

SCPI Command Reference, Volume 1

Agilent Technologies E4428C/38C ESG Signal Generators

This guide applies to the following signal generator models:

E4428C ESG Analog Signal Generator

E4438C ESG Vector Signal Generator

Due to our continuing efforts to improve our products through firmware and hardware revisions, signal generator design and operation may vary from descriptions in this guide. We recommend that you use the latest revision of this guide to ensure you have up-to-date product information. Compare the print date of this guide (see bottom of page) with the latest revision, which can be downloaded from the following website:

<http://www.agilent.com/find/esg>



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SCPI Command Reference, Volume 1

SCPI Basics	1
Command Reference Information	2
SCPI Command Listings.....	2
Key and Data Field Cross Reference	2
Supported Field.....	2
SCPI Basics.....	3
Common Terms.....	3
Command Syntax	4
Command Types	5
Command Tree	6
Command Parameters and Responses	7
Program Messages.....	12
File Name Variables	13
MSUS (Mass Storage Unit Specifier) Variable.....	15
Quote Usage with SCPI Commands	16
Binary, Decimal, Hexadecimal, and Octal Formats	16
2. Basic Function Commands	17
Correction Subsystem ([:SOURce]:CORRection)	18
:FLATness:LOAD	18
:FLATness:PAIR.....	18
:FLATness:POINts	18
:FLATness:PRESet	19
:FLATness:STORe	19
[:STATe]	19
Digital Modulation Subsystem—E4438C ([:SOURce]).....	20
:BURSt:SOURce.....	20
:BURSt:STATe	20
:DM:EXTernal:ALC:BANDwidth|BWIDth	21
:DM:EXTernal:HCRest[:STATe]	21
:DM:EXTernal:FILTer.....	22
:DM:EXTernal:FILTer:AUTO.....	22
:DM:EXTernal:POLarity.....	23
:DM:EXTernal:SOURce	23
:DM:IQADjustment:EXTernal:COFFset	24

Contents

:DM:IQADjustment:EXTernal:DIOFFset	24
:DM:IQADjustment:EXTernal:DQOFFset	25
:DM:IQADjustment:EXTernal:GAIN	25
:DM:IQADjustment:EXTernal:IOFFset	26
:DM:IQADjustment:EXTernal:IQATten	26
:DM:IQADjustment:EXTernal:QOFFset	27
:DM:IQADjustment:GAIN	27
:DM:IQADjustment:IOFFset	28
:DM:IQADjustment:QOFFset	28
:DM:IQADjustment:QSKew	29
:DM:IQADjustment:SKEW	29
:DM:IQADjustment:SKEW:Path	30
:DM:IQADjustment[:STATe]	31
:DM:MODulation:FILTer	31
:DM:MODulation:FILTer:AUTO	32
:DM:MODulation:ATTen	32
:DM:MODulation:ATTen:AUTO	33
:DM:POLarity[:ALL]	33
:DM:SKEW:PATH	34
:DM:SKEW[:STATe]	34
:DM:SOURce	35
:DM:SRATio	35
:DM:STATe	36
Frequency Subsystem ([:SOURce])	37
:FREQuency:CHANnels:BAND	37
:FREQuency:CHANnels:NUMBer	39
:FREQuency:CHANnels[:STATe]	40
:FREQuency:FIXed	40
:FREQuency:MODE	41
:FREQuency:MULTiplier	41
:FREQuency:OFFSet	42
:FREQuency:OFFSet:STATe	42
:FREQuency:REFerence	43
:FREQuency:REFerence:STATe	43
:FREQuency:START	44
:FREQuency:STOP	44
:FREQuency:SYNTHeSis	45
:FREQuency[:CW]	46

:PHASe:REFerence	46
:PHASe[:ADJust]	47
:ROSCillator:SOURce	47
:ROSCillator:SOURce:AUTO	47
List/Sweep Subsystem ([:SOURce])	48
:LIST:DIRection	49
:LIST:DWELI	49
:LIST:DWELI:POINts	50
:LIST:DWELI:TYPE	50
:LIST:FREQuency	50
:LIST:FREQuency:POINts	51
:LIST:MANual	51
:LIST:MODE	52
:LIST:POWer	52
:LIST:POWer:POINts	52
:LIST:RETRace	53
:LIST:TRIGger:SOURce	53
:LIST:TYPE	54
:LIST:TYPE:LIST:INITialize:FSTep	54
:LIST:TYPE:LIST:INITialize:PRESet	55
:SWEep:DWELI	55
:SWEep:POINts	56
Power Subsystem ([:SOURce]:POWer)	57
:ALC:BANDwidth|BWIDth	57
:ALC:BANDwidth	57
:ALC:LEVel	58
:ALC:SEARch	58
:ALC:SEARch:REFerence	59
:ALC:SEARch:SPAN:START	59
:ALC:SEARch:SPAN:STOP	59
:ALC:SEARch:SPAN:TYPE	60
:ALC:SEARch:SPAN[:STATe]	60
:ALC[:STATe]	60
:ALTerminate:AMPLitude	61
:ALTerminate:MANual	61
:ALTerminate:STATe	62
:ALTerminate:TRIGger[:SOURce]	62
:ATTenuation:AUTO	63

Contents

:ATTenuation.	64
:MODE	65
:REFeRence	65
:REFeRence:STATe	66
:STARt	66
:STOP	67
[:LEVe][:IMMediate]:OFFSet	67
[:LEVe][:IMMediate]:AMPLitude	68
Pulse Subsystem ([:SOURce]:PULSe).	69
:FREQuency:STEP	69
3. System Commands.	71
Calibration Subsystem (:CALibration).	72
:DCFM	72
:IQ	72
:IQ:DC	72
:IQ:DEFault	73
:IQ:FULL	73
:IQ:STARt	74
:IQ:STOP	74
Communication Subsystem (:SYSTem:COMMunicate)	75
:GPIB:ADDRes	75
:GTLocal	75
:LAN:GATEway	75
:LAN:HOSTname	76
:LAN:IP	76
:LAN:SUBNet	76
:PMETer:ADDRes	77
:PMETer:CHANnel	77
:PMETer:IDN	78
:PMETer:TIMEout	78
:SERial:BAUD	79
:SERial:ECHO	79
:SERial:RESet	79
:SERial:TOUT	80
Diagnostic Subsystem (:DIAGnostic[:CPU]:INFORMation)	81
:BOARds	81
:CCOunt:ATTenuator	81

:CCOut:PON	81
:CCOut:PROTection	81
:DISPlay:OTIME	82
:LICense:AUXiliary	82
:LICense:WAVeform	83
:OPTions	83
:OPTions:DETail	83
:OTIME	84
:REVision	84
:SDATe	84
:WLICence[:VALue]	84
Display Subsystem (:DISPlay)	85
:ANNotation:AMPLitude:UNIT	85
:ANNotation:CLOCK:DATE:FORMat	85
:ANNotation:CLOCK[:STATe]	85
:BRIGHtness	86
:CAPTure	86
:CONTrast	87
:INVerse	87
:REMote	88
[:WINDow][:STATe]	88
IEEE 488.2 Common Commands	89
*CLS	89
*ESE	89
*ESE?	89
*ESR?	90
*IDN?	90
*OPC	90
*OPC?	90
*PSC	91
*PSC?	91
*RCL	91
*RST	91
*SAV	92
*SRE	92
*SRE?	92
*STB?	93
*TRG	93

Contents

*TST?	93
*WAI	93
Memory Subsystem (:MEMory)	94
:CATalog:BINary	94
:CATalog:BIT	94
:CATalog:CDMa	95
:CATalog:DMOD	95
:CATalog:DWCDma	96
:CATalog:FCDMa	96
:CATalog:FIR	97
:CATalog:FSK	97
:CATalog:IQ	98
:CATalog:LIST	98
:CATalog:MCDMa	99
:CATalog:MDMod	99
:CATalog:MDWCdma	100
:CATalog:MFCdma	100
:CATalog:MTONe	101
:CATalog:RCDMa	101
:CATalog:SEQ	102
:CATalog:SHApe	102
:CATalog:STATe	103
:CATalog:UFLT	103
:CATalog:UWCDma	104
:CATalog[:ALL]	104
:COPY[:NAME]	105
:DATA	105
:DATA:APPend	106
:DATA:BIT	107
:DATA:FIR	108
:DATA:FSK	109
:DATA:IQ	110
:DATA:PRAM:FILE:BLOCK	111
:DATA:PRAM:FILE:LIST	112
:DATA:PRAM	113
:DATA:PRAM:BLOCK	113
:DATA:PRAM:LIST	113
:DATA:SHApe	113

:DATA:UNPRotected	114
:DELeTe:ALL	115
:DELeTe:BINary	116
:DELeTe:BIT	116
:DELeTe:CDMa	116
:DELeTe:DMOD	116
:DELeTe:DWCDma	116
:DELeTe:FCDMa	117
:DELeTe:FIR	117
:DELeTe:FSK	117
:DELeTe:IQ	117
:DELeTe:LIST	117
:DELeTe:MCDMa	118
:DELeTe:MMod	118
:DELeTe:MDWCdma	118
:DELeTe:MFCdma	118
:DELeTe:MTONE	118
:DELeTe:RCDMa	119
:DELeTe:SEQ	119
:DELeTe:SHApe	119
:DELeTe:STATe	119
:DELeTe:UFLT	119
:DELeTe:UWCDma	120
:DELeTe[:NAME]	120
:FREE[:ALL]	120
:LOAD:LIST	120
:MOVE	121
:STATe:COMMeNt	121
:STORe:LIST	121
Mass Memory Subsystem (:MMEMory)	122
:CATalog	122
:COpy	124
:DATA	124
:DATA:UNPRotected	125
:DELeTe:NVWFm	126
:DELeTe:WFM	126
:DELeTe:WFM1	127
:DELeTe[:NAME]	127

Contents

:HEADer:CLear	127
:HEADer:DESCription	128
:LOAD:LIST	128
:MOVE	128
:STORe:LIST	128
Output Subsystem (:OUTPut)	129
:BLANKing:AUTO	129
:BLANKing:STATe	129
:MODulation[:STATe]	129
[:STATe]	130
Route Subsystem (:ROUte:HARDware:DGENerator)	131
:INPut:BPOLarity	131
:INPut:CPOLarity	131
:INPut:DPOLarity	132
:INPut:SPOLarity	132
:IPOLarity:BGATe	132
:IPOLarity:CLOCK	133
:IPOLarity:DATA	133
:IPOLarity:SSYNc	133
:OPOLarity:CLOCK	134
:OPOLarity:DATA	134
:OPOLarity:SSYNc	135
:OUTPut:CPOLarity	135
:OUTPut:DCS[:STATe]	136
:OUTPut:DPOLarity	136
:OUTPut:SPOLarity	136
Status Subsystem (:STATus)	137
:OPERation:BASeband:CONDition	137
:OPERation:BASeband:ENABle	137
:OPERation:BASeband:NTRansition	138
:OPERation:BASeband:PTRansition	138
:OPERation:BASeband[:EVENT]	139
:OPERation:CONDition	139
:OPERation:ENABle	140
:OPERation:NTRansition	140
:OPERation:PTRansition	141
:OPERation[:EVENT]	141
:PRESet	141

:QUEStionable:BERT:CONDition	142
:QUEStionable:BERT:ENABle	142
:QUEStionable:BERT:NTRansition	143
:QUEStionable:BERT:PTRansition	143
:QUEStionable:BERT[:EVENT]	144
:QUEStionable:CALibration:CONDition	144
:QUEStionable:CALibration:ENABle	144
:QUEStionable:CALibration:NTRansition	145
:QUEStionable:CALibration:PTRansition	145
:QUEStionable:CALibration[:EVENT]	146
:QUEStionable:CONDition	146
:QUEStionable:ENABle	147
:QUEStionable:FREQuency:CONDition	147
:QUEStionable:FREQuency:ENABle	147
:QUEStionable:FREQuency:NTRansition	148
:QUEStionable:FREQuency:PTRansition	148
:QUEStionable:FREQuency[:EVENT]	148
:QUEStionable:MODulation:CONDition	149
:QUEStionable:MODulation:ENABle	149
:QUEStionable:MODulation:NTRansition	150
:QUEStionable:MODulation:PTRansition	150
:QUEStionable:MODulation[:EVENT]	150
:QUEStionable:NTRansition	151
:QUEStionable:POWer:CONDition	151
:QUEStionable:POWer:ENABle	152
:QUEStionable:POWer:NTRansition	152
:QUEStionable:POWer:PTRansition	152
:QUEStionable:POWer[:EVENT]	153
:QUEStionable:PTRansition	153
:QUEStionable[:EVENT]	154
System Subsystem (:SYSTem)	155
:CAPability	155
:DATE	155
:ERRor[:NEXT]	156
:ERRor:SCPI[:SYNTax]	156
:FILEsystem:SAFEmode	156
:HELP:MODE	157
:IDN	157

Contents

:LANGUage	157
:PON:TYPE	158
:PRESet	159
:PRESet:ALL	159
:PRESet:LANGUage	159
:PRESet:PERsistent	160
:PRESet:PN9	160
:PRESet:TYPE	161
:PRESet[:USER]:SAVE	161
:SECurity:DISPlay	162
:SECurity:ERASeall	162
:SECurity:LEVel	163
:SECurity:LEVel:STATe	164
:SECurity:OVERwrite	164
:SECurity:SANitize	165
:SSAVer:DELay	165
:SSAVer:MODE	166
:SSAVer:STATe	166
:TIME	166
:VERsion	167
Trigger Subsystem	168
:ABORt	168
:INITiate:CONTInuous[:ALL]	168
:INITiate[:IMMediate][:ALL]	169
:TRIGger:OUTPut:POLarity	169
:TRIGger[:SEQuence]:SLOPe	170
:TRIGger[:SEQuence]:SOURce	170
:TRIGger[:SEQuence][:IMMediate]	171
Unit Subsystem (:UNIT)	172
:POWer	172
4. Analog Commands	173
Amplitude Modulation Subsystem ([:SOURce])	174
:AM[1]2...	174
:AM:INTernal:FREQuency:STEP[:INCReMENT]	174
:AM:WIDeband:STATe	175
:AM[1]2:EXTernal[1]2:COUPling	175
:AM[1]2:INTernal[1]:FREQuency	176

:AM[1]2:INTErnal[1]:FREQuency:ALTErnate.....	176
:AM[1]2:INTErnal[1]:FREQuency:ALTErnate:AMPLitude:PERCent.....	176
:AM[1]2:INTErnal[1]:FUNCTion:SHAPE.....	177
:AM[1]2:INTErnal[1]:SWEep:TIME.....	177
:AM[1]2:INTErnal[1]:SWEep:TRIGger.....	178
:AM[1]2:SOURce.....	178
:AM[1]2:STATe.....	179
:AM[1]2[:DEPT]h.....	179
:AM[1]2[:DEPT]h:TRACk.....	180
:AM[:DEPT]h:STEP[:INCR]ement.....	180
Frequency Modulation Subsystem ([:SOUR]ce).....	181
:FM[1]2.....	181
:FM:INTErnal:FREQuency:STEP[:INCR]ement.....	182
:FM[1]2:EXTErnal[1]2:COUPLing.....	182
:FM[1]2:INTErnal[1]:FREQuency.....	183
:FM[1]2:INTErnal[1]:FREQuency:ALTErnate.....	183
:FM[1]2:INTErnal[1]:FREQuency:ALTErnate:AMPLitude:PERCent.....	184
:FM[1]2:INTErnal[1]:FUNCTion:SHAPE.....	184
:FM[1]2:INTErnal[1]:SWEep:TIME.....	185
:FM[1]2:INTErnal[1]:SWEep:TRIGger.....	185
:FM[1]2:SOURce.....	186
:FM[1]2:STATe.....	186
:FM[1]2[:DEVI]ation.....	187
:FM[1]2[:DEVI]ation:TRACk.....	187
Low Frequency Output Subsystem ([:SOUR]ce[:LFO]utput).....	188
:AMPLitude.....	188
:FUNCTion[1]:FREQuency.....	188
:FUNCTion[1]:FREQuency:ALTErnate.....	189
:FUNCTion[1]:FREQuency:ALTErnate:AMPLitude:PERCent.....	189
:FUNCTion[1]:PERiod.....	190
:FUNCTion[1]:PWIDth.....	190
:FUNCTion[1]:SHAPE.....	191
:FUNCTion[1]:SWEep:TIME.....	191
:FUNCTion[1]:SWEep:TRIGger.....	191
:SOURce.....	192
:STATe.....	192
Phase Modulation Subsystem ([:SOUR]ce).....	193
:PM[1]2.....	193

Contents

:PM:INTErnal:FREQUency:STEP[:INCRement]	194
:PM[1]2:BAWIDth|BWIDth	194
:PM[1]2:EXTErnal[1]:COUPLing	195
:PM[1]2:INTErnal[1]:FREQUency	195
:PM[1]2:INTErnal[1]:FREQUency:ALTErnate	196
:PM[1]2:INTErnal[1]:FREQUency:ALTErnate:AMPLitude:PERCent	196
:PM[1]2:INTErnal[1]:FUNCTion:SHAPE	197
:PM[1]2:INTErnal[1]:SWEep:TIME	197
:PM[1]2:INTErnal[1]:SWEep:TRIGger	197
:PM[1]2:SOURce	198
:PM[1]2:STATe	198
:PM[1]2[:DEVIation]	199
:PM[1]2[:DEVIation]:TRACk	199
:PM[:DEVIation]:STEP[:INCRement]	200
Pulse Modulation Subsystem ([:SOURce]:PULM)	201
:INTErnal[1]:FREQUency	201
:INTErnal[1]:FREQUency:STEP	201
:INTErnal[1]:FUNCTion:SHAPE	202
:INTErnal[1]:PERiod	202
:INTErnal[1]:PERiod:STEP[:INCRement]	202
:INTErnal[1]:PWIDth	203
:INTErnal[1]:PWIDth:STEP	203
:SOURce	204
:STATe	204
5. Component Test Digital Commands	205
All Subsystem–Option 001/601 or 002/602 ([:SOURce])	206
:RADio:ALL:OFF	206
AWGN ARB Subsystem–Option 403 ([:SOURce]:RADio:AWGN:ARB)	207
:BWIDth	207
:IQ:EXTErnal:FILTEr	207
:IQ:EXTErnal:FILTEr:AUTO	208
:HEADer:CLEar	208
:HEADer:SAVE	208
:IQ:MODulation:ATTen	209
:IQ:MODulation:ATTen:AUTO	209
:IQ:MODulation:FILTEr	210
:IQ:MODulation:FILTEr:AUTO	210

:MDEStination:PULSe	211
:MDEStination:AAMPlitude	211
:MDEStination:ALCHold	211
:MPOLarity:MARKer1	212
:MPOLarity:MARKer2	212
:MPOLarity:MARKer3	212
:MPOLarity:MARKer4	212
:LENGth	213
:REFErence:EXTErnal:FREQUency	213
:REFErence[:SOURce]	214
:SCLock:RATE	214
:SEED	215
[:STATE]	215
CDMA ARB Subsystem–Option 401 ([:SOURce]:RADio:CDMA:ARB)	216
:CLIPping:I	216
:CLIPping:POSition	216
:CLIPping:Q	217
:CLIPping:TYPE	217
:CLIPping[:IJQ]	218
:CRATe	218
:IQ:EXTErnal:FILTer	219
:IQ:EXTErnal:FILTer:AUTO	219
:FILTer	220
:FILTer:ALPHa	221
:FILTer:BBT	221
:FILTer:CHANnel	222
:HEADer:CLEar	222
:HEADer:SAVE	222
:IQMap	223
:IQ:MODulation:ATTen	223
:IQ:MODulation:ATTen:AUTO	223
:IQ:MODulation:FILTer	224
:IQ:MODulation:FILTer:AUTO	224
:MDEStination:PULSe	225
:MDEStination:AAMPlitude	225
:MDEStination:ALCHold	225
:MPOLarity:MARKer1	226
:MPOLarity:MARKer2	226

Contents

:MPOLarity:MARKer3	226
:MPOLarity:MARKer4	226
:OSAMple	227
:REFerence:EXTernal:FREQuency	227
:REFerence[:SOURce]	228
:RETRigger	228
:SCLock:RATE	229
:SETup	229
:SETup:CHANnel	230
:SETup:MCARrier	231
:SETup:MCARrier:STORe	232
:SETup:MCARrier:TABLE	232
:SETup:STORe	233
:TRIGger:TYPE	234
:TRIGger:TYPE:CONTInuous[:TYPE]	235
:TRIGger:TYPE:GATE:ACTive	236
:TRIGger[:SOURce]	236
:TRIGger[:SOURce]:EXTernal:DELay	238
:TRIGger[:SOURce]:EXTernal:DELay:STATe	238
:TRIGger[:SOURce]:EXTernal:SLOPe	239
:TRIGger[:SOURce]:EXTernal[:SOURce]	239
:WLENgth	240
[:STATe]	241
CDMA2000 ARB Subsystem–Option 401 ([:SOURce]:RADio:CDMA2000:ARB)	242
:CLIPping:I	242
:CLIPping:POSition	242
:CLIPping:Q	243
:CLIPping:TYPE	243
:CLIPping[:IJQ]	244
:IQ:EXTernal:FILTer	244
:IQ:EXTernal:FILTer:AUTO	244
:FILTer	245
:FILTer:ALPHa	246
:FILTer:BBT	246
:FILTer:CHANnel	247
:HEADer:CLEar	247
:HEADer:SAVE	247
:IQ:MODulation:ATTen	248

:IQ:MODulation:ATTen:AUTO	248
:IQ:MODulation:FILTer	249
:IQ:MODulation:FILTer:AUTO	249
:IQMap	250
:LINK	250
:LINK:FORWard:SETup	250
:LINK:FORWard:Setup:MCARrier	251
:LINK:FORWard:SETup:MCARrier:STORE	252
:LINK:FORWard:SETup:MCARrier:TABLE	252
:LINK:FORWard:SETup:MCARrier:TABLE:NCARriers	253
:LINK:FORWard:SETup:STORE	254
:LINK:FORWard:SETup:TABLE:APPLY	254
:LINK:FORWard:SETup:TABLE:CHANnel	255
:LINK:FORWard:SETup:TABLE:NCHannels	256
:LINK:FORWard:SETup:TABLE:PADJust	256
:LINK:REVerse:RCONfig	256
:LINK:REVerse:SETup	257
:LINK:REVerse:SETup:STORE	258
:LINK:REVerse:SETup:TABLE:APPLY	258
:LINK:REVerse:SETup:TABLE:CHANnel	259
:LINK:REVerse:SETup:TABLE:NCHannels	260
:LINK:REVerse:SETup:TABLE:PADJust	260
:MDEStination:PULSe	260
:MDEStination:AAMPLitude	261
:MDEStination:ALCHold	261
:MPOLarity:MARKer1	261
:MPOLarity:MARKer2	262
:MPOLarity:MARKer3	262
:MPOLarity:MARKer4	262
:REFerence:EXTernal:FREQuency	263
:REFerence[:SOURce]	263
:RETRigger	264
:REVision	264
:SCLock:RATE	264
:SPReading:RATE	265
:SPReading:TYPE	265
:SPReading:TYPE:MCARrier:SPACing	266
:TRIGger:TYPE	266

Contents

:TRIGger:TYPE:CONTInuous[:TYPE]	268
:TRIGger:TYPE:GATE:ACTive	268
:TRIGger[:SOURce]	269
:TRIGger[:SOURce]:EXTernal:DELay	270
:TRIGger[:SOURce]:EXTernal:DELay:STATe	271
:TRIGger[:SOURce]:EXTernal:SLOPe	271
:TRIGger[:SOURce]:EXTernal[:SOURce]	272
[:STATe]	273
Dmodulation Subsystem–Option 001/601 or 002/602 ([:SOURce]:RADio:DMODulation:ARB)	274
:IQ:EXTernal:FILTer	274
:IQ:EXTernal:FILTer:AUTO	274
:FILTer	275
:FILTer:ALPHa	276
:FILTer:BBT	276
:FILTer:CHANnel	277
:HEADer:CLEar	277
:HEADer:SAVE	277
:IQ:MODulation:ATTen	278
:IQ:MODulation:ATTen:AUTO	278
:IQ:MODulation:FILTer	279
:IQ:MODulation:FILTer:AUTO	279
:MDEStination:PULSe	280
:MDEStination:AAMPLitude	280
:MDEStination:ALCHold	280
:MODulation:FSK[:DEViation]	280
:MODulation[:TYPE]	281
:MPOLarity:MARKer1	281
:MPOLarity:MARKer2	282
:MPOLarity:MARKer3	282
:MPOLarity:MARKer4	282
:REFerence:EXTernal:FREQUency	282
:REFerence[:SOURce]	283
:RETRigger	283
:SCLock:RATE	284
:SETup	284
:SETup:MCARrier	285
:SETup:MCARrier:PHASe	286
:SETup:MCARrier:STORE	286

:SETup:MCARrier:TABLE	286
:SETup:MCARrier:TABLE:NCARriers	287
:SETup:STORE	288
:SRATE	288
:TRIGger:TYPE	289
:TRIGger:TYPE:CONTinuous[:TYPE]	291
:TRIGger:TYPE:GATE:ACTive	291
:TRIGger[:SOURce]	292
:TRIGger[:SOURce]:EXTernal:DELay	293
:TRIGger[:SOURce]:EXTernal:DELay:STATe	294
:TRIGger[:SOURce]:EXTernal:SLOPe	294
:TRIGger[:SOURce]:EXTernal[:SOURce]. [:STATe]	295 296
Dual ARB Subsystem–Option 001/601 or 002/602 (:SOURce):RADio:ARB)	297
:CLIPping	297
:GENerate:SINE	297
:HEADer:CLEar	298
:HEADer:RMS	298
:HEADer:SAVE	299
:HCRest[:STATe].	299
:IQ:EXTernal:FILTer	300
:IQ:EXTernal:FILTer:AUTO	300
:IQ:MODulation:ATTen	301
:IQ:MODulation:ATTen:AUTO	301
:IQ:MODulation:FILTer	302
:IQ:MODulation:FILTer:AUTO	302
:MARKer:CLEar	303
:MARKer:CLEar:ALL	303
:MARKer:ROtate	304
:MARKer:[SET]	304
:MDESTination:PULSe	305
:MDESTination:AAMPLitude	305
:MDESTination:ALCHold	306
:MPOLarity:MARKer1	306
:MPOLarity:MARKer2	306
:MPOLarity:MARKer3	307
:MPOLarity:MARKer4	307
:NOISe	307

Contents

:NOISe:BFACtor	308
:NOISe:CBWidth	308
:NOISe:CN	309
:REFerence:EXTernal:FREQuency	309
:REFerence[:SOURce]	310
:RETRigger	310
:RSCALing	311
:SCALing	311
:SCLock:RATE	311
:SEQuence	312
:TRIGger:TYPE	312
:TRIGger:TYPE:CONTinuous[:TYPE]	314
:TRIGger:TYPE:GATE:ACTive	314
:TRIGger:TYPE:SADVance[:TYPE]	315
:TRIGger[:SOURce]	315
:TRIGger[SOURce]:EXTernal:DELay	316
:TRIGger[:SOURce]:EXTernal:DELay:STATE	317
:TRIGger[:SOURce]:EXTernal:SLOPe	317
:TRIGger[:SOURce]:EXTernal[:SOURce]	318
:WAVEform	318
:Waveform:NHEAders	319
[:STATE]	320
Multitone Subsystem—Option 001/601 or 002/602 ([:SOURce]:RADio:MTONE:ARB)	321
Creating a Multitone Waveform	321
:HEADer:CLear	321
:HEADer:SAVE	321
:IQ:EXTernal:FILTer	322
:IQ:EXTernal:FILTer:AUTO	322
:IQ:MODulation:ATTen	323
:IQ:MODulation:ATTen:AUTO	323
:IQ:MODulation:FILTer	324
:IQ:MODulation:FILTer:AUTO	324
:MDESTination:PULSe	325
:MDESTination:AAMPplitude	325
:MDESTination:ALCHold	325
:MPOLarity:MARKer1	326
:MPOLarity:MARKer2	326
:MPOLarity:MARKer3	326

:MPOLarity:MARKer4	326
:REFeRence:EXTeRnal:FREQUency	327
:REFeRence[:SOURce]	327
:ROW	328
:SCLock:RATE	329
:SETup	329
:SETup:STORe	329
:SETup:TABLE	330
:SETup:TABLE:FSPacing	330
:SETup:TABLE:NTONes	331
:SETup:TABLE:PHASe:INITialize	331
:SETup:TABLE:PHASe:INITialize:SEED	332
[:STATe]	332
Wideband CDMA ARB Subsystem–Option 400 ([:SOURce]:RADio:WCDMa:TGPP:ARB)	333
:CLIPping:I	333
:CLIPping:POSition	333
:CLIPping:Q	334
:CLIPping:TYPE	334
:CLIPping[:IJQ]	335
:CRATe	335
:FILTer	336
:FILTer:ALPHa	336
:FILTer:BBT	337
:FILTer:CHANnel	337
:HEADer:CLear	338
:HEADer:SAVE	338
:IQ:EXTeRnal:FILTer	338
:IQ:EXTeRnal:FILTer:AUTO	338
:IQMap	339
:IQ:MODulation:ATTen	339
:IQ:MODulation:ATTen:AUTO	340
:IQ:MODulation:FILTer	340
:IQ:MODulation:FILTer:AUTO	341
:LINK	341
:LINK:DOWN:OACP	342
:LINK:DOWN:SETup	342
:LINK:DOWN:SETup:MCARrier	343
:LINK:DOWN:SETup:MCARrier:CLIPping:I	345

Contents

:LINK:DOWN:SETup:MCARrier:CLIPping:Q	345
:LINK:DOWN:SETup:MCARrier:CLIPping:TYPE	346
:LINK:DOWN:SETup:MCARrier:CLIPping[:IJQ]	346
:LINK:DOWN:SETup:MCARrier:SCODE:AINCrement	346
:LINK:DOWN:SETup:MCARrier:STORE	347
:LINK:DOWN:SETup:MCARrier:TABLE	347
:LINK:DOWN:SETup:MCARrier:TABLE:NCARriers	349
:LINK:DOWN:SETup:MCARrier:TOFFset:AINCrement	349
:LINK:DOWN:SETup:STORE	350
:LINK:DOWN:SETup:TABLE:APPLY	350
:LINK:DOWN:SETup:TABLE:CHANnel	351
:LINK:DOWN:SETup:TABLE:NCHannels?	355
:LINK:DOWN:SETup:TABLE:PADJust	356
:LINK:DOWN:TFCI	356
:LINK:UP:OACP	356
:LINK:UP:SCRAMBLE	357
:LINK:UP:SDPDch	357
:LINK:UP:SETup	357
:LINK:UP:SETup:STORE	358
:LINK:UP:SETup:TABLE:APPLY	359
:LINK:UP:SETup:TABLE:CHANnel	359
:LINK:UP:SETup:TABLE:GUNit	360
:LINK:UP:SETup:TABLE:NCHannel	361
:LINK:UP:TFCI	361
:MDEStination:PULSe	361
:MDEStination:AAMPLitude	362
:MDEStination:ALCHold	362
:MPOLarity:MARKer1	362
:MPOLarity:MARKer2	363
:MPOLarity:MARKer3	363
:MPOLarity:MARKer4	363
:REFerence:EXTernal:FREQuency	364
:REFerence[:SOURce]	364
:RETRigger	365
:REVision	365
:SCLock:RATE	366
:TRIGger:TYPE	366
:TRIGger:TYPE:CONTInuous[:TYPE]	368

:TRIGger:TYPE:GATE:ACTive.....	369
:TRIGger[:SOURce]	369
:TRIGger[:SOURce]:EXTernal:DELay	370
:TRIGger[:SOURce]:EXTernal:DELay:STATe	371
:TRIGger[:SOURce]:EXTernal:SLOPe	372
:TRIGger[:SOURce]:EXTernal[:SOURce].	372
[:STATe]	373

SCPI Command Reference, Volume 2

6. Digital Signal Interface Module Commands	375
Digital Subsystem—Option 003 and 004 ([:SOURCE])	376
:DIGital:CLOCK:CPS 1|2|4	376
:DIGital:CLOCK:PHASe	376
:DIGital:CLOCK:POLarity	377
:DIGital:CLOCK:RATE	378
:DIGital:CLOCK:REFerence:FREQuency	378
:DIGital:CLOCK:SKEW	379
:DIGital:CLOCK:SOURCe	379
:DIGital:DATA:ALIGNment	380
:DIGital:DATA:BORDER	380
:DIGital:DATA:DIRection	381
:DIGital:DATA:IGain	381
:DIGital:DATA:INEGate	382
:DIGital:DATA:IOFFset	382
:DIGital:DATA:IQSWap	383
:DIGital:DATA:NFORmat	383
:DIGital:DATA:POLarity:FRAMe	383
:DIGital:DATA:POLarity:IQ	384
:DIGital:DATA:QGain	384
:DIGital:DATA:QNEGate	385
:DIGital:DATA:QOFFset	386
:DIGital:DATA:ROTation	386
:DIGital:DATA:SCALing	387
:DIGital:DATA:SIZE	387
:DIGital:DATA:STYPe	388
:DIGital:DATA:TYPE	388
:DIGital:DIAGnostic:LOOPback	389
:DIGital:LOGic[:TYPE]	389
:DIGital:PCONfig	390
:DIGital:PRESet:PTHROUGH	391
:DIGital[:STATe]	391
7. Bit Error Rate Test (BERT) Commands	393
Calculate Subsystem—Option UN7 and 300 (:CALCulate:BERT)	394

:BTS:LOOPback:EDGE:ETCH:F43:COMParator:CRITeria:ERATe	394
:BTS:LOOPback:EDGE:ETCH:F43:COMParator:CRITeria[:SElect]	394
:BTS:LOOPback:EDGE:MCS5:COMParator:CRITeria:ERATe	395
:BTS:LOOPback:EDGE:MCS5:COMParator:CRITeria[:SElect]	395
:BTS:LOOPback:EDGE:MCS9:COMParator:CRITeria:ERATe	395
:BTS:LOOPback:EDGE:MCS9:COMParator:CRITeria[:SElect]	396
:BTS:LOOPback:EDGE:UNCoded:COMParator:CRITeria:ERATe	396
:BTS:LOOPback:EDGE:UNCoded:COMParator:CRITeria[:SElect]	397
:BTS:LOOPback:GSM:CS1:COMParator:CRITeria:ERATe	397
:BTS:LOOPback:GSM:CS1:COMParator:CRITeria[:SElect]	398
:BTS:LOOPback:GSM:CS4:COMParator:CRITeria:ERATe	398
:BTS:LOOPback:GSM:CS4:COMParator:CRITeria[:SElect]	398
:BTS:LOOPback:GSM:MCS1:COMParator:CRITeria:ERATe	399
:BTS:LOOPback:GSM:MCS1:COMParator:CRITeria[:SElect]	399
:BTS:LOOPback:GSM:COMParator:CRITeria:CIB	400
:BTS:LOOPback:GSM:COMParator:CRITeria:CII	400
:BTS:LOOPback:GSM:COMParator:CRITeria:FERasure	400
:BTS:LOOPback:GSM:COMParator:CRITeria[:SElect]	401
[:BAsEband]:COMParator:MODE	401
[:BAsEband]:COMParator:THReshold	402
[:BAsEband]:COMParator[:STATe]	402
[:BAsEband]:DISPlay:MODE:	403
[:BAsEband]:DISPlay:UPDate:	403
Data Subsystem–Option UN7 and 300 (:DATA)	404
:BERT:BTS:LOOPback:EDGE:ETCH:F43[:DATA]	404
:BERT:BTS:LOOPback:EDGE:MCS5[:DATA]	405
:BERT:BTS:LOOPback:EDGE:MCS9[:DATA]	406
:BERT:BTS:LOOPback:EDGE:UNCoded[:DATA]	406
:BERT:BTS:LOOPback:GSM[:DATA]	406
:BERT:BTS:LOOPback:GSM:CS1[:DATA]	408
:BERT:BTS:LOOPback:GSM:CS4[:DATA]	409
:BERT:BTS:LOOPback:GSM:MCS1[:DATA]	409
:BERT:AUXout	409
[:DATA]	411
Input Subsystem–Option UN7 (:INPut:BERT[: BAsEband])	412
:CGATe:DELay:CLOCK	412
:CGATe:DELay:MODE	412
:CGATe:DELay:TIME	413

Contents

:CGATe:DELay[:STATe]	413
:CGATe:POLarity	414
:CGATe[:STATe]	414
:CLOCK:DELay:RESolution	414
:CLOCK:DELay:TIME	415
:CLOCK:DELay[:STATe]	415
:CLOCK:POLarity	416
:DATA:POLarity	416
:IMPedance	416
:THReshold	417
Measure Subsystem–Option 300 (:MEASure[:SCALar]:BERT:BTS:LOOPback)	418
:EDGE:MCS5[:SENSitivity]	418
:EDGE:MCS9[:SENSitivity]	418
:EDGE:UNCoded[:SENSitivity]	419
:GSM[:SENSitivity]	420
Sense Subsystem–Options UN7 and 300 ([:SOURce]:SENSe:BERT)	421
:BTS:LOOPback:EDGE:ETCH:F43:BLOCK:COUNt	421
:BTS:LOOPback:EDGE:ETCH:F43:CONTain	421
:BTS:LOOPback:EDGE:ETCH:F43:STOP:CRITeria:EBLock	422
:BTS:LOOPback:EDGE:ETCH:F43:STOP:CRITeria[:SElect]	422
:BTS:LOOPback:EDGE:FTRigger:EXTernal:DELay	423
:BTS:LOOPback:EDGE:FTRigger:EXTernal:POLarity	423
:BTS:LOOPback:EDGE:FTRigger[SElect]	424
:BTS:LOOPback:EDGE:MCS5:BLOCK:COUNt	424
:BTS:LOOPback:EDGE:MCS5:CONTain	425
:BTS:LOOPback:EDGE:MCS5:ESENSitivity	425
:BTS:LOOPback:EDGE:MCS5:HAMPLitude	425
:BTS:LOOPback:EDGE:MCS5:LAMPLitude	426
:BTS:LOOPback:EDGE:MCS5:PAMPLitude	426
:BTS:LOOPback:EDGE:MCS5:SBLock:COUNt	426
:BTS:LOOPback:EDGE:MCS5:SBLock:INITial	427
:BTS:LOOPback:EDGE:MCS5:STOP:CRITeria:EBLock	427
:BTS:LOOPback:EDGE:MCS5:STOP:CRITeria[:SElect]	427
:BTS:LOOPback:EDGE:MCS9:BLOCK:COUNt	428
:BTS:LOOPback:EDGE:MCS9:CONTain	428
:BTS:LOOPback:EDGE:MCS9:ESENSitivity	428
:BTS:LOOPback:EDGE:MCS9:HAMPLitude	429
:BTS:LOOPback:EDGE:MCS9:LAMPLitude	429

:BTS:LOOPback:EDGE:MCS9:PAMPlitude	430
:BTS:LOOPback:EDGE:MCS9:SBLock:COUNT	430
:BTS:LOOPback:EDGE:MCS9:SBLock:INITial	430
:BTS:LOOPback:EDGE:MCS9:STOP:CRITeria:EBLock	431
:BTS:LOOPback:EDGE:MCS9:STOP:CRITeria[:SElect]	431
:BTS:LOOPback:EDGE:MEASurement:STOP	432
:BTS:LOOPback:EDGE:MEASurement:TSLot	432
:BTS:LOOPback:EDGE:MEASurement[:MODE]	432
:BTS:LOOPback:EDGE:SINVert	433
:BTS:LOOPback:EDGE:SYNC:AGain	433
:BTS:LOOPback:EDGE:SYNC:RF	433
:BTS:LOOPback:EDGE:SYNC[:SOURce]	434
:BTS:LOOPback:EDGE:TRIGger[:SOURce]	434
:BTS:LOOPback:EDGE:ULINK:OFFSet	435
:BTS:LOOPback:EDGE:UNCoded:BIT:COUNT	435
:BTS:LOOPback:EDGE:UNCoded:ESENSitivity	435
:BTS:LOOPback:EDGE:UNCoded:HAMPLitude	436
:BTS:LOOPback:EDGE:UNCoded:LAMPLitude	436
:BTS:LOOPback:EDGE:UNCoded:PAMPLitude	437
:BTS:LOOPback:EDGE:UNCoded:SBIT:COUNT	437
:BTS:LOOPback:EDGE:UNCoded:SBIT:INITial	437
:BTS:LOOPback:EDGE:UNCoded:STOP:CRITeria:EBIT	438
:BTS:LOOPback:EDGE:UNCoded:STOP:CRITeria[:SElect]	438
:BTS:LOOPback:EDGE[:STATe]	438
:BTS:LOOPback:GSM:CS1:BLock:COUNT	439
:BTS:LOOPback:GSM:CS1:CONtain	439
:BTS:LOOPback:GSM:CS1:STOP:CRITeria:EBLock	440
:BTS:LOOPback:GSM:CS1:STOP:CRITeria[:SElect]	440
:BTS:LOOPback:GSM:CS4:BLock:COUNT	440
:BTS:LOOPback:GSM:CS4:CONtain	441
:BTS:LOOPback:GSM:CS4:STOP:CRITeria:EBLock	441
:BTS:LOOPback:GSM:CS4:STOP:CRITeria[:SElect]	442
:BTS:LOOPback:GSM:ESENSitivity	442
:BTS:LOOPback:GSM:FRAME:CIB	442
:BTS:LOOPback:GSM:FRAME:CII	442
:BTS:LOOPback:GSM:FRAME:COUNT	443
:BTS:LOOPback:GSM:HAMPLitude	443
:BTS:LOOPback:GSM:LAMPLitude	443

Contents

:BTS:LOOPback:GSM:MCS1:BLOCK:COUNT	444
:BTS:LOOPback:GSM:MCS1:CONTain	444
:BTS:LOOPback:GSM:MCS1:STOP:CRITeria:EBLock	444
:BTS:LOOPback:GSM:MCS1:STOP:CRITeria[:SElect]	445
:BTS:LOOPback:GSM:MEASurement:STOP	445
:BTS:LOOPback:GSM:MEASurement:TSLot	446
:BTS:LOOPback:GSM:MEASurement[:MODE]	446
:BTS:LOOPback:GSM:PAMPlitude	447
:BTS:LOOPback:GSM:SFRame:COUNT	447
:BTS:LOOPback:GSM:SFRame:INITial	447
:BTS:LOOPback:GSM:SINVert	448
:BTS:LOOPback:GSM:STOP:CRITeria:CIB	448
:BTS:LOOPback:GSM:STOP:CRITeria:CII	449
:BTS:LOOPback:GSM:STOP:CRITeria:FERasure	449
:BTS:LOOPback:GSM:STOP:CRITeria[:SElect]	449
:BTS:LOOPback:GSM:SYNC:RF	450
:BTS:LOOPback:GSM:SYNC[:SOURce]	451
:BTS:LOOPback:GSM:TRIGger[:SOURce]	451
:BTS:LOOPback:GSM:ULINK:OFFSet	452
:BTS:LOOPback:GSM[:STATe]	452
[:BAsEband]:PRBS:FUNCTion:SPIGnore:DATA	452
[:BAsEband]:PRBS:FUNCTion:SPIGnore[:STATe]	453
[:BAsEband]:PRBS[:DATA]	453
[:BAsEband]:RSYNc:THReshold	454
[:BAsEband]:RSYNc[:STATe]	454
[:BAsEband]:STATe	454
[:BAsEband]:STOP:CRITeria:EBIT	455
[:BAsEband]:STOP:CRITeria[:SElect]	455
[:BAsEband]:TBITs	456
[:BAsEband]:TRIGger:BDELay	456
[:BAsEband]:TRIGger:BDELay:STATe	456
[:BAsEband]:TRIGger:COUNT	457
[:BAsEband]:TRIGger:POLarity	457
[:BAsEband]:TRIGger[:SOURce]	457
8. Receiver Test Digital Commands	459
All Subsystem–Option 001/601 or 002/602 ([:SOURce])	460
:RADio:ALL:OFF	460

AWGN Real-Time Subsystem–Option 403 ([:SOURCE]:RADio:AWGN:RT)	461
:BWIDth	461
[:STATe]	461
Bluetooth Subsystem–Option 406 ([:SOURCE]:RADio:BLUEtooth:ARB)	462
:AMADdr	462
:BDADdr	462
:BURSt[:STATe]	462
:CGDelay	463
:DATA	463
:IQ:EXTernal:FILTer	464
:IQ:EXTernal:FILTer:AUTO	464
:HEADer:CLEar	465
:HEADer:SAVE	465
:IMPairments	465
:IMPairments:AWGN	466
:IMPairments:AWGN:CNr	466
:IMPairments:AWGN:NSEed	467
:IMPairments:DDEVIation	467
:IMPairments:FDType	468
:IMPairments:FOFFset	469
:IMPairments:MINdex	469
:IMPairments:STERror	470
:IQ:MODulation:ATTen	470
:IQ:MODulation:ATTen:AUTO	471
:IQ:MODulation:FILTer	471
:IQ:MODulation:FILTer:AUTO	472
:MDESTination:PULSe	472
:MDESTination:AAMPliitude	472
:MDESTination:ALCHold	473
:MPOLarity:MARKer1	473
:MPOLarity:MARKer2	473
:MPOLarity:MARKer3	474
:MPOLarity:MARKer4	474
:PACKet	474
:REFerence:EXTernal:FREQuency	475
:REFerence[:SOURCE]	475
:RSYMBOLs	476
:SCLock:RATE	476

Contents

[:STATE]	476
CDMA2000 BBG Subsystem–Option 401 ([:SOURCE]:RADio:CDMA2000[:BBG])	477
:LMODe	477
[:FORWard]:BBCLock	478
[:FORWard]:CHIPrate	478
[:FORWard]:ESDelay	479
[:FORWard]:FILTer	479
[:FORWard]:FILTer:ALPHa	480
[:FORWard]:FILTer:BBT	481
[:FORWard]:FILTer:CHANnel	481
[:FORWard]:LCState	482
[:FORWard]:FFCH:DATA	482
[:FORWard]:FFCH:DATA:FIX4	482
[:FORWard]:FFCH:EBNO	483
[:FORWard]:FFCH:FOFFset	484
[:FORWard]:FFCH:LCMask	484
[:FORWard]:FFCH:LCMask:ESN	484
[:FORWard]:FFCH:LCMask:HEADer	485
[:FORWard]:FFCH:POWER	485
[:FORWard]:FFCH:PRAMp	485
[:FORWard]:FFCH:PRTIME	486
[:FORWard]:FFCH:QOF	486
[:FORWard]:FFCH:RATE	487
[:FORWard]:FFCH:RCONfig	487
[:FORWard]:FFCH:WALSh	487
[:FORWard]:FFCH[:STATE]	488
[:FORWard]:FPCH:DATA	488
[:FORWard]:FPCH:EBNO	488
[:FORWard]:FPCH:LCMask	489
[:FORWard]:FPCH:LCMask:F1	489
[:FORWard]:FPCH:LCMask:F2	489
[:FORWard]:FPCH:LCMask:F3	490
[:FORWard]:FPCH:MESSAge	490
[:FORWard]:FPCH:POWER	490
[:FORWard]:FPCH:RATE	491
[:FORWard]:FPCH:WALSh	491
[:FORWard]:FPCH[:STATE]	491
[:FORWard]:FPICH:ECNO	492

[:FORWARD]:FPICH:POWER	492
[:FORWARD]:FPICH[:STATE]	493
[:FORWARD]:FSCH[1]2:DATA	493
[:FORWARD]:FSCH[1]2:DATA:FIX4	493
[:FORWARD]:FSCH[1]2:EBNO	494
[:FORWARD]:FSCH[1]2:FOFFset	494
[:FORWARD]:FSCH[1]2:LCMask	495
[:FORWARD]:FSCH[1]2:LCMask:ESN	495
[:FORWARD]:FSCH[1]2:LCMask:HEADer	495
[:FORWARD]:FSCH[1]2:POWER	496
[:FORWARD]:FSCH[1]2:QOF	496
[:FORWARD]:FSCH[1]2:RATE	496
[:FORWARD]:FSCH[1]2:RCONfig	497
[:FORWARD]:FSCH[1]2:TCODE	497
[:FORWARD]:FSCH[1]2:WALSh	497
[:FORWARD]:FSCH[1]2[:STATE]	498
[:FORWARD]:FSYNc:CFRequency	498
[:FORWARD]:FSYNc:DAYLt	498
[:FORWARD]:FSYNc:EBNO	499
[:FORWARD]:FSYNc:ECFRequency	499
[:FORWARD]:FSYNc:LPSec	500
[:FORWARD]:FSYNc:LTMoff	500
[:FORWARD]:FSYNc:MPREv	500
[:FORWARD]:FSYNc:MSGType	501
[:FORWARD]:FSYNc:NID	501
[:FORWARD]:FSYNc:POWER	501
[:FORWARD]:FSYNc:PRATe	502
[:FORWARD]:FSYNc:PREV	502
[:FORWARD]:FSYNc:RESERved	502
[:FORWARD]:FSYNc:SID	503
[:FORWARD]:FSYNc:STYPe	503
[:FORWARD]:FSYNc:SYSTime	503
[:FORWARD]:FSYNc:WALSh	504
[:FORWARD]:FSYNc[:STATE]	504
[:FORWARD]:NOISe:CN	504
[:FORWARD]:NOISe[:STATE]	505
[:FORWARD]:OCNS:EBNO	505
[:FORWARD]:OCNS:POWER	506

Contents

[:FORWard]:OCNS:WALSh	507
[:FORWard]:OCNS[:STATe]	507
[:FORWard]:PADJust	507
[:FORWard]:POLarity	508
[:FORWard]:QPCH:CCI	508
[:FORWard]:QPCH:EBNO	508
[:FORWard]:QPCH:PI	509
[:FORWard]:QPCH:POWer	509
[:FORWard]:QPCH:RATE	510
[:FORWard]:QPCH:WALSh	510
[:FORWard]:QPCH[:STATe]	510
[:FORWard]:SRATe	510
:PNOFFset	511
:REVerse:BBCLock	511
:REVerse:CHIPrate	512
:REVerse:ESDdelay	512
:REVerse:FILTer	513
:REVerse:FILTer:ALPHa	514
:REVerse:FILTer:BBT	514
:REVerse:FILTer:CHANnel	515
:REVerse:LCMask	515
:REVerse:LCSTate	515
:REVerse:PADJust	516
:REVerse:POLarity[:ALL]	516
:REVerse:NOISe:CN	516
:REVerse:NOISe[:STATe]	517
:REVerse:RC12:ACCess:RACH:DATA	517
:REVerse:RC12:ACCess:RACH:DATA:FIX4	518
:REVerse:RC12:ACCess:RACH:EBNO	518
:REVerse:RC12:ACCess:RACH:FLENgth	519
:REVerse:RC12:ACCess:RACH:FOFFset	519
:REVerse:RC12:ACCess:RACH:POWer	519
:REVerse:RC12:ACCess:RACH:RCONfig	520
:REVerse:RC12:ACCess:RACH:RATE	520
:REVerse:RC12:ACCess:RACH[:STATe]	520
:REVerse:RC12:TRAFfic:RSCH:DATA	521
:REVerse:RC12:TRAFfic:RSCH:DATA:FIX4	521
:REVerse:RC12:TRAFfic:RSCH:FLENgth	521

:REVerse:RC12:TRAFfic:RSCH:FOFFset	522
:REVerse:RC12:TRAFfic:RSCH:POWer	522
:REVerse:RC12:TRAFfic:RSCH:RATE	522
:REVerse:RC12:TRAFfic:RSCH:RCONfig	523
:REVerse:RC12:TRAFfic:RSCH[:STATe]	523
:REVerse:RC34:CCONtrol:RCCCh:DATA	523
:REVerse:RC34:CCONtrol:RCCCh:DATA:FIX4	524
:REVerse:RC34:CCONtrol:RCCCh:EBNO	524
:REVerse:RC34:CCONtrol:RCCCh:FLENgth	525
:REVerse:RC34:CCONtrol:RCCCh:FOFFset	525
:REVerse:RC34:CCONtrol:RCCCh:POWer	525
:REVerse:RC34:CCONtrol:RCCCh:RCONfig	526
:REVerse:RC34:CCONtrol:RCCCh:RATE	526
:REVerse:RC34:CCONtrol:RCCCh:WALSh	526
:REVerse:RC34:CCONtrol:RCCCh[:STATe]	527
:REVerse:RC34:CCONtrol:RPICH:ECNO	527
:REVerse:RC34:CCONtrol:RPICH:GRATe	528
:REVerse:RC34:CCONtrol:RPICH:POWer	528
:REVerse:RC34:CCONtrol:RPICH:WALSh	528
:REVerse:RC34:CCONtrol:RPICH[:STATe]	529
:REVerse:RC34:EACCess:REACH:DATA	529
:REVerse:RC34:EACCess:REACH:DATA:FIX4	529
:REVerse:RC34:EACCess:REACH:EBNO	530
:REVerse:RC34:EACCess:REACH:FOFFset	530
:REVerse:RC34:EACCess:REACH:POWer	531
:REVerse:RC34:EACCess:REACH:RCONfig	531
:REVerse:RC34:EACCess:REACH:RATE	531
:REVerse:RC34:EACCess:REACH:WALSh	532
:REVerse:RC34:EACCess:REACH[:STATe]	532
:REVerse:RC34:EACCess:RPICH:ECNO	532
:REVerse:RC34:EACCess:RPICH:GRATe	533
:REVerse:RC34:EACCess:RPICH:POWer	533
:REVerse:RC34:EACCess:RPICH:WALSh	533
:REVerse:RC34:EACCess:RPICH[:STATe]	534
:REVerse:RC34:TRAFfic:RDCCh:DATA	534
:REVerse:RC34:TRAFfic:RDCCh:DATA:FIX4	534
:REVerse:RC34:TRAFfic:RDCCh:EBNO	534
:REVerse:RC34:TRAFfic:RDCCh:FLENgth	535

Contents

:REVerse:RC34:TRAFfic:RDCCh:FOFFset	536
:REVerse:RC34:TRAFfic:RDCCh:POWer	536
:REVerse:RC34:TRAFfic:RDCCh:RATE	536
:REVerse:RC34:TRAFfic:RDDCh:RCONfig	537
:REVerse:RC34:TRAFfic:RDCCh:WALSh	537
:REVerse:RC34:TRAFfic:RDCCh[:STATe]	537
:REVerse:RC34:TRAFfic:RFCH:DATA	538
:REVerse:RC34:TRAFfic:RFCH:DATA:FIX4	538
:REVerse:RC34:TRAFfic:RFCH:EBNO	538
:REVerse:RC34:TRAFfic:RFCH:FLENgth	539
:REVerse:RC34:TRAFfic:RFCH:FOFFset	539
:REVerse:RC34:TRAFfic:RFCH:POWer	540
:REVerse:RC34:TRAFfic:RFCH:RCONfig	540
:REVerse:RC34:TRAFfic:RFCH:RATE	540
:REVerse:RC34:TRAFfic:RFCH:WALSh	541
:REVerse:RC34:TRAFfic:RFCH[:STATe]	541
:REVerse:RC34:TRAFfic:RSCH[1]2:DATA	541
:REVerse:RC34:TRAFfic:RSCH[1]2:DATA:FIX4	542
:REVerse:RC34:TRAFfic:RSCH[1]2:DATA:EBNO	542
:REVerse:RC34:TRAFfic:RSCH[1]2:FLENgth	543
:REVerse:RC34:TRAFfic:RSCH[1]2:FOFFset	543
:REVerse:RC34:TRAFfic:RSCH[1]2:POWer	543
:REVerse:RC34:TRAFfic:RSCH[1]2:RCONfig	544
:REVerse:RC34:TRAFfic:RSCH[1]2:RATE	544
:REVerse:RC34:TRAFfic:RSCH[1]2:TCODE	544
:REVerse:RC34:TRAFfic:RSCH[1]2:WALSh	545
:REVerse:RC34:TRAFfic:RSCH[1]2[:STATe]	545
:REVerse:REFeRence:EXTErnal:FREQuency	545
:REVerse:REFeRence[:SOURce]	546
:REVerse:TADVance	546
:REVerse:TEDGE	546
:REVerse:SRATE	547
[:STATe]	547
Custom Subsystem–Option 001/601or 002/602 ([:SOURce]:RADio:CUSTom)	548
:ALPha	548
:BBCLock	548
:BBT	549
:BRATE	549

:BURSt:SHAPE:FALL:DElay	.551
:BURSt:SHAPE:FALL:TIME	.551
:BURSt:SHAPE:FDElay	.552
:BURSt:SHAPE:FTIME	.552
:BURSt:SHAPE:RDElay	.553
:BURSt:SHAPE:RISE:DElay	.554
:BURSt:SHAPE:RISE:TIME	.554
:BURSt:SHAPE:RTIME	.555
:BURSt:SHAPE[:TYPE]	.555
:CHANnel	.556
:DATA	.556
:DATA:FIX4	.557
:DATA:PRAM	.557
:DENCode	.558
:EDATa:DElay	.558
:EDCLock	.558
:EREference	.559
:EREference:VALue	.559
:FILTer	.560
:IQ:SCALE	.561
:MODulation:FSK[:DEVIation]	.561
:MODulation:MSK[:PHASe]	.562
:MODulation:UFSK	.562
:MODulation:UIQ	.562
:MODulation[:TYPE]	.563
:POLarity[:ALL]	.563
:SRATe	.564
:STANdard:SELect	.565
:TRIGger:TYPE	.566
:TRIGger:TYPE:CONTinuous[:TYPE]	.566
:TRIGger:TYPE:GATE:ACTive	.567
:TRIGger[:SOURce]	.567
:TRIGger[:SOURce]:EXTernal:DElay	.568
:TRIGger[:SOURce]:EXTernal:DElay:STATe	.569
:TRIGger[:SOURce]:EXTernal:SLOPe	.569
:TRIGger[:SOURce]:EXTernal[:SOURce]	.570
[:STATe]	.570
DECT Subsystem–Option 402 ([:SOURce]:RADio:DECT)	.571

Contents

:ALPha	571
:BBCLock	571
:BBT	572
:BRATe	572
:BURSt:PN9	574
:BURSt:SHAPE:FALL:DELay	574
:BURSt:SHAPE:FALL:TIME	575
:BURSt:SHAPE:FDELay	575
:BURSt:SHAPE:FTIME	576
:BURSt:SHAPE:RDELay	576
:BURSt:SHAPE:RISE:DELay	577
:BURSt:SHAPE:RISE:TIME	578
:BURSt:SHAPE:RTIME	578
:BURSt:SHAPE[:TYPE]	579
:BURSt[:STATe]	579
:CHANnel	580
:DATA	580
:DATA:FIX4	581
:DATA:PRAM	581
:DEFault	582
:EDATa:DELay	582
:EDCLock	582
:EREFerence	583
:EREFerence:VALue	583
:FILTer	584
:IQ:SCALE	585
:MODulation:FSK[:DEViation]	585
:MODulation:MSK[:PHASe]	586
:MODulation:UFSK	586
:MODulation:UIQ	586
:MODulation[:TYPE]	587
:POLarity[:ALL]	587
:PPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11[:TYPE]	588
:PPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:CUSTom	588
:PPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:CUSTom:FIX4	589
:PPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:LCAPacity:A	589
:PPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:LCAPacity:P	590
:PPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:LCAPacity:S	590

:PPart:SLOT0[1]2|3|4|5|6|7|8|9|10|11:LCAPacity[:B]	591
:PPart:SLOT0[1]2|3|4|5|6|7|8|9|10|11:LCAPacity[:B]:FIX4	591
:PPart:SLOT0[1]2|3|4|5|6|7|8|9|10|11:LCAPacity:POWer	592
:PPart:SLOT0[1]2|3|4|5|6|7|8|9|10|11:STATe	592
:PPart:SLOT0[1]2|3|4|5|6|7|8|9|10|11:TRAFfic:A	592
:PPart:SLOT0[1]2|3|4|5|6|7|8|9|10|11:TRAFfic:P	593
:PPart:SLOT0[1]2|3|4|5|6|7|8|9|10|11:TRAFfic:S	593
:PPart:SLOT0[1]2|3|4|5|6|7|8|9|10|11:TRAFfic[:B]	594
:PPart:SLOT0[1]2|3|4|5|6|7|8|9|10|11:TRAFfic[:B]:FIX4	594
:PPart:SLOT0[1]2|3|4|5|6|7|8|9|10|11:ZLCapacity:A	595
:PPart:SLOT0[1]2|3|4|5|6|7|8|9|10|11:ZLCapacity:P	595
:PPart:SLOT0[1]2|3|4|5|6|7|8|9|10|11:ZLCapacity:A	596
:PPart:SLOT0[1]2|3|4|5|6|7|8|9|10|11:ZLCapacity[:B]	596
:PPart:SLOT0[1]2|3|4|5|6|7|8|9|10|11:ZLCapacity[:B]:FIX4	597
:PPart:SLOT0[1]2|3|4|5|6|7|8|9|10|11:ZTRaffic:A	597
:PPart:SLOT0[1]2|3|4|5|6|7|8|9|10|11:ZTRaffic:P	598
:PPart:SLOT0[1]2|3|4|5|6|7|8|9|10|11:ZTRaffic:S	598
:PPart:SLOT0[1]2|3|4|5|6|7|8|9|10|11:ZTRaffic[:B]	599
:PPart:SLOT0[1]2|3|4|5|6|7|8|9|10|11:ZTRaffic[:B]:FIX4	599
:RFPart:SLOT0[1]2|3|4|5|6|7|8|9|10|11[:TYPE]	600
:RFPart:SLOT0[1]2|3|4|5|6|7|8|9|10|11:CUSTom	600
:RFPart:SLOT0[1]2|3|4|5|6|7|8|9|10|11:CUSTom:FIX4	601
:RFPart:SLOT0[1]2|3|4|5|6|7|8|9|10|11:DUMM2:A	601
:RFPart:SLOT0[1]2|3|4|5|6|7|8|9|10|11:DUMM2:P	602
:RFPart:SLOT0[1]2|3|4|5|6|7|8|9|10|11:DUMM2:S	602
:RFPart:SLOT0[1]2|3|4|5|6|7|8|9|10|11:DUMM[1]:A	602
:RFPart:SLOT0[1]2|3|4|5|6|7|8|9|10|11:DUMM[1]:P	603
:RFPart:SLOT0[1]2|3|4|5|6|7|8|9|10|11:DUMM[1]:S	603
:RFPart:SLOT0[1]2|3|4|5|6|7|8|9|10|11:LCAPacity:A	603
:RFPart:SLOT0[1]2|3|4|5|6|7|8|9|10|11:LCAPacity:P	604
:RFPart:SLOT0[1]2|3|4|5|6|7|8|9|10|11:LCAPacity:S	604
:RFPart:SLOT0[1]2|3|4|5|6|7|8|9|10|11:LCAPacity[:B]	604
:RFPart:SLOT0[1]2|3|4|5|6|7|8|9|10|11:LCAPacity[:B]:FIX4	605
:RFPart:SLOT0[1]2|3|4|5|6|7|8|9|10|11:LCAPacity:POWer	605
:RFPart:SLOT0[1]2|3|4|5|6|7|8|9|10|11:STATe	606
:RFPart:SLOT0[1]2|3|4|5|6|7|8|9|10|11:TRAFfic:A	606
:RFPart:SLOT0[1]2|3|4|5|6|7|8|9|10|11:TRAFfic:P	606
:RFPart:SLOT0[1]2|3|4|5|6|7|8|9|10|11:TRAFfic:S	607

Contents

:RFPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:TRAFfic[:B]	607
:RFPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:TRAFfic[:B]:FIX4	608
:RFPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:ZLCapacity:A	608
:RFPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:ZLCapacity:P	609
:RFPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:ZLCapacity:S	609
:RFPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:ZLCapacity[:B]	610
:RFPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:ZLCapacity[:B]:FIX4	610
:RFPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:ZTRaffic:A	611
:RFPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:ZTRaffic:P	611
:RFPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:ZTRaffic:S	611
:RFPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:ZTRaffic[:B]	612
:RFPart:SLOT0|[1]|2|3|4|5|6|7|8|9|10|11:ZTRaffic[:B]:FIX4	612
:SECondary:RECall	613
:SECondary:SAVE	613
:SECondary:TRIGger[:SOURce]	613
:SECondary[:STATe]	614
:SOUT	614
:SOUT:OFFSet	615
:SOUT:SLOT	615
:SRATe	616
:TRIGger:TYPE	617
:TRIGger:TYPE:CONTInuous[:TYPE]	618
:TRIGger:TYPE:GATE:ACTive	618
:TRIGger[:SOURce]	619
:TRIGger[:SOURce]:EXTernal:DELay	620
:TRIGger[:SOURce]:EXTernal:SLOPe	620
:TRIGger[:SOURce]:EXTernal[:SOURce]	621
:TRIGger[:SOURce]:EXTernal:DELay:STATe	622
[:STATe]	622
EDGE Subsystem–Option 402 ([:SOURce]:RADio:EDGE)	623
:ALPHa	623
:BBCLock	623
:BBT	624
:BURSt:SHAPe:FALL:DELay	624
:BURSt:SHAPe:FDELay	625
:BURSt:SHAPe:FALL:TIME	626
:BURSt:SHAPe:FTIME	626
:BURSt:SHAPe:RDELay	627

:BURSt:SHAPE:RISE:DELAY	628
:BURSt:SHAPE:RISE:TIME	628
:BURSt:SHAPE:RTIME	629
:BURSt:SHAPE[:TYPE]	630
:BURSt[:STATe]	630
:CHANnel	631
:DATA	631
:DATA:PRAM	632
:DATA:FIX4	632
:DEFault	633
:EDATa:DELay	633
:EDCLock	633
:EREFerence	634
:EREFerence:VALue	634
:FILTer	635
:IQ:SCALE	636
:MODulation:FSK[:DEViation]	636
:MODulation:MSK[:PHASe]	637
:MODulation:UFSK	637
:MODulation:UIQ	637
:MODulation[:TYPE]	638
:POLarity[:ALL]	638
:SECondary:RECall	638
:SECondary:SAVE	639
:SECondary:TRIGger[:SOURce]	639
:SECondary[:STATe]	640
:SLOT0[1]2|3|4|5|6|7:CUSTom	640
:SLOT0[1]2|3|4|5|6|7:CUSTom:FIX4	641
:SLOT0[1]2|3|4|5|6|7:CUSTom:GUARd	641
:SLOT0[1]2|3|4|5|6|7:GMSK:ENCryption	642
:SLOT0[1]2|3|4|5|6|7:GMSK:ENCryption:CS1:DATA	643
:SLOT0[1]2|3|4|5|6|7:GMSK:ENCryption:CS4:DATA	644
:SLOT0[1]2|3|4|5|6|7:GMSK:ENCryption:DLINK:MCS1:DATA	644
:SLOT0[1]2|3|4|5|6|7:GMSK:ENCryption:FIX4	644
:SLOT0[1]2|3|4|5|6|7:GMSK:ENCryption:TCH:FS:DATA	645
:SLOT0[1]2|3|4|5|6|7:GMSK:ENCryption:ULINK:MCS1:DATA	645
:SLOT0[1]2|3|4|5|6|7:GMSK:STEal	646
:SLOT0[1]2|3|4|5|6|7:GMSK:TSEQuence	646

Contents

:SLOT0[1]2|3|4|5|6|7:MULTIslot	647
:SLOT0[1]2|3|4|5|6|7:NORMAl:ENCRyption	648
:SLOT0:NORMAl:ENCRyption:BCH:BCC	650
:SLOT0:NORMAl:ENCRyption:BCH:CELLId	650
:SLOT0:NORMAl:ENCRyption:BCH:LAC	651
:SLOT0:NORMAl:ENCRyption:BCH:MCC	651
:SLOT0:NORMAl:ENCRyption:BCH:MNC	651
:SLOT0:NORMAl:ENCRyption:BCH:PLMN	652
:SLOT0[1]2|3|4|5|6|7:NORMAl:ENCRyption:DLINK:MCS5:DATA	652
:SLOT0[1]2|3|4|5|6|7:NORMAl:ENCRyption:DLINK:MCS9:DATA	653
:SLOT0[1]2|3|4|5|6|7:NORMAl:ENCRyption:ETCH:F43:DATA	653
:SLOT0[1]2|3|4|5|6|7:NORMAl:ENCRyption:FIX4	654
:SLOT0[1]2|3|4|5|6|7:NORMAl:ENCRyption:ULINK:MCS5:DATA	654
:SLOT0[1]2|3|4|5|6|7:NORMAl:ENCRyption:ULINK:MCS9:DATA	655
:SLOT0[1]2|3|4|5|6|7:NORMAl:ENCRyption:UNCoded	655
:SLOT0[1]2|3|4|5|6|7:NORMAl:GUARd	656
:SLOT0[1]2|3|4|5|6|7:NORMAl:T1	656
:SLOT0[1]2|3|4|5|6|7:NORMAl:T2	657
:SLOT0[1]2|3|4|5|6|7:NORMAl:TSEquence	657
:SLOT0[1]2|3|4|5|6|7:LCAPacity:POWer	657
:SLOT0[1]2|3|4|5|6|7:STATe	658
:SLOT0[1]2|3|4|5|6|7[:TYPE]	658
:SOUT:	658
:SOUT:OFFSet	659
:SOUT:SLOT	660
:SRATe	660
:TRIGger:TYPE	662
:TRIGger:TYPE:CONTInuous[:TYPE]	662
:TRIGger:TYPE:GATE:ACTive	663
:TRIGger[:SOURce]	663
:TRIGger[:SOURce]:EXTernal:DELay	664
:TRIGger[:SOURce]:EXTernal:DELay:FINe	665
:TRIGger[:SOURce]:EXTernal:DELay:STATe	666
:TRIGger[:SOURce]:EXTernal:SLOPe	666
:TRIGger[:SOURce]:EXTernal[:SOURce]	666
[:STATe]	667

SCPI Command Reference, Volume 3

9. Receiver Test Digital Commands (continued)	669
GPS Subsystem–Option 409	
([:SOURCE]:RADio[1]|2|3|4:GPS)	670
:DATA	670
:DMODE	670
:DSHift	671
:FILTer	671
:FILTer:ALPHa	672
:FILTer:BBT	673
:FILTer:CHANnel	673
:IQPHase	674
:PCODE	674
:RCODE	674
:REFClk	675
:REFFreq	675
:SATid	676
[:STATE]	676
GSM Subsystem–Option 402 ([:SOURCE]:RADio:GSM)	677
:ALPha	677
:BBCLock	677
:BBT	678
:BRATe	678
:BURSt:PN9	680
:BURSt:SHAPe:FALL:DELay	680
:BURSt:SHAPe:FALL:TIME	681
:BURSt:SHAPe:FDELay	681
:BURSt:SHAPe:FTIME	682
:BURSt:SHAPe:RDELay	683
:BURSt:SHAPe:RISE:DELay	683
:BURSt:SHAPe:RISE:TIME	684
:BURSt:SHAPe:RTIME	685
:BURSt:SHAPe[:TYPE]	685
:BURSt[:STATE]	686
:CHANnel	686
:DATA	687
:DATA:PRAM	687

Contents

:DATA:FIX4	688
:DEFault	688
:DENCode	688
:EDATa:DELay	689
:EDCLock	689
:EREFerence	690
:EREFerence:VALue	690
:FILTer	691
:IQ:SCALE	692
:MODulation:FSK[:DEViation]	692
:MODulation:MSK[:PHASe]	693
:MODulation:UFSK	693
:MODulation:UIQ	693
:MODulation[:TYPE]	694
:POLarity[:ALL]	694
:SECondary:RECall	695
:SECondary:SAVE	695
:SECondary:TRIGger[:SOURce]	695
:SECondary[:STATE]	696
:SLOT0[1]2|3|4|5|6|7:ACCess:ENCRyption	696
:SLOT0[1]2|3|4|5|6|7:ACCess:ENCRyption:FIX4	696
:SLOT0[1]2|3|4|5|6|7:ACCess:ETAil	697
:SLOT0[1]2|3|4|5|6|7:ACCess:SSEquence	697
:SLOT0[1]2|3|4|5|6|7:ACCess:CUSTom	697
:SLOT0[1]2|3|4|5|6|7:CUSTom:FIX4	698
:SLOT0[1]2|3|4|5|6|7:DUMMy:TSEquence	698
:SLOT0[1]2|3|4|5|6|7:MULTIslot	699
:SLOT0[1]2|3|4|5|6|7:NORMal:ENCRyption	699
:SLOT0:NORMal:ENCRyption:BCH:BCC	701
:SLOT0:NORMal:ENCRyption:BCH:CELLid	701
:SLOT0:NORMal:ENCRyption:BCH:LAC	701
:SLOT0:NORMal:ENCRyption:BCH:MCC	702
:SLOT0:NORMal:ENCRyption:BCH:MNC	702
:SLOT0:NORMal:ENCRyption:BCH:PLMN	702
:SLOT0[1]2|3|4|5|6|7:NORMal:ENCRyption:CS1:DATA	703
:SLOT0[1]2|3|4|5|6|7:NORMal:ENCRyption:CS4:DATA	703
:SLOT0[1]2|3|4|5|6|7:NORMal:ENCRyption:DLINK:MCS1:DATA	703
:SLOT0[1]2|3|4|5|6|7:NORMal:ENCRyption:FIX4	704

:SLOT0[1]2|3|4|5|6|7:NORMAl:ENCRYption:TCH:FS:DATA	704
:SLOT0[1]2|3|4|5|6|7:NORMAl:ENCRYption:ULINK:MCS1:DATA	704
:SLOT0[1]2|3|4|5|6|7:NORMAl:STeal	705
:SLOT0[1]2|3|4|5|6|7:NORMAl:TSEquence	705
:SLOT0[1]2|3|4|5|6|7:POWer	706
:SLOT0[1]2|3|4|5|6|7:STATe	706
:SLOT0[1]2|3|4|5|6|7:SYNC:ENCRYption	706
:SLOT0[1]2|3|4|5|6|7:SYNC:ENCRYption:FIX4	707
:SLOT0[1]2|3|4|5|6|7:SYNC:TSEquence	707
:SLOT0[1]2|3|4|5|6|7[:TYPE]	707
:SOUT	708
:SOUT:OFFSet	708
:SOUT:SLOT	709
:SRATe	709
:TRIGger:EXTernal:DELay	710
:TRIGger:TYPE	711
:TRIGger:TYPE:CONTInuous[:TYPE]	711
:TRIGger:TYPE:GATE:ACTive	712
:TRIGger[:SOURce]	712
:TRIGger[:SOURce]:EXTernal:DELay	713
:TRIGger[:SOURce]:EXTernal:DELay:FINe	714
:TRIGger[:SOURce]:EXTernal:DELay:STATe	714
:TRIGger[:SOURce]:EXTernal:SLOPe	714
:TRIGger[:SOURce]:EXTernal[:SOURce]	715
[:STATe]	716
HSDPA over W-CDMA Subsystem–Option 418 ([:SOURce]:RADio:WCDMa:HSDPa[:BBG])	717
File Overview	717
Managing ESG Setting Conflicts and Error Messages	719
:DLINK:APPLy	719
Nk:AWGN:CN	720
:DLINK:AWGN[:STATe]	720
:DLINK:BBCLock[:SOURce]	720
:DLINK:CPICH:CCODE	721
:DLINK:CPICH:POWer	721
:DLINK:CPICH[:STATe]	721
:DLINK:DPCH:CCODE	721
:DLINK:DPCH:DATA	722
:DLINK:DPCH:DATA:FIX4	722

Contents

:DLINK:DPCH:DCH[1]|2|3|4|5|6:BSIZE	723
:DLINK:DPCH:DCH[1]|2|3|4|5|6:CTYPe	723
:DLINK:DPCH:DCH[1]|2|3|4|5|6:CRC	724
:DLINK:DPCH:DCH[1]|2|3|4|5|6:DATA	724
:DLINK:DPCH:DCH[1]|2|3|4|5|6:DATA:FIX4	724
:DLINK:DPCH:DCH[1]|2|3|4|5|6:NBLocks	725
:DLINK:DPCH:DCH[1]|2|3|4|5|6:RMATtribute	725
:DLINK:DPCH:DCH[1]|2|3|4|5|6:TTI	726
:DLINK:DPCH:DCH2|3|4|5|6[:STATe]	726
:DLINK:DPCH:POWer	726
:DLINK:DPCH:SFORmat	727
:DLINK:DPCH:SSCOffset	727
:DLINK:DPCH:TFCI	728
:DLINK:DPCH:TOFFset	728
:DLINK:DPCH:TPC:NSTeps	729
:DLINK:DPCH:TPC:PATtern	729
:DLINK:DPCH:TRPosition	730
:DLINK:DPCH[:STATe]	730
:DLINK:FILTer	730
:DLINK:FILTer:ALPHa	731
:DLINK:FILTer:BBT	731
:DLINK:FILTer:CHANnel	732
:DLINK:HSBurst	732
:DLINK:HSDPa:AMC:CQIMapping:UECategory	733
:DLINK:HSDPa:AMC:CPATern	733
:DLINK:HSDPa:FCONtrol	734
:DLINK:HSDPa:HARQ:APATern	734
:DLINK:HSDPa:HARQ:MNHTrans	735
:DLINK:HSDPa:HARQ:RVSequence[1]|2|3|4|5|6|7|8	736
:DLINK:HSDPa[1]|2|3|4:BSINfo	737
:DLINK:HSDPa[1]|2|3|4:HSPDSch:COFFset	737
:DLINK:HSDPa[1]|2|3|4:HSPDSch:DATA	737
:DLINK:HSDPa[1]|2|3|4:HSPDSch:DATA:FIX4	738
:DLINK:HSDPa:HSPDSch:DSCH:DATA	738
:DLINK:HSDPa:HSPDSch:DSCH:DATA:FIX4	739
:DLINK:HSDPa:HSPDSch:DSCH:IRBSize	739
:DLINK:HSDPa:HSPDSch:NCODe	740
:DLINK:HSDPa[1]|2|3|4:HSPDSch:POWer	740

:DLINK:HSDPa[1]|2|3|4:HSPDsch:SFORmat	741
:DLINK:HSDPa[1]|2|3|4:HSPDsch[:STATe]	741
:DLINK:HSDPa[1]|2|3|4:HSSCch:CCODE	742
:DLINK:HSDPa[1]|2|3|4:HSSCch:DATA	742
:DLINK:HSDPa[1]|2|3|4:HSSCch:DATA:FIX4	743
:DLINK:HSDPa[1]|2|3|4:HSSCch:POWer	743
:DLINK:HSDPa[1]|2|3|4:ITTI	744
:DLINK:HSDPa[1]|2|3|4:ITTI:PATtern	744
:DLINK:HSDPa:NHPRocess	745
:DLINK:HSDPa[1]|2|3|4:RVParameter	745
:DLINK:HSDPa[1]|2|3|4:UEID	746
:DLINK:HSDPa[1]|2|3|4[:STATe]	746
:DLINK:OCNS[1]|2|3|4|5|6|7|8|9|10|11|12|13|14|15|16:CCODE	747
:DLINK:OCNS[1]|2|3|4|5|6|7|8|9|10|11|12|13|14|15|16:DATA	747
:DLINK:OCNS[1]|2|3|4|5|6|7|8|9|10|11|12|13|14|15|16:POWer	748
:DLINK:OCNS[1]|2|3|4|5|6|7|8|9|10|11|12|13|14|15|16:SSCOffset	748
:DLINK:OCNS[1]|2|3|4|5|6|7|8|9|10|11|12|13|14|15|16:TOFFset	749
:DLINK:OCNS[1]|2|3|4|5|6|7|8|9|10|11|12|13|14|15|16[:STATe]	749
:DLINK:PCCPch:BCH:DATA	749
:DLINK:PCCPch:BCH:DATA:FIX4	750
:DLINK:PCCPch:CCODE	750
:DLINK:PCCPch:POWer	751
:DLINK:PCCPch[:STATe]	751
:DLINK:PICH:CCODE	751
:DLINK:PICH:DATA	752
:DLINK:PICH:DATA:FIX4	752
:DLINK:PICH:POWer	753
:DLINK:PICH[:STATe]	753
:DLINK:POLarity	753
:DLINK:PSCH:POWer	754
:DLINK:PSCH[:STATe]	754
:DLINK:SCRamblecode	754
:DLINK:SSCH:POWer	755
:DLINK:SSCH[:STATe]	755
:DLINK:TXDiversity	755
:LINK	756
:ULINK:APPLY	756
:ULINK:AWGN:CN	757

Contents

:ULINK:AWGN[:STATe]	757
:ULINK:BBReference:EXternal:MRATe	757
:ULINK:BBReference[:SOURce]	758
:ULINK:DPCCh:CCODE	758
:ULINK:DPCCh:DATA	758
:ULINK:DPCCh:DATA:FIX4	759
:ULINK:DPCCh:FBI:PATtern	759
:ULINK:DPCCh:FBI:PATtern:FIX	760
:ULINK:DPCCh:POWER	760
:ULINK:DPCCh:SFOrmat	761
:ULINK:DPCCh[:STATe]	761
:ULINK:DPCCh:TFCI	761
:ULINK:DPCCh:TPC:NSTeps	762
:ULINK:DPCCh:TPC:PATtern	762
:ULINK:DPDCh:CCODE	763
:ULINK:DPDCh:DATA	763
:ULINK:DPDCh:DATA:FIX4	763
:ULINK:DPDCh:DCH[1]|2|3|4|5|6:BSIZE	764
:ULINK:DPDCh:DCH[1]|2|3|4|5|6:CRC	764
:ULINK:DPDCh:DCH[1]|2|3|4|5|6:CTYPe	764
:ULINK:DPDCh:DCH[1]|2|3|4|5|6:DATA	765
:ULINK:DPDCh:DCH[1]|2|3|4|5|6:DATA:FIX4	765
:ULINK:DPDCh:DCH[1]|2|3|4|5|6:NBLocks	766
:ULINK:DPDCh:DCH[1]|2|3|4|5|6:RMATtribute	766
:ULINK:DPDCh:DCH[1]|2|3|4|5|6:TTI	767
:ULINK:DPDCh:DCH2|3|4|5|6[:STATe]	767
:ULINK:DPDCh:POWER	768
:ULINK:DPDCh:SFOrmat	768
:ULINK:DPDCh[:STATe]	768
:ULINK:FCLock:INTerval	769
:ULINK:FCLock:POLarity	769
:ULINK:FILTer	770
ULINK:FILTer:ALPHa	770
:ULINK:FILTer:BBT	771
:ULINK:FILTer:CHANnel	771
:ULINK:FOFFset	772
:ULINK:HSDPcch:APATtern	772
:ULINK:HSDPcch:APOWER	773

:ULINK:HSDPcch:CCODE .....	.773
:ULINK:HSDPcch:CPATtern .....	.774
:ULINK:HSDPcch:CPOWer .....	.774
:ULINK:HSDPcch:NPOWer .....	.775
:ULINK:HSDPcch:SFDelay .....	.775
:ULINK:HSDPcch[:STATe] .....	.775
:ULINK:POLarity .....	.776
:ULINK:SCRamblecode .....	.776
:ULINK:SDElay .....	.776
:ULINK:SFNRst:POLarity .....	.777
:ULINK:SYNC:MODE .....	.777
:ULINK:SYNC[:SOURce] .....	.777
:ULINK:TOFFset .....	.778
[:STATe] .....	.778
NADC Subsystem–Option 402 ([:SOURce]:RADio[:NADC]) .....	.779
:ALpha .....	.779
:BBCLock .....	.779
:BBT .....	.780
:BRATe .....	.780
:BURSt:PN9 .....	.781
:BURSt:SHApe[:TYPE] .....	.782
:BURSt:SHApe:FALL:DElay .....	.782
:BURSt:SHApe:FALL:TIME .....	.783
:BURSt:SHApe:FDElay .....	.784
:BURSt:SHApe:FTIME .....	.784
:BURSt:SHApe:RDElay .....	.785
:BURSt:SHApe:RISE:DElay .....	.786
:BURSt:SHApe:RISE:TIME .....	.786
:BURSt:SHApe:RTIME .....	.787
:BURSt[:STATe] .....	.788
:BURSt:SHApe[:TYPE] .....	.788
:CHANnel .....	.789
:DATA .....	.789
:DATA:PRAM .....	.790
:DATA:FIX4 .....	.790
:DEFault .....	.790
:EDATa:DElay .....	.791
:EDCLock .....	.791

Contents

:EReference	792
:EReference:VALue	792
:FILTer	793
:FRATe	794
:IQ:SCALe	794
:MODulation:FSK[:DEVIation]	794
:MODulation:MSK[:PHASe]	795
:MODulation:UFSK	795
:MODulation:UIQ	796
:MODulation[:TYPE]	796
:REPeat	796
:POLarity[:ALL]	797
:SECondary:RECall	797
:SECondary:SAVE	797
:SECondary:TRIGger[:SOURce]	798
:SECondary[:STATe]	798
:SLOT[1]|2|3|4|5|6:DCUStom	798
:SLOT[1]|2|3|4|5|6:DCUStom:FIX4	799
:SLOT[1]|2|3|4|5|6:DTCHannel:CDLocator	799
:SLOT[1]|2|3|4|5|6:DTCHannel:CDVCcode	800
:SLOT[1]|2|3|4|5|6:DTCHannel:SACChannel	800
:SLOT[1]|2|3|4|5|6:DTCHannel:SWORd	800
:SLOT[1]|2|3|4|5|6:DTCHannel[:DATA]	801
:SLOT[1]|2|3|4|5|6:DTCHannel[:DATA]FIX4	801
:SLOT[1]|2|3|4|5|6:POWer	802
:SLOT[1]|2|3|4|5|6:STATe	802
:SLOT[1]|2|3|4|5|6:UCUStom	802
:SLOT[1]|2|3|4|5|6:UCUStom:FIX4	803
:SLOT[1]|2|3|4|5|6:UTCHannel:CDVCcode	803
:SLOT[1]|2|3|4|5|6:UTCHannel:SACChannel	804
:SLOT[1]|2|3|4|5|6:UTCHannel:SWORd	804
:SLOT[1]|2|3|4|5|6:UTCHannel[:DATA]	804
:SLOT[1]|2|3|4|5|6:UTCHannel[:DATA]:FIX4	805
:SLOT[1]|2|3|4|5|6[:TYPE]	805
:SOUT	806
:SOUT:OFFSet	806
:SOUT:SLOT	807
:SRATe	807

:TRIGger:TYPE	808
:TRIGger:TYPE:CONTInuous[:TYPE]	809
:TRIGger:TYPE:GATE:ACTive	810
:TRIGger[:SOURce]	810
:TRIGger[:SOURce]:EXTernal:DELay	811
:TRIGger[:SOURce]:EXTernal:DELay:STATe	812
:TRIGger[:SOURce]:EXTernal:SLOPe	812
:TRIGger[:SOURce]:EXTernal[:SOURce]	812
	813
PDC Subsystem–Option 402 ([:SOURce]:RADio:PDC)	814
:ALPha	814
:BBCLock	814
:BBT	815
:BRATe	815
:BURSt:PN9	817
:BURSt:SHAPe:FALL:DELay	817
:BURSt:SHAPe:FALL:TIME	818
:BURSt:SHAPe:FDELay	818
:BURSt:SHAPe:FTIME	819
:BURSt:SHAPe:RDELay	820
:BURSt:SHAPe:RISE:DELay	820
:BURSt:SHAPe:RISE:TIME	821
:BURSt:SHAPe:RTIME	822
:BURSt:SHAPe[:TYPE]	822
:BURSt[:STATe]	823
:CHANnel	823
:DATA	824
:DATA:PRAM	824
:DATA:FIX4	825
:DEFault	825
:EDATa:DELay	825
:EDCLock	826
:EREFerence	826
:EREFerence:VALue	827
:FILTer	827
:FRATe	828
:IQ:SCALE	828
:MODulation:FSK[:DEViation]	829

Contents

:MODulation:MSK[:PHASe]	829
:MODulation:UFSK	830
:MODulation:UIQ	830
:MODulation[:TYPE]	830
:POLarity[:ALL]	831
:SECondary:RECall	831
:SECondary:SAVE	832
:SECondary:TRIGger[:SOURce]	832
:SECondary[:STATe]	833
:SLOT0|[1]|2|3|4|5:DCUStom	833
:SLOT0|[1]|2|3|4|5:DCUSTom:FIX4	834
:SLOT0|[1]|2|3|4|5:DTCHannel:CCODE	834
:SLOT0|[1]|2|3|4|5:DTCHannel:SACChannel	834
:SLOT0|[1]|2|3|4|5:DTCHannel:SWORd	835
:SLOT0|[1]|2|3|4|5:DTCHannel[:TCHannel]	835
:SLOT0|[1]|2|3|4|5:DTCHannel[:TCHannel]:FIX4	836
:SLOT0|[1]|2|3|4:POWEr	836
:SLOT0|[1]|2|3|4|5:STATe	836
:SLOT0|[1]|2|3|4|5:UCUStom	837
:SLOT0|[1]|2|3|4|5:UCUStom:FIX4	837
:SLOT0|[1]|2|3|4|5:UTCHannel:CCODE	838
:SLOT0|[1]|2|3|4|5:UTCHannel:SACChannel	838
:SLOT0|[1]|2|3|4|5:UTCHannel:SWORd	838
:SLOT0|[1]|2|3|4|5:UTCHannel[:TCHannel]	839
:SLOT0|[1]|2|3|4|5:UTCHannel[:TCHannel]:FIX4	839
:SLOT0|[1]|2|3|4|5:UVOX:CCODE	840
:SLOT0|[1]|2|3|4|5:UVOX:SACChannel	840
:SLOT0|[1]|2|3|4|5:UVOX:SWORd	840
:SLOT0|[1]|2|3|4|5[:TYPE]	841
:SOUT	841
:SOUT:OFFSet	842
:SOUT:SLOT	842
:SRATE	843
:TRIGger:TYPE	844
:TRIGger:TYPE:CONTinuous[:TYPE]	845
:TRIGger:TYPE:GATE:ACTive	846
:TRIGger[:SOURce]	846
:TRIGger[:SOURce]:EXTernal:DELay	847

:TRIGger[:SOURce]:EXTernal:DELay:STATe	848
:TRIGger[:SOURce]:EXTernal:SLOPe	848
:TRIGger[:SOURce]:EXTernal[:SOURce]	848
[:STATe]	849
PHS Subsystem–Option 402 ([:SOURce]:RADio:PHS)	850
:ALPha	850
:BBCLock	850
:BBT	851
:BRATe	851
:BURSt:PN9	852
:BURSt:SCRamble:SEED	853
:BURSt:SCRamble[:STATe]	853
:BURSt:SHAPe:FALL:DELay	854
:BURSt:SHAPe:FALL:TIME	854
:BURSt:SHAPe:FDELay	855
:BURSt:SHAPe:FTIME	856
:BURSt:SHAPe:RDELay	856
:BURSt:SHAPe:RISE:DELay	857
:BURSt:SHAPe:RISE:TIME	858
:BURSt:SHAPe:RTIME	858
:BURSt:SHAPe[:TYPE]	859
:BURSt[:STATe]	859
:CHANnel	860
:DATA	860
:DATA:PRAM	861
:DATA:FIX4	861
:DEFault	862
:DLINK:SLOT[1]|2|3|4:CUSTom	862
:DLINK:SLOT[1]|2|3|4:CUSTom:FIX4	862
:DLINK:SLOT[1]|2|3|4:POWer	863
:DLINK:SLOT[1]|2|3|4:SCHannel:CSID	863
:DLINK:SLOT[1]|2|3|4:SCHannel:IDLE	863
:DLINK:SLOT[1]|2|3|4:SCHannel:PSID	864
:DLINK:SLOT[1]|2|3|4:SCHannel:UWORD	864
:DLINK:SLOT[1]|2|3|4:STATe	864
:DLINK:SLOT[1]|2|3|4:TCHannel:SACChannel	865
:DLINK:SLOT[1]|2|3|4:TCHannel:UWORD	865
:DLINK:SLOT[1]|2|3|4:TCHannel[:TCHannel]	866

Contents

:DLINK:SLOT[1]|2|3|4:TCHannel[:TCHannel]:FIX4	866
:DLINK:SLOT[1]|2|3|4[:TYPE]	867
:EDATa:DELay	867
:EDCLock	867
:EREFerence	868
:EREFerence:VALue	868
:FILTer	869
:IQ:SCALe	870
:MODulation:FSK[:DEViation]	870
:MODulation:MSK[:PHASe]	872
:MODulation:UFSK	872
:MODulation:UIQ	872
:MODulation[:TYPE]	873
:POLarity[:ALL]	873
:SECOndary:RECall	874
:SECOndary:SAVE	874
:SECOndary:TRIGger[:SOURce]	874
:SECOndary[:STATe]	875
:SOUT	875
:SOUT:OFFSet	876
:SOUT:SLOT	876
:SRATe	877
:TRIGger:TYPE	878
:TRIGger:TYPE:CONTinuous[:TYPE]	879
:TRIGger:TYPE:GATE:ACTive	880
:TRIGger[:SOURce]:EXTernal:DELay	880
:TRIGger[:SOURce]:EXTernal:DELay:STATe	881
:TRIGger[:SOURce]:EXTernal:SLOPe	881
:TRIGger[:SOURce]:EXTernal[:SOURce]	882
:TRIGger[:SOURce]	882
:ULINK:SLOT[1]|2|3|4:CUSTom	883
:ULINK:SLOT[1]|2|3|4:CUSTom:FIX4	884
:ULINK:SLOT[1]|2|3|4:POWer	884
:ULINK:SLOT[1]|2|3|4:SCHannel:CSID	884
:ULINK:SLOT[1]|2|3|4:SCHannel:IDLE	885
:ULINK:SLOT[1]|2|3|4:SCHannel:PSID	885
:ULINK:SLOT[1]|2|3|4:SCHannel:UWORD	885
:ULINK:SLOT[1]|2|3|4:STATe	886

:ULINK:SLOT[1]2|3|4:TCHannel:SACChannel	886
:ULINK:SLOT[1]2|3|4:TCHannel:UWORD	886
:ULINK:SLOT[1]2|3|4:TCHannel[:TCHannel]	887
:ULINK:SLOT[1]2|3|4:TCHannel[:TCHannel:FIX4	887
:ULINK:SLOT[1]2|3|4[:TYPE]	888
[:STATE]	888
TETRA Subsystem–Option 402 ([:SOURCE]:RADio:TETRa)	889
:ALPha	889
:BBCLock	889
:BBT	890
:BRATe	890
:BURSt:PN9	892
:BURSt:SCRamble:SEED	892
:BURSt:SCRamble[:STATE]	893
:BURSt:SHAPe:FALL:DELay	893
:BURSt:SHAPe:FALL:TIME	894
:BURSt:SHAPe:FDELay	894
:BURSt:SHAPe:FTIME	895
:BURSt:SHAPe:RDELay	896
:BURSt:SHAPe:RISE:DELay	896
:BURSt:SHAPe:RISE:TIME	897
:BURSt:SHAPe:RTIME	898
:BURSt:SHAPe[:TYPE]	898
:BURSt[:STATE]	899
:CHANnel	899
:DATA	900
:DATA:PRAM	900
:DATA:FIX4	901
:DEFault	901
:EDATa:DELay	901
:EDCLock	902
:EREference	902
:EREference:VALue	903
:FILTer	903
:IQ:SCALE	904
:MODulation:FSK[:DEViation]	904
:MODulation:MSK[:PHASe]	905
:MODulation:UFSK	905

Contents

:MODulation:UIQ	906
:MODulation[:TYPE]	906
:POLarity[:ALL]	907
:SECondary:RECall	907
:SECondary:SAVE	907
:SECondary:TRIGger[:SOURce]	908
:SECondary[:STATE]	908
:SLOT[1]|2|3|4:DCCustom	908
:SLOT[1]|2|3|4:DCCustom:FIX4	909
:DCNormal:B1	909
:DCNormal:B2	910
:SLOT[1]|2|3|4:DCNormal:TSEQuence	910
:SLOT[1]|2|3|4:DCNormal[:DATA]	910
:SLOT[1]|2|3|4:DCNormal[:DATA]:FIX4	911
:SLOT[1]|2|3|4:DCSync:B	911
:SLOT[1]|2|3|4:DCSync:FCOR	912
:SLOT[1]|2|3|4:DCSync:SSB	912
:SLOT[1]|2|3|4:DCSync:STS	912
:SLOT[1]|2|3|4:DCSync[:DATA]	913
:SLOT[1]|2|3|4:DCSync[:DATA]:FIX4	913
:SLOT[1]|2|3|4:DDCustom	914
:SLOT[1]|2|3|4:DDCustom:FIX4	914
:SLOT[1]|2|3|4:DDNormal:B1	914
:SLOT[1]|2|3|4:DDNormal:B2	915
:SLOT[1]|2|3|4:DDNormal:TSEQuence	915
:SLOT[1]|2|3|4:DDNormal[:DATA]	916
:SLOT[1]|2|3|4:DDNormal[:DATA]:FIX4	916
:SLOT[1]|2|3|4:DDSync:B	917
:SLOT[1]|2|3|4:DDSync:FCOR	917
:SLOT[1]|2|3|4:DDSync:SSB	917
:SLOT[1]|2|3|4:DDSync:STS	918
:SLOT[1]|2|3|4:DDSync[:DATA]	918
:SLOT[1]|2|3|4:DDSync[:DATA]:FIX4	918
:SLOT[1]|2|3|4:POWer	919
:SLOT[1]|2|3|4:STATE	919
:SLOT[1]|2|3|4:UC1:TSEQuence	919
:SLOT[1]|2|3|4:UC1[:DATA]	920
:SLOT[1]|2|3|4:UC1[:DATA]:FIX4	920

:SLOT[1]|2|3|4:UC2:TSEquence	920
:SLOT[1]|2|3|4:UC2[:DATA]	921
:SLOT[1]|2|3|4:UC2[:DATA]:FIX4	921
:SLOT[1]|2|3|4:UCUStom	922
:SLOT[1]|2|3|4:UCUStom:FIX4	922
:SLOT[1]|2|3|4:UNORmal:TSEquence	922
:SLOT[1]|2|3|4:UNORmal[:DATA]	923
:SLOT[1]|2|3|4:UNORmal[:DATA]:FIX4	923
:SLOT[1]|2|3|4[:TYPE]	924
:SOUT	924
:SOUT:OFFSet	925
:SOUT:SLOT	926
:SRATe	926
:TRIGger:TYPE	928
:TRIGger:TYPE:CONTInuous[:TYPE]	928
:TRIGger:TYPE:GATE:ACTive	929
:TRIGger[:SOURce]	930
:TRIGger[:SOURce]:EXTernal:DELay	931
:TRIGger[:SOURce]:EXTernal:DELay:STATe	931
:TRIGger[:SOURce]:EXTernal:SLOPe	932
:TRIGger[:SOURce]:EXTernal[:SOURce]	933
[:STATe]	933
Wideband CDMA Base Band Generator Subsystem–Option 400	
([:SOURce]:RADio:WCDMa:TGPP[:BBG])	934
:BBCLock	934
:BBCLock:EXT:RATE	934
:DLINK:APPLy	935
:DLINK:AWGN:CN	935
:DLINK:AWGN:CPOWer	935
:DLINK:AWGN:ECNO	936
:DLINK:AWGN:ECRPower	936
:DLINK:AWGN:ECRef	936
:DLINK:AWGN:FNBW	937
:DLINK:AWGN:NPOWer	937
:DLINK:AWGN:TICPower	937
:DLINK:AWGN[:STATe]	938
:DLINK:BBCLock	938
:DLINK:CARB:CMODE:CCODE	938
:DLINK:CARB:CMODE:DATA	938

Contents

:DLINK:CARB:CMODE:FOFFset	939
:DLINK:CARB:CMODE:FSTRuct	939
:DLINK:CARB:CMODE:POWer	940
:DLINK:CARB:CMODE:PRATio	940
:DLINK:CARB:CMODE:SCTYpe	940
:DLINK:CARB:CMODE:SFORmat	941
:DLINK:CARB:CMODE:SSCodeos	941
:DLINK:CARB:CMODE:TFIRst	942
:DLINK:CARB:CMODE:TGL	942
:DLINK:CARB:CMODE[:STATe]	942
:DLINK:CPICH:CCODE	942
:DLINK:CPICH:POWer	943
:DLINK:CPICH[:STATe]	943
:DLINK:CRATe	943
:DLINK:DPCH[1]:BALance	944
:DLINK:DPCH[1]:BINitialize	944
:DLINK:DPCH[1]2:ALL[:STATe]	944
:DLINK:DPCH[1]2:CCODE	945
:DLINK:DPCH[1]2:DATA	945
:DLINK:DPCH[1]2:DATA:FIX4	946
:DLINK:DPCH[1]2:POWer	946
:DLINK:DPCH[1]2:RCSetup	947
:DLINK:DPCH[1]2:SLOTformat	948
:DLINK:DPCH[1]2:SRATe	948
:DLINK:DPCH[1]2:SSCodeos	948
:DLINK:DPCH[1]2:TFCl:PATtern	949
:DLINK:DPCH[1]2:TOFFset	949
:DLINK:DPCH[1]2:TPC:NUMSteps	950
:DLINK:DPCH[1]2:TPC:PATtern	950
:DLINK:DPCH[1]2[:STATe]	951
:DLINK:FILTer	951
:DLINK:FILTer:ALPHa	952
:DLINK:FILTer:BBT	952
:DLINK:FILTer:CHANnel	953
:DLINK:MSYNc	953
:DLINK:OCNS[1]2|3|4|5|6|7|8|9|10|11|12|13|14|15|16:ALL[:STATe]	953
:DLINK:OCNS[1]2|3|4|5|6|7|8|9|10|11|12|13|14|15|16:CCODE	954
:DLINK:OCNS[1]2|3|4|5|6|7|8|9|10|11|12|13|14|15|16:DATA	954

