DC383 Introduction

Description

DC383 is a multipurpose DC/DC demonstration board featuring the LT1930 and LT1931, the industry's highest power SOT-23 regulators. The demo board offers three separate DC/DC converters for different application needs. The Boost Circuit is designed to convert 5V input to 12V output at 300mA maximum load. The SEPIC Circuit generates constant 12V/300mA output with 10V~16V variable input. The Inverter Circuit is designed for applications requiring negative 12V/350mA from a positive 12V input. All three circuits are designed to demonstrate the advantages of the 1.2MHz switching frequency, the internal 36V/1A switch, wide input voltage range and small circuit size. These circuits are intended for space-conscious applications such as digital cameras, cellular phones, palmtop computers and LCD displays. The 1.2MHz switching frequency, 1A integrated switch, small circuit size, and low component count makes the LT1930 and LT1931 suitable for use in many other applications, such as PC cards, miniature disk drives, xDSL power supplies, flash memory products and local 5V or 12V supplies.

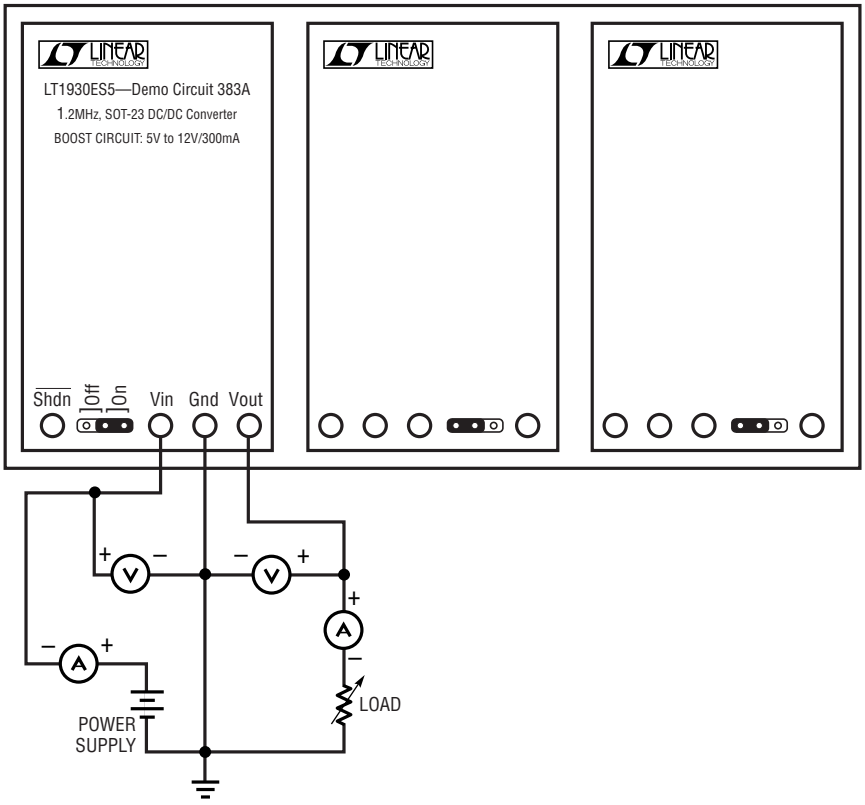
Quick Start

Refer to Figures 1–4 for proper measurement equipment setup and follow the procedure outlined below:

The equipment setup for the three circuits is very similar. They all have three pins marked “Vin,” “Gnd” and “Vout,” and a jumper marked “on/off” for demonstrating the shutdown function.

Quick Start for the Boost Circuit:

1. Before turning on the power, connect a 5V, 1A bench supply to the Vin and Gnd terminals and connect the output loads (up to 300mA). When an electronic load is used, decrease load current setting to less than 100mA until the output voltage has stabilized. Connect an oscilloscope and meters to the Vout and Gnd terminals, as shown in Figure 1. For the best accuracy it is important to connect true RMS reading voltmeters directly to the PCB terminals, where the input and output voltage are connected. True RMS



reading ammeters should be used for current measurements.

