Keysight U7233A/U7233B DDR1 Compliance Test Application

KEYSIGHT TECHNOLOGIES

Programmer's Reference

Notices

Revision

Version 01.53.0000

Edition

October 27, 2015

Available in electronic format only

Published by:
Keysight Technologies, Inc.
1900 Garden of the Gods Road
Colorado Springs, CO 80907 USA

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CAUTION

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A WARNING notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in personal injury or death. Do not proceed beyond a WARNING notice until the indicated conditions are fully understood and met.

In This Book

This book is your guide to programming the Keysight Technologies U7233A/U7233B DDR1 Compliance Test 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 27, and Chapter 4, “Instruments,” starting on page 33, provide information specific to programming the U7233A/U7233B DDR1 Compliance Test 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 application. The programming commands provide the means of remote control. Basic operations that you can do remotely with a computer and a compliance 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 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 U7233A/U7233B DDR1 Compliance Test Application uses Remote Interface Revision 3.40. 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 U7233A/U7233B DDR1 Compliance Test 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
Confgure	Burst Count	Multi_Burst	(Accepts user-defined text), 1, 10, 100, 1000	Determine how many bursts of measurements(s) the selected test(s) will be completed. *Note:This option only applicable to "Vix" test!
Confgure	CAS Latency Value	CLValue	1.0, 1.5, 2.0, 2.5, 3.0, 3.5, 4.0, 4.5, 5.0, 5.5, 6.0, 6.5, 7.0, 7.5, 8.0, 8.5, 0.0	This option will only available IF 'CS' is selected. This allow user to verify the DUT with CS signal by selecting respective CL value.
Confgure	CHANNEL 1 : Lower Threshold (V)	Chan1_Low _Thresh	(Accepts user-defined text), 0.00	Specify the lower measurement threshold used for Channel 1. The value set here is applicable ONLY when the "Threshold Trigger Setting" option is set to "Manual".
Confgure	CHANNEL 1 : Middle Threshold (V)	Chan1_Mid_ Thresh	(Accepts user-defined text), 0.00	Specify the middle measurement threshold used for Channel 1. The value set here is applicable ONLY when the "Threshold Trigger Setting" option is set to "Manual".
Confgure	CHANNEL 1 : Upper Threshold (V)	Chan1_Up_ Thresh	(Accepts user-defined text), 0.00	Specify the upper measurement threshold used for Channel 1. The value set here is applicable ONLY when the "Threshold Trigger Setting" option is set to "Manual".

Table 2 Configuration Variables and Values (continued)

GUI Location	Label	Variable	Values	Description
Confgure	CHANNEL 2 : Lower Threshold (V)	Chan2_Low _Thresh	(Accepts user-defined text), 0.00	Specify the lower measurement threshold used for Channel 2. The value set here is applicable ONLY when the "Threshold Trigger Setting" option is set to "Manual".
Confgure	CHANNEL 2 : Middle Threshold (V)	Chan2_Mid_ Thresh	(Accepts user-defined text), 0.00	Specify the middle measurement threshold used for Channel 2. The value set here is applicable ONLY when the "Threshold Trigger Setting" option is set to "Manual".
Confgure	CHANNEL 2 : Upper Threshold (V)	Chan2_Up_ Thresh	(Accepts user-defined text), 0.00	Specify the upper measurement threshold used for Channel 2. The value set here is applicable ONLY when the "Threshold Trigger Setting" option is set to "Manual".
Confgure	CHANNEL 3 : Lower Threshold (V)	Chan3_Low _Thresh	(Accepts user-defined text), 0.00	Specify the lower measurement threshold used for Channel 3. The value set here is applicable ONLY when the "Threshold Trigger Setting" option is set to "Manual".
Confgure	CHANNEL 3 : Middle Threshold (V)	Chan3_Mid_ Thresh	(Accepts user-defined text), 0.00	Specify the middle measurement threshold used for Channel 3. The value set here is applicable ONLY when the "Threshold Trigger Setting" option is set to "Manual".
Confgure	CHANNEL 3 : Upper Threshold (V)	Chan3_Up_ Thresh	(Accepts user-defined text), 0.00	Specify the upper measurement threshold used for Channel 3. The value set here is applicable ONLY when the "Threshold Trigger Setting" option is set to "Manual".
Confgure	CHANNEL 4 : Lower Threshold (V)	Chan4_Low _Thresh	(Accepts user-defined text), 0.00	Specify the lower measurement threshold used for Channel 4. The value set here is applicable ONLY when the "Threshold Trigger Setting" option is set to "Manual".

Table 2 Configuration Variables and Values (continued)

