MIC2196 SEPIC Evaluation Board

400kHz SO-8 SEPIC Demo Manual

Introduction

MIC2196 is a high efficiency PWM boost control IC housed in a SO-8 package. The MIC2196 is optimized for low input voltage applications. With its wide input voltage range of 2.9V to 14V, the MIC2196 can be used in boost, SEPIC (single ended primary inductive coupled), CUK, and flyback topologies to efficiently generate positive or negative voltages. This evaluation board addresses the SEPIC topology where input voltage (4V to 6V) can be less than or greater than the output voltage (5V).

The MIC2196 is ideal for space sensitive applications. The device is housed in the space saving SO-8 package, whose low pin-count minimizes external components. Its fixed 400kHz PWM operation allows the use of small inductor and small output capacitors and is ideal for noise-sensitive telecommunication applications. Efficiencies over 80% are achievable over a wide range of load conditions for the MIC2196 SEPIC evaluation board.

MIC2196 Evaluation Board Input/Output Voltages and Load Current

The MIC2196 SEPIC evaluation board is designed for input voltage between 4V to 6V and output voltage of 5V at 2A. The evaluation board can be programmed to a different output voltage and load current by merely replacing a few components. Please consult factory or your local Field Application Engineer to implement this change.

Quick-Start Guide

Refer to Figure 1 for the following:

1. Connect the positive terminal from the power supply to V_{IN} post (J1) on the MIC2196 SEPIC evaluation board.
2. Connect the GND terminal of the input power supply to GND (J3).
3. Connect a digital voltmeter across V_{OUT} (J2) and GND (J4) to measure output voltage.
4. After turning the input supply on, the output voltage should read 5V.

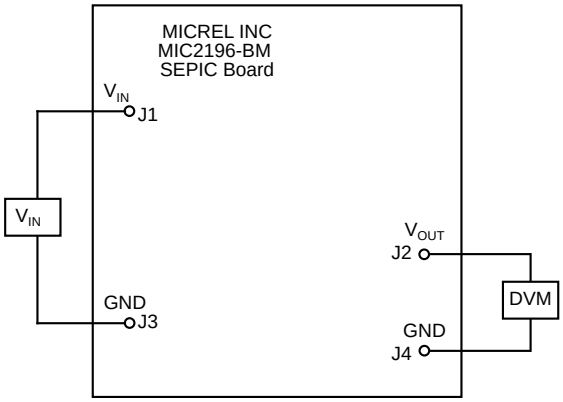
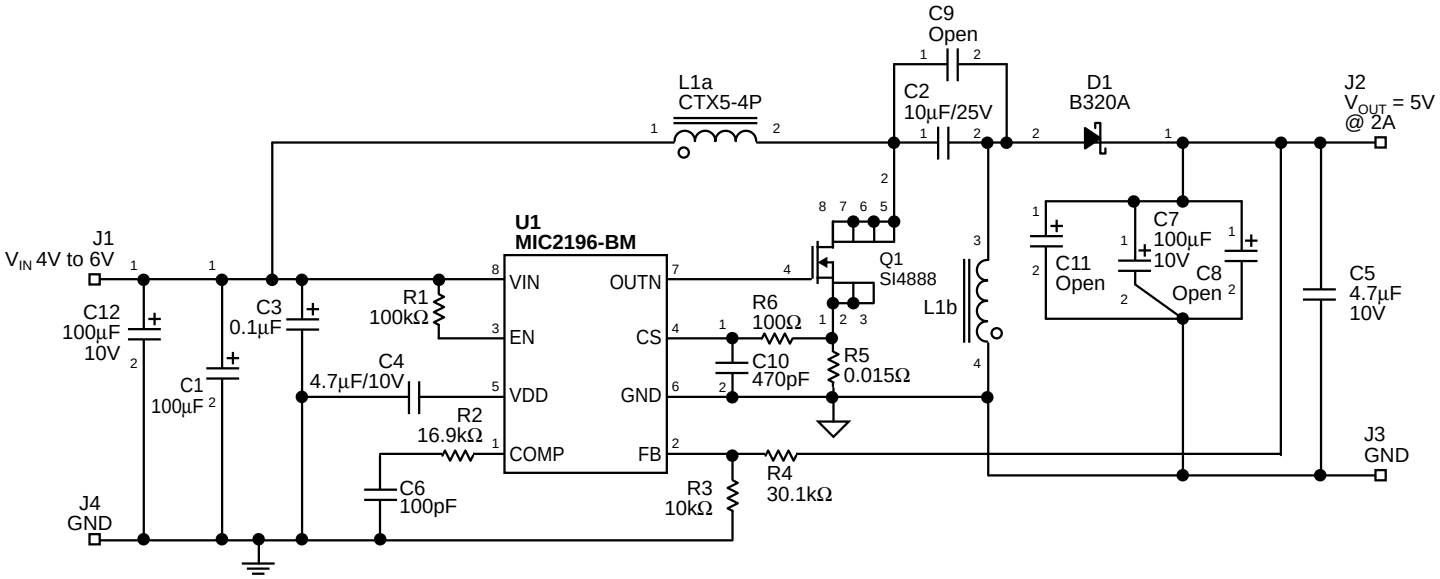


