# Keysight N109256CB OIF-CEI 56G-VSR/MR/LR Test Application

KEYSIGHT

PROGRAMMER'S REFERENCE

# Notices



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## Safety Notices

**CAUTION**

A **CAUTION** 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 damage to the product or loss of important data. Do not proceed beyond a **CAUTION** notice until the indicated conditions are fully understood and met.

**WARNING**

**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 N109256CB OIF-CEI 56G-VSR/MR/LR 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 19, Chapter 4, “Instruments,” starting on page 25, and Chapter 5, “Message IDs,” starting on page 27 provide information specific to programming the N109256CB OIF-CEI 56G-VSR/MR/LR 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, 4, and 5 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 N109256CB OIF-CEI 56G-VSR/MR/LR Test 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 N109256CB OIF-CEI 56G-VSR/MR/LR 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 |
|---|---|---|---|---|
| Configure | CDR Source | CKSource | DIFF, AUX, N4877A, N107, User | Select the source used for clock recovery. By selecting "Differential", the signal will be used to recover the clock according to the PLL specs. By selection "Aux", a user supplied clock must be supplied to the Clock Recovery Aux inputs. |
| Configure | CRE Jitter Optimization | CREState | ON, OFF | Controls state to optimize the standard Jitter-mode RJ measurement. The state will set to OFF if 86108B is detected to run in PAM-4 or N107x CDR is connected with DCA-M. |

**Table 2** Configuration Variables and Values (continued)

| GUI Location | Label | Variable | Values | Description |
|---|---|---|---|---|
| Configure | Channels for N104x/N1055A | CHANPAIR | DIFF1A, DIFF1C, DIFF2A, DIFF2C, DIFF3A, DIFF3C, DIFF4A, DIFF4C | When using the N104x/N1055A, you may use a 2-channel or 4-channel module and install the module in Slot 1 or Slot 2 (not Slots 3 or 4). You may choose one of the four differential pairs above. The default choice is Slot 1, channels A and B. If the application does not find a module in Slot 1, it will search for Slot 2; if found, the default channels will be 2A and 2B unless you have selected 2C and 2D. If there are no choices listed above, multi-lane automation of the N104x/N1055A was selected in the setup tab. These selections will be automated and require an N104x/N1055A is both slot 1 and slot 2. See connection diagram for more info. |
| Configure | Channels for N109x | CHANPAIR_DCAM | DIFF7A, DIFF7C | When using the N109x, you may use a 2-channel or 4-channel module and install the module in Slot 7. You may choose one of the four differential pairs above. |
| Configure | Channels for Switch chan1 | CHANSWITCH1 | 1A, 1C, 2A, 2C | Channel 1 for switch |
| Configure | Channels for Switch chan2 | CHANSWITCH2 | 2A, 1B, 1D, 2B, 2D | Channel 1 for switch |
| Configure | Disable Linear Fit Prerequisites | DisablePRBS | Enable, Disable | Select "Disable" to disable the the pre-requisites for the tests using Linear Fit. All Linear Fit and equalization tests require RLM to be measured. When the eye is closed, then the measurements cannot be made. By disabling the pre tests, ES1 and ES2 will default to 0.33 and noise for SNDR will default to 500uV. Select "Enable" to run the pre-reqs first. |

**Table 2** Configuration Variables and Values (continued)

| GUI Location | Label | Variable | Values | Description |
|---|---|---|---|---|
| Configure | Dp | DpVal | (Accepts user-defined text), 2 | Set the Dp value used for steady state, linear fit pulse peak, and error calculations. |
| Configure | Dw | DwVal | (Accepts user-defined text), 2 | For MR and LR step size measurements, set the Dw value used. |
| Configure | Eye Height/Width Probability | EyeProb | 1e-3, 1e-4, 1e-5, 1e-6, 1e-15 | Select the eye probability to test to for Eye Height and Width tests. |
| Configure | Fixed Rj for Lane0 | RjLane0 | (Accepts user-defined text), 1e-12 | Allows you to provide a fixed RJ value for use in Eye Mode. Enter the value in seconds using the format 374E-15 or 1.13E-12. The allowable range is 0 to 10 ps. |
| Configure | Fixed Rj for Lane1 | RjLane1 | (Accepts user-defined text), 1e-12 | Allows you to provide a fixed RJ value for use in Eye Mode. Enter the value in seconds using the format 374E-15 or 1.13E-12. The allowable range is 0 to 10 ps. |
| Configure | Fixed Rj for Lane2 | RjLane2 | (Accepts user-defined text), 1e-12 | Allows you to provide a fixed RJ value for use in Eye Mode. Enter the value in seconds using the format 374E-15 or 1.13E-12. The allowable range is 0 to 10 ps. |
| Configure | Fixed Rj for Lane3 | RjLane3 | (Accepts user-defined text), 1e-12 | Allows you to provide a fixed RJ value for use in Eye Mode. Enter the value in seconds using the format 374E-15 or 1.13E-12. The allowable range is 0 to 10 ps. |
| Configure | Fixed Rj for Lane4 | RjLane4 | (Accepts user-defined text), 1e-12 | Allows you to provide a fixed RJ value for use in Eye Mode. Enter the value in seconds using the format 374E-15 or 1.13E-12. The allowable range is 0 to 10 ps. |
| Configure | Fixed Rj for Lane5 | RjLane5 | (Accepts user-defined text), 1e-12 | Allows you to provide a fixed RJ value for use in Eye Mode. Enter the value in seconds using the format 374E-15 or 1.13E-12. The allowable range is 0 to 10 ps. |

