

Online Programmer Manual



TDS5000 Series **Digital Phosphor Oscilloscopes**

Adapted from the *TDS5000 Series Oscilloscope Online Programmer Guide*
PHP0190, Version 2.00 (August 6, 2002)

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TDS5000 Series Programmer Online Guide
PHP0190, Version 2.00 (August 6, 2002)

Copyright and Version Information	2
Getting Started	13
Introduction	13
Setting Up Remote Communications.....	14
Documentation.....	17
Command Syntax	18
Syntax Overview	18
Command and Query Structure.....	18
Clearing the Instrument.....	20
Command Entry	20
Constructed Mnemonics	23
Argument Types.....	24
Command Groups	27
Acquisition Command Group.....	27
Alias Command Group.....	27
Calibration Command Group	29
Cursor Command Group.....	30
Diagnostics Command Group.....	31
Display Control Command Group.....	32
File System Command Group	34
Hard Copy Command Group	35
Histogram Command Group.....	35
Horizontal Command Group	36
Math Command Group	37
Measurement Command Group	39
Miscellaneous Command Group	41
Save and Recall Command Group	42
Status and Error Command Group	43
Trigger Command Group.....	43
Vertical Command Group	48
Waveform Transfer Command Group	50
Zoom Command Group	55
Status and Events	56
Registers.....	56
Queues.....	60
Event Handling Sequence	61
Synchronization Methods.....	62
Messages.....	67
Programming Examples	74
Overview	74
Compiling the Example GPIB Programs.....	75
Compiling and Linking Example Visual C++ Programs	75
Commands Listed in Alphabetical Order	77
*CAL?.....	77
*CLS.....	78
*DDT	78
*ESE.....	79
*ESR?	80

*IDN?	80
*LRN?	81
*OPC	85
*OPT?	87
*PSC	87
*PUD	88
*RCL	89
*RST	89
*SAV	90
*SDS	91
*SRE	91
*STB?	92
*TRG	93
*TST?	93
*WAI	93
ACQuire:MODe	94
ACQuire:NUMACq?	96
ACQuire:NUMAVg	96
ACQuire:NUMEnv	97
ACQuire:REPEt	98
ACQuire:STATE	99
ACQuire:STOPAfter	100
ACQuire?	101
ALLEV?	101
ALias	102
ALias:CATalog?	103
ALias:DEFIne	103
ALias:DELEte	104
ALias:DELEte:ALL	104
ALias:DELEte:NAME	105
ALias:STATE	105
AUTOSet	106
AUXout?	107
AUXout:SOUrce	108
BELI	108
BUSY?	109
CAL?	110
CALibrate:FACTory	111
CALibrate:FACTory:ABOrt	111
CALibrate:FACTory:CONTInue	112
CALibrate:FACTory:NOTIfy:DUE?	113
CALibrate:FACTory:NOTIfy:HOURS	114
CALibrate:FACTory:NOTIfy:YEARS	115
CALibrate:FACTory:PREVious	116
CALibrate:FACTory:STARt	116
CALibrate:FACTory:STATus	117
CALibrate:FACTory:STEPSTATus	118
CALibrate:FACTory:STEPSTIMulus	119
CALibrate:PROBEstate:CH<x>?	120
CALibrate:RESulTs?	120
CALibrate:RESulTs:SPC?	121
CH<x>?	122
CH<x>:BANdwidth	122
CH<x>:COUPling	123
CH<x>:DESKew	125
CH<x>:INVERT	125

CH<x>:LABEL:NAME.....	126
CH<x>:LABEL:XPOS.....	127
CH<x>:LABEL:YPOS.....	128
CH<x>:OFFSet	129
CH<x>:POSition.....	130
CH<x>:PRObe?	131
CH<x>:PROBECal?.....	132
CH<x>:PRObe:GAIN?	132
CH<x>:PRObe:ID?	133
CH<x>:PRObe:ID:TYPe?	133
CH<x>:PRObe:ID:SERnumber?.....	134
CH<x>:PRObe:RESistance?	134
CH<x>:PRObe:UNIts?.....	134
CH<x>:PROBEFunc:EXTatten	135
CH<x>:PROBEFunc:EXTDBatten	136
CH<x>:PROBEFunc:EXTUnits	137
CH<x>:SCAle.....	138
CH<x>:TERmination	139
CMDBatch.....	140
CURSor?.....	140
CURSor:FUNCTion.....	141
CURSor:HBArS?	142
CURSor:HBArS:DELTA?	142
CURSor:HBArS:POSITION<x>	143
CURSor:HBArS:UNIts?	143
CURSor:MODE	144
CURSor:PAIred.....	144
CURSor:PAIred:HDELTA?	145
CURSor:PAIred:HPOS<x>?	146
CURSor:PAIred:POSITION<x>	146
CURSor:PAIred:UNIts?.....	147
CURSor:PAIred:VDELTA?.....	147
CURSor:SOURce.....	148
CURSor:SPLit	149
CURSor:SPLit:HDELTA?	149
CURSor:SPLit:HPOS<x>?	150
CURSor:SPLit:POSITION<x>.....	150
CURSor:SPLit:SOURCE2.....	151
CURSor:SPLit:UNIts	152
CURSor:SPLit:VDELTA?	152
CURSor:STATE	153
CURSor:VBArS	153
CURSor:VBArS:DELTA?	154
CURSor:VBArS:POSITION<x>	155
CURSor:VBArS:UNIts	155
CURVe	156
DATA	158
DATA:DESTination.....	158
DATA:ENCdg	159
DATA:SOURce	161
DATA:STARt	162
DATA:STOP	163
DATE	164
DELEte:SETUp	165
DELEte:WAVEform.....	165
DESE	166

DIAG:CONTROL:HALT	167
DIAG:CONTROL:LOOP	168
DIAG:EXECUTE	169
DIAG:ITEM?	169
DIAG:ITEM:FAILURES?	170
DIAG:ITEM:NAME?	171
DIAG:ITEM:RESULT?	172
DIAG:ITEM:SUBITEMS?	173
DIAG:LEVEL	174
DIAG:LOOPS?	175
DIAG:NAME?	175
DIAG:NAME:AREA?	176
DIAG:NAME:SUBSYS?	177
DIAG:NAME:TEST?	178
DIAG:NUMITEMS?	178
DIAG:RESULts?	179
DIAG:RESULts:VERBoSe?	180
DIAG:SElect:ALL	180
DIAG:SElect:AREA.....	181
DIAG:SElect:LAST	182
DIAG:SElect:SUBSYS.....	183
DIAG:SElect:TEST	184
DIAG:STATE	185
DIAG:STOP	186
DISplay?.....	186
DISplay:CLOCK.....	187
DISplay:COLOr?	187
DISplay:COLOr:PALEtte.....	188
DISplay:COLOr:MATHCOLOr	189
DISplay:COLOr:REFCOLOr	190
DISplay:FILTer	191
DISplay:FORMat.....	191
DISplay:GRATicule	193
DISplay:INTENSITy?	194
DISplay:INTENSITy:AUTOBright.....	195
DISplay:INTENSITy:WAVEform	196
DISplay:INTENSITy:SCREENSAVER.....	197
DISplay:INTENSITy:SCREENSAVERDELAY	198
DISplay:PERsistence	199
DISplay:STYle.....	200
DISplay:TRIGBar	201
DISplay:VARPersist	202
EVENT?	202
EVMsg?.....	203
EVQty?.....	203
FACTory	204
FASTAcq?.....	205
FASTAcq:STATE	205
FILESystem?	206
FILESystem:COpy.....	206
FILESystem:CWD.....	207
FILESystem:DELEte	208
FILESystem:DIR?	209
FILESystem:MKDir	209
FILESystem:PRInt	210
FILESystem:READFile.....	211

FILESystem:REName	212
FILESystem:RMDir	212
FILESystem:WRITEFile	213
HARDCopy	214
HARDCopy:FILENAME	215
HARDCopy:PORT	216
HEADer	217
HDR	218
HIStogram?	219
HIStogram:Box	219
HIStogram:BOXPcnt	220
HIStogram:COUNT	222
HIStogram:DISplay	222
HIStogram:FUNCTion	223
HIStogram:MODE	224
HIStogram:SIZE	225
HIStogram:SOURce	226
HIStogram:STATE	227
HORizontal?	228
HORizontal:DIVisions?	228
HORizontal:FASTframe:COUNT	229
HORizontal:FASTframe:REF:FRAME	230
HORizontal:FASTframe:LENGth	231
HORizontal:FASTframe:MULTipleframes:FRAMEStart:<wfm> <NR1>	231
HORizontal:FASTframe:MULTipleframes:MODE	232
HORizontal:FASTframe:MULTipleframes:NUMFRames:<wfm> <NR1>	233
HORizontal:FASTframe:REF:SOURce	234
HORizontal:FASTframe:SELECTED:<wfm>	236
HORizontal:FASTframe:STATE	237
HORizontal:FASTframe:TIMEStamp:ALL:<wfm>?	238
HORizontal:FASTframe:TIMEStamp:BETWeen:<wfm>?	239
HORizontal:FASTframe:TIMEStamp:DELTA:<wfm>?	240
HORizontal:FASTframe:TIMEStamp:FRAME:<wfm>?	241
HORizontal:FASTframe:TIMEStamp:REF?	241
HORizontal:FASTframe:TIMEStamp:SELECTED:<wfm>?	242
HORizontal:FASTframe:TRACK	243
HORizontal:MAIn?	244
HORizontal[:MAIn]:DELay:MODE	244
HORizontal[:MAIn]:DELay:POSition	245
HORizontal[:MAIn]:DELay:TIME	246
HORizontal:MAIn:INTERPRatio?	247
HORizontal[:MAIn]:POSition	247
HORizontal:MAIn:SAMPLERate	248
HORizontal[:MAIn]:SCALE	250
HORizontal:MAIn:UNIts	250
HORizontal:MAIn:UNIts:STRing	251
HORizontal:POSition	252
HORizontal:RECOrdlength	253
HORizontal:RESOLution	253
HORizontal:ROLL	254
HORizontal:SCALE	255
HORizontal:TRIGger:POSition	256
ID?	256
LOCK	257
MATH<x>?	258
MATH<x>:DEFIne	258

MATH<x>:LABEL:NAME.....	260
MATH<x>:LABEL:XPOS.....	260
MATH<x>:LABEL:YPOS.....	261
MATH<x>:NUMAVg.....	262
MATH<x>:SPECTral?.....	263
MATH<x>:SPECTral:CENTER.....	263
MATH<x>:SPECTral:GATEPOS.....	264
MATH<x>:SPECTral:GATEWIDTH.....	265
MATH<x>:SPECTral:LOCK.....	266
MATH<x>:SPECTral:MAG.....	267
MATH<x>:SPECTral:PHASE.....	268
MATH<x>:SPECTral:REFLevel.....	269
MATH<x>:SPECTral:REFLEVELOffset.....	270
MATH<x>:SPECTral:RESBw.....	271
MATH<x>:SPECTral:SPAN.....	272
MATH<x>:SPECTral:SUPPress.....	273
MATH<x>:SPECTral:UNWRap.....	274
MATH<x>:SPECTral:WINDow.....	275
MATH<x>:VERTical:POSition.....	277
MATH<x>:VERTical:SCAle.....	278
MEASUrement?.....	279
MEASUrement:GATing.....	280
MEASUrement:IMMed?.....	281
MEASUrement:IMMed:DELAy?.....	282
MEASUrement:IMMed:DELAy:DIREction.....	282
MEASUrement:IMMed:DELAy:EDGE[1].....	283
MEASUrement:IMMed:DELAy:EDGE2.....	284
MEASUrement:IMMed:SOURCE[1].....	285
MEASUrement:IMMed:SOURCE2.....	286
MEASUrement:IMMed:TYPe.....	287
MEASUrement:IMMed:UNIts?.....	290
MEASUrement:IMMed:VALue?.....	290
MEASUrement:MEAS<x>?.....	291
MEASUrement:MEAS<x>:COUNT?.....	291
MEASUrement:MEAS<x>:DELAy?.....	292
MEASUrement:MEAS<x>:DELAy:DIREction.....	292
MEASUrement:MEAS<x>:DELAy:EDGE[1].....	293
MEASUrement:MEAS<x>:DELAy:EDGE2.....	294
MEASUrement:MEAS<x>:MAXimum?.....	295
MEASUrement:MEAS<x>:MEAN?.....	295
MEASUrement:MEAS<x>:MINimum?.....	295
MEASUrement:MEAS<x>:SOURCE[1].....	296
MEASUrement:MEAS<x>:SOURCE2.....	297
MEASUrement:MEAS<x>:STATE.....	298
MEASUrement:MEAS<x>:STDdev?.....	299
MEASUrement:MEAS<x>:TYPe.....	299
MEASUrement:MEAS<x>:UNIts?.....	304
MEASUrement:MEAS<x>:VALue?.....	304
MEASUrement:METhod.....	305
MEASUrement:REFLevel?.....	306
MEASUrement:REFLevel:ABSolute:HIGH.....	306
MEASUrement:REFLevel:ABSolute:LOW.....	307
MEASUrement:REFLevel:ABSolute:MID.....	308
MEASUrement:REFLevel:ABSolute:MID2.....	309
MEASUrement:REFLevel:METhod.....	309
MEASUrement:REFLevel:PERCent:HIGH.....	310

MEASUrement:REFLevel:PERCent:LOW	311
MEASUrement:REFLevel:PERCent:MID[1]	312
MEASUrement:REFLevel:PERCent:MID2	313
MEASUrement:STATIstics:COUNT	313
MEASUrement:STATIstics:MODE	314
MEASUrement:STATIstics:WEIghting	315
NEWpass	315
PASSWord	316
RECAll:SETUp	317
RECAll:WAVEform	318
REF<x>:HORizontal:POSition	319
REF<x>:LABel?	320
REF<x>:LABel:NAME	320
REF<x>:LABel:XPOS	321
REF<x>:LABel:YPOS	322
REF<x>:VERTical:POSition	323
REF<x>:VERTical:SCALE	324
REM	325
ROSc:SOUrce	325
ROSc:STate?	326
SAVe:SETUp	327
SAVe:WAVEform	328
SAVe:WAVEform:FILEFormat	329
SElect?	330
SElect:<wfm>	331
SElect:CONTRol <wfm>	332
SETUp:NAME	333
SET?	333
TEKSecure	338
TEST	338
TEST:RESults?	339
TEST:RESults:VERBose?	340
TEST:STOP	340
Time	341
TRIGger	341
TRIGger:A	343
TRIGger:A:EDGE?	344
TRIGger:A:EDGE:COUPling	345
TRIGger:A:EDGE:SLOpe	346
TRIGger:A:EDGE:SOUrce	347
TRIGger:A:HOLDoff?	348
TRIGger:A:HOLDoff:ACTUal?	348
TRIGger:A:HOLDoff:BY	349
TRIGger:A:HOLDoff:TIME	350
TRIGger:A:LEVel	350
TRIGger:A:LOGIc?	351
TRIGger:A:LOGIc:CLAss	352
TRIGger:A:LOGIc:FUNCTion	353
TRIGger:A:LOGIc:INPut?	354
TRIGger:A:LOGIc:INPut:CH<x>	355
TRIGger:A:LOGIc:PATtern?	356
TRIGger:A:LOGIc:PATtern:INPut:CH2	356
TRIGger:A:LOGIc:PATtern:INPut:CH4	357
TRIGger:A:LOGIc:PATtern:WHEn	358
TRIGger:A:LOGIc:PATtern:WHEn:LESSLimit	359
TRIGger:A:LOGIc:PATtern:WHEn:MORELimit	360

TRIGger:A:LOGic:SETHold?	361
TRIGger:A:LOGic:SETHold:CLOCK?	361
TRIGger:A:LOGic:SETHold:CLOCK:EDGE	362
TRIGger:A:LOGic:SETHold:CLOCK:SOURce	363
TRIGger:A:LOGic:SETHold:CLOCK:THReshold	363
TRIGger:A:LOGic:SETHold:DATA?	364
TRIGger:A:LOGic:SETHold:DATA:SOURce	365
TRIGger:A:LOGic:SETHold:DATA:THReshold	366
TRIGger:A:LOGic:SETHold:HOLDTime	367
TRIGger:A:LOGic:SETHold:SETTime	367
TRIGger:A:LOGic:STATE?	368
TRIGger:A:LOGic:STATE:INPut:CH2	369
TRIGger:A:LOGic:STATE:INPut:CH4	370
TRIGger:A:LOGic:STATE:WHEn	371
TRIGger:A:LOGic:THReshold?	372
TRIGger:A:LOGic:THReshold:CH<x>	372
TRIGger:A:MODe	373
TRIGger:A:PULse?	374
TRIGger:A:PULse:CLAss	375
TRIGger:A:PULse:GLItch?	376
TRIGger:A:PULse:GLItch:POLarity	376
TRIGger:A:PULse:GLItch:TRIGIF	377
TRIGger:A:PULse:GLItch:WIDth	378
TRIGger:A:PULse:RUNT?	379
TRIGger:A:PULse:RUNT:LOGic?	379
TRIGger:A:PULse:RUNT:LOGic:INPut?	380
TRIGger:A:PULse:RUNT:LOGic:INPut:CH<x>	380
TRIGger:A:PULse:RUNT:LOGic:THReshold:CH<x>	381
TRIGger:A:PULse:RUNT:POLarity	382
TRIGger:A:PULse:RUNT:THReshold?	383
TRIGger:A:PULse:RUNT:THReshold:BOTH	383
TRIGger:A:PULse:RUNT:THReshold:HIGH	384
TRIGger:A:PULse:RUNT:THReshold:LOW	385
TRIGger:A:PULse:RUNT:WHEn	385
TRIGger:A:PULse:RUNT:WIDth	386
TRIGger:A:PULse:SOURce	387
TRIGger:A:PULse:TIMEOut?	388
TRIGger:A:PULse:TIMEOut:POLarity	388
TRIGger:A:PULse:TIMEOut:Time	389
TRIGger:A:PULse:TRANSition?	390
TRIGger:A:PULse:TRANSition:DELTATime	390
TRIGger:A:PULse:TRANSition:POLarity	391
TRIGger:A:PULse:TRANSition:THReshold?	392
TRIGger:A:PULse:TRANSition:THReshold:BOTH	393
TRIGger:A:PULse:TRANSition:THReshold:HIGH	393
TRIGger:A:PULse:TRANSition:THReshold:LOW	394
TRIGger:A:PULse:TRANSition:WHEn	395
TRIGger:A:PULse:WIDth?	396
TRIGger:A:PULse:WIDth:HIGHLimit	396
TRIGger:A:PULse:WIDth:LOWLimit	397
TRIGger:A:PULse:WIDth:POLarity	398
TRIGger:A:PULse:WIDth:WHEn	398
TRIGger:A:PULse:WINDow?	399
TRIGger:A:PULse:WINDow:LOGic?	400
TRIGger:A:PULse:WINDow:LOGic:INPut?	400
TRIGger:A:PULse:WINDow:LOGic:INPut:CH<x>	401

TRIGger:A:PULse:WINDow:THReshold:BOTH.....	402
TRIGger:A:PULse:WINDow:LOGic:THReshold:CH<x>	402
TRIGger:A:PULse:WINDow:THReshold:HIGh	403
TRIGger:A:PULse:WINDow:THReshold:LOW	404
TRIGger:A:PULse:WINDow:THReshold?	404
TRIGger:A:PULse:WINDow:TYPe	405
TRIGger:A:PULse:WINDow:WHEn	406
TRIGger:A:PULse:WINDow:WIDth	407
TRIGger:A:TYPe	407
TRIGger:A:VIDeo?	408
TRIGger:A:VIDeo:CUSTom?	409
TRIGger:A:VIDeo:CUSTom:FORMat	409
TRIGger:A:VIDeo:CUSTom:SCAN	410
TRIGger:A:VIDeo:FIELD	411
TRIGger:A:VIDeo:HOLdoff:FIELD	412
TRIGger:A:VIDeo:LINE	413
TRIGger:A:VIDeo:POLarity	414
TRIGger:A:VIDeo:SCAN	414
TRIGger:A:VIDeo:SOURce	415
TRIGger:A:VIDeo:STANdard	416
TRIGger:B	417
TRIGger:B:BY	418
TRIGger:B:EDGE?	419
TRIGger:B:EDGE:COUPling	420
TRIGger:B:EDGE:SLOpe	420
TRIGger:B:EDGE:SOURce	421
TRIGger:B:EVENTS?	422
TRIGger:B:EVENTS:COUNt	422
TRIGger:B:LEVel	423
TRIGger:B:STATE	424
TRIGger:B:TIME	425
TRIGger:B:TYPe	426
TRIGger:STATE?	426
UNLock	427
VERBose	428
WAVFrm?	429
WFMInpre?	430
WFMInpre:ENCdg	431
WFMInpre:BN_Fmt	432
WFMInpre:BYT_Or	432
WFMInpre:BYT_Nr	433
WFMInpre:BIT_Nr	434
WFMInpre:NR_FR?	435
WFMInpre:NR_Pt	435
WFMInpre:PT_Fmt	436
WFMInpre:PT_Off	437
WFMInpre:WFId	438
WFMInpre:XINcr	438
WFMInpre:XZEro	439
WFMInpre:XUNit	440
WFMInpre:YMUIt	440
WFMInpre:YOff	441
WFMInpre:YUNit	442
WFMInpre:YZEro	442
WFMOutpre?	443
WFMOutpre:ENCdg	444

WFMOutpre:BIT_Nr	445
WFMOutpre:BN_Fmt	445
WFMOutpre:BYT_Or	446
WFMOutpre:BYT_Nr.....	447
WFMOutpre:NR_FR?	448
WFMOutpre:NR_Pt?	448
WFMOutpre:PT_Fmt?	449
WFMOutpre:PT_Off?	449
WFMOutpre:PT_OR?	450
WFMOutpre:WFId?	450
WFMOutpre:XINcr?	452
WFMOutpre:XZEro?	452
WFMOutpre:XUNit?	453
WFMOutpre:YMUIt?	453
WFMOutpre:YOff?	454
WFMOutpre:YUNit?	454
WFMOutpre:YZEro?	455
WFMpre:NR_FR?	455
ZOOm	456
ZOOm:GRAticule:SPLIT	457
ZOOm:HORizontal:LOCK.....	458
ZOOm:MODe	459
ZOOm:<wfm>:HORizontal:POStion.....	460
ZOOm:<wfm>:HORizontal:SCAle.....	460
ZOOm:<wfm>:VERTical:POStion	461
ZOOm:<wfm>:VERTical:SCAle	462
Miscellaneous	463
Character Chart	463
Reserved Words	464
Factory Default Setup Values	466
GPIB Interface Specifications	474

Getting Started

Introduction

This online programmer guide provides you with the information required to use GPIB commands for remotely controlling your instrument. With this information, you can write computer programs that will perform functions such as setting the front-panel controls, taking measurements, performing statistical calculations, and exporting data for use in other programs, such as spreadsheets.

Besides the traditional GPIB electronic interface (referred to as the physical GPIB interface), your instrument is provided with a *TekVISA* GPIB-compatible interface (referred to as the virtual GPIB interface). This is a software Application Programming Interface (API) which enables you to communicate with the instrument in a variety of ways, including via the internet. With the following two exceptions, these interfaces are completely independent:

- **HEADER.** Command headers enabled or disabled on one interface are correspondingly enabled or disabled on the other interface. Refer to the command descriptions for more detailed information.
- **VERBOSE.** Verbosity enabled or disabled on one interface is correspondingly enabled or disabled on the other interface. Refer to the command description for more detailed information.

Refer to Documentation for information on related manuals and documents.

The programmer guide is divided into the following major topics (books):

- **Getting Started.** This topic introduces you to the online help and provides basic information about setting up your instrument for remote control.
- **Command Syntax.** This topic provides an overview of the command syntax that you will use to communicate with the instrument and other general information about commands, such as how commands and queries are constructed, how to enter commands, constructed mnemonics, and argument types.
- **Command Groups.** This topic contains all the commands listed in functional groups. Each group consists of an overview of the commands in that group and a table that lists all the commands and queries for that group. You can click a command in the listing to display a detailed description of the command.

- **Status and Events.** This topic discusses the status and event reporting system for the GPIB interfaces. This system informs you of certain significant events that occur within the instrument. Topics that are discussed include registers, queues, event handling sequences, synchronization methods, and messages that the instrument may return, including error messages.
- **Miscellaneous.** This topic contains miscellaneous information, such as a list of reserved words, a table of the factory initialization (default) settings, and GPIB interface specifications that may be helpful when using GPIB commands to remotely control the instrument.

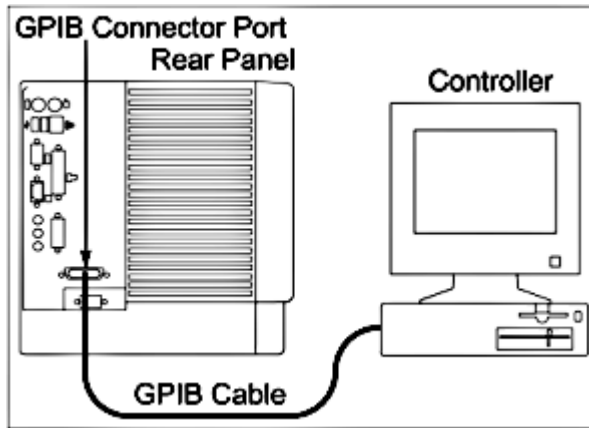
Setting Up Remote Communications

Before setting up the instrument for remote communications using the electronic (physical) GPIB interface, you should familiarize yourself with the following GPIB requirements:

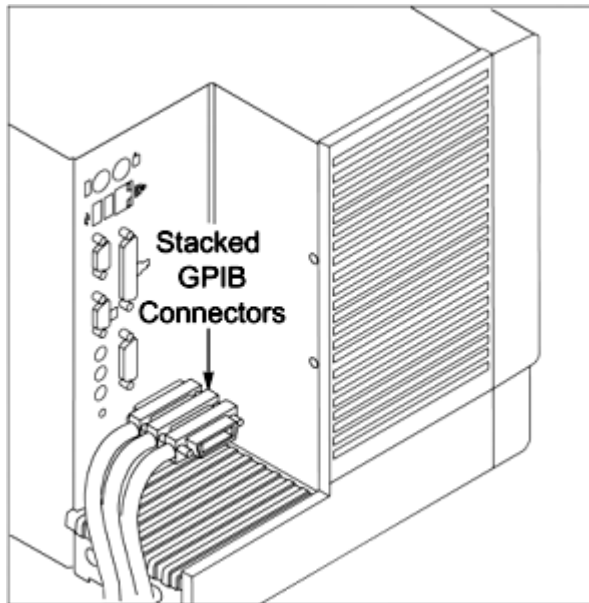
- A unique device address must be assigned to each device on the bus. No two devices can share the same device address.
- No more than 15 devices can be connected to any one line.
- One device should be connected for every 6 feet (2 meters) of cable used.
- No more than 65 feet (20 meters) of cable should be used to connect devices to a bus.
- At least two-thirds of the devices on the network should be powered on while using the network.
- Connect the devices on the network in a star or linear configuration. Do not use loop or parallel configurations.

Connecting to the Instrument

Your instrument has a 24-pin GPIB connector on its rear (side) panel. This connector has a D-type shell and conforms to IEEE Std 488.1—1987. Attach an IEEE Std 488.1—1987 GPIB cable to this connector and to your controller as shown in the following figure.



If necessary, the GPIB connectors can be stacked as shown in the figure below.



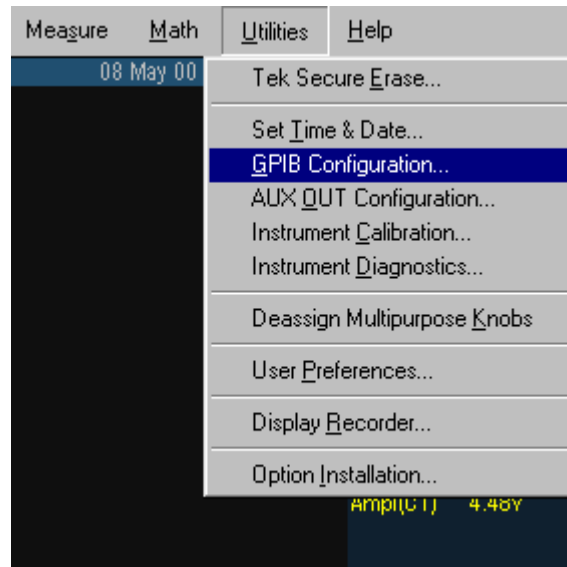
Setting the GPIB Address

To function correctly, your instrument must have a unique device address. The default settings for the GPIB configuration are:

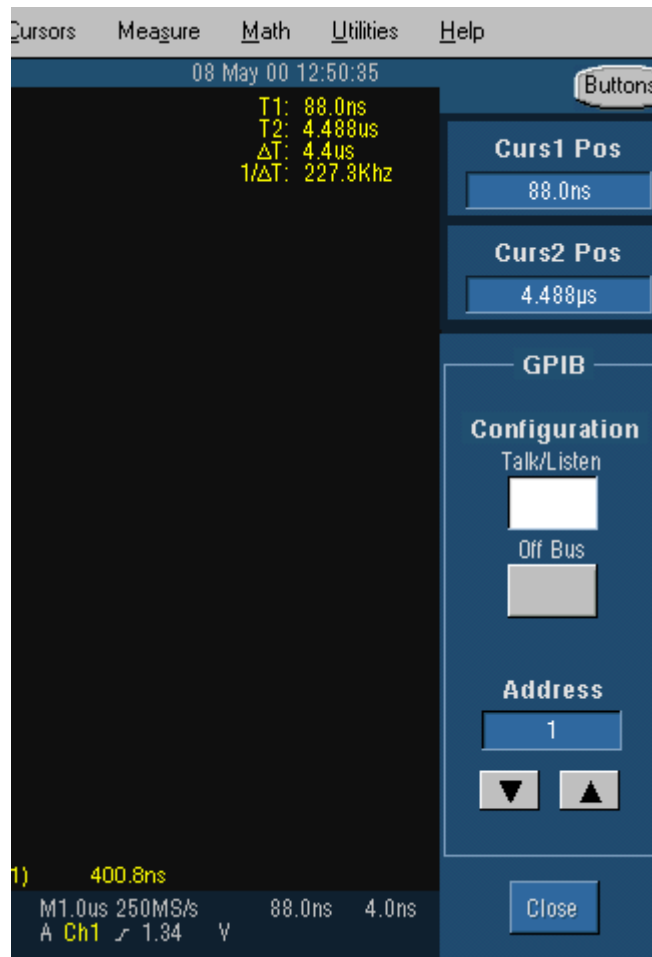
- GPIB Address 1
- GPIB Mode GPIB Talk/Listen

To change either of the GPIB settings, do the following:

1. Select GPIB Configuration... from the Utilities menu.



2. Click the Configuration Talk/Listen button.



3. Change the GPIB Address to a unique address.
4. Click the Close button.

The instrument is now set up for bidirectional communication with your controller.

Documentation

In addition to this *TDS5000 Series Oscilloscope Online Programmer Guide*, the following documentation is available for this instrument. (Unless noted as an optional accessory, the documentation is included with your instrument.)



TDS5000 Series Digital Phosphor Oscilloscopes User Manual. The user manual has information about installing and operating the instrument. It also provides concepts and theories about using the instrument that are not covered in the online help.

TDS5000 Series Digital Phosphor Oscilloscopes Reference Manual. The quick reference guide provides basic information on connecting a signal to the instrument and displaying the results.

TDS5000 Series Online Help. This is an online help system that is integrated with the User Interface application that ships with this product.

Oscilloscope Analysis and Connectivity Made Easy. A book that explores some options for getting data from your instrument into any one of several available analysis tools.

Performance Verification Procedure. A performance verification procedure is available as a printable PDF file on the *TDS5000 Series Product Software* CD-ROM. This procedure is also included in the optional service manual.

TekVISA Programmer Manual. This manual is available as a printable PDF file on the *TDS5000 Series Product Software* CD-ROM. The manual describes TekVISA, the Tektronix implementation of the VISA Application Programming Interface (API). TekVISA is industry-compliant software for writing interoperable instrument drivers in a variety of Application Development Environments (ADEs).

Other Included Documentation. Your instrument comes with a graphical packing list. Also, installation booklets are included in the *TDS5000 Series Product Software* and *TDS5000 Series Operating System Restore Software* CD-ROM packages.

TDS5000 Series Digital Phosphor Oscilloscopes Service Manual. A service manual is available as an optional accessory. The service manual includes procedures to service the instrument to module levels. The manual also includes performance verification procedures so that you can verify performance to the advertised specifications.

Command Syntax

Syntax Overview

You can control the operations and functions of the instrument through the GPIB interface using commands and queries. The related topics listed below describe the syntax of these commands and queries. The topics also describe the conventions that the instrument uses to process them. See the *Command Groups* topic in the table of contents for a listing of the commands by command group, or use the index to locate a specific command.

Backus-Naur Form Notation

This documentation describes the commands and queries using Backus-Naur Form (BNF) notation. Refer to the following table for the symbols that are used.

Symbols for Backus-Naur Form	
Symbol	Meaning
< >	Defined element
::=	Is defined as
	Exclusive OR
{ }	Group; one element is required
[]	Optional; can be omitted
...	Previous element(s) may be repeated
()	Comment

Command and Query Structure

Overview

Commands consist of set commands and query commands (usually called commands and queries). Commands modify instrument settings or tell the instrument to perform a specific action. Queries cause the instrument to return data and status information.

Most commands have both a set form and a query form. The query form of the command differs from the set form by its question mark on the end. For example, the set command ACQUIRE:MODE has a query form ACQUIRE:MODE?. Not all commands have both a set and a query form. Some commands have set only and some have query only.

Messages

A command message is a command or query name followed by any information the instrument needs to execute the command or query. Command messages may contain five element types, defined in the following table.

Command Message Elements	
Symbol	Meaning
<Header>	This is the basic command name. If the header ends with a question mark, the command is a query. The header may begin with a colon (:) character. If the command is concatenated with other commands, the beginning colon is required. Never use the beginning colon with command headers beginning with a star (*).
<Mnemonic>	This is a header subfunction. Some command headers have only one mnemonic. If a command header has multiple mnemonics, a colon (:) character always separates them from each other.
<Argument>	This is a quantity, quality, restriction, or limit associated with the header. Some commands have no arguments while others have multiple arguments. A <space> separates arguments from the header. A <comma> separates arguments from each other.
<Comma>	A single comma is used between arguments of multiple-argument commands. Optionally, there may be white space characters before and after the comma.
<Space>	A white space character is used between a command header and the related argument. Optionally, a white space may consist of multiple white space characters.

Commands

Commands cause the instrument to perform a specific function or change one of the settings. Commands have the structure:

```
[ : ] <Header> [ <Space> <Argument> [ <Comma> <Argument> ]  
... ]
```

A command header consists of one or more mnemonics arranged in a hierarchical or tree structure. The first mnemonic is the base or root of the tree and each subsequent mnemonic is a level or branch off the previous one. Commands at a higher level in the tree may affect those at a lower level. The leading colon (:) always returns you to the base of the command tree.

Queries

Queries cause the instrument to return status or setting information. Queries have the structure:

- [:] <Header>?
- [:] <Header>? [<Space><Argument> [<Comma><Argument> . . .]

You can specify a query command at any level within the command tree unless otherwise noted. These branch queries return information about all the mnemonics below the specified branch or level. For example, HISTogram:STATistics:STDdev? returns the standard deviation of the histogram, while HISTogram:STATistics? returns all the histogram statistics, and HISTogram? returns all the histogram parameters.

Headers

You can control whether the instrument returns headers as part of the query response. Use the HEADer command to control this feature. If header is on, the query response returns command headers, then formats itself as a valid set command. When header is off, the response includes only the values. This may make it easier to parse and extract the information from the response. The table below shows the difference in responses.

Comparison of Header Off and Header On Responses		
Query	Header Off	Header On
TIME?	"14:30:00"	:TIME "14:30:00"
ACQuire:NUMAVg?	100	:ACQUIRE:NUMAVG 100

Clearing the Instrument

You can clear the Output Queue and reset the instrument to accept a new command or query by using the selected Device Clear (DCL) GPIB function. Refer to your GPIB library documentation for further details about the selected Device Clear operation.

Command Entry

Rules

The following rules apply when entering commands:

- You can enter commands in upper or lower case.
- You can precede any command with white space characters. White space characters include any combination of the ASCII control characters 00 through 09 and 0B through 20 hexadecimal (0 through 9 and 11 through 32 decimal).
- The instrument ignores commands consisting of any combination of white space characters and line feeds.

Abbreviating

You can abbreviate many instrument commands. Each command in this documentation shows the abbreviations in capitals. For example, you can enter the command ACQUIRE:NUMAVg simply as ACQ:NUMA or acq:numa.

Abbreviation rules may change over time as new instrument models are introduced. Thus, for the most robust code, use the full spelling.

If you use the HEADER command to have command headers included as part of query responses, you can further control whether the returned headers are abbreviated or are full-length with the VERBOSE command.

Concatenating

You can concatenate any combination of set commands and queries using a semicolon (;). The instrument executes concatenated commands in the order received.

When concatenating commands and queries, you must follow these rules:

1. Separate completely different headers by a semicolon and by the beginning colon on all commands except the first one. For example, the commands TRIGGER:MODE NORMAL and ACQUIRE:NUMAVg 10, can be concatenated into the following single command:

```
TRIGGER:MODE NORMAL;:ACQUIRE:NUMAVg 10
```

2. If concatenated commands have headers that differ by only the last mnemonic, you can abbreviate the second command and eliminate the beginning colon. For example, you can concatenate the commands ACQUIRE:MODE ENVELOPE and ACQUIRE:NUMAVg 10 into a single command:

```
ACQUIRE:MODE ENVELOPE; NUMAVg 10
```

The longer version works equally well:

```
ACQUIRE:MODE ENVELOPE;:ACQUIRE:NUMAVg 10
```

3. Never precede a star (*) command with a colon:

```
ACQUIRE:MODE ENVELOPE;*OPC
```

Any commands that follow will be processed as if the star command was not there so the commands, ACQUIRE:MODE ENVELOPE;*OPC;NUMAVg 10 will set the acquisition mode to envelope and set the number of acquisitions for averaging to 10.

- When you concatenate queries, the responses to all the queries are concatenated into a single response message. For example, if the display background color is white and the display foreground color is black, the concatenated query `DISPlay:COLor:BACKGround?;FOREGround?` will return the following.

If the header is on:

```
:DISPLAY:COLOR:BACKGROUND
7;:DISPLAY:COLOR:FOREGROUND 0
```

If the header is off:

```
7;0
```

- Set commands and queries may be concatenated in the same message. For example,

```
ACQuire:MODE SAMple;NUMAVg?;STATE?
```

is a valid message that sets the acquisition mode to sample.

The message then queries the number of acquisitions for averaging and the acquisition state. Concatenated commands and queries are executed in the order received.

Here are some invalid concatenations:

- `DISPlay:STYle:NORMal;ACQuire:NUMAVg 10`
(no colon before `ACQuire`)
- `DISPlay:COLor:CURSor1 1;:CURSor2 5`
(extra colon before `CURSor2`; use `DISPlay:COLor:CURSor1 1:CURSor2 5` instead)
- `DISPlay:STYle:NORMal;:*OPC`
(colon before a star (*) command)
- `DISPlay:COLor:CURSor1 1;COLor:CURSor2 5`
(levels of the mnemonics are different; either remove the second use of `COLor` or place `:DISPlay:` in front of `COLor:CURSor2 5`)

Terminating

This documentation uses `<EOM>` (End of message) to represent a message terminator.

End of Message Terminator	
Symbol	Meaning
<code><EOM></code>	Message terminator

The end-of-message terminator may be the `END` message (EOI asserted concurrently with the last data byte), the ASCII code for line feed (LF) sent as the last data byte, or both. The instrument always terminates messages with LF and EOI. It allows white space before the terminator. For example, it allows `CR LF`.

Constructed Mnemonics

Some header mnemonics specify one of a range of mnemonics. For example, a channel mnemonic can be CH1, CH2, CH3, or CH4 for four-channel instruments or CH1 or CH2 for two-channel instruments. You use these mnemonics in the command just as you do any other mnemonic. For example, there is a CH1:POSITION command, and there is also a CH2:POSITION command. In the command descriptions, this list of choices is abbreviated as CH<x>.

Cursor Position Mnemonics

When cursors are displayed, commands may specify which cursor of the pair to use.

Cursor Mnemonics	
Symbol	Meaning
CURSOR<x>	A cursor selector; <x> is either 1 or 2.
POSITION<x>	A cursor selector; <x> is either 1 or 2.
HPOS<x>	A cursor selector; <x> is either 1 or 2.

Math Specifier Mnemonics

Commands can specify the mathematical waveform to use as a mnemonic in the header.

Math Specifier Mnemonics	
Symbol	Meaning
MATH<x>	A math waveform specifier; <x> is 1 through 4 for four-channel instruments or 1 through 2 for two-channel instruments.

Measurement Specifier Mnemonics

Commands can specify which measurement to set or query as a mnemonic in the header. Up to eight automated measurements may be displayed on a four-channel instrument or four automated measurements on a two-channel instrument..

Measurement Specifier Mnemonics	
Symbol	Meaning
MEAS<x>	A measurement specifier; <x> is 1 through 8 for four-channel instruments or 1 through 4 for two-channel instruments.

Channel Mnemonics

Commands specify the channel to use as a mnemonic in the header.

Channel Mnemonics	
Symbol	Meaning
CH<x>	A channel specifier; <x> is 1 through 4 for four-channel instruments and 1 through 2 for two-channel instruments.

Reference Waveform Mnemonics

Commands can specify the reference waveform to use as a mnemonic in the header.

Reference Waveform Mnemonics	
Symbol	Meaning
REF<x>	A reference waveform specifier; <x> is 1 through 4 for four-channel instruments or 1 through 2 for two-channel instruments.

Argument Types

Numeric

Many instrument commands require numeric arguments. The syntax shows the format that the instrument returns in response to a query. This is also the preferred format when sending the command to the instrument though any of the formats will be accepted. This documentation represents these arguments as follows:

Numeric Arguments	
Symbol	Meaning
<NR1>	Signed integer value
<NR2>	Floating point value without an exponent
<NR3>	Floating point value with an exponent

Most numeric arguments will be automatically forced to a valid setting, either by rounding or truncating, when an invalid number is input unless otherwise noted in the command description.

Quoted String

Some commands accept or return data in the form of a quoted string, which is simply a group of ASCII characters enclosed by a single quote (') or double quote ("). The following is an example of a quoted string: "This is a quoted string". This documentation represents these arguments as follows:

Quoted String Argument	
Symbol	Meaning
<QString>	Quoted string of ASCII text

A quoted string can include any character defined in the 7-bit ASCII character set. Follow these rules when you use quoted strings:

1. Use the same type of quote character to open and close the string. For example: "this is a valid string".
2. You can mix quotation marks within a string as long as you follow the previous rule. For example, "this is an 'acceptable' string".
3. You can include a quote character within a string by repeating the quote. For example: "here is a "" mark".
4. Strings can have upper or lower case characters.
5. If you use a GPIB network, you cannot terminate a quoted string with the END message before the closing delimiter.
6. A carriage return or line feed embedded in a quoted string does not terminate the string, but is treated as just another character in the string.
7. The maximum length of a quoted string returned from a query is 1000 characters.

Here are some invalid strings:

- "Invalid string argument" (quotes are not of the same type)
- "test<EOI>" (termination character is embedded in the string)

Block

Several instrument commands use a block argument form (see the following table).

Block Arguments	
Symbol	Meaning
<NZDig>	A nonzero digit character in the range of 1–9
<Dig>	A digit character, in the range of 0–9
<DChar>	A character with the hexadecimal equivalent of 00 through FF (0 through 255 decimal)
<Block>	A block of data bytes defined as: <pre><Block> ::= {#<NZDig><Dig>[<Dig>...][<DChar>...] #0[<DChar>...]<terminator>}</pre>

<NZDig> specifies the number of <Dig> elements that follow. Taken together, the <NZDig> and <Dig> elements form a decimal integer that specifies how many <DChar> elements follow.

Command Groups

Acquisition Command Group

Use the commands in the Acquisition Command Group to set up the modes and functions that control how the instrument acquires the signals you input to the channels and processes them into waveforms.

Using these commands for acquiring waveforms, you can do the following:

- Start and stop acquisitions.
- Control whether each waveform is simply acquired, averaged, or enveloped over successive acquisitions of that waveform.
- Set the controls or conditions that start and stop acquisitions.
- Determine the action the system takes upon completing an acquisition, such as saving all waveforms and taking a measurement when the acquisition is stopped.
- Control acquisition of acquired channel waveforms.
- Set acquisition parameters.

Command	Description
ACQuire?	Returns acquisition parameters
ACQuire:MODE	Sets or returns acquisition mode
ACQuire:NUMAcq?	Returns the number of acquisitions that have occurred
ACQuire:NUMAVg	Sets or returns number of acquisitions for an averaged waveform
ACQuire:NUMEnv	Sets or returns number of acquisitions for envelope waveform
ACQuire:REPET	Enables, disables, or returns state of repetitive signal acquisition mode
ACQuire:STATE	Starts, stops, or returns acquisition state
ACQuire:STOPAfter	Sets or returns whether the acquisition is continuous or single sequence
FASTAcq?	Returns the Fast Acquisition state
FASTAcq:STATE	Enables, disables, or returns state of Fast Acquisition mode

Alias Command Group

Alias commands allow you to define new commands as a sequence of standard commands. You may find this useful when

repeatedly using the same commands to perform certain tasks like setting up measurements.

Aliases are similar to macros but do not include the capability to substitute parameters into alias bodies. The alias mechanism obeys the following rules:

- The alias name must consist of a valid IEEE 488.2 message unit, which may not appear in a message preceded by a colon, comma, or a command or query program header.
- The alias name may not appear in a message followed by program data, a colon, comma, or question mark.
- An alias name must be distinct from any keyword or keyword short form.
- An alias name cannot be redefined without first being deleted using one of the alias deletion functions.
- Alias names do not appear in response messages.
- The Alias commands are defined in Tektronix Standard Codes and Formats. Deviations between that standard and what is specified here will be considered TDS5000 series errors unless specifically noted in the command description in this document.

Command

ALias
ALIAS:CATalog?
ALias:DEFIne
ALias:DELEte
ALias:DELEte:ALL
ALias:DELEte:NAME
ALias:STATE

Description

Sets or returns the alias state
Returns a list of the currently defined alias labels
Assigns a sequence of program messages to an alias label
Removes a specified alias
Deletes all existing aliases
Removes a specified alias
Sets or returns the alias state

Calibration Command Group

The calibration commands provide information about the current state of calibration for the mainframe and all resident sampling head channels.

Command	Description
*CAL?	Instructs the scope to perform self-calibration
CAL?	Returns the internal and factory calibration status and the calibration due date
CALibrate:FACTory	Start the factory calibration
CALibrate:FACTory:ABOrt	Stop the factory calibration without changing the cal file
CALibrate:FACTory:CONTinue	Do the next step in the calibration procedure
CALibrate:FACTory:NOTify:DUE?	Return whether the factory calibration is due
CALibrate:FACTory:NOTify:HOURS	Set or return the number of hours until the user is notified that the instrument is due for factory calibration
CALibrate:FACTory:NOTify:YEARS	Set or return the number of years until the user is notified that the instrument is due for factory calibration
CALibrate:FACTory:PREVIOUS	Backup to the previous step/group but don't go until a CONTINUE command is sent
CALibrate:FACTory:START	Start the factory calibration
CALibrate:FACTory:STATUS?	Return the factory calibration status
CALibrate:FACTory:STEPSTATUS?	Return the status of the current calibration step
CALibrate:FACTory:STEPSTIMulus?	Return the required stimulus for this calibration step
CALibrate:PRObestate:CH<x>	Returns the calibration status for the attached probe
CALibrate:RESults?	Returns the status of all calibration subsystems without performing an SPC operation
CALibrate:RESults:SPC?	Returns the results of the last SPC operation

Cursor Command Group

Use the commands in the Cursor Command Group to control the cursor display and readout. You can use these commands to control the setups for cursor 1 and cursor 2, such as waveform source, cursor position, and cursor color.

You can also use the commands to select one of the following cursor functions:

- **Off.** Shuts off the display of all cursors.
- **Vertical Bars.** Displays vertical bar cursors, which provide traditional horizontal unit readouts for Cursor 1 (bar1), Cursor 2 (bar2), the delta between them, and 1/delta (results in frequency when the horizontal unit is time).
- **Horizontal Bars.** Displays horizontal bar cursors, which provide traditional vertical unit readouts for Cursor 1 (bar1), Cursor 2 (bar2), and the delta between them.
- **Paired Cursors.** Displays measurement of horizontal (time) and vertical (voltage) difference between paired cursors; voltage at the vertical position of the specified paired cursor; horizontal position of the specified paired cursor; and measurement units for the paired cursors.
- **Split Cursors.** Displays measurement of horizontal (time) and vertical (voltage) difference between split cursors; voltage at the vertical position of the specified split cursor; horizontal position of the specified split cursor; and measurement units for the split cursors.

Command	Description
CURSor?	Returns all cursor settings
CURSor:FUNction	Sets or returns cursor type
CURSor:HBArs?	Returns hbar cursor settings
CURSor:HBArs:DELTA?	Returns hbars vertical difference
CURSor:HBArs:POSITION<x>	Sets or returns hbar cursor<x> vertical position
CURSor:HBArs:UNIts?	Returns hbar cursor units
CURSor:MODE	Sets or returns whether cursors move in unison or separately
CURSor:PAIred	Sets or returns active paired cursor positions
CURSor:PAIred:HDELTA?	Returns vertical difference between two paired cursors
CURSor PAIred:HPOS<x>?	Returns the voltage at the vertical position of the specified paired cursor
CURSor:PAIred:POSITION<x>	Sets or returns the horizontal position of the specified paired cursor
CURSor:PAIred:UNIts?	Returns the units for the paired cursors
CURSor:PAIred:VDELTA?	Returns the vbar difference between paired cursors

CURSor:SOUrce	Sets or returns the source for cursors
CURSor:SPLit	Sets the split cursors positions Or returns the units, position, and second source of the split cursors
CURSor:SPLit:HDELTA?	Returns the vertical difference between cursors 1 and 2
CURSor:SPLit:HPOS<x>?	Returns the vertical position of cursor 1 or 2
CURSor:SPLit:POSITION<x>	Sets or returns the horizontal position of the vbar markers for cursor 1 or 2
CURSor:SPLit:SOURCE2	Sets or returns the source waveforms for split cursor 2
CURSor:SPLit:UNIts	Sets or returns the amplitude units of the split cursors
CURSor:SPLit:VDELTA?	Returns the horizontal difference between cursors 1 and 2
CURSor:STATE	Turns cursors on or off Or returns their state
CURSor:VBArS	Sets or returns the position of the vertical bar cursor
CURSor:VBArS:DELTA?	Returns difference between vbar cursors
CURSor:VBArS:POSITION<x>	Sets or returns vbar and paired cursor<x> positions
CURSor:VBArS:UNIts?	Returns the units for the vbar cursors

Diagnostics Command Group

The calibration commands provide information about the current state of calibration for the mainframe and all resident sampling head channels.

Command	Description
DIAG:CONTROL:HALT	Enables or disables halting on first diagnostic failure
DIAG:CONTROL:LOOP	Enables or disables looping of diagnostics
DIAG:EXECUTE	Executes currently selected set of diagnostics
DIAG:ITEM?	Returns all data associated with a selected menu item
DIAG:ITEM:FAILURES?	Returns the total number of failures that occurred
DIAG:ITEM:NAME?	Returns the name of the selected menu item
DIAG:ITEM:RESULT?	Returns the result of the last test executed on this item
DIAG:ITEM:SUBITEMS?	Returns the number of subitems associated with this item
DIAG:LEVEL	Sets the current level of diagnostic test hierarchy
DIAG:LOOPS?	Returns the number of times the diagnostics were completed during the last execution
DIAG:NAME?	Returns the subsystem name,

	area and test name of the current diagnostic test
DIAG:NAME:AREA?	Returns the selected area of the current diagnostic test
DIAG:NAME:SUBSYS?	Returns the subsystem of the current diagnostic test
DIAG:NAME:TEST?	Returns the name of the current diagnostic test
DIAG:NUMITEMS?	Returns the number of items on the currently selected level of test hierarchy
DIAG:RESults?	Returns a brief pass or fail status of the last test execution
DIAG:RESults:VERBose?	Returns a more explanatory message about the results of the last diagnostic execution
DIAG:SElect:ALL	Selects all available diagnostics
DIAG:SElect:AREA	Selects one of the available diagnostic areas
DIAG:SElect:LAST	Sets the last item of a group of items from the same level of test hierarchy
DIAG:SElect:SUBSYS	Selects one of the available diagnostic subsystems
DIAG:SElect:TEST	Selects one of the available diagnostic tests
DIAG:STATE	Sets the instrument operating state
DIAG:STOP	Terminate the execution of diagnostics
TEST	Selects and executes any item at any level of the test hierarchy
TEST:RESults?	Returns a brief pass or fail status of the last test execution
TEST:RESults:VERBose?	Returns a more explanatory message about the results of the last test execution
TEST:STOP	Terminates the execution of the test

Display Control Command Group

Use the commands in the Display Control Command Group to change the graticule style, the displayed intensities, and to set the characteristics of the waveform display.

You can set the following: display of date and time; cursor, histogram, mask, and measurement readouts; measurement annotations, and the mode in which waveforms are displayed.

Use the commands to set the style that best displays your waveforms and graticule display properties. Note that the mode you choose globally affects all displayed waveforms.

Command	Description
DISplay?	Returns current display settings
DISplay:CLOCK	Sets or returns the display of the date/time stamp
DISplay:COLOR?	Returns color group settings
DISplay:COLOR:MATHCOLOR	Sets or returns the color to be used for math traces
DISplay:COLOR:PALETTE	Sets or returns the palette to be used for trace display
DISplay:COLOR:REFCOLOR	Sets or returns the color to be used for reference traces
DISplay:FILTer	Sets or returns the type of interpolation to use for the display
DISplay:FORMat	Sets or returns the display format
DISplay:GRATicule	Sets or returns the type of graticule that is displayed
DISplay:INTENSITY?	Returns the waveform saturation level, autobright state and screensaver settings
DISplay:INTENSITY:AUTOBRIGHT	Sets or returns whether automatic adjustment of waveform intensity is enabled
DISplay:INTENSITY:SCREENSAVER	Sets or returns automatic display protection features
DISplay:INTENSITY:SCREENSAVER DELAY	Sets or returns the display protection timeout state
DISplay:INTENSITY:WAVEform	Sets or returns the intensity saturation of the waveforms
DISplay:PERsistence	Sets or returns display persistence setting
DISplay:STYLE	Sets or returns data display style
DISplay:TRIGBar	Sets or returns the display of the trigger level indicator bar(s)
DISplay:VARPersist	Sets or returns the persistence decay time

File System Command Group

Use the commands in the File System Command Group to help you use the built-in hard disk drive and floppy disk drive. You can use the commands to do the following:

- List the contents of the default directory
- Create and delete directories
- Create, copy, read, rename, or delete a file

When using these commands, keep the following points in mind:

- File arguments are always enclosed within double quotes:
"C:\MYDIR\TEK00001.SET"
- File names follow the MSDOS format:
[DRIVE:][\PATH]filename
- Path separators may be either forward slashes (/) or back slashes (\)
NOTE: Using back slash as a path separator may produce some unexpected results, depending on how your GPIB controller application treats escaped characters. Many applications recognize the sequence of back slash followed by an alphabetic character as an escaped character, and, as such, interpret that alphabetic character as a control character. For example, the sequence "\n" may be interpreted as a newline character; "\t" may be interpreted as a tab character. To ensure that this interpretation does not occur, you can use double back slashes. For example, "C:\\testfile.txt".
- Some FILESystem commands may fail because a file has read-only attributes. You will not be able to delete or replace such files until this attribute is removed. Refer to the operating system help on file properties for further information.

Command	Description
FILESystem?	Returns the file system state
FILESystem:COpy	Copies one or more files to a new file
FILESystem:CWD	Sets or returns the current working directory for FILESystem GPIB commands.
FILESystem:DELEte	Deletes a named file or directory
FILESystem:DIR?	Returns a list of directory contents
FILESystem:MKDir	Makes a new directory
FILESystem:PRInt	Prints a named file to the named port
FILESystem:READFile	Copies the named file to the GPIB port
FILESystem:REName	Assigns a new name to an existing file
FILESystem:RMDir	Deletes the named directory
FILESystem:WRITEFile	Copies the GPIB port block data to a named file

Hard Copy Command Group

Hard copy commands enable you to make hard copies of data files or send the data to a specified file. In addition, these commands provide you with information about (and the ability to set) file path settings.

Command	Description
HARDCopy	Sends a screen copy to the selected port Or returns the selected port and file path
HARDCopy:FILENAME	Sets or returns the hardcopy file path
HARDCopy:PORT	Sets or returns whether the data will be sent to a file or printed on the next hardcopy

Histogram Command Group

You must have Option 2A, *Advanced Analysis*, installed to access the commands in this group. Histogram commands let you select the type of histogram, what part of the waveform should go into the histogram, and histogram statistics. Use commands from this group to do the following:

- Create a histogram of vertical or horizontal values for a channel, math or reference waveform
- Adjust the limits of the waveform area from which the histogram data is obtained
- Clear histogram count and restart

Command	Description
HIStogram?	Return all histogram parameters
HIStogram:BOX	Sets or returns the left, top, right, and bottom positions of the histogram box, in source waveform coordinates
HIStogram:BOXPct	Sets or returns same as HIStogram:BOX, but in percentage coordinates, with 0,0 upper left and 100,100 lower right
HIStogram:COUNT	Clears histogram count source data and restarts counting
HIStogram:DISplay	Sets or returns whether histogram data is displayed and what display type to use
HIStogram:FUNCTION?	Returns the current histogram type
HIStogram:FUNCTION	Sets the type of histogram to create
HIStogram:MODE	Sets type of histogram to create or turns histograms off Or returns the current histogram type or that histogram display is disabled
HIStogram:SIZE	Sets or returns the width (or height) of the histogram on the screen in divisions
HIStogram:SOURce	Sets or returns which source waveform will be compared against the histogram box when the histogram testing is enabled
HIStogram:STATE	Sets or returns whether histogram calculations are enabled

Horizontal Command Group

Horizontal commands control the time bases of the instrument. You can set the time per division (or time per point) of the main time base. You can use the Horizontal commands to do the following:

- Set the scale, horizontal position and reference, and units of the time base
- Get the screen resolution, time of first point and time of last point, or get all the horizontal settings
- Enable or disable the display of the time base

You may substitute SECdiv for SCALE in the horizontal commands. This provides program compatibility with earlier models of Tektronix instruments.

Command	Description
HORizontal?	Returns all learnable settings for the horizontal commands
HORizontal:DIVisions?	Returns the number of graticule divisions over which the waveform is displayed
HORizontal:FASTframe:COUNT	Sets or returns FastFrame frame count
HORizontal:FASTframe:LENGth	Sets or returns the horizontal record length to the number of sample points per frame
HORizontal:FASTframe:MUltipleframes:FRAMEStart:<wfm><NR1>	Sets or returns the start frame number on the specified waveform for the FastFrames' multiple frames feature
HORizontal:FASTframe:MUltipleframes:MODE	Sets or returns the multiple frames mode for the FastFrames' multiple frames feature
HORizontal:FASTframe:MUltipleframes:NUMFRames:<wfm><NR1>	Sets or returns the number of frames on the specified waveform for the FastFrames' multiple frames feature
HORizontal:FASTframe:REF:FRAMe	Sets or returns the FastFrame reference frame number
HORizontal:FASTframe:REF:Source	Sets or returns the FastFrame Reference waveform source
HORizontal:FASTframe:SELEctED:<wfm>	Sets or returns the FastFrame Selected frame number on the specified waveform
HORizontal:FASTframe:STATE	Sets or returns the state of the FastFrame acquisition
HORizontal:FASTframe:TIMEStamp:All:<wfm>?	Returns the frame number and time stamp for each frame between requested frames within the specified waveform
HORizontal:FASTframe:TIMEStamp:BEtWeen:<wfm>?	Returns the relative trigger for the delta time between the specified frames
HORizontal:FASTframe:TIMEStamp:DELTA:<wfm>?	Returns the relative time between the triggers of the FastFrame Selected and the FastFrame Reference, within the specified

	waveform
HORizontal:FASTframe:TIMEStamp:FRAME:<wfm>?	Returns the absolute trigger date and time for the specified frame and waveform.
HORizontal:FASTframe:TIMEStamp:REF?	Returns the absolute trigger date and time for FastFrame reference
HORizontal:FASTframe:TIMEStamp:SELECTED:<wfm>?	Returns the absolute trigger date and time for FastFrame Selected, within the specified waveform
HORizontal:FASTframe:TRACK	Sets or returns the state of the FastFrame tracking feature
HORizontal:MAIn?	Returns the time per division of the main time base
HORizontal[:MAIn]:DELay:POSition	Sets or returns the main time base position when Horizontal Delay Mode is turned off
HORizontal[:MAIn]:DELay:MODE	Sets or returns the main time base trigger delay mode
HORizontal[:MAIn]:DELay:TIME	Sets or returns the main time base trigger delay time
HORizontal[:MAIn]:POSition	Sets or returns the waveform horizontal position on the display
HORizontal:MAIn:SAMPLERate	Sets the horizontal sample rate to the desired number of samples per second Or returns the current horizontal sample rate
HORizontal[:MAIn]:SCALE	Sets time per division for the main time base Or returns the main time base horizontal scale
HORizontal:MAIn:UNIts	Sets or returns the units for the horizontal main time base
HORizontal:MAIn:UNIts:STRing	Sets or returns the units string for the horizontal main time base trigger delay
HORizontal:POSition	Sets or returns the waveform's horizontal position on the display
HORizontal:RECOrdlength	Sets the horizontal record length to the number of data points in each frame Or returns the current horizontal record length
HORizontal:RESOLution	Sets the horizontal record length to the number of data points in each frame and simultaneously adjusts the sample rate to maintain a constant time/division Or returns the current horizontal record length
HORizontal:ROLL	Sets or returns the horizontal roll mode
HORizontal:SCALE	Sets or returns the time per division for the main time base
HORizontal:TRIGger:POSition	Sets or returns the position of the horizontal trigger

Math Command Group

Use the commands in the Math Command Group to create and define math waveforms. You can define and display up to four math waveforms simultaneously in four-channel instruments and

up to two math waveforms in two-channel instruments. Use the available math functions to define your math waveform.

The math waveform you create depends on sources listed in the math expression. If you change these sources, the math waveforms you previously defined will be affected.

Using the standard math functions, you can create simple waveform expressions, such as Ch 1 + Ch 2, which creates a math waveform that is the algebraic sum of the signal source of channel 1 and channel 2. Standard math expressions must fit the following defined equations:

- $\langle \text{operand} \rangle \langle \text{operation} \rangle \langle \text{operand} \rangle$
where $\langle \text{operand} \rangle$ is one of Ch<x> or Ref<x> and $\langle \text{operation} \rangle$ is one of +, -, *, or /
- $\langle \text{operation} \rangle \langle \text{operand} \rangle$
where $\langle \text{operand} \rangle$ is one of Ch<x> or Ref<x> and $\langle \text{operation} \rangle$ is one of SpectralMag or SpectralPhase

If you have Option 2A, *Advanced Analysis*, installed in your instrument, you can create complex expressions consisting of 100 plus characters and comprising many sources, functions, and operands.

For information about constructing mathematical expressions, see *Creating and Using Math Waveforms* in the user manual for this instrument.

The acquisition of a live waveform can stop for several reasons: You can turn off the channel, stop the waveform (via Run/Stop from the Horiz/Acq menu), or stop the trigger (via Run/Stop from the Trig menu). When you turn off the channel, math continues and data is acquired but not displayed. When you stop either the waveform or the trigger, the math no longer calculates but the last math calculation performed is displayed.

When a live waveform update or reference waveform is altered, math waveforms containing those waveforms as sources are also updated to reflect the changes. Also, sources must exist but do not need to be displayed to be used in and to update math waveforms.

Command	Description
MATH<x>?	Returns the specified math waveform settings
MATH<x>:DEFine	Sets or returns the math<x> waveform definition for the specified waveform
MATH<x>:LABEL:NAME	Sets or returns the label string used for annotating the displayed math waveform
MATH<x>:LABEL:XPOS	Sets or returns the X screen offset where the math waveform label is displayed
MATH<x>:LABEL:YPOS	Sets or returns the Y screen offset where the math waveform label is displayed
MATH<x>:NUMavg	Sets or returns the acquisition number at which the averaging algorithm will begin exponential averaging
MATH<x>:SPECTral?	Returns the specified math waveform spectral

	setups
MATH<x>:SPECTral:CENTER	Sets or returns the center frequency of the spectral analyzer output data span
MATH<x>:SPECTral:GATEPOS	Sets or returns the position of the center of the gate
MATH<x>:SPECTral:GATEWIDTH	Sets or returns the gate width input to the spectral analyzer
MATH<x>:SPECTral:LOCK	Sets or returns the state of the spectral locking for the specified math waveform
MATH<x>:SPECTral:MAG	Sets or returns the units of the SpectralMag function in the specified math string
MATH<x>:SPECTral:PHASE	Sets or returns the units of the SpectralPhase function in the specified math string
MATH<x>:SPECTral:REFLEVEL	Sets or returns the vertical position of the output data from the spectral analyzer
MATH<x>:SPECTral REFLEVELOffset	Sets or returns the spectral reference level offset used for calculating the dB value
MATH<x>:SPECTral:RESBw	Sets or returns the resolution bandwidth of the spectral analyzer
MATH<x>:SPECTral:SPAN	Sets the top of the span to a value that is closest to the specified value Or returns the specified math waveform's current span value
MATH<x>:SPECTral:SUPPress	Sets or returns the phase suppression threshold
MATH<x>:SPECTral:UNWRap	Enables, disables, or returns the state of the phase unwrap of the spectral analyzer output data
MATH<x>:SPECTral:WINDow	Sets or returns the window function used to multiply the input data to the spectral analyzer
MATH<x>:VERTical:POSition	Sets or returns the specified math waveform vertical position
MATH<x>:VERTical:SCALE	Sets or returns the specified math waveform vertical scale (per div)

Measurement Command Group

Use the commands in the Measurement Command Group to control the automated measurement system.

Up to eight automated measurements can be displayed on the screen. In the commands, these measurement readouts are named MEAS<x>, where <x> can be 1 through 8.

In addition to the eight displayed measurements, the measurement commands let you specify an additional measurement, IMMEd. The immediate measurement has no front-panel equivalent. Immediate measurements are never displayed. Because they are computed only when needed, immediate measurements slow the waveform update rate less than displayed measurements.

Whether you use displayed or immediate measurements, use the VALUE? query to obtain measurement results.

Measurement commands can set and query measurement parameters. You can assign some parameters, such as waveform sources, differently for each measurement. Other parameters, such as reference levels, have only one value, which applies to all measurements.

Command	Description
MEASUrement?	Returns all measurement parameters
MEASUrement:GATING	Sets or returns the measurement gating
MEASUrement:IMMed?	Returns all immediate measurement setup parameters
MEASUrement:IMMed:DElay?	Returns information about the immediate delay measurement
MEASUrement:IMMed:DElay:DIREction	Sets or returns the search direction to use for immediate delay measurements
MEASUrement:IMMed:DElay:EDGE[1]	Sets or returns the slope of the edge used for immediate delay "from" waveform measurements
MEASUrement:IMMed:DElay:EDGE2	Sets or returns the slope of the edge used for immediate delay "to" waveform measurements
MEASUrement:IMMed:SOURCE[1]	Sets or returns the "from" source for all single channel immediate measurements
MEASUrement:IMMed:SOURCE2	Sets or returns the source to measure "to" for phase or delay immediate measurements
MEASUrement:IMMed:TYPe	Sets or returns the type of the immediate measurement
MEASUrement:IMMed:UNIts?	Returns the units of the immediate measurement
MEASUrement:IMMed:VALue?	Returns the value of the immediate measurement
MEASUrement:MEAS<x>:COUNT?	Returns the number of values accumulated since the last statistical reset
MEASUrement:MEAS<x>:MAXimum?	Returns the maximum value found since the last statistical reset
MEASUrement:MEAS<x>:MEAN?	Returns the mean value accumulated since the last statistical reset
MEASUrement:MEAS<x>:MINimum?	Returns the minimum value found since the last statistical reset
MEASUrement:MEAS<x>:STDdev?	Returns the standard deviation of values accumulated since the last statistical reset
MEASUrement:MEAS<x>?	Returns all measurement parameters for the displayed measurement
MEASUrement:MEAS<x>:DElay?	Returns the delay measurement parameters for specified measurement
MEASUrement:MEAS<x>:DElay:DIREction	Sets or returns the search direction to use for delay measurements
MEASUrement:MEAS<x>:DElay:EDGE[1]	Sets or returns the slope of the edge to use for delay "from" waveform measurements
MEASUrement:MEAS<x>:DElay:EDGE2	Sets or returns the slope of the edge to use for delay "to" waveform measurements
MEASUrement:MEAS<x>:SOURCE[1]	Sets or returns the channel from which measurements are taken
MEASUrement:MEAS<x>:SOURCE2	Sets or returns the source to measure "to" for phase or delay measurements

MEASUrement:MEAS<x>:STATE	Sets or returns whether the specified measurement slot is computed and displayed
MEASUrement:MEAS<x>:TYPE	Sets or returns the measurement<x> type
MEASUrement:MEAS<x>:UNIts?	Returns measurement<x> units
MEASUrement:MEAS<x>:VALue?	Returns the value of measurement<x>
MEASUrement:METhod	Sets or returns the method used for calculating reference levels
MEASUrement:REFLevel?	Returns reference level parameters
MEASUrement:REFLevel:ABSolute:HIGH	Sets or returns the top reference level for rise time
MEASUrement:REFLevel:ABSolute:LOW	Sets or returns the low reference level for rise time
MEASUrement:REFLevel:ABSolute:MID	Sets or returns the mid reference level for measurements
MEASUrement:REFLevel:ABSolute:MID2	Sets or returns the mid reference level for delay "to" measurements
MEASUrement:REFLevel:METhod	Sets or returns the method for assigning high and low reference levels
MEASUrement:REFLevel:PERCent:HIGH	Sets or returns the top reference percent level for rise time
MEASUrement:REFLevel:PERCent:LOW	Sets or returns the low reference percent level for rise time
MEASUrement:REFLevel:PERCent:MID	Sets or returns the mid reference percent level for waveform measurements
MEASUrement:REFLevel:PERCent:MID2	Sets or returns the mid reference percent level for second waveform measurements
MEASUrement:STATIstics:COUnT	Clears existing measurement statistics from memory
MEASUrement:STATIstics:MODe	Turns management statistics on or off and sets which pair of statistical accumulations is displayed Or returns which pair of statistical accumulations is displayed
MEASUrement:STATIstics:WEIghting	Sets or returns the 'time constant' for mean and standard deviation statistical accumulations

Miscellaneous Command Group

Miscellaneous commands do not fit into other categories.

Several commands and queries are common to all 488.2-1987 devices on the GPIB bus. The 488.2-1987 standard defines these commands. The common commands begin with an asterisk (*) character.

Command	Description
*DDT	Sets or returns the commands that will be executed by

	the group execute trigger
*IDN?	Returns the instrument identification code
*LRN?	Returns a listing of instrument settings
*TRG	Performs the group execute trigger (GET)
*TST?	Tests the GPIB interface and returns status
AUTOSet	Sets the vertical, horizontal and trigger controls to provide a stable display of the selected waveform
AUXout?	Returns the auxiliary out setup
AUXout:SOUrce	Sets or returns the trigger source at the BNC connection
BELI	In previous TDS models, this command sounded the audio indicator. Provided for backward compatibility.
CMDBatch	Turns command batching on or off Or returns the state of command batching
DATE	Sets or returns the date that the instrument can display
HDR	Sets or returns the Response Header Enable State
HEADer	Sets or returns the Response Header Enable State
ID?	Returns identifying information about the instrument and its firmware
LOCK	Sets or returns the front panel lock state
NEWpass	Changes the password for user protected data
PASSWord	Provides access for changing user protected data
REM	Specifies a comment, which is ignored by the instrument
ROSc:SOUrce	Sets or returns the source for the 10 MHz timebase
ROSc:SState?	Returns the state of the 10 MHz timebase
SET?	Returns a listing of instrument settings
TEKSecure	Initializes both waveform and setup memories
TIMe	Sets or returns the time displayed by the instrument
UNLock	Unlocks front panel
VERBose	Sets or returns verbose state

Save and Recall Command Group

Use the commands in the Save and Recall Command Group to store and retrieve internal waveforms and settings. When you save a setup, you save all the settings of the instrument. When you recall a setup, the instrument restores itself to the state that it was in when you originally saved that setting.

Command	Description
*RCL	Restores the state of the instrument from a copy of the setting stored in memory
*SAV	Stores the current instrument state to a specified memory location
*SDS	Changes the specified setup to reference the factory setup instead of the user setup
DELEte:SETUp	Removes stored setups from memory and initializes the location with the factory default setups
DELEte:WAVEform	Deletes (one or all of) the stored reference waveforms from memory
FACTory	Resets the instrument to factory default settings
RECAI:SETup	Recalls saved instrument settings

RECALL:WAVEform	Recalls a stored waveform to a reference location
SAVE:SETup	Saves the current front-panel setup to a specified memory location or file
SAVE:WAVEform	Saves a waveform to one of four reference memory locations or a mass storage file
SAVE:WAVEform:FILEFormat	Sets or returns the format for saved waveforms
SETUp:NAME	Sets or returns the user-defined setup label

Status and Error Command Group

Use the commands in the Status and Error command Group to determine the status of the instrument and control events.

Several commands and queries used with the instrument are common to all devices on the GPIB bus. The IEEE Std 488.2-1987 defines these commands and queries. The common commands begin with an asterisk (*) character.

Command	Description
*CLS	Clears status
*ESE	Sets or returns the bits in the Event Status Enable Register
*ESR?	Returns the contents of the Standard Event Status Register
*OPC	Generates the operation complete message in the standard event status register when all pending operations are finished Or returns "1" when all current operations are finished
*OPT?	Returns a list of options installed in the instrument
*PSC	Sets or returns the power on status flag
*PUD	Sets or returns a string of protected user data
*RST	Resets the instrument to factory default settings
*SRE	Sets or returns the bits in the Service Request Enable Register
*STB?	Returns the contents of the Status Byte Register
*WAI	Prevents the instrument from executing further commands until all pending operations finish
ALLEV?	Returns all events and their messages
BUSY?	Returns instrument status
DESE	Sets or returns the bits in the Device Event Status Enable Register
EVENT?	Returns event code from the event queue
EVMsg?	Returns event code, message from the event queue
EVQty?	Return number of events in the event queue

Trigger Command Group

Use the commands in the Trigger Command Group to control all aspects of triggering for the instrument.

There are two triggers: A and B. Where appropriate, the command set has parallel constructions for each trigger.

You can set the A or B triggers to edge mode. Edge triggering lets you display a waveform at or near the point where the signal passes through a voltage level of your choosing.

You can also set A triggers to pulse, logic or video modes. With pulse triggering, the instrument triggers whenever it detects a pulse of a certain width or height. Logic triggering lets you logically combine the signals on one or more channels. The instrument then triggers when it detects a certain combination of signal levels. Video triggering enables you to trigger on the most common Standard Definition, High Definition, and custom video standards. You can trigger on all fields, all lines, or individual video lines.

Command	Description
TRIGger	Forces a trigger event to occur Or returns current trigger parameters for the instrument
TRIGger:A	Sets A trigger level to 50% Or returns current A trigger parameters
TRIGger:A:EDGE?	Returns the source, coupling and source for the A edge trigger
TRIGger:A:EDGE:COUPling	Sets or returns the type of coupling for the A edge trigger
TRIGger:A:EDGE:SLOpe	Sets or returns the slope for the A edge trigger
TRIGger:A:EDGE:SOUrce	Sets or returns the source for the A edge trigger
TRIGger:A:HOLDoff?	Returns the A trigger holdoff parameters
TRIGger:A:HOLDoff:ACTUal?	Returns the holdoff time actually used by the A trigger
TRIGger:A:HOLDoff:BY	Sets or returns the type of holdoff for the A trigger
TRIGger:A:HOLDoff:TIME	Sets or returns the A trigger holdoff time
TRIGger:A:LEVel	Sets or returns the level for the A trigger
TRIGger:A:LOGic?	Returns all of the A trigger logic parameters
TRIGger:A:LOGic:CLAss	Sets or returns the type of A trigger logic
TRIGger:A:LOGic:FUNCTion	Sets or returns the logical combination of the input channels for the A logic trigger
TRIGger:A:LOGic:INPut?	Returns the A logic trigger input for channels 1-3.
TRIGger:A:LOGic:INPut:CH<x>	Specifies or returns the input settings for the specified logic trigger channel
TRIGger:A:LOGic:PATtern?	Returns the conditions for generating an A logic pattern trigger
TRIGger:A:LOGic:PATtern:INPut:CH2	Sets or returns the A logic trigger input for channel 2
TRIGger:A:LOGic:PATtern:INPut:CH4	Sets or returns the A logic

	trigger input for channel 4
TRIGger:A:LOGic:PATtern:WHEn	Sets or returns the condition for generating the A logic pattern trigger
TRIGger:A:LOGic:PATtern:WHEn:LEssLimit	Sets or returns the maximum time that the selected pattern may be true and still generate an A logic pattern trigger
TRIGger:A:LOGic:PATtern:WHEn:MORELimit?	Returns the minimum time that the selected pattern may be true and still generate an A logic pattern trigger
TRIGger:A:LOGic:PATtern:WHEn:MORELimit	Sets the minimum time that the selected pattern may be true and still generate an A logic pattern trigger
TRIGger:A:LOGic:SETHold?	Returns clock edge polarity, voltage threshold and source; data voltage threshold and source; and setup/hold times for violation triggering
TRIGger:A:LOGic:SETHold:CLOCK?	Returns clock edge polarity, voltage threshold and source input for setup/hold triggering
TRIGger:A:LOGic:SETHold:CLOCK:EDGE	Sets or returns the clock edge polarity for setup and hold triggering
TRIGger:A:LOGic:SETHold:CLOCK:SOUrce	Sets or returns the clock source for the A logic trigger setup and hold input
TRIGger:A:LOGic:SETHold:CLOCK:THReshold	Sets or returns the clock voltage threshold for setup and hold trigger
TRIGger:A:LOGic:SETHold:DATA?	Returns the voltage threshold and data source for the setup/hold trigger
TRIGger:A:LOGic:SETHold:DATA:SOUrce	Sets or returns the data source for the setup and hold trigger
TRIGger:A:LOGic:SETHold:DATA:THReshold	Sets or returns the data voltage threshold for setup and hold trigger
TRIGger:A:LOGic:SETHold:HOLDTime	Sets or returns the hold time for the setup and hold violation triggering
TRIGger:A:LOGic:SETHold:SETTime	Sets or returns the setup time for setup and hold violation triggering
TRIGger:A:LOGic:STATE?	Returns the data input and trigger criteria for the A logic trigger
TRIGger:A:LOGic:STATE:INPut:CH2	Sets or returns the slope for channel 2 of the A logic state trigger
TRIGger:A:LOGic:STATE:INPut:CH4	Sets or returns the slope for channel 4 of the A logic state trigger
TRIGger:A:LOGic:STATE:WHEn	Sets or returns the condition for generating an A logic state trigger
TRIGger:A:LOGic:THReshold?	Returns the threshold voltage for all channels in A logic trigger
TRIGger:A:LOGic:THReshold:CH<x>	Sets or returns the A logic trigger threshold voltage for the specified channel
TRIGger:A:MODE	Sets or returns the A trigger mode

TRIGger:A:PULse?	Returns the A pulse trigger parameters
TRIGger:A:PULse:CLAss	Sets or returns the type of pulse on which to trigger
TRIGger:A:PULse:GLItch?	Returns the current A glitch pulse trigger parameters
TRIGger:A:PULse:GLItch:POLarity	Sets or returns the polarity for the A pulse glitch trigger
TRIGger:A:PULse:GLItch:TRIGIF	Sets or returns the acceptance or rejection of pulse glitch trigger, based on width.
TRIGger:A:PULse:GLItch:WIDth	Sets or returns the width of the A pulse glitch trigger
TRIGger:A:PULse:RUNT?	Returns the current A runt pulse trigger parameters
TRIGger:A:PULse:RUNT:LOGIc?	Returns the current A runt pulse trigger logic parameters
TRIGger:A:PULse:RUNT:LOGIc:INPut?	Returns the current A runt pulse trigger logic input parameters
TRIGger:A:PULse:RUNT:LOGIc:INPut:CH<x>	Sets or returns the input setting for the logic condition with runt for channel 1 through channel 4
TRIGger:A:PULse:RUNT:LOGIc:THReshold:CH<x>	Sets or returns logic threshold channels with runt for channel 1 through channel 4
TRIGger:A:PULse:RUNT:POLarity	Sets or returns the polarity for the A pulse runt trigger
TRIGger:A:PULse:RUNT:THReshold?	Returns the upper and lower thresholds for the A pulse runt trigger
TRIGger:A:PULse:RUNT:THReshold:BOTH	Sets the upper and lower switching thresholds for the A pulse runt trigger
TRIGger:A:PULse:RUNT:THReshold:HIGh	Sets or returns the upper limit for the A pulse runt trigger
TRIGger:A:PULse:RUNT:THReshold:LOW	Sets or returns the lower limit for the A pulse runt trigger
TRIGger:A:PULse:RUNT:WHEn	Sets or returns the type of pulse width the trigger checks for when it uncovers a runt
TRIGger:A:PULse:RUNT:WIDth	Sets or returns the minimum width for A pulse runt trigger
TRIGger:A:PULse:SOURce	Sets or returns the source for the A pulse trigger
TRIGger:A:PULse:TIMEOut?	Returns the parameters for the A pulse timeout trigger
TRIGger:A:PULse:TIMEOut:POLarity	Sets or returns the polarity for the A pulse timeout trigger
TRIGger:A:PULse:TIMEOut:TIME	Sets or returns the pulse timeout trigger time
TRIGger:A:PULse:TRANSition?	Returns the delta time, polarity, and both upper and lower threshold limits for the transition time trigger
TRIGger:A:PULse:TRANSition:DeltaTime	Sets or returns the delta time used in calculating the transition value
TRIGger:A:PULse:TRANSition:POLarity	Sets or returns the polarity for the A pulse transition trigger

TRIGger:A:PULse:TRANSition:THReshold?	Returns the upper and lower threshold limits for the transition time trigger
TRIGger:A:PULse:TRANSition:THReshold:BOTh	Sets the upper and lower thresholds for the pulse transition trigger
TRIGger:A:PULse:TRANSition:THReshold:HIGH	Sets or returns the upper transition trigger threshold
TRIGger:A:PULse:TRANSition:THReshold:LOW	Sets or returns the lower transition trigger threshold
TRIGger:A:PULse:TRANSition:WHEn	Sets or returns the relationship of delta time to transitioning signal
TRIGger:A:PULse:WIDth?	Returns the trigger A pulse width parameters
TRIGger:A:PULse:WIDth:HIGHLimit	Sets or returns the upper limit for the A pulse width trigger
TRIGger:A:PULse:WIDth:LOWLimit	Sets or returns the lower limit for the A pulse width trigger
TRIGger:A:PULse:WIDth:POLarity	Sets or returns the polarity for the A pulse width trigger
TRIGger:A:PULse:WIDth:WHEn	Sets or returns the criteria for width specification of pulse width trigger events
TRIGger:A:PULse:WINDow?	Returns the current A window pulse trigger parameters
TRIGger:A:PULse:WINDow:LOGIc?	Returns the current A window pulse trigger logic parameters
TRIGger:A:PULse:WINDow:LOGIc:INPut?	Returns the current A window pulse trigger logic input parameters
TRIGger:A:PULse:WINDow:LOGIc:INPut:CH<x>	Sets or returns input setting for logic condition with window for channel 1 through channel 4
TRIGger:A:PULse:WINDow:LOGIc:THReshold:CH<x>	Sets or returns logic threshold channels with widow for channel 1 through channel 4
TRIGger:A:PULse:WINDow:Threshold?	Returns the upper and lower thresholds for the A pulse window trigger.
TRIGger:A:PULse:WINDow:THReshold:BOTh	Sets both window thresholds
TRIGger:A:PULse:WINDow:THReshold:HIGH	Sets or returns high window threshold
TRIGger:A:PULse:WINDow:THReshold:LOW	Sets or returns low window threshold
TRIGger:A:PULse:WINDow:TYPe	Sets or returns type of window trigger
TRIGger:A:PULse:WINDow:WHEn	Sets or returns condition for use of window violation
TRIGger:A:PULse:WINDow:WIDth	Sets or returns minimum width of violation
TRIGger:A:TYPe	Sets or returns the type of A trigger
TRIGger:A:VIDeo?	Returns the video parameters for the A trigger
TRIGger:A:VIDeo:CUSTom?	Returns the custom video parameters for the A trigger
TRIGger:A:VIDeo:CUSTom:FORMat	Sets or returns the video scan format when the video standard is set to Custom
TRIGger:A:VIDeo:CUSTom:SCAN	Sets or returns the video scan rate

TRIGger:A:VIDeo:FIELD	Sets or returns the video field trigger
TRIGger:A:VIDeo:HOLDOff:FIELD	Sets or returns the trigger holdoff in video field units
TRIGger:A:VIDeo:LINE	Sets or returns the trigger delay as a number of video lines
TRIGger:A:VIDeo:POLarity	Sets or returns the polarity of the video trigger
TRIGger:A:VIDeo:SCAN	Sets or returns the video scan rate
TRIGger:A:VIDeo:SOURCE	Sets or returns the video trigger source
TRIGger:A:VIDeo:STANdard	Sets or returns the video standard
TRIGger:B?	Returns the B trigger parameters
TRIGger:B	Sets the B trigger level to 50%
	Or returns the B trigger parameters
TRIGger:B:BY	Sets or returns B trigger time or event qualifiers
TRIGger:B:EDGE?	Returns B trigger edge type parameters
TRIGger:B:EDGE:COUPLing	Sets or returns the type of B trigger coupling
TRIGger:B:EDGE:SLOpe	Sets or returns the B edge trigger slope
TRIGger:B:EDGE:SOURce	Sets or returns the B edge trigger source
TRIGger:B:EVENTS?	Returns the current B trigger events parameter
TRIGger:B:EVENTS:COUNT	Sets or returns the number of events that must occur before the B trigger occurs
TRIGger:B:LEVel	Sets or returns the level for the B trigger
TRIGger:B:STATE	Sets or returns the state of the B trigger
TRIGger:B:TIME	Sets or returns the B trigger delay time
TRIGger:B:TYPE	Sets or returns the type of B trigger
TRIGger:STATE?	Returns the current state of the triggering system

Vertical Command Group

Use the commands in the Vertical Command Group to control the vertical setup of all live (channel) waveforms for acquisition and to control the display of channel, reference, and math waveforms. This group contains commands to set up vertical parameters for electrical or optical signals, depending on the sampling module in use.

