

DESCRIPTION

Demonstration circuit 1290A is a high frequency synchronous step-down converter featuring the LTC3775EUD. The circuit is designed as a drop-in layout with the main circuit components fitting in a 1" by ½" area. The package style for the LTC3775EUD is a 16-pin 3mm x 3mm QFN.

Two versions of the demonstration board are available. DC-1290A-A has been optimized for 5V to 26V input, while the DC1290A-B is optimized for 5V to 36V input range. Both circuits are designed for minimal size and maximum step-down ratio to demonstrate the low on-time capability of the LTC3775EUD and not for maximum efficiency.

The main features of the board include an internal 5V linear regulator for bias and a Mode selector that allows the converter to run in forced continuous conduction (FCC) or pulse skip mode operation. Synchronization to an external clock is also possible.

The LTC3775 datasheet gives a complete description of the part, operation and application information and must be read in conjunction with this quick start guide for demo circuit 1290A.

Design files for this circuit board are available. Call the LTC factory.

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PERFORMANCE SUMMARY

Specifications are at TA = 25°C

SYMBOL	PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
V _{IN}	Input Supply Range	DC1290A-A DC1290A-B	5 5		26 36	V
V _{OUT}	Output Voltage Range	V _{IN} = 5-26V, (DC1290A-A) V _{IN} = 5-36V (DC1290A-B)	1.164	1.20	1.236	V
I _{OUT}	Maximum Load Current	DC1290A-A DC1290A-B		15 10		A A
f _{SW}	Typical Free Running Switching Frequency	DC1290A-A DC1290A-B		500 330		kHz kHz
	Efficiency	DC1290A-A, V _{IN} = 12V, I _{OUT} = 15A		85.5		%
	See Figures 3 and 4 for efficiency curves	DC1290A-B, V _{IN} = 12V, I _{OUT} = 10A		86.5		%

QUICK START PROCEDURE

Demonstration circuit 1290A is easy to set up to evaluate the performance of the LTC3775EUD. 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 V_{in} or V_{out} and GND terminals or directly across relevant capacitor.

See Figure 2 for proper scope probe technique.

- Place jumpers in the following positions:

JP1 FCC

JP2 ON

- With power off, connect the input power supply to V_{in} and GND.

LTC3775EUD

3. Turn on the power at the input.

NOTE. Make sure that the input voltage does not exceed 26V or 36V for DC1290A-A or DC1290A-B demonstration boards respectively.

4. Check for the proper output voltages.

$$V_{OUT} = 1.164V \text{ to } 1.236V$$

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

5. Once the proper output voltage is established, adjust the loads within the operating range and observe the output voltage regulation, ripple voltage, efficiency and other parameters.