**Table 2** Configuration Variables and Values (continued)

| GUI Location | Label | Variable | Values | Description |
|---|---|---|---|---|
| Configure | Fixed Rj for Lane6 | RjLane6 | (Accepts user-defined text), 1e-12 | Allows you to provide a fixed RJ value for use in Eye Mode. Enter the value in seconds using the format 374E-15 or 1.13E-12. The allowable range is 0 to 10 ps. |
| Configure | Fixed Rj for Lane7 | RjLane7 | (Accepts user-defined text), 1e-12 | Allows you to provide a fixed RJ value for use in Eye Mode. Enter the value in seconds using the format 374E-15 or 1.13E-12. The allowable range is 0 to 10 ps. |
| Configure | Fixed Rj for Lane8 | RjLane8 | (Accepts user-defined text), 1e-12 | Allows you to provide a fixed RJ value for use in Eye Mode. Enter the value in seconds using the format 374E-15 or 1.13E-12. The allowable range is 0 to 10 ps. |
| Configure | Fixed Rj for Lane9 | RjLane9 | (Accepts user-defined text), 1e-12 | Allows you to provide a fixed RJ value for use in Eye Mode. Enter the value in seconds using the format 374E-15 or 1.13E-12. The allowable range is 0 to 10 ps. |
| Configure | Interpolate for Coefficient Tests | Interp | (Accepts user-defined text), ON, OFF | By turning interpolation on, the test will run faster. You can turn it off for true 32 points per bit accumulation. |
| Configure | JSA State | JSAState | ON, OFF | Controls state of Jitter Spectrum Analysis functionality, which is an available option on Megamodules or CDR modules. You may enable or add JSA feature to improve jitter results. |
| Configure | Jitter Sampling Level | JitSamp | Eye Center, Percent | This option allows the user to change from "Eye Center" to "Percent" for "Jitter Sampling Level". Note: Only change this selection from "Eye Center" (Default) to "Percent" when Jitter Mode fails to measure random noise (RN) and Level parameters due to a severely degraded PAM4 signal (e.g. closed eye). RN and Level measurements are common pre-requisites for other measurements. |

**Table 2** Configuration Variables and Values (continued)

| GUI Location | Label | Variable | Values | Description |
|---|---|---|---|---|
| Configure | Loop Bandwidth | LoopBW | (Accepts user-defined text), 3.883e6, 5e6, 10e6 | Select or enter the Loop BW to be used the clock recovery. |
| Configure | Loop Bandwidth Tuning | LoopBWTune | OFF, ON | Select "ON" to tune loopbandwidth on relock or "OFF" to remain. |
| Configure | Module Calibration | ModCal | Required, Not Required | Allows measurements to be completed if plug-in modules are not calibrated. Only available in Debug Mode. |
| Configure | Np | NpVal | (Accepts user-defined text), 8, 12, 13, 14, 16, 200 | Set the Np value used for steady state, linear fit pulse peak, and error calculations. |
| Configure | Number of averages for Coefficient Tests | StepLoop | (Accepts user-defined text), 5, 8, 10, 16, 20 | Set the number of averages used for the Coefficient tests. If Interpolation is turned off, the min average value is 16. |
| Configure | Nw | NwVal | (Accepts user-defined text), 8, 12, 13, 14, 16, 200 | For MR and LR step size measurements, set Nw value used. |
| Configure | Optimize for Rj and Linearity | OptLin | ON, OFF | Controls selection of setting the precision time base to optimize for Rj and Linearity in jitter tests. Results are more consistant with optimization. The test time is several minutes with optimization on. \\You can turn off optimization for quick results. |
| Configure | Pattern Length | PatternLength | (Accepts user-defined text), 0, 127, 511, 8191 | When Auto is set, FlexDCA will automatically determine the pattern length. If FlexDCA is having difficulty auto-detecting the correct pattern length, use this control to manually set the pattern length. |

