



MIC2009YM6/MIC2009YML Evaluation Boards

MIC2009 Current Limiting Power Distribution Switch

General Description

The MIC2009 evaluation boards provide a platform to evaluate the MIC2009YM6 and MIC2009YML high-side current-limiting power switches.

The MIC2009YM6 and MIC2009YML differ only in their package type, with the MIC2009YM6 packaged in a 6-pin SOT-23 and the MIC2009YML in a 6-pin 2mm x 2mm MLF[®]. The MLF package is smaller and has a lower thermal resistance than the SOT package. Refer to the [MIC20XX Family datasheet](#) for details. Datasheets and support documentation are available on the Micrel web site: www.micrel.com.

Evaluation Board Description

Control IC MIC2009
Topology..... High-Side Current Limiting Power Switch
 V_{IN} Supply Voltage Range..... 2.7V to 5.5V
Maximum Fault Pin Voltage V_{IN}
Maximum Enable Pin Voltage V_{IN}

Requirements

The evaluation board requires:

- A 2.7V to 5.5V power supply

Features

- Multiple test points for the enable input EN, fault output FLT/, V_{IN} and V_{OUT} .

Related Documentation

- [MIC20XX Family datasheet](#)

Precautions

The evaluation boards do not have reverse polarity protection. Do not apply a negative voltage (with respect to GND) to VIN, EN, FAULT/, FLG or VOUT.

Getting Started

1. **V_{IN} Supply.** Connect an external supply voltage of 2.7V to 5.5V across the VIN and GND terminals.
2. **Enable Signal.** The MIC2009 IC's have an active high enable input (EN). The EN input is connected to VIN through 10k Ω resistor (R4). When power is applied to VIN, the output is enabled. Two test points, J2 and J7, both labeled EN, allow external control using a logic signal. The enable input thresholds are $\leq 0.5V$ for a logic low and $\geq 1.5V$ for logic high. Do not use a logic voltage that exceeds V_{IN} .
3. **Monitor Output.** Monitor the output voltage with a scope probe or DVM connected across the VOUT and GND terminals.
4. **Monitor FAULT/.** Open Drain output FLT/ pulls low during an output over-current or thermal shutdown condition. The FLT/ output is connected to VIN through 10k Ω resistor R2. Monitor the fault output at jumper J3, labeled FLG on the YM6 board and FLT/ on the YML board.

Ordering Information

Part Number	Description
MIC2009YM6 EV	Evaluation Board for the MIC2009YM6
MIC2009YML EV	Evaluation Board for the MIC2009YML

Applications Information

For convenience there are a number of un-stuffed component footprints strategically placed to allow easy modification of the standard circuit. These positions are labeled NF on the schematics.

All power and signal connections are available on the 20-pin, 0.1 inch pitch edge connector. Additionally, the edge connector provides Kelvin sense connections for V_{IN} , V_{OUT} and GND.

Current Limit

Resistor R1 sets the output current limit.

Table presents a list of resistor values and their associated current limits. The default value for R1 is 165Ω, for a current limit of 1.5A. Current limit values are accurate to about ±20% over temperature. Refer to the [MIC20XX Family datasheet](#) for full details about the current limit feature.

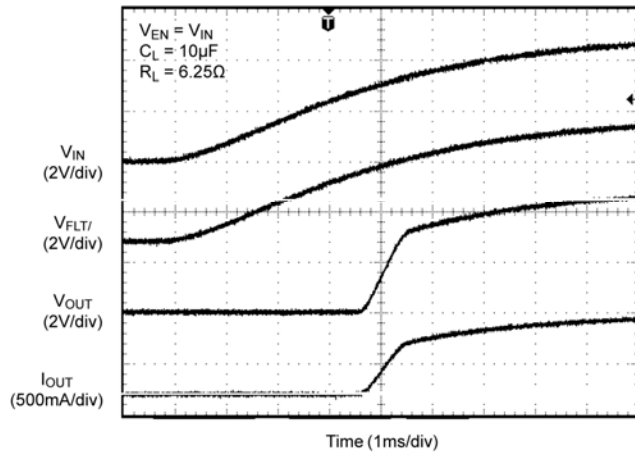
R1	I _{LIMIT_TYPICAL}	I _{LIMIT_MIN}	I _{LIMIT_MAX}
1125Ω	0.2A	0.127A	0.267A
765Ω	0.3A	0.202A	0.390A
582Ω	0.4A	0.281A	0.510A
470Ω	0.5A	0.361A	0.629A
395Ω	0.6A	0.443A	0.746A
341Ω	0.7A	0.526A	0.861A
300Ω	0.8A	0.610A	0.976A
268Ω	0.9A	0.695A	1.089A
243Ω	1A	0.781A	1.202A
222Ω	1.1A	0.868A	1.314A
204Ω	1.2A	0.956A	1.426A
189Ω	1.3A	1.044A	1.537A
176Ω	1.4A	1.133A	1.647A
165Ω*	1.5A	1.222A	1.757A

