

Dawn GUI User's Guide

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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 "DSXXXXXA", where "XXXXX" 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 Dawn GUI. Items discussed in this chapter include:

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

DOCUMENT LAYOUT

This document describes how to use the Dawn GUI as a development tool and debug firmware on a target board. The manual layout is as follows:

- **Chapter 1. "Introduction"** – Describes the system requirement and communication protocol of the Dawn GUI.
- **Chapter 2. "Dawn GUI Panel Layout and Operation"** – Explains the interface and operation of Dawn GUI in detail.

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
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	

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Please complete the enclosed Warranty Registration Card and mail it promptly. Sending in the Warranty Registration Card entitles users to receive new product updates. Interim software releases are available on the Microchip website.

RECOMMENDED READING

This user's guide describes how to use the Dawn GUI. Other useful documents are listed below. The following Microchip documents are available and recommended as supplemental reference resources.

Readme Files

For the latest information on using other tools, read the tool-specific Readme files in the Readmes subdirectory of the MPLAB® X IDE installation directory. The Readme files contain updated information and known issues that may not be included in this user's guide.

Low-Cost mTouch® Evaluation Kit User's Guide (DS40001818)

This user's guide gives an example of how to use the Dawn GUI for the mTouch applications.

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- Technical Support
- Development Systems Information Line

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Technical support is available through the website at: http://support.microchip.com.

DOCUMENT REVISION HISTORY

Revision A (December 2015)

Initial Release of this Document.

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Chapter 1. Introduction

The Dawn GUI is a PC utility designed to visualize the real-time data and configure the register of mTouch® firmware-based devices. A generic I^2C communication protocol is used to communicate with the target board, so any products with the same protocol can also use this utility to monitor and/or configure the system, such as the Microchip CAP1xxx capacitive sensing devices, MCP9800 temperature sensing device, etc.

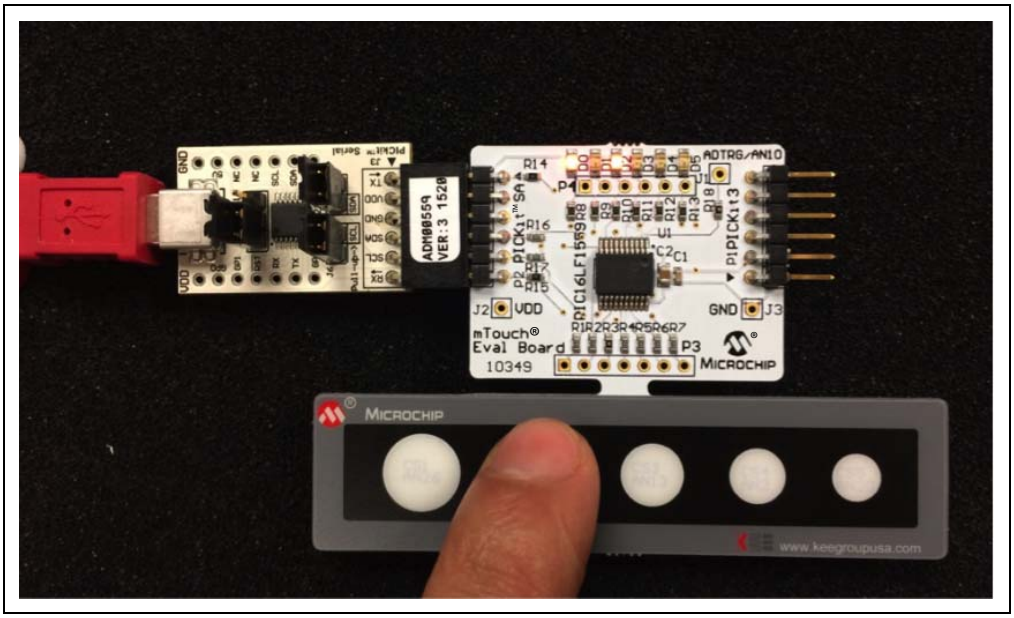
1.1 SYSTEM REQUIREMENT

In order to use the Dawn GUI, the user needs:

- The MCP2221 Breakout module, or other equivalent of the MCP2221 communication board with USB and I^2C interface
- A PC running Windows® XP or higher with USB 2.0 port
- Mini-USB cable
- A product that uses compatible I^2C protocol

Figure 1-1 shows a typical hardware setup for the low-cost mTouch evaluation kit.

