MIC2619 Evaluation Board

1.2MHz PWM Boost Converter with OVP

General Description

The MIC2619 is a 1.2MHz pulse width modulated (PWM) step-up switching regulator that is optimized for low power, high output voltage applications. With a maximum output voltage of 35V and a switch current of over 350mA, the MIC2619 can easily supply most high voltage bias applications, such as TV tuners.

The MIC2619 implements a constant frequency 1.2MHz PWM current-mode control scheme. The high frequency PWM operation saves board space by reducing external component sizes. The additional benefit of the constant frequency PWM control scheme as opposed to variable frequency control schemes is lower output noise and smaller input ripple injected back to the power source. The MIC2619 has programmable overvoltage protection to ensure output protection in case of fault condition.

Requirements

The MIC2619 Evaluation board requires a single 1W bench power source adjustable from 2.8V to 6.5V. The load can either be active (electronic load) or passive (resistor) with the capability to dissipate 0.7W. It is ideal to have an oscilloscope available to view the circuit waveforms, but not essential. For the simplest test, two voltage meters are required to measure input and output voltage. For efficiency measurements, two voltage meters and two ammeters are required to prevent errors due to measurement inaccuracies.

Precautions

The evaluation board does not have input reverse polarity protection. Be cautious when connecting the input source to ensure correct polarity is observed.

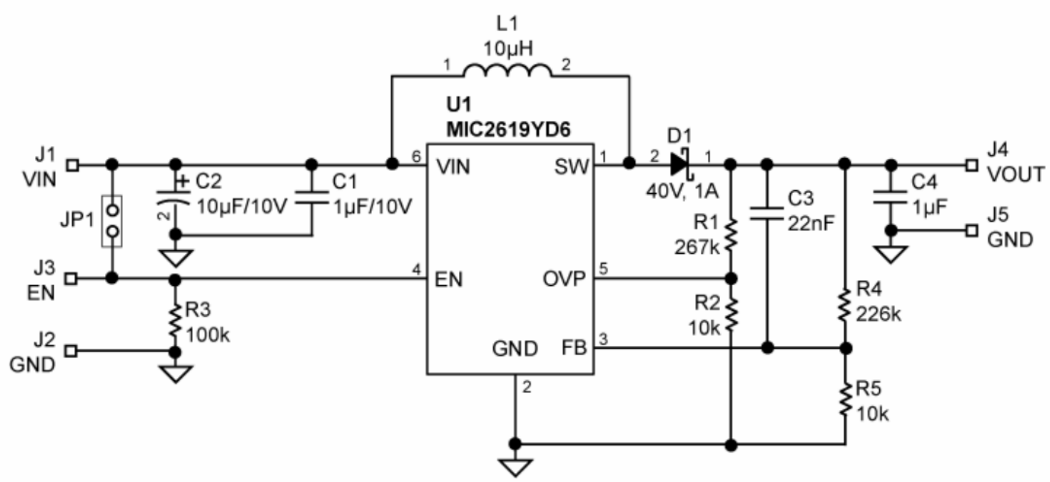
Getting Started

1. **Connect an external supply to the VIN (J1) terminal and GND (J2).** With the output of the power supply disabled, set its voltage to the desired input test voltage (2.8V ≤ VIN ≤ 6.5V). An ammeter may be placed between the power supply and the VIN (J1) terminal of the evaluation board. Be sure to monitor the supply voltage at the VIN (J1) terminal, as the ammeter and/or power lead resistance can reduce the voltage supplied to the input.
2. **Connect a load to the VOUT (J4) and GND pins (J5) terminals.** The load can be either passive (resistor) or active (electronic load). An ammeter may be placed between the load and output terminal. Be sure to monitor the output voltage at the VOUT (J4) terminal.
3. **Enable/Disable the MIC2619.** The MIC2619 evaluation board has a pull-down resistor to GND. By default the MIC2619 will be disabled and the output voltage will be approximately VIN. By placing a jumper at JP1, the enable pin is tied directly to VIN and the output voltage will be enabled when the input supply of ≥2.8V is applied.
4. **Over-Voltage Protection (OVP).** The MIC2619 evaluation board uses a resistor divider network (R1 and R2) to set the OVP voltage. The default OVP voltage of the evaluation board is 35V. Please see the “Additional Information” section for instructions to externally adjust the OVP voltage.

