

# **EEPROM Command Center**

## **Application User Manual v1.0**

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## 1 Introduction

EEPROM Command Center (ECC) is a client software application which allows the user to:

- Monitor the state of QSFP EEPROM
- Write to writable fields of the QSFP Memory Map
- Save statistics and parsed memory map fields to file

The monitoring capabilities of ECC are useful for detecting changes to the Memory Map of a QSFP Device Under Test (DUT) while performing external testing (such as InfiniBand ATD testing) while the write capabilities allow configuring the QSFP device via its memory map.

EEPROM Command Center utilizes Total Phase, Inc. [Aardvark I<sup>2</sup>C/SPI Host Adapters](#) in order to interface with an I<sup>2</sup>C Module Control Board (MCB) in order to read/write with a QSFP device.

This software comes bundled with the necessary library files to interface with the Aardvark API in agreement with Total Phase, Inc. (see accompanying license documentation), however, Total Phase, Inc. is in no way affiliated with Software Forge, Inc. or EEPROM Command Center.

## 2 System Requirements

Operating Systems	<ul style="list-style-type: none"> <li>• Windows Vista or higher</li> <li>• Linux</li> </ul>
Architecture	32 bit or 64 bit
CPU	2+ Core @ 1.8 GHz or higher
Memory	4 GB or more
Additional Hardware	<ul style="list-style-type: none"> <li>• (2) Aardvark Host Adapters</li> <li>• (2) QSFP I<sup>2</sup>C Module Control Boards</li> </ul>
Additional Software	<ul style="list-style-type: none"> <li>• Aardvark driver (see section Aardvark Driver for additional information)</li> </ul>

## 3 Installation

### 3.1 Windows

Obtain the correct installer file for your CPU architecture (32-bit or 64-bit) and run the installer on the machine where ECC should be installed as administrator. Follow the on-screen instructions to complete the installation procedure.

### 3.2 Linux

Linux installers are available for Debian-based and RPM-based distributions. Obtain the correct installer file for your distribution and CPU architecture (32-bit or 64-bit) and run the installer on the machine where ECC should be installed as root. For GUI-based installers, follow the on-screen instructions to complete the installation procedure.

### 3.3 Aardvark Driver

ECC is bundled with the necessary Aardvark library files but additional setup is necessary for enabling driver support for the Aardvark Host Adapters.

#### 3.3.1 Windows

Total Phase has a custom USB driver for Windows which can be downloaded from their [website](#). See the [Aardvark User Manual](#) for additional driver installation instructions.

#### 3.3.2 Linux

The Aardvarks run on a modified version of the libusb open source library. A one-time configuration is needed in order for the driver to function correctly for the Aardvark devices. The necessary configuration files can be downloaded from the [Total Phase website](#). Then, perform the following steps:

1. Move the `99-totalphase.rules` configuration file to `/etc/udev/rules.d`.
2. Run command `chmod 644 /etc/udev/rules.d/99-totalphase.rules`.
3. Unplug and replug any Aardvark adapters which were connected to the host machine.

For more information about the Aardvark drivers and their setup, see the [Aardvark User Manual](#).

## 4 Hardware Configuration

The host machine running the EEPROM Command Center software must be connected to two Aardvark Host Adapters via USB connection in order to be able to interface with both ends of a QSFP cable. Each Aardvark must then be connected to an individual I<sup>2</sup>C MCB via the Aardvark pinout connectors. Only the Ground (GND), Serial Clock Line (SCL), and Serial Data Line (SDA) connectors need to be connected to the MCB in order to enable I<sup>2</sup>C communications. See the Aardvark User Manual for more information about the Aardvark Host Adapters. Each end of the QSFP cable is then connected to an MCB. This setup is illustrated in Figure 1.