*Default

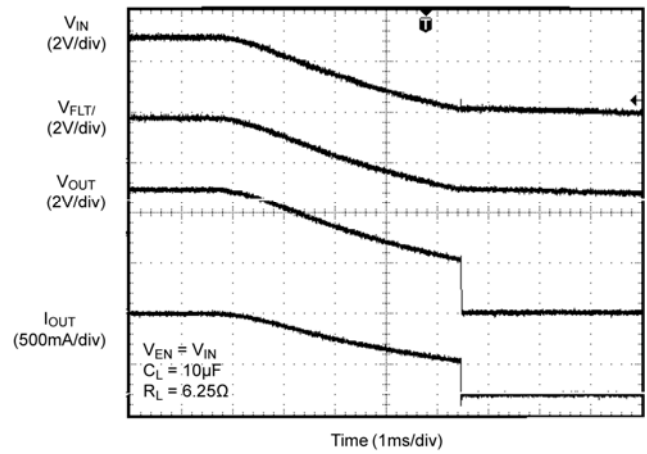
Table 1. I_{LIMIT} vs. R1

Functional Characteristics

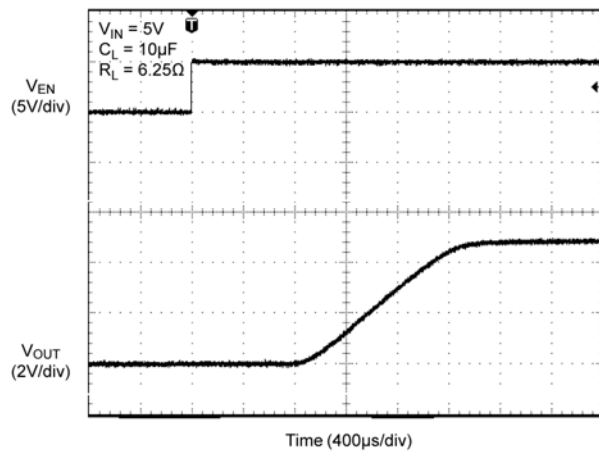
V_{IN} Soft Turn-On



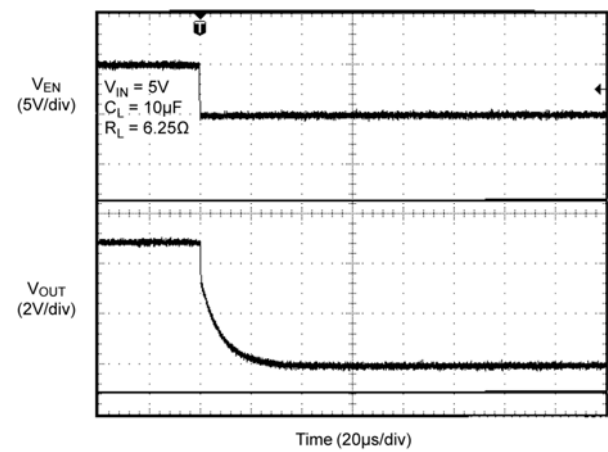
Turn-Off V_{IN}



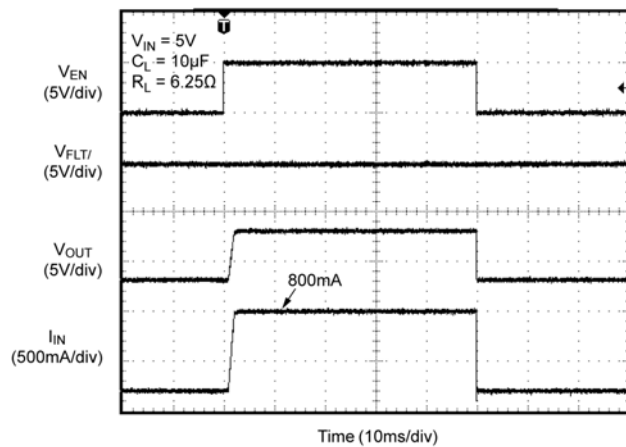
