TD-SCDMA Power Measurement Guide

Agilent Technologies PSA Series

Option 211

This manual provides documentation for the following instruments:
Spectrum Analyzers:
E4440A (3 Hz – 26.5 GHz)
E4443A (3 Hz – 6.7 GHz)
E4445A (3 Hz – 13.2 GHz)
E4446A (3 Hz – 44.0 GHz)
E4447A (3 Hz – 42.98 GHz)
E4448A (3 Hz – 50.0 GHz)

Manufacturing Part Number: E4440-90622
Supersedes E4440-90340

Printed in USA

June 2008

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Contents

1. Introduction

What Does the Agilent PSA Series and Option 211 Do? . . . 24
Installing Optional Measurement Personalities . . . 26
Do You Have Enough Memory to Load All Your Personality Options? . . . 26
How to Predict Your Memory Requirements . . . 28
Measurement Personality Options and Memory Required . . . 28
Memory Upgrade Kits . . . 30
Loading an Optional Measurement Personality . . . 30
Obtaining and Installing a License Key . . . 30
Viewing a License Key . . . 31
Using the Delete License Key on PSA . . . 31
Ordering Optional Measurement Personalities . . . 32

2. Making Measurements

TD-SCDMA Measurements . . . 34
Setting up and Making a Measurement . . . 35
Making the Initial Signal Connection . . . 35
Using Instrument Mode and Measurement Presets . . . 35
The 3 Steps to Set Up and Make Measurements . . . 36
Preparing for Measurements . . . 37
Initial Setup . . . 37
Transmit Power Measurement . . . 38
One-Button BTS Measurement Procedure . . . 38
Measurement Results . . . 39
Troubleshooting Hints . . . 43
Power Versus Time Measurement . . . 44
One-Button BTS Measurement Procedure . . . 44
Measurement Results . . . 46
Troubleshooting Hints . . . 48
ACP (ACLR) Measurement . . . 49
One-Button MS Measurement Procedure . . . 49
Measurement Results . . . 50
Troubleshooting Hints . . . 52
Multi-Carrier Power Measurement . . . 53
One-Button BTS Measurement Procedure . . . 53
Measurement Results . . . 54
Troubleshooting Hints . . . 56
Spurious Emissions Measurement . . . 57
One-Button MS Measurement Procedure . . . 57
Measurement Results . . . 59
Troubleshooting Hints . . . 59
Spectrum Emission Mask (SEM) Measurement . . . 60
One-Button MS Measurement Procedure . . . 60
Measurement Results . . . 61
Troubleshooting Hints . . . 63
Occupied Bandwidth Measurement . . . 64
One-Button MS Measurement Procedure . . . 64
Measurement Results . . . 66

Contents

Troubleshooting Hints. . . . 67
Using Basic Mode 68
Basic Mode in PSA Series Spectrum Analyzers 68

3. Key and SCPI Reference

Instrument Front Panel Highlights 70
Common Functionality. . . . 72
Mode Switching 72
Mode Selection on Power On/Preset 72
TD-SCDMA Mode Entry 72
TD-SCDMA Mode Exit 72
Mode Menu. . . . 72
Remote Control. . . . 73
Mode Setup Menu 74
Radio Menu. . . . 74
Input Functions 74
Trigger Functions 78
Sweep Functions 80
Screen Layout Details. . . . 85
Annunciators. . . . 85
Next Window / Zoom Front-panel keys 86
UI Integration with Base Instrument 88
Parameter Types 88
Status Reporting 89
STATus Subsystem 90
Other Common Menus 91
File/Save Functions. . . . 91
Frequency Functions. . . . 91
Span Functions 95
Markers 95
FORMat Subsystem 95
Byte Order. . . . 95
Trace Data Format 96
Measurement Display Availability 97
Measurements. . . . 98
Measure Menu 98
Restart Measurement 98
Continuous vs. Single Measurement Mode 98
Pause / Resume Measurement 98
Single Front-panel key 99
Remote Control. . . . 99
Transmit Power 105
Measurement Setup. . . . 105
Meas Setup Menu 105
Marker Functions 111
Amplitude / Y Scale 113
Restore Meas Defaults 114
Restart Parameters 114
Measurement Results 114

Contents

Transmit Power . . . 114
Max Pt (Current) . . . 114
Min Pt (Current) . . . 114
Mean Transmit Pwr (Current) . . . 114
Burst Width . . . 115
Results . . . 115
Results Screen . . . 115
Results File . . . 117
Status Bar Messages . . . 118
SCPI Remote Commands . . . 119
Power vs Time . . . 120
Measurement Setup . . . 120
Meas Setup Menu . . . 120
Display Functions . . . 128
Marker Functions . . . 130
Span / X Scale Menu . . . 132
Amplitude / Y Scale . . . 133
Query the Pass/Fail state . . . 134
Restart Parameters . . . 134
Restore Meas Defaults . . . 135
Results . . . 135
Measurement Results . . . 135
Results Screen . . . 137
Zoomed Results Screen . . . 137
Results File . . . 138
Status Bar Messages . . . 139
SCPI Remote Commands . . . 139
Adjacent Channel Power Ratio (ACPR) . . . 142
Measurement Setup . . . 142
Meas Setup Menu . . . 142
Query the Pass/Fail state . . . 153
Restart Parameters . . . 153
Marker Menu . . . 153
Span / X Scale Menu . . . 153
Amplitude / Y Scale . . . 154
Results . . . 155
Results Screens . . . 155
Results File . . . 156
SCPI Remote Commands . . . 160
Multi-Carrier Power (MCP) . . . 161
Measurement Setup . . . 161
Meas Setup Menu . . . 161
Query the Pass/Fail state . . . 176
Restart Parameters . . . 176
Marker Menu . . . 176
Span / X Scale Menu . . . 176
Amplitude / Y Scale . . . 176
Restore Meas Defaults . . . 177
Results . . . 177

Contents

Measurement Results . . . 177
Spectrum View . . . 179
Combined View . . . 180
Results File . . . 180
SCPI Remote Commands . . . 183
Spurious Emissions . . . 184
Measurement Setup . . . 184
Meas Setup Menu . . . 184
Range Table Description . . . 196
Marker Menu . . . 197
Span / X Scale Menu . . . 197
Amplitude / Y Scale Functions . . . 197
Couplings . . . 198
Query the Pass/Fail state . . . 198
Restart Parameters . . . 199
Restore Meas Defaults . . . 199
Results . . . 199
Meas Results File . . . 200
Status Bar Messages . . . 205
SCPI Remote Commands . . . 206
Spectrum Emissions Mask . . . 207
Measurement Setup . . . 207
Meas Setup Menu . . . 207
Query the Pass/Fail state . . . 222
Restart Parameters . . . 222
Display Menu . . . 222
Marker Functions . . . 222
Span / X Scale Menu . . . 224
Amplitude / Y Scale . . . 224
Restore Meas Defaults . . . 225
Results . . . 226
Meas Results File . . . 227
SCPI Remote Commands . . . 230
Occupied Bandwidth (OBW) . . . 235
Measurement Setup . . . 235
Meas Setup Menu . . . 235
Amplitude / Y Scale . . . 239
Query the Pass/Fail state . . . 241
Restart Parameters . . . 241
Results . . . 241
Results File . . . 241
SCPI Remote Commands . . . 243

4. Concepts

What Is the TD-SCDMA Communications System? . . . 246
Transmit Power Measurement Concepts . . . 249
Purpose . . . 249
Measurement Method . . . 249
Power Versus Time Measurement Concepts . . . 252

Contents

Purpose . . . 252
Measurement Method . . . 252
Adjacent Channel Power (ACP) Measurement Concepts . . . 254
Purpose . . . 254
Measurement Method . . . 254
Multi-carrier Power Measurement Concepts . . . 255
Purpose . . . 255
Measurement Method . . . 255
Results . . . 255
Spectrum Emissions Mask (SEM) Measurement Concepts . . . 258
Purpose . . . 258
Measurement Method . . . 258
Spurious Emissions Measurement Concepts . . . 259
Purpose . . . 259
Making the Measurement . . . 259
Occupied Bandwidth (OBW) Measurement Concepts . . . 261
Purpose . . . 261
Making the Measurement . . . 261
Other Sources of Measurement Information . . . 262
Instrument Updates at www.agilent.com . . . 262

5. Menu Maps

Amplitude Y Scale Key . . . 264
Frequency Channel Key . . . 265
Input/Output Key . . . 266
MEASURE Key . . . 267
Meas Control Key . . . 268
Menus for Setting Up Measurements . . . 269
Transmit Power Measurement Meas Setup Key . . . 269
Transmit Power Measurement Trace/View Key . . . 270
Power vs Time Measurement Meas Setup Key . . . 271
Power vs Time Measurement Trace/View Key . . . 272
Power vs Time Measurement Display Key . . . 273
Adjacent Channel Power—ACP Measurement Meas Setup Key . . . 274
Adjacent Channel Power—ACP Measurement Trace/View Key . . . 275
Multi-Carrier Power—MCP Measurement Meas Setup Key . . . 276
Multi-Carrier Power—MCP Measurement Trace/View Key . . . 277
Spectrum Emission Mask—SEM Measurement Meas Setup Key . . . 278
Spectrum Emission Mask—SEM Measurement Trace/View Key . . . 279
Spurious Emissions—Spurs Measurement Meas Setup Key . . . 280
Occupied BW—OBW Measurement Meas Setup Key . . . 281
Occupied BW—OBW Measurement Trace/View Key . . . 282
Mode Key . . . 283
Mode Setup Key . . . 284
Sweep Key . . . 285
Trigger Key . . . 286
Marker Key . . . 287

Contents

:CALCulate:ACP:OFFSet[1]|2:LIST:ABSolute <ampl>,... 150
:CALCulate:ACP:OFFSet[1]|2:LIST:ABSolute? 150
:CALCulate:ACP:OFFSet[1]|2:LIST:RCARrier <rel_ampl>,... 151
:CALCulate:ACP:OFFSet[1]|2:LIST:RCARrier? 151
:CALCulate:ACP:OFFSet[1]|2:LIST:RPSDensity <rel_ampl>,... 152
:CALCulate:ACP:OFFSet[1]|2:LIST:RPSDensity? 152
:CALCulate:CLIMits:FAIL? 134
:CALCulate:CLIMits:FAIL? 153
:CALCulate:CLIMits:FAIL? 176
:CALCulate:CLIMits:FAIL? 198
:CALCulate:CLIMits:FAIL? 222
:CALCulate:CLIMits:FAIL? 241
:CALCulate:MCPower:CARRier[1]|2:LIST:RCARrier <rel_ampl>,... 167
:CALCulate:MCPower:CARRier[1]|2:LIST:RCARrier? 167
:CALCulate:MCPower:OFFSet[1]|2:LIST:ABSolute 172
:CALCulate:MCPower:OFFSet[1]|2:LIST:RCARrier <rel_ampl>,... 173
:CALCulate:MCPower:OFFSet[1]|2:LIST:RCARrier? 173
:CALCulate:PVTime:MARKer[1]|2|3|4:AOFF 130
:CALCulate:PVTime:MARKer[1]|2|3|4:MODE DELT|OFF|POS 130
:CALCulate:PVTime:MARKer[1]|2|3|4:MODE? 130
:CALCulate:PVTime:MARKer[1]|2|3|4:X <time> 131
:CALCulate:PVTime:MARKer[1]|2|3|4:X? 131
:CALCulate:PVTime:MARKer[1]|2|3|4:Y? 131
:CALCulate:PVTime:MARKer[1]|2|3|4[:STATe] ON|OFF|1|0 131
:CALCulate:PVTime:MARKer[1]|2|3|4[:STATe]? 131
:CALCulate:SEMask:MARKer[1]|2|3|4:AOFF 222
:CALCulate:SEMask:MARKer[1]|2|3|4:MODE DELTa|OFF|POSition 223
:CALCulate:SEMask:MARKer[1]|2|3|4:MODE? 223
:CALCulate:SEMask:MARKer[1]|2|3|4:X <freq> 224
:CALCulate:SEMask:MARKer[1]|2|3|4:X? 224
:CALCulate:SEMask:MARKer[1]|2|3|4:Y? 224

:CALCulate:SEMask:MARKer[1]|2|3|4[:STATe] ON|OFF|1|0 . . . 223
:CALCulate:SEMask:MARKer[1]|2|3|4[:STATe]? . . . 223
:CALCulate:SPURious[:RANGe[1]]|:RANGe2[:LIST]:LIMit:ABSolute[:UPPer]:DATA:STOP <ampl>,. 194
:CALCulate:SPURious[:RANGe[1]]|:RANGe2[:LIST]:LIMit:ABSolute[:UPPer]:DATA:STOP:AUTO ON |OFF|1|0 . . . 194
:CALCulate:SPURious[:RANGe[1]]|:RANGe2[:LIST]:LIMit:ABSolute[:UPPer]:DATA:STOP:AUTO? 194
:CALCulate:SPURious[:RANGe[1]]|:RANGe2[:LIST]:LIMit:ABSolute[:UPPer]:DATA:STOP? . . . 194
:CALCulate:SPURious[:RANGe[1]]|:RANGe2[:LIST]:LIMit:ABSolute[:UPPer]:DATA[:STARt] <ampl>,. . . . 193
:CALCulate:SPURious[:RANGe[1]]|:RANGe2[:LIST]:LIMit:ABSolute[:UPPer]:DATA[:STARt]? . . . 193
:CALCulate:TXPower:MARKer[1]|2|3|4:AOFF . . . 111
:CALCulate:TXPower:MARKer[1]|2|3|4:MODE DELT|OFF|POS . . . 111
:CALCulate:TXPower:MARKer[1]|2|3|4:MODE? . . . 111
:CALCulate:TXPower:MARKer[1]|2|3|4:X <time> . . . 112
:CALCulate:TXPower:MARKer[1]|2|3|4:X? . . . 112
:CALCulate:TXPower:MARKer[1]|2|3|4:Y? . . . 112
:CALCulate:TXPower:MARKer[1]|2|3|4[:STATe] ON|OFF|1|0 . . . 111
:CALCulate:TXPower:MARKer[1]|2|3|4[:STATe]? . . . 111
:CONFigure:ACP . . . 103
:CONFigure:MCPower . . . 103
:CONFigure:OBWidth . . . 104
:CONFigure:PVTime . . . 103
:CONFigure:SEMask . . . 104
:CONFigure:SPURious . . . 104
:CONFigure:TXPower . . . 103
:CONFigure? . . . 102
:DISPlay:ACP:WINDow:TRACe:Y[:SCALe]:PDIVision <rel_ampl> . . . 154
:DISPlay:ACP:WINDow:TRACe:Y[:SCALe]:PDIVision? . . . 154
:DISPlay:ACP:WINDow:TRACe:Y[:SCALe]:RLEVel <ampl> . . . 154
:DISPlay:ACP:WINDow:TRACe:Y[:SCALe]:RLEVel? . . . 154
:DISPlay:FORMat:TILE . . . 86
:DISPlay:FORMat[:SELect] <integer> . . . 87

:DISPlay:MCPower:WINDow:TRACe:Y[:SCALe]:PDIVision <rel_ampl> . . . 176
:DISPlay:MCPower:WINDow:TRACe:Y[:SCALe]:PDIVision? . . . 176
:DISPlay:MCPower:WINDow:TRACe:Y[:SCALe]:RLEVel <ampl> . . . 177
:DISPlay:MCPower:WINDow:TRACe:Y[:SCALe]:RLEVel? . . . 177
:DISPlay:OBWidth:WINDow:TRACe:Y:SCALe:PDIVision <rel_ampl> . . . 240
:DISPlay:OBWidth:WINDow:TRACe:Y:SCALe:PDIVision? . . . 240
:DISPlay:OBWidth:WINDow:TRACe:Y[:SCALe]:RLEVel <real> . . . 240
:DISPlay:OBWidth:WINDow:TRACe:Y[:SCALe]:RLEVel? . . . 240
:DISPlay:PVTime:BLINes[:STATe] ON|OFF|1|0 . . . 129
:DISPlay:PVTime:BLINes[:STATe]? . . . 129
:DISPlay:PVTime:LIMit:MASK ON|OFF|1|0 . . . 128
:DISPlay:PVTime:LIMit:MASK:DELay <time> . . . 127
:DISPlay:PVTime:LIMit:MASK:DELay? . . . 127
:DISPlay:PVTime:LIMit:MASK? . . . 128
:DISPlay:PVTime:RAMP[:STATe] ON|OFF|1|0 . . . 130
:DISPlay:PVTime:RAMP[:STATe]? . . . 130
:DISPlay:PVTime:TRIGger[:STATe] ON|OFF|1|0 . . . 129
:DISPlay:PVTime:TRIGger[:STATe]? . . . 129
:DISPlay:PVTime:WINDow:TRACe:Y[:SCALe]:PDIVision <rel_ampl> . . . 133
:DISPlay:PVTime:WINDow:TRACe:Y[:SCALe]:PDIVision? . . . 133
:DISPlay:PVTime:WINDow:TRACe:Y[:SCALe]:RLEVel <ampl> . . . 134
:DISPlay:PVTime:WINDow:TRACe:Y[:SCALe]:RLEVel? . . . 134
:DISPlay:SEMask:WINDow:TRACe:Y[:SCALe]:PDIVision <rel_ampl> . . . 225
:DISPlay:SEMask:WINDow:TRACe:Y[:SCALe]:PDIVision? . . . 225
:DISPlay:SEMask:WINDow:TRACe:Y[:SCALe]:RLEVel <ampl> . . . 225
:DISPlay:SEMask:WINDow:TRACe:Y[:SCALe]:RLEVel? . . . 225
:DISPlay:SPURious:WINDow:TRACe:Y[:SCALe]:PDIVision <rel_ampl> . . . 197
:DISPlay:SPURious:WINDow:TRACe:Y[:SCALe]:PDIVision? . . . 197
:DISPlay:SPURious:WINDow:TRACe:Y[:SCALe]:RLEVel <ampl> . . . 198
:DISPlay:SPURious:WINDow:TRACe:Y[:SCALe]:RLEVel? . . . 198
:DISPlay:TXPower:WINDow:TRACe:Y[:SCALe]:PDIVision <rel_ampl> . . . 113

:DISPlay:TXPower:WINDow:TRACe:Y[:SCALe]:PDIVision? . . . 113
:DISPlay:TXPower:WINDow:TRACe:Y[:SCALe]:RLEVel <ampl> . . . 113
:DISPlay:TXPower:WINDow:TRACe:Y[:SCALe]:RLEVel? . . . 113
:FORMat[:TRACe][:DATA] ASC,8|REAL,32|REAL,64 . . . 96
:FORMat[:TRACe][:DATA]? . . . 96
:INITiate:ACP . . . 101
:INITiate:CONTinuous ON|OFF|1|0 . . . 99
:INITiate:CONTinuous? . . . 99
:INITiate:MCPower . . . 101
:INITiate:OBWidth . . . 102
:INITiate:PAUSe . . . 99
:INITiate:PVTime . . . 100
:INITiate:RESTart . . . 100
:INITiate:RESume . . . 99
:INITiate:SEMask . . . 102
:INITiate:SPURious . . . 101
:INITiate:TXPower . . . 101
:INITiate[:IMMediate] . . . 100
:INSTrument:NSELect 1|211 . . . 73
:INSTrument:NSELect? . . . 73
:INSTrument[:SELect] SA|TDSCDMA . . . 73
:INSTrument[:SELect]? . . . 73
:MMEMory:STORe:RESults <‘filename’> . . . 241
:TRIGger[:SEQuence]:EXTernal[1]|2:DELay <time> . . . 79
:TRIGger[:SEQuence]:EXTernal[1]|2:DELay? . . . 79
:TRIGger[:SEQuence]:EXTernal[1]|2:SLOPe NEGative|POSitive . . . 79
:TRIGger[:SEQuence]:EXTernal[1]|2:SLOPe? . . . 79
:TRIGger[:SEQuence]:RFBurst:DELay <time> . . . 78
:TRIGger[:SEQuence]:RFBurst:DELay? . . . 78
:TRIGger[:SEQuence]:RFBurst:SLOPe NEGative|POSitive . . . 79
:TRIGger[:SEQuence]:RFBurst:SLOPe? . . . 79

[:SENSe]:ACP:AVERage:COUNt <integer> . . . 142
[:SENSe]:ACP:AVERage:COUNt? . . . 142
[:SENSe]:ACP:AVERage:TCONtrol EXPonential|REPeat . . . 142
[:SENSe]:ACP:AVERage:TCONtrol? . . . 142
[:SENSe]:ACP:AVERage[:STATe] ON|OFF|1|0 . . . 142
[:SENSe]:ACP:AVERage[:STATe]? . . . 142
[:SENSe]:ACP:BANDwidth|BWIDth[:INTegration] <bandwidth> . . . 143
[:SENSe]:ACP:BANDwidth|BWIDth[:INTegration]? . . . 143
[:SENSe]:ACP:CARRier:AUTO[:STATe] ON|OFF|1|0 . . . 144
[:SENSe]:ACP:CARRier:AUTO[:STATe]? . . . 144
[:SENSe]:ACP:CARRier:CPSD <ampl> . . . 145
[:SENSe]:ACP:CARRier:CPSD? . . . 145
[:SENSe]:ACP:CARRier[:POWer] <ampl> . . . 144
[:SENSe]:ACP:CARRier[:POWer]? . . . 144
[:SENSe]:ACP:CORRection:NOISe[:AUTO] ON|OFF|1|0 . . . 143
[:SENSe]:ACP:CORRection:NOISe[:AUTO]? . . . 143
[:SENSe]:ACP:FILTer[:RRC]:ALPHa <real> . . . 146
[:SENSe]:ACP:FILTer[:RRC]:ALPHa? . . . 146
[:SENSe]:ACP:FILTer[:RRC][:STATe] ON|OFF|1|0 . . . 146
[:SENSe]:ACP:FILTer[:RRC][:STATe]? . . . 146
[:SENSe]:ACP:LIMit[:STATe] ON|OFF|1|0 . . . 145
[:SENSe]:ACP:LIMit[:STATe]? . . . 145
[:SENSe]:ACP:OFFSet:LIST:BANDwidth|BWIDth[:INTegration] <bandwidth>,... . . . 150
[:SENSe]:ACP:OFFSet:LIST:BANDwidth|BWIDth[:INTegration]? . . . 150
[:SENSe]:ACP:OFFSet:LIST[:FREQuency] <freq>,... . . . 149
[:SENSe]:ACP:OFFSet:LIST[:FREQuency]? . . . 149
[:SENSe]:ACP:OFFSet:LIST[:STATe] ON|OFF|1|0,... . . . 149
[:SENSe]:ACP:OFFSet:LIST[:STATe]? . . . 149
[:SENSe]:ACP:OFFSet[1]|2:LIST:TEST ABSolute|RELative|AND|OR,... . . . 152
[:SENSe]:ACP:OFFSet[1]|2:LIST:TEST? . . . 152
[:SENSe]:ACP:TRIGger:SOURce IMM|RFBurst|EXT[1]|EXT2 . . . 147

[:SENSe]:ACP:TYPE TPRef|PSDRef . . . 147
[:SENSe]:ACP:TYPE? . . . 147
[:SENSe]:CHANnel:BURSt TRAFfic|DPTS|UPTS . . . 93
[:SENSe]:CHANnel:BURSt? . . . 93
[:SENSe]:CHANnel:SLOT <integer> . . . 94
[:SENSe]:CHANnel:SLOT? . . . 94
[:SENSe]:CORRection:BTS[:RF]:LOSS <rel_ampl> . . . 77
[:SENSe]:CORRection:BTS[:RF]:LOSS? . . . 77
[:SENSe]:CORRection:MS[:RF]:LOSS <rel_ampl> . . . 77
[:SENSe]:CORRection:MS[:RF]:LOSS? . . . 77
[:SENSe]:FEED AREF|RF . . . 74
[:SENSe]:FEED? . . . 74
[:SENSe]:FREQuency:BAND:STARt <freq> . . . 92
[:SENSe]:FREQuency:BAND:STARt? . . . 92
[:SENSe]:FREQuency:BAND:STOP <freq> . . . 92
[:SENSe]:FREQuency:BAND:STOP? . . . 92
[:SENSe]:FREQuency[:CENTer] <freq> . . . 91
[:SENSe]:FREQuency[:CENTer]:STEP:AUTO ON|OFF|1|0 . . . 93
[:SENSe]:FREQuency[:CENTer]:STEP:AUTO? . . . 93
[:SENSe]:FREQuency[:CENTer]:STEP[:INCRement] <freq> . . . 93
[:SENSe]:FREQuency[:CENTer]:STEP[:INCRement]? . . . 93
[:SENSe]:FREQuency[:CENTer]? . . . 91
[:SENSe]:MCPower:AVERage:COUNt <integer> . . . 161
[:SENSe]:MCPower:AVERage:COUNt? . . . 161
[:SENSe]:MCPower:AVERage:TCONtrol EXPonential|REPeat . . . 161
[:SENSe]:MCPower:AVERage:TCONtrol? . . . 161
[:SENSe]:MCPower:AVERage[:STATe] ON|OFF|1|0 . . . 161
[:SENSe]:MCPower:AVERage[:STATe]? . . . 161
[:SENSe]:MCPower:CARRier:AUTO[:STATe] ON|OFF|1|0 . . . 174
[:SENSe]:MCPower:CARRier:AUTO[:STATe]? . . . 174
[:SENSe]:MCPower:CARRier:COUNt <integer> . . . 163

[:SENSe]:MCPower:CARRier:COUNt? . . . 163
[:SENSe]:MCPower:CARRier:LIST:BANDwidth|BWIDth[:INTegration] <bandwidth>,. . . 166
[:SENSe]:MCPower:CARRier:LIST:BANDwidth|BWIDth[:INTegration]? . . . 166
[:SENSe]:MCPower:CARRier:LIST:PPResent YES|NO,. . . 164
[:SENSe]:MCPower:CARRier:LIST:PPResent? . . . 164
[:SENSe]:MCPower:CARRier:LIST:WIDTh <bandwidth>,. . . 165
[:SENSe]:MCPower:CARRier:LIST:WIDTh? . . . 165
[:SENSe]:MCPower:CARRier[:POWer] <ampl> . . . 174
[:SENSe]:MCPower:CARRier[:POWer]? . . . 174
[:SENSe]:MCPower:CORRection:NOISe[:AUTO] ON|OFF|1|0 . . . 175
[:SENSe]:MCPower:CORRection:NOISe[:AUTO]? . . . 175
[:SENSe]:MCPower:FILTer[:RRC]:ALPHa <real> . . . 175
[:SENSe]:MCPower:FILTer[:RRC]:ALPHa? . . . 175
[:SENSe]:MCPower:FILTer[:RRC][:STATe] ON|OFF|1|0 . . . 175
[:SENSe]:MCPower:FILTer[:RRC][:STATe]? . . . 175
[:SENSe]:MCPower:LIMit[:STATe] ON|OFF|1|0 . . . 170
[:SENSe]:MCPower:LIMit[:STATe]? . . . 170
[:SENSe]:MCPower:OFFSet:LIST:BANDwidth|BWIDth[:INTegration] <bandwidth>,. . . 171
[:SENSe]:MCPower:OFFSet:LIST:BANDwidth|BWIDth[:INTegration]? . . . 171
[:SENSe]:MCPower:OFFSet:LIST[:FREQuency] <freq>,. . . 171
[:SENSe]:MCPower:OFFSet:LIST[:FREQuency]? . . . 171
[:SENSe]:MCPower:OFFSet[1]|2:LIST:TEST ABSolute|RELative|AND|OR,. . . 173
[:SENSe]:MCPower:OFFSet[1]|2:LIST:TEST? . . . 173
[:SENSe]:MCPower:RCARrier <integer> . . . 168
[:SENSe]:MCPower:RCARrier:AUTO ON|OFF|1|0 . . . 168
[:SENSe]:MCPower:RCARrier:AUTO? . . . 168
[:SENSe]:MCPower:RCARrier? . . . 168
[:SENSe]:MCPower:RCFRequency <freq> . . . 169
[:SENSe]:MCPower:RCFRequency:AUTO ON|OFF|1|0 . . . 169
[:SENSe]:MCPower:RCFRequency:AUTO? . . . 169
[:SENSe]:MCPower:RCFRequency? . . . 169

[:SENSe]:MCPower:TRIGger:SOURce IMM|RFBurst|EXT[1]|EXT2 . . . 162
[:SENSe]:MCPower:TRIGger:SOURce? . . . 162
[:SENSe]:OBWidth:AVERage:COUNt <integer> . . . 235
[:SENSe]:OBWidth:AVERage:COUNt? . . . 235
[:SENSe]:OBWidth:AVERage:TCONtrol REPeat|EXPonential . . . 235
[:SENSe]:OBWidth:AVERage:TCONtrol? . . . 235
[:SENSe]:OBWidth:AVERage[:STATe] ON|OFF|1|0 . . . 235
[:SENSe]:OBWidth:AVERage[:STATe]? . . . 235
[:SENSe]:OBWidth:BANDwidth:RESolution <bandwidth> . . . 239
[:SENSe]:OBWidth:BANDwidth:RESolution? . . . 239
[:SENSe]:OBWidth:FREQuency:SPAN <bandwidth> . . . 236
[:SENSe]:OBWidth:FREQuency:SPAN? . . . 236
[:SENSe]:OBWidth:MAXHold ON|OFF|0|1 . . . 236
[:SENSe]:OBWidth:MAXHold? . . . 236
[:SENSe]:OBWidth:PERCent <real> . . . 236
[:SENSe]:OBWidth:PERCent? . . . 236
[:SENSe]:OBWidth:SWEep:POINts <integer> . . . 239
[:SENSe]:OBWidth:SWEep:POINts? . . . 239
[:SENSe]:OBWidth:TRIGger:SOURce IMM|RFB|EXT[1]|EXT2 . . . 237
[:SENSe]:OBWidth:TRIGger:SOURce? . . . 237
[:SENSe]:OBWidth:XDB <real> . . . 237
[:SENSe]:OBWidth:XDB? . . . 237
[:SENSe]:POWer[:RF]:ATTenuation <rel_ampl> . . . 76
[:SENSe]:POWer[:RF]:ATTenuation? . . . 76
[:SENSe]:POWer[:RF]:GAIN[:STATe] ON|OFF|1|0 . . . 78
[:SENSe]:POWer[:RF]:GAIN[:STATe]? . . . 78
[:SENSe]:POWer[:RF]:RANGe:AUTO ON|OFF|1|0 . . . 75
[:SENSe]:POWer[:RF]:RANGe:AUTO? . . . 75
[:SENSe]:PVTime:AVERage:COUNt <integer> . . . 120
[:SENSe]:PVTime:AVERage:COUNt? . . . 120
[:SENSe]:PVTime:AVERage:TCONtrol EXPonential|REPeat . . . 120

[:SENSe]:PVTime:AVERage:TCONtrol? . . . 120
[:SENSe]:PVTime:AVERage:TYPE LOG|RMS . . . 121
[:SENSe]:PVTime:AVERage:TYPE? . . . 121
[:SENSe]:PVTime:AVERage[:STATe] ON|OFF|1|0 . . . 120
[:SENSe]:PVTime:AVERage[:STATe]? . . . 120
[:SENSe]:PVTime:MASK:LIST:LOWer:ABSolute <ampl>,... . . . 122
[:SENSe]:PVTime:MASK:LIST:LOWer:ABSolute? . . . 122
[:SENSe]:PVTime:MASK:LIST:LOWer:POINts? . . . 123
[:SENSe]:PVTime:MASK:LIST:LOWer:RELative <rel_ampl>,... . . . 124
[:SENSe]:PVTime:MASK:LIST:LOWer:RELative? . . . 124
[:SENSe]:PVTime:MASK:LIST:LOWer:TIME <time>,... . . . 124
[:SENSe]:PVTime:MASK:LIST:LOWer:TIME? . . . 124
[:SENSe]:PVTime:MASK:LIST:UPPer:ABSolute <ampl>,... . . . 125
[:SENSe]:PVTime:MASK:LIST:UPPer:ABSolute? . . . 125
[:SENSe]:PVTime:MASK:LIST:UPPer:POINts? . . . 126
[:SENSe]:PVTime:MASK:LIST:UPPer:RELative <rel_ampl>,... . . . 126
[:SENSe]:PVTime:MASK:LIST:UPPer:RELative? . . . 126
[:SENSe]:PVTime:MASK:LIST:UPPer:TIME <time>,... . . . 127
[:SENSe]:PVTime:MASK:LIST:UPPer:TIME? . . . 127
[:SENSe]:PVTime:MASK:SELect CUSTom|STANdard . . . 122
[:SENSe]:PVTime:MASK:SELect? . . . 122
[:SENSe]:PVTime:SWEep:TIME <integer> . . . 121
[:SENSe]:PVTime:SWEep:TIME? . . . 121
[:SENSe]:PVTime:TRIGger:SOURce RFB|EXT[1]|EXT2 . . . 128
[:SENSe]:PVTime:TRIGger:SOURce? . . . 128
[:SENSe]:PVTime:XSCale:XPDivision <time> . . . 132
[:SENSe]:PVTime:XSCale:XPDivision? . . . 132
[:SENSe]:PVTime:XSCale:XRPosition LEFT|CENTER|RIGHT . . . 133
[:SENSe]:PVTime:XSCale:XRPosition? . . . 133
[:SENSe]:PVTime:XSCale:XRValue <time> . . . 132
[:SENSe]:PVTime:XSCale:XRValue? . . . 132

[:SENSe]:RADio:DEVice BTS|MS 74
[:SENSe]:RADio:DEVice? 74
[:SENSe]:SEMask:AVERage:COUNt <integer> 207
[:SENSe]:SEMask:AVERage:COUNt? 207
[:SENSe]:SEMask:AVERage[:STATe] ON|OFF|1|0 207
[:SENSe]:SEMask:AVERage[:STATe]? 207
[:SENSe]:SEMask:BANDwidth|BWIDth:INTegration <bandwidth> 208
[:SENSe]:SEMask:BANDwidth|BWIDth:INTegration? 208
[:SENSe]:SEMask:BANDwidth|BWIDth[:RESolution] <bandwidth> 209
[:SENSe]:SEMask:BANDwidth|BWIDth[:RESolution]:AUTO ON|OFF|1|0 209
[:SENSe]:SEMask:BANDwidth|BWIDth[:RESolution]:AUTO? 209
[:SENSe]:SEMask:BANDwidth|BWIDth[:RESolution]? 209
[:SENSe]:SEMask:CARRier:AUTO[:STATe] ON|OFF|1|0 210
[:SENSe]:SEMask:CARRier:AUTO[:STATe]? 210
[:SENSe]:SEMask:CARRier[:POWer] <ampl> 210
[:SENSe]:SEMask:CARRier[:POWer]? 210
[:SENSe]:SEMask:FILTer[:RRC]:ALPHa <real> 221
[:SENSe]:SEMask:FILTer[:RRC]:ALPHa? 221
[:SENSe]:SEMask:FILTer[:RRC][:STATe] ON|OFF|1|0 220
[:SENSe]:SEMask:FILTer[:RRC][:STATe]? 220
[:SENSe]:SEMask:FREQuency:SPAN <bandwidth> 208
[:SENSe]:SEMask:FREQuency:SPAN? 208
[:SENSe]:SEMask:LIMits STD|MAN 207
[:SENSe]:SEMask:LIMits? 207
[:SENSe]:SEMask:OFFSet[1]|2:LIST:BANDwidth|BWIDth:IMULti <integer>,... 214
[:SENSe]:SEMask:OFFSet[1]|2:LIST:BANDwidth|BWIDth:IMULti? 214
[:SENSe]:SEMask:OFFSet[1]|2:LIST:BANDwidth|BWIDth[:RESolution] <bandwidth>,... 213
[:SENSe]:SEMask:OFFSet[1]|2:LIST:BANDwidth|BWIDth[:RESolution]:AUTO ON|OFF|1|0 213
[:SENSe]:SEMask:OFFSet[1]|2:LIST:BANDwidth|BWIDth[:RESolution]:AUTO? 213
[:SENSe]:SEMask:OFFSet[1]|2:LIST:BANDwidth|BWIDth[:RESolution]? 213
[:SENSe]:SEMask:OFFSet[1]|2:LIST:FREQuency:STARt <freq>,... 211

[:SENSe]:SEMask:OFFSet[1]|2:LIST:FREQuency:STARt? . . . 211
[:SENSe]:SEMask:OFFSet[1]|2:LIST:FREQuency:STOP <freq>,... . . . 212
[:SENSe]:SEMask:OFFSet[1]|2:LIST:FREQuency:STOP? . . . 212
[:SENSe]:SEMask:OFFSet[1]|2:LIST:STARt:ABSolute <ampl>,... . . . 215
[:SENSe]:SEMask:OFFSet[1]|2:LIST:STARt:ABSolute? . . . 215
[:SENSe]:SEMask:OFFSet[1]|2:LIST:STARt:RCARrier <rel_ampl>,... . . . 217
[:SENSe]:SEMask:OFFSet[1]|2:LIST:STARt:RCARrier? . . . 217
[:SENSe]:SEMask:OFFSet[1]|2:LIST:STATe ON|OFF . . . 211
[:SENSe]:SEMask:OFFSet[1]|2:LIST:STATe? . . . 211
[:SENSe]:SEMask:OFFSet[1]|2:LIST:STOP:ABSolute <ampl>,... . . . 216
[:SENSe]:SEMask:OFFSet[1]|2:LIST:STOP:ABSolute:COUPle ON|OFF|1|0 . . . 216
[:SENSe]:SEMask:OFFSet[1]|2:LIST:STOP:ABSolute:COUPle? . . . 216
[:SENSe]:SEMask:OFFSet[1]|2:LIST:STOP:ABSolute? . . . 216
[:SENSe]:SEMask:OFFSet[1]|2:LIST:STOP:RCARrier <rel_ampl>,... . . . 217
[:SENSe]:SEMask:OFFSet[1]|2:LIST:STOP:RCARrier:COUPle ON|OFF|1|0 . . . 217
[:SENSe]:SEMask:OFFSet[1]|2:LIST:STOP:RCARrier:COUPle? . . . 217
[:SENSe]:SEMask:OFFSet[1]|2:LIST:STOP:RCARrier? . . . 217
[:SENSe]:SEMask:OFFSet[1]|2:LIST:SWEeptime <time>,... . . . 213
[:SENSe]:SEMask:OFFSet[1]|2:LIST:SWEeptime:AUTO ON|OFF|1|0 . . . 213
[:SENSe]:SEMask:OFFSet[1]|2:LIST:SWEeptime:AUTO? . . . 213
[:SENSe]:SEMask:OFFSet[1]|2:LIST:SWEeptime? . . . 213
[:SENSe]:SEMask:OFFSet[1]|2:LIST:TEST Absolute|Relative|AND|OR,... . . . 219
[:SENSe]:SEMask:OFFSet[1]|2:LIST:TEST? . . . 219
[:SENSe]:SEMask:SIDE POS|BOTH|NEG . . . 221
[:SENSe]:SEMask:SIDE? . . . 221
[:SENSe]:SEMask:SWEeptime <time> . . . 209
[:SENSe]:SEMask:SWEeptime:AUTO ON|OFF|1|0 . . . 209
[:SENSe]:SEMask:SWEeptime:AUTO? . . . 209
[:SENSe]:SEMask:SWEeptime? . . . 209
[:SENSe]:SEMask:TRIGger:SOURce IMM|RFB|EXT[1]|EXT2 . . . 219
[:SENSe]:SEMask:TRIGger:SOURce? . . . 219

[:SENSe]:SPURious:AVERage:COUNt <integer> . . . 184
[:SENSe]:SPURious:AVERage:COUNt? . . . 184
[:SENSe]:SPURious:AVERage:TCONtrol EXPonential|REPeat . . . 184
[:SENSe]:SPURious:AVERage:TCONtrol? . . . 184
[:SENSe]:SPURious:AVERage[:STATe] ON|OFF|1|0. . . . 184
[:SENSe]:SPURious:AVERage[:STATe]? . . . 184
[:SENSe]:SPURious:FSMeas ON|OFF|1|0 . . . 186
[:SENSe]:SPURious:FSMeas?. . . . 186
[:SENSe]:SPURious:TYPE EXAMine | FULL . . . 186
[:SENSe]:SPURious:TYPE? . . . 186
[:SENSe]:SPURious[:RANGe[1]]|:RANGe2[:LIST]:STATe ON|OFF|1|0,... . . . 187
[:SENSe]:SPURious[:RANGe[1]]|:RANGe2[:LIST]:STATe? . . . 187
[:SENSe]:SPURious[:RANGe][:LIST]:BANDwidth|BWIDth:VIDeo <bandwidth>,... . . . 191
[:SENSe]:SPURious[:RANGe][:LIST]:BANDwidth|BWIDth:VIDeo:AUTO ON |OFF|1|0 . . . 191
[:SENSe]:SPURious[:RANGe][:LIST]:BANDwidth|BWIDth:VIDeo:AUTO? . . . 191
[:SENSe]:SPURious[:RANGe][:LIST]:BANDwidth|BWIDth:VIDeo? . . . 191
[:SENSe]:SPURious[:RANGe][:LIST]:BANDwidth|BWIDth[:RESolution] <bandwidth>,... . . . 190
[:SENSe]:SPURious[:RANGe][:LIST]:BANDwidth|BWIDth[:RESolution]:AUTO ON |OFF|1|0 . . . 190
[:SENSe]:SPURious[:RANGe][:LIST]:BANDwidth|BWIDth[:RESolution]:AUTO? . . . 190
[:SENSe]:SPURious[:RANGe][:LIST]:BANDwidth|BWIDth[:RESolution]? . . . 190
[:SENSe]:SPURious[:RANGe][:LIST]:FREQuency:STARt <freq>,... . . . 188
[:SENSe]:SPURious[:RANGe][:LIST]:FREQuency:STARt?. . . . 188
[:SENSe]:SPURious[:RANGe][:LIST]:FREQuency:STOP <freq>,... . . . 189
[:SENSe]:SPURious[:RANGe][:LIST]:FREQuency:STOP? . . . 189
[:SENSe]:SPURious[:RANGe][:LIST]:PEAK:EXCursion <rel_ampl>,... . . . 195
[:SENSe]:SPURious[:RANGe][:LIST]:PEAK:EXCursion? . . . 195
[:SENSe]:SPURious[:RANGe][:LIST]:PEAK:THReshold . . . 196
[:SENSe]:SPURious[:RANGe][:LIST]:SWEep:TIME <time>. . . . 192
[:SENSe]:SPURious[:RANGe][:LIST]:SWEep:TIME:AUTO ON |OFF|1|0 . . . 192
[:SENSe]:SPURious[:RANGe][:LIST]:SWEep:TIME:AUTO? . . . 192
[:SENSe]:SPURious[:RANGe][:LIST]:SWEep:TIME? . . . 192

[:SENSe]:SWEep:EGATe:DELay <time> . . . 81
[:SENSe]:SWEep:EGATe:DELay? . . . 81
[:SENSe]:SWEep:EGATe:EXTernal[1]:LEVel <voltage> . . . 84
[:SENSe]:SWEep:EGATe:EXTernal[1]? . . . 84
[:SENSe]:SWEep:EGATe:EXTernal2:LEVel <voltage> . . . 84
[:SENSe]:SWEep:EGATe:EXTernal2:LEVel? . . . 84
[:SENSe]:SWEep:EGATe:LENGth <time> . . . 83
[:SENSe]:SWEep:EGATe:LENGth? . . . 83
[:SENSe]:SWEep:EGATe:POLarity NEGative|POSitive . . . 81
[:SENSe]:SWEep:EGATe:POLarity? . . . 81
[:SENSe]:SWEep:EGATe:SOURce EXT[1]|EXT2|RFB . . . 83
[:SENSe]:SWEep:EGATe:SOURce? . . . 83
[:SENSe]:SWEep:EGATe[:STATe] ON|OFF|1|0 . . . 80
[:SENSe]:SWEep:EGATe[:STATe]? . . . 80
[:SENSe]:SYNC:BURSt:STHReshold <rel_ampl> . . . 80
[:SENSe]:SYNC:BURSt:STHReshold? . . . 80
[:SENSe]:TXPower:AVERage:COUNt <integer> . . . 105
[:SENSe]:TXPower:AVERage:COUNt? . . . 105
[:SENSe]:TXPower:AVERage:TCONtrol EXPonential|REPeat . . . 105
[:SENSe]:TXPower:AVERage:TCONtrol? . . . 105
[:SENSe]:TXPower:AVERage:TYPE LOG|RMS . . . 106
[:SENSe]:TXPower:AVERage:TYPE? . . . 106
[:SENSe]:TXPower:AVERage[:STATe] ON|OFF|1|0 . . . 105
[:SENSe]:TXPower:AVERage[:STATe]? . . . 105
[:SENSe]:TXPower:BURSt:AUTO ON|OFF|1|0 . . . 110
[:SENSe]:TXPower:BURSt:AUTO? . . . 110
[:SENSe]:TXPower:BURSt:WIDTh <time> . . . 110
[:SENSe]:TXPower:BURSt:WIDTh? . . . 110
[:SENSe]:TXPower:METHod BWIDth|THReshold . . . 107
[:SENSe]:TXPower:METHod? . . . 107
[:SENSe]:TXPower:SWEep:TIME <integer> . . . 109

[:SENSe]:TXPower:SWEep:TIME? 109
[:SENSe]:TXPower:THReshold <real>. 107
[:SENSe]:TXPower:THReshold:TYPE ABSolute|RELative 107
[:SENSe]:TXPower:THReshold:TYPE? 107
[:SENSe]:TXPower:THReshold? 107
[:SENSe]:TXPower:TRIGger:SOURce IMM|RFB|EXT[1]|EXT2 108
DISPlay:FORMat:ZOOM 87
FORMat:BORDer NORM|SWAP 95
FORMat:BORDer? 95

1 Introduction

This chapter provides overall information on the TD-SCDMA communications system and describes TD-SCDMA measurements made by the analyzer. For further information, a list of associated documents is also provided.

What Does the Agilent PSA Series and Option 211 Do?

The PSA series spectrum analyzer offers comprehensive RF measurement capabilities. The TD-SCDMA (Time Division Synchronous Code Domain Multiple Access) measurement personality provides a suite of standard-based measurements, including one-button power measurements, to provide the most comprehensive and easy-to-use TD-SCDMA measurement solution in one analyzer, and to help you evaluate margins and trade-offs in your design performance, efficiency, and cost.

TD-SCDMA is a wireless multiple access technology, which combines aspects of code division multiple access (CDMA) and time division multiple access (TDMA). Making standard-based measurements presents unique challenges and requirements. The PSA series TD-SCDMA measurement personality provides a one-analyzer solution to perform essential power measurements on complex TD-SCDMA signals so that you can:

- Facilitate the design, development, and deployment of TD-SCDMA systems
- Expand design possibilities with powerful measurement capability and flexibility
- Expedite troubleshooting and design verification with numerous features and an intuitive user interface
- Simplify test systems with RF power measurements, spur searches, and general high-performance spectrum analysis in one analyzer

You can test a TD-SCDMA transmitter manufactured according to CWTS TSM standards documents. These documents define complex, multi-part measurements used to create and maintain an interference-free environment. For example, the documents include standardized test methods for the measurement of power in a carrier, a spectrum emission mask, and other critical measurements.

You can use the PSA with Option 211 to automatically make these measurements using the measurement methods and limits defined in the CWTS TSM standards documents. You may perform measurements on both uplink and downlink signals. The measurements display detailed results that allow you to analyze TD-SCDMA system performance. You may alter the measurement parameters for specialized analysis.

For infrastructure test, the instrument will test transmitters of base stations in a non-interfering manner by means of a coupler or power splitter. For subscriber unit test, mobiles may be measured by way of a splitter or coupler when the mobile is actively linked to a base station or base station simulator. An alternate method of mobile measurement requires that the mobile be placed in a special test mode.

Using the PSA and Option 211, you can make the following measurements of TD-SCDMA signals:

- "Transmit Power Measurement" on page 38
- "Power Versus Time Measurement" on page 44
- "ACP (ACLR) Measurement" on page 49
- "Multi-Carrier Power Measurement" on page 53
- "Spurious Emissions Measurement" on page 57
- "Spectrum Emission Mask (SEM) Measurement" on page 60
- "Occupied Bandwidth Measurement" on page 64

Installing Optional Measurement Personalities

When you install a measurement personality, you need to follow a three step process:

1. Determine whether your memory capacity is sufficient to contain all the options you want to load. If not, decide which options you want to install now, and consider upgrading your memory. Details follow in "Do You Have Enough Memory to Load All Your Personality Options?" on page 26.
2. Install the measurement personality firmware into the instrument memory. Details follow in "Loading an Optional Measurement Personality" on page 30.
3. Enter a license key that activates the measurement personality. Details follow in "Obtaining and Installing a License Key" on page 30.

Adding measurement personalities requires the purchase of an upgrade kit for the desired option. The upgrade kit contains the measurement personality firmware and an entitlement certificate that is used to generate a license key from the internet website. A separate license key is required for each option on a specific instrument serial number and host ID.

For the latest information on Agilent Spectrum Analyzer options and upgrade kits, visit the following web location:

http://www.agilent.com/find/sa_upgrades

Do You Have Enough Memory to Load All Your Personality Options?

If you do not have memory limitations then you can skip ahead to the next section "Loading an Optional Measurement Personality" on page 30. If after installing your options you get error messages relating to memory issues, you can return to this section to learn more about how to optimize your configuration.

If you have 64 MBytes of memory installed in your instrument, you should have enough memory to install at least four optional personalities, with plenty of memory for data and states.

The optional measurement personalities require different amounts of memory. So the number of personalities that you can load varies. This is also impacted by how much data you need to save. If you are having memory errors you must swap the applications in or out of memory as needed. If you only have 48 MBytes of memory, you can upgrade your hardware to 64 MBytes.

Additional memory can be added to any PSA Series analyzer by installing Option 115. With this option installed, you can install all currently available measurement personalities in your analyzer and still have memory space to store more state and trace files than would otherwise be possible.

To see the size of your installed memory for PSA Series Spectrum Analyzers:

1. Ensure that the spectrum analyzer is in spectrum analyzer mode because this

can affect the screen size.

2. Press **System**, **Show System**. Under Options look for 115.
3. Press **System**, **More**, **Show Hdwr**.
4. Read `Flash Memory` size in the table.

PSA Flash Memory Size	Available Memory Without Option B7J and Option 122 or 140	Available Memory With Option B7J and Option 122 or 140
64 Mbytes	32.5 MBytes	30.0 MBytes
48 Mbytes	16.9 MBytes	14.3 MBytes

PSA Compact Flash Memory Size	Available Additional Memory for Measurement Personalities
512 Mbytes (Opt. 115)	512 MBytes

If you have 48 MBytes of memory, and you want to install more than 3 optional personalities, you may need to manage your memory resources. The following section, "How to Predict Your Memory Requirements" on page 28, will help you decide how to configure your installed options to provide optimal operation.

How to Predict Your Memory Requirements

If you plan to install many optional personalities, you should review your memory requirements, so you can determine whether you have enough memory (unless you have a PSA Series with Option 115). There is an Agilent "Memory Calculator" available online that can help you do this, or you can make a calculated approximation using the information that follows. You will need to know your instrument's installed memory size as determined in the previous section and then select your desired applications.

NOTE If you have a PSA Series analyzer with Option 115, there is adequate memory to install all of the available optional personalities in your instrument.

To calculate the available memory on your PSA, see:
http://sa.tm.agilent.com/PSA/memory/

Select the "Memory Calculator" link. You can try any combination of available personalities to see if your desired configuration is compatible with your installed memory.

NOTE After loading all your optional measurement personalities, you should have a reserve of ~2 MBytes memory to facilitate mode switching. Less available memory will increase mode switching time. For example, if you employ excessive free memory by saving files of states and/or data, your mode switching time can increase to more than a minute.

You can manually estimate your total memory requirements by adding up the memory allocations described in the following steps. Compare the desired total with the available memory that you identified in the previous section.

1. Program memory - Select option requirements from the table "Measurement Personality Options and Memory Required" on page 28.
2. Shared libraries require 7.72 MBytes.
3. The recommended mode swap space is 2 MBytes.
4. Screens - .gif files need 20-25 kBytes each.
5. State memory - State file sizes range from 21 kB for SA mode to 40 kB for W-CDMA. The state of every mode accessed since power-on will be saved in the state file. File sizes can exceed 150 kB each when several modes are accessed, for each state file saved.

TIP State memory retains settings for all states accessed before the **Save State** command. To reduce this usage to a minimum, reduce the modes accessed before the **Save State** is executed. You can set the PSA to boot into a selected mode by accessing the desired mode, then pressing the **System**, **Power On/Preset**, **Power On** keys and toggle the setting to **Last**.

Measurement Personality Options and Memory Required

Personality Options for PSA Series Spectrum Analyzers [a]	Option	File Size (PSA Rev: A.10)
cdmaOne measurement personality	**BAC**	1.91 Mbytes
NADC and PDC measurement personalities (not available separately)	**BAE**	2.43 Mbytes
W-CDMA or W-CDMA, HSDPA, HSUPA measurement personality	**BAF**, **210**	5.38 Mbytes[b]
cdma2000 or cdma2000 w/ 1xEV-DV measurement personality	**B78**, **214**	4.00 Mbytes[b]
1xEV-DO measurement personality	**204**	5.61 Mbytes[b]
GSM (with EDGE) measurement personality	**202**	3.56 Mbytes[b]
Shared measurement library[b]	n/a	7.72 Mbytes
Phase Noise measurement personality	**226**	2.82 Mbytes[c]
Noise Figure measurement personality	**219**	4.68 Mbytes[c]
Basic measurement personality with digital demod hardware	**B7J**	Cannot be deleted (2.64 Mbytes)
Programming Code Compatibility Suite[d] (8560 Series, 8590 Series, and 8566/8568)	**266**	1.18 Mbytes[c]
TD-SCDMA Power measurement personality	**211**	5.47 Mbytes[c]
TD-SCDMA Modulation Analysis or TD-SCDMA Modulation Analysis w/ HSDPA/8PSK measurement personality	**212, 213**	1.82 Mbytes
Flexible Digital Modulation Analysis	**241**	2.11 Mbytes[b]
WLAN measurement personality	**217**	3.24 Mbytes[b]
External Source Control	**215**	0.72 Mbytes[c]
Measuring Receiver Personality (available with Option 23A - Trigger support for AM/FM/PM and Option 23B - CCITT filter)	**233**	2.91 Mbytes[b]
EMC Analyzer	**239**	4.06 Mbytes[b]

a. Available as of the print date of this guide.
b. Many PSA Series personality options use a 7.72 Mbyte shared measurement library. If you are loading multiple personalities that use this library, you only need to add this memory allocation once.
c. Shared measurement library allocation not required.
d. This is a no charge option that does not require a license key.

Memory Upgrade Kits

The PSA 64 MByte Memory Upgrade kit part number is E4440AU-ANE. The PSA Compact Flash Upgrade kit part number is E4440AU-115.

For more information about memory upgrade kits contact your local sales office, service office, or see:
http://www.agilent.com/find/sa_upgrades

Loading an Optional Measurement Personality

You must use a PC to load the desired personality option into the instrument memory. Loading can be done from a firmware CD-ROM or by downloading the update program from the internet. An automatic loading program comes with the files and runs from your PC.

You can check the Agilent internet website for the latest PSA firmware versions available for downloading:
http://www.agilent.com/find/psa_firmware

NOTE When you add a new option, or update an existing option, you will get the updated versions of all your current options as they are all reloaded simultaneously. This process may also require you to update the instrument core firmware so that it is compatible with the new option.

Depending on your installed hardware memory, you may not be able to fit all of the available measurement personalities in instrument memory at the same time. You may need to delete an existing option file from memory and load the one you want. Use the automatic update program that is provided with the files. Refer to the table showing "Measurement Personality Options and Memory Required" on page 28. The approximate memory requirements for the options are listed in this table. These numbers are worst case examples. Some options share components and libraries, therefore the total memory usage of multiple options may not be exactly equal to the combined total.

Obtaining and Installing a License Key

If you purchase an optional personality that requires installation, you will receive an "Entitlement Certificate" which may be redeemed for a license key specific to one instrument. Follow the instructions that accompany the certificate to obtain your license key.

To install a license key for the selected personality option, use the following procedure:

NOTE You can also use this procedure to reinstall a license key that has been deleted during an uninstall process, or lost due to a memory failure.

1. Press **System**, **More**, **More**, **Licensing**, **Option** to accesses the alpha editor. Use this alpha editor to enter letters (upper-case), and the front-panel numeric keys to enter numbers for the option designation. You will validate your option entry in the active function area of the display. Then, press the **Enter** key.
2. Press **License Key** to enter the letters and digits of your license key. You will validate your license key entry in the active function area of the display. Then, press the **Enter** key.
3. Press the **Activate License** key.

Viewing a License Key

Measurement personalities purchased with your instrument have been installed and activated at the factory before shipment. The instrument requires a **License Key** unique to every measurement personality purchased. The license key is a hexadecimal number specific to your measurement personality, instrument serial number and host ID. It enables you to install, or reactivate that particular personality.

Use the following procedure to display the license key unique to your personality option that is already installed in your PSA:

Press **System**, **More**, **More**, **Licensing**, **Show License.** The **System**, **Personality** key displays the personalities loaded, version information, and whether the personality is licensed.

NOTE You will want to keep a copy of your license key in a secure location. Press **System**, **More**, then **Licensing**, **Show License**, and print out a copy of the display that shows the license numbers. If you should lose your license key, call your nearest Agilent Technologies service or sales office for assistance.

Using the Delete License Key on PSA

This key will make the option unavailable for use, but will not delete it from memory. Write down the 12-digit license key for the option before you delete it. If you want to use that measurement personality later, you will need the license key to reactivate the personality firmware.

NOTE Using the **Delete License** key does not remove the personality from the instrument memory, and does not free memory to be available to install another option. If you need to free memory to install another option, refer to the instructions for loading firmware updates located at the URL : **http://www.agilent.com/find/psa/**

1. Press **System**, **More**, **More**, **Licensing**, **Option**. Pressing the **Option** key will activate the alpha editor menu. Use the alpha editor to enter the letters (upper-case) and the front-panel numeric keyboard to enter the digits (if required) for the option, then press the **Enter** key. As you enter the option, you will see your entry in the active function area of the display.
2. Press **Delete License** to remove the license key from memory.

Ordering Optional Measurement Personalities

When you order a personality option, you will receive an entitlement certificate. You will need to go to the Web site to redeem your entitlement certificate for a license key. You will need to provide your instrument serial number and host ID, and the entitlement certificate number.

Required Information:	**Front Panel Key Path:**
Model #: (Ex. E4440A)	
Host ID: _____	**System**, **Show System**
Instrument Serial Number: _____	**System**, **Show System**

2 Making Measurements

This chapter introduces the basic features of the analyzer, including the front panel keys, and provides simplified procedures for making measurements on a TD-SCDMA BTS or MS.

TD-SCDMA Measurements

This chapter begins with instructions common to all measurements, and then details all TD-SCDMA measurements available by pressing the **MEASURE** key. For more information on front panel keys specific to this measurement personality refer to "Key and SCPI Reference" on page 69 and for keys not described in this manual, refer to the PSA *User's and Programmer's Reference* manual. For information specific to individual measurements refer to "Concepts" on page 245 or the sections at the page numbers below.

- "Transmit Power Measurement" on page 38
- "Power Versus Time Measurement" on page 44
- "ACP (ACLR) Measurement" on page 49
- "Multi-Carrier Power Measurement" on page 53
- "Spurious Emissions Measurement" on page 57
- "Spectrum Emission Mask (SEM) Measurement" on page 60
- "Occupied Bandwidth Measurement" on page 64

The measurements described in this chapter are referred to as one-button measurements. When you press the key to select one measurement, it becomes the active measurement, using settings and a display unique to that measurement. Data acquisition automatically begins when trigger requirements, if any, are met.

Setting up and Making a Measurement

Making the Initial Signal Connection

CAUTION	Before connecting a signal to the instrument, make sure the instrument can safely accept the signal level provided. The signal level limits are marked next to the connectors on the front panel.

See the menu map, "Input/Output Key" on page 266, and key descriptions, "Input Functions" on page 74, for details on selecting input ports and setting internal attenuation to prevent overloading the instrument

Using Instrument Mode and Measurement Presets

If you want to set your current measurement personality to a known, factory default state, press **Preset**. This initializes the instrument by returning the mode setup and all of the measurement setups in the mode to the factory default parameters.

NOTE	Pressing the **Preset** key may switch instrument modes if you have set the Power On/Preset function Preset Type to User or Factory.

To preset only the parameters that are specific to an active, selected measurement, press **Meas Setup**, then **Restore Meas Defaults**. Restore Meas Defaults will return all the measurement setup parameters to the factory defaults, but only for the currently selected measurement. This key may not appear on the first page of the Meas Setup menu. If it is not visible on the first page of the menu, press **More** until the key is available.

The 3 Steps to Set Up and Make Measurements

All measurements need to be set up in 3 steps: first at the Mode level, second at the Measurement level, then finally the result display may be adjusted.

1. Select and Set Up the Mode

   Press **MODE** - All licensed, installed Modes available are shown.
   Press **TD-SCDMA**, or to make measurements of signals with non-standard formats, select **Basic** mode.

   Press **Mode Setup** - Make any required adjustments to the mode settings. These settings apply to all measurement in the mode.

2. Select and Set Up the Measurement

   Press **MEASURE** - Select a specific measurement to be performed (for example, **ACP**, **Transmit Power**, or **Spectrum Emissions Mask**). The measurement begins as soon as any required trigger conditions are met. The resulting data is shown on the display or is available for export.

   Press **Meas Setup -** Make any adjustments as required to the selected measurement settings. The settings only apply to this measurement.

3. Select and Set Up a View of the Results

   Press **Trace/View** - Select a display format for the current measurement data. Depending on the mode and measurement selected, other graphical and tabular data presentations may be available. **Y-Scale** adjustments may also be made now.

NOTE A setting may be reset at any time, and will be in effect on the next measurement cycle or View.

Step	Primary Key	Setup Keys	Related Keys
1. Select & set up a Mode	**MODE**	**Mode Setup**, **Input/Output**, **FREQUENCY Channel**	**System**
2. Select & set up a Measurement	**MEASURE**	**Meas Setup**	**Meas Control**, **Restart**
3. Select & set up a View of the Results	**Trace/View**	**AMPLITUDE Y Scale**, **Display**, **Next Window**, **Zoom**	**File**, **Save**, **Print**, **Print Setup**, **Marker**

Preparing for Measurements

If you want to set your current measurement personality mode to a known, factory default state, ensure that the preset type is set to Mode, press **Preset**. This will initialize the instrument by setting the mode setup and all of the measurements to the factory default parameters. Often, you should be able to make a measurement using these defaults.

NOTE Pressing the **Preset** key may switch instrument modes if you have set the Power On/Preset function Preset Type to User or Factory.

To preset only the parameter settings that are specific to the selected measurement, press **Meas Setup** and **Restore Meas Defaults**. (The Restore Meas Defaults key may not appear on the first page of the menu. If not, press **More** until the key is available.) This will reset the measurement setup parameters, only for the currently selected measurement, to the factory defaults.

Initial Setup

Before activating a measurement, make sure the mode setup and frequency channel parameters are set to the desired settings. Refer to the sections "Mode Setup Key" on page 284 and "Frequency Channel Key" on page 265.

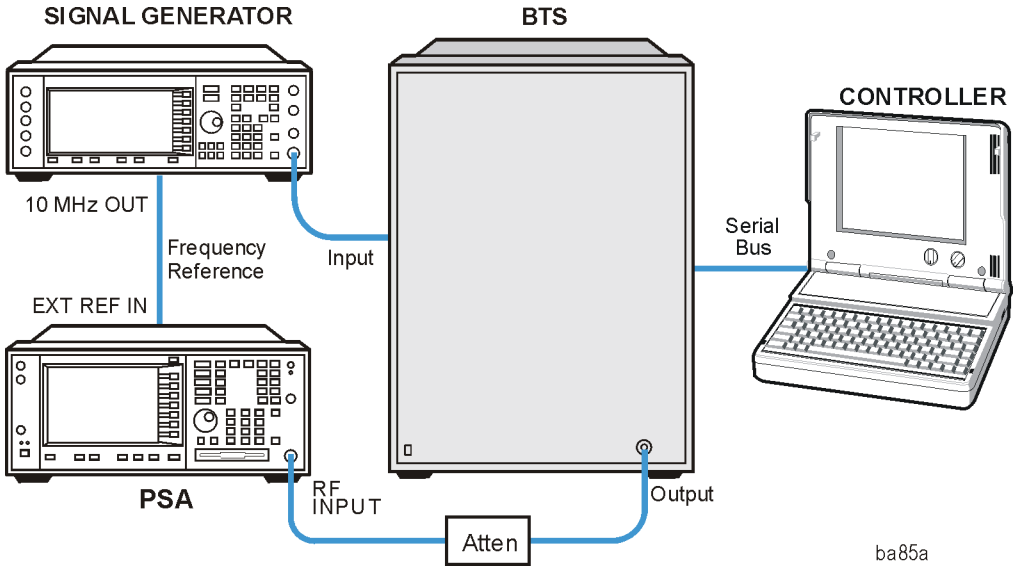
Transmit Power Measurement

One-Button BTS Measurement Procedure

Step 1. Configure the Device Under Test (DUT) as follows.

The base transmission station (BTS) under test has to be set to transmit the one RF carrier remotely through the system controller. This transmitting signal is connected to the instruments RF input port. Connect the equipment as shown.

Figure 2-1 Base Station Equipment Measurement System Setup



a. Using the appropriate cables and adapters, connect the modulated signal, using the proper radio standard, from the signal generator to the amplifier input connector of the BTS.

b. Connect the output signal of the BTS to the RF input port of the instrument, through the attenuator.

c. Connect a BNC cable between the 10 MHz OUT port of the signal generator and the EXT REF IN port of the instrument.

d. Connect the system controller to the BTS through the serial bus cable.

Step 2. From the system controller, perform all of the call acquisition functions required for the BTS to transmit the RF signal.

Step 3. Enable the TD-SCDMA measurement personality mode by pressing **MODE**, **TD-SCDMA**. (The desired mode key may not be on the first page of the menu. If not, press **More** until the key is available.)

Step 4. If you want to set the current measurement personality mode to a known, factory default state, ensure that the preset type is set to Mode, press **Preset**.

NOTE To preset only the parameter settings that are specific to the selected measurement, press **Meas Setup**, **Restore Meas Defaults**. (The Restore Meas Defaults key may not be on the first page of the menu. If not, press **More** until the key is available.)

