User's Guide

TMP1826EVM

ABSTRACT

This user's guide describes the characteristics, operation, and use of the TMP1826EVM evaluation board. This user's guide discusses how to set up and configure the software, lists the hardware, and reviews various aspects of the software operation. Throughout this document, the terms evaluation board, evaluation module, and EVM are synonymous with the TMP1826EVM. This user's guide also provides information on the operating procedure, input and output connections, an electrical schematic, printed circuit board (PCB) layout drawings, and a parts list for the EVM.

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1 Introduction

The TMP1826EVM allows users to evaluate the performance of the TMP1826 digital temperature sensor. The EVM comes in a USB stick form factor, with an onboard MSP430F5528 microcontroller that interfaces with both the host computer and the TMP1826 device using a Single Wire interface. The module is designed with perforations between the sensor and host controller on the EVM board. The perforation allows the user flexibility in their evaluation:

- The user can connect the TMP1826 to the user's system/host.
- The user can connect the EVM host and software to the user's system with TMP1826 devices.
- Small individual boards allow the user to place sensors in the user's system.
- Hole spacing is compatible with common 0.1" prototyping breadboards

1.1 EVM Kit Contents

Table 1-1 lists the contents of the EVM kit. Contact the Texas Instruments Product Information Center nearest you if any components are missing. TI highly recommends that users check the TI website at https://www.ti.com to verify that they have the latest versions of the related software.

Table 1-1. Kit Contents

Item	Quantity
TMP1826EVM	1

2 EVM Hardware

2.1 Perforations

The perforation between the USB controller board and TMP1826 sensor board is designed to allow separation of the sensor and controller. The holes support standard 0.1" pitch headers. The pins are labeled with their functions on both sides. The small sensor board can be placed in-system, or the controller can be used to test a sensor which is part of another system.

2.2 Subregulator

The switch S1 enables and disables the onboard 3.3-V regulator: U8. When the subregulator is enabled, the green LED D3 illuminates. The subregulator must be enabled for normal operation of TMP1826EVM. It is possible to supply other voltages at the 3P3V pin when the subregulator is disabled.

2.3 Logic Level Translator

The translators U3 and U6 separates the MSP430 UART host from the TMP1826 device. This is not required for end applications, but the translator is provided on the EVM as a courtesy. When the subregulator is disabled, a voltage between 1.7 V and 5.5 V can be applied at the 3P3V net, which is the 3.3-V pin on the perforation. This external voltage will illuminate the green LED D3 and power the TMP1826 device.

2.4 Programming Header

The TMP1826EVM comes pre-loaded with firmware that is necessary for the correct operation of the USB interface and PC GUI software. The unpopulated header, J2, is provided for Spy-Bi-Wire access to the MSP430F5528. TI does not recommend that users access this header or reprogram the device.

2.5 BSL Button

The TMP1826EVM features push-button SW1 for entering USB BSL mode. This can be used for firmware updates. The button must be held down while the user plugs in the USB and can be released afterwards.

2.6 Status LED

The red LED (D4) indicates status in the USB2ANY firmware. A blinking LED indicates the MSP430F5528 is waiting for USB connection from the GUI application. At initial power on, or when connected to the GUI, the LED turns off.

3 Software Download

The PC GUI Software for TMP1826EVM runs on TI's GUI Composer framework. The software is available as a live version which runs in your browser, and it is available as a download for offline use. The software is compatible with Windows, Mac, and Linux operating systems.

3.1 Live Software on dev.ti.com

The live software currently works on Chrome, Firefox, and Safari browsers. Internet Explorer is not supported. Users can access the live version through one of the following actions:

- Follow this link.
- Go to the EVM tool page and click the *View* button.
- Go to dev.ti.com/gallery, login with your myTI account credentials, and search for TMP1826.

Click the application icon within the gallery to launch the software. You must agree to the prompts to install or update the TI Cloud Agent Bridge browser plugin. The plugin is necessary for connection to the USB hardware.

3.2 Download from dev.ti.com

Users can access the latest version of the offline software by navigating to the live version as noted above. Look for the download icon and download both the application and runtime for the operating system as shown in Figure 3-1.

