

MCP19117 Flyback Stand-Alone Evaluation Board User's Guide

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Derek Carlson
VP Development Tools

12-Sep-14
Date

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MCP19117 FLYBACK STAND-ALONE EVALUATION BOARD USER'S GUIDE

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Preface

NOTICE TO CUSTOMERS

All documentation becomes dated, and this manual is no exception. Microchip tools and documentation are constantly evolving to meet customer needs, so some actual dialogs and/or tool descriptions may differ from those in this document. Please refer to our web site (www.microchip.com) to obtain the latest documentation available.

Documents are identified with a "DS" number. This number is located on the bottom of each page, in front of the page number. The numbering convention for the DS number is "DSXXXXXA", where "XXXXX" is the document number and "A" is the revision level of the document.

For the most up-to-date information on development tools, see the MPLAB® IDE online help. Select the Help menu, and then Topics to open a list of available online help files.

INTRODUCTION

This chapter contains general information that will be useful to know before using the MCP19117 Flyback Stand-Alone Evaluation Board. Items discussed in this chapter include:

- Document Layout
- Conventions Used in this Guide
- Recommended Reading
- The Microchip Web Site
- Customer Support
- Document Revision History

DOCUMENT LAYOUT

This document describes how to install the MCP19117 Flyback Stand-Alone Evaluation Board. It also describes how to operate the Evaluation Board. The manual layout is as follows:

- **Chapter 1. "Product Overview"** – Important information about the MCP19117 Flyback Stand-Alone Evaluation Board.
- **Chapter 2. "Installation and Operation"** – Includes instructions on how to get started with the MCP19117 Flyback Stand-Alone Evaluation Board.
- **Chapter 3. "Graphical User Interface (GUI) Features"** – Includes instructions on the MCP19117 Flyback Standalone GUI.
- **Appendix A. "Schematic and Layouts"** – Shows the schematic and layout diagrams for the MCP19117 Flyback Stand-Alone Evaluation Board.
- **Appendix B. "Bill of Materials (BOM)"** – Lists the parts used to build the MCP19117 Flyback Stand-Alone Evaluation Board.

CONVENTIONS USED IN THIS GUIDE

This manual uses the following documentation conventions:

DOCUMENTATION CONVENTIONS

Description	Represents	Examples
Arial font:		
Italic characters	Referenced books	*MPLAB® IDE User's Guide*
	Emphasized text	...is the *only* compiler...
Initial caps	A window	the Output window
	A dialog	the Settings dialog
	A menu selection	select Enable Programmer
Quotes	A field name in a window or dialog	"Save project before build"
Underlined, italic text with right angle bracket	A menu path	*File>Save*
Bold characters	A dialog button	Click **OK**
	A tab	Click the **Power** tab
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	*`file`*`.o`, where *`file`* can be any valid filename
Square brackets [ ]	Optional arguments	`mcc18 [options]` *`file`* `[options]`
Curly brackets and pipe character: { | }	Choice of mutually exclusive arguments; an OR selection	`errorlevel {0|1}`
Ellipses...	Replaces repeated text	`var_name [, var_name...]`
	Represents code supplied by user	`void main (void) { ... }`

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RECOMMENDED READING

This user's guide describes how to use MCP19117 Flyback Stand-Alone Evaluation Board. Other useful documents are listed below. The following Microchip documents are available and recommended as supplemental reference resources.

- **MCP19116/7 Data Sheet – *"Digitally Enhanced Power Analog Synchronous Low-Side PWM Controller"* (DS20005479)**
- **MPLAB® X IDE User Guide – *"PICkit™ 3 In-Circuit Debugger/Programmer User's Guide For MPLAB® X IDE"* (DS52116)**

THE MICROCHIP WEB SITE

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- **Product Support** – Data sheets and errata, application notes and sample programs, design resources, user's guides and hardware support documents, latest software releases and archived software
- **General Technical Support** – Frequently Asked Questions (FAQs), technical support requests, online discussion groups, Microchip consultant program member listing
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Users of Microchip products can receive assistance through several channels:

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

Customers should contact their distributor, representative or field application engineer (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 web site at:
http://www.microchip.com/support.

DOCUMENT REVISION HISTORY

Revision A (March 2016)

Initial Release of this Document.

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Chapter 1. Product Overview

1.1 INTRODUCTION

This chapter provides an overview of the MCP19117 Flyback Stand-Alone Evaluation Board and covers the following topics:

- MCP19117 Short Overview
- What is the MCP19117 Flyback Stand-Alone Evaluation Board?
- MCP19117 Flyback Stand-Alone Evaluation Board Kit Contents

1.2 MCP19117 SHORT OVERVIEW

The MCP19117 is a highly integrated, mixed-signal, analog pulse width-modulation (PWM) current mode controller with an integrated microcontroller core, and offers synchronous or asynchronous operation. Since the MCP19117 device uses traditional analog control circuitry to regulate the output current or voltage, the integration of the PIC® microcontroller mid-range core is used to provide complete customization of the device's operating parameters, protection levels, programmable offset, dead-times, slope compensation and fault handling procedures.

The MCP19117 has two internal low drop-out regulators (LDOs). A 5V LDO (V_{DD}) provides internal power to all the digital circuitry and can supply limited external power at the V_{DD} pin. A 4V LDO (AV_{DD}) provides power to the internal analog circuitry and supplies the reference voltage to the ADC. This device features synchronous low-side integrated drivers and 8k Words non-volatile memory, all in a space-saving 28-pin 5x5 mm QFN package.

To support traditional MOSFETs, pin 20 (V_{DR}) is used to provide input power to the two low-side synchronous gate drivers. The evaluation board is populated with the Microchip TC1240AECHTR voltage doubler. Resistor population provides the option of powering V_{DR} with 10V through the TC1240AECHTR voltage doubler (R19, R21 populated; R22 not populated) or 5V (R22 populated; R19, R21 not populated) gate-drive capability.

User firmware, including device configuration, is loaded using Microchip's MPLAB® X Integrated Development Environment (IDE). A graphical user's interface (GUI) is used to communicate with and edit operating parameters of the MCP19117. The GUI communicates via I^2C using the PICkit™ Serial Analyzer.

The GUI offers the user the ability to adjust the programmable features available in the MCP19117. Note that the interface cannot stop the user from uploading incorrect settings to the device. Incorrect settings may have unintended consequences, including, but not limited to, unstable operation, damaging the load, and even damaging of the MCP19117 device. It is the user's responsibility to understand the system effects of the parameters they enter.

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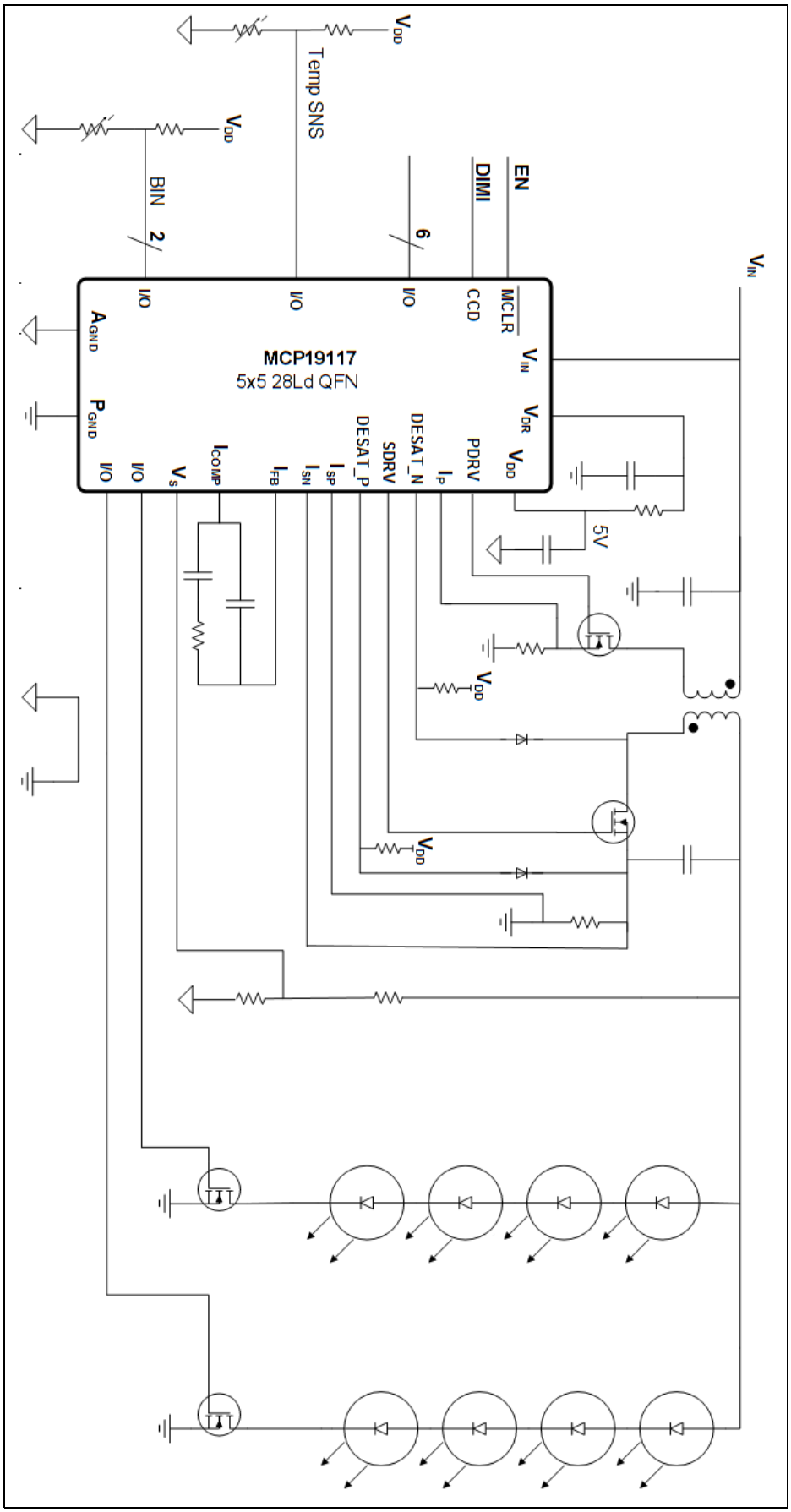


FIGURE 1-1: Typical MCP19117 Flyback Application – Two String LED Driver.