The `SElect : <wfm>` command also selects the waveform that many commands in other command groups use.

You may replace VOLts with SCALE in the vertical commands. This provides program compatibility with earlier models of Tektronix instruments.

Command	Description
CH<x>?	Returns vertical parameters for the specified channel
CH<x>:BANdwidth	Sets or returns the bandwidth of the specified channel
CH<x>:COUPling	Sets or returns the coupling for the specified channel
CH<x>:DESKew	Sets or returns the deskew time for the specified channel
CH<x>:INVERT	Sets or returns the invert function for the specified channel to on or off.
CH<x>:LABEL:NAME	Defines or returns the label for the channel waveform
CH<x>:LABEL:XPOS	Sets or returns the X display coordinate for the channel waveform label
CH<x>:LABEL:YPOS	Sets or returns the Y display coordinate for the channel waveform label
CH<x>:OFFSet	Sets or returns the channel offset
CH<x>:POSition	Sets or returns the channel vertical position
CH<x>:PRObe?	Returns the gain, resistance, units, and ID of the probe that is attached to the specified channel
CH<x>:PROBECal?	Returns the probe calibration status
CH<x>:PRObe:GAIN?	Returns the gain of the probe that is attached to the specified channel
CH<x>:PRObe:ID?	Returns the type and serial number of the probe that is attached to the specified channel
CH<x>:PRObe:ID:TYPE	Returns the type of probe that is attached to the specified channel
CH<x>:PRObe:ID:SERnumber?	Returns the serial number of the probe that is attached to the specified channel
CH<x>:PRObe:RESistance?	Returns the resistance of the probe that is attached to the specified channel
CH<x>:PRObe:UNITS?	Returns the units of the probe that is attached to the specified channel
CH<x>:PROBEFunc:EXTatten	Sets the attenuation value for the specified channel to the specified scale factor Or returns the user-specified attenuation
CH<x>PROBEFunc:EXTDBatten	Sets the attenuation value for the specified channel to the specified value, in decibels Or returns the user-specified attenuation, in decibels
CH<x>PROBEFunc:EXTUnits	Sets the unit of measurement for the external attenuator of the specified channel Or returns the user-specified unit of measurement for the external attenuator
CH<x>:SCALE	Sets or returns the vertical scale of the specified channel
CH<x>:TERmination	Sets channel input termination
MATH<x>:POSition	Sets or returns the vertical position for math display
MATH<x>:SCALE	Sets or returns the vertical scale (per div) for math display

	div) for math display
REF<x>:HORizontal:POSition	Sets or returns the horizontal position of the specified reference waveform in percent of the waveform that is displayed to the right of the center vertical graticule
REF<x>:LABel?	Returns a branch query containing the waveform label name and the coordinates at which the label is displayed
REF<x>:LABel:NAME	Sets or returns the label of the designated waveform
REF<x>:LABel:XPOS	Sets or returns the position of the reference waveform label on the X axis
REF<x>:LABel:YPOS	Sets or returns the position of the reference waveform label on the Y axis
REF<x>:VERTical:POSition	Sets or returns the vertical position of the specified reference waveform
REF<x>:VERTical:SCALE	Sets or returns the reference waveform vertical scale in vertical units/div
SElect?	Returns information on which waveforms are on or off and which waveform is selected.
SElect<wfm>	Turns on the specified waveform Or returns whether the specified channel is on or off
SElect:CONTRol?	Returns the waveform and timebase selected for front-panel control
SElect:CONTRol <wfm>	Sets the waveform controlled by the front panel

Waveform Transfer Command Group

Use the commands in the Waveform Transfer Command Group to transfer waveform data points to and from the instrument. Waveform data points are a collection of values that define a waveform. One data value usually represents one data point in the waveform record. When working with envelope waveforms, each data value is either the minimum or maximum of a min/max pair.

Before you transfer waveform data, you must specify the data format, record length, and waveform source.

Data Formats

Acquired waveform data uses eight or more bits to represent each data point. The number of bits used depends on the acquisition mode specified when you acquired the data. Data acquired in SAMple or ENVELOpe mode uses eight bits per waveform data point. Data acquired in AVERage mode uses up to 14 bits per point.

The instrument can transfer waveform data in either ASCII or binary format. You specify the format with the DATA:ENCdg command. The instrument uses signed, 4 byte integers and floating point values; it does not support unsigned floating point values.

ASCII data is represented by signed integer or floating point values. An example ASCII waveform data string may look like this:

```
CURVE<space>-110, -109, -110, -110, -109, -107,  
-109, -107, -106, -105, -103, -100, -97, -90, -84, -80
```

Use ASCII to obtain more readable and easier to format output than binary. However, ASCII may require more bytes to send the same values than it does with binary. This may reduce transmission speeds.

Binary data can be represented by signed integer or floating point values. The range of the values depends on the byte width specified. When the byte width is one, signed integer data ranges from -128 to 127, and positive integer values range from 0 to 255. When the byte width is two, the values range from -32768 to 32767. When a MATH (or REF that came with a MATH) is used, 32 bit floating point values are used that are four bytes in width.

The defined binary formats specify the order in which the bytes are transferred. The following are the four binary formats:

- RIBinary specifies signed integer data-point representation with the most significant byte transferred first.
- SRIBinary is the same as RIBinary except that the byte order is swapped, meaning that the least significant byte is transferred first. This format is useful when transferring data to PCs.
- RFBinary specifies floating point data-point representation with the most significant byte transferred first.
- SRFBinary is the same as RFBinary except that the byte order is swapped, meaning that the least significant byte is transferred first. This format is useful when transferring data to PCs.

Waveform Data and Record Lengths

You can transfer multiple points for each waveform record. You can transfer a portion of the waveform or you can transfer the entire record. You can use the DATA:START and DATA:STOP commands to specify the first and last data points of the waveform record.

When transferring data into the instrument, you must first specify the record length of the destination waveform record. You do this with the WFMInopre:NR_Pt command. Next, specify the first data point within the waveform record. For example, when you set DATA:START to 1, data points will be stored starting with the first point in the record. The instrument will ignore the value set by DATA:STOP when reading in data. It will stop reading data when there is no more data to read or when it has reached the specified record length.

When transferring data from the instrument, you must specify the first and last data points in the waveform record. Setting DATA:START to 1 and DATA:STOP to the record length will always return the entire waveform.

Waveform Data Locations and Memory Allocation

The DATA:SOURce command specifies the waveform source when transferring a waveform from the instrument. You can only transfer one waveform at a time. Waveforms sent to the instrument are always stored in one of the four reference memory locations. Use the DATA:DESTination command to specify a reference memory location.

Waveform Preamble

Each waveform that you transfer has an associated waveform preamble that contains information such as the horizontal scale, the vertical scale, and other settings in effect when the waveform was created. Refer to the individual WFMInpre and WFMOutpre commands for more information.

Scaling Waveform Data

Once you transfer the waveform data to the controller, you can convert the data points into voltage values for analysis using information from the waveform preamble.

Transferring Waveform Data from the Instrument

You can transfer waveforms from the instrument to an external controller using the following sequence:

1. Select the waveform source(s) using DATA:SOURce.
2. Specify the waveform data format using DATA:ENCdg.
3. Specify the number of bytes per data point using WFMOutpre:BYT_Nr.
Note: MATH waveforms (and REF waveforms that came from a MATH) are always set to four bytes.
4. Specify the portion of the waveform that you want to transfer using DATA:STARt and DATA:STOP.
5. Transfer waveform preamble information using WFMOutpre?.
6. Transfer waveform data from the instrument using CURVe?.

Transferring Waveform Data to the Instrument

1. Specify waveform reference memory using DATA:DESTination.
2. Set WFMInpre:NR_Pt to equal the number of data points to be sent.
3. Specify the waveform data format using WFMInpre:ENCdg.
4. Specify the number of bytes per data point using WFMInpre:BYT_Nr.

5. Specify first data point in the waveform record using DATA:START.
6. Transfer waveform preamble information using WFMInpre.

Note: FastAcq waveforms cannot be returned to the instrument via the CURVe command.

Command	Description
CURVe	The command format transfers waveform data to the instrument (reference memory location specified by DATA:DESTination) The query format transfers waveform data from instrument specified by the DATA:SOURce command
DATA	Sets the format and location of the waveform data that is transferred with the CURVe? Command Or returns the format and location of the waveform data that is transferred with the CURVe? command
DATA:DESTination	Sets or returns the reference memory location for storing waveform data sent to the instrument
DATA:ENCdg	Sets or returns the format of outgoing waveform data
DATA:SOURce	Sets or returns the location of waveform data transferred from the instrument
DATA:START	Sets or returns the starting point in waveform transfer
DATA:STOP	Sets or returns the ending data point in waveform transfer
WAVFrm?	Returns a branch query containing waveform data in either binary or ASCII format, waveform formatting data, and the location of the waveform data source
WFMInpre?	Returns the waveform formatting specification to be applied to the next incoming CURVE command data
WFMInpre:BIT_Nr	Sets or returns the number of bits per binary waveform point
WFMInpre:BN_Fmt	Sets or returns the format of binary data for the incoming waveform
WFMInpre:BYT_Nr	Sets or returns the binary field data width for the first ordered waveform
WFMInpre:BYT_Or	Sets or returns the byte order of waveform points
WFMInpre:ENCdg	Sets or returns the type of encoding for incoming waveform data
WFMInpre:NR_FR?	Returns one frame, indicating the number of frames in the transmitted waveform record
WFMInpre:NR_Pt?	Returns the number of points in the transmitted waveform record
WFMInpre:NR_Pt	Sets the number of points in the transmitted waveform record
WFMInpre:PT_Fmt	Sets or returns the point format of incoming waveform data
WFMInpre:PT_OFF	Sets or returns the trigger point within the incoming waveform data
WFMInpre:WFID	Provided to allow a waveform extracted from the instrument to be more easily sent back
WFMInpre:XINcr?	Returns the horizontal sampling interval between incoming waveform points
WFMInpre:XINcr	Sets the horizontal sampling interval between incoming waveform points

	incoming waveform points
WFMInpre:XUNit	Sets or returns the horizontal units of the incoming waveform
WFMInpre:XZero	Sets or returns the (sub-sample) time between the trigger sample and the occurrence of the actual incoming waveform trigger
WFMInpre:YMUlt	Sets or returns the vertical scale factor, per digitizing level, of the incoming waveform points
WFMInpre:YOff	Sets or returns the vertical position of the incoming waveform in digitizing levels
WFMInpre:YUNit	Sets or returns the vertical units of the incoming waveform
WFMInpre:YZero	Sets or returns the offset of the incoming waveform
WFMOutpre?	Returns the waveform formatting data for the waveform specified by the DATA:SOURCE command
WFMOutpre:BIT_Nr	Sets or returns the number of bits per waveform point that outgoing waveforms contain
WFMOutpre:BN_Fmt	Sets or returns the format of binary data for the waveform
WFMOutpre:BYT_Nr	Sets or returns the data width for the waveform
WFMOutpre:BYT_Or	Sets or returns the byte order of waveform points
WFMOutpre:ENCdg	Sets or returns the type of encoding for outgoing waveforms
WFMOutpre:NR_FR?	Returns the number of frames for the DATA:SOURce waveform transmitted in response to a CURVe? query
WFMOutpre:NR_Pt?	Returns the number of points for the waveform transmitted in response to a CURVe? query
WFMOutpre:PT_Fmt?	Returns the point format for the waveform
WFMOutpre:PT_OFF?	Returns the trigger point relative to DATA:START for the waveform
WFMOutpre:PT_OR?	Returns whether the source waveform is DPO
WFMOutpre:WFId?	Returns a string describing the acquisition parameters for the waveform
WFMOutpre:XINcr?	Returns the horizontal sampling interval
WFMOutpre:XUNit?	Returns the horizontal units for the waveform
WFMOutpre:XZero?	Returns the (sub-sample) time between the trigger sample and the occurrence of the actual waveform trigger
WFMOutpre:YMUlt?	Returns the vertical scale factor per digitizing level for the waveform
WFMOutpre:YOff?	Returns the vertical offset in digitizing levels for the waveform
WFMOutpre:YUNit?	Returns the vertical units for the waveform
WFMOutpre:YZero?	Returns the vertical offset for the waveform
WFMpre:NR_FR?	Returns the number of frames for the waveform transmitted in response to a CURVe? query

Zoom Command Group

Zoom commands let you expand and position the waveform display horizontally and vertically without changing the time base or vertical settings.

Command	Description
ZOOM	Sets the zoom transforms to default values for either live traces or all traces Or returns the current vertical and horizontal positioning and scaling of the display
ZOOM:GRAticule:SPLIT	Sets or returns the sizes of the acquisition and zoom windows when Zoom is selected.
ZOOM:HORizontal:LOCK	Sets or returns the waveforms that the horizontal zoom parameters affect
ZOOM:MODE	Turns zoom mode on or off Or returns the current zoom mode
ZOOM:<wfm>:HORizontal:POSition	Sets or returns the zoom horizontal position of the specified waveform
ZOOM:<wfm>:HORizontal:SCAle	Sets or returns the zoom horizontal scale factor of the specified waveform
ZOOM:<wfm>:VERTical:POSition	Sets or returns the zoom vertical position of the specified waveform
ZOOM:<wfm>:VERTical:SCAle	Sets or returns the zoom vertical scale of the specified waveform

Status and Events

The instrument provides a status and event reporting system for the GPIB interfaces. This system informs you of certain significant events that occur within the instrument.

The instrument status handling system consists of five 8-bit registers and two queues for each interface. The remaining Status subtopics describe these registers and components. They also explain how the event handling system operates.

Registers

Overview

The registers in the event handling system fall into two functional groups:

- Status Registers contain information about the status of the instrument. They include the Standard Event Status Register (SESR) and the Status Byte Register (SBR).
- Enable Registers determine whether selected types of events are reported to the Status Registers and the Event Queue. They include the Device Event Status Enable Register (DESER), the Event Status Enable Register (ESER), and the Service Request Enable Register (SRER).

Status

The Standard Event Status Register (SESR) and the Status Byte Register (SBR) record certain types of events that may occur while the instrument is in use. IEEE Std 488.2-1987 defines these registers.

Each bit in a Status Register records a particular type of event, such as an execution error or message available. When an event of a given type occurs, the instrument sets the bit that represents that type of event to a value of one. (You can disable bits so that they ignore events and remain at zero. See Enable Registers). Reading the status registers tells you what types of events have occurred.

The Standard Event Status Register (SESR) - The SESR records eight types of events that can occur within the instrument. Use the *ESR? query to read the SESR register. Reading the register clears the bits of the register so that the register can accumulate information about new events.

Note: TekVISA applications use SESR bit 6 to respond to any of several events, including some front panel actions.

Standard Event Status Register (SESR)

7	6	5	4	3	2	1	0
PON	URQ	CME	EXE	DDE	QYE	RQC	OPC

SESR Bit Functions

Bit	Function
7 (MSB)	PON Power On. Shows that the oscilloscope was powered on. On completion, the diagnostic tests also set this bit.
6	URQ User Request. Indicates that an application event has occurred. *See note.
5	CME Command Error. Shows that an error occurred while the oscilloscope was parsing a command or query.
4	EXE Execution Error. Shows that an error occurred while the oscilloscope was executing a command or query.
3	DDE Device Error. Shows that a device error occurred.
2	QYE Query Error. Shows that either an attempt was made to read the Output Queue when no data was present or pending, or that data in the Output Queue was lost.
1	RQC Request Control. This is not used.
0 (LSB)	OPC Operation Complete. Shows that the operation is complete. This bit is set when all pending operations complete following an *OPC command.

The Status Byte Register (SBR) - Records whether output is available in the Output Queue, whether the instrument requests service, and whether the SESR has recorded any events.

Use a Serial Poll or the *STB? query to read the contents of the SBR. The bits in the SBR are set and cleared depending on the contents of the SESR, the Event Status Enable Register (ESER), and the Output Queue. When you use a Serial Poll to obtain the SBR, bit 6 is the RQS bit. When you use the *STB? query to obtain the SBR, bit 6 is the MSS bit. Reading the SBR does not clear the bits.

Status Byte Register (SBR)

7	6	5	4	3	2	1	0
----	RQS	ESB	MAV	----	----	----	----
	6						
	MSS						

SBR Bit Functions		
Bit		Function
7 (MSB)	-----	Not used.
6	RQS	Request Service. Obtained from a serial poll. Shows that the oscilloscope requests service from the GPIB controller.
6	MSS	Master Status Summary. Obtained from *STB? query. Summarizes the ESB and MAV bits in the SBR.
5	ESB	Event Status Bit. Shows that status is enabled and present in the SESR.
4	MAV	Message Available. Shows that output is available in the Output Queue.
3	-----	Not used.
2	-----	Not used.
1 – 0	-----	Not used.

Enable

DESER, ESER, and SRER allow you to select which events are reported to the Status Registers and the Event Queue. Each Enable Register acts as a filter to a Status Register (the DESER also acts as a filter to the Event Queue) and can prevent information from being recorded in the register or queue.

Each bit in an Enable Register corresponds to a bit in the Status Register it controls. In order for an event to be reported to a bit in the Status Register, the corresponding bit in the Enable Register must be set to one. If the bit in the Enable Register is set to zero, the event is not recorded.

Various commands set the bits in the Enable Registers. The Enable Registers and the commands used to set them are described below.

The Device Event Status Enable Register (DESER) - This register controls which types of events are reported to the SESR and the Event Queue. The bits in the DESER correspond to those in the SESR.

Use the DESE command to enable and disable the bits in the DESER. Use the DESE? query to read the DESER.

Device Event Status Enable Register (DESER)							
7	6	5	4	3	2	1	0
PON	URQ	CME	EXE	DDE	QYE	RQC	OPC

The Event Status Enable Register (ESER) - This register controls which types of events are summarized by the Event Status Bit (ESB) in the SBR. Use the *ESE command to set the bits in the ESER. Use the *ESE? query to read it.

Event Status Enable Register (ESER)

7	6	5	4	3	2	1	0
PON	URQ	CME	EXE	DDE	QYE	RQC	OPC

The Service Request Enable Register (SRER) - This register controls which bits in the SBR generate a Service Request and are summarized by the Master Status Summary (MSS) bit.

Use the *SRE command to set the SRER. Use the *SRE? query to read the register. The RQS bit remains set to one until either the Status Byte Register is read with a Serial Poll or the MSS bit changes back to a zero.

Service Request Enable Register (SRER)

7	6	5	4	3	2	1	0
-----	-----	ESB	MAV	-----	-----	-----	-----

*PSC Command

The *PSC command controls the Enable Registers contents at power-on. Sending *PSC 1 sets the Enable Registers at power on as follows:

- DESER 255 (equivalent to a DESe 255 command)
- ESER 0 (equivalent to an *ESE 0 command)
- SRER 0 (equivalent to an *SRE 0 command)

Sending *PSC 0 lets the Enable Registers maintain their values in nonvolatile memory through a power cycle.

Note: To enable the PON (Power On) event to generate a Service Request, send *PSC 0, use the DESe and *ESE commands to enable PON in the DESER and ESER, and use the *SRE command to enable bit 5 in the SRER. Subsequent power-on cycles will generate a Service Request.

Queues

Overview

The instrument status and event reporting system contains two queues: the Output Queue and the Event Queue.

Output Queue

The instrument stores query responses in the Output Queue and empties this queue each time it receives a new command or query message after an <EOM>. The controller must read a query response before it sends the next command (or query) or it will lose responses to earlier queries.

Caution: When a controller sends a query, an <EOM>, and a second query, the instrument normally clears the first response and outputs the second while reporting a Query Error (QYE bit in the ESER) to indicate the lost response. A fast controller, however, may receive a part or all of the first response as well. To avoid this situation, the controller should always read the response immediately after sending any terminated query message or send a DCL (Device Clear) before sending the second query.

Event Queue

The Event Queue stores detailed information on up to 33 events. If more than 32 events stack up in the Event Queue, the 32nd event is replaced by event code 350, "Queue Overflow."

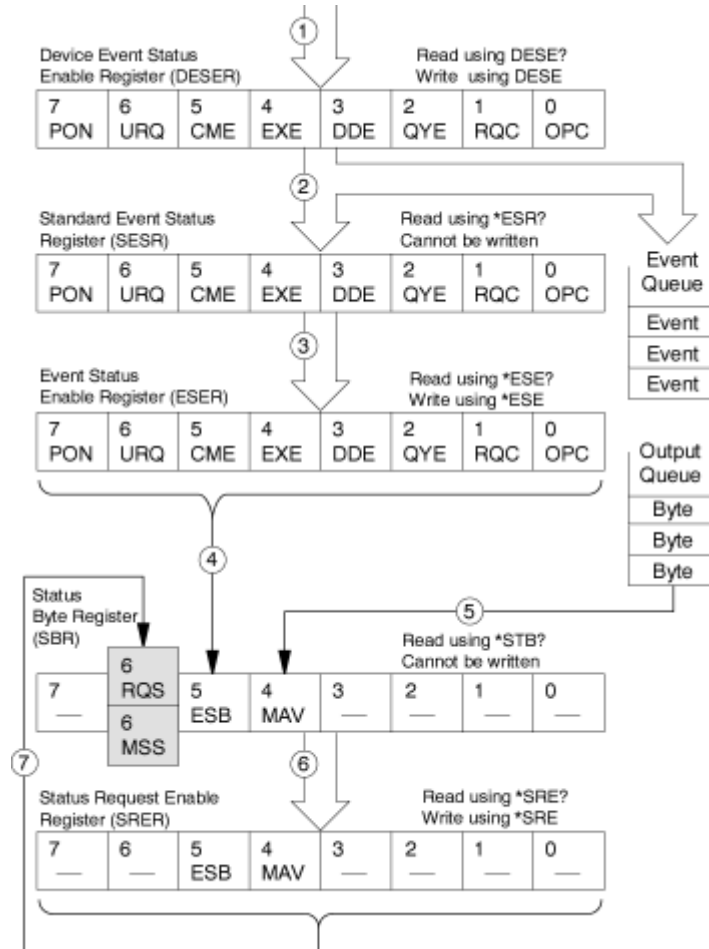
Read the Event Queue with the EVENT? query (which returns only the event number), with the EVMSG? query (which returns the event number and a text description of the event), or with the ALLEV? query (which returns all the event numbers along with a description of the event). Reading an event removes it from the queue.

Before reading an event from the Event Queue, you must use the *ESR? query to read the summary of the event from the SESR. This makes the events summarized by the *ESR? read available to the EVENT? and EVMSG? queries, and empties the SESR.

Reading the SESR erases any events that were summarized by previous *ESR? reads but not read from the Event Queue. Events that follow an *ESR? read are put in the Event Queue but are not available until *ESR? is used again.

Event Handling Sequence

The figure below shows how to use the status and event handling system. In the explanation that follows, numbers in parentheses refer to numbers in the figure.



When an event occurs, a signal is sent to the DESER (1). If that type of event is enabled in the DESER (that is, if the bit for that event type is set to 1), the appropriate bit in the SESR is set to one, and the event is recorded in the Event Queue (2). If the corresponding bit in the ESER is also enabled (3), then the ESB bit in the SBR is set to one (4).

When output is sent to the Output Queue, the MAV bit in the SBR is set to one (5).

When a bit in the SBR is set to one and the corresponding bit in the SRER is enabled (6), the MSS bit in the SBR is set to one and a service request is generated (7).

Synchronization Methods

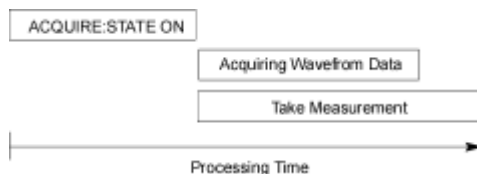
Overview

Although most GPIB commands are completed almost immediately after being received by the instrument, some commands start a process that requires more time. For example, once a single sequence acquisition command is executed, depending upon the applied signals and trigger settings, it may be a few seconds before the acquisition is complete. Rather than remain idle while the operation is in process, the instrument will continue processing other commands. This means that some operations will not be completed in the order that they were sent. Sometimes the result of an operation depends on the result of an earlier operation. A first operation must complete before the next one gets processed. The instrument status and event reporting system provides ways to do this.

For example, a typical application might involve acquiring a single-sequence waveform and then taking a measurement on the acquired waveform. You could use the following command sequence to do this:

```
/** Set up conditional acquisition **/  
ACQUIRE:STATE OFF  
SELECT:CH1 ON  
HORIZONTAL:RECORDLENGTH 500  
ACQUIRE:MODE SAMPLE  
ACQUIRE:STOPAFTER SEQUENCE  
  
/** Acquire waveform data **/  
ACQUIRE:STATE ON  
  
/** Set up the measurement parameters **/  
MEASUREMENT:IMMED:TYPE AMPLITUDE  
MEASUREMENT:IMMED:SOURCE CH1  
  
/** Take amplitude measurement **/  
MEASUREMENT:MEAS1:VALUE?
```

The acquisition of the waveform requires extended processing time. It may not finish before the instrument takes an amplitude measurement (see the following figure). This can result in an incorrect amplitude value.



To ensure the instrument completes waveform acquisition before taking the measurement on the acquired data, you can synchronize the program.



You can use four commands to synchronize the operation of the instrument with your application program: *WAI, BUSY?, *OPC, and *OPC?

***WAI**

The *WAI command forces completion of previous commands that generate an OPC message. No commands after the *WAI are processed before the OPC message(s) are generated

The same command sequence using the *WAI command for synchronization looks like this:

```

/* Set up conditional acquisition */
ACQUIRE:STATE OFF
SELECT:CH1 ON
HORIZONTAL:RECORDLENGTH 500
ACQUIRE:MODE SAMPLE
ACQUIRE:STOPAFTER SEQUENCE

/* Acquire waveform data */
ACQUIRE:STATE ON

/* Set up the measurement parameters */
MEASUREMENT:IMMED:TYPE AMPLITUDE
MEASUREMENT:IMMED:SOURCE CH1

/* Wait until the acquisition is complete before taking
the measurement*/
*/
*WAI

/* Take amplitude measurement */
MEASUREMENT:IMMED:VALUE?

```

The controller can continue to write commands to the input buffer of the instrument, but the commands will not be processed by the instrument until all OPC operations in process are complete. If the input buffer becomes full, the controller will be unable to write more commands to the buffer. This can cause a time-out.

BUSY?

The BUSY? query allows you to find out whether the instrument is busy processing a command that has an extended processing time such as single-sequence acquisition.

The same command sequence, using the BUSY? query for synchronization, looks like this:

```
/* Set up conditional acquisition */
ACQUIRE:STATE OFF
SELECT:CH1 ON
HORIZONTAL:RECORDLENGTH 500
ACQUIRE:MODE SAMPLE
ACQUIRE:STOPAFTER SEQUENCE

/* Acquire waveform data */
ACQUIRE:STATE ON

/* Set up the measurement parameters */
MEASUREMENT:IMMED:TYPE AMPLITUDE
MEASUREMENT:IMMED:SOURCE CH1

/* Wait until the acquisition is complete before taking
the measurement
*/
While BUSY? keep looping

/* Take amplitude measurement */
MEASUREMENT:IMMED:VALUE?
```

This sequence lets you create your own wait loop rather than using the *WAI command. The BUSY? query helps you avoid time-outs caused by writing too many commands to the input buffer. The controller is still tied up though, and the repeated BUSY? query will result in more bus traffic.

***OPC**

If the corresponding status registers are enabled, the *OPC command sets the OPC bit in the Standard Event Status Register (SESR) when an operation is complete. You achieve synchronization by using this command with either a serial poll or service request handler.

Serial Poll Method: Enable the OPC bit in the Device Event Status Enable Register (DESER) and the Event Status Enable Register (ESER) using the DESE and *ESE commands.

When the operation is complete, the OPC bit in the Standard Event Status Register (SESR) will be enabled and the Event Status Bit (ESB) in the Status Byte Register will be enabled.

The same command sequence using the *OPC command for synchronization with serial polling looks like this:

```
/* Set up conditional acquisition */
ACQUIRE:STATE OFF
SELECT:CH1 ON
HORIZONTAL:RECORDLENGTH 500
ACQUIRE:MODE SAMPLE
ACQUIRE:STOPAFTER SEQUENCE
```

```
/* Enable the status registers */
DESE 1
*ESE 1
*SRE 0
```

```
/* Acquire waveform data */
ACQUIRE:STATE ON
```

```
/* Set up the measurement parameters */
MEASUREMENT:IMMED:TYPE AMPLITUDE
MEASUREMENT:IMMED:SOURCE CH1
```

/* Wait until the acquisition is complete before taking the measurement.

```
*/
*OPC
```

While serial poll = 0, keep looping

```
/* Take amplitude measurement */
MEASUREMENT:IMMED:VALUE?
```

This technique requires less bus traffic than did looping on BUSY?.

Service Request Method: Enable the OPC bit in the Device Event Status Enable Register (DESER) and the Event Status Enable Register (ESER) using the DESE and *ESE commands.

You can also enable service requests by setting the ESB bit in the Service Request Enable Register (SRER) using the *SRE command. When the operation is complete, a Service Request will be generated.

The same command sequence using the *OPC command for synchronization looks like this:

```
/* Set up conditional acquisition */  
ACQUIRE:STATE OFF  
SELECT:CH1 ON  
HORIZONTAL:RECORDLENGTH 500  
ACQUIRE:MODE SAMPLE  
ACQUIRE:STOPAFTER SEQUENCE
```

```
/* Enable the status registers */  
DESE 1  
*ESE 1  
*SRE 32
```

```
/* Acquire waveform data */  
ACQUIRE:STATE ON
```

```
/* Set up the measurement parameters */  
MEASUREMENT:IMMED:TYPE AMPLITUDE  
MEASUREMENT:IMMED:SOURCE CH1
```

/* Wait until the acquisition is complete before taking the measurement

```
*/  
*OPC
```

The program can now do different tasks such as talk to other devices. The SRQ, when it comes, interrupts those tasks and returns control to this task.

```
/* Take amplitude measurement */  
MEASUREMENT:IMMED:VALUE?
```

This technique is more efficient but requires more sophisticated programming.

***OPC?**

The *OPC? query places a 1 in the Output Queue once an operation that generates an OPC message is complete. A time

out could occur if you try to read the output queue before there is any data in it.

The same command sequence using the *OPC? query for synchronization looks like this:

```
/* Set up conditional acquisition */
ACQUIRE:STATE OFF
SELECT:CH1 ON
HORIZONTAL:RECORDLENGTH 500
ACQUIRE:MODE SAMPLE
ACQUIRE:STOPAFTER SEQUENCE

/* Acquire waveform data */
ACQUIRE:STATE ON

/* Set up the measurement parameters */
MEASUREMENT:IMMED:TYPE AMPLITUDE
MEASUREMENT:IMMED:SOURCE CH1

/* Wait until the acquisition is complete before taking the
measurement
*/
*OPC?
Wait for read from Output Queue.

/* Take amplitude measurement */
MEASUREMENT:IMMED:VALUE?
```

This is the simplest approach. It requires no status handling or loops. However, you must set the controller time-out for longer than the acquisition operation.

Messages

Overview

The information contained in the topic tabs above covers all the programming interface messages the instrument generates in response to commands and queries.

For most messages, a secondary message from the instrument gives more detail about the cause of the error or the meaning of the message. This message is part of the message string and is separated from the main message by a semicolon.

Each message is the result of an event. Each type of event sets a specific bit in the SESR and is controlled by the equivalent bit in the DESER. Thus, each message is associated with a specific SESR bit. In the message tables, the associated SESR bit is specified in the table title, with exceptions noted with the error message text.

No Events

The following table shows the messages when the system has no events or status to report. These have no associated SESR bit.

No Event Messages	
Code	Message
0	No events to report; queue empty
1	No events to report; new events pending *ESR?

Command Errors

The following table shows the command error messages generated by improper syntax. Check that the command is properly formed and that it follows the rules in the section on command Syntax.

Command Error Messages (CME Bit 5)	
Code	Message
100	Command error
101	Invalid character
102	Syntax error
103	Invalid separator
104	Data type error
105	GET not allowed
108	Parameter not allowed
109	Missing parameter
110	Command header error
111	Header separator error
112	Program mnemonic too long
113	Undefined header
114	Header suffix out of range
120	Numeric data error
121	Invalid character in number
123	Exponent too large
124	Too many digits
128	Numeric data not allowed
130	Suffix error
131	Invalid suffix
134	Suffix too long
138	Suffix not allowed
140	Character data error
141	Invalid character data
144	Character data too long
148	Character data not allowed
150	String data error
151	Invalid string data
158	String data not allowed
160	Block data error
161	Invalid block data
168	Block data not allowed
170	Command expression error
171	Invalid expression
178	Expression data not allowed

Execution Errors

The following table lists the execution errors that are detected during execution of a command.

Execution Error Messages (EXE Bit 4)	
Code	Message
200	Execution error
201	Invalid while in local
202	Settings lost due to RTL
210	Trigger error
211	Trigger ignored
212	Arm ignored
219	Trigger delay not available
220	Parameter error
221	Settings conflict
222	Data out of range
223	Too much data
224	Illegal parameter value
225	Out of memory
230	Data corrupt or stale
240	Hardware error
241	Hardware missing
244	Invalid parameter selected
250	Mass storage error
251	Missing mass storage
252	Missing media
253	Corrupt media
254	Media full
255	Directory full
256	File name not found
257	File name error
258	Media Protected
260	Execution expression error
261	Math error in expression
2200	Measurement error, Measurement system error
2201	Measurement error, Zero period
2202	Measurement error, No period found
2203	Measurement error, No period, second waveform
2204	Measurement error, Low signal amplitude
2205	Measurement error, Low amplitude, second waveform
2206	Measurement error, Invalid gate
2207	Measurement error, Measurement overflow
2208	Measurement error, Waveform does not cross Mid Ref

2209	Measurement error, No second Mid Ref crossing
2210	Measurement error, No Mid Ref crossing, second waveform
2211	Measurement error, No backwards Mid Ref crossing
2212	Measurement error, No negative crossing
2213	Measurement error, No positive crossing
2214	Measurement error, No crossing
2215	Measurement error, No crossing, second waveform
2216	Measurement error, No crossing, target waveform
2217	Measurement error, Constant waveform
2218	Measurement error, Unused
2219	Measurement error, No valid edge - No arm sample
2220	Measurement error, No valid edge - No arm cross
2221	Measurement error, No valid edge - No trigger cross
2222	Measurement error, No valid edge - No second cross
2223	Measurement error, Waveform mismatch
2225	Measurement error, No waveform to measure
2226	Measurement error, Null Waveform
2227	Measurement error, Positive and Negative Clipping
2228	Measurement error, Positive Clipping
2229	Measurement error, Negative Clipping
2230	Measurement error, High Ref < Low Ref
2231	Measurement error, no statistics available
2241	Waveform request is invalid
2243	This meas cannot be performed on this type of wfm
2244	Source wfm is not active
2248	This ref cannot be activated
2249	Reference deletion error, Waveform in use for math

2250	Reference error, Waveform reference file is invalid
2251	Reference error, Waveform preamble does not match actual
2252	Reference error, Source wfm is not valid
2253	Reference error, Too many points received
2254	Reference error, Too few points received
2259	File too big
2261	Calibration error, wait for the warmup interval to expire before invoking SPC
2400	Not enough memory available
2401	This channel cannot be activated
2402	Math/Meas/Histo have circular definition
2410	Empty math string
2411	Syntax error in math string
2412	Semantic error in math string
2413	Math expression is too complex
2420	Histogram cannot be performed on this type of wfm

Device Errors

The following table lists the device errors that can occur during instrument operation. These errors may indicate that the instrument needs repair.

Device Error Messages (DDE Bit 3)	
Code	Message
300	Device-specific error
310	System error
311	Memory error
312	PUD memory lost
313	Calibration memory lost
314	Save/recall memory lost
315	Configuration memory lost
350	Queue overflow (does not set DDE bit)

System Events

The following table lists the system event messages. These messages are generated whenever certain system conditions occur.

System Event Messages	
Code	Message
400	Query event
401	Power on (PON bit 7 set)
402	Operation complete (OPC bit 0 set)
403	User request (URQ bit 6 set)
404	Power fail (DDE bit 3 set)
405	Request control
410	Query INTERRUPTED (QYE bit 2 set)
420	Query UNTERMINATED (QYE bit 2 set)
430	Query DEADLOCKED (QYE bit 2 set)
440	Query UNTERMINATED after indefinite response (QYE bit 2 set)

Execution Warnings

The following table lists warning messages that do not interrupt the flow of command execution. These notify you that you may get unexpected results.

Execution Warning Messages (EXE Bit 4)	
Code	Message
540	Measurement warning
541	Measurement warning, Low signal amplitude
542	Measurement warning, Unstable histogram
543	Measurement warning, Low resolution
544	Measurement warning, Uncertain edge
545	Measurement warning, Invalid in minmax
546	Measurement warning, Need 3 edges
547	Measurement warning, Clipping positive/negative
548	Measurement warning, Clipping positive
549	Measurement warning, Clipping negative
551	FASTAcq mode is active - deactivate to use math

Internal Warnings

The following table shows internal errors that indicate an internal fault in the instrument.

Internal Warning Messages	
Code	Message
600	Internal warning
630	Internal warning, 50 Ω overload

Programming Examples

Overview

Three example programs, which demonstrate methods that you can use to control the instrument through the General Purpose Interface Bus (GPIB), are included on your *TDS5000 Series Product Software* CD. These example programs are installed as part of the *GPIB Programmer* installation, which includes the TDS5000 Series Oscilloscope Programmer Online Guide.

To install the "GPIB Programmer", perform the following procedure:

1. Insert the *TDS5000 Series Product Software* CD in your CD drive.
2. Open the folder named *GPIB Programmer*.
3. Double-click *Setup.exe*.
4. Follow the Install Wizard directions.

An Examples directory will be created with the path name *C:\Program Files\TekScope\Programmer\Examples*

Within the *Examples* directory are two subdirectories, *Source* and *Programs*.

Source contains the source files, written in Microsoft Visual C++, Version 6.0, which is required to build executable files for each of the following example programs:

- *Meas.c* -- This example program demonstrates how to perform a periodic amplitude measurement on CH 1 of your instrument.
- *GetWfm.c* -- This example program demonstrates how to acquire and output the CH 1 waveform in a 500-point RIBANARY format. The program then queries the instrument to get the waveform preamble information, formats the binary waveform data as ASCII values, and, finally, writes out a report of the waveform preamble and ASCII data points to a file named *WFM_DATA.PRN*.
- *Tl.c* -- This example program demonstrates how to use a general talker/listener program to allow the user to send commands and queries to the instrument and display the responses.

A *README* file in the *Source* directory has the latest documentation.

Programs contains compiled, executable files for each of the example programs in the *Source* directory (see above).

The programs run on a PC-compatible system equipped with a National Instruments GPIB board and associated drivers.

Compiling the Example GPIB Programs

The example GPIB programs make the following assumptions:

- The GPIB controller board is "GPIB0" (board 0). If you have more than one GPIB controller in your workstation, and you want to use a GPIB controller other than board 0, you must edit the source files accordingly.
- The instrument is connected to the GPIB controller (see above) and is set to address 1 (DEV1). If you want to use another address, then you must edit the source files accordingly.

Each program requires adding the following source files to the associated VC++ project (which you will create):

- GPIBERR.C
- GPIBREAD.C
- GPIBWAIT.C
- GPIBWRIT.C

In addition to the above source files, you will also need to add the following files provided by National Instruments:

- decl-32.h
- gpib-32.obj

Compiling and Linking Example Visual C++ Programs

To make an executable for any of the example programs in the Source directory, perform the following steps:

1. Install Microsoft Visual C++, Version 6.0.
2. Install the National Instruments GPIB board and drivers.
3. Copy the following source files from your National Instruments GPIB drivers directory to this directory ("Examples\Source"):
 - decl-32.h
 - gpib-32.obj
4. Create a new "Win32 Console Application" project in Visual C++ located in this directory ("Examples\Source"). For example, if you want to build the Talker/Listener application, select this directory for the location, and enter a suitable name for the project, such as TL.
5. Add the following Visual C++ source files to the project:
 - ..\GPIBERR.C
 - ..\GPIBREAD

- ..\GPIBWAIT.C
 - ..\GPIBWRT.C
6. Add the following source files provided by National Instruments to the project:
 - ..\decl-32.h
 - ..\gpib-32.obj
 7. Add the appropriate program main source file to the project (see Overview for a list of the three source files).
 8. Build and test the project.
 9. To build another of the example projects, repeat steps 4 through 8.

Commands Listed in Alphabetical Order

*CAL?

Description

This query-only command instructs the digitizing oscilloscope to perform a signal path compensation and return its calibration status. This command is equivalent to selecting Instrument Calibration from the Utilities menu and then clicking the Calibrate button.

Note: The self-calibration can take several minutes to respond. No other commands will be executed until calibration is complete.

Group

Calibration

Related Commands

CALibrate:RESults:SPC?

Syntax

*CAL?

Returns

- 0
<NR1>
Means the calibration did not complete successfully.
- 1 (or any non zero value)
<NR1>
Means the calibration completed without errors.

Example

*CAL?

This query might return

1

to indicate that the calibration was successful

***CLS**

Description

This command (no query form) clears the following:

- Event Queue
- Standard Event Status Register
- Status Byte Register (except the MAV bit)

If the *CLS command immediately follows an <EOI>, the Output Queue and MAV bit (Status Byte Register bit 4) are also cleared. MAV indicates that information is in the output queue. The device clear (DCL) GPIB control message will clear the output queue and thus MAV. *CLS does not clear the output queue or MAV.

*CLS can suppress a Service Request that is to be generated by an *OPC. This will happen if a single sequence acquisition operation is still being processed when the *CLS command is executed.

Group

Status and Error

Related Commands

DESE, *ESE, *ESR?, EVENT?, EVMsg?, *SRE, *STB?

Syntax

*CLS

Example

*CLS

This command clears the instrument status data structures.

***DDT**

Description

This command allows you to specify a command or a list of commands that are executed when the instrument receives a *TRG command or the GET GPIB interface message. Define Device Trigger (*DDT) is a special alias that the *TRG command uses.

Group

Miscellaneous

Related Commands

ALias, *TRG

Syntax 1

*DDT {<Block>|<Qstring>}

Syntax 2

*DDT?

Arguments

- <Block>
This is a complete sequence of program messages. The messages can contain only valid commands that must be separated by semicolons and must follow all rules for concatenating commands. The sequence must be less than or equal to 80 characters. The format of this argument is always returned as a query.
- <QString>
This is a complete sequence of program messages. The messages can contain only valid commands that must be separated by semicolons and must follow all rules for concatenating commands. The sequence must be less than or equal to 80 characters.

Example

```
*DDT #OACQUIRE:STATE RUN
```

This command specifies that the acquisition system will be started each time a *TRG command is sent.

*ESE

Description

This command sets and queries the bits in the Event Status Enable Register (ESER). The ESER prevents events from being reported to the Status Byte Register (STB). For a more detailed discussion of the use of these registers, see Registers.

Group

Status and Error

Related Commands

*CLS, DESE, *ESR?, EVENT?, EVMsg?, *SRE, *STB?

Syntax 1

```
*ESE <NR1>
```

Syntax 2

```
*ESE?
```

Argument

- <NR1>
This specifies the binary bits of the ESER according to this value, which ranges from 0 through 255.

The power-on default for the ESER is 0 if *PSC is 1. If *PSC is 0, the ESER maintains the previous power cycle value through the current power cycle.

Note: Setting the DESER and the ESER to the same values allows only those codes to be entered into the Event Queue and summarized on the ESB bit (bit 5) of the Status Byte Register. Use the DESE command to set the DESER.

Example 1

*ESE 209

This command sets the ESER to binary 11010001, which enables the PON, URQ, EXE, and OPC bits.

Example 2

*ESE?

This query form of this command returns 186, showing that the ESER contains the binary value 10111010.

*ESR?

Description

This query-only command returns the contents of the Standard Event Status Register (SESR). *ESR? also clears the SESR (since reading the SESR clears it). For a more detailed discussion of the use of these registers, see Registers.

Group

Status and Error

Related Commands

ALLEV?, *CLS, DESE, *ESE, EVENT?, EVMsg?, *SRE, *STB?

Syntax

*ESR?

Example

*ESR?

This query might return 213, showing that the SESR contains the binary value 11010101.

*IDN?

Description

This query-only command returns the instrument identification code.

Group

Miscellaneous

Related Commands

ID?

Syntax

IDN?

Example

*IDN?

This query might return :TEKTRONIX,TDS5104,CF:91.1CT
FV:01.00.912, indicating the instrument model number,
configured number, and firmware version number.

*LRN?

Description

This query-only command returns the commands that list the instrument settings (except for configuration information for the calibration values), allowing you to record or "learn" the current instrument settings. You can use these commands to return the instrument to the state it was in when you made the *LRN? query. This command is identical to the SET? Command.

Group

Miscellaneous

Related Commands

SET?

Syntax

*LRN?

Example

*LRN?

This query might return the following response:

```
:ACQUIRE:STOPAFTER RUNSTOP;STATE 1;MODE
SAMPLE;NUMENV 10;NUMAVG 16;REPET
1;:FASTACQ:STATE 0;:APPLICATION:GPKNOB1:ACTIVE
0;:APPLICATION:GPKNOB2:ACTIVE
0;:APPLICATION:WINDOW:HEIGHT 236;WIDTH
640;:APPLICATION:SCOPEAPP:STATE RUNNING;WINDOW
FULLSCREEN;:APPLICATION:EXTAPP:STATE
NOTRUNNING;:AUXOUT:SOURCE ATRIGGER;EDGE
FALLING;:CMDBATCH 1;:HEADER 1;:LOCK
NONE;:ROSC:SOURCE INTERNAL;:VERBOSE
1;:ALIAS:STATE 0;:DISPLAY:CLOCK 1;COLOR:PALETTE
NORMAL;MATHCOLOR DEFAULT;REFCOLOR
DEFAULT;:DISPLAY:FILTER SINX;FORMAT YT;GRATICULE
FULL;INTENSITY:WAVEFORM 75.0000;AUTOBRIGHT
1;SCREENSAVER 1;SCREENSAVERDELAY
28800;:DISPLAY:PERSISTENCE OFF;STYLE
VECTORS;TRIGBAR SHORT;TRIGT 1;VARPERSIST
500.0000E-3;:HARDCOPY:FILENAME "untitled";PORT
FILE;:DIAG:LEVEL
SUBSYS;:SAVE:WAVEFORM:FILEFORMAT
INTERNAL;:TRIGGER:A:MODE AUTO;TYPE EDGE;LEVEL
0.0000;HOLDOFF:BY DEFAULT;TIME 1.5000E-
6;:TRIGGER:A:EDGE:SOURCE CH1;COUPLING DC;SLOPE
RISE;:TRIGGER:A:LOGIC:CLASS PATTERN;FUNCTION
AND;THRESHOLD:CH1 1.2000;CH2 1.2000;CH3
1.2000;CH4 1.2000;:TRIGGER:A:LOGIC:INPUT:CH1
HIGH;CH2 X;CH3
X;:TRIGGER:A:LOGIC:PATTERN:INPUT:CH4
X;:TRIGGER:A:LOGIC:PATTERN:WHEN
```

```

TRUE;WHEN:LESSLIMIT 5.0000E-9;MORELIMIT 5.0000E-
9;:TRIGGER:A:LOGIC:SETHOLD:CLOCK:EDGE
RISE;THRESHOLD 1.2000;SOURCE
CH2;:TRIGGER:A:LOGIC:SETHOLD:DATA:THRESHOLD
1.2000;SOURCE
CH1;:TRIGGER:A:LOGIC:SETHOLD:HOLDTIME 2.0000E-
9;SETTIME 3.0000E-
9;:TRIGGER:A:LOGIC:STATE:INPUT:CH4
RISE;:TRIGGER:A:LOGIC:STATE:WHEN
TRUE;:TRIGGER:A:PULSE:CLASS GLITCH;SOURCE
CH1;GLITCH:WIDTH 2.0000E-9;TRIGIF
ACCEPT;POLARITY
POSITIVE;:TRIGGER:A:PULSE:WINDOW:TYPE
INSIDE;WHEN OCCURS;WIDTH 2.0000E-
9;LOGIC:INPUT:CH1 HIGH;CH2 HIGH;CH3 HIGH;CH4
HIGH;:TRIGGER:A:PULSE:WINDOW:LOGIC:THRESHOLD:CH1
1.2000;CH2 1.2000;CH3 1.2000;CH4
1.2000;:TRIGGER:A:PULSE:WINDOW:THRESHOLD:HIGH
1.2000;LOW 800.0000E-
3;:TRIGGER:A:PULSE:RUNT:LOGIC:INPUT:CH1 HIGH;CH2
HIGH;CH3 HIGH;CH4
HIGH;:TRIGGER:A:PULSE:RUNT:LOGIC:THRESHOLD:CH1
1.2000;CH2 1.2000;CH3 1.2000;CH4
1.2000;:TRIGGER:A:PULSE:RUNT:POLARITY
POSITIVE;THRESHOLD:HIGH 1.2000;LOW 800.0000E-
3;:TRIGGER:A:PULSE:RUNT:WHEN OCCURS;WIDTH
2.0000E-9;:TRIGGER:A:PULSE:TRANSITION:DELTATIME
2.0000E-9;POLARITY POSITIVE;THRESHOLD:HIGH
1.2000;LOW 800.0000E-
3;:TRIGGER:A:PULSE:TRANSITION:WHEN
FASTER THAN;:TRIGGER:A:PULSE:WIDTH:LOWLIMIT
2.0000E-9;HIGHLIMIT 2.0000E-9;WHEN
WITHIN;POLARITY
POSITIVE;:TRIGGER:A:PULSE:TIMEOUT:POLARITY
STAYSHIGH;TIME 2.0000E-
9;:TRIGGER:A:VIDEO:CUSTOM:FORMAT INTERLACED;SCAN
RATE1;:TRIGGER:A:VIDEO:FIELD
ALLFIELDS;HOLDOFF:FIELD
0.0000;:TRIGGER:A:VIDEO:LINE 1;POLARITY
NORMAL;SCAN RATE1;SOURCE CH1;STANDARD
NTSC;:TRIGGER:B:STATE 0;TYPE EDGE;LEVEL
0.0000;BY EVENTS;EDGE:SOURCE CH1;SLOPE
RISE;COUPLING DC;:TRIGGER:B:TIME 16.0000E-
9;EVENTS:COUNT 2;:MATH1:DEFINE " ";NUMAVG
2;VERTICAL:SCALE 1.0000;POSITION
0.0000;:MATH1:LABEL:NAME "";XPOS 5;YPOS
65;:MATH1:SPECTRAL:MAG DB;PHASE DEGREES;GATEPOS
0.0000;GATEWIDTH 2.0000E-6;REFLEVEL
20.0000;REFLEVELOFFSET 223.6000E-3;SPAN
600.0000E+6;CENTER 325.0000E+6;RESBW
1.0000E+6;WINDOW GAUSSIAN;SUPPRESS -
35.0000;UNWRAP 0;LOCK 0;:MATH2:DEFINE " ";NUMAVG
2;VERTICAL:SCALE 1.0000;POSITION
0.0000;:MATH2:LABEL:NAME "";XPOS 5;YPOS
80;:MATH2:SPECTRAL:MAG DB;PHASE DEGREES;GATEPOS
0.0000;GATEWIDTH 2.0000E-6;REFLEVEL
20.0000;REFLEVELOFFSET 223.6000E-3;SPAN
600.0000E+6;CENTER 325.0000E+6;RESBW
1.0000E+6;WINDOW GAUSSIAN;SUPPRESS -
35.0000;UNWRAP 0;LOCK 0;:MATH3:DEFINE " ";NUMAVG
2;VERTICAL:SCALE 1.0000;POSITION
0.0000;:MATH3:LABEL:NAME "";XPOS 5;YPOS
95;:MATH3:SPECTRAL:MAG DB;PHASE DEGREES;GATEPOS
0.0000;GATEWIDTH 2.0000E-6;REFLEVEL

```

```

20.0000;REFLEVELOFFSET 223.6000E-3;SPAN
600.0000E+6;CENTER 325.0000E+6;RESBW
1.0000E+6;WINDOW GAUSSIAN;SUPPRESS -
35.0000;UNWRAP 0;LOCK 0;:MATH4:DEFINE " ";NUMAVG
2;VERTICAL:SCALE 1.0000;POSITION
0.0000;:MATH4:LABEL:NAME "";XPOS 5;YPOS
110;:MATH4:SPECTRAL:MAG DB;PHASE DEGREES;GATEPOS
0.0000;GATEWIDTH 2.0000E-6;REFLEVEL
20.0000;REFLEVELOFFSET 223.6000E-3;SPAN
600.0000E+6;CENTER 325.0000E+6;RESBW
1.0000E+6;WINDOW GAUSSIAN;SUPPRESS -
35.0000;UNWRAP 0;LOCK 0;:HISTOGRAM:BOXPCNT
30.0000,25.1000,70.0000,75.2000;DISPLAY
LINEAR;STATE 0;FUNCTION HORIZONTAL;SIZE
2.0000;SOURCE CH1;:CH1:BANDWIDTH
1.0000E+9;COUPLING DC;DESKEW 0.0000;OFFSET
0.0000;INVERT 0;POSITION 0.0000;SCALE 100.0000E-
3;TERMINATION 1.0000E+6;PROBEFUNC:EXTATTEN
1.0000;EXTUNITS "None";:CH1:LABEL:NAME "";XPOS
5;YPOS 5;:CH2:BANDWIDTH 1.0000E+9;COUPLING
DC;DESKEW 0.0000;OFFSET 0.0000;INVERT 0;POSITION
0.0000;SCALE 100.0000E-3;TERMINATION
1.0000E+6;PROBEFUNC:EXTATTEN 1.0000;EXTUNITS
"None";:CH2:LABEL:NAME "";XPOS 5;YPOS
20;:CH3:BANDWIDTH 1.0000E+9;COUPLING DC;DESKEW
0.0000;OFFSET 0.0000;INVERT 0;POSITION
0.0000;SCALE 100.0000E-3;TERMINATION
1.0000E+6;PROBEFUNC:EXTATTEN 1.0000;EXTUNITS
"None";:CH3:LABEL:NAME "";XPOS 5;YPOS
35;:CH4:BANDWIDTH 1.0000E+9;COUPLING DC;DESKEW
0.0000;OFFSET 0.0000;INVERT 0;POSITION
0.0000;SCALE 100.0000E-3;TERMINATION
1.0000E+6;PROBEFUNC:EXTATTEN 1.0000;EXTUNITS
"None";:CH4:LABEL:NAME "";XPOS 5;YPOS
50;:SELECT:CH1 1;CH2 0;CH3 0;CH4 0;MATH1 0;MATH2
0;MATH3 0;MATH4 0;REF1 0;REF2 0;REF3 0;REF4
0;CONTROL CH1;:CURSOR:STATE 0;FUNCTION
VBARS;MODE INDEPENDENT;SOURCE CH1;VBARS:UNITS
SECONDS;POSITION1 -1.6000E-6;POSITION2 1.6000E-
6;:CURSOR:HARS:POSITION1 300.0000E-3;POSITION2
-300.0000E-3;:CURSOR:PAIRED:POSITION1 -1.6000E-
6;POSITION2 1.6000E-6;:CURSOR:SPLIT:POSITION1 -
1.6000E-6;POSITION2 1.6000E-6;SOURCE2 CH1;UNITS
BASE;:HORIZONTAL:DELAY:MODE 0;POSITION
50.0000;TIME 0.0000;:HORIZONTAL:MAIN:SCALE
400.0000E-9;POSITION 50.0000;SAMPLERATE
1.2500E+9;:HORIZONTAL:RECORDLENGTH
5000;RESOLUTION 5000;ROLL
AUTO;:MEASUREMENT:GATING OFF;METHOD
HISTOGRAM;IMMED:TYPE UNDEFINED;SOURCE1
CH1;SOURCE2 CH1;DELAY:EDGE1 RISE;EDGE2
RISE;DIRECTION FORWARDS;:MEASUREMENT:MEAS1:STATE
0;TYPE UNDEFINED;SOURCE1 CH1;SOURCE2
CH1;DELAY:EDGE1 RISE;EDGE2 RISE;DIRECTION
FORWARDS;:MEASUREMENT:MEAS2:STATE 0;TYPE
UNDEFINED;SOURCE1 CH1;SOURCE2 CH1;DELAY:EDGE1
RISE;EDGE2 RISE;DIRECTION
FORWARDS;:MEASUREMENT:MEAS3:STATE 0;TYPE
UNDEFINED;SOURCE1 CH1;SOURCE2 CH1;DELAY:EDGE1
RISE;EDGE2 RISE;DIRECTION
FORWARDS;:MEASUREMENT:MEAS4:STATE 0;TYPE
UNDEFINED;SOURCE1 CH1;SOURCE2 CH1;DELAY:EDGE1
RISE;EDGE2 RISE;DIRECTION
FORWARDS;:MEASUREMENT:MEAS5:STATE 0;TYPE

```

```

UNDEFINED;SOURCE1 CH1;SOURCE2 CH1;DELAY:EDGE1
RISE;EDGE2 RISE;DIRECTION
FORWARDS;:MEASUREMENT:MEAS6:STATE 0;TYPE
UNDEFINED;SOURCE1 CH1;SOURCE2 CH1;DELAY:EDGE1
RISE;EDGE2 RISE;DIRECTION
FORWARDS;:MEASUREMENT:MEAS7:STATE 0;TYPE
UNDEFINED;SOURCE1 CH1;SOURCE2 CH1;DELAY:EDGE1
RISE;EDGE2 RISE;DIRECTION
FORWARDS;:MEASUREMENT:MEAS8:STATE 0;TYPE
UNDEFINED;SOURCE1 CH1;SOURCE2 CH1;DELAY:EDGE1
RISE;EDGE2 RISE;DIRECTION
FORWARDS;:MEASUREMENT:REFLEVEL:METHOD
PERCENT;ABSOLUTE:HIGH 0.0000;LOW 0.0000;MID1
0.0000;MID2
0.0000;:MEASUREMENT:REFLEVEL:PERCENT:HIGH
90.0000;LOW 10.0000;MID1 50.0000;MID2
50.0000;:MEASUREMENT:STATISTICS:MODE
OFF;WEIGHTING 32;:ZOOM:MODE 0;GRATICULE:SPLIT
FIFTYFIFTY;:ZOOM:HORIZONTAL:LOCK
ALL;:ZOOM:CH1:HORIZONTAL:POSITION 50.0000;SCALE
2;:ZOOM:CH1:VERTICAL:POSITION 0.0000;SCALE
1.0000;:ZOOM:CH2:HORIZONTAL:POSITION
50.0000;SCALE 2;:ZOOM:CH2:VERTICAL:POSITION
0.0000;SCALE
1.0000;:ZOOM:CH3:HORIZONTAL:POSITION
50.0000;SCALE 2;:ZOOM:CH3:VERTICAL:POSITION
0.0000;SCALE
1.0000;:ZOOM:CH4:HORIZONTAL:POSITION
50.0000;SCALE 2;:ZOOM:CH4:VERTICAL:POSITION
0.0000;SCALE
1.0000;:ZOOM:MATH1:HORIZONTAL:POSITION
50.0000;SCALE 2;:ZOOM:MATH1:VERTICAL:POSITION
0.0000;SCALE
1.0000;:ZOOM:MATH2:HORIZONTAL:POSITION
50.0000;SCALE 2;:ZOOM:MATH2:VERTICAL:POSITION
0.0000;SCALE
1.0000;:ZOOM:MATH3:HORIZONTAL:POSITION
50.0000;SCALE 2;:ZOOM:MATH3:VERTICAL:POSITION
0.0000;SCALE
1.0000;:ZOOM:MATH4:HORIZONTAL:POSITION
50.0000;SCALE 2;:ZOOM:MATH4:VERTICAL:POSITION
0.0000;SCALE
1.0000;:ZOOM:REF1:HORIZONTAL:POSITION
50.0000;SCALE 2;:ZOOM:REF1:VERTICAL:POSITION
0.0000;SCALE
1.0000;:ZOOM:REF2:HORIZONTAL:POSITION
50.0000;SCALE 2;:ZOOM:REF2:VERTICAL:POSITION
0.0000;SCALE
1.0000;:ZOOM:REF3:HORIZONTAL:POSITION
50.0000;SCALE 2;:ZOOM:REF3:VERTICAL:POSITION
0.0000;SCALE
1.0000;:ZOOM:REF4:HORIZONTAL:POSITION
50.0000;SCALE 2;:ZOOM:REF4:VERTICAL:POSITION
0.0000;SCALE 1.0000;:REF1:LABEL:NAME "";XPOS
5;YPOS 125;:REF1:VERTICAL:POSITION 0.0000;SCALE
1.0000E-3;:REF1:HORIZONTAL:POSITION
50.0000;:REF2:LABEL:NAME "";XPOS 5;YPOS
140;:REF2:VERTICAL:POSITION 0.0000;SCALE
1.0000E-3;:REF2:HORIZONTAL:POSITION
50.0000;:REF3:LABEL:NAME "";XPOS 5;YPOS
155;:REF3:VERTICAL:POSITION 0.0000;SCALE
1.0000E-3;:REF3:HORIZONTAL:POSITION
50.0000;:REF4:LABEL:NAME "";XPOS 5;YPOS
170;:REF4:VERTICAL:POSITION 0.0000;SCALE

```

```
1.0000E-3;:REF4:HORIZONTAL:POSITION  
50.0000;:DATA:DESTINATION REF1;ENCDG  
RIBINARY;SOURCE CH1;START 1;STOP 500
```

***OPC**

Description

This command generates the operation complete message in the Standard Event Status Register (SESR) when all pending commands that generate an OPC message are complete. The *OPC? query places the ASCII character "1" into the output queue when all such OPC commands are complete. The *OPC? response is not available to read until all pending operations finish. For a complete discussion of the use of these registers and the output queue, see Registers and Queues.

The *OPC command allows you to synchronize the operation of the instrument with your application program. For more information, see Synchronization Methods.

Commands that generate an OPC Message	
Operation	Command
Single sequence acquisition	ACQure:STATE ON or ACQure:STATE RUN or ACQure:STATE 1 (when ACQure:STOPAfter is set to SEQuence).
Hardcopy operation	HARDCopy STArt
Calibration step	Refer to the optional <i>TDS5000 Series Digital Phosphor Oscilloscopes Service Manual</i>

Group

Status and Error

Related Commands

BUSY?, *WAI

Syntax 1

*OPC

Syntax 2

*OPC?

Example 1

*OPC

Upon completion of all pending OPC operations, this command generates the operation complete message in the SESR.

Example 2

*OPC?

This query might return 1 to indicate that all pending OPC operations are finished.

***OPT?**

Description

This query-only command returns a list of the options installed in your instrument.

Group

Status and Error

Syntax

*OPT?

Example

*OPT?

This query might return

:3M:16 Meg Max 4M/CH

***PSC**

Description

This command sets and queries the power-on status flag that controls the automatic power-on handling of the DESER, SRER, and ESER registers. When *PSC is true, the DESER register is set to 255 and the SRER and ESER registers are set to 0 at power-on. When *PSC is false, the current values in the DESER, SRER, and ESER registers are preserved in nonvolatile memory when power is shut off and are restored at power-on.

Group

Status and Error

Related Commands

DESE, *ESE, FACTory, *RST, *SRE

Syntax 1

*PSC <NR1>

Syntax 2

*PSC?

Argument

- <NR1>
A 0 sets the power-on status clear flag to false, disables the power-on clear and allows the instrument to possibly assert SRQ after power-on; any other value sets the power-on status clear flag to true, enabling the power-on status clear and prevents any SRQ assertion after power on.

Example 1

```
*PSC 0
```

This command sets the power-on status clear flag to false.

Example 2

```
*PSC?
```

The query form of this command might return 1 to indicate that the power-on status clear flag is set to true.

*PUD

Description

This command sets or queries a string of Protected User Data. This data is protected by the PASSWord command. You can modify it only by first entering the correct password. This password is not necessary to query the data.

Group

Status and Error

Related Commands

PASSWord

Syntax 1

```
*PUD {<Block>|<String>}
```

Syntax 2

```
*PUD?
```

Argument

- <Block>
This is a block containing up to 100 characters.
- <String>
This is a string containing up to 100 characters.

Example 1

```
*PUD #229This instrument belongs to me
```

This command stores the string "This oscilloscope belongs to me" in the user protected data area.

Example 2

*PUD?

This query might return #221Property of Company X

*RCL

Description

This command (no query form) restores the state of the instrument from a copy of the settings stored in memory (The settings are stored using the *SAV command). If 'factory' is referenced (by specifying '0'), the factory default values will be restored. This command is equivalent to RECALL:SETUp and performs the same function as selecting Instrument Setup from the File menu and then choosing the Recall Setups tab.

Group

Save and Recall

Related Commands

DELEte:SETUp, FACTory, *LRN?, RECALL:SETUp, *RST, *SAV, SAVe:SETUp

Syntax

*RCL <NR1>

Argument

- <NR1>
This specifies a setup storage location value ranging from 0 through 10. Using an out-of-range value causes an execution error.

Example

*RCL 3

This command restores the instrument from a copy of the settings stored in memory location 3.

*RST

Description

This command (no query form) resets the instrument to the factory default settings. The *RST command does not alter the following:

- The state of the IEEE Std 488.1-1987 interface
- The selected IEEE Std 488.1-1987 address of the instrument
- Calibration data that affect device specifications
- The Output Queue
- The Service Request Enable Register setting

- The Power-on status clear flag setting
- Alias definitions
- Stored settings
- The *PUD? Response

This command is equivalent to pressing the **DEFAULT SETUP** button on the front panel.

Group

Status and Error

Related Commands

FACTory, RECALL:SETUp, SAVe:SETUp

Syntax

*RST

Argument

None

Example

*RST

This command resets the instrument settings to factory defaults.

*SAV

Description

This command (no query form) stores the state of the instrument to a specified memory location. You can later use the *RCL command to restore the instrument to this saved state. This is equivalent to selecting Instrument Setup from the File menu and then choosing the Save Setups tab.

Group

Save and Recall

Related Commands

*RCL, RECALL:SETUp, SAVe:SETUp

Syntax

*SAV <NR1>

Argument

- <NR1>

This specifies a location in which to save the state of the instrument. Location values range from 1 through 10. Using an out-of-range location value causes an execution error. Any settings that have been stored previously at this location will be overwritten.

Example

*SAV 2

This command saves the current instrument state in memory location 2.

*SDS

Description

This command (no query form) changes the specified setup to reference the factory setup instead of the specific user setup slot. The content of the setup slot is unchanged, but the data will no longer be accessible to you. This command is equivalent to selecting Instrument Setups from the File menu, choosing the Delete Setups tab, and then clicking the Default button.

Group

Save and Recall

Related Commands

DELEte:SETUp

Syntax

*SDS <NRf>

Argument

- <NR1>

This specifies a user setup location to delete. Setup storage location values range from 1 through 10; using an out-of-range value causes an error.

Example

*SDS 2

This command changes setup slot 2 to reference the factory setup.

*SRE

Description

The *SRE (Service Request Enable) command sets and queries the bits in the Service Request Enable Register. For more information, refer to Registers.

Group

Status and Error

Related Commands

*CLS, DESE, *ESE, *ESR?, EVENT?, EVMSg?, FACTory, *STB?

Syntax 1

*SRE <NR1>

Syntax 2

*SRE?

Argument

- <NR1>

This is a value in the range from 0 through 255. The binary bits of the SRER are set according to this value. Using an out-of-range value causes an execution error. The power-on default for SRER is 0 if *PSC is 1. If *PSC is 0, the SRER maintains the previous power cycle value through the current power cycle.

Example 1

*SRE 48

This command sets the bits in the SRER to binary 00110000.

Example 2

*SRE?

This query might return 32, showing that the bits in the SRER have the binary value of 00100000.

*STB?

Description

The *STB? (Read Status Byte) query returns the contents of the Status Byte Register (SBR) using the Master Summary Status (MSS) bit. For more information, refer to Registers.

Group

Status and Error

Related Commands

*CLS, DESE, *ESE, *ESR?, EVENT?, EVMSg?, FACtory, *SRE?

Syntax

*STB?

Returns

<NR1>

Example

*STB?

This query might return 96, showing that the SBR contains the binary value 01100000.

***TRG**

Description

This command (no query form) performs the group execute trigger on commands defined by *DDT.

Group

Miscellaneous

Related Commands

*DDT

Syntax

*TRG

Example

*TRG

This command immediately executes all commands that have been defined by *DDT.

***TST?**

Description

This query-only command tests (self-test) the GPIB interface and returns a 0.

Group

Miscellaneous

Syntax

*TST?

Example

*TST?

This query always returns 0.

***WAI**

Description

The *WAI (Wait) command (no query form) prevents the instrument from executing further commands or queries until all pending commands that generate an OPC message are complete. This command allows you to synchronize the operation of the instrument with your application program. For more information, refer to Synchronization Methods.

Group

Status and Error

Related Commands

BUSY?, *OPC

Syntax

*WAI

Example

*WAI

This command prevents the instrument from executing any further commands or queries until all pending commands that generate an OPC message are complete.

ACQUIRE:MODE

Description

This command sets or queries the acquisition mode of the instrument. This affects all live waveforms. This command is equivalent to selecting Horizontal/Acquisition from the Horiz/Acq menu, and then choosing the desired mode from the Acquisition Mode group box.

Waveforms are the displayed data point values taken from acquisition intervals. Each acquisition interval represents a time duration set by the horizontal scale (time per division). The instrument sampling system always samples at the maximum rate and so an acquisition interval may include more than one sample.

The acquisition mode (which you set using this ACQUIRE:MODE command) determines how the final value of the acquisition interval is generated from the many data samples.

Group

Acquisition

Related Commands

ACQUIRE:NUMAVG, ACQUIRE:NUMENV, CURVE?

Syntax 1

```
ACQUIRE:MODE{SAMPLE | PEAKdetect | HIRes | AVERAGE | ENV  
elope}
```

Syntax 2

```
ACQUIRE:MODE?
```

Arguments

- `SAMPLE`

Specifies that the displayed data point value is the first sampled value that is taken during the acquisition interval. In sample mode, all waveform data has 8 bits of precision. You can request 16 bit data with a CURVE? query but the lower-order 8 bits of data will be zero. `SAMPLE` is the default mode.

- **PEAKdetect**
Specifies the display of high-low range of the samples taken from a single waveform acquisition. The high-low range is displayed as a vertical column that extends from the highest to the lowest value sampled during the acquisition interval. PEAKdetect mode can reveal the presence of aliasing or narrow spikes.
- **HIRes**
Specifies Hi Res mode where the displayed data point value is the average of all the samples taken during the acquisition interval. This is a form of averaging, where the average comes from a single waveform acquisition. The number of samples taken during the acquisition interval determines the number of data values that compose the average.
- **AVERage**
Specifies averaging mode, in which the resulting waveform shows an average of SAMple data points from several separate waveform acquisitions. The instrument processes the number of waveforms you specify into the acquired waveform, creating a running exponential average of the input signal. The number of waveform acquisitions that go into making up the average waveform is set or queried using the ACQUIRE:NUMAVg command.
- **ENVELOpe**
Specifies envelope mode, where the resulting waveform shows the PEAKdetect range of data points from several separate waveform acquisitions. The number of waveform acquisitions that go into making up the envelope waveform is set or queried using the ACQUIRE:NUMENV command.

Example 1

```
ACQUIRE:MODE ENVELOpe
```

Sets the acquisition mode to display a waveform that is an envelope of many individual waveform acquisitions.

Example 2

```
ACQUIRE:MODE?
```

This command might return :ACQUIRE:MODE AVERAGE, indicating that the displayed waveform is the average of the specified number of waveform acquisitions.

ACQuire:NUMACq?

Description

This query-only command returns the number of waveform acquisitions that have occurred since starting acquisition with the ACQuire:STATE RUN command. This value is reset to zero when any acquisition, horizontal, or vertical arguments that affect the waveform are changed. The maximum number of acquisitions that can be counted is $2^{63}-1$. The instrument stops counting when this number is reached. This is the same value that displays in the upper center of the screen when the acquisition system is stopped.

Group

Acquisition

Related Commands

ACQuire:STATE

Syntax

ACQuire:NUMACq?

Example

ACQuire:NUMACq?

This command might return :ACQUIRE:NUMACQ 350, indicating that 350 acquisitions have occurred since executing an ACQuire:STATE RUN command.

ACQuire:NUMAVg

Description

This command sets or queries the number of waveform acquisitions that make up an averaged waveform. Use the ACQuire:MODE command to enable the Average mode. Sending this command is equivalent to selecting Horizontal/Acquisition Setup from the Horiz/Acq menu, selecting the Acquisition tab, and choosing Average from the Acquisition Mode group box. Then enter the desired number of waveforms that will be used to make up an averaged waveform in the # of Wfms box.

Group

Acquisition

Related Commands

ACQuire:MODE

Syntax 1

ACQuire:NUMAVg <NRf>

Syntax 2

ACQuire:NUMAVg?

Arguments

- `NRf`

This is the number of waveform acquisitions to average.

Example 1

```
ACQuire:NUMAVg 10
```

This command specifies that 10 waveform averages will be performed before exponential averaging starts.

Example 2

```
ACQuire:NUMAVg?
```

This command might return `:ACQUIRE:NUMAVG 75`, indicating that there are 75 acquisitions specified for averaging.

ACQuire:NUMEnv

Description

This command sets or queries the number of waveform acquisitions that make up an envelope waveform. Sending this command is equivalent to setting the # of Wfms in the Acquisition Setup menu when Envelope Acquisition mode is selected.

Group

Acquisition

Syntax 1

```
ACQuire:NUMEnv {<NRf> | INFIinite}
```

Syntax 2

```
ACQuire:NUMEnv?
```

Arguments

- `NRf`

This is the number of waveform acquisitions to be enveloped.

Example 1

```
ACQuire:NUMEnv 10
```

This command specifies that an enveloped waveform will show the result of combining 10 separately acquired waveforms.

Example 2

```
ACQuire:NUMEnv?
```

This command might return `:ACQUIRE:NUMENV 0`, indicating that acquisitions are acquired infinitely for enveloped waveforms.

ACQUIRE:REPET

Description

This command sets or queries whether repetitive mode is on or off. This is equivalent to setting Equivalent Time Auto/Off in the Acquisition control window. When the instrument is in real-time operation, this setting has no effect.

The ACQUIRE:REPET command specifies the behavior of the acquisition system during equivalent-time operation. When repetitive mode is on, the acquisition system will continue to acquire waveform data until the waveform record is filled with acquired data. When repetitive mode is off, horizontal scale and record length settings will be restricted to those settings that will be achievable with real-time acquisition.

Group

Acquisition

Syntax 1

```
ACQUIRE:REPET {OFF|ON|<NR1>}
```

Syntax 2

```
ACQUIRE:REPET?
```

Arguments

- OFF
This argument disables repetitive mode.
- ON
This argument enables repetitive mode.
- NR1
A 0 disables repetitive mode; any other value enables repetitive mode.

Example 1

```
ACQUIRE:REPET 1
```

This command enables repetitive mode.

Example 2

```
ACQUIRE:REPET?
```

This query might return :ACQUIRE:REPET OFF, indicating that repetitive mode is disabled.

ACQUIRE:STATE

Description

This command starts or stops acquisitions. When state is set to ON or RUN, a new acquisition will be started. If the last acquisition was a single acquisition sequence, a new single sequence acquisition will be started. If the last acquisition was continuous, a new continuous acquisition will be started.

If RUN is issued in the middle of completing a single sequence acquisition (for example, averaging or enveloping), the acquisition sequence is restarted, and any accumulated data is discarded. Also, the instrument resets the number of acquisitions. If the RUN argument is issued while in continuous mode, a reset occurs and acquired data continues to acquire.

Sending this command is equivalent to pressing the front-panel RUN/STOP button.

Group

Acquisition

Related Commands

ACQUIRE:STOPAFTER,

Syntax 1

```
ACQUIRE:STATE{OFF|ON|RUN|STOP|<NR1>}
```

Syntax 2

```
ACQUIRE:STATE?
```

Arguments

- OFF
This argument stops acquisitions.
- STOP
This argument stops acquisitions.
- ON
This argument starts acquisitions.
- RUN
This argument starts acquisitions.
- NR1
0 stops acquisitions; any other value starts acquisitions.

Example 1

```
ACQUIRE:STATE RUN
```

This command starts the acquisition of waveform data and resets the count of the number of acquisitions.

