LT8302
Isolated Triple Output
5V, ±15V Flyback Converter

DESCRIPTION

Demonstration circuit 2906A is an isolated triple output flyback converter featuring the LT®8302. The DC2906A operates over a wide input voltage range of 4.5V to 28V and samples the primary-side flyback waveform to regulate the secondary side output voltages. It generates three isolated output rails: 5V at 400mA+ and ±15V at 100mA+. Line and load regulation (combined) is within ±10%.

DC2906A showcases the high power density, high efficiency and good regulation that is possible due to the LT8302's high level of integration. Figure 3 and Figure 4 show the efficiency curves, while Figures 5 through 7, and Table 1 demonstrate the output voltage regulation under different load and line conditions.

The Performance Summary table summarizes the performance of the demo board at room temperature.

The LT8302 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 2906A.

Design files for this circuit board are available.

PERFORMANCE SUMMARY

Specifications are at T_A = 25°C

PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
Input Voltage		4.5	24	28	V
Output Voltage	VO1 (5V) VO2 (–15V) VO3 (15V)	4.75 –16.3 14.3		5.75 –14.3 16.3	V V V
Output Voltage Ripple (Peak to Peak)	VO1 (5V), 20 MHz Bandwidth VO2 (–15V), 20 MHz Bandwidth VO3 (15V), 20 MHz Bandwidth		50 150 150		mV mV mV
Efficiency	V_{IN} = 5V, Full Load V_{IN} = 12V, Full Load V_{IN} = 24V, Full Load		82.8 86.5 85.3		% % %

QUICK START PROCEDURE

Demonstration circuit 2906A is easy to set up to evaluate the performance of the LT8302. Refer to Figure 1 for proper measurement equipment setup and follow the procedure below:

1. With power off, connect the input power supply to the board through the V_{IN} and $-V_{IN}$ terminals. Connect the loads to the terminals VO1-GND1(5V), VO2-GND2(–15V) and VO3-GND3(15V) on the board.
2. Turn on the power at the input. Increase the input voltage slowly to 4.5V.

NOTE: Make sure that the input voltage is always within spec. To operate the board with higher input/output voltages, a higher voltage rating input capacitor, output capacitor and output diode might be needed.

3. Check for the proper output voltages. The output should be regulated at 5V, 15V and –15V (with allowable tolerance of ±10%) with respect to GND.

NOTE: The LT8302 requires very small minimum load to maintain good output voltage regulation. A zener diode is placed on each output to clamp the output voltage.

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 input or output voltage ripple by touching the probe tip directly across the V_{IN} and $-V_{IN}$, or output side terminals. See Figure 2 for proper scope probe technique.