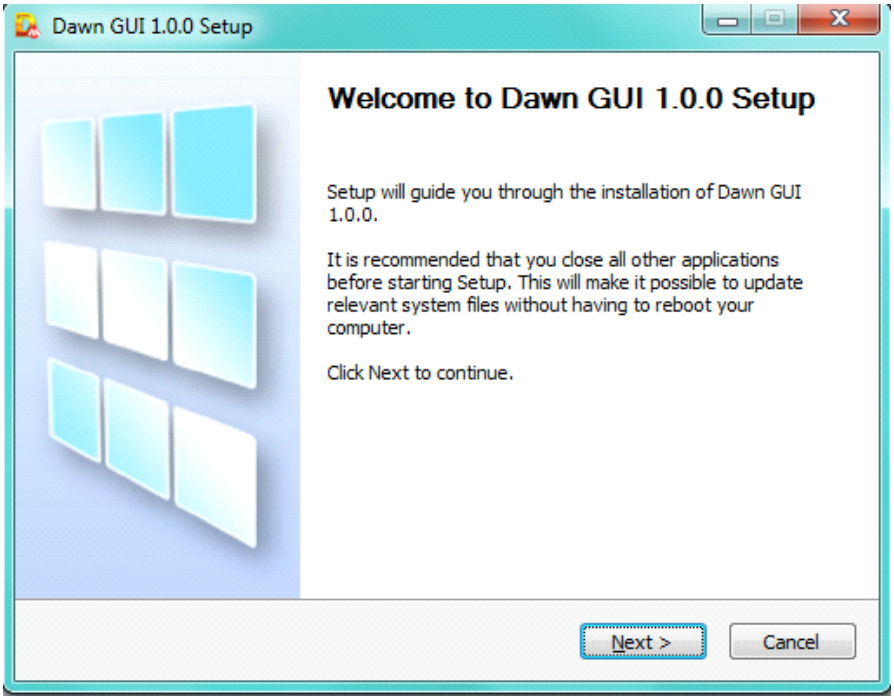
FIGURE 1-1: TYPICAL HARDWARE SETUP FOR DAWN GUI



1.2 INSTALLATION

The Dawn GUI can be downloaded from the Microchip website (www.microchip.com/dm160227). Unzip the file and run the Dawn 1.0 setup.exe; the installation process will start with Figure 1-2, and then follow the installation to finish the setup.

FIGURE 1-2: DAWN GUI INSTALLATION



1.3 COMMUNICATION PROTOCOL

The Dawn GUI is implemented as the host of a generic I^2C communication, which supports Read/Write byte and Read/Write block.

1.3.1 Write Byte

The Write Byte protocol is used to write one byte of data to a specific register as shown in Table 1-1.

TABLE 1-1: WRITE BYTE PROTOCOL

Start	Slave Address	W	ACK	Register Address	ACK	Register Address	ACK	Stop
1->0	0b101000	0	0	XXh	0	XXh	0	0->1

1.3.2 Read Byte

The Read Byte protocol is used to read one byte of data from the register shown in Table 1-3.

TABLE 1-2: READ BYTE PROTOCOL

Start	Slave Address	W	ACK	Register Address	ACK	Start	Slave Address	R	ACK	Register Data	Nack
1->0	0b101000	0	0	XXh	0	1->0	0b101000	1	0	XXh	1

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1.3.3 Write Block

The Write Block protocol is used to read multiple bytes to a group of contiguous registers as shown in Table 1-3.

TABLE 1-3: WRITE BLOCK PROTOCOL

Start	Slave Address	W	ACK	Register Address	ACK	Register Data	ACK	...	Register Data	ACK	Stop
1->0	0b101000	0	0	XXh	0	XXh	0	...	XXh	0	0->1
						data @ start address			data @ (start address + n)		

1.3.4 Read Block

The Read Block protocol is used to read multiple bytes from a group of contiguous registers as shown in Table 1-4.

TABLE 1-4: READ BLOCK PROTOCOL

Start	Slave Address	W	ACK	Register Address	ACK	Start	Slave Address	R	ACK	Register Address	ACK
1->0	0b101000	0	0	XXh	0	1->0	0b101000	1	0	XXh	0
...	Register data n	Nack	Stop						data @ (start address + n)		
...	XXh	1	0->1								

1.4 DATA INTERPRETATION

The data readout from the devices can be interpreted as different data type, including signed/unsigned 8-bit, 16-bit, 24-bit and 32-bit integer. More details will be discussed in the next chapter.