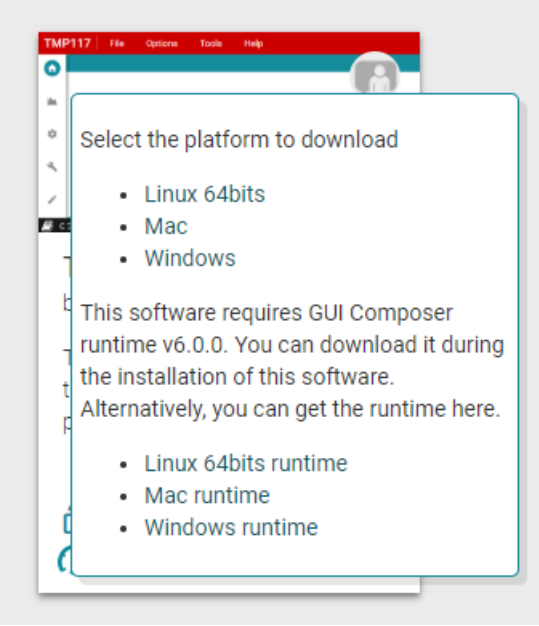

Figure 3-1. Download Pop-Up

4 Software

4.1 Home Tab

The *Home* tab is shown at software launch. The icons on the bottom of this tab are shortcuts to the other functional tabs of the GUI, and correspond to the icons on the left-hand-side of the GUI.

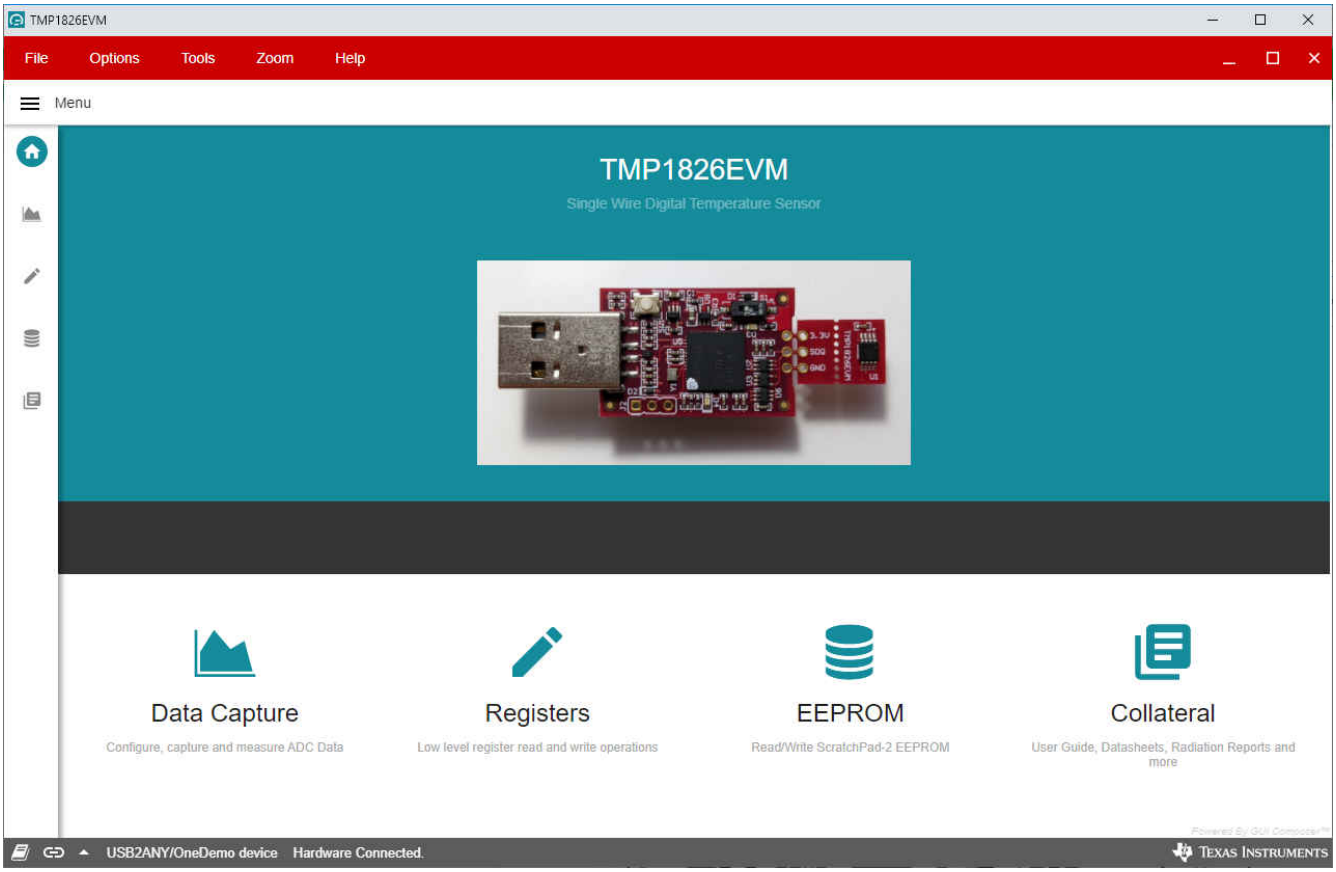

Figure 4-1. Home

4.2 Data Capture Tab

The *Data Capture* tab reports the temperature from the TMP1826 device included on the TMP1826EVM.

