

LT3799
Offline Isolated Flyback Led
Controller with PFC

DESCRIPTION

Demonstration circuit 1595A is an off-line isolated flyback converter featuring LT3799. The demo board is designed to drive a 20V nominal LED string at 1A from an input voltage range of 90VAC to 270VAC. 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 datasheet gives a complete description of the part, operation and application information. The datasheet must be read in conjunction with this quick start guide for demo circuit 1595A.

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

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PERFORMANCE SUMMARY (T_A = 25°C)

| PARAMETER | CONDITIONS | VALUE |
|---------------------------------|---------------------------|-----------------|
| Input Range | Line Frequency, 50Hz/60Hz | 90VAC to 270VAC |
| Output Current I _{OUT} | V _{IN} = 120VAC | 1A |
| Maximum Output Voltage | | 25V |
| Minimum Output Voltage | | 16V |

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 PERSONEL 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 DETERIORATIONS, CIRCUIT MALFUNCTION, PROPERTY DAMAGE, AND EVEN LIFE-THREATENING INJURIES. CONTACT LINEAR TECHNOLOGY APPLICATIONS ENGINEERS FOR PROPER COMPONENT REPLACEMENT.

Demonstration circuit 1595A is easy to set up to evaluate the performance of the LT3799. Refer to Figure 1 for proper measurement equipment setup and complete the following procedure:

1. Connect a 1A LED string between LED⁺ and LED⁻ 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 (270VAC).

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.

