

# **User Guide**

MP2796 Evaluation Kit (EVKT-MP2796-0000/0002)



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## **Overview**

The EVKT-MP2796-0000 and EVKT-MP2796-0002 are evaluation kits for the MP2796. This board is designed to demonstrate the capabilities of the MP2796, which is used as a robust battery management device. The MP2796 provides a complete analog front-end (AFE) monitoring and protection solution that is designed for 7-cell to 16-cell series battery systems.

#### **Kit Contents**

EVKT-MP2796-0000 kit contents (items below can be ordered separately):

#	Part Number	Item	Quantity
1	EV2796-0000-FP- 00A	MP2796-0000 evaluation board	1
2	EVKT-USBI2C-02	Includes one USB to I <sup>2</sup> C communication interface, one USB cable, and one ribbon cable	1
3	Online resources	Include GUI and supplemental documents	-



Figure 1: EVKT- MP2796-0000 Evaluation Kit Set-Up

EVKT-MP2796-0002 kit contents (items below can be ordered separately):

#	Part Number	Item	Quantity
1	EV2796-0002-FP- 00A	MP2796-0002 evaluation board	1
2	EVKT-USBSPI-00	Includes one USB to SPI communication interface, one USB cable, and one ribbon cable	1
3	Online resources	Include GUI and supplemental documents	-
	Battery P EV2796-0002- Charger / I	Ribbon Cable USB to SPI Communication Interface	
		Figure 2: EVKT- MP2796-0002 Evaluation Kit Set-Up	



#### **Features and Benefits**

- Supports 7-Cell to 16-Cell Series Battery Packs
- I<sup>2</sup>C or SPI Interface with 8-Bit Cyclic Redundancy Check (CRC)
- Analog Front-End (AFE) Monitor:
  - o Two Separate Analog-to-Digital Converters (ADCs) to Provide Voltage and Current Measurements
  - 15-Bit ADC with ≤10mV Total Cell Measurement Error at 25°C
  - 16-Bit ADC with <±0.5% Pack Current Measurement Error at 25°C via SRP and SRN
- Configurable Protections:
  - Charge and Discharge Over-Current Protection (OCP)
  - Charge and Discharge Short-Circuit Protection (SCP)
  - Cell Under-Voltage Protection (UVP) and Over-Voltage Protection (OVP)
  - Pack UVP and OVP
  - o Cell Low-Temperature and High-Temperature Protection
  - Die High-Temperature Protection
- Integrated High-Side MOSFET (HS-FET) Driver:
  - o Supports MOSFET Soft-Start Discharge Control to Eliminate Pre-Charge Circuit
  - Drives Up to 70A DC with Parallel N-Channel MOSFETs
  - o GPIO-Controlled or Register-Controlled MOSFET Enable
- Passive Cell Balancing Up to 58mA per Cell:
  - Can Drive External Balancing Transistors
  - Automatic or Manual Control
- Additional Features:
  - o Reduced Current Standby Mode
  - Integrated 3.3V and 5V Low-Dropout (LDO) Regulators
  - Dedicated Thermistor Inputs
  - o Open-Wire Detection
  - Persistent Dead Battery Flag
  - o Lockable Multiple-Time Programmable (MTP) Memory for Key Thresholds
- Random Cell Connection Tolerant
- Available in a TQFP-48 (7mmx7mm) Package

All changes made in I<sup>2</sup>C/SPI mode are not retained once the evaluation board shuts down.

