# 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

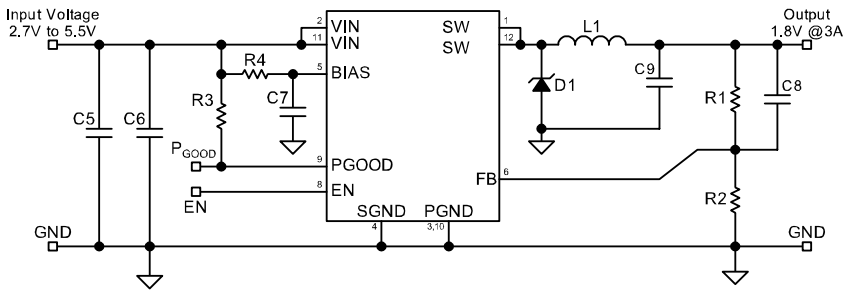
The evaluation board does not have reverse polarity protection. Applying a negative voltage to the $V_{IN}$ terminal may damage the device.

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**

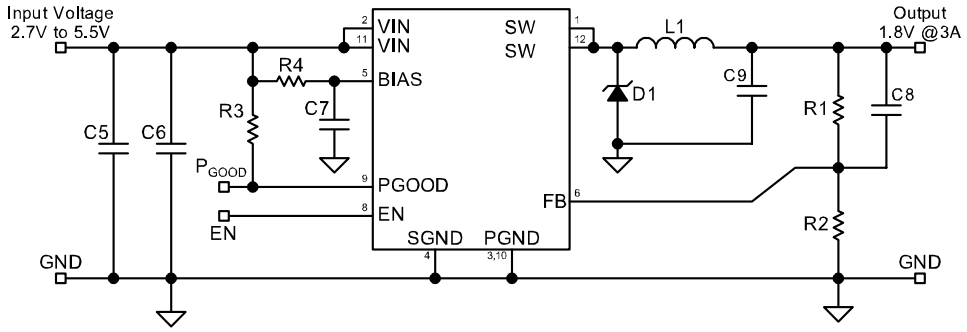
The output voltage on the MIC2207 evaluation board is adjustable. The output voltage is controlled by the feedback resistors (R1 and R2) and can be calculated as follows:

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

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 2.5$V_{OUT}$ | |
| | 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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