GUI Location	Label	Variable	Values	Description
Confgure	CHANNEL 4 : Middle Threshold (V)	Chan4_Mid_ Thresh	(Accepts user-defined text), 0.00	Specify the middle measurement threshold used for Channel 4. The value set here is applicable ONLY when the "Threshold Trigger Setting" option is set to "Manual".
Confgure	CHANNEL 4 : Upper Threshold (V)	Chan4_Up_ Thresh	(Accepts user-defined text), 0.00	Specify the upper measurement threshold used for Channel 4. The value set here is applicable ONLY when the "Threshold Trigger Setting" option is set to "Manual".
Confgure	Channel 1	MyCH1	NA_, Clock_DCK0, Clock_DCK1, Clock_DCK2, Clock_SCK0, Clock_SCK1, Clock_SCK2, Data_DQ0, Data_DQ1, Data_DQ2, Data_DQ3, Data_DQ4, Data_DQ5, Data_DQ6, Data_DQ7, Data_DQ8, Data_DQ9, Data_DQ10, Data_DQ11, Data_DQ12, Data_DQ13, Data_DQ14, Data_DQ15, Data_DQ16, Data_DQ17, Data_DQ18, Data_DQ19, Data_DQ20, Data_DQ21, Data_DQ22, Data_DQ23, Data_DQ25, Data_DQ26, Data_DQ27, Data_DQ28, Data_DQ29, Data_DQ30, Data_DQ31, Data_DQ32, Data_DQ33, Data_DQ34, Data_DQ35, Data_DQ36, Data_DQ37, Data_DQ38, Data_DQ39, Data_DQ40, Data_DQ41, Data_DQ42, Data_DQ43, Data_DQ44, Data_DQ45, Data_DQ46, Data_DQ47, Data_DQ48, Data_DQ49, Data_DQ50, Data_DQ51, Data_DQ52, Data_DQ53, Data_DQ54, Data_DQ55, Data_DQ56, Data_DQ57, Data_DQ58, Data_DQ59, Data_DQ60, Data_DQ61, Data_DQ62, Data_DQ63, Control_NCS0, Control_NCS1, Strobe_DDQS0, Strobe_DDQS1, Strobe_DDQS2, Strobe_DDQS3, Strobe_DDQS4, Strobe_DDQS5, Strobe_DDQS6, Strobe_DDQS7, Strobe_SDQS0, Strobe_SDQS1, Strobe_SDQS2, Strobe_SDQS3, Strobe_SDQS4, Strobe_SDQS5, Strobe_SDQS6, Strobe_SDQS7, DM_DM0, DM_DM1, DM_DM2, DM_DM3, DM_DM4, DM_DM5, DM_DM6, DM_DM7	Please select the signal connected to Channel 1 for timing tests.

Table 2 Configuration Variables and Values (continued)

GUI Location	Label	Variable	Values	Description
Confgure	Channel 2	MyCH2	NA_, Clock_DCK0, Clock_DCK1, Clock_DCK2, Clock_SCK0, Clock_SCK1, Clock_SCK2, Data_DQ0, Data_DQ1, Data_DQ2, Data_DQ3, Data_DQ4, Data_DQ5, Data_DQ6, Data_DQ7, Data_DQ8, Data_DQ9, Data_DQ10, Data_DQ11, Data_DQ12, Data_DQ13, Data_DQ14, Data_DQ15, Data_DQ16, Data_DQ17, Data_DQ18, Data_DQ19, Data_DQ20, Data_DQ21, Data_DQ22, Data_DQ23, Data_DQ25, Data_DQ26, Data_DQ27, Data_DQ28, Data_DQ29, Data_DQ30, Data_DQ31, Data_DQ32, Data_DQ33, Data_DQ34, Data_DQ35, Data_DQ36, Data_DQ37, Data_DQ38, Data_DQ39, Data_DQ40, Data_DQ41, Data_DQ42, Data_DQ43, Data_DQ44, Data_DQ45, Data_DQ46, Data_DQ47, Data_DQ48, Data_DQ49, Data_DQ50, Data_DQ51, Data_DQ52, Data_DQ53, Data_DQ54, Data_DQ55, Data_DQ56, Data_DQ57, Data_DQ58, Data_DQ59, Data_DQ60, Data_DQ61, Data_DQ62, Data_DQ63, Control_NCS0, Control_NCS1, Strobe_SDQS0, Strobe_SDQS1, Strobe_SDQS2, Strobe_SDQS3, Strobe_SDQS4, Strobe_SDQS5, Strobe_SDQS6, Strobe_SDQS7, DM_DM0, DM_DM1, DM_DM2, DM_DM3, DM_DM4, DM_DM5, DM_DM6, DM_DM7	Please select the signal connected to Channel 2 for timing tests.

Table 2 Configuration Variables and Values (continued)

GUI Location	Label	Variable	Values	Description
Confgure	Channel 3	MyCH3	NA_, Clock_DCK0, Clock_DCK1, Clock_DCK2, Clock_SCK0, Clock_SCK1, Clock_SCK2, Data_DQ0, Data_DQ1, Data_DQ2, Data_DQ3, Data_DQ4, Data_DQ5, Data_DQ6, Data_DQ7, Data_DQ8, Data_DQ9, Data_DQ10, Data_DQ11, Data_DQ12, Data_DQ13, Data_DQ14, Data_DQ15, Data_DQ16, Data_DQ17, Data_DQ18, Data_DQ19, Data_DQ20, Data_DQ21, Data_DQ22, Data_DQ23, Data_DQ25, Data_DQ26, Data_DQ27, Data_DQ28, Data_DQ29, Data_DQ30, Data_DQ31, Data_DQ32, Data_DQ33, Data_DQ34, Data_DQ35, Data_DQ36, Data_DQ37, Data_DQ38, Data_DQ39, Data_DQ40, Data_DQ41, Data_DQ42, Data_DQ43, Data_DQ44, Data_DQ45, Data_DQ46, Data_DQ47, Data_DQ48, Data_DQ49, Data_DQ50, Data_DQ51, Data_DQ52, Data_DQ53, Data_DQ54, Data_DQ55, Data_DQ56, Data_DQ57, Data_DQ58, Data_DQ59, Data_DQ60, Data_DQ61, Data_DQ62, Data_DQ63, Control_NCS0, Control_NCS1, Strobe_SDQS0, Strobe_SDQS1, Strobe_SDQS2, Strobe_SDQS3, Strobe_SDQS4, Strobe_SDQS5, Strobe_SDQS6, Strobe_SDQS7, DM_DM0, DM_DM1, DM_DM2, DM_DM3, DM_DM4, DM_DM5, DM_DM6, DM_DM7	Please select the signal connected to Channel 3 for timing tests.

