

# **M21125/M21115 Evaluation Module**

## **User Guide**

## Revision History

Revision	Date	Description
B	July 2013	Updated High Speed output settings, <a href="#">Table 2-3</a> Added Software Operation, <a href="#">Chapter 3</a>
A	February 2009	Initial release



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# 1.0 Introduction

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This user guide describes how to use the M21125/M21115 evaluation module (EVM). The M21125 is a 40 input by 40 output crosspoint switch and the M21115 is a 20 input by 20 output crosspoint switch rated to operate up to 3.8 Gbps. The EVM is a demonstration and test platform that enables system developers and product designers to quickly evaluate the functionality and performance of the M21125 and M21115.

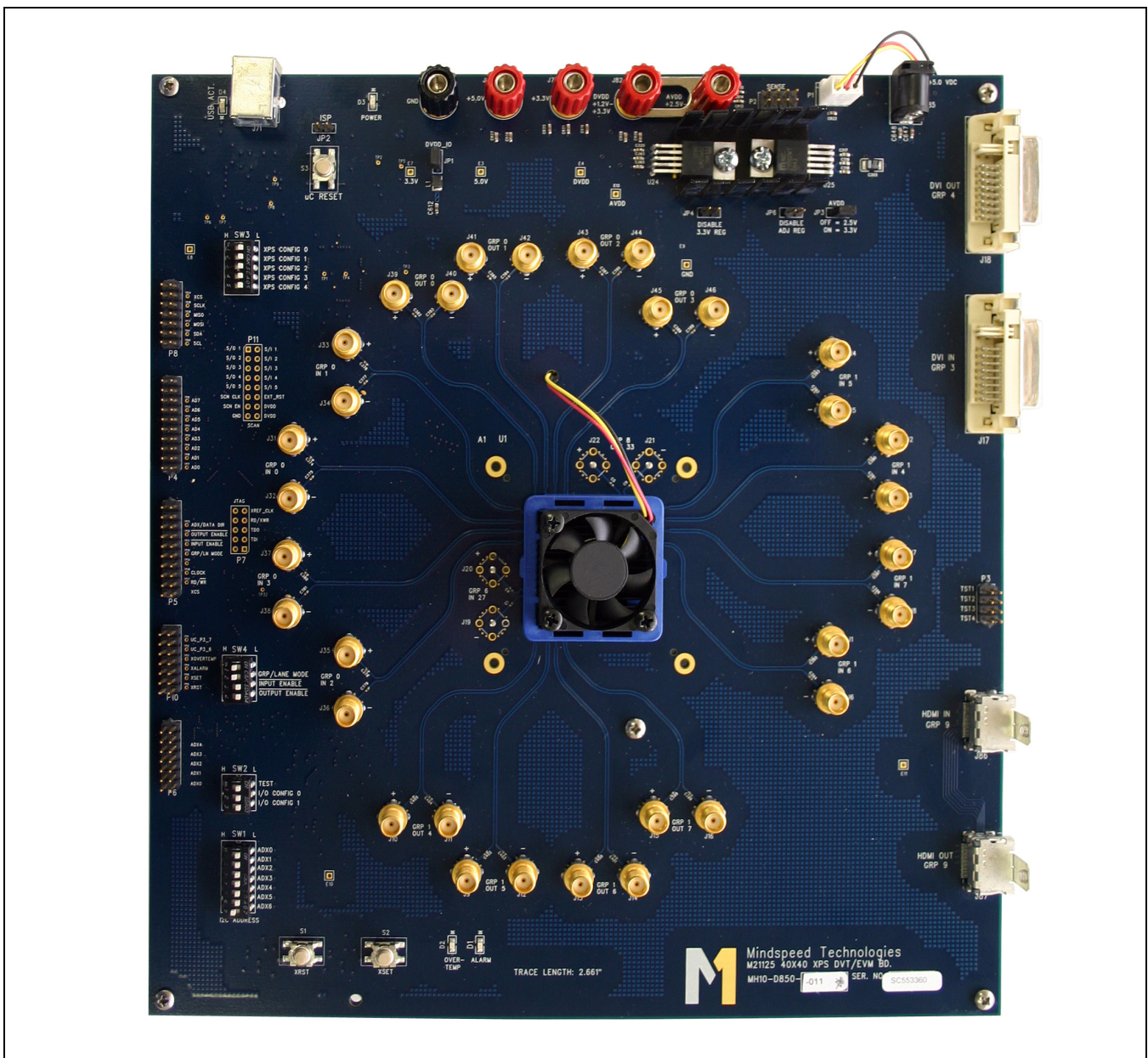
The EVM is a single PC board that provides access to 16 lanes of the crosspoint switch (XPTS). One group of four lanes is accessed via HDMI connectors, another group of four lanes is accessed via DVI connectors, and the remaining two groups of four lanes are accessed via SMA connectors. The HDMI and DVI connectors are DC-coupled to allow for direct connection to cables interfaced to TMDS sources and sinks. The SMA connectors are AC-coupled to enable connections to laboratory test equipment such as generators and analyzers. The EVM is powered utilizing the supplied AC adapter, and controlled with on-board DIP switches. Note that when the EVM is populated with a M21115 component, the HDMI connectors cannot be used.



