M8091CKCA Receiver Conformance Test Application for IEEE 802.3ck - Remote Programming Guide

KEYSIGHT

REMOTE PROGRAMMING GUIDE

Notices

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Contents

Keysight M8091CKCA Receiver Conformance Test Application for IEEE 802.3ck

Remote Programming Guide

1 At a Glance

KEYSIGHT TECHNOLOGIES

Remote Programming Guide

This Guide helps you in programming the Keysight M8091CKCA Receiver Conformance Test Application for IEEE 802.3ck remotely.

Using the N5452A remote interface, you can control the M8070B software's Rx Test Applications from a remote PC. While the remote interface has ready-to-run executable features available, you may also create custom programs using the Microsoft .NET 2.0 Remoting interface.

Introduction to Programming

This chapter introduces the basics that are required for remote programming an Rx Test Application. The programming commands provide the means for remote control. Basic operations that you can perform remotely with a computer and the Rx Test Application, include:

- Launching and closing the application
- Configuring various options
- Running tests
- Getting results
- Controlling the occurrence and appearance of prompts/dialogs
- Saving and loading projects

You may also perform several miscellaneous tasks, which may comprise one or more of the actions listed above.

Remote Programming Toolkit

The majority of the remote interface features are common across the Rx Test Applications that have been developed by Keysight Technologies. Information about those features is provided in the N5452A Compliance Application Remote Programming Toolkit available for download from the Keysight website.

Access the toolkit at www.keysight.com/find/rpi, where a Getting Started Guide, programming documents and working example clients with full source code are available. You can also find references to “application-specific configuration variables, test information, and instrument information”.

The remote programming options that are common to other Rx Test Applications can be found in the documentation provided with the toolkit. However, the remote programming options specific to Keysight M8091CKCA Receiver Conformance Test Application for IEEE 802.3ck are provided in this guide.

NOTE

The name for the “Keysight M8091CKCA Receiver Conformance Test Application for IEEE 802.3ck” used within the application itself is “Compliance Rx Test Automation for IEEE-100G” or simply “IEEE-100G ValiFrame” for short.

You can enable **Remote Interface Hints...**, which will appear under various tabs in the Rx Test Application.

To enable the remote interface hints feature in the Rx Test Application, click **View > Preferences...**. In the **Preferences** dialog, select the **Remote** tab. The option **Enable remote interface** is selected by default. Select the **Show remote interface hints** check-box to activate the Remote Interface Hints... feature for various options in the Rx Test Application.

2 Configuration Variables

This section lists various N5452A Remote Programming configuration options – along with their description – that are available in the Keysight M8091CKCA Receiver Conformance Test Application for IEEE 802.3ck for remote configuration. Using the appropriate remote interface method, you may query or set the options remotely.

In general, you can set the variables remotely using one of the two syntaxes described in this chapter.

Syntax for Configuration Variables

ARSL

Syntax: `arsl -a <VISA/SICL Address of the M8070B software> -c "<command>"`

Example: `arsl -a TCPIP0::localhost::hislip0::INSTR -c "SetConfig 'TargetErrorRatio' '1e-5'"`

C#

Syntax: `remoteAte.<command>;`

Example: `remoteAte.SetConfig("TargetErrorRatio", "1e-5");`

Values and Descriptions of Configuration Variables

Table 1 and Table 2 list the labels of the configuration variables that are used in the IEEE 802.3ck Rx Test Application for C2M (Host and Module) and C2C, respectively. They are listed in the order in which they are encountered in the app.

Table 3 on page 16 gives the descriptions and possible values of the various configuration variables used specifically in the IEEE 802.3ck Rx Test Application. They are arranged in alphabetical order of the corresponding label. The information contained in each column of the table is:

- **GUI Location** – Describes the specific tab in the IEEE 802.3ck Rx Test Application that contains the control to change the value remotely.
- **Label** – The name of the specific option/feature/control within the user interface tab of the IEEE 802.3ck Rx Test Application that 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.
- **Availability** – The Standard Options for which the configuration is available.

NOTE

Keysight recommends performing a "test run" of your remote script using the application's graphical user interface to ensure that the combinations of values in your program are valid.

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

Table 1 List of Configuration Variable Labels used in the IEEE 802.3ck Rx Test Application for C2M Host Input and C2M Module Input Standard Options

Heading / Procedure	Configuration Label	
IEEE 802.3ck Tests	Baud Rate Victim Generator PAM4 Symbol Mapping Victim Generator PAM4 Custom Symbol Mapping	Target Error Ratio Sync Loss Threshold Alignment BER Threshold
– C2M Host Input / C2M Module Input (100GAUI-1, 200GAUI-2, 400GAUI-4)	Host Channel Module Output Mode [only C2M Host]	PAM4 Symbol 1 Level PAM4 Symbol 2 Level
– – Calibrations	Transmitter Pre-Cursor3 Transmitter Pre-Cursor2 Transmitter Pre-Cursor1 Transmitter Post-Cursor1 Channel EQ Pre-Cursor3 Channel EQ Pre-Cursor2	Channel EQ Pre-Cursor1 Channel EQ Post-Cursor1 Loop Bandwidth SIRC Response for Tx Measurements SIRC Bandwidth for Tx Measurements Number of Averages for Waveform Acquisition
– – – Crosstalk Calibration	Crosstalk Amplitude	Crosstalk Transition Time
– – – Amplitude Calibration	Amplitude Transmitter Pre-Cursor3 Transmitter Pre-Cursor2	Transmitter Pre-Cursor1 Transmitter Post-Cursor1
– – – BUJ Calibration	BUJ	
– – – Transmitter Measurements	Amplitude SJ UUGJ BUJ PAM4 Symbol 1 Level PAM4 Symbol 2 Level Transmitter Pre-Cursor3	Transmitter Pre-Cursor2 Transmitter Pre-Cursor1 Transmitter Post-Cursor1 Np for TP0v Dp for TP0v Jnu Type Record Count
– – – Stressed Eye Calibration	SIRC Response for Stressed Eye SIRC Bandwidth for Stressed Eye Amplitude SJ UUGJ BUJ PAM4 Symbol 1 Level PAM4 Symbol 2 Level Transmitter Pre-Cursor3 Transmitter Pre-Cursor2 Transmitter Pre-Cursor1 Transmitter Post-Cursor1 FFE Mode Channel EQ Pre-Cursor3 Channel EQ Pre-Cursor2 Channel EQ Pre-Cursor1 Channel EQ Post-Cursor1	Enable Tx Deemphasis Fine Tuning Crosstalk Amplitude Crosstalk Transition Time Eye Height Eye Height Accuracy Vertical Eye Closure Vertical Eye Closure Accuracy CTLE Mode CTLE Zero Frequency CTLE Pole 1 Frequency CTLE Pole 2 Frequency CTLE Low-frequency Pole/Zero Spectral Density Noise State Spectral Density Noise Histogram Window Shape Gaussian Standard Deviation Pulse Response Save File

