



Optical Clock Recovery Application Help

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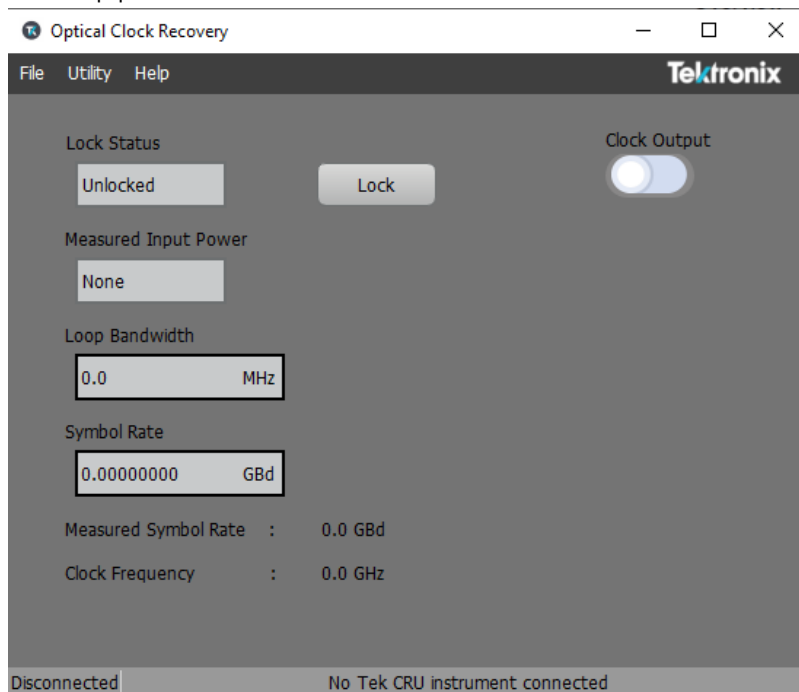
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Overview

The Tektronix Optical Clock Recovery (OCR) application is Microsoft Windows based application wthat allows for remote connection to a TCR801 device to control and analyze clock recovery and signal parameters. Clock recovery for optical signals (CRO) recovers clock or sub-clock of PAM2 and PAM4 signals in the range of 52 to 58 GBd and 25 to 29 GBd.

The main advantage of this application is clock recovery in support of acquisition of optical signals on Tektronix sampling oscilloscopes. The CRO can support other equipment that requires recovered high-speed clock, such as error detectors and similar equipment.



Key features

- Optical-to-electrical conversion gain for high dynamic range
- Recovers clock from PAM2 and PAM4 signals with symbol rate in the range of 52 to 58 GBd
- Adjustable loop bandwidth from 0.2 to 10 MHz
- 2x Clock electrical output (CLK/4 (13 to 14.5 GHz) for a 52 to 58 GBd input, CLK/2 (13 to 14.5 GHz) for a 26 to 29 GBd signal)
- 2x20 LCD Display to view the ethernet address and symbol rate when the status is locked
- Ethernet port to control the instrument
- Type-B USB port to reset the IP configuration
- An external 12 V power supply
- Auto-relock functionality to relock the signals in seconds

Getting started

Minimum system requirements

The following tables show the minimum hardware and software requirements to install and run the Optical Clock Recovery (OCR) application.

Table 1: Software requirements

Component	Description
Operating system	Windows 7 and above

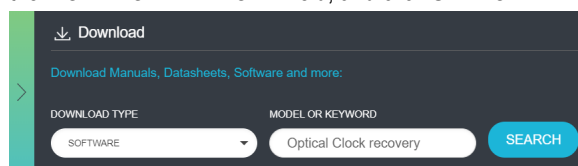
Table 2: Hardware requirements

Component	Description and quantity
Clock recovery instrument	TCR801
Connectivity	LAN cable - 1 No
Cable	1 Ethernet cable 2 SMA cables 1 single mode optical fiber cable
Power Supply	One 12 V power supply

Install the software

Complete the following steps to download and install the latest **Optical Clock Recovery** application. See [Minimum system requirements](#) on page 7 for compatibility.