## 2.0 Quick Start Guide

The EVM is ready to use out of the box. Please refer to [Figure 2-1](#) for the location of the various connectors.

**Figure 2-1.** M21125/M21115 Evaluation Module



1. Connect the supplied AC adapter to connector J85 (+5.0 VDC).
2. For HDMI evaluations, attach an HDMI cable from the source to the connector labeled HDMI IN (J86) and an HDMI cable from the sink to the connector labeled HDMI OUT (J87). Note that when the EVM is populated with a M21115 component, the HDMI connectors cannot be used.
3. For DVI evaluations, attach a DVI cable from the source to the connector labeled DVI IN (J17) and a DVI cable from the sink to the connector labeled DVI OUT (J18).
4. In addition, the SMA connectors can be used for an AC-coupled interface to test equipment. Signal generators should be connected to the EVM by securing 50Ω cables to the SMA connectors labeled IN[7:0], and signal analyzers should be connected to the EVM by securing 50Ω cables to the SMA connectors labeled OUT[7:0]. Note that the EVM is pre-configured for pass-through mode, routing GRP0 IN0 to GRP0 OUT0, GRP0 IN1 to GRP0 OUT1, ... , GRP1 IN7 to GRP1 OUT7.
5. The crosspoint switch state can be altered utilizing DIP switches XPS CONFIG[1:0] located at SW3, as shown in [Table 2-1](#). The EVM has been pre-configured for the group switch mode, where groups of four lanes are switched at a time. Group 0 consists of inputs/outputs [3:0] and group 1 consists of inputs/outputs [7:4]. See [Table 2-2](#) for the input/output mapping for two of the switch states. After the DIP switches have been reconfigured it is necessary to push the button labeled uC RESET located at S3; see [Figure 2-2](#).

**Table 2-1. Crosspoint Switch State Configuration**

XPS CONFIG[1:0]	Input	Output
LL	GRP0	GRP0
	GRP1	GRP1
	HDMI	HDMI
	DVI	DVI
LH	GRP0	GRP1
	GRP1	GRP0
	HDMI	DVI
	DVI	HDMI
HL	GRP0	HDMI
	GRP1	DVI
	HDMI	GRP0
	DVI	GRP1
HH	GRP0	DVI
	GRP1	HDMI
	HDMI	GRP1
	DVI	GRP0

