



MIC2208 Evaluation Board

3mm × 3mm 1MHz Buck Converter

By Martin Galinski

General Description

The Micrel MIC2208 is a high efficiency PWM buck (step-down) regulator that provides up to 3A of output current. The MIC2208 operates at 1MHz and has external voltage mode compensation that allows a closed loop bandwidth of over 100 KHz

The low-on-resistance internal p-channel MOSFET of the MIC2208 allows efficiencies over 94% and reduces external component count and eliminates the need for an expensive current sense resistor.

The MIC2208 operates from 2.7V to 5.5V input and the output can be adjusted down to 1V. The devices can operate with a maximum duty cycle of 100% for use in low-dropout conditions.

Requirements

The MIC2208 evaluation board requires an input power source that is able to deliver greater than 2.7V at over 3A. The output load can either be an active or passive source.

Precautions

The evaluation board does not have reverse polarity protection. Applying a negative voltage to the V_{IN} terminal may damage the device.

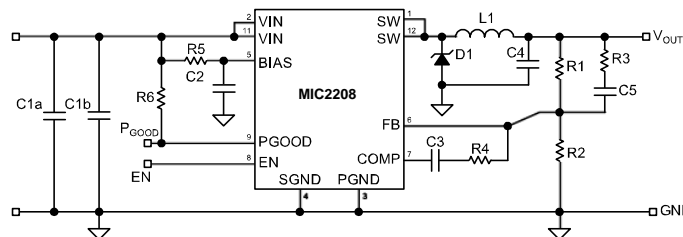
In addition, the maximum operating voltage of the MIC2208 evaluation board is 5.5V. Exceeding 6V on the input could damage the device. **For short circuit testing, an additional input capacitor over 22uF is required.** This is preferably an electrolytic, but may be tantalum or ceramic. When using long test leads to

provide power to the device. The inductance in long leads can be over 1uH. During a short circuit condition, the high peak currents through the test leads may cause the input voltage to spike and exceed the absolute maximum rating of 6V, possibly damaging the device.

Getting Started

1. **Connect an external supply to V_{IN} .** Apply desired input voltage to the V_{IN} and ground terminals of the evaluation board, paying careful attention to polarity and supply voltage ($2.7V < V_{IN} < 5.5V$). An ammeter may be placed between the input supply and the V_{IN} terminal to the evaluation board. Ensure the supply voltage is monitored at the V_{IN} terminal. The ammeter and/or power lead resistance can reduce the voltage supplied to the input.
2. **Connect the load to the V_{OUT} and ground terminals.** The load can be either passive (resistive) or active (as in an electronic load). An ammeter can be placed between the load and the V_{OUT} terminal. Ensure the output voltage is monitored at the V_{OUT} terminal. The default output voltage is set to 1.8V. This can be adjusted by changing the feedback resistors. See "Output Voltage."
3. **Enable the MIC2208.** Apply a 1.3V or greater voltage source to the enable pin.

Typical Application



MIC2208 Evaluation Board Schematic

Output Voltage

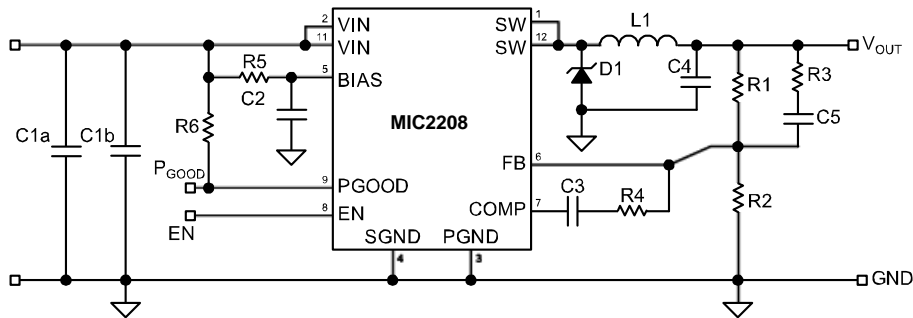
The output voltage on the MIC2208 evaluation board is adjustable. The output voltage is controlled by the feedback resistors (R1 and R2) and can be calculated as follows:

$$V_{\text{OUT}} = 1\text{V} \times \left(\frac{R1}{R2} + 1 \right)$$

The evaluation board is initially adjusted to 1.8V, but can easily be modified by removing R2 and replacing it with the value that yields the desired output voltage. (Removing R2 sets the output to 1V.)

$$R2 = \frac{48.7\text{k}\Omega}{\left(\frac{V_{\text{OUT}}}{1\text{V}} - 1 \right)}$$