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1.3 WHAT IS THE MCP19117 FLYBACK STAND-ALONE EVALUATION BOARD?

The MCP19117 Flyback Stand-Alone Evaluation Board is intended to demonstrate how the MCP19117 device operates in a synchronous flyback topology. It is configured to regulate load current and is also well-suited to drive LED loads. Nearly all operational and control system parameters are programmable by utilizing the integrated PIC Microcontroller core.

The MCP19117 Flyback Stand-Alone Evaluation Board is delivered preprogrammed with firmware designed to operate with the GUI interface. MPLAB X IDE software can be used to download user-defined firmware, thus tailoring it to their specific application.The evaluation board contains headers for In-Circuit Serial Programming™ (ICSP) as well as I^2C communication.

Several test points have been designed into the printed circuit board for easy access and development purposes. The MCP19117 Flyback Stand-Alone Evaluation Board is also intended to demonstrate an optimized printed circuit board (PCB) layout that minimizes parasitics while increasing efficiency and power density. Proper PCB layout is critical to achieve optimum MCP19117 operation as well as power train efficiency and noise minimization. The MPLAB X IDE, MCP19117 Flyback Standalone GUI and MCP19117 Flyback Stand-Alone firmware are available for download from Microchip's web site. See **Chapter 3. "Graphical User Interface (GUI) Features"** for details.

1.4 MCP19117 FLYBACK STAND-ALONE EVALUATION BOARD KIT CONTENTS

The MCP19117 Flyback Stand-Alone Evaluation Board includes the following items:

- MCP19117 Flyback Stand-Alone Evaluation Board (ADM00663)
- Important Information Sheet

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Chapter 2. Installation and Operation

2.1 ABOUT THE MCP19117 FLYBACK STAND-ALONE EVALUATION BOARD

The MCP19117 is a digitally-enhanced, power analog, synchronous low-side PWM controller. The GUI was developed to assist users in easily configuring the MCP19117 and evaluating it in their target application.

The MCP19117 Flyback Stand-Alone Evaluation Board is designed to operate from a single supply (nominal 8V to 14V, 24V maximum). The primary side MOSFET has a maximum V_{DS} rating of 100V. Users should be cautious that this 100V rating is not exceeded when determining input and output conditions for their application. The coupled inductor has a 2:1 ratio. The secondary MOSFET has a 200V maximum V_{DS} rating.

The default configuration provides the gate drive supply (V_{DR}) with 10V. Adequate ceramic and bulk capacitors are supplied on the input to reduce the root mean square (RMS) ripple current and lessen input voltage deviation caused by load transients. Ceramic capacitors are also provided on the output to reduce voltage ripple and provide energy to the output while the primary side is being re-energized.

The MCP19117 Flyback Stand-Alone Evaluation Board is fully assembled, programmed and tested to evaluate and demonstrate the MCP19117 operating performance. Users will need to download and install the MCP19117 Flyback Standalone GUI from the Microchip website and become familiar with its operation before powering the MCP19117 Flyback Stand-Alone Evaluation Board.

2.2 SYSTEM AND CONFIGURATION REQUIREMENTS

To power-up and run the MCP19117 Flyback Stand-Alone Evaluation Board, the following is required:

- MCP19117 Flyback Standalone GUI
- MCP19117 Flyback Stand-Alone Evaluation Board
- PICkit Serial Analyzer

For USB connectivity, the minimal physical requirement for the PC is a standard USB 2.0 port. If the board connects to the PC through a USB hub, use a self-powered hub.

The MCP19117 Flyback Stand-Alone Evaluation Board comes with preprogrammed firmware installed to operate with the GUI. To reprogram the device, the following tools are required:

- MPLAB X IDE (version 3.05 or later)
- MPLAB® XC8 C Compiler (v1.35 or later)
- MCP19117 Flyback Standalone Firmware
- MCP19117 Flyback Stand-Alone Evaluation Board
- PICkit™ 3 In-Circuit Debugger/Programmer

The MCP19117 Flyback Standalone GUI requires a Microsoft Windows® XP/7/8 operating system and a minimum screen resolution of 1024 x 768.

Note: The factory-loaded firmware requires the use of the provided GUI to function. Without the GUI, the evaluation board does not operate.

2.3 CONNECTING POWER INPUT AND OUTPUT

Use the V_{IN} and GND Test Points as shown below. Nominal V_{IN} is +8V to +14V with the Positive terminal (Red) connected to V_{IN} and the Negative terminal (Black) connected to GND.

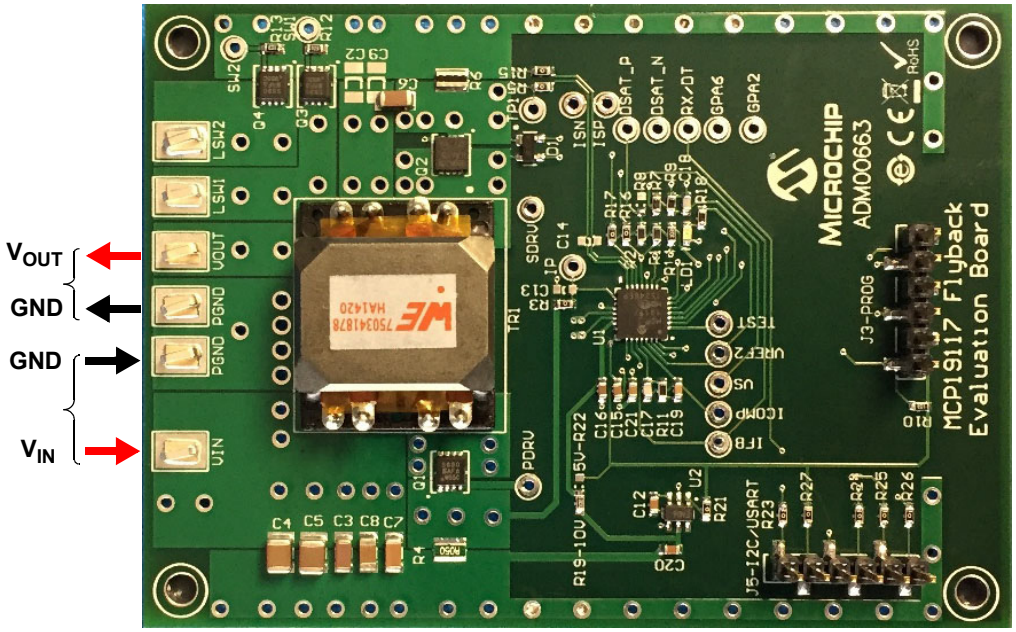


FIGURE 2-1: *Applying Power to the Board.*

CAUTION
Primary side MOSFET is Rated to 100V. The transformer turns ratio is 1:2. Do **NOT** exceed the 100V MOSFET Rating. Primary MOSFET (OFF) VDS = 0.5 x VOUT + VIN.

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2.4 INSTALLING THE MCP19117 FLYBACK STANDALONE GUI

The MCP19117 comes programmed with generic firmware that is compatible with the standalone GUI. It is up to the user to modify or create new firmware dedicated to their stand-alone application if different functionality is required.

> **Note:** If the default firmware is modified, the GUI may no longer be compatible with the MCP19117 Flyback Stand-Alone Evaluation Board.

Perform the following steps to install the MCP19117 Flyback Standalone GUI:

1. Download the MCP19117 Flyback Standalone GUI software package from the Microchip web site.
2. Extract the content of the archive files on the computer.
3. Double-click the `setup.exe` file to start software installation. Press the **Install** button in the Application Install window (Figure 2-2). After the installation completes, the application window is displayed (as shown in Figure 3-2 of Chapter 3. “Graphical User Interface (GUI) Features”).

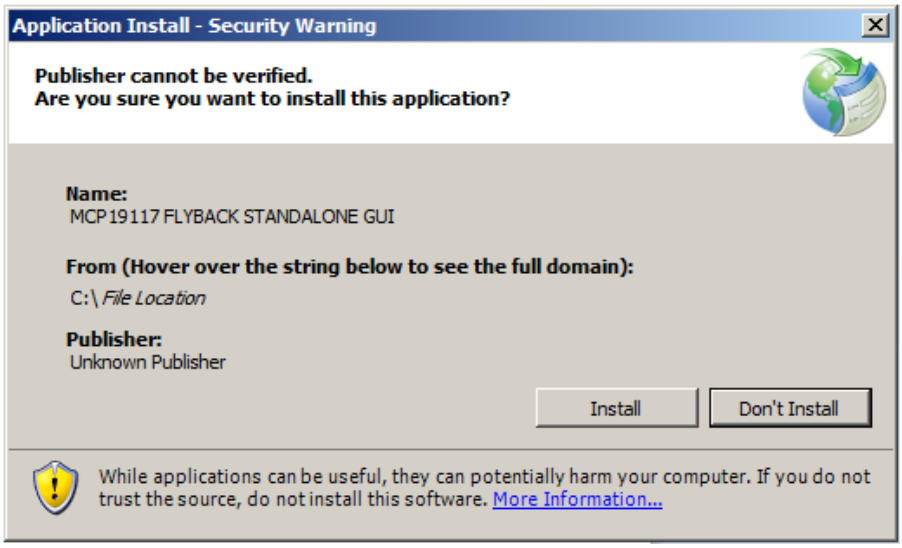


FIGURE 2-2: *MCP19117 Flyback Standalone GUI Installation Window.*

2.5 REPROGRAMMING THE MCP19117 FLYBACK STAND-ALONE EVALUATION BOARD

Perform the following steps to install necessary software and begin reprogramming the MCP19117 device:

1. If MPLAB X IDE is already installed, go to Step 2. If not, download MPLAB X IDE from: www.microchip.com/mplabx, and follow the installation instructions.
2. If the MPLAB XC8 C Compiler, or a compatible equivalent, is already installed in MPLAB X IDE, go to Step 3. If not, you can download a free version of the MPLAB XC8 C Compiler from: www.microchip.com/mplabxc. The user guide, installation instructions, and download links are available on the web page.
3. Download the MCP19117 - Flyback Stand-Alone Firmware (ADM00663_02_10403_U1-R2_Firmware.zip) from www.microchip.com/mcp19117 under "Documentation".
4. Unzip the MCP19117 - Flyback Stand-Alone Firmware archive. Place the MCP19117 project folder in the desired folder location.

Note: When installed, MPLAB X IDE automatically creates a project folder. In Windows, this folder is typically located under `drive\Users\user_name\MPLABXProjects`.