Enable Turn-On Delay and Rise Time



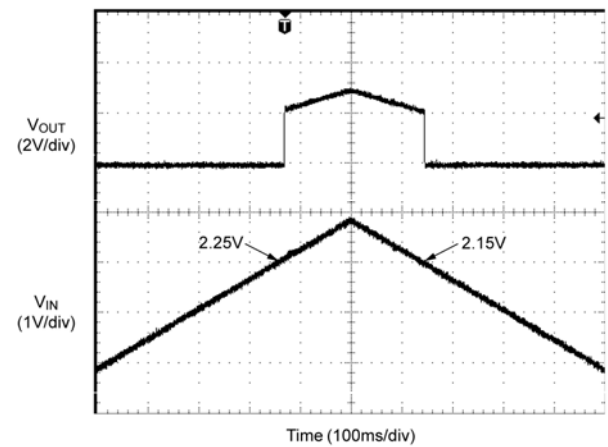
Enable Turn-Off Delay and Fall Time



Enable Turn-On/Turn-Off

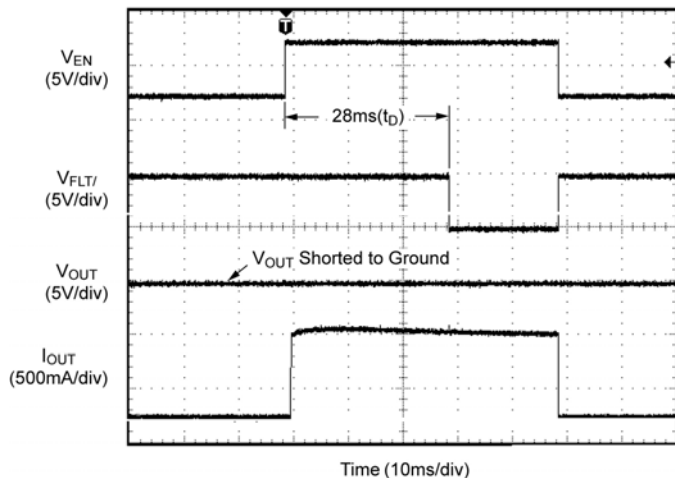


UVLO

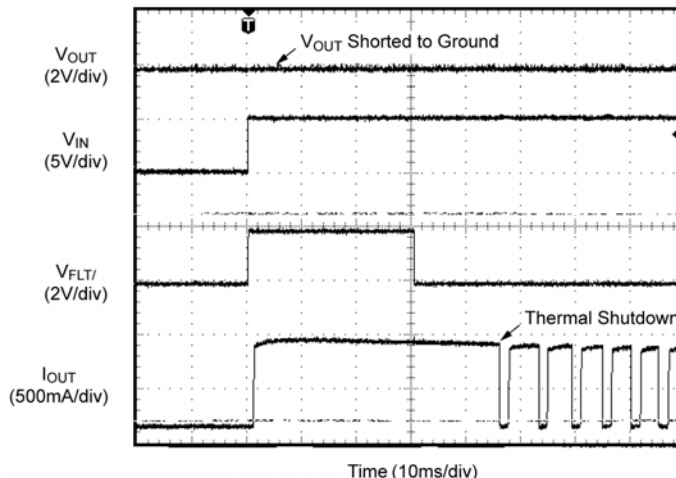


Functional Characteristics (Continued)

