LT8315
Offline Isolated Flyback Converter

DESCRIPTION

Demonstration circuit 2337A is an offline isolated flyback converter featuring LT®8315. The demo board outputs 12V, and maintains tight regulation with a load current from 4mA to 0.55A. It is optimized to operate over a wide AC input voltage range (90VAC to 265VAC, 47Hz to 63Hz). Output voltage accuracy stays within ±5% over the whole input voltage and load range.

The LT8315 is a high voltage flyback converter with integrated 630V/300mA switch. No opto-isolator is needed for regulation. The part samples the output voltage from the isolated flyback waveform appearing across a third winding on the transformer. Quasi-resonant boundary mode operation improves load regulation, reduces transformer size, and maintains high efficiency. The LT8315 is available in a thermally enhanced 20-pin TSSOP package with four pins removed for high voltage spacing.

The LT8315 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 2337A.

Design files for this circuit board are available at http://www.linear.com/demo/DC2337A

PERFORMANCE SUMMARY

Specifications are at T_A = 25°C

PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
Input Voltage		90		265	V_{RMS}
Output Voltage	I_{OUT} = 4mA to 0.55A	11.4	12	12.6	V
Maximum Output Current		0.55			A
Typical Switching Frequency	V_{IN} = 120VAC, I_{OUT} = 0.55A V_{IN} = 220VAC, I_{OUT} = 0.55A		65 89		kHz kHz
Efficiency	V_{IN} = 120VAC, I_{OUT} = 0.55A V_{IN} = 220VAC, I_{OUT} = 0.55A		85.0 84.6		% %

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

Demonstration circuit 2337A is easy to set up to evaluate the performance of the LT8315. Refer to Figure 1 for proper measurement equipment setup and follow the procedure below:

1. With power off, connect the AC input power supply to the board through line and neutral terminals. Connect the load to the terminals V_{OUT}^+ and V_{OUT}^- on the board.
2. Turn on the power at the input. Set the input voltage to 120VAC.

   NOTE: Make sure that the input voltage is always within spec. To operate the board with higher input/output voltage, input capacitor, output capacitor and output diode with higher voltage ratings are needed.
3. Check for the proper output voltages. The output should be regulated at 12V (±5%).

   NOTE: The LT8315 requires very small minimum load to maintain good output voltage regulation. A Zener diode is placed on the output to clamp the voltage to 13V. This Zener can be replaced with a 3000Ω resistor at the trade-off of lower efficiency.
4. Once the proper output voltage is established, adjust the input voltage and load current 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 output voltage ripple by touching the probe tip directly across the V_{OUT}^+ and V_{OUT}^- terminals.