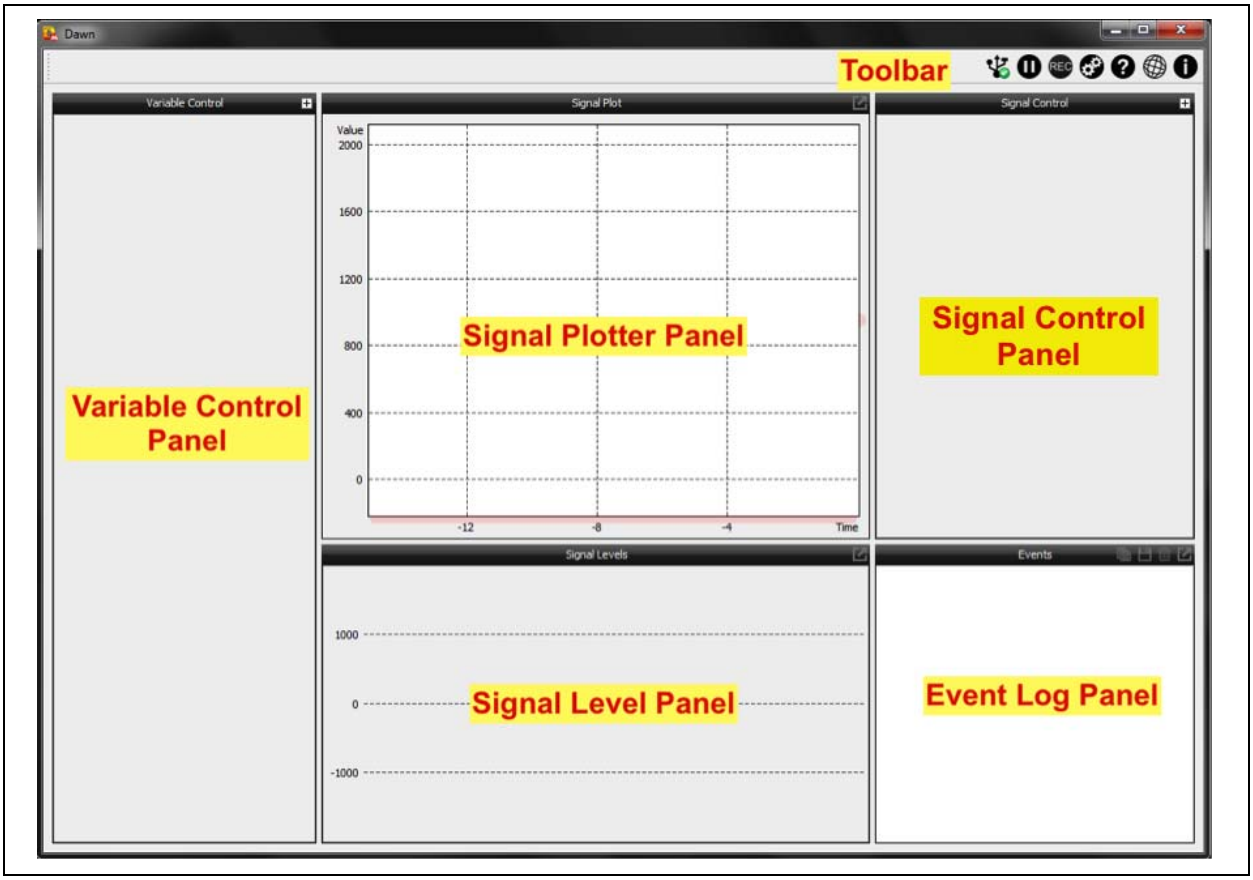
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Chapter 2. Dawn GUI Panel Layout and Operation

The Dawn GUI Main window consists of a toolbar and five panels as shown in Figure 2-1.

FIGURE 2-1: DAWN GUI MAIN WINDOW



The size of each panel can be adjusted by dragging the edge of the panel container.

2.1 TOOLBAR

The Toolbar is located at the top of the Main window, it contains six icons as shown below (see Figure 2-2):

FIGURE 2-2: TOOLBAR



The first icon is an indicator of hardware connection. If the GUI detects the target board, then it will have the green check signed on the icon, otherwise, the red cross sign will appear (see Figure 2-3).

FIGURE 2-3: CONNECTION ICON



Clicking this icon will pause the data display in the signal plotter and the level panel (see Figure 2-4).

FIGURE 2-4: PAUSE ICON



Clicking this icon will bring up a Setting window, which will be discussed in the next section (see Figure 2-5).

FIGURE 2-5: SETTING ICON



This is a quick link to this user's guide (see Figure 2-6).

FIGURE 2-6: USER'S GUIDE ICON



Clicking this icon will open up the link specified in the profile (the Dawn profile will be covered in **Section 2.7.3 "Device Profile Panel"**), as can be seen in Figure 2-7.

FIGURE 2-7: LINK ICON



Clicking this icon will bring up the Information window for the current GUI (see Figure 2-8).

FIGURE 2-8: INFORMATION ICON

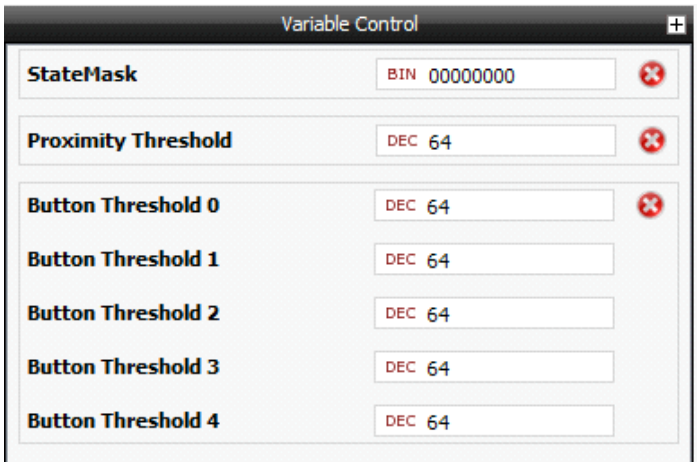


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2.2 VARIABLE CONTROL PANEL

The Variable Control Panel displays the register value at the location that is assigned by the user. Figure 2-9 shows an example of the mTouch evaluation kit.