Table 2 Configuration Variables and Values (continued)

GUI Location	Label	Variable	Values	Description
Confgure	Channel 4	MyCH4	NA_, Clock_DCK0, Clock_DCK1, Clock_DCK2, Clock_SCK0, Clock_SCK1, Clock_SCK2, Data_DQ0, Data_DQ1, Data_DQ2, Data_DQ3, Data_DQ4, Data_DQ5, Data_DQ6, Data_DQ7, Data_DQ8, Data_DQ9, Data_DQ10, Data_DQ11, Data_DQ12, Data_DQ13, Data_DQ14, Data_DQ15, Data_DQ16, Data_DQ17, Data_DQ18, Data_DQ19, Data_DQ20, Data_DQ21, Data_DQ22, Data_DQ23, Data_DQ25, Data_DQ26, Data_DQ27, Data_DQ28, Data_DQ29, Data_DQ30, Data_DQ31, Data_DQ32, Data_DQ33, Data_DQ34, Data_DQ35, Data_DQ36, Data_DQ37, Data_DQ38, Data_DQ39, Data_DQ40, Data_DQ41, Data_DQ42, Data_DQ43, Data_DQ44, Data_DQ45, Data_DQ46, Data_DQ47, Data_DQ48, Data_DQ49, Data_DQ50, Data_DQ51, Data_DQ52, Data_DQ53, Data_DQ54, Data_DQ55, Data_DQ56, Data_DQ57, Data_DQ58, Data_DQ59, Data_DQ60, Data_DQ61, Data_DQ62, Data_DQ63, Control_NCS0, Control_NCS1, Strobe_SDQS0, Strobe_SDQS1, Strobe_SDQS2, Strobe_SDQS3, Strobe_SDQS4, Strobe_SDQS5, Strobe_SDQS6, Strobe_SDQS7, DM_DM0, DM_DM1, DM_DM2, DM_DM3, DM_DM4, DM_DM5, DM_DM6, DM_DM7	Please select the signal connected to Channel 4 for timing tests.
Confgure	Data Lane	AdvDbgInput_Eye	DQ0, DQ1, DQ2, DQ3, DQ4, DQ5, DQ6, DQ7, DQ8, DQ9, DQ10, DQ11, DQ12, DQ13, DQ14, DQ15, DQ16, DQ17, DQ18, DQ19, DQ20, DQ21, DQ22, DQ23, DQ24, DQ25, DQ26, DQ27, DQ28, DQ29, DQ30, DQ31, DQ32, DQ33, DQ34, DQ35, DQ36, DQ37, DQ38, DQ39, DQ40, DQ41, DQ42, DQ43, DQ44, DQ45, DQ46, DQ47, DQ48, DQ49, DQ50, DQ51, DQ52, DQ53, DQ54, DQ55, DQ56, DQ57, DQ58, DQ59, DQ60, DQ61, DQ62, DQ63	Identifies the data lane for the eye diagram tests.
Confgure	Data Source	AdvDbg_Source1	1, 2, 3, 4	Identifies the source of the data to be analyzed for eye diagram tests.
Confgure	Data Strobe Lane	AdvDbgSupport	DQS0, DQS1, DQS2, DQS3, DQS4, DQS5, DQS6, DQS7	Identifies the data strobe lane for the eye diagram tests.

Table 2 Configuration Variables and Values (continued)

GUI Location	Label	Variable	Values	Description
Confgure	Data Strobe Source	AdvDbg_Source2	-1, 1, 2, 3, 4	Identifies the source of the data strobe for eye diagram tests.
Confgure	Mark Worst Case Cycles	MarkWorstCaseCycles	true, false	Places markers around the worst case cycles (test-dependent). Slows runtime performance.
Confgure	Measurement(s) Count	Multi_Measurement	(Accepts user-defined text), 1, 10, 100, 1000	Determine how many measurement(s) the selected test(s) will be completed.
Confgure	Multi-trial Selection	Multi_Mode	1, 2, 3	Determine the measurement mode for the selected multi-trial test(s).
Confgure	Option	TypeOfSignalCH1_CAT	NA, PUT, SP	Identifies the channel 1 signal parameter to use for timing tests.
Confgure	Option	TypeOfSignalCH2_CAT	NA, PUT, SP	Identifies the channel 2 signal parameter to use for timing tests.
Confgure	Option	TypeOfSignalCH3_CAT	NA, PUT, SP	Identifies the channel 3 signal parameter to use for timing tests.
Confgure	Option	TypeOfSignalCH4_CAT	NA, PUT, SP	Identifies the channel 4 signal parameter to use for timing tests.
Confgure	Overshoot/ Undershoot region(ns)	Over_Under_Region	(Accepts user-defined text), 3.75	Set the expected overshoot/undershoot region in time(ns) from vref point to the expected region.
Confgure	PUT Source	AdvDbg_Source3	1, 2, 3, 4	Identifies the source of the PUT for High/Low State Ringing Tests.
Confgure	PUT Source	ElecSE_Source1	1, 2, 3, 4	Identifies the source of the PUT for Single-Ended AC Input Tests.
Confgure	PUT Source	OvrShtSe_Source	1, 2, 3, 4	Identifies the source of the PUT for Single-Ended OverShoot/UnderShoot Tests.
Confgure	PUT(+) Source	ElecDIFF_Source1	1, 2, 3, 4	Identifies the source of the PUT(+) for Differential AC Input Tests.