QUICK START PROCEDURE

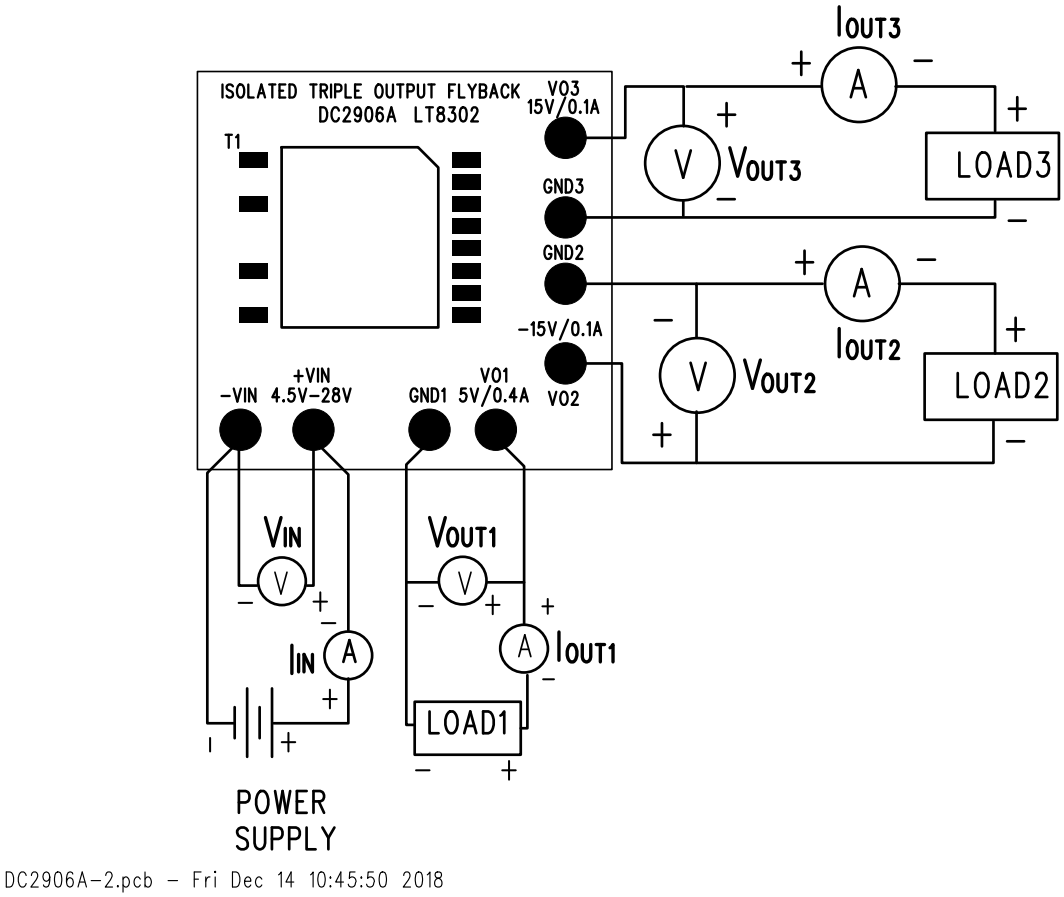


Figure 1. Proper Measurement Equipment Setup

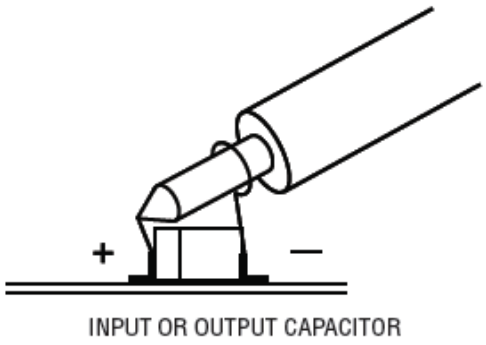


Figure 2. Proper Scope Probe Placement for Measuring Input or Output Ripple

QUICK START PROCEDURE

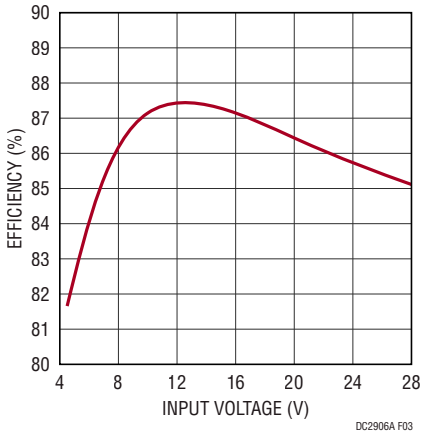


Figure 3. Full Load Efficiency vs. Input Voltage

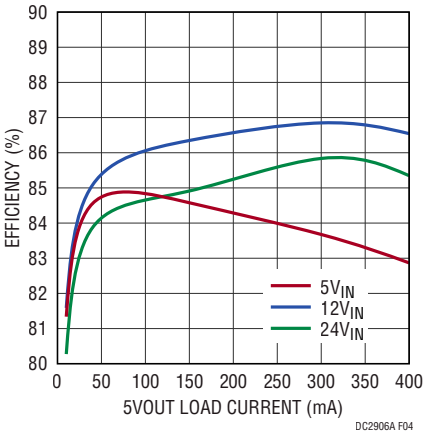


Figure 4. Efficiency vs. $5V_{OUT}$ Load Current with Different Input Voltages (0A – 0.4A on $5V_{OUT}$, Full Load on $\pm15V_{OUT}$)