:DLINK:OCNS[1]|2|3|4|5|6|7|8|9|10|11|12|13|14|15|16:POWer	954
:DLINK:OCNS[1]|2|3|4|5|6|7|8|9|10|11|12|13|14|15|16:SRATe	955
:DLINK:OCNS[1]|2|3|4|5|6|7|8|9|10|11|12|13|14|15|16:SSCodeos	955
:DLINK:OCNS[1]|2|3|4|5|6|7|8|9|10|11|12|13|14|15|16:TOFFset	956
:DLINK:OCNS[1]|2|3|4|5|6|7|8|9|10|11|12|13|14|15|16[:STATe]	956
:DLINK:OOSTest[:STATe]	956
:DLINK:OOSTest:DTXGate:POLarity	957
:DLINK:PADJust	957
:DLINK:PCCPch:BCHData	957
:DLINK:PCCPch:BCHData:FIX4	958
:DLINK:PCCPch:CCODE	958
:DLINK:PCCPch:POWer	958
:DLINK:PCCPch[:STATe]	959
:DLINK:PICH:CCODE	959
:DLINK:PICH:DATA	959
:DLINK:PICH:DATA:FIX4	960
:DLINK:PICH:PIBits	960
:DLINK:PICH:PINDicator	960
:DLINK:PICH:POWer	961
:DLINK:PICH[:STATe]	961
:DLINK:POLarity	961
:DLINK:PSCH:POWer	962
:DLINK:PSCH[:STATe]	962
:DLINK:RPANel:INPut:ALTPower	962
:DLINK:RPANel:INPut:BBGRef	963
:DLINK:RPANel:INPut:BGATe	963
:DLINK:RPANel:INPut:PTRigger1	963
:DLINK:RPANel:INPut:PTRigger2	964
:DLINK:RPANel:OUTPut:DCLock	964
:DLINK:RPANel:OUTPut:DOUT	966
:DLINK:RPANel:OUTPut:EVENT1	967
:DLINK:RPANel:OUTPut:EVENT2	967
:DLINK:RPANel:OUTPut:EVENT3	968
:DLINK:RPANel:OUTPut:EVENT4	968
:DLINK:RPANel:OUTPut:SSYNc	969
:DLINK:SCH[:STATe]	969
:DLINK:SCRamblecode	969
:DLINK:SDElay	970

Contents

:DLINK:SSCH:POWer	970
:DLINK:SSCH:SSGRoup	970
:DLINK:SSCH[:STATe]	971
:DLINK:TGAP:FSTRuct	971
:DLINK:TGAP:POFFset	971
:DLINK:TGAP:PSI[1]:CFN	972
:DLINK:TGAP:PSI[1]:CMMethod	972
:DLINK:TGAP:PSI[1]:D	973
:DLINK:TGAP:PSI[1]:L1	973
:DLINK:TGAP:PSI[1]:L2	973
:DLINK:TGAP:PSI[1]:PL1	974
:DLINK:TGAP:PSI[1]:PL2	974
:DLINK:TGAP:PSI[1]:PRC	975
:DLINK:TGAP:PSI[1]:PS	975
:DLINK:TGAP:PSI[1]:SN	975
:DLINK:TGAP:RPARameter	976
:DLINK:TGAP:SCFN	976
:DLINK:TGAP:STARt:TRIGger	977
:DLINK:TGAP:STARt:TRIGger:POLarity	977
:DLINK:TGAP:STOP:TRIGger	977
:DLINK:TGAP:STOP:TRIGger:POLarity	978
:DLINK:TGAP[:STATe]	978
:DLINK:TSETup	979
:DLINK:TXDV	980
:DLINK[:TGRoup [A]B]:DCH[1]2|3|4|5|6:BLKSize	980
:DLINK[:TGRoup [A]B]:DCH[1]2|3|4|5|6:BPFRame	981
:DLINK[:TGRoup [A]B]:DCH[1]2|3|4|5|6:BRATe	981
:DLINK[:TGRoup [A]B]:DCH[1]2|3|4|5|6:BSSize	981
:DLINK[:TGRoup [A]B]:DCH[1]2|3|4|5|6:CODE	982
:DLINK[:TGRoup [A]B]:DCH[1]2|3|4|5|6:CRC	982
:DLINK[:TGRoup [A]B]:DCH[1]2|3|4|5|6:DATA	983
:DLINK[:TGRoup [A]B]:DCH[1]2|3|4|5|6:DATA:EINsert	983
:DLINK[:TGRoup [A]B]:DCH[1]2|3|4|5|6:DATA:FIX4	984
:DLINK[:TGRoup [A]B]:DCH[1]2|3|4|5|6:NBLocks	984
:DLINK[:TGRoup [A]B]:DCH[1]2|3|4|5|6:POSition	985
:DLINK[:TGRoup [A]B]:DCH[1]2|3|4|5|6:PPERcentage	985
:DLINK[:TGRoup [A]B]:DCH[1]2|3|4|5|6:RMATch	985
:DLINK[:TGRoup [A]B]:DCH[1]2|3|4|5|6:TTI	986

:DLINK[:TGRoup [A]|B]:DCH[1]|2|3|4|5|6[:STATe]	986
:LINK	987
:POLarity[:ALL]	987
:ULINK:APPLy	987
:ULINK:AWGN:CN	988
:ULINK:AWGN:CPOWer	988
:ULINK:AWGN:DRATe	988
:ULINK:AWGN:EBNO	989
:ULINK:AWGN:EBRef	990
:ULINK:AWGN:FNBW	990
:ULINK:AWGN:NPOWer	991
:ULINK:AWGN:TICPower	991
:ULINK:AWGN[:STATe]	991
:ULINK:CRATe	992
:ULINK:DPCCh:BETA	992
:ULINK:DPCCh:CCODE	993
:ULINK:DPCCh:DATA	993
:ULINK:DPCCh:DATA:FIX4	994
:ULINK:DPCCh:FBI:PATtern	994
:ULINK:DPCCh:FBI:PATtern:FIX	995
:ULINK:DPCCh:FBI[:STATe]	995
:ULINK:DPCCh:POWer	996
:ULINK:DPCCh:RATE	996
:ULINK:DPCCh:SLOTformat	996
:ULINK:DPCCh:TFCI:PATtern	997
:ULINK:DPCCh:TFCI:PATtern:FIX	997
:ULINK:DPCCh:TFCI[:STATe]	998
:ULINK:DPCCh:TPC:NSTeps	998
:ULINK:DPCCh:TPC:PATtern	999
:ULINK:DPCCh:TPC:PATtern:FIX4	1000
:ULINK:DPCCh:TPC:PATtern:TRIGger:POLarity	1000
:ULINK:DPCCh:TPC:PATtern:TRIGger[:STATe]	1001
:ULINK:DPCCh:TPOWer	1001
:ULINK:DPCCh[:STATe]	1002
:ULINK:DPDCh:BETA	1002
:ULINK:DPDCh:CCODE	1003
:ULINK:DPDCh:DATA	1004
:ULINK:DPDCh:DATA:FIX4	1004

Contents

:ULINK:DPDCh:POWer	1005
:ULINK:DPDCh:RATE	1005
:ULINK:DPDCh:RBER	1006
:ULINK:DPDCh:SLOTformat	1007
:ULINK:DPDCh:TBER[:CLENgth]	1008
:ULINK:DPDCh:TBER:ELENgth	1008
:ULINK:DPDCh:TPOWer	1009
:ULINK:DPDCh[:STATe]	1009
:ULINK:FCLock:INTerval	1009
:ULINK:FCLock:POLarity	1010
:ULINK:FILTer	1010
:ULINK:FILTer:ALPHa	1011
:ULINK:FILTer:BBT	1012
:ULINK:FILTer:CHANnel	1012
:ULINK:FOFFset	1012
:ULINK:PADJust	1013
:ULINK:PHYSical[1]:TYPE	1013
:ULINK:PMODE:TPControl:HOLD	1014
:ULINK:PMODE:TPControl:POWER:INITial	1014
:ULINK:PMODE:TPControl:POWER:MAXimum	1015
:ULINK:PMODE:TPControl:POWER:MINimum	1015
:ULINK:PMODE:TPControl:POWER:RESet	1016
:ULINK:PMODE:TPControl:POWER:STEP	1016
:ULINK:PMODE:TPControl:TRIGger:POLarity	1017
:ULINK:PMODE[:SElect]	1017
:ULINK:PRACH:AICH:NUMBer	1018
:ULINK:PRACH:AICH:POLarity	1018
:ULINK:PRACH:AWGN:CN	1019
:ULINK:PRACH:AWGN:CPOWer	1019
:ULINK:PRACH:AWGN:DRATE	1019
:ULINK:PRACH:AWGN:EBNO	1020
:ULINK:PRACH:AWGN:ECNO	1020
:ULINK:PRACH:AWGN:EREF	1021
:ULINK:PRACH:AWGN:NPOWer	1021
:ULINK:PRACH:AWGN:TICPower	1022
:ULINK:PRACH:AWGN[:STATe]	1022
:ULINK:PRACH:MESSAge:CPART:BETA	1023
:ULINK:PRACH:MESSAge:CPART:DATA	1023

:ULINK:PRACH:MESSAge:CPART:DATA:FIX4	1024
:ULINK:PRACH:MESSAge:CPART:POWer	1024
:ULINK:PRACH:MESSAge:CPART:RATE	1025
:ULINK:PRACH:MESSAge:CPART:SLOTformat	1025
:ULINK:PRACH:MESSAge:CPART:TFCI:PATtern	1026
:ULINK:PRACH:MESSAge:CPART:TFCI:PATtern:FIX	1026
:ULINK:PRACH:MESSAge:CPART:TFCI[:STATe]	1027
:ULINK:PRACH:MESSAge:DPART:BETA	1027
:ULINK:PRACH:MESSAge:DPART:DATA	1028
:ULINK:PRACH:MESSAge:DPART:DATA:FIX4	1028
:ULINK:PRACH:MESSAge:DPART:POWer	1029
:ULINK:PRACH:MESSAge:DPART:RATE	1030
:ULINK:PRACH:MESSAge:DPART:SLOTformat	1031
:ULINK:PRACH:MODE[:SElect]	1032
:ULINK:PRACH:MULTi:MESSAge:TPOWer	1032
:ULINK:PRACH:MULTi:MESSAge[:STATe]	1033
:ULINK:PRACH:MULTi:NUMBer	1033
:ULINK:PRACH:MULTi:PREamble:NUMBer	1034
:ULINK:PRACH:MULTi:PREamble:POWer:INITial	1034
:ULINK:PRACH:MULTi:PREamble:POWer:MAX	1034
:ULINK:PRACH:MULTi:PREamble:POWer:RSTep	1035
:ULINK:PRACH:MULTi:PREamble:PPM	1035
:ULINK:PRACH:MULTi:UE[1]|2|3|4|5|6|7|8:MESSAge:CPART:CCODE	1035
:ULINK:PRACH:MULTi:UE[1]|2|3|4|5|6|7|8:MESSAge:DPART:CCODE	1036
:ULINK:PRACH:MULTi:UE[1]|2|3|4|5|6|7|8:PREamble:SIGNature	1036
:ULINK:PRACH:MULTi:UE[1]|2|3|4|5|6|7|8:SPOsition[1]|2|3|4|5|6|7|8[:ASLot]	1037
:ULINK:PRACH:MULTi:UE[1]|2|3|4|5|6|7|8[:STATe]	1038
:ULINK:PRACH:PREamble:POWer:AVERAge	1038
:ULINK:PRACH:PREamble:POWer:MODE	1039
:ULINK:PRACH:RPARAmeter	1040
:ULINK:PRACH:SCRamblecode	1040
:ULINK:PRACH:SDELay	1041
:ULINK:PRACH:SUBChannel	1041
:ULINK:PRACH:TOFFset	1042
:ULINK:PRACH:TPA	1042
:ULINK:PRACH:TPM	1043
:ULINK:PRACH:TPOWer	1043
:ULINK:PRACH:TPP	1044

Contents

:ULINK:PRACH:TRIGGER	1044
:ULINK:PRACH:TRIGGER:POLARITY	1045
:ULINK:PRACH:TRIGGER:SOURCE	1045
:ULINK:PRACH:TTI	1046
:ULINK:PRACH[:SINGLE]:MESSAGE[:STATE]	1046
:ULINK:PRACH[:SINGLE]:NUMBER	1047
:ULINK:PRACH[:SINGLE]:MESSAGE:CPART:CCODE	1047
:ULINK:PRACH[:SINGLE]:MESSAGE:DPART:CCODE	1048
:ULINK:PRACH[:SINGLE]:MESSAGE:TPOWER	1049
:ULINK:PRACH[:SINGLE]:NUMBER	1049
:ULINK:PRACH[:SINGLE]:PREAMBLE:NUMBER	1050
:ULINK:PRACH[:SINGLE]:PREAMBLE:POWER:INITIAL	1050
:ULINK:PRACH[:SINGLE]:PREAMBLE:POWER:MAX	1050
:ULINK:PRACH[:SINGLE]:PREAMBLE:POWER:RSTEP	1051
:ULINK:PRACH[:SINGLE]:PREAMBLE:PPM	1052
:ULINK:PRACH[:SINGLE]:PREAMBLE:SIGNATURE	1052
:ULINK:RMCHANNEL	1053
:ULINK:RPANEL:DPCH:INPUT:ALTPower	1054
:ULINK:RPANEL:DPCH:INPUT:BBGRef	1054
:ULINK:RPANEL:DPCH:INPUT:BGATE	1054
:ULINK:RPANEL:DPCH:INPUT:PTRigger1	1055
:ULINK:RPANEL:DPCH:INPUT:PTRigger2	1055
:ULINK:RPANEL:DPCH:OUTPUT:DCLOCK	1055
:ULINK:RPANEL:DPCH:OUTPUT:DOUT	1057
:ULINK:RPANEL:DPCH:OUTPUT:EVENT1	1057
:ULINK:RPANEL:DPCH:OUTPUT:EVENT2	1058
:ULINK:RPANEL:DPCH:OUTPUT:EVENT3	1058
:ULINK:RPANEL:DPCH:OUTPUT:EVENT4	1059
:ULINK:RPANEL:DPCH:OUTPUT:SSYNc	1059
:ULINK:RPANEL:PRACH:INPUT:ALTPower	1060
:ULINK:RPANEL:PRACH:INPUT:BBGRef	1060
:ULINK:RPANEL:PRACH:INPUT:BGATE	1060
:ULINK:RPANEL:PRACH:INPUT:PTRigger1	1061
:ULINK:RPANEL:PRACH:INPUT:PTRigger2	1061
:ULINK:RPANEL:PRACH:OUTPUT:DCLOCK	1062
:ULINK:RPANEL:PRACH:OUTPUT:DOUT	1064
:ULINK:RPANEL:PRACH:OUTPUT:EVENT1	1064
:ULINK:RPANEL:PRACH:OUTPUT:EVENT2	1065

:ULINK:RPANel:PRACH:OUTPut:EVENT3	1066
:ULINK:RPANel:PRACH:OUTPut:EVENT4	1067
:ULINK:RPANel:PRACH:OUTPut:SSYNc	1068
:ULINK:SCRamblecode	1068
:ULINK:SDElay	1069
:ULINK:SFNRst:POLarity	1069
:ULINK:SYNC:MODE	1070
:ULINK:SYNC[:SOURce]	1070
:ULINK:TGAP:POFFset	1071
:ULINK:TGAP:PSI[1]|2|3|4|5|6:CFN	1071
:ULINK:TGAP:PSI[1]:CMMethod	1072
:ULINK:TGAP:PSI[1]|2|3|4|5|6:D	1072
:ULINK:TGAP:PSI[1]|2|3|4|5|6:L1	1073
:ULINK:TGAP:PSI[1]|2|3|4|5|6:L2	1073
:ULINK:TGAP:PSI[1]|2|3|4|5|6:PL1	1073
:ULINK:TGAP:PSI[1]|2|3|4|5|6:PL2	1074
:ULINK:TGAP:PSI[1]|2|3|4|5|6:POWer	1074
:ULINK:TGAP:PSI[1]|2|3|4|5|6:PRC	1075
:ULINK:TGAP:PSI[1]|2|3|4|5|6:PS	1075
:ULINK:TGAP:PSI[1]|2|3|4|5|6:SN	1076
:ULINK:TGAP:RPARameter	1076
:ULINK:TGAP:SCFN	1076
:ULINK:TGAP[:STATe]	1077
:ULINK:TGAP:STARt:TRIGger	1077
:ULINK:TGAP:STARt:TRIGger:POLarity	1078
:ULINK:TGAP:STOP:TRIGger	1078
:ULINK:TGAP:STOP:TRIGger:POLarity	1078
:ULINK:TOFFset	1079
:ULINK:TSTatus:COMPressed	1079
:ULINK:TSTatus:RACH	1079
:ULINK:TSTatus:RECeive	1080
:ULINK:TSTatus:SYNC	1080
:ULINK:[TGRoup[1]]:DCH[1]|2|3|3|5|6:BLKSize	1080
:ULINK[:TGRoup[1]]:DCH[1]|2|3|4|5|6:BPFRame	1081
:ULINK[:TGRoup[1]]:DCH[1]|2|3|4|5|6:BRATe	1081
:ULINK:[TGRoup[1]]:DCH[1]|2|3|3|5|6:CODE	1081
:ULINK:[TGRoup[1]]:DCH[1]|2|3|3|5|6:CRc	1082
:ULINK:[TGRoup[1]]:DCH[1]|2|3|3|5|6:DATA	1082

Contents

:ULINK[:TGRoup[1]]:DCH[1]|2|3|4|5|6:DATA:BER:ACTual	1083
:ULINK[:TGRoup[1]]:DCH[1]|2|3|4|5|6:DATA:BER:ERRor:BIT	1083
:ULINK[:TGRoup[1]]:DCH[1]|2|3|4|5|6:DATA:BER:TOTal:BIT	1083
:ULINK[:TGRoup[1]]:DCH[1]|2|3|4|5|6:DATA:BER[:VALue]	1084
:ULINK[:TGRoup[1]]:DCH[1]|2|3|4|5|6:DATA:BLER:ACTual	1084
:ULINK[:TGRoup[1]]:2:DCH[1]|2|3|4|5|6:DATA:BLER:ERRor:BLOCK	1084
:ULINK[:TGRoup[1]]:2:DCH[1]|2|3|4|5|6:DATA:BLER:TOTal:BLOCK	1085
:ULINK[:TGRoup[1]]:DCH[1]|2|3|4|5|6:DATA:BLER[:VALue]	1085
:ULINK[:TGRoup[1]]:DCH[1]|2|3|4|5|6:DATA:EINSert	1086
:ULINK[:TGRoup[1]]:DCH[1]|2|3|4|5|6:DATA:FIX4	1086
:ULINK[:TGRoup[1]]:DCH[1]|2|3|4|5|6:NBLock	1087
:ULINK[:TGRoup [1]]:DCH[1]|2|3|4|5|6:PPERcentage	1087
:ULINK[:TGRoup[1]]:DCH[1]|2|3|4|5|6:RMATch	1087
:ULINK[:TGRoup[1]]:DCH[1]|2|3|4|5|6:TTI	1088
:ULINK[:TGRoup[1]]:DCH[1]|2|3|4|5|6[:STATe]	1088
:ULINK[:TGRoup[1]]:RACH[1]:BLKSize	1089
:ULINK[:TGRoup [1]]:RACH[1]:BPF rame	1089
:ULINK[:TGRoup [1]]:RACH[1]:BRATe	1089
:ULINK[:TGRoup[1]]:RACH[1]:CODE	1090
:ULINK[:TGRoup[1]]:RACH[1]:CRC	1090
:ULINK[:TGRoup[1]]:RACH[1]:DATA	1090
:ULINK[:TGRoup[1]]:RACH[1]:DATA:BER:ACTual	1091
:ULINK[:TGRoup[1]]:RACH[1]:DATA:BER:ERRor:BIT	1091
:ULINK[:TGRoup[1]]:RACH[1]:DATA:BER:TOTal:BIT	1091
:ULINK[:TGRoup[1]]:RACH[1]:DATA:BER[:VALue]	1092
:ULINK[:TGRoup[1]]:RACH[1]:DATA:BLER:ACTual	1092
:ULINK[:TGRoup[1]]:RACH[1]:DATA:BLER:ERRor:BLOCK	1092
:ULINK[:TGRoup[1]]:RACH[1]:DATA:BLER:TOTal:BLOCK	1093
:ULINK[:TGRoup[1]]:RACH[1]:DATA:BLER[:VALue]	1093
:ULINK[:TGRoup[1]]:RACH[1]:DATA:EINSert	1094
:ULINK[:TGRoup[1]]:RACH[1]:DATA:FIX4	1094
:ULINK[:TGRoup[1]]:RACH[1]:NBLock	1095
:ULINK[:TGRoup [1]]:RACH[1]:PPERcentage	1095
:ULINK[:TGRoup[1]]:RACH[1]:RMATch	1095
:ULINK[:TGRoup[1]]:RACH[1]:TTI	1096
:ULINK[:TGRoup[1]]:RACH[1][:STATe]	1096
[:STATe]	1096

1 SCPI Basics

This chapter describes how SCPI information is organized and presented in this guide. An overview of the SCPI language is also provided. This Chapter contains the following major sections:

- [“Command Reference Information” on page 2](#)
- [“SCPI Basics” on page 3](#)

Command Reference Information

SCPI Command Listings

The Table of Contents lists the Standard Commands for Programmable Instruments (SCPI) without the parameters. The SCPI subsystem name will generally have the first part of the command in parenthesis that is repeated in all commands within the subsystem. The title(s) beneath the subsystem name is the remaining command syntax. The following example demonstrates this listing:

```
Communication Subsystem (:SYSTem:COMMunicate)
:PMETer:CHANnel
:SERial:ECHO
```

The following examples show the complete commands from the above Table of Contents listing:

```
:SYSTem:COMMunicate:PMETer:CHANnel
:SYSTem:COMMunicate:SERial:ECHO
```

Key and Data Field Cross Reference

The index is set up so applicable key and data field names can be cross-referenced to the appropriate SCPI command. There are two headings in the index where the key and data field names can be found:

- individual softkey, hardkey, or data field name
- subsystem name

Supported Field

Within each command section, the Supported heading describes which signal generator configurations are supported by the SCPI command. When “All” is shown next to this heading, all signal generator configurations are supported by the SCPI command. When “All with Option xxx” is shown next to this heading, only the stated option(s) is supported.

SCPI Basics

This section describes the general use of the SCPI language for the ESG. It is not intended to teach you everything about the SCPI language; the SCPI Consortium or IEEE can provide that level of detailed information. For a list of the specific commands available for the signal generator, refer to the table of contents.

For additional information, refer to the following publications:

- IEEE Standard 488.1-1987, IEEE Standard Digital Interface for Programmable Instrumentation. New York, NY, 1998.
- IEEE Standard 488.2-1992, IEEE Standard Codes, Formats, Protocols and Command Commands for Use with ANSI/IEEE Standard 488.1-1987. New York, NY, 1998.

Common Terms

The following terms are used throughout the remainder of this section:

Command	A command is an instruction in SCPI consisting of mnemonics (keywords), parameters (arguments), and punctuation. You combine commands to form messages that control instruments.
Controller	A controller is any device used to control the signal generator, for example a computer or another instrument.
Event Command	Some commands are events and cannot be queried. An event has no corresponding setting; it initiates an action at a particular time.
Program Message	A program message is a combination of one or more properly formatted commands. Program messages are sent by the controller to the signal generator.
Query	A query is a special type of command used to instruct the signal generator to make response data available to the controller. A query ends with a question mark. Generally you can query any command value that you set.
Response Message	A response message is a collection of data in specific SCPI formats sent from the signal generator to the controller. Response messages tell the controller about the internal state of the signal generator.

Command Syntax

A typical command is made up of keywords prefixed with colons (:). The keywords are followed by parameters. The following is an example syntax statement:

```
[ :SOURce ] :POWer [ :LEVeL ] MAXimum | MINimum
```

In the example above, the [:LEVeL] portion of the command immediately follows the :POWer portion with no separating space. The portion following the [:LEVeL], MINimum | MAXimum, are the parameters (argument for the command statement). There is a separating space (white space) between the command and its parameter.

Additional conventions in syntax statements are shown in [Table 1-1](#) and [Table 1-2](#).

Table 1-1 Special Characters in Command Syntax

Characters	Meaning	Example
|	A vertical stroke between keywords or parameters indicates alternative choices. For parameters, the effect of the command varies depending on the choice.	[:SOURce] :AM: MOD DEEP | NORMAl DEEP or NORMAl are the choices.
[]	Square brackets indicate that the enclosed keywords or parameters are optional when composing the command. These implied keywords or parameters will be executed even if they are omitted.	[:SOURce] :FREQuency [:CW] ? SOURce and CW are optional items.
< >	Angle brackets around a word (or words) indicate they are not to be used literally in the command. They represent the needed item.	[:SOURce] :FREQuency : START <val> <unit> In this command, the words <val> and <unit> should be replaced by the actual frequency and unit. :FREQuency : START 2.5GHZ
{ }	Braces indicate that parameters can optionally be used in the command once, several times, or not at all.	[:SOURce] :LIST : POWER <val> { , <val> } a single power listing: LIST : POWER 5 a series of power listings: LIST : POWER 5 , 10 , 15 , 20

Table 1-2 Command Syntax

Characters, Keywords, and Syntax	Example
Upper-case lettering indicates the minimum set of characters required to execute the command.	[:SOURce] :FREQuency [:CW] ? , FREQ is the minimum requirement.
Lower-case lettering indicates the portion of the command that is optional; it can either be included with the upper-case portion of the command or omitted. This is the flexible format principle called forgiving listening. Refer to “Command Parameters and Responses” on page 7 for more information.	:FREQuency Either :FREQ, :FREQuency, or :FREQUENCY is correct.
When a colon is placed between two command mnemonics, it moves the current path down one level in the command tree. Refer to “Command Tree” on page 6 more information on command paths.	:TRIGger :OUTPut :POLarity? TRIGger is the root level keyword for this command.
If a command requires more than one parameter, you must separate adjacent parameters using a comma. Parameters are not part of the command path, so commas do not affect the path level.	[:SOURce] :LIST: DWELl <val> { , <val> }
A semicolon separates two commands in the same program message without changing the current path.	:FREQ 2.5GHZ ; :POW 10DBM
White space characters, such as <tab> and <space>, are generally ignored as long as they do not occur within or between keywords. However, you must use white space to separate the command from the parameter, but this does not affect the current path.	:FREQ uency or :POWER :LEVel are not allowed. A <space> between :LEVel and 6.2 is mandatory . :POWER :LEVel 6.2

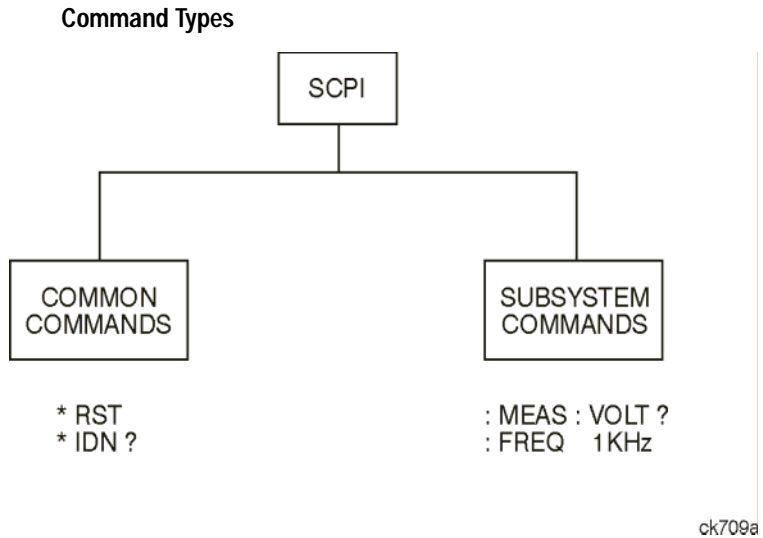
Command Types

Commands can be separated into two groups: common commands and subsystem commands. [Figure 1-1](#), shows the separation of the two command groups.

Common commands are used to manage macros, status registers, synchronization, and data storage and are defined by IEEE 488.2. They are easy to recognize because they all begin with an asterisk. For example *IDN?, *OPC, and *RST are common commands. Common commands are not part of any subsystem and the signal generator interprets them in the same way, regardless of the current path setting.

Subsystem commands are distinguished by the colon (:). The colon is used at the beginning of a command statement and between keywords, as in :FREQUency[:CW?]. Each command subsystem is a set of commands that roughly correspond to a functional block inside the signal generator. For example, the power subsystem (:POWeR) contains commands for power generation, while the status subsystem (:STATus) contains commands for controlling status registers.

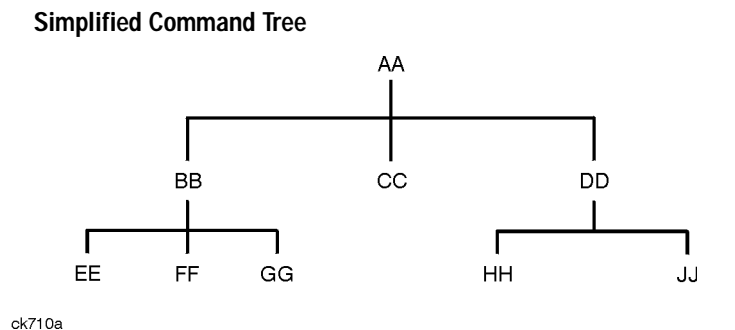
Figure 1-1



Command Tree

Most programming tasks involve subsystem commands. SCPI uses a structure for subsystem commands similar to the file systems on most computers. In SCPI, this command structure is called a command tree and is shown in [Figure 1-2](#).

Figure 1-2



The command closest to the top is the root command, or simply “the root.” Notice that you must follow a particular path to reach lower level commands. In the following example, :POWeR represents AA, :ALC

represents BB, :SOURCE represents GG. The complete command path is :POWER:ALC:SOURCE? (:AA:BB:GG).

Paths Through the Command Tree

To access commands from different paths in the command tree, you must understand how the signal generator interprets commands. The parser, a part of the signal generator firmware, decodes each message sent to the signal generator. The parser breaks up the message into component commands using a set of rules to determine the command tree path used. The parser keeps track of the current path (the level in the command tree) and where it expects to find the next command statement. This is important because the same keyword may appear in different paths. The particular path is determined by the keyword(s) in the command statement.

A message terminator, such as a <new line> character, sets the current path to the root. Many programming languages have output statements that automatically send message terminators.

NOTE The current path is set to the root after the line-power is cycled or when *RST is sent.

Command Parameters and Responses

SCPI defines different data formats for use in program and response messages. It does this to accommodate the principle of forgiving listening and precise talking. For more information on program data types refer to IEEE 488.2.

Forgiving listening means the command and parameter formats are flexible.

For example, with the :FREQUENCY:REFERENCE:STATE ON|OFF|1|0 command, the signal generator accepts :FREQUENCY:REFERENCE:STATE ON, :FREQUENCY:REFERENCE:STATE 1, :FREQ:REF:STAT ON, :FREQ:REF:STAT 1 to turn on the frequency reference mode.

Each parameter type has one or more corresponding response data types. A setting that you program using a numeric parameter returns either real or integer response data when queried. Response data (data returned to the controller) is more concise and restricted, and is called precise talking.

Precise talking means that the response format for a particular query is always the same.

For example, if you query the power state (:POWER:ALC:STATE?) when it is on, the response is always 1, regardless of whether you previously sent :POWER:ALC:STATE 1 or :POWER:ALC:STATE ON. [Table 1-3](#) shows the response for a given parameter type.

Table 1-3 Parameter and Response Types

Parameter Types	Response Data Types
Numeric	Real, Integer
Extended Numeric	Real, Integer
Discrete	Discrete
Boolean	Numeric Boolean
String	String

Numeric Parameters

Numeric parameters are used in both common and subsystem commands. They accept all commonly used decimal representations of numbers including optional signs, decimal points, and scientific notation.

If a signal generator setting is programmed with a numeric parameter which can only assume a finite value, it automatically rounds any entered parameter which is greater or less than the finite value. For example, if a signal generator has a programmable output impedance of 50 or 75 ohms, and you specified 76.1 for the output impedance, the value is rounded to 75. The following are examples of numeric parameters:

- 100 no decimal point required
- 100. fractional digits optional
- 1.23 leading signs allowed
- 4.56E<space>3 space allowed after the E in exponential
- 7.89E-001 use either E or e in exponential
- +256 leading + allowed
- .5 digits left of decimal point optional

Extended Numeric Parameters

Most subsystems use extended numeric parameters to specify physical quantities. Extended numeric parameters accept all numeric parameter values and other special values as well.

The following are examples of extended numeric parameters:

100	any simple numeric value
1.2GHZ	GHZ can be used for exponential (E009)
200MHZ	MHZ can be used for exponential (E006)
-100mV	negative 100 millivolts
10DEG	10 degrees

Extended numeric parameters also include the following special parameters:

DEfault	resets the parameter to its default value
UP	increments the parameter
DOWN	decrements the parameter
MINimum	sets the parameter to the smallest possible value
MAXimum	sets the parameter to the largest possible value

Discrete Parameters

Discrete parameters use mnemonics to represent each valid setting. They have a long and a short form, just like command mnemonics. You can mix upper and lower case letters for discrete parameters.

The following examples of discrete parameters are used with the command
:TRIGger[:SEQUence]:SOURce BUS|IMMediate|EXTernal.

BUS	GPIB, LAN, or RS-232 triggering
IMMediate	immediate trigger (free run)
EXTernal	external triggering

Although discrete parameters look like command keywords, do not confuse the two. In particular, be sure to use colons and spaces properly. Use a colon to separate command mnemonics from each other and a space to separate parameters from command mnemonics.

The following are examples of discrete parameters in commands:

```
TRIGger:SOURce BUS
TRIGger:SOURce IMMediate
TRIGger:SOURce EXTernal
```

Boolean Parameters

Boolean parameters represent a single binary condition that is either true or false. The two-state boolean parameter has four arguments. The following list shows the arguments for the two-state boolean parameter:

ON	boolean true, upper/lower case allowed
OFF	boolean false, upper/lower case allowed
1	boolean true
0	boolean false

String Parameters

String parameters allow ASCII strings to be sent as parameters. Single or double quotes are used as delimiters.

The following are examples of string parameters:

```
'This is valid'  
"This is also valid"  
'SO IS THIS'
```

Real Response Data

Real response data represent decimal numbers in either fixed decimal or scientific notation. Most high-level programming languages that support signal generator input/output (I/O) handle either decimal or scientific notation transparently.

The following are examples of real response data:

```
+4.000000E+010, -9.990000E+002  
-9.990000E+002  
+4.00000000000000E+010  
+1  
0
```

Integer Response Data

Integer response data are decimal representations of integer values including optional signs. Most status register related queries return integer response data.

The following are examples of integer response data:

0	signs are optional
+100	leading + allowed
-100	leading - allowed
256	never any decimal point

Discrete Response Data

Discrete response data are similar to discrete parameters. The main difference is that discrete response data only returns the short form of a particular mnemonic, in all upper case letters.

The following are examples of discrete response data:

```

IMM
EXT
INT
NEG
  
```

Numeric Boolean Response Data

Boolean response data returns a binary numeric value of one or zero.

String Response Data

String response data are similar to string parameters. The main difference is that string response data returns double quotes, rather than single quotes. Embedded double quotes may be present in string response data. Embedded quotes appear as two adjacent double quotes with no characters between them.

The following are examples of string response data:

```

"This is a string"
"one double quote inside brackets: [""]"
>Hello!"
  
```

Program Messages

The following commands will be used to demonstrate the creation of program messages:

```
[ :SOURce ] :FREQuency :START      [ :SOURce ] :FREQuency :STOP  
[ :SOURce ] :FREQuency [ :CW ]     [ :SOURce ] :POWer [ :LEVel ] :OFFSet
```

Example 1

```
:FREQuency :START 500MHZ ; STOP 1000MHZ
```

This program message is correct and will not cause errors; `START` and `STOP` are at the same path level. It is equivalent to sending the following message:

```
FREQuency :START 500MHZ ; FREQuency :STOP 1000MHZ
```

Example 2

```
:POWer 10DBM ; :OFFSet 5DB
```

This program message will result in an error. The message makes use of the default `POWER [:LEVel]` node (root command). When using a default node, there is no change to the current path position. Since there is no command `OFFSet` at the root level, an error results.

The following example shows the correct syntax for this program message:

```
:POWer 10DBM ; :POWer :OFFSet 5DB
```

Example 3

```
:POWer :OFFSet 5DB ; POWer 10DBM
```

This program message results in a command error. The path is dropped one level at each colon. The first half of the message drops the command path to the lower level command `OFFSet`; `POWer` does not exist at this level.

The `POWER 10DBM` command is missing the leading colon and when sent, it causes confusion because the signal generator cannot find `POWER` at the `POWER :OFFSet` level. By adding the leading colon, the current path is reset to the root. The following shows the correct program message:

```
:POWer :OFFSet 5DB ; :POWer 10DBM
```

Example 4

```
FREQ 500MHZ ; POW 4DBM
```

In this example, the keyword short form is used. The program message is correct because it utilizes the default nodes of `:FREQ [:CW]` and `:POW [:LEVel]`. Since default nodes do not affect the current path, it is not necessary to use a leading colon before `FREQ` or `POW`.

File Name Variables

File name variables, such as "<file name>", represent three formats, "<file name>", "<file name@file type>", and "</user/file type/file name>". The following shows the file name syntax for the three formats, but uses "FLATCAL" as the file name in place of the variable "<file name>":

```
Format 1      "FLATCAL"
Format 2      "FLATCAL@USERFLAT"
Format 3      "/USER/USERFLAT/FLATCAL"
```

Format 2 uses the file type extension (@USERFLAT) as part of the file name syntax. Format 3 uses the directory path which includes the file name and file type. Use Formats 2 and 3 when the command does not specify the file type. This generally occurs in the Memory (:MEMORY) or Mass Memory (:MMEMORY) subsystems.

The following examples demonstrate a command where Format 1 applies:

Command Syntax with the file name variable

```
:MEMORY:STORE:LIST "<file name>"
```

Command Syntax with the file name

```
:MEMORY:STORE:LIST "SWEEP_1"
```

This command has :LIST in the command syntax. This denotes that "SWEEP_1" will be saved in the :List file type location as a list type file.

The following examples demonstrate a command where Format 2 applies:

Command Syntax with the file name variable

```
:MMEMORY:COPY "<file name>","<file name>"
```

Command Syntax with the file name

```
:MMEMORY:COPY "FLATCAL@USERFLAT", "FLAT_2CAL@USERFLAT"
```

This command cannot distinguish which file type "FLATCAL" belongs to without the file type extension (@USERFLAT). If this command were executed without the extension, the command would assume the file type was Binary.

The following examples demonstrate a command where format 3 applies:

Command Syntax with the file name variable

```
:MMEMory:DATA "/USER/BBG1/WAVEFORM/<file name>" ,#ABC
```

alternate command syntax:

```
:MMEMory:DATA "WF1:<file name>" ,#ABC
```

Command Syntax with the file name

```
:MMEMory:DATA "/USER/BBG1/WAVEFORM/FLATCAL" ,#ABC
```

alternate command syntax:

```
:MMEMory:DATA "WF1:FLATCAL" ,#ABC
```

This command gives the directory path name where the file "FLATCAL" is stored.

- # indicates the start of the data block header
- A the number of decimal digits to follow in B.
- B a decimal number specifying the number of data bytes in C.
- C the binary waveform data.

Refer to [Table 3-1 on page 122](#) for a listing of the file systems and types. The entries under file type are used in the directory path.

MSUS (Mass Storage Unit Specifier) Variable

The variable "<msus>" enables a command to be file type specific when working with user files. Some commands use it as the only command parameter, while others can use it in conjunction with a file name when a command is not file type specific. When used with a file name, it is similar to Format 2 in the "File Name Variables" section on [page 13](#). The difference is the file type specifier (msus) occupies its own variable and is not part of the file name syntax.

The following examples illustrate the usage of the variable "<msus>" when it is the only command parameter:

Command Syntax with the msus variable

```
:MMEMory:CATAlOG? "<msus>"
```

Command Syntax with the file system

```
:MMEMory:CATAlOG? "LIST:"
```

The variable "<msus>" is replaced with "LIST:". When the command is executed, the output displays only the files from the List file system.

The following examples illustrate the usage of the variable "<file name>" with the variable "<msus>":

Command Syntax with the file name and msus variables

```
:MMEMory:DELEte[:NAME] "<file name>" , [ "<msus>" ]
```

Command Syntax with the file name and file system

```
:MMEMory:DELEte:NAME "LIST_1" , "LIST:"
```

The command from the above example cannot discern which file system LIST_1 belongs to without a file system specifier and will not work without it. When the command is properly executed, LIST_1 is deleted from the List file system.

The following example shows the same command, but using Format 2 from the "File Name Variables" section on [page 13](#):

```
:MMEMory:DELEte:NAME "LIST_1@LIST"
```

When a file name is a parameter for a command that is not file system specific, either format ("<file name>","<msus>" or "<file name@file systems>") will work.

Refer to [Table 1-1 on page 4](#) for a listing of the file systems and types.

Quote Usage with SCPI Commands

As a general rule, programming languages require that SCPI commands be enclosed in double quotes as shown in the following example:

```
" :FM:EXTeRnal:IMPeDance 600 "
```

However when a string is the parameter for a SCPI command, additional quotes or other delimiters may be required to identify the string. Your programming language may use two sets of double quotes, one set of single quotes, or back slashes with quotes to signify the string parameter. The following examples illustrate these different formats:

```
"MEMory:LOAD:LIST " "myfile" " " used in BASIC programming languages
```

```
"MEMory:LOAD:LIST \"myfile\" " used in C, C++, Java, and PERL
```

```
"MEMory:LOAD:LIST 'myfile' " accepted by most programming languages
```

Consult your programming language reference manual to determine the correct format.

Binary, Decimal, Hexadecimal, and Octal Formats

Command values may be entered using a binary, decimal, hexadecimal, or octal format. When the binary, hexadecimal, or octal format is used, their values must be preceded with the proper identifier. The decimal format (default format) requires no identifier and the signal generator assumes this format when a numeric value is entered without one. The following list shows the identifiers for the formats that require them:

- **#B** identifies the number as a binary numeric value (base-2).
- **#H** identifies the number as a hexadecimal alphanumeric value (base-16).
- **#Q** identifies the number as a octal alphanumeric value (base-8).

The following are examples of SCPI command values and identifiers for the decimal value 45:

```
#B101101      binary equivalent
```

```
#H2D          hexadecimal equivalent
```

```
#Q55         octal equivalent
```

The following example sets the RF output power to 10 dBm (or the equivalent value for the currently selected power unit, such as DBUV or DBUVEFMF) using the hexadecimal value 000A:

```
:POW #H000A
```

A unit of measure, such as DBM or mV, will not work with the values when using a format other than decimal.

The following example sets the bluetooth board address to FFBF7 (hexadecimal):

```
:RADio:BLUEtooth:ARB:BDADdr #HFFBF7
```

2 Basic Function Commands

This chapter provides SCPI descriptions for subsystems dedicated to signal generator operations common to most ESG Signal Generators. This chapter contains the following major sections:

- “Correction Subsystem ([:SOURce]:CORRection)” on page 18
- “Digital Modulation Subsystem—E4438C ([:SOURce])” on page 20
- “Frequency Subsystem ([:SOURce])” on page 37
- “List/Sweep Subsystem ([:SOURce])” on page 48
- “Power Subsystem ([:SOURce]:POWer)” on page 57
- “Pulse Subsystem ([:SOURce]:PULSe)” on page 69

Correction Subsystem ([:SOURce]:CORRection)

:FLATness:LOAD

Supported All Models

```
[ :SOURce ] :CORRection :FLATness :LOAD "<file name>"
```

This command loads a user-flatness correction file.

Key Entry Load From Selected File

:FLATness:PAIR

Supported All Models

```
[ :SOURce ] :CORRection :FLATness :PAIR <freq.>[<freq suffix>],  
<corr.>[<corr suffix>]
```

This command sets a frequency and amplitude correction pair.

<corr.> This variable is the power correction.

Range	Frequency	Standard	Option UNB
	Option 501: 100kHz–1GHz	–136 to 20DB	–136 to 25DB
	Option 502: 100kHz–2GHz	–136 to 20DB	–136 to 25DB
	Option 503: 100kHz–3GHz	–136 to 20DB	–136 to 25DB
	Option 504: 100kHz–4GHz	–136 to 20DB	–136 to 25DB
	Option 506: 100kHz–6GHz	–136 to 25DB	N/A

Key Entry Configure Cal Array

Remarks The maximum number of points that can be entered is 1601. Options 501, 502, and 504 are specific to the E4438C.

:FLATness:POINTS

Supported All Models

```
[ :SOURce ] :CORRection :FLATness :POINTS?
```

This query returns the number of points in the user-flatness correction file.

:FLATness:PRESet

Supported All Models

CAUTION The current correction data will be overwritten once this command is executed. Save the current data if needed. Refer to “:FLATness:STORE” on page 19 for storing user-flatness files.

[:SOURCE] :CORREction :FLATness :PRESet

This command presets the user-flatness correction to a factory-defined setting that consists of one point.

Key Entry Preset List

:FLATness:STORE

Supported All Models

[:SOURCE] :CORREction :FLATness :STORE "<file name>"

This command stores the current user-flatness correction data to a file.

Key Entry Store To File

Remarks For information on file name syntax, refer to “File Name Variables” on page 13.

[:STATE]

Supported All Models

[:SOURCE] :CORREction [:STATE] ON | OFF | 1 | 0

[:SOURCE] :CORREction [:STATE] ?

This command enables or disables the user-flatness corrections.

***RST** 0

Key Entry Flatness Off On

Digital Modulation Subsystem—E4438C ([:SOURce])

:BURSt:SOURce

Supported E4438C

[:SOURce] :BURSt :SOURce EXT[1] | INT[1]

[:SOURce] :BURSt :SOURce?

This command selects either an internally generated or an externally supplied burst source.

***RST** EXT

Key Entry Burst Envelope Int Ext Off

Remarks The external burst source is applied to the EXT 1 INPUT connector.
The INT[1] choice will not work unless an internal burst source is active.

:BURSt:STATe

Supported E4438C

[:SOURce] :BURSt :STATe ON | OFF | 1 | 0

[:SOURce] :BURSt :STATe?

This command enables or disables the burst envelope function.

***RST** 0

Key Entry Burst Envelope Int Ext Off

:DM:EXTernal:ALC:Bandwidth | BWIDth

Supported E4438C

```
[ :SOURce ] :DM:EXTernal:ALC:Bandwidth | BWIDth NORMal | NARRow  
[ :SOURce ] :DM:EXTernal:ALC:Bandwidth | BWIDth?
```

This command sets the bandwidth of the automatic leveling control (ALC) loop.

NORMal This choice enables the signal generator to automatically select the ALC bandwidth for the current test conditions.

NARRow This choice sets the narrowest possible ALC bandwidth and is useful when an external I/Q source is connected.

***RST** NORM

Key Entry ALC BW Normal Narrow

:DM:EXTernal:HCRest[:STATe]

Supported E4438C

```
[ :SOURce ] :DM:EXTernal:HCRest [ :STATe ] ON | OFF | 1 | 0  
[ :SOURce ] :DM:EXTernal:HCRest [ :STATe ]?
```

This command changes the operating condition to accommodate I/Q inputs with a high crest factor.

ON(1) This choice turns high crest mode on for externally applied signals with high crest factors. High crest mode allows the signal generator to process these signals with less distortion. For crest factors higher than 4 dB, I/Q drive levels should be reduced by 1 dB for each dB above that level. In high crest mode, the maximum output level is reduced and power level accuracy is degraded.

OFF(0) This choice disables the high crest mode.

***RST** 0

Key Entry High Crest Mode Off On

:DM:EXTernal:FILTer**Supported** E4438C

[:SOURce]:DM:EXTernal:FILTer 40e6|THRough

[:SOURce]:DM:EXTernal:FILTer?

This command selects the filter or through path for I/Q signals routed to the rear panel I and Q outputs. Selecting a filter using this command will automatically set “:DM:EXTernal:FILTer:AUTO” on [page 22](#) to OFF(0) mode.

40e6 This choice applies a 40 MHz baseband filter.

THRough This choice bypasses filtering.

***RST** THR

Key Entry 40.000 MHz Through

:DM:EXTernal:FILTer:AUTO**Supported** E4438C

[:SOURce]:DM:EXTernal:FILTer:AUTO ON|OFF|1|0

[:SOURce]:DM:EXTernal:FILTer:AUTO?

This command enables or disables the automatic selection of the filters for I/Q signals routed to the rear panel outputs.

ON(1) This choice will automatically select a digital modulation filter optimized for the current signal generator settings.

OFF(0) This choice disables the auto feature which lets you select a digital modulation filter or through path. Refer to “:DM:EXTernal:FILTer” on [page 22](#) for selecting a filter or through path.

***RST** 1

Key Entry I/Q Output Filter Manual Auto

:DM:EXTernal:POLarity

Supported E4438C

[:SOURce] :DM:EXTernal:POLarity NORMal | INVert

[:SOURce] :DM:EXTernal:POLarity?

This command sets the phase polarity for the I/Q signal.

***RST** NORM

Key Entry Int Phase Polarity Normal Invert

Remarks This command is for backward compatibility with the appropriate ESG E44xxB.

:DM:EXTernal:SOURce

Supported E4438C

[:SOURce] :DM:EXTernal:SOURce EXTernal | INTernal | BBG1 | EXT600 | OFF | SUM

[:SOURce] :DM:EXTernal:SOURce?

This command selects the I/Q signal source that is routed to the rear panel I and Q output connectors.

EXTernal This choice routes a portion of the externally applied signals at the 50 ohm I and Q input connectors to the rear panel I and Q output connectors.

INTernal This choice is for backward compatibility with the appropriate ESG E44xxB and performs the same function as the BBG1 selection.

BBG1 This choice routes a portion of the baseband generator I/Q signals to the rear panel I and Q connectors and requires Option 001/601 or 002/602.

EXT600 This choice routes a portion of the externally applied signals at the 600 ohm I and Q input connectors to the rear panel I and Q output connectors.

OFF This choice disables the output to the rear panel I and Q output connectors.

SUM This choice routes a portion of the summed I/Q signals from source one and two, to the rear panel I and Q output connectors. See “[:DM:SRATio](#)” on page 35 for setting the summing ratio of the I/Q signals between source one and two.

***RST** EXT

Key Entry Ext 50 Ohm BBG1 Ext 600 Ohm Off Sum

Remarks The output is the analog component of the I and Q signals. For selecting the I/Q source, refer to “[:DM:SOURce](#)” on page 35

:DM:IQADjustment:EXTernal:COFFset**Supported** E4438C

[:SOURce]:DM:IQADjustment:EXTernal:COFFset <val>

[:SOURce]:DM:IQADjustment:EXTernal:COFFset?

This command sets the common mode offset voltage for both the in-phase (I) and quadrature-phase (Q) signals going to the rear panel I and Q output connectors.

The variable <val> is expressed in units of volts (mV–V).

***RST** +0.00000000E+000**Range** –3 to 3**Key Entry** Common Mode I/Q Offset

Remarks This command is effective only if the state of the I/Q adjustment function is set to ON. Refer to “:DM:IQADjustment[:STATe]” on page 31.

:DM:IQADjustment:EXTernal:DIOffset**Supported** E4438C

[:SOURce]:DM:IQADjustment:EXTernal:DIOffset <val>

[:SOURce]:DM:IQADjustment:EXTernal:DIOffset?

This command sets the differential offset voltage for an in-phase (I) signal routed to the I output connectors.

The variable <val> is expressed in units of volts (mV–V).

***RST** +0.00000000E+000**Range** –3 to 3**Key Entry** Diff. Mode I Offset

Remarks This command is effective only if the state of the I/Q adjustment function is set to ON. Refer to “:DM:IQADjustment[:STATe]” on page 31.

:DM:IQADjustment:EXTernal:DQOOffset

Supported E4438C

[:SOURce] :DM:IQADjustment:EXTernal:DQOOffset <val>

[:SOURce] :DM:IQADjustment:EXTernal:DQOOffset?

This command sets the differential offset voltage for a quadrature-phase (Q) signal routed to the Q output connectors.

***RST** +0.00000000E+000

Range -4 to 4

Key Entry Diff. Mode Q Offset

Remarks This command is effective only if the state of the I/Q adjustment function is set to ON. Refer to “:DM:IQADjustment[:STATe]” on page 31.

:DM:IQADjustment:EXTernal:GAIN

Supported E4438C

[:SOURce] :DM:IQADjustment:EXTernal:GAIN <val>

[:SOURce] :DM:IQADjustment:EXTernal:GAIN?

This command sets the I/Q gain ratio for signals routed to the rear panel I and Q output connectors.

The variable <val> is expressed in units of decibels (dB).

***RST** +0.00000000E+000

Range -4 to 4

Key Entry I/Q Out Gain Balance

Remarks This command is effective only if the state of the I/Q adjustment function is set to ON. Refer to “:DM:IQADjustment[:STATe]” on page 31.

:DM:IQADjustment:EXTernal:IOFFset**Supported** E4438C

[:SOURce]:DM:IQADjustment:EXTernal:IOFFset <val>

[:SOURce]:DM:IQADjustment:EXTernal:IOFFset?

This command sets the offset voltage for a signal applied to the 600 ohm I input connector.

The variable <val> is expressed in units of volts (mV–V).

***RST** +0.00000000E+000**Key Entry** Ext In 600 Ohm I Offset**Range** –5 to 5

Remarks This command is effective only if the state of the I/Q adjustment function is set to ON. Refer to “:DM:IQADjustment[:STATe]” on page 31.

:DM:IQADjustment:EXTernal:IQATten**Supported** E4438C

[:SOURce]:DM:IQADjustment:EXTernal:IQATten <val>

[:SOURce]:DM:IQADjustment:EXTernal:IQATten?

This command sets the I/Q output attenuation level.

The variable <val> is expressed in units of decibels (dB).

***RST** +6.00000000E+000**Range** 0–40**Key Entry** I/Q Output Atten

Remarks The value set by this command is active even if the I/Q adjustment function is off.

:DM:IQADjustment:EXTernal:QOFFset

Supported E4438C

[:SOURce] :DM:IQADjustment:EXTernal:QOFFset <val>

[:SOURce] :DM:IQADjustment:EXTernal:QOFFset?

This command sets the offset voltage for a signal applied to the 600 ohm Q input connector.

The variable <val> is expressed in units of volts (mV–V).

***RST** +0.00000000E+000

Range –5 to 5

Key Entry Ext In 600 Ohm Q Offset

Remarks This command is effective only if the state of the I/Q adjustment function is set to ON. Refer to “:DM:IQADjustment[:STATe]” on page 31.

:DM:IQADjustment:GAIN

Supported E4438C

[:SOURce] :DM:IQADjustment:GAIN <val>

[:SOURce] :DM:IQADjustment:GAIN?

This command sets the gain for the I signal relative to the Q signal.

The variable <val> is expressed in units of decibels (dB).

***RST** +0.00000000E+000

Range –4 to 4

Key Entry I/Q Gain Balance Source 1

Remarks This command is effective only if the state of the I/Q adjustment function is set to ON. Refer to “:DM:IQADjustment[:STATe]” on page 31.

:DM:IQADjustment:IOFFset**Supported** E4438C

[:SOURce]:DM:IQADjustment:IOFFset <val>

[:SOURce]:DM:IQADjustment:IOFFset?

This command adjusts the I channel offset value.

The variable <val> is expressed in units of percent with a minimum resolution of 0.025.

***RST** +0.00000000E+000**Range** -50.000 to 50.000**Key Entry** I Offset

Remarks When using this command to minimize the LO feedthrough signal, optimum performance is achieved when the command is sent after all other I/Q path commands are executed, such as those that change the internal phase polarity or adjust the modulator attenuator. If other adjustments are made after minimizing is performed, the LO feedthrough signal may increase.

This command is effective only if the state of the I/Q adjustment function is set to ON. Refer to “:DM:IQADjustment[:STATe]” on page 31.

:DM:IQADjustment:QOFFset**Supported** E4438C

[:SOURce]:DM:IQADjustment:QOFFset

[:SOURce]:DM:IQADjustment:QOFFset?

This command adjusts the Q channel offset value.

The variable <val> is expressed in units of percent with a minimum resolution of 0.025.

***RST** +0.00000000E+000**Range** -50.000 to 50.000**Key Entry** Q Offset

Remarks When using this command to minimize the LO feedthrough signal, optimum performance is achieved when the command is sent after all other I/Q path commands are executed, such as those that change the internal phase polarity or adjust the modulator attenuator. If other adjustments are made after minimizing is performed, the LO feedthrough signal may increase.

This command is effective only if the state of the I/Q adjustment function is set to ON. Refer to “:DM:IQADjustment[:STATe]” on page 31.

:DM:IQADjustment:QSKew

Supported E4438C

```
[ :SOURce ] :DM:IQADjustment:QSKew <val>
```

```
[ :SOURce ] :DM:IQADjustment:QSKew?
```

This command adjusts the phase angle (quadrature skew) between the I and Q vectors by increasing or decreasing the Q phase angle.

The <val> variable is expressed in degrees with a minimum resolution of 0.1.

If the signal generator is operating at frequencies greater than 3.3 GHz, quadrature skew settings greater than ± 5 degrees will not be within specifications.

Positive skew increases the angle from 90 degrees while negative skew decreases the angle from 90 degrees. When the quadrature skew is zero, the phase angle between the I and Q vectors is 90 degrees.

This command is effective only if the state of the I/Q adjustment function is set to ON. Refer to “:DM:IQADjustment[:STATe]” on page 31.

Example

```
:DM:IQAD:QSK 4.5
```

The preceding example increases the phase angle by 4.5 degrees.

***RST** +0.00000000E+000

Range -1E1 to +1E1

Key Entry Quadrature Angle Adjustment

:DM:IQADjustment:SKEW

Supported E4438C

```
[ :SOURce ] :DM:IQADjustment:SKEW[ :DELay ] <val>
```

```
[ :SOURce ] :DM:IQADjustment:SKEW?
```

This command changes the input skew which is a time delay difference between the I and Q signals. Equal and opposite skew is applied to both I and Q and affects the RF Output and I/Q output paths simultaneously. A positive value delays the I signal relative to the Q signal, and a negative value delays the Q signal relative to the I signal.

If the internal I/Q correction path is set to RF or BB the I/Q signals are already optimized and adjusting I/Q skew would add an impairment to the signals. If the internal I/Q correction path is set to Off, then adjusting the I/Q skew could improve the I/Q signals. The I/Q skew adjustment cannot be performed on the MSK, FSK, and C4FM constant envelope modulations.

I/Q skew adjustments are preserved when the instrument state is saved. I/Q skew adjustments are also preserved when instrument settings are changed. If the signal generator is calibrated, the skew adjustments are added to the calibration value used for the given signal generator state. If the signal generator is uncalibrated, the skew adjustments are re-applied directly.

Using I/Q skew while playing a user FIR file greater than 32 symbols will generate an error.

The variable <val> is expressed in seconds. Range limits are determined by the modulation configuration but is limited to a maximum of ± 2 seconds.

Example

```
:DM:IQAD:SKEW .5
```

The preceding example sets the time delay difference between the I and Q signals to 500 milliseconds.

```
*RST          +0.00000000E+000
```

Key Entry I/Q Timing Skew

:DM:IQADjustment:SKEW:Path

Supported E4438C

```
[ :SOURce ] :DM:IQADjustment:SKEW:PATH RF BB
```

```
[ :SOURce ] :DM:IQADjustment:SKEW?
```

This command selects either the RF or BB (baseband) path as the path to which skew timing corrections will be applied. If there are no factory I/Q timing skew corrections data, then adjusting the I/Q timing skew for the selected path may improve the error vector magnitude (EVM) of the signal. Refer to the “[:DM:IQADjustment:SKEW](#)” on page 29 for more information.

If internal I/Q corrections are available for the RF or external I/Q output (BB) path then the I/Q signals are already optimized and adjusting I/Q skew for either path would add an impairment to the signal.

Example

```
:DM:IQAD:SKEW:PATH RF
```

The preceding example selects the RF path as the path to which skew timing adjustments will be made.

```
*RST          +0.00000000E+000
```

Key Entry I/Q Timing Skew Path

:DM:IQADjustment[:STATe]

Supported E4438C

```
[ :SOURce ] :DM :IQADjustment [ :STATe ] ON | OFF | 1 | 0  
[ :SOURce ] :DM :IQADjustment [ :STATe ] ?
```

This command enables or disables the I/Q adjustments.

Example

```
:DM:IQAD 1
```

The preceding example enables I/Q adjustments.

***RST** 0

Key Entry I/Q Adjustments Off On

:DM:MODulation:FILTer

Supported E4438C

```
[ :SOURce ] :DM :MODulation :FILTer 2.1e6 | 40e6 | THRough  
[ :SOURce ] :DM :MODulation :FILTer ?
```

This command enables you to select a filter or through path for I/Q signals modulated onto the RF carrier. Selecting a filter with this command automatically sets “:DM:MODulation:FILTer:AUTO” to OFF(0).

2.1E6 This choice applies a 2.1 MHz baseband filter to the I/Q signals.

40E6 This choice applies a 40 MHz baseband filter to the I/Q signals.

THRough This choice bypasses filtering.

***RST** THR

Key Entry 2.100 MHz 40.000 MHz Through

:DM:MODulation:FILTer:AUTO**Supported** E4438C

[:SOURce]:DM:MODulation:FILTer:AUTO ON|OFF|1|0

[:SOURce]:DM:MODulation:FILTer:AUTO?

This command enables or disables the automatic selection of the filters for I/Q signals modulated onto the RF carrier.

ON(1) This choice will automatically select a digital modulation filter.

OFF(0) This choice disables the auto feature which lets you select a digital modulation filter or through path. Refer to “[:DM:MODulation:FILTer](#)” on page 31 for selecting a filter or through path.

RST** 1**Key Entry** I/Q Mod Filter Manual Auto**:DM:MODulation:ATTen*Supported** E4438C

[:SOURce]:DM:MODulation:ATTen <val>

[:SOURce]:DM:MODulation:ATTen?

This command attenuates the I/Q signals being modulated through the signal generator RF path.

The variable <val> is expressed in units of decibels (dB).

***RST** +2.00000000E+000**Range** 0–40**Key Entry** Modulator Atten Manual Auto

:DM:MODulation:ATTen:AUTO

Supported E4438C

```
[ :SOURce ]:DM:MODulation:ATTen:AUTO ON|OFF|1|0  
[ :SOURce ]:DM:MODulation:ATTen:AUTO?
```

This command enables or disables the I/Q attenuation auto mode.

ON (1) This choice enables the attenuation auto mode which optimizes the modulator attenuation for the current conditions.

OFF (0) This choice holds the attenuator at its current setting or at a selected value. Refer to “:DM:MODulation:ATTen” on page 32 for setting the attenuation value.

***RST** 1

Key Entry Modulator Atten Manual Auto

:DM:POLarity[:ALL]

Supported E4438C

```
[ :SOURce ]:DM:POLarity[:ALL] NORMal|INVert  
[ :SOURce ]:DM:POLarity?
```

This command sets the digital modulation phase polarity.

NORMal This choice selects normal phase polarity for the I and Q signals.

INVert This choice flips the I and Q signals by routing the I signal to the Q input of the I/Q modulator and the Q signal to the I input.

***RST** NORM

Key Entry Int Phase Polarity Normal Invert

:DM:SKEW:PATH**Supported** E4438C

[:SOURce]:DM:SKEW:PATH RF|BB

[:SOURce]:DM:SKEW:PATH?

This command selects the skew path.

RF When RF is selected, the skew is optimized for the I/Q signal applied to the RF Output. The BB output will be functional, but the I/Q timing skew applied will be optimized for the RF path. When using this choice, seven symbols of latency are added to the Arb based waveform. While in real-time mode, the maximum number of user symbols for the FIR is limited to 32.

BB When BB is selected, the skew is optimized for the I/Q signal outputs on the rear panel. The RF Output will be functional, but the I/Q timing skew applied will be optimized for the BB path. When using this choice, seven symbols of latency are added to the Arb based waveform. While in real-time mode, the maximum number of user symbols for the FIR is limited to 32.

RST** INT**Key Entry** Int I/Q Skew Corrections RF BB Off**:DM:SKEW[:STATe]*Supported** E4438C

[:SOURce]:DM:SKEW[:STATe] ON|OFF|1|0

[:SOURce]:DM:SKEW[:STATe]?

This command enables or disables the I/Q timing skew correction function.

***RST** 1**Key Entry** Int I/Q Skew Corrections RF BB Off

:DM:SOURce

Supported E4438C

```
[ :SOURce ] :DM:SOURce [ 1 | 2 | EXTERNAL | INTERNAL | BBG1 | EXT600 | OFF ]
[ :SOURce ] :DM:SOURce?
```

This command selects the I/Q modulator source.

EXTERNAL	This choice selects a 50 ohm impedance for the I and Q input connectors and routes the applied signals to the I/Q modulator.
INTERNAL	This choice is for backward compatibility with the appropriate ESG E44xxB and performs the same function as the BBG1 selection.
BBG1	This choice selects the baseband generator as the source for the I/Q modulator and requires Option 001/601 or 002/602.
EXT600	This choice selects a 600 ohm impedance for the I and Q input connectors and routes the applied signals to the I/Q modulator.
OFF	This choice disables the digital modulation source.
*RST	EXT
Key Entry	Ext 50 Ohm BBG1 Ext 600 Ohm Off

:DM:SRATio

Supported E4438C

```
[ :SOURce ] :DM:SRATio <val><unit>
[ :SOURce ] :DM:SRATio?
```

This command sets the power level difference (ratio) between the source one and source two signals when the two signals are summed together. A positive ratio value reduces the amplitude for source two, while a negative ratio value reduces the amplitude for source one.

The range for the summing ratio is dependent on the modulator attenuator (mod atten) setting for the signal generator that is summing the signals together. The minimum range is achieved when the modulator attenuator setting is zero and the maximum range is reached when the maximum attenuator value is used. The range can be calculated using the following formula:

$$\pm \text{Range} = 50 \text{ dB} + \text{Mod Atten}$$

*RST	+0.00000000E+000
Range	<i>Min:</i> ± 50 dB <i>Max:</i> ± 90 dB
Key Entry	Summing Ratio (SRC1/SRC2) x.xx dB

Remarks For real-time modulation format modulator attenuator settings, see “:DM:MODulation:ATTen” on page 32 and “:DM:MODulation:ATTen:AUTO” on page 33. For an Arb modulation format modulator attenuator setting, refer to the SCPI command subsystem for the Arb format being used and find the commands that contain the command mnemonics IQ:MODulation:ATTen.

:DM:STATe

Supported E4438C

[:SOURce] :DM:STATe ON | OFF | 1 | 0

[:SOURce] :DM:STATe?

This command enables or disables the I/Q modulator.

ON (1) This choice enables the internal I/Q modulator.

OFF (0) This choice disables the internal I/Q modulator. You can turn off the I/Q modulation with this choice even though a digital modulation format is enabled. With this configuration, the RF output signal will not be modulated, but the I/Q signals may be present at the rear panel I and Q outputs depending on the rear panel output selection.

***RST** 0

Key Entry I/Q Off On

Remarks The I/Q modulator is enabled whenever a digital format is turned on.
The I/Q annunciator will be shown on the signal generator display whenever the I/Q modulator is on.

Frequency Subsystem ([:SOURce])

:FREQuency:CHANnels:BAND

Supported

All Models

```
[ :SOURce ] :FREQuency:CHANnels:BAND NBASe | NMOBile | BPGSm | MPGSm | BEGSm | MEGSm |
BRGSm | MRGSm | BDCS | MDCS | BPCS | MPCS | B450 | GM450 | B480 | M480 | B850 | M850 | B8 | M8 | B15
|M15 | B390 | B420 | B460 | B915 | M380 | M410 | M450 | M870 | PHS | DECT
[ :SOURce ] :FREQuency:CHANnels:BAND?
```

This command sets the frequency of the signal generator by specifying a frequency channel band.

NBASe	This choice selects Standard Base as the frequency band for NADC.
NMOBile	This choice selects Standard Mobile as the frequency band for NADC.
BPGSm	This choice selects P-Gsm 900 Base as the frequency band for GSM.
MPGSm	This choice selects P-Gsm 900 Mobile as the frequency band for GSM.
BEGSm	This choice selects E-Gsm 900 Base as the frequency band for GSM.
MEGSm	This choice selects E-Gsm 900 Mobile as the frequency band for GSM.
BRGSm	This choice selects R-Gsm 900 Base as the frequency band for GSM.
MRGSm	This choice selects R-Gsm 900 Mobile as the frequency band for GSM.
BDCS	This choice selects DCS 1800 Base as the frequency band for GSM.
MDCS	This choice selects DCS 1800 Mobile as the frequency band for GSM.
BPCS	This choice selects PCS 1900 Base as the frequency band for GSM.
MPCS	This choice selects PCS 1900 Mobile as the frequency band for GSM.
B450	This choice selects Gsm 450 Base as the frequency band for GSM.
GM450	This choice selects Gsm 450 Mobile as the frequency band for GSM.
B480	This choice selects Gsm 480 Base as the frequency band for GSM.
M480	This choice selects Gsm 480 Mobile as the frequency band for GSM.
B850	This choice selects Gsm 850 Base as the frequency band for GSM.
M850	This choice selects Gsm 850 Mobile as the frequency band for GSM.
B8	This choice selects 800MHz Base as the frequency band for PDC.

Basic Function Commands

Frequency Subsystem ([:SOURce])

M8	This choice selects 800MHz Mobile as the frequency band for PDC.
B15	This choice selects 1500MHz Base as the frequency band for PDC.
M15	This choice selects 1500MHz Mobile as the frequency band for PDC.
B390	This choice selects Base 390-400 as the frequency band for TETRA.
B420	This choice selects Base 420-430 as the frequency band for TETRA.
B460	This choice selects Base 460-470 as the frequency band for TETRA.
B915	This choice selects Base 915-921 as the frequency band for TETRA.
M380	This choice selects Mobile 380-390 as the frequency band for TETRA.
M410	This choice selects Mobile 410-420 as the frequency band for TETRA.
M450	This choice selects Mobile 450-460 as the frequency band for TETRA.
M870	This choice selects Mobile 870-876 as the frequency band for TETRA.
PHS	This choice selects Standard PHS as the frequency band.
DECT	This choice selects Standard DECT as the frequency band.

***RST**

BPGS

Key Entry

P-GSM Base	E-GSM Base	R-GSM Base	DCS Base
PCS Base	GSM 450 Base	GSM 480 Base	GSM 850 Base
NADC Base	800MHZ Base	1500MHZ Base	
Tetra Base 390/400	Tetra Base 420/430	Tetra Base 460/470	
Tetra Base 915/921	PHS Standard	DECT Standard	
P-GSM Mobile	E-GSM Mobile	R-GSM Mobile	DCS Mobile
PCS Mobile	GSM 450 Mobile	GSM 480 Mobile	GSM 850 Mobile
NADC Mobile	800MHZ Mobile	1500MHZ Mobile	
Tetra Mobile 380/390	Tetra Mobile 410/420	Tetra Mobile 450/460	
Tetra Mobile 870/876			

Remarks

The frequency channel state must be enabled for this command to work. Refer to “:FREQuency:CHANnels[:STATe]” on page 40.

:FREQuency:CHANnels:NUMBer

Supported All Models

[:SOURce] :FREQuency:CHANnels:NUMBer <number>

[:SOURce] :FREQuency:CHANnels:NUMBer?

This command sets the frequency of the signal generator by specifying a channel number of a given frequency band.

***RST** +1

Range	P-GSM Base/Mobile:	1–24
	E-GSM and R-GSM Base/Mobile:	1–1023
	DCS Base/Mobile:	512–885
	PCS Base/Mobile:	512–900
	GSM-450 Base/Mobile:	259–293
	GSM-480 Base/Mobile:	306–340
	GSM-850 Base/Mobile:	128–251
	NADC Base/Mobile:	1–1023
	800MHZ Base/Mobile:	0–640
	1500MHZ Base/Mobile:	0–960
	TETRA 380/390 Mobile:	3600–4000
	TETRA 390/4000 Base:	3600–4000
	TETRA 410/420 Mobile:	800–1200
	TETRA 420/430 Base:	800–1200
	TETRA 460/470: 2400 through 2800	2400–2800
	TETRA 870/876 Mobile:	600–640
	TETRA 915/921 Base:	600–940
PHS Standard:	1–255	
DECT Standard:	0–9	

Key Entry Channel Number

Remarks The frequency channel state must be enabled for this command to work. Refer to “:FREQuency:CHANnels[:STATe]” on page 40.

:FREQuency:CHANnels[:STATe]**Supported** All Models

[:SOURce]:FREQuency:CHANnels[:STATe] ON|OFF|1|0

[:SOURce]:FREQuency:CHANnels[:STATe]?

This command enables or disables the frequency channel and band selection to set the output frequency.

***RST** 0**Key Entry** Freq Channels Off On

Remarks To set frequency channels band refer to “[:FREQuency:CHANnels:BAND]” on [page 37](#).

:FREQuency:FIXed**Supported** All Models

[:SOURce]:FREQuency:FIXed <val><unit>

[:SOURce]:FREQuency:FIXed?

This command sets the signal generator output frequency.

***RST** Option 501: +10000000000000E+09
 Option 502: +20000000000000E+09
 Option 503: +30000000000000E+09
 Option 504: +40000000000000E+09
 Option 506: +60000000000000E+09

Range Option 501: 100kHz–1GHZ
 Option 502: 100kHz–2GHZ
 Option 503: 100kHz–3GHZ
 Option 504: 100kHz–4GHZ
 Option 506: 100kHz–6GHZ

Remarks A frequency change may affect the current output power. Refer to “[:LEVel][:IMMEDIATE][:AMPLitude]” on [page 68](#) for the correct specified frequency and amplitude settings. To set the frequency mode refer to “[:FREQuency:MODE]” on [page 41](#). Options 501, 502, and 504 are specific to the E4438C.

:FREQuency:MODE

Supported All Models

```
[ :SOURce ] :FREQuency:MODE CW | FIXEd | LIST
[ :SOURce ] :FREQuency:MODE?
```

This command sets the frequency mode of the signal generator to CW or swept.

CW and FIXEd These choices are synonymous with one another and stops a frequency sweep, allowing the ESG to operate at a set frequency. Refer to “:FREQuency[:CW]” on page 46 for setting the frequency in the CW mode and to “:FREQuency:FIXEd” on page 40 for setting the frequency in the FIXEd mode.

LIST This choice selects the swept frequency mode. If sweep triggering is set to immediate along with continuous sweep mode, executing the command starts the LIST or STEP frequency sweep.

NOTE To perform a frequency and amplitude sweep, you must also select LIST as the power mode. See “:MODE” on page 65 for selecting the list mode for an amplitude sweep.

***RST** CW

Key Entry Frequency Freq Off

:FREQuency:MULTIplier

Supported All Models

```
[ :SOURce ] :FREQuency:MULTIplier <val>
[ :SOURce ] :FREQuency:MULTIplier?
```

This command sets the multiplier for the signal generator carrier frequency.

***RST** +1.00000000E+000

Range Negative Values: -100 to -.001 Positive Values: .001-1000

Key Entry Freq Multiplier

Remarks For any multiplier other than one, the MULT indicator is shown in the frequency area of the display.

:FREQuency:OFFSet

Supported All Models

[:SOURce]:FREQuency:OFFSet <val><unit>

[:SOURce]:FREQuency:OFFSet?

This command sets the frequency offset.

The query of this command returns a value equal to the original output frequency times the multiplier value, plus the frequency offset value.

***RST** +0.00000000000000E+00

Range -200GHZ to 200GHZ

Key Entry Freq Offset

Remarks When an offset has been entered, the OFFS indicator is turned on in the frequency area of the display.

The frequency offset state is turned on when any non-zero value is entered; entering zero will turn it off. Refer to “:FREQuency:OFFSet:STATe” for setting the offset state independent of entering offset values.

:FREQuency:OFFSet:STATe

Supported All Models

[:SOURce]:FREQuency:OFFSet:STATe ON|OFF|1|0

[:SOURce]:FREQuency:OFFSet:STATe?

This command enables or disables the offset frequency.

***RST** 0

Key Entry Freq Offset

Remarks Entering OFF (0) will set the frequency offset to 0 Hz.

:FREQuency:REFErence

Supported All Models

[:SOURce]:FREQuency:REFErence <val><unit>

[:SOURce]:FREQuency:REFErence?

This command sets the output reference frequency.

***RST** +0.00000000000000E+00

Range Option 501: 0HZ–1GHZ
Option 502: 0HZ–2GHZ
Option 503: 0HZ–3GHZ
Option 504: 0HZ–4GHZ
Option 506: 0HZ–6GHZ

Key Entry Freq Ref Set

Remarks Options 501, 502, and 504 are specific to the E4438C.

:FREQuency:REFErence:STATe

Supported All Models

[:SOURce]:FREQuency:REFErence:STATe ON|OFF|1|0

[:SOURce]:FREQuency:REFErence:STATe?

This command enables or disables the frequency reference mode.

***RST** 0

Key Entry Freq Ref Off On

Remarks When the frequency reference mode is on, subsequent frequency parameters are set relative to the reference value.

:FREQuency:START

Supported All Models

[:SOURce] :FREQuency:START <val><unit>

[:SOURce] :FREQuency:START?

This command sets the first frequency point in a step sweep.

***RST** Option 501: +10000000000000E+09
Option 502: +20000000000000E+09
Option 503: +30000000000000E+09
Option 504: +40000000000000E+09
Option 506: +60000000000000E+09

Range Option 501: 100kHz–1GHZ
Option 502: 100kHz–2GHZ
Option 503: 100kHz–3GHZ
Option 504: 100kHz–4GHZ
Option 506: 100kHz–6GHZ

Key Entry Freq Start

Remarks Options 501, 502, and 504 are specific to the E4438C.

:FREQuency:STOP

Supported All Models

[:SOURce] :FREQuency:STOP <val><unit>

[:SOURce] :FREQuency:STOP?

This command sets the last frequency point in a step sweep.

***RST** Option 501: +10000000000000E+09
Option 502: +20000000000000E+09
Option 503: +30000000000000E+09
Option 504: +40000000000000E+09
Option 506: +60000000000000E+09

Range Option 501: 100kHz–1GHZ
Option 502: 100kHz–2GHZ
Option 503: 100kHz–3GHZ

	Option 504: 100kHz–4GHz
	Option 506: 100kHz–6GHz
Key Entry	Freq Stop
Remarks	Options 501, 502, and 504 are specific to the E4438C.

:FREQuency:SYNThesis

Supported E4438C except with Option UNJ

```
[ :SOURce ] :FREQuency:SYNThesis 1 | 2
[ :SOURce ] :FREQuency:SYNThesis?
```

This command sets the phase-lock loop (PLL) bandwidth to optimize phase noise for offsets above and below 10 kHz.

- 1 This choice will select mode 1 which optimize phase noise at offsets below 10 kHz.
- 2 This choice will select mode 2 which optimizes phase noise at offsets above 10 kHz.

***RST** +1

Key Entry **Mode 1 Optimize <10kHz Offset** **Mode 2 Optimize >10kHz Offset**

:FREQuency[:CW]

Supported All Models

```
[ :SOURce ] :FREQuency [ :CW ] <val><unit>  
[ :SOURce ] :FREQuency [ :CW ] ?
```

This command sets the signal generator output frequency for the CW frequency mode.

***RST** Option 501: +10000000000000E+09
Option 502: +20000000000000E+09
Option 503: +30000000000000E+09
Option 504: +40000000000000E+09
Option 506: +60000000000000E+09

Range Option 501: 100kHz–1GHZ
Option 502: 100kHz–2GHZ
Option 503: 100kHz–3GHZ
Option 504: 100kHz–4GHZ
Option 506: 100kHz–6GHZ

Key Entry Frequency

Remarks To set the frequency mode to CW, refer to “:FREQuency:MODE” on page 41.
Options 501, 502, and 504 are specific to the E4438C.

:PHASe:REFerence

Supported All Models

```
[ :SOURce ] :PHASe :REFerence
```

This command sets the current output phase as a zero reference.

Key Entry Phase Ref Set

Remarks Subsequent phase adjustments are set relative to the new reference.

:PHASe[:ADJust]

Supported All Models

```
[ :SOURce ] :PHASe [ :ADJust ] <val><unit>
[ :SOURce ] :PHASe [ :ADJust ] ?
```

This command adjusts the phase of the modulating signal.

The query will only return values in radians.

***RST** +0.00000000E+000

Range Radians: -3.14 to 3.14RAD Degrees: -180 to 179DEG

Key Entry Adjust Phase

:ROSCillator:SOURce

Supported All Models

```
[ :SOURce ] :ROSCillator :SOURce ?
```

This command queries the source of the reference oscillator. It returns either INT (internal) or EXT (external).

:ROSCillator:SOURce:AUTO

Supported All Models except signal generators with Option UNJ

```
[ :SOURce ] :ROSCillator :SOURce :AUTO ON | OFF | 1 | 0
[ :SOURce ] :ROSCillator :SOURce :AUTO ?
```

This command enables or disables the ability of the signal generator to automatically select between the internal and an external reference oscillator.

ON (1) This choice enables the signal generator to detect when a valid reference signal is present at the 10 MHz IN connector and automatically switches from internal to external frequency reference.

OFF (0) This choice selects the internal reference oscillator and disables the switching capability between the internal and an external frequency reference.

***RST** 1

Key Entry Ref Oscillator Source Auto Off On

List/Sweep Subsystem ([:SOURce])

To complete a sweep setup, requires commands from other subsystems. [Table 2-1](#) shows the function and location of these other commands.

Table 2-1 Location of Commands from the other Subsystems

Sweep Type	Function	Command Location	Key Entry under Sweep/List key
List and Step	Start/stop frequency sweep	“:FREQuency:MODE” on page 41	Freq Off
	Start/stop amplitude sweep	“:MODE” on page 65	Ampl Off
	Start/stop frequency and amplitude sweep ¹	“:MODE” on page 65 “:FREQuency:MODE” on page 41	Freq & Ampl Off
	Set up and control sweep triggering ²	“Trigger Subsystem” on page 168	See the “Trigger Subsystem”
Step	Start frequency sweep	“:FREQuency:START” on page 44	Freq Start
	Stop frequency sweep	“:FREQuency:STOP” on page 44	Freq Stop
	Start amplitude sweep	“:START” on page 66	Ampl Start
	Stop amplitude sweep	“:STOP” on page 67	Ampl Stop

1. Execute both commands to start or stop a frequency and amplitude sweep.
2. For point to point triggering, see [“:LIST:TRIGger:SOURce” on page 53](#).

:LIST:DIRection

Supported All Models

[:SOURce] :LIST:DIRection UP | DOWN

[:SOURce] :LIST:DIRection?

This command sets the direction of a list or step sweep.

UP This choice enables a sweep in an ascending order:

- first to last point for a list sweep
- start to stop for a step sweep

DOWN This choice reverses the direction of the sweep.

***RST** UP

Key Entry Sweep Direction Down Up

:LIST:DWELL

Supported All Models

[:SOURce] :LIST:DWELL <val> { , <val> }

[:SOURce] :LIST:DWELL?

This command sets the dwell time for the current list sweep points.

The variable <val> is expressed in units of seconds with a 0.001 resolution.

NOTE The dwell time (<val>) does not begin until the signal generator has settled for the current frequency and/or amplitude change.

Range 0.001–60

Remarks Dwell time is used when IMMEDIATE is the trigger source. Refer to [“:LIST:TRIGger:SOURce” on page 53](#) for the trigger setting.

The dwell time is the amount of time the sweep is guaranteed to pause after setting the frequency and/or power for the current point.

The setting enabled by this command is not affected by signal generator power-on, preset, or *RST.

:LIST:DWELl:POINts

Supported All Models

[:SOURce] :LIST:DWELl :POINts?

This command queries the signal generator for the number of dwell points in the current list sweep file.

:LIST:DWELl:TYPE

Supported All Models

[:SOURce] :LIST:DWELl :TYPE LIST | STEP

[:SOURce] :LIST:DWELl :TYPE?

This command toggles the dwell time for the list sweep points between the values defined in the list sweep and the value for the step sweep.

LIST This choice selects the dwell times from the list sweep. Refer to [“:LIST:DWELl” on page 49](#) for setting the list dwell points.

STEP This choice selects the dwell time from the step sweep. Refer to [“:SWEep:DWELl” on page 55](#) for setting the step dwell.

***RST** LIST

Key Entry Dwell Type List Step

:LIST:FREQuency

Supported All Models

[:SOURce] :LIST:FREQuency <val>{ , <val> }

[:SOURce] :LIST:FREQuency?

This command sets the frequency values for the current list sweep points.

The variable <val> is expressed in units of Hertz.

Range Option 501: 100E3–1E9
Option 502: 100E3–2E9
Option 503: 100E3–3E9
Option 504: 100E3–4E9
Option 506: 100E3–6E9

Remarks The setting enabled by this command is not affected by signal generator power-on, preset, or *RST. Options 501, 502, and 504 are specific to the E4438C. The maximum number of list sweep points is 1,601.

:LIST:FREQuency:POINTs

Supported All Models

[:SOURce] :LIST:FREQuency:POINTs?

This command queries the current list sweep file for the number of frequency points.

:LIST:MANual

Supported All Models

[:SOURce] :LIST:MANual <val>

[:SOURce] :LIST:MANual?

This command sets a list or step sweep point as the current sweep point controlling the frequency and power output.

Range List Sweep: 1–1601 Step Sweep: 2-65535

Key Entry Manual Point

Remarks If list or step mode is controlling frequency or power, or both, then the indexed point in the respective list(s) will be used.

Entering a value with this command will have no effect, unless MANual is the selected mode. Refer to “:LIST:MODE” on page 52 for setting the proper mode.

If the point selected is beyond the length of the longest enabled list, then the point will be set to the maximum possible point, and an error will be generated.

:LIST:MODE

Supported All Models

```
[ :SOURce ] :LIST:MODE AUTO | MANua1
```

```
[ :SOURce ] :LIST:MODE?
```

This command sets the operating mode for the current list or step sweep.

AUTO This choice enables the selected sweep type to perform a sweep of all points.

MANua1 This choice enables you to select a single sweep point. The selected point controls the frequency and/or amplitude according to the sweep type. Refer to “:LIST:MANua1” on page 51 for selecting a sweep point.

***RST** AUTO

Key Entry Manual Mode Off On

:LIST:POWer

Supported All Models

```
[ :SOURce ] :LIST:POWer <val> { , <val> }
```

```
[ :SOURce ] :LIST:POWer?
```

This command sets the amplitude for the current list sweep points.

Range Refer to “[:LEVel][:IMMediate][:AMPLitude]” on page 68 for output power ranges.

Remarks The setting enabled by this command is not affected by signal generator power-on, preset, or *RST.

During an amplitude sweep operation, signal generators with Option UNB or Option 506 protect the step attenuator by automatically switching to attenuator hold (OFF) mode. The attenuator is locked at its current setting and the amplitude sweep range is limited to 40 dB.

The maximum number of list sweep points is 1,601.

:LIST:POWer:POINts

Supported All Models

```
[ :SOURce ] :LIST:POWer:POINts?
```

This command queries the number of power points in the current list sweep file.

:LIST:RETRace

Supported All Models

```
[ :SOURce ] :LIST:RETRace ON | OFF | 1 | 0
[ :SOURce ] :LIST:RETRace?
```

This command resets the single sweep to the first sweep point, or leaves it at the last sweep point upon completion of the sweep operation.

On (1) The sweep resets to the first sweep point.

Off (0) The sweep stays at the last sweep point.

***RST** 1

Key Entry Sweep Retrace Off On

:LIST:TRIGger:SOURce

Supported All Models

```
[ :SOURce ] :LIST:TRIGger:SOURce BUS | IMMEDIATE | EXTERNAL | KEY
[ :SOURce ] :LIST:TRIGger:SOURce?
```

This command sets the trigger source for a list or step sweep event.

To set the sweep trigger, see [“:TRIGger\[:SEQUENCE\]:SOURce” on page 170](#).

BUS This choice enables GPIB triggering using the *TRG or GET command, or LAN and RS-232 triggering using the *TRG command.

IMMEDIATE This choice enables immediate triggering of the sweep event.

EXTERNAL This choice enables the triggering of a sweep event by an externally applied signal at the TRIGGER IN connector.

KEY This choice enables triggering by pressing the front-panel **Trigger** hardkey.

Example

```
:LIST:TRIG:SOUR BUS
```

The preceding example sets the trigger source to the instrument BUS.

***RST** IMM

Key Entry Bus Free Run Ext Trigger Key

:LIST:TYPE

Supported All Models

[:SOURce] :LIST:TYPE LIST | STEP

[:SOURce] :LIST:TYPE?

This command toggles between the two types of sweep.

LIST This type of sweep has arbitrary frequencies and amplitudes.

STEP This type of sweep has equally spaced frequencies and amplitudes.

***RST** STEP

Key Entry Sweep Type List Step

:LIST:TYPE:LIST:INITialize:FSTep

Supported All Models

CAUTION The current list sweep data will be overwritten once this command is executed. If needed, save the current data. Refer to “:STORe:LIST” on page 121 for storing list sweep files.

[:SOURce] :LIST:TYPE:LIST:INITialize:FSTep

This command replaces the loaded list sweep data with the settings from the current step sweep data points.

Key Entry Load List From Step Sweep

Remarks You can have only one sweep list at a time.

The maximum number of list sweep points is 1,601. When copying the step sweep settings over to a list sweep, ensure that the number of points in the step sweep do not exceed the maximum list sweep points.

:LIST:TYPE:LIST:INITialize:PRESet

Supported All Models

CAUTION The current list sweep data will be overwritten once this command is executed. If needed, save the current data. Refer to “:STORE:LIST” on page 121 for storing list sweep files.

[[:SOURCE]]:LIST:TYPE:LIST:INITialize:PRESet

This command replaces the current list sweep data with a factory-defined file consisting of one point at a frequency, amplitude, and dwell time.

Key Entry Preset List

:SWEep:DWELl

Supported All Models

[[:SOURCE]]:SWEep:DWELl <val>

[[:SOURCE]]:SWEep:DWELl?

This command enables you to set the dwell time for a step sweep.

The variable <val> is expressed in units of seconds with a 0.001 resolution.

NOTE The dwell time (<val>) does not begin until the signal generator has settled for the current frequency and/or amplitude change.

***RST** +2.00000000E-003

Range 0.001-60

Key Entry Step Dwell

Remarks Dwell time is used when the trigger source is set to IMMEDIATE. Refer to “:LIST:TRIGger:SOURce” on page 53 for the trigger setting.

The dwell time is the amount of time the sweep is guaranteed to pause after setting the frequency and/or power for the current point.

:SWEep:POINTs

Supported All Models

[:SOURce] :SWEep:POINTs <val>

[:SOURce] :SWEep:POINTs?

This command defines the number of step sweep points.

***RST** 2

Range 2–65535

Key Entry # Points

Power Subsystem ([:SOURce]:POWer)

:ALC:BANDwidth | BWIDth

Supported All Models

```
[ :SOURce ] :POWer :ALC :BANDwidth | BWIDth <bandwidth> ]
[ :SOURce ] :POWer :ALC :BANDwidth | BWIDth ?
```

This command sets the bandwidth of the automatic leveling control (ALC) loop. You can select bandwidths of 100 Hz, 1 kHz, or 10 kHz. If you do not specify one of these exact bandwidths, your entry rounds to the nearest acceptable value. The bandwidth choices for this command are not effective if an internal I/Q source is being used. Refer to the *ESG User's Guide* for information on ALC and bandwidth considerations.

Example

```
:POW:ALC:BWID 1KHZ
```

The preceding example sets the ALC bandwidth to 1 kHz.

```
*RST 100.0
```

Key Entry ALC BW

:ALC:BANDwidth

Supported All Models

```
[ :SOURce ] :POWer :ALC :BANDwidth | BWIDth NORMal | NARRow
[ :SOURce ] :POWer :ALC :BANDwidth | BWIDth ?
```

This command sets the bandwidth of the automatic leveling control (ALC) loop.

NORMal This choice enables the signal generator to automatically select the ALC bandwidth for the current test conditions.

NARRow This choice sets the narrowest possible ALC bandwidth and is useful when an external I/Q source is connected.

```
*RST NORM
```

Key Entry ALC BW Normal Narrow

Remarks The bandwidth choices for this command are not effective if an internal I/Q source is being used.

:ALC:LEVel**Supported** All Models

[:SOURce]:POWer:ALC:LEVel <value>

[:SOURce]:POWer:ALC:LEVel?

This command sets the automatic leveling control (ALC) level when the attenuator hold is active (On).

Use this command when the automatic attenuation mode is set to On. Refer to “:ATTenuation:AUTO” on page 63 for choosing the attenuator mode.

Example

:POW:ALC:LEV 10DB

The preceding example sets the ALC to 10 dB.

RST** +1.00000000E+000**Range** -20 to 25**Key Entry** Set ALC Level**:ALC:SEARCh*Supported** All Models

[:SOURce]:POWer:ALC:SEARCh ON|OFF|1|0|ONCE

[:SOURce]:POWer:ALC:SEARCh?

This command enables or disables the internal power search calibration. A power search is recommended for pulse-modulated signals with pulse widths less than one microsecond.

ON (1) This choice executes the power search automatically with each change in RF frequency or power.

OFF (0) This choice disables the automatic power search routine.

ONCE This choice executes a single power search of the current RF output signal.

***RST** 0**Key Entry** Power Search Manual Auto Do Power Search

Remarks Use this command when the ALC state is set to OFF (0). Refer to “:ALC[:STATE]” on page 60 for setting the ALC state.

If ON was previously selected, executing ONCE will cause OFF to be the current selection after the power search is completed.

:ALC:SEARCh:REFerence

Supported All Models

```
[ :SOURce ] :POWER:ALC:SEARCh:REFerence FIXed|MODulated  
[ :SOURce ] :POWER:ALC:SEARCh:REFerence?
```

This command sets either fixed or modulated modes of power search.

FIXed This choice uses a 0.5 volt reference.

MODulated This choice uses the RMS value of the current I/Q modulation.

***RST** MOD

Key Entry Power Search Reference Fixed Mod

:ALC:SEARCh:SPAN:START

Supported All Models

```
[ :SOURce ] :POWER:ALC:SEARCh:SPAN:START  
[ :SOURce ] :POWER:ALC:SEARCh:SPAN:START?
```

This command sets the start frequency for a span power search over a user specified range.

Key Entry Start Frequency

Remarks The start frequency has no default value. The start frequency value will be the last value set before powering off the instrument.

:ALC:SEARCh:SPAN:STOP

Supported All Models

```
[ :SOURce ] :POWER:ALC:SEARCh:SPAN:STOP  
[ :SOURce ] :POWER:ALC:SEARCh:SPAN:STOP?
```

This command sets the stop frequency for a span power search over a user specified range.

Key Entry Stop Frequency

Remarks The stop frequency has no default value. The stop frequency value will be the last value set before powering off the instrument.

:ALC:SEARCh:SPAN:TYPE

Supported All Models

```
[ :SOURce ] :POWer :ALC :SEARCh :SPAN :TYPE FULL | USER  
[ :SOURce ] :POWer :ALC :SEARCh :SPAN :TYPE ?
```

This command enables you to select the frequency range for a span power search. You can specify the range (USER) or you can select the full range (FULL) of the signal generator.

Key Entry Span Type User Full

:ALC:SEARCh:SPAN[:STATe]

Supported All Models

```
[ :SOURce ] :POWer :ALC :SEARCh :SPAN [ :STATe ] ON | OFF | 1 | 0  
[ :SOURce ] :POWer :ALC :SEARCh :SPAN [ :STATe ] ?
```

This command enables (1) or disables (0) the span mode, allowing you to perform power searches over a selected range of frequencies. The power search corrections are then stored and used whenever the signal generator is tuned within the selected range.

:ALC[:STATe]

Supported All Models

```
[ :SOURce ] :POWer :ALC [ :STATe ] ON | OFF | 1 | 0  
[ :SOURce ] :POWer :ALC [ :STATe ] ?
```

This command enables or disables the automatic leveling control (ALC) circuit.

***RST** 1

Key Entry ALC Off On

Remarks The purpose of the ALC circuit is to hold output power at the desired level in spite of drift due to temperature and time.

:ALternate:AMPLitude

Supported All Models except signal generators with Option UNB or 506.

[:SOURce] :POWER:ALternate:AMPLitude <val>

[:SOURce] :POWER:ALternate:AMPLitude?

This command sets the delta value for the alternate amplitude.

The variable <val> is expressed in units of decibels (dB).

***RST** +0.00000000E+000

Range -156 to 156

Key Entry Alt Amp Delta

Remarks The actual RF output amplitude is equal to the Alternate Amplitude Delta value plus the RF output amplitude; this sum cannot exceed the minimum and maximum amplitude limits of the signal generator. For example, if the Alternate Amplitude Delta is set to -156 dB and the RF output amplitude is set to 20 dB, the sum is equal to -136 dB.

:ALternate:MANual

Supported All Models

[:SOURce] :POWER:ALternate:MANual MAIN|DELTA

[:SOURce] :POWER:ALternate:MANual?

This command toggles the alternate amplitude manual trigger source between main and alternate (delta).

MAIN The main power is present at the RF output.

DELTA The alternate power is present at the RF output.

***RST** MAIN

Key Entry Manual Trigger Main Delta

Remarks This command is effective only if MANual is the selection for the trigger source. Refer to “:ALternate:TRIGger[:SOURce]” on page 62 for more information.

:ALternate:STATe**Supported** All Models

[:SOURce]:POWer:ALternate:STATe ON|OFF|1|0

[:SOURce]:POWer:ALternate:STATe?

This command enables or disables the alternate amplitude.

RST** 0**Key Entry** Alt Ampl Off On**:ALternate:TRIGger[:SOURce]*Supported** All Models except with Option UNB or 506

[:SOURce]:POWer:ALternate:TRIGger[:SOURce] INTernal|EXTernal|MANual

[:SOURce]:POWer:ALternate:TRIGger[:SOURce]?

This command sets the trigger source for the alternate amplitude signal.

INTernal This choice is available only for an E4438C with Option 001/601 or 002/602. The baseband generator triggers each timeslot to output a power level set with either the user-selected main or alternate amplitude parameter.

Each timeslot is allowed to output power with a user-selected main or alternate amplitude. This choice requires the Option 001/601 or 002/602 baseband generator option.

This choice requires a baseband generator option. Each timeslot is allowed to output power with a user-selected main or alternate amplitude.

EXTernal This choice requires an external trigger to the TRIG IN rear panel connector to toggle the RF output power between main and alternate amplitudes.

MANual This choice enables the RF output power to be toggled between main and alternate amplitudes using the front-panel **Trigger** hardkey.

***RST** MAN**Key Entry** Int Ext Manual

:ATTenuation:AUTO

Supported All Models

```
[ :SOURce ] :POWER:ATTenuation:AUTO ON|OFF|1|0  
[ :SOURce ] :POWER:ATTenuation:AUTO?
```

This command sets the state of the attenuator hold function.

ON (1) The attenuation auto on selection enables the attenuator to operate normally which allows the ALC to automatically adjust the attenuator level as needed to maintain RF power levels.

OFF (0) This choice holds the attenuator at its current setting or at a selected value that will not change during power adjustments. This choice eliminates the power discontinuity normally associated with the attenuator switching during power adjustments by holding the attenuator at the current level.

***RST** 1

Key Entry Atten Hold Off On

Remarks During an amplitude sweep operation, signal generators with Option UNB or 506 protect the step attenuator by automatically switching to attenuator hold (On) mode. The attenuator is locked at its current setting and the amplitude sweep range is limited to 40 dB. Refer to the “[:ALC:LEVel](#)” on page 58, “[:ATTenuation](#)” for more information.