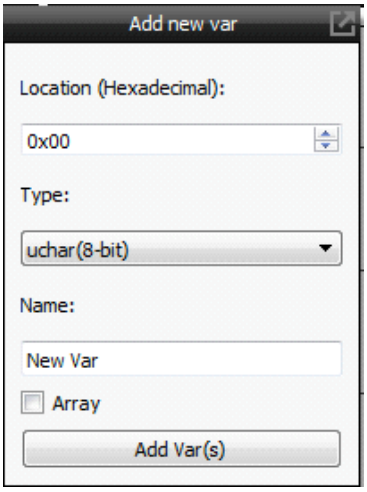
FIGURE 2-9: VARIABLE CONTROL PANEL



2.2.1 Add and Remove Variables

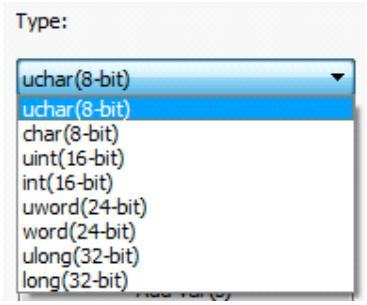
To add a variable to the panel, click the "**+**" on the top right corner. A window titled "Add new var" will be opened up as shown in Figure 2-10.

FIGURE 2-10: NEW VARIABLE WINDOW



The variable address, type and name will be assigned in this window. There are eight variable type options as shown in Figure 2-11.

FIGURE 2-11: VARIABLE TYPE LIST



By selecting a different variable type, the Dawn GUI will determine how many bytes need to be read from the target device. For instance, if "word (24-bit)" type is assigned to the address of 0x10, then the GUI will read three bytes from 0x10, 0x11 and 0x13 locations, and concatenate the three bytes following the little endian.

The "Array" checkbox is used to add an array variable and, as shown in Figure 2-11, the "Button Threshold" variables were added as char (8-bit) array.

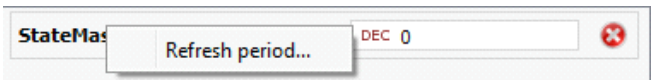
To remove any variable, click the cross icon to the right of the variable name.

Note 1:	The array is considered a group, so the remove operation will remove all the array members.

2.2.2 Read and Write Variable

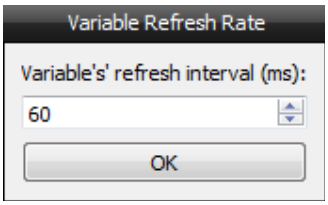
The GUI reads each variable from the target device at a fixed rate, and this rate can be altered by right clicking the variable name, as shown in Figure 2-12.

FIGURE 2-12: REFRESH PERIOD



Click **Refresh period**, and the refresh period can be changed in the window as shown in Figure 2-13.

FIGURE 2-13: REFRESH PERIOD SETTING



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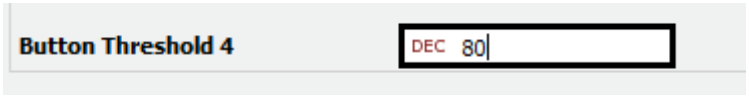
The GUI also allows displaying the variable in different formats, such as decimal, hexadecimal and binary. Clicking the red characters in front of the variable value will toggle the display format. The three display formats are shown in Figure 2-14.

FIGURE 2-14: TOGGLE DISPLAY FORMAT



The GUI supports writing variable value back to the target device. For example, set the mouse cursor into the textbox as shown in Figure 2-15, then the variable value can be edited. Hitting **Enter** on the keyboard will finalize the edit and write the value back to the target device.

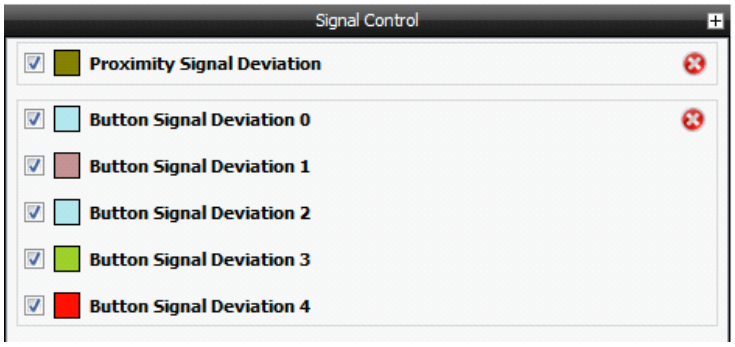
FIGURE 2-15: MODIFY REGISTER VALUE



2.3 SIGNAL CONTROL PANEL

The Signal Control Panel is very similar to the Variable Control Panel. It allows the user to observe the register value, but instead of displaying the value in digit format, the variable will be plotted in the Signal Plotter Panel and shown as a bar graph in the Signal Level panel (see Figure 2-16).

