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DM160232
Serial Memory Single-Wire Evaluation Kit User's Guide

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DM160232 SERIAL MEMORY SINGLE-WIRE EVALUATION KIT USER'S GUIDE

Table of Contents

Preface

NOTICE TO CUSTOMERS

All documentation becomes dated, and this manual is no exception. Microchip tools and documentation are constantly evolving to meet customer needs, so some actual dialogs and/or tool descriptions may differ from those in this document. Please refer to our website (www.microchip.com) to obtain the latest documentation available.

Documents are identified with a "DS" number. This number is located on the bottom of each page, in front of the page number. The numbering convention for the DS number is "DSXXXXXXXXA", where "XXXXXXXX" is the document number and "A" is the revision level of the document.

For the most up-to-date information on development tools, see the MPLAB® IDE online help. Select the Help menu, and then Topics to open a list of available online help files.

INTRODUCTION

This chapter contains general information that will be useful to know before using the DM160232 Serial Memory Single-Wire Evaluation Kit. Items discussed in this chapter include:

- Document Layout
- Conventions Used in This Guide
- Recommended Reading
- The Microchip Website
- Customer Support
- Revision History

DOCUMENT LAYOUT

This document describes how to use the DM160232 Serial Memory Single-Wire Evaluation Kit as a tool to demonstrate the best in class features, functionality, and low-power operation of the AT21CS Series single-wire Serial EEPROM devices. The document is organized as follows:

- **Chapter 1. "Product Overview"**
- **Chapter 2. "Installation and Operation"**
- **Chapter 3. "Graphical User Interface (GUI)"**
- **Chapter 4. "USB Base Board Firmware Upgrade"**
- **Chapter 5. "Troubleshooting Guide"**
- **Appendix A. "Schematics"**
- **Appendix B. "Bill of Materials (BOM)"**

CONVENTIONS USED IN THIS GUIDE

This manual uses the following documentation conventions:

DOCUMENTATION CONVENTIONS

Description	Represents	Examples
Arial font:		
Italic characters	Referenced books	*MPLAB® IDE User's Guide*
	Emphasized text	...is the *only* compiler...
Initial caps	A window	the Output window
	A dialog	the Settings dialog
	A menu selection	select Enable Programmer
Quotes	A field name in a window or dialog	"Save project before build"
Underlined, Italic text with right angle bracket	A menu path	*File>Save*
Bold characters	A dialog button	Click **OK**
	A tab	Click the **Power** tab
N'Rnnnn	A number in verilog format, where N is the total number of digits, R is the radix and n is a digit.	4'b0010, 2'hF1
Text in angle brackets < >	A key on the keyboard	Press <Enter>, <F1>
Courier New font:		
Plain Courier New	Sample source code	`#define START`
	Filenames	`autoexec.bat`
	File paths	`c:\mcc18\h`
	Keywords	`_asm, _endasm, static`
	Command-line options	`-Opa+, -Opa-`
	Bit values	`0, 1`
	Constants	`0xFF, 'A'`
Italic Courier New	A variable argument	*`file`*`.o`, where *`file`* can be any valid filename
Square brackets [ ]	Optional arguments	`mcc18 [options]` *`file`* `[options]`
Curly brackets and pipe character: { | }	Choice of mutually exclusive arguments; an OR selection	`errorlevel {0|1}`
Ellipses...	Replaces repeated text	`var_name [, var_name...]`
	Represents code supplied by user	`void main (void) { ... }`

RECOMMENDED READING

This user's guide describes how to use the DM160232 Serial Memory Single-Wire Evaluation Kit. The following documents are available and recommended as supplemental reference resources.

- **Serial Memory Single-Wire Quick Start Guide – "*Serial Memory Single-Wire Evaluation Kit Quick Start Guide*" (DS20005780)** – This quick start guide provides a brief overview on the DM160232 Evaluation Kit's functionalities, features and capabilities.
- **AT21CS01/AT21CS11 Data Sheet – "*Single-Wire, I/O Powered 1-Kbit (128 x 8) Serial EEPROM with a Unique, Factory-Programmed 64-Bit Serial Number*" (DS200005857)** – This document provides all the necessary information on the AT21CS01/AT21CS11 Serial EEPROM single-wire devices including features, general description, device operation, specifications and ordering information.
- **AN8976 – "*AT21CS Series Reset and Discovery*"** – This document provides information on the AT21CS Series Reset function and the AT21CS Series Discovery function. Additionally, a comparison between the Single-Wire Interface (SWI) Discovery event and the Maxim/Dallas One-Wire Discovery event is discussed to facilitate the understanding of which device type is on the bus.

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- **Product Support** – Data sheets and errata, application notes and sample programs, design resources, user's guides and hardware support documents, latest software releases and archived software
- **General Technical Support** – Frequently Asked Questions (FAQs), technical support requests, online discussion groups, Microchip consultant program member listing
- **Business of Microchip** – Product selector and ordering guides, latest Microchip press releases, listing of seminars and events, listings of Microchip sales offices, distributors and factory representatives

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The Development Systems product group categories are:

- **Compilers** – The latest information on Microchip C compilers, assemblers, linkers and other language tools. These include all MPLAB C compilers; all MPLAB assemblers (including MPASM™ assembler); all MPLAB linkers (including MPLINK™ object linker); and all MPLAB librarians (including MPLIB™ object librarian).
- **Emulators** – The latest information on Microchip in-circuit emulators.This includes the MPLAB REAL ICE™ and MPLAB ICE 2000 in-circuit emulators.
- **In-Circuit Debuggers** – The latest information on the Microchip in-circuit debuggers. This includes MPLAB ICD 3 in-circuit debuggers and PICkit™ 3 debug express.

- **MPLAB IDE** – The latest information on Microchip MPLAB IDE, the Windows® Integrated Development Environment for development systems tools. This list is focused on the MPLAB IDE, MPLAB IDE Project Manager, MPLAB Editor and MPLAB SIM simulator, as well as general editing and debugging features.
- **Programmers** – The latest information on Microchip programmers. These include production programmers such as MPLAB REAL ICE in-circuit emulator, MPLAB ICD 3 in-circuit debugger and MPLAB PM3 device programmers. Also included are nonproduction development programmers such as PICSTART® Plus and PICkit 2 and 3.

CUSTOMER SUPPORT

Users of Microchip products can receive assistance through several channels:

- Distributor or Representative
- Local Sales Office
- Field Application Engineer (FAE)
- Technical Support

Customers should contact their distributor, representative or field application engineer (FAE) for support. Local sales offices are also available to help customers. A listing of sales offices and locations is included in the back of this document.

Technical support is available through the website at:

http://www.microchip.com/support.

REVISION HISTORY

Revision A (02/2018)

- Initial release of this document.

Chapter 1. Product Overview

1.1 INTRODUCTION

Microchip Technology's DM160232 Serial Memory Single-Wire Evaluation Kit allows the user to read, write and verify the AT21CS Series Serial EEPROM devices using the single-wire bus protocol.

This chapter introduces the DM160232 Serial Memory Single-Wire Evaluation Kit and provides an overview of its features. Topics covered include:

- AT21CS Series Device Overview
- DM160232 Evaluation Kit Overview
- DM160232 Evaluation Kit Contents
- Supported Devices

1.2 AT21CS SERIES DEVICE OVERVIEW

The AT21CS Series is a family of Serial Electrically Erasable and Programmable Read-Only Memory (EEPROM) that utilizes the Single-Wire Interface (SWI) protocol.