2. Turn on the input power supply and observe the output. The DC383 Boost Circuit is programmed to generate 12V from 5V input. The circuit will deliver up to 300mA at 12V.

3. With the 300mA load at the output, observe the switching frequency ripple at the output using the oscilloscope. The typical switching frequency is around 1.2MHz.

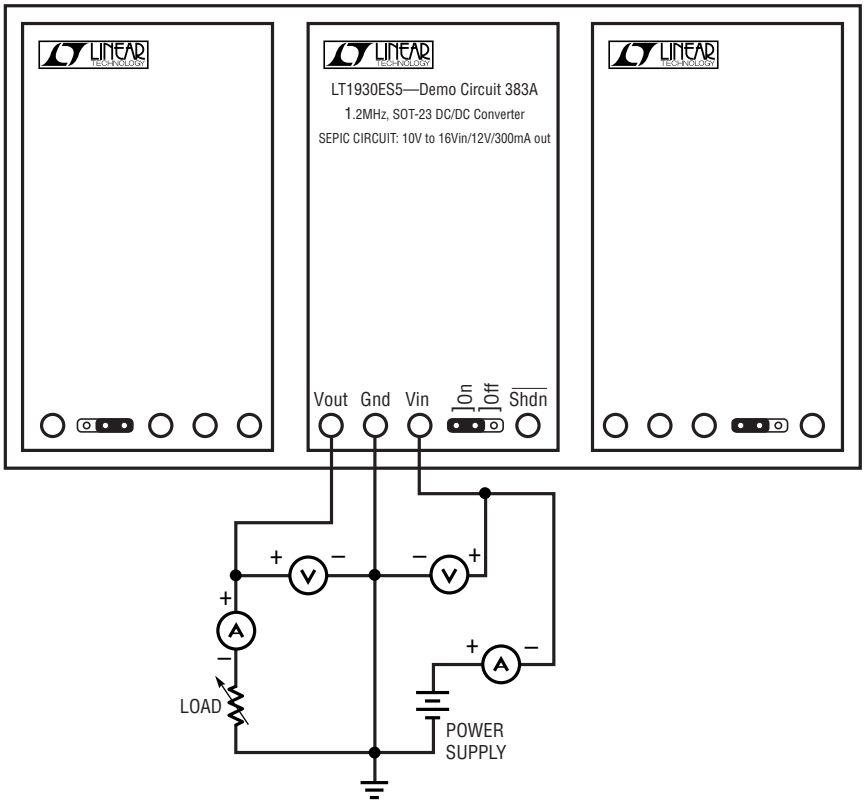
4. The current limit is tested by increasing the load past 400mA. The current limit will take effect when the peak switch current becomes higher than ~1A. When the current limit is exceeded, the output voltage will drop drastically. Return to normal operation by removing the load.

5. The SHUTDOWN function is tested by placing the jumper in the "off" position. This will short the shutdown pin to ground and turn off the internal switch of the LT1930. Placing the jumper in the "on" position will return the circuit to normal operation.

Quick Start for the SEPIC Circuit:

1. Before turning on the power, connect a 16V, 1A bench supply to the Vin and Gnd terminals and connect the output loads (up to 300mA). When an

electronic load is used, decrease load current setting to less than 100mA until the output voltage has stabilized. Connect oscilloscope and meters to the Vout



and Gnd terminals, as shown in Figure 2. For the best accuracy it is important to connect true RMS reading voltmeters directly to the PCB terminals where the input and output voltage are connected. True RMS reading ammeters should be used for current measurements.

2. Turn on the input power supply and observe the output. The DC383 SEPIC Circuit is programmed to generate 12V from a 10V–16V input. Vary the input

Figure 2. SEPIC Circuit Hook-Up

voltage to test the line regulation. The circuit is designed to deliver up to 300mA at a 12V output.