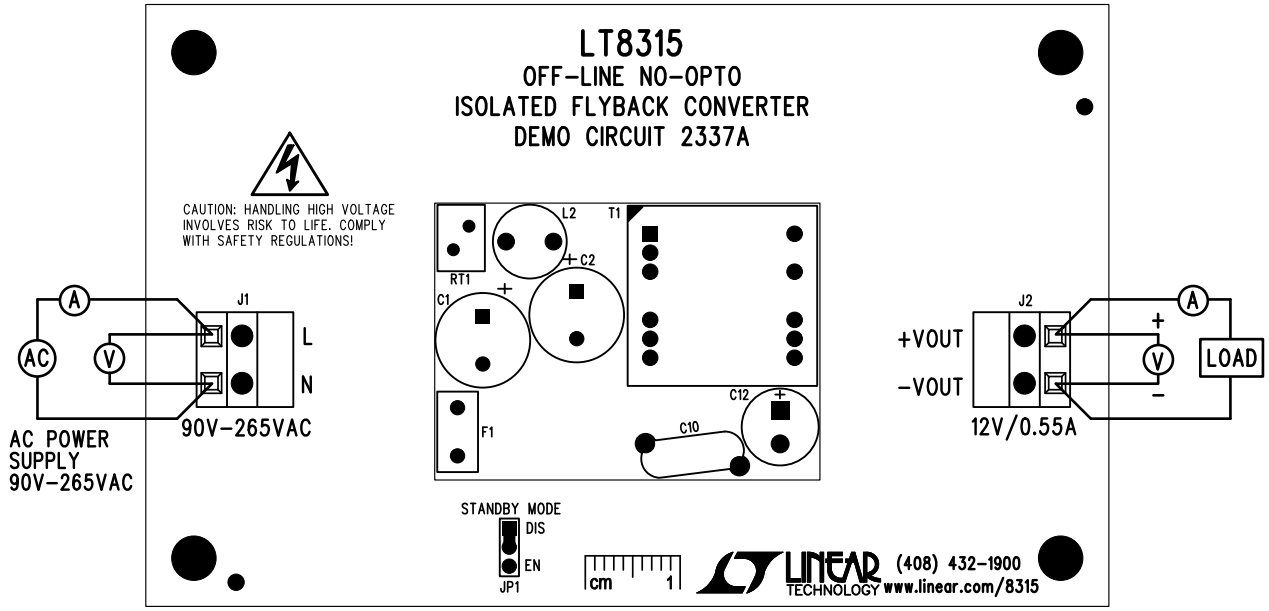


Figure 1. Proper Measurement Equipment Setup

QUICK START PROCEDURE

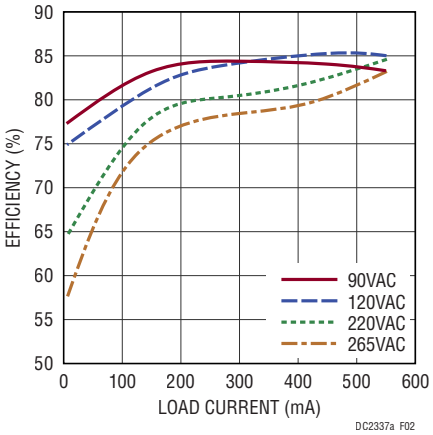


Figure 2. Efficiency vs Load Current

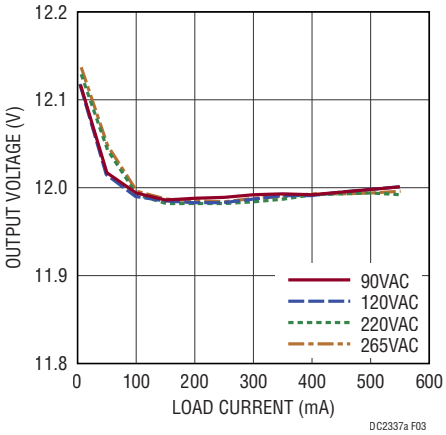


