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**MCP9984
Evaluation Board
User's Guide**

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NOTES:

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 MCP9984 Evaluation Board. Items discussed in this chapter include:

- [Document Layout](#)
- [Conventions Used in this Guide](#)
- [Recommended Reading](#)
- [The Microchip Website](#)
- [Product Change Notification Service](#)
- [Customer Support](#)
- [Document Revision History](#)

DOCUMENT LAYOUT

This document describes how to use the MCP9984 Evaluation Board as a development tool to emulate and debug firmware on a target board. The manual layout is as follows:

- **Chapter 1. “Product Overview”** – Important information about the MCP9984 Evaluation Board.
- **Chapter 2. “Installation and Operation”** – This chapter includes a detailed description of each function of the MCP9984 Evaluation Board and instructions on how to use it.
- **Chapter 3. “Software GUI Description”** – Includes instructions to evaluate the MCP9984 for temperature sensing applications.
- **Appendix 1. “Schematic and Layouts”** – Shows the schematic and layout diagrams for the MCP9984 Evaluation Board.
- **Appendix 1. “Bill of Materials (BOM)”** – Lists the parts used to build the MCP9984 Evaluation Board.

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CONVENTIONS USED IN THIS GUIDE

This manual uses the following documentation conventions:

DOCUMENTATION CONVENTIONS

Description	Represents	Examples
Arial font:		
Italic characters	Referenced books	<i>MPLAB® IDE User's Guide</i>
	Emphasized text	...is the <i>only</i> 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	<u><i>File>Save</i></u>
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	<i>file.o</i> , where <i>file</i> can be any valid filename
Square brackets []	Optional arguments	mcc18 [options] <i>file</i> [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 MCP9984 Evaluation Board. Another useful document is listed below. The following Microchip document is available and recommended as a supplemental reference resource:

- **MCP998X/MCP9933/MCP998XD/MCP9933D Data Sheet – “2-Wire, $\pm 1.0^{\circ}\text{C}$ Accurate Multichannel Automotive Temperature Monitor” (DS20006827).**

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

Customers should contact their distributor, representative or 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>

DOCUMENT REVISION HISTORY

Revision A (January 2024)

- Initial release of this document.

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NOTES:

Chapter 1. Product Overview

1.1 INTRODUCTION

This chapter provides an overview of the MCP9984 Evaluation Board and covers the following topics:

- [MCP9984 Device Short Overview](#)
- [What is the MCP9984 Evaluation Board?](#)
- [MCP9984 Evaluation Board Kit Contents](#)

1.2 MCP9984 DEVICE SHORT OVERVIEW

The MCP9984 Evaluation Board is used to evaluate the MCP998X family of remote diode temperature monitors. Users can now easily evaluate many of the integrated features of the MCP998X device family. The MCP9984 Evaluation Board has the MCP9984-A, which has the SMBus address decode capability. The MCP9984 Evaluation Board also has on-board connectors to allow for diode-connected transistors used for off-board temperature measurements.

In addition, the MCP9984 Evaluation Board connects to the PC through a USB interface. Temperature can be data-logged using the Microchip Thermal Management Software Graphical User Interface (GUI).

1.3 WHAT IS THE MCP9984 EVALUATION BOARD?

The MCP9984 Evaluation Board enables users to easily evaluate many custom programmable features such as Temperature Alert Limit settings, Temperature Conversion Rate, Resistance Error Correction (REC) and Power Modes.

[Figure 1-1](#) shows the top and bottom views of the MCP9984 Evaluation Board.

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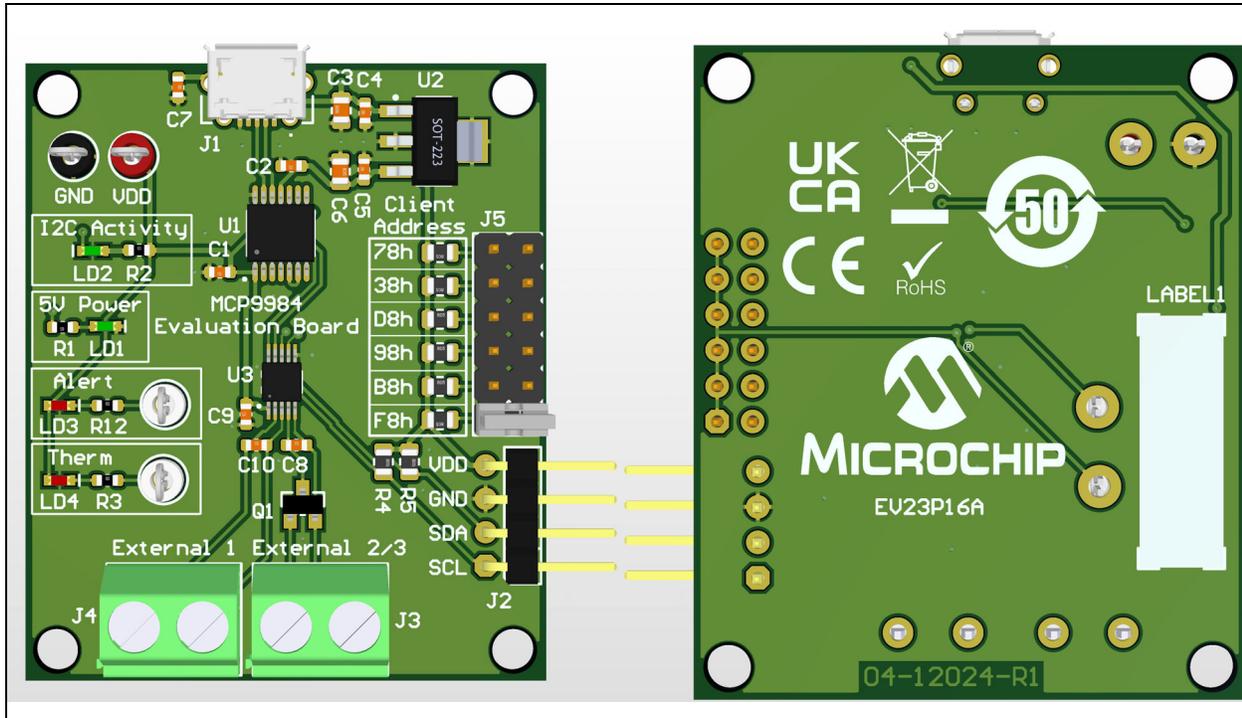


FIGURE 1-1: MCP9984 Evaluation Board - Top and Bottom Views.

1.4 MCP9984 EVALUATION BOARD KIT CONTENTS

The MCP9984 Evaluation Board Kit includes the following items:

- MCP9984 Evaluation Board (EV23P16A);
- USB cable for PC connectivity;
- (2) 2N3904TA transistor (TO-92 package).

Chapter 2. Installation and Operation

2.1 GETTING STARTED

This chapter describes how to power-up and interface with the MCP9984 Evaluation Board device. Items discussed in this chapter include:

- [System and Configuration Requirements](#)
- [MCP9984 Evaluation Board Setup](#)
- [Software Setup](#)

2.2 SYSTEM AND CONFIGURATION REQUIREMENTS

The MCP9984 Evaluation Board is designed to be used with a personal computer (desktop or laptop) running Microsoft® Windows® XP or later. For USB connectivity, the minimal physical requirement for the PC is a standard type-A USB 2.0 port.

2.3 MCP9984 EVALUATION BOARD SETUP

Before the MCP9984 Evaluation Board can be used, a few steps must be performed to install the PC software and configure the MCP9984 Evaluation Board's hardware.

1. Download the support material (PC application) that can be found on the EV23P16A board page, at www.microchip.com. Unzip the archive and install the executable.
2. When evaluating the MCP9984, ensure a jumper is populated at J5 to select the address decode resistance. Use [Table 2-1](#) as a reference.

TABLE 2-1: MCP9984 ADDRESS DECODE

Resistance Selected at J5	SMBus Address
4.7 kΩ	1111_100 (r/w)b
6.8 kΩ	1011_100 (r/w)b
10 kΩ	1001_100 (r/w)b
15 kΩ	1101_100 (r/w)b
22 kΩ	0011_100 (r/w)b
33 kΩ	0111_100 (r/w)b

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2.3.1 Hardware Setup and Description

Follow these steps to set up the hardware:

1. The MCP9984 Evaluation Board kit provides a micro-USB cable for PC interface. Connect the USB cable to a PC.
2. Start the Thermal Management Software GUI to evaluate the sensor board features.

This MCP9984 Evaluation Board is fully powered from PC USB source at 5V. Once power is applied via USB and the USB is successfully enumerated, then the MCP2221A USB to I²C Bridge is ready to receive commands from the host PC to program the MCP9984 Evaluation Board settings or transfer temperature data.

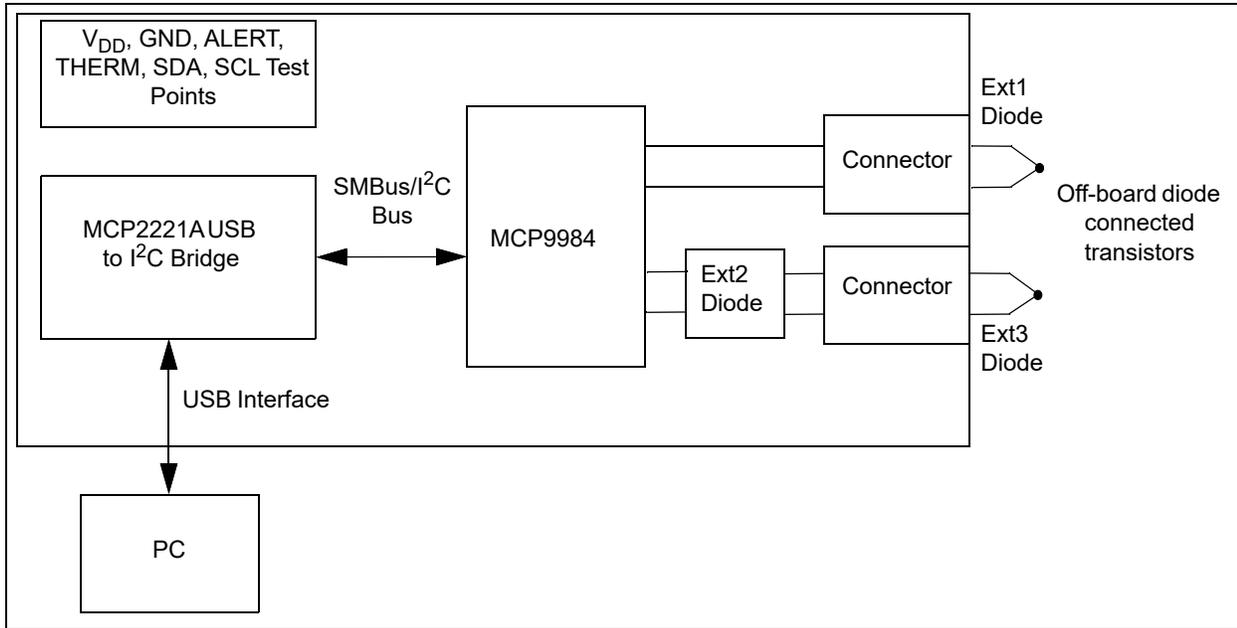


FIGURE 2-1: MCP9984 Evaluation Board Circuit Block Diagram.

The block diagram in [Figure 2-1](#) shows that the MCP9984 device is able to monitor and report the ambient temperature of three external diode-connected transistors. One diode is installed on the PCB for the MCP9984. Two-pin connectors allow the user to connect additional transistors to the MCP9984 for evaluation of off-board temperature applications. The Alert and Therm outputs, SDA, SCL and V_{DD} are connected to test points for external connections.