Example 2

ACQUIRE:STATE?

This query might return :ACQUIRE:STATE 0, indicating that the acquisition is stopped.

ACQUIRE:STOPAfter

Description

This command sets or queries whether the instrument continually acquires acquisitions or acquires a single sequence. This command is equivalent to pressing SINGLE from the front panel.

Group

Acquisition

Related Commands

ACQUIRE:STATE, ACQUIRE:REPEt

Syntax 1

ACQUIRE:STOPAfter {RUNSTOP|SEQUENCE}

Syntax 2

ACQUIRE:STOPAfter?

Arguments

- RUNSTOP
Specifies that the instrument will continually acquire data, if ACQUIRE:STATE is turned on.
- SEQUENCE
Specifies that the next acquisition will be a single-sequence acquisition.

Example 1

ACQUIRE:STOPAfter RUNSTOP

This command sets the instrument to continually acquire data.

Example 2

ACQUIRE:STOPAfter?

This query might return

:ACQUIRE:STOPAFTER SEQUENCE

This indicates that the next acquisition the instrument makes will be of the single-sequence type.

ACQUIRE?

Description

This query-only command returns the following current acquisition parameters:

- Stop after
- Acquisition state
- Mode
- Number of envelopes
- Number of averages
- Repetitive signals

Group

Acquisition

Related Commands

ACQUIRE:MODE, ACQUIRE:NUMACQ, ACQUIRE:NUMAVG, ACQUIRE:NUMENV, ACQUIRE:REPET, ACQUIRE:STATE, ACQUIRE:STOPAFTER

Syntax

ACQUIRE?

Example

ACQUIRE?

This query might return the following string for the current acquisition parameters:

```
:ACQUIRE:STOPAFTER RUNSTOP;STATE 1;MODE  
SAMPLE;NUMENV 10;NUMAVG 16;REPET ON
```

ALLEV?

Description

This query-only command prompts the instrument to return all events and their messages (delimited by commas), and removes the returned events from the Event Queue. Use the *ESR? query to enable the events to be returned. This command is similar to repeatedly sending *EVMsg? queries to the instrument.

Group

Status and Error

Related Commands

*ESR?, *EVMsg?

Syntax

ALLEV?

ALias

Example

ALLev?

This query might return :ALLEV 2225, "Measurement error, No waveform to measure; "420,"Query UNTERMINATED;"

Description

This command sets or queries the state of alias functionality.

Group

Alias

Related Commands

ALias:STATE

Syntax 1

ALias {OFF|ON|<NR1>}

Syntax 2

ALias?

Arguments

- OFF
This turns Alias expansion off. If a defined alias is sent when ALias:STATE is off, a command error (102) will be generated.
- ON
This turns Alias expansion on. When a defined alias is received, the specified command sequence is substituted for the alias and executed.
- NR1
A 0 disables Alias mode; any other value enables Alias mode.

Example 1

ALias ON

This command turns the alias feature on. When a defined alias is received, the specified command sequence is substituted for the alias and executed.

Example 2

ALias?

This query might return :ALIAS:STATE 1, indicating that the alias feature is on.

ALias:CATalog?

Description

This query-only command returns a list of the currently defined alias labels, separated by commas. If no aliases are defined, the query returns the string "".

Group

Alias

Syntax

ALias:CATalog?

Example

ALias:CATalog?

This query might return the string :ALIAS:CATALOG "SETUP1", "TESTMENU1", "DEFAULT", showing that there are three aliases named SETUP1, TESTMENU1, and DEFAULT.

ALias:DEFine

Description

This command assigns a sequence of program messages to an alias label. These messages are then substituted for the alias whenever it is received as a command or query, provided that ALias:STATE has been turned on. The query form of this command returns the definitions of a selected alias.

Note: Attempting to give two aliases the same name causes an error. To give a new alias the name of an existing alias, the existing alias must first be deleted.

Group

Alias

Related Commands

ALias:STATE

Syntax 1

ALias:DEFine <Qstring><,>{<Qstring>|<Block>}

Syntax 2

ALias:DEFine?

Arguments

- The first <Qstring> is the alias label.
This label cannot be a command name. Labels must start with a letter and can contain only letters, numbers, and underscores; other characters are not allowed. The label must be less than or equal to 12 characters.

- The second <Qstring> or <Block> is a complete sequence of program messages.

The messages can contain only valid commands that must be separated by semicolons and must follow all rules for concatenating commands. The sequence must be less than or equal to 256 characters.

Example 1

```
ALias:DEFine "ST1",":RECALL:SETUP 5;:AUTASET
EXECUTE;:SELECT:CH1 ON"
```

This command defines an alias named "ST1" that sets up the instrument.

Example 2

```
ALias:DEFine? "ST1"
```

```
This command returns :ALIAS:DEFINE "ST1",#246
:RECALL:SETUP 5;:AUTASET EXECUTE;:SELECT:CH1 ON
```

ALias:DELEte

Description

This command removes a specified alias and is identical to ALias:DELEte:NAME. An error message is generated if the named alias does not exist.

Group

Alias

Related Commands

*ESR?, ALias:DELEte:ALL

Syntax

```
ALias:DELEte <Qstring>
```

Argument

- <Qstring>
This is the name of the alias to be removed. Using ALias:DELEte without specifying an alias causes an execution error. <Qstring> must be a previously defined value.

Example

```
ALias:DELEte "SETUP1"
```

This command deletes the alias named SETUP1.

ALias:DELEte:ALL

Description

This command deletes all existing aliases.

Group

Alias

Related Commands

ALias:DELEte, ALias:DELEte:NAME

Syntax

ALias:DELEte:ALL

Example

```
ALias:DELEte:ALL
```

This command deletes all existing aliases.

ALias:DELEte:NAME

Description

This command removes a specified alias. An error message is generated if the named alias does not exist. This command is identical to ALias:DELEte.

Group

Alias

Syntax

```
ALias:DELEte:NAME <Qstring>
```

Argument

- <Qstring>
This is the name of the alias to remove. Using ALias:DELEte:NAME without specifying an alias causes an exception error. <Qstring> must be a previously defined alias.

Example

```
ALias:DELEte:NAME "STARTUP"
```

This command deletes the alias named STARTUP.

ALias:STATE

Description

This command turns aliases on or off and is identical to the ALias command. The query form of this command returns the state of the aliases.

Group

Alias

Syntax 1

```
ALias:STATE {OFF|ON|<NR1>}
```

Syntax 2

```
ALias:STATE?
```

Arguments

- OFF
This turns alias expansion off. If a defined alias is sent when ALIAS:STATE is OFF, the instrument generates a command error (102).
- ON
This turns alias expansion on. When a defined alias is received, the specified command sequence is substituted for the alias and executed.
- <NR1>
A 0 turns off aliases; any other value turns on aliases.

Example 1

```
ALIAS:STATE OFF
```

This command turns off the alias feature.

Example 2

```
ALIAS:STATE?
```

This query might return

```
:ALIAS:STATE ON
```

This indicates that alias expansion is currently turned on.

AUTOSet

Description

This command (no query format) sets the vertical, horizontal, and trigger controls of the instrument to automatically acquire and display the selected waveform. (To autoselect a video waveform, the video trigger must be set to video standard, not custom.) This is equivalent to pressing the front-panel AUTOSET button. For a detailed description of autoselect functionality, see *Autoset* in the index of the online help for your instrument.

Group

Miscellaneous

Related Command

DISplay:GRATICule

Syntax

```
AUTOSet {EXECute|UNDo|VIDeo|VLines|VFields}
```

Arguments

- EXECute
This argument autoselects the displayed waveform; this is equivalent to pressing the front-panel AUTOSET button. If the display is set to a PAL, MV, or IRE graticule, this argument forces the graticule display to full mode (frame,

grid, and cross hair).

- UNDO
This argument returns the instrument to the setting prior to executing an autoset.
- VIDEO
This autosets the displayed waveform.
- VLines
This autosets the displayed waveform.
- VFields
This autosets the displayed waveform.

Example

```
AUTOSet VFields
```

This command sets the instrument to trigger on all video fields.

AUXout?

Description

This query-only command returns the auxiliary output setup. This query command is equivalent to selecting AUX OUT Configuration from the Utilities menu and then viewing the current settings.

Group

Miscellaneous

Related Commands

AUXout:SOURce

Syntax

AUXout?

Example

```
AUXout?
```

This query might return

```
:AUXOUT:SOURCE ATRIGGER;EDGE RISING
```

This indicates that the source at the BNC connector is set to the A trigger and that the polarity is set to the rising edge of the trigger output signal.

AUXout:SOURce

Description

This command sets or queries the trigger source at the BNC connection. This command is equivalent to selecting AUX OUT Configuration from the Utilities menu and then selecting the desired Configuration setting.

Group

Miscellaneous

Related Commands

AUXout?

Syntax 1

```
AUXout:SOURce {ATRIGger|BTRIGger}
```

Syntax 2

```
AUXout:SOURce?
```

Arguments

- ATRIGger
This sets the source at the BNC connector to the main trigger.
- BTRIGger
This sets the source at the BNC connector to the delayed trigger.

Example

```
AUXout:SOURce?
```

This query might return

```
:AUXOUT:SOURCE ATRIGGER
```

This indicates that the source at the BNC connector is set to the A trigger.

BELI

Description

This command was previously used to beep an audio indicator and is provided for backward compatibility.

Group

Miscellaneous

Syntax

```
BEL1
```

Example

```
BEL1
```

This command is accepted but does nothing.

BUSY?

Description

This query-only command returns the status of the instrument. This command allows you to synchronize the operation of the instrument with your application program.

Group

Status and Error

Related Commands

*OPC, *WAI

Syntax

BUSY?

Returns

<NR1>

If 0 is returned, it means that the instrument is not busy processing a command whose execution time is extensive. If 1 is returned, it means that the instrument is busy processing one of the commands listed in the table below.

Commands that Affect BUSY? Response	
Operation	Command
Single sequence acquisition	ACQUIRE:STATE ON or ACQUIRE:STATE RUN or ACQUIRE:STATE 1 (when ACQUIRE:STOPAFTER is set to SEQUENCE).
Hardcopy operation	HARDCOPY START
Calibration step	Refer to the optional <i>TDS5000 Series Digital Phosphor Oscilloscopes Service Manual</i>

Example

BUSY?

This query might return

:BUSY 1

This indicates that the instrument is currently busy.

CAL?

Description

This query-only command instructs the digitizing oscilloscope to return the internal and factory calibration status and the calibration due status.

Group

Calibration

Related Commands

CALibrate:RESults_SPC?

Syntax

CAL?

Example

CAL?

This query might return

```
*CALIBRATE:INTERNAL:STATUS  
PASS;:CALIBRATE:FACTORY:STATUS  
PASS;NOTIFY:HOURS 2000;YEARS 1.0E0;DUE 0
```

This indicates that the internal and factory calibration status and the calibration due status.

CALibrate:FACTory

Description

This command starts the factory calibration. This command functions the same as the CALibrate:FACTory:START command.

Group

Calibration

Syntax

```
CALibrate:FACTory
```

Example

```
CALIBRATE:FACTORY
```

Starts the factory calibration.

CALibrate:FACTory:ABOrt

Description

This command stops the factory calibration, resets to the initialization step, and exits without changing the calibration data.

Group

Calibration

Related Commands

```
CALibrate:FACTory:START
```

Syntax

```
CALibrate:FACTory:ABOrt
```

Example

```
CALIBRATE:FACTORY:ABORT
```

Stops the factory calibration.

CALibrate:FACTory:CONTInue

Description

This command does the next step in the calibration procedure. The calibration step number is incremented on completion of this step, independent of the step pass/fail status. Follow this command with CALibrate:FACTory:STEPstatus? to determine execution status. Use CALibrate:FACTory:PREVious, followed by CALibrate:FACTory:CONTInue, to repeat a factory calibration step that failed.

If the current step is the last step and the calibration succeeds, new calibration data and pass status is saved to non-volatile memory and the oscilloscope returns to normal operation in the same state it was in before beginning factory calibration.

If the current step is the last step and any factory calibration step has failed, without a successful pass for repeated steps, a fail status will be saved to non-volatile memory. Factory calibration data will not be saved to non-volatile memory if the factory status is FAIL.

Group

Calibration

Syntax

```
CALibrate:FACTory:CONTInue
```

Example

```
CALIBRATE:FACTORY:CONTINUE
```

Causes the instrument to execute the next step in the calibration procedure.

CALibrate:FACTory:NOTIfy:DUE?

Description

This command returns whether the factory calibration is due.

Group

Calibration

Syntax

```
CALibrate:FACTory:NOTIfy:DUE?
```

Returns

- 0
<NR1>
Means the oscilloscope is not due for factory calibration.
- 1
<NR1>
Means the oscilloscope is due for factory calibration.

Example

```
CALIBRATE:FACTORY:NOTIFY:DUE?
```

Might return:

```
:CALIBRATE:FACTORY:NOTIFY:DUE 0
```

This signifies that factory calibration is not due.

CALibrate:FACTory:NOTIfy:HOURS

Description

This command sets or return the number of hours until the user is notified that the instrument is due for factory calibration.

Group

Calibration

Syntax

```
CALibrate:FACTory:NOTIfy:HOURS {INFInite|<NR1>}
```

Argument

- INFInite
Set to whatever the specified maximum is for the instrument.
- <NR1>
Set to an integer value.

Example 1

```
CALIBRATE:FACTORYLNOTIFY:HOURS 1500
```

Sets the calibration notification time to 1,500 hours.

Example 2

```
CALIBRATE:FACTORYLNOTIFY:HOURS?
```

might return

```
:CALIBRATE:FACTORY:NOTIFY:HOURS 2000
```

This signifies that the calibration due notifier will be displayed 2000 hours after the last calibration.

CALibrate:FACTory:NOTIfy:YEARs

Description

This command sets or returns the number of years until the user is notified that the instrument is due for factory calibration.

Group

Calibration

Syntax

CALibrate:FACTory:NOTIfy:YEARs { INFInite|<NR3>}

Argument

- INFInite
Set to whatever the specified maximum is for the instrument.
- <NR3>
Set to a floating point value.

Example 1

```
CALIBRATE:FACTORYLNOTIFY:YEARS 1.5e0
```

Sets the calibration notification time to 1.5 years.

Example 2

```
CALIBRATE:FACTORYLNOTIFY:YEARS?
```

might return

```
:CALIBRATE:FACTORY:NOTIFY:YEARS 1.5e0
```

This indicates that calibration due notifier will be displayed 1.5 years after the last calibration.

CALibrate:FACTory:PREVious

Description

This command backs up the calibration steps one step so that the next CALibrate:FACTory:CONTInue command will repeat the factory calibration step that just finished. Repeated CALibrate:FACTory:PREVious commands can back up as many calibration steps as desired, at least until step one is reached. The appropriate notifier, with signal source information, is displayed after the factory calibration step is adjusted.

Group

Calibration

Syntax

```
CALibrate:FACTory:PREVious
```

Example

```
CALIBRATE:FACTORY:PREVIOUS
```

Backs up the calibration steps one step.

CALibrate:FACTory:STARt

Description

This command starts the factory calibration. The factory calibration process consists of a series of steps. Do not send any other commands that change the state of the oscilloscope until the calibration process is complete.

Group

Calibration

Related Commands

```
CALibrate:FACTory:ABOrt
```

Syntax

```
CALibrate:FACTory:STARt
```

Example

```
CALIBRATE:FACTORY:START
```

Starts the factory calibration.

CALibrate:FACTory:STATus

Description

This command returns the factory calibration status.

Group

Calibration

Syntax

CALibrate:FACTory:STATus

Returns

- FAIL
The factory caibration failed
- PASS
The factory calibration passed
- UNCAL
The factory calibration has not been run

Example

CALIBRATE:FACTORY:STATUS

Might return

:CALIBRATE:FACTORY:STATUS PASS

This indicates the factory calibration passed.

CALibrate:FActory:STEPSTATus

Description

This command returns the status of the current calibration step. It returns pass during oscilloscope power on without regard to actual calibration status. It returns pass or fail for the factory calibration step that most recently executed when factory calibration is in progress. Use this query to synchronize programmed factory calibration steps.

Group

Calibration

Syntax

```
CALibrate:FActory:STEPSTATus
```

Returns

- FAIL
The factory calibration failed
- PASS
The factory calibration passed

Example

```
CALIBRATE:FACTORY:STEPSTATUS
```

Might return

```
:CALIBRATE:FACTORY:STEPSTATUS FAIL
```

This indicates the last oscilloscope calibration step did not pass.

CALibrate:FACTory:STEPSTIMulus

Description

This command returns the required stimulus for this calibration step

Group

Calibration

Syntax

CALibrate:FACTory:STEPSTIMulus

Returns

Using the format: <Volts>, <Freq>, <Chan>, <Term>, <Token>

- Volts
<NR3>

A floating point number representing DC volts if the value for <Freq> is 0 or representing $V_{\text{peak-to-peak}}$ if the value for <Freq> is non-zero.

Note: If the box sends back that the frequency is 4 then apply the WaveTek 9500 deskew function on all 4 channels at 1 megahertz

- Freq
<NR1>

The frequency in Hz of the applied waveform. 0 means the applied voltage is DC.

- Chan
<NR1>

The channel.

- Term
<NR1>

The ohms of termination. For example,

```
8.0E-03, 0, 1, 50, C01
```

means apply 800 mV DC to Channel 1 with 50 ohm termination. If the query is sent before FACTORY CAL has been initialized, the returned string will be:

```
0.0, 0, 0, 0, R01
```

- Token
A unique string identifying the step to be done next.

CALibrate:PROBEstate:CH<x>?

Description

This query-only command returns the status of a probe calibration for the probe of a given channel, which can be Pass (0), Initialized, (1), Fail (-1), or Running (2). This command is equivalent to selecting Probe Cal from the Vertical menu.

Group

Calibration

Related Commands

CH<x>:PROBECal?

Syntax

CALibrate:PROBEstate:CH<x>?

Example

CALibrate:PROBESTATE:CH1?

This query returns the status of the probe calibration for the probe of a given channel.

A query might return

```
:CALIBRATE:PROBESTATE:CH1 0
```

This indicates that the probe calibration passed.

CALibrate:RESults?

Description

This query-only command returns the status of all the calibration subsystems, without performing an SPC operation. The results returned do not include the calibration status of attached probes. The CALibration:RESults? Query is intended to support GO/NoGO testing of the oscilloscope calibration readiness: all returned results should indicate Pass status if the oscilloscope is "fit for duty". It is quite common, however, to use uncalibrated probes (particularly when the oscilloscope inputs are connected into a test system with coax cables). Not including the probe cal results prompts the instrument to perform a simple "every returned status field must be Pass" test.

This command is equivalent to selecting Instrument Calibration from the Utilities menu and then viewing the contents of the Status field.

Group

Calibration

Related Commands

*CAL?

Syntax

CALibrate:RESults?

Example

CALibrate:RESults?

This query returns the status of all the calibration subsystems.

The query might return

:CALIBRATE:RESULTS:SPC

CALibrate:RESults:SPC?

Description

This query-only command returns the results of the last SPC operation. However, this query does not cause an SPC to be run. This command is equivalent to selecting Instrument Calibration from the Utilities menu.

Group

Calibration

Related Commands

*CAL?

Syntax

CALibrate:RESults:SPC?

Arguments

None.

Example

CALibrate:RESults:SPC?

This query returns the results of the last SPC operation.

CH<x>?

Description

This query-only command returns the vertical parameters for the specified channel. The channel is specified by x. The value of x can range from 1 through 4 for four-channel instruments or 1 through 2 for two-channel instruments. This command is similar to selecting Vertical Setup from the Vertical menu.

Group

Vertical

Syntax

CH<x>?

Example

CH1?

This query might return the following vertical parameters for channel 1:

```
:CH1:BANDWIDTH 1.0000E+09; COUPLING DC; DESKEW
0.0000E+00; OFFSET 0.0000E+00; POSITION
0.0000E+00
; SCALE 5.0000E-01; TERMINATION
1.0000E+06; PROBCAL INIT;
PROBE:GAIN 1.0000E+00; RESISTANCE
1.0000E+06; UNITS "V"
; ID:TYPE "1X"; SERNUMBER
"N/A"; :CH1:PROBEFUNC:EXTATTEN
1.0000E+00; EXTUNITS "None"; :CH1:LABEL:NAME
"; XPOS 5
; YPOS 5
```

CH<x>:BANDwidth

Description

This command sets or queries the selectable low-pass bandwidth limit filter of the specified channel. The channel is specified by x. The value of x can range from 1 through 4 for four-channel instruments or 1 through 2 for two-channel instruments. This is equivalent to selecting Bandwidth from the Vertical menu.

The query form of this command always returns the maximum bandwidth of the channel.

Group

Vertical

Syntax 1

CH<x>:BANDwidth {TWenty|ONEfifty|FULl|<NR3>}

Syntax 2

CH<x>:BANDwidth?

Arguments

- TWEnty
This sets the upper bandwidth limit to 20 MHz.
- ONEfifty
This sets the upper bandwidth limit to 150 MHz.
- FIVE
This argument sets the upper bandwidth limit to 500 MHz.
- FULL
This disables any optional bandwidth limiting. The specified channel operates at its maximum attainable bandwidth.
- <NR3>
This argument is a double-precision ASCII string. The instrument rounds this value to an available bandwidth using geometric rounding and then uses this value set the upper bandwidth.

Example 1

```
CH1:BANDwidth TWEnty
```

This command sets the bandwidth of channel 1 to 20 MHz.

Example 2

```
CH2:BANDwidth?
```

For TDS5052 and TDS5054 instruments, this query might return
:CH2:BANDWIDTH 500.0000E+06

This indicates that there is no bandwidth limiting on channel 2.

For TDS5104 instruments, this query might return

```
:CH2:BANDWIDTH 1.0000E+09
```

This indicates that there is no bandwidth limiting on channel 2.

CH<x>:COUPLing

Description

This command sets or queries the input attenuator coupling setting for the specified channel. The channel is specified by x. The value of x can range from 1 through 4 for four-channel instruments or 1 through 2 for two-channel instruments. This command is equivalent to selecting Coupling from the Vertical menu.

Group

Vertical

Syntax 1

```
CH<x>:COUPLing {AC|DC|GND}
```

Syntax 2

CH<x>:COUPling?

Arguments

- AC
This sets the specified channel to AC coupling.
- DC
This sets the specified channel to DC coupling.
- GND
This sets the specified channel to ground. Only a flat, ground-level waveform will be displayed.

Example 1

CH2:COUPling GND

This command sets channel 2 to ground.

Example 2

CH3:COUPling?

This query might return

:CH3:COUPling DC

This indicates that channel 3 is set to DC coupling.

CH<x>:DESKew

Description

This command sets or queries the deskew time for the specified channel. The channel is specified by x. The value of x can range from 1 through 4 for four-channel instruments or 1 through 2 for two-channel instruments. This command is equivalent to selecting Deskew from the Vertical Setup menu.

You can adjust the deskew time to add an independent, channel-based delay time to the delay (set by the horizontal position control and common to all channels) from the common trigger point to first sample taken for each channel. This lets you compensate individual channels for different delays introduced by their individual input hook ups.

Group

Vertical

Syntax 1

```
CH<x>:DESKew <NR3>
```

Syntax 2

```
CH<x>:DESKew?
```

Argument

- <NR3>

This is the deskew time for this channel, ranging from -25 ns to +25 ns with a resolution of 1 ps. Out-of-range values are clipped.

Example 1

```
CH4:DESKew 5.0E-9
```

This command sets the deskew time for channel 4 to 5 ns.

Example 2

```
CH2:DESKew?
```

This query might return

```
:CH2:DESKEW 2.0000E-09
```

This indicates that the deskew time for channel 2 is set to 2 ns.

CH<x>:INVERT

Description

This command sets or queries the invert function for the specified channel. The channel is specified by x. The value of x can range from 1 through 4 for four-channel instruments or 1 through 2 for two-channel instruments. When on, the invert function inverts the waveform for the specified channel. This command is equivalent to selecting On or Off for the Invert function in the Vertical Setup control window.

Note: This command inverts the waveform for display purposes only. The instrument does not use an inverted waveform for triggers or trigger logic inputs.

Group

Vertical

Syntax 1

```
CH<x>:INVERT {ON|OFF|NR1}
```

Syntax 2

```
CH<x>:INVERT?
```

Argument

- OFF
This argument turns off the invert function for the specified channel.
- ON
This argument turns on the invert function for the specified channel.
- <NR1>
A 0 turns off the invert function; any other value turns on the invert function.

Example 1

```
CH4:INVERT ON
```

This command inverts the waveform on channel 4.

Example 2

```
CH2:INVERT?
```

This query might return

```
:CH2:INVERT 0
```

This indicates that the invert function for channel 2 is off.

CH<x>:LABEL:NAME

Description

This command sets or queries the label attached to the displayed waveform for the specified channel. The channel is specified by x. The value of x can range from 1 through 4 for four-channel instruments or 1 through 2 for two-channel instruments. This command is equivalent to selecting Label from the Vertical menu.

Group

Vertical

Syntax 1

```
CH<x>:LABEL:NAME <str>
```

Syntax 2

CH<x>:LABEL:NAME?

Argument

- <str>
This is an alphanumeric character string, ranging from 1 through 32 characters in length.

Example 1

CH2:LABEL:NAME "Pressure"

This command changes the waveform label for the CH2 waveform to "Pressure".

Example 2

CH3:LABEL:NAME?

This query might return

:CH3:LABEL:NAME "CH3"

This indicates that the waveform label for the CH 3 waveform is "CH3".

CH<x>:LABEL:XPOS

Description

This command sets or queries the X screen offset at which the label (attached to the displayed waveform of the specified channel) is displayed, relative to the left edge of the screen. The channel is specified by x. The value of x can range from 1 through 4 for four-channel instruments or 1 through 2 for two-channel instruments. This command is equivalent to selecting Label from the Vertical menu and either viewing or setting X Pos.

Group

Vertical

Syntax 1

CH<x>:LABEL:XPOS <NR1>

Syntax 2

CH<x>:LABEL:XPOS?

Argument

- <NR1>
This is the location (in pixels) where the waveform label for the selected channel is displayed, relative to the left edge of the screen. Arguments should be integers ranging from 0 through 500.

Example 1

CH3:LABEL:XPOS 50

This command moves the waveform label for the CH3 waveform so that it begins 50 pixels to the right of the left edge of the screen.

Example 2

```
CH2 : LABEL : XPOS ?
```

This query might return

```
: CH2 : LABEL : XPOS 50
```

This indicates that the waveform label for the CH2 waveform is currently 50 pixels to the right of the left edge of the screen.

CH<x>:LABEL:YPOS

Description

This command sets or queries the Y screen offset at which the label (attached to the displayed waveform of the specified channel) is displayed, relative to the top edge of the screen. The channel is specified by x. The value of x can range from 1 through 4 for four-channel instruments or 1 through 2 for two-channel instruments. This command is equivalent to selecting Label from the Vertical menu and either viewing or setting Y Pos.

Group

Vertical

Syntax 1

```
CH<x> : LABEL : YPOS <NR1 >
```

Syntax 2

```
CH<x> : LABEL : YPOS ?
```

Argument

- <NR1 >

This is the location (in pixels) where the waveform label for the selected channel is displayed, relative to the top edge of the screen. Arguments should be integers ranging from 0 to 385.

Example 1

```
CH3 : LABEL : YPOS -25
```

This command moves the waveform label for the CH3 waveform to just beneath (25 pixels below) the top of the screen.

Example 2

```
CH2 : LABEL : YPOS ?
```

This query might return

```
: CH2 : LABEL : YPOS 0
```

This indicates that the waveform label for the CH2 waveform is currently located just beneath the top of the screen.

CH<x>:OFFSet

Description

This command sets or queries the vertical offset for the specified channel. The channel is specified by x. The value of x can range from 1 through 4 for four-channel instruments or 1 through 2 for two-channel instruments. This command is equivalent to selecting Offset from the Vertical menu.

This command offsets the vertical acquisition window (moves the level at the vertical center of the acquisition window) for the selected channel. Visualize offset as scrolling the acquisition window towards the top of a large signal for increased offset values, and scrolling towards the bottom for decreased offset values. The resolution of the vertical window sets the offset increment for this control.

Offset adjusts only the vertical center of the acquisition window for channel waveforms to help determine what data is acquired. The instrument always displays the input signal minus the offset value. The channel reference marker will move to the vertical graticule position given by the negative of the offset value divided by the scale factor, unless that position is off-screen. If the computed coordinate for the reference mark is off-screen, the mark moves to the nearest screen limit and changes from a right-pointing arrow (\rightarrow) to an arrow pointing in the appropriate off-screen direction.

The settable range of a channel offset is either ± 100 V, ± 10 V or ± 1.0 V, depending on the vertical scale factor.

Vertical Scale Adjust Factors			
When Internal scale adjust gain is:	From 0.001 to 0.1	From 0.101 to 01.0	From 1.01 to 100.0
Product of Offset range, probe gain and transducer gain is:	± 1.0 V	± 10.0 V	± 100.0 V

Note: The above table describes instrument behavior only when no probe is attached, and when the external attenuation factor is 1.0.

Group

Vertical

Related Commands

CH<x>POSition

Syntax 1

CH<x>:OFFSet <NR3>

Syntax 2

CH<x>:OFFSet?

Argument

- <NR3>
This is the offset value for the specified channel, ranging from -1.6 V through 1.6 V.

Example 1

```
CH3:OFFSet 2.0E-3
```

This command sets the offset for channel 3 to 2 mV.

Example 2

```
CH2:OFFSet?
```

This query might return

```
:CH4:OFFSET 1.0000E-03
```

This indicates that the offset for channel 4 is set to 1 mV.

CH<x>:POSition

Description

This command sets or queries the vertical position of the specified channel. The channel is specified by x. The value of x can range from 1 through 4 for four-channel instruments or 1 through 2 for two-channel instruments. The position value is applied to the signal before it is digitized. This command is equivalent to selecting Position/Scale from the Vertical menu and either viewing or setting Position.

Increasing the position value of a waveform causes the waveform to move up, and decreasing the position value causes the waveform to move down. Position adjusts only the display position of a waveform, whether it is a channel, math, or reference waveform. The position value determines the vertical graticule coordinate at which input signal values, equal the present offset setting for that channel, are displayed. For example, if the position for Channel 3 is set to 2.0 and the offset is set to 3.0, then input signals equal to 3.0 units are displayed 2.0 divisions above the center of the screen.

Group

Vertical

Related Commands

CH<x>:OFFSet, REF<x>:VERTical:POSition,
MATH<x>:POSition

Syntax 1

```
CH<x>:POSition <NR3>
```

Syntax 2

```
CH<x>:POSition?
```

Argument

- <NR3>

This is the position value, in divisions from the center graticule, ranging from 8 to -8 divisions.

Example 1

```
CH2:POSition 1.3E+00
```

This command positions the Channel 2 input signal 1.3 divisions above the center graticule.

Example 2

```
CH1:POSition?
```

This query might return

```
:CH1:POSITION -1.3000E+00
```

This indicates that the current position of Channel 1 is 1.3 divisions below the center graticule.

CH<x>:PRObe?

Description

This query-only command returns all information concerning the probe that is attached to the specified channel. The channel is specified by x. The value of x can range from 1 through 4 for four-channel instruments or 1 through 2 for two-channel instruments.

Group

Vertical

Related Commands

```
CH<x>:PROBECal?
```

Syntax

```
CH<x>:PROBE?
```

Example

```
CH2:PROBE?
```

This query might return, for a 10x probe,

```
:CH2:PROBE:GAIN 1.0000E-01; RESISTANCE  
1.0000E+07; UNITS "V"; ID:TYPE "10X" ; SERNUMBER  
"N/A"
```

This indicates that (among other parameters) the attenuation factor for the probe attached to channel 2 is 100.0 mV (assuming that probe units are set to volts).

CH<x>:PROBECal?

Description

This query-only command returns the probe calibration state for the selected channel. The channel is specified by x. The value of x can range from 1 through 4 for four-channel instruments or 1 through 2 for two-channel instruments. This command is equivalent to selecting Probe Cal from the Vertical menu.

Group

Vertical

Related Commands

Syntax

CH<x>:PROBECal?

Outputs

- FAIL
This signifies that the probe calibration has failed for the selected channel.
- INIT
This signifies that the probe calibration has not yet been run for the selected channel.
- PASS
This signifies the probe calibration has passed for the selected channel.

Example

CH2:PROBECal?

This query might return

:CH2:PROBECAL PASS

This indicates that the probe calibration has passed for channel 2.

CH<x>:PRObe:GAIN?

Description

This query-only command returns the gain factor of the probe that is attached to the specified channel. The channel is specified by x. The value of x can range from 1 through 4 for four-channel instruments or 1 through 2 for two-channel instruments. The "gain" of a probe is the output divided by the input transfer ratio. For example, a common 10x probe has a gain of 0.1.

Group

Vertical

Related Commands

CH<x>:SCALE

Syntax

CH<x>:PRObe:GAIN?

Example

CH2:PRObe:GAIN?

This query might return :CH2:PROBE:GAIN 0.1000E+00, indicating that the attached 10x probe delivers 0.1 V to the channel 2 BNC for every 10 V applied to the probe input.

CH<x>:PRObe:ID?

Description

This query-only command returns the type and serial of the probe that is attached to the specified channel. The channel is specified by x. The value of x can range from 1 through 4 for four-channel instruments or 1 through 2 for two-channel instruments.

Group

Vertical

Syntax

CH<x>:PRObe:ID?

Example

CH2:PRObe:ID?

This query might return :CH2:PROBE:ID:TYPE "10X";SERNUMBER "N/A", indicating that a passive 10x probe of unknown serial number is attached to channel 2.

CH<x>:PRObe:ID:TYPE?

Description

This query-only command returns the type of probe that is attached to the specified channel. The channel is specified by x. The value of x can range from 1 through 4 for four-channel instruments or 1 through 2 for two-channel instruments. Level 2 (or higher) probes supply their exact product nomenclature; for Level 0 or 1 probes, a generic 'type string' of "nnX" is returned.

Group

Vertical

Syntax

CH<x>:PRObe:ID:TYPE?

Example

CH1:PRObe:ID:TYPE?

This query might return :CH1:PROBE:ID:TYPE "P6203", indicating that P6203-type probe is attached to channel 1.

CH<x>:PRObe:ID:SERnumber?

Description

This query-only command returns the serial number of the probe that is attached to the specified channel. The channel is specified by x. The value of x can range from 1 through 4 for four-channel instruments or 1 through 2 for two-channel instruments.

Note: For Level 0 and 1 probes, the serial number will be "N/A".

Group

Vertical

Syntax

CH<x>:PRObe:ID:SERnumber?

Example

CH1:PRObe:ID:SERnumber?

This query might return :CH1:PROBE:ID:SERNUMBER "B010289", indicating that the serial number of the probe attached to channel 1 is B010289.

CH<x>:PRObe:RESistance?

Description

This query-only command returns the resistance factor of the probe that is attached to the specified channel. The channel is specified by x. The value of x can range from 1 through 4 for four-channel instruments or 1 through 2 for two-channel instruments.

Group

Vertical

Syntax

CH<x>:PRObe:RESistance?

Example

CH2:PRObe:RESistance?

This query might return :CH2:PROBE:RESISTANCE 10.0000E+06, indicating that the input resistance of the probe attached to Channel 2 is 10.0 MΩ.

CH<x>:PRObe:UNIts?

Description

This query-only command returns a string describing the units of measure for the probe attached to the specified channel. The channel is specified by x. The value of x can range from 1

through 4 for four-channel instruments or 1 through 2 for two-channel instruments.

Group

Vertical

Related Commands

CH<x>:PROBEFunc:EXTUnits

Syntax

CH<x>:PRObe:UNITs?

Example

CH4:PRObe:UNITs?

This query might return :CH4:PROBE:UNITS "V", indicating that the units of measure for the probe attached to channel 4 are volts.

CH<x>:PROBEFunc:EXTatten

Description

This command instructs the instrument when to make vertical settings (offset and scale) effective for the specified channel. The vertical settings become effective at the input of the external network or transducer (of a specified input-output transfer ratio) when the output is connected to the input of the probe attached to the channel. The channel is specified by x. The value of x can range from 1 through 4 for four-channel instruments or 1 through 2 for two-channel instruments.

There is also a corresponding query that returns the user-specified attenuation. Note that, as the name implies, this command deals with an attenuation factor, not a gain factor, unlike CH<x>:PRObe? (Note that this command returns a value independent of the external attenuation). For example, if you specify a 20x attenuation factor for channel 1, then the commands return the following values (assuming that a 1x probe is presently attached, since the external attenuation is used in combination with the probe attenuation):

```
CH1:PRObe:EXTA? 20.00E+0
```

```
CH1:PRObe? 1.0E+0
```

This command is equivalent to selecting Attenuation from the Vertical command and then viewing or setting Ext Atten.

Group

Vertical

Related Commands

CH<x>:PROBEFunc:EXTDBatten

Syntax 1

CH<x>:PROBEFunc:EXTatten <NR3>

Syntax 2

CH<x>:PROBEFunc:EXTatten?

Argument

- <NR3>

This is the attenuation value, which is specified as a multiplier in the range from 1.00E-10 to 1.00E+10.

Example 1

```
CH1:PROBEFunc:EXTatten 167.00E-3
```

This command specifies an external attenuation, which is connected between the user's input signal and the input of the probe attached to channel 1.

Example 2

```
CH2:PROBEFunc:EXTatten?
```

This query might return :CH2:PROBEFunc:EXTATTEN 1.0000E+00, indicating that the probe attached to channel 2 is connected directly to the user's signal.

CH<x>:PROBEFunc:EXTDBatten

Description

This command instructs the instrument to make vertical scale and offset settings for a specified channel effective at the input of an external network or transducer (with a specified input ÷ output transfer ratio in decibels). It is assumed that the input of the probe for the specified channel is connected to the output of this network or transducer. The channel is specified by x. The value of x can range from 1 through 4 for four-channel instruments or 1 through 2 for two-channel instruments.

There is also a corresponding query, which returns the user-specified attenuation, in decibels. Note that 1X = 0 dB, 10X = 20 dB, 100X = 40 dB etc.

This command is equivalent to selecting Attenuation from the Vertical menu and then either viewing or setting Ext Att(dB).

Group

Vertical

Related Commands

CH<x>:PROBEFunc:EXTatten

Syntax 1

```
CH<x>:PROBEFunc:EXTDBatten <NR3>
```

Syntax 2

```
CH<x>:PROBEFunc:EXTDBatten?
```

Argument

- <NR3>

This is the attenuation value, which is specified in the range from -200.00 to 200.00 dB.

Example 1

```
CH3:PROBEFunc:EXTDBatten 2.5
```

This command specifies an external 2.5 dB attenuator on channel 3.

Example 2

```
CH1:PROBEFunc:EXTDBatten?
```

This query might return :CH1:PROBEFunc:EXTDBATTEEN 2.5000E+00, indicating that the attenuation for channel 1 is 2.5 dB.

CH<x>:PROBEFunc:EXTUnits

Description

This command sets the unit of measurement for the external attenuator of the specified channel. The channel is specified by x. The value of x can range from 1 through 4 for four-channel instruments or 1 through 2 for two-channel instruments. There is also a corresponding query that returns the user-specified unit of measurement for the external attenuator. Unless these units are set to the factory default string value of "None", they become the attenuated units of measurement for that channel. It is assumed that the probe connected to the specified channel is of the correct type to receive the output of the user's external transducer or network.

Group

Vertical

Related Commands

```
CH<x>:PRObe:UNITS
```

Syntax 1

```
CH<x>:PROBEFunc:EXTUnits <str>
```

Syntax 2

```
CH<x>:PROBEFunc:EXTUnits?
```

Argument

- <str>

This can contain a string of up to eight characters to indicate the attenuation unit of measurement for the specified channel. However, most instrument attenuators only display the first two characters.

Example 1

```
CH4:PROBEFunc:EXTUnits "Pa"
```

This command sets the unit of measurement for the Channel 4 external attenuator.

Example 2

```
CH2:PROBEFunc:EXTUnits?
```

This query might return :CH2:PROBEFUNC:EXTUNITS "Pa", indicating that the Channel 2 external attenuator units of measurement are pascals.

CH<x>:SCALE

Description

This command sets or queries the vertical scale of the specified channel. The channel is specified by x. The value of x can range from 1 through 4 for four-channel instruments or 1 through 2 for two-channel instruments. Sending this command is equivalent to selecting Vertical Setup from the Vertical menu and then viewing or setting the Scale.

Each waveform has a vertical scale parameter. For a signal with constant amplitude, increasing the Scale causes the waveform to be displayed smaller. Decreasing the scale causes the waveform to be displayed larger.

Scale affects all waveforms, but affects channel waveforms differently from other waveforms:

- For channel waveforms, this setting controls the vertical size of the acquisition window as well as the display scale. The range and resolution of scale values depends on the probe attached and any other external factors you have specified.
- For reference and math waveforms, this setting controls the display only, graphically scaling these waveforms and having no affect on the acquisition hardware.

Group

Vertical

Related Commands

CH<x>OFFSet, CH<x>:POSition, REF<x>:VERTical:SCALE, MATH<x>:VERTical:SCALE

Syntax 1

```
CH<x>:SCALE <NR3>
```

Syntax 2

```
CH<x>:SCALE?
```

Argument

- <NR3>

This is the vertical channel scale in units per division.

Example 1

```
CH4:SCALE 100E-03
```

This command sets the channel 4 scale to 100 mV per division.

Example 2

```
CH2:SCALE?
```

This query might return :CH2:SCALE 1.0000E+00, indicating that the current scale setting of channel 2 is 1 V per division.

CH<x>:TERmination

Description

This command sets the connected/disconnected status of a 50 Ω resistor, which may be connected between the specified channel's coupled input and instrument ground. The channel is specified by x. The value of x can range from 1 through 4 for four-channel instruments or 1 through 2 for two-channel instruments. There is also a corresponding query that requests the termination parameter and translates this enumeration into one of the two float values. This command is equivalent to selecting Termination from the Vertical menu or toggling between termination values from the VERTICAL area of the front panel.

Group

Vertical

Syntax 1

```
CH<x>:TERmination <NR3>
```

Syntax 2

```
CH<x>:TERmination?
```

Argument

- <NR3>

This specifies the channel input resistance, which can be specified as 50 or 1,000,000 Ω .

Example 1

```
CH4:TERmination 50.0E+0
```

This command establishes 50 Ω impedance on channel 1.

Example 2

```
CH2:TERmination?
```

This query might return :CH2:TERMINATION 50.0E+0, indicating that channel 2 is set to 50 Ω impedance.

CMDBatch

Description

This command sets or queries the state of command batching. By batching commands, database transactions can be optimized, increasing command throughput. Also, batching allows for ALL commands in an individual batch to be order independent and accomplish the same result as if the commands were coupled.

The Batch state is persistent and will be saved across power cycles, but will not be saved and recalled as part of a setup. In a setup scenario, the factory initial value is enabled.

Group

Miscellaneous

Syntax 1

```
CMDBatch {OFF|ON|<NR1>}
```

Syntax 2

```
CMDBatch?
```

Arguments

- OFF
This turns command batching off.
- ON
This turns command batching on.
- <NR1>
A 0 turns command batching off; any other value turns command batching on.

Example 1

```
CMDBatch OFF
```

This command disables command batching.

Example 2

```
CMDBatch?
```

This query might return :CMDBATCH 1, indicating that command batching is turned on.

CURSOr?

Description

This query-only command returns all of the current cursor settings.

Group

Cursor

Syntax

```
CURSOr?
```

Example: CURSOR?

This query might return the following as the current cursor settings:

```
:CURSOR:STATE OFF;FUNCTION VBARS;MODE
INDEPENDENT
;SOURCE CH1;VBARS:UNITS SECONDS;POSITION1 -
8.0000E-07
;POSITION2 8.0000E-07;:CURSOR:HBARS:POSITION1
3.0000E-01
;POSITION2 -3.0000E-01;UNITS BASE;:CURSOR:PAIRED
:POSITION1 -8.0000E-07;POSITION2 8.0000E-
07;UNITS BASE;
:CURSOR:SPLIT:POSITION1 -8.0000E-07;POSITION2
8.0000E-07
;SOURCE2 CH1;UNITS BASE
```

CURSor:FUNCTion

Description

This command selects or queries the cursor type. Sending this command is equivalent to selecting Cursor Type from the Cursors menu, and then choosing from the drop-down list.

Group

Cursor

Related Commands

CURSor:STAtE

Syntax 1

```
CURSor:FUNCTion {HBArS|OFF|VBArS|PAIred|SPLit}
```

Syntax 2

```
CURSor:FUNCTion?
```

Arguments

- **HBArS**
Specifies horizontal bar cursors, which measure in vertical units.
- **OFF**
Removes the cursors from the display but does not change the cursor type.
- **VBArS**
Specifies vertical bar cursors, which measure in horizontal units.
- **PAIred**
Specifies paired cursors, which measure in both horizontal and vertical units.
- **SPLit**
Specifies split cursors, which measure horizontal and

vertical units across two waveforms.

Example 1

```
CURSOR:FUNCTION VBARS
```

This command selects vertical bar type cursors.

Example 2

```
CURSOR:FUNCTION?
```

This query might return

```
:CURSOR:FUNCTION HBARS
```

This indicates that the horizontal bar cursors are currently selected.

CURSor:HBARs?

Description

This query-only command returns the current settings for the horizontal bar cursors.

Group

Cursor

Syntax

```
CURSor:HBARs?
```

Example

```
CURSor:HBARs?
```

This command might return the horizontal bar setting as
:CURSOR:HBARS:POSITION1 320.0000E-03;POSITION2-
320.0000E-03;UNITS BASE

CURSor:HBARs:DELTA?

Description

This query-only command returns the vertical difference between the two horizontal bar cursors.

Group

Cursor

Syntax

```
CURSor:HBARs:DELTA?
```

Returns

<NR3>

Example

```
CURSOR:HBARs:DELTA?
```

This command might return :CURSOR:HBARS:DELTA
5.0800E+00, indicating that the voltage difference between the
two cursors is 5.08 V.

CURSor:HBArS:POSITION<x>

Description

This command specifies or queries the horizontal bar cursor position relative to ground, which is expressed in vertical units (usually volts). This command is the equivalent of selecting Cursor Position from the Cursors menu, selecting the H Bars Cursor Type and then viewing or editing the desired cursor position.

Group

Cursor

Syntax 1

```
CURSor:HBArS:POSITION<x> <NR3>
```

Syntax 2

```
CURSor:HBArS:POSITION<x>?
```

Argument

- <NR3>

Specifies the cursor position relative to ground.

Example 1

```
CURSOR:HBARS:POSITION1 25.0E-3
```

This command positions one of the horizontal cursors at 25 mV.

Example 2

```
CURSOR:HBARS:POSITION2?
```

This query might return :CURSOR:HBARS:POSITION2 - 64.0000E-03, indicating that one of the horizontal bar cursors is at -64 mV.

CURSor:HBArS:UNItS?

Description

This query-only command returns the units for the horizontal bar cursors.

Group

Cursor

Syntax

```
CURSor:HBArS:UNItS?
```

Example

```
CURSor:HBArS:UNItS?
```

This query might return :CURSOR:HBARS:UNITS BASE indicating that the units for the horizontal bar cursors are base.

CURSor:MODE

Description

This command sets or queries whether the two cursors move together in unison or separately. This command is the equivalent of selecting Cursor Mode from the Cursors menu and then choosing from the drop-down list.

Group

Cursor

Syntax 1

```
CURSor:MODE {TRACk|INDePendent}
```

Syntax 2

```
CURSor:MODE?
```

Arguments

- TRACk
This ties the navigational functionality of the two cursors together.
For cursor 1 adjustments, this ties the movement of the two cursors together. However, cursor 2 continues to move independently of cursor 1.
- INDePendent
This frees the two cursors to be independently adjusted.

Example 1

```
CURSor:MODE TRACk
```

This command specifies that the cursor positions move in unison.

Example 2

```
CURSor:MODE?
```

This query might return :CURSOR:MODE TRACk indicating that the two cursors move in unison.

CURSor:PAIred

Description

This command positions the active paired cursors to the position defined by the DATA:STARt or DATA:STOP command. This query returns the current paired cursor settings.

Group

Cursor

Related Commands

DATA:STARt, DATA:STOP

Syntax 1

CURSor:PAIred SNAp

Syntax 2

CURSor:PAIred?

Arguments

- SNAp
This positions the paired cursors at DATA:START and DATA:STOP.

Returns

A string for horizontal units and two floating point values with an exponent for cursors1 position and cursors2 position.

Example 1

CURSor:PAIred SNAp

Specifies the positions of the cursors at the current DATA:START and DATA:STOP values.

Example 2

CURSor:PAIred?

This query might return :CURSOR:PAIRED:POSITION1 - 2.0000E-03;POSITION2 2.0000E-03;UNITS BASE

CURSor:PAIred:HDELTA?

Description

This query-only command returns the vertical difference between the cursors1 and cursors2 paired cursors. This is the absolute value of the vertical position for cursors1 minus the vertical position for cursors2.

Group

Cursor

Related Commands

CURSor:SPLit:HDELTA?

Syntax

CURSor:PAIred:HDELTA?

Returns

<NR3>

Example

CURSor:PAIred:HDELTA?

This query might return :CURSOR:PAIRED:HDELTA 5.0800E+00, indicating that the voltage difference between the two cursors is 5.08 V.

CURSor:PAIred:HPOS<x>?

Description

This query-only command returns the voltage at the vertical position of the cursor<x> paired cursor. The paired cursor can be either 1 or 2.

Group

Cursor

Related Commands

CURSor:FUNction

Syntax

CURSor:PAIred:HPOS<x>?

Returns

A floating point value that indicates the vertical position of the selected paired cursor.

Example

CURSor:PAIred:HPOS1?

This query might return :CURSOR:PAIRED:HPOS1 -64.0000E-03, indicating that the vertical position of cursors1 is at -64 mV.

CURSor:PAIred:POSITION<x>

Description

This command sets or queries the horizontal position (typically in time) of the cursor<x> paired cursor. The paired cursor can be either 1 or 2. This command is equivalent to selecting Cursor Position from the Cursors menu and then viewing or editing the desired cursor position.

Group

Cursor

Related Commands

CURSor:FUNction

Syntax 1

CURSor:PAIred:POSITION<x> <NRf>

Syntax 2

CURSor:PAIred:POSITION<x>?

Argument

- <NRf>

This specifies the horizontal position of the cursor<x> paired cursor, which ranges from 1 to 2. The cursor position can appear in units of base or 1/base.

Example 1

CURSor:PAIred:POSITION1 9.0000E-06

This command specifies that the first paired cursor is at 9 μ s.

Example 2

CURSor:PAIred:POSITION1?

This query might return :CURSOR:PAIRED:POSITION
1.0000E-06, indicating that the first paired cursor is at 1 μ s.

CURSor:PAIred:UNIts?

Description

This query-only command requests the units for the paired cursors.

Group

Cursor

Syntax

CURSor:PAIred:UNIts?

Returns

The unit of measurement.

Example

CURSor:PAIred:UNIts?

This query might return: :CURSOR:PAIRED:UNITS BASE,
indicating that base is the unit of measurement.

CURSor:PAIred:VDELTA?

Description

This query-only command requests the time distance between paired cursors. It returns the absolute value of the first cursor less the second cursor horizontal positions. The position can appear in units of base and 1/base.

Group

Cursor

Syntax

CURSor:PAIred:VDELTA?

Returns

<NR3>

Example

CURSor:PAIred:VDELTA?

This query might return :CURSOR:PAIRED:VDELTA
1.0640E+00, indicating that time between the paired cursors is
1.064 s.

CURSor:SOURce

Description

This command sets and queries the source for horizontal bar, vertical bar and paired cursors, and both sets and queries the source for split cursor1. This command is equivalent to selecting Cursor Setup from the Cursors menu and then choosing the desired cursor source.

Group

Cursor

Related Commands

CURSor:SPLit:SOURCE2

Syntax 1

CURSor:SOURce {CH<x>|MATH<x>|REF<x>}

Syntax 2

CURSor:SOURce?

Arguments

- CH<x>
This is an input channel waveform. The valid channel waveform range is from 1 through 4 for four-channel instruments or 1 through 2 for two channel-instruments.
- MATH<x>
This is a math waveform. The valid math waveform range is from 1 through 4 for four-channel instruments or 1 through 2 for two channel-instruments.
- REF<x>
This is a reference waveform. The valid reference waveform range is from 1 through 4 for four-channel instruments or 1 through 2 for two channel-instruments.

Returns

Any valid waveform.

Example 1

CURSor:SOURce CH2

This command sets the cursor source to channel2.

Example 2

CURSor:SOURce?

This query might return :CURSOR:SOURCE CH2, indicating that the cursor source is channel2.

CURSor:SPLit

Description

This command positions the split cursors to positions defined by DATA:START and DATA:STOP (or maximum record length, if DATA:STOP is greater than the maximum record length). The query form of this command returns the units, positions, and second source of the split cursors.

Group

Cursor

Related Commands

DATA:START, DATA:STOP

Syntax 1

```
CURSor:SPLit SNAP
```

Syntax 2

```
CURSor:SPLit?
```

Argument

- SNAP

This specifies that the vertical bar cursor positions will snap to the DATA:START and DATA:STOP.

Example 1

```
CURSor:SPLit SNAP
```

This command specifies that the cursor positions will snap to DATA:START and DATA:STOP positions.

Example 2

```
CURSor:SPLit?
```

```
This query might return: :CURSOR:SPLIT:POSITION1 -  
1.9992E+01  
:POSITION2 -1.7996E+01;SOURCE2 CH1;UNITS BASE.
```

CURSor:SPLit:HDELTA?

Description

This query-only command returns the vertical (volts) difference between cursor1 and cursor2. These values are represented on screen by the "X" markers (placed where the cursor marker and the waveform intersect).

Group

Cursor

Syntax

```
CURSor:SPLit:HDELTA?
```

Example

CURSor:SPLit:HDELTA?

This query might return :CURSOR:SPLIT:HDELTA
3.1400E+00, indicating that the vertical difference between two
split cursors is 3.14 V.

CURSor:SPLit:HPOS<x>?

Description

This query-only command returns the vertical position of
cursor<x> (that point where the Vbar intersects with the
waveform), which can be specified as 1 or 2.

Group

Cursor

Related Commands

CURSor:SPLit:HDELTA

Syntax

CURSor:SPLit:HPOS<x>?

Example

CURSor:SPLit:HPOS1?

This query might return :CURSOR:SPLIT:HPOS1 2.5400E+00,
indicating that the vertical position of cursor1 and cursor2 is
2.54 V.

CURSor:SPLit:POSITION<x>

Description

This command returns or sets the horizontal position of the
cursor<x> vertical bar markers. The value of x can be 1 or 2.
This command is equivalent to selecting Cursor Setup from the
Cursors menu and then entering the desired Cursor Position.

Group

Cursor

Syntax 1

CURSor:SPLit:POSITION<x>; <NRf>

Syntax 2

CURSor:SPLit:POSITION<x>?

Argument

- <NRf>
This specifies the horizontal position of the cursor<x>
cursor, which ranges from 1 to 2. The cursor position can
appear in units of base or 1/base.

Example 1

```
CURSor:SPLit:POSITION2 350E-6
```

This command sets the position of cursor2 to 350 μ s.

Example 2

```
CURSor:SPLit:POSITION1?
```

This query might return :CURSOR:SPLIT:POSITION1 - 204.0000E-09, indicating the position of cursor1 is 204 ns.

CURSor:SPLit:SOURCE2

This command sets or returns the source waveform associated with split cursor2. This command is equivalent to selecting Cursor Setup from the Cursors menu and then entering the desired cursor 2 Source.

Group

Cursor

Related Commands

```
CURSor:SOURce
```

Syntax 1

```
CURSor:SPLit:SOURCE2
```

Syntax 2

```
CURSor:SPLit:SOURCE2?
```

Arguments

- CH<x>
This is an input channel. The valid channel waveform range is from 1 through 4 for four-channel instruments or 1 through 2 for two-channel instruments.
- MATH<x>
This is a math waveform. The valid math waveform range is from 1 through 4 for four-channel instruments or 1 through 2 for two-channel instruments.
- REF<x>
This is a reference waveform. The valid reference waveform range is from 1 through 4 for four-channel instruments or 1 through 2 for two-channel instruments.

Example 1

```
CURSor:SPLit:SOURCE2 CH3
```

This command sets cursor2 source to Channel3.

Example 2

```
CURSor:SPLit:SOURCE2?
```

This query might return :CURSOR:SPLIT:SOURCE2 MATH2, indicating that the source associated with cursor2 is Math2.

CURSor:SPLit:UNIts

Description

This command returns or sets the amplitude units of the split cursors.

Group

Cursor

Syntax 1

```
CURSor:SPLit:UNIts
```

Syntax 2

```
CURSor:SPLit:UNIts?
```

Example 1

```
CURSor:SPLit:UNIts BASE
```

This command sets the amplitude units of the split cursors to base.

Example 2

```
CURSor:SPLit:UNIts?
```

This query might return `:CURSOR:SPLIT:UNITS BASE`, indicating that base is the current setting for split cursor amplitude units.

CURSor:SPLit:VDELTA?

Description

This command returns the horizontal (time) difference between the split cursors. It returns the absolute value of the first cursor less the second cursor horizontal positions. Note that the split cursor values are for source1 and source2, and the sources can be located on different waveforms. The position can appear in units of base and 1/base.

Group

Cursor

Syntax

```
CURSor:SPLit:VDELTA?
```

Example

```
CURSor:SPLit:VDELTA?
```

This command might return `:CURSOR:SPLIT:VDELTA 1.0640E+00`, indicating that the time between the vertical bar cursors is 1.064 s.

CURSor:STATE

Description

This command sets or returns the state of the cursor. The cursor can either be turned on or off. Note that setting the cursor state does not modify the cursor type. This command is equivalent to pressing the CURSOR button on the front panel.

Group

Cursor

Related Commands

CURSor:FUNCTion OFF

Syntax 1

```
CURSor:STATE {ON|OFF}
```

Syntax 2

```
CURSor:STATE?
```

Arguments

- ON
This displays the cursor.
- OFF
This removes the cursor from display.

Example 1

```
CURSor:STATE ON
```

This command displays the cursor.

Example 2

```
CURSor:STATE?
```

This query might return :CURSOR:STATE ON, indicating that the cursor is active on the display.

CURSor:VBArS

Description

This command positions the vertical bar cursor to the position defined by DATA:STARt or DATA:STOP. This query returns the current vertical bar settings for horizontal position and units.

Group

Cursor

Related Commands

DATA:STARt, DATA:STOP

Syntax 1

```
CURSor:VBArS?
```

Syntax 2

CURSor:VBArS SNAp

Argument

- SNAp

This positions the vertical bar cursors at DATA:START and DATA:STOP.

Example 1

CURSor:VBArS?

This query might return :CURSOR:VBARS:UNITS SECONDS
;POSITION1 1.0000E-06;POSITION2 9.0000E-06

Example 2

CURSor:VBArS SNAp

This command positions the vertical bar cursor to the position defined by DATA:START or DATA:STOP.

CURSor:VBArS:DELTA?

Description

This query-only command returns the difference between the two vertical bar cursors. The units are specified by the CURSor:VBArS:UNItS command. The position can appear in units of Base or 1/Base.

Group

Cursor

Related Commands

CURSor:VBArS:UNItS

Syntax

CURSor:VBArS:DELTA?

Returns

A floating point value with an exponent.

Example

CURSor:VBArS:DELTA?

This command might return :CURSOR:VBARS:DELTA
1.0640E+00, indicating that the time between the vertical bar
cursors is 1.064 s.

CURSor:VBArS:POSITION<x>

Description

This command sets or queries the horizontal position for both vertical bar and paired cursors. Values are with respect to trigger position or the zero reference point for the designated waveform (if horizontal units are not set to time). Use the CURSor:VBArS:UNItS command to specify units. The position can appear in units of base or 1/base.

This command is the equivalent of selecting Cursor Setup from the Cursors menu, selecting the V Bars Cursor Type and then viewing or editing the desired cursor position.

Group

Cursor

Related Commands

CURSor:VBArS:UNItS

Syntax 1

```
CURSor:VBArS:POSITION<x> <NRf>
```

Syntax 2

```
CURSor:VBArS:POSITION<x>?
```

Argument

<NRf>

Specifies the cursor position.

Returns

A floating point value with an exponent.

Example 1

```
CURSor:VBArS:POSITION2 9.00E-6
```

Positions the cursor2 vertical bar cursors at 9 ms.

Example 2

```
CURSor:VBArS:POSITION1?
```

This command might return :CURSOR:VBARS:POSITION1
1.0000E-06, indicating the cursor1 vertical bar is at 1 ms.

CURSor:VBArS:UNItS

Description

This command sets or queries the units for the vertical bar cursors.

Group

Cursor

Syntax 1

```
CURSor:VBArS:UNItS
```

Syntax 2

`CURSOR:VBARS:UNITS?`

Arguments

- `SECONDS`
This argument sets the units of the VBARS for the time domain (seconds).
- `HERTZ`
This argument sets the units of the VBARS for the frequency domain (hertz).

Returns

A string for `SECONDS` or `HERTZ`, depending upon current vertical bar cursor units.

Example 1

`CURSOR:VBARS:UNITS HERTZ`

Sets the units of the VBARS cursors to 1/seconds.

Example 2

`CURSOR:VBARS:UNITS?`

This command might return `:CURSOR:VBARS:UNITS SECONDS`, indicating that the units for the vertical bar cursor are currently set to seconds.

CURVe

Description

This command transfers waveform data to and from the instrument. Each waveform that is transferred has an associated waveform preamble that contains information such as data format and scale.

The `CURVe?` query transfers data from the instrument. The data source is specified by the `DATA:SOURCE` command. The first and last data points are specified by the `DATA:START` and `DATA:STOP` commands.

The `CURVe` command transfers waveform data to the instrument. The data is stored in the reference memory location specified by `DATA:DESTINATION`, starting with the data point specified by `DATA:START`. Only one waveform can be transferred at a time. The waveform will only be displayed if the reference is displayed.

Group

Waveform Transfer

Related Commands

`DATA:DESTINATION`, `DATA:SOURCE`, `DATA:START`, `DATA:STOP`, `SAVE:WAVEFORM`, `SAVE:WAVEFORM:FILEFORMAT`, `WFMINPRE`,

WFMInpre:BYT_Nr, WFMOutpre, WFMInpre:NR_FR?,
WFMOutpre:NR_FR?

Syntax 1

CURVe {<Block>|<asc curve>}

Syntax 2

CURVe?

Arguments

- <Block>

This is the waveform data in binary format. The waveform is formatted as: #<x><yyy><data><newline>, where

<x> is the number of y bytes. For example, if <yyy>=500, then <x>=3)

<yyy> is the number of bytes to transfer. If width is 1, then all bytes on the bus are single data points. If width is 2, then all bytes on the bus are 2-byte pairs. If width is 4, then all bytes on the bus are 4-byte pairs. Use the WFMInpre:BYT_Nr command to set the width.

<data> is the curve data.

<newline> is a single byte new line character at the end of the data.

- <asc curve>

This is the waveform data in ASCII format. The format for ASCII data is <NR1>[,<NR1>...], where each <NR1> represents a data point.

Example 1

CURVe?

This query with ASCII encoding, start and stop of 1 and 10 respectively, and a width set to 1 might return :CURVE
61,62,61,60,60,-59,-59,-58,-58,-59

Example 2

CURVe <Block>

This command sets the format of the waveform data, transferred to and from the instrument, to binary format.

DATA

Description

This command sets or queries the format and location of the waveform data that is transferred with the CURVe command.

Group

Waveform Transfer

Related Commands

CURVe, DATA:START, DATA:STOP, DATA:ENCdg
SAVE:WAVEform, SAVE:WAVEform:FILEFormat,
WFMinpre:NR_FR?, WFMinpre:NR_Pt, WFMOupre:NR_FR?,
WFMOupre:NR_Pt?

Syntax 1

DATA { INIT|SNAP }

Syntax 2

DATA?

Argument

- INIT
This initializes the waveform data parameters to their factory defaults.
- SNAP
This sets DATA:START and DATA:STOP to match the current V Bar/Paired/Split cursor positions.

Example 1

DATA?

This query might return :DATA:DESTINATION REF1:ENCDG
RIBINARY;SOURCE CH1;START 1;STOP 500

Example 2

DATA INIT

This command initializes the waveform data parameters to their factory defaults.

DATA:DESTINATION

Description

This command sets or queries the reference memory location for storing waveform data that is transferred into the instrument by the CURVe command.

Group

Waveform Transfer

Related Commands

CURVe

Syntax 1

DATA:DESTINATION REF<x>

Syntax 2

DATA:DESTINATION?

Argument

- REF<x>

This is the reference where the waveform will be stored. The reference number is specified by x, which ranges from 1 through 4.

Example 1

DATA:DESTINATION?

This query might return :DATA:DESTINATION REF3, indicating that reference 3 is the currently selected reference memory location for waveform data.

Example 2

DATA:DESTINATION REF1

This command indicates that incoming waveform data be stored in reference 1.

DATA:ENCdg

Description

This command sets or queries the format of outgoing waveform data. This command is equivalent to setting WFMOutpre:ENCdg, WFMOutpre:BN_Fmt, and WFMOutpre:BYT_Or. Setting the DATA:ENGdg value causes the corresponding WFMOutpre values to be updated and visa versa.

Note: Values are constrained (for outbound data) to the format of the data specified by DATA:SOURCE.

Group

Waveform Transfer

Related Commands

WFMOutpre:ENCdg, WFMOutpre:BN_Fmt,
WFMOutpre:BYT_Or

Syntax 1

DATA:ENCdg
{ASCIi|FAStest|RIBinary|RPBinary|FPBinary|SRIBinary|SRPbinary|SFPbinary}

Syntax 2

DATA:ENCdg?

Argument

- **ASCIi**
This specifies the ASCII representation of signed INT, FLOAT. If ASCII is the value, then :BN_Fmt and :BYT_Or are ignored.
- **FAStest**
This specifies that the data be sent in the fastest possible manner consistent with maintaining accuracy and is interpreted with respect to the first waveform specified in the DATA:SOURce list.

:ENCdg will always be BIN, :BYT_Or will always be LSB, but :BN_Fmt and :BYT_Nr will depend on the first DATA:SOURce waveform. :BN_Fmt will be RI unless the waveform is internally stored as a floating point number, in which case the FP format will be used.
- **RIBinary**
This specifies signed integer data point representation with the most significant byte transferred first.

When :BYT_Nr is 1, the range is from -128 through 127.
When :BYT_Nr is 2, the range is from -32,768 through 32,767. When :BYT_Nr is 8, then the waveform being queried has been set to Fast Acquisition mode. Center screen is 0 (zero). The upper limit is one division above the top of the screen and the lower limit is one division below the bottom of the screen. This is the default argument.
- **RPBinary**
This specifies the positive integer data-point representation, with the most significant byte transferred first.

When :BYT_Nr is 1, the range from 0 through 255. When :BYT_Nr is 2, the range is from 0 to 65,535. When :BYT_Nr is 8, then the waveform being queried has been set to Fast Acquisition mode. The center of the screen is 127. The upper limit is one division above the top of the screen and the lower limit is one division below the bottom of the screen.
- **FPBinary**
This specifies the floating point (width = 4) data.

The range is from -3.4×10^{38} to 3.4×10^{38} . The center of the screen is 0. The upper limit is one division above the top of the screen and the lower limit is one division below the bottom of the screen.

The FPBinary argument is only applicable to math waveforms or ref waveforms saved from math waveforms.

- **SRBinary**
This is the same as RIBinary except that the byte order is swapped, meaning that the least significant byte is transferred first. This format is useful when transferring data to IBM compatible PCs.
- **SRPbinary**
This is the same as RPBinary except that the byte order is swapped, meaning that the least significant byte is transferred first. This format is useful when transferring data to PCs.
- **SFPbinary**
This specifies floating point data in IBM PC format.
The SFPbinary argument only works on math waveforms or ref waveforms saved from math waveforms

DATA and WFMOUTPRE Parameter Settings				
DATA:ENCdg Setting	WFMOUTPRE Settings			
	:ENCdg	:BN_Fmt	:BYT_Or	:BYT_NR
AScii	ASC	N/A	N/A	1, 2, 4, 8
FASText	BIN	RI/FP	MSB	1, 2, 4
RIBinary	BIN	RI	MSB	1, 2, 8
RPBinary	BIN	RP	MSB	1, 2, 8
FPBinary	BIN	FP	MSB	4
SRBinary	BIN	RI	LSB	1, 2, 8
SRPbinary	BIN	RP	LSB	1, 2, 8
SFPbinary	BIN	FP	LSB	4

Example 1

DATA:ENCdg?

This query might return :DATA:ENCDG SRPBINARY for the format of the outgoing waveform data.

Example 2

DATA:ENGdg RPBinary

This command sets the data encoding format to be a positive integer where the most significant byte is transferred first.

DATA:SOURce

Description

This command sets or queries the location of waveform data that is transferred from the instrument by the CURVe? Query.

Group

Waveform Transfer

Related Commands

CURVe?

Syntax 1

DATA:SOURce <wfm> [<, ><wfm>]

Syntax 2

DATA:SOURce?

Argument

- <wfm>

This is the location of the waveform data that will be transferred from the instrument to the controller.

Example 1

DATA:SOURce?

This query might return :DATA:SOURCE REF3, indicating that the source for the waveform data which is transferred using a CURVe? Query is reference 3.

Example 2

DATA:SOURce CH1

This command specifies that the CH1 waveforms will be transferred in the next CURVe? query.

DATA:START

Description

This command sets or queries the starting data point for waveform transfer. This command allows for the transfer of partial waveforms to and from the instrument.

Group

Waveform Transfer

Related Commands

CURVe, DATA, DATA:STOP, SAVE:WAVEform, SAVE:WAVEform:FILEFormat, WFMInpre:NR_Pt, WFMOutpre:NR_Pt, WFMInpre:NR_FR?, WFMOutpre:NR_FR?

Syntax 1

DATA:START <NR1>

Syntax 2

DATA:START?

Argument

- <NR1>

This is the first data point that will be transferred, which ranges from 1 to the record length. Data will be transferred from <NR1> to DATA:STOP or the record length, whichever is less. If <NR1> is greater than the record length, the last data point in the record is transferred.

DATA:START and DATA:STOP are order independent.
When DATA:STOP is greater than DATA:START, the values will be swapped internally for the CURVE? query.

Example 1

DATA:START?

This query might return :DATA:START 214, indicating that data point 214 is the first waveform data point that will be transferred.

Example 2

DATA:START 10

This command specifies that the waveform transfer will begin with data point 10.

DATA:STOP

Description

This command sets or queries the last data point that will be transferred when using the CURVE? query. This command allows for the transfer of partial waveforms to the controller.

Changes to the record length value are not automatically reflected in the data:stop value. As record length is varied, the data:stop value must be explicitly changed to ensure the entire record is transmitted. In other words, curve results will not automatically and correctly reflect increases in record length if the distance from data:start to data:stop stays smaller than the increased record length.

Note: When using the CURVE command, DATA:STOP is ignored and WFMInpre:NR_Pt is used.

Group

Waveform Transfer

Related Commands

CURVE, DATA, DATA:START, SAVE:WAVEform, SAVE:WAVEform:FILEFormat, WFMInpre:NR_Pt, WFMOutpre:NR_Pt, WFMInpre:NR_FR?, WFMOutpre:NR_FR?

Syntax 1

DATA:STOP <NR1>

Syntax 2

DATA:STOP?

Argument

- <NR1>

This is the last data point that will be transferred, which ranges from 1 to the record length. If <NR1> is greater than the record length, then data will be transferred up to the record length. If both DATA:START and DATA:STOP are

greater than the record length, the last data point in the record is returned.

DATA:START and DATA:STOP are order independent. When DATA:STOP is less than DATA:START, the values will be swapped internally for the CURVE? query.

If you always want to transfer complete waveforms, set DATA:START to 1 and DATA:STOP to the maximum record length, or larger.

Example 1

```
DATA:STOP?
```

This query might return :DATA:STOP 14900, indicating that 14900 is the last waveform data point that will be transferred.

Example 2

```
DATA:STOP 15000
```

This command specifies that the waveform transfer will stop at data point 15000.

DATE

Description

This command sets or queries the date that the instrument can display. This command is equivalent to selecting Set Date & Time from the Utilities menu and then setting the fields in the Date group box.

Group

Miscellaneous

Related Commands

TIME

Syntax 1

```
DATE <Qstring>
```

Syntax 2

```
DATE?
```

Argument

- <QString>

This is a date in the form "yyyy-mm-dd" where yyyy refers to a four-digit year number, mm refers to a two-digit month number from 01 to 12, and dd refers to a two-digit day number in the month.

Example 1

```
DATE "2000-01-24"
```

This command specifies that the date is set to January 24, 2000.

Example 2

DATE?

This query might return :DATE 2000-01-24, indicating the current date is set to January 24, 2000.

DELEte:SETUp

Description

This command (no query form) changes the setup to reference the factory setup instead of the specific user setup slot. The content of the setup slot is unchanged, but the data will no longer be accessible to you. This command is equivalent to selecting Instrument Setup from the File menu, choosing the Delete Setups tab, and then clicking the Delete button for the specific setup you want to delete (or delete all).

Note: The setup information cannot be recovered once it has been deleted.

Group

Save and Recall

Related Commands

*RCL?, RECall:SETUp, *RST, *SAV, SAVe:SETUp, *SDS

Syntax

DELEte:SETUp {ALL|<NR1>}

Arguments

- ALL
This argument deletes all the stored setups.
- <NR1>
This argument specifies a setup storage location to delete. Setup storage location values range from 1 through 10; using an out-of-range value causes an error.

Example

DELEte:SETUp ALL

This command deletes all stored setups. All ten storage locations are initialized to the factory default setup.

DELEte:WAVEform

Description

This command (no query form) deletes one or all stored reference waveforms from memory. This command is equivalent to selecting Reference Waveforms from the File menu and choosing Reference Setup from the drop-down list (when deleting individual reference waveforms) or selecting Delete All Refs from the File menu (when deleting all reference waveforms).

Group

Save and Recall

Related Commands

RECALL:WAVEform, Save:WAVEform

Syntax

```
DELEte:WAVEform {ALL|REF<x>}
```

Arguments

- ALL
This specifies to delete all the stored reference waveforms.
- REF<x>
This specifies to delete one of the reference memory locations. Reference memory location values range from 1 through 4.

Example 1

```
DELEte:WAVEform ALL
```

This command removes all waveforms stored in reference memory.

Example 2

```
DELEte:WAVEform REF2
```

This command removes the waveform stored at REF2.

DESE

Description

This command sets and queries the bits in the Device Event Status Enable Register (DESER). The DESER is the mask that determines whether events are reported to the Standard Event Status Register (SESR), and entered into the Event Queue. For a more detailed discussion of the use of these registers, see Registers.

Group

Status and Error

Related Commands

*CLS, *ESE, *ESR?, *EVENT?, EVMsg?, *SRE, *STB?

Syntax 1

```
DESE <NR1>
```

Syntax 2

```
DESE?
```

Argument

- <NR1>
The binary bits of the DESER are set according to this value,

which ranges from 1 through 255. For example, DESE 209 sets the DESER to the binary value 11010001 (that is, the most significant bit in the register is set to 1, the next most significant bit to 1, the next bit to 0, etc.).

The power-on default for DESER is all bits set if *PSC is 1. If *PSC is 0, the DESER maintains the previous power cycle value through the current power cycle.

Note: Setting the DESER and ESER to the same value allows only those codes to be entered into the Event Queue and summarized on the ESB bit (bit 5) of the Status Byte Register. Use the *ESE command to set the ESER.

Example 1

DESE 209

This sets the DESER to binary 11010001, which enables the PON, URQ, EXE and OPC bits.

Example 2

DESE?

This query might return

:DESE 186,

This shows that the DESER contains the binary value 10111010.

DIAG:CONTROL:HALT

Description

This command (no query form) determines whether the next execution of diagnostics will stop on the first diagnostic failure that occurs or will execute the selected set of diagnostic functions. This command is equivalent to selecting Instrument Diagnostics from the Utilities menu and then enabling Halt on Fail.

Group

Diagnostics

Related Commands

DIAG:CONTROL:LOOP

Syntax

DIAG:CONTROL:HALT (ON|OFF|<NR1>}

Arguments

- ON
This enables the halt function, causing the execution of diagnostics to halt at the first diagnostic failure that occurs.
- OFF
This disables the halt function, allowing the oscilloscope to execute the entire set of diagnostics before halting, even if

diagnostic failure occurs.

- <NR1>
A 0 enables the halt function; any other value disables the halt function.

Example

```
DIAG:CONTROL:HALT ON
```

This command enables the halt function, causing the execution of diagnostics to halt at the first diagnostic failure that occurs.

DIAG:CONTROL:LOOP

Description

This command (no query form) determines whether the next execution of diagnostics executes once or continuously loops on the selected set of diagnostics (assuming the halt control is set to off using the DIAG:CONTROL:HALT command or that the halt control is set to ON but no failures occur). This command is equivalent to selecting Instrument Diagnostics from the Utilities menu and then enabling Loop Control.

Group

Diagnostics

Related Commands

DIAG:CONTROL:HALT, DIAG:STOP

Syntax

```
DIAG:CONTROL:LOOP {ON|OFF|<NR1>}
```

Arguments

- ON
This enables the loop function, causing the execution of diagnostics to continuously loop.
- OFF
This disables the loop function, causing the oscilloscope to execute the entire set of diagnostics once and then halt.
- <NR1>
A 0 enables the loop function; any other value disables the loop function.

Example

```
DIAG:CONTROL:LOOP ON
```

This command enables the loop function.

DIAg:EXECUTE

Description

This command (no query form) starts the execution of the currently selected set of diagnostics. This command is equivalent to selecting Instrument Diagnostics from the Utilities menu and then pressing Run.

Group

Diagnostics

Related Commands

DIAg:STATE

Syntax

DIAg : EXECUTE

Example

DIAg : EXECUTE

This command starts the execution of the entire set of diagnostics.

DIAg:ITEM?

Description

This query-only command returns diagnostics settings. This command is equivalent to selecting Instrument Diagnostics from the Utilities menu and then reviewing the diagnostics settings. This query-only command can be issued while diagnostics are still in progress.

Group

Diagnostics

Related Commands

DIAg:ITEM:FAILURES?, DIAg:ITEM:NAME?,
DIAg:ITEM:RESULT?, DIAg:ITEM:SUBITEMS?

Syntax

DIAg : ITEM? <NR1>

Arguments

- <NR1>
This sets the index item about which data will be returned, which ranges from 0 through 15.

Example

DIAg : ITEM? 2

This query might return

:DIAG : ITEM "TRIGGER" , "FAIL" , 2 , 7

DIAG:ITEM:FAILURES?

Description

This query-only command returns the total number of failures. This command is equivalent to selecting Instrument Diagnostics from the Utilities menu and then reviewing the Diagnostic Status.

This query-only command can be issued while diagnostics are still in progress.

Group

Diagnostics

Related Commands

DIAG:ITEM?, DIAG:ITEM:NAME?, DIAG:ITEM:RESULT?, DIAG:ITEM:SUBITEMS?

Syntax

```
DIAG:ITEM:FAILURES? <NR1>
```

Arguments

- <NR1>
This sets the index item about which data will be returned, which ranges from 0 through 15.

Example

```
DIAG:ITEM:FAILURES? 2
```

This query might return

```
:DIAG:ITEM:FAILURES 2
```

This indicates the number of failures.

DIAG:ITEM:NAME?

Description

This query-only command returns the name of the selected menu item. This command is equivalent to selecting Instrument Diagnostics from the Utilities menu and then reviewing the Subsystem, Area and Test settings.

This query-only command can be issued while diagnostics are still in progress.

Group

Diagnostics

Related Commands

DIAG:ITEM?, DIAG:ITEM:FAILURES?,
DIAG:ITEM:RESULT?, DIAG:ITEM:SUBITEMS?

Syntax

DIAG:ITEM:NAME? <NR1>

Arguments

- <NR1>
This sets the index item about which data will be returned, which ranges from 0 through 15.

Example

DIAG:ITEM:NAME? 2

This query might return

:DIAG:ITEM:NAME "TRIGGER"

This indicates that the selected menu item is Trigger.

DIAG:ITEM:RESULT?

Description

This query-only command returns the result from the last execution of the item. This command is equivalent to selecting Instrument Diagnostics from the Utilities menu and then reviewing the Diagnostic Status.

This query-only command can be issued while diagnostics are still in progress.

Group

Diagnostics

Related Commands

DIAG:ITEM?, DIAG:ITEM:NAME?, DIAG:ITEM:FAILURES?,
DIAG:ITEM:SUBITEMS?

Syntax

DIAG:ITEM:RESULT? <NR1>

Arguments

- <NR1>
This sets the index item about which data will be returned, which ranges from 0 through 15.

Example 1

DIAG:ITEM:RESULT? 2

This query might return

:DIAG:ITEM:RESULT "PASS"

This indicates that the item passed during the last execution.

Example 2

DIAG:ITEM:RESULT? 2

This query might return

:DIAG:ITEM:RESULT "FAIL"

This indicates that the item failed during the last execution.

Example 3

DIAG:ITEM:RESULT? 2

This query might return

:DIAG:ITEM:RESULT "*****"

This indicates that the item was not run.

DIAG:ITEM:SUBITEMS?

Description

This query-only command returns the number of sub-items associated with the item. This command is equivalent to selecting Instrument Diagnostics from the Utilities menu, choosing the Subsystem, Area or Test setting and then reviewing the resulting sub-items.

This query-only command can be issued while diagnostics are still in progress.

Group

Diagnostics

Related Commands

DIAG:ITEM?, DIAG:ITEM:NAME?, DIAG:ITEM:FAILURES?,
DIAG:ITEM:RESULT?

