

Non-Opto Isolated Flyback Converter

DESCRIPTION

Demonstration circuit 1557A is an Non-Opto Isolated Flyback Converter featuring LT3748EMS. It is designed for 12V output from a 30V to 75V DC input. The output current is up to 1A. The part senses the isolated output voltage directly from the primary side flyback waveform during the off time of the power switch. No third winding, opto-coupler or signal transformer is required for regulation. A minimum load of approximately 2% of maximum load is required on the output. Table 1 summarizes the performance of the demo board.

The demo circuit can be easily modified for applications of different input, and output voltages/currents. Some pre-designed EP10, EP13 transformers from vendors such as Würth Electronics, Sumida, Pulse Engineering and Coilcraft can be assembled on the board.

The LT3748EMS is a high input voltage isolated flyback controller operating with input supply voltages from 5V to 100V. The LT3748EMS utilizes boundary mode operation

to provide a high efficiency, small size solution with improved load regulation of $\pm 5\%$ over the full line, load and temperature ranges. The LT3748EMS is well suited for a wide variety of industrial, automotive, medical, telecom, data-com applications, where regulated isolated output is required.

The LT3748EMS datasheet gives a complete description of the part, operation and application information. The datasheet should be read in conjunction with this quick start guide for Demo Circuit 1557A.

Design files for this circuit board are available. Call the LTC Factory.


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Table 1. Performance Summary of DC1557A ($T_A = 25^{\circ}\text{C}$)

PARAMETER	CONDITION	VALUE
Minimum Input Voltage		30V
Maximum Input Voltage		75V
Output Voltage, VOUT	VIN=30V~75V IOUT=20mA~1A	12.0V $\pm 5\%$
Output Current, IOUT	VIN=30V~75V	1.0A

QUICK START PROCEDURE

Demo circuit 1557A is easy to set up to evaluate the performance of the LT3748EMS. Refer to Figure 1 for proper measurement equipment setup and follow the procedure below.

1. With power off, connect the input power supply to VIN and GND.
2. Connect the load to the terminals VOUT+ and VOUT- on the board. Apply 20mA load to the output.

3. Turn on the power at the input. Increase VIN to 30V.

NOTE. Make sure that the input voltage does not exceed 75V.

4. Check for the proper output voltages. The output should be regulated at 12V ($\pm 5\%$).

NOTE. If there is no output, temporarily disconnect the power supply. Make sure that the load is connected with correct polarity. If the output voltage is out of spec, make sure minimum load current is applied to the output, the load is not set too high, and the current of power supply is below current limit.

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

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 VIN and GND, or VOUT+ and VOUT- terminals. See Figure 2 for proper scope probe technique.