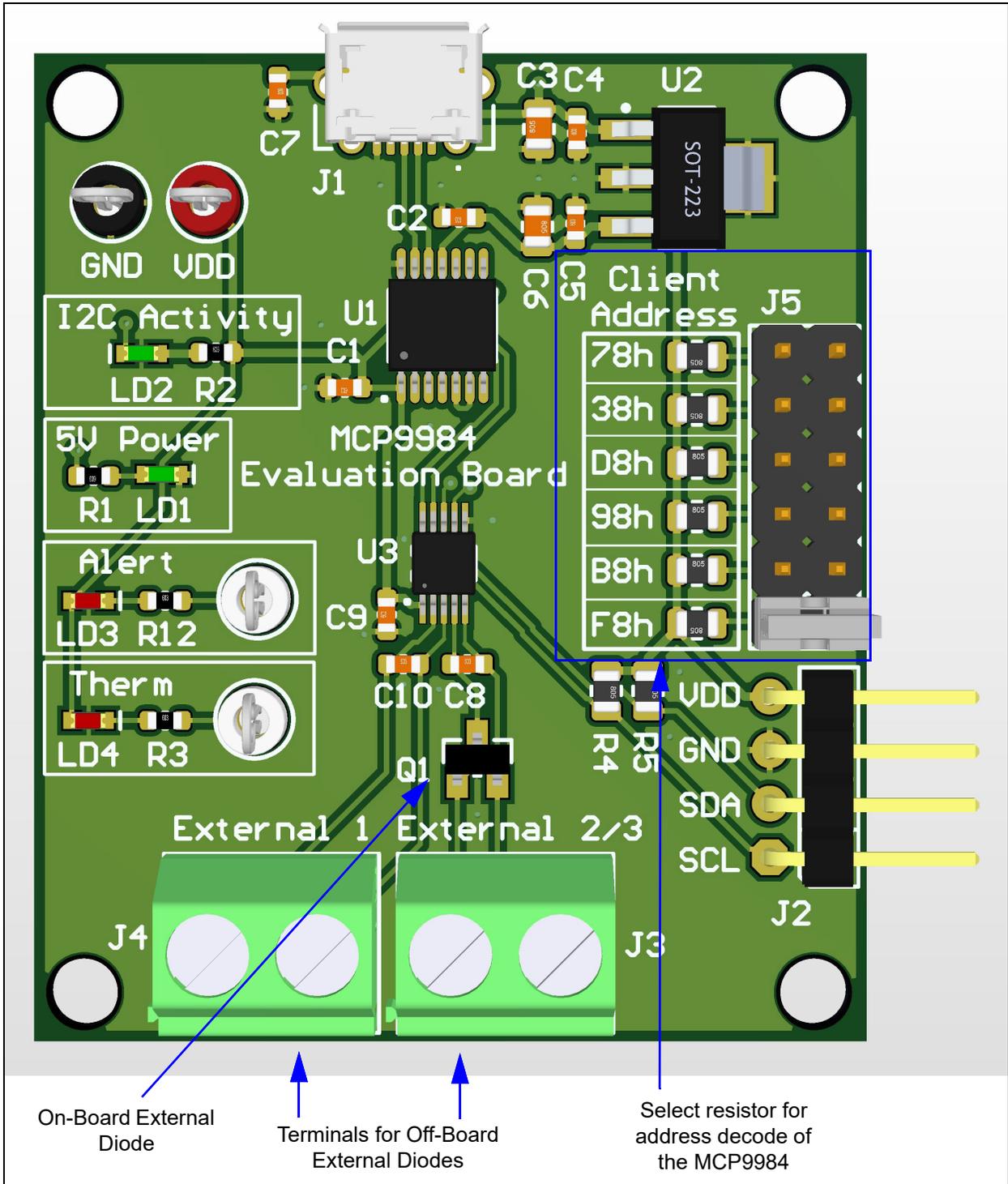


FIGURE 2-2: Top view of the MCP9984 Evaluation Board with Component Descriptions.

Figure 2-2 shows the top view of the MCP9984 Evaluation Board. See Table 2-2 for a more detailed description of each component.

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TABLE 2-2: COMPONENT DESCRIPTIONS

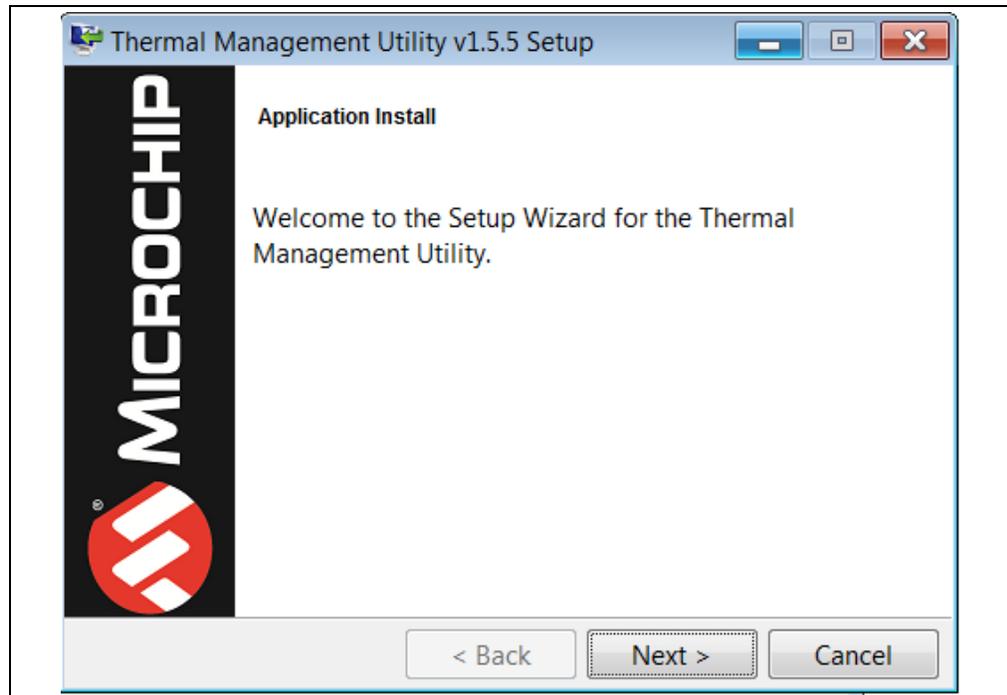
Component Name	Description
VDD	3.3V
GND	Ground
Alert	Test point for the ALERT pin
Therm	Test point for the THERM pin
J1	Micro-USB Connection
J2	I2C/SMBus Connections
J3	Terminal connection for External Channel 3 off-board diode connected transistor
J4	Terminal connection for External Channel 1 off-board diode connected transistor
J5	Address decode selection
Q1	On-board diode connected transistor for External Channel 2
U1	MCP2221A: USB to I2C Bridge
U2	MCP1703/3.3V: 3.3V Voltage regulator
U3	MCP9984: Temperature sensor device

2.4 SOFTWARE SETUP

Follow these steps to complete the Microchip Thermal Management Utility software installation and setup:

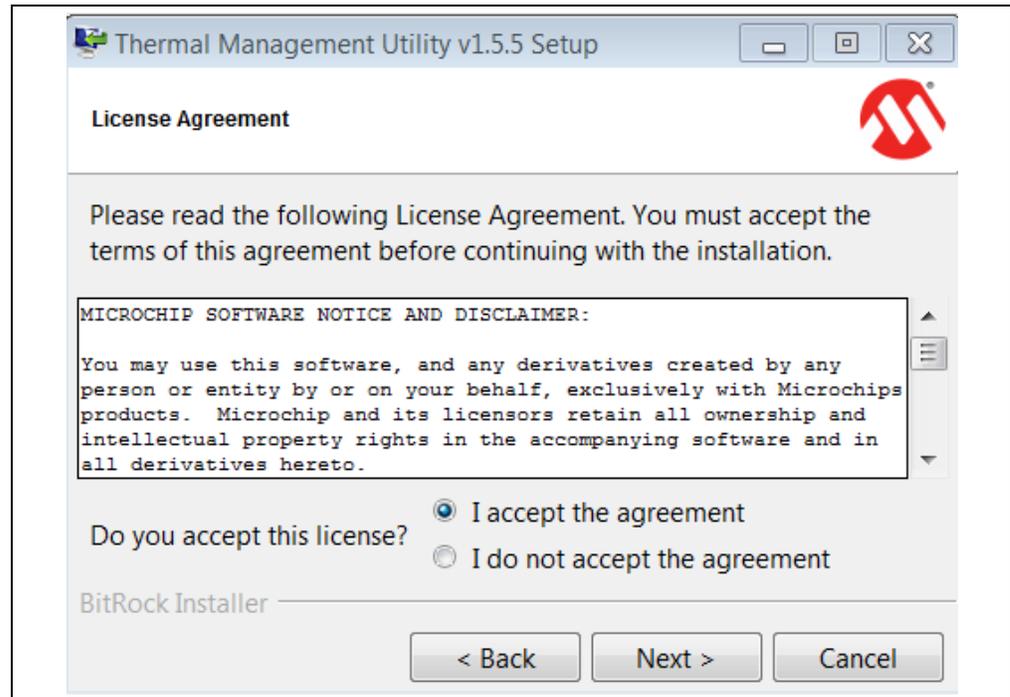
1. Open the `Thermal Management Utility.exe` then click **Next** in the Application Install window.

FIGURE 2-3: APPLICATION INSTALL DIALOG BOX



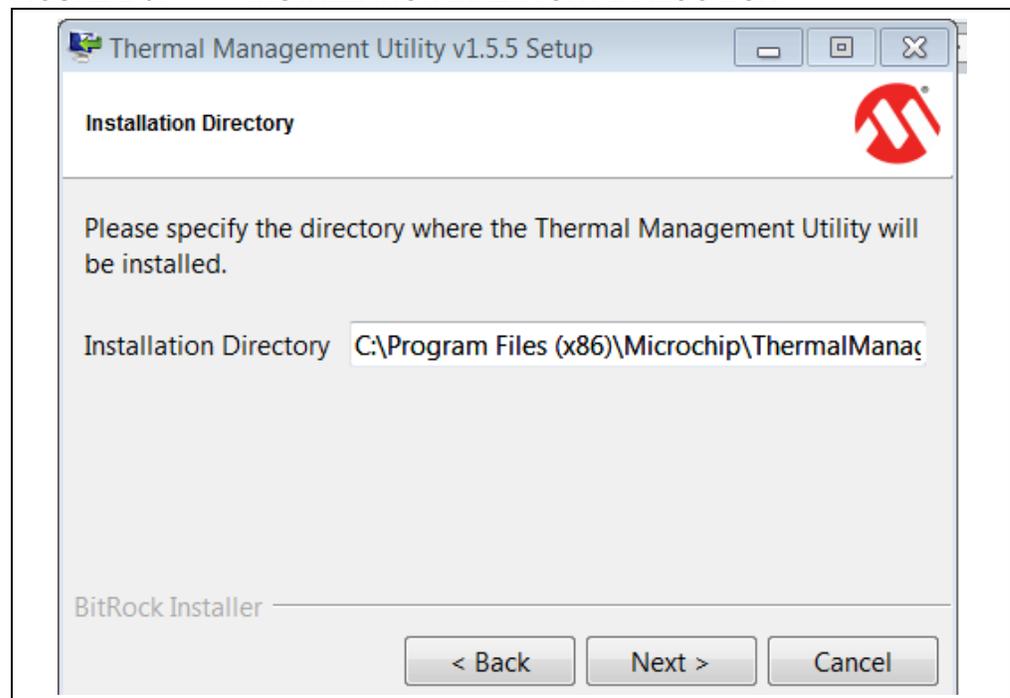
2. **Read** and **Accept** the License Agreement, then click **Next**.

