Keysight D9010ETHC Ethernet Compliance Application

KEYSIGHT

PROGRAMMER'S REFERENCE

Notices

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In This Book

This book is your guide to programming the Keysight Technologies D9010ETHC Ethernet Compliance Application.

- Chapter 1, “Introduction to Programming,” starting on page 7, describes compliance application programming basics.
- Chapter 2, “Configuration Variables and Values,” starting on page 9, Chapter 3, “Test Names and IDs,” starting on page 25, and Chapter 4, “Instruments,” starting on page 37 provide information specific to programming the D9010ETHC Ethernet Compliance Application.

How to Use This Book

Programmers who are new to compliance application programming should read all of the chapters in order. Programmers who are already familiar with this may review chapters 2, 3, and 4 for changes.

Contents

1 Introduction to Programming

This chapter introduces the basics for remote programming a compliance/test application. The programming commands provide the means of remote control. Basic operations that you can do remotely with a computer and a compliance/test app running on an oscilloscope include:

- Launching and closing the application.
- Configuring the options.
- Running tests.
- Getting results.
- Controlling when and were dialogs get displayed
- Saving and loading projects.

You can accomplish other tasks by combining these functions.

Remote Programming Toolkit

The majority of remote interface features are common across all the Keysight Technologies, Inc. family of compliance/test applications. Information on those features is provided in the N5452A Compliance Application Remote Programming Toolkit available for download from Keysight here: www.keysight.com/find/rpi. The D9010ETHC Ethernet Compliance Application uses Remote Interface Revision 7.12. The help files provided with the toolkit indicate which features are supported in this version.

In the toolkit, various documents refer to "application-specific configuration variables, test information, and instrument information". These are provided in Chapters 2, 3, and 4 of this document, and are also available directly from the application's user interface when the remote interface is enabled (View>Preferences::Remote tab::Show remote interface hints). See the toolkit for more information.

2 Configuration Variables and Values

The following table contains a description of each of the D9010ETHC Ethernet Compliance Application options that you may query or set remotely using the appropriate remote interface method. The columns contain this information:

- GUI Location — Describes which graphical user interface tab contains the control used to change the value.
- Label — Describes which graphical user interface control is used to change the value.
- Variable — The name to use with the SetConfig method.
- Values — The values to use with the SetConfig method.
- Description — The purpose or function of the variable.

For example, if the graphical user interface contains this control on the **Set Up** tab:

- Enable Advanced Features

then you would expect to see something like this in the table below:

Table 1 Example Configuration Variables and Values

GUI Location	Label	Variable	Values	Description
Set Up	Enable Advanced Features	EnableAdvanced	True, False	Enables a set of optional features.

and you would set the variable remotely using:

```
ARSL syntax
-----------
arsl -a ipaddress -c "SetConfig 'EnableAdvanced' 'True'"

C# syntax
```

```
---------
remoteAte.SetConfig("EnableAdvanced", "True");
```

Here are the actual configuration variables and values used by this application:

NOTE Some of the values presented in the table below may not be available in certain configurations. Always perform a "test run" of your remote script using the application's graphical user interface to ensure the combinations of values in your program are valid.

NOTE The file, "ConfigInfo.txt", which may be found in the same directory as this help file, contains all of the information found in the table below in a format suitable for parsing.

Table 2 Configuration Variables and Values

GUI Location	Label	Variable	Values	Description
Configure	# Harmonic Avgs	N10BTHarmonicAvgs	(Accepts user-defined text), 0.0, 8.0, 16.0, 32.0, 64.0, 128.0, 256.0, 512.0, 1024.0, 2048.0, 4096.0	Determines the number of averages used for the 10 Base-T Harmonic Ones measurement.
Configure	# Harmonic Avgs (10Base-Te)	N10BTeHarmonicAvgs	(Accepts user-defined text), 0.0, 8.0, 16.0, 32.0, 64.0, 128.0, 256.0, 512.0, 1024.0, 2048.0, 4096.0	Determines the number of averages used for the 10 Base-Te Harmonic Ones measurement.
Configure	# Harmonics Report in table	NoHarmonicReportHarmonics	(Accepts user-defined text), 10.0, 15.0, 20.0, 25.0, 30.0, 35.0, 40.0, 45.0, 50.0	Determines the number of harmonics that will report in table for the 10 Base-T Harmonic Ones measurement.
Configure	# Harmonics Report in table (10Base-Te)	N10BTeNoHarmonicReportHarmonics	(Accepts user-defined text), 10.0, 15.0, 20.0, 25.0, 30.0, 35.0, 40.0, 45.0, 50.0	Determines the number of harmonics that will report in table for the 10 Base-Te Harmonic Ones measurement.
Configure	# Quiet Waveforms (1000BT EEE)	N1000BTQuietTimeAcq	(Accepts user-defined text), 10.0, 20.0, 50.0, 100.0	Determines the number of waveforms acquired and analyzed for the 1000BT EEE Quiet time test.

Table 2 Configuration Variables and Values (continued)

GUI Location	Label	Variable	Values	Description
Configure	# Quiet Waveforms (100BT EEE)	N100BTQuietTimeAcq	(Accepts user-defined text), 10.0, 20.0, 50.0, 100.0	Determines the number of waveforms acquired and analyzed for the 100BT EEE Quiet time test.
Configure	# Refresh Burst Idle Width	N1000BTRefreshBurstIdle	(Accepts user-defined text), 125, 250, 375, 500	Determines the number of bit for the idle burst width in the Refresh waveform.
Configure	# Refresh Waveforms (1000BT EEE)	N1000BTRefreshTimeAcq	(Accepts user-defined text), 10.0, 20.0, 50.0, 100.0	Determines the number of waveforms acquired and analyzed for the 1000BT EEE Refresh time test.
Configure	# Refresh Waveforms (100BT EEE)	N100BTRefreshTimeAcq	(Accepts user-defined text), 10.0, 20.0, 50.0, 100.0	Determines the number of waveforms acquired and analyzed for the 100BT EEE Refresh time test.
Configure	# Rise/Fall Avgs	N100BTRiseFallAvgs	0.0, 8.0, 16.0, 32.0, 64.0, 128.0, 256.0, 512.0, 1024.0, 2048.0, 4096.0	Determines the number of averages used for all 100 Base-TX rise time and fall time measurements.
Configure	# Rise/Fall Meas	N100BTRiseFallMeas	(Accepts user-defined text), 1.0, 10.0, 20.0, 50.0, 100.0, 200.0	Determines the number of rise and fall time measurements used for 100 Base-TX rise time and fall time tests. This number is used to compute the worst case rise and fall time and the rise and fall symmetry.
Configure	# Waveforms (100 Base-TX AOI Template Test)	N100BTMaskTestAcqs	(Accepts user-defined text), 1.0, 10.0, 20.0, 30.0, 40.0, 50.0, 60.0, 70.0, 80.0, 90.0, 100.0, 200.0, 400.0, 500.0, 1000.0, 5000.0, 10000.0	Determines the number of waveforms acquired and analyzed for the 100 Base-TX AOI Template Test.
Configure	# Waveforms (1000 Base-T Common Mode Output Voltage Test)	N1000BTCommonModeAcqs	(Accepts user-defined text), 1.0, 10.0, 20.0, 30.0, 40.0, 50.0, 60.0, 70.0, 80.0, 90.0, 100.0, 200.0, 400.0, 500.0, 1000.0, 5000.0	Determines the number of waveforms acquired and analyzed for the 1000 Base-T Common Mode Output Voltage Test.

