



# MIC4742YML Evaluation Board

## Dual 2A Buck Regulator

### General Description

The Micrel MIC4742 is a high efficiency dual PWM buck (step-down) regulator that provides up to 2A of output current for each channel. The MIC4742 operates at 2MHz and has proprietary internal compensation that allows a closed loop bandwidth of over 200kHz. The low on resistance internal P-Channel MOSFET of the MIC4742 allows efficiencies up to 92%, reduces external component count and eliminates the need for an expensive external current sense resistor. The MIC4742 operates from a 2.9V to 5.5V input and its output is adjustable down to 0.6V. The devices can operate with a maximum duty cycle of 100% for use in low-dropout applications.

### Requirements

The MIC4742 evaluation board requires an input power source that is able to deliver greater than 2.9V at over 4A. The output load can either be an active or passive load.

### 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 MIC4742 evaluation board is 5.5V. Exceeding 6V on the input could damage the device.

### Getting Started

- 1. Connect an external supply to VIN terminal.** Apply desired input voltage to the  $V_{IN}$  and ground terminals of the evaluation board, paying careful attention to polarity and supply voltage ( $2.9V < V_{IN} < 5.5V$ ). 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  $V_{OUT1}/V_{OUT2}$  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  $V_{OUT1}/V_{OUT2}$  terminal. Ensure the output voltage is monitored at the  $V_{OUT1}/V_{OUT2}$  terminal. The default  $V_{OUT1}$  is set to 1.8V and the default  $V_{OUT2}$  is set to 1.2V. This can be adjusted by changing the feedback resistors. See "Output Voltage."

- 3. Enable the MIC4742.** The enable pins are connected to pull up resistors. Both outputs of the MIC4742 turn on when  $V_{IN}$  exceeds the UVLO threshold at the  $V_{IN}$  pin. Each output of the MIC4742 may be turned off by shorting the enable pin to ground or bringing the enable pin below the enable threshold. An external connection on the board provides easy access to the enable pin.

### Output Voltage

The output voltages on the MIC4742 evaluation board are adjustable. The output voltage is controlled by the feedback resistors ( $R_{11}$  and  $R_{12}$  for  $V_{OUT1}$ ,  $R_{21}$  and  $R_{22}$  for  $V_{OUT2}$ ) and can be calculated as follows:

$$V_{OUT1} = V_{REF} \times \left(1 + \frac{R_{11}}{R_{12}}\right)$$

$$V_{OUT2} = V_{REF} \times \left(1 + \frac{R_{21}}{R_{22}}\right)$$

Where  $V_{REF} = 0.6V$ .

The evaluation board is preset at 1.8V for  $V_{OUT1}$  and 1.2V for  $V_{OUT2}$ , but can easily be modified by removing  $R_{12}$  or  $R_{22}$  and replacing them with the value that yields the desired output voltage.

$$R_{12} = \frac{R_{11} \times V_{REF}}{V_{OUT} - V_{REF}}$$

$$R_{22} = \frac{R_{21} \times V_{REF}}{V_{OUT} - V_{REF}}$$

For  $V_{REF} = 0.6V$ , this reduces to:

$$R_{12} = \frac{R_{11} \times 0.6V}{V_{OUT} - 0.6V}$$

$$R_{22} = \frac{R_{21} \times 0.6V}{V_{OUT} - 0.6V}$$

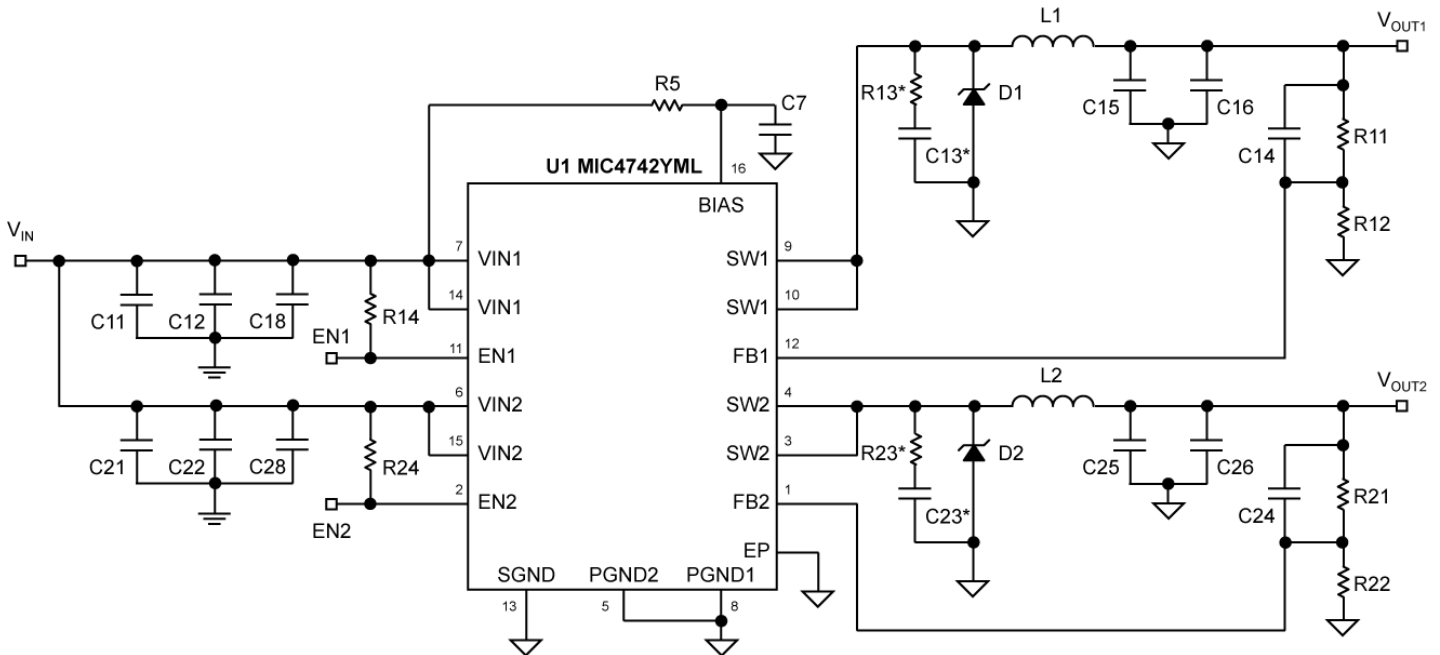
### Ordering Information

Part Number	Description	Package
MIC4742YML	IC	16-Pin EPAD-MLF <sup>®</sup>
MIC4742YML EV	Evaluation Board	16-Pin EPAD-MLF <sup>®</sup>

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## Evaluation Board Schematic



## Bill of Materials

Item	Part Number	Manufacturer	Description	Qty
C11,C12 C21,C22	GRM188R60J106M	Murata <sup>(1)</sup>	10µF Ceramic Capacitor, X5R, Size 0603, 6.3V	4
	C1608X5R0J106M	TDK <sup>(2)</sup>		
	06036D106KMAT2A	AVX <sup>(3)</sup>		
C13*,C23*	VJ0603A681KXXCW	Vishay <sup>(4)</sup>	680pF Ceramic Capacitor, NPO, Size 0603, 6.3V	2
C14,C24	VJ0603A820KXXCW	Vishay <sup>(4)</sup>	82pF Ceramic Capacitor, NPO Size 0603, 10V	2
C15,C25	GRM188R60J475K	Murata <sup>(1)</sup>	4.7µF Ceramic Capacitor, X5R, Size 0603, 6.3V	2
	C1608 X5R0J475M	TDK <sup>(2)</sup>		
	0603D475MAT	AVX <sup>(3)</sup>		
C16,C26,C7 C18,C28	VJ0603Y104KXXAT	Vishay <sup>(4)</sup>	0.1µF Ceramic Capacitor, X7R, Size 0603, 25V	5
D1,D2	SS2P3L	Vishay <sup>(4)</sup>	2A Schottky 30V	2
	SSA23L	Vishay <sup>(4)</sup>		
	B230A	Diodes <sup>(5)</sup>		
L1,L2	IHLP2525AH-01 1R0	Vishay <sup>(4)</sup>	1µH Inductor 17.5mΩ 6.86mm(L) x 6.47mm(W) x 1.8mm(H)	2
	RLF7030-1R0 N	TDK <sup>(2)</sup>	1µH Inductor 8.8mΩ 7.3mm(L) x 6.8mm(W) x 3.2mm(H)	
	HCP0703-1R0	COOPER <sup>(6)</sup>	1µH Inductor 10mΩ 7.3mm(L) x 7.0mm(W) x 3.0mm(H)	
R11,R12	CRCW060310K0FKXX	Vishay <sup>(4)</sup>	10kΩ, 1%, Size 0603 Resistor	2
R12,R22	CRCW06033K16FKXX	Vishay <sup>(4)</sup>	3.16kΩ, 1%, Size 0603 Resistor For 2.5V <sub>OUT</sub>	2
	CRCW06034K99FKXX		4.99kΩ, 1%, Size 0603 Resistor For 1.8 V <sub>OUT</sub>	
	CRCW06036K65FKXX		6.65kΩ, 1%, Size 0603 Resistor For 1.5 V <sub>OUT</sub>	
	CRCW060310K0FKXX		10kΩ, 1%, Size 0603 Resistor For 1.2 V <sub>OUT</sub>	
	CRCW060315K0FKXX		15kΩ, 1%, Size 0603 Resistor For 1.0 V <sub>OUT</sub>	

