

Wide Input Voltage Range Boost/SEPIC/Inverting Controller

DESCRIPTION

The LT3759 is a current mode DC/DC controller operating over an input range of 1.6V to 42V, making it well suited for applications ranging from single-cell lithium-ion battery portable electronics to high voltage automotive and industrial power supplies. It also exhibits low shutdown quiescent current of 1 μ A, making it an ideal fit for battery operated systems. Thanks to a novel FBX pin architecture, the LT3759 can be connected directly to a divider from either a positive or negative output feedback voltage to ground. It also packs many popular features such as soft-start, input undervoltage lockout, adjustable frequency and synchronization in a small 12-lead exposed pad MSOP package.

Demonstration circuit 1725A features LT3759 in a 485kHz boost converter, designed for a 5V/2A output from a 1.8V to 4.5V input. The demo circuit configures the shutdown voltage at typical 1.70V, which means that the input voltage can be dropped to as low as 1.70V, once it starts up. The start-up voltage is set at 2.5V but can be adjusted by changing R1 and R2 values.

The LT3759 data sheet gives a complete description of the part, operation and application information. The data sheet must be read in conjunction with this quick start guide.

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

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 (T_A = 25°C)

PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
Input Voltage Range, V _{IN}	I _{OUT} = 0mA~2A	1.8		4.5	V
Minimum Start-up Voltage				2.5	V
Switching Frequency	I _{OUT} = 2A		485		kHz
Output Voltage, V _{OUT}	V _{IN} = 1.8V~4.5V I _{OUT} = 0mA~2A	4.85	5.0	5.15	v
Maximum Continuous Output Current, I _{OUT}	V _{IN} = 1.8V~4.5V	2.0			A
Output Voltage Ripple	V _{IN} = 2.5V, I _{OUT} = 2A		60		mV
Typical Efficiency	V _{IN} = 4.5V, I _{OUT} = 2A		90		%

QUICK START PROCEDURE

Demo circuit 1725A is easy to set up to evaluate the performance of LT3759. Refer to Figure 1 for proper measurement equipment setup and follow the procedure below.

1. With power off, connect the input power supply, load and meters as shown in Figure 1. Preset the load to 0A, and V_{IN} supply to be 0V. Place jumpers in the following positions for a typical 5V application:

EN (JP1)	SYNC (JP2)
ON	OFF

2. Turn on V_{IN} and increase slowly to 2.5V. Check for proper output voltages. The output should be regulated at 5V ($\pm 3\%$). The switching frequency should be about 485kHz.

NOTE: If there is no output, or the output is out of spec, temporarily disconnect the load to make sure that the load is not set too high, and the power supply current capability is above 7A. Minimize voltage drop over the input wires.

NOTE: Make sure that the input voltage does not exceed 4.5V. If higher operating voltage is required, power components with higher voltage ratings should be used.

3. Once the proper output voltage is established, adjust the input voltage and load within the operating range and observe the output voltage regulation, ripple voltage, efficiency and other parameters. Typical efficiency curve is shown in Figure 3.

NOTE: When measuring the input or output voltage ripples, 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} and GND, or V_{OUT} and GND terminals. See Figure 2 for proper scope probe technique.