The family software addressing scheme allows up to eight devices to share a common single-wire bus. The device is optimized for use in many industrial and commercial applications where low-power and low-voltage operation are essential. Some applications examples include analog sensor calibration data storage, ink and toner printer cartridge identification, and management of after-market consumables. The family is available in space-saving package options and operates with an external pull-up voltage on the SI/O line.

1.3 DM160232 EVALUATION KIT OVERVIEW

The Serial Memory Single-Wire Evaluation Kit (DM160232) is an easy-to-use interactive user tool to demonstrate the best in class features, functionality and low-power operation of the AT21CS Series Serial EEPROM devices. The evaluation kit is for engineers, developers and decision makers to allow for fast system prototyping using the Single-Wire Interface (SWI) protocol. The Serial Memory Single-Wire Evaluation Kit includes a Graphical User Interface (GUI) which allows the user to configure, demonstrate and personalize the single-wire Serial EEPROM device.

1.4 EVALUATION KIT CONTENTS

The Serial Memory Single-Wire Evaluation Kit includes the following:

- SWI Socket Board (02-10681) (Figure 1-1)
- USB Base Board (02-10682) (Figure 1-2)
- Five AT21CS01-STUM10-T devices, with one installed in the SWI Socket Board's SOT23 socket
- Important Information Sheet

FIGURE 1-1: SWI SOCKET BOARD (02-10681)

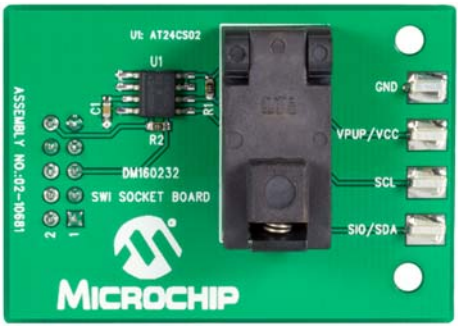
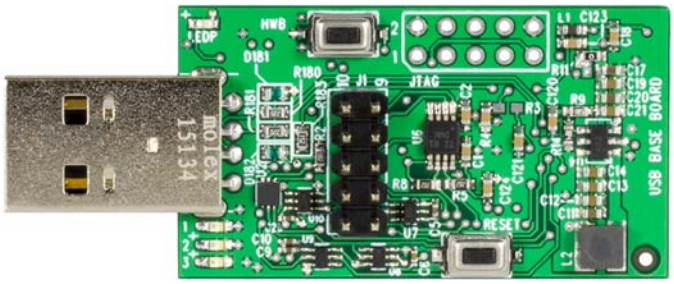


FIGURE 1-2: USB BASE BOARD (02-10682)



1.5 SUPPORTED DEVICES

The following table indicates the supported devices for the DM160232 Serial Memory Single-Wire Evaluation Kit.

TABLE 1-1: SUPPORTED DEVICES

Device	Protocol	Package Type	Voltage Range	Communication Speed
AT21CS01-STUM##-T	Single-Wire	3-lead SOT23	1.7V-3.6V	15.4 or 125 kbps

Note: ## indicates one of eight slave address combinations. Please see the corresponding device data sheet for more information about these slave address combinations.

1.6 OPERATIONAL REQUIREMENTS

For the Serial Memory Single-Wire Evaluation Kit to function properly, the following hardware and software requirements must be met:

- PC compatible system
- An available USB port on PC
- At least 1.8 MB of free disk space
- Windows® 7 or higher operating systems(1)

Note 1: Testing has been performed on a 64-bit Windows® 7 operating system.

Chapter 2. Installation and Operation

2.1 INTRODUCTION

Setup for the Serial Memory Single-Wire Evaluation Kit is straightforward. To start, both the USB Base Board driver and the SWI Graphical User Interface (GUI) will need to be downloaded and installed on the user's PC. Once both are installed, the user should perform a simple hardware setup sequence. Once completed, simply plug in the USB Base Board to an available USB port on the user's PC and launch the SWI GUI.

WARNING
Read the DM160232 Serial Memory Single-Wire Evaluation Kit User's Guide (this document) fully before proceeding to evaluation kit setup.

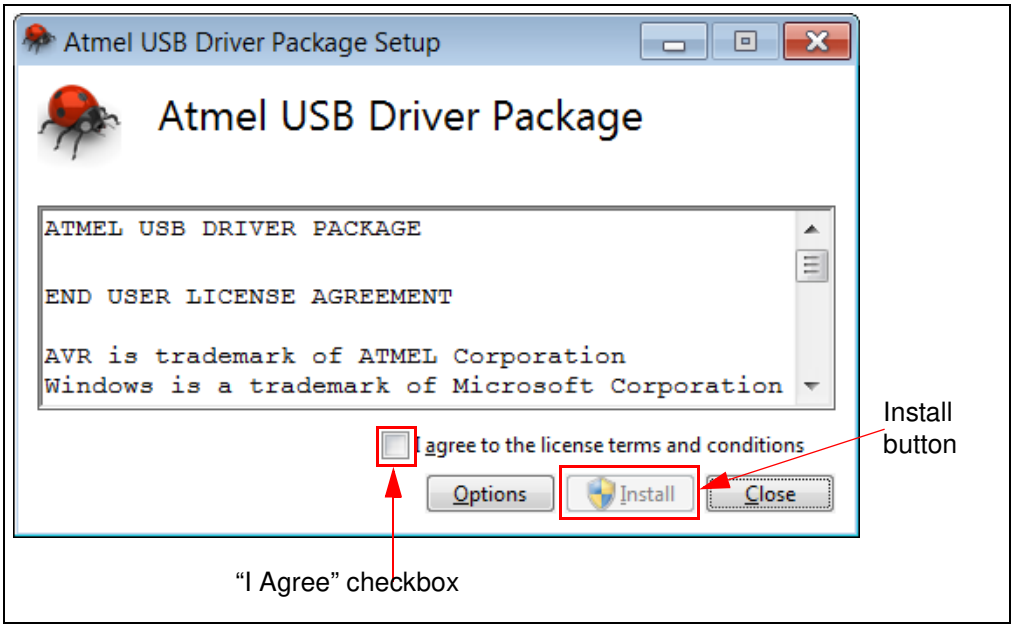
2.2 INSTALLING THE USB BASE BOARD DRIVER

The following steps are needed to successfully install the USB Base Board driver:

1. Go to http://www.microchip.com/DM160232 to download the USB Base Board driver.
2. Navigate to Documentation and Software and select the *USB Base Board Driver*.
3. Download and open the setup file indicated below.
   `driver-atmel-bundle-7.0.888.exe`
4. If the Open File – Security Warning pops up, press the **Run** button.
5. Once prompted, read the license terms and conditions. When ready, click the checkbox and press the **Install** button (Figure 2-1).