:ATTenuation

Supported All Models

```
[:SOURce]:POWer:ATTenuation <val><unit>  
[:SOURce]:POWer:ATTenuation?
```

This command sets the signal generator's attenuation level and is valid only when the automatic level control (ALC) is disabled. The ALC is disabled when the attenuator hold mode is set to On. In normal operation the ALC will automatically adjust the attenuator to maintain the RF power level. The signal generator output power is the ALC level minus the attenuator setting. The attenuation can be set in increments of 5 dB.

This command is valid only if the ALC mode is disabled (attenuator hold function set to ON). Refer to “:ATTenuation:AUTO” on page 63 for selecting the attenuator mode.

Example

```
:POW:ATT 10DB
```

The preceding example sets the attenuator to 10 dB.

***RST** +115

Range 0 to 115 dB

Key Entry Set Atten

:MODE

Supported All Models

```
[ :SOURCE ] :POWER:MODE FIXed | LIST
[ :SOURCE ] :POWER:MODE?
```

This command sets the signal generator power mode to fixed or swept.

FIXed This choice stops a power sweep, allowing the signal generator to operate at a fixed power level. Refer to “[:LEVel][:IMMediate][:AMPLitude]” on page 68 for setting the output power level.

LIST This choice selects the swept power mode. If sweep triggering is set to immediate along with continuous sweep mode, executing the command starts the LIST or STEP power sweep.

NOTE To perform a frequency and amplitude sweep, you must also select LIST as the frequency mode. See “:FREQuency:MODE” on page 41 for selecting the list mode for a frequency sweep.

***RST** FIX

Key Entry **Amplitude Ampl Off**

:REFeRence

Supported All Models

```
[ :SOURCE ] :POWER:REFeRence <val><unit>
[ :SOURCE ] :POWER:REFeRence?
```

This command sets the power level for the signal generator RF output reference.

***RST** +0.00000000E+000

Range -400 to 300DBM

Key Entry **Ampl Ref Set**

Remarks The RF output power is referenced to the value entered in this command.

:REfERENCE:STATe**Supported** All Models

[:SOURce]:POWer:REfERENCE:STATe ON|OFF|1|0

[:SOURce]:POWer:REfERENCE:STATe?

This command enables or disables the RF output reference.

ON(1) This choice will set the power reference state to ON. The unit displayed for commands, “:ANNOtation:AMPLitude:UNIT” on page 85 and “:POWer” on page 172 will be expressed in DB.

OFF(0) This choice will set the power reference state to OFF.

*RST 0

Key Entry **Ampl Ref Off On**

Remarks Once the reference state is ON, all subsequent output power settings are set relative to the reference value.

Amplitude offsets can be used with the amplitude reference mode.

:START**Supported** All Models

[:SOURce]:POWer:START <val><unit>

[:SOURce]:POWer:START?

This command sets the first amplitude point in a step sweep.

*RST -1.35000000E+002

Range Refer to “[:LEVel][:IMMediate][:AMPLitude]” on page 68 for the output power ranges.

Key Entry **Ampl Start**

Remarks During an amplitude sweep operation, signal generators with Option UNB or 506 protect the step attenuator by automatically switching to attenuator hold (ON) mode. The attenuator is locked at its current setting and the amplitude sweep range is limited to 40 dB.

:STOP

Supported All Models

```
[ :SOURce ] :POWer :STOP <val><unit>
```

```
[ :SOURce ] :POWer :STOP?
```

This command sets the last amplitude point in a step sweep.

***RST** -1.35000000E+002

Range Refer to “[:LEVel][:IMMediate][:AMPLitude]” on page 68 for the output power ranges.

Key Entry **Ampl Stop**

Remarks During an amplitude sweep operation, signal generators with Option UNB or 506 protect the step attenuator by automatically switching to attenuator hold (ON) mode. The attenuator is locked at its current setting and the amplitude sweep range is limited to 40 dB.

[:LEVel][:IMMediate]:OFFSet

Supported All Models

```
[ :SOURce ] :POWer [ :LEVel ] [ :IMMediate ] :OFFSet <val><unit>
```

```
[ :SOURce ] :POWer [ :LEVel ] [ :IMMediate ] :OFFSet?
```

This command sets the power offset value.

***RST** +0.00000000E+000

Range -200DB to 200DB

Key Entry **Ampl Offset**

Remarks This simulates a power level at a test point beyond the RF OUTPUT connector without changing the actual RF output power. The offset value only affects the displayed amplitude setting.

You can enter an amplitude offset any time in either normal operation or amplitude reference mode.

[:LEVel][:IMMediate][:AMPLitude]

Supported All Models

```
[:SOURce]:POWer[:LEVel][:IMMediate][:AMPLitude] <val><unit>
[:SOURce]:POWer[:LEVel][:IMMediate][:AMPLitude]?
```

This command sets the RF output power.

***RST** -1.35000000E+002

Range	<i>Frequency</i>	<i>Standard</i>	<i>Option UNB</i>	<i>Option 506</i>
	250kHz-1GHZ	-136 to 13DBM	-136 to 17DBM	-136 to 14DBM
	> 1-3GHZ	-136 to 10DBM	-136 to 16DBM	-136 to 13DBM
	> 3-4GHZ	-136 to 7DBM	-136 to 13DBM	-136 to 10DBM
	> 4-6GHZ	N/A	N/A	-136 to 10DBM

Key Entry Amplitude

Remarks The ranges for this command are specified values from the data sheet.

Pulse Subsystem ([:SOURce]:PULSe)

:FREQuency:STEP

Supported All Models

[:SOURce] :PULSe :FREQuency :STEP [:INCRement] freq

[:SOURce] :PULSe :FREQuency :STEP [:INCRement] ?

This command sets the step increment for the pulse frequency.

***RST** +1.00000000E+005

Range 0–100

Basic Function Commands

Pulse Subsystem ([:SOURce]:PULSe)

3 System Commands

This chapter provides SCPI descriptions for subsystems dedicated to peripheral signal generator operations common to all ESG models. This chapter contains the following major sections:

- “Calibration Subsystem (:CALibration)” on page 72
- “Communication Subsystem (:SYSTem:COMMunicate)” on page 75
- “Diagnostic Subsystem (:DIAGnostic[:CPU]:INFORMation)” on page 81
- “Display Subsystem (:DISPlay)” on page 85
- “IEEE 488.2 Common Commands” on page 89
- “Memory Subsystem (:MEMory)” on page 94
- “Mass Memory Subsystem (:MMEMory)” on page 122
- “Output Subsystem (:OUTPut)” on page 129
- “Route Subsystem (:ROUte:HARDware:DGENerator)” on page 131
- “Status Subsystem (:STATus)” on page 137
- “System Subsystem (:SYSTem)” on page 155
- “Trigger Subsystem” on page 168
- “Unit Subsystem (:UNIT)” on page 172

Calibration Subsystem (:CALibration)

:DCFM

Supported All

:CALibration:DCFM

This command initiates a DCFM or DC Φ M calibration depending on the currently active modulation. This calibration eliminates any dc or modulation offset of the carrier signal.

NOTE If the calibration is performed with a dc signal applied, any deviation provided by the dc signal will be removed and the new zero reference point will be at the applied dc level. The calibration will have to be performed again when the dc signal is disconnected to reset the carrier signal to the correct zero reference.

Key Entry DCFM/DCFM Cal

Remarks Use this calibration for externally applied signals. While the calibration can also be performed for internally generated signals, dc offset is not a normal characteristic for them.

:IQ

Supported E4438C

:CALibration:IQ

This command initiates an I/Q calibration.

Key Entry Execute Cal

:IQ:DC

Supported E4438C

:CALibration:IQ:DC

This command performs a one to two second adjustment that is not traceable to a standard. However, it will minimize errors associated with offset voltages. This adjustment minimizes errors for the current signal generator setting and at a single frequency. The DC adjustment is volatile and must be repeated with each signal generator setting change. This command can be sent while the RF On/Off is set to Off and the adjustment will still be valid when the RF is enabled.

The I/Q DC adjustment is dependent upon a number of instrument settings. If any of the instrument settings change, the adjustment will become invalid. The dependent instrument settings are:

- RF frequency
- I/Q attenuation level
- Baseband generator settings
- I/Q polarity settings
- Baseband filter settings
- Path settings (Internal I/Q Mux Path 1 or Path 2)
- I/Q calibration (the I/Q DC calibration will be invalidated if any other I/Q calibration is executed or if the **Revert to Factory Default** key is pressed)
- Temperature (± 5 degrees)

The following instrument states will not invalidate the I/Q DC calibration:

- Power level changes
- I/Q Impairments

Key Entry **Execute Cal** (with **Calibration Type User Full** set to DC)

:IQ:DEfault

Supported E4438C

:CALibration:IQ:DEfault

This command will restore the original factory calibration data for the internal I/Q modulator.

Key Entry **Revert to Default Cal Settings**

:IQ:FULL

Supported E4438C

:CALibration:IQ:FULL

This command performs an adjustment to the I/Q offset, gain and quadrature for the full-frequency range (regardless of the start and stop frequency settings) and stores the results in the signal generator's firmware.

Key Entry **Execute Cal** (with **Calibration Type User Full** set to Full)

Remarks Start and stop frequencies will default to the full frequency range of the signal generator.

:IQ:START

Supported E4438C

:CALibration:IQ:START <val><unit>

:CALibration:IQ:START?

This command sets the start frequency and automatically sets the calibration type to User for an I/Q calibration.

Range Option 501: 100kHz–1GHz
Option 502: 100kHz–2GHz
Option 503: 100kHz–3GHz
Option 504: 100kHz–4GHz
Option 506: 100kHz–6GHz

Key Entry Start Frequency

Remarks The setting enabled by this command is not affected by signal generator power-on, preset, or *RST.

:IQ:STOP

Supported E4438C

:CALibration:IQ:STOP <val><unit>

:CALibration:IQ:STOP?

This command sets the stop frequency and automatically sets the calibration type to User for an I/Q calibration.

Range Option 501: 100kHz–1GHz
Option 502: 100kHz–2GHz
Option 503: 100kHz–3GHz
Option 504: 100kHz–4GHz
Option 506: 100kHz–6GHz

Key Entry Stop Frequency

Remarks The setting enabled by this command is not affected by signal generator power-on, preset, or *RST.

Communication Subsystem (:SYSTem:COMMunicate)

:GPIB:ADDRes

Supported All

```
:SYSTem:COMMunicate:GPIB:ADDRes <number>
```

```
:SYSTem:COMMunicate:GPIB:ADDRes?
```

This command sets the signal generator's GPIB address.

Range 0–30

Key Entry GPIB Address

Remarks The setting enabled by this command is not affected by signal generator power-on, preset, or *RST.

:GTLocal

Supported All

```
:SYSTem:COMMunicate:GTLocal
```

This command sets the signal generator to local mode from remote mode, enabling front panel operation.

Key Entry Local

:LAN:GATEway

Supported All

```
:SYSTem:COMMunicate:LAN:GATEway "<ipstring>"
```

```
:SYSTem:COMMunicate:LAN:GATEway?
```

This command sets the gateway for local area network (LAN) access to the signal generator from outside the current sub-network.

Key Entry Default Gateway

Remarks Using an empty string restricts access to the signal generator to local hosts on the LAN.

:LAN:HOSName

Supported All

```
:SYSTEM:COMMunicate:LAN:HOSName "<string>"
```

```
:SYSTEM:COMMunicate:LAN:HOSName?
```

This command sets the signal generator's local area network (LAN) connection hostname.

Key Entry Hostname

Remarks The setting enabled by this command is not affected by signal generator power-on, preset, or *RST.

:LAN:IP

Supported All

```
:SYSTEM:COMMunicate:LAN:IP "<ipstring>"
```

```
:SYSTEM:COMMunicate:LAN:IP?
```

This command sets the signal generator's local area network (LAN) internet protocol (IP) address for your IP network connection.

Key Entry IP Address

Remarks The setting enabled by this command is not affected by signal generator power-on, preset, or *RST.

:LAN:SUBNet

Supported All

```
:SYSTEM:COMMunicate:LAN:SUBNet "<ipstring>"
```

```
:SYSTEM:COMMunicate:LAN:SUBNet?
```

This command sets the signal generator's local area network (LAN) subnet mask address for your internet protocol (IP) network connection.

Key Entry Subnet Mask

Remarks The setting enabled by this command is not affected by signal generator power-on, preset, or *RST.

:PMETER:ADDRESS

Supported All

:SYSTEM:COMMunicate:PMETER:ADDRESS <val>

:SYSTEM:COMMunicate:PMETER:ADDRESS?

This command sets the address for a power meter that is controlled by the signal generator.

Range 0–30

Key Entry Meter Address

Remarks The setting enabled by this command is not affected by signal generator power-on, preset, or *RST.

The power meter is controlled only through a GPIB cable.

Ensure that the power meter address is different from the signal generator address.

:PMETER:CHANNEL

Supported All

:SYSTEM:COMMunicate:PMETER:CHANNEL A|B

:SYSTEM:COMMunicate:PMETER:CHANNEL?

This command sets the measurement channel on the power meter that is controlled by the signal generator.

Key Entry Meter Channel A B

Remarks A single-channel power meter uses channel A and selecting channel B will have no effect.

The setting enabled by this command is not affected by signal generator power-on, preset, or *RST.

The power meter is controlled only through a GPIB cable.

:PMETer:IDN

Supported All

:SYSTem:COMMunicate:PMETer:IDN E4418B|E4419B|E4416A|E4417A

:SYSTem:COMMunicate:PMETer:IDN?

This command sets the model number of the power meter that is controlled by the signal generator.

Key Entry Power Meter

Remarks The setting enabled by this command is not affected by signal generator power-on, preset, or *RST.

The power meter is controlled only through a GPIB cable.

:PMETer:TIMEout

Supported All

:SYSTem:COMMunicate:PMETer:TIMEout <num>[<time suffix>]

:SYSTem:COMMunicate:PMETer:TIMEout?

This command sets the period of time which the signal generator will wait for a valid reading from the power meter.

The variable <num> has a resolution of 0.001.

Range 1mS–100S

Key Entry Meter Timeout

Remarks The setting enabled by this command is not affected by signal generator power-on, preset, or *RST.

The power meter is controlled only through a GPIB cable.

If a time-out occurs, the signal generator reports an error message.

:SERial:BAUD

Supported All

```
:SYSTem:COMMunicate:SERial:BAUD <number>
```

```
:SYSTem:COMMunicate:SERial:BAUD?
```

This command sets the baud rate for the rear panel RS-232 interface labeled RS-232.

Key Entry RS-232 Baud Rate

Remarks The setting enabled by this command is not affected by signal generator power-on, preset, or *RST.

:SERial:ECHO

Supported All

```
:SYSTem:COMMunicate:SERial:ECHO ON|OFF
```

```
:SYSTem:COMMunicate:SERial:ECHO?
```

This command enables or disables the RS-232 echo.

Key Entry RS-232 ECHO Off On

Remarks The setting enabled by this command is not affected by signal generator power-on, preset, or *RST.

:SERial:RESet

Supported All

```
:SYSTem:COMMunicate:SERial:RESet
```

This event command resets the RS-232 buffer and will discard any unprocessed SCPI input received by the RS-232 port.

Key Entry Reset RS-232

:SERial:TOUT

Supported All

:SYSTem:COMMunicate:SERial:TOUT <val>

:SYSTem:COMMunicate:SERial:TOUT?

This command sets the RS-232 serial port time-out value.

If further input is not received within the time-out period specified, while a SCPI command is being processed, the command is aborted and the input buffer is cleared.

The variable <val> is entered in units of seconds.

Range 1–25

Key Entry RS-232 Timeout

Remarks The setting enabled by this command is not affected by signal generator power-on, preset, or *RST.

Diagnostic Subsystem (:DIAGnostic[:CPU]:INFORMATION)

:BOARDs

Supported All

:DIAGnostic[:CPU]:INFORMATION:BOARDs?

This query returns a list of the installed boards in the signal generator. The information will be returned in the following format:

"<board name,part number,serial number,version number,status>"

This information format will repeat with as many iterations as the number of detected boards in the signal generator.

Key Entry **Installed Board Info**

:CCOUNT:ATTenuator

Supported All

:DIAGnostic[:CPU]:INFORMATION:CCOUNT:ATTenuator?

This query returns the cumulative number of times that the attenuator has been switched.

Key Entry **Diagnostic Info**

:CCOUNT:PON

Supported All

:DIAGnostic[:CPU]:INFORMATION:CCOUNT:PON?

This query returns the cumulative number of times the signal generator has been powered-on.

Key Entry **Diagnostic Info**

:CCOUNT:PROTECTION

Supported All

:DIAGnostic[:CPU]:INFORMATION:CCOUNT:PROTECTION?

This query returns the cumulative number of times the reverse power protection has been cycled.

Key Entry **Diagnostic Info**

:DISPlay:OTIME

Supported All Models

:DIAGnostic[:CPU]:INFORMATION:DISPlay:OTIME?

This query returns the cumulative number of hours the display has been on.

Key Entry Diagnostic Info

:LICense:AUXiliary

Supported All Models

:DIAGnostic[:CPU]:INFORMATION:LICense:AUXiliary?

This query returns a list of licenses for software applications associated with the signal generator that have the software license file installed on the PC, as opposed to a license key installed on the signal generator. However this query does not return demo licenses for Arb-based applications.

Key Entry Auxiliary Software Options

Remarks If you use the signal generator with a PC that has a copy of a software application for which a license shows with this query, the software automatically accesses and installs the license on the PC.

To access Arb-based demo software licenses, see “:LICense:WAVEform” . To view option numbers for software applications that use license keys, see “:OPTions” on page 83.

:LICense:WAVeform**Supported** All Models`:DIAGnostic[:CPU]:INFORMATION:LICense:WAVeform?`

This query returns a list of Arb-based licenses (including demo) for software applications associated with the signal generator that have the software license file installed on the PC, as opposed to a license key installed on the signal generator.

The response format is a series of comma-separated entries enclosed in quotation marks. The first field is the waveform type number and the second is a text description of the license.

Key Entry Waveform Licenses

Remarks If a license appears in this list, this means that you can transfer waveform files between signal generators that have the same license. The list duplicates the Arb-based software applications displayed with “:LICense:AUXiliary” query.

To view option numbers for software applications that use license keys, see “:OPTions”.

:OPTions**Supported** All Models`:DIAGnostic[:CPU]:INFORMATION:OPTions?`

This query returns a list of internally installed signal generator options.

Key Entry Options Info**:OPTions:DETail****Supported** All Models`:DIAGnostic[:CPU]:INFORMATION:OPTions:DETail?`

This query returns the options that are installed along with the option revision and DSP version if applicable.

Key Entry Options Info

:OTIME

Supported All Models

:DIAGnostic[:CPU]:INFORMATION:OTIME?

This query returns the cumulative number of hours that the signal generator has been on.

Key Entry Diagnostic Info

:REVISION

Supported All ModelsAll Models

:DIAGnostic[:CPU]:INFORMATION:REVISION?

This query returns the CPU bootstrap read only memory (boot ROM) revision date. In addition, the query returns the revision, creation date, and creation time of the main firmware.

Key Entry Diagnostic Info

:SDATE

Supported All Models

:DIAGnostic[:CPU]:INFORMATION:SDATE?

This query returns the date and time of the main firmware.

Key Entry Diagnostic Info

:WLICence[:VALue]

Supported All Models

:DIAGnostic[:CPU]:INFORMATION:WLICence[:VALue]? <type_num>

This query returns the number of seconds remaining on the waveform license for the type of waveform designated by the <type_num> variable number. The type variable number is obtained using the “:LICence:WAVEform” command shown on [page 83](#). Zero is returned for non-existent and expired licenses. The value $2^{32} - 1$ (4,294,967,295) is returned for licenses that do not expire.

Display Subsystem (:DISPlay)

:ANNotation:AMPLitude:UNIT

Supported All Models

```
:DISPlay:ANNotation:AMPLitude:UNIT DBM|DBUV|DBUVEFMF|V|VEMF|DB  
:DISPlay:ANNotation:AMPLitude:UNIT?
```

This command sets the displayed front panel amplitude units.

If the amplitude reference state is set to on, the query returns units expressed in DB. Setting any other unit will cause a setting conflict error stating that the amplitude reference state must be set to off. Refer to, “:REFerence:STATE” on page 66 for more information.

***RST** DBM

:ANNotation:CLOCK:DATE:FORMat

Supported All Models

```
:DISPlay:ANNotation:CLOCK:DATE:FORMat MDY|DMY  
:DISPlay:ANNotation:CLOCK:DATE:FORMat?
```

This command enables the selection of the date format. The choices are month-day-year (MDY) or day-month-year (DMY) format.

Remarks The setting enabled by this command is not affected by signal generator power-on, preset, or *RST.

:ANNotation:CLOCK[:STATe]

Supported All Models

```
:DISPlay:ANNotation:CLOCK[:STATe] ON|OFF|1|0  
:DISPlay:ANNotation:CLOCK[:STATe]?
```

This command enables or disables the digital clock view in the lower right side of the front panel display.

Remarks The setting enabled by this command is not affected by signal generator power-on, preset, or *RST.

:BRIGhtness

Supported All Models

:DISPlay:BRIGhtness <val>

:DISPlay:BRIGhtness?

This command sets the display brightness (intensity). The brightness can be set to the minimum level (0.02), maximum level (1), or in between by using fractional numeric values (0.03–0.99).

Range 0.02–1

Key Entry **Brightness**

Remarks The setting enabled by this command is not affected by signal generator power-on, preset, or *RST.

:CAPTure

Supported All Models

:DISPlay:CAPTure

This event command enables the user to capture the current display and store it in the signal generator's memory.

Remarks The display capture is stored as DISPLAY.BMP in the Binary file system. This file is overwritten with each subsequent display capture. The file can be down-loaded in the following manner:

1. Log on to the signal generator using ftp.
2. Change (cd) to the BIN directory.
3. Retrieve the file by using the get command.

:CONTrast

Supported All Models

:DISPlay:CONTrast <val>

:DISPlay:CONTrast?

This command sets the contrast of the LCD display. The contrast can be set to the maximum level (1), minimum level (0), or in between by using fractional numeric values (0.001–0.999).

Range 0–1

Key Entry Display contrast hardkeys are located below the display.

Remarks The setting enabled by this command is not affected by signal generator power-on, preset, or *RST.

:INVerse

Supported All Models

:DISPlay:INVerse ON|OFF|1|0

:DISPlay:INVerse?

This command sets the display of the source to inverse video mode.

Key Entry Inverse Video Off On

Remarks The setting enabled by this command is not affected by signal generator power-on, preset, or *RST.

:REMOte

Supported All Models

:DISPlay:REMOte ON|OFF|1|0

:DISPlay:REMOte?

This command enables or disables the display updating when the signal generator is remotely controlled.

ON (1) This choice updates the signal generator display so you can see the settings as the commands are executed, however, this will degrade the signal generator speed.

OFF (0) This choice turns off the display updating while further optimizing the signal generator for speed.

Key Entry Update in Remote Off On

Remarks The setting enabled by this command is not affected by signal generator preset or *RST. However, cycling the signal generator power will reset it to zero.

[:WINDow][:STATe]

Supported All Models

:DISPlay[:WINDow][:STATe] ON|OFF|1|0

:DISPlay[:WINDow][:STATe]?

This command is used to either blank out (OFF or 0) the display screen or turn it on (ON or 1).

Remarks The setting enabled by this command is not affected by *RST. However, presetting the signal generator or cycling the power will turn the display on.

IEEE 488.2 Common Commands

*CLS

Supported All Models

*CLS

The Clear Status (CLS) command clears the Status Byte Register, the Data Questionable Event Register, the Standard Event Status Register, the Standard Operation Status Register and any other registers that are summarized in the status byte.

*ESE

Supported All Models

*ESE <data>

The Standard Event Status Enable (ESE) command sets the Standard Event Status Enable Register.

The variable <data> represents the sum of the bits that will be enabled.

Range 0–255

Remarks The setting enabled by this command is not affected by signal generator preset or *RST. However, cycling the signal generator power will reset this register to zero.

Refer to Chapter 3 of the *E4428C/38C ESG Signal Generators Programming Guide* for more information.

*ESE?

Supported All Models

*ESE?

The Standard Event Status Enable (ESE) query returns the value of the Standard Event Status Enable Register.

Remarks Refer to Chapter 3 of the *ESG Signal Generators Programming Guide* for more information.

*ESR?

Supported All Models

CAUTION This is a destructive read. The data in the register is latched until it is queried. Once queried, the data is cleared.

*ESR?

The Standard Event Status Register (ESR) query returns the value of the Standard Event Status Register.

Remarks Refer to Chapter 3 of the *E4428C/38C ESG Signal Generators Programming Guide* for more information.

*IDN?

Supported All Models

*IDN?

The Identification (IDN) query outputs an identifying string. The response will show the following information:

<company name>, <model number>, <serial number>, <firmware revision>

Key Entry **Diagnostic Info**

Remarks The identification information can be modified. Refer to [“:IDN” on page 157](#) for more information.

*OPC

Supported All Models

*OPC

The Operation Complete (OPC) command sets bit 0 in the Standard Event Status Register when all pending operations have finished.

*OPC?

Supported All Models

*OPC?

The Operation Complete (OPC) query returns the ASCII character 1 in the Standard Event Status Register when all pending operations have finished.

*PSC

Supported

*PSC ON|OFF|1|0

The Power-On Status Clear (PSC) command controls the automatic power-on clearing of the Service Request Enable Register, the Standard Event Status Enable Register, and device-specific event enable registers.

- | | |
|---------|--|
| ON (1) | This choice enables the power-on clearing of the listed registers. |
| OFF (0) | This choice disables the clearing of the listed registers and they retain their status when a power-on condition occurs. |

Remarks The setting enabled by this command is not affected by signal generator power-on, preset, or *RST.

*PSC?

Supported All Models

*PSC?

The Power-On Status Clear (PSC) query returns the flag setting as enabled by the *PSC command.

*RCL

Supported All Models

*RCL <reg>, <seq>

The Recall (RCL) command recalls the state from the specified memory register <reg> of the specified sequence <seq>.

Range Registers: 0–99 Sequences: 0–9

Key Entry RECALL Reg Select Seq:

*RST

Supported All Models

*RST

The Reset (RST) command resets most signal generator functions to factory-defined conditions.

Remarks Each command shows the *RST value if the setting is affected.

*SAV

Supported All Models

*SAV <reg> , <seq>

The Save (SAV) command saves the state of the signal generator to the specified memory register <reg> of the specified sequence <seq>.

Range Registers: 0–99 Sequences: 0–9

Key Entry Save Reg Save Seq[n] Reg[nn]

*SRE

Supported All Models

*SRE <data>

The Service Request Enable (SRE) command sets the value of the Service Request Enable Register.

The variable <data> is the decimal sum of the bits that will be enabled. Bit 6 (value 64) is ignored and cannot be set by this command.

Range 0–255

Remarks Refer to Chapter 3 of the *E4428C/38C ESG Signal Generators Programming Guide* for more information.

Entering values from 64 to 127 is equivalent to entering values from 0 to 63.

The setting enabled by this command is not affected by signal generator preset or *RST. However, cycling the signal generator power will reset it to zero.

*SRE?

Supported All Models

*SRE?

The Service Request Enable (SRE) query returns the value of the Service Request Enable Register.

Range 0–63 or 128–191

Remarks Refer to Chapter 3 of the *E4428C/38C ESG Signal Generators Programming Guide* for more information.

*STB?

Supported All Models

*STB?

The Read Status Byte (STB) query returns the value of the status byte including the master summary status (MSS) bit.

Range 0–255

Remarks Refer to Chapter 3 of the *E4428C/38C ESG Signal Generators Programming Guide* for more information.

*TRG

Supported All Models

*TRG

The Trigger (TRG) command triggers the device if BUS is the selected trigger source, otherwise, *TRG is ignored.

*TST?

Supported All Models

*TST?

The Self-Test (TST) query initiates the internal self-test and returns one of the following results:

0 This shows that all tests passed.

1 This shows that one or more tests failed.

Key Entry Run Complete Self Test

*WAI

Supported All Models

*WAI

The Wait-to-Continue (WAI) command causes the signal generator to wait until all pending commands are completed, before executing any other commands.

Memory Subsystem (:MEMory)

:CATalog:BINary

Supported E4438C with Option 001/601 or 002/602

:MEMory:CATalog:BINary?

This command outputs a list of the binary files. The return data will be in the following form:

```
<mem used>,<mem free>{,"<file listing>"}
```

The signal generator will return the two memory usage parameters and as many file listings as there are files in the directory list. Each file listing parameter will be in the following form:

```
"<file name,file type,file size>"
```

Key Entry Binary

Remarks Refer to [“File Name Variables” on page 13](#) for information on the file name syntax.

:CATalog:BIT

Supported E4438C with Option 001/601 or 002/602

:MEMory:CATalog:BIT?

This command outputs a list of the bit files. The return data will be in the following form:

```
<mem used>,<mem free>{,"<file listing>"}
```

The signal generator will return the two memory usage parameters and as many file listings as there are files in the directory list. Each file listing parameter will be in the following form:

```
"<file name,file type,file size>"
```

Key Entry Bit

Remarks Refer to [“File Name Variables” on page 13](#) for information on the file name syntax.

:CATalog:CDMa

Supported E4438C with Option 401

:MEMory:CATalog:CDMa?

This command outputs a list of the arbitrary waveform CDMA files. The return data will be in the following form:

```
<mem used>,<mem free>{,"<file listing>"}
```

The signal generator will return the two memory usage parameters and as many file listings as there are files in the directory list. Each file listing parameter will be in the following form:

```
"<file name,file type,file size>"
```

Key Entry CDMA

Remarks Refer to [“File Name Variables” on page 13](#) for information on the file name syntax.

:CATalog:DMOD

Supported E4438C with Option 001/601 or 002/602

:MEMory:CATalog:DMOD?

This command outputs a list of the arbitrary waveform digital modulation files. The return data will be in the following form:

```
<mem used>,<mem free>{,"<file listing>"}
```

The signal generator will return the two memory usage parameters and as many file listings as there are files in the directory list. Each file listing parameter will be in the following form:

```
"<file name,file type,file size>"
```

Key Entry DMOD

Remarks Refer to [“File Name Variables” on page 13](#) for information on the file name syntax.

:CATalog:DWCDma

Supported E4438C with Option 400

:MEMory:CATalog:DWCDma?

This command outputs a list of the arbitrary waveform downlink W-CDMA files. The return data will be in the following form:

```
<mem used>,<mem free>{,"<file listing>"}
```

The signal generator will return the two memory usage parameters and as many file listings as there are files in the directory list. Each file listing parameter will be in the following form:

```
"<file name,file type,file size>"
```

Key Entry DWCDMA

Remarks Refer to [“File Name Variables” on page 13](#) for information on the file name syntax.

:CATalog:FCDMa

Supported E4438C with Option 401

:MEMory:CATalog:FCDMa?

This command outputs a list of the arbitrary waveform forward link cdma2000 files. The return data will be in the following form:

```
<mem used>,<mem free>{,"<file listing>"}
```

The signal generator will return the two memory usage parameters and as many file listings as there are files in the directory list. Each file listing parameter will be in the following form:

```
"<file name,file type,file size>"
```

Key Entry FCDMA

Remarks Refer to [“File Name Variables” on page 13](#) for information on the file name syntax.

:CATalog:FIR

Supported E4438C with Option 001/601 or 002/602

:MEMory:CATalog:FIR?

This command outputs a list of the finite impulse response filter files. The return data will be in the following form:

```
<mem used>,<mem free>{,"<file listing>"}
```

The signal generator will return the two memory usage parameters and as many file listings as there are files in the directory list. Each file listing parameter will be in the following form:

```
"<file name,file type,file size>"
```

Key Entry FIR

Remarks Refer to [“File Name Variables” on page 13](#) for information on the file name syntax.

:CATalog:FSK

Supported E4438C with Option 001/601 or 002/602

:MEMory:CATalog:FSK?

This command outputs a list of the FSK files. The return data will be in the following form:

```
<mem used>,<mem free>{,"<file listing>"}
```

The signal generator will return the two memory usage parameters and as many file listings as there are files in the directory list. Each file listing parameter will be in the following form:

```
"<file name,file type,file size>"
```

Key Entry FIR

Remarks Refer to [“File Name Variables” on page 13](#) for information on the file name syntax.

:CATalog:IQ

Supported E4438C with Option 001/601 or 002/602

:MEMory:CATalog:IQ?

This command outputs a list of the IQ files. The return data will be in the following form:

<mem used>,<mem free>{,"<file listing>"}

The signal generator will return the two memory usage parameters and as many file listings as there are files in the directory list. Each file listing parameter will be in the following form:

"<file name,file type,file size>"

Key Entry I/Q

Remarks Refer to [“File Name Variables” on page 13](#) for information on the file name syntax.

:CATalog:LIST

Supported All Models

:MEMory:CATalog:LIST?

This command outputs a list of the list sweep files. The return data will be in the following form:

<mem used>,<mem free>{,"<file listing>"}

The signal generator will return the two memory usage parameters and as many file listings as there are files in the directory list. Each file listing parameter will be in the following form:

"<file name,file type,file size>"

Key Entry List

Remarks Refer to [“File Name Variables” on page 13](#) for information on the file name syntax.

:CATalog:MCDMa

Supported E4438C with Option 401

:MEMory:CATalog:MCDMa?

This command outputs a list of the arbitrary waveform multicarrier IS-95 CDMA files. The return data will be in the following form:

```
<mem used>,<mem free>{,"<file listing>"}
```

The signal generator will return the two memory usage parameters and as many file listings as there are files in the directory list. Each file listing parameter will be in the following form:

```
"<file name,file type,file size>"
```

Key Entry MCDMA

Remarks Refer to [“File Name Variables” on page 13](#) for information on the file name syntax.

:CATalog:MDMod

Supported E4438C with Option 001/601 or 002/602

:MEMory:CATalog:MDMod?

This command outputs a list of the arbitrary waveform multicarrier digital modulation files. The return data will be in the following form:

```
<mem used>,<mem free>{,"<file listing>"}
```

The signal generator will return the two memory usage parameters and as many file listings as there are files in the directory list. Each file listing parameter will be in the following form:

```
"<file name,file type,file size>"
```

Key Entry MDMOD

Remarks Refer to [“File Name Variables” on page 13](#) for information on the file name syntax.

:CATalog:MDWCdma

Supported E4438C with Option 400

:MEMory:CATalog:MDWCdma?

This command outputs a list of the arbitrary waveform multicarrier downlink W-CDMA files. The return data will be in the following form:

```
<mem used>,<mem free>{,"<file listing>"}
```

The signal generator will return the two memory usage parameters and as many file listings as there are files in the directory list. Each file listing parameter will be in the following form:

```
"<file name,file type,file size>"
```

Key Entry MDWCDMA

Remarks Refer to [“File Name Variables” on page 13](#) for information on the file name syntax.

:CATalog:MFCdma

Supported E4438C with Option 401

:MEMory:CATalog:MFCdma?

This command outputs a list of the arbitrary waveform multicarrier forward link cdma2000 files. The return data will be in the following form:

```
<mem used>,<mem free>{,"<file listing>"}
```

The signal generator will return the two memory usage parameters and as many file listings as there are files in the directory list. Each file listing parameter will be in the following form:

```
"<file name,file type,file size>"
```

Key Entry MFCDMA

Remarks Refer to [“File Name Variables” on page 13](#) for information on the file name syntax.

:CATalog:MTONE

Supported E4438C with Option 001/601 or 002/602

:MEMory:CATalog:MTONE?

This command outputs a list of the arbitrary waveform multitone files. The return data will be in the following form:

```
<mem used>,<mem free>{,"<file listing>"}
```

The signal generator will return the two memory usage parameters and as many file listings as there are files in the directory list. Each file listing parameter will be in the following form:

```
"<file name,file type,file size>"
```

Key Entry MTONE

Remarks Refer to [“File Name Variables” on page 13](#) for information on the file name syntax.

:CATalog:RCDMa

Supported E4438C with Option 401

:MEMory:CATalog:RCDMa?

This command outputs a list of the arbitrary waveform files for reverse link cdma2000. The return data will be in the following form:

```
<mem used>,<mem free>{,"<file listing>"}
```

The signal generator will return the two memory usage parameters and as many file listings as there are files in the directory list. Each file listing parameter will be in the following form:

```
"<file name,file type,file size>"
```

Key Entry RCDMA

Remarks Refer to [“File Name Variables” on page 13](#) for information on the file name syntax.

:CATalog:SEQ

Supported E4438C with Option 001/601 or 002/602

:MEMory:CATalog:SEQ?

This command outputs a list of the arbitrary waveform sequence files. The return data will be in the following form:

```
<mem used>,<mem free>{,"<file listing>"}
```

The signal generator will return the two memory usage parameters and as many file listings as there are files in the directory list. Each file listing parameter will be in the following form:

```
"<file name,file type,file size>"
```

Key Entry SEQ

Remarks Refer to [“File Name Variables” on page 13](#) for information on the file name syntax.

:CATalog:SHAPE

Supported E4438C with Option 001/601 or 002/602

:MEMory:CATalog:SHAPE?

This command outputs a list of the burst shape files. The return data will be in the following form:

```
<mem used>,<mem free>{,"<file listing>"}
```

The signal generator will return the two memory usage parameters and as many file listings as there are files in the directory list. Each file listing parameter will be in the following form:

```
"<file name,file type,file size>"
```

Key Entry SHAPE

Remarks Refer to [“File Name Variables” on page 13](#) for information on the file name syntax.

:CATalog:STATe

Supported All Models

:MEMory:CATalog:STATe?

This command outputs a list of the state files. The return data will be in the following form:

```
<mem used>,<mem free>{,"<file listing>"}
```

The signal generator will return the two memory usage parameters and as many file listings as there are files in the directory list. Each file listing parameter will be in the following form:

```
"<file name,file type,file size>"
```

Key Entry State

Remarks Refer to [“File Name Variables” on page 13](#) for information on the file name syntax.

:CATalog:UFLT

Supported All Models

:MEMory:CATalog:UFLT?

This command outputs a list of the user-flatness correction files. The return data will be in the following form:

```
<mem used>,<mem free>{,"<file listing>"}
```

The signal generator will return the two memory usage parameters and as many file listings as there are files in the directory list. Each file listing parameter will be in the following form:

```
"<file name,file type,file size>"
```

Key Entry User Flatness

Remarks Refer to [“File Name Variables” on page 13](#) for information on the file name syntax.

:CATalog:UWCDma

Supported E4438C with Option 400

:MEMory:CATalog:UWCDma?

This command outputs a list of the arbitrary waveform uplink W-CDMA files. The return data will be in the following form:

```
<mem used>,<mem free>{,"<file listing>"}
```

The signal generator will return the two memory usage parameters and as many file listings as there are files in the directory list. Each file listing parameter will be in the following form:

```
"<file name,file type,file size>"
```

Key Entry UWCDMA

Remarks Refer to [“File Name Variables” on page 13](#) for information on the file name syntax.

:CATalog[:ALL]

Supported All Models

:MEMory:CATalog[:ALL]?

This command outputs a list of all the files in the memory subsystem. However it does not include files stored on the Option 001/601 or 002/602 baseband generator. The return data will be in the following form:

```
<mem used>,<mem free>{,"<file listing>"}
```

The signal generator will return the two memory usage parameters and as many file listings as there are files in the memory subsystem. Each file listing parameter will be in the following form:

```
"<file name,file type,file size>"
```

Key Entry All

Remarks Refer to [Table 3-1 on page 122](#) for a listing of the file types and [“File Name Variables” on page 13](#) for information on the "<file name>" syntax.

:COPY[:NAME]

Supported All Models

```
:MEMory:COPY[:NAME] "<file name>","<file name>"
```

This command makes a duplicate of the requested file.

Key Entry Copy File

Remarks Refer to [“File Name Variables” on page 13](#) for information on the file name syntax.

When copying a waveform file from volatile to non-volatile memory, the marker and header files associated with the waveform file will automatically be copied at the same time.

:DATA

Supported E4438C with Option 001/601 or 002/602

```
:MEMory:DATA "<file name>",<datablock>
```

```
:MEMory:DATA? "<file name>"
```

This command creates a user data file and stores it in the signal generator non-volatile binary memory catalog.

<file name> This variable represents the file name for the user file being stored in the signal generator non-volatile memory.

<datablock> This variable represents the block-formatted data.

Example:

```
:MEMory:DATA "userfile",#1912S407897
```

userfile This is the user file as it appears in the signal generator.

1 This variable defines the number of decimal digits to follow.

9 This variable defines how many bytes of data are to follow.

12S407897 This example is an ASCII representation of the data that is downloaded to the signal generator. Refer to the *E4428C/38C ESG Signal Generators Programming Guide* for more information.

Remarks Refer to [“File Name Variables” on page 13](#) for information on the file name syntax.

:DATA:APPend

Supported E4438C with Option 001/601 or 002/602

:MEMory:DATA:APPend "*<file name>*",*<datablock>*

This command appends new data to an existing binary user file stored in non-volatile signal generator memory.

<file name> This variable represents the name of the existing user file.

<datablock> This variable represents the block-formatted data.

Example:

:MEMory:DATA:APPend "userfile", #141249

userfile This name represents the user file name as it appears in the signal generator.

1 This variable defines the number of decimal digits to follow.

4 This variable defines how many bytes of data are to follow.

1249 This example is an ASCII representation of the data that is downloaded to the signal generator. Refer to the *E4428C/38C ESG Signal Generators Programming Guide* for more information.

Remarks Refer to [“File Name Variables” on page 13](#) for information on the file name syntax.

:DATA:BIT

Supported E4438C with Option 001/601 or 002/602

```
:MEMory:DATA:BIT "<file name>", <bit_count>, <datablock>
```

```
:MEMory:DATA:BIT? "<file name>"
```

This command creates a bit file and stores it in the signal generator non-volatile memory.

"<file name>" This variable represents the user file name as it will appear in the signal generator memory.

<bit_count> This variable represents the number of significant bits in the data block.

<datablock> This variable represents the block-formatted data.

Example:

```
:MEMory:DATA:BIT "userfile1", 16, #12Qz
```

"userfile1" This is the name of the user file as it appears in the signal generator.

16 This variable defines the actual number of data bits contained in the datablock.

1 This variable defines the number of decimal digits to follow.

2 This variable defines how many bytes of data are to follow.

Qz This variable defines the ASCII representation of the 16 bits of data that are downloaded to the signal generator. Refer to the *E4428C/38C ESG Signal Generators Programming Guide* for more information.

Remarks Refer to [“File Name Variables” on page 13](#) for information on the file name syntax.

:DATA:FIR

Supported E4438C with Option 001/601 or 002/602

:MEMory:DATA:FIR "<file name>",osr,coefficient{,coefficient}

:MEMory:DATA:FIR? "<file name>"

This command creates a user-defined finite impulse response (FIR) file and stores it in the signal generator non-volatile memory.

osr The oversample ratio (osr) is the number of filter taps per symbol.

coefficient This variable is the FIR coefficient. The maximum total number of coefficients is 1024.

{,coefficient} This optional variable is used when you enter additional coefficients.

Range osr: 1–32
coefficient: –1000 to 1000

Key Entry Oversample Ratio

Remarks Refer to [“File Name Variables” on page 13](#) for information on the file name syntax.

:DATA:FSK

Supported E4438C with Option 001/601 or 002/602

```
:MEMory:DATA:FSK "<file name>",<num_states>,<f0>,<f1>,...<f(n)>
[,<diff_state>,<num_diff_states>,<diff1>,...<diff(n)>]
:MEMory:DATA:FSK? "<file name>"
```

This command creates a custom FSK file and stores it in the signal generator non-volatile memory.

The query returns data in the following form:

```
<num_states>,<f0>,<f1>,...<f(n)>,<diff_state>,<num_diff_states>,<diff1>,
...<diff(n)>
```

"<file name>"	This variable string identifies the name of the FSK file.
<num_states>	This variable identifies the number of frequency states.
<f0>	This variable identifies the value of the first frequency state.
<f1>,...<f(n)>	This variable identifies the value of the second and subsequent frequency states with a frequency resolution of 0.1Hz.
<diff_state>	This variable enables or disables differential encoding.
<num_diff_states>	This variable identifies the number of differential states.
<diff0>	This variable identifies the value of the first differential state.
<diff1>,...<diff(n)>	This variable identifies the value of the second and subsequent differential states.

The following example creates and stores a four-level FSK file named 4FSK that has four states (frequencies): -2kHz, -1kHz, 2kHz, 1kHz; differential encoding is toggled ON, and there are two differential states 1 and 0.

```
:MEM:DATA:FSK "4FSK",4,-2kHz,-1kHz,2kHz,1kHz,ON,2,1,0
```

Range	num_diff_states: 0-256
	num_states: 2-16
	f0-f(n): -20MHZ to 20MHZ
	diff0-diff(n): -128 to 127

:DATA:IQ

Supported E4438C with Option 001/601 or 002/602

```
:MEMory:DATA:IQ "<file name>",<offsetQ>,<num_states>,<i0>,<q0>,<i1>,<q1>,...<i(n)>,<q(n)>  
[,<diff_state>,<num_diff_states>,<diff0>,<diff1>,...<diff(n)>]  
:MEMory:DATA:IQ? "<file name>"
```

This command creates a custom I/Q file and stores it in the signal generator non-volatile memory.

The query returns data in the following form:

```
<offsetQ>,<num_states>,<i0>,<q0>,<i1>,<q1>,...<i(n)>,<q(n)>,<diff_state>  
,<num_diff_states>,<diff0>,<diff1>,...<diff(n)>
```

- "<file name>" This variable string identifies the name of the I/Q file.
- <offsetQ> This variable enables or disables the Q output delay by 1/2 symbol from the I output.
- <num_states> This variable identifies the number of symbols.
- <i0>...<i(n)> This variable identifies the I value of the first and subsequent I symbols.
- <q0>...<q(n)> This variable identifies the Q value of the first and subsequent Q symbols.
- <diff_state> This variable enables and disables differential encoding.
- <num_diff_states> This variable identifies the number of differential states.
- <diff0> This variable identifies the value of the first differential state.
- <diff1,...diff(n)> This variable identifies the value of the second and subsequent differential states.

The following example creates and stores a two-symbol I/Q file named testBPSK that has the Q offset.

```
:MEM:DATA:IQ "testBPSK",1,2,1,0,0,0
```

Range

- num_states: 2–256
- i0–i(n): –1 to 1
- q0–q(n): –1 to 1
- num_diff_states: 0–256
- diff0–diff(n): –128 to 127

:DATA:PRAM:FILE:BLOCK

Supported E8267D with Option 601 or 602

```
:MEMory:DATA:PRAM:FILE:BLOCK "<file_name>", <data_block>
```

This command loads block-formatted data directly into pattern RAM volatile memory (WFM1). Pattern RAM memory describes how memory (WFM1) is used and is not a distinct piece of memory. A PRAM file is specified as an array of bytes. No directory path name is needed.

"<file_name>" This variable names the destination file. Refer to [“File Name Variables” on page 13](#) for information on the file name syntax.

<data_block> This parameter represents the data and file length parameters. The data in the file is represented by the <data_block> variable. The file length parameters are used by the signal generator for allocating memory.

Pattern Ram files are binary files downloaded directly into waveform memory as an array of bytes. Each byte specifies a data bit (LSB 0), a burst bit (BIT 2), and an Event 1 output bit (BIT 6). Refer to the *E4428C/38C ESG Signal Generators Programming Guide* for more information on pattern RAM downloading.

Example

```
:MEM:DATA:PRAM:FILE:BLOCK "PRAM_Data",#14Yq8L
```

The preceding example downloads PRAM data to a file named PRAM_Data into the signal generator's volatile memory (WFM1).

- "PRAM_Data" PRAM_Data is the data filename. PRAM files are saved to the signal generator's non-volatile memory (WFM1).
- #14Yq8L Data block
 - # This character indicates the beginning of the data block
 - 1 Number of digits in the byte count
 - 4 Byte count
 - Yq8L 4 bytes of data

NOTE The data, Yq8L, in the above command is not valid and is used for example purposes only. Typically, ascii characters representing data are unprintable.

:DATA:PRAM:FILE:LIST

Supported E8267D with Option 601 or 602

MEMory:DATA:PRAM:FILE:LIST "<file_name>", <uint8>[, <uint8> , <...>]

This command loads list-formatted data directly into pattern RAM volatile memory (WFM1). Pattern RAM memory describes how memory (WFM1) is used and is not a distinct piece of memory. A PRAM file is specified as an array of bytes.

NOTE This command should be preceded by a *WAI (Wait-to-Continue) command to ensure that all pending operations are completed, before loading the list.

"<file_name>" This variable names the destination file. Refer to [“File Name Variables” on page 13](#) for information on the file name syntax.

<uint8> This variable is any of the valid 8-bit, unsigned integer values between 0 and 255.

[, <uint8> , <...>] This variable identifies the value of the second and subsequent 8-bit unsigned integer variables.

Pattern Ram files are binary files downloaded directly into waveform memory as an array of bytes. Each byte specifies a data bit (LSB 0), a burst bit (BIT 2), and an Event 1 output bit (BIT 6). Refer to the *E4428C/38C ESG Signal Generators Programming Guide* for more information on pattern RAM downloading.

Example

```
:MEM:DATA:PRAM:LIST "Pram_Data", 85,21,21,20,20,100
```

The preceding example downloads PRAM data, in list format, to a file named `Pram_Data` in the signal generator's volatile memory (WFM1).

- "Pram_Data" Pram_Data is the data filename. PRAM files are saved to the signal generator's non-volatile memory (WFM1).
- 85 The first 8-bit integer value
- 21,21,20,20,100 Subsequent 8-bit integer values.

Range 0–255

:DATA:PRAM

NOTE This query is no longer supported; however, it is still valid for backward compatibility. Refer to *ESG E4428C/38C Programming Compatibility Guide* for information on this command.

:DATA:PRAM:BLOCK

NOTE This command was replaced by “[:DATA:PRAM:FILE:BLOCK](#)” on page 111. Refer to *ESG E4428C/38C Programming Compatibility Guide* for more information.

:DATA:PRAM:LIST

NOTE This command has been replaced by “[:DATA:PRAM:FILE:LIST](#)” on page 112. Refer to *ESG E4428C/38C Programming Compatibility Guide* for information.

:DATA:SHAPE

Supported E4438C with Option 001/601 or 002/602

```
:MEMory:DATA:SHAPE "<filename>",<num_rise_points>,<rp0>,<rp1>,  
...<num_fall_points>,<fp0>,<fp1>,...<fp(n)>  
:MEMory:DATA:SHAPE? "<filename>"
```

This command creates a new burst shape file and stores it in the signal generator non-volatile memory.

"<filename>" This variable string identifies the name of the burst shape file.

num_rise_points This variable specifies how many rise points used in the command.

rp0,...rp(n) This variable defines each successive rise point, where 0 is no power and 1 is full power.

num_fall_points This variable specifies how many fall points used in the command.

fp0,...fp(n) This variable defines each successive fall point, where 0 is no power and 1 is full power.

Range num_rise_points: 2–256 num_fall_points: 2–256
rp0–rp(n): 0.0–1.0 fp0–fp(n): 0.0–1.0

:DATA:UNPRotected

Supported E4438C with Option 001/601 or 002/602

:MEMory:DATA:UNPRotected "<file_name>" , <data_block>

This command allows you to download data and store it in a file on the signal generator with the ability to retrieve it. This command is intended for downloading waveform data; however, you can use it to download all types of data.

NOTE If you do not use the UNPRotected command when downloading a waveform file, you will not be able to retrieve or upload the file. Attempting to do so will cause the signal generator to display the message: `ERROR:221, Access denied.`

"<file_name>" This variable names the destination file and directory path. The file type determines how you must format the "<filename>" variable. The table shown below describes the different "<filename>" variable types.

Binary file	The "<filename>" variable requires only a file name. A file name without a file path is stored in the Binary memory catalog. Refer to "File Name Variables" on page 13 for information on the file name syntax.
-------------	---

Encrypted file	The "<filename>" variable requires a path that includes the SECUREWAVE directory. The securewave directory path is SNVWFM: for non-volatile waveform memory and SWFM1: for volatile waveform memory. Refer to the <i>E4428C/38C ESG Programming Guide</i> for more
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All other file types	The "<filename>" variable requires a path that includes the destination directory for the file type. Refer to Table 3-1 on page 122 , "File Name Variables" on page 13 , and to the <i>E4428C/38C ESG Programming Guide</i> for more information.
----------------------	---

<data_block> This parameter represents the data and file length parameters. The data in the file is represented by the <data_block> variable.

Refer to the *E4428C/38C ESG Signal Generators Programming Guide* for more information on downloading and using files.

Example

```
:MEM:DATA:UNPR "NVWFM:Data_File",#18Qz37pY9o
```

The preceding example downloads waveform data to a file named Data_File in the signal generator's non-volatile memory. The table shown below describes the command parameters.

- "NVWFM:Data_File" Data_File is the data filename. The directory path is implied along with the filename.
- #18Qz37pY9o Data block
 - # This character indicates the beginning of the data block
 - 1 Number of digits in the byte count
 - 8 Byte count
 - Qz37pY9o 8 bytes of data

NOTE The data, Qz37pY9o, in the above command is not valid and is used for example purposes only. Typically, ascii characters representing data are unprintable.

:DELeTe:ALL

Supported All Models

CAUTION Using this command deletes all user files including binary, list, state, and flatness correction files, and any saved setups which use the front panel table editor. However, this does not include files stored on the Option 001/601 or 002/602 baseband generator. You cannot recover the files after executing this command.

```
:MEMory:DELeTe:ALL
```

This command clears the file system of all user files.

Key Entry Delete All Files

:DElete:BINary

Supported E4438C with Option 001/601 or 002/602

:MEMory:DELeTe:BINary

This command deletes all binary files.

Key Entry Delete All Binary Files

:DElete:BIT

Supported E4438C with Option 001/601 or 002/602

:MEMory:DELeTe:BIT

This command deletes all bit files.

Key Entry Delete All Bit Files

:DElete:CDMa

Supported E4438C with Option 401

:MEMory:DELeTe:CDMa

This command deletes all arbitrary waveform IS-95 CDMA files.

Key Entry Delete All ARB CDMA Files

:DElete:DMOD

Supported E4438C with Option 001/601 or 002/602

:MEMory:DELeTe:DMOD

This command deletes all arbitrary waveform digital modulation files.

Key Entry Delete All ARB DMOD Files

:DElete:DWCDma

Supported E4438C with Option 400

:MEMory:DELeTe:DWCDma

This command deletes all arbitrary waveform downlink W-CDMA files.

Key Entry Delete All ARB DWCDMA Files

:DElete:FCDMa

Supported E4438C with Option 401

:MEMory:DELeTe:FCDMa

This command deletes all arbitrary waveform forward link W-CDMA files.

Key Entry Delete All ARB FCDMA Files

:DElete:FIR

Supported E4438C with Option 001/601 or 002/602

:MEMory:DELeTe:FIR

This command deletes all finite impulse response filter files.

Key Entry Delete All FIR Files

:DElete:FSK

Supported E4438C with Option 001/601 or 002/602

:MEMory:DELeTe:FSK

This command deletes all FSK files.

Key Entry Delete All FSK Files

:DElete:IQ

Supported E4438C with Option 001/601 or 002/602

:MEMory:DELeTe:IQ

This command deletes all I/Q files.

Key Entry Delete All I/Q Files

:DElete:LIST

Supported All Models

:MEMory:DELeTe:LIST

This command deletes all List files.

Key Entry Delete All List Files

:DElete:MCDMa

Supported E4438C with Option 401

:MEMory:DElete:MCDMa

This command deletes all arbitrary waveform multicarrier IS-95 CDMA files.

Key Entry Delete All ARB MCDMA Files

:DElete:MDMod

Supported E4438C with Option 001/601 or 002/602

:MEMory:DElete:MDMod

This command deletes all arbitrary waveform multicarrier digital modulation files.

Key Entry Delete All ARB MDMOD Files

:DElete:MDWCdma

Supported E4438C with Option 400

:MEMory:DElete:MDWCdma

This command deletes all arbitrary waveform multicarrier downlink W-CDMA files.

Key Entry Delete All ARB MDWCDMA Files

:DElete:MFCdma

Supported E4438C with Option 401

:MEMory:DElete:MFCdma

This command deletes all arbitrary waveform multicarrier forward link cdma2000 files.

Key Entry Delete All ARB MFCDMA Files

:DElete:MTONE

Supported E4438C with Option 001/601 or 002/602

:MEMory:DElete:MTONE

This command deletes all arbitrary waveform multitone files.

Key Entry Delete All ARB MTONE Files

:DElete:RCDMa

Supported E4438C with Option 401

:MEMory:DELeTe:RCDMa

This command deletes all arbitrary waveform reverse link cdma2000 files.

Key Entry Delete All ARB RCDMA Files

:DElete:SEQ

Supported E4438C with Option 001/601 or 002/602

:MEMory:DELeTe:SEQ

This command deletes all sequence files.

Key Entry Delete All Sequence Files

:DElete:SHAPE

Supported E4438C with Option 001/601 or 002/602

:MEMory:DELeTe:SHAPE

This command deletes all burst shape files.

Key Entry Delete All Shape Files

:DElete:STATE

Supported All Models

:MEMory:DELeTe:STATE

This command deletes all state files.

Key Entry Delete All Models State Files

:DElete:UFLT

Supported All Models

:MEMory:DELeTe:UFLT

This command deletes all user-flatness correction files.

Key Entry Delete All UFLT Files

:DELEte:UWCDma

Supported E4438C with Option 400

:MEMory:DELEte:UWCDma

This command deletes all arbitrary waveform uplink W-CDMA files.

Key Entry Delete All ARB UWCDMA Files

:DELEte[:NAME]

Supported All Models

:MEMory:DELEte[:NAME] "<file name>"

This command clears the user file system of "<file name>".

Key Entry Delete File

Remarks Refer to [“File Name Variables” on page 13](#) for information on the file name syntax.

When deleting a waveform (WFM1) file from memory, the marker and headers file associated with the waveform file will also be deleted.

:FREE[:ALL]

Supported All Models

:MEMory:FREE[:ALL]?

This command returns the number of bytes left in the user file system.

Key Entry All

:LOAD:LIST

Supported All Models

:MEMory:LOAD:LIST "<file name>"

This command loads a list sweep file.

Key Entry Load From Selected File

:MOVE

Supported All Models

```
:MEMory:MOVE "<src_file>", "<dest_file>"
```

This command renames the requested file in the memory catalog.

Key Entry Rename File

Remarks Refer to [“File Name Variables” on page 13](#) for information on the file name syntax.

:STATe:COMMeNt

Supported All Models

```
:MEMory:STATe:COMMeNt <reg_num>, <seq_num>, "<comment>"
```

```
:MEMory:STATe:COMMeNt? <reg_num>, <seq_num>
```

This command lets you to add a descriptive comment to the saved state <reg_num>,<seq_num>. Comments can be up to 55 characters long.

Key Entry Add Comment To Seq[n] Reg[nn]

:STORe:LIST

Supported All Models

```
:MEMory:STORe:LIST "<file name>"
```

This command stores the current list sweep data to a file.

Key Entry Store To File

Mass Memory Subsystem (:MMEMory)

:CATalog

Supported All Models

```
:MMEMory:CATalog? "<msus>"
```

This command outputs a list of the files from the specified file system.

The variable "<msus>" (mass storage unit specifier) represents "<file system>:". The file systems and types are shown in [Table 3-1](#).

Table 3-1

File System	File Type
BINARY ^a	BIN
BIT ^a	BIT
CDMA ^a	CDMA
DMOD - ARB digital modulation file ^a	DMOD
DWCDMA - ARB downlink W-CDMA file ^a	DWCD
FCDMA - ARB forward link cdma2000 file ^a	FCDM
FIR - finite impulse response filter file	FIR
FSK - frequency shift keying modulation file ^a	FSK
I/Q - modulation file ^a	IQ
LIST - sweep list file	LIST
MCDMA - ARB multicarrier CDMA file ^a	MCDM
MDMOD - ARB multicarrier digital modulation file ^a	MDM
MDWCDMA - ARB multicarrier downlink W-CDMA file ^a	MDWC

Table 3-1

File System	File Type
MFCDMA - ARB multicarrier forward link cdma2000 file ^a	MFCD
MTONE - ARB multitone file ^a	MTON
NVMKR - non-volatile arbitrary waveform marker file ^a	NVMKR
NVWFM - non-volatile arbitrary waveform file ^a	NVWFM
RCDMA - ARB reverse link cdma2000 file ^a	RCDM
SEQ - ARB sequence file ^a	SEQ
SHAPE - burst shape file ^a	SHAP
STATE	STAT
USERFLAT - user-flatness file	UFLT
UWCDMA - ARB uplink W-CDMA file ^a	UWCD
WFM1 - waveform file ^a	WFM1

a. This feature does not apply to the E4428C.

The return data will be in the following form:

```
<mem used>,<mem free>{,"<file listing>"}
```

The signal generator will return the two memory usage parameters and as many file listings as there are files in the specified file system. Each file listing will be in the following format:

```
"<file name,file type,file size>"
```

Key Entry	Binary	List	State	User Flatness	FIR	Shape	Bit	FSK
	IQ	Seq	DMOD	MTONE	MDMOD	CDMA	MCDMA	FCDMA
	MFCDMA	RCDMA	WCDMA	FWCDMA	MFWCDMA	RWCDMA		
	DWCDMA	MDWCDMA	UWCDMA	WFM1	NVMKR	NVWFM		

Remarks Refer to “[MSUS \(Mass Storage Unit Specifier\) Variable](#)” on page 15 for information on the use of the "<msus>" variable.

:COPY

Supported All Models

:MMEMory:COPY "<file name>", "<file name>"

This command makes a duplicate of the requested file.

Key Entry Copy File

Remarks Refer to [“File Name Variables” on page 13](#) for information on the file name syntax.

When copying a waveform file from volatile to non-volatile memory, the marker and header files associated with the waveform file will automatically be copied at the same time.

:DATA

Supported E4438C with Option 001/601 or 002/602

:MMEMory:DATA "<file name>", <datablock>

:MMEMory:DATA? "<file name>"

This command loads <datablock> into the memory location "<file name>".

The query returns the <datablock> associated with the "<file name>".

Remarks Refer to [“File Name Variables” on page 13](#) for information on the file name syntax.

:DATA:UNPRotected

Supported E4438C with Option 001/601 or 002/602

```
:MMEMory:DATA:UNPRotected "<file_name>" , <data_block>
```

This command allows you to download data and store it in a file on the signal generator with the ability to retrieve it. This command is intended for downloading waveform data; however, you can use it to download all types of data.

NOTE If you do not use the UNPRotected command when downloading a waveform file, you will not be able to retrieve or upload the file. Attempting to do so will cause the signal generator to display the message: `ERROR:221, Access denied`.

"<file_name>" This variable names the destination file and directory path. The file type determines how you must format the "<filename>" variable. The table shown below describes the different "<filename>" variable types.

Binary file The "<filename>" variable requires only a file name. A file name without a file path is stored in the Binary memory catalog. Refer to ["File Name Variables" on page 13](#) for information on the file name syntax.

Encrypted file The "<filename>" variable requires a path that includes the SECUREWAVE directory. The securewave directory path is SNVWFM: for non-volatile waveform memory and SWFM1: for volatile waveform memory. Refer to the *E4428C/38C ESG Programming Guide* for more

All other file types The "<filename>" variable requires a path that includes the destination directory for the file type. Refer to [Table 3-1 on page 122](#), ["File Name Variables" on page 13](#), and to the *E4428C/38C ESG Programming Guide* for more information.

<data_block> This parameter represents the data and file length parameters. The data in the file is represented by the <data_block> variable.

Refer to the *E4428C/38C ESG Signal Generators Programming Guide* for more information on downloading and using files.

Mass Memory Subsystem (:MMEMory)

Example

```
:MMEM:DATA:UNPR "NVWFM:Data_File",#18Qz37pY9o
```

The preceding example downloads waveform data to a file named `Data_File` and saves it to the signal generator's non-volatile (NVWFM) memory. The table shown below describes the command parameters.

- "NVWFM:Data_File" Data_File is the data filename. The securewave directory path is designated along with the filename.
- #18Qz37pY9o Data block
 - # This character indicates the beginning of the data block
 - 1 Number of digits in the byte count
 - 8 Byte count
 - Qz37pY9o 8 bytes of data

NOTE The data, `Qz37pY9o`, in the above command is not valid and is used for example purposes only. Typically, ascii characters representing data are unprintable.

:DELeTe:NVWFm

Supported E4438C with Option 001/601 or 002/602

```
:MMEMory:DELeTe:NVWFm
```

This command clears the user file system of all non-volatile arbitrary waveform files.

Key Entry Delete All NVWFM Files

:DELeTe:WFM

Supported E4438C with Option 001/601 or 002/602

```
:MMEMory:DELeTe:WFM
```

This command clears the user file system of all arbitrary waveform files.

Key Entry Delete All WFM1 Files

Remarks This command performs the same function as `DELeTe:WFM1`.

:DElete:WFM1

Supported E4438C with Option 001/601 or 002/602

`:MMEMory:DElete:WFM1`

This command clears the user file system of all arbitrary waveform files.

Key Entry Delete All WFM1 Files

Remarks This command performs the same function as DElete:WFM.

:DElete[:NAME]

Supported All

`:MMEMory:DElete[:NAME] "<file name>" , ["<msus>"]`

This command clears the user file system of "<file name>" with the option of specifying the file system separately.

The variable "<msus>" (mass storage unit specifier) represents "<file system>:". For a list of the file systems refer to [Table 3-1 on page 122](#).

Key Entry Delete File

Remarks If the optional variable "<msus>" is omitted, the file name needs to include the file system extension. Refer to [“File Name Variables” on page 13](#) and [“MSUS \(Mass Storage Unit Specifier\) Variable” on page 15](#) for information on the use of the file variables.

When deleting a waveform file from memory, the marker and headers file associated with the waveform file will also be deleted.

:HEADer:CLEar

Supported E4438C with Option 001/601 or 002/602

`:MMEMory:HEADer:CLEar "<file name>"`

This command deletes the header file for the waveform file named.

Key Entry Clear Header

Remarks This command does not require a personality modulation to be on.

:HEADer:DESCRiption

Supported E4438C with Option 001/601 or 002/602

:MMEMory:HEADer:DESCRiption "<file name>", "<description>"

:MMEMory:HEADer:DESCRiption? "<file name>"

This command inserts a description for the header file named.

Key Entry Edit Description

Remarks The header description is limited to 32 characters.

:LOAD:LIST

Supported All

:MMEMory:LOAD:LIST "<file name>"

This command loads a List sweep file.

Key Entry Load From Selected File

:MOVE

Supported All

:MMEMory:MOVE "<src_file>", "<dest_file>"

This command renames the requested file in the memory catalog.

Key Entry Rename File

Remarks Refer to [“File Name Variables” on page 13](#) for information on the file name syntax.

:STORE:LIST

Supported All

:MMEMory:STORE:LIST "<file name>"

This command stores the current list sweep data to a file.

Key Entry Store To File

Output Subsystem (:OUTPut)

:BLANking:AUTO

Supported All

:OUTPut:BLANking:AUTO ON|OFF|1|0

:OUTPut:BLANking:AUTO?

This command enables or disables the RF output blanking during frequency changes.

ON This choice causes the RF to always blank.

OFF This choice causes the RF to not blank.

*RST 1

Key Entry Output Blanking Off On Auto

:BLANking:STAtE

Supported All

:OUTPut:BLANking:STAtE ON|OFF|1|0

:OUTPut:BLANking:STAtE?

This command enables or disables the RF output blanking state.

*RST 1

:MODulation[:STAtE]

Supported All

:OUTPut:MODulation[:STAtE] ON|OFF|1|0

:OUTPut:MODulation[:STAtE]?

This command enables or disables the modulation of the RF output with the currently active modulation type(s).

*RST 1

Key Entry Mod On/Off

Remarks Some modulation types can be simultaneously enabled such as pulse and AM.
An annunciator on the signal generator is always displayed to indicate whether modulation is switched on or off.

System Commands
Output Subsystem (:OUTPut)

[[:STATe]

Supported All

:OUTPut [:STATe] ON|OFF|1|0

:OUTPut [:STATe]?

This command enables or disables the RF output.

***RST** 0

Key Entry RF On/Off

Remarks Although you can configure and engage various modulations, no signal is available at the RF OUTPUT connector until this command is executed.

An annunciator is always displayed on the signal generator to indicate whether the RF output is switched on or off.

Route Subsystem (:ROUTE:HARDware:DGENERator)

:INPut:BPOLarity

Supported E4438C with Option 001/601 or 002/602

```
:ROUTE:HARDware:DGENERator:INPut:BPOLarity POSitive|NEGative  
:ROUTE:HARDware:DGENERator:INPut:BPOLarity?
```

This command configures the polarity of the TTL input signal at the BURST GATE IN connector. POSitive refers to normal logic, while NEGative refers to inverted logic.

***RST** POS

Key Entry Burst Gate In Polarity Neg Pos

Remarks This command performs the same function as [“:IPOLarity:BGATE”](#) on page 132.

:INPut:CPOLarity

Supported E4438C with Option 001/601 or 002/602

```
:ROUTE:HARDware:DGENERator:INPut:CPOLarity POSitive|NEGative  
:ROUTE:HARDware:DGENERator:INPut:CPOLarity?
```

This command configures the polarity of the TTL input signal at the DATA CLOCK connector. POSitive refers to normal logic, while NEGative refers to inverted logic.

***RST** POS

Key Entry Data Clock Polarity Neg Pos

Remarks This command performs the same function as [“:IPOLarity:CLOCK”](#) on page 133.

:INPut:DPOLarity

Supported E4438C with Option 001/601 or 002/602

:ROUTE:HARDware:DGENERator:INPut:DPOLarity POSitive|NEGative

:ROUTE:HARDware:DGENERator:INPut:DPOLarity?

This command configures the polarity of the TTL input signal at the DATA connector. POSitive refers to normal logic, while NEGative refers to inverted logic.

***RST** POS

Key Entry Data Polarity Neg Pos

Remarks This command performs the same function as [“:IPOLarity:DATA” on page 133](#).

:INPut:SPOLarity

Supported E4438C with Option 001/601 or 002/602

:ROUTE:HARDware:DGENERator:INPut:SPOLarity POSitive|NEGative

:ROUTE:HARDware:DGENERator:INPut:SPOLarity?

This command configures the polarity of the TTL input signal at the SYMBOL SYNC connector. POSitive refers to normal logic, while NEGative refers to inverted logic.

***RST** POS

Key Entry Symbol Sync Polarity Neg Pos

Remarks This command performs the same function as [“:IPOLarity:SSYNc” on page 133](#).

:IPOLarity:BGATe

Supported E4438C with Option 001/601 or 002/602

:ROUTE:HARDware:DGENERator:IPOLarity:BGATe POSitive|NEGative

:ROUTE:HARDware:DGENERator:IPOLarity:BGATe?

This command configures the polarity of the input signal at the BURST GATE IN connector. POSitive refers to normal logic, while NEGative refers to inverted logic.

***RST** POS

Key Entry Burst Gate In Polarity Neg Pos

Remarks This command performs the same function as [“:INPut:BPOLarity” on page 131](#).

:IPOLarity:CLOCK

Supported E4438C with Option 001/601 or 002/602

:ROUTE:HARDware:DGENERator:IPOLarity:CLOCK POSitive|NEGative

:ROUTE:HARDware:DGENERator:IPOLarity:CLOCK?

This command configures the polarity of the TTL input signal at the DATA CLOCK connector. POSitive refers to normal logic, while NEGative refers to inverted logic.

***RST** POS

Key Entry Data Clock Polarity Neg Pos

Remarks This command performs the same function as “:INPut:CPOLarity” on page 131.

:IPOLarity:DATA

Supported E4438C with Option 001/601 or 002/602

:ROUTE:HARDware:DGENERator:IPOLarity:DATA POSitive|NEGative

:ROUTE:HARDware:DGENERator:IPOLarity:DATA?

This command configures the polarity of the TTL input signal at the DATA connector. POSitive refers to normal logic, while NEGative refers the inverted logic.

***RST** POS

Key Entry Data Polarity Neg Pos

Remarks This command performs the same function as “:INPut:DPOLarity” on page 132.

:IPOLarity:SSYNc

Supported E4438C with Option 001/601 or 002/602

:ROUTE:HARDware:DGENERator:IPOLarity:SSYNc POSitive|NEGative

:ROUTE:HARDware:DGENERator:IPOLarity:SSYNc?

This command configures the polarity of the TTL input signal at the SYMBOL SYNC connector. POSitive refers to normal logic, while NEGative refers to inverted logic.

***RST** POS

Key Entry Symbol Sync Polarity Neg Pos

Remarks This command performs the same function as “:INPut:SPOLarity” on page 132.

:OPOLarity:CLOCK

Supported E4438C with Option 001/601 or 002/602

:ROUTE:HARDware:DGENERator:OPOLarity:CLOCK POSitive|NEGative

:ROUTE:HARDware:DGENERator:OPOLarity:CLOCK?

This command configures the polarity of the TTL output Data Clock Out signal at the DATA CLK OUT pin on the rear panel AUX I/O connector. POSitive refers to normal logic, while the NEGative refers to inverted logic.

***RST** POS

Key Entry Data Clock Out Neg Pos

Remarks This command performs the same function as [“:OUTPut:CPOLarity” on page 135](#).

:OPOLarity:DATA

Supported E4438C with Option 001/601 or 002/602

:ROUTE:HARDware:DGENERator:OPOLarity:DATA POSitive|NEGative

:ROUTE:HARDware:DGENERator:OPOLarity:DATA?

This command configures the polarity of the TTL output DATA OUT signal at the DATA OUT pin on the rear panel AUX I/O connector. POSitive refers to normal logic, while NEGative refers to inverted logic.

***RST** POS

Key Entry Data Out Polarity Neg Pos

Remarks This command performs the same function as [“:OUTPut:DPOLarity” on page 136](#).

:OPOLarity:SSYNc

Supported E4438C with Option 001/601 or 002/602

:ROUTE:HARDware:DGENERator:OPOLarity:SSYNc POSitive|NEGative

:ROUTE:HARDware:DGENERator:OPOLarity:SSYNc?

This command configures the polarity of the TTL output SYMBOL SYNC signal at the SYM SYNC OUT pin on the rear panel AUX I/O connector. POSitive refers to normal logic, while NEGative refers to inverted logic.

***RST** POS

Key Entry Symbol Sync Out Polarity Neg Pos

Remarks This command performs the same function as “:OUTPut:SPOLarity” on [page 136](#).

:OUTPut:CPOLarity

Supported E4438C with Option 001/601 or 002/602

:ROUTE:HARDware:DGENERator:OUTPut:CPOLarity POSitive|NEGative

:ROUTE:HARDware:DGENERator:OUTPut:CPOLarity?

This command configures the polarity of the TTL output DATA CLOCK OUT signal at the DATA CLK OUT pin on the rear panel AUX I/O connector. POSitive refers to normal logic, while NEGative refers to inverted logic.

***RST** POS

Key Entry Data Clock Polarity Neg Pos

Remarks This command performs the same function as “:OPOLarity:CLOCK” on [page 134](#).

:OUTPut:DCS[:STATe]

Supported E4438C with Option 001/601 or 002/602

```
:ROUTE:HARDware:DGENERator:OUTPut:DCS[:STATe] ON|OFF|1|0
```

```
:ROUTE:HARDware:DGENERator:OUTPut:DCS[:STATe]?
```

This command is used to enable or disable the output DATA OUT, DATA CLK OUT, and SYM SYNC OUT signals from the rear panel AUX I/O connector. Normally, these output signals should be enabled (On). However, disabling these outputs will decrease the spurs that are sometimes present when operating at high symbol rates.

***RST** 1

Key Entry DATA/CLK/SYNC Rear Outputs Off On

:OUTPut:DPOLarity

Supported E4438C with Option 001/601 or 002/602

```
:ROUTE:HARDware:DGENERator:OUTPut:DPOLarity POSitive|NEGative
```

```
:ROUTE:HARDware:DGENERator:OUTPut:DPOLarity?
```

This command configures the polarity of the TTL output signal at the DATA OUT connector. POSitive refers to normal logic, while NEGative refers to inverted logic.

***RST** POS

Key Entry Data Out Polarity Neg Pos

Remarks This command performs the same function as [“:OPOLarity:DATA”](#) on page 134.

:OUTPut:SPOLarity

Supported E4438C with Option 001/601 or 002/602

```
:ROUTE:HARDware:DGENERator:OUTPut:SPOLarity POSitive|NEGative
```

```
:ROUTE:HARDware:DGENERator:OUTPut:SPOLarity?
```

This command configures the polarity of the TTL input signal at the SYMBOL SYNC connector. POSitive refers to normal logic, while NEGative refers to inverted logic.

***RST** POS

Key Entry Symbol Sync Out Polarity Neg Pos

Status Subsystem (:STATUS)

:OPERation:BASEband:CONDition

Supported E4438C with Option 001/601 or 002/602

:STATus:OPERation:BASEband:CONDition?

This query returns the decimal sum of the bits in the Baseband Operation Condition Register. For example, if the baseband is busy (bit 0), the value 1 is returned.

Range 0–32767

Remarks The data in this register is continuously updated and reflects the current conditions.

Refer to Chapter 3 of the *E4428C/38C ESG Signal Generators Programming Guide* for more information.

:OPERation:BASEband:ENABLE

Supported E4438C with Option 001/601 or 002/602

:STATus:OPERation:BASEband:ENABLE <val>

:STATus:OPERation:BASEband:ENABLE?

This command determines which bits in the Baseband Operation Event Register will set the Baseband is Busy bit (bit 10) in the Standard Operation Condition Register.

The variable <num> is the sum of the decimal values of the bits you want to enable.

Range 0–32767

Remarks Refer to Chapter 3 of the *E4428C/38C ESG Signal Generators Programming Guide* for more information.

:OPERation:BASEband:NTRansition

Supported E4438C with Option 001/601 or 002/602

:STATus:OPERation:BASEband:NTRansition <val>

:STATus:OPERation:BASEband:NTRansition?

This command determines which bits in the Baseband Operation Condition Register will set the corresponding bit in the Baseband Operation Event Register when that bit has a negative transition (1 to 0).

The variable <val> is the sum of the decimal values of the bits that you want to enable.

Range 0–32767

Remarks Refer to Chapter 3 of the *E4428C/38C ESG Signal Generators Programming Guide* for more information.

:OPERation:BASEband:PTRansition

Supported E4438C with Option 001/601 or 002/602

:STATus:OPERation:BASEband:PTRansition <val>

:STATus:OPERation:BASEband:PTRansition?

This command determines which bits in the Baseband Operation Condition Register will set the corresponding bit in the Baseband Operation Event Register when that bit has a positive transition (0 to 1).

The variable <val> is the sum of the decimal values of the bits that you want to enable.

Range 0–32767

Remarks Refer to Chapter 3 of the *E4428C/38C ESG Signal Generators Programming Guide* for more information.

:OPERation:BASeband[:EVENT]

Supported E4438C with Option 001/601 or 002/602

:STATus:OPERation:BASeband[:EVENT]?

CAUTION This is a destructive read. The data in the register is latched until it is queried. Once queried, the data is cleared.

This query returns the decimal sum of the bits in the Standard Operation Baseband Event Register.

Range 0–32767

Remarks The equivalent PTR and NTR filters must be set before the condition register can set the corresponding bit in the event register.

Refer to Chapter 3 of the *E4428C/38C ESG Signal Generators Programming Guide* for more information.

:OPERation:CONDition

Supported All

:STATus:OPERation:CONDition?

This query returns the decimal sum of the bits for the registers that are set to one and are part of the Standard Operation Status Group. For example, if a sweep is in progress (bit 3), the value 8 is returned.

Range 0–32767

Remarks The data in this register is continuously updated and reflects current conditions.

Refer to Chapter 3 of the *E4428C/38C ESG Signal Generators Programming Guide* for more information.

:OPERation:ENABLE

Supported All

:STATus:OPERation:ENABle <val>

:STATus:OPERation:ENABle?

This command determines which bits in the Standard Operation Event Register will set the Standard Operation Status Summary bit (bit 7) in the Status Byte Register.

The variable <val> is the sum of the decimal values of the bits that you want to enable.

Range 0–32767

Remarks Refer to Chapter 3 of the *E4428C/38C ESG Signal Generators Programming Guide* for more information.

:OPERation:NTRansition

Supported All

:STATus:OPERation:NTRansition <val>

:STATus:OPERation:NTRansition?

This command determines which bits in the Standard Operation Condition Register will set the corresponding bit in the Standard Operation Event Register when that bit has a negative transition (1 to 0).

The variable <val> is the sum of the decimal values of the bits that you want to enable.

Range 0–32767

Remarks Refer to Chapter 3 of the *E4428C/38C ESG Signal Generators Programming Guide* for more information.

:OPERation:PTRansition

Supported All

```
:STATus:OPERation:PTRansition <val>
:STATus:OPERation:PTRansition?
```

This command determines which bits in the Standard Operation Condition Register will set the corresponding bit in the Standard Operation Event Register when that bit has a positive transition (0 to 1).

The variable <val> is the sum of the decimal values of the bits that you want to enable.

Range 0–32767

Remarks Refer to Chapter 3 of the *E4428C/38C ESG Signal Generators Programming Guide* for more information.

:OPERation[:EVENT]

Supported All

CAUTION This is a destructive read. The data in the register is latched until it is queried. Once queried, the data is cleared.

```
:STATus:OPERation[:EVENT]?
```

This query returns the decimal sum of the bits in the Standard Operation Event Register.

Range 0–32767

Remarks The equivalent PTR or NTR filters must be set before the condition register can set the corresponding bit in the event register.

Refer to Chapter 3 of the *E4428C/38C ESG Signal Generators Programming Guide* for more information.

:PRESet

Supported All

```
:STATus:PRESet
```

This command presets all transition filters, enable registers, and error/event queue enable registers.

Remarks Refer to Chapter 3 of the *E4428C/38C ESG Signal Generators Programming Guide* for more information.

:QUESTionable:BERT:CONDition

Supported E4438C with Option UN7, 300 or both

:STATus:QUESTionable:BERT:CONDition?

This query returns the decimal sum of the bits in the Data Questionable BERT Condition Register. For example, if no clock signal has been input for more than three seconds during the bit error rate measurement (bit 0), then a value of 1 is returned.

Range 0–32767

Remarks The data in this register is continuously updated and reflects the current conditions.

Refer to Chapter 3 of the *E4428C/38C ESG Signal Generators Programming Guide* for more information.

:QUESTionable:BERT:ENABLE

Supported E4438C with Option UN7, 300 or both

:STATus:QUESTionable:BERT:ENABLE <val>

:STATus:QUESTionable:BERT:ENABLE?

This command determines which bits in the Data Questionable BERT Event Register will set the Data Questionable BERT Summary bit (bit 12) in the Data Questionable Condition Register.

The variable <val> is the sum of the decimal values of the bits you want to enable.

Range 0–32767

Remarks Refer to Chapter 3 of the *E4428C/38C ESG Signal Generators Programming Guide* for more information.

:QUESTIONable:BERT:NTRansition

Supported E4438C with Option UN7, 300 or both

:STATUS:QUESTIONable:BERT:NTRansition <val>

:STATUS:QUESTIONable:BERT:NTRansition?

This command determines which bits in the Data Questionable BERT Condition Register will set the corresponding bit in the Data Questionable BERT Event Register when that bit has a negative transition (1 to 0).

The variable <val> is the sum of the decimal values of the bits that you want to enable.

Range 0–32767

Remarks The data in this register is continuously updated and reflects the current conditions.

Refer to Chapter 3 of the *E4428C/38C ESG Signal Generators Programming Guide* for more information.

:QUESTIONable:BERT:PTRansition

Supported E4438C with Option UN7, 300 or both

:STATUS:QUESTIONable:BERT:PTRansition <val>

:STATUS:QUESTIONable:BERT:PTRansition?

This command determines which bits in the Data Questionable BERT Condition Register will set the corresponding bit in the Data Questionable BERT Event Register when that bit has a positive transition (0 to 1).

The variable <val> is the sum of the decimal values of the bits that you want to enable.

Range 0–32767

Remarks Refer to Chapter 3 of the *E4428C/38C ESG Signal Generators Programming Guide* for more information.

:QUESTionable:BERT[:EVENT]

Supported E4438C with Option UN7, 300 or both

CAUTION This is a destructive read. The data in the register is latched until it is queried. Once queried, the data is cleared.

:STATus:QUESTionable:BERT[:EVENT]?

This command returns the decimal value of the sum of the bits in the Data Questionable BERT Event Register.

Range 0–32767

Remarks Note that the register requires that the equivalent PTR or NTR filters be set before a condition register bit can set a bit in the Event register.

Refer to Chapter 3 of the *E4428C/38C ESG Signal Generators Programming Guide* for more information.

:QUESTionable:CALibration:CONDition

Supported All

:STATus:QUESTionable:CALibration:CONDition?

This query returns the decimal sum of the bits in the Data Questionable Calibration Condition Register. For example, if the DCFM or DCΦM zero calibration fails (bit 0), a value of 1 is returned.

Range 0–32767

Remarks The data in this register is continuously updated and reflects the current conditions.

Refer to Chapter 3 of the *E4428C/38C ESG Signal Generators Programming Guide* for more information.

:QUESTionable:CALibration:ENABle

Supported All

:STATus:QUESTionable:CALibration:ENABle <val>

:STATus:QUESTionable:CALibration:ENABle?

This command determines which bits in the Data Questionable Calibration Event Register will set the calibration summary bit (bit 8) in the Data Questionable Condition Register.

The variable <val> is the sum of the decimal values of the bits that you want to enable.

Range 0–32767

Remarks Refer to Chapter 3 of the *E4428C/38C ESG Signal Generators Programming Guide* for more information.

:QUESTIONable:CALibration:NTRansition

Supported All

```
:STATus:QUESTIONable:CALibration:NTRansition <val>  
:STATus:QUESTIONable:CALibration:NTRansition?
```

This command determines which bits in the Data Questionable Calibration Condition Register will set the corresponding bit in the Data Questionable Calibration Event Register when that bit has a negative transition (1 to 0).

The variable <val> is the sum of the decimal values of the bits that you want to enable.

Range 0–32767

Remarks Refer to Chapter 3 of the *E4428C/38C ESG Signal Generators Programming Guide* for more information.

:QUESTIONable:CALibration:PTRansition

Supported All

```
:STATus:QUESTIONable:CALibration:PTRansition <val>  
:STATus:QUESTIONable:CALibration:PTRansition?
```

This command determines which bits in the Data Questionable Calibration Condition Register will set the corresponding bit in the Data Questionable Calibration Event Register when that bit has a positive transition (0 to 1).

The variable <val> is the sum of the decimal values of the bits that you want to enable.

Range 0–32767

Remarks Refer to Chapter 3 of the *E4428C/38C ESG Signal Generators Programming Guide* for more information.

:QUESTionable:CALibration[:EVENT]

Supported All

CAUTION This is a destructive read. The data in the register is latched until it is queried. Once queried, the data is cleared.

:STATus:QUESTionable:CALibration[:EVENT]?

This command returns the decimal sum of the bits in the Data Questionable Calibration Event Register.

Range 0–32767

Remarks The equivalent PTR or NTR filters must be set before the condition register can set the corresponding bit in the event register.

Refer to Chapter 3 of the *E4428C/38C ESG Signal Generators Programming Guide* for more information.

:QUESTionable:CONDition

Supported All

:STATus:QUESTionable:CONDition?

This query returns the decimal sum of the bits in the Data Questionable Condition Register. For example, if the reference oscillator oven is cold (bit 4), a value of 16 is returned.

Range 0–32767

Remarks The data in this register is continuously updated and reflects current conditions.

Refer to Chapter 3 of the *E4428C/38C ESG Signal Generators Programming Guide* for more information.

:QUESTIONable:ENABLE

Supported All

```
:STATUS:QUESTIONable:ENABLE <val>
:STATUS:QUESTIONable:ENABLE?
```

This command determines which bits in the Data Questionable Event Register will set the Data Questionable Status Group Summary bit (bit 3) in the Status Byte Register.

The variable <val> is the sum of the decimal values of the bits that you want to enable.

Range 0–32767

Remarks Refer to Chapter 3 of the *E4428C/38C ESG Signal Generators Programming Guide* for more information.

:QUESTIONable:FREQuency:CONDition

Supported All

```
:STATUS:QUESTIONable:FREQuency:CONDition?
```

This query returns the decimal sum of the bits in the Data Questionable Frequency Condition Register. For example, if the 1 GHz internal reference clock is unlocked (bit 2), a value of 4 is returned.

Range 0–32767

Remarks The data in this register is continuously updated and reflects current conditions. Refer to Chapter 3 of the *E4428C/38C ESG Signal Generators Programming Guide* for more information.

:QUESTIONable:FREQuency:ENABLE

Supported All

```
:STATUS:QUESTIONable:FREQuency:ENABLE <val>
:STATUS:QUESTIONable:FREQuency:ENABLE?
```

This command determines which bits in the Data Questionable Frequency Event Register will set the frequency summary bit (bit 5) in the Data Questionable Condition Register.

The variable <val> is the sum of the decimal values of the bits that you want to enable.

Range 0–32767

Remarks Refer to Chapter 3 of the *E4428C/38C ESG Signal Generators Programming Guide* for more information.

:QUESTIONable:FREQuency:NTRansition

Supported All

```
:STATUS:QUESTIONable:FREQuency:NTRansition <val>  
:STATUS:QUESTIONable:FREQuency:NTRansition?
```

This command determines which bits in the Data Questionable Frequency Condition Register will set the corresponding bit in the Data Questionable Frequency Event Register when that bit has a negative transition (1 to 0).

The variable <val> is the sum of the decimal values of the bits that you want to enable.

Range 0–32767

Remarks Refer to Chapter 3 of the *E4428C/38C ESG Signal Generators Programming Guide* for more information.

:QUESTIONable:FREQuency:PTRansition

Supported All

```
:STATUS:QUESTIONable:FREQuency:PTRansition <val>  
:STATUS:QUESTIONable:FREQuency:PTRansition?
```

This command determines which bits in the Data Questionable Frequency Condition Register will set the corresponding bit in the Data Questionable Frequency Event Register when that bit has a positive transition (0 to 1).

The variable <val> is the sum of the decimal values of the bits that you want to enable.

Range 0–32767

Remarks Refer to Chapter 3 of the *E4428C/38C ESG Signal Generators Programming Guide* for more information.

:QUESTIONable:FREQuency[:EVENT]

Supported All

CAUTION This is a destructive read. The data in the register is latched until it is queried. Once queried, the data is cleared.

```
:STATUS:QUESTIONable:FREQuency[:EVENT]?
```

This query returns the decimal sum of the bits in the Data Questionable Frequency Event Register.

Range 0–32767

Remarks The equivalent PTR or NTR filters must be set before the condition register can set the corresponding bit in the event register.

Refer to Chapter 3 of the *E4428C/38C ESG Signal Generators Programming Guide* for more information.

:QUESTIONable:MODulation:CONDition

Supported All

:STATUS:QUESTIONable:MODulation:CONDition?

This command returns the decimal sum of the bits in the Data Questionable Modulation Condition Register. For example, if the modulation is uncalibrated (bit 4), a value of 16 is returned.

Range 0–32767

Remarks The data in this register is continuously updated and reflects current conditions.

Refer to Chapter 3 of the *E4428C/38C ESG Signal Generators Programming Guide* for more information.

:QUESTIONable:MODulation:ENABLE

Supported All

:STATUS:QUESTIONable:MODulation:ENABLE <val>

:STATUS:QUESTIONable:MODulation:ENABLE?

This command determines which bits in the Data Questionable Modulation Event Register will set the modulation summary bit (bit 7) in the Data Questionable Condition Register.

The variable <val> is the sum of the decimal values of the bits that you want to enable.

Range 0–32767

Remarks Refer to Chapter 3 of the *E4428C/38C ESG Signal Generators Programming Guide* for more information.

:QUESTionable:MODulation:NTRansition

Supported All

```
:STATUS:QUESTionable:MODulation:NTRansition <val>  
:STATUS:QUESTionable:MODulation:NTRansition?
```

This command determines which bits in the Data Questionable Modulation Condition Register will set the corresponding bit in the Data Questionable Modulation Event Register when that bit has a negative transition (1 to 0).

The variable <val> is the sum of the decimal values of the bits that you want to enable.

Range 0–32767

Remarks Refer to Chapter 3 of the *E4428C/38C ESG Signal Generators Programming Guide* for more information.

:QUESTionable:MODulation:PTRansition

Supported All

```
:STATUS:QUESTionable:MODulation:PTRansition <val>  
:STATUS:QUESTionable:MODulation:PTRansition?
```

This command determines which bits in the Data Questionable Modulation Condition Register will set the corresponding bit in the Data Questionable Modulation Event Register when that bit has a positive transition (0 to 1).

The variable <val> is the sum of the decimal values of the bits that you want to enable.

Range 0–32767

Remarks Refer to Chapter 3 of the *E4428C/38C ESG Signal Generators Programming Guide* for more information.

:QUESTionable:MODulation[:EVENT]

Supported All

CAUTION This is a destructive read. The data in the register is latched until it is queried. Once queried, the data is cleared.

```
:STATUS:QUESTionable:MODulation[:EVENT]?
```

This query returns the decimal sum of the bits in the Data Questionable Modulation Event Register.

Range 0–32767

Remarks The equivalent PTR or NTR filters must be set before the condition register can set the corresponding bit in the event register.

Refer to Chapter 3 of the *E4428C/38C ESG Signal Generators Programming Guide* for more information.

:QUESTIONable:NTRansition

Supported All

```
:STATus:QUEStionable:NTRansition <val>  
:STATus:QUEStionable:NTRansition?
```

This command determines which bits in the Data Questionable Condition Register will set the corresponding bit in the Data Questionable Event Register when that bit has a negative transition (1 to 0).

The variable <val> is the sum of the decimal values of the bits that you want to enable.

Range 0–32767

Remarks Refer to Chapter 3 of the *E4428C/38C ESG Signal Generators Programming Guide* for more information.

:QUESTIONable:POWer:CONDition

Supported All

```
:STATus:QUEStionable:POWer:CONDition?
```

This query returns the decimal sum of the bits in the Data Questionable Power Condition Register. For example, if the RF output signal is unlevelled (bit 1), a value of 2 is returned.

Range 0–32767

Remarks The data in this register is continuously updated and reflects current conditions.

Refer to Chapter 3 of the *E4428C/38C ESG Signal Generators Programming Guide* for more information.

:QUESTionable:POWer:ENABle

Supported All

```
:STATus:QUESTionable:POWer:ENABle <val>  
:STATus:QUESTionable:POWer:ENABle?
```

This command determines which bits in the Data Questionable Power Event Register will set the power summary bit (bit 3) in the Data Questionable Condition Register.

The variable <val> is the sum of the decimal values of the bits that you want to enable.

Range 0–32767

Remarks Refer to Chapter 3 of the *E4428C/38C ESG Signal Generators Programming Guide* for more information.

:QUESTionable:POWer:NTRansition

Supported All

```
:STATus:QUESTionable:POWer:NTRansition <val>  
:STATus:QUESTionable:POWer:NTRansition?
```

This command determines which bits in the Data Questionable Power Condition Register will set the corresponding bit in the Data Questionable Power Event Register when that bit has a negative transition (1 to 0).

The variable <val> is the sum of the decimal values of the bits that you want to enable.

Range 0–32767

Remarks Refer to Chapter 3 of the *E4428C/38C ESG Signal Generators Programming Guide* for more information.

:QUESTionable:POWer:PTRansition

Supported All

```
:STATus:QUESTionable:POWer:PTRansition <val>  
:STATus:QUESTionable:POWer:PTRansition?
```

This command determines which bits in the Data Questionable Power Condition Register will set the corresponding bit in the Data Questionable Power Event Register when that bit has a positive transition (0 to 1).

The variable <val> is the sum of the decimal values of the bits that you want to enable.

Range 0–32767

Remarks Refer to Chapter 3 of the *E4428C/38C ESG Signal Generators Programming Guide* for more information.

:QUESTionable:POWer[:EVENT]

Supported All

CAUTION This is a destructive read. The data in the register is latched until it is queried. Once queried, the data is cleared.

:STATus:QUESTionable:POWer[:EVENT]?

This query returns the decimal sum of the bits in the Data Questionable Power Event Register.

Range 0–32767

Remarks The equivalent PTR or NTR filters must be set before the condition register can set the corresponding bit in the event register.

Refer to Chapter 3 of the *E4428C/38C ESG Signal Generators Programming Guide* for more information.

:QUESTionable:PTRansition

Supported All

:STATus:QUESTionable:PTRansition <val>

:STATus:QUESTionable:PTRansition?

This command determines which bits in the Data Questionable Condition Register will set the corresponding bit in the Data Questionable Event Register when that bit has a positive transition (0 to 1).

The variable <val> is the sum of the decimal values of the bits that you want to enable.

Range 0–32767

Remarks Refer to Chapter 3 of the *E4428C/38C ESG Signal Generators Programming Guide* for more information.

:QUEStionable[:EVENT]

Supported All

CAUTION This is a destructive read. The data in the register is latched until it is queried. Once queried, the data is cleared.

`:STATus:QUEStionable[:EVENT]?`

This query returns the decimal sum of the bits in the Data Questionable Event Register.

Range 0–32767

Remarks The equivalent PTR or NTR filters must be set before the condition register can set the corresponding bit in the event register.

Refer to Chapter 3 of the *E4428C/38C ESG Signal Generators Programming Guide* for more information.

System Subsystem (:SYSTem)

:CAPability

Supported All

:SYSTem:CAPability?

This query returns the signal generator's capabilities and outputs the appropriate specifiers:

```
(RFSOURCE WITH( (AM|FM|PULM|PM|LFO)&(FSSWEEP|FLIST)&(PSSWEEP|PLIST)
&TRIGGER&REFERENCE))
```

This is a list of the SCPI-defined basic functionality of the signal generator and the additional capabilities it has in parallel (a&b) and singularly (a|b).

:DATE

Supported All

:SYSTem:DATE <year>, <month>, <day>

:SYSTem:DATE?

This command sets the date as shown in the lower right area of the signal generator display.

<year> This variable requires a four digit integer.

The query returns the date in the following format:

```
<+year>, <+month>, <+day>
```

Range <month>: 1–12 <day>: 1–31

Key Entry Time/Date

:ERRor[:NEXT]

Supported All

:SYSTem:ERRor[:NEXT]?

This query returns the most recent error message from the signal generator error queue. If there are no error messages, the query returns the following output:

```
+0, "No error"
```

When there is more than one error message, the query will need to be sent for each message.

Key Entry Error Info View Next Error Message

Remarks The ESG deletes the error messages after viewing the last message.

:ERRor:SCPI[:SYNTax]

Supported All

:SYSTem:ERRor:SCPI[:SYNTax] ON|OFF|1|0

:SYSTem:ERRor:SCPI[:SYNTax]?

This command enables or disables the reporting of SCPI syntax errors to the error queue.

***RST** 1

:FILEsystem:SAFEmode

Supported All

:SYSTem:FILEsystem:SAFEmode ON|OFF|1|0

:SYSTem:FILEsystem:SAFEmode?

This command selects the safe mode for file handling. When safe mode is set to OFF, volatile waveform files can be edited and saved while the signal generator plays the file without signal interruption. However, it is possible with complex waveforms, for corruption of memory to occur which will be reported as an error on the front-panel display and require a reboot of the signal generator to resolve.

Example

```
:SYST:FILE:SAVE ON
```

The preceding example enables the safe mode setting and waveform files cannot be edited without signal disruption while the signal generator plays them.

***RST** On

:HELP:MODE

Supported All

:SYSTem:HELP:MODE SINGLE|CONTInuous

:SYSTem:HELP:MODE?

This command sets the help function mode of the signal generator.

SINGLE Help is provided only for the next key that you press.

CONTInuous Help is provided for each key you press. In addition, the function of the key is executed.

When the help dialog box is displayed, pressing the **Help** hardkey in either mode will turn help off.

Key Entry Help Mode Single Cont

Remarks The setting enabled by this command is not affected by signal generator power-on, preset, or *RST.

:IDN

Supported All

:SYSTem:IDN "string"

This command modifies the identification string that the *IDN? query returns. Sending an empty string returns the query output of *IDN? to its factory shipped setting. The maximum string length is 72 characters.

Remarks Modification of the *IDN? query output enables the signal generator to identify itself as another signal generator when used as a replacement.

The display diagnostic information, shown by pressing the **Diagnostic Info** softkey, is not affected by this command.

:LANGuage

Supported All

:SYSTem:LANGuage "SCPI"|"COMP"|"NADC"|"PDC"|"PHS"|"8648"

:SYSTem:LANGuage?

This command sets the remote language for the signal generator.

SCPI This choice provides compatibility for SCPI commands.

COMP This choice provides compatibility for the 8656B, 8657A/B signal generator which is supported by using the GPIB interface.

