MCPF1525M06 Evaluation Board User Guide

EV21B88A

Introduction

The **MCPF1525** is a 16V, 25A converter that provides high power density and high efficiency, and it is stackable with up to eight modules for a 200A capability. This Evaluation Board allows the user to investigate the part in a single-module application and demonstrates the device's capabilities.

Features

The MCPF1525 Evaluation Board (EV21B88A) has the following features:

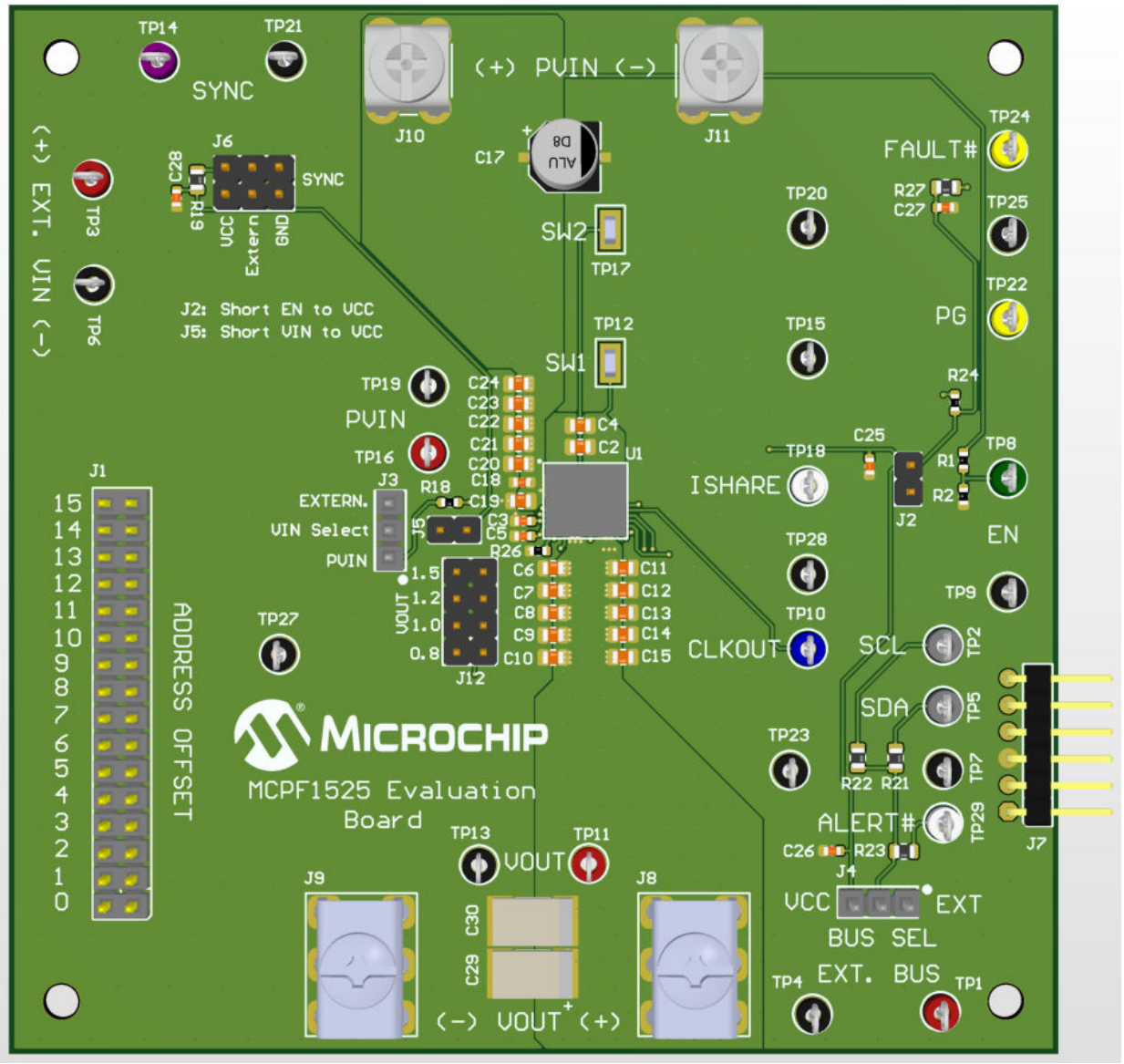
- POL Module With Output Inductor Included
- Small Size: 5.8 mm x 4.9 mm x 1.6 mm
- Continuous 25A Load Capability
- Wide Input Voltage Range: 4.5-16V
- Adjustable Output Voltage: 0.6-1.8V
- No External Compensation Required
- Programmable Operation Using I^2C and PMBus™
- Enable Input, Programmable Undervoltage Lockout (UVLO) Circuit
- Power Good Indicator
- Built-in Protection Features
- Operating Temperature From -40°C to +125°C
- Lead-Free and Halogen-Free
- Compliant with EU REACH and RoHS.

Kit Contents

The MCPF1525 Evaluation Board (EV21B88A) kit includes:

- MCPF1525 Evaluation Board (EV21B88A)

Figure 1. MCPF1525 Evaluation Board (EV21B88A)

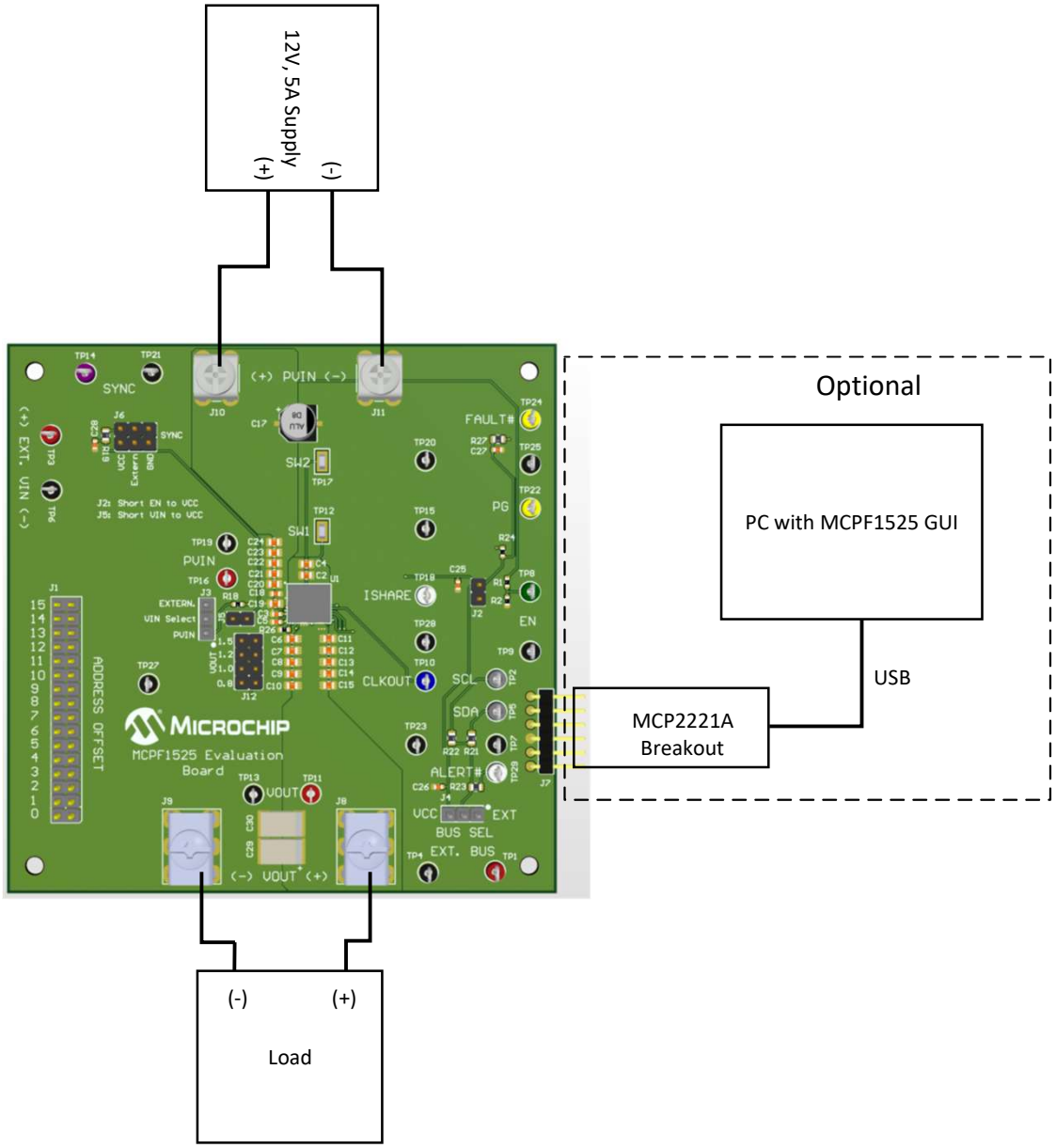


1. Setup and Configuration

1.1. Connection to the Evaluation Board

Connect a 12V typical power supply and a DC electronic load to the board as shown below in Figure 1-1. An optional MCP2221A Breakout Board (available separately) can also be connected as shown to allow I2C and/or PMBus communication with the MCPF1525 device. Once the jumpers on the board have been verified to be set to the desired selections, turn on the power supply and then the load. Adjust the load current as desired.

