MIC4722 Evaluation Board

3mm × 3mm 2.75MHz Converter

General Description

The Micrel MIC4722 is a high efficiency PWM buck (step-down) regulator that provides up to 3A of output current. The MIC4722 operates at 2.7MHz 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 MIC4722 allows efficiencies over 94% and reduces external component count and eliminates the need for an expensive current sense resistor.

The MIC4722 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 MIC4722 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 MIC4722 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 MIC4722**. Apply a 1.3V or greater voltage source to the enable pin.

Output Voltage

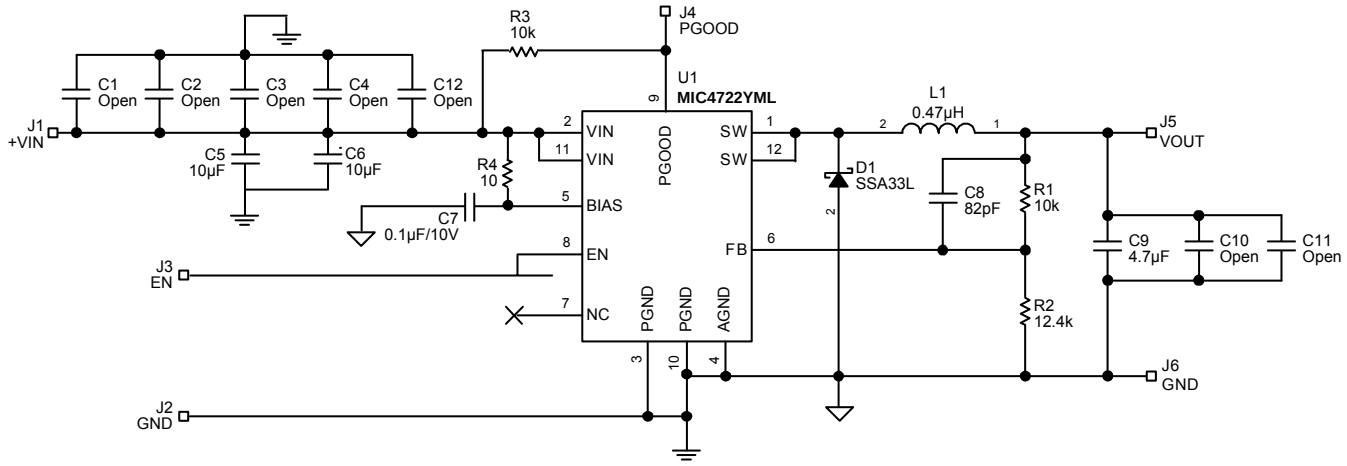
The output voltage on the MIC4722 evaluation board is adjustable. The output voltage is controlled by the feedback resistors (R1 and R2) and can be calculated as follows:

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

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



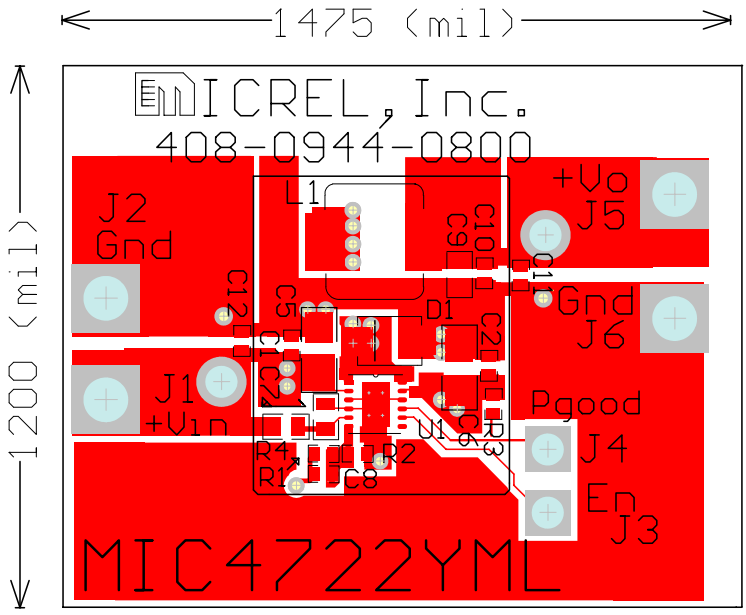
Bill of Materials

Item	Part Number	Manufacturer	Description	Qty.
C1-4, C10-12*	C1005X7R1C104K	TDK[1]	OPEN (0.1µF Ceramic Capacitor X7R 16V)	*
	GRM155R601A104M	Murata[2]	OPEN (0.1µF Ceramic Capacitor X5R 10V)	
	VJ0402Y104KXQCW1BC	Vishay[3]	OPEN (0.1µF Ceramic Capacitor X7R 10V)	
C5, C6	C1608X5R0J106K	TDK[1]	10µF Ceramic Capacitor X5R 6.3V	2
	GRM188R60J106M	Murata[2]		
C7	VJ0402Y104KXQCW1BC	Vishay[3]	0.1µF Ceramic Capacitor X7R 10V	1
	C1005X7R1C104K	TDK[1]	0.1µF Ceramic Capacitor X7R 16V	
C8	VJ0402A820KXXCW1BC	Vishay[3]	82pF Ceramic Capacitor NPO 25V	1
	C1005COG1H820J	TDK[1]	82pF Ceramic Capacitor 50V	
C9	C1680JFOJ475Z	TDK[1]	4.7µF Ceramic Capacitor 6.3V	1
	GRM188R60J475KE19D	Murata[2]	4.7µF Ceramic Capacitor X5R 6.3V	
D1	SSA33L	Vishay[3]	3A Schottky 30V	1
	MBRM330-13	Diodes, Inc.[4]		
L1	SPM6530T-R47M170	TDK[1]	0.47µH Inductor 3.63mΩ 7.1mm (L) x 6.8mm (W) x 3mm (H)	1
	IHLP2525AHERR47M01	Vishay[3]	0.47µH Inductor 8.4mΩ (L) 6.47mm x (W) 6.86mm x (H) 1.8mm	
R1, R3	CRCW04021002FKEYE3	Vishay Dale[3]	10k 1% 0402 1/16W Resistor	1
R2	CRCW04021242FKEYE3	Vishay Dale[3]	12.4k 1% 0402 1/16W Resistor	1
R4	CRCW040210R0FKEYE3	Vishay Dale[3]	10 1% 0402 1/16W Resistor	1
U1	**MIC4722YML**	**Micrel[5]**	**2.7MHz 3A Buck Regulator**	**1**

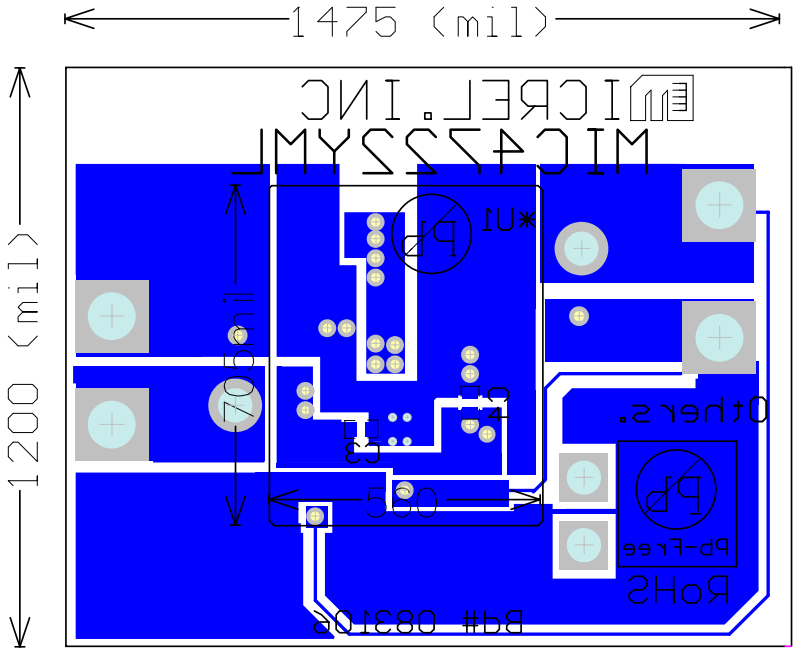
Notes:

1. TDK: www.tdk.com
2. Murata: www.murata.com
3. Vishay: www.vishay.com
4. Wurth Elektronik: www.we-online.de
5. **Micrel, Inc.: www.micrel.com**

Printed Circuit Board Layouts



Top Layer



Bottom Layer

MICREL, INC. 2180 FORTUNE DRIVE SAN JOSE, CA 95131 USA
TEL +1 (408) 944-0800 FAX +1 (408) 474-1000 WEB http:/www.micrel.com