3. With the 300mA load at the output, observe the switching frequency ripple at the output using the oscilloscope. The typical switching frequency is around 1.2MHz.

4. The current limit is tested by increasing the load past 400mA. The current limit will take effect when the peak switch current becomes higher than ~1A. When the current limit is exceeded, the output voltage will drop drastically. Return to normal operation by removing the load.

5. The SHUTDOWN function is tested by placing the jumper in the "off" position. This will short the shutdown pin to ground and turn off the internal switch of the LT1930. Placing the jumper in the "on" position will return the circuit to normal operation.

Quick Start for the Inverter Circuit:

1. Before turning on the power, connect a 12V, 1A bench supply to the Vin and Gnd terminals and connect the output loads (up to 300mA). When an electronic load is used, decrease load current setting to less than 100mA until the output voltage has stabilized. Connect oscilloscope and meters to the Vout and Gnd terminals, as shown in Figure 3. For the best accuracy it is important

to connect true RMS reading voltmeters directly to the PCB terminals where the input and output voltage are connected. True RMS reading ammeters should be used for current measurements.

Turn on the input power supply and observe the output. The DC383 Inverter Circuit is programmed to generate –12V from a +12V input. The circuit will deliver up to 300mA at –12V.

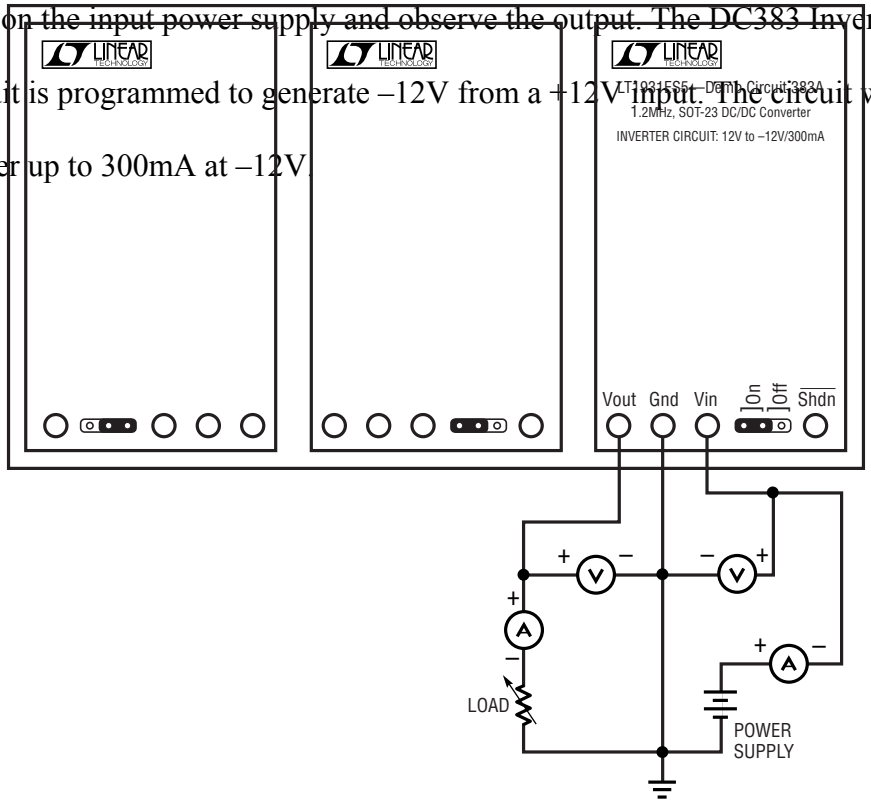


Figure 3. Inverter Circuit Hook-Up

2. With the 300mA load at the output observe the switching frequency ripple at the output using the oscilloscope. The typical switching frequency is around 1.2MHz.

3. The current limit is tested by increasing the load past 500mA. The current limit will take effect when the peak switch current becomes higher than ~1A. When the current limit is exceeded, the output voltage will drop drastically. Return to normal operation by removing the load.

