

LT8570, LT8570-1 Boost/SEPIC/Inverting Regulator

DESCRIPTION

Demonstration circuits 2297A-A and 2297A-B feature the **LT[®]8570** and LT8570-1 in a boost configuration. These demo circuits demonstrate small size and low component count. Both converters are designed to convert a 5V to 10V source to 12V. Refer to Figures 3 and 4 for maximum load current at different input voltage levels.

Both converters use only one feedback resistor to set the output voltage.

The LT8570 can operate with inputs as high as 40V but in these demo circuits, the input is limited by the voltage rating of the input capacitors, and the magnitude of the output voltage.

The LT8570 and LT8570-1 include many other features such as synchronization to external clock, user configurable undervoltage lockout, soft-start, frequency foldback, and other features that are easily configured as Boost, SEPIC or Inverting Converters.

The data sheet gives a complete description of the device, operation and application information. The data sheet must be read in conjunction with this demo manual for DC2297A.

Design files for this circuit board are available at <http://www.linear.com/demo/DC2297A>

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PERFORMANCE SUMMARY Specifications are at $T_A = 25^\circ\text{C}$

SYMBOL	PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
DC2297A-A						
V_{IN}	Input Supply Range		5		10	V
V_{OUT}	Output Voltage	$V_{IN} = 5\text{V}$, $I_{LOAD} = 125\text{mA}$	11.64	12	12.36	V
RIPPLE		$V_{IN} = 5\text{V}$, $I_{LOAD} = 125\text{mA}$		25		mV
EFFICIENCY		$V_{IN} = 5\text{V}$, $I_{LOAD} = 125\text{mA}$		86		%
SWITCHING FREQUENCY				1.5		MHz
DC2297A-B						
V_{IN}	Input Supply Range		5		10	V
V_{OUT}	Output Voltage	$V_{IN} = 5\text{V}$, $I_{LOAD} = 60\text{mA}$	11.64	12	12.36	V
RIPPLE		$V_{IN} = 5\text{V}$, $I_{LOAD} = 60\text{mA}$		5		mV
EFFICIENCY		$V_{IN} = 5\text{V}$, $I_{LOAD} = 60\text{mA}$		86		%
SWITCHING FREQUENCY				1.5		MHz

QUICK START PROCEDURE

Demo circuit 2297A is easy to set up to evaluate the performance of the LT8570 and LT8570-1. Refer to Figure 1 for proper measurement equipment setup and follow the procedure below:

NOTE: When measuring the input or output voltage ripple, 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 VIN or VOUT and GND terminals. See Figure 2 for proper scope probe technique.

1. With power off, connect the input power supply to VIN and GND.

2. Turn on the power at the input.

NOTE: Make sure that the input voltage does not exceed 10V.

3. Check for the proper output voltage.

NOTE: If there is no output, temporarily disconnect the load to make sure that the load is not set too high.

4. Once the proper output voltages are established, adjust the load within the operating range and observe the output voltage regulation, ripple voltage, efficiency and other parameters.