1 Information written in MTP mode cannot be changed.



#### Adjustable Features

I <sup>2</sup> C/SPI	MTP
<ul> <li>Cell and communication configuration</li> <li>MOSFET configuration</li> <li>Pin configuration</li> <li>Analog-to-digital converter (ADC) scan configuration</li> <li>Watchdog configuration</li> <li>Open-wire configuration</li> <li>Over-current (OC) configuration</li> <li>Short circuit configuration</li> <li>Short circuit removal configuration</li> <li>Negative temperature coefficient (NTC) configuration</li> <li>Die temperature configuration</li> <li>Cell balancing configuration</li> <li>Cell over-voltage (OV) configuration</li> <li>Cell over-voltage (UV) configuration</li> <li>Cell under-voltage (UV) configuration</li> <li>Cell dead configuration</li> <li>VTOP OV configuration</li> <li>VTOP UV configuration</li> <li>VTOP UV configuration</li> <li>NEGIN, 3V3, VDD, and ADC self-test check configuration</li> <li>One-time programmable (OTP) cyclic redundancy check (CRC) configuration</li> <li>Interrupt configuration</li> </ul>	<ul> <li>Cell and communication configuration</li> <li>MOSFET configuration</li> <li>Pin configuration</li> <li>ADC scan configuration</li> <li>Watchdog configuration</li> <li>Open-wire configuration</li> <li>OC configuration</li> <li>Short circuit configuration</li> <li>Short circuit removal configuration</li> <li>NTC configuration</li> <li>Die temperature configuration</li> <li>Cell balancing configuration</li> <li>Cell OV configuration</li> <li>Cell UV configuration</li> <li>Cell dead configuration</li> <li>Cell dead configuration</li> <li>VTOP OV configuration</li> <li>VTOP UV configuration</li> <li>REGIN, 3V3, VDD, and ADC self-test check configuration</li> <li>OTP CRC check configuration</li> </ul>

#### **Kit Specifications**

Features	Specifications
Battery Pack Voltage	18V to 75.2V
Cell Voltage	0V to 5V
Operating Systems Supported	Windows XP, 7, or later
System Requirements	Minimum 25.7MB free
GUI Software	Programming tool MP2796 V1.0
EVB Size (LxW)	14cmx9.6cm



## **Section 1. Hardware Specifications**

#### **1.1 Personal Computer Requirements**

The following minimum conditions must be met to use the EVKT-MP2796-0000/0002:

- Operating System of Windows XP, 7, or later
- Net Framework 4.0
- PC with a minimum of one available USB port
- At least 25.7MB of free space

#### 1.2 EV2796-0000/0002-FP-00A Specifications

The EV2796-0000-FP-00A and EV2796-0002-FP-00A are evaluation boards for the MP2796. For more information, refer to the EV2796-0000/0002-FP-00A datasheet.



Feature	Specifications
Battery Pack Voltage	18V to 75.2V
Cell Voltage	0V to 5V
EVB Size (LxW)	14cmx9.6cm

Figure 3: EV2796-0000-FP-00A Evaluation Board



Figure 4: EV2796-0002-FP-00A Evaluation Board

Feature	Specifications
Battery Pack Voltage	18V to 75.2V
Cell Voltage	0V to 5V
EVB Size (LxW)	14cmx9.6cm



#### 1.3 EVKT-USBI2C-02 and EVKT-USBSPI-00 Specifications

The EVKT-USBI2C-02 refers to the USB-to-I<sup>2</sup>C communication interface, which connects the EVB, the PC, and its supporting accessories (see Figure 5). It provides I<sup>2</sup>C capabilities. Together with MPS Virtual Bench Pro and I<sup>2</sup>C GUI tools, it provides a quick and easy way to evaluate the performance of MPS digital products. For more details, refer to the EVKT-USBI2C-02 datasheet.



Figure 5: EVKT-USBI2C-02 Communication Interface

The EVKT-USBSPI-00 refers to the USB-to-SPI communication interface, which connects the EVB, the PC, and its supporting accessories (see Figure 6). It provides SPI capabilities. Together with MPS Virtual Bench Pro and SPI GUI tools, it provides a quick and easy way to evaluate the performance of MPS digital products. For more details, refer to the EVKT-USBSPI-00 datasheet.



Figure 6: EVKT-USBSPI-00 Communication Interface

## mps.

## **Section 2. Software Requirements**

#### 2.1 Software Installation Procedure

Configuration occurs through the MPS GUI. Follow the instructions below to install the software:

Note: This software can be downloaded from the MPS website.

- 1. Download and extract the "Programming tool MP2796 V1.0" file.
- 2. Double click the ".exe" file to open the set-up guide (see Figure 7). If a protection window comes up, click "More info," then click "Run anyway."
- 3. Follow the prompts in the set-up guide.
- 4. Wait for the status screen to verify that installation is complete (see Figure 8).