Table 2 Configuration Variables and Values (continued)

GUI Location	Label	Variable	Values	Description
Configure	# Waveforms (1000 Base-T Template Tests)	N1000BTMaskTestAcqs	(Accepts user-defined text), 1.0, 10.0, 20.0, 30.0, 40.0, 50.0, 60.0, 70.0, 80.0, 90.0, 100.0, 200.0, 400.0, 500.0	Determines the number of waveforms acquired and analyzed for all 1000 Base-T Template Tests.
Configure	#Avgs (100 Base-TX Peak Voltage measurements)	N100BTPeakVoltAvgs	(Accepts user-defined text), 0.0, 8.0, 16.0, 32.0, 64.0, 128.0, 256.0, 512.0, 1024.0, 2048.0, 4096.0	Determines the number of averages used for all 100 Base-TX Peak Voltage measurements.
Configure	#Avgs (100 Base-TX overshoot)	N100BTOvershootAvgs	(Accepts user-defined text), 0.0, 8.0, 16.0, 32.0, 64.0, 128.0, 256.0, 512.0, 1024.0, 2048.0, 4096.0	Determines the number of averages used for the 100 Base-TX overshoot tests.
Configure	#Avgs (1000 Base-T Droop Tests)	N1000BTDroopTestAvgs	(Accepts user-defined text), 0.0, 8.0, 16.0, 32.0, 64.0, 128.0, 256.0, 512.0, 1024.0, 2048.0, 4096.0	Determines the number of averages used for 1000 Base-T Droop Tests.
Configure	#Avgs (1000 Base-T Peak Voltage measurements)	N1000BTPeakVoltAvgs	(Accepts user-defined text), 0.0, 8.0, 16.0, 32.0, 64.0, 128.0, 256.0, 512.0, 1024.0, 2048.0, 4096.0	Determines the number of averages used for all 1000 Base-T Peak Voltage measurements.
Configure	#Avgs (1000 Base-T template tests)	N1000BTMaskTestAvgs	(Accepts user-defined text), 0.0, 8.0, 16.0, 32.0, 64.0, 128.0, 256.0, 512.0, 1024.0, 2048.0, 4096.0	Determines the number of averages used for all 1000 Base-T template tests.
Configure	#Avgs (TM4 Distortion test)	N1000BTTM4Avgs	(Accepts user-defined text), 1.0, 50.0, 100.0, 150.0, 200.0, 250.0	Determines the number of averages used for all TM4 Distortion test. This also represent the number of cycle used for TM4 measurements.

Table 2 Configuration Variables and Values (continued)

GUI Location	Label	Variable	Values	Description
Configure	#Edges	N1000BTFilteredJitterEdges	(Accepts user-defined text), 1250.0, 6000.0, 100000	This sets the minimum number of TX_TCLK edges to inspect when running 1000Base-T filtered jitter measurements. This applies to both MASTER and SLAVE mode filtered jitter measurements.
Configure	#Jitter Waveforms	N10BTJitterAcqs	(Accepts user-defined text), 300.0, 500.0, 1000.0, 1500.0, 2000.0, 3000.0, 4000.0	Determines the number of waveforms hits acquired and analyzed for the 10 Base-T Jitter Tests.
Configure	#Jitter Waveforms (10 Base-Te)	N10BTeJitterAcqs	(Accepts user-defined text), 300.0, 500.0, 1000.0, 1500.0, 2000.0, 3000.0, 4000.0	Determines the number of waveforms hits acquired and analyzed for the 10 Base-Te Jitter Tests.
Configure	#LTP/IDL Avgs	N10BTMaskTestAvgs	(Accepts user-defined text), 0.0, 8.0, 16.0, 32.0, 64.0, 128.0, 256.0, 512.0, 1024.0, 2048.0, 4096.0	Determines the number of averages used for the 10 Base-T Link Test Pulse and TP_IDL Template Tests. Note that you may need many averages to reduce measurement noise. These templates are extremely tight.
Configure	#LTP/IDL Avgs (10Base-Te)	N10BTeMaskTestAvgs	(Accepts user-defined text), 0.0, 8.0, 16.0, 32.0, 64.0, 128.0, 256.0, 512.0, 1024.0, 2048.0, 4096.0	Determines the number of averages used for the 10 Base-Te Link Test Pulse and TP_IDL Template Tests. Note that you may need many averages to reduce measurement noise. These templates are extremely tight.
Configure	#LTP/MAU Waveforms	N10BTMaskTestAcqs	(Accepts user-defined text), 1.0, 10.0, 20.0, 30.0, 40.0, 50.0, 60.0, 70.0, 80.0, 90.0, 100.0, 200.0, 400.0, 500.0, 1000.0, 5000.0, 10000.0	Determines the number of waveforms acquired and analyzed for the 10 Base-T Link Test Pulse and MAU Template Tests.

Table 2 Configuration Variables and Values (continued)

GUI Location	Label	Variable	Values	Description
Configure	#LTP/MAU Waveforms (10 Base-Te)	N10BTeMaskTestAcqs	(Accepts user-defined text), 1.0, 10.0, 20.0, 30.0, 40.0, 50.0, 60.0, 70.0, 80.0, 90.0, 100.0, 200.0, 400.0, 500.0, 1000.0, 5000.0, 10000.0	Determines the number of waveforms acquired and analyzed for the 10 Base-Te Link Test Pulse and MAU Template Tests.
Configure	#TP_IDL Waveforms	N10BTMaskTestIDLAcqs	(Accepts user-defined text), 1.0, 10.0, 15.0, 20.0, 30.0, 40.0, 50.0, 60.0, 70.0, 80.0, 90.0, 100.0, 200.0, 400.0, 500.0, 1000.0, 5000.0, 10000.0	Determines the number of waveforms acquired and analyzed for the 10 Base-T TP_IDL Template Test.
Configure	#TP_IDL Waveforms (10 Base-Te)	N10BTeMaskTestIDLAcqs	(Accepts user-defined text), 1.0, 10.0, 15.0, 20.0, 30.0, 40.0, 50.0, 60.0, 70.0, 80.0, 90.0, 100.0, 200.0, 400.0, 500.0, 1000.0, 5000.0, 10000.0	Determines the number of waveforms acquired and analyzed for the 10 Base-Te TP_IDL Template Test.
Configure	Average factor	AvgFac	(Accepts user-defined text), 10, 20	Set the average factor for Return Loss test.
Configure	Bandwidth Limit	ScopeBandwidthMode	AUTO, MAN	Applies to Transmitter Timing Jitter test. Manual means user can specify the scope bandwidth at bandwidth reduction config.
Configure	Bandwidth Limiting	TM4BWLimit	ON, OFF	This applies 1GHz Bandwidth Limiting when turned on to reduce the noise contributing from the oscilloscope when running Transmitter Distortion test. By turning on this option will increase the test time of this test.

Table 2 Configuration Variables and Values (continued)

GUI Location	Label	Variable	Values	Description
Configure	Bandwidth Reduction	ScopeBandwidth	(Accepts user-defined text), 0, 1e+9, 2e+9, 3e+9, 4e+9, 5e+9, 6e+9	Applies to certain tests if noise reduction feature is available. Auto means no noise reduction.
Configure	Clock/Data Edges	GBEDataEdges	Rising, Falling, Both	Determines which Clock and Data edges are used to measure Jitter.
Configure	Common Mode BNC	CommonModeChan	CHAN1, CHAN2, CHAN3, CHAN4	The oscilloscope channel used to measure common mode voltage of the DUT with a BNC cable connected to fixture 4.
Configure	DCD Pattern	ExpectedDCDRandom	1.0, 0.0	Determines the pattern to use when testing 100 Base-TX Duty Cycle Distortion (DCD).
Configure	DUT Clock	DUTClockChan	CHAN1, CHAN2, CHAN3, CHAN4	Determines the oscilloscope channel used to probe the transmit (TX_TCLK) clock signal on the DUT with an InfiniiMax probe and solder-in diff probe head. This signal is used for all 1000 Base-T Jitter measurements.
Configure	DUT D+	DataPosChan	CHAN1, CHAN2, CHAN3, CHAN4	Specifies the oscilloscope channel being used for D+. Used in tests with disturber or jitter test without access to TX_TCLK.
Configure	DUT D-	DataNegChan	CHAN1, CHAN2, CHAN3, CHAN4	Specifies the oscilloscope channel being used for D-. Used in tests with disturber or jitter test without access to TX_TCLK.
Configure	DUT Data	DataChan	CHAN1, CHAN2, CHAN3, CHAN4	The oscilloscope channel used to probe transmitted Ethernet Data from the DUT. This channel setting does NOT apply to 1000 Base-T Jitter Tests.
Configure	Enable Manual Mask Alignment	ManMaskAlign	True, False	Enable manual mask alignment after the auto mask test failed.
Configure	Ground Reference	N100RefPoint	Offset, Default	Determines the 100BT Peak Voltage Measurement Reference.