Table 2 Configuration Variables and Values (continued)

GUI Location	Label	Variable	Values	Description
Confgure	PUT(-) Source	ElecDIFF_Source2	1, 2, 3, 4	Identifies the source of the PUT(-) for Differential AC Input Tests.
Confgure	Pin Under Test, PUT	ADvDbgInput_Ringing	DQ0, DQ1, DQ2, DQ3, DQ4, DQ5, DQ6, DQ7, DQ8, DQ9, DQ10, DQ11, DQ12, DQ13, DQ14, DQ15, DQ16, DQ17, DQ18, DQ19, DQ20, DQ21, DQ22, DQ23, DQ24, DQ25, DQ26, DQ27, DQ28, DQ29, DQ30, DQ31, DQ32, DQ33, DQ34, DQ35, DQ36, DQ37, DQ38, DQ39, DQ40, DQ41, DQ42, DQ43, DQ44, DQ45, DQ46, DQ47, DQ48, DQ49, DQ50, DQ51, DQ52, DQ53, DQ54, DQ55, DQ56, DQ57, DQ58, DQ59, DQ60, DQ61, DQ62, DQ63, /RAS, /WE, /CAS, /CS0, /CS1, CKE0, CKE1, ODT0, ODT1, DQS0, DQS1, DQS2, DQS3, DQS4, DQS5, DQS6, DQS7, A0, A1, A2, A3, A4, A5, A6, A7, A8, A9, A10, A11, A12, A13, A14, A15, BA0, BA1, BA2, CK0, CK1, CK2, /CK0, /CK1, /CK2, DM0, DM1, DM2, DM3, DM4, DM5, DM6, DM7	Identifies the Pin Under Test for High/Low State Ringing tests.
Confgure	Pin Under Test, PUT	ElecParamDiInput	CK0, CK1, CK2	Identifies the Pin Under Test for Differential AC Input Tests.
Confgure	Pin Under Test, PUT	ElecParamSeInput	DQ0, DQ1, DQ2, DQ3, DQ4, DQ5, DQ6, DQ7, DQ8, DQ9, DQ10, DQ11, DQ12, DQ13, DQ14, DQ15, DQ16, DQ17, DQ18, DQ19, DQ20, DQ21, DQ22, DQ23, DQ24, DQ25, DQ26, DQ27, DQ28, DQ29, DQ30, DQ31, DQ32, DQ33, DQ34, DQ35, DQ36, DQ37, DQ38, DQ39, DQ40, DQ41, DQ42, DQ43, DQ44, DQ45, DQ46, DQ47, DQ48, DQ49, DQ50, DQ51, DQ52, DQ53, DQ54, DQ55, DQ56, DQ57, DQ58, DQ59, DQ60, DQ61, DQ62, DQ63, /RAS, /WE, /CAS, /CS0, /CS1, CKE0, CKE1, ODT0, ODT1, DQS0, DQS1, DQS2, DQS3, DQS4, DQS5, DQS6, DQS7, A0, A1, A2, A3, A4, A5, A6, A7, A8, A9, A10, A11, A12, A13, A14, A15, BA0, BA1, BA2, CK0, CK1, CK2, /CK0, /CK1, /CK2, DM0, DM1, DM2, DM3, DM4, DM5, DM6, DM7	Identifies the Pin Under Test for Single-Ended AC input parameters.

Table 2 Configuration Variables and Values (continued)

GUI Location	Label	Variable	Values	Description
Confgure	Pin Under Test, PUT	OvrShtSeInput	DQ0, DQ1, DQ2, DQ3, DQ4, DQ5, DQ6, DQ7, DQ8, DQ9, DQ10, DQ11, DQ12, DQ13, DQ14, DQ15, DQ16, DQ17, DQ18, DQ19, DQ20, DQ21, DQ22, DQ23, DQ24, DQ25, DQ26, DQ27, DQ28, DQ29, DQ30, DQ31, DQ32, DQ33, DQ34, DQ35, DQ36, DQ37, DQ38, DQ39, DQ40, DQ41, DQ42, DQ43, DQ44, DQ45, DQ46, DQ47, DQ48, DQ49, DQ50, DQ51, DQ52, DQ53, DQ54, DQ55, DQ56, DQ57, DQ58, DQ59, DQ60, DQ61, DQ62, DQ63, /RAS, /WE, /CAS, /CS0, /CS1, CKE0, CKE1, ODT0, ODT1, DQS0, DQS1, DQS2, DQS3, DQS4, DQS5, DQS6, DQS7, A0, A1, A2, A3, A4, A5, A6, A7, A8, A9, A10, A11, A12, A13, A14, A15, BA0, BA1, BA2, CK0, CK1, CK2, /CK0, /CK1, /CK2, DM0, DM1, DM2, DM3, DM4, DM5, DM6, DM7	Identifies the Pin Under Test for Single-Ended Overshoot/Undershoot.
Confgure	Pin Under Test, PUT	TypeOfSignalCH1	NA, Clock, Strobe, Data, DM, Control	Identifies the channel 1 signal parameter to use for timing tests.
Confgure	Pin Under Test, PUT	TypeOfSignalCH2	NA, Clock, Strobe, Data, DM, Control	Identifies the channel 2 signal parameter to use for timing tests.
Confgure	Pin Under Test, PUT	TypeOfSignalCH3	NA, Clock, Strobe, Data, DM, Control	Identifies the channel 3 signal parameter to use for timing tests.
Confgure	Pin Under Test, PUT	TypeOfSignalCH4	NA, Clock, Strobe, Data, DM, Control	Identifies the channel 4 signal parameter to use for timing tests.
Confgure	READ Separation Max Setup/Hold Time (% of UI)	InfiniiScanMaxLimitR	(Accepts user-defined text), 0.2	Identifies the upper limit for Setup Time measurement used in the InfiniiScan Measurement Mode (READ cycle). For example, 0.2 represent 20% of 1 Unit Interval and etc.
Confgure	READ Separation Min Setup/Hold Time (% of UI)	InfiniiScanMinLimitR	(Accepts user-defined text), 0.0	Identifies the lower limit for Setup Time measurement used in the InfiniiScan Measurement Mode (READ cycle). For example, 0.2 represent 20% of 1 Unit Interval and etc.