🕼 Setup - Programming	tool MP2796 1.0		_		$\times$
Select Destination Lo Where should Program	c <b>ation</b> mming tool MP2796 1.0	0 be installed?			Ð
Setup will inst	all Programming tool M	IP2796 1.0 into t	he following f	older.	
To continue, click Nex	kt. If you would like to	select a different	folder, click E	Browse.	
C:\Program Files (x8	6)\MPS\MP2796			Browse	
At least 25.7 MB of fr	ee disk space is require	d.			
		< Back	Next >	Ca	ancel

Figure 7: MPS GUI Set-Up Guide

Device Driver Installation Wizar	d	
	Completing the De Installation Wizard	vice Driver 1
	The drivers were successfully in	stalled on this computer.
	You can now connect your devi came with instructions, please re	ce to this computer. If your device ad them first.
	Driver Name	Status
	✓ Silicon Laboratories Inc	Ready to use
	< Back	Finish Cancel

Figure 8: Driver Set-Up Success



## Section 3. Evaluation Kit Test Set-Up

#### 3.1 Hardware Set-Up

The hardware must be properly configured prior to use. Follow the instructions below to set up the EVB:

- 1. Remove the CN7 jumper.
- 2. Turn off all the channels on SW1 and SW2.
- 3. Short all unused cell channels (channel x, where x = 8 to 16) to the practical maximum cell channel using  $0\Omega$  resistors, depending on the number of cells in series in the battery pack. If there are 16 cells in series, then skip this step. For example, for a battery back with 10 cells in series, add a  $0\Omega$  resistor at R54, R55, R56, R57, R58, and R59.
- 4. Connect the cell terminals to the voltage sensing connectors. For a battery pack with <16 cells in series, float the higher channel connectors.
- 5. Connect the battery terminals to:
  - a. Positive (+): BATT+
  - b. Negative (-): BATT-
- 6. Remove the CN2, CN3, CN4, and CN5 jumpers.
- 7. Connect and locate the temperature sensors. The temperature connectors can support up to four negative temperature coefficient (NTC) channels.
- 8. Connect the charger/load terminals to:
  - a. Positive (+): PACK+
  - b. Negative (-): PACK-
- If using the EV2796-0000-FP-00A, connect SDA, SCL, and GND to the USB-to-I<sup>2</sup>C communication interface (see Figure 9 on page 10). If using the EV2796-0002-FP-00A, connect NCS, SCK, SDO, SDI, and GND to the USB-to-SPI communication interface (see Figure 10 on page 10).
- 10. Connect the EVKT-USBI2C-02 or EVKT-USBSPI-00 to the computer.





Figure 9: EV2796-0000-FP-00A Wire Connection







#### 3.2 Powering Up the EVB

- 1. Connect the cell terminals to the voltage sensing connectors.
- 2. Preset the battery voltage (V<sub>BATT</sub>) between 18V and 75.2V, then turn off the power supply.
- 3. Connect the battery terminals to:
  - a. Positive (+): BATT+
  - b. Negative (-): BATT-
- 4. Turn on the power supply. The device should start up automatically.

#### 3.3 Software Set-Up

After connecting the hardware according to the steps above, follow the steps below to use the GUI software:

- 1. Start up the MP2796 GUI software. It should automatically check the EVB connection.
  - If the connection is successful, both the USB and MP2796 demo board statuses are listed as "Connected" at the bottom left of the screen (see Figure 11).
  - If the connection is unsuccessful, the USB and MP2796 demo board statuses are listed as "Disconnected" in red at the bottom left of the screen. Check the connections between the EVB, communication interface, and PC. Unplug the USB cable from the PC, then plug it back in.
    - If the MP2796 demo board status is listed as "Disconnected," this means that the evaluation board is not connected correctly.
    - If the USB status is listed as "Disconnected," this means that the USB communication interface is not connected correctly.

