

LT3580EDD Boost/ Inverting Regulator

DESCRIPTION

Demonstration circuits 1144A-A and 1144A-B feature the [LT[®]3580EDD](#) in Boost/Inverting Regulator configurations. The demo circuits demonstrate small size and low component count. The boost is designed to convert a 3V to 10V source to 12V at 300mA while the inverter converts a 5V to 12V source to -12V at 350mA. Both converters use only one feedback resistor to set the output voltage.

The LT3580 operates with inputs as high as 32V but in these demo boards the input is limited by the voltage rating of the input capacitors and the magnitude of the boost output. In a boost converter the input needs to be less than the output.

Care must be taken when operating the LT3580 at high input voltages as the junction temperature increases due to higher internal dissipation. Higher switching frequencies also increase the internal dissipation.

The LT3580 gets powered from the main input in both, DC1144A-A and DC1144A-B, but there is an option for a

linear regulator built into the board that will allow the IC to be powered from a lower voltage. If this option is used, just cut the trace as shown in Figure 6 and install the optional emitter follower regulator on the back of the board.

The DC1144A-B can easily be configured into a SEPIC converter, just switch the positions of L2 and D2 as shown in Figure 6.

The LT3580 includes many other features such as Synchronization to external clock, User Configurable Undervoltage Lockout, Soft-start, Frequency Foldback, and it is easily configured as boost or inverting converter.

These circuits are intended for space-conscious applications such as Local Bias Supplies, TFT-LCD Bias Supplies, GPS Receivers, VFD Bias Supplies and DSL Modems.

Design files for this circuit board are available at <http://www.linear.com/demo/DC1144A>

LT, LT, LTC, LTM, Linear Technology and the Linear logo are registered trademarks of Linear Technology Corporation. All other trademarks are the property of their respective owners.

PERFORMANCE SUMMARY Specifications are at T_A = 25°C

Performance Summary DC1144A-A

SYMBOL	PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
V _{IN}	Input Supply Range		3		10	V
V _{OUT}	Output Voltage Range	V _{IN} = 3V, I _{LOAD} = 300mA	11.64	12	12.36	V
Ripple		V _{IN} = 3.6V, I _{LOAD} = 300mA		40		mV
Efficiency		V _{IN} = 4.2V, I _{LOAD} = 350mA		88		%
Switching Frequency				1		MHz

Performance Summary DC1144A-B

SYMBOL	PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
V _{IN}	Input Supply Range		5		12	V
V _{OUT}	Output Voltage Range	V _{IN} = 5V, I _{LOAD} = 350mA	-11.64	-12	-12.36	V
Ripple		V _{IN} = 5V, I _{LOAD} = 350mA		10		mV
Efficiency		V _{IN} = 5V, I _{LOAD} = 350mA		80		%
Switching Frequency				2		MHz

QUICK START PROCEDURE

Demonstration circuit 1144A is easy to set up to evaluate the performance of the LT3580EDD. Refer to **Error! Reference source not found.** and Figure 2 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 VIN or VOUT and GND terminals. See **Error! Reference source not found.** for proper scope probe technique.

1. Place jumpers in the following positions:
JP1 ON
2. With power off, connect the input power supply to VIN and GND.
3. Turn on the power at the input.
4. Check for the proper output voltages.

NOTE: If there is no output, temporarily disconnect the load to make sure that the load is not set too high.

5. Once the proper output voltage is established, adjust the load within the operating range and observe the output voltage regulation, ripple voltage, efficiency and other parameters.