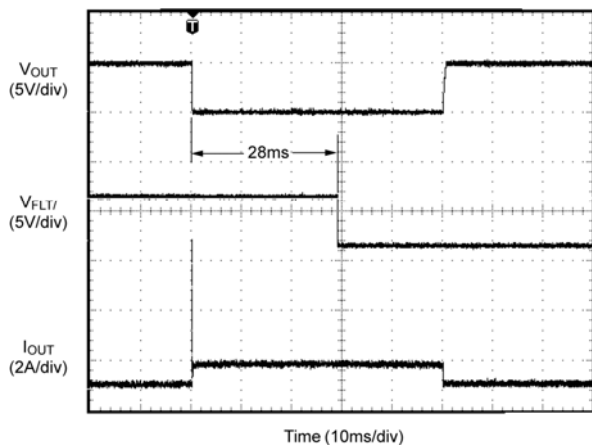
Enabled into Short



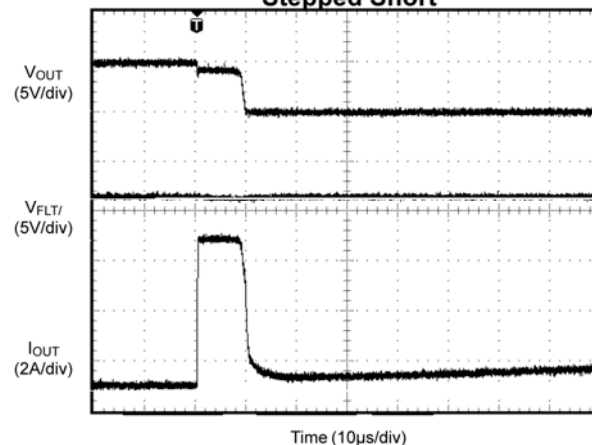
Power Up into Short Circuit



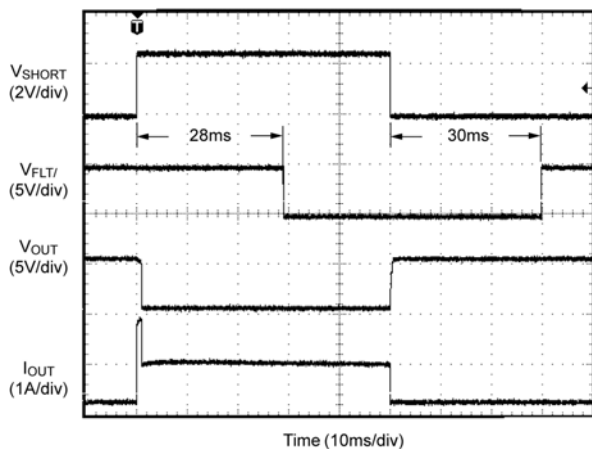
Current Limit Response, Stepped Short



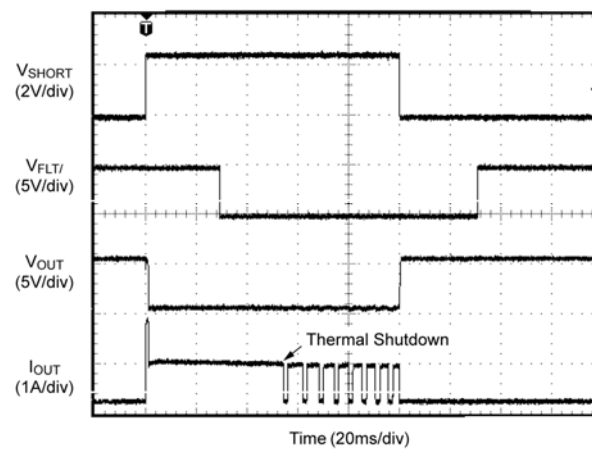
Zoom Current Limit Response Time, Stepped Short



Output Recovery from Short Circuit

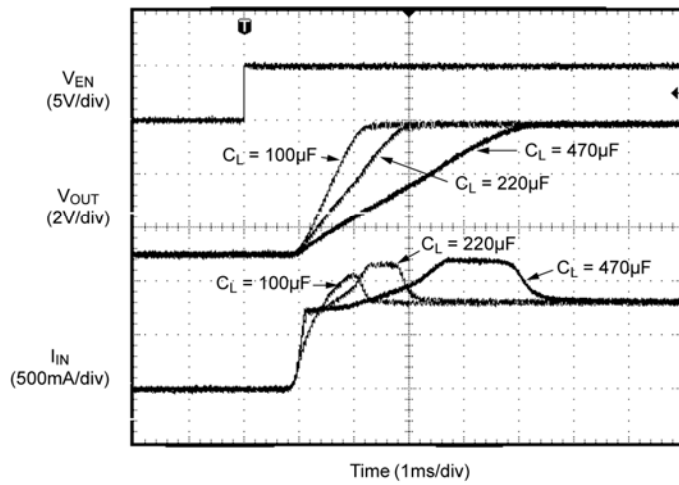


Output Recovery from Thermal Shutdown



Functional Characteristics (Continued)