PROGRAMMING TOOL - MP2796			
File OTP OPTION			
Monitor and Control Configurati	ion		
NFETs Off	Scheduler Idle	GPIO1 <b>0.0mV</b> VTOP <b>0.000V</b>	VTOP RT UV OV INTERRUPT
Standby Enable Disable	Command Free	GPIO2 0.0mV VPACK 0.000V	Cell Mismatch
Current Status Standby	ADC Scan 60	GPIO3 • 0.0mV ITOP 0.000mV	Lowest 1 DelatV 0.00mV Cell Dead CLEAR
Power Status Safe	Done Error	Die Temperature Status RT	Voltage UV OV MS Dead BAL
Standby Mode Disable	Cell Balance 60	10-Bit ADC -269.1°C HR ADC -269.1°C	Cell1 0.0mV
Standby PFET Disable	Run NO 0	Digital CLEAR Analog CLEAR	Cell2 0.0mV
VTOP NA VPACK CLEAR	Dana Frrar	Status 10-Bit ADC HR ADC RT	Cell3 0.0mV
	Done Error	NTC1 Normal 0.0% 0.000% Normal	Cell4 0.0mV
WDI Status CLEAR	Skipped No	NTC2 Normal 0.0% 0.000% Normal	Cell5 0.0mV
Dite Dark	Open Wire GO	NTC3 Normal 0.0% 0.000% Normal	Cell6 0.0mV
FET Status Timer out	Done Error	NTC4 Normal 0.0% 0.000% Normal	Cell7 0.0mV
CHG DSCHG	List	Status 10-Bit ADC	Cell8 0.0mV
SBYDSCHG CHG Pump	Over-Current Status	VDD Normal 0.0mV	Cell9 0.0mV
OTP CRC GO	CHG RT	3V3 Normal 0.0mV	Cell10 0.0mV
Done Error	DSCHG1 RT	REGIN Normal 0.0mV	Cell11 0.0mV
Short-Circuit Status	DSCHG2 RT	Self Normal 0.0mV	Cell12 0.0mV
CHG RT	Dominal Press	ITOP Show Current Rsense 1 mQ	Cell13 0.0mV
DSCHG RT	Removal busy	Auto ADC Scap	Cell14 0.0mV
			Cell15 0.0mV
		Auto Read 🖌 Intervals 1000 ms READ ALL	Cell16 0.0mV
USB: Connected MP2796 Demo board: Connecte			CRC 🔽 🎆 🎦 Monolithic Power Systems, Inc

Figure 11: USB and MP2796 Demo Board Statuses Show Successful Connection



- 2. If the user CRC function must be enabled, check the "CRC" box at the bottom right of the GUI screen. This value cannot be written to the register later.
- 3. Click the "Configuration" tab in the menu to switch to the configuration view. Click the "Read All" button to read the register values. The default values are displayed.
- 4. Configure the number of cells in series, where between 7 cells and 16 cells can be enabled. Click the "Write All" button to save the configurations to the IC.
- 5. Set each protection function and its corresponding threshold, interrupt, and fault configurations according to the application specifications. These settings are available in the second and third columns. Click the "Write All" button to save the configurations to the IC.
- 6. During configuration, the IC must be in safe mode, with all the MOSFETs turned off. All the voltage monitoring protections are disabled in safe mode by default. If a protection is required in safe mode, enable the "HW VADC at Safe" setting (see Figure 12).



Figure 12: HW VADC at Safe Is Enabled

All changes made via the PC/SPI are restored to their default values once the EVB shuts down.

#### **3.4 Device Configuration Instructions**

The MP2796 can be custom configured. All one-time programmable (OTP) and multiple-time programmable (MTP) registers can be configured via the microcontroller unit (MCU). It is not recommended to use MTP memory in application with the MCU. The MTP registers can be configured up to three times. OTP memory and one-time MTP are performed at the factory, allowing the user to use MTP twice. Follow the instructions outlined below to create and export customized configurations as well as to configure the MTP.

▲ Once the lock bit in the OTP/MTP is set to 1, the corresponding setting register cannot be modified anymore.

#### Create and Export Customized Configurations

- 1. Using a computer, open the MPS GUI software.
- 2. Click the "Configuration" tab in the menu to switch to the configuration view.
- 3. Select "OTP View" from the OTP drop-down menu to enter OTP and MTP view (see Figure 13 on page 13).