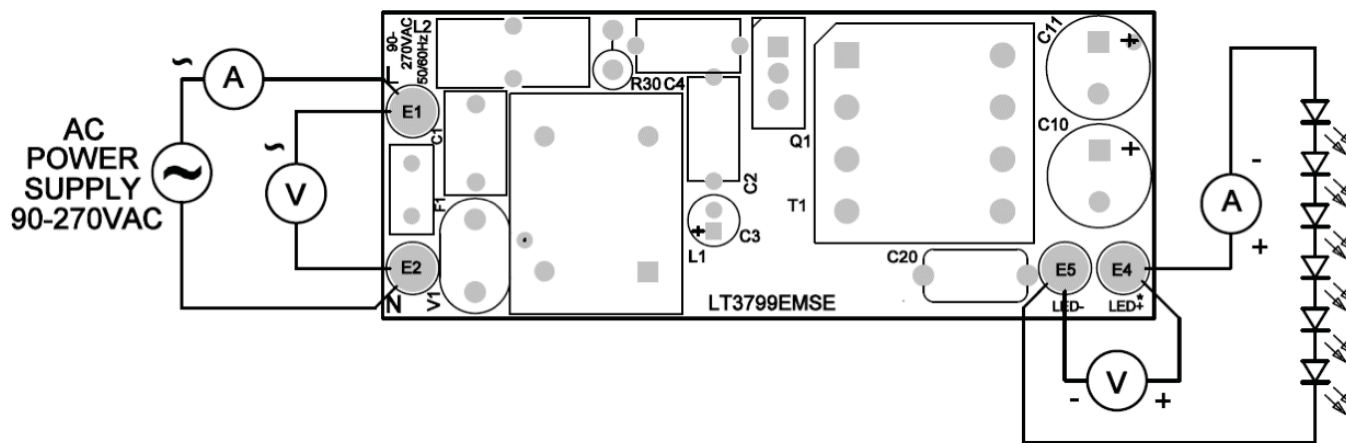


Figure 1. Proper Measurement Equipment Setup

QUICK START PROCEDURE

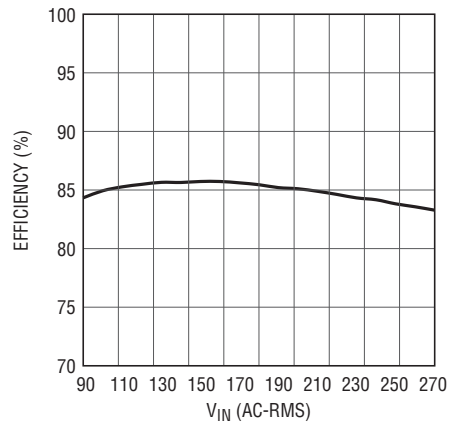


Figure 2. Efficiency vs V_{IN}

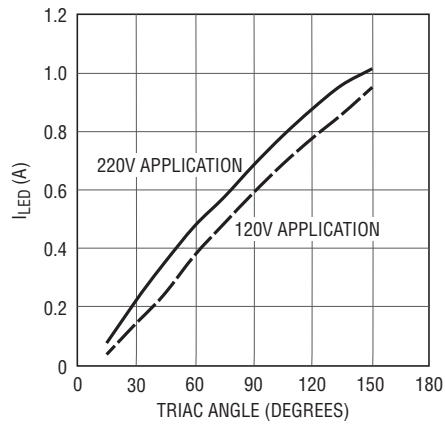


Figure 3. LED Current vs TRIAC Angle

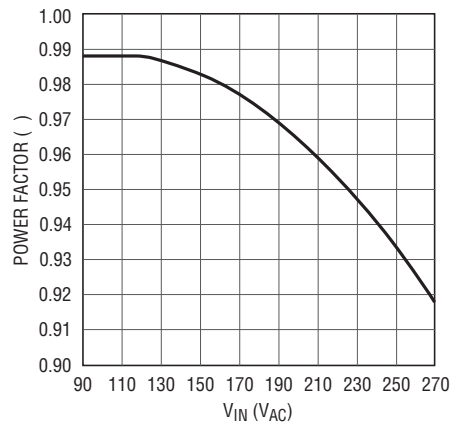


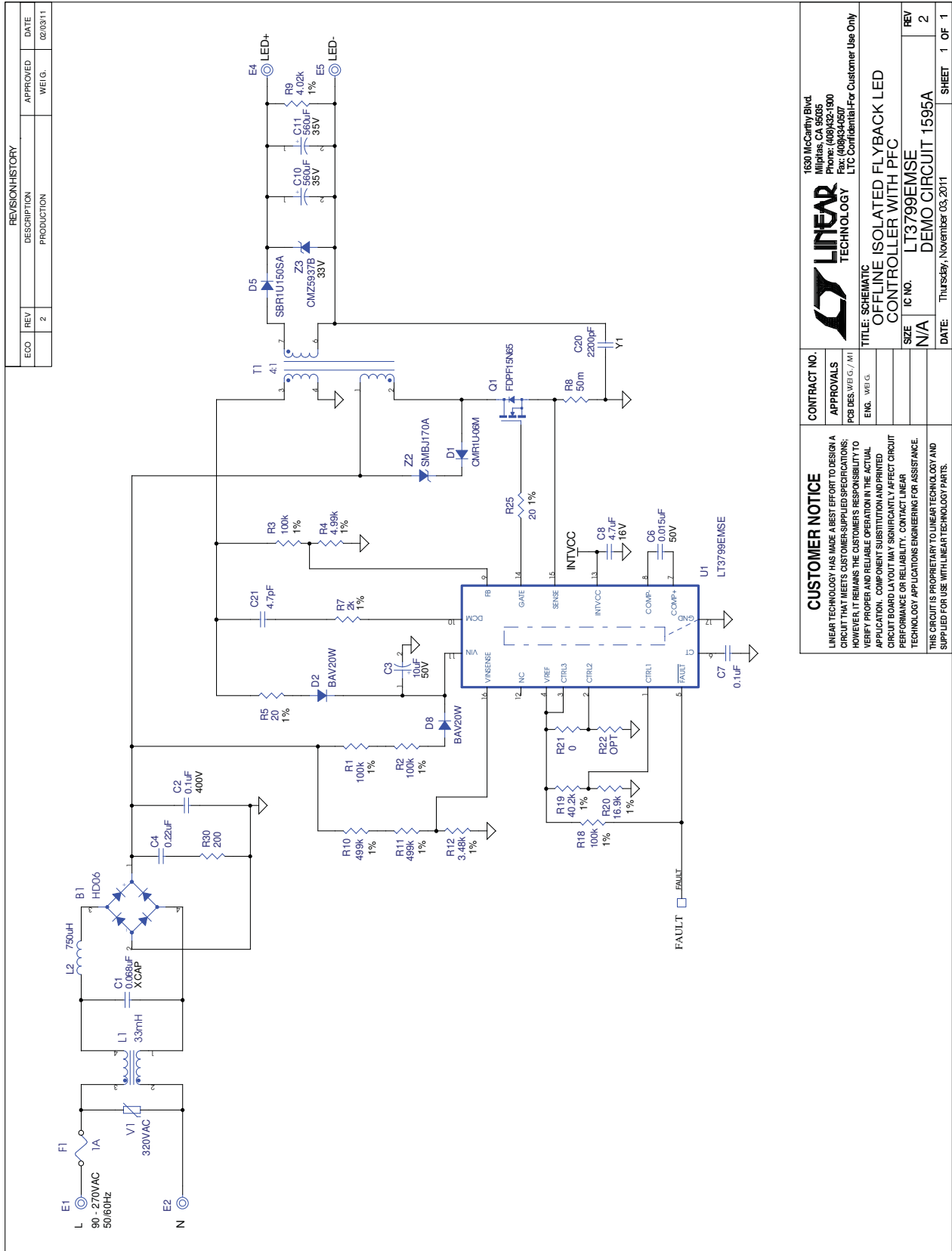
Figure 4. Power Factor vs Input Voltage

DEMO MANUAL DC1595A

PARTS LIST

| ITEM | QTY | REFERENCE | PART DESCRIPTION | MANUFACTURER/PART NUMBER |
|---|-----|----------------|--|---|
| Required Circuit Components | | | | |
| 1 | 1 | B1 | RECTIFIER, BRIDGE 600V 0.8A | DIODES INC. HD06-T |
| 2 | 1 | C1 | CAP, 0.068 μ F 20% 305VAC MKP | VISHAY BFC2 339 20683 |
| 3 | 1 | C2 | CAP, 0.1 μ F 10% 450V | RUBYCON 450MMK104J |
| 4 | 1 | C3 | CAP, 10 μ F 20% 50V ALUM | RUBYCON 50YXJ10M 5X11 |
| 5 | 1 | C4 | CAP, 0.22 μ F 20% 450V FILM | RUBYCON 450MMK 224K |
| 6 | 1 | C6 | CAP, 0603 0.015 μ F 10% 50V X7R | AVX 06035C153KAT2A |
| 7 | 1 | C7 | CAP, 0603 0.1 μ F 10% 50V X7R | AVX 06035C104KAT2A |
| 8 | 1 | C8 | CAP, 0805 4.7 μ F 20% 16V X5R | AVX 0805YD475MAT2A |
| 9 | 2 | C10, C11 | CAP, 560 μ F 20% 35V ELEC | RUBYCON 35ZLJ560M 10X20 |
| 10 | 1 | C20 | CAP, 2.2nF 10% Y5B TYPE "Y1" | VISHAY 440LD22-R |