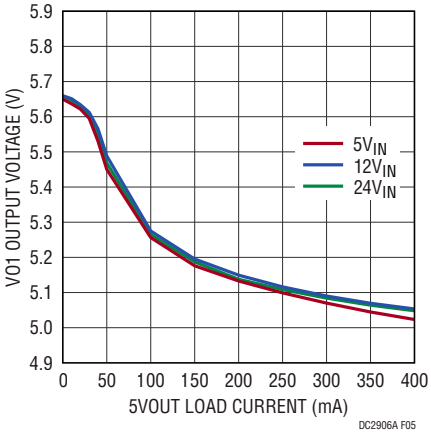


Figure 5. VO1 Output Voltage vs. Load Current with Different Input Voltages (0A – 0.4A on $5V_{OUT}$, Full Load on $\pm15V_{OUT}$)

QUICK START PROCEDURE

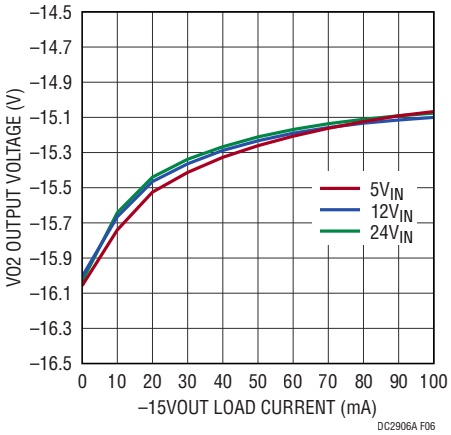


Figure 6. VO2 Output Voltage vs. Load Current with Different Input Voltages (0A – 0.1A on -15V_{OUT}, Full Load on 5V_{OUT} and 15V_{OUT})

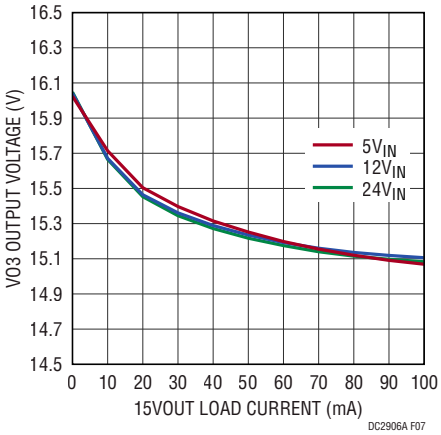


Figure 7. VO3 Output Voltage vs. Load Current with Different Input Voltages (0A – 0.1A on 15V_{OUT}, Full Load on 5V_{OUT} and -15V_{OUT})

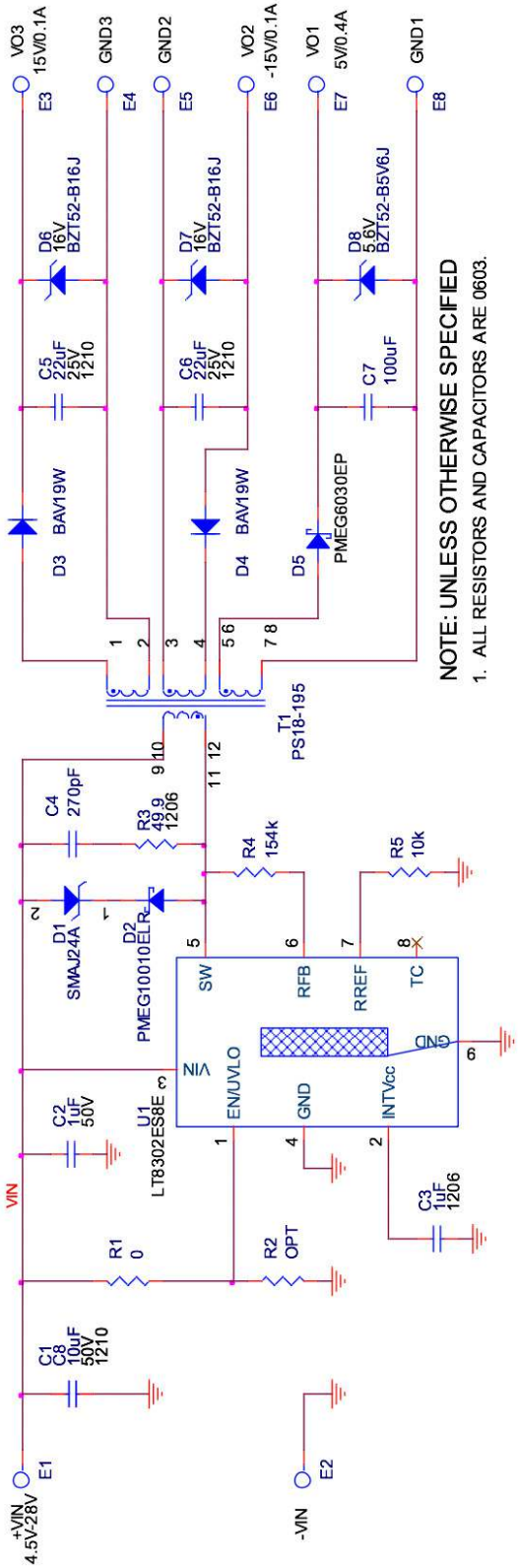
Table 1. Full Load Output Voltage vs. Input Voltage