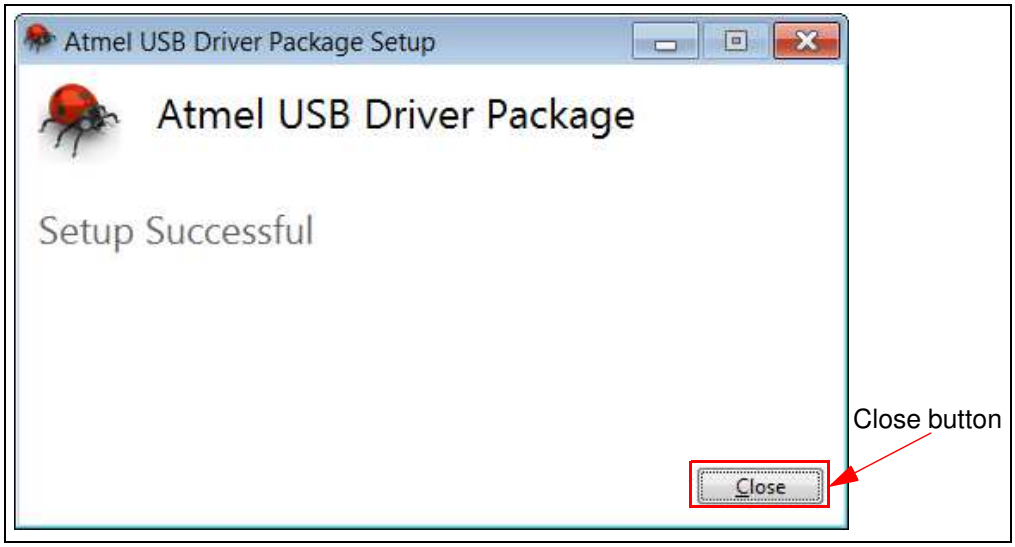
Note: If prompted, allow the program to make changes to your PC.

FIGURE 2-1: LICENSE TERMS AND CONDITIONS



6. Let the program setup the driver. A progress or status bar is included to show the overall progress of the installation. Once completed, press the **Close** button to complete the USB Base Board driver installation (Figure 2-2).

FIGURE 2-2: USB DRIVER INSTALLATION COMPLETE



2.3 INSTALLING THE GRAPHICAL USER INTERFACE (GUI)

The following steps are needed to successfully install the GUI software:

Note:	If an earlier version of the DM160232 SWI Evaluation Kit GUI was previously installed, it is recommended to uninstall the previous version before installing the new version. This will ensure robust GUI operation.

1. Go to http://www.microchip.com/DM160232 to download the GUI software.
2. Navigate to Documentation and Software and select the *DM160232 SWI Evaluation Kit GUI* software.
3. Download and open the setup file: `DM160232_x.x.x_setup.exe`, where `x.x.x` indicates the GUI version.
4. If the Open File – Security Warning pops up, press the **Run** button.

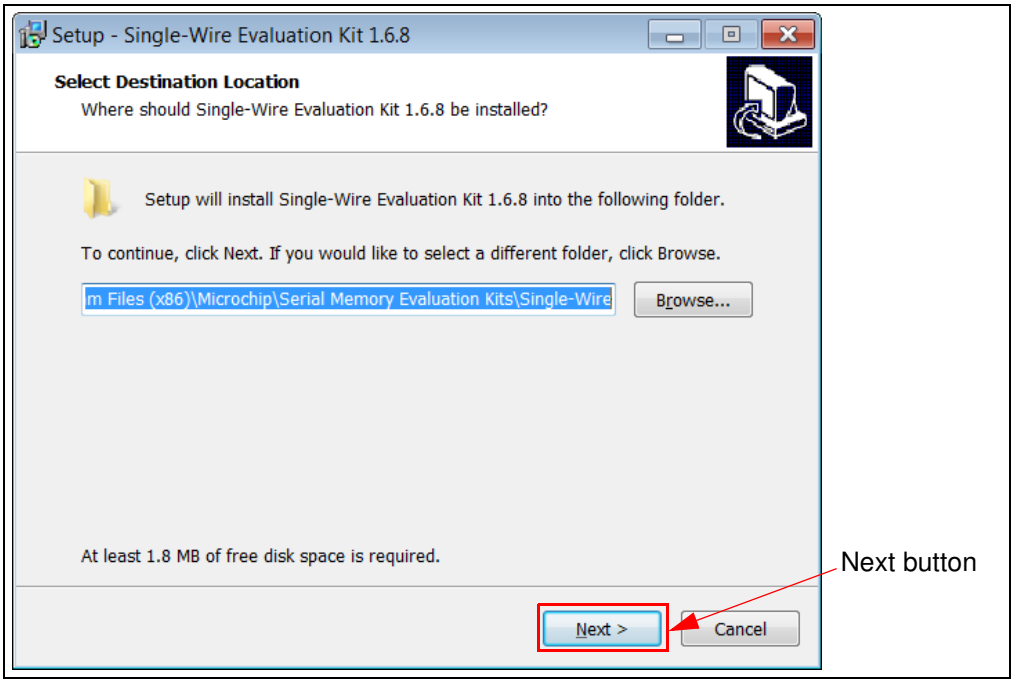
Note:	If prompted, allow the program to make changes to your PC.

5. Select the Installation Destination Location from the Graphical User Interface (GUI). Press the **Next** button when ready (Figure 2-3). The default Destination Location is:

   `C:\Program Files (x86)\Microchip\Serial Memory Evaluation Kits\Single-Wire`.

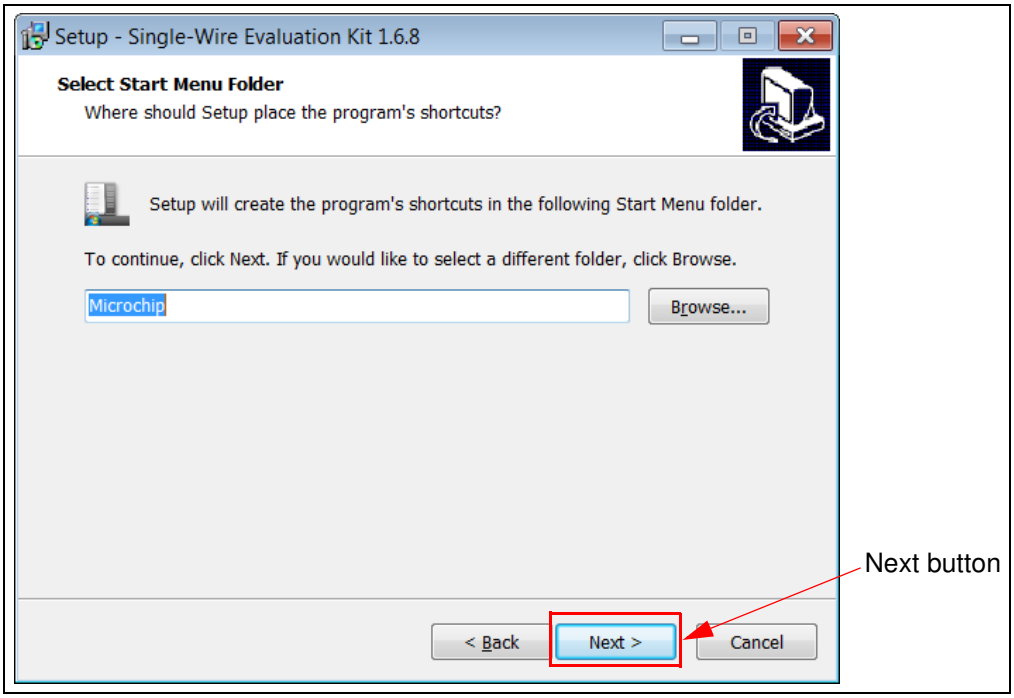
Note:	When referring to location of files on the user's PC, this document is assuming that the default installation was used when the GUI was installed. If the default installation is not used, it is the user's responsibility to determine the reference file location.