1. Go to the www.tek.com.
2. Click **Downloads**. In the Download menu, select Software as the DOWNLOAD TYPE, enter **Optical Clock Recovery** in the MODEL OR KEYWORD field, and click **SEARCH**.



3. Select the latest version of software and follow the instructions to download the application.
4. Double-click the executable and follow the on-screen instructions to install the application.

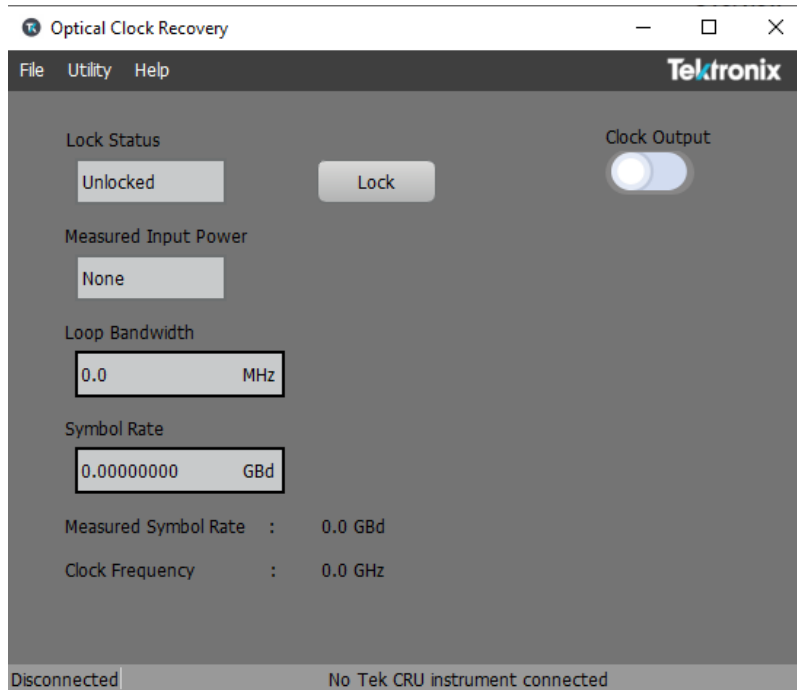
See also

[Minimum system requirements](#) on page 7

Operating basics

Launch the application

To launch the OCR application, double click on the **Tek-OCR-Application** icon on the desktop.



Application controls

The OCR application has a user interface controls. Use these controls to monitor and control the clock recovery and signal parameters.

Table 3: Application controls and descriptions






Control	Description
Menu controls	
File	<ul style="list-style-type: none"> • Default Setup • Connect • Disconnect • Exit
Utility	<ul style="list-style-type: none"> • IP Configuration • Software Upgrade
Help	<ul style="list-style-type: none"> • About • User Manual • Third Party software attribution statement
Minimize   	Click to minimize the OCR application.

Table continued...

Control	Description
Maximize 	Click maximize the OCR application.
Close 	Click to close the OCR application.
Configuration controls	
Lock Status	Displays the current status of the device. Possible status indicators are Locked, Unlocked, Lost Lock, or Locking . Default status is Unlocked .
Lock	Click to start or end the lock process of the device.
Clock Output	Select to toggle between clock output on or off. Default status is Off .
Measured Input Power	Displays the measured input power. Possible values are Too Low, Low, Medium, High, Too High, None . Default is None .
Loop Bandwidth	Enter the loop bandwidth value in the text field. Default value is the last entered loop bandwidth value on the device.
Symbol Rate	Enter the symbol rate value in the text field. Default value is the last entered symbol rate value on the device.
Measured Symbol Rate	Displays the measured symbol rate value. Default value is 0.00 GBd.
Clock Frequency	Displays the clock frequency value. Default value is 0.0 MHz.

Menu options

The menu bar provides access to the following controls.