**Table 2-2. Input/Output Mapping Examples**

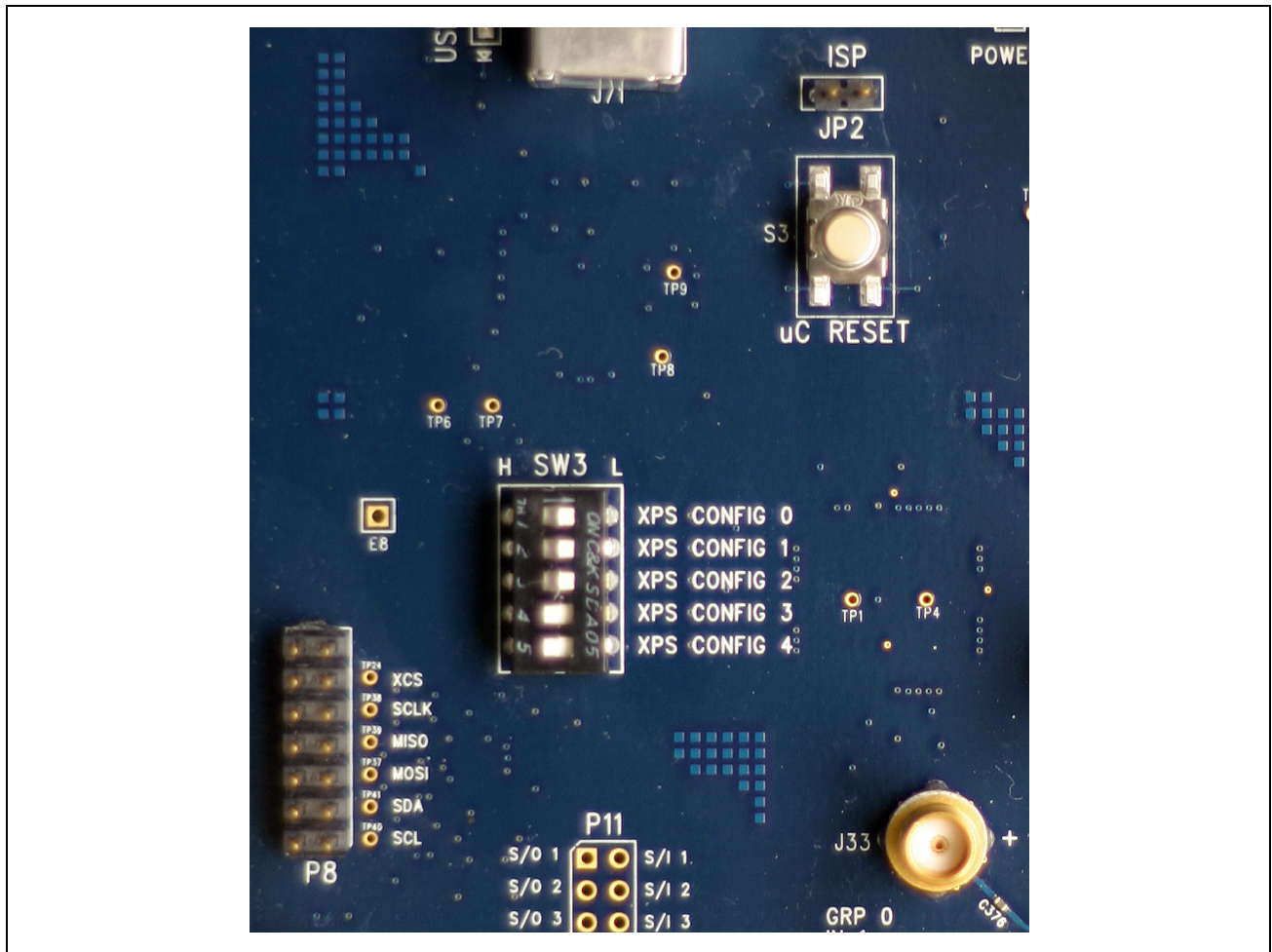
XPS CONFIG[1:0]	Input	Output
LL	IN0	OUT0
	IN1	OUT1
	IN2	OUT2
	IN3	OUT3
	IN4	OUT4
	IN5	OUT5
	IN6	OUT6
	IN7	OUT7
LH	IN0	OUT4
	IN1	OUT5
	IN2	OUT6
	IN3	OUT7
	IN4	OUT0
	IN5	OUT1
	IN6	OUT2
	IN7	OUT3

- Signal conditioning settings such as input equalization (IE) and output de-emphasis (DE) can be configured utilizing DIP switches XPS CONFIG[4:2] located at SW3, as shown in Table 2-3. The EVM has been pre-configured for the DIP switch setting XPS CONFIG[4:2] = HLH. After the DIP switches have been reconfigured it is necessary to push the button labeled uC RESET located at S3; see Figure 2-2.

**Table 2-3. Input Equalization and Output De-Emphasis Configuration**

XPS CONFIG[4:2]	IE Level	DE Level	Output Swing
LLL	Disabled	Low	1000 mVppd
LLH	Disabled	Medium	1000 mVppd
LHL	Disabled	High	1000 mVppd
LHH	Low	Low	1000 mVppd
HLL	Medium	Low	1000 mVppd
HLH	High	Low	1000 mVppd
HHL	High	High	1000 mVppd
HHH	High	High	1400 mVppd