FIGURE 2-4: LICENSE AGREEMENT DIALOG BOX



3. Select an installation directory and click **Next**. A default installation directory is provided.

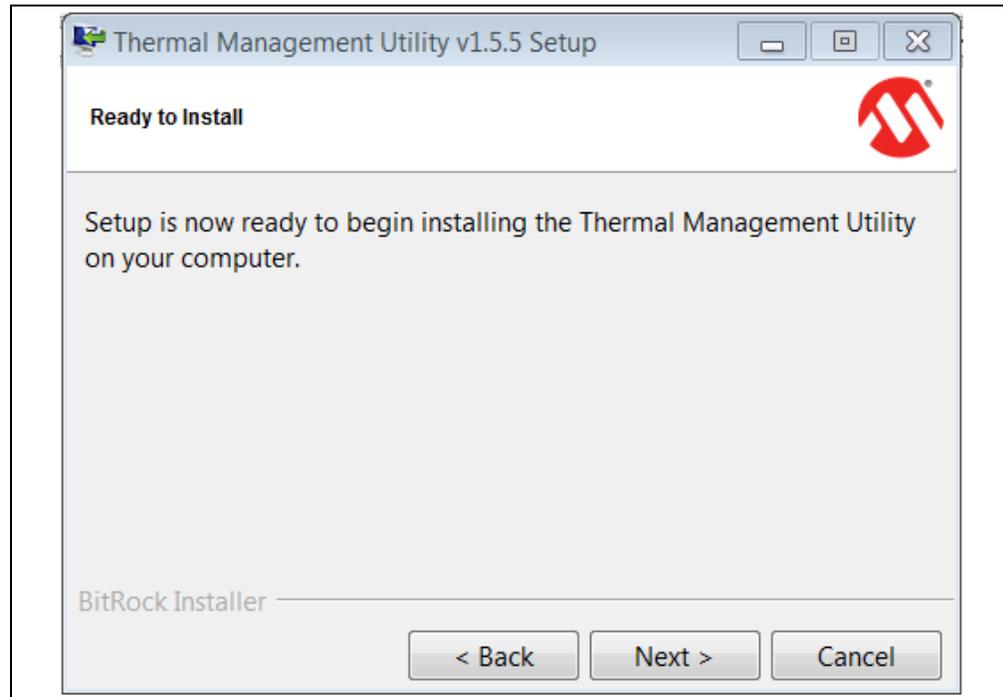
FIGURE 2-5: INSTALLATION DIRECTORY DIALOG BOX



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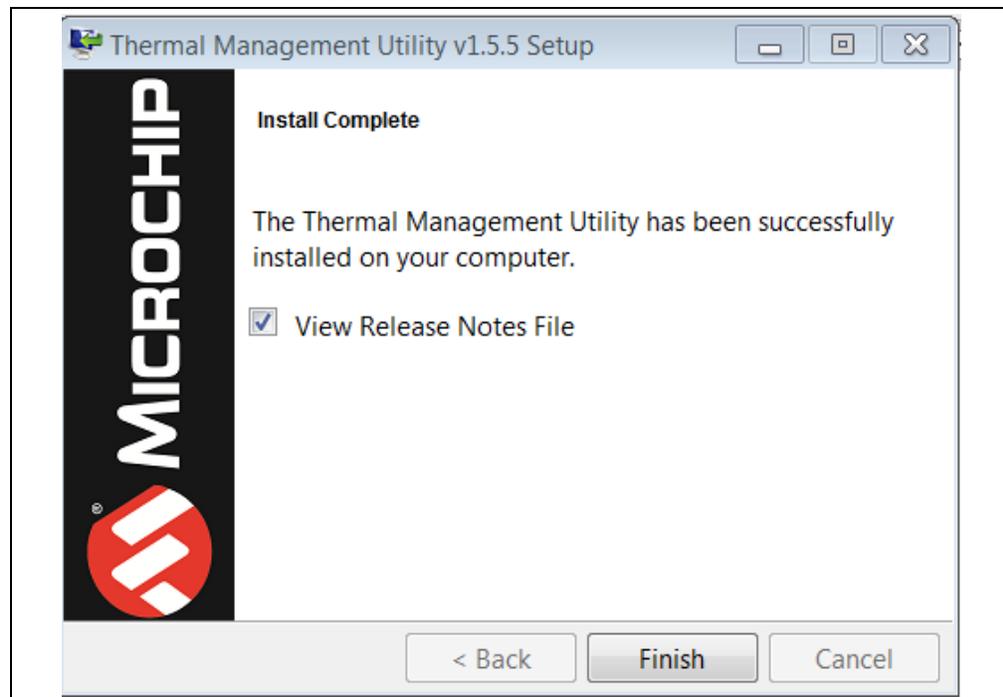
4. Select **Next** to install the Microchip Thermal Management Utility.

FIGURE 2-6: READY TO INSTALL DIALOG BOX



5. In the **Install Complete** dialog box click **Finish** to finalize installation.

FIGURE 2-7: INSTALL COMPLETE DIALOG BOX



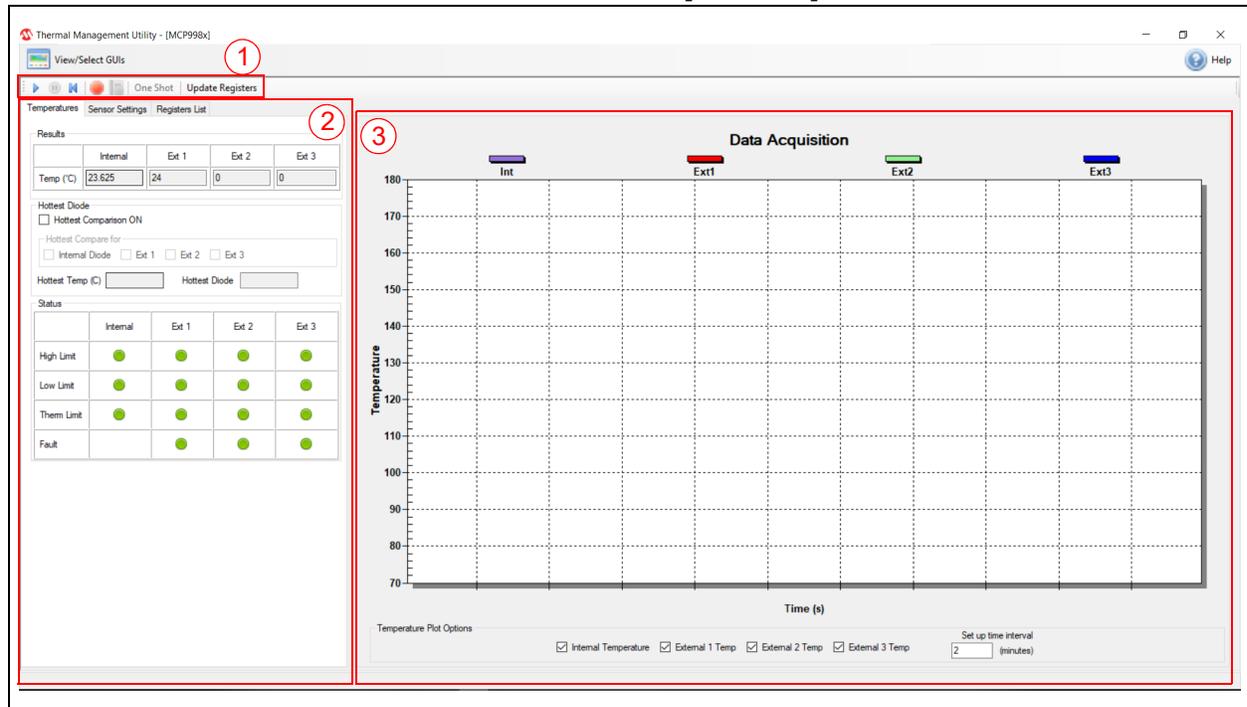
Chapter 3. Software GUI Description

3.1 THERMAL MANAGEMEN UTILITY - [MCP9984] SOFTWARE GUI OVERVIEW

The Microchip Thermal Management Software GUI allows users to evaluate the MCP9984 for temperature sensing applications. Once the hardware is connected, the software recognizes the board ID and displays the corresponding GUI for the MCP9984 Evaluation Board. Disconnecting the USB closes the GUI. This tool enables users to evaluate the sensor features and perform temperature data-logging.

Figure 3-1 depicts the Thermal Managemen Utility - [MCP9984] GUI.

FIGURE 3-1: THERMAL MANAGEMEN UTILITY - [MCP9984] GUI



As displayed in Figure 3-1, the GUI can be divided into three sections as follows:

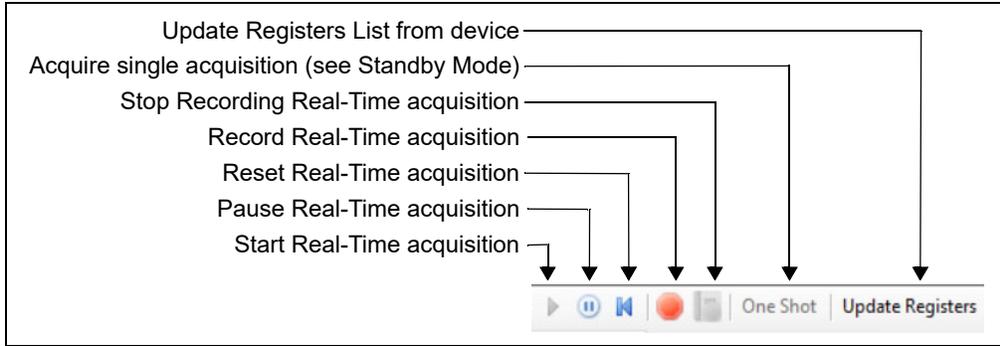
1. Real-Time Acquisition action buttons
2. Temperatures, Sensor Settings and Registers List tabs
3. Data Acquisition Charting area

The features and functionality of the GUI are described below.

3.2 REAL-TIME ACQUISITION ACTION BUTTONS

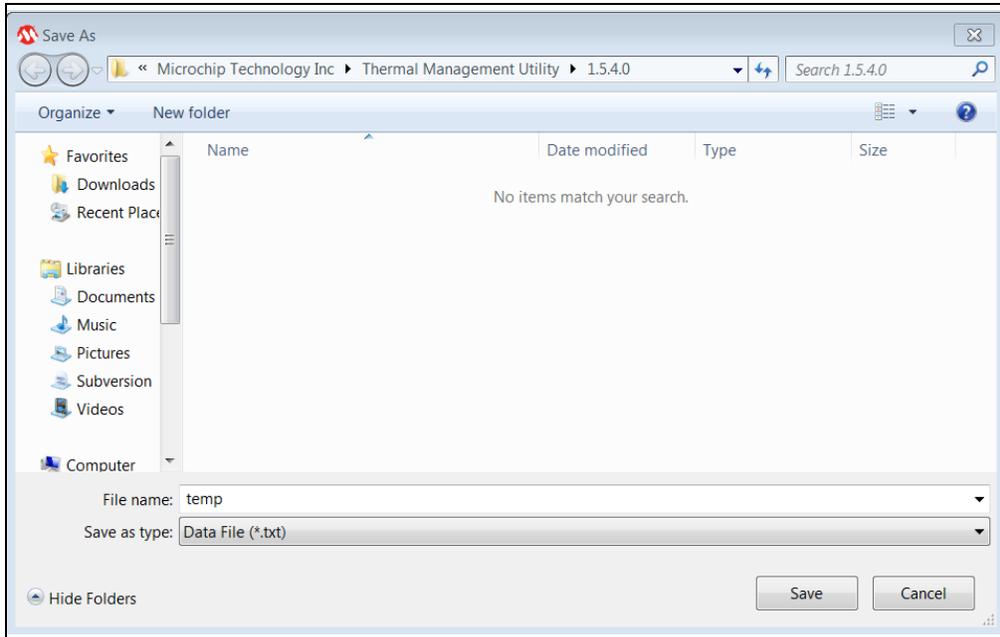
The **Play**, **Pause** and **Reset** icons (Figure 3-2) can be used to perform continuous data acquisitions.

FIGURE 3-2: REAL-TIME ACQUISITION BUTTONS



To initiate data logging, click the **Record Acquisitions** button (red button). The system displays the Save As window (see [Figure 3-3](#)), where users must select a file name and a location, then click the **Save** button.

FIGURE 3-3: SAVE AS WINDOW FOR RECORDING ACQUISITIONS



To stop the data logging click the **Stop Recording** button. Users can now go to the file's location to view the file.