File menu

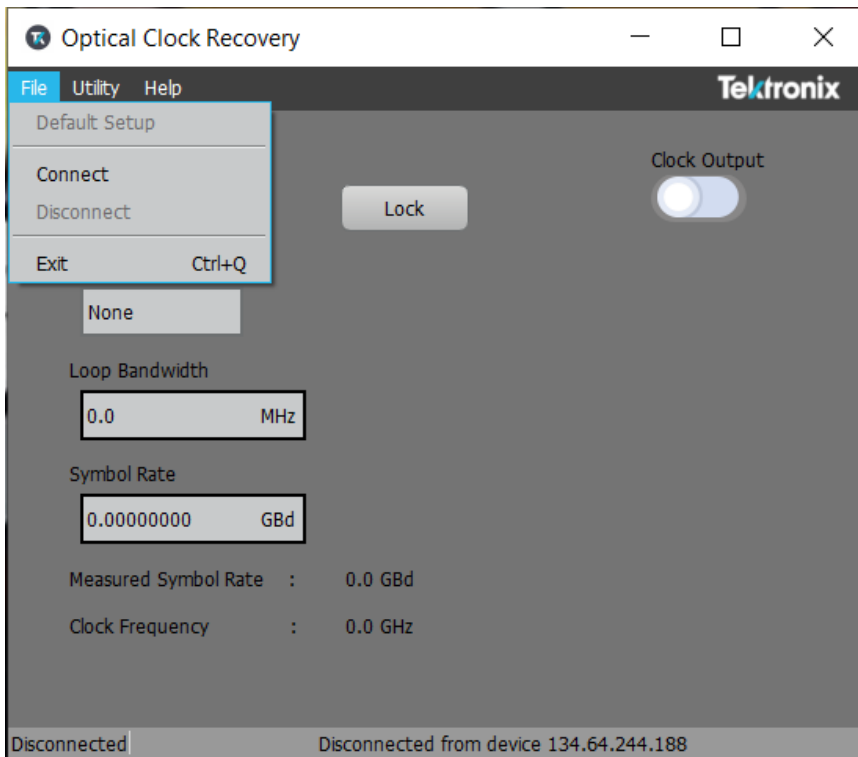



Table 4: File menu controls

Control	Description
Default Setup	Select to reset the application setup to default setting. Default setting: <ul style="list-style-type: none"> • Lock Status: Unlocked • Clock Output: Off • Measured Input Power: None • Loop Bandwidth: <ul style="list-style-type: none"> • 0.0 MHz when the device is disconnected • Ranges between 0.2 to 10 MHz when the device is connected • Symbol Rate: <ul style="list-style-type: none"> • 0.00 GBd when the device is disconnected • Ranges between 25.5 to 32 GBd or 51 to 64 GBd when the device is connected
Connect	Select to connect to a TCR801 device. When selected, a connect pop-up window appears that allows you to enter the IP address of the device and click Connect .
Disconnect	Select to disconnect the OCR application from the connected TCR801 device.

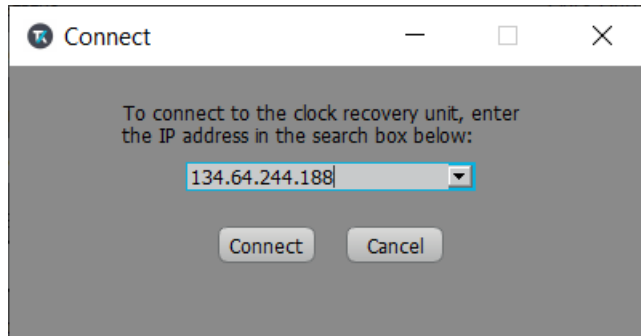
Table continued...

Control	Description
Exit	Select to close the OCR application.  Tip: Ctrl+Q is the keyboard shortcut to close the application.

Connect to a TCR801 device

Complete the following steps to connect the OCR application to a TCR801 device:

1. Click **File > Connect**.
2. Enter the IP address in the text field of the pop-up window. If you have already entered the IP address, you can select it from the drop-down list.



3. Click **Connect**.



Note: For instructions to connect the TCR801 to an oscilloscope, refer to the TCR801 Installation and Safety Instructions that shipped with the instrument. The document is also available for download from www.tek.com/.