Heading / Procedure	Configuration Label	
– – – – CTLE Auto-tune	Measure All CTLE Options Start Value for gDC CTLE Auto-tune Stop Value for gDC CTLE Auto-tune Start Value for gDC2 CTLE Auto-tune	Stop Value for gDC2 CTLE Auto-tune Minimum CTLE Gain [only C2M Module] Eye Measurement Maximum UI Capture Threshold
– – – – CTLE Manual	Manual CTLE gDC	Manual CTLE gDC2
– – – Differential Peak-Peak Voltage Tolerance Calibration	Differential Pk-Pk Voltage	
– – Tests	Victim Analyzer Module Victim Analyzer Clock Source Victim Analyzer PAM4 Symbol Mapping Victim Analyzer PAM4 Custom Symbol Mapping	Target Confidence Level DUT Control Interface Script File DUT Control Interface Location Pause Before Starting Receiver Tests
– – – Stressed Input Test	Test Mode Jitter Profile Frequency1 Jitter Profile Amplitude1 Jitter Profile Frequency2 Jitter Profile Amplitude2 Jitter Profile Frequency3 Jitter Profile Amplitude3 Frequency Relax Time Amplitude Relax Time Algorithm	Frequency Mode Start Frequency Stop Frequency Number of Steps Manual Frequency List Minimum Jitter Amplitude Limit Maximum Jitter Amplitude Limit JTol Step Size JTol Linear Step Size JTol Step Size Log
– – – Voltage Tolerance Test	Differential Pk-Pk Voltage	

Table 2 List of Configuration Variable Labels used in the IEEE 802.3ck Rx Test Application for the C2C Standard Option

Heading / Procedure	Configuration Label	
IEEE 802.3ck Tests	Baud Rate Victim Generator PAM4 Symbol Mapping Victim Generator PAM4 Custom Symbol Mapping	Target Error Ratio Sync Loss Threshold Alignment BER Threshold
– C2C (100GAUI-1, 200GAUI-2, and 400GAUI-4)	Target COM Test Channel Configuration PAM4 Symbol 1 Level PAM4 Symbol 2 Level Transmitter Pre-Cursor3 Transmitter Pre-Cursor2 Transmitter Pre-Cursor1	Transmitter Post-Cursor1 Channel EQ Pre-Cursor3 Channel EQ Pre-Cursor2 Channel EQ Pre-Cursor1 Channel EQ Post-Cursor1 Noise Generator Channel Selection
– – Calibrations	Loop Bandwidth SIRC Response for Tx Measurements SIRC Bandwidth for Tx Measurements Number of Averages for Waveform Acquisition	CTLE Zero Frequency CTLE Pole 1 Frequency CTLE Pole 2 Frequency CTLE Low-frequency Pole/Zero
– – – Common		
– – – – Amplitude Calibration	Amplitude Transmitter Pre-Cursor3 Transmitter Pre-Cursor2	Transmitter Pre-Cursor1 Transmitter Post-Cursor1
– – – – BUJ Calibration	BUJ	
– – – Receiver Interference Tolerance		
– – – – Transmitter Measurements for COM Model	Amplitude SJ UUGJ BUJ PAM4 Symbol 1 Level PAM4 Symbol 2 Level Transmitter Pre-Cursor3 Transmitter Pre-Cursor2	Transmitter Pre-Cursor1 Transmitter Post-Cursor1 Np for TP0v Dp for TP0v Np for Rx Test Dp for Rx Test Jnu Type Record Count
– – – Receiver Jitter Tolerance		
– – – – Transmitter Measurements for COM Model	Amplitude SJ UUGJ BUJ PAM4 Symbol 1 Level PAM4 Symbol 2 Level Transmitter Pre-Cursor3 Transmitter Pre-Cursor2	Transmitter Pre-Cursor1 Transmitter Post-Cursor1 Np for TP0v Dp for TP0v Np for Rx Test Dp for Rx Test Jnu Type Record Count

Heading / Procedure	Configuration Label	
– – Tests	Victim Analyzer Module Victim Analyzer Clock Source Victim Analyzer PAM4 Symbol Mapping Victim Analyzer PAM4 Custom Symbol Mapping	Target Confidence Level DUT Control Interface Script File DUT Control Interface Location Pause Before Starting Receiver Tests
– – – Receiver Interference Tolerance Test	Broadband Noise Amplitude	Broadband Noise Selector
– – – Receiver Jitter Tolerance Test	Test Mode Jitter Profile Frequency1 Jitter Profile Amplitude1 Jitter Profile Frequency2 Jitter Profile Amplitude2 Jitter Profile Frequency3 Jitter Profile Amplitude3 Frequency Relax Time Amplitude Relax Time Algorithm	Frequency Mode Start Frequency Stop Frequency Number of Steps Manual Frequency List Minimum Jitter Amplitude Limit Maximum Jitter Amplitude Limit JTol Step Size JTol Linear Step Size JTol Step Size Log

