MIC94325/45/55
Evaluation Board

500mA LDO with
Ripple Blocker Technology

RIPPLE BLOCKER™
A MICREL PRODUCT

General Description

The MIC943x5 Ripple Blocker™ is a monolithic integrated circuit that provides low-frequency ripple attenuation (switching noise rejection) to a regulated output voltage. This is important for applications, such as RF applications, where switching noise cannot be tolerated by sensitive downstream circuits. The MIC94325/45/55 maintains high power supply ripple rejection (PSRR) with input voltage operating near the output voltage level to improve overall system efficiency.

The MIC943x5 operates from an input voltage of 1.8V to 3.6V. The MIC943x5 options include fixed (MIC94345/55) or adjustable (MIC94325) output voltages. The MIC94355 version offers an auto-discharge to discharge the output capacitor when the part is disabled.

Datasheets and support documentation are available on Micrel's web site at: www.micrel.com.

Requirements

The MIC94325/45/55 evaluation board requires an input power supply that can deliver greater than 800mA at a voltage range of 1.8V to 3.6V. The output load can be either active or passive.

Precautions

The MIC94325/45/55 evaluation board does not have reverse polarity protection. Applying a negative voltage to the VIN terminal may damage the device.

Getting Started

1. **Connect an External Supply to VIN**.
   Apply the desired input voltage to the VIN and ground terminal of the evaluation board, paying careful attention to polarity and supply voltage (1.8V ≤ VIN ≤ 3.6V).
2. **Enable/Disable the MIC94325/45/55**.
   The evaluation board is supplied with a 100kΩ pull-up resistor to VIN, which makes the on state the default. To disable the output, jumper the EN terminal to ground.
3. **Connect the Load**.
   Connect the load to the VOUT terminal and the ground terminal. The load can be either passive (resistor) or active (electronic load). Be sure to monitor the output voltage at the VOUT terminal.

Ordering Information

Part Number	Description
MIC94325YMT EV	500mA LDO Ripple Blocker Evaluation Board
MIC94355-4YMT EV	500mA LDO Ripple Blocker Evaluation Board (V_{OUT} = 1.2V)
MIC94355-FYMT EV	500mA LDO Ripple Blocker Evaluation Board (V_{OUT} = 1.5V)
MIC94355-GYMT EV	500mA LDO Ripple Blocker Evaluation Board (V_{OUT} = 1.8V)
MIC94355-MYMT EV	500mA LDO Ripple Blocker Evaluation Board (V_{OUT} = 2.8V)
MIC94355-SYMT EV	500mA LDO Ripple Blocker Evaluation Board (V_{OUT} = 3.3V)

Power Supply Ripple Rejection (PSRR) Measurements

Figure 1 shows the frequency response of the MIC94325.

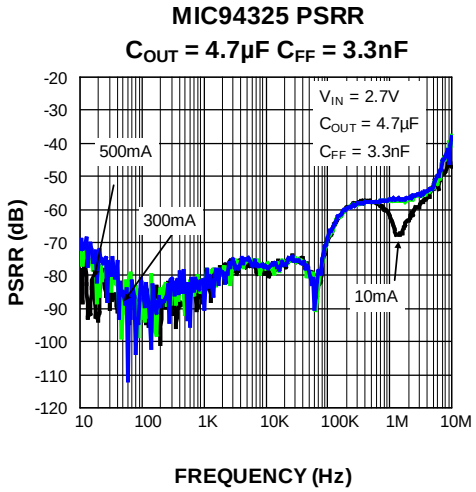


Figure 1. MIC94325 Rippled Blocker Frequency Response

For high-frequency measurements (above 1MHz), pay careful attention to the test set-up configuration because it is easy to introduce noise into the grounds. That gives inaccurate measurements, as shown in Figure 2.

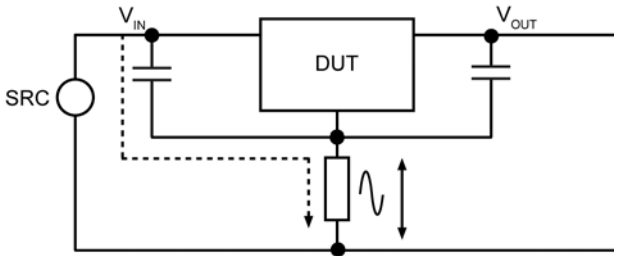


Figure 2. High-Frequency Noise on Measurement System

The inductance of test probes connected to the evaluation board at higher frequencies is a factor that 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 using a test measurement system that can make differential measurements will help to reduce these effects.

PSRR measurements can be made using either dedicated PSRR test equipment or 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 problem comes when trying to impose the network analyzer's AC signal with the DC input voltage to the MIC94325/45/55. The circuit shown in Figure 3 solves this problem by using the MIC911 as a summing amplifier.