NADC	This choice provides compatibility for the 8657D NADC personality which is supported only through a GPIB interface (E4438C only).
PDC	This choice provides compatibility for the 8657D PDC personality which is supported only through a GPIB interface (E4438C only).
PHS	This choice provides compatibility for the 8657J PHS personality which is supported only through a GPIB interface (E4438C only).
8648	This choice provides compatibility for the 8648A/B/C/D signal generator which is supported only through a GPIB interface.
Key Entry	SCPI 8656B,8657A/B 8657D NADC 8657D PDC 8657J PHS 8648A/B/C/D
Remarks	The setting enabled by this command is not affected by signal generator power-on, preset, or *RST. For more information on supported SCPI commands and programming codes, refer to the <i>Programming Compatibility Guide</i> .

:PON:TYPE

Supported All

:SYSTem: PON:TYPE PRESet | LAST
:SYSTem: PON:TYPE?

This command sets the defined conditions for the signal generator at power on.

PRESet	This choice sets the conditions to factory- or user-defined as determined by the choice for the preset type. Refer to “:PRESet:TYPE” on page 161 for selecting the type of preset.
LAST	This choice retains the settings at the time the signal generator was last powered down.

NOTE When LAST is selected, no signal generator interaction can occur for at least 3 seconds prior to cycling the power for the current settings to be saved.

Key Entry Power On Last Preset

Remarks The setting enabled by this command is not affected by signal generator power-on, preset, or *RST.

:PRESet

Supported All

SYSTem:PRESet

This command returns the signal generator to a set of defined conditions. It is equivalent to pressing the front panel **Preset** hardkey.

Key Entry Preset

Remarks The defined conditions are either factory- or user-defined. Refer to “:PRESet:TYPE” on page 161 for selecting the type of defined conditions.

:PRESet:ALL

Supported All

:SYSTem:PRESet:ALL

This command sets all states of the signal generator back to their factory default settings, including states that are not normally affected by signal generator power-on, preset, or *RST.

:PRESet:LANGUage

Supported All

:SYSTem:PRESet:LANGUage "SCPI" | "COMP" | "NADC" | "PDC" | "PHS" | "8648"
:SYSTem:PRESet:LANGUage?

This command sets the remote language that is available when the signal generator is preset.

SCPI This choice provides compatibility for SCPI commands.

COMP This choice provides compatibility for the 8656B, 8657A/B signal generator which is supported by using the GPIB interface.

NADC This choice provides compatibility for the 8657D NADC personality which is supported only through a GPIB interface (E4438C only).

PDC This choice provides compatibility for the 8657D PDC personality which is supported only through a GPIB interface (E4438C only).

PHS This choice provides compatibility for the 8657J PHS personality which is supported only through a GPIB interface (E4438C only).

System Commands

System Subsystem (:SYSTem)

8648 This choice provides compatibility for the 8648A/B/C/D signal generator which is supported only through a GPIB interface.

***RST** "SCPI"

Key Entry SCPI 8656B,8657A/B 8657D NADC 8657D PDC 8657J PHS
8648A/B/C/D

:PRESet:PERsistent

Supported All

:SYSTem:PRESet:PERsistent

This command sets the states that are not affected by signal generator power-on, preset, or *RST to their factory default settings.

Key Entry Restore Sys Defaults

:PRESet:PN9

Supported E4438C Option with Option 001/601 or 002/602

:SYSTem:PRESet:PN9 NORMAl | QUICK

:SYSTem:PRESet:PN9?

This command sets the preset length of the PN9 sequence for personalities that require software PRBS generation.

NORMAl This choice produces a maximal length PN9 sequence.

QUICK This choice produces a truncated (216 bits) PN9 sequence.

***RST** NORM

Key Entry PN9 Mode Preset

:PRESet:TYPE

Supported All

:SYSTem:PRESet:TYPE NORMAl | USER

:SYSTem:PRESet:TYPE?

This command toggles the preset state between factory- and user-defined conditions.

Key Entry Preset Normal User

Remarks Refer to “:PRESet[:USER]:SAVE” for saving the USER choice preset settings.

The setting enabled by this command is not affected by signal generator power-on, preset, or *RST.

:PRESet[:USER]:SAVE

Supported All

:SYSTem:PRESet[:USER]:SAVE

This command saves your user-defined preset conditions to a state file.

Key Entry Save User Preset

Remarks Only one user-defined preset file can be saved. Subsequent saved user-defined preset files will overwrite the previously saved file.

:SECurity:DISPlay

Supported All Models

```
:SYSTem:SECurity:DISPlay ON|OFF|1|0  
:SYSTem:SECurity:DISPlay?
```

This command enables or disables the secure display mode.

On(1) This selection turns the signal generator display back on, showing the current settings. Cycling the signal generator power also restores the display, however the current settings may change depending on the power-on configuration choice. See “:PON:TYPE” on page 158 for information on the power-on choices available.

OFF(0) This selection blanks the signal generator’s display, hiding the settings and disabling the front panel keys. While in this mode, the display shows
*** SECURE DISPLAY ACTIVATED ***.

For more information about security functions, refer to the *E4428C/38C ESG Signal Generators User’s Guide*.

Example

```
:SYST:SEC:DISP OFF
```

The preceding example enables the secure display mode.

***RST** 1

Range N/A

Key Entry Activate Security Display

:SECurity:ERASeall

Supported All Models

```
:SYSTem:SECurity:ERASall
```

This command removes all user files, flatness correction files, and baseband generator files. In addition, all table editor files are returned to their original factory values.

This command differs from the :DELeTe:ALL command, which does not reset table editors to factory values. For more information about security functions, refer to the *E4428C/38C ESG Signal Generators User’s Guide*.

Key Entry Erase All

:SECurity:LEVel

Supported All Models

```
:SYSTem:SECurity:LEVel NONE | ERASe | OVERwrite | SANitize
:SYSTem:SECurity:LEVel?
```

This command selects the security level operation for the signal generator.

NONE	This selection causes the signal generator to reset to factory default settings.
ERASe	This selection removes all user files, table editor files, flatness correction files, and baseband generator files.
OVERwrite	This selection removes all user files, table editor files, flatness correction files, and baseband generator files. The memory is then overwritten with random data.
SRAM	All addressable locations will be overwritten with random characters.
Hard Disk	All addressable locations will be overwritten with random characters.
Flash Memory	The flash blocks will be erased.
SANitize	This selection removes all user files, table editor files, flatness correction files, and baseband generator files using the same techniques as the OVERwrite selection for SRAM and flash memory. For the hard disk, the signal generator overwrites all addressable locations with a single character, its complement, and then with a random character.

Once you select the security level, you must execute the command from “:SECurity:LEVel:STATe” to arm the security level.

NOTE Once you select a security level and arm it, you cannot change the level.

For other cleaning and security operation descriptions, see “:SECurity:ERASeall” on page 162, “:SECurity:OVERwrite” on page 164, and “:SECurity:SANitize” on page 165. For more information about security functions, refer to the *E4428C/38C ESG Signal Generators User’s Guide*.

Example

```
:SYST:SEC:LEV NONE
```

The preceding example sets the secure mode so it resets the signal generator to factory settings after completing the security operation.

Key Entry None Erase Overwrite Sanitize

:SECurity:LEVel:STATe

Supported All Models

CAUTION Ensure that you select the security level prior to executing this command with the ON (1) selection. Once you enable the state, you cannot reduce the security level.

```
:SYSTem:SECurity:LEVel:STATe ON|OFF|1|0  
:SYSTem:SECurity:LEVel:STATe?
```

This command arms and executes the current security level parameter.

On (1) This selection arms and prevents any changes to the current security level. Refer to “:SECurity:LEVel” on page 163 for setting the security level.

OFF (0) This selection performs the actions required for the current security level setting. Cycling the signal generator power also performs the same function.

For more information about security functions, refer to the *E4428C/38C ESG Signal Generators User's Guide*.

Example

```
:SYST:SEC:LEV:STAT ON
```

The preceding example arms the secure mode selected with the SYSTem:SECurity:LEVel command.

Key Entry Enter Secure Mode

:SECurity:OVERwrite

Supported All Models

```
:SYSTem:SECurity:OVERwrite
```

This command removes all user files, table editor files values, flatness correction files, and baseband generator files. The memory is then overwritten with random data as described below. For more information about security functions, refer to the *E4428C/38C ESG Signal Generators User's Guide*.

SRAM All addressable locations will be overwritten with random characters.

HARD DISK All addressable locations will be overwritten with random characters.

FLASH MEMORY The flash blocks will be erased.

Key Entry Erase and Overwrite All

:SECurity:SANitize

Supported All Models

:SYSTem:SECurity:SANitize

This command removes all user files, table editor files values, flatness correction files, and baseband generator files. The memory is then overwritten with a sequence of data as described below. For more information about security functions, refer to the *E4428C/38C ESG Signal Generators User's Guide*.

SRAM All addressable locations will be overwritten with random characters.

HARD DISK All addressable locations will be overwritten with a single character and then a random character.

FLASH MEMORY The flash blocks will be erased.

Key Entry Erase and Sanitize All

:SSAVer:DELAy

Supported All

:SYSTem:SSAVer:DELAy <val>

:SYSTem:SSAVer:DELAy?

This command sets the amount of time before the display light or display light and text is switched off. This will occur if there is no input via the front panel during the delay period.

The variable <val> is a whole number measured in hours.

Range 1–12

Key Entry Screen Saver Delay:

Remarks The setting enabled by this command is not affected by signal generator power-on, preset, or *RST.

Refer to “:SSAVer:MODE” on page 166 for selecting the screen saver mode.

:SSAVer:MODE

Supported All

:SYSTem:SSAVer:MODE LIGHT|TEXT

:SYSTem:SSAVer:MODE?

This command toggles the screen saver mode between light only or light and text.

LIGHT This choice enables only the light to turn off during the screen saver operation while leaving the text visible on the darkened screen.

TEXT This choice enables both the display light and text to turn off during the screen saver operation.

Key Entry Screen Saver Mode

Remarks The setting enabled by this command is not affected by signal generator power-on, preset, or *RST.

:SSAVer:STATe

Supported All

:SYSTem:SSAVer:STATe ON|OFF|1|0

:SYSTem:SSAVer:STATe?

This command enables or disables the display screen saver.

Key Entry Screen Saver Off On

Remarks The setting enabled by this command is not affected by signal generator power-on, preset, or *RST.

:TIME

Supported All

:SYSTem:TIME <hour>, <minute>, <second>

:SYSTem:TIME?

This command sets the time displayed in the lower right area of the signal generator's display.

Range <hour>: 0-23 <minute>: 0-59 <second>: 0-59

Key Entry Time/Date

:VERSion

Supported All

:SYSTem:VERSion?

This command returns the SCPI version number with which the signal generator complies.

Trigger Subsystem

:ABORt

Supported All

:ABORt

This command causes the List or Step sweep in progress to abort. If INIT:CONT[:ALL] is set to ON, the sweep will immediately re-initiate. The pending operation flag affecting *OPC, *OPC?, and *WAI will undergo a transition once the sweep has been reset.

:INITiate:CONTinuous[:ALL]

Supported All

:INITiate:CONTinuous[:ALL] ON|OFF|1|0

:INITiate:CONTinuous[:ALL]?

This command selects either a continuous or single list or step sweep.

ON (1) This choice selects continuous sweep where, after the completion of the previous sweep, the current sweep will restart automatically or wait until the appropriate trigger source is received.

OFF (0) This choice selects a single sweep. Refer to “:INITiate:IMMediate[:ALL]” on [page 169](#) for single sweep triggering information.

*RST 0

Key Entry Sweep Repeat Single Cont

Remarks Execution of this command will not affect a sweep in progress.

:INITiate[:IMMediate][:ALL]

Supported All

```
:INITiate[:IMMediate][:ALL]
```

This command either sets or sets and starts a single List or Step sweep, depending on the trigger type. The command performs the following:

- arms a single sweep when BUS, EXTERNAL, or KEY is the trigger source selection
- arms and starts a single sweep when IMMEDIATE is the trigger source selection

This command is ignored if a sweep is in progress. See “:INITiate:CONTinuous[:ALL]” on page 168 for setting continuous or single sweep. See “:TRIGger[:SEQuence]:SOURce” on page 170 to select the trigger source.

In some atypical cases, the :INIT command could be ignored if it immediately follows an *OPC? command. If the :INIT command is ignored, then use a 10ms sleep function before sending the command.

Key Entry Single Sweep

:TRIGger:OUTPut:POLarity

Supported All

```
:TRIGger:OUTPut:POLarity POSitive|NEGative  
:TRIGger:OUTPut:POLarity?
```

Sets the TTL signal level present at the TRIGGER OUT connector to either high (5 vdc) or low (0 vdc). The trigger out is asserted after the frequency and/or power is set while the sweep is waiting for its step trigger. In addition, the swept-sine sends a pulse to the TRIGGER OUT at the beginning of each sweep.

Example

```
:TRIG:OUTP:POL NEG
```

The preceding example enables the continuous mode as the sweep type.

***RST** POS

Key Entry Trigger Out Polarity Neg Pos

:TRIGger[:SEQuence]:SLOPe

Supported All

:TRIGger[:SEQuence]:SLOPe POSitive|NEGative

:TRIGger[:SEQuence]:SLOPe?

This command sets the polarity of the ramp or sawtooth waveform slope present at the TRIG IN connector that will trigger a list or step sweep.

***RST** POS

Key Entry Trigger In Polarity Neg Pos

:TRIGger[:SEQuence]:SOURce

Supported All

:TRIGger[:SEQuence]:SOURce BUS|IMMediate|EXTernal|KEY

:TRIGger[:SEQuence]:SOURce?

This command sets the sweep trigger source for a list or step sweep.

BUS This choice enables GPIB triggering using the *TRG or GET command or LAN and RS-232 triggering using the *TRG command.

IMMediate This choice enables immediate triggering of the sweep event.

EXTernal This choice enables the triggering of a sweep event by an externally applied signal at the TRIG IN connector.

KEY This choice enables triggering through front panel interaction by pressing the **Trigger** hardkey.

***RST** IMM

Remarks The wait for the BUS, EXTernal, or KEY trigger can be bypassed by sending the :TRIGger[:SEQuence][:IMMediate] command.

Example

```
:TRIG:SOUR BUS
```

The preceding example sets the sweep trigger source to BUS.

***RST** IMM

Key Entry Bus Free Run Ext Trigger Key

:TRIGger[:SEQuence][:IMMediate]

Supported All Models

`:TRIGger[:SEQuence][:IMMediate]`

This event command causes an armed List or Step sweep to immediately start without the selected trigger occurring.

In some atypical cases, the `:TRIG` command could be ignored if it immediately follows an `*OPC?` command. If the `:TRIG` command is ignored, then use a 10ms sleep function before sending the command.

Unit Subsystem (:UNIT)

:POWer

Supported All

:UNIT:POWer DBM|DBuV|DBuVemf|V|Vemf|DB

:UNIT:POWer?

This command terminates an amplitude value in the selected unit of measure.

If the amplitude reference state is set to on, the query returns units expressed in DB and the DB choice will be displayed. Setting any other unit will cause a setting conflict error stating that the amplitude reference state must be set to off. Refer to, “[:REFerence:STATe](#)” on page 66 for more information.

***RST** DBM

Key Entry dBm dBuV dBuVemf mV uV mVemf uVemf DB

Remarks All power values in this chapter are shown with DBM as the unit of measure. If a different unit of measure is selected, replace DBM with the newly selected unit whenever it is indicated for the value.

4 Analog Commands

This chapter provides SCPI descriptions for subsystems dedicated to analog commands common to all ESG signal generator models. This chapter contains the following major sections:

- “Amplitude Modulation Subsystem ([:SOURce])” on page 174
- “Frequency Modulation Subsystem ([:SOURce])” on page 181
- “Low Frequency Output Subsystem ([:SOURce]:LFOOutput)” on page 188
- “Phase Modulation Subsystem ([:SOURce])” on page 193
- “Pulse Modulation Subsystem ([:SOURce]:PULM)” on page 201

Amplitude Modulation Subsystem ([:SOURce])

:AM[1] | 2...

Supported All Models

[:SOURce] :AM [1] | 2 . . .

This prefix enables the selection of the AM path and is part of most SCPI commands associated with this subsystem. The two paths are equivalent to the **AM Path 1 2** softkey.

AM[1] **AM Path 1 2** with 1 selected

AM2 **AM Path 1 2** with 2 selected

When just AM is shown in a command, this means the command applies globally to both paths.

Each path is set up separately. When a SCPI command uses AM[1], only path one is affected. Consequently, when AM2 is selected, only path two is set up. However, the depth of the signals for the two paths can be coupled.

Depth coupling links the depth value of AM[1] to AM2. Changing the deviation value for one path will change it for the other path.

These two paths can be on at the same time provided the following conditions have been met:

- DUALsine or SWEPTSine is not the selection for the waveform type
- each path uses a different source (Internal 1, Ext1, or Ext2)

:AM:INTernal:FREQuency:STEP[:INCRement]

Supported All Models

[:SOURce] :AM :INTernal :FREQuency :STEP [:INCRement] <num>

[:SOURce] :AM :INTernal :FREQuency :STEP [:INCRement] ?

This command sets the step increment for the amplitude modulation internal frequency.

The variable <num> is expressed in units of Hertz.

Range 0.5–1E6

Key Entry Incr Set

Remarks The value set by this command is used with the UP and DOWN choices for the AM frequency setting. Refer to “:AM[1]2:INTernal[1]:FREQuency” on page 176 for more information.

The setting enabled by this command is not affected by signal generator power-on, preset, or *RST.

:AM:WIDeband:STATe

Supported All Models

[:SOURce] :AM:WIDeband:STATe ON | OFF | 1 | 0

[:SOURce] :AM:WIDeband:STATe?

This command enables or disables the wideband amplitude modulation for the selected path.

***RST** 0

Key Entry **AM Off On**

Remarks The RF carrier is modulated when the modulation state of the signal generator is set to ON, see “:MODulation[:STATe]” on page 129 for more information.

Whenever amplitude modulation is enabled, the AM annunciator is turned on in the display

The two paths for amplitude modulation can be simultaneously enabled. Refer to “:AM[1]2...” on page 174 for more information.

:AM[1] | 2:EXTeRnal[1] | 2:COUPling

Supported All Models

[:SOURce] :AM[1] | 2:EXTeRnal[1] | 2:COUPling AC | DC

[:SOURce] :AM[1] | 2:EXTeRnal[1] | 2:COUPling?

This command sets the coupling for the amplitude modulation source through the selected external input connector.

AC This choice will only pass ac signal components.

DC This choice will pass both ac and dc signal components.

***RST** DC

Key Entry **Ext Coupling DC AC**

Remarks The command does not change the currently active source or switch the current modulation on or off. The modulating signal may be the sum of several signals, either internal or external sources.

:AM[1] | 2:INteRnal[1]:FREQuency**Supported** All Models

```
[ :SOURce ] :AM[ 1 ] | 2 :INteRnal[ 1 ] :FREQuency <val><unit> | UP | DOWN
[ :SOURce ] :AM[ 1 ] | 2 :INteRnal[ 1 ] :FREQuency?
```

This command sets the internal amplitude modulation rate for the following applications:

- the first tone of a dual-sine waveform
- the start frequency for a swept-sine waveform
- the frequency rate for all other waveforms

***RST** +4.00000000E+002

Range Dual Sine, Swept-Sine & Sine: 0.1HZ–100kHZ
All Other Waveforms: 0.1HZ–20kHZ

Key Entry AM Tone 1 Rate AM Start Rate AM Rate

:AM[1] | 2:INteRnal[1]:FREQuency:ALteRnate**Supported** All Models

```
[ :SOURce ] :AM[ 1 ] | 2 :INteRnal[ 1 ] :FREQuency:ALteRnate <val><unit>
[ :SOURce ] :AM[ 1 ] | 2 :INteRnal[ 1 ] :FREQuency:ALteRnate?
```

This command sets the frequency for the alternate signal.

***RST** +4.00000000E+002

Range Dual-Sine: 0.1HZ–100kHZ Swept-Sine: 0.1HZ–100kHZ

Key Entry AM Tone 2 Rate AM Stop Rate

Remarks The alternate signal frequency is the second tone of a dual-sine or the stop frequency of a swept-sine waveform.

Refer to “:AM[1]2:INteRnal[1]:FUNctIon:SHAPE” on page 177 for the waveform selection.

:AM[1] | 2:INteRnal[1]:FREQuency:ALteRnate:AMPLitude:PERCent**Supported** All Models

```
[ :SOURce ] :AM[ 1 ] | 2 :INteRnal[ 1 ] :FREQuency:ALteRnate:AMPLitude:
PERCent <val><unit>
[ :SOURce ] :AM[ 1 ] | 2 :INteRnal[ 1 ] :FREQuency:ALteRnate:AMPLitude:PERCent?
```


This command sets the amplitude of the second tone for a dual-sine waveform as a percentage of the total amplitude. For example, if the second tone makes up 30% of the total amplitude, then the first tone is 70% of the total amplitude.

***RST** +5.00000000E+001
Range 0–100PCT
Key Entry **AM Tone 2 Ampl Percent Of Peak**
Remarks Refer to “:AM[1]:2:INTErnal[1]:FUNcTion:SHAPE” on page 177 for the waveform selection.

:AM[1] | 2:INTErnal[1]:FUNcTion:SHAPE

Supported All Models

[:SOURce] :AM[1] | 2 :INTErnal[1] :FUNcTion:SHAPE SINE | TRIangle | SQUare | RAMP |
 NOISE | DUALsine | SWEPTsine

[:SOURce] :AM[1] | 2 :INTErnal[1] :FUNcTion:SHAPE?

This command sets the AM waveform type.

***RST** SINE
Key Entry **Sine Triangle Square Ramp Noise Dual-Sine Swept-Sine**

:AM[1] | 2:INTErnal[1]:SWEep:TIME

Supported All Models

[:SOURce] :AM[1] | 2 :INTErnal[1] :SWEep:TIME <val><unit>

[:SOURce] :AM[1] | 2 :INTErnal[1] :SWEep:TIME?

This command sets the sweep rate for the amplitude-modulated, swept-sine waveform.

***RST** +1.00000000E–001
Range 1mS–65.535S
Key Entry **AM Sweep Time**

:AM[1] | 2:INTernal[1]:SWEep:TRIGger**Supported** All Models

```
[ :SOURce ] :AM[ 1 ] | 2:INTernal[ 1 ] :SWEep:TRIGger BUS | IMMEDIATE | EXTernal | KEY
[ :SOURce ] :AM[ 1 ] | 2:INTernal[ 1 ] :SWEep:TRIGger?
```

This command sets the trigger source for the amplitude modulated swept-sine waveform.

BUS This choice enables GPIB triggering using the *TRG or GET command or LAN and RS-232 triggering using the *TRG command.

IMMEDIATE This choice enables immediate triggering of the sweep event.

EXTernal This choice enables the triggering of a sweep event by an externally applied signal at the TRIG IN connector.

KEY This choice enables triggering through front panel interaction by pressing the **Trigger** hardkey.

***RST** IMM

Key Entry Bus Free Run Ext Trigger Key

Remarks Refer to “:AM[1]2:INTernal[1]:FUNCTION:SHAPE” on page 177 for the waveform selection.

:AM[1] | 2:SOURce**Supported** All Models

```
[ :SOURce ] :AM[ 1 ] | 2:SOURce INT[ 1 ] | EXT[ 1 ] | EXT2
[ :SOURce ] :AM[ 1 ] | 2:SOURce?
```

This command sets the source to generate the amplitude modulation.

INT This choice selects the internal source to provide an ac-coupled signal.

EXT This choice selects the EXT 1 INPUT or the EXT 2 INPUT connector to provide an externally applied signal that can be ac- or dc-coupled.

***RST** INT

Key Entry Internal Ext1 Ext2

Remarks A $1.0 V_p$ input is required for calibrated AM depth settings.

The externally applied, ac-coupled input signal is tested for a voltage level and a display annunciator will report a high or low condition if that voltage is $> \pm 3\%$ of $1 V_p$.

:AM[1] | 2:STATe

Supported All Models

[:SOURce] :AM[1] | 2 :STATe ON | OFF | 1 | 0

[:SOURce] :AM[1] | 2 :STATe?

This command enables or disables the amplitude modulation for the selected path.

***RST** 0

Key Entry **AM Off On**

Remarks The RF carrier is modulated when you have set the signal generator's modulation state to ON, see [“:MODulation\[:STATe\]” on page 129](#) for more information.

Whenever amplitude modulation is enabled, the AM annunciator is turned on in the display.

The two paths for amplitude modulation can be simultaneously enabled. Refer to [“:AM\[1\]2...” on page 174](#) for more information.

:AM[1] | 2[:DEPTh]

Supported All Models

[:SOURce] :AM[1] | 2 [:DEPTh] <val><unit> | UP | DOWN

[:SOURce] :AM[1] | 2 [:DEPTh]?

This commands sets the amplitude modulation depth in percent.

***RST** +1.00000000E-001

Range 0.00-100PCT

Key Entry **AM Depth**

Remarks The value of AM depth applies only to whichever AM path configuration (AM[1]2) you have currently selected.

When the depth values are coupled, a change made to one path is applied to both. Refer to [“:AM\[1\]2\[:DEPTh\]:TRACK” on page 180](#) for AM depth value coupling.

Refer to [“:AM\[:DEPTh\]:STEP\[:INCRement\]” on page 180](#) for setting the value associated with UP and DOWN choices.

:AM[1] | 2[:DEPTh]:TRACK**Supported** All Models

[:SOURce]:AM[1] | 2[:DEPTh]:TRACK ON|OFF|1|0

[:SOURce]:AM[1] | 2[:DEPTh]:TRACK?

This command enables or disables the coupling of the AM depth values between the paths (AM[1] and AM2).

ON (1) This choice will link the depth value of AM[1] with AM2; AM2 will assume the AM[1] depth value. For example, if AM[1] depth is set to 15% and AM2 is set to 11%, enabling the depth tracking will cause the AM2 depth value to change to 15%. This applies regardless of the path (AM[1] or AM2) selected in this command

OFF (0) This choice disables the coupling and both paths will have independent depth values.

RST** 0**Key Entry** AM Depth Couple Off On**Remarks** When the depth values are coupled, a change made to one path is applied both.**:AM[:DEPTh]:STEP[:INCRement]*Supported** All Models

[:SOURce]:AM[:DEPTh]:STEP[:INCRement] <val><unit>

[:SOURce]:AM[:DEPTh]:STEP[:INCRement]?

This command sets the AM depth step increment.

Range 0.1–100PCT**Key Entry** Incr Set

Remarks The value set by this command is used with the UP and DOWN choices for the AM depth setting. Refer to “:AM[1]2[:DEPTh]” on page 179 for more information.

The setting enabled by this command is not affected by signal generator power-on, preset, or *RST.

Frequency Modulation Subsystem ([:SOURce])

:FM[1] | 2...

Supported All Models

[[:SOURce]:FM[1] | 2...]

This prefix enables the selection of the FM path and is part of most SCPI commands associated with this subsystem. The two paths are equivalent to the **FM Path 1 2** softkey.

FM[1] **FM Path 1 2** with 1 selected

FM2 **FM Path 1 2** with 2 selected

When just FM is shown in a command, this means the command applies globally to both paths.

Each path is set up separately. When a SCPI command uses FM[1], only path one is affected. Consequently, when FM2 is selected, only path two is set up. However, the deviation of the signals for the two paths can be coupled.

Deviation coupling links the deviation value of FM[1] to FM2. Changing the deviation value for one path will change it for the other path.

These two paths can be on at the same time provided the following conditions have been met:

- DUALsine or SWEPTSine is not the selection for the waveform type
- each path uses a different source (Internal 1, Ext1, or Ext2)
- FM2 must be set to a deviation less than FM[1]

:FM:INTernal:FREQuency:STEP[:INCRement]**Supported** All Models

[:SOURce]:FM:INTernal:FREQuency:STEP[:INCRement] <num>

[:SOURce]:FM:INTernal:FREQuency:STEP[:INCRement]?

This command sets the step increment for the internal frequency modulation.

The variable <num> sets the entered value in units of Hertz.

***RST** +5.00000000E+002**Range** 0.5–1E6**Key Entry** Incr Set

Remarks The value set by this command is used with the UP and DOWN choices for the FM frequency setting. Refer to “:FM[1]2:INTernal[1]:FREQuency” on page 183 for more information.

The setting enabled by this command is not affected by signal generator power-on, preset, or *RST.

:FM[1] | 2:EXTernal[1] | 2:COUPLing**Supported** All Models

[:SOURce]:FM[1] | 2:EXTernal[1] | 2:COUPLing AC|DC

[:SOURce]:FM[1] | 2:EXTernal[1] | 2:COUPLing?

This command sets the coupling for the frequency modulation source through the selected external input connector.

AC This choice will only pass ac signal components.

DC This choice will pass both ac and dc signal components.

***RST** DC**Key Entry** Ext Coupling DC AC

Remarks The command does not change the currently active source or switch the current modulation on or off. The modulating signal may be the sum of several signals, either internal or external sources.

:FM[1] | 2:INTernal[1]:FREQuency

Supported All Models

[:SOURce] :FM[1] | 2 :INTernal [1] :FREQuency <val><unit> | UP | DOWN

[:SOURce] :FM[1] | 2 :INTernal [1] :FREQuency?

This command sets the internal frequency modulation rate for the following applications:

- the first tone of a dual-sine waveform
- the start frequency for a swept-sine waveform
- the frequency rate for all other waveforms

***RST** +4.00000000E+002

Range Dual-Sine: 0.1HZ–100KHZ Swept-Sine: 0.1HZ–100KHZ
 All Other Waveforms: 0.1HZ–20KHZ

Key Entry FM Tone 1 Rate FM Start Rate FM Rate

:FM[1] | 2:INTernal[1]:FREQuency:ALternate

Supported All Models

[:SOURce] :FM[1] | 2 :INTernal [1] :FREQuency:ALternate <val><unit>

[:SOURce] :FM[1] | 2 :INTernal [1] :FREQuency:ALternate?

This command sets the frequency for the alternate signal.

***RST** +4.00000000E+002

Range Dual-Sine: 0.5HZ–1MHZ Swept-Sine: 1HZ–1MHZ

Key Entry FM Tone 2 Rate FM Stop Rate

Remarks The alternate signal frequency is the second tone of a dual-sine or the stop frequency of a swept-sine waveform.

Refer to “:FM[1]2:INTernal[1]:FUNCtion:SHApe” on page 184 for the waveform selection.

:FM[1] | 2:INTernal[1]:FREQuency:ALternate:AMPLitude:PERCent**Supported** All Models[:SOURce]:FM[1] | 2:INTernal[1]:FREQuency:ALternate:AMPLitude:
PERCent <val><unit>

[:SOURce]:FM[1] | 2:INTernal[1]:FREQuency:ALternate:AMPLitude:PERCent?

This command sets the amplitude of the second tone for a dual-sine waveform as a percentage of the total amplitude. For example, if the second tone makes up 30% of the total amplitude, then the first tone is 70% of the total amplitude.

RST** +1.00000000E+002**Range** 0–100PCT**Key Entry** FM Tone 2 Ampl Percent Of Peak**Remarks** Refer to “:FM[1]2:INTernal[1]:FUNction:SHApe” for the waveform selection.**:FM[1] | 2:INTernal[1]:FUNction:SHApe*Supported** All Models[:SOURce]:FM[1] | 2:INTernal[1]:FUNction:SHApe SINE|TRIangle|SQUare|RAMP|
NOISe|DUALsine|SWEPTsine

[:SOURce]:FM[1] | 2:INTernal[1]:FUNction:SHApe?

This command sets the FM waveform type.

***RST** SINE**Key Entry** Sine Triangle Square Ramp Noise Dual-Sine Swept-Sine**Remarks** The waveform selection is only valid when INT[1] is the source selection. Refer to “:FM[1]2:SOURce” on page 186 for type source selection.

:FM[1] | 2:INteRnal[1]:SWEep:TIME

Supported	All Models
	[:SOURce] :FM[1 ] | 2 :INteRnal[1] :SWEep:TIME <val><unit> [:SOURce] :FM[1 ] | 2 :INteRnal[1] :SWEep:TIME?
	This command sets the sweep time for the swept-sine waveform.
*RST	+1.00000000E-001
Range	1.0mS-65.535S
Key Entry	FM Sweep Time
Remarks	Refer to “:FM[1]2:INteRnal[1]:FUNctIon:SHApe” on page 184 for the waveform selection.

:FM[1] | 2:INteRnal[1]:SWEep:TRIGger

Supported	All Models
	[:SOURce] :FM[1 ] | 2 :INteRnal[1] :SWEep:TRIGger BUS | IMMEDIATE | EXteRnal | KEY [:SOURce] :FM[1 ] | 2 :INteRnal[1] :SWEep:TRIGger?
	This command sets the trigger source for the frequency modulated swept-sine waveform.
BUS	This choice enables GPIB triggering using the *TRG or GET command or LAN and RS-232 triggering using the *TRG command.
IMMEDIATE	This choice enables immediate triggering of the sweep event.
EXteRnal	This choice enables the triggering of a sweep event by an externally applied signal at the TRIG IN connector.
KEY	This choice enables triggering through front panel interaction by pressing the Trigger hardkey.
*RST	IMM
Key Entry	Bus Free Run Ext Trigger Key
Remarks	Refer to “:FM[1]2:INteRnal[1]:FUNctIon:SHApe” on page 184 for the waveform selection.

:FM[1] | 2:SOURce**Supported** All Models

[:SOURce]:FM[1] | 2:SOURce INT[1] | EXT1 | EXT2

[:SOURce]:FM[1] | 2:SOURce?

This command sets the source to generate the frequency modulation.

INT This choice selects the internal source to provide an ac-coupled signal.

EXT This choice selects the EXT 1 INPUT or the EXT 2 INPUT connector to provide an externally applied signal that can be ac- or dc-coupled.

***RST** INT

Key Entry Internal Ext1 Ext2

Remarks The externally applied, ac-coupled input signal is tested for a voltage level and a display annunciator will report a high or low condition if that voltage is $> \pm 3\%$ of $1 V_p$.

:FM[1] | 2:STATe**Supported** All Models

[:SOURce]:FM[1] | 2:STATe ON | OFF | 1 | 0

[:SOURce]:FM[1] | 2:STATe?

This command enables or disables the frequency modulation for the selected path.

***RST** 0

Key Entry FM Off On

Remarks The RF carrier is modulated when you set the signal generator's modulation state to ON, see “[:MODulation[:STATe]]” on page 129 for more information.

Whenever frequency modulation is enabled, the FM annunciator is turned on in the display.

The two paths for frequency modulation can be simultaneously enabled. Refer to “[:FM[1]2...]” on page 181 for more information.

:FM[1] | 2[:DEVIation]

Supported All Models

[:SOURce] :FM[1] | 2 [:DEVIation] <val><unit>

[:SOURce] :FM[1] | 2 [:DEVIation] ?

This command sets the frequency modulation deviation.

***RST** +1.00000000E+003

Range	<i>Frequency</i>	<i>Deviation</i>	Deviation Option UNJ
	250kHz–249.999MHZ	0–8MHZ	0–1MHZ
	> 249.999–500MHZ	0–4MHZ	0–500kHz
	> 500MHZ–1GHZ	0–8MHZ	0–1MHZ
	> 1–2GHZ	0–16MHZ	0–2MHZ
	> 2–4GHZ	0–32MHZ	0–4MHZ
	> 4–6GHZ	0–8MHZ	0–8MHZ

Key Entry **FM DEV**

Remarks If deviation tracking is ON, a change to the deviation value on one path will apply to both. Refer to “[:FM\[1\]|2\[:DEVIation\]:TRACK](#)” on page 187 for more information and setting the deviation tracking.

:FM[1] | 2[:DEVIation]:TRACK

Supported All Models

[:SOURce] :FM[1] | 2 [:DEVIation] :TRACk ON|OFF|1|0

[:SOURce] :FM[1] | 2 [:DEVIation] :TRACk ?

This command enables or disables the deviation coupling between the paths (FM[1] and FM2).

ON (1) This choice will link the deviation value of FM[1] with FM2; FM2 will assume the FM[1] deviation value. For example, if FM[1] deviation is set to 500 Hz and FM2 is set to 2 kHz, enabling the deviation tracking will cause the FM2 deviation value to change to 500 Hz. This applies regardless of the path (FM[1] or FM2) selected in this command

OFF (0) This choice disables the coupling and both paths will have independent deviation values.

***RST** 0

Key Entry **FM Dev Couple Off On**

Remarks This command uses exact match tracking, not offset tracking.

Low Frequency Output Subsystem ([:SOURce]:LFOutput)

:AMPLitude

Supported All Models

[:SOURce] :LFOutput :AMPLitude <val><unit>

[:SOURce] :LFOutput :AMPLitude?

This command sets the amplitude for the signal at the LF OUTPUT connector.

***RST** 0.00

Range 0.000VP–5.0VP

Key Entry LF Out Amplitude

:FUNCTION[1]:FREQuency

Supported All Models

[:SOURce] :LFOutput :FUNCTION[1] :FREQuency <val><unit>

[:SOURce] :LFOutput :FUNCTION[1] :FREQuency?

This command sets the internal modulation frequency for the following applications:

- the first tone of a dual-sine waveform
- the start frequency for a swept-sine waveform
- the frequency rate for all other waveforms

***RST** +4.00000000E+002

Range Sine: 0.1HZ–100KHZ Dual-Sine: 0.1HZ–100KHZ
Swept-Sine: 0.1HZ–100KHZ
All Other Waveforms: 0.1HZ–20KHZ

Key Entry LF Out Tone 1 Freq LF Out Start Freq LF Out Freq

Remarks Refer to [“:FUNCTION\[1\]:SHAPE” on page 191](#) for selecting the waveform type.

:FUNCTION[1]:FREQUENCY:ALternate**Supported** All Models

[:SOURce]:LFOutput:FUNCTION[1]:FREQUENCY:ALternate <val><unit>

[:SOURce]:LFOutput:FUNCTION[1]:FREQUENCY:ALternate?

This command sets the frequency for the alternate LF output signal.

RST** +4.00000000E+002**Range** Dual-Sine: 0.1HZ–100KHZ Swept-Sine: 0.1HZ–100KHZ**Key Entry** **LF Out Tone 2 Freq** **LF Out Stop Freq*Remarks** The alternate frequency is the second tone of a dual-sine or the stop frequency of a swept-sine waveform.

Refer to “:FUNCTION[1]:SHAPE” on page 191 for selecting the waveform type.

:FUNCTION[1]:FREQUENCY:ALternate:AMPLitude:PERCent**Supported** All Models

[:SOURce]:LFOutput:FUNCTION[1]:FREQUENCY:ALternate:AMPLitude:

PERCent <val><unit>

[:SOURce]:LFOutput:FUNCTION[1]:FREQUENCY:ALternate:AMPLitude:PERCent?

This command sets the amplitude of the second tone for a dual-sine waveform as a percentage of the total LF output amplitude. For example, if the second tone makes up 30% of the total amplitude, then the first tone is 70% of the total amplitude.

RST** +5.00000000E+001**Range** 0–100PCT**Key Entry** **LF Out Tone 2 Ampl % of Peak*Remarks** Refer to “:FUNCTION[1]:SHAPE” on page 191 for selecting the waveform type.

:FUNCTION[1]:PERiod**Supported** All Models

[:SOURce]:LFOutput:FUNCTION[1]:PERiod <val><unit>

[:SOURce]:LFOutput:FUNCTION[1]:PERiod?

This command sets the pulse period of the internally generated pulsed low frequency waveform.

RST** +1.60000000E-005**Range** 16uS-30S**Key Entry** LF Out Period**:FUNCTION[1]:PWIDth*Supported** All Models

[:SOURce]:LFOutput:FUNCTION[1]:PWIDth <val><unit>

[:SOURce]:LFOutput:FUNCTION[1]:PWIDth?

This command sets the pulse width of the internally-generated pulsed low frequency waveform.

The upper limit range value is restricted by the current value of the pulse period. For example, if the pulse period value is set to 16 μ S, the pulse width is limited to a maximum range value of 16 μ S.

***RST** +8.00000000E-006**Range** 8uS-30S**Key Entry** LF Out Width**Remarks** To change the pulse period value, refer to “:FUNCTION[1]:PERiod” on page 190.

:FUNCTION[1]:SHAPE**Supported** All Models

[:SOURce]:LFOutput:FUNCTION[1]:SHAPE SINE|DUALsine|SWEptsine|TRIangle|SQUare|RAMP|PULSe|NOISe|DC

[:SOURce]:LFOutput:FUNCTION[1]:SHAPE?

This command sets the waveform type for the generated signal at the LF output.

***RST** SINE**Key Entry** Sine Dual-Sine Swept-Sine Triangle Square Ramp Pulse
Noise DC**Remarks** Function Generator must be the source selection to support DUALsine or the SWEptsine waveform. Refer to “:SOURce” on page 192.**:FUNCTION[1]:SWEep:TIME****Supported** All Models

[:SOURce]:LFOutput:FUNCTION[1]:SWEep:TIME <val><unit>

[:SOURce]:LFOutput:FUNCTION[1]:SWEep:TIME?

This command sets the sweep time for an internally generated swept-sine signal at the LF output.

RST** +1.00000000E-001**Range** 1mS-65.535S**Key Entry** LF Out Sweep Time**:FUNCTION[1]:SWEep:TRIGger*Supported** All Models

[:SOURce]:LFOutput:FUNCTION[1]:SWEep:TRIGger BUS|IMMEDIATE|EXTernal|KEY

[:SOURce]:LFOutput:FUNCTION[1]:SWEep:TRIGger?

This command sets the trigger source for the internally generated swept-sine waveform signal at the LF output.

BUS This choice enables GPIB triggering using the *TRG or GET command or LAN and RS-232 triggering using the *TRG command.**IMMEDIATE** This choice enables immediate triggering of the sweep event.**EXTernal** This choice enables the triggering of a sweep event by an externally applied signal at the TRIG IN connector.

Analog Commands

Low Frequency Output Subsystem ([:SOURce]:LFOutput)

KEY	This choice enables triggering through front panel interaction by pressing the Trigger hardkey.
*RST	IMM
Key Entry	Bus Free Run Ext Trigger Key
Remarks	Refer to “:FUNCTION[1]:SHAPE” on page 191 for selecting the waveform type.

:SOURce

Supported All Models

```
[ :SOURce ] :LFOutput :SOURce INT[1] | FUNCTION
```

```
[ :SOURce ] :LFOutput :SOURce?
```

This command sets the low frequency source for the LF output.

INT[1] This choice enables you to output a signal where the frequency and shape of the signal is set by the internal source as it is being used by a modulation. For example, if the internal source is currently assigned to an AM path configuration and AM is turned on, the signal output at the LF OUTPUT connector will have the frequency and shape of the amplitude modulating signal.

FUNCTION This choice enables the selection of an internal function generator.

***RST** FUNC

Key Entry **Internal Monitor** **Function Generator**

:STATe

Supported All Models

```
[ :SOURce ] :LFOutput :STATe ON | OFF | 1 | 0
```

```
[ :SOURce ] :LFOutput :STATe?
```

This command enables or disables the low frequency output.

***RST** 0

Key Entry **LF Out Off On**

Phase Modulation Subsystem ([:SOURce])

:PM[1] | 2...

Supported All Models

[[:SOURce]:PM[1] | 2...]

This prefix enables the selection of the Φ M path and is part of most SCPI commands associated with this subsystem. The two paths are equivalent to the Φ M Path 1 2 softkey.

PM[1] Φ M Path 1 2 with 1 selected

PM2 Φ M Path 1 2 with 2 selected

When just PM is shown in a command, this means the command applies globally to both paths.

Each path is set up separately. When a SCPI command uses PM[1], only path one is affected. Consequently, when PM2 is selected, only path two is set up. However, the deviation of the signals for the two paths can be coupled.

Deviation coupling links the deviation value of PM[1] to PM2. Changing the deviation value for one path will change it for the other path.

These two paths can be on at the same time provided the following conditions have been met:

- DUALsine or SWEPTsine is not the selection for the waveform type
- each path uses a different source (Internal 1, Ext1, or Ext2)
- PM2 must be set to a deviation less than or equal to PM[1]

:PM:INTernal:FREQuency:STEP[:INCRement]**Supported** All Models

[:SOURce]:PM:INTernal:FREQuency:STEP[:INCRement] <num>

[:SOURce]:PM:INTernal:FREQuency:STEP[:INCRement]?

This command sets the step increment of the phase modulation internal frequency.

The variable <num> sets the entered value in units of Hertz.

Range 0.5–1E6**Key Entry** Incr Set

Remarks The value set by this command is used with the UP and DOWN choices for the FM frequency command. Refer to “:PM[1]2:INTernal[1]:FREQuency” on [page 195](#) for more information.

The setting enabled by this command is not affected by signal generator power-on, preset, or *RST.

:PM[1] | 2:BANDwidth | BWIDth**Supported** All Models

[:SOURce]:PM[1] | 2:BANDwidth | BWIDth NORMal | HIGH

[:SOURce]:PM[1] | 2:BANDwidth | BWIDth?

This command toggles between normal phase modulation and high bandwidth phase modulation mode.

***RST** NORM**Key Entry** FM ΦM Normal High BW

:PM[1] | 2:EXternal[1]:COUPling

Supported All Models

```
[ :SOURce ] :PM[ 1 ] | 2 :EXternal[ 1 ] :COUPling AC | DC
```

```
[ :SOURce ] :PM[ 1 ] | 2 :EXternal[ 1 ] :COUPling?
```

This command sets the coupling for the phase modulation source through the selected external input connector.

AC This choice will only pass ac signal components.

DC This choice will pass both ac and dc signal components.

***RST** DC

Key Entry Ext Coupling DC AC

Remarks This command does not change the currently active source or switch the current modulation on or off. The modulating signal may be the sum of several signals, either internal or external sources.

:PM[1] | 2:INternal[1]:FREQuency

Supported All Models

```
[ :SOURce ] :PM[ 1 ] | 2 :INternal[ 1 ] :FREQuency <val><unit> | UP | DOWN
```

```
[ :SOURce ] :PM[ 1 ] | 2 :INternal[ 1 ] :FREQuency?
```

This command sets the internal modulation frequency rate for the following applications:

- the first tone of a dual-sine waveform
- the start frequency for a swept-sine waveform
- the frequency rate for all other waveforms

***RST** +4.00000000E+002

Range Dual-Sine: 0.1HZ–100KHZ Swept-Sine: 0.1HZ–100KHZ

All Other Waveforms: 0.1HZ–20KHZ

Key Entry Φ MTone 1 Rate Φ M Start Rate Φ M Rate

Remarks Refer to “:FUNCTION[1]:SHAPE” on page 191 for selecting the waveform type.

:PM[1] | 2:INTernal[1]:FREQuency:ALternate**Supported** All Models

[:SOURce]:PM[1] | 2:INTernal[1]:FREQuency:ALternate <val><unit>

[:SOURce]:PM[1] | 2:INTernal[1]:FREQuency:ALternate?

This command sets the frequency for the alternate signal.

***RST** +4.00000000E+002**Range** Dual-Sine: 0.1HZ–100KHZ Swept-Sine: 0.1HZ–100KHZ**Key Entry** Φ M Stop Rate Φ M Tone 2 Rate**Remarks** The alternate frequency is the second tone of a dual-sine or the stop frequency of a swept-sine waveform.

Refer to “:PM[1]2:INTernal[1]:FUNctIon:SHApe” on page 197 for the waveform selection.

:PM[1] | 2:INTernal[1]:FREQuency:ALternate:AMPLitude:PERCent**Supported** All Models

[:SOURce]:PM[1] | 2:INTernal[1]:FREQuency:ALternate:AMPLitude:

PERCent <val><unit>

[:SOURce]:PM[1] | 2:INTernal[1]:FREQuency:ALternate:AMPLitude:PERCent?

This command sets the amplitude of the second tone for the dual-sine waveform as a percentage of the total amplitude. For example, if the second tone makes up 30% of the total amplitude, then the first tone is 70% of the total amplitude.

***RST** +5.00000000E+001**Range** 0–100PCT**Key Entry** Φ M Tone 2 Ampl Percent of Peak**Remarks** Refer to “:PM[1]2:INTernal[1]:FUNctIon:SHApe” on page 197 for the waveform selection.

:PM[1] | 2:INTernal[1]:FUNction:SHAPE

Supported All Models

```
[ :SOURce ] :PM[ 1 ] | 2 :INTernal[ 1 ] :FUNction:SHAPE SINE | TRIangle | SQUare | RAMP |
NOISe | DUALsine | SWEPTsine
```

```
[ :SOURce ] :PM[ 1 ] | 2 :INTernal[ 1 ] :FUNction:SHAPE?
```

This command sets the phase modulation waveform type.

***RST** SINE

Key Entry Sine Triangle Square Ramp Noise Dual-Sine Swept-Sine

Remarks The INTernal1 source selection does not support the DUALsine and SWEPTsine waveform choices.

:PM[1] | 2:INTernal[1]:SWEep:TIME

Supported All Models

```
[ :SOURce ] :PM[ 1 ] | 2 :INTernal[ 1 ] :SWEep:TIME <val><unit>
```

```
[ :SOURce ] :PM[ 1 ] | 2 :INTernal[ 1 ] :SWEep:TIME?
```

This command sets the sweep time for a phase-modulated, swept-sine waveform.

***RST** +1.00000000E-001

Range 1.0mS-65.535S

Key Entry Φ M Sweep Time

Remarks Refer to “:PM[1]2:INTernal[1]:FUNction:SHAPE” for the waveform selection.

:PM[1] | 2:INTernal[1]:SWEep:TRIGger

Supported All Models

```
[ :SOURce ] :PM[ 1 ] | 2 :INTernal[ 1 ] :SWEep:TRIGger BUS | IMMEDIATE | EXTERNAL | KEY
```

```
[ :SOURce ] :PM[ 1 ] | 2 :INTernal[ 1 ] :SWEep:TRIGger?
```

This command sets the trigger source for the phase-modulated, swept-sine waveform.

BUS This choice enables GPIB triggering using the *TRG or GET command or LAN and RS-232 triggering using the *TRG command.

IMMEDIATE This choice enables immediate triggering of the sweep event.

EXTERNAL This choice enables the triggering of a sweep event by an externally applied signal at the TRIG IN connector.

Phase Modulation Subsystem ([:SOURce])

KEY	This choice enables triggering through front panel interaction by pressing the Trigger hardkey.
*RST	IMM
Key Entry	Bus Free Run Ext Trigger Key
Remarks	Refer to “:PM[1]2:INTernal[1]:FUNCTion:SHAPE” on page 197 for the waveform selection.

:PM[1] | 2:SOURce

Supported	All Models
	[:SOURce] : PM [1 ] | 2 : SOURce INT [1 ] | EXT1 | EXT2 [:SOURce] : PM [1 ] | 2 : SOURce?
	This command sets the source to generate the phase modulation.
INT	This choice selects internal source 1 to provide an ac-coupled signal.
EXT	This choice selects the EXT 1 INPUT or the EXT 2 INPUT connector to provide an externally applied signal that can be ac- or dc-coupled.
*RST	INT
Key Entry	Internal 1 Ext1 Ext2
Remarks	The externally applied, ac-coupled input signal is tested for a voltage level and a display annunciator will report a high or low condition if that voltage is $> \pm 3\%$ of $1 V_p$.

:PM[1] | 2:STATe

Supported	All Models
	[:SOURce] : PM [1 ] | 2 : STATe ON | OFF | 1 | 0 [:SOURce] : PM [1 ] | 2 : STATe?
	This command enables or disables the phase modulation for the selected path.
*RST	0
Key Entry	ΦM Off On
Remarks	The RF carrier is modulated when you set the signal generator’s modulation state to ON, see “:MODulation[:STATe]” on page 129 for more information. Whenever phase modulation is enabled, the ΦM annunciator is turned on in the display

The two paths for phase modulation can be simultaneously enabled. Refer to “:PM[1]2...” on page 193 for more information.

:PM[1] | 2[:DEVIATION]

Supported All Models

```
[ :SOURCE ] :PM[ 1 ] | 2 [ :DEVIATION ] <val><unit> | UP | DOWN
[ :SOURCE ] :PM[ 1 ] | 2 [ :DEVIATION ] ?
```

This command sets the deviation of the phase modulation.

The variable <unit> will accept RAD (radians), PIRAD (pi-radians), and DEG (degrees); however, the query will only return values in radians.

***RST** +0.00000000E+000

Range	Frequency	Normal Bandwidth	High Bandwidth
	250kHz–249.999MHz	0–10RAD	0–1RAD
	> 249.999–500MHz	0–5RAD	0–0.5RAD
	> 500MHz–1GHz	0–10RAD	0–1RAD
	> 1–2GHz	0–20RAD	0–2RAD
	> 2–4GHz	0–40RAD	0–4RAD
	> 4–6GHz	0–80RAD	0–8RAD

Key Entry Φ M Dev

Remarks If deviation tracking is active, a change to the deviation value on one path will apply to both.

Refer to “:PM[:DEVIATION]:STEP[:INCREMENT]” on page 200 for setting the value associated with the UP and DOWN choices.

:PM[1] | 2[:DEVIATION]:TRACK

Supported All Models

```
[ :SOURCE ] :PM[ 1 ] | 2 [ :DEVIATION ] :TRACK ON | OFF | 1 | 0
[ :SOURCE ] :PM[ 1 ] | 2 [ :DEVIATION ] :TRACK ?
```

This command enables or disables the deviation coupling between the paths (PM[1] and PM2).

ON (1) This choice will link the deviation value of PM[1] with PM2; PM2 will assume the PM[1] deviation value. For example, if PM[1] deviation is set to 500 Hz and

Phase Modulation Subsystem (:SOURce)

PM2 is set to 2 kHz, enabling the deviation tracking will cause the PM2 deviation value to change to 500 Hz. This applies regardless of the path (PM[1] or PM2) selected in this command.

OFF (0) This choice disables the coupling and both paths will have independent deviation values.

***RST** 0

Key Entry Φ M Dev Couple Off On

Remarks This command uses exact match tracking, not offset tracking.

:PM[:DEVIation]:STEP[:INCRement]

Supported All Models

[:SOURce] :PM[:DEVIation] :STEP[:INCRement] <val><unit>

[:SOURce] :PM[:DEVIation] :STEP[:INCRement]?

This command sets the phase modulation deviation step increment.

Range 0.001–1E3RAD

Key Entry Incr Set

Remarks The value set by this command is used with the UP and DOWN choices for the FM deviation command. Refer to “:PM[1]2[:DEVIation]” on page 199 for more information.

The setting enabled by this command is not affected by signal generator power-on, preset, or *RST.

Pulse Modulation Subsystem ([:SOURce]:PULM)

:INTErnal[1]:FREQUency

Supported All Models

```
[ :SOURce ] :PULM :INTErnal [ 1 ] :FREQUency <val><unit> |UP|DOWN
[ :SOURce ] :PULM :INTErnal [ 1 ] :FREQUency?
```

This command sets the rate of the internal square wave pulse modulation source.

***RST** +4.00000000E+002

Range 0.1HZ–20.0kHz

Key Entry **Pulse Rate**

Remarks This command is used when SQUare is the current pulse modulation type. Refer to “[:SOURce]” on page 204 for the pulse modulation type selection.

:INTErnal[1]:FREQUency:STEP

Supported All Models

```
[ :SOURce ] :PULM :INTErnal [ 1 ] :FREQUency :STEP [ :INCREment ] <frequency>
[ :SOURce ] :PULM :INTErnal [ 1 ] :FREQUency :STEP [ INCREment ]?
```

This command sets the step value for the internally-generated square wave pulse rate.

This command is used when SQUare is the pulse modulation type. Refer to “[:SOURce]” on page 204 for the pulse modulation type selection. The step value, set with this command, is used with the UP and DOWN choices in the :INTErnal[1]:FREQUency command.

The step value set with this command is not affected by a power-on, preset, or *RST command.

Example

```
:PULM:INT:FREQ:STEP MIN
```

The preceding example sets the step value for the square wave pulse rate to 0.1 Hz, the minimum rate.

Range 0.1HZ–10MHZ

:INteRnal[1]:FUNctIon:SHApe**Supported** All Models

[:SOURce]:PULM:INteRnal[1]:FUNctIon:SHApe PULSe|SQUare

[:SOURce]:PULM:INteRnal[1]:FUNctIon:SHApe?

This command sets the internal pulse modulation waveform type.

RST** PULS**Key Entry** Internal Square Internal Pulse**:INteRnal[1]:PERiod*Supported** All Models

[:SOURce]:PULM:INteRnal[1]:PERiod <val><unit>|UP|DOWN

[:SOURce]:PULM:INteRnal[1]:PERiod?

This command sets the period for the internally generated pulse modulation source.

RST** +8.00000000E-005**Range** 8uS–30S**Key Entry** Pulse Period**Remarks** If the entered value for the pulse period is equal to or less than the value for the pulse width, the pulse width changes to a value that is equal to the pulse period.Refer to “[:INteRnal\[1\]:PERiod:STEP\[:INCRement\]](#)” on page 202 for setting the value associated with the UP and DOWN choices.**:INteRnal[1]:PERiod:STEP[:INCRement]*Supported** All Models

[:SOURce]:PULM:INteRnal[1]:PERiod:STEP[:INCRement] <val><unit>|UP|DOWN

[:SOURce]:PULM:INteRnal[1]:PERiod:STEP[:INCRement]?

This command sets the period time step increment for the internally-generated pulse modulation source.

***RST** +1.00000000E-006**Range** 4uS–30S**Key Entry** Incr Set

Remarks The value set by this command is used with the UP and DOWN choices for the pulse period command. Refer to “:INTernal[1]:PERiod” on page 202 for more information.

:INTernal[1]:PWIDth

Supported All Models

```
[ :SOURce ] :PULM :INTernal [ 1 ] :PWIDth <val><unit> |UP|DOWN
[ :SOURce ] :PULM :INTernal [ 1 ] :PWIDth?
```

This command sets the pulse width for the internally generated pulse modulation source.

NOTE A power search is recommended for signals with pulse widths less than one microsecond. Refer to “:ALC:SEARCh” on page 58.

***RST** +4.00000000E-005

Range 4uS–30S

Key Entry **Pulse Width**

Remarks If the entered value for the pulse width is equal to or greater than the value for the pulse period, the pulse width will change to a value that is equal to the pulse period.

Refer to “:INTernal[1]:PWIDth:STEP” on page 203 for setting the value associated with the UP and DOWN choices.

:INTernal[1]:PWIDth:STEP

Supported All Models

```
[ :SOURce ] :PULM :INTernal [ 1 ] :PWIDth :STEP <num>[<time suffix>]
[ :SOURce ] :PULM :INTernal [ 1 ] :PWIDth :STEP?
```

This command sets the step increment for the pulse width.

The optional variable [<time suffix>] accepts nS (nano-seconds) to S (seconds).

***RST** +1.00000000E-006

Range 4uS–30S

Remarks The value set by this command is used by the UP and DOWN choices for the pulse width command. Refer to “:INTernal[1]:PWIDth” on page 203 for more information.

Pulse Modulation Subsystem ([:SOURce]:PULM)

:SOURce

Supported All Models

[:SOURce] :PULM :SOURce INT | EXT [1] | EXT2

[:SOURce] :PULM :SOURce?

This command sets the source that will generate the pulse modulation.

***RST** INT

Key Entry Internal Square Internal Pulse Ext1 DC-Coupled Ext2 DC-Coupled

:STATe

Supported All Models

[:SOURce] :PULM :STATe ON | OFF | 1 | 0

[:SOURce] :PULM :STATe?

This command enables or disables the operating state of the pulse modulation source.

***RST** 0

Key Entry Pulse Off On

Remarks When pulse modulation is enabled, the PULSE annunciator is shown in the display

5 Component Test Digital Commands

This chapter provides SCPI descriptions for commands dedicated to digital component testing using the E4438C ESG Vector Signal Generator. This chapter contains the following major sections:

- “All Subsystem–Option 001/601 or 002/602 ([:SOURce])” on page 206
- “AWGN ARB Subsystem–Option 403 ([:SOURce]:RADio:AWGN:ARB)” on page 207
- “CDMA ARB Subsystem–Option 401 ([:SOURce]:RADio:CDMA:ARB)” on page 216
- “CDMA2000 ARB Subsystem–Option 401 ([:SOURce]:RADio:CDMA2000:ARB)” on page 242
- “Dmodulation Subsystem–Option 001/601 or 002/602 ([:SOURce]:RADio:DMODulation:ARB)” on page 274
- “Dual ARB Subsystem–Option 001/601 or 002/602 ([:SOURce]:RADio:ARB)” on page 297
- “Multitone Subsystem–Option 001/601 or 002/602 ([:SOURce]:RADio:MTONe:ARB)” on page 321
- “Wideband CDMA ARB Subsystem–Option 400 ([:SOURce]:RADio:WCDMa:TGPP:ARB)” on page 333

All Subsystem–Option 001/601 or 002/602 ([:SOURce])

:RADio:ALL:OFF

Supported E4438C with Option 001/601 or 002/602

[:SOURce] :RADio :ALL :OFF

This command disables all digital modulation personalities on a particular baseband.

Remarks This command does not affect analog modulation.

AWGN ARB Subsystem–Option 403 ([:SOURce]:RADio:AWGN:ARB)

:BWIDth

Supported E4438C with Option 403

[:SOURce] :RADio :AWGN :ARB :BWIDth <val>

[:SOURce] :RADio :AWGN :ARB :BWIDth?

This command adjusts the bandwidth of the AWGN waveform.

The variable <val> is expressed in units of Hertz (Hz–MHz).

***RST** +1.00000000E+006

Range 5E4–1.5E7

Key Entry Bandwidth

:IQ:EXTernal:FILTer

Supported E4438C with Option 403

[:SOURce] :RADio :AWGN :ARB :IQ :EXTernal :FILTer 40e6 |THRough

[:SOURce] :RADio :AWGN :ARB :IQ :EXTernal :FILTer?

This command selects the filter or through path for I/Q signals routed to the rear panel I and Q outputs. Selecting a filter setting with this command will automatically set the “:IQ:EXTernal:FILTer:AUTO” on page 208 command to Off mode.

40e6 This choice applies a 40 MHz baseband filter.

THRough This choice bypasses filtering.

***RST** THR

Key Entry 40.000 MHz Through

:IQ:EXtErnal:FILTer:AUTO**Supported** E4438C with Option 403

[:SOURce]:RADio:AWGN:ARB:IQ:EXtErnal:FILTer:AUTO ON|OFF|1|0

[:SOURce]:RADio:AWGN:ARB:IQ:EXtErnal:FILTer:AUTO?

This command enables or disables the automatic selection of the filters for I/Q signals routed to the rear panel I/Q outputs.

ON(1) This choice will automatically select a digital modulation filter optimized for the current signal generator settings.

OFF(0) This choice disables the auto feature which lets you select a digital modulation filter or through path. Refer to “[:IQ:EXtErnal:FILTer](#)” on page 207 for selecting a filter or through path.

*RST ON

Key Entry I/Q Output Filter Manual Auto

:HEADer:CLEar**Supported** E4438C with Option 403

[:SOURce]:RADio:AWGN:ARB:HEADer:CLEar

This command clears the header information from the header file used by this modulation format.

Key Entry Clear Header

Remarks The **AWGN Off On** softkey must be set to On for this command to function.

:HEADer:SAVE**Supported** E4438C with Option 403

[:SOURce]:RADio:AWGN:ARB:HEADer:SAVE

This command saves the header information to the header file used by this modulation format.

Key Entry Save Setup To Header

Remarks The **AWGN Off On** softkey must be set to On for this command to function.

:IQ:MODulation:ATTen

Supported E4438C with Option 403

[:SOURce] :RADio :AWGN :ARB :IQ :MODulation :ATTen <val>

[:SOURce] :RADio :AWGN :ARB :IQ :MODulation :ATTen?

This command attenuates the I/Q signals being modulated through the signal generator RF path.

The variable <val> is expressed in units of decibels (dB).

***RST** +2.00000000E+000

Range 0–40

Key Entry Modulator Atten Manual Auto

:IQ:MODulation:ATTen:AUTO

Supported E4438C with Option 403

[:SOURce] :RADio :AWGN :ARB :IQ :MODulation :ATTen :AUTO ON | OFF | 1 | 0

[:SOURce] :RADio :AWGN :ARB :IQ :MODulation :ATTen :AUTO?

This command enables or disables the I/Q attenuation auto mode.

ON (1) This choice enables the attenuation auto mode which optimizes the modulator attenuation for the current conditions.

OFF (0) This choice holds the attenuator at its current setting or at a selected value. Refer to “:IQ:MODulation:ATTen” on page 209 for setting the attenuation value.

***RST** 1

Key Entry Modulator Atten Manual Auto

:IQ:MODulation:FILTer**Supported** E4438C with Option 403

```
[ :SOURce ] :RADio:AWGN:ARB:IQ:MODulation:FILTer 2.1e6|40e6|THROUGH
[ :SOURce ] :RADio:AWGN:ARB:IQ:MODulation:FILTer?
```

This command enables you to select a filter or through path for I/Q signals modulated onto the RF carrier. Selecting a filter with this command will automatically set “:IQ:MODulation:ATTen:AUTO” on page 209 to Off(0) mode.

2.1E6 This choice applies a 2.1 MHz baseband filter to the I/Q signals.

40E6 This choice applies a 40 MHz baseband filter to the I/Q signals.

THROUGH This choice bypasses filtering.

***RST** THR

Key Entry 2.100 MHz 40.000 MHz Through

:IQ:MODulation:FILTer:AUTO**Supported** E4438C with Option 403

```
[ :SOURce ] :RADio:AWGN:ARB:IQ:MODulation:FILTer:AUTO ON|OFF|1|0
[ :SOURce ] :RADio:AWGN:ARB:IQ:MODulation:FILTer:AUTO?
```

This command enables or disables the automatic selection of the filters for I/Q signals modulated onto the RF carrier.

ON(1) This choice will automatically select a digital modulation filter.

OFF(0) This choice disables the auto feature which lets you select a digital modulation filter or through path. Refer to “:IQ:MODulation:FILTer” on page 302 for selecting a filter or through path.

***RST** 1

Key Entry I/Q Mod Filter Manual Auto

:MDEStination:PULSe

Supported E4438C with Option 403

```
[ :SOURCE ] :RADio:AWGN:ARB:MDEStination:PULSe NONE |M1 |M2 |M3 |M4  
[:SOURCE]:RADio:AWGN:ARB:MDEStination:PULSe?
```

This command routes the selected marker to the Pulse/RF Blanking function. The NONE parameter clears the marker for the Pulse/RF Blanking functions.

***RST** NONE

Key Entry None Marker 1 Marker 2 Marker 3 Marker 4

:MDEStination:AAMPlitude

Supported E4438C with Option 403

```
[ :SOURCE ] :RADio:AWGN:ARB:MDEStination:AAMPlitude NONE |M1 |M2 |M3 |M4  
[:SOURCE]:RADio:AWGN:ARB:MDEStination:AAMPlitude?
```

This command routes the selected marker to the Alternate Amplitude function. The NONE parameter clears the marker for the Alternate Amplitude function.

***RST** NONE

Key Entry None Marker 1 Marker 2 Marker 3 Marker 4

:MDEStination:ALCHold

Supported E4438C with Option 403

```
[ :SOURCE ] :RADio:AWGN:ARB:MDEStination:ALCHold NONE |M1 |M2 |M3 |M4  
[:SOURCE]:RADio:AWGN:ARB:MDEStination:ALCHold?
```

This command routes the selected marker to the ALC Hold function. The NONE parameter clears the marker for the ALC Hold function.

***RST** NONE

Key Entry None Marker 1 Marker 2 Marker 3 Marker 4

:MPOLarity:MARKer1

Supported E4438C with Option 403

[:SOURce] :RADio:AWGN:ARB:MPOLarity:MARKer1 NEGative | POSitive
[:SOURce] :RADio:AWGN:ARB:MPOLarity:MARKer1?

This command sets the polarity for marker 1.

***RST** POS

Key Entry Marker 1 Polarity Neg Pos

:MPOLarity:MARKer2

Supported E4438C with Option 403

[:SOURce] :RADio:AWGN:ARB:MPOLarity:MARKer2 NEGative | POSitive
[:SOURce] :RADio:AWGN:ARB:MPOLarity:MARKer2?

This command sets the polarity for marker 2.

***RST** POS

Key Entry Marker 2 Polarity Neg Pos

:MPOLarity:MARKer3

Supported E4438C with Option 403

[:SOURce] :RADio:AWGN:ARB:MPOLarity:MARKer3 NEGative | POSitive
[:SOURce] :RADio:AWGN:ARB:MPOLarity:MARKer3?

This command sets the polarity for marker 3.

***RST** POS

Key Entry Marker 3 Polarity Neg Pos

:MPOLarity:MARKer4

Supported E4438C with Option 403

[:SOURce] :RADio:AWGN:ARB:MPOLarity:MARKer4 NEGative | POSitive
[:SOURce] :RADio:AWGN:ARB:MPOLarity:MARKer4?

This command sets the polarity for marker 4.

***RST** POS

Key Entry Marker 4 Polarity Neg Pos

:LENgth

Supported E4438C with Option 403

```
[ :SOURce ] :RADio :AWGN :ARB :LENgth 1048576 | 524288 | 262144 | 131072 | 65536 |
32768 | 16384
```

```
[ :SOURce ] :RADio :AWGN :ARB :LENgth?
```

This command specifies the length (number of points) of the AWGN waveform.

***RST** +524288

Key Entry 1048576 524288 262144 131072 65536 32768 16384

Remarks A longer waveform yields a statistically more correct waveform.

:REFerence:EXTernal:FREQuency

Supported E4438C with Option 403

```
[ :SOURce ] :RADio :AWGN :ARB :REFerence :EXTernal :FREQuency <val>
```

```
[ :SOURce ] :RADio :AWGN :ARB :REFerence :EXTernal :FREQuency?
```

This command allows you to enter the frequency of the applied external reference.

The variable <val> is expressed in units of Hertz (Hz–MHz).

***RST** +1.00000000E+007

Range 2.5E5–1E8

Key Entry Reference Freq

Remarks The value specified by this command is effective only when you are using an external ARB reference applied to the BASEBAND GEN REF IN rear panel connector.

To specify external as the ARB reference source type, refer to [“:REFerence\[:SOURce\]” on page 283](#).

:REFerence[:SOURce]

Supported E4438C with Option 403

```
[ :SOURce ] :RADio:AWGN:ARB:REFerence[ :SOURce ] INTernal | EXTernal
[ :SOURce ] :RADio:AWGN:ARB:REFerence[ :SOURce ] ?
```

This command selects either an internal or external reference for the waveform clock.

***RST** INT

Key Entry ARB Reference Ext Int

Remarks If the EXTernal choice is selected, the external frequency *value must* be entered and the signal must be applied to the BASEBAND GEN REF IN rear panel connector.

Refer to “[\[:REFerence:EXTernal:FREQuency\]](#)” on page 282 to enter the external reference frequency.

:SCLock:RATE

Supported E4438C with Option 403

```
[ :SOURce ] :RADio:AWGN:ARB:SCLock:RATE <val>
[ :SOURce ] :RADio:AWGN:ARB:SCLock:RATE ?
```

This command sets the sample clock rate for the AWGN modulation format.

The variable <val> is expressed in units of hertz.

***RST** +1.00000000E+008

Range 1–1E8

Key Entry ARB Sample Clock

Remarks The modulation format should be active before executing this command. If this command is executed before the modulation format is active, the entered value will be overridden by a calculated factory default value. Refer to “[\[:STATe\]](#)” on page 215 to activate the modulation format.

:SEED

Supported E4438C with Option 403

[:SOURce] :RADio :AWGN :ARB :SEED FIXed | RANDom

[:SOURce] :RADio :AWGN :ARB :SEED?

This command toggles the AWGN waveform noise seed value type.

FIXed This choice selects a fixed noise seed value.

RANDom This choice selects a randomly generated noise seed value.

***RST** FIX

Key Entry Noise Seed Fixed Random

[:STATe]

Supported E4438C with Option 403

[:SOURce] :RADio :AWGN :ARB [:STATe] ON | OFF | 1 | 0

[:SOURce] :RADio :AWGN :ARB [:STATe]?

This command enables or disables the AWGN generator function.

***RST** 0

Key Entry Arb AWGN Off On

CDMA ARB Subsystem–Option 401 ([:SOURce]:RADio:CDMA:ARB)

:CLIPping:I

Supported E4438C with Option 401

[:SOURce] :RADio:CDMA:ARB:CLIPping:I <val>

[:SOURce] :RADio:CDMA:ARB:CLIPping:I?

This command clips (limits) the modulation level of the waveform's I component to a percentage of full scale.

The variable <val> is expressed in units of percent.

***RST** +1.00000000E+002

Range 10–100

Key Entry Clip |I| To

:CLIPping:POSition

Supported E4438C with Option 401

[:SOURce] :RADio:CDMA:ARB:CLIPping:POSition PRE|POST

[:SOURce] :RADio:CDMA:ARB:CLIPping:POSition?

This command specifies whether a waveform is clipped before (PRE) or after (POST) FIR filtering.

***RST** PRE

Key Entry Clip At PRE POST FIR Filter

:CLIPping:Q

Supported E4438C with Option 401

[:SOURCE] :RADio:CDMA:ARB:CLIPping:Q <val>

[:SOURCE] :RADio:CDMA:ARB:CLIPping:Q?

This command clips (limits) the modulation level of the waveform's Q component to a percentage of full scale.

The variable <val> is expressed in units of percent.

***RST** +1.00000000E+002

Range 10–100

Key Entry Clip |Q| To

:CLIPping:TYPE

Supported E4438C with Option 401

[:SOURCE] :RADio:CDMA:ARB:CLIPping:TYPE IJQ|IORQ

[:SOURCE] :RADio:CDMA:ARB:CLIPping:TYPE?

This command selects either IJQ or IORQ as the clipping type.

IJQ The combined I and Q waveform will be clipped (*circular clipping*).

IORQ The I and Q components of the waveform are clipped independently (*rectangular clipping*). I and Q can be clipped to different levels using this mode.

***RST** IJQ

Key Entry Clipping Type |I+jQ| |I|,|Q|

:CLIPping[:IJQ]**Supported** E4438C with Option 401

[:SOURCE]:RADIO:CDMA:ARB:CLIPping[:IJQ] <val>

[:SOURCE]:RADIO:CDMA:ARB:CLIPping[:IJQ]?

This command clips (limits) the modulation level of the combined I and Q waveform to a percentage of full scale.

The variable <val> is expressed in units of percent.

RST** +1.00000000E+002**Range** 10–100**Key Entry** Clip |I+jQ| To**:CRATe*Supported** E4438C with Option 401

[:SOURCE]:RADIO:CDMA:ARB:CRATe <val>

[:SOURCE]:RADIO:CDMA:ARB:CRATe?

This command sets the chip rate value.

The variable <val> is expressed as chips per second (cps–Mcps).

***RST** +1.22880000E+006**Range** 10–8E6**Key Entry** Chip Rate

:IQ:EXTERNAL:FILTER

Supported E4438C with Option 401

```
[ :SOURCE ] : RADIO : CDMA : ARB : IQ : EXTERNAL : FILTER 40e6 | THROUGH
[ :SOURCE ] : RADIO : CDMA : ARB : IQ : EXTERNAL : FILTER ?
```

This command selects the filter or through path for I/Q signals routed to the rear panel I and Q outputs. Selecting a filter using this command will automatically set “:IQ:EXTERNAL:FILTER:AUTO” on [page 219](#) to OFF(0) mode.

40e6 This choice applies a 40 MHz baseband filter.

THROUGH This choice bypasses filtering.

***RST** THR

Key Entry 40.000 MHz Through

:IQ:EXTERNAL:FILTER:AUTO

Supported E4438C with Option 401

```
[ :SOURCE ] : RADIO : CDMA : ARB : IQ : EXTERNAL : FILTER : AUTO ON | OFF | 1 | 0
[ :SOURCE ] : RADIO : CDMA : ARB : IQ : EXTERNAL : FILTER : AUTO ?
```

This command enables or disables the automatic selection of the filters for I/Q signals routed to the rear panel I/Q outputs.

ON(1) This choice will automatically select a digital modulation filter optimized for the current signal generator settings.

OFF(0) This choice disables the auto feature which lets you select a digital modulation filter or through path. Refer to “:IQ:EXTERNAL:FILTER” on [page 219](#) for selecting a filter or through path.

***RST** 1

Key Entry I/Q Output Filter Manual Auto

:FILTER

Supported E4438C with Option 401

```
[ :SOURCE ]:RADIO:CDMA:ARB:FILTer RNYQuist|NYQuist|GAUSSian|RECTangle|
IS95|IS95_EQ|IS95_MOD|IS95_MOD_EQ|WCDMA|AC4Fm|IS2000SR3DS|UGGaussian|
"<user FIR>"
[ :SOURCE ]:RADIO:CDMA:ARB:FILTer?
```

This command selects the pre-modulation filter type.

- IS95 This choice selects a filter that meets the criteria of the IS-95 standard.
- IS95_EQ This choice selects a filter which is a combination of the IS-95 filter (above) and the equalizer filter described in the IS-95 standard. This filter is only used for IS-95 baseband filtering.
- IS95_MOD This choice selects a filter that meets the criteria of the IS-95 error function (for improved adjacent channel performance) with lower passband rejection than the filter specified in the IS-95 standard.
- IS95_MOD_EQ This choice selects a filter which is a combination of the equalizer filter described in the IS-95 standard and a filter that meets the criteria of the IS-95 error function (for improved adjacent channel performance), with lower passband rejection.
- WCDMa This choice selects a 0.22 Nyquist filter optimized for ACP.
- AC4Fm This choice selects a predefined Association of Public Safety Communications Officials (APCO) specified compatible 4-level frequency modulation (C4FM) filter.
- IS2000SR3DS This choice selects an IS-2000 standard, spread rate 3 direct spread filter.
- UGGaussian This choice selects a backwards compatible GSM Gaussian filter (Gaussian filter with a fixed BbT value of 0.300) for the ESG E44xxB Option UN3 or UN4.
- "<user FIR>" This variable is any FIR filter file that you have stored in memory. The variable needs no directory path indicating the location of the file, such as FIR: or /USER/FIR. The command assumes the FIR directory. Refer to [“File Name Variables” on page 13](#) for more information on file names.

***RST** IS95_MOD_EQ

Key Entry	Root Nyquist	Nyquist	Gaussian	Rectangle	IS-95	IS-95 w/EQ
	IS-95 Mod	IS-95 Mod w/EQ	WCDMA	APCO 25 C4FM	IS-2000 SR3 DS	
	UN3/4 GSM Gaussian	User FIR				

:FILTer:ALPHa

Supported E4438C with Option 401

[:SOURCE]:RADio:CDMA:ARB:FILTer:ALPHa <val>

[:SOURCE]:RADio:CDMA:ARB:FILTer:ALPHa?

This command changes the Nyquist or root Nyquist filter's alpha value.

The filter alpha value can be set to the minimum level (0), the maximum level (1), or in between by using fractional numeric values (0.001–0.999).

***RST** +5.00000000E–001

Range 0.000–1.000

Key Entry Filter Alpha

Remarks To change the current filter type, refer to “:FILTer” on page 220.

:FILTer:BBT

Supported E4438C with Option 401

[:SOURCE]:RADio:CDMA:ARB:FILTer:BBT <val>

[:SOURCE]:RADio:CDMA:ARB:FILTer:BBT?

This command changes the bandwidth-multiplied-by-bit-time (BbT) filter parameter.

The filter BbT value can be set to the minimum level (0), the maximum level (1), or in between by using fractional numeric values (0.001–0.999).

***RST** +5.00000000E–001

Range 0.000–1.000

Key Entry Filter BbT

Remarks This command is effective only after choosing a Gaussian filter. It does not have an effect on other types of filters.

To change the current filter type, refer to “:FILTer” on page 220.

:FILTER:CHANnel

Supported E4438C with Option 401

[:SOURCE] :RADIO:CDMA:ARB:FILTer:CHANnel EVM|ACP

[:SOURCE] :RADIO:CDMA:ARB:FILTer:CHANnel?

This command optimizes the Nyquist and root Nyquist filters to minimize error vector magnitude (EVM) or to minimize adjacent channel power (ACP).

EVM This choice provides the most ideal passband.

ACP This choice improves stopband rejection.

***RST** EVM

Key Entry Optimize FIR For EVM ACP

Remarks To change the current filter type, refer to “:FILTer” on page 220.

:HEADer:CLEar

Supported E4438C with Option 401

[:SOURCE] :RADIO:CDMA:ARB:HEADer:CLEar

This command clears the header information from the header file used by this modulation format.

Key Entry Clear Header

Remarks The **CDMA Off On** softkey must be set to On for this command to function.

:HEADer:SAVE

Supported E4438C with Option 401

[:SOURCE] :RADIO:CDMA:ARB:HEADer:SAVE

This command saves the header information to the header file used by this modulation format.

Key Entry Save Setup To Header

Remarks The **CDMA Off On** softkey must be set to On for this command to function.

:IQMap

Supported E4438C with Option 401

```
[ :SOURCE ] :RADio:CDMA:ARB:IQMap NORMAL | INVerted  
[ :SOURCE ] :RADio:CDMA:ARB:IQMap?
```

This command selects whether the Q output will be normal or inverted.

NORMAL This choice selects normal polarity.

INVerted This choice inverts the internal Q signal.

***RST** NORM

Key Entry I/Q Mapping Normal Invert

Remarks Inverting the Q output inverts the RF spectrum after the modulation.

:IQ:MODulation:ATTen

Supported E4438C with Option 401

```
[ :SOURCE ] :RADio:CDMA:ARB:IQ:MODulation:ATTen <val>  
[ :SOURCE ] :RADio:CDMA:ARB:IQ:MODulation:ATTen?
```

This command attenuates the I/Q signals being modulated through the signal generator RF path.

The variable <val> is expressed in units of decibels (dB).

***RST** +2.00000000E+000

Range 0–40

Key Entry Modulator Atten Manual Auto

:IQ:MODulation:ATTen:AUTO

Supported E4438C with Option 401

```
[ :SOURCE ] :RADio:CDMA:ARB:IQ:MODulation:ATTen:AUTO ON | OFF | 1 | 0  
[ :SOURCE ] :RADio:CDMA:ARB:IQ:MODulation:ATTen:AUTO?
```

This command enables or disables the I/Q attenuation auto mode.

ON (1) This choice enables the attenuation auto mode which optimizes the modulator attenuation for the current conditions.

OFF (0)	This choice holds the attenuator at its current setting or at a selected value. Refer to “:IQ:MODulation:ATTen” on page 223 for setting the attenuation value.
*RST	1
Key Entry	Modulator Atten Manual Auto

:IQ:MODulation:FILTer

Supported E4438C with Option 401

```
[ :SOURCE ] :RADIo:CDMA:ARB:IQ:MODulation:FILTer 2.1e6|40e6|THROUGH
[ :SOURCE ] :RADIo:CDMA:ARB:IQ:MODulation:FILTer?
```

This command enables you to select a filter or through path for I/Q signals modulated onto the RF carrier. Selecting a filter using this command will automatically set “:IQ:MODulation:ATTen:AUTO” on page 223 to OFF(0) mode.

2.1E6	This choice applies a 2.1 MHz baseband filter to the I/Q signals.
40E6	This choice applies a 40 MHz baseband filter to the I/Q signals.
THROUGH	This choice bypasses filtering.
*RST	THR
Key Entry	2.100 MHz 40.000 MHz Through

:IQ:MODulation:FILTer:AUTO

Supported E4438C with Option 401

```
[ :SOURCE ] :RADIo:CDMA:ARB:IQ:MODulation:FILTer:AUTO ON|OFF|1|0
[ :SOURCE ] :RADIo:CDMA:ARB:IQ:MODulation:FILTer:AUTO?
```

This command enables or disables the automatic selection of the filters for I/Q signals modulated onto the RF carrier.

ON(1)	This choice will automatically select a digital modulation filter.
OFF(0)	This choice disables the auto feature which lets you select a digital modulation filter or through path. Refer to “:IQ:MODulation:FILTer” on page 302 for selecting a filter or through path.
*RST	1
Key Entry	I/Q Mod Filter Manual Auto

:MDESTINATION:PULSE

Supported E4438C with Option 401

```
[ :SOURCE ] : RADIO : CDMA : ARB : MDESTINATION : PULSE NONE | M1 | M2 | M3 | M4  
[ :SOURCE ] : RADIO : CDMA : ARB : MDESTINATION : PULSE ?
```

This command routes the selected marker to the Pulse/RF Blanking function. The NONE parameter clears the marker for the Pulse/RF Blanking functions.

***RST** NONE

Key Entry None Marker 1 Marker 2 Marker 3 Marker 4

:MDESTINATION:AAMPLITUDE

Supported E4438C with Option 401

```
[ :SOURCE ] : RADIO : CDMA : ARB : MDESTINATION : AAMPLITUDE NONE | M1 | M2 | M3 | M4  
[ :SOURCE ] : RADIO : CDMA : ARB : MDESTINATION : AAMPLITUDE ?
```

This command routes the selected marker to the Alternate Amplitude function. The NONE parameter clears the marker for the Alternate Amplitude function.

***RST** NONE

Key Entry None Marker 1 Marker 2 Marker 3 Marker 4

:MDESTINATION:ALCHOLD

Supported E4438C with Option 401

```
[ :SOURCE ] : RADIO : CDMA : ARB : MDESTINATION : ALCHOLD NONE | M1 | M2 | M3 | M4  
[ :SOURCE ] : RADIO : CDMA : ARB : MDESTINATION : ALCHOLD ?
```

This command routes the selected marker to the ALC Hold function. The NONE parameter clears the marker for the ALC Hold function.

***RST** NONE

Key Entry None Marker 1 Marker 2 Marker 3 Marker 4

:MPOLarity:MARKer1

Supported E4438C with Option 401

[:SOURCE] :RADIO:CDMA:ARB:MPOLarity:MARKer1 NEGative | POSitive
[:SOURCE] :RADIO:CDMA:ARB:MPOLarity:MARKer1?

This command sets the polarity for marker 1.

***RST** POS

Key Entry Marker 1 Polarity Neg Pos

:MPOLarity:MARKer2

Supported E4438C with Option 401

[:SOURCE] :RADIO:CDMA:ARB:MPOLarity:MARKer2 NEGative | POSitive
[:SOURCE] :RADIO:CDMA:ARB:MPOLarity:MARKer2?

This command sets the polarity for marker 2.

***RST** POS

Key Entry Marker 2 Polarity Neg Pos

:MPOLarity:MARKer3

Supported E4438C with Option 401

[:SOURCE] :RADIO:CDMA:ARB:MPOLarity:MARKer3 NEGative | POSitive
[:SOURCE] :RADIO:CDMA:ARB:MPOLarity:MARKer3?

This command sets the polarity for marker 3.

***RST** POS

Key Entry Marker 3 Polarity Neg Pos

:MPOLarity:MARKer4

Supported E4438C with Option 401

[:SOURCE] :RADIO:CDMA:ARB:MPOLarity:MARKer4 NEGative | POSitive
[:SOURCE] :RADIO:CDMA:ARB:MPOLarity:MARKer4?

This command sets the polarity for marker 4.

***RST** POS

Key Entry Marker 4 Polarity Neg Pos

:OSAMple

Supported E4438C with Option 401

[:SOURce]:RADio:CDMA:ARB:OSAMple <val>

[:SOURce]:RADio:CDMA:ARB:OSAMple?

This command sets the oversampling ratio (number of filter taps per symbol) for CDMA modulation.

***RST** +5

Range 2–8

Key Entry Oversample Ratio

Remarks The upper limit of the oversample ratio is adjusted based on the waveform length and chip rate.

Using larger oversample ratios result in more completely filtered images, but this action also uses up more waveform memory.

The maximum oversample ratio is the smaller of 8, 40 Mcps/Chip Rate, or 32/Waveform Length (number of CDMA short codes).

:REference:EXternal:FREQuency

Supported E4438C with Option 401

[:SOURce]:RADio:CDMA:ARB:REference:EXternal:FREQuency <val>

[:SOURce]:RADio:CDMA:ARB:REference:EXternal:FREQuency?

This command allows you to enter the frequency of the applied external reference.

The variable <val> is expressed in units of Hertz (Hz–MHz).

***RST** +1.00000000E+007

Range 2.5E5–1E8

Key Entry Reference Freq

Remarks The value specified by this command is effective only when you are using an external ARB reference applied to the BASEBAND GEN REF IN rear panel connector.

To specify external as the ARB reference source type, refer to [“:REference\[:SOURce\]” on page 228](#).

:REFeRence[:SOURce]

Supported E4438C with Option 401

```
[ :SOURce ] :RADio:CDMA:ARB:REFeRence[ :SOURce ] INTernal | EXTeRnal
[ :SOURce ] :RADio:CDMA:ARB:REFeRence[ :SOURce ] ?
```

This command selects either an internal or external reference for the waveform clock.

***RST** INT

Key Entry ARB Reference Ext Int

Remarks If the EXTeRnal choice is selected, the external frequency value *must* be entered and the signal must be applied to the BASEBAND GEN REF IN rear panel connector.

Refer to “[:REFeRence:EXTeRnal:FREQUency](#)” on page 227 to enter the external reference frequency.

:RETRigger

Supported E4438C with Option 401

```
[ :SOURce ] :RADio:CDMA:ARB:RETRigger ON | OFF | IMMEDIATE
[ :SOURce ] :RADio:CDMA:ARB:RETRigger ?
```

This command enables or disables the ARB retriggering mode; the retrigger mode controls how the retriggering function performs while a waveform is playing.

ON(1) This choice specifies that if a trigger occurs while a waveform is playing, the waveform will retrigger at the end of the current waveform sequence and play once more.

OFF(0) This choice specifies that if a trigger occurs while a waveform is playing, the trigger will be ignored.

IMMEDIATE This choice specifies that if a trigger occurs while a waveform is playing, the waveform will reset and replay from the start immediately upon receiving a trigger.

***RST** ON

Key Entry On Off Immediate

:SCLock:RATE

Supported E4438C with Option 401

[:SOURce] :RADio :CDMA :ARB :SCLock :RATE <val>

[:SOURce] :RADio :CDMA :ARB :SCLock :RATE?

This command sets the sample clock rate for the CDMA modulation format.

The variable <val> is expressed in units of hertz.

***RST** +1.00000000E+008

Range 1–1E8

Key Entry ARB Sample Clock

Remarks The modulation format should be active before executing this command. If this command is executed before the modulation format is active, the entered value will be overridden by a calculated factory default value. Refer to “[:STaTe]” on [page 241](#) to activate the modulation format.

:SETup

Supported E4438C with Option 401

[:SOURce] :RADio :CDMA :ARB :SETup FWD9 | FWD32 | FWD64 | PILot | REVerse | MCARrier |
 "<file name>"

[:SOURce] :RADio :CDMA :ARB :SETup?

This command selects a pre-defined CDMA channel setup.

FWD9 This CDMA setup consists of 9 forward channels (pilot, paging, sync, and 6 traffic channels) at IS-97-defined power levels.

FWD32 This CDMA setup consists of 32 forward channels (pilot, paging, sync, and 29 traffic channels) at IS-97-defined power levels.

FWD64 This CDMA setup consists of 64 forward channels (pilot, 7 paging, sync, and 55 traffic channels) at IS-97-defined power levels.

PILot This choice selects single pilot channel.

REVerse A single reverse link traffic channel.

MCARrier This choice activates Multicarrier mode (3 carrier setup) and deactivates any other mode that was previously selected. To change multicarrier setup, refer to “[:SETup:MCARrier]” on [page 231](#).

***RST** FWD9

Key Entry	9 Ch Fwd 32 Ch Fwd 64 Ch Fwd Pilot Reverse Multicarrier Off On
	Multicarrier Off On Custom CDMA State
Remarks	Refer to “File Name Variables” on page 13 for information on the file name syntax.

:SETup:CHANnel

Supported E4438C with Option 401

```
[ :SOURce ]:RADio:CDMA:ARB:SETup:CHANnel IS97|EQUAL|SCALE|NONE { ,PILot |
SYNC|PAGing|TRAFfic ,<walsh_value> ,<power_value> ,<pn_offset> ,RANDom |
<data_value> }
[ :SOURce ]:RADio:CDMA:ARB:SETup:CHANnel?
```

This command defines the channel parameters of the CDMA signal. This allows for customizing of the channel type, the channel parameters, and the data value.

The variable <power_value> is expressed in units of decibels (dB).

- IS97 This choice sets the channel power levels to IS-97-defined power levels.
- EQUAL This choice sets the channel power levels so that all channels are of equal power and the total power equals 0 dBm.
- SCALE This choice scales all of the current channel powers so that the total power equals 0 dB while keeping the previous power ratios between the individual channels.
- NONE This choice bypasses the power level setting.
- PILot This choice selects a single traffic channel.
- SYNC This choice selects a sync channel.
- PAGing This choice selects a paging channel.
- TRAFfic This choice selects a traffic channel.
- RANDom This choice selects a randomly generated data value.

The channel type, walsh code, power, PN offset, and data values are returned when a query is initiated. The output format is as follows:

```
<channel type> ,<walsh_value> ,<power> ,<pn_offset> ,<data_value>
```

*RST	Channel #	Channel Type	Walsh Code	Power	PN Offset	Data
	1	PIL	+0	-7.00000000E+000	+0	+0
	2	PAG	+1	-7.26000023E+000	+0	RAND
	3	TRAF	+8	-1.02600002E+001	+0	RAND
	4	TRAF	+9	-1.02600002E+001	+0	RAND

*RST	Channel #	Channel Type	Walsh Code	Power	PN Offset	Data
	5	TRAF	+10	-1.02600002E+001	+0	RAND
	6	TRAF	+11	-1.02600002E+001	+0	RAND
	7	TRAF	+12	-1.02600002E+001	+0	RAND
	8	TRAF	+13	-1.02600002E+001	+0	RAND
	9	SYNC	+32	-1.02600002E+001	+0	RAND

Range <power_value>: -40 to 0 <walsh_value>: 0-63 <pn_offset>: 0-511

Key Entry **IS-97 Levels** **Equal Powers** **Scale to 0dB** **Sync** **Pilot** **Paging** **Traffic**

:SETup:MCARrier

Supported E4438C with Option 401

```
[ :SOURCE ]:RADio:CDMA:ARB:SETup:MCARrier CAR3 | CAR4 | "<file name>"
[ :SOURCE ]:RADio:CDMA:ARB:SETup:MCARrier?
```

This command selects a pre-defined type of multicarrier CDMA setup required for your application.

CAR3 This choice selects three 9 channel forward carriers with a power level of 0.00 dB, the first with a -1.25 MHz frequency offset, the second with no frequency offset, and the third with +1.25 MHz frequency offset.

CAR4 This choice selects four 9 channel forward carriers with a power level of 0.00 dB, the first with a -1.875 MHz frequency offset, the second with a -625 kHz frequency offset, the third with +625 kHz frequency offset, and the fourth with a +1.875 MHz frequency offset.

***RST** CAR3

Key Entry **3 Carriers** **4 Carriers** **Custom CDMA Multicarrier**

Remarks Refer to [“File Name Variables” on page 13](#) for information on the file name syntax.

:SETup:MCARrier:STORe**Supported** E4438C with Option 401

[:SOURCE]:RADio:CDMA:ARB:SETup:MCARrier:STORe "<file name>"

This command stores the current multicarrier setup information.

The stored file contains information including the digital modulation format, number of carriers, frequency spacing, and power settings for the multicarrier setup.

Key Entry Store Custom Multicarrier**Remarks** Refer to “File Name Variables” on page 13 for information on the file name syntax.**:SETup:MCARrier:TABLE****Supported** E4438C with Option 401[:SOURCE]:RADio:CDMA:ARB:SETup:MCARrier:TABLE {FWD9|FWD32|FWD64|PILot|CUSTom,"<file name>"|" ",<freq_offset>,<power>}
[:SOURCE]:RADio:CDMA:ARB:SETup:MCARrier:TABLE?

This command defines the multicarrier CDMA waveform.

The variable <freq_offset> is expressed in units of Hertz (kHz to MHz).

The variable <power> is expressed in units of decibels (dB).

The carrier type, carrier name, frequency offset, and power level are returned when a query is initiated. The output format is as follows:

<carrier type>,<carrier_name>,<freq_offset>,<power>

FWD9 This CDMA setup consists of 9 forward channels (pilot, paging, sync, and 6 traffic channels) at IS-97-defined power levels.

FWD32 This CDMA setup consists of 32 forward channels (pilot, paging, sync, and 29 traffic channels) at IS-97-defined power levels.

FWD64 This CDMA setup consists of 64 forward channels (pilot, 7 paging, sync, and 55 traffic channels) at IS-97-defined power levels.

PILot This choice selects single pilot channel.

" " A null string, entered for any non-custom carrier.

*RST	carrier type: FWD9 <freq_offset>: +1.25000000E+006 <power>: +0.00000000E+000
Range	<freq_offset>: -7.5E6 to 7.5E6 <power>: -40 to 0
Key Entry	9 Ch Fwd 32 Ch Fwd 64 Ch Fwd Pilot Custom CDMA State
Remarks	Refer to “File Name Variables” on page 13 for information on the file name syntax. To store a multicarrier setup refer to “:SETup:MCARrier:STORe” on page 232 The file name specified must be a single carrier CDMA file.

:SETup:STORe

Supported E4438C with Option 401

[:SOURCE]:RADio:CDMA:ARB:SETup:STORe "<file name>"

This command stores the current custom CDMA state, using a designated file name, to the signal generator non-volatile memory.

Along with the contents of the CDMA channel table editor (channel types, Walsh code, power levels, PN offset, and data), this command stores the following information to the signal generator non-volatile memory:

- FIR filter
- FIR filter file name
- FIR filter alpha
- FIR filter BbT
- FIR filter channel (EVM or ACP)
- chip rate
- waveform length
- oversample ratio
- ARB reference clock source (internal or external)
- ARB reference clock frequency

Key Entry **Store Custom CDMA State**

Remarks Recall the stored file by executing the following command:

[:SOURCE]:RADio:CDMA:ARB:SETup: "<file name>"

Refer to [“File Name Variables” on page 13](#) for information on the file name syntax.

:TRIGger:TYPE

Supported E4438C with Option 401

```
[ :SOURCE ]:RADio:CDMA:ARB:TRIGger:TYPE CONTInuous | SINGle | GATE
[ :SOURCE ]:RADio:CDMA:ARB:TRIGger:TYPE?
```

This command sets the trigger mode (type) that controls the waveform’s playback.

Triggers control the playback by telling the ESG when to play the modulating signal (waveform). Depending on the trigger settings for the ESG, the waveform playback can occur once, continuously, or the ESG may start and stop playing the waveform repeatedly (GATE mode).

A trigger signal comprises both positive and negative signal transitions (states), which are also called high and low periods. You can configure the ESG to trigger on either state of the trigger signal. It is common to have multiple triggers, also referred to as trigger occurrences or events, occur when the signal generator requires only a single trigger. In this situation, the ESG recognizes the first trigger and ignores the rest.

When you select a trigger mode, you may lose the signal (carrier plus modulating) from the RF output until you trigger the waveform. This is because the ESG sets the I and Q signals to zero volts prior to the first trigger event, which suppresses the carrier. After the first trigger event, the waveform’s final I and Q levels determine whether you will see the carrier signal or not (zero = no carrier, other values = carrier visible). At the end of most files, the final I and Q points are set to a value other than zero.

There are four parts to configuring the trigger:

- Choosing the trigger type, which controls the waveform’s transmission.
- Setting the waveform’s response to triggers:
 - CONTInuous, see “:TRIGger:TYPE:CONTInuous[:TYPE]” on page 235
 - SINGle, see “:RETRigger” on page 228
 - GATE, selecting the mode also sets the response
- Selecting the trigger source (see “:TRIGger[:SOURCE]” on page 236), which determines how the ESG receives its trigger signal, internally or externally. The GATE choice requires an external trigger.
- Setting the trigger polarity when using an external source:
 - CONTInuous and SINGle see “:TRIGger[:SOURCE]:EXTernal:SLOPe” on page 239
 - GATE, see “:TRIGger:TYPE:GATE:ACTive” on page 236

For more information on triggering, see the *E4428C/38C ESG Signal Generators User’s Guide*.

The following list describes the trigger type command choices:

CONTInuous Upon triggering, the waveform repeats continuously.

SINGLE	Upon triggering, the waveform segment or sequence plays once.
GATE	An external trigger signal repeatedly starts and stops the waveform’s playback (transmission). The time duration for playback depends on the duty period of the trigger signal and the gate polarity selection (see “:TRIGger:TYPE:GATE:ACTive” on page 236). The waveform plays during the inactive state and stops during the active polarity selection state. The active state can be set high or low. The gate mode works only with an external trigger source.

NOTE The ARB gating behavior described above is opposite to the gating behavior for real-time custom mode.

*RST	CONT		
Key Entry	Continuous	Single	Gated

:TRIGger:TYPE:CONTInuous[:TYPE]

Supported E4438C with Option 401

```
[ :SOURce ] :RADio:CDMA:ARB:TRIGger:TYPE:CONTInuous [ :TYPE ] FREE | TRIGger |
RESet
[ :SOURce ] :RADio:CDMA:ARB:TRIGger:TYPE:CONTInuous [ :TYPE ] ?
```

This commands selects the waveform’s response to a trigger signal while using the continuous trigger mode.