Table 3 Values and Descriptions of Configuration Variables

GUI Location	Label in the App	Variable	Available Values	Description	Standard Options for which it is available
Set Up	Standard Option	MyTestFilterVar	C2M Host Input | C2M Module Input | C2C	This option allows you to select the specific standard to test against.	–
Configure	Algorithm	Algorithm	Binary | Binary + Down Linear | Binary + Up Linear | Down Linear | Down Logarithmic | Up Linear | Up Logarithmic | Up Log + Linear | Adaptive Binary | Custom	Select the measurement algorithm.	C2M Host | C2M Module | C2C
Configure	Alignment BER Threshold	AlignmentBERThreshold	1E-1 | 1E-2 | 1E-3 | 1E-4 | 1E-5 | 1E-6 | 1E-7 | 1E-8 | 1E-9	BER threshold used as pass/fail criterion during the sample point alignment.	C2M Host | C2M Module | C2C
Configure	Amplitude	Amplitude	(Accepts user-defined text in Debug mode) | ▪ For C2M Host: 0.9 ▪ For C2M Module: 0.9 | 1.2 ▪ For C2C: 0.8	Victim Differential Amplitude.	C2M Host | C2M Module | C2C
Configure	Amplitude Relax Time	AMPRelaxTime	(Accepts user-defined text in Debug mode) | 0.200	Relax time on jitter amplitude changes.	C2M Host | C2M Module | C2C
Configure	Baud Rate	BaudRate	(Accepts user-defined text in Debug mode) | 53.125e9	Baud Rate for testing device and for all calibrations. Enter value in the format 53.125e9.	C2M Host | C2M Module | C2C
Configure	Broadband Noise Amplitude (RMS)	Broadband_Noise_Amplitude	(Accepts user-defined text in Debug mode) | 0.01	Specifies the amplitude of the broadband noise.	C2C
Configure	Broadband Noise Selector	Broadband_Noise_Selector	Manual | Calibrated	Select between manual or calibrated broadband noise amplitude.	C2C

GUI Location	Label in the App	Variable	Available Values	Description	Standard Options for which it is available
Configure	BUJ	BUJ	(Accepts user-defined text in Debug mode) | 0.0	Controls the amplitude of the BUJ jitter source for Transmitter Measurements (for C2M) or Transmitter Measurements for COM Model (for C2C).	C2M Host | C2M Module | C2C
Configure	BUJ	BUJCal	(Accepts user-defined text in Debug mode) | 0.01	Controls the amplitude of the BUJ jitter source for BUJ Calibration.	C2M Host | C2M Module | C2C
Configure	BUJ	BUJ_JTol	(Accepts user-defined text in Debug mode) | 0.0	Controls the amplitude of the BUJ jitter source for Transmitter Measurements (for C2M) or Transmitter Measurements for COM Model (for C2C).	C2M Host | C2M Module | C2C
Configure	Channel EQ Post-Cursor1	Cursor4	(Accepts user-defined text) | 0.0	Controls the post-cursor 1 coefficient for channel equalization.	C2M Host | C2M Module | C2C
Configure	Channel EQ Pre-Cursor1	Cursor2	(Accepts user-defined text) | 0.0	Controls the pre-cursor 3 coefficient for channel equalization.	C2M Host | C2M Module | C2C
Configure	Channel EQ Pre-Cursor2	Cursor1	(Accepts user-defined text) | 0.0	Controls the pre-cursor 2 coefficient for channel equalization.	C2M Host | C2M Module | C2C
Configure	Channel EQ Pre-Cursor3	Cursor0	(Accepts user-defined text) | 0.0	Controls the pre-cursor 3 coefficient for channel equalization.	C2M Host | C2M Module | C2C
Configure	Crosstalk Amplitude	CrosstalkAmplitude	(Accepts user-defined text in Debug mode) | ▪ For C2M Host: 0.6 | 0.75 ▪ For C2M Module: 0.6 | 0.845	Crosstalk Amplitude.	C2M Host | C2M Module
Configure	Crosstalk Transition Time	CrosstalkSlewTime	(Accepts user-defined text in Debug mode) | ▪ For C2M Host: 10e-12 | 15e-12 ▪ For C2M Module: 8.5e-12 | 10e-12	Crosstalk Transition Time.	C2M Host | C2M Module

GUI Location	Label in the App	Variable	Available Values	Description	Standard Options for which it is available
Configure	CTLE Low-Frequency Pole/Zero	CtleLowFrequencyPoleZero	(Accepts user-defined text in Debug mode) | ▪ For C2M: 1.328125e9 ▪ For C2C: 0.6640625e9	Defines the continuous time filter, low-frequency pole/zero.	C2M Host | C2M Module | C2C
Configure	CTLE Mode	CTLEMode	Optimized | Auto | Manual	Selects CTLE control and behavior. ▪ Optimized CTLE using COM Method (Optimized): Use the optimized CTLE settings determined by the COM model. ▪ Auto-tune (Auto): Run 'Auto-tune' to find the optimal CTLE settings. ▪ Manual: Manual entry of CTLE DC gain settings.	C2M Host | C2M Module
Configure	CTLE Pole 1 Frequency	CtlePole1Frequency	(Accepts user-defined text in Debug mode) | ▪ For C2M: 20e9 ▪ For C2C: 21.25e9	Defines the continuous time filter, pole 1 frequency.	C2M Host | C2M Module | C2C
Configure	CTLE Pole 2 Frequency	CtlePole2Frequency	(Accepts user-defined text in Debug mode) | ▪ For C2M: 28e9 ▪ For C2C: 53.125e9	Defines the continuous time filter, pole 2 frequency.	C2M Host | C2M Module | C2C
Configure	CTLE Zero Frequency	CtleZeroFrequency	(Accepts user-defined text in Debug mode) | ▪ For C2M: 12.58e9 ▪ For C2C: 21.25e9	Defines the continuous time filter, zero frequency.	C2M Host | C2M Module | C2C
Configure	Differential Pk-Pk Voltage	VoltageMin	(Accepts user-defined text in Debug mode) | ▪ For C2M Host: 0.6 | 0.845 ▪ For C2M Module: 0.75	Minimum Voltage that the device must tolerate at its input without overloading its front end and causing distortion/clipping that would generate poor equalization and/or BER degradation.	C2M Host | C2M Module
Configure	Dp for Rx Test	DpVal	(Accepts user-defined text in Debug mode) | 2 | 3 | 4	Set the Dp value used for linear fit pulse peak and error calculations in Rx Tests.	C2C