Figure 1. MIC2196 SEPIC Evaluation Board Hook-up

Evaluation Board Schematic



Evaluation Board Efficiency

Figure 2 shows the MIC2196 efficiency for input voltage between 4V and 6V to produce a constant 5V output for up to 2A of load current.

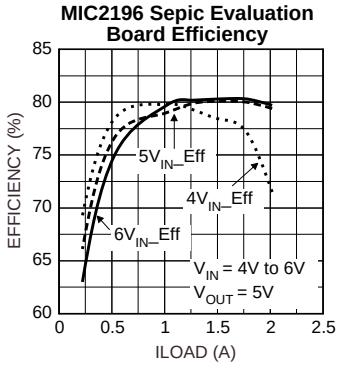


Figure 2. MIC2196 SEPIC Evaluation Board Efficiency for V_{IN} = 4V to 6V and V_{OUT} = 5V

Transient Response

Figures 3 and 4 show the transient response and output voltage ripple for V_{IN} = 4V and Figures 5 and 6 for V_{IN} = 6V for the MIC2196 SEPIC evaluation board.

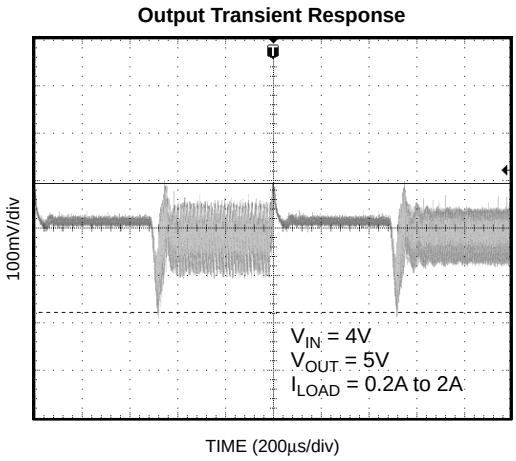


Figure 3. Transient Response for V_{IN} = 4V, V_{OUT} = 5V, I_{LOAD} = 0.2A to 2A