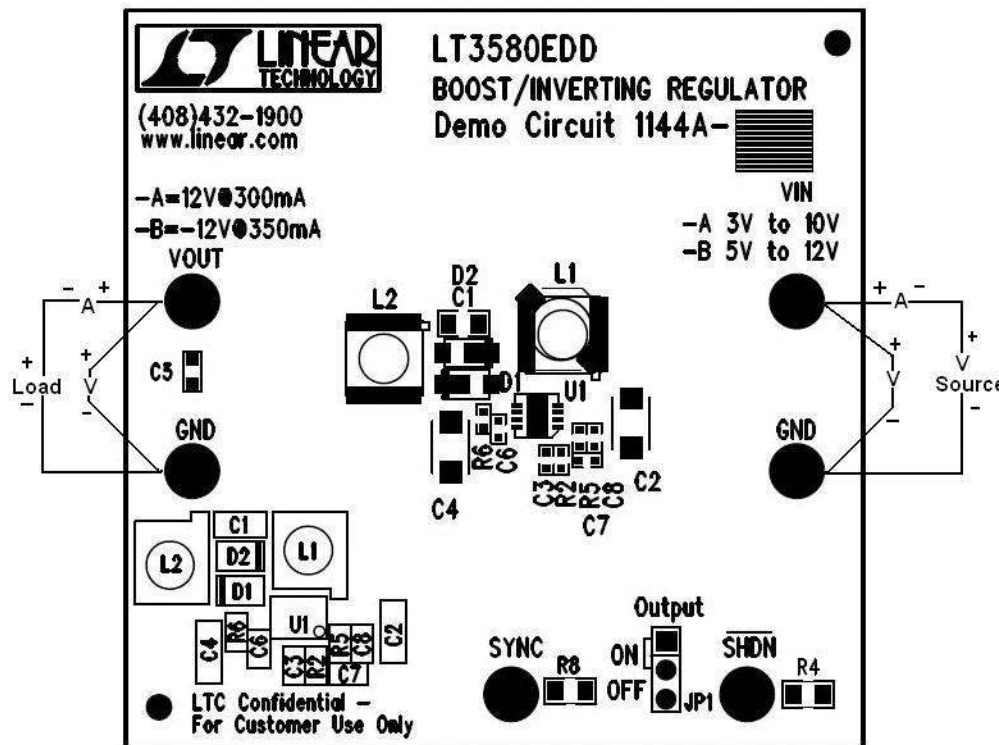


Figure 1. Proper Measurement Equipment for DC1144A-A

QUICK START PROCEDURE

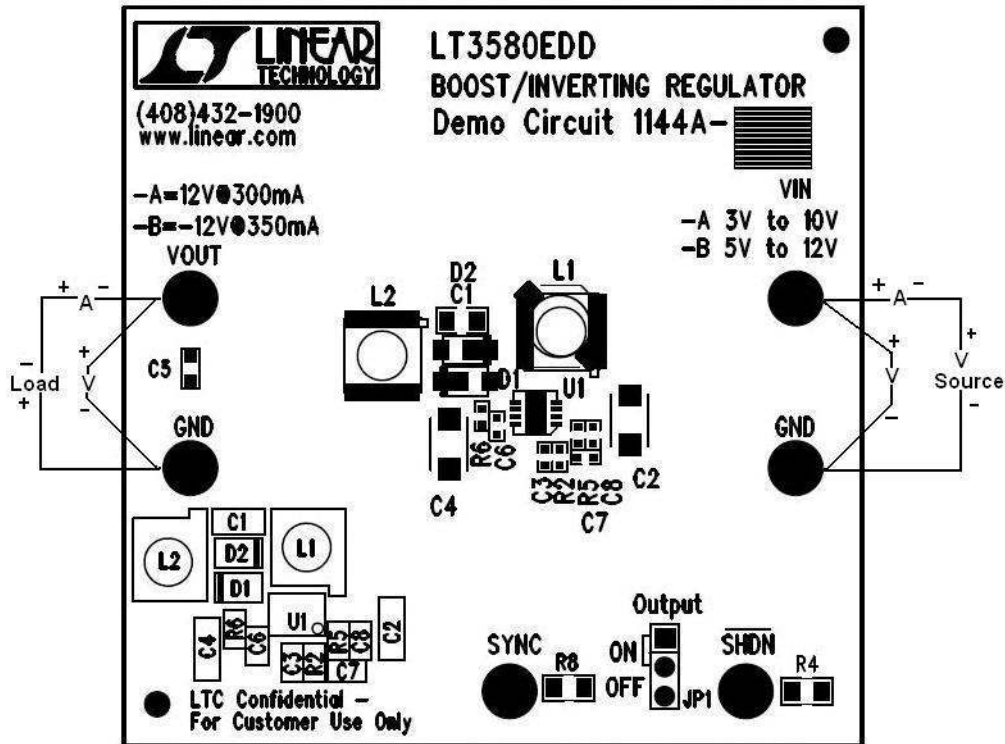


Figure 2. Proper Measurement Equipment for DC1144A-B

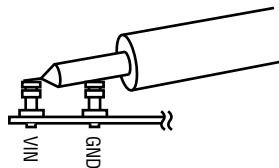


Figure 3. Measurement Input and Output Ripple

QUICK START PROCEDURE

