LT3759
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 1µA, 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

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 (±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

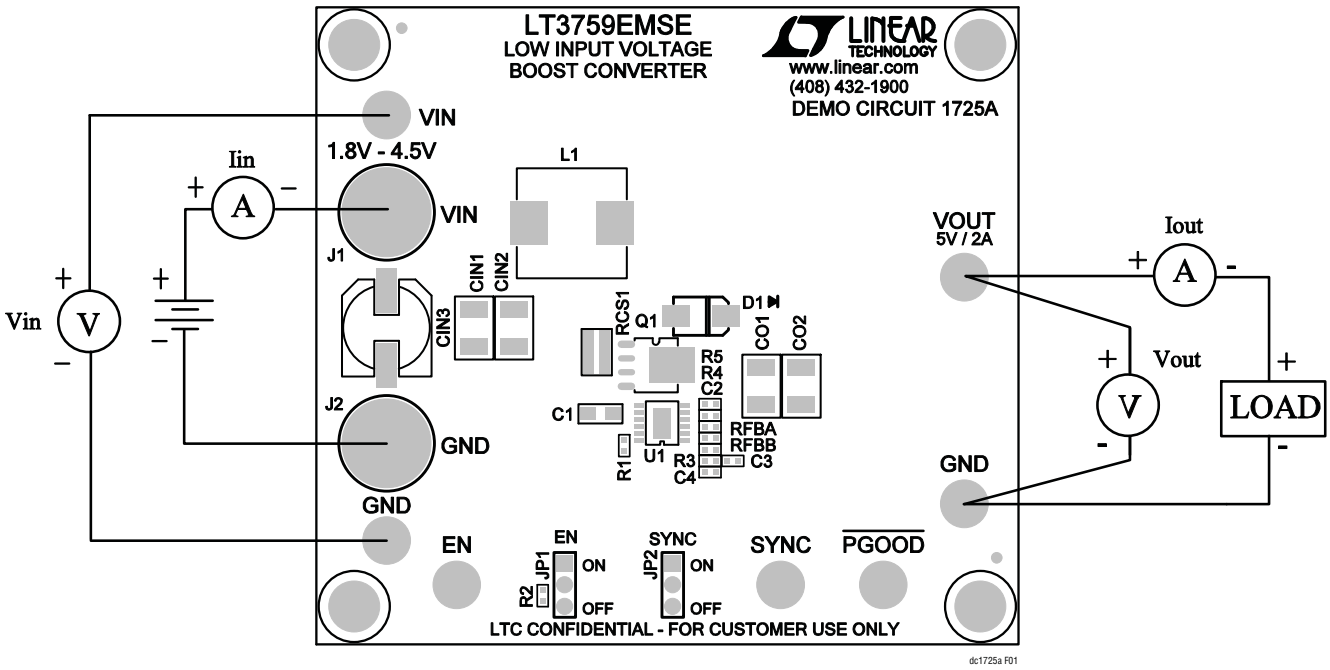


Figure 1. Proper Measurement Equipment Setup

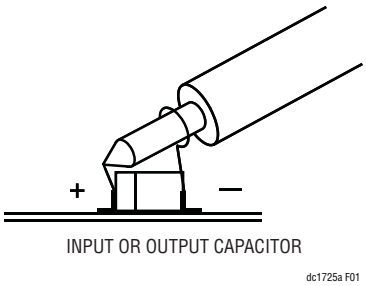