Table 2 Configuration Variables and Values (continued)

GUI Location	Label	Variable	Values	Description
Configure	HPFCommonMode	HPFCommonModeChan	ON, OFF	The oscilloscope channel used to measure common mode voltage of the DUT with a BNC cable connected to fixture 4.
Configure	Harmonic Content Peak Threshold	HCPeakThreshold	-20, -25, -30, -35, -40, -45, -50, -55, -60	Determines peak threshold level for the 10 Base-T harmonic content Tests.
Configure	Harmonic Content Peak Threshold (10 Base-Te)	N10BTeHCPeakThreshold	-20, -25, -30, -35, -40, -45, -50, -55, -60	Determines peak threshold level for the 10 Base-Te harmonic content Tests.
Configure	Harmonic Test Pattern Type	10BTHarmonicPacketType	standard, no headers, continuous	Determines the type of packet used for Harmonic test.
Configure	Harmonic Test Pattern Type (10Base-Te)	10BTeHarmonicPacketType	standard, no headers, continuous	Determines the type of packet used for Harmonic test.
Configure	High Pass Filter (w/o Disturbing)	HPFwo	Default, UDF	Determines the mask alignment method for template test.
Configure	Jitter DUT Data	JitterDataChan	CHAN1, CHAN2, CHAN3, CHAN4	The oscilloscope channel used to probe transmitted Ethernet Data from the DUT. This channel setting ONLY applies to 1000BT Jitter Tests in both with and without access to TX_TCLK.
Configure	Jitter Measurement	JitterMeas10BT	ALL, EIGHT_BT, EIGHT_POINT5_BT	Determines the Jitter Measurements to perform for 10 Base-T jitter tests. 'ALL' tests jitter at both 8.0BT and 8.5BT as described in the specification. '8.0BT' and '8.5BT' test jitter individually at either 8.0 or 8.5BT respectively.
Configure	Jitter Measurement (10 Base-Te)	JitterMeas10BTe	ALL, EIGHT_BT, EIGHT_POINT5_BT	Determines the Jitter Measurements to perform for 10 Base-Te jitter tests. 'ALL' tests jitter at both 8.0BT and 8.5BT as described in the specification. '8.0BT' and '8.5BT' test jitter individually at either 8.0 or 8.5BT respectively.
Configure	Jitter Measurement Point	N10JittPoint	Mid, Cross	Determines the Jitter Measurement Point.

Table 2 Configuration Variables and Values (continued)

GUI Location	Label	Variable	Values	Description
Configure	Jitter Measurement Point ((10 Base-Te))	N10BTeJittPoint	Mid, Cross	Determines the Jitter Measurement Point.
Configure	Jitter Trigger Method	JitterTrigger	Auto, Manual	Determines the Trigger Method used for Jitter Measurements. This method automatically attempts to determine the packet length and provides a stable trigger in the middle of a random data packet. This requires random data packets with a consistent packet size and a consistent inter-packet gap. Choosing Manual will prompt the user to set up the trigger before continuing the test.
Configure	Jitter Trigger Method (10Base-Te)	N10BTeJitterTrigger	Auto, Manual	Determines the Trigger Method used for Jitter Measurements. This method automatically attempts to determine the packet length and provides a stable trigger in the middle of a random data packet. This requires random data packets with a consistent packet size and a consistent inter-packet gap. Choosing Manual will prompt the user to set up the trigger before continuing the test.
Configure	LTP/TP_IDL Loads	TenBTMaskTestLoads	ALL, LOAD1, LOAD2, LOAD3	Determines which of the 3 required loads to apply when testing 10 Base-T Link Test Pulse and TP_IDL Template tests. To determine compliance, select 'ALL'. You may also select an individual load if you wish to test only that load.
Configure	LTP/TP_IDL Loads (10 Base-Te)	TenBTeMaskTestLoads	ALL, LOAD1, LOAD2, LOAD3	Determines which of the 3 required loads to apply when testing 10 Base-Te Link Test Pulse and TP_IDL Template tests. To determine compliance, select 'ALL'. You may also select an individual load if you wish to test only that load.

Table 2 Configuration Variables and Values (continued)

GUI Location	Label	Variable	Values	Description
Configure	LTP/TP_IDL Tests	TenBTStartEndTests	Both, Start, End	Determines which parts of the signal to test (Start, End, or Both)This setting applieas to the 10 Base-T Link Test Pulse and TP_IDL Template tests. To determine compliance, select 'Both'.
Configure	LTP/TP_IDL Tests (10 Base-Te)	TenBTeStartEndTests	Both, Start, End	Determines which parts of the signal to test (Start, End, or Both)This setting applieas to the 10 Base-Te Link Test Pulse and TP_IDL Template tests. To determine compliance, select 'Both'.
Configure	Link Partner Clock	LPClockChan	CHAN1, CHAN2, CHAN3, CHAN4	Determines the oscilloscope channel used to probe the transmit (TX_TCLK) clock signal on the Link Partner with an InfiniiMax probe and solder-in diff probe head. This signal is used for 1000 Base-T SLAVE mode jitter measurements.
Configure	Link Test Pulse Trigger Holdoff	LTPHoldoff	100E-09, 200E-09, 300E-09, 400E-09, 500E-09, 1E-06, 2E-06, 30E-06, 4E-06, 5E-06	Determines the trigger holdoff for the Link Test Pulse tests.
Configure	Link Test Pulse Trigger Holdoff (10 Base-Te)	N10BTeLTPHoldoff	100E-09, 200E-09, 300E-09, 400E-09, 500E-09, 1E-06, 2E-06, 30E-06, 4E-06, 5E-06	Determines the trigger holdoff for the Link Test Pulse tests.
Configure	Link Test Pulse Trigger Level	LTPTrigLevel	100E-03, 200E-03, 300E-03, 400E-03, 500E-03, 600E-03, 700E-03, 800E-03, 900E-03, 1.0, 1.1, 1.2	Determines the trigger level for the Link Test Pulse tests.
Configure	Link Test Pulse Trigger Level ((10 Base-Te))	N10BTeLTPTrigLevel	100E-03, 200E-03, 300E-03, 400E-03, 500E-03, 600E-03, 700E-03, 800E-03, 900E-03, 1.0, 1.1, 1.2	Determines the trigger level for the Link Test Pulse tests.

Table 2 Configuration Variables and Values (continued)

GUI Location	Label	Variable	Values	Description
Configure	MAU Max Scaling	MAUMaxScaling	1.1, 1.09, 1.08, 1.07, 1.06, 1.05, 1.04, 1.03, 1.02, 1.01, 1.0, 0.99, 0.98, 0.97, 0.96, 0.95, 0.94, 0.93, 0.92, 0.91	Determines the maximum scale used for the MAU Mask. The mask-alignment routines will not scale the mask above the value that you specify here. NOTE: The standard does not allow scaling by more than 1.1.
Configure	MAU Max Scaling (10Base-Te)	N10BTeMAUMaxScaling	1.1, 1.09, 1.08, 1.07, 1.06, 1.05, 1.04, 1.03, 1.02, 1.01, 1.0, 0.99, 0.98, 0.97, 0.96, 0.95, 0.94, 0.93, 0.92, 0.91	Determines the maximum scale used for the MAU Mask. The mask-alignment routines will not scale the mask above the value that you specify here. NOTE: The standard does not allow scaling by more than 1.1.
Configure	MAU Min Scaling	MAUMinScaling	1.09, 1.08, 1.07, 1.06, 1.05, 1.04, 1.03, 1.02, 1.01, 1.0, 0.99, 0.98, 0.97, 0.96, 0.95, 0.94, 0.93, 0.92, 0.91, 0.9	Determines the minimum scale used for the MAU Mask. The mask-alignment routines will not scale the mask below the value that you specify here. NOTE: The standard does not allow scaling below 0.9.
Configure	MAU Min Scaling (10Base-Te)	N10BTeMAUMinScaling	1.09, 1.08, 1.07, 1.06, 1.05, 1.04, 1.03, 1.02, 1.01, 1.0, 0.99, 0.98, 0.97, 0.96, 0.95, 0.94, 0.93, 0.92, 0.91, 0.9	Determines the minimum scale used for the MAU Mask. The mask-alignment routines will not scale the mask below the value that you specify here. NOTE: The standard does not allow scaling below 0.9.
Configure	MAU Type	MAUType	Integrated, External	Determines the type of 10 Base-T Media Access Unit (MAU): Integrated or External.
Configure	MAU Type (10Base-Te)	N10BTeMAUType	Integrated, External	Determines the type of 10 Base-Te Media Access Unit (MAU): Integrated or External.
Configure	Mask Alignment	UTPMaskAlign	Default, Manual	Determines the mask alignment method for template test.
Configure	Min # Jitter UI	N100BTJitterUI	(Accepts user-defined text), 5E+3, 25E+3, 100E+3, 200E+3, 500E+3, 1E+6, 10E+6, 12.5E+6, 100E+6	This determines the minimum number of unit intervals used to compute the peak to peak jitter value