Figure 13: Select OTP View

4. In OTP and MTP view, all parameters that are not relevant to OTP and MTP cannot be modified. Any other parameters can be adjusted as necessary (see Figure 14).

		ingulation				
CELLS AND COMMUNI	CATIO	N CONFIGURATION	WATCHDOG CONFIGURATION		OV UV DEAD MISMATCH CC	NFIGURATION
Number of Series Cells	ð	16 cells enable 🔹	Configuration Lock	Comunication WDT Disable	CELL OVER VOLTAGE CONF	IGURATION
User CRC	ð	Disable	Bark Timeout	2000ms 💌	Function	Disable
Communication Address	ð	01 *	Bite Timeout	3000ms 💌	Interrupt Disable Type	High level * Mask
> FET CONFIGURATION			Interrupt	Disable	Status Bits Control	Latched the status
FET Control Source	ð	Register 🔹	OPEN WIRE CONFIGURATION		Condtion 🔂 Threshold 419	9mV • Deglitch 1cycles •
NFETs Control Mode	ð	Simple 🔻	Fault	Disable	Hysteresis(mV)	195mV
Enable Logic	ð	Rising edge 🔹	Interrupt	Disable	Exit Logic Selection 🔂 Ign	ore Hysteresis when PACKP
PFET Manual Control		Execute at Power On Disable		CELL UNDER VOLTAGE CONFIGURATION		
SC Removal Detect Softon		Enable	Pull Up/Down Time	8ms 💌	Function	Disable
Soft On 🔂 DSG	En	able CHG Enable	Threshold	195mV 💌	Interrupt Disable Type	High level * Mask
SC Deglitch Softon		800us 👻	OVER CURRENT CONFIGURATION	- DN	Status Bits Control	Latched the status
SC Current Limit Softon		625uV 👻	Enable Configuration Lock		Condtion 🔁 Threshold 2969mV 🔻 Deglitch 1cycles	
Configuration Lock			OC1 DSCHG Function	Enable Fault Enable	Hysteresis(mV)	195mV
DSCHG Turn On Slope		0.1V/ms *	OC2 DSCHG Function	Enable Fault Enable	Exit Logic Selection 🔂 Ign	ore Hysteresis when PACKP
CHG Turn On Timer		50ms 👻	OC CHG Function	OC CHG Function Enable Fault Enable		
CHG Turn On OC Limit		3.6mV •	Over Current Interrupt	Disable Mask	Cell UV Fault	Disable
Driver Voltage		10V •	OC1 DSCHC Internet		Cell OV Fault	Disable

Figure 14: OTP and MTP View

- 5. Click "Export" to export the configurations from the OTP drop-down menu.
- 6. Find a location for the exported file, rename the file if necessary, and click "Save." The configurations are saved in a text file (see Figure 15).

Save As	;	×
← → • ↑ 🖡	« Desktop → MP2796	
Organize • Ne	w folder 📰 👻 🕐	
Garvin MP2793	Name     Date modified     No items match your search.	
🗢 This PC		
Documents Downloads		
💺 OS (C:) 🧼 Program (D:)	v (	>
File name:	MP2796-0000-revx.txt	~
Save as type:	Text files(*.txt)	~
▲ Hide Folders	Save Cancel	

#### Figure 15: Save the Exported Configurations to Desired Location

7. Send this file to an MPS FAE to request a custom "xxxx" code.



#### MTP Configuration

- 1. Using a computer, open the MPS GUI software. Ensure that the EVB is powered on.
- 2. Ensure that there is a successful connection between the EVB and computer.
- 3. Select "NVM View" from the OTP drop-down menu to enter non-volatile memory (NVM) view.
- 4. In NVM view, all parameters that are not relevant to MTP cannot be modified. Any other parameters can be modified as necessary (see Figure 16).