5. Power-up the MCP19117 Flyback Stand-Alone Evaluation Board.
6. Connect the PICkit 3 In-Circuit Debugger to the MCP19117 Flyback Stand-Alone Evaluation Board via the 6-pin connector J3, as seen in Figure 2-3. For more information about PICkit 3 In-Circuit Debugger refer to the *PICkit™ 3 In-Circuit Debugger/Programmer User's Guide For MPLAB® X IDE* (DS52116).



FIGURE 2-3: *PICkit 3 In-Circuit Debugger/Programmer Connected to the MCP19117 Flyback Stand-Alone Evaluation Board.*

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7. Open MPLAB X IDE to load the MCP19117 Flyback Stand-Alone firmware. From the File menu select **Open Project** (Figure 2-4).

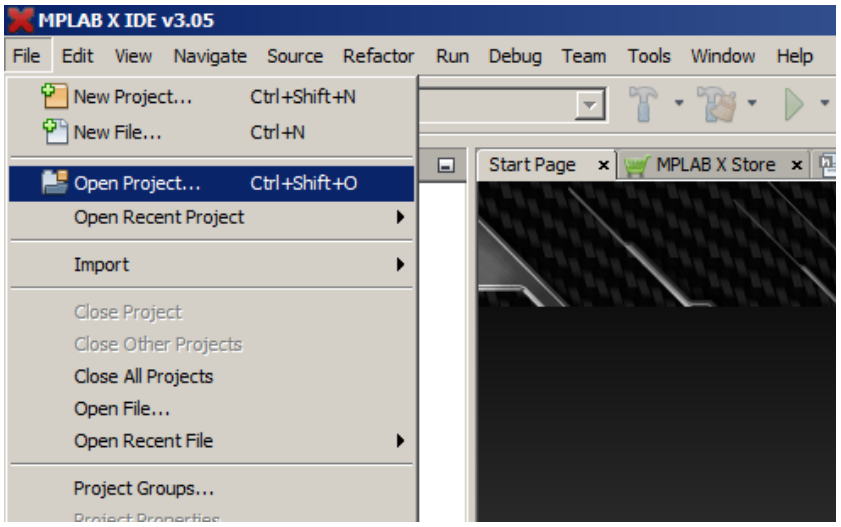


FIGURE 2-4: *Opening Project in MPLAB X IDE.*

8. Browse for the location of the extracted firmware. Select the `MCP19117_Stand_Alone` from the list, then check the Open as Main Project option. Click the **Open Project** button to complete loading the file.

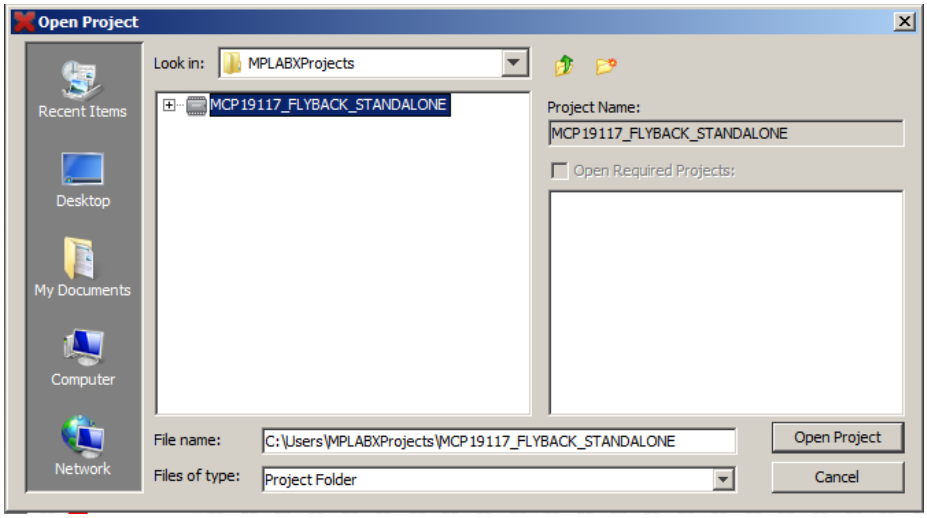


FIGURE 2-5: *Loading Firmware into MPLAB X IDE.*

9. When the project is open, click the **Make and Program Device Main Project** button on the tool bar to program the device. Wait until the program process is complete (see Figure 2-6).

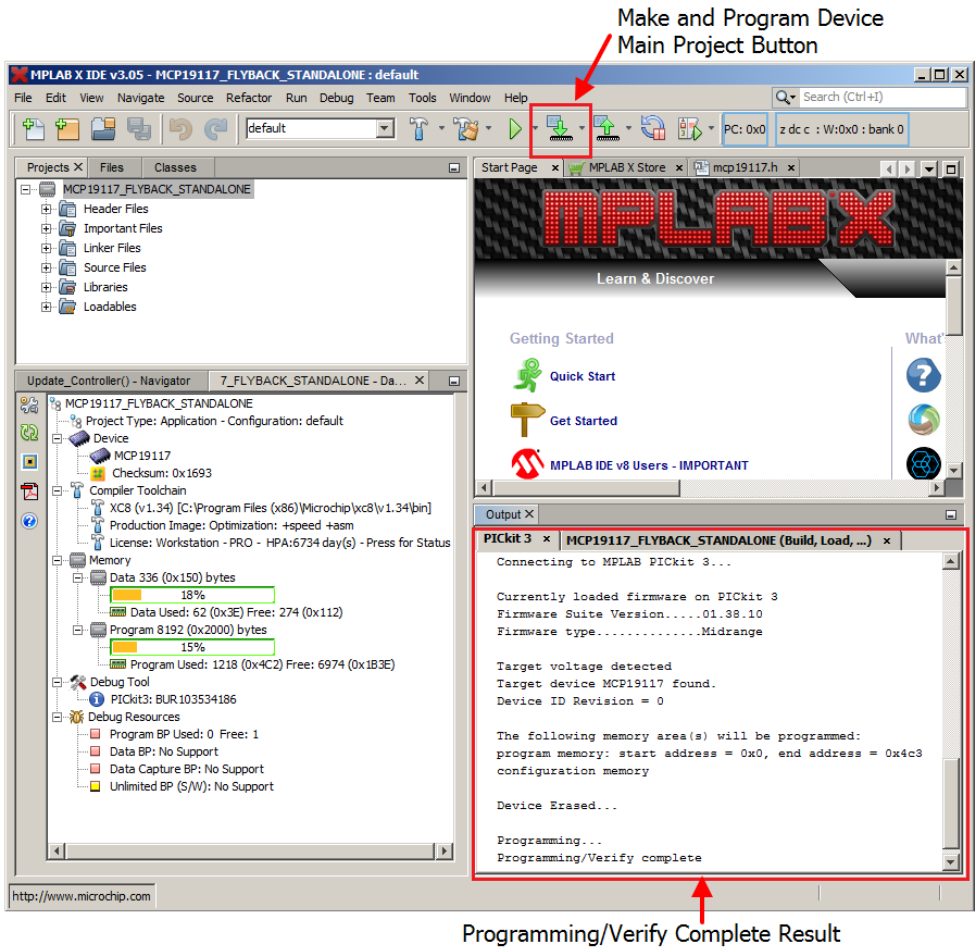


FIGURE 2-6: *Selecting and Executing the Make and Program Device Main Project in MPLAB X IDE.*

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Chapter 3. Graphical User Interface (GUI) Features

3.1 ABOUT THE MCP19117 FLYBACK STANDALONE GUI

This chapter describes the steps that are required to launch the MCP19117 Flyback Standalone GUI.

3.1.1 Prerequisites

Prior to starting the GUI, perform these actions:

1. Apply an input voltage in the normal operating range (8V to 14V) at the V_{IN} and Ground test points.
2. Connect the PICkit Serial Analyzer to the PC through USB port and then connect the analyzer to the Control Board via the 6-pin serial connector J5 (Figure 3-1).



FIGURE 3-1: *PICkit Serial Analyzer Connection to the Board.*

3.1.2 Launching the GUI

To start the GUI, select *Start > All Programs > Microchip Technology Inc. > MCP19117 FLYBACK_STANDALONE_GUI*.

The interface detects the MCP19117 device automatically and is ready for use (see Figure 3-2).

