# Keysight D9020224C OIF-CEI-224G Transmitter Conformance 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 D9020224C OIF-CEI-224G Transmitter 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 21, and Chapter 4, “Instruments,” starting on page 25 provide information specific to programming the D9020224C OIF-CEI-224G Transmitter 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

In This Book / 3

1 Introduction to Programming

Remote Programming Toolkit / 8

2 Configuration Variables and Values

3 Test Names and IDs

4 Instruments

Index

# 1 Introduction to Programming

Remote Programming Toolkit / 8

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 D9020224C OIF-CEI-224G Transmitter Conformance Test Application uses Remote Interface Revision 7.30. 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 D9020224C OIF-CEI-224G Transmitter 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 |
|---|---|---|---|---|
| Configure | Auto Load Waveform with Interpolation | AutoLoadWfmInterp | No, Yes | Select "Yes" to automatically detect the saved waveform interpolation ratio, then load the waveform with the correct interpolation ratio. This option will automatically switch to "Yes" when performing an Online Run. |
| Configure | Bandwidth | BW | (Accepts user-defined text), 60e9 | Enter the scope bandwidth. |
| Configure | Channel 1 Skew | Channel1Skew | (Accepts user-defined text), 0 | Set the skew for Channel 1 (in seconds). |
| Configure | Channel 2 Skew | Channel2Skew | (Accepts user-defined text), 0 | Set the skew for Channel 2 (in seconds). |
| Configure | Channel 3 Skew | Channel3Skew | (Accepts user-defined text), 0 | Set the skew for Channel 3 (in seconds). |
| Configure | Channel 4 Skew | Channel4Skew | (Accepts user-defined text), 0 | Set the skew for Channel 4 (in seconds). |
| Configure | Clock Recovery Method | CRMethod | FOPLL, SOPLL | Select the Cock Recovery Method to be used. |
| Configure | Damping Factor | DFactor | (Accepts user-defined text), 1 | Enter the Damping Factor to use for clock recovery. This values is only used for Second Order PLL. You may enter any value. |

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

| GUI Location | Label | Variable | Values | Description |
|---|---|---|---|---|
| Configure | Disable Pattern Check | 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 | Disable SNDR Pre-requisites | DisSNDRPre | Enabled, Disabled | Sigma n and ES1/ES2 are pre-requisite measurements to SNDR. If you want to skip these pre-requisites and enter a user sigma-n value, Select "Disable". ES1/ES2 will be set to 0.33. |
| Configure | Dp | DpVal | (Accepts user-defined text), 2, 3, 4 | Set the Dp value used for steady state, linear fit pulse peak, and error calculations. |
| Configure | Dp (Eye) | DpVal_Eye | (Accepts user-defined text), 2, 3, 4 | Set the Dp value used for Eye Measurement calculations. |
| Configure | Dw | DwVal | (Accepts user-defined text), 2 | For MR, LR step size measurements, set the Dw value used. |
| Configure | Eye Gaussian Standard Deviation | EyeStd | (Accepts user-defined text), 2 | Select or set the standard deviation used in eye measurements (EH, EW, VEC) when gaussian window shape is used. |
| Configure | Eye Level Width | EyeLevWidth | (Accepts user-defined text), 5, 10 | Select the eye level width used in eye measurements (EH, EW, VEC). |
| Configure | Eye Window Shape | EyeWinShape | GAUSsian, BOXCar | Select the eye window shape used in eye measurements (EH, EW, VEC). |
| Configure | Jitter Edge Count | JitCount | (Accepts user-defined text), 200, 1000, 10000 | Set the number of edges for jitter to start measuring results. Note: lower value than the default of 10000 will not be as accurate and consistent. However, will enable quick results. |