Utility menu

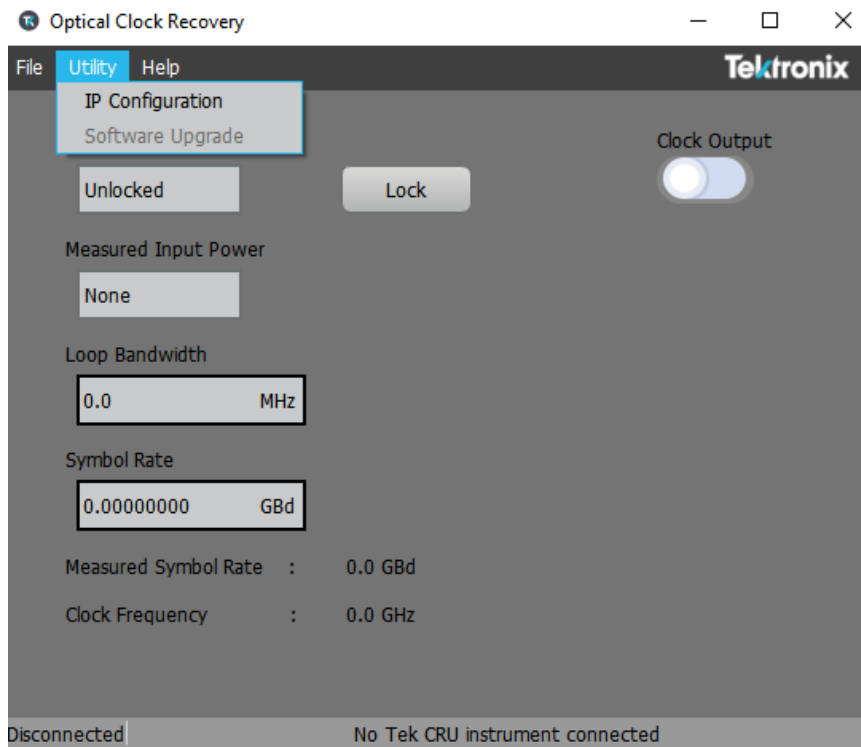


Table 5: Utility menu controls

Control	Description
IP Configuration	Select to configure the IP address to establish the connection between the TCR801 device and OCR application.
Software Upgrade	Select to upgrade the TCR801 device software with the latest available version.

IP Configuration

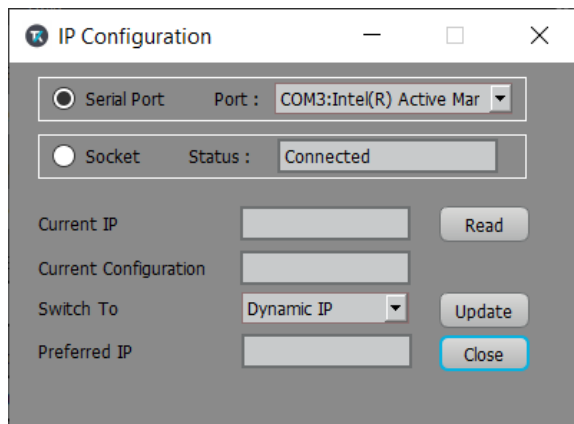



Table 6: IP Configuration controls

Control	Description
Serial Port (Port)	Select to configure the serial port of the device to allow for dynamic and static IP addresses.
Socket (Status)	Allows you to change the IP configuration while connected via ethernet when socket the status is connected.
Current IP	Click Read to view the IP address of the connected device.
Read	Click to retrieve the current IP address of the connected device.
Current Configuration	Displays the the current IP address configuration.
Switch To	Select the IP address type from the drop-down list. <ul style="list-style-type: none"> • Dynamic IP: Dynamic IP address of the connected device • Static IP: Static IP address of the connected device retrieved from the COM port • Static IP (new): Static IP address of the device to be connected of your choice
Update	Click to update the configuration with the newly selected IP address type.
Preferred IP	Enter the static IP address of your preferred device in the text field. <p> Note: Preferred IP is applicable and enabled only when Static IP (new) is selected as the IP address type.</p>
Close	Click to close the IP configuration window.