Syntax

```
DIAG:ITEM:SUBITEMS? <NR1>
```

Arguments

- <NR1>
This sets the index item about which data will be returned, which ranges from 0 through 15.

Example

```
DIAG:ITEM:SUBITEMS? 2
```

This query might return

```
:DIAG:ITEM:SUBITEMS 15
```

This indicates that there are 15 sub-items associated with the selected item.

DIAG:LEVEL

Description

This command sets or returns the currently selected level of diagnostic test hierarchy. This command is equivalent to selecting Instrument Diagnostics from the Utilities menu and then reviewing the Diagnostic Status.

Group

Diagnostics

Syntax 1

```
DIAG:LEVEL (SUBSYS|AREA|TEST)
```

Syntax 2

```
DIAG:LEVEL?
```

Arguments

- SUBSYS
This sets diagnostic testing to the subsystem level.
- AREA
This sets diagnostic testing to the area level.
- TEST
This sets diagnostic testing to the test level.

Example 1

```
DIAG:LEVEL AREA
```

This command sets the level of diagnostic test hierarchy to Area.

Example 2

```
DIAG:LEVEL?
```

This query might return

```
:DIAG:LEVEL SUBSYS
```

This indicates that the current level of diagnostic test hierarchy is Subsys.

DIAG:LOOPS?

Description

This query-only command returns the number of times that the selected diagnostics set was completed during the last diagnostic execution. This command is equivalent to selecting Instrument Diagnostics from the Utilities menu and then reviewing the Elapsed Loops.

This query-only command can be issued while diagnostics are still in progress.

Group

Diagnostics

Syntax

DIAG:LOOPS?

Example

DIAG:LOOPS?

This query might return

```
:DIAG:LOOPS 5
```

This indicates that the selected set of diagnostics was completed five times during the last diagnostic execution.

DIAG:NAME?

Description

This query-only command returns the names of the subsystem, area, and test of the current diagnostic test.

This query-only command can be issued while diagnostics are still in progress.

Group

Diagnostics

Related Commands

DIAG:NAME:AREA?, DIAG:NAME:SUBSYS?,
DIAG:NAME:TEST?

Syntax

DIAG:NAME?

Example

DIAG:NAME?

This query might return

```
:DIAG:NAME:SUBSYS "Acquisition";AREA  
"Memory";TEST"diag Data Format"
```

This indicates the subsystem name, area name, and test name of the currently selected diagnostic test.

DIAG:NAME:AREA?

Description

This query-only command returns the selected area of the current diagnostic test. There are three levels of diagnostic test hierarchy: subsystem, area and test. This command is equivalent to selecting Instrument Diagnostics from the Utilities menu and then reviewing the Diagnostic Status.

This query-only command can be issued while diagnostics are still in progress.

Group

Diagnostics

Related Commands

DIAG:NAME?, DIAG:NAME:SUBSYS?, DIAG:NAME:TEST?

Syntax

DIAG:NAME:AREA?

Example

DIAG:NAME:AREA?

This query might return

:DIAG:NAME:AREA "Memory"

This indicates the selected area name of the current diagnostic test.

DIAG:NAME:SUBSYS?

Description

This query-only command returns the subsystem of the current diagnostic test. This command is equivalent to selecting Instrument Diagnostics from the Utilities menu and then reviewing the Diagnostic Status.

This query-only command can be issued while diagnostics are still in progress.

Group

Diagnostics

Related Commands

DIAG:NAME?, DIAG:NAME:AREA?, DIAG:NAME:TEST?

Syntax

DIAG:NAME:SUBSYS?

Example

DIAG:NAME:SUBSYS?

This query might return

```
:DIAG:NAME:SUBSYS "Acquisition"
```

This indicates the subsystem name of the current diagnostic test.

DIAG:NAME:TEST?

Description

This query-only command returns the name of the current diagnostic test. This command is equivalent to selecting Instrument Diagnostics from the Utilities menu and then reviewing the Diagnostic Status.

This query-only command can be issued while diagnostics are still in progress.

Group

Diagnostics

Related Commands

DIAG:NAME?, DIAG:NAME:AREA?, DIAG:NAME:SUBSYS?

Syntax

DIAG:NAME:TEST?

Example

DIAG:NAME:TEST?

This query might return:

```
:DIAG:NAME:TEST "diagDataFormatConf"
```

This indicates the test name of the current diagnostic test.

DIAG:NUMITEMS?

Description

This query-only command returns the number of items on the currently selected level of test hierarchy, which ranges from 1 through 15. This command is equivalent to selecting Instrument Diagnostics from the Utilities menu and then reviewing the Diagnostic Status.

This query-only command can be issued while diagnostics are still in progress.

Group

Diagnostics

Syntax

DIAG:NUMITEMS?

Example

DIAG:NUMITEMS?

This query might return

```
:DIAG:NUMITEMS 7
```

This indicates the number of items on the currently selected level of test hierarchy.

DIAG:RESULts?

Description

This query-only command returns an abbreviated status about the results of the last diagnostic (or test) execution. For a more explanatory status message, use the DIAG:RESULts:VERBose? query. This command is equivalent to selecting Instrument Diagnostics from the Utilities menu and then reviewing the Diagnostic Status.

This query-only command can be issued while diagnostics are still in progress.

Group

Diagnostics

Related Commands

DIAG:RESULts:VERBose?

Syntax

DIAG:RESULts?

Example 1

DIAG:RESULts?

This query might return :DIAG:RESULTS "135", indicating the specific failure code of the first test failure that occurred.

Example 2

DIAG:RESULts?

This query might return :DIAG:RESULTS "Pass", indicating that the last diagnostic test passed.

Example 3

DIAG:RESULts?

This query might return

:DIAG:RESULTS "*****"

This indicates that the diagnostic test was not run.

DIAG:RESULts:VERBoSe?

Description

This query-only command returns a more explanatory message about the results of the last diagnostic (or test) execution than the DIAG:RESULts? query. This command is equivalent to selecting Instrument Diagnostics from the Utilities menu and then reviewing the Diagnostic Status.

This query-only command can be issued while diagnostics are still in progress.

Group

Diagnostics

Related Commands

DIAG:RESULts?

Syntax

DIAG:RESULts:VERBoSe?

Example

DIAG:RESULts:VERBoSe?

This query might return

```
:DIAG:RESULTS:VERBOSE "DIAG ABORTED, ERROR  
15 in A2D-Dmux 1 interconnects"
```

DIAG:SELEct:ALL

Description

This command (no query form) selects all available diagnostics. This command is equivalent to selecting Instrument Diagnostics from the Utilities menu and then choosing ALL from the Subsystem, Area and Test pull-down lists.

Group

Diagnostics

Related Commands

DIAG:NAME:AREA?, DIAG:NAME:SUBSYS?,
DIAG:NAME:TEST?, DIAG:EXECUTE

Syntax

DIAG:SELEct:ALL ALL

Example

DIAG:SELEct:ALL ALL

This command selects all available diagnostics.

DIAG:SElect:AREA

Description

This command (no query form) selects one of the available areas. This command is equivalent to selecting Instrument Diagnostics from the Utilities menu and then selecting an Area from the pull-down list.

Note: This command should be executed only if DIAG:LEVEL is currently set to AREA.

Group

Diagnostics

Related Commands

DIAG:SElect:SUBSYS, DIAG:SElect:TEST,
DIAG:SElect:LAST

Syntax

```
DIAG:SElect:AREA <NR1>
```

Argument

- <NR1>
This selects an area by number, which can range from 0 (zero selects all) through 15 (as specified by DIAG:NUMITEMS).

Example

```
DIAG:SElect:AREA 1
```

This command selects Area 1 as the area to be diagnosed.

DIAG:SElect:LAST

Description

This command (no query form) selects one or more diagnostic menu items to be executed via the DIAG:EXECUTE command. If you specify DIAG:LEVEL SUBSYS, then menu items come from this diagnostic level and are limited to the value returned by the DIAG:NUMITEMS? query. For example, specifying DIAG:SELECT:SUBSYS 2 and DIAG:NUMITEMS 5 indicates that diagnostics will start from subsystem 2 and that you can specify a range from 2 through 5 for DIAG:SElect:LAST.

If you enter:

DIAG:SElect:LAST 2, only subsystem 2 will be executed.

DIAG:SElect:LAST 4, subsystems 2 *through* 4 will be executed.

Group

Diagnostics

Related Commands

DIAG:EXECUTE, DIAG:LEVEL, DIAG:NAME:AREA?,
DIAG:NAME:SUBSYS?, DIAG:NAME:TEST?,
DIAG:NUMITEMS?, DIAG:SElect:SUBSYS

Syntax

DIAG:SElect:LAST <NR1>

Arguments

- <NR1>
This selects an integer that identifies the number of the last item that will be executed when the DIAG:EXECUTE command is run.

Example

DIAG:SElect:LAST 2

This command specifies that (based on the previous example) only subsystem 2 will be executed.

DIAG:SElect:SUBSYS

Description

This command (no query form) selects one of the available subsystems. This command is equivalent to selecting Instrument Diagnostics from the Utilities menu and then choosing a Subsystem from the drop-down list.

Note: This command should be executed only if DIAG:LEVEL is currently set to SUBSYS.

Group

Diagnostics

Related Commands

DIAG:SElect:AREA, DIAG:SElect:TEST, DIAG:SElect:LAST

Syntax

```
DIAG:SElect:SUBSYS <NR1>
```

Argument

- <NR1>
This selects a subsystem by number, which can range from 0 (zero selects ALL) through 15 (as specified by DIAG:NUMITEMS).

Example

```
DIAG:SElect:SUBSYS
```

This command selects Subsystem 1 as the subsystem to be diagnosed.

DIAG:SElect:TEST

Description

This command (no query form) selects one of the available tests. This command is equivalent to selecting Instrument Diagnostics from the Utilities menu and then choosing a Test from the drop-down list.

Note: This command should be executed only if DIAG:LEVEL is currently set to TEST.

Group

Diagnostics

Related Commands

DIAG:SElect:AREA, DIAG:SElect:SUBSYS,
DIAG:SElect:LAST

Syntax

```
DIAG:SElect:TEST <NR1>
```

Arguments

- <NR1>
This selects a test by number, which can range from 0 (zero selects ALL) through 15 (as specified by DIAG:NUMITEMS).

Example

```
DIAG:SElect:TEST 1
```

This command selects Test 1 as the test to be executed.

DIAG:STATE

Description

This command (no query form) changes the oscilloscope operating state. Depending on the argument, diagnostics capabilities are either turned on or off. This command is equivalent to opening the DIAG:STATE dialog (ON) or closing it (OFF).

Group

Diagnostics

Related Commands

TEST:STOP

Syntax

DIAG:STATE {ON|OFF}

Arguments

- ON

This puts the instrument into the state in which diagnostics can be run. This argument is thrown automatically if either the DIAG:EXECUTE or DIAG:TEST commands are executed.

- OFF

This disables diagnostics capabilities and returns the oscilloscope to a normal operating state.

Example

DIAG:STATE OFF

This command turns off diagnostics capabilities and returns the instrument to a normal operating state.

DIAG:STOP

Description

This command (no query form) causes diagnostics (or test) execution to terminate at the end of the next low-level test. This command is equivalent to selecting Instrument Diagnostics from the Utilities menu and then clicking Abort.

Group

Diagnostics

Related Commands

TEST:STOP

Syntax

DIAG:STOP

Example

DIAG:STOP

This command terminates diagnostics (or test) execution at the end of the next low-level test.

DISplay?

Description

This query-only command returns the current display settings. This command is equivalent to selecting Display Setup from the Display menu and then viewing the contents of each tab.

Group

Display Control

Syntax

DISplay?

Example

DISplay?

This query might return

```
:DISPLAY:CLOCK 1;COLOR:PALETTE NORMAL;MATHCOLOR
DEFAULT;REFCOLOR DEFAULT;:DISPLAY:FILTER
SINX;FORMAT YT
;GRATICULE FULL;INTENSITY:WAVEFORM 6.0000E+01
;AUTOBRIGHT 1;SCRENSAVER 1;SCRENSAVERDELAY
28800,
:DISPLAY:PERSISTENCE OFF;STYLE VECTORS;TRIGBAR
SHORT
;TRIGT 0;VARPERSIST 5.0000E-01
```

DISplay:CLOCK

Description

This command sets or queries the display of the date and time. This is equivalent to selecting Display Date & Time from the Display menu. The query form of this command returns an ON (1) or an OFF (0).

Group

Display Control

Syntax 1

```
DISplay:CLOCK {ON|OFF|<NR1>}
```

Syntax 2

```
DISplay:CLOCK?
```

Arguments

- ON
This enables display of date and time.
- OFF
This disables display of date and time.
- <NR1>
A 0 disables display of date and time; any other value enables display of date and time.

Example 1

```
DISplay:CLOCK ON
```

This command enables display of date and time.

Example 2

```
DISplay:CLOCK?
```

This query might return

```
:DISPLAY:CLOCK 1
```

This indicates that the display of date and time is currently enabled.

DISplay:COLOr?

Description

This query-only command returns the settings from the PALETTE, MATHCOLOR and REFCOLOR commands. This is equivalent to selecting Colors from the Display menu.

Group

Display Control

Syntax

```
DISplay:COLOr?
```

Arguments

None

Example

```
DISplay:COLOr?
```

This query might return

```
:DISPLAY:COLOR:PALETTE NORMAL;MATHCOLOR  
DEFAULT;REFCOLOR INHERIT
```

DISplay:COLOr:PALEtte

Description

This command sets or queries the palette to be used for trace display. This is equivalent to selecting Colors from the Display menu and choosing from the displayed color palette options.

Group

Display Control

Related Commands

DISplay:COLOr, DISplay:COLOr:MATHCOLOr,
DISplay:COLOr:REFCOLOr

Syntax 1

```
DISplay:COLOr:PALEtte  
{NORMAl | MONOGREEN | MONOGRAY | TEMPERature | SPECTral}
```

Syntax 2

```
DISplay:COLOr:PALEtte?
```

Arguments

- **NORMAl**
This colors traces according to their channel. This is the default color palette.
- **MONOGREEN**
This colors traces green, emulating a traditional instrument color palette.
- **MONOGRAY**
This colors traces gray, emulating a monochrome TDS series instrument.
- **TEMPERature**
All traces share a multicolored palette, where "intensity" is represented by hue; blue for least frequently occurring values, red for most frequently occurring values.
- **SPECTral**
All traces share a multicolored palette, where "intensity" is represented by hue; red for least frequently occurring values, blue for most frequently occurring values.

Example 1

```
DISplay:COLOr:PALEtte MONOGRAY
```

This command sets the palette for all display types.

Example 2

```
DISplay:COLOr:PALEtte?
```

This query might return

```
:DISPLAY:COLOR:PALETTE NORMAL
```

This indicates that the Normal color palette is currently selected, which colors traces according to their channel.

DISplay:COLOr:MATHCOLOr

Description

This command sets or queries the color to be used for math traces, either in the standard palette's nominal Math color, or according to the color of the source waveform. This command is equivalent to selecting Display Setup from the Display menu and then choosing the Colors tab.

Group

Display Control

Related Commands

```
DISplay:COLOr:PALETTE
```

Syntax 1

```
DISplay:COLOr:MATHCOLOr {DEFAULT|INHERIT}
```

Syntax 2

```
DISplay:COLOr:MATHCOLOr?
```

Arguments

- **DEFAULT**
This sets color math traces in nominal palette math color, which is red.
- **INHERIT**
This sets color math traces in the source waveform color. Math waveforms are drawn in the same color as their primary source waveform.

Example 1

```
DISplay:COLOr:MATHCOLOr DEFAULT
```

This command sets the color math traces in the nominal palette math color.

Example 2

```
DISplay:COLOr:MATHCOLOr?
```

This query might return

```
:DISPLAY:COLOR:MATHCOLOR INHERIT
```

This indicates that the primary source waveform color is used for each math trace.

DISplay:COLOr:REFCOLOr

Description

This command sets or queries the color to be used for reference traces, either in the standard palette's nominal REF color or according to the color of the source waveform. This command is equivalent to selecting Display Setup from the Display menu and then choosing the Colors tab.

Group

Display Control

Related Commands

DISplay:COLOr:PALETTE

Syntax 1

```
DISplay:COLOr:REFCOLOr {DEFAULT|INHERIT}
```

Syntax 2

```
DISplay:COLOr:REFCOLOr?
```

Arguments

- **DEFAULT**
This assigns color reference traces in nominal palette reference color, which is off-white.
- **INHERIT**
This assigns color reference traces in the source waveform color.

Example 1

```
DISplay:COLOr:REFCOLOr DEFAULT
```

This command assigns color reference traces in nominal palette reference color, which is off-white.

Example 2

```
DISplay:COLOr:REFCOLOr?
```

This query might return

```
:DISPLAY:COLOR:REFCOLOR INHERIT
```

This indicates that source waveform color is used for reference traces.

DISplay:FILTer

Description

This command sets or queries the type of interpolation to use for the display. Filtering only applies to normal-mode acquisition. The DISplay:FILTer command also provides selection for acquisition interpolation type. This command is equivalent to selecting Waveform Interpolation from the Display menu.

Group

Display Control

Syntax 1

```
DISplay:FILTer {LINEAr|SINX}
```

Syntax 2

```
DISplay:FILTer?
```

Arguments

- LINEAr
This specifies linear interpolation, where acquired points are connected with straight lines.
- SINX
This specifies $\sin(x)/x$ interpolation, where acquired points are fit to a curve.

Example 1

```
DISplay:FILTer SINX
```

This command specifies sine-curve interpolation, when magnifying waveforms.

Example 2

```
DISplay:FILTer?
```

This query might return `:DISPLAY:FILTER LINEAR`, indicating that straight-line interpolation is specified for magnifying waveforms.

DISplay:FORMat

Description

This command sets or queries the display format. This command is equivalent to selecting Format from the Display menu.

Group

Display Control

Syntax 1 (Two-channel instruments)

```
DISplay:FORMat {YT|XY}
```

Syntax 2 (Four-channel instruments)

```
DISplay:FORMat {YT|XY|XYZ}
```

Syntax 3

DISplay:FORMat?

Arguments

- YT
This sets the display to a voltage versus time format and is the default mode.
- XY
This argument displays one waveform against another. The source pairs that make up an XY trace are predefined and are listed in the following table. Selecting one source causes its corresponding source to be implicitly selected, producing a single trace from the two input waveforms.

XY Format Pairs	
X-Axis Source	Y-Axis Source
Ch 1	Ch 2
Ch 3 (Four-channel models only)	Ch 4 (Four-channel models only)
Ref 1	Ref 2
Ref 3 (Four-channel models only)	Ref 4 (Four-channel models only)

- **XYZ**
This argument is available only for four-channel instruments. The argument combines channel 1 and channel 2 for X and Y coordinates and uses channel 3 to provide the intensity value for the sample. XYZ groups channels 1, 2 and 3 to form a single trace. Other channel, math, and reference waveforms are turned off.

Note: Selecting XY or XYZ forces a switch to FASTAcq mode.

Example 1

DISplay:FORMat YT

This command selects a voltage versus time format for the display.

Example 2

DISplay:FORMat?

This query might return :DISPLAY:FORMAT XYZ for the display format, indicating that the display is in the XYZ mode.

DISplay:GRATicule

Description

This command selects or queries the type of graticule that is displayed. This command is equivalent to selecting Graticule Style from the Display menu.

Group

Display Control

Syntax 1

DISplay:GRATicule
{ CROSSHair | FRame | FULl | GRId | IRE | MV | PAL }

Syntax 2

DISplay:GRATicule?

Arguments

- **CROSSHair**
This specifies a frame and cross hairs.
- **FRame**
This specifies a frame only.
- **FULl**
This specifies a frame, a grid and cross hairs.
- **GRId**
This specifies a frame and grid only.

- IRE
This specifies an IRE video graticule, and sets the vertical scale to 143 mV per division. This graticule is used to measure NTSC standard video signals.
- MV
This specifies an mV video graticule and sets the vertical scale to 143 mV per division. This graticule is used to measure PAL standard video signals.
- PAL
This specifies a PAL video graticule (same as the mV graticule) and sets the vertical scale to 143 mV per division. This graticule is used to measure PAL standard video signals.

Example 1

```
DISplay:GRAticule FRAME
```

This command sets the graticule type to display the frame only.

Example 2

```
DISplay:GRAticule?
```

This query might return `:DISPLAY:GRATICULE FULL`, indicating that all graticule elements are selected.

DISplay:INTENSITY?

Description

This query-only command returns the waveform saturation level, autobright state and screen saver settings. This command is equivalent to selecting Display Setup from the Display menu and choosing the Appearance tab.

Group

Display Control

Related Commands

```
DISplay:INTENSITY:AUTPBright,  
DISplay:INTENSITY:WAVEform,  
DISplay:INTENSITY:SCREENSAVER,  
DISplay:INTENSITY:SCREENSAVERDELAY
```

Syntax

```
DISplay:INTENSITY?
```

Arguments

None

Example

```
DISplay:INTENSITY?
```

```
This query might return :DISPLAY:INTENSITY:WAVEFORM  
7.5000E+01; AUTOBRIGHT 1; SCREENSAVER 1;  
SCREENSAVERDELAY 120
```

DISplay:INTENSITY:AUTOBright

Description

This command enables automatic, ongoing adjustment of the intensity to display images. The query form returns a 1 (ON) or a 0 (OFF). This command is equivalent to selecting Display Setup from the Display menu and choosing the Appearance tab.

Group

Display Control

Related Commands

DISplay:INTENSITY:WAVEform

Syntax 1

```
DISplay:INTENSITY:AUTOBright {OFF|ON|<NR1>}
```

Syntax 2

```
DISplay:INTENSITY:AUTOBright?
```

Arguments

- OFF
This argument allows the system to use the manually set waveform intensity value against an absolute scale. The display simulates the appearance of signals on an analog oscilloscope. Waveforms that trigger more frequently appear brighter than waveforms that trigger less frequently.
- ON
This argument allows the system to adjust the settings automatically to provide a visible waveform.
- <NR1>
A 0 allows the system to use the manually-set waveform intensity value against an absolute scale; any other value allows the system to adjust settings.

Example 1

```
DISplay:INTENSITY:AUTOBright ON
```

This command allows the system to adjust settings using the waveform intensity value and the pixel intensity found in the acquired waveform.

Example 2

This query might return `:DISPLAY:INTENSITY:AUTOBRIGHT 1`, indicating that system adjustment of waveform intensity is enabled.

DISplay:INTENSITy:WAVEform

Description

This command sets or queries the intensity saturation of the waveforms. This command is equivalent adjusting the INTENSITY knob on the front panel.

Group

Display Control

Related Commands

DISplay:INTENSITy:AUTOBright

Syntax 1

DISplay:INTENSITy:WAVEform <NR1>

Syntax 2

DISplay:INTENSITy:WAVEform?

Arguments

- <NR1>
This is the waveform intensity and ranges from 10 to 100 percent.

Example 1

DISplay:INTENSITy:WAVEform 100

This command sets the waveform intensity to 100 percent.

Example 2

DISplay:INTENSITy:WAVEform?

This query might return `:DISPLAY:INTENSITY:WAVEFORM 6.0000E+01`, indicating that the intensity of the waveforms is currently set to 60 percent.

DISplay:INTENSITY:SCRENSAVER

Description

This command sets and queries the screen saver features of the MS Windows operating system. When enabled, a delay timer (set in seconds by the DISplay:INTENSITY:SCRENSAVERDELAY command) begins counting down. When this screen saver delay times out, the screen low-power mode engages. This causes the LCD backlight to switch off and clears both waveform and text displays. Any control (front panel, mouse or keyboard) or touch screen activity resets the delay timer and restores normal instrument display. This command is equivalent to selecting LCD Save Enabled from the Display menu.

Group

Display Control

Related Commands

DISplay:INTENSITY:SCRENSAVERDELAY

Syntax 1

```
DISplay:INTENSITY:SCRENSAVER {OFF|ON|<NR1>}
```

Syntax 2

```
DISplay:INTENSITY:SCRENSAVER?
```

Arguments

- OFF
This disables the screen saver feature.
- ON
This enables the screen saver feature after the specified screen saver delay seconds of control activity have passed.
- <NR1>
A 0 disables the screen saver feature; a 1 enables the screen saver protection features.

Example 1

```
DISplay:INTENSITY:SCRENSAVER OFF
```

This command disables the screen saver feature.

Example 2

```
DISplay:INTENSITY:SCRENSAVER?
```

This query might return

```
:DISPLAY:INTENSITY:SCRENSAVER 0, indicating that the  
screen saver feature is disabled.
```

DISplay:INTENSITY:SCRENSAVERDELAY

Description

This command sets or queries the timeout of the screen saver features of the display system. When enabled (after the specified screen saver delay seconds of control activity and when the screen saver feature is enabled) the instrument activates the screen saver feature. Normal instrument displays are restored and the delay timer is reset upon any control activity. The instrument continues to acquire and process data normally while in screen saver mode; only the display is disabled. This command is equivalent to selecting Objects from the Display menu and entering a time in the Delay field of the LCD Backlight Timeout control.

Group

Display Control

Related Commands

DISplay:INTENSITY:SCRENSAVER

Syntax 1

DISplay:INTENSITY:SCRENSAVERDELAY {<NR1>}

Syntax 2

DISplay:INTENSITY:SCRENSAVERDELAY?

Arguments

- <NR1>
This sets the screen saver timeout, which ranges from 30 through 28800 seconds.

Example 1

DISplay:INTENSITY:SCRENSAVERDELAY 120

This command sets the screen saver delay feature to activate after 120 seconds of control inactivity.

Example 2

DISplay:INTENSITY:SCRENSAVERDELAY?

This query might return

:DISPLAY:INTENSITY:SCRENSAVERDELAY 300, indicating that the screen saver delay feature is set to 300 seconds of control inactivity.

DISplay:PERStence

Description

This command sets or queries the persistence aspect of the display. This affects the display only and is equivalent to selecting Display Persistence from the Display menu.

Group

Display Control

Related Commands

DISplay:VARPersist

Syntax 1

```
DISplay:PERStence {OFF|INFPersist|VARPersist}
```

Syntax 2

```
DISplay:PERStence?
```

Arguments

- OFF
This disables the persistence aspect of the display.
- INFPersist
This sets a display mode where any pixels, once touched by samples, remain set until cleared by a mode change.
- VARPersist
This sets a display mode where set pixels are gradually dimmed.

Example 1

```
DISplay:PERStence VARPersist
```

This command sets the persistence aspect of the display to fade set pixels according to the time set in the DISplay:VARPersist command.

Example 2

```
DISplay:PERStence?
```

This query might return `:DISPLAY:PERSISTENCE OFF`, indicating that the persistence aspect of the display is disabled.

DISplay:STYle

Description

This command sets or queries how the data is displayed for normal and FastAcq modes. This command is equivalent to selecting Display Style from the Display menu and choosing a style.

Group

Display Control

Syntax 1

```
DISplay:STYle {VECTors|DOTs|INTENSIFied}
```

Syntax 2

```
DISplay:STYle?
```

Arguments

- `VECTors`
This connects adjacent data points. New points immediately replace old ones.
- `DOTs`
This displays individual data points. New points immediately replace old ones.
- `INTENSIFied`
This causes the display to show interpolated samples with dark spaces (Only the "real" samples are displayed).
When FastAcq mode is enabled, intensified samples display as dots. However, turning off FastAcq mode causes the display style to snap back to its previous setting.

Example 1

```
DISplay:STYle VECTors
```

This command sets the display to connect adjacent data points.

Example 2

```
DISplay:STYle?
```

This query might return `:DISPLAY:STYLE INTENSIFIED`, indicating that interpolated samples are not displayed.

DISplay:TRIGBar

Description

This command controls or queries the display of the trigger-level indicator bar/s. Indicator bars show where the trigger voltage level is set.

The instrument will only display the bar if the associated trigger source is also displayed. If both a main and a delayed trigger are displayed, then two bars will appear. One will accompany each source. If a logic trigger is selected, then multiple bars may appear. One will show the upper threshold and one will show the lower threshold. This command is equivalent to selecting Display Setup from the Display menu and then choosing the Objects tab.

Group

Display Control

Syntax 1

```
DISplay:TRIGBar {OFF|SHORT|LONG}
```

Syntax 2

```
DISplay:TRIGBar?
```

Arguments

- OFF
This removes the trigger indicator bar from the display.
- SHORT
This displays, as the indicator, a short arrow at the right side of the graticule for each displayed trigger signal.
- LONG
This displays, as the indicator, a horizontal line across the width of the graticule for each displayed trigger signal.

Example 1

```
DISplay:TRIGBar LONG
```

This command sets the display to show a long trigger indicator bar (or bars).

Example 2

```
DISplay:TRIGBar?
```

This query might return `:DISPLAY:TRIGBAR OFF`, indicating that the indicator bar is removed from the display.

DISplay:VARPersist

Description

This command sets or queries persistence decay time, which is the approximate decay time for a freshly struck persistence sample. This command is equivalent to selecting Display Setup from the Display menu, selecting the Appearance tab, and then entering the desired Persist Time.

Group

Display Control

Related Commands

DISplay:PERStistence

Syntax 1

```
DISplay:VARPersist <NR3>
```

Syntax 2

```
DISplay:VARPersist?
```

Arguments

- <NR3>
This indicates the persistence decay time setting in numeric seconds. The persistence time ranges from 32 ms to 10 s.

Example 1

```
DISplay:VARPersist 5E-1
```

This command sets the persistence decay time to 500 ms.

Example 2

```
DISplay:VARPersist?
```

This query might return `:DISPLAY:VARPERSIST 5.0000E-01`, indicating that persistence decay time is currently set to 500 ms.

EVENT?

Description

This query-only command returns an event code from the Event Queue that provides information about the results of the last *ESR? read. EVENT? also removes the returned value from the Event Queue.

Group

Status and Error

Related Commands

ALLEV?, *CLS, DESE, *ESE, *ESR?, EVMsg?, *SRE, *STB?

Syntax

EVENT?

Example

EVENT?

This query might return :EVENT 110, showing that there was an error in a command header.

EVMsg?

Description

This query-only command removes a single event code from the Event Queue that is associated with the results of the last *ESR? read and returns the event code along with an explanatory message. For more information, see Event Handling.

Group

Status and Error

Related Commands

ALLEv?

*CLS, DESE, *ESE, *ESR?, EVENT?, *SRE, *STB?

Syntax

EVMsg?

Returns

The event code and message in the following format:

```
<Event Code><Comma><Qstring>[<Event Code><Comma><Qstring>...]  
<Qstring> ::= <Message>;[<Command>]
```

where <Command> is the command that caused the error and may be returned when a command error is detected by the instrument. As much of the command will be returned as possible without exceeding the 60 character limit of the <Message> and <Command> string combined. The command string is right-justified.

Example

EVMsg?

This query might return :EVMSG 110, "Command header error"

EVQty?

Description

This query-only command returns the number of event codes that are in the Event Queue. This is useful when using the ALLEv? query, since it lets you know exactly how many events will be returned.

Group

Status and Error

Related Commands

ALLEv?, EVENT?, EVMsg?

Syntax

EVQty?

Example

EVQty?

This query might return :EVQTY 3, indicating the number of event codes in the Event Queue.

FACTory

Description

This command (no query form) resets the instrument to its factory default settings. This command is equivalent to pressing the DEFAULT SETUP button located on the front panel.

Group

Save and Recall

Related Commands

*PSC, *RCL?, RECall:SETUp, *RST, *SAV, SAVe:SETUp

Syntax

FACTory

Arguments

None

Example

FACTory

This command resets the instrument settings to factory defaults:

- Clears the Event Status Enable Register.
- Clears the Service Request Enable Register.
- Sets the Device Event Status Enable Register to 2555.
- Sets the Power On Status Clear Flag to TRUE.
- Purges all defined aliases.
- Enables all Command Headers.
- Sets the macro defined by *DDT to a "zero-length field."
- Clears the pending operation flag and associated operations.

This command does not reset the following:

- The state of the GPIB (IEEE Std 488.1-1987) interface.
- The selected GPIB address.
- Calibration data that affects device specifications.
- Protected user data.
- Stored settings.
- The current password (if implemented).

FASTAcq?

Description

This query-only command returns the state of Fast Acquisitions. This command is equivalent to pressing the FASTACQ button on the front panel.

Group

Acquisition

Syntax

FASTAcq?

Example

FASTAcq?

This query might return the following string for the current acquisition parameters:

```
:FASTACQ:STATE 0
```

FASTAcq:STATE

Description

This command sets or queries the state of Fast Acquisitions. This command is equivalent to the FASTACQ button on the front panel.

Group

Acquisition

Syntax 1

```
FASTAcq:STATE {ON|OFF|<NR1>}
```

Syntax 2

```
FASTAcq:STATE?
```

Arguments

- ON
This enables Fast Acquisitions mode.

- OFF
This disables Fast Acquisitions mode.
- <NR1>
A 0 disables Fast Acquisitions mode; any other value enables Fast Acquisitions mode.

Example 1

FASTAcq:STATE ON

This command enables the Fast Acquisitions mode.

Example 2

This query might return :FASTACQ:STATE 1, indicating that Fast Acquisitions mode is currently active.

FILESystem?

Description

This query-only command returns the directory listing of the current working directory. This query is the same as the FILESystem:DIR? query.

Group

File System

Related Commands

FILESystem:COPy, FILESystem:CWD, FILESystem:DELEte, FILESystem:DIR?, FILESystem:PRInt, FILESystem:READFile, FILESystem:REName, FILESystem:WRITEFile

Syntax

FILESystem?

Arguments

None.

Example

FILESystem?

This query might return :FILESYSTEM:DIR,
".", "..", "myFile.txt", "myWaveform.wfm".

FILESystem:COPy

Description

This command (no query form) copies a named file to a new file. The new file may be in a totally separate directory than the old file. You can only copy one file at a time using this command. Wild card characters are not allowed.

Group

File System

Related Commands

FILESystem:CWD, FILESystem:DELEte

Syntax

```
FILESystem:COpy {<source file path>,<destination  
file path>}
```

Arguments

- <file path>
This is a quoted string that defines the file name and path. If the file path is within the current working directory, you need only specify the file name.

Example

```
FILESystem:COpy  
"C:\MYDIR\TEK00001.SET", "C:\AnotherDir\copyOfTek  
001.set"
```

This command copies the file named TEK00001.SET, located in the MYDIR directory on the C drive to a file named copyOfTek001.set in the AnotherDir directory on the C drive.

FILESystem:CWD

Description

This command sets or queries the current working directory for FILESystem GPIB commands. The default working directory is "C:\TekScope". Anytime that you use this command to change the directory, the directory that you specify is retained as the current working directory until you either change the directory or you delete the directory. If you delete the current working directory, the instrument resets current working directory to the default directory (C:\TekScope) the next time the instrument is powered on or the next time you execute a file system command. The current working directory is retained between power cycles. This command supports the permutations of file and directory names that are supported by Microsoft Windows:

- Relative path names; for example, ".\Temp"
- Absolute path names; for example, "C:\Windows\System"
- Implied relative path names; for example "newfile.txt" becomes "C:\TekScope\newfile.txt" if the current working directory is "C:\TekScope"

Group

File System

Syntax 1

```
FILESystem:CWD {<new working directory path>}
```

Syntax 2

Arguments

- <new working directory path>
This is a quoted string that defines the current working; a directory name can be up to 128 characters.

Example 1

```
FILESystem:CWD "C:\TekScope\images"
```

This command sets the current working directory to images.

Example 2

```
FILESystem:CWD?
```

This query might return : FILESYSTEM:CWD
"C:\TekScope\Waveforms", indicating that the current working directory is set to Waveforms.

FILESystem:DELEte

Description

This command (no query form) deletes a named file. It does not delete directories. Use the FILESystem:RMDir command to delete a directory.

Group

File System

Related Commands

FILESystem:COPy, FILESystem:CWD

Syntax

```
FILESystem:DELEte <file path>
```

Arguments

- <file path>
This is a quoted string that defines the file name and path. If the file path is within the current working directory, you need only specify the file name.

Example 1

```
FILESystem:DELEte "NOT_MINE.SET"
```

This command deletes the file named NOT_MINE.SET from the current working directory.

FILESystem:DIR?

Description

This query-only command returns a list of quoted strings. Each string contains the name of a file or directory in the current working directory.

Group

File System

Related Commands

FILESystem:CWD, FILESystem:MKDir

Syntax

```
FILESystem:DIR?
```

Arguments

None

Example

```
FILESystem:DIR?
```

This query returns a list of files and directories in the current working directory.

FILESystem:MKDir

Description

This command (no query form) creates a new directory.

Group

File System

Related Commands

FILESystem:CWD, FILESystem:DIR?

Syntax

```
FILESystem:MKDir <directory path>
```

Arguments

- <directory path>
This is a quoted string that specifies the directory to create

Example 1

```
FILESystem:MKDir "C:\NewDirectory"
```

This command creates the directory named `NewDirectory` at the root of the C drive.

Example 2

```
FILESystem:CWD "C:\MyDirectory"  
FILESystem:MKDir "MyNewSubDirectory"
```

These two commands create the directory MyNewSubDirectory within the existing directory MyDirectory at the root of the C drive. This, of course, assumes that C:\MyDirectory already existed and was not a read-only directory.

FILESystem:PRInt

Description

This command (no query form) prints a named file to a named port. This command is the same as the FILESystem:READFile command.

This command is not IEEE 488.2 compliant for the following reasons:

- The command produces output on the 488.2 bus. Queries, not commands, are the only message units that should produce output on the 488.2 bus. Errors may not be recognized if they occur while data is being output in response to this command. This will be evident if a command is sent to the instrument before all of the data generated by this command has been read. In such cases, you should send a device clear message to the instrument.
- The command does not use a standard 488.2 output format. The closest defined format is the indefinite format of ARBITRARY BLOCK PROGRAM DATA encoding. However, this command output omits the initial '#0' characters needed for that format.
- Newlines, ASCII value 10, can be included in the output data. Output on the bus can be terminated by newlines. The output of this command is only terminated by <EOI>.

Group

File System

Related Commands

FILESystem:CWD, FILESystem:READFile

Syntax

```
FILESystem:PRInt <filepath>, GPIb
```

Arguments

- <file path>
This is a quoted string that defines the file name and path. If the file path is within the current working directory, you need only specify the file name.

- GPIb
This specifies that the hardcopy is sent out of the GPIB port. GPIb is the only port allowed for this command.

Example

```
FILESystem:PRInt "C:\TEK00000.IBM", GPIb
```

This command sends the file named TEK00000.IBM out of the GPIB port.

FILESystem:READFile

Description

This command (no query form) prints a named file to a named port. It is identical to the FILESystem:PRInt command.

This command is not IEEE 488.2 compliant for the following reasons:

- The command produces output on the 488.2 bus. Queries, not commands, are the only message units that should produce output on the 488.2 bus. Errors may not be recognized if they occur while data is being output in response to this command. This will be evident if a command is sent to the instrument before all of the data generated by this command has been read. In such cases, you should send a device clear message to the instrument.
- The command does not use a standard 488.2 output format. The closest defined format is the indefinite format of ARBITRARY BLOCK PROGRAM DATA encoding. However, this command output omits the initial '#0' characters needed for that format.
- Newlines, ASCII value 10, can be included in the output data. Output on the bus can be terminated by newlines. The output of this command is only terminated by <EOI>.

Group

File System

Related Commands

FILESystem:CWD, FILESystem:PRInt

Syntax

```
FILESystem:READFile <filepath>, GPIb
```

Arguments

- <file path>
This is a quoted string that defines the file name and path. If the file path is within the current working directory, you need only specify the file name.

- GPIb
This specifies that the hardcopy is sent out of the GPIB port. GPIb is the only port allowed for this command.

Example

```
FILESystem:READFile "C:\TEK00000.IBM", GPIb
```

This command sends the file named TEK00000.IBM out of the GPIB port.

FILESystem:REName

Description

This command (no query form) assigns a new name to an existing file.

Group

File System

Related Command

FILESystem:CWD

Syntax

```
FILESystem:REName <old file path>,<new file path>
```

Arguments

- <old file path>
This is a quoted string that defines the file name and path. If the file path is within the current working directory, you need only specify the file name.
- <new file path>
This is a quoted string that defines the file name and path. If the file path is within the current working directory, you need only specify the file name.

Example

```
FILESystem:REName  
"C:\TEK00000.SET", "C:\MYSETTING.SET"
```

This command gives the file named TEK00000.SET the new name of MYSETTING.SET. The file remains in the root directory on the C drive.

FILESystem:RMDir

Description

This command (no query form) deletes a named directory. The directory cannot contain any files. If there are files in the directory, they must first be deleted. The directory must not be a read-only directory.

Group

File System

Related Command

FILESystem:CWD

Syntax

```
FILESystem:RMDir <directory path>
```

Arguments

- <directory path>
This is a quoted string that defines the file name and path. If the file path is within the current working directory, you need only specify the file name.

Example

```
FILESystem:RMDir "C:\OldDirectory"
```

This command removes the directory named OldDirectory from the root of the C drive.

FILESystem:WRITEFile

Description

This command (no query form) copies the block data from the GPIB port to a named file.

Group

File System

Related Command

FILESystem:CWD

Syntax

```
FILESystem:WRITEFile <file path>,<data>
```

Arguments

- <file path>
This is a quoted string that defines the file name and path. If the file path is within the current working directory, you need only specify the file name
- <data>
This data can be either DEFINITE LENGTH or INDEFINITE LENGTH ARBITRARY BLOCK PROGRAM DATA encoding as described in IEEE 488.2.

Example 1

```
FILESystem:WRITEFile "C:\SomeNewFile.txt",#221  
1.23 2.54 8.22 -1.22<EOI>
```

This command creates a file named "SomeNewFile.txt" on the root of the C drive, containing the string of 21 characters " 1.23 2.54 8.22 -1.22". This is an example of using the definite length arbitrary block.

Example 2

```
FILESystem:WRITEFile "C:\SomeNewFile.txt",#0  
This is a test<NL+EOI>
```

This command creates a file named "SomeNewFile.txt" on the root of the C drive, containing the string of " This is a test". This is an example of using the indefinite length arbitrary block. The newline character (0x0a) is required.

```
FILESystem:WRITEFile "C:\SomeNewFile.txt",#221  
1.23 2.54 8.22 -1.22<NL+EOI>
```

This command creates a file named "SomeNewFile.txt" on the root of the C drive, containing the string of 21 characters " 1.23 2.54 8.22 -1.22". Because the data argument is indefinite format arbitrary block program data, it may contain any 8-bit values, including newline characters (hexadecimal 0a). The fact that newline characters are allowed makes this command deviate from the strictest interpretation of the IEEE488.2 specification.

HARDCopy

Description

This command sends a copy of the screen display to the port specified by HARDCopy:PORT. This command is equivalent to pressing the PRINT button on the front panel. When printing to a file, the file format is Windows Bitmap Image (BMP).

The HARDCopy query returns the port and file path.

Group

Hardcopy

Related Commands

*WAI, *CLS?

Syntax 1

HARDCopy START

Syntax 2

HARDCopy?

Arguments

- START

This initiates a screen copy to a file or the default system printer, as specified by the :HARDCopy:PORT selection. The default system printer is set within the Windows operating system. If you need information about how to set the default system printer, refer to Microsoft Windows online help.

Note: Use the *WAI command between HARDCopy START commands to ensure that the first hardcopy is complete before starting another.

Example 1

```
HARDCopy START
```

This command initiates a screen copy to a file or the default system printer, as specified by the :HARDCopy:PORT selection.

Example 2

```
HARDCopy?
```

This query returns the hardcopy file path and the selected port. The query might return

```
:HARDCOPY:FILENAME  
"C:\TekScope\Images\hcFILE.BMP";PORT FILE.
```

HARDCopy:FILENAME

Description

This command sets or returns the file that will be sent hardcopy data on the next HARDCopy command (if the HARDCopy:PORT is set to FILE).

Group

Hardcopy

Related Commands

HARDCopy

Syntax 1

```
HARDCopy:FILENAME <file path>
```

Syntax 2

```
HARDCopy:FILENAME?
```

Argument

- <file path>
This specifies that the hardcopy is sent to the named file. <file path> is a quoted string that defines the file name and path. Input the file path using the form <drive>:<dir>\ <filename>. <drive> and one or more <dir>s are optional. <filename> stands for a filename of up to 128 characters. If you don't specify the path with <drive> and one or more <dir>s, the default location is "C:\TekScope\Images". While filename extensions are not required, they are highly recommended.

Example 1

```
HARDCopy:FILENAME "TEK.IBM"
```

This command sets TEK.IBM as the selected file name. The next hardcopy will be sent to this file in the default hardcopy directory, if the :HARDCopy:PORT selection is FILE.

Example 2

```
HARDCopy:FILENAME?
```

This query might return :HARDCOPY:FILENAME
"C:\TekScope\Images\TEK.IBM" as the selected file.

Example 3

HARDCopy:FILENAME "TEK?? . IBM"

This command sets TEK as the selected file name with a numeric, two-digit suffix. The instrument might return

:HARDCOPY:FILENAME "TEK00 . IBM" ; "TEK01 . IBM"

This indicates TEK00.IBM is the first file and TEK01.IBM is the second file.

HARDCopy:PORT

Description

This command selects or returns whether the hardcopy data will be sent to a file or printed on the next hardcopy command (for example, the HARDCopy START command). This is equivalent to selecting Print in the File menu and then either choosing Print to file or specifying the default printer.

Group

Hardcopy

Related Commands

HARDCopy, HARDCopy:FILENAME

Syntax 1

HARDCopy:PORT {FILE|PRINTER}

Syntax 2

HARDCopy:PORT?

Arguments

- FILE
This argument specifies that the hardcopy is stored in the file specified in the HARDCopy:FILENAME command.
- PRINTER
This argument specifies that the hardcopy is sent to the printer specified in the Print dialog box.

Example 1

HARDCopy:PORT FILE

This command specifies

That the hardcopy is stored in the file specified in the HARDCopy:FILENAME command.

Example 2

HARDCopy:PORT?

This query might return

:HARDCOPY:PORT FILE

This indicates that hardcopies are sent to the specified file.

HEADer

Description

This command sets or queries the Response Header Enable State that causes the instrument to either include or omit headers on query responses.

Note: This command does not affect IEEE Std 488.2-1987 Common Commands (those starting with an asterisk); these commands never return headers. This command does make a corresponding change in the Response Header Enable State of the opposite interface (physical or virtual GPIB interface). Refer to Introduction for more information.

Group

Miscellaneous

Related Commands

HDR, VERBose

Syntax 1

```
HEADer {OFF|ON|<NR1>}
```

Syntax 2

```
HEADer?
```

Arguments

- OFF
This sets the Response Header Enable State to false. This causes the instrument to omit headers on query responses, so that only the argument is returned.
- ON
This sets the Response Header Enable State to true. This causes the instrument to include headers on applicable query responses. You can then use the query response as a command.
- <NR1>
A 0 sets the Response Header Enable State to false; any other value sets this state to true, which causes the instrument to omit headers on query responses.

Example 1

```
HEADer OFF
```

This command specifies that the instrument omits headers on query responses, so that only the argument is returned.

Example 2

```
HEADer?
```

This query might return

:HEADER 1

This indicates that the instrument is including headers on applicable query responses.

HDR

Description

This command is identical to the HEADer query and is included for backward compatibility purposes.

Group

Miscellaneous

Related Commands

HEADer, VERBose

Syntax 1

```
HDR {OFF|ON|<NR1>}
```

Syntax 2

```
HDR?
```

Arguments

- OFF
This sets the Response Header Enable State to false. This causes the instrument to omit headers on query responses, so that only the argument is returned.
- ON
This sets the Response Header Enable State to true. This causes the instrument to include headers on applicable query responses. You can then use the query response as a command.
- <NR1>
A 0 sets the Response Header Enable State to false; any other value sets this state to true, which causes the instrument to omit headers on query responses.

Example 1

```
HDR OFF
```

This command specifies that the instrument omits headers on query responses, so that only the argument is returned.

Example 2

```
HDR?
```

This query might return

```
:HEADER 1I
```

This indicates that the instrument is including headers on applicable query responses.

HIStogram?

Description

This query-only command returns all histogram parameters; it queries the state of all histogram parameters that the user can set. This command is equivalent to selecting Waveform Histograms from the Measure menu.

Note: This command is available only if you have installed Option 2A Advanced Analysis in your instrument.

Group

Histogram

Related Commands

MEASUREMENT:METHOD

Syntax 1

HIStogram?

Example 1

HIStogram?

This query might return the histogram parameters as

```
:HISTOGRAM:BOXPCNT 3.0000E+01,  
2.5100E+01,7.0000E+01,7.5200E+01;DISPLAY LINEAR  
;STATE 0;FUNCTION HORIZONTAL;SIZE 2.0000E+00  
;SOURCE CH1
```

HIStogram:Box

Description

This command defines or returns the left, top, right, and bottom boundaries of the histogram box, in source waveform coordinates. This command is equivalent to selecting Waveform Histograms from the Measure menu and then setting Limits for Left, Right, Top, and Bottom in the appropriate boxes. The command is similar to the HIStogram:BOXPcnt command except that command uses percentage coordinates to define the boundaries of the histogram box.

Note: This command implicitly clears the histogram count and statistics for the histogram and histogram source data when HIStogram:STATE is turned on.

This command is available only if you have installed Option 2A Advanced Analysis in your instrument.

Group

Histogram

Related Commands

HIStogram:BOXPcnt

Syntax 1

HIStogram:Box <NR3>,<NR3>,<NR3>,<NR3>

Syntax 2

HISTogram:Box?

Arguments

- <NR3>
This specifies the left position of the histogram box in source waveform coordinates.
- <NR3>
This specifies the top position of the histogram box in source waveform coordinates.
- <NR3>
This specifies the right position of the histogram box in source waveform coordinates.
- <NR3>
This specifies the bottom position of the histogram box in source waveform coordinates.

Example 1

```
HISTogram:Box 1E-9, 0.250, 2E-9, 0.500
```

This command defines the coordinates of the histogram box in source waveform coordinates.

Example 2

```
HISTogram:Box?
```

This query might return

```
HISTOGRAM:BOX 1.0000E-09, 0.2500, 2.0000E-09,  
0.5000
```

which identifies the coordinates of the histogram box in source waveform coordinates.

HISTogram:BOXPcnt

Description

This command defines or queries the left, top, right, and bottom positions of the histogram box, in percentage coordinates. The upper left has the value 0,0 and the lower right has the value 100, 100. Any value outside the range of 0 to 100 is clipped. This command is similar to the HISTogram:Box command except that this command uses percentage coordinates to define the boundaries of the histogram box.

Note: This command implicitly clears the histogram count and statistics for the histogram and histogram source data when HISTogram:STATE is turned on.

This command is available only if you have installed Option 2A Advanced Analysis in your instrument.

Group

HISistogram

Related Commands

HISistogram:Box

Syntax 1

HISistogram:BOXPcnt <NR3>, <NR3>, <NR3>, <NR3>

Syntax 2

HISistogram:BOXPcnt?

Arguments

- <NR3>
This specifies the left position of the histogram box in percentage coordinates. The default value is 30.0.
- <NR3>
This specifies the top position of the histogram box in percentage coordinates. The default value is 25.1.
- <NR3>
This specifies the right position of the histogram box in percentage coordinates. The default value is 70.0.
- <NR3>
This specifies the bottom position of the histogram box in percentage coordinates. The default value is 75.2.

Example 1

```
HISistogram:BOXPct 30.0,25.1,70.0,75.2
```

This command sets the hardcopy page layout format to default values.

Example 2

```
HISistogram:BOXPct?
```

This query might return

```
:HISTOGRAM:BOXPCT  
3.0000E+01,25.1000E+01,7.0000E+01,7.5200E+01.
```

HISistogram:COUNT

Description

This command (no query form) clears the count and statistics for the histogram and the histogram source data. If the histogram is on, then counting restarts. This command is equivalent selecting Waveform Histograms from the Measure menu and then clicking the Reset button.

Note: This command is available only if you have installed Option 2A Advanced Analysis in your instrument.

Group

HIStogram

Related Commands

HIStogram:Box, HIStogram:BOXPent

Syntax

```
HIStogram:COUNT RESET
```

- RESET

This zeros the histogram count.

Example

```
HIStogram:COUNT RESET
```

This command clears the count and statistics for the histogram and the histogram source data.

HIStogram:DISplay

Description

This command sets whether or not the histogram is displayed. If the histogram is displayed, this command also sets the format of the histogram. The query form of this command either returns the histogram display format or that histogram display is disabled. This command is equivalent to selecting Waveform Histogram from the Measure menu and then ensuring that Display is set to On.

Note: This command is available only if you have installed Option 2A Advanced Analysis in your instrument.

Group

HIStogram

Related Commands

HIStogram:MODE, HIStogram:STATE

Syntax 1

```
HIStogram:DISplay {OFF|LOG|LINEAr}
```

Syntax 2

```
HIStogram:DISplay?
```

Arguments

- <OFF>
This disables the histogram display but allows the histogram data to accumulate.
- <LOG>
This specifies that the histogram display type is set to Log format.
- <LINEAr>

This argument sets the histogram display type to linear format. LINEAR is the default setting.

Example 1

```
HISTogram:DISplay OFF
```

This command disables the histogram display.

Example 2

```
HISTogram:DISplay?
```

This query might return

```
:HISTOGRAM:DISPLAY LOG
```

This indicates that the current histogram displayed is in Log format.

HISTogram:FUNCTion

Description

This command either selects the type of histogram to create or returns the current histogram type. This command is equivalent to selecting Waveform Histogram from the Measure menu and then choosing either Horizontal or Vertical from the Histogram Mode group box.

Note: This command is available only if you have installed Option 2A Advanced Analysis in your instrument.

Group

HISTogram

Related Commands

HISTogram:MODE, HISTogram:STATE

Syntax 1

```
HISTogram:FUNCTion {HORizontal|VERTical}
```

Syntax 2

```
HISTogram:FUNCTion?
```

Arguments

- **HORizontal**
This displays a horizontally positioned histogram that shows time distribution.
- **VERTical**
This displays a vertically positioned histogram that shows a voltage distribution (or another distribution such as amperes).

Example 1

```
HISTogram:FUNCTion HORizontal
```

This command sets the histogram mode to the horizontal display mode.

Example 2

`HISTogram:FUNCTION?`

This query might return

```
:HISTOGRAM:FUNCTION VERTICAL
```

This indicates that the vertical display mode is selected for the histogram.

HISTogram:MODE

Description

This command selects the type of histogram to create or disables the histogram display. The query form either returns the current histogram type or that histogram display is disabled. This command is equivalent to selecting Waveform Histogram from the Measure menu and then choosing from the Histogram Mode group box.

`HISTogram:MODE` is functionally equivalent to the `HISTogram:FUNCTION` and `HISTogram:STATE` commands and is included for backward compatibility purposes.

Note: This command is available only if you have installed Option 2A Advanced Analysis in your instrument.

Group

HISTogram

Related Commands

`HISTogram:FUNCTION`, `HISTogram:STATE`,
`HISTogram:DISplay`

Syntax 1

```
HISTogram:MODE {HORizontal|VERTical|OFF}
```

Syntax 2

```
HISTogram:MODE?
```

Arguments

- `HORizontal`
This enables a horizontally positioned histogram that shows time distribution.
- `VERTical`
This enables a vertically positioned histogram that shows a voltage distribution (or another distribution such as amperes).
- `OFF`
This disables collection of the histogram measurement.

Example 1

```
HISTogram:MODE HORizontal
```


This command sets the type of histogram created to horizontal, which displays a horizontally positioned histogram that shows time distribution.

Example 2

```
HISTogram:MODE?
```

This query might return

```
:HISTOGRAM:MODE OFF
```

This indicates that histogram display is disabled.

HISTogram:SIZE

Description

This command sets or queries the width or height of the histogram on the screen. This is equivalent to selecting Waveform Histograms from the Measure menu and then entering a value in the Histo Size box.

Note: This command is available only if you have installed Option 2A Advanced Analysis in your instrument.

Group

HISTogram

Related Commands

HISTogram:DISplay

Syntax 1

```
HISTogram:SIZE <NR3>
```

Syntax 2

```
HISTogram:SIZE?
```

Arguments

- <NR3>
This specifies the histogram size. The value can vary from 0.1 to 8.0 divisions in HORIZONTAL mode and from 0.1 to 10.0 divisions in VERTICAL mode. Resolution is to the nearest pixel.

Example 1

```
HISTogram:SIZE 2.0
```

This command sets the size of the histogram to 2.0 divisions.

Example 2

```
HISTogram:SIZE?
```

This query might return

```
:HISTOGRAM:SIZE 2.0000E+01
```

This indicates the histogram size is set to 2.0 divisions.

HISTogram:SOURce

Description

This command sets or queries which source will be compared against the histogram box when the histogram testing is enabled. This is equivalent to selecting Waveform Histograms from the Measure menu and then choosing the desired waveform source. The waveform need not be displayed for histograms to run. You might want the channel displays disabled so you can see a full-screen histogram and not have waveform data confuse the display.

Note: This command is available only if you have installed Option 2A Advanced Analysis in your instrument.

Group

HISTogram

Related Commands

HISTogram:DISplay,

Syntax 1

```
HISTogram:SOURce {CH<x>|MATH<x>|REF<x>}
```

Syntax 2

```
HISTogram:SOURce?
```

Arguments

- CH<x>
This selects a channel waveform as the source for the histogram. The channel waveform range is from 1 through 4.
- MATH<x>
This selects a math waveform as the source for the histogram. The valid math waveform range is from 1 through 4.
- REF<x>
This selects a reference waveform as the source for the histogram. The valid reference waveform range is from 1 through 4.

Example 1

```
HISTogram:SOURce CH1
```

This command enables the channel 1 waveform to be compared against the histogram box. The default timebase, Main, is used for the histogram display.

Example 2

```
HISTogram:SOURce?
```

This query might return

```
:HISTOGRAM:SOURCE CH1
```

This indicates that the waveform for channel 1 is the source for the histogram.

HISTogram:STATE

Description

This command sets or queries whether the histogram calculations are enabled. This is equivalent to selecting Waveform Histograms from the Measure menu.

Note: This command is available only if you have installed Option 2A Advanced Analysis in your instrument.

Group

HISTogram

Related Commands

HISTogram:MODE, MEASUREMENT:METHOD

Syntax 1

```
HISTogram:STATE {ON|OFF|NR1}
```

Syntax 2

```
HISTogram:STATE?
```

Arguments

- <ON>
This enables histogram calculations.
- <OFF>
This disables the histogram calculations.
- <NR1>
A 0 disables histogram calculations; any other value enables histogram calculations.

Example 1

```
HISTogram:STATE ON
```

This command enables histogram calculations.

Example 2

```
HISTogram:STATE?
```

This query might return :HISTOGRAM:STATE 0, indicating that histogram calculations are currently disabled.

HORizontal?

Description

This query-only command returns all settings for the horizontal commands.

Group

HORizontal

Syntax

HORizontal?

Example

HORizontal?

This query might return the following horizontal settings
:HORIZONTAL:DELAY:MODE 0;POSITION 50.0000;TIME
0.0000;:HORIZONTAL:MAIN:SCALE 400.0000E-
9;POSITION 50.0000;SAMPLERATE
1.2500E+9;UNITS:VALUE 1.0000;STRING "s";OFFSET
0.0000;:HORIZONTAL:RECORDLENGTH 5000;RESOLUTION
5000;ROLL AUTO

HORizontal:DIVisions?

Description

This query-only command returns the number of graticule divisions over which the waveform is displayed.

Group

Horizontal

Syntax

HORizontal:DIVisions?

Arguments

None.

Example

HORizontal:DIVisions?

This query might return

:HORIZONTAL:DIVISIONS 1.0000E-01

This indicates that the waveform is displayed across one division.

HORizontal:FASTframe:COUNT

Description

This command sets or queries FastFrame frame count. This is equivalent to selecting FastFrame Setup from the Horiz/Acq menu and entering a value in the Frame Count box. FastFrame, also known as memory segmentation, captures a series of triggered acquisitions with minimal intervening time. This command is equivalent to selecting Fast Frame Setup from the Horiz/Acq menu and entering a value in the Frame Count box.

Group

Horizontal

Related Commands

HORizontal:RECOrdlength

Syntax 1

HORizontal:FASTframe:COUNT <NR1>

Syntax 2

HORizontal:FASTframe:COUNT?

Arguments

- <NR1>

This indicates the number of frames to acquire.

Example 1

HORIZONTAL:FASTFRAME:COUNT 2

This command sets up FastFrame mode to acquire two frames (segments) of data.

Example 2

HORIZONTAL:FASTFRAME:COUNT?

This query might return

:HORIZONTAL:FASTFRAME:COUNT 4

This indicates that FastFrame mode is currently set to acquire 4 frames (segments) of data.

HORizontal:FASTframe:REF:FRAME

Description

This command sets or queries the FastFrame reference frame number. The Reference Frame number is used to calculate time differences for each frame and displays those differences in the graticule. This command is equivalent to selecting FastFrame Setup in the Horiz/Acq menu and entering a value in the Time Stamps/Frame box.

Group

Horizontal

Related Commands

HORizontal:FASTframe:REF:SOURce,
HORizontal:FASTframe:TIMEstamp:DELTA:<wfm>?,
HORizontal:FASTframe:TIMEstamp:REF?,
HORizontal:FASTframe:TRACK

Syntax 1

HORizontal:FASTframe:REF:FRAME <NR1>

Syntax 2

HORizontal:FASTframe:REF:FRAME?

Argument

- <NR1>

This specifies the FastFrame reference frame.

Example 1

HORIZONTAL:FASTFRAME:REF:FRAME 2

This command sets the FastFrame reference frame to 2.

Example 2

HORIZONTAL:FASTFRAME:REF:FRAME?

This query might return

:HORIZONTAL:FASTFRAME:REF:FRAME 3

This indicates that the FastFrame reference frame is currently set to 3.

HORizontal:FASTframe:LENgth

Description

This command sets or queries the horizontal record length to the number of sample points in each frame. This command is equivalent to selecting FastFrame Setup from the Horiz/Acq menu and entering a value in the Rec Length box. FastFrame, also known as memory segmentation, captures a series of triggered acquisitions with minimal intervening time between them.

Group

Horizontal

Syntax 1

```
HORizontal:FASTframe:LENgth <NR1>
```

Syntax 2

```
HORizontal:FASTframe:LENgth?
```

Argument

- <NR1>

This represents the supported values for horizontal record lengths, which can range from 500 through 400000. For more information about valid data point ranges, select Specifications from the Help menu and choose the Horizontal & Acquisition tab.

Example 1

```
HORIZONTAL:FASTFRAME:LENGTH 5000
```

This command sets the horizontal record length to 5000 sample points in each frame.

Example 2

```
HORIZONTAL:FASTFRAME:LENGTH?
```

This query might return

```
:HORIZONTAL:FASTFRAME:LENGTH 25000
```

This indicates that the FastFrame record length is set to 25000 sample points in each frame.

HORizontal:FASTframe:MULTipleframes:FRAMEStart:<wfm> <NR1>

Description

This command sets or queries the start frame number on the specified waveform for the FastFrame multiple frames feature. The multiple frames feature supports displaying multiple frames in an overlaid manner.

Group

Horizontal

Related Commands

HORizontal:FASTframe:MULTipleframes:NUMFRames:<wfm>
<NR1>,

HORizontal:FASTframe:MULTipleframes:MODE,
HORizontal:FASTframe:COUNt

Syntax 1

HORizontal:FASTframe:MULTipleframes:FRAMEStart:
<wfm> <NR1>

Syntax 2

HORizontal:FASTframe:MULTipleframes:FRAMEStart:
<wfm>?

Argument

- <wfm>

This specifies the waveform source. Valid waveforms include CH<x>, MATH<x>, and REF<x>. Express the x variable as an integer ranging from 1 through 4 in four-channel instruments and 1 through 2 in two-channel instruments.

- <NR1>

This represents the start frame number on the specified waveform.

Example 1

```
HORIZONTAL:FASTFRAME:MULTIPLEFRAMES:FRAMESTART:  
CH1 3
```

This command sets the start frame number to frame 3 on Channel 1

Example 2

```
HORIZONTAL:FASTFRAME:  
MULTIPLEFRAMES:FRAMESTART:CH1?
```

This query might return

```
:HORIZONTAL:FASTFRAME:MULTIFRAMES:  
FRAMESTART:CH1 3
```

This indicates that the frame number starts on frame 3 for channel 1.

HORizontal:FASTframe:MULTipleframes:MODE

Description

This command sets or queries the mode for the FastFrame multiple frames feature. The multiple frames feature supports displaying multiple frames in an overlaid manner.

Group

Horizontal

Related Commands

HORizontal:FASTframe:MULTipleframes:FRAMEStart:<wfm>
<NR1>,

HORizontal:FASTframe:MULTipleframes:NUMFRames:<wfm>
<NR1>,

HORizontal:FASTframe:COUNT

Syntax 1

HORizontal:FASTframe:MULTipleframes:MODE
{OFF|OVERlay}

Syntax 2

HORizontal:FASTframe:MULTipleframes:MODE?

Argument

- OFF
This turns off the multiple frames mode.
- OVERlay
This sets the multiple frames mode to overlay.

Example 1

```
HORIZONTAL:FASTFRAME:MULTIPLEFRAMES:MODE OFF
```

This command turns off the multiple frames mode.

Example 2

```
HORIZONTAL:FASTFRAME:MULTIPLEFRAMES:MODE?
```

This query might return:

```
:HORIZONTAL:FASTFRAME:MULTIPLEFRAMES:MODE  
OFF
```

This indicates that the multiple frames mode is off.

HORizontal:FASTframe:MULTipleframes:NUMFRames:<wfm> <NR1>

Description

This command sets or queries the number of frames on the specified waveform for the FastFrame multiple frames feature. The multiple frames feature supports displaying multiple frames in an overlaid manner.

Group

Horizontal

Related Commands

HORizontal:FASTframe:MULTipleframes:FRAMEStart:<wfm>
<NR1>,

HORizontal:FASTframe:MULTipleframes:MODE,
HORizontal:FASTframe:COUNt

Syntax 1

HORizontal:FASTframe:MULTipleframes:NUMFRAMES:
<wfm> <NR1>

Syntax 2

HORizontal:FASTframe:MULTipleframes:NUMFRAMES:
<wfm>?

Arguments

- <wfm>
This specifies the waveform source. Valid waveforms include CH<x>, MATH<x>, and REF<x>. Express the x variable as an integer ranging from 1 through 4 in four-channel instruments and 1 through 2 in two-channel instruments.
- <NR1>
This represents the number of frames on the specified waveform.

Example 1

HORIZONTAL:FASTFRAME:MULTIPLEFRAMES:NUMFRAMES:
CH1 3

This command sets the number of frames to 3 on channel 1.

Example 2

HORIZONTAL:FASTFRAME:MULTIPLEFRAMES:NUMFRAMES:
CH1?

This query might return

:HORIZONTAL:FASTFRAME:MULTIPLEFRAMES:
NUMFRAMES:CH1 3

This indicates that the number of frames on channel 1 is 3.

HORizontal:FASTframe:REF:SOURce

Description

This command sets or queries FastFrame Reference waveform source. This is equivalent to selecting FastFrame Setup from the Horiz/Acq menu and choosing the reference source.

Group

Horizontal

Related Commands

HORizontal:FASTframe:REF:FRAME,
HORizontal:FASTframe:TIMEstamp:DELTA:<wfm>?,
HORizontal:FASTframe:TIMEstamp:REF?,
HORizontal:FASTframe:TRACK

Syntax 1

`HORizontal:FASTframe:REF:SOURce <wfm>`

Syntax 2

`HORizontal:FASTframe:REF:SOURce?`

Argument

- `<wfm>`

This specifies the FastFrame Reference waveform source. Valid waveforms include `CH<x>`, `MATH<x>`, and `REF<x>`; the `x` variable can be expressed as an integer ranging from 1 through 4.

Example 1

`HORIZONTAL:FASTFRAME:REF:SOURCE CH2`

This command sets the horizontal FastFrame waveform reference source to CH2.

Example 2

`HORIZONTAL:FASTFRAME:REF:SOURCE?`

This query might return

`:HORIZONTAL:FASTFRAME:REF:SOURCE CH2`

This indicates that the FastFrame waveform source is currently set to CH2.

HORizontal:FASTframe:SELECTED:<wfm>

Description

This command sets or returns the FastFrame Selected frame number on the specified waveform. This is equivalent to selecting FastFrame Setup from the Horiz/Acq menu and then choosing the waveform source and frame. Valid waveforms include CH<x>, MATH<x> and REF<x>; the x variable can be expressed as an integer ranging from 1 through 4.

Group

Horizontal

Related Commands

HORizontal:FASTframe:TRACk,
HORizontal:FASTframe:TIMEstamp:DELTA:<wfm>?,
HORizontal:FASTframe:TIMEstamp:REF?

Syntax 1

HORizontal:FASTframe:SELECTED:<wfm> <NR1>

Syntax 2

HORizontal:FASTframe:SELECTED?

Argument

- <NR1>

This specifies the selected frame number on the specified waveform.

Example 1

```
HORIZONTAL:FASTFRAME:SELECTED:CH2 33
```

This command sets the FastFrame Selected frame number on channel 2 to 33.

Example 2

```
HORIZONTAL:FASTFRAME:SELECTED:CH4?
```

This query might return

```
:HORIZONTAL:FASTFRAME:SELECTED:CH4 25
```

This indicates that the FastFrame frame number on channel 4 is set to 25.

Example 3

```
HORIZONTAL:FASTFRAME:SELECTED?
```

This query might return

```
:HORIZONTAL:FASTFRAME:SELECTED:CH1 2; CH2  
2; CH3 2; CH4 2; MATH1 2; MATH2 2; MATH3 2;  
MATH4 2; REF1 8; REF2 8; REF3 8; REF4 8,  
indicating all waveforms' Fastframe selected frame numbers.
```

HORizontal:FASTframe:STATE

Description

This command sets or returns the state of FastFrame acquisition. This is equivalent to setting FastFrame On in the FastFrame Setup menu. FastFrame, also known as memory segmentation, lets users capture a series of triggered acquisitions with minimal time between them.

The digitizing oscilloscope in FastFrame mode is ready to accept a continuous burst of triggers 400 ms after the controller sends the ACQUIRE:STATE RUN command.

Group

Horizontal

Related Commands

ACQUIRE:STATE RUN

Syntax 1

```
HORizontal:FASTframe:STATE {ON|OFF|<NR1>}
```

Syntax 2

```
HORizontal:FASTframe:STATE?
```

Arguments

- <ON>
This turns on horizontal FastFrame.
- <OFF>
This turns off horizontal FastFrame.
- <NR1>
A 0 turns off horizontal FastFrame; any other value turns on horizontal FastFrame.

Example 1

```
HORIZONTAL:FASTFRAME:STATE ON
```

This command turns on horizontal FastFrame.

Example 2

```
HORIZONTAL:FASTFRAME:STATE?
```

This query might return

```
:HORIZONTAL:FASTFRAME:STATE 0
```

This indicates that the current state of FastFrame is off.

HORizontal:FASTframe:TIMESTAMP:ALL:<wfm>?

Description

This query-only command returns the frame number and time stamp for each frame between requested frames, inclusive, within the specified waveform. Argument order is unimportant. Valid waveforms include CH<x>, MATH<x> and REF<x>; the x variable can be expressed as an integer ranging from 1 through 4.

Group

Horizontal

Syntax

```
HORizontal:FASTframe:TIMESTAMP:ALL:<wfm>? <NRF>, <NRF>
```

Arguments

- <NRF>
This specifies the selected "from" frame number within the specified waveform.
- <NRF>
This specifies the selected "to" frame number within the specified waveform.

Example

```
HORIZONTAL:FASTFRAME:TIMESTAMP:ALL:CH2? 4,1
```

This query might return

```
:HORIZONTAL:FASTFRAME:TIMESTAMP:ALL:CH1  
4,1,"02 Mar 2000 20:10:54.542 037 272 620",  
which is the list of time stamps from frame 1 through frame 4 on  
channel 1.
```

HORizontal:FASTframe:TIMESTAMP:BETween:<wfm>?

Description

This query-only command returns the relative trigger for the delta time between the specified frames, within the specified waveform. Valid waveforms include CH<x>, MATH<x> and REF<x>; the x variable can be expressed as an integer ranging from 1 through 4.

Group

Horizontal

Syntax

```
HORizontal:FASTframe:TIMESTAMP:BETween:<wfm>?
<NRF>, <NRF>
```

Arguments

- <NRF>
This specifies the selected "from" frame number within the specified waveform.
- <NRF>
This specifies the selected "to" frame number within the specified waveform.

Example

```
HORIZONTAL:FASTFRAME:TIMESTAMP:BETWEEN:CH1? 5,2
```

This query might return

```
:HORIZONTAL:FASTFRAME:TIMESTAMP:BETWEEN:CH1
5,2,"00:00:00.010 000 540 624"
```

This is the delta of channel 1's Time Stamp frame 5 - Time Stamp frame 2 (TS[5]-TS[2]).

HORizontal:FASTframe:TIMESamp:DELTA:<wfm>?

Description

This query-only command returns the relative time between the triggers of the FastFrame Selected and the FastFrame Reference, within the specified waveform. Valid waveforms include CH<x>, MATH<x> and REF<x>; the x variable can be expressed as an integer ranging from 1 through 4.

Group

Horizontal

Syntax

`HORizontal:FASTframe:TIMESamp:DELTA:<wfm>?`

Example

`HORIZONTAL:FASTRAME:TIMESTAMP:DELTA:CH1?`

This query might return

```
:HORIZONTAL:FASTFRAME:TIMESTAMP:DELTA:CH1  
"00:00:00.006 000 306 556"
```

This is the delta time stamp of FastFrame Selected Frame on channel 1 - FastFrame Reference Frame (TS[C1 Selected]-TS[Reference]).

HORizontal:FASTframe:TIMESamp:FRAME:<wfm>?

Description

This query-only command returns the absolute trigger date and time for the specified frame and waveform. Valid waveforms include CH<x>, MATH<x> and REF<x>; the x variable can be expressed as an integer ranging from 1 through 4.

Group

Horizontal

Syntax

```
HORizontal:FASTframe:TIMESamp:FRAME:<wfm>?
<NR1>
```

Argument

- <NR1>

The frame number for which the timestamp will be returned on the specified waveform.

Example

```
HORIZONTAL:FASTFRAME:TIMESTAMP:FRAME:CH1? 10
```

This query might return

```
:HORIZONTAL:FASTFRAME:TIMESTAMP:FRAME:CH1
10,"02 Mar 2000 20:10:54.536 036 928 432",
which is the time stamp of channel 1, frame 10.
```

HORizontal:FASTframe:TIMESamp:REF?

Description

This query-only command returns the absolute trigger date and time for FastFrame reference.

Group

Horizontal

Related Commands

```
HORizontal:FASTframe:REF:FRAME,
HORizontal:FASTframe:REF:SOURce
```

Syntax

```
HORizontal:FASTframe:TIMESamp:REF?
```

Example

```
HORIZONTAL:FASTFRAME:TIMESTAMP:REF?
```

This query might return

```
:HORIZONTAL:FASTFRAME:TIMESTAMP:REF "02 Mar
2000 20:10:54.533 036 838 784", which is the time
stamp of FastFrame Reference.
```

HORizontal:FASTframe:TIMESamp:SELECTED:<wfm>?

Description

This query-only command returns the absolute trigger date and time for the FastFrame Selected, within the specified waveform. Valid waveforms include CH<x>, MATH<x> and REF<x>; the x variable can be expressed as an integer ranging from 1 through 4.

Group

Horizontal

Related Commands

HORizontal:FASTframe:SELECTED:<wfm>?

Syntax

HORizontal:FASTframe:TIMESamp:SELECTED:<wfm>?

Example

HORIZONTAL:FASTFRAME:TIMESTAMP:SELECTED:REF1?

This query might return

:HORIZONTAL:FASTFRAME:TIMESTAMP:SELECTED:REF1
F1 "02 MAR 2000 20:10:54:539 037 145 340",
which is the time stamp of FastFrame Selected on reference 1.

HORizontal:FASTframe:TRACK

Description

This command sets up or returns the state of FastFrame tracking feature. This command is equivalent to selecting FastFrame Setup from the Horiz/Acq menu and then clicking the desired Frame Tracking state.

When FastFrame Track is set to "live", the channel and math waveforms are locked together. Adjusting a channel waveform also adjusts a related math waveform. All reference waveforms are also locked together but they are separate from channel and math waveforms.

For example, when you set the Selected Frame Source Ch1 to Frame 3, then Selected Frame Ch2, Ch3, Ch4, Math1, Math2, Math3 and Math4 are also set to Frame 3.

When you set the Selected Frame Source Ref1 to Frame 2, then Selected Frame Ref2, Ref3 and Ref4 are also set to Frame 2. If the Frame Tracking is set to Live, changing Selected Frame Ch1 will not affect the Selected Frame Ref1 frame of the Reference Frame setting.

When FastFrame Track is set to "all", the channel, math and reference waveforms are locked together. Adjusting a channel waveform also adjusts the related math and reference waveforms.

For example, when you set the Selected Frame Source Ch1 to Frame 3, then Selected Frame Ch2, Ch3, Ch4, Math1, Math2, Math3, Math4, Ref1, Ref2, Ref3 and Ref4 are also set to Frame 3.

Group

Horizontal

Related Commands

HORizontal:FASTframe:REF:FRAME,
HORizontal:FASTframe:REF:SOURce,
HORizontal:FASTframe:SELECTED:<wfm>?

Syntax 1

```
HORizontal:FASTframe:TRACK {LIVE|ALL}
```

Syntax 2

```
HORizontal:FASTframe:TRACK?
```

Arguments

- LIVE
This sets FastFrame Track to Live.
- ALL
This sets FastFrame Track to All.

Example 1

```
HORIZONTAL:FASTFRAME:TRACK LIVE
```

This command sets FastFrame Track to live.

Example 2

```
HORIZONTAL:FASTFRAME:TRACK?
```

This query might return

```
:HORIZONTAL:FASTFRAME:TRACK ALL
```

This indicates that all FastFrame Selected Frames and the FastFrame Reference will be locked together.

HORizontal:MAIn?

Description

This query-only command returns the time per division of the time base. This command is equivalent to selecting Position/Scale from the Horiz/Acq menu.

Group

Horizontal

Related Commands

HORizontal:SCAlE

Syntax

```
HORizontal:MAIn?
```

Example

```
HORizontal:MAIn?
```

This query might return

```
:HORIZONTAL:MAIN:SCALE 1.0000E-04;POSITION  
5.0000E+01;UNITS:VALUE 1.0000E+00;STRING  
"s";OFFSET 0.0000E+01
```

HORizontal[:MAIn]:DELay:MODE

Description

This command sets or queries the time base trigger delay mode. This command is equivalent to choosing Delay Mode On from the Horiz/Acq menu.

Group

Horizontal

Related Commands

HORizontal[:MAIn]:DELay:TIMe

Syntax 1

```
HORizontal[:MAIn]:DELay:MODE [ON|OFF|<NR1>]
```

Syntax 2

`HORizontal [:MAIn] :DELay:MODE?`

Arguments

- ON
This enables the time base trigger delay mode.
- OFF
This disables the time base trigger delay mode.
- <NR1>
A 0 disables the time base trigger delay mode, any other value enables the time base trigger delay mode.

Example 1

`HORizontal:DELay:MODE ON`

This command enables the time base trigger delay mode.

Example 2

`HORizontal:DELay:MODE?`

This query might return

`:HORIZONTAL:DELAY:MODE 1`

This indicates that the time base trigger delay mode is currently enabled.

HORizontal[:MAIn]:DELay:POSition

Description

This command sets or queries the time base position when Horizontal Delay Mode is turned on. This command is equivalent to selecting Horizontal/Acquisition Setup from the Horiz/Acq menu and then entering a Ref Point value.

Group

Horizontal

Related Commands

`HORizontal[:MAIn}:DELay:TIME`

Syntax 1

`HORizontal [:MAIn] :DELay:POSition <NR3>`

Syntax 2

`HORizontal [:MAIn] :DELay:POSition?`

Arguments

- <NR3>
This is from 0 to ≈ 100 and is the percentage of the waveform that is displayed left of the center graticule.

Note: The upper limit of the waveform position is slightly limited by a value that is determined from the record length (upper limit = 100 - 1/record length).

Example 1

```
HORizontal:DELay:POSition 5E+1
```

This command sets the time base trigger delay position to 50 percent.

Example 2

```
HORizontal:DELay:POSition?
```

This query might return

```
:HORIZONTAL:MAIN:DELAY:POSITION 5.0000E+01
```

This indicates that the time base trigger delay position is currently set to 50 percent.

HORizontal[:MAIn]:DELay:TIME

Description

This command sets or queries the time base trigger delay time. This command is equivalent to selecting Position/Scale from the Horiz/Acq menu and choosing a value for Horiz Delay.

Group

Horizontal

Related Commands

```
HORizontal[:MAIn]:DELay:MODE,  
HORizontal[:MAIn]:DELay:POSition
```

Syntax 1

```
HORizontal [:MAIn] :DELay:TIME <NR3>
```

Syntax 2

```
HORizontal [:MAIn] :DELay:TIME?
```

Argument

- <NR3>

This specifies the time base trigger delay time setting, typically represented in seconds.

Example 1

```
HORizontal:DElay:TIME 5.0E-3
```

This command sets the time base trigger delay time to 5 ms.

Example 2

```
HORizontal:DElay:TIME?
```

This query might return

```
:HORIZONTAL:MAIN:DELAY 5.0000E-05
```

This indicates that the time delay setting is 5 μ s.

HORizontal:MAIn:INTERPRatio?

Description

This query-only command returns the Horizontal Main time base interp ratio.