**Table 2** Configuration Variables and Values (continued)

| GUI Location | Label | Variable | Values | Description |
|---|---|---|---|---|
| Configure | Pattern Verification | DisablePattern | Enable, Disable | Select "Disable" to disable the pattern verification for square 8 pattern tests and suppress pattern error pop-ups. Select "Enable" to ensure that the correct pattern is being tested as per specification. |
| Configure | Run Simulation Signals | RunSim | No, Yes | Select Yes to run simulation signals. Set simulation signals to slot 5 (channels 5A and 5B). |
| Configure | SIRC Bandwidth | SIRCBW | (Accepts user-defined text), 33e9, 40e9, 43e9 | Select or enter the SIRC BW. This will automatically be applied to any pattern lock waveform. |
| Configure | SIRC Response | SIRCResponse | BESSel, SINC, FLAT, OFF | Select the SIRC response. This will automatically be applied to any pattern lock waveform. |
| Configure | Samples Taken for Eye Mode | EyeSamples | (Accepts user-defined text), 150e3, 250e3, 500e3, 1e6, 2e6 | Select or enter how many samples are collected before calculating eye measurement results. Default is 250,000 samples. The range of allowable values is 100K to 2M samples. |
| Configure | Save Tested Waveforms | SaveWFM | No, Yes | Select Yes to save the waveform files of the tested signals. Files will be saved to directory set in Select waveform directory. |
| Configure | Select Waveform Directory | DirWFM | (Accepts user-defined text), C:\Temp\KRwfm | Type in a directory path to save your measured waveforms. |
| Configure | Signaling Rate | SignalingRate | (Accepts user-defined text), 10.3125e9, 25.78125e9, 26.5625e9 | Set the Signaling Rate to be tested. Enter value in the format 10.3125e9. |

**Table 2** Configuration Variables and Values (continued)

| GUI Location | Label | Variable | Values | Description |
|---|---|---|---|---|
| Configure | Source for Rj | RjSource | JitterMode, User | Select "Option 200 Jitter" to have the DCA measure RJ using Jitter Mode for shorter patterns, such as PRBS9. You will need Option 200 installed for this choice. If you select "User Provided", enter the values that you would like to use for Fixed RJ on the Configure tab for each lane that you'll display. |
| Configure | Start value for CTLE utility for Eye Opening | StartCTLE | 1, 1.5, 2, 2.5, 3, 3.5, 4, 4.5, 5, 5.5, 6, 6.5, 7, 7.5, 8, 8.5, 9 | Select the starting CTLE setting to use for the "Find optimal CTLE Eye Opening" test. The test will test the range of settings from this start value, to the stop value set in the next config. |
| Configure | Start value for Far-end CTLE utility for Eye Opening | StartFarCTLE | 1, 1.5, 2, 2.5, 3, 3.5, 4, 4.5, 5, 5.5, 6, 6.5, 7, 7.5, 8, 8.5, 9 | Select the starting Far-end CTLE setting to use for the "Find optimal Far-end CTLE Eye Opening" test. The test will test the range of settings from this start value, to the stop value set in the next config. |
| Configure | Stop value for CTLE utility for Eye Opening | StopCTLE | 1, 1.5, 2, 2.5, 3, 3.5, 4, 4.5, 5, 5.5, 6, 6.5, 7, 7.5, 8, 8.5, 9 | Select the last CTLE setting to use for the "Find optimal CTLE Eye Opening" test. The test will test the range of settings from start value selected in the previous config, to the stop value set here. |
| Configure | Stop value for Far-end CTLE utility for Eye Opening | StopFarCTLE | 1, 1.5, 2, 2.5, 3, 3.5, 4, 4.5, 5, 5.5, 6, 6.5, 7, 7.5, 8, 8.5, 9 | Select the last CTLE setting to use for the "Find optimal Far-end CTLE Eye Opening" test. The test will test the range of settings from start value selected in the previous config, to the stop value set here. |
| Configure | TX Off Voltage Scale | TXOFFSCALE | (Accepts user-defined text), Auto, 10e-3 | Auto will automatically set the voltage scale for tests with the transmitter off. To manually set the scale, enter in the scale per division number (i.e. 10e-3) |