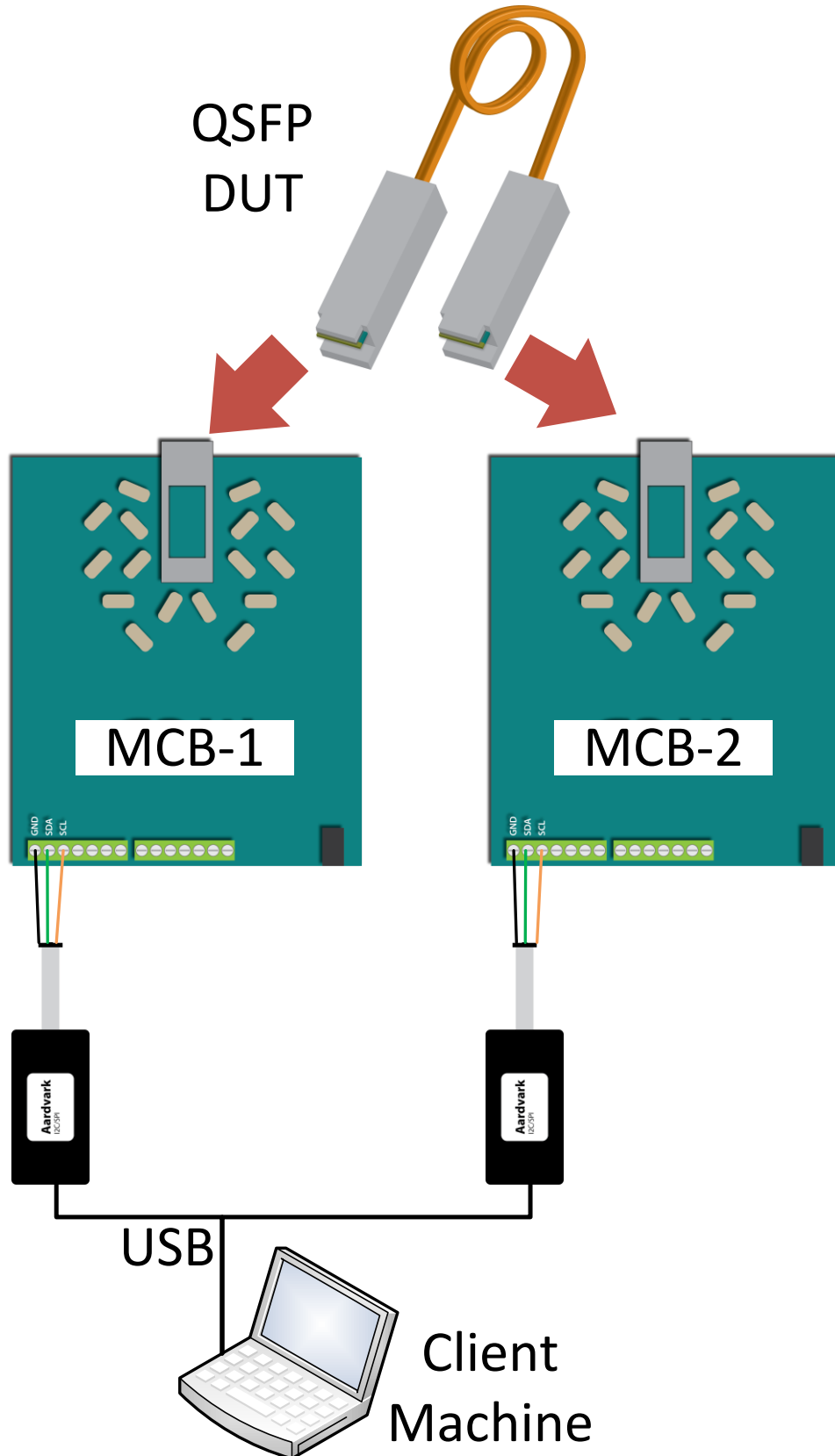


Figure 1 - ECC hardware setup

## 5 Licensing

EEPROM Command Center uses node-locked, expiring licenses. The application will not function without a license. When loading the application for the first time or any subsequent time without loading a license, you will be presented with the error dialog shown in Figure 4. Clicking OK will load the GUI but the main display will be disabled.

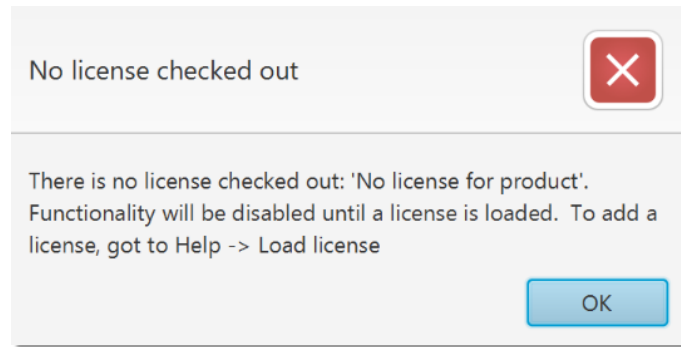


Figure 2 - ECC license error dialog

Licenses can be obtained from Software Forge, Inc.