Table 2 Configuration Variables and Values (continued)

GUI Location	Label	Variable	Values	Description
Configure	Number of Segment for disturbing signal removal	DisturbRemovalNumOfSeg	5, 4, 3	Advanced settings for disturbing signal removal that fine tune the disturbing signal removal algorithm for Point A, B, C, D.
Configure	Offset removal	GBEPeakOffsetRemoval	Off, On	Determines whether offset removal is applied to peak measurements.
Configure	Phase	N1000BTTM4Phase	0.00, -1.00, 0.05, 0.10, 0.15, 0.20, 0.25, 0.30, 0.35, 0.40, 0.45, 0.50, 0.55, 0.60, 0.65, 0.70, 0.75, 0.80, 0.85, 0.90, 1.00	Determine sampling phase to analyze in TM4 Distortion test. You can choose All to analyze all phases, individual phase or Arbitrary for search for the phase with minimum noise.
Configure	Point H Event Trigger Level ((w/ Disturbing Signal))	PointHTrigLevel	(Accepts user-defined text), 0, 5E-03, 10E-03, 15E-03, 20E-03, 25E-03, 30E-03, 35E-03, 40E-03, 45E-03, 50E-03, 55E-03, 60E-03, 65E-03, 70E-03, 75E-03, 80E-03	Determines the trigger level for the Point H Template (w/ Disturbing Signal).
Configure	Point H Event Trigger Level (w/o Disturbing Signal)	NonDistPointHtTrig	(Accepts user-defined text), 150E-03, 200E-03, 250E-03, 300E-03	Determines the trigger level for the Point H Template (w/o Disturbing Signal).
Configure	Point H Glitch Trigger Level	PointHGlitchTrigLevel	135E-03, 140E-03, 145E-03, 150E-03, 155E-03, 160E-03, 165E-03	Determines the trigger level for the Point H Template (w/ Disturbing Signal).
Configure	Point H Trigger Method	PointHTrigMethod	Event, Glith	Determines the Trigger Method used for Point H Template (w/ Disturbing Signal).
Configure	PointA/PointB Vertical Scale	N1000BTPeakVscale	auto, 200E-3, 400E-3	Determines the vertical scale which used for 1000 Base-T Peak Voltage measurements for Point A and Point B.
Configure	PointCTriggerLevel	N1000BTPeakCTrigLvl	(Accepts user-defined text), 250E-03	Determines the trigger level for Point C

Table 2 Configuration Variables and Values (continued)

GUI Location	Label	Variable	Values	Description
Configure	Preferred Sample Rate, Sa/s	JitterPreferredSRate	(Accepts user-defined text), 9E+37, 40.0E+9, 20.0E+9, 10.0E+9, 5.0E+9, 4.0E+9, 2.0E+9, 32.0E+9, 16.0E+9, 8.0E+9	This sets the preferred sample rate for 1000 Base-T jitter measurements. This applies to all 1000 Base-T jitter measurements. Note that you may not be able to achieve this sample rate depending on the configuration. Increasing the sample rate will improve measurement resolution but will significantly increase the runtime of the test.
Configure	Pulse Width	T100BTRiseFallPulseWidth	80, 96	Determines the pulse width of the signal captured for all 100 Base-TX measurements.
Configure	Refresh Wakemz Threshold	N1000BTRefreshWakemzThreshold	(Accepts user-defined text), 10E-3, 20E-3, 30E-3, 50E-3	Determines peak threshold level for the 100BT EEE Refresh Wakemz time test.
Configure	Refresh Waketx Threshold	N1000BTRefreshWaketxThreshold	(Accepts user-defined text), 10E-3, 20E-3, 30E-3, 50E-3	Determines peak threshold level for the 100BT EEE Refresh Waketx time test.
Configure	Rise/Fall Time Pulse Width	T100BTRiseFallTimePulseWidth	80, 96	Determines the pulse width of the signal captured for all 100 Base-TX rise time and fall time measurements.
Configure	Step Size	StepSize	(Accepts user-defined text), 2E-10, 0.25E-10	Set the Step Size for 1000BT Mask Test.
Configure	TP_IDL mask (End) vertical range	N10BTIDLEndVertRange	(Accepts user-defined text), 400E-3, 800E-3, 1.6, 3.2, 6	Sets the vertical range for the 10 Base-T TP_IDL Template (End) Test.
Configure	TP_IDL mask (End) vertical range (10 Base-Te)	N10BTeIDLEndVertRange	(Accepts user-defined text), 400E-3, 800E-3, 1.6, 3.2, 6	Sets the vertical range for the 10 Base-Te TP_IDL Template (End) Test.

Table 2 Configuration Variables and Values (continued)

GUI Location	Label	Variable	Values	Description
Configure	Template Mask Alignment	TemplateMaskAlign	Auto, Manual	Determines the MaskAlignment Method used for Template Measurement. Choosing Auto will automatically align the Mask for passing condition. Choosing Manual will prompt the user to align the mask itself before continue the test.
Configure	Template Mask Alignment (10Base-Te)	N10BTeTemplateMaskAlign	Auto, Manual	Determines the MaskAlignment Method used for Template Measurement. Choosing Auto will automatically align the Mask for passing condition. Choosing Manual will prompt the user to align the mask itself before continue the test.
Configure	Template Mask Alignment Step Size	TemplateMaskAlignStepSize	(Accepts user-defined text), 2.5E-10, 5E-10, 7.5E-10, 10E-10	Determines the step size used for the mask alignment for Automatic Template Mask Alignment. Manual mask-alignment routines will not use this value specify here.
Configure	Test Pair	GigabitTestPair	ALL, A, B, C, D	Determines the 1000 Base-T pair or pairs tested. This setting applies to all 1000 Base-T Tests.
Configure	TestMode 1 Trigger Hold Off	N1000BTTrigHoldOff	(Accepts user-defined text), 9.0E-06, 9.5E-06, 10.0E-06, 10.5E-06	Determines the trigger hold off TestMode1 signal.
Configure	Time Range(s)	N1000BTUnfilteredJitterSeconds	(Accepts user-defined text), 0.005, 0.1, 0.2, 0.3, 0.4, 0.5, 0.6, 0.7, 0.8, 0.9, 1.0	Determines the amount of TX_TCLK and DUT MDI Data analyzed to compute the unfiltered jitter measurements. The specification says that this should between 0.1s and 1s. This applies to both MASTER and SLAVE mode unfiltered jitter measurements, as well as MASTER and SLAVE mode JTxOut measurements.

Table 2 Configuration Variables and Values (continued)

GUI Location	Label	Variable	Values	Description
Configure	Trigger Holdoff (s) (10 Base-T Jitter Tests)	JitterTrigHoldoff10BT	(Accepts user-defined text), 80.0E-9, 10.2E-6	Determines the amount of trigger holdoff used for 10 Base-T Jitter Tests. Note that you may need to adjust this in order to exclude the effects of the TP_IDL signal. Another alternative is to try the "Automatic" Triggering Method.
Configure	Trigger Holdoff (s) (10 Base-Te Jitter Tests)	JitterTrigHoldoff10BTe	(Accepts user-defined text), 80.0E-9, 10.2E-6	Determines the amount of trigger holdoff used for 10 Base-Te Jitter Tests. Note that you may need to adjust this in order to exclude the effects of the TP_IDL signal. Another alternative is to try the "Automatic" Triggering Method.
Configure	Trigger Sweep	TriggerSweep	AUTO, TRIG	Specifies the mode of Trigger Sweep being used.
Configure	UTP AOI Template Scaling	UTPScaling	1.05, 1.04, 1.03, 1.02, 1.01, 1.00, 0.99, 0.98, 0.97, 0.96, 0.95	Determines the minimum scale used for the UTP AOI Mask. The mask-alignment routines will not scale the mask below the value that you specify here.
Configure	X-axis step size for mask alignment	XStepFine	10E-12, 5E-12	This is mainly for mask alignment where user can choose the x-axis step size for a finer alignment.
Run Tests	Event	RunEvent	(None), Fail, Margin < N, Pass	Names of events that can be used with the StoreMode=Event or RunUntil RunEventAction options
Run Tests	RunEvent=Margin < N: Minimum required margin %	RunEvent_Margin < N_MinPercent	Any integer in range: 0 <= value <= 99	Specify N using the 'Minimum required margin %' control.
Set Up	AccessTxtclk	AccessTxtclk	0.0, 1.0	AccessTxtclk
Set Up	DisturbingSignal	DisturbingSignal	0.0, 1.0	DisturbingSignal On Off selection
Set Up	RemoteConnection	RemoteConnection	None, Fg33612, Fg81150/60A, FgMaster, FgSlave, VNA	Select external instrument address type
Set Up	ReturnLossTest	ReturnLossTest	Use Vector Network Analyzer, Use Data File	ReturnLossTest method
Set Up	Tests1000BT	Tests1000BT	0.0, 1.0	Tests1000BT