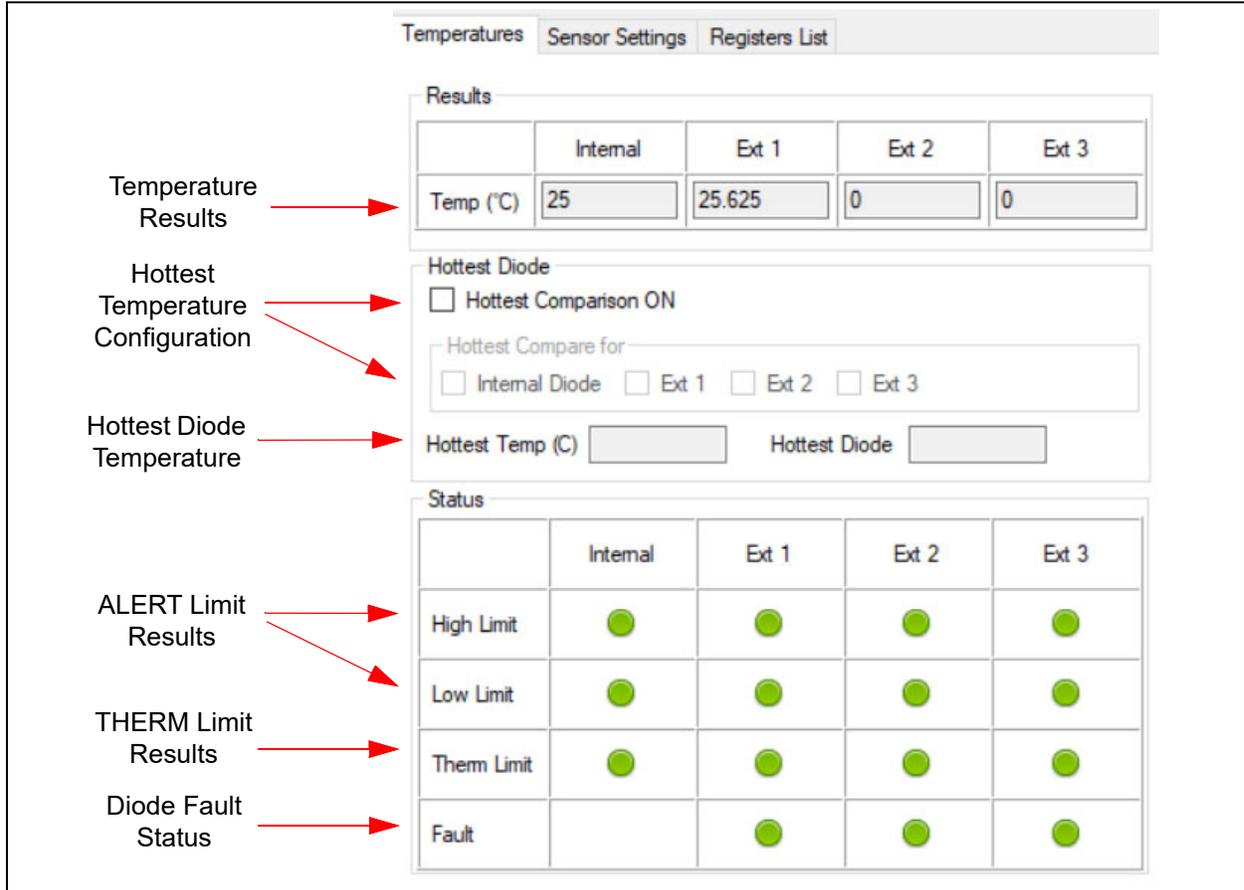
Clicking the Update Registers button updates the GUI with all the registers of the selected device (see the **Registers List** tab for all register values).

3.3 TEMPERATURES, SENSOR SETTINGS AND REGISTERS LIST TABS

3.3.1 Temperatures Tab

The **Temperatures** tab displayed in [Figure 3-4](#) shows the results of the MCP9984 temperature channels. This tab also displays the results of the various user programmable features of the MCP9984 Evaluation Board, such as the temperature ALERT and THERM status, Diode Fault status and hottest diode comparison.

FIGURE 3-4: TEMPERATURES TAB



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3.3.2 Sensor Settings Tab

The Sensor Settings tab is divided into two sections:

- [General Settings](#)
- [Beta & Ideality](#)

3.3.2.1 GENERAL SETTINGS

Figure 3-5 displays the **General Settings** section under the **Sensor Settings** tab. This is where the user configures various features of the device.

Refer to the MCP998X data sheet for detailed information on the operation of these features and settings.

FIGURE 3-5: SENSOR SETTINGS TAB - GENERAL SETTINGS

Select or clear the check boxes to enable and disable features

Temperature hysteresis value for ALERT and THERM

I2C/SMBus Settings

ALERT/THERM Limits

Set output type as comparator or interrupt

Mask the alert signal for all temperature channels and ROC events

Mask the alert signal for specific temperature channels

Temperatures | Sensor Settings | Registers List

Beta & Ideality | General Settings

Sensor Settings

- Dynamic Averaging On
- REC D1/D2 On
- Anti Parallel Diode On

Therm Hysteresis: 10

I2C/SMBus Settings

- SMBus PEC On
- I2C Timeout On

Active Mode: Run

Range (C): 0..127.875

Consecutive Alert: 1

Consecutive Them: 4

Conversion Rate: 4

Ext 1 Filter: Disabled

	Internal	Ext 1	Ext 2	Ext 3
High	85	85	85	0
Low	0	0	0	0
Them	85	85	85	0

Alerts

- Mask All
- Alert Pin Mode: Interrupt

Mask Individual Settings

- Internal Diode
- Ext Diode 1
- Ext Diode 2
- Ext Diode 3

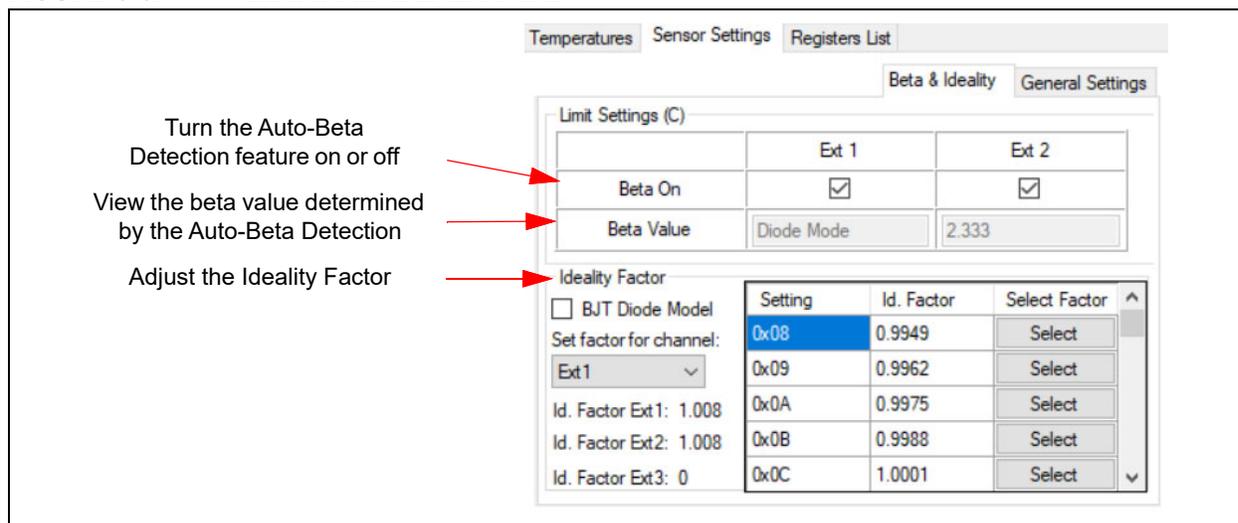
3.3.2.1.1 Standby Mode (One Shot)

Selecting **Standby** in the Active Mode drop-down menu puts the selected device in Standby mode. While in this mode, the device does not continuously acquire new data acquisitions. Instead, the device only acquires data when a One Shot command is issued. This is done by clicking on the **One Shot** button in the Real-Time Acquisition Action Buttons bar.

3.3.2.2 BETA & IDEALITY

Figure 3-6 displays the **Beta and Ideality** tab under the **Sensor Settings** tab. In this section, the user can manage the Auto-Beta Detection feature and ideality factor of the selected device. The Beta Value, which is determined by the device, is read-only. The ideality factor can be changed by the user.

FIGURE 3-6: BETA AND IDEALITY TAB



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3.3.3 Registers List Tab

The **Registers List** tab (Figure 3-7) contains a read/write table that contains all the user registers.

3.3.3.1 READING AND WRITING TO REGISTERS

Read

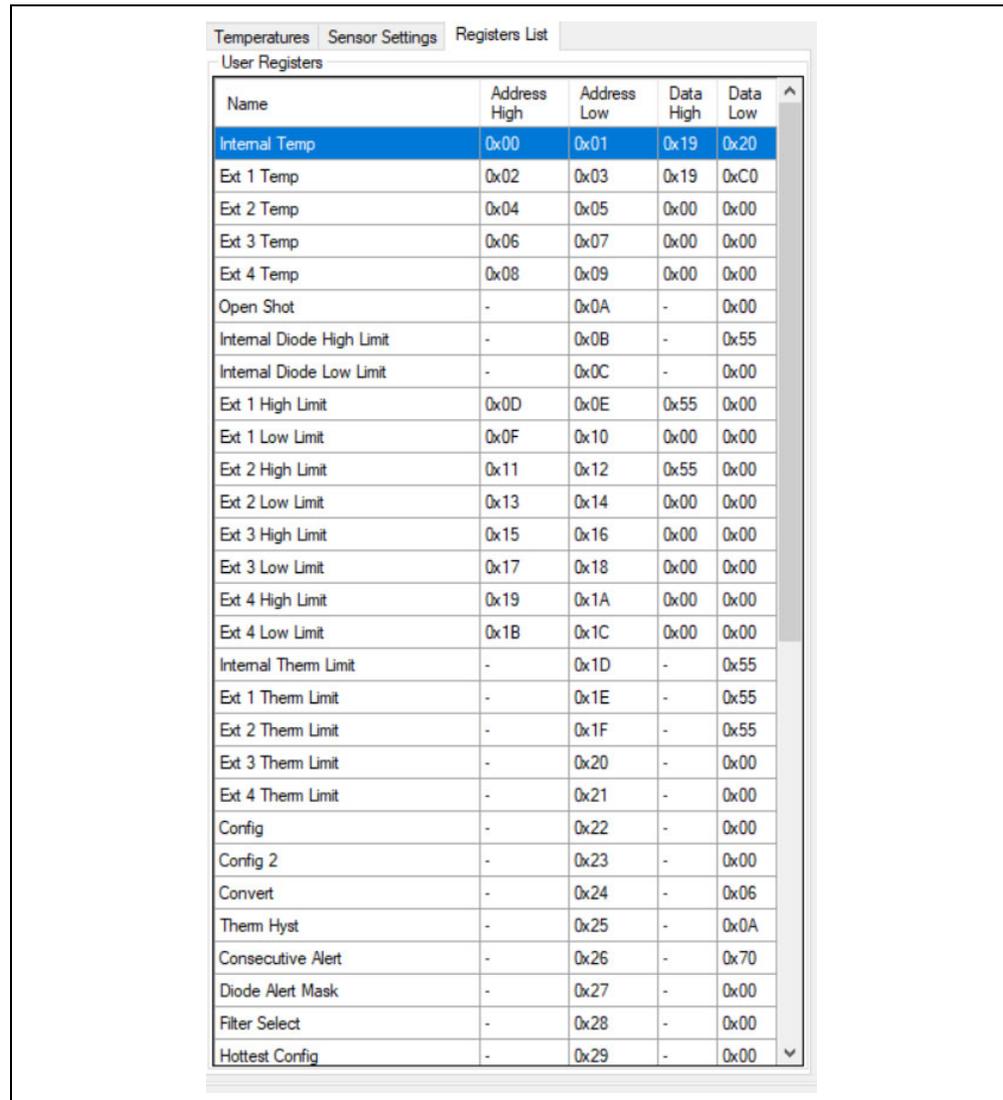
To read all registers, simply click the **Update Registers** button at the top of the GUI.