Step 5. Toggle the device to **BTS** by pressing **Mode Setup**, **Radio**, **Device**.

Step 6. Set the desired center frequency by pressing **FREQUENCY Channel**, **Center Freq**, then use the numeric keypad to enter the frequency of interest.

Step 7. Select the measurement by pressing **MEASURE** and the **Transmit Power** key. (The desired measurement key may not be on the first page of the menu. If not, press **More** until the key is available.)

Depending on the current settings of **Meas Control**, the instrument will begin making the selected measurements. The resulting data will be shown on the display or available for export. For additional information on the measurement results for your selection, refer to "Measurement Results" on page 39

Step 8. You may need to change some of the display settings. These changes should not affect the measurement results, but will affect how you view the measurement results on the instrument display.

The **AMPLITUDE Y Scale** key accesses the menu to set the desired vertical scale and associated settings: **Scale/Div**, **Ref Level**.

Step 9. If you want to change the measurement parameters from their default condition so that you can make a customized measurement, press **Meas Setup** to see the available keys. For additional information on the use of the available keys and customizing your measurement, refer to "Transmit Power " on page 105. For additional information on the measurement concepts, refer to "Transmit Power Measurement Concepts" on page 249.

Measurement Results

Figure 2-2 shows an example of the Transmit Power measurement result with the measurement method set to measured burst width. The transmit power graph is shown in the graph window. The measured mean transmit power, current data minimum and maximum power points, full burst width, along with the amplitude threshold level used are shown in the text window.

Figure 2-2 Transmit Power—Measured Burst Width

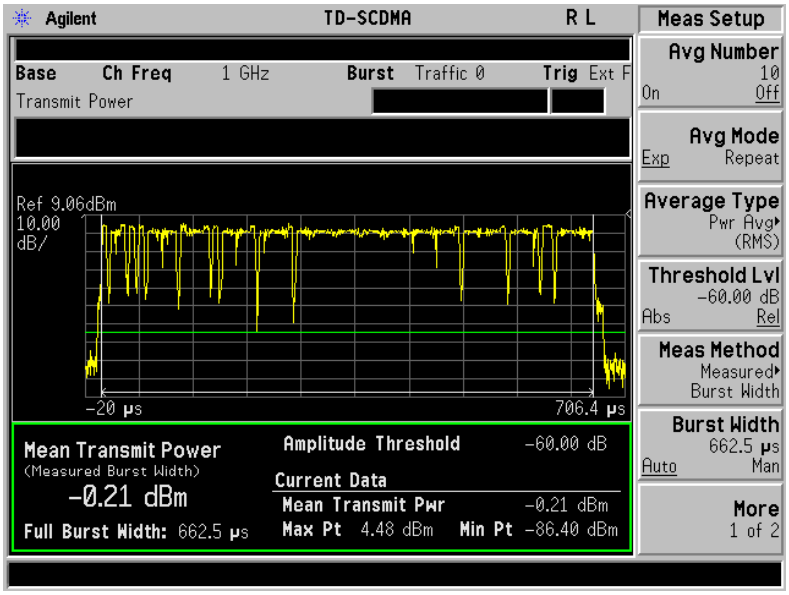


Figure 2-3 shows an example of the Transmit Power measurement result with the measurement method set to above threshold level. The transmit power graph is shown in the graph window. The measured mean transmit power, current data minimum and maximum power points, along with the amplitude threshold level used are shown in the text window.

Figure 2-4 shows an example of the Transmit Power measurement result with the measurement method set to single time slot. The transmit power graph is shown in the graph window. The measured mean transmit power, current data minimum and maximum power points, along with the amplitude threshold level used are shown in the text window.

- **Mean Transmit Power** - The mean transmit power result can be calculated using one of two methods:

  — When the Measure Method parameter is set to Above Threshold Level, all trace data points above the Threshold Lvl parameter value are averaged according to the selected Average Type parameter.

  — When the Measure Method parameter is set to Measured Burst Width, the trace data points that fall within the Burst Width are averaged according to the selected Average Type parameter. These data points are indicated on the screen as the region between the two white vertical lines.

  — When the Measure Method parameter is set to Signal Time Slot, the trace data points that fall with the time slot specified in the Frequency Channel menu are indicated on the screen as the region between the two green vertical lines.

  The result is averaged according to the Average Number, Average Mode, and Average Type parameter settings.

- **Max Pt.** - The max pt is current data, and therefore is based on the current trace, and not the averaged data. It gives the maximum trace point detected over the entire trace.

- **Min Pt.** - The min pt is current data, and therefore is based on the current trace, and not the averaged data. It gives the minimum trace point detected over the entire trace.
- **Full Burst Width** - The full burst width result is the time between the detected –6 dB start and stop points relative to the mean transmit power of the first detected “active” timeslot. This result metric is only available when the Measure Method parameter is set to Measured Burst Width.

  If no signal timeslots are determined to be “active”, all the screen results are unavailable (four dashed lines are shown).

NOTE It may be necessary to adjust the Threshold Lvl parameter located under the Meas Setup menu, to achieve reliable detection of the input signal active timeslots. Use of an inappropriate value for the Threshold Lvl parameter may result in all the screen results being unavailable (four dashed lines are shown).

- **Amplitude Threshold** - The relative or absolute value of the Threshold Lvl setup parameter is displayed on the screen, and represents the level of the green horizontal amplitude threshold line displayed in the graph window.

  In the Above Threshold Level measurement method, the Amplitude Threshold determines the level above which trace points will be included in the Mean Transmit Power result calculation.

  In the Measured Burst Width measurement method, the Amplitude Threshold determines the burst search threshold level to be used by the Transmit Power measurement in determining whether or not a signal timeslot is active or not.

Figure 2-3 Transmit Power—Above Threshold Level

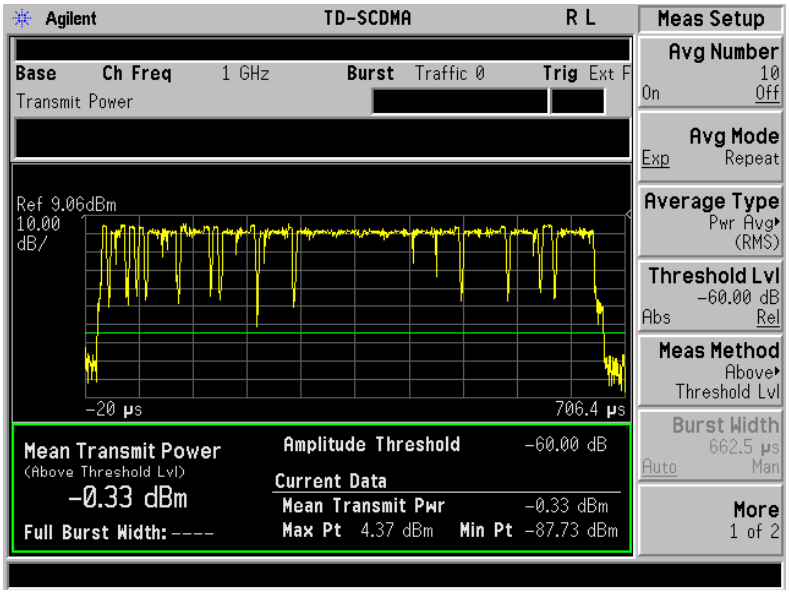


Figure 2-4 **Transmit Power—Single Time Slot**

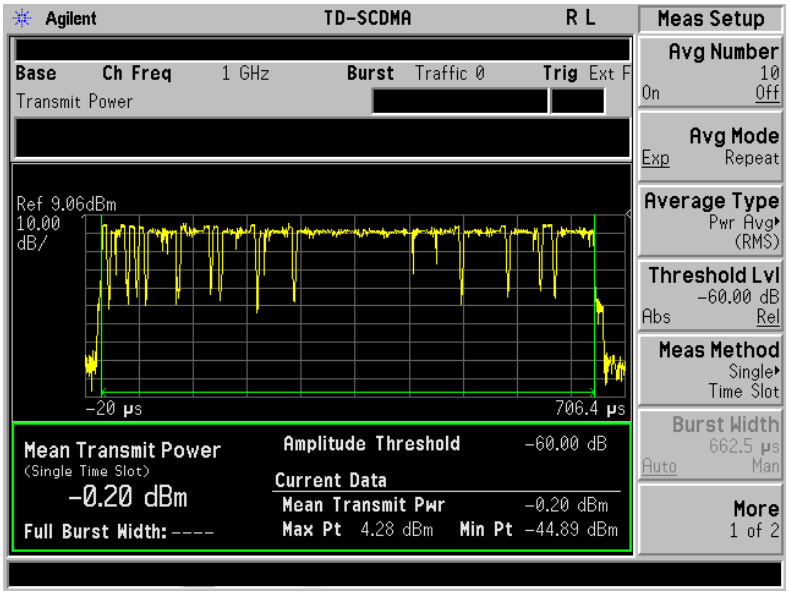


Figure 2-5 **Transmit Power—Meas Time = 1**

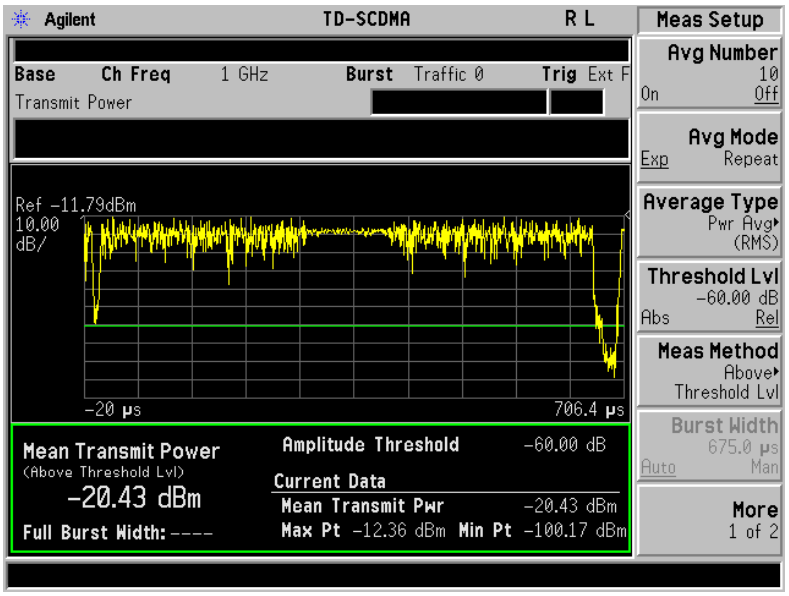
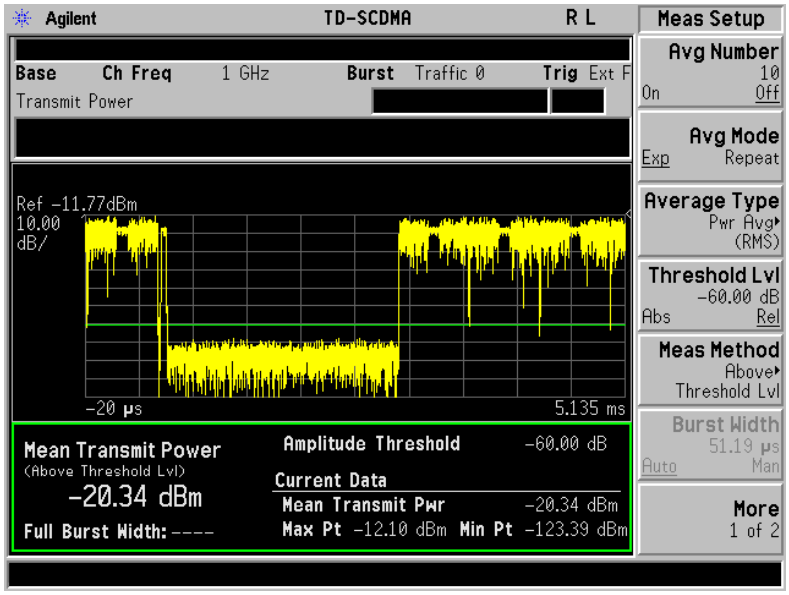


Figure 2-6 **Transmit Power—Meas Time = 9 Full Frame**



If you have a problem and get an error message, refer to the “Instrument Messages and Functional Tests” manual.

Troubleshooting Hints

Low output power can lead to poor coverage and intermittent service for phone users. Out of specification power measurements indicate a fault usually in the power amplifier circuitry. They can also provide early indication of a fault with the power supply, i.e. the battery in the case of mobile stations.

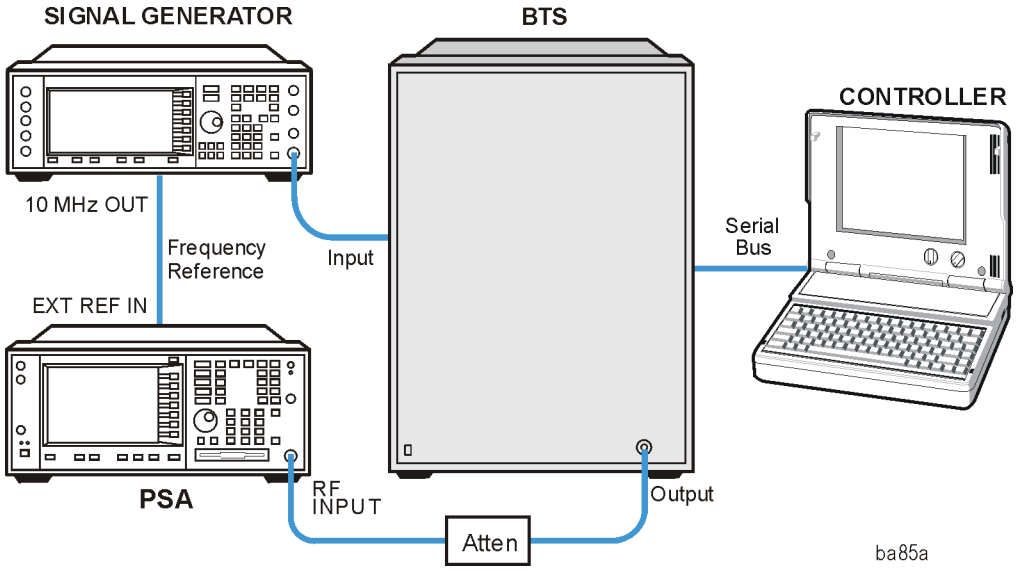
Power Versus Time Measurement

One-Button BTS Measurement Procedure

Step 1. Configure the Device Under Test (DUT) as follows.

The base transmission station (BTS) under test has to be set to transmit the one RF carrier remotely through the system controller. This transmitting signal is connected to the instruments RF input port. Connect the equipment as shown.

Figure 2-7 Base Station Equipment Measurement System Setup



a. Using the appropriate cables and adapters, connect the modulated signal, using the proper radio standard, from the signal generator to the amplifier input connector of the BTS.

b. Connect the output signal of the BTS to the RF input port of the instrument, through the attenuator.

c. Connect a BNC cable between the 10 MHz OUT port of the signal generator and the EXT REF IN port of the instrument.

d. Connect the system controller to the BTS through the serial bus cable.

Step 2. From the system controller, perform all of the call acquisition functions required for the BTS to transmit the RF signal.

Step 3. Enable the TD-SCDMA measurement personality mode by pressing **MODE**, **TD-SCDMA**. (The desired mode key may not be on the first page of the menu. If not, press **More** until the key is available.)

Step 4. If you want to set the current measurement personality mode to a known, factory default state, ensure that the preset type is set to Mode, press **Preset**.

NOTE To preset only the parameter settings that are specific to the selected measurement, press **Meas Setup**, **Restore Meas Defaults**. (The Restore Meas Defaults key may not be on the first page of the menu. If not, press **More** until the key is available.)

Step 5. Toggle the device to **BTS** by pressing **Mode Setup**, **Radio**, **Device**.

Step 6. Set the desired center frequency by pressing **FREQUENCY Channel**, **Center Freq**, then use the numeric keypad to enter the frequency of interest.

Step 7. Select the measurement by pressing **MEASURE** and the **Pwr vs Time** key. (The desired measurement key may not be on the first page of the menu. If not, press **More** until the key is available.)

Depending on the current settings of **Meas Control**, the instrument will begin making the selected measurements. The resulting data will be shown on the display or available for export. For additional information on the measurement results for your selection, refer to "Measurement Results" on page 46

Step 8. It may be necessary to adjust the external trigger Delay parameter located under the Trigger menu, to achieve reliable detection of the input signal active timeslots.

Proper adjustment of the external trigger delay can be achieved by ensuring the rise and fall edges of the input signal active timeslot align with the location of the two white vertical Burst Lines displayed in the graph window. These Burst Lines represent the theoretical expected location of the selected Burst Type and Traffic Slot parameters, when the external trigger event occurs at the start of each 5 msec frame.

Using an inappropriate value for the external trigger Delay parameter may result in both the Full Burst Width result being made unavailable (four dashed lines are shown) as well as an inappropriate Power vs Time limit mask being automatically created and applied resulting in a potential limit test FAIL.

Step 9. It may be necessary to adjust the Burst Search Threshold parameter located under the Trigger menu, to achieve reliable detection of the input signal active timeslots.

Use of an inappropriate value of the Burst Search Threshold parameter may result in both the Full Burst Width result being made unavailable (four dashed lines are shown) as well as an inappropriate Power vs Time limit mask being automatically created and applied resulting in a potential limit test FAIL.

Step 10. You may need to change some of the display settings. These changes should not affect the measurement results, but will affect how you view the measurement results on the instrument display.

The **AMPLITUDE Y Scale** key accesses the menu to set the desired vertical scale and associated settings: **Scale/Div** and **Ref Level**.

Step 11. If you want to change the measurement parameters from their default condition so that you can make a customized measurement, press **Meas Setup** to see the available keys. Then, for additional information on the use of the available keys and customizing your measurement, refer to "Power vs Time " on page 120. For additional information on the measurement concepts, refer to "Power Versus Time Measurement Concepts" on page 252.

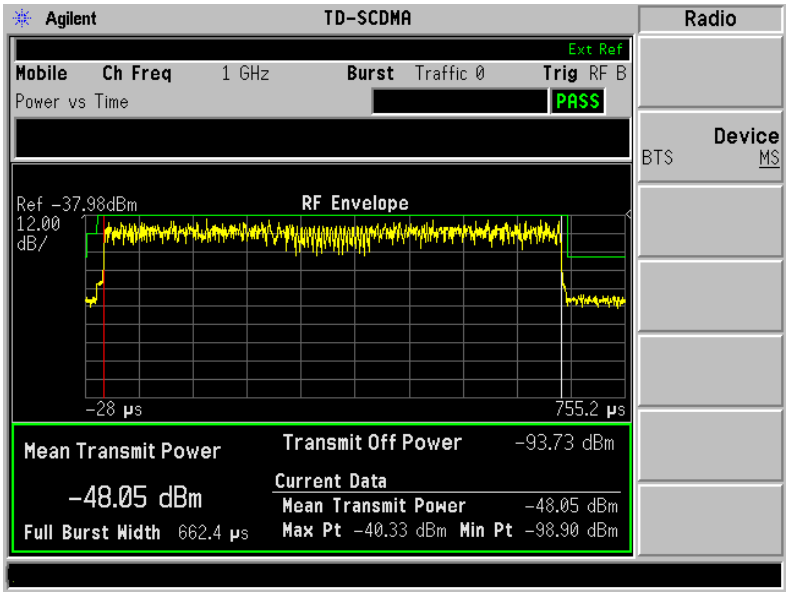
Measurement Results

The following figure shows an example of the results of `Power vs Time` measurement in the graph window. The measured mean transmit power, transmit off power, current data minimum and maximum power points, and full burst width are shown in the text window.

When the Auto RF Input Range parameter is set to On, the spectrum analyzer reference level and attenuator are set automatically.

For averaged measurements, you may specify the number of sweeps over which to average the result.

Figure 2-8 Power vs Time Measurement



Information shown in the data window of the displays include:

- **Mean Transmit Power** - The Mean Transmit Pwr result is measured over the transmission period of the selected Burst Type, which is indicated on screen as the region between the two white vertical lines displayed when the Burst Lines display parameter is enabled.

  The result is averaged according to the Average Number, Average Mode, and Average Type parameter settings.

- **Transmit Off Power** - The transmit off power result is measured in accordance with the TSM specification. It is a measure the average power of the BTS or MS output signal over the transmit off power period region starting 11 chips before the start of any “inactive” time slot, and ending 8 chips before any following “active” time slot. Also, if there are more than one “inactive” region, then the average power measurement is made over all “inactive” regions.

  The result is averaged according to the Average Number, Average Mode, and Average Type parameter settings.

  If all signal timeslots are determined to be “active”, the screen result is unavailable (four dashed lines are shown) and SCPI_ = 9.91E37 is returned for this result when the measurement results are queried remotely.

- **Max Pt.** - The max pt is current data, and therefore is based on the current trace, and not the averaged data. It gives the maximum trace point detected over the entire trace.

- **Min Pt.** - The min pt is current data, and therefore is based on the current trace, and not the averaged data. It gives the minimum trace point detected over the entire trace.

- **Full Burst Width** - The full burst width result is the time between the detected –3 dB start and stop points relative to the mean transmit power of the selected Burst Type timeslot.

  If the selected Burst Type signal timeslot is determined to be “inactive”, the screen result is unavailable (four dashed lines are shown) and SCPI_NAN = 9.91E37 is returned for this result when the measurement results are queried remotely.

Figure 2-9 Power vs Time—Meas Time = 1

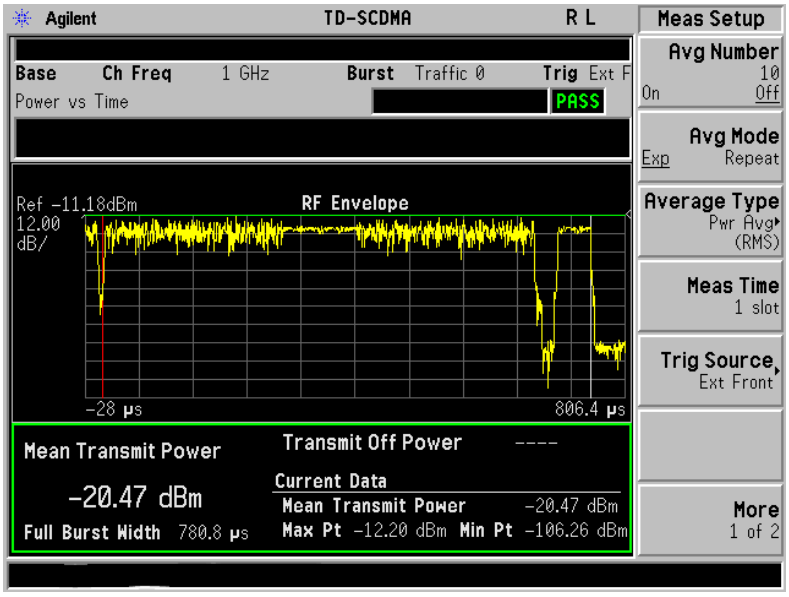
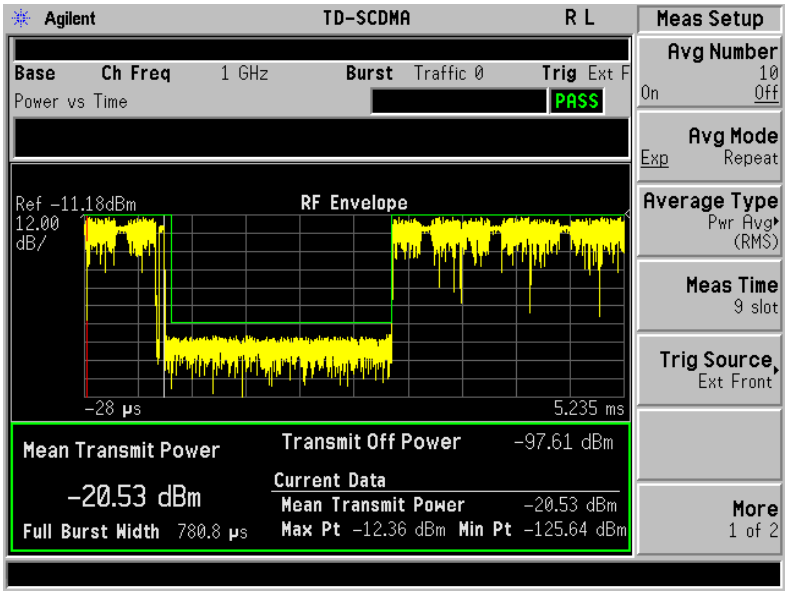


Figure 2-10 **Power vs Time—Meas Time = 9 Full Frame**



If you have a problem and get an error message, refer to the “Instrument Messages and Functional Tests” manual.

Troubleshooting Hints

If a transmitter fails the Power vs. Time measurement this usually indicates a problem with the units output amplifier or leveling loop.

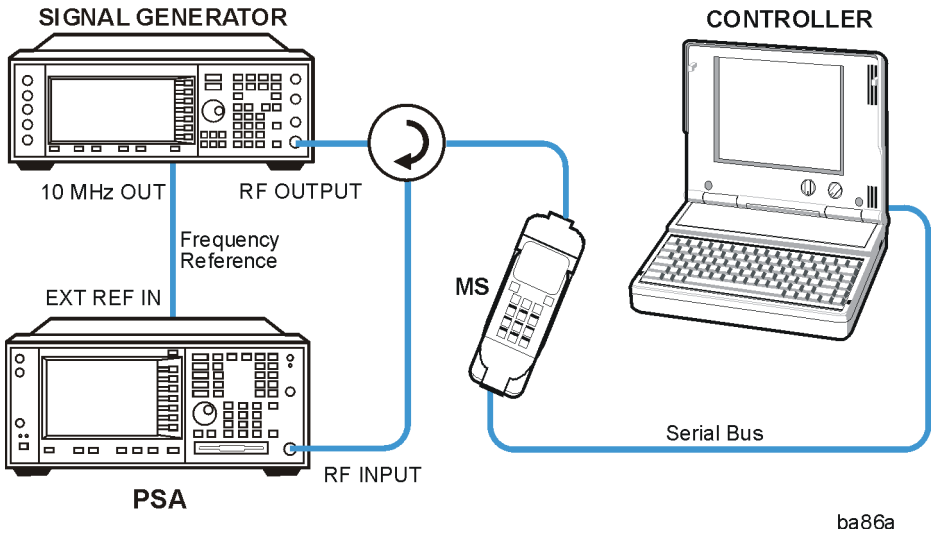
ACP (ACLR) Measurement

One-Button MS Measurement Procedure

Step 1. Configure the Device Under Test (DUT) as follows.

The mobile station (MS) under test has to be set to transmit the RF power remotely through the system controller. This transmitting signal is connected to the instruments RF input port. Connect the equipment as shown.

Figure 2-11 Mobile Station Equipment Measurement System Setup



a. Using the appropriate cables, adapters, and circulator, connect the output signal from the MS to the RF input port of the instrument.

b. Connect the base transmission station simulator or signal generator to the MS through the circulator to initiate a link constructed with the sync and pilot channels, if required.

c. Connect a BNC cable between the 10 MHz OUT port of the signal generator and the EXT REF IN port of the instrument.

d. Connect the system controller to the MS through the serial bus cable to control the MS operation.

Step 2. From the system controller, perform all of the call acquisition functions required for the MS to transmit the RF signal.

Step 3. Enable the TD-SCDMA measurement personality mode by pressing **MODE**, **TD-SCDMA**. (The desired mode key may not be on the first page of the menu. If not, press **More** until the key is available.)

Step 4. If you want to set the current measurement personality mode to a known, factory default state, ensure that the preset type is set to Mode, press **Preset**.

NOTE To preset only the parameter settings that are specific to the selected measurement, press **Meas Setup**, **Restore Meas Defaults**. (The Restore Meas Defaults key may not be on the first page of the menu. If not, press **More** until the key is available.)

Step 5. Toggle the device to **MS** by pressing **Mode Setup**, **Radio**, **Device**.

Step 6. Set the desired center frequency by pressing **FREQUENCY Channel** and **Center Freq**, then use the numeric keypad to enter the frequency of interest.

Step 7. Start your measurement by pressing **MEASURE** and the **ACP** key. (The desired measurement key may not be on the first page of the menu. If not, press **More** until the key is available.)

Depending on the current settings of **Meas Control**, the instrument will begin making the selected measurements. The resulting data will be shown on the display or available for export. For additional information on the measurement results for your selection, refer to "Measurement Results" on page 50

Step 8. You may need to change some of the display settings. These changes should not affect the measurement results, but will affect how you view the measurement results on the instrument display.

The **AMPLITUDE Y Scale** key accesses the menu to set the desired vertical scale and associated settings: **Scale/Div** and **Ref Level**.

Step 9. Depending on the mode and measurement you have selected, various graphical and tabular presentations are available. To set the display presentation you need, press **Trace/View** and select the desired presentation from the menu list displayed.

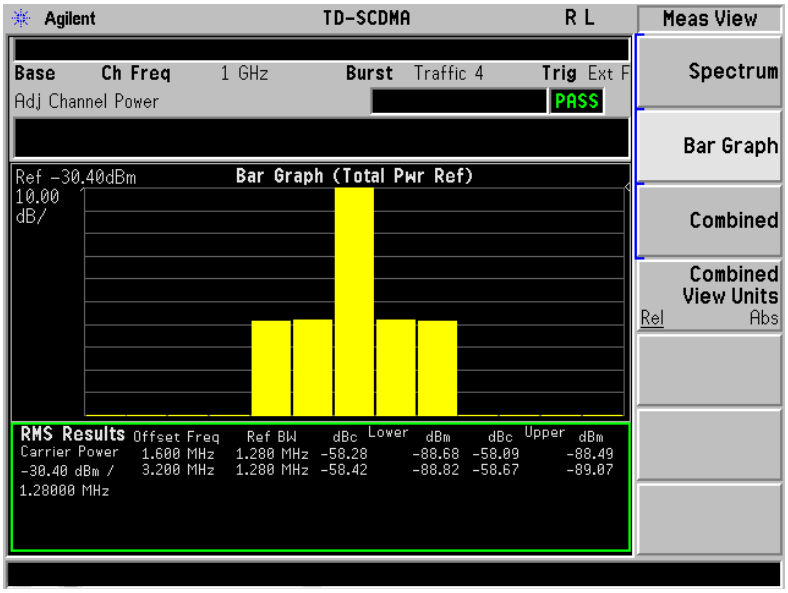
Step 10. If you want to change the measurement parameters from their default condition so that you can make a customized measurement, press **Meas Setup** to see the available keys. Then, for additional information on using the available keys and customizing your measurement, refer to "Adjacent Channel Power Ratio (ACPR)" on page 142. For additional information on the measurement concepts, refer to "Adjacent Channel Power (ACP) Measurement Concepts" on page 254.

Step 11. If you want to enable the gated LO sweep feature in this measurement press the **Sweep** front-panel key to see the available gate setup keys. Then, for additional information on the use of the available keys, refer to "Sweep Functions" on page 80.

Measurement Results

Figure 2-12 shows an example result of ACP (Total Pwr Ref) measurement in the bar graph window when you have selected the measurement mode indicated. The absolute and relative power levels on both sides of the carrier frequency are displayed in the graphic window and text window. The text window shows the absolute total power reference, while the lower and upper offset channel power levels are displayed in both absolute and relative readings.

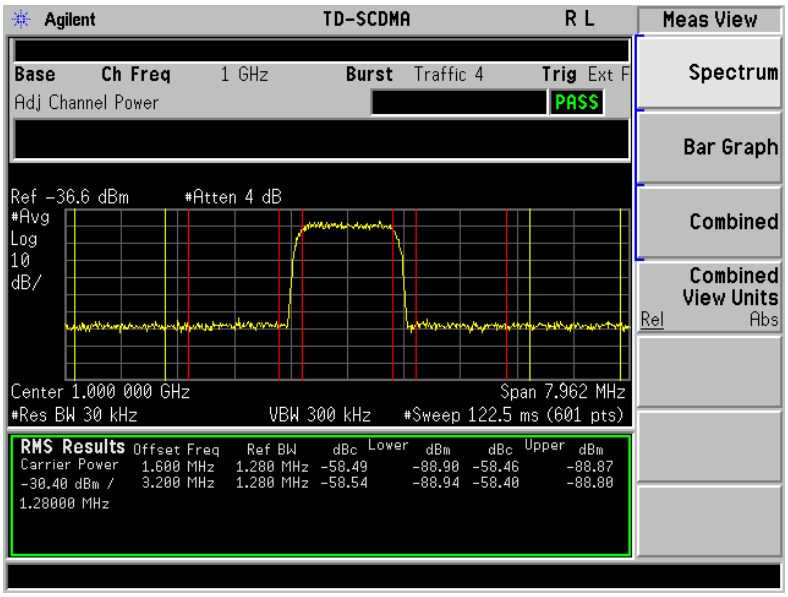
Figure 2-12 **ACP Measurement - Bar Graph View**



NOTE For ACP measurements with DwPTS, since DwPTS is very short (75 us) in length, to make an accurate measurement, longer measurement time is needed and the numeric result display will be refreshed after the trace is completed.

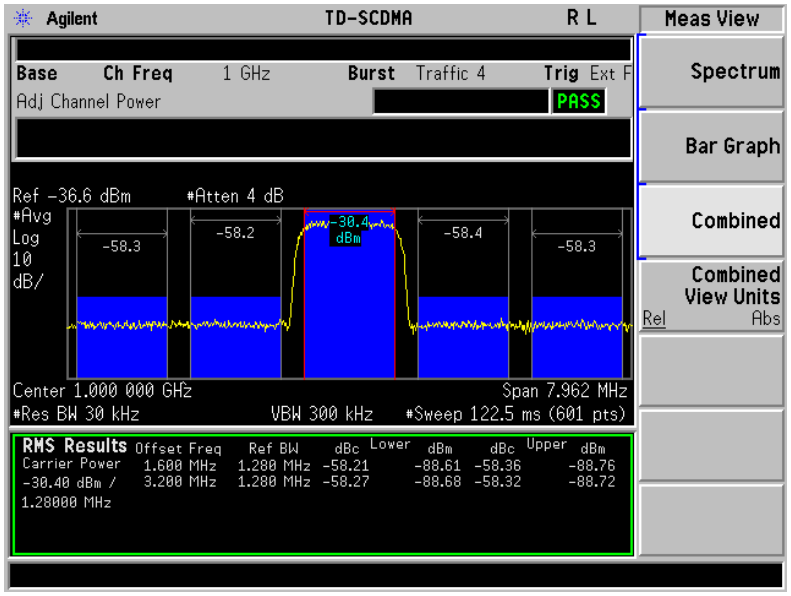
You can press the **View/Trace**, **Spectrum** keys to see the ACP Spectrum graph with the bandwidth marker lines (which can be set in the Offset/Limits menu) in the graph window. The corresponding measured data is also shown in the text window. (See Figure 2-13.)

Figure 2-13 **ACP Measurement - Spectrum View**



You can press the **View/Trace**, **Combined** keys to see the ACP Bar graph combined with the Spectrum graph. The corresponding measured data is also shown in the text window. (See Figure 2-14.)

Figure 2-14 ACP Measurement - Combined View



You can press the **View/Trace**, **Combined View Units** keys to set the units used, for the data displayed in the graphic window, to relative or absolute values.

If you have a problem and get an error message, refer to the “Instrument Messages and Functional Tests” manual.

Troubleshooting Hints

This adjacent channel power ratio measurement can reveal degraded or defective parts in the transmitter section of the DUT. The following examples are those areas to be checked further.

- Some faults in the DC power supply control of the transmitter power amplifier, RF power controller of the pre-power amplifier stage, or I/Q control of the baseband stage
- Some degradation in the gain and output power level of the amplifier due to the degraded gain control and/or increased distortion
- Some degradation of the amplifier linearity and other performance characteristics

Power amplifiers are one of the final stage elements of a base or mobile transmitter and are a critical part of meeting the important power and spectral efficiency specifications. Since ACP measures the spectral response of the amplifier to a complex wideband signal, it is a key measurement linking amplifier linearity and other performance characteristics to the stringent system specifications.

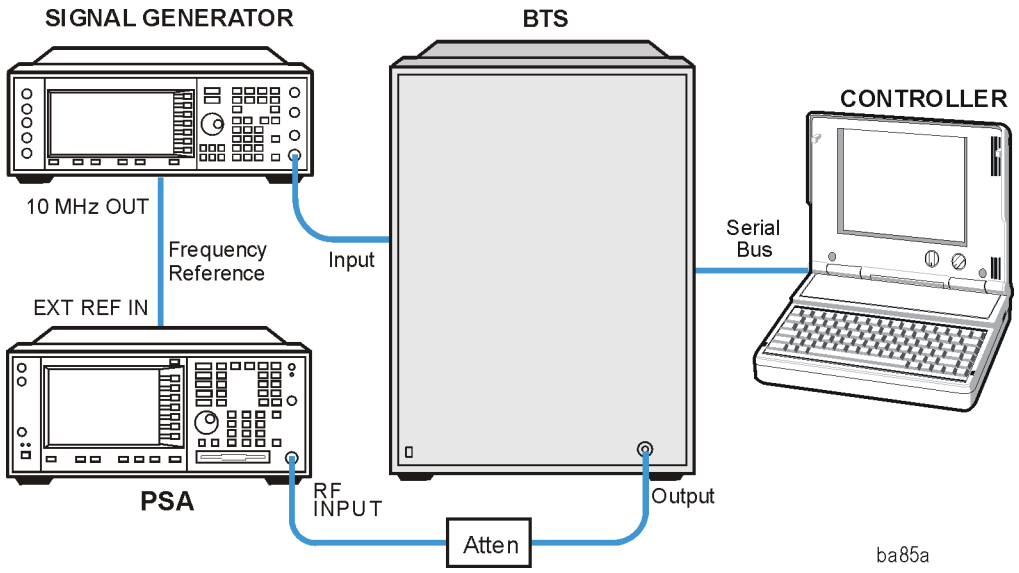
Multi-Carrier Power Measurement

One-Button BTS Measurement Procedure

Step 1. Configure the Device Under Test (DUT) as follows.

The base transmission station (BTS) under test has to be set to transmit the one RF carrier remotely through the system controller. This transmitting signal is connected to the instruments RF input port. Connect the equipment as shown.

Figure 2-15 Base Station Equipment Measurement System Setup



a. Using the appropriate cables and adapters, connect the modulated signal, using the proper radio standard, from the signal generator to the amplifier input connector of the BTS.

b. Connect the output signal of the BTS to the RF input port of the instrument, through the attenuator.

c. Connect a BNC cable between the 10 MHz OUT port of the signal generator and the EXT REF IN port of the instrument.

d. Connect the system controller to the BTS through the serial bus cable.

Step 2. From the system controller, perform all of the call acquisition functions required for the BTS to transmit the RF signal.

Step 3. Enable the TD-SCDMA measurement personality mode by pressing **MODE**, **TD-SCDMA**. (The desired mode key may not be on the first page of the menu. If not, press **More** until the key is available.)

Step 4. If you want to set the current measurement personality mode to a known, factory default state, ensure that the preset type is set to Mode, press **Preset**.

NOTE To preset only the parameter settings that are specific to the selected measurement, press **Meas Setup** and **Restore Meas Defaults**. (The Restore Meas Defaults key may not be on the first page of the menu. If not, press **More** until the key is available.)

Step 5. Toggle the device to **BTS** by pressing **Mode Setup**, **Radio**, **Device**.

Step 6. Set the desired center frequency by pressing **FREQUENCY Channel**, **Center Freq**, then use the numeric keypad to enter the frequency of interest.

Step 7. Select the measurement by pressing **MEASURE** and the **Multi Carrier Power** key. (The desired measurement key may not be on the first page of the menu. If not, press **More** until the key is available.)

Depending on the current settings of **Meas Control**, the instrument will begin making the selected measurements. The resulting data will be shown on the display or available for export. For additional information on the measurement results for your selection, refer to "Measurement Results" on page 54

Step 8. You may need to change some of the display settings. These changes should not affect the measurement results, but will affect how you view the measurement results on the instrument display.

The **AMPLITUDE Y Scale** key accesses the menu to set the desired vertical scale and associated settings: **Scale/Div** and **Ref Level**.

Step 9. If you want to change the measurement parameters from their default condition so that you can make a customized measurement, press **Meas Setup** to see the available keys. Then, for additional information on using the available keys and customizing your measurement, refer to "Multi-Carrier Power (MCP)" on page 161. For additional information on the measurement concepts, refer to "Multi-carrier Power Measurement Concepts" on page 255.

Step 10. If you want to enable the gated LO sweep feature in this measurement press the **Sweep** front-panel key to see the available gate setup keys. Then, for additional information on the use of the available keys, refer to "Sweep Functions" on page 80.

Measurement Results

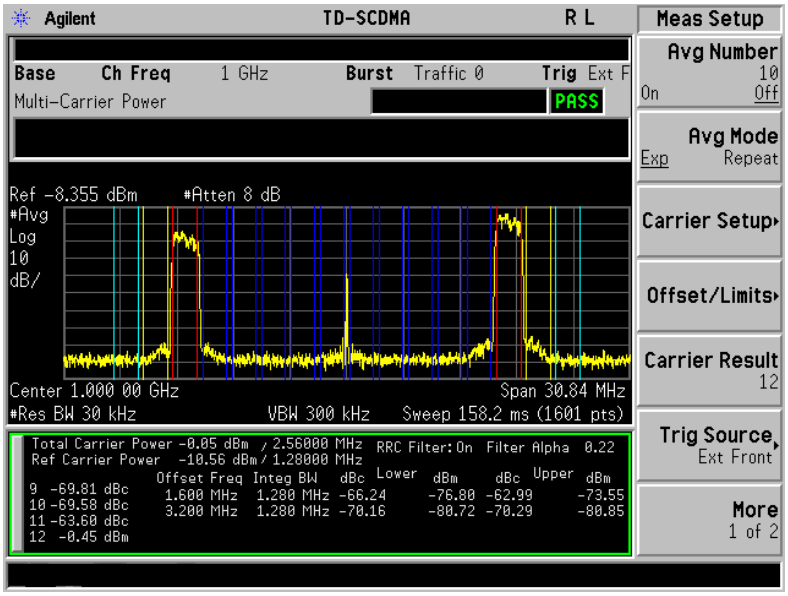
Figure 2-16 shows an example result of the Spectrum View for the multi-carrier power measurement with the bandwidth marker lines in the graph window. The relative and absolute power levels for the center and second carriers, the lower and upper offset channels, and other parameters are shown in the text window.

The example shows a 12 Carrier TD-SCDMA signal with the Carrier 1 Frequency at 991.2 MHz (1000-0.8-5 x 1.6 = 991.2 MHz) set with 0 dBm power and Carrier 12 Frequency at 1008.8 MHz (1000 + 0.8 + 5 x 1.6 = 1008.8 MHz) set with 10 dBm power. The remaining carriers, Carrier 2 to Carrier 11 are shown with no power.

The colored vertical bars on the spectrum view indicate the following:

— Dark Blue lines: represent the carriers with no power (Carriers from 2 to 11)
— Red lines: represent the carriers with power
— Yellow lines: represent the Upper & Lower 1.6 MHz offset
— Light Blue lines: represent the Upper & Lower 3.2 MHz offset

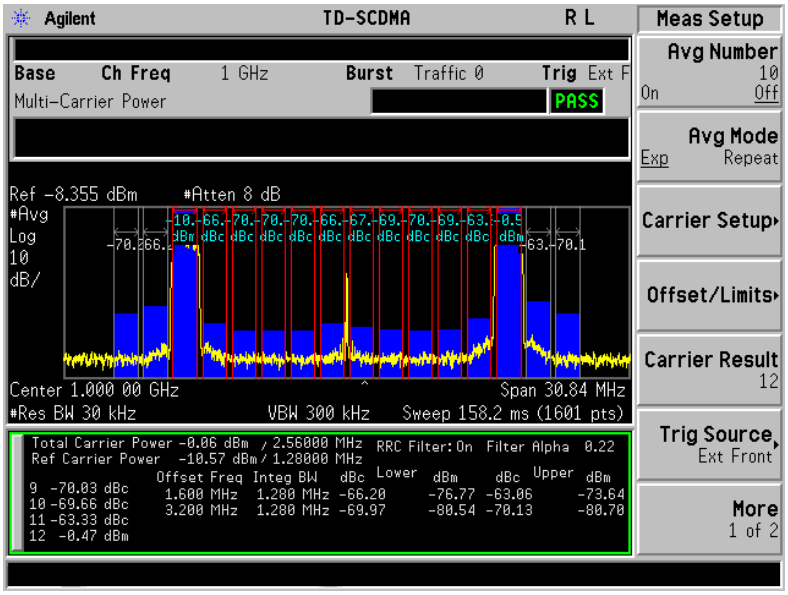
Figure 2-16 **MCP Measurement - Spectrum View**



NOTE For the MCP measurement with DwPTS, since DwPTS is very short (75 us) in length, to make an accurate measurement, longer measurement time is needed and the numeric result display will be refreshed after the trace is completed.

You can press the **View/Trace**, **Combined** keys to see the MCP Bar graph combined with the Spectrum graph. The corresponding measured data is also shown in the text window. (See Figure 2-17.)

Figure 2-17 **MCP Measurement - Combined View**



You can press the **View/Trace**, **Combined View Units** keys to set the units used, for the data displayed in the graphic window, to relative or absolute values.

Troubleshooting Hints

If there is a frequency channel dependency in the operating characteristics of a multi-carrier power amplifier, it might have channel balance problems due to spurious response, distortion, and/or intermodulation products.

If you have a problem and get an error message, refer to the “Instrument Messages and Functional Tests” manual.

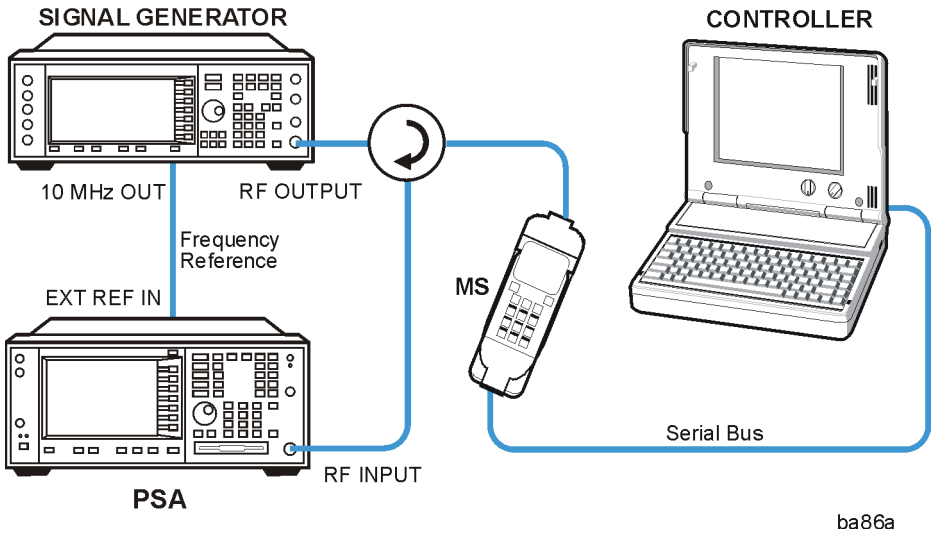
Spurious Emissions Measurement

One-Button MS Measurement Procedure

Step 1. Configure the Device Under Test (DUT) as follows.

The mobile station (MS) under test has to be set to transmit the RF power remotely through the system controller. This transmitting signal is connected to the instruments RF input port. Connect the equipment as shown.

Figure 2-18 Mobile Station Equipment Measurement System Setup



a. Using the appropriate cables, adapters, and circulator, connect the output signal from the MS to the RF input port of the instrument.

b. Connect the base transmission station simulator or signal generator to the MS through the circulator to initiate a link constructed with the sync and pilot channels, if required.

c. Connect a BNC cable between the 10 MHz OUT port of the signal generator and the EXT REF IN port of the instrument.

d. Connect the system controller to the MS through the serial bus cable to control the MS operation.

Step 2. From the system controller, perform all of the call acquisition functions required for the MS to transmit the RF power as required.

Step 3. Enable the TD-SCDMA measurement personality mode by pressing **MODE**, **TD-SCDMA**. (The desired mode key may not be on the first page of the menu. If not, press **More** until the key is available.)

Step 4. If you want to set the current measurement personality mode to a known, factory default state, ensure that the preset type is set to Mode, press **Preset**.

NOTE To preset only the parameter settings that are specific to the selected measurement, press **Meas Setup** and **Restore Meas Defaults**. (The Restore Meas Defaults key may not be on the first page of the menu. If not, press **More** until the key is available.)

Step 5. Toggle the device to **MS** by pressing **Mode Setup**, **Radio**, **Device**.

Step 6. Set the desired center frequency by pressing **FREQUENCY Channel**, **Center Freq**, then use the numeric keypad to enter the frequency of interest.

Step 7. Start your measurement by pressing **MEASURE** and the **Spurious Emissions** key. (The desired measurement key may not be on the first page of the menu. If not, press **More** until the key is available.)

Depending on the current settings of **Meas Control**, the instrument will begin making the selected measurements. The resulting data will be shown on the display or available for export. For additional information on the measurement results for your selection, refer to "Measurement Results" on page 59

Step 8. You may need to change some of the display settings. These changes should not affect the measurement results, but will affect how you view the measurement results on the instrument display.

The **AMPLITUDE Y Scale** key accesses the menu to set the desired vertical scale and associated settings: **Scale/Div** and **Ref Level**.

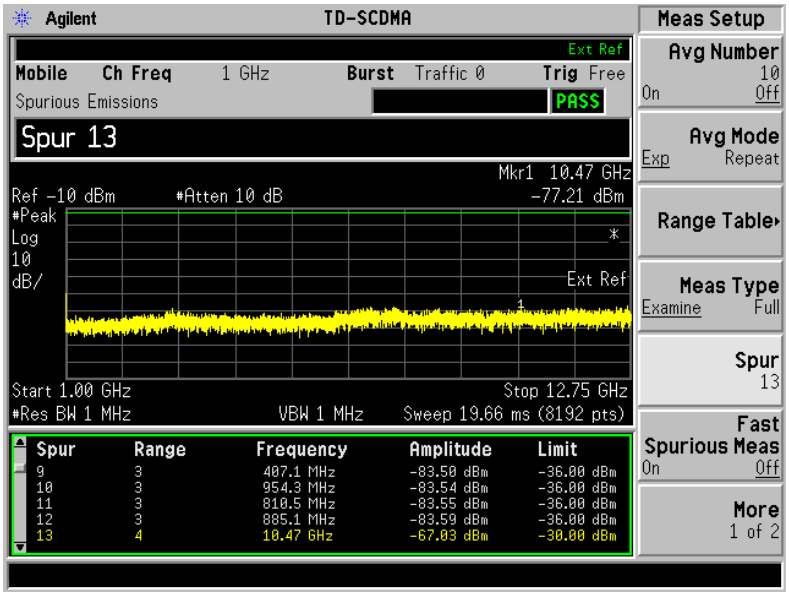
Step 9. Depending on the mode and measurement you have selected, various graphical and tabular presentations are available. To set the display presentation you need, press **Trace/View** and select the desired presentation from the menu list displayed.

Step 10. If you want to change the measurement parameters from their default condition so that you can make a customized measurement, press **Meas Setup** to see the available keys. Then, for additional information on using the available keys and customizing your measurement, refer to "Spurious Emissions" on page 184. For additional information on the measurement concepts, refer to "Spurious Emissions Measurement Concepts" on page 259.

Measurement Results

The Spurious Emissions measurement results should look like the next figure. The spectrum window and the text window show the Spurs that are within the current value of the Marker Peak Excursion setting of the absolute limit. Any spur that has failed the absolute limit will have the red 'F' beside it.

Figure 2-19 Spurious Emissions Measurement



If you have a problem and get an error message, refer to the "Instrument Messages and Functional Tests" manual.

Troubleshooting Hints

If there is a frequency channel dependency in the operating characteristics of a multi-carrier power amplifier, it might have channel balance problems due to spurious response, distortion, and/or intermodulation products.

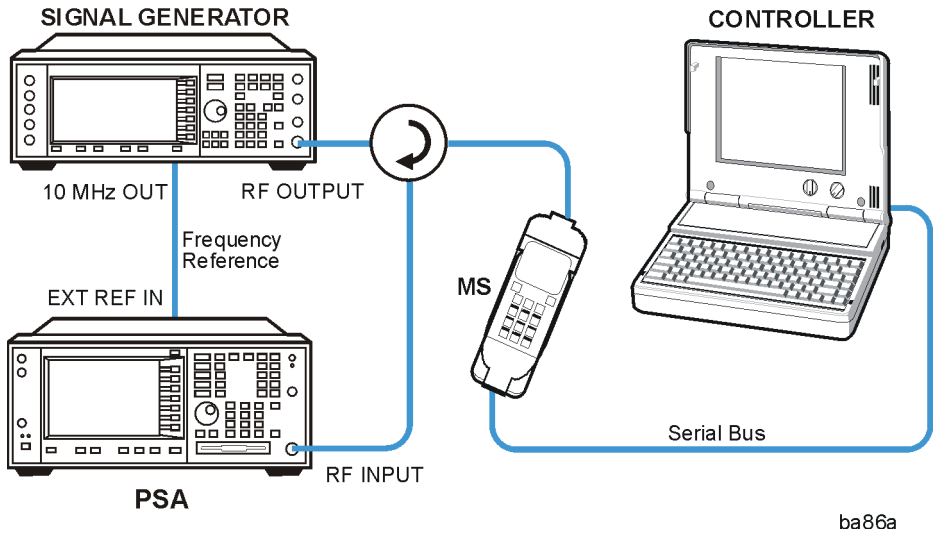
Spectrum Emission Mask (SEM) Measurement

One-Button MS Measurement Procedure

Step 1. Configure the Device Under Test (DUT) as follows.

The mobile station (MS) under test has to be set to transmit the RF power remotely through the system controller. This transmitting signal is connected to the instruments RF input port. Connect the equipment as shown.

Figure 2-20 Mobile Station Equipment Measurement System Setup



a. Using the appropriate cables, adapters, and circulator, connect the output signal from the MS to the RF input port of the instrument.

b. Connect the base transmission station simulator or signal generator to the MS through the circulator to initiate a link constructed with the sync and pilot channels, if required.

c. Connect a BNC cable between the 10 MHz OUT port of the signal generator and the EXT REF IN port of the instrument.

d. Connect the system controller to the MS through the serial bus cable to control the MS operation.

Step 2. From the system controller, perform all of the call acquisition functions required for the MS to transmit the RF power as required.

Step 3. Enable the TD-SCDMA measurement personality mode by pressing **MODE**, **TD-SCDMA**. (The desired mode key may not be on the first page of the menu. If not, press **More** until the key is available.)

Step 4. If you want to set the current measurement personality mode to a known, factory default state, ensure that the preset type is set to Mode, press **Preset**.

NOTE To preset only the parameter settings that are specific to the selected measurement, press **Meas Setup** and **Restore Meas Defaults**. (The Restore Meas Defaults key may not be on the first page of the menu. If not, press **More** until the key is available.)

Step 5. Toggle the device to **MS** by pressing **Mode Setup**, **Radio**, **Device**.

Step 6. Set the desired center frequency by pressing **FREQUENCY Channel**, **Center Freq**, then use the numeric keypad to enter the frequency of interest.

Step 7. Start your measurement by pressing **MEASURE** and the **Spectrum Emission Mask** key. (The desired measurement key may not be on the first page of the menu. If not, press **More** until the key is available.)

Depending on the current settings of **Meas Control**, the instrument will begin making the selected measurements. The resulting data will be shown on the display or available for export. For additional information on the measurement results for your selection, refer to "Measurement Results" on page 61

Step 8. You may need to change some of the display settings. These changes should not affect the measurement results, but will affect how you view the measurement results on the instrument display.

The **AMPLITUDE Y Scale** key accesses the menu to set the desired vertical scale and associated settings: **Scale/Div** and **Ref Level**.

Step 9. Depending on the mode and measurement you have selected, various graphical and tabular presentations are available. To set the display presentation you need, press **Trace/View** and select the desired presentation from the menu list displayed.

Step 10. If you want to change the measurement parameters from their default condition so that you can make a customized measurement, press **Meas Setup** to see the available keys. Then, for additional information on using the available keys and customizing your measurement, refer to "Spectrum Emissions Mask" on page 207. For additional information on the measurement concepts, refer to "Spectrum Emissions Mask (SEM) Measurement Concepts" on page 258.

Step 11. If you want to enable the gated LO sweep feature in this measurement press the **Sweep** front-panel key to see the available gate setup keys. Then, for additional information on the use of the available keys, refer to "Sweep Functions" on page 80.

Measurement Results

The following figures show examples of Integrated Power View, Rel Peak Pwr & Freq View, and Abs Peak Pwr & Freq View result metrics.

The relative and absolute integrated power levels for each offset frequency range on both sides of the reference channel are displayed in the Integrated Power View.

The relative peak power levels along with the frequency of the peak in each offset frequency range on both sides of the reference channel are displayed in the Rel Peak Pwr & Freq View.

The absolute peak power levels along with the frequency of the peak in each offset frequency range on both sides of the reference channel are displayed in the Abs Peak Pwr & Freq View.

Figure 2-21 SEM Measurement—Integrated Power View

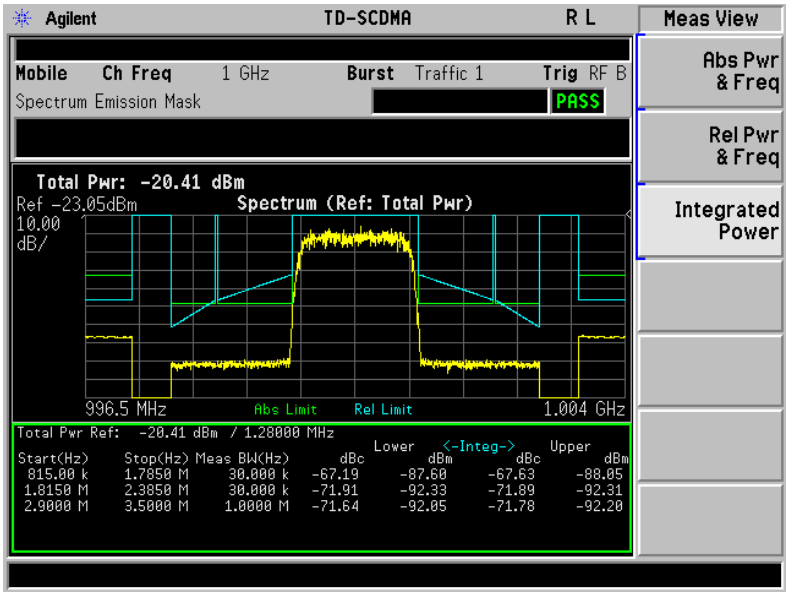


Figure 2-22 Standard Results Screen—Rel Peak Pwr & Freq View

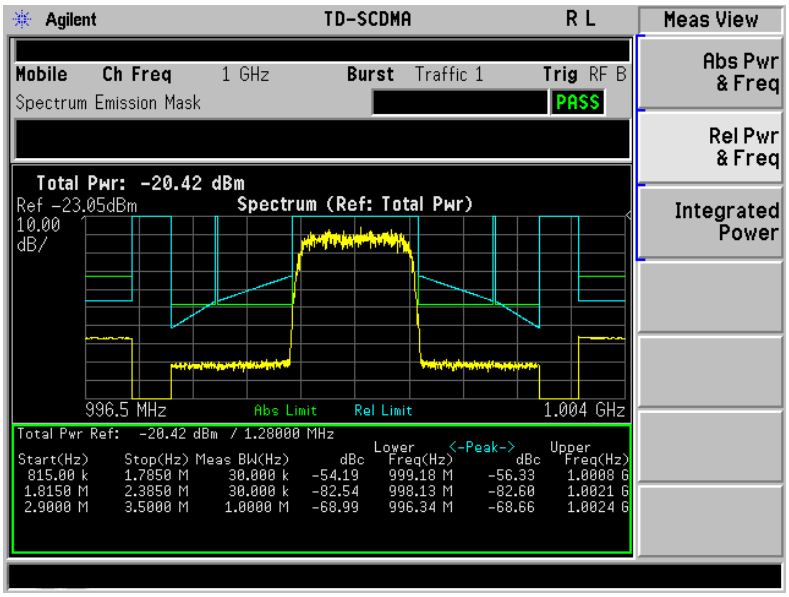
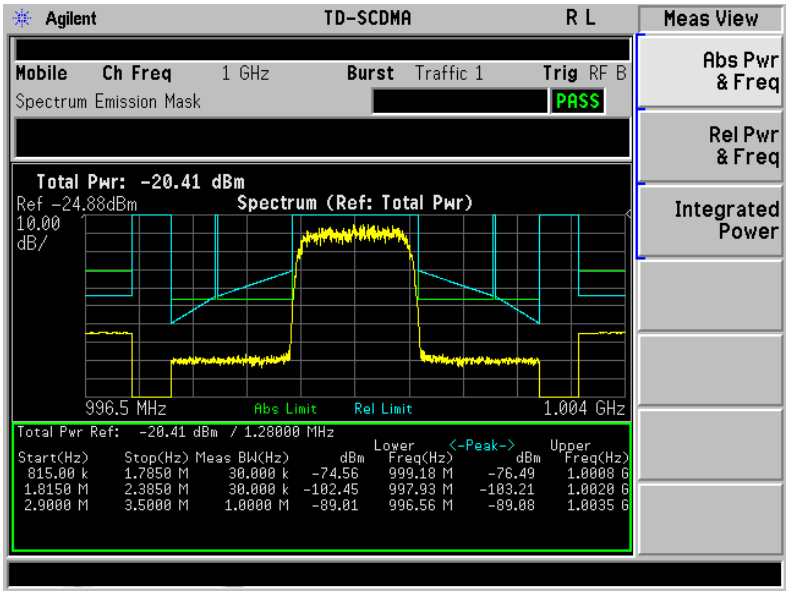


Figure 2-23 **Standard Results Screen—Abs Peak Pwr & Freq View**



If you have a problem and get an error message, refer to the "Instrument Messages and Functional Tests" manual.

Troubleshooting Hints

This spectrum emission mask measurement can reveal degraded or defective parts in the transmitter section of the DUT. The following examples are those areas to be checked further.

- Faulty DC power supply control of the transmitter power amplifier.
- RF power controller of the pre-power amplifier stage.
- I/Q control of the baseband stage.
- Some degradation in the gain and output power level of the amplifier due to the degraded gain control and/or increased distortion.
- Some degradation of the amplifier linearity or other performance characteristics.

Power amplifiers are one of the final stage elements of a base or mobile transmitter and are a critical part of meeting the important power and spectral efficiency specifications. Since spectrum emission mask measures the spectral response of the amplifier to a complex wideband signal, it is a key measurement linking amplifier linearity and other performance characteristics to the stringent system specifications.

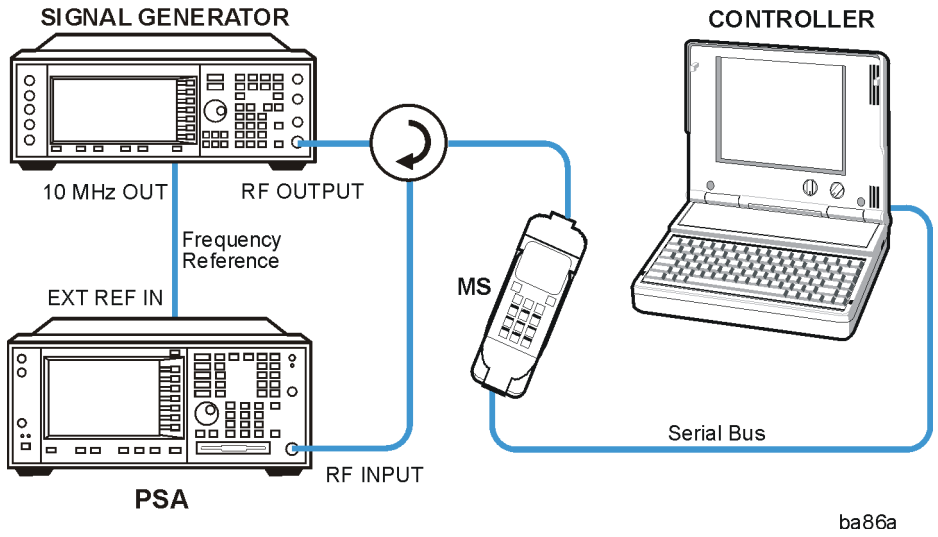
Occupied Bandwidth Measurement

One-Button MS Measurement Procedure

Step 1. Configure the Device Under Test (DUT) as follows.

The mobile station (MS) under test has to be set to transmit the RF power remotely through the system controller. This transmitting signal is connected to the instruments RF input port. Connect the equipment as shown.

Figure 2-24 Mobile Station Equipment Measurement System Setup



a. Using the appropriate cables, adapters, and circulator, connect the output signal from the MS to the RF input port of the instrument.

b. Connect the base transmission station simulator or signal generator to the MS through the circulator to initiate a link constructed with the sync and pilot channels, if required.

c. Connect a BNC cable between the 10 MHz OUT port of the signal generator and the EXT REF IN port of the instrument.

d. Connect the system controller to the MS through the serial bus cable to control the MS operation.

Step 2. From the system controller, perform all of the call acquisition functions required for the MS to transmit the RF power as required.

Step 3. Enable the TD-SCDMA measurement personality mode by pressing **MODE**, **TD-SCDMA**. (The desired mode key may not be on the first page of the menu. If not, press **More** until the key is available.)

Step 4. If you want to set the current measurement personality mode to a known, factory default state, ensure that the preset type is set to Mode, press **Preset**.

Step 5. Toggle the device to **MS** by pressing **Mode Setup**, **Radio**, **Device**.

Step 6. Set the desired center frequency by pressing **FREQUENCY Channel**, **Center Freq**, then use the numeric keypad to enter the frequency of interest.

Step 7. Start your measurement by pressing **MEASURE** and the **Occupied BW** key. (The desired measurement key may not be on the first page of the menu. If not, press **More** until the key is available.)

Depending on the current settings of **Meas Control**, the instrument will begin making the selected measurements. The resulting data will be shown on the display or available for export. For additional information on the measurement results for your selection, refer to "Measurement Results" on page 61

Step 8. You may need to change some of the display settings. These changes should not affect the measurement results, but will affect how you view the measurement results on the instrument display.

The **AMPLITUDE Y Scale** key accesses the menu to set the desired vertical scale and associated settings: **Scale/Div** and **Ref Level**.