- Temperature data will be polled and displayed by default. To disable polling or change the polling rate, use the *Polling Rate* drop-down menu under the *Chart Controls* tile on the right. The CONVERT TEMP command (0x44) is sent automatically while polling. The polling rate setting on the *Data Capture* tab is synchronized with the polling rate setting on the *Registers* tab.
- Temperature data can be saved to file as it is received using the *Save Start* and *Save Stop* buttons. Note that when the online version of the GUI is used, a download will begin in your browser. This download will be lost if the GUI is closed. When the offline version of the GUI is used, the file will be appended as data is received. In this case, appended data will not be lost if the GUI is closed.

- The *Offset* and *Alert* settings are synchronized to the *Registers* tab. A temperature in Celsius may be entered and view the corresponding hex value or vice versa.

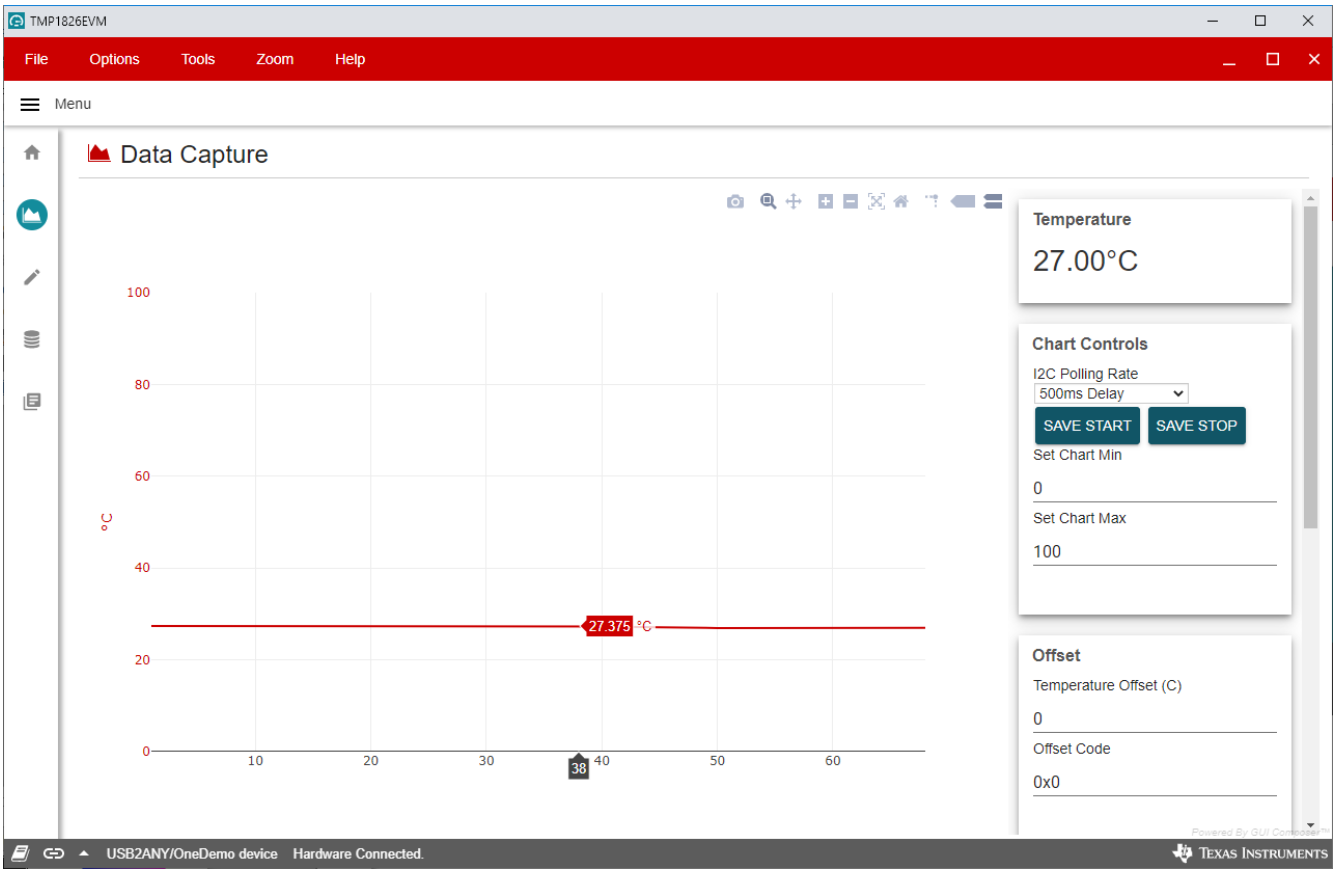

Figure 4-2. Data Capture

4.3 Registers Tab

The *Registers* tab interacts with the ScratchPad-1 registers within the TMP1826 device.