Figure 3. Load and Line Regulation

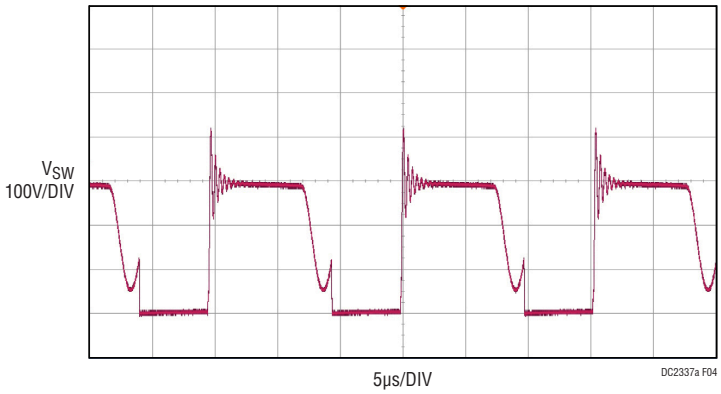


Figure 4. 120VAC Steady State Switch Node Voltage at Full Load Condition

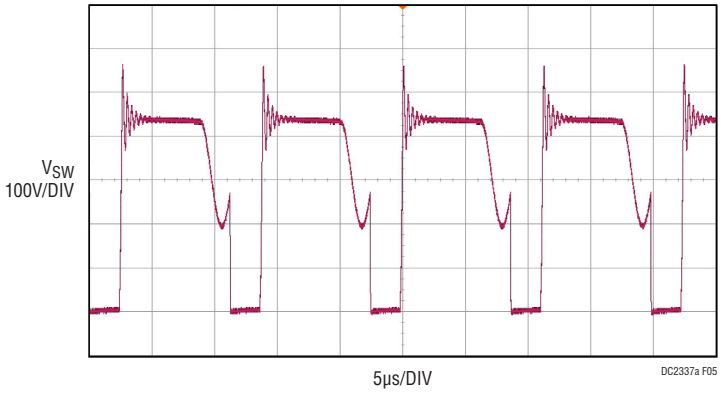
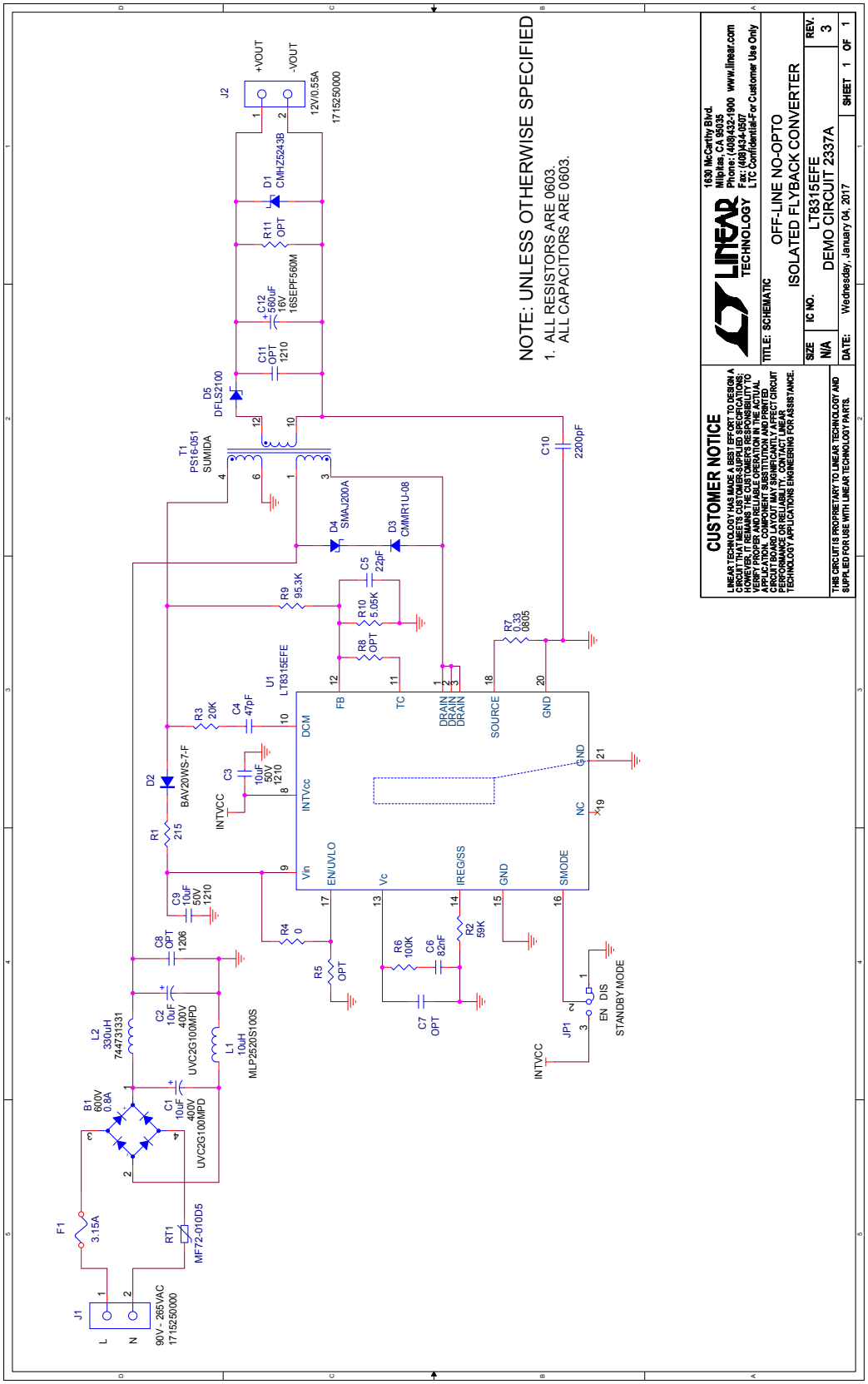