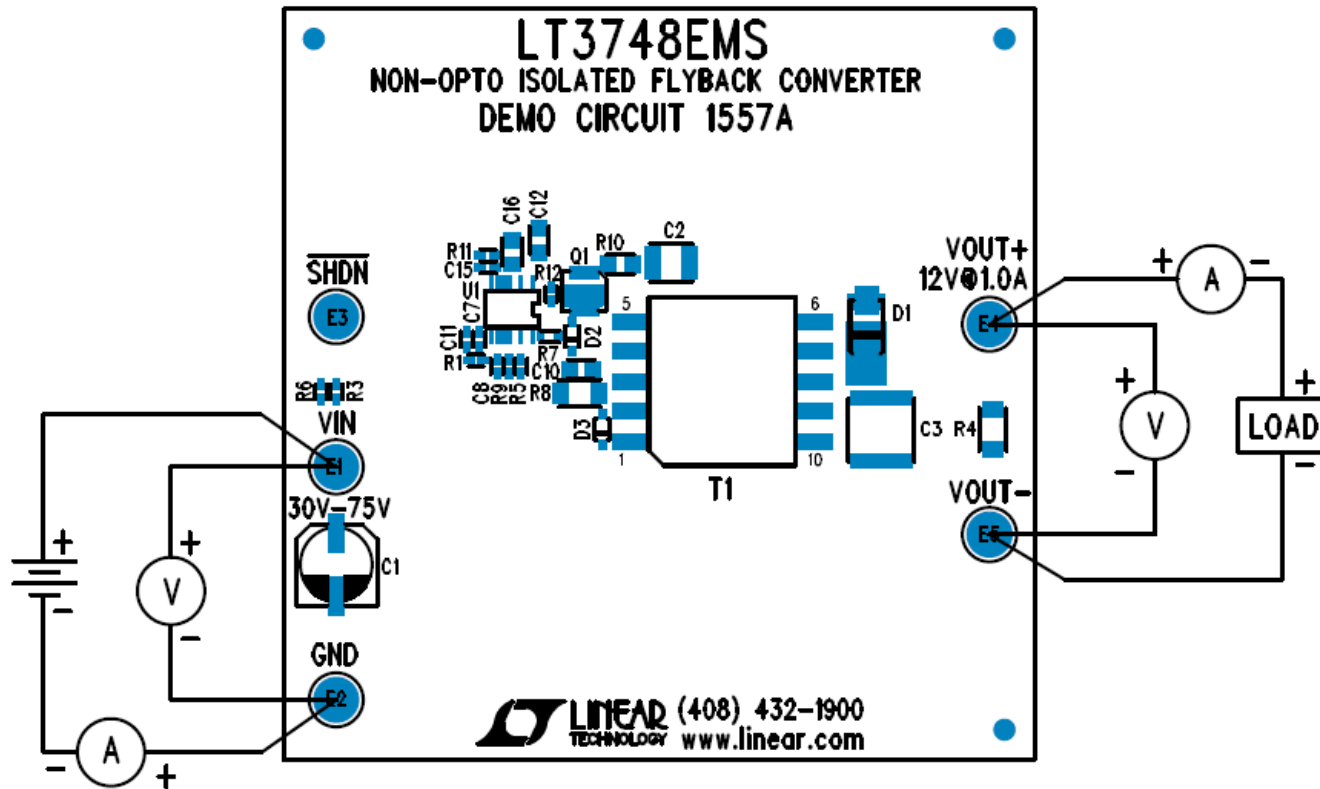


Figure 1. Proper Measurement Equipment Setup

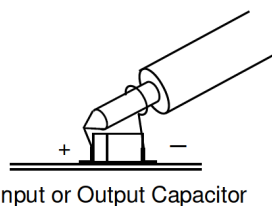
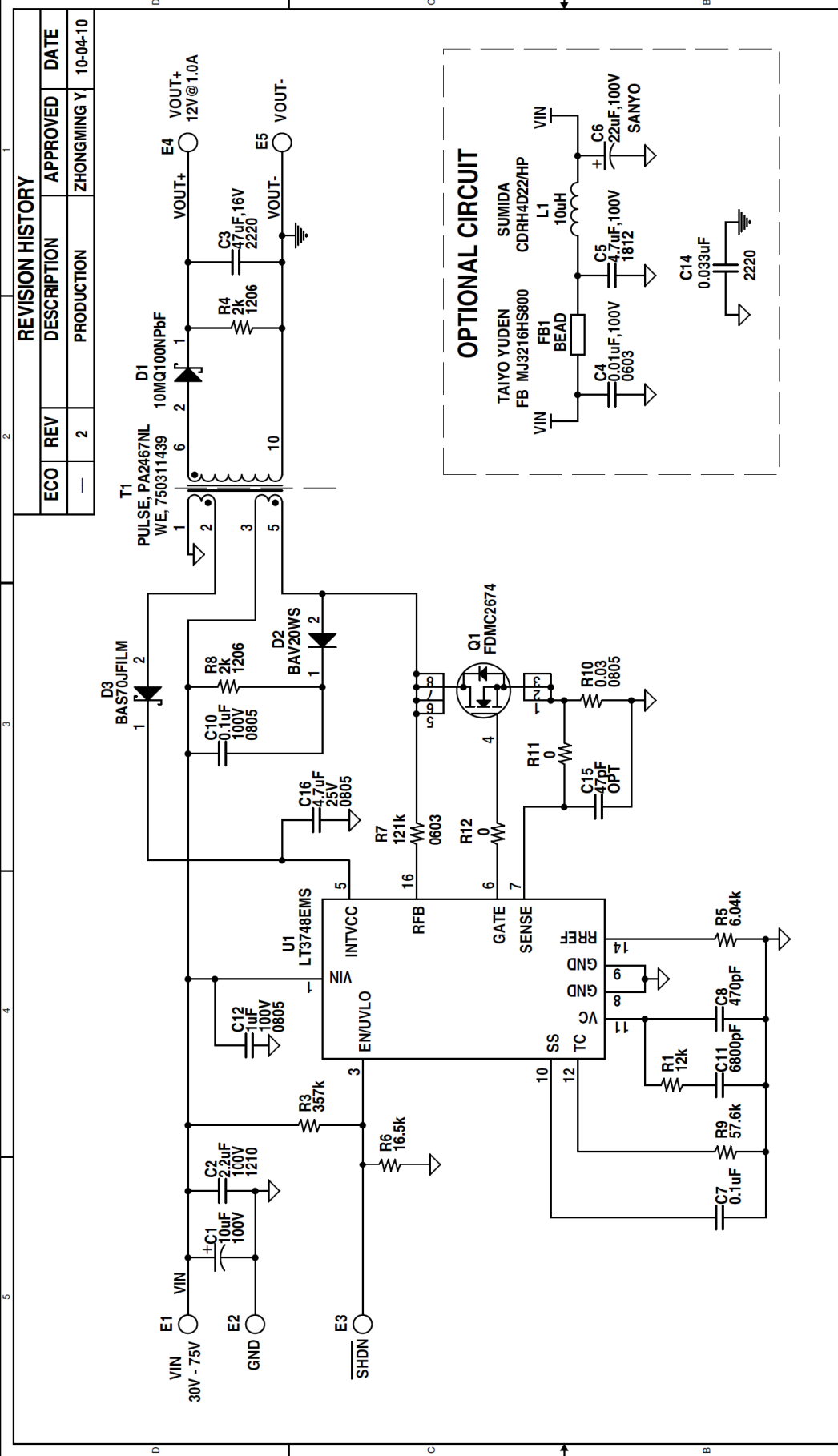


Figure 2. Proper Scope Probe Placement for Measuring Input or Output Ripple



REVISION HISTORY				
ECO	REV	DESCRIPTION	APPROVED	DATE
—	2	PRODUCTION	ZHONGMING Y	10-04-10

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NON-OPTO ISOLATED FLYBACK CONVERTER

SIZE: N/A IC NO.: LT3748EMS REV.: 2
DATE: Monday, October 04, 2010 SHEET 1 OF 1

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.