Step 9. If you want to change the measurement parameters from their default condition so that you can make a customized measurement, press **Meas Setup** to see the available keys. Then, for additional information on using the available keys and customizing your measurement, refer to "Occupied Bandwidth (OBW)" on page 235. For additional information on the measurement concepts, refer to "Occupied Bandwidth (OBW) Measurement Concepts" on page 261.

Step 10. If you want to enable the gated LO sweep feature in this measurement press the **Sweep** front-panel key to see the available gate setup keys. Then, for additional information on the use of the available keys, refer to "Sweep Functions" on page 80.

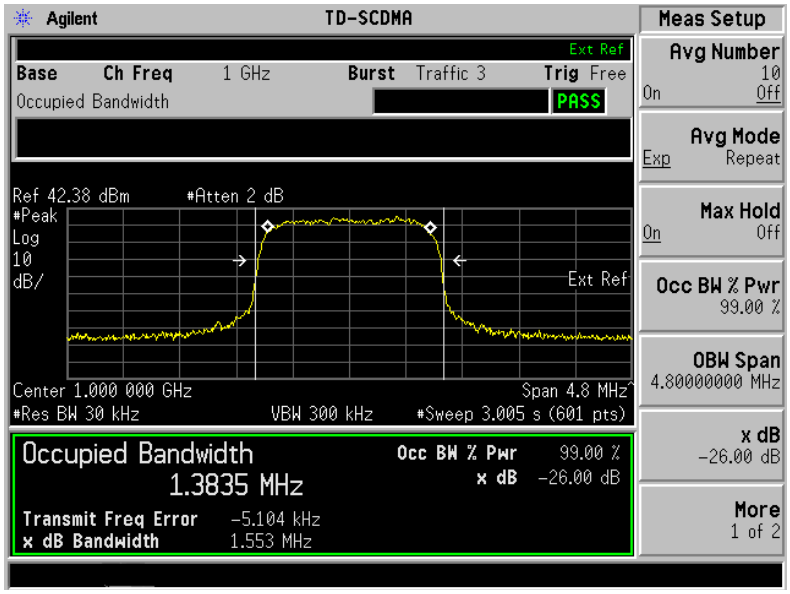
Measurement Results

The occupied bandwidth results are shown in Figure 2-25.

The different marks on the spectrum view indicate the following:

— A pair of white vertical lines: represent the 3GPP standard carrier bandwidth 1.6 MHz
— A pair of arrowheads: represent x dB bandwidth
— A pair of diamonds: represent the occupied bandwidth

Figure 2-25 Occupied Bandwidth Measurement Results



Information shown in the text window of the displays include:

- **Occupied Bandwidth** - The result indicates the bandwidth containing 99% of the total transmitted power.

  The power of the transmitted signal is measured with a 30 kHz bandwidth approximate Gaussian filter and a measurement span of 4.8 MHz, which is centered on the channel center frequency and compliant with the 3GPP standard.

- **Occ BW % Pwr** - Specifies the percentage of the total power. The bandwidth which contains the specified power will be measured. The default setting is 99%. You can adjust the parameter for your testing.

- **x** dB - Defines the dB number relative to the peak level. The default setting is -26 dB. You can adjust the parameter for your testing.

- **Transmit Freq Error.** - The result is the transmit frequency error from the specified center frequency.

- **x** dB **Bandwidth** - The result is the frequency bandwidth when the power drops to the specified x dB relative to the peak level, which is centered on channel center frequency.

If you have a problem and get an error message, refer to the “Instrument Messages and Functional Tests” manual.

Troubleshooting Hints

Any distortion such as harmonics or intermodulation, for example, produces undesirable power outside the specified bandwidth.

Shoulders on either side of the spectrum shape indicate spectral regrowth and intermodulation. Rounding or sloping of the top shape can indicate filter shape problems.

Using Basic Mode

Basic mode is part of Option B7J for the PSA Series Spectrum Analyzers. Basic mode is *not* related to a particular communications standard. That is, it does not default to measurement settings that are for any specific standard. You may want to use Basic Mode if you are making measurements on a signal that is not based on a specific digital communications standard.

Basic Mode in PSA Series Spectrum Analyzers

There are two generic measurements available under the **MEASURE** key in Basic mode:

- Spectrum measurement (frequency domain).
- Waveform measurement (time domain)

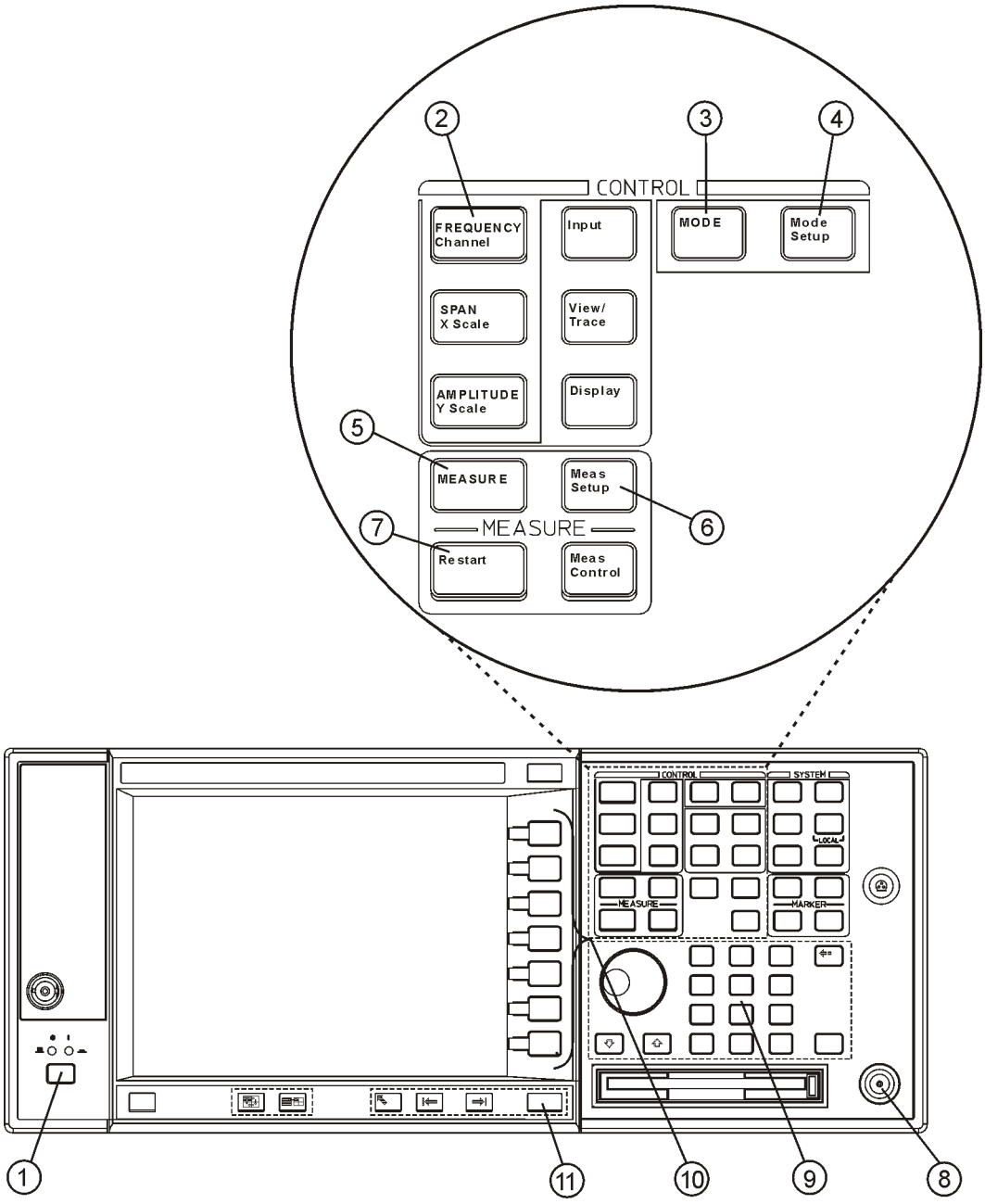
See the *PSA Series Basic Mode Guide* for additional information.

3 Key and SCPI Reference

Instrument Front Panel Highlights

The most commonly used function keys on the PSA front panel are located as shown in the illustration below. The operation of the keys is briefly explained on the following page.

Figure 3-1 Front Panel Major Key Locations - PSA Series



ar84a

1. The **On/Off** switch toggles the power between on and off. A green LED will be on once the instrument has been turned on. When in the standby mode a yellow LED is on above the **On/Off** switch.
2. **FREQUENCY Channel** accesses the menu key that controls the center frequency or channel number. These parameters apply to all measurements in the current mode.
3. **MODE** accesses the menu key menu to select one of the radio systems measurement modes loaded in the instrument. Each mode is independent from all other modes.
4. **Mode Setup** accesses menu keys that affect parameters that are specific to the current mode and affect all measurements within that mode.
5. **MEASURE** accesses the menus to initiate one of the various measurements that are specific to the current mode.
6. **Meas Setup** accesses the menus of test parameters that are specific to the current measurement.
7. **Restart** causes the measurement, for which the process is currently halted, to start again from the beginning of the measurement according to the current measurement setup parameters.
8. The **RF INPUT** port allows you to apply an external RF signal.
9. The **Data Entry** keypad is used to enter numeric values for parameters. A value from this entry will be displayed in the active function area of the screen. The value will become valid after pressing the **Enter** key, or selecting a unit of measurement, depending on the current parameter.
10. The **menu keys** allow you either to activate a feature or to access a further menu key menu. An arrow on the right side of a menu key label indicates that the key has a further selection menu. The active menu key is highlighted. Grayed-out keys are currently unavailable for use or are only to show information. If a menu key menu has multiple pages, access them by pressing the **More** key at the bottom of a menu.
11. **Return** allows you to exit from the current menu and display the previous menu. If you are on the first page of a multiple-page menu (the menu with **More (1 of 3)** for example), the **Return** key will exit from that menu. When you activate a different measurement, the return list is cleared. The **Return** key will not return you to a previously activated mode, nor will it alter any values you have entered on previous menus.

Common Functionality

Mode Switching

The TD-SCDMA mode is notified when a mode switch is about to happen. Upon leaving the TD-SCDMA mode (as when another mode has been selected by the user), the TD-SCDMA mode is saved into an ISTATE file in the flash file system. Mode ISTATE will consist of all measurement setup settings, the current measurement, and the mode setup settings. Upon re-entry to the TD-SCDMA mode, the mode state will be recalled from the stored ISTATE file. The mode will start with the same measurement that was selected when exited and all measurement and mode settings will be restored. Trace data and measurement results from the last time the mode was active are not restored.

Mode Selection on Power On/Preset

The mode that becomes active when the analyzer is turned on depends on the settings in the ‘Power On/Preset’ menu under the ‘System’ front-panel key of the analyzer:

Value of Power On/Preset Parameter	Mode entered at Power On
Power-On Last State	Mode that was active at Power-down
Power-On Factory Preset	Spectrum Analyzer Mode

TD-SCDMA Mode Entry

Upon entering the TD-SCDMA Mode, the last saved state for the TD-SCDMA Mode is restored. The first time the mode is entered there will be no saved state information, and therefore the DLP will restore the factory-preset state. The default measurement for the TD-SCDMA mode is Transmit Power. The first time the TD-SCDMA personality is activated, this will be the active measurement. It will also be the active measurement if TD-SCDMA is the active mode and a mode or factory preset (green Preset front-panel key or remote :*RST) is performed.

TD-SCDMA Mode Exit

When the TD-SCDMA Mode exits, the state is saved, for the purposes of restoring the state the next time the mode becomes active.

Mode Menu

When the TD-SCDMA personality has been installed and licensed on the spectrum analyzer, it will appear in the menu brought up by the MODE front-panel key. Other modes might also be present on this menu.

Remote Control

Mode Selection by Mode Name

Selects the analyzer mode.

Mode	TDSCDMA
Remote Command	`:INSTrument[:SELect] SA|TDSCDMA` `:INSTrument[:SELect]?`
Example	:INSTrument:SELect TDSCDMA
Restriction and Notes	Other modes may be available, depending on the software configuration of the analyzer.
Preset	SA
State Saved	Saved in instrument state.
Range	SA | TDSCDMA
Key Path	**Mode**

Mode Selection by Mode Number

Selects the analyzer mode.

Mode	TDSCDMA
Remote Command	`:INSTrument:NSELect 1|211` `:INSTrument:NSELect?`
Example	:INSTrument:NSELect 211
Restriction and Notes	Mode 1 is Spectrum Analysis. Mode 211 is the TD-SCDMA mode. Other values may be accepted if other modes are loaded into the analyzer.
Preset	1
State Saved	Saved in instrument state.
Range	1 | 211
Key Path	**MODE**

Mode Setup Menu

Radio Menu

Device

Sets the type of device (mobile or base station) to be tested.

Mode	TDSCDMA
Remote Command	`[:SENSe]:RADio:DEVice BTS|MS` `[:SENSe]:RADio:DEVice?`
Example	:SENSe:RADio:DEVice MS
Restriction and Notes	Allows you to indicate if measurements will be performed to mobile (MS) or base station (BTS) specifications. Changing this parameter will cause and change to some parameters (measurement frequencies, bandwidths, and limits) in some measurements.
Dependencies/Couplings	When Device changes in TxP, PvT, ACP, MCP, SEM or OBW measurement, Trigger Source and some other parameters will perform an auto couple. For more information, refer to the Trigger Source table in each measurement described in later chapters.
Preset	BTS
State Saved	Saved in instrument state.
Range	BTS | MS
Key Path	**Mode Setup, Radio**

Input Functions

Input Port

Sets the input path of the signal to be tested.

Mode	TDSCDMA
Remote Command	`[:SENSe]:FEED AREF|RF` `[:SENSe]:FEED?`
Example	:SENSe:FEED AREF
Restriction and Notes	Supports the following: RF = RF Input Port AREF = Amptd Ref Useful service feature, or when an input signal not available.
Preset	RF
State Saved	Saved in instrument state.

Range	AREF | RF
Key Path	**Mode Setup, Input**

RF Input Range

Turn the Auto reference level and attenuation feature on or off.

Mode	TDSCDMA
Remote Command	`[:SENSe]:POWer[:RF]:RANGe:AUTO ON|OFF|1|0` `[:SENSe]:POWer[:RF]:RANGe:AUTO?`
Example	:SENSe:POWer:RF:RANGe:AUTO OFF
Restriction and Notes	When set to Auto, the reference level and attenuation will be set automatically each time a measurement is entered or is restarted with the Restart front-panel key. The algorithm used determines the input attenuation based on the input signal level and the max mixer level appropriate for the measurement being made. It ensures the max mixer level is protected and the minimum attenuation setting is used for optimum dynamic range. This is done using the following steps; Measure and update Max Total Pwr, which represents the maximum total signal power level at the device under test (DUT) output. Calculate the maximum signal level at the SA RF Input port. RF Input Power = Max Total Pwr + Ext Amp Gain – Ref Level Offset Calculate the optimum attenuator setting for protecting the current measurements appropriate max mixer level, taking into account any gain associated with the current Int Preamp state. Input Atten (MML) = RF Input Power + Internal Preamp Gain – Max Mixer Level Calculate the optimum attenuator setting for best accuracy and trace display purposes. This takes into account how far down the peak of the signal should be positioned on the display. (Note: Only important on ESA platform for accuracy purposes) Input Atten (Accy) = RF Input Power + No. of Divisions Down – Maximum Base Box MML The maximum Input Atten value calculated from steps 3 and 4 is rounded up to the nearest attenuation step and is used as the optimum attenuation setting. Finally the ideal reference level for accuracy and display purposes is calculated and set. Ref Level = RF Input Power – Ext Amp Gain + Ref Level Offset + No. of Divisions Down When set to Man, the reference level and attenuation will be set according to the user defined values of Max Total Pwr, Input Atten, and Ref Level.

Dependencies/Couplings	When set to Auto, the reference level and attenuation will be set automatically each time a measurement is entered or is restarted with the Restart front-panel key, see Restrictions and Notes entry below for more detail.
Preset	ON
State Saved	Saved in instrument state.
Range	On | Off
Key Path	**Mode Setup, Input**

Maximum Total Power

Input RF Attenuation

Sets the RF input attenuator value to be used by the current measurement.

Unit	dB
Mode	TDSCDMA
Remote Command	`[:SENSe]:POWer[:RF]:ATTenuation <rel_ampl>` `[:SENSe]:POWer[:RF]:ATTenuation?`
Example	:SENSe:POWer:RF:ATTenuation 20
Restriction and Notes	If RF Input Range is set to Auto, then the Input Atten value will be automatically updated based on the measured Max Total Pwr value each time a measurement is entered or is restarted with the Restart front-panel key. (see RF Input Range for more details) If RF Input Range is set to Man, then the user defined Input Atten value will be used to make the currently selected measurement.
Dependencies/Couplings	Manually updating Input Atten value, causes: RF Input Range to be set to Man Max Total Pwr to be re-calculated in order to protect appropriate measurement max mixer level per equation: Max Total Pwr = Input Atten – Ext Amp Gain + Ref Level Offset – Internal Preamp Gain + Max Mixer Level
Preset	10 dB
State Saved	Saved in instrument state.
Min	0 dB
Max	70 dB
Key Path	**Mode Setup, Input**

Mobile External RF Attenuation

Sets the amount of external attenuation to be corrected for in the results when the Device is set to MS (Mobile).

Unit	dB
Mode	TDSCDMA
Remote Command	`[:SENSe]:CORRection:MS[:RF]:LOSS <rel_ampl>` `[:SENSe]:CORRection:MS[:RF]:LOSS?`
Example	:SENSe:CORRection:MS:LOSS 20
Dependencies/Couplings	Manually updating the Ext RF Atten MS value, causes: Max Total Pwr to be re-calculated (only if RF Input Range = Man) in order to protect appropriate measurement max mixer level per equation: Max Total Pwr = Input Atten – Ext Amp Gain + Ref Level Offset – Internal Preamp Gain + Max Mixer Level
Preset	0 dB
State Saved	Saved in instrument state.
Min	–81.9 dB
Max	81.9 dB
Key Path	**Mode Setup, Input, Ext RF Atten**

Base Station External RF Attenuation

Sets the amount of external attenuation to be corrected for in the results when Device is set to BTS (Base Station).

Unit	dB
Mode	TDSCDMA
Remote Command	`[:SENSe]:CORRection:BTS[:RF]:LOSS <rel_ampl>` `[:SENSe]:CORRection:BTS[:RF]:LOSS?`
Example	:SENSe:CORRection:BTS:LOSS 20
Dependencies/Couplings	Manually updating the Ext RF Atten BS value, causes: Max Total Pwr to be re-calculated (only if RF Input Range = Man) in order to protect appropriate measurement max mixer level per equation: Max Total Pwr = Input Atten – Ext Amp Gain + Ref Level Offset – Internal Preamp Gain + Max Mixer Level
Preset	0 dB
State Saved	Saved in instrument state.

Min	–81.9 dB
Max	81.9 dB
Key Path	**Mode Setup, Input, Ext RF Atten**

Internal RF Preamplifier

Turns the internal RF preamplifier on or off.

Mode	TDSCDMA
Remote Command	`[:SENSe]:POWer[:RF]:GAIN[:STATe] ON|OFF|1|0` `[:SENSe]:POWer[:RF]:GAIN[:STATe]?`
Example	:SENSe:POWer:RF:GAIN:STATe ON
Restriction and Notes	Greyed-out if and set to off, if Option 1DS is not installed in instrument.
Dependencies/Couplings	Manually updating the Int Preamp state, causes: Max Total Pwr to be re-calculated (only if RF Input Range = Man) in order to protect appropriate measurement max mixer level per equation: Max Total Pwr = Input Atten – Ext Amp Gain + Ref Level Offset – Internal Preamp Gain + Max Mixer Level
Preset	OFF
State Saved	Saved in instrument state.
Range	On | Off
Key Path	**Mode Setup, Input, More**

Trigger Functions

RF Burst Trigger Delay

Sets the trigger delay when using the RF Burst (wideband) trigger.

Unit	ns | us | ms | s | ks
Mode	TDSCDMA
Remote Command	`:TRIGger[:SEQuence]:RFBurst:DELay <time>` `:TRIGger[:SEQuence]:RFBurst:DELay?`
Example	:TRIGger:SEQuence:RFBurst:DELay 0.3s
Preset	0 s
State Saved	Saved in instrument state.
Min	–100 ms
Max	500 ms

Key Path	**Mode Setup, Trigger, RF Burst**

RF Burst Trigger Slope

Sets the trigger slope when using the RF Burst (wideband) trigger.

Mode	TDSCDMA
Remote Command	`:TRIGger[:SEQuence]:RFBurst:SLOPe NEGative|POSitive` `:TRIGger[:SEQuence]:RFBurst:SLOPe?`
Example	:TRIGger:SEQuence:RFBurst:SLOPe NEG
Preset	POSitive
State Saved	Saved in instrument state.
Range	Neg| Pos
Key Path	**Mode Setup, Trigger, RF Burst**

External Trigger Delay

Sets the trigger delay when using an external trigger.

Unit	ns | us | ms | s | ks
Mode	TDSCDMA
Remote Command	`:TRIGger[:SEQuence]:EXTernal[1]|2:DELay <time>` `:TRIGger[:SEQuence]:EXTernal[1]|2:DELay?`
Example	:TRIGger:SEQuence:EXTernal:DELay 0.3s
Preset	0 s
State Saved	Saved in instrument state.
Min	–100 ms
Max	500 ms
Key Path	**Mode Setup, Trigger, External Front**

External Trigger Slope

Sets the trigger slope when using an external trigger.

Mode	TDSCDMA
Remote Command	`:TRIGger[:SEQuence]:EXTernal[1]|2:SLOPe NEGative|POSitive` `:TRIGger[:SEQuence]:EXTernal[1]|2:SLOPe?`
Example	:TRIGger:SEQuence:EXTernal:SLOPe NEG

Preset	POSitive
State Saved	Saved in instrument state.
Range	Neg | Pos
Key Path	**Mode Setup, Trigger, External Front**

Burst Search Threshold

Sets the relative power threshold, which is used to determine the time slots that will be included in the search for TD-SCDMA bursts. The threshold power is relative to the peak power of the highest power time slot. This is useful when measuring a BTS with different power levels in different time slots, and you want to exclude bursts with lower power levels.

Unit	dB
Mode	TDSCDMA
Remote Command	`[:SENSe]:SYNC:BURSt:STHReshold <rel_ampl>` `[:SENSe]:SYNC:BURSt:STHReshold?`
Example	:SENSe:SYNC:BURSt:STHReshold –35
Preset	–30 dB
State Saved	Saved in instrument state.
Min	–200 dB
Max	–0.01 dB
Key Path	**Mode Setup, Trigger, More**

Sweep Functions

Gate State

Turns the gate function on and off. When set to Gate (On), the LO sweeps whenever the gate conditions are satisfied by the signal at the **Gate Source** selected under **Gate Setup**.

Mode	TDSCDMA
Remote Command	`[:SENSe]:SWEep:EGATe[:STATe] ON|OFF|1|0` `[:SENSe]:SWEep:EGATe[:STATe]?`
Example	:SWE:EGAT ON
Restriction and Notes	This parameter is disabled when the current measurement is Transmit Power, Power v Time or Spurious Emissions.
Dependencies/Couplings	When Trig Src is Freerun, gate state is set to Off; When Trig Src is Ext Front/ Ext Rear/ RF Burst, gate state is set to On.
Preset	OFF

State Saved	Saved in instrument state.
Range	On | Off
Key Path	**Sweep**

Gate Polarity

Sets the polarity for the gate signal. When Positive (Pos) is selected, a positive-going edge will satisfy the gate condition, after the delay set with the **Gate Delay** key. When Negative (Neg) is selected, a negative-going edge will satisfy the gate condition after the delay.

Mode	TDSCDMA
Remote Command	`[:SENSe]:SWEep:EGATe:POLarity NEGative|POSitive` `[:SENSe]:SWEep:EGATe:POLarity?`
Example	:SWE:EGAT:POL NEG
Preset	POSitive
State Saved	Saved in instrument state.
Range	Pos | Neg
Key Path	**Sweep, Gate Setup**

Gate Delay

Controls the time elapse from the time the gate condition goes 'true' until the gate is turned on.

Unit	ns | us | ms | s | ks
Mode	TDSCDMA
Remote Command	`[:SENSe]:SWEep:EGATe:DELay <time>` `[:SENSe]:SWEep:EGATe:DELay?`
Example	:SWE:EGAT:DELay 500 ms

Restriction and Notes

When Trigger Source is set to Freerun, gate turns Off;

When Trigger Source is set to Ext Front/ Ext Rear/ RF Burst, Gate State turns On, and Gate Source will be set identically with Trigger Source.

If Trig Src = Ext Front/ Ext Rear

{

Gate Src = Ext Front/ Ext Rear;

If Burst Type = Trafficslot

{

Gate Length = 662.5 us;

$$GateDelay = \begin{cases} 60\mu s(trafficslot = 0) \\ trafficslot * 675 + 275\mu s + 60\mu s(trafficslot = 1 \sim 6) \end{cases}$$

}

If Burst Type = Downlink Pilot

Gate Length = 50 us; Gate Delay = 786 us;

If Burst Type = Uplink Pilot

Gate Length = 100 us; Gate Delay = 911 us;

}

If Trig Src =RF Burst

{

Gate Src = RF Burst;

If Burst Type = Trafficslot

Gate Delay = 60 us,

Gate Length = 662.5 us;

If Burst Type = Downlink Pilot

Gate Delay = 86 us,

Gate Length = 50 us;

If Burst Type = Uplink Pilot

Gate Delay =86 us,

Gate Length = 100 us.

}

Dependencies/Couplings

See Restriction and Notes

Preset

57.70 us

State Saved

Saved in instrument state.

Min

0 s

Max	100 s
Key Path	**Sweep, Gate Setup**

Gate Length

Controls the length of time that the gate is on after it opens.

Unit	ns | us | ms | s | ks
Mode	TDSCDMA
Remote Command	`[:SENSe]:SWEep:EGATe:LENGth <time>` `[:SENSe]:SWEep:EGATe:LENGth?`
Example	:SWE:EGAT:LENG 1
Dependencies/Couplings	See Restriction and Notes in the “Gate Delay” key table.
Preset	461.6 us
State Saved	Saved in instrument state.
Min	10 us
Max	500 ms
Key Path	**Sweep, Gate Setup**

Gate Source

Selects the input to which the gate signal will be applied.

Readback Text	EXT | EXT2 | RFB
Mode	TDSCDMA
Remote Command	`[:SENSe]:SWEep:EGATe:SOURce EXT[1]|EXT2|RFB` `[:SENSe]:SWEep:EGATe:SOURce?`
Example	:SWE:EGAT:SOUR EXT1
Dependencies/Couplings	See Restriction and Notes in the “Gate Delay” key table.
Preset	EXT
State Saved	Saved in instrument state.
Range	EXTernal[1] | EXTernal2 | RFBurst
Key Path	**Sweep, Gate Setup**

External Front (Ext Trig In)

Sets the gate input to be the EXT TRIGGER INPUT on the front panel, and defines the transition point for that input to be the value set on the key.

Unit	mV | V
Mode	TDSCDMA
Remote Command	`[:SENSe]:SWEep:EGATe:EXTernal[1]:LEVel <voltage>`
	`[:SENSe]:SWEep:EGATe:EXTernal[1]?`
Example	:SWE:EGAT:EXT1:LEV 1.5
Preset	1.50 V
State Saved	Saved in instrument state.
Min	–5 V
Max	5 V
Key Path	**Sweep. Gate Setup**

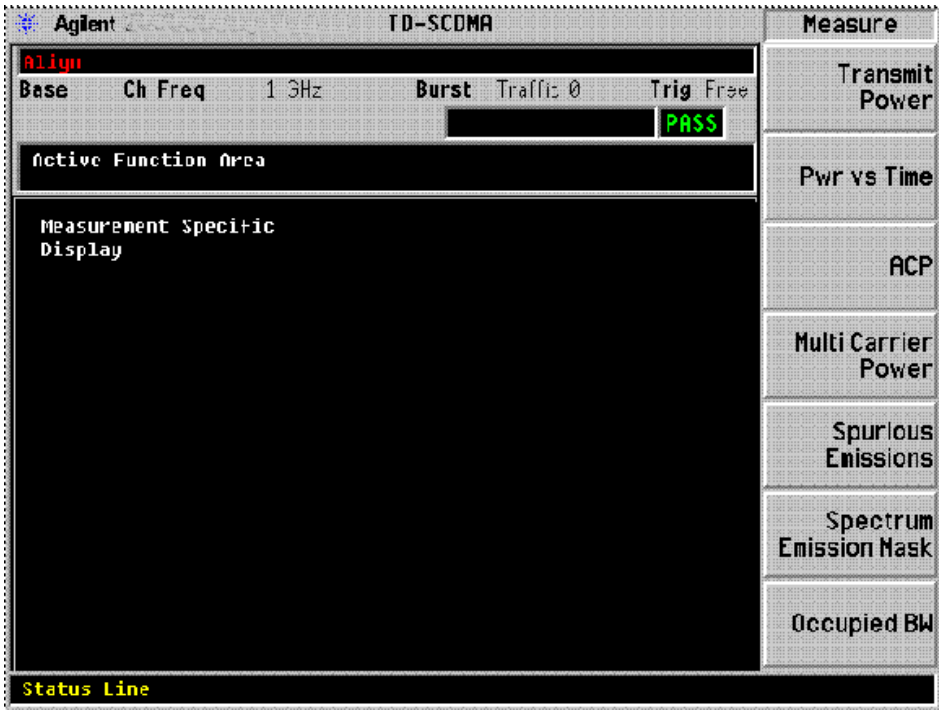
External Rear (Trigger In)

Sets the gate input to be the external input TRIGGER IN on the rear panel, and defines the transition point for that input to be the value set on the key.

Unit	mV | V
Mode	TDSCDMA
Remote Command	`[:SENSe]:SWEep:EGATe:EXTernal2:LEVel <voltage>`
	`[:SENSe]:SWEep:EGATe:EXTernal2:LEVel?`
Example	:SWE:EGAT:EXT2:LEV 1.5
Preset	1.50 V
State Saved	Saved in instrument state.
Min	–5 V
Max	5 V
Key Path	**Sweep. Gate Setup**

Screen Layout Details

This layout includes an area near the top of the display for the active function, error information, and configuration information. See below:



Annunciators

The following annunciators appear in red in the left part of the hardware status bar when appropriate.

Annunciator	Corresponding Instrument Status message
Align	Align Now All Needed Align Now RF Needed Align Now RF Skipped System Alignments, Align Now, All Required
Overload	IF Overload Overload
Uncal	Meas Uncal
Unlevel	50 MHz Osc Unlevel LO Out Unlevel Source LO Unlevel Source Unlevel

Annunciator	Corresponding Instrument Status message
Unlock	1st LO Unlock (PSA) 2nd LO Unlock (PSA) 4th LO Unlock (PSA)
Freq Ref Unlock	Freq Ref Error (Freq Ref Unlocked)

The following annunciators appear in green in the right part of the hardware status bar when appropriate.

Annunciator	Corresponding Instrument Status message
Ext Ref	External Reference

Next Window / Zoom Front-panel keys

When measurements in the personality have a display that consists of more than one window, the analyzer Zoom and Next Window front-panel keys may be used to control the way the windows appear. The Zoom front-panel key causes the current window (indicated by a bright green outline when the standard color palette is used) to fill the entire display area (covering the other windows in the process). All measurements will be written to take advantage of the stingray display system's method of anchoring display items to specific points on the window. This allows the display items to be automatically resized/repositioned/redrawn when the window is resized.

The Next Window front-panel key may be used to change the current (highlighted) measurement window. The Next Window of the display need not be visible on the screen for it to be made current.

Display Window Tile

Selects the viewing format that displays multiple windows of the current measurement data simultaneously. Use DISP:FORM:ZOOM to return the display to a single window.

Mode	TDSCDMA
Remote Command	`:DISPlay:FORMat:TILE`
Example	:DISPlay:FORMat:TILE
Restriction and Notes	Return the display to a state that shows all available windows. Use DISPlay:FORMat:ZOOM to zoom in on the selected window.
State Saved	Saved in instrument state.
Key Path	**Zoom**

Display Window Select

Selects the current window for displays that contain more than one window. The current window is highlighted with a green border when the color palette is set to the default.

Parameter Type	Int32
Mode	TDSCDMA
Remote Command	`:DISPlay:FORMat[:SELect] <integer>`
Example	:DISPlay:FORMat:SELect 2
Restriction and Notes	The maximum value is the number of windows on the display.
Preset	2
State Saved	Saved in instrument state.
Min	1
Max	2
Key Path	**Next Window**

Display Window Zoom

Selects the viewing format that displays only one window of the current measurement data (the current active window). Use DISP:FORMat:TILE to return the display to multiple windows.

Mode	TDSCDMA
Remote Command	`DISPlay:FORMat:ZOOM`
Example	:DISPlay:FORMat:ZOOM
State Saved	Saved in instrument state.
Key Path	**Zoom**

UI Integration with Base Instrument

The measurements will be available on the MEASURE menu only when the TD-SCDMA mode has been selected from the Mode menu.

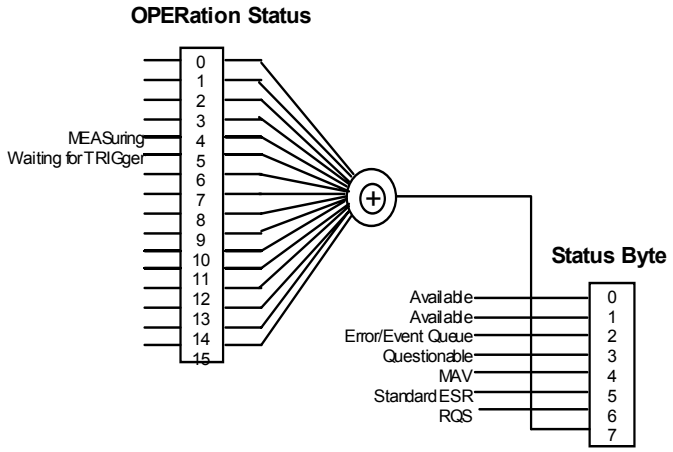
Parameter Types

The table below defines the categories which will be used to define the expected behavior of measurement and base instrument parameters, with the exception of markers. Marker behavior is described in the Markers Section.

	Description	**Changed by User during the Meas**	**Changed by Meas during the Meas**	**Reset on Meas Entry**	**Coupled BI parameters restored on Meas exit to Meas entry value**	**Preset and State Recall active**	**Change Causes a Restart**
Fully Configurable Parameters	These are the most important settings and are typically found under the meas setup key.	Yes	No	No	Yes	Yes	Yes
Locked Out Parameters	These are base instrument settings that cannot be changed whilst the measurement is running. Their SCPI commands have been knit over and their front panel access has been blocked by context sensitive menus.	N/A	Meas Dependent	Yes	Yes	Yes	N/A
Restart Parameters	These are parameters which when changed will cause a measurement restart	Yes	No	No	No	Yes	Yes
Passive Parameters	These are base instrument settings that are not used in the measurement results algorithm	Yes	No	No	No	Yes	No

Status Reporting

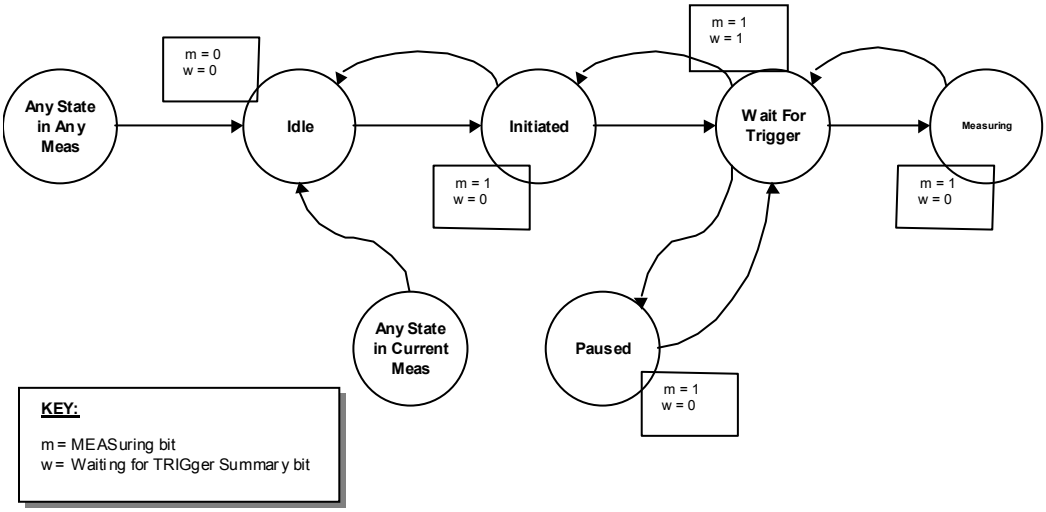
After any of the measurements have been initiated (with the INIT:IMM command or :READ?, or MEAS? queries), the status of operation may be queried using the STATus subsystem SCPI commands. The following bits in the registers as shown below shall be utilized.



The following table defines the meanings of the bits in the previous status diagram:

Bit	Meaning
MEASuring	MEASuring status: Set to 1 if the instrument is actively measuring i.e. Not in the “idle” state. Set to 0 if the instrument is in the “idle” state.
Waiting for TRIGger	Set to 1 if the instrument is in the “wait for trigger” state of the trigger model. Set to 0 otherwise.

The following diagram shows the status of the “MEASuring” and “Waiting for TRIGger” bits at each individual state. Note that it is possible to determine the status of these two bits given the current measurement state, not vice versa.



STATus Subsystem

The STATus command subsystem enables you to examine the status of the spectrum analyzer by monitoring the “Operation Status Register”.

Status Register Set Commands This section lists the five commands that can be applied to all the SCPI registers. These commands should be prefixed with the node or nodes that represent the SCPI Register Set you wish to control.

The five Status Register Set commands are as follows. See SCPI Reference Section 20.1 – 20.5 for detailed definition.

STATus:OPERation:CONDition? See SCPI Reference Section 20.1.

STATus:OPERation:ENABLE <NRf> | <non-decimal numeric> See SCPI Reference Section 20.2.

STATus:OPERation [:EVENt?] See SCPI Reference Section 20.3.

STATus:OPERation:NTRansition <NRf> | <non-decimal numeric> See SCPI Reference Section 20.4.

STATus:OPERation:PTRansition <NRf> | <non-decimal numeric> See SCPI Reference Section 20.5.

Operation Register Sets The following registers contain information that is part of the instrument’s normal operation. The contents of these registers may be accessed by appending the commands listed below

STATus:OPERation The following bits in this register are utilized by the measurements:

Bit Number	Decimal Weight	Description	Graph / Combined
0–3	-	Not used	Averaged Data
4	16	MEASuring	N/A
5	32	Waiting for TRIGger	Averaged Data
6–15	-	Not used	Averaged Data

Other Common Menus

File/Save Functions

The File/Save menu is left unchanged from the base analyzer, other than the addition of a new file type. This allows the user to save the measurement results in a comma-delimited fashion, suitable for opening in a spreadsheet program on a personal computer/laptop/palmtop.

This is implemented as Mime functionality, therefore all measurements which are written to support the Mime display objects will implicitly support saving of measurement results. Any measurement that does not have any results available should gray out and disable this particular menu key.

Results are output in a tabular form, with the headings supplied by the Display object static text and the entries supplied by the Display object values.

Example results files are included in each measurement chapter later in this document. Order and layout in the file should be as close as possible to the layout on the screen.

Note: The ‘Measurement Results’ file type also exists when using the file system to Delete, Catalog, Copy and Rename files.

Frequency Functions

Center Frequency

Allows you to specify the center frequency of the spectrum analyzer. For measurements that tune to more than one frequency during their execution, the frequency of the carrier should be entered here.

Unit	Hz | kHz | MHz | GHz
Mode	TDSCDMA
Remote Command	`[:SENSe]:FREQuency[:CENTer] <freq>`
	`[:SENSe]:FREQuency[:CENTer]?`
Example	:SENSe:FREQuency:CENTer 900 MHz
Preset	1.000 GHz
State Saved	Saved in instrument state.
Min	–100 MHz

Max	HW Dependant
Key Path	**FREQUENCY**

Transmit Band Start Frequency

Allows you to specify the start frequency for the transmit band. This value is used for determining the spectrum that should be skipped in order to meet the specification requirements for spurious emissions for base station measurements and when the measured spectrum should be extended in order to meet the spectrum emission mask measurement requirements.

Unit	Hz | kHz | MHz | GHz
Mode	TDSCDMA
Remote Command	`[:SENSe]:FREQuency:BAND:STARt <freq>` `[:SENSe]:FREQuency:BAND:STARt?`
Example	:SENSe:FREQuency:BAND:STARt 1805 MHz
Preset	1785 MHz
State Saved	Saved in instrument state.
Min	–100 MHz
Max	HW Dependant
Key Path	**FREQUENCY**

Transmit Band Stop Frequency

Allows you to specify the stop frequency for the transmit band. This value is used for determining the spectrum that should be skipped in order to meet the specification requirements for spurious emissions for base station measurements and when the measured spectrum should be extended in order to meet the spectrum emission mask measurement requirements.

Unit	Hz | kHz | MHz | GHz
Mode	TDSCDMA
Remote Command	`[:SENSe]:FREQuency:BAND:STOP <freq>` `[:SENSe]:FREQuency:BAND:STOP?`
Example	SENSe:FREQuency:BAND:STOP 1825 MHz
Preset	1805 MHz
State Saved	Saved in instrument state.
Min	–100 MHz
Max	HW Dependant
Key Path	**FREQUENCY**

Center Frequency Step Size

Allows you to set the size for the center frequency parameter step function.

Unit	Hz | kHz | MHz | GHz
Mode	TDSCDMA
Remote Command	`[:SENSe]:FREQuency[:CENTer]:STEP[:INCRement] <freq>`
	`[:SENSe]:FREQuency[:CENTer]:STEP[:INCRement]?`
	`[:SENSe]:FREQuency[:CENTer]:STEP:AUTO ON|OFF|1|0`
	`[:SENSe]:FREQuency[:CENTer]:STEP:AUTO?`
Example	:SENSe:FREQuency:CENTer:STEP:INCRement 1.6 MHz
	:SENSe:FREQuency:CENTer:STEP:AUTO ON
Preset	1.6 MHz
State Saved	Saved in instrument state.
Min	1 kHz
Max	1 GHz
Key Path	**FREQUENCY**

Channel Burst Type

Selects the type of burst to be measured. Choices are Traffic (TRAFfic), Downlink Pilot (DPTS), and Uplink Pilot (UPTS).

Mode	TDSCDMA
Remote Command	`[:SENSe]:CHANnel:BURSt TRAFfic|DPTS|UPTS`
	`[:SENSe]:CHANnel:BURSt?`
Example	:SENSe:CHANnel:BURSt TRAF

Restriction and Notes	This parameter automatically sets the base box hardware trigger delay to an appropriate value such that the timeslot specified by the Burst Type and Traffic Slot parameter combination is the first complete timeslot viewed at the left-most side of both the Power vs Time and Transmit Power measurements traces. (Assuming ideal Ext Trigger is being used with trigger event representing start of traffic slot 0, and that the specified burst type is active). This parameter also affects the base box hardware sweeptime used for the Power vs Time and Transmit Power measurements. The sweeptime setting employed is determined by the specified Burst Type, along with the number of slots to be viewed (Meas Time parameter), and the known configuration of the TD-SCDMA burst. In some frequency-domain measurements, Burst Type and Traffic Slot keys will determine the Gate Length and Gate Delay. When Burst Type menu key is pressed, Gate State will turn On automatically if current trigger source is NOT Freerun. For more information please refer to the “Gate Delay” section. This key is unavailable (grayed out) while switching to the Spurious Emissions measurement
Dependencies/Couplings	See “Restriction and Notes”
Preset	TRAFfic
State Saved	Saved in instrument state.
Range	Traffic | Downlink Pilot | Uplink Pilot
Key Path	**FREQUENCY**

Traffic Timeslot

Sets the number of the traffic slot that will appear on the left of the display. (see Channel Burst Type for more details)

Mode	TDSCDMA

Remote Command	`[:SENSe]:CHANnel:SLOT <integer>`
	
	`[:SENSe]:CHANnel:SLOT?`

Example	:SENSe:CHANnel:SLOT 2
Restriction and Notes	This parameter is unavailable (greyed out) when the Burst Type parameter is set to Uplink / Downlink or the Spurious Emissions measurement is selected.
Dependencies/Couplings	Traffic Timeslot menu key is enabled when the current Burst Type is Traffic.
Preset	0
State Saved	Saved in instrument state.
Min	0
Max	6

Key Path	**FREQUENCY**

Span Functions

Span Menu

The base analyzer span menu is not available when the TD-SCDMA mode is active. Measurements requiring a Span / X Scale menu have a menu map and command descriptions included in the individual measurement chapters later in this document.

Remote Control

Remote commands for those measurements that place keys on the Span / X Scale menu are listed under those measurements.

Markers

The base analyzer Marker menu is not available while the analyzer is in TD-SCDMA mode. Measurements that require marker functionality have their own Marker menu that will be available only when that measurement is running. These measurement-specific Marker menus are described in detail later in this document, in the chapters describing the individual measurements. When a measurement has no specific marker requirements, the Marker menu will appear blank.

Markers are all measurement-specific. That is, turning on a marker for one measurement does not turn it on for any other measurement. Marker states for each measurement are saved at measurement exit and recalled at measurement entry. If a marker is turned on in a measurement and the measurement is subsequently exited, the marker will be restored the next time that measurement, begins, provided that no *RST or state recall has happened before then. See the individual measurement chapters later in this document for specific SCPI commands for markers.

FORMat Subsystem

The FORMat subsystem sets a data format for transferring numeric and array information. The TRACe [:DATA] command is affected by FORMat subsystem commands.

Byte Order

Selects the binary data byte order for numeric data transfer. In normal mode the most significant byte is sent first. In swapped mode the least significant byte is first. (PCs use the swapped order.) Binary data byte order functionality does not apply to ASCII.

Mode	TDSCDMA
Remote Command	`FORMat:BORDer NORM|SWAP` `FORMat:BORDer?`
Example	FORMat:BORDer SWAPped
Restriction and Notes	Selects the binary data byte order for numeric data transfer. In normal mode the most significant byte is sent first. In swapped mode the least significant byte is first. (PCs use the swapped order.) Binary data byte order functionality does not apply to ASCII.

Preset	NORM
State Saved	Saved in instrument state.
Range	NORMal | SWAPped

Trace Data Format

Sets the format for the data transfer across any remote port. The REAL and ASCII formats will format trace data in the current amplitude units.

ASCII - Amplitude values are in ASCII, in amplitude units, separated by commas. ASCII format requires more memory than the binary formats. Therefore, handling large amounts of this type of data, will take more time and storage space.

Integer,16 - Binary 16-bit integer values in internal units (dBm), in a definite length block.

Integer,32 - Binary 32-bit integer values in internal units (dBm), in a definite length block.

Real,32 (or 64) - Binary 32-bit (or 64-bit) real values in amplitude unit, in a definite length block. Transfers of real data are done in a binary block format.

UINTeger,16 - Binary 16-bit unsigned integer that is uncorrected ADC values, in a definite length block. This format is almost never applicable with current data.

Mode	TDSCDMA
Remote Command	`:FORMat[:TRACe][:DATA] ASC,8|REAL,32|REAL,64`
	`:FORMat[:TRACe][:DATA]?`
Example	FORMat:TRACe:DATA INT32
Preset	REAL,32
State Saved	Saved in instrument state.
Range	ASCii,8| REAL,32 | REAL,64

Measurement Display Availability

The following table is included to show the Windows available for each of the different views for each measurement. This information is intended for use in creating IVI-COM drivers for the DISPlay system of commands.

Measurement	View	Window	X-scale function Available?	Y-scale function Available?
Transmit Power	(Single)	Top (Window 1)	Yes	Yes
		Bottom (Window 2)	—	—
ACLR (ACP)	Combined	Top (Window 1)	No	Yes
		Bottom (Window 2)	—	—
	Bar Graph	Top (Window 1)	No	No
		Bottom (Window 2)	—	—
	Spectrum	Top (Window 1)	No	Yes
		Bottom (Window 2)	—	—
Spectrum Emission Mask	(Single)	Top (Window 1)	No	Yes
		Bottom (Window 2)	—	—
Multi Carrier Power	Spectrum	Top (Window 1)	No	Yes
		Bottom (Window 2)		
	Combined	Top (Window 1)	No	Yes
		Bottom (Window 2)	—	—
Spurious	(Single)	Top (Window 1)	No	Yes
Power vs Time	Burst	Top (Window 1)	Yes	Yes
Occupied Bandwidth	(Single)	Top (Window 1)	No	Yes
		Bottom (Window 2)	—	—

Measurements

Measure Menu

Restart Measurement

Pressing the ‘Restart’ menu key in the Meas Control menu, or pressing the ‘Restart’ front-panel key re-starts the measurement running from the Idle state. This does not change any parameter values but does reset the average counter.

Continuous vs. Single Measurement Mode

The mode of operation of the measurement may be configured from the ‘Continuous/Single’ menu keys in the Meas Control menu. The setting of Continuous/Single is valid for all measurements. If set to:

SINGLE–one measurement will be taken (this will involve a number of sweeps if averaging is ON or if the measurement uses multiple set-points, otherwise just one sweep if averaging is OFF) and measurement results will be displayed. The measurement will then enter the “idle” state.

CONTINUOUS–the measurement run continuously, displaying the measurement results after each trigger cycle. The “idle” state will not be entered.

Pressing this menu key will start the measurement if it is in the “idle” state, or will follow the procedure detailed in the following table if it is in a measurement (trigger) cycle.

Meas Change	Averaging	‘N’ is	Measurement Adjustment
Single to Cont	ON	Less than or equal to ‘K’	Measurement switched into Continuous mode as soon as “idle” state reached. No adjustment necessary.
Cont to Single	ON	Less than or equal to ‘K’	Switch to Single mode immediately. Measurement will terminate and return to the idle state when K averages reached.
Cont to Single	ON	Greater than ‘K’	Restart the measurement in Single mode with the averages ‘N’ set back to 1.
Cont to Single	OFF	-	Switch to Single mode immediately. Measurement will terminate and return to the idle state after current trigger cycle

If the number of averages (K) is altered during a measurement, the new value of K will be used the next time K it is used in any calculation. Note that this will not cause the measurement to restart.

Pause / Resume Measurement

If the ‘Pause’ menu key is pressed during a measurement, the “paused” state is. The measurement can be resumed by pressing the same menu key, which will now be labeled ‘Resume’. The ‘Restart’ front-panel key may also be used to start the measurement from the beginning.

When in the paused state, the analyzer will not sweep. As a result, any trace visible on the display will remain unchanged.

Single Front-panel key

Should put the measurement into ‘Single’ mode, and also initiate a measurement sweep if the measurement is idle.

Remote Control

Continuous Sweep Mode

Turns the continuous sweep mode on or off.

Readback Text	0 | 1
Mode	TDSCDMA
Remote Command	`:INITiate:CONTinuous ON|OFF|1|0` `:INITiate:CONTinuous?`
Example	:INITiate:CONTinuous OFF
Preset	ON
State Saved	Saved in instrument state.
Range	Single | Cont
Key Path	**Meas Control**

Measurement Pause

Pauses the current measurement. Sweeping will stop after the end of the current sweep.

Mode	TDSCDMA
Remote Command	`:INITiate:PAUSe`
Example	:INITiate:PAUSe
Remote Command Notes	No corresponding query.
State Saved	No
Key Path	**Meas Control**

Measurement Resume

Resumes a paused measurement.

Mode	TDSCDMA
Remote Command	`:INITiate:RESume`
Example	:INITiate:RESume
Remote Command Notes	No corresponding query.
State Saved	No

Key Path	**Meas Control**

Initiate Measurement Sweep

Initiates a measurement. Any current measurement is interrupted.

Mode	TDSCDMA
Remote Command	`:INITiate[:IMMediate]`
Example	:INITiate:IMMidiate
Remote Command Notes	No corresponding query.
State Saved	No
Key Path	**Meas Control**

Initiate Measurement Restart

Re-initiate the current measurement. Any measurement in progress is interrupted.

Mode	TDSCDMA
Remote Command	`:INITiate:RESTart`
Example	:INITiate:RESTart
Remote Command Notes	No corresponding query.
State Saved	No
Key Path	**Meas Control, Restart**

Initiate Power vs Time Measurement

Initiates a power versus time measurement. Any current measurement is interrupted.

Mode	TDSCDMA
Remote Command	`:INITiate:PVTime`
Example	:INITiate:PVTime
Remote Command Notes	No corresponding query.
State Saved	No
Key Path	**Measure, Pwr vs Time**

Initiate Transmit Power Measurement

Initiates a transmit power measurement. Any current measurement is interrupted.

Mode	TDSCDMA
Remote Command	`:INITiate:TXPower`
Example	:INITiate:TXPower
Remote Command Notes	No corresponding query.
State Saved	No
Key Path	**Measure, Transmit Power**

Initiate an ACP Measurement

Initiates an adjacent channel power measurement. Any current measurement is interrupted.

Mode	TDSCDMA
Remote Command	`:INITiate:ACP`
Example	:INITiate:ACP
Remote Command Notes	No corresponding query.
State Saved	No
Key Path	**Measure, ACP**

Initiate a Multi-carrier Power Measurement

Initiates a multi-carrier power measurement. Any current measurement is interrupted.

Mode	TDSCDMA
Remote Command	`:INITiate:MCPower`
Example	:INITiate:MCPower
Remote Command Notes	No corresponding query.
State Saved	No
Key Path	**Measure, Multi Carrier Power**

Initiate a Spurious Emissions Measurement

Initiates a spurious emissions measurement. Any current measurement is interrupted.

Mode	TDSCDMA
Remote Command	`:INITiate:SPURious`
Example	:INITiate:SPURious

Remote Command Notes	No corresponding query.
State Saved	No
Key Path	**Measure, Spurious Emissions**

Initiate a Spectrum Emission Mask Measurement

Initiates a spectrum emission mask measurement. Any current measurement is interrupted.

Mode	TDSCDMA
Remote Command	`:INITiate:SEMask`
Example	:INITiate:SEMask
Remote Command Notes	No corresponding query.
State Saved	No
Key Path	**Measure, Spectrum Emission Mask**

Initiate an Occupied Bandwidth Measurement

Initiates an occupied bandwidth measurement. Any current measurement is interrupted.

Mode	TDSCDMA
Remote Command	`:INITiate:OBWidth`
Example	:INITiate:OBWidth
Remote Command Notes	No corresponding query.
State Saved	No
Key Path	**Measure, Occupied BW**

Query the current measurement configuration

Queries the measurement for which the analyzer is currently configured. Possible return values are PVTime | TXPower | ACP | MCPower | SPURious | SEMask | OBWidth

Mode	TDSCDMA
Remote Command	`:CONFigure?`
Example	:CONFigure?
State Saved	No
Range	PVTime | TXPower | ACP | MCPower | SPURious | SEMask | OBWidth
Key Path	**Measure**

Configure a Power vs Time Measurement

Configures the analyzer for a power versus time measurement. Any current measurement is interrupted.

Mode	TDSCDMA
Remote Command	`:CONFigure:PVTime`
Example	:CONFigure:PVTime
Remote Command Notes	No corresponding query.
State Saved	No
Key Path	**Measure, Pwr vs Time**

Configure Transmit Power Measurement

Configures a transmit power measurement. Any current measurement is interrupted.

Mode	TDSCDMA
Remote Command	`:CONFigure:TXPower`
Example	:CONFigure:TXPower
Remote Command Notes	No corresponding query.
State Saved	No
Key Path	**Measure, Transmit Power**

Configure an ACP Measurement

Configures an adjacent channel power measurement. Any current measurement is interrupted.

Mode	TDSCDMA
Remote Command	`:CONFigure:ACP`
Example	:CONFigure:ACP
Remote Command Notes	No corresponding query.
State Saved	No
Key Path	**Measure, ACP**

Configure a Multi-carrier Power Measurement

Configures a multi-carrier power measurement. Any current measurement is interrupted.

Mode	TDSCDMA
Remote Command	`:CONFigure:MCPower`
Example	:CONFigure:MCPower

Remote Command Notes	No corresponding query.
State Saved	No
Key Path	**Measure, Multi Carrier Power**

Configure a Spurious Emissions Measurement

Configures a spurious emissions measurement. Any current measurement is interrupted.

Mode	TDSCDMA
Remote Command	`:CONFigure:SPURious`
Example	:CONFigure:SPURious
Remote Command Notes	No corresponding query.
State Saved	No
Key Path	**Measure, Spurious Emissions**

Configure a Spectrum Emission Mask Measurement

Configures a spectrum emission mask measurement. Any current measurement is interrupted.

Mode	TDSCDMA
Remote Command	`:CONFigure:SEMask`
Example	:CONFigure:SEMask
Remote Command Notes	No corresponding query.
State Saved	No
Key Path	**Measure, Spectrum Emission Mask**

Configure an Occupied Bandwidth Measurement

Configures an occupied bandwidth measurement. Any current measurement is interrupted.

Mode	TDSCDMA
Remote Command	`:CONFigure:OBWidth`
Example	:CONFigure:OBWidth
Remote Command Notes	No corresponding query.
State Saved	No
Key Path	**Measure, Occupied Bandwidth**

Transmit Power

Measurement Setup

Meas Setup Menu

Avg Number

Allows you to specify the number of measurement averages used when calculating the measurement result. The average will be displayed at the end of each sweep. The Average state allows the you to turn averaging on or off.

Mode	TDSCDMA
Remote Command	`[:SENSe]:TXPower:AVERage:COUNt <integer>`
	`[:SENSe]:TXPower:AVERage:COUNt?`
	`[:SENSe]:TXPower:AVERage[:STATe] ON|OFF|1|0`
	`[:SENSe]:TXPower:AVERage[:STATe]?`
Example	:SENSe:TXPower:AVERage:COUNt 25
	:SENSe:TXPower:AVERage:STATe ON
Preset	10
State Saved	Saved in instrument state.
Min	1
Max	1000
Key Path	**Meas Setup**

Avg Mode

Press Avg Mode (Exp) to continue measurement averaging, using the specified number of averages to compute each averaged value. The average will be displayed at the end of each sweep. Avg Mode (Repeat) will cause the measurement to reset the average counter each time the specified number of averages is reached.

Mode	TDSCDMA
Remote Command	`[:SENSe]:TXPower:AVERage:TCONtrol EXPonential|REPeat`
	`[:SENSe]:TXPower:AVERage:TCONtrol?`
Example	:SENSe:TXPower:AVERage:TCONtrol
Preset	EXPonential
State Saved	Saved in instrument state.

Range	Exp | Repeat
Key Path	**Meas Setup**

Average Type

Selects the type of averaging to be performed. Video (LOG) averaging sums the trace data and divides by the average count. Power averaging is performed by converting the trace data from dB to power units, and then averaging the power trace data (which is more time consuming). Minimum and Maximum keep the minimum or maximum value, respectively. The front-panel labels used for this parameter are Log (LOG), Minimum, Maximum, and RMS.

Mode	TDSCDMA
Remote Command	`[:SENSe]:TXPower:AVERage:TYPE LOG|RMS` `[:SENSe]:TXPower:AVERage:TYPE?`
Example	:SENSe:PVTime:AVERage:TYPE RMS
Preset	RMS
State Saved	Saved in instrument state.
Range	Log | Pwr Avg (RMS)
Key Path	**Meas Setup**

Meas Method

There are three options for this parameter; Above Threshold Level, Measured Burst Width, and Single Time Slot.

The Above Threshold Level measurement algorithm is to capture a time record, and average only those points in the time record that exceed the user-specified threshold level. No attempt is made to position the burst, or to calculate/display burst widths. This can be used to measure continuous signals, or burst signals where the Measured Burst Width algorithm is too restrictive.

The Measured Burst Width measurement algorithm uses the threshold level to calculate the burst center, and average those points that lie within a user-specified burst width that is centered upon the burst.This method is recommend both to measure a continuous burst when trigger source is External Front/Rear and to measure a single burst when trigger source is RF Burst.

The Single Time Slot measurement algorithm is to capture a single time slot record, and calculate the start and stop position of the time slot in terms of the trigger position theoretically. No attempt is made to position the burst, or to calculate/display burst widths. The burst width drawn in the screen is considered to be the theoretical width of the slot. This method is recommended to measure the mean transmit power in a single slot when trigger source is External Front/Rear while the Measured Burst Width algorithm is too restrictive.

Readback Text	BWID | THR | SING
Mode	TDSCDMA

Remote Command	`[:SENSe]:TXPower:METHod BWIDth|THReshold|SINGle` `[:SENSe]:TXPower:METHod?`
Example	:SENSe:TXPower:METHod BWIDth
Dependencies/Couplings	When device in Radio menu changes: If device is BTS, Trigger Source: External Front, Method: Single Time Slot, Measure: Continuous, Measure Time: disabled (=1); If device is MS, Trigger Source: RF Burst, Method: Measured Burst Width, Measure: Single, Measure Time: enabled.
Preset	SINGle
State Saved	Saved in instrument state.
Range	Measured Burst Width | Above Threshold Level | Single Time Slot
Key Path	**Meas Setup**

Threshold Lvl

The mean reference is calculated based on the trace above the threshold level. The threshold level may be described in dB (relative to the carrier) or dBm (absolute). A green line on the trace area will be displayed at the y-position associated with the current threshold level value, converted to the current amplitude display units. The default values are –60 dB and Relative, and the range is –100 dB to 0 dB (relative), or –100 dBm to 60 dBm (absolute).

Mode	TDSCDMA

Remote Command	`[:SENSe]:TXPower:THReshold <real>`
	`[:SENSe]:TXPower:THReshold?`
	`[:SENSe]:TXPower:THReshold:TYPE ABSolute|RELative`
	`[:SENSe]:TXPower:THReshold:TYPE?`

Example	:SENSe:TXPower:THReshold –30 :SENSe:TXPower:THReshold:TYPE ABS
Restriction and Notes	When thew method is Single Time Slot, this key will not trigger a restart.
Preset	–60
State Saved	Saved in instrument state.

Min	–100
Max	0
Key Path	**Meas Setup**

Trig Source

Selects one of the trigger sources used to control the data acquisitions.

EXTernal 1 – front panel external trigger input

EXTernal 2 – rear panel external trigger input

IMMediate – the next data acquisition is immediately taken, capturing the signal asynchronously (also called free run).

RFBurst – internal wideband RF burst envelope trigger that has automatic level control for periodic burst signals.

Mode	TDSCDMA
Remote Command	`[:SENSe]:TXPower:TRIGger:SOURce IMM|RFB|EXT[1]|EXT2`
Example	:SENSe:TXPower:TRIGger:SOURce EXT1
Restriction and Notes	Allows you to change the type of trigger used for the measurement. EXT or EXT1 is the front panel external trigger. EXT2 is the rear panel external trigger.
Dependencies/Couplings	When the device in the Radio menu changes: If the selected device is BTS, Trigger Source: External Front, Method: Single Time Slot, Measure: Continuous, Measure Time: disabled (=1); If the selected device is MS, Trigger Source: RF Burst, Method: Measured Burst Width, Measure: Single, Measure Time: enabled.
Preset	EXT[1]
State Saved	Saved in instrument state.
Range	Free Run (Immediate) | RF Burst (Wideband) | Ext Front | Ext Rear
Key Path	**Meas Setup, More**

Meas Time

Sets the number of slots to be captured for each measurement. Uplink and downlink pilots each count as one slot, so setting the Meas Time parameter to 9 will display one full subframe.

Mode	TDSCDMA
Remote Command	`[:SENSe]:TXPower:SWEep:TIME <integer>` `[:SENSe]:TXPower:SWEep:TIME?`
Example	:SENSe:TXPower:SWEep:TIME 4
Restriction and Notes	In Single Time Slot method, Meas Time will be set to 1 and the key will be disabled automatically
Dependencies/Couplings	When the device in the Radio menu changes: If the selected device is BTS, Trigger Source: External Front, Method: Single Time Slot, Measure: Continuous, Measure Time: disabled (=1); If the selected device is MS, Trigger Source: RF Burst, Method: Measured Burst Width, Measure: Single, Measure Time: enabled.
Preset	1
State Saved	Saved in instrument state.
Min	1
Max	18
Key Path	**Meas Setup, More**

Burst Width

When Burst Width Mode is set to manual the user may enter a fixed-time value in seconds, or alternatively specify the burst width as a percentage of the last measured burst width (result in bottom-left corner of display). If the user specifies the burst width as a percentage, the fixed-value time is instantaneously calculated and displayed in the menu key.

Burst Width will be grayed out if Meas Method is set to ‘Above Threshold Lvl’ or ‘Single Time Slot’.

The burst width parameter has two modes; Auto and Manual.

When set to Auto, the burst width is automatically calculated based on the threshold level. For example, if the threshold level is set to 3 dB, the burst width will be the time between the two 3 dB points. This will update after each sweep, but before any results are calculated. Since the measurement only ever

measures over the burst width, this will force a measurement between the 3 dB points.

When set to Manual, the user can specify the burst width. To measure a portion of the burst, for example 20% to 80%, or a fixed time period for example 542 us centered on the burst, then you can specify that using this function.

The user may enter a fixed-time value in seconds, or alternatively specify the burst width as a percentage of the last measured burst width (result in bottom-left corner of display). If the user specifies the burst width as a percentage, the fixed-value time is instantaneously calculated and displayed in the menu key.

Burst Width will be grayed out if Meas Method is set to 'Above Threshold Lvl' or 'Single Time Slot'.

Unit	ns | us | ms | s | ks
Mode	TDSCDMA

Remote Command	`[:SENSe]:TXPower:BURSt:WIDTh <time>`
	`[:SENSe]:TXPower:BURSt:WIDTh?`
	`[:SENSe]:TXPower:BURSt:AUTO ON|OFF|1|0`
	`[:SENSe]:TXPower:BURSt:AUTO?`

Example	:SENSe:TXPower:BURSt:WIDTh 600 µs :SENSe:TXPower:BURSt:AUTO ON
Restriction and Notes	The default value is dependant on the Burst type: Burst Type = Traffic, Burst Width = 662.5 us Burst Type = Downlink Pilot, Burst Width = 50 us Burst Type = Uplink Pilot, Burst Width = 100 us Set the burstwidth used for measuring the power in the burst. If set to Auto, the burst width will be determined. This key is grayed out when the measurement method is set to Above Threshold Level or Single Time Slot.
Preset	662.5us
State Saved	Saved in instrument state.
Min	1us
Max	1s
Key Path	**Meas Setup**

Marker Functions

Markers All Off

Turns all markers off for the Transmit Power measurement

Mode	TDSCDMA
Remote Command	`:CALCulate:TXPower:MARKer[1]|2|3|4:AOFF`
Example	:CALCulate:PVTime:MARKer:AOFF
Restriction and Notes	Turn all markers off.
Remote Command Notes	No corresponding query.
State Saved	No
Key Path	**Marker**

Marker Mode

Sets the mode for the specified marker.