Table 2 Configuration Variables and Values (continued)

GUI Location	Label	Variable	Values	Description
Confgure	Re-scale Test Mask	ReScaleMask	true, false	Enable/disable horizontal re-scaling of selected test mask to be loaded in the eye diagram tests.
Confgure	Sample Size (UI)	Sample_Len_UI	(Accepts user-defined text), 500, 1000, 2000	Determine the length of the sample acquisition based on number of UI. This value will determine the maximum supported burst length of a test data signal. A large value set here will result in slower runtime performance when performing the timing tests. *Note:This option is applicable to all timing tests except for Command and Address Timing tests.
Confgure	Signal Selected	MyCH1_CAT	NA_, Clock_DCK0, Clock_DCK1, Clock_DCK2, Clock_SCK0, Clock_SCK1, Clock_SCK2, Control_NCS0, Control_NCS1, Control_BA0, Control_BA1, Control_BA2, Control_NRAS, Control_NWE, Control_NCAS, Control_CKE0, Control_CKE1, Control_ODT0, Control_ODT1, Address_A0, Address_A1, Address_A2, Address_A3, Address_A4, Address_A5, Address_A6, Address_A7, Address_A8, Address_A9, Address_A10, Address_A11, Address_A12, Address_A13, Address_A14, Address_A15	Please select the signal connected to Channel 1 for Control and Address timing tests.
Confgure	Signal Threshold setting by percentage	Threshold_pct	(Accepts user-defined text), 0.1, 0.2	This option allow user to define the Upper and Lower threshold of the signal by percentage. Eg. Formula used is equivalent to Upper Threshold = { Vref + (%) X (VMax - Vref) } and Lower Threshold = { Vref - (%) X (Vref - Vmin) }

Table 2 Configuration Variables and Values (continued)

GUI Location	Label	Variable	Values	Description
Confgure	Signal selected	MyCH2_CAT	NA_, Clock_DCK0, Clock_DCK1, Clock_DCK2, Clock_SCK0, Clock_SCK1, Clock_SCK2, Control_NCS0, Control_NCS1, Control_BA0, Control_BA1, Control_BA2, Control_NRAS, Control_NWE, Control_NCAS, Control_CKE0, Control_CKE1, Control_ODT0, Control_ODT1, Address_A0, Address_A1, Address_A2, Address_A3, Address_A4, Address_A5, Address_A6, Address_A7, Address_A8, Address_A9, Address_A10, Address_A11, Address_A12, Address_A13, Address_A14, Address_A15	Please select the signal connected to Channel 2 for Control and Address timing tests.
Confgure	Signal selected	MyCH3_CAT	NA_, Clock_DCK0, Clock_DCK1, Clock_DCK2, Clock_SCK0, Clock_SCK1, Clock_SCK2, Control_NCS0, Control_NCS1, Control_BA0, Control_BA1, Control_BA2, Control_NRAS, Control_NWE, Control_NCAS, Control_CKE0, Control_CKE1, Control_ODT0, Control_ODT1, Address_A0, Address_A1, Address_A2, Address_A3, Address_A4, Address_A5, Address_A6, Address_A7, Address_A8, Address_A9, Address_A10, Address_A11, Address_A12, Address_A13, Address_A14, Address_A15	Please select the signal connected to Channel 3 for Control and Address timing tests.
Confgure	Signal selected	MyCH4_CAT	NA_, Clock_DCK0, Clock_DCK1, Clock_DCK2, Clock_SCK0, Clock_SCK1, Clock_SCK2, Control_NCS0, Control_NCS1, Control_BA0, Control_BA1, Control_BA2, Control_NRAS, Control_NWE, Control_NCAS, Control_CKE0, Control_CKE1, Control_ODT0, Control_ODT1, Address_A0, Address_A1, Address_A2, Address_A3, Address_A4, Address_A5, Address_A6, Address_A7, Address_A8, Address_A9, Address_A10, Address_A11, Address_A12, Address_A13, Address_A14, Address_A15	Please select the signal connected to Channel 4 for Control and Address timing tests.