Steps to configure the IP address of the TCR801 device

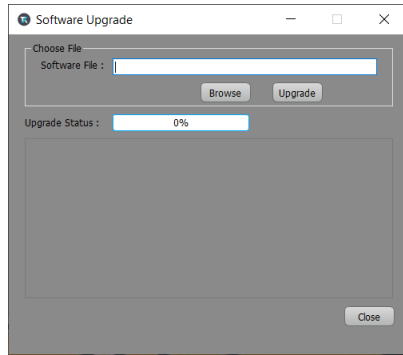
Complete the below steps to perform the IP configuration.

1. Connect the USB cable to the back panel of the TCR801 device.
2. Click **Utility > IP Configuration** in the application.
3. Select **COM port** in the TCR801 device from the drop-down list which indicates *Silicon Labs*. Refer *TCR801 Installation and Safety Instructions* document for device related details.
4. Click **Read** to get the current configured IP address.
5. Select desired configuration from the **Switch To** drop-down list.
6. Click **Update**.
7. Repeat step 4 to confirm the changes.

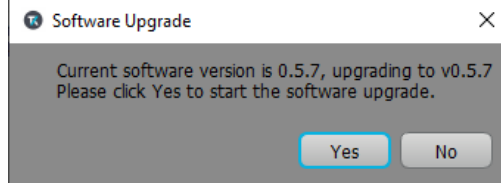
Steps to upgrade the TCR801 device software

Complete the below steps to upgrade the TCR801 device software to the latest available version.

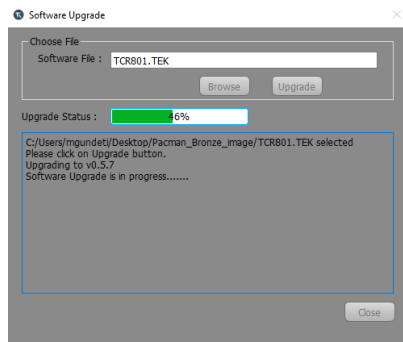
1. Click **Utility > Software Upgrade**.
2. Click **Browse** and navigate to the path and select the file.



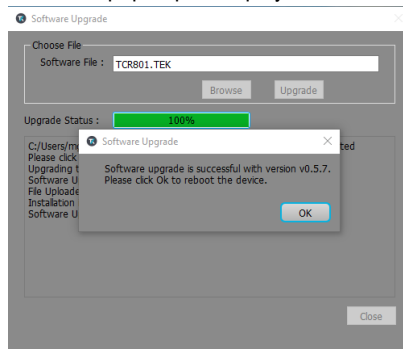
3. Click **Upgrade**.
4. Click **Yes** to confirm the upgrade version and to start the software upgrade.



5. The **Upgrade Status** field will display the software upgrade complete status in percentage followed with software upgrade log.



6. A window pops-up to display that the software upgrade is successful.



7. After the software upgrade, the device is rebooted automatically and it is disconnected from the application.

Help menu

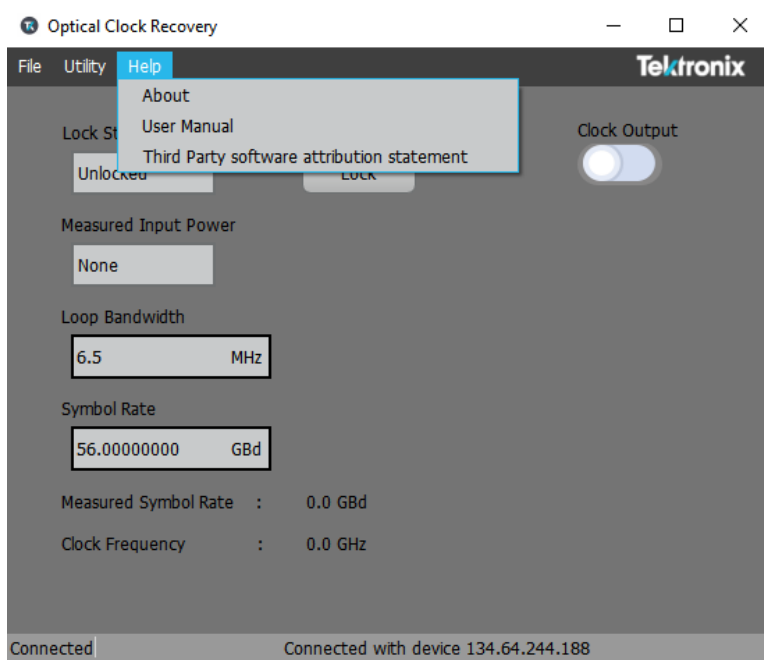



Table 7: Help menu controls

Control	Description
About	Select to view the software, firmware, and other version details. 
User Manual	Select to launch this OCR application Help document.
Third Party software attribution statement	Select to view the copyright information and third party software license details.

