MIC4930 Evaluation Board

HyperSpeed™ 5A Buck Regulator in 3mm x 4mm DFN Package

General Description

This board enables the evaluation of the MIC4930, a fully integrated 5A switching regulator featuring HyperSpeed™ control and Power Good output indication. The MIC4930 is highly efficient throughout the entire output current range, exceeding 95% over 5V input to 3.3V output range. The tiny 3mm x 4mm DFN package, in combination with the high switching frequency, allows for a compact, small footprint solution. The MIC4930 provides accurate output voltage regulation under the most demanding conditions and responds extremely fast to a load transient with exceptionally small output voltage ripple.

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

Requirements

The MIC4930 evaluation board requires a single power source adjustable up to at least 5.5V, with 5A of current capability. The load can either be active (electronic load) or passive (resistor) with the capability to dissipate 20W. It is ideal to have an oscilloscope available to view the circuit waveforms, but not essential. For the simplest tests, 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

There is no reverse input protection on this board. Be certain that the correct polarity is observed when connecting the input source.

The maximum VIN of the board is rated at 5.5V, and the maximum load current is rated at 5A.

Input power leads should ensure negligible voltage drop up to the maximum load, and should be kept as short as possible to minimize inductance.

For load transient and/or pre-biased output start-up testing up to 5.5V VIN, the use of a bulk electrolytic capacitor in position C7 (at least 100µF, 10V rating) is recommended.

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 (2.7V ≤ VIN ≤ 5.5V). An ammeter may be placed between the input supply and the VIN (TP4) terminal. Be sure to monitor the supply voltage at the VIN (TP4) terminal, as the ammeter and/or power lead resistance can reduce the voltage supplied to the device.

2. **Connect a load to the V_{OUT} (J3) and ground (J4) terminals.**

   The load can be either active passive (resistive) or active (electronic load). In case of electronic load, keep the load disabled until the MIC4930 has been powered up.
   An ammeter may be placed between the load and the output terminal. Ensure the output voltage is monitored at the V_{OUT} (TP6) terminal.

3. **Enable the MIC4930.**

   The MIC4930 evaluation board has a pull-up resistor R6 to V_{IN}. With a jumper installed in positions 1-2 of TP5, the output voltage will be enabled when the input supply of >2.7V is applied. To disable the device, apply a voltage below 0.5V to the EN (TP2) terminal, or install a jumper across positions 2-3 of TP5.

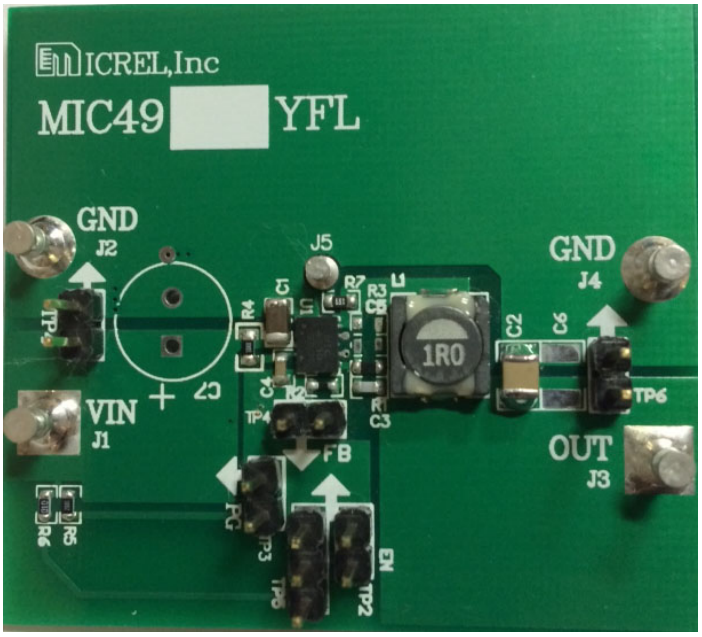
4. **Power Good.**

   A Power good test point (TP3) is provided to monitor the Power Good function. The Power Good output will go high (approximately 80µs) after the output voltage reaches 88% of its nominal voltage.