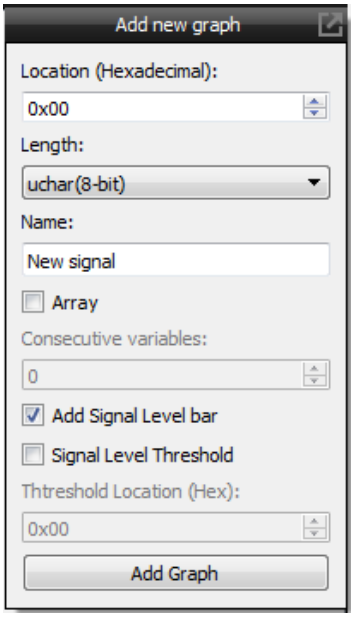
FIGURE 2-16: SIGNAL CONTROL PANEL



2.3.1 Add and Remove Signal

Clicking the "**+**" sign on the right top corner will bring up the window to specify the signal location, type and name as shown in Figure 2-17.

FIGURE 2-17: NEW SIGNAL WINDOW



The signal level bar is optional, and a horizontal threshold bar can also be added for each signal in the Signal Level Panel. Note that the threshold is also a value read from target device, not an arbitrary number that can be set in the GUI.
To remove any signal, click the **cross icon** to the right of the signal name, which is the same as the variable control.

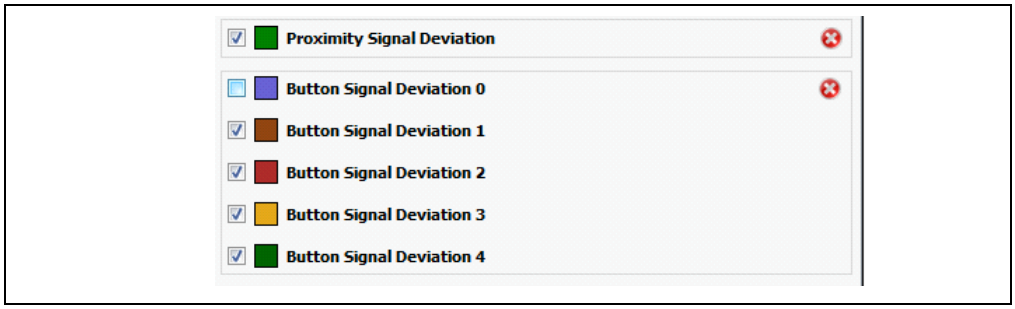
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2.3.2 Signal Display Control

Each signal will be assigned a color for plotter and level bar; the color indication is shown to the left of the signal names, and the refresh period of the signal can also be changed in the same fashion as the variable.

Unchecking the checkbox to the left of the signal color indication can temporarily disable the signal display. For example, the “Button Signal Deviation 0” signal display is disabled, as shown in Figure 2-18.