### 5.1 License Loading

In order to load a license:

1. In the ECC GUI, select Help → Load license.
2. Perform one of the following in the license load dialog:
  - a. Drag your license file from your operating system's file explorer to the license entry area in the ECC window
  - b. Open your license file in a text editor, copy **all** of the text in the file, then paste it into the license entry area in the ECC window
3. Click Apply then OK or just OK to automatically apply

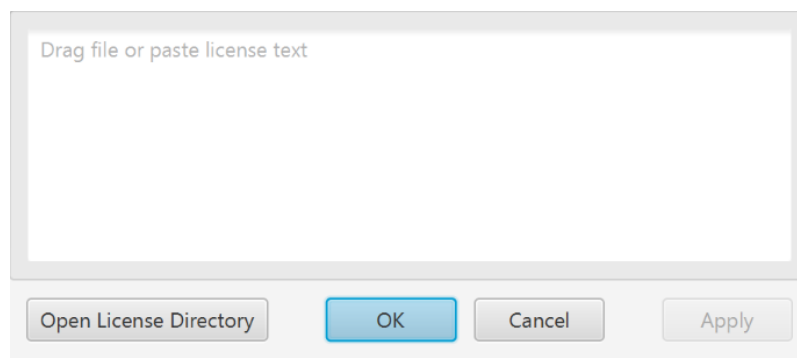


Figure 3 – ECC license load window

If license loading was successful, the main ECC window will now be enabled and you will have full access to the application's capabilities. If license loading failed, contact support at Software Forge.

## 6 Application Overview

Figure 4 shows the initial ECC window if license loading was successful.

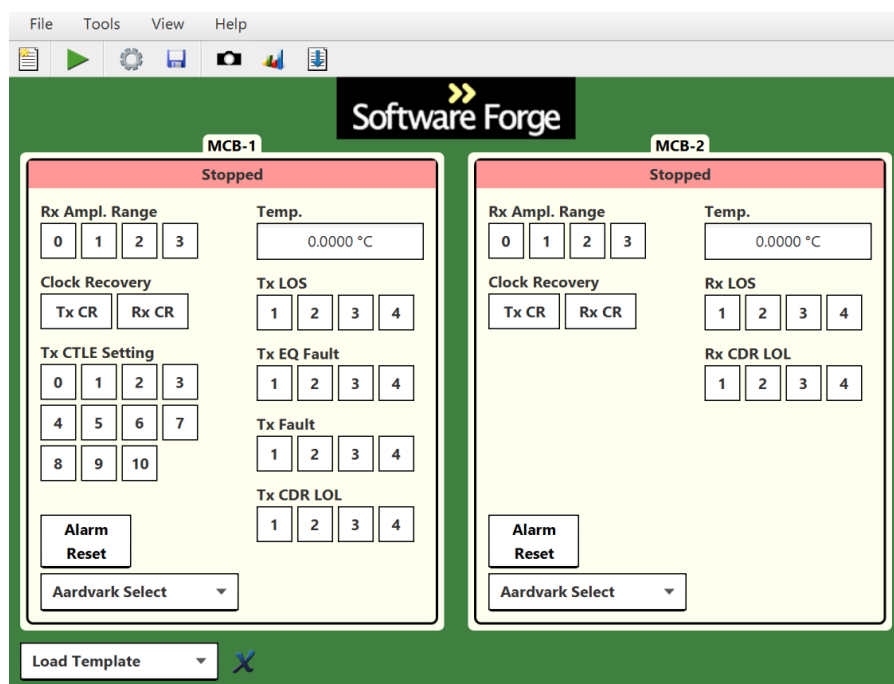


Figure 4 - ECC initial window

### 6.1 Menus

#### 6.1.1 File Menu

Menu Item	Description
New Test	Creates a new test. See section Tests.
Save Snapshot	Saves an image snapshot of the main display.
Save Results	Save a summary of results from the cable. See section Results.
Save Log	Save the log for the current test.
Save Settings	Save settings. See section Settings.
Save Settings As	Save the settings to a new file.
Open Settings	Open a previously saved settings file.
Exit	Closes the application

#### 6.1.2 Tools Menu

Menu Item	Description
Resume	Resumes/starts read execution. This item will only be visible while execution is stopped or paused.
Pause	Pauses read execution. This item will only be visible while execution is running.
Settings	Opens the settings window. See section Settings.









### 6.1.3 View Menu

Menu Item	Description
Open Log Window	Opens the log window to display the current log.

### 6.1.4 Help Menu

Menu Item	Description
Load License	Load a license to enable application functionality. See section License Loading.
Open User Manual	Opens this user manual in the system default PDF viewer.
About	Opens the About window to display application information.