4. The SHUTDOWN function is tested by placing the jumper in the “off” position. This will short the shutdown pin to ground and turn off the internal switch of the LT1931. Placing the jumper in the “on” position will return the circuit to normal operation.

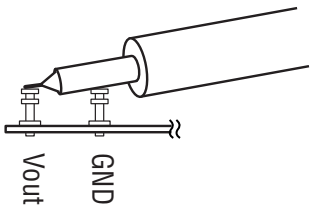


Figure 4. Scope Probe Placement for Measuring Output Ripple (All Circuits)

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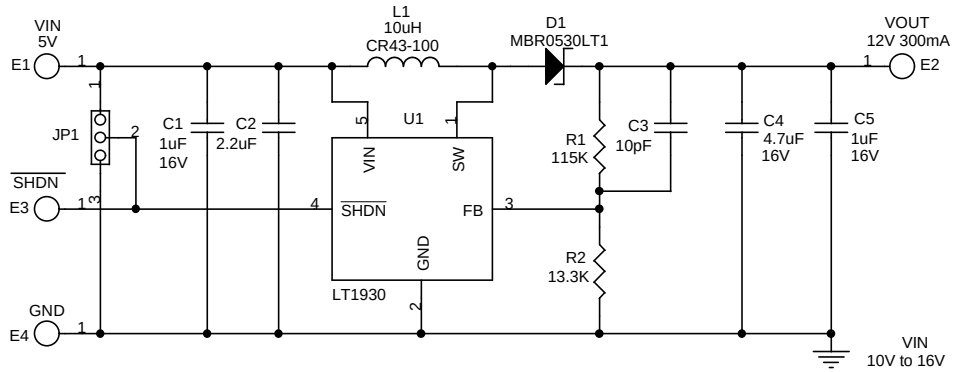
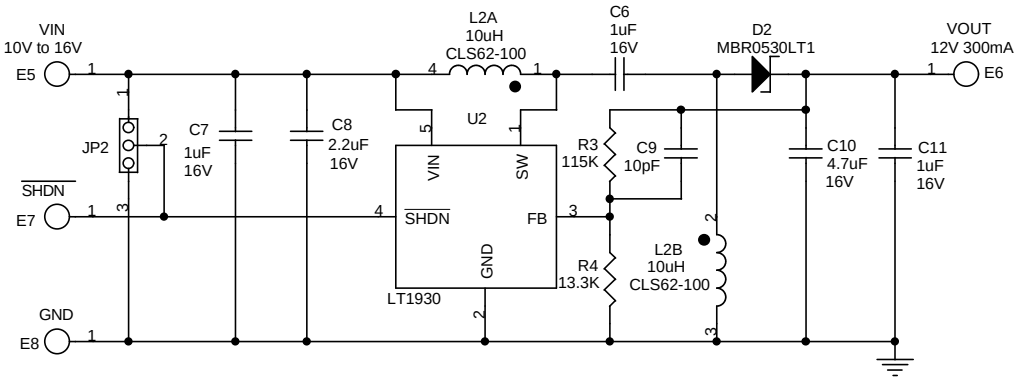
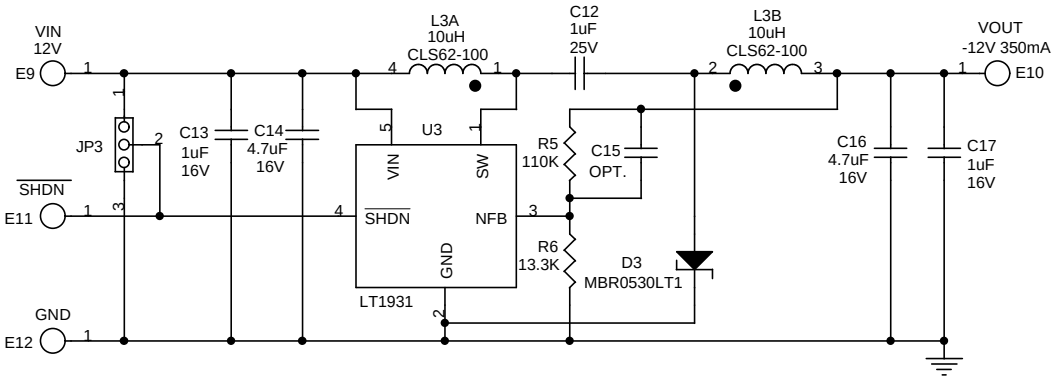
REVISION HISTORY				
ECO	REV	DESCRIPTION	DATE	APPROVED
	1	DEMO BOARD PRODUCTION RELEASE	02/07/01	