Table 2 Configuration Variables and Values (continued)

GUI Location	Label	Variable	Values	Description
Confgure	Skip Connection Diagram Prompt	Connection PromptOff	1, 0	By selecting "Yes", system will automatically suppress all connection prompt window to allow user to continuously running all test without interuption. By selecting "No", system will prompt the connection diagram window. Hint: Select "Yes" when the user wants to run multiple trials overnight.
Confgure	Skip Error Message	ErrorMsgOff	0, 1	By selecting "Yes", system will bypass all error message that occur and continue to next test. By selecting "No", system will prompt error message. Hint: Select "Yes" when the user wants to run multiple trials overnight.
Confgure	Statistic Selection	Stats_Mode	MIN, MEAN, MAX	Determine the statistic result to be returned for the selected multi-trial test(s).
Confgure	Supporting Pin	ElecParamSeSupport	N/A, DQ0, DQ1, DQ2, DQ3, DQ4, DQ5, DQ6, DQ7, DQ8, DQ9, DQ10, DQ11, DQ12, DQ13, DQ14, DQ15, DQ16, DQ17, DQ18, DQ19, DQ20, DQ21, DQ22, DQ23, DQ24, DQ25, DQ26, DQ27, DQ28, DQ29, DQ30, DQ31, DQ32, DQ33, DQ34, DQ35, DQ36, DQ37, DQ38, DQ39, DQ40, DQ41, DQ42, DQ43, DQ44, DQ45, DQ46, DQ47, DQ48, DQ49, DQ50, DQ51, DQ52, DQ53, DQ54, DQ55, DQ56, DQ57, DQ58, DQ59, DQ60, DQ61, DQ62, DQ63, DQS0, DQS1, DQS2, DQS3, DQS4, DQS5, DQS6, DQS7	Identifies the required supporting pin for Single-Ended AC input parameters.
Confgure	Supporting Pin Source	ElecSE_Source2	-1, 2, 1, 3, 4	Identifies the source of the supporting pin for Single-Ended AC Input Tests.

Table 2 Configuration Variables and Values (continued)

GUI Location	Label	Variable	Values	Description
Confgure	Threshold Trigger Setting	ThreshSetMode	1, 0	By selecting "Auto", the system will automatically determine the appropriate measurement threshold settings that are used for triggering and measurement purposes. Setting "Manual" allows user to set the appropriate optimization for the measurement threshold values used in the test signals.
Confgure	Time(minute(s))	Multi_Time	(Accepts user-defined text), 1, 10, 100, 1000	Determine how long(in minutes) the selected test(s) will be executed.
Confgure	Timeout (ms)	RunT_Timeout	(Accepts user-defined text), 5000, 10000, 15000	Identifies the timeout value to be used for High/Low State Ringing Test.
Confgure	Total Bit Display (cycle)	myDisBit	(Accepts user-defined text), 2, 4, 10, 20, 50	This option allows the user to select how many data bits to be displayed by end of the test.More bits selected will enable user to have a clearer view of the whole burst of signals.
Confgure	Total Measurement Required	mytIHtISTotalTest	(Accepts user-defined text), 1, 2, 5, 10, 25	This option is ONLY applicable to Command and Address Timing tests(eg.tIS and tIH.) Reason for having this option is because tIS and tIH test do not perform measurement for every single bit for Read or Write cycle. Hence, the tool will perform the total number of measurement based on user selection.
Confgure	Total Unit Interval	ADM_Mem Depth	(Accepts user-defined text), 4, 5, 10, 20, 50, 100	This Unit Interval means that the total UI(ns) to be used for Eye-Diagram eye folding. Unit Interval here is represented in Bit(ns). UI here can translate to Memory Depth with following equation : Memory Depth = 20G Sampling Rate x UI(user-select) X 1 Bit Cycle(2.5ns for a 400MT/s DUT)

Table 2 Configuration Variables and Values (continued)

GUI Location	Label	Variable	Values	Description
Confgure	Total Waveform	EyeDiagram NumOfWav e	(Accepts user-defined text), 500, 1000, 1500, 3000, 5000	Select or type the total number of waveforms required for eye diagram tests.
Confgure	Trigger Level (V)	RTriggerLev el_Ringing	(Accepts user-defined text), 0.100, 0.500, 0.900	Sets the rising edge voltage level to trigger on for all High/Low State Ringing Tests.
Confgure	Trigger timeout (ms)	TimeOut_Co mpliance	(Accepts user-defined text), 5000, 10000, 15000, 20000, 30000	Identifies the trigger time out value. This represent the time taken to terminate the test when the scope unable to trigger any signal.
Confgure	VDD (V)	InputVDD	(Accepts user-defined text), 2.500	Identifies the input supply voltage.
Confgure	VDDQ (V)	InputVDDQ	(Accepts user-defined text), 2.500	Identifies the input supply voltage for data output.
Confgure	Verify Selected Rank Only?	CSDQSCYC	0.0, 1.0	By choosing Yes, you will require an additional channel for Chip Select(CS). Measurement will only be done on selected Rank based on chip select signal connected to the oscilloscope.
Confgure	Vih_ac (V)	InputThresh old_Vih_ac	(Accepts user-defined text), 1.56	Identifies the ac input logic HIGH voltage.
Confgure	Vih_dc (V)	InputThresh old_Vih_dc	(Accepts user-defined text), 1.40	Identifies the dc input logic HIGH voltage.
Confgure	Vil_ac (V)	InputThresh old_Vil_ac	(Accepts user-defined text), 0.940	Identifies the ac input logic LOW voltage.
Confgure	Vil_dc (V)	InputThresh old_Vil_dc	(Accepts user-defined text), 1.10	Identifies the dc input logic LOW voltage.
Confgure	Voh(V)	OutputThres hold_Voh	(Accepts user-defined text), 2.25	Identifies the ac input logic HIGH voltage.
Confgure	Vol(V)	OutputThres hold_Vol	(Accepts user-defined text), 0.50	Identifies the dc input logic LOW voltage.
Confgure	Vref (V)	InputRefV_V ref	(Accepts user-defined text), 1.250	Identifies the input reference voltage.

