



MIC2290 (APD) Evaluation Board

48V Avalanche Photo Diode (APD) Bias Circuit

General Description

The Micrel MIC2290 is configured as a 48V (or less) bias circuit for avalanche photo diodes. The MIC2290 is a 1.2MHz step-up switching regulator with an internal Schottky diode. The MIC2290 is available in a 2mm x 2mm MLF[®] package. High power densities, in a very small size, are achieved using its internal 34V/500mA power switch.

Requirements

The MIC2290 APD evaluation board requires an input power source that is able to deliver greater than 100mA at 3.3V.

Precautions

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

The MIC2290 APD evaluation board is tailored for the typical 3.3V and 5V input voltages encountered with 48V (or less) avalanche photo diode applications. The evaluation board should not exceed 6.3V on the input unless the input capacitor is replaced with a higher rated input capacitor.

Getting Started

1. **Connect an external supply to V_{IN} .** Apply desired input voltage to the V_{IN} (J1) and ground (J2) terminals of the evaluation board, paying careful attention to polarity and supply voltage ($2.5V \leq V_{IN} \leq 6.3V$). 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 V_{IN} terminal.

2. **Connect the load to the V_{OUT} (J4) and ground (J5) terminals.** The load can be either passive (resistor) or active (electronic load). An ammeter can be placed between the load and the V_{OUT} terminal. The default output voltage is around 49V, when the V_{DAC} (J6) terminal is grounded. The output voltage can be adjusted by increasing the voltage on the V_{DAC} terminal.
3. **Enabling the MIC2290.** Apply a 1.5V or greater voltage to the enable (J3) terminal.

Output Voltage

The output voltage on the MIC2290 APD evaluation board is adjustable. To set the output voltage, use the equations below to calculate the voltage that should be placed on the V_{DAC} terminal:

$$V_{OUT} \text{ (J4 terminal)} = [(V_{FB} * R1) * (1/R1 + 1/R2 + 1/R3)] - [(V_{DAC} * R1) * (1/R3)]$$

$$V_{DAC} \text{ (J6 terminal)} = [(V_{FB} * R3) * (1/R1 + 1/R2 + 1/R3)] - [(V_{OUT} * (R3/R1))]$$

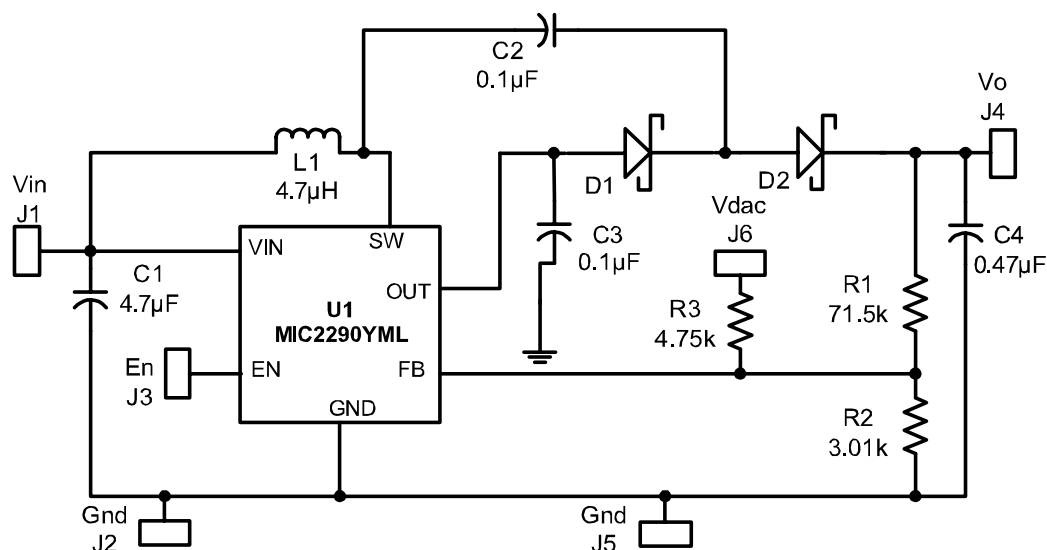
V_{FB} = Feedback Voltage (1.24V Typical)