Remote control commands



Note:

For this product, the PI is setup on port 4000. So they need to set up their Visa controller to communicate on a socket on port 4000.

Abbreviating: Commands are generally presented in two different forms, long and short.

Concatenating: Command concatenation is not allowed.

Terminating: All commands sent to the unit must be terminated with a LF character: • \n, ASCII(10).

All PI commands have been divided into sections based on what commands can be used in what locking state. Some commands can only be used while locked, and some only while unlocked.

Lock state: All (unless noted)

Query: ALL commands have been setup as a query. If you send a standard query command, like *IDN? you will receive the requested information on the return. If you send a non standard query command that is just a write, like "CREC:ACQL" you will get a return when the task has been completed, typically in the form of "Written Successfully".

Identification

Gets the instrument information (Query only).

Group

Lock State: All (unless noted)

Syntax

*IDN?

Return

<Manufacturer>, <Model>, <Serial Number>, <FW version(s)>

Get Serial Number

Gets the serial number of unit (Query only).

Group

Lock State: All (unless noted)

Syntax

CREC:SNUM? or CRECcovery:SNUMBER?

Return

String of characters

Example

CREC : SNUM? returns the serial number of unit B010101.

Get FW Version

Gets the firmware version of FPGA, MCU, SOM Uboot, Som Linux, and SOM Application (Query only).

Group

Lock State: All (unless noted)

Syntax

`CREC:FWVER?` or `CREcovery:FirmWareVERsion?`

Return

String of characters and numbers.

Stop Locking

Set the locking process of the device (Query only). This command is allowed only when the device is LOCKED or LOCKING.

Group

Lock State: All (unless noted)

Syntax

`CREC:ENDL` or `CREcovery:ENDLock`

Return

Written state (Success or Error)

Get Lock Status

Queries the lock status of the device (Query only).

Group

Lock State: All (unless noted)

Syntax

`CREC:LST?` or `CREcovery:LState?`

Return

Lock state {Locked / Unlocked / Locking / Lost Lock}

Relock

Initiates the relock function of the device (Query only).

Group

Lock State: All (unless noted)

Syntax

`CREC:RELOCK`

Return

Written state (Success or Error)

Get Autorelock State

Queries the Autorelock state of the device (Query only).

Group

Lock State: All (unless noted)

Syntax

```
CREC:AUTOARELOCK? or CRECcovery:AUTOARELOCK?
```

Return

Autorelock Enabled or Disabled

Set Autorelock On or Off

Sets on or off autorelock functionality (Query only). Autorelock will allow user to remove a source while locked, and then replace the source while the CR quickly relocks.

Group

Lock State: All (unless noted)

Syntax

```
CREC:AUTOARELOCK "<value>" or CRECcovery:AUTOARELOCK "<value>"
```

Arguments

<value>: {ON / OFF}

Return

Written state (Success or Error)

Example

```
CREC:AUTOARELOCK "ON"
```

Check Error Status

Queries the error status (Query only). If error status query is sent, it returns the most recent error. If error status query is sent again it returns the previous one, until the queue of error messages is clear.

Group

Lock State: All (unless noted)

Syntax

```
CREC:ERRSTAT? or CRECcovery:ERRorSTATUS?
```

Return

Error state of unit (No error, range limit error, data rate mismatch error, etc.)

Get Data Rate

Queries the configured data rate (Query only).

Group

Lock State: All (unless noted)

Syntax

```
CREC:DRATE? or CRECovery:DataRATE?
```

Return

Data rate in GBd

Set Loop Bandwidth

Sets the loop bandwidth in MHz (Query only).