To read an individual register, highlight the row of the register that you want to read, right-click, then select read.

Write

To write to a register, enter the value you wish to write to the corresponding Data High or Data Low cell. Then, click out of the cell and highlight the entire row, including the cell that was just written to. Then, right-click and select write. If the cell that is being written to is not highlighted blue with the rest of the row, the write function does not take place.

FIGURE 3-7: REGISTERS LIST TAB

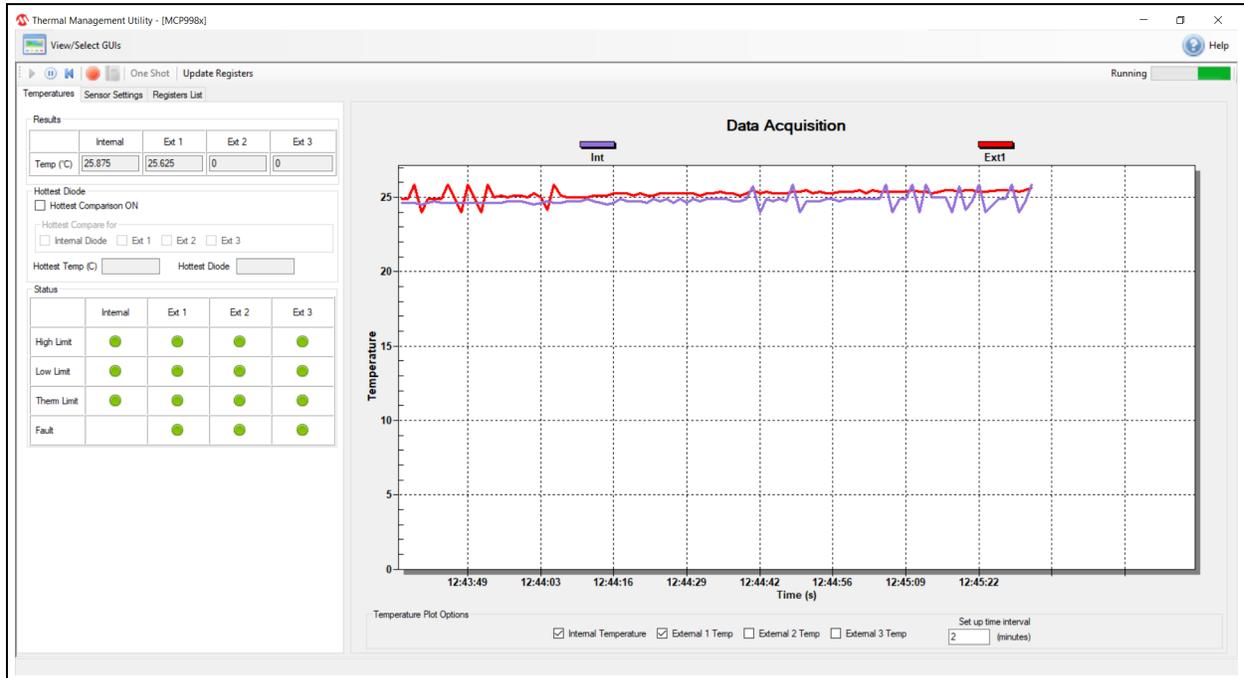


Name	Address High	Address Low	Data High	Data Low
Internal Temp	0x00	0x01	0x19	0x20
Ext 1 Temp	0x02	0x03	0x19	0xC0
Ext 2 Temp	0x04	0x05	0x00	0x00
Ext 3 Temp	0x06	0x07	0x00	0x00
Ext 4 Temp	0x08	0x09	0x00	0x00
Open Shot	-	0x0A	-	0x00
Internal Diode High Limit	-	0x0B	-	0x55
Internal Diode Low Limit	-	0x0C	-	0x00
Ext 1 High Limit	0x0D	0x0E	0x55	0x00
Ext 1 Low Limit	0x0F	0x10	0x00	0x00
Ext 2 High Limit	0x11	0x12	0x55	0x00
Ext 2 Low Limit	0x13	0x14	0x00	0x00
Ext 3 High Limit	0x15	0x16	0x00	0x00
Ext 3 Low Limit	0x17	0x18	0x00	0x00
Ext 4 High Limit	0x19	0x1A	0x00	0x00
Ext 4 Low Limit	0x1B	0x1C	0x00	0x00
Internal Them Limit	-	0x1D	-	0x55
Ext 1 Them Limit	-	0x1E	-	0x55
Ext 2 Them Limit	-	0x1F	-	0x55
Ext 3 Them Limit	-	0x20	-	0x00
Ext 4 Them Limit	-	0x21	-	0x00
Config	-	0x22	-	0x00
Config 2	-	0x23	-	0x00
Convert	-	0x24	-	0x06
Them Hyst	-	0x25	-	0x0A
Consecutive Alert	-	0x26	-	0x70
Diode Alert Mask	-	0x27	-	0x00
Filter Select	-	0x28	-	0x00
Hottest Config	-	0x29	-	0x00

3.4 DATA ACQUISITION CHARTING AREA

Figure 3-8 shows the Data Acquisition interface with a plot of the MCP9984 Evaluation Board's temperature channels.

FIGURE 3-8: MICROCHIP THERMAL MANAGEMENT UTILITY GUI DATA PLOT

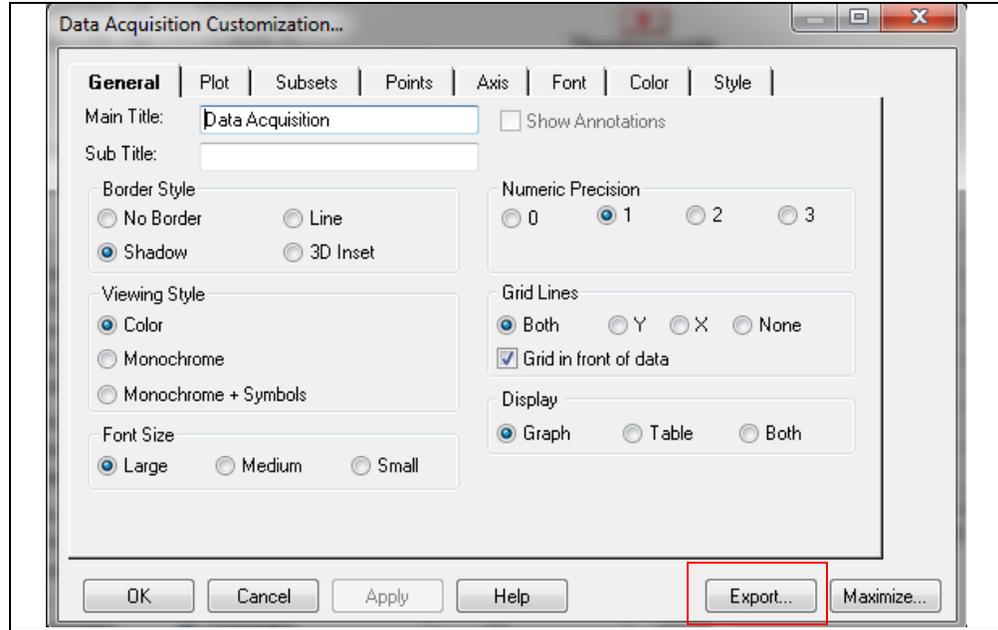


The logging interval can be adjusted using the interval scroll bar from 100 ms to 30s, as shown in Figure 3-8.

The data acquisition charting area (Figure 3-8) can be customized by double clicking the chart. Performing this action opens the Data Acquisition Customization window, shown in Figure 3-9.

Users can also zoom into a specific plot range by clicking and dragging the section. The data in the chart can also be exported by right-clicking the plot and selecting the **Export dialog** button.

FIGURE 3-9: DATA ACQUISITION CUSTOMIZATION WINDOW



3.4.0.1 DATA ACQUISITION CUSTOMIZATION WINDOW DESCRIPTION

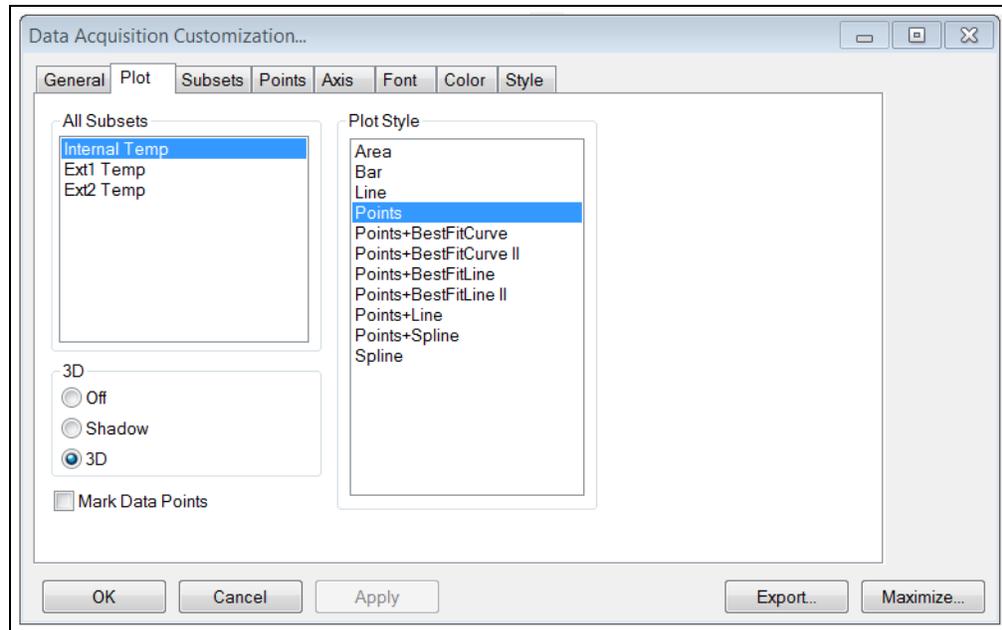
The **Data Acquisition Customization** window contains eight tabs with several options allowing users to customize the data acquisition charting area.

The **General** tab (Figure 3-9) determines how the data acquisition charting area is displayed. General options include the border style, viewing style, font size, numeric precision and grid lines.

The **Display** option determines how the data acquisition charting area is generated: a graph, a table, or both.

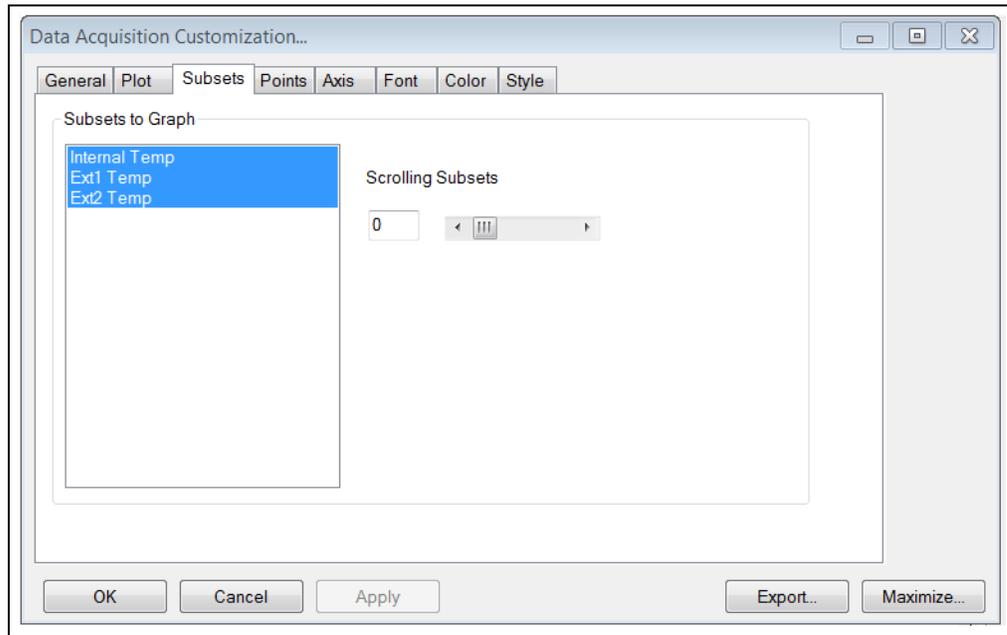
The **Plot** tab, displayed in Figure 3-10, allows users to customize the appearance of the data sensor plots.