| 11 | 1 | C21 | CAP, 0603 4.7pF \pm 0.1pF 50V NPO | AVX 06035A4R7CAT2A |
| 12 | 1 | D1 | DIODE, FAST SWITCHING | DIODES INC. US1J-13-F |
| 13 | 2 | D2, D8 | DIODE, FAST SWITCHING | DIODES INC. BAV20W-7-F |
| 14 | 1 | D5 | DIODE, 150V , 1A, SBR | DIODES INC. SBR1U150SA |
| 15 | 1 | F1 | FUSE, 1A | BUSSMAN SS-5H-1A |
| 16 | 1 | L1 | IND, 33mH | WURTH ELECTRONIK 7448640418 |
| 17 | 1 | L2 | IND, 750 μ H | WURTH ELECTRONIK 750311431 |
| 18 | 1 | Q1 | XSTR, MOSFET, N-CHANNEL 650V | FAIRCHILD SEMI FDPF15N65 |
| 19 | 2 | R1, R2 | RES, 1206 100k Ω 1% 1/4W | VISHAY CRCW1206100KFKEA |
| 20 | 2 | R3, R18 | RES, 0603 100k Ω 1% 1/10W | VISHAY CRCW0603100KFKEA |
| 21 | 1 | R4 | RES, 0603 4.99k Ω 1% 1/10W | VISHAY CRCW06034K99FKEA |
| 22 | 2 | R5, R25 | RES, 0603 20 Ω 1% 1/10W | VISHAY CRCW060320R0FKEA |
| 23 | 1 | R7 | RES, 0603 2k Ω 1% 1/10W | VISHAY CRCW06032K00FKEA |
| 24 | 1 | R8 | RES, 1206 0.05 Ω 1% 1/4W | VENKEL LCR1206-R050GT |
| 25 | 1 | R9 | RES, 1206 4.02k Ω 1% 1/4W | VISHAY CRCW12064K02FKEA |
| 26 | 2 | R10, R11 | RES, 1206 499k Ω 1% 1/4W | VISHAY CRCW1206499KFKEA |
| 27 | 1 | R12 | RES, 0603 3.48k Ω 1% 1/10W | VISHAY CRCW06033K48FKEA |
| 28 | 1 | R19 | RES, 0603 40.2k Ω 1% 1/10W | VISHAY CRCW060340K2FKEA |
| 29 | 1 | R20 | RES, 0603 16.9k Ω 1% 1/10W | VISHAY CRCW060316K9FKEA |