V_{OUT} = Output Voltage

$R1 = 71.5k\Omega$

$R2 = 3.01k\Omega$

$R3 = 4.75k\Omega$



Bill of Material

MIC2290 (APD) Evaluation Board

Ref Des	Part Number	Description	Manufacturer
C1	GRM188R60J475KE19D	4.7µF 6.3V Ceramic Capacitor, Size 0603	Murata
	C1608X5R0J475M		TDK
C2, C3	GRM188R71H104KA93D	0.1µF 50V Ceramic Capacitor, Size 0603	Murata
	VJ0603Y104KXACW1BC		Vishay
C4	GRM21BR71H474K	0.47µF 50V Ceramic Capacitor, Size 0805	Murata
	C2012X7R1H474M		TDK
L1	LBMF1608T4R7M	4.7µH 100mA Inductor, Size 0603	Taiyo-Yuden
	GLF1608T4R7M	4.7µH 115mA Inductor, Size 0603	TDK
D1, D2	SD101BWS	200mW, 50V Schottky Diode	Diodes, Inc.
R1	CRCW06037152FKEYE3	71.5kΩ Resistor, Size 0603	Vishay
R2	CRCW06033011FKEYE3	3.01kΩ Resistor, Size 0603	Vishay
R3	CRCW06034751FKEYE3	4.75kΩ Resistor, Size 0603	Vishay
U1	MIC2290YML	1.2MHz PWM Step-Up DC/DC Converter	Micrel, Inc.

Notes:

1. Murata: www.murata.com
2. TDK: www.tdk.com
3. Vishay: www.vishay.com
4. Taiyo-Yuden: www.t-yuden.com
5. Diodes, Inc.: www.diodes.com
6. Micrel Semiconductor: www.micrel.com

Printed Circuit Board Layouts

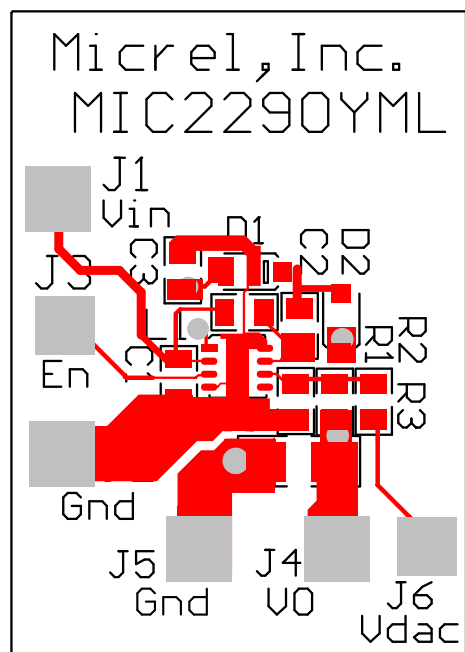


Figure 1. Top Silkscreen

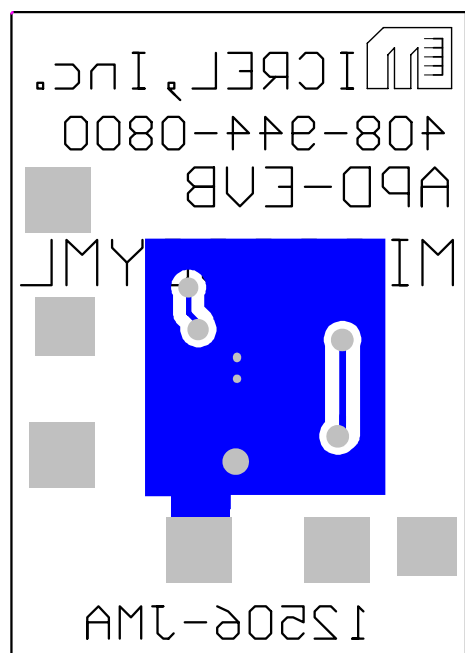


Figure 2. Bottom Silkscreen

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