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

| GUI Location | Label | Variable | Values | Description |
|---|---|---|---|---|
| Configure | Jitter Memory Depth per Acquisition | JitMem | (Accepts user-defined text), 10000000, 60000000 | Set the memory depth used for jitter measurement. A lower memory depth requires more acquisitions to complete one measurement. |
| Configure | Jitter Pattern | JitPat | P9Q, P13Q | Select PRBS13Q or PRBS9Q to test jitter. |
| Configure | Loop Bandwidth | LoopBandwidth | (Accepts user-defined text), 4e6, 10e6, 10.3035e6 | Enter the loop bandwidth to use for clock recovery. Value with automatically scale with signaling rate change. Manually set to desired value if different from autoset. |
| Configure | Np | NpVal | (Accepts user-defined text), 52, 53, 200, 400 | Set the Np value used for used for SNDR and SNR_ISI calculations. |
| Configure | Np (Eye) | NpVal_Eye | (Accepts user-defined text), 52, 53, 200, 400 | Set the Np value used for used for Eye Measurement calculations. |
| Configure | Number of Averages | NumAvg | 16, 32, 64, 128, 256 | Specify the number of averages for the detected bit pattern output. The averaged pattern will be used to construct a linear fit pulse response. Use a lower value for faster test times. |
| Configure | Number of FFE Precursor Taps | NumFFEPre | (Accepts user-defined text), 5 | Specify the total number of FFE Precursor Taps. The number of Postcursor Taps will be (NumTapsFFE - NumPreTapsFFE - 1). The minus one is due to Tap 0. |
| Configure | Number of FFE Taps | NumFFETaps | (Accepts user-defined text), 29 | Specify the total number of FFE Taps including Tap 0 |
| Configure | Nv (Eye) | NvVal_Eye | (Accepts user-defined text), 8, 12, 13, 14, 29, 200, 400 | Set the Nv value used for Eye Measurement calculations. |
| Configure | Nw | NwVal | (Accepts user-defined text), 8, 12, 13, 14, 16, 200 | For MR, LR step size measurements, set Nw value used. |

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

| GUI Location | Label | Variable | Values | Description |
|---|---|---|---|---|
| Configure | Sample Rate | SR | (Accepts user-defined text), 256e9 | Enter the scope sample rate. |
| 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 | Scope Response | ScopeResp | BESSEL4, BUTT, WALL | Select the Scope Response. A selection of 4th order Bessel will better represent a reference reciever. A flat response will give a direct look at the exact signal at the test point. |
| Configure | Scope Response 3dB frequency | ScopeFreq | (Accepts user-defined text), 50e9, 59e9, 60e9, 63e9, 65e9, 80e9 | Select the Scope Response 3dB frequency. |
| Configure | Select Waveform Directory | DirWFM | (Accepts user-defined text), C:\Temp\IEEEwfm | Type in a directory path to save your measured waveforms. |
| Configure | Set Channel Skew Method | SetChannelSkewMethod | Auto, Manual | Select the method for setting the channel skew. Choose "Auto" to let the system determine the optimal skew automatically, or "Manual" to allow manual adjustment. |
| Configure | Sigma N | SigmaN | (Accepts user-defined text), 2e-3 | Enter the value to use for Sigma N. This value will be used when SNDR pre-req are disabled. Format 0.002 or 2e-3. |

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

| GUI Location | Label | Variable | Values | Description |
|---|---|---|---|---|
| Configure | Signal Channels | CHANPAIR | 1, 2, Channel 1 and 2, Channel 3 and 4, CHANnel1, CHANnel2, CHANnel3, CHANnel4, 3, 4, WMEMory1, WMEMory2, WMEMory3, WMEMory4, FUNCtion1, FUNCtion2, FUNCtion3, FUNCtion4 | Select the oscllloscope input channel pair if connected dual single-ended. Or select the channel used for differential connection. All single channel, waveform memories, or functions that contain the word "differential", must be a single probe or signal that is differential. The channel or waveform memories with two channels are for dual single-ended connections. Note: All functions must be differential. |
| Configure | Signaling Rate | SignalingRate | (Accepts user-defined text), 53.125e9, 72.0e9, 106.25e9, 116.0e9 | Set the Signaling Rate to be tested. Enter value in the format 106.25e9. |
| Configure | Tfx Delay for LR | TfxLR | (Accepts user-defined text), 0 | Select the value of fixture delay time for LR. This is for ERL measurement. Please enter value in the format 2e-9. |
| Configure | Tfx Delay for MR | TfxMR | (Accepts user-defined text), 0 | Select the value of fixture delay time for MR. This is for ERL measurement. Please enter value in the format 2e-9. |
| Configure | Tx pattern | SNDRPat | PRBS13Q, PRBS13Qu, Other, OtherInv | Select the pattern to be used for SNDR, Coefficient, and DFE calculations. NOTE: This pattern is NOT for Jitter measurements. Due to specific edge definitions for the 12 edges, PRBS13Q grey code or PRBS9Q gray code are required. Use jitter pattern configuration for jitter selection. "PRBS13Q" is the specified PRBS13Q grey code signal. "PRBS13Q Uncoded" is PRBS13Q uncoded. "Other" is a PRBS13Q pattern that not only swapped the 3/2 (as defined by grey code), but also the 0/1. "Other Inv" is the inverse of "Other" |