FIGURE 2-3: GUI INSTALLATION LOCATION



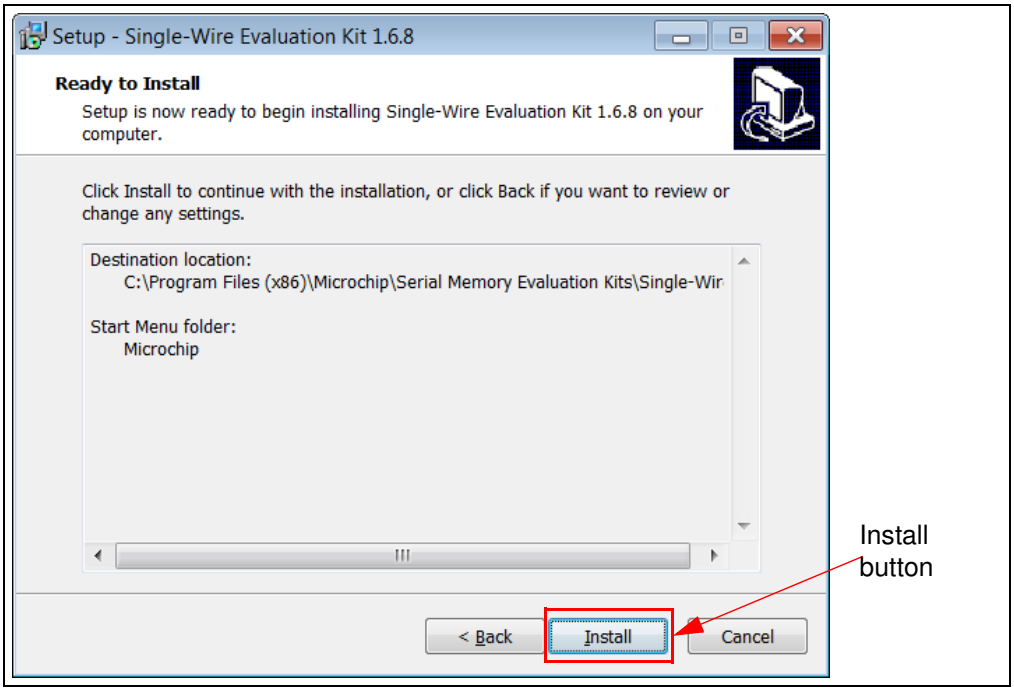
6. The next step is to select the Start Menu folder. By default, the setup will create a Start Menu folder named *Microchip* if one is not already present on the user's PC. Press the **Next** button when ready to continue (Figure 2-4).

FIGURE 2-4: GUI START MENU FOLDER



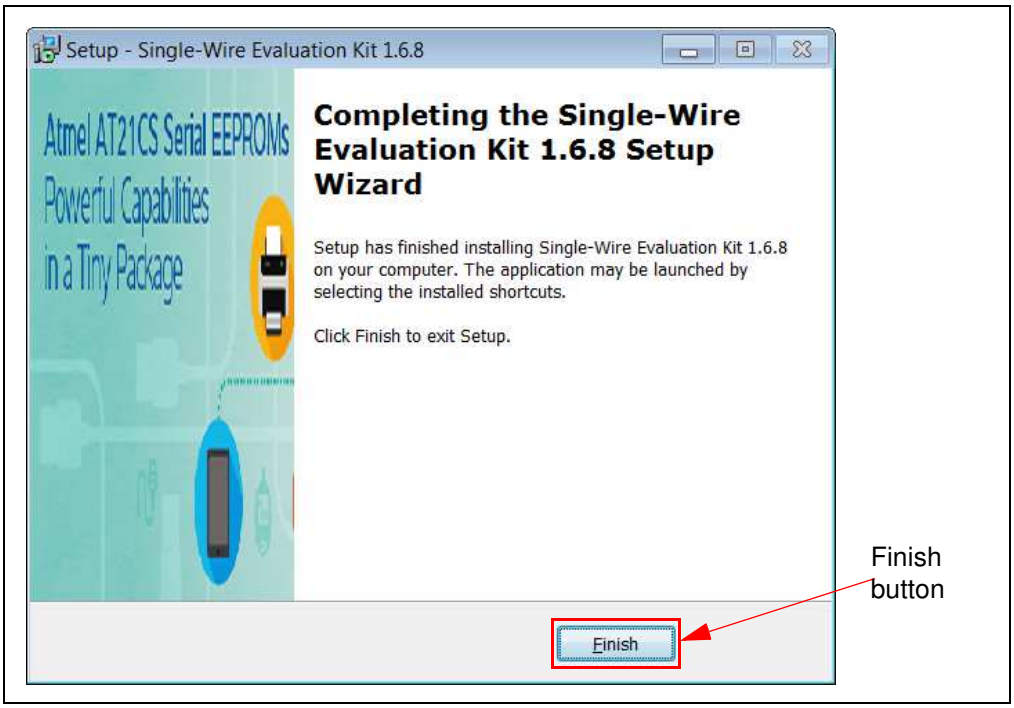
7. Once the Destination location and the Start Menu folder have been selected, the setup will prompt the user if they are ready to install the software. Press the **Install** button when ready (Figure 2-5).

FIGURE 2-5: GUI READY TO INSTALL



8. Let the program setup the SWI GUI. A progress or status bar is included to show the overall progress of the installation. Once completed, press the **Finish** button to complete the SWI GUI installation (Figure 2-6).

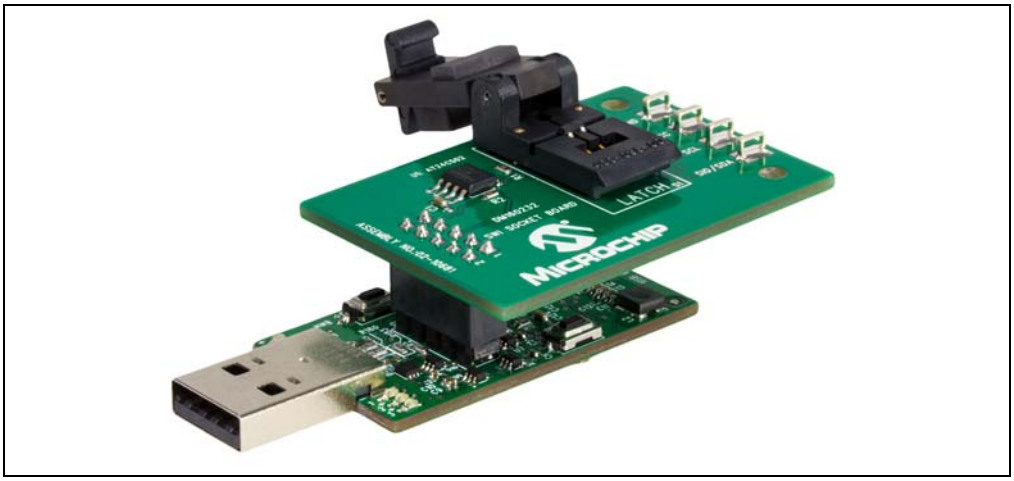
FIGURE 2-6: GUI INSTALLATION COMPLETE



2.4 EVALUATION KIT SETUP PROCEDURE

In order to start using the evaluation kit, simply plug the SWI Socket Board into the USB Base Board using the H1 and J1 headers. See Figure 2-7 for illustration.