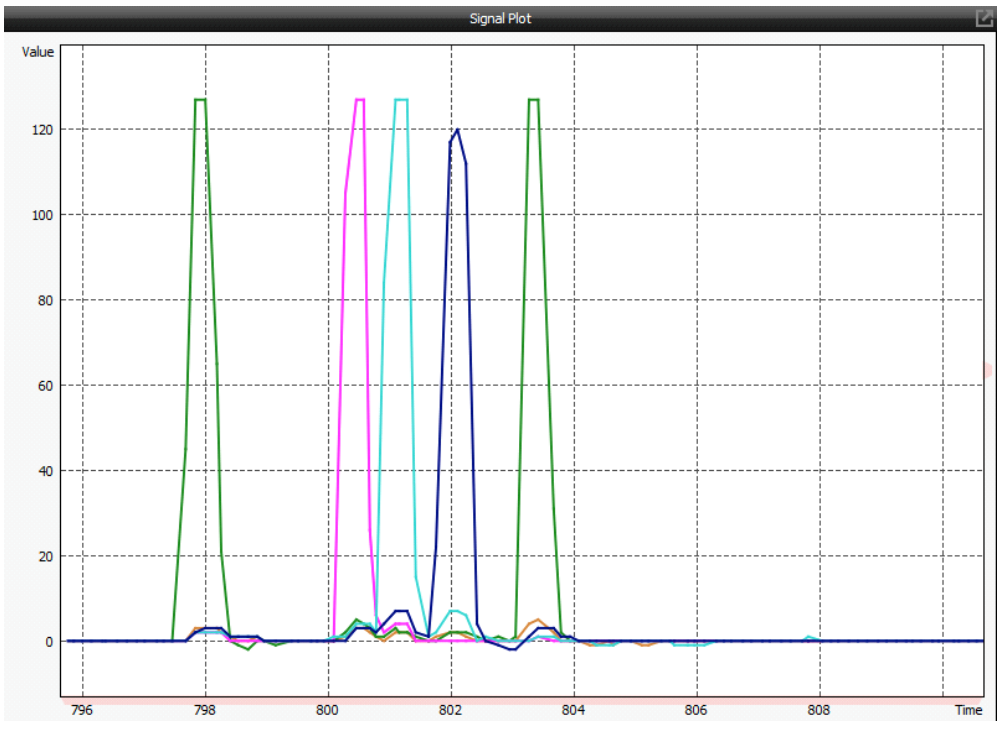
FIGURE 2-18: SIGNAL ENABLE WINDOW



2.4 SIGNAL PLOTTER PATTERN

The Signal Plotter Panel plots the signals that are enabled in the Signal Control Panel. Each signal is color-coded as shown in Figure 2-19.

FIGURE 2-19: SIGNAL PLOTTER PANEL



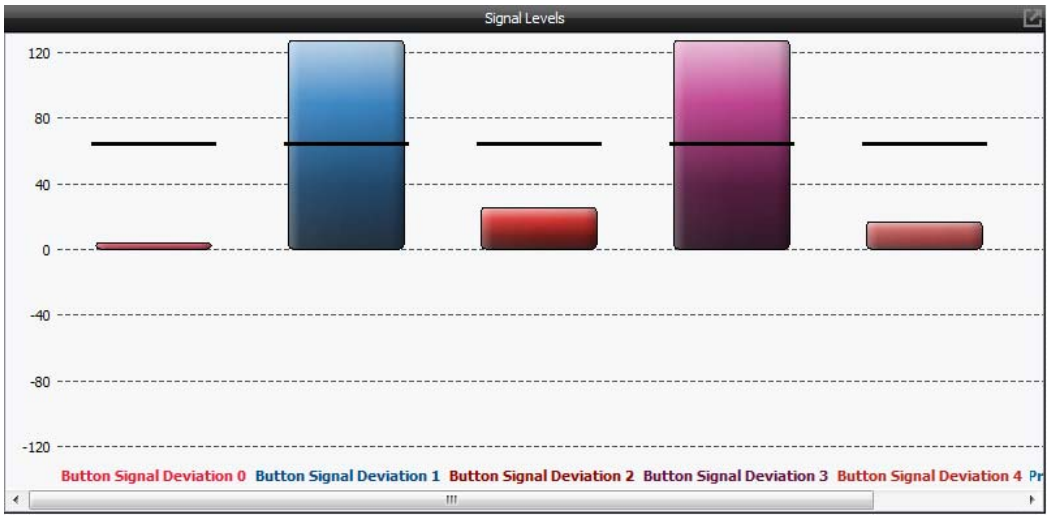
By default the plotter is in Auto-Zoom mode, which means the Y axis will be automatically adjusted, based of the signal value.

Scrolling up using the mouse wheel will zoom in the plotter, scrolling down will zoom out the plotter in the Y axis. Right clicking the plotter panel will restore the Auto-Zoom mode. For better observation, clicking the icon on the top right corner will put the plotter in Full-Screen mode.

2.5 SIGNAL LEVEL PLOTTER

The Signal Level Panel displays the signals in the bar graph as shown in Figure 2-20.

FIGURE 2-20: SIGNAL LEVEL PANEL



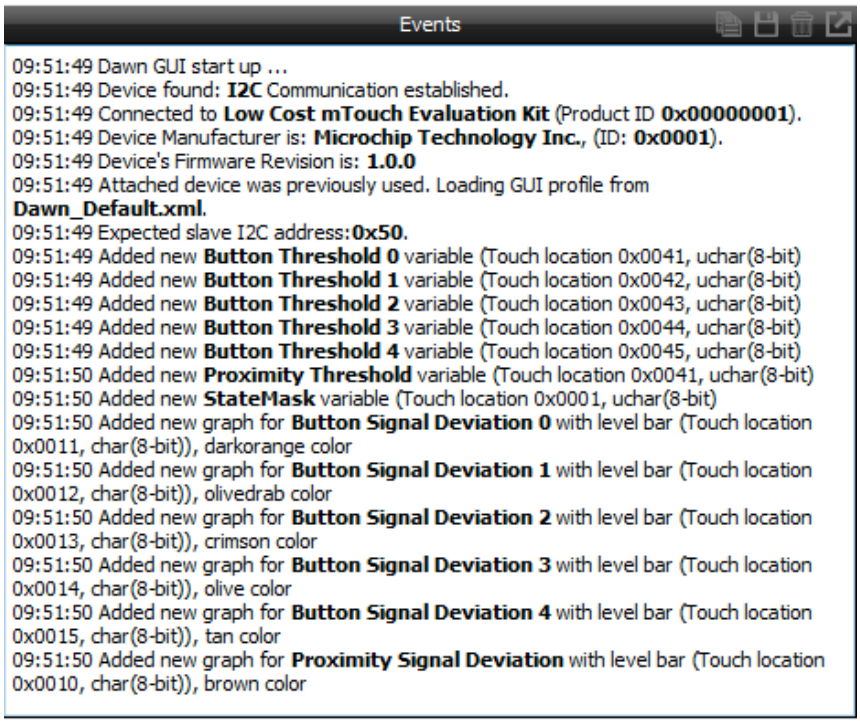
Similar to the Signal Plotter Panel, right clicking will auto-zoom the graph scale and Full-Screen mode can be enabled by clicking the icon on the top right corner.