Mode	TDSCDMA
Remote Command	`:CALCulate:TXPower:MARKer[1]|2|3|4:MODE DELT|OFF|POS` `:CALCulate:TXPower:MARKer[1]|2|3|4:MODE?`
Example	:CALCulate:TXPower:MARKer4:MODE DELTa
Restriction and Notes	When a Marker is set to Delta, the next marker is used as the Reference Marker and its Mode is set to Normal (POSition). The value of the Delta Marker is the relative value from the Reference Marker. When Marker 4 is set to Delta, Marker 1 is used as the Reference Marker.
Preset	OFF
State Saved	Saved in instrument state.
Range	Delta | Off | Normal
Range	DELT | OFF | POS
Key Path	**Marker**

Marker State

Turns the specified marker on or off.

Mode	TDSCDMA
Remote Command	`:CALCulate:TXPower:MARKer[1]|2|3|4[:STATe] ON|OFF|1|0` `:CALCulate:TXPower:MARKer[1]|2|3|4[:STATe]?`
Example	:CALCulate:TXPower:MARKer2:STATe ON

Preset	OFF
State Saved	Saved in instrument state.
Range	On | Off
Key Path	**Marker**

Marker X Value

Sets the X-axis value for the specified marker

Unit	ns | us | ms | s | ks
Mode	TDSCDMA
Remote Command	`:CALCulate:TXPower:MARKer[1]|2|3|4:X <time>` `:CALCulate:TXPower:MARKer[1]|2|3|4:X?`
Example	:CALCulate:TXPower:MARKer2:X 0.001s
Restriction and Notes	This will be absolute if Marker Mode is Normal and relative if Marker Mode is Delta.
Preset	0
State Saved	Saved in instrument state.
Min	–1 ms
Max	6 ms

Marker Y Position

Queries the amplitude value at the specified marker.

Mode	TDSCDMA
Remote Command	`:CALCulate:TXPower:MARKer[1]|2|3|4:Y?`
Example	:CALCulate:TXPower:MARKer2:Y?
Remote Command Notes	Query only
State Saved	No
Min	–170
Max	100

Amplitude / Y Scale

Y-Axis Scale / Div

Sets the logarithmic units per vertical graticule division on the display.

Unit	dB
Mode	TDSCDMA
Remote Command	`:DISPlay:TXPower:WINDow:TRACe:Y[:SCALe]:PDIVision <rel_ampl>` `:DISPlay:TXPower:WINDow:TRACe:Y[:SCALe]:PDIVision?`
Example	:DISPlay:TXPower:WINDow:TRACe:Y:SCALe:PDIVision 10 dB
Preset	10 dB
State Saved	Saved in instrument state.
Min	0.10 dB
Max	20.00 dB
Key Path	**Amplitude**

Y Axis Ref Value

Sets the logarithmic units per vertical graticule division on the display.

Unit	dBm
Mode	TDSCDMA
Remote Command	`:DISPlay:TXPower:WINDow:TRACe:Y[:SCALe]:RLEVel <ampl>` `:DISPlay:TXPower:WINDow:TRACe:Y[:SCALe]:RLEVel?`
Example	:DISPlay:TXPower:WINDow:TRACe:Y:SCALe:RLEVel 10 dBm
Restriction and Notes	Allows the reference Level to be changed. Min and Max dependant on Attenuation and Max Mixer Level settings.
Dependencies/Couplings	Coupled to Attenuation and Max Mixer Level
Preset	0 dBm
State Saved	Saved in instrument state.
Min	–170 dBm
Max	30 dBm
Key Path	**Amplitude**

Restore Meas Defaults

Pressing the Restore Meas Defaults key (Meas Setup, More, Restore Meas Defaults) will preset (that is, set to the factory defaults) only the parameters that are specific to the selected measurement. Parameters whose default values are determined by the value of a mode parameter are set to the appropriate value for the current setting of that mode parameter.

Restart Parameters

A change to any parameter found on the Mode Setup menu (and its submenus) will cause the measurement to restart. The same is true of changes to Center Freq (Frequency Menu). Note that parameters described above in the Meas Setup Menu section also cause a restart of the measurement.

Measurement Results

Result	Units	Min	Max
Mean Transmit Power	dBm	–200 dBm	200 dBm
Max Pt	dBm	–200 dBm	200 dBm
Min Pt	dBm	–200 dBm	200 dBm
Mean Transmit Pwr (Current)	dBm	–200 dBm	200 dBm
Burst Width	us	See parameter minimum	See parameter maximum

Transmit Power

This result is simply the Mean Transmit Pwr result, averaged according to the Average Number, Average Mode, and Average Type parameter settings.

Max Pt (Current)

The max pt is current data, and therefore is based on the current trace, and not the averaged data. It simply gives the maximum trace point on the measured part of the burst.

Min Pt (Current)

The min pt is current data, and therefore is based on the current trace, and not the averaged data. It simply gives the minimum trace point on the measured part of the burst.

Mean Transmit Pwr (Current)

The mean transmit power is current data, and therefore is based on the current trace, and not the averaged data. The value is calculated in two ways, RMS and Log, which can be specified in Average Type key. If the type is RMS, all of the trace element amplitudes (only those above the threshold level for the Above Threshold Level method, and only those between the two vertical lines in both Measured Burst Width and Single Time Slot method) are converted from dBm into mW, and added together, then the sum is divided by the number of trace elements included in the average. If Log type is selected, all of the trace element amplitudes (only those above the threshold level for the Above Threshold Level method, and only those between the two vertical lines in both Measured Burst Width and Single Time Slot method)

are added together directly, and the sum is divided by the number of the trace elements included in the average. For both RMS and Log type, the logarithmic form (dBm) of the average value will be displayed as the mean transmit power at the end of the measurement sweep.

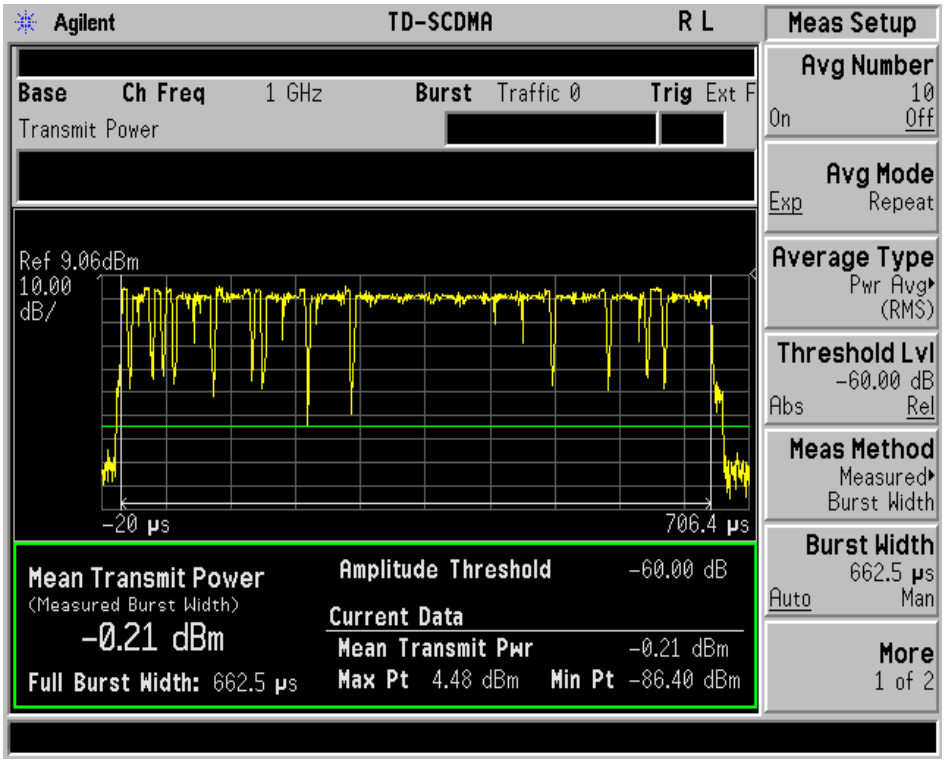
Burst Width

The burst width result is the time between the detected start and stop of the burst. These points are worked out based on the mean power of the trace, and the –6 dB points (relative to mean power). The –6 dB points are calculated using the threshold level parameter. This result does not reflect and is not linked with the Burst Width parameter, unless Burst Width Mode = Auto. If the Measure Method parameter is set to Above Threshold Level or Single Time Slot, the screen result is unavailable (four dashed lines are shown) and 0.00 is returned for this result when measurement results are queried remotely.

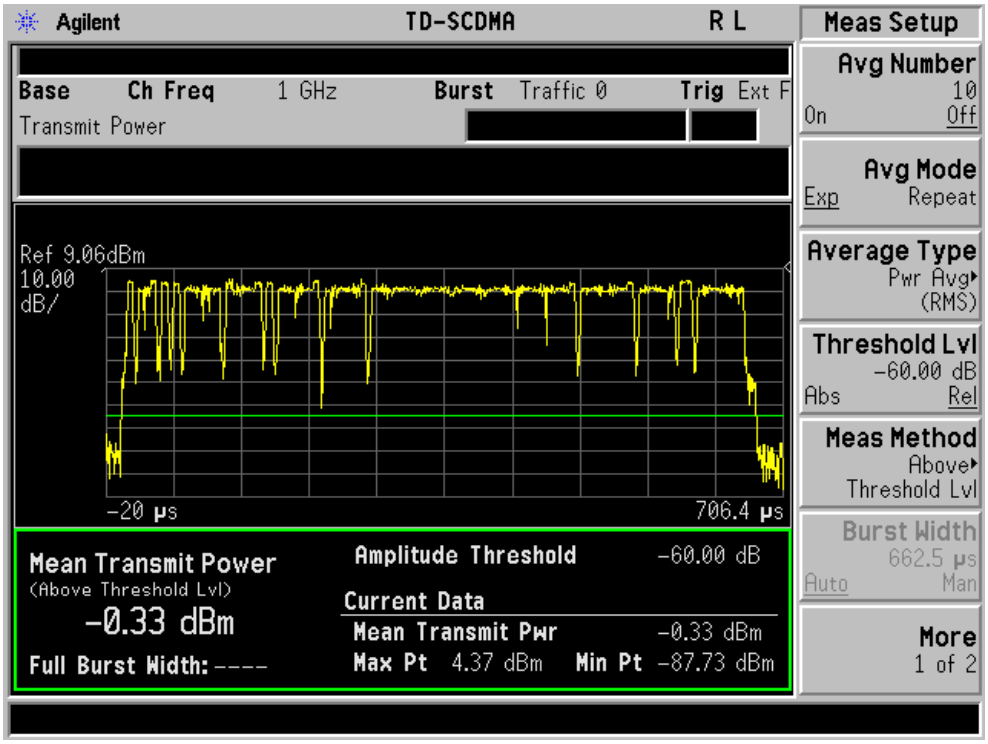
Results

Results Screen

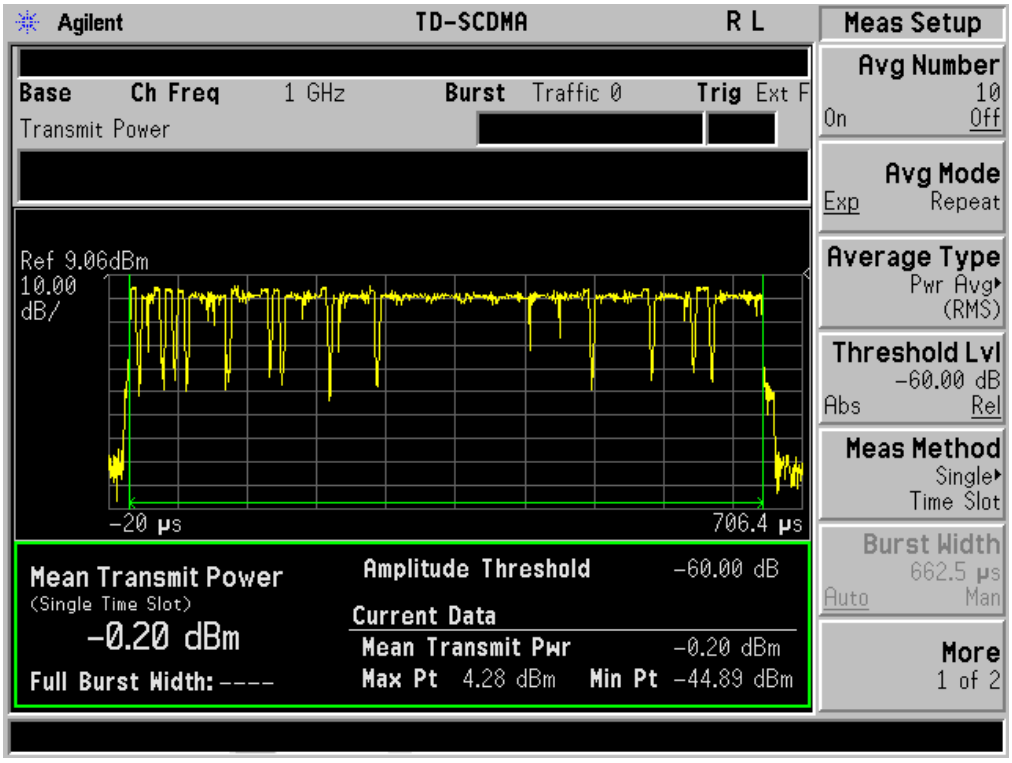
Results screen for Meas Method set to Measured Burst Width:



Results screen for Meas Method set to Above Threshold Level:



Results screen for Meas Method set to Single Time Slot:



The annotation consists of:

In Measured Burst Width method:

Threshold Level (or n dB point indicator) - Horizontal Green Line

Measured area indicator - twin light grey vertical lines

The lower (smaller) screen is used to display the measurement results and is updated after every sweep.

In Above Threshold Level method:

Threshold Level (or n dB point indicator) - Horizontal Green Line

The lower (smaller) screen is used to display the measurement results and is updated after every sweep.

In Single Time Slot method:

Measured area indicator - twin light green vertical lines

The lower (smaller) screen is used to display the measurement results and is updated after every sweep.

Results File

:MMEMory:STORe:RESults <'filename'>

One method of results storage will be in a file suitable for import into a spreadsheet program. Upon request from the file system, a comma delimited .csv file should be created with the following items; time, date, column titles, and "results." This file should contain all of the data necessary to recreate the measurement conditions.

Application	**TD-SCDMA Utilities**	
Measurement	Transmit Power	
Date	17-Apr	2007
Time	9:00:33	
Measurement Parameters		
Average State	Off	
Number of Averages	10	
Average Mode	Exp	
Average Type	Pwr Avg (RMS)	
Measure	Cont	
Device	BTS	
Meas Method	Above Threshold Lvl	
Trigger Source	Ext Front	
Burst Type	Downlink Pilot	

Application	TD-SCDMA Utilities	
Traffic Timeslot	NA	
Meas Time	1	
Threshold Level	–60	dB
Res BW	1.3	MHz
Video BW	1.3	MHz
Frequency Parameters		
Center Freq	1	GHz
Sweep Time	122.5	µs
Measurement Results		
Mean Transmit Power	–28.36	dBm
Current Data		
Mean Transmit Power	–28.36	dBm
Max Pt	–24.52	dBm
Min Pt	–108	dBm
Full Burst Width:	NA	

Status Bar Messages

Status Bar Text	Meaning	ID (SCPI #)	Type
Entire trace is below threshold level	The measurement cannot operate properly because the trace has completely fallen below the threshold level.	10159	Warning

SCPI Remote Commands

Command	Return Value
CONFigure:TXPower	N/A
INITiate:TXPower	N/A
FETCh:TXPower[n]? MEASure:TXPower[n]? READ:TXPower[n]?	N = 1 Returns the following scalar results: 1. Sample time is a floating point number representing the time between samples when using the trace queries. 2. Power is the mean power (in dBm) value. If averaging is on, the power is for the latest acquisition. 3. Power averaged is power (in dBm) for N averages, if averaging is on. An average consists of N acquisitions of data which represents the current trace. If averaging is off, the value of power averaged is the same as the power value. 4. Number of samples is the number of data points in the captured signal. This number is useful when performing a query on the signal. 5. Threshold value is the threshold (in dBm) above which the power is calculated when method is 'Above Threshold Level'. 6. Threshold points is the number of points that were above the threshold. When current method is 'Single Time Slot', -999 will be returned. 7. Maximum value is the maximum of the most recently acquired data (in dBm). 8. Minimum value is the minimum of the most recently acquired data (in dBm).
	N = 2 Returns trace point values of the entire captured trace data. These data points are floating point numbers representing the power of the signal (in dBm). There are N data points, where N is the number of samples. The period between the samples is defined by the sample time.

Power vs Time

Measurement Setup

Meas Setup Menu

Avg Number

Allows you to specify the number of measurement averages used when calculating the measurement result. The average will be displayed at the end of each sweep. Average State allows the user to turn averaging on or off.

Mode	TDSCDMA
Remote Command	`[:SENSe]:PVTime:AVERage:COUNt <integer>`
	`[:SENSe]:PVTime:AVERage:COUNt?`
	`[:SENSe]:PVTime:AVERage[:STATe] ON|OFF|1|0`
	`[:SENSe]:PVTime:AVERage[:STATe]?`
Example	:SENSe:PVTime:AVERage:COUNt 25
	:SENSe:PVTime:AVERage:STATe ON
Preset	10
State Saved	Saved in instrument state.
Min	1
Max	1000
Key Path	**Meas Setup**

Avg Mode

Selects the averaging mode. Press Avg Mode (Exp) to continue measurement averaging, using the specified number of averages to compute each averaged value. The average will be displayed at the end of each sweep. Avg Mode (Repeat) will cause the measurement to reset the average counter each time the specified number of averages is reached.

Mode	TDSCDMA
Remote Command	`[:SENSe]:PVTime:AVERage:TCONtrol EXPonential|REPeat`
	`[:SENSe]:PVTime:AVERage:TCONtrol?`
Restriction and Notes	
Preset	EXPonential
State Saved	Saved in instrument state.

Range	Exp | Repeat
Key Path	**Meas Setup**

Average Type

Selects the type of averaging to be performed. Video (LOG) averaging sums the trace data and divides by the average count. Power (RMS) averaging is performed by converting the trace data from dB to power units, and then averaging the power trace data (which is more time consuming). Minimum and Maximum keep the minimum or maximum value, respectively.

Mode	TDSCDMA
Remote Command	`[:SENSe]:PVTime:AVERage:TYPE LOG|RMS`
	`[:SENSe]:PVTime:AVERage:TYPE?`
Example	:SENSe:PVTime:AVERage:TYPE RMS
Preset	RMS
State Saved	Saved in instrument state.
Range	Log | Pwr Avg (RMS)
Key Path	**Meas Setup**

Meas Time

Set the number of slots to be captured for each measurement. Each of the pilots counts as a timeslot, so setting the Meas Time value to 9 will show a whole subframe (5 ms).

Mode	TDSCDMA
Remote Command	`[:SENSe]:PVTime:SWEep:TIME <integer>`
	`[:SENSe]:PVTime:SWEep:TIME?`
Example	:SENSe:PVTime:SWEep:TIME 4
Restriction and Notes	
Preset	1
State Saved	Saved in instrument state.
Min	1
Max	9
Key Path	**Meas Setup**

Limit Mask Selection

Choose whether the limit masks used will be the default, standard-compliant values or the user-defined values.

Mode	TDSCDMA
Remote Command	`[:SENSe]:PVTime:MASK:SELect CUSTom|STANdard` `[:SENSe]:PVTime:MASK:SELect?`
Example	:SENSe:PVTime:MASK:SELect CUSTom
Restriction and Notes	When set to CUSTom, the mask used will be the one described by these programming commands: [:SENSe]:PVTime:MASK:LIST:LOWer:ABSolute [:SENSe]:PVTime:MASK:LIST:UPPer:ABSolute [:SENSe]:PVTime:MASK:LIST:LOWer:RELative [:SENSe]:PVTime:MASK:LIST:UPPer:RELative [:SENSe]:PVTime:MASK:LIST:LOWer:TIME [:SENSe]:PVTime:MASK:LIST:UPPer:TIME
Preset	STANdard
State Saved	Saved in instrument state.
Range	CUSTom | STANdard

Lower Mask Absolute Amplitude Levels

Sets a power level for any mask line segments that require an absolute minimum power limit.

Unit	dBm
Mode	TDSCDMA
Remote Command	`[:SENSe]:PVTime:MASK:LIST:LOWer:ABSolute <ampl>,…` `[:SENSe]:PVTime:MASK:LIST:LOWer:ABSolute?`
Example	:SENSe:PVTime:MASK:LIST:LOWer:ABSolute –130, –130, –130,–130

Restriction and Notes	Enter a power level for any mask line segments that require an absolute minimum power limit. Each time a measurement is made the Ref Level is determined, (this is the power level of the useful part of the burst). As the power of the Ref Level changes, all of the relative mask power levels will change by the same amount. Each relative limit is then compared to the Ref Level and an equivalent absolute power level is calculated. This power level is compared to the specified absolute limit for each line segment. If this calculated relative limit is lower than the absolute limit specified, the value of the absolute limit is used for this segment. If the absolute limit is set to a very low value (–200 dBm), the calculated value of the reference limit will never be lower, and the specified relative limit will always be used for that segment. Every time point defined with PVT:MASK:LOW:TIME must have a power value defined in the same order.
Remote Command Notes	When setting these values remotely, the position in the list sent corresponds to the offset. Missing values are not permitted, that is, if you want to change values 2 and 4 you must send all values up to 4. Subsequent values will remain unchanged, unless the number of values sent is greater than the number of carriers, then subsequent values will be ignored.
Preset	–200 dBm, –200 dBm, –200 dBm, –200 dBm
State Saved	Saved in instrument state.
Min	–200 dBm
Max	100 dBm

Lower Mask Points

Queries the number of elements in the lower mask. This value is determined by the number of time points entered using [:SENSe]:PVTime:MASK:LIST:LOWer:TIME.

Mode	TDSCDMA
Remote Command	`[:SENSe]:PVTime:MASK:LIST:LOWer:POINts?`
Example	:SENSe:PVTime:MASK:LIST:LOWer:POINts?
Remote Command Notes	No corresponding command
State Saved	Saved in instrument state.
Min	1
Max	25

Lower Mask Relative Amplitude Levels

Sets the relative power level for each horizontal line segment in the lower limit mask.

Unit	dB
Mode	TDSCDMA

Remote Command	`[:SENSe]:PVTime:MASK:LIST:LOWer:RELative <rel_ampl>,…` `[:SENSe]:PVTime:MASK:LIST:LOWer:RELative?`
Example	:SENSe:PVTime:MASK:LIST:LOWer:RELative 130, 130, 130 130
Restriction and Notes	Enter the relative power level for each horizontal line segment in the lower limit mask. There should be a power level for each time point entered using :PVTime:MASK:LIST:LOWer:TIME, and they must be entered in the same order. These power levels are all relative to the defined Reference Power Level (the average power in the useful part of the data).
Remote Command Notes	When setting these values remotely, the position in the list sent corresponds to the offset. Missing values are not permitted i.e. if you want to change values 2 and 4 you must send all values up to 4. Subsequent values will remain unchanged, unless the number of values sent is greater than the number of carriers, then subsequent values will be ignored.
Preset	100 dB, 100 dB, 100 dB, 100 dB
State Saved	Saved in instrument state.
Min	–200 dB
Max	100 dB

Lower Mask Time Points

Sets the value on the X-Axis at which the next segment of the mask begins.

Unit	ns | us | ms | s | ks
Mode	TDSCDMA
Remote Command	`[:SENSe]:PVTime:MASK:LIST:LOWer:TIME <time>,…` `[:SENSe]:PVTime:MASK:LIST:LOWer:TIME?`
Example	:SENSe:PVTime:MASK:LIST:LOWer:TIME –1.0, -.5, 0, 0.5, 1.0
Restriction and Notes	Enter the value on the X-Axis at which the next segment of the mask begins. The left most value on the X-Axis is the value of the trigger delay (which may be positive or negative), and is shown on the display as an annotation on the X-Axis. Selecting a large time value for the first and last mask points (e.g. –1 and +1 second) guarantees a limit is defined for all measured data.
Remote Command Notes	When setting these values remotely, the position in the list sent corresponds to the offset. Missing values are not permitted i.e. if you want to change values 2 and 4 you must send all values up to 4. Subsequent values will remain unchanged, unless the number of values sent is greater than the number of carriers, then subsequent values will be ignored.
Preset	0, 0, 0, 0
State Saved	Saved in instrument state.

Min	–1 s
Max	1 s

Upper Mask Absolute Amplitude Levels

Sets a power level for any of your mask line segments that require an absolute minimum power limit in addition to its relative limit.

Unit	dBm
Mode	TDSCDMA
Remote Command	`[:SENSe]:PVTime:MASK:LIST:UPPer:ABSolute <ampl>,…` `[:SENSe]:PVTime:MASK:LIST:UPPer:ABSolute?`
Example	:SENSe:PVTime:MASK:LIST:UPPer:ABSolute –130, –130, –130 –130
Restriction and Notes	Enter a power level for any of your mask line segments that require an absolute minimum power limit in addition to its relative limit. Each time a measurement is made the Ref Level is determined. (This is the power level of the useful part of the burst, or midway between the upper/lower masks). As the power of the Ref Level changes, all of the relative mask power levels will change by the same amount. Each relative limit is then compared to the Ref Level and an equivalent absolute power level is calculated. This power level is compared to the specified absolute limit for each line segment. If this calculated relative limit is lower than the absolute limit specified, the value of the absolute limit is used for this segment. If the absolute limit is set to a very low value (–200 dBm), the calculated value of the reference limit will never be lower, and the specified relative limit will always be used for that segment. Every time point defined with PVT:MASK:LOW:TIME must have a power value defined in the same order. A comma may be used in the SCPI command as a place holder for any points where an absolute power is not specified. The default value will then be used for that segment.
Remote Command Notes	When setting these values remotely, the position in the list sent corresponds to the offset. Missing values are not permitted i.e. if you want to change values 2 and 4 you must send all values up to 4. Subsequent values will remain unchanged, unless the number of values sent is greater than the number of carriers, then subsequent values will be ignored.
Preset	–200 dBm, –200 dBm, –200 dBm, –200 dBm
State Saved	Saved in instrument state.
Min	–200 dBm
Max	100 dBm

Upper Mask Points

Queries the number of elements in the upper mask. This value is determined by the number of time points entered using [:SENSe]:PVTime:MASK:LIST:UPPer:TIME.

Mode	TDSCDMA
Remote Command	`[:SENSe]:PVTime:MASK:LIST:UPPer:POINts?`
Example	:SENSe:PVTime:MASK:LIST:UPPer:POINts?
Remote Command Notes	No corresponding command.
State Saved	Saved in instrument state.
Min	1
Max	25

Upper Mask Relative Amplitude Levels

Sets the relative power level for each horizontal line segment in the upper limit mask.

Unit	dB
Mode	TDSCDMA
Remote Command	`[:SENSe]:PVTime:MASK:LIST:UPPer:RELative <rel_ampl>,…` `[:SENSe]:PVTime:MASK:LIST:UPPer:RELative?`
Example	:SENSe:PVTime:MASK:LIST:UPPer:RELative –130, –130, –130 –130
Restriction and Notes	Enter the relative power level for each horizontal line segment in the upper limit mask. There should be a power level for each time point entered using PVTime:MASK:LIST:UPPer:TIME, and they must be entered in the same order. These power levels are all relative to the defined Reference Power Level (the average power in the useful part of the data).
Remote Command Notes	When setting these values remotely, missing values are not permitted i.e. if you want to change values 2 and 4 you must send all values up to 4. Subsequent values will remain unchanged.
Preset	100 dB, 100 dB, 100 dB, 100 dB
State Saved	Saved in instrument state.
Min	–200 dB
Max	100 dB

Upper Mask Time Points

Sets the value on the X-Axis at which the next segment of the mask begins

Unit	ns | us | ms | s | ks
Mode	TDSCDMA

Remote Command	`[:SENSe]:PVTime:MASK:LIST:UPPer:TIME <time>,…` `[:SENSe]:PVTime:MASK:LIST:UPPer:TIME?`
Example	:SENSe:PVTime:MASK:LIST:UPPer:–1.0, –0.5, 0.5, 1.0
Restriction and Notes	Enter the value on the X-Axis at which the next segment of the mask begins. The left most value on the X-Axis is the value of the trigger delay (which may be positive or negative), and is shown on the display as an annotation on the X-Axis. Selecting a large time value for the first and last mask points (for example, –1 and +1 second) guarantees a limit is defined for all measured data.
Remote Command Notes	When setting these values remotely, the position in the list sent corresponds to the offset. Missing values are not permitted i.e. if you want to change values 2 and 4 you must send all values up to 4. Subsequent values will remain unchanged, unless the number of values sent is greater than the number of carriers, then subsequent values will be ignored.
Preset	0, 0, 0, 0
State Saved	Saved in instrument state.
Min	–1.0 s
Max	1.0 s

Mask Delay

Sets the PVT mask delay, which allows post-capture adjustment of the PVT mask for fine adjustment of mask relative to captured trace data, for comparison purposes and limit checking.

Unit	ns | us | ms | s | ks
Mode	TDSCDMA
Remote Command	`:DISPlay:PVTime:LIMit:MASK:DELay <time>` `:DISPlay:PVTime:LIMit:MASK:DELay?`
Example	:DISPlay:PVTime:LIMit:MASK:DELay 0.003s
Preset	0.0 s
State Saved	Saved in instrument state.
Min	–10 ms
Max	10 ms
Key Path	**Meas Setup, More**

Trig Source

Selects one of the trigger sources used to control the data acquisitions.

EXTernal 1 – front panel external trigger input

EXTernal 2 – rear panel external trigger input

Mode	TDSCDMA
Remote Command	`[:SENSe]:PVTime:TRIGger:SOURce RFB|EXT[1]|EXT2` `[:SENSe]:PVTime:TRIGger:SOURce?`
Example	:SENSe:PVTime:TRIGger:SOURce EXT1
Dependencies/Couplings	When the Device in Radio menu changes: If the Device changes to MS, the Trigger Source change to RFB; If the Device changes to BTS, the Trigger Source change to EXT.
Preset	EXT[1]
State Saved	Saved in instrument state.
Range	RF Burst (Wideband) | Ext Front | Ext Rear
Key Path	**Meas Setup**

Display Functions

Limit Mask

Turns the display of the limit mask lines on and off. It also enables and disables limit checking.

Mode	TDSCDMA
Remote Command	`:DISPlay:PVTime:LIMit:MASK ON|OFF|1|0` `:DISPlay:PVTime:LIMit:MASK?`
Example	:DISPlay:PVTime:LIMit:MASK OFF
Restriction and Notes	
Preset	ON
State Saved	Saved in instrument state.
Range	On | Off
Key Path	**Display**

Burst Lines

Shows or hides a pair of "white vertical" transmission period burst annotation lines for the timeslot specified by the current Burst Type and Traffic Slot settings. It is useful to display the transmission period burst annotation lines while adjusting the trigger delay parameter, to ensure signal timeslots are properly aligned to the PVT mask.

Mode	TDSCDMA
Remote Command	`:DISPlay:PVTime:BLINes[:STATe] ON|OFF|1|0` `:DISPlay:PVTime:BLINes[:STATe]?`
Example	:DISPlay:PVTime:BLINes:STATe OFF
Restriction and Notes	The state of this parameter does not affect the pass or fail calculation for limit tests.
Preset	ON
State Saved	Saved in instrument state.
Range	On | Off
Key Path	**Display**

Trigger Lines

Shows or hides a "red vertical" trigger annotation line for the timeslot specified by current trigger source setting.

Mode	TDSCDMA
Remote Command	`:DISPlay:PVTime:TRIGger[:STATe] ON|OFF|1|0` `:DISPlay:PVTime:TRIGger[:STATe]?`
Example	:DISPlay:PVTime:TRIGger:STATe OFF
Restriction and Notes	The state of this parameter does not affect the pass/fail calculation for limit tests.
Preset	ON
State Saved	Saved in instrument state.
Range	On | Off
Key Path	**Display**

Ramp Lines

Shows or hides 2 pairs of "cyan vertical" annotation lines for the timeslot specified by current Traffic Slot setting. One pair of lines indicates the Ramp Up Time and the other pair indicates Ramp Down Time.

Mode	TDSCDMA
Remote Command	`:DISPlay:PVTime:RAMP[:STATe] ON|OFF|1|0` `:DISPlay:PVTime:RAMP[:STATe]?`
Example	:DISPlay:PVTime:RAMP:STATe OFF
Restriction and Notes	The state of this parameter does not affect the pass/fail calculation for limit tests.
Preset	OFF
State Saved	Saved in instrument state.
Range	On | Off
Key Path	**Display**

Marker Functions

Markers All Off

Turns all markers off for the Power vs.Time measurement.

Mode	TDSCDMA
Remote Command	`:CALCulate:PVTime:MARKer[1]|2|3|4:AOFF`
Example	:CALCulate:PVTime:MARKer:AOFF
Remote Command Notes	No corresponding query.
State Saved	No
Key Path	**Marker**

Marker Mode

Sets the mode for the specified marker. When a Marker is set to Delta, the next marker is used as the Reference Marker and its Mode is set to Normal (POSition). The value of the Delta Marker is the relative value from the Reference Marker. When Marker 4 is set to Delta, Marker1 is used as the Reference Marker.

Mode	TDSCDMA
Remote Command	`:CALCulate:PVTime:MARKer[1]|2|3|4:MODE DELT|OFF|POS` `:CALCulate:PVTime:MARKer[1]|2|3|4:MODE?`
Example	:CALCulate:PVTime:MARKer4:MODE DELTa

Preset	OFF
State Saved	Saved in instrument state.
Range	Delta | Off | Normal
Key Path	**Marker**

Marker State

Turns the specified marker on or off.

Mode	TDSCDMA
Remote Command	`:CALCulate:PVTime:MARKer[1]|2|3|4[:STATe] ON|OFF|1|0` `:CALCulate:PVTime:MARKer[1]|2|3|4[:STATe]?`
Example	:CALCulate:PVTime:MARKer2:STATe ON
Preset	OFF
State Saved	Saved in instrument state.
Range	On | Off
Key Path	**Marker**

Marker X Value

Sets the X-axis value for the specified marker

Unit	ns | us | ms | s | ks
Mode	TDSCDMA
Remote Command	`:CALCulate:PVTime:MARKer[1]|2|3|4:X <time>` `:CALCulate:PVTime:MARKer[1]|2|3|4:X?`
Example	:CALCulate:PVTime:MARKer2:X 0.001s
Preset	0
State Saved	Saved in instrument state.
Min	–100 s
Max	100 s

Marker Y Position

Queries the amplitude value at the specified marker.

Mode	TDSCDMA
Remote Command	`:CALCulate:PVTime:MARKer[1]|2|3|4:Y?`

Example	:CALCulate:PVTime:MARKer2:Y?
Remote Command Notes	Query only
State Saved	No
Min	–170
Max	100

Span / X Scale Menu

X-Axis Scale / Div

Sets the time units per horizontal graticule division on the display.

Unit	s| ms| us| ns
Mode	TDSCDMA
Remote Command	`[:SENSe]:PVTime:XSCale:XPDivision <time>` `[:SENSe]:PVTime:XSCale:XPDivision?`
Example	:SENSe:PVTime:XSCale:XPDivision 10 us
Preset	72 us
State Saved	No
Min	1 ns
Max	1 ms
Key Path	**Span**

X-Axis Ref Value

Sets the X-axis reference level.

Unit	s| ms| us| ns
Mode	TDSCDMA
Remote Command	`[:SENSe]:PVTime:XSCale:XRValue <time>` `[:SENSe]:PVTime:XSCale:XRValue?`
Example	:SENSe:PVTime:XSCale:XRValue 10 MS
Preset	–28 us
State Saved	No
Min	–50 us
Max	10 ms
Key Path	**Span**

X-Axis Ref Position

Allows you to use the zoom function to show a specific part of the displayed trace.

Mode	TDSCDMA
Remote Command	`[:SENSe]:PVTime:XSCale:XRPosition LEFT|CENTER|RIGHT` `[:SENSe]:PVTime:XSCale:XRPosition?`
Example	:SENSe:PVTime:XSCale:XRPosition LEFT
Restriction and Notes	If LEFT: Ref Value = Ref Value – 10 * Scale/Div If CENTER: Ref Value = Ref Value + 5 * Scale/Div If RIGHT: Ref Value = Ref Value + 5 * Scale/Div
Dependencies/Couplings	See Restriction and Notes
Preset	LEFT
State Saved	No
Range	LEFT | CENTER | RIGHT
Key Path	**Span**

Amplitude / Y Scale

Y-Axis Scale / Div

Sets the logarithmic units per vertical graticule division on the display.

Unit	dB
Mode	TDSCDMA
Remote Command	`:DISPlay:PVTime:WINDow:TRACe:Y[:SCALe]:PDIVision <rel_ampl>` `:DISPlay:PVTime:WINDow:TRACe:Y[:SCALe]:PDIVision?`
Example	:DISPlay:PVTime:WINDow:TRACe:Y:SCALe:PDIVision 10 dB
Preset	12 dB
State Saved	Saved in instrument state.
Min	0.10 dB
Max	20.00 dB
Key Path	**Amplitude**

Y-Axis Ref Value

Sets the Y-axis reference level.

Unit	dBm
Mode	TDSCDMA
Remote Command	`:DISPlay:PVTime:WINDow:TRACe:Y[:SCALe]:RLEVel <ampl>` `:DISPlay:PVTime:WINDow:TRACe:Y[:SCALe]:RLEVel?`
Example	:DISPlay:PVTime:WINDow:TRACe:Y:SCALe:RLEVel 10 dBm
Restriction and Notes	The Min and Max values are dependant on the Attenuation and Max Mixer Level settings.
Dependencies/Couplings	Coupled to Attenuation and Max Mixer Level
Preset	0 dBm
State Saved	Saved in instrument state.
Min	–170 dBm
Max	30 dBm
Key Path	**Amplitude**

Query the Pass/Fail state

Queries the Pass/Fail state of the measurement. Returns True (1) if one or more of the limits for the measurement have failed.

Mode	TDSCDMA
Remote Command	`:CALCulate:CLIMits:FAIL?`
Example	:CALCulate:CLIMits:FAIL?
Restriction and Notes	Returns 1 if the measurement has failed the specified limits. Returns 0 if the measurement passes or if the limit checking is not turned on.
State Saved	No
Min	0
Max	1

Restart Parameters

A change to any parameter found on the Mode Setup menu (and its submenus) will cause the measurement to restart. The same is true of changes to Center Freq (Frequency Menu). Note that parameters described above in the Meas Setup Menu section also cause a restart of the measurement.

Restore Meas Defaults

Pressing the Restore Meas Defaults key (Meas Setup, More (1 of 2), Restore Meas Defaults) will preset (that is, set to the factory defaults) only the parameters that are specific to the selected measurement. Parameters whose default values are determined by the value of a mode parameter are set to the appropriate value for the current setting of that mode parameter.Results

The results reported in the data area of the analyzer screen will include averaged Mean Transmit Power, Full Burst Width, Transmit Off Power, and Min and Max point and Mean Transmit Power of the current trace.

Results

Measurement Results

Result	Units	Min	Max
Mean Transmit Power	dBm	–200 dBm	200 dBm
Transmit Off Power	dBm	–200 dBm	200 dBm
Max Pt	dBm	–200 dBm	200 dBm
Min Pt	dBm	–200 dBm	200 dBm
Full Burst Width	us	See parameter minimum	See parameter maximum

Mean Transmit Power

The Mean Transmit Pwr result is measured over the transmission period of the selected Burst Type, which is indicated on screen as the region between the two white vertical lines displayed when the Burst Lines display parameter is enabled.

The result is averaged according to the Average Number, Average Mode, and Average Type parameter settings.

Transmit Off Power

Transmit Off Power is measured in accordance with the TSM spec procedure in the Tx Off Power Definition, the TSM 11.21 v310 std states:

“Measure the RRC filtered mean power of the BTS output signal chipwise (i.e. averaged over time intervals of one chip duration) over the transmit off power period starting 11 chips before the start of the receive time slot TS i = Up PCH, and ending 8 chips before the next transmit time slot TS i = 4 starts.”

To implement a measurement algorithm which would make the Tx Off Power measurement according to the above TSM spec statement (excluding the RRC filter requirement part), and yet also be able to be applied in a general way, irrespective of the “Meas Time” and “Traffic Slot” settings, and the signals active timeslots, the following Tx Off Power algorithm will be implemented:

“Measure the average power of the BTS or MS output signal over the transmit off power period region starting 11 chips before the start of any “inactive” time slot, and ending 8 chips before any following “active” time slot. Also if there are more than one “inactive” region, then just average all the “inactive” region results.

The result is averaged according to the Average Number, Average Mode, and Average Type parameter settings.

If all signal timeslots are determined to be “active”, the screen result is unavailable (four dashed lines are shown).

Full Burst Width

The full burst width result is the time between the detected –6dB start and stop points of the full Burst. These points are worked out based on the peak of the Burst Type transmission period and the –6dB points (relative to peak).

When there is no valid burst found in the process of measurement, the screen result is unavailable (four dashed lines are shown) and SCPI_NAN is returned for this result when measurement results are queried remotely.

Max Pt (Current)

The max pt is current data, and therefore is based on the current trace, and not the averaged data. It gives the maximum trace point detected over the entire trace.

Min Pt (Current)

The min pt is current data, and therefore is based on the current trace, and not the averaged data. It gives the minimum trace point detected over the entire trace.

Mean Transmit Power (Current)

The Mean Transmit Pwr result is measured over the transmission period of the current captured data according with the Burst Type and Meas Time, which is indicated on screen as the region between the two white vertical lines displayed when the Burst Lines display parameter (in Display menu) is enabled.

Trig Delay Diff

The trigger delay difference result is the time difference between the position of the trigger line and the -6 dB point of the positive slope of the burst.

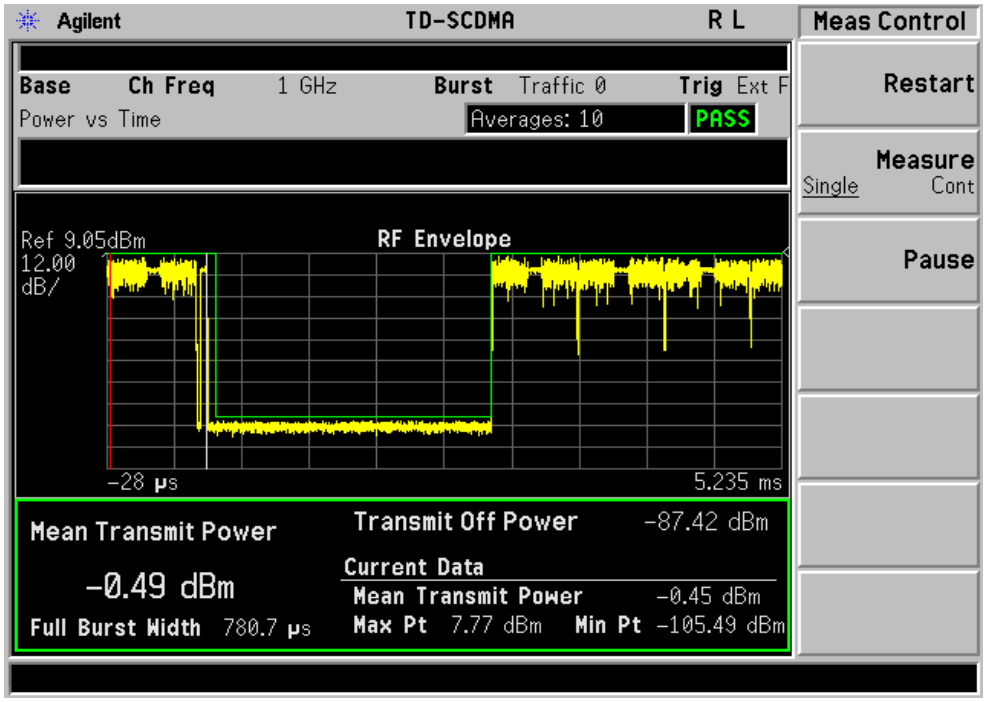
Ramp Up Time

The time difference between 10% and 90% voltage points (relative to peak) on the positive slope of the burst.

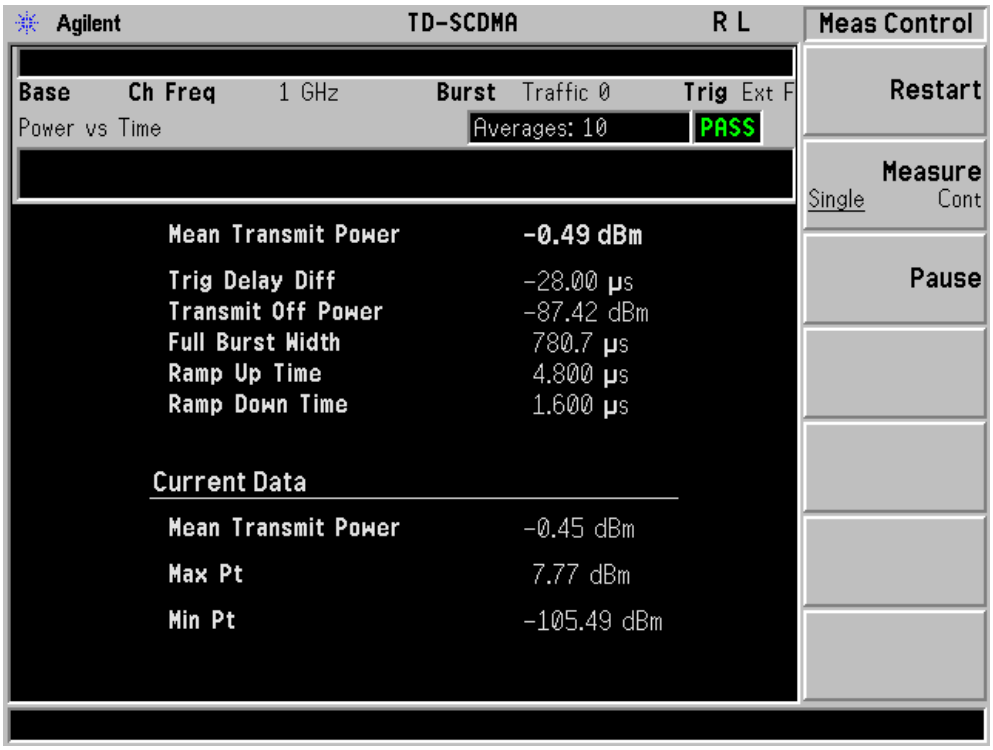
Ramp Down Time

The time difference between 90% and 10% voltage points (relative to peak) on the negative slope of the burst.

Results Screen



Zoomed Results Screen



Compared with the lower window in normal results screen, the zoomed results screen displays three more results: 'Trig Delay Diff', 'Ramp Up Time', and 'Ramp Down Time'.

Results File

:MMEMory:STORe:RESults <‘filename’>

One method of results storage will be in a file suitable for import into a spreadsheet program. Upon request from the file system, a comma delimited .csv file should be created with the following items; time, date, column titles, and “results.” This file should contain all of the data necessary to recreate the measurement conditions.

Table -2

Application	**TD-SCDMA Utilities**	
Measurement	Power vs Time	
Date	17–Apr	2007
Time	8:51:19	
Measurement Parameters		
Average State	Off	
Number of Averages	10	
Average Mode	Exp	
Average Type	Pwr Avg (RMS)	
Measure	Single	
Device	BTS	
Res BW	1.3	MHz
Frequency Parameters		
Center Freq	1	GHz
Sweep Time	5.263	ms
Meas Time	9	slot
Trig Source	Ext Front	
Burst Type	Downlink Pilot	
Traffic Timeslot	NA	
Mask Delay	0	s

Table -2

Application	TD-SCDMA Utilities	
Measurement Results		
Mean Transmit Power	–28.59	dBm
Transmit Off Power	–100.46	dBm
Full Burst Width	100.8	µs
Max Pt	–121.27	dBm
Min Pt	–21.73	dBm
Ramp Up Start Time	646.2	µs
Ramp Up Stop Time	652.6	µs
Ramp Down Start Time	751.8	µs
Ramp Down Stop Time	753.4	µs
Trig Delay Diff	–47.2	µs
Ramp Up Time	6.4	µs
Ramp Down Time	1.6	µs

Status Bar Messages

There are no Power vs Time-specific error messages displayed.

SCPI Remote Commands

Command	Return Value
CONFigure:PVTime	N/A
INITiate:PVTime	N/A

Command	Return Value
FETCh:PVTime[n]? MEASure:PVTime[n]? READ:PVTime[n]?	N=1 (or not supplied) Returns 12 comma-separated scalar results, in the following order: Sample time – floating point number that represents the time (in seconds) between each trace point returned when using the trace result queries (n = 2,3,4) Power of current burst – floating point number that represents the Mean Transmit Pwr (Current) (in dBm) measured over the transmission period of the selected Burst Type, in the most recently acquired data, or in the last data acquired at the end of a set averages. If averaging is on, the power returned is for the last full burst only. Power averaged – floating point number that represents the Mean Transmit Pwr (in dBm) measured over the transmission period of the selected Burst Type. The result is averaged according to the Average Number, Average Mode, and Average Type parameter settings. If averaging is off, the power returned is the same as the Power of single burst. Number of samples – integer number that represents the number of trace data points (N) that will be returned when using the trace result queries (n = 2,3,4). Start point of the transmission period – integer number that represents the trace index to theoretical start location of selected Burst Type transmission period. Stop point of the transmission period – integer number that represents the trace index to theoretical stop location of selected Burst Type transmission period. Center point of the transmission period – integer number that represents the trace index to theoretical center location of selected Burst Type transmission period Full Burst width – floating point number that represents the Full Burst Width (in seconds) measured as the time between the detected –3 dB start and stop points of the selected Burst Type timeslot. These points are worked out based on the peak of the Burst Type transmission period, and the –3 dB points (relative to peak). If the selected Burst Type signal timeslot is determined to be “inactive”, SCPI_NAN is returned for this result. Maximum value – floating point number that represents the maximum trace point (in dBm) detected over the entire trace. Max Pt is current data, and therefore is based on the current trace, and not the averaged data. Minimum value – floating point number that represents the minimum trace point (in dBm) detected over the entire trace. Min Pt is current data, and therefore is based on the current trace, and not the averaged data. Burst search threshold – floating point number that represents the burst active power threshold (in dBm), derived from the measured signals peak power and the Burst Search Threshold parameter setting. This burst active power threshold is used to determine which timeslots are considered active for the purpose of power versus time limit mask creation.
	Transmit Off Power – floating point number that represents the Transmit Off Power is measured in accordance with the TSM spec procedure outlined above. The result is averaged according to the Average Number, Average Mode, and Average Type parameter settings. If all signal timeslots are determined to be “active”, SCPI_NAN is returned for this result.

Command	Return Value
	n = 2 Returns trace point values of the entire waveform data. These data points are floating point numbers representing the power of the signal (in dBm). There are N data points, where N is the Number of samples. The period between the samples is defined by the Sample time.
	n = 3 Returns data points representing the upper mask (in dBm).
	n = 4 Returns data points representing the lower mask (in dBm).

Adjacent Channel Power Ratio (ACPR)

Measurement Setup

Meas Setup Menu

Avg Number

Allows you to specify the number of measurement averages used when calculating the measurement result. The average will be displayed at the end of each sweep. Average State allows the user to turn averaging on or off.

Mode	TDSCDMA
Remote Command	`[:SENSe]:ACP:AVERage:COUNt <integer>`
	`[:SENSe]:ACP:AVERage:COUNt?`
	`[:SENSe]:ACP:AVERage[:STATe] ON|OFF|1|0`
	`[:SENSe]:ACP:AVERage[:STATe]?`
Example	:SENSe:ACP:AVERage:COUNt 25
	:SENSe:ACP:AVERage:STATe ON
Preset	10
State Saved	Saved in instrument state.
Min	1
Max	1000
Key Path	**Meas Setup**

Avg Mode

Press Avg Mode (Exp) to continue measurement averaging, using the specified number of averages to compute each averaged value. The average will be displayed at the end of each sweep. Avg Mode (Repeat) will cause the measurement to reset the average counter each time the specified number of averages is reached.

Mode	TDSCDMA
Remote Command	`[:SENSe]:ACP:AVERage:TCONtrol EXPonential|REPeat`
	`[:SENSe]:ACP:AVERage:TCONtrol?`
Example	SENSe:ACP:AVERage:TCONtrol EXP
Preset	EXPonential
State Saved	Saved in instrument state.

Range	Exp | Repeat
Key Path	**Meas Setup**

Noise Correction

Allows you to set the noise floor correction function to on or off. On enables measurement noise correction when the measured power in the reference channel or any offset is close to the noise floor of the Can. Off turns these corrections off. Noise correction is unavailable if signal tracking is on. If noise correction is on and signal tracking is turned on, the signal tracking state is forced back to off and an advisory message is displayed.

Mode	TDSCDMA
Remote Command	`[:SENSe]:ACP:CORRection:NOISe[:AUTO] ON|OFF|1|0` `[:SENSe]:ACP:CORRection:NOISe[:AUTO]?`
Example	:SENSe:ACP:CORRection:NOISe:AUTO ON
Preset	OFF
State Saved	Saved in instrument state.
Range	On | Off
Key Path	**Meas Setup, More**

Chan Integ BW

Allows you to specify the integration bandwidth used in calculating the power in the carrier.

Unit	Hz | kHz | MHz | GHz
Mode	TDSCDMA
Remote Command	`[:SENSe]:ACP:BANDwidth|BWIDth[:INTegration] <bandwidth>` `[:SENSe]:ACP:BANDwidth|BWIDth[:INTegration]?`
Example	:SENSe:ACP:BANDwidth:INTegration 3.84 MHz
Preset	1.28 MHz
State Saved	Saved in instrument state.
Min	100 Hz
Max	200 MHz
Key Path	**Meas Setup**

Carrier Power State

Allows you to set the state of the carrier power result or PSD Ref result, depending on the current Meas Type setting. If set to Total Power Ref, the state set will be the carrier power. If set to PSD Ref, state set will be the power spectral density. When set to auto, the result reflects the value measured in the carrier. When set to manual, the result takes on the last measured value, or may be entered by the user.

Mode	TDSCDMA
Remote Command	`[:SENSe]:ACP:CARRier:AUTO[:STATe] ON|OFF|1|0` `[:SENSe]:ACP:CARRier:AUTO[:STATe]?`
Example	:SENSe:ACP:CARRier:AUTO:STATe ON
Restriction and Notes	This key has different function and is coupled with the “Meas Setup > Meas Type” menu key. If the Meas Type is set to Total Power Ref, the state set will be the carrier power. If set to PSD Ref, state set will be the power spectral density. When set to auto, the result reflects the value measured in the carrier. When set to manual, the result takes on the last measured value, or may be entered by the user.
Preset	ON
State Saved	Saved in instrument state.
Range	Auto | Man
Key Path	**Meas Setup, More**

Total Pwr Ref

The power in the carrier (main channel) that will be used to compute the relative power values for the offsets. When the total power reference state is set to auto, this will be set to the measured carrier power.

Unit	dBm
Mode	TDSCDMA
Remote Command	`[:SENSe]:ACP:CARRier[:POWer] <ampl>` `[:SENSe]:ACP:CARRier[:POWer]?`
Example	:SENSe:ACP:CARRier:POWer –10 dBm
Restriction and Notes	Allows the user to set the mode of the carrier power result. When set to auto, the carrier power result reflects the measured power value in the reference carrier. When set to manual, the result takes on the last measured value, or may be entered by the user. The default value is the measured Total Power Spectral Reference of the first measurement.
Preset	0
State Saved	Saved in instrument state.

Min	–200
Max	200
Key Path	**Meas Setup, More**

PSD Ref

The power spectral density in the carrier (main channel) that will be used to compute the relative power spectral density values for the offsets. When the PSD Ref state is set to auto, this will be set to the measured carrier power spectral density.

Unit	dBm
Mode	TDSCDMA
Remote Command	`[:SENSe]:ACP:CARRier:CPSD <ampl>` `[:SENSe]:ACP:CARRier:CPSD?`
Example	:SENSe:ACP:CPSD –10 dBm
Restriction and Notes	Allows the user to set the mode of the carrier power result. When set to auto, the carrier power result reflects the measured power value in the reference carrier. When set to manual, the result takes on the last measured value, or may be entered by the user. The default value is the measured Carrier Power Spectral Density of the first measurement.
Preset	0
State Saved	Saved in instrument state.
Min	–999
Max	999
Key Path	**Meas Setup, More**

Limit Test

Allows you to turn on or off limit checking for each offset. The limits may be specified within the Offset menu, for each offset, both sides of the carrier. For results that fail the limit, a red F is appended. In Combined view, the bar turns red.

Mode	TDSCDMA
Remote Command	`[:SENSe]:ACP:LIMit[:STATe] ON|OFF|1|0` `[:SENSe]:ACP:LIMit[:STATe]?`
Example	:SENSe:ACP:LIMit:STATe ON
Preset	ON
State Saved	Saved in instrument state.

Range	On | Off
Key Path	**Meas Setup**

RRC Filter

Allows you to turn RRC filtering of the carriers and all adjacent channels on or off. The α value (roll off) for the filter will be set to the value of the Filter Alpha parameter.

Mode	TDSCDMA
Remote Command	`[:SENSe]:ACP:FILTer[:RRC][:STATe] ON|OFF|1|0` `[:SENSe]:ACP:FILTer[:RRC][:STATe]?`
Example	:SENSe:ACP:FILTer:RRC:STATe ON
Preset	ON
State Saved	Saved in instrument state.
Range	On | Off
Key Path	**Meas Setup**

Filter Alpha

Allows you to input the alpha value for the RRC Filter.

Mode	TDSCDMA
Remote Command	`[:SENSe]:ACP:FILTer[:RRC]:ALPHa <real>` `[:SENSe]:ACP:FILTer[:RRC]:ALPHa?`
Example	:SENSe:ACP:FILTer:RRC:ALPHa 0.33
Preset	0.22
State Saved	Saved in instrument state.
Min	0.01
Max	1.00
Key Path	**Meas Setup**

Meas Type

Allows you to change the reference used for the measurement. Total Pwr Ref (Remote: TPR) sets the reference to the total carrier power. PSD Ref (Remote: PSDR) sets the reference to the power spectral density of the carrier.

Mode	TDSCDMA

Remote Command	`[:SENSe]:ACP:TYPE TPRef|PSDRef` `[:SENSe]:ACP:TYPE?`
Example	:SENSe:ACP:TYPE TPRef
Dependencies/Couplings	If Meas Type is set to Total Power Ref, the state set of Carrier Power State key will be the carrier power. If set to PSD Ref, state set will be the power spectral density.
Preset	TPR
State Saved	Saved in instrument state.
Range	Total Pwr Ref | PSD Ref
Key Path	**Meas Setup**

Trig Source

Selects one of the trigger sources used to control the data acquisitions.

EXTernal 1 – front panel external trigger input

EXTernal 2 – rear panel external trigger input

Mode	TDSCDMA
Remote Command	`[:SENSe]:ACP:TRIGger:SOURce IMM|RFBurst|EXT[1]|EXT2`
Example	:SENSe:ACP:TRIGger:SOURce EXT1

Dependencies/Couplings	A. When Device changes, If Device changes to BTS, 1. Trigger Source and Gate Source will turn to 'External Front'; 2. Gate State turns to 'On'; 3. Gate Delay and Gate Length will be set in terms of Burst Type and Traffic Slot specified in Frequency menu. If Device changes to BTS, 1. Trigger Source and Gate Source will turn to 'RF Burst'; 2. Gate State turns to 'On'; 3. Gate Delay and Gate Length will be set in terms of Burst Type and Traffic Slot specified in Frequency menu. B. When Trigger Source key is pressed: If Trigger Source turns to 'Free Run', Gate State will turn to 'Off'; If Trigger Source turns to 'External Front/External Rear/RF Burst', 1. Gate State turns to 'On'; 2. Gate Source is set identically with Trigger Source; 3. Gate Delay and Gate Length will be set in terms of Burst Type and Traffic Slot specified in Frequency menu. (For more information on gate setup, please refer to the section “Gate Delay”)
Preset	EXT[1]
State Saved	Saved in instrument state.
Range	Free Run (Immediate) | RF Burst (Wideband) | Ext Front | Ext Rear
Key Path	**Meas Setup**

Offset State

Allows you to select the offset to configure.

Mode	TDSCDMA
Preset	A
State Saved	Saved in instrument state.
Range	A | B | C | D | E | F

Key Path	**Meas Setup, Offset/Limits**

Offset Freq

Allows you to set the center frequency difference from the main channel center frequency. The lines of different color are used for different offset bandwidth and will be displayed when the setting is On. Setting the frequency of any offset to 0 Hz will cause the same behavior as turning the offset state off, and it will be removed from the results screen

Unit	Hz | kHz | MHz | GHz
Mode	TDSCDMA

Remote Command	`[:SENSe]:ACP:OFFSet:LIST[:FREQuency] <freq>,…`
	`[:SENSe]:ACP:OFFSet:LIST[:FREQuency]?`
	`[:SENSe]:ACP:OFFSet:LIST[:STATe] ON|OFF|1|0,…`
	`[:SENSe]:ACP:OFFSet:LIST[:STATe]?`

Example	:SENSe:ACP:OFFSet:LIST:FREQuency 5 MHz, 10 MHz, 15 MHz :SENSe:ACP:OFFSet:LIST:STATe ON,ON,ON,OFF,OFF,OFF
Restriction and Notes	This parameter determines the frequency difference between the center of the main channel and the center of the carrier. When set to Offset to Edge, this parameter determines the frequency difference between the center of the main channel and the near edge of the offset The Offset Freq State allows you to turn the current offset (indicated on the offset key) On or Off. Turning the offset Off has the same effect as setting the frequency of the offset to 0 Hz and will cause it to be removed from the results screen.
Remote Command Notes	When setting these values remotely, the position in the list sent corresponds to the offset. Missing values are not permitted i.e. if you want to change values 2 and 6 you must send all values up to 6. Subsequent values will remain unchanged, unless the number of values sent is greater than the number of carriers, then subsequent values will be ignored.
Preset	1.6 MHz, 3.2 MHz, 0 Hz, 0 Hz, 0 Hz, 0 Hz
State Saved	Saved in instrument state.
Min	0 Hz
Max	45 MHz
Key Path	**Meas Setup, Offset/Limits**

Ref BW

Allows you to set the Reference Bandwidth for the current offset (indicated on the Offset key) using front panel and all the offsets using SCPI. If the RRC filter is on, the actual reference bandwidth used will be the displayed reference bandwidth multiplied by (1 + filter alpha).

Unit	Hz | kHz | MHz | GHz
Mode	TDSCDMA
Remote Command	`[:SENSe]:ACP:OFFSet:LIST:BANDwidth|BWIDth[:INTegration] <bandwidth>,…` `[:SENSe]:ACP:OFFSet:LIST:BANDwidth|BWIDth[:INTegration]?`
Example	:SENSe:ACP:OFFSet:LIST:BANDwidth:INTegration 3.84 MHz, 3.84 MHz, 3.84 MHz
Remote Command Notes	When setting these values remotely, the position in the list sent corresponds to the offset. Missing values are not permitted i.e. if you want to change values 2 and 6 you must send all values up to 6. Subsequent values will remain unchanged, unless the number of values sent is greater than the number of carriers, then subsequent values will be ignored.
Preset	1.28 MHz, 1.28 MHz, 1.28 MHz, 1.28 MHz, 1.28 MHz, 1.28 MHz
State Saved	Saved in instrument state.
Min	100 Hz
Max	20 MHz
Key Path	**Meas Setup, Offset/Limits**

Abs Limit

Allows you to set the upper absolute limit for the current offset (indicated on the Offset key) using front panel and all the offsets using SCPI.

Unit	dBm
Mode	TDSCDMA
Remote Command	`:CALCulate:ACP:OFFSet[1]|2:LIST:ABSolute <ampl>,…` `:CALCulate:ACP:OFFSet[1]|2:LIST:ABSolute?`
Example	:CALCulate:ACP:OFFSet:LIST:LIMit:ABSolute 0,0,0,0,0,0
Restriction and Notes	The default values are –55 dBm, –55 dBm, 0 dBm, 0 dBm, 0 dBm, 0 dBm if Device is Mobile (MS) m is 1 for BTS, 2 for MS. BTS is the default.

Remote Command Notes	When setting these values remotely, the position in the list sent corresponds to the offset. Missing values are not permitted i.e. if you want to change values 2 and 6 you must send all values up to 6. Subsequent values will remain unchanged, unless the number of values sent is greater than the number of carriers, then subsequent values will be ignored.
Preset	0 dBm, 0 dBm, 0 dBm, 0 dBm, 0 dBm, 0 dBm
State Saved	Saved in instrument state.
Min	–200
Max	200
Key Path	**Meas Setup, Offset/Limits**

Relative (to Carrier) Limit

Allows you to set the upper limit relative to the Total Pwr Reference value for the current offset (indicated on the Offset key) using front panel and all the offsets using SCPI.

Unit	dB
Mode	TDSCDMA
Remote Command	`:CALCulate:ACP:OFFSet[1]|2:LIST:RCARrier <rel_ampl>,…` `:CALCulate:ACP:OFFSet[1]|2:LIST:RCARrier?`
Example	:CALCulate:ACP:OFFSet:LIST:RCARrier 0,0,0,0,0,0
Restriction and Notes	Allows you to set the Lower Limit for the current offset (indicated on the Offset key). This particular parameter sets the limit for the offset to the left of the carrier. The default values are –33 dB, –43 dB, 0 dB, 0 dB, 0 dB, 0 dB if Device is Mobile (MS) m is 1 for BTS, 2 for MS. BTS is the default.
Remote Command Notes	When setting these values remotely, the position in the list sent corresponds to the offset. Missing values are not permitted i.e. if you want to change values 2 and 6 you must send all values up to 6. Subsequent values will remain unchanged, unless the number of values sent is greater than the number of carriers, then subsequent values will be ignored.
Preset	–40 dB, –45 dB, 0 dB, 0 dB, 0 dB, 0 dB
State Saved	Saved in instrument state.
Min	–200
Max	200
Key Path	**Meas Setup, Offset/Limits**

Relative (to PSD) Limit

Allows you to set the upper limit relative to the PSD Reference value for the current offset (indicated on the Offset key) using front panel and all the offsets using SCPI.