**Bill of Materials (continued)**

Item	Part Number	Manufacturer	Description	Qty
R13*, R23*	CRCW06032R70FKXX	Vishay <sup>(4)</sup>	2.7Ω, 1%, Size 0603 Resistor	2
R14, R24	CRCW060349K9FKXX	Vishay <sup>(4)</sup>	49.9kΩ, 1%, Size 0603 Resistor	2
R5	CRCW060310R0FKXX	Vishay <sup>(4)</sup>	10Ω, 1%, Size 0603 Resistor	1
<b>U1</b>	<b>MIC4742YML</b>	<b>Micrel, Inc.<sup>(7)</sup></b>	<b>Dual 2A 2MHz Integrated Switch Buck Regulator</b>	<b>1</b>

**Notes:**

1. Murata: [www.murata.com](http://www.murata.com)
2. TDK: [www.tdk.com](http://www.tdk.com)
3. AVX: [www.avx.com](http://www.avx.com)
4. Vishay: [www.vishay.com](http://www.vishay.com)
5. Cooper: [www.cooperbusmann.com](http://www.cooperbusmann.com)
6. Diode: [www.diodes.com](http://www.diodes.com)
7. Micrel, Inc: [www.micrel.com](http://www.micrel.com)

\* only for ultra-low noise applications.

