



MIC2203 Evaluation Board

High Efficiency 1MHz Buck Converter

General Description

The MIC2203 is an ultra-high efficiency, high frequency synchronous buck (step-down) switching regulator. Efficiencies above 90% are easily obtainable for a wide variety of applications. In addition, the MIC2203 has a logic compatible-enable function, which provides near "zero" OFF mode quiescent current for power critical battery applications.

The MIC2203 operates from 2.3V to 5.5V input and features internal power MOSFETs that can supply up to 300mA output current. It can operate with a maximum duty cycle of 100% for low-dropout conditions and regulate output voltages down to 0.5V.

The MIC2203 is a constant frequency pulse width modulation (PWM) buck converter that maintains high efficiency even at light load currents. By maintaining a constant PWM frequency, RF interference is kept down to a minimum.

The MIC2203 has a SYNC_IN pin and SYNC_OUT function, which can be used to synchronize the MIC2203 to an external clock or used in combination with other MIC2203s to daisy chain multiple converters to a single clock.

Requirements

The MIC2203 evaluation board requires an input power source that is able to deliver greater than 1A at 2.3V.

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 MIC2203 evaluation board is 5.5V. Exceeding 6V on the input could damage the device.

Getting Started

1. **Connect an external supply to V_{IN} .** Apply desired input voltage to the V_{IN} (+Vin) and ground (Gnd) terminals of the evaluation board, paying careful attention to polarity and supply voltage ($2.3V \leq V_{IN} \leq 5.5V$). An ammeter may be placed between the input supply and the V_{IN} terminal to the evaluation board. Ensure that 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 (resistor) or active (electronic load). An ammeter can be placed between the load and the V_{OUT} (+Vo) terminal. The default output voltage is set to 1.8V. This can be adjusted by changing the feedback resistors. See "Output Voltage."
3. **Enabling the MIC2203.** If an R5 resistor is on the evaluation board, a 2.3V or greater voltage must be applied to the VIN terminal to enable the device. Conversely, if an R5 resistor is not on the evaluation board, a 1.3V or greater voltage must be applied to the enable (En) terminal to enable the device.

Output Voltage

The output voltage on the MIC2203 evaluation board is adjustable. The output voltage is controlled by the feedback resistors (R1 and R2) and can be calculated as follows:

$$V_{\text{OUT}} = 0.5\text{V} \times \left(\frac{R1}{R2} + 1 \right)$$

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 0.5V.)

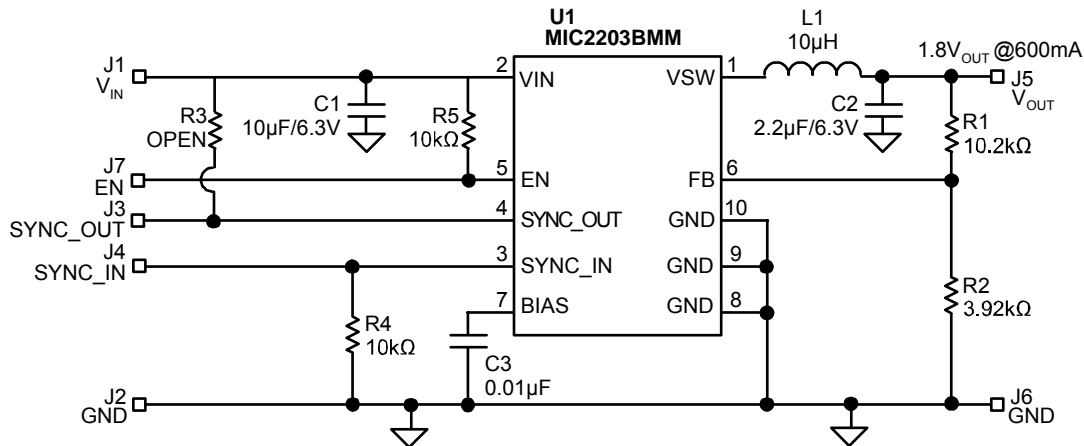
$$R2 = \frac{10\text{k}\Omega}{\left(\frac{V_{\text{OUT}}}{0.5\text{V}} - 1 \right)}$$

SYNC_IN

SYNC_IN is an input that allows the MIC2203 to synchronize its internal switching frequency to an external frequency source. The source must have sufficient amplitude (down below 0.7V and above 1.7V). Again, careful attention should be paid to avoid driving this pin above 5.5V. The range of synchronization is around 20% of the fundamental frequency. This pin can be tied high (to V_{IN}) to reduce the oscillator to its minimum frequency. When not in use, this pin should be tied to ground. The evaluation board accomplishes this through a 10k Ω resistor (R4).