Unit	dB
Mode	TDSCDMA
Remote Command	`:CALCulate:ACP:OFFSet[1]|2:LIST:RPSDensity <rel_ampl>,…` `:CALCulate:ACP:OFFSet[1]|2:LIST:RPSDensity?`
Example	:CALCulate:ACP:OFFSet:LIST:RPSDensity 0,0,0,0,0,0
Restriction and Notes	Allows you to set the Lower Limit for the current offset (indicated on the Offset key). This particular parameter sets the limit for the offset to the left of the carrier. The default values are –33 dB, –43 dB, 0 dB, 0 dB, 0 dB, 0 dB if Device is Mobile (MS) m is 1 for BTS, 2 for MS. BTS is the default.
Remote Command Notes	When setting these values remotely, the position in the list sent corresponds to the offset. Missing values are not permitted i.e. if you want to change values 2 and 6 you must send all values up to 6. Subsequent values will remain unchanged, unless the number of values sent is greater than the number of carriers, then subsequent values will be ignored.
Preset	–40 dB, –45 dB, 0 dB, 0 dB, 0 dB, 0 dB
State Saved	Saved in instrument state.
Min	–200
Max	200
Key Path	**Meas Setup, Offset/Limits**

Fail Mask

Allows you to select one of the logic keys for determining the conditions for which the measurement fails: Absolute and Relative both check the results against the respective limit, while OR checks against both limits, failing if either of the limits is broken. AND will result in a failure reported only if both the absolute and relative limits fail.

Mode	TDSCDMA
Remote Command	`[:SENSe]:ACP:OFFSet[1]|2:LIST:TEST ABSolute|RELative|AND|OR,…` `[:SENSe]:ACP:OFFSet[1]|2:LIST:TEST?`
Example	:SENSe:ACP:OFFSet:LIST:TEST ABS, REL, ABS, AND, OR

Restriction and Notes	Select the type of testing to be done to determine whether the measurement passes the limit test. Default values are REL,REL,REL,REL,REL,REL if Device is Base AND,AND,AND,AND,AND if Device is Mobile
Remote Command Notes	When setting these values remotely, the position in the list sent corresponds to the carrier. Missing values are not permitted i.e. if you want to change values 2 and 5 you must send all values up to 5. Subsequent values will remain unchanged, unless the number of values sent is greater than the number of carriers, then subsequent values will be ignored.
Preset	REL,REL,REL,REL,REL,REL (BTS) AND,AND,AND,AND,AND (MS)
State Saved	Saved in instrument state.
Range	Absolute | Relative | Abs AND Rel | Abs OR Rel
Key Path	**Meas Setup, Offset/Limits**

Query the Pass/Fail state

Queries the Pass/Fail state of the measurement. Returns True (1) if one or more of the limits for the measurement have failed.

Mode	TDSCDMA
Remote Command	`:CALCulate:CLIMits:FAIL?`
Example	:CALCulate:CLIMits:FAIL?
Restriction and Notes	Returns 1 if the measurement has failed the specified limits. Returns 0 if the measurement passes or if the limit checking is not turned on.
State Saved	No
Min	0
Max	1

Restart Parameters

A change to any parameter found on the Mode Setup menu (and its submenus) will cause the measurement to restart. The same is true of changes to Center Freq (Frequency Menu). Note that parameters described above in the Meas Setup Menu section also cause a restart of the measurement.

Marker Menu

No Marker functions will be available while the ACPR measurement is running. The menu that will appear when the Marker front-panel key is pressed is shown below.

Span / X Scale Menu

No Span / X Scale functions are available when ACPR is the active measurement.

Amplitude / Y Scale

Only a small subset of the base analyzer amplitude parameters will be available when ACPR is the current measurement.

Y-Axis Scale / Div

Sets the logarithmic units per vertical graticule division on the display.

Unit	dB
Mode	TDSCDMA
Remote Command	`:DISPlay:ACP:WINDow:TRACe:Y[:SCALe]:PDIVision <rel_ampl>` `:DISPlay:ACP:WINDow:TRACe:Y[:SCALe]:PDIVision?`
Example	:DISPlay:ACP:WINDow:TRACe:Y:SCALe:PDIVision 10 dB
Preset	10 dB
State Saved	Saved in instrument state.
Min	0.10 dB
Max	20.00 dB
Key Path	**Amplitude**

Y-Axis Ref Value

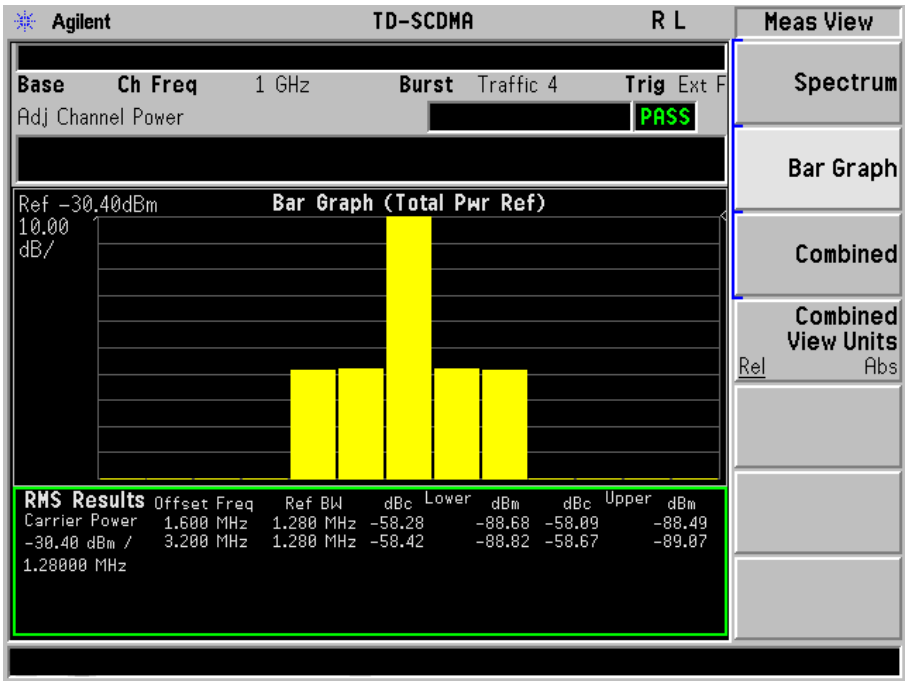
Set the logarithmic units per vertical graticule division on the display.

Unit	dBm
Mode	TDSCDMA
Remote Command	`:DISPlay:ACP:WINDow:TRACe:Y[:SCALe]:RLEVel <ampl>` `:DISPlay:ACP:WINDow:TRACe:Y[:SCALe]:RLEVel?`
Example	:DISPlay:ACP:WINDow:TRACe:Y:SCALe:RLEVel 10 dBm
Restriction and Notes	Allows the reference Level to be changed. Min and Max dependant on Attenuation and Max Mixer Level settings.
Dependencies/Couplings	Coupled to Attenuation and Max Mixer Level
Preset	0 dBm
State Saved	Saved in instrument state.
Min	–170 dBm
Max	30 dBm
Key Path	**Amplitude**

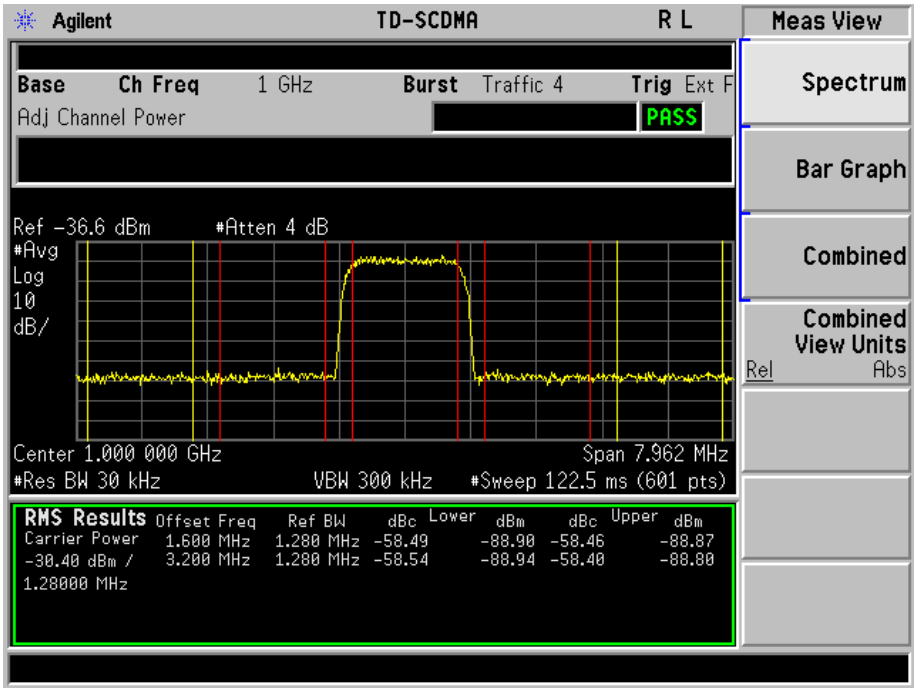
Results

Results Screens

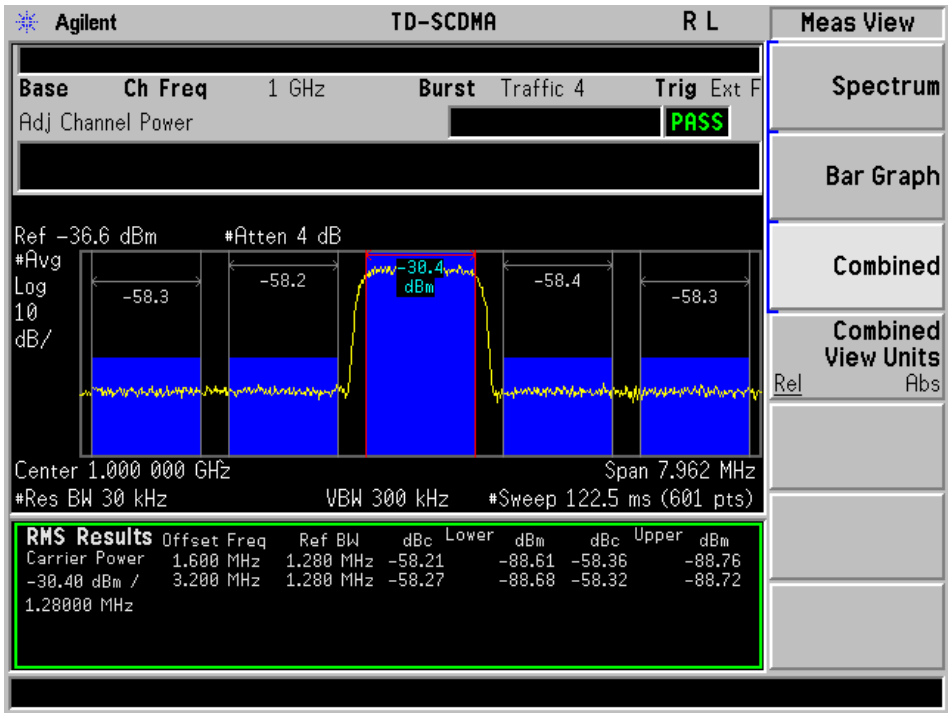
Total Power Ref Results—Bar Graph View



Total Pwr Ref Results—Spectrum View



Total Pwr Ref Results—Combined View



Results File

:MMEMory:STORe:RESults <‘filename’>

One method of results storage will be in a file suitable for import into a spreadsheet program. Upon request from the file system, a comma delimited .csv file should be created with the following items; time, date, column titles, and “results.” This file should contain all of the data necessary to recreate the measurement conditions.

Table -3

Application	**TD-SCDMA Utilities**	
Measurement	Adj Channel Power	
Date	17–Apr	2007
Time	9:04:42	
Measurement Parameters		
Average State	Off	
Number of Averages	10	
Average Mode	Exp	

Table -3

Application	TD-SCDMA Utilities	
Measure	Cont	
Device	BTS	
Channel Integration BW	1.28	MHz
RRC Filter	On	
Filter Alpha		0.22
Noise Correction	Off	
Meas Type	Total Pwr Ref	
Offset Freq[1]	1600000	
Offset Freq[2]	3200000	
Offset Freq[3]	0	
Offset Freq[4]	0	
Offset Freq[5]	0	
Offset Freq[6]	0	
Ref BW[1]	1280000	
Ref BW[2]	1280000	
Ref BW[3]	1280000	
Ref BW[4]	1280000	
Ref BW[5]	1280000	
Ref BW[6]	1280000	
State[1]	On	
State[2]	On	
State[3]	Off	
State[4]	Off	
State[5]	Off	
State[6]	Off	
Limit Test	On	
Trigger Source	Ext Front	
Burst Type	Traffic	
Traffic Timeslot	1	

Table -3

Application	TD-SCDMA Utilities	
Gate	On	
Res BW	30	kHz
Video BW	300	kHz
Frequency Parameters		
Center Freq	1	GHz
Span	7.962	MHz
Measurement Results		
Carrier Power	–88.87	dBm
PSD Ref	–149.94	dBm
Lower Absolute Results[1]	–88.96	dBm
Lower Absolute Results[2]	–88.86	dBm
Lower Absolute Results[3]	–999	dBm
Lower Absolute Results[4]	–999	dBm
Lower Absolute Results[5]	–999	dBm
Lower Absolute Results[6]	–999	dBm
Lower Relative Results[1]	–0.09	dB
Lower Relative Results[2]	0.01	dB
Lower Relative Results[3]	–999	dB
Lower Relative Results[4]	–999	dB
Lower Relative Results[5]	–999	dB
Lower Relative Results[6]	–999	dB
Upper Absolute Results[1]	–88.96	dBm
Upper Absolute Results[2]	–88.72	dBm
Upper Absolute Results[3]	–999	dBm
Upper Absolute Results[4]	–999	dBm
Upper Absolute Results[5]	–999	dBm
Upper Absolute Results[6]	–999	dBm

Table -3

Application	TD-SCDMA Utilities	
Upper Relative Results[1]	–0.09	dB
Upper Relative Results[2]	0.15	dB
Upper Relative Results[3]	–999	dB
Upper Relative Results[4]	–999	dB
Upper Relative Results[5]	–999	dB
Upper Relative Results[6]	–999	dB
Abs Limit[1]	0	dBm
Abs Limit[2]	0	dBm
Abs Limit[3]	0	dBm
Abs Limit[4]	0	dBm
Abs Limit[5]	0	dBm
Abs Limit[6]	0	dBm
Limit Fail Mask[1]	Relative	
Limit Fail Mask[2]	Relative	
Limit Fail Mask[3]	Relative	
Limit Fail Mask[4]	Relative	
Limit Fail Mask[5]	Relative	
Limit Fail Mask[6]	Relative	
Rel Lim (Car)[1]	–40	dBc
Rel Lim (Car)[2]	–45	dBc
Rel Lim (Car)[3]	0	dBc
Rel Lim (Car)[4]	0	dBc
Rel Lim (Car)[5]	0	dBc
Rel Lim (Car)[6]	0	dBc

SCPI Remote Commands

:CONFigure:ACP

:FETCh:ACP[n]?

:READ:ACP[n]?

:MEASure:ACP[n]?

Measurement Type	N	Results Returned
Total power reference	not specified or n=1	Returns 28 comma-separated scalar results, in the following order: Center frequency - relative power (dB) Center frequency - absolute power (dBm) Center frequency - relative power (dB) Center frequency - absolute power (dBm) Negative offset frequency (1) - relative power (dB), Negative offset frequency (1) - absolute power (dBm) Positive offset frequency (1) - relative power (dB) Positive offset frequency (1) - absolute power (dBm) . . . Positive offset frequency (6) - relative power (dB) Positive offset frequency (6) - absolute power (dBm) Center frequency relative power is relative to the center frequency absolute power and therefore, is always equal to 0.00 dB.
Power spectral density reference	not specified or n=1	Returns 28 comma-separated scalar results, in the following order: Center frequency - relative power (dB) Center frequency - absolute power (dBm/Hz) Center frequency - relative power (dB) Center frequency - absolute power (dBm/Hz) Negative offset frequency (1) - relative power (dB) Negative offset frequency (1) - absolute power (dBm/Hz) Positive offset frequency (1) - relative power (dB) Positive offset frequency (1) - absolute power (dBm/Hz) . . . Positive offset frequency (6) - relative power (dB) Positive offset frequency (6) - absolute power (dBm/Hz) Center frequency relative power is relative to the center frequency absolute power and therefore, is always equal to 0.00 dB.

Multi-Carrier Power (MCP)

Measurement Setup

Meas Setup Menu

Avg Number

Allows you to specify the number of measurement averages used when calculating the measurement result. The average will be displayed at the end of each sweep. Average State allows the user to turn averaging on or off.

Mode	TDSCDMA
Remote Command	`[:SENSe]:MCPower:AVERage:COUNt <integer>`
	`[:SENSe]:MCPower:AVERage:COUNt?`
	`[:SENSe]:MCPower:AVERage[:STATe] ON|OFF|1|0`
	`[:SENSe]:MCPower:AVERage[:STATe]?`
Example	:SENSe:MCPower:AVERage:COUNt 25
	:SENSe:MCPower:AVERage:STATe ON
Preset	10
State Saved	Saved in instrument state.
Min	1
Max	1000
Key Path	**Meas Setup**

Avg Mode

Press Avg Mode (Exp) to continue measurement averaging, using the specified number of averages to compute each averaged value. The average will be displayed at the end of each sweep. Avg Mode (Repeat) will cause the measurement to reset the average counter each time the specified number of averages is reached.

Mode	TDSCDMA
Remote Command	`[:SENSe]:MCPower:AVERage:TCONtrol EXPonential|REPeat`
	`[:SENSe]:MCPower:AVERage:TCONtrol?`
Example	:SENSe:MCPower:AVERage:TCONtrol
Preset	EXPonential
State Saved	Saved in instrument state.

Range	Exp | Repeat
Key Path	**Meas Setup**

Carrier Result

Allows you to scroll through the carrier power results.

Mode	TDSCDMA
Preset	1
State Saved	Saved in instrument state.
Min	1
Max	12
Key Path	**Meas Setup**

Trig Source

Select one of the trigger sources used to control the data acquisitions.

EXTernal 1 – front panel external trigger input

EXTernal 2 – rear panel external trigger input

Mode	TDSCDMA
Remote Command	`[:SENSe]:MCPower:TRIGger:SOURce IMM|RFBurst|EXT[1]|EXT2` `[:SENSe]:MCPower:TRIGger:SOURce?`
Example	:SENSe:MCP:TRIGger:SOURce EXT1
Restriction and Notes	Allows you to change the type of trigger used for the measurement. EXT or EXT1 is the front panel external trigger. EXT2 is the rear panel external trigger.

Dependencies/Couplings	A. When Device changes, If Device changes to BTS, 1. Trigger Source and Gate Source will turn to 'External Front'; 2. Gate State turns to 'On'; 3. Gate Delay and Gate Length will be set in terms of Burst Type and Traffic Slot specified in Frequency menu. If Device changes to BTS, 1. Trigger Source and Gate Source will turn to 'RF Burst'; 2. Gate State turns to 'On'; 3. Gate Delay and Gate Length will be set in terms of Burst Type and Traffic Slot specified in Frequency menu. B. When Trigger Source key is pressed: If Trigger Source turns to 'Free Run', Gate State will turn to 'Off'; If Trigger Source turns to 'External Front/External Rear/RF Burst', 1. Gate State turns to 'On'; 2. Gate Source is set identically with Trigger Source; 3. Gate Delay and Gate Length will be set in terms of Burst Type and Traffic Slot specified in Frequency menu. (For more information on gate setup, refer to the section “Gate Delay”)
Preset	EXT[1]
State Saved	Saved in instrument state.
Range	Free Run (Immediate) | RF Burst (Wideband) | Ext Front | Ext Rear
Key Path	**Meas Setup**

Carriers

Allows you to specify the number of carriers to be measured. When new carriers are added, the Carrier Power Present parameter will default to Yes. The existing carriers will retain their present Power Present setting.

Mode	TDSCDMA
Remote Command	`[:SENSe]:MCPower:CARRier:COUNt <integer>` `[:SENSe]:MCPower:CARRier:COUNt?`
Example	:SENSe:MCPower:CARRier:COUNt 6

Preset	3
State Saved	Saved in instrument state.
Min	2
Max	12
Key Path	**Meas Setup, Carrier Setup**

Carrier Pwr Present

The carrier power present parameter is used to configure the carriers for this measurement. It allows spaces to be inserted between carriers. Carriers with the power present parameter set to yes are carriers and those with power present parameter set to no are spaces. The total number of carrier power present values will be coupled to the number of carriers. The maximum number of entries that can be set is 12. Each carrier power present will be yes or no and these are input by selecting the desired carrier on the carrier menu key by using the up down arrows, RPG or numeric keypad then toggling the carrier power present using the carrier power present menu key.

When setting these values remotely, the position in the list sent corresponds to the carrier. Missing values are not permitted i.e. if you want to change values 2 and 6 you must send all values up to 6. Subsequent values will remain unchanged, unless the number of values sent is greater than the number of carriers, then subsequent values will be ignored.

The query for this parameter returns the current values for all of the carriers. If a carrier is defined as having no power present, the power displayed will be relative to the reference carrier, else the absolute power will be displayed.

If you change the carrier power present to no and that carrier is currently configured as the reference carrier, the next carrier to the left (or the right if there are no carriers to the left) will be assigned as the reference carrier. This also applies to the scenario where there are only two carriers configured as having power present and the user changes one to have no power present.

If there are only two carriers this key will be greyed out as they both need to have power present.

Mode	TDSCDMA
Remote Command	`[:SENSe]:MCPower:CARRier:LIST:PPResent YES|NO,…` `[:SENSe]:MCPower:CARRier:LIST:PPResent?`
Example	:SENSe:MCPower:CARRier:LIST:PPResent YES,NO,NO,YES
Dependencies/Couplings	Coupled to the number of carriers. When the SCPI command is sent, the number of carriers will be set to the number of entries in the parameter list.
Remote Command Notes	When setting these values remotely, the position in the list sent corresponds to the carrier. Missing values are not permitted i.e. if you want to change values 2 and 6 you must send all values up to 6. Subsequent values will remain unchanged, unless the number of values sent is greater than the number of carriers, then subsequent values will be ignored.
Preset	YES,YES,YES,YES,YES,YES,YES,YES,YES,YES,YES,YES
State Saved	Saved in instrument state.

Range	Yes | No
Key Path	**Meas Setup, Carrier Setup, Configure Carriers**

Carrier Width

Allows you to set the width of the carriers. This will be the value applied to all the current slots, whether they are carriers or spaces.

The total number of carrier width values will be coupled to the number of carriers. The maximum number of entries that can be set is 12. Each carrier width value is entered by selecting the desired carrier on the carrier menu key by using the up down arrows, RPG or numeric keypad then entering the carrier width using the carrier width menu key.

When setting these values remotely, the position in the list sent corresponds to the carrier. Missing values are not permitted, for example, if you want to change values 2 and 6 you must send all values up to 6. Subsequent values will remain unchanged, unless the number of values sent is greater than the number of carriers, then subsequent values will be ignored.

The query for this parameter returns the current values for all of the carriers.

Unit	Hz | kHz | MHz | GHz
Mode	TDSCDMA
Remote Command	`[:SENSe]:MCPower:CARRier:LIST:WIDTh <bandwidth>,…` `[:SENSe]:MCPower:CARRier:LIST:WIDTh?`
Example	:SENSe:MCPower:CARRier:LIST:WIDTh 8 MHz, 5 MHz, 5 MHz, 8 MHz
Dependencies/Couplings	Coupled to the number of carriers. When the SCPI command is sent, the number of carriers will be set to the number of entries in the parameter list.
Remote Command Notes	When setting these values remotely, the position in the list sent corresponds to the carrier. Missing values are not permitted i.e. if you want to change values 2 and 6 you must send all values up to 6. Subsequent values will remain unchanged, unless the number of values sent is greater than the number of carriers, then subsequent values will be ignored.
Preset	1.6 MHz, 1.6 MHz, 1.6 MHz, 1.6 MHz, 1.6 MHz, 1.6 MHz, 1.6 MHz, 1.6 MHz, 1.6 MHz, 1.6 MHz, 1.6 MHz, 1.6 MHz
State Saved	Saved in instrument state.
Min	0 Hz
Max	45 MHz
Key Path	**Meas Setup, Carrier Setup, Configure Carriers**

Carrier Integ BW

Allows you to specify the integration bandwidth used in calculating the power in the carriers. If the RRC Filter is on, the actual integration bandwidth used will be the displayed integration bandwidth multiplied by (1 + filter alpha).

The total number of carrier integ BW values will be coupled to the number of carriers. The maximum number of entries that can be set is 12. Each carrier integ BW value is entered by selecting the desired carrier on the carrier menu key by using the up down arrows, RPG or numeric keypad then entering the carrier integ bw using the carrier width menu key.

When setting these values remotely, the position in the list sent corresponds to the carrier. Missing values are not permitted i.e. if you want to change values 2 and 6 you must send all values up to 6. Subsequent values will remain unchanged, unless the number of values sent is greater than the number of carriers, then subsequent values will be ignored.

The query for this parameter returns the current values for all of the carriers.

Factory Preset and *RST:	**1.28 MHz, 1.28MHz, 1.28MHz, 1.28MHz**			
Range:	Min:	100 Hz	Max :	20 MHz
Step:	3 p.p.d. (100 Hz, 300 Hz, 1 kHz, etc.)			
RPG:	Same as base analyzer RBW RPG steps			
Set:	No Restrictions			
Remarks:				
Front Panel Access:	Meas Setup, Carrier Setup, Configure Carriers, Carrier Integ BW			

Unit	Hz | kHz | MHz | GHz
Mode	TDSCDMA
Remote Command	`[:SENSe]:MCPower:CARRier:LIST:BANDwidth|BWIDth[:INTegration] <bandwidth>,…` `[:SENSe]:MCPower:CARRier:LIST:BANDwidth|BWIDth[:INTegration]?`
Example	:SENSe:MCPower:CARRier:LIST:BANDwidth:INTegration 4 MHz, 4 MHz, 4 MHz, 4 MHz,…
Restriction and Notes	Each carrier integ bw value is entered by selecting the desired carrier on the carrier menu key by using the up down arrows, RPG or numeric keypad then entering the carrier integ bw using the carrier width menu key.
Dependencies/Couplings	Coupled to the number of carriers. When the SCPI command is sent, the number of carriers will be set to the number of entries in the parameter list.

Remote Command Notes	When setting these values remotely, the position in the list sent corresponds to the carrier. Missing values are not permitted i.e. if you want to change values 2 and 6 you must send all values up to 6. Subsequent values will remain unchanged, unless the number of values sent is greater than the number of carriers, then subsequent values will be ignored.
Preset	1.28 MHz, 1.28 MHz, 1.28 MHz, 1.28 MHz, 1.28 MHz, 1.28 MHz, 1.28 MHz, 1.28 MHz, 1.28 MHz, 1.28 MHz, 1.28 MHz, 1.28 MHz
State Saved	Saved in instrument state.
Min	100 Hz
Max	20 MHz
Key Path	**Meas Setup, Carrier Setup, Configure Carriers**

Carrier Limit

Specifies the upper limit for the power measured in the carrier if the Carrier Power Present parameter is set to No. If the Carrier Power Present parameter is set to Yes for the carrier, the value is ignored. If it is set to No, the measured power will be compared to the power measured in the reference carrier. If the carrier does not pass the limit, the carrier power result will appear in red and the SCPI query ':CALCulate:CLIMits:FAIL?' will return TRUE.

Unit	dB
Mode	TDSCDMA
Remote Command	`:CALCulate:MCPower:CARRier[1]|2:LIST:RCARrier <rel_ampl>,…` `:CALCulate:MCPower:CARRier[1]|2:LIST:RCARrier?`
Example	:CALCulate:MCPower:CARRier1:LIST:RCARrier 0,0,0,0,…
Restriction and Notes	Allows you to set the Upper Limit for the current carrier (indicated on the Carrier key). If the device is set to mobile, the default values are: –33 dB, –33 dB, –33 dB, –33 dB, –33 dB, –33 dB, –33 dB, –33 dB, –33 dB, –33 dB, –33 dB, –33 dB This key is greyed out if the carrier is configured to have power present.
Dependencies/Couplings	Coupled with Ref Carrier. The value in Ref Carrier is always less than the value set in Carriers.
Remote Command Notes	When setting these values remotely, the position in the list sent corresponds to the offset. Missing values are not permitted i.e. if you want to change values 2 and 6 you must send all values up to 6. Subsequent values will remain unchanged, unless the number of values sent is greater than the number of carriers, then subsequent values will be ignored.
Preset	–40 dB, –40 dB, –40 dB, –40 dB, –40 dB, –40 dB, –40 dB, –40 dB, –40 dB, –40 dB, –40 dB, –40 dB

State Saved	Saved in instrument state.
Min	–200
Max	200
Key Path	**Meas Setup, Carrier Setup, Configure Carriers**

Ref Carrier

Allows you to specify which carrier is the reference carrier. If you enter a value when Ref Carrier Mode is set to Auto, it will be changed to Man. It is from this carrier that the relative power measurements will be made. If you enter a carrier value that is currently configured as having no power present, that carrier will be changed to having power present.

If Ref Carrier Mode is set to auto, the measurement will select the carrier with the highest power as the reference carrier and the Ref Carrier parameter will be updated. If set to man, the Ref Carrier value entered by will be used as the reference carrier.

Mode	TDSCDMA

Remote Command	`[:SENSe]:MCPower:RCARrier <integer>`
	`[:SENSe]:MCPower:RCARrier?`
	`[:SENSe]:MCPower:RCARrier:AUTO ON|OFF|1|0`
	`[:SENSe]:MCPower:RCARrier:AUTO?`

Example	:SENSe:MCPower:RCARrier 4 :SENSe:MCPower:RCARrier:AUTO ON
Restriction and Notes	If there is only one carrier, this key will be greyed out.
Dependencies/Couplings	Ref Carrier Frequency Mode cannot be set to Man when Ref Carrier Mode is set to Auto. If Ref Carrier Frequency Mode is set to Man and Ref Carrier Mode is changed to Auto, Ref Carrier Frequency Mode is forced to Auto. Coupled with Carriers. The max value of Ref Carrier is equal to the value set in Carriers key.
Preset	1
State Saved	Saved in instrument state.
Min	1
Max	12
Key Path	**Meas Setup, Carrier Setup**

Ref Car Freq

Allows you to specify the frequency of the reference carrier. Once entered the Ref Car Freq Mode will be set to man and the center frequency of the analyzer will be calculated as per the ref carrier freq mode.

If Ref Carrier Freq Mode is set to auto it is assumed the carriers are distributed evenly round the current center frequency. In this case the following three steps are used to calculate the Ref Freq and the

calculated Ref Carrier Freq is shown on the Ref Carrier Freq menu key;

1. Ref Freq1 = Ctr Freq - (Total of all Carrier Widths / 2)

2. Ref Freq2 = Ref Freq1 + (Total of all Carrier Widths up to Ref Carrier)

3. Ref Freq = Ref Freq2 + (0.5 * Carrier Width of Ref Carrier)

The Ref Carrier Freq can also be entered by the user. This will set the Ref Carrier Freq Mode to man and the Ctr Freq of the analyzer will be calculated using the following three steps;

1. Ctr Freq1 = Ref Freq - (0.5 * Carrier Width of Ref Carrier)

2. Ctr Freq2 = Ctr Freq1 - (Total of all Carrier Widths up to Ref Carrier)

3. Ctr Freq = Ctr Freq2 + (Total of all Carrier Widths / 2)

This ensures that the carriers are always centered on the screen.

Unit	Hz | kHz | MHz | GHz
Mode	TDSCDMA

Remote Command	`[:SENSe]:MCPower:RCFRequency <freq>`
	`[:SENSe]:MCPower:RCFRequency?`
	`[:SENSe]:MCPower:RCFRequency:AUTO ON|OFF|1|0`
	`[:SENSe]:MCPower:RCFRequency:AUTO?`

Example	:SENSe:MCPower:RCFRequency 1 GHz :SENSe:MCPower:RCFRequency:AUTO ON
Restriction and Notes	The default value is calculated based on current Center Freq. The Min, Max, Res Min, Res Max, are different depending on the Spectrum Analyzer Model Limitations. The Min/Max value provided above are for a 27 GHz PSA. The reason why Ref Carrier Max is not equal to 27 GHz is because the offset range need to take into account. Similar comment for Ref Carrier Min not equal to –100 MHz
Dependencies/Couplings	Ref Carrier Mode cannot be set to Auto when Ref Carrier Frequency Mode is set to Man. If Ref Carrier Mode is set to Auto and Ref Carrier Frequency Mode is changed to Man, Ref Carrier Frequency Mode is forced to Man.
Preset	1.5e+009 Hz
State Saved	Saved in instrument state.
Min	HW Dependant
Max	HW Dependant
Key Path	**Meas Setup, Carrier Setup**

Carrier

Allows you to select the carrier to configure.

Mode	TDSCDMA
Restriction and Notes	Max for this parameter will be equal to the number of carriers.
Dependencies/Couplings	Coupled to the number of carriers.
Preset	1
State Saved	Saved in instrument state.
Min	1
Max	12
Key Path	**Meas Setup, Carrier Setup, Configure Carriers**

Limit Test

Allows you to turn on or off limit checking for each offset. The limits may be specified within the Offset menu, for each offset, both sides of the carrier. For results that fail the limit, a red F is appended. In Combined view, the bar turns red.

Mode	TDSCDMA
Remote Command	`[:SENSe]:MCPower:LIMit[:STATe] ON|OFF|1|0` `[:SENSe]:MCPower:LIMit[:STATe]?`
Example	:SENSe:MCPower:LIMit:STATe ON
Preset	ON
State Saved	Saved in instrument state.
Range	On | Off
Key Path	**Meas Setup, More**

Offset

Allows you to select the offset to configure.

Mode	TDSCDMA
Preset	A
State Saved	Saved in instrument state.
Range	A | B | C
Key Path	**Meas Setup, Offset/Limit**

Offset Freq

Allows you to set the frequency difference from the lower and upper carriers frequency. Setting the frequency of any offset to 0 Hz will cause the same behavior as turning the offset state off and it will be removed from the results screen

Unit	Hz | kHz | MHz | GHz
Mode	TDSCDMA
Remote Command	`[:SENSe]:MCPower:OFFSet:LIST[:FREQuency] <freq>,…` `[:SENSe]:MCPower:OFFSet:LIST[:FREQuency]?`
Example	:SENSe:MCPower:OFFSet:LIST:FREQuency 5 MHz, 10 MHz, 15 MHz
Restriction and Notes	This parameter determines the frequency difference between the center of the main channel and the center of the carrier.
Remote Command Notes	When setting these values remotely, the position in the list sent corresponds to the offset. Missing values are not permitted i.e. if you want to change values 1 and 3 you must send all values up to 3. Subsequent values will remain unchanged, unless the number of values sent is greater than the number of carriers, then subsequent values will be ignored.
Preset	1.6 MHz, 3.2 MHz, 0 MHz
State Saved	Saved in instrument state.
Min	0 Hz
Max	45 MHz
Key Path	**Meas Setup, Offset/Limit**

Offset Integ BW

Allows you to set the bandwidth for the current offset (indicated on the Offset key) using front panel and all the offsets using SCPI. If the RRC Filter is on, the actual integration bandwidth used will be the displayed integration bandwidth multiplied by (1 + filter alpha).

Unit	Hz | kHz | MHz | GHz
Mode	TDSCDMA
Remote Command	`[:SENSe]:MCPower:OFFSet:LIST:BANDwidth|BWIDth[:INTegration] <bandwidth>,…` `[:SENSe]:MCPower:OFFSet:LIST:BANDwidth|BWIDth[:INTegration]?`
Example	:SENSe:MCPower:OFFSet:LIST:BANDwidth:INTegration 3.84 MHz, 3.84 MHz, 3.84 MHz

Remote Command Notes	When setting these values remotely, the position in the list sent corresponds to the offset. Missing values are not permitted, for example, if you want to change values 2 and 6 you must send all values up to 6. Subsequent values will remain unchanged, unless the number of values sent is greater than the number of carriers, then subsequent values will be ignored.
Preset	1.28 MHz, 1.28 MHz, 1.28 MHz
State Saved	Saved in instrument state.
Min	100 Hz
Max	20 MHz
Key Path	**Meas Setup, Offset/Limit**

Abs Limit

Allows you to set the upper absolute limit for the current offset (indicated on the Offset key) using front panel and all the offsets using SCPI.

Unit	dBm
Mode	TDSCDMA
Remote Command	`:CALCulate:MCPower:OFFSet[1]|2:LIST:ABSolute`
Example	:CALCulate:MCPower:OFFSet:LIST:LIMit:ABSolute 0,0,0
Restriction and Notes	The default values are –55 dBm, –55 dBm, 0 dBm if Device is Mobile (MS) m is 1 for BTS, 2 for MS. BTS is the default.
Remote Command Notes	When setting these values remotely, the position in the list sent corresponds to the offset. Missing values are not permitted, for example, if you want to change values 2 and 3 you must send all values up to 3. Subsequent values will remain unchanged, unless the number of values sent is greater than the number of carriers, then subsequent values will be ignored.
Preset	0 dBm, 0 dBm, 0 dBm
State Saved	Saved in instrument state.
Min	–200
Max	200
Key Path	**Meas Setup, Offset/Limit, Abs Limit**

Rel Lim

Allows you to set the upper limit relative to the Total Pwr Reference value for the current offset (indicated on the Offset key) using front panel and all the offsets using SCPI.

Unit	dB

Mode	TDSCDMA
Remote Command	`:CALCulate:MCPower:OFFSet[1]|2:LIST:RCARrier <rel_ampl>,…` `:CALCulate:MCPower:OFFSet[1]|2:LIST:RCARrier?`
Example	:CALCulate:MCPower:OFFSet:LIST:RCARrier 0,0,0
Restriction and Notes	This particular parameter sets the limit for the offset to the left of the carrier. The default values are –33 dB, –43 dB, 0 dB, 0 dB, 0 dB, 0 dB if Device is Mobile (MS) m is 1 for BTS, 2 for MS. BTS is the default.
Remote Command Notes	When setting these values remotely, the position in the list sent corresponds to the offset. Missing values are not permitted, for example, if you want to change values 2 and 3 you must send all values up to 63. Subsequent values will remain unchanged, unless the number of values sent is greater than the number of carriers, then subsequent values will be ignored.
Preset	–40 dB, –45 dB, 0 dB
State Saved	Saved in instrument state.
Min	–200
Max	200
Key Path	**Meas Setup, Offset/Limit, Rel Lim (Car)**

Fail Mask

Allows you to select one of the logic keys for determining the conditions for which the measurement fails: Absolute and Relative both check the results against the respective limit, while OR checks against both limits, failing if either of the limits is broken. AND will result in a failure reported only if both the absolute and relative limits fail.

Mode	TDSCDMA
Remote Command	`[:SENSe]:MCPower:OFFSet[1]|2:LIST:TEST ABSolute|RELative|AND|OR,…` `[:SENSe]:MCPower:OFFSet[1]|2:LIST:TEST?`
Example	:SENSe:MCPower:OFFSet:LIST:TEST ABS, REL, ABS, AND, OR
Restriction and Notes	Select the type of testing to be done to determine whether the measurement passes the limit test. Default values are REL,REL,REL if Device is Base AND,AND,AND if Device is Mobile

Remote Command Notes	When setting these values remotely, the position in the list sent corresponds to the carrier. Missing values are not permitted, for example, if you want to change values 2 and 5 you must send all values up to 5. Subsequent values will remain unchanged, unless the number of values sent is greater than the number of carriers, then subsequent values will be ignored.
Preset	REL,REL,REL
State Saved	Saved in instrument state.
Range	ABSolute | RELative | Abs AND Rel | Abs OR Rel
Key Path	**Meas Setup, Offset/Limits, Fail Mask**

Power Ref

Allows you to set the mode of the carrier power result. When set to auto, the carrier power result reflects the measured power value in the reference carrier. When set to manual, the result takes on the last measured value, or may be entered by the user.

The power in the carrier (main channel) that will be used to compute the relative power values for the offsets. When the carrier power state is set to auto, this will be set to the measured carrier power.

Unit	dBm
Mode	TDSCDMA

Remote Command	`[:SENSe]:MCPower:CARRier[:POWer] <ampl>`
	`[:SENSe]:MCPower:CARRier[:POWer]?`
	`[:SENSe]:MCPower:CARRier:AUTO[:STATe] ON|OFF|1|0`
	`[:SENSe]:MCPower:CARRier:AUTO[:STATe]?`

Example	:SENSe:MCPower:CARRier:POWer –10 dBm :SENSe:MCPower:CARRier:AUTO:STATe ON
Restriction and Notes	The default Reference carrier power is the measured power in the carrier.
State Saved	Saved in instrument state.
Min	–200
Max	200
Key Path	**Meas Setup, More**

RRC Filter

Allows you to turn RRC filtering of the carriers and all adjacent channels on or off. The α value (roll off) for the filter will be set to the value of the Filter Alpha parameter.

Mode	TDSCDMA

Remote Command	`[:SENSe]:MCPower:FILTer[:RRC][:STATe] ON|OFF|1|0` `[:SENSe]:MCPower:FILTer[:RRC][:STATe]?`
Example	:SENSe:MCPower:FILTer:RRC:STATe ON
Preset	ON
State Saved	Saved in instrument state.
Range	On | Off
Key Path	**Meas Setup, More**

Filter Alpha

Allows you to input the alpha value for the RRC Filter.

Mode	TDSCDMA
Remote Command	`[:SENSe]:MCPower:FILTer[:RRC]:ALPHa <real>` `[:SENSe]:MCPower:FILTer[:RRC]:ALPHa?`
Example	:SENSe:MCPower:FILTer:RRC:ALPHa 0.33
Preset	0.22
State Saved	Saved in instrument state.
Min	0.01
Max	1
Key Path	**Meas Setup, More**

Noise Correction

Allows you to turn the noise floor correction function to on or off. On enables measurement noise correction when the measured power in the reference channel or any offset is close to the noise floor of the analyzer. Off turns these corrections off.

Mode	TDSCDMA
Remote Command	`[:SENSe]:MCPower:CORRection:NOISe[:AUTO] ON|OFF|1|0` `[:SENSe]:MCPower:CORRection:NOISe[:AUTO]?`
Example	:SENSe:MCPower:CORRection:NOISe:AUTO ON
Restriction and Notes	Noise correction is unavailable if signal tracking is on. If noise correction is on and signal tracking is turned on, the signal tracking state is forced back to off and an advisory message is displayed.
Preset	OFF
State Saved	Saved in instrument state.
Range	On | Off

Key Path	**Meas Setup, More**

Query the Pass/Fail state

Queries the Pass/Fail state of the measurement. Returns True (1) if one or more of the limits for the measurement have failed.

Mode	TDSCDMA
Remote Command	`:CALCulate:CLIMits:FAIL?`
Example	:CALC:CLIM:FAIL?
Restriction and Notes	Returns 1 if the measurement has failed the specified limits. Returns 0 if the measurement passes or if the limit checking is not turned on.
Preset	N/A
Range	0 (False), 1 (True)
Key Path	None

Restart Parameters

A change to any parameter found on the Mode Setup menu (and its submenus) will cause the measurement to restart. The same is true of changes to Center Freq (Frequency Menu). Note that parameters described above in the Meas Setup Menu section also cause a restart of the measurement.

Marker Menu

No Marker functions are available while the Multi-carrier Power measurement is running.

Span / X Scale Menu

No Span / X Scale functions are available when Multi-carrier Power is the active measurement.

Amplitude / Y Scale

Only a small subset of the base analyzer amplitude parameters are available when Multi-carrier Power is the current measurement.

Y-Axis Scale / Div

Sets the logarithmic units per vertical graticule division on the display.

Unit	dB
Mode	TDSCDMA
Remote Command	`:DISPlay:MCPower:WINDow:TRACe:Y[:SCALe]:PDIVision <rel_ampl>` `:DISPlay:MCPower:WINDow:TRACe:Y[:SCALe]:PDIVision?`
Example	:DISPlay:MCPower:WINDow:TRACe:Y:SCALe:PDIVision 10 dB

Preset	10 dB
State Saved	Saved in instrument state.
Min	0.10 dB
Max	20.00 dB
Key Path	**Amplitude**

Y-Axis Ref Value

Sets the logarithmic units per vertical graticule division on the display.

Unit	dBm
Mode	TDSCDMA
Remote Command	`:DISPlay:MCPower:WINDow:TRACe:Y[:SCALe]:RLEVel <ampl>` `:DISPlay:MCPower:WINDow:TRACe:Y[:SCALe]:RLEVel?`
Example	:DISPlay:MCPower:WINDow:TRACe:Y:SCALe:RLEVel 10 dBm
Restriction and Notes	Min and Max are dependant on the Attenuation and Max Mixer Level settings.
Dependencies/Couplings	Coupled to Attenuation and Max Mixer Level
Preset	0 dBm
State Saved	Saved in instrument state.
Min	–170 dBm
Max	30 dBm
Key Path	**Amplitude**

Restore Meas Defaults

Pressing the Restore Meas Defaults key (Meas Setup, More (1 of 2), Restore Meas Defaults) will preset (that is, set to the factory defaults) only the parameters that are specific to the selected measurement. Parameters whose default values are determined by the value of a mode parameter are set to the appropriate value for the current setting of that mode parameter.

Results

Measurement Results

The results shown in the results view are described below.

Result	Units	Min	Max
Total Carrier Power	dBm	–200	200
Ref Carrier Power	dBm	–200	200

Result	Units	Min	Max
Carrier Power (Carrier Pwr Present set to Yes | No)	dBm | dB	–200	200
Offset Relative Power	dB	–200	200
Offset Absolute Power	dBm	–200	200

Total Carrier Power

This result gives the total power in all the carriers with carrier power present set to yes. The power is calculated by integrating across the bandwidth declared by the Carrier Integ BW parameter for each carrier then totalling. The total integration bandwidth is shown as part of the result. This will be the total of the Carrier Integ BW parameters of the carriers used in calculating the total carrier power.

Ref Carrier Power

This result gives the power in the reference carrier. The power is calculated by integrating across the bandwidth declared by the Carrier Integ BW parameter for that carrier. The integration bandwidth is shown as part of the result.

On the graph display the carrier representing the reference carrier will be identified using white. In Spectrum view the vertical lines used to identify the carrier will be white and in combined view the width arrow will be white.

Carrier Power

This result is the power in all the currently defined carriers. If the carrier has carrier power present the power will be absolute. If it is defined as not having power present the power will be relative to the reference carrier. The power is calculated by integrating across the bandwidth declared by the Carrier Integ BW parameter. The integration bandwidth is shown as part of the result. As there are potentially more results than can be easily viewed on the display a scrolled list will be used to display their results. The Carrier Results menu key will be used to index the carrier amplitude results. This key will be greyed out unless the measurement is in single mode as in continual measurement mode the display will be continually updating and will not need to be accessed. The currently selected Carrier Result will be displayed on the last line of the carrier power result list unless;

- the selected Carrier Result is 4 or less in normal multi carrier power results view. In this case the first 4 carrier power results will be displayed.
- the selected Carrier Result is 9 or greater in normal multi carrier power results view. In this case the last 4 carrier power results will be displayed.
- the zoom mode is selected. In this case all carrier power ranges can be displayed.

On the graph display the carrier(s) representing the carriers (with the exception of the reference carrier) with power present will be identified using red. The carrier(s) representing carriers with no power present will be identified using pale blue. In Spectrum view the vertical lines used to identify the carrier(s) with power present will be red and the vertical lines used to identify the carrier(s) with no power present will be pale blue. In combined view the width arrow for carrier(s) with power present will be red and the width arrow for carrier(s) with no power present will be pale blue.

Offset Relative Power

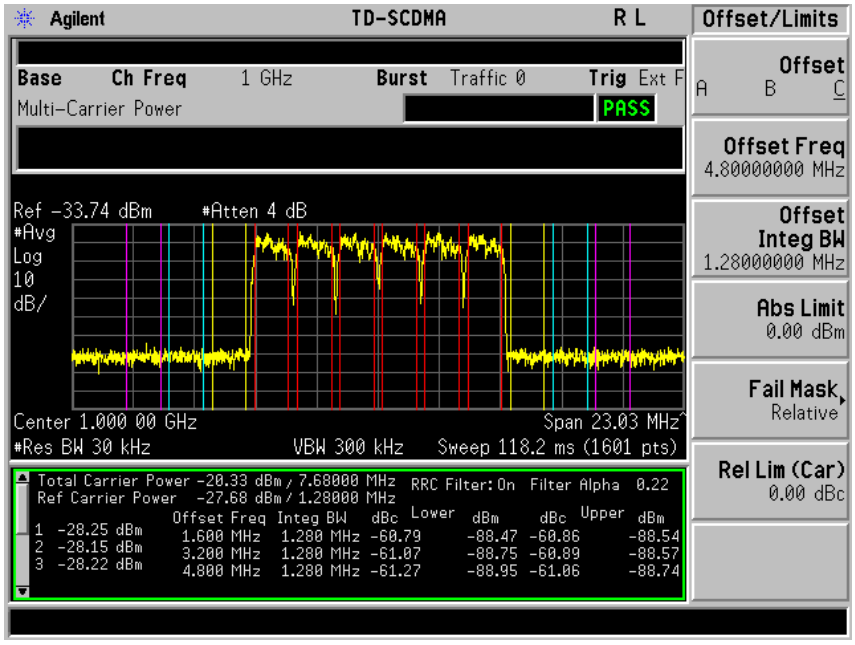
This result gives the power in the offsets relative to the reference carrier. The power is calculated by integrating across the bandwidth declared by the Offset Integ BW parameter. The offset integration bandwidth is shown as part of the result.

On the graph display the offsets A, B, and C will be identified using yellow, blue and purple. In Spectrum view the appropriate color will be applied to the vertical lines to identify the offset and in combined view the appropriate color will be applied to the width arrow to identify the offset.

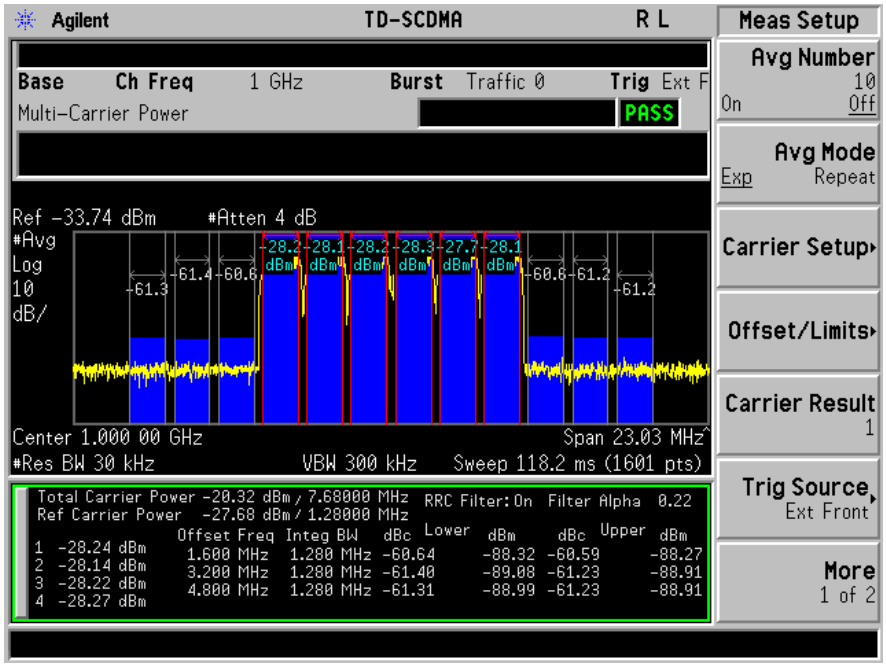
Offset Absolute Power

This result gives the absolute power in the offsets. The power is calculated by integrating across the bandwidth declared by the Offset Integ BW parameter. The offset integration bandwidth is shown as part of the result. On the graph display the offset A, B, and C will be identified using yellow, blue and purple. In Spectrum view the appropriate color will be applied to the vertical lines to identify the offset and in combined view the appropriate color will be applied to the width arrow to identify the offset.

Spectrum View



Combined View



Results File

:MMEMory:STORe:RESults <‘filename’>

One method of results storage will be in a file suitable for import into a spreadsheet program. Upon request from the file system, a comma delimited .csv file should be created with the following items; time, date, column titles, and “results.” This file should contain all of the data necessary to recreate the measurement conditions.

Table -4

Application	**TD-SCDMA Utilities**	
Measurement	Multi-Carrier Power	
Date	17–Apr	2007
Time	9:07:50	
Measurement Parameters		
Average State	Off	
Number of Averages	10	
Average Mode	Exp	
Measure	Cont	

Table -4

Application	**TD-SCDMA Utilities**	
Device	MS	
Channel Integration BW	1.28	MHz
RRC Filter:	On	
Offset Freq[1]	1600000	
Offset Freq[2]	3200000	
Offset Freq[3]	4800000	
Offset Integ BW[1]	1280000	
Offset Integ BW[2]	1280000	
Offset Integ BW[3]	1280000	
State[1]	On	
State[2]	On	
State[3]	On	
Limit Test	On	
Trigger Source	RF Burst (Wideband)	
Burst Type	Traffic	
Traffic Timeslot	2	
Gate	On	
Res BW	30	kHz
Video BW	300	kHz
Frequency Parameters		
Center Freq	1	GHz
Span	17.18	MHz
Measurement Results		
Ref Carrier Power	–29.55	dBm
Carriers[1]	–89.08	dBm
Carriers[2]	–29.55	dBm
Carriers[3]	–88.59	dBm

Table -4

Application	TD-SCDMA Utilities	
Lower Absolute Results[1]	–88.82	dBm
Lower Absolute Results[2]	–88.81	dBm
Lower Absolute Results[3]	–89.01	dBm
Lower Absolute Results[4]		
Lower Relative Results[1]	–59.27	dB
Lower Relative Results[2]	–59.26	dB
Lower Relative Results[3]	–59.46	dB
Lower Relative Results[4]		
Upper Absolute Results[1]	–88.69	dBm
Upper Absolute Results[2]	–88.26	dBm
Upper Absolute Results[3]	–88.72	dBm
Upper Absolute Results[4]		
Upper Relative Results[1]	–59.14	dB
Upper Relative Results[2]	–58.71	dB
Upper Relative Results[3]	–59.17	dB
Upper Relative Results[4]		
Abs Limit[1]	–55	dBm
Abs Limit[2]	–55	dBm
Abs Limit[3]	0	dBm
Limit Fail Mask[1]	Abs AND Rel	
Limit Fail Mask[2]	Abs AND Rel	
Limit Fail Mask[3]	Abs AND Rel	
Rel Lim (Car)[1]	–33	dBc
Rel Lim (Car)[2]	–43	dBc
Rel Lim (Car)[3]	0	dBc

SCPI Remote Commands

:CONFigure:MCP

:FETCh:MCP[n]?

:READ:MCP[n]?

:MEASure:MCP[n]?

N	Results Returned
N=1	Returns 36 comma-separated scalar results, in the following order. 1 to 24. All carriers absolute and relative values 25. lower offset A - relative power (dBc) 26. lower offset A - absolute power (dBm) 27. upper offset A - relative power (dBc) 28. upper offset A - absolute power (dBm) 29. lower offset B - relative power (dBc) 30. lower offset B - absolute power (dBm) 31. upper offset B - relative power (dBc) 32. upper offset B - absolute power (dBm) 33. lower offset C - relative power (dBc) 34. lower offset C - absolute power (dBm) 35. upper offset C - relative power (dBc) 36. upper offset C - absolute power (dBm) If the results are not available, –999.0 is returned.
n = 2	Returns 18 values representing the pass/fail status of all of the offsets and those carriers with power present (0 = pass, 1 = fail) 1 to 12: pass/fail status for the 12 carriers. If power present is set to YES, 0 (Pass) is returned. 13 pass/fail status for lower offset A 14 pass/fail status for upper offset A 15 pass/fail status for lower offset B 16 pass/fail status for upper offset B 17 pass/fail status for lower offset C 18 pass/fail status for upper offset C

Spurious Emissions

Measurement Setup

Meas Setup Menu

Avg Number

Allows you to set the number of averages to be used when averaging is on. Trace averaging is used for this measurement. When turned on, the trace for each range is averaged by the current number of averages.

Mode	TDSCDMA

Remote Command	`[:SENSe]:SPURious:AVERage:COUNt <integer>`
	`[:SENSe]:SPURious:AVERage:COUNt?`
	`[:SENSe]:SPURious:AVERage[:STATe] ON|OFF|1|0`
	`[:SENSe]:SPURious:AVERage[:STATe]?`

Example	:SENSe:SPURious:AVERage:COUNt 25 :SENSe:SPURious:AVERage:STATe ON
Restriction and Notes	Allows you to specify the number of measurement averages used when calculating the measurement result. The average will be displayed at the end of each sweep.
Preset	10
State Saved	Saved in instrument state.
Min	1
Max	1000
Key Path	**Meas Setup**

Average Mode

Allows you to change between exponential and repeat averaging. This parameter is coupled to the measurement type. If exponential averaging is selected, the measurement sets the measurement type to examine. If repeat averaging is selected, the instrument sets the measurement type to full.

Mode	TDSCDMA
Remote Command	`[:SENSe]:SPURious:AVERage:TCONtrol EXPonential|REPeat` `[:SENSe]:SPURious:AVERage:TCONtrol?`
Example	SENSe:SPURious:AVERageTCONtrol REP

Restriction and Notes	Press Avg Mode (Exp) to continue measurement averaging, using the specified number of averages to compute each averaged value. The average will be displayed at the end of each sweep. Avg Mode (Repeat) will cause the measurement to reset the average counter each time the specified number of averages is reached.
Preset	EXPonential
State Saved	Saved in instrument state.
Range	EXP | Repeat
Key Path	**Meas Setup**

Meas Type

Allows you to change between examine and full measurement type.

	Single		**Continuous**	
	No Spurs Found	**Spurs Found**	**No Spurs Found**	**Spurs Found**
Examine	All active ranges are measured. On completion the measurement is set to the idle state and the 'No Spurs' happening is displayed.	All active ranges are measured and the spurs found reported. On completion the measurement is set to the idle state and the trace containing the worst spur restored. The spur menu key is enabled. A marker is also added which is set to the frequency of the worst spur.	All active ranges are measured. On completion the SA remains set to last range checked with an active trace and the 'No Spurs' happening is displayed.	All active ranges are measured and the spurs found reported. On completion the SA is set to the range containing the worst spur found and continually sweeps this range. The spur menu key is enabled. A marker is also added which is set to the frequency of the worst spur.
Full	All active ranges are measured. On completion measurement is set to idle state and the 'No Spurs' happening is displayed.	All active ranges are measured and spurs found reported. On completion the measurement is set to the idle state, displaying the trace of the last active range.	Measurement continually cycles through all active ranges.	All active ranges are measured and spurs found reported. On each cycle of the active ranges the spurs found are reset. This ensures any remote queries retrieve the trace data that matches the currently displayed results.

Mode	TDSCDMA
Remote Command	`[:SENSe]:SPURious:TYPE EXAMine | FULL` `[:SENSe]:SPURious:TYPE?`
Example	SENSe:SPURious:TYPE FULL
Restriction and Notes	This parameter is coupled to the average mode. If examine meas type is selected, the measurement sets average mode to exp; If full meas type is selected, the average mode is set to repeat.
Preset	EXAMine
State Saved	Saved in instrument state.
Range	Examine | Full
Key Path	**Meas Setup**

Spur

The spur menu key is used to view any spurs which have been found. It will only be enabled when the measurement type is set to examine and on completion of a measurement. Once the Spur menu key has been enabled you can view any spur. The measurement will set the analyzer to the range in which the currently selected spur was found. The range settings will only change if the spur selected is in a range which is different from the current range settings. A marker is used to identify the currently selected spur on the trace.

NOTE	There is no means of scrolling through the spur results when the Meas Type parameter is set to Full

Mode	TDSCDMA
Restriction and Notes	Select the number of the spur whose result is displayed at the top of the list. No corresponding SCPI command.
State Saved	No
Key Path	**Meas Setup**

Fast Spurious Meas

Allows you to turn the fast spurious measurement on or off. This provides a faster method of execution because with fast spurious measurement turned on only spurs above the limit line are reported. Any spurs reported will therefore cause the measurement to fail.

Mode	TDSCDMA
Remote Command	`[:SENSe]:SPURious:FSMeas ON|OFF|1|0` `[:SENSe]:SPURious:FSMeas?`

Example	:SENSe:SPURious:FSMeas ON
Restriction and Notes	See Abs Start Limit for more details.
Preset	OFF
State Saved	Saved in instrument state.
Range	On | Off
Key Path	**Meas Setup**

Range Table

Range Number

Allows you to select the range using the front panel, Select the number of the range to be edited with the keys on the range table menu.

Mode	TDSCDMA
Restriction and Notes	No corresponding SCPI command.
State Saved	No
Key Path	**Meas Setup, Range Table**

Range State

Changing the range will update the values on the other menu keys so that they reflect the settings for the selected range. If range is on it will be used as part of the measurement, if off it will be excluded. A range is made up of the next eleven parameters. This parameter can send up to 20 values. The location in the list sent corresponds to the range the value is associated with. Missing values are not permitted, for example,. if you want to change values 2 and 6 you must send all values up to 6. Subsequent values will remain as they were. The query for this parameter always returns 20 values.

Mode	TDSCDMA
Remote Command	`[:SENSe]:SPURious[:RANGe[1]]|:RANGe2[:LIST]:STATe ON|OFF|1|0,…` `[:SENSe]:SPURious[:RANGe[1]]|:RANGe2[:LIST]:STATe?`
Example	:SENSe:SPURious:RANGe:LIST:STATe ON,ON,ON,OFF,OFF,OFF,OFF,…
Restriction and Notes	Allows you to turn the specified range On or Off. If the device is set to mobile the default values are: ON, ON, ON, ON, ON, ON, ON, OFF, OFF, OFF, OFF, OFF, OFF, OFF, OFF, OFF, OFF, OFF, OFF RANGe1 (or RANGe with no number appended) will set BTS values. Use RANGe2 for MS.
Preset	ON, ON, ON, ON, OFF, OFF, OFF, OFF, OFF, OFF, OFF, OFF, OFF, OFF, OFF, OFF, OFF, OFF, OFF, OFF
State Saved	Saved in instrument state.

Range	On | Off
Key Path	**Meas Setup, Range Table**

Start Freq

Allows you to set the start frequency of the analyzer. This parameter can send up to 20 values. The location in the list sent corresponds to the range the value is associated with. Missing values are not permitted i.e. if you want to change values 2 and 6 you must sent all values up to 6. Subsequent values will remain as they were. The query for this parameter always returns 20 values.

Unit	Hz | kHz | MHz | GHz
Mode	TDSCDMA
Remote Command	`[:SENSe]:SPURious[:RANGe][:LIST]:FREQuency:STARt <freq>,…` `[:SENSe]:SPURious[:RANGe][:LIST]:FREQuency:STARt?`
Example	:SENSe:SPURious:RANGe:LIST:FREQuency:START 5 MHz, 10 MHz, 15 MHz
Restriction and Notes	The maximum value corresponds to the Frequency Maximum of the Analyser. Set the frequency offset to the start of the specified range. The Range State parameter allows you to turn the current range (indicated on the range key) On or Off. For base station measurements, note that the requirement applies at frequencies within the specified frequency ranges which are more than 4 MHz under the first carrier frequency used or more than 4 MHz above the last carrier frequency used. The values for the first and last carrier transmit frequencies are set with the Tx Band Start and Tx Band Stop parameters. For measurements made on mobile devices, the requirements apply everywhere except the 4 MHz above and 4 MHz below the mobile carrier frequency (set by the Centre Freq parameter on the Frequency menu).
Remote Command Notes	When setting these values remotely, the position in the list sent corresponds to the offset. Missing values are not permitted i.e. if you want to change values 2 and 6 you must send all values up to 6. Subsequent values will remain unchanged, unless the number of values sent is greater than the number of carriers, then subsequent values will be ignored.
Preset	9 kHz, 150 kHz, 30 MHz, 1 GHz, 925 MHz, 935 MHz, 1805 MHz, 1.5 GHz,1.5 GHz,1.5 GHz,1.5 GHz,1.5 GHz,1.5 GHz,1.5 GHz,1.5 GHz,1.5 GHz,1.5 GHz,1.5 GHz,1.5 GHz,1.5 GHz
State Saved	Saved in instrument state.
Min	–100 MHz
Max	HW Dependant

Key Path	**Meas Setup, Range Table**

Stop Freq

Allows you to set the stop frequency of the analyzer. This parameter can send up to 20 values. The location in the list sent corresponds to the range the value is associated with. Missing values are not permitted i.e. if you want to change values 2 and 6 you must sent all values up to 6. Subsequent values will remain as they were. The query for this parameter always returns 20 values.

Unit	Hz | kHz | MHz | GHz
Mode	TDSCDMA
Remote Command	`[:SENSe]:SPURious[:RANGe][:LIST]:FREQuency:STOP <freq>,…` `[:SENSe]:SPURious[:RANGe][:LIST]:FREQuency:STOP?`
Example	SENSe:SPURious:LIST:FREQuency:STOP 2.715 MHz, 3.515 MHz, 4.0 MHz, 7.5 MHz, 12.5 MHz
Restriction and Notes	Set the frequency offset to the end of the specified range. The Range State parameter allows you to turn the specified range (indicated on the Range key) On or Off. For base station measurements, note that the requirement applies at frequencies within the specified frequency ranges which are more than 4 MHz under the first carrier frequency used or more than 4 MHz above the last carrier frequency used. The values for the first and last carrier transmit frequencies are set with the Tx Band Start and Tx Band Stop parameters. For measurements made on mobile devices, the requirements apply everywhere except the 4 MHz above and 4 MHz below the mobile carrier frequency (set by the Centre Freq parameter on the Frequency menu).
Remote Command Notes	When setting these values remotely, the position in the list sent corresponds to the offset. Missing values are not permitted i.e. if you want to change values 2 and 6 you must send all values up to 6. Subsequent values will remain unchanged, unless the number of values sent is greater than the number of carriers, then subsequent values will be ignored.
Preset	150 kHz, 30 MHz, 1 GHz, 12.75 GHz, 935 MHz, 960 MHz, 1880 MHz, 2.5 GHz, 2.5 GHz, 2.5 GHz, 2.5 GHz, 2.5 GHz, 2.5 GHz, 2.5 GHz, 2.5 GHz, 2.5 GHz, 2.5 GHz, 2.5 GHz, 2.5 GHz
State Saved	Saved in instrument state.
Min	–100 MHz
Max	HW Dependant
Key Path	**Meas Setup, Range Table**

Res BW Mode

Allows you to set the Res BW mode of the analyzer. This can be auto, where the analyzer determines the optimum setting or man, where the user determines the setting. This parameter can send up to 20 values. The location in the list sent corresponds to the range the value is associated with. Missing values are not permitted i.e. if you want to change values 2 and 6 you must send all values up to 6. Subsequent values will remain as they were. The query for this parameter always returns 20 values.

