LTM8048 Isolated µModule DC/DC Converter with LDO Post Regulator

DESCRIPTION

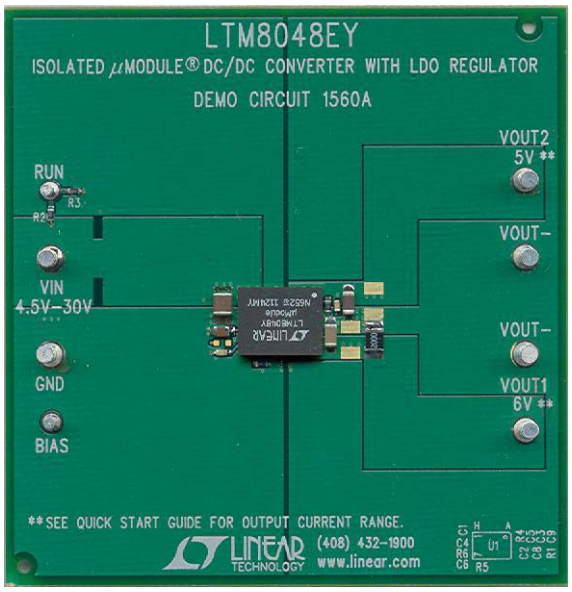
Demo circuit 1560A is an isolated flyback µModule® DC/DC converter with LDO post regulator featuring LTM®8048. The demo circuit is designed for a 6V flyback output and a 5V post regulator output from a 4.5V to 30V input. The typical current capability of the 6V flyback output varies with input voltage from about 110mA at V_{IN} = 4.5V to about 370mA at V_{IN} = 30V. Figure 1 shows the typical maximum output current on V_{OUT1} when V_{OUT2} is not loaded. V_{OUT2} is the LDO post regulator from V_{OUT1}. The current capability of V_{OUT2} is limited by either the current capability of V_{OUT1} minus V_{OUT1} loading or the 300mA current limit on the LDO post regulator itself.

The two-stage converter provides an isolated flyback output as well as a low noise LDO output. Figure 2 shows the output noise spectrum on V_{OUT1} and Figure 3 shows the output noise spectrum on V_{OUT2}.

The LTM8048 data sheet gives complete description of the device, operation and application information. The data sheet must be read in conjunction with this demo manual prior to working on or modifying demo circuit 1560A.

Design files for this circuit board are available at http://www.linear.com/demo

BOARD PHOTO



DESCRIPTION

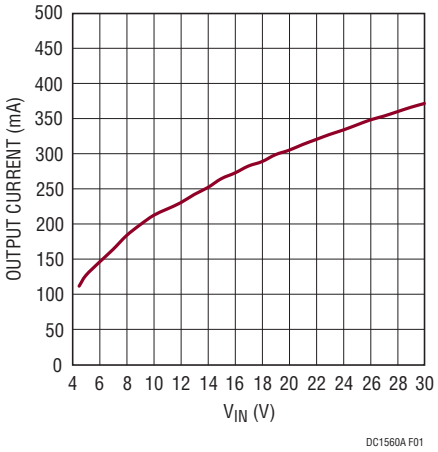


Figure 1. V_{OUT1} Typical Maximum Output Current vs V_{IN} When V_{OUT2} is not Loaded

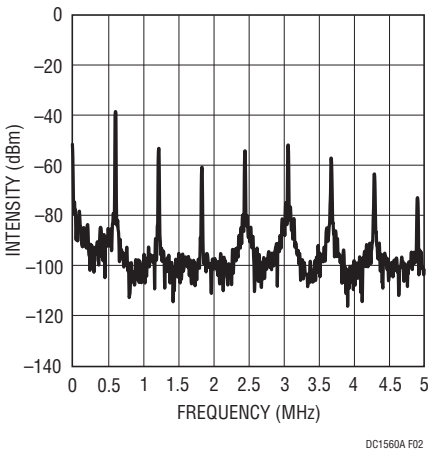


Figure 2. V_{OUT1} Output Noise Spectrum with I_{OUT2} at 100mA and V_{IN} at 12V (V_{OUT1} Has no Extra Load)

