

# MIC94300 Evaluation Board



## 200mA Switch with Ripple Blocker™ Technology



## General Description

The MIC94300 is an integrated load switch that incorporates Micrel's Ripple Blocker™ active filter technology. The MIC94300 provides high-frequency ripple attenuation for applications where switching noise cannot be tolerated by sensitive downstream circuits such as in RF applications. The MIC94300 replaces a high-side switch, large filtering inductor, and capacitors to save board area.

The MIC94300 operates from an input voltage of 1.8V to 3.6V, allowing true load switching of low-voltage power rails in any electronic device. The output voltage ( $V_{OUT}$ ) is set at a fixed drop from the input voltage.

Datasheets and support documentation can be found on Micrel's web site at [www.micrel.com](http://www.micrel.com).

## Requirements

The MIC94300 evaluation board requires an input power supply that is capable of delivering a minimum of 300mA at a voltage range of 1.8V to 3.6V. The output load can be either active or passive.

## Precautions

The MIC94300 evaluation board does not have reverse polarity protection. Applying a negative voltage to the  $V_{IN}$  terminal may damage the device.

## Getting Started

- **Connect an External Supply to  $V_{IN}$ .** Apply the desired input voltage to the  $V_{IN}$  and ground terminal of the evaluation board, paying careful attention to polarity and supply voltage ( $1.8V \leq V_{IN} \leq 3.6V$ ).
- **Enable/Disable the MIC94300.** The evaluation board is supplied with 100k $\Omega$  pull-up resistor to  $V_{IN}$  for default on state. To disable the output, simply jumper the EN terminal to ground.
- **Connect the Load.** Connect the load to the  $V_{OUT}$  terminal and the ground terminal. The load can be either a passive (resistor) or active (electronic load). Be sure to monitor the output voltage at the  $V_{OUT}$  terminal.

## Ordering Information

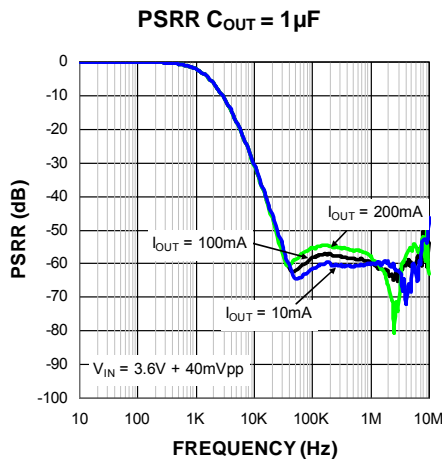
Part Number	Description
MIC94300YCS EV	200mA Ripple Blocker™ CSP Package Evaluation Board
MIC94300YMT EV	200mA Ripple Blocker™ Thin MLF® Package Evaluation Board

Ripple Blocker is a trademark of Micrel, Inc  
MLF and MicroLeadFrame are registered trademarks of Amkor Technology, Inc.

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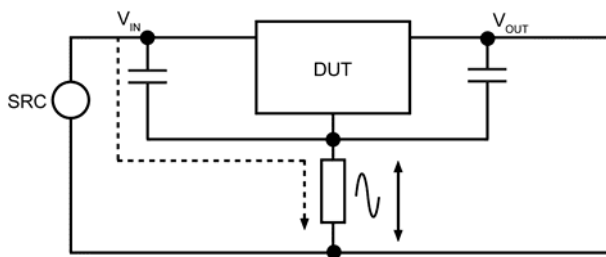
## Power Supply Ripple Rejection (PSRR) Measurements

Figure 1 illustrates the frequency response of the MIC94300.



**Figure 1. MIC94300 Ripple Blocker™ Frequency Response**

For high-frequency measurements (above 1MHz), careful attention must be made to the test set-up configuration as it is easy to introduce noise into the grounds which will give inaccurate measurements as shown in Figure 2.