Group

Horizontal

Syntax

```
HORizontal:MAIn:INTERPRatio?
```

Example

```
HORIZONTAL:MAIN:INTERPRATIO?
```

This query might return

```
:HORIZONTAL:MAIN:INTERPRATIO 10.0
```

HORizontal[:MAIn]:POSition

This command either positions the waveform horizontally on the display or returns the horizontal position on the display and is identical to the HORizontal:POSition command. When Horizontal Delay mode is turned off, this command is equivalent to adjusting the HORIZONTAL POSITION knob on the front-panel. When Horizontal Delay mode is turned on, this command is equivalent to selecting Horizontal/Acquisition from the Horiz/Acq menu and then choosing a Horizontal Ref Point value.

Group

Horizontal

Related Commands

```
HORizontal[:MAIn]:DElay:MODE
```

Syntax 1

```
HORizontal:MAIn:POSition <NR3>
```

Syntax 2

`HORizontal:MAIn:POSition?`

Arguments

- `<NR3>`
This argument can range from 0 to ≈ 100 and is the percentage of the waveform that is displayed left of the center graticule.

Note: The upper limit of the waveform position is slightly limited by a value that is determined from the record length (upper limit = $100 - 1/\text{record length}$).

Example 1

`HORizontal:MAIn:POSition 5.000E+01`

This command sets the horizontal position of the waveform such that 10 percent of the waveform is to the left of center of the screen.

Example 2

`HORizontal:MAIn:POSition?`

This query might return `:HORIZONTAL:MAIN:POSITION 5.0000E+01`, indicating that the horizontal position of the waveform on the screen is currently set to 50 percent.

HORizontal:MAIn:SAMPLERate

Description

This command sets the horizontal sample rate to the desired number of samples per second. The record length is automatically adjusted at the same time to maintain a constant number of data points in each frame. The query form of this command returns the current horizontal sample rate. This command is equivalent to selecting Horizontal/Acquisition Setup from the Horiz/Acq menu and then entering the desired Sample Rate.

Group

Horizontal

Related Commands

`HORizontal:RESOlution`

Syntax 1

`HORizontal:MAIn:SAMPLERate <NR3>`

Syntax 2

`HORizontal:MAIn:SAMPLERate?`

Arguments

- `<NR3>`
This represents the size of the sample rate, which ranges from 5 S/s to 250 GS/s.

Example 1

```
HORizontal:MAIn:SAMPLERate 125E6
```

This command sets the sample rate to the sample rate increment that is closest to 125 MS/s.

Example 2

```
HORizontal:MAIn:SAMPLERate?
```

This query might return :HORIZONTAL:MAIN:SAMPLERATE
2.5000E+09, indicating that the sample rate is currently set to
2.5 GS/s.

HORizontal[:MAIn]:SCAle

Description

This command sets the time per division for the time base or returns its horizontal scale on the display and is identical to the HORizontal:SCAle command. The specified scale value is rounded to a valid scale setting. This command is equivalent to selecting Position/Scale from the Horiz/Acq menu and then choosing a Scale value.

Group

Horizontal

Related Commands

HORizontal:SCAle

Syntax 1

```
HORizontal:MAIn:SCAle <NR3>
```

Syntax 2

```
HORizontal:MAIn:SCAle?
```

Argument

- <NR3>

This is the time per division. The range is from 200 ps through 40 s.

Example 1

```
HORizontal:MAIn:SCAle 2E-6
```

This command sets the main scale to 2 μ s per division.

Example 2

```
HORizontal:MAIn:SCAle?
```

This query might return :HORIZONTAL:MAIN:SCALE
2.0000E-06, indicating that the main scale is currently set to 2
 μ s per division.

HORizontal:MAIn:UNIts

Description

This command sets or returns the units for the horizontal time base. It is equivalent to setting the HORizontal:MAIn:UNIts:STRing

Group

Horizontal

Related Commands

HORizontal:MAIn:UNIts:STRing

Syntax 1

```
HORizontal:MAIn:UNIts <STRing>
```

Syntax 2

```
HORizontal:MAIn:UNIts?
```

Arguments

- <STRing>
This is the time base units string.

Example 1

```
HORizontal:MAIn:UNIts "lum"
```

This command sets the time base multiplier to 5.5, the units to lumens and the time base units offset to 2.9.

Example 2

```
HORizontal:MAIn:UNIts?
```

This query might return

```
:HORIZONTAL:MAIN:UNITS STRING "lum".
```

HORizontal:MAIn:UNIts:STRing

Description

This command sets or returns the units string for the horizontal time base trigger delay.

Group

Horizontal

Related Commands

```
HORizontal:MAIn:UNIts
```

Syntax 1

```
HORizontal:MAIn:UNIts:STRing <string>
```

Syntax 2

```
HORizontal:MAIn:UNIts:STRing?
```

Argument

- <string>
This is the time base units string.

Example 1

```
HORizontal:MAIn:UNIts:STRing lum
```

This command sets the units string for the time base trigger delay to lumens.

Example 2

```
HORizontal:MAIn:UNItS:STRing?
```

This query might return

```
:HORIZONTAL:MAIN:UNITS:STRING "lum"
```

indicating that the units string for the time base trigger delay is set to lumens.

HORizontal:POSition

Description

This command either positions the waveform horizontally on the display or returns its horizontal position on the display. When Horizontal Delay Mode is turned off, this command is equivalent to adjusting the HORIZONTAL POSITION knob on the front panel.

Group

Horizontal

Related Commands

```
HORizontal[:MAIn]:DELay:MODE
```

Syntax 1

```
HORizontal:POSition <NR3>
```

Syntax 2

```
HORizontal:POSition?
```

Argument

- <NR3>

This is from 0 to ≈ 100 and is the percentage of the waveform that is displayed left of the center graticule.

Note: The upper limit of the waveform position is slightly limited by a value that is determined from the record length (upper limit = $100 - 1/\text{record length}$).

Example 1

```
HORizontal:POSition 10
```

This command sets the horizontal position of the waveform such that 10% of the waveform is to the left of screen center.

Example 2

```
HORizontal:POSition?
```

This query might return

```
:HORIZONTAL:POSITION 5.0000E+01
```

indicating the horizontal position of the waveform on the screen.

HORizontal:RECOrdlength

Description

This command sets the horizontal record length to the number of data points in each frame. The query form of this command returns the current horizontal record length. This command is equivalent to selecting Resolution from the Horiz/Acq menu and then entering the desired Rec Length.

Group

Horizontal

Syntax 1

```
HORizontal:RECOrdlength <NR1>
```

Syntax 2

```
HORizontal:RECOrdlength?
```

Argument

- <NR1>
This represents the supported values for horizontal record lengths, which range from 500 through 400K data points. For more information about valid data point ranges, select Specifications from the Help menu and choose the Horizontal & Acquisition tab.

Example 1

```
HORizontal:RECOrdlength 50000
```

This command specifies that 50000 data points will be acquired for each record.

Example 2

```
HORizontal:RECOrdlength?
```

This query might return

```
:HORIZONTAL:RECOrdlength 5000
```

indicating that the horizontal record length is equal to 5000 data points.

HORizontal:RESOLution

Description

This command sets the horizontal record length to the number of data points in each frame. The sample rate is automatically adjusted at the same time to maintain a constant time per division. The query form of this command returns the current horizontal record length. This command is equivalent to adjusting the RESOLUTION knob on the front panel.

Group

Horizontal

Syntax 1

`HORizontal:RESOLution <NR1>`

Syntax 2

`HORizontal:RESOLution?`

Argument

- `<NR1>`

This represents the supported values for horizontal record lengths, which range from 500 through 400K data points. For more information about valid data point ranges, select Specifications from the Help menu and choose the Horizontal & Acquisition tab.

Example 1

`HORizontal:RESOLution 50000`

This command specifies that 50000 data points will be acquired for each record.

Example 2

`HORizontal:RESOLution?`

This query might return

`:HORIZONTAL:RESOLUTION 5000`

indicating that the horizontal record length is equal to 5000 data points.

HORIZONTAL:ROLL

Description

This command sets or queries the Roll Mode status. Use Roll Mode when you want to view data at very slow sweep speeds. It is useful for observing data samples on the screen as they occur. This command is equivalent to selecting Horizontal/Acquisition Setup from the Horiz/Acq menu, selecting the Acquisition tab, and setting the Roll Mode to Auto or Off.

Group

Horizontal

Syntax 1

`HORizontal:ROLL {AUTO|OFF|ON}`

Syntax 2

`HORizontal:ROLL?`

Arguments

- `AUTO`

This enables Roll Mode, if the time/division is set appropriately.

- `OFF`

This disables Roll Mode.

- ON

This enables Roll Mode, if the time/division is set appropriately.

Example 1

```
HORizontal:ROLL ON
```

This command enables Roll Mode.

Example 2

```
HORizontal:RECOrdlength?
```

This query might return

```
:HORIZONTAL:ROLL OFF
```

indicating that the Roll Mode is disabled.

HORizontal:SCAle

Description

This command sets or queries the time per division for the time base and is identical to the HORizontal:MAIn:SCAle command. It is provided to maintain program compatibility with some older models of Tektronix instruments. This command is equivalent to selecting Position/Scale from the Horiz/Acq menu and entering the desired Scale value.

Group

Horizontal

Related Commands

HORizontal:MAIn:SCAle

Syntax 1

```
HORizontal:SCAle <NR3>
```

Syntax 2

```
HORizontal:SCAle?
```

Argument

- <NR3>

This is the time per division. The range is from 200 ps to 40 s.

Example 1

```
HORizontal:SCAle 2E-6
```

This command sets the main scale to 2 μ s per division.

Example 2

```
HORizontal:SCAle?
```

This query might return

```
:HORIZONTAL:SCALE 2.0000E-06
```

indicating that the time per division is currently set to 2 μ s,

HORizontal:TRIGger:POSition

Description

This command sets or queries the position of the trigger and is identical to the HORizontal:MAIn:POSition command. It is provided to maintain program compatibility with some older models of Tektronix instruments. This command is equivalent to selecting Position/Scale from the Horiz/Acq menu and entering the desired Position.

Group

Horizontal

Related Commands

HORizontal:MAIn:POSition

Syntax 1

`HORizontal:TRIGger:POSition <NR1>`

Syntax 2

`HORizontal:TRIGger:POSition?`

Argument

- `<NR1>`
This is the amount of pretrigger information in the waveform. The range is from 0 to 100%.

Example 1

`HORizontal:TRIGger:POSition 50`

This command sets the pretrigger information in the waveform to 50%.

Example 2

`HORizontal:TRIGger:POSition?`

This query might return

`:HORIZONTAL:TRIGGER:POSITION 50`

indicating that 50% of the waveform is pretrigger information.

ID?

Description

This query-only command returns identifying information about the instrument and related firmware.

Group

Miscellaneous

Related Commands

`*IDN?`

LOCK

Syntax

ID?

Example

ID?

This query might return

```
:TEK/TDS5404,CF:91.1CT,FV:01.00.912
```

indicating the instrument model number, configured format, and firmware version number.

Description

This command enables or disables all front-panel buttons and knobs, including the touch screen. There is no front panel equivalent.

Group

Miscellaneous

Related Commands

UNLock

Syntax 1

```
LOCK {ALL|NONE}
```

Syntax 2

LOCK?

Arguments

- ALL
This disables all front panel controls.
- NONE
This enables all front panel controls. This is equivalent to the UNLock ALL command.

Note: If the instrument is in the Remote With Lockout State (RWLS), the LOCK NONE command has no effect. For more information, see the ANSI/IEEE Std 488.1-1987 Standard Digital Interface for Programmable Instrumentation, section 2.8.3 on RL State Descriptions.

Example 1

```
LOCK ALL
```

This command locks the front panel controls.

Example 2

```
LOCK?
```

This query might return

```
:LOCK NONE
```

indicating that the front panel controls are enabled by this command.

MATH<x>?

Description

This query-only command returns the definition for the math waveform specified by <x>, which ranges from 1 through 4 in four-channel instruments and 1 through 2 in two-channel instruments.

Group

Math

Related Commands

SELEct:<wfm>

Syntax

MATH<x>?

Example

MATH1?

```
This query might return the definition of a math waveform as
:MATH1 DEFINE "PROBE POINT7";NUMAVG 2;SCALE
1.0000E+00;
POSITION 0.0000E+00;LABEL:NAME "Math1";XPOS 5;
YPOS 65;;MATH1:SPECTRAL:MAG DB;PHASE
DEGREES;GATEPOS 0.0000E+00;
GATEWIDTH 1.9996E-06;REFLEVEL
2.0000E+01;REFLEVELOFFSET
2.2360E-01;SPAN 1.2500+09;CENTER
6.2500E+08;RESBW 1.0002E+06
;WINDOW GAUSSIAN;SUPPRESS -3.5000EE+01;UNWRAP
0;LOCK 0
```

MATH<x>:DEFine

Description

This command allows you to use mathematical expressions to define the math math waveform specified by x. The value of x can range from 1 through 4 for four-channel instruments or 1 through 2 for two-channel instruments. Sending this command is equivalent to selecting Math Setup from the Math menu, selecting a math waveform (Math 1 through Math 4 in four-channel instruments or Math 1 through Math 2 in two-channel instruments), and entering a math expression in the Math<x> = box. The query form of this command returns the math definition for the specified math waveform.

You can define and display up to four math waveforms simultaneously in four-channel instruments and two math waveforms simultaneously in two-channel instruments.

The standard math functions allow you to create simple waveform expressions, such as Ch 1 + Ch 2, which creates a math waveform that is the algebraic sum of the signal source of channel 1 and channel 2. Standard math expressions must fit the following defined equations:

- `<operand><operation><operand>`
where `<operand>` is one of Ch<x> or Ref<x> and
`<operation>` is one of +, -, *, or /
- `<operation><operand>`
where `<operand>` is one of Ch<x> or Ref<x> and
`<operation>` is one of SpectralMag or SpectralPhase

If you have Option 2A, *Advanced Analysis*, installed, you can create complex expressions consisting of 100 plus characters and comprising many sources, functions, and operands. For example, you can enter the expression `Log(Ch 1+Ch 2)`, which specifies that the signals from channels 1 and 2 are to be algebraically added, and the base 10 log of the sum is to be shown as the final math waveform.

For information about constructing mathematical expressions, see *Creating and Using Math Waveforms* in the user manual for this instrument.

Group

Math

Syntax 1

```
MATH<x>:DEFIne <QString>
```

Syntax 2

```
MATH<x>:DEFIne?
```

Argument

- `<QString>`
This quoted string argument is the mathematical expression that defines the waveform.

Example 1

```
MATH2:DEFIne "Ch1+Ch2"
```

This command adds the Ch 1 waveform and Ch 2 waveforms, storing the results in Math 2.

Example 2

```
MATH2:DEFIne?
```

This query might return

```
:MATH1:DEFINE "CH2*REF2"
```

as the expression that defines Math 1.

MATH<x>:LABEL:NAME

Description

This command sets or returns the label string, which is used for annotating the math waveform on the screen. The math waveform to which the label is attached is specified by *x*, which ranges in value from 1 through 4 for four-channel instruments or 1 through 2 for two-channel instruments. This command is equivalent to selecting Math Setup from the Math menu and entering a label in the Label box.

Group

Math

Syntax 1

```
MATH<x>:LABEL:NAME <string>
```

Syntax 2

```
MATH<x>:LABEL:NAME?
```

Argument

- <string>
This specifies the label to annotate the math waveform.

Example 1

```
MATH2:LABEL:NAME "Probe point7"
```

This command assigns "Probe point7" Math 2.

Example 2

```
MATH2:LABEL:NAME?
```

This query might return

```
:MATH2:LABEL:NAME "Probe point7"
```

indicating that Probe point 7 is the label for Math 2.

MATH<x>:LABEL:XPOS

Description

This command sets or queries the X screen offset at which the label attached to a math waveform is displayed, relative to the left edge of the screen. Channels are specified by *x*, which ranges from 1 through 4 for four-channel instruments or 1 through 2 for two-channel instruments. This command is equivalent to selecting Math Label from the Math menu and entering a value in the X Position box.

Group

Math

Related Commands

```
MATH<x>:LABEL:YPOS
```

Syntax 1

MATH<x>:LABEL:XPOS <NR1>

Syntax 2

MATH<x>:LABEL:XPOS?

Argument

- <NR1>

This is the location (in pixels) where the label for the selected math waveform is displayed, relative to the left edge of the screen. Arguments should be integers ranging from 0 to 500.

Example 1

MATH2:LABEL:XPOS 50

This command moves the waveform label for the MATH2 waveform (on a four-channel instrument) so that it begins 50 pixels to the right of the left edge of the screen.

Example 2

MATH2:LABEL:XPOS?

This query might return

:MATH2:LABEL:XPOS 50

indicating that the waveform label for the MATH2 waveform is currently 50 pixels to the right of the left edge of the screen.

MATH<x>:LABEL:YPOS

Description

This command sets or queries the Y screen offset at which the label attached to a math waveform is displayed, relative to the top edge of the screen. The Math waveform is specified by x, which ranges from 1 through 4 for four-channel instruments or 1 through 2 for two-channel instruments. This command is equivalent to selecting Math Label from the Math menu and entering a value in the Y Position box.

Group

Math

Related Commands

MATH<x>:LABEL:XPOS

Syntax 1

MATH<x>:LABEL:YPOS <NR1>

Syntax 2

MATH<x>:LABEL:YPOS?

Argument

- <NR1>

This is the location (in pixels) where the label for the selected math waveform is displayed, relative to the top edge of the screen. Arguments should be integers ranging from 0 to 400.

Example 1

```
MATH2:LABEL:YPOS -25
```

This command moves the waveform label for the MATH2 waveform to just beneath (25 pixels below) the top of the screen.

Example 2

```
MATH2:LABEL:YPOS?
```

This query might return

```
:MATH2:LABEL:YPOS 0
```

indicating that the waveform label for the MATH2 waveform is currently located just beneath the top of the screen.

MATH<x>:NUMAVg

Description

This command sets or returns the acquisition number at which the averaging algorithm will begin **exponential averaging**. Prior to that acquisition number, the algorithm uses **stable averaging**. This has no affect unless the AVG() function is used in the specified math expression. If so, it affects all AVG() functions in this math expression. The Math waveform is specified by x, which ranges from 1 through 4 for four-channel instruments or 1 through 2 for two-channel instruments. This command is equivalent to selecting Set Math Averages from the Math menu and then entering an averaging value for the math waveform.

Group

Math

Related Commands

ACQuire:NUMAVg

Syntax 1

```
MATH<x>:NUMAVg <NR1>
```

Syntax 2

```
MATH<x>:NUMAVg?
```

Argument

- <NR1>

This specifies the number of acquisitions over which exponential averaging is performed.

Example 1

```
MATH2:NUMAVg 10
```

This command averages the Math 2 waveform ten times.

Example 2

```
MATH2 :NUMAVG?
```

This query might return

```
:MATH2 :NUMAVG 10
```

indicating that ten Math 2 waveforms are averaged before a single acquisition occurs.

MATH<x>:SPECTral?

Description

This query-only command returns the current spectral setups for the specified math waveform. The Math waveform is specified by x, which ranges from 1 through 4 for four-channel instruments or 1 through 2 for two-channel instruments. This command is equivalent to selecting Spectral Setup from the Math menu and viewing the current spectral setup values.

Group

Math

Syntax

```
MATH<x>:SPECTral?
```

Example

```
MATH1:SPECTral?
```

```
This query might return the spectral setup values for MATH1 as
:MATH1:SPECTRAL:MAG DB;PHASE DEGREES;GATEPOS
0.0000E+00
;GATEWIDTH 1.9996E-06;REFLEVEL 4.4587+01
;REFLEVELOFFSET 2.2360E-01;SPAN
1.2500E+09;CENTER 6.2500E+08
;RESBW 1.0002E=06;WINDOW GAUSSIAN;SUPPRESS -
3.5000E+01
;UNWRAP 0;LOCK 0
```

MATH<x>:SPECTral:CENTER

Description

This command specifies or returns the center frequency of the spectral analyzer output data span for the specified math waveform. The Math waveform is specified by x, which ranges from 1 through 4 for four-channel instruments or 1 through 2 for two-channel instruments. This command is equivalent to selecting Spectral Setup from the Math menu and then entering a Center Freq value.

Note: This command is available only if you have installed Option 2A Advanced Analysis in your instrument.

Group

Math

Related Commands

MATH<x>:SPECTral:SPAN

Syntax 1

MATH<x>:SPECTral:CENTER <NR3>

Syntax 2

MATH<x>:SPECTral:CENTER?

Argument

- <NR3>

This is the desired frequency of the spectral analyzer output data span in hertz.

Example 1

```
MATH3:SPECTral:CENTER 10.09E6
```

This command sets the center frequency to the closest value it can attain to 10.09 MHz.

Example 2

```
MATH2:SPECTral:CENTER?
```

This query might return

```
:MATH2:SPECTral:CENTER 10.0900E+06
```

indicating that the center frequency is currently set at 10.09 MHz.

MATH<x>:SPECTral:GATEPOS

Description

This command sets or returns the position of the center of the gate, which is used as the data input to the spectral analyzer for the specified math waveform. The math waveform is specified by x, which ranges from 1 through 4 for four-channel instruments or 1 through 2 for two-channel instruments. This command is equivalent to selecting Spectral Setup from the Math menu and then entering a Gate Pos value.

Note: This command is available only if you have installed Option 2A Advanced Analysis in your instrument.

Group

Math

Related Commands

MATH<x>:SPECTral:GATEWIDTH

Syntax 1

MATH<x>:SPECTral:GATEPOS <NRf>

Syntax 2

MATH<x>:SPECTral:GATEPOS?

Argument

- <NRf>

This is the gate position. Units are represented in seconds, with respect to trigger position.

Example 1

```
MATH1:SPECTral:GATEPOS 0
```

This command specifies the position of the center edge of the gate used as the data input to the spectral analyzer.

Example 2

```
MATH2:SPECTral:GATEPOS?
```

This query might return

```
:MATH2:SPECTRAL:GATEPOS 0.0000E+00
```

indicating that the gate position is set to zero (the trigger position).

MATH<x>:SPECTral:GATEWIDTH

Description

This command sets or returns the gate width input, in seconds, to the spectral analyzer for the specified math waveform. The math waveform is specified by x, which ranges from 1 through 4 for four-channel instruments or 1 through 2 for two-channel instruments. This command is equivalent to selecting Spectral Setup from the Math menu and entering a duration value in the Gate Dur box.

Note: This command is available only if you have installed Option 2A Advanced Analysis in your instrument.

Group

Math

Related Commands

```
MATH<x>:SPECTral:GATEPOS
```

Syntax 1

```
MATH<x>:SPECTral:GATEWIDTH <NR3>
```

Syntax 2

```
MATH<x>:SPECTral:GATEWIDTH?
```

Argument

- <NR3>

This is the time across the 10-division screen in seconds.

Example 1

```
MATH1:SPECTral:GATEWIDTH 1.0E-3
```

This command sets the gate width input to the spectral analyzer at 1 ms.

Example 2

MATH3 : SPECTral : GATEWIDTH?

This query might return

:MATH3 : SPECTRAL : GATEWIDTH 1.0000E-03

indicating that the gate width to the spectral analyzer is set to 1 ms.

MATH<x>:SPECTral:LOCK

Description

This command locks menus for two or more math waveforms together as a group. The query form of this command returns an ON (1) or OFF (0), indicating whether spectral locking is turned on. This command is equal to selecting Spectral Setup from the Math menu, choosing the Control tab and then clicking the Time/Track Frequency Domain Controls button associated with the math waveforms that you want to lock. However, applying spectral locking functionality from the interface is limited to locking Math1 and Math2 (on two-channel and four-channel instruments) or Math 3 and Math4 (on four channel instruments).

Note: This command is available only if you have installed Option 2A Advanced Analysis in your instrument.

MATH<x> Lock Combinations			
MATH1	MATH2	MATH3	Locked Math Waveforms
Off	Off	Off	None
Off	Off	On	Math3 and Math4 locked
Off	On	Off	Math2 and Math3 locked
Off	On	On	Math2, Math3 and Math4 locked
On	Off	Off	Math1 and Math2 locked
On	Off	On	Math1 and Math 2 locked, Math3 and Math4 locked
On	On	Off	Math1, Math2 and Math3 locked
On	On	On	Math1, Math2, Math3 and Math4 locked

Note: Executing MATH4:SPECTral:LOCK via the GPIB interface has no affect since there is no Math5 to which it can be locked.

Group

Math

Syntax 1

MATH<x> : SPECTral : LOCK {ON|OFF}

Syntax 2

MATH<x> : SPECTral : LOCK?

Arguments

- ON
This turns on the parameter lock for the specified math waveform.
- OFF
This turns off the parameter lock for the specified math waveform.
- <NR1>
A 0 disables the parameter lock for the specified math waveform; any other value enables the parameter lock.

Example 1

```
MATH1:SPECTral:LOCK ON
```

This command turns on the parameter lock for Math1, which causes the parameters for Math1 and Math2 to be locked together.

Example 2

```
MATH1:SPECTral:LOCK?
```

This query might return

```
:MATH1:SPECTRAL:LOCK 0
```

indicating that the parameter lock for Math1 is turned off.

MATH<x>:SPECTral:MAG

Description

This command sets or returns the units of the SpectralMag function in the math string. The Math waveform is specified by x, which ranges from 1 through 4 for four-channel instruments or 1 through 2 for two-channel instruments. If you are using the standard math, this command is equivalent to selecting Magnitude Spectrum from the Math menu and then selecting the units that you want from the Scale button drop-down menu. If you have Option 2A Advanced Analysis installed on your instrument, this command is equivalent to selecting Spectral Setup from the Math menu, choosing the Mag tab, and then clicking the desired Scale button.

Group

Math

Related Commands

```
MATH<x>:SPECTral:PHASE
```

Syntax 1

```
MATH<x>:SPECTral:MAG {LINEAR|DB|DBM}
```

Syntax 2

```
MATH<x>:SPECTral:MAG?
```

Arguments

- `LINEAR`
This sets the SpectralMag units to linear.
- `DB`
This sets the SpectralMag units to decibels.
- `DBM`
This sets the SpectralMag units to decibels. It also sets the Ref Level Offset to a value that is the equivalent of 1mW into 50Ω.

Example 1

```
MATH2:SPECTral:MAG DB
```

This command sets the SpectralMag units for Math2 to decibels.

Example 2

```
MATH2:SPECTral:MAG?
```

This query might return

```
:MATH2:SPECTRAL:MAG DB
```

indicating that the SpectralMag units for Math2 are set to decibels.

MATH<x>:SPECTral:PHASE

Description

This command sets or returns the units of a SpectralPhase function in the math string. The Math waveform is specified by `x`, which ranges from 1 through 4 for four-channel instruments or 1 through 2 for two-channel instruments. This command is equal to selecting Spectral Setup from the Math menu, choosing the Phase tab, and then clicking the desired Scale button.

Note: This command is available only if you have installed Option 2A Advanced Analysis in your instrument.

Group

Math

Related Commands

```
MATH<x>:SPECTral:MAG
```

Syntax 1

```
MATH<x>:SPECTral:PHASE  
{DEGREES|RADIANS|GROUPDELAY}
```

Syntax 2

```
MATH<x>:SPECTral:PHASE?
```

Arguments

- `DEGREES`
This sets the SpectralPhase units to degrees.

- RADIANS
This sets the SpectralPhase units to radians.
- GROUPDELAY
This sets the SpectralPhase units to groupdelay, which commutes the derivative of unwrapped phase spectrum. Units are expressed in seconds.

Example 1

MATH2:SPECTral:PHASE DEGREES

This command sets the SpectralPhase units for Math2 to degrees.

Example 2

MATH2:SPECTral:PHASE?

This query might return

:MATH2:SPECTRAL:PHASE RADIANS

indicating that the SpectralPhase units for Math2 are set to radians.

MATH<x>:SPECTral:REFLevel

Description

This command specifies the vertical position of the output data from the spectral analyzer on the display screen for the specified math waveform. The numerical value represents the position at the top of the display graticule. The Math waveform is specified by x, which ranges from 1 through 4 for four-channel instruments or 1 through 2 for two-channel instruments. This command is equal to selecting Spectral Setup from the Math menu, choosing the Mag tab and then entering a value in the Reference Level box.

Note: This command is available only if you have installed Option 2A Advanced Analysis in your instrument.

Group

Math

Related Commands

MATH<x>:SPECTral:REFLEVELOffset

Syntax 1

MATH<x>:SPECTral:REFLevel <NR3>

Syntax 2

MATH<x>:SPECTral:REFLevel?

Argument

- <NR3>
This is the position that represents the top of the display screen graticule. The range depends on the units and both the MATH<x>:VERTical:SCALE and

MATH<x>:VERTical:POSition settings.

Example 1

```
MATH1:SPECTral:REFLevel -10
```

This sets the top of the display screen to be a reference level of -10 dB. If the vertical scale is LINEAR, then the vertical units will be the same as the input waveform.

Example 2

```
MATH1:SPECTral:REFLevel?
```

This query might return

```
:MATH1:SPECTRAL:REFLEVEL 2.0000E+01
```

indicating that the top of the display screen is set to a reference level of 20 dB.

MATH<x>:SPECTral:REFLEVELOffset

Description

This command sets or returns the spectral level offset used for calculating the dB value for the specified math waveform. The Math waveform is specified by x, which ranges from 1 through 4 for four-channel instruments or 1 through 2 for two-channel instruments. Changing the reference level offset causes the spectral waveform to move vertically, with respect to zero dB. This command is equal to selecting Spectral Setup from the Math menu, choosing the Mag tab and then entering a value in the Reference Level Offset box.

Note: This command is available only if you have installed Option 2A Advanced Analysis in your instrument.

Group

Math

Related Commands

```
MATH<x>:SPECTral:REFLevel
```

Syntax 1

```
MATH<x>:SPECTral:REFLEVELOffset {DBM|<NR3>}
```

Syntax 2

```
MATH<x>:SPECTral:REFLEVELOffset?
```

Arguments

- DBM
This specifies the reference level used for calculation to be equivalent to 1 mW into 50 Ω (Zero dB will occur at this level).
- <NR3>
This specifies the reference level used for calculation of the decibel value when the output units are Log.

Example 1

```
MATH1:SPECTral:REFLEVELOffset 0.5
```

This sets the reference level for the Log calculation for decibel to be 0.5. $\text{dB} = A \times \text{Log}(y/\langle\text{NR3}\rangle)$ where A is 10 if the input units are watts and A is 20 if the input units are otherwise.

Example 2

```
MATH1:SPECTral:REFLEVELOffset DBM
```

This sets the decibel reference to be equivalent to 1 mW into 50 Ω . The reference level numerical value will depend on the input units. If the units are volts, the value is set to 0.2236 V; if the units are amperes, the value is set to 40 μA ; if the units are watts, the value is set to 0.001 W.

Example 3

```
MATH1:SPECTral:REFLEVELOffset?
```

This query might return

```
:MATH1:SPECTRAL:REFLEVELOFFSET 2.23360E-01
```

indicating that the spectral reference level offset is 223.6 mV.

MATH<x>:SPECTral:RESBw

Description

This command sets or returns the resolution bandwidth of the spectral analyzer for the specified math waveform. The Math waveform is specified by x, which ranges from 1 through 4 for four-channel instruments or 1 through 2 for two-channel instruments. This command is equivalent to selecting Spectral Setup from the Math menu and then entering a value in the Res BW box.

Note: This command is available only if you have installed Option 2A Advanced Analysis in your instrument.

Group

Math

Related Commands

MATH<x>:SPECTral:GATEWIDTH,
MATH<x>:SPECTral:CENTER, MATH<x>:SPECTral:SPAN,
MATH<x>:SPECTral:WINDow

Syntax 1

```
MATH<x>:SPECTral:RESBw <NR3>
```

Syntax 2

```
MATH<x>:SPECTral:RESBw?
```

Argument

- <NR3>
This is the desired resolution bandwidth value. Units are represented in hertz.

Example 1

```
MATH1:SPECTral:RESBw 250E3
```

This command sets the resolution bandwidth to the attainable value that is close to 250 KHz.

Example 2

```
MATH1:SPECTral:RESBw?
```

This query might return

```
:MATH1:SPECTRAL:RESBW 1.0002E+06
```

indicating the actual resolution bandwidth value obtained from the spectral analyzer.

MATH<x>:SPECTral:SPAN

Description

This command sets the ceiling of the span to a value that is closest to the specified value. The query form of this command returns the current span value for specified math waveform. The Math waveform is specified by x, which ranges from 1 through 4 for four-channel instruments or 1 through 2 for two-channel instruments. This command is equal to selecting Spectral Setup from the Math menu and then entering a value in the Freq Span box.

Note: This command is available only if you have installed Option 2A Advanced Analysis in your instrument.

Group

Math

Related Commands

```
MATH<x>:SPECTral:CENTER
```

Syntax 1

```
MATH<x>:SPECTral:SPAN {<NR3>|FULL}
```

Syntax 2

```
MATH<x>:SPECTral:SPAN?
```

Arguments

- <NR3>
This specifies the frequency span of the output data vector from the spectral analyzer.
- FULL
This sets the top of the span to 1/2 the sample rate and sets the center frequency to 1/2 the span.

Example 1

```
MATH1:SPECTral:SPAN FULL
```

This command sets the top of the span to 1/2 the sample rate and sets the center frequency to 1/2 the span.

Example 2

```
MATH1:SPECTral:SPAN 2.56E6
```

This command sets the top of the span to a value that is closest to 2.56 MHz.

Example 3

```
MATH1:SPECTral:SPAN?
```

This query might return

```
:MATH1:SPECTRAL:SPAN 1.2500E+09
```

indicating the actual span value obtained by the spectral analyzer.

MATH<x>:SPECTral:SUPPress

Description

This command sets or returns the phase suppression threshold for the specified math waveform. The Math waveform is specified by x, which ranges from 1 through 4 for four-channel instruments or 1 through 2 for two-channel instruments. This command is equal to selecting Spectral Setup from the Math menu, choosing the Phase tab and then entering a value in the Suppression Threshold box.

Note: This command is available only if you have installed Option 2A Advanced Analysis in your instrument.

Group

Math

Related Commands

```
MATH<x>:SPECTral:UNWRap
```

Syntax 1

```
MATH<x>:SPECTral:SUPPress <NR3>
```

Syntax 2

```
MATH<x>:SPECTral:SUPPress?
```

Argument

- <NR3>

This is the level under which all data with magnitudes are displayed as zero phase.

Example 1

```
MATH1:SPECTral:SUPPress -62
```

This command specifies that any magnitude values less than -62 dB will have their phase output set to zero.

Example 2

```
MATH1:SPECTral:SUPPress?
```

This query might return

```
:MATH1:SPECTRAL:SUPPRESS -3.5000E+01
```

indicating that the phase suppression threshold is currently set to -35 dB.

MATH<x>:SPECTral:UNWRap

Description

This command sets or returns whether phase unwrap of the spectral analyzer output data is enabled for the specified math waveform. The Math waveform is specified by x, which ranges from 1 through 4 for four-channel instruments or 1 through 2 for two-channel instruments. This command is equal to selecting Spectral Setup from the Math menu, choosing the Phase tab and then clicking the Unwrap button.

Note: This command is available only if you have installed Option 2A Advanced Analysis in your instrument.

Group

Math

Related Commands

MATH<x>:SPECTral:SUPPress

Syntax 1

MATH<x>:SPECTral:UNWRap <ON|OFF>

Syntax 2

MATH<x>:SPECTral:UNWRap?

Arguments

- ON
This enables phase unwrap.
- OFF
This disables phase wrap.
- <NR1>
A 0 disables phase wrap; any other value enables phase wrap.

Example 1

MATH1:SPECTral:UNWRap ON

This command enables phase wrap of the spectral analyzer output data.

Example 2

MATH1:SPECTral:UNWRap?

This query might return

:MATH1:SPECTRAL:UNWRAP 0

indicating that phase unwrap of the spectral analyzer output data is disabled.

MATH<x>:SPECTral:WINDow

Description

This command sets or returns the window function used to multiply the spectral analyzer input data for the specified math waveform. The Math waveform is specified by x, which ranges from 1 through 4 for four-channel instruments or 1 through 2 for two-channel instruments. A spectral window determines what the filter shape of the spectral analyzer will be in the frequency domain. It can be described by a mathematical function that is multiplied point-by-point times the input data to the spectral analyzer. This command is equal to selecting Spectral Setup from the Math menu, and choosing from the Window Type drop-down list.

Following is a list of arguments that specify the window function used to multiply the spectral analyzer input data. The windows are listed in the order of their ability to resolve frequencies (resolution bandwidth). For additional information about spectral windows, see *Selecting a Spectral Window* in the online help for this instrument.

Note: This command is available only if you have installed Option 2A Advanced Analysis in your instrument.

Group

Math

Related Commands

MATH<x>:SPECTral:RESBw

Syntax 1

```
MATH<x>:SPECTral:WINDow {RECTANGULAR | HAMMING  
| HANNING | KAISERBESSEL | BLACKMANHARRIS | FLATTOP2  
| GAUSSIAN | TEKEXPONENTIAL}
```

Syntax 2

```
MATH<x>:SPECTral:WINDow?
```

Arguments

- RECTANGULAR
This type of window function is equivalent to multiplying all gate data by one.
- HAMMING
This type of window function is based on a cosine series.
- HANNING
This type of window function is based on a cosine series.
- KAISERBESSEL
This type of window function is based on a cosine series.
- BLACKMANHARRIS

This type of window function is based on a cosine series.

- GAUSSIAN

This type of window function has the best localization characteristics in the joint time/frequency plane.

- TEKEXPONENTIAL

This type of window has an exponential nonsymmetrical shape in the time domain and a triangular shape in the frequency domain.

- FLATTOP2

This type of window function is a cosine series window with a flattened frequency response lobe.

Example 1

```
MATH2:SPECTral:WINDow HANNING
```

This command applies a Hanning window to the spectral analyzer input data.

Example 2

```
MATH2:SPECTral:WINDow?
```

This query might return

```
:MATH2:SPECTRAL:WINDOW TEKEXPONENTIAL
```

indicating that the window function used to multiply the spectral analyzer input data is the Tek exponential function.

MATH<x>:VERTical:POStion

Description

This command sets or queries the vertical position of the specified Math waveform. The Math waveform is specified by *x*, which ranges from 1 through 4 for four-channel instruments or 1 through 2 for two-channel instruments. The position value is usually applied to the signal before it is digitized. The highest three units/div scale ranges of a given math are implemented by changing the way the acquired data is displayed. When the instrument is operating in any of these highest three scale ranges, the position control operates only on the signal after it is digitized. Note that if a signal that exceeds the range of the digitizer in one of these three scale ranges is repositioned, the displayed waveform will contain clipped values on-screen. This command is equivalent to selecting Position/Scale from the Math menu and then entering a Vert Pos value or adjusting the front-panel Vertical POSITION knob.

Increasing the position value of a waveform causes the waveform to move up, and decreasing the position value causes the waveform to move down. Position adjusts only the display position of a waveform, whether a channel, math, or reference waveform. The position value determines the vertical graticule coordinate at which input signal values, equal to the present offset setting for that reference, are displayed. For example, if the position for Math 3 is set to 2.0 and the offset is set to 3.0, then the input signals equal to 3.0 are displayed 2.0 divisions above the center of the screen.

Be aware that autoscaling occurs when a math waveform is first defined and enabled, or when a math string changes. After the math waveform is computed for the first time, the instrument determines the min + max of that waveform data. Then, the instrument sets the math position so that $(\text{min} + \text{max})/2$ is in the center of the screen. In addition, the instrument sets the math scale so that the range of the min and max cover 6 divisions. This autoscaling process can take up to 1/2 second to complete and will override any vertical scale or position commands for that math waveform received during this time. You should insert an appropriate pause in your program after defining and enabling a math waveform before changing its position or scale.

Group

Math, Vertical

Related Commands

CH<x>POStion, REF<x>:VERTical:POStion

Syntax 1

MATH<x>:VERTical:POStion <NR3>

Syntax 2

MATH<x>:VERTical:POSition?

Argument

- <NR3>
This is the desired position in divisions from the center graticule.

Example 1

```
MATH2:VERTical:POSition 1.3E+00
```

This command positions the Math 2 input signal 1.3 divisions higher than a position of 0.

Example 2

```
MATH1:VERTical:POSition?
```

This query might return

```
:MATH1:VERTICAL:POSITION -1.3000E+00
```

indicating that the current position of Math 1 is 1.3 divisions below the center graticule.

MATH<x>:VERTical:SCALE

Description

This command sets or queries the vertical scale of the specified math waveform. The Math waveform is specified by x, which ranges from 1 through 4 for four-channel instruments or 1 through 2 for two-channel instruments. This command is equivalent to selecting Position/Scale from the Math menu and then entering a Vert Scale value or adjusting the front-panel Vertical SCALE knob.

Each waveform has its own vertical scale parameter. For a signal with constant amplitude, increasing the scale causes the waveform to be displayed smaller. Decreasing the scale causes the waveform to be displayed larger.

Scale affects all waveforms. For reference and math waveforms, the scale setting controls the display only, graphically scaling these waveforms and having no affect on the acquisition hardware.

Be aware that autoscaling occurs when a math waveform is first defined and enabled, or when a math string changes. After the math waveform is computed for the first time, the instrument determines the min + max of that waveform data. Then, the instrument sets the math position so that $(\text{min} + \text{max})/2$ is in the center of the screen. In addition, the instrument sets the math scale so that the range of the min and max covers 6 divisions. This autoscaling process can take up to 1/2 second to complete and will override any vertical scale or position commands for that math waveform received during this time. You should insert

an appropriate pause in your program after defining and enabling a math waveform before changing its position or scale.

Group

Math, Vertical

Related Commands

CH<x>:SCALE, REF<x>:VERTICAL:SCALE

Syntax 1

MATH<x>:VERTICAL:SCALE <NR3>

Syntax 2

MATH<x>:VERTICAL:SCALE?

Argument

- <NR3>

This is the scale, in volts, amps or watts per division. The range is from 100.0E-36 through 100.0E+36.

Example 1

MATH4:VERTICAL:SCALE 100E-03

This command sets the Math 4 scale to 100 mV per division.

Example 2

CH2:VERTICAL:SCALE?

This query might return

:MATH2:VERTICAL:SCALE 1.0000E+00

indicating that the current scale setting of Math 2 is 1 V per division.

MEASUREMENT?

Description

This query-only command returns all measurement parameters in the following order: MEAS1, MEAS2, MEAS3, MEAS4, MEAS5, MEAS6, MEAS7, MEAS8, and IMMED.

Group

Measurement

Syntax

MEASUREMENT?

Example

MEASUREMENT?

This query might return

```
:MEASUREMENT:GATING OFF
;METHOD HISTOGRAM;IMMED:TYPE UNDEFINED;UNITS
"V"
;SOURCE1 CH1;SOURCE2 CH1;DELAY:EDGE1 RISE;EDGE2
RISE
```

```

;DIRECTION FORWARDS;:MEASUREMENT:MEAS1:STATE 0
;TYPE UNDEFINED;UNITS "V";SOURCE1 CH1;SOURCE2
CH1
;DELAY:EDGE1 RISE;EDGE2 RISE;DIRECTION
FORWARDS;
:MEASUREMENT:MEAS2:STATE 0;TYPE UNDEFINED;UNITS
"V"
;SOURCE1 CH1;SOURCE2 CH1;DELAY:EDGE1 RISE;EDGE2
RISE
;DIRECTION FORWARDS;:MEASUREMENT:MEAS3:STATE 0
;TYPE UNDEFINED;UNITS "V";SOURCE1 CH1;SOURCE2
CH1;DELAY
:EDGE1 RISE;EDGE2 RISE;DIRECTION FORWARDS;
:MEASUREMENT:MEAS4:STATE 0;TYPE UNDEFINED;UNITS
"V"
;SOURCE1 CH1;SOURCE2 CH1;DELAY:EDGE1 RISE;EDGE2
RISE
;DIRECTION FORWARDS;:MEASUREMENT:MEAS5:STATE 0
;TYPE UNDEFINED;UNITS "V";SOURCE1 CH1;SOURCE2
CH1
;DELAY:EDGE1 RISE;EDGE2 RISE;DIRECTION
FORWARDS;
:MEASUREMENT:MEAS6:STATE 0;TYPE UNDEFINED;UNITS
"V"
;SOURCE1 CH1;SOURCE2 CH1;DELAY:EDGE1 RISE;EDGE2
RISE
;DIRECTION FORWARDS;:MEASUREMENT:MEAS7:STATE 0
;TYPE UNDEFINED;UNITS "V";SOURCE1 CH1;SOURCE2
CH1;DELAY
:EDGE1 RISE;EDGE2 RISE;DIRECTION FORWARDS;
:MEASUREMENT:MEAS8:STATE 0;TYPE UNDEFINED;UNITS
"V"
;SOURCE1 CH1;SOURCE2 CH1;DELAY:EDGE1 RISE;EDGE2
RISE
;DIRECTION
FORWARDS;:MEASUREMENT:REFLEVEL:METHOD PERCENT
;ABSOLUTE:HIGH 0.0000;LOW 0.0000;MID1
0.0000;MID2 0.0000;
:MEASUREMENT:REFLEVEL:PERCENT:HIGH 90.0000;LOW
10.0000
;MID1 50.0000;MID2
50.0000;:MEASUREMENT:STATISTICS:MODE
OFF;WEIGHTING 32

```

MEASUrement:GATing

Description

This command specifies or returns the measurement gating setting. This command is equivalent to selecting Gating from the Measure menu and then clicking the desired Measurement Gating setting.

Group

Measurement

Syntax 1

MEASUREMENT:GATING {ON|OFF|<NRF>|ZOOM|CURSOR}

Syntax 2

MEASUREMENT:GATING?

Arguments

- ON
This turns on measurement gating.
- OFF
This turns off measurement gating.
- <NRF>
A 0 turns off measurement gating; any other value turns on measurement gating.
- ZOOM
This turns on gating, using the left and right edges of the zoom box.
- CURSOR
This limits measurements to the portion of the waveform between the vertical bar cursors, even if they are off screen.

Example 1

MEASUREMENT:GATING ON

This command turns on measurement gating.

Example 2

MEASUREMENT:GATING?

This query might return

:MEASUREMENT:GATING CURSOR

indicating that measurements are limited to the portion of the waveform between the vertical bar cursors.

MEASUREMENT:IMMED?

Description

This query-only command returns all immediate measurement setup parameters.

Group

Measurement

Syntax

MEASUREMENT:IMMED?

Example

MEASUREMENT:IMMED?

This query might return

```
:MEASUREMENT:IMMED:TYPE PERIOD;UNITS
"s";SOURCE1 CH1;SOURCE2 CH1;DELAY:EDGE1
RISE;EDGE2 RISE;DIRECTION FORWARDS
```

MEASUREMENT:IMMED:DELAY?

Description

This query-only command returns information about the immediate delay measurement. This command is equivalent to selecting Measurement Setup from the Measure menu, choosing the Time tab and then clicking the Delay button.

Group

Measurement

Syntax

```
MEASUREMENT:IMMED:DELAY?
```

Example

```
MEASUREMENT:IMMED:DELAY?
```

This query might return

```
:MEASUREMENT:IMMED:DELAY:EDGE1 RISE;EDGE2 RISE;
DIRECTION FORWARDS
```

MEASUREMENT:IMMED:DELAY:DIRECTION

Description

This command sets or returns the starting point and direction that determines the delay "to" edge when taking an immediate delay measurement. Use the MEASUREMENT:IMMED:SOURCE2 command to specify the delay "to" waveform. This command is equivalent to selecting Measurement Setup from the Measure menu, choosing the Time tab, clicking the Delay button to display the delay settings and then clicking the desired Search Direction setting.

Group

Measurement

Related Commands

```
MEASUREMENT:IMMED:SOURCE2
```

Syntax 1

```
MEASUREMENT:IMMED:DELAY:DIRECTION
{BACKWARDS|FORWARDS}
```

Syntax 2

```
MEASUREMENT:IMMED:DELAY:DIRECTION?
```

Arguments

- BACKWARDS

This starts the search at the end of the waveform and looks for the last rising or falling edge in the waveform.

- **FORwards**
This starts the search at the beginning of the waveform and looks for the first rising or falling edge in the waveform.

Example 1

```
MEASUREMENT:IMMED:DELAY:DIRECTION FORwards
```

This command starts searching from the beginning of the waveform record and looks for the first rising or falling edge.

Example 2

```
MEASUREMENT:IMMED:DELAY:DIRECTION?
```

This query might return

```
:MEASUREMENT:IMMED:DELAY:DIRECTION BACKWARDS
```

indicating that searching begins at the end of the waveform record and looks for the last rising or falling edge.

MEASUREMENT:IMMED:DELAY:EDGE[1]

Description

This command sets or queries the slope of the edge that is used for the delay "from" waveform when taking an immediate delay measurement. Use the MEASUREMENT:IMMED:SOURCE1 command to specify the waveform. This command is equivalent to selecting Measurement Setup from the Measure menu, choosing the Time tab, clicking the Delay button to display the delay settings and then clicking the desired Delay Edge1 setting.

Group

Measurement

Related Commands

```
MEASUREMENT:IMMED:SOURCE1
```

Syntax 1

```
MEASUREMENT:IMMED:DELAY:EDGE[1] {FALL|RISe}
```

Syntax 2

```
MEASUREMENT:IMMED:DELAY:EDGE[1]?
```

Arguments

- **FALL**
This specifies the falling edge.
- **RISe**
This specifies the rising edge.

Example 1

```
MEASUREMENT:IMMED:DELAY:EDGE[1] RISe
```

This command specifies that the rising edge be used for the immediate delay measurement.

Example 2

```
MEASUREMENT:IMMED:DELAY:EDGE[1]?
```

This query might return

```
MEASUREMENT:IMMED:DELAY:EDGE1 FALL
```

indicating that the falling edge or negative edge of the waveform is used for the immediate delay measurement.

MEASUREMENT:IMMED:DELAY:EDGE2

Description

This command sets or queries the slope of the edge that is used for the delay "to" waveform when taking an immediate delay measurement. Use the MEASUREMENT:IMMED:SOURCE2 command to specify the waveform. This command is equivalent to selecting Measurement Setup from the Measure menu, choosing the Time tab, clicking the Delay button to display the delay settings and then clicking the desired Delay Edge2 setting.

Group

Measurement

Related Commands

```
MEASUREMENT:IMMED:SOURCE2
```

Syntax 1

```
MEASUREMENT:IMMED:DELAY:EDGE2 {FALL|RISe}
```

Syntax 2

```
MEASUREMENT:IMMED:DELAY:EDGE2?
```

Arguments

- FALL
This specifies the falling edge.
- RISe
This specifies the rising edge.

Example 1

```
MEASUREMENT:IMMED:DELAY:EDGE2 RISe
```

This command specifies that the rising edge be used for the immediate delay measurement.

Example 2

```
MEASUREMENT:IMMED:DELAY:EDGE2?
```

This query might return

```
MEASUREMENT:IMMED:DELAY:EDGE2 FALL
```

indicating that the falling edge or negative edge of the waveform is used for the immediate delay measurement.

MEASUREMENT:IMMED:SOURCE[1]

Description

This command sets or queries the source for all single channel immediate measurements and specifies the source to measure "from" when taking an immediate delay measurement or phase measurement. This command is equivalent to selecting Measurement Setup from the Measure menu, choosing the Time tab, clicking the Delay button to display the delay settings and then clicking the desired Source1 (From) setting.

Group

Measurement

Related Commands

MEASUREMENT:IMMED:SOURCE2

Syntax 1

```
MEASUREMENT:IMMED:SOURCE[1]
{CH<x>|MATH<y>|REF<x>|HISTogram}
```

Syntax 2

```
MEASUREMENT:IMMED:SOURCE[1]?
```

Arguments

- CH<x>
This is an input channel waveform. The valid channel waveform range is from 1 through 4.
- MATH<y>
This is a math waveform. The valid math waveform range is from 1 through 4.
- REF<X>
This is a reference waveform. The valid reference waveform range is from 1 through 4.
- HISTogram
This indicates histogram as the object to be measured.

Example 1

```
MEASUREMENT:IMMED:SOURCE[1] MATH1
```

This command specifies Math1 as the immediate measurement source .

Example 2

```
MEASUREMENT:IMMED:SOURCE{1}?
```

This query might return

```
:MEASUREMENT:IMMED:SOURCE1 CH3
```

indicating that channel 3 is the immediate measurement source.

MEASUREMENT:IMMED:SOURCE2

Description

This command sets or queries the source to measure “to” for phase or delay immediate measurements. This command is equivalent to selecting Measurement Setup from the Measure menu, choosing the Time tab, clicking the Delay button to display the delay settings and then clicking the desired Source2 (To) setting.

Tip: Source2 measurements only apply to phase and delay measurement types, which require both a target (Source1) and reference (Source2) source.

Group

Measurement

Related Commands

MEASUREMENT:IMMED:SOURCE[1]

Syntax 1

MEASUREMENT:IMMED:SOURCE2 {CH<x>|MATH<y>|REF<x>}

Syntax 2

MEASUREMENT:IMMED:SOURCE2?

Arguments

- CH<x>
This is an input channel waveform. The valid channel waveform range is from 1 through 4.
- MATH<y>
This is a math waveform. The valid math waveform range is from 1 through 4.
- REF<x>
This is a reference waveform. The valid reference waveform range is from 1 through 4.

Example 1

MEASUREMENT:IMMED:SOURCE2 REF3

This command sets the waveform in reference memory location 3 as the delay "to" source when making delay measurements.

Example 2

MEASUREMENT:IMMED:SOURCE2?

This query might return

:MEASUREMENT:IMMED:SOURCE2 MATH1

indicating that Math1 is the immediate measurement source.

MEASUrement:IMMed:TYPE

Description

This command sets or queries the immediate measurement type.

Group

Measurement

Syntax 1 (Standard)

```
MEASUrement:IMMed:TYPE  
{AMPlitude|AREa|BURst|CAREa|CMEan|  
CRMs|DELay|FALL|FREQuency|HIGH|LOW|MAXimum|MEAN|  
MINimum|  
NDUty|NOVershoot|NWidth|PDUty|PERIod|PHase|PK2Pk  
|POVershoot|  
PWidth|RISe|RMS|UNDEFINED}
```

Syntax 2 (Option 2A Advanced Analysis)

In addition to the arguments listed in Syntax 1 above, if you have Option 2A, *Advanced Analysis*, installed on your instrument, the following syntax is also supported:

```
MEASUrement:IMMed:TYPE  
{HITs|MEDIan|PEAKHits|SIGMA1|SIGMA2|  
SIGMA3|STDdev|WAVEFORMS}
```

Syntax 3

```
MEASUrement:IMMed:TYPE?
```

Arguments (Standard)

- **AMPlitude**
This is the high value minus the low value.
- **AREa**
This is the area between the curve and ground over the entire waveform.
- **BURst**
This is the time from the first MidRef crossing to the last MidRef crossing.
- **CAREa**
This is the area between the curve and ground over one cycle.
- **CMEan**
This is the arithmetic mean over one cycle.
- **CRMs**
This is the true Root Mean Square voltage over one cycle.
- **DELay**
This is the time between the MidRef crossings of two different waveforms.

- FALL
This is the time that it takes for the falling edge of a pulse to fall from a HighRef value to a LowRef value of its final value.
- FREQuency
This is the reciprocal of the period measured in hertz.
- HIGH
This is the 100% reference level.
- LOW
This is the 0% reference level.
- MAXimum
This is the highest amplitude (voltage).
- MINimum
This is the lowest amplitude (voltage).
- NDUty
This is the ratio of the negative pulse width to the signal period expressed as a percentage.
- NOVershoot
This is the negative overshoot, expressed as $100 \times (\text{Low} - \text{Minimum}/\text{Amplitude})$.
- NWIdth
This is the distance (time) between MidRef (usually 50%) amplitude points of a negative pulse.
- PDUty
This is the ratio of the positive pulse width to the signal period, expressed as a percentage.
- PERIod
This is the time in seconds that it takes for one complete signal cycle to happen.
- PHAse
This is the amount of shift expressed in degrees from the selected waveform to the designated waveform.
- PK2Pk
This is the absolute difference between the maximum and minimum amplitude.
- POVershoot
This is the positive overshoot, expressed as $100 \times (\text{Maximum} - \text{High}/\text{Amplitude})$.
- PWIdth

This is the distance (time) between MidRef (usually 50%) amplitude points of a positive pulse.

- RISE

This is the time that it takes for the leading edge of a pulse to rise from a low reference value to a high reference value of its final value.

- RMS

This is the true Root Mean Square voltage.

- UNDEFINED

This is the default measurement type, which indicates that no measurement type is specified. Once a measurement type is chosen, it can be cleared by using this argument.

Arguments (Option 2A, Advanced Analysis)

- HITS

This argument is the number of points in the histogram box or on the box boundary.

- MEDIAN

This argument is the value that half of all acquired points within (or on) the histogram box are less than and half are greater than.

- PEAKHITS

This argument is the number of points in the largest bin of the histogram

- SIGMA1

This argument is the number of points in the histogram that are within 1 standard deviation of the histogram mean.

- SIGMA2

This argument is the number of points in the histogram that are within 2 standard deviations of the histogram mean.

- SIGMA3

This argument is the number of points in the histogram that are within 3 standard deviations of the histogram mean.

- STDDEV

This argument is the standard RMS deviation of all acquired points within (or on) the histogram box.

- WAVEFORMS

This argument is the number of waveforms that have contributed to the histogram.

Example 1

MEASUREMENT:IMMED:TYPE FREQUENCY

This defines the immediate measurement to be a frequency measurement.

Example 2

```
MEASUrement:IMMed:TYPe?
```

This query might return

```
:MEASUREMENT:IMMED:TYPe RMS
```

indicating that the immediate measurement is the true Root Mean Square voltage.

MEASUrement:IMMed:UNIts?

Description

This query-only command returns the units of the immediate measurement.

Group

Measurement

Syntax

```
MEASUrement:IMMed:UNIts?
```

Example

```
MEASUrement:IMMed:UNIts?
```

This query might return

```
:MEASUREMENT:IMMED:UNIts "s"
```

indicating that units for the immediate measurement are in seconds.

MEASUrement:IMMed:VALue?

Description

This query-only command returns the value of the measurement specified by the MEASUrement:IMMed:TYPe command. The measurement is immediately taken on the source(s) specified by a MEASUrement:IMMed:SOURCE command.

Note: A change to HORizontal:MAIn:SCALE or CH<x>:SCALE will not necessarily have taken affect if followed by this command.

Group

Measurement

Related Commands

```
MEASUrement:IMMed:TYPe,  
MEASUrement:IMMed:SOURCE, *ESR?, ALLEV?
```

Syntax

```
MEASUrement:IMMed:VALue?
```

Example

```
MEASUrement:IMMed:VALue?
```

This query might return

```
:MEASUREMENT:IMMED:VALUE 9.9000E+37
```

If the measurement has an error or warning associated with it, then an item is added to the error queue. The error can be checked for with the *ESR? and ALLEV? commands.

MEASUrement:MEAS<x>?

Description

This query-only command returns all measurement parameters for the displayed measurement specified by x, which can range from 1 through 8. This query command is equivalent to selecting Measurement Setup from the Measure menu and viewing the Measurements table; then choosing the Time tab, clicking the Delay button and viewing the Delay Edge and Search Direction settings.

Group

Measurement

Syntax

```
MEASUrement:MEAS<x>?
```

Example

```
MEASUrement:MEAS3?
```

This query might return

```
:MEASUREMENT:MEAS3:STATE 0;TYPE PERIOD;UNITS  
"s";SOURCE1 CH1;DELAY:EDGE1 RISE;EDGE2  
RISE;DIRECTION FORWARDS.
```

MEASUrement:MEAS<x>:COUNT?

Description

This query-only command returns the number of values accumulated for this measurement since the last statistical reset. Some values may have been ignored because they generated an error. Measurements are specified by x, which ranges from 1 through 8.

Group

Measurement

Syntax

```
MEASUrement:MEAS<x>:COUNT?
```

Example

```
MEASUrement:MEAS3:COUNT?
```

This query might return

```
:MEASUREMENT:MEAS3:COUNT 3.247000000E+03.
```

MEASUREMENT:MEAS<x>:DELAY?

Description

This query-only command returns the delay measurement parameters for the measurement specified by <x>, which ranges from 1 through 8. Measurement parameters are presented in the following order: Edge1, Edge2, and Direction. This query command is equivalent to selecting Time from the Measure menu, choosing Delay and viewing the Delay Edge and Search Direction settings.

Group

Measurement

Syntax 1

```
MEASUREMENT:MEAS<x>:DELAY?
```

Example

```
MEASUREMENT:MEAS3?
```

This query might return

```
:MEASUREMENT:MEAS3:DELAY:EDGE1 RISE;EDGE2  
RISE;DIRECTION FORWARDS.
```

MEASUREMENT:MEAS<x>:DELAY:DIRECTION

Description

This command sets or queries the starting point and direction that determines the delay "to" edge when taking a delay measurement. Use the MEASUREMENT:MEAS<x>:SOURCE2 command to specify the waveform. This command is equivalent to selecting Time from the Measure menu, choosing Delay from the drop-down list and then clicking the desired Search Direction setting.

Group

Measurement

Related Commands

```
MEASUREMENT:MEAS<x>:SOURCE2
```

Syntax 1

```
MEASUREMENT:MEAS<x>:DELAY:DIRECTION  
{BACKWARDS|FORWARDS}
```

Syntax 2

```
MEASUREMENT:MEAS<x>:DELAY:DIRECTION?
```

Arguments

- BACKWARDS

This means that the search starts at the end of the waveform and looks for the last rising or falling edge in the waveform. Use the MEASUREMENT:MEAS<x>:DELAY:EDGE2

command to specify the slope of the edge.

- **FORwards**

This means that the search starts at the beginning of the waveform and looks for the first rising or falling edge in the waveform. Use the

MEASUREMENT:MEAS<x>:DELAY:EDGE2 command to specify the slope of the edge.

Example 1

```
MEASUREMENT:MEAS3:DELAY:DIRECTION BACKWARDS
```

This command starts searching from the end of the waveform record.

Example 2

```
MEASUREMENT:MEAS3:DELAY:DIRECTION?
```

This query might return

```
:MEASUREMENT:MEAS3:DELAY:DIRECTION BACKWARDS
```

This indicates that the current search direction is backwards.

MEASUREMENT:MEAS<x>:DELAY:EDGE[1]

Description

This command sets or queries the slope of the edge that is used for the delay "from" waveform when taking a delay measurement. Use the MEASUREMENT:MEAS<x>:SOURCE[1] command to specify the waveform. This command is equivalent to selecting Time from the Measure menu, choosing Delay from the drop-down list and clicking the desired Delay Edge1 setting.

Group

Measurement

Related Commands

```
MEASUREMENT:MEAS<x>:SOURCE[1]
```

Syntax 1

```
MEASUREMENT:MEAS<x>:DELAY:EDGE [1] {FALL|RIS}
```

Syntax 2

```
MEASUREMENT:MEAS<x>:DELAY:EDGE [1] ?
```

Arguments

- **FALL**
This specifies the falling edge of the waveform.
- **RIS**
This specifies the rising edge of the waveform.

Example 1

```
MEASUREMENT:MEAS3:DELAY:EDGE [1] RIS
```

This command specifies that the rising edge of the waveform be used for measurement 3.

Example 2

```
MEASUrement:MEAS1:DElay:EDGE[1]?
```

This query might return

```
:MEASUREMENT:MEAS1:DELAY:EDGE[1] FALL
```

This indicates that the falling edge of the waveform is being used for measurement 1.

MEASUrement:MEAS<x>:DElay:EDGE2

Description

This command sets or queries the slope of the edge that is used for the delay "to" waveform when taking a delay measurement. Use the MEASUrement:MEAS<x>:SOURCE2 command to specify the waveform. This command is equivalent to selecting Time from the Measure menu, choosing Delay from the drop-down list and then clicking the desired Delay Edge2 setting.

Group

Measurement

Related Commands

```
MEASUrement:MEAS<x>:SOURCE2
```

Syntax 1

```
MEASUrement:MEAS<x>:DElay:EDGE2 {FALL|RISe}
```

Syntax 2

```
MEASUrement:MEAS<x>:DElay:EDGE2?
```

Arguments

- FALL
This specifies the falling edge of the waveform.
- RISe
This specifies the rising edge of the waveform.

Example 1

```
MEASUrement:MEAS3:DElay:EDGE2 RISe
```

This command specifies that the rising edge of the waveform be used for measurement 3.

Example 2

```
MEASUrement:MEAS1:DElay:EDGE2?
```

This query might return

```
:MEASUREMENT:MEAS1:DELAY:EDGE2 FALL
```

This indicates that the falling edge of the waveform is being used for measurement 1.

MEASUrement:MEAS<x>:MAXimum?

Description

This query-only command returns the maximum value found for this measurement since the last statistical reset. Measurements are specified by x, which ranges from 1 through 8.

Group

Measurement

Syntax

```
MEASUrement:MEAS<x>:MAXimum?
```

Example

```
MEASUrement:MEAS3:MAXimum?
```

This query might return :MEASUREMENT:MEAS3:MAXIMUM
4.18E-9.

MEASUrement:MEAS<x>:MEAN?

Description

This query-only command returns the mean value accumulated for this measurement since the last statistical reset. Measurements are specified by x, which ranges from 1 through 8.

Group

Measurement

Syntax

```
MEASUrement:MEAS<x>:MEAN?
```

Example

```
MEASUrement:MEAS1:MEAN?
```

This query might return
:MEASUREMENT:MEAS1:MEAN 514.71E-09.

MEASUrement:MEAS<x>:MINimum?

Description

This query-only command returns the minimum value found for this measurement since the last statistical reset. Measurements are specified by x, which ranges from 1 through 8.

Group

Measurement

Syntax

```
MEASUrement:MEAS<x>:MINimum?
```

Example

```
MEASUrement:MEAS1:MINimum?
```

This query might return

```
:MEASUREMENT:MEAS1:MINIMUM 1.75E-09.
```

MEASUREMENT:MEAS<x>:SOURCE[1]

Description

This command sets or queries the source for all single channel measurements and specifies the source to measure "from" when taking a delay measurement or phase measurement.

Measurements are specified by x, which ranges from 1 through 8. This command is equivalent to selecting Measurement Setup from the Measure menu and then choosing the desired measurement source.

Group

Measurement

Syntax 1

```
MEASUREMENT:MEAS<x>:SOURCE [1]  
{CH<x>|MATH<y>|REF<x>|HISTogram}
```

Syntax 2

```
MEASUREMENT:MEAS<x>:SOURCE [1] ?
```

Arguments

- CH<x>
This is an input channel waveform. The valid channel waveform range is from 1 through 4.
- MATH<y>
This is a math waveform. The valid math waveform range is from 1 through 4.
- REF<x>
This is a reference waveform. The valid reference waveform range is from 1 through 4.
- HISTogram
This is a histogram.

Example 1

```
MEASUREMENT:MEAS2:SOURCE [1] MATH1
```

This command specifies Math 1 as the measurement 2 source.

Example 2

```
MEASUREMENT:MEAS1:SOURCE [1] ?
```

This query might return

```
:MEASUREMENT:MEAS1:SOURCE [1] MATH1
```

This indicates that Math1 is the measurement 2 source.

MEASUREMENT:MEAS<x>:SOURCE2

Description

This command sets or queries the source to measure “to” for phase or delay measurements. Measurements are specified by *x*, which ranges from 1 through 8. This command is equivalent to selecting Measurement Setup from the Measure menu, selecting a measurement type of either Phase or Delay, and then choosing the desired measurement source.

Tip: Source2 measurements only apply to phase and delay measurement types, which require both a target (Source1) and reference (Source2) source.

Group

Measurement

Related Commands

MEASUREMENT:MEAS<x>:TYPE

Syntax 1

```
MEASUREMENT:MEAS<x>:SOURCE2  
{ CH<x> | MATH<y> | REF<x> }
```

Syntax 2

```
MEASUREMENT:MEAS<x>:SOURCE2?
```

Arguments

- CH<x>
This is an input channel waveform. The valid channel waveform range is from 1 through 4.
- MATH<y>
This is a math waveform. The valid math waveform range is from 1 through 4.
- REF<x>
This is a reference waveform. The valid reference waveform range is from 1 through 4.

Example 1

```
MEASUREMENT:MEAS4:SOURCE2 CH1
```

This command specifies CH1 as the delay "to" source when making delay measurement.

Example 2

```
MEASUREMENT:MEAS2:SOURCE2?
```

This query might return

```
:MEASUREMENT:MEAS2:SOURCE2 MATH1
```

This indicates that Math 1 is the measurement 2 source.

MEASUREMENT:MEAS<x>:STATE

Description

This command sets or queries whether the specified measurement slot is computed and displayed. The measurement slot is specified by x, which ranges from 1 through 8. This command is equivalent to selecting Measurement Setup from the Measure menu and then clicking the Display button.

For a measurement to display, you must have selected a source waveform and defined the measurement you want to take and display. You select the measurement using the MEASUREMENT:MEAS<x>:SOURCE[1] command. You define the measurement type using the MEASUREMENT:MEAS<x>:TYPE command.

Group

Measurement

Related Commands

MEASUREMENT:MEAS<x>:SOURCE[1],
MEASUREMENT:MEAS<x>:TYPE

Syntax 1

```
MEASUREMENT:MEAS<x>:STATE {OFF|ON|<NR1>}
```

Syntax 2

```
MEASUREMENT:MEAS<x>:STATE?
```

Arguments

- OFF
This disables calculation and display of the specified measurement slot.
- ON
This enables calculation and display of the specified measurement slot.
- <NR1>
A 0 disables calculation and display of the specified measurement slot; any other value enables calculation and display of the specified measurement slot.

Example 1

```
MEASUREMENT:MEAS2:STATE ON
```

This command computes and displays the measurement defined as measurement 2.

Example 2

```
MEASUREMENT:MEAS1:STATE?
```

This query might return

```
:MEASUREMENT:MEAS1:STATE 0
```

This indicates that measurement defined for measurement slot 1 is disabled.

MEASUREMENT:MEAS<x>:STDdev?

Description

This query-only command returns the standard deviation of values accumulated for this measurement since the last statistical reset. Measurements are specified by x, which ranges from 1 through 8.

Group

Measurement

Syntax

```
MEASUREMENT:MEAS<x>:STDdev?
```

Example

```
MEASUREMENT:MEAS1:STDdev?
```

This query might return

```
:MEASUREMENT:MEAS1:STDDEV 21.0E-12.
```

MEASUREMENT:MEAS<x>:TYPE

Description

This command sets or queries the type of measurement that is defined for the specified measurement slot. The measurement slot is specified by x, which ranges from 1 through 8. This command is equivalent to selecting Measurement Setup from the Measure menu and then choosing the desired measurement type.

Group

Measurement

Syntax 1 (Standard)

```
MEASUREMENT:MEAS<x>:TYPE  
{AMPLitude|AREa|BURst|CAREa|CMEan|CRMs  
|DELay|FALL|FREQuency|HIGH|LOW|MAXimum|MEAN|MIN  
Imum|NDUty  
|NOVershoot|NwIdth|PDUty|PERIod|PHase|PK2Pk|POVe  
rshoot|PWidth  
|RISe|RMS|UNDEFINED}
```

Syntax 2 (Option 2A Advanced Analysis)

In addition to the arguments listed in Syntax 1 above, if you have Option 2A, *Advanced Analysis*, installed on your instrument, the following syntax is also supported:

```
MEASUREMENT:MEAS<x>:TYPE  
{HITs|MEDIan|PEAKHits|SIGMA1|SIGMA2|SIGMA3  
|STDdev|WAVEFORMS}
```

Syntax 3

```
MEASUREMENT:MEAS<x>:TYPE?
```

Arguments (Standard)

- **AMPlitude**
This measures the amplitude of the selected waveform.
- **AREa**
This measures the voltage over time. The area is over the entire waveform or gated region and is measured in volt-seconds. The area measured above the ground is positive, while the area below ground is negative.
- **BURst**
This measures the duration of a burst. The measurement is made over the entire waveform or gated region.
- **CARea**
This measures the voltage over time. The area is over the first cycle in the waveform or the first cycle in the gated region and measured in volt-seconds. The area measured above ground is positive, while the area below ground is negative.
- **CMEan**
This measures the arithmetic mean over the first cycle in the waveform or the first cycle in the gated region.
- **CRMs**
This measures the true Root Mean Square voltage over the first cycle in the waveform or the first cycle in the gated region.
- **DELay**
This measures the time between the middle reference point of the source waveform and the destination waveform.
- **FALL**
This measures the time taken for the falling edge of the first pulse in the waveform or gated region to fall from a high reference value (default is 90%) to a low reference value (default is 10%).
- **FREQuency**
This measures the first cycle in the waveform or gated region. Frequency is the reciprocal of the period and is measured in hertz (Hz), where 1 Hz = 1 cycle per second.
- **HIGH**
This measures the High reference (100% level, sometimes called Topline) of a waveform.

You can also limit the High measurement (normally taken over the entire waveform record) to a gated region on the waveform.

- **LOW**
This measures the Low reference (0% level, sometimes called Baseline) of a waveform.
- **MAXimum**
This finds the maximum amplitude. This value is the most positive peak voltage found. It is measured over the entire waveform or gated region.
- **MEAN**
This amplitude measurement finds the arithmetic mean over the entire waveform or gated region.
- **MINimum**
This amplitude measurement finds the minimum amplitude. This value is typically the most negative peak voltage. It is measured over the entire waveform or gated region.
- **NDUty**
This measures the first cycle in the waveform or gated region. The negative duty cycle is the ratio of the negative pulse width to the signal period, expressed as a percentage.
- **NOVershoot**
This amplitude measurement finds the negative overshoot value over the entire waveform or gated region.
- **NWIdth**
This measures the first pulse in the waveform or gated region. This distance (time) is measured at the middle reference amplitude points of a negative pulse.
- **PDUty**
This measures the first cycle in the waveform or gated region. The positive duty cycle is the ratio of the positive pulse width to the signal period, expressed as a percentage.
- **PERIod**
This measures the time it takes for the first complete waveform cycle to complete in the waveform or gated region. Period is the reciprocal of frequency and is measured in seconds.
- **PHAsE**
This measures the phase difference (amount of time a waveform leads or lags the reference waveform) between two waveforms. The measurement is made between the middle reference points of the two waveforms and is expressed in degrees, where 360° represents one waveform cycle.
- **PK2Pk**

This peak-to-peak amplitude measurement is the absolute difference between the maximum and minimum amplitude in the entire waveform or gated region.

- `POVershoot`

This amplitude measurement is the positive overshoot value over the entire waveform or gated region.

- `PWIdth`

This measures the first pulse in the waveform or gated region. The distance (time) is measured at the middle reference amplitude points of a positive pulse.

- `RISe`

This timing measurement is the rise time of the waveform. The rise time is the time it takes for the leading edge of the first pulse encountered to rise from a low reference value (default is 10%) to a high reference value (default is 90%).

$$\text{Rise time} = \text{TimeRef High} - \text{TimeRef Low}$$

You can also limit the measurement (normally taken over the entire waveform record) to a gated region on the waveform.

- `RMS`

This amplitude measurement is the true Root Mean Square voltage in the entire waveform or gated region.

- `UNDEFINED`

This is the default measurement type, which indicates that no measurement type is specified. Once a measurement type is chosen, it can be cleared by using this argument. Note that if the measurement is displayed when you change its type to `UNDEFINED`, the measurement is removed from the display. In this case, the `STATE` will still indicate "1" and, when a valid type is later specified for the measurement, the measurement will again be displayed.

Arguments (Option 2A, Advanced Analysis)

- `HITs`

This argument is the number of points in the histogram box or on the box boundary.

- `MEDian`

This argument is the value that half of all acquired points within (or on) the histogram box are less than and half are greater than.

- `PEAKHits`

This argument is the number of points in the largest bin of the histogram

- `SIGMA1`

This argument is the number of points in the histogram that are within 1 standard deviation of the histogram mean.

- SIGMA2

This argument is the number of points in the histogram that are within 2 standard deviations of the histogram mean.

- SIGMA3

This argument is the number of points in the histogram that are within 3 standard deviations of the histogram mean.

- STDdev

This argument is the standard RMS deviation of all acquired points within (or on) the histogram box.

- WAVEFORMS

This argument is the number of waveforms that have contributed to the histogram.

Example 1

`MEASUREMENT:MEAS2:TYPE FREQUENCY`

This command defines measurement 2 as a measurement of the frequency of a waveform.

Example 2

MEASUrement:MEAS1:TYPE?

This query might return :MEASUREMENT:MEAS1:TYPE RMS, indicating that measurement 1 is defined to measure the RMS value of a waveform.

MEASUrement:MEAS<x>:UNIts?

Description

This query-only command returns the units associated with the specified measurement.

Group

Measurement

Related Commands

MEASUrement:MEAS<x>:TYPE

Syntax

MEASUrement:MEAS<x>:UNIts?

Example

MEASUrement:MEAS1:UNIts?

This query might return :MEASUREMENT:MEAS1:UNIts %, indicating units for measurement 1 are set to percent.

MEASUrement:MEAS<x>:VALue?

Description

This query-only command returns the value that has been calculated for the measurement specified by <x>, which ranges from 1 through 8. This command is equivalent to selecting Display Statistics from the Measure menu and then choosing Value from the drop-down list to display *all* measurement values on-screen.

Note: This is the displayed value in the onscreen display. If measurement statistics are enabled, a new value is calculated with every waveform. In addition, this value is updated about every 1/3 second. If you are acquiring a long acquisition record, the instrument may take longer to update.

Group

Measurement

Related Commands

MEASUrement:MEAS<x>:UNIts?, *ESR?, ALLEV?

Syntax

MEASUrement:MEAS<x>:VALue?

Example

MEASUrement:MEAS1:VALue?

This query might return :MEASUREMENT:MEAS1:VALue 2.8740E-06. If the measurement has an error or warning associated with it, then an item is added to the error queue. The error can be checked for with the *ESR? and ALLEV? commands.

MEASUrement:METHOD

Description

This command sets or queries the method used to calculate the 0% and 100% reference level. This command is equivalent to selecting Reference Levels from the Measure menu and then choosing the desired Determine Base, Top From setting.

Group

Measurement

Related Commands

MEASUrement:REFLevel:PERCent:HIGH,
MEASUrement:REFLevel:PERCent:LOW,
MEASUrement:REFLevel:PERCent:MID,
MEASUrement:REFLevel:PERCent:MID2

Syntax 1

MEASUrement:METHOD {HISTogram|MINMax}

Syntax 2

MEASUrement:METHOD?

Arguments

- HISTogram
This sets the high and low reference levels statistically using a histogram algorithm.
- MINMax
This sets the high and low waveform levels to MAX and MIN, respectively.

Example 1

MEASUrement:METHOD HISTogram

This command specifies that the high and low reference levels are set statistically.

Example 2

MEASUrement:METHOD?

This query might return :MEASUREMENT:METHOD MINMAX, indicating that the reference levels are set to MIN and MAX.

MEASUrement:REFLevel?

Description

This query-only command returns the current reference level parameters. This command is equivalent to selecting Reference Levels from the Measure menu and then viewing the current Reference Levels settings.

Group

Measurement

Syntax

```
MEASUrement:REFLevel?
```

Example

```
MEASUrement:REFLevel?
```

This query might return these reference level settings

```
:MEASUREMENT:REFLEVEL:METHOD ABSOLUTE  
;ABSOLUTE:HIGH 0.0000E+00;LOW 0.0000E+00;MID1  
0.0000E+00  
;MID2  
0.0000E+00; :MEASUREMENT:REFLEVEL:PERCENT:HIGH  
9.0000E+01;LOW 1.0000+01;MID1 5.0000E+01;MID2  
5.0000E+01
```

MEASUrement:REFLevel:ABSolute:HIGH

Description

This command sets or queries the high reference level, and is the upper reference level when MEASUrement:REFLevel:METHOD is set to Absolute. Note that this command affects the results of rise and fall measurements. This command is equivalent to selecting Reference Levels from the Measure menu and then entering the Absolute High Ref value.

Group

Measurement

Related Commands

```
MEASUrement:REFLevel:METHOD,  
MEASUrement:IMMed:TYPE,  
MEASUrement:MEAS<x>:TYPE
```

Syntax 1

```
MEASUrement:REFLevel:ABSolute:HIGH <NR3>
```

Syntax 2

```
MEASUrement:REFLevel:ABSolute:HIGH?
```

Argument

- <NR3>

This is the high reference level, in volts. The default is 0.0 V.

Example 1

```
MEASUREMENT:REFLevel:ABSolute:HIGH 1.71
```

This command sets the high reference level to 1.71 V.

Example 2

```
MEASUREMENT:REFLevel:ABSolute:HIGH?
```

This query might return

```
:MEASUREMENT:REFLEVEL:ABSOLUTE:HIGH 1.7100E+00,
```

indicating that the absolute high reference level is set to 1.71 V.

MEASUREMENT:REFLevel:ABSolute:LOW

Description

This command sets or queries the low reference level, and is the lower reference level when MEASUREMENT:REFLevel:METHOD is set to Absolute. Note that this command affects the results of rise and fall measurements. This command is equivalent to selecting Reference Levels from the Measure menu and entering the Absolute Low Ref value.

Group

Measurement

Related Commands

MEASUREMENT:REFLevel:METHOD,
MEASUREMENT:IMMed:TYPE,
MEASUREMENT:MEAS<x>:TYPE

Syntax 1

```
MEASUREMENT:REFLevel:ABSolute:LOW <NR3>
```

Syntax 2

```
MEASUREMENT:REFLevel:ABSolute:LOW?
```

Argument

- <NR3>

This is the low reference level, in volts. The default is 0.0 V.

Example 1

```
MEASUREMENT:REFLevel:ABSolute:LOW 0.0 V.
```

This command sets the low reference level to 0.0 V.

Example 2

```
MEASUrement:REFLevel:ABSolute:LOW?
```

This query might return

```
:MEASUREMENT:REFLEVEL:ABSOLUTE:LOW 0.0000E+00,
```

indicating that the absolute low reference level is set to 0.0 V.