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2.6 EVENT LOG PANEL

The Event Log panel records the board information and the signal operations as shown in Figure 2-21.

FIGURE 2-21: EVENT LOG PANEL

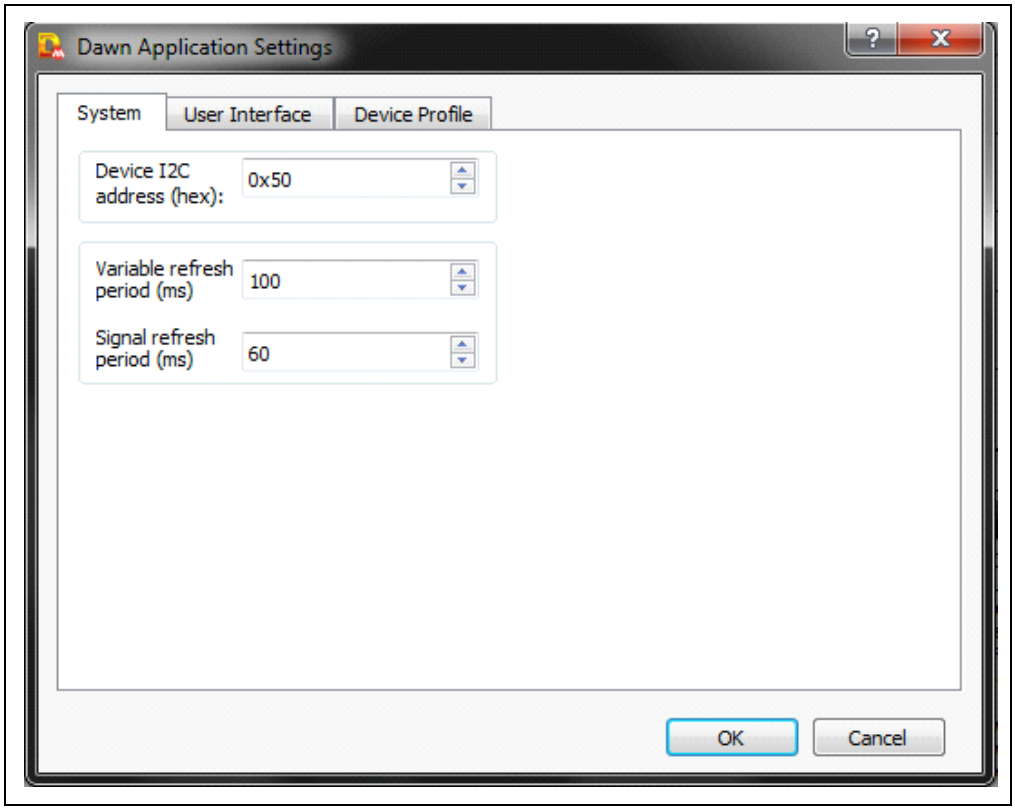


The events log can be saved to the system clipboard or to a .txt file by clicking the first two icons on the top right corner. The third icon will clear the Log window to give it a refresh start. The last icon is the same as in the Signal Plotter/Level Panel, which puts the panel into Full-Screen mode.

2.7 DAWN APPLICATION SETTING WINDOW

As mentioned in the Toolbar section, the 'Gear' icon will bring up the Dawn Application Settings window as shown in Figure 2-22.

FIGURE 2-22: DAWN APPLICATION SETTING WINDOW



2.7.1 System Tab

The **System** tab allows the user to change the expected target device address and refresh period of Variable and Signal display.