APPROVALS
PCB DES: KT
APP ENG: ZHONGMING Y.
SCALE = NONE

NOTE: UNLESS OTHERWISE SPECIFIED

1. ALL RESISTORS ARE IN OHMS, 0402
ALL CAPACITORS ARE IN MICROFARADS, 0402.

LT3748EMS

Linear Technology Corporation
LT3748EMS

Bill of Materials
Demo Bd. #1557A

Item	Qty	Reference	Part Description	Manufacturer / Part #
REQUIRED CIRCUIT COMPONENTS:				
1	1	C1	CAP., ELECTROLYTIC, 10uF 100V, 6.3x8	NIC, NACEW100M100V6.3X8TR13F
2	1	C2	CAP., X7R, 2.2uF 100V, 1210	TDK, C3225X7R2A225M
3	1	C3	CAP., X7R, 47uF 16V, 2220	TDK, C5750X7R1C476M
4	1	C7	CAP., X7R, 0.1uF 16V, 0402	TDK, C1005X7R1C104K
5	1	C8	CAP., C0G, 470pF 50V, 0402	TDK, C1005C0G1H471M
6	1	C10	CAP., X7R, .1uF 100V, 0805	TDK, C2012X7R2A104K
7	1	C11	CAP., X7R, 6800pF 25V, 0402	TDK, C1005X7R1E682K
8	1	C12	CAP., X7S, 1uF 100V, 0805	TDK, C2012X7S2A105K
9	1	C13	CAP., C0G, 10pF 50V, 0402	TDK, C1005C0G1H100M
10	1	C16	CAP., X5R, 4.7uF, 25V, 0805	TDK, 2012X5R1E475K
11	1	D1	SCHOTTKY BARRIER RECTIFIER 2.1A,SMA-DIODE	VISHAY, VS-10MQ100NPbF
12	1	D2	SCHOTTKY MINI, SOD323	DIODES/ZETEX., BAV20WS-7-F
13	1	D3	DE, SCHOTTKY MINI, SOD323	DIODES/ZETEX., 1N5711WS-7-F
14	1	Q1	MOSFET N-CH, POWER33	FAIRCHILD SEMI., FDMC2674
15	1	R1	RES., CHIP, 12K Ω , 0402	VISHAY, CRCW040212K0FKED
16	1	R3	RES., CHIP, 357K Ω , 0402	NIC, NRC04F3573TRF
17	2	R4,R8	RES., CHIP, 2K Ω , 1206	VISHAY, CRCW12062K00FKEA
18	1	R5	RES., CHIP, 6.04K Ω , 0402	NIC, NRC04F6041TRF
19	1	R6	RES., CHIP, 16.5K Ω , 0402	VISHAY, CRCW040216K5FKED
20	1	R7	RES., CHIP, 121K Ω , 0603	VISHAY, CRCW0603121KFKED
21	1	R9	RES., CHIP, 57.6K Ω , 0402	VISHAY, CRCW040257K6FKED
22	1	R10	RES., SENSE, 0.03, 0805	VISHAY, WSL0805R0300FEA
23	2	R11,R12	RES., CHIP, 0 Ω , 0402	VISHAY, CRCW04020000Z0ED
24	1	T1	XFMR, FLYBACK, TRANS-PULSE-EP13	PULSE, PA2467NL, or WURTH, 750311439
25	1	U1	IC., LT3748EMS, MSE16(12)	LINEAR TECH., LT3748EMS
ADDITIONAL DEMO BOARD CIRCUIT COMPONENTS:				
1	0	C4 (OPT)	CAP., X7R, 0.01uF 50V, 0603	TDK, C1608X7R1H103K
2	0	C5 (OPT)	CAP., X7R, 4.7uF 100V, 1210	TDK, C4532X7S2A475M
3	0	C6 (OPT)	CAP., 22uF 100V	OPT
4	0	C14 (OPT)	CAP., 0.033uF, 2220	OPT
5	0	C15 (OPT)	CAP., NPO, 47pF 50V, 0402	OPT
6	0	FB1 (OPT)	BEAD, 1206	TAIYO YUDEN, FB MJ3216HS800
7	0	L1 (OPT)	IND, PWR, 10UH, L-CDRH4D22/HP	SUMIDA, CDRH4D22HPNP-100MC
8	0	R2 (OPT)	RES., CHIP, 0603	OPT
HARDWARE-FOR DEMO BOARD ONLY:				
1	5	E1,E2,E3,E4,E5	TP, TURRET, 0.094"	MILL-MAX, 2501-2-00-80-00-00-07-0