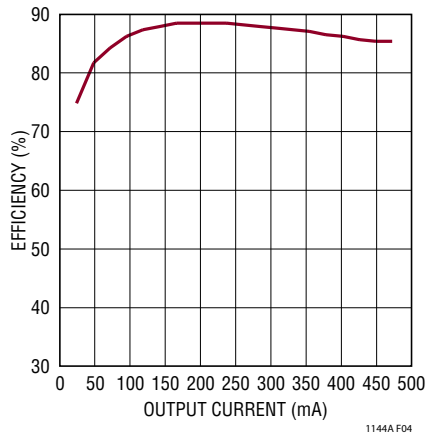


Figure 4. Boost Converter Efficiency at 4.2V_{IN}

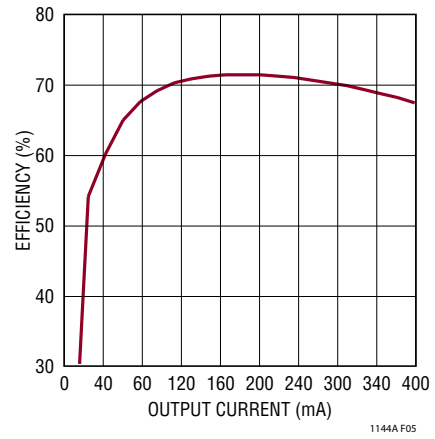


Figure 5. Inverting Regulator Efficiency at 5V_{IN}

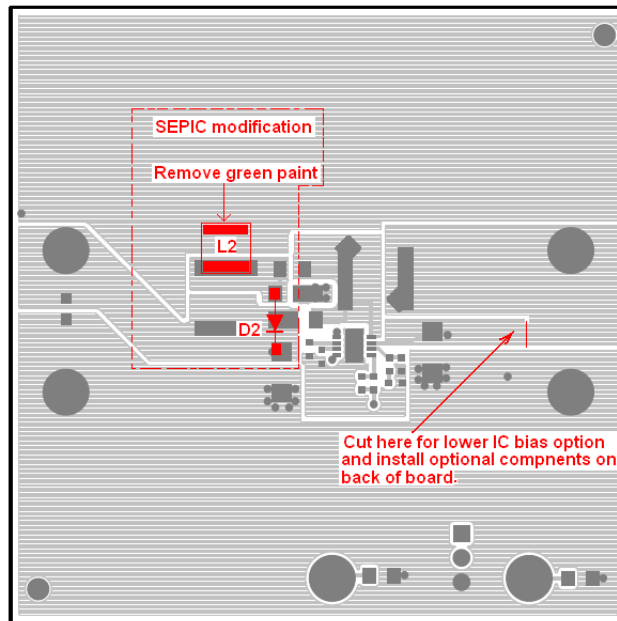


Figure 6. Optional Modifications to Convert DC1144A-B to ZEPIC Converter and/or Use Separate Regulator to Bias IC