The *Auto Read* drop-down menu configures polling of register contents. When Auto Read is off, it is necessary to click *Read Register* to fetch the contents of the current register. The *Read All Registers* button can be used to fetch the contents of all registers at once. The *Write Register* button is greyed and disabled when the drop-down menu next to the button is set to *Immediate*. Immediate mode triggers a write operation each time a register is modified. When *Deferred mode* is selected, the *Write Register* button is enabled, and write operations will not be performed unless the *Write Register* button is clicked. These settings give the user total control over bus activity,

and enable individual transactions to be easily observed with an oscilloscope, logic analyzer, or bus-sniffing device.

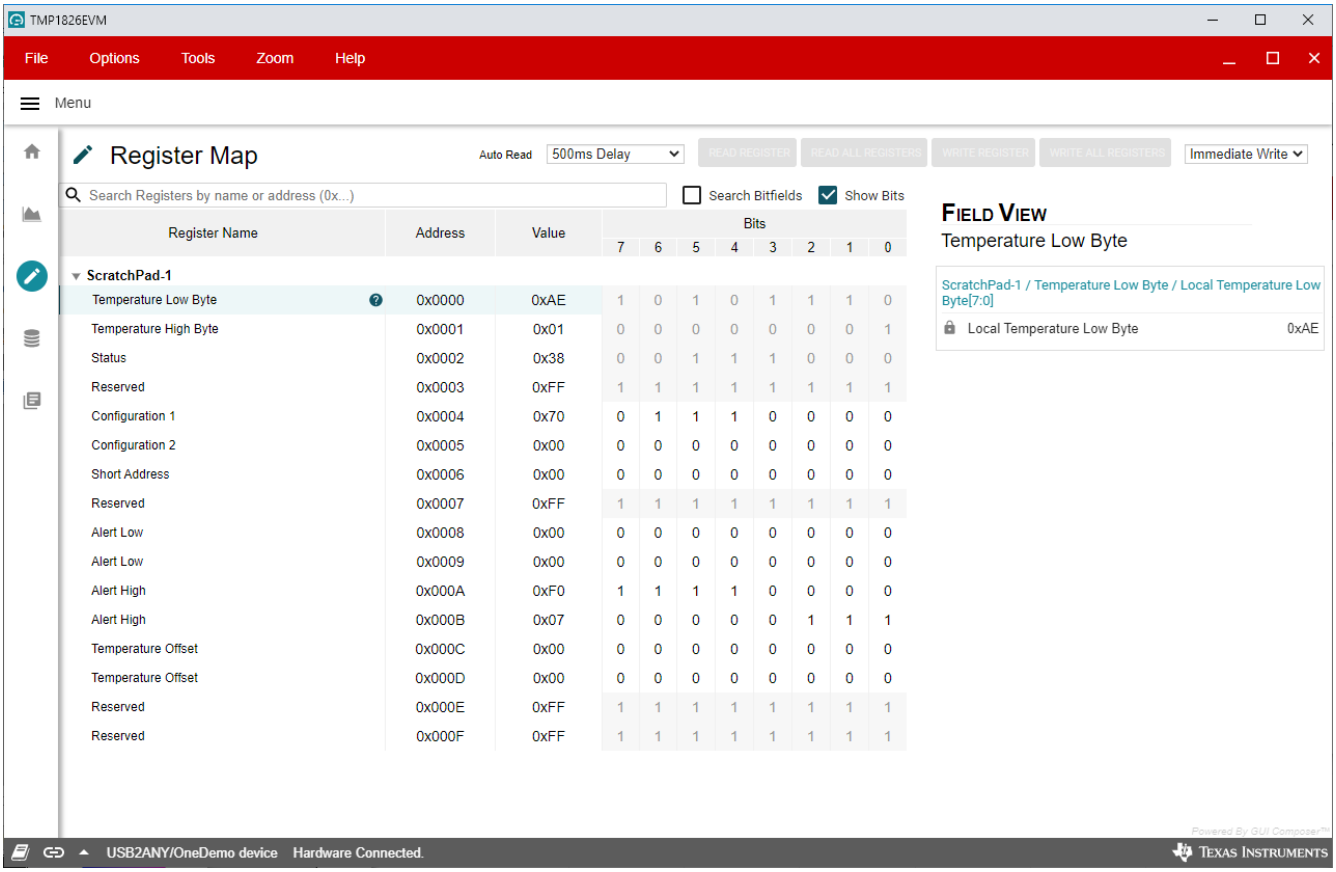

Figure 4-3. Registers

4.4 EEPROM Tab

The *EEPROM* tab interacts with the user EEPROM through the ScratchPad-2 register within the TMP1826 device.