FIGURE 3-10: DATA ACQUISITION CUSTOMIZATION - PLOT TAB



Users can also control the appearance of the subsets plots using the **Subsets** tab, displayed in [Figure 3-11](#).

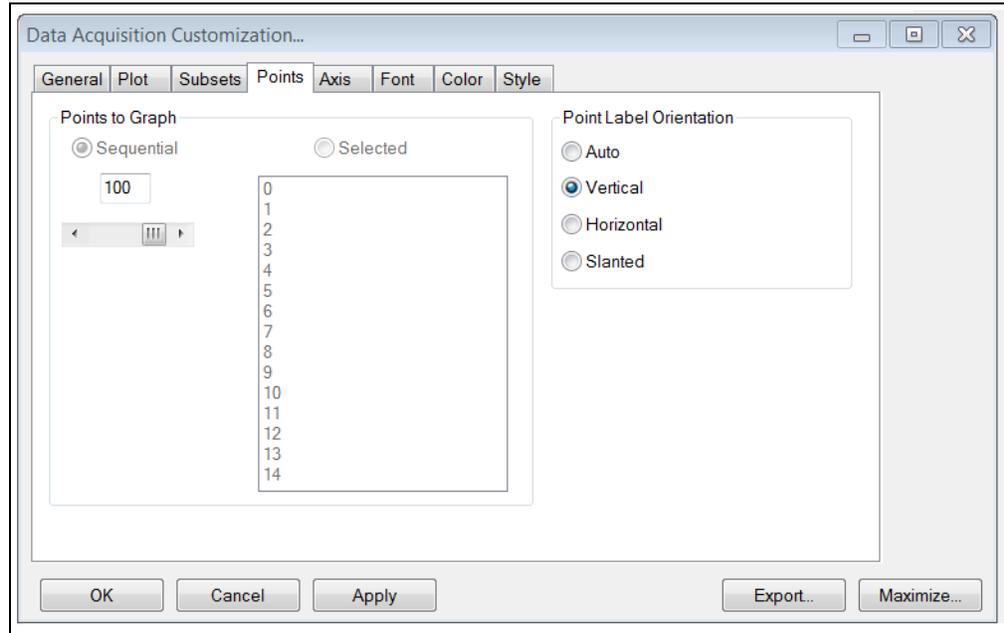
FIGURE 3-11: DATA ACQUISITION WINDOW - SUBSETS TAB



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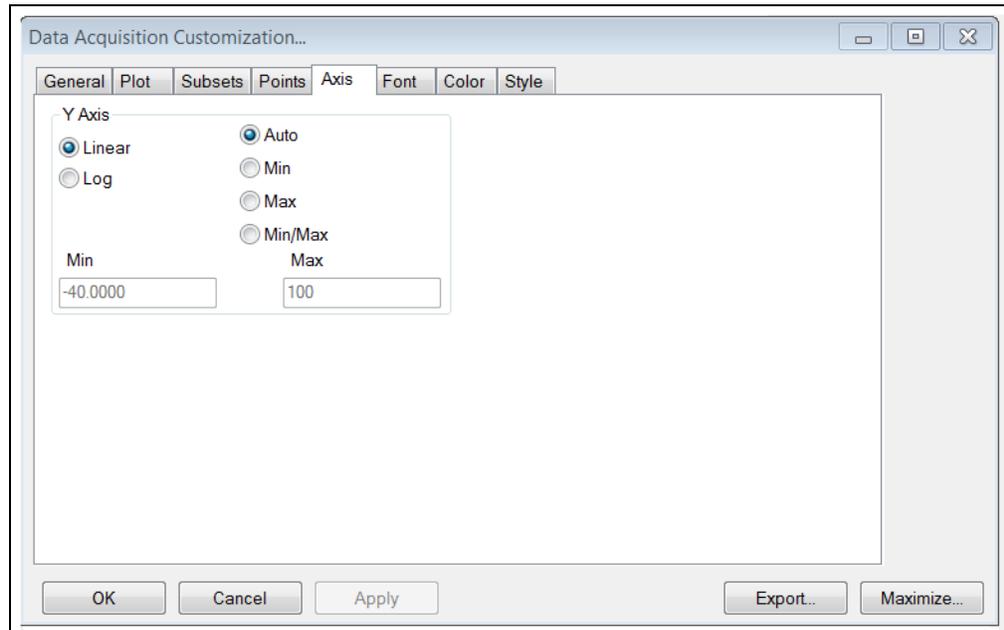
The **Points** tab, displayed in [Figure 3-12](#), controls the number of data points displayed in the graph and the orientation of the labels on the X-Axis.

FIGURE 3-12: DATA ACQUISITION WINDOW - POINTS TAB



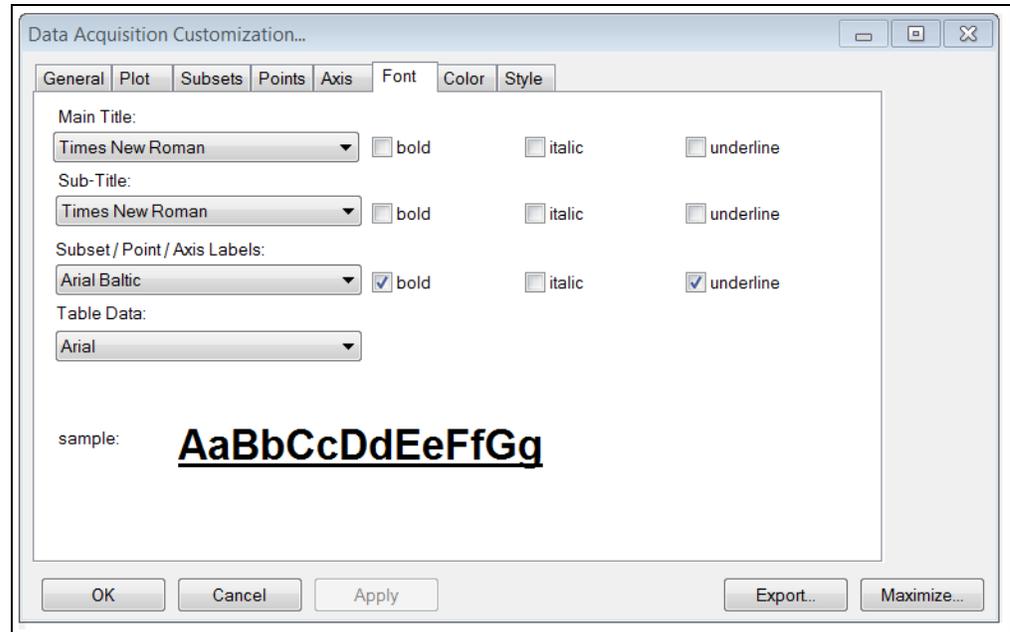
The **Axis** tab, displayed in [Figure 3-13](#), determines the scale and range of the Y-Axis.

FIGURE 3-13: DATA ACQUISITION WINDOW - AXIS TAB.



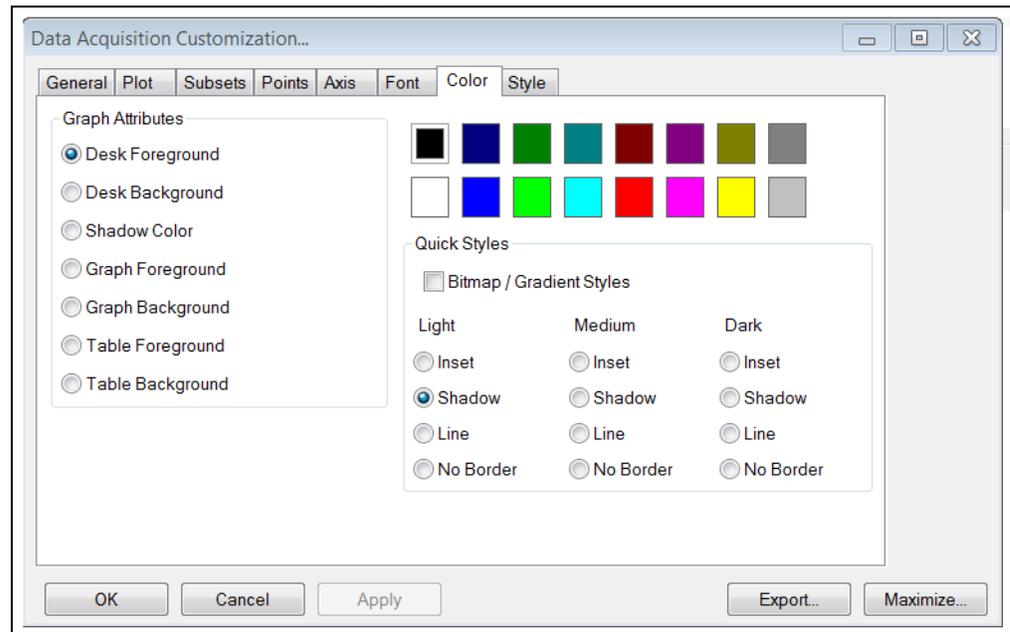
The user can modify the options in the **Font** tab, displayed in [Figure 3-14](#), to change the size, font and style of the text that appears in the data acquisition charting area. A sample text is also provided for preview before applying the changes to the charting area.

FIGURE 3-14: DATA ACQUISITION WINDOW - FONT TAB



The **Color** tab, displayed in [Figure 3-15](#), determines which colors are used by the system. Optionally, users can select a pre-configured style in the **Quick Styles** section.

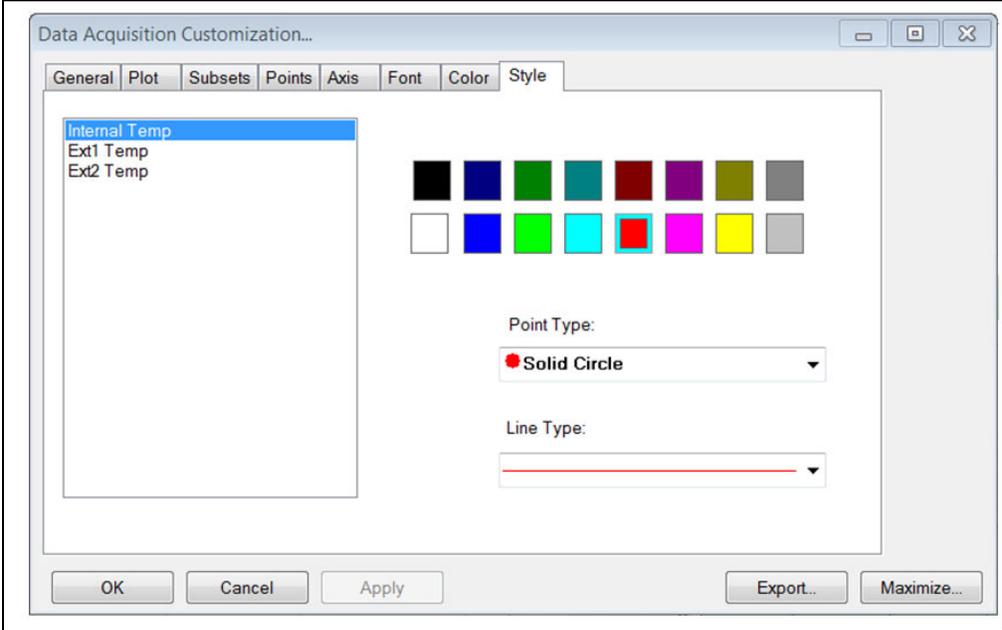
FIGURE 3-15: DATA ACQUISITION WINDOW - COLOR TAB



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Through the **Style** tab, displayed in [Figure 3-16](#), users can customize the line style, color and data point type for each temperature plot.