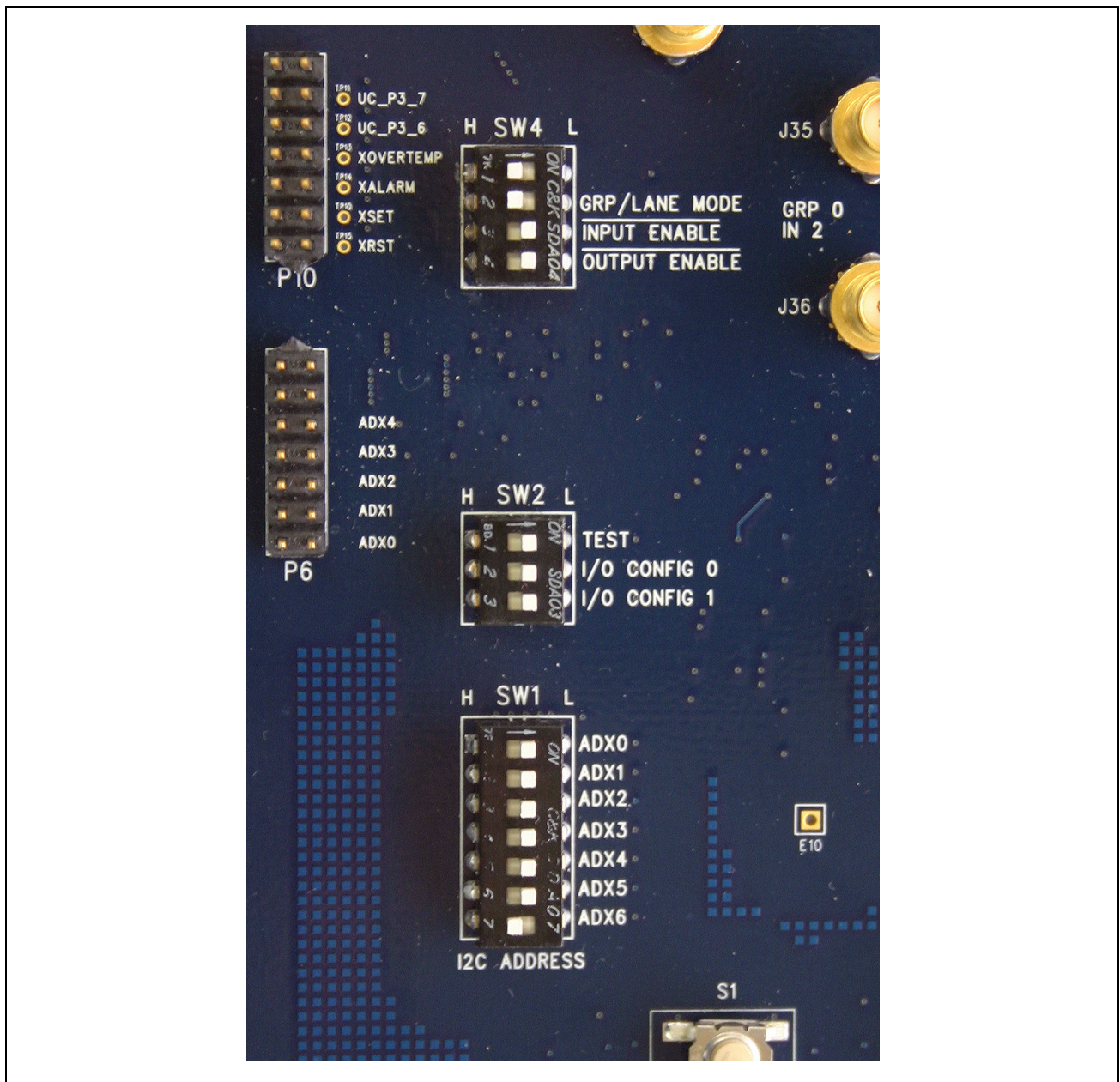
**Figure 2-2. Location of DIP Switch Bank SW3 and Button S3**





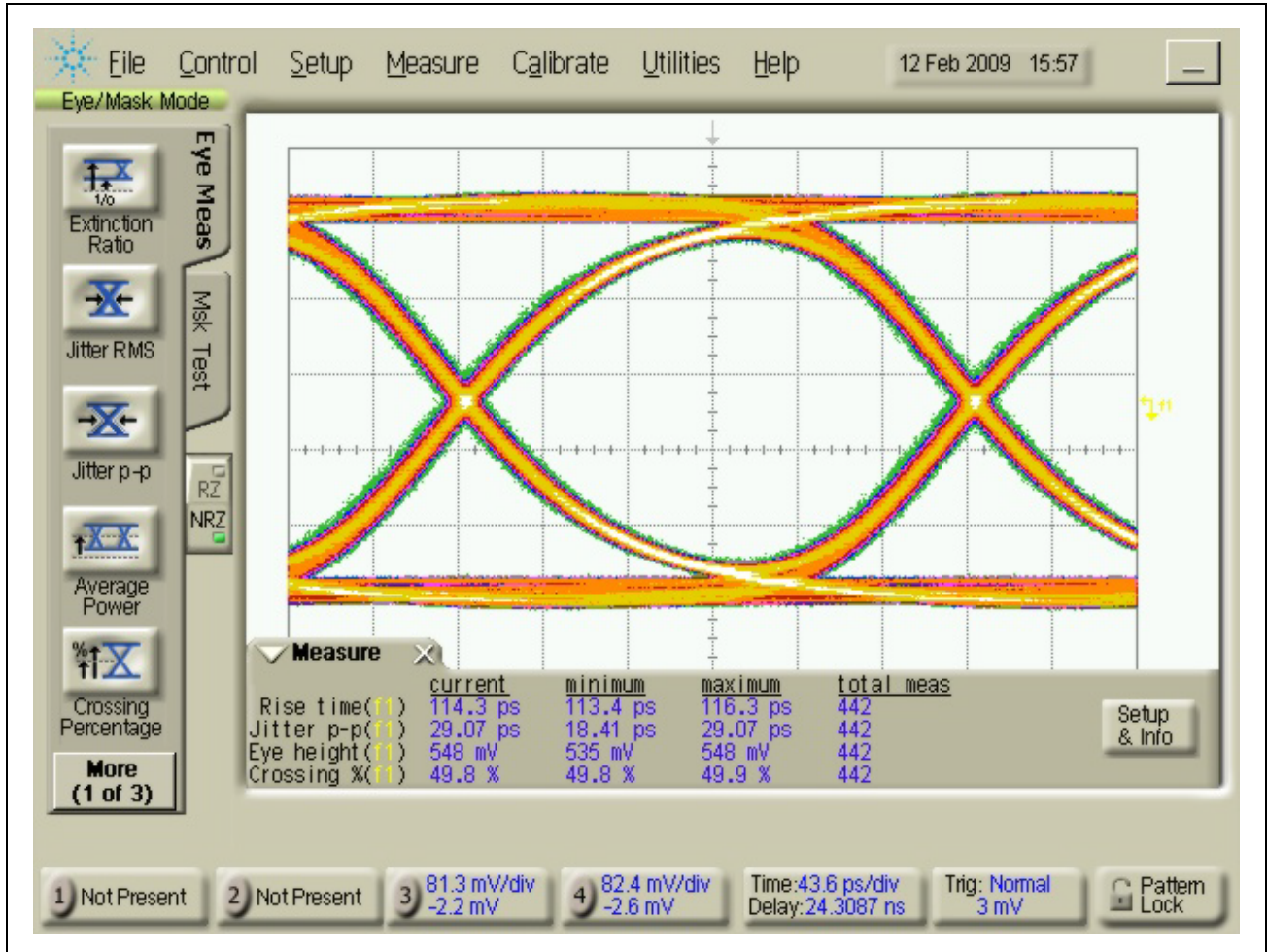
7. Verify the settings of the following DIP switches located at SW4 and SW2. [Figure 2-3](#) shows the location of these DIP switches.
  - a. GRP/LANE MODE = H
  - b. INPUT ENABLE = L
  - c. OUTPUT ENABLE = L
  - d. TEST = L
  - e. I/O CONFIG0 = L
  - f. I/O CONFIG1 = L