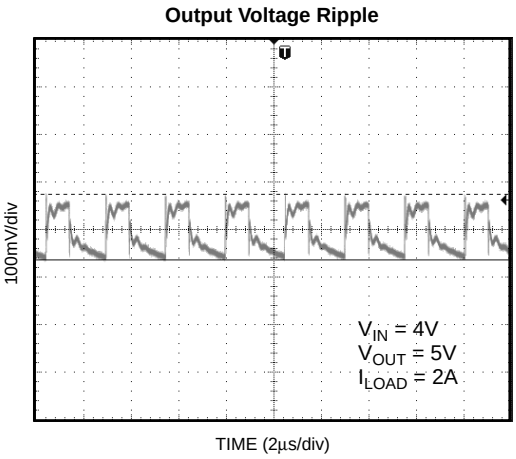


Figure 4. Output Voltage Ripple for V_{IN} = 4V, V_{OUT} = 5V, I_{LOAD} = 2A

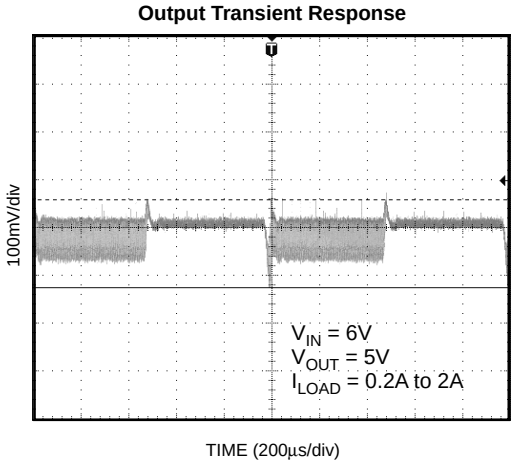


Figure 5. Transient Response for V_{IN} = 6V, V_{OUT} = 5V, I_{LOAD} = 0.2A to 2A

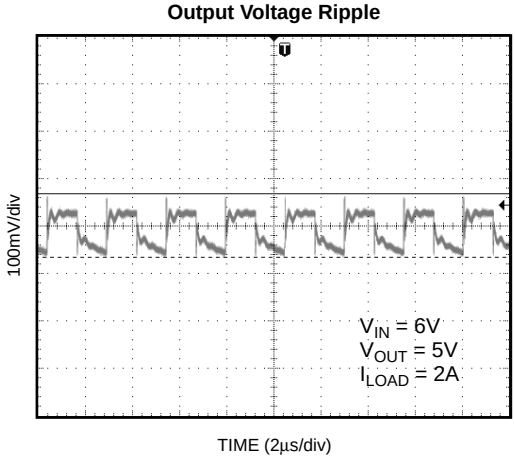


Figure 6. Output Voltage Ripple for V_{IN} = 6V, V_{OUT} = 5V, I_{LOAD} = 2A

Bill of Materials

Item	Part Number	Manufacturer	Description	Qty.
C1, C7, C11, C12	594D107X0020D2T TPSD107M020R0065.	Vishay Sprague AVX	100µF, 20V, tantalum capacitor	4 OR
C2	GRM31CR61E106K***L	Murata	10µF, 25V ceramic capacitor	1
C3	VJ0805Y104KXXAT	Vishay Vitramon	0.1µF, 25V ceramic capacitor	1
C4	GRM21BR71C105KA01L VJ0805S105KXXAT	Murata Vishay Vitramon	1µF, 16V ceramic capacitor	1 OR
C5	GRM21BR61A475KA73L C2012 X5R 1A 475K	Murata TDK	4.7µF, 10V ceramic capacitor 4.7µF, 10V, X5R ceramic capacitor	1 OR
C6	VJ0805A101KXXMT	Vishay Vitramon	100pF, 25V, X7R ceramic capacitor	1
C8, C9			OPEN	0
C10	VJ0805Y471KXXMT	Vishay Vitramon	470pF, 25V	1
D1 D1 D1	B320A (SMA Package) SS32 SMA SK32 SMA	Diodes, Inc. Vishay Corp. Micro Commercial Components	3A, 20V Schottky diode	1 OR
J1-J4	2551-2-00-01-00-00-07-0	MilMax	Turret Pins	4
L1	CTX5-4P	Cooper Electronics	Econo-Pac	1
Q1	Si4888DY	Vishay Corp.	MOSFET	1
R1	CRCW08051003FRT1	Vishay Dale	100kΩ, size 0805, 1%	1
R2	CRCW08051692FRT1	Vishay Dale	16.9kΩ, size 0805, 1%	1
R3	CRCW08051002FRT1	Vishay Dale	10kΩ, size 0805, 1%	1
R4	CRCW08053012FRT1	Vishay Dale	30.1kΩ, size 0805, 1%	1
R5	WSL-2010-R015-F	Vishay Dale	0.015Ω, size 2010, 1%	1
R6	CRCW06031000FRT1	Vishay Dale	100Ω, size 0805, 1%	1
U1	MIC2196-BM	Micrel Semiconductor	Boost controller	1

Shaded items not being used by evaluation board.