Res BW

Allows you to set the Res BW of the analyzer. This parameter can send up to 20 values. The location in the list sent corresponds to the range the value is associated with. Missing values are not permitted i.e. if you want to change values 2 and 6 you must send all values up to 6. Subsequent values will remain as they were. The query for this parameter always returns 20 values.

Unit	Hz|kHz|MHz|GHz
Mode	TDSCDMA

Remote Command	`[:SENSe]:SPURious[:RANGe][:LIST]:BANDwidth|BWIDth[:RESolution] <bandwidth>,…`
	`[:SENSe]:SPURious[:RANGe][:LIST]:BANDwidth|BWIDth[:RESolution]?`
	`[:SENSe]:SPURious[:RANGe][:LIST]:BANDwidth|BWIDth[:RESolution]:AUTO ON |OFF|1|0`
	`[:SENSe]:SPURious[:RANGe][:LIST]:BANDwidth|BWIDth[:RESolution]:AUTO?`

Example	:SENSe:SPURious:RANGe:LIST:BANDwidth:RESolution 30 kHz, 30 kHz, 30 kHz, 1 MHz, 1 MHz, 1 MHz :SENSe:SPURious:RANGe:LIST:BANDwidth:RESolution:AUTO ON,ON,ON,ON,ON
Restriction and Notes	Set the resolution bandwidth used for each offset. Defaults values are 1 kHz, 10 kHz, 100 kHz, 1 MHz, 100 kHz, 100 kHz, 100 kHz for Mobile measurements
Remote Command Notes	When setting these values remotely, the position in the list sent corresponds to the offset. Missing values are not permitted i.e. if you want to change values 2 and 5 you must send all values up to 5. Subsequent values will remain unchanged, unless the number of values sent is greater than the number of carriers, then subsequent values will be ignored.
Preset	1 kHz, 10 kHz, 100 kHz, 1 MHz, 100 kHz, 100 kHz, 100 kHz, 3 MHz, 3 MHz, 3 MHz, 3 MHz, 3 MHz, 3 MHz, 3 MHz, 3 MHz, 3 MHz, 3 MHz, 3 MHz, 3 MHz
State Saved	Saved in instrument state.
Min	1 Hz
Max	8 MHz

Key Path	**Meas Setup, Range Table**

Video BW

Allows you to set the Video BW of the analyzer. This parameter can send up to 20 values. The location in the list sent corresponds to the range the value is associated with. Missing values are not permitted i.e. if you want to change values 2 and 6 you must send all values up to 6. Subsequent values will remain as they were. The query for this parameter always returns 20 values.

Video BW mode can be auto, where the analyzer determines the optimum setting or man, where the user determines the setting. This parameter can send up to 20 values. The location in the list sent corresponds to the range the value is associated with. Missing values are not permitted i.e. if you want to change values 2 and 6 you must send all values up to 6. Subsequent values will remain as they were. The query for this parameter always returns 20 values.

Unit	Hz|kHz|MHz|GHz
Mode	TDSCDMA

Remote Command	`[:SENSe]:SPURious[:RANGe][:LIST]:BANDwidth|BWIDth:VIDeo <bandwidth>,…`
	`[:SENSe]:SPURious[:RANGe][:LIST]:BANDwidth|BWIDth:VIDeo?`
	`[:SENSe]:SPURious[:RANGe][:LIST]:BANDwidth|BWIDth:VIDeo:AUTO ON |OFF|1|0`
	`[:SENSe]:SPURious[:RANGe][:LIST]:BANDwidth|BWIDth:VIDeo:AUTO?`

Example	:SENSe:SPURiousRANGe:LIST:BANDwidth:VIDeo 30 kHz, 30 kHz, 30 kHz, 1 MHz, 1 MHz, 1 MHz :SENSe:SPURious:RANGe:LIST:BANDwidth:VIDeo:AUTO ON,ON,ON,ON,ON,…
Remote Command Notes	When setting these values remotely, the position in the list sent corresponds to the offset. Missing values are not permitted i.e. if you want to change values 2 and 5 you must send all values up to 5. Subsequent values will remain unchanged, unless the number of values sent is greater than the number of carriers, then subsequent values will be ignored.
Preset	1 kHz, 10 kHz, 100 kHz, 1 MHz, 100 kHz, 100 kHz, 100 kHz, 3 MHz, 3 MHz, 3 MHz, 3 MHz, 3 MHz, 3 MHz, 3 MHz, 3 MHz, 3 MHz, 3 MHz, 3 MHz, 3 MHz, 3 MHz
State Saved	Saved in instrument state.
Min	1 Hz
Max	8 MHz
Key Path	**Meas Setup, Range Table**

Sweep Time

Allows you to set the Sweep Time of the analyzer. This parameter can send up to 20 values. The location in the list sent corresponds to the range the value is associated with. Missing values are not permitted, that is, if you want to change values 2 and 6 you must send all values up to 6. Subsequent values will remain as they were. The query for this parameter always returns 20 values.

Sweep Time Mode can be auto, where the analyzer determines the optimum setting or man, where the user determines the setting. This parameter can send up to 20 values. The location in the list sent corresponds to the range the value is associated with. Missing values are not permitted, that is, if you want to change values 2 and 6 you must send all values up to 6. Subsequent values will remain as they were. The query for this parameter always returns 20 values.

Unit	ns | us | ms | s | ks
Mode	TDSCDMA

Remote Command	`[:SENSe]:SPURious[:RANGe][:LIST]:SWEep:TIME <time>`
	`[:SENSe]:SPURious[:RANGe][:LIST]:SWEep:TIME?`
	`[:SENSe]:SPURious[:RANGe][:LIST]:SWEep:TIME:AUTO ON |OFF|1|0`
	`[:SENSe]:SPURious[:RANGe][:LIST]:SWEep:TIME:AUTO?`

Example	:SENSe:SPURiousRANGe:LIST:SWEep:TIME 5 ms, 5 ms, 5 ms, 5 ms, 5 ms :SENSe:SPURious:RANGe:LIST:SWEep:TIME:AUTO ON,ON,ON,ON,ON
Restriction and Notes	Set the sweep time used for each range.
Remote Command Notes	When setting these values remotely, the position in the list sent corresponds to the offset. Missing values are not permitted, that is, if you want to change values 2 and 5 you must send all values up to 5. Subsequent values will remain unchanged, unless the number of values sent is greater than the number of carriers, then subsequent values will be ignored.
Preset	170.4 ms, 360.4 ms, 117.4 ms, 19.66 ms, 1.638 ms, 3.276 ms, 9.283 ms, 2.184 ms, 2.184 ms, 2.184 ms, 2.184 ms, 2.184 ms, 2.184 ms, 2.184 ms, 2.184 ms, 2.184 ms, 2.184 ms, 2.184 ms, 2.184 ms, 2.184 ms, 2.184ms, 2.184 ms
State Saved	Saved in instrument state.
Min	1ms
Max	2ks
Key Path	**Meas Setup, Range Table**

Abs Start Limit

Allows you to determine the limit above which spurs will report a failing. If Abs Stop Limit Mode is set to Auto, this is coupled to Abs Stop Limit to make a flat limit line. If set to Man, Abs Start Limit and Abs Stop Limit can take different values to make a sloped limit line.

If the Limit Line Test parameter is off then any spurs which are found to be above the current ‘Peak Excursion’ they will be added to the results table. From these spurs the amplitude will be checked using the abs limit start and abs limit stop parameters to calculate the limit. A red ‘F’ will be appended to the amplitude value of the spur if the

measured amplitude is above the limit. If the Limit Line Test is on only spurs whose amplitudes exceed the limit will be reported.

This parameter can send up to 20 values. The location in the list sent corresponds to the range the value is associated with. Missing values are not permitted, that is, if you want to change values 2 and 6 you must send all values up to 6. Subsequent values will remain as they were. The query for this parameter always returns 20 values.

Unit	dBm
Mode	TDSCDMA
Remote Command	`:CALCulate:SPURious[:RANGe[1]]|:RANGe2[:LIST]:LIMit:ABSolute[:UPPer]:DATA[:STARt] <ampl>,…` `:CALCulate:SPURious[:RANGe[1]]|:RANGe2[:LIST]:LIMit:ABSolute[:UPPer]:DATA[:STARt]?`
Example	:CALCulate:SPURious:RANGe:LIST:LIMit:ABSolute:UPPer:DATA:STARt –80,–80,–80,–80
Restriction and Notes	Set the absolute limit value for the left most edge of the specified offset. Default values are –36 dBm, –36 dBm, –36 dBm, –30 dBm, –67 dBm, –79 dBm, –71 dBm, –50 dBm, –50 dBm, –50 dBm, –50 dBm, –50 dBm, –50 dBm, –50 dBm, –50 dBm, –50 dBm, –50 dBm, –50 dBm, –50 dBm, –50 dBm, –50 dBm if Device is Mobile RANGe1 (or RANGe with no number appended) will set BTS values. Use RANGe2 for MS.
Remote Command Notes	When setting these values remotely, the position in the list sent corresponds to the offset. Missing values are not permitted, that is, if you want to change values 2 and 5 you must send all values up to 5. Subsequent values will remain unchanged, unless the number of values sent is greater than the number of carriers, then subsequent values will be ignored.
Preset	–13 dBm, –13 dBm, –13 dBm, –13 dBm, –50 dBm, –50 dBm, –50 dBm, –50 dBm, –50 dBm, –50 dBm, –50 dBm, –50 dBm, –50 dBm, –50 dBm, –50 dBm, –50 dBm, –50 dBm, –50 dBm, –50 dBm, –50 dBm
State Saved	Saved in instrument state.
Min	–150 dBm
Max	50 dBm
Key Path	**Meas Setup, Range Table, More**

Abs Stop Limit

Allows you to determine the limit above which spurs will report a failing. If Abs Stop Limit Mode is set to Auto, this is coupled to Abs Start Limit to make a flat limit line. If set to Man, Abs Start Limit and Abs Stop Limit can take different values to make a sloped limit line.

This parameter can send up to 20 values. The location in the list sent corresponds to the range the value is associated with. Missing values are not permitted, that is, if you want to change values 2 and 6 you must send all values up to 6. Subsequent values will remain as they were. The query for this parameter always returns 20 values.

If Abs Stop Limit Mode is set to Couple, Abs Start Limit and Abs Stop Limit are coupled to make a flat limit line. If set to Man, Abs Start and Abs Stop can take different values to make a sloped limit line.

This parameter can send up to 20 values. The location in the list sent corresponds to the range the value is associated with. Missing values are not permitted, that is, if you want to change values 2 and 6 you must send all values up to 6. Subsequent values will remain as they were. The query for this parameter always returns 20 values.

Unit	dBm
Mode	TDSCDMA

Remote Command	`:CALCulate:SPURious[:RANGe[1]]|:RANGe2[:LIST]:LIMit:ABSolute[:UPPer]:DATA:STOP <ampl>,…`
	`:CALCulate:SPURious[:RANGe[1]]|:RANGe2[:LIST]:LIMit:ABSolute[:UPPer]:DATA:STOP?`
	`:CALCulate:SPURious[:RANGe[1]]|:RANGe2[:LIST]:LIMit:ABSolute[:UPPer]:DATA:STOP:AUTO ON |OFF|1|0`
	`:CALCulate:SPURious[:RANGe[1]]|:RANGe2[:LIST]:LIMit:ABSolute[:UPPer]:DATA:STOP:AUTO?`

Example	:SENSe:SPURious:RANGe:LIST:STOP:ABS –80, –80, –80, –80, –80 :CALC:SPUR:LIMit:ABS:UPPer:DATA:STOP:AUTO ON,ON,ON,ON,ON,…
Restriction and Notes	Set the absolute limit for the right most edge of the specified range. If AUTO is set to on, the value will be set to that same as the value for the left most edge (STARt). Default values are –36 dBm, –36 dBm, –36 dBm, –30 dBm, –67 dBm, –79 dBm, –71 dBm, –50 dBm, –50 dBm, –50 dBm, –50 dBm, –50 dBm, –50 dBm, –50 dBm, –50 dBm, –50 dBm, –50 dBm, –50 dBm, –50 dBm, –50 dBm if Device is Mobile RANGe1 (or RANGe with no number appended) will set BTS values. Use RANGe2 for MS.
Remote Command Notes	When setting these values remotely, the position in the list sent corresponds to the offset. Missing values are not permitted, that is, if you want to change values 2 and 5 you must send all values up to 5. Subsequent values will remain unchanged, unless the number of values sent is greater than the number of carriers, then subsequent values will be ignored. ON,ON,ON,ON,ON

Preset	–13 dBm, –13 dBm, –13 dBm, –13 dBm, –50 dBm, –50 dBm, –50 dBm, –50 dBm, –50 dBm, –50 dBm, –50 dBm, –50 dBm, –50 dBm, –50 dBm, –50 dBm, –50 dBm, –50 dBm, –50 dBm, –50 dBm, –50 dBm
State Saved	Saved in instrument state.
Min	–150 dBm
Max	50 dBm
Key Path	**Meas Setup, Range Table, More**

Peak Excursion

Sets the minimum amplitude variation of signals that can be identified as peaks. If a value of 6 dB is selected, peaks that rise and fall more than 6 dB above the peak threshold value are identified. This parameter can send up to 20 values. The location in the list sent corresponds to the range the value is associated with. Missing values are not permitted, that is, if you want to change values 2 and 6 you must send all values up to 6. Subsequent values will remain as they were. The query for this parameter always returns 20 values.

Unit	dB
Mode	TDSCDMA
Remote Command	`[:SENSe]:SPURious[:RANGe][:LIST]:PEAK:EXCursion <rel_ampl>,…` `[:SENSe]:SPURious[:RANGe][:LIST]:PEAK:EXCursion?`
Example	:SENSe:SPURious:RANGe:LIST:PEAK:EXCursion 10, 10, 10, 10, 10, …
Restriction and Notes	Set the peak excursion value used for finding peaks in the specified range.
Remote Command Notes	When setting these values remotely, the position in the list sent corresponds to the offset. Missing values are not permitted, that is, if you want to change values 2 and 5 you must send all values up to 5. Subsequent values will remain unchanged, unless the number of values sent is greater than the number of carriers, then subsequent values will be ignored.
Preset	6 dB, 6 dB, 6 dB, 6 dB, 6 dB, 6 dB, 6 dB, 6 dB, 6 dB, 6 dB, 6 dB, 6 dB, 6 dB, 6 dB, 6 dB, 6 dB, 6 dB, 6 dB, 6 dB, 6 dB
State Saved	Saved in instrument state.
Min	0 dB
Max	100 dB
Key Path	**Meas Setup, Range Table, More**

Peak Threshold

Sets the minimum amplitude of signals that can be identified as peaks. For example, if a value of –90 dBm is selected, only peaks that rise and fall more than the peak excursion value which are above –90 dBm are identified. This parameter can send up to 20 values. The location in the list sent corresponds to the range the value is associated with. Missing values are not permitted, that is,. if you want to change values 2 and 6 you must send all values up to 6. Subsequent values will remain as they were. The query for this parameter always returns 20 values.

Unit	dBm
Mode	TDSCDMA
Remote Command	`[:SENSe]:SPURious[:RANGe][:LIST]:PEAK:THReshold`
Example	:SENSe:SPURious:RANGe:LIST:PEAK:THReshold –60, –60, –60, –60, –60
Restriction and Notes	Set the peak threshold value used for finding peaks in the specified range. The maximum value for the peak threshold is the current reference level setting.
Remote Command Notes	When setting these values remotely, the position in the list sent corresponds to the offset. Missing values are not permitted, that is, if you want to change values 2 and 5 you must send all values up to 5. Subsequent values will remain unchanged, unless the number of values sent is greater than the number of carriers, then subsequent values will be ignored.
Preset	–90 dBm, –90 dBm, –90 dBm, –90 dBm, –90 dBm, –90 dBm, –90 dBm, –90 dBm, –90 dBm, –90 dBm, –90 dBm, –90 dBm, –90 dBm, –90 dBm, –90 dBm, –90 dBm, –90 dBm, –90 dBm, –90 dBm, –90 dBm
State Saved	Saved in instrument state.
Min	–100 dBm
Max	0 dBm
Key Path	**Meas Setup, Range Table, Pk Threshold**

Range Table Description

The range table is used to enter the settings for up to twenty ranges. Access by pressing the ‘Range Table’ menu key under the meas setup menu. To leave the table, press any front-panel key with the exception of the following;

Esc, System, File, Save, Print Setup, Print, Marker, Peak Search, Freq Count, Next Marker, Next Window, Zoom, Right Tab, Left Tab, Home.

These front-panel keys do not cause an exit from the range table as it was felt the functionality associated with the front-panel keys may be useful when the range table is displayed.Table entry is performed by using the front-panel keys and/or SCPI.

On entering the range table (front panel only) the measurement is stopped and the analyzer is set to a constantly sweeping idle state. The analyzer will be set to the current values of range 1 (whether it is on or off). If a range is currently off the values in the range table for that range will be replaced with --- to indicate this range is currently inactive. The currently enabled menu key will be displayed in the table as yellow.

To change a parameter select the appropriate menu key and enter the value using the numeric keypad,

RPG or Step. The analyzer settings will be updated with the new parameter values. Although no measurements are being made, this allows the user to preview the range they will be measuring.

On changing range the analyzer will change its settings to reflect the currently selected range.The selected range will be displayed on the last line of the range table view unless;

The selected range is 5 or less in normal range table view. In this case the first 5 entries of the range table will be displayed.

The zoom mode is selected. In this case all ranges can be displayed.

Marker Menu

No Marker functions will be available while the Spurious Emissions measurement is running.

Span / X Scale Menu

No Span / X Scale functions are available to the Spurious Emissions measurement.

Amplitude / Y Scale Functions

Only a small subset of the base analyzer amplitude parameters will be available when Spurious Emissions is the current measurement.

Y-Axis Scale / Div

Set the logarithmic units per vertical graticule division on the display.

TDSCDMA	TDSCDMA
Float32	Float32
Unit	dB
Remote Command	`:DISPlay:SPURious:WINDow:TRACe:Y[:SCALe]:PDIVision <rel_ampl>` `:DISPlay:SPURious:WINDow:TRACe:Y[:SCALe]:PDIVision?`
Example	:DISPlay:SPURious:WINDow:TRACe:Y:SCALe:PDIVision 10 dB
Preset	10 dB
State Saved	Saved in instrument state.
Min	0.10 dB
Max	20.00 dB
Key Path	**Amplitude**

Y-Axis Ref Value

Set the logarithmic units per vertical graticule division on the display.

TDSCDMA	TDSCDMA
Float32	Float32
Unit	dBm
Remote Command	`:DISPlay:SPURious:WINDow:TRACe:Y[:SCALe]:RLEVel <ampl>` `:DISPlay:SPURious:WINDow:TRACe:Y[:SCALe]:RLEVel?`
Example	:DISPlay:SPURious:WINDow:TRACe:Y:SCALe:RLEVel 10 dBm
Restriction and Notes	Allows the reference Level to be changed. Min and Max are dependant on the Attenuation and Max Mixer Level settings.
Dependencies/Couplings	Coupled to Attenuation and Max Mixer Level
Preset	0 dBm
State Saved	Saved in instrument state.
Min	–170 dBm
Max	30 dBm
Key Path	**Amplitude**

Couplings

Any time the measurement is selected, the user may change any of the base analyzer settings from the appropriate menu. Changing any of these parameters during a running measurement (that is, not in the “idle” state) will cause the measurement to restart automatically.

Additional couplings for the Spurious Emissions measurement are;

Average Mode and Meas Type. It did not provide any use having repeat averaging for examine meas type or exponential averaging for full meas type therefore in Repeat Average Mode the measurement will always be in Full Meas Type and vice versa, and in Exponential Averaging Mode the measurement will always be in Examine Meas Mode and vice versa.

Query the Pass/Fail state

Query the Pass/Fail state of the measurement. Returns True (1) if one or more of the limits for the measurement have failed.

Mode	TDSCDMA
Remote Command	`:CALCulate:CLIMits:FAIL?`
Example	:CALC:CLIM:FAIL?

Restriction and Notes	Returns 1 if the measurement has failed the specified limits. Returns 0 if the measurement passes or if the limit checking is not turned on.
Preset	N/A
Range	0 (False), 1 (True)
Key Path	None

Restart Parameters

A change to any parameter found on the Mode Setup menu (and its submenus) will cause the measurement to restart. The same is true of changes to the Center Freq (Frequency Menu) parameter. Parameters described above in the Meas Setup Menu section also cause a restart of the measurement.

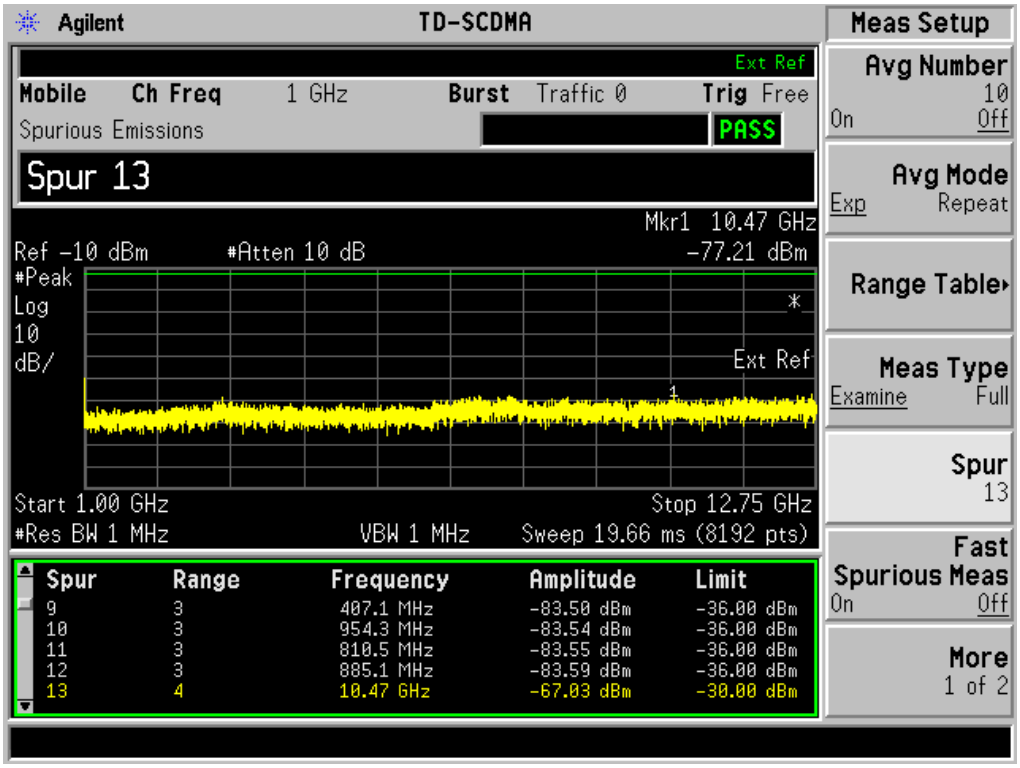
Restore Meas Defaults

Pressing the Restore Meas Defaults key (**Meas Setup**, **More (1 of 2)**, **Restore Meas Defaults**) will preset (that is, set to the factory defaults) only the parameters that are specific to the selected measurement. Parameters whose default values are determined by the value of a mode parameter are set to the appropriate value for the current setting of that mode parameter.

Results

Result	Units	Min	Max
Spur	N/A	0	200
Range	N/A	1	20
Frequency	Hz	Analyzer Min	Analyzer Max
Amplitude	dBm	–150	50
Limit	dBm	–150	50

Standard Results Screen



Spurs that are within the current value of the Marker Peak Excursion setting of the absolute limit but did not fail are listed. Any spur that has failed the absolute limit will have the red 'F' beside it.

Meas Results File

:MMEMory:STORe:RESults <'filename'>

One method of results storage will be in a file suitable for import into a spreadsheet program. Upon request from the file system, a comma delimited .csv file should be created with the following items; time, date, column titles, and results. This file should contain all of the data necessary to recreate the measurement conditions.

Application	**TD-SCDMA Measurement Suite**											
Measurement	Spurious Emissions											
Date	#####	2002										
Time	#####											
Measurement Parameters												
Average State	Off											

Application	**TD-SCDMA Measurement Suite**											
Number of Averages	10											
Average Mode	Exp											
Meas Type	Examine											
Fast Spur Meas	Off											
Tx Band Start	1.78500 GHz											
Tx Band Stop	1.80500 GHz											
Range Settings												
Range	Range State	Start Freq	Stop Freq	Res BW	Res BW Mode	Video BW	Video BW Mode	Sweep Time	Sweep Time Mode	Abs Start Lim	Abs Stop Lim	Abs Stop Limit Mode
1	On	1.920 GHz	1.980 GHz	1.200 MHz	Man	1.200 MHz	Auto	1.000 ms	Auto	–50.00 dBm	–50.00 dBm	Auto
2	On	1.894 GHz	1.920 GHz	510.0 kHz	Man	510.0 kHz	Auto	1.000 ms	Auto	–50.00 dBm	–50.00 dBm	Auto
3	On	2.100 GHz	2.102 GHz	100.0 kHz	Man	100.0 kHz	Auto	1.000 ms	Auto	–50.00 dBm	–50.00 dBm	Auto
4	On	2.175 GHz	2.180 GHz	100.0 kHz	Man	100.0 kHz	Auto	1.000 ms	Auto	–50.00 dBm	–50.00 dBm	Auto
5	On	800.0 MHz	1.000 GHz	4.000 MHz	Man	4.000 MHz	Auto	1.000 ms	Auto	–50.00 dBm	–50.00 dBm	Auto
6	Off	1.500 GHz	2.500 GHz	27.00 kHz	Auto	27.00 kHz	Auto	5.000 ms	Auto	–50.00 dBm	–50.00 dBm	Auto
7	Off	1.500 GHz	2.500 GHz	27.00 kHz	Auto	27.00 kHz	Auto	5.000 ms	Auto	–50.00 dBm	–50.00 dBm	Auto
8	Off	1.500 GHz	2.500 GHz	27.00 kHz	Auto	27.00 kHz	Auto	5.000 ms	Auto	–50.00 dBm	–50.00 dBm	Auto
9	Off	1.500 GHz	2.500 GHz	27.00 kHz	Auto	27.00 kHz	Auto	5.000 ms	Auto	–50.00 dBm	–50.00 dBm	Auto
10	Off	1.500 GHz	2.500 GHz	27.00 kHz	Auto	27.00 kHz	Auto	5.000 ms	Auto	–50.00 dBm	–50.00 dBm	Auto
11	Off	1.500 GHz	2.500 GHz	27.00 kHz	Auto	27.00 kHz	Auto	5.000 ms	Auto	–50.00 dBm	–50.00 dBm	Auto
12	Off	1.500 GHz	2.500 GHz	27.00 kHz	Auto	27.00 kHz	Auto	5.000 ms	Auto	–50.00 dBm	–50.00 dBm	Auto
13	Off	1.500 GHz	2.500 GHz	27.00 kHz	Auto	27.00 kHz	Auto	5.000 ms	Auto	–50.00 dBm	–50.00 dBm	Auto

Application	**TD-SCDMA Measurement Suite**											
14	Off	1.500 GHz	2.500 GHz	27.00 kHz	Auto	27.00 kHz	Auto	5.000 ms	Auto	–50.00 dBm	–50.00 dBm	Auto
15	Off	1.500 GHz	2.500 GHz	27.00 kHz	Auto	27.00 kHz	Auto	5.000 ms	Auto	–50.00 dBm	–50.00 dBm	Auto
16	Off	1.500 GHz	2.500 GHz	27.00 kHz	Auto	27.00 kHz	Auto	5.000 ms	Auto	–50.00 dBm	–50.00 dBm	Auto
17	Off	1.500 GHz	2.500 GHz	27.00 kHz	Auto	27.00 kHz	Auto	5.000 ms	Auto	–50.00 dBm	–50.00 dBm	Auto
18	Off	1.500 GHz	2.500 GHz	27.00 kHz	Auto	27.00 kHz	Auto	5.000 ms	Auto	–50.00 dBm	–50.00 dBm	Auto
19	Off	1.500 GHz	2.500 GHz	27.00 kHz	Auto	27.00 kHz	Auto	5.000 ms	Auto	–50.00 dBm	–50.00 dBm	Auto
20	Off	1.500 GHz	2.500 GHz	27.00 kHz	Auto	27.00 kHz	Auto	5.000 ms	Auto	–50.00 dBm	–50.00 dBm	Auto
Measurement Results												
Spur	Range	Frequency	Amplitude	Limit	Pass/Fail							
1	1	1.924 GHz	–75.61 dBm	–50.00 dBm	Pass							
2	1	1.927 GHz	–76.12 dBm	–50.00 dBm	Pass							
3	1	1.928 GHz	–75.02 dBm	–50.00 dBm	Pass							
4	1	1.929 GHz	–76.54 dBm	–50.00 dBm	Pass							
5	1	1.929 GHz	–76.23 dBm	–50.00 dBm	Pass							
6	1	1.930 GHz	–75.90 dBm	–50.00 dBm	Pass							
7	1	1.933 GHz	–76.27 dBm	–50.00 dBm	Pass							
8	1	1.936 GHz	–75.86 dBm	–50.00 dBm	Pass							
9	1	1.937 GHz	–77.75 dBm	–50.00 dBm	Pass							
10	1	1.937 GHz	–76.48 dBm	–50.00 dBm	Pass							
11	2	1.894 GHz	–80.91 dBm	–50.00 dBm	Pass							

Application	TD-SCDMA Measurement Suite											
12	2	1.894 GHz	–82.20 dBm	–50.00 dBm	Pass							
13	2	1.894 GHz	–82.33 dBm	–50.00 dBm	Pass							
14	2	1.895 GHz	–80.65 dBm	–50.00 dBm	Pass							
15	2	1.895 GHz	–83.68 dBm	–50.00 dBm	Pass							
16	2	1.896 GHz	–79.32 dBm	–50.00 dBm	Pass							
17	2	1.896 GHz	–80.49 dBm	–50.00 dBm	Pass							
18	2	1.897 GHz	–80.15 dBm	–50.00 dBm	Pass							
19	2	1.897 GHz	–81.41 dBm	–50.00 dBm	Pass							
20	2	1.897 GHz	–85.33 dBm	–50.00 dBm	Pass							
21	3	2.100 GHz	–87.30 dBm	–50.00 dBm	Pass							
22	3	2.100 GHz	–89.42 dBm	–50.00 dBm	Pass							
23	3	2.100 GHz	–87.93 dBm	–50.00 dBm	Pass							
24	3	2.101 GHz	–87.09 dBm	–50.00 dBm	Pass							
25	3	2.101 GHz	–89.08 dBm	–50.00 dBm	Pass							
26	3	2.101 GHz	–89.04 dBm	–50.00 dBm	Pass							
27	3	2.101 GHz	–85.82 dBm	–50.00 dBm	Pass							
28	3	2.101 GHz	–89.67 dBm	–50.00 dBm	Pass							
29	3	2.101 GHz	–89.66 dBm	–50.00 dBm	Pass							
30	3	2.101 GHz	–86.99 dBm	–50.00 dBm	Pass							
31	4	2.175 GHz	–84.94 dBm	–50.00 dBm	Pass							
32	4	2.176 GHz	–89.73 dBm	–50.00 dBm	Pass							

Application	TD-SCDMA Measurement Suite											
33	4	2.176 GHz	–87.34 dBm	–50.00 dBm	Pass							
34	4	2.177 GHz	–89.84 dBm	–50.00 dBm	Pass							
35	4	2.177 GHz	–87.80 dBm	–50.00 dBm	Pass							
36	4	2.177 GHz	–86.14 dBm	–50.00 dBm	Pass							
37	4	2.177 GHz	–87.09 dBm	–50.00 dBm	Pass							
38	4	2.178 GHz	–87.88 dBm	–50.00 dBm	Pass							
39	4	2.178 GHz	–89.34 dBm	–50.00 dBm	Pass							
40	4	2.178 GHz	–88.44 dBm	–50.00 dBm	Pass							
41	5	809.3 MHz	–68.58 dBm	–50.00 dBm	Pass							
42	5	826.0 MHz	–67.57 dBm	–50.00 dBm	Pass							
43	5	828.6 MHz	–67.65 dBm	–50.00 dBm	Pass							
44	5	838.3 MHz	–67.46 dBm	–50.00 dBm	Pass							
45	5	858.9 MHz	–66.52 dBm	–50.00 dBm	Pass							
46	5	871.9 MHz	–66.68 dBm	–50.00 dBm	Pass							
47	5	883.9 MHz	–67.03 dBm	–50.00 dBm	Pass							
48	5	892.8 MHz	–66.34 dBm	–50.00 dBm	Pass							
49	5	896.8 MHz	–67.00 dBm	–50.00 dBm	Pass							
50	5	913.8 MHz	–67.40 dBm	–50.00 dBm	Pass							

Status Bar Messages

Status Bar Text	Meaning	ID (SCPI #)	Type
100 spurs found. Additional spurs ignored.	There are too many spurs for the table (the limit is 100), and any additional spurs that are found will be ignored.	10511	Error
No spurs have been found	The user has started a measurement in examine meas type in single or continual sweep mode, or full meas type in single sweep mode, but no spurs were found.	10512	Error
No ranges are defined	There are no active ranges in the range table. The user will need to activate at least one range.	10513	Error
Avg Mode changed to Repeat for Full Meas Type	Meas Type has been changed to Full. Exponential Average Mode is not available for Full Meas Type therefore Average Mode has been changed to Repeat.	10514	Error
Avg Mode changed to Exp for Examine Meas Type	Meas Type has been changed to Examine. Repeat Average Mode is not available for Examine Meas Type therefore Average Mode has been changed to Exponential.	10515	Error
Meas Type changed to Examine for Exp Avg Mode	Average Mode has been changed to Exponential. Full Meas Type is not available for Exponential Average Mode therefore Meas Type has been changed to Examine.	10516	Error
Meas Type changed to Full for Repeat Avg Mode	Average Mode has been changed to Repeat. Examine Meas Type is not available for Repeat Average Mode therefore Meas Type has been changed to Full.	10517	Error

SCPI Remote Commands

Command	Return Value
CONFigure:SPURious	N/A
FETCh:SPURious [n]? MEASure:SPURious [n]? READ:SPURious [n]? (Note – these commands are not available when viewing the Range Table)	n=1 (or not supplied) Returns a variable-length (1+6*Spurs) comma separated list containing detailed information in the following format: Number of spurs in following list (Integer) [Repeat the following for each spur] Spur # Range # Spur was located (Integer) Frequency of Spur (Hz, Float64) Amplitude of Spur (dBm, Float32) Absolute Limit (dBm, Float32) Pass or Fail (1 | 0, Boolean)
	n=2 – 21 Returns a comma separated list of the trace data for the selected range (where range number = n – 1). If selected range is not active SCPI_NAN is returned for each trace data element where SCPI_NAN = 9.91E37.
	n=22 Returns the number of spurs found.

Spectrum Emissions Mask

Measurement Setup

Meas Setup Menu

Avg Number

Allows you to specify the number of measurement averages used when calculating the measurement result. The average will be displayed at the end of each sweep.

Mode	TDSCDMA

Remote Command	`[:SENSe]:SEMask:AVERage:COUNt <integer>`
	`[:SENSe]:SEMask:AVERage:COUNt?`
	`[:SENSe]:SEMask:AVERage[:STATe] ON|OFF|1|0`
	`[:SENSe]:SEMask:AVERage[:STATe]?`

Example	:SENSe:SEMask:AVERage:COUNt 25 :SENSe:SEMask:AVERage:STATe ON
Preset	10
State Saved	Saved in instrument state.
Min	1
Max	1000
Key Path	**Meas Setup**

Limits

Limits key is enabled when the DUT is a BTS. When Limits is “Std”, mask lines will be drawn according to 3GPP standard. When Limits is “Man”, mask lines will be drawn by user-defined specification in Offset/Limits Menu.

Mode	TDSCDMA
Remote Command	`[:SENSe]:SEMask:LIMits STD|MAN` `[:SENSe]:SEMask:LIMits?`
Example	:SENSe:SEMask:LIMits STD
Restriction and Notes	When Limits is Std, the specifications in Offset/Limits Menu will be modified according to the carrier power, which corresponds to the 3GPP standard. Besides that, all the keys except Offset in Offset/Limits Menu will be grayed. When Limits is Man, all the previous manual specifications will be restored.

Dependencies/Couplings	When Device is set to MS, Limits key is grayed. When Device is set to BTS, Limits key is enabled.
Preset	MAN
State Saved	Saved in instrument state.
Range	STD | MAN
Key Path	**Meas Setup**

Chan Integ BW

Allows you to specify the integration bandwidth used in calculating the power in the main channel.

Unit	Hz | kHz | MHz | GHz
Mode	TDSCDMA
Remote Command	`[:SENSe]:SEMask:BANDwidth|BWIDth:INTegration <bandwidth>` `[:SENSe]:SEMask:BANDwidth|BWIDth:INTegration?`
Example	:SENSe:SEMask:BANDwidth:INTegration 6 MHz
Dependencies/Couplings	Chan Integ BW must be between 10% and 100% of the channel span.
Preset	1.28 MHz
State Saved	Saved in instrument state.
Min	100 Hz
Max	20 MHz
Key Path	**Meas Setup, Ref Channel**

Chan Span

Allows you to specify the span used in calculating the power in the main channel.

Unit	Hz | kHz | MHz | GHz
Mode	TDSCDMA
Remote Command	`[:SENSe]:SEMask:FREQuency:SPAN <bandwidth>` `[:SENSe]:SEMask:FREQuency:SPAN?`
Example	:SENSe:SEMask:FREQuency:SPAN 2 MHz
Dependencies/Couplings	Chan Integ BW must be between 10% and 100% of the channel span.
Preset	1.6 MHz
State Saved	Saved in instrument state.
Min	1 kHz

Max	50 MHz
Key Path	**Meas Setup, Ref Channel**

Channel Sweep Time

Allows you to specify the sweep time used in calculating the power in the main channel.

Unit	ns | us | ms | s | ks
Mode	TDSCDMA

Remote Command	`[:SENSe]:SEMask:SWEeptime <time>`
	`[:SENSe]:SEMask:SWEeptime?`
	`[:SENSe]:SEMask:SWEeptime:AUTO ON|OFF|1|0`
	`[:SENSe]:SEMask:SWEeptime:AUTO?`

Example	:SENSe:SEMask:SWEeptime 2 MS :SENSe:SEMask:SWEeptime:AUTO ON
Remote Command Notes	The auto rule ensures that the sweep time allows at least 5 ms per bucket. To optimize the speed of this measurement, the number of trace points is changed to improve the sweep time. The method used to determine the number of trace points to use states that the RBW filter should be set between 1.2 and 4.0 times the trace element width (the span divided by the number of trace elements). For a factor of 1.2, the error due to reduced frequency selectivity will be less than 0.2 dB.
Preset	8.6 ms
State Saved	Saved in instrument state.
Min	1 ms
Max	4 ks
Key Path	**Meas Setup, Ref Channel**

Chan Res BW

Allows you to specify the resolution bandwidth used in calculating the power in the main channel.

Unit	Hz | kHz | MHz | GHz
Mode	TDSCDMA

Remote Command	`[:SENSe]:SEMask:BANDwidth|BWIDth[:RESolution] <bandwidth>`
	`[:SENSe]:SEMask:BANDwidth|BWIDth[:RESolution]?`
	`[:SENSe]:SEMask:BANDwidth|BWIDth[:RESolution]:AUTO ON|OFF|1|0`
	`[:SENSe]:SEMask:BANDwidth|BWIDth[:RESolution]:AUTO?`

Example	:SENSe:SEMask:BAND:RESolution 1.6 MHz :SENSe:SEMask:BANDwidth:RESolution:AUTO ON
Restriction and Notes	This key is always disabled, since the resolution bandwidth has an impact on not only time delay of the time-domain waveform but also the time delay of the gate.
Preset	30 kHz
State Saved	Saved in instrument state.
Min	1 Hz
Max	8 MHz
Key Path	**Meas Setup, Ref Channel**

Total Pwr Ref

Allows you to set the power in the carrier (ref channel) that will be used to compute the relative power values for the offsets. When the carrier power state is set to auto, this will be set to the measured carrier reference power. When set to manual, the result takes on the last measured value, or may be entered.

Unit	dBm
Mode	TDSCDMA

Remote Command	`[:SENSe]:SEMask:CARRier[:POWer] <ampl>`
	`[:SENSe]:SEMask:CARRier[:POWer]?`
	`[:SENSe]:SEMask:CARRier:AUTO[:STATe] ON|OFF|1|0`
	`[:SENSe]:SEMask:CARRier:AUTO[:STATe]?`

Example	:SENSe:SEMask:CARRier:POWer –10 dBm :SENSe:SEMask:CARRier:AUTO:STATe ON
State Saved	Saved in instrument state.
Min	–200 dBm
Max	200 dBm
Key Path	**Meas Setup, Ref Channel**

Offset Start Freq

Allows you to specify the start frequency, and to toggle this function between On and Off, for the currently selected offset using the front panel, and all the offsets using SCPI. Offsets that are turned off (inactive) will return –999.0 when their results are queried over SCPI. Also when saving measurement results, will also replace values with NA, if offset is inactive.

Unit	Hz | kHz | MHz | GHz
Mode	TDSCDMA

Remote Command	`[:SENSe]:SEMask:OFFSet[1]|2:LIST:FREQuency:STARt <freq>,…`
	`[:SENSe]:SEMask:OFFSet[1]|2:LIST:FREQuency:STARt?`
	`[:SENSe]:SEMask:OFFSet[1]|2:LIST:STATe ON|OFF`
	`[:SENSe]:SEMask:OFFSet[1]|2:LIST:STATe?`

Example	:SENSe:SEMask:OFFSet:LIST:FREQuency:START 5 MHz, 10 MHz, 15 MHz :SENSe:SEMask:OFFSet:LIST:STATe ON,ON,ON,OFF,OFF,OFF
Restriction and Notes	Turning the offset Off has the same effect as setting the frequency of the offset to 0 Hz and will cause it to be removed from the results screen. Default values are: 815 kHz,1.015MHz,1.815MHz,2.415MHz, 0.0 MHz if Device is Base 815 kHz, 1.815 MHz, 2.9 MHz, 0.0 MHz, 0.0 MHz if Device is Mobile
Dependencies/Couplings	Coupled to Stop Freq. Start cannot go above the stop freq less 100 Hz. Similarly Stop freq cannot go below Start Freq plus 100 Hz
Remote Command Notes	When setting these values remotely, the position in the list sent corresponds to the offset. Missing values are not permitted, that is, if you want to change values 2 and 6 you must send all values up to 6. Subsequent values will remain unchanged, unless the number of values sent is greater than the number of carriers, then subsequent values will be ignored. ON,ON,ON,ON, OFF if Device is Base ON,ON,ON,OFF,OFF if Device is Mobile
Preset	815 kHz,1.015MHz,1.815MHz,2.3 MHz, 0 (BTS) 815 kHz, 1.815 MHz, 2.9 MHz, 0, 0 (MS)
State Saved	Saved in instrument state.
Min	0 Hz
Max	99 MHz
Key Path	**Meas Setup, Offset/Limits**

Offset Stop Freq

Allows you to specify the stop frequency for the current offset (indicated on the Offset key) using the front panel, and all the offsets using SCPI.

Unit	Hz | kHz | MHz | GHz
Mode	TDSCDMA
Remote Command	`[:SENSe]:SEMask:OFFSet[1]|2:LIST:FREQuency:STOP <freq>,…` `[:SENSe]:SEMask:OFFSet[1]|2:LIST:FREQuency:STOP?`
Example	:SENSe:SEMask:OFFSet:LIST:FREQuency:STOP 2.715 MHz, 3.515 MHz, 4.0 MHz, 7.5 MHz, 12.5 MHz
Restriction and Notes	Set the frequency offset to the start of the specified offset. The Offset Freq State allows you to turn the current offset (indicated on the offset key) On or Off. Turning the offset Off has the same effect as setting the frequency of the offset to 0 Hz and will cause it to be removed from the results screen.
Dependencies/Couplings	Coupled to Start Freq. Start cannot go above the stop freq less 100 Hz. Similarly Stop freq cannot go below Start Freq plus 100 Hz
Remote Command Notes	When setting these values remotely, the position in the list sent corresponds to the offset. Missing values are not permitted i.e. if you want to change values 2 and 6 you must send all values up to 6. Subsequent values will remain unchanged, unless the number of values sent is greater than the number of carriers, then subsequent values will be ignored.
Preset	1.015MHz,1.815MHz,2.415MHz,2.9MHz,4.0MHz if Device is Base 1.785MHz, 2.385MHz, 3.5MHz, 0.0 MHz, 0.0 MHz if Device is Mobile
State Saved	Saved in instrument state.
Min	100Hz
Max	100MHz
Key Path	**Meas Setup, Offset/Limits**

Offset Sweep Time

Allows you to specify the sweep time for the currently selected offset using the front panel, and all the offsets using SCPI.

Unit	ns | us | ms | s | ks
Mode	TDSCDMA

Remote Command	`[:SENSe]:SEMask:OFFSet[1]|2:LIST:SWEeptime <time>,…`
	`[:SENSe]:SEMask:OFFSet[1]|2:LIST:SWEeptime?`
	`[:SENSe]:SEMask:OFFSet[1]|2:LIST:SWEeptime:AUTO ON|OFF|1|0`
	`[:SENSe]:SEMask:OFFSet[1]|2:LIST:SWEeptime:AUTO?`

Example	:SENSe:SEMask:OFFSet:LIST:SWEeptime 1 ms, 1 ms, 50 ms, 1 s :SENSe:SEMask:OFFSet:LIST:STATe ON,ON,ON,ON,ON
Remote Command Notes	When setting these values remotely, the position in the list sent corresponds to the offset. Missing values are not permitted, that is, if you want to change values 2 and 6 you must send all values up to 6. Subsequent values will remain unchanged, unless the number of values sent is greater than the number of carriers, then subsequent values will be ignored.
Preset	Automatically calculated by the PSA.
State Saved	Saved in instrument state.
Min	1 ms
Max	4 ks
Key Path	**Meas Setup, Offset/Limits**

Offset Res BW

Allows you to specify which Resolution BW filter to be used when measuring the currently selected offset using the front panel, and all the offsets using SCPI.

Unit	Hz|kHz|MHz|GHz
Mode	TDSCDMA

Remote Command	`[:SENSe]:SEMask:OFFSet[1]|2:LIST:BANDwidth|BWIDth[:RESolution] <bandwidth>,…`
	`[:SENSe]:SEMask:OFFSet[1]|2:LIST:BANDwidth|BWIDth[:RESolution]?`
	`[:SENSe]:SEMask:OFFSet[1]|2:LIST:BANDwidth|BWIDth[:RESolution]:AUTO ON|OFF|1|0`
	`[:SENSe]:SEMask:OFFSet[1]|2:LIST:BANDwidth|BWIDth[:RESolution]:AUTO?`

Example	:SENSe:SEMask:OFFSet:LIST:BANDwidth:RESolution 1 MHz, 1 MHz, 1 MHz, 5 MHz :SENSe:SEMask:OFFSet:LIST:BANDwidth:RESolution:AUTO ON,ON,ON,ON,ON
Restriction and Notes	Default values are: 30 kHz, 30 kHz, 30 kHz, 30 kHz, 1 MHz if Device is Base 30 kHz, 30 kHz, 50 kHz, 1 MHz, 1 MHz if Device is Mobile
Remote Command Notes	When setting these values remotely, the position in the list sent corresponds to the offset. Missing values are not permitted, that is, if you want to change values 2 and 5 you must send all values up to 5. Subsequent values will remain unchanged, unless the number of values sent is greater than the number of carriers, then subsequent values will be ignored.
Preset	30 kHz, 30 kHz, 30 kHz, 30 kHz, 1 MHz (BTS) 30 kHz, 30 kHz, 50 kHz, 1 MHz, 1 MHz (MS)
State Saved	Saved in instrument state.
Min	1 Hz
Max	8 MHz
Key Path	**Meas Setup, Offset/Limits**

Offset Meas BW

Allows you to specify the measure bandwidth to be used when measuring the currently selected offset using the front panel, and all the offsets using SCPI. This is the multiplier to be applied to the Res BW to be used as the bandwidth to integrate over when calculating the power.

Mode	TDSCDMA
Remote Command	`[:SENSe]:SEMask:OFFSet[1]|2:LIST:BANDwidth|BWIDth:IMULti <integer>,…` `[:SENSe]:SEMask:OFFSet[1]|2:LIST:BANDwidth|BWIDth:IMULti?`
Example	:SENSe:SEMask:OFFSet:LIST:BANDwidth:IMULti 1, 1, 1, 30, 1
Remote Command Notes	When setting these values remotely, the position in the list sent corresponds to the offset. Missing values are not permitted, that is, if you want to change values 2 and 5 you must send all values up to 5. Subsequent values will remain unchanged, unless the number of values sent is greater than the number of carriers, then subsequent values will be ignored.
Preset	1, 1, 1, 20, 20 (BTS) 1,1, 20, 1, 1 (MS)
State Saved	Saved in instrument state.
Min	1

Max	1000
Key Path	**Meas Setup, Offset/Limits**

Offset Abs Start

Allows you to enter an absolute level limit at the Start Freq ranging from –200 to +50 dBm.

Unit	dBm
Mode	TDSCDMA
Remote Command	`[:SENSe]:SEMask:OFFSet[1]|2:LIST:STARt:ABSolute <ampl>,…` `[:SENSe]:SEMask:OFFSet[1]|2:LIST:STARt:ABSolute?`
Example	:SENSe:SEMask:OFFSet:LIST:STARt:ABSolute –80, –80, –80, –80, –80
Restriction and Notes	Set the absolute limit value for the left most edge of the specified offset. Default values are as below: –28 dBm, –28 dBm, –36 dBm, –21 dBm, –21 dBm if Device is Base –71.30 dBm, –71.30 dBm, –56.07 dBm, 0 dBm, 0 dBm if Device is Mobile OFFSet1 or OFFSet is used for Base Station limit values; OFFSet2 is used for mobile measurement limits.
Remote Command Notes	When setting these values remotely, the position in the list sent corresponds to the offset. Missing values are not permitted i.e. if you want to change values 2 and 5 you must send all values up to 5. Subsequent values will remain unchanged, unless the number of values sent is greater than the number of carriers, then subsequent values will be ignored.
Preset	–28 dBm, –28 dBm, –36 dBm, –21 dBm, –21 dBm (BTS –71.30 dBm, –71.30 dBm, –56.07 dBm, 0 dBm, 0 dBm (MS)
State Saved	Saved in instrument state.
Min	–200 dBm
Max	50 dBm
Key Path	**Meas Setup, Offset/Limits, More**

Offset Abs Stop

Allows you to enter and absolute level limit at the Stop Freq ranging from –200 to +50 dBm, and to toggle this function between Auto and Man. If set to Auto, this is coupled to Abs Start to make a flat limit line. If set to Man, Abs Start and Abs Stop can take different values to make a sloped limit line.

Unit	dBm
Mode	TDSCDMA

Remote Command	`[:SENSe]:SEMask:OFFSet[1]|2:LIST:STOP:ABSolute <ampl>,…`
	`[:SENSe]:SEMask:OFFSet[1]|2:LIST:STOP:ABSolute?`
	`[:SENSe]:SEMask:OFFSet[1]|2:LIST:STOP:ABSolute:COUPle ON|OFF|1|0`
	`[:SENSe]:SEMask:OFFSet[1]|2:LIST:STOP:ABSolute:COUPle?`

Example	:SENSe:SEMask:OFFSet:LIST:STOP:ABS –80, –80, –80, –80, –80 :SENSe:SEMask:OFFSet:LIST:STOP:ABSolute:COUPle ON,ON,ON,ON,ON
Restriction and Notes	Set the absolute limit for the right most edge of the specified offset. If AUTO is set to on, the value will be set to the same as the value for the left most edge (STARt). Default values are as below: –28 dBm, –36 dBm, –36 dBm, –21 dBm, –21 dBm if Device is (BTS) –71.30 dBm, –71.30 dBm, –56.07 dBm, 0 dBm, 0 dBm if Device is (MS) Note that the limit for the range 1.0 MHz to 1.8 MHz for base station measurements is not a constant: –22 – 15*(f_offset – 1.015) dBm where f_offset is the separation between the carrier frequency and the centre frequency of the measuring filter
Remote Command Notes	When setting these values remotely, the position in the list sent corresponds to the offset. Missing values are not permitted, that is, if you want to change values 2 and 4 you must send all values up to 4. Subsequent values will remain unchanged, unless the number of values sent is greater than the number of carriers, then subsequent values will be ignored. The default value for mobile measurements are ON,ON,ON,ON,ON
Preset	–28 dBm, –36 dBm, –36 dBm, –21 dBm, –21 dBm (BTS) –71.30 dBm, –71.30 dBm, –56.07 dBm, 0 dBm, 0 dBm (MS)
State Saved	Saved in instrument state.
Min	–200 dBm
Max	50 dBm
Key Path	**Meas Setup, Offset/Limits, More**

Offset Rel Start

Allows you to enter a relative level limit at the Start Freq ranging from –200 to +50 dBc.

Unit	dB
Mode	TDSCDMA
Remote Command	`[:SENSe]:SEMask:OFFSet[1]|2:LIST:STARt:RCARrier <rel_ampl>,…` `[:SENSe]:SEMask:OFFSet[1]|2:LIST:STARt:RCARrier?`
Example	:SENSe:SEMask:OFFSet:LIST:STARt:RCARrier –80, –80, –80, –80, –80
Restriction and Notes	Set the relative limit value for the left most edge of the specified offset. Default values are as below: –54 dBc, –54 dBc, –62 dBc, –47 dBc, –47 dBc if Device is Base –35 dBc, –49 dBc, –49 dBc, –49 dBc, –49 dBc if Device is Mobile
Remote Command Notes	When setting these values remotely, the position in the list sent corresponds to the offset. Missing values are not permitted, that is, if you want to change values 2 and 4 you must send all values up to 4. Subsequent values will remain unchanged, unless the number of values sent is greater than the number of carriers, then subsequent values will be ignored.
Preset	–54 dBc, –54 dBc, –62 dBc, –47 dBc, –47 dBc (BTS) –35 dBc, –49 dBc, –49 dBc, –49 dBc, –49 dBc (MS)
State Saved	Saved in instrument state.
Min	–200 dB
Max	50 dB
Key Path	**Meas Setup, Offset/Limits, More**

Offset Rel Stop

Allows you to enter a relative level limit at the Stop Freq ranging from –200 to 50 dBc

Unit	dB
Mode	TDSCDMA

Remote Command	`[:SENSe]:SEMask:OFFSet[1]|2:LIST:STOP:RCARrier <rel_ampl>,…`
	`[:SENSe]:SEMask:OFFSet[1]|2:LIST:STOP:RCARrier?`
	`[:SENSe]:SEMask:OFFSet[1]|2:LIST:STOP:RCARrier:COUPle ON|OFF|1|0`
	`[:SENSe]:SEMask:OFFSet[1]|2:LIST:STOP:RCARrier:COUPle?`

Example	:SENSe:SEMask:OFFSet:LIST:STOP:ABS –80, –80, –80, –80, –80 :SENSe:SEMask:OFFSet:LIST:STOP:RCARrier:COUPle ON,ON,ON,OFF,ON

Restriction and Notes	Set the relative limit for the right most edge of the specified offset. If AUTO is set to on, the value will be set to that same as the value for the left most edge (STARt). Default values are: –54 dBc, –62 dBc, –62 dBc, –47 dBc, –47 dBc if Device is Base –49 dBc, –64 dBc, –49 dBc, –49 dBc, –49 dBc if Device is Mobile Note that the 2 first values for Mobile are not fixed limits: –49 dBc: –35 – 14*(Δf–0.8) dBc –64 dBc: –49 – 25*(Δf–1.8)dBc Δf is the separation between the carrier frequency and the nominal –3 dB point of the measuring filter closest to the carrier frequency.
Remote Command Notes	When setting these values remotely, the position in the list sent corresponds to the offset. Missing values are not permitted, that is, if you want to change values 2 and 5 you must send all values up to 5. Subsequent values will remain unchanged, unless the number of values sent is greater than the number of carriers, then subsequent values will be ignored. Default values for mobile measurements: OFF,OFF,ON,ON,ON
Preset	–54 dBc, –62 dBc, –62 dBc, –47 dBc, –47 dBc if Device is Base –49 dBc, –64 dBc, –49 dBc, –49 dBc, –49 dBc if Device is Mobile
State Saved	Saved in instrument state.
Min	–200 dB
Max	50 dB
Key Path	**Meas Setup, Offset/Limits, More**

Offset Limit Fail Mask

Allows you to select one of the logic keys for the fail conditions between the measurement results and the test limits. Absolute and Relative both check the results against the respective limit, while OR checks against both limits, failing if either of the limits is broken. AND will only display a fail if both of the limits are broken.

Mode	TDSCDMA
Remote Command	`[:SENSe]:SEMask:OFFSet[1]|2:LIST:TEST Absolute|Relative|AND|OR,…` `[:SENSe]:SEMask:OFFSet[1]|2:LIST:TEST?`
Example	:SENSe:SEMask:OFFSet:LIST:TEST ABS,REL,ABS,AND,OR
Restriction and Notes	Default values are ABS,ABS,ABS,ABS,ABS if Device is Base (When Limits state is “MAN”) AND, AND, AND, AND, AND if Device is Mobile
Remote Command Notes	When setting these values remotely, the position in the list sent corresponds to the carrier. Missing values are not permitted, that is, if you want to change values 2 and 5 you must send all values up to 5. Subsequent values will remain unchanged, unless the number of values sent is greater than the number of carriers, then subsequent values will be ignored.
Preset	ABS,ABS,ABS,ABS,ABS (BTS) AND, AND, AND, AND, AND (MS)
State Saved	Saved in instrument state.
Range	Absolute | Relative | Abs AND Rel | Abs OR Rel
Key Path	**Meas Setup, Offset/Limits, More**

Trig Source

Allows you to select one of the trigger sources used to control the data acquisitions.

Mode	TDSCDMA
Remote Command	`[:SENSe]:SEMask:TRIGger:SOURce IMM|RFB|EXT[1]|EXT2` `[:SENSe]:SEMask:TRIGger:SOURce?`
Example	:SENSe:SEMask:TRIGger:SOURce EXT1
Restriction and Notes	EXT or EXT1 is the front panel external trigger. EXT2 is the rear panel external trigger.

Dependencies/Couplings	A. When Device changes, If Device changes to BTS, 1. Trigger Source and Gate Source will turn to 'External Front'; 2. Gate State turns to 'On'; 3. Gate Delay and Gate Length will be set in terms of Burst Type and Traffic Slot specified in Frequency menu. If Device changes to BTS, 1. Trigger Source and Gate Source will turn to 'RF Burst'; 2. Gate State turns to 'On'; 3. Gate Delay and Gate Length will be set in terms of Burst Type and Traffic Slot specified in Frequency menu. B. When Trigger Source key is pressed: If Trigger Source turns to 'Free Run', Gate State will turn to 'Off'; If Trigger Source turns to 'External Front/External Rear/RF Burst', 1. Gate State turns to 'On'; 2. Gate Source is set identically with Trigger Source; 3. Gate Delay and Gate Length will be set in terms of Burst Type and Traffic Slot specified in Frequency menu. (For more information on gate setup, please refer to the section “Gate Delay”)
Preset	EXT[1]
State Saved	Saved in instrument state.
Range	Free Run (Immediate) | RF Burst (Wideband) | Ext Front | Ext Rear
Key Path	**Meas Setup**

RRC Filter

Allows you to turn RRC filtering of the carrier channel on or off. The α value (rolloff) for the filter will be set to the value of the Filter Alpha parameter.

Mode	TDSCDMA
Remote Command	`[:SENSe]:SEMask:FILTer[:RRC][:STATe] ON|OFF|1|0` `[:SENSe]:SEMask:FILTer[:RRC][:STATe]?`
Example	:SENSe:SEMask:FILTer:RRC:STATe ON

Preset	ON
State Saved	Saved in instrument state.
Range	On | Off
Key Path	**Meas Setup, More**

Filter Alpha

Allows you to input the α value for the RRC Filter.

Mode	TDSCDMA
Remote Command	`[:SENSe]:SEMask:FILTer[:RRC]:ALPHa <real>`
	`[:SENSe]:SEMask:FILTer[:RRC]:ALPHa?`
Example	:SENSe:SEMask:FILTer:RRC:ALPHa 0.33
Preset	0.22
State Saved	Saved in instrument state.
Min	0.01
Max	1.00
Key Path	**Meas Setup, More**

Offset Side

Allows you to choose the lower/upper side of the spectrum for the PASS/FAIL check of the multi-carrier measurements or both sides for the single-carrier measurements.

Mode	TDSCDMA
Remote Command	`[:SENSe]:SEMask:SIDE POS|BOTH|NEG`
	`[:SENSe]:SEMask:SIDE?`
Example	:SENSe:SEMask:SIDE POS
	:SENSe:SEMask:SIDE?
Preset	BOTH
State Saved	Saved in instrument state.
Key Path	**Meas Setup**, **More**

Query the Pass/Fail state

Query the Pass/Fail state of the measurement. Returns True (1) if one or more of the limits for the measurement have failed.

Mode	TDSCDMA
Remote Command	`:CALCulate:CLIMits:FAIL?`
Example	:CALC:CLIM:FAIL?
Restriction and Notes	Returns 1 if the measurement has failed the specified limits. Returns 0 if the measurement passes or if the limit checking is not turned on.
Preset	N/A
Range	0 (False), 1 (True)
Key Path	None

Restart Parameters

A change to any parameter found on the Mode Setup menu (and its submenus) will cause the measurement to restart. The same is true of changes to Center Freq (Frequency Menu). Note that parameters described above in the Fully Configurable Parameters section also cause a restart of the measurement.

Display Menu

Displays or hides the mask lines.

The Menu under the Display front-panel key is removed for the Spectrum Emission Mask measurement.

Marker Functions

Markers All Off

Turn all markers off for the Transmit Power measurement

Mode	TDSCDMA
Remote Command	`:CALCulate:SEMask:MARKer[1]|2|3|4:AOFF`
Example	:CALCulate:SEMask:MARKer:AOFF
Remote Command Notes	No corresponding query.
State Saved	No
Key Path	**Marker**

Marker Mode

Set the mode for the specified marker.

Unit	ENUM
Readback Text	DELT | OFF | POS
Mode	TDSCDMA
Remote Command	`:CALCulate:SEMask:MARKer[1]|2|3|4:MODE DELTa|OFF|POSition` `:CALCulate:SEMask:MARKer[1]|2|3|4:MODE?`
Example	:CALCulate:SEMask:MARKer4:MODE DELTa
Restriction and Notes	When a Marker is set to Delta, the next marker is used as the Reference Marker and its Mode is set to Normal (POSition). The value of the Delta Marker is the relative value from the Reference Marker. When Marker4 is set to Delta, Marker1 is used as the Reference Marker.
Preset	OFF
State Saved	Saved in instrument state.
Range	Delta | Off | Normal
Key Path	**Marker**

Marker State

Turn the specified marker on or off.

Mode	TDSCDMA
Remote Command	`:CALCulate:SEMask:MARKer[1]|2|3|4[:STATe] ON|OFF|1|0` `:CALCulate:SEMask:MARKer[1]|2|3|4[:STATe]?`
Example	:CALCulate:SEMask:MARKer2:STATe ON
Preset	OFF
State Saved	Saved in instrument state.
Range	On | Off
Key Path	**Marker**

Marker X Value

Set the X-axis value for the specified marker

Unit	Hz|kHz|MHz|GHz
Mode	TDSCDMA
Remote Command	`:CALCulate:SEMask:MARKer[1]|2|3|4:X <freq>` `:CALCulate:SEMask:MARKer[1]|2|3|4:X?`
Example	:CALCulate:SEMask:MARKer2:X 900MHz
Preset	1 GHz
State Saved	Saved in instrument state.
Min	100 Hz
Max	HW Dependant

Marker Y Position

Query the amplitude value at the specified marker.

Mode	TDSCDMA
Remote Command	`:CALCulate:SEMask:MARKer[1]|2|3|4:Y?`
Example	:CALCulate:SEMask:MARKer2:Y?
Remote Command Notes	Query only
State Saved	No
Min	–170
Max	100

Span / X Scale Menu

No Span / X Scale functions are available when Spectrum Emission Mask is the active measurement.

Amplitude / Y Scale

Only a small subset of the base analyzer amplitude parameters will be available when Spectrum Emission Mask is the current measurement.

Y-Axis Scale / Div

Set the logarithmic units per vertical graticule division on the display.

Unit	dB
Mode	TDSCDMA

Remote Command	`:DISPlay:SEMask:WINDow:TRACe:Y[:SCALe]:PDIVision <rel_ampl>` `:DISPlay:SEMask:WINDow:TRACe:Y[:SCALe]:PDIVision?`
Example	:DISPlay:SEMask:WINDow:TRACe:Y:SCALe:PDIVision 10 dB
Preset	10 dB
State Saved	Saved in instrument state.
Min	0.10 dB
Max	20.00 dB
Key Path	**Amplitude**

Y-Axis Reference Value

Set the logarithmic units per vertical graticule division on the display.