Table 2 Configuration Variables and Values (continued)

GUI Location	Label	Variable	Values	Description
Confgure	WRITE Separation Max Setup/Hold Time (% of UI)	InfiniiScanMaxLimitW	(Accepts user-defined text), 0.6	Identifies the upper limit for Setup Time measurement used in the InfiniiScan Measurement Mode (WRITE cycle). For example, 0.6 represent 60% of 1 Unit Interval and etc.
Confgure	WRITE Separation Min Setup/Hold Time (% of UI)	InfiniiScanMinLimitW	(Accepts user-defined text), 0.4	Identifies the lower limit for Setup Time measurement used in the InfiniiScan Measurement Mode (WRITE cycle). For example, 0.4 represent 40% of 1 Unit Interval and etc.
Confgure	Waveform Source	Source	1, 2, 3, 4	Identifies the source of the data to be analyzed.
Confgure	terr(nper) Maximum N Width Value	nper_max	(Accepts user-defined text), 10	Sets the upper bound (inclusive) of the inner sliding window for the terr(nper) series.
Confgure	terr(nper) Minimum N Width Value	nper_min	(Accepts user-defined text), 6	Sets the lower bound (inclusive) of the inner sliding window for the terr(nper) series.
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 <= 100	Specify N using the 'Minimum required margin %' control.
Set Up	Class	ClassType	A, B, C	This option allow user to select Class.
Set Up	Custom Data Rate	pcboCustomSG	(Accepts user-defined text), 200, 266, 333, 400	This option allow user to key in specific data rate.
Set Up	Device ID	pcboOverallDeviceID	(Accepts user-defined text)	This option allow user to key in related test details.
Set Up	LowPow	chkLowPowType	0.0, 1.0	This option allow user to select Low Power.
Set Up	TestMode	TestMode	Compliance, Custom	This option allow user to select test mode.

Table 2 Configuration Variables and Values (continued)

GUI Location	Label	Variable	Values	Description
Set Up	User Description	pcboOverallDeviceDescription	(Accepts user-defined text)	This option allow user to key in test detail.
Set Up	optSpeedGrade	DeviceType	DDR1-200, DDR1-266, DDR1-333, DDR1-370, DDR1-400	This option allow user to select specific speed grade.
Set Up	txtOverallUserComment	txtOverallUserComment	(Accepts user-defined text)	