Group

Lock State: All (unless noted)

Syntax

```
CREC:LBW "<value>" or CRECovery:LoopBandWidth "<value>"
```

Arguments

<Value> = 0.2 to 10

Example

```
CREC:LBW "6.5"
```

Return

Written state (Success or Error)

Condition

Loop bandwidth command is enabled in CSV / User mode only.

Use-case scenario: If set loop bandwidth command is given in Unlocked state it updates the variable and in locking process the respective loop bandwidth is written.

Get Loop Bandwidth

Gets user provided loop bandwidth (Query only).

Group

Lock State: All (unless noted)

Syntax

```
CREC:LBW? or CRECovery:LoopBandWidth?
```

Return

Loop bandwidth value in MHz

Get Calibration Date

Queries the calibration date from the loop bandwidth and clock output tables CSV file (parsing from date column) (Query only).

Group

Lock State: All (unless noted)

Syntax

CREC:CALIBDATE? or CREcovery:CALIBrationDATE?

Return

Returns calibration date in mm/dd/yyyy format for both loop bandwidth and clock output tables.

Get Output State

Queries the state of output clock (Query only).

Group

Lock State: All (unless noted)

Syntax

CREC:OUTCLK? or CREcovery:OUTputCLocK?

Return

Output state (ON / OFF)

Lock State: LOCKED



Note: If the instrument is in Locking or Unlocked state, command is not accepted by the instrument and 'Invalid access' error will be returned by the application.

Get Meas Data Rate

Queries the measured data rate of the device (Query only).

Group

Lock State: LOCKED

Syntax

`CREC:MDRATE?` or `CRECcovery:MeasureDRATE?`

Return

Data rate in GBd

Get Output CLK Freq

Queries the output clock frequency of the device (Query only).

Group

Lock State: LOCKED

Syntax

`CREC:OUTFREQ?` or `CRECcovery:OUTputFREQuency?`

Return

Clock frequency in GHz

Set Output State, ON or OFF

Sets the output state as ON or OFF for the CLK outputs of the device (Query only).

Group

Lock State: LOCKED

Syntax

`CREC:OUTCLK "<value>"` or `CRECcovery:OUTputCLocK "<value>"`

Arguments

`<Value> = {ON / OFF / 0 / 1}`

Example

`CREC:OUTCLK "ON"`

Return

Written state (Success or Error)

Get Optical PWR Status

Returns Optical power status (Query only).

Group

Lock State: LOCKED

Syntax

CREC:OPTPWRSTAT? or CREcovery:OPTicalPoWeRSTATus?

Return

Level (Low, Medium or High similar to the GUI.)

Lock State: Unlocked



Note: If the instrument is in Locking or Locked state, command is not accepted by instrument and "Invalid access" error will be returned by the application.

Set Data Rate

Sets the data rate in GBd (Query only).

Group

Lock State: UNLOCKED

Syntax

CREC:DRATE "<value>" or CRECcovery:DataRATE "<value>"

Arguments

<Value> = 51 to 64 GBd

Example

CREC:DRATE "55"

Return

Written state (Success or Range limit error)

Start Locking

Initializes the locking process (Query only). This command is allowed only when the device is UNLOCKED.

Group

Lock State: UNLOCKED

Syntax

CREC:ACQL or CRECcovery:ACquireLock

Condition

Acquire lock command is accepted only when there is no error state.

Use-case scenario I: If "No Lock" occurs due to Symbol rate mismatch. The error state need to be cleared by giving end process command CREC:ENDL and again can start locking(CREC:ACQL).

Use-case scenario II: When the input of Data Rate is not in valid range CREC:ACQL command is not accepted. Clear the range error by changing the value within limits and give CREC:ACQL or give ENDL and ACQL to start lock with default values again.

Use-case scenario III: Giving ACQL without ending process will not be accepted. Giving continuous ACQL command will be ignored.

Related commands

CREC:ENDL

Return

Written state (Success or Error)

Acquiring Lock process is stopped only when CREC:ENDL (End the process) command is used.

Reset

Resets the device settings to factory default values (Query only).

Group

Lock State: UNLOCKED

Syntax

CREC : RESET

Return

Written state (Success or Error)