Current Inrush Current Response



Evaluation Board Schematics

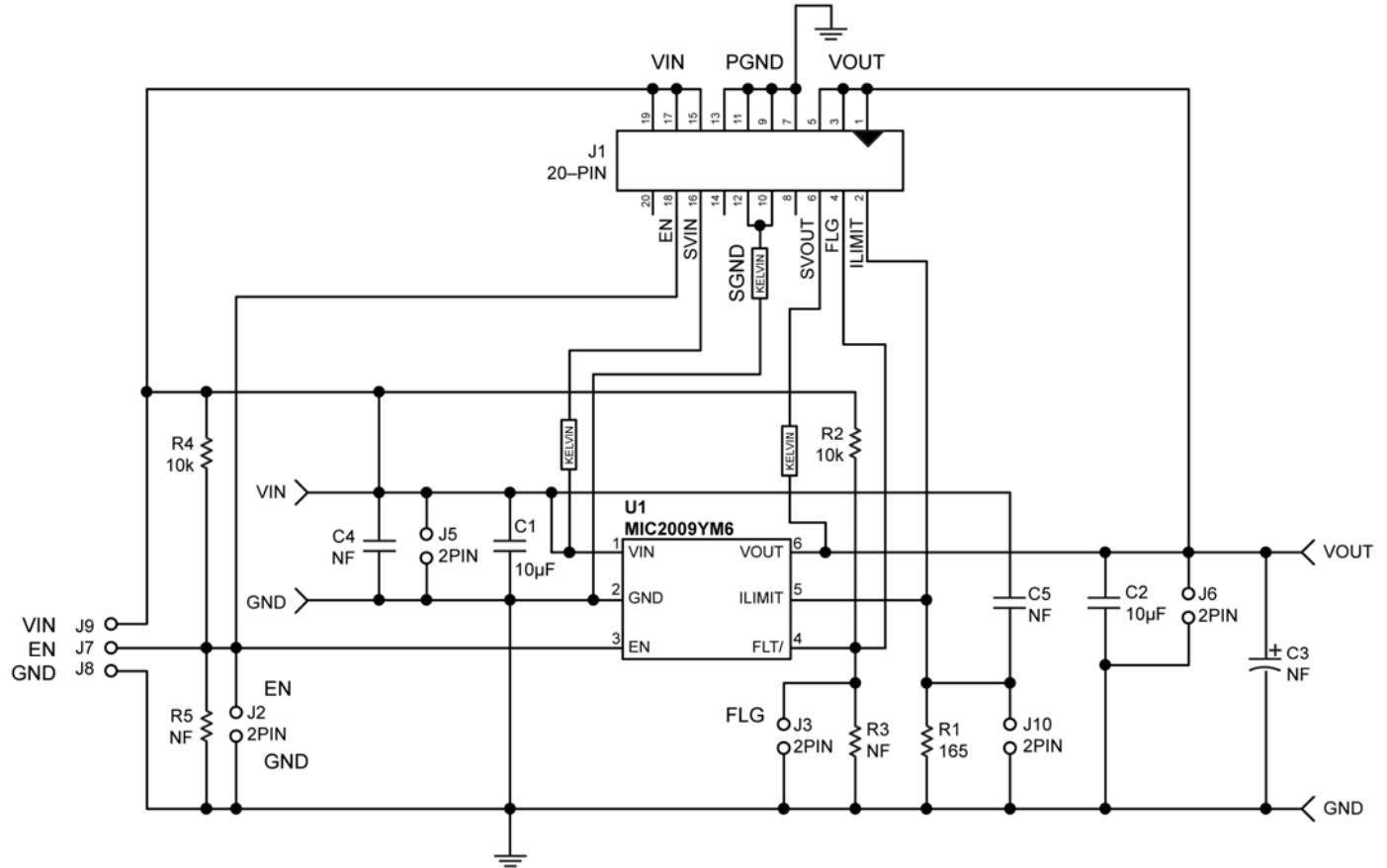


Figure 1. MIC2009YM6 EV Evaluation Board Schematic
(J1 is the factory test connector)

Evaluation Board Schematics (Continued)