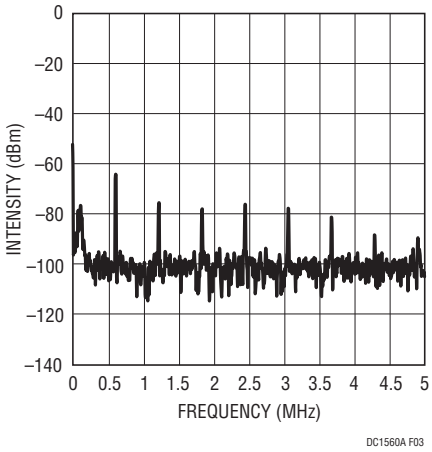


Figure 3. V_{OUT2} Output Noise Spectrum with I_{OUT2} at 100mA and V_{IN} at 12V (V_{OUT1} Has no Extra Load)

PERFORMANCE SUMMARY (T_A = 25°C)

PARAMETER	CONDITION	VALUE
Minimum Input Voltage		4.5V
Maximum Input Voltage		30V
Output Voltage V_{OUT1}	V_{IN} = 7V to 30V	6.0V ±5%
Output Voltage V_{OUT2}	V_{IN} = 7V to 30V	5.0V ±3%
Voltage Ripple V_{OUT1}	V_{IN} = 12V, I_{OUT2} = 0mA, I_{OUT2} = 100mA	<20mV
Voltage Ripple V_{OUT2}	V_{IN} = 12V, I_{OUT2} = 0mA, I_{OUT2} = 100mA	<10mV

QUICK START PROCEDURE

Demo circuit 1560A is easy to set up to evaluate the performance of the LTM8048. Refer to Figure 4 for proper measurement equipment setup and follow the procedure below:

NOTE. When measuring the input or output voltage ripple, care must be taken to avoid a long ground lead on the oscilloscope probe. Measure the input or output voltage ripple by touching the probe tip directly across the V_{IN} or V_{OUT} and GND terminals. See Figure 5 for proper scope probe technique.

1. With power off, connect the input power supply to V_{IN} and GND.
2. Turn on the power at the input.

   NOTE. Make sure that the input voltage does not exceed 30V.
3. Check for the proper output voltages. (For V_{OUT1}, check the voltage between V_{OUT1} and V_{OUT}^-. For V_{OUT2}, check the voltage between V_{OUT2} and V_{OUT}^-.)

   NOTE. If there is no output, temporarily disconnect the load to make sure that the load is not set too high.
4. Once the proper output voltages are established, adjust the load within the operating range and observe the output voltage regulation, ripple voltage, efficiency and other parameters.