**Figure 2-3. Location of DIP Switch Banks SW4 and SW2**



8. Perform the desired electrical evaluations. Figure 2-4 shows a typical eye diagram.

**Figure 2-4. Typical Data Output Eye Diagram at 3.8 Gbps**





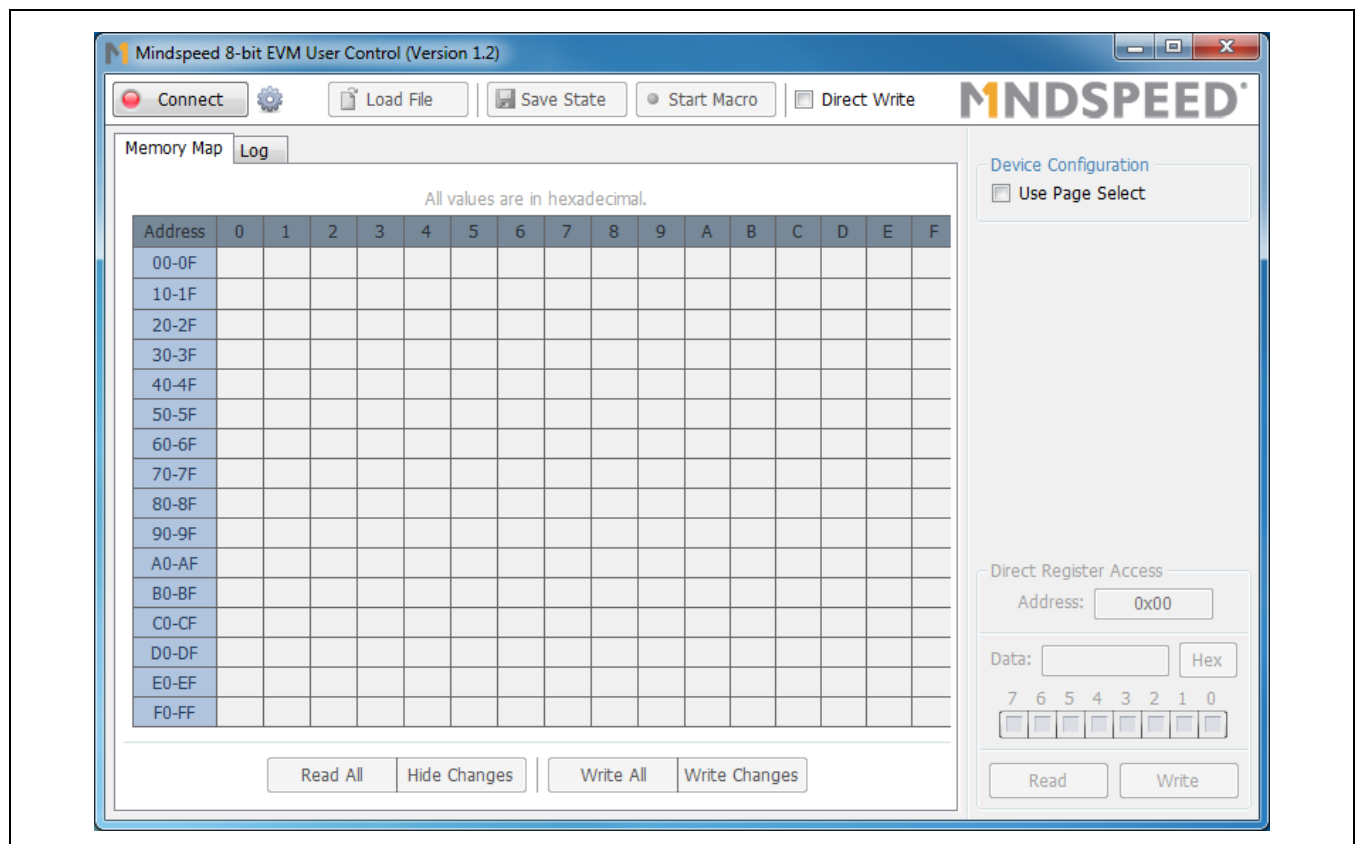
## 3.0 Software Operation

### 3.1 Software Setup

Before using the EVM, install the control software on the host PC.

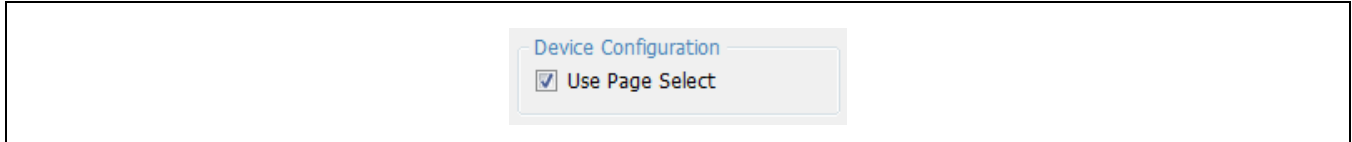
1. Insert the EVM CD or USB flash drive into the computer that will be used as the controller for the EVM. Locate the “\Software\Mindspeed 8-bit EVM Setup vX.X” folder and launch **Setup.exe** to install the software. Please note that Windows XP Service Pack 2 is the minimum system requirement for this software.
2. Connect a USB cable to the EVM and the PC. When the USB cable is connected, a new hardware found window may pop up and install the USB driver. Allow this process to complete before proceeding.
3. Launch the Mindspeed 8-bit EVM User Control software by going to Start > All Programs > Mindspeed Technologies.

**Figure 3-5. Mindspeed EVM Software (before connection)**



4. Once the software is running, set the “Use Page Select” setting to *checked*.

**Figure 3-6. Use Page Select Setting**



5. Next, click the “Connect” button in the top-left corner of the screen. Most settings will be auto-detected, but you will be prompted if additional information is required (see [Section 3.2.1](#)).
6. Once connected, it is generally a good practice to reset the device using the supplied configuration file (see [Section 3.2.2](#)).