**Figure 2. High-Frequency Noise on Measurement System**

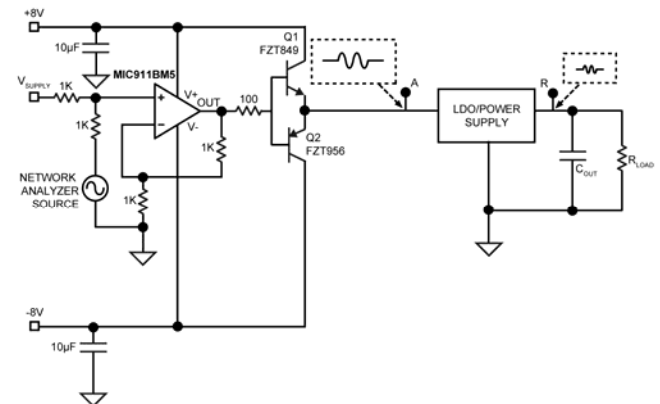
The inductance of test probes connected to the evaluation board at higher frequencies becomes a factor which can create a differential between the device under test and test measurement system grounds. Adding a low-value resistor (2Ω) in series with the input capacitor to ground and utilizing a test measurement system capable of making differential measurements will help to reduce these affects.

PSRR measurements may be made using either dedicated PSRR test equipment or with a PSRR interface board and a network analyzer. The network analyzer can sweep the AC frequency and perform a comparison measurement of the amplitude on the input and output. With this method, the network analyzer is configured for an A/R measurement. The difficulty arises when trying to impose the network analyzer's AC signal with the DC input voltage to the MIC94300. The circuit shown in Figure 3 accomplishes this by using the MIC911 as a summing amplifier. The summing amplifier adds the  $V_{SUPPLY}$  (DC voltage) and the network analyzers AC signal. As the network analyzers source is 50Ω impedance it may be neglected, the DC voltage seen at the non-inverting side is half of the  $V_{SUPPLY}$  voltage. The output is gained up by 2 with the 1kΩ resistor divider to the non-inverting side. This sums the AC and DC voltages with an overall gain of 1.

$$V_{OUT} = \left( \frac{1k\Omega}{1k\Omega + 1k\Omega} V_{SUPPLY} + \frac{1k\Omega}{1k\Omega + 1k\Omega} V_{NETWORKANALYZER} \right) \left( 1 + \frac{1k\Omega}{1k\Omega} \right)$$

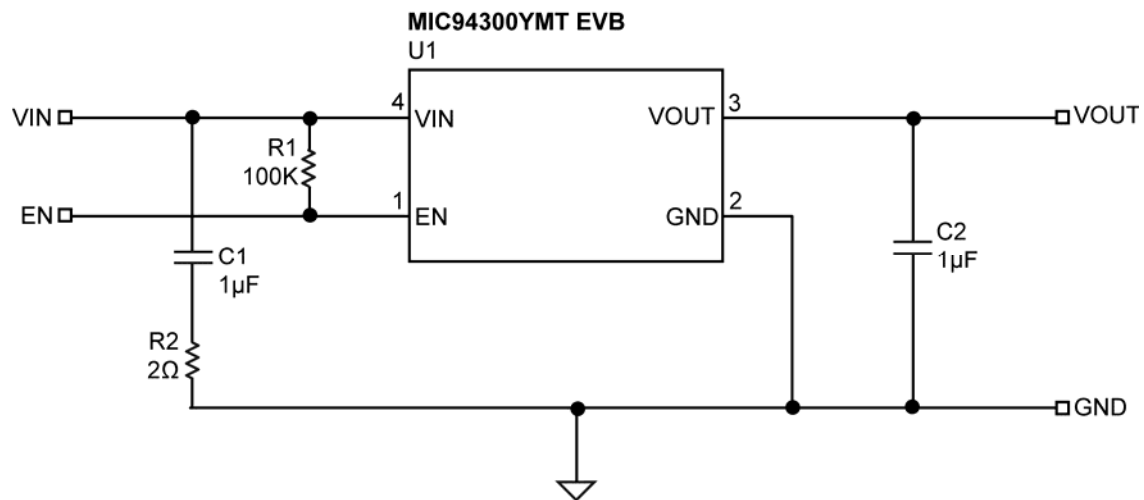
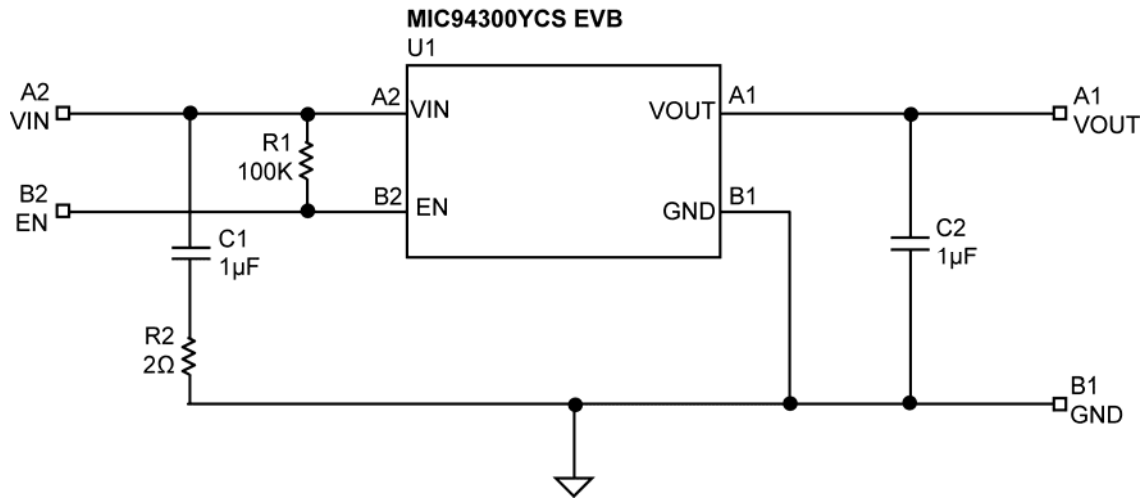
$$V_{OUT} = \left( \frac{1}{2} V_{SUPPLY} + \frac{1}{2} V_{NETWORKANALYZER} \right) (2)$$

