

Offline Isolated Flyback  
LED Driver with PFC

## DESCRIPTION

Demonstration circuit 1744A is an off-line isolated flyback converter featuring the LT<sup>®</sup>3799. The demo board is designed to drive a single LED from an input voltage range of 90V AC to 270V AC. It is also designed to comply with IEC 61000-3-2 Class C harmonics standard and EN55015B conducted EMI standard.

The LT3799 controls an isolated flyback converter in boundary mode, suitable for LED applications requiring 4W to over 100W of LED power. Its novel current sensing scheme delivers a well-regulated output current to the secondary side without using an opto-coupler. Its unique bleeder circuit makes the LED driver compatible with

TRIAC dimmers without additional components. Open- and shorted-LED protection ensures long-term reliability.

The LT3799 is available in a low profile, thermally-enhanced 16-lead MSOP package.

The LT3799 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 for demo circuit 1744A.

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

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## PERFORMANCE SUMMARY (T<sub>A</sub> = 25°C)

PARAMETER	CONDITIONS	VALUE (TYPICAL)
Input Range	Line Frequency, 50Hz/60Hz	90V AC to 270V AC
Output Current I <sub>OUT</sub>	V <sub>IN</sub> = 120V AC, V <sub>LED</sub> = 3.6V	1.07A
Maximum Output Voltage		5V
Minimum Output Voltage		3V

## QUICK START PROCEDURE

### IMPORTANT NOTE TO CUSTOMERS:

HIGH VOLTAGES ARE PRESENTED ON THE DEMO CIRCUIT, AND CAN LEAD TO LETHAL INJURIES TO HUMAN BODY. ONLY QUALIFIED PERSONNEL SHOULD OPERATE IT. IT IS STRONGLY RECOMMENDED TO USE SAFETY GLASSES AND AN ISOLATION TRANSFORMER.

NOTE. IMPROPER COMPONENTS REPLACEMENT ON THE DEMO CIRCUIT CAN CAUSE PERFORMANCE DEGRADATIONS, CIRCUIT MALFUNCTION, PROPERTY DAMAGE, AND EVEN LIFE-THREATENING INJURIES. CONTACT LINEAR TECHNOLOGY APPLICATIONS ENGINEERS FOR PROPER COMPONENT REPLACEMENT.

Demonstration circuit 1744A is easy to set up to evaluate the performance of the LT3799. Refer to Figure 1 for proper measurement equipment setup and follow the procedure below:

1. Connect a 1A LED between LED<sup>+</sup> and LED<sup>-</sup> terminals.
2. With power off, connect the input power supply to Line (L) Input and Neutral (N) Input.

3. Turn on the power at the input.

NOTE: Make sure that the input voltage does not exceed the maximum input voltage (270V AC).

4. Check for the proper output current.

Once the proper output currents are established, adjust the input voltage and/or the load and observe the output current regulation, efficiency, power factor and other parameters.

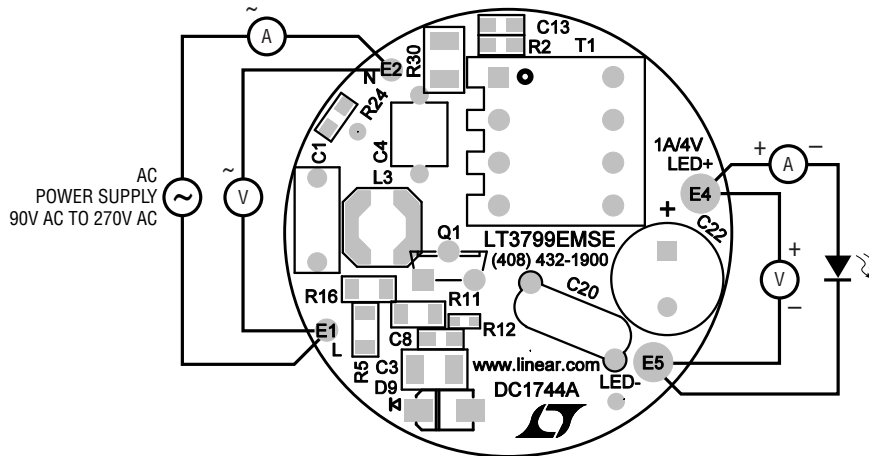
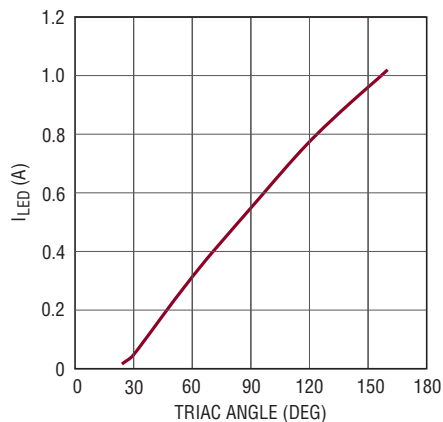