**Table 2** Configuration Variables and Values (continued)

| GUI Location | Label | Variable | Values | Description |
|---|---|---|---|---|
| Configure | TX On Voltage Scale | TXONSCALE | (Accepts user-defined text), Auto, 200e-3 | Auto will automatically set the voltage scale for tests with the transmitter on. To manually set the scale, enter in a scale per division number (i.e. 200e-3). |
| Configure | Use CTLE Setting for Far-end Eye Opening. | UseFarCTLE | Off, 1, 1.5, 2, 2.5, 3, 3.5, 4, 4.5, 5, 5.5, 6, 6.5, 7, 7.5, 8, 8.5, 9 | Select the CTLE setting to use for far-end. Default is 6dB. Far-end test addes cable s4p at ~6.4dB of loss. CTLE is needed to open the eye. Set to reference receiver. |
| Configure | Use Optimized CTLE for Eye Opening. | UseCTLE | Off, 1, 1.5, 2, 2.5, 3, 3.5, 4, 4.5, 5, 5.5, 6, 6.5, 7, 7.5, 8, 8.5, 9 | Select the optimized setting to use. Default is off. Run "Find Optimal CTLE Eye Opening" Test under "Utilities" to find the optimal setting. When the utility is run, it will automatically set the optimal setting. This value will only be automatically set if utility is run any time after app load or if project is loaded with setting. All other instances, the setting will be the default of off and will need to be manually selected. |
| Configure | Using Switch or N1045A | SWITCH | Yes, No, Other | Only available in Debug Mode. |
| 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. |

# 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. 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 |
|---|---|---|
| BUJ | 55202 | Bounded Uncorrelated Jitter BUJ measurement |
| Baud Rate | 75200 | Baud rate of the signal |
| Baud Rate | 65200 | Baud rate of the signal |
| Baud Rate | 55200 | Baud rate of the signal |
| Coefficient c(-1) Normalized Amplitude | 65500 | Measures the Coefficient c(-1) Normalized Amplitude |
| Coefficient c(-1) Normalized Amplitude | 75500 | Measures the Coefficient c(-1) Normalized Amplitude |
| Coefficient c(-1) Normalized Step Size | 65501 | Measures the Coefficient c(-1) Normalized Step Size |
| Coefficient c(-1) Normalized Step Size | 75501 | Measures the Coefficient c(-1) Normalized Step Size |
| Coefficient c(-2) Normalized Amplitude | 75506 | Measures the Coefficient c(-2) Normalized Amplitude |
| Coefficient c(-2) Normalized Step Size | 75507 | Measures the Coefficient c(-2) Normalized Step Size |
| Coefficient c(0) Normalized Amplitude | 65502 | Measures the Coefficient c(0) Normalized Amplitude |
| Coefficient c(0) Normalized Amplitude | 75502 | Measures the Coefficient c(0) Normalized Amplitude |
| Coefficient c(0) Normalized Step Size | 65503 | Measures the Coefficient c(0) Normalized Step Size |
| Coefficient c(0) Normalized Step Size | 75503 | Measures the Coefficient c(0) Normalized Step Size |
| Coefficient c(1) Normalized Amplitude | 65504 | Measures the Coefficient c(1) Normalized Amplitude |
| Coefficient c(1) Normalized Amplitude | 75504 | Measures the Coefficient c(1) Normalized Amplitude |
| Coefficient c(1) Normalized Step Size | 65505 | Measures the Coefficient c(1) Normalized Step Size |
| Coefficient c(1) Normalized Step Size | 75505 | Measures the Coefficient c(1) Normalized Step Size |
| Common Mode Noise, RMS | 55103 | Test the common mode RMS Noise. This test can only be tested in dual single ended connection |
| Common Mode Noise, RMS | 256103 | Test the common mode rms noise. This test can only be tested in dual single ended connection |
| Common Mode Noise, RMS | 356103 | Test the common mode rms noise. This test can only be tested in dual single ended connection. Must be DC coupled. |

