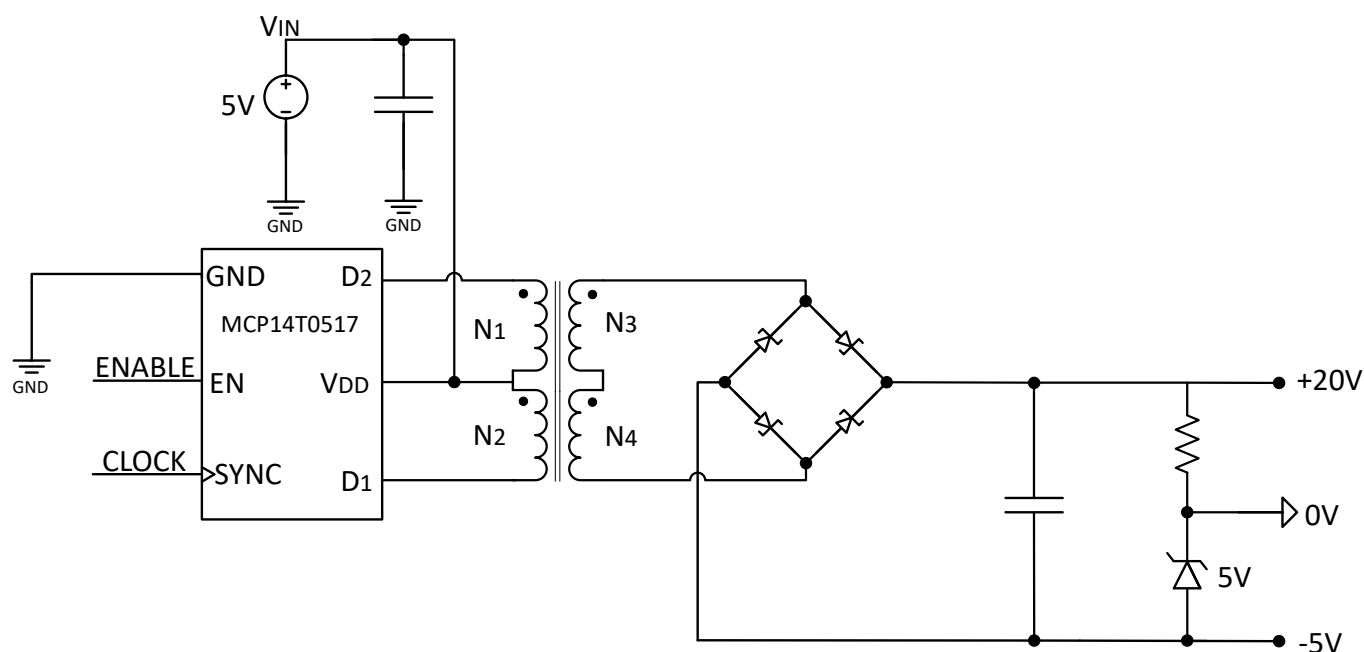


Introduction

The Isolated Bias Generator for SiC Gate Drivers Reference Design is based on MCP14T0517B which operates at 5V input voltage. The board provides galvanic isolated and regulated bias voltage of +20V with respect to 0V and -5V with respect to 0V at up to 100 mA of current. The board features configurable ENABLE pin for external control and synchronization.

The MCP14T0517A/B device is a push-pull transformer driver designed for small form factor isolated power supply applications with a switching frequency of 150 kHz for MCP14T0517A and 450 kHz for MCP14T0517B. MCP14T0517A/B allows synchronization with multiple devices and operation at higher frequencies by applying an external clock of up to 1000 kHz.