MEASUrement:REFLevel:ABSolute:MID

Description

This command sets or queries the mid reference level, and is the 50% reference level when MEASUrement:REFLevel:METHOD is set to Absolute. Note that this command affects the results of period, frequency, delay, and all cyclic measurements. This command is equivalent to selecting Reference Levels from the Measure menu and then entering the Absolute Mid Ref value.

Group

Measurement

Related Commands

```
MEASUrement:REFLevel:METHOD
```

Syntax 1

```
MEASUrement:REFLevel:ABSolute:MID [1] <NR3>
```

Syntax 2

```
MEASUrement:REFLevel:ABSolute:MID [1] ?
```

Argument

- <NR3>

This is the mid reference level, in volts. The default is 0.0 V.

Example 1

```
MEASUrement:REFLevel:ABSolute:MID [1] .71
```

This command sets the mid reference level to .71 V.

Example 2

```
MEASUrement:REFLevel:ABSolute:MID [1] ?
```

This query might return

```
:MEASUREMENT:REFLEVEL:ABSOLUTE:MID 0.7100E+00,
```

indicating that the absolute mid1 reference level is set to .71 V.

MEASUrement:REFLevel:ABSolute:MID2

Description

This command sets or queries the mid reference level for the "to" waveform when taking a delay measurement, and is the 50% reference level when MEASUrement:REFLevel:METHod is set to Absolute. Note that this command affects the results of delay measurements. This command is equivalent to selecting Reference Levels from the Measure menu and then entering the Absolute Mid2 Ref value.

Group

Measurement

Related Commands

MEASUrement:REFLevel:METHod

Syntax 1

```
MEASUrement:REFLevel:ABSolute:MID2 <NR3>
```

Syntax 2

```
MEASUrement:REFLevel:ABSolute:MID2?
```

Argument

- <NR3>

This is the mid reference level, in volts. The default is 0.0 V.

Example 1

```
MEASUrement:REFLevel:ABSolute:MID2 0.5
```

This command sets the mid reference level for the delay waveform to 0.5 V.

Example 2

```
MEASUrement:REFLevel:ABSolute:MID2?
```

This query might return

```
:MEASUREMENT:REFLEVEL:ABSOLUTE:MID2 0.5000E+00,
```

indicating that the absolute mid2 reference level is set to 0.5 V.

MEASUrement:REFLevel:METHod

Description

This command specifies or queries the reference level units used for measurement calculations. This command is equivalent to selecting Reference Levels from the Measure menu and then choosing the desired reference level from the Units group box.

Group

Measurement

Syntax 1

```
MEASUrement:REFLevel:METHod {ABSolute|PERCent}
```

Syntax 2

MEASUREMENT:REFLevel:METHOD?

Arguments

- **ABSolute**
This specifies that the reference levels are set explicitly using the MEASUREMENT:REFLevel:ABSolute commands. This method is useful when precise values are required (for example, when designing to published interface specifications, such as RS-232-C).
- **PERCent**
This specifies that the reference levels are calculated as a percent relative to HIGH and LOW. The percentages are defined using the MEASUREMENT:REFLevel:PERCent commands.

Example 1

MEASUREMENT:REFLevel:METHOD ABSolute

This command specifies that explicit user-defined values are used for the reference levels.

Example 2

MEASUREMENT:REFLevel:METHOD?

This query might return :MEASUREMENT:REFLEVEL:METHOD PERCENT, indicating that the reference level units used are calculated as a percent relative to HIGH and LOW.

MEASUREMENT:REFLevel:PERCent:HIGH

Description

This command sets or queries the percent (where 100% is equal to HIGH) that is used to calculate the high reference level when MEASUREMENT:REFLevel:METHOD is set to Percent. Note that this command affects the results of rise and fall measurements. This command is equivalent to selecting Reference Levels from the Measure menu and then entering the Percentage High Ref value.

Group

Measurement

Related Commands

MEASUREMENT:REFLevel:METHOD,
MEASUREMENT:IMMed:TYPE,
MEASUREMENT:MEAS<x>:TYPE

Syntax 1

MEASUREMENT:REFLevel:PERCent:HIGH <NR3>

Syntax 2

MEASUREMENT:REFLevel:PERCent:HIGH?

Argument

- <NR3>

This is the high reference level, ranging from 0 to 100%. The default high reference level is 90%.

Example 1

```
MEASUREMENT:REFLEVEL:PERCENT:HIGH 95
```

This command sets the high reference level to 95% of HIGH.

Example 2

```
MEASUREMENT:REFLEVEL:PERCENT:HIGH?
```

This query might return

```
:MEASUREMENT:REFLEVEL:PERCENT:HIGH 90, indicating  
that the percentage high reference level is set to 90% of HIGH.
```

MEASUREMENT:REFLEVEL:PERCENT:LOW

Description

This command sets or queries the percent (where 100% is equal to HIGH) that is used to calculate the low reference level when MEASUREMENT:REFLEVEL:METHOD is set to Percent. Note that this command affects the results of rise and fall measurements. This command is equivalent to selecting Reference Levels from the Measure menu and then entering the Percentage Low Ref value.

Group

Measurement

Related Commands

```
MEASUREMENT:REFLEVEL:METHOD,  
MEASUREMENT:IMMED:TYPE,  
MEASUREMENT:MEAS<x>:TYPE
```

Syntax 1

```
MEASUREMENT:REFLEVEL:PERCENT:LOW <NR3>
```

Syntax 2

```
MEASUREMENT:REFLEVEL:PERCENT:LOW?
```

Argument

- <NR3>

This is the low reference level, ranging from 0 to 100%. The default low reference level is 10%.

Example 1

```
MEASUREMENT:REFLEVEL:PERCENT:LOW 15
```

This command sets the high reference level to 15% of HIGH.

Example 2

```
MEASUREMENT:REFLEVEL:PERCENT:LOW?
```

This query might return
:MEASUREMENT:REFLEVEL:PERCENT:LOW 10, indicating that
the percentage high reference level is set to 10% of HIGH.

MEASUREMENT:REFLEVEL:PERCENT:MID[1]

Description

This command sets or queries the percent (where 100% is equal to HIGH) that is used to calculate the mid reference level when MEASUREMENT:REFLEVEL:METHOD is set to Percent. Note that this command affects the results of period, frequency, delay, and all cyclic measurements. This command is equivalent to selecting Reference Levels from the Measure menu and entering the Percentage Mid Ref value.

Group

Measurement

Related Commands

MEASUREMENT:REFLEVEL:METHOD

Syntax 1

```
MEASUREMENT:REFLEVEL:PERCENT:MID[1] <NR3>
```

Syntax 2

```
MEASUREMENT:REFLEVEL:PERCENT:MID[1] ?
```

Argument

- <NR3>
This is the mid reference level, ranging from 0 to 100%. The default mid reference level is 50%.

Example 1

```
MEASUREMENT:REFLEVEL:PERCENT:MID[1] 60
```

This command sets the mid reference level to 60% of HIGH.

Example 2

```
MEASUREMENT:REFLEVEL:PERCENT:MID[1] ?
```

This query might return

```
:MEASUREMENT:REFLEVEL:PERCENT:MID 65, indicating that  
the percentage mid reference level is set to 65% of HIGH.
```


MEASUrement:REFLevel:PERCent:MID2

Description

This command sets or queries the percent (where 100% is equal to HIGH) that is used to calculate the mid reference level for the second waveform specified when MEASUrement:REFLevel:METHOD is set to Percent. Note that this command affects the results of delay measurements. This command is equivalent to selecting Reference Levels from the Measure menu and then entering the Percentage Mid2 Ref value.

Group

Measurement

Related Commands

MEASUrement:REFLevel:METHOD

Syntax 1

```
MEASUrement:REFLevel:PERCent:MID2 <NR3>
```

Syntax 2

```
MEASUrement:REFLevel:PERCent:MID2?
```

Argument

- <NR3>

This is the mid reference level, ranging from 0 to 100%. The default mid reference level is 50%.

Example 1

```
MEASUrement:REFLevel:PERCent:MID2 40
```

This command sets the mid2 reference level to 40% of HIGH.

Example 2

```
MEASUrement:REFLevel:PERCent:MID2?
```

This query might return

```
:MEASUREMENT:REFLEVEL:PERCENT:MID2 45, indicating  
that the percentage mid2 reference level is set to 45% of HIGH.
```

MEASUrement:STATistics:COUNT

Description

This command (no query form) clears existing measurement statistics from memory. This command is equivalent to selecting Measurement Setup from the Measure menu, selecting Statistics, and clicking the Reset button.

Group

Measurement

Related Commands

MEASUrement:STATistics:MODE

Syntax

MEASUREMENT:STATISTICS:COUNT {RESET}

Argument

- RESET

This clears existing measurement statistics from memory.

Example

MEASUREMENT:STATISTICS:COUNT RESET

This command resets the count of the statistics measurement to zero, clears the measurement statistics from memory, and restarts the calculation.

MEASUREMENT:STATISTICS:MODE

Description

This command controls the operation and display of management statistics. This command is equivalent to selecting Measurement Setup from the Measure menu, clicking the Statistics button and then choosing the desired Measurement Format.

Group

Measurement

Related Commands

MEASUREMENT:STATISTICS:WEIGHTING

Syntax 1

MEASUREMENT:STATISTICS:MODE {OFF|ALL|VALUEMean}

Syntax 2

MEASUREMENT:STATISTICS:MODE?

Arguments

- OFF

This turns all measurements off. This is the default value.

- ALL

This turns on statistics and displays all statistics for each measurement.

- VALUEMean

This turns on statistics and displays the value and the mean (μ) of each measurement.

Example 1

MEASUREMENT:STATISTICS:MODE OFF

This command turns statistic measurements off.

Example 2

```
MEASUrement:STATIstics:MODE?
```

This query might return `:MEASUREMENT:STATISTICS:MODE ALL`, indicating that measurement statistics are turned on and all statistics are being displayed for each measurement.

MEASUrement:STATIstics:WEIghting

Description

This command sets or queries the time constant for mean and standard deviation statistical accumulations. This command is equivalent to selecting Measurement Setup from the Measure menu, clicking the Statistics button and entering the desired Weight n= value.

Group

Measurement

Related Commands

MEASUrement:STATIstics:MODE

Syntax 1

```
MEASUrement:STATIstics:WEIghting <NR1>
```

Syntax 2

```
MEASUrement:STATIstics:WEIghting?
```

Argument

- <NR1>

This is the time constant for the mean and standard deviation statistical accumulations.

Example 1

```
MEASUrement:STATIstics:WEIghting 4
```

This command sets statistical weighting to 4.

Example 2

```
MEASUrement:STATIstics:WEIghting?
```

This query might return

```
:MEASUREMENT:STATISTICS:WEIGHTING 4
```

, indicating that measurement statistics weighting is currently set to 4.

NEWpass

Description

This command (no query form) changes the password that enables access to password protected data. The PASSWord command must be successfully executed before using this command or an execution error will be generated.

Group

Miscellaneous

Related Commands

PASSWord, *PUD

Syntax

NEWpass <QString>

Argument

- <Qstring>
This is the new password, which can contain up to 10 characters.

Example

```
NEWpass "mypassword"
```

This command creates a new password (mypassword) for accessing your protected data.

PASSWord

Description

This command (no query form) enables the *PUD and NEWpass set commands. Sending PASSWord without any arguments disables these same commands. Once the password is successfully entered, the *PUD and NEWpass commands are enabled until the instrument is powered off, or until the FACTory command, the PASSWord command with no arguments, or the *RST command is issued.

To change the password, you must first enter the valid password with the PASSWord command and then change to your new password with the NEWpass command. Remember that the password is case sensitive.

Group

Miscellaneous

Related Commands

NEWpass, *PUD

Syntax

PASSWord <QString>

Argument

- <QString>
This is the password, which can contain up to 10 characters. The factory default password is "XYZZY" and is always valid.

Example 1

```
PASSWord "XYZZY"
```

This command enables the *PUD and NEWPass set commands.

Example 2

```
PASSWord
```

This command disables the *PUD and NEWPass set commands. You can still use the query version of *PUD.

RECALL:SETUp

Description

This command (no query form) restores a stored or factory front-panel setup of the instrument from a copy of the settings stored in memory. If factory is referenced (by specifying '0'), the factory default values will be restored. This command is equivalent to *RCL and performs the same function as selecting Instrument Setup from the File menu and choosing the Recall Setups tab.

Group

Save and Recall

Related Commands

FACTory, *RCL, *RST, *SAV, SAVe:SETUp

Syntax

```
RECALL:SETUp {FACTory|<NR1>|<file path>}
```

Arguments

- **FACTory**
This restores the factory setup.
- **<NR1>**
This specifies a setup storage location to restore. Setup storage location values range from 0 through 10; using an out of range value causes an error (222, "Data out of range").
- **<file path>**
This is the location from where the setup will be recalled.

<file path> is a quoted string that defines the file name and path. Input the file path using the form <drive>/<dir>/<filename>. <drive> and one or more <dir>s are optional. If you do not specify them, the instrument will read the file from the default directory. <filename> stands for a filename of up to 128 characters (use of wildcard characters in filenames is not supported). Filename extensions are not required but are highly recommended.

Example 1

```
RECALL:SETUP FACTORY
```

This command recalls (and makes current) the front-panel setup to its factory defaults.

Example 2

```
RECALL:SETUP 2
```

This command recalls the front-panel setup from setup storage location 2.

Example 3

```
RECALL:SETUP "TEK00000.SET"
```

This command recalls the front panel setup from the file TEK00000.SET in the default directory and on the default drive.

RECALL:WAVEform

Description

This command (no query form) recalls a stored waveform to a reference location. This command is equivalent to selecting Reference Waveforms from the File menu and then choosing Recall Wfm.

Group

Save and Recall

Related Commands

DELETE:WAVEform, SAVE_WAVEform

Syntax

```
RECALL:WAVEform {<file path>|REF<x>}
```

Arguments

- REF<x>
This specifies the location in internal reference memory from which the waveform is recalled. Reference memory location values range from 1 through 4.
- <file path>
This is the location from which the waveform will be recalled.

<file path> is a quoted string that defines the file name and path. Input the file path using the form <drive>/<dir>/<filename>. <drive> and one or more <dir>s are optional. If you do not specify them, the instrument will read the waveform from the default directory. <filename> stands for a filename of up to 128 characters (use of wildcard characters in filenames is not supported). Filename extensions are not required but are highly recommended.

Example

```
RECALL:WAVEform "TEK00000.WFM",REF1
```

This command recalls the waveform stored in the file named TEK00000.WFM to reference location 1.

REF<x>:HORizontal:POSition

Description

This command sets or queries the horizontal display position of the reference waveform. The reference waveform is specified by x. The value of x can range from 1 through 4 for four-channel instruments or 1 through 2 for two-channel instruments. This command is equivalent to selecting Reference Waveforms from the File menu, choosing Reference Setup... from the drop-down list, selecting a reference waveform, and then entering the horizontal position value using the multipurpose knob.

Group

Vertical

Syntax 1

```
REF<x>:HORizontal:POSition <NR3>
```

Syntax 2

```
REF<x>:HORizontal:POSition?
```

Argument

- <NR3>

This argument specifies the horizontal position of the specified reference waveform in percentage of the waveform that is displayed to the right of the center vertical graticule. The range of this argument is from 0 through 100.

Example 1

```
REF2:HORizontal:POSition 0.0
```

This command positions the start of the Reference 2 waveform at the center graticule.

Example 2

```
REF1:HORizontal:POSition?
```

This query might return :REF1:HORIZONTAL:POSITION 50, indicating that the Reference 1 waveform is centered on the horizontal graticule.

REF<x>:LABel?

Description

This query-only command returns a branch query containing the waveform label name and the coordinates at which the label (attached to the displayed waveform of the specified reference) is displayed. The reference waveform is specified by x. The value of x can range from 1 through 4 for four-channel instruments or 1 through 2 for two-channel instruments. This command is equivalent to selecting Reference Waveforms from the File menu and then choosing Label from the drop-down list.

Group

Vertical

Related Commands

REF<x>:LABel:NAME?, REF<x>:LABel:XPOS?,
REF<x>:LABel:YPOS?

Syntax

REF<x>:LABel?

Argument

None

Example

REF1:LABel?

This query might return :REF1:LABel:NAME
"Myname"; :XPOS-200; :YPOS 50.

REF<x>:LABel:NAME

Description

This command sets or queries the label of the designated waveform. The reference waveform is specified by x. The value of x can range from 1 through 4 for four-channel instruments or 1 through 2 for two-channel instruments. This command is equivalent to selecting Reference Waveforms from the File menu, choosing Label from the drop-down list, selecting the tab associated with the reference for which you want to create a label, and entering a label in the Label box.

Group

Vertical

Related Commands

REF<x>:LABel

Syntax 1

REF<x>:LABel:NAME <String>

Syntax 2

REF<x>:LAbel:NAME?

Argument

- <String>
This is the character string that will be used for the reference waveform label name.

Example 1

REF3:LAbel:NAME?

This query might return :REF3:LABEL:NAME "Signal2", indicating that the label name for Reference 3 is currently set to "Signal2".

Example 2

REF4:LAbel:NAME "My Reference"

This command sets the label name of Reference 4 to "My Reference".

REF<x>:LAbel:XPOS

Description

This command sets or queries the X screen offset at which the label (attached to the displayed waveform of the specified reference) is displayed, relative to the left edge of the screen. The reference waveform is specified by x. The value of x can range from 1 through 4 for four-channel instruments or 1 through 2 for two-channel instruments. This command is equivalent to selecting Reference Waveforms from the File menu, choosing Label from the drop-down list, selecting the tab associated with the reference for which you want to position a label, and entering a value in the X Position box.

Group

Vertical

Related Commands

REF<x>:LAbel

Syntax 1

REF<x>:LAbel:XPOS <NR1>

Syntax 2

REF<x>:LAbel:XPOS?

Argument

- <NR1>
This is the location (in pixels) where the waveform label for the selected reference is displayed, relative to the left edge of the screen. Arguments should be integers ranging from 0 through 500.

Example 1

```
REF4:LABel:XPOS 10
```

This command moves the waveform label for the REF3 waveform, so that it begins 10 pixels to the right of the left edge of the screen.

Example 2

```
REF2:LABel:XPOS?
```

This query might return `:REF2:LABEL:XPOS 150`, indicating that the x-axis for the REF 2 waveform is currently 150 pixels to the right of the left edge of the screen.

REF<x>:LABel:YPOS

Description

This command sets or queries the Y screen offset at which the label (attached to the displayed waveform of the specified reference) is displayed, relative to the top edge of the screen. The reference waveform is specified by x. The value of x can range from 1 through 4 for four-channel instruments or 1 through 2 for two-channel instruments. This command is equivalent to selecting Reference Waveforms from the File menu, choosing Label from the drop-down list, selecting the tab associated with the reference for which you want to position a label, and entering a value in the Y Position box.

Group

Vertical

Related Commands

```
REF<x>:LABel
```

Syntax 1

```
REF<x>:LABel:YPOS <NR1>
```

Syntax 2

```
REF<x>:LABel:YPOS?
```

Argument

- <NR1>

This is the location (in pixels) where the waveform label for the selected reference is displayed, relative to the top edge of the screen. Arguments should be integers ranging from 0 to 385.

Example 1

```
REF3:LABel:YPOS -10
```

This command moves the waveform label for the REF 3 waveform to just beneath (10 pixels) the top of the screen.

Example 2

```
REF2:LABel:YPOS?
```

This query might return `:REF2:LABEL:YPOS 0`, indicating that the waveform label for the REF 2 waveform is currently located just beneath the top of the screen.

REF<x>:VERTical:POSition

Description

This command sets or queries the vertical position of a reference waveform. The reference waveform is specified by `x`. The value of `x` can range from 1 through 4 for four-channel instruments or 1 through 2 for two-channel instruments.

This command is equivalent to selecting Reference Waveforms from the File menu, choosing Reference Setup... from the drop-down list, selecting a reference waveform, and then entering the Position value using the multipurpose knob.

Increasing the position value of a waveform causes the waveform to move up, and decreasing the position value causes the waveform to move down. Position adjusts only the display position of a waveform. The position value determines the vertical graticule coordinate at which signal values are displayed. For example, if the position for Reference 3 is set to 2.0, the signal represented by that reference will be displayed at 2.0 divisions above the center of the screen.

Note: References are static. All position and scale changes are applied in a post-processing mode.

Group

Vertical

Related Commands

CH<x>:POSition, MATH<x>:POSition

Syntax 1

REF<x>:VERTical:POSition <NR3>

Syntax 2

REF<x>:VERTical:POSition?

Argument

- <NR3>

This is the desired position, in divisions from the center horizontal graticule. The range is from -5 to 5 divisions.

Example 1

```
REF2:VERTical:POSition 1.3E+00
```

This command positions the Reference 2 input signal 1.3 divisions above the center horizontal graticule.

Example 2

```
REF1:VERTical:POSition?
```

This query might return `:REF1:VERTICAL:POSITION - 1.3000E+00`, indicating that the current position of Reference 1 is 1.3 divisions below the center horizontal graticule.

REF<x>:VERTical:SCAle

Description

This command sets or queries the vertical scale of a reference waveform. The reference waveform is specified by `x`. The value of `x` can range from 1 through 4 for four-channel instruments or 1 through 2 for two-channel instruments. This command is equivalent to selecting Reference Waveforms from the File menu, choosing Reference Setup... from the drop-down list, selecting a reference waveform, and then entering the Scale value using the multipurpose knob.

Each waveform has a vertical scale parameter. For a signal with constant amplitude, increasing the Scale causes the waveform to be displayed smaller. Decreasing the scale causes the waveform to be displayed larger.

Scale affects all waveforms, but affects reference and math waveforms differently from channel waveforms:

- For reference and math waveforms, this setting controls the display only, graphically scaling these waveforms and having no affect on the acquisition hardware.
- For channel waveforms, this setting controls the vertical size of the acquisition window as well as the display scale. The range and resolution of scale values depends on the probe attached and any other external factors you have specified.

Group

Vertical

Related Commands

CH<x>:SCAle, MATH<x>:VERTical:SCAle

Syntax 1

REF<x>:VERTical:SCAle <NR3>

Syntax 2

REF<x>:VERTical:SCAle?

Argument

- <NR3>
This is the gain in user units per division.

Example 1

```
REF4:VERTical:SCAlE 100E-03
```

This command sets the Reference 4 scale to 100 mV per division.

Example 2

```
CH2:SCAlE?
```

This query might return `:REF2:VERTICAL:SCALE 1.0000e+00`, indicating that the current vertical scale setting for Reference 2 is 1 V per division.

REM

Description

This command (no query form) embeds a comment within GPIB programs as a means of internally documenting the programs. The instrument ignores these embedded comment lines.

Group

Miscellaneous

Related Commands

NEWpass, *PUD

Syntax

```
REM <QString>
```

Argument

- <QString>
This is a string that can contain a maximum of 80 characters.

Example

```
REM "This is a comment"
```

The instrument ignores this comment string.

ROSc:SOURce

Description

This command sets or queries the source for the 10 MHz timebase reference. Depending on the command argument that you specify, you can use an external reference or use the internal crystal oscillator as the timebase reference.

This command is also useful for synchronizing multiple instruments.

Group

Miscellaneous

Related Commands

ROSc:STate

Syntax 1

ROSc:SOUrce {INTERnAl|EXTERnAl}

Syntax 2

ROSc:SOUrce?

Arguments

- INTERnAl
This specifies the internal 10 MHz crystal oscillator as the timebase reference.
- EXTERnAl
This specifies the user-supplied external signal as the timebase reference.

Example 1

ROSc:SOUrce INTERnAl

This command specifies the internal 10 MHz crystal oscillator as the timebase reference.

Example 2

ROSc:SOUrce?

This query might return: ROsc:SOURCE INTERNAL, indicating that the 10 MHz crystal oscillator is being used as the timebase reference.

ROSc:STate?

Description

This query-only command returns the state of the 10 MHz timebase reference. This command will return either LOCKED or UNLOCKED.

Group

Miscellaneous

Related Commands

ROSc:SOUrce

Syntax

ROSc:STate?

Example

ROSc:STate?

This query might return :ROSc:STATE LOCKED, indicating that the state of the 10 MHz timebase reference is locked.

SAVe:SETUp

Description

This command (no query form) saves the current front-panel setup into the specified memory location or file. This is

equivalent to selecting Instrument Setup from the File menu and then choosing the Save Setups tab.

Group

Save and Recall

Related Commands

*RCL, RECALL:SETUp ,*SAV

Syntax

SAVE:SETUp {<file path>|<NR1>}

Arguments

- <file path>
This is the location from where the waveform will be recalled.

<file path> is a quoted string that defines the file name and path. Input the file path using the form <drive>/<dir>/<filename>. <drive> and one or more <dir>s are optional. If you do not specify them, the instrument will read the waveform from the default directory. <filename> stands for a filename of up to 125 characters, followed by a period (".") and the three-character extension "SET". The instrument will generate an error if you use any other extension for saving a setup.
- <NR1>
This specifies a location for saving the current front-panel setup. The front-panel setup value ranges from 1 to 10. Using an out-of-range value causes an execution error. Any settings that have been stored previously at this location will be overwritten.

Example 1

```
SAVE:SETUp 5
```

This command saves the current front-panel setup in memory location 5.

Example 2

```
SAVE:SETUp "TEK00000.SET"
```

This command saves the current front-panel setup in the file TEK00000.SET in the default directory and on the default drive.

SAVE:WAVEform

Description

This command (no query form) saves a waveform to one of four reference memory locations or a file. This command is equivalent to selecting Reference Waveforms from the File menu and choosing Save Wfm from the drop-down list.

Group

Save and Recall

Related Commands

DELEte:WAVEform, RECALL:WAVEform

Syntax

```
SAVe:WAVEform <wfm>, {<file path>|REF<x>}
```

Arguments

- <wfm>
This is the waveform that will be saved. Valid waveforms include CH<x>, MATH<y>, and REF<x>.
- REF<x>
This specifies the location in internal reference memory to where the waveform is stored.
- <file path>
This is the location to where the waveform is stored.
<file path> is a quoted string that defines the file name and path. Input the file path using the form <drive>/<dir>/<filename>. <drive> and one or more <dir>s are optional. If you do not specify them, the instrument will read the waveform from the default directory. <filename> stands for a filename of up to 125 characters, followed by a period (".") and the three-character extension. Internal format waveforms use the .wfm extension for spreadsheet format files or the .dat extension for MathCad format files. The instrument will generate an error if you use any other extension for saving a waveform.

Example 1

```
SAVe:WAVEform MATH2, REF2
```

This command saves the Math2 waveform in reference memory location2.

Example 2

```
SAVe:WAVEform MATH1, "TEK0000.WFM"
```

This command saves the Math1 waveform to the file TEK00000.WFM in the default directory and on the default drive.

SAVe:WAVEform:FILEFormat

Description

This command specifies or returns the file format for saved waveforms. Waveform header and timing information is included in the resulting file of non-internal formats. The instrument saves DPO waveforms as a 500x200 matrix, with the first row corresponding to the most recently acquired data. The values specified by DATA:START and DATA:STOP determine

the range of waveform data to output. In the event that DATA:STOP value is greater than the current record length, the current record length determines the last output value.

This command is equivalent to selecting Export Setup from the File menu, clicking the Waveforms tab and choosing the desired waveform file format from the Data destination drop-down list. Note that you choose the waveform file format after first selecting Select for Export from the File menu and then choosing Waveform (data) from the drop-down list.

Group

Save and Recall

Related Commands

CURVe , DATA, DATA:START, DATA:STOP, SAVE:WAVEform, WFMInpre:NR_FR?, WFMInpre:NR_Pt, WFMOutpre:NR_FR?, WFMOutpre:NR_Pt?

Syntax 1

```
SAVE:WAVEform:FILEFormat  
{ INTERNAL | MATHCad | MATLAB | SPREADSHEETCsv | SPREADSHEETtxt }
```

Syntax 2

```
SAVE:WAVEform:FILEFormat?
```

Arguments

- INTERNAL
This specifies that waveforms are saved in an internal format, using a .wfm filename extension. These files can be recalled as reference waveforms. When this argument is specified, the settings specified via the DATA:START and DATA:STOP commands have no meaning as the entire waveform is saved.
- MATHCad
This specifies that waveforms are saved in MathCad format, using a .dat filename extension. When saving in this format, waveform values are delimited with new lines. MathCad format enables easy import of waveform data into MathCad or MATLAB.

For FastAcq waveforms, data is imported as a matrix. For these formats, waveform header and timing information is saved in a separate header file. MathCad format header files use a `_hdr.dat` extension.

- **MATLab**

This specifies that waveforms are saved in Matlab format, using a `.dat` filename extension. When saving in this format, waveform values are delimited with new lines. MATLAB format enables easy import of waveform data into MathCad or MATLAB.

For FastAcq waveforms, data is imported as a matrix. For these formats, waveform header and timing information is saved in a separate header file. MATLAB format header files use a `_hdr.dat` extension.

- **SPREADSHEETCsv**

This specifies that waveform data is saved in a format that contains comma delimited values. These waveform data files are named using the `.csv` filename extension. Saving waveforms in CSV format enables spreadsheet programs to import the data.

- **SPREADSHEETtxt**

This specifies that waveform data is saved in a format that contains tab delimited values. These waveform data files are named using the `.txt` filename extension. Saving waveforms in this format enables spreadsheet programs to import the data.

Example 1

```
SAVE:WAVEform:FILEFormat INTERNAL
```

This command specifies that the internal file format is the format used for saving waveforms.

Example 2

```
SAVE:WAVEform:FILEFormat?
```

This query might return: `SAVE:WAVEFORM:FILEFORMAT INTERNAL`, indicating that waveforms are saved using the internal format.

SElect?

Description

This query-only command returns the selected waveform that is affected by the front-panel controls and the display status (on or off) of all waveforms. This query command is equivalent to selecting Measurement Setup from the Measure menu and viewing the Source waveform setting.

Group

Vertical

Syntax

SElect?

Example

SElect?

This query might return the waveform and status information as
:SELECT:CH1 1;CH2 0;CH3 0;CH4 0;MATH1 0;MATH2
0;MATH3 0;MATH4 0;REF1 0;REF2 0;REF3 0;REF4
0;CONTROL CH1

SElect:<wfm>

Description

This command turns on the display of a specified waveform and also resets the acquisition. The query returns whether the channel is on or off but does not indicate whether it is the selected waveform.

Group

Vertical

Syntax 1

SElect:<wfm> {ON|OFF|<NR1>}

Syntax 2

SElect:<wfm>?

Arguments

- ON
This turns on the display of the specified waveform. This waveform also becomes the selected waveform.
- OFF
This turns off the display of the specified waveform.
- <NR1>
A 0 turns off the display of the specified waveform; any other value turns on the display of the specified waveform.

Example

SElect:CH2 ON

This command turns the channel 2 waveform display on, and selects channel 2.

SElect:REF1?

This query might return :SELECT:REF1, indicating that REF1 is the selected waveform.

SElect:CONTRol <wfm>

Description

This command sets or queries the waveform that is selected as the implied recipient of channel-related commands that support legacy-style programs. The command form also performs the equivalent of a SELECT:<wfm> ON command. This command is equivalent to selecting Measurement Setup from the Measure menu and either viewing or setting the Source waveform.

Group

Vertical

Syntax 1

```
SElect:CONTRol (CH<x>|MATH<x>|REF<x>)
```

Syntax 2

```
SElect:CONTRol?
```

Arguments

- CH<x>
This selects the specified channel waveform as the waveform that is affected by the front-panel controls. The valid channel waveform range is from 1 through 4.
- MATH<x>
This selects the specified math waveform as the waveform that is affected by the front-panel controls. The valid math waveform range is from 1 through 4.
- REF<x>
This selects the specified reference waveform as the waveform that is affected by the front-panel controls. The valid reference waveform range is from 1 through 4.

Example 1

```
SElect:CONTRol CH2
```

This command resets acquisition, displays channel 2, and causes the selected waveform to be the implied object of waveform commands.

Example 2

```
SElect:CONTRol?
```

This query might return :SELECT:CONTROL MATH3, indicating that math 3 is the implied object of waveform commands.

SETUp:NAME

Description

This command sets and queries a setup label that you define. This command is equivalent to selecting Instrument Setup from the File menu, choosing the Save Setups tab, and adding a label to the selected setup.

Group

Save and Recall

Related Commands

SAVe:SETUp

Syntax 1

SETUp:NAME <NR1>,<QString>

Syntax 2

SETUp:NAME? <NR1>

Arguments

- <NR1>
This specifies a location in which the setup label is stored. Location values range from 1 through 10.
- <QString>
This is a string containing the setup label.

Example 1

```
SETUp:NAME 1 "My Setup"
```

This command changes the setup label for internal setup location 1 to "My Setup".

Example 2

```
SETUp:NAME? 2
```

This query might return :SETUP:NAME 2, "My Setup", indicating that "My Setup" is the setup label that you defined for internal setup location 2.

SET?

Description

This query-only command returns the commands that list the instrument settings, except for configuration information for the calibration values. You can use these commands to return the instrument to the state it was in when you made the SET? query. This command is identical to the *LRN? command.

Group

Miscellaneous

Related Commands

HEADer, *LRN?, VERBoSe

Syntax

SET?

Note: The SET? query always returns command headers, regardless of the setting of the HEADer command. This is because the returned commands are intended to be sent back to the instrument as a command string. The VERBoSe command can still be used to specify whether the returned headers should be abbreviated or full-length.

Example

SET?

This query might return the following response:

```
:ACQUIRE:STOPAFTER RUNSTOP;STATE 1;MODE
SAMPLE;NUMENV 10;NUMAVG 16;REPET
1;:FASTACQ:STATE 0;:APPLICATION:GPKNOB1:ACTIVE
0;:APPLICATION:GPKNOB2:ACTIVE
0;:APPLICATION:WINDOW:HEIGHT 236;WIDTH
640;:APPLICATION:SCOPEAPP:STATE RUNNING;WINDOW
FULLSCREEN;:APPLICATION:EXTAPP:STATE
NOTRUNNING;:AUXOUT:SOURCE ATRIGGER;EDGE
FALLING;:CMDBATCH 1;:HEADER 1;:LOCK
NONE;:ROSC:SOURCE INTERNAL;:VERBOSE
1;:ALIAS:STATE 0;:DISPLAY:CLOCK 1;COLOR:PALETTE
NORMAL;MATHCOLOR DEFAULT;REFCOLOR
DEFAULT;:DISPLAY:FILTER SINX;FORMAT YT;GRATICULE
FULL;INTENSITY:WAVEFORM 75.0000;AUTOBRIGHT
1;SCRENSAVER 1;SCRENSAVERDELAY
28800;:DISPLAY:PERSISTENCE OFF;STYLE
VECTORS;TRIGBAR SHORT;TRIGT 1;VARPERSIST
500.0000E-3;:HARDCOPY:FILENAME "untitled";PORT
FILE;:DIAG:LEVEL
SUBSYS;:SAVE:WAVEFORM:FILEFORMAT
INTERNAL;:TRIGGER:A:MODE AUTO;TYPE EDGE;LEVEL
0.0000;HOLDOFF:BY DEFAULT;TIME 1.5000E-
6;:TRIGGER:A:EDGE:SOURCE CH1;COUPLING DC;SLOPE
RISE;:TRIGGER:A:LOGIC:CLASS PATTERN;FUNCTION
AND;THRESHOLD:CH1 1.2000;CH2 1.2000;CH3
1.2000;CH4 1.2000;:TRIGGER:A:LOGIC:INPUT:CH1
HIGH;CH2 X;CH3
X;:TRIGGER:A:LOGIC:PATTERN:INPUT:CH4
X;:TRIGGER:A:LOGIC:PATTERN:WHEN
TRUE;WHEN:LESSLIMIT 5.0000E-9;MORELIMIT 5.0000E-
9;:TRIGGER:A:LOGIC:SETHOLD:CLOCK:EDGE
RISE;THRESHOLD 1.2000;SOURCE
CH2;:TRIGGER:A:LOGIC:SETHOLD:DATA:THRESHOLD
1.2000;SOURCE
CH1;:TRIGGER:A:LOGIC:SETHOLD:HOLDTIME 2.0000E-
9;SETTIME 3.0000E-
9;:TRIGGER:A:LOGIC:STATE:INPUT:CH4
RISE;:TRIGGER:A:LOGIC:STATE:WHEN
TRUE;:TRIGGER:A:PULSE:CLASS GLITCH;SOURCE
CH1;GLITCH:WIDTH 2.0000E-9;TRIGIF
ACCEPT;POLARITY
POSITIVE;:TRIGGER:A:PULSE:WINDOW:TYPE
INSIDE;WHEN OCCURS;WIDTH 2.0000E-
9;LOGIC:INPUT:CH1 HIGH;CH2 HIGH;CH3 HIGH;CH4
HIGH;:TRIGGER:A:PULSE:WINDOW:LOGIC:THRESHOLD:CH1
```

```

1.2000;CH2 1.2000;CH3 1.2000;CH4
1.2000;:TRIGGER:A:PULSE:WINDOW:THRESHOLD:HIGH
1.2000;LOW 800.0000E-
3;:TRIGGER:A:PULSE:RUNT:LOGIC:INPUT:CH1 HIGH;CH2
HIGH;CH3 HIGH;CH4
HIGH;:TRIGGER:A:PULSE:RUNT:LOGIC:THRESHOLD:CH1
1.2000;CH2 1.2000;CH3 1.2000;CH4
1.2000;:TRIGGER:A:PULSE:RUNT:POLARITY
POSITIVE;THRESHOLD:HIGH 1.2000;LOW 800.0000E-
3;:TRIGGER:A:PULSE:RUNT:WHEN OCCURS;WIDTH
2.0000E-9;:TRIGGER:A:PULSE:TRANSITION:DELTA TIME
2.0000E-9;POLARITY POSITIVE;THRESHOLD:HIGH
1.2000;LOW 800.0000E-
3;:TRIGGER:A:PULSE:TRANSITION:WHEN
FASTER THAN;:TRIGGER:A:PULSE:WIDTH:LOW LIMIT
2.0000E-9;HIGH LIMIT 2.0000E-9;WHEN
WITHIN;POLARITY
POSITIVE;:TRIGGER:A:PULSE:TIMEOUT:POLARITY
STAYSHIGH;TIME 2.0000E-
9;:TRIGGER:A:VIDEO:CUSTOM:FORMAT INTERLACED;SCAN
RATE1;:TRIGGER:A:VIDEO:FIELD
ALLFIELDS;HOLD OFF:FIELD
0.0000;:TRIGGER:A:VIDEO:LINE 1;POLARITY
NORMAL;SCAN RATE1;SOURCE CH1;STANDARD
NTSC;:TRIGGER:B:STATE 0;TYPE EDGE;LEVEL
0.0000;BY EVENTS;EDGE:SOURCE CH1;SLOPE
RISE;COUPLING DC;:TRIGGER:B:TIME 16.0000E-
9;EVENTS:COUNT 2;:MATH1:DEFINE " ";NUMAVG
2;VERTICAL:SCALE 1.0000;POSITION
0.0000;:MATH1:LABEL:NAME " ";XPOS 5;YPOS
65;:MATH1:SPECTRAL:MAG DB;PHASE DEGREES;GATEPOS
0.0000;GATEWIDTH 2.0000E-6;REFLEVEL
20.0000;REFLEVEL OFFSET 223.6000E-3;SPAN
600.0000E+6;CENTER 325.0000E+6;RESBW
1.0000E+6;WINDOW GAUSSIAN;SUPPRESS -
35.0000;UNWRAP 0;LOCK 0;:MATH2:DEFINE " ";NUMAVG
2;VERTICAL:SCALE 1.0000;POSITION
0.0000;:MATH2:LABEL:NAME " ";XPOS 5;YPOS
80;:MATH2:SPECTRAL:MAG DB;PHASE DEGREES;GATEPOS
0.0000;GATEWIDTH 2.0000E-6;REFLEVEL
20.0000;REFLEVEL OFFSET 223.6000E-3;SPAN
600.0000E+6;CENTER 325.0000E+6;RESBW
1.0000E+6;WINDOW GAUSSIAN;SUPPRESS -
35.0000;UNWRAP 0;LOCK 0;:MATH3:DEFINE " ";NUMAVG
2;VERTICAL:SCALE 1.0000;POSITION
0.0000;:MATH3:LABEL:NAME " ";XPOS 5;YPOS
95;:MATH3:SPECTRAL:MAG DB;PHASE DEGREES;GATEPOS
0.0000;GATEWIDTH 2.0000E-6;REFLEVEL
20.0000;REFLEVEL OFFSET 223.6000E-3;SPAN
600.0000E+6;CENTER 325.0000E+6;RESBW
1.0000E+6;WINDOW GAUSSIAN;SUPPRESS -
35.0000;UNWRAP 0;LOCK 0;:MATH4:DEFINE " ";NUMAVG
2;VERTICAL:SCALE 1.0000;POSITION
0.0000;:MATH4:LABEL:NAME " ";XPOS 5;YPOS
110;:MATH4:SPECTRAL:MAG DB;PHASE DEGREES;GATEPOS
0.0000;GATEWIDTH 2.0000E-6;REFLEVEL
20.0000;REFLEVEL OFFSET 223.6000E-3;SPAN
600.0000E+6;CENTER 325.0000E+6;RESBW
1.0000E+6;WINDOW GAUSSIAN;SUPPRESS -
35.0000;UNWRAP 0;LOCK 0;:HISTOGRAM:BOXPCNT
30.0000,25.1000,70.0000,75.2000;DISPLAY
LINEAR;STATE 0;FUNCTION HORIZONTAL;SIZE
2.0000;SOURCE CH1;:CH1:BANDWIDTH
1.0000E+9;COUPLING DC;DESKEW 0.0000;OFFSET

```

0.0000;INVERT 0;POSITION 0.0000;SCALE 100.0000E-3;TERMINATION 1.0000E+6;PROBEFUNC:EXTATTEN 1.0000;EXTUNITS "None";:CH1:LABEL:NAME "";XPOS 5;YPOS 5;:CH2:BANDWIDTH 1.0000E+9;COUPLING DC;DESKEW 0.0000;OFFSET 0.0000;INVERT 0;POSITION 0.0000;SCALE 100.0000E-3;TERMINATION 1.0000E+6;PROBEFUNC:EXTATTEN 1.0000;EXTUNITS "None";:CH2:LABEL:NAME "";XPOS 5;YPOS 20;:CH3:BANDWIDTH 1.0000E+9;COUPLING DC;DESKEW 0.0000;OFFSET 0.0000;INVERT 0;POSITION 0.0000;SCALE 100.0000E-3;TERMINATION 1.0000E+6;PROBEFUNC:EXTATTEN 1.0000;EXTUNITS "None";:CH3:LABEL:NAME "";XPOS 5;YPOS 35;:CH4:BANDWIDTH 1.0000E+9;COUPLING DC;DESKEW 0.0000;OFFSET 0.0000;INVERT 0;POSITION 0.0000;SCALE 100.0000E-3;TERMINATION 1.0000E+6;PROBEFUNC:EXTATTEN 1.0000;EXTUNITS "None";:CH4:LABEL:NAME "";XPOS 5;YPOS 50;:SELECT:CH1 1;CH2 0;CH3 0;CH4 0;MATH1 0;MATH2 0;MATH3 0;MATH4 0;REF1 0;REF2 0;REF3 0;REF4 0;CONTROL CH1;:CURSOR:STATE 0;FUNCTION VBARS;MODE INDEPENDENT;SOURCE CH1;VBARS:UNITS SECONDS;POSITION1 -1.6000E-6;POSITION2 1.6000E-6;:CURSOR:HBARS:POSITION1 300.0000E-3;POSITION2 -300.0000E-3;:CURSOR:PAIRED:POSITION1 -1.6000E-6;POSITION2 1.6000E-6;:CURSOR:SPLIT:POSITION1 -1.6000E-6;POSITION2 1.6000E-6;SOURCE2 CH1;UNITS BASE;:HORIZONTAL:DELAY:MODE 0;POSITION 50.0000;TIME 0.0000;:HORIZONTAL:MAIN:SCALE 400.0000E-9;POSITION 50.0000;SAMPLERATE 1.2500E+9;:HORIZONTAL:RECORDLENGTH 5000;RESOLUTION 5000;ROLL AUTO;:MEASUREMENT:GATING OFF;METHOD HISTOGRAM;IMMED:TYPE UNDEFINED;SOURCE1 CH1;SOURCE2 CH1;DELAY:EDGE1 RISE;EDGE2 RISE;DIRECTION FORWARDS;:MEASUREMENT:MEAS1:STATE 0;TYPE UNDEFINED;SOURCE1 CH1;SOURCE2 CH1;DELAY:EDGE1 RISE;EDGE2 RISE;DIRECTION FORWARDS;:MEASUREMENT:MEAS2:STATE 0;TYPE UNDEFINED;SOURCE1 CH1;SOURCE2 CH1;DELAY:EDGE1 RISE;EDGE2 RISE;DIRECTION FORWARDS;:MEASUREMENT:MEAS3:STATE 0;TYPE UNDEFINED;SOURCE1 CH1;SOURCE2 CH1;DELAY:EDGE1 RISE;EDGE2 RISE;DIRECTION FORWARDS;:MEASUREMENT:MEAS4:STATE 0;TYPE UNDEFINED;SOURCE1 CH1;SOURCE2 CH1;DELAY:EDGE1 RISE;EDGE2 RISE;DIRECTION FORWARDS;:MEASUREMENT:MEAS5:STATE 0;TYPE UNDEFINED;SOURCE1 CH1;SOURCE2 CH1;DELAY:EDGE1 RISE;EDGE2 RISE;DIRECTION FORWARDS;:MEASUREMENT:MEAS6:STATE 0;TYPE UNDEFINED;SOURCE1 CH1;SOURCE2 CH1;DELAY:EDGE1 RISE;EDGE2 RISE;DIRECTION FORWARDS;:MEASUREMENT:MEAS7:STATE 0;TYPE UNDEFINED;SOURCE1 CH1;SOURCE2 CH1;DELAY:EDGE1 RISE;EDGE2 RISE;DIRECTION FORWARDS;:MEASUREMENT:MEAS8:STATE 0;TYPE UNDEFINED;SOURCE1 CH1;SOURCE2 CH1;DELAY:EDGE1 RISE;EDGE2 RISE;DIRECTION FORWARDS;:MEASUREMENT:REFLEVEL:METHOD PERCENT;ABSOLUTE:HIGH 0.0000;LOW 0.0000;MID1 0.0000;MID2 0.0000;:MEASUREMENT:REFLEVEL:PERCENT:HIGH 90.0000;LOW 10.0000;MID1 50.0000;MID2


```

50.0000;:MEASUREMENT:STATISTICS:MODE
OFF;WEIGHTING 32;:ZOOM:MODE 0;GRATICULE:SPLIT
FIFTYFIFTY;:ZOOM:HORIZONTAL:LOCK
ALL;:ZOOM:CH1:HORIZONTAL:POSITION 50.0000;SCALE
2;:ZOOM:CH1:VERTICAL:POSITION 0.0000;SCALE
1.0000;:ZOOM:CH2:HORIZONTAL:POSITION
50.0000;SCALE 2;:ZOOM:CH2:VERTICAL:POSITION
0.0000;SCALE
1.0000;:ZOOM:CH3:HORIZONTAL:POSITION
50.0000;SCALE 2;:ZOOM:CH3:VERTICAL:POSITION
0.0000;SCALE
1.0000;:ZOOM:CH4:HORIZONTAL:POSITION
50.0000;SCALE 2;:ZOOM:CH4:VERTICAL:POSITION
0.0000;SCALE
1.0000;:ZOOM:MATH1:HORIZONTAL:POSITION
50.0000;SCALE 2;:ZOOM:MATH1:VERTICAL:POSITION
0.0000;SCALE
1.0000;:ZOOM:MATH2:HORIZONTAL:POSITION
50.0000;SCALE 2;:ZOOM:MATH2:VERTICAL:POSITION
0.0000;SCALE
1.0000;:ZOOM:MATH3:HORIZONTAL:POSITION
50.0000;SCALE 2;:ZOOM:MATH3:VERTICAL:POSITION
0.0000;SCALE
1.0000;:ZOOM:MATH4:HORIZONTAL:POSITION
50.0000;SCALE 2;:ZOOM:MATH4:VERTICAL:POSITION
0.0000;SCALE
1.0000;:ZOOM:REF1:HORIZONTAL:POSITION
50.0000;SCALE 2;:ZOOM:REF1:VERTICAL:POSITION
0.0000;SCALE
1.0000;:ZOOM:REF2:HORIZONTAL:POSITION
50.0000;SCALE 2;:ZOOM:REF2:VERTICAL:POSITION
0.0000;SCALE
1.0000;:ZOOM:REF3:HORIZONTAL:POSITION
50.0000;SCALE 2;:ZOOM:REF3:VERTICAL:POSITION
0.0000;SCALE
1.0000;:ZOOM:REF4:HORIZONTAL:POSITION
50.0000;SCALE 2;:ZOOM:REF4:VERTICAL:POSITION
0.0000;SCALE 1.0000;:REF1:LABEL:NAME "";XPOS
5;YPOS 125;:REF1:VERTICAL:POSITION 0.0000;SCALE
1.0000E-3;:REF1:HORIZONTAL:POSITION
50.0000;:REF2:LABEL:NAME "";XPOS 5;YPOS
140;:REF2:VERTICAL:POSITION 0.0000;SCALE
1.0000E-3;:REF2:HORIZONTAL:POSITION
50.0000;:REF3:LABEL:NAME "";XPOS 5;YPOS
155;:REF3:VERTICAL:POSITION 0.0000;SCALE
1.0000E-3;:REF3:HORIZONTAL:POSITION
50.0000;:REF4:LABEL:NAME "";XPOS 5;YPOS
170;:REF4:VERTICAL:POSITION 0.0000;SCALE
1.0000E-3;:REF4:HORIZONTAL:POSITION
50.0000;:DATA:DESTINATION REF1;ENCDG
RIBINARY;SOURCE CH1;START 1;STOP 500

```

TEKSecure

Description

This command initializes both waveform and setup memories, overwriting any previously stored data.

TEKSecure deletes all four waveform reference memory slots on the hard drive, if they exist, and puts all setups in the factory-initialized state. External setups that are stored on the hard drive are not affected.

TEST

Group

Miscellaneous

Syntax

TEKSecure

Example

TEKSecure

This command initializes both waveform and setup memories.

Description

This command (no query form) provides the ability to select and execute an item at any level of the test hierarchy (Test, Area or Subsystem). This command is equivalent to selecting Instrument Diagnostics from the Utilities menu, choosing a test and then pressing Run.

Note: Turning off both DIAg:CONTROL:HALT and DIAg:CONTROL:LOOP before executing the TEST command is recommended.

Group

Diagnostics

Related Commands

TEST:RESults?, TEST:RESults:VERBose?, TEST:STOP

Syntax

TEST

Argument

- <NR3>

This sets the test ID, which ranges from 0 through 3 characters. If no test ID is specified, all available diagnostics are executed.

Example 1

TEST "1"

This command executes all Acquisition tests (Subsystem:Acquisition).

Example 2

TEST "11"

This command executes all Acquisition Memory tests (Subsystem:Acquisition, Area:Memory)

Example 3

TEST "113"

This command executes a specific Acquisition Memory test (Subsystem:Acquisition, Area:Memory, Test:Address Lines).

TEST:RESults?

Description

This query-only command returns an abbreviated status about the results of the last TEST execution. This command is equivalent to selecting Instrument Diagnostics from the Utilities menu and then reviewing the Diagnostic Status.

Group

Diagnostics

Related Commands

TEST, TEST:RESults:VERBose?

Syntax

TEST:RESults?

Example 1

TEST:RESults?

This query might return :TEST:RESULTS "135", indicating the specific failure code of the first test failure.

Example 2

TEST:RESults?

This query might return :TEST:RESULTS "PASS", indicating that the previously executed test passed.

Example 3

TEST:RESults?

This query might return

:TEST:RESULTS "*****"

indicating that the test was not run.

TEST:RESults:VERBose?

Description

This query-only command returns a more explanatory message about the results of the last TEST execution than the TEST:RESults query. This command is equivalent to selecting Instrument Diagnostics from the Utilities menu and then clicking the Error Log button.

Group

Diagnostics

Related Commands

TEST, TEST:RESults?

Syntax

TEST:RESults:VERBose?

Example

TEST:RESuLts:VERBoSe?

This query might return

```
:TEST:RESULTS:VERBOSE DIAG ABORTED, ERROR 15 in  
A2D-Dmux 1 interconnects"
```

TEST:STOP

Description

This command (no query form) causes test (or diagnostics) execution to terminate at the end of the next low-level test. This command is equivalent to selecting Instrument Diagnostics from the Utilities menu and then clicking Abort.

Group

Diagnostics

Related Commands

DIAG:STOP

Syntax

TEST:STOP

Example

TEST:STOP

This command terminates test (or diagnostics) execution at the end of the next low-level test.

TIME

Description

This command sets or queries the time that the instrument displays. This command is equivalent to selecting Set Time & Date from the Utilities menu and then setting the fields in the Time group box.

Group

Miscellaneous

Related Commands

DATE

Syntax 1

TIME <Qstring>

Syntax 2

TIME?

Argument

- <QString>

This is a time in the form "hh:mm:ss" where hh refers to a

two-digit hour number, mm refers to a two-digit minute number from 01 to 60, and ss refers to a two-digit second number from 01 to 60.

Example 1

```
TIME "14:00:00"
```

This command sets the time to exactly 2:00 p.m.

Example 2

```
DATE?
```

This query might return `:TIME "14:05:17"`, indicating the current time is set to 2:05 p.m. and 17 seconds.

TRIGger

Description

This command forces a trigger event to occur. The query returns the current trigger parameters for the instrument.

Group

Trigger

Syntax 1

```
TRIGger FORCe
```

Syntax 2

```
TRIGger?
```

Argument

- FORCe

This creates a trigger event. If TRIGger:STATE is set to READy, the acquisition will complete. Otherwise, this command will be ignored. This is equivalent to selecting A Event (Main) Trigger Setup from the Trig menu and then clicking Force Trigger.

Example 1

```
TRIGger FORCe
```

This command forces a trigger event to occur.

Example 2

```
TRIGger?
```

This query might return these trigger parameters:

```
:TRIGGER:A:MODE AUTO;TYPE EDGE  
;LEVEL 0.0000;HOLDOFF:BY DEFAULT;TIME  
250.0000E-9;  
:TRIGGER:A:EDGE:SOURCE CH1;COUPLING DC;SLOPE  
RISE;  
:TRIGGER:A:LOGIC:CLASS PATTERN;FUNCTION  
AND;WHEN TRUE  
;THRESHOLD:CH1 1.4000;CH2 1.4000;CH3 1.4000;CH4  
1.4000;
```

```

:TRIGGER:A:LOGIC:INPUT:CH1 HIGH;CH2 X;CH3 X;
:TRIGGER:A:LOGIC:PATTERN:INPUT:CH4
X;:TRIGGER:A:LOGIC
:PATTERN:WHEN TRUE;WHEN:LESSLIMIT 5.0000E-
9;MORELIMIT
5.0000E-9;:TRIGGER:A:LOGIC:SETHOLD:CLOCK:EDGE
RISE
;THRESHOLD 1.4000;SOURCE
CH2;:TRIGGER:A:LOGIC:SETHOLD
:DATA:THRESHOLD 1.4000;SOURCE
CH1;:TRIGGER:A:LOGIC
:SETHOLD:HOLDTIME 2.0000E-9;SETTIME 3.0000E-
9;:TRIGGER
:A:LOGIC:STATE:INPUT:CH4
RISE;:TRIGGER:A:LOGIC:STATE
:WHEN TRUE;:TRIGGER:A:PULSE:CLASS GLITCH;SOURCE
CH1
;GLITCH:WIDTH 2.0000E-9;TRIGIF ACCEPT;POLARITY
POSITIVE;
:TRIGGER:A:PULSE:RUNT:POLARITY
POSITIVE;THRESHOLD:HIGH
1.2000;LOW 800.0000E-
3;:TRIGGER:A:PULSE:RUNT:WHEN OCCURS
;WIDTH 2.0000E-
9;:TRIGGER:A:PULSE:TRANSITION:DELTATIME
2.0000E-9;POLARITY POSITIVE;THRESHOLD:HIGH
1.2000;LOW
800.0000E-3;:TRIGGER:A:PULSE:TRANSITION:WHEN
SLOWERTHAN;
:TRIGGER:A:PULSE:WIDTH:LOWLIMIT 2.0000E-
9;HIGHLIMIT
2.0000E-9;WHEN WITHIN;POLARITY
POSITIVE;:TRIGGER:A
:PULSE:TIMEOUT:POLARITY STAYSHIGH;TIME 2.0000E-
9;
:TRIGGER:B:STATE 0;TYPE EDGE;LEVEL 0.0000;BY
EVENTS
;EDGE:SOURCE CH1;SLOPE RISE;COUPLING
DC;:TRIGGER:B
:TIME 16.0000E-9;EVENTS:COUNT 2

```

TRIGger:A

Description

This command sets the A trigger level automatically to 50% of the range of the minimum and maximum values of the trigger input signal. The query returns current A trigger parameters. The trigger level is the voltage threshold through which the trigger source signal must pass to generate a trigger event. This command is equivalent to pushing the LEVEL knob on the front panel.

Group

Trigger

Related Commands

TRIGger:A:EDGE?, TRIGger:A:LOGic?, TRIGger:A:PULSE?

Syntax 1

TRIGger:A SETLevel

Syntax 2

TRIGger:A?

Argument

- SETLevel
This sets the A trigger level to 50% of the range of the minimum and maximum values of the trigger input signal.

Example 1

TRIGger:A SETLevel

This command sets the A trigger level to 50% of the range of the minimum and maximum values of the trigger input signal.

Example 2

TRIGger:A?

This query might return the following A trigger parameters;

```
:TRIGGER:A:MODE AUTO;TYPE EDGE
;LEVEL 0.0000;HOLDOFF:BY DEFAULT;TIME
250.0000E-9;
:TRIGGER:A:EDGE:SOURCE CH1;COUPLING DC;SLOPE
RISE;
:TRIGGER:A:LOGIC:CLASS PATTERN;FUNCTION
AND;WHEN TRUE
;THRESHOLD:CH1 1.4000;CH2 1.4000
;CH3 1.4000;CH4
1.4000;:TRIGGER:A:LOGIC:INPUT:CH1 HIGH
;CH2 X;CH3 X;:TRIGGER:A:LOGIC:PATTERN:INPUT:CH4
X;
:TRIGGER:A:LOGIC:PATTERN:WHEN
TRUE;WHEN:LESSLIMIT
5.0000E-9;MORELIMIT 5.0000E-
9;:TRIGGER:A:LOGIC:SETHOLD
:CLOCK:EDGE RISE;THRESHOLD 1.4000;SOURCE
CH2;:TRIGGER
:A:LOGIC:SETHOLD:DATA:THRESHOLD 1.4000;SOURCE
CH1;
:TRIGGER:A:LOGIC:SETHOLD:HOLDTIME 2.0000E-
9;SETTIME
3.0000E-9;:TRIGGER:A:LOGIC:STATE:INPUT:CH4
RISE;
:TRIGGER:A:LOGIC:STATE:WHEN
TRUE;:TRIGGER:A:PULSE:CLASS
GLITCH;SOURCE CH1;GLITCH:WIDTH 2.0000E-9;TRIGIF
ACCEPT
;POLARITY
POSITIVE;:TRIGGER:A:PULSE:RUNT:POLARITY
POSITIVE;THRESHOLD:HIGH 1.2000;LOW 800.0000E-
3;:TRIGGER
```

```

:A:PULSE:RUNT:WHEN OCCURS;WIDTH 2.0000E-
9;:TRIGGER:A
:PULSE:TRANSITION:DELTATIME 2.0000E-9;POLARITY
POSITIVE
;THRESHOLD:HIGH 1.2000;LOW 800.0000E-
3;:TRIGGER:A:PULSE
:TRANSITION:WHEN
SLOWERTHAN;:TRIGGER:A:PULSE:WIDTH
:LOWLIMIT 2.0000E-9;HIGHLIMIT 2.0000E-9;WHEN
WITHIN
;POLARITY
POSITIVE;:TRIGGER:A:PULSE:TIMEOUT:POLARITY
STAYSHIGH;TIME 2.0000E-9

```

TRIGger:A:EDGE?

Description

This query-only command returns the trigger source, coupling, and slope for the A edge trigger. This command is equivalent to selecting Edge Setup from the Trig menu and viewing the current setups.

Group

Trigger

Related Commands

TRIGger:A:PULse, TRIGger:A:LOGIc

Syntax

TRIGger:A:EDGE?

Example

TRIGger:A:EDGE?

This query might return :TRIGGER:A:EDGE:SOURCE CH1;COUPLING DC;SLOPE RISE, indicating the trigger source, coupling, and slope for the A edge trigger.

TRIGger:A:EDGE:COUPLing

Description

This command sets or queries the type of coupling for the A edge trigger. This command is equivalent to selecting A Event (Main) Trigger Setup from the Trig menu, selecting Edge Trigger, and choosing from the Coupling drop-down list.

Group

Trigger

Related Commands

TRIGger:A:EDGE:SOUrce, TRIGger:A:EDGE:SLOpe

Syntax 1

```

TRIGger:A:EDGE:COUPLing
{AC|DC|HFRej|LFRej|NOISErej}

```


Syntax 2

TRIGger:A:EDGE:COUPling?

Arguments

- AC
This selects AC trigger coupling, which passes the input signals above 60 Hz to the trigger circuitry.
- DC
This selects DC trigger coupling, which passes all input signals to the trigger circuitry.
- HFRej
This coupling attenuates signals above 50 kHz before passing the signals to the trigger circuitry.
- LFRcj
This coupling attenuates signals below 80 kHz before passing the signals to the trigger circuitry.
- NOISErej
This coupling provides stable triggering by increasing the trigger hysteresis. Increased hysteresis reduces the trigger sensitivity to noise but may require greater trigger signal amplitude.

Example 1

```
TRIGger:A:EDGE:COUpling DC
```

This command sets the A edge trigger coupling to DC.

Example 2

```
TRIGger:A:EDGE:COUpling?
```

This query might return :TRIGGER:A:EDGE:COUPLING DC, indicating that the A edge trigger coupling is set to DC.

TRIGger:A:EDGE:SLOpe

Description

This command sets or queries the slope for the A edge trigger. This command is equivalent to selecting A Event (Main) Trigger Setup from the Trig menu and then choosing the desired Slope.

Group

Trigger

Related Commands

TRIGger:A:EDGE:SOUrce, TRIGger:A:EDGE:COUpling

Syntax 1

```
TRIGger:A:EDGE:SLOpe {RISe|FALL}
```

Syntax 2

```
TRIGger:A:EDGE:SLOpe?
```

Arguments

- **RISe**
This specifies to trigger on the rising or positive edge of a signal.
- **FALL**
This specifies to trigger on the falling or negative edge of a signal.

Example 1

TRIGger:A:EDGE:SLOpe?

This query might return :TRIGGER:A:EDGE:SLOPE FALL, indicating that the A edge trigger slope is negative.

Example 2

TRIGger:A:EDGE:SLOpe RISe

This command sets the A edge trigger slope to positive, which triggers on the rising edge of the signal.

TRIGger:A:EDGE:SOURce

Description

This command sets or queries the source for the A edge trigger. This command is equivalent to selecting A Event (Main) Trigger Setup from the Trig menu and then choosing from the Source drop-down list.

Group

Trigger

Related Commands

TRIGger:A:EDGE:SLOpe, TRIGger:A:EDGE:COUPling

Syntax 1

TRIGger:A:EDGE:SOURce {AUXiliary|CH<x>|LINE}

Syntax 2

TRIGger:A:EDGE:SOURce?

Arguments

- **AUXiliary**
This specifies an external trigger using the Auxiliary Trigger Input connector located on the rear panel of the instrument.
- **CH<x>**
This specifies one input channel as the A edge trigger source.
- **LINE**
This specifies AC line voltage.

Example 1

```
TRIGger:A:EDGE:SOURce?
```

This query might return `:TRIGGER:A:EDGE:SOURCE CH1`, indicating that channel 1 is the A edge trigger source.

Example 2

```
TRIGger:A:EDGE:SOURce CH1
```

This command sets channel 1 as the A edge trigger source.

TRIGger:A:HOLDoff?

Description

This query-only command returns the A trigger holdoff parameters. These parameters specify the time period during which the trigger circuitry is not looking to generate a trigger event. This command is equivalent to selecting Holdoff from the Trig menu and then viewing the current settings.

Group

Trigger

Related Commands

TRIGger:A:HOLDoff:ACTUal?, TRIGger:A:HOLDoff:BY, TRIGger:A:HOLDoff:TIME

Syntax

```
TRIGger:A:HOLDoff?
```

Example

```
TRIGger:A:HOLDoff?
```

This query might return `:TRIGGER:A:HOLDOFF:TIME 900.0000E-09;BY DEFAULT`, indicating that the A edge trigger holdoff time is set 900 ns.

TRIGger:A:HOLDoff:ACTUal?

Description

This query-only command returns the holdoff time actually used (expressed in seconds) by the A trigger. This command is equivalent to selecting Holdoff from the Trig menu and then viewing the current Trig Holdoff value.

Group

Trigger

Related Commands

TRIGger:A:HOLDoff?, TRIGger:A:HOLDoff:BY, TRIGger:A:HOLDoff:TIME

Syntax

```
TRIGger:A:HOLDoff:ACTUal?
```

Example

TRIGger:A:HOLDoff:ACTUal?

This query might return :TRIGGER:A:HOLDOFF:ACTUAL
4.0000E-06, showing that the holdoff time is set to 4 μ s.

TRIGger:A:HOLDoff:BY

Description

This command sets or queries the type of holdoff for the A trigger. Holdoff types are expressed as either user-specified time (TIME) or by an internally calculated minimum time value (DEFAULT/AUTO). This command is equivalent to selecting Holdoff from the Trig menu and then setting the Holdoff type.

Group

Trigger

Related Commands

TRIGger:A:HOLDoff:TIME

Syntax 1

TRIGger:A:HOLDoff:BY {TIME|DEFAULT}

Syntax 2

TRIGger:A:HOLDoff:BY {TIME|RANDOM|AUTO}

Syntax 3

TRIGger:A:HOLDoff:BY?

Arguments

- TIME
This enables you to set the holdoff time via the TRIGger:A:HOLDoff:TIME command.
- DEFAULT
This automatically calculates a holdoff time to use. This time is typically equivalent to the greater of 1/2 screen (5 divisions) of time or 250 ns. The maximum value is 12 s. For example, if the instrument is set to 1 ms/division then the default holdoff will be 1 ms/division x 25 divisions = 25 ms.

Example 1

TRIGger:A:HOLDoff:BY?

This query might return :TRIGGER:A:HOLDOFF:BY TIME,
indicating that you will set the holdoff time.

Example 2

TRIGger:A:HOLDoff:BY TIME

This command sets the holdoff to the "by time" setting. This enables you to set the holdoff time.

TRIGger:A:HOLDoff:TIME

Description

This command sets or queries the A trigger holdoff time. This command is equivalent to selecting Holdoff from the Trig menu and then choosing the desired Trig Holdoff.

Group

Trigger

Related Commands

TRIGger:A:HOLDoff:BY

Syntax 1

TRIGger:A:HOLDoff:TIME <NR3>

Syntax 2

TRIGger:A:HOLDoff:TIME?

Argument

- <NR3>
This specifies the holdoff time in seconds. The range is from 250 ns through 12.0 s.

Example 1

TRIGger:A:HOLDoff:TIME?

This query might return :TRIGGER:A:HOLDOFFTIME
1.2000E-06, indicating that the A trigger holdoff time is set to 1.2 μ s.

Example 2

TRIGger:A:HOLDoff:TIME 10

This command sets the A trigger holdoff time to 10 s.

TRIGger:A:LEVEl

Description

This command sets or queries the level for the A trigger. This command is equivalent to selecting Holdoff from the Trig menu and then viewing or setting the trigger Level.

Group

Trigger

Syntax 1

TRIGger:A:LEVEl {ECL|TTL|<NR3>}

Syntax 2

TRIGger:A:LEVEl?

Arguments

- ECL
This specifies the ECL high level.
- TTL
This specifies the TTL high level.
- <NR3>
This specifies the trigger level in user units (usually volts).

Example 1

```
TRIGger:A:LEVel?
```

This query might return `:TRIGGER:A:LEVel 1.3000E+00`, indicating that the A edge trigger is set to 1.3 V.

Example 2

```
TRIGger:A:LEVel TTL
```

This command sets the A edge trigger to TTL high level, which is 1.4 V.

TRIGger:A:LOGic?

Description

This query-only command returns all of the A logic trigger parameters.

Group

Trigger

Related Commands

```
TRIGger:A:LOGic:CLAss
```

Syntax

```
TRIGger:A:LOGic?
```

Example

```
TRIGger:A:LOGic?
```

```
This query might return :TRIGGER:A:LOGIC:CLASS PATTERN
;FUNCTION AND;WHEN TRUE;THRESHOLD:CH1
1.4000;CH2 1.4000
;CH3 1.4000;CH4
1.4000;:TRIGGER:A:LOGIC:INPUT:CH1 HIGH
;CH2 X;CH3 X;:TRIGGER:A:LOGIC:PATTERN:INPUT:CH4
X;
:TRIGGER:A:LOGIC:PATTERN:WHEN
TRUE;WHEN:LESSLIMIT
5.0000E-9;MORELIMIT 5.0000E-
9;:TRIGGER:A:LOGIC:SETHOLD
:CLOCK:EDGE RISE;THRESHOLD 1.4000;SOURCE
CH2;:TRIGGER:A
:LOGIC:SETHOLD:DATA:THRESHOLD 1.4000;SOURCE
CH1;
```

```
:TRIGGER:A:LOGIC:SETHOLD:HOLDTIME 2.0000E-9;SETTIME
3.0000E-9;:TRIGGER:A:LOGIC:STATE:INPUT:CH4
RISE;:TRIGGER
:A:LOGIC:STATE:WHEN TRUE
```

TRIGger:A:LOGic:CLAss

Description

This command sets or queries the class of the Logic Trigger. Used in conjunction with the TRIGger:A:TYPE command, this command is equivalent to selecting Logic Pattern, Logic State or Setup/Hold Setup from the Trig menu.

Group

Trigger

Related Commands

TRIGger:A:TYPE, TRIGger:A:PULse:CLAss

Syntax 1

```
TRIGger:A:LOGic:CLAss {PATtern|STATE|SETHold}
```

Syntax 2

```
TRIGger:A:LOGic:CLAss?
```

Arguments

- **PATtern**
In four-channel instruments, this argument sets the instrument to trigger when the specified logical combinations of channels 1, 2, 3, and 4 are met. On two-channel instruments, only channel 1 and channel 2 are available.
- **STATE**
In four-channel instruments, this argument sets the instrument to trigger when the specified conditions of channels 1, 2, and 3 are met after the channel 4 (clock) condition is met. On two-channel instruments, only channel 1 and channel 2 (clock) are available.
- **SETHold**
This argument sets the instrument to trigger on setup and hold violations between a data source and a clock source. Use one channel input as the clock signal and a second channel input as the data input. The clocking and data levels are used to determine if a clock or data transition has occurred.

Example 1

```
TRIGger:A:TYPe LOGIc  
TRIGger:A:LOGIc:CLAss?
```

This query might return :TRIGGER:A:LOGIC:CLASS PATTERN

Example 2

```
TRIGger:A:LOGIc:CLAss PATTERN
```

This command sets the trigger A logic class to PATtern, which causes the instrument to trigger when the specified logical combinations of channels 1, 2, 3, and 4 are met.

TRIGger:A:LOGIc:FUNCTion

Description

This command sets or queries the logical combination of the input channels for the A pattern and A state logic triggers. This command is equivalent to selecting A Event (Main) Trigger Setup from the Trig menu, selecting Pattern or State for the Trigger Type, and setting or viewing the Pattern Type.

Group

Trigger

Related Commands

```
TRIGger:A:LOGIc:PATtern:WHEn,  
TRIGger:A:LOGIc:INPut:CH<x>,  
TRIGger:A:LOGIc:THReshold:CH<x>
```

Syntax 1

```
TRIGger:A:LOGIc:FUNCTion {AND|NANd|NOR|OR}
```

Syntax 2

```
TRIGger:A:LOGIc:FUNCTion?
```

Arguments

- AND
This specifies to trigger if all conditions are true.
- NANd
This specifies to trigger if any of the conditions are false.
- NOR
This specifies to trigger if all conditions are false.
- OR
This specifies to trigger if any of the conditions are true.

Example 1

TRIGger:A:LOGic:FUNCTION?

This query might return :TRIGGER:A:LOGIC:FUNCTION NAND, which indicates that the instrument will trigger if and of the logic conditions are false.

Example 2

TRIGger:A:LOGic:FUNCTION AND

This command sets the logical combination of channels to be true when all conditions are true.

TRIGger:A:LOGic:INPut?

Description

On four-channel instruments, this query-only command returns the A logic trigger input expected for channel 1, 2, and 3.

Channel 4 is set or queried with the command

TRIGger:A:LOGic:PATtern:INPut:CH4.

On two-channel instruments, this query returns the A logic trigger input expected for channel 1. Channel 2 is set or queried with the command TRIGger:A:LOGic:PATtern:INPut:CH2.

This command is equivalent to selecting A Event (Main) Trigger Setup and viewing or setting the Input Threshold for channel 1 through 3 for four-channel instruments or channel 1 for two-channel instruments.

Group

Trigger

Related Commands

TRIGger:A:LOGic:PATtern:INPut:CH4

Syntax

TRIGger:A:LOGic:INPut?

Example

TRIGger:A:LOGic:INPut?

This query might return :TRIGGER:A:LOGIC:INPUT:CH1 HIGH;CH2 X;CH3 X, indicating that a logic high is expected on channel 1 while channel 2 and channel three are Don't Care.

TRIGger:A:LOGIc:INPut:CH<x>

Description

This command sets or queries the A logical input for the logic trigger channel specified by x. The value of x ranges from 1 through 3 for four-channel instruments. For two-channel instruments x can only be 1. Note that CH4 on four-channel instruments or CH2 on two-channel instruments cannot be set or queried with this command. For details about setting this channel, see TRIGger:A:LOGIc:PATtern:INPut:CH4 or TRIGger:A:LOGIc:PATtern:INPut:CH2. This command is equivalent to selecting A Event (Main) Trigger Setup from the Trig menu and then choosing the desired logical input from the Ch<x> drop-down list, which is located in the Input Threshold group box.

Group

Trigger

Related Commands

TRIGger:A:LOGIc:PATtern:INPut:CH4,
TRIGger:A:LOGIc:PATtern:INPut:CH2

Syntax 1

TRIGger:A:LOGIc:INPut:CH<x> {HIGH|LOW|X}

Syntax 2

TRIGger:A:LOGIc:INPut:CH<x>?

Arguments

- HIGH
This specifies the logic high.
- LOW
This specifies the logic low.
- X
This specifies a "do not care" state.

Example 1

TRIGger:A:LOGIc:INPut:CH1?

This query might return :TRIGGER:LOGIC:INPUT:CH1 X, indicating that the setting for the A logic trigger input to channel 1 does not matter.

Example 2

TRIGger:A:LOGIc:INPut:CH2 HIGH

This command sets the A logic trigger input to logic HIGH for channel 2.

TRIGger:A:LOGIc:PATtern?

Description

This query-only command returns the conditions used for generating an A logic pattern trigger, with respect to the defined input pattern, and identifies the maximum and minimum time that the selected pattern may be true and still generate the trigger. This command is equivalent to selecting Logic Pattern from the Trig menu and then viewing the current setups.

Group

Trigger

Related Commands

TRIGger:A:LOGIc:PATtern:INPut:CH4,
TRIGger:A:LOGIc:PATtern:WHEn,
TRIGger:A:LOGIc:PATtern:WHEn:LESSLimit,
TRIGger:A:LOGIc:PATtern:WHEn:MORELimit

Syntax

TRIGger:A:LOGIc:PATtern?

Example

TRIGger:A:LOGIc:PATtern?

This query might return

```
:TRIGGER:A:LOGIC:PATTERN:INPUT:CH4  
X;:TRIGGER:A:LOGIC:PATTERN:WHEN  
TRUE;WHEN:LESSLIMIT 5.0000E-9;MORELIMIT  
5.0000E-9.
```

TRIGger:A:LOGIc:PATtern:INPut:CH2

Description

This command sets or queries the A logic trigger input for channel 2 in two-channel instruments only. The command specifies the logic value used when the pattern trigger detects the threshold level. Sending this command is equivalent to selecting Logic Pattern from the Trig menu and then choosing the desired logical input from the Ch2 drop-down list, which is located in the Input Threshold group box.

To set or query the A logic trigger input for a four-channel instrument, see TRIGger:A:LOGIc:PATtern:INPut:CH4.

Group

Trigger

Related Commands

TRIGger:A:LOGIc:FUNCTion,
TRIGger:A:LOGIc:INPut:CH<x>,
TRIGger:A:LOGIc:THReshold:CH<x>

Syntax 1

TRIGger:A:LOGIc:PATtern:INPut:CH2 {HIGH|LOW|X}

Syntax 2

TRIGger:A:LOGIc:PATtern:INPut:CH2?

Arguments

- HIGH
This specifies the logic high.
- LOW
This specifies the logic low.
- X
This specifies a "do not care" state.

Example 1

TRIGger:A:LOGIc:PATtern:INPut:CH2?

This query might return

:TRIGGER:A:LOGIC:PATTERN:INPUT:CH2 HIGH, indicating that the logic input for channel 2 is logic high.

Example 2

TRIGger:A:LOGIc:PATtern:INPut:CH2 HIGH

This command sets the A logic trigger input to logic high for channel 2 when the logic class is set to PATtern. When the threshold level is detected, HIGH places a 1 on the channel 2 input to the selected function.

TRIGger:A:LOGIc:PATtern:INPut:CH4

Description

This command sets or queries the A logic trigger input for channel 4 in four-channel instruments only. The command specifies the logic value used when the pattern trigger detects the threshold level. Sending this command is equivalent to selecting Logic Pattern from the Trig menu and then choosing the desired logical input from the Ch4 drop-down list, which is located in the Input Threshold group box.

To set or query the A logic trigger input for a two-channel instrument, see TRIGger:A:LOGIc:PATtern:INPut:CH2.

Group

Trigger

Related Commands

TRIGger:A:LOGIc:FUNcTION,
TRIGger:A:LOGIc:INPut:CH<x>,
TRIGger:A:LOGIc:THReshold:CH<x>

Syntax 1

TRIGger:A:LOGIc:PATtern:INPut:CH4 {HIGH|LOW|X}

Syntax 2

TRIGger:A:LOGIc:PATtern:INPut:CH4?

Arguments

- HIGH
This specifies the logic high.
- LOW
This specifies the logic low.
- X
This specifies a "do not care" state.

Example 1

TRIGger:A:LOGIc:PATtern:INPut:CH4?

This query might return

:TRIGGER:A:LOGIC:PATTERN:INPUT:CH4 HIGH, indicating that the logic input for channel 4 is logic high.

Example 2

TRIGger:A:LOGIc:PATtern:INPut:CH4 HIGH

This command sets the A logic trigger input to logic high for channel 4 when the logic class is set to PATtern. When the threshold level is detected, HIGH places a 1 on the channel 4 input to the selected function.

TRIGger:A:LOGIc:PATtern:WHEn

Description

This command sets or queries the condition for generating an A logic pattern trigger with respect to the defined input pattern. This command is equivalent to selecting A Event (Main) Trigger Setup from the Trig menu, selecting Pattern for Trigger Type, and choosing a trigger condition from the Pattern drop-down list, which is located in the Trigger When group box.

Group

Trigger

Related Commands

TRIGger:A:LOGIc:FUNCTion, TRIGger:A:LOGIc:INPut,
TRIGger:A:LOGIc:THREshold,
TRIGger:A:LOGIc:PATtern:WHEn:LESSLimit,
TRIGger:A:LOGIc:PATtern:WHEn:MORELimit

Syntax 1

TRIGger:A:LOGIc:PATtern:WHEn
{TRUE|FALSE|LESSThan|MOREThan}

Syntax 2

TRIGger:A:LOGIc:PATtern:WHEn?

Arguments

- **TRUe**
This argument sets the instrument to trigger when the pattern becomes true.
- **FALSe**
This argument sets the instrument to trigger when the pattern becomes false.
- **LESSThan**
This argument sets the instrument to trigger if the specific pattern is true less than the time set by the `TRIGger:A:LOGIc:PATtern:WHEn:LESSLimit` command.
- **MOREThan**
This argument sets the instrument to trigger if the specific pattern is true longer than the specified time set by the `TRIGger:A:LOGIc:PATtern:WHEn:MORELimit` command.

Example 1

```
TRIGger:A:LOGIc:PATtern:WHEn?
```

This query might return `:TRIGGER:A:LOGIC:PATTERN:WHEN TRUE`, indicating that the A logic pattern will trigger when the pattern becomes true.

Example 2

```
TRIGger:A:LOGIc:PATtern:WHEn FALSe
```

This command specifies to trigger the A logic pattern when the pattern becomes false.

TRIGger:A:LOGIc:PATtern:WHEn:LESSLimit

Description

This command sets or queries the maximum time that the selected pattern may be true and still generate an A logic pattern trigger. This command is equivalent to selecting A Event (Main) Trigger Setup from the Trig menu, selecting Pattern as the Trigger Type, selecting Less Than for the Pattern in the Trigger When settings, and entering a maximum value for Time.