**Table 4** Test IDs and Names (continued)

| Name | TestID | Description |
|---|---|---|
| Common Mode Voltage - Vcm | 256101 | Test the DC common mode voltage. This test can only be tested in dual single ended connection |
| Common Mode Voltage - Vcm | 356101 | Test the common mode voltage. This test can only be tested in dual single ended connection. Must be DC coupled. |
| Common-mode Output Return Loss | 10001 | Common-mode Output Return Loss measurement |
| Common-mode Output Return Loss | 15001 | Common-mode Output Return Loss measurement |
| Common-mode Return Loss | 215001 | Common-mode Return Loss measurement |
| Common-mode Return Loss | 315001 | Common-mode Return Loss measurement |
| Common-mode to Differential Mode Conversion | 215003 | Common-mode to Differential Mode Conversion measurement |
| Common-mode to Differential Mode Conversion | 315003 | Common-mode to Differential Mode Conversion measurement |
| DC Common Mode Voltage | 55101 | Test the DC common mode voltage. This test can only be tested in dual single ended connection |
| DC Common Mode Voltage Test | 75101 | Test the DC common mode voltage. This test can only be tested in dual single ended connection |
| DC Common Mode Voltage Test | 65101 | Test the DC common mode voltage. This test can only be tested in dual single ended connection |
| Differential Output Return Loss | 10000 | Differential Output Return Loss measurement |
| Differential Output Return Loss | 15000 | Differential Output Return Loss measurement |
| Differential Output Return Loss | 215000 | Differential Output Return Loss measurement |
| Differential Output Return Loss | 315000 | Differential Output Return Loss measurement |
| Differential Voltage pk-pk | 256102 | Test the maximum voltage with the TX enabled |
| Differential Voltage, pk-pk | 55102 | Test the maximum voltage with the TX enabled |
| Differential Voltage, pk-pk | 356102 | Test the maximum voltage with the TX enabled |
| Effective bounded uncorrelated jitter | 65205 | Effective bounded uncorrelated Jitter measurement |
| Effective total uncorrelated jitter | 65206 | Effective total uncorrelated Jitter measurement |
| Even-Odd Jitter | 75201 | Even-Odd Jitter measurement |
| Even-Odd Jitter | 65201 | Even-Odd Jitter measurement |
| Even-Odd Jitter | 65204 | Even-Odd Jitter measurement |
| Even-Odd Jitter | 55201 | Even-Odd Jitter measurement |
| Eye Height - EH15 | 1356600 | Measures the eye height of each the eye at user selected CTLE at 10-15 probability. |

**Table 4** Test IDs and Names (continued)

| Name | TestID | Description |
|---|---|---|
| Eye Height - EH15 | 1256600 | Measures the height of each the eye at user selected CTLE at 10-15 probability. |
| Eye Height - EH6 | 256600 | Measures the height of each the eye at user selected CTLE at 10-6 probability. |
| Eye Linearity | 256603 | Measures the Eye Linearity |
| Eye Width - EW15 | 1356601 | Measures the eye width of the eye at user CTLE at 10-15 probability |
| Eye Width - EW15 | 1256601 | Measures the width of the eye at user CTLE at 10-15 probability. |
| Eye Width - EW6 | 256601 | Measures the width of the eye at user CTLE at 10-6 probability. |
| Far-end Eye Height - EH6 | 356610 | Measures the Far-end eye height of each the eye at user selected CTLE at 10-6 probability. |
| Far-end Eye Width - EW6 | 356611 | Measures the Far-end eye width of the eye at user CTLE at 10-6 probability |
| Find Optimal CTLE Eye Opening | 6602 | Measures the eye width and height with each CTLE setting and reports the optimal setting to use in Eye Width and Eye Height measurements. The optimal value is automatically set in the configure tab after this test has run. |
| Find Optimal Far-end CTLE Eye Opening | 6603 | Measures the eye width and height with each CTLE setting and reports the optimal setting to use in Eye Width and Eye Height measurements. The optimal value is automatically set in the configure tab after this test has run. |
| J4 | 75202 | J4 Jitter measurement |
| J4 | 65202 | J4 Jitter measurement |
| JRMS | 75203 | JRMS Jitter measurement |
| JRMS | 65203 | JRMS Jitter measurement |
| Level - PRBS pattern | 2000 | Tests the level for each level in the PRBS pattern |
| Level - PRBS pattern | 52000 | Tests the level for each level in the PRBS pattern |
| Level Noise - PRBS pattern | 52002 | Tests the noise of each level in the PRBS pattern |
| Level RMS - PRBS pattern | 72001 | Tests the level rms for each level in the PRBS pattern |
| Level RMS - PRBS pattern | 62001 | Tests the level rms for each level in the PRBS pattern |
| Level RMS - PRBS pattern | 52001 | Tests the level rms for each level in the PRBS pattern |
| Level Separation Mismatch Ratio - RLM | 72003 | Tests the level mismatch ratio |
| Level Separation Mismatch Ratio - RLM | 62003 | Tests the level mismatch ratio |
| Level Separation Mismatch Ratio - RLM | 52003 | Tests the level mismatch ratio |
| Linear Fit Pulse Peak | 75301 | Linear Fit Pulse Peak |