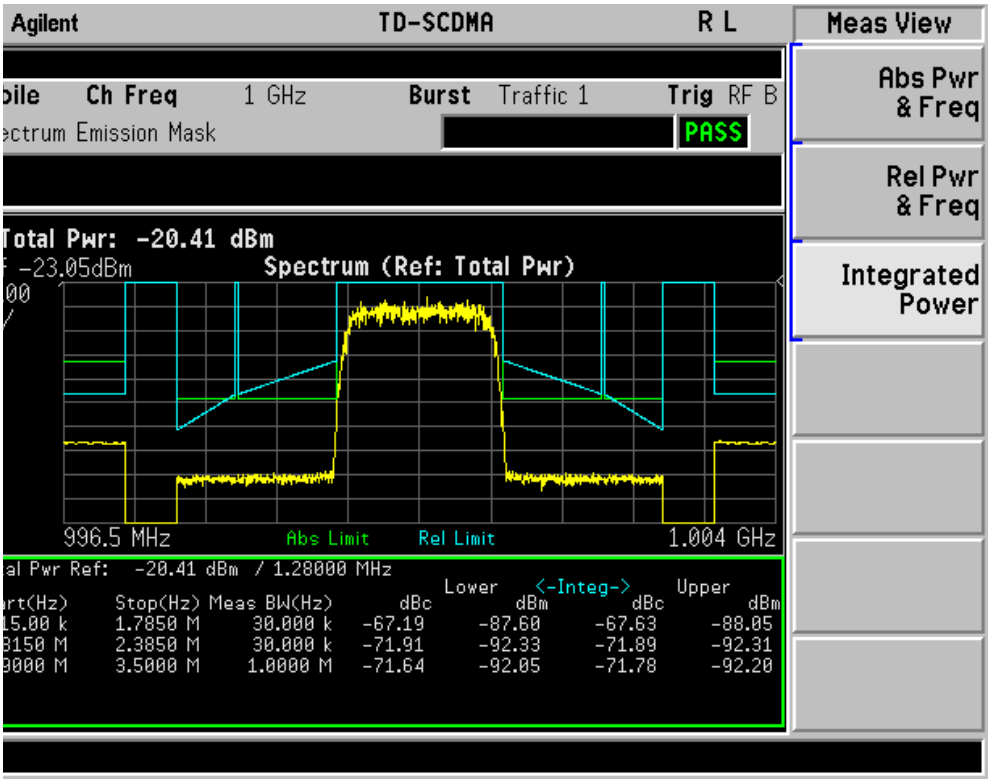
Unit	dBm
Mode	TDSCDMA
Remote Command	`:DISPlay:SEMask:WINDow:TRACe:Y[:SCALe]:RLEVel <ampl>` `:DISPlay:SEMask:WINDow:TRACe:Y[:SCALe]:RLEVel?`
Example	:DISPlay:SEMask:WINDow:TRACe:Y:SCALe:RLEVel 10 dBm
Restriction and Notes	Allows the reference Level to be changed. Min and Max are dependant on the Attenuation and Max Mixer Level settings.
Dependencies/Couplings	Coupled to Attenuation and Max Mixer Level
Preset	0 dBm
State Saved	Saved in instrument state.
Min	–170 dBm
Max	30 dBm
Key Path	**Amplitude**

Restore Meas Defaults

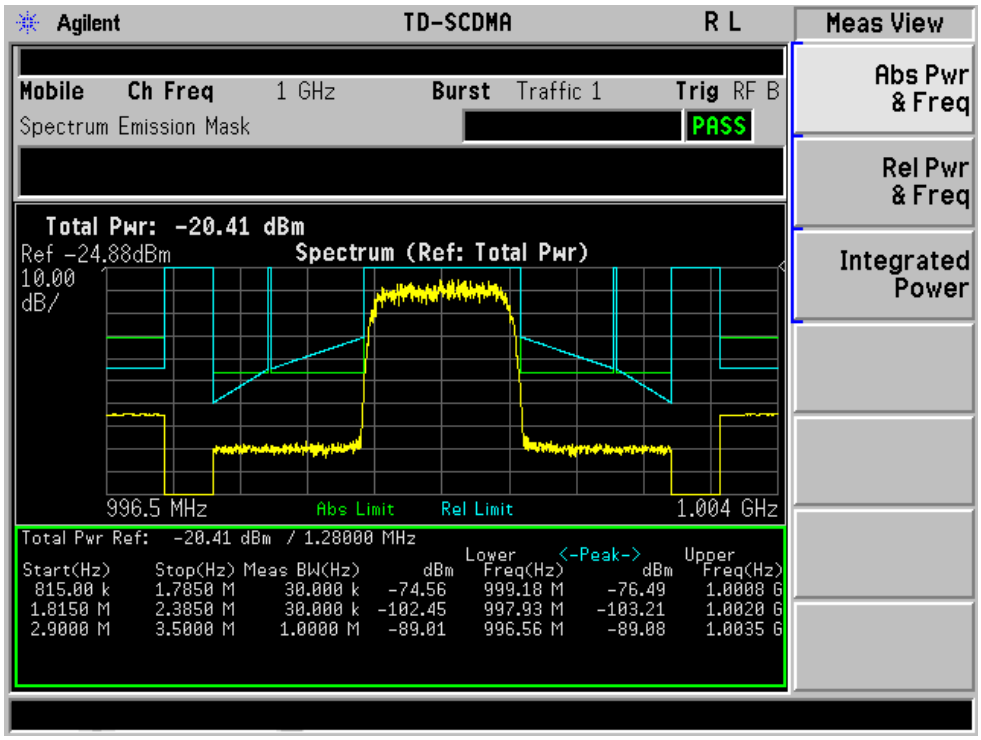
Pressing the Restore Meas Defaults key (**Meas Setup**, **Restore Meas Defaults**) will preset (that is, set to the factory defaults) only the parameters that are specific to the selected measurement. Parameters whose default values are determined by the value of a mode parameter are set to the appropriate value for the current setting of that mode parameter.

Results

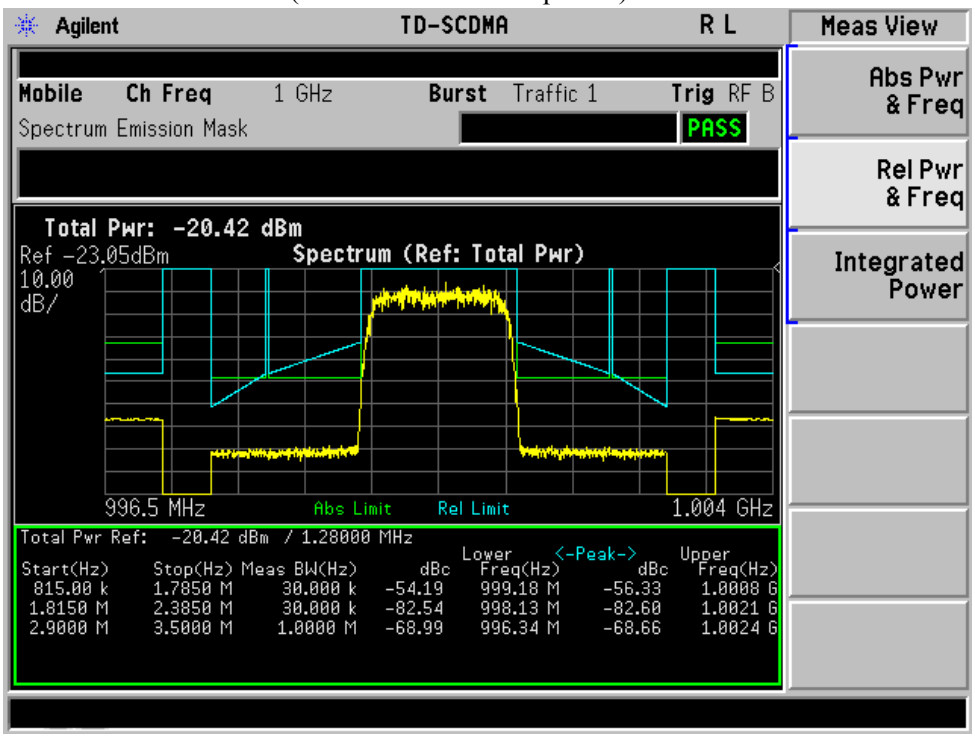
Standard Results Screen (Integrated Power View)



Standard Results Screen (Abs Peak Pwr & Freq View)



Standard Results Screen (Rel Peak Pwr & Freq View)



Meas Results File

:MMEMory:STORe:RESults <‘filename’>

One method of results storage will be in a file suitable for import into a spreadsheet program. Upon request from the file system, a comma delimited .csv file should be created with the following items: time, date, column titles, and results. This file should contain all of the data necessary to recreate the measurement conditions.

Application	**TD-SCDMA Measurement Suite**											
Measurement	Spectrum Emission Mask											
Date	May–17	2002										
Time	14:17:50											
Measurement Parameters												
Average State	Off											
Number of Averages	10											
Limit Display	On											

Application	**TD-SCDMA Measurement Suite**											
Meas Type	Total Pwr Ref											
Channel Integration BW	3.84	MHz										
Channel Span	5	MHz										
Channel Sweep Time	3.4	ms										
Channel Sweep Time	Auto											
Channel Resolution BW	75	kHz										
Channel Resolution BW	Man											
RRC Filter	Off											
Filter Alpha		0.22										
Radio Parameters												
Device	BTS											
Frequency Parameters												
Center Freq	1	GHz										
Offset Settings												
Result State	Start Freq (Hz)	Stop Freq (Hz)	Resolution BW (Hz)	Resolution BW State	Meas BW (Hz)	Sweep Time (s)	Sweep Time State	Limit Test	Abs Start limit	Abs Stop Limit	Rel Start Limit	Rel Stop Limit
On	2515000	2715000	30000	Man	30000	0.001	Auto	Absolute	–14	–14	–30	–30
On	2715000	3515000	30000	Man	30000	0.0034	Auto	Absolute	–14	–26	–30	–30
On	3515000	4000000	30000	Man	30000	0.0021	Auto	Absolute	–26	–26	–30	–30

Application	**TD-SCDMA Measurement Suite**											
On	4000000	8000000	1000000	Man	1E+06	0.001	Auto	Absolute	–13	–13	–30	–30
On	8000000	12500000	1000000	Man	1E+06	0.001	Auto	Absolute	–13	–13	–30	–30
Measurement Results												
Total Pwr Ref:	–0.22	dBm										
Lower Offset Results												
Peak Frequency (Hz)	Peak Abs Ampl (dBm)	Peak Rel Ampl (dBc)	Integ Abs Ampl (dBm)	Integ Rel Ampl (dBc)								
997400166	–95.987	–95.7641	–89.6272	–89.4								
996693012	–95.382	–95.1591	–82.9875	–82.76								
996401830	–95.288	–95.0651	–85.0733	–84.85								
995112313	–75.754	–75.5311	–75.3858	–75.16								
989413478	–73.686	–73.4631	–73.9343	–73.71								
Upper Offset Results												
Peak Frequency (Hz)	Peak Abs Ampl (dBm)	Peak Rel Ampl (dBc)	Integ Abs Ampl (dBm)	Integ Rel Ampl (dBc)								
1002641431	–95.704	–95.4811	–89.2425	–89.02								
1003057404	–93.959	–93.7361	–82.3416	–82.12								
1003598170	–93.672	–93.4491	–84.0008	–83.78								
1005636439	–76.989	–76.7661	–75.4638	–75.24								
1008132280	–80.186	–79.9631	–75.5536	–75.33								

SCPI Remote Commands

Offsets that are turned off (inactive) will return –999.0 when their results are queried over SCPI.

Command	Return Value	
CONFigure:SEMask	N/A	
FETCh:SEMask[n]? MEASure:SEMask[n]? READ:SEMask[n]?	N=1	Total Power Reference Returns 60 comma-separated scalar results, in the following order: 1. Reserved for the future use, returns –999.0 2. Absolute power at the center frequency (reference) area (dBm) 3. Reserved for the future use, returns –999.0 4. Reserved for the future use, returns –999.0 5. Reserved for the future use, returns –999.0 6. Reserved for the future use, returns –999.0 7. Reserved for the future use, returns –999.0 8. Reserved for the future use, returns –999.0 9. Reserved for the future use, returns –999.0 10.Reserved for the future use, returns –999.0 11.Relative power on the negative offset A (dBc) 12.Absolute power on the negative offset A (dBm) 13.Relative peak power on the negative offset A (dBc) 14.Absolute peak power on the negative offset A (dBm) 15.Peak frequency in the negative offset A (Hz) 16.Relative power on the positive offset A (dBc) 17.Absolute power on the positive offset A (dBm) 18.Relative peak power on the positive offset A (dBc) 19.Absolute peak power on the positive offset A (dBm) 20.Peak frequency in the positive offset A (Hz) 21.Relative power on the negative offset B (dBc) ... 59.Absolute peak power on the positive offset E (dBm) 60.Peak frequency in the positive offset E (Hz)

Command	Return Value	
	N=1	Power Spectral Density Reference Returns 60 comma-separated scalar results, in the following order: 1. Reserved for the future use, returns –999.0 2. Absolute power at the center frequency (reference) area (dBm) 3. Reserved for the future use, returns –999.0 4. Reserved for the future use, returns –999.0 5. Reserved for the future use, returns –999.0 6. Reserved for the future use, returns –999.0 7. Reserved for the future use, returns –999.0 8. Reserved for the future use, returns –999.0 9. Reserved for the future use, returns –999.0 10.Reserved for the future use, returns –999.0 11.Relative power on the negative offset A (dB). Returns –999.0 if in WLAN. 12.Absolute power on the negative offset A (dBm/Hz). Returns –999.0 if in WLAN. 13.Relative peak power on the negative offset A (dB) 14.Absolute peak power on the negative offset A (dBm/Hz) 15.Peak frequency in the negative offset A (Hz) 16.Relative power on the positive offset A (dB) 17.Absolute power on the positive offset A (dBm/Hz) 18.Relative peak power on the positive offset A (dB) 19.Absolute peak power on the positive offset A (dBm/Hz) 20.Peak frequency in the positive offset A (Hz) 21.Relative power on the negative offset B (dB). Returns –999.0 if in WLAN. ... 59.Absolute peak power on the positive offset E (dBm/Hz) 60.Peak frequency in the positive offset E (Hz)
	N=2	Returns the displayed frequency domain spectrum trace data separated by comma. The number of data is determined by the setting of the trace points parameter.
	N=3	Returns the displayed frequency domain absolute limit trace data separated by comma. The number of data is determined by the setting of the trace points parameter.

Command	Return Value	
	N=4	Returns the displayed frequency domain relative limit trace data separated by comma. The number of data is determined by the setting of the trace points parameter.
	N=5	Total Power Reference Returns 12 comma-separated scalar values (in dBm) of the absolute power of the segment frequencies: 1. Total power reference (dBm) 2. Reserved for the future use, returns –999.0 3. Negative offset frequency (A) 4. Positive offset frequency (A) ... 11.Negative offset frequency (E) 12.Positive offset frequency (E)
	N=5	Power Spectral Density Reference Returns 12 comma-separated scalar values (in dBm/Hz) of the absolute power of the segment frequencies. Returns –999.0 for the offsets if in WLAN: 1. Power spectral density reference (dBm/Hz) 2. Reserved for the future use, returns –999.0 3. Negative offset frequency (A) 4. Positive offset frequency (A) ... 11.Negative offset frequency (E) 12.Positive offset frequency (E)
	N=6	Total Power Reference Returns 12 comma-separated scalar values (in dBc) of the power relative to the carrier at the segment frequencies: 1. Reserved for the future use, returns –999.0 2. Reserved for the future use, returns –999.0 3. Negative offset frequency (A) 4. Positive offset frequency (A) ... 11.Negative offset frequency (E) 12.Positive offset frequency (E)

Command	Return Value	
	N=6	Power Spectral Density Reference Returns 12 comma-separated scalar values (in dB) of the power relative to the carrier at the segment frequencies. Returns –999.0 for the offsets if in WLAN: 1. Reserved for the future use, returns –999.0 2. Reserved for the future use, returns –999.0 3. Negative offset frequency (A) 4. Positive offset frequency (A) ... 11.Negative offset frequency (E) 12.Positive offset frequency (E)
	N=7	Returns 12 comma-separated pass/fail test results (0 = passed, or 1 = failed) determined by testing the absolute power of the of the segment frequencies: 1. Reserved for the future use, returns –999.0 2. Reserved for the future use, returns –999.0 3. Negative offset frequency (A) 4. Positive offset frequency (A) ... 11.Negative offset frequency (E) 12.Positive offset frequency (E)
	N=8	Returns 12 comma-separated scalar values of the pass/fail (0=passed, or 1=failed) results determined by testing the power relative to the segment frequencies: 1. Reserved for the future use, returns –999.0 2. Reserved for the future use, returns –999.0 3. Negative offset frequency (A) 4. Positive offset frequency (A) ... 11.Negative offset frequency (E) 12.Positive offset frequency (E)

Command	Return Value	
	N=9	Returns 12 comma-separated scalar values of frequency (in Hz) that have peak power in each offset: 1. Reserved for the future use, returns –999.0 2. Reserved for the future use, returns –999.0 3. Negative offset frequency (A) 4. Positive offset frequency (A) ... 11.Negative offset frequency (E) 12.Positive offset frequency (E)
	N=10	Returns 12 comma-separated scalar values (in dBm) of the absolute peak power of the segment frequencies: 1. Reserved for the future use, returns –999.0 2. Reserved for the future use, returns –999.0 3. Negative offset frequency (A) 4. Positive offset frequency (A) ... 11.Negative offset frequency (E) 12.Positive offset frequency (E)
	N=11	Returns 12 comma-separated scalar values in dBc (dB if Meas Type = PSD) of the peak power relative to the carrier at the segment frequencies: 1. Reserved for the future use, returns –999.0 2. Reserved for the future use, returns –999.0 3. Negative offset frequency (A) 4. Positive offset frequency (A) ... 11.Negative offset frequency (E) 12.Positive offset frequency (E)

Occupied Bandwidth (OBW)

Measurement Setup

Meas Setup Menu

Avg Number

Allows you to specify the number of measurement averages used when calculating the measurement result. The average will be displayed at the end of each sweep.

Mode	TDSCDMA
Remote Command	`[:SENSe]:OBWidth:AVERage:COUNt <integer>`
	`[:SENSe]:OBWidth:AVERage:COUNt?`
	`[:SENSe]:OBWidth:AVERage[:STATe] ON|OFF|1|0`
	`[:SENSe]:OBWidth:AVERage[:STATe]?`
Example	:SENSe:OBWidth:AVERage:COUNt 25
	:SENSe:OBWidth:AVERage:STATe ON
Preset	10
State Saved	Saved in instrument state.
Min	1
Max	1000
Key Path	**Meas Setup**

Average Mode

Press Avg Mode (Exp) to continue measurement averaging, using the specified number of averages to compute each averaged value. The average will be displayed at the end of each sweep. Avg Mode (Repeat) will cause the measurement to reset the average counter each time the specified number of averages is reached.

Mode	TDSCDMA
Remote Command	`[:SENSe]:OBWidth:AVERage:TCONtrol REPeat|EXPonential`
	`[:SENSe]:OBWidth:AVERage:TCONtrol?`
Preset	EXPonential
State Saved	Saved in instrument state.
Range	Exp | Repeat
Key Path	**Meas Setup**

Max Hold

Allow you to turn the max hold of the peak detection on or off.

Mode	TDSCDMA
Remote Command	`[:SENSe]:OBWidth:MAXHold ON|OFF|0|1`
	`[:SENSe]:OBWidth:MAXHold?`
Example	:OBWidth:MAXHold ON
	:OBWidth:MAXHold?
Restriction and Notes	When Max Hold is ON, peak detector mode is used; otherwise average detector mode is used.
Preset	OFF (BTS)
	OFF (MS)
State Saved	Saved in instrument state.
Range	On | Off
Key Path	**Meas Setup**

Occ BW% Pwr

Specifies the percentage of the total power. The bandwidth which contains the specified power will be displayed.

Mode	TDSCDMA
Remote Command	`[:SENSe]:OBWidth:PERCent <real>`
	`[:SENSe]:OBWidth:PERCent?`
Example	:SENSe:OBWidth:PERCent 90
Preset	99
State Saved	Saved in instrument state.
Min	10
Max	99.99
Key Path	**Meas Setup**

OBW Span

Specifies the sweep bandwidth of the measurement.

Mode	TDSCDMA
Remote Command	`[:SENSe]:OBWidth:FREQuency:SPAN <bandwidth>`
	`[:SENSe]:OBWidth:FREQuency:SPAN?`

Example	:SENSe:OBWidth:FREQuency:SPAN 3 MHz
Preset	4.8 MHz
State Saved	Saved in instrument state.
Min	100 Hz
Max	HW Frequency Range Dependant
Key Path	**Meas Setup**

x dB

The measurement performs a peak search through the captured data. The frequency difference between the first and last point which drops x dB relative to the peak level is defined as the x dB bandwidth.

Mode	TDSCDMA
Remote Command	`[:SENSe]:OBWidth:XDB <real>`
	`[:SENSe]:OBWidth:XDB?`
Example	:SENSe:OBWidth:XDB –3
Preset	–26.00 dB
State Saved	Saved in instrument state.
Min	–100 dB
Max	–0.1 dB
Key Path	**Meas Setup**

Trig Source

Selects one of the trigger sources used to control the data acquisition.

Mode	TDSCDMA
Remote Command	`[:SENSe]:OBWidth:TRIGger:SOURce IMM|RFB|EXT[1]|EXT2`
	`[:SENSe]:OBWidth:TRIGger:SOURce?`
Example	:SENSe:OBWidth:TRIGger:SOURce EXT1
Restriction and Notes	Allows you to change the type of trigger used for the measurement.
	EXT or EXT1 is the front panel external trigger.
	EXT2 is the rear panel external trigger.

Dependencies/Couplings	A. When Device changes, If Device changes to BTS, 1. Trigger Source and Gate Source will turn to 'External Front'; 2. Gate State turns to 'On'; 3. Gate Delay and Gate Length will be set in terms of Burst Type and Traffic Slot specified in Frequency menu. If Device changes to BTS, 1. Trigger Source and Gate Source will turn to 'RF Burst'; 2. Gate State turns to 'On'; 3. Gate Delay and Gate Length will be set in terms of Burst Type and Traffic Slot specified in Frequency menu. B. When Trigger Source key is pressed: If Trigger Source turns to 'Free Run', Gate State will turn to 'Off'; If Trigger Source turns to 'External Front/External Rear/RF Burst', 1. Gate State turns to 'On'; 2. Gate Source is set identically with Trigger Source; 3. Gate Delay and Gate Length will be set in terms of Burst Type and Traffic Slot specified in Frequency menu. (For more information on gate setup, please refer to the section “Gate Delay”)
Preset	EXT[1]
State Saved	Saved in instrument state.
Range	Free Run (Immediate) | RF Burst (Wideband) | Ext Front | Ext Rear
Key Path	**Meas Setup, More**

Advanced

Access a menu that enables you to set the Resolution Bandwidth and the Trace Points

Resolution Bandwidth

Sets the resolution bandwidth for the current measurement. If an unavailable bandwidth is entered with the numeric keypad, the closest available bandwidth is selected

Mode	TDSCDMA
Remote Command	`[:SENSe]:OBWidth:BANDwidth:RESolution <bandwidth>`
	`[:SENSe]:OBWidth:BANDwidth:RESolution?`
Example	:SENSe:OBWidth:BANDwidth:RESolution 1.6 MHz
Preset	30 kHz
State Saved	Saved in instrument state.
Min	1 Hz
Max	8 MHz
Key Path	**Meas Setup, More, Advanced**

Trace Points

Sets the number of Trace points that will be used. The correct value of points is displayed parenthetically next to the Sweep time in the lower right corner of the display.

Mode	TDSCDMA
Remote Command	`[:SENSe]:OBWidth:SWEep:POINts <integer>`
	`[:SENSe]:OBWidth:SWEep:POINts?`
Example	:SENSe:OBWidth:SWEep:POINts 160
Preset	601
State Saved	Saved in instrument state.
Min	101
Max	8192
Key Path	**Meas Setup, More, Advanced**

Amplitude / Y Scale

Y-Axis Scale / Div

Allows you to enter a numeric value to change the vertical display sensitivity.

Unit	dB
Mode	TDSCDMA

Remote Command	`:DISPlay:OBWidth:WINDow:TRACe:Y:SCALe:PDIVision <rel_ampl>` `:DISPlay:OBWidth:WINDow:TRACe:Y:SCALe:PDIVision?`
Example	:DISPlay:OBWidth:WINDow:TRACe:Y:SCALe:PDIVision 10
Preset	10 dB
State Saved	Saved in instrument state.
Min	0.10 dB
Max	20.00 dB
Key Path	**Amplitude**

Y-Axis Reference Value

Unit	dBm
Mode	TDSCDMA
Remote Command	`:DISPlay:OBWidth:WINDow:TRACe:Y[:SCALe]:RLEVel <real>` `:DISPlay:OBWidth:WINDow:TRACe:Y[:SCALe]:RLEVel?`
Example	:DISPlay:OBWidth:WINDow:TRACe:Y:SCALe:RLEVel –10 dBm
Preset	0 dBm
State Saved	Saved in instrument state.
Min	–170 dBm
Max	30 dBm
Key Path	**Amplitude**

Query the Pass/Fail state

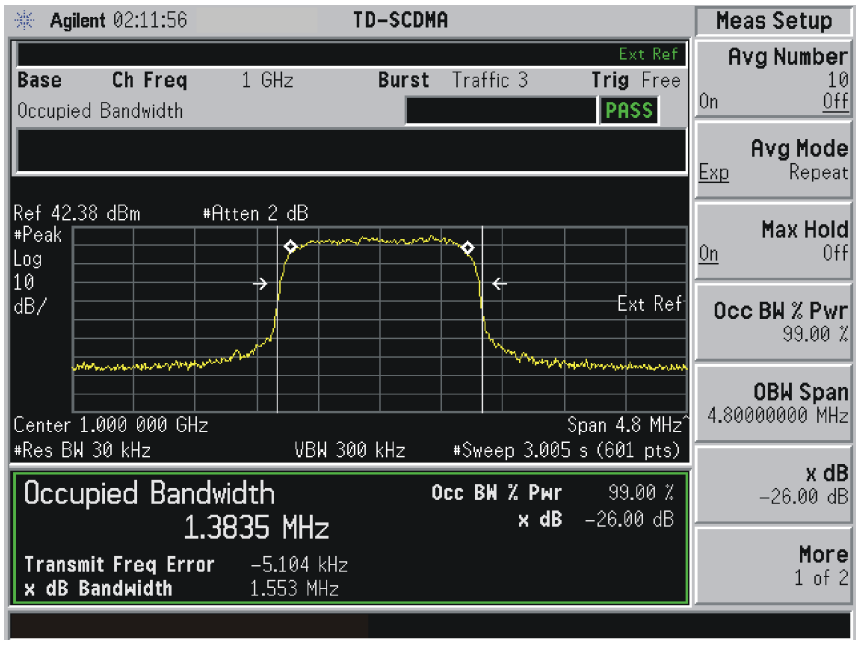
Mode	TDSCDMA
Remote Command	`:CALCulate:CLIMits:FAIL?`
Example	:CALC:CLIM:FAIL
Restriction and Notes	Returns 1 if the measurement has failed the specified limits. Returns 0 if the measurement passes or if the limit checking is not turned on.
Range	0 (False), 1 (True)
Key Path	None

Restart Parameters

A change to any parameter found on the Mode Setup menu (and its submenus) will cause the measurement to restart. The same is true of changes to Center Freq (Frequency Menu). Note that parameters described above in the Meas Setup Menu section also cause a restart of the measurement.

Results

Standard Results Screen



Results File

`:MMEMory:STORe:RESults <'filename'>`

One method of results storage is a file suitable for import into a spreadsheet program. Upon request from

the file system, a comma delimited .csv file should be created with the following items; time, date, column titles, and results. This file should contain all of the data necessary to recreate the measurement conditions.

Application	**TD-SCDMA Utilities**	
Measurement	Occupied Bandwidth	
Date	17–Apr	2007
Time	9:37:36	
Measurement Parameters		
Average State	Off	
Number of Averages	10	
Average Mode	Exp	
Measure	Single	
Device	BTS	
Trigger Source	Ext Front	
Burst Type	Traffic	
Traffic Timeslot	0	
Gate	On	
Occ BW% Pwr	99	
Res BW	30	kHz
Video BW	300	kHz
Frequency Parameters		
Center Freq	1	GHz
Span	4.8	MHz
Measurement Results		
Occupied Bandwidth	1.38485	MHz
Transmit Freq Error	13.52	kHz

SCPI Remote Commands

:CONFigure:OBWidth

:INITiate:OBWidth

:FETCh:OBWidth[n]?

:MEASure: OBWidth[n]?

:READ:OBWidth[n]?

Index: n <Mnemonic>	Results Returned
n = 1	Return 2 comma separated values: Occupied bandwidth in Hz specified by “Occ BW % Pwr” (float) [Hz]. Transmit Freq Error from the specified center frequency (float) [Hz]. Occupied bandwidth specified by “x dB” (float) [Hz]

4 Concepts

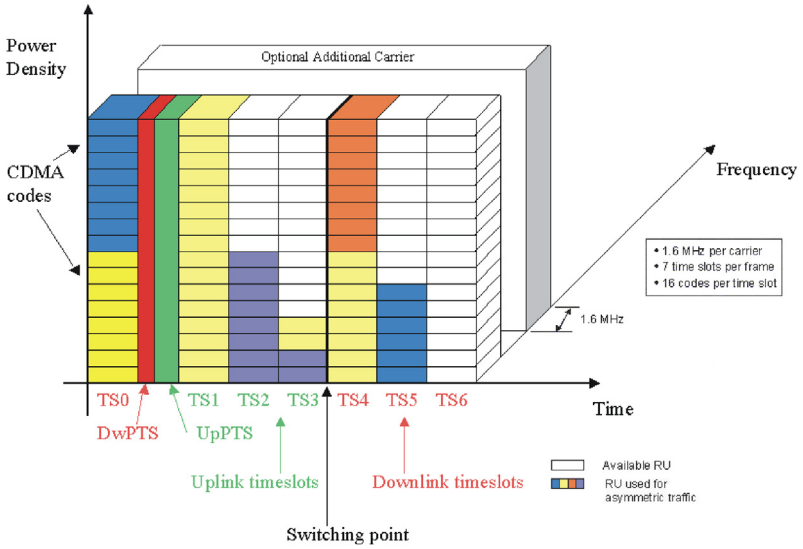
This chapter provides overall information on the TD-SCDMA communications system and describes TD-SCDMA measurements made by the analyzer. For further information, a list of associated documents is also provided.

What Is the TD-SCDMA Communications System?

TD-SCDMA (Time Division-Synchronous Code Division Multiple Access) is a mobile radio format developed by the China Academy of Telecommunication and Technology (CATT). TD-SCDMA combines a TDMA component with a CDMA component to provide an efficient use of resources and dynamically adapt to both symmetric and asymmetric traffic loads. There are seven time slots (numbered 0 through 6) in a single 5 ms long frame, and within each time slot there are up to 16 code channels that are available to allocate to a single user or to distribute among multiple users. Time division duplexing is used to separate uplink and downlink periods in a given time frame. Therefore, a Resource Unit (RU) is defined by a frequency, time slot, and code channel with spreading factor. The basic resource unit uses a spreading factor of 16. In TD-SCDMA, the chip rate is 1.28 Mcps and each carrier signal occupies 1.6 MHz bandwidth.

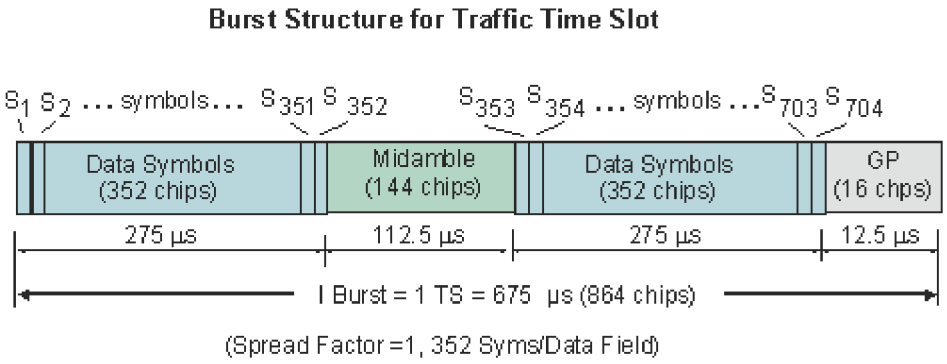
The first time slot in a frame, time slot 0, is always allocated to downlink traffic. Also included in each 5 ms frame are two additional time slots, the downlink pilot timeslot (DwPTS) and the uplink pilot timeslot (UpPTS), which are separated by a 75 µs guard period. The DwPTS and UpPTS are separated from the traffic time-slot 0 by a switching point. The next time slots, beginning with time slot 1, are allocated to uplink traffic, until the second switching point in the frame occurs, at which point traffic time slots switch from uplink to downlink traffic slots. TD-SCDMA adapts to symmetric and asymmetric traffic loads by adjusting the number of downlink and uplink time slots per frame.

Figure 4-1 **TD-SCDMA Resource Unit Structure**



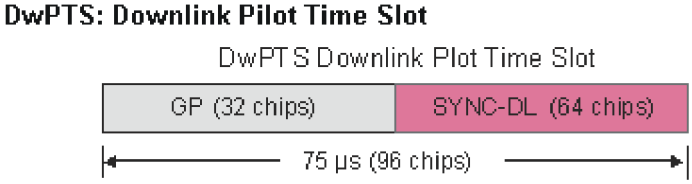
In TD-SCDMA, a traffic time slot burst consists of two data symbol fields, a midamble field, and a guard period. Each traffic burst is 675 µs in length, including the 12.5 µs long guard period at the end of the burst, which is used to avoid time slot multi-path interference. The midamble is used as a training sequence for channel estimation, power measurements, and synchronization.

Figure 4-2 **Burst Structure for Traffic Time Slot**



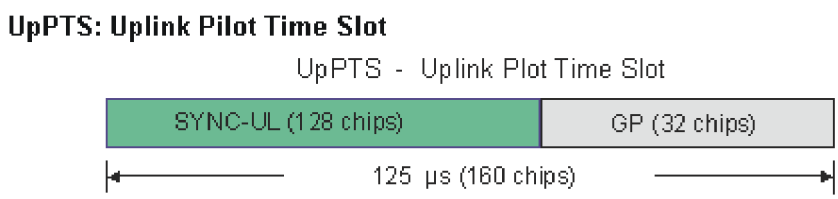
The downlink pilot time slot is used for downlink synchronization and cell initial search. There are 32 different downlink synchronization codes used to distinguish base stations. The DwPTS is 75 µs long.

Figure 4-3 **Downlink Pilot Time Slot**



The uplink pilot timeslot is used for initial synchronization, random access, and adjacent cell handoff measurements. There are 256 synchronization codes, which can be divided into 32 groups of 8 codes. The base station receives initial beam forming parameters from this signal. This time slot is 125 µs long.

Figure 4-4 **Uplink Pilot Time Slot**



TD-SCDMA benefits from several key technological features that enable its efficiency in handling symmetric and asymmetric traffic loads and optimize system performance and capacity. These include the following:

Smart antennas permit cell sectorization through the use of multiple, dynamic, focused base station antenna beam patterns. These multiple-element antenna arrays receive and transmit signals to specific areas within a cell, in order to target specific mobile users individually and simultaneously. They also enable the base station to track the user as it moves within a cell. Additionally, smart antennas help minimize multiple access interference, and increase the capacity of the TD-SCDMA network.

Joint detection is used to combat multiple access interference and increase system

capacity. Efficient implementation of joint detection is made possible through the limited use of CDMA codes per timeslot (a maximum of 16), thus avoiding the high computational complexity of joint detection as implemented in other systems. The capacity improvement through the use of joint detection is enhanced by the synchronization of nodes in the network.

Synchronization also reduces the search time for handover searching and reduces the time for position location calculations. It enables the use of hard handoffs instead of soft handoffs, thus reducing system overhead.

Optimal utilization of spectrum is achieved through the use of unpaired frequency bands. Assigning separate frequency bands for uplink and downlink signals is inefficient for use with applications that have asymmetric traffic loads. Applications that have a heavy downlink requirement do not efficiently use frequency bands allocated to uplink signals. TD-SCDMA uses the same frequency band for both uplink and downlink, and can dynamically allocate resources for either uplink or downlink as needed.

Transmit Power Measurement Concepts

Purpose

Transmit Power is the measure of in-channel power for TD-SCDMA systems. Mobile stations and base transceiver stations must transmit enough power, with sufficient modulation accuracy, to maintain a call of acceptable quality without leaking into frequency channels or timeslots allocated for others. TD-SCDMA systems use dynamic power control to ensure that each link is maintained with minimum power. This gives two fundamental benefits: overall system interference is kept to a minimum and, in the case of mobile stations, battery life is maximized.

The Transmit Power measurement determines the average power for an RF signal burst at or above a specified threshold value. The threshold value may be absolute, or relative to the peak value of the signal.

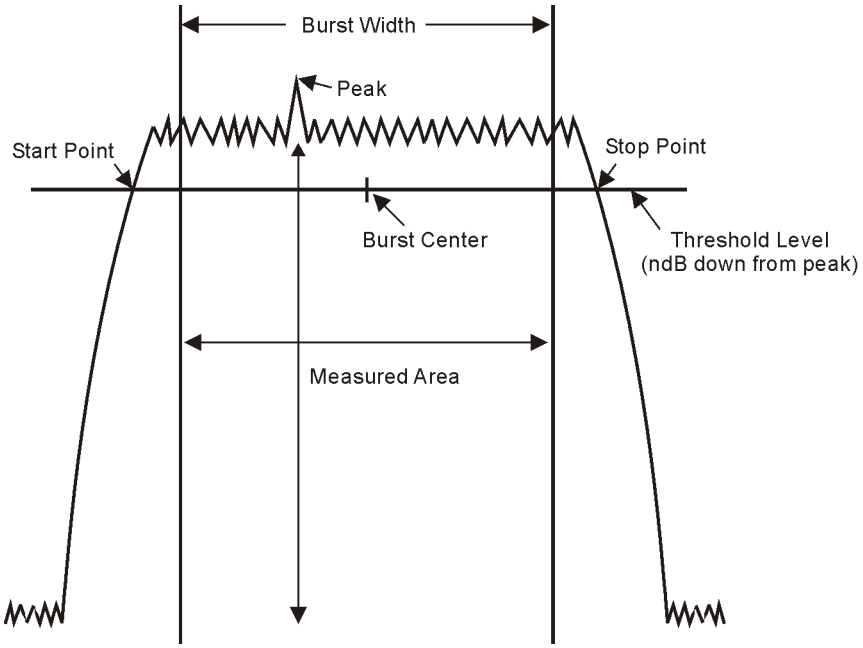
At the base transceiver station, the purpose of the Transmit Power measurement is to determine the power delivered to the antenna system on the radio-frequency channel under test. The Transmit Power measurement verifies the accuracy of the mean transmitted RF carrier power. This can be done across the frequency range and at each power step.

Measurement Method

The instrument acquires a TD-SCDMA signal in the time domain. The average power level above the threshold is then computed and displayed. This measurement uses the “power-above-threshold” method instead of the “useful part of the burst” method defined in the TD-SCDMA standards. The measured Transmit Carrier Power will be very nearly the same for these two methods. The power-above-threshold method has the advantages of being faster and allows power measurements to be made at somewhat lower power levels. It also has the advantage of not requiring the carrier to have a valid TSC (Training Sequence Code).

Note that this measurement does not provide a way to specify which timeslot is to be measured. Therefore if multiple timeslots are on, they should all be set at the same power level, or the levels of those timeslots to be excluded need to be kept below the threshold level. If you want to measure Transmit Carrier Power using the TD-SCDMA specified useful part of the burst method, use the Power vs. Time measurement, which also measures the power ramping of the burst.

The transmit power measurement is an accurate method of determining the average power for the specified burst. The analyzer is set into zero-span mode, with a sweep time that captures at least one burst.



The transmit power measurement acquires data from the "Measured Area" above when a radio standard is chosen and when **Meas Setup**, **Meas Method**, **Measured Burst Width** is selected. When **Meas Setup**, **Meas Method**, **Above Threshold Lvl** is selected, the "Measured Area" extends the burst width delimiter lines to the start and stop points.

The mean carrier power is calculated by:

1. converting each trace point amplitude from dBm into linear power
2. Adding the above amplitudes together and dividing by the number of points included in the average.
3. This value is then displayed in logarithmic form (dBm).

$$(P_{avg}) = 10\log 10\left\{\frac{\left(\sum_{n}^{m}\left(10^{\frac{p}{10}}\right)\right)}{m-n}\right\}$$

where P_{avg} = average power, n is the start trace point, m = the stop trace point, and p = the trace point amplitude power in dBm.

NOTE The analyzer defaults to zero-span mode and the sweep time is set to capture at least one burst. The sweep time can be changed by pressing **Meas Setup**, **Meas Time**.

Pressing **Meas Setup** after **Transmit Power** has been selected displays the transmit power measurement setup menu. Pressing **Meas Control** after **Transmit Power** has been selected displays the transmit power control menu, where you can pause or restart a measurement, or toggle between continuous and single measurement.

Power Versus Time Measurement Concepts

Purpose

The Power vs. Time (PvT) measurement analyzes the amplitude profile and timing of the burst signal and provides a time mask for the signal. It measures the mean transmit power during the "useful part" of TD-SCDMA bursts and verifies that the power ramp fits within the defined mask.

TD-SCDMA is a Time Division Multiple Access (TDMA) scheme with seven time slots, or bursts, per RF channel. If the burst does not occur at exactly the right time, or if the burst is irregular, then other adjacent timeslots can experience interference. Because of this, the industry standards specify a tight mask for the fit of the TD-SCDMA burst. The measurement allows adjustment of Meas Time to capture from 1 to 9 timeslots (up to one complete subframe).

This measurement supports the three types of TD-SCDMA timeslots Traffic, Uplink Pilot, and Downlink Pilot.

The Power vs. Time measurement provides masks for both BTS (Base Transceiver Station) and MS (mobile station).

Measurement Method

The instrument acquires a TD-SCDMA signal by capturing two time records for each Power vs Time measurement using a 1.3 MHz RBW.

The first time record capture is made with the internal preamp (Option 1DS) enabled and with internal attenuation set to off to support the required Base Station transmit off level of –82 dBm.

The second time capture is made using the user defined settings of internal preamp (Option 1DS) and internal attenuation as defined under the Input/Output menu to ensure accurate measurement of the burst transmit on power level. The data from the two sweeps will be combined to create one trace. This combined trace is displayed (with the limit mask, if it has not been turned off) and is used to calculate results data.

This two sweep method allows the measurement to reach the high dynamic range requirement of greater than 112 dB for the Transmit ON/OFF Time Mask defined by the TD-SCDMA Specs for Base Station when measuring a maximum input signal power of +30 dBm.

CAUTION It is imperative that there be no more than +30 dBm present at the analyzer input, in order to prevent damage to the internal attenuator.

NOTE

- PvT requires Option 1DS (Preamplifier Option). The measurement will still work without this option present, but you will not be able to reach the dynamic range required by the TD-SCDMA specifications.
- PvT is set in the single sweep mode. Because of the switching of the Preamp state from on to off, making PvT measurements in the continuous sweep mode is not recommended.

Adjacent Channel Power (ACP) Measurement Concepts

Purpose

Adjacent Channel Power (ACP) is the power contained in a specified frequency channel bandwidth relative to the total carrier power. It may also be expressed as a ratio of power spectral densities between the carrier and the specified offset frequency band.

As a composite measurement of out-of-channel emissions, ACP combines both in-band and out-of-band specifications to provide useful figures-of-merit for spectral regrowth and emissions produced by components and circuit blocks without the rigor of performing a full spectrum emissions mask measurement.

To maintain a quality call by avoiding channel interference, it is important to measure and reduce any adjacent channel leakage power transmitted from a mobile phone. The characteristics of adjacent channel leakage power are mainly determined by the transmitter design, particularly the low-pass filter.

Measurement Method

This ACP measurement analyzes the total power levels within the defined carrier bandwidth and at given frequency offsets on both sides of the carrier frequency.This measurement requires the user to specify measurement bandwidths of the carrier channel and each of the offset frequency pairs up to 6. Each pair may be defined with unique measurement bandwidths.

It uses an integration bandwidth (IBW) method that performs a swept trace data acquisition in the frequency domain. In this process, the channel integration bandwidth is analyzed using the automatically defined resolution bandwidth (RBW), which is much narrower than the channel bandwidth. The measurement computes an average power of the carrier channel and each of the offset channels, automatically compensating for resolution bandwidth and noise bandwidth.

If **Total Pwr Ref** is selected as the measurement type, the results are displayed as relative power in dBc and as absolute power in dBm. If **PSD Ref** (Power Spectral Density Reference) is selected, the results are displayed as relative power in dB, and as absolute power in dBm/Hz.

Multi-carrier Power Measurement Concepts

Purpose

This measurement is for adjusting multi-carrier power amplifiers to transmit well balanced multiple carriers. In this measurement, two carrier inputs are required to make measurements of the in-channel and out-of-channel powers. Up to 12 carrier inputs can be measured. If a power amplifier accepts multiple carriers, the intermodulation products caused by these carriers will act to decrease the performance of the amplifier.

Measurement Method

Multi-carrier Power is a measure of the power in two or more transmit channels and of the power that leaks into their adjacent transmit channels. The results reported are identical to the adjacent channel power measurement, but the setup is different to allow for two or more carriers present.

When you choose the MCP measurement from the Measurement menu, the center frequency of the analyzer is maintained. If you have set Ref Freq Mode to auto, the slot with the highest power will be used as the reference. However, you also may enter a value for Ref Freq, and this will set the Ref Freq Mode to man. To ensure that the carriers are always centered on the screen, the following algorithm is used to calculate the Ref Freq:

CtrFreq = Ref Freq + (((0.5*Carriers) – Ref Carrier Pos + 0.5) * Carrier Span)

This algorithm is identical to the algorithm used for the ACP measurement, except the appropriate number of carriers will be included in the sequence of bursts measured before the spectrum view is constructed.

If the RRC filter is turned on, this will be noted in the results area. All carriers and offsets will have the filter mathematically applied before the power results are reported. The value (rolloff) for the filter will be set to the value of the Filter Alpha parameter and T will be 1/Integ BW (where the default Integration BW parameters are set to 1.28 MHz, equal to the chip rate).

There is no change in algorithm when the view is changed to either Spectrum or Combined.

Results

The results shown in the results view are described below.

Result	Units	Min	Max
Total Carrier Power	dBm	-200	200
Ref Carrier Power	dBm	-200	200

Result	Units	Min	Max
Carrier Power (Carrier Pwr Present set to Yes | No)	dBm | dB	-200	200
Offset Relative Power	dB	-200	200
Offset Absolute Power	dBm	-200	200

Total Carrier Power result gives the total power in all the carriers with carrier power present set to yes. The power is calculated by integrating across the bandwidth declared by the Carrier Integ BW parameter for each carrier then totalling. The total integration bandwidth is shown as part of the result. This will be the total of the Carrier Integ BW parameters of the carriers used in calculating the total carrier power.

Ref Carrier Power result gives the power in the reference carrier. The power is calculated by integrating across the multi-carrier power bandwidth declared by the Carrier Integ BW parameter for that carrier. The integration bandwidth is shown as part of the result.

On the graph display the carrier representing the reference carrier will be identified using white. In Spectrum view the vertical lines used to identify the carrier will be white and in combined view the width arrow will be white.

Carrier Power result is the power in all the currently defined carriers. If the carrier has carrier power present the power will be absolute. If it is defined as not having power present the power will be relative to the reference carrier. The power is calculated by integrating across the bandwidth declared by the Carrier Integ BW parameter. The integration bandwidth is shown as part of the result. As there may be more results than can be easily viewed on the display a scrollable list is used to display the results. The currently selected Carrier Result will be displayed on the last line of the carrier power result list unless:

- the selected Carrier Result is 4 or less in normal multi-carrier power results view. In this case the first 4 carrier power results will be displayed.
- the selected Carrier Result is 9 or greater in normal multi-carrier power results view. In this case the last 4 carrier power results will be displayed.
- the zoom mode is selected. In this case all carrier power ranges can be displayed.

On the graph display, the carrier(s) representing the carriers with power present (with the exception of the reference carrier) are identified using red. The carrier(s) representing carriers with no power present are identified using pale blue. In the Spectrum view, the vertical lines used to identify the carrier(s) with power present are red and the vertical lines used to identify the carrier(s) with no power present are pale blue. In combined view, the width arrow for carrier(s) with power present are red and the width arrow for carrier(s) with no power present are pale blue.

Offset Relative Power result gives the power in the offsets relative to the reference carrier. The power is calculated by integrating across the bandwidth

declared by the Offset Integ BW parameter. The offset integration bandwidth is shown as part of the result.

On the graph display, the offsets A, B and C are identified using yellow, blue and purple respectively. In the Spectrum view, the appropriate color is applied to the vertical lines to identify the offset.

Offset Absolute Power result gives the absolute power in the offsets. The power is calculated by integrating across the bandwidth declared by the Offset Integ BW parameter. The offset integration bandwidth is shown as part of the result. On the graph display, the offset A, B and C are identified using yellow, blue and purple respectively. In the Spectrum view, the appropriate color is applied to the vertical lines to identify the offset.

Spectrum Emissions Mask (SEM) Measurement Concepts

Purpose

The Spectrum Emission Mask measurement includes the in-band and out-of-band spurious emissions. As it applies to TD-SCDMA, this is the power contained in a specified frequency bandwidth at certain offsets relative to the total carrier power. It may also be expressed as a ratio of power spectral densities between the carrier and the specified offset frequency band.

This spectrum emission mask measurement is a composite measurement of out-of-channel emissions, combining both in-band and out-of-band specifications. It provides useful figures-of-merit for the spectral regrowth and emissions produced by components and circuit blocks, without the rigor of performing a full spectrum emissions mask measurement.

Measurement Method

The spectrum emission mask measurement measures spurious signal levels in up to five pairs of offset/region frequencies and relates them to the carrier power. The reference channel integration bandwidth method is used to measure the carrier channel power and offset/region powers. Spectrum emission mask measurements are made, relative to the carrier channel frequency bandwidth.

This integration bandwidth method is used to perform a data acquisition. In this process, the reference channel integration bandwidth (Meas BW) is analyzed using the automatically defined resolution bandwidth (Res BW), which is much narrower than the channel bandwidth. The measurement computes an average power of the channel or offset/region over a specified number of data acquisitions, automatically compensating for resolution bandwidth and noise bandwidth.

This measurement requires you to specify the measurement bandwidths of carrier channel and each of the offset/region frequency pairs up to 5. You may define each pair with unique measurement bandwidths. The results are displayed either as relative power (to the measured output power of the signal) in dBc, or as absolute power in dBm. In addition to the reference power a “Total Pwr” result is displayed at the top of the trace window. This value is a duplicate of the top left hand value in the results window. This allows you to zoom into this trace window and have all the relevant results, while adjusting your DUT power parameters.

Spurious Emissions Measurement Concepts

Purpose

This measurement identifies and determines the (absolute) power level of spurious emissions in certain frequency bands. This energy may cause interference for other users of the TD-SCDMA system. You may use the range table to specify the parameters of the ranges to be swept.

Making the Measurement

NOTE The factory default settings provide a measurement that complies with pre-established standards for TD-SCDMA. For special requirements, you may need to change some of the settings. To return all parameters for the current measurement to their default settings press **Meas Setup**, **More**, **Restore Meas Defaults** at any time.

The Spurious Emissions measurement begins executing when the **Spurious Emissions** menu key in the Measure menu is pressed. The measurement sets up the analyzer using the data from the first active range. If no ranges are active, the "No ranges are defined" message is displayed and the measurement is put in the idle state. Once the measurement is started you can edit the current table or load the table with new data using the File System (i. e., ISTATE save/recall).

The state machine cycles through each active range table entry one at a time averaging to N as necessary. This test uses the multiple setpoint state machine model. Once all set points are measured the completion behavior is determined by the Meas Type and Measure settings. This is shown in the table under the description for the Meas Type parameter late in this chapter.

For each range that you specify and activate, the analyzer scans the band using the specified Res BW, Video BW, Span and Sweep Time settings. As each band is swept, any signal which is above the Peak Threshold value and has a peak excursion of greater than the Peak Excursion value will be added to a list of spurs displayed in the lower (data) results window. A total of 200 spurs can be recorded for one measurement, with a limit of 10 spurs per frequency range.

Those spurs in the list with a peak amplitude greater than the Absolute Limit for that range will be logged as a measurement failure and indicated by a red 'F' in the 'Amplitude' column of the table.

The China Wireless Telecommunication Standard document CWTS TSM 05.05 V3.1 requires different default measurement ranges for mobile devices (UE or MS) and base stations (BTS). The spurious emissions measurement takes these differences into account, according to the Device parameter value you enter under the **Mode Setup**, **Radio** menu.

When the radio device is set to Mobile (MS), the measurement will not report any

spurs that are within 4 MHz of the expected MS carrier frequency that you enter as the Center Freq value on the frequency menu. When the radio device is set to Base (BTS),", the measurement will not report any spurs for the spectrum 4 MHz below the beginning of the transmission band nor the spectrum 4 MHz above the end of the transmission band. The beginning and ending of the transmission band are set by you using the Tx Band Start and Tx Band Stop menu keys (or SCPI commands). Any spectrum falling within either "skipped' spectrum will indeed not be swept so that an optimal reference level can be used.

Occupied Bandwidth (OBW) Measurement Concepts

Purpose

This measurement measures 'Occupied Bandwidth' primarily, as well as 'x dB Bandwidth' and two other incidental parameters. The 'Occupied Bandwidth' measured parameter is the bandwidth that contains some fraction (default is 99%) of the power within the displayed span. The 'x dB Bandwidth' measured parameter is the bandwidth outside of which all the spectrum is more than x dB (default for x is 26 dB) below the peak of the spectrum.

The measurement also reports “transmitter frequency error” and “total power”.

Making the Measurement

The Occupied Bandwidth measurement begins executing when the **Occupied Bandwidth** menu key in the Measure menu is pressed. The measurement measures the bandwidth containing 99% of the total transmitted power and is centered on the channel center frequency. The power of the transmitted signal is measured with an approximately Gaussian filter with 30 kHz bandwidth. The measure span is 4.8 MHz, which is centered on channel center frequency and compliant with 3GPP standard.

Other Sources of Measurement Information

Additional measurement application information is available through your local Agilent Technologies sales and service office. The following application notes treat digital communications measurements in much greater detail than discussed in this measurement guide.

- Application Note 1298

  Digital Modulation in Communications Systems - An Introduction
  Agilent part number 5965-7160E

- Application Note 1311

  Understanding CDMA Measurements for Base Stations and Their Components
  Agilent part number 5968-0953E

- Application Note 1355

  Designing and Testing W-CDMA User Equipment
  Agilent part number 5980-1239E

- Application Note 1356

  Designing and Testing 3GPP W-CDMA Base Stations
  Agilent part number 5980-1238E

- Application Note

  Characterizing Digitally Modulated Signals with CCDF Curves
  Agilent part number 5968-5858E

Instrument Updates at www.agilent.com

These web locations can be used to access the latest information about the instrument, including the latest firmware version.

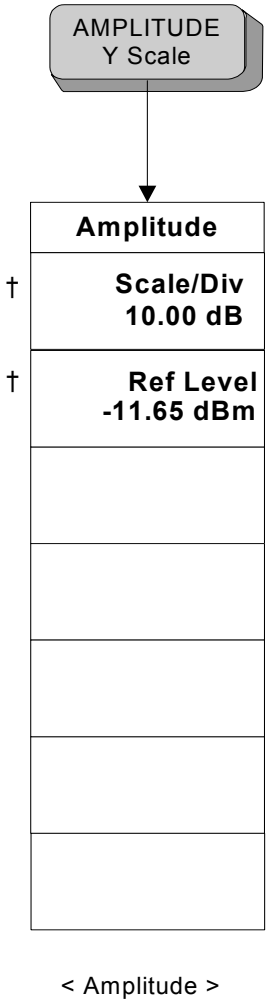
http://www.agilent.com/find/vsa

http://www.agilent.com/find/psa

5 Menu Maps

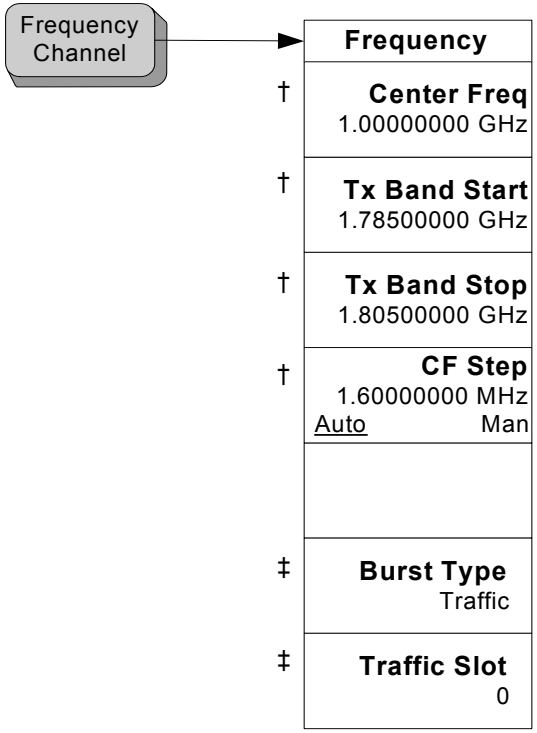
These menu maps are in alphabetical order by the front-panel key label. You can locate detailed information about each key/function at the Key and SCPI Reference chapter.

5.1 Amplitude Y Scale Key



† A dagger to the left of the menu key indicates that when the key is pressed this is an active function.

5.2 Frequency Channel Key

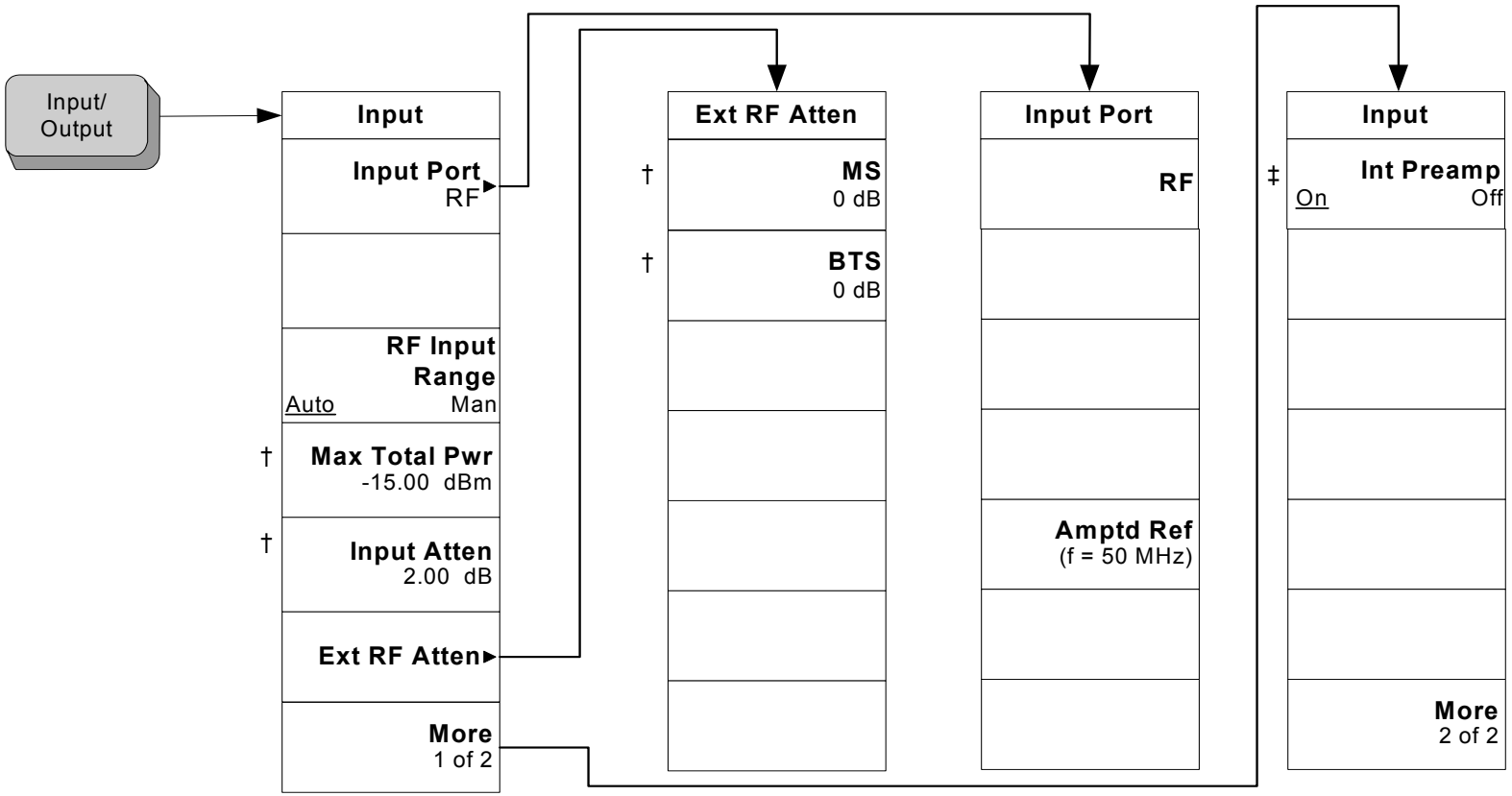


† A dagger to the left of the menu key indicates that when the key is pressed this is an active function.

‡ A double-dagger to the left of the menu key indicates a function that is not always available. It is dependent on other instrument settings.

Menu Maps

5.3 Input/Output Key

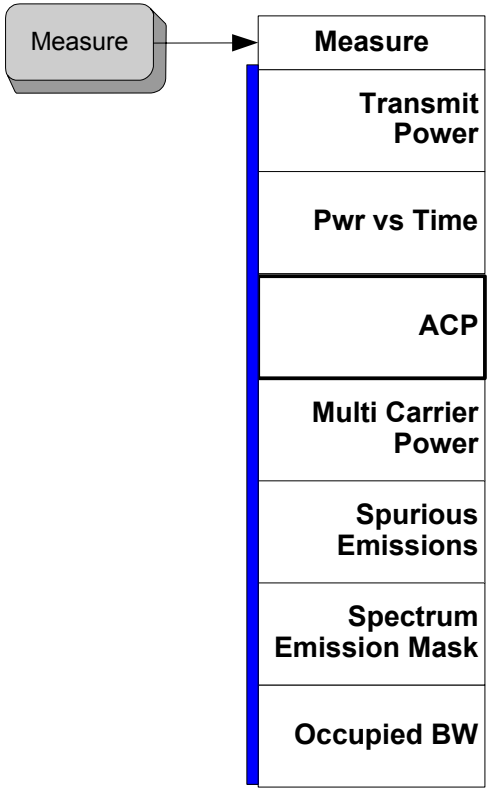


< Input/Output >

† A dagger to the left of the menu key indicates that when the key is pressed this is an active function.

‡ A double-dagger to the left of the menu key indicates a function that is not always available. It is dependent on other instrument settings.

5.4 MEASURE Key

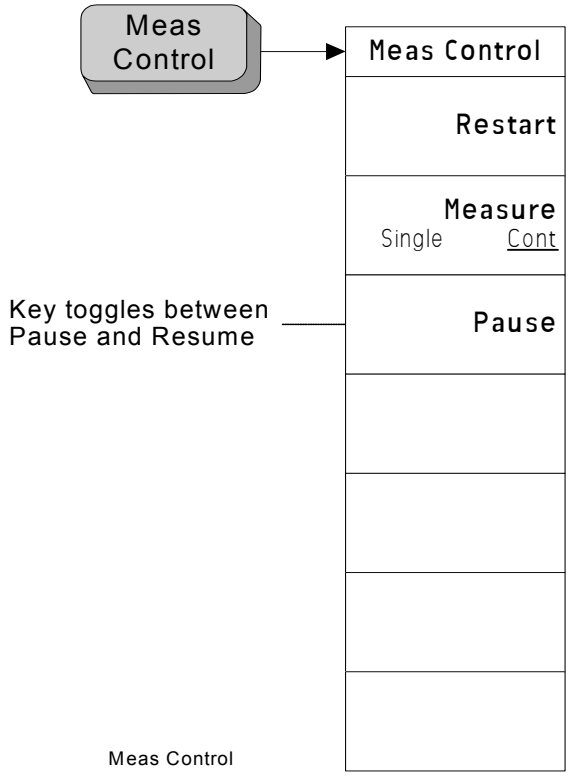


<Measure_Menu>

A bar on the left of two or more menu keys indicates that the keys are a set of mutually exclusive choices.