Group

Trigger

Related Commands

`TRIGger:A:LOGIc:PATtern:WHEn:MORELimit`

Syntax 1

```
TRIGger:A:LOGIc:PATtern:WHEn:LESSLimit <NR3>
```

Syntax 2

```
TRIGger:A:LOGIc:PATtern:WHEn:LESSLimit?
```

Argument

- <NR3>

This specifies the amount of time to hold the pattern true.

Example 1

```
TRIGger:A:LOGic:PATtern:WHEn:LESSLimit?
```

This query might return

```
:TRIGGER:A:LOGIC:PATTERN:WHEN:LESSLIMIT
```

5.0000E-09, indicating that the selected pattern may hold true for up to 5 ns and still generate an A logic pattern trigger.

Example 2

```
TRIGger:A:LOGic:PATtern:WHEn:LESSLimit 10.0E+00
```

This command sets the maximum time that the selected pattern may hold true (and generate an A logic pattern trigger) to 10 s.

TRIGger:A:LOGic:PATtern:WHEn:MORELimit

Description

This command sets or queries the minimum time that the selected pattern may be true and still generate an A logic pattern trigger. This command is equivalent to selecting A Event (Main) Trigger Setup from the Trig menu, selecting Pattern as the Trigger Type, selecting More Than for the Pattern in the Trigger When settings, and entering a minimum value for Time.

Group

Trigger

Related Commands

```
TRIGger:A:LOGic:PATtern:WHEn:LESSLimit
```

Syntax 1

```
TRIGger:A:LOGic:PATtern:WHEn:MORELimit <NR3>
```

Syntax 2

```
TRIGger:A:LOGic:PATtern:WHEn:MORELimit?
```

Argument

- <NR3>

This specifies the amount of time to hold the pattern true.

Example 1

```
TRIGger:A:LOGic:PATtern:WHEn:MORELimit?
```

This query might return

```
:TRIGGER:A:LOGIC:PATTERN:WHEN:MORELIMIT
```

5.0000E-09, indicating that the selected pattern must hold true for at least 5 ns to generate an A logic pattern trigger.

Example 2

```
TRIGger:A:LOGic:PATtern:WHEn:MORELimit 10.0E+00
```


This command sets the minimum time that the selected pattern may hold true (and generate an A logic pattern trigger) to 10 s.

TRIGger:A:LOGic:SETHold?

Description

This query-only command returns the clock edge polarity, voltage threshold and source input; data voltage threshold and source; and both setup and hold times for setup and hold violation triggering. This command is equivalent to selecting Setup/Hold Setup from the Trig menu and then viewing the current setups.

Group

Trigger

Related Commands

TRIGger:A:LOGic:PATtern?, TRIGger:A:LOGic:STATE?

Syntax

TRIGger:A:LOGic:SETHold?

Example

TRIGger:A:LOGic:SETHold?

This query might return the settings

```
:TRIGGER:A:LOGIC:SETHOLD:CLOCK:EDGE RISE
;THRESHOLD 1.4000;SOURCE
CH2; :TRIGGER:A:LOGIC:SETHOLD:DATA
:THRESHOLD 1.4000;SOURCE
CH1; :TRIGGER:A:LOGIC:SETHOLD
:HOLDTIME 2.0000E-9;SETTIME 3.0000E-9
```

TRIGger:A:LOGic:SETHold:CLOCK?

Description

This query-only command returns the clock edge polarity, voltage threshold and source input for setup and hold triggering. This command is equivalent to selecting Setup/Hold Setup from the Trig menu and then viewing the current clock setups.

Group

Trigger

Related Commands

TRIGger:A:LOGic:SETHold:DATA?,
TRIGger:A:LOGic:SETHold:CLOCK:EDGE,
TRIGger:A:LOGic:SETHold:CLOCK:THReshold,
TRIGger:A:LOGic:SETHold:CLOCK:SOURce

Syntax

TRIGger:A:LOGic:SETHold:CLOCK?

Example

```
TRIGger:A:LOGic:SETHold:CLOCK?
```

This query might return

```
:TRIGGER:A:LOGIC:SETHOLD:CLOCK:EDGE  
RISE;THRESHOLD 1.4000;SOURCE CH2, indicating the  
current clock settings for setup and hold triggering.
```

TRIGger:A:LOGic:SETHold:CLOCK:EDGE

Description

This command sets or queries the clock edge polarity for setup and hold triggering. This is equivalent to selecting Setup/Hold Setup from the Trig menu and then choosing the desired Clock Edge.

Group

Trigger

Related Commands

```
TRIGger:A:LOGic:SETHold:CLOCK:SOURce,  
TRIGger:A:LOGic:SETHold:CLOCK:THReshold
```

Syntax 1

```
TRIGger:A:LOGic:SETHold:CLOCK:EDGE {FALL|RISe}
```

Syntax 2

```
TRIGger:A:LOGic:SETHold:CLOCK:EDGE?
```

Arguments

- FALL
This specifies polarity as the clock falling edge.
- RISe
This specifies polarity as the clock rising edge.

Example 1

```
TRIGger:A:LOGic:SETHold:CLOCK:EDGE?
```

This query might return

```
:TRIGGER:A:LOGIC:SETHOLD:CLOCK:EDGE RISE,  
indicating that polarity is specified as the clock rising edge.
```

Example 2

```
TRIGger:A:LOGic:SETHold:CLOCK:EDGE RISE
```

This command specifies the polarity as the clock rising edge.

TRIGger:A:LOGic:SETHold:CLOCK:SOURce

Description

This command sets or queries the clock source for the A logic trigger setup and hold input. This is equivalent to selecting

Setup/Hold Setup from the Trig menu and choosing the desired channel from the Clock Source drop-down list.

Group

Trigger

Related Commands

TRIGger:A:LOGic:SETHold:CLOCK:EDGE,
TRIGger:A:LOGic:SETHold:CLOCK:THReshold

Syntax 1

TRIGger:A:LOGic:SETHold:CLOCK:SOURce CH<x>

Syntax 2

TRIGger:A:LOGic:SETHold:CLOCK:SOURce?

Argument

- CH<x>

This specifies the input channel, which ranges from 1 through 4 for four-channel instruments or 1 through 2 for two channel instruments.

Example 1

TRIGger:A:LOGic:SETHold:CLOCK:SOURce?

This query might return

:TRIGGER:A:LOGIC:SETHOLD:CLOCK:SOURCE CH4,
indicating that channel 4 is the clock source for the setup and hold input. For the A logic trigger.

Example 2

TRIGger:A:LOGic:SETHold:CLOCK:SOURce CH1

This command specifies channel 1 as the A logic setup and hold input.

TRIGger:A:LOGic:SETHold:CLOCK:THReshold

Description

This command sets or queries the clock voltage threshold for the setup and hold trigger. This command is equivalent to selecting Setup/Hold Setup from the Trig menu and setting the desired Clock Level.

Group

Trigger

Related Commands

TRIGger:A:LOGic:SETHold:CLOCK:EDGE,
TRIGger:A:LOGic:SETHold:CLOCK:SOURce

Syntax 1

TRIGger:A:LOGic:SETHold:CLOCK:THReshold
{ECL|TTL|<NR3>}

Syntax 2

TRIGger:A:LOGic:SETHold:CLOCK:THReshold?

Arguments

- ECL
This specifies a preset ECL high level of -1.3 V.
- TTL
This specifies a preset TTL high level of 1.4 V.
- <NR3>
This is the clock level, in volts.

Example 1

TRIGger:A:LOGic:SETHold:CLOCK:THReshold?

This query might return

:TRIGGER:A:LOGIC:SETHOLD:CLOCK:THRESHOLD
1.2000E+00, indicating that the clock threshold for the setup
and hold trigger is 1.2 V.

Example 2

TRIGger:A:LOGic:SETHold:CLOCK:THReshold TTL

This command specifies the preset TTL value of 1.4 V as the
clock threshold for the setup and hold trigger.

TRIGger:A:LOGic:SETHold:DATA?

Description

This query-only command returns the voltage threshold and data source for the setup and hold trigger. This command is equivalent to selecting Setup/Hold Setup from the Trig menu and then viewing the current data setups.

Group

Trigger

Related Commands

TRIGger:A:LOGic:SETHold:CLOCK?

Syntax

TRIGger:A:LOGic:SETHold:DATA?

Example

```
TRIGger:A:LOGic:SETHold:DATA?
```

This query might return

```
:TRIGGER:A:LOGIC:SETHOLD:DATA:THRESHOLD  
1.4000;SOURCE CH1, indicating the current trigger data  
settings.
```

TRIGger:A:LOGic:SETHold:DATA:SOURce

Description

This command sets or queries the data source for the setup and hold trigger. This command is equivalent to selecting Setup/Hold Setup from the Trig menu and choosing the desired channel from the Data Source drop-down list.

Group

Trigger

Related Commands

```
TRIGger:A:LOGic:SETHold:DATA:THReshold
```

Syntax 1

```
TRIGger:A:LOGic:SETHold:DATA:SOURce CH<x>
```

Syntax 2

```
TRIGger:A:LOGic:SETHold:DATA:SOURce?
```

Argument

- CH<x>
This specifies the input channel, which ranges from 1 through 4 for four-channel instruments or 1 through 2 for two-channel instruments..

Example 1

```
TRIGger:A:LOGic:SETHold:DATA:SOURce?
```

This query might return

```
:TRIGGER:A:LOGIC:SETHOLD:DATA:SOURCE CH2,  
indicating that channel 2 is the current clock source for the setup  
and hold trigger.
```

Example 2

```
TRIGger:A:LOGic:SETHold:DATA:SOURce CH1
```

This command sets channel 1 as the clock source for the setup and hold trigger.

TRIGger:A:LOGic:SETHold:DATA:THReshold

Description

This command sets or queries the data voltage threshold for setup and hold trigger. This command is equivalent to selecting Setup/Hold Setup from the Trig menu and then setting the desired Data Level.

Group

Trigger

Related Commands

TRIGger:A:LOGic:SETHold:DATA:SOUrce

Syntax 1

```
TRIGger:A:LOGic:SETHold:DATA:THReshold  
{ECL|TTL<NR3>}
```

Syntax 2

```
TRIGger:A:LOGic:SETHold:DATA:THReshold?
```

Arguments

- ECL
This specifies the preset ECL high level of -1.3 V.
- TTL
This specifies the preset TTL high level of 1.4 V.
- <NR3>
This is the setup and hold data level, in V.

Example 1

```
TRIGger:A:LOGic:SETHold:DATA:THReshold?
```

This query might return

```
:TRIGGER:A:LOGIC:SETHOLD:DATA:THRESHOLD  
1.2000E+00, indicating that 1.2 V is the current data voltage  
level for the setup and hold trigger.
```

Example 2

```
TRIGger:A:LOGic:SETHold:DATA:THReshold TTL
```

This command specifies the preset ECL high level of 1.4 V as the current data voltage level for the setup and hold trigger.

TRIGger:A:LOGIc:SETHold:HOLDTime

Description

This command sets or queries the hold time for setup and hold violation triggering. This command is equivalent to selecting Setup/Hold Setup from the Trig menu and then setting the desired Hold Time.

Group

Trigger

Related Commands

TRIGger:A:LOGIc:SETHold:SETTime

Syntax 1

TRIGger:A:LOGIc:SETHold:HOLDTime <NR3>

Syntax 2

TRIGger:A:LOGIc:SETHold:HOLDTime?

Argument

- <NR3>

This specifies the hold time setting in seconds. Positive values for hold time occur after the clock edge. Negative values occur before the clock edge.

Example 1

TRIGger:A:LOGIc:SETHold:HOLDTime?

This query might return

:TRIGGER:A:LOGIC:SETHOLD:HOLDTIME 2.0000E-09,
indicating that the current hold time for the the setup and hold trigger is 2 ns.

Example 2

TRIGger:A:LOGIc:SETHold:HOLDTime 3.0E-3

This command sets the hold time for the the setup and hold trigger to 3 ms.

TRIGger:A:LOGIc:SETHold:SETTime

Description

This command sets or queries the setup time for setup and hold violation triggering. This command is equivalent to selecting Setup/Hold Setup from the Trig menu and then setting the desired Setup Time.

Group

Trigger

Related Commands

TRIGger:A:LOGIc:SETHold:HOLDTime

Syntax 1

TRIGger:A:LOGic:SETHold:SETTime <NR3>

Syntax 2

TRIGger:A:LOGic:SETHold:SETTime?

Argument

- <NR3>
This specifies the setup time for setup and hold violation triggering.

Example 1

TRIGger:A:LOGic:SETHold:SETTime?

This query might return

:TRIGGER:A:LOGIC:SETHOLD:SETTIME 2.0000E-09,
indicating that the current setup time for setup and hold trigger is 2 ns.

Example 2

TRIGger:A:LOGic:SETHold:SETTime 3.0E-6

This command specifies that the current setup time for setup and hold trigger is 3 μ s.

TRIGger:A:LOGic:STATE?

Description

This query-only command returns the data input and trigger criteria for the A logic trigger. This command is equivalent to selecting Logic State from the Trig menu and then viewing the current logic state settings.

Group

Trigger

Related Commands

TRIGger:A:LOGic:STATE:INPut:CH4,
TRIGger:A:LOGic:STATE:WHEn

Syntax

TRIGger:A:LOGic:STATE?

Example

TRIGger:A:LOGic:STATE?

This query might return

:TRIGGER:A:LOGIC:STATE:INPUT:CH4 RISE;
:TRIGGER:A:LOGIC:STATE:WHEN TRUE

TRIGger:A:LOGic:STATE:INPut:CH2

Description

This command sets or queries the slope for channel 2 when the logic class is set to STATE in two-channel instruments. This

command is equivalent to selecting Logic State from the Trig menu and then choosing the desired channel input (NEG or POS) from the Ch2 drop-down list.

To set or query the slope of the logic state in four-channel instruments, see TRIGger:A:LOGic:STATE:INPut:CH4.

Group

Trigger

Related Commands

TRIGger:A:LOGic:STATE:WHEn

Syntax 1

TRIGger:A:LOGic:STATE:INPut:CH2 {FALL|RISe}

Syntax 2

TRIGger:A:LOGic:STATE:INPut:CH2?

Arguments

- FALL
This specifies falling edge.
- RISe
This specifies rising edge.

Example 1

TRIGger:A:LOGic:STATE:INPut:CH2?

This query might return

:TRIGGER:A:LOGIC:STATE:INPUT:CH2 RISE,
indicating that the A logic trigger input for channel 2 is the rising edge.

Example 2

TRIGger:A:LOGic:STATE:INPut:CH2 RISE

This command specifies that the A logic trigger input for channel 2 is the rising edge.

TRIGger:A:LOGIc:STATE:INPut:CH4

Description

This command sets or queries the slope for channel 4 when the logic class is set to State in four-channel instruments. This command is equivalent to selecting Logic State from the Trig menu and then choosing the desired channel input (NEG or POS) from the Ch4 (Clk) drop-down list.

To set or query the slope of the logic state in two-channel instruments, see TRIGger:A:LOGIc:STATE:INPut:CH2.

Group

Trigger

Related Commands

TRIGger:A:LOGIc:STATE:WHEn

Syntax 1

TRIGger:A:LOGIc:STATE:INPut:CH4 {FALL|RISe}

Syntax 2

TRIGger:A:LOGIc:STATE:INPut:CH4?

Arguments

- FALL
This specifies falling edge.
- RISe
This specifies rising edge.

Example 1

TRIGger:A:LOGIc:STATE:INPut:CH4?

This query might return

:TRIGGER:A:LOGIC:STATE:INPUT:CH4 RISE,
indicating that the A logic trigger input for channel 4 is the rising edge.

Example 2

TRIGger:A:LOGIc:STATE:INPut:CH4 RISE

This command specifies that the A logic trigger input for channel 4 is the rising edge.

TRIGger:A:LOGIc:STATE:WHEn

Description

This command sets or queries the condition for generating an A logic state trigger. This command is equivalent to selecting Logic State from the Trig menu and choosing the desired condition from the Trigger When Pattern drop-down list.

Group

Trigger

Related Commands

TRIGger:A:LOGIc:INPut:CH<x>,
TRIGger:A:LOGIc:STATE:INPut:CH4

Syntax 1

TRIGger:A:LOGIc:STATE:WHEn {TRUe|FALSe}

Syntax 2

TRIGger:A:LOGIc:STATE:WHEn?

Arguments

- TRUe
On four-channel instruments, this argument specifies that the trigger occurs when the clock transition on channel 4 occurs and the pattern of channels 1-3 are at the desired logic input states. On two-channel instruments, this specifies that the trigger occurs when the clock transition on channel 2 occurs and the pattern of channel 1 is at the desired logic input state.
- FALSe
On four-channel instruments, this argument specifies that the trigger occurs when the desired clock transition on channel 4 occurs and the desired logic input states on channels 1-3 are not found. On two-channel instruments, this specifies that the trigger occurs when the clock transition on channel 2 occurs and the desired logic input state on channel 1 is not found.

Example 1

TRIGger:A:LOGIc:STATE:WHEn?

This query might return :TRIGGER:A:LOGIC:STATE:WHEN FALSE, indicating that the logic condition to trigger upon is false.

Example 2

TRIGger:A:LOGIc:STATE:WHEn TRUE

This command specifies that the logic condition to trigger upon is true.

TRIGger:A:LOGic:THReshold?

Description

This query-only command returns the threshold voltage for all channels in an A logic trigger. This command query is equivalent to selecting A Event (Main) Trigger Setup from the Trig menu, choosing a logic trigger type, such as State or Pattern, and viewing the current Input Threshold voltage settings.

Group

Trigger

Related Commands

TRIGger:A:LOGic:THReshold:CH<x>,
TRIGger:A:LOGic:INPut, TRIGger:A:LOGic:INPut:CH<x>

Syntax

TRIGger:A:LOGic:THReshold?

Example

TRIGger:A:LOGic:THReshold?

This query might return :TRIGGER:A:LOGIC:THRESHOLD CH1 24.0000E-03;CH2 1.2000E+00;CH3 1.2000E+00;CH4 1.2000E+00, indicating the threshold voltages for the channels in an A logic trigger are as follows: channel 1 = 24 mV; channel 2 = 1.2 V; channel 3 = 1.2 V; channel 4 = 1.2 V.

TRIGger:A:LOGic:THReshold:CH<x>

Description

This command sets or queries the A logic trigger threshold voltage for the channel, specified by x, which ranges from 1 through 4 for four-channel instruments or 1 through 2 for two-channel instruments. This command is equivalent to selecting A Event (Main) Trigger Setup from the Trig menu, choosing a logic trigger type, such as State or Pattern, and setting the Input Threshold voltage for the desired channel.

Group

Trigger

Related Commands

TRIGger:A:LOGic:INPut?

Syntax 1

TRIGger:A:LOGic:THReshold:CH<x> <NR3>

Syntax 2

TRIGger:A:LOGic:THReshold:CH<x>?

Argument

- <NR3>

This specifies the threshold voltage.

Example 1

```
TRIGger:A:LOGic:THReshold:CH3?
```

This query might return :TRIGGER:A:LOGIC:THRESHOLD:CH3 1.2000E+00, indicating that the A logic trigger threshold voltage for channel 3 is 1.2 V.

Example 2

```
TRIGger:A:LOGicTHReshold:CH2 3.0E-3
```

This command sets the A logic trigger threshold voltage for channel 2 to 3 mV.

TRIGger:A:MODE

Description

This command sets or queries the A trigger mode. This command is equivalent to selecting Mode from the Trig menu and then choosing the desired Trigger Mode.

Group

Trigger

Related Commands

```
TRIGger:A:LEVel
```

Syntax 1

```
TRIGger:A:MODE {AUTO|NORMa1}
```

Syntax 2

```
TRIGger:A:MODE?
```

Arguments

- AUTO

This generates a trigger if one is not detected within a specified time period.

- NORMa1

This waits for a valid trigger event.

Example 1

```
TRIGger:A:MODE?
```

This query might return :TRIGGER:A:MODE NORMAL, indicating that a valid trigger event must occur before a trigger is generated.

Example 2

TRIGger:A:MODE NORMAL

This command specifies that a valid trigger event must occur before a trigger is generated.

TRIGger:A:PULse?

Description

This query-only command returns the A pulse trigger parameters.

Group

Trigger

Related Commands

TRIGger:A:EDGE?, TRIGger:A:LOGic?

Syntax

TRIGger:A:PULse?

Example

TRIGger:A:PULse?

```
This query might return :TRIGGER:A:PULSE:CLASS
GLITCH;SOURCE
CH1;GLITCH:WIDTH 2.0000E-9;TRIGIF
ACCEPT;POLARITY
POSITIVE;:TRIGGER:A:PULSE:RUNT:POLARITY
POSITIVE
;THRESHOLD:HIGH 1.2000;LOW 800.0000E-
3;:TRIGGER:A:PULSE
:RUNT:WHEN OCCURS;WIDTH 2.0000E-
9;:TRIGGER:A:PULSE:
TRANSITION:DELTATIME 2.0000E-9;POLARITY
POSITIVE
;THRESHOLD:HIGH 1.2000;LOW 800.0000E-
3;:TRIGGER:A
:PULSE:TRANSITION:WHEN
SLOWERTHAN;:TRIGGER:A:PULSE:WIDTH
:LOWLIMIT 2.0000E-9;HIGHLIMIT 2.0000E-9;WHEN
WITHIN
;POLARITY
POSITIVE;:TRIGGER:A:PULSE:TIMEOUT:POLARITY
STAYSHIGH;TIME 2.0000E-9
```

TRIGger:A:PULse:CLAss

Description

This command sets or queries the type of pulse on which to trigger. This command is equivalent to selecting the setup menu for the pulse type that you want from the Trig menu: Glitch Setup, Width Setup, Runt Setup, Timeout Setup, or Transition Setup.

Group

Trigger

Related Commands

TRIGger:A:PULse:GLItch, TRIGger:A:PULse:RUNT, TRIGger:A:PULse:WIDth, TRIGger:A:PULse:TIMEOut, TRIGger:A:PULse:TRANSition?, TRIGger:A:TYPE

Syntax 1

```
TRIGger:A:PULse:CLAss  
{GLItch|RUNT|WIDth|TRANSition|TIMEOut}
```

Syntax 2

```
TRIGger:A:PULse:CLAss?
```

Arguments

- **GLItch**
This triggers when a pulse is found that is of the specified polarity and width. These are set with the commands TRIGger:A:PULse:GLITch:POLarity and TRIGger:A:PULse;GLItch:WIDth.
- **RUNT**
This triggers when a pulse crosses the first preset voltage threshold but does not cross the second preset threshold before re-crossing the first. The thresholds are set with the TRIGger:A:PULse:RUNT:THReshold:LOW and TRIGger:A:PULse:RUNT:THReshold:HIGH commands.
- **WIDth**
This triggers when a pulse is found that has the specified polarity and is either inside or outside the limits as specified by TRIGger:A;PULse:WIDth:LOWLimit and TRIGger:A:PULse:WIDth:HIGHLimit. The polarity is selected using the TRIGger:A:PULse:WIDth:POLarity command.
- **TRANSition**
This triggers when a pulse crosses both thresholds in the same direction as the specified polarity and the transition time between the two threshold crossings is greater or less than the specified time delta.

- **TIMEOut**
This triggers when the pulse train stops in the selected state for longer than the specified time.

Example 1

TRIGger:A:PULse:CLAss?

This query might return :TRIGGER:A:PULSE:CLASS GLITCH, indicating that a pulse was found that is of the specified polarity and width.

Example 2

TRIGger:A:PULse:CLAss WIDTH

This command specifies a width pulse for the A trigger.

TRIGger:A:PULse:GLItch?

Description

This query-only command returns the current A glitch pulse trigger parameters. This command query is equivalent to selecting Glitch Setup from the Trig menu and viewing the current glitch trigger settings.

Group

Trigger

Related Commands

TRIGger:A:PULse:GLItch:POLarity,
TRIGger:A:PULse:GLItch:TRIGIF,
TRIGger:A:PULse:GLItch:WIDTH

Syntax

TRIGger:A:PULse:GLItch?

Example

TRIGger:A:PULse:GLItch?

This query might return :TRIGGER:A:PULSE:GLITCH:WIDTH
2.0000E-09;FILTER ACCEPT;POLARITY POSITIVE

TRIGger:A:PULse:GLItch:POLarity

Description

This command sets or queries the polarity for A pulse glitch trigger. This command is equivalent to selecting Glitch Setup from the Trig menu and then choosing the desired Polarity.

Group

Trigger

Related Commands

TRIGger:A:LEVel, TRIGger:A:PULse:GLItch:WIDTH

Syntax 1

```
TRIGger:A:PULse:GLItch:POLarity  
{ POSITIVE | NEGative | EITHer }
```

Syntax 2

```
TRIGger:A:PULse:GLItch:POLarity?
```

Arguments

- **POSITIVE**
This specifies that the instrument will only trigger when the polarity of the glitch is positive.
- **NEGative**
This specifies that the instrument will only trigger when the polarity of the glitch is negative.
- **EITHer**
This specifies that the instrument will trigger when the polarity of the glitch is either positive or negative.

Example 1

```
TRIGger:A:PULse:GLItch:POLarity?
```

This query might return

```
:TRIGGER:A:PULSE:GLITCH:POLARITY POSITIVE,
```

indicating that the polarity of the glitch must be positive for the trigger to occur.

Example 2

```
TRIGger:A:PULse:GLItch:POLarity EITHER
```

This command specifies that the polarity of the glitch can be either positive or negative for the trigger to occur.

TRIGger:A:PULse:GLItch:TRIGIF

Description

This command sets or queries the acceptance/rejection of the glitch pulse trigger, based on width. This command is equivalent to selecting Glitch Setup from the Trig menu and choosing the desired Trig if Width setting.

Group

Trigger

Related Commands

```
TRIGger:A:PULse:GLItch:WIDTH
```

Syntax 1

```
TRIGger:A:PULse:GLItch:TRIGIF { ACCEpt | REJect }
```

Syntax 2

```
TRIGger:A:PULse:GLItch:TRIGIF?
```

Arguments

- **ACCEpt**
This specifies that the instrument will only trigger on pulses that are narrower than the specified width, when the trigger type is set to glitch. The width is specified using the `TRIGger:A:PULse:GLItch:WIDth` command.
- **REJect**
This specifies that the instrument will only trigger on pulses that are wider than the specified width, when the trigger type is set to glitch. The width is specified using the `TRIGger:A:PULse:GLItch:WIDth` command.

Example 1

```
TRIGger:A:PULse:GLItch:TRIGIF?
```

This query might return `:TRIGGER:A:PULSE:GLITCH:TRIGIF ACCEPT`, indicating that the instrument is set to trigger on pulses that are narrower than the specified width.

Example 2

```
TRIGger:A:PULse:GLItch:TRIGIF REJect
```

This command specifies that the instrument triggers on pulses that are wider than the specified width.

TRIGger:A:PULse:GLItch:WIDth

Description

This command sets or queries the width for the A glitch trigger. This command is equivalent to selecting Glitch Setup from the Trig menu and then setting the desired Width.

For information about using the width value, refer to the `TRIGger:A:PULse:GLItch:TRIGIF` command.

Group

Trigger

Related Commands

`TRIGger:A:LEVel`, `TRIGger:A:PULse:GLItch:TRIGIF`

Syntax 1

```
TRIGger:A:PULse:GLItch:WIDth <NR3>
```

Syntax 2

```
TRIGger:A:PULse:GLItch:WIDth?
```

Argument

- `<NR3>`
This argument specifies the width of the glitch in seconds.

Example 1

```
TRIGger:A:PULse:GLItch:WIDth?
```

This query might return :TRIGGER:A:PULSE:GLITCH:WIDTH 2.0000E-09, indicating that the width of the glitch is currently set at 2 ns.

Example 2

```
TRIGger:A:PULse:GLItch:WIDth 15E-6
```

This command sets the width of the glitch to 15 μ s.

TRIGger:A:PULse:RUNT?

Description

This query-only command returns the current A runt trigger parameters. This command query is equivalent to selecting Runt Setup from the Trig menu and then viewing the current settings.

Group

Trigger

Related Commands

TRIGger:A:PULse:GLItch?, TRIGger:A:PULse:TIMEOut?, TRIGger:A:PULse:TRANsition?, TRIGger:A:PULse:WIDth?

Syntax

```
TRIGger:A:PULse:RUNT?
```

Example

```
TRIGger:A:PULse:RUNT?
```

This query might return

```
:TRIGGER:A:PULSE:RUNT:LOGIC:INPUT:CH1 HIGH; CH2  
X; CH3 X; CH4  
LOW; :TRIGGER:A:PULSE:RUNT:LOGIC:THRESHOLD:CH1  
1.2000;CH2 1.2000;CH3 1.2000;CH4  
1.2000; :TRIGGER:A:PULSE:RUNT:POLARITY POSITIVE  
:THRESHOLD:HIGH 1.2000;LOW 800.0000E-  
3; :TRIGGER:A:PULSE:RUNT:WHEN OCCURS;WIDTH  
2.0000E-9.
```

TRIGger:A:PULse:RUNT:LOGIc?

Description

This query-only command returns the current A runt trigger logic parameters. This query is equivalent to selecting Runt Setup from the Trig menu and then viewing the current settings.

Note: This command is not available in two-channel instruments.

Group

Trigger

Syntax

TRIGger:A:PULse:RUNT:LOGIc?

Example

TRIGger:A:PULse:RUNT:LOGIc?

This query might return

```
:TRIGGER:A:PULSE:RUNT:LOGIC:INPUT:CH1 HIGH; CH2  
X; CH3 X; CH4  
LOW; :TRIGGER:A:PULSE:RUNT:LOGIC:THRESHOLD:CH1  
1.2000;CH2 1.2000;CH3 1.2000;CH4 1.2000.
```

TRIGger:A:PULse:RUNT:LOGIc:INPut?

Description

This query-only command returns the current A runt pulse trigger logic input parameters. This query is equivalent to selecting Runt Setup from the Trig menu and then viewing the current settings.

Note: This command is not available in two-channel instruments.

Group

Trigger

Syntax

TRIGger:A:PULse:RUNT:LOGIcINPut?

Example

TRIGger:A:PULse:RUNT:LOGIc:INPut?

This query might return these parameters:

```
:TRIGGER:A:PULSE:RUNT:LOGIC:INPUT:CH1 HIGH; CH2  
X; CH3 X; CH4 LOW.
```

TRIGger:A:PULse:RUNT:LOGIc:INPut:CH<x>

Description

This command sets or queries the A runt logic input for the channel specified by <x>, which can be 1, 2, 3, or 4. This is equivalent to setting the runt logic inputs from the Trigger When section in the Runt Trigger menu. While all channels can be set or queried, only channels 3 and 4 can be used if the runt source is channel 1 or 2. Similarly, only channels 1 and 2 can be used if the runt source is channel 3 or 4.

Note: This command is not available in two-channel instruments.

Group

Trigger

Syntax 1

TRIGger:A:PULse:RUNT:LOGIc:INPut:CH<x>
{HIGH\LOW\X}

Syntax 2

TRIGGER:A:PULSE:RUNT:LOGIC:INPUT:CH<x>?

Arguments

- HIGH
This argument specifies logic high.
- LOW
This argument specifies logic low.
- X
This argument specifies a don't care state.

Example 1

TRIGGER:A:PULSE:RUNT:LOGIC:INPUT:CH2?

This query might return

:TRIGGER:A:PULSE:RUNT:LOGIC:INPUT:CH2:LOW,
indicating that the runt logic trigger input is set to logic low for channel 2.

Example 2

TRIGGER:A:PULSE:RUNT:LOGIC:INPUT:CH3:HIGH

This command sets the runt logic trigger input to logic high for channel 3.

TRIGGER:A:PULSE:RUNT:LOGIC:THRESHOLD:CH<x>

Description

This command sets or queries the A runt logic threshold for the channel specified by <x>, which can be 1, 2, 3, or 4. This is equivalent to selecting Runt Setup from the Trig menu and setting the runt logic threshold. While all channels can be set or queried, only channels 3 and 4 can be used if the runt source is channel 1 or 2. Similarly only channels 1 and 2 can be used if the runt source is channel 3 or 4.

Note: This command is not available in two-channel instruments.

Group

Trigger

Syntax 1

TRIGGER:A:PULSE:RUNT:LOGIC:THRESHOLD:CH<x> <NR3>

Syntax 2

TRIGGER:A:PULSE:RUNT:LOGIC:THRESHOLD:CH<x>?

Argument

- <NR3>
This argument specifies the threshold in volts.

Example 1

TRIGger:A:PULse:RUNT:LOGIC:THReshold:CH1?

This query might return

:TRIGGER:A:PULSE:RUNT:LOGIC:THRESHOLD:CH1 0.5000,
indicating that the runt logic trigger threshold is set to 0.5 V for
channel 1.

Example 2

TRIGger:A:PULse:RUNT:LOGIC:THReshold:CH3 0.5.

This command sets the runt logic trigger threshold to 0.5 V for
channel 3.

TRIGger:A:PULse:RUNT:POLarity

Description

This command sets or queries the polarity for the A pulse runt
trigger. This command is equivalent to selecting Runt Setup
from the Trig menu and then choosing the Polarity setting.

Group

Trigger

Related Commands

TRIGger:A:PULse:RUNT:THReshold?

Syntax 1

TRIGger:A:PULse:RUNT:POLarity
{ POSITIVE|NEGAtive }

Syntax 2

TRIGger:A:PULse:RUNT:POLarity?

Arguments

- POSitive
This indicates that the rising edge crosses the low threshold
and the falling edge re-crosses the low threshold without
either edge ever crossing the high threshold.
- NEGAtive
This indicates that the falling edge crosses the high threshold
and the rising edge re-crosses the high threshold without
either edge ever crossing the low threshold.

Example 1

TRIGger:A:PULse:RUNT:POLarity?

This query might return :TRIGGER:A:PULSE:RUNT:POLARITY
POSITIVE, indicating that the polarity of the A pulse runt trigger
is positive.

Example 2

TRIGger:A:PULse:RUNT:POLarity NEGATIVE

This command specifies that the polarity of the A pulse runt trigger is negative.

TRIGger:A:PULse:RUNT:THReshold?

Description

This query-only command returns the upper and lower thresholds for the A pulse runt trigger. This command query is equivalent to selecting Runt Setup from the Trig menu and then viewing the Upper Level and Lower Level settings.

Group

Trigger

Related Commands

TRIGger:A:PULse:RUNT:POLarity,
TRIGger:A:PULse:RUNT:THReshold:BOTH,
TRIGger:A:PULse:RUNT:THReshold:HIGH,
TRIGger:A:PULse:RUNT:THReshold:LOW

Syntax

TRIGger:A:PULse:RUNT:THReshold?

Example

TRIGger:A:PULse:RUNT:THReshold?

This query might return

:TRIGGER:A:PULSE:THRESHOLD:HIGH 2.0000E+00;LOW
8.0000E-01, indicating that the upper threshold is 2 V and that
the lower threshold is 800 mV.

TRIGger:A:PULse:RUNT:THReshold:BOTH

Description

This command (no query form) sets the upper and lower switching thresholds for the A pulse runt trigger. This command is equivalent to selecting Runt Setup from the Trig menu and then setting the Upper Level and Lower Level voltages.

Group

Trigger

Related Commands

TRIGger:A:PULse:RUNT:THReshold?

Syntax

TRIGger:A:PULse:RUNT:THReshold:BOTH {TTL|ECL}

Arguments

- TTL
This sets the upper threshold to 1.8 V and the lower threshold to 800 mV, which are the nominal TTL voltage levels.
- ECL
This sets the upper threshold to -1.1 V and the lower threshold to -1.5 V, which are the nominal ECL voltage levels.

Example

```
TRIGger:A:PULse:RUNT:THReshold:BOTH TTL
```

This command sets the threshold of the pulse runt trigger to the nominal TTL voltage levels.

TRIGger:A:PULse:RUNT:THReshold:HIGH

Description

This command sets or queries the upper limit for the A pulse runt trigger. This command is equivalent to selecting Runt Setup from the Trig menu and setting the runt trigger Upper Level voltage.

Group

Trigger

Related Commands

```
TRIGger:A:PULse:RUNT:THReshold?
```

Syntax 1

```
TRIGger:A:PULse:RUNT:THReshold:HIGH <NR3>
```

Syntax 2

```
TRIGger:A:PULse:RUNT:THReshold:HIGH?
```

Argument

- <NR3>
This specifies the threshold value, in volts.

Example 1

```
TRIGger:A:PULse:RUNT:THReshold:HIGH?
```

This query might return

```
:TRIGGER:A:PULSE:RUNT:THRESHOLD:HIGH 1.1000E+00,
```

indicating that the upper limit of the pulse runt trigger is currently set to 1.1 V.

Example 2

```
TRIGger:A:PULse:RUNT:THReshold:HIGH 120E-3
```

This command sets the upper limit of the pulse runt trigger to 120 mV.

TRIGger:A:PULse:RUNT:THReshold:LOW

Description

This command sets or queries the lower limit for the A pulse runt trigger. This command is equivalent to selecting Runt Setup from the Trig menu and then setting the Lower Level voltage.

Group

Trigger

Related Commands

TRIGger:A:PULse:RUNT:THReshold?

Syntax 1

```
TRIGger:A:PULse:RUNT:THReshold:LOW <NR3>
```

Syntax 2

```
TRIGger:A:PULse:RUNT:THReshold:LOW?
```

Argument

- <NR3>
This specifies the threshold value, in volts.

Example 1

```
TRIGger:A:PULse:RUNT:THReshold:LOW?
```

This query might return

```
:TRIGGER:A:PULSE:RUNT:THRESHOLD:LOW 1.2000E-01,
```

indicating that the lower limit of the pulse runt trigger is set to 120 mV.

Example 2

```
TRIGger:A:PULse:RUNT:THReshold:LOW 50E-3
```

This command sets the lower limit of the pulse runt trigger to 50 mV.

TRIGger:A:PULse:RUNT:WHEn

Description

This command sets or queries the type of pulse width the trigger checks for when it detects a runt. This is equivalent to selecting Runt Setup from the Trig menu and choosing the desired Trigger When setting from the drop-down list.

Group

Trigger

Related Commands

TRIGger:A:PULse:RUNT:WIDth

Syntax 1 (Four-channel instruments)

```
TRIGger:A:PULse:RUNT:WHEn  
{LOGIc|OCCurs|WIDERthan}
```

Syntax 2 (Two-channel instruments)

TRIGger:A:PULse:RUNT:WHEn {OCCurs|WIDERthan}

Syntax 3

TRIGger:A:PULse:RUNT:WHEn?

Arguments

- LOGIc
This argument specifies a trigger event when a runt occurs and the AND of the logic channels. This argument is not available for two-channel instruments.
- OCCurs
This argument specifies a trigger event if a runt of any detectable width occurs.
- WIDERthan
This specifies a trigger event if a runt greater than the specified width occurs.

Example 1

TRIGger:A:PULse:RUNT:WHEn?

This query might return :TRIGGER:A:PULSE:RUNT:WHEN OCCURS, indicating that a runt trigger will occur if the instrument detects a runt of any detectable width.

Example 2

TRIGger:A:PULse:RUNT:WHEn WIDERthan

This command sets the runt trigger to occur when the instrument detects a runt in a pulse wider than the specified width.

TRIGger:A:PULse:RUNT:WIDth

Description

This command sets or queries the minimum width for a A pulse runt trigger. This command is equivalent to selecting Runt Setup from the Trig menu and then setting the Width.

Group

Trigger

Related Commands

TRIGger:A:PULse:RUNT:WHEn

Syntax 1

TRIGger:A:PULse:RUNT:WIDth <NR3>

Syntax 2

TRIGger:A:PULse:RUNT:WIDth?

Argument

- <NR3>

This specifies the minimum width, in seconds.

Example 1

```
TRIGger:A:PULse:RUNT:WIDth?
```

This query might return :TRIGGER:A:PULSE:RUNT:WIDTH 2.0000E-09, indicating that the minimum width of a pulse runt trigger is 2 ns.

Example 2

```
TRIGger:A:PULse:RUNT:WIDth 15E-6
```

This command sets the minimum width of the pulse runt trigger to 15 μ s.

TRIGger:A:PULse:SOUrce

Description

This command sets or queries the source for the A pulse trigger. This source parameter applies to all classes of pulse triggers. This command is equivalent to selecting A Event (Main) Trigger Setup from the Trig menu, selecting the pulse type (Glitch, Width, Runt, Timeout, or Transition), and then choosing the desired channel from the Source pull-down list.

Group

Trigger

Related Commands

```
TRIGger:A:EDGE:SOUrce
```

Syntax 1

```
TRIGger:A:PULse:SOUrce CH<x>
```

Syntax 2

```
TRIGger:A:PULse:SOUrce?
```

Argument

- CH<x>

This specifies one of the input channels, which range from 1 through 4 for four-channel instruments and 1 through 2 for two-channel instruments.

Example 1

```
TRIGger:A:PULse:SOUrce?
```

This query might return :TRIGGER:A:PULSE:SOURCE CH2, indicating that channel 2 is the source for the A pulse trigger.

Example 2

```
TRIGger:A:PULse:SOUrce CH4
```

This command sets channel 4 as the source for the A pulse trigger.

TRIGger:A:PULse:TIMEOut?

Description

This query-only command returns the polarity and time-out duration for the A pulse timeout trigger. This command is equivalent to selecting Timeout Setup from the Trig menu and viewing the polarity in the Trigger When box and the Timer setting.

Group

Trigger

Related Commands

TRIGger:A:PULse:TIMEOut:POLarity,
TRIGger:A:PULse:TIMEOut:TIME

Syntax

```
TRIGger:A:PULse:TIMEOut?
```

Example

```
TRIGger:A:PULse:TIMEOut?
```

This query might return

```
:TRIGGER:A:PULSE:TIMEOUT:POLARITY
```

```
STAYSHIGH;TIME 2.0000E-9, indicating that the polarity setting for the A pulse trigger is STAYSHIGH (positive) and the timeout duration is 2 ns.
```

TRIGger:A:PULse:TIMEOut:POLarity

Description

This command sets or queries the polarity for the A pulse timeout trigger. This command is equivalent to selecting Timeout Setup from the Trig menu and setting the desired polarity in the Trigger When box.

Group

Trigger

Related Commands

```
TRIGger:A:PULse:TIMEOut?
```

Syntax 1

```
TRIGger:A:PULse:TIMEOut:POLarity  
{STAYSHigh|STAYSLow|EITHer}
```

Syntax 2

```
TRIGger:A:PULse:TIMEOut:POLarity?
```

Arguments

- **STAYSHigh**
This indicates that a pulse edge must stay high (positive) for the required time period to permit timeout triggering to occur. This is the default polarity.
- **STAYSLow**
This indicates that a pulse edge must stay low (negative) for the required time period to permit timeout triggering to occur.
- **EITHer**
This indicates that the polarity of the timeout trigger can stay either high or low (positive or negative) for the required time period to permit time out triggering to occur.

Example 1

TRIGger:A:PULse:TIMEOut:POLarity?

This query might return

:TRIGGER:A:PULSE:TIMEOUT:POLARITY EITHER,
indicating that the polarity of the A timeout trigger can be either positive or negative.

Example 2

TRIGger:A:PULse:TIMEOut:POLarity STAYSHigh

This command sets the polarity of the A timeout trigger to positive.

TRIGger:A:PULse:TIMEOut:TIME

Description

This command sets or queries the pulse timeout trigger time (measured in seconds). This command is equivalent to selecting Timeout Setup from the Trig menu and setting a value for Timer.

Group

Trigger

Related Commands

TRIGger:A:PULse:TIMEOut?

Syntax 1

TRIGger:A:PULse:TIMEOut:TIME <NR3>

Syntax 2

TRIGger:A:PULse:TIMEOut:TIME?

Argument

- <NR3>
This argument specifies the timeout period in seconds.

Example 1

TRIGger:A:PULse:TIMEOut:TIME?

This query might return :TRIGGER:A:PULSE:TIMEOUT:TIME 2.0000E-9, indicating that the timeout is currently set to 2 ns.

Example 2

TRIGger:A:PULse:TIMEOut:TIME 3.134E-6

This command sets the timeout to 3.134 μ s.

TRIGger:A:PULse:TRANSition?

Description

This query-only command returns delta time, polarity, and both upper and lower threshold limits for the transition time trigger. This command is equivalent to selecting Transition Setup from the Trig menu and then viewing the current transition settings.

Group

Trigger

Related Commands

TRIGger:A:TYPe, TRIGger:A:PULse:CLAss, TRIGger:A:PULse:GLItch, TRIGger:A:PULse:RUNT, TRIGger:A:PULse:TIMEOut, TRIGger:A:PULse:WIDth

Syntax

TRIGger:A:PULse:TRANSition?

Example

TRIGger:A:PULse:TRANSition?

This query might return

:TRIGGER:A:PULSE:TRANSITION:DELTATIME 2.0000E-9;POLARITY POSITIVE;THRESHOLD:HIGH 1.2000;LOW 800.0000E-3;:TRIGGER:A:PULSE:TRANSITION:WHEN SLOWERTHAN, indicating the current transition time trigger settings.

TRIGger:A:PULse:TRANSition:DELTATime

Description

This command sets or queries the delta time used in calculating the transition value for the transition trigger. This is equivalent to selecting Transition Setup from the Trig menu and setting the Time.

Group

Trigger

Related Commands

TRIGger:A:PULse:TRANSition:POLarity, TRIGger:A:PULse:TRANSition:THReshold?

Syntax 1

TRIGger:A:PULse:TRANSition:DeltaTime <NR3>

Syntax 2

TRIGger:A:PULse:TRANSition:DeltaTime?

Argument

- <NR3>

This specifies the delta time, in seconds.

Example 1

TRIGger:A:PULse:TRANSition:DeltaTime?

This query might return

:TRIGGER:A:PULSE:TRANSITION:DELTATIME 2.0000E-09, indicating that the delta time of the transition trigger is set to 2 ns.

Example 2

TRIGger:A:PULse:TRANSition:DeltaTime 15E-6

This command sets the delta time of the transition trigger to 15 μ s.

TRIGger:A:PULse:TRANSition:POLarity

Description

This command sets or queries the polarity for the transition trigger. This command is equivalent to selecting Transition Setup from the Trig menu and choosing from the Polarity pull-down list.

Group

Trigger

Related Commands

TRIGger:A:PULse:TRANSition:DELTATime

Syntax 1

TRIGger:A:PULse:TRANSition:POLarity
{POSITIVE|NEGative|EITHer}

Syntax 2

TRIGger:A:PULse:TRANSition:POLarity?

Arguments

- POSITIVE

This indicates that a pulse edge must traverse from the lower (most negative) to higher (most positive) level for transition triggering to occur.

- **NEGative**
This indicates that a pulse edge must traverse from the upper (most positive) to lower (most negative) level for transition triggering to occur.
- **EITher**
This indicates either positive or negative polarity.

Example 1

TRIGger:A:PULse:TRANSition:POLarity?

This query might return

:TRIGGER:A:PULSE:TRANSITION:POLARITY EITHER
indicating that the polarity can be either positive or negative.

Example 2

TRIGger:A:PULse:TRANSition:DeltaTime NEGative

This command sets the transition polarity to negative.

TRIGger:A:PULse:TRANSition:THReshold?

Description

This query-only command returns the upper and lower threshold limits for the transition time trigger. This command is equivalent to selecting Transition Setup from the Trig menu and viewing the Upper Level and Lower Level voltage settings.

Group

Trigger

Related Commands

TRIGger:A:PULse:TRANSition:DELTAime,
TRIGger:A:PULse:TRANSition:POLarity

Syntax

TRIGger:A:PULse:TRANSition:THReshold?

Example

TRIGger:A:PULse:TRANSition:THReshold?

This query might return

:TRIGGER:A:PULSE:TRANSITION:THRESHOLD:HIGH
1.2000;LOW 800.0000E-3, indicating the upper and lower
threshold limits for the transition time trigger.

TRIGger:A:PULse:TRANSition:THReshold:BOTH

Description

This command (no query form) sets the upper and lower thresholds for the transition trigger. This command is equivalent to selecting Transition Setup from the Trig menu and setting the desired Upper Level and Lower Level voltages.

Group

Trigger

Related Commands

TRIGger:A:PULse:TRANSition:THReshold:HIGH,
TRIGger:A:PULse:TRANSition:THReshold:LOW

Syntax 1

```
TRIGger:A:PULse:TRANSition:THReshold:BOTH  
{TTL|ECL}
```

Arguments

- TTL
This sets the upper threshold to 1.2 V and the lower threshold to 800 mV, which represent the nominal TTL voltage levels.
- ECL
This sets the upper threshold to -1.1 V and the lower threshold to -1.5 V, which represent the nominal ECL voltage levels.

Example 1

```
TRIGger:A:PULse:TRANSition:THReshold:BOTH TTL
```

This command sets the thresholds of the transition trigger to the nominal TTL voltage levels.

TRIGger:A:PULse:TRANSition:THReshold:HIGH

Description

This command sets or queries the upper (most positive) transition trigger threshold. This command is equivalent to selecting Transition Setup from the Trig menu and then setting the desired Upper Level voltage.

Group

Trigger

Related Commands

TRIGger:A:PULse:TRANSition:THReshold:LOW

Syntax 1

```
TRIGger:A:PULse:TRANSition:THReshold:HIGH <NR3>
```

Syntax 2

TRIGger:A:PULse:TRANSition:THReshold:HIGH?

Argument

- <NR3>

This specifies the upper threshold, in volts.

Example 1

TRIGger:A:PULse:TRANSition:THReshold:HIGH?

This query might return

:TRIGGER:A:PULSE:TRANSITION:THRESHOLD:HIGH
2.0000E+00, indicating that the upper limit of the pulse
transition trigger is 2 V.

Example 2

TRIGger:A:PULse:TRANSition:THReshold:HIGH 120E-3

This command sets the upper limit of the pulse transition trigger
to 120 mV.

TRIGger:A:PULse:TRANSition:THReshold:LOW

Description

This command sets or queries the lower (most negative)
transition trigger threshold. This command is equivalent to
selecting Transition Setup from the Trig menu and setting the
desired Lower Level voltage.

Group

Trigger

Related Commands

TRIGger:A:PULse:TRANSition:THReshold:HIGH

Syntax 1

TRIGger:A:PULse:TRANSition:THReshold:LOW <NR3>

Syntax 2

TRIGger:A:PULse:TRANSition:THReshold:LOW?

Argument

- <NR3>

This specifies the lower threshold, in volts.

Example 1

TRIGger:A:PULse:TRANSition:THReshold:LOW?

This query might return

:TRIGGER:A:PULSE:TRANSITION:THRESHOLD:LOW
50.0000E-03, indicating that the lower limit of the transition
trigger is 50 mV.

Example 2

TRIGger:A:PULse:TRANSition:THReshold:LOW 20E-3

This command sets the lower limit of the transition trigger to 20 mV.

TRIGger:A:PULse:TRANSition:WHEN

Description

This command sets or queries whether to check for a transitioning signal that is faster or slower than the specified delta time. This is equivalent to selecting Transition Setup from the Trig menu and choosing the Trigger When Transition Time setting.

Group

Trigger

Related Commands

TRIGger:A:PULse:TRANSition:DELTAtime,
TRIGger:A:PULse:TRANSition:POLarity,
TRIGger:A:PULse:TRANSition:THReshold?

Syntax 1

```
TRIGger:A:PULse:TRANSition:WHEN  
{FASTERthan|SLOWERthan}
```

Syntax 2

```
TRIGger:A:PULse:TRANSition:WHEN?
```

Arguments

- **FASTERthan**
This sets the trigger to occur when the transitioning signal is faster than the set volts/second rate.
- **SLOWERthan**
This sets the trigger to occur when the transitioning signal is slower than the set volts/second rate.

Example 1

```
TRIGger:A:PULse:TRANSition:WHEN?
```

This query might return

```
:TRIGGER:A:PULSE:TRANSITION:WHEN FASTERTHAN,  
indicating that the transition triggers when the transitioning  
signal is faster than the set volts/second rate.
```

Example 2

```
TRIGger:A:PULse:TRANSition:WHEN SLOWERthan
```

TRIGger:A:PULse:WIDTH?

Description

This query-only command returns the width parameters for the A pulse width trigger. This command is equivalent to selecting Width Setup from the Trig menu and then viewing the current

pulse width trigger Lower Limit, Upper Limit, Trig When and Polarity settings.

Group

Trigger

Related Commands

TRIGger:A:PULse:WIDth:HIGHLimit,
TRIGger:A:PULse:WIDth:LOWLimit,
TRIGger:A:PULse:WIDth:POLarity,
TRIGger:A:PULse:WIDth:WHEn

Syntax 1

TRIGger:A:PULse:WIDth

Example

TRIGger:A:PULse:WIDth?

This query might return

```
:TRIGGER:A:PULSE:WIDTH:LOWLIMIT 2.0000E-9;  
HIGHLIMIT 2.0000E-9;WHEN WITHIN;POLARITY  
POSITIVE as the current A width trigger parameters.
```

TRIGger:A:PULse:WIDth:HIGHLimit

Description

This command sets or queries the upper limit for the width trigger. This command is equivalent to selecting Width Setup from the Trig menu and setting the Upper Limit.

Group

Trigger

Related Commands

TRIGger:A:PULse:WIDth?

Syntax 1

TRIGger:A:PULse:WIDth:HIGHLimit <NR3>

Syntax 2

TRIGger:A:PULse:WIDth:HIGHLimit?

Argument

- <NR3>

This specifies the width trigger upper limit in seconds.

Example 1

TRIGger:A:PULse:WIDth:HIGHLimit?

This query might return

```
:TRIGGER:A:PULSE:WIDTH:HIGHLIMIT 2.0000E-9,  
indicating that the upper limit of the width trigger is set to 2 ns.
```

Example 2

TRIGger:A:PULse:WIDth:HIGHLimit 5.0E-6

This command sets the upper limit of the width trigger to 5 μ s.

TRIGger:A:PULse:WIDTH:LOWLimit

Description

This command sets or queries the lower limit for the width trigger. This command is equivalent to selecting Width Setup from the Trig menu and setting the pulse Lower Limit.

Group

Trigger

Related Commands

TRIGger:A:PULse:WIDTH?

Syntax 1

TRIGger:A:PULse:WIDTH:LOWLimit <NR3>

Syntax 2

TRIGger:A:PULse:WIDTH:LOWLimit?

Argument

- <NR3>
This specifies the A pulse width trigger lower limit, in seconds.

Example 1

TRIGger:A:PULse:WIDTH:LOWLimit?

This query might return

:TRIGGER:A:PULSE:WIDTH:LOWLIMIT 1.0000E-9,
indicating that the lower limit of the width trigger is set to 1 ns.

Example 2

TRIGger:A:PULse:WIDTH:LOWLimit 2.0E-6

This command sets the lower limit of the width trigger to 2 μ s.

TRIGger:A:PULse:WIDth:POLarity

Description

This command sets or queries the polarity for the width trigger. This command is equivalent to selecting Width Setup from the Trig menu and selecting the Polarity.

Group

Trigger

Related Commands

TRIGger:A:PULse:WIDth?

Syntax 1

```
TRIGger:A:PULse:WIDth:POLarity  
{NEGAtive|POSITIVe}
```

Syntax 2

```
TRIGger:A:PULse:WIDth:POLarity?
```

Arguments

- **NEGAtive**
This specifies a negative pulse.
- **POSITIVe**
This specifies a positive pulse.

Example 1

```
TRIGger:A:PULse:WIDth:POLarity?
```

This query might return

```
:TRIGGER:A:PULSE:WIDTH:POLARITY POSITIVE,
```

indicating a positive pulse.

Example 2

```
TRIGger:A:PULse:WIDth:POLarity NEGAtive
```

This command sets the pulse polarity to negative.

TRIGger:A:PULse:WIDth:WHEN

Description

This command sets or queries whether to trigger on a pulse width that falls outside (or within) the specified range of limits. You can define or query trigger pulse width upper and lower limits using the TRIGger:A:PULse:WIDth:HIGHLimit and TRIGger:A:PULse:WIDth:LOWLimit commands.

This command is equivalent to selecting Width Setup from the Trig menu and then choosing from the Trig When drop-down list.

Group

Trigger

Related Commands

TRIGger:A:PULse:WIDth:HIGHLimit,
TRIGger:A:PULse:WIDth:LOWLimit

Syntax 1

TRIGger:A:PULse:WIDth:WHEn {OUTside|WIThin}

Syntax 2

TRIGger:A:PULse:WIDth:WHEn?

Arguments

- **OUTside**
This argument causes a trigger event the duration of the pulse is greater than the high limit or less than the low limit specified. The high and low limits are specified with the TRIGger:A:PULse:WIDth:HIGHLimit and TRIGger:A:PULse:WIDth:LOWLimit commands respectively.
- **WIThin**
This argument causes a trigger event when the duration of the pulse is within the high and low limits. The high and low limits are specified with the TRIGger:A:PULse:WIDth:HIGHLimit and TRIGger:A:PULse:WIDth:LOWLimit command respectively.

Example 1

TRIGger:A:PULse:WIDth:WHEn?

This query might return :TRIGGER:A:PULSE:WIDTH:WHEN OUTSIDE, indicating the conditions for generating a width trigger.

Example 2

TRIGger:A:PULse:WIDth:WHEn WIThin

This command specifies that the duration of the A pulse will fall within defined high and low limits.

TRIGger:A:PULse:WINDow?

Description

This query-only command returns the current window trigger parameters.

Group

Trigger

Syntax

TRIGger:A:PULse:WINDow?

Example

TRIGger:A:PULse:WINDow?

This query might return :TRIGGER:A:PULSE:WINDOW:TYPE
INSIDE;WHEN OCCURS;
WIDTH 2.0000e-9;LOGIC:INPUT:CH1 HIGH; CH2 X;
CH3 X; CH4 LOW;
:TRIGGER:A:PULSE:WINDOW:LOGIC:THRESHOLD:CH1
1.2000;CH2 1.2000;
CH3 1.2000;CH4
1.2000;:TRIGGER:A:PULSE:WINDOW:THRESHOLD
:HIGH 1.2000;LOW 800.0000E-3.

TRIGger:A:PULse:WINDow:LOGic?

Description

This query-only command returns the current window trigger logic parameters.

Note: This command is not available in two-channel instruments.

Group

Trigger

Syntax

TRIGger:A:PULse:WINDow:LOGic?

Example

TRIGger:A:PULse:WINDow:LOGic?

This query might return

:TRIGGER:A:PULSE:WINDOW:LOGIC:INPUT:CH1 HIGH;
CH2 X; CH3 X; CH4
LOW;:TRIGGER:A:PULSE:WINDOW:LOGIC:THRESHOLD:CH1
1.2000;CH2 1.2000;CH3 1.2000;CH4 1.2000.

TRIGger:A:PULse:WINDow:LOGic:INPut?

Description

This query-only command returns the current window trigger logic input parameters.

Note: This command is not available in two-channel instruments.

Group

Trigger

Syntax

TRIGger:A:PULse:WINDow:LOGicINPut?

Example

```
TRIGger:A:PULse:WINDow:LOGIc:INPut?
```

This query might return

```
:TRIGGER:A:PULSE:WINDOW:LOGIC:INPUT:CH1 HIGH;  
CH2 X; CH3 X; CH4 LOW.
```

TRIGger:A:PULse:WINDow:LOGIc:INPut:CH<x>

Description

This command sets or queries the A window logic input for the channel specified by <x>, which can be 1, 2, 3, or 4. This is equivalent to selecting Window Setup from the Trig menu, selecting Logic in the Trigger When box, and selecting a logic (H, L, or X) for the channel. While all channels can be set or queried, only channels 3 and 4 can be used if the window source is channel 1 or 2. Similarly, only channels 1 and 2 can be used if the window source is channel 3 or 4.

Note: This command is not available in two-channel instruments.

Group

Trigger

Syntax 1

```
TRIGger:A:PULse:WINDow:LOGIc:INPut:CH<x>  
{HIGH\LOW\X}
```

Syntax 2

```
TRIGger:A:PULse:RUNT:LOGIc:INPut:CH<x>?
```

Arguments

- HIGH
This argument specifies logic high.
- LOW
This argument specifies logic low.
- X
This argument specifies a Don't Care state.

Example 1

```
TRIGger:A:PULse:WINDow:LOGIc:INPut:CH2?
```

This query might return

```
:TRIGGER:A:PULSE:WINDOW:LOGIC:INPUT:CH2 LOW,  
indicating that the window logic trigger input is set to logic low  
for channel 2.
```

Example 2

```
TRIGger:A:PULse:WINDow:LOGIc:INPut:CH3 HIGH
```

This command sets the window logic trigger input to logic high for channel 3.

TRIGger:A:PULse:WINDow:THReshold:BOTh

Description

This command (no query form) sets the upper and lower switching thresholds for the window trigger. This command is equivalent to selecting Window Setup from the Trig menu and then setting the Upper Level and Lower Level voltages.

Group

Trigger

Syntax

```
TRIGger:A:PULse:WINDow:THReshold:BOTh {TTL|ECL}
```

Arguments

- TTL
This argument sets the upper threshold to 2.0 V and the lower threshold to 800 mV, which are the nominal TTL voltage levels.
- ECL
This argument sets the upper threshold to -1.1 V and the lower threshold to -1.5 V, which are the nominal ECL voltage levels.

Example

```
TRIGger:A:PULse:WINDow:THReshold:BOTh TTL
```

This command sets the threshold of the window trigger to the nominal TTL voltage levels.

TRIGger:A:PULse:WINDow:LOGIc:THReshold:CH<x>

Description

This command sets or queries the window logic trigger threshold for the channel specified by <x>, which can be 1, 2, 3, or 4. This is equivalent to selecting Window Setup from the Trig menu and setting the window logic threshold in the Trigger When box. While all channels can be set or queried, only channels 3 and 4 can be used if the window source is channel 1 or 2. Similarly, only channels 1 and 2 can be used if the window source is channel 3 or 4.

Note: This command is not available in two-channel instruments.

Group

Trigger

Syntax 1

```
TRIGger:A:PULse:WINDow:LOGIc:THReshold:CH<x>  
<NR3>
```

Syntax 2

TRIGger:A:PULse:WINDow:LOGic:THReshold:CH<x>?

Argument

- <NR3>

This argument specifies the window logic trigger threshold in volts.

Example 1

TRIGger:A:PULse:WINDow:LOGic:THReshold:CH1?

This query might return

:TRIGGER:A:PULSE:WINDOW:LOGIC:THRESHOLD:CH1
0.5000, indicating that the window logic trigger threshold is set to 0.5 V for channel 1.

Example 2

TRIGger:A:PULse:WINDow:LOGic:THReshold:CH3 0.5.

This command sets the window logic trigger threshold to 0.5 V for channel 3.

TRIGger:A:PULse:WINDow:THReshold:HIGH

Description

This command sets or queries the upper limit for the pulse window trigger. This command is equivalent to selecting Window Setup from the Trig menu and setting the window trigger Upper Level voltage.

Group

Trigger

Syntax 1

TRIGger:A:PULse:WINDow:THReshold:HIGH <NR3>

Syntax 2

TRIGger:A:PULse:WINDow:THReshold:HIGH?

Argument

- <NR3>

This specifies the threshold value in volts.

Example 1

TRIGger:A:PULse:WINDow:THReshold:HIGH?

This query might return

:TRIGGER:A:PULSE:WINDOW:THRESHOLD:HIGH
1.1000E+00, indicating that the upper limit of the window trigger is set to 1.1 V.

Example 2

TRIGger:A:PULse:WINDow:THReshold:HIGH 2.0

This command sets the upper limit of the pulse window trigger to 2 V.

TRIGger:A:PULse:WINDow:THReshold:LOW

Description

This command sets or queries the lower limit for the window trigger. This command is equivalent to selecting Window Setup from the Trig menu and setting the Lower Level voltage.

Group

Trigger

Syntax 1

```
TRIGger:A:PULse:WINDow:THReshold:LOW <NR3>
```

Syntax 2

```
TRIGger:A:PULse:WINDow:THReshold:LOW?
```

Argument

- <NR3>

This specifies the threshold value in volts.

Example 1

```
TRIGger:A:PULse:WINDow:THReshold:LOW?
```

This query might return

```
:TRIGGER:A:PULSE:WINDOW:THRESHOLD:LOW 1.2000E-01,
```

indicating that the lower limit of the window trigger is currently set to 120 mV.

Example 2

```
TRIGger:A:PULse:WINDow:THReshold:LOW 0.8
```

This command sets the lower threshold of the window trigger to 0.8 V.

TRIGger:A:PULse:WINDow:THReshold?

Description

This query-only command returns the upper and lower thresholds for the window trigger. This command query is equivalent to selecting Window Setup from the Trig menu and viewing the window trigger Upper Level and Lower Level settings.

Group

Trigger

Syntax

```
TRIGger:A:PULse:WINDow:THReshold?
```

Example

```
TRIGger:A:PULse:WINDow:THReshold?
```

This query might return
:TRIGGER:A:PULSE:WINDOW:THRESHOLD:HIGH
1.2000;LOW 800.0000E-3, indicating that the upper
threshold is 1.2 V and that the lower threshold is 800 mV.

TRIGger:A:PULse:WINDow:TYPE

Description

This command sets or queries the window trigger type. This command is equivalent to selecting Window Setup from the Trig menu and selecting Outside Limits or Inside Limits in the Trigger When section.

Group

Trigger

Syntax 1

TRIGger:A:PULse:WINDow:TYPE {INSide|OUTside}

Syntax 2

TRIGger:A:PULse:WINDow:TYPE?

Arguments

- **INSide**
This argument causes a trigger event to occur when a pulse enters the window defined by the upper and lower thresholds.
- **OUTside**
This argument causes a trigger event to occur when a pulse goes outside the window defined by the upper and lower thresholds.

Example 1

TRIGger:A:PULse:WINDow:TYPE?

This query might return :TRIGGER:A:PULSE:WINDOW:TYPE
INSIDE, indicating that the window type is set to inside, which
will cause a trigger event when a pulse enters the window
defined by the upper and lower thresholds.

Example 2

TRIGger:A:PULse:WINDow:TYPE OUTside

This command sets the window type to outside.

TRIGger:A:PULse:WINDow:WHEn

Description

This command sets or queries the window trigger violation qualification. This command is equivalent to selecting Window Setup from the Trig menu and selecting Logic, Occurs, or Wider than in the Trigger When box.

Group

Trigger

Related Commands

Syntax 1

```
TRIGger:A:PULseWINDow:WHEn  
{LOGIc|OCCurs|WIDERthan}
```

Syntax 2

```
TRIGger:A:PULse:WINDow:WHEn?
```

Arguments

- **LOGIc**
This argument specifies a trigger event when a window violation occurs on the AND of the logic channels.
- **OCCurs**
This argument specifies a trigger event if any detectable window violation occurs.
- **WIDERthan**
This specifies a trigger event if a window violation greater than the specified width occurs.

Example 1

```
TRIGger:A:PULse:WINDow:WHEn?
```

This query might return :TRIGGER:A:PULSE:WINDow:WHEN OCCURS, indicating that a trigger will occur if the instrument detects any window violation.

Example 2

```
TRIGger:A:PULse:WHEn:WHEn OCCurs
```

This command sets the widow violation qualifier to OCCurs, which causes a trigger to occur when the instrument detects any window violation.

TRIGger:A:PULse:WINDow WIDTH

Description

This command sets or queries the minimum width for a window violation. This command is equivalent to selecting Window Setup from the Trig menu, selecting Wider than in the Trigger When box, and setting the Width.

Group

Trigger

Syntax 1

```
TRIGger:A:PULse:WINDow:WIDTH <NR3>
```

Syntax 2

```
TRIGger:A:PULse:WINDow:WIDTH?
```

Argument

- <NR3>

This argument specifies the minimum width in seconds.

Example 1

```
TRIGger:A:PULse:WINDow:WIDTH?
```

This query might return :TRIGGER:A:PULSE:WINDOW:WIDTH 2.0000E-09, indicating that the minimum width of a valid window violation is 2 ns.

Example 2

```
TRIGger:A:PULse:WINDow:WIDTH 15E-9
```

This command sets the minimum width of a valid window violation to 15 ns.

TRIGger:A:TYPE

Description

This command sets or queries the type of A trigger. The four types of triggers are of Edge, Logic, Pulse, and Video. Logic and Pulse triggers contain classes. Logic triggers consist of State and Pattern classes; Pulse triggers consist of Glitch, Runt, Width, Transition, and Timeout classes. Once you have set the trigger type, you may also need to identify the associated trigger class. For details on selecting Logic and Pulse trigger classes, see TRIGger:A:LOGic:CLAss and TRIGger:A:PULse:CLAss respectively. This command is similar to selecting A Event (Main) Trigger Setup from the Trig menu and then selecting the desired Trigger Type.

Group

Trigger

Related Commands

TRIGger:A:EDGE, TRIGger:A:LOGIc:CLAss,
TRIGger:A:PULse:CLAss

Syntax 1

TRIGger:A:TYPe {EDGE|LOGIc|PULse|VIDeo}

Syntax 2

TRIGger:A:TYPe?

Arguments

- **EDGE**
This is a normal trigger. A trigger event occurs when a signal passes through a specified voltage level in a specified direction and is controlled by the TRIGger:A:EDGE commands.
- **LOGIc**
This specifies that a trigger occurs when specified conditions are met and is controlled by the TRIGger:A:LOGIc commands.
- **PULse**
This specifies that a trigger occurs when a specified pulse is found and is controlled by the TRIGger:A:PULse commands.
- **VIDeo**
This specifies that the trigger occurs when a video signal is found.

Example 1

TRIGger:A:TYPe?

This query might return :TRIGGER:A:TYPE PULSE, indicating that the A trigger type is a pulse trigger.

Example 2

TRIGger:A:TYPe EDGE

This command sets the A trigger type to EDGE.

TRIGger:A:VIDeo?

This query only command returns the video parameters for the A trigger.

Group

Trigger

Syntax

TRIGger:A:VIDeo?

Example 1

TRIGger:A:VIDeo?

This query might return :TRIGGER:A:VIDEO:CUSTOM:FORMAT INTERLACED;SCAN RATE1;:TRIGGER:A:VIDEO:FIELD ALLFIELDS;HOLDOFF:FIELD 1.0000;TIME 20.0000E-3;:TRIGGER:A:VIDEO:LINE 1;SCAN RATE1;SOURCE CH1;STANDARD NTSC.

TRIGger:A:VIDeo:CUSTom?

This query only command returns the custom video parameters for the A trigger.

Group

Trigger

Syntax

TRIGger:A:VIDeo:CUSTom?

Example 1

TRIGger:A:VIDeo:CUSTom?

This query might return the parameters

:TRIGGER:A:VIDEO:CUSTOM:FORMAT INTERLACED;SCAN RATE1.

TRIGger:A:VIDeo:CUSTom:FORMat

Description

This command sets or queries the video trigger format. Use this command only when the video format is set to custom.

Group

Trigger

Related Commands

Syntax 1

TRIGger:A:VIDeo:CUSTom:FORMat
{ INTERLAcEd | PROGRessive }

Syntax 2

TRIGger:A:VIDeo:CUSTom:FORMat?

Arguments

- INTERLAcEd
This argument sets the format for interlaced video lines.
- PROGRessive
This argument sets the format for progressive video lines.

Example 1

```
TRIGger:A:VIDeo:CUSTom:FORMat?
```

This query might return :TRIGGER:A:VIDEO:CUSTOM:FORMAT INTERLACED, indicating that interlaced is selected as the custom format for the A video trigger.

Example 2

```
TRIGger:A:VIDeo:CUSTom:FORMat PROGrESSive
```

This command sets the custom format for the A video trigger to progressive lines.

TRIGger:A:VIDeo:CUSTom:SCAN

Description

This command sets or queries the horizontal line scan rate of the A video trigger. Use this command only when the video format is set to custom. This is equivalent to selecting Video Setup from the Trig menu, setting Custom for Format, and selecting the Scan Rate from the drop-down menu.

Group

Trigger

Syntax 1

```
TRIGger:A:VIDeo:CUSTom:SCAN  
{RATE1 | RATE2 | RATE3 | RATE4 | RATE5 }
```

Syntax 2

```
TRIGger:A:VIDeo:CUSTom:SCAN?
```

Arguments

- RATE1
This argument sets the range of the video line scan rate to 15 kHz through 20 kHz. This is the standard broadcast rate.
- RATE2
This argument sets the range of the video line scan rate to 20 kHz through 25 kHz.
- RATE3
This argument sets the range of the video line scan rate to 25 kHz through 35 kHz.
- RATE4
This argument sets the range of the video line scan rate to 35 kHz through 50 kHz.
- RATE5
This argument sets the range of the video line scan rate to 50 kHz through 65 kHz.

Example 1

TRIGger:A:VIDeo:CUSTom:SCAN?

This query might return :TRIGGER:A:VIDEO:CUSTOM:SCAN RATE2, indicating that the video line rate for the A trigger custom video is set to Rate 2, which is 20 kHz to 23 kHz.

Example 2

TRIGger:A:VIDeo:CUSTom:SCAN RATE1

This command sets the scan rate of the A trigger custom video to Rate 1, which is 15 kHz to 20 kHz (standard broadcast rate).

TRIGger:A:VIDeo:FIELD

Description

This command sets or queries the video field or line that the trigger detects.

Group

Trigger

Syntax 1

```
TRIGger:A:VIDeo:FIELD  
{ODD|EVEN|FIELD1|FIELD2|ALLFields|ALLLines|NUMER  
ic}
```

Syntax 2

TRIGger:A:VIDeo:FIELD?

Arguments

- ODD
This argument sets the instrument to trigger on interlaced video odd fields.
- EVEN
This argument sets the instrument to trigger on interlaced video even fields.
- FIELD1
This argument sets the instrument to trigger on interlaced video odd fields (same as ODD).
- FIELD2
This argument sets the instrument to trigger on interlaced video even fields (same as EVEN).
- ALLFields
This argument sets the instrument to trigger on all fields.
- ALLLines
This argument sets the instrument to trigger on all video lines.

- `NUMERIC`
This argument sets the instrument to trigger on the video signal line specified by the `TRIGGER:A:VIDEO:LINE` command.

Example 1

`TRIGGER:A:VIDEO:FIELD?`

This query might return `:TRIGGER:A:VIDEO:FIELD ALLFIELDS`, indicating that the A video will trigger on all video fields.

Example 2

`TRIGGER:A:VIDEO:FIELD EVEN`

This command sets the A video trigger so that it will trigger on even fields.

TRIGGER:A:VIDEO:HOLDoff:FIELD

Description

This command sets or queries the video trigger holdoff in terms of video fields.

Group

Trigger

Syntax 1

`TRIGGER:A:VIDEO:HOLDoff:FIELD <NR3>`

Syntax 2

`TRIGGER:A:VIDEO:HOLDoff:FIELD?`

Argument

- `<NR3>`
This argument is a real number from 0.0 to 8.5 in increments of 0.5. The argument sets the number of fields that the instrument waits before re-arming the video trigger.

Example 1

`TRIGGER:A:VIDEO:HOLDoff:FIELD?`

This query might return `:TRIGGER:A:VIDEO:HOLDoff:FIELD 5`, indicating that the instrument is set to wait 5 video fields before re-arming the trigger.

Example 2

`TRIGGER:A:VIDEO:HOLDoff:FIELD 4.5`

This command sets the instrument to wait 4.5 video fields before re-arming the trigger.

TRIGger:A:VIDeo:LINE

Description

This command sets or queries the video line number on which the instrument triggers. This command is equivalent to selecting Video Setup from the Trig menu, selecting Line # in the Trigger on box, and setting the line number. Use the TRIGger:A:VIDeo:FIELD command to actually trigger the instrument on the line that you specify with this command.

Group

Trigger

Related Commands

TRIGger:A:VIDeo:FIELD

Syntax 1

TRIGger:A:VIDeo:LINE <NR1>

Syntax 2

TRIGger:A:VIDeo:LINE?

Argument

- <NR1>

This argument is an integer that sets the video line number on which the instrument triggers. The following table lists the valid choices, depending on the active video standard.

Video Line Numbering Ranges	
Video Standard	Line Number Range
CUSTOM	4-3000
NTSC	1-263 (odd) and 264-525 (even)
PAL	1-625
SECAM	1-625
HD480P60	1-520
HD720P60	1-750
HD1080I50	1-11235
HD1080I60	1-1125
HD1080P24	1-1125
HD1080P25	1-1125
HD1080SF24	1-1125

Example 1

TRIGger:A:VIDeo:LINE?

This query might return :TRIGger:A:VIDeo:LINE 10, indicating that the instrument is set to trigger on line 10.

Example 2

```
TRIGger:A:VIDeo:LINE 23
```

This command sets the instrument to trigger on the line 23.

TRIGger:A:VIDeo:POLarity

Description

This command sets or queries the polarity of the A video trigger.

Group

Trigger

Syntax 1

```
TRIGger:A:VIDeo:POLarity {INVERTed|NORMAL}
```

Syntax 2

```
TRIGger:A:VIDeo:POLarity?
```

Argument

- `INVERTed`
This argument sets the instrument to trigger on a positive video sync pulse.
- `NORMAL`
This argument sets the instrument to trigger on a negative video sync pulse.

Example 1

```
TRIGger:A:VIDeo:POLarity?
```

This query might return `:TRIGGER:A:VIDEO:POLARITY INVERTED`, indicating that the instrument is set to trigger on a positive video sync pulse.

Example 2

```
TRIGger:A:VIDeo:POLarity NORMAL
```

This command sets the instrument to trigger on a negative video pulse.

TRIGger:A:VIDeo:SCAN

Description

This command sets or queries the video trigger horizontal line scan rate. This command is for compatibility with earlier instruments in the TDS series. This command is the same as the `TRIGger:A:VIDeo:CUSTom:SCAN` command.

Group

Trigger

Syntax 1

```
TRIGger:A:VIDeo:SCAN  
{RATE1|RATE2|RATE3|RATE4|RATE5}
```

Syntax 2

TRIGger:A:VIDeo:SCAN?

Arguments

- RATE1
This argument sets the range of the video line scan rate to 15 kHz through 20 kHz. This is the standard broadcast rate.
- RATE2
This argument sets the range of the video line scan rate to 20 kHz through 25 kHz.
- RATE3
This argument sets the range of the video line scan rate to 25 kHz through 35 kHz.
- RATE4
This argument sets the range of the video line scan rate to 35 kHz through 50 kHz.
- RATE5
This argument sets the range of the video line scan rate to 50 kHz through 65 kHz.

Example 1

TRIGger:A:VIDeo:SCAN?

This query might return :TRIGGER:A:VIDEO:SCAN RATE2, indicating that the video line rate for the A trigger is set to Rate 2, which is 20 kHz to 23 kHz.

Example 2

TRIGger:A:VIDeo:SCAN RATE1

This command sets the scan rate of the A video trigger to Rate 1, which is 15 kHz to 20 kHz (standard broadcast rate).

TRIGger:A:VIDeo:SOURce

Description

This command sets or queries the source for the A video trigger. This command is equivalent to selecting Video Setup from the Trig menu and selecting a channel from the Source drop-down menu.

Group

Trigger

Syntax 1

TRIGger:A:VIDeo:SOURce {CH<x>}

Syntax 2

TRIGger:A:VIDeo:SOURce?

Arguments

- CH<x>
This argument specifies one of the input channels of the instrument as the A video trigger. The value of x ranges from 1 through 4 for four-channel instruments or 1 through 2 for two-channel instruments.

Example 1

```
TRIGger:A:VIDeo:SOUrce?
```

This query might return :TRIGGER:A:VIDEO:SOURCE CH2, indicating that the source for the A video trigger is set to Channel 2.

Example 2

```
TRIGger:A:VIDeo:SOUrce CH1
```

This command sets the source for A video trigger to Channel 1.

TRIGger:A:VIDeo:STANdard

Description

This command sets or queries the video standard.

Group

Trigger

Syntax 1

```
TRIGger:A:VIDeo:STANdard  
{ CUSTom | NTSc | PAL | SECAM | HD480P60 | HD720P60  
| HD1080I50 | HD1080I60 | HD1080P24 | HD1080P25 | HD1080S  
F24 }
```

Syntax 2

```
TRIGger:A:VIDeo:SOUrce?
```

Arguments

- CUSTom
This argument sets the instrument to use custom video horizontal scan rate parameters that you set with the TRIGger:A:VIDeo:SCAN command.
- NTSc
This argument sets the instrument to trigger on video signals that meet the NTSC 525/60/2:1 standard (a line rate of 525 lines per frame and a field rate of 60 Hz).
- PAL
This argument sets the instrument to trigger on video signals that meet the NTSC 625/50/2:1 standard (a line rate of 625 lines per frame and a field rate of 50 Hz).
- SECAM
This argument sets the instrument to trigger on video signals

that meet the SECAM standard.

- HD480P60
This argument sets the instrument to trigger on the HDTV 480/60 progressive format.
- HD720P60
This argument sets the instrument to trigger on the HDTV 720/60 progressive format.
- HD1080I50
This argument sets the instrument to trigger on HDTV 1080/50 interlaced format.
- HD1080I60
This argument sets the instrument to trigger on HDTV 1080/60 interlaced format.
- HD1080P24
This argument sets the instrument to trigger on HDTV 1080/24 progressive format.
- HD1080P25
This argument sets the instrument to trigger on HDTV 1080/25 progressive format.
- HD1080SF24
This argument sets the instrument to trigger on HDTV 1080/24 segmented frame format.

Example 1

```
TRIGger:A:VIDeo:STANdard?
```

This query might return `:TRIGGER:A:VIDEO:SOURCE CH2`, indicating that the source for the A video trigger is set to Channel 2.

Example 2

```
TRIGger:A:VIDeo:STANdard NTSC
```

This command sets the instrument to trigger on NTSC-standard video signals.

TRIGger:B

Description

This command sets the B trigger level to 50% of minimum and maximum. The query form of this command returns the B trigger parameters. This command is similar to selecting B Event (Delayed) Trigger Setup from the Trig menu and then viewing the current setups.

Group

Trigger

Related Commands

TRIGger:A

Syntax 1

TRIGger:B SETLevel

Syntax 2

TRIGger:B?