## 3.2 Software Operation

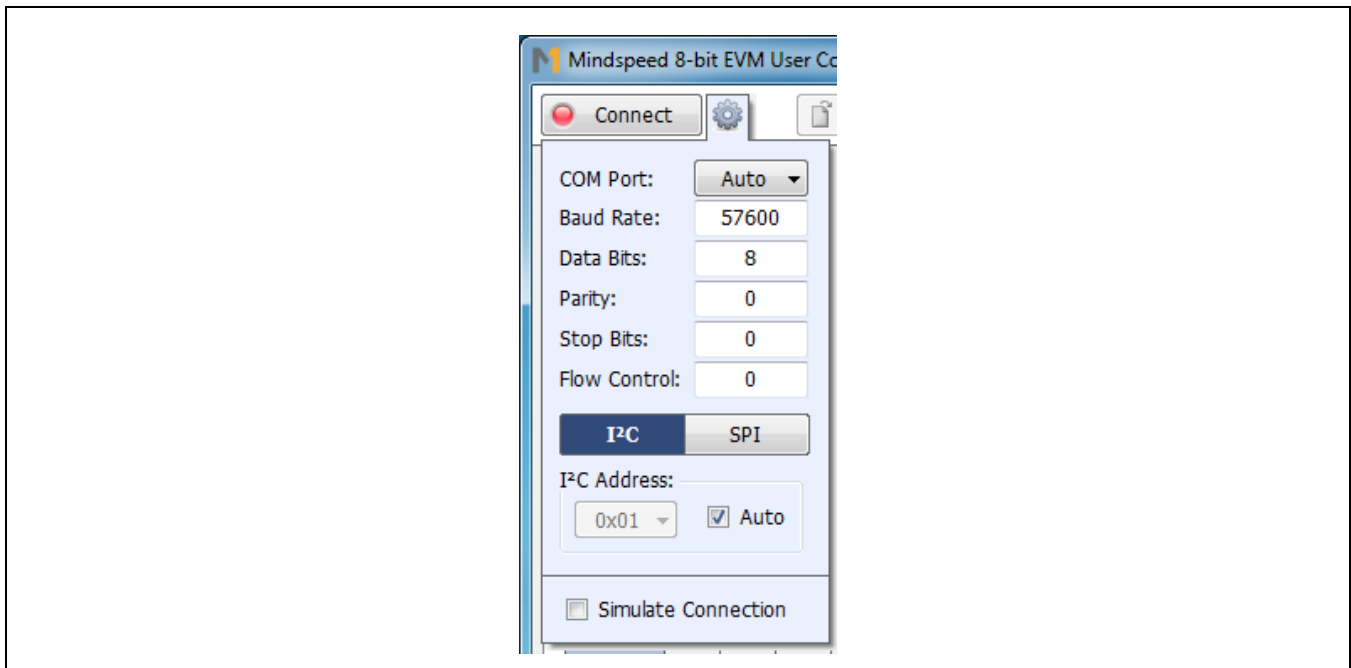
### 3.2.1 Connection Settings

In most cases, simply clicking the “Connect” button will auto-detect all settings necessary to connect to the device. However, if changes to the connection settings need to be made, click the settings icon next to the Connect button and adjust the settings in the drop-down panel that appears.

For the M21125/15, make sure that “I<sup>2</sup>C” is selected.

The software may also be operated without a device plugged in by turning “Simulate Connection” on. This is useful primarily for getting familiarized with the interface or reviewing the available device settings.

**Figure 3-7. Connection Settings Panel**



### 3.2.2 Resetting the Device

In order to reset this device to the default settings, Mindspeed has provided a configuration file that can be loaded after connection.

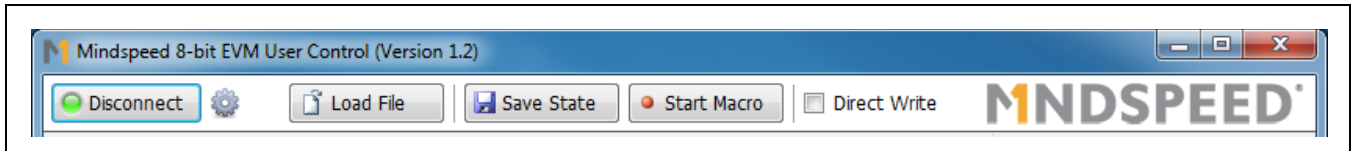
1. Click the “Load” button in the toolbar.
2. In the File Selection dialog that appears, navigate to “Software\Scripts” and select the “Reset.txt” file.
3. Click “Open.”

The details of the “Load” button are described in greater detail in [Section 3.2.6](#).

### 3.2.3 Direct/Indirect Write Mode

The Mindspeed EVM software has two modes of operation, and can be switched between them at any time by clicking the “Direct Write” check-box located in the toolbar (see [Figure 3-8](#)).

**Figure 3-8. Mindspeed GUI Toolbar**



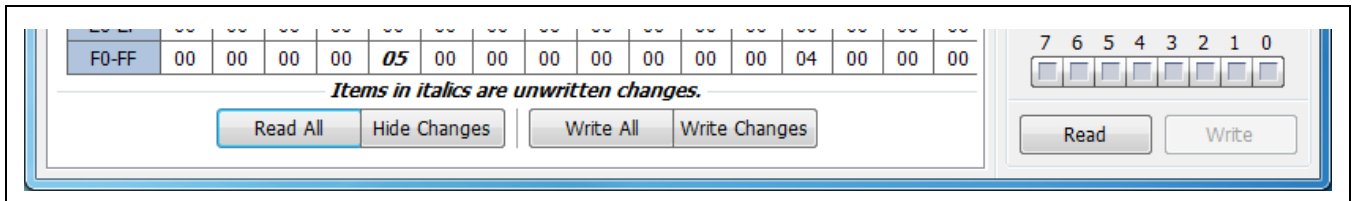
#### Direct Write Mode

In this mode any changes made in the software are immediately written to the device without any further actions necessary. When a direct-write occurs, the field will momentarily flash red to indicate that the write is taking place. This applies throughout the interface, except for the “Direct Register Access” control (see [Section 3.2.5](#)), which still requires that the “Write” button be clicked in order to commit a change.

#### Indirect Write Mode (Direct Write disabled)

In this mode, changes made in the software are not written to the device until “Write Changes” or “Write All” is clicked. Any items that have been modified will appear in ***bold italics*** to make it clear that these items have not been written.

**Figure 3-9. Writing Changes**



Note that the buttons at the bottom of the tabpage only affect items on that tabpage.

#### Read All

Discards changes by re-reading the registers from the device.

#### Hide Changes

Temporarily reveals what the settings were before they were changed.

#### Write All

Re-writes every register on the current tabpage, even those that haven’t changed.

#### Write Changes

Writes only those items that have changed (items in ***italics***).