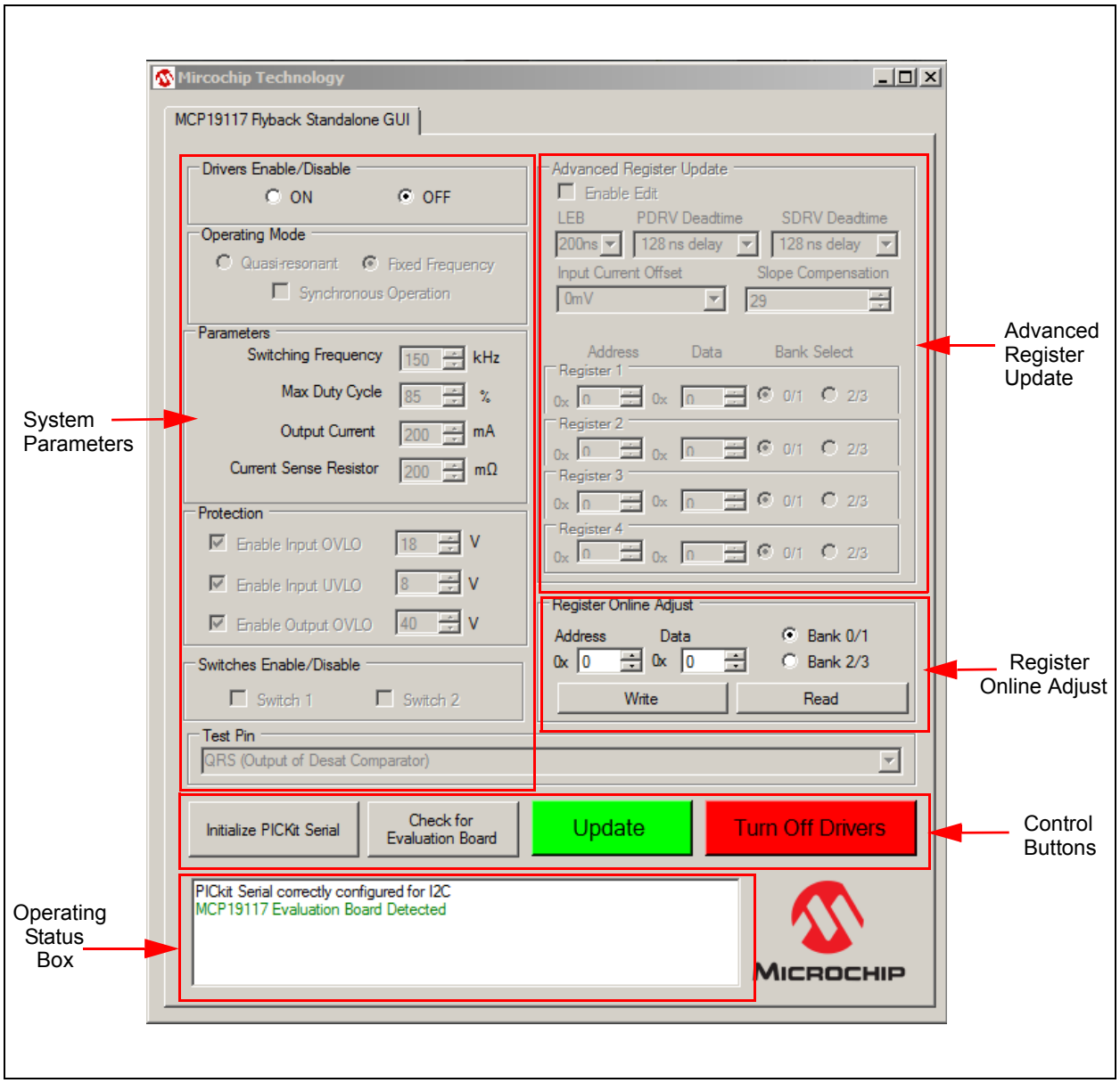


FIGURE 3-2: *MCP19117 Flyback Standalone GUI - Initial Screen.*

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3.2 MCP19117 FLYBACK STANDALONE GUI DESCRIPTION

As depicted in Figure 3-2, the MCP19117 Flyback Standalone GUI is divided into five areas:

- System Parameters Area
- Advanced Register Update Area
- Register Online Adjust Area
- Control Buttons Area
- Operating Status Box Area

3.2.1 System Parameters Area

The following sections are available in the System Parameters Area

- Drivers Enable/Disable Section
- Operating Mode Section
- Parameters Section
- Protection Section
- Switches Enable/Disable Section
- Test Pin Section

3.2.1.1 DRIVERS ENABLE/DISABLE SECTION

The “Drivers Enable/Disable” section contains an “ON” and an “OFF” check box. If the “OFF” check box is selected (default), the system turns off the Primary and Secondary Drivers and all the sections in the MCP19117 Flyback Standalone GUI become read only. In order for the sections to become editable, select the “ON” check box.

3.2.1.2 OPERATING MODE SECTION

The “Operating Mode” section controls how the Flyback converter operates. Options are:

- Quasi-resonant: the controller will run Quasi-resonant mode and the switching frequency will vary depending on the operation conditions.
- Fixed Frequency: the switching frequency parameters are adjustable. By default, the check box is selected.

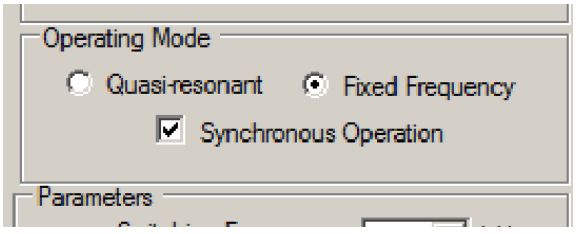


FIGURE 3-3: *Operating Mode Options.*

This section also contains a selection named Synchronous Operation. When the ON check box in the Drivers Enable/Disable section is selected, the Synchronous Operation check box is automatically selected – setting the MCP19117 Flyback Stand-Alone Evaluation Board to function in Synchronous mode.

If the Synchronous Operation check box is cleared, the evaluation board is set to function in Asynchronous Operation mode, which disables the secondary driver (SDRV).

3.2.1.3 PARAMETERS SECTION

This section controls the Switching Frequency, Maximum Duty Cycle, Output Current and Current Sense Resistor parameters, as shown in Figure 3-4

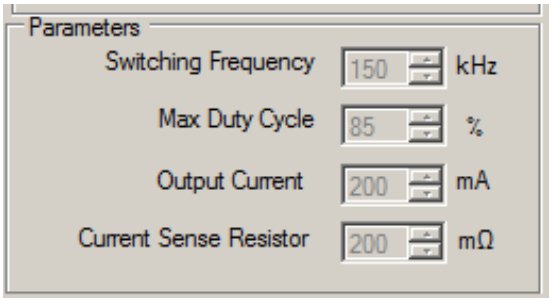


FIGURE 3-4: *Parameters Options*

The switching frequency is user programmable in Fixed Frequency mode over the range of 60 kHz to 1 MHz. Switching Frequency can be adjusted in 10 kHz intervals. The maximum duty cycle is programmable from 0 to 100%.

CAUTION

Increasing switching frequency results in increased switching losses in the MOSFETs. It is the user's responsibility to ensure that the MOSFETs are operated within their safe operating range.

The Output Current can be adjusted within a range of 0 to 500 mA. The Current Sense Resistor (R6) value on the MCP19117 Flyback Stand-Alone Evaluation Board is 200 mΩ. Both of these values are used to calculate the set point value written to the VREFCON register. Do **NOT** raise the resistor value in the GUI without changing the resistor on the evaluation board to match. Failure to do so could result in damage to the evaluation board.

Note: Attempting to write a value larger than 0xFF to VREFCON is prohibited by the GUI.

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3.2.1.4 PROTECTION SECTION

The “Protection” section (see Figure 3-5) allows the user to set levels for the three adjustable protection features:

- Enable Input OVLO: specified range of 9V to 24V. The default setting is 18V. This parameter is configurable per its specified range.
- Enable Input UVLO: specified range is 4V to 20V. The default setting is 8V. This parameter is configurable per its specified range.
- Enable Output OVLO: configurable range between 0V and 60V. The default setting is 40V.

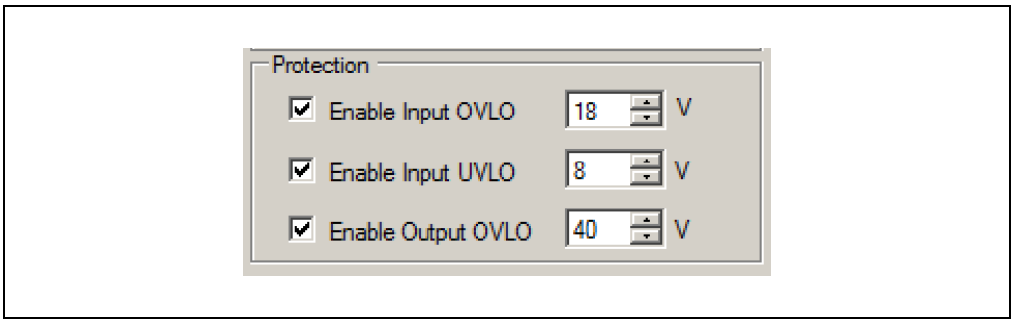


FIGURE 3-5: *Protection Options.*

In order for the user to be able to set different values, the corresponding check boxes of the features must be selected. Otherwise, the protections are not applied.

The LED (marked with D2) on the evaluation board is used to indicate various fault conditions. The firmware will flash this LED to indicate each of the following fault conditions:

- VIN UVLO FAULT: Short Flash Routine
- VIN OVLO FAULT: Long Flash Routine
- OUTPUT OV FAULT: Short/Long Flash Routine

WARNING

Use caution when changing from these default settings to ensure that damage will not occur. The VINUVLO, VINOVLO and Output OV controls adjust the VINUVLO, VINOVLO and OVREFCON registers, respectively.

3.2.1.5 SWITCHES ENABLE/DISABLE SECTION

There are two general purpose MOSFET low-side series switches located on MCP19117 Flyback Stand-Alone Evaluation Board (LSW1 and LSW2). The check boxes named “Switch 1” and “Switch 2” in the Switches Enable/Disable section of the GUI allow the user to turn these switches ON (selected) and OFF (cleared).

3.2.1.6 TEST PIN SECTION

The "Test Pin" section of the GUI has a drop-down menu that allows users to select and connect test signals to GPIO GPA0. These signals are accessible at the test point labeled TEST. The Test Pin can be configured to output several analog or digital parameters. See Figure 3-6 for the list of signals.

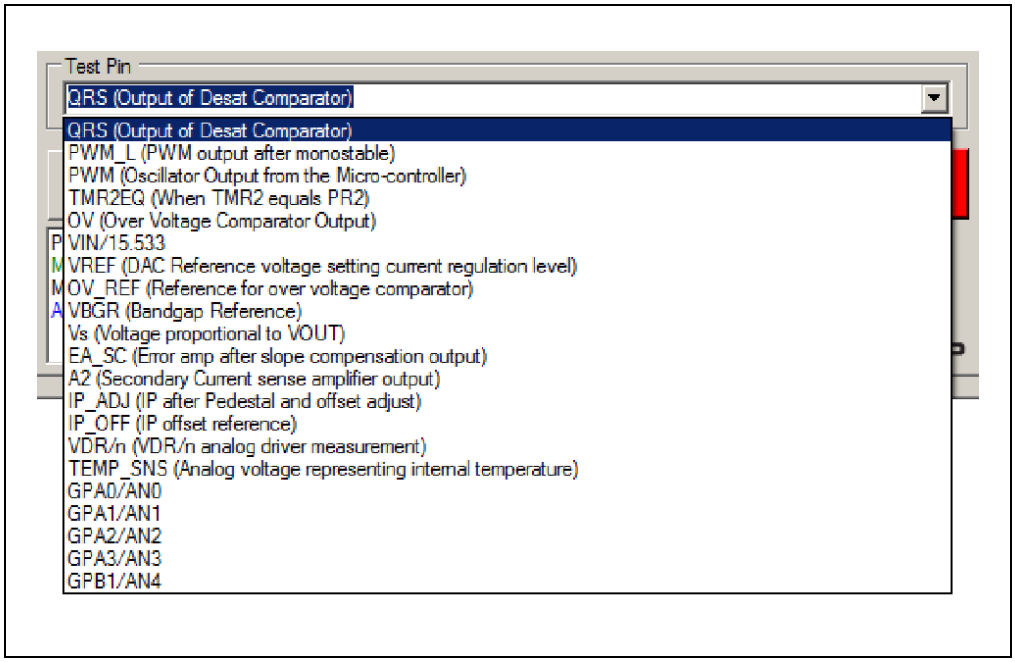


FIGURE 3-6: *Test Pin Options.*

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3.2.2 Advanced Register Update Area

This section of GUI gives the user more options to configure and operate the MCP19117 Flyback Stand-Alone Evaluation Board (see Figure 3-7).