Figure 1-1. Basic Boards Connections

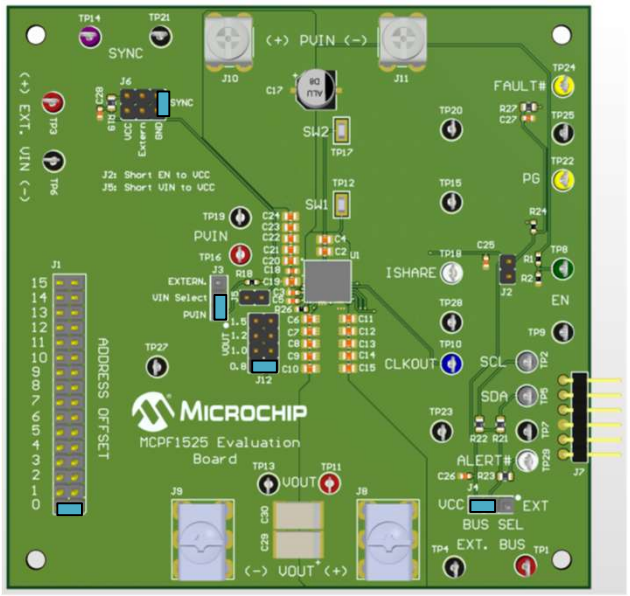


1.2. Headers, Connectors, Jumpers

The MCPF1525 Evaluation Board has several jumpers and test points that can be used to alter the function of the board. These are:

- **J1**: This jumper is used to select the offset applied to the base I2C and PMBus addresses for communication. By default, this jumper will be in the “0” position so that the effective I2C address is 0x10 and the effective PMBus address is 0x70. Offsets up to 0xF (15 decimal) can be selected by changing the jumper position. The base addresses can be found in register 0x40 for I2C and 0x41 for PMBus, allowing for complete configuration of any address space.
- **J2**: Normally open, placing this jumper connects the EN pin directly to VDD on the module and disables the UVLO threshold set by resistors R1 and R2.
- **J3**: This jumper selects the source for VIN, either from PVCC or from another externally applied source. This jumper will usually be used in conjunction with J5 (which bypasses the internal VCC LDO) when the externally supplied source is 5V.
- **J4**: This jumper selects the termination voltage source for the I2C bus termination. In the “VCC” position, the I2C bus will be terminated by the on-board 5V regulator of the MCPF1525 and use on-board resistors (R21 and R22) to terminate the bus lines. In the “EXT” position an external voltage source is used to terminate the I2C bus, again using on-board termination resistors. The external bus termination voltage can be applied at the “EXT. BUS” test points, TP4 and TP1. If using the on-board termination resistors is not preferred, they can be removed as long as there is a termination resistor available on the I2C bus.
- **J5**: This jumper bypasses the internal VCC LDO on the module and is only used with an external VIN source of 5V.
- **J7**: This is a six-position header that is used with the MCP2221A Breakout Module (available separately) to communicate with the module using the I2C and PMBus capabilities of the module.
- **J12**: This jumper can be used to select one of four preconfigured output voltages for the board. 800 mV, 1.0V, 1.2V and 1.5V options are available. Leaving this jumper off will let the module regulate at 600 mV and allow direct control of the output voltage using the PMBus VOUT_COMMAND command or the corresponding I2C registers (consult the MCP1525 data sheet). These jumper positions connect biasing resistors to a voltage divider which is in turn connected to the FB pin of the MCPF1525.

Figure 1-2. Default Jumper Positions



1.3. Programming/Debugging

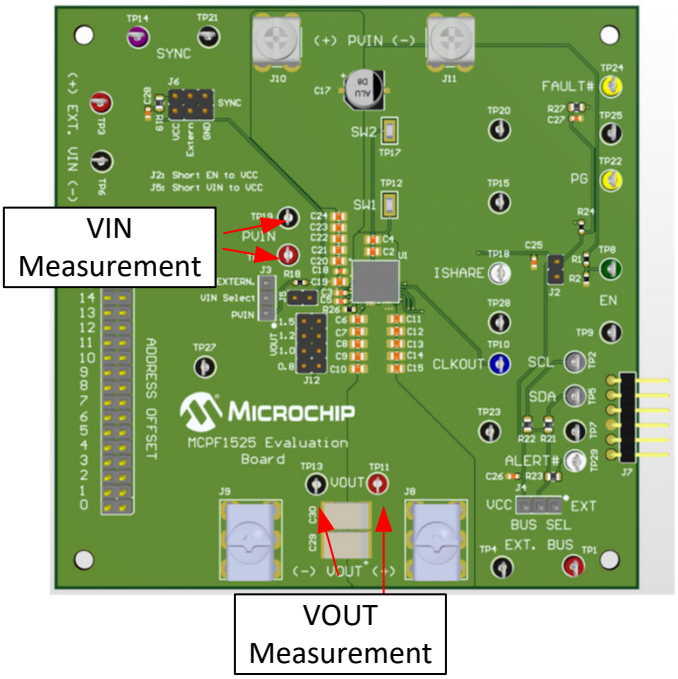
The MCPF1525 has both an I2C register-level access and a PMBus 1.3-compliant access mechanism. For a description of the available registers and PMBus commands, refer to the MCPF1525 data sheet.

The MCPF1525 has on board nonvolatile memory that can be programmed. For instructions on how to program the nonvolatile memory, refer to the MCPF1525 data sheet.

1.4. Hardware Description

The MCPF1525 Evaluation Board is a six-layer board with 2 oz. copper on all layers. The board dimensions are 100 mm x 100 mm making it easy to handle in a lab environment. Test points are provided close to the actual circuit for measuring input and output voltages for use in efficiency measurements (see Figure 1-3).

Figure 1-3. Efficiency Measurement Test Points



Serial bus communication can be monitored on TP2 and TP5, which are labeled “SCL” and “SDA”. These test points are located near J7, the connection point for the optional MCP2221A Breakout Module. The EN pin can be externally manipulated using TP8 and TP9, labeled “EN”.

2. Graphical User Interface

A Graphical User Interface (GUI) is available for download at www.microchip.com/en-us/product/MCPF1525 which allows access to individual registers as well as PMBus communication. This requires an MCP2221A Breakout Module available separately (https://www.microchip.com/en-us/development-tool/ADM00559 or https://www.microchip.com/en-us/development-tool/BB62Z76A). The connection of this module is shown in Figure 1-1.

Figure 2-1 shows the register access tab of the GUI. From this page, all registers in the device can be accessed and modified, where write access is permitted, as desired. On the left side of the screen, decoded displays for the most useful registers are shown. The affected registers can be read or written using the associated Read/Write button controls, or the Read/Write All Fields buttons. On the right side, each individual register can be accessed directly using bit level data (bar at the top) or by hex data using the value column and cell adjacent to the desired register. The registers can be written individually or all at once with the Read/Write controls at the top of this section. Note that the decoded values pane and the direct register access pane are treated separately for reads and writes. A running log of communication with the device can be seen in the bottom section.

Figure 2-1. MPCF1525 Graphical User Interface - Register Access Tab

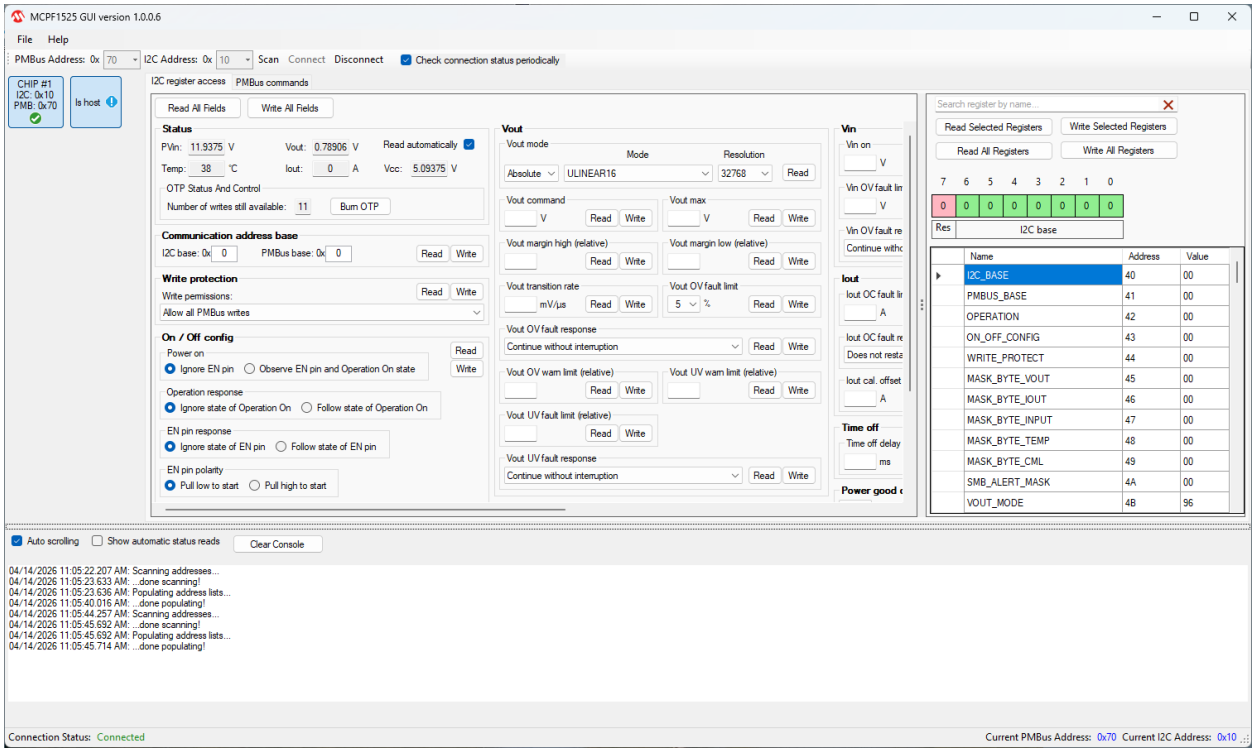


Figure 2-2 shows the PMBus command tab. On the left is a list of the available PMBus commands. Selecting one of these populates the right-hand pane with the register representation and any decoded values in various controls. The OPERATION command is selected in the figure. Once a command is selected, click the “Read Selected” button to populate the right pane with the values currently stored in the part’s working memory. The values can be changed by either clicking specific bits in the register representation of by manipulating the controls and the written to the part’s working memory by clicking the “Write Selected” button.