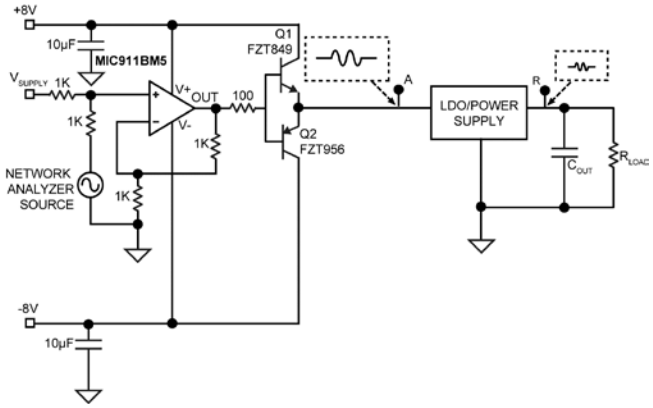


Figure 3. Network Analyzer Set-Up

The summing amplifier adds the V_{SUPPLY} (DC voltage) and the network analyzer's AC signal. Because the network analyzer's 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.

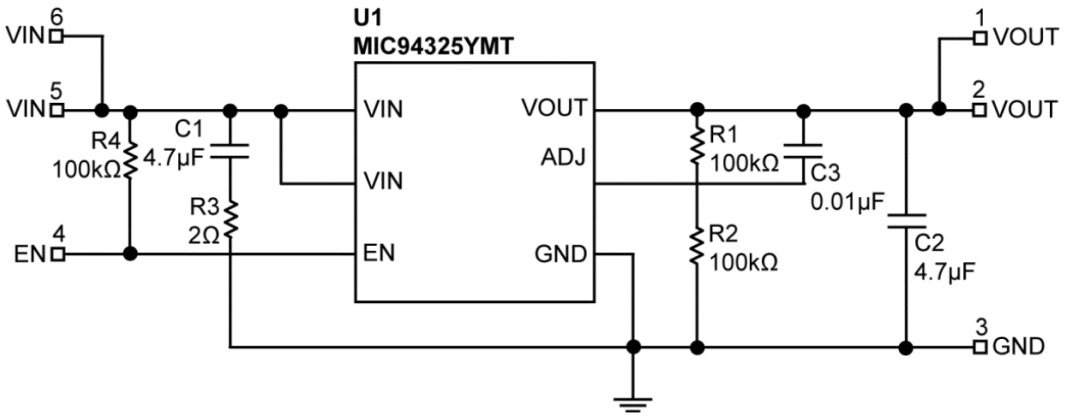
$$V_{OUT} = \left(\frac{1k\Omega}{1k\Omega + 1k\Omega} V_{SUPPLY} + \frac{1k\Omega}{1k\Omega + 1k\Omega} V_{NETWORKANALYZER}\right)\left(1 + \frac{1k\Omega}{1k\Omega}\right)$$

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

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

Eq. 1

Evaluation Board Schematic (Adjustable)



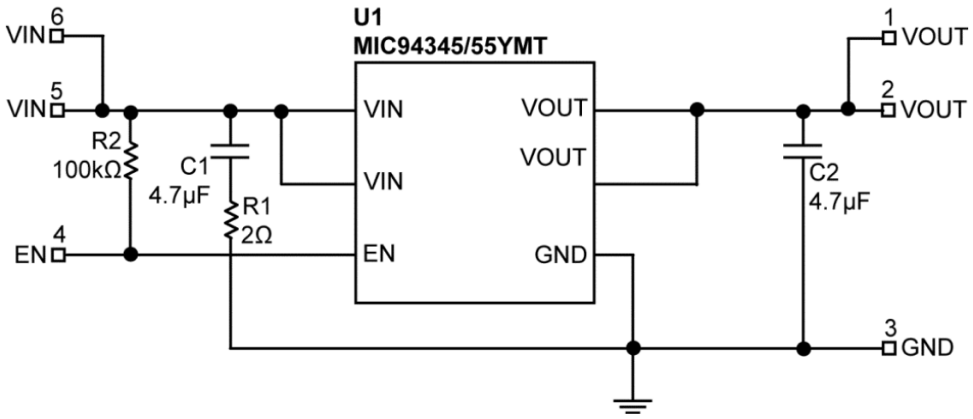
Bill of Materials

Item	Part Number	Manufacturer	Description	Qty.
C1, C2	CL10A475K08NNNC	Samsung[1]	Capacitor, 4.7µF Ceramic, 16V, X5R, Size 0603	2
C3	C1608X7R2AP/NK	TDK[2]	Capacitor, 10nF Ceramic, 50V, X7R, Size 0603	1
R1, R2, R4	CRCW0402100KFKED	Vishay[3]	Resistor, 100kΩ, Size 0402	3
R3	CRCW04022R00FKED	Vishay[3]	Resistor, 2.0Ω, Size 0402	1
U1	**MIC943X5YMT**	**Micrel, Inc.**[4]	**500mA LDO with Ripple Blocker Technology**	1

Notes:

1. Samsung: www.samsung.com.
2. TDK: www.tdk.com.
3. Vishay: www.vishay.com.
4. **Micrel, Inc.:** www.micrel.com.

Evaluation Board Schematic (Fixed)