Vendor Phone Numbers:

1. Vishay Corp. tel: 206-452-5664
2. AVX tel: 843-448-9411
3. Murata tel: 800-831-9172
4. TDK tel: 847-803-6100
5. Diodes, Inc. tel: 805-446-4800
6. Micro Commercial Components tel: 800-346-3371
7. Cooper Electronics tel: 561-752-5000
8. **Micrel Semiconductor** tel: 408-944-0800

Printed Circuit Board Layouts

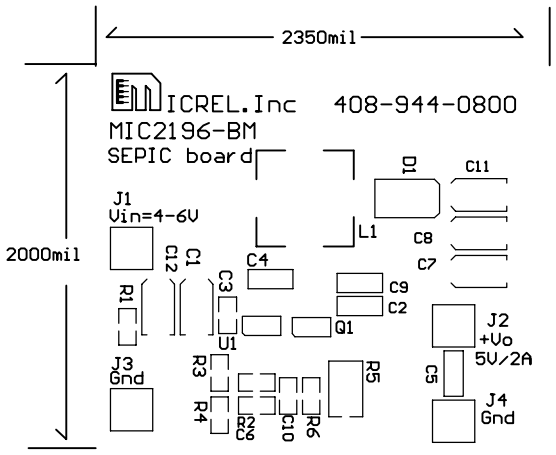


Figure 7a. Top Silkscreen

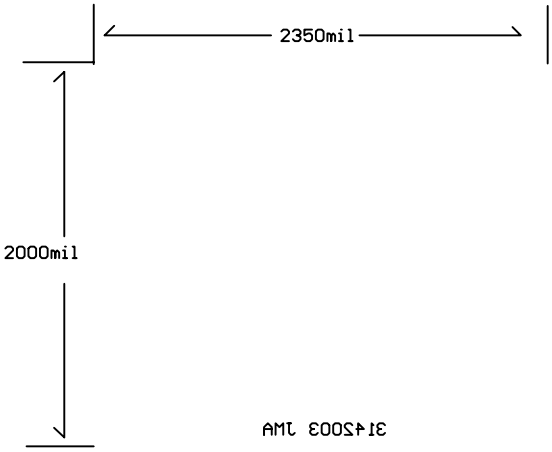


Figure 7c. Bottom Silkscreen

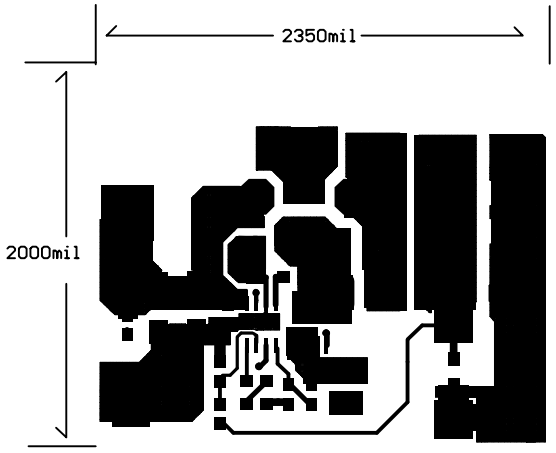


Figure 7b. Top Layer

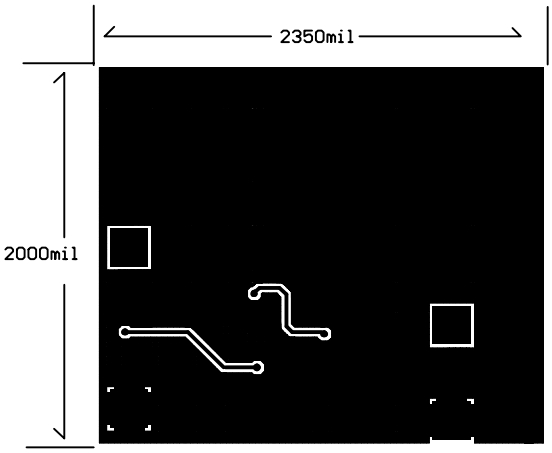


Figure 7d. Bottom Layer

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