## 6.2 Button Toolbar

Image	Action	Description
	New Test	Creates a new test. See section Tests.
	Resume	Resumes/starts read execution. This button will only be visible while execution is stopped or paused.
	Pause	Pauses read execution. This item will only be visible while execution is running.
	Settings	Opens the settings window. See section Settings.
	Save Settings	Save settings. See section Settings.
	Save Snapshot	Saves an image snapshot of the main display.
	Save Results	Save a summary of results from the cable. See section Results.
	Save Log	Save the log for the current test.



## 6.3 MCB Display

The MCB display is the bulk of ECC. It contains a display and controls for each of the MCBs controlled by ECC as well as a Load Template dropdown control.

MCB-1 is associated with the transmission (TX) side for ATD testing and so contains indicators relevant to transmission of data. Conversely, MCB-2 is associated with the receiving (RX) side for ATD testing and so contains indicators relevant to reception of data.

The top of each MCB display contains a color-coded status for that MCB's execution. Each MCB starts in the stopped state and each are controlled by the same execution controls. See section Read Execution for more information on execution.

Status indicators are only updated when reading the memory map of the device and so they always represent the current state of the memory map. A field is never updated at any other time or for any other reason (including writeable indicators).

### 6.3.1 Writeable Fields

The left column of each MCB display contains writable controls which will write the displayed value to the associated field of the memory map when clicked. The current value will be displayed as green when read execution is enabled (see section Read Execution). After writing to the memory map, the value of the indicator should change to the written value after the next read of the memory map. If it does not, check the log for errors.

### 6.3.2 Read-only Fields

The right column of each MCB contains read-only displays of the memory maps. These displays are here for monitoring purposes only. The temperature field displays the current temperature of the QSFP device as reported in its memory map. Each status indicator displays the state of the associated interrupt flag. As opposed to the write fields, the numbers in these indicators represent different channels and so each indicator represents a different bit in the memory map. The status indicators are color coded according to Table 1.

Table 1 - Interrupt flag status indicator colors/status.

Color	Alarm State	Description
Green	Cleared	The interrupt flag is not currently set (i.e. it is cleared to 0) and has not been set since the start of read execution.
Red	Set	The interrupt flag is currently set.
Yellow	Previously Set	The interrupt flag is not currently set, however, it was set at some point since the start of read execution. This state is necessary since the behavior for QSFP device is that they will clear an interrupt flag after it is read. Since ECC is constantly reading all of the interrupt flags, the flags are constantly being cleared and so it would be easy to miss that a flag was set on the display without this state.

### 6.3.3 Additional Controls

The MCB display also contains the following additional controls:

#### 6.3.3.1 Alarm Reset

This button resets the interrupt flag alarm state (see section Read-only Fields). This has the effect of forgetting the “Previously Set” state of all interrupt flag status indicators. After the next read of the memory maps, no interrupt flag will be displayed as yellow; all interrupt flags will be displayed as either green or red depending on the values read from the memory map. However, it will be possible for the “Previously Set” state to be set again in the future.

#### 6.3.3.2 Aardvark Select

This dropdown menu will automatically be populated with all Aardvarks connected to the system running ECC. Each Aardvark is identified by its serial number which is usually located under the bar code label of on the physical adapter. Selecting an Aardvark device from the dropdown will select which Aardvark is used by that MCB display. The Aardvarks will be re-discovered every time one of the dropdowns is clicked and so changes to which Aardvarks are connected to the system will be detected.

#### 6.3.3.3 Templates

This dropdown menu contains pre-configured templates which represent configurations for the memory maps of both QSFP devices. Selecting one of these templates will write to the memory maps of both QSFP devices as follows:

- *All Zero*: Writes zero to the following fields for both QSFP devices:
  - RX Amplitude Control
  - Clock Recovery
  - TX CTLE
- *Semi-Retimed*: Sets the cable to semi-retimed
  - RX Amplitude Control is cleared to zero for both MCBs
  - Clock Recovery is cleared to 0 for MCB-2 and TX CR is set for MCB-1
  - TX CTLE is unchanged
- *Fully-Retimed*: Sets the cable to fully-retimed
  - RX Amplitude Control is cleared to zero for both MCBs
  - RX CR is set for MCB-2 and TX CR is set for MCB-1
  - TX CTLE is unchanged

The X button next to the template dropdown is used to clear the template selection. This merely clears the selection and does not write anything to the devices. This is useful if you select a template and then change the configuration with the writeable controls and then would like to configure back to the selected template.

## 7 Tests

Tests in ECC represent a test run with a single DUT. A single set of results and a log are associated with a test. A new test will automatically be created when first opening the application and can be done manually at any time by pressing the New Test menu item or button on the toolbar. Creating a new test will create a new log and will reset all results. Without creating a new test between DUTs, the results and log will contain data for multiple devices and so it is important to always create a new test when switching devices or test scenarios.