$$V_{OUT} = V_{SUPPLY} + V_{NETWORKANALYZER}$$



**Figure 3. Network Analyzer Set-Up**

### Evaluation Board Schematics



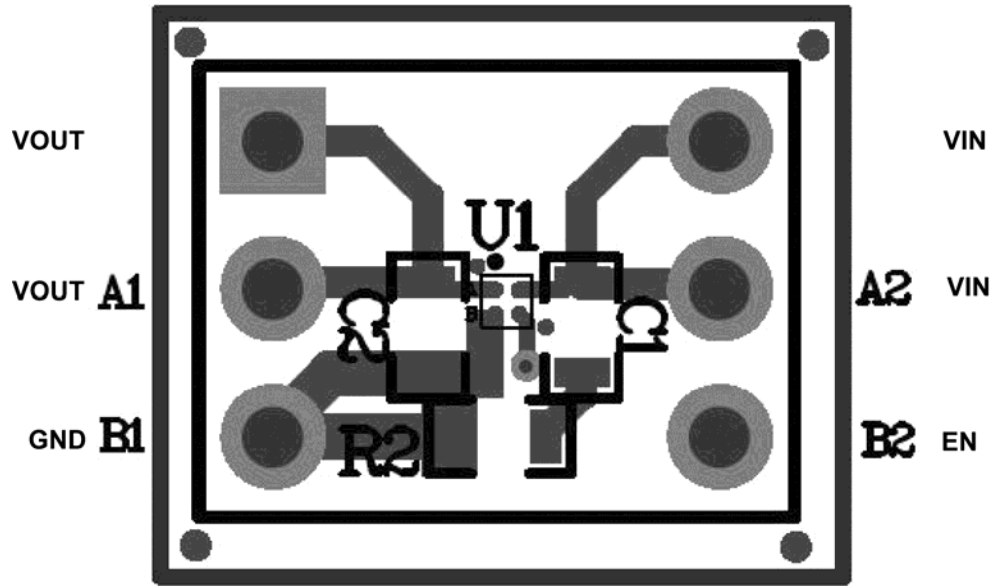
### Bill of Materials

Item	Part Number	Manufacturer	Description	Qty.
C1, C2	CL10B105KA8NNNC	Samsung <sup>(1)</sup>	1μF, 25V, X7R, Size 0603, ceramic capacitor	2
R1	CRCW0402100KFKEA	Vishay <sup>(2)</sup>	100KΩ, 1%, 1/16W, Size 0402 resistor	1
R2	CRCW04022R00FKED	Vishay <sup>(2)</sup>	2Ω, 1%, 1/16W, Size 0402 resistor	1
U1	MIC94300YCS	Micrel, Inc. <sup>(3)</sup>	200mA Switch with Ripple Blocker™ Technology	1
	MIC94300YMT			