Ordering Information

Part Number	Description
MIC4930YFL EV	1.8V Fixed Output Evaluation Board

Evaluation Board



Other Features

Feedback Resistors (R1, R2) for Adjustable Output

The output voltage is set nominally to 1.8V. This output can be changed by adjusting the upper resistor, R1, in the feedback potential divider. Therefore:

$$R2 = R1 \times V_{REF}/(V_{OUT}-V_{REF})$$

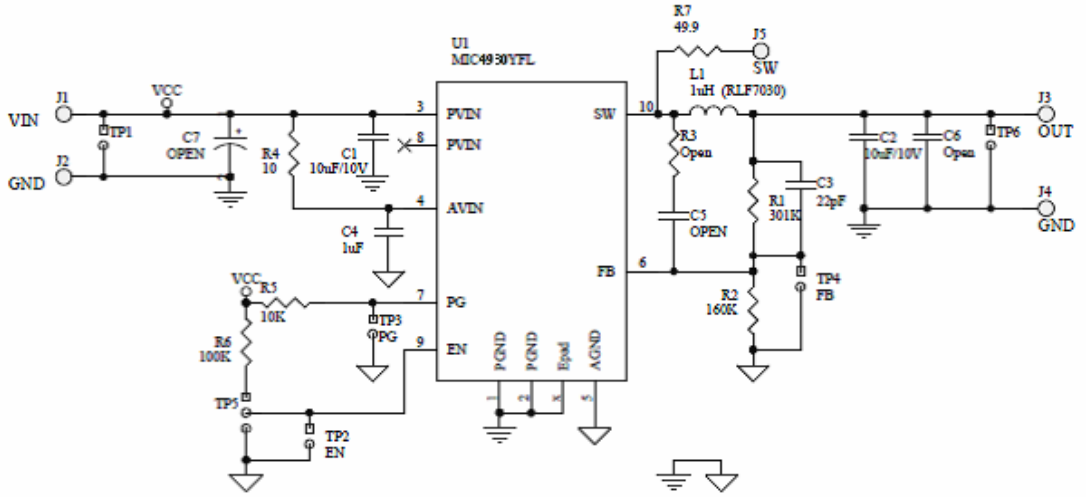
Where $V_{REF} = 0.625V$

Some example values are:

V_{OUT}	R1	R2
1.0V	120k	180k
1.2V	274k	294k
1.5V	316k	226k
1.8V	301k	160k
2.5V	316k	105k
3.3V	309k	71.5k

The feed-forward capacitor, C3, is typically in the range 22pF-39pF. The MIC4930 features an internal ripple injection network, whose current is injected into the FB node and integrated by C3, thus the waveform at FB is approximately a triangular ripple. The size of C3 dictates the amount of ripple amplitude at the FB node. Smaller values of C3 yield higher FB ripple amplitude and better stability, but also degrade somewhat line regulation and transient response.