- Read Blocks: To query the contents of EEPROM, enter an address range and click *Read EEPROM*. The data will be displayed at the right in the preview area as it is retrieved. Note that ScratchPad-2 is a buffer for data being committed to EEPROM, so only the last write to ScratchPad-2 can be read back. Other addresses will respond with 0xFF when the Read ScratchPad-2 command is used.
- Write Blocks: A single block of 8 bytes can be written to ScratchPad-2, or written and immediately committed to EEPROM.
- File Operations:
  - *Read File* will load a CSV file into the preview area at the right. TI recommends to verify read back of edited files before clicking the *Write EEPROM From File* button.
  - *Save File* will save the current preview, shown at the right, to a CSV file. TI recommends to save a preview and edit the resulting file.

– *Write EEPROM From File* will load a CSV file into preview as it performs the necessary Write ScratchPad-2 and EEPROM Copy (Commit) commands.

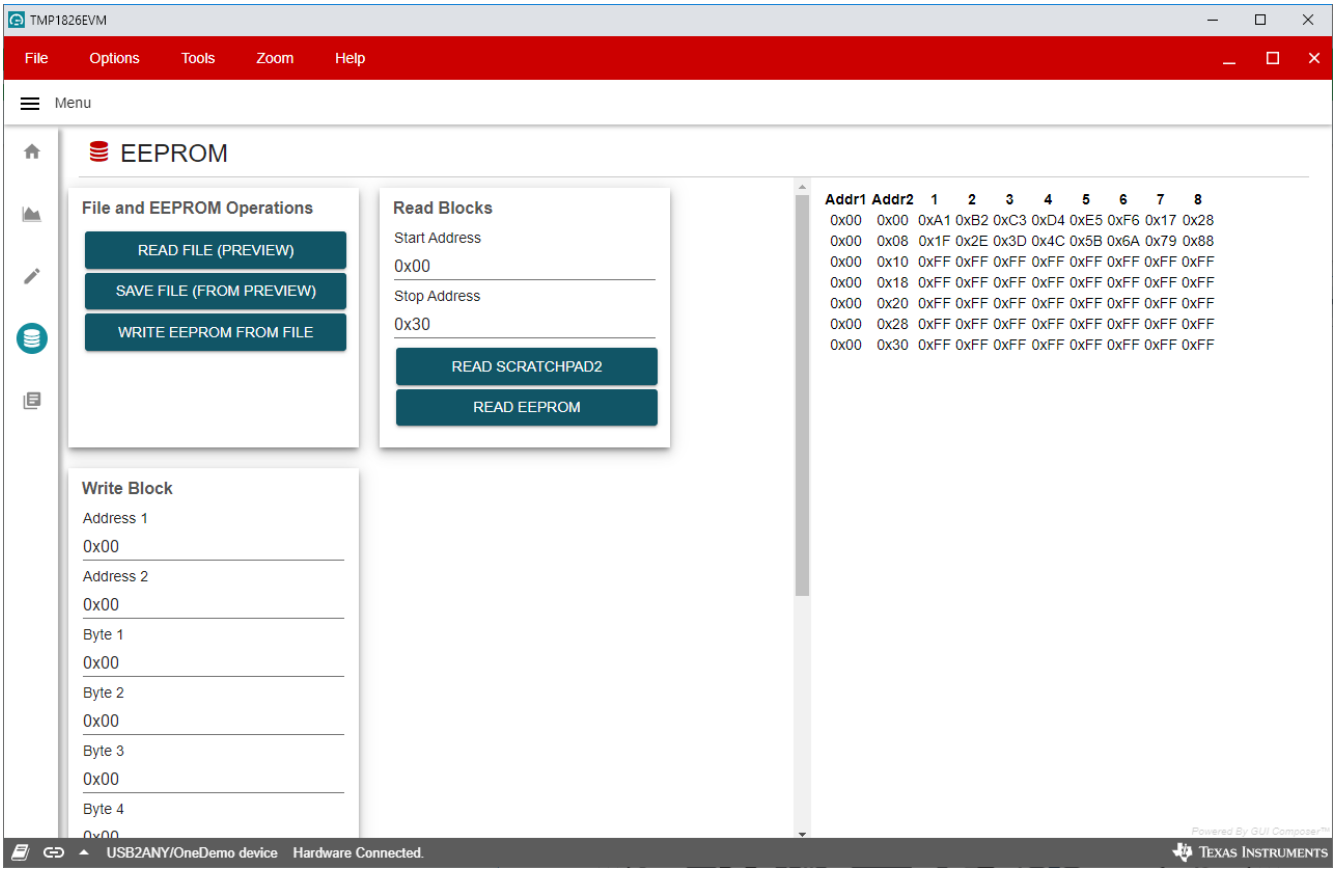

Figure 4-4. EEPROM

5 Schematic, Board Layout and Bill of Materials

5.1 Schematic

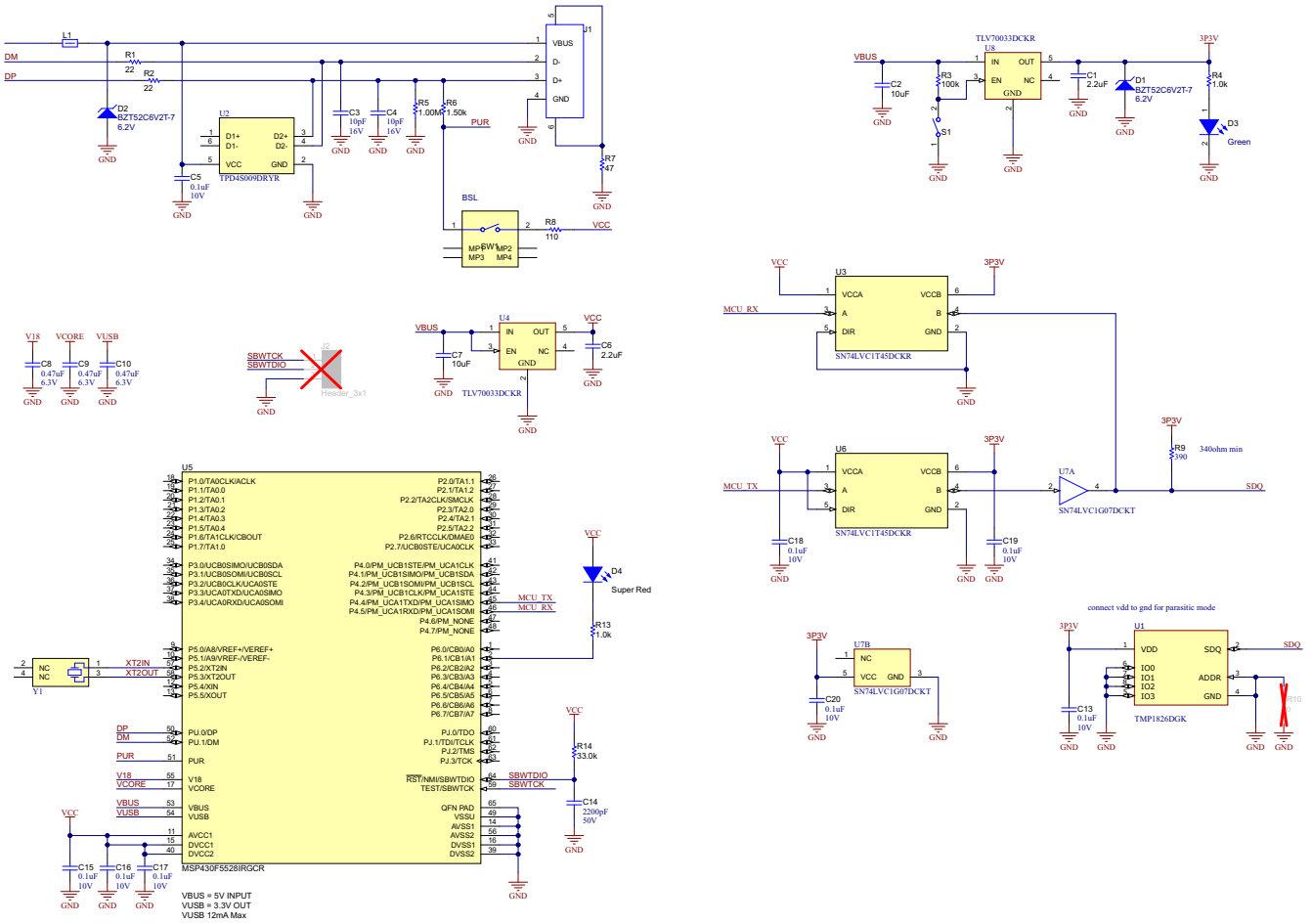

Figure 5-1. Schematic

5.2 Printed Circuit Board (PCB)

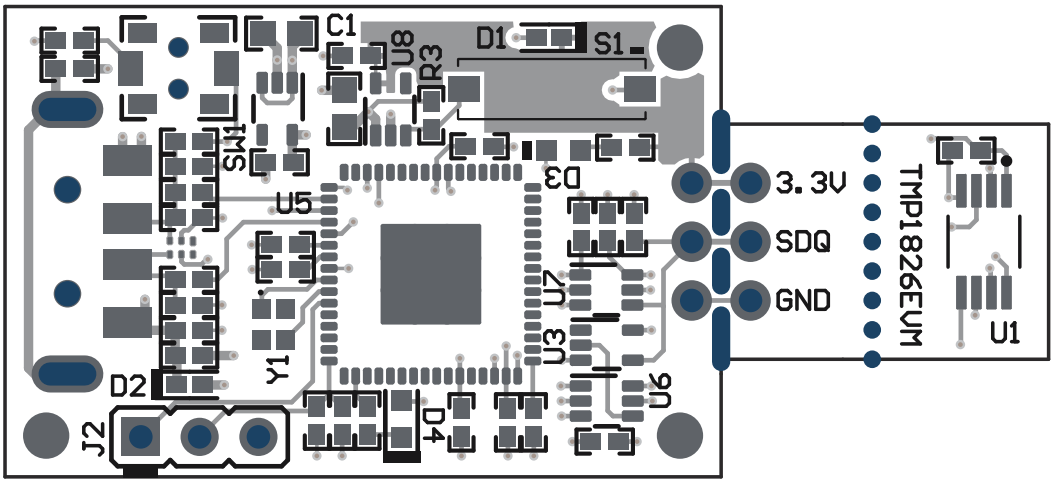

Figure 5-2. PCB Top

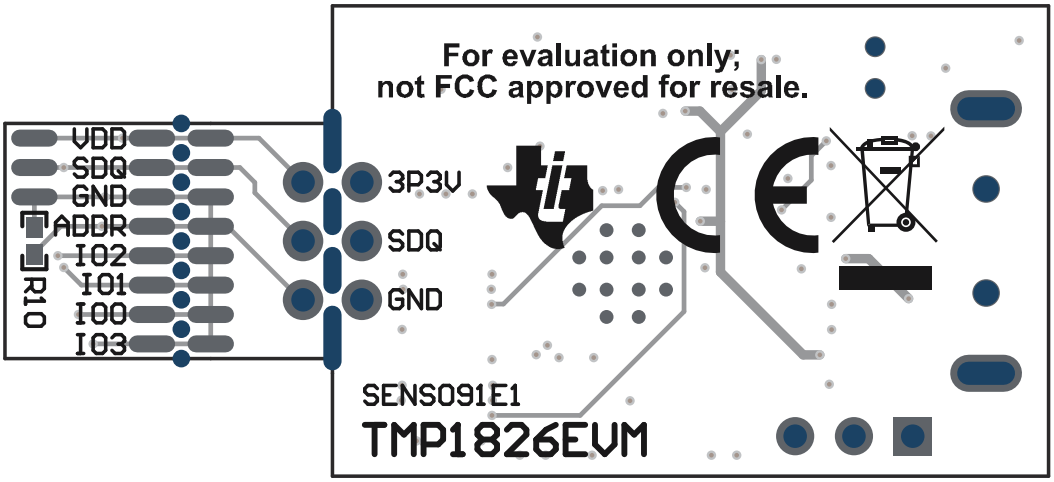

Figure 5-3. PCB Bottom

5.3 Bill of Materials

Table 5-1. Bill of Materials

Description	Designator	PartNumber	Quantity	Manufacturer	PackageReference	Value
Printed Circuit Board	!PCB1	SENS091	1	Any		
CAP, CERM, 2.2 uF, 16 V, +/- 10%, X5R, 0402	C1, C6	GRM155R61C225KE11D	2	MuRata	0402	2.2uF
CAP, CERM, 2200 pF, 50 V, +/- 5%, X7R, 0402	C14	CL05B222JB5NNNC	1	Samsung Electro-Mechanics	0402	2200pF
CAP, CERM, 10 uF, 10 V, +/- 20%, X5R, 0603	C2, C7	C1608X5R1A106M080AC	2	TDK	0603	10uF
CAP, CERM, 10 pF, 16 V,+/- 10%, C0G, 0402	C3, C4	C0402C100K4GACTU	2	Kemet	0402	10pF