GUI Location	Label in the App	Variable	Available Values	Description	Standard Options for which it is available
Configure	Dp for TP0v	DpVal_TP0v	(Accepts user-defined text in Debug mode) | 2 | 3 | 4	Set the Dp value used for linear fit pulse peak and error calculations in TP0v.	C2M Host | C2M Module | C2C
Configure	DUT Control Interface Location	DCILocation	(Accepts user-defined text) | Lane0 | Lane1 | Lane2 | Lane3	DCI Location to be used for receiver tests.	C2M Host | C2M Module | C2C
Configure	DUT Control Interface Script File	DCIScriptFile	(Accepts user-defined text)	Select the DCI script file to be loaded for receiver tests.	C2M Host | C2M Module | C2C
Configure	Enable Tx Deemphasis Fine Tuning	EnableFineTuneTxDeemphasis	false | true	Enable or disable Tx deemphasis fine tuning.	C2M Host | C2M Module
Configure	Eye Height	EH5	▪ For C2M Host: 0.015 ▪ For C2M Module: 0.01	Eye Height @ 1e-5.	C2M Host | C2M Module
Configure	Eye Height Accuracy	EyeHeightAccuracy	(Accepts user-defined text in Debug mode) | 0.002	Defines the accuracy of Eye Height parameter.	C2M Host | C2M Module
Configure	Eye Measurement Maximum UI Capture Threshold	MaxUICountEyeMeasure	0.233 | 1.165 | 2.330 | 4.660 | 5.825	Set the maximum threshold to capture the UI used for measuring the eye.	C2M Host | C2M Module
Configure	FFE Mode	TransmitterEqualization	Auto | Manual	When 'Auto"is selected, channel equalization coefficients are computed from measured pulse response; otherwise, the Pre-Cursor1/2/3 and Post-Cursor parameters should be specified by the user.	C2M Host | C2M Module
Configure	Frequency Mode	FrequencyMode	Auto | Manual	Select between Auto and Manual frequency mode.	C2M Host | C2M Module | C2C
Configure	Frequency Relax Time	FRQRelaxTime	(Accepts user-defined text in Debug mode) | 1.000	Relax time on jitter frequency changes.	C2M Host | C2M Module | C2C
Configure	Gaussian Standard Deviation	GaussianStdDev	(Accepts user-defined text in Debug mode) | 2	Controls the standard deviation of the Gaussian window.	C2M Host | C2M Module

GUI Location	Label in the App	Variable	Available Values	Description	Standard Options for which it is available
Configure	Histogram Window Shape	HistogramWindowShape	Boxcar | Gaussian	Select between boxcar and Gaussian window shape.	C2M Host | C2M Module
Configure	Host Channel	TestMethod	NearEnd | FarEnd	Selects between Near-end and Far-end host channel.	C2M Host
Configure	Host Channel	HostChannelForModuleInput	LowLoss | HighLoss	Selects between Low Loss and High Loss channel. The frequency-dependent attenuation is used only for the High Loss channel.	C2M Module
Configure	Jitter Profile Amplitude1	SJ1Amplitude	(Accepts user-defined text in Debug mode) | 5.0	Defines the jitter amplitude at the first corner frequency of the jitter profile.	C2M Host | C2M Module | C2C
Configure	Jitter Profile Amplitude2	SJ2Amplitude	(Accepts user-defined text in Debug mode) | 0.05	Defines the jitter amplitude at the second corner frequency of the jitter profile.	C2M Host | C2M Module | C2C
Configure	Jitter Profile Amplitude3	SJ3Amplitude	(Accepts user-defined text in Debug mode) | 0.05	Defines the jitter amplitude at the third corner frequency of the jitter profile.	C2M Host | C2M Module | C2C
Configure	Jitter Profile Frequency1	SJ1Frequency	(Accepts user-defined text in Debug mode) | 40e3	Defines the first corner frequency of the jitter profile.	C2M Host | C2M Module | C2C
Configure	Jitter Profile Frequency2	SJ2Frequency	(Accepts user-defined text in Debug mode) | 4e6	Defines the second corner frequency of the jitter profile.	C2M Host | C2M Module | C2C
Configure	Jitter Profile Frequency3	SJ3Frequency	(Accepts user-defined text in Debug mode) | 40e6	Defines the third corner frequency of the jitter profile.	C2M Host | C2M Module | C2C
Configure	Jnu Type	JnuType	J3u | J4u | J5u	Select Jnu Type. This will select the probability used in the 12-edge output jitter measurement.	C2M Host | C2M Module | C2C
Configure	JTol Linear Step Size	JTolLinearStepSize	(Accepts user-defined text in Debug mode) | 0.05	Step Size for the linear algorithm of the JTol measurement.	C2M Host | C2M Module | C2C
Configure	JTol Step Size	JTolStepSize	(Accepts user-defined text in Debug mode) | 0.05	Step Size for the binary algorithm of the JTol measurement.	C2M Host | C2M Module | C2C