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

| GUI Location | Label | Variable | Values | Description |
|---|---|---|---|---|
| Configure | Use Optimized CTLE gDC for Eye Opening TP1a. | UseCTLE | 0, -1, -2, -3, -4, -5, -6, -7, -8, -9, -10 | Select the optimized setting to use. Default is off. Run "Auto-tune" 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 | Use Optimized CTLE gDC for Far-end Eye Opening TP4 Short. | UseFarCTLE | 0, -1, -2, -3, -4, -5, -6, -7, -8, -9, -10 | Select the optimized setting to use. Default is off. Run "Auto-tune" 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 | Use Optimized CTLE gDC for Far-end Eye Opening TP4. | UseFarCTLE | 0, -1, -2, -3, -4, -5, -6, -7, -8, -9, -10 | Select the optimized setting to use. Default is off. Run "Auto-tune" 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. |

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

| GUI Location | Label | Variable | Values | Description |
|---|---|---|---|---|
| Configure | Use Optimized CTLE gDC for Near-end Eye Opening TP4. | UseNearCTLE | 0, -1, -2, -3, -4, -5, -6, -7, -8, -9, -10 | Select the optimized setting to use. Default is off. Run "Auto-tune" 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 | Use Optimized CTLE gDC2 for Eye Opening TP1a. | UseCTLEgDC2 | 0, -1, -2, -3, -4, -5 | Select the optimized setting to use. Default is off. Run "Auto-tune" 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 | Use Optimized CTLE gDC2 for Far-end Eye Opening TP4 Short. | UseFarCTLEgDC2 | 0, -1, -2, -3, -4, -5 | Select the optimized setting to use. Default is off. Run "Auto-tune" 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. |

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

| GUI Location | Label | Variable | Values | Description |
|---|---|---|---|---|
| Configure | Use Optimized CTLE gDC2 for Far-end Eye Opening TP4. | UseFarCTLEgDC2 | 0, -1, -2, -3, -4, -5 | Select the optimized setting to use. Default is off. Run "Auto-tune" 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 | Use Optimized CTLE gDC2 for Near-end Eye Opening TP4. | UseNearCTLEgDC2 | 0, -1, -2, -3, -4, -5 | Select the optimized setting to use. Default is off. Run "Auto-tune" 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 | Use Predefined Function | UseFunc | Chan, FUNCtion1, FUNCtion3, FUNCtion4, FUNCtion5, FUNCtion6 | This gives the option to use a function that the user sets up. Select the function the user has set. The app will skip default setup and scaling. Please ensure that the function you are using is properly scaled before starting run. Note: Function2 is used by the app, do not include Function 2 in your setup. |
| Configure | Use Scope Cal | ScopeCal | Y, N | Select Yes to use scope calibration. No, to not. This is automatically set to Yes when a scope cal is run on the setup tab. |