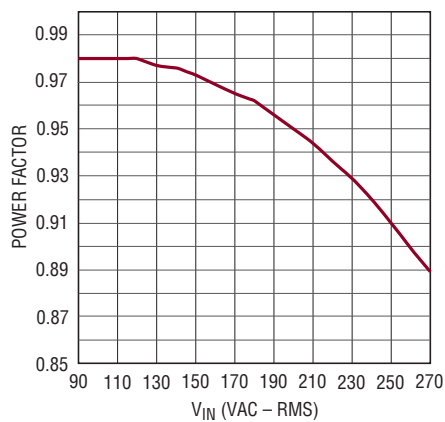
Figure 1. Proper Measurement Equipment Setup

**QUICK START PROCEDURE**



DC1744 F02

**Figure 2. LED Current vs TRIAC Angle (120V AC Application)**



DC1744A F03

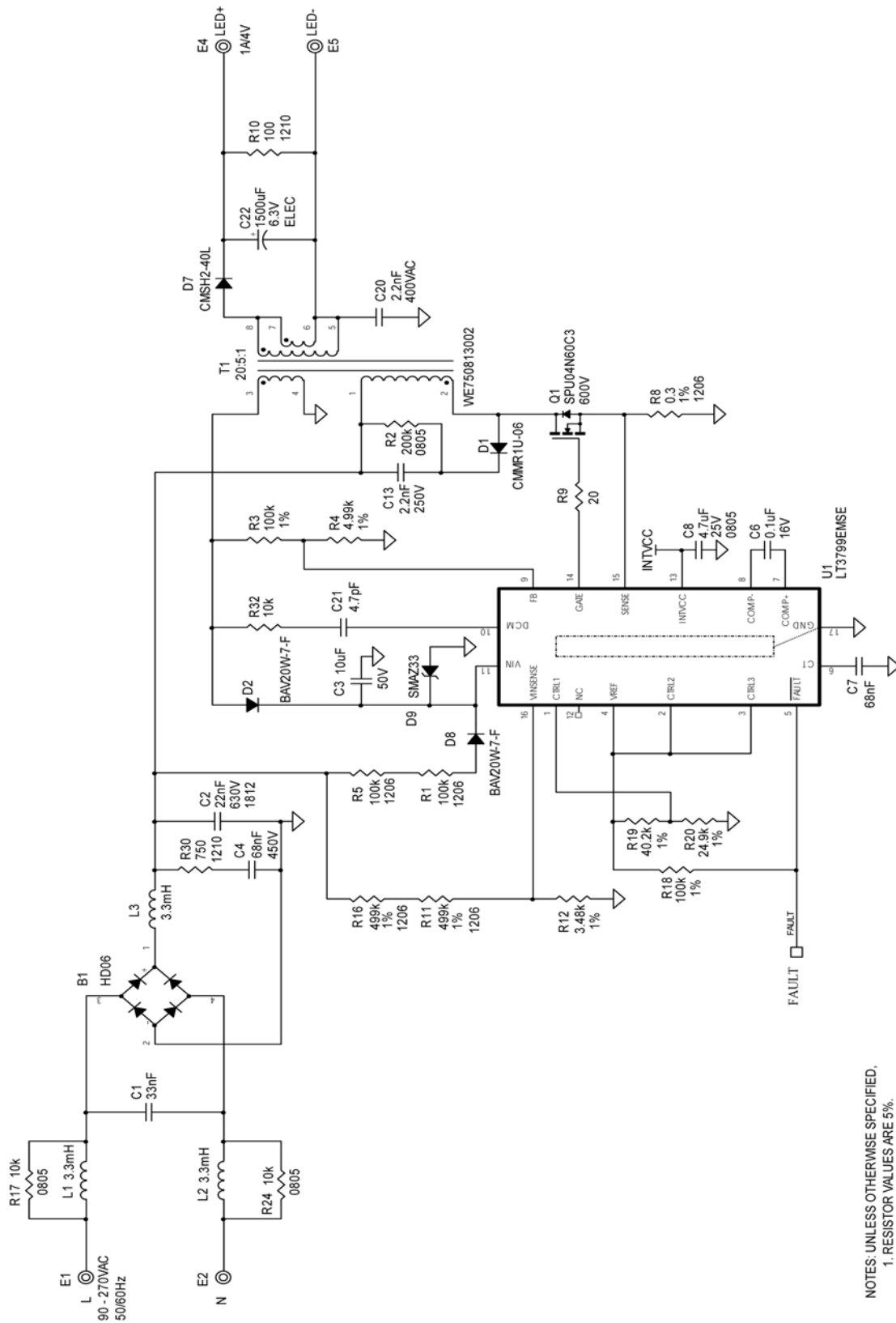
**Figure 3. Power Factor vs Input Voltage**