FIGURE 3-16: DATA ACQUISITION WINDOW - STYLE TAB



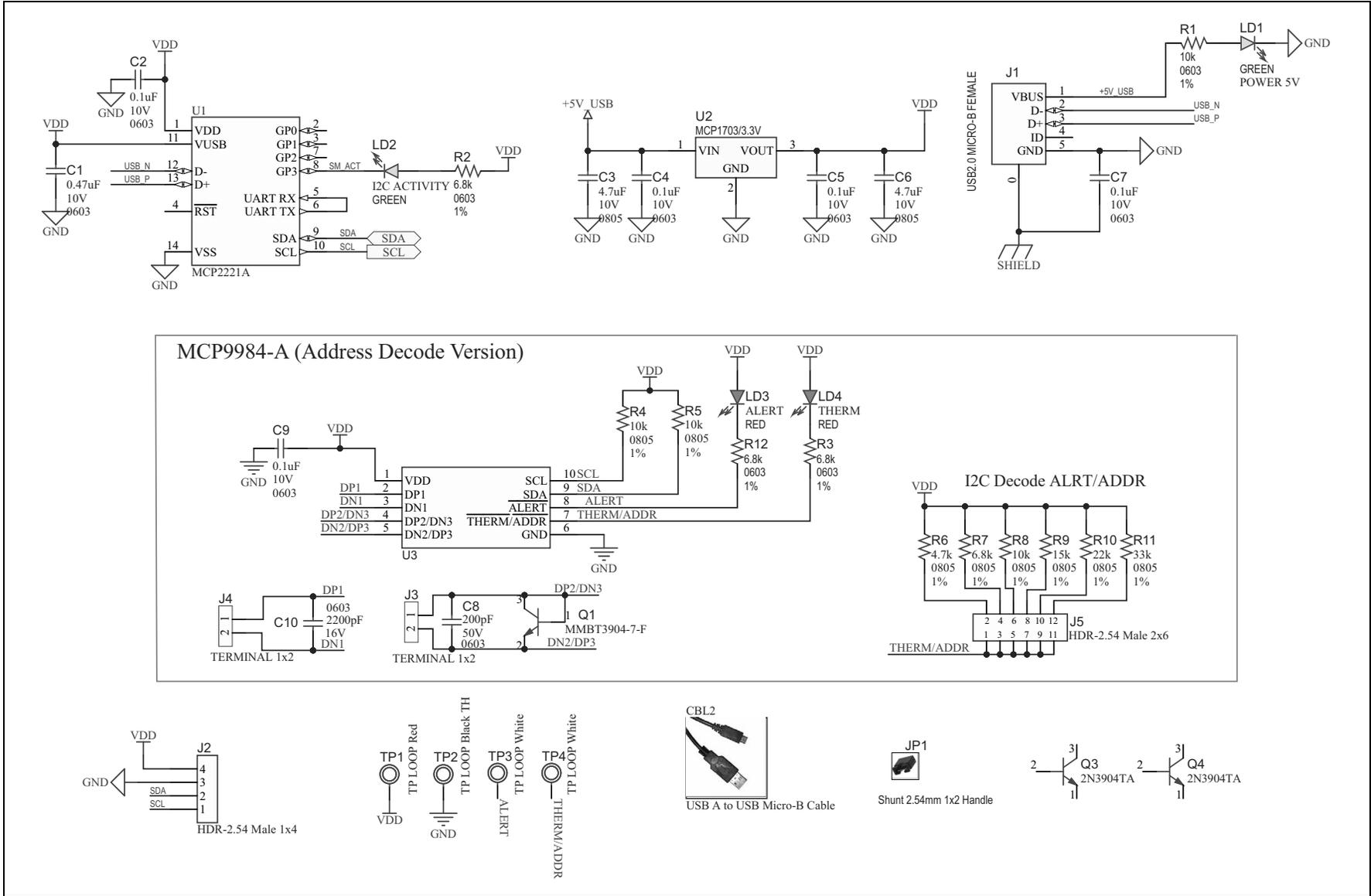
Appendix 1. Schematic and Layouts

1.1 INTRODUCTION

This appendix contains the following schematics and layouts for the MCP9984 Evaluation Board:

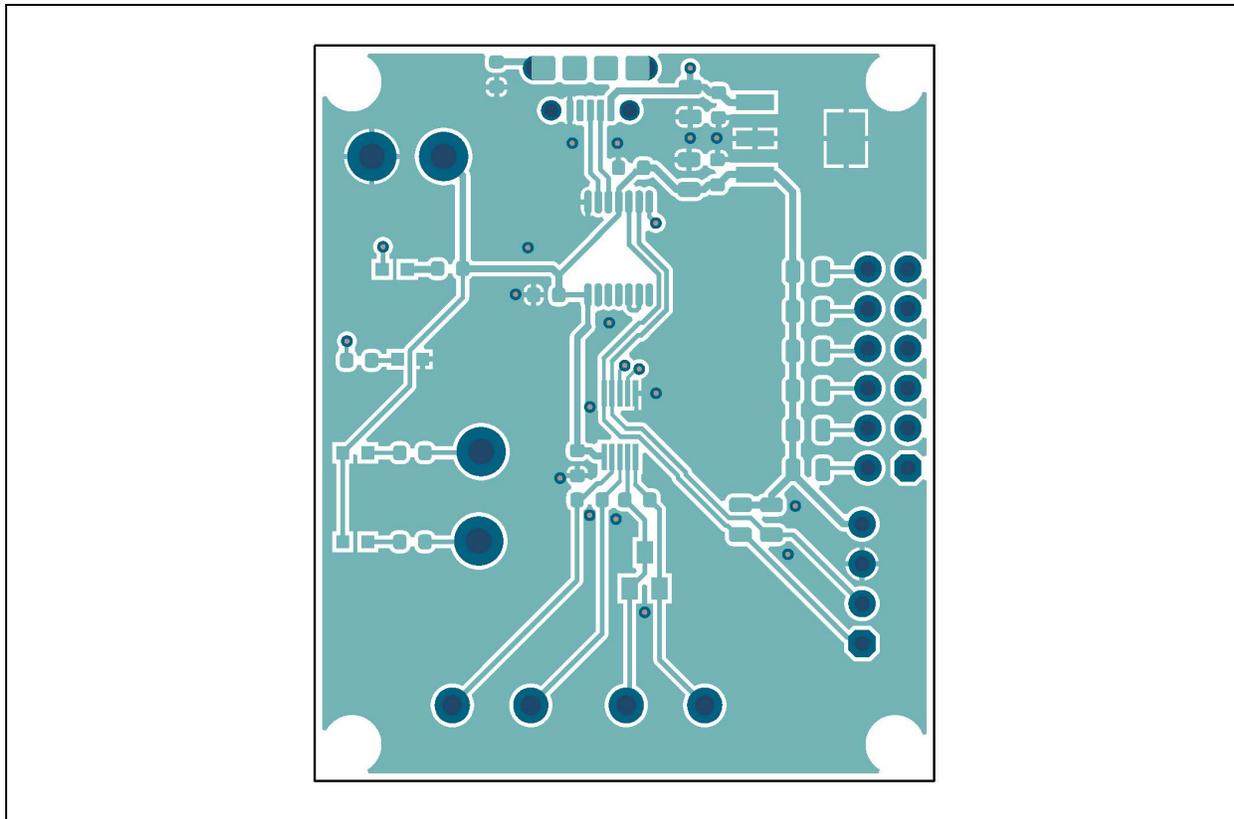
- [MCP9984 Evaluation Board – Schematic](#)
- [Board – Top Silk](#)
- [Board – Top Copper and Silk](#)
- [Board – Top Copper](#)
- [Board – Bottom Copper](#)
- [Board – Bottom Copper and Silk](#)
- [Board – Bottom Silk](#)