## 8 Read Execution

Read execution is the process of performing consecutive reads of the memory maps of the connected devices through the Aardvark adapters. When ECC is initially started, read execution is in the stopped state and no monitoring of the devices will be enabled. Additionally, write controls will not be enabled while read execution is stopped.

In order to start read execution, press the Resume menu item or button on the toolbar. This will not be possible without first selecting an Aardvark device for each MCB in the associated Aardvark Select dropdown menu. Once read execution has started, both MCB status indicators should display “Running” and the memory map status indicators should display the current state read from the memory map.

By default, reads will be done as fast as possible only limited by the amount of time it takes to perform a read through the Aardvark adapters. A delay can be added between each read by setting the read delay in the settings menu (see section Settings).

## 9 Settings

The settings window can be opened via the Tools → Settings menu item or the Settings button on the toolbar. The settings menu is shown in Figure 5. The settings shown in Table 2 can be configured in this menu.

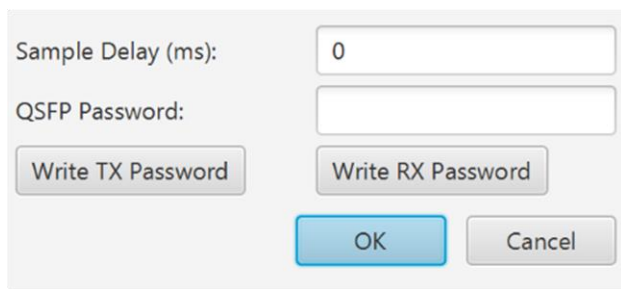


Figure 5 - ECC settings window

Table 2 - Configurable settings

Setting	Description
<b>Sample Delay</b>	The delay between read execution samples. The default is 0 which is no delay between reads (reads as fast as possible). The units are in milliseconds.
<b>QSFP Password</b>	The password to write to the QSFP memory map password entry field. The Write TX Password button will write this value to the QSFP device connected to MCB-1 and the Write RX Password button will write the same value to the QSFP device connected to MCB-2. Entering the password should not be necessary for normal functionality of the application.

Pressing the OK button in the settings window will apply the settings if any were changed. The cancel button will cancel any changes (any writes to the memory map are still performed but the password will not be preserved).

The settings can then be saved to file in order to be loaded on a subsequent application launch via the File → Save Settings or File → Save Settings As menu items or the Save Settings button on the toolbar. When ECC is launched, it will automatically load the last saved settings file. Additionally, a specific settings file can be loaded via the File → Load Settings menu item.

## 10 Results

Results from a DUT as well as statistics gathered during a test can be saved to file using the File → Save Results menu item or the Save Results button on the toolbar. Results can currently be saved to HTML or XML file formats. Results contain the information listed in Table 3.

Table 3 - Result contents

Field	Description
<b>Vendor Data</b>	Data about the vendor of the cable. This is gathered from the memory map.
<b>User Data</b>	Data about the user of ECC. This is gathered from the OS.
<b>Device Data</b>	Data about the device. This includes the serial number and device capabilities gathered from the memory map.
<b>Statistics</b>	These are statistics gathered by ECC during the course of a test.
<b>Map Dumps</b>	<p>These are dumps of the complete memory map in both byte format and parsed field format. There are 4 different dumps in this section:</p> <ul style="list-style-type: none"> <li>• <i>TX initial map</i> <ul style="list-style-type: none"> <li>○ The map read at the start of the test for the QSFP device connected to MCB-1.</li> </ul> </li> <li>• <i>TX ending map</i> <ul style="list-style-type: none"> <li>○ The map read at the end of the test (just before results are saved) for the QSFP device connected to MCB-1.</li> </ul> </li> <li>• <i>RX initial map</i> <ul style="list-style-type: none"> <li>○ The map read at the start of the test for the QSFP device connected to MCB-2.</li> </ul> </li> <li>• <i>RX ending map</i> <ul style="list-style-type: none"> <li>○ The map read at the end of the test (just before results are saved) for the QSFP device connected to MCB-2.</li> </ul> </li> </ul>

Results are cleared whenever a new test is created. See section Tests for more details.

## 11 Known Issues

The following are known issues of ECC:

- If the Aardvark Select dropdown shows Aardvark serial numbers that do not match the connected Aardvarks, disconnect and reconnect the Aardvark USB cables. This appears to be a rare issue with the Aardvark API/Driver.