GUI Location	Label in the App	Variable	Available Values	Description	Standard Options for which it is available
Configure	JTol Step Size Log	JTolStepSizeLog	(Accepts user-defined text in Debug mode) | 50.0	Step Size for the logarithmic algorithm of the JTol measurement.	C2M Host | C2M Module | C2C
Configure	Loop Bandwidth	LoopBW	(Accepts user-defined text in Debug mode) | 4e6	Select or enter the Loop Bandwidth to be used in the clock recovery.	C2M Host | C2M Module | C2C
Configure	Manual CTLE gDC	ManualCTLEgDC	-1 | -2 | -3 | -4 | -5 | -6 | -7 | -8 | -9 | -10 | -11 | -12 | -13	Specifies the CTLE DC gain setting.	C2M Host | C2M Module
Configure	Manual CTLE gDC2	ManualCTLEgDC2	0 | -0.5 | -1 | -1.5 | -2 | -2.5 | -3	Specifies the CTLE DC gain 2 setting.	C2M Host | C2M Module
Configure	Manual Frequency List	ManualFrequencyList	(Accepts user-defined text in Debug mode) | 40000,400000,1333000,4000000,12000000,40000000	List of Jitter frequencies separated by commas.	C2M Host | C2M Module | C2C
Configure	Maximum Jitter Amplitude Limit	MaximumJitterAmplitudeLimit	(Accepts user-defined text in Debug mode) | 100	Maximum Jitter Amplitude Limit.	C2M Host | C2M Module | C2C
Configure	Measure All CTLE Options	MeasureAll	false | true	For auto-tune, you can select to run all options, or to stop testing when CTLE is shown to worsen the eye.	C2M Host | C2M Module
Configure	Minimum CTLE Gain	CTLEGainMin	0 | -0.5 | -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 | -9.5 | -10 | -10.5 | -11 | -11.5 | -12	Select minimum CTLE gain for C2M Module, high-loss, stressed input signal calibration. Condition is gdc + gdc2 <= Minimum CTLE Gain.	C2M Module
Configure	Minimum Jitter Amplitude Limit	MinimumJitterAmplitudeLimit	(Accepts user-defined text in Debug mode) | 0.01	Minimum Jitter Amplitude Limit.	C2M Host | C2M Module | C2C
Configure	Module Output Mode	ModuleOutputMode	Short | Long	Selects between short and long module output mode, as requested by the host.	C2M Host

GUI Location	Label in the App	Variable	Available Values	Description	Standard Options for which it is available
Configure	Noise Generator Channel Selection	NoiseGeneratorChannelSelection	DataOut1 | DataOut2 | DataOut3 | DataOut4	Selects the location of the Noise Generator that will be used for generating broadband noise.	C2C
Configure	Np for Rx test	NpVal	(Accepts user-defined text in Debug mode) | 8 | 11 | 12 | 13 | 14 | 15 | 16 | 200	Set the Np value used for linear fit pulse peak and error calculations in 'Transmitter Measurements for COM Model' (RxITol and RxJTol).	C2C
Configure	Np for TP0v	NpVal_TP0v	(Accepts user-defined text in Debug mode) | 8 | 11 | 12 | 13 | 14 | 15 | 16 | 29 | 200 (29 not for C2C)	Set the Np value used for linear fit pulse peak and error calculations in 'Transmitter Measurements' (C2M) and 'Transmitter Measurements for COM Model' (RxITol and RxJTol; C2C).	C2M Host | C2M Module | C2C
Configure	Number of Averages for Waveform Acquisition	StepLoop	(Accepts user-defined text in Debug mode) | 5 | 8 | 10 | 16 | 20	Sets the number of averages used for waveform acquisition during pulse response and SNDR measurement.	C2M Host | C2M Module | C2C
Configure	Number of Steps	NumberOfSteps	(Accepts user-defined text in Debug mode) | 6	The number of steps within the jitter sweep.	C2M Host | C2M Module | C2C
Configure	PAM4 Symbol 1 Level	PAM4_Level_1	(Accepts user-defined text in Debug mode) | 33.0	Controls the level of symbol 1.	C2M Host | C2M Module | C2C
Configure	PAM4 Symbol 2 Level	PAM4_Level_2	(Accepts user-defined text in Debug mode) | 67.0	Controls the level of symbol 2.	C2M Host | C2M Module | C2C
Configure	Pause Before Starting Receiver Tests	PauseRxTests	true | false	Selects whether a pause is made after configuring the error detector modules and before running the alignment to allow for manual changes in the settings.	C2M Host | C2M Module | C2C
Configure	Pulse Response Save File	PulseResponseSaveFile	(Accepts user-defined text)	Save fitted pulse response data as two columns of time and voltage in csv format.	C2M Host | C2M Module

GUI Location	Label in the App	Variable	Available Values	Description	Standard Options for which it is available
Configure	SIRC Bandwidth for Stressed Eye	SIRCBWStressedEye	(Accepts user-defined text in Debug mode) | 39.84e9	Select or enter the SIRC BW for the stressed eye calibration. This will automatically be applied to any pattern lock waveform.	C2M Host | C2M Module
Configure	SIRC Bandwidth for Tx Measurements	SIRCBW	(Accepts user-defined text in Debug mode) | 40e9	Select or enter the SIRC Bandwidth for victim transmitter measurements and crosstalk calibration. This parameter will automatically be applied to any pattern lock waveform.	C2M Host | C2M Module | C2C
Configure	SIRC Response for Stressed Eye	SIRCResponseStressed Eye	BESSel | BUTTerworth1 | BUTTerworth2 | BUTTerworth3 | BUTTerworth4 | SINC | FLAT | BESSEL4 | WALL | BUTTerworth	Select the SIRC response for the Stressed Eye calibration. This parameter will automatically be applied to any pattern lock waveform. The available values depend on the Oscilloscope in use.	C2M Host | C2M Module
Configure	SIRC Response for Tx Measurements	SIRCResponse	BESSel | BUTTerworth1 | BUTTerworth2 | BUTTerworth3 | BUTTerworth4 | SINC | FLAT | BESSEL4 | WALL | BUTTerworth	Select the SIRC response for victim transmitter measurements and crosstalk calibration. This parameter will automatically be applied to any pattern lock waveform. The available values depend on the Oscilloscope in use.	C2M Host | C2M Module | C2C
Configure	SJ	SJ	(Accepts user-defined text in Debug mode) | 0.05	Sinusoidal Jitter at 10x receiver loop bandwidth for all calibrations apart from 'Transmitter Measurements for COM Model' for Receiver Jitter Tolerance (C2C).	C2M Host | C2M Module | C2C
Configure	SJ	SJ_JTol	(Accepts user-defined text in Debug mode) | 0.035	Sinusoidal Jitter at 10x receiver loop bandwidth for 'Transmitter Measurements for COM Model' for Receiver Jitter Tolerance (C2C).	C2C
Configure	Spectral Density Noise	OneSidedNoiseSpectral Density	(Accepts user-defined text in Debug mode) | 4.1e-8	Defines the one-sided spectral density of receiver input referred noise.	C2M Host | C2M Module