QUICK START PROCEDURE

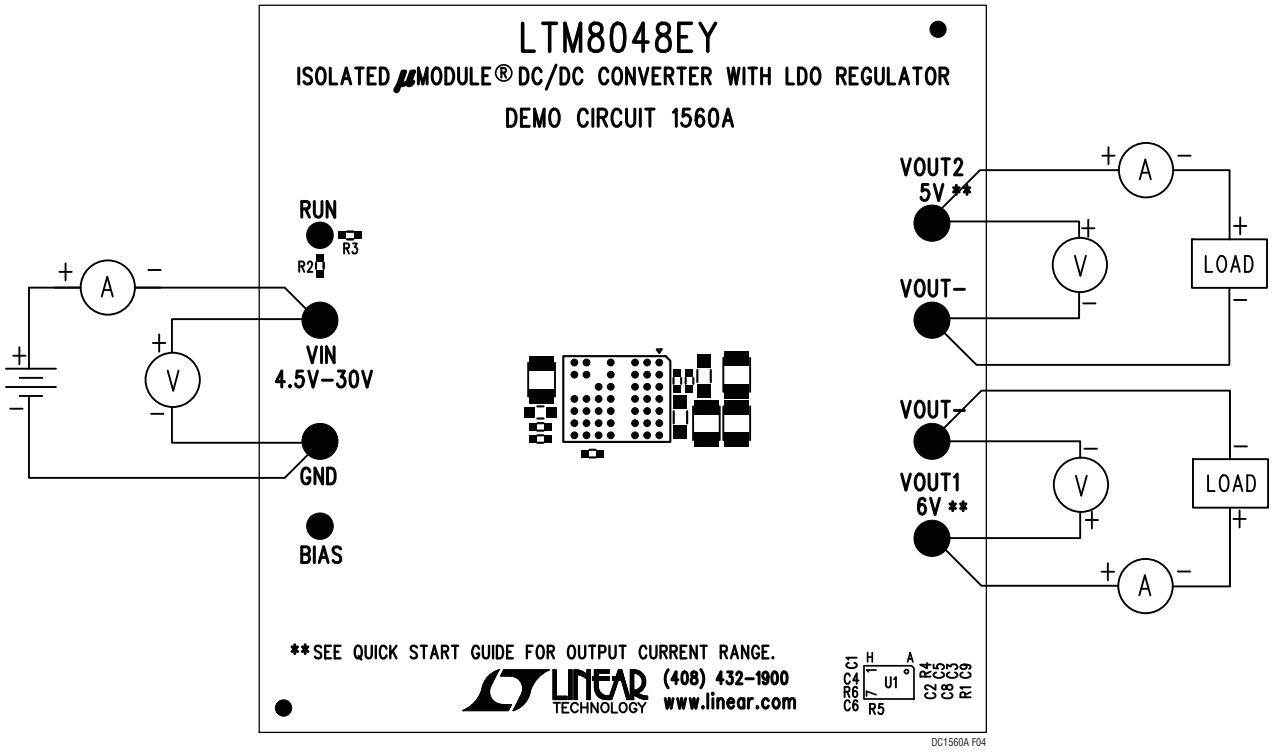


Figure 4. DC1560A Proper Equipment Setup

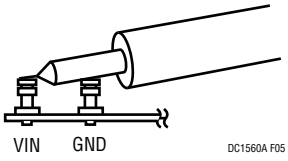
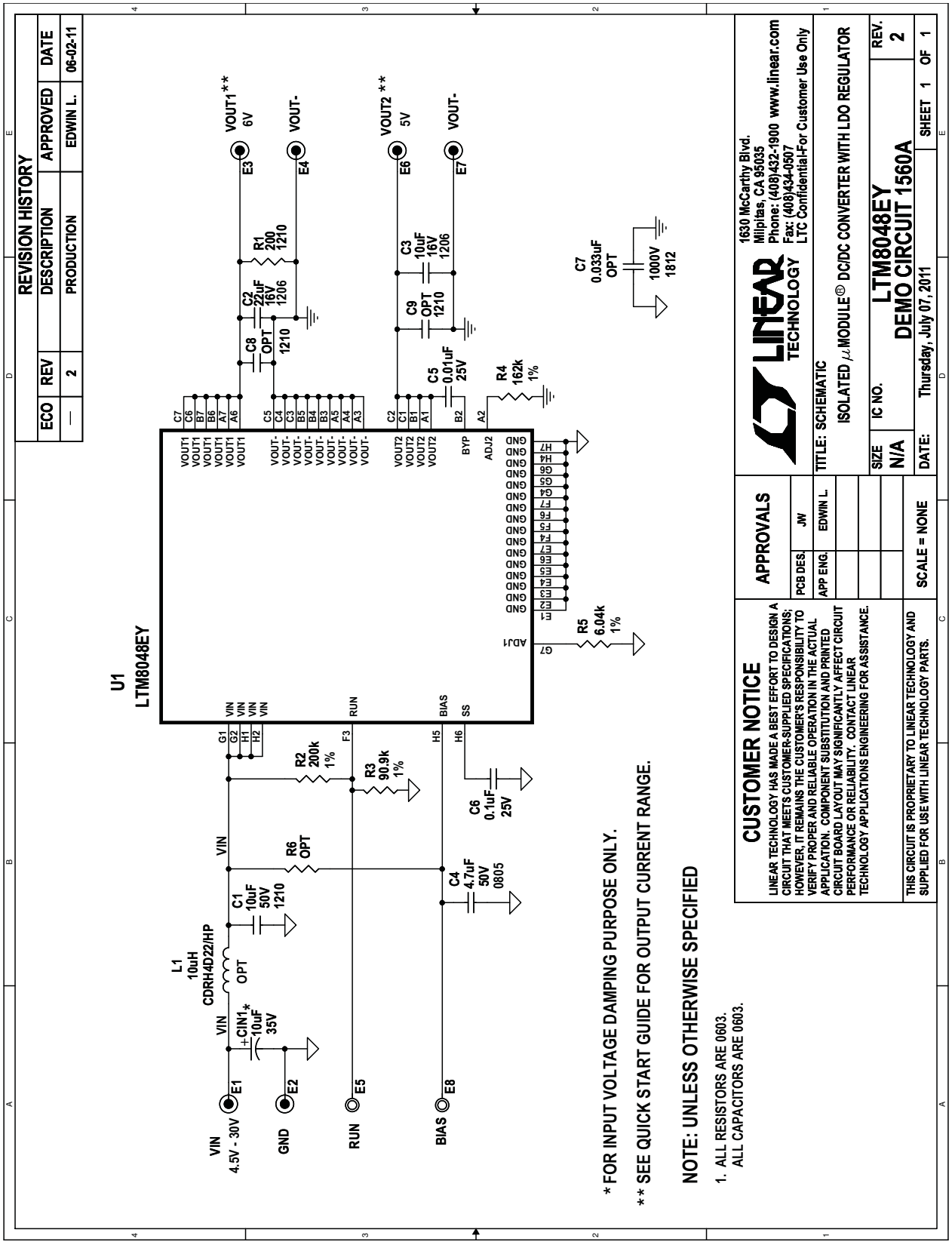


