



MIC5281 Evaluation Board

120V_{IN}, 25mA, Ultra-Low I_Q,
High-PSRR LDOs

General Description

The MIC5281 is a high-performance, low-dropout linear regulator featuring a very-low noise output and a very-wide input voltage range (6V to 120V). The MIC5281 supplies an output current of up to 25mA and is offered in both fixed output voltage (3.3V/5.0V) and adjustable output voltage (1.27V to 5.5V) options.

Ideal for high input voltage applications such as industrial and telecom, the MIC5281 offers $\pm 3\%$ initial accuracy, extremely-high power supply rejection ratio (>90db) and ultra-low quiescent current (6 μ A typical). The MIC5281 is optimized for line transient response, which makes it ideal for applications operating in harsh environments.

The MIC5281 operates over the -40°C to $+125^{\circ}\text{C}$ temperature range and is available in the lead-free, RoHS-compliant 8-pin ePad MSOP and 8-pin MSOP packages.

Data sheets and support documentation can be found on Micrel's web site at: www.micrel.com.

Requirements

The MIC5281 evaluation board requires a single power supply to provide V_{IN}. The V_{IN} power supply must be able to deliver a minimum of 6V more than 25mA capability. The output load can either be an active or passive load.

Precautions

The evaluation board does not have reverse polarity protection, thus applying a negative voltage to the V_{IN} terminal may damage the device. In addition, the maximum V_{IN} operating voltage of the MIC5281 evaluation board is 120V. Exceeding 120V on V_{IN} could permanently damage the device.

Getting Started

1. **Connect an external supply to V_{IN} terminal.** Apply desired input voltage to the V_{IN} and ground terminals of the evaluation board, paying careful attention to polarity and supply voltage. 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 (resistive) or active (as in an electronic load). An ammeter can be placed between the load and the V_{OUT} terminal. Ensure that the output voltage is monitored at the V_{OUT} terminal. The V_{OUT} can be adjusted by changing the feedback resistors. See "Output Voltage" section.
3. **Enable the MIC5281.** The EN pin is provided on the evaluation board with a 10k pull-up resistor. The output of the MIC5281 may be turned off by shorting the EN pin to ground. An external connection on the board provides easy access to the enable pin. Removing the pull-up resistor and leaving the EN pin floating will cause the regulator to operate in an indeterminate state.

Ordering Information

Part Number	Description
MIC5281YMME EV	Evaluation board featuring the 25mA MIC5281YMME with adjustable output

Applications Information

Output Voltage

The output voltage on the MIC5281YMME evaluation board is adjustable. The output is set by connecting one of the feedback resistors into the circuit via a jumper short. The output voltage can be programmed to 1.8V, 2.5V, 3.3V, or 5V. The output voltage for the MIC5281 evaluation board is set at the factory for a 5V output. In general, the output voltage can be calculated using the following equation:

$$V_{\text{OUT}} = V_{\text{REF}} \times \left(1 + \frac{R_1}{R_{\text{FB}}} \right)$$

where $V_{\text{REF}} = 1.27\text{V}$, R_1 is the combination of R1 and R2 in the EVB circuit schematic, and R_{FB} is the feedback resistor that will be connected from FB to ground amongst R3, R4, R5, and R6 in the circuit schematic.