Table 2 Configuration Variables and Values (continued)

GUI Location	Label	Variable	Values	Description
Set Up	Tests1000BT_EEE	Tests1000BT_EEE	0.0, 1.0	Tests1000BT_EEE
Set Up	Tests100BT	Tests100BT	0.0, 1.0	Tests100BT
Set Up	Tests100BT_EEE	Tests100BT_EEE	0.0, 1.0	Tests100BT_EEE
Set Up	Tests10BT	Tests10BT	0.0, 1.0	Tests10BT
Set Up	Tests10BT_EEE	Tests10BT_EEE	0.0, 1.0	Tests10BT_EEE
Set Up	pcbRemoteSicl	pcbRemoteSicl	(Accepts user-defined text), gpib1, 17	Set gpib sicl address

3 Test Names and IDs

The following table shows the mapping between each test's numeric ID and name. The numeric ID is required by various remote interface methods.

- Name — The name of the test as it appears on the user interface **Select Tests** tab.
- Test ID — The number to use with the RunTests method.
- Description — The description of the test as it appears on the user interface **Select Tests** tab.

For example, if the graphical user interface displays this tree in the **Select Tests** tab:

- All Tests
  - Rise Time
  - Fall Time

then you would expect to see something like this in the table below:

Table 3 Example Test Names and IDs

Name	Test ID	Description
Fall Time	110	Measures clock fall time.
Rise Time	100	Measures clock rise time.

and you would run these tests remotely using:

```
ARSL syntax
-----------
arsl -a ipaddress -c "SelectedTests '100,110'"
arsl -a ipaddress -c "Run"

C# syntax
---------
remoteAte.SelectedTests = new int[]{100,110};
remoteAte.Run();
```

KEYSIGHT TECHNOLOGIES

Here are the actual Test names and IDs used by this application. Listed at the end, you may also find:

- Deprecated IDs and their replacements.
- Macro IDs which may be used to select multiple related tests at the same time.

NOTE The file, "TestInfo.txt", which may be found in the same directory as this help file, contains all of the information found in the table below in a format suitable for parsing.

Table 4 Test IDs and Names

Name	TestID	Description
10 Base-T, Common Mode Output Voltage	801	The magnitude of the total common-mode output voltage of the transmitter, Ecm, measured as shown in Figure 14-14, shall be less than 50 mV peak.
10 Base-T, Harmonic Content	52	When the DO circuit is driven by an all-ones Manchester-encoded signal, any harmonic measured on the TD circuit shall be at least 27 dB below the fundamental.
10 Base-T, Jitter with TPM	53	In accordance with Annex B.4.3.3, An external MAU with a jitterless source driving DO is compliant when all zero crossings fall within the time intervals 8.0 BT ± 7 ns and 8.5 BT ± 7 ns (with TPM). An integrated MAU is compliant when all zero crossings fall within the time intervals 8.0 BT ± 11 ns and 8.5 BT ± 11 ns (with TPM).
10 Base-T, Jitter without TPM	54	In accordance with Annex B.4.3.3 and B.4.1 System Jitter Budget, an external MAU with a jitterless source driving DO is compliant when all zero crossings fall within the time intervals 8.0 BT ± 16 ns and 8.5 BT ± 16 ns (without TPM). An integrated MAU is compliant when all zero crossings fall within the time intervals 8.0 BT ± 20 ns and 8.5 BT ± 20 ns (without TPM).
10 Base-T, Link Test Pulse, with TPM	810	The link test pulse shall be a single positive pulse which falls within the shaded area of Figure 14-12
10 Base-T, Link Test Pulse, without TPM	815	The link test pulse shall be a single positive pulse which falls within the shaded area of Figure 14-12
10 Base-T, MAU Template	812	The output signal Vo, is defined at the output of the twisted-pair model as shown in Figure 14-8. The TD transmitter shall provide equalization such that the output waveform shall fall within the template shown in Figure 14-9 for all data sequences. The template voltage may be scaled by a factor of 0.9 to 1.1 but any scaling below 0.9 or above 1.1 shall not be allowed. During this test the twisted-pair model shall be terminated in 100 Ohms and driven by a transmitter with a Manchester-encoded pseudo-random sequence with a minimum repetition period of 511 bits. This test shall be repeated with the template inverted about the time axis.

Table 4 Test IDs and Names (continued)

Name	TestID	Description
10 Base-T, Peak Differential Voltage	50	The peak differential voltage on the TD circuit when terminated with a 100ohm resistive load shall be between 2.2V and 2.8V for all data sequences.
10 Base-T, Receiver Return Loss	803	The Return Loss obtained must conform to the requirements specified in IEEE802.3-2018 Subclause 14.3.1.3.4 and Annex B.4.3.5. Pass Limit shall be at least 15dB over the frequency range 5.0MHz to 10MHz.
10 Base-T, TP_IDL Template, with TPM (last bit CD0)	809	The TP_IDL shall always start with a positive waveform when a waveform conforming to Figure 7-12 is applied to the DO circuit. After the zero crossing of the last transition, the differential voltage shall remain within the shaded area of Figure 14-10.
10 Base-T, TP_IDL Template, with TPM (last bit CD1)	811	The TP_IDL shall always start with a positive waveform when a waveform conforming to Figure 7-12 is applied to the DO circuit. After the zero crossing of the last transition, the differential voltage shall remain within the shaded area of Figure 14-10.
10 Base-T, TP_IDL Template, without TPM (last bit CD0)	814	The TP_IDL shall always start with a positive waveform when a waveform conforming to Figure 7-12 is applied to the DO circuit. After the zero crossing of the last transition, the differential voltage shall remain within the shaded area of Figure 14-10.
10 Base-T, TP_IDL Template, without TPM (last bit CD1)	816	The TP_IDL shall always start with a positive waveform when a waveform conforming to Figure 7-12 is applied to the DO circuit. After the zero crossing of the last transition, the differential voltage shall remain within the shaded area of Figure 14-10.
10 Base-T, Transmitter Return Loss	802	The Return Loss obtained must conform to the requirements specified in IEEE802.3-2018 Subclause 14.3.1.2.2 and Annex B.4.3.2. Pass Limit shall be at least 15dB over the frequency range 5.0MHz to 10MHz.
10 Base-Te, Common Mode Output Voltage	821	The magnitude of the total common-mode output voltage of the transmitter, Ecm, measured as shown in Figure 14-14, shall be less than 50 mV peak.
10 Base-Te, Harmonic Content	62	When the DO circuit is driven by an all-ones Manchester-encoded signal, any harmonic measured on the TD circuit shall be at least 27 dB below the fundamental.
10 Base-Te, Jitter with TPM	63	In accordance with Annex B.4.3.3, An external MAU with a jitterless source driving DO is compliant when all zero crossings fall within the time intervals 8.0 BT ± 7 ns and 8.5 BT ± 7 ns (with TPM). An integrated MAU is compliant when all zero crossings fall within the time intervals 8.0 BT ± 11 ns and 8.5 BT ± 11 ns (with TPM).