Argument

- SETLevel

This sets the B trigger level to 50% of MIN and MAX.

Example 1

TRIGger:B?

This query might return the following B trigger parameters:
:TRIGGER:B:STATE 0;TYPE EDGE;LEVEL -220.0000E-3;BY TIME;EDGE:SOURCE CH1;SLOPE RISE;COUPLING DC;:TRIGGER:B:TIME 16.0000E-9;EVENTS:COUNT 2

Example 2

TRIGger:B SETLevel

This command sets the B trigger level to 50% of MIN and MAX.

TRIGger:B:BY

Description

This command selects or returns whether the B trigger occurs after a specified number of events or a specified period of time after the A trigger. This is equivalent to selecting B Event (Delayed) Trigger Setup from the Trig menu, selecting the A→B Seq tab, and then choosing Trig After Time or Trig on nth event.

Note: The traditional Runs After functionality is now served by the Horizontal Delay function. For details, see the `HORIZontal[:MAIN]:DELay:MODE` and `HORIZontal[:MAIN]:DELay:TIME` commands.

Group

Trigger

Related Commands

TRIGger:B:EVENTS:COUNT, TRIGger:B:TIME, `HORIZontal[:MAIN]:DELay:MODE`, `HORIZontal[:MAIN]:DELay:TIME`

Syntax 1

TRIGger:B:BY {EVENTS|TIME}

Syntax 2

TRIGger:B:BY?

Arguments

- **EVENTS**

This sets the B trigger to take place following a set number of trigger events after the A trigger occurs. The number of events is specified by TRIGger:B:EVENTS:COUNT.

- **TIME**

This sets the B trigger to occur a set time after the A trigger event. The time period is specified by TRIGger:B:TIME.

Example 1

```
TRIGger:B:BY?
```

This query might return :TRIGGER:B:BY EVENTS, indicating that the B trigger takes place following a set number of trigger events after the A trigger occurs.

Example 2

```
TRIGger:B:BY TIME
```

This command sets the B trigger to occur at a set time after the A trigger event.

TRIGger:B:EDGE?

Description

This query-only command returns the source, slope, and coupling for B trigger. This command is equivalent to selecting B Event (Delayed) Trigger Setup from the Trig menu and viewing the current Source, Slope, and Coupling settings.

Group

Trigger

Related Commands

TRIGger:B:EDGE:COUPLing, TRIGger:B:EDGE:SLOpe, TRIGger:B:EDGE:SOUrce

Syntax

```
TRIGger:B:EDGE?
```

Example

```
TRIGger:B:EDGE?
```

This query might return :TRIGGER:B:EDGE:SOURCE CH1;SLOPE RISE;COUPLING DC

TRIGger:B:EDGE:COUPLing

Description

This command sets or queries the type of coupling for the B trigger. This command is equivalent to selecting B Event (Delayed) Trigger Setup from the Trig menu and choosing the setting from the Coupling drop-down list.

Group

Trigger

Related Commands

TRIGger:B:EDGE?

Syntax 1

TRIGger:B:EDGE:COUPling {DC|ATRIGger|NOISErej}

Syntax 2

TRIGger:B:EDGE:COUPling?

Arguments

- ATRIGger
This sets the B trigger coupling to match the setting on the A trigger.
- DC
This selects DC trigger coupling.
- NOISErej
This selects DC low sensitivity.

Example 1

TRIGger:B:EDGE:COUPling?

This query might return :TRIGGER:B:EDGE:COUPLING
ATRIGGER for the B trigger coupling.

Example 2

TRIGger:B:EDGE:COUPling DC

This command selects DC for the B trigger coupling.

TRIGger:B:EDGE:SLOpe

Description

This command sets or queries the slope for the B trigger. This command is equivalent to selecting B Event (Delayed) Trigger Setup from the Trig menu and choosing the Slope.

Group

Trigger

Related Commands

TRIGger:B:EDGE?

Syntax 1

TRIGger:B:EDGE:SLOpe {RISe|FALL}

Syntax 2

TRIGger:B:EDGE:SLOpe?

Arguments

- RISe

This argument specifies the trigger on the rising or positive edge of a signal.

- FALL

This argument specifies the trigger on the falling or negative edge of a signal.

Example 1

```
TRIGger:B:EDGE:SLOpe?
```

This query might return :TRIGGER:B:EDGE:SLOPE RISE, indicating that the B edge trigger occurs on the rising slope.

Example 2

```
TRIGger:B:EDGE:SLOpe FALL
```

This command sets the B edge trigger to occur on the falling slope.

TRIGger:B:EDGE:SOURce

Description

This command sets or queries the source for the B trigger. This command is equivalent to selecting B Event (Delayed) Trigger Setup from the Trig menu and choosing the desired setting from the Source drop-down list.

Group

Trigger

Related Commands

```
TRIGger:B:EDGE?
```

Syntax 1

```
TRIGger:B:EDGE:SOURce {AUXiliary|CH<x>}
```

Syntax 2

```
TRIGger:B:EDGE:SOURce?
```

Arguments

- AUXiliary
This specifies an external trigger (using the Auxiliary Trigger Input connector, located on the rear panel of the instrument) as the B trigger source.
- CH<x>
This specifies one of the input channels as the B trigger source. Input channels are specified by x, which can range from 1 through 4 for four-channel instruments or 1 through 2 for two-channel instruments.

Example 1

```
TRIGger:B:EDGE:SOURce?
```

This query might return `:TRIGGER:B:EDGE:SOURCE CH1`, indicating that the current input source for the B trigger is channel 1.

Example 2

```
TRIGger:B:EDGE:SOUrce CH4
```

This command sets channel 4 as the input source for the B trigger.

TRIGger:B:EVENTS?

Description

This query-only command returns the current B trigger events parameter. This command is equivalent to selecting B Event (Delayed) Trigger Setup from the Trig menu, selecting the A→B Seq tab, choosing Trig on nth event, and viewing the Trig Event setting.

Group

Trigger

Related Commands

TRIGger:B:EVENTS:COUNT

Syntax

```
TRIGger:B:EVENTS?
```

Example

```
TRIGger:B:EVENTS?
```

This query might return `:TRIGGER:B:EVENTS:COUNT 2`, indicating that 2 events must occur before the B trigger occurs.

TRIGger:B:EVENTS:COUNT

Description

This command sets or queries the number of events that must occur before the B trigger (when TRIG:DELay:BY is set to EVENTS). This command is equivalent to selecting B Event (Delayed) Trigger Setup from the Trig menu, selecting the A→B Seq tab, choosing Trig on nth event, and setting the desired Trig Event value.

Group

Trigger

Related Commands

TRIGger:B:EVENTS?

Syntax 1

```
TRIGger:B:EVENTS:COUNT <NR1>
```

Syntax 2

TRIGger:B:EVENTS:COUNT?

Argument

- <NR1>

This is the number of B trigger events, which can range from 1 to 10,000,000.

Example 1

TRIGger:B:EVENTS:COUNT?

This query might return :TRIGGER:B:EVENTS:COUNT 2, indicating that two events must occur after the A trigger before the B trigger can occur.

Example 2

TRIGger:B:EVENTS:COUNT 4

This command specifies that the B trigger will occur four trigger events after the A trigger.

TRIGger:B:LEVEL

Description

This command sets or queries the level for the B trigger. This command is equivalent to selecting B Event (Delayed) Trigger Setup from the Trig menu, selecting the A→B Seq tab and setting the B Trig Level voltage.

Group

Trigger

Related Commands

TRIGger:A:LEVEL, TRIGger:B, TRIGger:B:EDGE:SOUrce

Syntax 1

TRIGger:B:LEVEl {ECL|TTL|<NR3>}

Syntax 2

TRIGger:B:LEVEl?

Arguments

- ECL
This specifies a preset ECL level of -1.3 V.
- TTL
This specifies a preset TTL level of 1.4 V.
- <NR3>
This is the B trigger level, in volts.

Example 1

TRIGger:B:LEVel?

This query might return :TRIGGER:B:LEVEL 173.0000E-03, indicating that the B trigger level is currently set at 173 mV.

Example 2

TRIGger:B:LEVel ECL

This command sets the B trigger level to -1.3 V.

TRIGger:B:STATE

Description

This command sets or queries the state of B trigger activity. If the B trigger state is on, the B trigger is part of the triggering sequence. If the B trigger state is off, then only the A trigger causes the trigger event.

Group

Trigger

Related Commands

TRIGger:A:MODe

Syntax 1

TRIGger:B:STATE {ON|OFF|<NR1>}

Syntax 2

TRIGger:B:STATE?

Arguments

- ON
This argument indicates that the B trigger is active and in causes trigger events conjunction with the A trigger.
- OFF
This argument indicates that only the A trigger causes trigger events.
- <NR1>
A 0 turns off the B trigger; any other value activates the B trigger.

Example 1

TRIGger:B:STATE?

This query might return :TRIGGER:B:STATE 0, indicating that the B trigger is inactive and that only the A trigger causes trigger events.

Example 2

TRIGger:B:STATE ON

This command sets the B trigger to active, making it capable of causing trigger events.

TRIGger:B:TIME

Description

This command sets or queries B trigger delay time. The B Trigger time applies only if TRIGger:B:BY is set to TIME. This command is equivalent to selecting B Event (Delayed) Trigger Setup from the Trig menu, choosing the A→B Seq tab, and setting Trig Delay.

Group

Trigger

Related Commands

TRIGger:B:BY, TRIGger:B:EVENTS:COUNT

Syntax 1

TRIGger:B:TIME <NR3>

Syntax 2

TRIGger:B:TIME?

Argument

- <NR3>

This is the B trigger delay time in seconds.

Example 1

TRIGger:B:TIME?

This query might return :TRIGGER:B:TIME 16.0000E-9, indicating that the B trigger time is set to 16 ns.

Example 2

TRIGger:B:TIME 4E-6

This command sets the B trigger delay time to 4 μ s.

TRIGger:B:TYPe

Description

This command sets or queries the type of B trigger. This command is equivalent to selecting B Event (Delayed) Trigger Setup from the Trig menu and choosing Edge.

Group

Trigger

Related Commands

TRIGger:A:TYPe

Syntax 1

TRIGger:B:TYPe EDGE

Syntax 2

TRIGger:B:TYPe?

Argument

- EDGE

This sets the B trigger type to edge.

Example 1

TRIGger:B:TYPe?

This query will return :TRIGGER:B:TYPE EDGE

Example 2

TRIGger:B:TYPe EDGE

This command sets the B trigger type to edge.

TRIGger:STATE?

Description

This query-only command returns the current state of the triggering system. This command is equivalent to viewing the trigger status LEDs on the instrument front panel.

Group

Trigger

Related Commands

TRIGger:A:MODE

Syntax

TRIGger:STATE?

Outputs

- **ARMed**
This indicates that the instrument is acquiring pretrigger information. All triggers are ignored when TRIGger:STATE is arming.
- **AUTO**
This indicates that the instrument is in the automatic mode and acquires data even in the absence of a trigger.
- **DPO**
This indicates that the instrument is in DPO mode.
- **PARTial**
This indicates that the A trigger has occurred and the instrument is waiting for the B trigger to occur.
- **REAdy**
This indicates that all pretrigger information has been acquired and that the instrument is ready to accept a trigger.
- **SAVe**
This indicates that the instrument is in save mode and is not acquiring data.
- **TRIGger**
This indicates that the instrument triggered and is acquiring the posttrigger information.

Example

TRIGger:STATE?

This query might return :TRIGGER:STATE ARMED, indicating that the pretrigger data is being acquired.

UNLock

Description

This command (no query form) unlocks the front panel. The command is equivalent to LOCK NONE.

Note: If the instrument is in the Remote With Lockout State (RWLS), the UNLock command has no effect. For more information, see the ANSI-IEEE Std 488.1-1987 Standard Digital Interface for Programmable Instrumentation, section 2.8.3 on RL State Descriptions.

Group

Miscellaneous

Related Commands

LOCK

Syntax

UNLock ALL

Argument

- ALL
This specifies that all front-panel buttons and knobs are unlocked.

Example

UNLock ALL

This command unlocks all front-panel buttons and knobs.

VERBose

Description

This command sets or queries the Verbose state that controls the length of keywords on query responses. Keywords can be both headers and arguments.

Note: This command does not affect IEEE Std 488.2-1987 Common Commands (those starting with an asterisk). However, this command does make a corresponding change in the Response Header Enable State of the opposite interface (physical or virtual GPIB interface). Refer to Introduction for more information.

Group

Miscellaneous

Related Commands

HEADer, *LRN?, SET?

Syntax

VERBose {OFF|ON|<NR1>}

Arguments

- OFF
This sets the Verbose state to true, which returns full-length keywords for applicable setting queries.
- ON
This sets the Verbose state to false, which returns minimum-length keywords for applicable setting queries.
- <NR1>
A 0 returns minimum-length keywords for applicable setting queries; any other value returns full-length keywords.

Example 1

VERBose ON

This command enables the Verbose state.

Example 2

VERBOSE?

This query might return :VERBOSE 0, indicating that the Verbose state is disabled.

WAVFrm?

Description

This query-only command returns WFMOUtpre? and CURVe? data for the waveform as specified by the DATA:SOURce command. This command is equivalent to sending both WFMOUtpre? and CURVe?, with the additional provision that the response to WAVFrm? is guaranteed to provide a synchronized preamble and curve.

Group

Waveform Transfer

Related Commands

CURVe?, DATA:SOURce, WFMOUtpre?

Syntax

WAVFrm?

Example

WAVFrm?

This query might return the waveform data as:

```
:WFMOUtpre:BIT_NR 8;BN_FMT RI;BYT_NR 1;BYT_OR
MSB;ENCDG
ASC;NR_PT 500;PT_FMT Y;PT_ORDER LINEAR;PT_OFF 0
;XINCR 400.0000E-12;XZERO 0.0000;XUNIT
"s";YMULT
4.0000E-3;YOFF 0.0000;YZERO 0.0000;YUNIT
"V";WFID "Ch1,
DC coupling, 100.0mV/div, 200.0ns/div, 5000
points,
Sample mode";:CURVE
51,50,51,48,51,48,50,49,51,49,51,48,
51,48,51,49,50,49,50,48,49,49,52,49,49,50,50,48
,50,49,
49,49,49,49,50,47,49,47,50,48,49,48,50,48,49,47
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25, 24, 24, 21, 23, 22, 22, 21, 24, 22, 22, 22, 22, 21, 22, 20
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21, 20

WFMIpre?

Description

This query-only command returns the waveform formatting specification to be applied to the next incoming CURVe command data.

Group

Waveform Transfer

Related Commands

WFMOutpre?

Syntax

WFMIpre?

Example

WFMInpre?

This query might return the waveform formatting as

```
:WFMINPRE:BIT_NR 8;BN_FMT RI;BYT_NR 1;BYT_OR
MSB;ENCDG BIN;NR_PT 500;PT_FMT Y;PT_OFF 0;XINCR
2.0000E-6;XZERO 1.7536E-6;XUNIT "s";YMULT
1.0000E-3;YOFF 0.0000;YZERO 0.0000;YUNIT "V"
```

WFMInpre:ENCdg

Description

This command sets or queries the type of encoding for incoming waveform data.

Group

Waveform Transfer

Related Commands

WFMOutpre:ENCdg

Syntax 1

```
WFMInpre:ENCdg {ASC|BIN}
```

Syntax 2

```
WFMInpre:ENCdg?
```

Arguments

- ASC
This specifies that the incoming data is in ASCII format.
- BIN
This specifies that the incoming data is in a binary format whose further interpretation requires knowledge of BYT_NR, BIT_NR, BN_FMT, and BYT_OR.

Example 1

```
WFMInpre:ENCdg?
```

This query might return :WFMINPRE:ENCDG BIN, indicating that the incoming waveform data is in binary format.

Example 2

```
WFMInpre:ENCdg ASC
```

This command sets the format of incoming waveform data to ASCII format.

WFMinpre:BN_Fmt

Description

This command sets or queries the format of binary data for incoming waveforms.

Group

Waveform Transfer

Related Commands

WFMOutpre:BN_Fmt

Syntax 1

```
WFMinpre:BN_Fmt {RI|RP|FP}
```

Syntax 2

```
WFMinpre:BN_Fmt?
```

Arguments

- RI
This specifies signed integer data point representation.
- RP
This specifies positive integer data point representation.
- FP
This specifies single-precision binary floating point representation.

Example 1

```
WFMinpre:BN_Fmt?
```

This query might return :WFMINPRE:BN_FMT RI, indicating that the incoming data is currently interpreted as signed integers.

Example 2

```
WFMinpre:BN_Fmt FP
```

This command specifies that incoming data will be interpreted as single-precision binary floating point numbers.

WFMinpre:BYT_Or

Description

This command sets or queries which byte of binary waveform data is transmitted first for incoming waveform data when data points require more than one byte. This specification only has meaning when WFMinpre:ENCdg is set to BIN and WFMinpre:BYT_Nr is greater than 1.

Group

Waveform Transfer

Related Commands

WFMInpre:ENCdg, WFMInpre:BYT_Nr, WFMOutpre:BYT_Or

Syntax 1

WFMInpre:BYT_Or {LSB|MSB}

Syntax 2

WFMInpre:BYT_Or?

Arguments

- LSB
This specifies that the least significant byte will be transmitted first.
- MSB
This specifies that the most significant byte will be transmitted first.

Example 1

WFMInpre:BYT_Or?

This query might return :WFMINPRE:BYT_OR LSB, indicating that the least significant incoming CURVe data byte will be transmitted first.

Example 2

WFMInpre:BYT_Or MSB

This command sets the most significant incoming byte of incoming waveform data to be transmitted first.

WFMInpre:BYT_Nr

Description

This command sets or returns the binary field data width for the first ordered waveform, as specified by the DATA:DESTINATION command. This specification is only meaningful when WFMInpre:ENCdg is set to BIN and WFMInpre:BN_Fmt is set to either RI or RP.

Group

Waveform Transfer

Related Commands

DATA:DESTINATION, WFMInpre:BN_Fmt, WFMInpre:ENCdg, WFMInpre:BIT_Nr, WFMOutpre:BYT_Nr

Syntax 1

WFMInpre:BYT_Nr <NR1>

Syntax 2

WFMInpre:BYT_Nr?

Argument

- <NR1>
This is the number of bytes per data point and can be 1, 2 (RI, RP) or 4 (FP).

Example 1

WFMInpre:BYT_Nr?

This query might return :WFMINPRE:BYT_NR 2, indicating that there are 2 bytes per incoming waveform data point.

Example 2

WFMInpre:BYT_Nr 1

This command sets the number of bytes per incoming waveform data point to 1, which is the default setting.

WFMInpre:BIT_Nr

Description

This command sets or returns the number of bits per binary waveform point for the waveform, as specified by the DATA:DESTINATION command. This specification is only meaningful when WFMInpre:ENCdg is set to BIN.

Group

Waveform Transfer

Related Commands

DATA:DESTINATION, WFMInpre:ENCdg, WFMInpre:BYT_Nr, WFMOutpre:BIT_Nr

Syntax 1

WFMInpre:BIT_Nr <NR1>

Syntax 2

WFMInpre:BIT_Nr?

Argument

- <NR1>
This number of bits per data point can be 8, 16 (RI, RP) or 32 (FP).

Example 1

WFMInpre:BIT_Nr?

This query might return :WFMINPRE:BIT_NR 8, indicating that incoming RI or RP binary format data uses 8 bits per waveform point.

Example 2

WFMInpre:BIT_Nr 16

This command sets the number of bits per waveform point to 16, for incoming RI and RP binary format data.

WFMinpre:NR_FR?

Description

This query-only command returns one frame, indicating the number of frames in the transmitted waveform record.

Group

Waveform Transfer

Related Commands

CURVe, DATA, DATA:START, DATA:STOP,
SAVe:WAVEform, SAvE:WAVEform:FILEFormat,
WFMinpre:NR_Pt, WFMOuppre:NR_FR?, WFMOuppre:NR_Pt?

Syntax

WFMinpre:NR_FR?

Example

WFMinpre:NR_FR?

This query will return :WFMINPRE:NR_FR 1, indicating that there is 1 data frame in the transmitted waveform record.

WFMinpre:NR_Pt

Description

This command sets or returns the number of data points that are in the transmitted waveform record.

Group

Waveform Transfer

Related Commands

CURVe, DATA, DATA:START, DATA:STOP,
SAVe:WAVEform, SAvE:WAVEform:FILEFormat,
WFMinpre:NR_FR?, WFMOuppre:NR_FR?,
WFMOuppre:NR_Pt?,

Syntax 1

WFMinpre:NR_Pt <NR1>

Syntax 2

WFMinpre:NR_Pt?

Argument

- <NR1>

If WFMinpre:PT_Fmt is set to Y, this is the number of data points; if WFMinpre:PT_Fmt is set to ENV, this is the number of min-max pairs.

Example 1

WFMInpre:NR_Pt?

This query might return :WFMINPRE:NR_PT 8000, indicating that there are 8000 data points in the transmitted waveform record.

Example 2

WFMInpre:NR_Pt 5000

This command specifies that 5000 data points will be transmitted.

WFMInpre:PT_Fmt

Description

This command sets or queries the point format of the incoming waveform data. Regardless of the argument used, the scale, offset, and so on are interpreted similarly. When ENV is used, waveform data is interpreted over the min-max pair; when Y is used, it is interpreted over a single point.

Group

Waveform Transfer

Related Commands

WFMOutpre:PT_Fmt

Syntax 1

WFMInpre:PT_Fmt {ENV|Y}

Syntax 2

WFMInpre:PT_Fmt?

Arguments

- ENV
This specifies that the waveform is transmitted in envelope mode as maximum and minimum point pairs. Only Y values are explicitly transmitted. Absolute coordinates are given by:

$$X_n = XZERO + XINcr (n-PT_Off)$$

$$Y_{nmax} = YZERO + YMULT (ynmax - YOFf)$$

$$Y_{nmin} = YZERO + YMULT (ynmin - YOFf)$$

- Y
This specifies a normal waveform where one ASCII or binary data point is transmitted for each point in the waveform record. Only Y values are explicitly transmitted. Absolute coordinates are given by:

$$X_n = XZERO + XINcr (N-PT_Off)$$

$$Y_n = YZERO + YMULT (Yn - YOFf)$$

Example 1

```
WFMInpre:PT_Fmt ENV
```

This command sets the incoming waveform data point format to enveloped.

Example 2

```
WFMInpre:PT_Fmt?
```

This query might return `:WFMINPRE:PT_FMT ENV`, indicating that the waveform is transmitted as maximum and minimum point pairs.

WFMInpre:PT_Off

Description

This command specifies or returns the trigger point within the waveform record for the reference waveform specified by the `DATA:DESTINATION` command.

Group

Waveform Transfer

Related Commands

`DATA:DESTINATION`, `DATA:START`, `WFMOutpre:PT_Off`

Syntax 1

```
WFMInpre:PT_Off <NR1>
```

Syntax 2

```
WFMInpre:PT_Off?
```

Argument

- `<NR1>`

This is (record length -1) to record length and is the position of the data point immediately following the actual trigger. `<NR1>` is expressed relative to `DATA:START`.

Example 1

```
WFMInpre:PT_Off 0
```

This command specifies that the trigger point is the first point in the waveform record, which is the default.

Example 2

```
WFMInpre:PT_Off?
```

This query might return `:WFMINPRE:PT_OFF 0`, indicating that the incoming waveform trigger point is the first point in the waveform record.

WFMinpre:WFId

Description

This command (no query form) accepts but ignores the argument. This command is provided only to allow a waveform extracted from the instrument to be easily imported.

Group

Waveform Transfer

Related Commands

DATA:DESTination, WFMinpre:BN_Fmt, WFMinpre:ENCdg, WFMinpre:WFid

Syntax

```
WFMinpre:WFId <String>
```

Argument

- <String>
This must be a valid IEEE-488.2 string (but the contents are ignored).

Example

```
WFMinpre:WFId "Ch1, DC coupling, 2.000V/div,  
400.0ns/div, 500 points, Sample mode"
```

This is a syntactically correct command.

WFMinpre:XINcr

Description

This command sets or queries the horizontal interval between incoming waveform points in units specified by WFMinpre:XUNit.

Group

Waveform Transfer

Related Commands

WFMinpre:XUNit, WFMinpre:XINcr

Syntax 1

```
WFMinpre:XINcr <NR3>
```

Syntax 2

```
WFMinpre:XINcr?
```

Argument

- <NR3>
This is the horizontal interval representation.

Example 1

WFMInpre:XINcr?

This query might return :WFMINPRE:XINCR 1.0000E-3, indicating that if WFMInpre:XUNit is set to "s", there is a 1 ms interval between incoming waveform points.

Example 2

WFMInpre:XINcr 3E-3

This command sets the interval between Incoming waveform points to 3 ms.

WFMInpre:XZEro

Description

This command sets or queries the subsample time between the trigger sample (designated by PT_OFF) and the occurrence of the actual trigger on the incoming waveform. This value is used to compute TTOFF for the incoming waveform, and is expressed in terms of WFMInpre:XUNit.

Group

Waveform Transfer

Related Commands

WFMInpre:PT_Off, WFMInpre:XINcr, WFMInpre:XUnit, WFMOutpre:XZEro

Syntax 1

WFMInpre:XZEro <NR3>

Syntax 2

WFMInpre:XZEro?

Argument

- <NR3>

This argument is a floating point value that ranges from -WFMInpre:XINcr to 0.

Example 1

WFMInpre:XZEro?

This query might return :WFMINPRE:XZEro 7.5000E-6, indicating that the trigger occurs 7.5 μ s before the sample designated by WFMInpre:PT_Off.

Example 2

WFMInpre:XZEro 5.7E-6

This command specifies that the trigger actually occurred 5.7 μ s before the sample designated by WFMInpre:PT_Off.

WFMinpre:XUNit

Description

This command sets or returns the horizontal units of the incoming waveform.

Group

Waveform Transfer

Related Commands

WFMOutpre:XUNit

Syntax 1

```
WFMinpre:XUNit <String>
```

Syntax 2

```
WFMinpre:XUNit?
```

Argument

- <String>
This contains a maximum of three alpha characters that represent the horizontal unit of measure for the incoming waveform.

Example 1

```
WFMinpre:XUNit?
```

This query might return :WFMINPRE:XUNIT "s", indicating that the horizontal units for the incoming waveform are seconds.

Example 2

```
WFMinpre:XUNit "Hz"
```

This command specifies that the horizontal units for the incoming waveform are hertz.

WFMinpre:YMUlt

Description

This command sets or queries the vertical scale factor (in units/digitizing level) for the reference waveform, specified by DATA:DESTination, upon a CURVe command.

Group

Waveform Transfer

Related Commands

DATA:DESTination, WFMinpre:BYT_Nr, WFMinpre:YUNit

Syntax 1

```
WFMinpre:YMUlt <NR3>
```

Syntax 2

```
WFMinpre:UMUlt?
```


Argument

- <NR3>
This is the vertical scale factor per digitizing level of the incoming waveform points.

Example 1

WFMInpre:YMUlt?

This query might return :WFMINPRE:YMULT 40.0000E-3, indicating that the vertical scale is 40 mV/digitizing level (1V/div).

Example 2

WFMInpre:YMUlt 20E-3

This command specifies that (if WFMInpre:YUNit is "V" and WFMInpre:BYT_Nr is 1), the vertical scale is 20 mV/digitizing level (500 mV/div).

WFMInpre:YOFF

Description

This command sets or queries the vertical position of the incoming waveform in digitizing levels. Variations in this number are analogous to changing the vertical position of the waveform. For those formats in which WFMInpre:BYT_Nr is important (all nonfloating point formats), this command must take the location of the binary point implied by BYT_NR into consideration.

Group

Waveform Transfer

Related Commands

WFMInpre:BYT_Nr, WFMInpre:YMUlt, WFMOutpre:YOFF

Syntax 1

WFMInpre:YOFF <NR3>

Syntax 2

WFMInpre:YOFF?

Argument

- <NR3>
This is the vertical offset in digitizing levels.

Example 1

WFMInpre:YOFF?

This query might return :WFMINPRE:YOFF 25, indicating the vertical position of the incoming waveform in digitizing levels.

Example 2

WFMInpre:YOff 50

This command specifies that the zero reference point for the incoming waveform is 50 digitizing levels (2 divisions) above the center of the data range.

WFMInpre:YUNit

Description

This command sets or queries the vertical units of the incoming waveform.

Group

Waveform Transfer

Related Commands

WFMOutpre:YUNit

Syntax 1

WFMInpre:YUNit <String>

Syntax 2

WFMInpre:YUNit?

Argument

- <String>
This contains a maximum of three alpha characters that represent the vertical unit of measure for the incoming waveform.

Example 1

WFMInpre:YUNit?

This query might return :WFMINPRE:YUNIT "s", indicating the vertical units for the incoming waveform are seconds.

Example 2

WFMInpre:YUNit "Pa"

This command specifies that the vertical units for the incoming waveform are pascal.

WFMInpre:YZero

Description

This command sets or queries the offset of the incoming waveform in units specified by WFMInpre:YUNit. Variations in this number are analogous to changing the vertical offset of the waveform.

Group

Waveform Transfer

Related Commands

WFMInpre:YUNit, WFMOutpre:YZero

Syntax 1

WFMInpre:YZero <NR3>

Syntax 2

WFMInpre:YZero?

Argument

- <NR3>

This is the offset in YUNits.

Example 1

WFMInpre:YZero?

This query might return :WFMINPRE:YZERO 7.5000E-6, indicating that the zero reference for the incoming waveform is 7.5 μ V below the center of the data range (given that WFMInpre:YUNit is set to V).

Example 2

WFMInpre:YZero 1.5E+0

This command specifies that the zero reference point for the incoming waveform is 1.5 V below the center of the data range (given that WFMInpre:YUNit is set to V).

WFMOutpre?

Description

This query-only command returns the waveform formatting data for the waveform specified by the DATA:SOURCE command. The preamble components are considered to be of two types; formatting and interpretation. The formatting components are: ENCDG, BN_Fmt, BYT_Or, BYT_Nr, BIT_Nr. The interpretation components are derived from the DATA:SOURCE specified waveform.

Group

Waveform Transfer

Syntax

WFMOutpre?

Example

WFMOutpre:?

This query might return the waveform formatting data as:

```
:WFMOUTPRE:BIT_NR 8;BN_FMT RI
;BYT_NR 1;BYT_OR MSB;ENCDG BIN;NR_PT 500;PT_FMT
Y
;PT_ORDER LINEAR;PT_OFF 0;XINCR 8.0000E-9
;XZERO 4.8794E-9;XUNIT "s";YMULT -2000.0000E-3
;YOFF -4999.9995E-3;YZERO 0.0000;YUNIT "V"
```

```
;WFID "Ch1, DC coupling, 2.000V/div,  
400.0ns/div,  
500 points, Sample mode"
```

WFMOutpre:ENCdg

Description

This command sets and queries the type of encoding for outgoing waveforms.

Group

Waveform Transfer

Related Commands

DATA:ENCdg, WFMOutpre:BYT_Nr, WFMOutpre:BYT_Or, WFMOutpre:BIT_Nr, WFMOutpre:BN_Fmt

Syntax 1

```
WFMOutpre:ENCdg {ASC|BIN}
```

Syntax 2

```
WFMOutpre:ENCdg?
```

Argument

- ASC

This specifies that the outgoing data is to be in ASCII format. Waveforms internally stored as integers will be sent as <NR1> numbers, while those stored as floating point will be sent as <NR3> numbers.

- BIN

This specifies that outgoing data is to be in a binary format whose further specification is determined by WFMOutpre:BYT_Nr, WFMOutpre:BIT_Nr, WFMOutpre:BN_Fmt and WFMOutpre:BYT_Or.

Example 1

```
WFMOutpre:ENCdg?
```

This query might return :WFMOUTPRE:ENCDG BIN, indicating that outgoing waveform data will be sent in binary format.

Example 2

```
WFMOutpre:ENCdg ASC
```

This command specifies that the outgoing waveform data will be sent in ASCII format.

WFMOutpre:BIT_Nr

Description

This command sets and returns the number of bits per waveform point that outgoing waveforms contain, as specified by the DATA:SOURce command. Note that values will be constrained according to the underlying waveform data. This specification is only meaningful when WFMOutpre:ENCdg is set to BIN and WFMOutpre:BN_Fmt is set to either RI or RP.

Group

Waveform Transfer

Related Commands

DATA:SOURce, WFMOutpre:BN_Fmt, WFMOutpre:ENCdg

Syntax 1

```
WFMOutpre:BIT_Nr <NR1>
```

Syntax 2

```
WFMOutpre:BIT_Nr?
```

Argument

- <NR1>

This number of bits per data point can be 8, 16, 32 or 64.

Example 1

```
WFMOutpre:BIT_Nr?
```

This query might return :WFMOUTPRE:BIT_NR 8, indicating that outgoing RI or RP binary format data uses 8 bits per waveform point.

Example 2

```
WFMOutpre:BIT_Nr 16
```

This command sets the number of bits per waveform point to 16 for incoming RI and RP binary format data.

WFMOutpre:BN_Fmt

Description

This command sets or queries the format of binary data for outgoing waveforms specified by the DATA:SOURce command.

Group

Waveform Transfer

Related Commands

DATA:SOURce

Syntax 1

```
WFMOutpre:BN_Fmt {RI|RP|FP}
```

Syntax 2

WFMOutput:BN_Fmt?

Arguments

- RI
This specifies signed integer data point representation.
- RP
This specifies positive integer data point representation.
- FP
This specifies single-precision binary floating point data point representation.

Example 1

WFMOutpre:BN_Fmt?

This query might return :WFMOUTPRE:BN_FMT RI, indicating that the outgoing waveform data is currently in signed integer format.

Example 2

WFMOutpre:BN_Fmt FP

This command specifies that outgoing waveform data will be in single-precision binary floating point format.

WFMOutpre:BYT_Or

Description

This command sets or queries which byte of binary waveform data is transmitted first, during a waveform data transfer, when data points require more than one byte. This specification only has meaning when WFMOutpre:ENCdg is set to BIN.

Group

Waveform Transfer

Related Commands

WFMOutpre:ENCdg

Syntax 1

WFMOutpre:BYT_Or {LSB|MSB}

Syntax 2

WFMOutpre:BYT_Or?

Arguments

- LSB
This specifies that the least significant byte will be transmitted first.

- **MSB**
This specifies that the most significant byte will be transmitted first.

Example 1

WFMOutpre:BYT_Or?

This query might return :WFMOUTPRE:BYT_OR LSB, indicating that the least significant data byte will be transmitted first.

Example 2

WFMOutpre:BYT_Or MSB

This command sets the most significant outgoing byte of waveform data to be transmitted first.

WFMOutpre:BYT_Nr

Description

This command sets or returns the binary field data width for the waveform specified by the DATA:SOURCE command. Note that values will be constrained according to the underlying waveform data. This specification is only meaningful when WFMOutpre:ENCdg is set to BIN, and WFMOutpre:BN_Fmt is set to either RI or RP.

Group

Waveform Transfer

Related Commands

DATA:SOURCE, WFMOutpre:BN_Fmt, WFMOutpre:ENCdg

Syntax 1

WFMOutpre:BYT_Nr <NR1>

Syntax 2

WFMOutpre:BYT_Nr?

Argument

- <NR1>
This is the number of bytes per data point and can be 1, 2, 4 or 8. A value of 1 or 2 bytes per waveform point indicates channel data; 4 bytes per waveform point indicate math data; 8 bytes per waveform point indicate pixel map (DPO) data.

Example 1

WFMOutpre:BYT_Nr?

This query might return :WFMOUTPRE:BYT_NR 2, indicating that there are 2 bytes per outgoing waveform data point.

Example 2

WFMOutpre:BYT_Nr 1

This command sets the number of bytes per outgoing waveform data point to 1, which is the default setting.

WFMOutpre:NR_FR?

Description

This query-only command returns the number of frames for the DATA:SOURce waveform transmitted in response to a CURVe? query.

Group

Waveform Transfer

Related Commands

CURVe , DATA, DATA:START, DATA:STOP,
SAVE:WAVEform, SAVE:WAVEform:FILEFormat,
WFMInpre:NR_FR?, WFMInpre:NR_Pt, WFMOutpre:NR_Pt?

Syntax

WFMOutpre:NR_FR?

Example

WFMOutpre:NR_FR?

This query might return :WFMOUTPRE:NR_FR 500, indicating that there are 500 data frames to be sent.

WFMOutpre:NR_Pt?

Description

This query-only command returns the number of points for the DATA:SOURce waveform that will be transmitted in response to a CURVe? query.

Group

Waveform Transfer

Related Commands

CURVe , DATA, DATA:START, DATA:STOP,
SAVE:WAVEform, SAVE:WAVEform:FILEFormat,
WFMInpre:NR_FR?, WFMInpre:NR_Pt, WFMOutpre:NR_FR?

Syntax

WFMOutpre:NR_Pt?

Example

WFMOutpre:NR_Pt?

This query might return :WFMOUTPRE:NR_PT 5000, indicating that there are 5000 data points to be sent.

WFMOutpre:PT_Fmt?

Description

This query-only command returns the point format for the waveform specified by the DATA:SOURce command. The format specifies a set of equations describing how the scale factors in the preamble are used to give meaning to the CURVe data points.

An error is reported if the DATA:SOURce waveform does not exist.

Group

Waveform Transfer

Related Commands

CURVe?, DATA:SOURce

Syntax

WFMOutpre:PT_Fmt?

Example

WFMOutpre:PT_Fmt?

This query might return :WFMOutpre:PT_Fmt ENV, indicating that the waveform data is a series of min-max pairs.

WFMOutpre:PT_Off?

Description

This query-only command returns the trigger point relative to DATA:STARt for the waveform specified by the DATA:SOURce command.

Note: This returned value is the point immediately following the actual trigger.

Group

Waveform Transfer

Related Commands

DATA:SOURce, DATA:STARt, WFMOutpre:XZEro

Syntax

WFMOutpre:PT_Off?

Example

WFMOutpre:PT_Off?

This query might return :WFMOutpre:PT_Off 251, specifying that the trigger actually occurred between points 250 and 251.

WFMOutpre:PT_OR?

Description

This query-only command specifies whether the source waveform is Fast Acquisition. A Fast Acquisition waveform is stored as a 200 (vertical) by 500 (horizontal) point bitmap. Each point represents display intensity for that screen location. Only CURVe? query functions are allowed on Fast Acquisition waveforms.

When the WFMOutpre:PT_OR query returns Column, this indicates that the source is a Fast Acquisition waveform (and that each of 500 possible horizontal columns being transmitted contains 200 vertical points). When the WFMOutpre:PT_OR? query returns Linear, this indicates that the source is not a Fast Acquisition waveform (and that each horizontal column being sent contains only one vertical point). Note that waveform points are transmitted in the following order: top to bottom, then left to right.

Group

Waveform Transfer

Related Commands

DATA:SOURce

Syntax

```
WFMOutpre:PT_OR?
```

Example 1

```
WFMOutpre:PT_OR?
```

This query might return :WFMOUTPRE:PT_OR COL, specifying that the waveform designated by the DATA:SOURce waveform is a Fast Acquisition waveform.

Example 2

```
WFMOutpre:PT_OR?
```

This query might return :WFMOUTPRE:PT_OR LINEAR, specifying that the source waveform is a nonFast Acquisition waveform.

WFMOutpre:WFId?

Description

This query-only command returns a string describing several aspects of the acquisition parameters for the waveform specified by the DATA:SOURce command.

An error is reported if the DATA:SOURce waveform does not exist.

Group

Waveform Transfer

Related Commands

DATA:SOURce

Syntax

WFMOutpre:WFID?

Outputs

<string> comprises the following comma-separated fields:

Waveform Suffixes		
Field	Description	Examples
Source	The source identification string as it appears in the front panel scale factor readouts.	"Ch1-4" "Math1-3" "Ref1-4"
Coupling	A string describing the vertical coupling of the waveform (the Source 1 waveform in the case of Dual Waveform Math).	"AC coupling" "DC coupling" "GND coupling"
Vert Scale	A string containing the vertical scale factor of the unzoomed waveform. The numeric portion will always be 4 digits. The examples cover all known internal units.	"100.0 mV/div" "20.00 dB/div" "45.00 deg/div" "785.4 mrad/div" "500.0 uVs/div" "10.00 kV/s/div" "200.0 mV/div" "50.00 unk/div"
Horiz Scale	A string containing the horizontal scale factor of the unzoomed waveform. The numeric portion will always be four digits. The examples cover all known internal units.	"100.0 ms/div" "10.00 kHz/div" "50.00 c/div"
Record Length	A string containing the number of waveform points available in the entire record. The numeric portion is given as an integer.	"500 points" "500000 points"
Acquisition Mode	A string describing the mode used to acquire the waveform.	"Sample mode" "Pk Detect mode" "Hi Res mode" "Envelope mode" "Average mode"
Primary Reference Offset	A string specifying the delta between the Primary Reference (typically, the A trigger) and the CURVe? zero reference location identified by a combination of PT_Off and XZEro in units of XUNits. For example, in Trigger After Delay, this number would be the actual time between the A and B trigger. In the event that this number is not meaningful, the string will be exactly "0".	"57.2345 ms" "87.3 Hz" "0"

Example

WFMOutpre:WFID?

This query might return :WFMOUTPRE:WFID "Ch1, DC coupling, 100.0mVolts/div,500.0µs/div,500 points, Hi Res mode"

WFMOutpre:XINcr?

Description

This query-only command returns the horizontal point spacing in units of WFMOutpre:XUNit for the waveform specified by the DATA:SOURce command. This value corresponds to the sampling interval.

An error is reported if the DATA:SOURce waveform does not exist.

Group

Waveform Transfer

Related Commands

DATA:SOURce, WFMOutpre:XUNit_x

Syntax

WFMOutpre:XINcr?

Example

WFMOutpre:XINcr?

This query might return :WFMOUTPRE:XINCR 10.0000E-6, indicating that the horizontal sampling interval is 10 μ s/point (500 μ s/div).

WFMOutpre:XZEro?

Description

This query-only command returns the subsample time between the trigger sample (designated by PT_OFF) and the occurrence of the actual trigger for the waveform specified by the DATA:SOURce command. This value is in units of WFMOutpre:XUNit.

An error is reported if the DATA:SOURce waveform does not exist.

Note: During *stopped state operation* (i.e., ACQUIRE:STATE OFF), this is the only preamble that changes on each acquisition. If a query is run during steady state operation (that is, all control changes have settled and triggers are arriving on a regular basis), the XZEro value of the last stopped state is returned.

Group

Waveform Transfer

Related Commands

DATA:SOURce, WFMOutpre:XUNit

Syntax

WFMOutpre:XZEro?

Example

WFMOutpre:XZEro?

This query might return :WFMOUTPRE:XZERO 5.6300E-9, indicating that the trigger actually occurred 5.63 ns before the trigger sample.

WFMOutpre:XUNit?

Description

This query-only command returns the horizontal units for the waveform specified by the DATA:SOURce command.

An error is reported if the DATA:SOURce waveform does not exist.

Group

Waveform Transfer

Related Commands

DATA:SOURce

Syntax

WFMOutpre:XUNit?

Example

WFMOutpre:XUNit?

This query might return :WFMOUTPRE:XUNIT "Hz", indicating that the horizontal units for the waveform are in hertz.

WFMOutpre:YMUIt?

Description

This query-only command returns the vertical scale factor per digitizing level in units specified by WFMOutpre:YUNit for the waveform specified by the DATA:SOURce command. For those formats in which WFMOutpre:BYT_Nr is important (all nonfloating point formats), WFMOutpre:YMUIt? must take the location of the binary point implied by BYT_NR into consideration.

An error is reported if the DATA:SOURce waveform does not exist.

Group

Waveform Transfer

Related Commands

DATA:SOURce

Syntax

WFMOutpre:YMUIt?

Example

WFMOutpre:YMULT?

This query might return :WFMOUTPRE:YMULT 4.0000E-3, indicating that the vertical scale for the corresponding waveform is 100 mV/div.

WFMOutpre:YOFF?

Description

This query-only command returns the vertical offset in digitized levels for the waveform specified by the DATA:SOURce command. For those formats in which BYT_NR is important (all non-floating point formats), this command must take the location of the binary point implied by WFMOutpre:BYT_Nr into consideration.

An error is reported if the DATA:SOURce waveform does not exist.

Group

Waveform Transfer

Related Commands

DATA:SOURce, WFMOutpre:BYT_Nr

Syntax

WFMOutpre:YOFF?

Example

WFMOutpre:YOFF?

This query might return :WFMOUTPRE:YOFF -50.0000E+0, indicating that the position indicator for the waveform was 50 digitizing levels (2 divisions) below center screen.

WFMOutpre:YUNIT?

Description

This query-only command returns the vertical units for the waveform specified by the DATA:SOURce command.

An error is reported if the DATA:SOURce waveform does not exist.

Group

Waveform Transfer

Related Commands

DATA:SOURce

Syntax

WFMOutpre:YUNIT?

Example

WFMOutpre:YUNit?

This query might return :WFMOUTPRE:YUNIT "dB", indicating that the vertical units for the waveform are measured in decibels.

WFMOutpre:YZero?

Description

This query-only command returns the vertical offset in units specified by WFMOutpre:YUNit for the waveform specified by the DATA:SOURce command.

An error is reported if the DATA:SOURce waveform does not exist.

Group

Waveform Transfer

Related Commands

DATA:SOURce, WFMOutpre:YUNit

Syntax

WFMOutpre:YZero?

Example

WFMOutpre:YUNit?

This query might return :WFMOUTPRE:YZERO -100.0000E-3, indicating that vertical offset is set to -100 mV.

WFMpre:NR_FR?

Description

This query-only command returns the number of frames for the waveform transmitted in response to a CURVE? query.

Group

Waveform Transfer

Related Commands

CURVe , DATA, DATA:START, DATA:STOP, SAVE:WAVEform, SAVE:WAVEform:FILEFormat, WFMInpre:NR_FR?, WFMInpre:NR_Pt, WFMOutpre:NR_FR?, WFMOutpre:NR_Pt?,

Syntax

WFMpre:NR_FR?

Example

WFMpre:NR_FR?

This query might return :WFMPRE:NR_FR:10, indicating that you have acquired 10 frames.

ZOOM

Description

This command resets the zoom transforms to default values for all traces or live traces. The ZOOM query returns the current vertical and horizontal positioning and scaling of the display. This command is equivalent to selecting Zoom Setup from the Vertical menu and selecting Reset.

Group

Zoom

Syntax 1

ZOOM {RESET|RESETLive}

Syntax 2

ZOOM?

Arguments

- RESET
This resets the zoom transforms to default values for all traces.
- RESETLive
This resets the zoom transforms to default values for live traces.

Example 1

ZOOM?

This query might return :

```
:ZOOM:MODE 0;GRATICULE:SIZE
50;:ZOOM:HORIZONTAL:LOCK ALL;
:ZOOM:CH1:HORIZONTAL:POSITION 50.0000;SCALE 2;
:ZOOM:CH1:VERTICAL:POSITION 0.0000;SCALE
1.0000;
:ZOOM:CH2:HORIZONTAL:POSITION 50.0000;SCALE 2;
:ZOOM:CH2:VERTICAL:POSITION 0.0000;SCALE
1.0000;
:ZOOM:CH3:HORIZONTAL:POSITION 50.0000;SCALE 2;
:ZOOM:CH3:VERTICAL:POSITION 0.0000;SCALE
1.0000;
:ZOOM:CH4:HORIZONTAL:POSITION 50.0000;SCALE 2;
:ZOOM:CH4:VERTICAL:POSITION 0.0000;SCALE
1.0000;
:ZOOM:MATH1:HORIZONTAL:POSITION 50.0000;SCALE
2;
:ZOOM:MATH1:VERTICAL:POSITION 0.0000;SCALE
1.0000;
:ZOOM:MATH2:HORIZONTAL:POSITION 50.0000;SCALE
2;
:ZOOM:MATH2:VERTICAL:POSITION 0.0000;SCALE
1.0000;
:ZOOM:MATH3:HORIZONTAL:POSITION 50.0000;SCALE
```



```

2;
:ZOOM:MATH3:VERTICAL:POSITION 0.0000;SCALE
1.0000;
:ZOOM:MATH4:HORIZONTAL:POSITION 50.0000;SCALE
2;
:ZOOM:MATH4:VERTICAL:POSITION 0.0000;SCALE
1.0000;
:ZOOM:REF1:HORIZONTAL:POSITION 50.0000;SCALE 2;
:ZOOM:REF1:VERTICAL:POSITION 0.0000;SCALE
1.0000;
:ZOOM:REF2:HORIZONTAL:POSITION 50.0000;SCALE 2;
:ZOOM:REF2:VERTICAL:POSITION 0.0000;SCALE
1.0000;
:ZOOM:REF3:HORIZONTAL:POSITION 50.0000;SCALE 2;
:ZOOM:REF3:VERTICAL:POSITION 0.0000;SCALE
1.0000;
:ZOOM:REF4:HORIZONTAL:POSITION 50.0000;SCALE 2;
:ZOOM:REF4:VERTICAL:POSITION 0.0000;SCALE
1.0000

```

Example 2

ZOOM RESET

This command resets the zoom transforms to default values for all traces.

ZOOM:GRATICULE:SPLIT

Description

This command sets or returns the sizes of the acquisition and zoom windows when Zoom is selected. You can use this command to set the graticule to display the zoom and acquisition windows in the following manner:

- Use half of the available display for the zoomed graticule and half of the available display for the acquisition graticule
- Use 80% of the available display for the zoomed graticule and 20% for the acquisition graticule
- Use the entire display for the zoomed graticule

Note: For this command to have an effect on the display, you must have the zoom mode turned on. Use the ZOOM:MODE command to turn on the zoom mode.

The ZOOM:GRATICULE:SPLIT command is equivalent to selecting Zoom Setup from the Horiz/Acq menu and selecting a value for the Graticule Split in the control window.

Group

Zoom

Related Commands

ZOOM:MODE

Syntax 1

```
ZOOm:GRAticule:SPLIT  
{FIFtyfifty|EIGHtytwenty|FuLl}
```

Syntax 2

```
ZOOm:GRAticule:SPLIT?
```

Arguments

- FIFtyfifty
This argument sets half of the available display to the zoomed graticule and half of the available display to the acquisition graticule; this argument is the default value.
- EIGHtytwenty
This argument sets 80% of the available display to the zoomed graticule and 20% to the acquisition graticule.
- FuLl
This argument sets the entire display to the zoomed graticule.

Example 1

```
ZOOm:GRAticule:SPLIT?
```

This query might return :ZOOM:GRATICULE:SPLIT FIFTYFIFTY, indicating that the display area is divided equally between the zoomed graticule and the acquisition graticule.

Example 2

```
ZOOm:GRAticule:SPLIT FuLl
```

This command sets the full display area to the zoomed graticule.

ZOOm:HORizontal:LOCK

Description

This command sets or queries the waveforms that the horizontal zoom parameter affects. This is equivalent to selecting Zoom Setup from the Hoiz/Acq menu and selecting the Lock.

Group

Zoom

Syntax 1

```
ZOOm:HORizontal:LOCK {ALL|LIVE|NONE}
```

Syntax 2

```
ZOOm:HORizontal:LOCK?
```

Arguments

- ALL
This argument specifies that all the (CH<x>, Ref<x>, Math<x>) waveforms will be horizontally positioned and scaled together.

- **LIVe**
This argument specifies that all live (CH<x>) waveforms will be horizontally positioned and scaled together.
- **NONe**
This argument specifies that only the selected waveform is positioned and scaled using the horizontal zoom parameters.

Example 1

ZOOm:HORizontal:LOCK?

This query might return :ZOOM:HORIZONTAL:LOCK ALL, indicating that all waveforms are positioned and scaled together.

Example 2

ZOOm:HORizontal:LOCK LIVE

This command horizontally positions and scales all live waveforms.

ZOOm:MODE

Description

This command turns Zoom mode on or off. The Zoom query returns the current state of Zoom mode. This command is equivalent to pressing the front-panel ZOOM button.

Group

Zoom

Syntax 1

ZOOm:MODE {ON|OFF|<NR1>}

Syntax 2

ZOOm:MODE

Arguments

- **ON**
This turns on Zoom mode.
- **OFF**
This turns off Zoom mode.
- **<NR1>**
A 0 turns off Zoom mode; any other value turns on Zoom mode.

Example 1

ZOOm:MODE?

This query might return :WFMOUTPRE:ZOOM:MODE 1, indicating that Zoom mode is currently turned on.

Example 2

ZOOm:MODE OFF

This command turns off Zoom mode.

ZOOm:<wfm>:HORizontal:POSition

Description

This command sets or queries the horizontal position of the specified waveform. The setting of the ZOOm:HORizontal:LOCK command determines the waveforms that are affected. For example, if ZOOm:HORizontal:LOCK is set to LIVE, then only live (as opposed to reference or math) waveforms are affected.

Group

Zoom

Syntax 1

ZOOm:<wfm>:HORizontal:POSition <NR3>

Syntax 2

ZOOm:<wfm>:HORizontal:POSition?

Argument

- <NR3>

This is a value from 0 to 100 and is the percent of the waveform that is to the left of screen center, when the zoom factor is 1 times or greater.

Example 1

ZOOm:CH1:HORizontal:POSition?

This query might return :ZOOM:CH1:HORIZONTAL:POSITION 50.0000, indicating that the Zoom position for channel 1 is currently set at 50% of acquired waveform.

Example 2

ZOOm:CH1:HORizontal:POSition 50

This command sets the Zoom position for channel 1 at 50% of acquired waveform.

ZOOm:<wfm>:HORizontal:SCALE

Description

This command sets or queries the zoom horizontal scale factor of the specified waveform.

Group

Zoom

Syntax 1

ZOOm:<wfm>:HORizontal:SCALE <NR3>

Syntax 2

ZOOm:<wfm>:HORizontal:SCAle?

Argument

- <NR3>

This is the amount of expansion in the horizontal direction.

Example 1

ZOOm:CH2:HORizontal:SCAle?

This query might return :ZOOM:CH2:HORIZONTAL:SCALE 1, indicating that the channel 2 waveform has a horizontal zoom scale factor of 1.

Example 2

ZOOm:CH1:HORizontal:SCAle 5

This command sets the channel 1 horizontal scale factor to 5.

ZOOm:<wfm>:VERTical:POSition

Description

This command sets or queries the zoom vertical position of the specified waveform.

Group

Zoom

Syntax 1

ZOOm:<wfm>:VERTical:POSition <NR3>

Syntax 2

ZOOm:<wfm>:VERTical:POSition?

Argument

- <NR3>

This is the vertical zoom position expressed in divisions.

Example 1

ZOOm:CH1:VERTical:POSition?

This query might return :ZOOM:CH1:VERTICAL:POSITION 0.0000, indicating that the zoomed trace is centered at division 0 of the acquisition trace.

Example 2

ZOOm:CH1:VERTical:POSition 2

This command sets the vertical position to 2, which centers the zoom trace at the second division of the acquisition trace.

ZOOM:<wfm>:VERTICAL:SCALE

Description

This command sets or queries the zoom vertical scale of the specified waveform.

Group

Zoom

Syntax 1

```
ZOOM:<wfm>:VERTICAL:SCALE <NR3>
```

Syntax 2

```
ZOOM:<wfm>:VERTICAL:SCALE?
```

Argument

- <NR3>
This is the amount of vertical expansion or compression, which operates on a 1 - 2 - 5 sequence (For example, 1, 2, 5, 10, 20, 50, 100...). Based on the value entered, this command uses the nearest scale factor. Setting the vertical scale to 1 indicates unity (no zoom).

Example 1

```
ZOOM:CH2:VERTICAL:SCALE?
```

This query might return :ZOOM:CH2:VERTICAL:SCALE
2.0000, indicating that the vertical scale is 2x.

Example 2

```
ZOOM:REF1:VERTICAL:SCALE 4
```

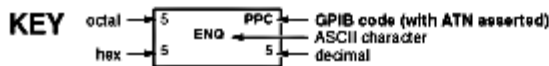
This command sets the vertical scale of REF1 to 5x (the nearest scale factor).

Miscellaneous

Character Chart

Appendix A: ASCII & GPIB Code Chart

B7 B6 B5 BITS B4 B3 B2 B1	0 0 0		0 0 1		0 1 0		0 1 1		1 0 0		1 0 1		1 1 0		1 1 1			
	CONTROL				NUMBERS SYMBOLS				UPPER CASE				LOWER CASE					
0 0 0 0	0	20	40	60	80	100	120	140	160	NUL	DLE	SP	LA0	LA16	TA0	TA16	SA0	SA16
	0	10	20	30	40	50	60	70	80									
0 0 0 1	1	21	41	61	81	101	121	141	161	GTL	LLD	LA1	LA17	TA1	TA17	SA1	SA17	
	1	11	21	31	41	51	61	71	81	SOH	DC1	!	1	A	Q	"	9	q
0 0 1 0	2	22	42	62	82	102	122	142	162	STX	DC2	LA2	LA18	TA2	TA18	SA2	SA18	
	2	12	22	32	42	52	62	72	82			2	2	B	R	b	9	r
0 0 1 1	3	23	43	63	83	103	123	143	163	ETX	DC3	LA3	LA19	TA3	TA19	SA3	SA19	
	3	13	23	33	43	53	63	73	83			#	3	C	S	c	9	s
0 1 0 0	4	24	44	64	84	104	124	144	164	SDC	EDT	LA4	LA20	TA4	TA20	SA4	SA20	
	4	14	24	34	44	54	64	74	84			\$	4	D	T	d	9	t
0 1 0 1	5	25	45	65	85	105	125	145	165	PPC	PPU	LA5	LA21	TA5	TA21	SA5	SA21	
	5	15	25	35	45	55	65	75	85	ENQ	NAK	%	5	E	U	e	9	u
0 1 1 0	6	26	46	66	86	106	126	146	166	ACK	SYM	LA6	LA22	TA6	TA22	SA6	SA22	
	6	16	26	36	46	56	66	76	86			&	6	F	V	f	9	v
0 1 1 1	7	27	47	67	87	107	127	147	167	BEL	ETB	LA7	LA23	TA7	TA23	SA7	SA23	
	7	17	27	37	47	57	67	77	87			'	7	G	W	g	9	w
1 0 0 0	8	28	48	68	88	108	128	148	168	GET	SPE	LA8	LA24	TA8	TA24	SA8	SA24	
	8	18	28	38	48	58	68	78	88	BS	CAN	(8	H	X	h	9	x
1 0 0 1	9	29	49	69	89	109	129	149	169	TCT	SPO	LA9	LA25	TA9	TA25	SA9	SA25	
	9	19	29	39	49	59	69	79	89	HT	EM)	9	I	Y	i	9	y
1 0 1 0	10	30	50	70	90	110	130	150	170	LF	BUB	LA10	LA26	TA10	TA26	SA10	SA26	
	10	20	30	40	50	60	70	80	90	A	1A	2A	3A	4A	5A	6A	7A	8A
1 0 1 1	11	31	51	71	91	111	131	151	171	VT	ESC	LA11	LA27	TA11	TA27	SA11	SA27	
	11	21	31	41	51	61	71	81	91	B	1B	2B	3B	4B	5B	6B	7B	8B
1 1 0 0	12	32	52	72	92	112	132	152	172	FF	FB	LA12	LA28	TA12	TA28	SA12	SA28	
	12	22	32	42	52	62	72	82	92	C	1C	2C	3C	4C	5C	6C	7C	8C
1 1 0 1	13	33	53	73	93	113	133	153	173	CR	GS	LA13	LA29	TA13	TA29	SA13	SA29	
	13	23	33	43	53	63	73	83	93	D	1D	2D	3D	4D	5D	6D	7D	8D
1 1 1 0	14	34	54	74	94	114	134	154	174	SO	RS	LA14	LA30	TA14	TA30	SA14	SA30	
	14	24	34	44	54	64	74	84	94	E	1E	2E	3E	4E	5E	6E	7E	8E
1 1 1 1	15	35	55	75	95	115	135	155	175	SI	US	LA15	UNL	TA15	UNT	SA15	177	
	15	25	35	45	55	65	75	85	95	F	1F	2F	3F	4F	5F	6F	7F	8F
	ADDRESSED COMMANDS		UNIVERSAL COMMANDS		LISTEN ADDRESSES		TALK ADDRESSES		SECONDARY ADDRESSES OR COMMANDS									



Tektronix
 REF: ANSI STD X3.4-1977
 IEEE STD 488.1-1987
 ISO STD 646-2973

Reserved Words

Overview

This is a list of reserved words for the TDS5000 series instruments. Capital letters identify the required minimum spelling. For the most robust code, use the full spelling, since spelling rules may change over time and among instrument models.

*CAL to DIAG

*CAL	*TRG	BETWEEen	CONTROL
*CLS	*TST	BIT_Nr	COPY
*DDT	*WAI	BN_Fmt	COUNT
*ESE	A	BOTH	COUPLing
*ESR	ABSolute	Box	CURSOr
*IDN	ACQuire	BOXPent	CURVe
*LRN	ACTUal	BUSY	DATA
*OPC	ALias	BY	DATE
*OPT	ALL	BYT_Nr	DEFIne
*PSC	ALLev	BYT_Or	DELAy
*PUD	AREA	CALibrate	DELEte
*RCL	AUTOBright	CENTER	DELTA
*RST	AUTOSet	CH<x>	DELTATime
*SAV	AUXout	CLAss	DESE
*SDS	B	CLOCK	DESKew
*SRE	BANdwidth	CMDBatch	DESTination
*STB	BELI	COLOR	DIAG

DIR to MAXimum

DIR	FASTAcq	HARDCopy	LABEL
DIREction	FILEName	HBArS	LAST
DISplay	FILESystem	HDELTA	LENGth
DIVisions	FILTer	HDR	LESSLimit
EDGE	FIRST	HEADer	LEVEL
EDGE2	FORMat	HIGH	LOCK
ENCdg	FRAME	HIGHLimit	LOGIc
EVENT	FREQuency	HISTogram	LOOP
EVENTS	FUNcTion	HOLDoff	LOOPS
EVMsg	GAIN	HOLDTime	LOW
EVQty	GATEPOS	HORizontal	LOWLimit
EXECUTE	GATEWIDTH	HPOS<x>	MAG
EXTatten	GATING	ID	MAIn
EXTDBatten	GLItch	IMMed	MATH<x>
EXTUnits	GPIB	INTENSItY	MATHCOLOR
FACTory	GRATICule	INPut	MAXimum
FAILURES	HALT	ITEM	

MEAN to SIZE

MEAN	NUMITEMS	PRObestate	RESULT
MEAS<x>	OFFSet	PT_Fmt	RESults
MEASUrement	PAIred	PT_Off	RMDir
METHod	PALETTE	PT_OR	RUNT
MID	PASSword	PULse	SAMPLERate
MID2	PATtern	PUMODE	SAVe
MINimum	PERCent	READFile	SCALE
MKDir	PERSistence	RECALL	SCREENSAVER
MODE	PHASE	RECOrdlength	SCREENSAVERDELAY
MORELimit	POLarity	REF	SElect
NAME	PORT	REF<x>	SELECTED
NEWpass	POSition	REFCOLOr	SERnumber
NEXT	POSition<x>	REFLevel	SET
NR_Pt	PRInt	REName	SETHold
NUMACq	PRObe	REPET	SETTime
NUMAVg	PROBECal	RESBw	SETUp
NUMEnv	PROBEFunc	RESistance	SIZE

SLOpe to ZOOM

SLOpe	SUPPress	VALue	XINcr
SOURCE	TERminator	VARPersist	XPOS
SOURCE2	TEST	VBArS	XUNit
SPAN	THReshold	VDELTA	XZErO
SPC	TIMe	VERBoSe	YMUlT
SPECTral	TIMEOut	VOLtage	YOff
SPLit	TIMEStamp	<wfm>	YPOS
STARt	TRACk	WAVEform	YUNit
STATE	TRANsition	WAVFrm	YZErO
STATIstics	TRIGBar	WEIghting	ZOOM
STDdev	TRIGger	WFId	
STOP	TRIGIF	WFMInpre	
STOPAfter	TRIGT	WFMOutpre	
STRing	TYPE	WHEn	
STYLE	UNIts	WIDth	
SUBITEMS	UNLock	WINdow	
SUBSYS	UNWRap	WRITEFile	

Factory Default Setup Values

Overview

These tables list the default setup values by command group. These are the values that the instrument sets when you press the DEFAULT SETUP front-panel button or send the FACTORY command. Only those commands that have values set by the DEFAULT SETUP function are listed in these tables.

Acquisition

Default Setup Values	
Command	Default
ACQUIRE:MODE	SAMPLE
ACQUIRE:NUMAVG	16
ACQUIRE:NUMENV	10
ACQUIRE:REPEt	1 (ON)
ACQUIRE:STATE	1 (ON)
ACQUIRE:STOPAfter	RUNSTop

Cursor

Default Setup Values	
Command	Default
CURSOr:FUNcTION	VBArs
CURSOr:HBArs:POSITION<x>	$\pm 300.0000E-3$
CURSOr:MODE	INDEpendent
CURSOr:PAIred:POSITION<x>	$\pm 1.6000E-6$
CURSOr:SOURce	CH1
CURSOr:SPLit:POSITION<x>	$\pm 1.6000E-6$
CURSOr:SPLit:SOURCE2	CH1
CURSOr:SPLit:UNIts	BASE
CURSOr:STATE	0 (OFF)
CURSOr:VBArs:POSITION<x>	$\pm 1.6000E-6$
CURSOr:VBArs:UNIts	SECOnds

Display

Default Setup Values	
Command	Default
DISPlay:CLOCK	1
DISPlay:COLOR:MATHCOLOR	DEFAULT
DISPlay:COLOR:PALETTE	NORMAL
DISPlay:COLOR:REFCOLOR	DEFAULT
DISPlay:FILTer	SINX
DISPlay:FORMat	YT
DISPlay:GRATICule	FULI
DISPlay:INTENSITy:AUTOBright	1 (ON)
DISPlay:INTENSITy:SCREENSAVER	1 (ON)
DISPlay:INTENSITy:SCREENSAVERDELAY	28800
DISPlay:INTENSITy:WAVEform	75.0000
DISPlay:PERsistence	OFF
DISPlay:STYle	VECTors
DISPlay:TRIGBar	SHORT
DISPlay:TRIGT	1 (ON)
DISPlay:VARPersist	$500.0000E-3$

Hardcopy

Default Setup Values	
Command	Default
HARDCopy:FILENAME	""
HARDCopy:PORT	FILE

Histogram

Default Setup Values	
Command	Default
HIStogram:BOXPcnt	30.0000, 25.1000, 70.0000, 75.2000
HIStogram:DISplay	LINEAr
HIStogram:FUNCTION	HORizontal
HIStogram:SIze	2.0000
HIStogram:SOUrce	CH1
HIStogram:STATE	0 (OFF)

Horizontal

Default Setup Values	
Command	Default
HORizontal:RECOrdlength	5000
HORizontal:RESOLution	5000
HORizontal:ROLL	AUTO
HORizontal[:MAIN]:DELAy:MODE	0 (OFF)
HORizontal[:MAIN]:DELAy:POSition	50.0000
HORizontal[:MAIN]:DELAy:TIME	0.0000
HORizontal[:MAIN]:POSition	50.0000
HORizontal[:MAIN]:SAMPLERate	1.2500E+9
HORizontal[:MAIN]:SCAle	400.0000E-9

Math

Default Setup Values	
Command	Default
MATH<x>:DEFine	" "
MATH<x>:LABEL:NAME	" "
MATH<x>:LABEL:XPOS	5
MATH<x>:LABEL:YPOS	MATH1 65 MATH2 80 MATH3 95 MATH4 110
MATH<x>:NUMavg	2
MATH<x>:POSition	0.0000
MATH<x>:SCAle	1.0000
MATH<X>:SPECTral:CENTER	325.0000E+06
MATH<X>:SPECTral:GATEPOS	0.0000
MATH<X>:SPECTral:GATEWIDTH	2.0000E-06
MATH<X>:SPECTral:LOCK	0 (OFF)
MATH<X>:SPECTral:MAG	DB
MATH<X>:SPECTral:PHASE	DEGREES
MATH<X>:SPECTral:REFLEVEL	20.0000
MATH<X>:SPECTral:REFLEVELOffset	223.6000E-03
MATH<X>:SPECTral:RESBw	1.0000E+06
MATH<X>:SPECTral:SPAN	600.0000E+06
MATH<X>:SPECTral:SUPPress	-35.0000
MATH<X>:SPECTral:UNWRap	0 (OFF)
MATH<X>:SPECTral:WINdow	GAUSSIAN

Measurement

Default Setup Values	
Command	Default
MEASUrement:GATING	0 (OFF)
MEASUrement:METhod	HISTogram
MEASUrement:IMMed:TYPe	UNDEFINED
MEASUrement:IMMed:SOURCE[1]	CH1
MEASUrement:IMMed:SOURCE2	CH1
MEASUrement:IMMed:DELAy:EDGE[1]	RISe
MEASUrement:IMMed:DELAy:EDGE2	RISe
MEASUrement:IMMed:DELAy:DIREction	FORWards
MEASUrement: MEAS<x>:STATE	0 (OFF)
MEASUrement: MEAS<x>:TYPe	UNDEFINED
MEASUrement:MEAS<x>:SOURCE[1]	CH1
MEASUrement:MEAS<x>:SOURCE2	CH1
MEASUrement:MEAS<x>:DELAy:EDGE[1]	RISe
MEASUrement:MEAS<x>:DELAy:EDGE2	RISe
MEASUrement:MEAS<x>:DELAy:DIREction	FORWards
MEASUrement:REFLevel:METhod	PERCent
MEASUrement:REFLevel:ABSolute:HIGH	0.0000
MEASUrement:REFLevel:ABSolute:LOW	0.0000
MEASUrement:REFLevel:ABSolute:MID	0.0000
MEASUrement:REFLevel:ABSolute:MID2	0.0000
MEASUrement:REFLevel:PERCent:HIGH	90.0000
MEASUrement:REFLevel:PERCent:LOW	10.0000
MEASUrement:REFLevel:PERCent:MID	50.0000
MEASUrement:REFLevel:PERCent:MID2	50.0000
MEASUrement:STATIstics:MODe	OFF
MEASUrement:STATIstics:WEIghting	32

Miscellaneous

Default Setup Values	
Command	Default
AUXout:EDGE	FALing
AUXout:SOUrce	ATRIGger
CMDBatch	1 (ON)
HEADer	1 (ON)
LOCK	NONE
ROSc:SOUrce	INTERNAL
VERBose	1 (ON)

Trigger

Default Setup Values	
Command	Default
TRIGger:A:MODE	AUTO
TRIGger:A:TYPe	EDGE
TRIGger:A:LEVel	0.0000
TRIGger:A:HOLDoff:BY	DEFAUlt
TRIGger:A:HOLDoff:TIME	1.5000E-06
TRIGger:A:EDGE:SOUrce	CH1
TRIGger:A:EDGE:COUPling	DC
TRIGger:A:EDGE:SLOpe	RISe
TRIGger:A:LOGic:CLAss	PATtern
TRIGger:A:LOGic:FUNcTion	AND
TRIGger:A:LOGic:THReshold:CH<x>	CH1 1.2000 CH2 1.2000 CH3 1.2000 CH4 1.2000
TRIGger:A:LOGic:INPut:CH<x>	CH1 HIGH CH2 X CH3 X
TRIGger:A:LOGic:PATtern:INPut:CH4	X
TRIGger:A:LOGic:PATtern:WHEn	TRUE
TRIGger:A:LOGic:PATtern:WHEn:LESSLimit	5.0000E-09
TRIGger:A:LOGic:PATtern:WHEn:MORELimit	5.0000E-09
TRIGger:A:LOGic:SETHold:CLOCK:EDGE	RISe
TRIGger:A:LOGic:SETHold:CLOCK:THReshold	1.2000
TRIGger:A:LOGic:SETHold:CLOCK:SOUrce	CH2
TRIGger:A:LOGic:SETHold:DATa:THReshold	1.2000
TRIGger:A:LOGic:SETHold:DATa:SOUrce	CH1
TRIGger:A:LOGic:SETHold:HOLDTime	2.0000E-09
TRIGger:A:LOGic:SETHold:SETTime	3.0000E-09
TRIGger:A:LOGic:STATE:INPut:CH4	RISe
TRIGger:A:LOGic:STATE:WHEn	TRUe
TRIGger:A:PULse:CLAss	GLItch
TRIGger:A:PULse:SOUrce	CH1
TRIGger:A:PULse:GLItch:WIDth	2.0000E-09
TRIGger:A:PULse:GLItch:TRIGIF	ACcEpt
TRIGger:A:PULse:GLItch:POLarity	POSITIVe
TRIGger:A:PULse:SOUrce	CH1
TRIGger:A:PULse:RUNT:LOGic:INPut:CH<x>	HIGH
TRIGger:A:PULse:RUNT:LOGic:THReshold:CH<x>	1.2000E-00
TRIGger:A:PULse:RUNT:POLarity	POSITIVe
TRIGger:A:PULse:RUNT:THReshold:HIGH	1.2000E-00
TRIGger:A:PULse:RUNT:THReshold:LOW	800.0000E-03
TRIGger:A:PULse:RUNT:WHEn	OCCurs
TRIGger:A:PULse:RUNT:WIDth	2.0000E-09
TRIGger:A:PULse:TRANSition:DELTATime	2.0000E-09
TRIGger:A:PULse:TRANSition:POLarity	POSITIVe
TRIGger:A:PULse:TRANSition:THReshold:HIGH	1.2000E-00
TRIGger:A:PULse:TRANSition:THReshold:LOW	800.0000E-03
TRIGger:A:PULse:TRANSition:WHEn	FASTERthan
TRIGger:A:PULse:WIDth:LOWLimit	2.0000E-09
TRIGger:A:PULse:WIDth:HIGHLimit	2.0000E-09
TRIGger:A:PULse:WIDth:WHEn	WITHIN
TRIGger:A:PULse:WIDth:POLarity	POSITIVe
TRIGger:A:PULse:WINDow:LOGic:INPut:CH<x>	HIGH
TRIGger:A:PULse:WINDow:LOGic:THReshold:CH<x>	1.20000-E00
TRIGger:A:PULse:WINDow:THReshold:HIGH	1.2000-E00
TRIGger:A:PULse:WINDow:THReshold:LOW	800.0000-E3
TRIGger:A:PULse:WINDow:TYPe	INSide
TRIGger:A:PULse:WINDow:WHEn	OCCurs
TRIGger:A:PULse:WINDow:WIDth	2.0000E-9
TRIGger:A:PULse:TIMEOut:POLarity	STAYSHigh
TRIGger:A:PULse:TIMEOut:TIME	2.0000E-09
TRIGger:A:VIDeo:CUSTom:FORMat	INTERLAcEd

TRIGger:A:VIDeo:CUSTom:SCAN	RATE1
TRIGger:A:VIDeo:FIELD	ALLFields
TRIGger:A:VIDeo:HOLdoff:FIELD	0.0000
TRIGger:A:VIDeo:LINE	1
TRIGger:A:VIDeo:POLarity	NORMAI
TRIGger:A:VIDeo:SCAN	RATE1
TRIGger:A:VIDeo:SOURce	CH1
TRIGger:A:VIDeo:STANdard	NTSC
TRIGger:B:STATE	0 (OFF)
TRIGger:B:TYPe	EDGE
TRIGger:B:LEVel	0.0000
TRIGger:B:BY	EVENTS
TRIGger:B:EDGE:SOURce	CH1
TRIGger:B:EDGE:SLOpe	RISe
TRIGger:B:EDGE:COUPling	DC
TRIGger:B:TIME	16.0000E-09
TRIGger:B:EVENTS:COUNT	2

Vertical

Default Setup Values	
Command	Default
CH<x>:BANdwidth	CH1-4 1.0000E+09
CH<x>:COUPling	CH1-4 DC
CH<x>:DESKew	CH1-4 0.0000
CH<x>:OFFSet	CH1-4 0.0000
CH<x>:INVert	0
CH<x>:POSition	CH1-4 0.0000
CH<x>:SCAle	CH1-4 100.0000E-03
CH<x>:TERmination	CH1-4 1.0000E-06
CH<x>:PROBEFunc:EXTatten	CH1-4 1.0000
CH<x>:PROBEFunc:EXTUnits	CH1-4 "None"
CH<x>:LABEL:NAME	CH1-4 " "
CH<x>:LABEL:XPOS	CH1-4 5
CH<x>:LABEL:YPOS	CH1 5 CH2 20 CH3 35 CH4 50
CH<x>:PROBEFunc:EXTUnits	"None"
DATa:DESTination	REF1
DATa:ENCdg	RIBinary
DATa:SOURce	CH1
DATa:STARt	1
DATa:STOP	500
REF<x>:HORizontal:POSition	50.0
REF<x>:LABel:NAME	" "
REF<x>:LABel:XPOS	REF1-4 5
REF<x>:LABel:YPOS	REF1 125 REF2 140 REF3 155 REF4 170
REF<x>:VERTical:POSition	0.0000
REF<x>:VERTical:SCAle	1.0000E-3
SElect:CH<x>	CH1 1 CH2 0 CH3 0 CH4 0
SElect:CONTROI	CH1
SElect:MATH<x>	MATH1-4 0
SElect:REF<x>	REF1-4 0

Waveform

Default Setup Values	
Command	Default
WFMInpre:BIT_Nr	8
WFMInpre:BN_Fmt	RI
WFMInpre:BYT_Nr	1
WFMInpre:BYT_Or	MSB
WFMInpre:ENCdg	BIN
WFMInpre:NR_Pt	500
WFMInpre:PT_Fmt	Y
WFMInpre:PT_Off	0
WFMInpre:XINcr	2.0000E-06
WFMInpre:XUNit	"s"
WFMInpre:XZEro	0.000
WFMInpre:YMUlt	1.0000E-03
WFMInpre:YOff	0.0000
WFMInpre:YUNit	"V"
WFMInpre:YZEro	0.0000
WFMOutpre:BIT_Nr	8
WFMOutpre:BN_Fmt	RI
WFMOutpre:BYT_Nr	1
WFMOutpre:BYT_Or	MSB
WFMOutpre:ENCdg	BIN
WFMOutpre:NR_Pt	500
WFMOutpre:PT_Fmt	Y
WFMOutpre:PT_Off	2500
WFMOutpre:XINcr	800.0000E-12
WFMOutpre:XUNit	"s"
WFMOutpre:XZEro	0.000
WFMOutpre:YMUlt	4.0000E-03
WFMOutpre:YOff	0.0000
WFMOutpre:YUNit	"V"
WFMOutpre:YZEro	0.0000
WFMOutpre:WFid	"Ch1, DC coupling, 100.0mV/div, 400.0ns/div, 5000 points, Sample mode"

Zoom

Default Setup Values	
Command	Default
ZOOM:GRATICule:SPLIT	FIFtyfifty
ZOOM:<wfm>:HORizontal:POSition	CH1-4 50.0000 MATH1-4 50.0000 REF1-4 50.0000
ZOOM:<wfm>:HORizontal:SCAle	CH1-4 2 MATH1-4 2 REF1-4 2
ZOOM:HORizontal:LOCK	ALL
ZOOM:MODE	0 (OFF)
ZOOM:<wfm>:VERTical:POSition	CH1-4 0.0000 MATH1-4 0.0000 REF1-4 0.0000
ZOOM:<wfm>:VERTical:SCAle	CH1-4 1.0000 MATH1-4 1.0000 REF1-4 1.0000

GPIB Interface Specifications

Overview

This topic describes details of the GPIB remote interface of the instrument. Normally, you will not need this information to use the instrument, but this information may be useful if you are connecting to controllers with unusual configurations.

GPIB Functions

The following table lists the GPIB interface functions and electrical function subsets supported by this instrument and a brief description of each function.

GPI Functions		
Interface Function	Subset	Description
Acceptor Handshake	AH1	The instrument can receive multiline messages across the GPIB from other devices.
Controller	C0	No Controller capability; the instrument cannot control other devices.
Device Clear	DC1	The instrument can respond to both the DCL (Device Clear) interface message and to the Selected Device Clear (SDC) interface message when the instrument is listen-addressed.
Device Trigger	DT1	Device Trigger capability; the Instrument does respond to the GET (Group Execute Trigger) interface message.
Electrical	E2	The instrument uses tri-state buffers, which are optimal for high-speed data transfer.
Listener	L4	The instrument becomes a listener when it detects the listen address being sent over the bus with the ATN line asserted. The instrument ceases to be a listener and becomes a talker when it detects the talk address being sent over the bus with the ATN line asserted.
Parallel Poll	PP0	No Parallel Poll capability; the instrument does not respond to PPC (Parallel Poll Configure), PPD (Parallel Poll Disable), PPE (Parallel Poll Enable), or PPU (Parallel Poll Unconfigure) interface messages, nor does it send a status message when the ATN and EOI lines are asserted simultaneously.
Remote/Local	RL1	The instrument can respond to both the GTL (Go To Local) and LLO (Local Lock Out) interface messages.
Service Request	SR1	The instrument can assert the SRQ line to notify the controller in charge that it requires service.
Source Handshake	SH1	The instrument can initiate multiline messages to send across the GPIB to other devices.
Talker	T5	The instrument becomes a talker when it detects the talk address being sent over the bus with the ATN line asserted. The instrument ceases to be a talker and becomes a listener when it detects the listen address being sent over the bus with the ATN line asserted. The instrument also ceases to be a talker when it detects the talk address of another device being sent over the data lines with ATN asserted.

Interface Messages

The following table shows the standard interface messages that the instrument supports.

Standard Interface Messages	
Message	GPIB
DCL	Yes
GET	Yes
GTL	Yes
LLO	Yes
PPC	No
PPD	No
PPE	No
PPU	No
SDC	Yes
SPD	Yes
SPE	Yes
TCT	No
UNL	Yes
UNT	Yes
Listen Addresses	Yes
Talk Addresses	Yes