| 30 | 1 | R21 | RES, 0603 0k Ω JUMPER | VISHAY CRCW06030000Z0EA |
| 31 | 1 | R30 | RES, 200 Ω 5% 1W METAL OXIDE | KOA MOS1CT52R201J |
| 32 | 1 | T1 | XFMR, FLYBACK | COILCRAFT JA4429-AL |
| 33 | 1 | U1 | IC, TRAIAC DIMMABLE OFFLINE LED DRIVER | LINEAR TECH. LT3799EMSE |
| 34 | 1 | V1 | VARIATOR, 320V RMS 13.5MM RADIAL | SEI CV1320K10T |
| 35 | 1 | Z2 | DIODE, TRANSIENT VOLTAGE SUPPRESSOR 170V | DIODES INC. SMBJ170A |
| 36 | 1 | Z3 | DIODE, ZENER, 33V | DIODES INC.SMAZ33-13-F |
| Additional Demo Board Circuit Components | | | | |
| 1 | 0 | R22 | RES, 0603 OPTION | OPTION |
| Hardware | | | | |
| 1 | 4 | E1, E2, E4, E5 | TURRET | MILL MAX MILL-MAX 2501-2-00-80-00-00-07-0 |

SCHEMATIC DIAGRAM



| | | | |
|-------------------------------------|------------|---------------------|--|
| CONTRACT NO. | | CONTRACT NO. | |
| APPROVALS | | APPROVALS | |
| PCB DES. WEI.G./AMI | | PCB DES. WEI.G./AMI | |
| ENG. WEI.G. | | ENG. WEI.G. | |
| TITLE: SCHEMATIC | | | |
| OFFLINE ISOLATED FLYBACK LED | | | |
| CONTROLLER WITH PFC | | | |
| SIZE | IC NO. | REV | |
| N/A | LT3799EMSE | 2 | |
| DATE: Thursday, November 03, 2011 | | SHEET 1 OF 1 | |

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DEMO MANUAL DC1595A

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