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

| GUI Location | Label | Variable | Values | Description |
|---|---|---|---|---|
| Configure | Vertical Scale Factor | VertScaleFactor | (Accepts user-defined text), 7, 6.5, 6, 5.5, 5, 4.5, 4 | This setting specifies the fixed vertical scaling factor applied to the acquired signal when the Vertical Scaling Method is set to Manual. It allows users to define the exact scale used during signal acquisition, offering precise control over how signal amplitudes are represented. The value entered here represents the number of vertical divisions the signal will occupy on the display. Based on this setting, the vertical scale per division is automatically calculated by dividing the peak-to-peak voltage of the signal by the specified number of divisions. |
| Configure | Vertical Scaling Method | VertScaleMethod | Auto, Manual | This variable determines how vertical scaling is applied to the signal during acquisition. When set to "Auto", the system will automatically calculate and apply the appropriate vertical scale based on the acquired signal. If the method is set to "Manual", the user is required to specify the desired vertical scale factor explicitly in the "Vertical Scale Factor" configuration. This provides full control over the scaling behavior but requires manual input. |
| 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. |

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

| GUI Location | Label | Variable | Values | Description |
|---|---|---|---|---|
| Set Up | Channel Pairs Option | ChanPairOpt | Channels 1 and 2 | This option allows user to select which channel pair is being used for test. Note: Selecting main channels will bandwidth limit your signal, please select correct channels for signal you are measuring. Select Channel Pairs Option |
| Set Up | OfflineEnable | OfflineEnable | 0.0, 1.0 | Enable testing using saved waveforms. |
| Set Up | automate the ERL browse button | | 1 | Browse the path to load the required ERL file Setup the ERL file |
| Set Up | automate the ERL clear button | ClearS4PERLFilePath | 1 | Clear the entry of ERL file path Clear the ERL file entry |
| Set Up | automate the Fixture Ref browse button | | 1 | Browse the path to load the required reference fixture file Setup the Fixture Ref file |
| Set Up | automate the Fixture Ref clear button | ClearFixRefFilePath | 1 | Clear the entry of Fixture Ref file path Clear the Fixture Ref file entry |

# 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 |
|---|---|---|
| AC Common Mode Voltage, Full-band VCMFB | 213001 | Test the AC common mode voltage, full band. This test can only be tested in dual single ended connection |
| AC Common Mode Voltage, Full-band VCMFB | 313001 | Test the AC common mode voltage, full band. This test can only be tested in dual single ended connection |
| AC Common Mode Voltage, Low-frequency VCMLF | 213000 | Test the AC common mode voltage, low-frequency, 100MHz low-pass filter. This test can only be tested in dual single ended connection |
| AC Common Mode Voltage, Low-frequency VCMLF | 313000 | Test the AC common mode voltage, low-frequency, 100MHz low-pass filter. This test can only be tested in dual single ended connection |
| Baud Rate (QPRBS13-CEI) | 210000 | Baud rate of the signal |
| Baud Rate (QPRBS13-CEI) | 310000 | Baud rate of the signal |
| Coefficient c(-1) Normalized Amplitude | 211102 | Measures the Coefficient c(-1) Normalized Amplitude |
| Coefficient c(-1) Normalized Amplitude | 311102 | Measures the Coefficient c(-1) Normalized Amplitude |
| Coefficient c(-1) Normalized Step Size | 211103 | Measures the Coefficient c(-1) Normalized Step Size |
| Coefficient c(-1) Normalized Step Size | 311103 | Measures the Coefficient c(-1) Normalized Step Size |
| Coefficient c(-2) Normalized Amplitude | 211100 | Measures the Coefficient c(-2) Normalized Amplitude |
| Coefficient c(-2) Normalized Amplitude | 311100 | Measures the Coefficient c(-2) Normalized Amplitude |
| Coefficient c(-2) Normalized Step Size | 211101 | Measures the Coefficient c(-2) Normalized Step Size |
| Coefficient c(-2) Normalized Step Size | 311101 | Measures the Coefficient c(-2) Normalized Step Size |
| Coefficient c(0) Normalized Amplitude | 211104 | Measures the Coefficient c(0) Normalized Amplitude |
| Coefficient c(0) Normalized Amplitude | 311104 | Measures the Coefficient c(0) Normalized Amplitude |
| Coefficient c(0) Normalized Step Size | 211105 | Measures the Coefficient c(0) Normalized Step Size |
| Coefficient c(0) Normalized Step Size | 311105 | Measures the Coefficient c(0) Normalized Step Size |
| Coefficient c(1) Normalized Amplitude | 211106 | Measures the Coefficient c(1) Normalized Amplitude |
| Coefficient c(1) Normalized Amplitude | 311106 | Measures the Coefficient c(1) Normalized Amplitude |