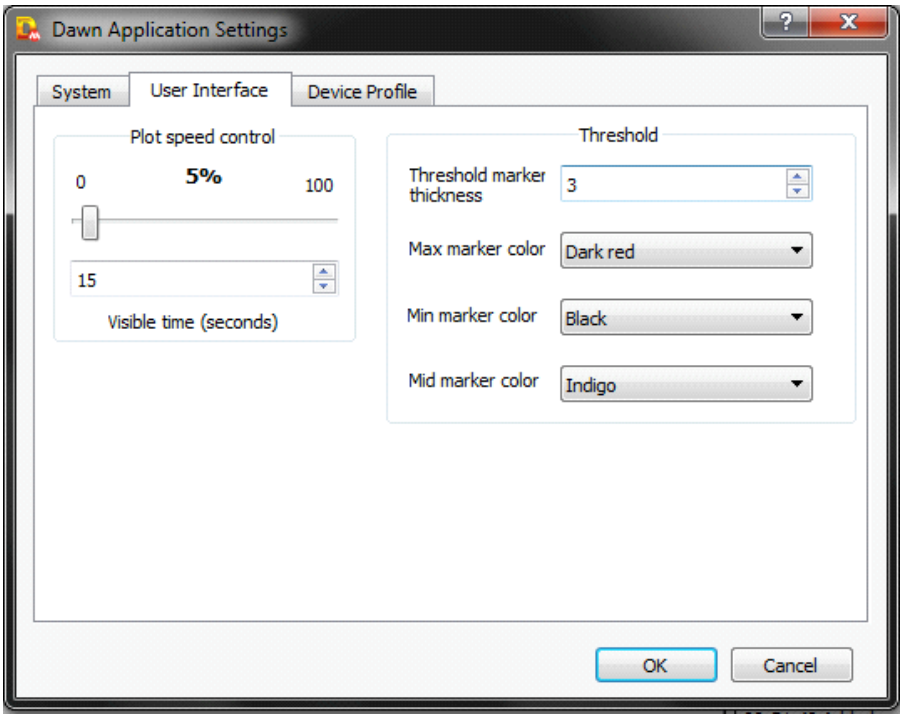
Note 1:	The I^2C address is in 8-bit format, which is the 7-bit address and a Read/Write bit.

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2.7.2 User Interface Tab

The **User Interface** tab controls how the signals are displayed as shown in Figure 2-23.

FIGURE 2-23: USER INTERFACE TAB

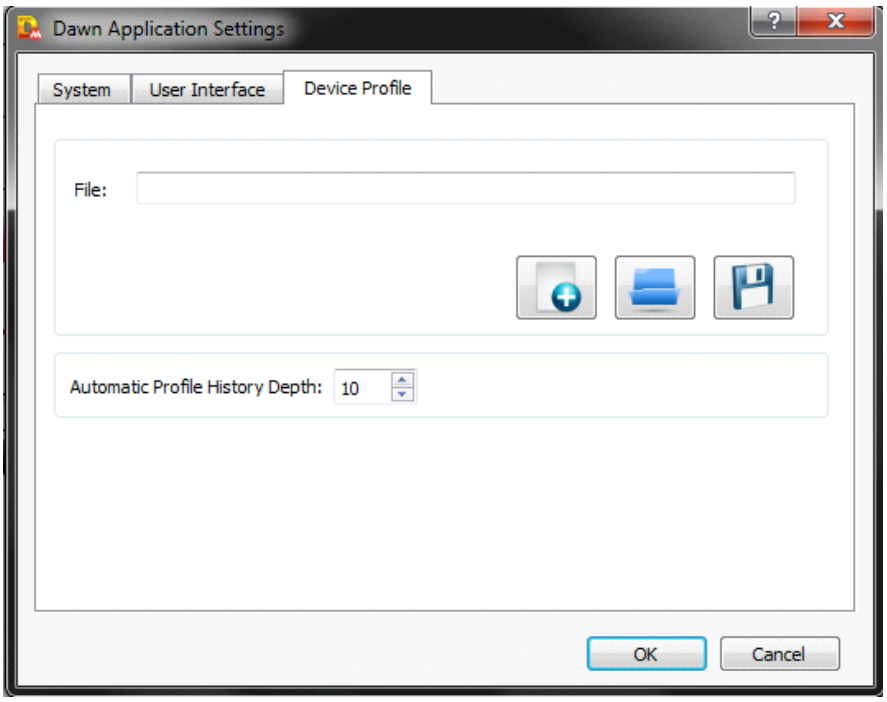


The plot speed control determines how many samples will be plotted in the Plotter window. The more visible time the user selects, the more samples the plotter displays, and the slower the plotter scrolls. The threshold container specifies the attributes for the threshold bar in the Signal Level Panel.

2.7.3 Device Profile Panel

The Device Profile Panel is a very handy feature, which eases the management of multiple profiles for different firmware/hardware.

FIGURE 2-24: DEVICE PROFILE PANEL



The profile of the Dawn GUI stores the device information and signal/variable configuration. Each time the user exits the Dawn GUI, the current information and configuration will be automatically stored in the `Dawn_default.xml` file in the installation folder, so next time the GUI can restore the last-time configuration.

At the same time, the user can save and load profiles manually through the **Device Profile** tab as shown in Figure 2-24.

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Fax: 480-792-7277
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ASIA/PACIFIC

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Harbour City, Kowloon

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Fax: 44-118-921-5820

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