Table 4 Test IDs and Names (continued)

Name	TestID	Description
10 Base-Te, Jitter without TPM	64	In accordance with Annex B.4.3.3 and B.4.1 System Jitter Budget, an external MAU with a jitterless source driving DO is compliant when all zero crossings fall within the time intervals 8.0 BT ± 16 ns and 8.5 BT ± 16 ns (without TPM). An integrated MAU is compliant when all zero crossings fall within the time intervals 8.0 BT ± 20 ns and 8.5 BT ± 20 ns (without TPM).
10 Base-Te, Link Test Pulse, with TPM	830	The link test pulse shall be a single positive pulse which falls within the shaded area of Figure 14-12
10 Base-Te, Link Test Pulse, without TPM	835	The link test pulse shall be a single positive pulse which falls within the shaded area of Figure 14-12
10 Base-Te, MAU Template	832	The output signal Vo, is defined at the output of the twisted-pair model as shown in Figure 14-8. The TD transmitter shall provide equalization such that the output waveform shall fall within the template shown in Figure 14-9 for all data sequences. The template voltage may be scaled by a factor of 0.9 to 1.1 but any scaling below 0.9 or above 1.1 shall not be allowed. During this test the twisted-pair model shall be terminated in 100 Ohms and driven by a transmitter with a Manchester-encoded pseudo-random sequence with a minimum repetition period of 511 bits. This test shall be repeated with the template inverted about the time axis.
10 Base-Te, Peak Differential Voltage	60	For a type 10BASE-Te MAU, the peak differential voltage on the TD circuit when terminated with a 100 Ω resistive load shall be between 1.54 V and 1.96 V for all data sequences.
10 Base-Te, TP_IDL Template, with TPM (last bit CD0)	829	The TP_IDL shall always start with a positive waveform when a waveform conforming to Figure 7-12 is applied to the DO circuit. After the zero crossing of the last transition, the differential voltage shall remain within the shaded area of Figure 14-10.
10 Base-Te, TP_IDL Template, with TPM (last bit CD1)	831	The TP_IDL shall always start with a positive waveform when a waveform conforming to Figure 7-12 is applied to the DO circuit. After the zero crossing of the last transition, the differential voltage shall remain within the shaded area of Figure 14-10.
10 Base-Te, TP_IDL Template, without TPM (last bit CD0)	834	The TP_IDL shall always start with a positive waveform when a waveform conforming to Figure 7-12 is applied to the DO circuit. After the zero crossing of the last transition, the differential voltage shall remain within the shaded area of Figure 14-10.
10 Base-Te, TP_IDL Template, without TPM (last bit CD1)	836	The TP_IDL shall always start with a positive waveform when a waveform conforming to Figure 7-12 is applied to the DO circuit. After the zero crossing of the last transition, the differential voltage shall remain within the shaded area of Figure 14-10.
100 Base-T, EEE, Quiet Time	1101	The quiet time of the PHY is determined by the lpi_tx_tq_timer. The timer should have a duration of 20-22ms.

Table 4 Test IDs and Names (continued)

Name	TestID	Description
100 Base-T, EEE, Refresh Time	1102	For a 100 Base-T EEE capable PHY, the refresh time should be between 200-220µs.
100 Base-T, EEE, Sleep Time	1103	The sleep time of the PHY is determined by the lpi_tx_ts_timer. The timer should have a duration of 200-220µs.
100 Base-T, EEE, Transmit Wake Time	1104	Measures the wake time of the PHY.
100 Base-T, EEE, Transmitter Timing Jitter	1106	The jitter for an EEE capable PHY in LPI is measured using scrambled SLEEP code-groups transmitted during the TX_SLEEP state. The jitter contributed during the TX_QUIET state and the first 5µs of the TX_SLEEP state are ignored. The total peak-to-peak jitter measured shall be less than 1.4ns.
100 Base-TX, +Vout Overshoot	24	We define overshoot as the percentage difference between the peak voltage of the waveform and the final adjusted value (VOut). The peak voltage is measured between the 50% transition crossing time from 0 to VOut and a point in time 8ns afterward. Overshoot 0s computed as (Vpeak - VOut)/VOut * 100 percent.
100 Base-TX, -Vout Overshoot	26	We define overshoot as the percentage difference between the peak voltage of the waveform and the final adjusted value (VOut). The peak voltage is measured between the 50% transition crossing time from 0 to VOut and a point in time 8ns afterward. Overshoot 0s computed as (Vpeak - VOut)/VOut * 100 percent.
100 Base-TX, AOI +Vout Fall Time	19	The AOI signal fall is defined as the transition from the +Vout or -Vout to the baseline voltage (nominally 0V). The AOI rise and fall times (10/90) for +Vout and -Vout shall fall in the range of 3 to 5 ns. Note that this test uses 100 measurements. The reported "Actual Value" is the current/last measurement, The statistics (min/max) over 100 measurements are used to determine compliance.
100 Base-TX, AOI +Vout Rise Time	18	The AOI signal rise is defined as the transition from the baseline voltage (nominally 0V) to either +Vout or -Vout. The AOI rise and fall times (10/90) for +Vout and -Vout shall fall in the range of 3 to 5 ns. A number of rise/falltime measurements are made. The worst case is reported here.
100 Base-TX, AOI +Vout Rise/Fall Symmetry	20	The difference between the maximum and minimum of all rise and fall times shall be less than or equal to 0.5ns. The statistics (min/max Rise/Falltime) over 100 measurements are used to determine compliance.
100 Base-TX, AOI -Vout Fall Time	22	The AOI signal fall is defined as the transition from the +Vout or -Vout to the baseline voltage (nominally 0V). The AOI rise and fall times (10/90) for +Vout and -Vout shall fall in the range of 3 to 5 ns. Note that this test uses 100 measurements. The reported "Actual Value" is the current/last measurement, The statistics (min/max) over 100 measurements are used to determine compliance.

Table 4 Test IDs and Names (continued)

Name	TestID	Description
100 Base-TX, AOI -Vout Rise Time	21	The AOI signal rise is defined as the transition from the baseline voltage (nominally 0V) to either +Vout or -Vout. The AOI rise and fall times (10/90) for +Vout and -Vout shall fall in the range of 3 to 5 ns. Note that this test uses 100 measurements. The reported "Actual Value" is the current/last measurement, The statistics (min/max) over 100 measurements are used to determine compliance.
100 Base-TX, AOI -Vout Rise/Fall Symmetry	23	The difference between the maximum and minimum of all rise and fall times shall be less than or equal to 0.5ns. The statistics (min/max Rise/Falltime) over 100 measurements are used to determine compliance.
100 Base-TX, AOI Overall Rise/Fall Symmetry	33	The difference between the maximum and minimum of all rise and fall times shall be less than or equal to 0.5ns. The statistics (min/max Rise/Falltime) over 100 measurements are used to determine compliance.
100 Base-TX, Duty Cycle Distortion	29	The deviations of the 50 crossing times from a best fit to a time grid of 16 ns spacing shall not exceed +/- 0.25 ns. The peak-to-peak Duty Cycle Distortion shall not exceed 0.5ns
100 Base-TX, Receiver Return Loss	886	The Return Loss obtained must conform to the requirements specified in ANSI X3.263-1995, Section 9.2.2. Pass limits shall be > 16 dB from 2 MHz to 30 MHz, > (16 – 20 log(f / 30 MHz)) dB from 30 MHz to 60 MHz, > 10 dB from 60 MHz to 80 MHz
100 Base-TX, Transmit Jitter	31	Total Transmit jitter, including contributions from duty cycle distortion and Baseline Wander shall not exceed 1.4 ns peak-to-peak.
100 Base-TX, Transmitter Return Loss	885	The Return Loss obtained must conform to the requirements specified in ANSI X3.263-1995, Section 9.1.5. Pass limits shall be > 16 dB from 2 MHz to 30 MHz, > (16 – 20 log(f / 30 MHz)) dB from 30 MHz to 60 MHz, > 10 dB from 60 MHz to 80 MHz
100 Base-TX, UTP +Vout Differential Output Voltage	13	Vout is defined as the straight line best fit for amplitude. Here, Vout is measured over a 96ns pulse.
100 Base-TX, UTP -Vout Differential Output Voltage	14	Vout is defined as the straight line best fit for amplitude. Here, Vout is measured over a 96ns pulse.
100 Base-TX, UTP AOI Template	28	The template is first centered vertically on the eye pattern baseline. It should be translated horizontally and scaled in amplitude for the best fit to the eye pattern. For UTP, the scaling factor must be between 0.95 and 1.05.
100 Base-TX, UTP Signal Amplitude Symmetry	15	The ratio of the +Vout magnitude to -Vout magnitude shall be between the limits of 0.98 and 1.02
1000 Base-T, Difference A,B Peak Output Voltage(w/ Disturbing Signal)	102	The absolute value of the peak of the waveform at points A and B shall differ by less than 1%

Table 4 Test IDs and Names (continued)