For more information on triggering and to select the continuous trigger mode, see [“:TRIGger:TYPE” on page 234](#).

The following list describes the waveform’s response to each of the command choices:

FREE	Turning the ARB format on immediately triggers the waveform. The waveform repeats until you turn the format off, select another trigger, or choose another waveform file.
TRIGger	The waveform waits for a trigger before play begins. When the waveform receives the trigger, it plays continuously until you turn the format off, select another trigger, or choose another waveform file.
RESet	The waveform waits for a trigger before play begins. When the waveform receives the trigger, it plays continuously. Subsequent triggers reset the waveform

to the beginning. For a waveform sequence, this means to the beginning of the first segment in the sequence.

***RST** FREE
Key Entry Free Run Trigger & Run Reset & Run

:TRIGger:TYPE:GATE:ACTive

Supported E4438C with Option 401

```
[ :SOURCE ] :RADio:CDMA:ARB:TRIGger:TYPE:GATE:ACTive LOW|HIGH
[ :SOURCE ] :RADio:CDMA:ARB:TRIGger:TYPE:GATE:ACTive?
```

This command selects the active state (gate polarity) of the gate while using the gating trigger mode.

The LOW and HIGH selections correspond to the low and high states of an external trigger signal. For example, when you select HIGH, the active state occurs during the high of the trigger signal. When the active state occurs, the ESG stops the waveform playback at the last played sample point, then restarts the playback at the next sample point when the inactive state occurs. For more information on triggering and to select gating as the trigger mode, see “:TRIGger:TYPE” on page 234.

The following list describes the ESG’s gating behavior for the polarity selections:

LOW The waveform playback stops when the trigger signal goes low (active state) and restarts when the trigger signal goes high (inactive state).

HIGH The waveform playback stops when the trigger signal goes high (active state) and restarts when the trigger signal goes low (inactive state).

***RST** HIGH

Key Entry Gate Active Low High

:TRIGger[:SOURCE]

Supported E4438C with Option 401

```
[ :SOURCE ] :RADio:CDMA:ARB:TRIGger[ :SOURCE ] KEY|EXT|BUS
[ :SOURCE ] :RADio:CDMA:ARB:TRIGger[ :SOURCE ]?
```

This command sets the trigger source.

For more information on triggering, see “:TRIGger:TYPE” on page 234. The following list describes the command choices:

KEY This choice enables manual triggering by pressing the front-panel **Trigger** hardkey.

EXT An externally applied signal triggers the waveform. This is the only choice that works with gating. The following conditions affect an external trigger:

- The input connector selected for the trigger signal. You have a choice between the rear-panel PATTERN TRIG IN connector or the PATT TRIG IN 2 pin on the rear-panel AUXILIARY I/O connector. To make the connector selection, see “:TRIGger[:SOURce]:EXTernal[:SOURce]” on page 239.

For more information on the connectors and on connecting the cables, see the *ESG User’s Guide*.

- The trigger signal polarity:
 - gating mode, see “:TRIGger:TYPE:GATE:ACTive” on page 236
 - continuous and single modes, see “:TRIGger[:SOURce]:EXTernal:SLOPe” on page 239
- The time delay between when the ESG receives a trigger and when the waveform responds to the trigger. There are two parts to setting the delay:
 - setting the amount of delay, see “:TRIGger[:SOURce]:EXTernal:DELay” on page 238
 - turning the delay on, see “:TRIGger[:SOURce]:EXTernal:DELay:STATe” on page 238

BUS This choice enables triggering over the GPIB or LAN using the *TRG or GET commands or the AUXILIARY INTERFACE (RS-232) using the *TRG command.

***RST** KEY

Key Entry Trigger Key Ext Bus

:TRIGger[:SOURCE]:EXternal:DElay**Supported** E4438C with Option 401

[:SOURCE]:RADio:CDMA:ARB:TRIGger[:SOURCE]:EXternal:DElay <val>

[:SOURCE]:RADio:CDMA:ARB:TRIGger[:SOURCE]:EXternal:DElay?

This command sets the amount of time to delay the ESG’s response to an external trigger.

The delay is a path (time) delay between when the ESG receives the trigger and when it responds to the trigger. For example, configuring a trigger delay of two seconds, causes the ESG to wait two seconds after receipt of the trigger before the ESG plays the waveform.

The delay does not occur until you turn it on (see “:TRIGger[:SOURCE]:EXternal:DElay:STATe” on page 238). You can set the delay value either before or after turning it on.

For more information on configuring an external trigger source and to select external as the trigger source, see “:TRIGger[:SOURCE]” on page 236.

The unit of measurement for the variable <val> is in seconds (nsec–sec).

RST** +1.00000000E–003**Range** 1E–8 to 4E1**Key Entry** Ext Delay Time**:TRIGger[:SOURCE]:EXternal:DElay:STATe*Supported** E4438C with Option 401

[:SOURCE]:RADio:CDMA:ARB:TRIGger[:SOURCE]:EXternal:DElay:STATe ON|OFF|

1|0

[:SOURCE]:RADio:CDMA:ARB:TRIGger[:SOURCE]:EXternal:DElay:STATe?

This command enables or disables the operating state of the external trigger delay function.

For setting the delay time, see “:TRIGger[:SOURCE]:EXternal:DElay” on page 238, and for more information on configuring an external source, see “:TRIGger[:SOURCE]” on page 236.

***RST** 0**Key Entry** Ext Delay Off On

:TRIGger[:SOURce]:EXTErnal:SLOPe

Supported E4438C with Option 401

```
[ :SOURce ]:RADio:CDMA:ARB:TRIGger[ :SOURce ]:EXTErnal:SLOPe POSitive|
NEGative
[ :SOURce ]:RADio:CDMA:ARB:TRIGger[ :SOURce ]:EXTErnal:SLOPe?
```

This command sets the polarity for an external trigger signal while using the continuous, single triggering mode. To set the polarity for gating, see “[:TRIGger:TYPE:GATE:ACTive](#)” on page 236.

The POSitive and NEGative selections correspond to the high (positive) and low (negative) states of the external trigger signal. For example, when you select POSitive, the waveform responds (plays) during the high state of the trigger signal. When the PSG receives multiple trigger occurrences when only one is required, the signal generator uses the first trigger and ignores the rest.

For more information on configuring an external trigger source and to select external as the trigger source, see “[:TRIGger\[:SOURce\]](#)” on page 236.

***RST** NEG

Key Entry Ext Polarity Neg Pos

:TRIGger[:SOURce]:EXTErnal[:SOURce]

Supported E4438C with Option 401

```
[ :SOURce ]:RADio:CDMA:ARB:TRIGger[ :SOURce ]:EXTErnal[ :SOURce ] EPT1|EPT2 |
EPTRIGGER1 | EPTRIGGER2
[ :SOURce ]:RADio:CDMA:ARB:TRIGger[ :SOURce ]:EXTErnal[ :SOURce ]?
```

This command selects which PATTERN TRIG IN connection the ESG uses to accept an externally applied trigger signal when external is the trigger source selection.

For more information on configuring an external trigger source and to select external as the trigger source, see “[:TRIGger\[:SOURce\]](#)” on page 236. For more information on the rear-panel connectors, see the *E4428C/38C ESG Signal Generators User’s Guide*.

The following list describes the command choices:

- | | |
|------------|---|
| EPT1 | This choice is synonymous with EPTRIGGER1 and selects the PATTERN TRIG IN rear-panel connector. |
| EPT2 | This choice is synonymous with EPTRIGGER2 and selects the PATT TRIG IN 2 pin on the rear-panel AUXILIARY I/O connector. |
| EPTRIGGER1 | This choice is synonymous with EPT1 and selects the PATTERN TRIG IN rear-panel connector. |

EPTRIGGER2 This choice is synonymous with EPT2 and selects the PATT TRIG IN 2 pin on the rear-panel AUXILIARY I/O connector.

***RST** EPT1

Key Entry Patt Trig In 1 Patt Trig In 2

:WLENgth

Supported E4438C with Option 401

[:SOURCE] :RADio :CDMA :ARB :WLENgth <val>

[:SOURCE] :RADio :CDMA :ARB :WLENgth?

This command specifies the waveform length (in short codes).

***RST** +1

Range 1–6

Key Entry Waveform Length

Remarks The upper limit is adjusted based on the oversample ratio to fit the signal within the available memory.

The maximum waveform length is 32/oversample ratio.

[:STATe]

Supported E4438C with Option 401

[:SOURCE]:RADio:CDMA:ARB[:STATe] ON|OFF|1|0

[:SOURCE]:RADio:CDMA:ARB[:STATe]?

This command enables or disables the CDMA modulation format.

Executing the command [:SOURCE]:RADio:CDMA:ARB[:STATe] ON sets up the internal hardware to generate the currently selected CDMA signal selection. This also activates the I/Q state and sets the I/Q source to internal.

ON (1) This choice sets up the internal hardware to generate the currently selected CDMA signal selection. This also activates the I/Q state and sets the I/Q source to internal.

OFF (0) This choice disables the CDMA modulation format.

***RST** 0

Key Entry CDMA Off On

Remarks The enabled modulation is not present on RF carrier until you have activated the modulation by executing the command :OUTPut:MODulation[:STATe] ON.

Overriding the I/Q state and I/Q source functions can be achieved by using the I/Q menu.

CDMA2000 ARB Subsystem–Option 401 ([:SOURce]:RADio:CDMA2000:ARB)

:CLIPping:I

Supported E4438C with Option 401

[:SOURce] :RADio :CDMA2000 :ARB :CLIPping :I <val>

[:SOURce] :RADio :CDMA2000 :ARB :CLIPping :I ?

This command clips (limits) the modulation level of the waveform's I component to a percentage of full scale.

The variable <val> is expressed in units of percent.

***RST** +1.00000000E+002

Range 10–100

Key Entry Clip |I| To

:CLIPping:POSition

Supported E4438C with Option 401

[:SOURce] :RADio :CDMA2000 :ARB :CLIPping :POSition PRE |POST

[:SOURce] :RADio :CDMA2000 :ARB :CLIPping :POSition ?

This command specifies whether a waveform is clipped before (PRE) or after (POST) FIR filtering.

***RST** PRE

Key Entry Clip At PRE POST FIR Filter

:CLIPping:Q

Supported E4438C with Option 401

[:SOURCE] :RADIO:CDMA2000:ARB:CLIPping:Q <val>

[:SOURCE] :RADIO:CDMA2000:ARB:CLIPping:Q?

This command clips (limits) the modulation level of the waveform's Q component to a percentage of full scale.

The variable <val> is expressed in units of percent.

***RST** +1.00000000E+002

Range 10–100

Key Entry Clip | Q | To

:CLIPping:TYPE

Supported E4438C with Option 401

[:SOURCE] :RADIO:CDMA2000:ARB:CLIPping:TYPE IJQ | IORQ

[:SOURCE] :RADIO:CDMA2000:ARB:CLIPping:TYPE?

This command selects either IJQ or IORQ as the clipping type.

IJQ This choice clips (circular clipping) the combined I and Q waveform.

IORQ This choice independently clips (rectangular clipping) I and Q components of the waveform. I and Q can be clipped to different levels using this mode.

***RST** IORQ

Key Entry Clipping Type | I+jQ | |I|,|Q|

:CLIPping[:IJQ]**Supported** E4438C with Option 401

[:SOURce]:RADio:CDMA2000:ARB:CLIPping[:IJQ] <val>

[:SOURce]:RADio:CDMA2000:ARB:CLIPping[:IJQ]?

This command clips (limits) the modulation level of the combined I and Q waveform to a percentage of full scale.

The variable <val> is expressed in units of percent.

RST** +1.00000000E+002**Range** 10–100**Key Entry** Clip |I+jQ| To**:IQ:EXtErnal:FILTer*Supported** E4438C with Option 401

[:SOURce]:RADio:CDMA2000:ARB:IQ:EXtErnal:FILTer 40e6 |THRough

[:SOURce]:RADio:CDMA2000:ARB:IQ:EXtErnal:FILTer?

This command selects the filter or through path for I/Q signals routed to the rear panel I and Q outputs. Selecting a filter using this command will automatically set “:IQ:EXtErnal:FILTer:AUTO” on [page 244](#) to OFF(0) mode.

40e6 This choice applies a 40 MHz baseband filter.

THRough This choice bypasses filtering.

RST** THR**Key Entry** 40.000 MHz Through**:IQ:EXtErnal:FILTer:AUTO*Supported** E4438C with Option 401

[:SOURce]:RADio:ARB:IQ:EXtErnal:FILTer:AUTO ON|OFF|1|0

[:SOURce]:RADio:ARB:IQ:EXtErnal:FILTer:AUTO?

This command enables or disables the automatic selection of the filters for I/Q signals routed to the rear panel I/Q outputs.

ON(1) This choice will automatically select a digital modulation filter optimized for the current signal generator settings.

OFF(0)	This choice disables the auto feature which lets you select a digital modulation filter or through path. Refer to “:IQ:EXTERNAL:FILTer” on page 244 for selecting a filter or through path.
*RST	1
Key Entry	I/Q Output Filter Manual Auto

:FILTer

Supported E4438C with Option 401

```
[ :SOURce ] :RADio :CDMA2000 :ARB :FILTer RNYquist | NYquist | GAUSSian | RECTangle |
IS95 | IS95_EQ | IS95_MOD | IS95_MOD_EQ | AC4Fm | WCDMA | IS2000SR3DS | UGGaussian |
" <user FIR> "
[ :SOURce ] :RADio :CDMA2000 :ARB :FILTer?
```

This command selects the pre-modulation filter type.

IS95	This choice selects a filter that meets the criteria of the IS-95 standard.
IS95_EQ	This choice selects a filter which is a combination of the IS-95 filter (above) and the equalizer filter described in the IS-95 standard. This filter is only used for IS-95 baseband filtering.
IS95_MOD	This choice selects a filter that meets the criteria of the IS-95 error function (for improved adjacent channel performance) with lower passband rejection than the filter specified in the IS-95 standard.
IS95_MOD_EQ	This choice selects a filter which is a combination of the equalizer filter described in the IS-95 standard and a filter that meets the criteria of the IS-95 error function (for improved adjacent channel performance), with lower passband rejection.
WCDMa	This choice selects a 0.22 Nyquist filter optimized for ACP.
AC4Fm	This choice selects the Association of Public Safety Communications Officials (APCO) specified compatible 4-level frequency modulation (C4FM) filter.
IS2000SR3DS	This choice selects an IS-2000 standard, spread rate 3 direct spread filter.
UGGaussian	This choice selects a backwards compatible GSM Gaussian filter (Gaussian filter with a fixed BbT value of 0.300) for the ESG E44xxB Option UN3 or UN4.
" <user FIR> "	This variable is any FIR filter file that you have stored in memory. The variable needs no directory path indicating the location of the file, such as FIR : or

/USER/FIR. The command assumes the FIR directory. Refer to “File Name Variables” on page 13 for more information on file names.

***RST** IS95_MOD_EQ

Key Entry **Root Nyquist** **Nyquist** **Gaussian** **Rectangle** **IS-95** **IS-95 w/EQ**
IS-95 Mod **IS-95 Mod w/EQ** **APCO 25 C4FM** **WCDMA**
UN3/4 GSM Gaussian **IS-2000 SR3 DS** **User FIR**

:FILTER:ALPHA

Supported E4438C with Option 401

[:SOURCE] : RADIO : CDMA2000 : ARB : FILTER : ALPHA <val>

[:SOURCE] : RADIO : CDMA2000 : ARB : FILTER : ALPHA?

This command changes the Nyquist or root Nyquist filter alpha value.

The filter alpha value can be set to the minimum level (0), the maximum level (1), or in between by using fractional numeric values (0.001–0.999).

***RST** +5.00000000E–001

Range 0.000–1.000

Key Entry **Filter Alpha**

Remarks To change the current filter type, refer to “:FILTER” on page 245.

:FILTER:BBT

Supported E4438C with Option 401

[:SOURCE] : RADIO : CDMA2000 : ARB : FILTER : BBT <val>

[:SOURCE] : RADIO : CDMA2000 : ARB : FILTER : BBT?

This command changes the bandwidth-multiplied-by-bit-time (BbT) filter parameter.

The filter BbT value can be set to the minimum level (0), the maximum level (1), or in between by using fractional numeric values (0.001–0.999).

***RST** +5.00000000E–001

Range 0.000–1.000

Key Entry **Filter BbT**

Remarks This command is effective only after choosing a Gaussian filter. It does not have an effect on other types of filters.

To change the current filter type, refer to “:FILTER” on page 245.

:FILTER:CHANnel

Supported E4438C with Option 401

```
[ :SOURCE ] : RADIO : CDMA2000 : ARB : FILTER : CHANnel EVM | ACP  
[ :SOURCE ] : RADIO : CDMA2000 : ARB : FILTER : CHANnel ?
```

This command optimizes the Nyquist and root Nyquist filters to minimize error vector magnitude (EVM) or to minimize adjacent channel power (ACP).

EVM This choice provides the most ideal passband.

ACP This choice improves stopband rejection.

***RST** EVM

Key Entry Optimize FIR For EVM ACP

Remarks To change the current filter type, refer to “:FILTER” on page 245.

:HEADer:CLEar

Supported E4438C with Option 401

```
[ :SOURCE ] : RADIO : CDMA2000 : ARB : HEADer : CLEar
```

This command clears the header information from the header file used by this modulation format.

Key Entry Clear Header

Remarks The CDMA2000 Off On softkey must be set to On for this command to function.

:HEADer:SAVE

Supported E4438C with Option 401

```
[ :SOURCE ] : RADIO : CDMA2000 : ARB : HEADer : SAVE
```

This command saves the header information to the header file used by this modulation format.

Key Entry Save Setup To Header

Remarks The CDMA2000 Off On softkey must be set to On for this command to function.

:IQ:MODulation:ATTen**Supported** E4438C with Option 401

[:SOURce]:RADio:CDMA2000:ARB:IQ:MODulation:ATTen <val>

[:SOURce]:RADio:CDMA2000:ARB:IQ:MODulation:ATTen?

This command attenuates the I/Q signals being modulated through the signal generator RF path.

The variable <val> is expressed in units of decibels (dB).

RST** +2.00000000E+000**Range** 0–40**Key Entry** Modulator Atten Manual Auto**:IQ:MODulation:ATTen:AUTO*Supported** E4438C with Option 401

[:SOURce]:RADio:CDMA2000:ARB:IQ:MODulation:ATTen:AUTO ON|OFF|1|0

[:SOURce]:RADio:CDMA2000:ARB:IQ:MODulation:ATTen:AUTO?

This command enables or disables the I/Q attenuation auto mode.

ON (1) This choice enables the attenuation auto mode which optimizes the modulator attenuation for the current conditions.

OFF (0) This choice holds the attenuator at its current setting or at a selected value. Refer to “:IQ:MODulation:ATTen” on page 248 for setting the attenuation value.

***RST** 1**Key Entry** Modulator Atten Manual Auto

:IQ:MODulation:FILTer

Supported E4438C with Option 401

```
[ :SOURce ]:RADio:CDMA2000:ARB:IQ:MODulation:FILTer 2.1e6 | 40e6 | THROugh
[ :SOURce ]:RADio:CDMA2000:ARB:IQ:MODulation:FILTer?
```

This command enables you to select a filter or through path for I/Q signals modulated onto the RF carrier. Selecting a filter using this command will automatically set “[:IQ:MODulation:FILTer:AUTO](#)” on [page 249](#) to OFF(0) mode.

2.1E6 This choice applies a 2.1 MHz baseband filter to the I/Q signals.

40E6 This choice applies a 40 MHz baseband filter to the I/Q signals.

THROugh This choice bypasses filtering.

***RST** THR

Key Entry 2.100 MHz 40.000 MHz Through

:IQ:MODulation:FILTer:AUTO

Supported E4438C with Option 401

```
[ :SOURce ]:RADio:CDMA2000:ARB:IQ:MODulation:FILTer:AUTO ON | OFF | 1 | 0
[ :SOURce ]:RADio:CDMA2000:ARB:IQ:MODulation:FILTer:AUTO?
```

This command enables or disables the automatic selection of the filters for I/Q signals modulated onto the RF carrier.

ON(1) This choice will automatically select a digital modulation filter.

OFF(0) This choice disables the auto feature which lets you select a digital modulation filter or through path. Refer to “[:IQ:MODulation:FILTer](#)” on [page 302](#) for selecting a filter or through path.

***RST** 1

Key Entry I/Q Mod Filter Manual Auto

:IQMap

Supported E4438C with Option 401

```
[ :SOURce ]:RADio:CDMA2000:ARB:IQMap NORMal | INVerted
[ :SOURce ]:RADio:CDMA2000:ARB:IQMap?
```

This command selects whether the Q output will be normal or inverted.

NORMal This choice selects normal polarity.

INVerted This choice inverts the internal Q signal.

***RST** NORM

Key Entry I/Q Mapping Normal Invert

Remarks Inverting the Q output inverts the RF spectrum after the modulation.

:LINK

Supported E4438C with Option 401

```
[ :SOURce ]:RADio:CDMA2000:ARB:LINK FORWard | REVerse
[ :SOURce ]:RADio:CDMA2000:ARB:LINK?
```

This command selects the CDMA2000 forward or reverse link channel setup.

FORW This choice selects a basestation to mobile configuration.

REV This choice selects a mobile to basestation configuration.

***RST** FORW

Key Entry Link Forward Reverse

:LINK:FORWard:SETup

Supported E4438C with Option 401

```
[ :SOURce ]:RADio:CDMA2000:ARB:LINK:FORWard:SETup S1Pilot | S3DPilot |
S3MPilot | S19Chan | S3D9chan | S3M9chan | MCArrier | "<file name>"
[ :SOURce ]:RADio:CDMA2000:ARB:LINK:FORWard:SETup?
```

This command selects a previously defined channel configuration for the CDMA2000 forward link.

S1Pilot This choice selects a spread rate 1, pilot-channel setup.

S3DPilot This choice selects a spread rate 3, direct spread, pilot-channel setup.

S3MPilot This choice selects a spread rate 3, multicarrier spread, pilot-channel setup.

S19Chan	This choice selects a spread rate 1, 9-channel setup.										
S3D9Chan	This choice selects a spread rate 3, direct spread, 9-channel setup.										
S3M9Chan	This choice selects a spread rate 3, multicarrier spread, 9-channel setup.										
MCARrier	This choice enables the multicarrier mode. To set the CDMA2000 multicarrier type, refer to “” on page 251.										
*RST	S19C										
Key Entry	<table border="0" style="width: 100%;"> <tr> <td style="width: 10%;">Pilot</td> <td style="width: 20%;">9 Channel</td> <td style="width: 20%;">Spread Rate 1</td> <td style="width: 20%;">Spread Rate 3</td> <td style="width: 30%;">Multicarrier Off On</td> </tr> <tr> <td></td> <td>Spreading Type Direct Mcarrier</td> <td></td> <td>Custom CDMA2000 Carrier</td> <td></td> </tr> </table>	Pilot	9 Channel	Spread Rate 1	Spread Rate 3	Multicarrier Off On		Spreading Type Direct Mcarrier		Custom CDMA2000 Carrier	
Pilot	9 Channel	Spread Rate 1	Spread Rate 3	Multicarrier Off On							
	Spreading Type Direct Mcarrier		Custom CDMA2000 Carrier								
Remarks	Refer to “File Name Variables” on page 13 for information on the file name syntax.										

:LINK:FORWARD:SETup:MCARrier

Supported E4438C with Option 401

```
[ :SOURce ] :RADio :CDMA2000 :ARB :LINK :FORWARD :SETup :MCARrier CAR2 | CAR3 | CAR4 |
"<file name>"
[ :SOURce ] :RADio :CDMA2000 :ARB :LINK :FORWARD :SETup :MCARrier?
```

This command defines the type of multicarrier CDMA2000 setup.

CAR2	<p>This choice specifies the following standard 2-carrier setup:</p> <p>Carrier 1: spread rate 3, direct spread, 9 channel; –2.5 MHz frequency offset; 0 dB power</p> <p>Carrier 2: spread rate 3, direct spread, 9 channel; 2.5 MHz frequency offset; 0 dB power</p>
CAR3	<p>This choice specifies the following standard 3-carrier setup:</p> <p>Carrier 1: spread rate 1, 9 channel; –1.25 MHz frequency offset; 0 dB power</p> <p>Carrier 2: spread rate 1, 9 channel; 0 kHz frequency offset; 0 dB power</p> <p>Carrier 3: spread rate 1, 9 channel; 1.25 MHz frequency offset; 0 dB power</p>
CAR4	<p>This choice specifies the following standard 2-carrier setup:</p> <p>Carrier 1: spread rate 1, 9 channel; –1.875 MHz frequency offset; 0 dB power</p> <p>Carrier 2: spread rate 1, 9 channel; –625 kHz frequency offset; 0 dB power</p>

	Carrier 3: spread rate 1, 9 channel; 625 kHz frequency offset; 0 dB power
	Carrier 4: spread rate 1, 9 channel; 1.875 MHz frequency offset; 0 dB power
*RST	CAR2
Key Entry	2 SR3 Carriers 3 Carriers 4 Carriers Custom CDMA2000 Multicarrier
Remarks	Refer to “ File Name Variables ” on page 13 for information on the file name syntax.

:LINK:FORWARD:SETup:MCARrier:STORE

Supported E4438C with Option 401

```
[ :SOURCE ] : RADIO : CDMA2000 : ARB : LINK : FORWARD : SETup : MCARrier :
STORE "<file name>"
```

This command stores the current multicarrier setup information.

The stored file contains information including the digital modulation format, number of carriers, frequency spacing, and power settings for the multicarrier setup.

Key Entry Store Custom Multicarrier

Remarks Recall stored files from memory by executing the following command:

```
[ :SOURCE ] : RADIO : CDMA2000 : ARB : LINK : FORWARD : SETup :
MCARrier "<file name>"
```

Refer to “[File Name Variables](#)” on page 13 for information on the file name syntax.

:LINK:FORWARD:SETup:MCARrier:TABLE

Supported E4438C with Option 401

```
[ :SOURCE ] : RADIO : CDMA2000 : ARB : LINK : FORWARD : SETup : MCARrier : TABLE INIT |
APPend | <chan_num> , S1Pilot | S3DPilot | S3MPilot | S19Chan | S3D9chan | S3M9chan |
"<file name>" , <freq_offset> , <power>
[ :SOURCE ] : RADIO : CDMA2000 : ARB : LINK : FORWARD : SETup : MCARrier :
TABLE? <chan_num>
```

This command defines the multicarrier CDMA2000 waveform.

The variable <freq_offset> is expressed in units of Hertz (MHz).

The variable <power> is expressed in units of decibels (dB).

Channel type, frequency offset, and power level are returned when a query is initiated. The output format is as follows:

<channel type> , <freq_offset> , <power>

INIT	This choice clears the current information and creates a new one-row table, allowing for further definition using additional parameters.
APPend	This choice adds rows to an existing table. The maximum number of rows for one table is 25.
S1Pilot	This choice sets a single SR1 Pilot forward channel.
S3DPilot	This choice sets a single direct spread pilot forward channel.
S3MPilot	This choice sets a single SR3 multicarrier spread pilot forward channel.
S19Chan	This choice sets a SR1 9 forward channel.
S3D9chan	This choice sets a SR3 direct spread forward channel.
S3M9chan	This choice sets a SR3 multicarrier spread 9 forward channel.
*RST	channel type: S3D9CHAN <freq_offset>: -2.50000000E+006 <power>: +0.00000000E+000
Range	<freq_offset>: -15E6 to 15E6 <power>: -40 to 0
Key Entry	Select File Insert Row SR1 Pilot SR3 Direct Pilot SR3 Mcarrier Pilot SR3 Mcarrier Pilot SR1 9 Channel SR3 Direct 9 Channel SR3 Mcarrier 9 Channel Custom CDMA2000 Carrier
Field Entry	Freq Offset Power
Remarks	Refer to “File Name Variables” on page 13 for information on the file name syntax.

:LINK:FORWARD:SETup:MCARrier:TABLE:NCARriers

Supported E4438C with Option 401

[:SOURce] :RADio :CDMA2000 :ARB :LINK :FORWARD :SETup :MCARrier :TABLE :
 NCARriers?

This command queries the number of carriers specified for the multicarrier CDMA2000 waveform.

***RST** +2

:LINK:FORWARD:SETup:STORe**Supported** E4438C with Option 401

[:SOURCE]:RADio:CDMA2000:ARB:LINK:FORWARD:SETup:STORe "<file name>"

This command stores the current custom CDMA2000 state, using a designated file name, to the signal generator memory.

Along with the contents of the CDMA2000 channel table editor (channel types, Walsh code, power levels, PN offset, and data), this command stores the following information to the signal generator memory:

- FIR filter
- FIR filter file name
- FIR filter alpha
- FIR filter BbT
- FIR filter channel (EVM or ACP)
- I/Q mapping
- link
- spread type
- spread rate
- ARB reference clock source (internal or external)
- ARB reference clock frequency
- clipping
- multicarrier spacing
- radio configuration

Key Entry Store Custom CDMA State**Remarks** Recall this stored file by executing the following command:

[:SOURCE]:RADio:CDMA2000:ARB:LINK:FORWARD:SETup "<file name>"

Refer to [“File Name Variables” on page 13](#) for information on the file name syntax.

:LINK:FORWARD:SETup:TABLE:APPLy**Supported** E4438C with Option 401

[:SOURCE]:RADio:CDMA2000:ARB:LINK:FORWARD:SETup:TABLE:APPLy

This command generates a CDMA2000 signal based on the current values in the CDMA2000 channel setup table editor.

Key Entry Apply Channel Setup

:LINK:FORWard:SETup:TABLE:CHANnel

Supported E4438C with Option 401

```
[ :SOURce ]:RADio:CDMA2000:ARB:LINK:FORWard:SETup:TABLE:CHANnel INIT|
APPend|<chan_num>,<chan_type>,<config>,<data_rate>,<walsh>,<power>,<pn_offset>,RANDOM|<data_val>
[ :SOURce ]:RADio:CDMA2000:ARB:LINK:FORWard:SETup:TABLE:
CHANnel? <chan_num>
```

This command defines the channel parameters of the CDMA2000 signal.

The variable <power> is expressed in units of decibels (dB).

The variable <data_rate> is expressed in units bits per second (bps).

The channel type, configuration type, data rate, walsh code, power, pn offset, and data value are returned when a query is initiated. The output format is as follows:

```
<chan_type>,<config>,<data_rate>,<walsh>,<power>,<pn_offset>,<data_val>
```

INIT This choice clears the current information and creates a new one-row table, allowing for further definition using additional parameters.

APPend This choice adds rows to an existing table.

RANDom This choice selects a randomly generated data value.

<data_val> This variable specifies a specific data value.

***RST** channel type: PIL <config>: +3 <data_rate>: +3.84000000E+004
<walsh>: +0 <power>: -7.00000000E+000 <pn_offset>: +0
<data_val>: 0

Range <data_rate>: 1500–307200 <walsh>: 0–63 <power>: –40 to 0
<pn_offset>: 0–511 <data_val>: 0000000–11111111

Key Entry **Edit Channel Setup Insert Row Config Rate**
Walsh Code PN Offset

Remarks Queries initiated for this command must be followed by a specific channel number.

The above *RST value represents a query of channel one.

:LINK:FORWARD:SETup:TABLE:NCHannels**Supported** E4438C with Option 401

[:SOURCE]:RADIO:CDMA2000:ARB:LINK:FORWARD:SETup:TABLE:NCHannels?

This command queries the number of channels specified for the CDMA2000 link setup.

RST** +9**:LINK:FORWARD:SETup:TABLE:PADJust*Supported** E4438C with Option 401

[:SOURCE]:RADIO:CDMA2000:ARB:LINK:FORWARD:SETup:TABLE:PADJust EQUAL | SCALE

This command sets the code domain power (the relative power in each of the channels).

EQUAL Sets all channels to equal power, and the total power to 0 dB.

SCALE Scales all of the current channel powers so that the total power equals 0 dB, keeping the previous power ratios between the individual channels.

Key Entry Equal Powers Scale To 0dB**:LINK:REVERSE:RCONfig****Supported** E4438C with Option 401

[:SOURCE]:RADIO:CDMA2000:ARB:LINK:REVERSE:RCONfig <val>

[:SOURCE]:RADIO:CDMA2000:ARB:LINK:REVERSE:RCONfig?

This command sets the radio configuration for all reverse link channels.

***RST** +1**Range** 1–4**Key Entry** Radio Config**Remarks** Changing the radio configuration results in changes to the channel data rate.

:LINK:REVerse:SETup

Supported E4438C with Option 401

```
[ :SOURce ]:RADio:CDMA2000:ARB:LINK:REVerse:SETup S1Pilot|S3Pilot|
S15Chan|S35Chan|S18Chan| "<file name>"
[:SOURce]:RADio:CDMA2000:ARB:LINK:REVerse:SETup?
```

This command selects a previously defined channel configuration for the CDMA2000 reverse link.

S1Pilot This choice selects a spread rate 1, pilot-channel setup.

S3Pilot This choice selects a spread rate 3, pilot-channel setup.

S15Chan This choice selects a spread rate 1, 5-channel setup.

S35Chan This choice selects a spread rate 3, 5-channel setup.

S18Chan This choice selects a spread rate 1, 8-channel setup.

***RST** S15Chan

Key Entry **Pilot 5 Channel 8 Channel Custom CDMA2000 State**
Spread Rate 1 Spread Rate 3

Remarks Refer to [“File Name Variables” on page 13](#) for information on the file name syntax.

:LINK:REverse:SETup:STORE**Supported** E4438C with Option 401

[:SOURCE]:RADIO:CDMA2000:ARB:LINK:REverse:SETup:STORE "<file name>"

This command stores the current custom CDMA2000 state, using a designated file name, to the signal generator memory.

Along with the contents of the CDMA2000 channel table editor (channel types, Walsh code, power levels, PN offset, and data), this command stores the following information to the signal generator memory:

- FIR filter
- FIR filter file name
- FIR filter alpha
- FIR filter BbT
- FIR filter channel (EVM or ACP)
- I/Q mapping
- link
- spread type
- spread rate
- ARB reference clock source (internal or external)
- ARB reference clock frequency
- clipping
- multicarrier spacing
- radio configuration

Key Entry Store Custom CDMA State**Remarks** Recall this stored file by executing the following command:[:SOURCE]:RADIO:CDMA2000:ARB:LINK:REverse:
SETup "<file name>"

Refer to [“File Name Variables” on page 13](#) for information on the file name syntax.

:LINK:REverse:SETup:TABLE:APPLY**Supported** E4438C with Option 401

[:SOURCE]:RADIO:CDMA2000:ARB:LINK:REverse:SETup:TABLE:APPLY

This command generates a CDMA2000 signal based on the current values in the CDMA2000 channel setup table editor.

Key Entry Apply Channel Setup

:LINK:REVerse:SETup:TABLE:CHANnel

Supported E4438C with Option 401

```
[ :SOURce ]:RADio:CDMA2000:ARB:LINK:REVerse:SETup:TABLE:CHANnel INIT|
APPend|<chan_num>, <chan_type>, <data_rate>, <power>, RANDOM| <data_val>
[ :SOURce ]:RADio:CDMA2000:ARB:LINK:REVerse:SETup:TABLE:
CHANnel? <chan_num>
```

This command defines the channel parameters for the CDMA2000 signal.

The channel number, configuration type, data rate, walsh code, power, pn offset, and data value are returned when a query is initiated. The output format is as follows:

```
<chan_type>,<data_rate>,<power>,<data_val>
```

The variable <data_rate> is expressed as bits per second (bps).

The variable <power> is expressed in units of decibels (dB).

INIT This choice clears the current information and creates a new one-row table, allowing for further definition using additional parameters.

APPend This choice adds rows to an existing table. The maximum number of channels in a table is eight.

RANDom This choice selects a randomly generated data value.

<data_val> This variable customizes a specific data value.

***RST** *channel type:* PIL *<data_rate>:* +3.84000000E+004
<power>: -7.00000000E+000 *<pn_offset>:* +0 *<data_val>:* 0

Range *<data_rate>:* 1500–9600 *<power>:* –40 to 0
<data_val>: 0000000–11111111

Key Entry **Edit Channel Setup Insert Row Config Rate**
Walsh Code PN Offset

Remarks Queries initiated for this command must be followed by a specific channel number.

The above *RST value represents a query of channel one.

:LINK:REVerse:SETup:TABLE:NCHannels**Supported** E4438C with Option 401

[:SOURce]:RADio:CDMA2000:ARB:LINK:REVerse:SETup:TABLE:NCHannels?

This command query returns the number of channels for the CDMA2000 link reverse setup.

RST** +5**:LINK:REVerse:SETup:TABLE:PADJust*Supported** E4438C with Option 401

[:SOURce]:RADio:CDMA2000:ARB:LINK:REVerse:SETup:TABLE:PADJust EQUAL | SCALE

This command customizes the code domain power (the relative power in each of the channels).

EQUAL This choice changes all channels to equal power, and the total power to 0 dB.

SCALE This choice scales all of the current channel powers so that the total power equals 0 dB, keeping the previous power ratios between the individual channels.

Key Entry Equal Powers Scale To 0dB**:MDESTination:PULSE****Supported** E4438C with Option 401[:SOURce]:RADio:CDMA2000:ARB:MDESTination:PULSE NONE | M1 | M2 | M3 | M4
[:SOURce]:RADio:CDMA2000:ARB:MDESTination:PULSE?

This command routes the selected marker to the Pulse/RF Blanking function. The NONE parameter clears the marker for the Pulse/RF Blanking function.

***RST** NONE**Key Entry** None Marker 1 Marker 2 Marker 3 Marker 4

:MDESTINATION:AAMPLITUDE

Supported E4438C with Option 401

```
[ :SOURCE ]:RADIO:CDMA2000:ARB:MDESTINATION:AAMPLITUDE NONE | M1 | M2 | M3 | M4  
[ :SOURCE ]:RADIO:CDMA2000:ARB:MDESTINATION:AAMPLITUDE?
```

This command routes the selected marker to the Alternate Amplitude function. The NONE parameter clears the marker for the Alternate Amplitude function.

***RST** NONE

Key Entry None Marker 1 Marker 2 Marker 3 Marker 4

:MDESTINATION:ALCHOLD

Supported E4438C with Option 401

```
[ :SOURCE ]:RADIO:CDMA2000:ARB:MDESTINATION:ALCHOLD NONE | M1 | M2 | M3 | M4  
[ :SOURCE ]:RADIO:CDMA2000:ARB:MDESTINATION:ALCHOLD?
```

This command routes the selected marker to the ALC Hold function. The NONE parameter clears the marker for the ALC Hold function.

***RST** NONE

:MPOLARITY:MARKER1

Supported E4438C with Option 401

```
[ :SOURCE ]:RADIO:CDMA2000:ARB:MPOLARITY:MARKER1 NEGATIVE | POSITIVE  
[ :SOURCE ]:RADIO:CDMA2000:ARB:MPOLARITY:MARKER1?
```

This command sets the polarity for marker 1.

***RST** POS

Key Entry Marker 1 Polarity Neg Pos

:MPOLarity:MARKer2

Supported E4438C with Option 401

```
[ :SOURce ]:RADio:CDMA2000:ARB:MPOLarity:MARKer2 NEGative|POSitive  
[ :SOURce ]:RADio:CDMA2000:ARB:MPOLarity:MARKer2?
```

This command sets the polarity for marker 2.

***RST** POS

Key Entry Marker 2 Polarity Neg Pos

:MPOLarity:MARKer3

Supported E4438C with Option 401

```
[ :SOURce ]:RADio:CDMA2000:ARB:MPOLarity:MARKer3 NEGative|POSitive  
[ :SOURce ]:RADio:CDMA2000:ARB:MPOLarity:MARKer3?
```

This command sets the polarity for marker 3.

***RST** POS

Key Entry Marker 3 Polarity Neg Pos

:MPOLarity:MARKer4

Supported E4438C with Option 401

```
[ :SOURce ]:RADio:CDMA2000:ARB:MPOLarity:MARKer4 NEGative|POSitive  
[ :SOURce ]:RADio:CDMA2000:ARB:MPOLarity:MARKer4?
```

This command sets the polarity for marker 4.

***RST** POS

Key Entry Marker 4 Polarity Neg Pos

:REfERENCE:EXtERnal:FREQUency

Supported E4438C with Option 401

```
[ :SOURce ]:RADio:CDMA2000:ARB:REfERENCE:EXtERnal:FREQUency <val>  
[ :SOURce ]:RADio:CDMA2000:ARB:REfERENCE:EXtERnal:FREQUency?
```

This command allows you to enter the frequency of the applied external reference.

The variable <val> is expressed in units of Hertz (KHz–MHz).

***RST** +1.00000000E+007

Range 2.5E5–1E8

Key Entry Reference Freq

Remarks The value specified by this command is effective only when you are using an external ARB reference applied to the BASEBAND GEN REF IN rear panel connector.

To specify external as the ARB reference source type, refer to “:REfERENCE[:SOURce]” on page 263.

:REfERENCE[:SOURce]

Supported E4438C with Option 401

```
[ :SOURce ]:RADio:CDMA2000:ARB:REfERENCE[ :SOURce ] INTernal | EXtERnal  
[ :SOURce ]:RADio:CDMA2000:ARB:REfERENCE[ :SOURce ]?
```

This command selects either an internal or external reference for the waveform clock.

***RST** INT

Key Entry ARB Reference Ext Int

Remarks If the EXtERnal choice is selected, the external frequency value *must* be entered and the signal must be applied to the BASEBAND GEN REF IN rear panel connector.

Refer to “:REfERENCE:EXtERnal:FREQUency” on page 263 to enter the external reference frequency.

:RETRigger**Supported** E4438C with Option 401

[:SOURce]:RADio:CDMA:ARB:RETRigger ON|OFF|IMMEDIATE

[:SOURce]:RADio:CDMA:ARB:RETRigger?

This command enables or disables the ARB retriggering mode; the retrigger mode controls how the retriggering function performs while a waveform is playing.

ON (1) This choice specifies that if a trigger occurs while a waveform is playing, the waveform will retrigger at the end of the current waveform sequence and play once more.

OFF (0) This choice specifies that if a trigger occurs while a waveform is playing, the trigger will be ignored.

IMMEDIATE This choice specifies that if a trigger occurs while a waveform is playing, the waveform will reset and replay from the start immediately upon receiving a trigger.

RST** ON**Key Entry** On Off Immediate**:REVISION*Supported** E4438C with Option 401

[:SOURce]:RADio:CDMA2000:ARB:REVISION?

This command queries the revision number of the current CDMA2000 format.

RST** 8**:SCLock:RATE*Supported** E4438C with Option 401

[:SOURce]:RADio:CDMA2000:ARB:SCLock:RATE <val>

[:SOURce]:RADio:CDMA2000:ARB:SCLock:RATE?

This command sets the sample clock rate for the CDMA2000 modulation format.

The variable <val> is expressed in units of hertz.

***RST** +1.00000000E+008**Range** 1–1E8**Key Entry** ARB Sample Clock

Remarks The modulation format should be active before executing this command. If this command is executed before the modulation format is active, the entered value will be overridden by a calculated factory default value. Refer to “[:STAtE]” on [page 273](#) to activate the modulation format.

:SPReading:RATE

Supported E4438C with Option 401

```
[ :SOURce ] :RADio:CDMA2000:ARB:SPReading:RATE 1 | 3
[ :SOURce ] :RADio:CDMA2000:ARB:SPReading:RATE?
```

This command opens a submenu that provides the available spread rate choices for the CDMA2000 waveform.

***RST** +1

Key Entry Spread Rate 1 Spread Rate 3

Remarks The spread rate multiplied by 1.2288 MHz is equal to the chip rate. For example, spread rate 3 equals a 3.6864 Mcps chip rate.

Higher data rates can be achieved using spread rate 3, though offset by greater bandwidth/spectrum usage.

Changing the spread rate to either 1 or 3 will also change the initial setup menu, resulting in a configuration that is specific to the current spread rate.

:SPReading:TYPE

Supported E4438C with Option 401

```
[ :SOURce ] :RADio:CDMA2000:ARB:SPReading:TYPE DIRect | MCArrier
[ :SOURce ] :RADio:CDMA2000:ARB:SPReading:TYPE?
```

This command selects the spreading type for a CDMA2000 waveform.

***RST** DIR

Key Entry Spreading Type Direct Mcarrier

Remarks Multicarrier is not available in the reverse link setup.

Note that changing the spreading type will result in the setup changing to a setup for the current spreading type.

:SPReading:TYPE:MCARrier:SPACing**Supported** E4438C with Option 401

[:SOURce]:RADio:CDMA2000:ARB:SPReading:TYPE:MCARrier:SPACing 1.23MHz | 1.25MHz

[:SOURce]:RADio:CDMA2000:ARB:SPReading:TYPE:MCARrier:SPACing?

This command selects the multicarrier frequency spacing.

RST** +1.25000000E+006**Key Entry** 1.23 MHz 1.25 MHz**Remarks** Cellular band uses 1.23 MHz and PCS band uses 1.25 MHz.**:TRIGger:TYPE*Supported** E4438C with Option 401

[:SOURce]:RADio:CDMA2000:ARB:TRIGger:TYPE CONTinuous | SINGLE | GATE

[:SOURce]:RADio:CDMA2000:ARB:TRIGger:TYPE?

:TRIGger:TYPE**Supported** E4438C with Option 401

[:SOURce]:RADio:CDMA:ARB:TRIGger:TYPE CONTinuous | SINGLE | GATE

[:SOURce]:RADio:CDMA:ARB:TRIGger:TYPE?

This command sets the trigger mode (type) that controls the waveform's playback.

Triggers control the playback by telling the ESG when to play the modulating signal (waveform). Depending on the trigger settings for the ESG, the waveform playback can occur once, continuously, or the ESG may start and stop playing the waveform repeatedly (GATE mode).

A trigger signal comprises both positive and negative signal transitions (states), which are also called high and low periods. You can configure the ESG to trigger on either state of the trigger signal. It is common to have multiple triggers, also referred to as trigger occurrences or events, occur when the signal generator requires only a single trigger. In this situation, the ESG recognizes the first trigger and ignores the rest.

When you select a trigger mode, you may lose the signal (carrier plus modulating) from the RF output until you trigger the waveform. This is because the ESG sets the I and Q signals to zero volts prior to the first trigger event, which suppresses the carrier. After the first trigger event, the waveform's final I

and Q levels determine whether you will see the carrier signal or not (zero = no carrier, other values = carrier visible). At the end of most files, the final I and Q points are set to a value other than zero.

There are four parts to configuring the trigger:

- Choosing the trigger type, which controls the waveform’s transmission.
- Setting the waveform’s response to triggers:
 - CONTInuous, see “:TRIGger:TYPE:CONTInuous[:TYPE]” on page 268
 - SINGle, see “:RETRigger” on page 264
 - GATE, selecting the mode also sets the response
- Selecting the trigger source (see “:TRIGger[:SOURce]” on page 269), which determines how the ESG receives its trigger signal, internally or externally. The GATE choice requires an external trigger.
- Setting the trigger polarity when using an external source:
 - CONTInuous and SINGle see “:TRIGger[:SOURce]:EXTernal:SLOPe” on page 271
 - GATE, see “:TRIGger:TYPE:GATE:ACTive” on page 268

For more information on triggering, see the *E4428C/38C ESG Signal Generators User’s Guide*.

The following list describes the trigger type command choices:

CONTInuous	Upon triggering, the waveform repeats continuously.
SINGle	Upon triggering, the waveform segment or sequence plays once.
GATE	An external trigger signal repeatedly starts and stops the waveform’s playback (transmission). The time duration for playback depends on the duty period of the trigger signal and the gate polarity selection (see “:TRIGger:TYPE:GATE:ACTive” on page 268). The waveform plays during the inactive state and stops during the active polarity selection state. The active state can be set high or low. The gate mode works only with an external trigger source.

NOTE The ARB gating behavior described above is opposite to the gating behavior for real-time custom mode.

*RST	CONT		
Key Entry	Continuous	Single	Gated

:TRIGger:TYPE:CONTInuous[:TYPE]**Supported** E4438C with Option 401

```
[ :SOURce ] :RADio :CDMA2000 :ARB :TRIGger :TYPE :CONTInuous [ :TYPE ] FREE |
TRIGger | RESet
[ :SOURce ] :RADio :CDMA2000 :ARB :TRIGger :TYPE :CONTInuous [ :TYPE ] ?
```

This commands selects the waveform’s response to a trigger signal while using the continuous trigger mode.

For more information on triggering and to select the continuous trigger mode, see “[:TRIGger:TYPE](#)” on page 266.

The following list describes the waveform’s response to each of the command choices:

FREE	Turning the ARB format on immediately triggers the waveform. The waveform repeats until you turn the format off, select another trigger, or choose another waveform file.
TRIGger	The waveform waits for a trigger before play begins. When the waveform receives the trigger, it plays continuously until you turn the format off, select another trigger, or choose another waveform file.
RESet	The waveform waits for a trigger before play begins. When the waveform receives the trigger, it plays continuously. Subsequent triggers reset the waveform to the beginning. For a waveform sequence, this means to the beginning of the first segment in the sequence.
*RST	FREE
Key Entry	Free Run Trigger & Run Reset & Run

:TRIGger:TYPE:GATE:ACTive**Supported** E4438C with Option 401

```
[ :SOURce ] :RADio :CDMA2000 :ARB :TRIGger :TYPE :GATE :ACTive LOW | HIGH
[ :SOURce ] :RADio :CDMA2000 :ARB :TRIGger :TYPE :GATE :ACTive ?
```

This command selects the active state (gate polarity) of the gate while using the gating trigger mode.

The LOW and HIGH selections correspond to the low and high states of an external trigger signal. For example, when you select HIGH, the active state occurs during the high of the trigger signal. When the active state occurs, the ESG stops the waveform playback at the last played sample point, then restarts the playback at the next sample point when the inactive state occurs. For more information on triggering and to select gating as the trigger mode, see “[:TRIGger:TYPE](#)” on page 266.

The following list describes the ESG’s gating behavior for the polarity selections:

LOW	The waveform playback stops when the trigger signal goes low (active state) and restarts when the trigger signal goes high (inactive state).
HIGH	The waveform playback stops when the trigger signal goes high (active state) and restarts when the trigger signal goes low (inactive state).
*RST	HIGH
Key Entry	Gate Active Low High

:TRIGger[:SOURce]

Supported E4438C with Option 401

```
[ :SOURce ] :RADio:CDMA2000:ARB:TRIGger [ :SOURce ] KEY|EXT|BUS
[ :SOURce ] :RADio:CDMA2000:ARB:TRIGger [ :SOURce ] ?
```

This command sets the trigger source.

For more information on triggering, see “**:TRIGger:TYPE**” on page 266. The following list describes the command choices:

- | | |
|-----|--|
| KEY | This choice enables manual triggering by pressing the front-panel Trigger hardkey. |
| EXT | An externally applied signal triggers the waveform. This is the only choice that works with gating. The following conditions affect an external trigger: <ul style="list-style-type: none"> • The input connector selected for the trigger signal. You have a choice between the rear-panel PATTERN TRIG IN connector or the PATT TRIG IN 2 pin on the rear-panel AUXILIARY I/O connector. To make the connector selection, see “:TRIGger[:SOURce]:EXTernal[:SOURce]” on page 272.

For more information on the connectors and on connecting the cables, see the <i>ESG User’s Guide</i>. • The trigger signal polarity: <ul style="list-style-type: none"> — gating mode, see “:TRIGger:TYPE:GATE:ACTive” on page 268 — continuous and single modes, see “:TRIGger[:SOURce]:EXTernal:SLOPe” on page 271 |

- The time delay between when the ESG receives a trigger and when the waveform responds to the trigger. There are two parts to setting the delay:
 - setting the amount of delay, see “[:TRIGger[:SOURce]:EXternal:DELay” on page 270
 - turning the delay on, see “[:TRIGger[:SOURce]:EXternal:DELay:STATe” on page 271

BUS This choice enables triggering over the GPIB or LAN using the *TRG or GET commands or the AUXILIARY INTERFACE (RS-232) using the *TRG command.

***RST** EXT

Key Entry Trigger Key Ext Bus

[:TRIGger[:SOURce]:EXternal:DELay

Supported E4438C with Option 401

```
[ :SOURce ] :RADio :CDMA2000 :ARB :TRIGger [ :SOURce ] :EXternal :DELay <val>
[ :SOURce ] :RADio :CDMA2000 :ARB :TRIGger [ :SOURce ] :EXternal :DELay?
```

This command sets the amount of time to delay the ESG’s response to an external trigger.

The delay is a path (time) delay between when the ESG receives the trigger and when it responds to the trigger. For example, configuring a trigger delay of two seconds, causes the ESG to wait two seconds after receipt of the trigger before the ESG plays the waveform.

The delay does not occur until you turn it on (see “[:TRIGger[:SOURce]:EXternal:DELay:STATe” on page 271). You can set the delay value either before or after turning it on.

For more information on configuring an external trigger source and to select external as the trigger source, see “[:TRIGger[:SOURce]]” on page 269.

The unit of measurement for the variable <val> is in seconds (nsec–sec).

***RST** +1.00000000E–003

Range 1E–8 to 4E1

Key Entry Ext Delay Time

:TRIGger[:SOURce]:EXTErnal:DELay:STATe

Supported E4438C with Option 401

```
[ :SOURce ]:RADio:CDMA2000:ARB:TRIGger [ :SOURce ]:EXTErnal:DELay:STATe ON |  
OFF | 1 | 0  
[ :SOURce ]:RADio:CDMA2000:ARB:TRIGger [ :SOURce ]:EXTErnal:DELay:STATe?
```

This command enables or disables the operating state of the external trigger delay function.

For setting the delay time, see “:TRIGger[:SOURce]:EXTErnal:DELay” on page 270, and for more information on configuring an external source, see “:TRIGger[:SOURce]” on page 269.

***RST** 0

Key Entry Ext Delay Off On

:TRIGger[:SOURce]:EXTErnal:SLOPe

Supported E4438C with Option 401

```
[ :SOURce ]:RADio:CDMA2000:ARB:TRIGger [ :SOURce ]:EXTErnal:SLOPe POSitive |  
NEGative  
[ :SOURce ]:RADio:CDMA2000:ARB:TRIGger [ :SOURce ]:EXTErnal:SLOPe?
```

This command sets the polarity for an external trigger signal while using the continuous, single triggering mode. To set the polarity for gating, see “:TRIGger:TYPE:GATE:ACTive” on page 268.

The POSitive and NEGative selections correspond to the high (positive) and low (negative) states of the external trigger signal. For example, when you select POSitive, the waveform responds (plays) during the high state of the trigger signal. When the PSG receives multiple trigger occurrences when only one is required, the signal generator uses the first trigger and ignores the rest.

For more information on configuring an external trigger source and to select external as the trigger source, see “:TRIGger[:SOURce]” on page 269.

***RST** NEG

Key Entry Ext Polarity Neg Pos

:TRIGger[:SOURce]:EXTernal[:SOURce]**Supported** E4438C with Option 401

```
[ :SOURce ] :RADio :CDMA2000 :ARB :TRIGger [ :SOURce ] :EXTernal [ :SOURce ] EPT1 |
EPT2 | EPTRIGGER1 | EPTRIGGER2
[ :SOURce ] :RADio :CDMA2000 :ARB :TRIGger [ :SOURce ] :EXTernal [ :SOURce ] ?
```

This command selects which PATTERN TRIG IN connection the ESG uses to accept an externally applied trigger signal when external is the trigger source selection.

For more information on configuring an external trigger source and to select external as the trigger source, see “[:TRIGger\[:SOURce\]](#)” on page 269. For more information on the rear-panel connectors, see the *E4428C/38C ESG Signal Generators User’s Guide*.

The following list describes the command choices:

EPT1	This choice is synonymous with EPTRIGGER1 and selects the PATTERN TRIG IN rear-panel connector.
EPT2	This choice is synonymous with EPTRIGGER2 and selects the PATT TRIG IN 2 pin on the rear-panel AUXILIARY I/O connector.
EPTRIGGER1	This choice is synonymous with EPT1 and selects the PATTERN TRIG IN rear-panel connector.
EPTRIGGER2	This choice is synonymous with EPT2 and selects the PATT TRIG IN 2 pin on the rear-panel AUXILIARY I/O connector.
*RST	EPT1
Key Entry	Patt Trig In 1 Patt Trig In 2

[:STATe]

Supported E4438C with Option 401

[:SOURce] :RADio :CDMA2000 :ARB [:STATe] ON | OFF | 1 | 0

[:SOURce] :RADio :CDMA2000 :ARB [:STATe] ?

This command enables or disables the CDMA2000 modulation format.

ON (1) This choice enables the CDMA2000 modulation capability and sets up the internal hardware to generate the currently selected CDMA2000 signal selection.

This choice also activates the I/Q state and sets the I/Q source to internal.

OFF (0) This choice disables the CDMA2000 baseband signal capability.

***RST** 0

Key Entry CDMA2000 Off On

Dmodulation Subsystem–Option 001/601 or 002/602 [:SOURce]:RADio:DMODulation:ARB)

:IQ:EXTernal:FILTer

Supported E4438C with Option 001/601 or 002/602

```
[ :SOURce ] :RADio:DMODulation:ARB:IQ:EXTernal:FILTer 40e6 | THRough
```

```
[ :SOURce ] :RADio:DMODulation:ARB:IQ:EXTernal:FILTer?
```

This command selects the filter or through path for I/Q signals routed to the rear panel I and Q outputs. Selecting a filter using this command will automatically set “:IQ:EXTernal:FILTer:AUTO” on [page 274](#) to OFF(0) mode.

40e6 This choice applies a 40 MHz baseband filter.

THRough This choice bypasses filtering.

***RST** THR

Key Entry 40.000 MHz Through

:IQ:EXTernal:FILTer:AUTO

Supported E4438C with Option 001/601 or 002/602

```
[ :SOURce ] :RADio:DMODulation:ARB:IQ:EXTernal:FILTer:AUTO ON | OFF | 1 | 0
```

```
[ :SOURce ] :RADio:DMODulation:ARB:IQ:EXTernal:FILTer:AUTO?
```

This command enables or disables the automatic selection of the filters for I/Q signals routed to the rear panel I/Q outputs.

ON(1) This choice will automatically select a digital modulation filter optimized for the current signal generator settings.

OFF(0) This choice disables the auto feature which lets you select a digital modulation filter or through path. Refer to “:IQ:EXTernal:FILTer” on [page 274](#) for selecting a filter or through path.

***RST** 1

Key Entry I/Q Output Filter Manual Auto

:FILTer

Supported E4438C with Option 001/601 or 002/602

```
[ :SOURCE ]:RADio:DMODulation:ARB:FILTer RNYQuist | NYQuist | GAUSSian |
RECTangle | IS95 | IS95_EQ | IS95_MOD | IS95_MOD_EQ | WCDMa | AC4Fm | IS2000SR3DS |
UGGaussian | "<user FIR>"
[ :SOURCE ]:RADio:DMODulation:ARB:FILTer?
```

This command specifies the pre-modulation filter type.

IS95	This choice selects a filter that meets the criteria of the IS-95 standard.																		
IS95_EQ	This choice selects a filter which is a combination of the IS-95 filter (above) and the equalizer filter described in the IS-95 standard. This filter is only used for IS-95 baseband filtering.																		
IS95_MOD	This choice selects a filter that meets the criteria of the IS-95 error function (for improved adjacent channel performance) with lower passband rejection than the filter specified in the IS-95 standard.																		
IS95_MOD_EQ	This choice selects a filter which is a combination of the equalizer filter described in the IS-95 standard and a filter that meets the criteria of the IS-95 error function (for improved adjacent channel performance), with lower passband rejection.																		
WCDMa	This choice selects a 0.22 Nyquist filter optimized for ACP.																		
AC4Fm	This choice selects a predefined Association of Public Safety Communications Officials (APCO) specified compatible 4-level frequency modulation (C4FM) filter.																		
IS2000SR3DS	This choice selects an IS-2000 standard, spread rate 3 direct spread filter.																		
UGGaussian	This choice selects a backwards compatible GSM Gaussian filter (Gaussian filter with a fixed BbT value of 0.300) for the ESG E44xxB Option UN3 or UN4.																		
"<user FIR>"	This variable is any FIR filter file that you have stored in memory. The variable needs no directory path indicating the location of the file, such as FIR: or /USER/FIR. The command assumes the FIR directory. Refer to “File Name Variables” on page 13 for more information on file names.																		
*RST	RNYQ																		
Key Entry	<table> <tr> <td>Root Nyquist</td> <td>Nyquist</td> <td>Gaussian</td> <td>Rectangle</td> <td>IS-95</td> <td>IS-95 w/EQ</td> </tr> <tr> <td>IS-95 Mod</td> <td>IS-95 Mod w/EQ</td> <td>WCDMA</td> <td>IS-2000 SR3 DS</td> <td>APCO 25 C4FM</td> <td></td> </tr> <tr> <td>UN3/4 GSM Gaussian</td> <td>User FIR</td> <td></td> <td></td> <td></td> <td></td> </tr> </table>	Root Nyquist	Nyquist	Gaussian	Rectangle	IS-95	IS-95 w/EQ	IS-95 Mod	IS-95 Mod w/EQ	WCDMA	IS-2000 SR3 DS	APCO 25 C4FM		UN3/4 GSM Gaussian	User FIR				
Root Nyquist	Nyquist	Gaussian	Rectangle	IS-95	IS-95 w/EQ														
IS-95 Mod	IS-95 Mod w/EQ	WCDMA	IS-2000 SR3 DS	APCO 25 C4FM															
UN3/4 GSM Gaussian	User FIR																		

:FILTer:ALPHa

Supported E4438C with Option 001/601 or 002/602

```
[ :SOURce ] :RADio:DMODulation:ARB:FILTer:ALPHa <val>
```

```
[ :SOURce ] :RADio:DMODulation:ARB:FILTer:ALPHa?
```

This command changes the Nyquist or root Nyquist filter alpha value.

The filter alpha value can be set to the minimum level (0), the maximum level (1), or in between by using fractional numeric values (0.001–0.999).

***RST** +3.50000000E–001

Range 0.000–1.000

Key Entry **Filter Alpha**

Remarks To change the current filter type, refer to “:FILTer” on page 275.

:FILTer:BBT

Supported E4438C with Option 001/601 or 002/602

```
[ :SOURce ] :RADio:DMODulation:ARB:FILTer:BBT <val>
```

```
[ :SOURce ] :RADio:DMODulation:ARB:FILTer:BBT?
```

This command changes the bandwidth-multiplied-by-bit-time (BbT) filter parameter.

The filter BbT value can be set to the minimum level (0), the maximum level (1), or in between by using fractional numeric values (0.001–0.999).

***RST** +5.00000000E–001

Range 0.000–1.000

Key Entry **Filter BbT**

Remarks This command is effective only after choosing a Gaussian filter. It does not have an effect on other types of filters.

To change the current filter type, refer to “:FILTer” on page 275.

:FILTer:CHANnel

Supported E4438C with Option 001/601 or 002/602

```
[ :SOURce ] :RADio :DMODulation :ARB :FILTer :CHANnel EVM | ACP
[ :SOURce ] :RADio :DMODulation :ARB :FILTer :CHANnel ?
```

This command optimizes the Nyquist and root Nyquist filters to minimize error vector magnitude (EVM) or to minimize adjacent channel power (ACP).

EVM This choice provides the most ideal passband.

ACP This choice improves stopband rejection.

***RST** EVM

Key Entry Optimize FIR For EVM ACP

Remarks To change the current filter type, refer to “:FILTer” on page 275.

:HEADer:CLEar

Supported E4438C with Option 001/601 or 002/602

```
[ :SOURce ] :RADio :DMODulation :ARB :HEADer :CLEar
```

This command clears the header information from the header file used by this modulation format.

Key Entry Clear Header

Remarks The **Digital Modulation Off On** softkey must be set to On for this command to function.

:HEADer:SAVE

Supported E4438C with Option 001/601 or 002/602

```
[ :SOURce ] :RADio :DMODulation :ARB :HEADer :SAVE
```

This command saves the header information to the header file used by this modulation format.

Key Entry Save Setup To Header

Remarks The **Digital Modulation Off On** softkey must be set to On for this command to function.

:IQ:MODulation:ATTen

Supported E4438C with Option 001/601 or 002/602

```
[ :SOURce ] :RADio:DMODulation:ARB:IQ:MODulation:ATTen <val>
```

```
[ :SOURce ] :RADio:DMODulation:ARB:IQ:MODulation:ATTen?
```

This command sets the attenuation level of the I/Q signals being modulated through the signal generator RF path.

The variable <val> is expressed in units of decibels (dB).

***RST** +2.00000000E+000

Range 0–40

Key Entry Modulator Atten Manual Auto

:IQ:MODulation:ATTen:AUTO

Supported E4438C with Option 001/601 or 002/602

```
[ :SOURce ] :RADio:DMODulation:ARB:IQ:MODulation:ATTen:AUTO ON|OFF|1|0
```

```
[ :SOURce ] :RADio:DMODulation:ARB:IQ:MODulation:ATTen:AUTO?
```

This command enables or disables the I/Q attenuation auto mode.

ON (1) This choice enables the attenuation auto mode which optimizes the modulator attenuation for the current conditions.

OFF (0) This choice holds the attenuator at its current setting or at a selected value. Refer to [“” on page 278](#) for setting the attenuation value.

***RST** 1

Key Entry Modulator Atten Manual Auto

:IQ:MODulation:FILTer**Supported** E4438C with Option 001/601 or 002/602

```
[ :SOURce ] :RADio :DMODulation :ARB :IQ :MODulation :FILTer 2.1e6 | 40e6 | THROugh
[ :SOURce ] :RADio :DMODulation :ARB :IQ :MODulation :FILTer ?
```

This command enables you to select a filter or through path for I/Q signals modulated onto the RF carrier. Selecting a filter using this command will automatically set “[:IQ:MODulation:FILTer:AUTO](#)” on [page 279](#) to OFF(0) mode.

2.1E6 This choice applies a 2.1 MHz baseband filter to the I/Q signals.

40E6 This choice applies a 40 MHz baseband filter to the I/Q signals.

THROugh This choice bypasses filtering.

***RST** THR

Key Entry 2.100 MHz 40.000 MHz Through

:IQ:MODulation:FILTer:AUTO**Supported** E4438C with Option 001/601 or 002/602

```
[ :SOURce ] :RADio :DMODulation :ARB :IQ :MODulation :FILTer :AUTO ON | OFF | 1 | 0
[ :SOURce ] :RADio :DMODulation :ARB :IQ :MODulation :FILTer :AUTO ?
```

This command enables or disables the automatic selection of the filters for I/Q signals modulated onto the RF carrier.

ON(1) This choice will automatically select a digital modulation filter.

OFF(0) This choice disables the auto feature which lets you select a digital modulation filter or through path. Refer to “[:IQ:MODulation:FILTer](#)” on [page 302](#) for selecting a filter or through path.

***RST** 1

Key Entry I/Q Mod Filter Manual Auto

:MDEStination:PULSe

Supported E4438C with Option 001/601 or 002/602

```
[ :SOURCE ]:RADio:DMODulation:ARB:MDEStination:PULSe NONE | M1 | M2 | M3 | M4
[:SOURCE]:RADio:DMODulation:ARB:MDEStination:PULSe?
```

This command routes the selected marker to the Pulse/RF Blanking function. The NONE parameter clears the marker for the Pulse/RF Blanking function.

***RST** NONE

Key Entry None Marker 1 Marker 2 Marker 3 Marker 4

:MDEStination:AAMPlitude

Supported E4438C with Option 001/601 or 002/602

```
[ :SOURCE ]:RADio:DMODulation:ARB:MDEStination:AAMPlitude NONE | M1 | M2 | M3 | M4
[:SOURCE]:RADio:DMODulation:ARB:MDEStination:AAMPlitude?
```

This command routes the selected marker to the Alternate Amplitude function. The NONE parameter clears the marker for the Alternate Amplitude function.

***RST** NONE

Key Entry None Marker 1 Marker 2 Marker 3 Marker 4

:MDEStination:ALCHold

Supported E4438C with Option 001/601 or 002/602

```
[ :SOURCE ]:RADio:DMODulation:ARB:MDEStination:ALCHold NONE | M1 | M2 | M3 | M4
[:SOURCE]:RADio:DMODulation:ARB:MDEStination:ALCHold?
```

This command routes the selected marker to the ALC Hold function. The NONE parameter clears the marker for the ALC Hold function.

***RST** NONE

Key Entry None Marker 1 Marker 2 Marker 3 Marker 4

:MODulation:FSK[:DEVIation]

Supported E4438C with Option 001/601 or 002/602

```
[ :SOURCE ]:RADio:DMODulation:ARB:MODulation:FSK[:DEVIation] <val>
[:SOURCE]:RADio:DMODulation:ARB:MODulation:FSK[:DEVIation]?
```

This command sets the symmetric FSK frequency deviation value.

Dmodulation Subsystem—Option 001/601 or 002/602 ([:SOURCE]:RADio:DMODulation:ARB)

The variable <val> is expressed in units of Hertz and the maximum range value equals the current symbol rate value multiplied by ten, limited to 20 MHz.

***RST** +4.00000000E+002

Range 0–2E7

Key Entry Freq Dev

Remarks To change the modulation type, refer to “:MODulation[:TYPE]” on page 281.

Refer to “:SRATE” on page 288 for a list of the minimum and maximum symbol rate values.

To set an asymmetric FSK deviation value, refer to the *E4428C/38C ESG Signal Generators User’s Guide* for more information.

:MODulation[:TYPE]

Supported E4438C with Option 001/601 or 002/602

```
[ :SOURCE ] :RADio:DMODulation:ARB:MODulation[:TYPE] BPSK | QPSK | IS95QPSK |
GRAYQPSK | OQPSK | IS95OQPSK | P4DQPSK | PSK8 | PSK16 | D8PSK | EDGE | MSK | FSK2 | FSK4 |
FSK8 | FSK16 | C4FM | QAM4 | QAM16 | QAM32 | QAM64 | QAM128 | QAM256
[ :SOURCE ] :RADio:DMODulation:ARB:MODulation[:TYPE]?
```

This command sets the modulation type for the digital modulation personality.

***RST** P4DQPSK

Key Entry	BPSK	QPSK	IS-95 QPSK	Gray Coded QPSK	OQPSK			
	IS-95 OQPSK	$\pi/4$ DQPSK	8PSK	16PSK	D8PSK	EDGE	MSK	
	2-Lvl FSK	4-Lvl FSK	8-Lvl FSK	16-Lvl FSK	C4FM	4QAM	16QAM	
	32QAM	64QAM	128QAM	256QAM				

:MPOLarity:MARKer1

Supported E4438C with Option 001/601 or 002/602

```
[ :SOURCE ] :RADio:DMODulation:ARB:MPOLarity:MARKer1 NEGative | POSitive
[ :SOURCE ] :RADio:DMODulation:ARB:MPOLarity:MARKer1?
```

This command sets the polarity for marker 1.

***RST** POS

Key Entry Marker 1 Polarity Neg Pos

:MPOLarity:MARKer2

Supported E4438C with Option 001/601 or 002/602

```
[ :SOURce ]:RADio:DMODulation:ARB:MPOLarity:MARKer2 NEGative|POSitive  
[ :SOURce ]:RADio:DMODulation:ARB:MPOLarity:MARKer2?
```

This command sets the polarity for marker 2.

***RST** POS

Key Entry Marker 2 Polarity Neg Pos

:MPOLarity:MARKer3

Supported E4438C with Option 001/601 or 002/602

```
[ :SOURce ]:RADio:DMODulation:ARB:MPOLarity:MARKer3 NEGative|POSitive  
[ :SOURce ]:RADio:DMODulation:ARB:MPOLarity:MARKer3?
```

This command sets the polarity for marker 3.

***RST** POS

Key Entry Marker 3 Polarity Neg Pos

:MPOLarity:MARKer4

Supported E4438C with Option 001/601 or 002/602

```
[ :SOURce ]:RADio:DMODulation:ARB:MPOLarity:MARKer4 NEGative|POSitive  
[ :SOURce ]:RADio:DMODulation:ARB:MPOLarity:MARKer4?
```

This command sets the polarity for marker 4.

***RST** POS

Key Entry Marker 4 Polarity Neg Pos

:REFerence:EXTernal:FREQuency

Supported E4438C with Option 001/601 or 002/602

```
[ :SOURce ]:RADio:DMODulation:ARB:REFerence:EXTernal:FREQuency <val>  
[ :SOURce ]:RADio:DMODulation:ARB:REFerence:EXTernal:FREQuency?
```

This command conveys the expected reference frequency value of an externally applied reference the signal generator.

The variable <val> is expressed in units of Hertz (Hz–MHz).

Dmodulation Subsystem—Option 001/601 or 002/602 ([:SOURce]:RADio:DMODulation:ARB)

*RST	+1.00000000E+007
Range	2.5E5–1E8
Key Entry	Reference Freq
Remarks	The value specified by this command is effective only when you are using an external ARB reference applied to the BASEBAND GEN REF IN rear panel connector. To specify external as the ARB reference source type, refer to “:REFerence[:SOURce]” on page 283.

:REFerence[:SOURce]

Supported	E4438C with Option 001/601 or 002/602
	[:SOURce] :RADio:DMODulation:ARB:REFerence[:SOURce] INTernal | EXTernal [:SOURce] :RADio:DMODulation:ARB:REFerence[:SOURce] ?

This command selects either an internal or external reference for the waveform clock.

*RST	INT
Key Entry	ARB Reference Ext Int
Remarks	If the EXTernal choice is selected, the external frequency value <i>must</i> be entered and the signal must be applied to the BASEBAND GEN REF IN rear panel connector. Refer to “:REFerence:EXTernal:FREQuency” on page 282 to enter the external reference frequency.

:RETRigger

Supported	E4438C with Option 001/601 or 002/602
	[:SOURce] :RADio:DMODulation:ARB:RETRigger ON | OFF | IMMEDIATE [:SOURce] :RADio:DMODulation:ARB:RETRigger ?

This command enables or disables the ARB retriggering mode; the retrigger mode controls how the retriggering function performs while a waveform is playing.

ON (1)	This choice specifies that if a trigger occurs while a waveform is playing, the waveform will retrigger at the end of the current waveform sequence and play once more.
--------	---

OFF (0)	This choice specifies that if a trigger occurs while a waveform is playing, the trigger will be ignored.
IMMEDIATE	This choice specifies that if a trigger occurs while a waveform is playing, the waveform will reset and replay from the start immediately upon receiving a trigger.
*RST	ON
Key Entry	On Off Immediate

:SCLock:RATE

Supported	E4438C with Option 001/601 or 002/602
	[:SOURce] :RADio:DMODulation:ARB:SCLock:RATE <val> [:SOURce] :RADio:DMODulation:ARB:SCLock:RATE?
	This command sets the sample clock rate.
	The variable <val> is expressed in units of Hertz (Hz – MHz)
*RST	+1.00000000E+008
Range	1–1E8
Key Entry	ARB Sample Clock
Remarks	The modulation format should be active before executing this command. If this command is executed before the modulation format is active, the entered value will be overridden by a calculated factory default value. Refer to “[:STATe]” on page 296 to activate the modulation format.

:SETup

Supported	E4438C with Option 001/601 or 002/602
	[:SOURce] :RADio:DMODulation:ARB:SETup GSM|NADC|PDC|PHS|DECT|AC4Fm|ACQPsk|CDPD|PWT|EDGE|TETRA|MCARRIER| "<file name>" [:SOURce] :RADio:DMODulation:ARB:SETup?
	This command selects the digital modulation format type.
*RST	NADC
Key Entry	GSM NADC PDC PHS DECT APCO 25 w/C4FM APCO w/CQPSK CDPD PWT EDGE TETRA Multicarrier Off On Select File
Remarks	Refer to “File Name Variables” on page 13 for information on the file name syntax.

:SETup:MCARrier

Supported E4438C with Option 001/601 or 002/602

```
[ :SOURCE ]:RADio:DMODulation:ARB:SETup:MCARrier (GSM|NADC|PDC|PHS|DECT|
AC4Fm|ACQPsk|CDPD|PWT|EDGE|TETRA,<num carriers>,<freq spacing>)|
"<file name>"
[:SOURCE]:RADio:DMODulation:ARB:SETup:MCARrier?
```

This command builds a table with the specified number of carriers and frequency spacing or retrieves the setup stored in the specified user file.

The carrier type, number of carriers, and frequency spacing value are returned when a query is initiated. The output format is as follows:

```
<carrier type>,<num carriers>,<freq spacing>
```

If a specific file is loaded and then queried, only the file name is returned.

The variable <freq spacing> is expressed in units of Hertz (kHz–MHz).

```
*RST      Carrier: NADC      <num carriers>: 2
          <freq spacing>: +1.0000000000000E+06
```

```
Range      <num carriers>: 2–100
          <freq spacing>: 2 ÷ (<num carriers> – 1) × 80 MHz
```

```
Key Entry  GSM   NADC   PDC   PHS   DECT   APCO 25 w/C4FM   APCO w/CQPSK
             CDPD   PWT   EDGE  TETRA  # of Carriers   Freq Spacing
             Custom Digital Mod State
```

Remarks Refer to [“File Name Variables” on page 13](#) for information on the file name syntax.

The file specified must be a single carrier CDMA file. To store a multicarrier setup refer to [“:SETup:MCARrier:STORE” on page 232](#).

:SETup:MCARrier:PHASe

Supported E4438C with Option 001/601 or 002/602

```
[ :SOURCE ]:RADio:DMODulation:ARB:SETup:MCARrier:PHASe FIXed | RANDom
[ :SOURCE ]:RADio:DMODulation:ARB:SETup:MCARrier:PHASe?
```

This command toggles the phase settings for multicarrier digital modulation.

FIXed This choice sets the phase of all carriers to 0.

RANDom This choice sets random phase values for all of the carriers.

***RST** FIX

Key Entry Carrier Phases Fixed Random

:SETup:MCARrier:STORE

Supported E4438C with Option 001/601 or 002/602

```
[ :SOURCE ]:RADio:DMODulation:ARB:SETup:MCARrier:STORE "<file name>"
```

This command stores the current multicarrier setup information.

The stored file contains information that includes the digital modulation format, number of carriers, frequency spacing, and power settings for the multicarrier setup.

Key Entry Load/Store

Remarks The setting enabled by this command is not affected by signal generator power-on, preset, or *RST.

Refer to [“File Name Variables” on page 13](#) for information on the file name syntax.

:SETup:MCARrier:TABLE

Supported E4438C with Option 001/601 or 002/602

```
[ :SOURCE ]:RADio:DMODulation:ARB:SETup:MCARrier:TABLE INIT | APPend |
<carrier_num>, GSM | NADC | PDC | PHS | DECT | AC4Fm | ACQPsk | CDPD | PWT | EDGE | TETRA |
"<file name>", <freq_offset>, <power>
[ :SOURCE ]:RADio:DMODulation:ARB:SETup:MCARrier:TABLE? <carrier_num>
```

This command modifies the parameters of one of the available multicarrier digital modulation formats.

The variable <freq_offset> is expressed in units of Hertz (kHz–MHz).

The variable <power> is expressed in units of decibels (dB).

Dmodulation Subsystem—Option 001/601 or 002/602 ([:SOURCE]:RADio:DMODulation:ARB)

INIT	This choice clears the current information and creates a new one-row table, allowing for further definition using additional parameters.
APPend	This choice adds rows to an existing table.
<carrier_num>	This variable specifies the number of the carriers in the multicarrier table that will be modified. The value of the variable <carrier_num> must be specified prior to selecting the digital modulation format.

Carrier type, frequency offset, and power level are returned when a query is initiated. The output format is as follows:

<carrier type>, <freq_offset>, <power>

***RST** *carrier type*: NADC <*freq_offset*>: -5.00000000E+004
 <*power*>: +0.00000000E+000

Range <*freq_offset*>: -1E5 to 1E6 <*power*>: -40 to 0

Key Entry Initialize Table Insert Row GSM NADC PDC PHS DECT
APCO 25 w/C4FM APCO w/CQPSK CDPD PWT EDGE TETRA
Custom Digital Mod State

Remarks Refer to “[File Name Variables](#)” on page 13 for information on the file name syntax.

The file specified must be a single carrier CDMA file. To store a multicarrier setup refer to “[:SETup:MCARrier:STORE](#)” on page 232.

:SETup:MCARrier:TABLE:NCARriers

Supported E4438C with Option 001/601 or 002/602

[:SOURCE] :RADio:DMODulation:ARB:SETup:MCARrier:TABLE:NCARriers?

This query returns the number of carriers in the current multicarrier setup.

***RST** +2

Range 1–100

Key Entry # of Carriers

:SETup:STORe

Supported E4438C with Option 001/601 or 002/602

```
[ :SOURce ]:RADio:DMODulation:ARB:SETup:STORe "<file name>"
```

This command stores the current custom digital modulation state.

The saved file contains information that includes the modulation type, filter and symbol rate for the custom modulation setup.

Key Entry Store Custom Dig Mod State

Remarks Refer to “File Name Variables” on page 13 for information on the file name syntax.

:SRATe

Supported E4438C with Option 001/601 or 002/602

```
[ :SOURce ]:RADio:DMODulation:ARB:SRATe <val>
```

```
[ :SOURce ]:RADio:DMODulation:ARB:SRATE?
```

This command sets the transmission symbol rate.

The variable <val> is expressed in units of bits per second (bps–Mbps) and the maximum range value is dependent upon the source of data (internal or external), the modulation type, and filter.

***RST** +2.43000000E+004

Range	Modulation Type	Bits per Symbol	Internal Data	External Serial Data
	BPSK	1	1–50 Msps	1–50 Msps
	FSK2			
	MSK			
	C4FM	2	1–50 Msps	1–25 Msps
	FSK4			
	OQPSK			
	OQPSK195			
	P4QPPSK			
	QAM4			
	QPSK			
	QPSKIS95			
	QPSKISAT			
EDGE				
FSK8				
PSK8				

Range	<i>Modulation Type</i>	<i>Bits per Symbol</i>	<i>Internal Data</i>	<i>External Serial Data</i>
	FSK16	4	1–25 Msps	1–12.5 Msps
	PSK16			
	QAM16			
	QAM32	5	1–20 Msps	1–10 Msps
	QAM64	6	1–16.67 Msps	1–8.33 Msps
	QAM256	7	1–12.50 Msps	1–6.25 Msps

Key Entry**Symbol Rate****Remarks**

When user-defined filters are selected using the command in section “:FILTer” on page 275, the upper bit rate will be restricted in line with the following symbol rate restriction:

- FIR filter length > 32 symbols: upper limit is 12.5 Msps
- FIR filter length > 16 symbols: upper limit is 25 Msps

When internal FIR filters are used, the limits of the above table always apply. For higher symbol rates, the FIR filter length will be truncated as follows:

- Above 12.5 Msps, the FIR length will be truncated to 32 symbols
- Above 25 Msps, the FIR length will be truncated to 16 symbols

This will impact the relative timing of the modulated data, as well as the actual filter response.

To change the modulation type, refer to “:MODulation[:TYPE]” on page 281.

:TRIGger:TYPE**Supported**

E4438C with Option 001/601 or 002/602

```
[ :SOURCE ] :RADio:DMODulation:ARB:TRIGger:TYPE CONTinuous | SINGle | GATE
[ :SOURCE ] :RADio:DMODulation:ARB:TRIGger:TYPE?
```

This command sets the trigger mode (type) that controls the waveform’s playback.

Triggers control the playback by telling the ESG when to play the modulating signal (waveform). Depending on the trigger settings for the ESG, the waveform playback can occur once, continuously, or the ESG may start and stop playing the waveform repeatedly (GATE mode).

A trigger signal comprises both positive and negative signal transitions (states), which are also called high and low periods. You can configure the ESG to trigger on either state of the trigger signal. It is common to have multiple triggers, also referred to as trigger occurrences or events, occur when the signal generator requires only a single trigger. In this situation, the ESG recognizes the first trigger and ignores the rest.

When you select a trigger mode, you may lose the signal (carrier plus modulating) from the RF output until you trigger the waveform. This is because the ESG sets the I and Q signals to zero volts prior to the first trigger event, which suppresses the carrier. After the first trigger event, the waveform's final I and Q levels determine whether you will see the carrier signal or not (zero = no carrier, other values = carrier visible). At the end of most files, the final I and Q points are set to a value other than zero.

There are four parts to configuring the trigger:

- Choosing the trigger type, which controls the waveform's transmission.
- Setting the waveform's response to triggers:
 - CONTInuous, see “:TRIGger:TYPE:CONTInuous[:TYPE]” on page 291
 - SINGle, see “:RETRigger” on page 283
 - GATE, selecting the mode also sets the response
- Selecting the trigger source (see “:TRIGger[:SOURce]” on page 292), which determines how the ESG receives its trigger signal, internally or externally. The GATE choice requires an external trigger.
- Setting the trigger polarity when using an external source:
 - CONTInuous and SINGle see “:TRIGger[:SOURce]:EXTernal:SLOPe” on page 294
 - GATE, see “:TRIGger:TYPE:GATE:ACTive” on page 291

For more information on triggering, see the *E4428C/38C ESG Signal Generators User's Guide*.

The following list describes the trigger type command choices:

CONTInuous	Upon triggering, the waveform repeats continuously.
SINGle	Upon triggering, the waveform segment or sequence plays once.
GATE	An external trigger signal repeatedly starts and stops the waveform's playback (transmission). The time duration for playback depends on the duty period of the trigger signal and the gate polarity selection (see “:TRIGger:TYPE:GATE:ACTive” on page 291). The waveform plays during the inactive state and stops during the active polarity selection state. The active state can be set high or low. The gate mode works only with an external trigger source.

NOTE The ARB gating behavior described above is opposite to the gating behavior for real-time custom mode.

*RST	CONT		
Key Entry	Continuous	Single	Gated

:TRIGger:TYPE:CONTInuous[:TYPE]

Supported E4438C with Option 001/601 or 002/602

```
[ :SOURce ] :RADio :DMODulation :ARB :TRIGger :TYPE :CONTInuous [ :TYPE ] FREE |
TRIGger | RESet
[ :SOURce ] :RADio :DMODulation :ARB :TRIGger :TYPE :CONTInuous [ :TYPE ] ?
```

This command selects the waveform's response to a trigger signal while using the continuous trigger mode.

For more information on triggering and to select the continuous trigger mode, see [“:TRIGger:TYPE” on page 289](#).

The following list describes the waveform's response to each of the command choices:

FREE	Turning the ARB format on immediately triggers the waveform. The waveform repeats until you turn the format off, select another trigger, or choose another waveform file.
TRIGger	The waveform waits for a trigger before play begins. When the waveform receives the trigger, it plays continuously until you turn the format off, select another trigger, or choose another waveform file.
RESet	The waveform waits for a trigger before play begins. When the waveform receives the trigger, it plays continuously. Subsequent triggers reset the waveform to the beginning. For a waveform sequence, this means to the beginning of the first segment in the sequence.
*RST	FREE
Key Entry	Free Run Trigger & Run Reset & Run

:TRIGger:TYPE:GATE:ACTive

Supported E4438C with Option 001/601 or 002/602

```
[ :SOURce ] :RADio :DMODulation :ARB :TRIGger :TYPE :GATE :ACTive LOW | HIGH
[ :SOURce ] :RADio :DMODulation :ARB :TRIGger :TYPE :GATE :ACTive ?
```

This command selects the active state (gate polarity) of the gate while using the gating trigger mode.

The LOW and HIGH selections correspond to the low and high states of an external trigger signal. For example, when you select HIGH, the active state occurs during the high of the trigger signal. When the active state occurs, the ESG stops the waveform playback at the last played sample point, then restarts

the playback at the next sample point when the inactive state occurs. For more information on triggering and to select gating as the trigger mode, see “:TRIGger:TYPE” on page 289.

The following list describes the ESG’s gating behavior for the polarity selections:

LOW	The waveform playback stops when the trigger signal goes low (active state) and restarts when the trigger signal goes high (inactive state).
HIGH	The waveform playback stops when the trigger signal goes high (active state) and restarts when the trigger signal goes low (inactive state).
*RST	HIGH
Key Entry	Gate Active Low High

:TRIGger[:SOURCE]

Supported E4438C with Option 001/601 or 002/602

```
[ :SOURCE ] :RADio:DMODulation:ARB:TRIGger [ :SOURCE ] KEY | EXT | BUS
[ :SOURCE ] :RADio:DMODulation:ARB:TRIGger [ :SOURCE ] ?
```

This command sets the trigger source.

For more information on triggering, see “:TRIGger:TYPE” on page 289. The following list describes the command choices:

KEY	This choice enables manual triggering by pressing the front-panel Trigger hardkey.
EXT	An externally applied signal triggers the waveform. This is the only choice that works with gating. The following conditions affect an external trigger:

- The input connector selected for the trigger signal. You have a choice between the rear-panel PATTERN TRIG IN connector or the PATT TRIG IN 2 pin on the rear-panel AUXILIARY I/O connector. To make the connector selection, see “:TRIGger[:SOURCE]:EXTernal[:SOURCE]” on page 295.

For more information on the connectors and on connecting the cables, see the *ESG User’s Guide*.

- The trigger signal polarity:
 - gating mode, see “:TRIGger:TYPE:GATE:ACTive” on page 291
 - continuous and single modes, see “:TRIGger[:SOURCE]:EXTernal:SLOPe” on page 294

- The time delay between when the ESG receives a trigger and when the waveform responds to the trigger. There are two parts to setting the delay:
 - setting the amount of delay, see “[:TRIGger[:SOURce]:EXternal:DELay” on page 293
 - turning the delay on, see “[:TRIGger[:SOURce]:EXternal:DELay:STATe” on page 294

BUS This choice enables triggering over the GPIB or LAN using the *TRG or GET commands or the AUXILIARY INTERFACE (RS-232) using the *TRG command.

***RST** EXT

Key Entry Trigger Key Ext Bus

[:TRIGger[:SOURce]:EXternal:DELay

Supported E4438C with Option 001/601 or 002/602

```
[ :SOURce ] :RADio :DMODulation :ARB :TRIGger [ :SOURce ] :EXternal :DELay <val>
[ :SOURce ] :RADio :DMODulation :ARB :TRIGger [ :SOURce ] :EXternal :DELay?
```

This command sets the amount of time to delay the ESG’s response to an external trigger.

The delay is a path (time) delay between when the ESG receives the trigger and when it responds to the trigger. For example, configuring a trigger delay of two seconds, causes the ESG to wait two seconds after receipt of the trigger before the ESG plays the waveform.

The delay does not occur until you turn it on (see “[:TRIGger[:SOURce]:EXternal:DELay:STATe” on page 294). You can set the delay value either before or after turning it on.

For more information on configuring an external trigger source and to select external as the trigger source, see “[:TRIGger[:SOURce]]” on page 292.

The unit of measurement for the variable <val> is in seconds (nsec–sec).

***RST** +1.00000000E–003

Range 1E–8 to 4E1

Key Entry Ext Delay Time

:TRIGger[:SOURCE]:EXTernal:DELay:STATe

Supported E4438C with Option 001/601 or 002/602

```
[ :SOURCE ] : RADio : DMODulation : ARB : TRIGger [ :SOURCE ] : EXTernal : DELay :
STATe ON | OFF | 1 | 0
[ :SOURCE ] : RADio : DMODulation : ARB : TRIGger [ :SOURCE ] : EXTernal : DELay : STATe ?
```

This command enables or disables the external trigger delay function.

For setting the delay time, see “:TRIGger[:SOURCE]:EXTernal:DELay” on page 293, and for more information on configuring an external source, see “:TRIGger[:SOURCE]” on page 292.

***RST** 0

Key Entry Ext Delay Off On

:TRIGger[:SOURCE]:EXTernal:SLOPe

Supported E4438C with Option 001/601 or 002/602

```
[ :SOURCE ] : RADio : DMODulation : ARB : TRIGger [ :SOURCE ] : EXTernal :
SLOPe POSitive | NEGative
[ :SOURCE ] : RADio : DMODulation : ARB : TRIGger [ :SOURCE ] : EXTernal : SLOPe ?
```

This command sets the polarity for an external trigger signal while using the continuous, single triggering mode. To set the polarity for gating, see “:TRIGger:TYPE:GATE:ACTive” on page 291.

The POSitive and NEGative selections correspond to the high (positive) and low (negative) states of the external trigger signal. For example, when you select POSitive, the waveform responds (plays) during the high state of the trigger signal. When the PSG receives multiple trigger occurrences when only one is required, the signal generator uses the first trigger and ignores the rest.

For more information on configuring an external trigger source and to select external as the trigger source, see “:TRIGger[:SOURCE]” on page 292.

***RST** NEG

Key Entry Ext Polarity Neg Pos

:TRIGger[:SOURCE]:EXTernal[:SOURCE]

Supported E4438C with Option 001/601 or 002/602

```
[ :SOURCE ] :RADio:DMODulation:ARB:TRIGger [ :SOURCE ] :
EXTernal [ :SOURCE ] EPT1 | EPT2 | EPTRIGGER1 | EPTRIGGER2
[ :SOURCE ] :RADio:DMODulation:ARB:TRIGger [ :SOURCE ] :EXTernal [ :SOURCE ] ?
```

This command selects which PATTERN TRIG IN connection the ESG uses to accept an externally applied trigger signal when external is the trigger source selection.

For more information on configuring an external trigger source and to select external as the trigger source, see “:TRIGger[:SOURCE]” on page 292. For more information on the rear-panel connectors, see the *E4428C/38C ESG Signal Generators User’s Guide*.

The following list describes the command choices:

EPT1	This choice is synonymous with EPTRIGGER1 and selects the PATTERN TRIG IN rear-panel connector.
EPT2	This choice is synonymous with EPTRIGGER2 and selects the PATT TRIG IN 2 pin on the rear-panel AUXILIARY I/O connector.
EPTRIGGER1	This choice is synonymous with EPT1 and selects the PATTERN TRIG IN rear-panel connector.
EPTRIGGER2	This choice is synonymous with EPT2 and selects the PATT TRIG IN 2 pin on the rear-panel AUXILIARY I/O connector.
*RST	EPT1
Key Entry	Patt Trig In 1 Patt Trig In 2

[[:STATe]]

Supported E4438C with Option 001/601 or 002/602

[[:SOURce]:RADio:DMODulation:ARB[:STATe]] ON|OFF|1|0

[[:SOURce]:RADio:DMODulation:ARB[:STATe]]?

This command enables or disables the digital modulation capability.

ON (1) This choice sets up the internal hardware to generate the currently selected digital modulation format signal selection.

OFF (0) This choice disables the digital modulation capability.

***RST** 0

Key Entry Digital Modulation Off On

Remarks When ON is selected, the I/Q state is activated and the I/Q source is set to internal.

Dual ARB Subsystem–Option 001/601 or 002/602 ([:SOURce]:RADio:ARB)

:CLIPping

Supported E4438C with Option 001/601 or 002/602

```
[ :SOURce ] :RADio :ARB :CLIPping "<file name>" , IJQ | IORQ , <val> [ , <val> ]
```

This command sets the clipping level of the selected waveform segment to a percentage of its highest peak.

The variable <val> is expressed in units of percent.

IJQ This choice clips the composite I/Q waveform.

IORQ This choice clips I and Q separately. When this choice is enabled, percentage values for both I and Q must be specified.

***RST** IJQ <val>: +100

Range <val>: 10–100 (0.1% resolution)

Key Entry Clipping Type | I+jQ | | I | , | Q |

Remarks A value of 100 percent equates to no clipping.

Refer to [“File Name Variables” on page 13](#) for information on the file name syntax.

:GENerate:SINE

Supported E4438C with Option 001/601 or 002/602

```
[ :SOURce ] :RADio :ARB :GENerate :SINE [ "<filename>" ] [ , <osr> ] [ , <scale> ] [ , I | Q | IQ ]
```

This command creates a file (using a specific file name) and stores a generated sine wave.

<osr> This variable sets the oversample ratio, which must be a value that is ≥ 4 . If the specified over sample ratio is < 60 (the minimum number of samples), multiple periods are generated to create a waveform with at least 60 samples. The number of periods that will be created is $60 \div \text{osr}$ (quotient will round off to a whole number). A waveform with an oversample ratio ≥ 60 has one period.

The maximum value for the range below is determined by the option and available baseband memory.

Range <osr> Option 001: 4–8Msamples
Option 002: 4–32Msamples

- Remarks** Executing this command without the "<file name>" variable will generate a factory default SINE_TEST_WFM file.
- When using the variable "<file name>" for this command, the "@" or ":" character is not allowed.
- The file is always generated as "WFM#: <file name>", where "#" is replaced by the baseband generator number.

:HEADer:CLEar

Supported E4438C with Option 001/601 or 002/602

[:SOURCE] :RADio:ARB:HEADer:CLEar

This command clears the header information from the header file used by this modulation format.

Key Entry Clear Header

Remarks The **ARB Off On** softkey must be set to On for this command to function.

:HEADer:RMS

Supported E4438C with Option 001/601 or 002/602

[:SOURCE] :RADio:ARB:HEADer:RMS "<file_name>" ,<val> | UNSPecified
[:SOURCE] :RADio:ARB:HEADer:RMS? "<file_name>"

This command sets the RMS value in the header file for the waveform designated by the "<file_name>" variable. The RMS value is expressed in volts. The filename variable includes the directory path and can designate a file in either the WFM1, NVWFM, or SEQ directories. For information on the file name syntax, refer to [“File Name Variables” on page 13](#). When a file is created with no header information then a header is automatically generated with all fields set to unspecified.

The <val> variable is the user-measured RMS value for the specified waveform. The UNSPecified parameter means that the signal generator will calculate the RMS value when it is needed. The signal generator calculation includes rise times and does not include consecutive zero level samples. DC offsets and noise are also included in the RMS measurement. Because the RMS calculation done by the signal generator, is slow and may not be appropriate for your application, it is recommended that the user calculate and enter in their measured RMS value for the waveform file.

The RMS value is calculated as:

$$\sqrt{\sum_{n=1}^N (i_n^2 + q_n^2) * \frac{1}{N}}$$

N = # of Samples

Examples

```
[ :SOURce ] :RADIo:ARB:HEADER:RMS "WF1:Sine_Wave" , .835
:RAD:ARB:HEADER:RMS "WF1:Sine_Wave" , UNSP
```

The first example sets a user-measured RMS value for the `Sine_Wave` waveform file in the waveform's header file. In the second example, the signal generator will calculate the RMS value when needed.

Range 0 – 1.414213562373095

:HEADer:SAVE

Supported E4438C with Option 001/601 or 002/602

```
[ :SOURce ] :RADIo:ARB:HEADer:SAVE
```

This command saves the header information to the header file used by this modulation format.

Key Entry **Save Setup To Header**

Remarks The **ARB Off On** softkey must be set to On for this command to function.

:HCRest[:STATe]

Supported E4438C with Option 001/601 or 002/602

```
[ :SOURce ] :RADIo:ARB:HCRest [ :STATe ] ON | OFF | 1 | 0
[ :SOURce ] :RADIo:ARB:HCRest [ :STATe ] ?
```

This command enables or disables the operating state of the high crest mode.

ON(1) This choice turns high crest mode on for arbitrary I/Q waveforms with high crest factors (such as downloaded Signal Studio for 802.11 signals). High crest mode reduces the ALC vernier level by 7.5 dB, allowing the signal generator to process these signals with less distortion and improved EVM. For crest factors higher than

4 dB, I/Q drive levels should be reduced by 1 dB for each dB above that level. In high crest mode, the maximum output level is reduced and power level accuracy is degraded.

OFF(0) This choice disables the high crest mode.

*RST 0

Key Entry High Crest Mode Off On

Remarks The high crest mode is automatically turned on by some Signal Studio applications. You can manually override this automatic selection at any time.

:IQ:EXtErnal:FILTer

Supported E4438C with Option 001/601 or 002/602

```
[ :SOURce ] :RADio :ARB :IQ :EXtErnal :FILTer 40e6 | THRough
[ :SOURce ] :RADio :ARB :IQ :EXtErnal :FILTer ?
```

This command selects the filter or through path for I/Q signals routed to the rear panel I and Q outputs. The filter has not effect on the modulated RF signal. Selecting a filter using this command will automatically set “:IQ:EXtErnal:FILTer:AUTO” on page 300 to OFF(0) mode.

40e6 This choice applies a 40 MHz baseband filter.

THRough This choice bypasses filtering.

*RST THR

Key Entry 40.000 MHz Through

:IQ:EXtErnal:FILTer:AUTO

Supported E4438C with Option 001/601 or 002/602

```
[ :SOURce ] :RADio :ARB :IQ :EXtErnal :FILTer :AUTO ON | OFF | 1 | 0
[ :SOURce ] :RADio :ARB :IQ :EXtErnal :FILTer :AUTO ?
```

This command enables or disables the automatic selection of the filters for I/Q signals routed to the rear panel I/Q outputs.

ON(1) This choice will automatically select a digital modulation filter optimized for the current signal generator settings.