QUICK START PROCEDURE

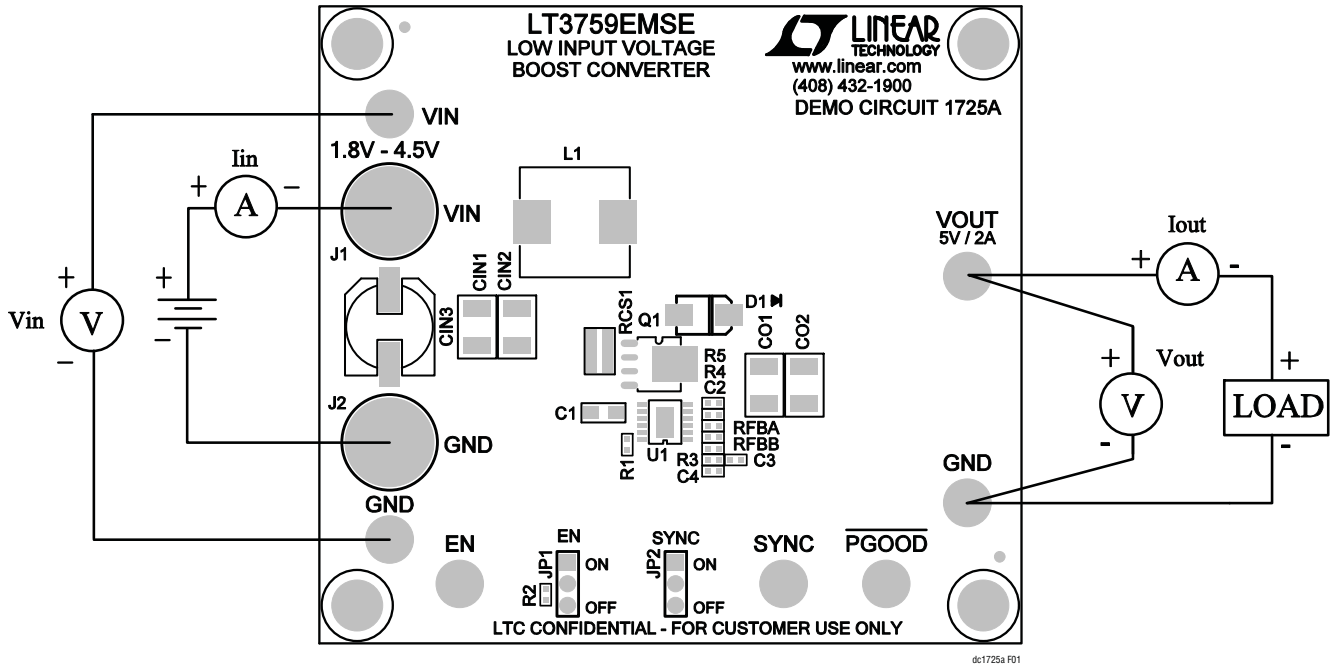


Figure 1. Proper Measurement Equipment Setup

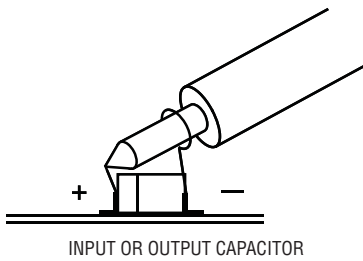


Figure 2. Proper Scope Probe Placement for Measuring Input or Output Ripple

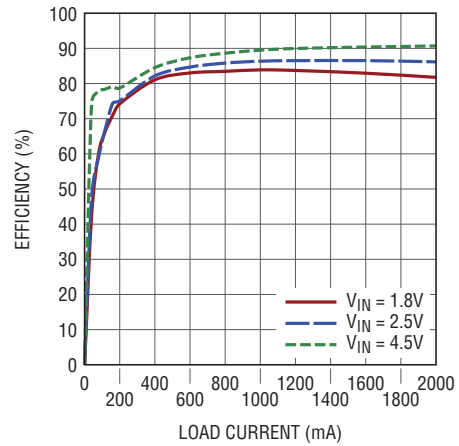


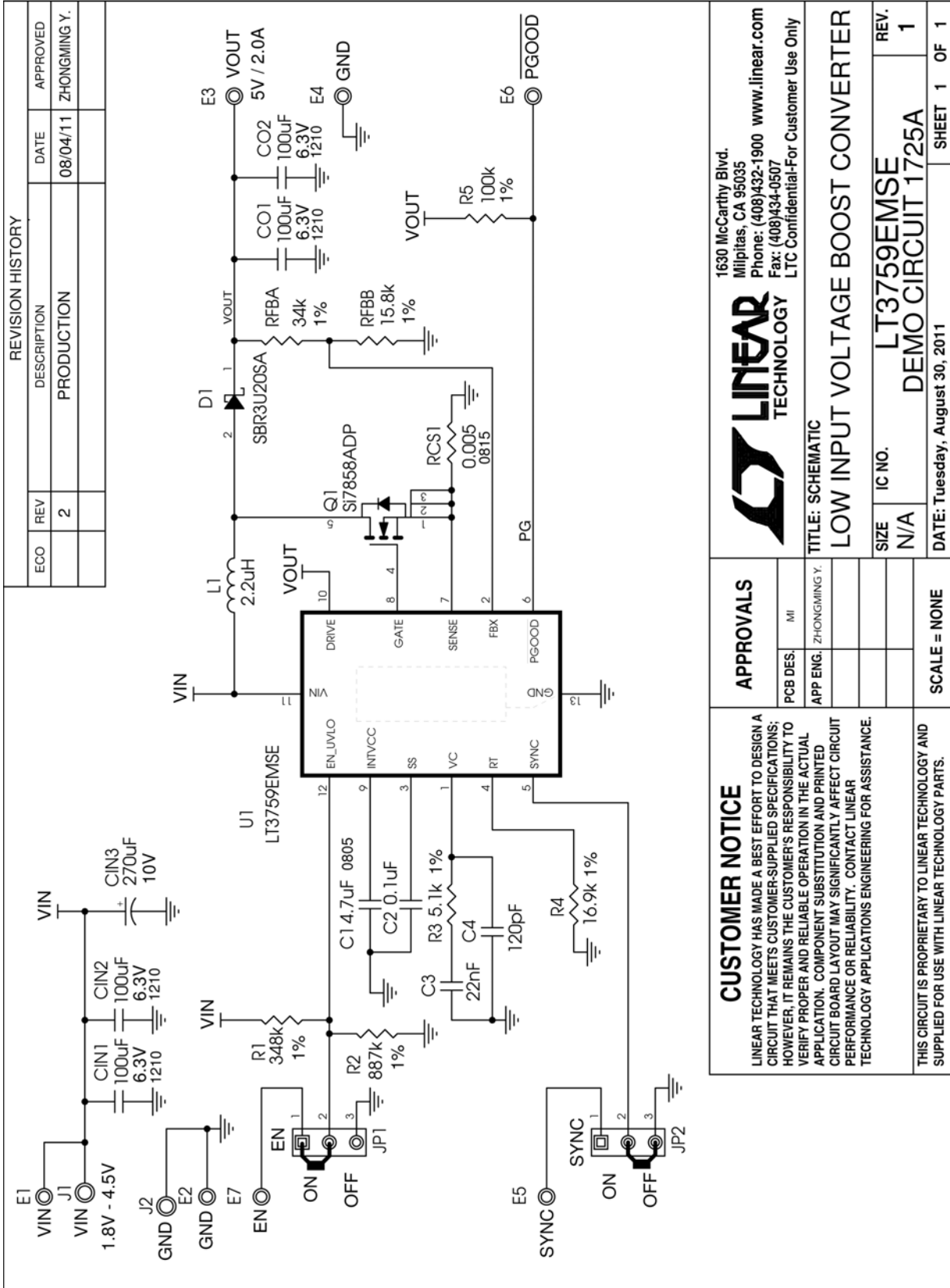
Figure 3. Efficiency with Different Input Voltages

DEMO MANUAL DC1725A

PARTS LIST

ITEM	QTY	REFERENCE	PART DESCRIPTION	MANUFACTURER/PART NUMBER
Required Circuit Components				
1	4	CO1, CIN1, CO2, CIN2	CAP, 1210, 100µF, 20%, 6.3V, X5R	MURATA GRM32ER60J107ME20L
2	1	CIN3	CAP, 270µF, 20%, 10V	SANYO 10SVPC270M
3	1	C1	CAP, 1206, 4.7µF, 10%, 50V, X5R	TAIYO YUDEN UMK316BJ475KL
4	1	C2	CAP, 0402, 0.1µF, 10%, 16V, X5R	AVX 0402YD104KAT2A
5	1	C3	CAP, 0402, 22nF, 10%, 25V, X7R	MURATA GRM155R71E223KA61D
6	1	C4	CAP, 0402, 120pF, 10% 25V, X7R	AVX 04023C121KAT2A
7	1	D1	DIODE, SCHOTTKY BARRIER RECTIFIER SMA	DIODES INC/ZETEX SBR3U20SA
8	1	L1	IND, 2.2µH	WÜRTH ELEKTRONIK 7443552200