Ordering Information

Part Number	Description
MIC2619YD6 EV	Evaluation Board with MIC2619YD6 Device

Evaluation Board Schematic



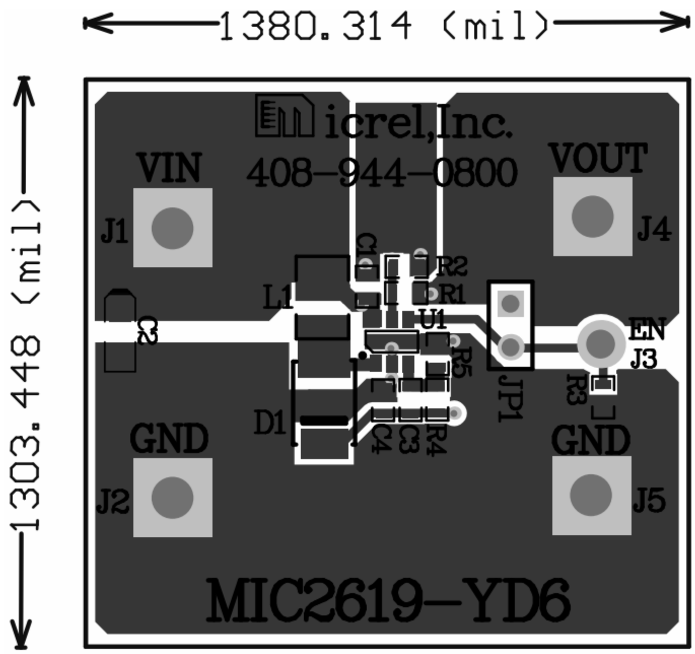
Bill of Materials

Item	Part Number	Manufacturer	Description	Qty.
C1	C1608X5R1A105K	TDK[1]	Capacitor, 1.0µF, 10V, X5R, 0603 size	
	GRM185R61A105KE36D	Murata[2]	Capacitor, 1.0µF, 10V, X5R, 0603 size	1
	0603ZD105KT2A	AVX[3]	Capacitor, 1.0µF, 10V, X5R, 0603 size	
C2	TAJA106M010R	AVX	Capacitor, 10.0µF, 10V, A Case	1
C3	C1608X7R11H223K	TDK	Capacitor, 22nF, 50V, X7R, 0603 size	
	GRM188R71H223KA01D	Murata	Capacitor, 22nF, 50V, X7R, 0603 size	1
	06035C223JAT2A	AVX	Capacitor, 22nF, 50V, X7R, 0603 size	
C4	08055D105MAT2A	AVX	Capacitor, 1.0µF, 50V, X5R, 0805 size	
	GRM21BR71H105KA12L	Murata	Capacitor, 1.0µF, 50V, X5R, 0805 size	1
	CL21B105KBFNNNE	Samsung[4]	Capacitor, 1.0µF, 50V, X7R, 0805 size	
D1	SK14	MCC[5]	Schottky Diode, 1A, 40V	1
	B140/B	Diode, Inc.[6]	Schottky Diode, 1A, 40V	
L1	C1G22L100MNE	Samsung	Inductor, 10.0µH, 0.8A, 2.5 x 2.0 x 1.0mm	
	VLF3012ST-100MR59	TDK	Inductor, 10.0µH, 0.59A, 2.8 x 3.0 x 1.2mm	1
	LQH32PN100MN0L	Murata	Inductor, 10.0µH, 0.7A, 3.2 x 2.5 x 1.55mm	
R1	CRCW0603267KFKEA	Vishay[7]	Resistor, 267kΩ, 1%, 1/16W, 0603 size	1
R2, R5	CRCW060310K0FKEA	Vishay	Resistor, 10kΩ, 1%, 1/16W, 0603 size	2
R3	CRCW0603100KFKEA	Vishay	Resistor, 100kΩ, 1%, 1/16W, 0603 size	1
R4	CRCW0603226KFKEA	Vishay	Resistor, 226kΩ, 1%, 1/16W, 0603 size	1
U1	**MIC2619YD6**	**Micrel, Inc.[8]**	**1.2MHz PWM Boost Converter with OVP**	**1**