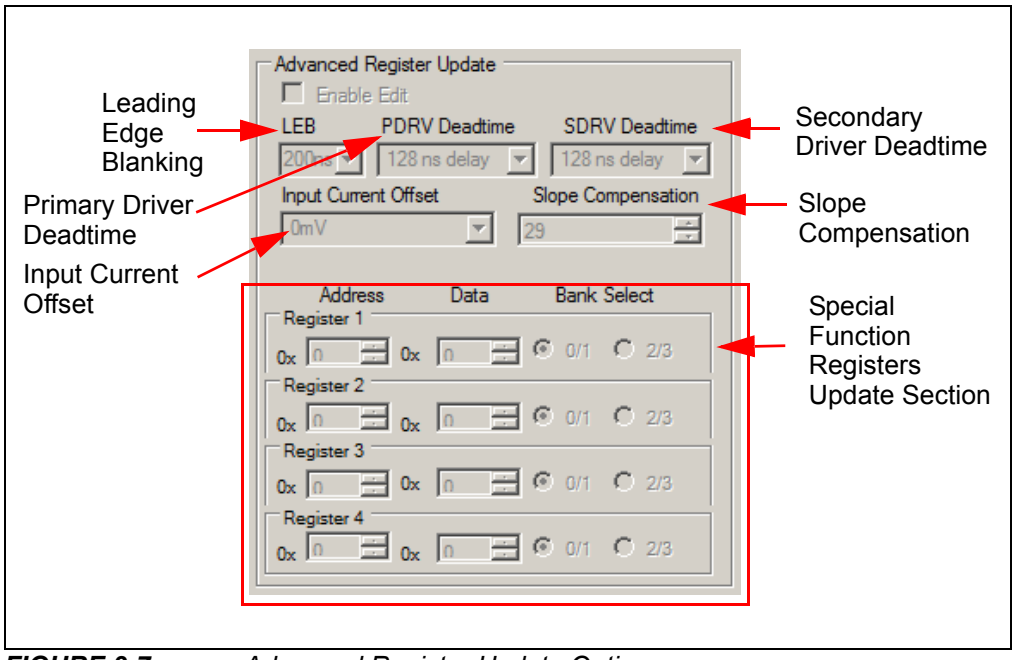


FIGURE 3-7: *Advanced Register Update Options.*

Note that the Enable Edit check box must be selected in order for the section to become editable.

The parameters have drop-down lists with predetermined values can be selected.

.The adjustable parameters are the following:

- LEB: selects a time period (in nS) for the Leading Edge Blanking
- PDRV Deadtime: sets the delay time (in nS) for the primary driver
- SDRV Deadtime: sets the delay time (in nS) for the secondary driver
- Input Current Offset:: sets a value (in mV) in for the input current offset
- Slope Compensation: sets a value for the slope compensation

In addition, this section allows users to update up to four Special Function Registers (SFR) at the same time. For more information on Special Function Registers, refer to the MCP19116/7 Data Sheet – *"Digitally Enhanced Power Analog Synchronous Low-Side PWM Controller"* (DS20005479).

3.2.3 Register Online Adjust Area

The "Register Online Adjust" section of the GUI allows the user to have direct control of register values at any time when operating the MCP19117. The device data sheet contains information on register address locations and content. Reads and writes are done in hexadecimal format. Users must select the proper bank, which is especially important when executing a write. It is good practice to always execute an address read before a write, to check for expected results. This may help prevent an unintended write to an improper address or bank. Please note that the **Update** button will not update this section.

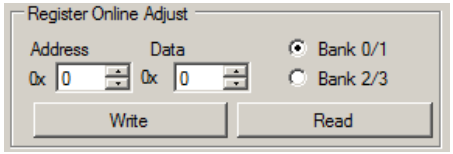


FIGURE 3-8: *Register Online Adjust Options.*

3.2.4 Control Buttons Area

From left to right (see Figure 3-9), the following four buttons are available:

- **Initialize PICKit Serial** button (selectable self-test option)
- **Check for Evaluation Board** button (selectable self-test option)
- **Update** button
- **Turn Off Drivers** button

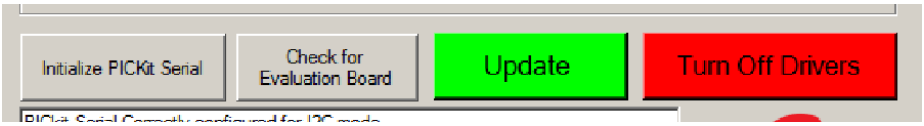


FIGURE 3-9: *Control Buttons.*

In this section the user can perform the following actions:

- Click the **Initialize PICkit Serial** button for the system to check the communication between your computer and PICkit Serial Analyzer.
- Click the **Check for Evaluation Board** to manually ask the system to detect the evaluation board.
- Click the **Update** button to apply the configuration settings made in "Operating Mode", "Parameters", "Protection", "Switches Enable/Disable", and "Advanced Register Update" areas. Clicking **Update** also turns on the output drivers. Note that it does not update information in the Register Online Adjust area.
- The **Turn Off Drivers** button is a master stop that shuts off the output drivers. Clicking this button disables both primary and secondary drivers.

The system communicates whether the user action was successful or not in the Operating Status Box (see Figure 3-10).

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3.2.5 Operating Status Box Area

This text-box provides messages and operating status to the user. By default, the text box is blank. It is populated when actions are performed in other sections of the GUI (see Figure 3-10). The information is system-generated and read-only.

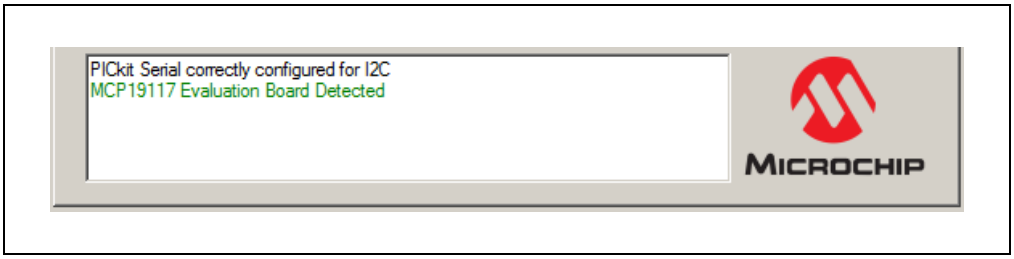


FIGURE 3-10: *Operating Status Box.*

The following messages are examples of text that may appear in this area:

- MCP19117 Evaluation Board Not Detected
- PICkit Serial correctly configured for I2C
- MCP19117 Evaluation Board Update Successful

NOTES:

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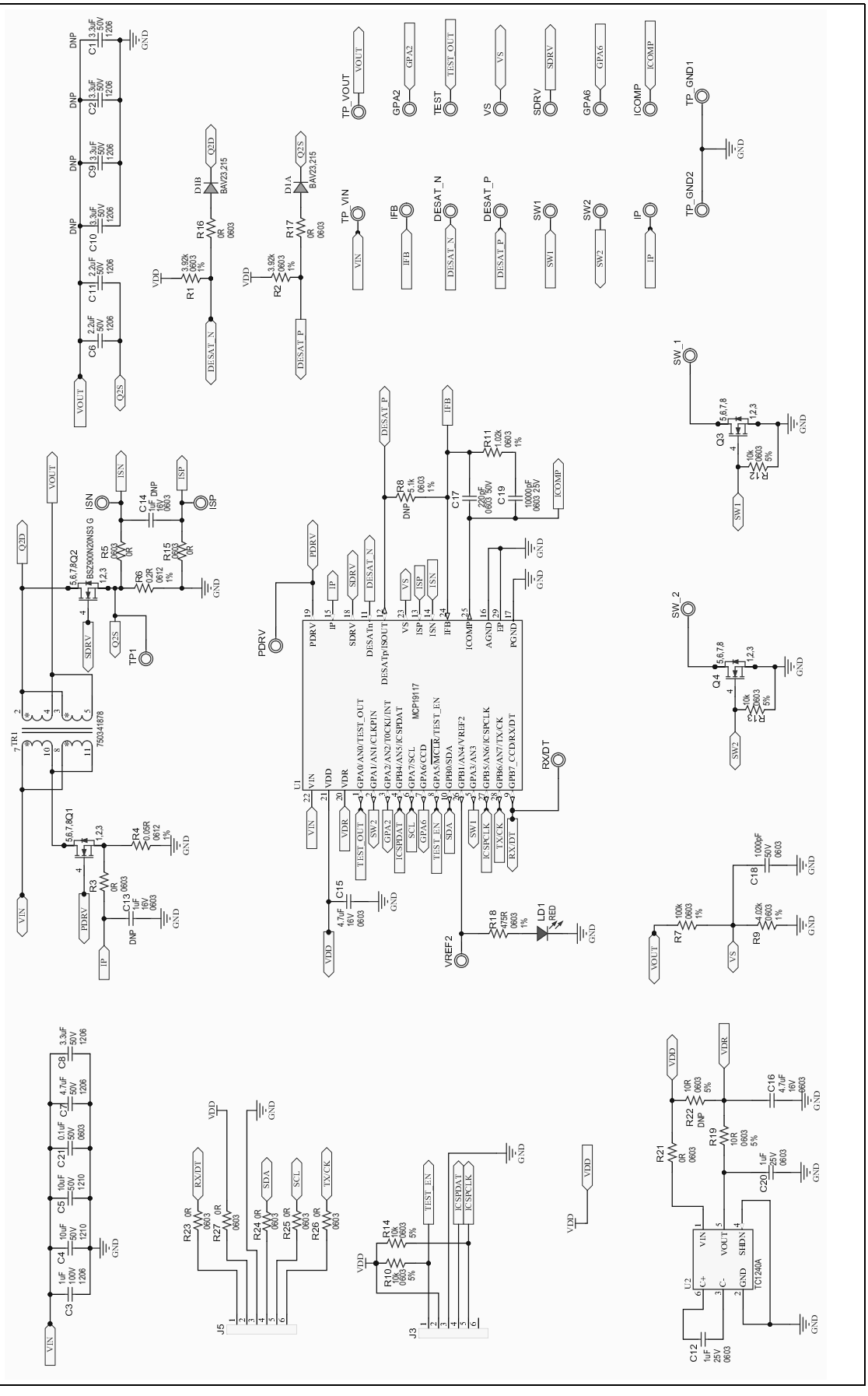
Appendix A. Schematic and Layouts