9	1	Q1	XSTR, N-CHANNEL MOSFET	VISHAY Si7858ADP-T1-E3
10	1	RCS1	RES, 0815 0.005Ω, 1% 1W	SUSUMU/THIN FILM RL3720WT-R005-F
11	1	RFBA	RES, 0402, 34kΩ, 1%, 1/16W	VISHAY CRCW040234K0FKED
12	1	RFBB	RES, 0402, 15.8kΩ, 1%, 1/16W	VISHAY CRCW040215K8FKED
13	1	R1	RES, 0402, 348kΩ, 1%, 1/16W	VISHAY CRCW0402348KFKED
14	1	R2	RES, 0402, 887kΩ, 1%, 1/16W	VISHAY CRCW0402887KFKED
15	1	R3	RES, 0402, 5.1kΩ, 1%, 1/16W	VISHAY CRCW04025K10FKED
16	1	R4	RES, 0402, 16.9kΩ, 1%, 1/16W	VISHAY CRCW040216K9FKED
17	1	R5	RES, 0402, 100kΩ, 1%, 1/16W	VISHAY CRCW0402100KFKED
18	1	U1	IC, INVERTING CONVERTER	LINEAR TECH. LT3759EMSE
Hardware/Components (For Demo Board Only)				
1	7	E1-E7	TURRETS	MILLMAX 2501-2-00-80-00-00-07-0
2	2	JP1, JP2	HEADER, 3-PIN, 2mm	SAMTEC TMM-103-02-L-S
3	2	J1, J2	JACK, BANANA	KEYSTONE 575-4
4	2	JP1, JP2	SHUNT, 2mm	SAMTEC 2SN-BK-G
5	4	MH1, MH2, MH3, MH4	STANDOFF, SNAP ON	KEYSTONE 8834
6	1		FAB, PRINTED CIRCUIT BOARD	DEMO CIRCUIT 1725A
7	1		STENCIL FOR BOTH SIDES	STENCIL 1725A