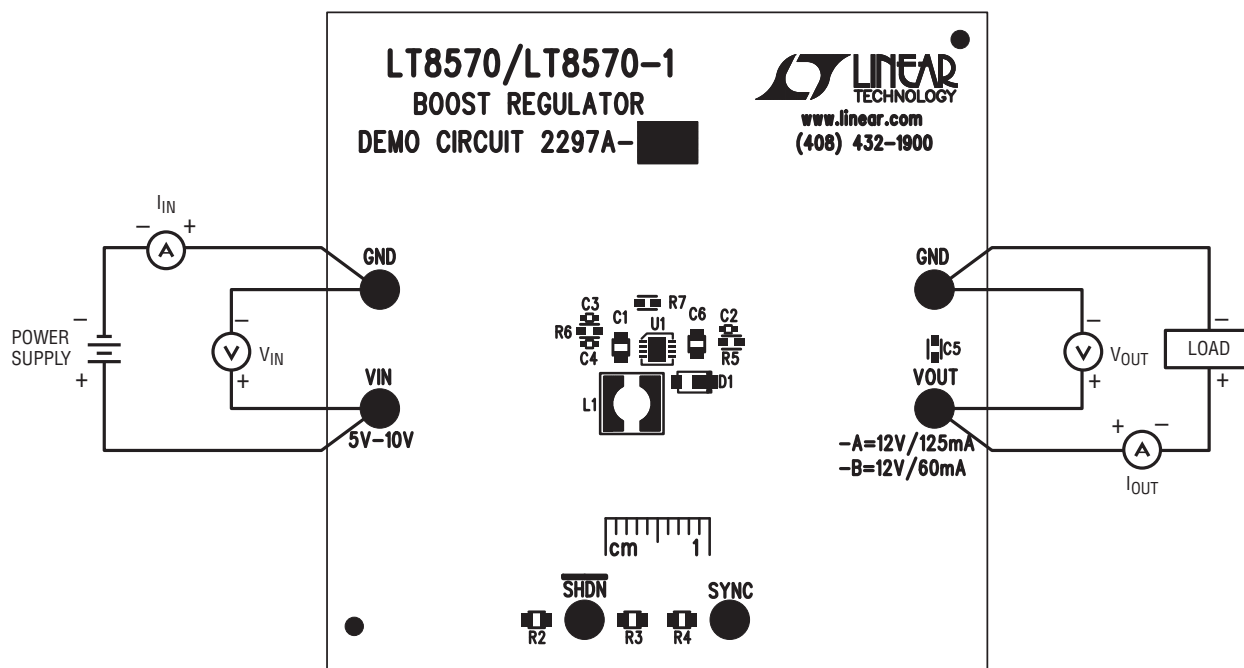


Figure 1. Proper Measurement Equipment Setup

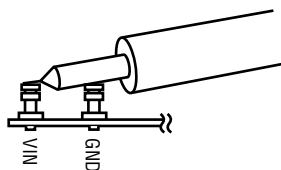


Figure 2. Measuring Input or Output Ripple

QUICK START PROCEDURE

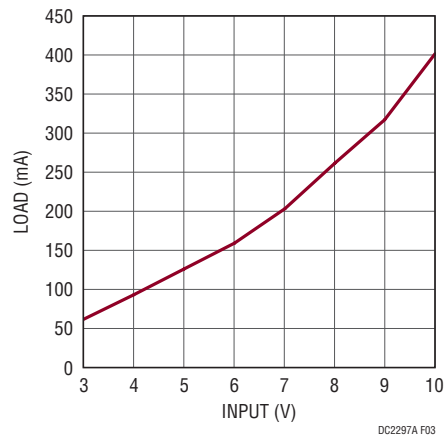


Figure 3. DC2297A-A Max Load Current vs Input Voltage