### Printed Circuit Board Layouts

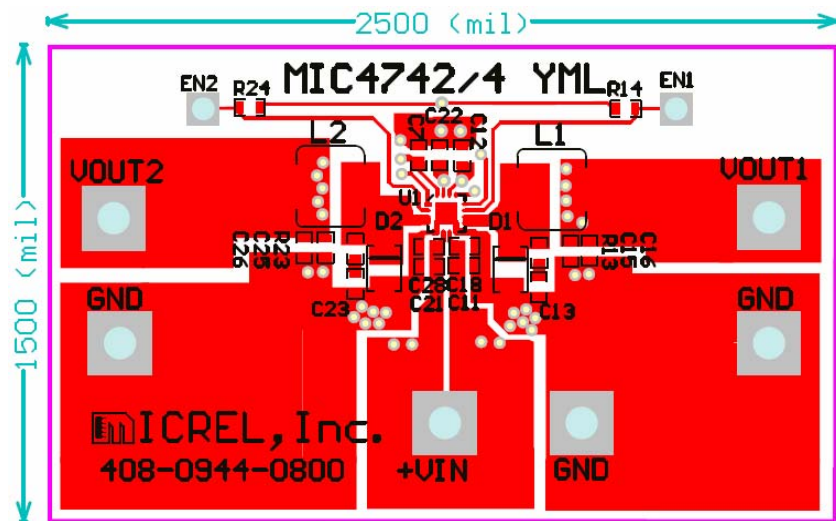


Figure 1a. Top Layer

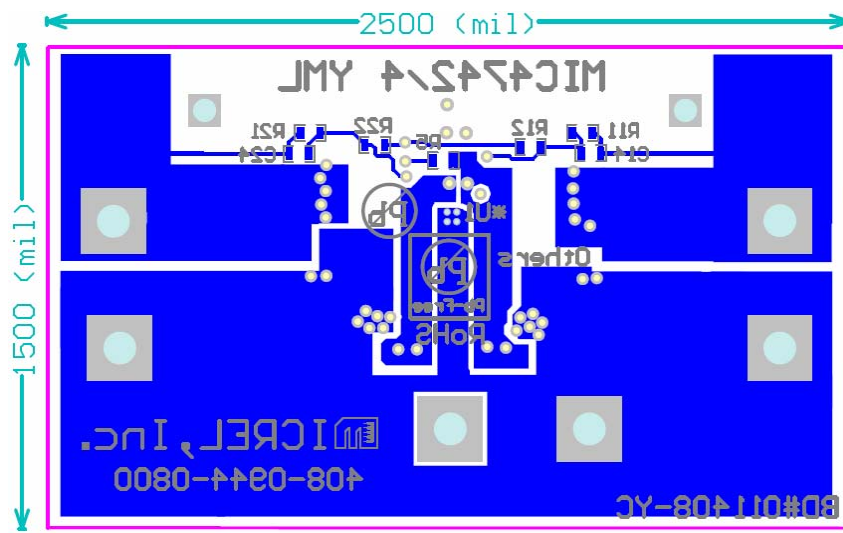


Figure 1b. Bottom Layer

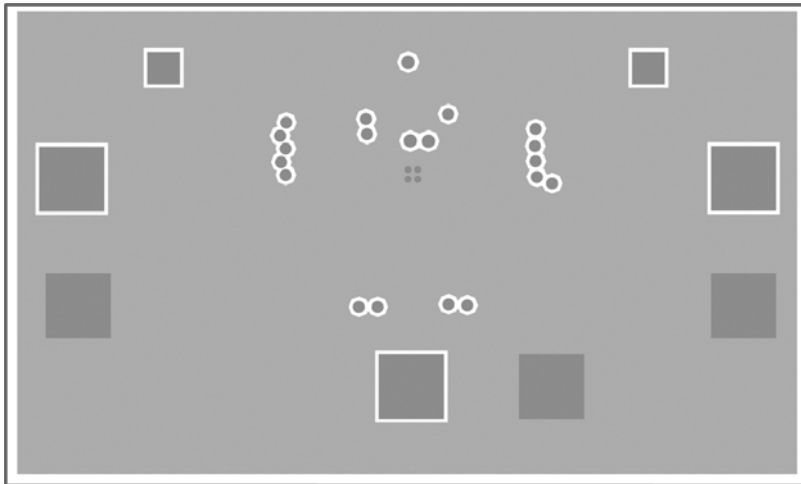


Figure 1c. Mid-Layer 1

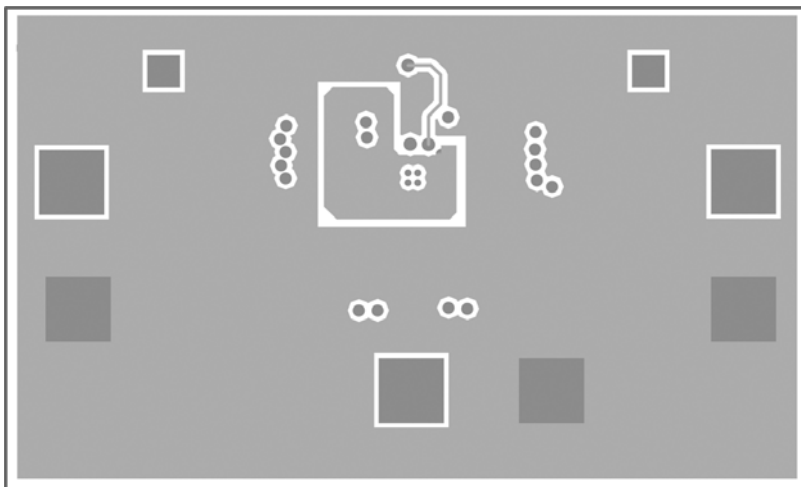


Figure 1d. Mid-Layer 2

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