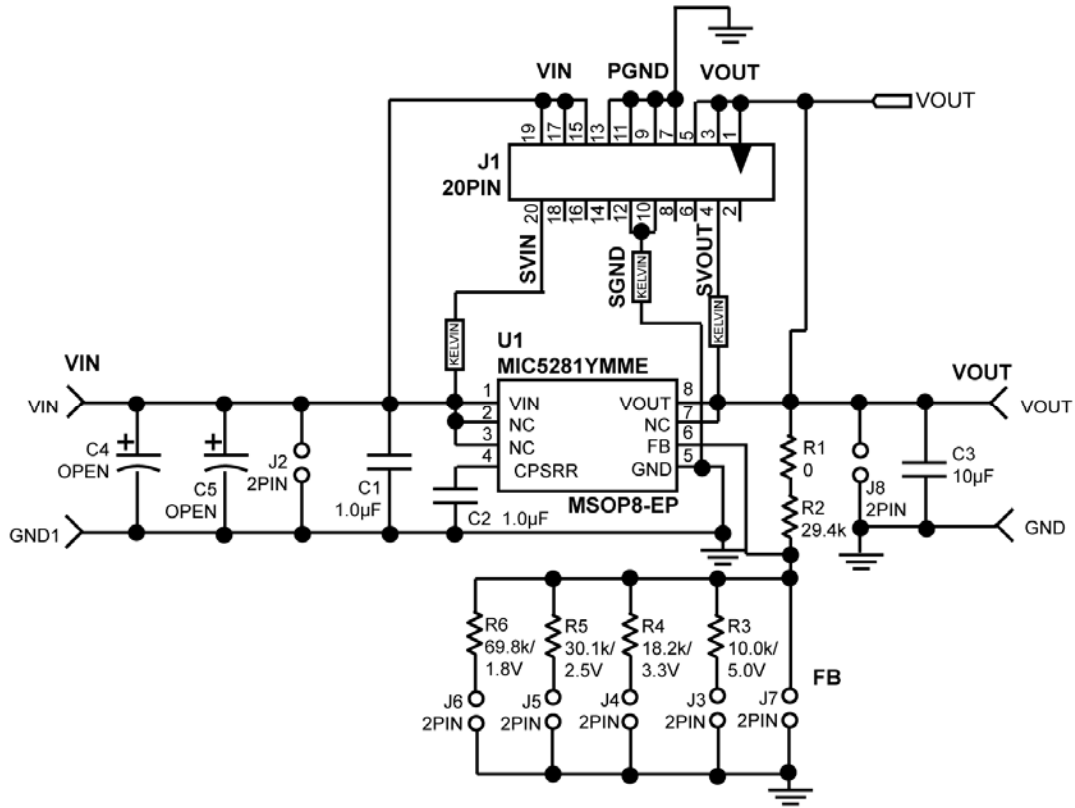
The output voltage can easily be modified by removing R1 and R_{FB} and replacing them with the values that yield the desired output voltage. Once R1 is selected, R_{FB} can be calculated using:

$$R_{\text{FB}} = \frac{R_1 \times V_{\text{REF}}}{V_{\text{OUT}} - V_{\text{REF}}}$$

For $V_{\text{REF}} = 1.27\text{V}$:

$$R_{\text{FB}} = \frac{R_1 \times 1.27\text{V}}{V_{\text{OUT}} - 1.27\text{V}}$$

Evaluation Board Schematic



MIC5281YMME Evaluation Board
(J1 is for test purposes only)