### 3.2.4 Memory Map

Register values can be set directly using the memory map. Click the “Read All” button to load the current values into the interface. To change a value, click on a particular cell in the table and type a new value. Changes will either take effect immediately or after “Write Changes” is clicked, depending on the current Direct Write/Indirect Write setting (see [Section 3.2.3](#)).

**Figure 3-10. Memory Map**

Memory Map

All values are in hexadecimal.

Address	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
00-0F	00	00	00	00	00	00	00	00	00	00	00	24	05	00	24	00
10-1F	08	08	08	00	00	00	00	00	E4	00	00	00	90	5F	30	E4
20-2F	C0	08	08	00	00	00	00	00	00	00	00	00	30	00	00	00
30-3F	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
40-4F	A0	00	00	00	00	00	A3	00	80	00	00	00	00	00	00	00
50-5F	00	00	00	00	FF	00	00	00	00	00	00	00	00	00	00	00
60-6F	2A	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
70-7F	02	01	00	00	00	00	00	00	00	00	00	00	00	00	00	00
80-8F	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
90-9F	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
A0-AF	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
B0-BF	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
C0-CF	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
D0-DF	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
E0-EF	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
F0-FF	00	00	00	00	00	00	00	00	00	00	00	00	04	00	00	00

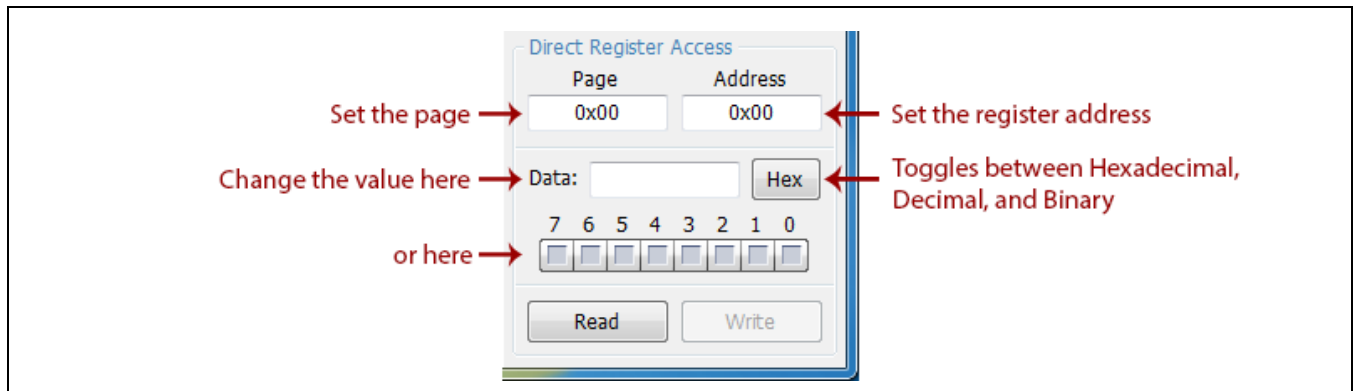
### 3.2.5 Direct Register Access

The Direct Register Access control is located in the bottom-right corner of the interface, and can be used to read and write register values directly (by page and address). To view a register value, type the page and address into the appropriate boxes, then click the “Read” button. To write a new value, make sure the “Page” and “Address” boxes are set to the proper values, then enter the new value into the “Data” box and click “Write.”

The data value can also be modified by clicking the individual bits on or off in the bit-strip located just below the data box.

The button to the right of the data box can be clicked to toggle between Hexadecimal, Decimal, and Binary views.

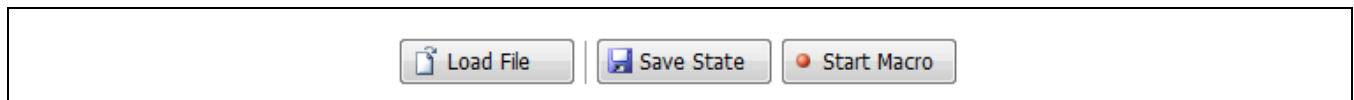
Figure 3-11. Direct Register Access



### 3.2.6 Saving/Loading State and Macro Files

The three buttons located along the center of the toolbar allow you to load and save preset values into the device.

Figure 3-12. Load/Save Buttons



#### Load File

Loads the settings from a file into the device. In some cases Mindspeed will provide pre-created files which may be included on the EVM CD or USB Drive. Your application resource will provide these files along with instructions for their use if necessary.

#### Save State

Takes a snapshot of the current state of all user-level registers on the device and creates a script file that can be loaded back in later (via the Load File command). This is very useful for creating a baseline configuration that will need to be returned to many times.

#### Start Macro

This function begins recording any register changes from the time that the button is clicked until it is clicked again (once started the button will read “End Macro”). The results will be saved in a file which can be loaded back in later (via the Load File command). When using this feature, consider enabling “Direct Write Mode” (see Section 3.2.3). In this mode, each change will be recorded to the script file in the order that it was executed. This is useful when the order of the register writes is particularly important.



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