A.1 INTRODUCTION

This appendix contains the following schematics and layouts for the MCP19117 Flyback Stand-Alone Evaluation Board:

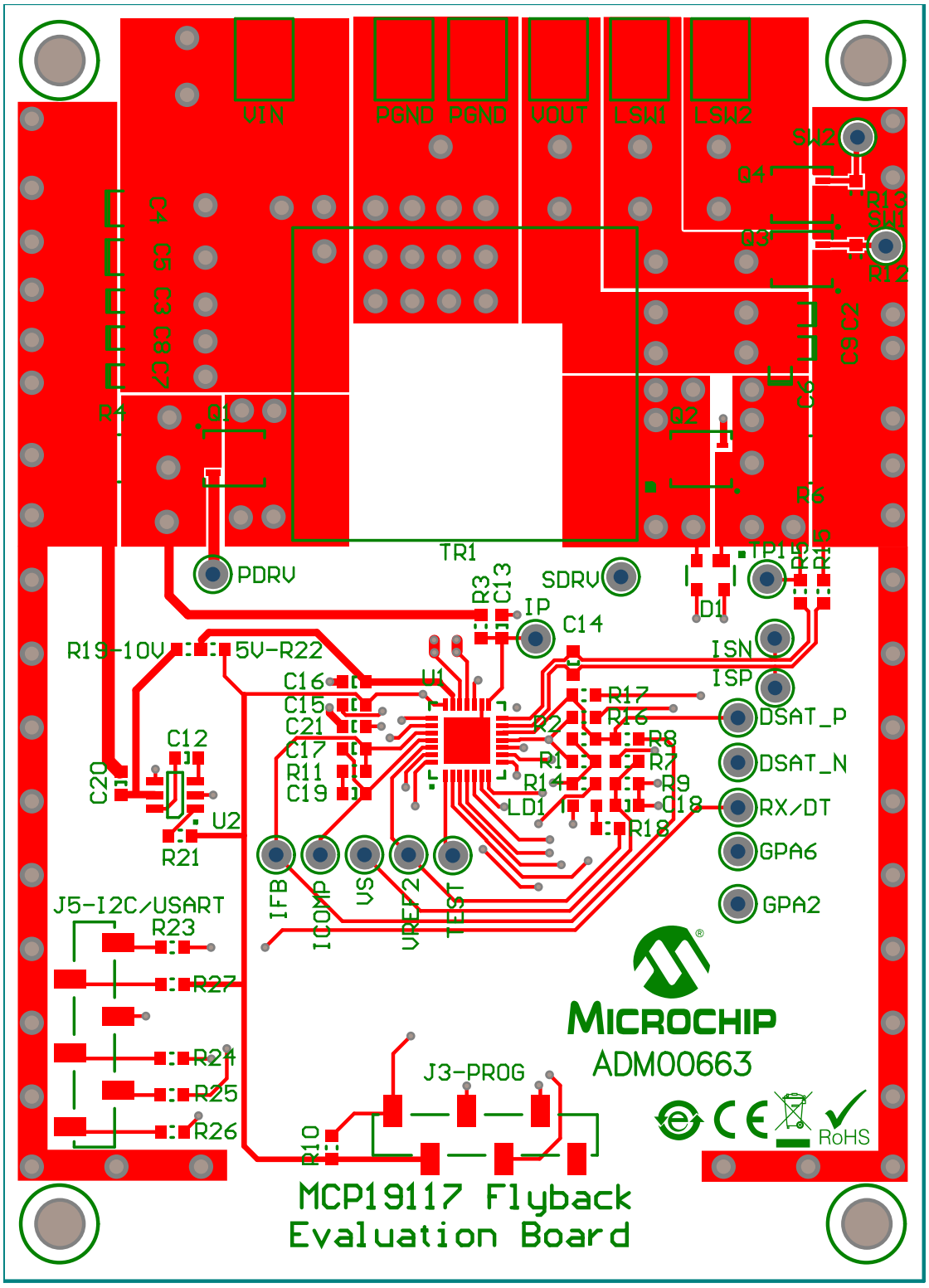
- Board – Schematic
- Board – Top Layer
- Board – Top Copper
- Board – Mid Layer 1
- Board – Mid Layer 2
- Board – Bottom Copper
- Board – Bottom Layer