GUI Location	Label in the App	Variable	Available Values	Description	Standard Options for which it is available
Configure	Spectral Density Noise State	SpectralDensityNoiseState	ON | OFF	Select 'ON' to apply Spectral Density Noise for Stressed Eye Calibration and 'OFF' to disable.	C2M Host | C2M Module
Configure	Start Frequency	StartFrequency	(Accepts user-defined text in Debug mode) | 1e3	Controls the start frequency of the jitter sweep.	C2M Host | C2M Module | C2C
Configure	Start Value for gDC CTLE Auto-tune	StartCTLE	-1 | -2 | -3 | -4 | -5 | -6 | -7 | -8 | -9 | -10 | -11 | -12 | -13 |	Select the starting CTLE DC gain setting to use for the 'Auto-Tune'. Auto-Tune will use the range of settings from this start value to the stop value set in the StopCTLE configuration.	C2M Host | C2M Module
Configure	Start Value for gDC2 CTLE Auto-tune	StartCTLEgDC2	0 | -0.5 | -1 | -1.5 | -2 | -2.5 | -3	Select the starting CTLE DC gain 2 setting to use for the 'Auto-Tune'. Auto-Tune will use the range of settings from this start value to the stop value set in the StopCTLEgDC2 configuration.	C2M Host | C2M Module
Configure	Stop Frequency	StopFrequency	(Accepts user-defined text in Debug mode) | 15e6	Controls the stop frequency of the jitter sweep.	C2M Host | C2M Module | C2C
Configure	Stop Value for gDC CTLE Auto-tune	StopCTLE	-1 | -2 | -3 | -4 | -5 | -6 | -7 | -8 | -9 | -10 | -11 | -12 | -13 |	Select the last CTLE DC gain setting to use for the 'Auto-Tune'. Auto-Tune will use the range of settings from the start value selected in the StartCTLE configuration to the stop value set here.	C2M Host | C2M Module
Configure	Stop Value for gDC2 CTLE Auto-tune	StopCTLEgDC2	0 | -0.5 | -1 | -1.5 | -2 | -2.5 | -3	Select the last CTLE DC gain 2 setting to use for the 'Auto-Tune'. Auto-Tune will use the range of settings from the start value selected in the StartCTLEgDC2 configuration to the stop value set here.	
Configure	Sync Loss Threshold	SyncLossThreshold	1E-1 | 1E-2 | 1E-3 | 1E-4 | 1E-5 | 1E-6 | 1E-7 | 1E-8	The threshold level of error ratio at which synchronization is successful.	C2M Host | C2M Module | C2C

GUI Location	Label in the App	Variable	Available Values	Description	Standard Options for which it is available
Configure	Target COM	TargetCOM	(Accepts user-defined text in Debug mode) | 3.0	Target COM for deciding if a test is passed or failed.	C2C
Configure	Target Confidence Level	TargetConfidenceLevel	(Accepts user-defined text in Debug mode) | 95.0	Target Confidence Level for Target Error Ratio to decide if a test is passed or failed.	C2M Host | C2M Module | C2C
Configure	Target Error Ratio	TargetErrorRatio	1E-3 | 1E-4 | 1E-5 | 1E-6 | 1E-7 | 1E-8 | 1E-9 | 1E-10 | 1E-11 | 1E-12	Target Error Ratio for deciding if a test is passed or failed.	C2M Host | C2M Module | C2C
Configure	Test Channel Configuration	TestChannelConfiguration	LowLoss | HighLoss	Specify test channel configuration that needs to be calibrated to meet COM (3 dB max).	C2C
Configure	Test Mode	TestMode	Compliance | Characterization	Test just for predefined SJ Frequencies or measure SJ Frequency.	C2M Host | C2M Module | C2C
Configure	Transmitter Post-Cursor1	TxCursor4	(Accepts user-defined text in Debug mode) | 0.05	Controls the post-cursor 1 equalization coefficient for Transmitter Measurements.	C2M Host | C2M Module | C2C
Configure	Transmitter Pre-Cursor1	TXCursor2	(Accepts user-defined text in Debug mode) | 0.0	Controls the pre-cursor 1 equalization coefficient for Transmitter Measurements.	C2M Host | C2M Module | C2C
Configure	Transmitter Pre-Cursor2	TXCursor1	(Accepts user-defined text in Debug mode) | 0.0	Controls the pre-cursor 2 equalization coefficient for Transmitter Measurements.	C2M Host | C2M Module | C2C
Configure	Transmitter Pre-Cursor3	TXCursor0	(Accepts user-defined text) | 0.0	Controls the pre-cursor 3 equalization coefficient for Transmitter Measurements.	C2M Host | C2M Module | C2C