**Table 4** Test IDs and Names (continued)

| Name | TestID | Description |
|---|---|---|
| Linear Fit Pulse Peak | 65301 | Linear Fit Pulse Peak |
| Linear Fit Pulse Peak | 55301 | Linear Fit Pulse Peak |
| Near-end Eye Height - EH6 | 356600 | Measures the Near-end eye height of each the eye at user selected CTLE at 10-6 probability. |
| Near-end Eye Linearity | 356603 | Measures the Near-end eye linearity of each the eye at user selected CTLE |
| Near-end Eye Width - EW6 | 356601 | Measures the Near-end eye width of the eye at user CTLE at 10-6 probability |
| Output AC Common Mode Voltage Test | 75103 | Test the AC common mode voltage. This test can only be tested in dual single ended connection |
| Output AC Common Mode Voltage Test | 65103 | Test the AC common mode voltage. This test can only be tested in dual single ended connection |
| Output Differential Voltage Test | 75102 | Test the maximum voltage with the TX enabled |
| Output Differential Voltage Test | 65102 | Test the maximum voltage with the TX enabled |
| Post-cursor equalization Local_eq_c1(0) | 5504 | Measures Post-cursor equalization for c(1) weight 0 |
| Post-cursor equalization Local_eq_c1(1) | 5505 | Measures Post-cursor equalization for c(1) weight 1 |
| Post-cursor equalization Local_eq_c1(2) | 5506 | Measures Post-cursor equalization for c(1) weight 2 |
| Post-cursor equalization Local_eq_c1(3) | 5507 | Measures Post-cursor equalization for c(1) weight 3 |
| Post-cursor equalization Local_eq_c1(4) | 5508 | Measures Post-cursor equalization for c(1) weight 4 |
| Post-cursor equalization Local_eq_c1(5) | 5509 | Measures Post-cursor equalization for c(1) weight 5 |
| Pre-cursor equalization Local_eq_cm1(0) | 5500 | Measures Pre-cursor equalization for c(-1) weight 0 |
| Pre-cursor equalization Local_eq_cm1(1) | 5501 | Measures Pre-cursor equalization for c(-1) weight 1 |
| Pre-cursor equalization Local_eq_cm1(2) | 5502 | Measures Pre-cursor equalization for c(-1) weight 2 |
| Pre-cursor equalization Local_eq_cm1(3) | 5503 | Measures Pre-cursor equalization for c(-1) weight 3 |
| Signal-to-noise-and-distortion ratio | 75302 | Measures the SNDR |
| Signal-to-noise-and-distortion ratio | 65302 | Measures the SNDR |

**Table 4** Test IDs and Names (continued)

| Name | TestID | Description |
|---|---|---|
| Signal-to-noise-and-distortion ratio | 55302 | Measures the SNDR |
| Single-Ended Output Voltage Test | 75104 | Test the minimum and maximum voltages of the single-ended signals |
| Single-Ended Output Voltage Test | 65104 | Test the minimum and maximum voltages of the single-ended signals |
| Steady-State Voltage Vf | 75300 | Steady-State Voltage Vf measurement |
| Steady-State Voltage Vf | 65300 | Steady-State Voltage Vf measurement |
| Steady-State Voltage Vf | 55300 | Steady-State Voltage Vf measurement |
| Total Jitter | 55204 | Total Jitter measurement |
| Transition Time - Rise Time (20%-80%) | 55400 | Rise Time measurement |
| Transition Time - Rise Time (20%-80%) | 256400 | Rise Time measurement |
| Transition Time - Fall Time (20%-80%) | 55401 | Fall Time measurement |
| Transition Time - Fall Time (20%-80%) | 256401 | Fall Time measurement |
| Transition Time - Fall Time (20%-80%) | 356401 | Fall Time measurement |
| Transition Time - Rise Time (20%-80%) | 356400 | Rise Time measurement |
| UUGJ | 55203 | Uncorrelated Unbounded Gaussian Jitter UUGJ measurement |
| Vertical Eye Closure | 356602 | Measures the Vertical Eye Closure at Near-End |