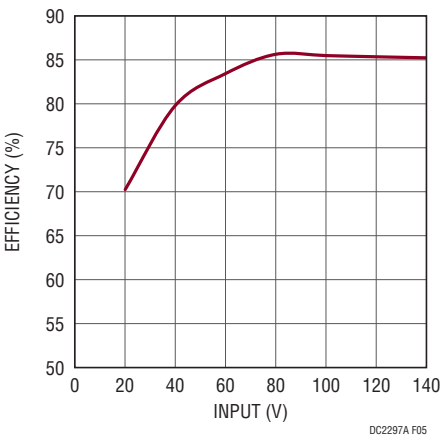


Figure 5. DC2297A-A Efficiency at 5V_{IN}

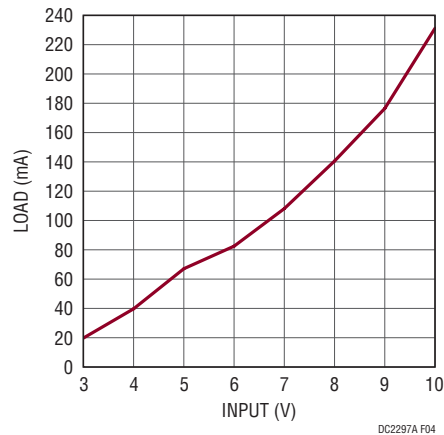


Figure 4. DC2297A-B Max Load Current vs Input Voltage

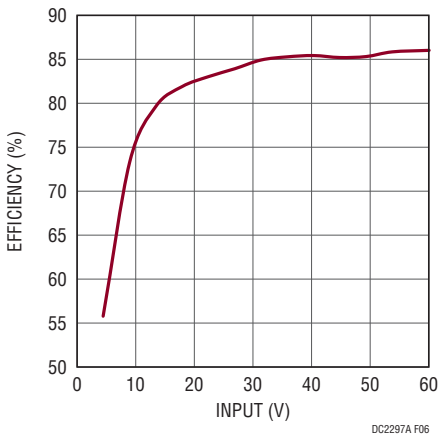


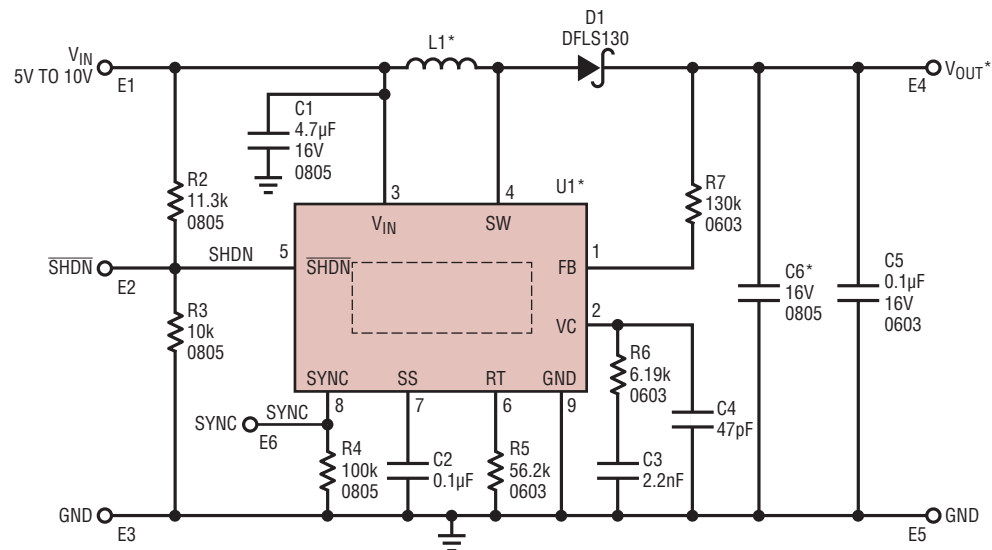
Figure 6. DC2297A-B Efficiency at 5V_{IN}