1.2 MCP9984 EVALUATION BOARD – SCHEMATIC

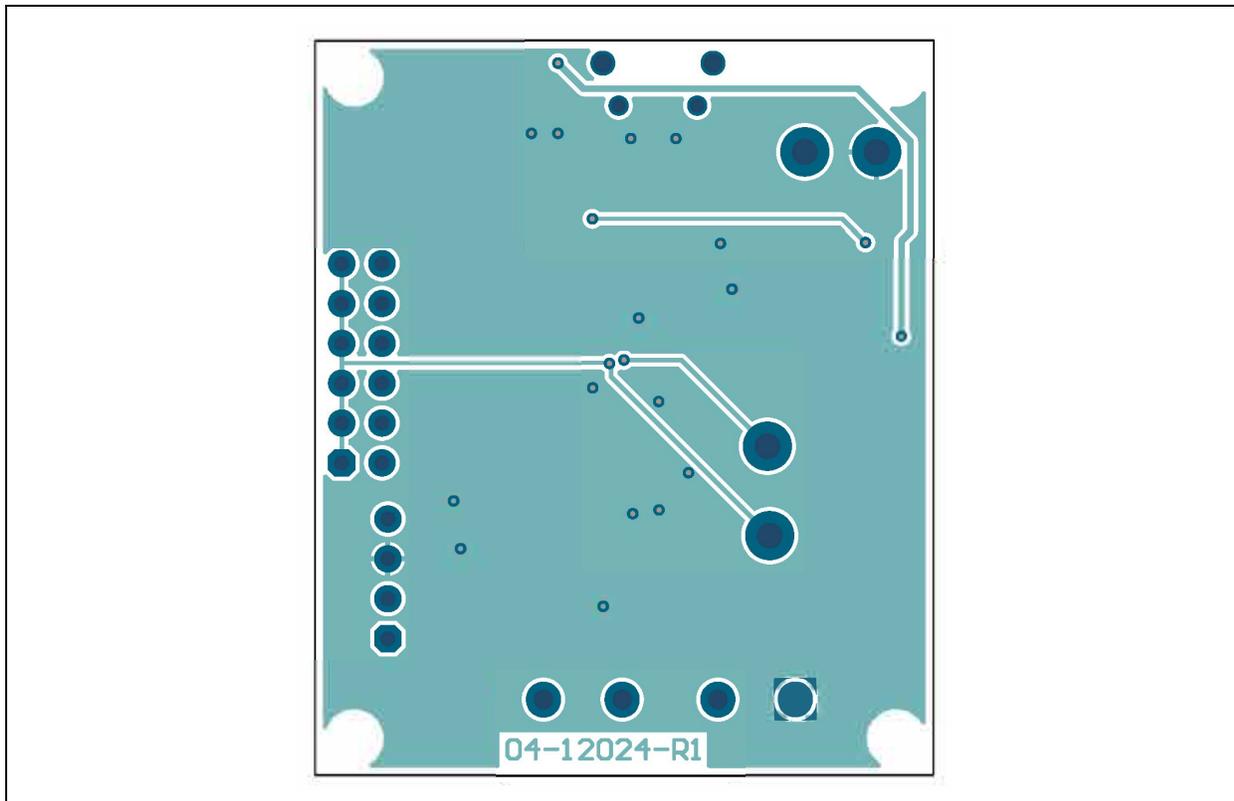


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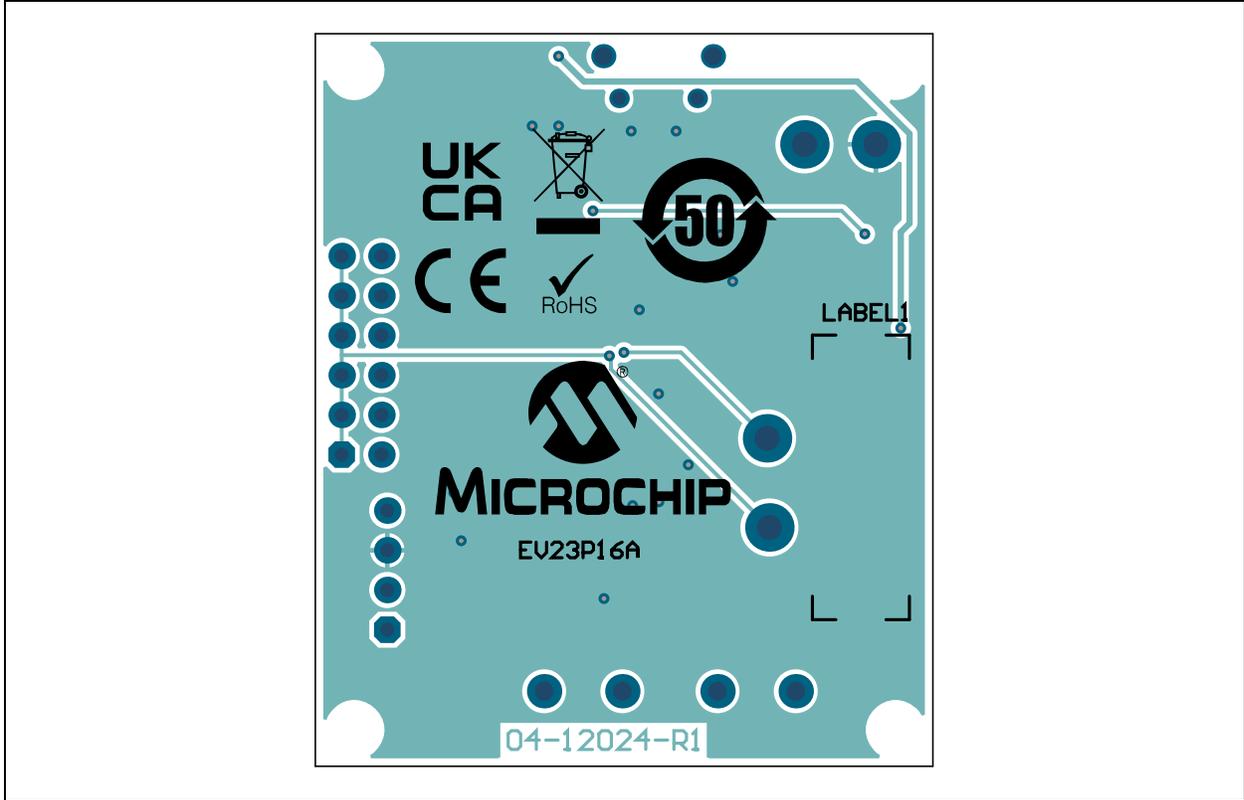
1.5 BOARD – TOP COPPER



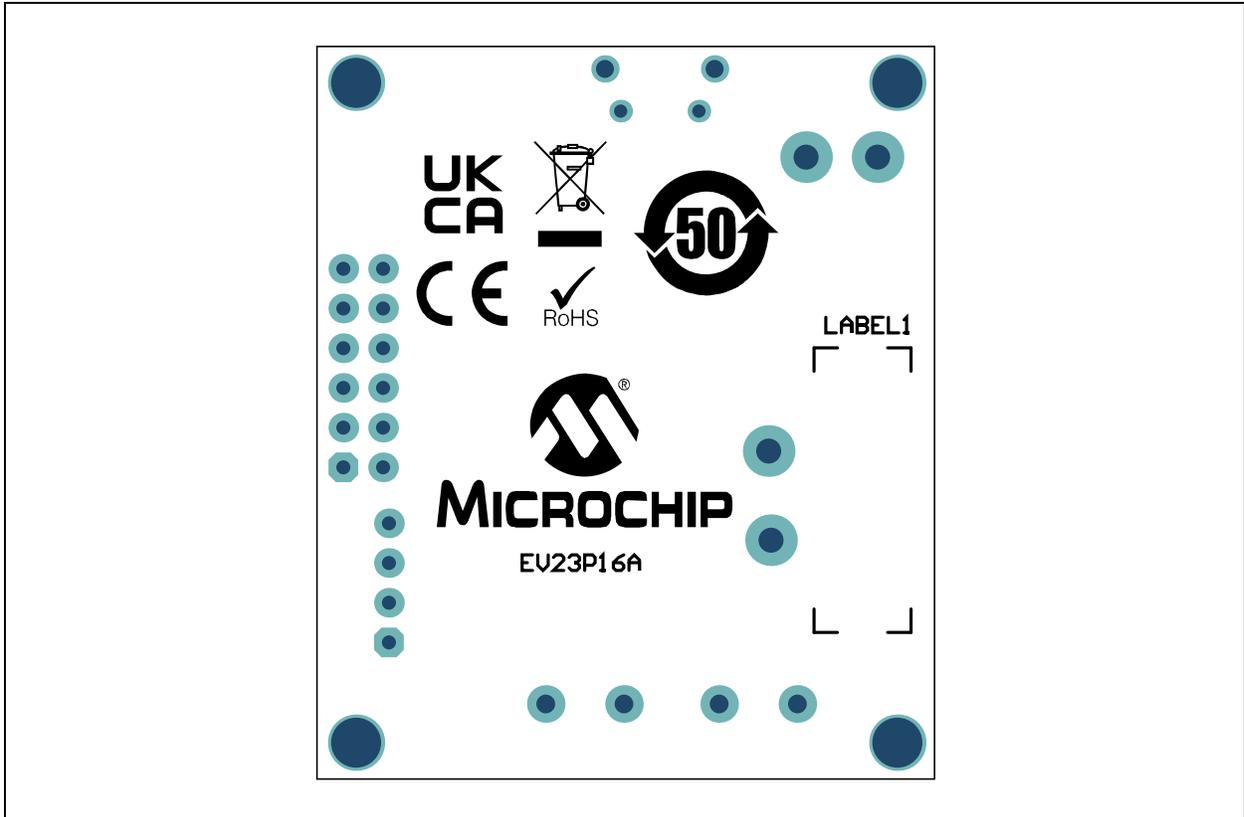
1.6 BOARD – BOTTOM COPPER



1.7 BOARD – BOTTOM COPPER AND SILK



1.8 BOARD – BOTTOM SILK



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NOTES:

Appendix 1. Bill of Materials (BOM)

1.1 MCP9984 EVALUATION BOARD - BILL OF MATERIALS (BOM)

TABLE 1-1: MCP9984 EVALUATION BOARD - BOM

Qty.	Reference	Description	Manufacturer	Part Number
1	C1	Ceramic Capacitor, 0.47 μ F, 10V, 10%, X5R, Surface-Mount, 0603	KEMET	C0603C474K8PACTU
1	C10	Ceramic Capacitor, 2200 pF, 16V, 10%, X7R, Surface-Mount, 0603	AVX Corporation	0603YC222KAT2A
5	C2, C4, C5, C7, C9	Ceramic Capacitor, 0.1 μ F, 10V, 10%, X7R, Surface-Mount, 0603	KEMET	C0603C104K8RACTU
2	C3, C6	Ceramic Capacitor, 4.7 μ F, 10V, 10%, X5R, Surface-Mount, 0805	Wurth Elektronik	885012107009
1	C8	Ceramic Capacitor, 200 pF, 50V, 5%, C0G, Surface-Mount, 0603	Murata Electronics®	GRM1885C1H201JA01D
1	J1	Connector, USB 2.0, Micro-B, Female, Through-Hole/Surface-Mount, Right-Angle	FCI	10118194-0001LF
1	J2	Connector, HDR-2.54, Male, 1x4, Gold 5.84 MH, Through-Hole, Right-Angle	Samtec, Inc.	TSW-104-08-S-S-RA
2	J3, J4	Connector, Terminal, 5 mm, 1x2, Female, 12-26AWG, 18A, Through-Hole, Right-Angle	Phoenix Contact	1935161
1	J5	Connector, HDR-2.54, Male, 2x6, Tin, 5.84 MH, Through-Hole, Vertical	Amphenol ICC (FCI)	67996-412HLF
2	LD1, LD2	Diode, LED, Green, 3.2V, 20 mA, 430 mcd, Clear, Surface-Mount, 0603	Wurth Elektronik	150060GS75000
2	LD3, LD4	Diode, LED, Red, 2V, 20 mA, 250 mcd, Clear, Surface-Mount, 0603	Wurth Elektronik	150060RS75000
1	PCB1	MCP9984 Evaluation Board - Printed Circuit Board	Microchip Technology Inc.	04-12024-R1
1	Q1	Transistor, BJT, NPN, MMBT3904-7-F, 40V, 0.2A, Surface-Mount, SOT23-3	Diodes Incorporated®	MMBT3904-7-F
1	R1	Resistor, Thick Film, 10 k Ω , 1%, 1/10W, Surface-Mount, 0603	Panasonic Industry Co., Ltd.	ERJ-3EKF1002V
1	R10	Resistor, Thick Film, 22 k Ω , 1%, 1/8W, Surface-Mount, 0805, AEC-Q200	Stackpole Electronics, Inc.	RMCF0805FT22K0
1	R11	Resistor, Thick Film, 33 k Ω , 1%, 1/16W, Surface-Mount, 0805	Stackpole Electronics, Inc.	RMCF 1/10 33K 1% R
3	R2, R3, R12	Resistor, Thick Film, 6.8 k Ω , 1%, 1/10W, Surface-Mount, 0603	Panasonic Industry Co., Ltd.	ERJ-3EKF6801V
3	R4, R5, R8	Resistor, Thick Film, 10 k Ω , 1%, 1/8W, Surface-Mount, 0805	Panasonic Industry Co., Ltd.	ERJ-6ENF1002V

Note 1: The components listed in this Bill of Materials are representative of the PCB assembly. The released BOM used in manufacturing uses all RoHS-compliant components.

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TABLE 1-1: MCP9984 EVALUATION BOARD - BOM (CONTINUED)

Qty.	Reference	Description	Manufacturer	Part Number
1	R6	Resistor, Thick Film, 4.7 k Ω , 1%, 1/8W, Surface-Mount, 0805	Yageo Corporation	RC0805FR-074K7L
1	R7	Resistor, 6.8 k Ω , 1%, 1/8W, Surface-Mount, 0805	Yageo Corporation	RC0805FR-076K8L
1	R9	Resistor, Thick Film, 15 k Ω , 1%, 1/8W, Surface-Mount, 0805	Yageo Corporation	RC0805FR-0715KL
1	TP1	Connector, Test Point, Loop, Red, Through-Hole	Keystone [®] Electronics Corp.	5010
1	TP2	Connector, Test Point, Loop, Black, Through-Hole	Keystone Electronics Corp.	5011
2	TP3, TP4	Connector, Test Point, Loop, White, Through-Hole	Keystone Electronics Corp.	5012
1	U1	MCHP Interface USB, I ² C, UART, MCP2221A-I/ST, TSSOP-14	Microchip Technology Inc.	MCP2221A-I/ST
1	U2	MCHP Analog LDO, 3.3V, MCP1703T-3302E/DB, SOT-223-3	Microchip Technology Inc.	MCP1703T-3302E/DB
1	U3	MCP9984-AE/E3, 2-Wire, $\pm 1^{\circ}\text{C}$, Accuracy Remote Diode Temperature Monitor MSOP-10	Microchip Technology Inc.	MCP9984-AE/E3

Note 1: The components listed in this Bill of Materials are representative of the PCB assembly. The released BOM used in manufacturing uses all RoHS-compliant components.

1.2 MCP9984 EVALUATION BOARD - BOM MECHANICAL PARTS

TABLE 1-2: MCP9984 EVALUATION BOARD - BOM MECHANICAL PARTS

Qty.	Reference	Description	Manufacturer	Part Number
1	CBL2	Mechanical, Headings & Wires Cable, USB Male-A to USB Male Micro-B, 0.91M	Dongguan Zhanxin Electronic Technology Co., Ltd	A006ZX028
1	JP1	Mechanical, Headings & Wires Jumper, 2.54 mm, 1x2, Handle, Gold	TE Connectivity AMP	881545-2
2	Q3, Q4	Transistor, BJT, NPN, 2N3904TA, 40V, 0.2A, 0.625W, TO-92-3	Fairchild Semiconductor [®]	2N3904TA

Note 1: The components listed in this Bill of Materials are representative of the PCB assembly. The released BOM used in manufacturing uses all RoHS-compliant components.



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