Figure 5. Measuring Input or Output Ripple

PARTS LIST

ITEM	QTY	REFERENCE	PART DESCRIPTION	MANUFACTURER/PART NUMBER
Required Circuit Components				
1	1	C5	CAP, CHIP X7R, 0.01µF, 25V, 5%, 0603	AVX 06033C103JAT
2	1	C6	CAP, CHIP X7R, 0.1µF, 25V, 10%, 0603	AVX 06033C104KAT
3	1	C4	CAP, CHIP X5R, 4.7µF, 50V, 10%,0805	TDK C2012X5R1H475K
4	1	C2	CAP, CHIP X5R, 22µF, 16V, 10%, 1206	AVX 1206YD226KAT2A
5	1	C3	CAP, CHIP X5R, 10µF, 16V, 10%, 1206	AVX 1206YD106KAT2A
6	1	C1	CAP, CHIP X5R, 10µF, 50V, 10%, 1210	MURATA GRM32ER71H106KA12L
7	1	R1	RES, CHIP 200, 1%,1210	VISHAY CRCW1210200RFKEA
8	1	R2	RES, CHIP 200k, 1%, 0603	VISHAY CRCW0603200KFKEA
9	1	R3	RES, CHIP 90.9k, 1%, 0603	VISHAY CRCW060390K9FKED
10	1	R4	RES, CHIP 162k, 1%, 0603	VISHAY CRCW0603162KFKED
11	1	R5	RES, CHIP 6.04k,1%, 0603	VISHAY CRCW06036K04FKEA
12	1	U1	IC, LINEAR LTM8048EY#PBF	LINEAR TECHNOLOGY LTM8048EY#PBF
Additional Demo Board Circuit Components				
1	0	C8, C9	CAP, 1210, OPTION	
2	1	CIN1	CAP, TANT, 10µF, 35V, CASE-C	AVX TAJC106K035R
3	0	C7	CAP, 1812, OPTION	
4	0	L1	OPTION	
5	0	R6	RES, 0603, OPTION	
Hardware/Components (For Demo Board Only)				
1	6	E1 to E4, E6, E7	TESTPOINT, TURRET, 0.094"	Mill-Max 2501-2-00-80-00-00-07-0
2	2	E5, E8	TESTPOINT, TURRET, 0.064"	Mill-Max 2308-2-00-80-00-00-07-0

SCHEMATIC DIAGRAM



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