FIGURE 2-7: DM160232 USB BASE BOARD AND SWI SOCKET BOARD

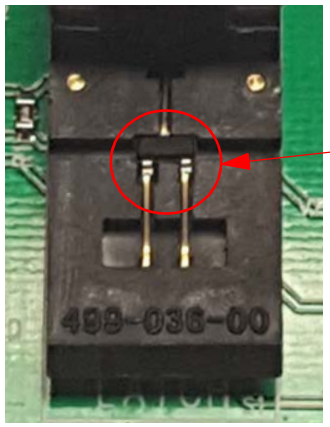


Once both the boards are connected, verify that there is a device correctly installed in the SOT23 socket on the SWI Socket Board. If there is not a device installed, the user must install a device from the supported device list into the SOT23 socket. To ensure robust GUI and hardware operation, it is recommended that when installing a supported device, the USB Base Board be disconnected from the user's PC.

Note: Due to the small size of the 3-lead SOT23 package, it is recommended to use tweezers in order to properly install the supported device into the SWI Socket Board socket.

Figure 2-8 illustrates a supported device which is properly seated in the SOT23 socket. Once the device is seated properly, close the socket lid to finish installing the supported device.

FIGURE 2-8: SUPPORTED DEVICE IN SOT23 SOCKET



Once a supported device is installed in the SOT23 socket, the user can then plug in the USB Base Board into one of their computer's USB ports. Once the USB Base Board enumerates on the user's PC, open the GUI by selecting either the desktop icon (SWI GUI) or navigating to the Start Menu folder that was created when the DM160232 SWI Evaluation Kit GUI software was installed.

NOTES:

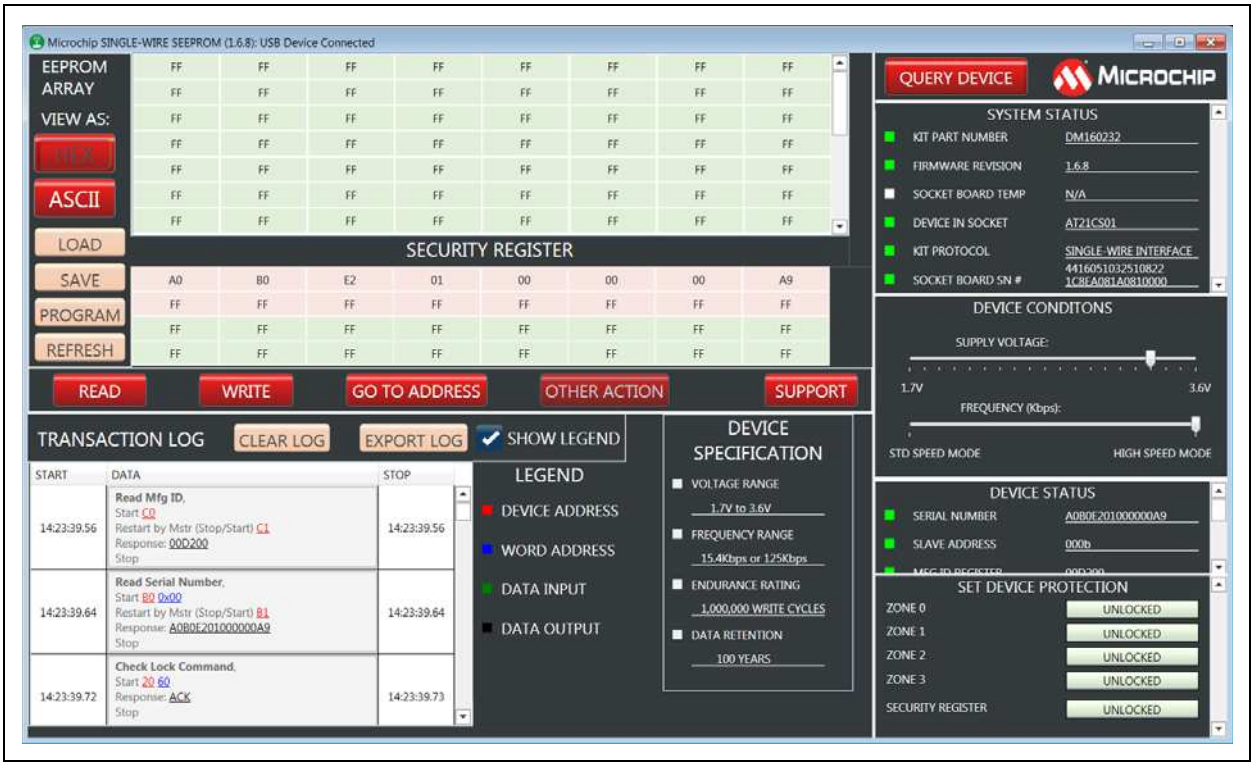
Chapter 3. Graphical User Interface (GUI)

3.1 INTRODUCTION

The Serial Memory Single-Wire Evaluation Kit includes a Graphical User Interface (GUI) which is used as an interface between the user's PC and the evaluation kit hardware. The GUI allows the user to easily interact with the single-wire Serial EEPROM using built-in read and write features. The GUI also highlights the value-added features of the installed supported device. In the subsequent sections, the GUI features and functions are explained in detail to help the user to interact with the installed single-wire Serial EEPROM.

The GUI version and USB Base Board firmware version must match in order to use the GUI. If the GUI and USB Base Board versions do not match and the USB Base Board has an earlier version programmed, perform a USB Base Board device firmware upgrade using the GUI version. Refer to the **Chapter 4. "USB Base Board Firmware Upgrade"** for details on the firmware upgrade process. If the GUI version is earlier than the USB Base Board, download the latest version of the GUI (refer to **Section 2.3 "Installing the Graphical User Interface (GUI)"** for additional information).

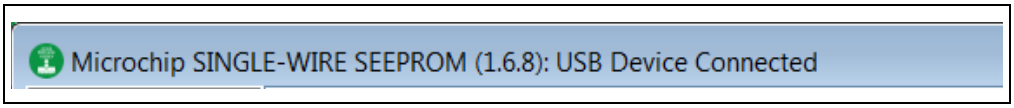
FIGURE 3-1: GRAPHICAL USER INTERFACE



3.2 MAIN TITLE BAR

The title bar displays the GUI version and the USB Base Board connection status. Figure 3-2, shown below, illustrates a GUI version of 1.6.8.

FIGURE 3-2: TITLE BAR

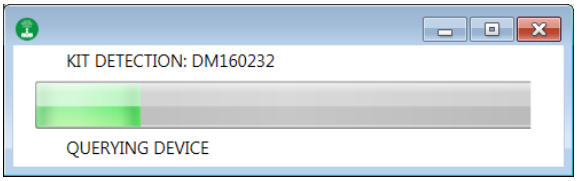


3.3 QUERY DEVICE

The GUI will perform an auto-query when the GUI is launched or when the USB Base Board is initially connected to the PC. Afterwards, the user can initiate a device query at any time with the **QUERY DEVICE** button (Figure 3-3). The Device Query feature utilizes the Single-Wire Interface (SWI) Reset and Discovery Response feature in order to determine whether the supported device was installed properly. Querying the device will populate or re-populate the GUI with the content read from the installed device.