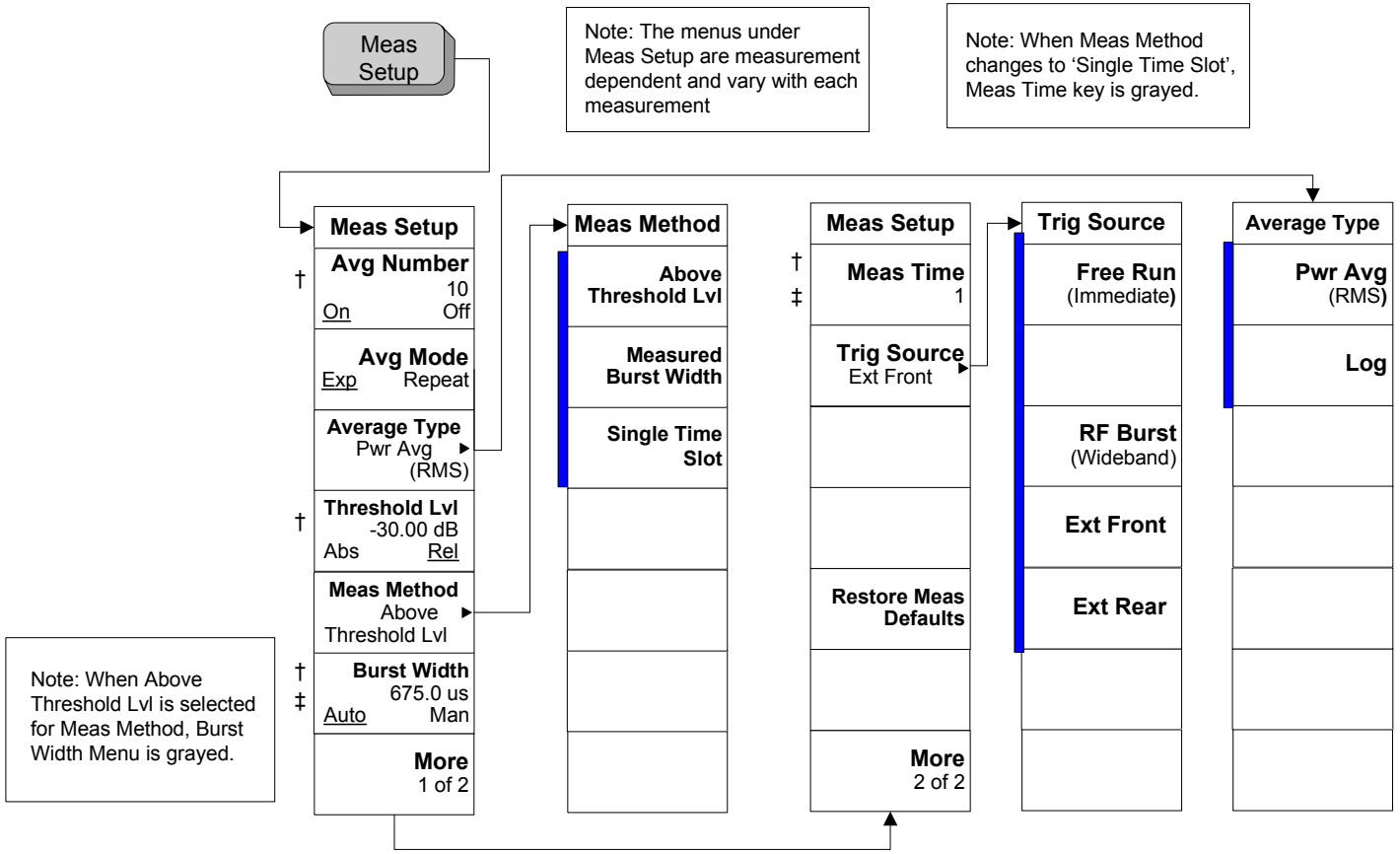
Menu Maps

5.5 Meas Control Key



5.6 Menus for Setting Up Measurements

5.6.1 Transmit Power Measurement Meas Setup Key



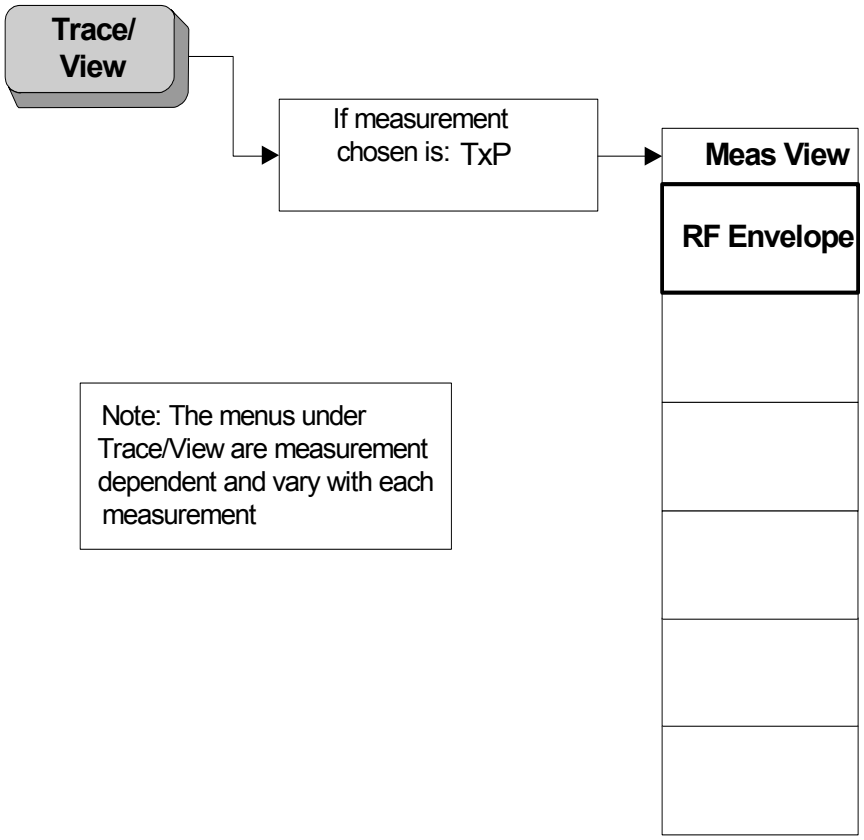
A bar on the left of two or more menu keys indicates that the keys are a set of mutually exclusive choices.

† A dagger to the left of the menu key indicates that when the key is pressed this is an active function.

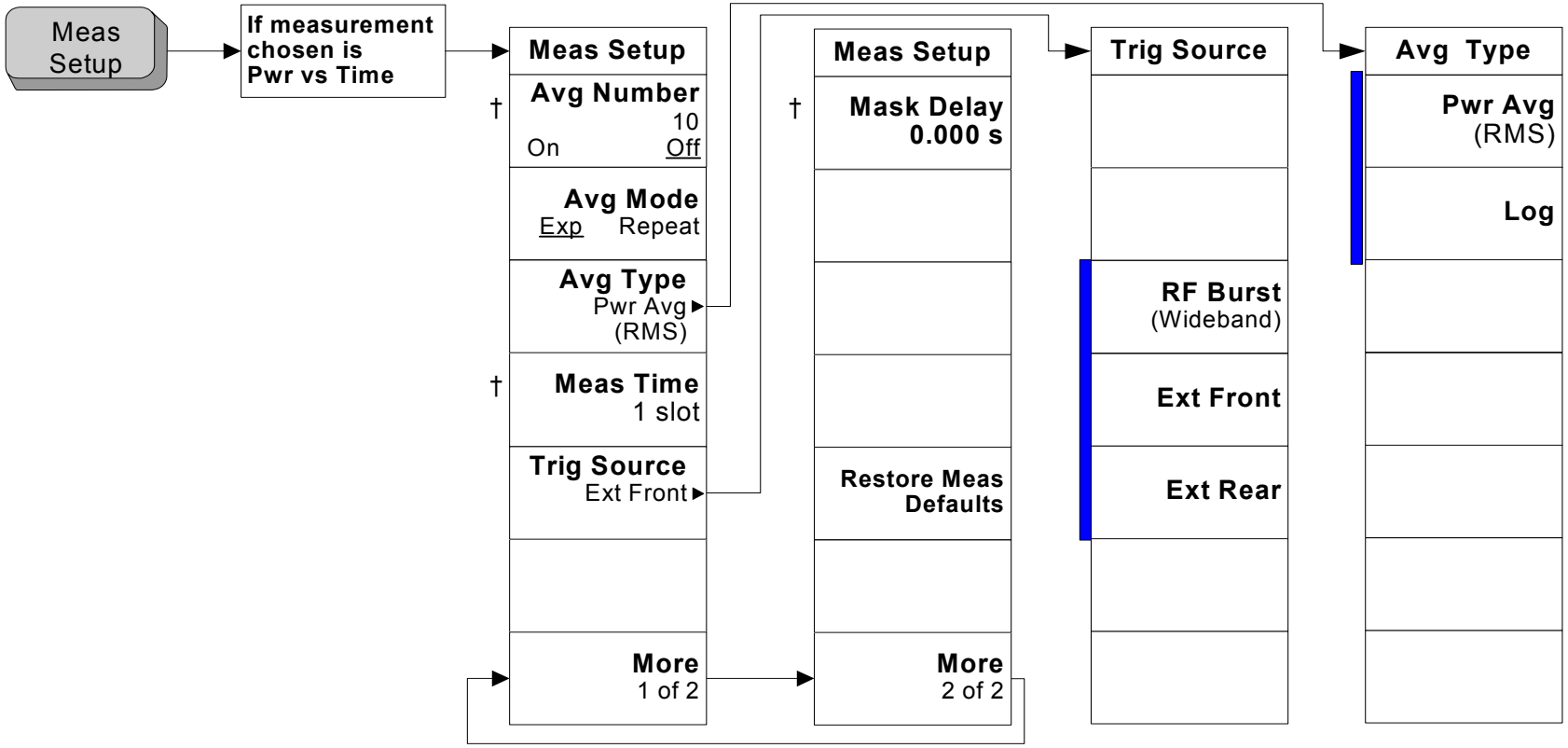
‡ A double-dagger to the left of the menu key indicates a function that is not always available. It is dependent on other instrument settings.

Menu Maps

5.6.2 Transmit Power Measurement Trace/View Key



5.6.3 Power vs Time Measurement Meas Setup Key

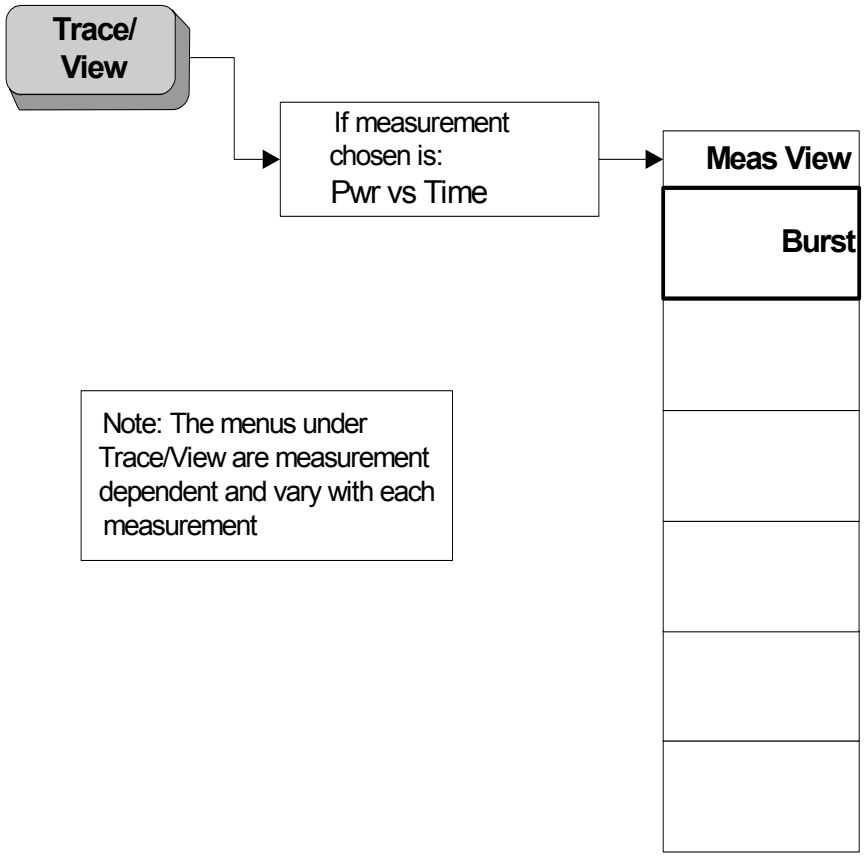


A bar on the left of two or more menu keys indicates that the keys are a set of mutually exclusive choices.

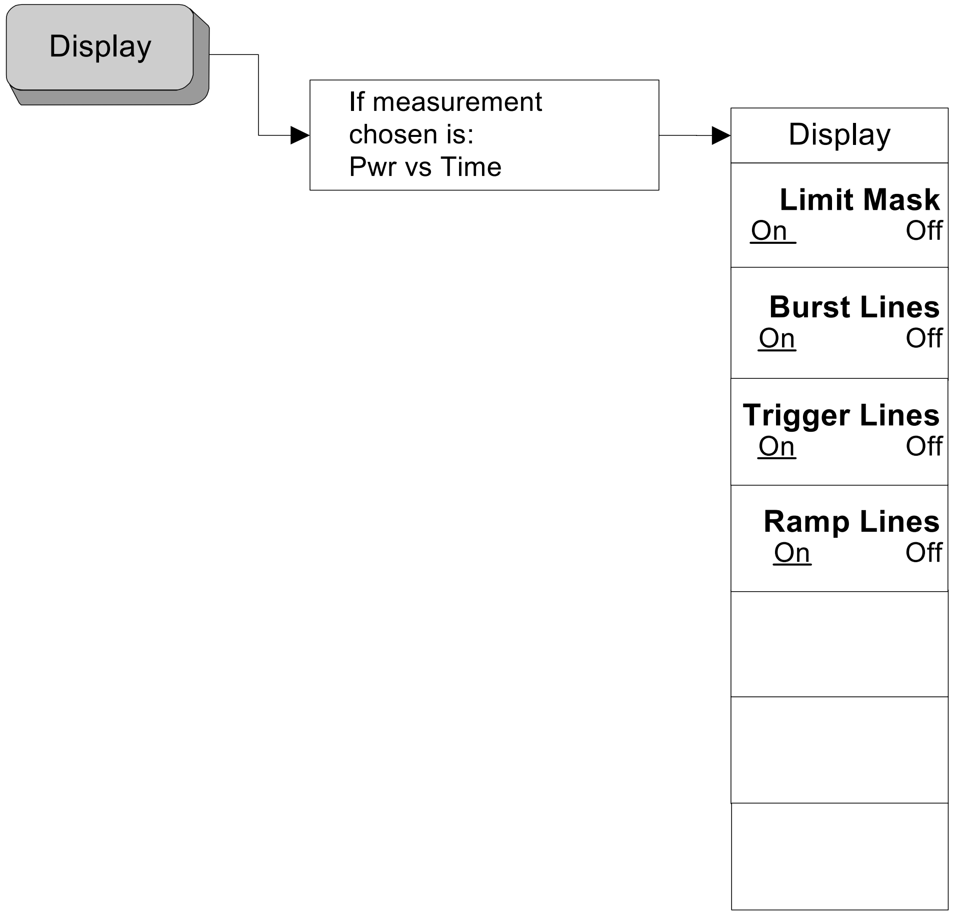
† A dagger to the left of the menu key indicates that when the key is pressed this is an active function.

Menu Maps

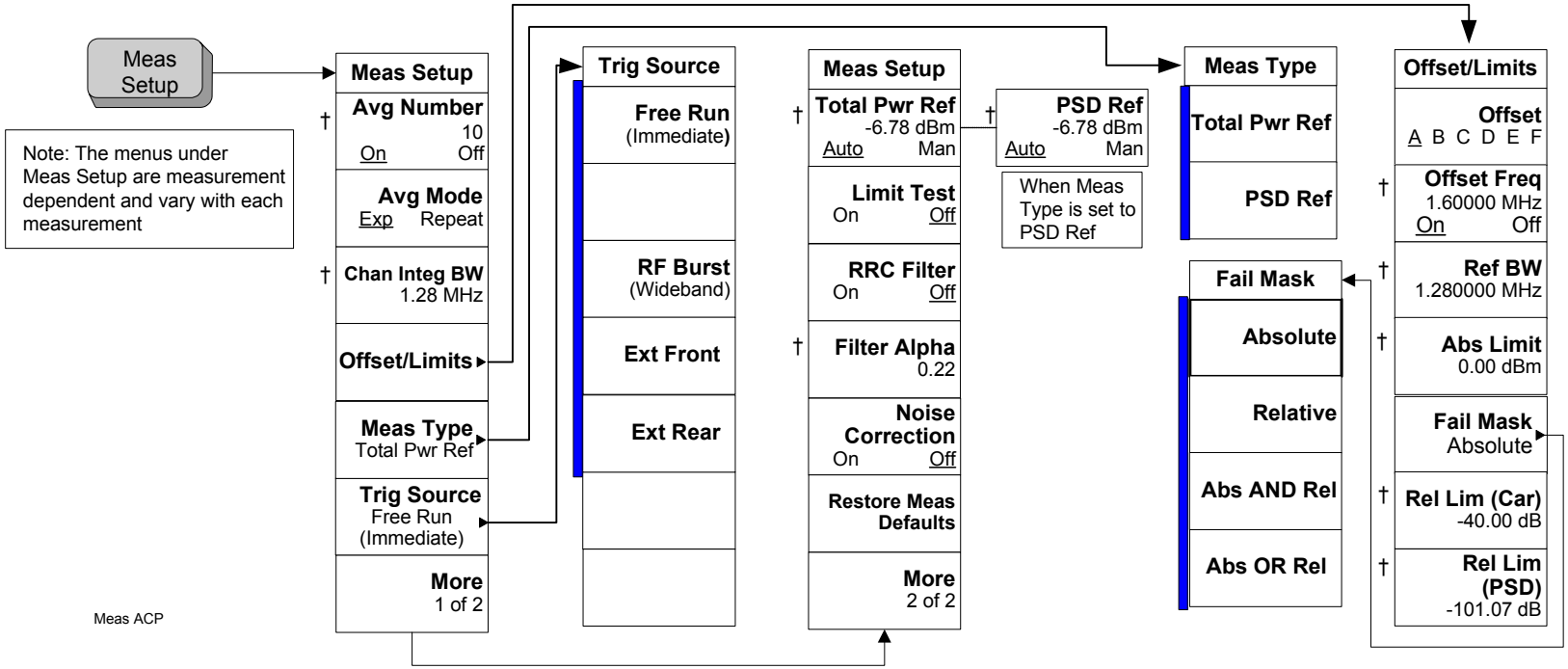
5.6.4 Power vs Time Measurement Trace/View Key



5.6.5 Power vs Time Measurement Display Key



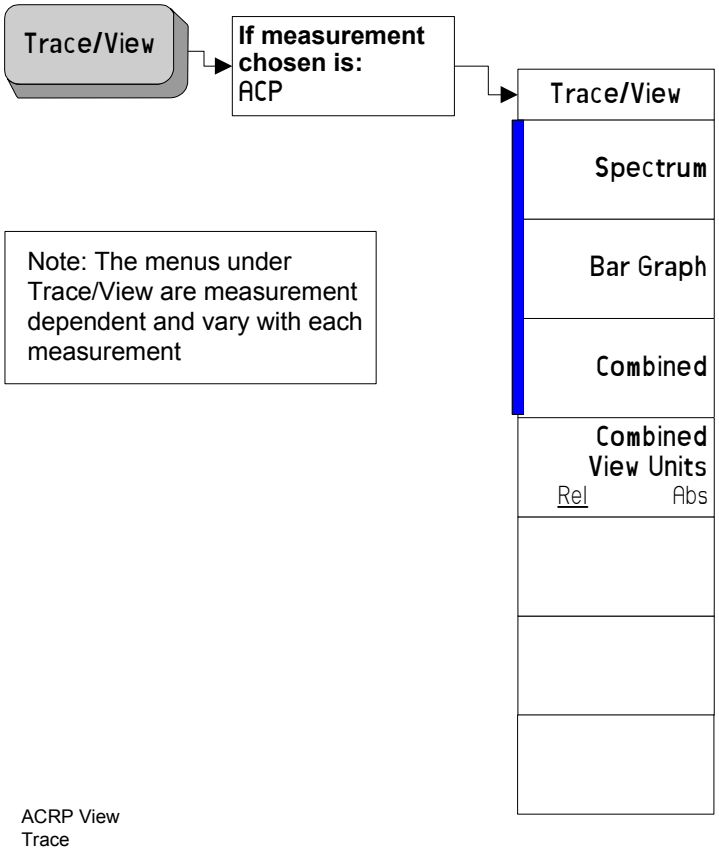
5.6.6 Adjacent Channel Power—ACP Measurement Meas Setup Key



A bar on the left of two or more menu keys indicates that the keys are a set of mutually exclusive choices.

† A dagger to the left of the menu key indicates that when the key is pressed this is an active function.

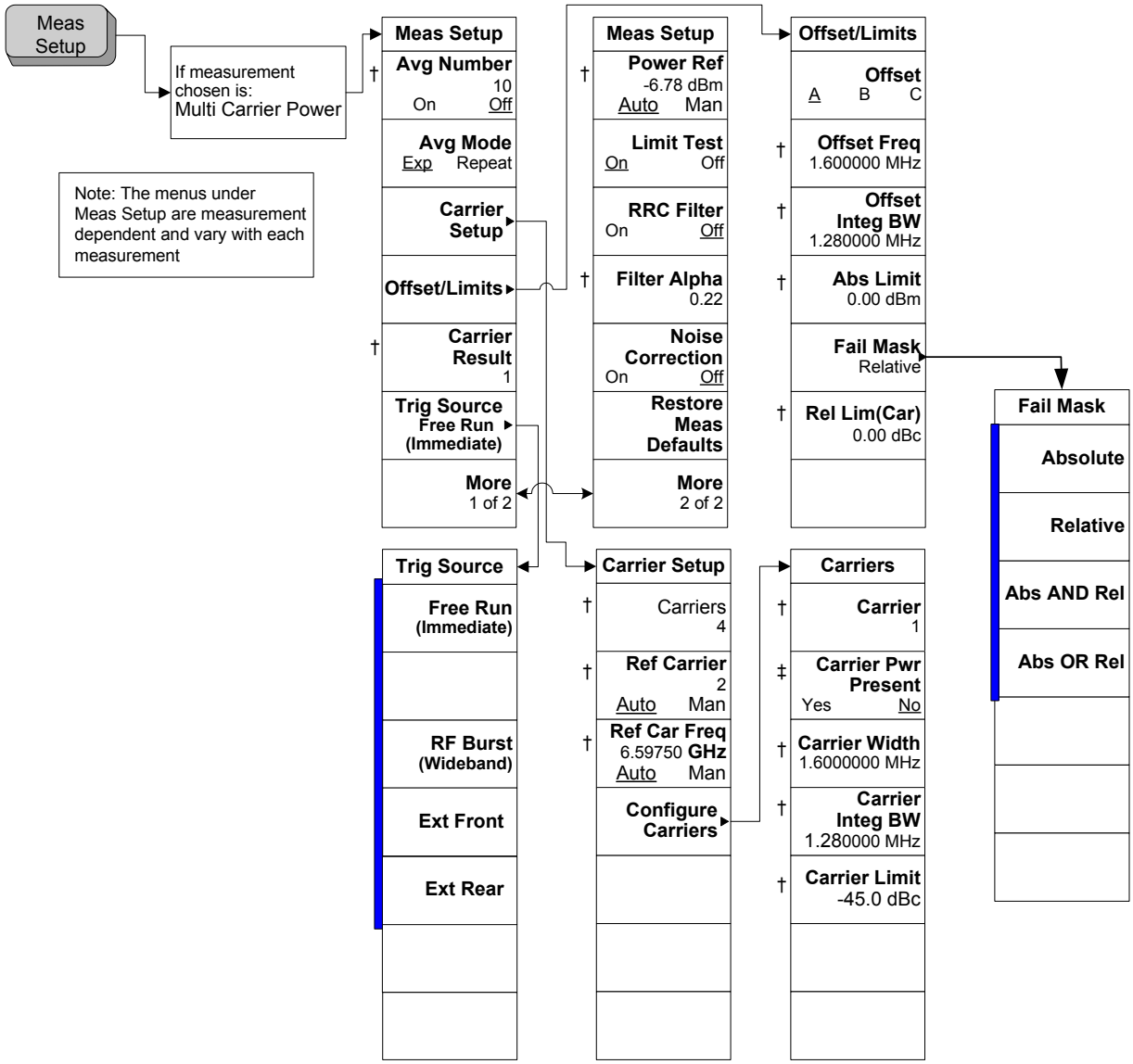
5.6.7 Adjacent Channel Power—ACP Measurement Trace/View Key



A bar on the left of two or more menu keys indicates that the keys are a set of mutually exclusive choices.

Menu Maps

5.6.8 Multi-Carrier Power—MCP Measurement Meas Setup Key

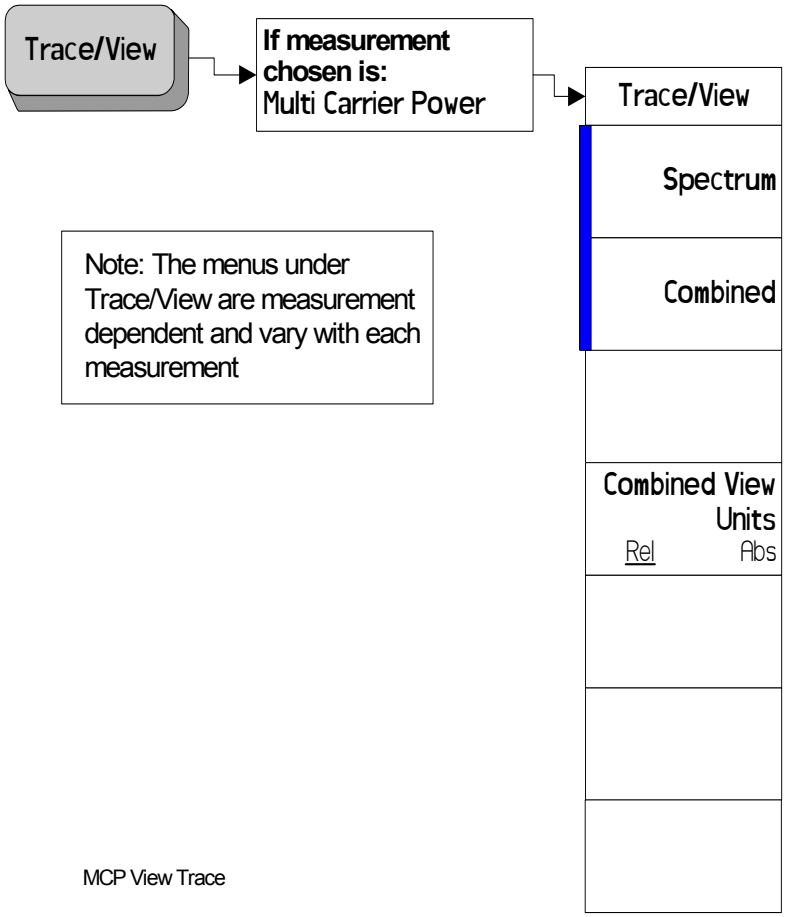


A bar on the left of two or more menu keys indicates that the keys are a set of mutually exclusive choices.

† A dagger to the left of the menu key indicates that when the key is pressed this is an active function.

‡ A double-dagger to the left of the menu key indicates a function that is not always available. It is dependent on other instrument settings.

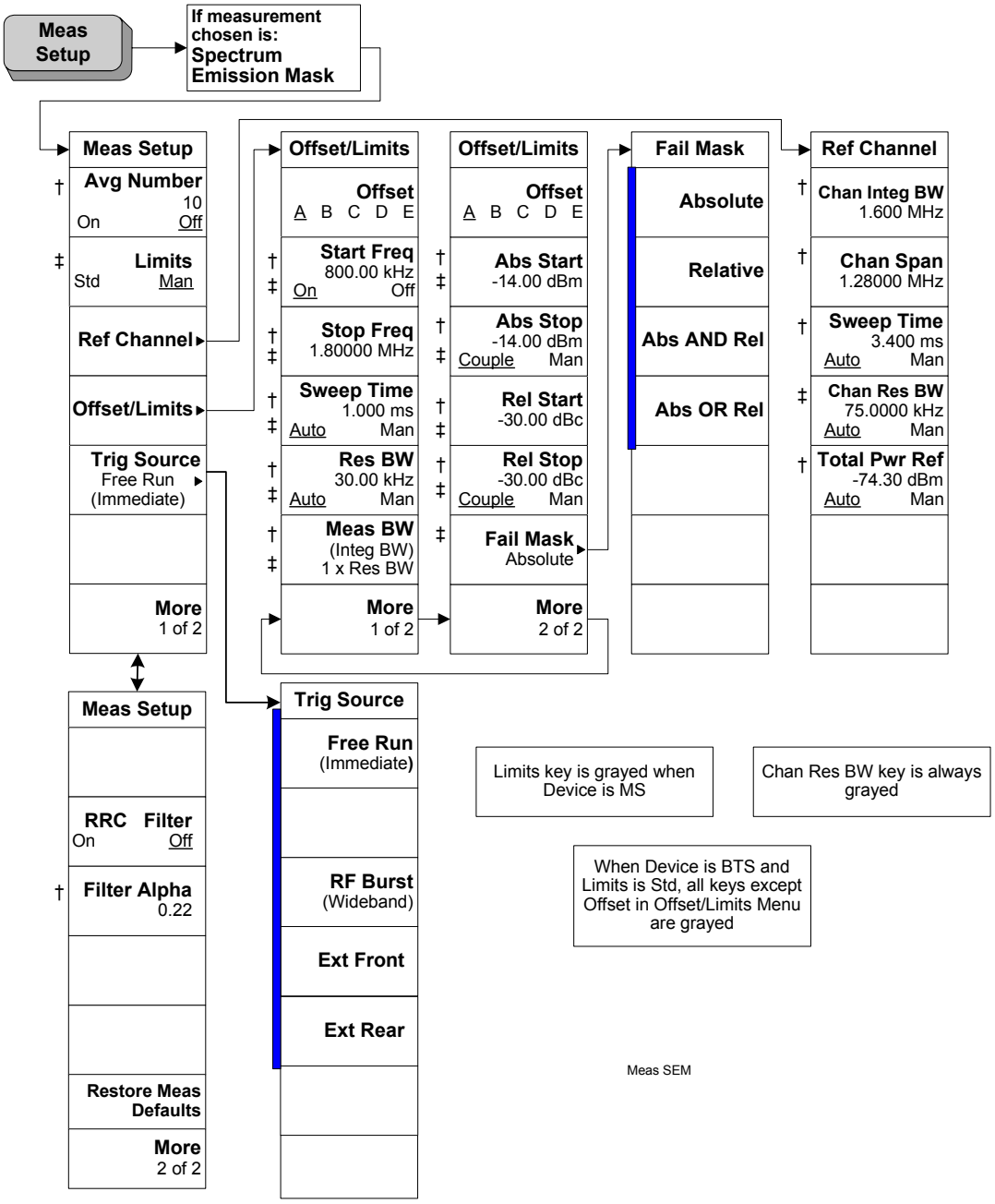
5.6.9 Multi-Carrier Power—MCP Measurement Trace/View Key



A bar on the left of two or more menu keys indicates that the keys are a set of mutually exclusive choices.

Menu Maps

5.6.10 Spectrum Emission Mask—SEM Measurement Meas Setup Key

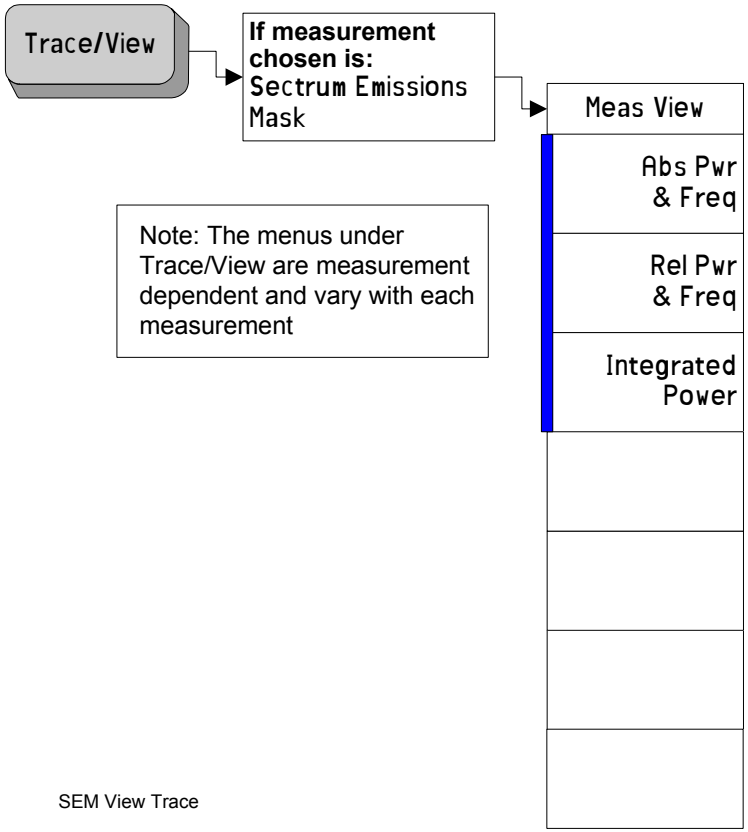


A bar on the left of two or more menu keys indicates that the keys are a set of mutually exclusive choices.

† A dagger to the left of the menu key indicates that when the key is pressed this is an active function.

‡ A double-dagger to the left of the menu key indicates a function that is not always available. It is dependent on other instrument settings.

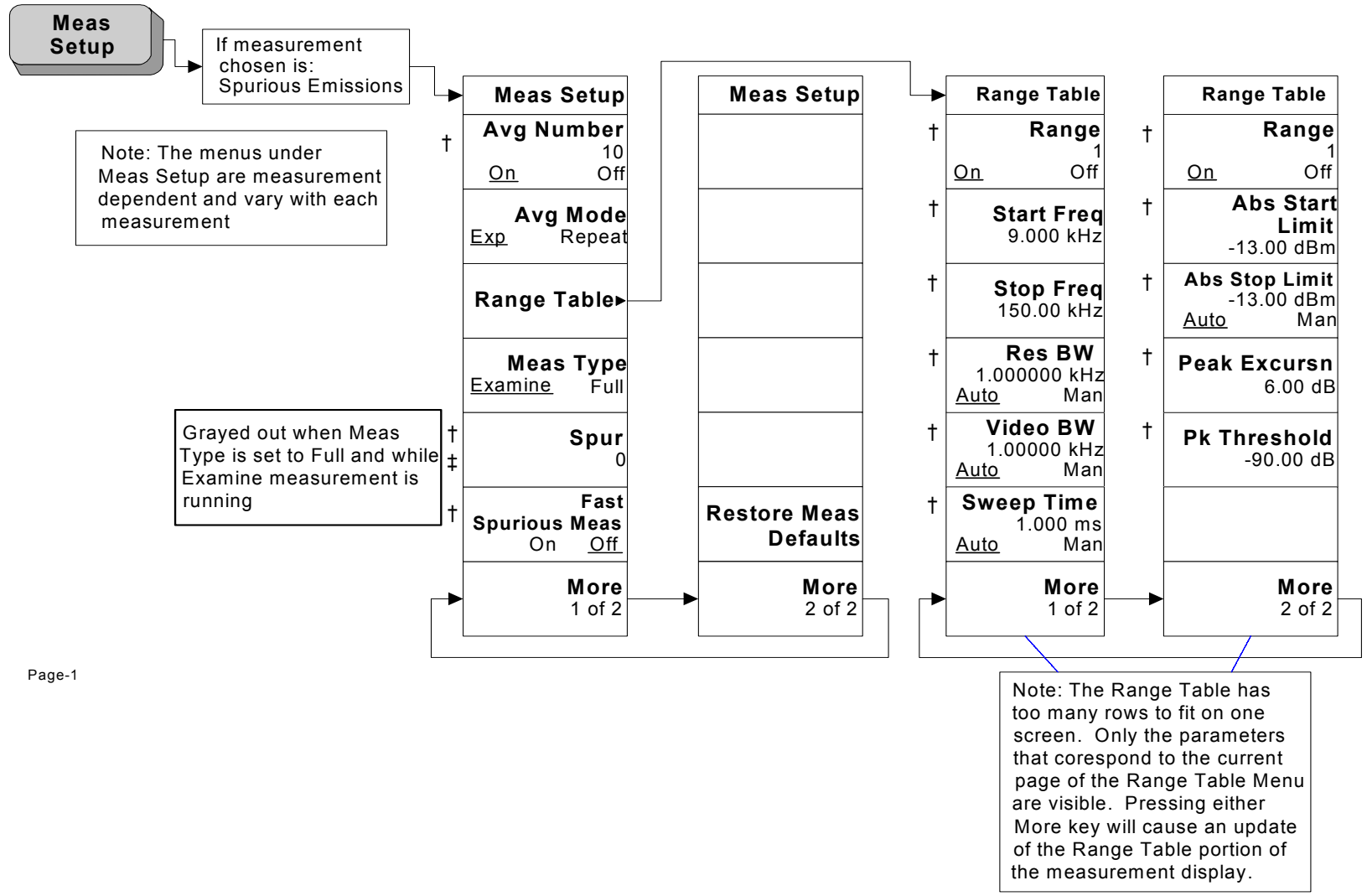
5.6.11 Spectrum Emission Mask—SEM Measurement Trace/View Key



A bar on the left of two or more menu keys indicates that the keys are a set of mutually exclusive choices.

Menu Maps

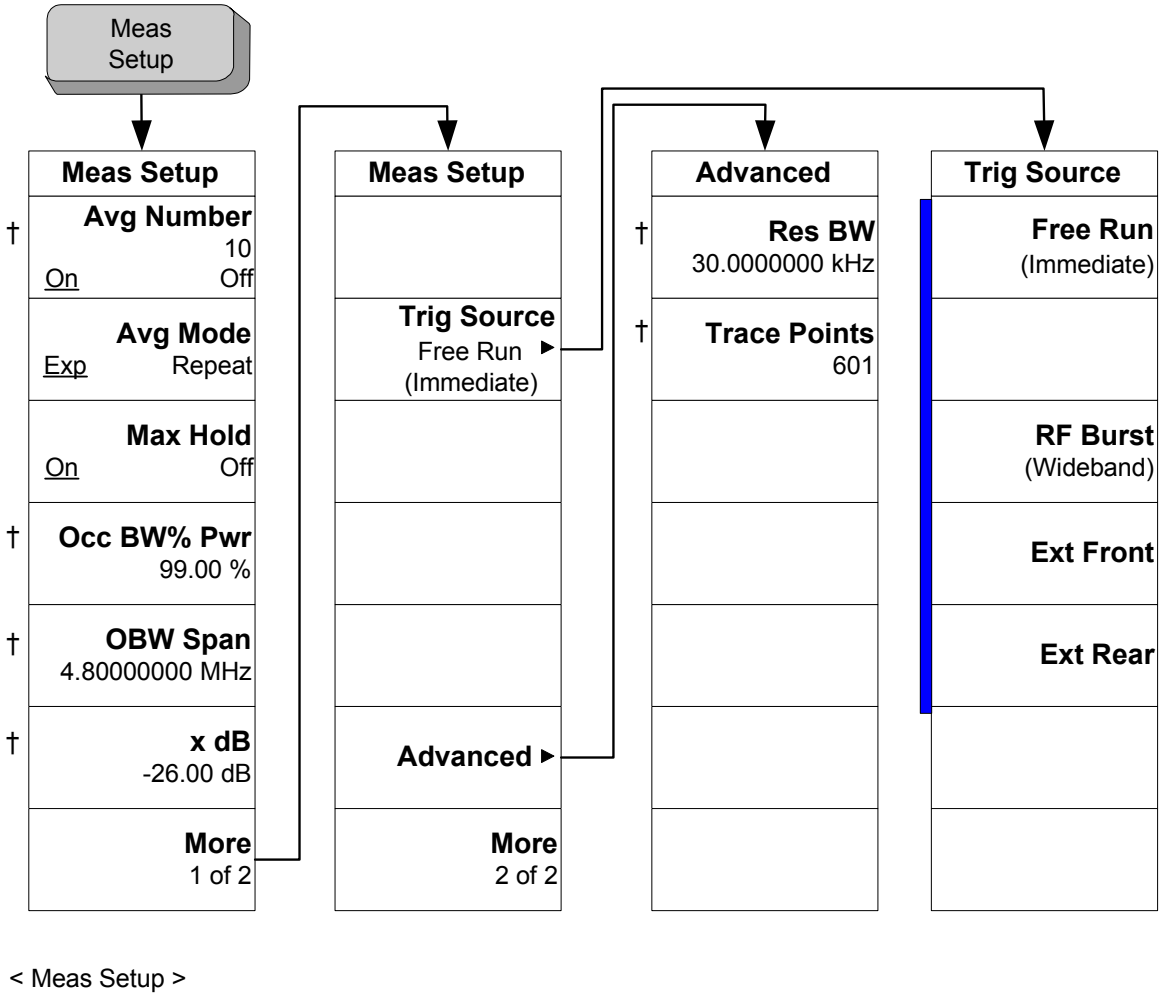
5.6.12 Spurious Emissions—Spurs Measurement Meas Setup Key



† A dagger to the left of the menu key indicates that when the key is pressed this is an active function.

‡ A double-dagger to the left of the menu key indicates a function that is not always available. It is dependent on other instrument settings.

5.6.13 Occupied BW—OBW Measurement Meas Setup Key

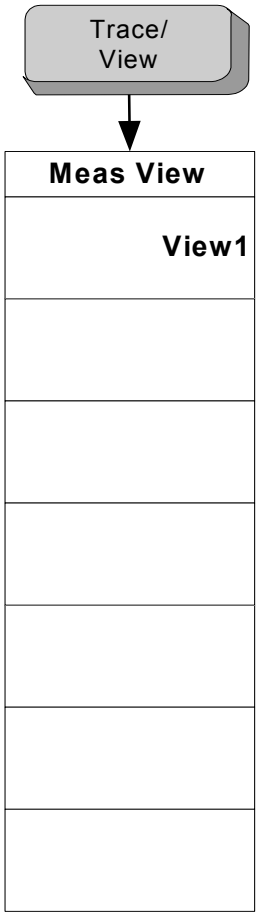


A bar on the left of two or more menu keys indicates that the keys are a set of mutually exclusive choices.

† A dagger to the left of the menu key indicates that when the key is pressed this is an active function.

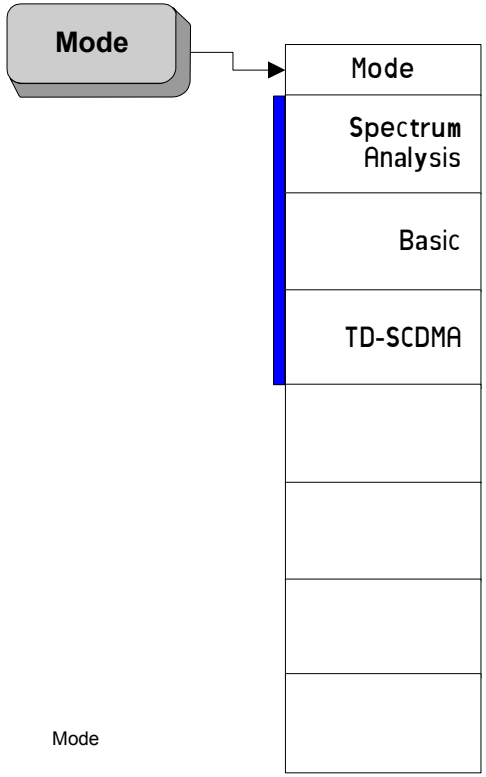
Menu Maps

5.6.14 Occupied BW—OBW Measurement Trace/View Key



< Trace/View >

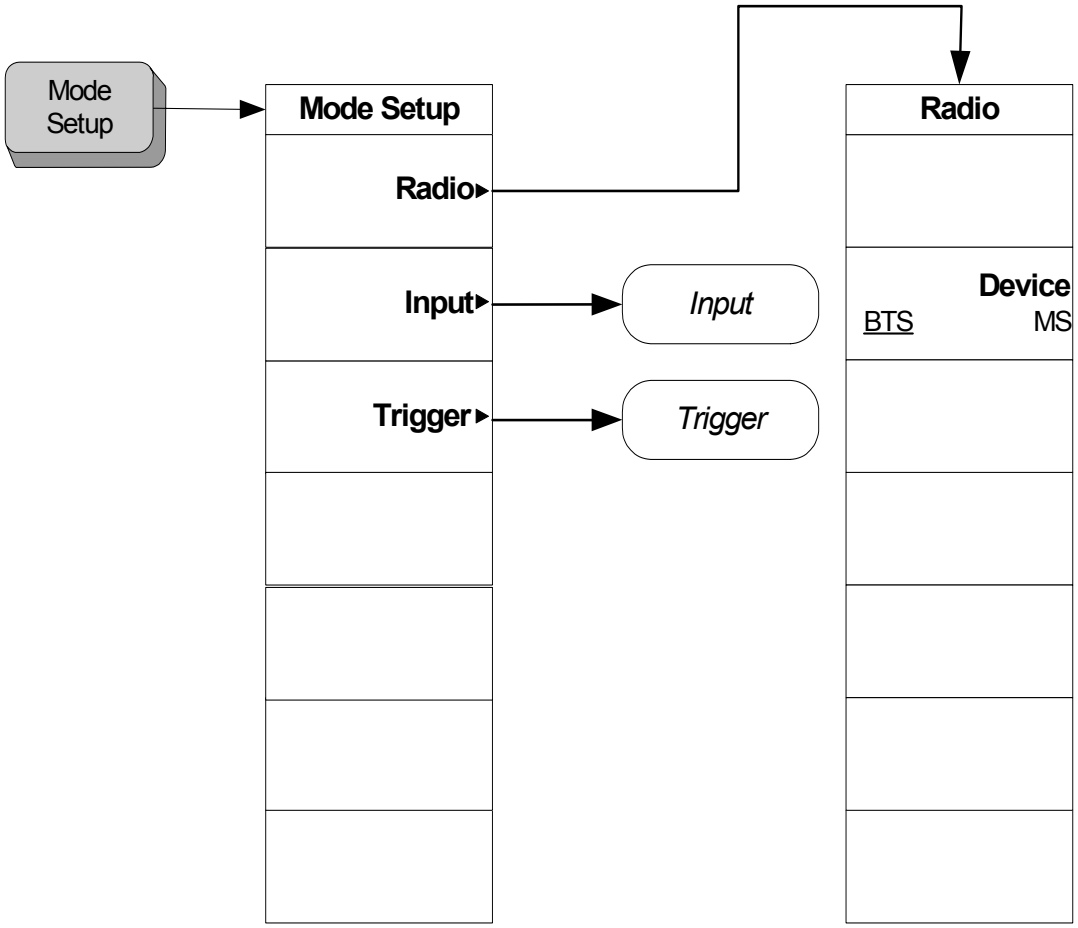
5.7 Mode Key



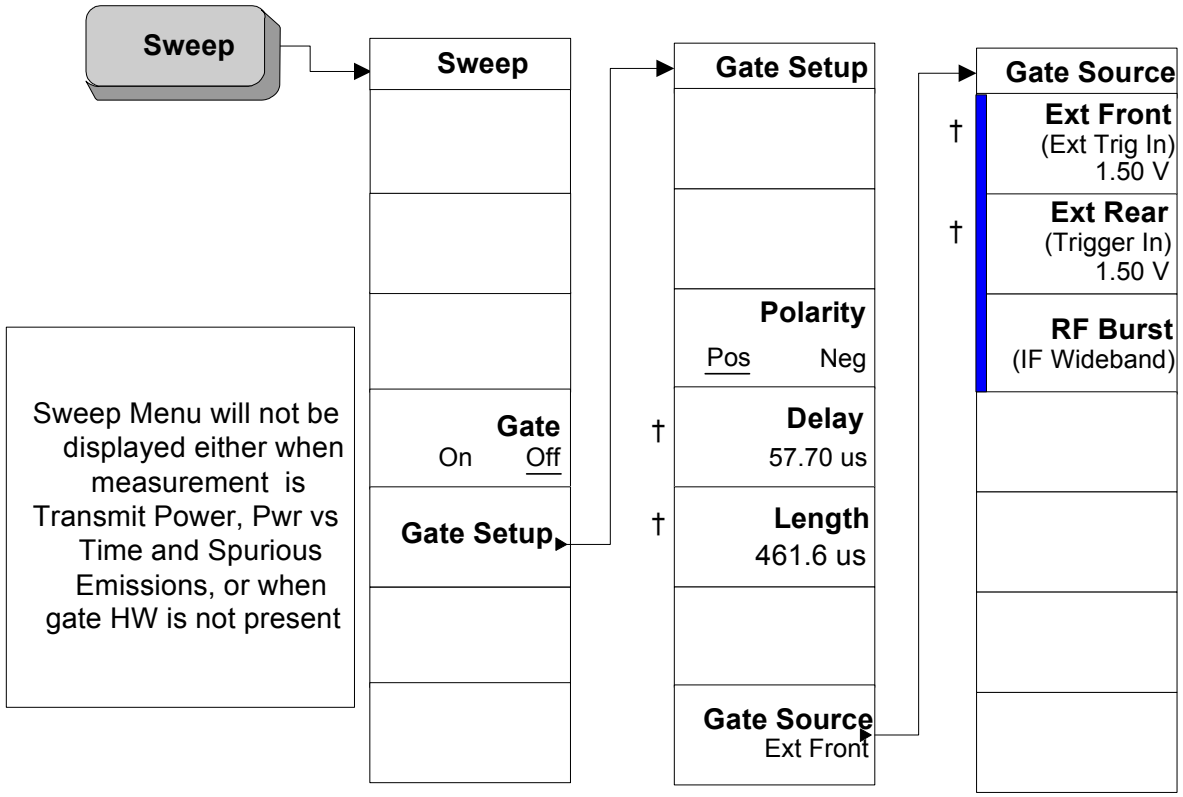
A bar on the left of two or more menu keys indicates that the keys are a set of mutually exclusive choices.

Menu Maps

5.8 Mode Setup Key



5.9 Sweep Key

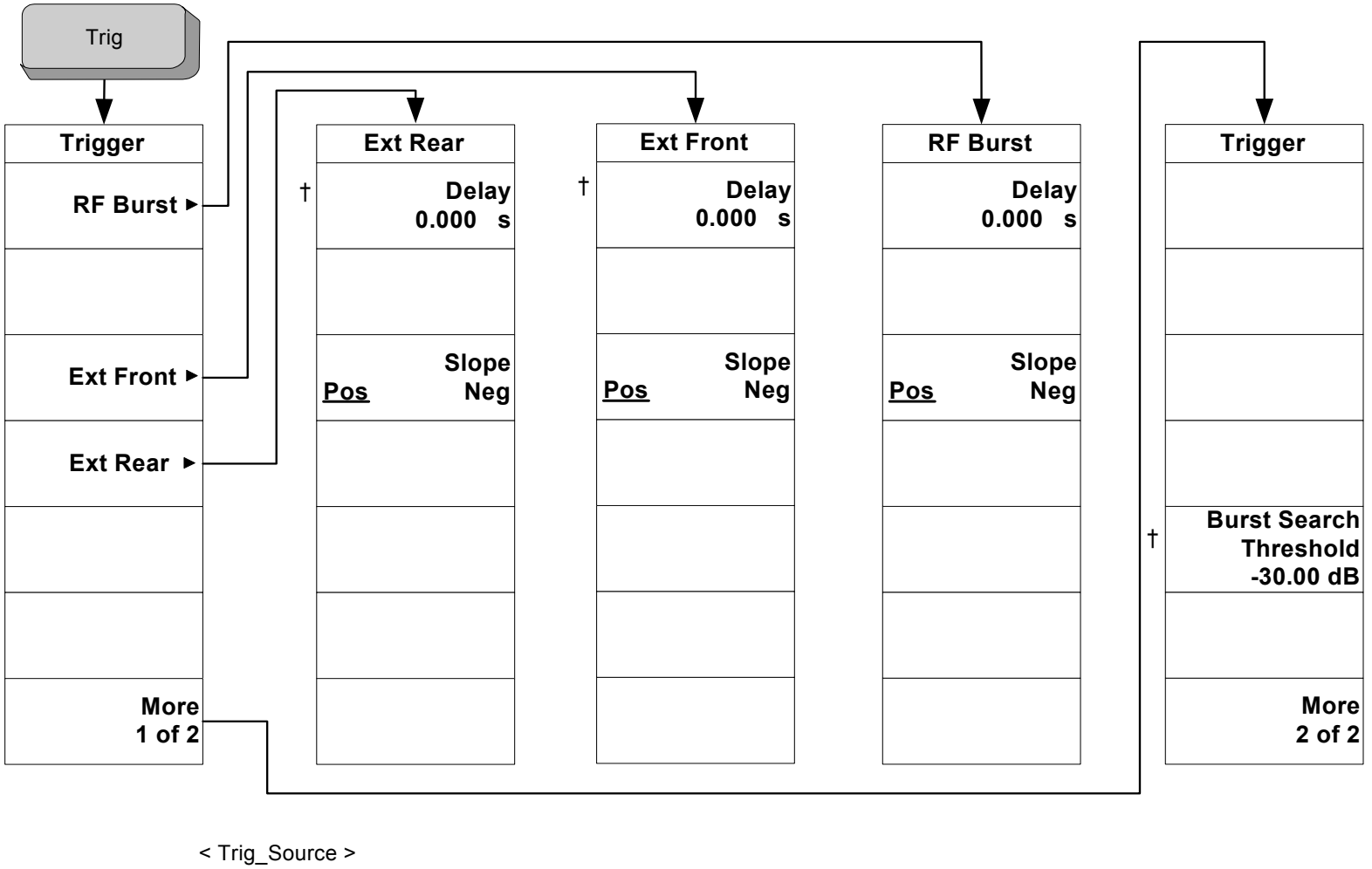


A bar on the left of two or more menu keys indicates that the keys are a set of mutually exclusive choices.

† A dagger to the left of the menu key indicates that when the key is pressed this is an active function.

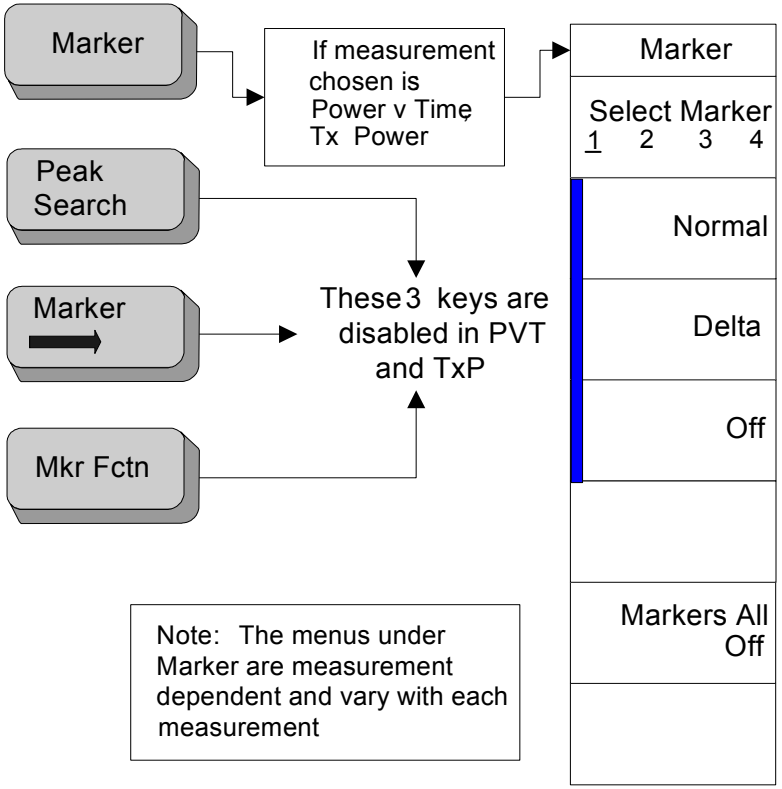
Menu Maps

5.10 Trigger Key



† A dagger to the left of the menu key indicates that when the key is pressed this is an active function.

5.11 Marker Key



A bar on the left of two or more menu keys indicates that the keys are a set of mutually exclusive choices.

Menu Maps

Index

A

Abs Limit, 150, 172
Abs Start Limit, 192
Abs Stop Limit, 194
ACP
  measurement method, 254
  purpose, 254
  trace/view, menu map, 275
ACP (ACLR) Measurement, 49
active license key, 31
  how to locate, 31
Adjacent Channel Power Ratio, 142
Amplitude / Y Scale, 113, 133, 154, 176, 224, 239
Amplitude Threshold, transmit power measurement, 41
amplitude Y scale
  menu map, 264
Average Mode, 184, 235
Average Type, 106, 121
Avg Mod, 120
Avg Mode, 105, 142, 161
Avg Number, 105, 120, 142, 161, 207

B

Base Station External RF Attenuation, 77
basic mode, 68
  spectrum measurement, 68
  waveform measurement, 68
Burst Lines, 129
Burst Search Threshold, 80
Burst Width, 109, 115
Burst width, PvT measurement, 47
Burst width, transmit power measurement, 41
Byte Order, 95

C

Carrier, 170
Carrier Integ BW, 166
Carrier Limit, 167
Carrier Power, 178
Carrier Power State, 144
Carrier Pwr Present, 164
Carrier Result, 162
Carrier Width, 165
Carriers, 163
Center Frequency, 91
Center Frequency Step Size, 93
Chan Integ BW, 143, 208
Chan Res BW, 209
Chan Span, 208
Channel Burst Type, 93
Channel Sweep Time, 209
Choose Option key, 31
Configure a Multi-carrier Power Measurement, 103
Configure a Power vs Time Measurement, 103
Configure a Spectrum Emission Mask Measurement, 104
Configure a Spurious Emissions Measurement, 104
Configure an ACP Measurement, 103
Configure an Occupied Bandwidth Measurement, 104
Configure Transmit Power Measurement, 103
Continuous, 99
Couplings, 198
current data, power vs time, 46
current data, transmit power, 40, 66

D

Data entry keypad, 71
deleting an application/personality, 26
Device, 74
Display, 222
display
  power vs time, menu map, 273
Display Window Select, 87
Display Window Tile, 86
Display Window Zoom, 87

E

External Front (Ext Trig In), 84
External Rear (Trigger In), 84
External Trigger Delay, 79
External Trigger Slope, 79

F

Fail Mask, 152, 173
Fast Spurious Meas, 186
Filter Alpha, 146, 175, 221
frequency channel
  menu map, 265
FREQUENCY Channel key, 71
front-panel key
  MODE, 71
front-panel keys
  MEASURE, 71
Full Burst Width, 136

G

Gate Delay, 81
Gate Length, 83
Gate Polarity, 81
Gate Source, 83
Gate State, 80

I

initial setup, 37
initial signal connection, 35
Initiate a Multi-carrier Power Measurement, 101
Initiate a Spectrum Emission Mask Measurement, 102
Initiate a Spurious Emissions Measurement, 101
Initiate an ACP Measurement, 101
Initiate an Occupied Bandwidth Measurement, 102
Initiate Power vs Time Measurement, 100
Initiate Transmit Power Measurement, 101
input
  menu map, 266
Input Port, 74
Input RF Attenuation, 76
Install Now key, 31
Installing and Obtaining a license key, 30
installing measurement personalities, 26
Internal RF Preamplifier, 78

K

key
  front-panel
    meas setup, 71
    mode, 71
    mode setup, 71
keys
  front-panel
    MEASURE, 71

L

license key
  obtaining and installing, 30
Limit Mask, 128
Limit Mask Selection, 122
Limit Test, 145, 170
Limits, 207
loading an application/personality, 26
Lower Mask Absolute Amplitude Levels, 122
Lower Mask Points, 123
Lower Mask Relative Amplitude Levels, 123
Lower Mask Time Points, 124
Lower Offset Limit, 152

M

Marker, 153, 176, 197
Marker Mode, 111, 130, 223

Marker State, 111, 131, 223
Marker X Value, 112, 131, 224
Marker Y Position, 112, 131, 224
Markers All Off, 111, 130, 222
Mask Delay, 127
Max Hold, 236
Max Pt (Current), 114, 136
max pt, PvT measurement, 47
max pt, transmit power measurement, 40
Maximum Total Power, 76
Mean Transmit Power, 135
mean transmit power, PvT measurement, 46
mean transmit power, transmit power measurement, 40
Mean Transmit Pwr (Current), 114
meas control
  menu map, 268
Meas Method, 106
meas setup
  ACP
    menu map, 274
  multi carrier power, menu map, 276
  power vs time, menu map, 271
  spurious emissions
    menu map, 280
  transmit power
    menu map, 269
Meas Setup front-panel key, 71
meas setup, spectrum emissions mask
  menu map, 278
Meas Time, 109, 121
Meas Type, 146, 185
Measure, 98
measure
  menu map, 267
MEASURE front-panel key, 71
measurement
  power vs time, 252
  spurious emissions, 57
measurement concepts
  ACP, 254
  carrier power, 255
  occupied bandwidth, 261
  power vs time, 252
  spectrum emissions mask, 258
  spurious emissions, 259
  transmit power, 249
measurement information sources, 262
measurement method
  ACP, 254
  multi carrier power, 255
  occupied bandwidth, 261
  power vs time, 252
  spectrum emission mask, 258
  spurious emissions, 259
  transmit power, 249
measurement purpose
  ACP, 254
  multi carrier power, 255
  occupied bandwidth, 261
  power vs time, 252
  spectrum emission mask, 258
  spurious emissions, 259
  transmit power, 249
measurement results
  multi carrier power (concepts), 255
  spurious emissions, 59
measurements
  ACP, 254
  ACP (ACLR), 49
  multi carrier power, 53, 255
  occupied bandwidth, 64, 261
  power vs time, 44, 252
  spectrum emission mask, 60
  spectrum emissions mask, 258
  spurious emissions, 259
  transmit power, 249
  transmit power (TxP), 38
menu keys, 71
menu map
  amplitude Y scale, 264
  display
    power vs time, 273
  frequency channel, 265
  input, 266
  marker, 287
  meas control, 268
  meas setup
    ACP, 274
    spurious emissions, 280
    transmit power, 269
  meas setup, multi carrier power, 276
  meas setup, power vs time, 271
  meas setup, spectrum emissions mask, 278
  measure, 267
  mode, 283
  mode setup, 284
  Occupied BW, 281
  setting up measurements, 269
  trace/view
    ACP, 275
    multi carrier power, 277
    spectrum emission mask, 279
    transmit power, 270
  trace/view, power vs time, 272
  trigger, 285, 286
Min Pt (Current), 114, 136
min pt, PvT measurement, 47
min pt, transmit power measurement, 41
missing options, 26
Mobile External RF Attenuation, 77
Mode, 72
mode
  menu map, 283
MODE front-panel key, 71
Mode Selection by Mode Name, 73
Mode Selection by Mode Number, 73
mode setup
  menu map, 284
Mode Setup front-panel key, 71
multi carrier power
  amplifier, 255
  measurement method, 255
  measurement results, 54, 255
  purpose, 255
  trace/view, menu map, 277
Multi Carrier Power Measurement, 53
Multi-Carrier Power, 161

N

Next Window / Zoom, 86
Noise Correction, 143, 175
Number of Averages, 184, 235

O

OBW Span, 236
occ bw % pwr, occupied bandwidth measurement, 66
Occ BW% Pwr, 236
Occupied Bandwidth, 235
occupied bandwidth
  measurement method, 261
  purpose, 261
Occupied Bandwidth Measurement, 64
occupied bandwidth measurement, occ bw % pwr, 66
occupied bandwidth measurement, occupied bandwidth, 66
occupied bandwidth measurement, transmit freq error, 66
occupied bandwidth measurement, x dB, 66
occupied bandwidth measurement, x dB bandwidth, 66
occupied bandwidth, occupied bandwidth measurement, 66
Occupied BW-OBW Measurement Trace/View Key, 282
Offset, 170
Offset Absolute Limit Start, 215
Offset Absolute Limit Stop, 215
Offset Absolute Power, 179
Offset Freq, 149, 171
Offset Integ BW, 171
Offset Limit Fail Mask, 219
Offset Meas BW, 214
Offset Relative Limit Start, 217

Index

Offset Relative Limit Stop, 217
Offset Relative Power, 179
Offset Res BW, 213
Offset Start Freq, 210
Offset State, 148
Offset Stop Freq, 212
Offset Sweep Time, 213
options
  loading/deleting, 26
options not in instrument memory, 26

P

Pause, 99
Peak Excursion, 195
Peak Threshold, 196
personality options not in instrument, 26
power on/off switch, 71
Power Ref, 174
Power vs Time, 120
power vs time
  display
    menu map, 273
  meas setup, menu map, 271
  measurement method, 252
  purpose, 252
  trace/view, menu map, 272
Power vs Time Measurement, 44
power vs time, current data, 46
preset
  factory defaults, 35, 37
PSD Ref, 145
PvT measurement, burst width, 47
PvT measurement, max pt, 47
PvT measurement, mean transmit power, 46
PvT measurement, min pt, 47
PvT measurement, transmit off power, 47

Q

Query the current measurement configuration, 102

R

Radio, 74
Ramp Lines, 130
Range Number, 187
Range State, 187
Ref BW, 150
Ref Car Freq, 168
Ref Carrier, 168
Ref Carrier Power, 178
Rel Lim, 172
Relative (to Carrier) Limit, 151
Res BW, 190
Res BW Mode, 190
Resolution Bandwidth, 239
Restart, 100
Restart key, 71
Resume, 99
Return key, 71
RF Burst Trigger Delay, 78
RF Burst Trigger Slope, 79
RF INPUT port, 71
RF Input Range, 75
RRC Filter, 146, 174, 220

S

setting up measurements
  menu map, 269
Single, 99
sources of measurement information, 262
Span, 95
Span / X Scale, 153, 176, 197, 224
spectrum emission mask
  in-band and out-of-band spurious emissions, 258
  integration bandwidth method, 258
  measurement method, 258
  measurement results, 61
  offset or region frequency pairs, 258
  purpose, 258
  reference channel integration bandwidth method, 258
  spectral regrowth, 258
  trace/view, menu map, 279
Spectrum Emission Mask Measurement, 60
spectrum measurement
  basic mode, 68
Spur, 186
spurious emission
  measurement method, 259
Spurious Emissions, 184, 207
spurious emissions
  measurement results, 59
  purpose, 259
Spurious Emissions measurement, 57
spurs
  measurement results, 59
Start Freq, 188
Stop Freq, 189
Sweep Time, 192

T

TD-SCDMA, 72
TD-SCDMA communications concepts, 246
Threshold Lvl, 107
Total Carrier Power, 178
Total Pwr Ref, 144, 210
Trace Data Format, 96
Trace Points, 239
trace/view
  ACP, menu map, 275
  multi carrier power, menu map, 277
  power vs time, menu map, 272
  spectrum emission mask, menu map, 279
  transmit power, menu map, 270
Traffic Timeslot, 94
Transmit Band Start Frequency, 92
Transmit Band Stop Frequency, 92
transmit freq error, occupied bandwidth measurement, 66
Transmit Off Power, 135
Transmit Off Power, PvT measurement, 47
Transmit Power, 105, 114
transmit power
  measurement method, 249
  purpose, 249
  trace/view, menu map, 270
Transmit Power Measurement (TxP), 38
transmit power measurement, amplitude threshold, 41
transmit power measurement, burst width, 41
transmit power measurement, max pt, 40
transmit power measurement, mean transmit power, 40
transmit power measurement, min pt, 41
transmit power, current data, 40, 66
Trig Source, 108, 128, 147, 162, 219, 237
trigger
  menu map, 285, 286
Trigger Lines, 129

U

Uninstall Now, 31
uninstalling measurement personalities, 26
Upper Mask Absolute Amplitude Levels, 125
Upper Mask Points, 126
Upper Mask Relative Amplitude Levels, 126
Upper Mask Time Points, 126

V

Video BW, 191

W

waveform measurement
  basic mode, 68
well balanced multiple carriers, 255

X

x dB, 237
x dB bandwidth, occupied bandwidth
    measurement, 66
x dB, occupied bandwidth
    measurement, 66
X-Axis Ref Value, 132, 133
X-Axis Scale / Div, 132

Y

Y Axis Ref Value, 113, 154, 177
Y-Axis Ref Value, 134, 198
Y-Axis Reference Value, 225, 240
Y-Axis Scale / Div, 113, 133, 154,
    176, 197, 224, 239