CAP, CERM, 0.1 uF, 10 V,+/- 10%, X5R, 0402	C5, C13, C15, C16, C17, C18, C19, C20	LMK105BJ104KV-F	8	Taiyo Yuden	0402	0.1uF
CAP, CERM, 0.47 uF, 6.3 V, +/- 10%, X7R, 0402	C8, C9, C10	JMK105B7474KVHF	3	Taiyo Yuden	0402	0.47uF
Diode, Zener, 6.2 V, 300 mW, SOD-523	D1, D2	BZT52C6V2T-7	2	Diodes Inc.	SOD-523	6.2V
LED, Green, SMD	D3	SML-LX0603GW-TR	1	Lumex	LED, GREEN, 0603	Green
LED, Super Red, SMD	D4	150060SS75000	1	Wurth Elektronik	LED_0603	Super Red
Connector, Plug, USB Type A, R/A, Top Mount SMT	J1	48037-1000	1	Molex	USB Type A right angle	
Header, 2.54 mm, 3x1, Gold, TH	J2	GBC03SAAN	0	Sullins Connector Solutions	Header, 2.54 mm, 3x1, TH	
Ferrite Bead, 220 ohm @ 100 MHz, 0.45 A, 0402	L1	BLM15AG221SN1D	1	MuRata	0402	220 ohm
RES, 22, 5%, 0.1 W, AEC-Q200 Grade 0, 0402	R1, R2	ERJ-2GEJ220X	2	Panasonic	0402	22
RES, 0, 5%, 0.063 W, AEC-Q200 Grade 0, 0402	R10	CRCW04020000Z0ED	0	Vishay-Dale	0402	0
RES, 33.0 k, 1%, 0.063 W, 0402	R14	RC0402FR-0733KL	1	Yageo America	0402	33.0k