FIGURE 3-3: QUERY DEVICE

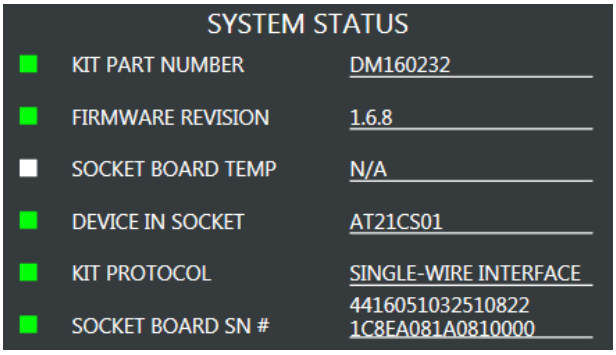
FIGURE 3-4: DEVICE QUERY PROGRESS BAR



3.4 SYSTEM STATUS

The System Status pane is populated with information related to the evaluation kit hardware. These include the "Kit Part Number", "Firmware Revision", the installed supported device or "Device In Socket", the "Kit Protocol", and the "Socket Board Sn #" (serial number).

FIGURE 3-5: SYSTEM STATUS PANE



3.4.1 Kit Part Number

This displays the evaluation kit part number.

3.4.2 Firmware Revision

This is the version of the firmware programmed in the USB Base Board.

3.4.3 Socket Board Temp

This is not utilized in the DM160232 Serial Memory Single-Wire Evaluation Kit.

3.4.4 Device in Socket

The GUI identifies the installed supported device by reading the Manufacturer ID register of the installed device.

3.4.5 Kit Protocol

Identifies the communication protocol used by the evaluation kit's socket board.

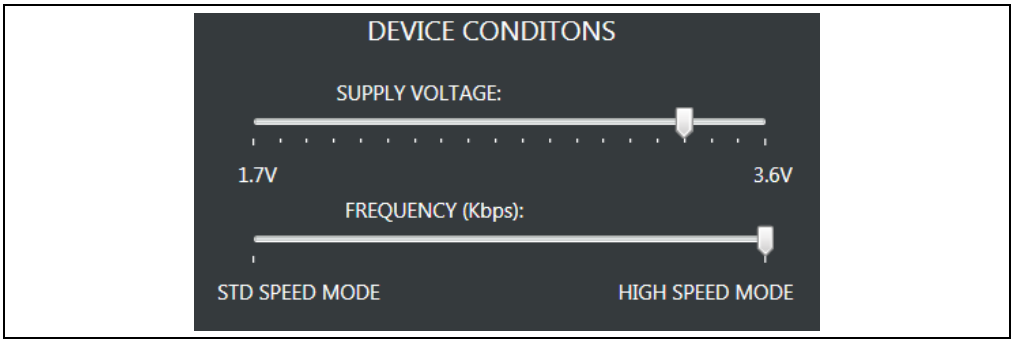
3.4.6 Socket Board SN

The SWI Socket Board serial number is retrieved from the AT24CS02 serialized Serial EEPROM located on the SWI Socket Board. Every SWI Socket Board will have its own unique serial number.

3.5 DEVICE CONDITIONS

The Device Conditions pane (Figure 3-6) allows the user to set the supply voltage to the SWI Socket Board and the communication speed or frequency of the Single-Wire Interface (SWI) protocol.

FIGURE 3-6: DEVICE CONDITIONS PANE



3.5.1 Supply Voltage Slider

The voltage slider provides the ability to change the supply voltage to the SWI Socket Board along with the installed device V_{PUP} voltage. The V_{PUP} refers to the voltage used to pull up the SI/O line. The user can change the V_{PUP} by either clicking along the slider or dragging the indicator to the desired V_{PUP}. The upper and lower limits of the V_{PUP} are determined by the installed device specification. Because the supply voltage is common between every device on the SWI Socket Board, a test point is included to measure V_{PUP} to the installed device and V_{CC} supply to the AT24CS02. Whenever the GUI is initially started, the voltage slider will default to 3.3V to ensure the installed supported device has sufficient V_{PUP} to communicate.

3.5.2 Frequency (Kbps) Slider

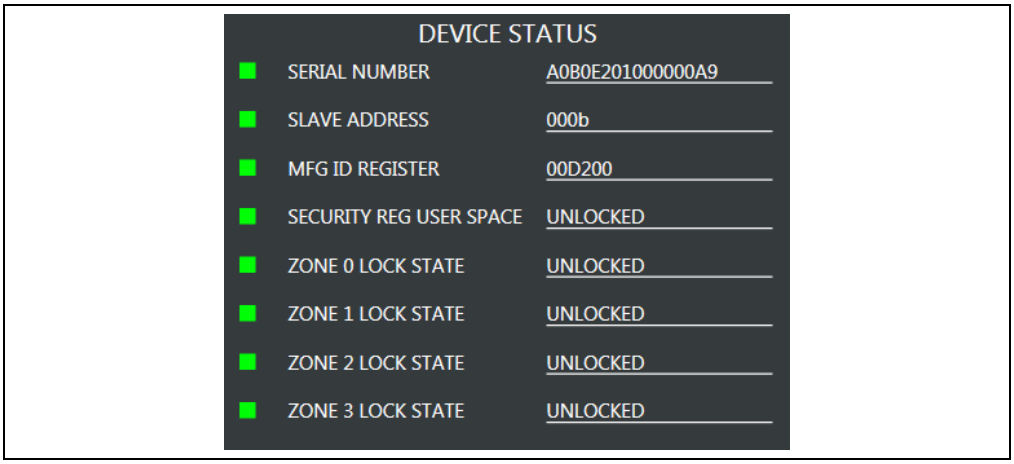
The frequency slider provides the ability to change the I/O or communication speed between the host controller (USB Base Board) and the installed device. The user can change the I/O speed by either clicking along the slider or dragging the indicator to the desired I/O speed. The upper and lower frequency limits of the frequency slider are determined by the installed device specification. Whenever the GUI is initially started, the frequency slider will default to High-Speed mode to ensure the installed supported device is able to communicate with the host controller.

Note: The Device Query feature communicates with the Serial EEPROM using High-Speed mode. Therefore, whenever the Device Query feature is used, it will revert the installed device back to High-Speed mode regardless of the current frequency slider setting.

3.6 DEVICE STATUS

The Device Status pane shows various Serial EEPROM device features including the serial number, the device slave address, the Manufacturer (MFG) ID register, the lock state of the Security register, and the lock state of the memory zones (Zone 0 -Zone 3) (Figure 3-7).

FIGURE 3-7: DEVICE STATUS PANE



3.6.1 Serial Number

Displays the serial number read from the Security register of the installed supported device. The serial number is displayed in hexadecimal.

3.6.2 Slave Address

Displays the preprogrammed device slave address of the installed device. The slave address is populated with A2 bit first, A1 bit second, and A0 bit last. The slave address is displayed in binary.

3.6.3 MFG ID Register

Reports the content of the installed device's Manufacturer ID register. The data is displayed in hexadecimal.

3.6.4 Security Register User Space

Displays the lock state of the Security register. If the register is not locked, UNLOCKED is displayed. If the register is locked, LOCKED is displayed.