Evaluation Board Schematic



MIC2208 Evaluation Board Schematic

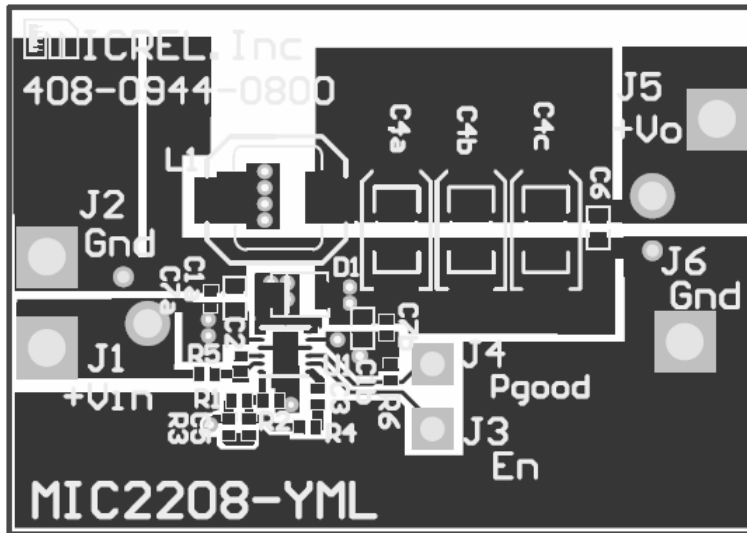
Bill of Materials

Item	Part Number	Description	Manufacturer	Qty
C1a,C1b	C2012JB0J106K	10uF Ceramic Capacitor X5R 0805 6.3V	TDK	2
	GRM219R60J106KE19	10uF Ceramic Capacitor X5R 0805 6.3V	Murata	
	08056D106MAT	10uF Ceramic Capacitor X5R 0805 6.3V	AVX	
C2	0402ZD104MAT	0.1uF Ceramic Capacitor X5R 0402 10V	AVX	1
C3	0402ZD103MAT	1nF Ceramic Capacitor X5R 0402 10V	AVX	2
C4	C3216X5R0J476K	47uF Ceramic Capacitor X5R 1206 6.3V	TDK	1
	GRM32ER60J476ME20	47uF Ceramic Capacitor X5R 1206 6.3V	Murata	
	12106D476MAT2A	47uF Ceramic Capacitor X5R 1210 6.3V	AVX	
C5	VJ0402A330KXAA	33pF Ceramic Capacitor 0402	Vishay VT	1
D1	SSA33L	3A Schottky 30V SMA	Vishay Semi	1
L1	RLF7030-1R0N6R4	1uH Inductor 8.8mOhm 7.1mm(L) x 6.8mm (W)x 3.2mm(H)	TDK	1
	744 778 9001	1uH Inductor 12mOhm 7.3mm(L)x7.3mm(W)x3.2mm(H)	Würth Electronik	
	IHLP2525AH-01 1	1uH Inductor 17.5mΩ (L)6.47mmx(W)6.86mmx(H) 1.8mm	Vishay Dale	
R1	CRCW04024992F	49.9KΩ 1% 0402 resistor	Vishay Dale	1
		33.2 kΩ 1% 0402 For 2.5V _{OUT}	Vishay Dale	
		61.9 kΩ 1% 0402 For 1.8 V _{OUT}	Vishay Dale	
		100 kΩ 1% 0402 For 1.5 V _{OUT}	Vishay Dale	
		249 kΩ 1% 0402 For 1.2 V _{OUT}	Vishay Dale	
	Open For 1.0 V _{OUT}	Vishay Dale		
R3	CRCW04024991F	4.99KΩ 1% 0402 resistor	Vishay Dale	1
R4	CRCW04024991F	90.9KΩ 1% 0402 resistor	Vishay Dale	1
R5	CRCW040210R0F	10Ω 1% 0402 resistor	Vishay Dale	1
R6	CRCW04021002F	10KΩ 1% 0402 resistor	Vishay Dale	1
U1	MIC2208BML	1MHz 3A Buck Regulator	Micrel	1

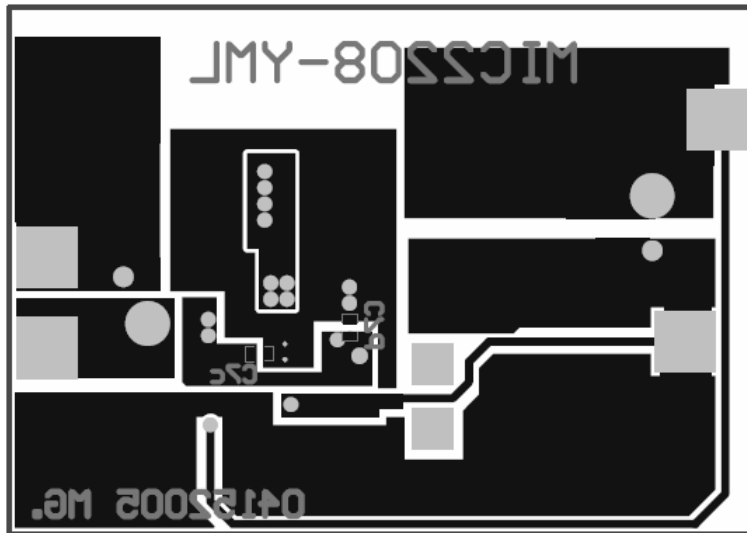
Notes:

1. TDK: www.TDK.com
2. Murata Tel: www.Murata.com
3. AVX: www.AVX.com
4. Vishay: www.Vishay.com
5. Micrel Semiconductor :www.Micrel.com

Topside



Bottom Side



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