	VO1 = 5V	VO2 = –15V	VO3 = 15V
Min.	5.010V	–15.102V	15.066V
Max.	5.054V	–15.060V	15.112V

PARTS LIST

ITEM	QTY	REFERENCE	PART DESCRIPTION	MANUFACTURER/PART NUMBER
Required Circuit Components				
1	2	C1, C8	CAP., 10uF, X7R, 50V, 10%, 1210	MURATA, GRM32ER71H106KA12L
2	1	C2	CAP., 1uF, X7R, 50V, 10%, 0603	AVX, 06035C105KAT2A
3	1	C3	CAP., 1uF, X7R, 50V, 10%, 1206	AVX, 12065C105KAT2A
4	1	C4	CAP., 270pF, C0G, 100V, 5%, 0603	AVX, 06031A271JAT2A
5	2	C5, C6	CAP., 22uF, X7R, 25V, 10%, 1210	AVX, 12103C226KAT2A
6	1	C7	CAP., 100uF, X5R, 10V, 20%, 1210	KEMET, C1210C107M8PACTU
7	1	D1	DIODE, TVS, SINGLE, UNI-DIRECT, 24V, 400W, SMA	DIODES INC., SMAJ24A-13-F
8	1	D2	DIODE, SCHOTTKY, 100V, 1A, SOD-123W, AEC-Q101	NEXPERIA, PMEG10010ELR
9	2	D3, D4	DIODE, SWITCHING, 100V, 250mW, SOD-123	DIODES INC., BAV19W-7-F
10	1	D5	DIODE, SCHOTTKY, 60V, 3A, SOD-128, AEC-Q101	NEXPERIA, PMEG6030EP, 115
11	2	D6, D7	DIODE, ZENER, 16V, 590mW, SOD-123, AEC-Q101	NEXPERIA, BZT52-B16J
12	1	D8	DIODE, ZENER, 5.6V, 590mW, SOD-123, AEC-Q101	NEXPERIA, BZT52-B5V6J
13	1	R1	RES., 0 OHM, 1/10W, 0603, AEC-Q200	VISHAY, CRCW06030000Z0EA
14	1	R3	RES., 49.9 OHMS, 1%, 1/4W, 1206, AEC-Q200	NIC, NRC12F49R9TRF
15	1	R4	RES., 154k OHMS, 1%, 1/10W, 0603	VISHAY, CRCW0603154KFKEA
16	1	R5	RES., 10k OHMS, 1%, 1/8W, 0603, AEC-Q200	VISHAY, TNPW060310K0BEEA
17	1	T1	XFMR, FLYBACK, 15.2 x 14.0mm SMD	SUMIDA, PS18-195
18	1	U1	IC, Isolated Flyback Converter, SOIC-8	ANALOG DEVICES, LT8302ES8E#PBF
HARDWARE: FOR DEMOBOARD ONLY				
1	8	E1, E2, E3	TEST POINT, TURRET, 0.064", MTG. HOLE	MILL-MAX, 2308-2-00-80-00-00-07-0
OPTIONAL CIRCUIT COMPONENTS				
1	0	R2	RES., OPTION, 0603	

SCHEMATIC DIAGRAM



ESD Caution
ESD (electrostatic discharge) sensitive device. Charged devices and circuit boards can discharge without detection. Although this product features patented or proprietary protection circuitry, damage may occur on devices subjected to high energy ESD. Therefore, proper ESD precautions should be taken to avoid performance degradation or loss of functionality.