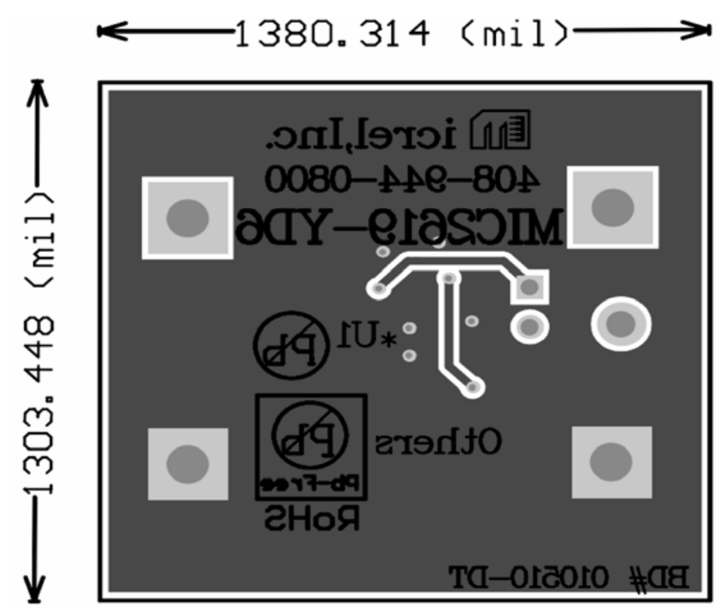
Notes:

1. TDK: www.tdk.com
2. Murata: www.murata.com
3. AVX: www.avx.com
4. Samsung: www.sem.samsung.com
5. MCC: www.mccsemi.com
6. Diode, Inc.: www.diodes.com
7. Vishay: www.vishay.com
8. **Micrel, Inc.: www.micrel.com**

PCB Layout Recommendations



Top Layer



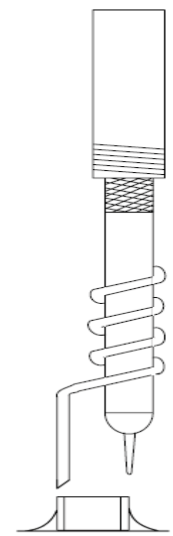
Bottom Layer

Additional Information

Ripple Measurements

To properly measure voltage ripple on either the input or output of any regulator with a switching regulator near by, a proper ring in tip measurement is required. Standard oscilliscope probes come with a grounding clip, or a long wire with an alligator clip. Unfortunately, for high frequency measurements, this ground clip can pick up high frequency noise and erroneously inject it into the measured output ripple.

The MIC2619 evaluation boards accommodate a home made ring in tip measurement by probing across input and output capacitors. This requires the removing of the oscilloscope probe sheath and ground clip from a standard oscilloscope probe and wrapping a non-shielded bus wire around the oscilloscope probe (as shown on the left). If there does not happen to be any non-shielded bus wire immediately available, the leads from axial resistors will work. By maintaining the shortest possible ground lengths on the oscilloscope probe, true ripple measurements can be obtained.



Feedback resistors

The MIC2619 utilizes a feedback pin to compare the output to an internal reference. The output voltage is adjusted by selecting the appropriate feedback resistor network values. The desired output voltage can be calculated as follows:

$$V_{OUT} = 1.265 \times \left(\frac{R_1}{R_2} + 1 \right)$$

Over-Voltage Protection (OVP)

The OVP pin provides over-voltage protection on the output of the MIC2619. When the OVP circuit is tripped, the output voltage remains at the set OVP voltage. Because the OVP circuit operates at a lower frequency than the feedback circuit, output ripple will be higher while in an OVP state. OVP requires a resistor divider network to the output and GND to set the OVP voltage. If the output voltage overshoots the set OVP voltage, the MIC2619 OVP circuit will shut off the switch; saving itself and other sensitive circuitry downstream. The accuracy of the OVP pin is ±5% and therefore, should be set above the output voltage to ensure noise or other variations will not cause a false triggering of the OVP circuit. Caution should be exercised to not exceed the 35V rating of the output voltage.

To set the OVP voltage, replace the R1 and R2 resistor values on the evaluation board with the calculated values using the following equation:

$$V_{OVP} = 1.265 \times \left(\frac{R_1}{R_2} + 1 \right)$$

V_{OUT} or V_{OVP} (V)	R3 (kΩ)	R6 (kΩ)
5.0	29.4	10
8.0	53.6	10
10	69.8	10
12	84.5	10
15	107	10
18	133	10
20	147	10
25	187	10
30	226	10
35	267	10

Table 1. VOUT or OVP Example Resistor Va

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