OFF(0)	This choice disables the auto feature which lets you select a digital modulation filter or through path. Refer to “:IQ:EXtErnal:FiLTer” on page 300 for selecting a filter or through path.
*RST	1
Key Entry	I/Q Output Filter Manual Auto

:IQ:MODulation:ATTen

Supported E4438C with Option 001/601 or 002/602

```
[ :SOURce ] :RADio:ARB:IQ:MODulation:ATTen <val>
[ :SOURce ] :RADio:ARB:IQ:MODulation:ATTen?
```

This command sets the attenuation level of the I/Q signals being modulated through the signal generator RF path.

The variable <val> is expressed in units of decibels (dB).

*RST	+2.00000000E+000
Range	0–40
Key Entry	Modulator Atten Manual Auto

:IQ:MODulation:ATTen:AUTO

Supported E4438C with Option 001/601 or 002/602

```
[ :SOURce ] :RADio:ARB:IQ:MODulation:ATTen:AUTO ON|OFF|1|0
[ :SOURce ] :RADio:ARB:IQ:MODulation:ATTen:AUTO?
```

This command enables or disables the I/Q attenuation auto mode.

ON (1)	This choice enables the attenuation auto mode which optimizes the modulator attenuation for the current conditions.
OFF (0)	This choice holds the attenuator at its current setting or at a selected value. Refer to “:IQ:MODulation:ATTen” on page 301 for setting the attenuation value.
*RST	1
Key Entry	Modulator Atten Manual Auto

:IQ:MODulation:FILTer**Supported** E4438C with Option 001/601 or 002/602

```
[ :SOURce ] :RADio:ARB:IQ:MODulation:FILTer 2.1e6 | 40e6 | THROugh
[ :SOURce ] :RADio:ARB:IQ:MODulation:FILTer?
```

This command enables you to select a filter or through path for I/Q signals modulated onto the RF carrier. This filter has no effect on the I/Q signal out the rear panel. Selecting a filter using this command will automatically set “:IQ:MODulation:FILTer:AUTO” on page 302 to OFF(0) mode.

2.1E6 This choice applies a 2.1 MHz baseband filter to the I/Q signals.

40E6 This choice applies a 40 MHz baseband filter to the I/Q signals.

THROugh This choice bypasses filtering.

***RST** THR

Key Entry 2.100 MHz 40.000 MHz Through

:IQ:MODulation:FILTer:AUTO**Supported** E4438C with Option 001/601 or 002/602

```
[ :SOURce ] :RADio:ARB:IQ:MODulation:FILTer:AUTO ON | OFF | 1 | 0
[ :SOURce ] :RADio:ARB:IQ:MODulation:FILTer:AUTO?
```

This command enables or disables the automatic selection of the filters for I/Q signals modulated onto the RF carrier.

ON(1) This choice will automatically select a digital modulation filter.

OFF(0) This choice disables the auto feature which lets you select a digital modulation filter or through path. Refer to “:IQ:MODulation:FILTer” on page 302 for selecting a filter or through path.

***RST** 1

Key Entry I/Q Mod Filter Manual Auto

:MARKer:CLEar

Supported E4438C with Option 001/601 or 002/602

```
[ :SOURCE ] :RADio :ARB :MARKer :CLEar "<filename>" , <mkr1 | 2 | 3 | 4> ,  
<first_point> , <last_point>
```

This command clears markers from a waveform segment.

"<file name>" This variable specifies the name of the waveform segment file.

<mkr1|2|3|4> This variable designates which marker is to be cleared (1, 2, 3, or 4).

<first_point> This variable defines the first point in a range of points (must be ≥ 1 , and \leq the total number of waveform points).

<last_point> This variable defines the last point in a range of points (must be ≥ 1 , and \leq the total number of waveform points).

Range <first_Point>: 1–# of waveform points

<last_point>: 1–# of waveform points

Key Entry **Marker 1 2 3 4 First Mkr Point Last Mkr Point**

Remarks Refer to [“File Name Variables” on page 13](#) for information on the file name syntax.

:MARKer:CLEar:ALL

Supported E4438C with Option 001/601 or 002/602

```
[ :SOURCE ] :RADio :ARB :MARKer :CLEar :ALL "<file name>" , <mkr1 | 2 | 3 | 4>
```

This command clears all markers from a waveform segment simultaneously.

"<file name>" This variable specifies the name of the waveform segment file.

<mkr1|2|3|4> This variable designates which marker is to be cleared (1, 2, 3, or 4).

Key Entry **Set Marker Off All Points**

Remarks Refer to [“File Name Variables” on page 13](#) for information on the file name syntax.

Remarks Refer to [“File Name Variables” on page 13](#) for information on the file name syntax.

:MARKer:ROtate

Supported E4438C with Option 001/601 or 002/602

```
[ :SOURce ]:RADio:ARB:MARKer:ROtate "<file name>", <rotate_count>
```

This command shifts the marker bits in a waveform segment.

Range <rotate_count>: number of points in the waveform – 1

Remarks To define the maximum allowable points in a waveform, refer to “:MARKer:[SET]” on page 304.

Refer to “File Name Variables” on page 13 for information on the file name syntax.

:MARKer:[SET]

Supported E4438C with Option 001/601 or 002/602

```
[ :SOURce ]:RADio:ARB:MARKer:[SET] "<filename>", <mkr1|2|3|4>, <first_point>, <last_point>, <skip_count>
```

This command defines a marker over a range of points on a waveform segment.

"<file name>" This choice specifies the name of the waveform segment file.

<mkr1|2|3|4> This variable designates which marker is to be set (1, 2, 3, or 4).

<first_point> This variable defines the first point in the range over which the marker will be placed. This number must be greater than or equal to 1, and less than or equal to the total number of waveform points.

If you enter a value for either the first marker point or the last marker point that would make the first marker point occur after the last, the last marker point is automatically adjusted to match the first marker point.

<last_point> This variable defines the last point in the range over which the marker will be placed. This value must be greater than or equal to 1, and less than or equal to the total number of waveform points.

<skip_count> This variable creates a repeating pattern of markers.

Defining a skip count causes the marker to appear on the first point in the defined range, disappear over the number of points defined as the skip count, then reappear for one point. The pattern repeats until the end of the defined range. This

enables you to set repetitively spaced markers. For example, a skip of 2 produces two points between each marker across the defined range.

Range	<first_Point>: 1–# of waveform points <last_point>: 1–# of waveform points <skip_count>: 0–65535
Key Entry	Marker 1 2 3 4 First Mkr Point Last Mkr Point # Skipped Points
Remarks	Refer to “File Name Variables” on page 13 for information on the file name syntax.

:MDEStination:PULSe

Supported E4438C with Option 001/601 or 002/602
 [:SOURce] :RADio :ARB :MDEStination :PULSe NONE | M1 | M2 | M3 | M4
 [:SOURce] :RADio :ARB :MDEStination :PULSe ?

This command routes the selected marker to the Pulse/RF Blanking function. The NONE parameter clears the marker for the Pulse/RF Blanking function.

***RST** NONE
Key Entry **None Marker 1 Marker 2 Marker 3 Marker 4**

:MDEStination:AAMPlitude

Supported E4438C with Option 001/601 or 002/602
 [:SOURce] :RADio :ARB :MDEStination :AAMPlitude NONE | M1 | M2 | M3 | M4
 [:SOURce] :RADio :ARB :MDEStination :AAMPlitude ?

This command routes the selected marker to the Alternate Amplitude function. The NONE parameter clears the marker for the Alternate Amplitude function.

***RST** NONE
Key Entry **None Marker 1 Marker 2 Marker 3 Marker 4**

:MDEStination:ALCHold

Supported E4438C with Option 001/601 or 002/602

```
[ :SOURce ] :RADio :ARB :MDEStination :ALCHold NONE | M1 | M2 | M3 | M4
[ :SOURce ] :RADio :ARB :MDEStination :ALCHold?
```

This command routes the selected marker to the ALC Hold function. The `NONE` parameter clears the marker for the ALC Hold function.

***RST** NONE

Key Entry None Marker 1 Marker 2 Marker 3 Marker 4

:MPOLarity:MARKer1

Supported E4438C with Option 001/601 or 002/602

```
[ :SOURce ] :RADio :ARB :MPOLarity :MARKer1 NEGative | POSitive
[ :SOURce ] :RADio :ARB :MPOLarity :MARKer1?
```

This command sets the polarity for marker 1.

***RST** POS

Key Entry Marker 1 Polarity Neg Pos

:MPOLarity:MARKer2

Supported E4438C with Option 001/601 or 002/602

```
[ :SOURce ] :RADio :ARB :MPOLarity :MARKer2 NEGative | POSitive
[ :SOURce ] :RADio :ARB :MPOLarity :MARKer2?
```

This command sets the polarity for marker 2.

***RST** POS

Key Entry Marker 2 Polarity Neg Pos

:MPOLarity:MARKer3

Supported E4438C with Option 001/601 or 002/602

```
[ :SOURce ]:RADio:ARB:MPOLarity:MARKer3 NEGative | POSitive  
[ :SOURce ]:RADio:ARB:MPOLarity:MARKer3?
```

This command sets the polarity for marker 3.

***RST** POS

Key Entry Marker 3 Polarity Neg Pos

:MPOLarity:MARKer4

Supported E4438C with Option 001/601 or 002/602

```
[ :SOURce ]:RADio:ARB:MPOLarity:MARKer4 NEGative | POSitive  
[ :SOURce ]:RADio:ARB:MPOLarity:MARKer4?
```

This command sets the polarity for marker 4.

***RST** POS

Key Entry Marker 4 Polarity Neg Pos

:NOISe

Supported E4438C with Option 001/601 or 002/602 and Option 403

```
[ :SOURce ]:RADio:ARB:NOISe[ :STATe] ON | {OFF} | 1 | 0  
[ :SOURce ]:RADio:ARB:NOISe[ :STATe]?
```

This command enables or disables adding real-time, non-repeating, additive white gaussian noise (AWGN) to the carrier modulated by the waveform being played by the Dual ARB waveform player. The noise bandwidth will be at least 0.8 times the sample rate, or 1.6 times the sample rate depending on the bandwidth factor. For information on the bandwidth factor, refer to “:NOISe:BFACtor”.

When the bandwidth factor is 2 and the sample rate is greater than 50 megasamples per/second, noise cannot be enabled. Maximum bandwidth cannot exceed 80 MHz. Any oversampling in the waveform increases the noise bandwidth by a factor equal to the oversampling.

Example

```
:RAD:ARB:NOIS ON
```

The preceding example applies real-time AWGN to the carrier.

***RST** 0

Key Entry Real-time Noise Off On

:NOISe:BFACtor

Supported E4438C with Option 001/601 or 002/602, and Option 403

```
[ :SOURce ]:RADio:ARB:NOISe:BFACtor <val>
```

```
[ :SOURce ]:RADio:ARB:NOISe:BFACtor?
```

This command sets the flat noise bandwidth for applied real-time noise. The bandwidth factor will set the noise bandwidth to at least 0.8 times the sample rate when the bandwidth factor is 1 or to 1.6 times the sample rate, if the bandwidth factor is 2. Maximum bandwidth cannot exceed 80 MHz.

When the bandwidth factor is 2 and the sample rate is greater than 50 megasamples/second, noise cannot be enabled. Any oversampling in the waveform increases the noise bandwidth by a factor equal to the oversampling.

Example

```
:RAD:ARB:NOIS:BFAC 2
```

The preceding example sets the bandwidth factor to 2 and increases the flat noise bandwidth by at least 1.6 times the ARB sample clock rate.

***RST** +1

Key Entry Noise Bandwidth Factor

:NOISe:CBWidth

Supported E4438C with Option 001/601 or 002/602 and Option 403

```
[ :SOURce ]:RADio:ARB:NOISe:CBWidth <val><unit>
```

```
[ :SOURce ]:RADio:ARB:NOISe:CBWidth?
```

This command selects the carrier bandwidth over which the AWGN (additive white gaussian noise) is applied. The noise power will be integrated over the selected bandwidth for the purposes of calculating C/N (carrier to noise ratio). The carrier bandwidth is limited to the ARB sample rate but cannot exceed 80 MHz. For more information refer to “:NOISe” and “:NOISe:BFACtor” on page 308.

***RST** +1.00000000E+000

Range 1Hz to 80 MHz

Key Entry Carrier Bandwidth

:NOISe:CN

Supported E4438C with Option 001/601 or 002/602 and Option 403

```
[ :SOURce ]:RADio:ARB:NOISe:CN <val><unit>  
[:SOURce]:RADio:ARB:NOISe:CN?
```

This command sets the carrier to noise ratio in dB. The carrier power is defined as the total modulated signal power without noise power added. The noise power is applied over the specified bandwidth of the carrier signal. For more information, refer to “:NOISe:CBWidth” on page 308.

Example

```
:RAD:ARB:NOIS:CN 50DB
```

The preceding example sets the carrier to noise ratio to 50 dB.

***RST** +0.00000000E+000

Range –100 to 100 dB

Key Entry Carrier to Noise Ratio

:REFerence:EXTernal:FREQuency

Supported E4438C with Option 001/601 or 002/602

```
[ :SOURce ]:RADio:ARB:REFerence:EXTernal:FREQuency <value>  
[:SOURce]:RADio:ARB:REFerence:EXTernal:FREQuency?
```

This command enters the frequency of the applied external reference.

The variable <val> is expressed in units of Hertz (Hz–MHz).

***RST** +1.00000000E+007

Range 2.5E5–1E8

Key Entry Reference Freq

Remarks The value specified by this command is effective only when you are using an external ARB reference applied to the BASEBAND GEN REF IN rear panel connector.

To specify external as the ARB reference source type, refer to “:REFerence[:SOURce]” on page 310.

:REFerence[:SOURce]

Supported E4438C with Option 001/601 or 002/602

```
[ :SOURce ]:RADio:ARB:REFerence[ :SOURce ] INTernal | EXTernal
[ :SOURce ]:RADio:ARB:REFerence[ :SOURce ]?
```

This command selects either an internal or external reference for the waveform clock.

***RST** INT

Key Entry ARB Reference Ext Int

Remarks If the EXTernal choice is selected, the external frequency value *must* be entered and the signal must be applied to the BASEBAND GEN REF IN rear panel connector.

Refer to “:REFerence:EXTernal:FREQuency” on page 309 to enter the external reference frequency.

:RETRigger

Supported E4438C with Option 001/601 or 002/602

```
[ :SOURce ]:RADio:ARB:RETRigger ON | OFF | IMMEDIATE
[ :SOURce ]:RADio:ARB:RETRigger?
```

This command enables or disables the ARB retriggering mode; the retrigger mode controls how the retriggering function performs while a waveform is playing.

ON (1) This choice specifies that if a trigger occurs while a waveform is playing, the waveform will retrigger at the end of the current waveform sequence and play once more.

OFF (0) This choice specifies that if a trigger occurs while a waveform is playing, the trigger will be ignored.

IMMEDIATE This choice specifies that if a trigger occurs while a waveform is playing, the waveform will reset and replay from the start immediately upon receiving a trigger.

***RST** ON

Key Entry On Off Immediate

:RSCALing

Supported E4438C with Option 001/601 or 002/602

[:SOURCE]:RADio:ARB:RSCALing <val>

[:SOURCE]:RADio:ARB:RSCALing?

This command adjusts the scaling value that is applied to a waveform while it is playing.

The variable <val> is expressed in units of percent.

***RST** +7.00000000E+001

Range 1–100

Key Entry Waveform Runtime Scaling

Remarks Runtime scaling does not alter the waveform data file.

:SCALing

Supported E4438C with Option 001/601 or 002/602

[:SOURCE]:RADio:ARB:SCALing "<file name>", <val>

This command sets the scaling value of the selected waveform segment.

The variable <val> is expressed in units of percent.

Range <val>: 1–100

Key Entry Scaling

Remarks Refer to [“File Name Variables” on page 13](#) for information on the file name syntax.

:SCLock:RATE

Supported E4438C with Option 001/601 or 002/602

[:SOURCE]:RADio:ARB:SCLock:RATE <val>

[:SOURCE]:RADio:ARB:SCLock:RATE?

This command sets the sample clock rate for the Dual ARB format.

The variable <val> is expressed in units of hertz.

***RST** +1.00000000E+008

Range 1–1E8

Key Entry ARB Sample Clock

:SEquence

Supported E4438C with Option 001/601 or 002/602

```
[ :SOURce ]:RADio:ARB:SEquence "<file name>" , "<waveform>" , <reps> , NONE | M1 |
M2 | M3 | M4 | M1M2 | M1M3 | M1M4 | M2M3 | M2M4 | M3M4 | M1M2M3 | M1M2M4 | M1M3M4 | M2M3M4 |
M1M2M3M4 | ALL , { , , , NONE | M1 | M2 | M3 | M4 | M1M2 | M1M3 | M1M4 | M2M3 | M2M4 | M3M4 | M1M2M3 |
M1M2M4 | M1M3M4 | M2M3M4 | M1M2M3M4 | ALL , }
[ :SOURce ]:RADio:ARB:SEquence? "<file name>"
```

This command creates or defines a waveform sequence. The waveform file consists of the subsequent waveform segment files (combined in the same order in which the variables are listed above).

"<file name>" This variable specifies the name of the waveform sequence file.

"<waveform>" This variable specifies the exact name of the waveform file.

<reps> This variable edits the number times the waveform should repeat.

M1–4 This variable designates the marker number to be toggled on.

Range <reps>: 1–65535

Key Entry **Build New Waveform Sequence** **Edit Selected Waveform Sequence**

Toggle Marker 1 **Toggle Marker 2** **Toggle Marker 3**

Toggle Marker 4 **Edit Repetitions**

Remarks Refer to [“File Name Variables” on page 13](#) for information on the file name syntax. compilations.

:TRIGger:TYPE

Supported E4438C with Option 001/601 or 002/602

```
[ :SOURce ]:RADio:ARB:TRIGger:TYPE CONTinuous | SINGle | GATE | SADVance
[ :SOURce ]:RADio:ARB:TRIGger:TYPE?
```

This command sets the trigger mode (type) that controls the waveform’s playback.

Triggers control the playback by telling the ESG when to play the modulating signal (waveform). Depending on the trigger settings for the ESG, the waveform playback can occur once, continuously, or the ESG may start and stop playing the waveform repeatedly (GATE mode).

A trigger signal comprises both positive and negative signal transitions (states), which are also called high and low periods. You can configure the ESG to trigger on either state of the trigger signal. It is common to have multiple triggers, also referred to as trigger occurrences or events, occur when the signal generator requires only a single trigger. In this situation, the ESG recognizes the first trigger and ignores the rest.

When you select a trigger mode, you may lose the signal (carrier plus modulating) from the RF output until you trigger the waveform. This is because the ESG sets the I and Q signals to zero volts prior to the first trigger event, which suppresses the carrier. After the first trigger event, the waveform’s final I and Q levels determine whether you will see the carrier signal or not (zero = no carrier, other values = carrier visible). At the end of most files, the final I and Q points are set to a value other than zero.

There are four parts to configuring the trigger:

- Choosing the trigger type, which controls the waveform’s transmission.
- Setting the waveform’s response to triggers:
 - CONTInuous, see “:TRIGger:TYPE:CONTInuous[:TYPE]” on page 314
 - SINGle, see “:RETRigger” on page 310
 - GATE, selecting the mode also sets the response
- Selecting the trigger source (see “:TRIGger[:SOURce]” on page 315), which determines how the ESG receives its trigger signal, internally or externally. The GATE choice requires an external trigger.
- Setting the trigger polarity when using an external source:
 - CONTInuous and SINGle see “:TRIGger[:SOURce]:EXTernal:SLOPe” on page 317
 - GATE, see “:TRIGger:TYPE:GATE:ACTive” on page 314

For more information on triggering, see the *E4428C/38C ESG Signal Generators User’s Guide*.

The following list describes the trigger type command choices:

CONTInuous	Upon triggering, the waveform repeats continuously.
SINGle	Upon triggering, the waveform segment or sequence plays once.
GATE	An external trigger signal repeatedly starts and stops the waveform’s playback (transmission). The time duration for playback depends on the duty period of the trigger signal and the gate polarity selection (see “:TRIGger:TYPE:GATE:ACTive” on page 314). The waveform plays during the inactive state and stops during the active polarity selection state. The active state can be set high or low. The gate mode works only with an external trigger source.

NOTE The ARB gating behavior described above is opposite to the gating behavior for real-time custom mode.

*RST	CONT			
Key Entry	Continuous	Single	Gate	Segment Advance

:TRIGger:TYPE:CONTInuous[:TYPE]

Supported E4438C with Option 001/601 or 002/602

```
[ :SOURce ] :RADio:ARB:TRIGger:TYPE:CONTInuous[ :TYPE ] FREE | TRIGger | RESet
[ :SOURce ] :RADio:ARB:TRIGger:TYPE:CONTInuous[ :TYPE ] ?
```

This command selects the waveform's response to a trigger signal while using the continuous trigger mode.

For more information on triggering and to select the continuous trigger mode, see [“:TRIGger:TYPE” on page 312](#).

The following list describes the waveform's response to each of the command choices:

FREE	Turning the ARB format on immediately triggers the waveform. The waveform repeats until you turn the format off, select another trigger, or choose another waveform file.
TRIGger	The waveform waits for a trigger before play begins. When the waveform receives the trigger, it plays continuously until you turn the format off, select another trigger, or choose another waveform file.
RESet	The waveform waits for a trigger before play begins. When the waveform receives the trigger, it plays continuously. Subsequent triggers reset the waveform to the beginning. For a waveform sequence, this means to the beginning of the first segment in the sequence.
*RST	FREE
Key Entry	Free Run Trigger & Run Reset & Run

:TRIGger:TYPE:GATE:ACTive

Supported E4438C with Option 001/601 or 002/602

```
[ :SOURce ] :RADio:ARB:TRIGger:TYPE:GATE:ACTive LOW | HIGH
[ :SOURce ] :RADio:ARB:TRIGger:TYPE:GATE:ACTive ?
```

This command selects the active state (gate polarity) of the gate while using the gating trigger mode.

The LOW and HIGH selections correspond to the low and high states of an external trigger signal. For example, when you select HIGH, the active state occurs during the high of the trigger signal. When the active state occurs, the ESG stops the waveform playback at the last played sample point, then restarts the playback at the next sample point when the inactive state occurs. For more information on triggering and to select gating as the trigger mode, see [“:TRIGger:TYPE” on page 312](#).

The following list describes the ESG’s gating behavior for the polarity selections:

LOW	The waveform playback stops when the trigger signal goes low (active state) and restarts when the trigger signal goes high (inactive state).
HIGH	The waveform playback stops when the trigger signal goes high (active state) and restarts when the trigger signal goes low (inactive state).
*RST	HIGH
Key Entry	Gate Active Low High

:TRIGger:TYPE:SADVance[:TYPE]

Supported E4438C with Option 001/601 or 002/602

```
[ :SOURce ] :RADio:ARB:TRIGger:TYPE:SADVance[ :TYPE ] SINGLE | CONTinuous
[ :SOURce ] :RADio:ARB:TRIGger:TYPE:SADVance[ :TYPE ] ?
```

This command customizes the segment advance trigger type setting.

SINGLE	This choice will play the next segment in the sequence only once.
CONTinuous	This choice will instruct the sequencer to continually play the next segments in the waveform sequence in a continuous pattern.
*RST	CONT
Key Entry	Single Continuous
Remarks	This command is valid when SADVance has been selected as the trigger type.

To select SADVance as the trigger type, refer to “:TRIGger:TYPE” on page 312.

:TRIGger[:SOURce]

Supported E4438C with Option 001/601 or 002/602

```
[ :SOURce ] :RADio:ARB:TRIGger [ :SOURce ] KEY | EXT | BUS
[ :SOURce ] :RADio:ARB:TRIGger [ :SOURce ] ?
```

This command sets the trigger source.

For more information on triggering, see “:TRIGger:TYPE” on page 312. The following list describes the command choices:

KEY	This choice enables manual triggering by pressing the front-panel Trigger hardkey.
------------	---

EXT	<p>An externally applied signal triggers the waveform. This is the only choice that works with gating. The following conditions affect an external trigger:</p> <ul style="list-style-type: none"> • The input connector selected for the trigger signal. You have a choice between the rear-panel PATTERN TRIG IN connector or the PATT TRIG IN 2 pin on the rear-panel AUXILIARY I/O connector. To make the connector selection, see “[:TRIGger[:SOURce]:EXTErnal[:SOURce]]” on page 318. <p>For more information on the connectors and on connecting the cables, see the <i>ESG User’s Guide</i>.</p> <ul style="list-style-type: none"> • The trigger signal polarity: <ul style="list-style-type: none"> — gating mode, see “[:TRIGger:TYPE:GATE:ACTive]” on page 314 — continuous and single modes, see “[:TRIGger[:SOURce]:EXTErnal:SLOPe]” on page 317 • The time delay between when the ESG receives a trigger and when the waveform responds to the trigger. There are two parts to setting the delay: <ul style="list-style-type: none"> — setting the amount of delay, see “[:TRIGger[SOURce]:EXTErnal:DELAy]” on page 316 — turning the delay on, see “[:TRIGger[:SOURce]:EXTErnal:DELAy:STATe]” on page 317 			
BUS	<p>This choice enables triggering over the GPIB or LAN using the *TRG or GET commands or the AUXILIARY INTERFACE (RS-232) using the *TRG command.</p>			
*RST	EXT			
Key Entry	<table border="0" style="width: 100%;"> <tr> <td style="width: 25%;">Trigger Key</td> <td style="width: 25%;">Ext</td> <td style="width: 25%;">Bus</td> </tr> </table>	Trigger Key	Ext	Bus
Trigger Key	Ext	Bus		

[:TRIGger[SOURce]:EXTErnal:DELAy

Supported E4438C with Option 001/601 or 002/602

```
[ :SOURce ] :RADio:ARB:TRIGger [ :SOURce ] :EXTErnal:DELAy <val>
[ :SOURce ] :RADio:ARB:TRIGger [ :SOURce ] :EXTErnal:DELAy?
```

This command sets the amount of time to delay the ESG’s response to an external trigger.

The delay is a path (time) delay between when the ESG receives the trigger and when it responds to the trigger. For example, configuring a trigger delay of two seconds, causes the ESG to wait two seconds after receipt of the trigger before the ESG plays the waveform.

The delay does not occur until you turn it on (see “[:TRIGger[:SOURce]:EXTErnal:DELAy:STATe]” on page 317). You can set the delay value either before or after turning it on.

For more information on configuring an external trigger source and to select external as the trigger source, see “:TRIGger[:SOURce]” on page 315.

The unit of measurement for the variable <val> is in seconds (nsec–sec).

***RST** +1.00000000E–003

Range 1E–8 to 4E1

Key Entry Ext Delay Time

:TRIGger[:SOURce]:EXTernal:DELay:STATe

Supported E4438C with Option 001/601 or 002/602

```
[ :SOURce ] :RADio:ARB:TRIGger [ :SOURce ] :EXTernal:DELay:STATe ON|OFF|1|0
[ :SOURce ] :RADio:ARB:TRIGger [ :SOURce ] :EXTernal:DELay:STATe?
```

This command enables or disables the operating state of the external trigger delay function.

For setting the delay time, see “:TRIGger[SOURce]:EXTernal:DELay” on page 316, and for more information on configuring an external source, see “:TRIGger[:SOURce]” on page 315.

***RST** 0

Key Entry Ext Delay Off On

:TRIGger[:SOURce]:EXTernal:SLOPe

Supported E4438C with Option 001/601 or 002/602

```
[ :SOURce ] :RADio:ARB:TRIGger [ :SOURce ] :EXTernal:SLOPe POSitive|NEGative
[ :SOURce ] :RADio:ARB:TRIGger [ :SOURce ] :EXTernal:SLOPe?
```

This command sets the polarity for an external trigger signal while using the continuous, single triggering mode. To set the polarity for gating, see “:TRIGger:TYPE:GATE:ACTive” on page 314.

The POSitive and NEGative selections correspond to the high (positive) and low (negative) states of the external trigger signal. For example, when you select POSitive, the waveform responds (plays) during the high state of the trigger signal. When the PSG receives multiple trigger occurrences when only one is required, the signal generator uses the first trigger and ignores the rest.

For more information on configuring an external trigger source and to select external as the trigger source, see “:TRIGger[:SOURce]” on page 315.

***RST** NEG

Key Entry Ext Polarity Neg Pos

:TRIGger[:SOURCE]:EXTeRnal[:SOURCE]

Supported E4438C with Option 001/601 or 002/602

```
[ :SOURCE ] :RADio:ARB:TRIGger [ :SOURCE ] :EXTeRnal [ :SOURCE ] EPT1 | EPT2 |
EPTRIGGER1 | EPTRIGGER2
[ :SOURCE ] :RADio:ARB:TRIGger [ :SOURCE ] :EXTeRnal [ :SOURCE ] ?
```

This command selects which PATTERN TRIG IN connection the ESG uses to accept an externally applied trigger signal when external is the trigger source selection.

For more information on configuring an external trigger source and to select external as the trigger source, see “[:TRIGger\[:SOURCE\]](#)” on page 315. For more information on the rear-panel connectors, see the *E4428C/38C ESG Signal Generators User’s Guide*.

The following list describes the command choices:

EPT1	This choice is synonymous with EPTRIGGER1 and selects the PATTERN TRIG IN rear-panel connector.
EPT2	This choice is synonymous with EPTRIGGER2 and selects the PATT TRIG IN 2 pin on the rear-panel AUXILIARY I/O connector.
EPTRIGGER1	This choice is synonymous with EPT1 and selects the PATTERN TRIG IN rear-panel connector.
EPTRIGGER2	This choice is synonymous with EPT2 and selects the PATT TRIG IN 2 pin on the rear-panel AUXILIARY I/O connector.
*RST	EPT1
Key Entry	Patt Trig In 1 Patt Trig In 2

:WAVeform

Supported E4438C with Option 001/601 or 002/602

```
[ :SOURCE ] :RADio:ARB:WAVeform "WFM1:file_name" | "SEQ:file_name"
[ :SOURCE ] :RADio:ARB:WAVeform?
```

This command selects a waveform file or sequence, for the Dual ARB player to play. The file must be present in volatile memory, WFM1: or in the SEQ directory. If a file is in non-volatile memory (NVWFM), use the command “[:COPY](#)” on page 124 to copy the file to WFM1.

"WFM1:file_name" This variable names a waveform file residing in volatile memory:WFM1. For information on the file name syntax, see “[File Name Variables](#)” on page 13.

"SEQ:file_name" This variable names a sequence file residing in the catalog of sequence files. For more information on the file name syntax, see [“File Name Variables” on page 13](#).

Example

```
:RAD:ARB:WAV "WFM1:Test_Data"
```

The preceding example selects the file `Test_Data` from the list of files in volatile waveform memory, WFM1, and applies its header settings.

Key Entry **Select Waveform**

:Waveform:NHEAders

Supported E4438C with Option 001/601 or 002/602

```
[ :SOURce ]:RADio:ARB:WAVEform:NHEAders "WFM1:file_name" | "SEQ:filename"  
[ :SOURce ]:RADio:ARB:WAVEform:NHEAders?
```

This command, for the Dual ARB mode, allows for a fast selection of a waveform file or sequence. No header information or settings are applied to the waveform or sequence when this command is used. This will improve the access or loading speed of the waveform file or sequence to approximately 100 mS for a single segment. The file must be in volatile waveform memory, WFM1, or in the SEQ directory. If a file is in non-volatile waveform memory (NVWFM), use the command [“:COPY” on page 124](#) to copy files to WFM1.

"WFM1:file_name" This variable names a waveform file residing in volatile memory:WFM1. For information on the file name syntax, see [“File Name Variables” on page 13](#).

"SEQ:filename" This variable names a sequence file residing in the catalog of sequence files. For more information on the file name syntax, see [“File Name Variables” on page 13](#).

Example

```
:RAD:ARB:WAV:NHEA "Test_Data"
```

The preceding example selects the file `Test_Data`, without applying header settings.

[:STATe]

Supported E4438C with Option 001/601 or 002/602

[:SOURce] :RADio :ARB [:STATe] ON | OFF | 1 | 0

[:SOURce] :RADio :ARB [:STATe] ?

This command enables or disables the arbitrary waveform generator function.

***RST** 0

Key Entry ARB Off On

Multitone Subsystem–Option 001/601 or 002/602 ([:SOURce]:RADio:MTONe:ARB)

Creating a Multitone Waveform

Use the following steps to create a multitone waveform:

1. Initialize the phase for the multitone waveform. Refer to “:SETup:TABLE:PHASe:INITialize” on page 331.
2. Assign the frequency spacing between the tones. Refer to “:SETup:TABLE:FSPacing” on page 330.
3. Define the number of tones within the waveform. Refer to “:SETup:TABLE:NTONes” on page 331.
4. Modify the power level, phase, and state of any individual tones. Refer to “:ROW” on page 328.

:HEADer:CLEAr

Supported E4438C with Option 001/601 or 002/602

[:SOURce] :RADio :MTONe :ARB :HEADer :CLEAr

This command clears the header information from the header file used by this modulation format.

Key Entry Clear Header

Remarks The **Multitone Off On** softkey must be set to On for this command to function.

:HEADer:SAVE

Supported E4438C with Option 001/601 or 002/602

[:SOURce] :RADio :MTONe :ARB :HEADer :SAVE

This command saves the header information to the header file used by this modulation format.

Key Entry Save Setup To Header

Remarks The **Multitone Off On** softkey must be set to On for this command to function.

:IQ:EXTeRnal:FiLTeR

Supported E4438C with Option 001/601 or 002/602

```
[ :SOURce ] :RADio:MTONE:ARB:IQ:EXTeRnal:FiLTeR 40e6 | THRough
[ :SOURce ] :RADio:MTONE:ARB:IQ:EXTeRnal:FiLTeR?
```

This command selects the filter or through path for I/Q signals routed to the rear panel I and Q outputs. Selecting a filter using this command will automatically set “:IQ:EXTeRnal:FiLTeR:AUTO” on [page 322](#) to OFF(0) mode.

40e6 This choice applies a 40 MHz baseband filter.

THRough This choice bypasses filtering.

***RST** THR

Key Entry 40.000 MHz Through

:IQ:EXTeRnal:FiLTeR:AUTO

Supported E4438C with Option 001/601 or 002/602

```
[ :SOURce ] :RADio:MTONE:ARB:IQ:EXTeRnal:FiLTeR:AUTO ON | OFF | 1 | 0
[ :SOURce ] :RADio:MTONE:ARB:IQ:EXTeRnal:FiLTeR:AUTO?
```

This command enables or disables the automatic selection of the filters for I/Q signals routed to the rear panel I/Q outputs.

ON(1) This choice will automatically select a digital modulation filter optimized for the current signal generator settings.

OFF(0) This choice disables the auto feature which lets you select a digital modulation filter or through path. Refer to “:IQ:EXTeRnal:FiLTeR” on [page 322](#) for selecting a filter or through path.

***RST** 1

Key Entry I/Q Output Filter Manual Auto

:IQ:MODulation:ATTen

Supported E4438C with Option 001/601 or 002/602

```
[ :SOURce ] :RADio:MTONE:ARB:IQ:MODulation:ATTen <val>
```

```
[ :SOURce ] :RADio:MTONE:ARB:IQ:MODulation:ATTen?
```

This command attenuates the I/Q signals being modulated through the signal generator RF path.

The variable <val> is expressed in units of decibels (dB).

***RST** +2.00000000E+000

Range 0–40

Key Entry Modulator Atten Manual Auto

:IQ:MODulation:ATTen:AUTO

Supported E4438C with Option 001/601 or 002/602

```
[ :SOURce ] :RADio:MTONE:ARB:IQ:MODulation:ATTen:AUTO ON|OFF|1|0
```

```
[ :SOURce ] :RADio:MTONE:ARB:IQ:MODulation:ATTen:AUTO?
```

This command enables or disables the I/Q attenuation auto mode.

ON (1) This choice enables the attenuation auto mode which optimizes the modulator attenuation for the current conditions.

OFF (0) This choice holds the attenuator at its current setting or at a selected value. Refer to “:IQ:MODulation:ATTen” on page 323 for setting the attenuation value.

***RST** 1

Key Entry Modulator Atten Manual Auto

:IQ:MODulation:FILTer**Supported** E4438C with Option 001/601 or 002/602

```
[ :SOURce ] :RADio:MTONE:ARB:IQ:MODulation:FILTer 2.1e6 | 40e6 | THROugh
[ :SOURce ] :RADio:MTONE:ARB:IQ:MODulation:FILTer?
```

This command enables you to select a filter or through path for I/Q signals modulated onto the RF carrier. Selecting a filter using this command will automatically set “[:IQ:MODulation:FILTer:AUTO](#)” on [page 324](#) to OFF(0) mode.

2.1E6 This choice applies a 2.1 MHz baseband filter to the I/Q signals.

40E6 This choice applies a 40 MHz baseband filter to the I/Q signals.

THROugh This choice bypasses filtering.

***RST** THR

Key Entry 2.100 MHz 40.000 MHz Through

:IQ:MODulation:FILTer:AUTO**Supported** E4438C with Option 001/601 or 002/602

```
[ :SOURce ] :RADio:MTONE:ARB:IQ:MODulation:FILTer:AUTO ON | OFF | 1 | 0
[ :SOURce ] :RADio:MTONE:ARB:IQ:MODulation:FILTer:AUTO?
```

This command enables or disables the automatic selection of the filters for I/Q signals modulated onto the RF carrier.

ON(1) This choice will automatically select a digital modulation filter.

OFF(0) This choice disables the auto feature which lets you select a digital modulation filter or through path. Refer to “[:IQ:MODulation:FILTer](#)” on [page 302](#) for selecting a filter or through path.

***RST** 1

Key Entry I/Q Mod Filter Manual Auto

:MDEStination:PULSe

Supported E4438C with Option 001/601 or 002/602

```
[ :SOURCE ] :RADio:MTONE:ARB:MDEStination:PULSe NONE | M1 | M2 | M3 | M4  
[ :SOURCE ] :RADio:MTONE:ARB:MDEStination:PULSe?
```

This command routes the selected marker to the Pulse/RF Blanking function. The NONE parameter clears the marker for the Pulse/RF Blanking function.

***RST** NONE

Key Entry None Marker 1 Marker 2 Marker 3 Marker 4

:MDEStination:AAMPlitude

Supported E4438C with Option 001/601 or 002/602

```
[ :SOURCE ] :RADio:MTONE:ARB:MDEStination:AAMPlitude NONE | M1 | M2 | M3 | M4  
[ :SOURCE ] :RADio:MTONE:ARB:MDEStination:AAMPlitude?
```

This command routes the selected marker to the Alternate Amplitude function. The NONE parameter clears the marker for the Alternate Amplitude function.

***RST** NONE

Key Entry None Marker 1 Marker 2 Marker 3 Marker 4

:MDEStination:ALCHold

Supported E4438C with Option 001/601 or 002/602

```
[ :SOURCE ] :RADio:MTONE:ARB:MDEStination:ALCHold NONE | M1 | M2 | M3 | M4  
[ :SOURCE ] :RADio:MTONE:ARB:MDEStination:ALCHold?
```

This command routes the selected marker to the ALC Hold function. The NONE parameter clears the marker for the ALC Hold function.

***RST** NONE

Key Entry None Marker 1 Marker 2 Marker 3 Marker 4

:MPOLarity:MARKer1

Supported E4438C with Option 001/601 or 002/602

[:SOURCE] :RADIO:MTONE:ARB:MPOLarity:MARKer1 NEGative | POSitive
[:SOURCE] :RADIO:MTONE:ARB:MPOLarity:MARKer1?

This command sets the polarity for marker 1.

***RST** POS

Key Entry Marker 1 Polarity Neg Pos

:MPOLarity:MARKer2

Supported E4438C with Option 001/601 or 002/602

[:SOURCE] :RADIO:MTONE:ARB:MPOLarity:MARKer2 NEGative | POSitive
[:SOURCE] :RADIO:MTONE:ARB:MPOLarity:MARKer2?

This command sets the polarity for marker 2.

***RST** POS

Key Entry Marker 2 Polarity Neg Pos

:MPOLarity:MARKer3

Supported E4438C with Option 001/601 or 002/602

[:SOURCE] :RADIO:MTONE:ARB:MPOLarity:MARKer3 NEGative | POSitive
[:SOURCE] :RADIO:MTONE:ARB:MPOLarity:MARKer3?

This command sets the polarity for marker 3.

***RST** POS

Key Entry Marker 3 Polarity Neg Pos

:MPOLarity:MARKer4

Supported E4438C with Option 001/601 or 002/602

[:SOURCE] :RADIO:MTONE:ARB:MPOLarity:MARKer4 NEGative | POSitive
[:SOURCE] :RADIO:MTONE:ARB:MPOLarity:MARKer4?

This command sets the polarity for marker 4.

***RST** POS

Key Entry Marker 4 Polarity Neg Pos

:REFeRence:EXTeRnal:FREQuency

Supported E4438C with Option 001/601 or 002/602

```
[ :SOURce ] :RADio:MTONE:ARB:REFeRence:EXTeRnal:FREQuency <val>
```

```
[ :SOURce ] :RADio:MTONE:ARB:REFeRence:EXTeRnal:FREQuency?
```

This command allows you to enter the frequency of the applied external reference.

The variable <val> is expressed in units of Hertz (Hz–MHz).

***RST** +1.00000000E+007

Range 2.5E5–1E8

Key Entry Reference Freq

Remarks The value specified by this command is effective only when you are using an external ARB reference applied to the BASEBAND GEN REF IN rear panel connector.

To specify external as the ARB reference source type, refer to “:REFeRence[:SOURce]” on page 327.

:REFeRence[:SOURce]

Supported E4438C with Option 001/601 or 002/602

```
[ :SOURce ] :RADio:MTONE:ARB:REFeRence[ :SOURce ] INTernal | EXTeRnal
```

```
[ :SOURce ] :RADio:MTONE:ARB:REFeRence[ :SOURce ]?
```

This command selects either an internal or external reference for the waveform clock.

***RST** INT

Key Entry ARB Reference Ext Int

Remarks If the EXTeRnal choice is selected, the external frequency *value must* be entered and the signal must be applied to the BASEBAND GEN REF IN rear panel connector.

Refer to “:REFeRence:EXTeRnal:FREQuency” on page 327 to enter the external reference frequency.

:ROW

Supported E4438C with Option 001/601 or 002/602

```
[ :SOURce ] :RADio:MTONe:ARB:SETup:TABLE:ROW <row_number> , <power> ,
<phase> , <state>
```

```
[ :SOURce ] :RADio:MTONe:ARB:SETup:TABLE:ROW? <row_number>
```

This command modifies the indicated tone (row) of the multitone waveform.

<row_number> The number of rows for this variable are determined by the :SETup:TABLE command.

The variable <power> is expressed in units of decibels (dB).

The variable <phase> is expressed in units of degrees (deg).

Frequency offset, power, phase, and state value are returned when a query is initiated. The output format is as follows:

```
<frequency offset> , <power> , <phase> , <state>
```

```
*RST          frequency offset: -3.50000000E+004      <power>: +0.00000000E+000
              <phase>: +0.00000000E+000      <state>: 1
```

```
Range       frequency offset: -4E7 to 4E7      <power>: -80 to 0      <phase>: 0-359
              <state>: 1
```

Key Entry **Goto Row** **Toggle State**

Remarks Refer to “:SETup:TABLE” on page 330 for information on how to change the number of rows.

This command is the final step in creating a multitone waveform. Refer to “Creating a Multitone Waveform” on page 321 for all four steps.

:SCLock:RATE

Supported E4438C with Option 001/601 or 002/602

```
[ :SOURCE ] :RADio:MTONE:ARB:SCLock:RATE <val>
```

```
[ :SOURCE ] :RADio:MTONE:ARB:SCLock:RATE?
```

This command sets the sample clock rate for the Multitone modulation format.

The variable <val> is expressed in units of hertz.

***RST** +1.00000000E+008

Range 1–1E8

Key Entry ARB Sample Clock

Remarks The modulation format should be active before executing this command. If this command is executed before the modulation format is active, the entered value will be overridden by a calculated factory default value. Refer to “[:STaTe]” on [page 332](#) to activate the modulation format.

:SETup

Supported E4438C with Option 001/601 or 002/602

```
[ :SOURCE ] :RADio:MTONE:ARB:SETup "<file name>"
```

```
[ :SOURCE ] :RADio:MTONE:ARB:SETup?
```

This command retrieves a multitone waveform file.

Key Entry Load From Selected File

Remarks The name of a multitone waveform file is stored in the signal generator file system of MTONE files. This information is held in memory until you send the command that turns the waveform on.

Refer to “[File Name Variables](#)” on [page 13](#) for information on the file name syntax.

:SETup:STORe

Supported E4438C with Option 001/601 or 002/602

```
[ :SOURCE ] :RADio:MTONE:ARB:SETup:STORe "<file name>"
```

This command stores the current multitone waveform setup in the signal generator file system of MTONE files.

Key Entry Store To File

:SETup:TABLE

Supported E4438C with Option 001/601 or 002/602

```
[ :SOURce ]:RADio:MTONe:ARB:SETup:TABLE <freq_spacing> ,
<num_tones> , { <phase> , <state> }
[ :SOURce ]:RADio:MTONe:ARB:SETup:TABLE?
```

This command creates and configures a multitone waveform.

The frequency offset, power, phase, and state value are returned when a query is initiated. The output format is as follows:

```
<frequency_offset> , <power> , <phase> , <state>
```

The variable <freq_spacing> is expressed in units of Hertz (Hz–MHz).

The variable <power> is expressed in units of decibels (dB).

*RST	Tone	<frequency offset>	<power>	<phase>	<state>
	Tone 1	-35000	+0.00000000E+000	+0	+1
	Tone 2	-25000	+0.00000000E+000	+0	+1
	Tone 3	-15000	+0.00000000E+000	+0	+1
	Tone 4	-5000	+0.00000000E+000	+0	+1
	Tone 5	+5000	+0.00000000E+000	+0	+1
	Tone 6	+15000	+0.00000000E+000	+0	+1
	Tone 7	+25000	+0.00000000E+000	+0	+1
	Tone 8	+35000	+0.00000000E+000	+0	+1

Range <freq_spacing> (2 tones): 1E4–8E7 <num_tones>: 2–64
 <freq_spacing> (>2 tones): 1E4 to (80 MHz ÷ (num_tones – 1))
 <phase>: 0–359

Key Entry Freq Spacing Number Of Tones Toggle State

Remarks To set the frequency spacing, refer to “:SETup:TABLE:FSPacing” on page 330.

:SETup:TABLE:FSPacing

Supported E4438C with Option 001/601 or 002/602

```
[ :SOURce ]:RADio:MTONe:ARB:SETup:TABLE:FSPacing <freq_spacing>
[ :SOURce ]:RADio:MTONe:ARB:SETup:TABLE:FSPacing?
```

This command sets the frequency spacing between the tones.

The variable <freq_spacing> is expressed in units of Hertz (Hz–MHz).

***RST** +1.00000000E+004

Range <freq_spacing> (2 tones): 1E4–8E7

Multitone Subsystem—Option 001/601 or 002/602 ([:SOURCE]:RADio:MTONE:ARB)

<freq_spacing> (>2 tones): 1E4 to (80 MHz ÷ (num_tones – 1))

Key Entry	Freq Spacing
Remarks	To set frequency spacing and additional parameters required to create or configure a multitone waveform, refer to “:SETup:TABLE” on page 330. This command is the second step in creating a multitone waveform. Refer to “Creating a Multitone Waveform” on page 321 for all four steps.

:SETup:TABLE:NTONes

Supported	E4438C with Option 001/601 or 002/602
	[:SOURCE] :RADio:MTONE:ARB:SETup:TABLE:NTONes <num_tones> [:SOURCE] :RADio:MTONE:ARB:SETup:TABLE:NTONes?
	This command defines the number of tones in the multitone waveform.
*RST	+8
Range	2–64
Key Entry	Number Of Tones
Remarks	To specify the number of tones and additional parameters required to create or configure a multitone waveform, refer to “:SETup:TABLE” on page 330. This command is the third step in creating a multitone waveform. Refer to “Creating a Multitone Waveform” on page 321 for all four steps.

:SETup:TABLE:PHASe:INITialize

Supported	E4438C with Option 001/601 or 002/602
	[:SOURCE] :RADio:MTONE:ARB:SETup:TABLE:PHASe:INITialize FIXed|RANDom [:SOURCE] :RADio:MTONE:ARB:SETup:TABLE:PHASe:INITialize?
	This command initializes the phase in the multitone waveform table.
FIXed	This choice sets the phase of all tones to the fixed value of 0 degrees.
RANDom	This choice sets the phase of all tones to random values based on the setting on the random seed generator.
*RST	FIX
Key Entry	Initialize Phase Fixed Random
Remarks	To change the random number generator seed value, refer to “:SETup:TABLE:PHASe:INITialize:SEED” on page 332.

This command is the first step in creating a multitone waveform. Refer to “Creating a Multitone Waveform” on page 321 for all four steps.

:SETup:TABLE:PHASe:INITialize:SEED

Supported E4438C with Option 001/601 or 002/602

```
[ :SOURCE ] :RADio:MTONE:ARB:SETup:TABLE:PHASe:INITialize:SEED FIXed | RANDom
[ :SOURCE ] :RADio:MTONE:ARB:SETup:TABLE:PHASe:INITialize:SEED?
```

This command initializes the random number generator seed that is used to generate the random phase values for the multitone waveform.

FIXed This choice sets the random number generator seed to a fixed value.

RANDom This choice sets the random number generator seed to a random value. This changes the phase value after each initialization of the phase.

***RST** FIX

Key Entry Random Seed Fixed Random

[:STATe]

Supported E4438C with Option 001/601 or 002/602

```
[ :SOURCE ] :RADio:MTONE:ARB[:STATe] ON | OFF | 1 | 0
[ :SOURCE ] :RADio:MTONE:ARB[:STATe]?
```

This command enables or disables the multitone waveform generator function.

***RST** 0

Key Entry Multitone Off On

Wideband CDMA ARB Subsystem–Option 400 [:SOURce]:RADio:WCDMa:TGPP:ARB)

:CLIPping:I

Supported E4438C with Option 400

```
[ :SOURce ]:RADio:WCDMa:TGPP:ARB:CLIPping:I <val>
```

```
[ :SOURce ]:RADio:WCDMa:TGPP:ARB:CLIPping:I?
```

This command limits the modulation level of the waveform's I component to a percentage of full scale.

The variable <val> is expressed in units of percent.

***RST** +1.00000000E+002

Range 10–100

Key Entry Clip III To

:CLIPping:POSition

Supported E4438C with Option 400

```
[ :SOURce ]:RADio:WCDMa:TGPP:ARB:CLIPping:POSition PRE|POST
```

```
[ :SOURce ]:RADio:WCDMa:TGPP:ARB:CLIPping:POSition?
```

This command specifies whether a waveform is clipped before (PRE) or after (POST) FIR filtering.

***RST** PRE

Key Entry Clip At PRE POST FIR Filter

:CLIPping:Q**Supported** E4438C with Option 400

[:SOURce]:RADio:WCDMa:TGPP:ARB:CLIPping:Q <val>

[:SOURce]:RADio:WCDMa:TGPP:ARB:CLIPping:Q?

This command limits the modulation level of the waveform's Q component to a percentage of full scale.

The variable <val> is expressed in units of percent.

RST** +1.00000000E+002**Range** 10–100**Key Entry** Clip |Q| To**:CLIPping:TYPE*Supported** E4438C with Option 400

[:SOURce]:RADio:WCDMa:TGPP:ARB:CLIPping:TYPE IJQ|IORQ

[:SOURce]:RADio:WCDMa:TGPP:ARB:CLIPping:TYPE?

This command selects either IJQ or IORQ as the clipping type.

IJQ The combined I and Q waveform will be clipped (*circular* clipping).

IORQ The I and Q components of the waveform are clipped independently (*rectangular* clipping). I and Q can be clipped to different levels using this mode.

***RST** IJQ**Key Entry** Clipping Type |I+jQ| |I|,|Q|

:CLIPping[:IJQ]**Supported** E4438C with Option 400

[:SOURce]:RADio:WCDMa:TGPP:ARB:CLIPping[:IJQ] <val>

[:SOURce]:RADio:WCDMa:TGPP:ARB:CLIPping[:IJQ]?

This command clips (limits) the modulation level of the combined I and Q waveform to a percentage of full scale.

The variable <val> is expressed in units of percent.

RST** +1.00000000E+002**Range** 10–100**Key Entry** Clip |I+jQ| To**:CRATe*Supported** E4438C with Option 400

[:SOURce]:RADio:WCDMa:TGPP:ARB:CRATe <val>

[:SOURce]:RADio:WCDMa:TGPP:ARB:CRATe?

This command sets the chip rate value.

***RST** +3.84000000E+006**Range** 3456000–4224000**Key Entry** Chip Rate

:FILTer

Supported E4438C with Option 400

```
[ :SOURce ] :RADio :WCDMa :TGPP :ARB :FILTer RNYQuist | NYQuist | GAUSSian |
RECTangle | WCDMA | AC4Fm | IS2000SR3DS | UGGaussian | "<user FIR>"
[ :SOURce ] :RADio :WCDMa :TGPP :ARB :FILTer?
```

This command selects the pre-modulation filter type.

WCDMA This choice selects a 0.22 Nyquist filter optimized for ACP.

AC4Fm This choice selects a predefined Association of Public Safety Communications Officials (APCO) specified compatible 4-level frequency modulation (C4FM) filter.

IS2000SR3DS This choice selects an IS-2000 standard, spread rate 3 direct spread filter.

UGGaussian This choice selects a backwards compatible GSM Gaussian filter (Gaussian filter with a fixed BbT value of 0.300) for the ESG E44xxB Option UN3 or UN4.

"<user FIR>" This variable is any FIR filter file that you have stored in memory. The variable needs no directory path indicating the location of the file, such as FIR: or /USER/FIR. The command assumes the FIR directory. Refer to [“File Name Variables” on page 13](#) for more information on file names.

***RST** NYQ

Key Entry	Root Nyquist	Nyquist	Gaussian	Rectangle	WCDMA
	APCO 25 C4FM	IS-95	UN3/4 GSM Gaussian		IS-2000 SR3 DS
	User FIR				

:FILTer:ALPHA

Supported E4438C with Option 400

```
[ :SOURce ] :RADio :WCDMa :TGPP :ARB :FILTer :ALPHA <val>
[ :SOURce ] :RADio :WCDMa :TGPP :ARB :FILTer :ALPHA?
```

This command sets the alpha value for the Nyquist or root Nyquist filter.

The filter alpha value can be set to the minimum level (0), the maximum level (1), or in between by using fractional numeric values (0.001–0.999).

***RST** +2.20000000E–001

Range 0.000–1.000

Key Entry FiLter Alpha

Remarks To change the current filter type, refer to “:FILTer” on page 336.

:FILTer:BBT

Supported E4438C with Option 400

```
[ :SOURce ] :RADio:WCDMa:TGPP:ARB:FILTer:BBT <val>
```

```
[ :SOURce ] :RADio:WCDMa:TGPP:ARB:FILTer:BBT?
```

This command changes the bandwidth-multiplied-by-bit-time (BbT) filter parameter.

The filter BbT value can be set to the minimum level (0), the maximum level (1), or in between by using fractional numeric values (0.001–0.999).

***RST** +5.00000000E–001

Range 0.000–1.000

Key Entry Filter BbT

Remarks This command is effective only after choosing a Gaussian filter. It does not have an effect on other types of filters.

To change the current filter type, refer to “:FILTer” on page 336.

:FILTer:CHANnel

Supported E4438C with Option 400

```
[ :SOURce ] :RADio:WCDMa:TGPP:ARB:FILTer:CHANnel EVM|ACP
```

```
[ :SOURce ] :RADio:WCDMa:TGPP:ARB:FILTer:CHANnel?
```

This command optimizes the Nyquist and root Nyquist filters to minimize error vector magnitude (EVM) or to minimize adjacent channel power (ACP).

EVM This choice provides the most ideal passband.

ACP This choice improves stopband rejection.

***RST** ACP

Key Entry Optimize FIR For EVM ACP

Remarks To change the current filter type, refer to “:FILTer” on page 336.

:HEADer:CLEAr**Supported** E4438C with Option 400

[:SOURce]:RADio:WCDMa:TGPP:ARB:HEADer:CLEAr

This command clears the header information from the header file used by this modulation format.

Key Entry Clear Header**Remarks** The **W-CDMA Off On** softkey must be set to On for this command to function.**:HEADer:SAVE****Supported** E4438C with Option 400

[:SOURce]:RADio:WCDMa:TGPP:ARB:HEADer:SAVE

This command saves the header information to the header file used by this modulation format.

Key Entry Save Setup To Header**Remarks** The **W-CDMA Off On** softkey must be set to On for this command to function.**:IQ:EXTerنال:FILTer****Supported** E4438C with Option 400

[:SOURce]:RADio:WCDMa:TGPP:ARB:IQ:EXTerنال:FILTer 40e6|THROUGH

[:SOURce]:RADio:WCDMa:TGPP:ARB:IQ:EXTerنال:FILTer?

This command selects the filter or through path for I/Q signals routed to the rear panel I and Q outputs. Selecting a filter using this command will automatically set “:IQ:EXTerنال:FILTer:AUTO” on [page 338](#) to OFF(0) mode.

40e6 This choice applies a 40 MHz baseband filter.

THROUGH This choice bypasses filtering.

RST** THR**Key Entry** 40.000 MHz Through**:IQ:EXTerنال:FILTer:AUTO*Supported** E4438C with Option 400

[:SOURce]:RADio:WCDMa:TGPP:ARB:IQ:EXTerنال:FILTer:AUTO ON|OFF|1|0

[:SOURce]:RADio:WCDMa:TGPP:ARB:IQ:EXTerنال:FILTer:AUTO?

This command enables or disables the automatic selection of the filters for I/Q signals routed to the rear panel I/Q outputs.

ON(1)	This choice will automatically select a digital modulation filter optimized for the current signal generator settings.
OFF(0)	This choice disables the auto feature which lets you select a digital modulation filter or through path. Refer to “:IQ:EXTERNAL:FILTER” on page 338 for selecting a filter or through path.
*RST	1
Key Entry	I/Q Output Filter Manual Auto

:IQMap

Supported	E4438C with Option 400
[:SOURCE]:RADIO:WCDMA:TGPP:ARB:IQMap NORMAL | INVERT	
[:SOURCE]:RADIO:WCDMA:TGPP:ARB:IQMap?	
This command selects whether or not the I/Q outputs will be inverted.	
NORMAL	This choice selects normal polarity.
INVERTED	This choice inverts the internal Q signal.
*RST	NORM
Key Entry	I/Q Mapping Normal Invert

:IQ:MODulation:ATTen

Supported	E4438C with Option 400
[:SOURCE]:RADIO:WCDMA:TGPP:ARB:IQ:MODulation:ATTen <val>	
[:SOURCE]:RADIO:WCDMA:TGPP:ARB:IQ:MODulation:ATTen?	
This command attenuates the I/Q signals being modulated through the signal generator RF path.	
The variable <val> is expressed in units of decibels (dB).	
*RST	+2.00000000E+00
Range	0–40
Key Entry	Modulator Atten Manual Auto

:IQ:MODulation:ATTen:AUTO**Supported** E4438C with Option 400

```
[ :SOURce ] :RADio:WCDMa:TGPP:ARB:IQ:MODulation:ATTen:AUTO ON|OFF|1|0
[ :SOURce ] :RADio:WCDMa:TGPP:ARB:IQ:MODulation:ATTen:AUTO?
```

This command enables or disables the I/Q attenuation auto mode.

ON (1) This choice enables the attenuation auto mode which optimizes the modulator attenuation for the current conditions.

OFF (0) This choice holds the attenuator at its current setting or at a selected value. Refer to “:IQ:MODulation:ATTen” on page 339 for setting the attenuation value.

***RST** 1

Key Entry Modulator Atten Manual Auto

:IQ:MODulation:FILTer**Supported** E4438C with Option 400

```
[ :SOURce ] :RADio:WCDMa:TGPP:ARB:IQ:MODulation:FILTer 2.1e6|40e6|THROUGH
[ :SOURce ] :RADio:WCDMa:TGPP:ARB:IQ:MODulation:FILTer?
```

This command enables you to select a filter or through path for I/Q signals modulated onto the RF carrier. Selecting a filter using this command will automatically set “:IQ:MODulation:FILTer:AUTO” on page 341 to OFF(0) mode.

2.1E6 This choice applies a 2.1 MHz baseband filter to the I/Q signals.

40E6 This choice applies a 40 MHz baseband filter to the I/Q signals.

THROUGH This choice bypasses filtering.

***RST** THR

Key Entry 2.100 MHz 40.000 MHz Through

:IQ:MODulation:FILTer:AUTO**Supported** E4438C with Option 400

[:SOURCE]:RADIO:WCDMA:TGPP:ARB:IQ:MODulation:FILTer:AUTO ON|OFF|1|0

[:SOURCE]:RADIO:WCDMA:TGPP:ARB:IQ:MODulation:FILTer:AUTO?

This command enables or disables the automatic selection of the filters for I/Q signals modulated onto the RF carrier.

ON(1) This choice will automatically select a digital modulation filter.

OFF(0) This choice disables the auto feature which lets you select a digital modulation filter or through path. Refer to “[:IQ:MODulation:FILTer](#)” on page 302 for selecting a filter or through path.

RST** 1**Key Entry** I/Q Mod Filter Manual Auto**:LINK*Supported** E4438C with Option 400

[:SOURCE]:RADIO:WCDMA:TGPP:ARB:LINK DOWN|UP

[:SOURCE]:RADIO:WCDMA:TGPP:ARB:LINK?

This command selects either a downlink or uplink channel configuration.

***RST** DOWN**Key Entry** Link Down Up

:LINK:DOWN:OACP

Supported E4438C with Option 400

```
[ :SOURce ] :RADio :WCDMa :TGPP :ARB :LINK :DOWN :OACP ADJ | ALT
```

```
[ :SOURce ] :RADio :WCDMa :TGPP :ARB :LINK :DOWN :OACP ?
```

This command selects the channel power optimization type for any downlink channel W-CDMA setup.

ADJ This choice optimizes for adjacent channel power.

ALT This choice optimizes for alternate channel power.

***RST** ADJ

Key Entry Optimize ACP ADJ ALT

Remarks This command is operational for any downlink channel W-CDMA setup.

To change the current W-CDMA setup information, refer to
[“:LINK:DOWN:SETup” on page 342.](#)

:LINK:DOWN:SETup

Supported E4438C with Option 400

```
[ :SOURce ] :RADio :WCDMa :TGPP :ARB :LINK :DOWN :SETup DPCH1 | DPCH3 | PPSCH |  
PPDPCH1 | PPDPCH3 | TM1D16 | TM1D32 | TM1D64 | TM2 | TM3D16 | TM3D32 | TM4 | TM5H2 | TM5H4 |  
TM5H8 | MCArrier | "<file name>"
```

```
[ :SOURce ] :RADio :WCDMa :TGPP :ARB :LINK :DOWN :SETup ?
```

This command defines the multicarrier waveform.

DPCH1 This choice selects 1 dedicated physical channel.

DPCH3 This choice selects 3 dedicated physical channels.

PPSCH This choice selects a primary command control physical channel (PCCPCH) with a synchronization channel (SCH).

PPDPCH1 This choice selects a primary command control physical channel (PCCPCH) with a dedicated physical channel (DPCH).

PPDPCH3 This choice selects a primary command control physical channel (PCCPCH) with 3 dedicated physical channels.

TM1D16 This choice selects a Test Model 1 with 16 dedicated physical channels.

TM1D32 This choice selects a Test Model 1 with 32 dedicated physical channels.

TM1D64 This choice selects a Test Model 1 with 64 dedicated physical channels.

TM2	This choice selects a Test Model 2 downlink W-CDMA setup.																								
TM3D16	This choice selects a Test Model 3 with 16 dedicated physical channels.																								
TM3D32	This choice selects a Test Model 3 with 32 dedicated physical channels.																								
TM4	This choice selects a Test Model 4 downlink W-CDMA setup.																								
TM5H2	This choice selects a Test Model 5 with 6 DPCH and 2 HS-PDSCH (high speed physical shared channel) channels downlink W-CDMA setup.																								
TM5H4	This choice selects a Test Model 5 with 14 DPCH and 4 HS-PDSCH (high speed-physical downlink shared channel) channels downlink W-CDMA setup.																								
TM5H8	This choice selects a Test Model 5 with 30 DPCH and 8 HS-PDSCH (high speed physical shared channel) channels downlink WCDMA setup.																								
*RST	DPCH1																								
Key Entry	<table border="0"> <tr> <td>1 DPCH</td> <td>3 DPCH</td> <td>PCCPCH + SCH</td> <td>PCCPCH + SCH + 1 DPCH</td> </tr> <tr> <td colspan="2">PCCPCH + SCH + 3 DPCH</td> <td colspan="2">Test Model 1 w/ 16 DPCH</td> </tr> <tr> <td colspan="2">Test Model 1 w/ 32 DPCH</td> <td>Test Model 1 w/ 64 DPCH</td> <td>Test Model 2</td> </tr> <tr> <td colspan="2">Test Model 3 w/ 16 DPCH</td> <td>Test Model 3 w/ 32 DPCH</td> <td>Test Model 4</td> </tr> <tr> <td colspan="2">Test Model 5 w/2HSPDSCH</td> <td colspan="2">Test Model 5 w/4HSPDSCH</td> </tr> <tr> <td colspan="4">Test Model 5 w/8HSPDSCH</td> </tr> </table>	1 DPCH	3 DPCH	PCCPCH + SCH	PCCPCH + SCH + 1 DPCH	PCCPCH + SCH + 3 DPCH		Test Model 1 w/ 16 DPCH		Test Model 1 w/ 32 DPCH		Test Model 1 w/ 64 DPCH	Test Model 2	Test Model 3 w/ 16 DPCH		Test Model 3 w/ 32 DPCH	Test Model 4	Test Model 5 w/2HSPDSCH		Test Model 5 w/4HSPDSCH		Test Model 5 w/8HSPDSCH			
1 DPCH	3 DPCH	PCCPCH + SCH	PCCPCH + SCH + 1 DPCH																						
PCCPCH + SCH + 3 DPCH		Test Model 1 w/ 16 DPCH																							
Test Model 1 w/ 32 DPCH		Test Model 1 w/ 64 DPCH	Test Model 2																						
Test Model 3 w/ 16 DPCH		Test Model 3 w/ 32 DPCH	Test Model 4																						
Test Model 5 w/2HSPDSCH		Test Model 5 w/4HSPDSCH																							
Test Model 5 w/8HSPDSCH																									
Remarks	Refer to “ File Name Variables ” on page 13 for information on the file name syntax.																								

:LINK:DOWN:SETup:MCARrier

Supported E4438C with Option 400

```
[ :SOURCE ]:RADIO:WCDMA:TGPP:ARB:LINK:DOWN:SETup:MCARrier CAR2|CAR3|CAR4 |
CAR4TM1D64| "<file name>"
```

```
[ :SOURCE ]:RADIO:WCDMA:TGPP:ARB:LINK:DOWN:SETup:MCARrier?
```

This command defines the type of multicarrier W-CDMA setup.

CAR2 a standard 2-carrier setup with the following settings:

Carrier 1: PCCPCH + SCH, -7.5 MHz frequency offset, 0 dB power

Carrier 2: PCCPCH + SCH, 7.5 MHz frequency offset, 0 dB power

CAR3	a standard 3-carrier setup with the following settings: Carrier 1: PCCPCH + SCH, –5 MHz frequency offset, 0 dB power Carrier 2: PCCPCH + SCH, 0 kHz frequency offset, 0 dB power Carrier 3: PCCPCH + SCH, 5 MHz frequency offset, 0 dB power
CAR4	a standard 4-carrier setup with the following settings: Carrier 1: PCCPCH + SCH, –7.5 MHz frequency offset, 0 dB power Carrier 2: PCCPCH + SCH, –2.5 MHz frequency offset, 0 dB power Carrier 3: PCCPCH + SCH, 2.5 MHz frequency offset, 0 dB power Carrier 4: PCCPCH + SCH, 7.5 MHz frequency offset, 0 dB power
CAR4TM1D64	a standard 4-carrier test model 1 with 64 dedicated physical channels setup with the following settings: Carrier 1: Test Model 1 w/64 DPCH, –7.5 MHz frequency offset, 0 dB power Carrier 2: Test Model 1 w/64 DPCH, –2.5 MHz frequency offset, 0 dB power Carrier 3: Test Model 1 w/64 DPCH, 2.5 MHz frequency offset, 0 dB power Carrier 4: Test Model 1 w/64 DPCH, 7.5 MHz frequency offset, 0 dB power
*RST	CAR2
Key Entry	2 Carriers 3 Carriers 4 Carriers
Remarks	Refer to “File Name Variables” on page 13 for information on the file name syntax.

:LINK:DOWN:SETup:MCARrier:CLIPping:I**Supported** E4438C with Option 400

[:SOURCE]:RADIO:WCDMA:TGPP:ARB:LINK:DOWN:SETup:MCARrier:CLIPping:I <val>

[:SOURCE]:RADIO:WCDMA:TGPP:ARB:LINK:DOWN:SETup:MCARrier:CLIPping:I?

This command limits the modulation level of the waveform's I component to a percentage of full scale.

The variable <val> is expressed in units of percent.

RST** +1.00000000E+002**Range** 10–100**Key Entry** Clip III To**:LINK:DOWN:SETup:MCARrier:CLIPping:Q*Supported** E4438C with Option 400

[:SOURCE]:RADIO:WCDMA:TGPP:ARB:LINK:DOWN:SETup:MCARrier:CLIPping:Q <val>

[:SOURCE]:RADIO:WCDMA:TGPP:ARB:LINK:DOWN:SETup:MCARrier:CLIPping:Q?

This command limits the modulation level of the waveform's Q component to a percentage of full scale.

The variable <val> is expressed in units of percent.

***RST** +1.00000000E+002**Range** 10–100**Key Entry** Clip |Q| To

:LINK:DOWN:SETup:MCARrier:CLIPping:TYPE**Supported** E4438C with Option 400

```
[ :SOURce ] :RADio:WCDMa:TGPP:ARB:LINK:DOWN:SETup:MCARrier:CLIPping:
TYPE IJQ|IORQ
[ :SOURce ] :RADio:WCDMa:TGPP:ARB:LINK:DOWN:SETup:MCARrier:CLIPping:TYPE?
```

This command selects either IJQ or IORQ as the clipping type.

IJQ The combined I and Q waveform will be clipped (*circular clipping*).

IORQ The I and Q components of the waveform are clipped independently (*rectangular clipping*). I and Q can be clipped to different levels using this mode.

***RST** IJQ

Key Entry Clipping Type |I+jQ| |I|,|Q|

:LINK:DOWN:SETup:MCARrier:CLIPping[:IJQ]**Supported** E4438C with Option 400

```
[ :SOURce ] :RADio:WCDMa:TGPP:ARB:LINK:DOWN:SETup:MCARrier:
CLIPping[ :IJQ ] <val>
[ :SOURce ] :RADio:WCDMa:TGPP:ARB:LINK:DOWN:SETup:MCARrier:CLIPping[ :IJQ ]?
```

This command clips (limits) the modulation level of the combined I and Q waveform to a percentage of full scale.

The variable <val> is expressed in units of percent.

***RST** +1.00000000E+002

Range 10–100

Key Entry Clip |I+jQ| To

:LINK:DOWN:SETup:MCARrier:SCODE:AINCrement**Supported** E4438C with Option 400

```
[ :SOURce ] :RADio:WCDMa:TGPP:ARB:LINK:DOWN:SETup:MCARrier:SCODE:AINCrement
```

This command will sort carriers by frequency offset and auto-increment scramble codes starting from the current scramble code value for the lowest frequency carrier.

Key Entry Increment Scramble Code

Remarks If the lowest frequency carrier has a scramble code value of N/A, the auto-increment value will start at 0.

:LINK:DOWN:SETup:MCARrier:STORe**Supported** E4438C with Option 400

[:SOURCE]:RADIO:WCDMA:TGPP:ARB:LINK:DOWN:SETup:MCARrier:STORe "<file name>"

This command stores the current multicarrier setup information.

The stored file contains information including the digital modulation format, number of carriers, frequency spacing, and power settings for the multicarrier setup.

Key Entry Store Custom Multicarrier

Remarks User defined files created using firmware prior to C.02.40 did not save the setting for Increment Scramble Code, Increment Timing Offset, and Clipping Type settings. When loading user defined files created with firmware prior to C.02.40, Increment Scramble Code and Increment Timing Offset will default to Off and the Clipping Type settings will default to 100%. Firmware C.02.40 will save the Increment Scramble Code, Increment Timing Offset and Clipping Type settings.

Refer to [“File Name Variables” on page 13](#) for information on the file name syntax.

:LINK:DOWN:SETup:MCARrier:TABLE**Supported** E4438C with Option 400

```
[:SOURCE]:RADIO:WCDMA:TGPP:ARB:LINK:DOWN:SETup:MCARrier:TABLE INIT |
APPend |<carrier_num>,DPCH1|DPCH3|PPSCH|PPDPCH1|PPDPCH3|TM1D16|TM1D32|
TM1D64|TM2|TM3D16|TM3D32|TM4|TM5H2|TM5H4|TM5H8|"<filename>",<freq_offset
>,<power>[,<scramble code>,<timing offset>,<initial phase>,<pre-FIR circular clipping>[<clipping units {pct}|dB>],
<post-FIR circularclipping>[<clipping units {pct}|dB>]]
[:SOURCE]:RADIO:WCDMA:TGPP:ARB:LINK:DOWN:SETup:MCARrier:
TABLE? <carrier_num>
```

This command defines the multicarrier format and waveform.

Use INIT to clear the table and define the parameters for the first carrier; use APPend to add new channels. To edit an existing carrier, use its carrier number (<carrier_num>).

The variable <freq_offset> is expressed in units of Hertz (kHz–MHz).

The variable <power> is expressed in units of decibels (dB).

The carrier type, frequency offset, and power level are returned when a query is initiated. The output format is as follows:

```
<carrier type>,<freq_offset>,<power>
```

INIT	This choice clears the current information and creates a new one-row table, allowing for further definition using additional parameters.
APPend	This choice adds rows to an existing table. The maximum number of rows for one table is 16.
DPCH1	This choice selects 1 dedicated physical channel.
DPCH3	This choice selects 3 dedicated physical channels.
PPSCH	This choice selects a primary command control physical channel (PCCPCH) with a synchronization channel (SCH).
PPDPCH1	This choice selects a primary command control physical channel (PCCPCH) with a dedicated physical channel (DPCH).
PPDPCH3	This choice selects a primary command control physical channel (PCCPCH) with 3 dedicated physical channels.
TM1D16	This choice selects a test model 1 with 16 dedicated physical channels.
TM1D32	This choice selects a test model 1 with 32 dedicated physical channels.
TM1D64	This choice selects a test model 1 with 64 dedicated physical channels.
TM2	This choice selects a test model 2.
TM3D16	This choice selects a test model 3 with 16 dedicated physical channels.
TM3D32	This choice selects a test model 3 with 32 dedicated physical channels.
TM4	This choice selects a test model 4.
TM5H2	This choice selects a Test Model 5 with 6 DPCH and 2 HS-PDSCH (high speed physical shared channel) channels downlink W-CDMA setup.
TM5H4	This choice selects a Test Model 5 with 14 DPCH and 4 HS-PDSCH (high speed-physical downlink shared channel) channels downlink W-CDMA setup.
TM5H8	This choice selects a Test Model 5 with 30 DPCH and 8 HS-PDSCH (high speed physical shared channel) channels downlink W-CDMA setup.
<scramble code>	This variable sets the scramble code value.
<timing offset>	This variable sets the timing offset value.
<initial phase>	This variable sets the initial phase value. The units are not specified but the value represents degrees.
<clipping>	This variable sets the clipping value. If the units are not specified, the value will default to percent.

<carrier_num>	This variable specifies the number of multicarriers.
*RST	<i>carrier type</i> : PPSCH <freq_offset>: +7.5000000E+006 <power>: +0.0000000E+000
Range	<freq_offset>: -37.5E6 to 37.5E6 <power>: -40 to 0 <i>scramble code</i> : 0–511 <i>timing offset</i> : 0–149 <i>initial phase</i> : 0–359 <i>clipping(in units of percent)</i> : 0.0–100.0 or 0.0 to -20.0 (if units are dB)
Key Entry	1 DPCH 3 DPCH PCCPCH + SCH PCCPCH + SCH + 1 DPCH PCCPCH + SCH + 3 DPCH Test Model 1 w/ 16 DPCH Test Model 1 w/ 32 DPCH Test Model 1 w/ 64 DPCH Test Model 2 Test Model 3 w/ 16 DPCH Test Model 3 w/ 32 DPCH Test Model 4 Test Model 5 w/2HSPDSCH Test Model 5 w/4HSPDSCH Test Model 5 w/8HSPDSCH
Remarks	Refer to “ File Name Variables ” on page 13 for information on the file name syntax. If the parameter set by this command is changed while the signal is active, the apply command must be executed for the change to occur. Refer to “ :LINK:DOWN:SETup:TABLE:APPLY ” on page 350 .

:LINK:DOWN:SETup:MCARrier:TABLE:NCARriers**Supported** E4438C with Option 400

[:SOURCE]:RADIO:WCDMA:TGPP:ARB:LINK:DOWN:SETup:MCARrier:TABLE:NCARriers?

This command queries the number of carriers specified for the W-CDMA multicarrier waveform.

RST** +2**:LINK:DOWN:SETup:MCARrier:TOFFset:AInCrement*Supported** E4438C with Option 400

[:SOURCE]:RADIO:WCDMA:TGPP:ARB:LINK:DOWN:SETup:MCARrier:TOFFset:AInCrement

This command will sort carriers by frequency offset and auto-increment timing offsets. The new values will start with the current timing offset for the lowest frequency carrier and increment by one for each subsequent carrier.

Key Entry Increment Timing Offset

:LINK:DOWN:SETup:STORe**Supported** E4438C with Option 400

[:SOURce]:RADio:WCDMa:TGPP:ARB:LINK:DOWN:SETup:STORe "<file name>"

This command stores the current downlink setup information into the memory catalog with the entered file name.

Along with the contents of the W-CDMA channel table editor (channel types, Walsh code, power levels, PN offset, and data), this command stores the following information to the signal generator memory:

- FIR filter
- FIR filter file name
- FIR filter alpha
- FIR filter BbT
- FIR filter channel (EVM or ACP)
- I/Q mapping
- increment scramble code
- increment timing offset
- link
- spread type
- spread rate
- ARB reference clock source (internal or external)
- ARB reference clock frequency
- clipping
- multicarrier spacing
- radio configuration

Key Entry Store Custom W-CDMA State**Remarks** Refer to [“File Name Variables” on page 13](#) for information on the file name syntax.**:LINK:DOWN:SETup:TABLE:APPLy****Supported** E4438C with Option 400

[:SOURce]:RADio:WCDMa:TGPP:ARB:LINK:DOWN:SETup:TABLE:APPLy

This command generates a W-CDMA signal based on the current values in the W-CDMA channel setup table editor.

Key Entry Apply Channel Setup

:LINK:DOWN:SETup:TABLE:CHANnel**Supported** E4438C with Option 400

```
[ :SOURCE ] :RADIO:WCDMA:TGPP:ARB:LINK:DOWN:SETup:TABLE:CHANnel INIT |
APPend | <chan_num> , <chan_type> , <symbol_rate> , <spread_code> , <power> ,
<timing_offset> , <TFCI> , <TPC> , <scramble_code> , STANdard | RALternate |
LALternate , <scramble_offset> , RANDom | PN9 | PINDicator |
<data_val> , <TFCI_power> , <TPC_power> , <pilot_power> , <pilot_bits>
[ :SOURCE ] :RADIO:WCDMA:TGPP:ARB:LINK:DOWN:SETup:TABLE:CHANnel? <chan_num>
```

This command sets up the W-CDMA downlink channel type parameters.

Use INIT to clear the table editor and define the parameters for the first channel; use APPend to add new channels. To edit an existing channel, use its channel number <chan_num>.

The <power>, <TFCI_power>, <TPC_power>, and <pilot_power> variables are expressed in units of decibels (dB).

The channel type, symbol rate, spread code, power, timing offset, TFCI value, TPC value, scramble code, scramble type, scramble offset, data type, TFCI power, TPC power, pilot power, and the number of pilot bits are returned when a query is initiated. The output format is as follows:

```
<chan_type> , <symbol_rate> , <spread_code> , <power> , <tDPCH_offset> , <TFCI> ,
<TPC> , <scramble_code> , <scramble_type> , <scramble_code> , <scramble_offset> ,
<data_type> , <TFCI_power> , <TPC_power> , <pilot_power> , <pilot_bits>
```

INIT This choice clears the current information and creates a new one-row table, allowing for further definition using additional parameters.

APPend This choice adds a row to an existing table.

<chan_num> This variable sets the physical channel number.

<chan_type> This variable sets the channel type.

<timing_offset> This variable sets the symbol offset.

<TFCI> This variable sets the transport format combination indicator.

<TPC> This variable sets the transmit power control.

STANdard This choice sets the scramble type to standard.

RALternate This choice sets the scramble type to right alternate.

LALternate This choice sets the scramble type to left alternate.

RANDom This choice sets a randomly generated pseudo-random sequence pattern as output data.

- PN9 This choice sets an internally generated 9-bit pseudo-random sequence pattern as output data.
- PINDicator This choice sets the paging indicator channel (PICH).
- <data_val> This variable sets the data value.
- <TFCI_power> This variable sets the transport format combination indicator power offset.
- <TPC_power> This variable sets the transport power control power offset.
- <pilot_power> This variable sets the pilot power offset.
- <pilot_bits> This variable sets the number of pilot bits that will be in the dedicated physical channel (DPCH).

Table 5-1 Variables and Channel Types

	SSCH	CPICH	PCCPCH	SCCPCH	PICH	DPCH	OCNS	PSCH
Channel number	X	X	X	X	X	X	X	X
Symbol rate	N/A	N/A	N/A	X	N/A	X	X	N/A
Spread code	N/A	X	X	X	X	X	X	N/A
Power	X	X	X	X	X	X	X	X
Symbol offset	N/A	N/A	N/A	N/A	X	X	N/A	N/A
TFCI	N/A	N/A	N/A	X	N/A	X	N/A	N/A
TPC	N/A	N/A	N/A	N/A	N/A	X	N/A	N/A
Scramble code	X	X	X	X	X	X	X	N/A
Standard	X	X	X	N/A	X	X	X	N/A
Right alternate	X	X	X	N/A	X	X	X	N/A
Left alternate	X	X	X	N/A	X	X	X	N/A
Scramble offset	X	X	X	X	X	X	X	N/A
Random	N/A	N/A	X	X	X	X	X	N/A
PN9	N/A	N/A	X	X	X	X	X	N/A

Table 5-1 Variables and Channel Types

	SSCH	CPICH	PCCPCH	SCCPCH	PICH	DPCH	OCNS	PSCH
Paging Indicator	N/A	N/A	N/A	N/A	X	N/A	N/A	N/A
Data value	N/A	N/A	X	N/A	X	X	X	N/A
TFCI power	N/A	N/A	N/A	N/A	X	N/A	N/A	N/A
Pilot power offset	N/A	N/A	N/A	N/A	X	N/A	N/A	N/A
Pilot bits	N/A	N/A	N/A	X	X	N/A	N/A	N/A

Table 5-2 Variables and Channel Types

	HSPDSCH	HSSCCH
Channel number	X	X
Symbol rate	N/A (fixed to 30ksps)	N/A (fixed to 240ksps)
Spread code	X	X
Power	X	X
Symbol offset	X	X
TFCI	N/A	N/A
TPC	N/A	N/A
Scramble code	X	X
Standard	X	X
Right alternate	X	X
Left alternate	X	X
Scramble offset	X	X
Random	X	X
PN9	X	X
Paging Indicator	N/A	N/A

Table 5-2 Variables and Channel Types

	HSPDSCH	HSSCCH
Data value	X	X
TFCI power	N/A	N/A
Pilot power offset	N/A	N/A
Pilot bits	N/A	N/A

***RST** <chan_type>: DPCH <symbol_rate>: +3.00000000E+004
 <spread_code>: +8 <scramble_offset>: +0.00000000E+000
 power: +0.00000000E+000 <tDPCH_offset>: +0 <TFCI>: +0
 <TPC>: #H5555 <scramble_code>: +0 scramble type: STAN
 <TFCI_power>: +0.00000000E+000
 <TPC_power>: +0.00000000E+000 <pilot_power>: +0.00000000E+000
 <pilot_bits>: +4

Range <chan_type>: PSCH SSCH CPICH PCCPch SCCPch
 DPCH PICH OCNS HSSCch HSPDsch
 <power>: -40 to 0 <tDPCH_offset>: 0-149 <TFCI>: 0-1023
 <TPC>: 0000-7FFF <scramble_code>: 0-511
 <scramble_offset>: 0-15 <data_val>: 00000000-11111111
 <TFCI_power>: -20 to 20 <TPC_power>: -20 to 20
 <pilot_power>: 0000-7FFF <pilot_bits>: 0-511

SCCPCH Channel

<symbol_rate>	<spread_code>	*<pilot_bits>
15 ksps	0-256	0,8
30 ksps	0-128	0,8
60 ksps	0-64	0,8
120 ksps	0-32	0,8
240 ksps	0-16	0,16
480 ksps	0-8	0,16
960 ksps	0-4	0,16

All Other Channels

<symbol_rate>	<spread_code>	<pilot_bits>
7.5 ksps	0-511	4

All Other Channels

<symbol_rate>	<spread_code>	<pilot_bits>
15 ksps	0–255	2,4,8
30 ksps	0–127	4,8
60 ksps	0–63	8
120 ksps	0–31	8
240 ksps	0–15	16
480 ksps	0–7	16
960 ksps	0–3	16

Key Entry	Channel	Type	Symbol Rate	First Spread Code		Power		
	Spread Code		TFCI Field Off On	Scramble Code		Scramble Offset		
	Random	PN9	Standard	Left Alternate	Right Alternate			
	PCCPCH	SCCPCH	PSCH	SSCH	CPICH	DPCH	PICH	OCNS
	HSPDSCH	HSSCCH						
Field Entry	Spread Code	Power	Timing		TFCI	Scramble Code		
			Offset					
	TFCI	TPC		Pilot Power	Pilot Bits	Data		
	Power	Power						
	Scramble	Scramble						
	Type	Offset						

Remarks

For additional information, refer to the 3GPP TS 25.211 (V 3.7) standard.

If the parameter set by this command is changed while the signal is active, the apply command must be executed for the change to occur. Refer to “:LINK:DOWN:SETup:TABLE:APPLY” on page 350.

:LINK:DOWN:SETup:TABLE:NChannels?

Supported E4438C with Option 400

[:SOURCE] :RADIO:WCDMA:TGPP:ARB:LINK:DOWN:SETup:TABLE:NChannel?

This command queries the number of channels being used for the carrier.

***RST** 1

:LINK:DOWN:SETup:TABLE:PADJust**Supported** E4438C with Option 400

[:SOURce]:RADio:WCDMa:TGPP:ARB:LINK:DOWN:SETup:TABLE:PADJust EQUal|SCALE

This command sets the code domain power.

EQUal This choice will adjust all channel powers to have equal energy per symbol, referenced to 7.5 kbps and increasing by 3 dB for each doubling of the symbol rate.**SCALE** This choice will scale the channel power levels so that the sum of the powers are equal to 0 dB.**Key Entry** **Equal Energy per Symbol** **Scale To 0dB****Remarks** This command is available in downlink only.**:LINK:DOWN:TFCI****Supported** E4438C with Option 400

[:SOURce]:RADio:WCDMa:TGPP:ARB:LINK:DOWN:TFCI ON|OFF|1|0

[:SOURce]:RADio:WCDMa:TGPP:ARB:LINK:DOWN:TFCI?

This command enables or disables the transport format combination indicator (TFCI) field for all channels.

RST** 1**Key Entry** **TFCI Field Off On*:LINK:UP:OACP****Supported** E4438C with Option 400

[:SOURce]:RADio:WCDMa:TGPP:ARB:LINK:UP:OACP ADJ|ALT

[:SOURce]:RADio:WCDMa:TGPP:ARB:LINK:UP:OACP?

This command selects the channel power optimization type for any uplink channel W-CDMA setup.

ADJ This choice optimizes for adjacent channel power.**ALT** This choice optimizes for alternate channel power.***RST** ADJ**Key Entry** **Optimize ACP ADJ ALT****Remarks** This command is only operational for any uplink channel W-CDMA setup.

To change the current W-CDMA setup information, refer to “:LINK:UP:SETup” on page 357.

:LINK:UP:SCRAMBLE

Supported E4438C with Option 400

```
[ :SOURce ] :RADIo:WCDMa:TGPP:ARB:LINK:UP:SCRAMBLE <val>
[ :SOURce ] :RADIo:WCDMa:TGPP:ARB:LINK:UP:SCRAMBLE?
```

This command sets the scramble code for the uplink.

***RST** #H000000

Range #H0–FFFFFFF

Key Entry Scramble Code

:LINK:UP:SDPDch

Supported E4438C with Option 400

```
[ :SOURce ] :RADIo:WCDMa:TGPP:ARB:LINK:UP:SDPDch I | Q
[ :SOURce ] :RADIo:WCDMa:TGPP:ARB:LINK:UP:SDPDch?
```

This command selects whether the second dedicated physical data channel (SDPDCH) will be put onto I or Q.

***RST** Q

Key Entry Second DPDCH I Q

:LINK:UP:SETup

Supported E4438C with Option 400

```
[ :SOURce ] :RADIo:WCDMa:TGPP:ARB:LINK:UP:SETup DPCCH|DDPDCH1|DDPDCH2|
DDPDCH3|DDPDCH4|DDPDCH5|"<file name>"
[ :SOURce ] :RADIo:WCDMa:TGPP:ARB:LINK:UP:SETup?
```

This command selects a dedicated physical control channel (DPCCH) for uplink with the option to add one or more dedicated physical data channel (DPDCH) or a previously stored setup.

DPCCH This choice selects 1 dedicated physical control channel.

DDPDCH1 This choice selects 1 dedicated physical control channel and 1 dedicated physical data channel.

DDPDCH2	This choice selects 1 dedicated physical control channel and 2 dedicated physical data channel.								
DDPDCH3	This choice selects 1 dedicated physical control channel and 3 dedicated physical data channel.								
DDPDCH4	This choice selects 1 dedicated physical control channel and 4 dedicated physical data channel.								
DDPDCH5	This choice selects 1 dedicated physical control channel and 5 dedicated physical data channel.								
*RST	DPCCH								
Key Entry	<table border="0" style="width: 100%;"> <tr> <td>DPCCH</td> <td>DPCCH + 1 DPDCH</td> <td>DPCCH + 2 DPDCH</td> <td>DPCCH + 3 DPDCH</td> </tr> <tr> <td>DPCCH + 4 DPDCH</td> <td>DPCCH + 5 DPDCH</td> <td colspan="2">Custom WCDMA State</td> </tr> </table>	DPCCH	DPCCH + 1 DPDCH	DPCCH + 2 DPDCH	DPCCH + 3 DPDCH	DPCCH + 4 DPDCH	DPCCH + 5 DPDCH	Custom WCDMA State	
DPCCH	DPCCH + 1 DPDCH	DPCCH + 2 DPDCH	DPCCH + 3 DPDCH						
DPCCH + 4 DPDCH	DPCCH + 5 DPDCH	Custom WCDMA State							
Remarks	<p>Refer to “File Name Variables” on page 13 for information on the file name syntax.</p> <p>If the parameter set by this command is changed while the signal is active, the apply command must be executed for the change to occur. Refer to “:LINK:UP:SETup:TABLE:APPLY” on page 359.</p>								

:LINK:UP:SETup:STORe

Supported E4438C with Option 400

[:SOURce] :RADio :WCDMa :TGPP :ARB :LINK :UP :SETup :STORe "<file name>"

This command stores the current state into a designated file name.

Key Entry Store To File

Remarks You can recall a saved state from signal generator memory (non-volatile) by executing the following commands (using a designated file name):

For downlink, refer to “[:LINK:DOWN:SETup](#)” on page 342.

For uplink, refer to “[:LINK:UP:SETup](#)” on page 357.

Refer to “[File Name Variables](#)” on page 13 for information on the file name syntax.

:LINK:UP:SETup:TABLE:APPLY**Supported** E4438C with Option 400

[:SOURCE]:RADIO:WCDMA:TGPP:ARB:LINK:UP:SETup:TABLE:APPLY

This command applies the signal based on the current values in the W-CDMA channel setup table editor.

Key Entry Apply Channel Setup**Remarks** Refer to “File Name Variables” on page 13 for information on the file name syntax.**:LINK:UP:SETup:TABLE:CHANnel****Supported** E4438C with Option 400[:SOURCE]:RADIO:WCDMA:TGPP:ARB:LINK:UP:SETup:TABLE:CHANnel
INIT|APPend|<chan_num>, <chan_type>, <symbol_rate>, <spread_code> ,

wer>, <TFCI>, <TCP>, RANDOM|<data_val>, <fbi_bits_count>, <fbi_bits_value>
[:SOURCE]:RADIO:WCDMA:TGPP:ARB:LINK:UP:SETup:TABLE:CHANnel? <chan_num>

This command defines the channel parameters of the signal.

Use INIT to clear the table editor and define the parameters for the first channel; use APPend to add new channels. To edit an existing channel, use its channel number <chan_num>.

The variable <power> is expressed in units of decibels (dB).

The channel type, symbol rate, spread code, power, TFCI value, TPC value, data value, FBI bit count, and FBI bit value are returned when a query is initiated. The output format is as follows:

<chan_type>,<symbol_rate>,<spread_code>,<power>,<TFCI>,<TCP>,<data_val>,
<fbi_bits_count>,<fbi_bits_value>

INIT This choice clears the current information and creates a new one-row table, allowing for further definition using additional parameters.

APPend This choice adds a row to an existing table.

RANDOM This choice selects random data format for the digital modulation signal.

<fbi_bits_count> This variable sets the number of feedback information (FBI) bits.

<fbi_bits_value> This variable sets the value of the FBI bits.

Wideband CDMA ARB Subsystem–Option 400 ([:SOURce]:RADio:WCDMa:TGPP:ARB)

***RST** <chan_type>: DPCH <symbol_rate>: +1.50000000E+
 <spread_code>: +0 <power>: +0.00000000E+000 <TFCI>: +0
 <TPC>: #H5555 <data_val>: RAND <FBI Bits Count>: +0
 <FBI Bit Count>: +0

Range <power>: -40 to 0 <data_val>: 00000000–11111111
 <fbi_bits_count>: 0–2 <fbi_bits_value>: 0–3

<symbol_rate>	<spread_rate>
7.5 ksps	0–511
15 ksps	0–255
30 ksps	0–127
60 ksps	0–63
120 ksps	0–31
240 ksps	0–15
480 ksps	0–7
960 ksps	0–3

Key Entry	Channel	Type	Symbol Rate	First Spread Code	Power
	Spread Code	TFCI Field Off On	Scramble Code	Scramble Offset	
	Random				

Remarks If the parameter set by this command is changed while the signal is active, the apply command must be executed for the change to occur. Refer to “:LINK:UP:SETup:TABLE:APPLy” on page 359.

:LINK:UP:SETup:TABLE:GUNit

Supported E4438C with Option 400

[:SOURce] :RADio:WCDMa:TGPP:ARB:LINK:UP:SETup:TABLE:GUNit DB|LINear|INDex
 [:SOURce] :RADio:WCDMa:TGPP:ARB:LINK:UP:SETup:TABLE:GUNit?

This command selects the uplink power measurement units.

DB The power is set in decibels-exponential.
LINear The power is set to increase linearly.
INDex The power is set at an index level - steps.

***RST** DB

Key Entry Gain Unit dB Lin Index

Remarks If the parameter set by this command is changed while the signal is active, the apply command must be executed for the change to occur. Refer to “:LINK:UP:SETup:TABLE:APPLy” on page 359.

:LINK:UP:SETup:TABLE:NCHannel**Supported** E4438C with Option 400

[:SOURCE]:RADIO:WCDMA:TGPP:ARB:LINK:UP:SETup:TABLE:NCHannels?

This command queries the setup table for the number of uplink channels.

RST** 1**:LINK:UP:TFCI*Supported** E4438C with Option 400

[:SOURCE]:RADIO:WCDMA:TGPP:ARB:LINK:UP:TFCI ON|OFF|1|0

[:SOURCE]:RADIO:WCDMA:TGPP:ARB:LINK:UP:TFCI?

This command enables or disables the transport format combination indicator (TFCI) field for all channels in the table.

RST** 1**Key Entry** TFCI Field Off On**:MDEStination:PULSe*Supported** E4438C with Option 400

[:SOURCE]:RADIO:WCDMA:TGPP:ARB:MDEStination:PULSe NONE|M1|M2|M3|M4

[:SOURCE]:RADIO:WCDMA:TGPP:ARB:MDEStination:PULSe?

This command routes the selected marker to the Pulse/RF Blanking function. The NONE parameter clears the marker for the Pulse/RF Blanking function.

***RST** NONE**Key Entry** None Marker 1 Marker 2 Marker 3 Marker 4

:MDESTINATION:AAMPLITUDE**Supported** E4438C with Option 400

```
[ :SOURCE ] : RADIO : WCDMA : TGPP : ARB : MDESTINATION : AAMPLITUDE NONE | M1 | M2 | M3 | M4
[ :SOURCE ] : RADIO : WCDMA : TGPP : ARB : MDESTINATION : AAMPLITUDE?
```

This command routes the selected marker to the Alternate Amplitude function. The `NONE` parameter clears the marker to the Alternate Amplitude function.

RST** NONE**Key Entry** None Marker 1 Marker 2 Marker 3 Marker 4**:MDESTINATION:ALCHOLD*Supported** E4438C with Option 400

```
[ :SOURCE ] : RADIO : WCDMA : TGPP : ARB : MDESTINATION : ALCHOLD NONE | M1 | M2 | M3 | M4
[ :SOURCE ] : RADIO : WCDMA : TGPP : ARB : MDESTINATION : ALCHOLD?
```

This command routes the selected marker to the ALC Hold function. The `NONE` parameter clears the marker for the ALC Hold function.

RST** NONE**Key Entry** None Marker 1 Marker 2 Marker 3 Marker 4**:MPOLARITY:MARKER1*Supported** E4438C with Option 400

```
[ :SOURCE ] : RADIO : WCDMA : TGPP : ARB : MPOLARITY : MARKER1 NEGATIVE | POSITIVE
[ :SOURCE ] : RADIO : WCDMA : TGPP : ARB : MPOLARITY : MARKER1?
```

This command sets the polarity for marker 1.

***RST** POS**Key Entry** Marker 1 Polarity Neg Pos

:MPOLarity:MARKer2**Supported** E4438C with Option 400[:SOURCE]:RADIO:WCDMA:TGPP:ARB:MPOLarity:MARKer2 NEGative|POSitive
[:SOURCE]:RADIO:WCDMA:TGPP:ARB:MPOLarity:MARKer2?

This command sets the polarity for marker 2.

RST** POS**Key Entry** Marker 2 Polarity Neg Pos**:MPOLarity:MARKer3*Supported** E4438C with Option 400[:SOURCE]:RADIO:WCDMA:TGPP:ARB:MPOLarity:MARKer3 NEGative|POSitive
[:SOURCE]:RADIO:WCDMA:TGPP:ARB:MPOLarity:MARKer3?

This command sets the polarity for marker 3.

RST** POS**Key Entry** Marker 3 Polarity Neg Pos**:MPOLarity:MARKer4*Supported** E4438C with Option 400[:SOURCE]:RADIO:WCDMA:TGPP:ARB:MPOLarity:MARKer4 NEGative|POSitive
[:SOURCE]:RADIO:WCDMA:TGPP:ARB:MPOLarity:MARKer4?

This command sets the polarity for marker 4.

***RST** POS**Key Entry** Marker 4 Polarity Neg Pos

:REfERENCE:EXtERnal:FREQuency**Supported** E4438C with Option 400

[:SOURce]:RADio:WCDMa:TGPP:ARB:REfERENCE:EXtERnal:FREQuency <val>

[:SOURce]:RADio:WCDMa:TGPP:ARB:REfERENCE:EXtERnal:FREQuency?

This command sets the external reference frequency.

The variable <val> is expressed in Hertz (Hz).

***RST** +1.00000000E+007**Range** 2.5E5–1E8**Remarks** The value specified by this command is effective only when you are using an external ARB reference applied to the BASEBAND GEN REF IN rear panel connector.

To specify external as the ARB reference source type, refer to “:REfERENCE[:SOURce]” on page 214.

:REfERENCE[:SOURce]**Supported** E4438C with Option 400

[:SOURce]:RADio:WCDMa:TGPP:ARB:REfERENCE[:SOURce] INTernal | EXtERnal

[:SOURce]:RADio:WCDMa:TGPP:ARB:REfERENCE[:SOURce]?

This command selects either an internal or external reference for the waveform clock.