Figure 2. Proper Scope Probe Placement for Measuring Input or Output Ripple

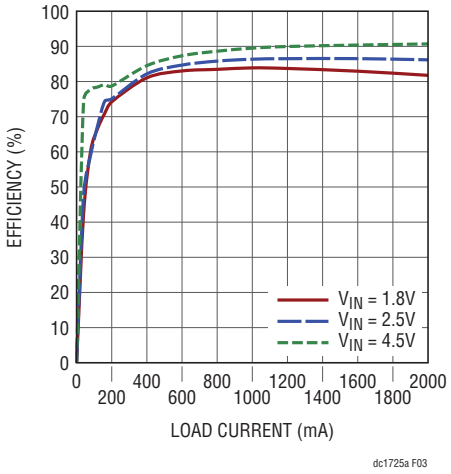
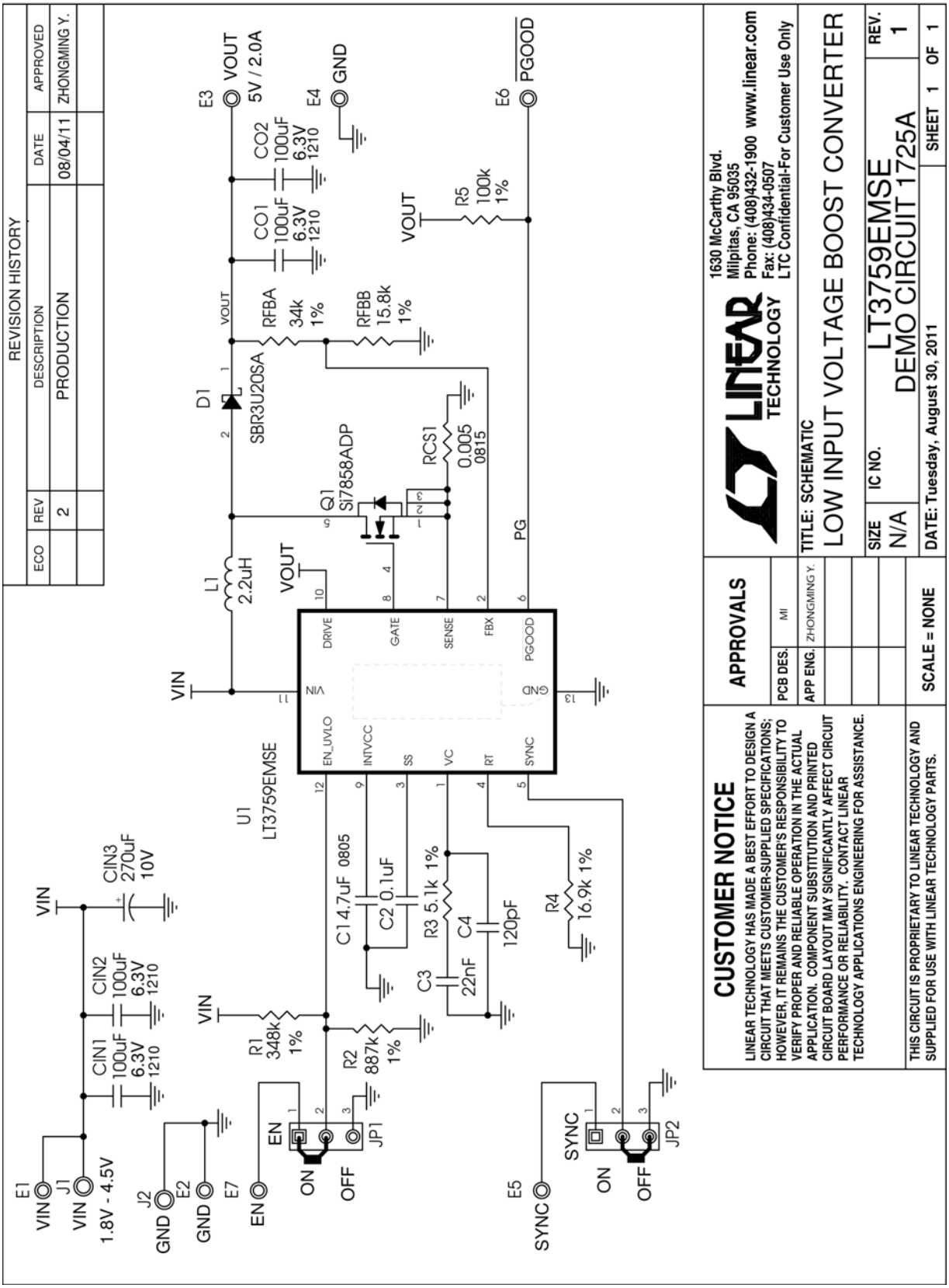


Figure 3. Efficiency with Different Input Voltages

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



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