MIC2207 Evaluation Board

3mm × 3mm 2MHz Buck Converter

General Description

The Micrel MIC2207 is a high efficiency PWM buck (step-down) regulator that provides up to 3A of output current. The MIC2207 operates at 2MHz and has proprietary internal compensation that allows a closed loop bandwidth of over 200 KHz

The low on-resistance internal p-channel MOSFET of the MIC2207 allows efficiencies over 94% and reduces external component count and eliminates the need for an expensive current sense resistor.

The MIC2207 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 MIC2207 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

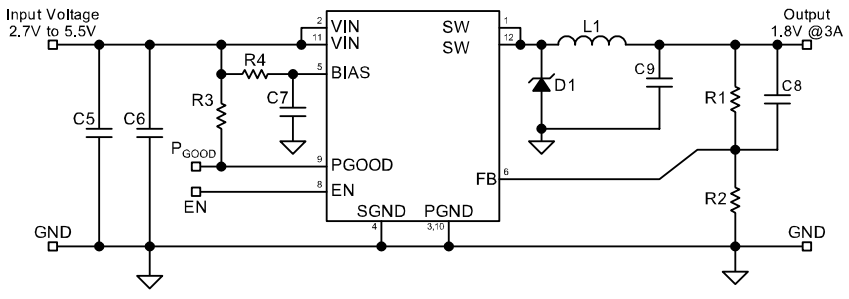
The evaluation board does not have reverse polarity protection. Applying a negative voltage to the V_{IN} terminal may damage the device.

In addition, the maximum operating voltage of the MIC2207 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 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 MIC2207**. Apply a 1.3V or greater voltage source to the enable pin.

Typical Application



MIC2207 Evaluation Board Schematic

Output Voltage

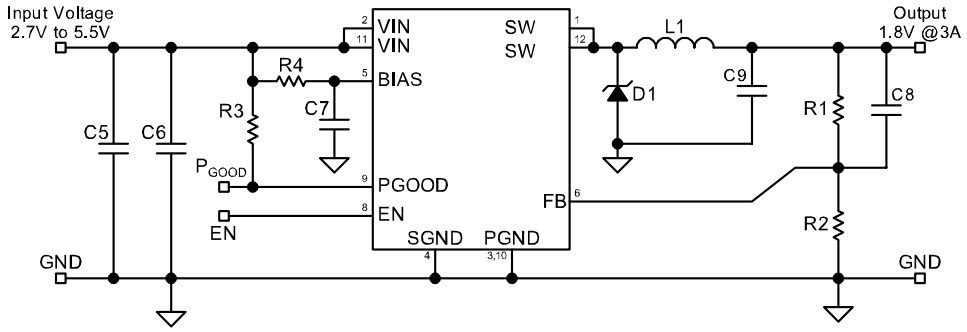
The output voltage on the MIC2207 evaluation board is adjustable. The output voltage is controlled by the feedback resistors (R1 and R2) and can be calculated as follows:

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

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.)

$$R2 = \frac{10k\Omega}{\left(\frac{V_{OUT}}{1V} - 1 \right)}$$

Evaluation Board Schematic



MIC2207 Evaluation Board Schematic

Bill of Materials

Item	Part Number	Manufacturer	Description	Qty.
C5,C6	C2012JB0J106K	TDK[1]	10µF Ceramic Capacitor X5R 0805 6.3V	
	GRM219R60J106KE19	Murata[2]	10µF Ceramic Capacitor X5R 0805 6.3V	
	08056D106MAT	AVX[3]	10µF Ceramic Capacitor X5R 0805 6.3V	2
C7	0402ZD104MAT	AVX[3]	0.1µF Ceramic Capacitor X5R 0402 10V	1
C1-4, C10-12*	0402ZD104MAT	AVX[3]	0.1µF Ceramic Capacitor X5R 0402 10V	*
C9	C2012JB0J475K	TDK[1]	4.7µF Ceramic Capacitor X5R 0603 6.3V	
	GRM188R60J475KE19	Murata[2]	4.7µF Ceramic Capacitor X5R 0603 6.3V	
	06036D475MAT	AVX[3]	4.7µF Ceramic Capacitor X5R 0603 6.3V	1
C8	VJ0402A820KXAA	Vishay VT[4]	82pF Ceramic Capacitor 0402	1
D1	SSA33L	Vishay Semi[4]	3A Schottky 30V SMA	1
L1	RLF7030-1R0N6R4	TDK[1]	1µH Inductor 8.8mΩ 7.1mm (L) x 6.8mm (W) x 3.2mm (H)	
	744 778 9001	Wurth Electronik	1µH Inductor 12mΩ 7.3mm (L) x 7.3mm (W) x 3.2mm (H)	
	IHLP2525AH-01 1	Vishay Dale[4]	1µH Inductor 17.5mΩ (L) 6.47mm x (W) 6.86mm x (H) 1.8mm	1
R1,R3	CRCW04021002F	Vishay Dale[4]	10KΩ1% 0402 resistor	1
R4	CRCW04026652F	Vishay Dale[4]	66.5 kΩ 1% 0402 For 2.5V_{OUT}	
	CRCW04021243F	Vishay Dale[4]	124 kΩ 1% 0402 For 1.8 V_{OUT}	
	CRCW04022003F	Vishay Dale[4]	200 kΩ 1% 0402 For 1.5 V_{OUT}	
	CRCW04024023F	Vishay Dale[4]	402 kΩ 1% 0402 For 1.2 V_{OUT}	
		Vishay Dale[4]	Open For 1.0 V_{OUT}	1
R3	CRCW040210R0F	Vishay Dale[4]	10Ω 1% 0402 resistor	1
U1	**MIC2207YML†**	**Micrel[5]**	**2MHz 3A Buck Regulator**	**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

† Micrel IC = Pb-Free

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