GUI Location	Label in the App	Variable	Available Values	Description	Standard Options for which it is available
Configure	UUGJ	UUGJ	(Accepts user-defined text in Debug mode) | 0.0	Unbounded Uncorrelated Gaussian Jitter ▪ For C2M: For 'Transmitter Measurements' and 'Stressed Eye Calibration'. ▪ For C2C: For 'Transmitter Measurements for COM Model' for Receiver Interference Tolerance. This is the RMS value that is set on the BERT.	C2M Host | C2M Module C2C
Configure	UUGJ	UUGJ_JTol	(Accepts user-defined text in Debug mode) | 0.0	Unbounded Uncorrelated Gaussian Jitter for 'Transmitter Measurements for COM Model' for Receiver Jitter Tolerance. This is the RMS value that is set on the BERT.	C2C
Configure	Vertical Eye Closure	VEC5	(Accepts user-defined text in Debug mode) | 12.0	Vertical Eye Closure @ 1e-5.	C2M Host | C2M Module
Configure	Vertical Eye Closure Accuracy	VecAccuracy	(Accepts user-defined text in Debug mode) | 1.0	Defines the accuracy of the Vertical Eye Closure parameter.	C2M Host | C2M Module
Configure	Victim Analyzer Clock Source	VictimAnalClockSource	CDR | ClkIn |ExternalClockRecovery	Selects the clock source for the victim analyzer module. This parameter is only applicable for the BERT analyzer.	C2M Host | C2M Module | C2C
Configure	Victim Analyzer Module	VictimAnalModule	BertAnalyzer | DCI	Selects the victim analyzer module for testing device.	C2M Host | C2M Module | C2C
Configure	Victim Analyzer PAM4 Custom Symbol Mapping	VictimAnalPAM4CustomSymbolMapping	(Accepts user-defined text in Debug mode) | 00,01,11,10	Selects how consecutive data bits are mapped to symbols. The mapping is defined as a comma-separated list of bit sequences (e.g. 00,01,11,10). The position within this list corresponds to the symbol level. First value is for Symbol 0 and last value is for Symbol 3.	C2M Host | C2M Module | C2C

GUI Location	Label in the App	Variable	Available Values	Description	Standard Options for which it is available
Configure	Victim Analyzer PAM4 Symbol Mapping	VictimAnalPAM4SymbolMapping	None | Gray | Custom	Selects how consecutive data bits are mapped to symbols.	C2M Host | C2M Module | C2C
Configure	Victim Generator PAM4 Custom Symbol Mapping	VictimGenPAM4CustomSymbolMapping	(Accepts user-defined text in Debug mode) | 00,01,11,10	Selects how consecutive data bits are mapped to symbols. The mapping is defined as a comma-separated list of bit sequences (e.g. 00,01,11,10). The position within this list corresponds to the symbol level. First value is for Symbol 0 and last value is for Symbol 3.	C2M Host | C2M Module | C2C
Configure	Victim Generator PAM4 Symbol Mapping	VictimGenPAM4SymbolMapping	None | Gray | Custom	Selects how consecutive data bits are mapped to symbols.	C2M Host | C2M Module | C2C

3 Test IDs and Names

This section lists the mapping between the test name and the corresponding test numeric ID, for each test available in the Keysight M8091CKCA Receiver Conformance Test Application for IEEE 802.3ck. The test numeric ID is required for various remote interface methods.

In general, you can select and run calibrations/tests remotely using one of the two syntaxes described in this chapter.

Syntax for Test IDs and Names

ARSL

Syntax:
```
arsl -a <VISA/SICL Address of the M8070B software> -c
"<command>"
```

Example:
```
arsl -a TCPIP0::localhost::hislip0::INSTR -c
"SelectedTests '471100,471101'"

arsl -a TCPIP0::localhost::hislip0::INSTR -c "Run"
```

C#

Syntax:
```
remoteAte.<command>;
```

Example:
```
remoteAte.SelectedTests = new int[]{471100,471101};

remoteAte.Run();
```

IDs, Names and Descriptions of Calibrations and Tests

In Table 4 and Table 5, the various Test IDs and corresponding test names used specifically in the IEEE 802.3ck Rx Test Application are listed, along with descriptions of the calibrations/tests. The information contained in each column of the table is:

- **Name** – The calibration/test name as it appears in the **Select Tests** tab of the IEEE 802.3ck Rx Test Application.
- **Standard Option** – The standard to which the Test ID corresponds.
- **Test ID** – The calibration/test ID/number that must be used with the `RunTests` method.
- **Description** – The calibration/test description.

NOTE

Keysight recommends performing a "test run" of your remote script using the application's graphical user interface to ensure that the combinations of values in your program are valid.

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

Table 4 Test IDs, Test Names and Descriptions for C2C

Calibration/Test Name	Standard Option	Test ID	Description
Calibrations			
Amplitude Calibration	C2C	471100	Calibrates the Victim Generator's Amplitude for the Transmitter Measurements for COM model.
SJ Calibration	C2C	471101	Calibrates the Sinusoidal Jitter.
UUGJ Calibration	C2C	471102	Calibrates the Uncorrelated Unbounded Jitter.
BUJ Calibration	C2C	471103	Calibrates the Bounded Uncorrelated Jitter.
Broadband Noise Calibration	C2C	471104	Calibrates the broadband noise in the channel.
Channel Characterization using COM model	C2C	472100	Validates the channel characteristics using the COM model.
Transmitter Measurements for COM Model – Rx ITol	C2C	472101	Measures transmitter parameters for the calculation of the test channel COM for the Receiver Interference Tolerance Test.