MIC4930 Evaluation Board Schematic



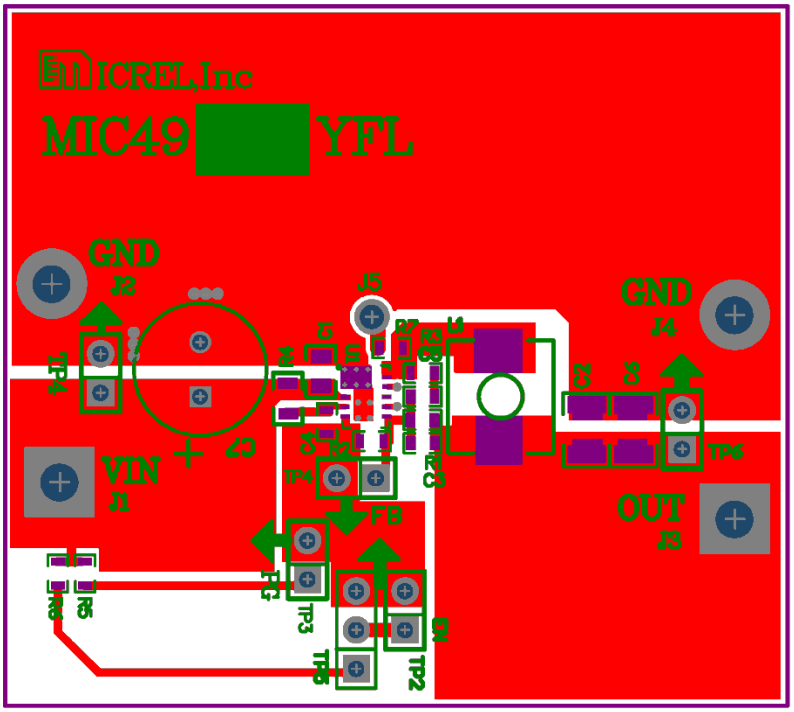
Bill of Materials

Item	Part Number	Manufacturer	Description	Qty.
C1, C2	C2012X5R1A106M125AB	TDK[1]	Ceramic Capacitor, 10µF, 10V, X5R, Size 0805	2
	GRM219R61A106ME44	Murata[2]		
C3	C1608C0G1H220J080AA	TDK	Ceramic Capacitor, 22pF, 50V, C0G, Size 0603	1
	GRM1885C1H220JA01	Murata		
C4	C1608X5R1A105M080AC	TDK	Ceramic Capacitor, 1µF, 10V, X5R, Size 0603	1
	GRM185R61A105ME26	Murata		
C5	-	-	Not Fitted (FT), Size 0603	0
C6	-	-	Not Fitted (FT), Size 1210	0
C7	-	-	Not Fitted (FT), Radial, 8mm diameter polarized capacitor	0
L1	RLF7030T-1R0N6R4	TDK	1µH, 6.4A, 7.3mΩ, L7.3mm x W6.8mm x H3.2mm	1
	CLF7045T-1R0N	TDK	1µH, 5.2A, 9.6mΩ, L7.2mm x W6.9mm x H4.5mm	
	CDRH8D43RT125NP-1R0NC	Sumida[3]	1µH, 7.5A, 7.8mΩ, L8.5mm x W8.3mm x H4.5 mm	
R1	CRCW06033013FK	Vishay[4]	Resistor, 301kΩ, Size 0603	1
R2	CRCW06031603F	Vishay	Resistor, 160kΩ, Size 0603	1
R3	-	-	Not Fitted (FT), Size 0603	0
R4	CRCW060310R0FK	Vishay	Resistor, 10Ω, Size 0603	1
R5	CRCW06031002FK	Vishay	Resistor, 10kΩ, Size 0603	1
R6	CRCW06031003FK	Vishay	Resistor, 100kΩ, Size 0603	1
R7	CRCW060349R9FK	Vishay	Resistor, 49.9Ω, Size 0603	1
U1	**MIC4930YFL**	**Micrel, Inc.[5]**	**HyperSpeed™ 5A Buck Regulator**	**1**

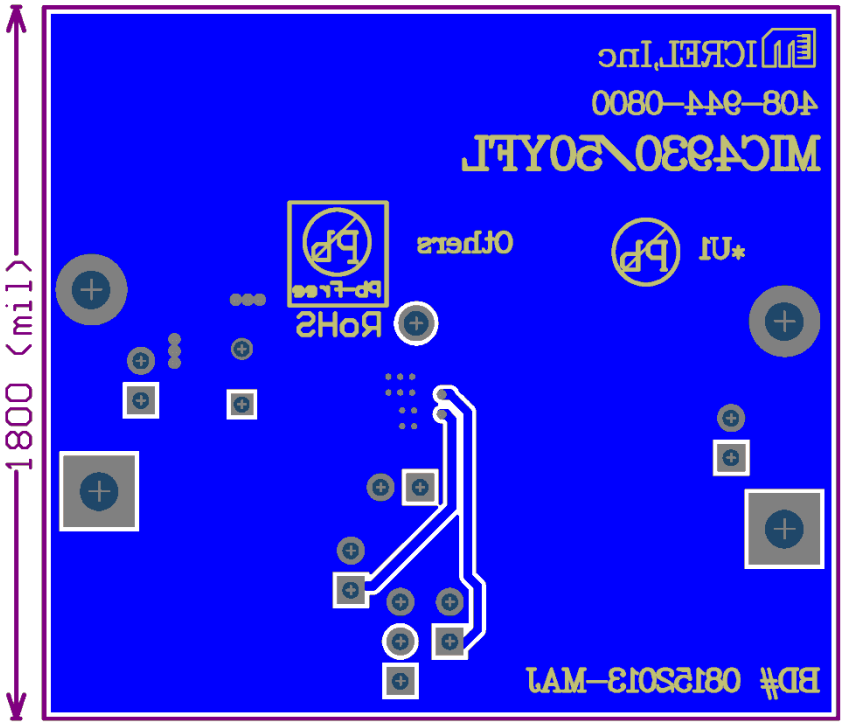
Notes:

1. TDK: **www.tdk.com**.
2. Murata: **www.murata.com**.
3. Sumida: **www.sumida.com**
4. Vishay: **www.vishay.com**.
5. **Micrel, Inc.: www.micrel.com.**

PCB Layout Recommendations



Top Layer



Bottom Layer

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Revision History

Date	Change Description/Edits by:	Rev.
1/12/10	Changed dates in template. M. Galvan	0.5
8/4/10	Added new paragraph to disclaimer in boiler plate. Per Colin Sturt. M.Galvan	1.0
1/7/13	Complete rework	2.0
4/30/13	Made notes run continuously, rather than restart on each page	2.1
12/17/13	Original release by Paolo Nora	0.0

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