Figure 2-2. MPCF1525 Graphical User Interface - PMBus Commands Tab

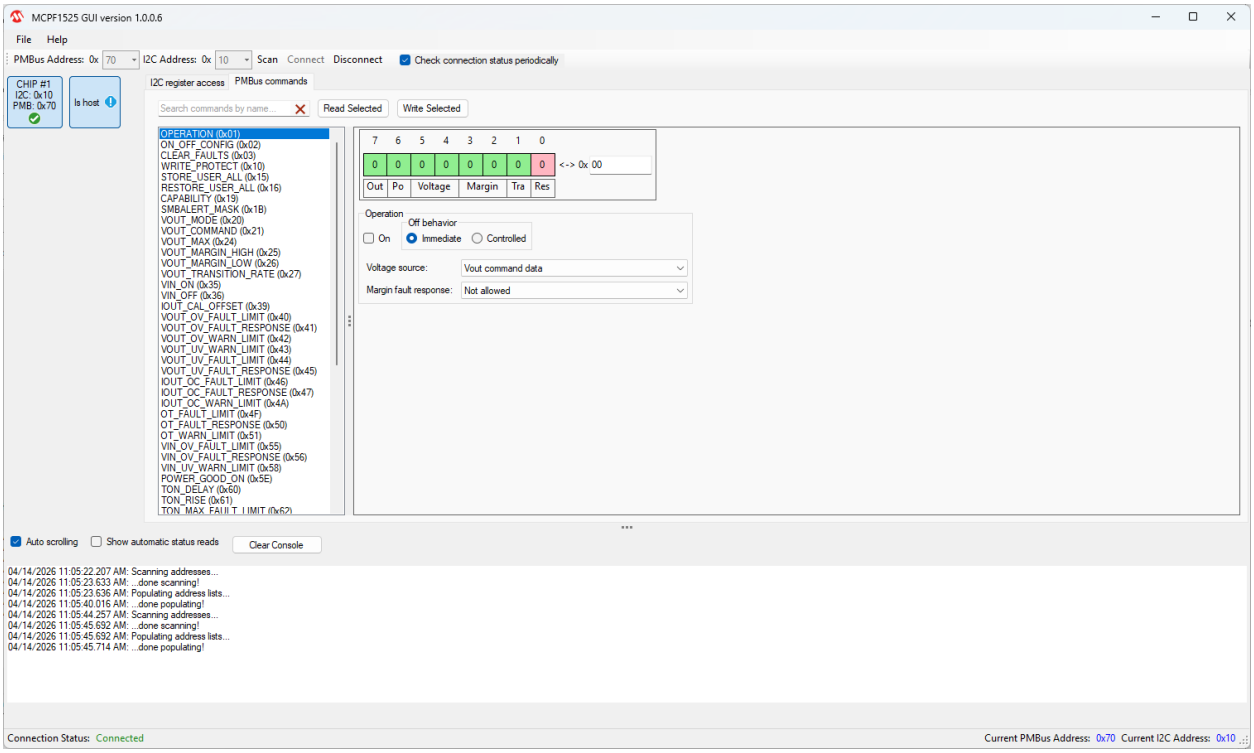


Figure 2-3. MPCF1525 Graphical User Interface - Top Section

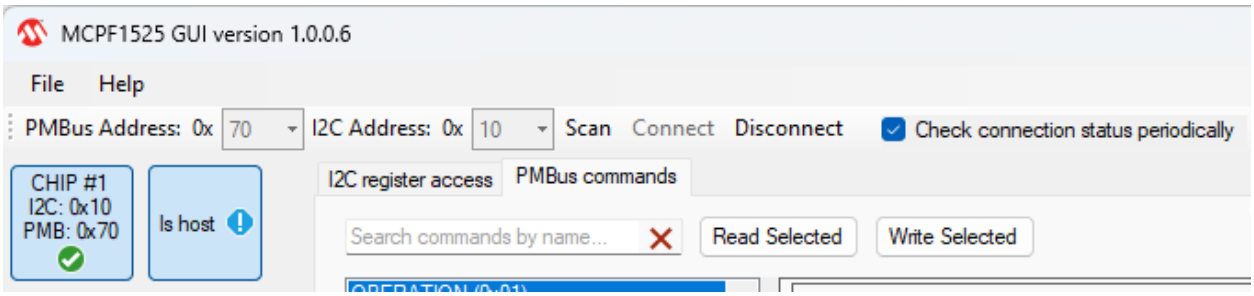


Figure 2-3 shows the top section of the GUI in more detail. Across the top, under the menu, there are displays for the detected PMBus address and I^{2}C address. These should be populated automatically if the Evaluation Board is connected to the computer and powered up when the GUI is launched. If the Evaluation Board is not connected or powered when the GUI is launched, connect and power up the GUI and then click the “Scan” button immediately to the right of the “I2C Address” display. When asked to mark the IC as master, select **Yes**. The GUI is now ready for normal operation.

The “Connect” and “Disconnect” buttons start and stop communication with the Evaluation Board. The “Check connection status periodically” control turns on a periodic check to determine whether if the Evaluation Board is connected and powered. This check is not required for normal GUI operation and may be turned off if testing requirements dictate.

On the far left is a display of the devices found during the startup scan or after clicking the “Scan” button. If multiple MCPF1525 modules are found, they will be displayed here. The GUI communicate with each module individually. Select the module to communicate with and proceed with reading and writing as needed.

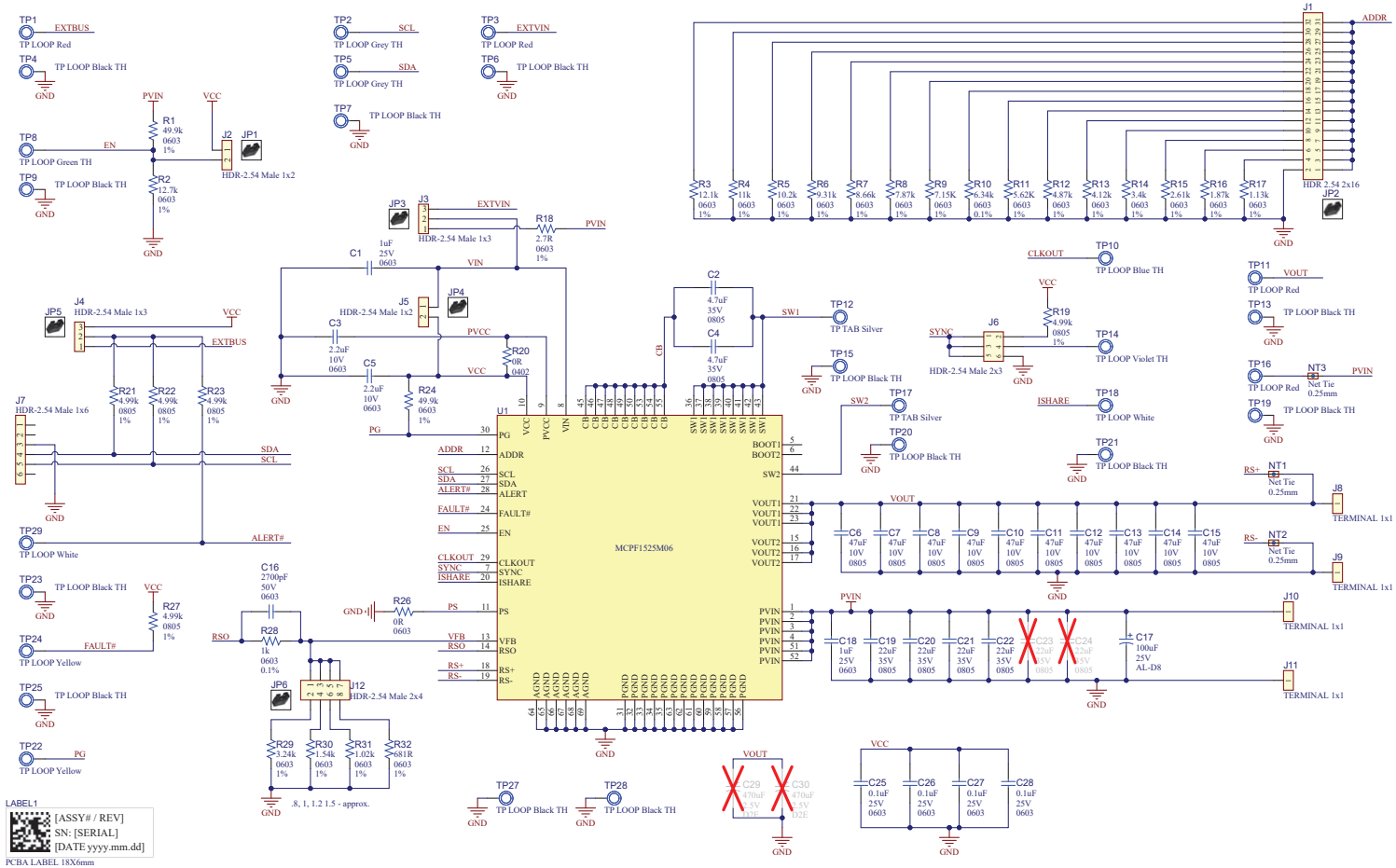
Note: The GUI is designed to support multiple parallel modules supplying a single output only. Multiple outputs and other configurations are not supported at this time. In a multiple-module single-output system, one module is designated as the host and the others are clients. This relationship is established in hardware by the selection of the PS resistor as described in the MCPF1525 data sheet. It is important to make sure that the correct module is designated as the host.