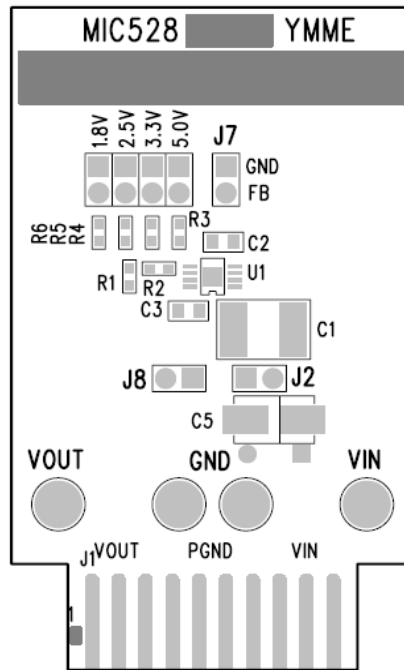
Bill of Materials

Item	Part Number	Manufacturer	Description	Qty.
C1	GRM55DR72E105KW01L	Murata ⁽¹⁾	1 μ F/250V Ceramic Capacitor, X7R, 20%	1
	C5750X7R2E105M	TDK ⁽²⁾		
	2220PC105MAT1A	AVX ⁽³⁾		
C2	GRM21BR71E104KA01L	Murata	0.1 μ F/25V Ceramic Capacitor, X7R, 0805	1
	C2012X7R1E104K	TDK		
	08053C104KAT2A	AVX		
C3	GRM21BR61A106KE19L	Murata	10 μ F/10V Ceramic Capacitor, X5R, 0805, 10%	1
	C2012X7R1A106K	TDK		
	0805ZD106KAT2A	AVX		
C4	—	—	Large value electrolytic capacitor, 250V (minimum)	DNP
C5	—	—	Minimum 250V Ceramic Capacitor (any value)	DNP
R1	CRCW060300R0F	Vishay ⁽⁴⁾	0 Ω Film Resistor, Size 0603, 1%	1
R2	CRCW06032942F	Vishay	29.4k Ω Film Resistor, Size 0603, 1%	1
R3	CRCW06031002F	Vishay	10.0k Ω Film Resistor, Size 0603, 1%	1
R4	CRCW06031822F	Vishay	18.2k Ω Film Resistor, Size 0603, 1%	1
R5	CRCW06033012F	Vishay	30.1k Ω Film Resistor, Size 0603, 1%	1
R6	CRCW06036982F	Vishay	69.8k Ω Film Resistor, Size 0603, 1%	1
U1	MIC5281YMME	Micrel, Inc. ⁽⁵⁾	120V _{IN} , 25mA, Ultra-Low I _Q , High-PSRR LDOs	1

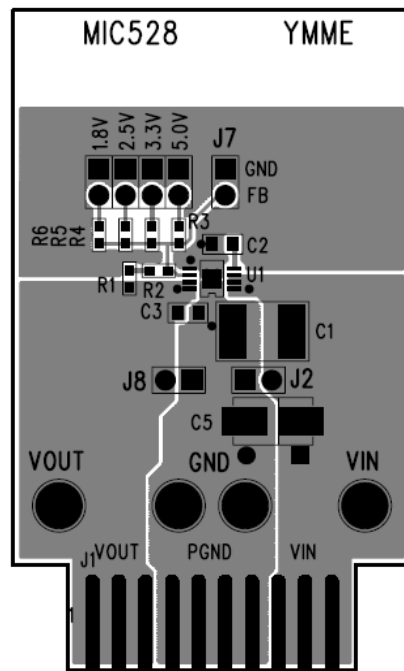
Notes:

1. Murata: www.murata.com.
2. TDK: www.tdk.com.
3. AVX: www.avx.com.
4. Vishay: www.vishay.com.
5. Micrel, Inc.: www.micrel.com.

Evaluation Board PCB Layout

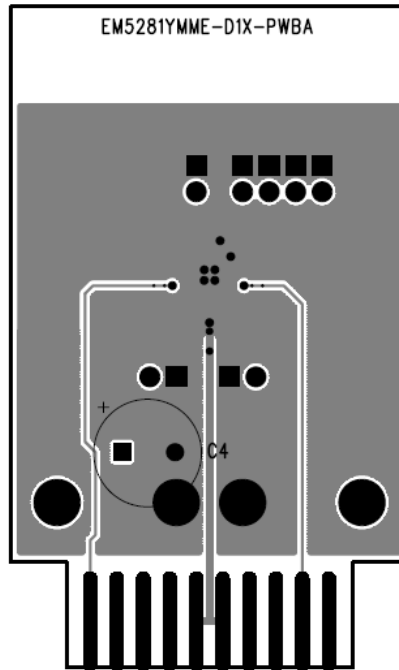


MIC5281YMME Evaluation Board – Top Silkscreen Layer

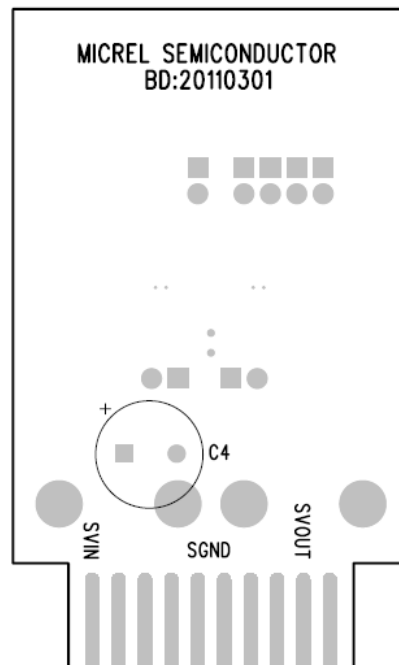


MIC5281YMME Evaluation Board – Top Layer

Evaluation Board PCB Layout (Continued)



MIC5281YMME Evaluation Board – Bottom Layer



MIC5281YMME Evaluation Board – Bottom Silkscreen

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