PARTS LIST

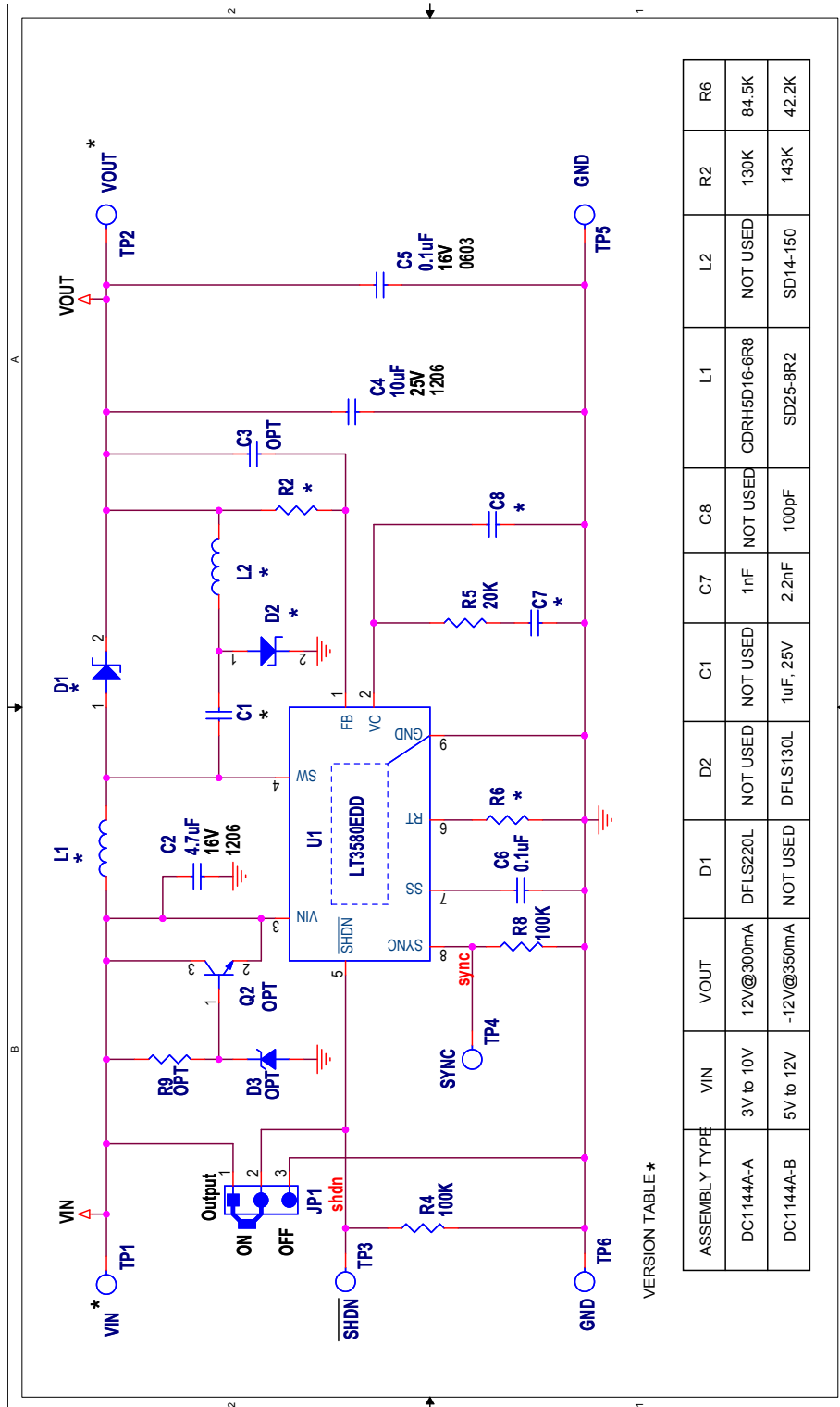
QTY	REFERENCE	PART DESCRIPTION	MANUFACTURER/PART NUMBER
Required Circuit Components for Boost Converter			
1	C2	CAP., X5R, 4.7 μ F, 16V, 20% 1206	TAIYOYUDEN, EMK316BJ475ML
1	C4	CAP., X5R, 10 μ F, 25V, 20% 1206	TAIYOYUDEN, TMK316ABJ106ML-T
1	C7	CAP., X7R, 1000pF, 16V, 10% 0402	MURATA, GRM155R71C102KA01D
1	D1	DIODE, SCHOTTKY RECTIFIER 2A, POWER D123	DIODES INC., DFLS220L-7
1	L1	INDUCTOR, 6.8 μ H	SUMIDA, CDRH5D16NP-6R8NC
1	R2	RES., CHIP, 130k, 1/6W, 1% 0402	VISHAY, CRCW0402133KFKED
1	R5	RES., CHIP, 20k, 1/16W, 1% 0402	VISHAY, CRCW040220K0FKED
1	R6	RES., CHIP, 84.5k, 1/6W, 1% 0402	VISHAY, CRCW040284K5FKED
1		FAB, PRINTED CIRCUIT BOARD	DEMO CIRCUIT 1144A-A
1	C6	CAP., X7R, 0.1 μ F, 16V, 10% 0402	AVX, 0402YC104KAT2A
1	U1	LT3580EDD, 8-LEAD PLASTIC DFN (3X3)	LINEAR TECH., LT3580EDD#PBF
Additional Demo Board Circuit Components			
0	C3 (OPT)	CAP., 0402	
1	C5	CAP., X7R, 0.1 μ F, 16V, 10% 0603	AVX, 0603YC104KAT2A
0	C8 (OPT)	CAP., 0402	
0	D3 (OPT)		
6	TP1-TP6	TESTPOINT, TURRET	MILL MAX 2501-2-00-80-00-00-07-0