DEMO MANUAL DC2297A

PARTS LIST

ITEM	QTY	REFERENCE	PART DESCRIPTION	MANUFACTURER/PART NUMBER
DC2297A-A				
Required Circuit Components for Boost Regulator				
1	1	C1	CAP., CER., 4.7 μ F, X7R, 16V, 10%, 0805	MURATA, GRM21BR71C475KA73L
2	1	C2	CAP., CER., 0.1 μ F, X7R, 16V, 10%, 0402	MURATA, GRM155R71C104KA88D
3	1	C3	CAP., CER., 2.2nF, X7R, 16V, 10%, 0402	AVX, 0402YC222KAT2A
4	1	C4	CAP., CER., 47pF, C0G, 25V, 5%, 0402	AVX, 04023A470JAT2A
5	1	C6	CAP., CER., 4.7 μ F, X7R, 16V, 10%, 0805	MURATA, GRM21BR71C475KA73L
6	1	D1	DIODE, SCHOTTKY, 30V, 1A, DI123	DIODES INC., DFLS130-7
7	1	L1	IND., 33 μ H	WÜRTH ELEKTRONIK, 744 042 330
8	1	R2	RES., 11.3k, 1/8W, 1%, 0805	VISHAY, CRCW080511K3FKEA
9	1	R3	RES., 10k, 1/8W, 1%, 0805	VISHAY, CRCW080510K0FKEA
10	1	R5	RES., 56.2k, 1/10W, 1%, 0603	VISHAY, CRCW060356K2FKEA
11	1	R6	RES., 6.04k, 1/10W, 1%, 0603	NIC, NRC06F6041TRF
12	1	R7	RES., 130k, 1/10W, 1%, 0603	VISHAY, CRCW0603130KFKEA
13	1	U1	I.C., LT8570EDD, 8DFN	LINEAR TECH., LT8570EDD#PBF
Additional Demo Board Circuit Components				
1	1	C5	CAP., CER., 0.1 μ F, X7R, 16V, 10%, 0603	TDK, C1608X7R1C104K
2	1	R4	RES., 100k, 1/8W, 1%, 0805	VISHAY, CRCW0805100KFKEA
Hardware: For Demo Board Only				
1	6	E1-E6	TEST POINT, TURRET, 0.094" MTG HOLE	MILL-MAX, 2501-2-00-80-00-00-07-0
DC2297A-B				
Required Circuit Components for Boost Regulator				
1	1	C1	CAP., CER., 4.7 μ F, X7R, 16V, 10%, 0805	MURATA, GRM21BR71C475KA73L
2	1	C2	CAP., CER., 0.1 μ F, X7R, 16V, 10%, 0402	MURATA, GRM155R71C104KA88D
3	1	C3	CAP., CER., 2.2nF, X7R, 16V, 10%, 0402	AVX, 0402YC222KAT2A
4	1	C4	CAP., CER., 47pF, C0G, 25V, 5%, 0402	AVX, 04023A470JAT2A
5	1	C6	CAP., CER., 2.2 μ F, X7R, 16V, 10%, 0805	MURATA, GRM21BR71C225KA12L
6	1	D1	DIODE, SCHOTTKY, 30V, 1A, DI123	DIODES INC., DFLS130-7
7	1	L1	IND., 68 μ H	U ELEKTRONIK, 744 042 680
8	1	R2	RES., 11.3k, 1/8W, 1%, 0805	VISHAY, CRCW080511K3FKEA
9	1	R3	RES., 10k, 1/8W, 1%, 0805	VISHAY, CRCW080510K0FKEA
10	1	R5	RES., 56.2k, 1/10W, 1%, 0603	VISHAY, CRCW060356K2FKEA
11	1	R6	RES., 6.04k, 1/10W, 1%, 0603	NIC, NRC06F6041TRF
12	1	R7	RES., 130k, 1/10W, 1%, 0603	VISHAY, CRCW0603130KFKEA
13	1	U1	I.C., LT8570EDD-1, 8DFN	LINEAR TECH., LT8570EDD-1#PBF
Additional Demo Board Circuit Components				
1	1	C5	CAP., CER., 0.1 μ F, X7R, 16V, 10%, 0603	TDK, C1608X7R1C104K
2	1	R4	RES., 100k, 1/8W, 1%, 0805	VISHAY, CRCW0805100KFKEA
Hardware: For Demo Board Only				
1	6	E-E6	TEST POINT, TURRET, 0.094" MTG HOLE	MILL-MAX, 2501-2-00-80-00-00-07-0

SCHEMATIC DIAGRAM



* VERSION TABLE

ASSEMBLY TYPE	U1	C6	L1	V_{OUT}
DC2297A-A	LT8570EDD	4.7µF	33µF	12V/125mA
DC2297A-B	LT8570-1EDD	2.2µF	66µH	12V/60mA

DEMO MANUAL DC2297A

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