3.6.5 Zone X Lock State

Displays the lock state for the respective memory zones (Zone 0 through Zone 3). If the zone is not locked, UNLOCKED is displayed. If the zone is locked, LOCKED is displayed.

3.7 SET DEVICE PROTECTION

The Set Device Protection pane (Figure 3-8) allows the user to independently lock the four memory zones and the Security register based on the user's preference. The user locks a zone or the Security register by pressing the button to the right of that memory region. The button also indicates the current lock status of that zone or the Security register and the button shading is based on the current lock status. Once a button is pressed, a warning message is displayed to make sure the user intends to lock that zone or the Security register.

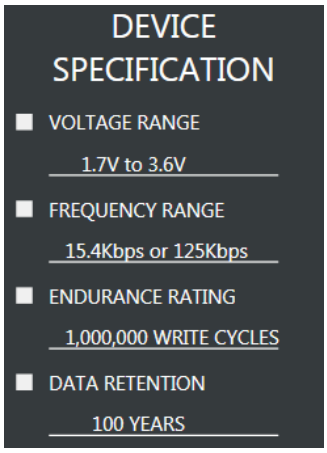
Note: Once the Security register or a memory zone is locked, it cannot be unlocked and is permanently set to ROM (Read-Only-Memory).

FIGURE 3-8: SET DEVICE PROTECTION PANE

3.8 DEVICE SPECIFICATION

The Device Specification pane (Figure 3-9) displays key device parameters, which can be found in the installed device's data sheet. These parameters include "Voltage Range", "Frequency Range", "Endurance Rating", and "Data Retention".

FIGURE 3-9: DEVICE SPECIFICATION PANE

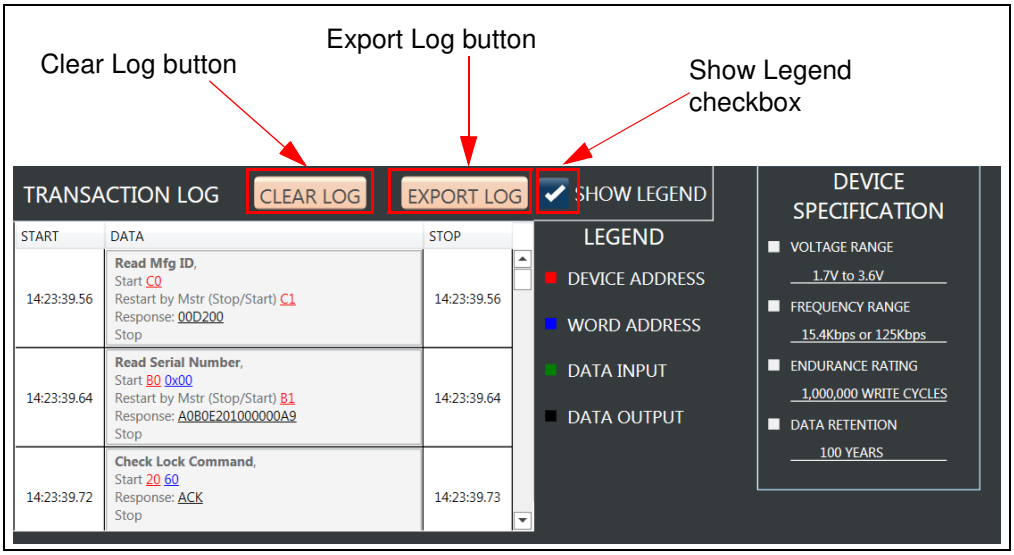


3.9 TRANSACTION LOG

The Transaction Log records all single-wire communication with the installed device as well as highlights the communication protocol according to the legend. The Transaction Log reports the data on the single-wire bus in hexadecimal. The Transaction Log can be used in conjunction with an oscilloscope connected to the SI/O and GND test points to help the user decode the captured protocol.

Note: The Transaction Log does not capture the Reset and Discovery Response sent to the installed device. The Reset and Discovery Response can be observed by performing a device query while monitoring an oscilloscope connected to the SI/O and GND test points.

FIGURE 3-10: TRANSACTION LOG



3.9.1 Clear Log

The **CLEAR LOG** button clears the Transaction Log. The Clear Log function is helpful when the user wants to look at a specific type or group of single-wire protocol.

3.9.2 Export Log

The **EXPORT LOG** button exports the Transaction Log in HTML format. The exported Transaction Log can be used as a reference without having to resend protocol to the installed device.

3.9.3 Legend

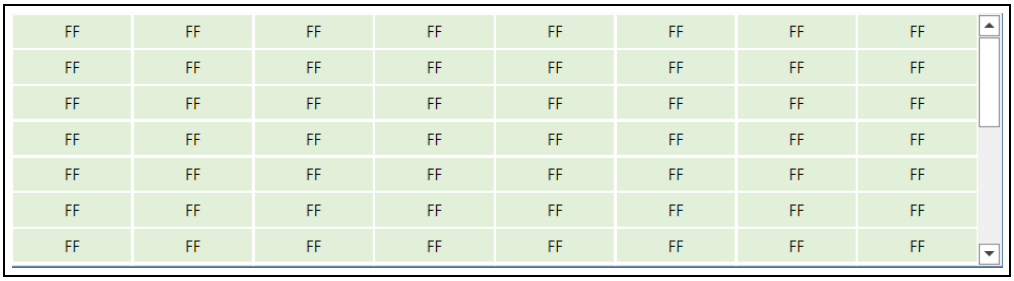
The Transaction Log legend highlights the different data bytes in the single-wire protocol that is being sent/received; the device address byte is shown in *red*, the word address byte is shown in *blue*, data input byte(s) is shown in *green*, and data output byte(s) or the response is shown in *black*. The Show Legend function can either show or hide the Transaction Log legend.

3.10 GUI MEMORY ARRAY

The GUI memory array is initially populated with the data read from the installed Serial EEPROM. The data of the GUI memory array is organized in 8-byte rows, left to right, and in ascending order. The GUI memory array will always be displayed in 8-byte row lengths regardless of the installed device's page size. The GUI memory array data can be modified by the user by using various GUI features which are outlined in the subsequent sections.

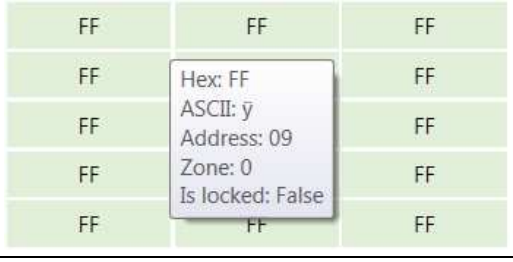
The GUI memory array features memory cell shading that is used to highlight the different state of that memory cell or cells. *Green* shading indicates that the cell or cells have not been locked and the user can write to that word address or range of word addresses. *Red* shading indicates that cell or cells have been locked and now functions as Read-Only-Memory (ROM). *Yellow* shading indicates that the memory array cell or cells have been changed in the internal GUI buffer and have not been written to the Serial EEPROM (see **Section 3.11.5 "PROGRAM"** for additional information).