1	JP1	0.079 SINGLE ROW HEADER, 3 PIN	SAMTEC, TMM103-02-L-S
1	XJP	SHUNT	SAMTEC, 2SN-BK-G
0	Q2 (OPT)		
2	R4, R8	RES., CHIP, 100k, 1/10W, 1% 0805	VISHAY, CRCW0805100KFKEA
0	R9 (OPT)		
Required Circuit Components for Inverting Regulator			
1	C1	CAP., X5R, 1 μ F, 25V, 10%, 0805	AVX, 08053D105KAT
1	C2	CAP., X5R, 4.7 μ F, 16V, 20% 1206	TAIYOYUDEN, EMK316BJ475ML
1	C4	CAP., X5R, 10 μ F, 25V, 20% 1206	TAIYOYUDEN, TMK316ABJ106ML-T
1	C6	CAP., X5R, 0.1 μ F, 16V, 10% 0402	AVX, 0402YC104KAT2A
1	C7	CAP., X7R, 2200pF, 16V, 10% 0402	MURATA, GRM155R71C222KA01D
1	C8	CAP., NPO, 100pF, 25, 10%, 0402	AVX, 04023A101KAT2A
1	D2	DIODE, SCHOTTKY RECTIFIER 2A, POWER D123	DIODES INC., DFLS130L-7
1	L1	INDUCTOR, 8.2 μ H	COOPER BUSSMANN, SD25-8R2-R
1	L2	INDUCTOR, 15 μ H	COOPER BUSSMANN, SD14-150-R
1	R2	RES., CHIP, 143k, 1/6W, 1% 0402	VISHAY, CRCW0402143KFKED
1	R5	RES., CHIP, 20k, 1/16W, 1% 0402	VISHAY, CRCW040220K0FKED
1	R6	RES., CHIP, 42.2k, 1/6W, 1% 0402	VISHAY, CRCW040242K2FKED
1		FAB, PRINTED CIRCUIT BOARD	DEMO CIRCUIT 1144A-B
1	U1	LT3580EDD, 8-LEAD PLASTIC DFN (3X3)	LINEAR TECH., LT3580EDD#PBF