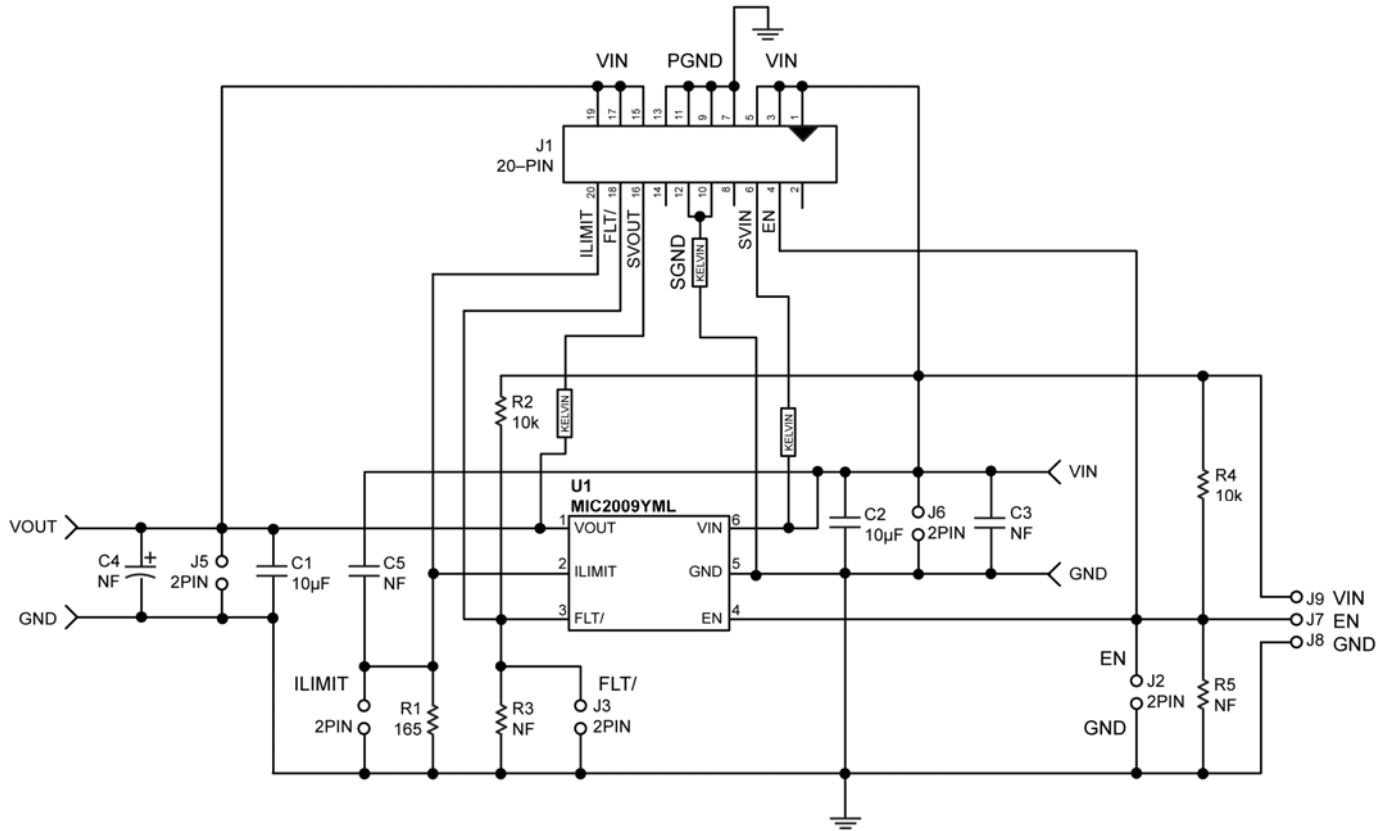


Figure 2. MIC2009YML EV Evaluation Board Schematic
(J1 is the factory test connector)

Bill of Materials

Item	Part Number	Manufacturer	Description	Qty
C1	0805ZD106MAT2A	AVX ⁽¹⁾	10uF/10V, X5R, 0805	1
C2	0805ZD106MAT2A	AVX ⁽¹⁾	10uF/10V, X5R, 0805	1
R1	CRCW0603165RFKEA	Vishay Dale ⁽²⁾	165Ω, 1%, 1/10W, 0603	1
R2	CRCW060310K0FKEA	Vishay Dale ⁽²⁾	10K, 1%, 1/10W, 0603	1
R4	CRCW0603165RFKEA	Vishay Dale ⁽²⁾	165Ω, 1%, 1/10W, 0603	1
U1	MIC2009YM6	Micrel, Inc. ⁽³⁾	Current Limiting Power Distribution Switch, 1.5A with Adjustable Current Limit in SOT23-6	1
	MIC2009YML		Current Limiting Power Distribution Switch, 1.5A with Adjustable Current Limit in 6-pin MLF [®]	

Notes:

1. AVX: www.avx.com.
2. Vishay: www.vishay.com.
3. Micrel, Inc.: www.micrel.com.

PCB Layout Recommendations

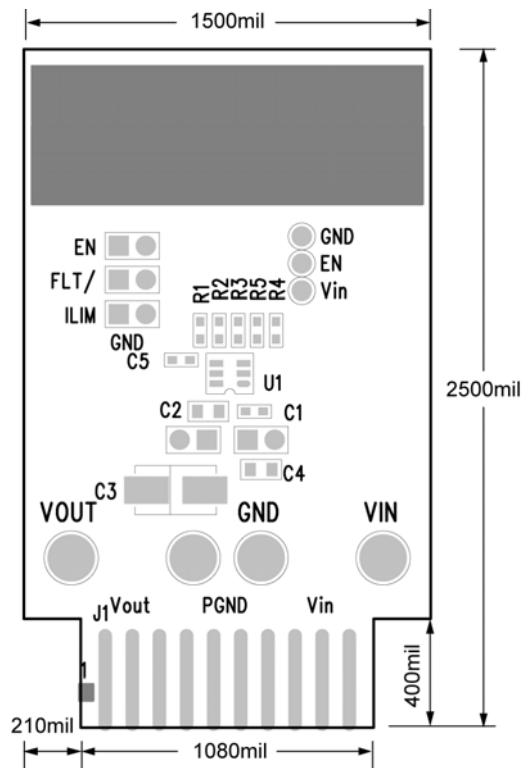


Figure 3. MIC2009YM6 EV Top Layer Silk Screen

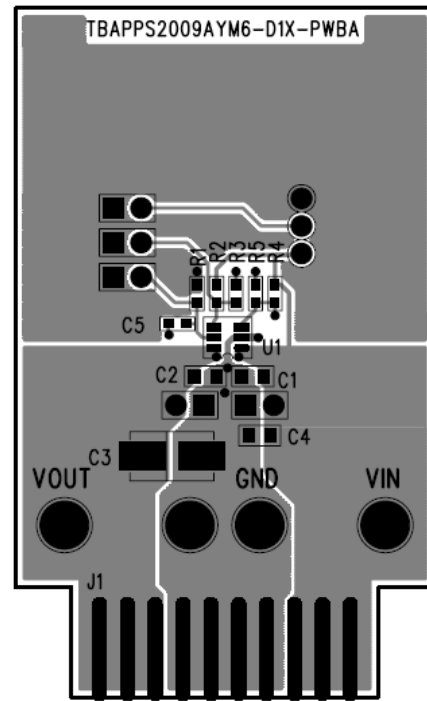


Figure 4. MIC2009YM6 EV Top Layer Traces

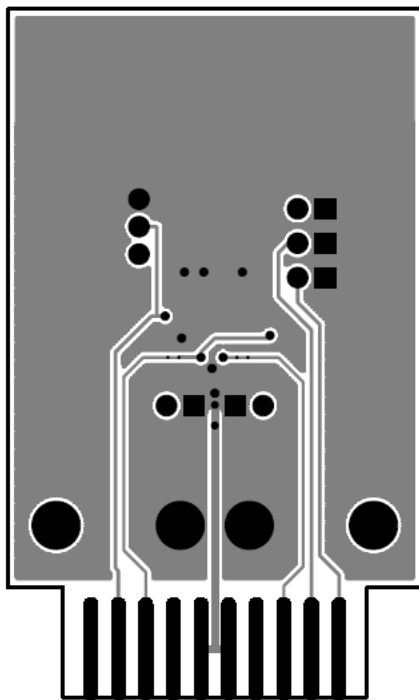


Figure 5. MIC2009YM6 EV Bottom Layer Traces

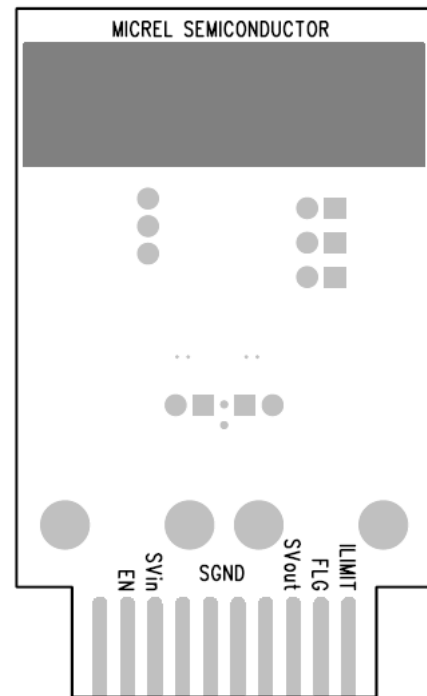


Figure 6. MIC2009YM6 EV Bottom Layer Silk Screen

PCB Layout Recommendations (Continued)