				O WATCHDOG CONF					OV UV DEAD MISMATCH			
Number of Series Cells	ð	16 cells enable		Configuration Lock	6	Comunication WDT Disable			CELL OVER VOLTAGE CONFIGURATION			
User CRC	ð	Disable		Bark Timeout		2000ms		v	Function	ð	Disable	
Communication Address	ð	01	•	Bite Timeout		3000ms		Ŧ	Interrupt Disable Typ	e High le	vel • Ma	ask
FET CONFIGURATION				Interrupt		Disable			Status Bits Control Latched the statu		ched the status	1
FET Control Source	ð	Register	*	OPEN WIRE CONFI	IGURATION				Condtion 🔂 Threshold 4	199mV	Deglitch 1cycle	es 1
NFETs Control Mode	ð	Simple	¥	Fault	ð	E	lisable		Hysteresis(mV)	19	5mV	
Enable Logic	ð	Rising edge	-	Interrupt	Disable			Exit Logic Selection 💼 Ignore Hysteresis when PACKP				
PFET Manual Control	ê	Disable		Execute at Power On	Disable			CELL UNDER VOLTAGE CONFIGURATION				
SC Removal Detect Softon Enable		Pull Up/Down Time		8ms 💌		w	Function		Disable			
Soft On DSG		vable CHG Enal	ble	Threshold		195mV		÷	Interrupt Disable Typ	e High le	vel * M	ask
SC Deglitch Softon		800us	÷	OVER CURRENT CO	ONFIGURATIC	N			Status Bits Control	Lat	ched the status	
SC Current Limit Softon		625uV	-	Enable Configurat	ion Lock				Condtion 🔂 Threshold 2	969mV	Deglitch 1cycle	PS
Configuration Lock				OC1 DSCHG	Function	Enable	Fault	Enable	Hysteresis(mV)	19	5mV	
DSCHG Turn On Slope		0.1V/ms	•	OC2 DSCHG	Function	Enable	Fault	Enable	Exit Logic Selection	Ignore Hy	steresis when PACK	p
CHG Turn On Timer		50ms	*	OC CHG	Function	Enable	Fault	Enable	Fault Configuration Lock			
CHG Turn On OC Limit		3.6mV	*	Over Current Interrup	t	Disable		Mask	Cell UV Fault		Disable	
Driver Voltage		10V		OC1 DSCHG Interrupt	Enable				Cell OV Fault		Disable	
CHG Pull Un Current		704										

Figure 16: NVM View

5. Click "I2C Group Tool" (for the -0000 configuration code) or "SPI Group Tool" (for the -0002 configuration tool) at the top right of the GUI window to configure a single register in the "COMM REV2.0" window that pops up (See Figure 17).

PROGRAMMING TOO	DL -	MP2796											120	Group Tool —	
File OTP OPTION Monitor and Control		onfiguration													
CELLS AND COMMUNIC	CATIC	🕥 comm rev	/2.0								Bauc	Rate 400kHz	• ×	SURATION	
Number of Series Cells	ð	Slave Address	00	h	٦	SAVE	LOAD		CLEAR	RU	N	CRC 🗸		ATION	
User CRC	ð				NO.	TIME	DELAY	ADDR	REG	BYTE	WR	DATA	CRC	Disable	
Communication Address	ð	Write Deviator	00		0									level 🔻	Mask
• FET CONFIGURATION		write Register	00	n										atched the status	~
FET Control Source	ð	Byte	1											<ul> <li>Deglitch 1</li> </ul>	cycles 🔻
NFETs Control Mode	ð	Data	00	h										195mV	*
Enable Logic	ð	butu												Hysteresis when P	ACKP 🔻
PFET Manual Control	ô		WRITE	:										JRATION	
SC Removal Detect Softon			INSER	r										Disable	
Soft On DSG				-										level 🔻	Mask
SC Deglitch Softon		Read Register	00	h										atched the status	*
SC Current Limit Softon		Byte	1											Deglitch 1	cycles 🔻
Configuration Lock														195mV	*
DSCHG Turn On Slope		l	READ											Hysteresis when P	ACKP 🔻
CHG Turn On Timer		Data		h											
CHG Turn On OC Limit			INCERT											Disable	
Driver Voltage			INSER	<u> </u>	Liber	отпенаре	Endore						•	Disable	
CHG Pull Un Current		7uA	-										-		