DEMO MANUAL DC1144A

PARTS LIST

QTY	REFERENCE	PART DESCRIPTION	MANUFACTURER/PART NUMBER
Additional Demo Board Circuit Components			
0	C3 (OPT)	CAP., 0402	
1	C5	CAP., X7R, 0.1 μ F, 16V, 10% 0603	AVX, 0603YC104KAT2A
0	D3 (OPT)		
6	TP1-TP6	TESTPOINT, TURRET	MILL MAX 2501-2-00-80-00-00-07-0
1	JP1	0.079 SINGLE ROW HEADER, 3 PIN	SAMTEC, TMM103-02-L-S
1	XJP	SHUNT	SAMTEC, 2SN-BK-G
0	Q2 (OPT)		
2	R4, R8	RES., CHIP, 100k, 1/10W, 1% 0805	VISHAY, CRCW0805100KFKEA
0	R9 (OPT)		

SCHEMATIC DIAGRAM



VERSION TABLE *

ASSEMBLY TYPE	VIN	VOUT	D1	D2	C1	C7	C8	L1	L2	R2	R6
DC1144A-A	3V to 10V	12V@300mA	DFLS220L	NOT USED	NOT USED	1nF	NOT USED	CDRH6D16-6R8	NOT USED	130K	84.5K
DC1144A-B	5V to 12V	-12V@350mA	NOT USED	DFLS130L	1uF, 25V	2.2nF	100pF	SD25-8R2	SD14-150	143K	42.2K

DEMO MANUAL DC1144A

DEMONSTRATION BOARD IMPORTANT NOTICE

Linear Technology Corporation (LTC) provides the enclosed product(s) under the following **AS IS** conditions:

This demonstration board (DEMO BOARD) kit being sold or provided by Linear Technology is intended for use for **ENGINEERING DEVELOPMENT OR EVALUATION PURPOSES ONLY** and is not provided by LTC for commercial use. As such, the DEMO BOARD herein may not be complete in terms of required design-, marketing-, and/or manufacturing-related protective considerations, including but not limited to product safety measures typically found in finished commercial goods. As a prototype, this product does not fall within the scope of the European Union directive on electromagnetic compatibility and therefore may or may not meet the technical requirements of the directive, or other regulations.

If this evaluation kit does not meet the specifications recited in the DEMO BOARD manual the kit may be returned within 30 days from the date of delivery for a full refund. **THE FOREGOING WARRANTY IS THE EXCLUSIVE WARRANTY MADE BY THE SELLER TO BUYER AND IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED, IMPLIED, OR STATUTORY, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE. EXCEPT TO THE EXTENT OF THIS INDEMNITY, NEITHER PARTY SHALL BE LIABLE TO THE OTHER FOR ANY INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES.**

The user assumes all responsibility and liability for proper and safe handling of the goods. Further, the user releases LTC from all claims arising from the handling or use of the goods. Due to the open construction of the product, it is the user's responsibility to take any and all appropriate precautions with regard to electrostatic discharge. Also be aware that the products herein may not be regulatory compliant or agency certified (FCC, UL, CE, etc.).

No License is granted under any patent right or other intellectual property whatsoever. **LTC assumes no liability for applications assistance, customer product design, software performance, or infringement of patents or any other intellectual property rights of any kind.**

LTC currently services a variety of customers for products around the world, and therefore this transaction **is not exclusive**.

Please read the DEMO BOARD manual prior to handling the product. Persons handling this product must have electronics training and observe good laboratory practice standards. **Common sense is encouraged.**

This notice contains important safety information about temperatures and voltages. For further safety concerns, please contact a LTC application engineer.

Mailing Address:

Linear Technology
1630 McCarthy Blvd.
Milpitas, CA 95035

Copyright © 2004, Linear Technology Corporation