SCHEMATIC DIAGRAM



LINEAR TECHNOLOGY

1630 McCarthy Blvd.
Milpitas, CA 95035
Phone: (408)432-1900 www.linear.com
Fax: (408)434-0507
LTC Confidential-For Customer Use Only

TITLE: SCHEMATIC
LOW INPUT VOLTAGE BOOST CONVERTER

SIZE	IC NO.	REV.	
N/A	LT3759EMSE	1	
DATE: Tuesday, August 30, 2011		SHEET 1 OF 1	

APPROVALS	
PCB DES.	MI
APP ENG. ZHONGMING Y.	

SCALE = NONE

CUSTOMER NOTICE

LINEAR TECHNOLOGY HAS MADE A BEST EFFORT TO DESIGN A CIRCUIT THAT MEETS CUSTOMER-SUPPLIED SPECIFICATIONS; HOWEVER, IT REMAINS THE CUSTOMER'S RESPONSIBILITY TO VERIFY PROPER AND RELIABLE OPERATION IN THE ACTUAL APPLICATION. COMPONENT SUBSTITUTION AND PRINTED CIRCUIT BOARD LAYOUT MAY SIGNIFICANTLY AFFECT CIRCUIT PERFORMANCE OR RELIABILITY. CONTACT LINEAR TECHNOLOGY APPLICATIONS ENGINEERING FOR ASSISTANCE.

THIS CIRCUIT IS PROPRIETARY TO LINEAR TECHNOLOGY AND SUPPLIED FOR USE WITH LINEAR TECHNOLOGY PARTS.

DEMO MANUAL DC1725A

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

X-ON Electronics

Largest Supplier of Electrical and Electronic Components

Click to view similar products for [Power Management IC Development Tools](#) category:

Click to view products by [Analog Devices](#) manufacturer:

Other Similar products are found below :

[EVAL-ADM1168LQEBZ](#) [EVB-EP5348UI](#) [MIC23451-AAAYFL EV](#) [MIC5281YMME EV](#) [DA9063-EVAL](#) [ADP122-3.3-EVALZ](#) [ADP130-0.8-EVALZ](#) [ADP130-1.2-EVALZ](#) [ADP130-1.5-EVALZ](#) [ADP130-1.8-EVALZ](#) [ADP1714-3.3-EVALZ](#) [ADP1716-2.5-EVALZ](#) [ADP1740-1.5-EVALZ](#) [ADP1752-1.5-EVALZ](#) [ADP1828LC-EVALZ](#) [ADP1870-0.3-EVALZ](#) [ADP1871-0.6-EVALZ](#) [ADP1873-0.6-EVALZ](#) [ADP1874-0.3-EVALZ](#) [ADP1882-1.0-EVALZ](#) [ADP199CB-EVALZ](#) [ADP2102-1.25-EVALZ](#) [ADP2102-1.875EVALZ](#) [ADP2102-1.8-EVALZ](#) [ADP2102-2-EVALZ](#) [ADP2102-3-EVALZ](#) [ADP2102-4-EVALZ](#) [ADP2106-1.8-EVALZ](#) [ADP2147CB-110EVALZ](#) [AS3606-DB](#) [BQ24010EVM](#) [BQ24075TEVM](#) [BQ24155EVM](#) [BQ24157EVM-697](#) [BQ24160EVM-742](#) [BQ24296MEVM-655](#) [BQ25010EVM](#) [BQ3055EVM](#) [NCV891330PD50GEVB](#) [ISLUSBI2CKIT1Z](#) [LM2744EVAL](#) [LM2854EVAL](#) [LM3658SD-AEV/NOPB](#) [LM3658SDEV/NOPB](#) [LM3691TL-1.8EV/NOPB](#) [LM4510SDEV/NOPB](#) [LM5033SD-EVAL](#) [LP38512TS-1.8EV](#) [EVAL-ADM1186-1MBZ](#) [EVAL-ADM1186-2MBZ](#)