3. Board Design

This chapter contains the following schematic and layouts for the MCPF1525 Evaluation Board (EV21B88A):

- Board - Schematic
- Board - Top Silk
- Board - Top Copper and Silk
- Board - Top Copper
- Board - Mid Layer 1
- Board - Mid Layer 2
- Board - Mid Layer 3
- Board - Mid Layer 4
- Board - Bottom Copper
- Board - Bottom Copper and Silk
- Board - Bottom Silk

3.1. Schematic



3.2. Layout

Figure 3-1. Board - Top Silk

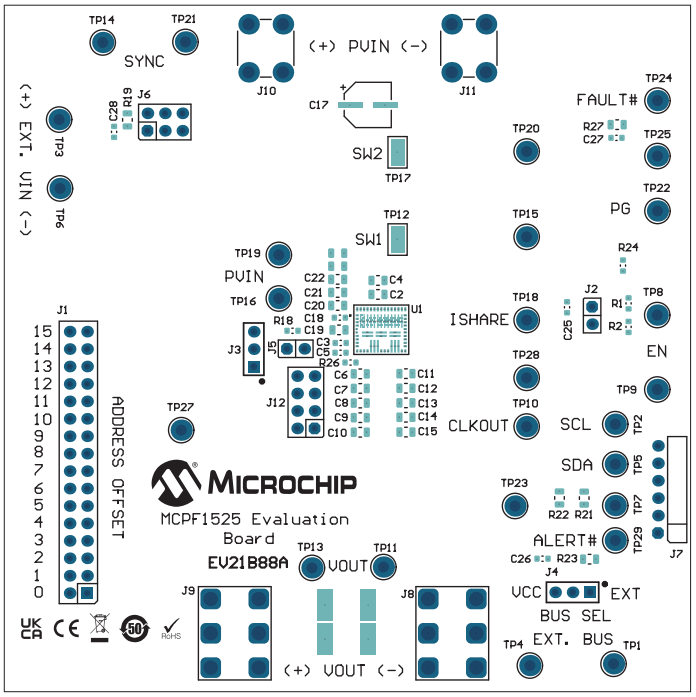


Figure 3-2. Board - Top Copper and Silk

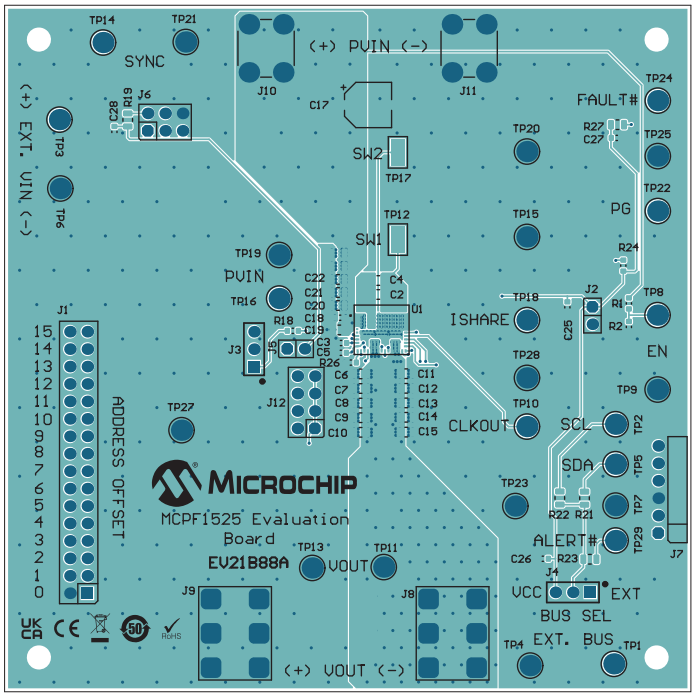


Figure 3-3. Board - Top Copper

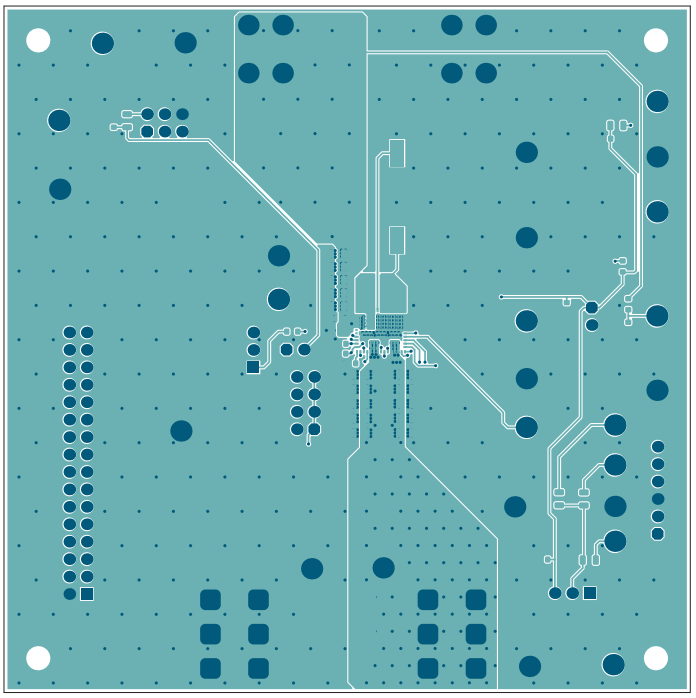