Calibration/Test Name	Standard Option	Test ID	Description
Rx Calibration using COM model	C2C	472102	Prepares the calibration data as a prerequisite to performing the Receiver Interference Tolerance Test.
Transmitter Measurements for COM Model – Rx JTol	C2C	473100	Measures transmitter parameters for the calculation of the test channel COM for the Receiver Jitter Tolerance Test.
COM Verification	C2C	473101	Verifies the calibration data as a prerequisite to performing the Receiver Jitter Tolerance Test.
Tests			
Receiver Interference Tolerance Test	C2C	475100	Validates that the receiver on each lane meets the BER requirement with channels matching the COM and loss parameters for Test 1 and Test 2.
Receiver Jitter Tolerance Test	C2C	475101	Validates that the receiver BER meets the specification requirements for each pair of jitter frequency and peak-to-peak amplitude values.

Table 5 Test IDs, Test Names and Descriptions for C2M Host Input and C2M Module Input

Calibration/Test Name	Standard Option	Test ID	Description
Calibrations			
Crosstalk Calibration	C2M Host Input C2M Module Input	71100 271100	Calibrates the crosstalk amplitude and transition time.
Amplitude Calibration	C2M Host Input C2M Module Input	71101 271101	Calibrates the Victim Generator's amplitude.
SJ Calibration	C2M Host Input C2M Module Input	71102 271102	Calibrates the Sinusoidal Jitter.
UUGJ Calibration	C2M Host Input C2M Module Input	71103 271103	Calibrates the Uncorrelated Unbounded Gaussian Jitter (UUGJ) at TP0a.
BUJ Calibration	C2M Host Input C2M Module Input	71104 271104	Calibrates the Bounded Uncorrelated Jitter.
Transmitter Measurements	C2M Host Input C2M Module Input	71105 271105	Explores different transmitters for the receiver tests.
Stressed Eye Calibration	C2M Host Input C2M Module Input	71106 271106	Calibrates the stressed eye signal for the Multi-lane Stressed Input Test.
Differential Peak-Peak Voltage Tolerance Calibration	C2M Host Input C2M Module Input	71107 271107	Calibrates the peak-to-peak voltage of the differential signal on a PRBS13Q pattern.

Calibration/Test Name	Standard Option	Test ID	Description
Tests			
Multi-lane Stressed Input Test	C2M Host Input C2M Module Input	75100 275100	Validates the ability of the host input to tolerate the sinusoidal jitter within the specified limits.
Voltage Tolerance Test	C2M Host Input C2M Module Input	75102 275102	Validates the ability of the host input to tolerate the minimum voltage according to the specification.

4 Instruments

This section lists the instrument name required for various remote interface methods.

In general, you can control the instruments remotely using one of the two syntaxes described in this chapter.

Syntax for Instruments

ARSL

Replace the content in the square brackets [ ] with actual parameter values.

Syntax for Command:

```
arsl -a <VISA/SICL Address of the M8070B software> -c
"SendScpiCommandCustom 'Command=[scpi
command];Timeout=[timeout
value];Instrument=[instrument name]'"
```

Syntax for Query:

```
arsl -a <VISA/SICL Address of the M8070B software> -c
"SendScpiQueryCustom 'Command=[scpi
query];Timeout=[timeout value];Instrument=[instrument
name]'"
```

C#

Replace the content in the square brackets [ ] with actual parameter values.

Syntax for Command:

```
SendScpiCommandOptions commandOptions = new
SendScpiCommandOptions();

commandOptions.Command = "[scpi command]";

commandOptions.Instrument = "[instrument name]";

commandOptions.Timeout = [timeout value];

remoteAte.SendScpiCommand(commandOptions);
```

Syntax for Query:

```
SendScpiQueryOptions queryOptions = new
SendScpiQueryOptions();

queryOptions.Query = "[scpi query]";

queryOptions.Instrument = "[instrument name]";

queryOptions.Timeout = [timeout value];

remoteAte.SendScpiQuery(queryOptions);
```

Description of Instruments and Software

Table 6 shows the instruments that are used by the IEEE 802.3ck Rx Test Application to run tests. The information contained in each column of the table is:

- **Instrument Name** – Instrument name is required as a parameter in remote interface commands.
- **Description** – The description of the instrument.

The supported versions of the software are listed in the current IEEE 802.3ck Rx Test Application data sheet available on the keysight.com website.

NOTE

Keysight recommends performing a "test run" of your remote script using the application's graphical user interface to ensure that the combinations of values in your program are valid.

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

Table 6 Instrument Names and Descriptions

Instrument Name	Description
M8070	M8070B System Software for M8000 Series of BER Test Solutions
FlexDca	FlexDCA N1000-Series System Software
Uxr	UXR Series Oscilloscope, Infiniium software

5 Appendix: Acronyms and Abbreviations

This chapter lists the acronyms and abbreviations used throughout this guide.

List of Acronyms and Abbreviations

Acronym	Definition
ARSL	Automated Test Engine Remote Scripting Language
BER	Bit Error Ratio
BUJ	Bounded Uncorrelated Jitter
BW	Bandwidth
C2C	Chip-to-Chip
C2M	Chip-to-Module
CDR	Clock Data Recovery
COM	Channel Operating Margin
CTLE	Continuous Time Linear Equalization
DCI	DUT Control Interface
DUT	Device Under Test
EQ	Equalization
GUI	Graphical User Interface
HiSLIP	High-Speed LAN Instrument Protocol
ID	Identifier
IP	Internet Protocol
ITol	Interference Tolerance
JTol	Jitter Tolerance
LAN	Local Area Network
PAM4	Pulse Amplitude Modulation with Four Levels
PC	Personal Computer
rms	root mean squared
Rx	Receiver
SICL	Standard Instrument Control Library
SIRC	System Impulse Response Correction

Acronym	Definition
SJ	Sinusoidal Jitter
SNDR	Signal-to-Noise-and-Distortion Ratio
TCP	Transmission Control Protocol
TJ	Total Jitter
Tx	Transmitter
UUGJ	Uncorrelated Unbounded Gaussian Jitter
VISA	Virtual Instrument Software Architecture

5 Appendix: Acronyms and Abbreviations

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