Name	TestID	Description
1000 Base-T, Difference A,B Peak Output Voltage(w/o Disturbing Signal)	2	The absolute value of the peak of the waveform at points A and B shall differ by less than 1%
1000 Base-T, EEE, Quiet Time	1201	The quiet time of the PHY as measured on the medium will be the sum of the lpi_waitwq_timer and lpi_quiet_timer.
1000 Base-T, EEE, Refresh Time (Master)	1202	The refresh time is measured from the start of the WAKE transient to the entry into the WAIT_QUIET state. The time measured in this test is the lpi_wake_timer, the lpi_update_timer and the lpi_postupdate_timer.
1000 Base-T, EEE, Refresh Time (Slave)	1203	The refresh time is measured from the start of the WAKE transient to the entry into the WAIT_QUIET state. The time measured in this test is the lpi_wake_timer, the lpi_update_timer and the lpi_postupdate_timer.
1000 Base-T, EEE, Refresh Wakemz Time (Master)	1212	This timer defines the time allowed for the PHY transmitter to achieve compliant operation following activation.
1000 Base-T, EEE, Refresh Waketx Time - 65% Amplitude (Master)	1211	This timer defines the time the PHY transmits to ensure detection by the remote PHY receiver and trigger an exit from the low power state.
1000 Base-T, EEE, Refresh Waketx Time - Full (Master)	1210	This timer defines the time the PHY transmits to ensure detection by the remote PHY receiver and trigger an exit from the low power state.
1000 Base-T, EEE, Sleep Time (Master)	1204	The sleep time of the PHY as measured on the medium will be the sum of the lpi_update_timer and the lpi_postupdate_timer.
1000 Base-T, EEE, Sleep Time (Slave)	1205	The sleep time of the PHY as measured on the medium will be the sum of the lpi_update_timer and the lpi_postupdate_timer.
1000 Base-T, EEE, Transmit Wake Time (Master)	1206	The minimum wake time as measured on the medium, Tphy_wake (min) should be greater than 11.5µs.
1000 Base-T, EEE, Transmit Wake Time (Slave)	1207	The minimum wake time as measured on the medium, Tphy_wake (min) should be greater than 4.26µs.
1000 Base-T, EEE, Transmitter Timing Jitter (Master)	1209	The unfiltered jitter requirements of an EEE capable PHY shall be satisfied during the LPI mode, with the exception that clock edges corresponding to the WAIT_QUIET, QUIET, WAKE, and WAKE_SILENT states are not considered in the measurement.
1000 Base-T, EEE, Wake State Levels	1208	While the device is transmitting Idle at the beginning of WAKE the transmit levels shall exceed 65% of compliant Idle symbol levels for at least 500ns.

Table 4 Test IDs and Names (continued)

Name	TestID	Description
1000 Base-T, Jitter MASTER Filtered (w/ TX_TCLK)	502	This test measures filtered jitter on the DUT's TX_TCLK signal. The jitter on the DUT's TX_TCLK signal relative to an unjittered reference is passed through a 5kHz high-pass filter (HPF). The 5kHz HPF filtered MASTER TX_TCLK jitter plus the worst MASTER mode JTxOut must be less than 0.3ns. For further information on jitter measurements, consult the user manual.
1000 Base-T, Jitter MASTER Filtered (w/o TX_TCLK)	506	This test measures filtered jitter on the MDI output. The MASTER output at the MDI relative to an unjittered reference is passed through a 5kHz high-pass filter (HPF). The filtered peak-to-peak jitter shall be less than 0.3ns. For further information on jitter measurements, consult the user manual.
1000 Base-T, Jitter MASTER Unfiltered (w/ TX_TCLK)	503	This test measures the peak-to-peak jitter on the DUT's transmit clock (TX_TCLK) relative to an unjittered reference. For further information on jitter measurements, consult the user manual.
1000 Base-T, Jitter MASTER Unfiltered (w/o TX_TCLK)	508	This test measures the peak-to-peak jitter of the MASTER output at MDI relative to an unjittered reference. The result should be less than 1.4ns. For further information on jitter measurements, consult the user manual.
1000 Base-T, Jitter SLAVE Filtered (w/ TX_TCLK)	504	This test makes a number of measurements. Jitter is measured on the DUT's TX_TCLK while in SLAVE mode, connected to a MASTER via the Test Channel. Jitter on the DUT's TX_TCLK is measured relative to the simultaneously captured MASTER TX_TCLK. The jitter of the MASTER TX_TCLK jitter is also measured. The SLAVE TX_TCLK jitter is passed through a 32kHz high-pass filter (HPF), and the MASTER TX_TCLK jitter is passed through a 5kHz HPF. The 32kHz HPF filtered SLAVE TX_TCLK jitter plus the worst SLAVE mode JTxOut minus the 5kHz filtered MASTER TX_TCLK jitter must be less than 0.4ns. For further information on jitter measurements, consult the user manual.
1000 Base-T, Jitter SLAVE Filtered (w/o TX_TCLK)	507	This test measures filtered jitter on the MDI output. The jitter on the MDI output signal relative to an unjittered reference is passed through a 5kHz high-pass filter (HPF). The 5kHz HPF filtered MASTER output at MDI and the filtered Master jitter shall be less than 0.4ns. The result is only meant for informational purposes and cannot be used as conformance limits. For further information on jitter measurements, consult the user manual.
1000 Base-T, Jitter SLAVE Unfiltered (w/ TX_TCLK)	505	This test measures the peak-to-peak jitter on the DUT's transmit clock (TX_TCLK) while it is operating in SLAVE mode, connected to a MASTER via the Test Channel. Jitter on the DUT's TX_TCLK is measured relative to the simultaneously captured MASTER TX_TCLK. For further information on jitter measurements, consult the user manual.

Table 4 Test IDs and Names (continued)

Name	TestID	Description
1000 Base-T, Jitter SLAVE Unfiltered (w/o TX_TCLK)	509	This test measures the unfiltered peak-to-peak jitter at the MDI output whereby the SLAVE output is relatives to an unjittered reference . The resulting unfiltered SLAVE jitter peak-to-peak value will then be subtracted with the unfiltered MASTER peak-to-peak jitter. The result is only meant for informational purposes and cannot be used as conformance limits. For further information on jitter measurements, consult the user manual.
1000 Base-T, MASTER mode JTxOut (w/ TX_TCLK)	510	There are no specific requirements for JTxOut. However, JTxOut is used in all filtered jitter measurements. JTxOut measures the amount of jitter on the MDI Data relative to the DUT's transmit clock (TX_TCLK). This measurement is made while the DUT is transmitting the Test Mode 2 signal (MASTER timing mode). For further information on jitter measurements, consult the user manual.
1000 Base-T, MDI Common Mode Output Voltage	501	The magnitude of the total common-mode output voltage on any transmit circuit, when measured as shown in Figure 40-32, shall be less than 50 mV peak-to-peak when transmitting data.
1000 Base-T, MDI Return Loss	1004	The Return Loss obtained must conform to the requirements specified in IEEE802.3-2018 Subclause 40.8.3.1. Pass Limit shall be at least 16 dB over the frequency range of 1.0 MHz to 40 MHz and at least 10 – 20log10(f/80) dB over the frequency range 40 MHz to 100 MHz (f in MHz)
1000 Base-T, Point A Peak Output Voltage(w/ Disturbing Signal)	100	The magnitude of the voltage at Point A shall fall within the range of 0.67 V to 0.82V (0.75V +/- 0.83dB)
1000 Base-T, Point A Peak Output Voltage(w/o Disturbing Signal)	0	The magnitude of the voltage at Point A shall fall within the range of 0.67 V to 0.82V (0.75V +/- 0.83dB)
1000 Base-T, Point A Template Test(w/ Disturbing Signal)	105	Fit The Template. The voltage waveforms around points A, B, C, D defined in Figure 40-20 (after normalization) shall lie within the time domain template 1 defined in Figure 40-27 and the piecewise linear interpolation between the points in Table 40-10. The waveform around point A is normalized by dividing by the peak value of the waveform at A.
1000 Base-T, Point A Template Test(w/o Disturbing Signal)	5	Fit The Template. The voltage waveforms around points A, B, C, D defined in Figure 40-20 (after normalization) shall lie within the time domain template 1 defined in Figure 40-27 and the piecewise linear interpolation between the points in Table 40-10. The waveform around point A is normalized by dividing by the peak value of the waveform at A.
1000 Base-T, Point B Peak Output Voltage(w/ Disturbing Signal)	101	The magnitude of the voltage at Point B shall fall within the range of 0.67 V to 0.82V (0.75V +/- 0.83dB)
1000 Base-T, Point B Peak Output Voltage(w/o Disturbing Signal)	1	The magnitude of the voltage at Point B shall fall within the range of 0.67 V to 0.82V (0.75V +/- 0.83dB)