Figure 1. Isolated Bias Generator for SiC Gate Drivers Reference Design Block Diagram



Features

The Isolated Bias Generator for SiC Gate Drivers Reference Design has the following features:

- Input Voltage (V_{IN}): 5V
- Output Voltages: +20V with respect to 0V and -5V with respect to 0V
- Output Current: up to 100 mA (for the output voltage of +25V with respect to -5V)
- Switching Frequency: 450 kHz
- Overtemperature and Overcurrent Protections
- Ro-HS Compliant

Kit Contents

The Isolated Bias Generator for SiC Gate Drivers Reference Design kit includes:

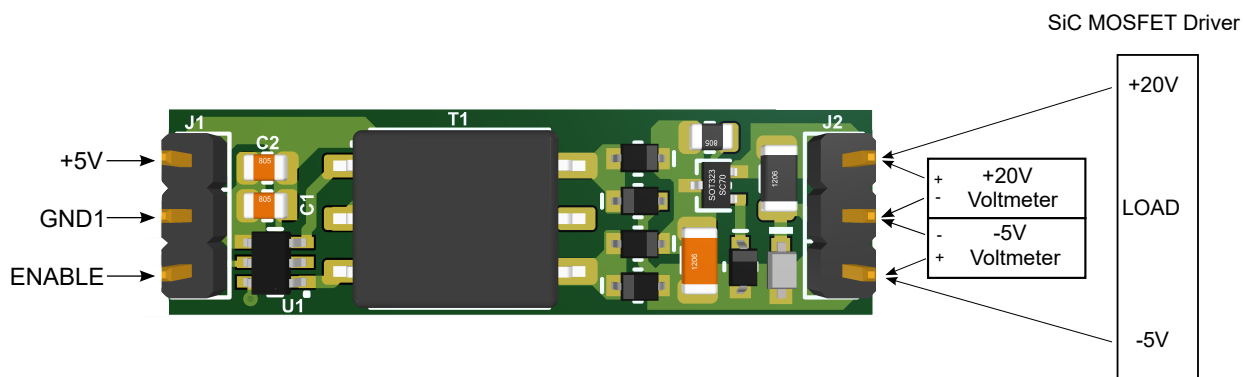
- Isolated Bias Generator for SiC Gate Drivers Reference Design PCB
- Two 3-pin 2.54 mm header connectors for input and output signals
- Important Information Sheet

1. Setup and Configuration

The Isolated Bias Generator for SiC Gate Drivers Reference Design is a small (34 x 10 mm) printed-circuit board (PCB) module that has two 3-pin 2.54 mm header connectors for input and output signals. The input connector is a 3-pin header for the 5V input voltage supply and for the external enable signal. The output connector is a 3-pin 2.54 mm header, and it provides a regulated bias voltage of +25V with respect to -5V. The PCB board includes a transformer with 1:2.88 turns ratio, a rectifier bridge and a voltage regulator.

The Isolated Bias Generator for SiC Gate Drivers Reference Design is fully assembled and tested and can bias a SiC Gate Driver with +25V with respect to -5V for up to 100 mA of current.

Figure 1-1. Isolated Bias Generator for SiC Gate Drivers Reference Design PCB



To power up the Isolated Bias Generator for SiC Gate Drivers Reference Design the following steps must be completed:

1. Connect the +5V pin of J1 connector to the ENABLE pin of J1 in order to enable MCP14T0517B. Alternatively, the ENABLE pin can be driven by an external 5V power source.
2. Connect the external 5V power source to J1 connector between +5V pin and GND1 pin.
3. Connect the SiC Gate Driver or a load to J2 as shown in [Figure 1-1](#).
4. Power up the external 5V power source.
5. The output voltage should be +25V. Alternatively, a voltmeter can be connected between the middle pin of J2 (unlabeled in [Figure 1-1](#)) and the +20V pin to read +20V and between the middle pin of J2 (unlabeled in [Figure 1-1](#)) and the -5V pin to read -5V.