A.2 BOARD – SCHEMATIC

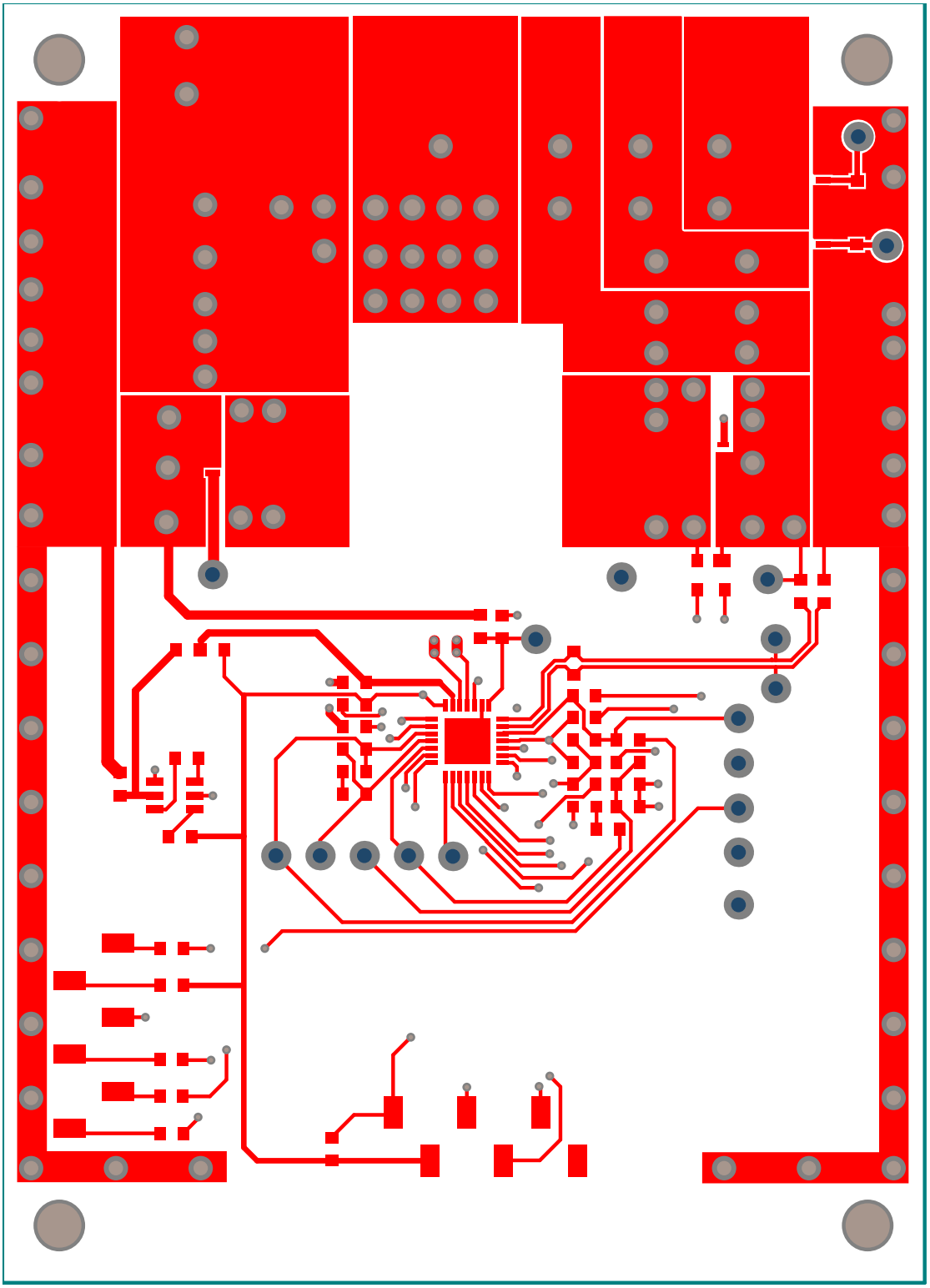


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A.3 BOARD – TOP LAYER

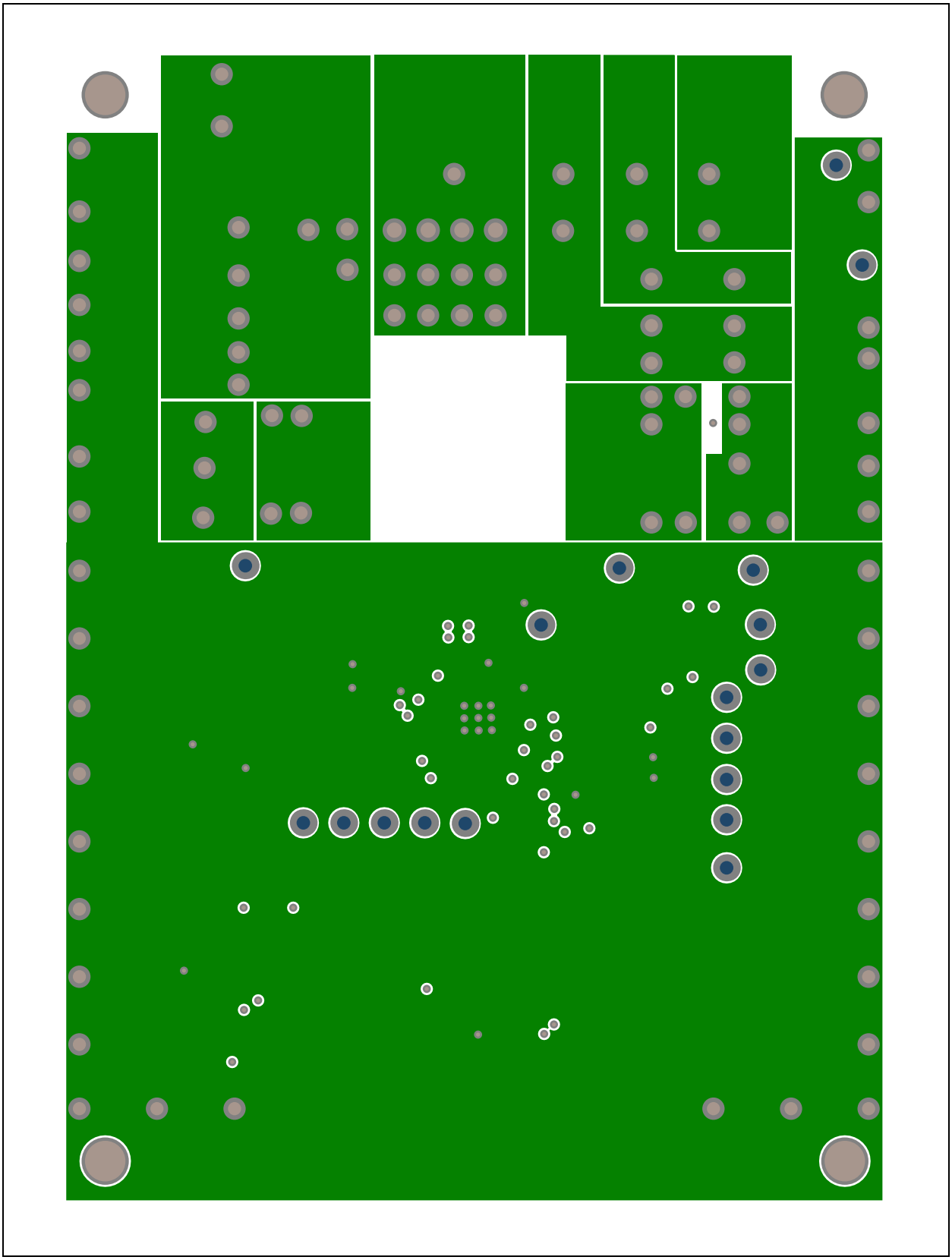


A.4 BOARD – TOP COPPER

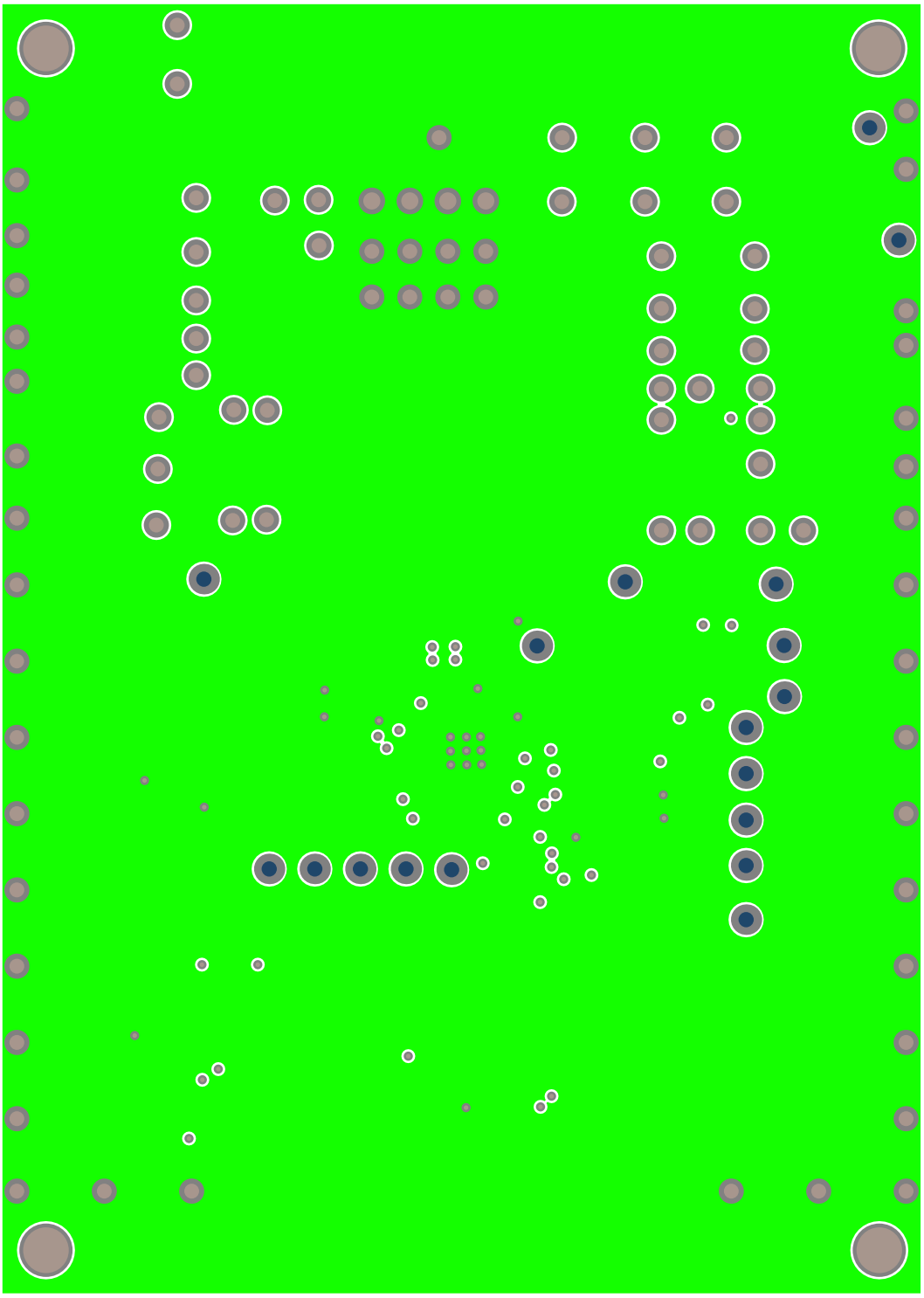


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A.5 BOARD – MID LAYER 1

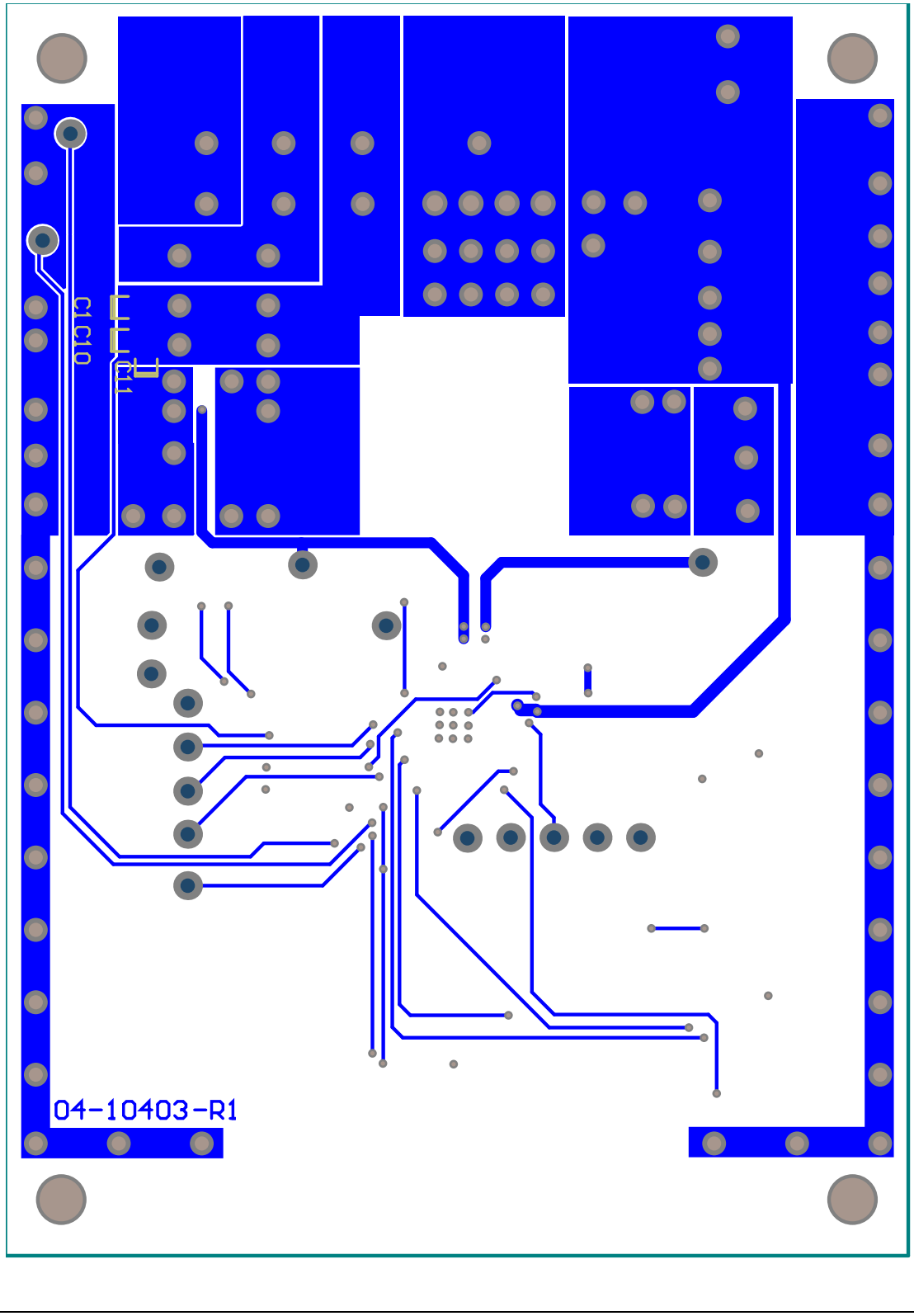


A.6 BOARD – MID LAYER 2

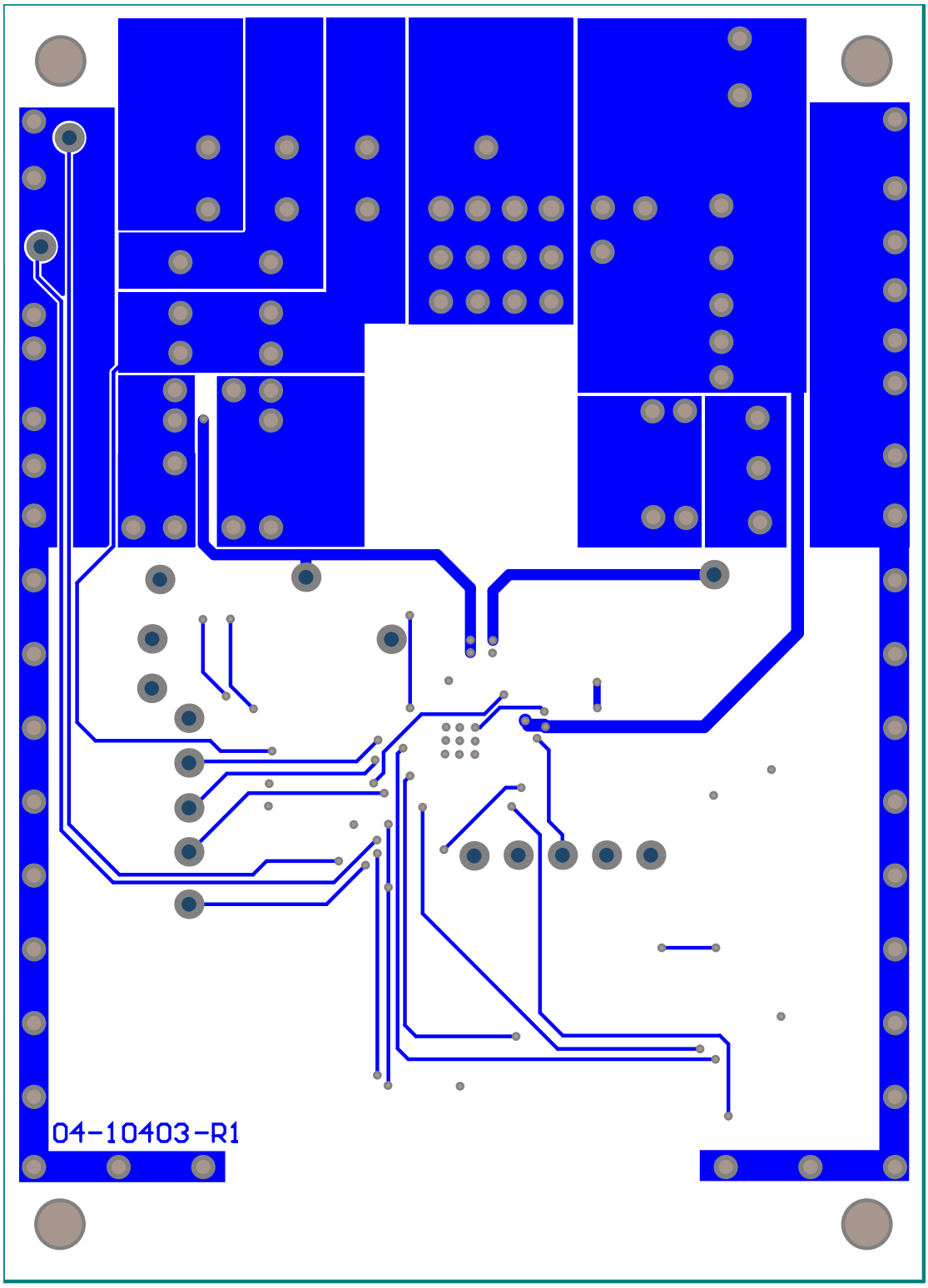


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A.7 BOARD – BOTTOM COPPER



A.8 BOARD – BOTTOM LAYER



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Appendix B. Bill of Materials (BOM)

TABLE 2-1: BILL OF MATERIALS (BOM)

Qty.	Reference	Description	Manufacturer	Part Number
4	C1, C2, C9, C10	**DO NOT POPULATE**		
1	C3	CAP CER 1 µF 100V 10% X7R SMD 1206	Taiyo Yuden Co., Ltd.	HMK316B7105KL-T
2	C4, C5	CAP CER 10 µF 50V 20% X7S SMD 1210	TDK Corporation	C3225X7S1H106M
2	C6, C11	CAP CER 2.2 µF 50V 10% X7R SMD 1206	TDK Corporation	CGA5L3X7R1H225K160AB
1	C7	CAP CER 4.7 µF 50V 10% X7R SMD 1206	TDK Corporation	C3216X7R1H475K160AC
1	C8	CAP CER 3.3 µF 50V 10% X7R SMD 1206	TDK Corporation	C3216X7R1H335K160AC
2	C12	CAP CER 1 µF 25V 10% X7R SMD 0603	TDK Corporation	CGA3E1X7R1E105K080AC
2	C13, C14	**DO NOT POPULATE**		
2	C15, C16	CAP CER 4.7 µF 16V 10% X5R SMD 0603	TDK Corporation	C1608X5R1C475K080AC
1	C17	CAP CER 220 pF 50V 5% NP0 SMD 0603	KEMET	C0603C221J5GACTU
1	C18	CAP CER 1000 pF 50V 20% X7R SMD 0603	Panasonic® - ECG	ECJ-1VB1H102K
1	C19	CAP CER 10000 pF 25V 10% X7R SMD 0603	Panasonic - ECG	ECJ-1VB1E103K
1	C20	CAP CER 1 µF 25V 20% X5R SMD 0603	Panasonic - ECG	ECJ-1V41E105M
1	C21	CAP CER 0.1 µF 50V 20% Y5V SMD 0603	AVX Corporation	06035G104ZAT2A
1	D1	DIO RECTARR BAV23,215 1V 225 mA 200V SMD SOT-143B	NXP Semiconductors	BAV23,215
1	LD1	DIO LED RED 1.8V 40 mA 10 mcd Clear SMD 0603	Lite-On®, Inc.	LTST-C190KRKT
3	Q1, Q3, Q4	TRANS FET N-CH SIS890DN-T1-GE3 100V 8.8A 52W PowerPAK 1212-8	Vishay Siliconix	SIS890DN-T1-GE3
1	Q2	TRANS FET N-CH BSZ900N20NS3 G 200V 15.2A 62.5W 8-PowerTDFN	Infineon Technologies AG	BSZ900N20NS3 G
2	R1, R2	RES TKF 3.92 kΩ 1% 1/10W SMD 0603	Panasonic - ECG	ERJ-3EKF3921V
6	R3, R5, R15, R16, R17, R21, R23, R24, R25, R26, R27	RES TKF 0Ω 1/10W SMD 0603	Panasonic - ECG	ERJ-3GSY0R00V
1	R4	RES TF 0.05Ω 1% 1W SMD 0612	Susumu Co., LTD.	PRL1632-R050-F-T1
1	R6	RES TKF 0.2Ω 1% 1W SMD 0612	ROHM Semiconductor	LTR18EZPFLR200
1	R7	RES TF 100kΩ 1% 1/8W SMD 0603	Vishay Intertechnology, Inc.	MCT06030C1003FP500
1	R8	**DO NOT POPULATE**		

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.

TABLE 2-1: BILL OF MATERIALS (BOM) (CONTINUED)

Qty.	Reference	Description	Manufacturer	Part Number