Figure 3-4. Board - Mid Layer 1

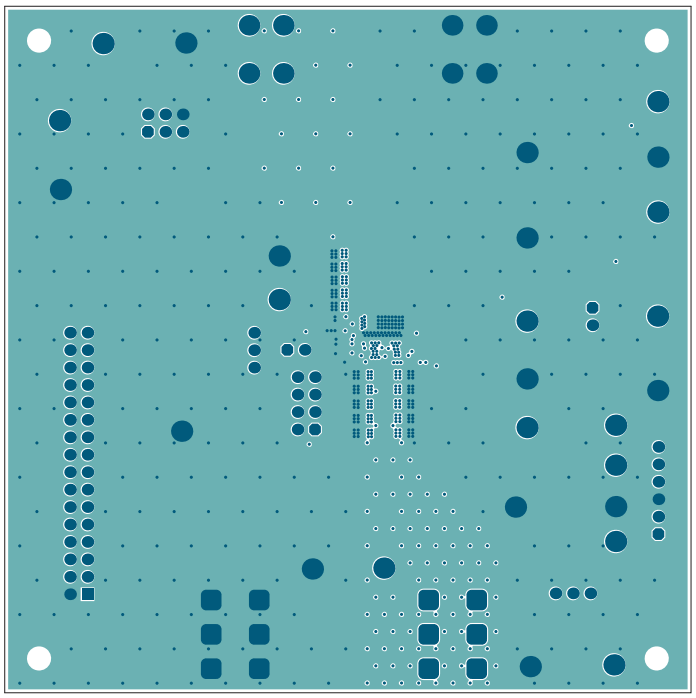


Figure 3-5. Board - Mid Layer 2

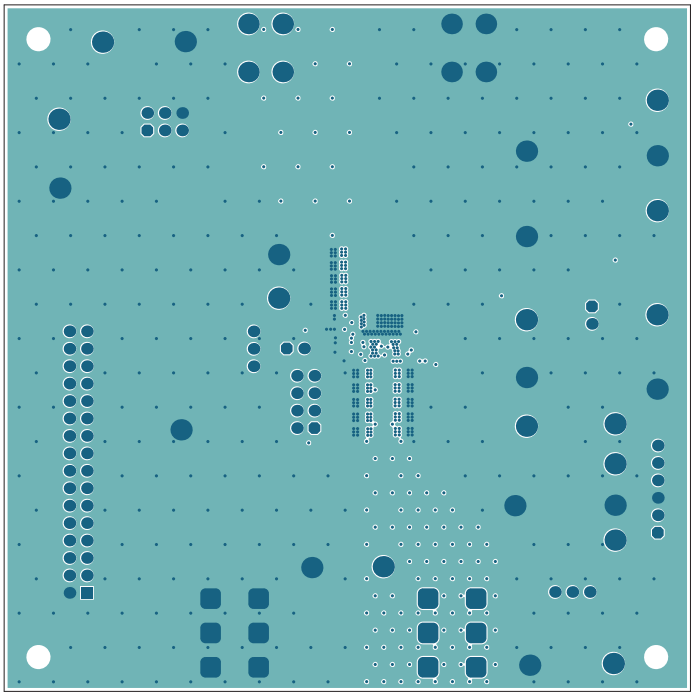


Figure 3-6. Board - Mid Layer 3

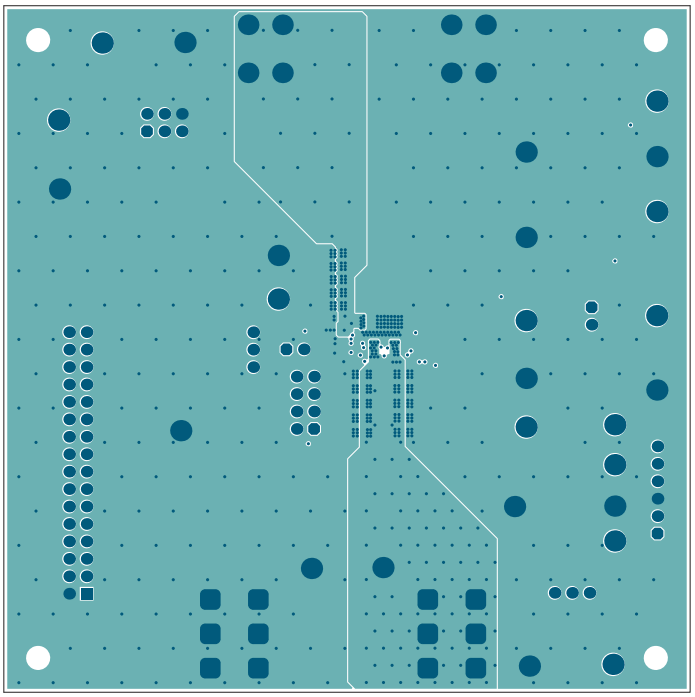


Figure 3-7. Board - Mid Layer 4

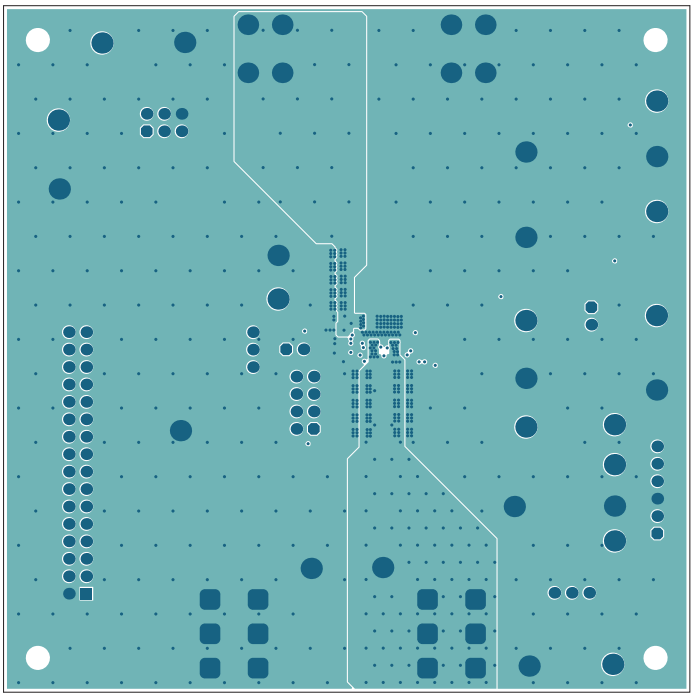


Figure 3-8. Board - Bottom Copper

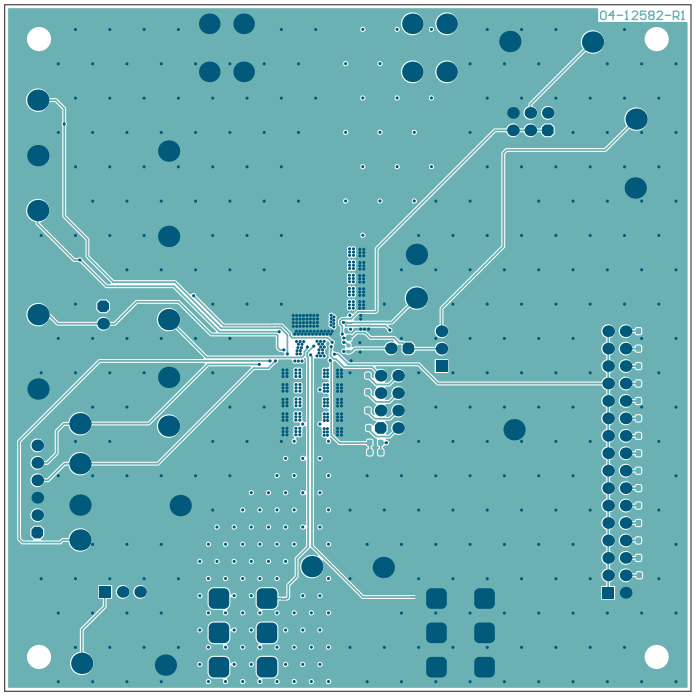


Figure 3-9. Board - Bottom Copper and Silk

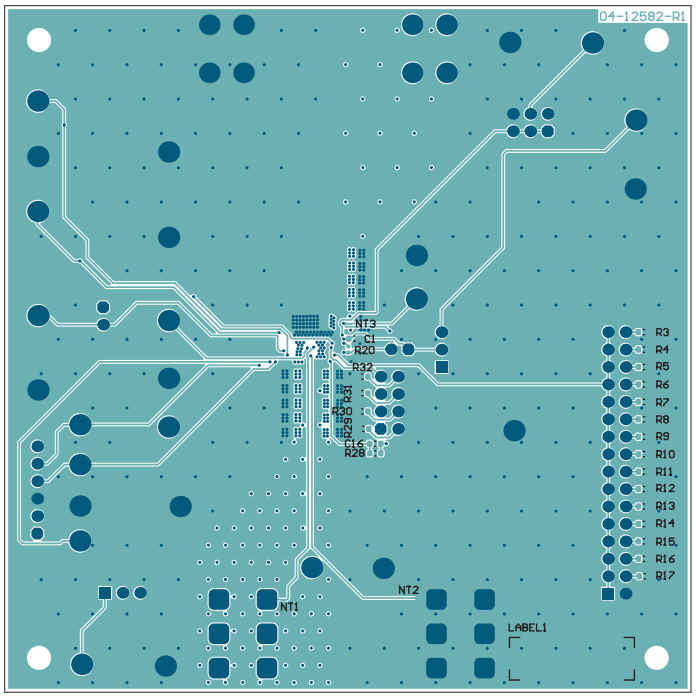
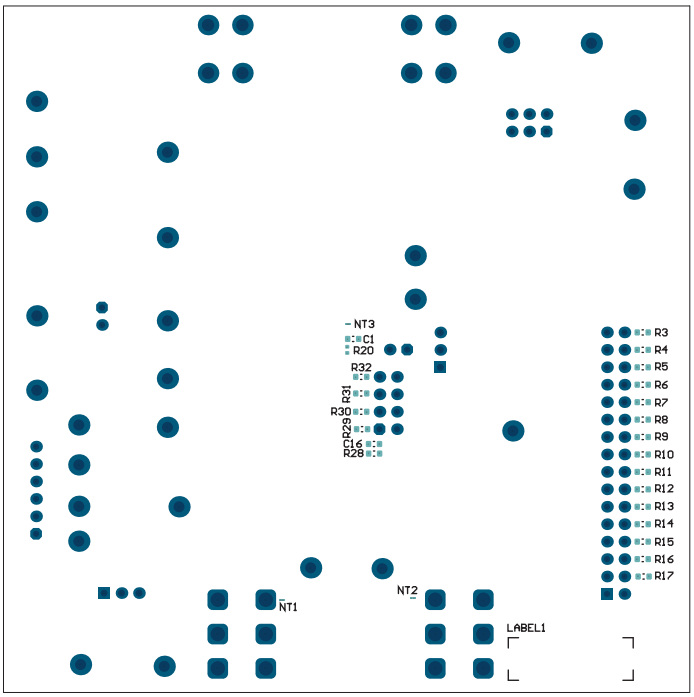


Figure 3-10. Board - Bottom Silk



4. Bill of Materials (BOM)

Table 4-1. Bill of Materials (BOM)