BOOST



SEPIC



INVERTER

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCE ON ANGLE - - - 2 PLACES - - - 3 PLACES - - - INTERPRET DIM AND TOL PER ASME Y14.5M -1994	CONTRACT NO.		
	APPROVALS	DATE	
	DRAWN L.SANTOS	11/16/00	
THIRD ANGLE PROJECTION	CHECKED		
	APPROVED		
	ENGINEER		
	DESIGNER		
DO NOT SCALE DRAWING	Friday, March 23, 2001		

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TITLE

SCHEMATIC, LT1930/31, 1.2MHz, SOT-23 DC/DC CONVERTER PCB

SIZE	CAGE CODE	DWG NO	REV
A		DC383A	1

SCALE: NONE	FILENAME:383Ar1.DSN	SHEET 1 OF 1

Bill Of Material
Demo Bd. # DC383A
QTY- 600
6/16/2005
3:58 PM

1.2MHz, SOT-23 DC/DC CONVERVTER

Item	*Qty*	*Reference*	*Part Description*	*Manufacture / Part #*
1	7	C1,C5,C6,C7,C11,C13,C17	CAP, X5R, 1uF, 16V, 0805	TAIYO-YUDEN EMK212BJ105MG
2	2	C2,C8	CAP, X5R, 2.2uF, 16V, 1206	TAIYO-YUDEN EMK316BJ225ML
3	2	C3,C9	CAP, NPO, 10pF, 25V, 10%, 0402	AVX 04023A100KAT1A
4	4	C4,C10,C14,C16	CAP, X5R, 4.7uF, 16V, 1206	TAIYO-YUDEN EMK316BJ475ML
5	1	C12	CAP, X5R, 1uF, 25V, 1206	TAIYO-YUDEN EMK316BJ105ML
6	0	C15	CAP, OPT., 0402	OPT.
7	3	D1,D2,D3	DIO, SCHOTTKY, 30V, .5A	DIODES INC B0530W
8	12	E1-E12	TESTPOINT, TURRET, .061	MILL MAX 2308-2-00-44
9	3	JP1,JP2,JP3	CON, HDR, 2MM, 3 PIN	COMM CON CONN. 2802S-03G2
10	3	(JP1,JP2,JP3)	SHUNT, 2PIN, 3MM	COMM CON CCIJ2MM-138-G
11	1	L1	INDUCTOR, 10uH, 20%	SUMIDA CR43-100
12	2	L2,L3	INDUCTOR, 10uH, 30%	SUMIDA CLS62-100
13	2	R1,R3	RES, CHIP, 115K, 1/16W, 1%, 0402	AAC CR05-1153FM
14	1	R5	RES, CHIP, 110K, 1/16W, 1%, 0402	AAC CR05-1103FM
15	3	R2,R4,R6	RES, CHIP, 13.3K, 1/16W, 1%, 0402	AAC CR05-1332FM
16	2	U1,U2	I.C., LINEAR, LT1930ES5	LINEAR TECHNOLOGY LT1930ES5
17	1	U3	I.C., LINEAR, LT1931ES5	LINEAR TECHNOLOGY LT1931ES5
18	1		PRINTED CIRCUIT BOARDS	DEMO BOARD DC383A
19	1		STENCIL	STENCIL DC383A

(Dept. Acct #:23-30)