FIGURE 3-11: MEMORY ARRAY



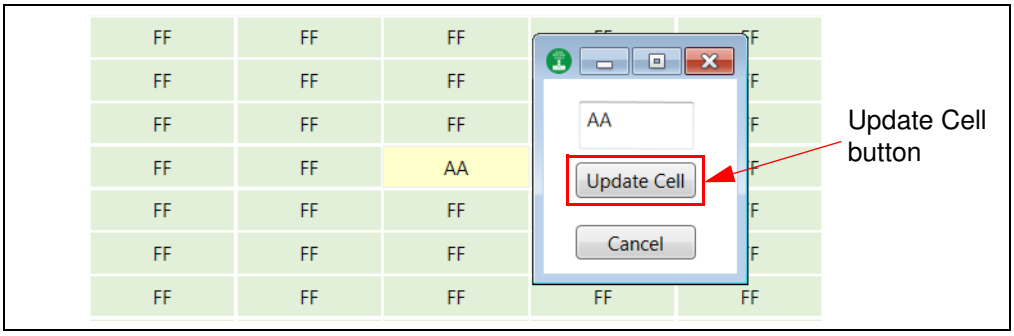
When the user hovers the mouse cursor over the GUI memory array, a pop-up appears to show the data in *HEX*, data in *ASCII*, *Address*, *Zone:* #, and Zone Protection state of that particular memory cell. This is illustrated in Figure 3-12.

FIGURE 3-12: ARRAY HOVER



The user can change the content of a cell by double-clicking a word address or memory cell in the GUI memory array or GUI Security register (see Figure 3-13). In order to change the content of a cell, the user should update the value, followed by pressing the **Update Cell** button. Once the cell is updated, the cell shading will become yellow. This indicates to the user that they must then program the device using the Program Feature (see **Section 3.11.5 "PROGRAM"** for additional information).

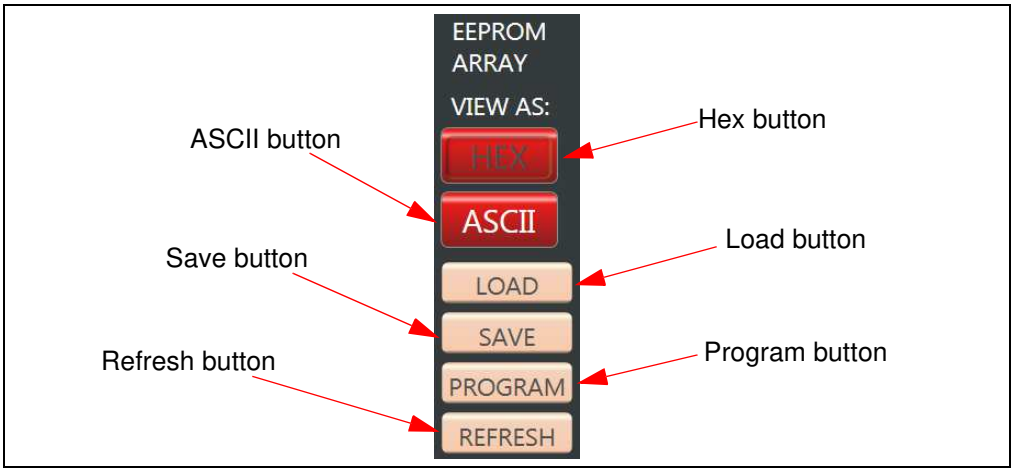
FIGURE 3-13: ARRAY UPDATE CELL



3.11 ARRAY ACTIONS

Array actions allow the user to manipulate the GUI memory array in terms of how the data is displayed (HEX or ASCII) and also allow the user to save the GUI memory array or load a previous array.

FIGURE 3-14: ARRAY ACTIONS



3.11.1 HEX

The **HEX** button displays the GUI memory array in hexadecimal (HEX) format.

3.11.2 ASCII

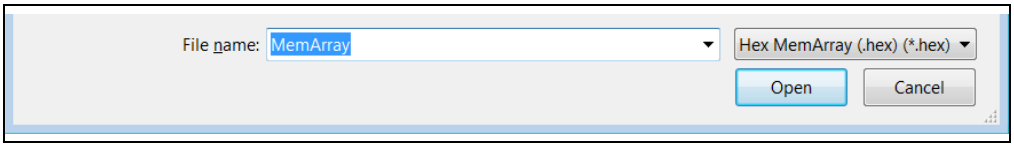
The **ASCII** button displays the GUI memory array in American Standard Code for Information Interchange (ASCII) format.

3.11.3 LOAD

The **LOAD** button gives the user the option to load a previous saved GUI memory array either HEX (.hex) or TEXT (.txt) file. The file, once loaded, will be used to populate the internal GUI buffer. Once the file is loaded in the GUI array buffer, the user must program the installed device using the **PROGRAM** button (see **Section 3.11.5 "PROGRAM"** for additional information).

Note:	The loaded file must follow a specific format. In order to determine the correct file format, it is recommended to save a GUI memory array as a reference (see **Section 3.11.4 "SAVE"** for additional information) and refer to that file when formatting the data.

FIGURE 3-15: LOAD

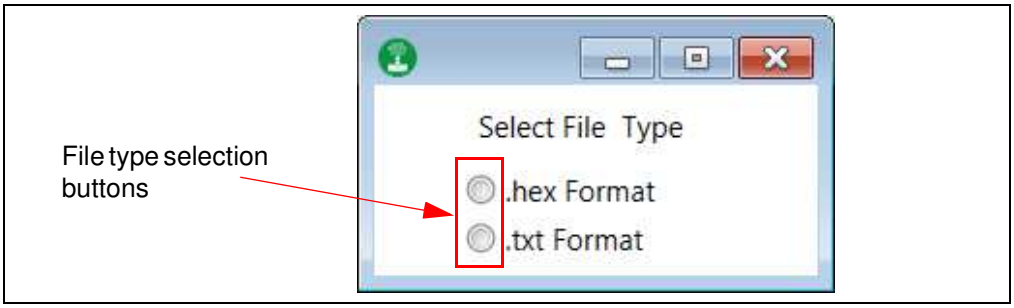


3.11.4 SAVE

The **SAVE** button gives the user the ability to save the current state of the GUI memory array. The GUI memory array can be saved as either a HEX (.hex) file or TEXT (.txt) file based on the user preference. Once a file type is selected, a file explorer will pop up prompting the user to specify the file directory and name of the file.

Note: When using the Save feature, the software will create the data for the saved file based on the internal GUI buffer and not on the actual data from the Serial EEPROM.

FIGURE 3-16: SAVE



3.11.5 PROGRAM

The Program feature can be used to write to the Serial EEPROM memory array, Security register, lock Zone 0 to Zone 3, and lock the Security register. When the **PROGRAM** button is pressed, the current internal GUI buffer will be written to the Serial EEPROM memory. The Program feature must be used when a cell is updated (*yellow* shaded), or when a file (.hex or .txt) is loaded. If the Program feature is not used, the data in the internal GUI buffer will not be written to the Serial EEPROM.

The Program feature can also be used to lock the four memory zones and/or the Security register. Each zone and the Security register can be locked independently of each other by placing a check mark in the corresponding box.

When the Program feature is used to program the Serial EEPROM memory array or Security register, that entire memory region will be written with the current data in the internal GUI buffer rather than only the changed values. If a specific data byte or bytes are to be programmed, it is recommended to use the Write feature (see **Section 3.13.2 "Write"** for additional information).

Note: By default, the memory array is selected. Therefore, if the user only wants to write the Security register or lock a zone or register, the user must unselect the memory array and select the particular operation to be performed.