Qty.	Reference	Description	Manufacturer	Part Number
2	C1, C18	Capacitor, Ceramic, 1 µF, 25V, 20%, X5R, SMD, 0603	TDK Corporation	C1608X5R1E105M080AC
2	C2, C4	Capacitor, Ceramic, 4.7 µF, 35V, 10%, X7R, SMD, 0805	TDK Corporation	C2012X7R1V475K125AC
2	C3, C5	Capacitor, Ceramic, 2.2 µF, 10V, 10%, X7R, SMD, 0603	TDK Corporation	C1608X7R1A225K080AC
10	C6, C7, C8, C9, C10, C11, C12, C13, C14, C15	Capacitor, Ceramic, 47 µF, 10V, 20%, X5R, SMD, 0603	TDK Corporation	C2012X5R1A476M125AC
1	C16	Capacitor, Ceramic, 2700 pF, 50V, 10%, X7R, SMD, 0603	Panasonic® - ECG	ECU-V1H272KBV
1	C17	Capacitor, Aluminum, 100 µF, 25V, 20%, SMD, D8	Panasonic® - ECG	EEE-FPE101XAP
4	C19, C20, C21, C22	Capacitor, Ceramic, 22 µF, 35V, 20%, JB, SMD, 0805	TDK Corporation	C2012JB1V226M125AC
4	C25, C26, C27, C28	Capacitor, Ceramic, 0.1 µF, 25V, 20%, X7R, SMD, 0603	KEMET	C0603C104M3RACTU
1	J1	Connector, HDR-2.54, Male, 2x16, Gold, 5.84MH, Through Hole, Vertical	Samtec, Inc.	TSW-116-07-G-D
2	J2, J5	Connector, HDR-2.54, Male, 1x2, Gold, 5.84MH, Through Hole, Vertical	Samtec, Inc.	TSW-102-07-G-S
2	J3, J4	Connector, HDR-2.54, Male, 2x3, Gold, 6.48MH, Through Hole, Vertical	Samtec, Inc.	HMTSW-103-23-F-S-237
1	J6	Connector, HDR-2.54, Male, 2x3, Gold, 5.84MH, Through Hole, Vertical	Shenzhen Junhao Engineering Co., Ltd.	213-0617-0021-401
1	J7	Connector, HDR-2.54, Male, 1x6, Gold, 5.84MH, Through Hole, Right Angle	FCI	68016-106HLF
2	J8, J9	Connector, Terminal, 30A, Female, 1x1, Through Hole, Vertical	Keystone® Electronics Corp.	8197
2	J10, J11	Connector, Terminal, 15A, Female, 1x1, Through Hole, Vertical	Keystone® Electronics Corp.	7701
1	J12	Connector, HDR-2.54, Male, 2x4, Gold, 5.84MH, Through Hole, Vertical	Samtec, Inc.	TSW-104-08-L-D
2	R1, R24	Resistor, Thick Film, 49.9k, 1%, 1/10W, SMD, 0603	Panasonic® - ECG	ERJ-3EKF4992V
1	R2	Resistor, Surface Mount, 12.7k Ohm, 1%, 1/10W, 0603, AEC-Q200	Panasonic® - ECG	ERJ-3EKF1272V
1	R3	Resistor, Thick Film, 12.1k, 1%, 1/10W, SMD, 0603, AEC-Q200	Panasonic® - ECG	ERJ-3EKF1212V
1	R4	Resistor, Thick Film, 11k, 1%, 1/10W, SMD, 0603	Panasonic® - ECG	ERJ-3EKF1102V
1	R5	Resistor, Thick Film, 10.2k, 1%, 1W, SMD 2512	Yageo Corporation	RC0603FR-0710K2L
1	R6	Resistor, Thick Film, 9.31k, 1%, 1/10W, SMD, 0603	Panasonic® - ECG	ERJ-3EKF9311V
1	R7	Resistor, Thick Film, 8.66k, 1%, 1/10W, SMD, 0603	Yageo Corporation	RC0603FR-078K66L
1	R8	Resistor, Thick Film, 7.87k, 1%, 1/10W, SMD, 0603, AEC-200	Panasonic® - ECG	ERJ-U03F7871V

Table 4-1. Bill of Materials (BOM) (continued)

Qty.	Reference	Description	Manufacturer	Part Number
1	R9	Resistor, Thick Film, 7.15k, 1%, 1/10W, SMD, 0603	Panasonic® - ECG	ERJ-3EKF7151V
1	R10	Resistor, Thick Film, 6.34k, 0.1%, 1/10W, SMD, 0603, AEC-200	Panasonic® - ECG	ERA-3AEB6341V
1	R11	Resistor, Thick Film, 5.62k, 1%, 1/10W, SMD, 0603	Panasonic® - ECG	ERJ-3EKF5621V
1	R12	Resistor, Thick Film, 4.87k, 1%, 1/10W, SMD, 0603	Yageo Corporation	RC0603FR-074K87L
1	R13	Resistor, Thick Film, 4.12k, 1%, 1/10W, SMD, 0603, AEC-200	Stackpole Electronics, Inc.	RMCF0603FT4K12
1	R14	Resistor, Thick Film, 3.4k, 1%, 1/10W, SMD, 0603	Panasonic® - ECG	ERJ-3EKF3401V
1	R15	Resistor, Thick Film, 2.61k, 1%, 1/10W, SMD, 0603	Yageo Corporation	RC0603FR-072K61L
1	R16	Resistor, Thick Film, 1.87k, 1%, 1/10W, SMD, 0603	Panasonic® - ECG	ERJ-3EKF1871V
1	R17	Resistor, Thick Film, 1.87k, 1%, 1/10W, SMD, 0603	Stackpole Electronics, Inc.	RMCF0603FT1K13
1	R18	Resistor, Thick Film, 2.7R, 1%, 1/10W, SMD, 0603, AEC-200	Vishay Intertechnology, Inc.	CRCW06032R70FKEA
5	R19, R21, R22, R23, R27	Resistor, Thin Film, 4.99k, 1%, 1/8W, SMD, 0805, AEC-200	Panasonic® - ECG	ERJ-6ENF4991V
1	R20	Resistor, Thick Film, 0R, 1/5W, SMD, 0402, AEC-200	Vishay Intertechnology, Inc.	CRCW04020000Z0EDHP
1	R26	Resistor, Thick Film, 0R, 1/10W, SMD, 0603, AEC-200	Panasonic® - ECG	ERJ-3GEY0R00V
1	R28	Resistor, Thin Film, 1k, 0.1%, 1/10W, SMD, 0603	Panasonic® - ECG	ERA-3AEB102V
1	R29	Resistor, Thick Film, 3.24k, 1%, 1/10W, SMD, 0603	Panasonic® - ECG	ERJ-3EKF3241V
1	R30	Resistor, Thick Film, 1.54k, 1%, 1/10W, SMD, 0603	Panasonic® - ECG	ERJ-3EKF1541V
1	R31	Resistor, Thick Film, 1.02k, 1%, 1/10W, SMD, 0603, AEC-200	Panasonic® - ECG	ERJ-3EKF1021V
1	R32	Resistor, Thick Film, 681R, 1%, 1/10W, SMD, 0603, AEC-200	Panasonic® - ECG	ERJ-3EKF6810V
4	TP1, TP3, TP11, TP16	Connector, Test Point, LOOP, Red, Through Hole	Keystone® Electronics Corp.	5010
2	TP2, TP5	Connector, Test Point, LOOP, Grey, Through Hole	Keystone® Electronics Corp.	5128
13	TP4, TP6, TP7, TP9, TP13, TP15, TP19, TP20, TP21, TP23, TP25, TP27, TP28	Connector, Test Point, LOOP, Black, Through Hole	Keystone® Electronics Corp.	5011
1	TP8	Connector, Test Point, LOOP, Green, Through Hole	Keystone® Electronics Corp.	5126
1	TP10	Connector, Test Point, LOOP, Blue, Through Hole	Keystone® Electronics Corp.	5127
2	TP12, TP17	Connector, Test Point, TAB, Silver, Mini 3.8x2.03, SMD	Keystone® Electronics Corp.	5019
1	TP14	Connector, Test Point, LOOP, Violet, Through Hole	Keystone® Electronics Corp.	5129

Table 4-1. Bill of Materials (BOM) (continued)

Qty.	Reference	Description	Manufacturer	Part Number
2	TP18, TP29	Connector, Test Point, LOOP, White, Through Hole	Keystone® Electronics Corp.	5012
2	TP22, TP24	Connector, Test Point, LOOP, Yellow, Through Hole	Keystone® Electronics Corp.	5014
1	**U1**	**Analog, Switcher, Buck, 4.5–16V, 8ZW**	**Microchip Technology Inc.**	**MCPF1525M06**
1	PCB1	Printed Circuit Board	Microchip Technology Inc.	04-12582-R1
1	PCB1	PCB Assembly	Microchip Technology Inc.	02-01539-R1

Note: 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.

Table 4-2. Bill of Materials (BOM) – Mechanical Parts

Qty.	Reference	Description	Manufacturer	Part Number
6	JP1, JP2, JP3, JP4, JP5, JP6	Mechanical, Headers & Wires, Jumper, 2.54 mm, 1x2	FCI	63429-202LF

Note: 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.

Table 4-3. Bill of Materials (BOM) – Do not Populate Parts

Qty.	Reference	Description	Manufacturer	Part Number
0	C23, C24	Capacitor, Ceramic, 22 µF, 35V, 20%, JB, SMD, 0805	TDK Corporation	C2012JB1V226M125AC
0	C29, C30	Capacitor, Tantalum, 470 µF, 2.5V, 20%, 0.007 Ohm, SMD, D2E	Panasonic® - ECG	2R5TPE470M7

Note: 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.