# 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.

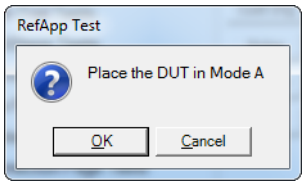
**Table 6** Instrument Names

| Instrument Name | Description |
|---|---|
| FlexDca | Primary oscilloscope |
| N4877A | Clock/Data recovery and Demultiplexer |
| Keysight PNA | Performance Network Analyzer |
| Keysight ENA | Economy Network Analyzer |

# 5 Message IDs

During the normal course of operation, an application displays multiple message prompts. The application's remote interface exposes a callback capability which enables remote clients to receive the text found in the prompt and to programmatically select the desired response (OK, Cancel, etc.). In order to determine which message is being received, the remote program could parse the message and look for key words. However, because message text is subject to change, a more reliable approach is to use the "message ID" that is attached to the more frequently-seen messages. The following table shows the IDs of the messages that this application may prompt during nominal operation.

For example, if the application may display the following prompt:




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

| Message | ID | Responses | Usage |
|---|---|---|---|
| DUT mode message | 313AEE2F-9EF0-476f-A2EB-29A5C7DE686F | OK=action completed and proceed, Cancel = abort test | App |

- Message – A summary of the message in the prompt.
- ID – A unique code that will never change for this prompt, even if the message text changes (assuming the underlying purpose is maintained).
- Responses – The buttons on the prompt and their actions.
- Usage – The scope of the message:
  - "Common" – This message/ID may be used by other apps.

- "App" — This message/ID is unique to this app.
- "<testID>" — This message/ID is unique to this test ID.

A remote client would then structure the code in its message callback handler as shown below to manage message identification:

```
private static void OnSimpleMessage(object sender, MessageEventArgs e)
{
  if (e.ID == "313AEE2F-9EF0-476f-A2EB-29A5C7DE686F")
  {
    // Add code here to set the DUT in Mode A

    e.Response = DialogResult.OK;
  }
}
```

Here are actual message IDs used by this application:

**NOTE** The file, "MessageInfo.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 7** Message IDs

| Message | ID | Responses | Usage |
|---|---|---|---|
| Activating limit will conflict with existing results | 31A39751-6019-41de-89DF-59DB239DF978 | OK=delete conflicting results, Cancel=cancel activation | Instrument |
| Already running tests | 022467B0-6E08-40eb-B4D4-BBB018FBFBC7 | OK | Instrument |
| App startup aborted | C2B67F67-E5D5-4845-8B63-443781223010 | OK | Instrument |
| Can't set memory depth | FFFF1129-BD83-4318-993E-64C94033CEC4 | OK=skip step and continue, Cancel=abort test | Instrument |
| Compliance/Debug mode change | 9C72A970-8D7D-4b37-9787-48AEEA5DC3F1 | OK=change mode, Cancel=abort action | Instrument |
| Confirmation Required | 37437505-160C-4cc8-BA06-093C12994C1E | OK=continue, Cancel=abort test | Instrument |
| Connection change | 879629E6-78FA-4a87-B247-A9DB4F0D7330 | Abort=abort run, Retry=connection changed - continue run, Ignore=connection not chagned - continue run | Instrument |
| Debug pause (messages vary) | 50B66A97-A6A9-413f-8329-76DFAC492FD6 | OK=resume, Cancel=abort run | Instrument |
| End of run summary | 602F9866-F975-42b7-842C-D8447E5E3FCB | OK | Instrument |