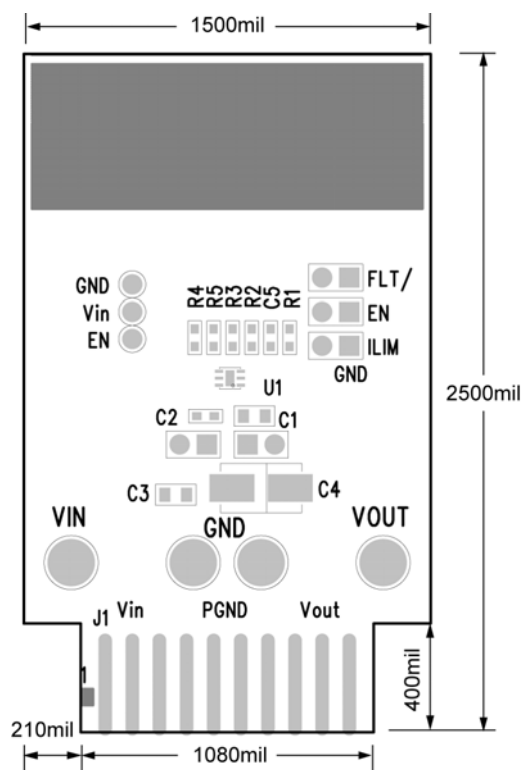


Figure 7. MIC2009YML EV Top Layer Silk Screen

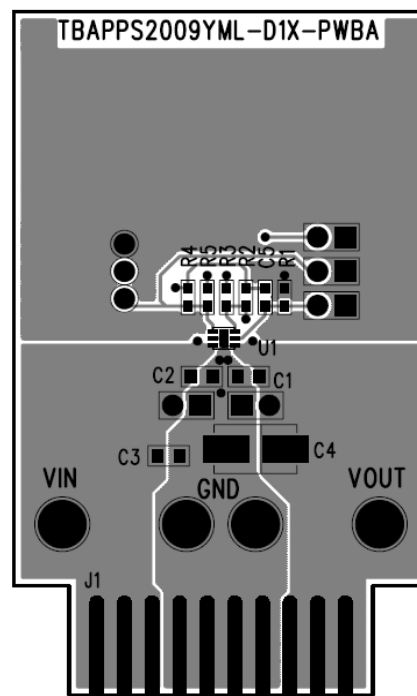


Figure 8. : MIC2009YML EV Top Layer Traces

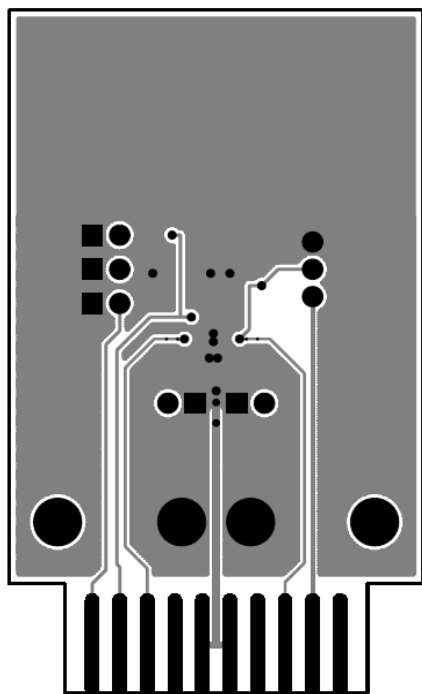


Figure 9. MIC2009YML EV Bottom Layer Traces

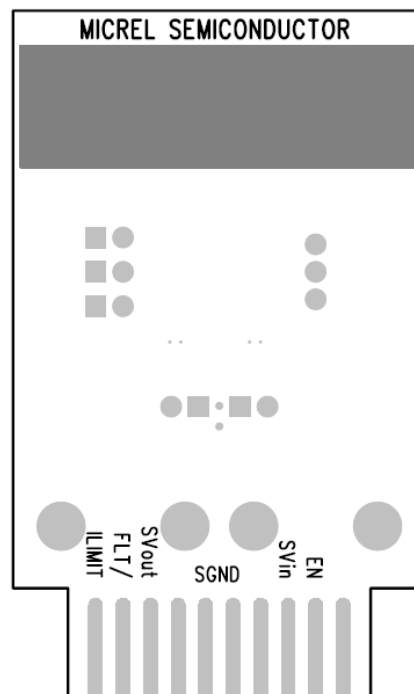


Figure 10. MIC2009YML EV Bottom Layer Silk Screen

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