5. Performance

Figure 5-1. Nominal Switching Waveforms, 12V Input, 600 mV Output, 0A Load, PS Resistor = 0 kΩ

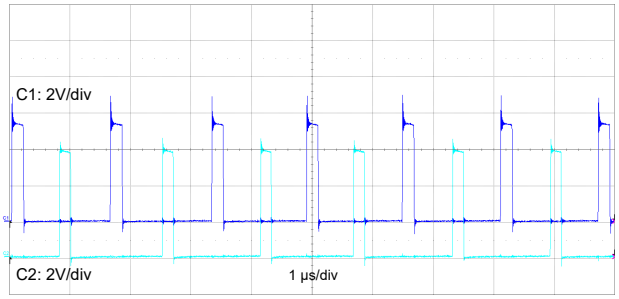


Figure 5-2. Nominal Switching Waveforms, 12V Input, 600 mV Output, 25A Load, PS Resistor = 0 kΩ

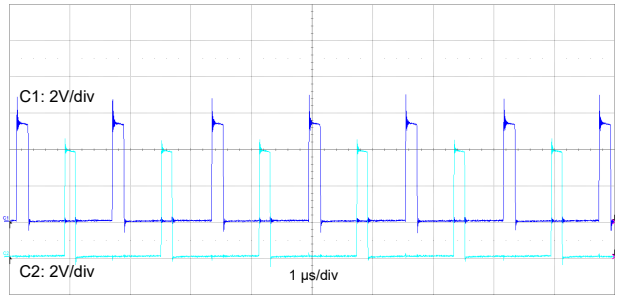


Figure 5-3. Output Ripple, 12V Input, 600 mV Output, 0A Load, PS Resistor = 0 kΩ, COUT = 10 x 47 µF MLCC

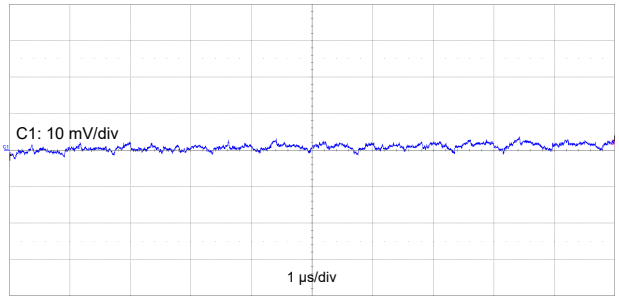


Figure 5-4. Output Ripple, 12V Input, 600 mV Output, 25A Load, PS Resistor = 0 kΩ, COUT = 10 x 47 µF MLCC

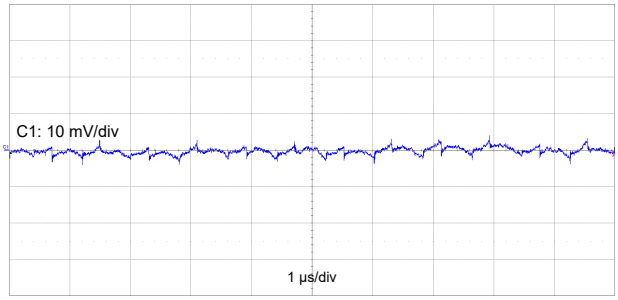


Figure 5-5. Transient, 3A to 20A, 12V to 600 mV, PS Resistor = 0 kΩ, COUT = 10 x 47 µF MLCC

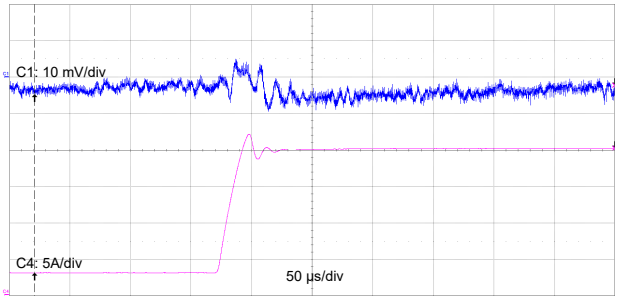


Figure 5-6. Transient, 20A to 3A, 12V to 600 mV, PS Resistor = 0 kΩ, COUT = 10 x 47 µF MLCC

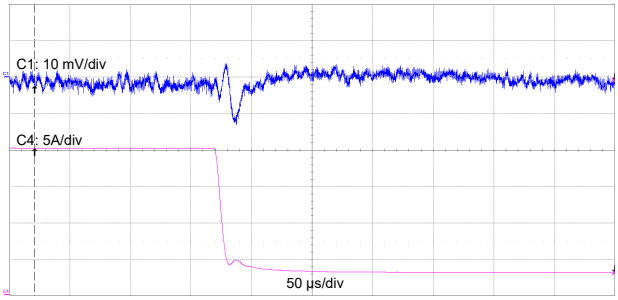


Figure 5-7. Transient, 3A to 20A, 12V to 1V, PS Resistor = 0 kΩ, COUT = 10 x 47 µF MLCC

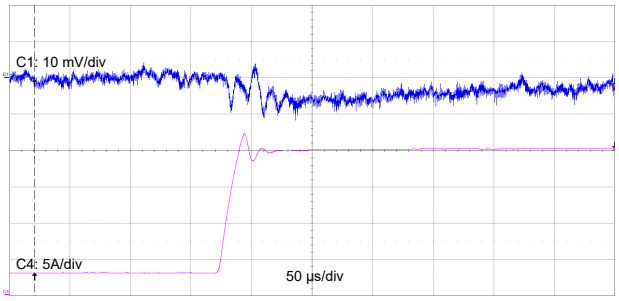


Figure 5-8. Transient, 20A to 3A, 12V to 1V, PS Resistor = 0 kΩ, COUT = 10 x 47 µF MLCC

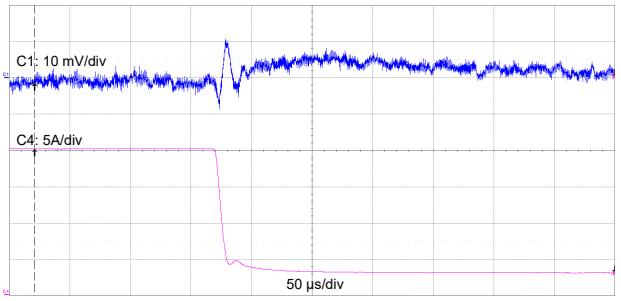


Figure 5-9. Startup, 12V to 600 mV, 0A Load, PS Resistor = 0 kΩ, COUT = 10 x 47 µF MLCC, CH1: VOUT, CH2: EN, CH3: PVIN, CH4: PGOOD

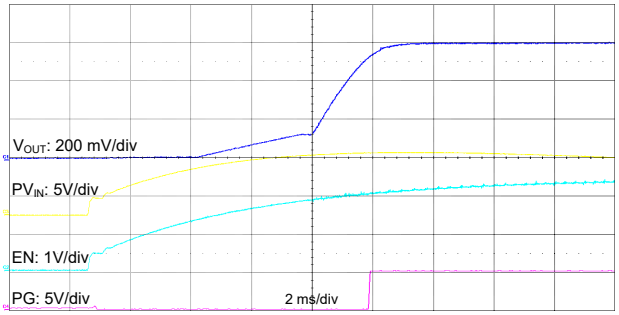


Figure 5-10. Startup, 12V to 600 mV, 16A Load, PS Resistor = 0 kΩ, COUT = 10 x 47 µF MLCC, CH1: VOUT, CH2: EN, CH3: PVIN, CH4: PGOOD

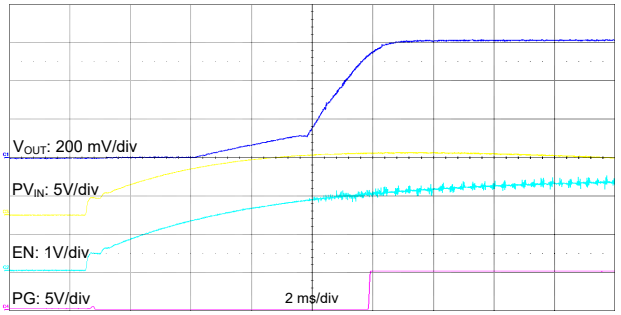


Figure 5-11. Startup, 12V to 1V, 0A Load, PS Resistor = 0 kΩ, COUT = 10 x 47 µF MLCC, CH1: VOUT, CH2: EN, CH3: PVIN, CH4: PGOOD

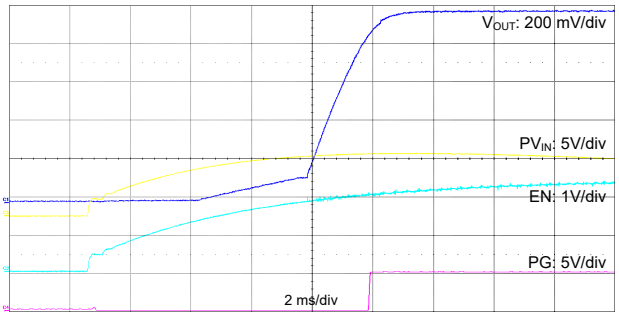


Figure 5-12. Startup, 12V to 1V, 16A Load, PS Resistor = 0 kΩ, COUT = 10 x 47 µF MLCC, CH1: VOUT, CH2: EN, CH3: PVIN, CH4: PGOOD

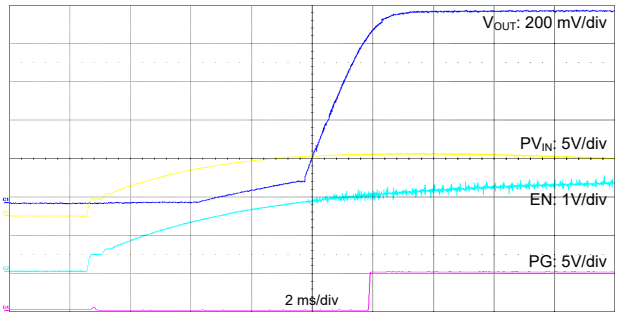


Figure 5-13. Shutdown via EN, 12V to 600 mV, 0A Load, PS Resistor = 0 kΩ, COUT = 10 x 47 µF MLCC, CH1: VOUT, CH2: EN, CH3: PVIN, CH4: PGOOD