Figure 5. 220VAC Steady State Switch Node Voltage at Full Load Condition

PARTS LIST

ITEM	QTY	REFERENCE	PART DESCRIPTION	MANUFACTURER/PART NUMBER
Required Circuit Components				
1	1	B1	RECTIFIER, BRIDGE GP 600V 0.8A	DIODES INC, HD06-T
2	2	C1, C2	CAP, ALUM, 10µF, 400V, 20%	NICHION, UVC2G100MPD
3	2	C3, C9	CAP, X7R, 10µF, 50V, 10%, 1210	MURATA, GRJ32EC71H106KE11L
4	1	C4	CAP, NP0, 47pF, 50V, 5%, 0603	AVX, 06035A470JAT2A
5	1	C5	CAP, NP0, 22µF, 50V, 5%, 0603	AVX, 06035A220JAT2A
6	1	C6	CAP, X7R, 0.082µF, 25V, 10%, 0603	MURATA, GRM188R71E823KA01D
7	1	C10	CAP, Y5U 2200pF 500VAC 20%	VISHAY, 440LD22-R
8	1	C12	CAP, ALUM, 560µF, 16V, 20%	PANASONIC, 16SEPF560M
9	1	D1	DIODE, ZENER, 13V, SOD123	CENTRAL SEMI, CMHZ5243B
10	1	D2	DIODE, 150V, SOD323	DIODES INC, BAV20WS-7-F
11	1	D3	DIODE, 800V, SOD123F	CENTRAL SEMI, CMMR1U-08
12	1	D4	DIODE, TVS, SMA	LITTLEFUSE, SMAJ200A
13	1	D5	DIODE, SCHOTTKY, 100V, POWER-DI-123	DIODES INC, DFLS2100-7
14	1	F1	FUSE, 3.15A	EATON BUSSMANN, SS-5H-3.15A
15	1	L1	IND, 10µH, 1008	TDK, MLP2520S100S
16	1	L2	IND, 330µH	WURTH ELEKTRONIC, 744731331
17	1	RT1	ICL, 10Ω, 700MA, 20%, 7MM	CANTHERM, MF72-010D5
18	1	R1	RES, CHIP, 215, 1/10W, 1% 0603	VISHAY, CRCW0603215RFKEA
19	1	R2	RES, CHIP, 59k, 1/10W, 1% 0603	VISHAY, CRCW060359K0FKEA
20	1	R3	RES, CHIP, 20k, 1/10W, 1% 0603	VISHAY, CRCW060320K0FKEA
21	1	R4	RES, CHIP, 0Ω, 1/10W, 1% 0603	VISHAY, CRCW06030000Z0EA
22	1	R6	RES, CHIP, 100k, 1/10W, 1% 0603	VISHAY, CRCW0603100KFKEA
23	1	R7	RES, SENSE, 0.33Ω, 1/3W, 1% 0805	SUSUMU, RL1220S-R33-F
24	1	R9	RES, CHIP, 95.3k, 1/10W, 1% 0603	VISHAY, CRCW060395K3FKEA
25	1	R10	RES, CHIP, 5.05k, 1/10W, 1% 0603	VISHAY, CRCW06035K05FKEA
26	1	T1	TRANSFORMER	SUMIDA, PS16-051
27	1	U1	IC, LT8315EFE, TSSOP20FE	LINEAR, LT8315EFE#PBF
Additional Demo Board Circuit Components				
1	0	R5, R8, R11	RES, OPTION, 0603	
2	0	C7	CAP, OPTION, 0603	
3	0	C8	CAP, OPTION, 1206	
4	0	C11	CAP, OPTION, 1210	
Hardware: For Demo Board Only				
1	1	XJP1	SHUNT, 0.079" CENTER	SAMTEC, 2SN-BK-G
2	2	J1, J2	CONN, TERM BLOCK, 5MM, 2POS	WEIDMULLER, 1715250000
3	1	JP1	3 PIN 0.079 SINGLE ROW HEADER	SULLINS, NRPN031PAEN-RC

SCHEMATIC DIAGRAM



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Mailing Address:

Linear Technology
1630 McCarthy Blvd.
Milpitas, CA 95035

Linear Technology Corporation
1630 McCarthy Blvd., Milpitas, CA 95035-7417
(408) 432-1900 • FAX: (408) 434-0507 • www.linear.com

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Телефон: 8 (812) 309-75-97 (многоканальный)
Факс: 8 (812) 320-03-32
Электронная почта: ocean@oceanchips.ru
Web: http://oceanchips.ru/
Адрес: 198099, г. Санкт-Петербург, ул. Калинина, д. 2, корп. 4, лит. А