Keysight FlexRay Physical Layer Conformance Test Application

KEYSIGHT TECHNOLOGIES

Programmer's Reference

Notices

Revision

Version 01.11.0000

Edition

October 1, 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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In This Book

This book is your guide to programming the Keysight Technologies FlexRay Physical Layer Conformance 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 13, and Chapter 4, “Instruments,” starting on page 17, provide information specific to programming the FlexRay Physical Layer Conformance 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

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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 FlexRay Physical Layer Conformance 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 FlexRay Physical Layer Conformance 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	Flexray Bus	TriggerFlexBus	A, B	Select the Flexray Bus to Trigger
Confgure	Number of Waveforms (Eye-diagram tests)	NoOfWav	100000, 200000, 300000, 400000, 500000, 600000, 700000, 800000, 900000, 1000000	Select number of waveforms tested for eye-diagram tests.
Confgure	Scope Input Channel	DataChan	CHAN1, CHAN2, CHAN3, CHAN4	Select the scope input channel to use.
Confgure	Trigger Level (V)	TrigLevelManual	(Accepts user-defined text), -0.2, -0.3, -0.5, -1, -2, -4	Select or enter the initial trigger level (in Volts) in manual mode to a setting that is approximately 25% above the base level (Vbase) of the lowest amplitude frame. If the scope successfully triggers using the edge trigger mode at this setting, the software will then re-optimize the V/div and trigger level setting for each tested frame ID.
Confgure	Vertical Scaling (V/div)	VertScaleManual	(Accepts user-defined text), 0.1, 0.5, 1	Select or enter the initial V/div in manual mode to a setting that will scale the highest amplitude frame to be approximately 75% of screen height.

Table 2 Configuration Variables and Values (continued)

GUI Location	Label	Variable	Values	Description
Confgure	Vertical Scaling Mode	VertScaleAutoManual	Auto, Manual	Select "auto" mode to allow the software to optimally scale the V/div and trigger level for all tests. If the amplitude of the highest amplitude frame is more than 30% higher than the amplitude of the lowest amplitude frame, then you may need to select the "manual" initial scaling mode. You should then select a V/div setting that will insure that the highest amplitude frame is scaled to be on-screen (not clipped); and also select a trigger level that insures that the lowest amplitude frame triggers reliably.
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	Comments	txtOverallUserComment	(Accepts user-defined text)	Comments
Set Up	pstOptExpTests	pstOptExpTests	On, Off	Expanded/Debug SI Voting Options
Set Up	pstOptTPLocation	pstOptTPLocation	Receiver Input, Transmitter Output	Test Plane
Set Up	pstOptTransDUT	pstOptTransDUT	Bus Driver (BD), Active Star (AS)	Input/Output Device-under-test
Set Up	pstOptTransSigSource	pstOptTransSigSource	Signal Generator Clock gated by T-ENABLE, FlexRay Communication Controller generated traffic	Transmitter Signal Source
Set Up	pstOptTransType	pstOptBaudRate	10M, 5M, 2.5M	Baud Rate(bps)

Table 2 Configuration Variables and Values (continued)

GUI Location	Label	Variable	Values	Description
Set Up	pstOptTransType	pstOptTransType	Standard Voltage, Increased Voltage	Transmitter Type
Set Up	pstTxtFrameID	pstTxtFrameID	(Accepts user-defined text)	Static Frame ID

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
Data 0 Amplitude	20501	Data 0 Amplitude for Receiver Test
Data 0 Amplitude	10501	Data 0 Amplitude for Transmitter Test
Data 1 Amplitude	20502	Data 1 Amplitude for Receiver Test
Data 1 Amplitude	10502	Data 1 Amplitude for Transmitter Test
Eye-Diagram Measurement	10103	Eye-Diagram Measurement for Transmitter Test
Eye-Diagram Measurement (all frames)	20101	Eye-Diagram Measurement (all frames) for Receiver Test
Eye-Diagram Measurement (all frames)	10101	Eye-Diagram Measurement (all frames) for Transmitter Test
Eye-Diagram Measurement (specified frame only)	20102	Eye-Diagram Measurement (specified frame only) for Receiver Testt
Fall Time - Data1 to Data0	20602	Fall Time - Data1 to Data0 for Receiver Test
Fall Time - Data1 to Data0	10602	Fall Time - Data1 to Data0 for Transmitter Test
Idle Level	20503	Idle Level for Receiver Test
Idle Level	10503	Idle Level for Transmitter Test
Isolated One	20201	Isolated One for Receiver Test
Isolated One - Bit Asymmetry (dBitLengthVariation)	30215	Isolated One - Bit Asymmetry (dBitLengthVariation) for Expanded Receiver Test
Isolated One - Falling Edge Duration (dEdge10)	30213	Isolated One - Falling Edge Duration (dEdge10) for Expanded Receiver Test
Isolated One - Required maximal Lvl (uData1Top)	30211	Isolated One - Required maximal Lvl (uData1Top) for Expanded Receiver Test
Isolated One - Rising Edge Duration (dEdge01)	30212	Isolated One - Rising Edge Duration (dEdge01) for Expanded Receiver Test
Isolated One - Shortest Single bit (dBitShort)	30214	Isolated One - Shortest Single bit (dBitShort) for Expanded Receiver Test
Isolated One - Slowest Edge (dEdgeMax)	30216	Isolated One - Slowest Edge (dEdgeMax) for Expanded Receiver Test
Isolated Zero	20202	Isolated Zero for Receiver Test
Isolated Zero - Bit Asymmetry (dBitLengthVariation)	30225	Isolated Zero - Bit Asymmetry (dBitLengthVariation) for Expanded Receiver Test

Table 4 Test IDs and Names (continued)

Name	TestID	Description
Isolated Zero - Falling Edge Duration (dEdge10)	30223	Isolated Zero - Falling Edge Duration (dEdge10) for Expanded Receiver Test
Isolated Zero - Required minimal Lvl (uData0Top)	30221	Isolated Zero - Required minimal Lvl (uData0Top) for Expanded Receiver Test
Isolated Zero - Rising Edge Duration (dEdge01)	30222	Isolated Zero - Rising Edge Duration (dEdge01) for Expanded Receiver Test
Isolated Zero - Shortest Single Bit (dBitShort)	30224	Isolated Zero - Shortest Single Bit (dBitShort) for Expanded Receiver Test
Isolated Zero - Slowest Edge (dEdgeMax)	30226	Isolated Zero - Slowest Edge (dEdgeMax) for Expanded Receiver Test
Mean Corrected Cycle Time	20401	Mean Corrected Cycle Time for Receiver Test
Mean Corrected Cycle Time	10401	Mean Corrected Cycle Time for Transmitter Test
Rise Time - Data0 to Data1	20601	Rise Time - Data0 to Data1 for Receiver Test
Rise Time - Data0 to Data1	10601	Rise Time - Data0 to Data1 for Transmitter Test
TSS Width	20301	TSS Width for Receiver Test
TSS Width	10301	TSS Width for Transmitter Test

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
scope	The primary Oscilloscope.

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