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();
```

Here are the actual Test names and IDs used by this application:

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
AC differential input cross point voltage, Vix	1038	AC differential cross point voltage
AC differential input voltage, Vid	1037	AC differential input voltage
High State Ringing Test	10421	High State Ringing Test
Input signal minimum falling slew rate, SLEWf	10342	Input signal minimum falling slew rate
Input signal minimum rising slew rate, SLEWr	10341	Input signal minimum rising slew rate
Low State Ringing Test	10422	Low State Ringing Test
Maximum AC Input Logic High, Vih(ac)	10311	Maximum AC Input Logic High
Maximum DC Input Logic Low, Vil(dc) for Address and Command Inputs	10323	Maximum DC Input Logic Low
Maximum DC Input Logic Low, Vil(dc) for Data Inputs	10322	Maximum DC Input Logic Low
Maximum Output Logic High, Voh	20311	Maximum Output Logic High
Minimum AC Input Logic Low, Vil(ac)	10321	Minimum AC Input Logic Low
Minimum DC Input Logic High, Vih(dc) for Address and Command Inputs	10313	Minimum DC Input Logic High
Minimum DC Input Logic High, Vih(dc) for Data Inputs	10312	Minimum DC Input Logic High
Minimum Output Logic Low, Vol	20321	Minimum Output Logic Low
Overshoot Amplitude for Address and Control Pins	10351	Peak amplitude of AC overshoot
Overshoot Amplitude for Data, Strobe and Mask Pins	10352	Peak amplitude of AC overshoot
Overshoot Area for Address and Control Pins	10353	OverShoot area above VDDQ

Table 4 Test IDs and Names (continued)

Name	TestID	Description
Overshoot Area for Data, Strobe and Mask Pins	10354	OverShoot area above VDDQ
Undershoot Amplitude for Address and Control Pins	10361	Peak amplitude of AC undershoot
Undershoot Amplitude for Data, Strobe and Mask Pins	10362	Peak amplitude of AC undershoot
Undershoot Area for Address and Control Pins	10363	UnderShoot area below VSSQ
Undershoot Area for Data, Strobe and Mask	10364	UnderShoot area below VSSQ
User Defined Real-Time Eye Diagram Test For Read Cycle	10401	User Defined Real-Time Eye Diagram Test For Read Cycle
User Defined Real-Time Eye Diagram Test For Write Cycle	10402	User Defined Real-Time Eye Diagram Test For Write Cycle
tAC	30011	DQ output access time from CK,/CK.
tCH Average High Measurements	1000	tCH Average High Measurements
tCK(avg) Falling Edge Measurements, CL = 2.0	25077	tCK(avg) Falling Edge Measurements for CL = 2.0
tCK(avg) Falling Edge Measurements, CL = 2.5	25088	tCK(avg) Falling Edge Measurements for CL = 2.5
tCK(avg) Falling Edge Measurements, CL = 3.0	25099	tCK(avg) Falling Edge Measurements for CL = 3.0
tCK(avg) Falling Edge Measurements, CL = 4.0	25100	tCK(avg) Falling Edge Measurements for CL = 4.0
tCK(avg) Rising Edge Measurements, CL = 2.0	20077	tCK(avg) Rising Edge Measurements for CL = 2.0
tCK(avg) Rising Edge Measurements, CL = 2.5	20078	tCK(avg) Rising Edge Measurements for CL = 2.5
tCK(avg) Rising Edge Measurements, CL = 3.0	20079	tCK(avg) Rising Edge Measurements for CL = 3.0
tCK(avg) Rising Edge Measurements, CL = 4.0	20080	tCK(avg) Rising Edge Measurements for CL = 4.0
tCL Average Low Measurements	1050	tCL Average LowMeasurements
tDH	3302	DQ and DM input hold time

Table 4 Test IDs and Names (continued)

Name	TestID	Description
tDH, Fast Slew Rate	33020	DQ and DM input hold time, fast slew rate. For Low Power only.
tDH, Slow Slew Rate	33021	DQ and DM input hold time, slow slew rate. For Low Power only.
tDQSCK	30021	DQS output access time from CK,/CK
tDQSH	3107	DQS input high pulse width
tDQSL	3108	DQS input low pulse width
tDQSQ	3104	DQS-DQ skew for DQS and associated DQ signals, For TSOP Package
tDQSQ(BGA)	31041	DQS-DQ skew for DQS and associated DQ signals, For BGA Package
tDQSQ(TSOP)	31040	DQS-DQ skew for DQS and associated DQ signals, For TSOP Package
tDQSS	3106	DQS latching transition to associated clock edge
tDS	3301	DQ and DM input setup time
tDS, Fast Slew Rate	33010	DQ and DM input setup time, fast slew rate. For Low Power DDR Only.
tDS, Slow Slew Rate	33011	DQ and DM input setup time, slow slew rate. For Low Power DDR Only.
tDSH	3110	DQS falling edge hold time from CK
tDSS	3109	DQS falling edge to CK setup time
tHZDQ	3101	DQ out high-impedance time from CK,/CK
tHZDQS	31011	DQS out high-impedance time from CK,/CK
tIH, Fast Slew Rate	3202	Address and control input hold time
tIH, Slow Slew Rate	32020	Address and control input hold time
tIS, Fast Slew Rate	3201	Address and control input setup time
tIS, Slow Slew Rate	32010	Address and control input setup time
tLZDQ	3102	DQ low-impedance time from CK,/CK
tLZDQS	3103	DQS low-impedance time from CK,/CK
tQH	3105	DQ/DQS output hold time from DQS
tQH(BGA)	31051	DQ/DQS output hold time from DQS
tQH(TSOP)	31050	DQ/DQS output hold time from DQS
tRPRE,CL=1.5	31130	Read preamble

Table 4 Test IDs and Names (continued)

Name	TestID	Description
tRPRE,CL=2.0	31131	Read preamble
tRPRE,CL=2.5	31132	Read preamble
tRPRE,CL=3.0	3113	Read preamble
tRPRE,CL=4.0	31133	Read preamble
tRPST	3114	Read postamble
tWPRE	3111	Write preamble
tWPRE	31110	Write preamble
tWPST	3112	Write postamble
terr(11-50per) Falling Edge Measurements	950	terr(11-50per) Falling Edge Measurements
terr(11-50per) Rising Edge Measurements	900	terr(11-50per) Rising Edge Measurements
terr(2per) Falling Edge Measurements	450	terr(2per) Falling Edge Measurements
terr(2per) Rising Edge Measurements	400	terr(2per) Rising Edge Measurements
terr(3per) Falling Edge Measurements	550	terr(3per) Falling Edge Measurements
terr(3per) Rising Edge Measurements	500	terr(3per) Rising Edge Measurements
terr(4per) Falling Edge Measurements	650	terr(4per) Falling Edge Measurements
terr(4per) Rising Edge Measurements	600	terr(4per) Rising Edge Measurements
terr(5per) Falling Edge Measurements	750	terr(5per) Falling Edge Measurements
terr(5per) Rising Edge Measurements	700	terr(5per) Rising Edge Measurements
terr(6-10per) Falling Edge Measurements	850	terr(6-10per) Falling Edge Measurements
terr(6-10per) Rising Edge Measurements	800	terr(6-10per) Rising Edge Measurements
terr(nper) Falling Edge Measurements	1250	terr(nper) Falling Edge Measurements
terr(nper) Rising Edge Measurements	1200	terr(nper) Rising Edge Measurements

Table 4 Test IDs and Names (continued)

Name	TestID	Description
tjit(CC) Falling Edge Measurements	150	tjit(CC) Falling Edge Measurements
tjit(CC) Rising Edge Measurements	100	tjit(CC) Rising Edge Measurements
tjit(duty-high) Jitter Average High Measurements	1100	tjit(duty-high) Jitter Average High Measurements
tjit(duty-low) Jitter Average Low Measurements	1150	tjit(duty-low) Jitter Average Low Measurements
tjit(per) Falling Edge Measurements	350	tjit(per) Falling Edge Measurements
tjit(per) Rising Edge Measurements	300	tjit(per) Clock period jitter of Rising Edge Measurements

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
pulsegen	81134A PulseGen
scope	The primary oscilloscope

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