**Table 7** Message IDs (continued)

| Message | ID | Responses | Usage |
|---|---|---|---|
| End of run summary (test aborted) | 124580E4-4486-42d4-B908-C6D0FB2AEE93 | OK | Instrument |
| Error during CSV file generation | C88B1C64-8334-4b15-8727-81F5E2BA2ED4 | OK | Instrument |
| Error during app exit | 81112706-F720-4787-81D3-B22A9B692B41 | OK | Instrument |
| Expected signal not found | 86C74779-322E-4585-A07A-26A2C8FAAC84 | Abort=abort test, Retry=retry failed action, Ignore=skip failed step | Instrument |
| Expected signal not found | 7957D5B8-E62D-4224-A7DD-70361E816A43 | Retry=retry failed action, Cancel=abort test | Instrument |
| InfiniiSim: Unknown scope channel | 4E5ECAF6-867C-47B3-982D-5F07E2090703 | OK | Instrument |
| Measurement Server no Measure Workers declared | 54A8428D-8E22-4286-AC88-7495821ABA77 | OK=retry, Cancel=abort run | Instrument |
| No test selected | B5D233AD-9EB4-4ac2-A443-A30A13643978 | OK | Instrument |
| PrecisionProbe and InfiniiSim controllers turned off after config change | B4477006-D6D1-4375-9FF7-D8177FFC1BF9 | OK | Instrument |
| Project loaded as read-only (reason) | 98C785F8-D24F-4758-A18D-1CCE61F25371 | OK | Instrument |
| Project loaded with errors | 58AD7A02-1E63-4d77-BC6C-6EF3E37AAD5B | OK | Instrument |
| Project not loaded | B2615E9C-5ED7-4db7-AEAF-2BC25C62B656 | OK | Instrument |
| Project save failed (unauthorized access) | 89DCC194-6254-4902-AE63-B7CCD12C8B2A | OK | Instrument |
| Run paused | FE2CF871-6D4A-4080-8FF9-770075590D9F | OK=resume, Cancel=abort run | Instrument |
| Setting change requires result deletion | 8732A3AB-142C-47e5-86EA-DB737F415DDE | OK=delete results; Cancel=abort change | Instrument |
| Store mode change requires result deletion | 884CDFDE-605E-4d04-B8FD-9B181E7FA468 | OK=delete results, Cancel=abort change | Instrument |
| Switch Matrix controller turned off after config change | FC95EBAA-F33F-4eae-90BB-6A6A8F16E2DF | OK | Instrument |
| Switch Matrix: Auto mode unavailable after config change | 6E5589DC-E073-4818-9E8A-782A75898475 | OK | Instrument |
| Switch Matrix: Auto mode unavailable for model, all settings will be reset | F78BD2E2-BF29-42e0-98F8-23B6CE565B08 | OK=go auto do reset, Cancel=abort action | Instrument |

**Table 7** Message IDs (continued)

| Message | ID | Responses | Usage |
|---|---|---|---|
| Switch Matrix: Confirm Auto mode | D5E1A12E-6218-4416-8451-5F9415D924BF | OK=go auto, Cancel=stay manual | Instrument |
| Switch Matrix: Obsolete items in settings discarded | 0C45BD20-E0C2-481e-A3B6-9C1A26C2103A | OK | Instrument |
| Switch Matrix: Reconnect drivers | 047FE44F-B251-49fa-B3C7-5590317230CD | Yes=use saved addresses, No=prompt for new addresses, Cancel=reset all settings | Instrument |
| Switch Matrix: Remove all InfiniiSim settings | C5560182-73BE-4901-941E-3DAEC9F07B33 | OK=remove, Cancel=abort action | Instrument |
| Switch Matrix: User cancelled settings load | 50F3FB70-AA6B-488e-8CFA-62CDA756F746 | OK | Instrument |
| SwitchMatrix: Correction reset due to application route change | 95FEA629-3BE1-4288-BA34-426516018B07 | OK=Accept new routing, Cancel=Reset switch matrix settings | Instrument |
| SwitchMatrix: Instrument already connected to another driver | 08556148-4D63-4edd-B894-22916F39849A | OK | Instrument |
| SwitchMatrix: Max num drivers exceeded | 7D8994AB-FCC2-4294-87B3-19B972BB6510 | OK | Instrument |
| SwitchMatrix: Reset after drive reconnect fail | CF3E93B6-77FA-4FD7-B656-D286BE1C7C75 | OK | Instrument |
| SwitchMatrix: Reset after drive reconnect fail | D298A4B8-F077-49BE-9CB2-AE6C14FB4705 | OK | Instrument |
| SwitchMatrix: Unexpected multi-SPDT module | 2723591D-55A9-44F3-9318-B732995D9427 | OK | Instrument |
| SwitchMatrix: Unknown current switch state | ECE6535B-5C1A-4688-9E45-FB255435CC92 | OK | Instrument |
| SwitchMatrix: Will reset due to requested change | 420FCEA9-0FF4-4088-B47A-3189413EA0AD | OK=Allow the reset, Cancel=Abort the original requested change | Instrument |
| Unknown EEyeLocation parameter | FCA1C61B-D2EA-4671-AD48-9C080A6C6039 | OK | Instrument |
| Upgrade app to open project | 794C6148-ADF4-4b24-895D-74D94B76F8AE | OK | Instrument |

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