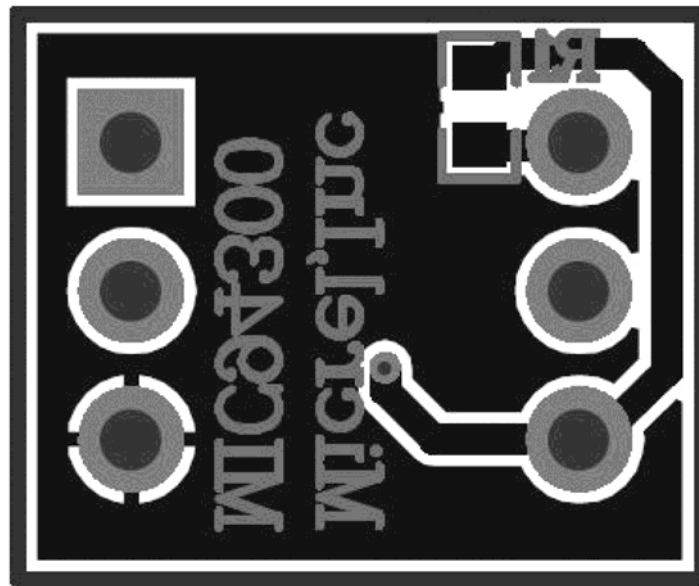
**Notes:**

1. Samsung: <http://www.semicon.com>.
2. Vishay: [www.vishay.com](http://www.vishay.com).
3. Micrel, Inc.: [www.micrel.com](http://www.micrel.com).

### PCB Layout Recommendations (CS Package)

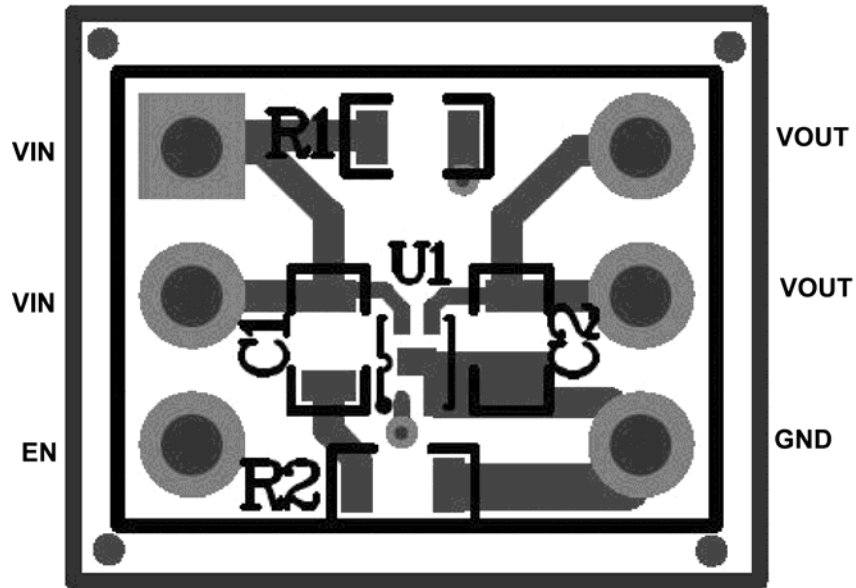


Top Layer

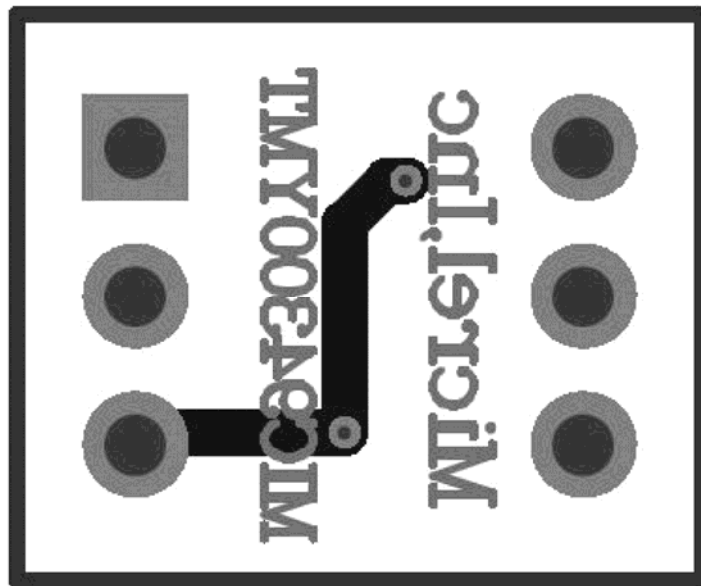


Bottom Layer

### PCB Layout Recommendations (MT Package)



Top Layer



Bottom Layer

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