# DEMO MANUAL DC1744A

## PARTS LIST

ITEM	QTY	REFERENCE	PART DESCRIPTION	MANUFACTURER/PART NUMBER
<b>Required Circuit Components</b>				
1	1	B1	RECTIFIER, BRIDGE 600V 0.8A	DIODES INC. HD06-T
2	1	C1	CAP, 33nF 20% 310V AC MKP	VISHAY BFC233920333
3	1	C2	CAP, 1812 22nF 5% 630V COG	TDK C4532C0G2J223J
4	1	C3	CAP, 1210 10µF 20% 50V X7S	TAIYO YUDEN UMK325C7106MM-T
5	1	C4	CAP, 68nF 10% 450V RADIAL	RUBYCON 450MMK683K
6	1	C6	CAP, 0603 0.1µF 10% 16V X7R	MURATA GRM188R71C104KA01D
7	1	C7	CAP, 0603 68nF 10% 50V X7R	AVX 06035C682KAT2A
8	1	C8	CAP, 0805 4.7µF 10% 25V X5R	TDK C2012X5R1E475K
9	1	C13	CAP, 0805 2.2nF 10% 250V U2J	MURATA GRM21A7U2E222JW31D
10	1	C20	CAP, 2.2nF 10% 550VAC TYPE "Y1"	VISHAY 440LD22-R
11	1	C21	CAP, 0603 4.7pF ±0.25pF 50V NPO	AVX 06035A4R7CAT2A
12	1	C22	CAP, 1500µF 20% 6.3V ELEC	SANYO 6SEPC1500M+T
13	1	D1	DIODE, ULTRA FAST RECOVERY RECTIFIER	CENTRAL SEMI CMMR1U-06 TR
14	2	D2, D8	DIODE, FAST SWITCHING	DIODES/ZETEX BAV20W-7-F
15	1	D7	DIODE, SCHOTTKY BARRIER RECTIFIER	CENTRAL SEMI CMSH2-40L TR13
16	1	D9	DIODE, ZENER 33V	DIODES INC SMAZ33-13-F
17	3	L1, L2, L3	IND, 3.3mH, SMD	COILCRAFT LPS6235-335ML
18	1	Q1	XSTR, MOSFET, N-CHANNEL 600V	INFINEON SPU04N60C3
19	2	R1, R5	RES, 1206 100k 5% 1/4W	VISHAY CRCW1206100KJNEA
20	1	R2	RES, 0805 200k 5% 1/8W	VISHAY CRCW0805200KJNEA
21	2	R3, R18	RES, 0603 100k 1% 1/10W	VISHAY CRCW0603100KFKEA
22	1	R4	RES, 0603 4.99k 1% 1/10W	VISHAY CRCW06034K99FKEA
23	1	R8	RES, 1206 300mΩ 1% 1/4W	VISHAY RCWE1206R300FKEA
24	1	R9	RES, 0603 20Ω 5% 1/10W	VISHAY CRCW060320R0JNEA
25	1	R10	RES, 1210 100Ω 5% 1/4W	VISHAY CRCW1210100R0JNEA
26	2	R11, R16	RES, 1206 499k 1% 1/4W	VISHAY CRCW1206499KFKEA
27	1	R12	RES, 0603 3.48k 1% 1/10W	VISHAY CRCW06033K48FKEA
28	2	R17, R24	RES, 0805 10k 5% 1/8W	VISHAY CRCW080510K0JNEA
29	1	R19	RES, 0603 40.2k 1% 1/10W	NIC NRC06F4022TRF
30	1	R20	RES, 0603 24.9k 1% 1/10W	VISHAY CRCW060324K9FKEA
31	1	R30	RES, 1210 750Ω 5% 1/2W	VISHAY CRCW1210750RJNEA
32	1	R32	RES, 0603 10k 5% 1/10W	NIC NRC06J103TRF
33	1	T1	XFMR, FLYBACK (T201)	WURTH ELEKTRONIK 750813002
34	1	U1	IC, TRIAC DIMMABLE OFFLINE LED DRIVER	LINEAR TECH. LT3799EMSE
<b>Hardware</b>				
	2	E4, E5	TURRET	MILL-MAX 2308-2-00-80-00-00-07-0

**SCHEMATIC DIAGRAM**



NOTES: UNLESS OTHERWISE SPECIFIED,  
 1. RESISTOR VALUES ARE 5%.  
 2. CAPACITOR AND RESISTOR CASE SIZE ARE 0603.

# DEMO MANUAL DC1744A

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**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.

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