SYNC_OUT

SYNC_OUT is an open collector output that tracks the internal oscillator. A 10k Ω pull-up resistor is required to use the SYNC_OUT function. The R3 location is reserved for this option. Applying the SYNC_OUT signal to the SYNC_IN pin of another MIC2203 converter allows both devices to run at the same frequency.



Bill of Material

MIC2203 Evaluation Board

| Ref Des | Part Number | Description | Manufacturer |
|---------|---------------------|---|-----------------|
| C1 | GRM21BR60J106KE19L | 10µF/6.3V Ceramic Capacitor, Size 0805 | Murata |
| | C2012X5R0J106K | 10µF/6.3V Ceramic Capacitor, Size 0805 | TDK |
| | VJ0805G106KXQCW1BC | 10µF/6.3V Ceramic Capacitor, Size 0805 | Vishay |
| | 08056D106KAT | 10µF/6.3V Ceramic Capacitor, Size 0805 | AVX |
| C2 | C2012X5R1A225K | 2.2µF/6.3V Ceramic Capacitor, Size 0805 | TDK |
| | 0603D225KAT | 2.2µF/6.3V Ceramic Capacitor, Size 0603 | AVX |
| | VJ08055G225KXQCW1BC | 2.2µF/6.3V Ceramic Capacitor, Size 0805 | Vishay |
| | GRM185R60J225KE26D | 2.2µF/6.3V Ceramic Capacitor, Size 0603 | Murata |
| C3 | VJ0603Y103KXXAT | 0.01µF Ceramic Capacitor, Size 0603 | Vishay |
| L1 | LQH32CN100K33 | 10µH 450mA Inductor | Murata |
| | VLF3010AT-100MR49 | 10µH 490mA Inductor | TDK |
| | SD3812-100 | 10µH 778mA Inductor | Cooper Bussmann |
| R1 | CRCW06031002FRT1 | 10kΩ 1% Resistor, Size 0603 | Vishay |
| R2 | CRCW06033921FRT1 | 3.92KΩ 1% Resistor, Size 0603 | Vishay |
| R3 | OPEN | | Vishay |
| R4 | CRCW06031002FRT1 | 10kΩ 1% Resistor, Size 0603 | Vishay |
| R5 | CRCW06031002FRT1 | 10kΩ 1% Resistor, Size 0603 | Vishay |
| U1 | MIC2203BMM | MSOP-10 1MHz PWM Step-Down Converter | Micrel |

Notes:

1. AVX: www.avx.com
2. Murata: www.murata.com
3. TDK: www.tdk.com
4. Vishay: www.vishay.com
5. Cooper Bussmann: www.cooperet.com
6. Micrel Semiconductor: www.micrel.com

Printed Circuit Board Layouts

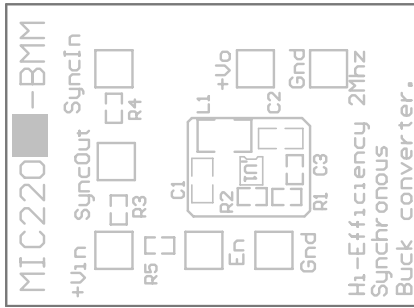


Figure 1a. Top Silkscreen

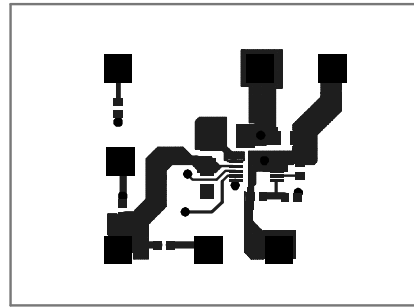


Figure 1b. Top Layer



Figure 1c. Bottom Silkscreen

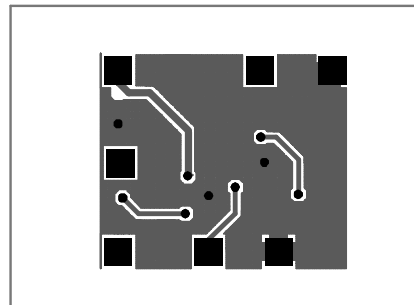


Figure 1d. Bottom Layer

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