***RST** 0**Key Entry** ARB Reference Ext Int**Remarks** If the EXtERnal choice is selected, the external frequency value *must* be entered and the signal must be applied to the BASEBAND GEN REF IN rear panel connector.

Refer to “:REfERENCE:EXtERnal:FREQuency” on page 364 to enter the external reference frequency.

:RETRigger**Supported** E4438C with Option 400

[:SOURCE]:RADIO:WCDMA:TGPP:ARB:RETRigger ON|OFF|IMMEDIATE

[:SOURCE]:RADIO:WCDMA:TGPP:ARB:RETRigger?

This command sets the retrigger mode.

ON This choice specifies that if a trigger occurs while a waveform is initiated, the waveform will retrigger at the end of the previous waveform sequence and play once more.

OFF This choice specifies that if a trigger occurs while a waveform is initiated, the action will be ignored.

IMMEDIATE This choice specifies that if a trigger occurs while a waveform is playing, the waveform will reset and replay from the start immediately upon receiving a trigger.

RST** 0**Key Entry** Retrigger Mode Off On**:REVISION*Supported** E4438C with Option 400

[:SOURCE]:RADIO:WCDMA:TGPP:ARB:REVISION?

This command checks the version for the arbitrary waveform generator firmware.

***RST** 3GPP 06-2001

:SCLock:RATE

Supported E4438C with Option 400

```
[ :SOURce ] :RADio:WCDMa:TGPP:ARB:SCLock:RATE <val>
```

```
[ :SOURce ] :RADio:WCDMa:TGPP:ARB:SCLock:RATE?
```

This command sets the sample clock rate for the W-CDMA modulation format.

The variable <val> is expressed in units of hertz.

***RST** +1.00000000E+008

Range 1–1E8

Key Entry ARB Sample Clock

Remarks The modulation format should be active before executing this command. If this command is executed before the modulation format is active, the entered value will be overridden by a calculated factory default value. Refer to “[:STATe]” on [page 373](#) to activate the modulation format.

:TRIGger:TYPE

Supported E4438C with Option 400

```
[ :SOURce ] :RADio:WCDMa:TGPP:ARB:TRIGger:TYPE CONTinuous | SINGLE | GATE
```

```
[ :SOURce ] :RADio:WCDMa:TGPP:ARB:TRIGger:TYPE?
```

This command sets the trigger mode (type) that controls the waveform’s playback.

Triggers control the playback by telling the ESG when to play the modulating signal (waveform). Depending on the trigger settings for the ESG, the waveform playback can occur once, continuously, or the ESG may start and stop playing the waveform repeatedly (GATE mode).

A trigger signal comprises both positive and negative signal transitions (states), which are also called high and low periods. You can configure the ESG to trigger on either state of the trigger signal. It is common to have multiple triggers, also referred to as trigger occurrences or events, occur when the signal generator requires only a single trigger. In this situation, the ESG recognizes the first trigger and ignores the rest.

When you select a trigger mode, you may lose the signal (carrier plus modulating) from the RF output until you trigger the waveform. This is because the ESG sets the I and Q signals to zero volts prior to the first trigger event, which suppresses the carrier. After the first trigger event, the waveform’s final I and Q levels determine whether you will see the carrier signal or not (zero = no carrier, other values = carrier visible). At the end of most files, the final I and Q points are set to a value other than zero.

There are four parts to configuring the trigger:

- Choosing the trigger type, which controls the waveform’s transmission.
- Setting the waveform’s response to triggers:
 - CONTInuous, see “:TRIGger:TYPE:CONTInuous[:TYPE]” on page 368
 - SINGle, see “:RETRigger” on page 365
 - GATE, selecting the mode also sets the response
- Selecting the trigger source (see “:TRIGger[:SOURCE]” on page 369), which determines how the ESG receives its trigger signal, internally or externally. The GATE choice requires an external trigger.
- Setting the trigger polarity when using an external source:
 - CONTInuous and SINGle see “:TRIGger[:SOURCE]:EXTErnal:SLOPe” on page 372
 - GATE, see “:TRIGger:TYPE:GATE:ACTive” on page 369

For more information on triggering, see the *E4428C/38C ESG Signal Generators User’s Guide*.

The following list describes the trigger type command choices:

CONTInuous	Upon triggering, the waveform repeats continuously.
SINGle	Upon triggering, the waveform segment or sequence plays once.
GATE	An external trigger signal repeatedly starts and stops the waveform’s playback (transmission). The time duration for playback depends on the duty period of the trigger signal and the gate polarity selection (see “:TRIGger:TYPE:GATE:ACTive” on page 369). The waveform plays during the inactive state and stops during the active polarity selection state. The active state can be set high or low. The gate mode works only with an external trigger source.

NOTE The ARB gating behavior described above is opposite to the gating behavior for real-time custom mode.

*RST	CONT		
Key Entry	Continuous	Single	Gated

:TRIGger:TYPE:CONTInuous[:TYPE]**Supported** E4438C with Option 400

```
[ :SOURce ] :RADio:WCDMa:TGPP:ARB:TRIGger:CONTInuous[ :TYPE ] FREE |
TRIGger | RESet
[ :SOURce ] :RADio:WCDMa:TGPP:ARB:TRIGger:CONTInuous[ :TYPE ] ?
```

This commands selects the waveform's response to a trigger signal while using the continuous trigger mode.

For more information on triggering and to select the continuous trigger mode, see [“:TRIGger:TYPE” on page 366](#).

The following list describes the waveform's response to each of the command choices:

FREE	Turning the ARB format on immediately triggers the waveform. The waveform repeats until you turn the format off, select another trigger, or choose another waveform file.
TRIGger	The waveform waits for a trigger before play begins. When the waveform receives the trigger, it plays continuously until you turn the format off, select another trigger, or choose another waveform file.
RESet	The waveform waits for a trigger before play begins. When the waveform receives the trigger, it plays continuously. Subsequent triggers reset the waveform to the beginning. For a waveform sequence, this means to the beginning of the first segment in the sequence.
*RST	FREE
Key Entry	Free Run Trigger & Run Reset & Run

:TRIGger:TYPE:GATE:ACTIVE**Supported** E4438C with Option 400

```
[ :SOURCE ] :RADIo:WCDMa:TGPP:ARB:TRIGger:TYPE:GATE:ACTIve LOW|HIGH
[ :SOURCE ] :RADIo:WCDMa:TGPP:ARB:TRIGger:TYPE:GATE:ACTIve?
```

This command selects the active state (gate polarity) of the gate while using the gating trigger mode.

The LOW and HIGH selections correspond to the low and high states of an external trigger signal. For example, when you select HIGH, the active state occurs during the high of the trigger signal. When the active state occurs, the ESG stops the waveform playback at the last played sample point, then restarts the playback at the next sample point when the inactive state occurs. For more information on triggering and to select gating as the trigger mode, see “:TRIGger:TYPE” on page 366.

The following list describes the ESG’s gating behavior for the polarity selections:

LOW	The waveform playback stops when the trigger signal goes low (active state) and restarts when the trigger signal goes high (inactive state).
HIGH	The waveform playback stops when the trigger signal goes high (active state) and restarts when the trigger signal goes low (inactive state).
*RST	HIGH
Key Entry	Gate Active Low High

:TRIGger[:SOURCE]**Supported** E4438C with Option 400

```
[ :SOURCE ] :RADIo:WCDMa:TGPP:ARB:TRIGger[ :SOURCE ] KEY|EXT|BUS
[ :SOURCE ] :RADIo:WCDMa:TGPP:ARB:TRIGger[ :SOURCE ]?
```

This command sets the trigger source.

For more information on triggering, see “:TRIGger:TYPE” on page 366. The following list describes the command choices:

KEY	This choice enables manual triggering by pressing the front-panel Trigger hardkey.
EXT	An externally applied signal triggers the waveform. This is the only choice that works with gating. The following conditions affect an external trigger: <ul style="list-style-type: none"> The input connector selected for the trigger signal. You have a choice between the rear-panel PATTERN TRIG IN connector or the PATT TRIG IN 2 pin on

the rear-panel AUXILIARY I/O connector. To make the connector selection, see “:TRIGger[:SOURce]:EXTernal[:SOURce]” on page 372.

For more information on the connectors and on connecting the cables, see the *ESG User’s Guide*.

- The trigger signal polarity:
 - gating mode, see “:TRIGger:TYPE:GATE:ACTive” on page 369
 - continuous and single modes, see “:TRIGger[:SOURce]:EXTernal:SLOPe” on page 372
- The time delay between when the ESG receives a trigger and when the waveform responds to the trigger. There are two parts to setting the delay:
 - setting the amount of delay, see “:TRIGger[:SOURce]:EXTernal:DELay” on page 370
 - turning the delay on, see “:TRIGger[:SOURce]:EXTernal:DELay:STATe” on page 371

BUS This choice enables triggering over the GPIB or LAN using the *TRG or GET commands or the AUXILIARY INTERFACE (RS-232) using the *TRG command.

Key Entry **Trigger Key** **Bus** **Ext**

:TRIGger[:SOURce]:EXTernal:DELay

Supported E4438C with Option 400

```
[ :SOURce ] :RADio:WCDMa:TGPP:ARB:TRIGger [ :SOURce ] :EXTernal:DELay <val>
[ :SOURce ] :RADio:WCDMa:TGPP:ARB:TRIGger [ :SOURce ] :EXTernal:DELay?
```

This command sets the amount of time to delay the ESG’s response to an external trigger.

The delay is a path (time) delay between when the ESG receives the trigger and when it responds to the trigger. For example, configuring a trigger delay of two seconds, causes the ESG to wait two seconds after receipt of the trigger before the ESG plays the waveform.

The delay does not occur until you turn it on (see “:TRIGger[:SOURce]:EXTernal:DELay:STATe” on page 371). You can set the delay value either before or after turning it on.

For more information on configuring an external trigger source and to select external as the trigger source, see “:TRIGger[:SOURce]” on page 369.

The unit of measurement for the variable <val> is in seconds (nsec–sec).

***RST** +1.00000000E–003

Range 1E–8 to 4E1

Key Entry Ext Delay Time

Remarks This command is effective only if an external trigger is selected as the trigger source. Refer to “:TRIGger[:SOURCE]” on page 369.

:TRIGger[:SOURCE]:EXtErnal:DELay:STATe

Supported E4438C with Option 400

[:SOURCE] :RADIo:WCDMA:TGPP:ARB:TRIGger [:SOURCE] :EXtErnal:DELay:

STATe ON|OFF|1|0

[:SOURCE] :RADIo:WCDMA:TGPP:ARB:TRIGger [:SOURCE] :EXtErnal:DELay:STATe?

This command enables or disables the arbitrary waveform generator’s external trigger delay.

For setting the delay time, see “:TRIGger[:SOURCE]:EXtErnal:DELay” on page 370, and for more information on configuring an external source, see “:TRIGger[:SOURCE]” on page 369.

***RST** 0

Key Entry Ext Delay Off On

:TRIGger[:SOURce]:EXTernal:SLOPe**Supported** E4438C with Option 400[:SOURce]:RADio:WCDMa:TGPP:ARB:TRIGger[:SOURce]:EXTernal:
SLOPe POSitive|NEGative

[:SOURce]:RADio:WCDMa:TGPP:ARB:TRIGger[:SOURce]:EXTernal:SLOPe?

This command sets the polarity for an external trigger signal while using the continuous, single triggering mode. To set the polarity for gating, see “:TRIGger:TYPE:GATE:ACTive” on page 369.

The POSitive and NEGative selections correspond to the high (positive) and low (negative) states of the external trigger signal. For example, when you select POSitive, the waveform responds (plays) during the high state of the trigger signal. When the PSG receives multiple trigger occurrences when only one is required, the signal generator uses the first trigger and ignores the rest.

For more information on configuring an external trigger source and to select external as the trigger source, see “:TRIGger[:SOURce]” on page 369.

RST** NEG**Key Entry** Ext Polarity Neg Pos**:TRIGger[:SOURce]:EXTernal[:SOURce]*Supported** E4438C with Option 400

[:SOURce]:RADio:WCDMa:TGPP:ARB:TRIGger[:SOURce]:EXTernal

[:SOURce] EPT1|EPT2|EPTRIGGER1|EPTRIGGER2

[:SOURce]:RADio:WCDMa:TGPP:ARB:TRIGger[:SOURce]:EXTernal[:SOURce]?

This command selects which PATTERN TRIG IN connection the ESG uses to accept an externally applied trigger signal when external is the trigger source selection.

For more information on configuring an external trigger source and to select external as the trigger source, see “:TRIGger[:SOURce]” on page 369. For more information on the rear-panel connectors, see the *E4428C/38C ESG Signal Generators User’s Guide*.

The following list describes the command choices:

- | | |
|------------|---|
| EPT1 | This choice is synonymous with EPTRIGGER1 and selects the PATTERN TRIG IN rear-panel connector. |
| EPT2 | This choice is synonymous with EPTRIGGER2 and selects the PATT TRIG IN 2 pin on the rear-panel AUXILIARY I/O connector. |
| EPTRIGGER1 | This choice is synonymous with EPT1 and selects the PATTERN TRIG IN rear-panel connector. |

Wideband CDMA ARB Subsystem–Option 400 ([:SOURce]:RADio:WCDMa:TGPP:ARB)

EPTRIGGER2	This choice is synonymous with EPT2 and selects the PATT TRIG IN 2 pin on the rear-panel AUXILIARY I/O connector.
*RST	EPT1
Choices	EPT1 EPT2 EPTRIGGER1 EPTRIGGER2

[:STATe]

Supported E4438C with Option 400

[:SOURce] :RADio :WCDMa :TGPP :ARB [:STATe] ON | OFF | 1 | 0
 [:SOURce] :RADio :WCDMa :TGPP :ARB [:STATe] ?

This command enables or disables the W-CDMA modulation format.

ON (1) This choice enables the W-CDMA modulation capability and sets up the internal hardware to generate the currently selected W-CDMA signal selection.

OFF (0) This choice disables the W-CDMA baseband signal capability.

***RST** 0

Key Entry **W-CDMA Off On**

Remarks This choice also activates the I/Q state and sets the I/Q source to internal.

Symbols

of Blocks field, [984](#)
 # of Carriers softkey, [285](#), [287](#)
 # Points softkey, [56](#)
 # Skipped Points softkey, [304](#)
 ΦM Dev, [199](#)
 ΦM Dev Couple Off On, [199](#)
 FM ΦM Normal High BW, [194](#)
 ΦM Off On, [198](#)
 ΦM Path 1 2, [193](#)
 ΦM Stop Rate, [196](#)
 ΦM Sweep Time, [197](#)
 ΦM Tone 2 Ampl Percent of Peak, [196](#)

Numerics

0.7V,1.4V,1.65V,2.5V softkey, [417](#)
 1 DPCH softkey, [342](#), [347](#)
 1.23 MHz softkey, [266](#)
 1.25 MHz softkey, [266](#)
 1/2 Conv softkey, [982](#), [983](#), [1081](#)
 1/3 Conv softkey, [982](#), [983](#), [1081](#)
 10 msec softkey, [1009](#)
 1048576 softkey, [213](#)
 10ms Frame Pulse (DRPS11) softkey, [964](#), [966](#),
 [967](#), [968](#), [969](#)
 10ms Frame Pulse (RPS6) softkey
 See wideband CDMA base band generator
 subsystem keys and fields
 12.2 kbps (34.121 v3.8) softkey, [947](#)
 128QAM softkey
 See custom subsystem keys
 See DECT subsystem keys
 See Dmodulation subsystem keys
 See EDGE subsystem keys
 See GSM subsystem keys
 See NADC subsystem keys
 See PDC subsystem keys
 See PHS subsystem keys
 See TETRA subsystem keys
 131072 softkey, [213](#)
 144 kbps (34.121 v3.8) softkey, [947](#)
 16 1's & 16 0's softkey
 See custom subsystem keys
 See DECT subsystem keys

16 1's & 16 0's softkey (continued)
 See EDGE subsystem keys
 See GSM subsystem keys
 See NADC subsystem keys
 See PDC subsystem keys
 See PHS subsystem keys
 See TETRA subsystem keys
 16384 softkey, [213](#)
 16-Lvl FSK softkey
 See DECT subsystem keys
 See PHS subsystem keys
 16PSK softkey
 See custom subsystem keys
 See DECT subsystem keys
 See Dmodulation subsystem keys
 See EDGE subsystem keys
 See GSM subsystem keys
 See NADC subsystem keys
 See PDC subsystem keys
 See PHS subsystem keys
 See TETRA subsystem keys
 16QAM softkey
 See custom subsystem keys
 See DECT subsystem keys
 See Dmodulation subsystem keys
 See EDGE subsystem keys
 See GSM subsystem keys
 See NADC subsystem keys
 See PDC subsystem keys
 See PHS subsystem keys
 See TETRA subsystem keys
 2 Carriers softkey, [343](#)
 2 SR3 Carriers softkey, [251](#)
 2.100 MHz softkey, [31](#), [210](#), [224](#), [249](#), [279](#), [302](#),
 [324](#), [340](#), [471](#)
 20 msec softkey, [1009](#)
 2560 msec softkey, [1009](#)
 256QAM softkey
 See custom subsystem keys
 See DECT subsystem keys
 See Dmodulation subsystem keys
 See EDGE subsystem keys
 See GSM subsystem keys
 See NADC subsystem keys
 See PDC subsystem keys

Index

- 256QAM softkey (*continued*)
 - See PHS subsystem keys
 - See TETRA subsystem keys
- 262144 softkey, [213](#)
- 2-Lvl FSK softkey
 - See custom subsystem keys
 - See DECT subsystem keys
 - See Dmodulation subsystem keys
 - See EDGE subsystem keys
 - See GSM subsystem keys
 - See NADC subsystem keys
 - See PDC subsystem keys
 - See PHS subsystem keys
 - See TETRA subsystem keys
- 2nd Scr Offset field, [948](#), [955](#)
- 3 Carriers softkey, [231](#), [251](#), [343](#)
- 3 DPCH softkey, [342](#), [347](#)
- 3.84MHz chip-clk (DRPS4) softkey, [964](#), [966](#), [967](#), [968](#), [969](#)
- 32 1's & 32 0's softkey
 - See custom subsystem keys
 - See DECT subsystem keys
 - See EDGE subsystem keys
 - See GSM subsystem keys
 - See NADC subsystem keys
 - See PDC subsystem keys
 - See PHS subsystem keys
 - See TETRA subsystem keys
- 32 Ch Fwd softkey, [229](#), [232](#)
- 32768 softkey, [213](#)
- 32QAM softkey
 - See custom subsystem keys
 - See DECT subsystem keys
 - See Dmodulation subsystem keys
 - See EDGE subsystem keys
 - See GSM subsystem keys
 - See NADC subsystem keys
 - See PDC subsystem keys
 - See PHS subsystem keys
 - See TETRA subsystem keys
- 384 kbps (34.121 v3.8) softkey, [947](#)
- 4 1's & 4 0's softkey
 - See custom subsystem keys
 - See DECT subsystem keys
 - See EDGE subsystem keys
- 4 1's & 4 0's softkey (*continued*)
 - See GSM subsystem keys
 - See NADC subsystem keys
 - See PDC subsystem keys
 - See PHS subsystem keys
 - See TETRA subsystem keys
- 4 Carriers softkey, [231](#), [251](#), [343](#)
- 40 msec softkey, [1009](#)
- 40.000 MHz softkey, [31](#), [207](#), [210](#), [219](#), [224](#), [244](#), [249](#), [274](#), [279](#), [300](#), [302](#), [322](#), [324](#), [338](#), [340](#), [464](#), [471](#)
- 4-Lvl FSK softkey
 - See custom subsystem keys
 - See DECT subsystem keys
 - See Dmodulation subsystem keys
 - See EDGE subsystem keys
 - See GSM subsystem keys
 - See NADC subsystem keys
 - See PDC subsystem keys
 - See PHS subsystem keys
 - See TETRA subsystem keys
- 4QAM softkey
 - See custom subsystem keys
 - See DECT subsystem keys
 - See Dmodulation subsystem keys
 - See EDGE subsystem keys
 - See GSM subsystem keys
 - See NADC subsystem keys
 - See PDC subsystem keys
 - See PHS subsystem keys
 - See TETRA subsystem keys
- 5 Channel softkey, [257](#)
- 524288 softkeys, [213](#)
- 64 1's & 64 0's softkey
 - See custom subsystem keys
 - See DECT subsystem keys
 - See EDGE subsystem keys
 - See GSM subsystem keys
 - See NADC subsystem keys
 - See PDC subsystem keys
 - See PHS subsystem keys
 - See TETRA subsystem keys
- 64 Ch Fwd softkey, [229](#), [232](#)
- 64 kbps (34.121 v3.8) softkey, [947](#)

- 64QAM softkey
See custom subsystem keys
See DECT subsystem keys
See Dmodulation subsystem keys
See EDGE subsystem keys
See GSM subsystem keys
See NADC subsystem keys
See PDC subsystem keys
See PHS subsystem keys
See TETRA subsystem keys
- 65536 softkey, [213](#)
- 8 1's & 8 0's softkey
See custom subsystem keys
See DECT subsystem keys
See EDGE subsystem keys
See GSM subsystem keys
See NADC subsystem keys
See PDC subsystem keys
See PHS subsystem keys
See TETRA subsystem keys
- 8 Bit Pattern softkey, [463](#)
- 8 Channel softkey, [257](#)
- 80 msec softkey, [1009](#)
- 80ms Frame Pulse (DRPS13) softkey, [964](#), [966](#),
[967](#), [968](#), [969](#)
- 80ms Frame Pulse (RPS20) softkey
See wideband CDMA base band generator
subsystem keys and fields
- 8648A/B/C/D softkey, [157](#), [159](#)
- 8656B,8657A/B softkey, [157](#), [159](#)
- 8657D NADC softkey, [157](#), [159](#)
- 8657D PDC softkey, [157](#), [159](#)
- 8657J PHS softkey, [157](#), [159](#)
- 8-Lvl FSK softkey
See DECT subsystem keys
See PHS subsystem keys
- 8PSK softkey
See custom subsystem keys
See DECT subsystem keys
See Dmodulation subsystem keys
See EDGE subsystem keys
See GSM subsystem keys
See NADC subsystem keys
See PDC subsystem keys
See PHS subsystem keys
- 8PSK softkey (continued)
See TETRA subsystem keys
- 9 Ch Fwd softkey, [229](#), [232](#)
- 9 Channel softkey, [250](#)
- ## A
- A field softkey
See DECT subsystem keys
- A softkey, [939](#)
- abort list/step sweep, [168](#)
- Access denied, [114](#), [125](#)
- Access softkey, [707](#)
- ACS softkey, [979](#)
- Activate Secure Display softkey, [162](#)
- Active softkey, [975](#)
- Actual BER softkey, [1091](#)
- Actual BLER field, [1084](#), [1092](#)
- Add Comment To Seq[n] Reg[nn] softkey, [121](#)
- Adjust Gain softkey, [433](#)
- Adjust Phase softkey, [47](#)
- AICH softkey, [1046](#)
- AICH Trigger Polarity Pos Neg softkey, [1018](#)
- ALC BW Normal Narrow, [57](#)
- ALC BW Normal Narrow softkey, [21](#)
- ALC BW softkey, [57](#)
- ALC level, [58](#)
- ALC Off On softkey, [60](#)
- All Down softkey, [950](#), [999](#)
- All softkey, [104](#), [120](#)
- All Timeslots softkey
See DECT subsystem keys
See EDGE subsystem keys
See GSM subsystem keys
See NADC subsystem keys
See PDC subsystem keys
See PHS subsystem keys
See TETRA subsystem keys
- All Up softkey, [950](#), [999](#)
- Alt Amp Delta softkey, [61](#)
- Alt Ampl Off On softkey, [62](#)
- Alt power in field, [1060](#)
- AM softkeys
AM Depth, [179](#)
AM Depth Couple Off On, [180](#)
AM Off On, [179](#)

Index

- AM softkeys (*continued*)
 - AM Off On softkey, [175](#)
 - AM Path 1 2, [174](#)
 - AM Stop Rate, [176](#)
 - AM Sweep Rate, [177](#)
 - AM Tone 2 Ampl Percent Of Peak, [176](#)
 - AM Tone 2 Rate, [176](#)
- AM_ADDR softkey, [462](#)
- Ampl softkeys
 - Ampl, [48](#), [65](#)
 - Ampl Offset, [67](#)
 - Ampl Ref Off On, [66](#)
 - Ampl Ref Set, [65](#)
 - Ampl Start, [48](#), [66](#)
 - Ampl Stop, [48](#), [67](#)
- Amplitude hardkey, [65](#), [68](#)
- amplitude modulation subsystem keys
 - AM Depth, [179](#)
 - AM Depth Couple Off On, [180](#)
 - AM Off On, [175](#), [179](#)
 - AM Path 1 2, [174](#)
 - AM Stop Rate, [176](#)
 - AM Sweep Rate, [177](#)
 - AM Tone 2 Ampl Percent Of Peak, [176](#)
 - AM Tone 2 Rate, [176](#)
 - Bus, [178](#)
 - Dual-Sine, [177](#)
 - Ext, [178](#)
 - Ext Coupling DC AC, [175](#)
 - Ext1, [178](#)
 - Ext2, [178](#)
 - Free Run softkey, [178](#)
 - Incr Set, [174](#), [180](#)
 - Internal, [178](#)
 - Noise, [177](#)
 - Ramp, [177](#)
 - Sine, [177](#)
 - Square, [177](#)
 - Swept-Sine, [177](#)
 - Triangle, [177](#)
 - Trigger Key, [178](#)
- AMR 12.2 kbps softkey, [947](#), [1053](#)
- APCO 25 C4FM softkey
 - See* CDMA ARB subsystem keys
 - See* CDMA2000 ARB subsystem keys
- APCO 25 C4FM softkey (*continued*)
 - See* CDMA2000 BBG subsystem keys and fields
 - See* custom subsystem keys
 - See* DECT subsystem keys
 - See* Dmodulation subsystem keys
 - See* EDGE subsystem keys
 - See* GPS subsystem keys
 - See* GSM subsystem keys
 - See* NADC subsystem keys
 - See* PDC subsystem keys
 - See* PHS subsystem keys
 - See* TETRA subsystem keys
 - See* wideband CDMA ARB subsystem keys
 - See* wideband CDMA base band generator subsystem keys and fields
- APCO 25 w/C4FM softkey, [284](#), [285](#), [286](#)
- APCO 25 w/C4QPSK softkey, [284](#), [285](#), [286](#)
- APCO 25 w/CQPSK softkey, [565](#)
- Apply Channel Setup softkey, [254](#), [258](#), [350](#), [359](#), [935](#), [987](#)
- Arb AWGN Off On softkey, [215](#)
- ARB Off On softkey, [320](#)
- ARB Reference Ext Int softkey
 - See* AWGN subsystem keys
 - See* bluetooth subsystem keys
 - See* CDMA ARB subsystem keys
 - See* CDMA2000 ARB subsystem keys
 - See* Dmodulation subsystem keys
 - See* dual ARB subsystem keys
 - See* multitone subsystem keys
 - See* wideband CDMA ARB subsystem keys
- ARB Sample Clock softkey, [214](#), [229](#), [264](#), [284](#), [311](#), [329](#), [366](#), [476](#)
- Atten Hold Off On softkey, [63](#)
- automatic leveling control, [60](#)
- Aux I/O Trigger Polarity Pos Neg softkey, [457](#)
- Aux softkey
 - See* sense subsystem keys
- Auxiliary Software Options softkey, [82](#)
- AWGN Off On softkey, [466](#)
- AWGN subsystem keys
 - 1048576, [213](#)
 - 131072, [213](#)
 - 16384, [213](#)
 - 2.100 MHz, [210](#)

- AWGN subsystem keys (*continued*)
262144, 213
32768, 213
40.000 MHz, 207, 210
524288, 213
65536, 213
Arb AWGN Off On, 215
ARB Reference Ext Int, 214
ARB Sample Clock, 214
Bandwidth, 207
Clear Header, 208
I/Q Mod Filter Manual Auto, 210
I/Q Output Filter Manual Auto, 208
Marker 1, 211
Marker 1 Polarity Neg Pos, 212
Marker 2, 211
Marker 2 Polarity Neg Pos, 212
Marker 3, 211
Marker 3 Polarity Neg Pos, 212
Marker 4, 211
Marker 4 Polarity Neg Pos, 212
Modulator Atten Manual Auto, 209
Noise Seed Fixed Random, 215
None, 211
Reference Freq, 213
Save Setup To Header, 208
Through, 207, 210
Waveform Length, 213
- B**
- B softkey, 911, 917, 939
B1 softkey, 909, 914
B2 softkey, 910, 915
Bandwidth softkey, 207, 461
Base Delay Tp-a softkey, 1042
BBG Chip Clock Ext Int softkey
 See wideband CDMA base band generator
 subsystem keys and fields
BBG Data Clock Ext Int softkey
 See custom subsystem keys
 See DECT subsystem keys
 See GSM subsystem keys
 See NADC subsystem keys
 See PHS subsystem keys
 See TETRA subsystem keys
BBG Data Clock field, 478
BBG Ref Ext Int softkey
 See custom subsystem keys
 See DECT subsystem keys
 See EDGE subsystem keys
 See GSM subsystem keys
 See NADC subsystem keys
 See PDC subsystem keys
 See PHS subsystem keys
 See TETRA subsystem keys
BBG1 softkey, 23, 35
BD_ADDR softkey, 462
Begin Data Format Pattern Framed softkey
 See DECT subsystem keys
 See EDGE subsystem keys
 See GSM subsystem keys
 See NADC subsystem keys
 See PDC subsystem keys
 See PHS subsystem keys
 See TETRA subsystem keys
Begin Frame softkey
 See DECT subsystem keys
 See EDGE subsystem keys
 See GSM subsystem keys
 See NADC subsystem keys
 See PDC subsystem keys
 See PHS subsystem keys
 See TETRA subsystem keys
Begin Timeslot # softkey
 See DECT subsystem keys
 See EDGE subsystem keys
 See GSM subsystem keys
 See NADC subsystem keys
 See PDC subsystem keys
 See PHS subsystem keys
 See TETRA subsystem keys
BER Display % Exp softkey, 403
BER field, 1084, 1092
BER Mode Off On softkey
 See sense subsystem keys
BER softkey, 1086, 1094
BERT Off On softkey, 454
BERT Resync Off On softkey, 454
Beta field, 992, 1002
Binary softkey, 94, 122

Index

- binary values, [16](#)
- Bit Count softkey
 - See* sense subsystem keys
- Bit Delay Off On softkey, [456](#)
- Bit Rate field
 - See* CDMA2000 BBG subsystem keys and fields
- Bit softkey, [94](#)
- BLER field, [1085](#), [1093](#)
- BLER softkey, [1086](#), [1094](#)
- Blk Set Size field, [981](#)
- Blk Size field, [980](#), [1080](#), [1089](#)
- Block Count softkey
 - See* calculate subsystem keys
 - See* sense subsystem keys
- Block Erasure softkey
 - See* sense subsystem keys
- Blocking softkey, [979](#)
- Bluetooth Off On softkey, [476](#)
- Bluetooth softkey, [565](#)
- bluetooth subsystem keys
 - [2.100 MHz](#), [471](#)
 - [40.000 MHz](#), [464](#), [471](#)
 - [8 Bit Pattern](#), [463](#)
 - [AM_ADDR](#), [462](#)
 - [ARB Reference Ext Int](#), [475](#)
 - [ARB Sample Clock](#), [476](#)
 - [AWGN Off On](#), [466](#)
 - [BD_ADDR](#), [462](#)
 - [Bluetooth Off On](#), [476](#)
 - [Burst Off On](#), [462](#)
 - [Burst Power Ramp](#), [476](#)
 - [C/N\[1 MHz\]](#), [466](#)
 - [Clear Header](#), [465](#)
 - [Clock/Gate Delay](#), [463](#)
 - [Continuous PN9](#), [463](#)
 - [Drift Deviation](#), [467](#)
 - [Freq Drift Type Linear Sine](#), [468](#)
 - [Freq Offset](#), [469](#)
 - [I/Q Mod Filter Manual Auto](#), [472](#)
 - [I/Q Output Filter Manual Auto](#), [464](#)
 - [Impairments Off On](#), [465](#)
 - [Marker 1](#), [472](#), [473](#)
 - [Marker 1 Polarity Neg Pos](#), [473](#)
 - [Marker 2](#), [472](#), [473](#)
 - [Marker 2 Polarity Neg Pos](#), [473](#)
 - bluetooth subsystem keys (*continued*)
 - [Marker 3](#), [472](#), [473](#)
 - [Marker 3 Polarity Neg Pos](#), [474](#)
 - [Marker 4](#), [472](#), [473](#)
 - [Marker 4 Polarity Neg Pos](#), [474](#)
 - [Mod Index](#), [469](#)
 - [Modulator Atten Manual Auto](#), [470](#), [471](#)
 - [Noise Seed](#), [467](#)
 - [None](#), [472](#), [473](#)
 - [Packet \(DH1\)](#), [474](#)
 - [Reference Freq](#), [475](#)
 - [Save Setup To Header](#), [465](#)
 - [Symbol Timing Err](#), [470](#)
 - [Through](#), [464](#), [471](#)
 - [Truncated PN9](#), [463](#)
- boolean SCPI parameters, [10](#)
- boolean, numeric response data, [11](#)
- BPSK softkey
 - See* custom subsystem keys
 - See* DECT subsystem keys
 - See* Dmodulation subsystem keys
 - See* EDGE subsystem keys
 - See* GSM subsystem keys
 - See* NADC subsystem keys
 - See* PDC subsystem keys
 - See* PHS subsystem keys
 - See* TETRA subsystem keys
- Brightness softkey, [86](#)
- Build New Waveform Sequence softkey, [312](#)
- Burst Envelope Int Ext Off softkey, [20](#)
- Burst gate in field, [1060](#)
- Burst Gate In Polarity Neg Pos softkey, [131](#), [132](#)
- Burst Off On softkey, [462](#)
- Burst Power Ramp softkey, [476](#)
- Bus softkey
 - [list trigger source](#), [53](#)
 - See* amplitude modulation subsystem keys
 - See* CDMA ARB subsystem keys
 - See* CDMA2000 ARB subsystem keys
 - See* DECT subsystem keys
 - See* Dmodulation subsystem keys
 - See* dual ARB subsystem keys
 - See* EDGE subsystem keys
 - See* frequency modulation subsystem keys
 - See* GSM subsystem keys

Bus softkey (continued)

- See low frequency output subsystem keys
- See NADC subsystem keys
- See PDC subsystem keys
- See phase modulation subsystem keys
- See PHS subsystem keys
- See sense subsystem keys
- See TETRA subsystem keys
- See trigger subsystem keys
- See wideband CDMA ARB subsystem keys

C

- C Power field, 988, 1019
- C/N softkey, 504, 516
- C/N value field, 935, 988, 1019
- C/N[1 MHz] softkey, 466
- C4FM softkey, 873
- calculate subsystem keys
 - BER Display % Exp, 403
 - Block Count, 421
 - Class II RBER, 400, 401
 - Class Ib RBER, 400, 401
 - Cycle End, 401
 - Error Rate, 394, 395, 396, 397, 398, 399
 - Exceeds Any Limit, 401
 - Fail Hold, 401
 - Frame Erasure, 400, 401
 - No Limits, 395, 398, 399, 401
 - Pass/Fail Limits, 402
 - Pass/Fail Off On, 402
 - Update Display Cycle End Cont, 403
- calibration subsystem keys
 - DCFM/DCΦM Cal, 72
 - Execute Cal, 72, 73
 - I/Q Calibration, 72
 - Revert to Default Cal Settings, 73
 - Start Frequency, 74
 - Stop Frequency, 74
- Carrier Bandwidth, 308
- Carrier Phases Fixed Random softkey, 286
- Carrier to Noise Ratio, 309
- CC softkey, 834, 838, 840
- CDL softkey, 799
- CDMA ARB subsystem keys
 - 2.100 MHz, 224

CDMA ARB subsystem keys (continued)

- 3 Carriers, 231
- 32 Ch Fwd, 229, 232
- 4 Carriers, 231
- 40.000 MHz, 219, 224
- 64 Ch Fwd, 229, 232
- 9 Ch Fwd, 229, 232
- APCO 25 C4FM, 220
- ARB Reference Ext Int, 228
- ARB Sample Clock, 229
- Bus, 236
- CDMA Off On, 241
- Chip Rate, 218
- Clear Header, 222
- Clip |I+jQ| To, 218
- Clip |I| To, 216
- Clip |Q| To, 217
- Clip At PRE POST FIR Filter, 216
- Clipping Type |I+jQ| |I|,|Q|, 217
- Continuous, 234, 266
- CPICH, 352
- Custom CDMA Multicarrier, 231
- Custom CDMA State, 229, 232
- Equal Powers, 230
- Ext, 236
- Ext Delay Off On, 238
- Ext Delay Time, 238
- Ext Polarity Neg Pos, 239
- Filter Alpha, 221
- Filter BbT, 221
- Free Run, 235
- Gate Active Low High, 236
- Gated, 234, 266
- Gaussian, 220
- I/Q Mapping Normal Invert, 223
- I/Q Mod Filter Manual Auto, 224
- I/Q Output Filter Manual Auto, 219
- Immediate, 228
- IS-2000 SR3 DS, 220
- IS-95, 220
- IS-95 Mod, 220
- IS-95 Mod w/EQ, 220
- IS-95 w/EQ, 220
- IS-97 Levels, 230
- Marker 1, 225

Index

CDMA ARB subsystem keys (*continued*)

- Marker 1 Polarity Neg Pos, [226](#)
- Marker 2, [225](#)
- Marker 2 Polarity Neg Pos, [226](#)
- Marker 3, [225](#)
- Marker 3 Polarity Neg Pos, [226](#)
- Marker 4, [225](#)
- Marker 4 Polarity Neg Pos, [226](#)
- Modulator Atten Manual Auto, [223](#)
- Multicarrier Off On, [229](#)
- None, [225](#)
- Nyquist, [220](#)
- Off, [228](#)
- On, [228](#)
- Optimize FIR For EVM ACP, [222](#)
- Oversample Ratio, [227](#)
- Paging, [230](#)
- Patt Trig In 1, [239](#)
- Patt Trig In 2, [239](#)
- Pilot, [229](#), [230](#), [232](#)
- Rectangle, [220](#)
- Reference Freq, [227](#)
- Reset & Run, [235](#)
- Reverse, [229](#)
- Root Nyquist, [220](#)
- Save Setup To Header, [222](#)
- Scale to 0dB, [230](#)
- Single, [234](#), [266](#)
- Store Custom CDMA State, [233](#)
- Store Custom Multicarrier, [232](#)
- Sync, [230](#)
- Through, [219](#), [224](#)
- Traffic, [230](#)
- Trigger & Run, [235](#)
- Trigger Key, [236](#)
- UN3/4 GSM Gaussian, [220](#)
- User FIR, [220](#)
- Waveform Length, [240](#)
- WCDMA, [220](#)

CDMA Freq field, [498](#)

CDMA Off On softkey, [241](#)

CDMA softkey, [95](#)

CDMA2000 ARB subsystem keys

- 1.23 MHz, [266](#)
- 1.25 MHz, [266](#)

CDMA2000 ARB subsystem keys (*continued*)

- 2 SR3 Carriers, [251](#)
- 2.100 MHz, [249](#)
- 3 Carriers, [251](#)
- 4 Carriers, [251](#)
- 40.000 MHz, [244](#), [249](#)
- 5 Channel, [257](#)
- 8 Channel, [257](#)
- 9 Channel, [250](#)
- APCO 25 C4FM, [245](#)
- Apply Channel Setup, [254](#), [258](#)
- ARB Reference Ext Int, [263](#)
- ARB Sample Clock, [264](#)
- Bus, [269](#)
- CDMA2000 Off On, [273](#)
- Clear Header, [247](#)
- Clip $|I+jQ|$ To, [244](#)
- Clip $|I|$ To, [242](#)
- Clip $|Q|$ To, [243](#)
- Clip At PRE POST FIR Filter, [242](#)
- Clipping Type $|I+jQ|$ $|I|$, $|Q|$, [243](#)
- Config, [255](#), [259](#)
- Continuous, [266](#)
- Custom CDMA2000 Carrier, [250](#), [252](#)
- Custom CDMA2000 Multicarrier, [251](#)
- Custom CDMA2000 State, [257](#)
- Edit Channel Setup, [255](#), [259](#)
- Equal Powers, [256](#), [260](#)
- Ext, [269](#)
- Ext Delay Off On, [271](#)
- Ext Delay Time, [270](#)
- Ext Polarity Neg Pos, [271](#)
- Filter Alpha, [246](#)
- Filter BbT, [246](#)
- Free Run, [268](#)
- Gate Active Low High, [268](#)
- Gated, [266](#)
- Gaussian, [245](#)
- I/Q Mapping Normal Invert, [250](#)
- I/Q Mod Filter Manual Auto, [249](#)
- I/Q Output Filter Manual Auto, [244](#)
- Immediate, [264](#)
- Insert Row, [255](#), [259](#)
- IS-2000 SR3 DS, [245](#)
- IS-95, [245](#)

CDMA2000 ARB subsystem keys (*continued*)

IS-95 Mod, 245
 IS-95 Mod w/EQ, 245
 IS-95 w/EQ, 245
 Link Forward Reverse, 250
 Marker 1, 260, 261
 Marker 1 Polarity Neg Pos, 261
 Marker 2, 260, 261
 Marker 2 Polarity Neg Pos, 262
 Marker 3, 260, 261
 Marker 3 Polarity Neg Pos, 262
 Marker 4, 260, 261
 Marker 4 Polarity Neg Pos, 262
 Modulator Atten Manual Auto, 248
 Multicarrier Off On, 250
 None, 260, 261
 Nyquist, 245
 Off, 264
 On, 264
 Optimize FIR For EVM ACP, 247
 Patt Trig In 1, 272
 Patt Trig In 2, 272
 Pilot, 250, 257
 PN Offset, 255, 259
 Radio Config, 256
 Rate, 255, 259
 Rectangle, 245
 Reference Freq, 263
 Reset & Run, 268
 Root Nyquist, 245
 Save Setup To Header, 247
 Scale to 0dB, 256, 260
 Single, 266
 Spread Rate 1, 250, 257, 265
 Spread Rate 3, 250, 257, 265
 Spreading Type Direct Mcarrier, 250, 265
 SR1 9 Channel, 252
 SR1 Pilot, 252
 SR3 Direct 9 Channel, 252
 SR3 Direct Pilot, 252
 SR3 Mcarrier 9 Channel, 252
 SR3 MCarrier Pilot, 252
 Store Custom CDMA State, 254, 258
 Store Custom Multicarrier, 252
 Through, 244, 249

CDMA2000 ARB subsystem keys (*continued*)

Trigger & Run, 268
 Trigger Key, 269
 UN3/4 GSM Gaussian, 245
 User FIR, 245
 Walsh Code, 255, 259
 WCDMA, 245

CDMA2000 BBG subsystem keys and fields

APCO 25 C4FM, 479, 513
 BBG Data Clock, 478
 Bit Rate, 487, 491, 496, 510, 520, 522, 526, 531, 536, 540, 544
 C/N, 504, 516
 CDMA Freq, 498
 CDMA2000 Off On, 547
 Change, 508
 Chip Rate, 478, 512
 DAYLT, 498
 EbNo, 483, 488, 494, 499, 505, 508, 518, 524, 526, 530, 534, 538, 542
 EcNo, 492, 527, 532
 Equal Powers, 507, 516
 Even Second Delay, 479, 512
 Ext, 482, 493, 521
 Ext CDMA Freq, 499
 External, 511
 Falling, 546
 Field 1, 489
 Field 2, 489
 Field 3, 490
 Filter Alpha, 480, 514
 Filter BbT, 481, 484, 514
 FIX4, 482, 493, 517, 518, 521, 523, 524, 529, 534, 538, 541, 542
 Frame Length, 519, 521, 525, 535, 539, 543
 Frame Offset, 494, 519, 522, 525, 530, 536, 539, 543
 FSYNCH Type, 503
 Full, 528, 533
 Gaussian, 479, 513
 Half, 528, 533
 Header, 485, 495
 Internal, 511
 Inverted, 516
 IS-95, 479, 513

Index

CDMA2000 BBG subsystem keys and fields

(continued)

IS-95 MOD, 513
IS-95 Mod, 479
IS-95 MOD w/EQ, 513
IS-95 Mod w/EQ, 479
IS-95 w/EQ, 479, 513
Leap Seconds, 500
Link Forward Reverse, 477
Long Code Mask, 515
Long Code State, 482, 515
LTM OFF, 500
Message Type, 501
Network ID, 501
Noise Off On, 505, 517
Normal, 516
Nyquist, 479, 513
Optimize FIR For EVM ACP, 481, 515
P Rev, 502
P Rev Min, 500
Paging Indicator, 509
Permuted ESN, 484, 495
Phase Polarity, 508
PN Offset, 511
PN15, 482, 493, 517, 521, 523, 529, 534, 538, 541
PN9, 482, 493, 517, 521, 523, 529, 534, 538, 541
Power, 485, 490, 492, 496, 501, 506, 509, 519,
522, 525, 528, 531, 533, 536, 540, 543
PRAT, 502
QOF, 486, 496
Quarter, 528, 533
Radio Config, 487, 497, 520, 523, 531, 537, 540,
544
RadioConfig 1/2 Access, 477
RadioConfig 1/2 Traffic, 477
RadioConfig 3/4 Common Control, 477
RadioConfig 3/4 Enhanced Access, 477
RadioConfig 3/4 Traffic, 477
Ramp, 485
Ramp Time, 486
Rectangle, 479, 513
Reserved, 502
Rising, 546
Root Nyquist, 479, 513
Scale to 0dB, 507, 516

CDMA2000 BBG subsystem keys and fields

(continued)

Spread Rate, 510
State, 491, 493, 498, 504, 507, 510, 520, 523, 527,
529, 532, 534, 537, 541, 545
State field, 488
System ID, 503
Time, 503
Trigger Advance, 546
Turbo Coding, 497, 544
UN3/4 GSM Gaussian, 479, 513
User File, 482, 488, 493, 517, 521, 523, 529, 534,
538, 541
User FIR, 479, 513
Walsh, 491, 497, 504, 507, 510, 526, 528, 532,
533, 537, 541, 545
Walsh field, 487
CDMA2000 Off On softkey, 273, 547
CDPD softkey, 284, 285, 286, 565
CDVCC softkey, 800, 803
CFN #0 Frame Pulse (RPS10) softkey
See wideband CDMA base band generator
subsystem keys and fields
Chan Code field, 945, 954
Chan Code softkey, 944
Change field, 508
Channel Code field, 1003, 1047
See wideband CDMA base band generator
subsystem keys and fields
Channel Number softkey, 39
Channel softkey, 351, 359
Channel State field, 1002, 1009
Channel State Off On softkey, 1022
See wideband CDMA base band generator
subsystem keys and fields
ChCode Ctl field, 1035
ChCode Dat field, 1036
Chip Clock (RPS1) softkey
See wideband CDMA base band generator
subsystem keys and fields
Chip Rate field, 478, 512, 943, 992
Chip Rate softkey, 218, 335
Class Ib Bit Error softkey, 448, 449
Class II Bit Error softkey, 449
Class II RBER softkey, 400, 401

- Class Ib RBER softkey, [400](#), [401](#)
- Clear Header softkey, [208](#), [222](#), [247](#), [277](#), [298](#), [321](#), [338](#), [465](#)
- Clip |I+jQ| To softkey, [218](#), [244](#)
- Clip |I| To softkey, [216](#), [242](#), [333](#), [345](#)
- Clip |Q| To softkey, [217](#), [243](#), [334](#), [345](#)
- Clip At PRE POST FIR Filter, [216](#)
- Clip At PRE POST FIR Filter softkey, [242](#), [333](#)
- Clip Type |I+jQ| To softkey, [335](#), [346](#)
- Clipping Type |I+jQ| |I|,|Q| softkey, [217](#), [243](#), [297](#), [334](#), [346](#)
- Clock Delay Off On softkey, [415](#)
- Clock Polarity Neg Pos softkey, [416](#)
- Clock Time Delay softkey, [415](#)
- Clock/Gate Delay softkey, [463](#)
- command tree, SCPI, [6](#), [7](#)
- Common Mode I/Q Offset softkey, [24](#)
- communication subsystem keys
 - Default Gateway, [75](#)
 - GPIB Address, [75](#)
 - Hostname, [76](#)
 - IP Address, [76](#)
 - Meter Address, [77](#)
 - Meter Channel A B, [77](#)
 - Meter Timeout, [78](#)
 - Power Meter, [78](#)
 - Reset RS-232, [79](#)
 - RS-232 Baud Rate, [79](#)
 - RS-232 ECHO Off On, [79](#)
 - RS-232 Timeout, [80](#)
 - Subnet Mask, [76](#)
- Comp Mode Start Trigger Polarity Neg Pos softkey, [1078](#)
- Comp Mode Start Trigger Polarity Pos Neg softkey, [977](#), [978](#)
- Comp Mode Stop Trigger Polarity Neg Pos softkey, [1078](#)
- Comp Mode Stop Trigger Polarity Pos Neg softkey, [978](#)
- Compressed Frame (RPS8) softkey
 - See* wideband CDMA base band generator subsystem keys and fields
- Compressed Mode Off On softkey, [1077](#)
- Compressed Mode Start Trigger softkey, [953](#), [977](#), [1077](#)
- Compressed Mode Stop Trigger softkey, [977](#), [1078](#)
- Config softkey, [255](#), [259](#)
- Configure Cal Array softkey, [18](#)
- Continuous PN9 softkey, [463](#)
- Continuous softkey
 - See* CDMA ARB subsystem keys
 - See* CDMA2000 ARB subsystem keys
 - See* custom subsystem keys
 - See* DECT subsystem keys
 - See* Dmodulation subsystem keys
 - See* dual ARB subsystem keys
 - See* EDGE subsystem keys
 - See* GSM subsystem keys
 - See* NADC subsystem keys
 - See* PDC subsystem keys
 - See* PHS subsystem keys
 - See* TETRA subsystem keys
 - See* wideband CDMA ARB subsystem keys
- Copy File softkey, [105](#), [113](#), [124](#)
- correction subsystem keys
 - Configure Cal Array, [18](#)
 - Flatness Off On, [19](#)
 - Load From Selected File, [18](#)
 - Preset List, [19](#)
 - Store To File, [19](#)
- CPICH softkey, [352](#)
- CRC Size field, [982](#), [1082](#), [1090](#)
- creating a waveform, multitone, [321](#)
- CS-1 softkey, [642](#), [643](#), [699](#)
- CS-4 softkey, [642](#), [644](#), [703](#)
- CSID softkey, [863](#), [884](#)
- Ctrl Beta field, [1023](#)
- Ctrl Pwr field, [1024](#)
- Custom CDMA Multicarrier softkey, [231](#)
- Custom CDMA State softkey, [229](#), [232](#)
- Custom CDMA2000 Carrier softkey, [250](#), [252](#)
- Custom CDMA2000 Multicarrier softkey, [251](#)
- Custom CDMA2000 State softkey, [257](#)
- Custom Digital Mod State softkey, [285](#), [286](#)
- Custom Off On softkey, [570](#)
- Custom softkey, [588](#), [600](#), [658](#), [707](#), [867](#)
- custom subsystem keys
 - 128QAM, [563](#)
 - 16 1's & 16 0's, [556](#)
 - 16PSK, [563](#)

Index

custom subsystem keys (*continued*)

- 16QAM, [563](#)
- 256QAM, [563](#)
- 2-Lvl FSK, [563](#)
- 32 1's & 32 0's, [556](#)
- 32QAM, [563](#)
- 4 1's & 4 0's, [556](#)
- 4-Lvl FSK, [563](#)
- 4QAM, [563](#)
- 64 1's & 64 0's, [556](#)
- 64QAM, [563](#)
- 8 1's & 8 0's, [556](#)
- 8PSK, [563](#)
- APCO 25 C4FM, [560](#)
- APCO 25 w/CQPSK, [565](#)
- BBG Data Clock Ext Int, [548](#)
- BBG Ref Ext Int, [559](#)
- Bluetooth, [565](#)
- BPSK, [563](#)
- Bus, [567](#)
- CDPD, [565](#)
- Continuous, [566](#)
- Custom Off On, [570](#)
- D8PSK, [563](#)
- Diff Data Encode Off On, [558](#)
- Ext, [556](#), [567](#)
- Ext BBG Ref Freq, [559](#)
- Ext Data Clock Normal Symbol, [558](#)
- Ext Delay Bits, [568](#)
- Ext Delay Off On, [569](#)
- Ext Polarity Neg Pos, [569](#)
- Fall Delay, [551](#), [552](#)
- Fall Time, [551](#), [552](#)
- Filter Alpha, [548](#)
- Filter BbT, [549](#)
- FIX4, [556](#), [557](#)
- Free Run, [566](#)
- Freq Dev, [561](#)
- Gate Active Low High, [567](#)
- Gated, [566](#)
- Gaussian, [560](#)
- Gray Coded QPSK, [563](#)
- I/Q Scaling, [561](#)
- IS-95, [560](#)
- IS-95 Mod, [560](#)

custom subsystem keys (*continued*)

- IS-95 Mod w/EQ, [560](#)
- IS-95 OQPSK, [563](#)
- IS-95 QPSK, [563](#)
- IS-95 w/EQ, [560](#)
- MSK, [563](#)
- None, [565](#)
- Nyquist, [560](#)
- Optimize FIR For EVM ACP, [556](#)
- OQPSK, [563](#)
- $\pi/4$ DQPSK, [563](#)
- Patt Trig In 1, [570](#)
- Patt Trig In 2, [570](#)
- Phase Dev, [562](#)
- Phase Polarity Normal Invert, [563](#)
- PN11, [556](#)
- PN15, [556](#)
- PN20, [556](#)
- PN23, [556](#)
- PN9, [556](#)
- PRAM Files, [557](#)
- QPSK, [563](#)
- Rectangle, [560](#)
- Reset & Run, [566](#)
- Rise Delay, [553](#), [554](#)
- Rise Time, [554](#), [555](#)
- Root Nyquist, [560](#)
- Single, [566](#)
- Symbol Rate, [564](#)
- Trigger & Run, [566](#)
- Trigger Key, [567](#)
- UN3/4 GSM Gaussian, [560](#)
- User File, [556](#)
- User FIR, [560](#)
- User FSK, [562](#), [563](#)
- User I/Q, [562](#), [563](#)
- Custom TS softkey, [646](#), [657](#), [698](#), [705](#)
- Custom WCDMA State softkey, [357](#)
- Cycle Count softkey, [457](#)
- Cycle End softkey, [401](#)

D

- D8PSK softkey
 - See* custom subsystem keys
 - See* DECT subsystem keys

- D8PSK softkey (continued)*
See Dmodulation subsystem keys
See EDGE subsystem keys
See GSM subsystem keys
See NADC subsystem keys
See PDC subsystem keys
See PHS subsystem keys
See TETRA subsystem keys
- Data Beta field, 1027
- data block, 113
- Data Clock Out Neg Pos softkey, 134
- Data Clock Polarity Neg Pos softkey, 131, 133, 135
- Data field, 1004, 1094
- Data Mode Raw Enc TLM softkey, 670, 671
- Data Out Polarity Neg Pos softkey, 134, 136
- Data Polarity Neg Pos softkey, 132, 133, 416
- Data Pwr field, 1029
- Data Rate field, 955
- data subsystem keys
Error Out, 409
PN9, 409
Reference Out, 409
- DATA/CLK/SYNC Rear Outputs Off On softkey, 136
- DAYLT field, 498
- dBm softkey, 172
- dBuV softkey, 172
- dBuVemf softkey, 172
- DC softkey, 191
- DCFM/DCΦM Cal softkey, 72
- DCH1 softkey, 990
- DCH2 softkey, 990
- DCH3 softkey, 990
- DCH4 softkey, 990
- DCH5 softkey, 990
- DCH6 softkey, 990
- decimal values, 16
- Dect Off On softkey, 622
- DECT softkey, 284, 285, 286
- DECT subsystem keys
128QAM, 587
16 1's & 16 0's, 580, 588, 591, 594, 596, 599, 600, 604, 607, 610, 612
16-Lvl FSK, 580
16PSK, 587
- DECT subsystem keys (*continued*)
16QAM, 587
256QAM, 587
2-Lvl FSK, 587
32 1's & 32 0's, 580, 588, 591, 594, 596, 599, 600, 604, 607, 610, 612
32QAM, 587
4 1's & 4 0's, 580, 588, 591, 594, 596, 599, 600, 604, 607, 610, 612
4-Lvl FSK, 587
4QAM, 587
64 1's & 64 0's, 580, 588, 591, 594, 596, 599, 600, 604, 607, 610, 612
64QAM, 587
8 1's & 8 0's, 580, 588, 591, 594, 596, 599, 600, 604, 607, 610, 612
8-Lvl FSK, 580
8PSK, 587
A field, 589, 592, 595, 597, 601, 602, 603, 606, 608, 611
All Timeslots, 614
APCO 25 C4FM, 584
BBG Data Clock Ext Int, 571
BBG Ref Ext Int, 583
Begin Frame, 614
Begin Timeslot #, 614, 615
BPSK, 587
Bus, 613, 619
Continuous, 617
Custom, 588, 600
D8PSK, 587
Data Format Pattern Framed, 579
Dect Off On, 622
DM0, 588, 591, 594, 596, 599, 600, 604, 607, 610, 612
DM1, 588, 591, 594, 596, 599, 600, 604, 607, 610, 612
Dummy Bearer 1, 600
Dummy Bearer 2, 600
Ext, 580, 588, 591, 594, 596, 599, 600, 604, 607, 610, 612, 613, 619
Ext Data Clock Normal Symbol, 582
Ext Delay Bits, 620
Ext Delay Off On, 622
Ext Polarity Neg Pos, 620

Index

DECT subsystem keys (*continued*)

FACC, 588, 591, 594, 596, 599, 600, 604, 607, 610, 612
Fall Delay, 574, 575
Fall Time, 575, 576
FDEV1_FS, 588, 591, 594, 596, 599, 600, 604, 607, 610, 612
FDEV1_HS, 588, 591, 594, 596, 599, 600, 604, 607, 610, 612
FDEV2_FS, 588, 591, 594, 596, 599, 600, 604, 607, 610, 612
Filter Alpha, 571
Filter BbT, 572
FIX4, 580, 581, 588, 589, 591, 594, 596, 597, 599, 600, 601, 604, 605, 607, 608, 610, 612
Free Run, 618
Freq Dev, 585
Gate Active Low High, 618
Gated, 617
Gaussian, 584
Gray Coded QPSK, 587
I/Q Scaling, 585
IS-95, 584
IS-95 Mod, 584
IS-95 Mod w/EQ, 584
IS-95 OQPSK, 587
IS-95 QPSK, 587
IS-95 w/EQ, 584
Low Capacity, 588, 600
Low Capacity with Z field, 588, 600
MSK, 587
Nyquist, 584
Optimize FIR For EVM ACP, 580
OQPSK, 587
P, 590, 593, 595, 598, 602, 603, 604, 606, 609, 611
 $\pi/4$ DQPSK, 587
Patt Trig In 1, 621
Patt Trig In 2, 621
Phase Dev, 586
Phase Polarity Normal Invert, 587
PN11, 580, 588, 591, 594, 596, 599, 600, 607, 610, 612
PN15, 580, 588, 591, 594, 596, 599, 600, 604, 607, 610, 612

DECT subsystem keys (*continued*)

PN20, 580, 588, 591, 594, 596, 599, 600, 607, 610, 612
PN23, 580, 588, 591, 594, 596, 599, 600, 607, 610, 612
PN9, 580, 588, 591, 594, 596, 599, 600, 604, 607, 610, 612
PN9 Mode Normal Quick, 574
QPSK, 587
Recall Secondary Frame State, 613
Rectangle, 584
Reset & Run, 618
Restore DECT Factory Default, 582
Rise Delay, 576, 577
Rise Time, 578
Root Nyquist, 584
S, 590, 593, 596, 598, 602, 603, 604, 607, 609, 611
Save Secondary Frame State, 613
Secondary Frame Off On, 614
Sine, 555, 579
Single, 617
Symbol Rate, 616
Sync Out Offset, 615
Timeslot Ampl Main Delta, 592, 605
Timeslot Off On, 592, 606
Traffic Bearer, 588, 600
Traffic Bearer with Z field, 588, 600
Trigger & Run, 618
Trigger Key, 613, 619
UN3/4 GSM Gaussian, 584
User File, 555, 579, 580, 588, 591, 594, 596, 599, 600, 604, 607, 610, 612
User FIR, 584
User FSK, 586, 587
User I/Q, 586, 587
dect subsystem keys
PRAM File, 581
Default Gateway softkey, 75
Delay Bits softkey, 456
Delete All NVWFM Files softkey, 126
Delete All WFM Files softkey, 126
Delete All WFM1 Files softkey, 127
Delete File softkey, 127
Delete softkeys
Delete All ARB CDMA Files, 116

- Delete softkeys (*continued*)
 - Delete All ARB DMOD Files, [116](#)
 - Delete All ARB DWCDMA Files, [116](#)
 - Delete All ARB FCDMA Files, [117](#)
 - Delete All ARB MCDMA Files, [118](#)
 - Delete All ARB MDMOD Files, [118](#)
 - Delete All ARB MDWCDMA Files, [118](#)
 - Delete All ARB MFCDMA Files, [118](#)
 - Delete All ARB MTONE Files, [118](#)
 - Delete All ARB RCDMA Files, [119](#)
 - Delete All ARB UWCDMA Files, [120](#)
 - Delete All Binary Files, [116](#)
 - Delete All Bit Files, [116](#)
 - Delete All Files, [115](#)
 - Delete All FIR Files, [117](#)
 - Delete All FSK Files, [117](#)
 - Delete All I/Q Files, [117](#)
 - Delete All List Files, [117](#)
 - Delete All SEQ Files, [119](#)
 - Delete All SHAPE Files, [119](#)
 - Delete All State Files, [119](#)
 - Delete All UFLT Files, [119](#)
 - Delete File, [120](#)
- Diagnostic Info softkey, [81](#), [82](#), [84](#), [90](#)
- diagnostic subsystem keys
 - Auxiliary Software Options, [82](#)
 - Diagnostic Info, [81](#), [82](#), [84](#)
 - Installed Board Info, [81](#)
 - license value, [84](#)
 - Options Info, [83](#)
 - Waveform Licenses, [83](#)
- Diff Data Encode Off On softkey, [558](#), [688](#)
- Diff. Mode I Offset softkey, [24](#)
- Diff. Mode Q Offset softkey, [25](#)
- Digital Modulation Off On softkey, [296](#)
- digital modulation subsystem keys
 - 2.100 MHz, [31](#)
 - 40.000 MHz, [31](#)
 - ALC BW Normal Narrow, [21](#)
 - BBG1, [23](#), [35](#)
 - Burst Envelope Int Ext Off, [20](#)
 - Common Mode I/Q Offset, [24](#)
 - Diff. Mode I Offset, [24](#)
 - Diff. Mode Q Offset, [25](#)
 - Ext 50 Ohm, [23](#), [35](#)
 - digital modulation subsystem keys (*continued*)
 - Ext 600 Ohm, [23](#), [35](#)
 - Ext In 600 Ohm I Offset, [26](#)
 - Ext In 600 Ohm Q Offset, [27](#)
 - High Crest Mode Off On, [21](#)
 - I Offset, [28](#)
 - I/Q Adjustments Off On, [31](#)
 - I/Q Gain Balance Source 1, [27](#)
 - I/Q Mod Filter Manual Auto, [32](#)
 - I/Q Off On, [36](#)
 - I/Q Out Gain Balance, [25](#)
 - I/Q Output Atten, [26](#)
 - I/Q Timing Skew, [29](#)
 - I/Q Timing Skew Path softkey, [30](#)
 - Int I/Q Skew Corrections RF BB Off, [34](#)
 - Int Phase Polarity Normal Invert, [23](#), [33](#)
 - Modulator Atten Manual Auto, [32](#), [33](#)
 - Off, [23](#), [35](#)
 - Q Offset, [28](#)
 - Quadrature Skew, [29](#)
 - Sum, [23](#)
 - Summing Ratio (SRC1/SRC2) x.xx dB, [35](#)
 - Through, [31](#)
- digital signal interface module
 - N5102A, [376](#)
- digital subsystem
 - clock cps, [376](#)
 - clock phase, [376](#)
 - clock polarity, [377](#)
 - clock rate, [378](#)
 - data alignment, [380](#)
 - data border, [380](#)
 - direction, [381](#)
 - frame, [383](#)
 - igain, [381](#)
 - inagate, [382](#)
 - IQ polarity, [384](#)
 - iqswap, [383](#)
 - logic type, [389](#)
 - loopback, [389](#)
 - N5102A, [376](#)
 - nformat, [383](#)
 - pconfig, [390](#)
 - pthrough, [391](#)
 - qgain, [384](#)

Index

- digital subsystem (*continued*)
 - qnegate, 385
 - qoffset, 386
 - reference frequency, 378
 - rotation, 386
 - scaling, 387
 - size, 387
 - skew, 379
 - source, 379
 - state, 391
 - Stype, 388
 - type, 388
- digital subsystem
 - inegate, 382
- discrete response data, 11
- discrete SCPI parameters, 9
- display
 - secure mode, 162
- display contrast hardkeys, 87
- display subsystem keys
 - Brightness, 86
 - display contrast, 87
 - Inverse Video Off On, 87
 - Update in Remote Off On, 88
- DL Reference 1.1 softkey, 1076
 - wideband CDMA base band generator subsystem softkeys
 - DL Reference 1.1, 976
- DL Reference 1.2 softkey, 1076
 - wideband CDMA base band generator subsystem softkeys
 - DL Reference 1.2, 976
- DL Reference 2.1 softkey, 1076
 - wideband CDMA base band generator subsystem softkeys
 - DL Reference 2.1, 976
- DL Reference 2.2 softkey, 1076
 - wideband CDMA base band generator subsystem softkeys
 - DL Reference 2.2, 976
- DM0 softkey
 - See DECT subsystem keys
- DM1 softkey
 - See DECT subsystem keys
- DMOD softkey, 95
- Dmodulation subsystem keys
 - # of Carriers, 285, 287
 - 128QAM, 281
 - 16PSK, 281
 - 16QAM, 281
 - 2.100 MHz, 279
 - 256QAM, 281
 - 2-Lvl FSK, 281
 - 32QAM, 281
 - 40.000 MHz, 274, 279
 - 4-Lvl FSK, 281
 - 4QAM, 281
 - 64QAM, 281
 - 8PSK, 281
 - APCO 25 C4FM, 275
 - APCO 25 w/C4FM, 284, 285, 286
 - APCO 25 w/C4QPSK, 284, 285, 286
 - ARB Reference Ext Int, 283
 - ARB Sample Clock, 284
 - BPSK, 281
 - Bus, 292
 - Carrier Phases Fixed Random, 286
 - CDPD, 284, 285, 286
 - Clear Header, 277
 - Continuous, 289
 - Custom Digital Mod State, 285, 286
 - D8PSK, 281
 - DECT, 284, 285, 286
 - Digital Modulation Off On, 296
 - EDGE, 284, 285, 286
 - Ext, 292
 - Ext Delay Off On, 294
 - Ext Delay Time, 293
 - Ext Polarity Neg Pos, 294
 - Filter Alpha, 276
 - Filter BbT, 276
 - Free Run, 291
 - Freq Dev, 280
 - Freq Spacing, 285
 - Gate Active Low High, 291
 - Gated, 289
 - Gaussian, 275
 - Gray Coded QPSK, 281
 - GSM, 284, 285, 286
 - I/Q Mod Filter Manual Auto, 279

Dmodulation subsystem keys (*continued*)

I/Q Output Filter Manual Auto, [274](#)
 Immediate, [283](#)
 Initialize Table, [286](#)
 Insert Row, [252](#), [286](#)
 IS-2000 SR3 DS, [275](#)
 IS-95, [275](#)
 IS-95 Mod, [275](#)
 IS-95 Mod w/EQ, [275](#)
 IS-95 OQPSK, [281](#)
 IS-95 QPSK, [281](#)
 IS-95 w/EQ, [275](#)
 Load/Store, [286](#)
 Marker 1, [280](#)
 Marker 1 Polarity Neg Pos, [281](#)
 Marker 2, [280](#)
 Marker 2 Polarity Neg Pos, [282](#)
 Marker 3, [280](#)
 Marker 3 Polarity Neg Pos, [282](#)
 Marker 4, [280](#)
 Marker 4 Polarity Neg Pos, [282](#)
 Modulator Atten Manual Auto, [278](#)
 MSK, [281](#)
 Multicarrier Off On, [284](#)
 NADC, [284](#), [285](#), [286](#)
 None, [280](#)
 Nyquist, [275](#)
 Off, [283](#)
 On, [283](#)
 Optimize FIR For EVM ACP, [277](#)
 OQPSK, [281](#)
 $\pi/4$ DQPSK, [281](#)
 Patt Trig In 1, [295](#)
 Patt Trig In 2, [295](#)
 PDC, [284](#), [285](#), [286](#)
 PHS, [284](#), [285](#), [286](#)
 PWT, [284](#), [285](#), [286](#)
 QPSK, [281](#)
 Rectangle, [275](#)
 Reference Freq, [213](#), [282](#)
 Reset & Run, [291](#)
 Root Nyquist, [275](#)
 Save Setup To Header, [277](#)
 Select File, [252](#), [284](#)
 Single, [289](#)

Dmodulation subsystem keys (*continued*)

Store Custom Dig Mod State, [288](#)
 Symbol Rate, [288](#)
 TETRA, [284](#), [285](#), [286](#)
 Through, [274](#), [279](#)
 Trigger & Run, [291](#)
 Trigger Key, [292](#)
 UN3/4 GSM Gaussian, [275](#)
 User FIR, [275](#)
 WCDMA, [275](#)
 Dn Custom Cont softkey, [924](#)
 Dn Normal Cont softkey, [924](#)
 Dn Normal Disc softkey, [924](#)
 Dn Sync Cont softkey, [924](#)
 Dn Sync Disc softkey, [924](#)
 Do Power Search softkey, [58](#), [59](#), [60](#)
 Doppler Shift softkey, [671](#)
 Down Custom softkey, [805](#), [841](#)
 Down TCH All softkey, [805](#), [841](#)
 Down TCH softkey, [805](#), [841](#)
 Down/Up softkey, [950](#), [999](#)
 Downlink MCS-1 softkey, [642](#), [644](#), [699](#)
 Downlink MCS-5 softkey, [648](#)
 Downlink MCS-9 softkey, [648](#)
 downloading files, [114](#), [125](#)
 DPCCH + 1 DPDCH softkey, [357](#)
 DPCCH + 2 DPDCH softkey, [357](#)
 DPCCH + 3 DPCCH softkey, [357](#)
 DPCCH + 4 DPDCH softkey, [357](#)
 DPCCH + 5 DPDCH softkey, [357](#)
 DPCCH Pilot data-clk (DRPS23) softkey, [964](#), [966](#),
 [967](#), [968](#), [969](#)
 DPCCH Power field, [996](#)
 DPCCH Raw Data (RPS4) softkey
 See wideband CDMA base band generator
 subsystem keys and fields
 DPCCH Raw Data Clock (RPS5) softkey
 See wideband CDMA base band generator
 subsystem keys and fields
 DPCCH softkey, [357](#), [990](#), [1013](#)
 DPCCH TFC I data-clk (DRPS22) softkey, [964](#),
 [966](#), [967](#), [968](#), [969](#)
 DPCCH TPC indicator (DRPS21) softkey, [964](#), [966](#),
 [967](#), [968](#), [969](#)
 DPCH + 1 softkey, [936](#), [937](#)

Index

- DPCH + 2 softkey, [936](#), [937](#)
- DPCH Channel Balance softkey, [944](#)
- DPCH Compressed Frame Indicator (DRPS32) softkey, [964](#), [966](#), [967](#), [968](#), [969](#)
- DPCH data stream (DRPS24) softkey, [964](#), [966](#), [967](#), [968](#), [969](#)
- DPCH data-clk (0) (DRPS28) softkey, [964](#), [966](#), [967](#), [968](#), [969](#)
- DPCH Gap Indicator (DRPS33) softkey, [964](#), [966](#), [967](#), [968](#), [969](#)
- DPCH softkey, [352](#)
- DPCH TimeSlot pulse (DRPS25) softkey, [964](#), [966](#), [967](#), [968](#), [969](#)
- DPCH10ms Frame-Pulse (DRPS26) softkey, [964](#), [966](#), [967](#), [968](#), [969](#)
- DPDCH data-clk withDTX (DRPS20) softkey, [964](#), [966](#), [967](#), [968](#), [969](#)
- DPDCH data-clk WithOutDTX (DRPS30) softkey, [964](#), [966](#), [967](#), [968](#), [969](#)
- DPDCH Power field, [1005](#)
- DPDCH Raw Data (RPS2) softkey
 - See wideband CDMA base band generator subsystem keys and fields
- DPDCH Raw DataClock (RPS3) softkey
 - See wideband CDMA base band generator subsystem keys and fields
- DPDCH softkey, [990](#)
- Drift Deviation softkey, [467](#)
- dual ARB subsystem
 - Through, [300](#)
- dual ARB subsystem keys
 - # Skipped Points, [304](#)
 - 2.100 MHz, [302](#)
 - 40.000 MHz, [300](#), [302](#)
 - ARB Off On, [320](#)
 - ARB Reference Ext Int, [22](#), [310](#)
 - ARB Sample Clock, [311](#)
 - Build New Waveform Sequence, [312](#)
 - Bus, [315](#)
 - Carrier Bandwidth, [308](#)
 - Carrier to Noise Ratio, [309](#)
 - Clear Header, [298](#)
 - Clipping Type |I+jQ| |I|,|Q|, [297](#)
 - Continuous, [315](#)
 - Edit Repetitions, [312](#)
 - dual ARB subsystem keys (*continued*)
 - Edit Selected Waveform Sequence, [312](#)
 - Ext, [315](#)
 - Ext Delay Off On, [317](#)
 - Ext Delay Time, [316](#)
 - Ext Polarity Neg Pos, [317](#)
 - First Mkr Point, [303](#), [304](#)
 - Free Run, [314](#)
 - Gate Active Low High, [314](#)
 - Gated, [312](#)
 - Header RMS, [298](#)
 - I/Q Mod Filter Manual Auto, [302](#)
 - I/Q Output Filter Manual Auto, [299](#), [300](#)
 - Immediate, [310](#)
 - Last Mkr Point, [303](#), [304](#)
 - Marker 1, [305](#), [306](#)
 - Marker 1 2, [303](#), [304](#)
 - Marker 1 Polarity Neg Pos, [306](#)
 - Marker 2, [305](#), [306](#)
 - Marker 2 Polarity Neg Pos, [306](#)
 - Marker 3, [305](#), [306](#)
 - Marker 3 Polarity Neg Pos, [307](#)
 - Marker 4, [305](#), [306](#)
 - Marker 4 Polarity Neg Pos, [307](#)
 - Modulator Atten Manual Auto, [301](#)
 - Noise Bandwidth Factor, [308](#)
 - None, [305](#), [306](#)
 - Off, [310](#)
 - On, [310](#)
 - Patt Trig In 1, [318](#)
 - Patt Trig In 2, [318](#)
 - Real-time Noise Off On, [307](#)
 - Reference Freq, [309](#)
 - Reset & Run, [314](#)
 - Save Setup To Header, [299](#)
 - Scaling, [311](#)
 - Segment Advance, [312](#)
 - Select Waveform, [318](#), [319](#)
 - Set Marker Off All Points, [303](#)
 - Single, [312](#), [315](#)
 - Through, [300](#), [302](#)
 - Toggle Marker 1, [312](#)
 - Trigger & Run, [314](#)
 - Trigger Key, [315](#)
 - Waveform Runtime Scaling, [311](#)

Dual-Sine softkey, 177, 184, 191, 197
 Dummy Bearer 1 softkey, 600
 Dummy Bearer 2 softkey, 600
 Dummy softkey, 707
 DWCDMA softkey, 96
 Dwell Type List Step softkey, 50

E

Eb/No field, 1020
 Eb/No value (dB) field, 989
 EbNo field, 505
See CDMA2000 BBG subsystem keys and fields
 Ec/No value field, 936, 1020
 EcNo field, 492, 527, 532
 EDGE BERT Off On softkey, 438
 EDGE Off On softkey, 667
 EDGE softkey, 284, 285, 286, 635
 EDGE subsystem keys
 128QAM, 638
 16 1's & 16 0's, 631, 640, 642, 648
 16PSK, 638
 16QAM, 638
 256QAM, 638
 2-Lvl FSK, 638
 32 1's & 32 0's, 631, 640, 642, 648
 32QAM, 638
 4 1's & 4 0's, 631, 640, 642, 648
 4-Lvl FSK, 638
 4QAM, 638
 64 1's & 64 0's, 631, 640, 642, 648
 64QAM, 638
 8 1's & 8 0's, 631, 640, 642, 648
 8PSK, 638
 All Timeslots, 658
 APCO 25 C4FM, 635
 BBG Ref Ext Int, 634
 Begin Frame, 658
 Begin Timeslot #, 658, 660
 BPSK, 638
 Bus, 639, 663
 Continuous, 662
 CS-1, 642, 643
 CS-4, 642, 644
 Custom, 658
 Custom TS, 646, 657

EDGE subsystem keys (*continued*)
 D8PSK, 638
 Data Format Pattern Framed, 630
 Downlink MCS-1, 642, 644
 Downlink MCS-5, 648
 Downlink MCS-9, 648
 EDGE, 635
 EDGE Off On, 667
 E-TCH/F43.2, 648
 Ext, 631, 639, 640, 648, 663
 Ext BBG Ref Freq, 634
 Ext Data Clock Ext Int, 623
 Ext Data Clock Normal Symbol, 633
 Ext Delay Bits, 664
 Ext Delay Off On, 666
 Ext Polarity Neg Pos, 666
 Fall Delay, 624, 625
 Fall Time, 626
 Filter Alpha, 623
 Filter BbT, 624
 FIX4, 631, 632, 640, 641, 642, 644, 648, 654
 Free Run, 662
 Freq Dev, 636
 G, 641, 656
 Gate Active Low High, 663
 Gated, 662
 Gaussian, 635
 GMSK, 658
 Gray Coded QPSK, 638
 I/Q Scaling, 636
 IS-95, 635
 IS-95 Mod, 635
 IS-95 Mod w/EQ, 635
 IS-95 OQPSK, 638
 IS-95 QPSK, 638
 IS-95 w/EQ, 635
 MSK, 638
 Multislot Off On, 647
 Normal, 658
 Normal All, 658
 Nyquist, 635
 Optimize FIR For EVM ACP, 631
 OQPSK, 638
 $\pi/4$ DQPSK, 638
 Patt Trig In 1, 666

Index

EDGE subsystem keys (*continued*)

Patt Trig In 2, [666](#)
Phase Dev, [637](#)
Phase Polarity Normal Invert, [638](#)
PN11, [631](#), [640](#), [648](#)
PN15, [631](#), [640](#), [642](#), [643](#), [644](#), [645](#), [648](#), [652](#), [653](#),
[654](#), [655](#)
PN20, [631](#), [640](#), [648](#)
PN23, [631](#), [640](#), [648](#)
PN9, [631](#), [640](#), [642](#), [643](#), [644](#), [645](#), [648](#), [652](#), [653](#),
[654](#), [655](#)
QPSK, [638](#)
Recall Secondary Frame State, [638](#)
Rectangle, [635](#)
Reset & Run, [662](#)
Restore EDGE Factory Default, [633](#)
Rise Delay, [627](#), [628](#)
Rise Time, [628](#), [629](#)
Root Nyquist, [635](#)
S, [646](#)
Save Secondary Frame State, [639](#)
Secondary Frame Off On, [640](#)
Sine, [630](#)
Single, [662](#)
Symbol Rate, [660](#)
Sync Out Offset, [659](#)
T1, [656](#)
T2, [657](#)
TCH/FS, [642](#), [645](#)
Timeslot Ampl Main Delta, [657](#)
Timeslot Off On, [658](#)
Trigger & Run, [662](#)
Trigger Key, [639](#), [663](#)
TSC0, [646](#), [657](#)
TSC1, [646](#), [657](#)
TSC2, [646](#), [657](#)
TSC3, [646](#), [657](#)
TSC4, [646](#), [657](#)
TSC5, [646](#), [657](#)
TSC6, [646](#), [657](#)
TSC7, [646](#), [657](#)
UN3/4 GSM Gaussian, [635](#)
Uncoded, [648](#)
Uplink MCS-1, [642](#), [645](#)
Uplink MCS-5, [648](#)

EDGE subsystem keys (*continued*)

Uplink MCS-9, [648](#)
User File, [630](#), [631](#), [640](#), [642](#), [648](#)
User FIR, [635](#)
User FSK, [637](#), [638](#)
User I/Q, [637](#), [638](#)
edge subsystem keys
PRAM File, [632](#)
Edit Channel Setup softkey, [255](#), [259](#)
Edit Repetitions softkey, [312](#)
Edit Selected Waveform Sequence softkey, [312](#)
Enter Secure Mode softkey, [164](#)
Equal Energy per Symbol softkey, [356](#)
Equal Powers softkey
See CDMA ARB subsystem keys
See CDMA2000 ARB subsystem keys
See CDMA2000 BBG subsystem keys and fields
See wideband CDMA base band generator
subsystem keys and fields
Erase All softkey, [162](#)
Erase and Overwrite All softkey, [164](#)
Erase and Sanitize All softkey, [165](#)
Erase softkey, [163](#)
ERROR
[221](#), [114](#), [125](#)
Error BER softkey, [1091](#)
Error Bits softkey, [1083](#)
Error Blocks field, [1084](#)
Error Count softkey, [438](#)
See sense subsystem keys
Error Info softkey, [156](#)
error messages, resolving, [719](#)
Error Out softkey, [409](#)
Error Rate softkey
See calculate subsystem keys
See calculate subsystem keys
ESG file overview, [717](#)
ET softkey, [697](#)
E-TCH/F43.2 softkey, [648](#)
Even Second Delay field, [479](#), [512](#)
Exceeds Any Limit softkey, [401](#)
Exceeds Any Thresholds softkey
See sense subsystem keys
Execute Cal softkey, [72](#), [73](#)
Ext 50 Ohm softkey, [23](#), [35](#)

- Ext 600 Ohm softkey, [23](#), [35](#)
- Ext BBG Ref Freq softkey
 - See custom subsystem keys
 - See EDGE subsystem keys
 - See GSM subsystem keys
 - See NADC subsystem keys
 - See PDC subsystem keys
 - See PHS subsystem keys
 - See TETRA subsystem keys
- Ext CDMA Freq field, [499](#)
- Ext Clock Rate x1 x2 x4 softkey, [934](#)
- Ext Data Clock Ext Int softkey
 - See EDGE subsystem keys
 - See PDC subsystem keys
- Ext Data Clock Normal Symbol softkey
 - See custom subsystem keys
 - See DECT subsystem keys
 - See EDGE subsystem keys
 - See GSM subsystem keys
 - See NADC subsystem keys
 - See PDC subsystem keys
 - See PHS subsystem keys
 - See TETRA subsystem keys
- Ext Delay Bits softkey
 - See custom subsystem keys
 - See DECT subsystem keys
 - See EDGE subsystem keys
 - See GSM subsystem keys
 - See NADC subsystem keys
 - See PDC subsystem keys
 - See PHS subsystem keys
 - See TETRA subsystem keys
- Ext Delay Off On softkey
 - See CDMA ARB subsystem keys
 - See CDMA2000 ARB subsystem keys
 - See custom subsystem keys
 - See DECT subsystem keys
 - See Dmodulation subsystem keys
 - See dual ARB subsystem keys
 - See EDGE subsystem keys
 - See GSM subsystem keys
 - See NADC subsystem keys
 - See PDC subsystem keys
 - See PHS subsystem keys
 - See TETRA subsystem keys
- Ext Delay Off On softkey (continued)
 - See wideband CDMA ARB subsystem keys
- Ext Delay Time softkey, [238](#), [270](#), [293](#), [316](#), [370](#)
- Ext Frame Trigger Delay softkey, [423](#)
- Ext In 600 Ohm I Offset softkey, [26](#)
- Ext In 600 Ohm Q Offset softkey, [27](#)
- Ext Polarity Neg Pos softkey
 - See CDMA ARB subsystem keys
 - See CDMA2000 ARB subsystem keys
 - See custom subsystem keys
 - See DECT subsystem keys
 - See Dmodulation subsystem keys
 - See dual ARB subsystem keys
 - See EDGE subsystem keys
 - See GSM subsystem keys
 - See NADC subsystem keys
 - See PDC subsystem keys
 - See PHS subsystem keys
 - See TETRA subsystem keys
 - See wideband CDMA ARB subsystem keys
- Ext softkey
 - List/Sweep subsystem, [53](#)
 - See amplitude modulation subsystem keys
 - See CDMA ARB subsystem keys
 - See CDMA2000 ARB subsystem keys
 - See CDMA2000 BBG subsystem keys and fields
 - See custom subsystem keys
 - See DECT subsystem keys
 - See Dmodulation subsystem keys
 - See dual ARB subsystem keys
 - See EDGE subsystem keys
 - See frequency modulation subsystem keys
 - See GSM subsystem keys
 - See low frequency output subsystem keys
 - See NADC subsystem keys
 - See PDC subsystem keys
 - See phase modulation subsystem keys
 - See PHS subsystem keys
 - See sense subsystem keys
 - See TETRA subsystem keys
 - See trigger subsystem keys
 - See wideband CDMA ARB subsystem keys
 - See wideband CDMA base band generator subsystem keys and fields

Index

Ext softkeys

Ext Coupling DC AC, [175](#), [182](#), [195](#)

Ext Detector, [61](#)

Ext Pulse, [204](#)

Ext1, [178](#), [186](#), [198](#)

Ext2, [178](#), [186](#), [198](#)

extended numeric SCPI parameter, [8](#)

External Frame Trigger Polarity Neg Pos softkey, [423](#)

External softkey, [511](#)

F

FACC softkey

See DECT subsystem keys

Fail Hold softkey, [401](#)

Fall Delay softkey

See custom subsystem keys

See DECT subsystem keys

See EDGE subsystem keys

See GSM subsystem keys

See NADC subsystem keys

See PDC subsystem keys

See PHS subsystem keys

See TETRA subsystem keys

Fall Time softkey

See custom subsystem keys

See DECT subsystem keys

See EDGE subsystem keys

See GSM subsystem keys

See NADC subsystem keys

See PDC subsystem keys

See PHS subsystem keys

See TETRA subsystem keys

Falling softkey, [546](#)

FBI State field, [995](#)

FCDMA softkey, [96](#)

FCOR softkey, [912](#), [917](#)

FCorr softkey, [707](#)

FDEV1_FS softkey

See DECT subsystem keys

FDEV1_HS softkey

See DECT subsystem keys

FDEV2_FS softkey

See DECT subsystem keys

Field 1 field, [489](#)

Field 2 field, [489](#)

Field 3 field, [490](#)

file

retrieval, [114](#), [125](#)

systems, [122](#)

types, [122](#)

file overview, HDSPA, [717](#)

Filter Alpha softkey, [1011](#)

See CDMA ARB subsystem keys

See CDMA2000 ARB subsystem keys

See CDMA2000 BBG subsystem keys and fields

See custom subsystem keys

See DECT subsystem keys

See Dmodulation subsystem keys

See EDGE subsystem keys

See GPS subsystem keys

See GSM subsystem keys

See NADC subsystem keys

See PDC subsystem keys

See PHS subsystem keys

See TETRA subsystem keys

See wideband CDMA ARB subsystem keys

See wideband CDMA base band generator
subsystem keys and fields

Filter BbT softkey, [1012](#)

See CDMA ARB subsystem keys

See CDMA2000 ARB subsystem keys

See CDMA2000 BBG subsystem keys and fields

See custom subsystem keys

See DECT subsystem keys

See Dmodulation subsystem keys

See EDGE subsystem keys

See GPS subsystem keys

See GSM subsystem keys

See NADC subsystem keys

See PDC subsystem keys

See PHS subsystem keys

See TETRA subsystem keys

See wideband CDMA ARB subsystem keys

See wideband CDMA base band generator
subsystem keys and fields

FIR softkey, [97](#)

First Mkr Point softkey, [303](#), [304](#)

First Spread Code softkey, [351](#), [359](#)

FIX softkey, [995](#)

- FIX4 softkey, [644](#), [994](#), [1024](#), [1028](#)
 - See* CDMA2000 BBG subsystem keys and fields
 - See* custom subsystem keys
 - See* DECT subsystem keys
 - See* EDGE subsystem keys
 - See* GPS subsystem keys
 - See* GSM subsystem keys
 - See* NADC subsystem keys
 - See* PDC subsystem keys
 - See* PHS subsystem keys
 - See* TETRA subsystem keys
 - See* wideband CDMA baseband generator subsystem keys and fields
- Flat Noise BW field, [990](#)
- Flatness Off On softkey, [19](#)
- FM softkeys
 - FM Dev, [187](#)
 - FM Dev Couple Off On, [187](#)
 - FM Off On, [186](#)
 - FM Path 1 2, [181](#)
 - FM Stop Rate, [183](#)
 - FM Sweep Rate, [185](#)
 - FM Tone 2 Amp Percent of Peak, [184](#)
 - FM Tone 2 Rate, [183](#)
- forgiving listening and precise talking, [7](#)
- Frame Clock Polarity Neg Pos softkey, [1010](#)
- Frame Count softkey
 - See* sense subsystem keys
- Frame Erasure softkey, [449](#)
 - See* calculate subsystem keys
- Frame Length field
 - See* CDMA2000 BBG subsystem keys and fields
- Frame Offset field
 - See* CDMA2000 BBG subsystem keys and fields
- Frame offset field, [536](#)
- Frame Repeat Single Cont softkey, [796](#)
- Frame Struct field, [971](#)
- Frame Sync Trigger Mode Single Cont softkey, [1070](#)
- Frame Trigger Source Int Ext softkey, [424](#)
- Free Run softkey
 - list trigger source, [53](#)
 - See* amplitude modulation subsystem keys
 - See* CDMA ARB subsystem keys
 - See* CDMA2000 ARB subsystem keys
- Free Run softkey (continued)*
 - See* custom subsystem keys
 - See* DECT subsystem keys
 - See* Dmodulation subsystem keys
 - See* dual ARB subsystem keys
 - See* EDGE subsystem keys
 - See* frequency modulation subsystem keys
 - See* GSM subsystem keys
 - See* low frequency output subsystem keys
 - See* NADC subsystem keys
 - See* PDC subsystem keys
 - See* phase modulation subsystem keys
 - See* PHS subsystem keys
 - See* TETRA subsystem keys
 - See* trigger subsystem keys
 - See* wideband CDMA ARB subsystem keys
- Freq Dev softkey
 - See* custom subsystem keys
 - See* DECT subsystem keys
 - See* Dmodulation subsystem keys
 - See* EDGE subsystem keys
 - See* GSM subsystem keys
 - See* NADC subsystem keys
 - See* PDC subsystem keys
 - See* TETRA subsystem keys
- Freq softkeys
 - Freq, [41](#), [48](#)
 - Freq & Ampl, [48](#)
 - Freq Channels Off On, [40](#)
 - Freq Drift Type Linear Sine, [468](#)
 - Freq Multiplier, [41](#)
 - Freq Offset, [42](#), [469](#)
 - Freq Ref Off On, [43](#)
 - Freq Ref Set, [43](#)
 - Freq Spacing, [285](#), [330](#)
 - Freq Start, [44](#), [48](#)
 - Freq Stop, [44](#), [48](#)
- Frequency hardkey, [37](#), [40](#), [41](#), [45](#), [46](#)
- frequency modulation subsystem keys
 - Bus, [185](#)
 - Dual-Sine, [184](#)
 - Ext, [185](#)
 - Ext Coupling DC AC, [182](#)
 - Ext1, [186](#)
 - Ext2, [186](#)

Index

frequency modulation subsystem keys (*continued*)

FM Dev, [187](#)
FM Dev Couple Off On, [187](#)
FM Off On, [186](#)
FM Path 1 2, [181](#)
FM Stop Rate, [183](#)
FM Sweep Rate, [185](#)
FM Tone 2 Amp Percent of Peak, [184](#)
FM Tone 2 Rate, [183](#)
Free Run, [185](#)
Incr Set, [182](#)
Internal 1, [186](#)
Internal 2, [186](#)
Noise, [184](#)
Ramp, [184](#)
Sine, [184](#)
Square, [184](#)
Swept-Sine, [184](#)
Triangle, [184](#)
Trigger Key, [185](#)

frequency subsystem keys

Adjust Phase, [47](#)
Channel Number, [39](#)
Freq, [41](#), [48](#)
Freq Channels Off On, [40](#)
Freq Multiplier, [41](#)
Freq Offset, [42](#)
Freq Ref Off On, [43](#)
Freq Ref Set, [43](#)
Freq Start, [44](#), [48](#)
Freq Stop, [44](#), [48](#)
Frequency, [37](#), [40](#), [41](#), [45](#), [46](#)
Off, [41](#), [48](#)
Phase Ref Set, [46](#)
Ref Oscillator Source Auto Off On, [47](#)

FSK softkey, [97](#)

FSYNCH Type field, [503](#)

Full softkey, [528](#), [533](#)

Function Generator softkey, [192](#)

G

G softkey, [641](#), [656](#)

Gain Unit dB Lin Index softkey, [360](#)

Gate Active Low High softkey

See CDMA ARB subsystem keys

Gate Active Low High softkey (*continued*)

See CDMA2000 ARB subsystem keys
See custom subsystem keys
See DECT subsystem keys
See Dmodulation subsystem keys
See dual ARB subsystem keys
See EDGE subsystem keys
See GSM subsystem keys
See NADC subsystem keys
See PDC subsystem keys
See PHS subsystem keys
See TETRA subsystem keys
See wideband CDMA ARB subsystem keys

Gate Clk Delay softkey, [412](#)

Gate Delay Off On softkey, [413](#)

Gate Mode Time Clk softkey, [412](#)

Gate Off On softkey, [414](#)

Gate Polarity Neg Pos softkey, [414](#)

Gate Time Delay softkey, [413](#)

Gated softkey

See CDMA ARB subsystem keys
See CDMA2000 ARB subsystem keys
See custom subsystem keys
See DECT subsystem keys
See Dmodulation subsystem keys
See dual ARB subsystem keys
See EDGE subsystem keys
See GSM subsystem keys
See NADC subsystem keys
See PDC subsystem keys
See PHS subsystem keys
See TETRA subsystem keys
See wideband CDMA ARB subsystem keys

Gaussian softkey

See CDMA ARB subsystem keys
See CDMA2000 ARB subsystem keys
See CDMA2000 BBG subsystem keys and fields
See custom subsystem keys
See DECT subsystem keys
See Dmodulation subsystem keys
See EDGE subsystem keys
See GPS subsystem keys
See GSM subsystem keys
See NADC subsystem keys
See PDC subsystem keys

- Gaussian softkey (continued)*
 See PHS subsystem keys
 See TETRA subsystem keys
 See wideband CDMA ARB subsystem keys
 See wideband CDMA base band generator
 subsystem keys and fields
- GMSK softkey, [658](#)
- Goto Row softkey, [328](#)
- GPIB Address softkey, [75](#)
- GPS Ref (f0) softkey, [675](#)
- GPS Ref Clk Ext Int softkey, [675](#)
- GPS subsystem
 Data Mode Raw Enc TLM, [671](#)
- GPS subsystem keys
 APCO 25 C4FM, [671](#)
 Data Mode Raw Enc TLM, [670](#)
 Doppler Shift, [671](#)
 Filter Alpha, [672](#)
 Filter BbT, [673](#)
 FIX4, [670](#)
 Gaussian, [671](#)
 GPS Ref (f0), [675](#)
 GPS Ref Clk Ext Int, [675](#)
 IQ Phase Normal Invert, [674](#)
 IS-95, [671](#)
 IS-95 Mod, [671](#)
 IS-95 Mod w/EQ, [671](#)
 IS-95 w/EQ, [671](#)
 Nyquist, [671](#)
 Optimize FIR For EVM ACP, [673](#)
 P Code Pwr, [674](#)
 PN15, [670](#)
 PN9, [670](#)
 Ranging Code C/A P C/A+P, [674](#)
 Real-time GPS Off On, [676](#)
 Rectangle, [671](#)
 Root Nyquist, [671](#)
 Satellite ID, [676](#)
 UN3/4 GSM Gaussian, [671](#)
 User File, [670](#)
 User FIR, [671](#)
- Gray Coded QPSK softkey
 See custom subsystem keys
 See DECT subsystem keys
 See Dmodulation subsystem keys
- Gray Coded QPSK softkey (continued)*
 See EDGE subsystem keys
 See GSM subsystem keys
 See NADC subsystem keys
 See PDC subsystem keys
 See PHS subsystem keys
 See TETRA subsystem keys
- GSM BERT Off On softkey, [452](#)
- GSM Off On softkey, [716](#)
- GSM softkey, [284](#), [285](#), [286](#)
- GSM subsystem keys
 128QAM, [694](#)
 16 1's & 16 0's, [687](#), [696](#), [697](#), [699](#), [706](#)
 16PSK, [694](#)
 16QAM, [694](#)
 256QAM, [694](#)
 2-Lvl FSK, [694](#)
 32 1's & 32 0's, [687](#), [696](#), [697](#), [699](#), [706](#)
 32QAM, [694](#)
 4 1's & 4 0's, [687](#), [696](#), [697](#), [699](#), [706](#)
 4-Lvl FSK, [694](#)
 4QAM, [694](#)
 64 1's & 64 0's, [687](#), [696](#), [697](#), [699](#), [706](#)
 64QAM, [694](#)
 8 1's & 8 0's, [687](#), [696](#), [697](#), [699](#), [706](#)
 8PSK, [694](#)
 Access, [707](#)
 All Timeslots, [708](#)
 APCO 25 C4FM, [691](#)
 BBG Data Clock Ext Int, [677](#)
 BBG Ref Ext Int, [690](#)
 Begin Frame, [708](#)
 Begin Timeslot #, [708](#), [709](#)
 BPSK, [694](#)
 Bus, [695](#), [712](#)
 Continuous, [711](#)
 CS-1, [699](#)
 CS-4, [703](#)
 Custom, [707](#)
 Custom TS, [698](#), [705](#)
 D8PSK, [694](#)
 Data Format Pattern Framed, [686](#)
 Diff Data Encode Off On, [688](#)
 Downlink MCS-1, [699](#)
 Dummy, [707](#)

Index

GSM subsystem keys (*continued*)

ET, 697
Ext, 687, 695, 696, 697, 706, 712
Ext BBG Ref Freq, 583, 690
Ext Data Clock Normal Symbol, 689
Ext Delay Bits, 713
Ext Delay Off On, 714
Ext Polarity Neg Pos, 714
Fall Delay, 680, 681
Fall Time, 681, 682
FCorr, 707
Filter Alpha, 677
Filter BbT, 678
FIX4, 687, 688, 696, 697, 698, 699, 704, 706, 707
Free Run, 711
Freq Dev, 692
Gate Active Low High, 712
Gated, 711
Gaussian, 691
Gray Coded QPSK, 694
GSM Off On, 716
I/Q Scaling, 692
IS-95, 691
IS-95 Mod, 691
IS-95 Mod w/EQ, 691
IS-95 OQPSK, 694
IS-95 QPSK, 694
IS-95 w/EQ, 691
MSK, 694
Multislot Off On, 699
Normal, 707
Normal All, 707
Nyquist, 691
Optimize FIR For EVM ACP, 686
OQPSK, 694
 $\pi/4$ DQPSK, 694
Patt Trig In 1, 715
Patt Trig In 2, 715
Phase Dev, 693
Phase Polarity Normal Invert, 694
PN11, 687, 706
PN15, 687, 696, 697, 699, 703, 704, 706
PN20, 687, 706
PN23, 687, 706
PN9, 687, 696, 697, 699, 703, 704, 706

GSM subsystem keys (*continued*)

PN9 Mode Normal Quick, 680
QPSK, 694
Recall Secondary Frame State, 695
Rectangle, 691
Reset & Run, 711
Restore Factory Default, 688
Rise Delay, 683
Rise Time, 684, 685
Root Nyquist, 691
S, 705
Save Secondary Frame State, 695
Secondary Frame Off On, 696
Sine, 685
Single, 711
SS, 697
Symbol Rate, 709
Sync, 707
Sync Out Offset, 708
TCH/FS, 699
Timeslot Ampl Main Delta, 706
Timeslot Off On, 706
Trigger & Run, 711
Trigger Key, 695, 712
TS, 707
TSC0, 698, 705
TSC1, 698, 705
TSC2, 698, 705
TSC3, 698, 705
TSC4, 698, 705
TSC5, 698, 705
TSC6, 698, 705
TSC7, 698, 705
UN3/4 GSM Gaussian, 691
Uplink MCS-1, 699
User File, 685, 687, 696, 697, 699, 706
User FIR, 691
User FSK, 693, 694
User I/Q, 693, 694
gsm subsystem keys
PRAM Files, 687