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

| Name | TestID | Description |
|---|---|---|
| Coefficient c(1) Normalized Step Size | 211107 | Measures the Coefficient c(1) Normalized Step Size |
| Coefficient c(1) Normalized Step Size | 311107 | Measures the Coefficient c(1) Normalized Step Size |
| Common-mode Output Return Loss | 214000 | Common-mode Output Return Loss measurement |
| Common-mode Output Return Loss | 314000 | Common-mode Output Return Loss measurement |
| DC Common Mode Output Voltage Test | 213002 | Test the DC common mode voltage. This test can only be tested in dual single ended connection. Must be DC coupled. |
| DC Common Mode Output Voltage Test | 313002 | Test the DC common mode voltage. This test can only be tested in dual single ended connection. Must be DC coupled. |
| EOJ | 210101 | Even-Odd Jitter measurement |
| EOJ | 310101 | Even-Odd Jitter measurement |
| ERL | 211003 | Calculates ERL. |
| ERL | 311003 | Calculates ERL. |
| Eye Height | 215000 | Measures the height of each the eye at user selected CTLE |
| Eye Height | 315000 | Measures the height of each the eye at user selected CTLE |
| J3u | 310102 | J3u Jitter measurement |
| J4.3u | 210102 | J4.3u Jitter measurement |
| JRMS | 210100 | JRMS measurement |
| JRMS | 310100 | JRMS measurement |
| Level - PRBS pattern | 212000 | Tests the level for each level in the PRBS pattern |
| Level - PRBS pattern | 312000 | Tests the level for each level in the PRBS pattern |
| Level RMS - PRBS pattern | 212001 | Tests the level rms for each level in the PRBS pattern |
| Level RMS - PRBS pattern | 312001 | Tests the level rms for each level in the PRBS pattern |
| Level Separation Mismatch Ratio - RLM | 212002 | Tests the level mismatch ratio |
| Level Separation Mismatch Ratio - RLM | 312002 | Tests the level mismatch ratio |
| Linear Fit Pulse Peak | 211001 | Linear Fit Pulse Peak |
| Linear Fit Pulse Peak | 311001 | Linear Fit Pulse Peak |
| Output Differential Voltage Test | 213003 | Test the maximum voltage with the TX enabled |
| Output Differential Voltage Test | 313003 | Test the maximum voltage with the TX enabled |
| Signal-to-noise-and-distortion ratio | 211002 | Measures the SNDR |
| Signal-to-noise-and-distortion ratio | 311002 | Measures the SNDR |
| Single-ended Transmitter Output Voltage Test | 213004 | Test the minimum and maximum voltage of the single-ended signals |

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

| Name | TestID | Description |
|---|---|---|
| Single-ended Transmitter Output Voltage Test | 313004 | Test the minimum and maximum voltage of the single-ended signals |
| Steady-State Voltage Vf | 211000 | Steady-State Voltage Vf measurement |
| Steady-State Voltage Vf | 311000 | Steady-State Voltage Vf measurement |
| Vertical Eye Closure | 315001 | Measures the Vertical Eye Closure LR |
| Vertical Eye Closure | 215001 | Measures the Vertical Eye Closure MR |

# 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 |
|---|---|
| Infiniium | The primary oscilloscope |
| Keysight PNA | Performance Network Analyzer |
| Keysight ENA | Economy Network Analyzer |

# Index


## C

configuration variables and values, 9
copyright, 2

## I

IDs and names of tests, 21
instrument names, 25

## N

names and IDs of tests, 21
names of instruments, 25
notices, 2

## P

programming, introduction to, 7

## R

Remote Programming Toolkit, 8

## T

test names and IDs, 21

## V

variables and values, configuration, 9

## W

warranty, 2