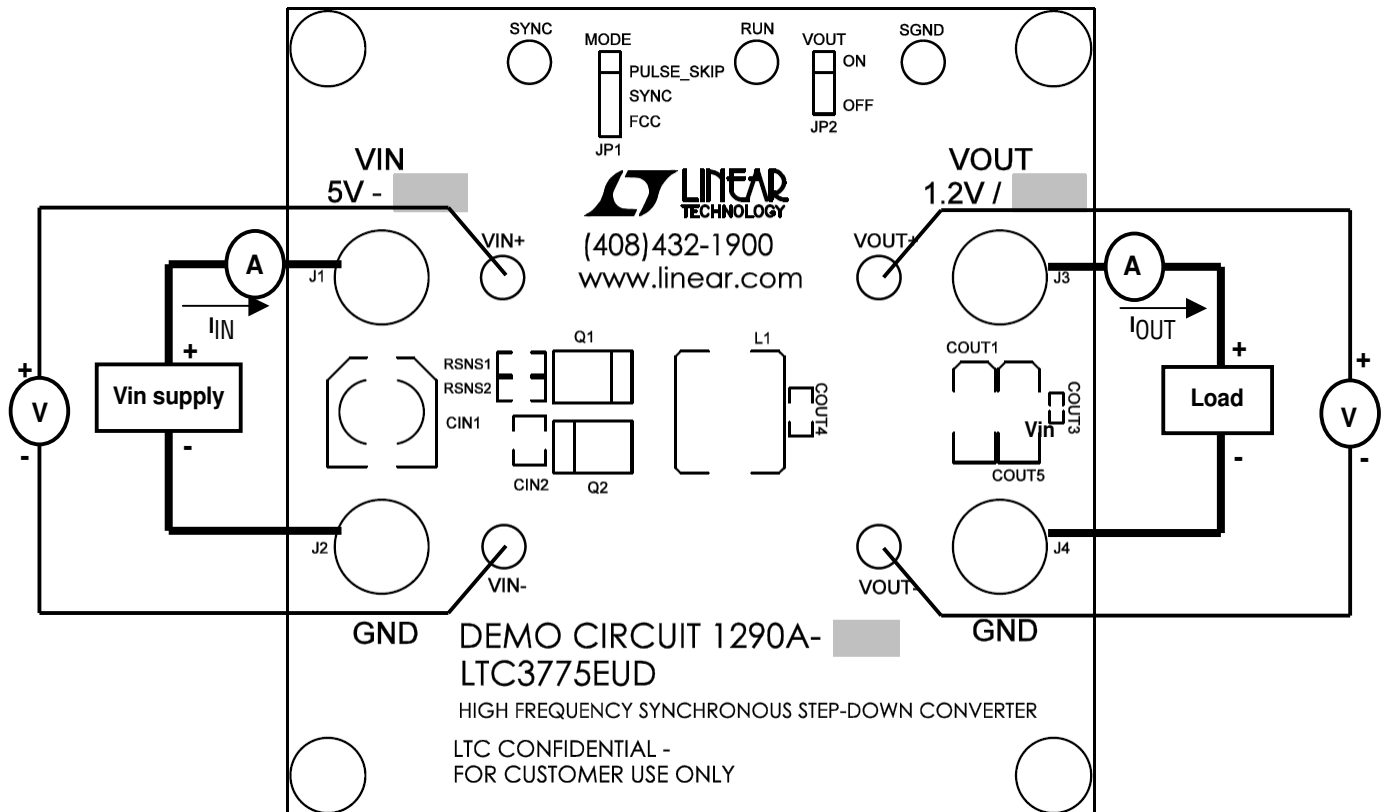


Figure 1. Proper Measurement Equipment Setup

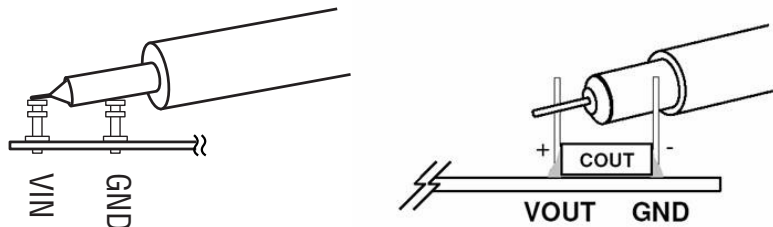


Figure 2. Measuring Input or Output Ripple Across Terminals or Directly Across Bulk Capacitor

FREQUENCY SYNCHRONIZATION AND MODE SELECTION

Demonstration circuit 1290A's Mode selector allows the converter to run in FCC operation, pulse skip operation or synchronizing to an external clock by changing

the position of JP1 accordingly. Please note that the external synchronizing frequency should be close to (+/-20%) the free running frequency.

Mode Selection and Synchronized Operation Options

CONFIGURATION	JP1
FCC operation	'FCC'
Pulse skip operation	'Pulse_Skip'
Synchronized to ext. clock applied to SYNC pin	'Sync'