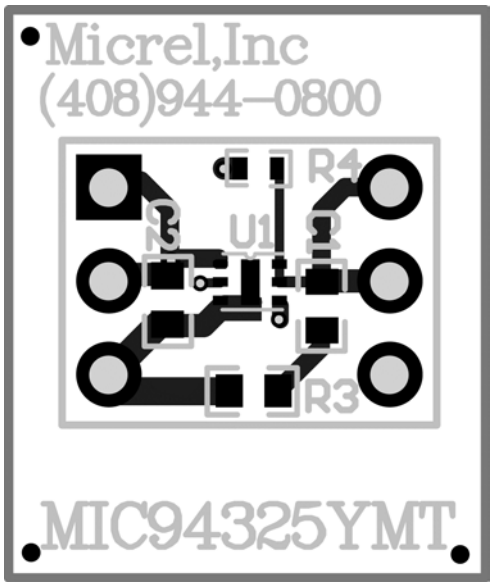
Bill of Materials

Item	Part Number	Manufacturer	Description	Qty.
C1, C2	CL10A475K08NNNC	Samsung[5]	Capacitor, 4.7µF Ceramic, 16V, X5R, Size 0603	2
R1	CRCW04022R0FKED	Vishay[6]	Resistor, 2.0Ω, Size 0402	
R2	CRCW0402100KFKED	Vishay[6]	Resistor, 100kΩ, Size 0402	2
U1	**MIC94355-XYMT**	**Micrel, Inc.**[7]	**500mA LDO with Ripple Blocker Technology**	1

Notes:

5. Samsung: www.samsung.com.
6. Vishay: www.vishay.com.
7. **Micrel, Inc.:** www.micrel.com.

PCB Layout Recommendations (MIC94325)



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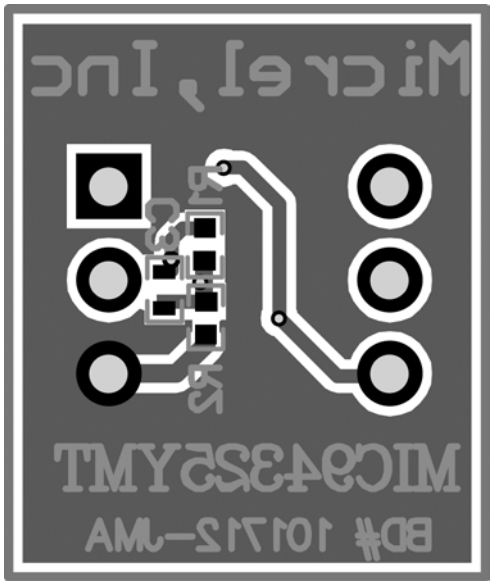

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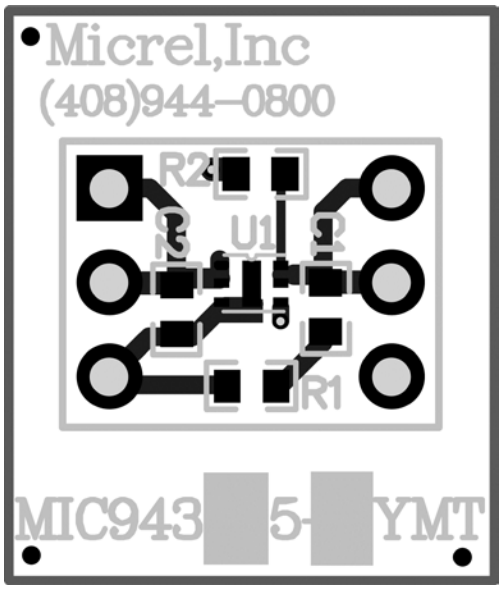
PCB Layout Recommendations (MIC94345/55)



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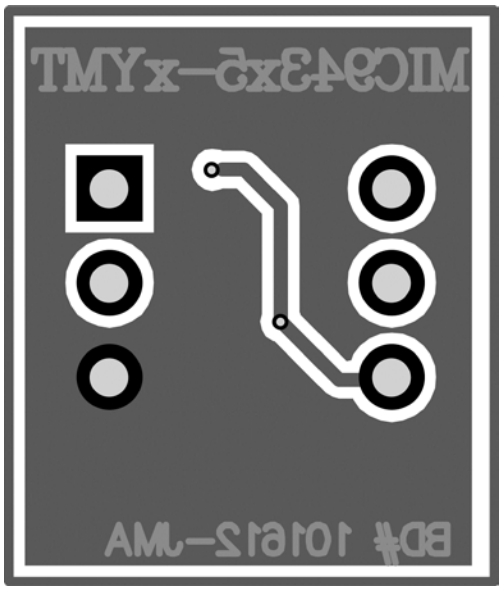

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MICREL, INC. 2180 FORTUNE DRIVE SAN JOSE, CA 95131 USA
TEL +1 (408) 944-0800 FAX +1 (408) 474-1000 WEB http://www.micrel.com