- Check the number of times that MTP has been performed by reading NVM\_STATUS. Stop MTP if NVM Page 3 has been fully configured (register 0xB4, bits[5:3] = 3'b1xx).
- 7. Apply a 7.5V voltage to the NSHDN pin by connecting the 7.5V power supply terminals to:
  - a) Positive (+): VMTP
  - b) Negative (-): GND
- 8. Write the appropriate value to the register that enables MTP.
- 9. Write register 0xB9 to 0xA5B6 to enable the stored command.
- 10. Write 1 to STORE\_MTP\_CMD (register 0xB8, bit[3]) to send the command to store the register's current value to the NVM.
- 11. Wait for STORE\_IN\_PROGRESS (register 0xB8, bit[15]) to return to 0.
- 12. Recover the NSHDN pin to 3.3V.
- 13. If a user tries to perform MTP on a device that has been configured three times previously, the GUI software allows the user to proceed normally; however, this may trigger an OTP CRC error and cause all configurations to fail to load. Confirm that MTP has not already been configured three times before performing MTP.

#### 3.5 Troubleshooting Tips

#### EVKT-USBI2C-02 or EVKT-USBSPI-00 Driver Installation Problem

If the USB driver is not properly installed, manual installation is required. Follow the steps below to manually install the EVKT-USBI2C-02 or EVKT-USBSPI-00 driver:

Note: Find "USBXpress Device" in the Device Manager.

🔲 🏺 USBXpress Device

If the PC is running Windows 10, check the driver version of USBXpress Device. Windows 10 automatically installs the older USB driver, which is not compatible. The correct driver version is 4.0.0.0 (see Figure 18).

1. Install the correct "USBXpress ".exe" file. Choose either the 32-bit or 64-bit operating system.

32-bit: USBXpressInstaller\_x86.exe

64-bit: USBXpressInstaller\_x64.exe

2. Connect the EVKT-USBI2C-02 or EVKT-USBSPI-00 communication interface to the PC with a USB cable (see Figure 18 on page 16).



USBXpress Device Properti	es X
General Driver Details	
USBXpress Dev	ice
Driver Provider:	Silicon Laboratories
Driver Date:	2013/4/8
Driver Version:	4.0.0.0
Digital Signer:	Microsoft Windows Hardware Compatibility Publisher
Driver Details	To view details about the driver files.
Update Driver	To update the driver software for this device.
Roll Back Driver	If the device fails after updating the driver, roll back to the previously installed driver.
Disable	Disables the selected device.
Uninstall	To uninstall the driver (Advanced).
	OK Cancel

Figure 18: Correct Driver Version

#### **Communication Problem**

If the EVB is unable to communicate after start-up, check whether the VTOP and NSHDN pin voltages ( $V_{TOP}$  and  $V_{NSHDN}$ , respectively) meet the following conditions for normal operation:

- V<sub>TOP</sub> > 20V
- V<sub>NSHDN</sub> > 3V

To determine whether the IC is operating properly, check that the REGCTRL, REGIN, and VDD pin voltages ( $V_{REGCTRL}$ ,  $V_{REGIN}$ , and  $V_{DD}$ , respectively) meet the following specifications:

- V<sub>REGCTRL</sub> = 5.6V
- V<sub>REGIN</sub> = 5V
- V<sub>DD</sub> = 1.8V

#### **Thermal Recovery**

If the MP2796 shuts down due to the die temperature exceeding the thermal protection threshold, then the IC starts up again once the die temperature decreases.



## **Section 4. Ordering Information**

The components of the evaluation kit can be purchased separately depending on user needs.

Part Number	Description				
EVKT-MP2796-0000	Complete evaluation kit				
Contents of EVKT-MP2796-0000					
EV2796-0000-FP-00A	MP2796-0000 evaluation board				
EVKT-USBI2C-02	Includes one USB to $I^2C$ communication interface, one USB cable, and one ribbon cable				
Online resources	Include GUI and supplemental documents				

Part Number	Description
EVKT-MP2796-0002	Complete evaluation kit
Contents of EVKT-MP2796-0002	
EV2796-0002-FP-00A	MP2796-0002 evaluation board
EVKT-USBSPI-00	Includes one USB to SPI communication interface, one USB cable, and one ribbon cable
Online resources	Include GUI and supplemental documents

Order directly from MonolithicPower.com or our distributors.



## **REVISION HISTORY**

Revision #	<b>Revision Date</b>	Description	Pages Updated
1.0	8/21/2023	Initial Release	-

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