Table 4 Test IDs and Names (continued)

Name	TestID	Description
1000 Base-T, Point B Template Test(w/ Disturbing Signal)	106	Fit The Template. The voltage waveforms around points A, B, C, D defined in Figure 40-20 (after normalization) shall lie within the time domain template 1 defined in Figure 40-27 and the piecewise linear interpolation between the points in Table 40-10. The waveform around point B is normalized by dividing by the negative of the peak value of the waveform at A.
1000 Base-T, Point B Template Test(w/o Disturbing Signal)	6	Fit The Template. The voltage waveforms around points A, B, C, D defined in Figure 40-20 (after normalization) shall lie within the time domain template 1 defined in Figure 40-27 and the piecewise linear interpolation between the points in Table 40-10. The waveform around point B is normalized by dividing by the negative of the peak value of the waveform at A.
1000 Base-T, Point C Peak Output Voltage(w/ Disturbing Signal)	103	The absolute value of the peak of the waveform at point C shall differ by less than 2% from 0.5 times the average of the absolute values of the peaks of the waveform at points A and B
1000 Base-T, Point C Peak Output Voltage(w/o Disturbing Signal)	3	The absolute value of the peak of the waveform at point C shall differ by less than 2% from 0.5 times the average of the absolute values of the peaks of the waveform at points A and B
1000 Base-T, Point C Template Test(w/ Disturbing Signal)	107	Fit The Template. The voltage waveforms around points A, B, C, D defined in Figure 40-20 (after normalization) shall lie within the time domain template 1 defined in Figure 40-27 and the piecewise linear interpolation between the points in Table 40-10. The waveform around point C is normalized by dividing by the 1/2 the peak value of the waveform at A.
1000 Base-T, Point C Template Test(w/o Disturbing Signal)	7	Fit The Template. The voltage waveforms around points A, B, C, D defined in Figure 40-20 (after normalization) shall lie within the time domain template 1 defined in Figure 40-27 and the piecewise linear interpolation between the points in Table 40-10. The waveform around point C is normalized by dividing by the 1/2 the peak value of the waveform at A.
1000 Base-T, Point D Peak Output Voltage(w/ Disturbing Signal)	104	The absolute value of the peak of the waveform at point D shall differ by less than 2% from 0.5 times the average of the absolute values of the peaks of the waveform at points A and B
1000 Base-T, Point D Peak Output Voltage(w/o Disturbing Signal)	4	The absolute value of the peak of the waveform at point D shall differ by less than 2% from 0.5 times the average of the absolute values of the peaks of the waveform at points A and B
1000 Base-T, Point D Template Test(w/ Disturbing Signal)	108	Fit The Template. The voltage waveforms around points A, B, C, D defined in Figure 40-20 (after normalization) shall lie within the time domain template 1 defined in Figure 40-27 and the piecewise linear interpolation between the points in Table 40-10. The waveform around point D is normalized by dividing by the negative of 1/2 the peak value of the waveform at A.

Table 4 Test IDs and Names (continued)

Name	TestID	Description
1000 Base-T, Point D Template Test(w/o Disturbing Signal)	8	Fit The Template. The voltage waveforms around points A, B, C, D defined in Figure 40-20 (after normalization) shall lie within the time domain template 1 defined in Figure 40-27 and the piecewise linear interpolation between the points in Table 40-10. The waveform around point D is normalized by dividing by the negative of 1/2 the peak value of the waveform at A.
1000 Base-T, Point F Template Test(w/ Disturbing Signal)	109	Fit The Template. The voltage waveforms around points F and H defined in Figure 40-20, (after normalization) shall lie within the time domain template 2 defined in Figure 40-27 and the piecewise linear interpolation between the points in Table 40-11. The waveform around point F is normalized by dividing by the peak value of the waveform at F.
1000 Base-T, Point F Template Test(w/o Disturbing Signal)	9	Fit The Template. The voltage waveforms around points F and H defined in Figure 40-20, (after normalization) shall lie within the time domain template 2 defined in Figure 40-27 and the piecewise linear interpolation between the points in Table 40-11. The waveform around point F is normalized by dividing by the peak value of the waveform at F.
1000 Base-T, Point G Droop Test(w/ Disturbing Signal)	111	The Voltage at Point G (500ns after point F) must be more than 73.1% of the negative Voltage at Peak F
1000 Base-T, Point G Droop Test(w/o Disturbing Signal)	11	The Voltage at Point G (500ns after point F) must be more than 73.1% of the negative Voltage at Peak F
1000 Base-T, Point H Template Test(w/ Disturbing Signal)	110	Fit The Template. The voltage waveforms around points F and H defined in Figure 40-20, (after normalization) shall lie within the time domain template 2 defined in Figure 40-27 and the piecewise linear interpolation between the points in Table 40-11. The waveform around point H is normalized by dividing by the peak value of the waveform at H.
1000 Base-T, Point H Template Test(w/o Disturbing Signal)	10	Fit The Template. The voltage waveforms around points F and H defined in Figure 40-20, (after normalization) shall lie within the time domain template 2 defined in Figure 40-27 and the piecewise linear interpolation between the points in Table 40-11. The waveform around point H is normalized by dividing by the peak value of the waveform at H.
1000 Base-T, Point J Droop Test(w/ Disturbing Signal)	112	The Voltage at Point J (500ns after point H) must be more than 73.1% of the Voltage at Peak H
1000 Base-T, Point J Droop Test(w/o Disturbing Signal)	12	The Voltage at Point J (500ns after point H) must be more than 73.1% of the Voltage at Peak H

Table 4 Test IDs and Names (continued)

Name	TestID	Description
1000 Base-T, SLAVE mode JTxOut (w/ TX_TCLK)	511	There are no specific requirements for JTxOut. However, JTxOut is used in all filtered jitter measurements. JTxOut measures the amount of jitter on the MDI Data relative to the DUT's transmit clock (TX_TCLK). This measurement is made while the DUT is transmitting the Test Mode 3 signal (SLAVE timing mode). For further information on jitter measurements, consult the user manual.
1000 Base-T, Transmitter Distortion(w/ Disturbing Signal)	213	The peak distortion must be less than 10mV.
1000 Base-T, Transmitter Distortion(w/o Disturbing Signal)	113	The peak distortion must be less than 10mV.

4 Instruments

The following table shows the instruments used by this application. The name is required by various remote interface methods.

- Instrument Name — The name to use as a parameter in remote interface commands.
- Description — The description of the instrument.

For example, if an application uses an oscilloscope and a pulse generator, then you would expect to see something like this in the table below:

Table 5 Example Instrument Information

Name	Description
scope	The primary oscilloscope.
Pulse	The pulse generator used for Gen 2 tests.

and you would be able to remotely control an instrument using:

```
ARSL syntax (replace [description] with actual parameter)
----------------------------------------------------------------------
arsl -a ipaddress -c "SendScpiCommandCustom 'Command=[scpi
command];Timeout=100;Instrument=pulsegen'"

arsl -a ipaddress -c "SendScpiQueryCustom 'Command=[scpi
query];Timeout=100;Instrument=pulsegen'"


C# syntax (replace [description] with actual parameter)
----------------------------------------------------------------------
SendScpiCommandOptions commandOptions = new SendScpiCommandOptions();
commandOptions.Command = "[scpi command]";
commandOptions.Instrument = "[instrument name]";
commandOptions.Timeout = [timeout];
remoteAte.SendScpiCommand(commandOptions);

SendScpiQueryOptions queryOptions = new SendScpiQueryOptions();
queryOptions.Query = "[scpi query]";
queryOptions.Instrument = "[instrument name]";
```

```
queryOptions.Timeout = [timeout];
remoteAte.SendScpiQuery(queryOptions);
```

Here are the actual instrument names used by this application:

NOTE The file, "InstrumentInfo.txt", which may be found in the same directory as this help file, contains all of the information found in the table below in a format suitable for parsing.

Table 6 Instrument Names

Instrument Name	Description
FgMaster	The Master signal source.
FgSlave	The Slave signal source.
Fg33612	The 33612 signal source.
Fg81150/60A	The 81150/60A signal source.
VNA	The Vector Network Analyzer.
Infiniium	The primary oscilloscope.

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