Table 5-1. Bill of Materials (continued)

Description	Designator	PartNumber	Quantity	Manufacturer	PackageReference	Value
RES, 100 k, 5%, 0.1 W, AEC-Q200 Grade 0, 0402	R3	ERJ-2GEJ104X	1	Panasonic	0402	100k
RES, 1.0 k, 5%, 0.1 W, AEC-Q200 Grade 0, 0402	R4, R13	ERJ-2GEJ102X	2	Panasonic	0402	1.0k
RES, 1.00 M, 1%, 0.063 W, AEC-Q200 Grade 0, 0402	R5	RMCF0402FT1M00	1	Stackpole Electronics Inc	0402	1.00Meg
RES, 1.50 k, 1%, 0.063 W, AEC-Q200 Grade 0, 0402	R6	RMCF0402FT1K50	1	Stackpole Electronics Inc	0402	1.50k
RES, 47, 5%, 0.1 W, AEC-Q200 Grade 0, 0402	R7	ERJ-2GEJ470X	1	Panasonic	0402	47
RES, 110, 1%, 0.1 W, AEC-Q200 Grade 0, 0402	R8	ERJ-2RKF1100X	1	Panasonic	0402	110
RES, 390, 5%, 0.063 W, AEC-Q200 Grade 0, 0402	R9	CRCW0402390RJNED	1	Vishay-Dale	0402	390
Switch, Slide, SPST, Top Slide, SMT	S1	CHS-01TB	1	Copal Electronics	Switch, Single Top Slide, 2.5x8x2.5mm	
Switch, SPST-NO, Off-Mom, 0.05A, 12VDC, SMD	SW1	PTS820 J20M SMTR LFS	1	C&K Components	3.9x2.9mm	
Single Wire, ±0.3 °C Accurate Digital Temperature Sensor With Integrated 2-Kbit EEPROM, VSSOP8	U1	TMP1826DGK	1	Texas Instruments	VSSOP8	
4-Channel ESD Solution for High-Speed Differential Interface, DRY0006A (USON-6)	U2	TPD4S009DRYR	1	Texas Instruments	DRY0006A	

Table 5-1. Bill of Materials (continued)

Description	Designator	PartNumber	Quantity	Manufacturer	PackageReference	Value
Single-Bit Dual-Supply Bus Transceiver with Configurable Voltage Translation and 3-State Outputs, DCK0006A, LARGE T&R	U3, U6	SN74LVC1T45DCKR	2	Texas Instruments	DCK0006A	
Single Output LDO, 200 mA, Fixed 3.3 V Output, 2 to 5.5 V Input, with Low IQ, 5-pin SC70 (DCK), -40 to 125 degC, Green (RoHS & no Sb/Br)	U4, U8	TLV70033DCKR	2	Texas Instruments	DCK0005A	
16-Bit Ultra-Low-Power Microcontroller, 128KB Flash, 8KB RAM, USB, 12Bit ADC, 2 USCIs, 32Bit HW MPY, RGC0064B (VQFN-64)	U5	MSP430F5528IRGCR	1	Texas Instruments	RGC0064B	
Single Buffer/Driver With Open-Drain Output, DCK0005A, SMALL T&R	U7	SN74LVC1G07DCKT	1	Texas Instruments	DCK0005A	
Crystal, 24 MHz, SMD	Y1	XRCGB24M000F2P00R0	1	MuRata	2x1.6mm	

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