1	R9	RES TKF 4.02kΩ 1% 1/10W SMD 0603	Stackpole Electronics, Inc.	RMCF0603FT4K02
4	R10, R12, R13, R14	RES TKF 10kΩ 5% 1/10W SMD 0603	Panasonic - ECG	ERJ-3GEYJ103V
1	R11	RES TKF 1.02kΩ 1% 1/10W SMD 0603	Panasonic - ECG	ERJ-3EKF1021V
1	R18	RES TKF 475Ω 1% 1/10W SMD 0603	Panasonic - ECG	ERJ-3EKF4750V
1	R19	RES TKF 10Ω 5% 1/10W SMD 0603	Panasonic - ECG	ERJ-3GEYJ100V
1	R22	RES TKF 10Ω 5% 1/10W SMD 0603 **DO NOT POPULATE**	Panasonic - ECG	ERJ-3GEYJ100V
1	TR1	TRANS SMPS Flyback 1:1,2:1 SMD	Würth Elektronik	750341878
1	U1	MCHP ANALOG PWM CONTROLLER 2 MHz MCP19117-E/MQ QFN-28	Microchip Technology Inc.	**MCP19117-E/MQ**
1	U2	MCHP ANALOG CHARGE PUMP 5V - 11V TC1240A SOT-23-6	Microchip Technology Inc.	**TC1240AECHTR**

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.

TABLE B-1: BILL OF MATERIALS (BOM) - MECHANICAL PARTS

Qty	Reference	Description	Manufacturer	Part Number
1	PCB	Printed Circuit Board - MCP19117 Flyback Stand-Alone Evaluation Board	—	**04-10403-R1**
18	DESAT_N, DESAT_P, GPA2, GPA6, ICOMP, IFB, IP, ISN, ISP, PDRV, RX/DT, SDRV, SW1, SW2, TEST, TP1, VREF2, VS	MISC, TEST POINT MULTI PURPOSE MINI BLACK; **DO NOT POPULATE**	Keystone Electronics Corp.	5001
2	J3,J5	CON HDR-2.54 Male 1x6 Gold 5.84 MH SMD VERT	Samtec, Inc.	TSM-106-01-L-SV
4	PAD1, PAD2, PAD3, PAD4	MECH HW RUBBER PAD CYLINDRICAL D7.9 H5.3 BLACK	3M	SJ61A11
6	SW_1, SW_2, TP_PGND1, TP_PGND2, TP_VIN, TP_VOUT	CON TP LOOP SILVER 3.4x5 SMD	Component Corporation	TP-107-2

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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82-2-558-5934

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Fax: 34-91-708-08-91

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UK - Wokingham
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Fax: 44-118-921-5820

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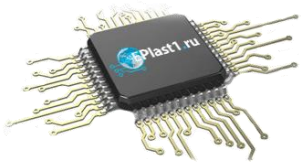
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- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- Лицензия ФСБ на осуществление работ с использованием сведений, составляющих государственную тайну;
- Поставка специализированных компонентов (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Aeroflex, Peregrine, Syfer, Eurofarad, Texas Instrument, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits,General Dynamics и др.);

Помимо этого, одним из направлений компании «ЭлектроПласт» является направление «Источники питания». Мы предлагаем Вам помощь Конструкторского отдела:

- Подбор оптимального решения, техническое обоснование при выборе компонента;
- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



Как с нами связаться

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