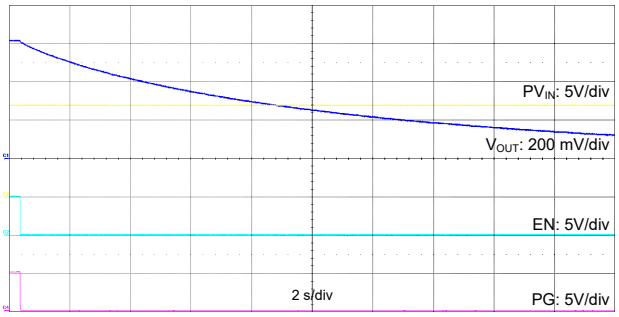


Figure 5-14. Efficiency vs. Load

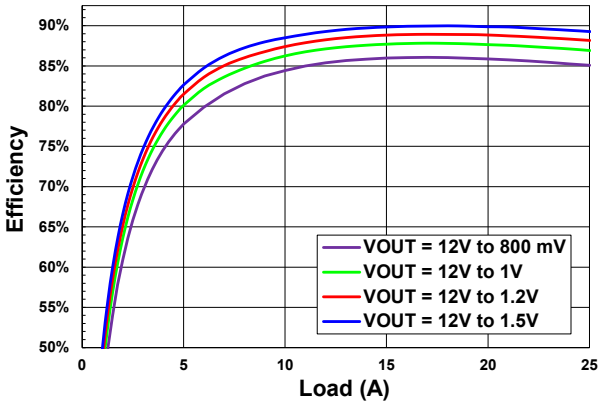


Figure 5-15. Power Loss vs. Load

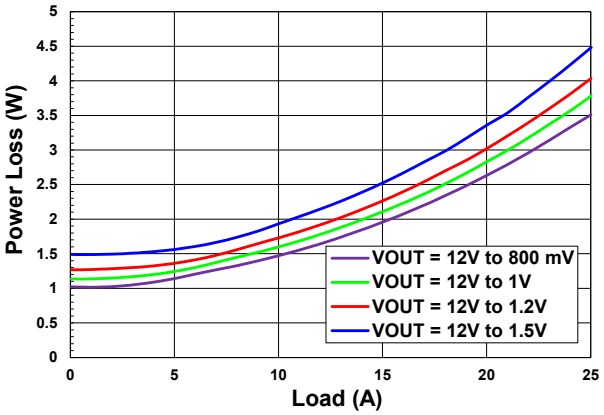


Figure 5-16. Load Regulation, 12V to 800 mV, PS Resistor = 0 kΩ

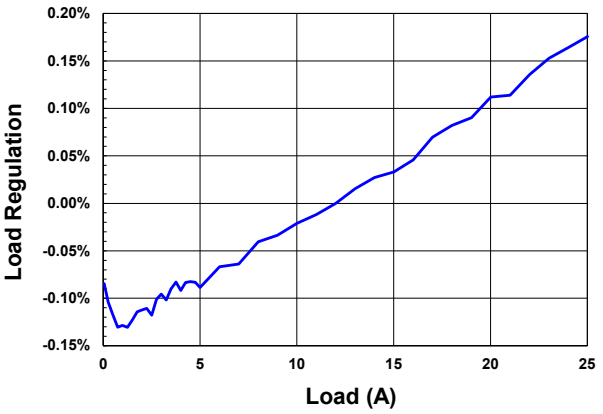


Figure 5-17. Load Regulation, 12V to 1V, PS Resistor = 0 kΩ

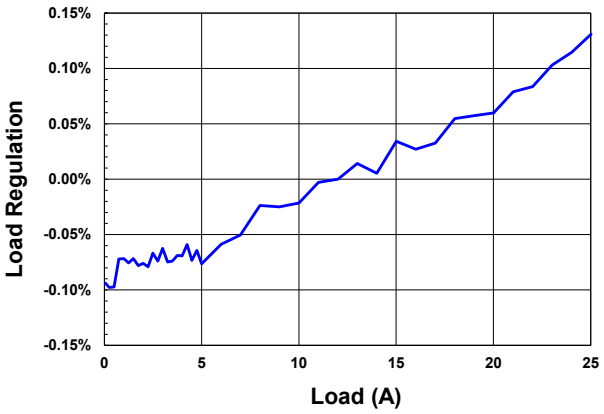


Figure 5-18. Load Regulation, 12V to 1.2V, PS Resistor = 0 kΩ

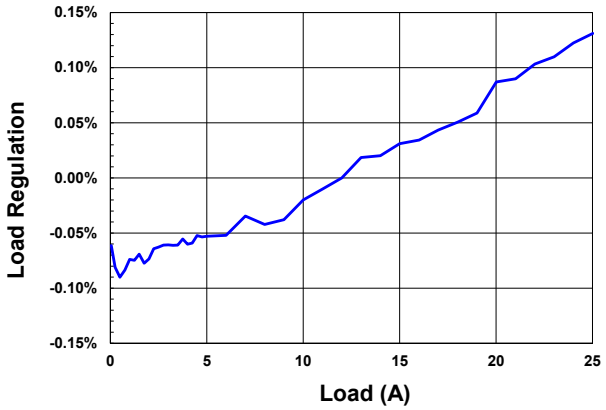
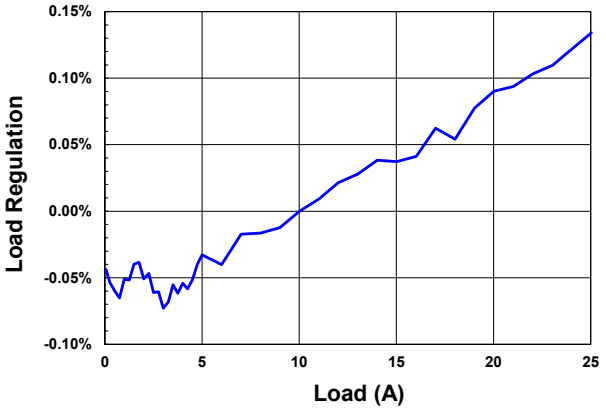


Figure 5-19. Load Regulation, 12V to 1.5V, PS Resistor = 0 kΩ



6. References

Table 6-1. Recommended Reading

Source	Document Title	Literature Number	Available
Microchip Technology Inc.	MCPF1525M06 - 16V, 25A Stackable Switching Buck Regulator Module	DS60001915	MCPF1525
Microchip Technology Inc.	MCP2221A Product Page	—	MCP2221A

7. Revision History

Doc. Rev.	Date	Section	Comments
A	5/2026		Initial release of this document.

Microchip Information

Trademarks

The “Microchip” name and logo, the “M” logo, and other names, logos, and brands are registered and unregistered trademarks of Microchip Technology Incorporated or its affiliates and/or subsidiaries in the United States and/or other countries (“Microchip Trademarks”). Information regarding Microchip Trademarks can be found at https://www.microchip.com/en-us/about/legal-information/microchip-trademarks.

ISBN: 979-8-3371-3280-8

Legal Notice

This publication and the information herein may be used only with Microchip products, including to design, test, and integrate Microchip products with your application. Use of this information in any other manner violates these terms. Information regarding device applications is provided only for your convenience and may be superseded by updates. It is your responsibility to ensure that your application meets with your specifications. Contact your local Microchip sales office for additional support or, obtain additional support at www.microchip.com/en-us/support/design-help/client-support-services.

THIS INFORMATION IS PROVIDED BY MICROCHIP “AS IS”. MICROCHIP MAKES NO REPRESENTATIONS OR WARRANTIES OF ANY KIND WHETHER EXPRESS OR IMPLIED, WRITTEN OR ORAL, STATUTORY OR OTHERWISE, RELATED TO THE INFORMATION INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTIES OF NON-INFRINGEMENT, MERCHANTABILITY, AND FITNESS FOR A PARTICULAR PURPOSE, OR WARRANTIES RELATED TO ITS CONDITION, QUALITY, OR PERFORMANCE.

IN NO EVENT WILL MICROCHIP BE LIABLE FOR ANY INDIRECT, SPECIAL, PUNITIVE, INCIDENTAL, OR CONSEQUENTIAL LOSS, DAMAGE, COST, OR EXPENSE OF ANY KIND WHATSOEVER RELATED TO THE INFORMATION OR ITS USE, HOWEVER CAUSED, EVEN IF MICROCHIP HAS BEEN ADVISED OF THE POSSIBILITY OR THE DAMAGES ARE FORESEEABLE. TO THE FULLEST EXTENT ALLOWED BY LAW, MICROCHIP’S TOTAL LIABILITY ON ALL CLAIMS IN ANY WAY RELATED TO THE INFORMATION OR ITS USE WILL NOT EXCEED THE AMOUNT OF FEES, IF ANY, THAT YOU HAVE PAID DIRECTLY TO MICROCHIP FOR THE INFORMATION.

Use of Microchip devices in life support and/or safety applications is entirely at the buyer’s risk, and the buyer agrees to defend, indemnify and hold harmless Microchip from any and all damages, claims, suits, or expenses resulting from such use. No licenses are conveyed, implicitly or otherwise, under any Microchip intellectual property rights unless otherwise stated.

Microchip Devices Code Protection Feature

Note the following details of the code protection feature on Microchip products:

- Microchip products meet the specifications contained in their particular Microchip Data Sheet.
- Microchip believes that its family of products is secure when used in the intended manner, within operating specifications, and under normal conditions.
- Microchip values and aggressively protects its intellectual property rights. Attempts to breach the code protection features of Microchip products are strictly prohibited and may violate the Digital Millennium Copyright Act.
- Neither Microchip nor any other semiconductor manufacturer can guarantee the security of its code. Code protection does not mean that we are guaranteeing the product is “unbreakable”. Code protection is constantly evolving. Microchip is committed to continuously improving the code protection features of our products.