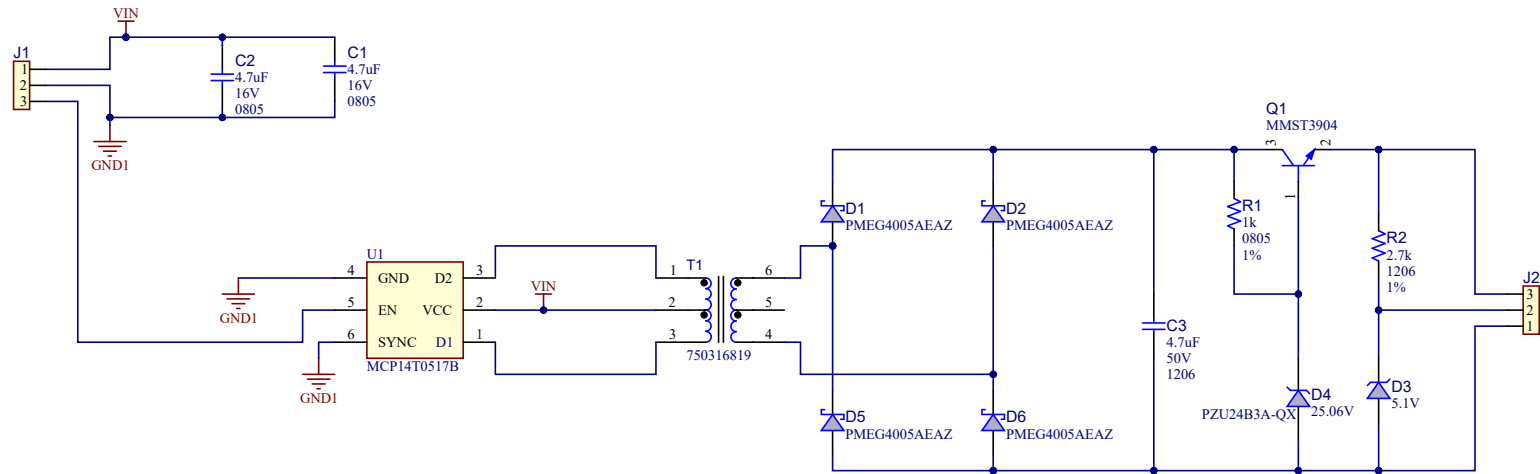
2. Schematic and Layout

This section contains the following schematic and layout for the Isolated Bias Generator for SiC Gate Drivers Reference Design:

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

2.1. Schematic

Figure 2-1. Board - Schematic



2.2. Layout

Figure 2-2. Top Copper and Silk

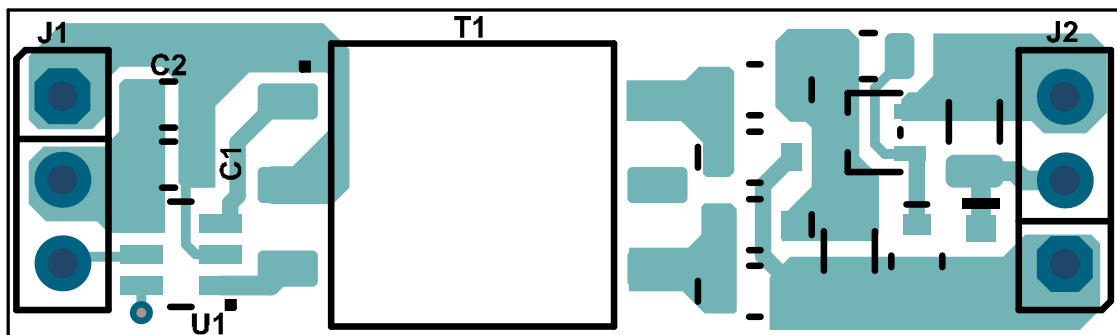


Figure 2-3. Bottom Copper and Silk



3. Bill of Materials (BOM)

Qty.	Reference	Description	Manufacturer	Part Number
2	C1, C2	Capacitor, Ceramic, 4.7 μ F, 16V, 10%, X7R, SMD, 0805	Murata Electronics®	GRM21BR71C475KE51L
1	C3	Capacitor, Ceramic, 4.7 μ F, 50V, 20%, X7R, AEC-Q200, SMD, 1206	KEMET	C1206X475M5RACAUTO
4	D1, D2, D5, D6	Diode, Schottky, 470 mV @ 500 mA, 40V, SMD, SOD-323	Nexperia USA Inc.	PMEG4005AEAZ
1	D3	Diode, Zener, 5.1V, 400 mW, SMD, SOD-323	Nexperia USA Inc.	PDZ5.1B,115
1	D4	Diode, Zener, 25.06V, 320 mW, SOD-323, AEC-Q101	Nexperia USA Inc.	PZU24B3A-QX
1	J1	Connector, HDR-2.54, Male, 1x3, Gold, 6.10 Through Hole, Vertical	METZ CONNECT USA Inc.	PR20203VBNN
1	J2	Connector, HDR-2.54, Male, 1x3, Gold, 5.84, Through Hole, Vertical	FCI	68000-103HLF
1	Q1	Transistor, Bipolar, NPN, 40V, 200 mA, 200 mW, SOT-323	Diodes Incorporated®	MMST3904-7-F
1	R1	Resistor, Thick Film, 1 k Ω , 1%, 1/8W, SMD, 0805	Vishay/Dale	CRCW08051K00FKEA
1	R2	Resistor, Thick Film, 2.7 k Ω , 1%, 1/4W, SMD, 1206, AEC-Q200	Panasonic® - ECG	ERJ-8ENF2701V
1	T1	Transformer SMPS, 1:2.88, 5V, 1A, 86 μ H, SMD, AEC-Q200	Würth Elektronik	750316819
1	U1	Analog Transformer Driver, Push-Pull, 450 kHz, 6 Lead, SOT-23	Microchip Technology Inc.	MCP14T0517BT-E/CH

4. Performance

Figure 4-1. D1 and D2 Waveforms at 120 mA Load Current

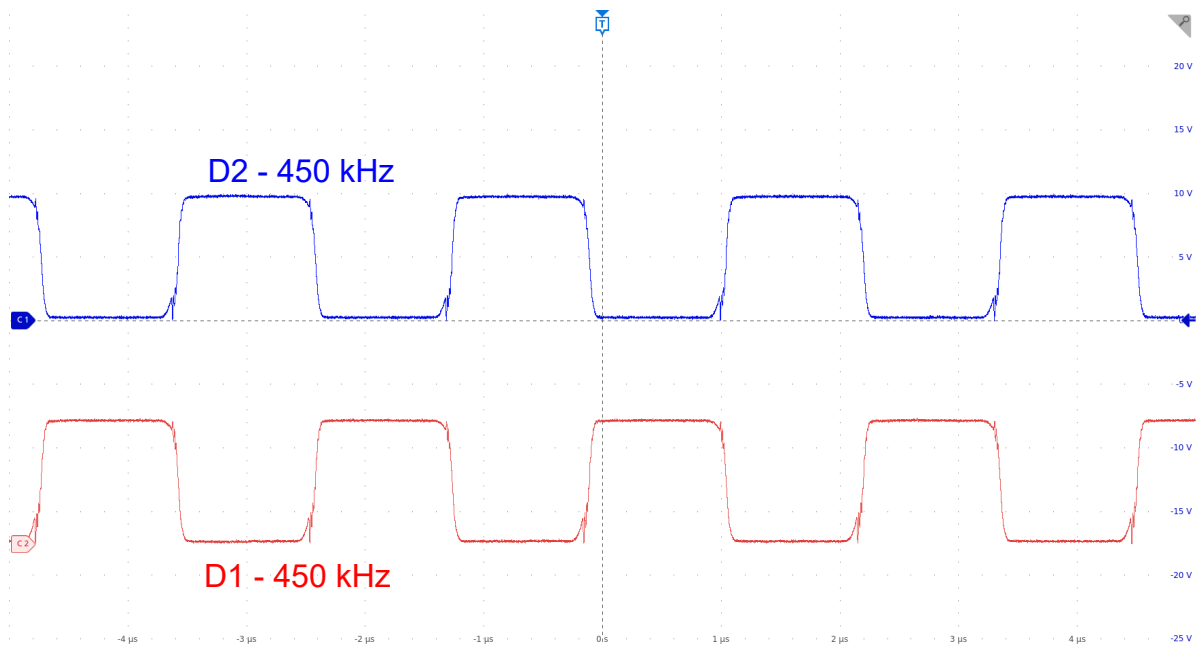


Figure 4-2. Output Ripple at 120 mA Load Current



5. Revision History

The revision history describes the changes that were implemented in the document. The changes are listed by revision, starting with the most current publication.

Revision	Date	Section	Description
A	11/2025		Initial Revision

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