H

Half softkey, 528, 533
Header field, 485, 495

- Help Mode Single Cont softkey, 157
- hexadecimal values, 16
- High Amplitude softkey
 - See* sense subsystem keys
- High Crest Mode Off On softkey, 21
- Higher Layer softkey, 1072
- Hostname softkey, 76
- HSDPA file overview, 717
- HSDPA over W-CDMA SCPI commands, 717
- HSDPA user files, 717
- I**
- I Offset softkey, 28
- I/Q Adjustments Off On softkey, 31
- I/Q Calibration softkey, 72
- I/Q Gain Balance Source 1 softkey, 27
- I/Q Mapping Normal Invert softkey, 223, 250, 339
- I/Q Mod Filter Manual Auto softkey, 32, 210, 224, 249, 279, 302, 324, 341, 472
- I/Q Off On softkey, 36
- I/Q Out Gain Balance softkey, 25
- I/Q Output Atten softkey, 26
- I/Q Output Filter Manual Auto softkey, 208, 219, 244, 274, 299, 300, 322, 338, 464
- I/Q Scaling softkey
 - See* custom subsystem keys
 - See* DECT subsystem keys
 - See* EDGE subsystem keys
 - See* GSM subsystem keys
 - See* NADC subsystem keys
 - See* PDC subsystem keys
 - See* PHS subsystem keys
 - See* TETRA subsystem keys
- I/Q softkey, 98
- I/Q Timing Skew Path, 30
- I/Q timing Skew softkey, 29
- IDLE softkey, 863, 885
- IEEE 488.2 common command keys
 - Diagnostic Info, 90
 - RECALL Reg, 91
 - Run Complete Self Test, 93
 - Save Reg, 92
 - Save Seq[n] Reg[nn], 92
 - Select Seq, 91
- Immediate softkey, 228, 264, 283, 310
 - See* sense subsystem keys
- Impairments Off On softkey, 465
- Impedance 75 Ohm High softkey, 416
- Incr Set hardkey
 - See* amplitude modulation subsystem keys
 - See* frequency modulation subsystem keys
 - See* phase modulation subsystem keys
- Increment Scramble Code softkey, 346
- Increment Timing Offset softkey, 349
- Infinity softkey, 975, 1075
- Init Power field, 1014
- Init Pwr field, 1034, 1050
- Initial Bit Count softkey, 437
- Initial Block Count softkey, 427, 430
- Initial Frame Count softkey, 447
- Initialize Phase Fixed Random softkey, 331
- Initialize Table softkey, 286
- input subsystem keys
 - 0.7V, 417
 - 1.4V, 417
 - 1.6V, 417
 - 2.5V, 417
 - Clock Delay Off On, 415
 - Clock Polarity Neg Pos, 416
 - Clock Time Delay, 415
 - Data Polarity Neg Pos, 416
 - Gate Clk Delay, 412
 - Gate Delay Off On, 413
 - Gate Mode Time Clk, 412
 - Gate Off On, 414
 - Gate Polarity Neg Pos, 414
 - Gate Time Delay, 413
 - Impedance 75 Ohm High, 416
 - Resolution, 414
- Insert Row softkey, 252, 255, 259, 286
- Installed Board Info softkey, 81
- Int I/Q Skew Corrections RF BB Off softkey, 34
- Int softkeys
 - Int Doublet, 204
 - Int Free-Run, 204
 - Int Gated, 204
 - Int Phase Polarity Normal Invert, 23, 33
 - Int Triggered, 204
- integer response data, 10

Index

- Intermod softkey, [979](#)
- Internal softkeys
 - Internal, [61](#), [178](#), [511](#)
 - Internal 1, [186](#), [198](#)
 - Internal 2, [186](#), [198](#)
 - Internal Monitor, [192](#)
 - Internal Square, [204](#)
- Inverse Video Off On softkey, [87](#)
- Inverted softkey, [516](#)
- IP Address softkey, [76](#)
- IQ Phase Normal Invert softkey, [674](#)
- IS-2000 SR3 DS softkey
 - See* CDMA ARB subsystem keys
 - See* CDMA2000 ARB subsystem keys
 - See* Dmodulation subsystem keys
 - See* wideband CDMA ARB subsystem keys
- IS-95 Mod softkey
 - See* CDMA ARB subsystem keys
 - See* CDMA2000 ARB subsystem keys
 - See* CDMA2000 BBG subsystem keys and fields
 - See* custom subsystem keys
 - See* DECT subsystem keys
 - See* Dmodulation subsystem keys
 - See* EDGE subsystem keys
 - See* GPS subsystem keys
 - See* GSM subsystem keys
 - See* NADC subsystem keys
 - See* PDC subsystem keys
 - See* PHS subsystem keys
 - See* TETRA subsystem keys
 - See* wideband CDMA ARB subsystem keys
 - See* wideband CDMA base band subsystem keys and fields
- IS-95 Mod w/EQ softkey
 - See* CDMA ARB subsystem keys
 - See* CDMA2000 ARB subsystem keys
 - See* CDMA2000 BBG subsystem keys and fields
 - See* custom subsystem keys
 - See* DECT subsystem keys
 - See* Dmodulation subsystem keys
 - See* EDGE subsystem keys
 - See* GPS subsystem keys
 - See* GSM subsystem keys
 - See* NADC subsystem keys
 - See* PDC subsystem keys
 - See* PHS subsystem keys
 - See* TETRA subsystem keys
 - See* wideband CDMA ARB subsystem keys
 - See* wideband CDMA base band generator subsystem keys and fields
- IS-95 softkey
 - See* CDMA ARB subsystem keys
 - See* CDMA2000 ARB subsystem keys
 - See* CDMA2000 BBG subsystem keys and fields
 - See* custom subsystem keys
 - See* DECT subsystem keys
 - See* Dmodulation subsystem keys
 - See* EDGE subsystem keys
 - See* GPS subsystem keys
 - See* GSM subsystem keys
 - See* NADC subsystem keys
 - See* PDC subsystem keys
 - See* PHS subsystem keys
 - See* TETRA subsystem keys
 - See* wideband CDMA ARB subsystem keys
 - See* wideband CDMA base band generator subsystem keys and fields
- IS-95 w/EQ softkey
 - See* CDMA ARB subsystem keys
- IS-95 Mod w/EQ softkey (*continued*)
 - See* PHS subsystem keys
 - See* TETRA subsystem keys
 - See* wideband CDMA ARB subsystem keys
 - See* wideband CDMA base band generator subsystem keys and fields
- IS-95 OQPSK softkey
 - See* custom subsystem keys
 - See* DECT subsystem keys
 - See* Dmodulation subsystem keys
 - See* EDGE subsystem keys
 - See* GSM subsystem keys
 - See* NADC subsystem keys
 - See* PDC subsystem keys
 - See* PHS subsystem keys
 - See* TETRA subsystem keys
- IS-95 QPSK softkey
 - See* custom subsystem keys
 - See* DECT subsystem keys
 - See* Dmodulation subsystem keys
 - See* EDGE subsystem keys
 - See* GSM subsystem keys
 - See* NADC subsystem keys
 - See* PDC subsystem keys
 - See* PHS subsystem keys
 - See* TETRA subsystem keys

IS-95 w/EQ softkey (continued)

- See CDMA2000 ARB subsystem keys
- See CDMA2000 BBG subsystem keys and fields
- See custom subsystem keys
- See DECT subsystem keys
- See Dmodulation subsystem keys
- See EDGE subsystem keys
- See GPS subsystem keys
- See GSM subsystem keys
- See NADC subsystem keys
- See PDC subsystem keys
- See PHS subsystem keys
- See TETRA subsystem keys
- See wideband CDMA ARB subsystem keys

IS-97 Levels softkey, 230

L

Last Mkr Point softkey, 303, 304

Leap Seconds field, 500

Left Alternate softkey, 351

Left softkey, 940

LF Out softkeys

- LF Out Amplitude, 188

- LF Out Off On, 192

- LF Out Stop Freq, 188, 189, 195

- LF Out Sweep Rate, 190

- LF Out Sweep Time, 191

- LF Out Tone 2 Ampl % of Peak, 189

- LF Out Tone 2 Freq, 188, 189, 195

license, 83

license value, 84

Link Down Up softkey, 341, 987

Link Forward Reverse softkey, 250, 477

list data, 113

List softkey, 98, 122

list/sweep subsystem keys

- # Points, 56

- Ampl, 48, 65

- Ampl Start, 48, 66

- Ampl Stop, 48, 67

- Dwell Type List Step, 50

- Freq, 41, 48

- Freq & Ampl, 48

- Freq Start, 44, 48

- Freq Stop, 44, 48

list/sweep subsystem keys (*continued*)

- Load List From Step Sweep, 54

- Manual Mode Off On, 52

- Manual Point, 51

- Off, 41, 48, 65

- Preset List, 55

- Step Dwell, 55

- Sweep Direction Down Up, 49

- Sweep Retrace Off On, 53

- Sweep Type List Step, 54

Load From Selected File softkey, 18, 120, 128, 329

Load List From Step Sweep softkey, 54

Load/Store softkey, 286

Long Code Mask field, 515

Long Code State field, 482, 515

Low Amplitude softkey, 426, 429

- See sense subsystem keys

Low Capacity softkey, 588, 600

Low Capacity with Z field softkey, 588, 600

low frequency output subsystem keys

- Bus, 191

- DC, 191

- Dual-Sine, 191

- Ext, 191

- Free Run, 191

- Function Generator, 192

- Internal Monitor, 192

- LF Out Amplitude, 188

- LF Out Off On, 192

- LF Out Stop Freq, 188, 189, 195

- LF Out Sweep Rate, 190

- LF Out Sweep Time, 191

- LF Out Tone 2 Ampl % of Peak, 189

- LF Out Tone 2 Freq, 188, 189, 195

- Noise, 191

- Ramp, 191

- Sine, 191

- Square, 191

- Swept-Sine, 191

- Triangle, 191

- Trigger Key, 191

LTM OFF field, 500

M

Manual Mode Off On softkey, 52

Index

- Manual Point softkey, [51](#)
- Marker 1 2 softkey, [303](#), [304](#)
- Marker 1 Polarity Neg Pos softkey, [212](#), [226](#), [261](#),
[281](#), [306](#), [326](#), [362](#), [473](#)
- Marker 1 softkey, [211](#), [225](#), [260](#), [261](#), [280](#), [305](#), [306](#),
[325](#), [361](#), [362](#), [472](#), [473](#)
- Marker 2 Polarity Neg Pos softkey, [212](#), [226](#), [262](#),
[282](#), [306](#), [326](#), [363](#), [473](#)
- Marker 2 softkey, [211](#), [225](#), [260](#), [261](#), [280](#), [305](#), [306](#),
[325](#), [361](#), [362](#), [472](#), [473](#)
- Marker 3 Polarity Neg Pos softkey, [212](#), [226](#), [262](#),
[282](#), [307](#), [326](#), [363](#), [474](#)
- Marker 3 softkey, [211](#), [225](#), [260](#), [261](#), [280](#), [305](#), [306](#),
[325](#), [361](#), [362](#), [472](#), [473](#)
- Marker 4 Polarity Neg Pos softkey, [212](#), [226](#), [262](#),
[282](#), [307](#), [326](#), [363](#), [474](#)
- Marker 4 softkey, [211](#), [225](#), [260](#), [261](#), [280](#), [305](#), [306](#),
[325](#), [361](#), [362](#), [472](#), [473](#)
- mass memory subsystem keys
 - Binary, [122](#)
 - Copy File, [124](#)
 - Delete All NVWFM Files, [126](#)
 - Delete All WFM Files, [126](#)
 - Delete All WFM1 Files, [127](#)
 - Delete File, [127](#)
 - List, [122](#)
 - Load From Selected File, [128](#)
 - Rename File, [128](#)
 - State, [122](#)
 - Store To File, [128](#)
 - User Flatness, [122](#)
- Max Input softkey, [979](#)
- Max Power field, [1015](#)
- Max Pwr field, [1034](#), [1050](#)
- MCDMA softkey, [99](#)
- MDMOD softkey, [99](#)
- MDWCDMA softkey, [100](#)
- Measurement Mode BER% Search softkey, [446](#)
- Measurement Mode BLER% Search softkey, [432](#)
- memory subsystem keys, [112](#)
 - Add Comment To Seq[n] Reg[nn], [121](#)
 - All, [104](#), [120](#)
 - Binary, [94](#)
 - Bit, [94](#)
 - CDMA, [95](#)
 - memory subsystem keys, [112](#) (*continued*)
 - Copy File, [105](#), [113](#)
 - Data PRAM, [111](#)
 - Delete All ARB CDMA Files, [116](#)
 - Delete All ARB DMOD Files, [116](#)
 - Delete All ARB DWCDMA Files, [116](#)
 - Delete All ARB FCDMA Files, [117](#)
 - Delete All ARB MCDMA Files, [118](#)
 - Delete All ARB MDWCDMA Files, [118](#)
 - Delete All ARB MTONE Files, [118](#)
 - Delete All ARB RCDMA Files, [119](#)
 - Delete All ARB UWCDMA Files, [120](#)
 - Delete All Binary Files, [116](#)
 - Delete All Bit Files, [116](#)
 - Delete All Files, [115](#)
 - Delete All FIR Files, [117](#)
 - Delete All FSK Files, [117](#)
 - Delete All I/Q Files, [117](#)
 - Delete All List Files, [117](#)
 - Delete All MDMOD Files, [118](#)
 - Delete All MFCDMA Files, [118](#)
 - Delete All SEQ Files, [119](#)
 - Delete All SHAPE Files, [119](#)
 - Delete All State Files, [119](#)
 - Delete All UFLT Files, [119](#)
 - Delete File, [120](#)
 - DMOD, [95](#)
 - DWCDMA, [96](#)
 - FCDMA, [96](#)
 - FIR, [97](#)
 - FSK, [97](#)
 - I/Q, [98](#)
 - List, [98](#)
 - Load From Selected File, [120](#)
 - MCDMA, [99](#)
 - MDMOD, [99](#)
 - MDWCDMA, [100](#)
 - MFCDMA, [100](#)
 - MTONE, [101](#)
 - Oversample Ratio, [108](#)
 - RCDMA, [101](#)
 - Rename File, [121](#)
 - SEQ, [102](#)
 - SHAPE, [102](#)
 - State, [103](#)

- memory subsystem keys, 112 (*continued*)
 - Store To File, 121
 - User Flatness, 103
 - UWCDMA, 104
- Message Data Raw Data (RPS11) softkey
 - See wideband CDMA base band generator subsystem keys and fields
- Message Part field, 1033
- Message Pulse (RPS22) softkey
 - See wideband CDMA base band generator subsystem keys and fields
- Message Type field, 501
- Message-Control Raw Data Clock (RPS12) softkey
 - See wideband CDMA base band generator subsystem keys and fields
- Meter Address softkeys, 77
- Meter Channel A B softkey, 77
- Meter Timeout softkey, 78
- MFCDMA softkey, 100
- Min Power field, 1015
- Mod Index softkey, 469
- Mod On/Off hardkey, 129
- Modulator Atten Manual Auto softkey, 32, 33, 209, 223, 248, 278, 301, 323, 339, 340, 470, 471
- Msg Ctrl softkey, 1021
- Msg Data softkey, 1021
- Msg Pwr field, 1032, 1049
- MSK softkey
 - See custom subsystem keys
 - See DECT subsystem keys
 - See Dmodulation subsystem keys
 - See EDGE subsystem keys
 - See GSM subsystem keys
 - See NADC subsystem keys
 - See PDC subsystem keys
 - See PHS subsystem keys
 - See TETRA subsystem keys
- MTONE softkey, 101
- Multicarrier Off On softkey, 229, 250, 284
- Multislot Off On softkey, 647, 699
- Multitone Off On softkey, 332
- multitone subsystem keys
 - 2.100 MHz, 324
 - 40.000 MHz, 322, 324
 - ARB Reference Ext Int, 327
 - multitone subsystem keys (*continued*)
 - ARB Sample Clock, 329
 - Clear Header, 321
 - Freq Spacing, 330
 - Goto Row, 328
 - I/Q Mod Filter Manual Auto, 324
 - I/Q Output Filter Manual Auto, 322
 - Initialize Phase Fixed Random, 331
 - Load From Selected File, 329
 - Marker 1, 325
 - Marker 1 Polarity Neg Pos, 326
 - Marker 2, 325
 - Marker 2 Polarity Neg Pos, 326
 - Marker 3, 325
 - Marker 3 Polarity Neg Pos, 326
 - Marker 4, 325
 - Marker 4 Polarity Neg Pos, 326
 - Modulator Atten Manual Auto, 323
 - Multitone Off On, 332
 - None, 325
 - Number Of Tones, 330, 331
 - Random Seed Fixed Random, 332
 - Reference Freq, 327
 - Save Setup To Header, 321
 - Store To File, 329
 - Through, 322, 324
 - Toggle State, 328, 330
 - mV softkey, 172
 - mVemf softkey, 172
- N**
- N Power field, 991, 1021
- N5102A
 - See digital subsystem
- NADC Off On softkey, 813
- NADC softkey, 284, 285, 286
- NADC subsystem keys
 - 128QAM, 796
 - 16 1's & 16 0's, 789, 798, 801, 802, 804
 - 16PSK, 796
 - 16QAM, 796
 - 256QAM, 796
 - 2-Lvl FSK, 796
 - 32 1's & 32 0's, 789, 798, 801, 802, 804
 - 32QAM, 796

Index

NADC subsystem keys (*continued*)

4 1's & 4 0's, [789](#), [798](#), [801](#), [802](#), [804](#)
4-Lvl FSK, [796](#)
4QAM, [796](#)
64 1's & 64 0's, [789](#), [798](#), [801](#), [802](#), [804](#)
64QAM, [796](#)
8 1's & 8 0's, [789](#), [798](#), [801](#), [802](#), [804](#)
8PSK, [796](#)
All Timeslots, [806](#)
APCO 25 C4FM, [793](#)
BBG Data Clock Ext Int, [779](#)
BBG Ref Ext Int, [792](#)
Begin Frame, [806](#)
Begin Timeslot #, [806](#), [807](#)
BPSK, [796](#)
Bus, [798](#), [810](#)
CDL, [799](#)
CDVCC, [800](#), [803](#)
Continuous, [808](#)
D8PSK, [796](#)
Data Format Pattern Framed, [788](#)
Down Custom, [805](#)
Down TCH, [805](#)
Down TCH All, [805](#)
Ext, [789](#), [798](#), [801](#), [802](#), [804](#), [810](#)
Ext BBG Ref Freq, [792](#)
Ext Data Clock Normal Symbol, [791](#)
Ext Delay Bits, [811](#)
Ext Delay Off On, [812](#)
Ext Polarity Neg Pos, [812](#)
Fall Delay, [782](#), [784](#)
Fall Time, [783](#), [784](#)
Filter Alpha, [779](#)
Filter BbT, [780](#)
FIX4, [789](#), [790](#), [798](#), [799](#), [801](#), [802](#), [803](#), [804](#), [805](#)
Frame Repeat Single Cont, [796](#)
Free Run, [809](#)
Freq Dev, [794](#)
Gate Active Low High, [810](#)
Gated, [808](#)
Gaussian, [793](#)
Gray Coded QPSK, [796](#)
I/Q Scaling, [794](#)
IS-95, [793](#)
IS-95 Mod, [793](#)

NADC subsystem keys (*continued*)

IS-95 Mod w/EQ, [793](#)
IS-95 OQPSK, [796](#)
IS-95 QPSK, [796](#)
IS-95 w/EQ, [793](#)
MSK, [796](#)
NADC Off On, [813](#)
Nyquist, [793](#)
Optimize FIR For EVM ACP, [789](#)
OQPSK, [796](#)
 $\pi/4$ DQPSK, [796](#)
Patt Trig In 1, [812](#)
Patt Trig In 2, [812](#)
Phase Dev, [795](#)
PN11, [789](#), [798](#), [801](#), [802](#), [804](#)
PN15, [789](#), [798](#), [801](#), [802](#), [804](#)
PN20, [789](#), [798](#), [801](#), [802](#), [804](#)
PN23, [789](#), [798](#), [801](#), [802](#), [804](#)
PN9, [789](#), [798](#), [801](#), [802](#), [804](#)
PN9 Mode Normal Quick, [781](#)
Polarity Normal Invert, [797](#)
QPSK, [796](#)
Rate Full Half, [794](#)
Recall Secondary Frame State, [797](#)
Rectangle, [793](#)
Reset & Run, [809](#)
Restore NADC Factory Default, [790](#)
Rise Delay, [785](#), [786](#)
Rise Time, [786](#), [787](#)
Root Nyquist, [793](#)
SACCH, [800](#), [804](#)
Save Secondary Frame State, [797](#)
Secondary Frame Off On, [798](#)
Sine, [782](#), [788](#)
Single, [808](#)
Symbol Rate, [807](#)
SYNC, [800](#), [804](#)
Sync Out Offset, [806](#)
Timeslot Ampl Main Delta, [802](#)
Timeslot Off On, [802](#)
Trigger & Run, [809](#)
Trigger Key, [798](#), [810](#)
UN3/4 GSM Gaussian, [793](#)
Up Custom, [805](#)
Up TCH, [805](#)

- NADC subsystem keys (*continued*)
 Up TCH All, [805](#)
 User File, [782](#), [788](#), [789](#), [798](#), [801](#), [802](#), [804](#)
 User FIR, [793](#)
 User FSK, [795](#), [796](#)
 User I/Q, [796](#)
- nadc subsystem keys
 PRAM Files, [790](#)
- Network ID field, [501](#)
- No Limits softkey
See calculate subsystem keys
- No Thresholds softkey
See sense subsystem keys
- Noise Bandwidth Factor, [308](#)
- Noise Off On softkey, [505](#), [517](#)
- Noise Seed Fixed Random softkey, [215](#)
- Noise Seed softkey, [467](#)
- Noise softkey, [177](#), [184](#), [191](#), [197](#)
- NONE (RPS0) softkey
See wideband CDMA base band generator subsystem keys and fields
- NONE softkey, [1081](#)
- None softkey, [163](#), [211](#), [225](#), [260](#), [261](#), [280](#), [305](#), [306](#), [325](#), [361](#), [362](#), [472](#), [473](#), [565](#), [982](#), [983](#), [1086](#), [1094](#)
- Normal All softkey, [658](#), [707](#)
- Normal softkey, [516](#), [658](#), [707](#), [940](#)
- Num of Blk field, [1087](#), [1095](#)
- Num of Pre field, [1034](#), [1050](#)
- Number of AICH field, [1018](#)
- Number of PRACH 80ms field, [1033](#)
- Number of PRACH field, [1047](#), [1049](#)
- Number of Preamble field, [1050](#)
- Number Of Tones softkey, [330](#), [331](#)
- numeric boolean response data, [11](#)
- numeric SCPI parameter, [8](#)
- numeric, extended SCPI parameter, [8](#)
- Nyquist softkey
See CDMA ARB subsystem keys
See CDMA2000 ARB subsystem keys
See CDMA2000 BBG subsystem keys and fields
See custom subsystem keys
See DECT subsystem keys
See Dmodulation subsystem keys
See EDGE subsystem keys
- Nyquist softkey (continued)*
See GPS subsystem keys
See GSM subsystem keys
See NADC subsystem keys
See PDC subsystem keys
See PHS subsystem keys
See TETRA subsystem keys
See wideband CDMA ARB subsystem keys
See wideband CDMA base band generator subsystem keys and fields
- 0**
- OCNS softkey, [352](#)
- octal values, [16](#)
- Off softkey, [23](#), [35](#), [41](#), [48](#), [65](#), [228](#), [264](#), [283](#), [310](#), [1046](#)
- Omitted softkey, [974](#), [1074](#)
- On softkey, [228](#), [264](#), [283](#), [310](#), [1046](#)
- On/Off field, [956](#), [1038](#)
- OpenLoop Ant1 SCH TSTD OFF softkey, [980](#)
- OpenLoop Ant1 softkey, [980](#)
- OpenLoop Ant2 SCH TSTD OFF softkey, [980](#)
- OpenLoop Ant2 softkey, [980](#)
- Optimize ACP ADJ ALT softkey, [342](#), [356](#)
- Optimize FIR For EVM ACP softkey, [1012](#)
See CDMA ARB subsystem keys
See CDMA2000 ARB subsystem keys
See CDMA2000 BBG subsystem keys and fields
See custom subsystem keys
See DECT subsystem keys
See Dmodulation subsystem keys
See EDGE subsystem keys
See GPS subsystem keys
See GSM subsystem keys
See NADC subsystem keys
See PDC subsystem keys
See PHS subsystem keys
See TETRA subsystem keys
See wideband CDMA ARB subsystem keys
See wideband CDMA base band generator subsystem keys and fields
- options
 001/002
 all subsystem, [206](#), [460](#)
 custom subsystem, [548](#)

Index

options (*continued*)

001/002

Dmodulation subsystem, [274](#)

dual ARB subsystem, [297](#)

multitone subsystem, [321](#)

400

wideband CDMA ARB subsystem, [333](#)

wideband CDMA base band generator
subsystem, [934](#)

401

CDMA ARB subsystem, [216](#)

CDMA2000 ARB subsystem, [242](#)

CDMA2000 BBG subsystem, [477](#)

402

DECT subsystem, [571](#)

EDGE subsystem, [623](#)

GSM subsystem, [677](#)

NADC subsystem, [779](#)

PDC subsystem, [814](#)

PHS subsystem, [850](#)

TETRA subsystem, [889](#)

403

AWGN real-time subsystem, [461](#)

AWGN subsystem, [207](#)

406

bluetooth subsystem, [462](#)

409

GPS subsystem, [670](#)

UN7/300

calculate subsystem, [394](#)

data subsystem, [404](#)

input subsystem, [412](#), [418](#)

sense subsystem, [421](#)

Options Info softkey, [83](#)

OQPSK softkey

See custom subsystem keys

See DECT subsystem keys

See Dmodulation subsystem keys

See EDGE subsystem keys

See GSM subsystem keys

See NADC subsystem keys

See PDC subsystem keys

See PHS subsystem keys

See TETRA subsystem keys

Output Blanking Off On Auto softkey, [129](#)

output subsystem keys

Mod On/Off, [129](#)

Output Blanking Off On Auto, [129](#)

RF On/Off, [130](#)

Oversample Ratio softkey, [108](#), [227](#)

Overwrite softkey, [163](#)

P

P Code Pwr softkey, [674](#)

P Rev field, [502](#)

P Rev Min field, [500](#)

P softkey, [590](#)

$\pi/4$ DQPSK softkey

See custom subsystem keys

See DECT subsystem keys

See Dmodulation subsystem keys

See EDGE subsystem keys

See GSM subsystem keys

See NADC subsystem keys

See PDC subsystem keys

See PHS subsystem keys

See TETRA subsystem keys

Packet (DH1) softkey, [474](#)

Paging Indicator field, [509](#), [960](#)

Paging softkey, [230](#)

parameter types. *See* SCPI commands parameter
types

Pass Amplitude softkey, [426](#), [430](#)

See sense subsystem keys

Pass/Fail Limits softkey, [402](#)

Pass/Fail Off On softkey, [402](#)

paths, SCPI command tree, [7](#)

Patt Trig In 1 softkey

See CDMA ARB subsystem keys

See CDMA2000 ARB subsystem keys

See custom subsystem keys

See DECT subsystem keys

See Dmodulation subsystem keys

See dual ARB subsystem keys

See EDGE subsystem keys

See GSM subsystem keys

See NADC subsystem keys

See PDC subsystem keys

See PHS subsystem keys

See TETRA subsystem keys

Patt Trig In 1 softkey (continued)

See wideband CDMA ARB subsystem keys
subsystem keys

Patt Trig In 2 softkey

See CDMA ARB subsystem keys

See CDMA2000 ARB subsystem keys

See custom subsystem keys

See DECT subsystem keys

See Dmodulation subsystem keys

See dual ARB subsystem keys

See EDGE subsystem keys

See GSM subsystem keys

See NADC subsystem keys

See PDC subsystem keys

See PHS subsystem keys

See TETRA subsystem keys

See wideband CDMA ARB subsystem keys
subsystem keys

Pattern trigger in 1 field, 1061

Pattern trigger in 2 field, 1061

PCCPCH + SCH + 3 DPCH softkey, 342, 347

PCCPCH + SCH +1 DPCH softkey, 342, 347

PCCPCH + SCH softkey, 342, 347

P-CCPCH data (DRPS39) softkey, 964, 966, 967,
968, 969

P-CCPCH data-clk (DRPS38) softkey, 964, 966,
967, 968, 969

PCCPCH softkey, 936, 937

PDC Off On softkey, 849

PDC softkey, 284, 285, 286

PDC subsystem keys

128QAM, 830

16 1's & 16 0's, 824, 833, 835, 837, 839

16PSK, 830

16QAM, 830

256QAM, 830

2-Lvl FSK, 830

32 1's & 32 0's, 824, 833, 835, 837, 839

32QAM, 830

4 1's & 4 0's, 824, 833, 835, 837, 839

4-Lvl FSK, 830

4QAM, 830

64 1's & 64 0's, 824, 833, 835, 837, 839

64QAM, 830

8 1's & 8 0's, 824, 833, 835, 837, 839

PDC subsystem keys (continued)

8PSK, 830

All Timeslots, 841

APCO 25 C4FM, 827

BBG Ref Ext Int, 826

Begin Frame, 841

Begin Timeslot #, 841, 842

BPSK, 830

Bus, 832, 846

CC, 834, 838, 840

Continuous, 844

D8PSK, 830

Data Format Pattern Framed, 823

Down Custom, 841

Down TCH, 841

Down TCH All, 841

Ext, 824, 832, 833, 835, 837, 839, 846

Ext BBG Ref Freq, 827

Ext Data Clock Ext Int, 814

Ext Data Clock Normal Symbol, 826

Ext Delay Bits, 847

Ext Delay Off On, 848

Ext Polarity Neg Pos, 848

Fall Delay, 817, 818

Fall Time, 818, 819

Filter Alpha, 814

Filter BbT, 815

FIX4, 824, 825, 833, 834, 835, 836, 837, 839

Free Run, 845

Freq Dev, 829

Gate Active Low High, 846

Gated, 844

Gaussian, 827

Gray Coded QPSK, 830

I/Q Scaling, 828

IS-95, 827

IS-95 Mod, 827

IS-95 Mod w/EQ, 827

IS-95 OQPSK, 830

IS-95 QPSK, 830

IS-95 w/EQ, 827

MSK, 830

Nyquist, 827

Optimize FIR For EVM ACP, 823

OQPSK, 830

Index

ΠΔΧ συβψσψτεμ κερσ (*continued*)

$\pi/4$ DQPSK, 830
Patt Trig In 1, 848
Patt Trig In 2, 848
PDC Off On, 849
Phase Dev, 829
Phase Polarity Normal Invert, 831
PN11, 824, 835, 837, 839
PN15, 824, 833, 835, 837, 839
PN20, 824, 835, 837, 839
PN23, 824, 835, 837, 839
PN9, 824, 833, 835, 837, 839
PN9 Mode Normal Quick, 817
QPSK, 830
Rate Full Half, 828
Recall Secondary Frame State, 831
Rectangle, 827
Reset & Run, 845
Restore PDC Factory Default, 825
Rise Delay, 820
Rise Time, 821, 822
Root Nyquist, 827
SACCH, 834, 838, 840
Save Secondary Frame State, 832
Secondary Frame Off On, 833
Sine, 822
Single, 844
SW, 835, 838, 840
Symbol Rate, 843
Sync Out Offset, 842
Timeslot Ampl Main Delta, 836
Timeslot Off On, 836
Trigger & Run, 845
Trigger Key, 832, 846
UN3/4 GSM Gaussian, 827
Up Custom, 841
Up TCH, 841
Up TCH All, 841
Up VOX, 841
User File, 822, 824, 833, 835, 837, 839
User FIR, 827
User FSK, 830
User I/Q, 830
pdc subsystem keys
PRAM Files, 824

Performance Req softkey, 979
Permuted ESN field, 484, 495
Phase Dev softkey
See custom subsystem keys
See DECT subsystem keys
See EDGE subsystem keys
See GSM subsystem keys
See NADC subsystem keys
See PDC subsystem keys
See PHS subsystem keys
See TETRA subsystem keys
phase modulation subsystem keys
 Φ M Sweep Time softkey, 197
FM Φ M Normal High BW softkey, 194
 Φ M Dev Couple Off On, 199
 Φ M Dev softkey, 199
 Φ M Off On softkey, 198
 Φ M Path 1 2, 193
 Φ M Tone 2 Ampl Percent of Peak, 196
 Φ M Tone 2 Rate, 196
Bus, 197
Dual-Sine, 197
Ext, 197
Ext Coupling DC AC, 195
Ext1, 198
Ext2, 198
Free Run, 197
Incr Set, 194, 200
Internal 1, 198
Internal 2, 198
Noise, 197
Ramp, 197
Sine, 197
Square, 197
Swept-Sine, 197
Triangle, 197
Trigger Key, 197
Phase Polarity field, 508
Phase Polarity Normal Invert softkey
See custom subsystem keys
See DECT subsystem keys
See EDGE subsystem keys
See GSM subsystem keys
See PDC subsystem keys
See PHS subsystem keys

- Phase Polarity Normal Invert softkey (continued)*
See TETRA subsystem keys
See wideband CDMA base band generator
subsystem keys and fields
Phase Polarity Normal Inverted softkey, 987
Phase Ref Set softkey, 46
PHS Off On softkey, 888
PHS softkey, 284, 285, 286
PHS subsystem keys
128QAM, 873
16 1's & 16 0's, 860, 862, 866, 883, 887
16-Lvl FSK, 873
16PSK, 873
16QAM, 873
256QAM, 873
2-Lvl FSK, 873
32 1's & 32 0's, 860, 862, 866, 883, 887
32QAM, 873
4 1's & 4 0's, 860, 862, 866, 883, 887
4-Lvl FSK, 873
4QAM, 873
64 1's & 64 0's, 860, 862, 866, 883, 887
64QAM, 873
8 1's & 8 0's, 860, 862, 866, 883, 887
8-Lvl FSK, 873
8PSK, 873
All Timeslots, 875
APCO 25 C4FM, 869
BBG Data Clock Ext Int, 850
BBG Ref Ext Int, 868
Begin Frame, 875
Begin Timeslot #, 875, 876
BPSK, 873
Bus, 874, 882
C4FM, 873
Continuous, 878
CSID, 863, 884
Custom, 867
D8PSK, 873
Data Format Pattern Framed, 859
Ext, 860, 862, 866, 874, 882, 883, 887
Ext BBG Ref Freq, 868
Ext Data Clock Normal Symbol, 867
Ext Delay Bits, 880
Ext Delay Off On, 881
PHS subsystem keys (*continued*)
Ext Polarity Neg Pos, 881
Fall Delay, 854, 855
Fall Time, 854, 856
Filter Alpha, 850
Filter BbT, 851
FIX4, 860, 861, 862, 866, 883, 884, 887
Free Run, 879
Gate Active Low High, 880
Gated, 878
Gaussian, 869
Gray Coded QPSK, 873
I/Q Scaling, 870
IDLE, 863, 885
IS-95, 869
IS-95 Mod, 869
IS-95 Mod w/EQ, 869
IS-95 OQPSK, 873
IS-95 QPSK, 873
IS-95 w/EQ, 869
MSK, 873
Nyquist, 869
Optimize FIR For EVM ACP, 860
OQPSK, 873
 $\pi/4$ DQPSK, 873
Patt Trig In 1, 882
Patt Trig In 2, 882
Phase Dev, 870, 872
Phase Polarity Normal Invert, 873
PHS Off On, 888
PN11, 860, 862, 866, 883, 887
PN15, 860, 862, 866, 883, 887
PN20, 860, 862, 866, 883, 887
PN23, 860, 862, 866, 883, 887
PN9, 860, 862, 866, 883, 887
PN9 Mode Normal Quick, 852
PSID, 864, 885
QPSK, 873
Recall Secondary Frame State, 874
Rectangle, 869
Reset & Run, 879
Restore PHS Factory Default, 862
Rise Delay, 856, 857
Rise Time, 858
Root Nyquist, 869

Index

PHS subsystem keys (*continued*)

SA, [865](#), [886](#)
Save Secondary Frame State, [874](#)
Scramble Off On, [853](#)
Scramble Seed, [853](#)
Secondary Frame Off On, [875](#)
Sine, [859](#)
Single, [878](#)
Symbol Rate, [877](#)
SYNC, [867](#)
Sync Out Offset, [876](#)
TCH, [867](#)
TCH All, [867](#)
Timeslot Ampl Main Delta, [863](#), [884](#)
Timeslot Off On, [864](#), [886](#)
Timeslot Type, [888](#)
Trigger & Run, [879](#)
Trigger Key, [874](#), [882](#)
UN3/4 GSM Gaussian, [869](#)
User File, [859](#), [860](#), [862](#), [866](#), [883](#), [887](#)
User FIR, [869](#)
User FSK, [872](#), [873](#)
User I/Q, [872](#), [873](#)
UW, [864](#), [865](#), [885](#), [886](#)

phs subsystem keys
PRAM Files, [861](#)
PI Bits field, [960](#)
PICH 10ms FramePulse (DRPS37) softkey, [964](#),
[966](#), [967](#), [968](#), [969](#)
PICH data (DRPS35) softkey, [964](#), [966](#), [967](#), [968](#),
[969](#)
PICH data-clk (DRPS34) softkey, [964](#), [966](#), [967](#),
[968](#), [969](#)
PICH softkey, [352](#), [936](#), [937](#)
PICH TimeSlot Pulse (DRPS36) softkey, [964](#), [966](#),
[967](#), [968](#), [969](#)
Pilot softkey, [229](#), [230](#), [232](#), [250](#), [257](#)
Playback Ratio field, [940](#)
PN Offset field, [511](#)
PN Offset softkey, [255](#), [259](#)
PN11 softkey
See custom subsystem keys
See DECT subsystem keys
See EDGE subsystem keys
See GSM subsystem keys

PN11 softkey (*continued*)

See NADC subsystem keys
See PDC subsystem keys
See PHS subsystem keys
See sense subsystem keys
See TETRA subsystem keys

PN15 softkey
See CDMA2000 BBG subsystem keys and fields
See custom subsystem keys
See DECT subsystem keys
See EDGE subsystem keys
See GPS subsystem keys
See GSM subsystem keys
See NADC subsystem keys
See PDC subsystem keys
See PHS subsystem keys
See sense subsystem keys
See TETRA subsystem keys
See wideband CDMA base band generator
subsystem keys and fields

PN20 softkey
See custom subsystem keys
See DECT subsystem keys
See EDGE subsystem keys
See GSM subsystem keys
See NADC subsystem keys
See PDC subsystem keys
See PHS subsystem keys
See sense subsystem keys
See TETRA subsystem keys

PN23 softkey
See custom subsystem keys
See DECT subsystem keys
See EDGE subsystem keys
See GSM subsystem keys
See NADC subsystem keys
See PDC subsystem keys
See PHS subsystem keys
See sense subsystem keys
See TETRA subsystem keys

PN9 Mode Normal Quick softkey
See DECT subsystem keys
See GSM subsystem keys
See NADC subsystem keys
See PDC subsystem keys

- PN9 Mode Normal Quick softkey (continued)*
 See PHS subsystem keys
 See TETRA subsystem keys
- PN9 Mode Preset softkey, [160](#)
- PN9 softkey
 See CDMA2000 BBG subsystem keys and fields
 See custom subsystem keys
 See data subsystem keys
 See DECT subsystem keys
 See EDGE subsystem keys
 See GPS subsystem keys
 See GSM subsystem keys
 See NADC subsystem keys
 See PDC subsystem keys
 See PHS subsystem keys
 See sense subsystem keys
 See TETRA subsystem keys
 See wideband CDMA base band generator
 subsystem keys and fields
- Polarity Normal Invert softkey, [797](#)
- Power Control Signal Polarity Neg Pos softkey,
[1017](#)
- Power field
 See CDMA2000 BBG subsystem keys and fields
 See wideband CDMA baseband generator
 subsystem keys and fields
- Power Hold Off On softkey, [1014](#)
- Power Meter softkey, [78](#)
- Power Mode Norm TPC softkey, [1017](#)
- Power On Last Preset softkey, [158](#)
- Power Search Manual Auto softkey, [58](#), [59](#), [60](#)
- Power softkey, [359](#)
- power subsystem keys
 ALC BW, [57](#)
 ALC BW Normal Narrow, [57](#)
 ALC Off On, [60](#)
 Alt Amp Delta, [61](#)
 Alt Ampl Off On, [62](#)
 Ampl, [48](#), [65](#)
 Ampl Offset, [67](#)
 Ampl Ref Off On, [66](#)
 Ampl Ref Set, [65](#)
 Ampl Start, [48](#), [66](#)
 Ampl Stop, [48](#), [67](#)
 Amplitude, [65](#), [68](#)
- power subsystem keys (*continued*)
 Atten Hold Off On, [63](#)
 Do Power Search, [58](#), [59](#), [60](#)
 Ext Detector, [61](#)
 Internal, [61](#)
 Off, [48](#), [65](#)
 Power Search Manual Auto, [58](#), [59](#), [60](#)
 Set ALC Level, [58](#)
 Set Atten, [64](#)
 Source Module, [61](#)
- PPCCPCH softkey, [352](#), [353](#)
- Pp-m field, [1035](#), [1052](#)
- PRACH Mode Single Multi softkey, [1032](#)
- PRACH Power Setup Mode Pp-m Total softkey,
[1039](#)
- PRACH Processing (RPS19) softkey
 See wideband CDMA base band generator
 subsystem keys and fields
- PRACH Scrambling Code field, [1040](#)
- PRACH softkey, [1013](#)
- PRACH Trigger Polarity Neg Pos softkey, [1045](#)
- PRACH Trigger softkey, [1044](#)
- PRACH Trigger Source Immedi Trigger softkey,
[1045](#)
- PRAM
 downloads, [111](#)
 list, [112](#)
- PRAM DATA BLOCK, [113](#)
- pram files
 CUSTOM subsystem keys, [557](#)
 DECTsubsystem keys, [581](#)
 EDGE subsystem keys, [632](#)
 GSM subsystem keys, [687](#)
 NADC subsystem keys, [790](#)
 PDC subsystem keys, [824](#)
 PHS subsystem keys, [861](#)
 TETRA subsystem keys, [900](#)
- PRAM LIST, [113](#)
- PRAM?, [113](#)
- PRAT field, [502](#)
- Pre Sig field, [1036](#)
- Preamble power average field, [1038](#)
- Preamble Pulse (RPS21) softkey
 See wideband CDMA base band generator
 subsystem keys and fields

Index

Preamble Raw Data (RPS15) softkey
 See wideband CDMA base band generator
 subsystem keys and fields

Preamble Raw Data Clock (RPS16) softkey
 See wideband CDMA base band generator
 subsystem keys and fields

Preamble softkey, [1021](#)

precise talking and forgiving listening, [7](#)

Preset hardkey, [159](#)

Preset List softkey, [19](#), [55](#)

Preset Normal User softkey, [161](#)

PSCH softkey, [352](#)

PSCH State field, [962](#)

PSID softkey, [864](#), [885](#)

pulse modulation subsystem keys

 Ext Pulse, [204](#)

 Int Doublet, [204](#)

 Int Free-Run, [204](#)

 Int Gated, [204](#)

 Int Triggered, [204](#)

 Internal Square, [204](#)

 Pulse Delay, [69](#)

 Pulse Off On, [204](#)

 Pulse Period, [202](#)

 Pulse Rate, [201](#)

 Pulse Width, [203](#)

Pulse softkeys

 Pulse Delay, [69](#)

 Pulse Off On, [204](#)

 Pulse Period, [202](#)

 Pulse Rate, [201](#)

 Pulse Width, [203](#)

Puncture fields, [1087](#), [1095](#)

Puncture softkey, [972](#)

PwrOffs field, [971](#), [1071](#)

PWT softkey, [284](#), [285](#), [286](#)

Q

Q Offset softkey, [28](#)

QOF field, [486](#), [496](#)

QPSK softkey

See custom subsystem keys

See DECT subsystem keys

See Dmodulation subsystem keys

See EDGE subsystem keys

QPSK softkey (continued)

See GSM subsystem keys

See NADC subsystem keys

See PDC subsystem keys

See PHS subsystem keys

See TETRA subsystem keys

Quadrature Skew softkey, [29](#)

Quarter softkey, [528](#), [533](#)

quotes, SCPI command use of, [16](#)

R

RACH TrCH softkey, [1021](#)

Radio Config field

See CDMA2000 BBG subsystem keys and fields

Radio Config softkey, [256](#)

RadioConfig 1/2 Access softkey, [477](#)

RadioConfig 1/2 Traffic softkey, [477](#)

RadioConfig 3/4 Common Control softkey, [477](#)

RadioConfig 3/4 Enhanced Access softkey, [477](#)

RadioConfig 3/4 Traffic softkey, [477](#)

Ramp field, [485](#)

Ramp softkey, [177](#), [184](#), [191](#), [197](#)

Ramp Step field, [1035](#), [1051](#)

Ramp Time field, [486](#)

Random Seed Fixed Random softkey, [332](#)

Random softkey, [351](#), [359](#)

Ranging Code C/A P C/A+P softkey, [674](#)

Rate Full Half softkey, [794](#), [828](#)

Rate Match Attr field, [985](#), [1087](#), [1095](#)

Rate softkey, [255](#), [259](#)

RCDMA softkey, [101](#)

real response data, [10](#)

Real-time AWGN Off On softkey, [461](#)

real-time AWGN subsystem keys

 Bandwidth, [461](#)

 Real-time AWGN Off On, [461](#)

Real-time GPS Off On softkey, [676](#)

Real-time Noise, [307](#)

RECALL Reg softkey, [91](#)

Recall Secondary Frame State softkey

See DECT subsystem keys

See EDGE subsystem keys

See GSM subsystem keys

See NADC subsystem keys

See PDC subsystem keys

- Recall Secondary Frame State softkey (continued)*
 See PHS subsystem keys
 See TETRA subsystem keys
- Rectangle softkey
 See CDMA ARB subsystem keys
 See CDMA2000 ARB subsystem keys
 See CDMA2000 BBG subsystem keys and fields
 See custom subsystem keys
 See DECT subsystem keys
 See Dmodulation subsystem keys
 See EDGE subsystem keys
 See GPS subsystem keys
 See GSM subsystem keys
 See NADC subsystem keys
 See PDC subsystem keys
 See PHS subsystem keys
 See TETRA subsystem keys
 See wideband CDMA ARB subsystem keys
 See wideband CDMA base band generator subsystem keys and fields
- Ref Data Rate field, [988](#), [1019](#)
- Ref Oscillator Source Auto Off On softkey, [47](#)
- Ref Sensitivity softkey, [979](#)
- Reference Freq softkey, [475](#)
 See AWGN subsystem keys
 See bluetooth subsystem keys
 See CDMA ARB subsystem keys
 See CDMA2000 ARB subsystem keys
 See Dmodulation subsystem keys
 See dual ARB subsystem keys
 See multitone subsystem keys
 See wideband CDMA ARB subsystem keys
- Reference Out softkey, [409](#)
- Rename File, [121](#)
- Rename File softkey, [128](#)
- Reserved field, [502](#)
- Reset & Run softkey
 See CDMA ARB subsystem keys
 See CDMA2000 ARB subsystem keys
 See custom subsystem keys
 See DECT subsystem keys
 See Dmodulation subsystem keys
 See dual ARB subsystem keys
 See EDGE subsystem keys
 See GSM subsystem keys
- Reset & Run softkey (continued)*
 See NADC subsystem keys
 See PDC subsystem keys
 See PHS subsystem keys
 See TETRA subsystem keys
 See wideband CDMA ARB subsystem keys
- Reset RS-232 softkey, [79](#)
- Reset to Initial Power softkey, [1016](#)
- Resolution softkey, [414](#)
- resolving error messages/setting conflicts, [719](#)
- response data types. *See* SCPI commands response types
- Restore DECT Factory Default softkey, [582](#)
- Restore EDGE Factory Default softkey, [633](#)
- Restore Factory Default softkey, [688](#)
- Restore NADC Factory Default softkey, [790](#)
- Restore PDC Factory Default softkey, [825](#)
- Restore PHS Factory Default softkey, [862](#)
- Restore Sys Defaults softkey, [160](#)
- Restore TETRA Factory Default softkey, [901](#)
- Resync Limits softkey, [454](#)
- Retrigger Mode Off On softkey, [365](#)
- Reverse softkey, [229](#)
- Revert to Default Cal Settings softkey, [73](#)
- RF On/Off hardkey, [130](#)
- Right Alternate softkey, [351](#)
- Right softkey, [940](#)
- Rise Delay softkey
 See custom subsystem keys
 See DECT subsystem keys
 See EDGE subsystem keys
 See GSM subsystem keys
 See NADC subsystem keys
 See PDC subsystem keys
 See PHS subsystem keys
 See TETRA subsystem keys
- Rise Time softkey
 See custom subsystem keys
 See DECT subsystem keys
 See EDGE subsystem keys
 See GSM subsystem keys
 See NADC subsystem keys
 See PDC subsystem keys
 See PHS subsystem keys
 See TETRA subsystem keys

Index

- Rising softkey, [546](#)
- RMC 144 kbps (25.141 v3.9) softkey, [1053](#)
- RMC 384 kbps (25.141 v3.9) softkey, [1053](#)
- RMC 64 kbps (25.141 v3.9) softkey, [1053](#)
- RMC122 kbps (25.141 v3.9) softkey, [1053](#)
- RMS header info, [298](#)
- Root Nyquist softkey
 - See* CDMA ARB subsystem keys
 - See* CDMA2000 ARB subsystem keys
 - See* CDMA2000 BBG subsystem keys and fields
 - See* custom subsystem keys
 - See* DECT subsystem keys
 - See* Dmodulation subsystem keys
 - See* EDGE subsystem keys
 - See* GPS subsystem keys
 - See* GSM subsystem keys
 - See* NADC subsystem keys
 - See* PDC subsystem keys
 - See* PHS subsystem keys
 - See* TETRA subsystem keys
 - See* wideband CDMA ARB subsystem keys
 - See* wideband CDMA base band generator subsystem keys and fields
- route subsystem keys
 - Burst Gate In Polarity Neg Pos, [131](#), [132](#)
 - Data Clock Out Neg Pos, [134](#)
 - Data Clock Polarity Neg Pos, [131](#), [133](#), [135](#)
 - Data Out Polarity Neg Pos, [134](#), [136](#)
 - Data Polarity Neg Pos, [132](#), [133](#)
 - DATA/CLK/SYNC Rear Outputs Off On, [136](#)
 - Symbol Sync Out Polarity Neg Pos, [135](#), [136](#)
 - Symbol Sync Polarity Neg Pos, [132](#), [133](#)
- RS-232 Baud Rate softkey, [79](#)
- RS-232 ECHO Off On softkeys, [79](#)
- RS-232 Timeout softkeys, [80](#)
- Run Complete Self Test softkey, [93](#)
- S**
- S softkey, [646](#), [705](#)
 - See* DECT subsystem keys
- SA softkey, [865](#), [886](#)
- SACCH softkey, [800](#), [804](#), [834](#), [838](#), [840](#)
- Sanitize softkey, [163](#)
- Satellite ID softkey, [676](#)
- Save Reg softkey, [92](#)
- Save Secondary Frame State softkey
 - See* DECT subsystem keys
 - See* EDGE subsystem keys
 - See* GSM subsystem keys
 - See* NADC subsystem keys
 - See* PDC subsystem keys
 - See* PHS subsystem keys
 - See* TETRA subsystem keys
- Save Seq[n] Reg[nn] softkey, [92](#)
- Save Setup To Header softkey, [208](#), [222](#), [247](#), [277](#), [299](#), [321](#), [338](#), [465](#)
- Save User Preset softkey, [161](#)
- Scale to 0dB softkey
 - See* CDMA ARB subsystem keys
 - See* CDMA2000 ARB subsystem keys
 - See* CDMA2000 BBG subsystem keys and fields
 - See* wideband CDMA ARB subsystem keys
 - See* wideband CDMA base band generator subsystem keys and fields
- Scaling softkey, [311](#)
- SCCPCH softkey, [352](#), [353](#)
- SCFN field, [976](#), [1076](#)
- SCH slot-pulse (DRPS10) softkey, [964](#), [966](#), [967](#), [968](#), [969](#)
- SCPI
 - errors, [156](#)
- SCPI command subsystems
 - all, [460](#)
 - amplitude modulation, [174](#)
 - AWGN, [207](#)
 - AWGN real-time, [461](#)
 - bluetooth, [462](#)
 - calculate, [394](#)
 - calibration, [72](#)
 - CDMA ARB, [216](#)
 - CDMA2000 ARB, [242](#)
 - CDMA2000 BBG, [477](#)
 - communication, [75](#)
 - correction, [18](#)
 - custom, [548](#)
 - data, [404](#)
 - DECT, [571](#)
 - diagnostic, [81](#)
 - digital modulation, [20](#)
 - digital subsystem, [376](#)

SCPI command subsystems (*continued*)

- display, 85
- Dmodulation, 274
- Dual ARB, 297
- E4438C, 206
- EDGE, 623
- frequency, 37
- frequency modulation, 181
- GPS subsystem, 670
- GSM, 677
- HSDPA over W-CDMA, 717
- IEEE 488.2 common commands, 89
- input, 412, 418
- list/sweep, 48
- low frequency output, 188
- mass memory, 122
- memory, 94
- multitone, 321
- N5102A, 376
- NADC, 779
- output, 129
- PDC, 814
- phase modulation, 193
- PHS, 850
- power, 57
- pulse, 69
- pulse modulation, 201
- route, 131
- sense, 421
- status, 137
- system, 155
- TETRA, 889
- trigger, 168
- unit, 172
- wideband CDMA ARB, 333
- wideband CDMA base band generator, 934

SCPI commands

- command tree paths, 7
- parameter and response types, 7
- parameter types
 - boolean, 10
 - discrete, 9
 - extended numeric, 8
 - numeric, 8
 - string, 10

SCPI commands (*continued*)

- response data types
 - discrete, 11
 - integer, 10
 - numeric boolean, 11
 - real, 10
 - string, 11
- root command, 6
- SCPI softkey, 157, 159
- Scramble Code softkey, 351, 357, 359
- Scramble Off On softkey, 853, 893
- Scramble Offset softkey, 351, 359
- Scramble Seed softkey, 853, 892
- Scrambling Code field, 969, 970, 1068
- Screen Saver Delay
 - 1 hr softkey, 165
- Screen Saver Mode softkeys, 166
- Screen Saver Off On softkeys, 166
- Second DPDCH I Q softkey, 357
- Secondary Frame Off On softkey
 - See* DECT subsystem keys
 - See* EDGE subsystem keys
 - See* GSM subsystem keys
 - See* NADC subsystem keys
 - See* PDC subsystem keys
 - See* PHS subsystem keys
 - See* TETRA subsystem keys
- secure wave directory, 114, 125
- security functions
 - erase, 162, 163
 - none, 163
 - overwrite, 163, 164
 - sanitize, 163, 165
 - secure display, 162
 - secure mode, 164
- Segment Advance softkey, 312
- Select File softkey, 252, 284
- Select Seq softkey, 91
- Select Waveform softkey, 318, 319
- sense subsystem keys
 - Adjust Gain, 433
 - Aux, 434, 451, 457
 - Aux I/O Trigger Polarity Pos Neg, 457
 - BER Mode Off On, 421, 425, 444
 - BERT Off On, 454

Index

sense subsystem keys (*continued*)

BERT Resync Off On, 454
Bit Count, 435, 437
Bit Delay Off On, 456
Block Count, 424, 426, 428, 440, 444
Block Erasure, 422, 427, 440, 441, 442, 444, 445
Bus, 434, 451, 457
Class Ib Bit Error, 448, 449
Class II Bit Error, 449
Cycle Count, 457
Delay Bits, 456
EDGE BERT Off On, 438
Error Count, 438, 455
Exceeds Any Thresholds, 449
Ext, 434, 451, 457
Ext Frame Trigger Delay, 423
External Frame Polarity Net Pos, 423
Frame Count, 443, 447
Frame Erasure, 449
Frame Trigger Source Int Ext, 424
GSM BERT Off On, 452
High Amplitude, 425, 429, 436
Immediate, 434, 451, 457
Initial Bit Count, 437
Initial Block Count, 427, 430
Initial Frame Count, 447
Low Amplitude, 426, 429, 436, 443
Measurement Mode BER% Search, 446
Measurement Mode BLER% Search, 432
No Thresholds, 422, 427, 442, 445, 449, 455
Pass Amplitude, 426, 430, 437
PN11, 453
PN15, 453
PN20, 453
PN23, 453
PN9, 453
Resync Limits, 454
Spcl Pattern 0's 1's, 452
Spcl Pattern Ignore Off On, 453
Spectrum Invert Off On, 433, 448
Stop Measurement, 432, 445
Sync Source BCH PDCH, 434
Sync Source BCH TCH, 451
Synchronize to BCH/PDCH, 433
Synchronize to BCH/TCH, 450

sense subsystem keys (*continued*)

Target BER %, 425, 428
Timeslot, 432, 446
Total Bits, 456
Trigger Key, 434, 451, 457
Uplink Timing Advance, 435, 452
SEQ softkey, 102
Set ALC Level softkey, 58
Set Atten softkey, 64
Set Marker Off All Points softkey, 303
setting conflicts, resolving, 719
setup sweep, 48
SF/2 softkey, 1072
SF2 softkey, 972
SFN reset-signal (DRPS5) softkey, 964, 966, 967,
968, 969
SFN RST Polarity softkey, 1069
SFN-CFN Frame Offset softkey, 1012
SHAPE softkey, 102
Signature field, 1052
Sine softkey
 See amplitude modulation subsystem keys
 See DECT subsystem keys
 See EDGE subsystem keys
 See frequency modulation subsystem keys
 See GSM subsystem keys
 See low frequency output subsystem keys
 See NADC subsystem keys
 See PDC subsystem keys
 See phase modulation subsystem keys
 See PHS subsystem keys
 See TETRA subsystem keys
Single softkey
 See CDMA ARB subsystem keys
 See CDMA2000 ARB subsystem keys
 See custom subsystem keys
 See DECT subsystem keys
 See Dmodulation subsystem keys
 See dual ARB subsystem keys
 See EDGE subsystem keys
 See GSM subsystem keys
 See NADC subsystem keys
 See PDC subsystem keys
 See PHS subsystem keys
 See TETRA subsystem keys

Single softkey (continued)

- See* wideband CDMA ARB subsystem keys
- Single Sweep softkey, [169](#)
- skew, [29](#), [30](#)
- skew, I/Q
 - adjustment, [29](#)
- Slot Format field, [941](#), [948](#), [996](#), [1007](#), [1025](#), [1031](#)
- softkey, [121](#)
- software options, [82](#)
- Source Module softkey, [61](#)
- Spcl Pattern 0's 1's softkey, [452](#)
- Spcl Pattern Ignore Off On softkey, [453](#)
- Spectrum Invert Off On softkey
 - See* sense subsystem keys
- Spread Rate 1 softkey, [250](#), [257](#), [265](#)
- Spread Rate 3, [257](#)
- Spread Rate 3 softkey, [250](#), [265](#)
- Spread Rate field, [510](#)
- Spreading Type Direct Mcarrier, [250](#)
- Spreading Type Direct Mcarrier softkey, [265](#)
- Spurious Response softkey, [979](#)
- Square softkey, [177](#), [184](#), [191](#), [197](#)
- square wave pulse rate
 - internally generated, [201](#)
- SR1 9 Channel softkey, [252](#)
- SR1 Pilot softkey, [252](#)
- SR3 Direct 9 Channel softkey, [252](#)
- SR3 Direct Pilot softkey, [252](#)
- SR3 Mcarrier 9 Channel softkey, [252](#)
- SR3 MCarrier Pilot softkey, [252](#)
- SS softkey, [697](#)
- SSB softkey, [912](#), [917](#)
- SSCH 2nd Scramble Group field, [970](#)
- SSCH Power field, [970](#)
- SSCH softkey, [352](#)
- SSCH State field, [971](#)
- Standard softkey, [351](#)
- Start Access Slot Position in 80ms Period field, [1037](#)
- Start Frequency softkey, [74](#)
- Start Sub-Channel# field, [1041](#)
- State field
 - See* CDMA2000 BBG subsystem keys and fields
- State softkey, [103](#), [122](#)
- STD softkey, [993](#)
- Step Dwell softkey, [55](#)
- Step Power field, [1016](#)
- Stop Frequency softkey, [74](#)
- Stop Measurement softkey
 - See* sense subsystem keys
- Store Custom CDMA State softkey, [233](#), [254](#), [258](#)
- Store Custom Dig Mod State softkey, [288](#)
- Store Custom Multicarrier softkey, [232](#), [252](#)
- Store Custom W-CDMA State softkey, [347](#), [350](#)
- Store To File softkey, [19](#), [121](#), [128](#), [329](#), [358](#)
- string response data, [11](#)
- string SCPI parameter, [10](#)
- strings, quote usage, [16](#)
- STS softkey, [912](#), [918](#)
- Sub Channel Timing (RPS17) softkey
 - See* wideband CDMA base band generator subsystem keys and fields
- Subnet Mask softkey, [76](#)
- subsystems, SCPI commands
 - See* SCPI command subsystems
- Sum softkey, [23](#)
- Summing Ratio (SRC1/SRC2) x.xx dB softkey, [35](#)
- SW softkey, [835](#), [838](#), [840](#)
- Sweep Direction Down Up softkey, [49](#)
- Sweep Repeat Single Cont softkey, [168](#)
- Sweep Retrace Off On softkey, [53](#)
- sweep setup, [48](#)
- Sweep Type List Step softkey, [54](#)
- Swept-Sine softkey, [177](#), [184](#), [191](#), [197](#)
- Symbol Out Polarity Neg Pos softkey, [135](#)
- Symbol Rate field, [996](#), [1005](#), [1030](#)
- Symbol Rate softkey, [288](#), [351](#), [359](#), [660](#), [1025](#)
- Symbol Sync Out Polarity Neg Pos softkey, [136](#)
- Symbol Sync Polarity Neg Pos softkey, [132](#), [133](#)
- Symbol Timing Err softkey, [470](#)
- Sync Out Offset softkey, [615](#), [659](#), [708](#), [806](#), [842](#), [876](#), [925](#)
- SYNC softkey, [800](#), [804](#), [867](#)
- Sync softkey, [230](#), [707](#)
- Sync Source BCH PDCH softkey, [434](#)
- Sync Source BCH TCH softkey, [451](#)
- Sync Source SFN FCIk ESG softkey, [1070](#)
- Synchronize to BCH/PDCH softkey, [433](#)
- Synchronize to BCH/TCH softkey, [450](#)
- System ID field, [503](#)

Index

system subsystem keys

8648A/B/C/D, [157](#), [159](#)
8656B,8657A/B, [157](#), [159](#)
8657D NADC, [157](#), [159](#)
8657D PDC, [157](#), [159](#)
8657J PHS, [157](#), [159](#)
Activate Secure Display, [162](#)
Enter Secure Mode, [164](#)
erase, [163](#)
Erase All, [162](#)
Erase and Overwrite All, [164](#)
Erase and Sanitize All, [165](#)
Error Info, [156](#)
Help Mode Single Cont, [157](#)
none, [163](#)
overwrite, [163](#)
PN9 Mode Preset, [160](#)
Power On Last Preset, [158](#)
Preset, [159](#)
Preset Normal User, [161](#)
Restore Sys Defaults, [160](#)
sanitize, [163](#)
Save User Preset, [161](#)
SCPI, [157](#), [159](#)
Screen Saver Delay
 1 hr, [165](#)
Screen Saver Mode, [166](#)
Screen Saver Off On, [166](#)
Time/Date, [155](#), [166](#)
View Next Error Message, [156](#)

T

T1 softkey, [656](#)
T2 softkey, [657](#)
Target BER % softkey
 See sense subsystem keys
TCH All softkey, [867](#)
TCH softkey, [867](#)
TCH/FS softkey, [642](#), [645](#), [699](#)
tDPCH Offset field, [949](#)
Test Model 1 w/16 DPCH softkey, [342](#), [347](#)
Test Model 1 w/32 DPCH softkey, [342](#), [347](#)
Test Model 1 w/64 DPCH softkey, [342](#), [347](#)
Test Model 2 softkey, [342](#), [347](#)
Test Model 3 w/16 DPCH softkey, [342](#), [347](#)

Test Model 3 w/32 DPCH softkey, [342](#), [347](#)
Test Model 4 softkey, [342](#), [347](#)
Test Model 5 w/2HSPDSCH softkey, [342](#), [347](#)
Test Model 5 w/4HSPDSCH softkey, [342](#), [347](#)
Test Model 5 w/8HSPDSCH softkey, [342](#), [347](#)
TETRA Off On softkey, [933](#)
TETRA softkey, [284](#), [285](#), [286](#)
TETRA subsystem keys
 128QAM, [906](#)
 16 1's & 16 0's, [900](#), [908](#), [910](#), [913](#), [914](#), [916](#), [918](#),
 [920](#), [921](#), [922](#), [923](#)
 16PSK, [906](#)
 16QAM, [906](#)
 256QAM, [906](#)
 2-Lvl FSK, [906](#)
 32 1's & 32 0's, [900](#), [908](#), [910](#), [913](#), [914](#), [916](#), [918](#),
 [920](#), [921](#), [922](#), [923](#)
 32QAM, [906](#)
 4 1's & 4 0's, [900](#), [908](#), [910](#), [913](#), [914](#), [916](#), [918](#),
 [920](#), [921](#), [922](#), [923](#)
 4-Lvl FSK, [906](#)
 4QAM, [906](#)
 64 1's & 64 0's, [900](#), [908](#), [910](#), [913](#), [914](#), [916](#), [918](#),
 [920](#), [921](#), [922](#), [923](#)
 64QAM, [906](#)
 8 1's & 8 0's, [900](#), [908](#), [910](#), [913](#), [914](#), [916](#), [918](#),
 [920](#), [921](#), [922](#), [923](#)
 8PSK, [906](#)
 All Timeslots, [924](#)
 APCO 25 C4FM, [903](#)
 B, [911](#), [917](#)
 B1, [909](#), [914](#)
 B2, [910](#), [915](#)
 BBG Data Clock Ext Int, [889](#)
 BBG Ref Ext Int, [902](#)
 Begin Frame, [924](#)
 Begin Timeslot #, [924](#), [926](#)
 BPSK, [906](#)
 Bus, [908](#), [930](#)
 Continuous, [928](#)
 D8PSK, [906](#)
 Data Format Pattern Framed, [899](#)
 Dn Custom Cont, [924](#)
 Dn Normal Cont, [924](#)
 Dn Normal Disc, [924](#)

TETRA subsystem keys (*continued*)

Dn Sync Cont, [924](#)
 Dn Sync Disc, [924](#)
 Ext, [900](#), [908](#), [910](#), [913](#), [914](#), [916](#), [918](#), [920](#), [921](#),
[922](#), [923](#), [930](#)
 Ext BBG Ref Freq, [903](#)
 Ext Data Clock Normal Symbol, [902](#)
 Ext Delay Bits, [931](#)
 Ext Delay Off On, [931](#)
 Ext Polarity Neg Pos, [932](#)
 Fall Delay, [893](#), [894](#)
 Fall Time, [894](#), [895](#)
 FCOR, [912](#), [917](#)
 Filter Alpha, [889](#)
 Filter BbT, [890](#)
 FIX4, [900](#), [901](#), [908](#), [909](#), [910](#), [911](#), [913](#), [914](#), [916](#),
[918](#), [920](#), [921](#), [922](#), [923](#)
 Free Run, [928](#)
 Freq Dev, [904](#)
 Gate Active Low High, [929](#)
 Gated, [928](#)
 Gaussian, [903](#)
 Gray Coded QPSK, [906](#)
 I/Q Scaling, [904](#)
 IS-95, [903](#)
 IS-95 Mod, [903](#)
 IS-95 Mod w/EQ, [903](#)
 IS-95 OQPSK, [906](#)
 IS-95 QPSK, [906](#)
 IS-95 w/EQ, [903](#)
 MSK, [906](#)
 Nyquist, [903](#)
 Optimize FIR For EVM ACP, [899](#)
 OQPSK, [906](#)
 $\pi/4$ DQPSK, [906](#)
 Patt Trig In 1, [933](#)
 Patt Trig In 2, [933](#)
 Phase Dev, [905](#)
 Phase Polarity Normal Invert, [907](#)
 PN11, [900](#), [908](#), [910](#), [913](#), [914](#), [916](#), [918](#), [920](#), [921](#),
[922](#), [923](#)
 PN15, [900](#), [908](#), [910](#), [913](#), [914](#), [916](#), [918](#), [920](#), [921](#),
[922](#), [923](#)
 PN20, [900](#), [908](#), [910](#), [913](#), [914](#), [916](#), [918](#), [920](#), [921](#),
[922](#), [923](#)

TETRA subsystem keys (*continued*)

PN23, [900](#), [908](#), [910](#), [913](#), [914](#), [916](#), [918](#), [920](#), [921](#),
[922](#), [923](#)
 PN9, [900](#), [908](#), [910](#), [913](#), [914](#), [916](#), [918](#), [920](#), [921](#),
[922](#), [923](#)
 PN9 Mode Normal Quick, [892](#)
 QPSK, [906](#)
 Recall Secondary Frame State, [907](#)
 Rectangle, [903](#)
 Reset & Run, [928](#)
 Restore TETRA Factory Default, [901](#)
 Rise Delay, [896](#)
 Rise Time, [897](#), [898](#)
 Root Nyquist, [903](#)
 Save Secondary Frame State, [907](#)
 Scramble Off On, [893](#)
 Scramble Seed, [892](#)
 Secondary Frame Off On, [908](#)
 Sine, [898](#)
 Single, [928](#)
 SSB, [912](#), [917](#)
 STS, [912](#), [918](#)
 Symbol Rate, [926](#)
 Sync Out Offset, [925](#)
 TETRA Off On, [933](#)
 Timeslot Ampl Main Delta, [919](#)
 Timeslot Off On, [919](#)
 Trigger & Run, [928](#)
 Trigger Key, [908](#), [930](#)
 TS, [910](#), [915](#), [919](#), [920](#), [922](#)
 UN3/4 GSM Gaussian, [903](#)
 Up Control 1, [924](#)
 Up Control 2, [924](#)
 Up Custom, [924](#)
 Up Normal, [924](#)
 User File, [898](#), [900](#), [908](#), [910](#), [913](#), [914](#), [916](#), [918](#),
[920](#), [921](#), [922](#), [923](#)
 User FIR, [903](#)
 User FSK, [905](#), [906](#)
 User I/Q, [906](#)
 tetra subsystem keys
 PRAM Files, [900](#)
 TFCI Field Off On softkey, [351](#), [356](#), [359](#), [361](#)
 TFCI Pat field, [949](#)
 TFCI Pattern field, [997](#), [1026](#)

Index

- TFCI State field, [998](#), [1027](#)
- Tfirst field, [942](#)
- TGCFN field, [972](#), [1071](#)
- TGD field, [973](#), [1072](#)
- Tgl field, [942](#)
- TGL1 field, [973](#), [1073](#)
- TGL2 field, [973](#), [1073](#), [1074](#)
- TGPL1 field, [974](#), [1073](#)
- TGPRC field, [1075](#)
- TGPS Inactive Active softkey, [1075](#)
- TGSN field, [975](#), [1076](#)
- Through softkey, [31](#), [207](#), [210](#), [219](#), [224](#), [244](#), [249](#),
[274](#), [279](#), [300](#), [302](#), [322](#), [324](#), [338](#), [340](#), [464](#), [471](#)
- Time field, [503](#)
- Time/Date softkey, [155](#), [166](#)
- Timeslot Ampl Main Delta softkey
 - See* DECT subsystem keys
 - See* EDGE subsystem keys
 - See* NADC subsystem keys
 - See* PDC subsystem keys
 - See* PHS subsystem keys
 - See* TETRA subsystem keys
- Timeslot Off On softkey
 - See* DECT subsystem keys
 - See* EDGE subsystem keys
 - See* GSM subsystem keys
 - See* NADC subsystem keys
 - See* PHS subsystem keys
 - See* TETRA subsystem keys
- Timeslot Offset softkey, [1041](#)
- Timeslot softkey
 - See* sense subsystem keys
- Timeslot Type softkey, [888](#)
- Timing Offset softkey, [1042](#), [1069](#), [1079](#)
- tOCNS Offset field, [956](#)
- Toggle Marker 1 softkey, [312](#)
- Toggle State softkey, [328](#), [330](#)
- Total Bits field, [1083](#)
- Total Bits softkey, [456](#)
- Total Block field, [1085](#)
- TotalPwr field, [991](#), [1022](#)
- TPC Pat Steps field, [998](#)
- TPC Pat Trig Polarity Neg Pos softkey, [1000](#)
- TPC Pattern field, [1000](#)
- TPC Steps field, [950](#)
- TPC UserFile Trig field, [1001](#)
- Tp-m field, [1043](#)
- Tp-p field, [1044](#)
- Traffic Bearer softkey, [588](#), [600](#)
- Traffic Bearer with Z field softkey, [588](#), [600](#)
- Traffic softkey, [230](#)
- Transp Chan A softkey, [945](#)
- Transp Chan B softkey, [945](#)
- Transp Position Flexible Fixed softkey, [985](#)
- Transport CH softkey, [957](#)
- TrCH BER field, [1006](#)
- TrCh BlkSize 168 softkey, [1040](#)
- TrCh BlkSize 360 softkey, [1040](#)
- TrCH State Off On softkey, [1096](#)
- TrCHI State Off On softkey, [986](#)
- Triangle softkey, [177](#), [184](#), [191](#), [197](#)
- Trigger & Run softkey
 - See* CDMA ARB subsystem keys
 - See* CDMA2000 ARB subsystem keys
 - See* custom subsystem keys
 - See* DECT subsystem keys
 - See* Dmodulation subsystem keys
 - See* dual ARB subsystem keys
 - See* EDGE subsystem keys
 - See* GSM subsystem keys
 - See* NADC subsystem keys
 - See* PDC subsystem keys
 - See* PHS subsystem keys
 - See* TETRA subsystem keys
 - See* wideband CDMA ARB subsystem keys
- Trigger Advance field, [546](#)
- Trigger In Polarity Neg Pos softkey, [170](#)
- Trigger Key softkey
 - list/sweep subsystem, [53](#)
 - See* amplitude modulation subsystem keys
 - See* CDMA ARB subsystem keys
 - See* CDMA2000 ARB subsystem keys
 - See* DECT subsystem keys
 - See* Dmodulation subsystem keys
 - See* dual ARB subsystem keys
 - See* EDGE subsystem keys
 - See* frequency modulation subsystem keys
 - See* GSM subsystem keys
 - See* low frequency output subsystem keys
 - See* NADC subsystem keys

- Trigger Key softkey (continued)*
See PDC subsystem keys
See phase modulation subsystem keys
See PHS subsystem keys
See sense subsystem keys
See TETRA subsystem keys
See trigger subsystem keys
See wideband CDMA ARB subsystem keys
- Trigger Out Polarity Neg Pos softkey, [169](#)
trigger source, list sweep, [53](#)
trigger subsystem keys
 Bus, [170](#), [546](#)
 Ext, [170](#), [546](#)
 Free Run, [170](#), [546](#)
 Single Sweep, [169](#)
 Sweep Repeat Single Cont, [168](#)
 Trigger In Polarity Neg Pos, [170](#)
 Trigger Key, [170](#), [546](#)
 Trigger Out Polarity Neg Pos, [169](#)
- Trigger Sync Reply (RPS7) softkey
See wideband CDMA base band generator
 subsystem keys and fields
- Truncated PN9 softkey, [463](#)
- TS softkey, [707](#), [910](#), [915](#), [919](#), [920](#), [922](#)
- TSC0 softkey, [646](#), [657](#), [698](#), [705](#)
- TSC1 softkey, [646](#), [657](#), [698](#), [705](#)
- TSC2 softkey, [646](#), [657](#), [698](#), [705](#)
- TSC3 softkey, [646](#), [657](#), [698](#), [705](#)
- TSC4 softkey, [646](#), [657](#), [698](#), [705](#)
- TSC5 softkey, [646](#), [657](#), [698](#), [705](#)
- TSC6 softkey, [646](#), [657](#), [698](#), [705](#)
- TSC7, [646](#), [698](#), [705](#)
- TSC7 softkey, [646](#), [657](#), [698](#), [705](#)
- TTI field, [986](#), [1046](#), [1088](#), [1096](#)
- TTI Frame Clock (RPS9) softkey
See wideband CDMA base band generator
 subsystem keys and fields
- Turbo Coding field, [497](#), [544](#)
- Turbo softkey, [982](#), [983](#), [1081](#)
- Type softkey, [351](#), [359](#)
- U**
- UDI 64 kbps softkey, [1053](#)
- UDI ISDN (25.101 v3.5) softkey, [947](#)
- UN3/4 GSM Gaussian softkey
See CDMA ARB subsystem keys
See CDMA2000 ARB subsystem keys
See CDMA2000 BBG subsystem keys and fields
See custom subsystem keys
See DECT subsystem keys
See Dmodulation subsystem keys
See EDGE subsystem keys
See GPS subsystem keys
See GSM subsystem keys
See NADC subsystem keys
See PDC subsystem keys
See PHS subsystem keys
See TETRA subsystem keys
See wideband CDMA ARB subsystem keys
See wideband CDMA base band generator
 subsystem keys and fields
- Uncoded softkey, [648](#)
- unit subsystem keys
 dBm, [172](#)
 dBuV, [172](#)
 dBuVemf, [172](#)
 mV, [172](#)
 mVemf, [172](#)
 uV, [172](#)
 uVemf, [172](#)
- unprotected
 memory subsystem, [114](#), [125](#)
- unspecified RMS, [298](#)
- Up Control 1 softkey, [924](#)
- Up Control 2 softkey, [924](#)
- Up Custom softkey, [805](#), [841](#), [924](#)
- Up Normal softkey, [924](#)
- Up TCH All softkey, [805](#), [841](#)
- Up TCH softkey, [805](#), [841](#)
- Up VOX softkey, [841](#)
- Up/Down softkey, [950](#), [999](#)
- Update Display Cycle End Cont softkey, [403](#)
- Update in Remote Off On softkey, [88](#)
- Uplink MCS-1 softkey, [642](#), [645](#), [699](#)
- Uplink MCS-5 softkey, [648](#)
- Uplink MCS-9 softkey, [648](#)
- Uplink Timing Advance softkey
See sense subsystem keys
- uploading files, [114](#), [125](#)

Index

User File softkey

- See* CDMA2000 BBG subsystem keys and fields
- See* custom subsystem keys
- See* DECT subsystem keys
- See* EDGE subsystem keys
- See* GPS subsystem keys
- See* GSM subsystem keys
- See* NADC subsystem keys
- See* PDC subsystem keys
- See* PHS subsystem keys
- See* TETRA subsystem keys
- See* wideband CDMA base band generator subsystem keys and fields

user files, HSDPA, [717](#)

User FIR softkey

- See* CDMA ARB subsystem keys
- See* CDMA2000 ARB subsystem keys
- See* CDMA2000 BBG subsystem keys and fields
- See* custom subsystem keys
- See* DECT subsystem keys
- See* Dmodulation subsystem keys
- See* EDGE subsystem keys
- See* GPS subsystem keys
- See* GSM subsystem keys
- See* NADC subsystem keys
- See* PDC subsystem keys
- See* PHS subsystem keys
- See* TETRA subsystem keys
- See* wideband CDMA ARB subsystem keys
- See* wideband CDMA base band generator subsystem keys and fields

User Flatness softkey, [103](#), [122](#)

User FSK softkey

- See* custom subsystem keys
- See* DECT subsystem keys
- See* EDGE subsystem keys
- See* GSM subsystem keys
- See* NADC subsystem keys
- See* PDC subsystem keys
- See* PHS subsystem keys
- See* TETRA subsystem keys

User I/Q softkey

- See* custom subsystem keys
- See* DECT subsystem keys
- See* EDGE subsystem keys

User I/Q softkey (continued)

- See* GSM subsystem keys
 - See* NADC subsystem keys
 - See* PDC subsystem keys
 - See* PHS subsystem keys
 - See* TETRA subsystem keys
- uV softkey, [172](#)
uVemf softkey, [172](#)
UW softkey, [864](#), [865](#), [885](#), [886](#)
UWCDMA softkey, [104](#)

V

View Next Error Message softkey, [156](#)

W

Walsh Code softkey, [255](#), [259](#)

Walsh field

- See* CDMA2000 BBG subsystem keys and fields
- Waveform Length softkey, [213](#), [240](#)
Waveform Licenses softkey, [83](#)
Waveform Runtime Scaling softkey, [311](#)
waveform, creating a multitone, [321](#)
W-CDMA Off On softkey, [373](#), [1096](#)

WCDMA softkey

- See* CDMA ARB subsystem keys
 - See* CDMA2000 ARB subsystem keys
 - See* Dmodulation subsystem keys
 - See* wideband CDMA ARB subsystem keys
- wideband CDMA ARB subsystem keys
- 1 DPCH, [342](#), [347](#)
 - 2 Carriers, [343](#)
 - 2.100 MHz, [340](#)
 - 3 Carriers, [343](#)
 - 3 DPCH, [342](#), [347](#)
 - 4 Carriers, [343](#)
 - 40.000 MHz, [338](#), [340](#)
 - APCO 25 C4FM, [336](#)
 - Apply Channel Setup, [350](#), [359](#)
 - ARB Reference Ext Int, [364](#)
 - ARB Sample Clock, [366](#)
 - Bus, [369](#)
 - Channel, [351](#), [359](#)
 - Chip Rate, [335](#)
 - Clear Header, [338](#)

- wideband CDMA ARB subsystem keys (*continued*)
- Clip |I| To, 333, 345
 - Clip |Q| To, 334, 345
 - Clip At PRE POST FIR Filter, 333
 - Clip Type |I+jQ| To, 335, 346
 - Clipping Type |I+jQ| |I|,|Q|, 334, 346
 - Continuous, 366
 - Custom WCDMA State, 357
 - DPCCH, 357
 - DPCCH + 1 DPDCH, 357
 - DPCCH + 2 DPDCH, 357
 - DPCCH + 3 DPDCH, 357
 - DPCCH + 4 DPDCH, 357
 - DPCCH + 5 DPDCH, 357
 - DPCH, 352
 - Equal Energy per Symbol, 356
 - Ext Delay Off On, 371
 - Ext Delay Time, 370
 - Ext Key, 369
 - Ext Polarity Neg Pos, 372
 - Filter Alpha, 336
 - Filter BbT, 337
 - First Spread Code, 351, 359
 - Free Run, 368
 - Gain Unit dB Lin Index, 360
 - Gate Active Low High, 369
 - Gated, 366
 - Gaussian, 336
 - I/Q Mapping Norma Invert, 339
 - I/Q Mod Filter Manual Auto, 341
 - I/Q Output Filter Manual Auto, 338
 - Increment Scramble Code, 346
 - Increment Timing Offset, 349
 - IS-2000 SR3 DS, 336
 - IS-95, 336
 - IS-95 Mod, 336
 - IS-95 Mod w/EQ, 336
 - IS-95 w/EQ, 336
 - Left Alternate, 351
 - Link Down Up, 341
 - Marker 1, 361, 362
 - Marker 1 Polarity Neg Pos, 362
 - Marker 2, 361, 362
 - Marker 2 Polarity Neg Pos, 363
 - Marker 3, 361, 362
- wideband CDMA ARB subsystem keys (*continued*)
- Marker 3 Polarity Neg Pos, 363
 - Marker 4, 361, 362
 - Marker 4 Polarity Neg Pos, 363
 - Modulator Atten Manual Auto, 339, 340
 - None, 361, 362
 - Nyquist, 336
 - OCNS, 352
 - Optimize ACP ADJ ALT, 342, 356
 - Optimize FIR For EVM ACP, 337
 - Patt Trig In 1, 372
 - Patt Trig In 2, 372
 - PCCPCH + SCH, 342, 347
 - PCCPCH + SCH + 1 DPCH, 342, 347
 - PCCPCH + SCH + 3 DPCH, 342, 347
 - PICH, 352
 - Power, 359
 - PPCCPCH, 352, 353
 - PSCH, 352
 - Random, 351, 359
 - Rectangle, 336
 - Reference Freq, 364
 - Reset & Run, 368
 - Retrigger Mode Off On, 365
 - Right Alternate, 351
 - Root Nyquist, 336
 - Save Setup To Header, 338
 - Scale to 0dB, 356
 - SCCPCH, 352, 353
 - Scramble Code, 351, 357, 359
 - Scramble Offset, 351, 359
 - Second DPDCH I Q, 357
 - Single, 366
 - SSCH, 352
 - Standard, 351
 - Store Custom W-CDMA State, 347, 350
 - Store To File, 358
 - Symbol Rate, 351, 359
 - Test Model 1 w/16 DPCH, 342, 347
 - Test Model 1 w/32 DPPCH, 342, 347
 - Test Model 1 w/64 DPCH, 342, 347
 - Test Model 2, 342, 347
 - Test Model 3 w/16 DPCH, 342, 347
 - Test Model 3 w/32 DPCH, 342, 347
 - Test Model 4, 342, 347

Index

wideband CDMA ARB subsystem keys (*continued*)

Test Model 5 w/2HSPDSCH, [342](#), [347](#)
Test Model 5 w/4HSPDSCH, [342](#), [347](#)
Test Model 5 w/8HSPDSCH, [342](#), [347](#)
TFCI Field Off On, [351](#), [356](#), [359](#), [361](#)
Through, [338](#), [340](#)
Trigger & Run, [368](#)
Trigger Key, [369](#)
Type, [351](#), [359](#)
UN3/4 GSM Gaussian, [336](#)
User FIR, [336](#)
WCDMA, [336](#)
W-CDMA Off On, [373](#)

wideband CDMA base band generator subsystem

keys and fields

of Blocks, [984](#)
1/2 Conv, [982](#), [983](#), [1081](#)
1/3 Conv, [982](#), [983](#), [1081](#)
10 msec, [1009](#)
10ms Frame Pulse (DRPS11), [964](#), [966](#), [967](#), [968](#),
[969](#)
10ms Frame Pulse (RPS6), [1062](#), [1064](#), [1065](#),
[1066](#), [1067](#), [1068](#)
12.2 kbps (34.121 v3.8), [947](#)
144 kbps (34.121 v3.8), [947](#)
20 msec, [1009](#)
2560 msec, [1009](#)
2nd Scr Offset, [948](#), [955](#)
3.84MHz chip-clk (DRPS4), [964](#), [966](#), [967](#), [968](#),
[969](#)
384 kbps (34.121 v3.8), [947](#)
40 msec, [1009](#)
64 kbps (34.121 v3.8), [947](#)
80 msec, [1009](#)
80ms Frame Pulse (DRPS13), [964](#), [966](#), [967](#), [968](#),
[969](#)
80ms Frame Pulse (RPS20), [1062](#), [1064](#), [1065](#),
[1066](#), [1067](#), [1068](#)
A, [939](#)
ACS, [979](#)
Active, [975](#)
Actual BER, [1091](#)
Actual BLER, [1084](#), [1092](#)
AICH, [1046](#)
AICH Trigger Polarity Pos Neg, [1018](#)

wideband CDMA base band generator subsystem

keys and fields (*continued*)

All Down, [950](#), [999](#)
All Up, [950](#), [999](#)
Alt power in, [1060](#)
AMR 12.2 kbps, [947](#), [1053](#)
APCO 25 C4FM, [951](#), [1010](#)
Apply Channel Setup, [935](#), [987](#)
B, [939](#)
Base Delay Tp-a, [1042](#)
BBG Chip Clock Ext Int, [934](#)
BBG Data Clock Ext In, [938](#)
BER, [1084](#), [1086](#), [1092](#), [1094](#)
Beta, [992](#), [1002](#)
BLER, [1085](#), [1086](#), [1093](#), [1094](#)
Blk Set Size, [981](#)
Blk Size, [980](#), [1080](#), [1089](#)
Blocking, [979](#)
Burst gate in, [1060](#)
C Power, [988](#)
C Power value, [1019](#)
C/N value, [935](#), [988](#), [1019](#)
CFN #0 Frame Pulse (RPS10), [1055](#)
Chan Code, [944](#), [945](#), [954](#)
Channel Code, [959](#), [993](#), [1003](#), [1047](#), [1048](#)
Channel Code field, [958](#)
Channel State, [1002](#), [1009](#)
Channel State Off On, [938](#), [942](#), [943](#), [944](#), [951](#),
[953](#), [956](#), [957](#), [959](#), [961](#), [969](#), [991](#), [1022](#), [1081](#),
[1088](#), [1089](#)
ChCode Ctl, [1035](#)
ChCode Dat, [1036](#)
Chip Clock (RPS1), [1055](#), [1062](#), [1064](#), [1065](#),
[1066](#), [1067](#), [1068](#)
Chip Rate, [943](#), [992](#)
Comp Mode Start Trigger Polarity Neg Pos, [1078](#)
Comp Mode Start Trigger Polarity Pos Neg, [977](#),
[978](#)
Comp Mode Stop Trigger Polarity Neg Pos, [1078](#)
Comp Mode Stop Trigger Polarity Pos Neg, [978](#)
Compressed Mode Off On, [1077](#)
Compressed Mode Start Trigger, [953](#), [977](#), [1077](#)
Compressed Mode Stop Trigger, [977](#), [1078](#)
CRC Size, [982](#), [1082](#), [1090](#)
Ctrl Beta, [1023](#)

- wideband CDMA base band generator subsystem
 keys and fields (*continued*)
 Ctrl Pwr, 1024
 Data, 1004
 Data Beta, 1027
 Data field, 1094
 Data Pwr, 1029
 Data Rate, 955
 DCH1, 990
 DCH2, 990
 DCH3, 990
 DCH4, 990
 DCH5, 990
 DCH6, 990
 DL Reference 1.1, 1076
 DL Reference 1.2, 1076
 DL Reference 2.1, 1076
 DL Reference 2.2, 1076
 Down/Up, 950, 999
 DPCCH, 990, 1013
 DPCCH Pilot data-clk (DRPS23), 964, 966, 967, 968, 969
 DPCCH Power, 996
 DPCCH Raw Data (RPS4), 1055
 DPCCH Raw Data Clock (RPS5), 1055
 DPCCH TFCI data-clk (DRPS22), 964, 966, 967, 968, 969
 DPCCH TPC indicator (DRPS21), 964, 966, 967, 968, 969
 DPCH + 1, 936, 937
 DPCH + 2, 936, 937
 DPCH 10ms Frame-Pulse (DRPS26), 964, 966, 967, 968, 969
 DPCH Channel Balance, 944
 DPCH Compressed Frame Indicator (DRPS32), 964, 966, 967, 968, 969
 DPCH data stream (DRPS24), 964, 966, 967, 968, 969
 DPCH data-clk (0) (DRPS28), 964, 966, 967, 968, 969
 DPCH Gap Indicator (DRPS33), 964, 966, 967, 968, 969
 DPCH TimeSlot pulse (DRPS25), 964, 966, 967, 968, 969
 DPDCH, 990
- wideband CDMA base band generator subsystem
 keys and fields (*continued*)
 DPDCH data-clk withDTX (DRPS20), 964, 966, 967, 968, 969
 DPDCH data-clk WithOutDTX (DRPS30), 964, 966, 967, 968, 969
 DPDCH Power, 1005
 DPDCH Raw Data (RPS2), 1055
 DPDCH Raw Data Clock (RPS3), 1055
 Eb/No, 1020
 Eb/No value (dB), 989
 Ec/No value, 936, 1020
 Equal Powers, 957, 1013
 Error BER, 1091
 Error Bits, 1083
 Error Blocks, 1084
 Ext, 950
 Ext Clock Rate x1 x2 x4, 934
 FBI State, 995
 Filter Alpha, 952, 1011
 Filter BbT, 952, 1012
 FIX, 995
 FIX4, 946, 957, 958, 959, 960, 983, 984, 994, 1004, 1023, 1024, 1026, 1028, 1086, 1090
 Flat Noise BW, 990
 Frame Clock Polarity Neg Pos, 1010
 Frame Struct, 971
 Frame Sync Trigger Mode Single Cont, 1070
 Gaussian, 951, 1010
 Higher Layer, 1072
 Infinity, 975, 1075
 Init Power, 1014
 Init Pwr, 1034, 1050
 Intermod, 979
 IS-95, 951, 1010
 IS-95 Mod, 951, 1010
 IS-95 Mod w/EQ, 951, 1010
 IS-95 w/EQ, 1010
 Left, 940
 Link Down Up, 987
 Max Input, 979
 Max Power, 1015
 Max Pwr, 1034, 1050
 Message Data Raw Data (RPS11), 1062, 1064, 1065, 1066, 1067, 1068

Index

wideband CDMA base band generator subsystem
 keys and fields (*continued*)
 Message Part, [1033](#)
 Message Pulse (RPS22), [1062](#), [1064](#), [1065](#), [1066](#),
 [1067](#), [1068](#)
 Message-Control Raw Data (RPS13), [1064](#), [1065](#),
 [1066](#), [1067](#), [1068](#)
 Message-Control Raw Data Clock (RPS12), [1062](#),
 [1064](#), [1065](#), [1066](#), [1067](#), [1068](#)
 Min Power, [1015](#)
 Msg Ctrl, [1021](#)
 Msg Data, [1021](#)
 Msg Pwr, [1032](#), [1049](#)
 N Power, [991](#), [1021](#)
 NONE, [1081](#)
 None, [982](#), [983](#), [1086](#), [1094](#)
 NONE (RPS0), [1055](#), [1062](#), [1064](#), [1065](#), [1066](#),
 [1067](#), [1068](#)
 Normal, [940](#)
 Num of Blk, [1087](#), [1095](#)
 Num of Pre, [1034](#), [1050](#)
 Number of AICH, [1018](#)
 Number of PRACH, [1047](#), [1049](#)
 Number of PRACH 80ms, [1033](#)
 Number of Preamble, [1050](#)
 Nyquist, [951](#), [1010](#)
 Off, [1046](#)
 Omitted, [974](#), [1074](#)
 On, [1046](#)
 On/Off, [956](#), [1038](#)
 OpenLoop Ant1, [980](#)
 OpenLoop Ant1 SCH TSTD OFF, [980](#)
 OpenLoop Ant2, [980](#)
 OpenLoop Ant2 SCH TSTD OFF, [980](#)
 Optimize FIR For EVM ACP, [953](#), [1012](#)
 Paging Indicator, [960](#)
 Pattern trigger in 1, [1061](#)
 Pattern trigger in 2, [1061](#)
 PCCPCH, [936](#), [937](#)
 P-CCPCH data (DRPS39), [964](#), [966](#), [967](#), [968](#),
 [969](#)
 P-CCPCH data-clk (DRPS38), [964](#), [966](#), [967](#), [968](#),
 [969](#)
 Performance Req, [979](#)
 Phase Polarity Normal Invert, [961](#)

wideband CDMA base band generator subsystem
 keys and fields (*continued*)
 Phase Polarity Normal Inverted, [987](#)
 PI Bits, [960](#)
 PICH, [936](#), [937](#)
 PICH 10ms FramePulse (DRPS37), [964](#), [966](#), [967](#),
 [968](#), [969](#)
 PICH data (DRPS35), [964](#), [966](#), [967](#), [968](#), [969](#)
 PICH data-clk (DRPS34), [964](#), [966](#), [967](#), [968](#), [969](#)
 PICH TimeSlot Pulse (DRPS36), [964](#), [966](#), [967](#),
 [968](#), [969](#)
 Playback Ratio, [940](#)
 PN15, [938](#), [945](#), [954](#), [957](#), [959](#), [993](#), [994](#), [997](#), [999](#),
 [1004](#), [1023](#), [1026](#), [1028](#)
 PN9, [938](#), [945](#), [954](#), [957](#), [959](#), [983](#), [993](#), [994](#), [997](#),
 [999](#), [1004](#), [1023](#), [1026](#), [1028](#), [1082](#), [1090](#)
 Power, [940](#), [943](#), [946](#), [954](#), [958](#), [961](#), [962](#)
 Power Control Signal Polarity Neg Pos, [1017](#)
 Power Hold Off On, [1014](#)
 Power Mode Norm TPC, [1017](#)
 Pp-m, [1035](#), [1052](#)
 PRACH, [1013](#)
 PRACH Mode Single Multi, [1032](#)
 PRACH Power Setup Mode Pp-m Total, [1039](#)
 PRACH Processing (RPS19), [1062](#), [1064](#), [1065](#),
 [1066](#), [1067](#), [1068](#)
 PRACH Scrambling Code, [1040](#)
 PRACH Trigger, [1044](#)
 PRACH Trigger Polarity Neg Pos, [1045](#)
 PRACH Trigger Source Immedi Trigger, [1045](#)
 Pre Sig, [1036](#)
 Preamble, [1021](#)
 Preamble power average, [1038](#)
 Preamble Pulse (RPS21), [1062](#), [1064](#), [1065](#), [1066](#),
 [1067](#), [1068](#)
 Preamble Raw Data (RPS15), [1062](#), [1064](#), [1065](#),
 [1066](#), [1067](#), [1068](#)
 Preamble Raw Data Clock (RPS16), [1062](#), [1064](#),
 [1065](#), [1066](#), [1067](#), [1068](#)
 PSCH State, [962](#)
 Puncture, [972](#), [1087](#), [1095](#)
 PwrOffs, [971](#), [1071](#)
 RACH TrCH, [1021](#)
 Ramp Step, [1035](#), [1051](#)
 Rate Match Attr, [985](#), [1087](#), [1095](#)

- wideband CDMA base band generator subsystem
 keys and fields (*continued*)
 Rectangle, 951, 1010
 Ref Data Rate, 988, 1019
 Ref Sensitivity, 979
 Reset to Initial Power, 1016
 Right, 940
 RMC 144 kbps (25.141 v3.9), 1053
 RMC 384 kbps (25.141 v3.9), 1053
 RMC 64 kbps (25.141 v3.9), 1053
 RMC122 kbps (25.141 v3.9), 1053
 Root Nyquist, 951, 1010
 Scale to 0dB, 957, 1013
 SCFN, 976, 1076
 SCH slot-pulse (DRPS10), 964, 966, 967, 968, 969
 Scrambling Code, 969, 970, 1068
 SF/2, 1072
 SF2, 972
 SFN reset-signal (DRPS5), 964, 966, 967, 968, 969
 SFN RST Polarity, 1069
 SFN-CFN Frame Offset, 1012
 Signature, 1052
 Slot Format, 941, 948, 996, 1007, 1025, 1031
 Spurious Response, 979
 SSCH 2nd Scramble Group, 970
 SSCH Power, 970
 SSCH State, 971
 Start Access Slot Position in 80ms Period, 1037
 Start Sub-Channel#, 1041
 STD, 993
 Step Power, 1016
 Sub Channel Timing (RPS17), 1062, 1064, 1065, 1066, 1067, 1068
 Symbol Rate, 996, 1005, 1025, 1030
 Sync Source SFN FCik ESG, 1070
 tDPCH Offset, 949
 TFCI Pat, 949
 TFCI Pattern, 997, 1026
 TFCI State, 998, 1027
 Tfirst, 942
 TGCFN, 972, 1071
 TGD, 973, 1072
 Tgl, 942
- wideband CDMA base band generator subsystem
 keys and fields (*continued*)
 TGL1, 973, 1073
 TGL2, 973, 1073
 TGPL1, 974, 1073
 TGPL2, 1074
 TGPRC, 1075
 TGPS Inactive Active, 1075
 TGSN, 975, 1076
 Timeslot Offset, 1041
 Timing Offset, 1042, 1069, 1079
 tOCNS Offset, 956
 Total Bits, 1083
 Total Blocks, 1085
 TotalPwr, 991, 1022
 TPC Pat Steps, 998
 TPC Pat Trig Polarity Neg Pos, 1000
 TPC Pattern, 1000
 TPC Steps, 950
 TPC UserFile Trig, 1001
 Tp-m, 1043
 Tp-p, 1044
 Transp Chan A, 945
 Transp Chan B, 945
 Transp Position Flexible Fixed, 985
 Transport CH, 957
 TrCH BER, 1006
 TrCh BlkSize 168, 1040
 TrCh BlkSize 360, 1040
 TrCH State Off On, 986, 1096
 Trigger Sync Reply (RPS7), 1062, 1064, 1065, 1066, 1067, 1068
 TTI, 986, 1046, 1088, 1096
 TTI Frame Clock (RPS9), 1055
 Turbo, 982, 983, 1081
 UDI 64 kbps, 1053
 UDI ISDN (25.101 v3.5), 947
 UN3/4 GSM Gaussian, 951
 Up/Down, 950, 999
 User File, 945, 950, 957, 959, 983, 993, 994, 997, 1004, 1023, 1026, 1028, 1082, 1090
 User FIR, 951, 1010
 W-CDMA Off On, 1096