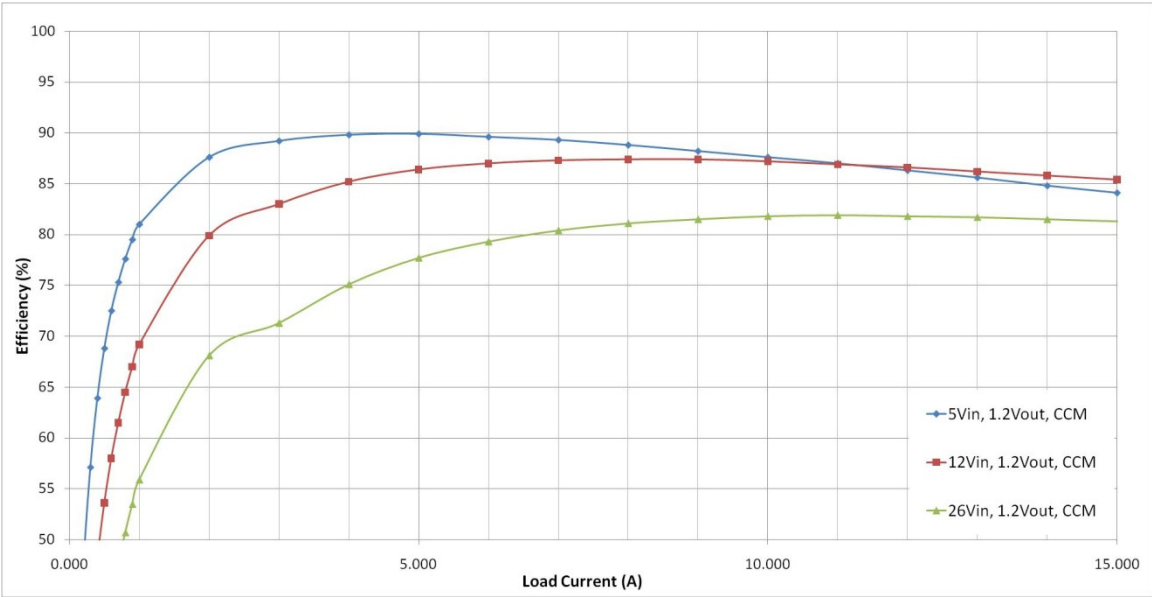


Figure 3. Typical Efficiency vs. Load Current for DC1290A-A

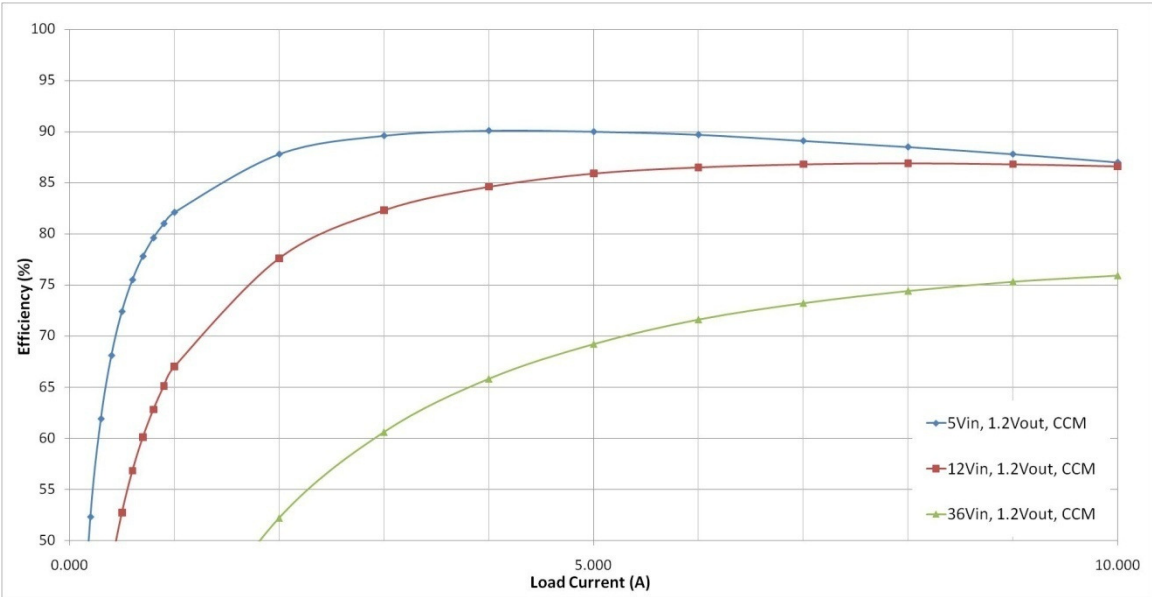


Figure 4. Typical Efficiency vs. Load Current for DC1290A-B



Figure 5. Thermal images of DC1290A-A, 26V_{IN}, 1.2V_{OUT} @ 15A, 22°C ambient

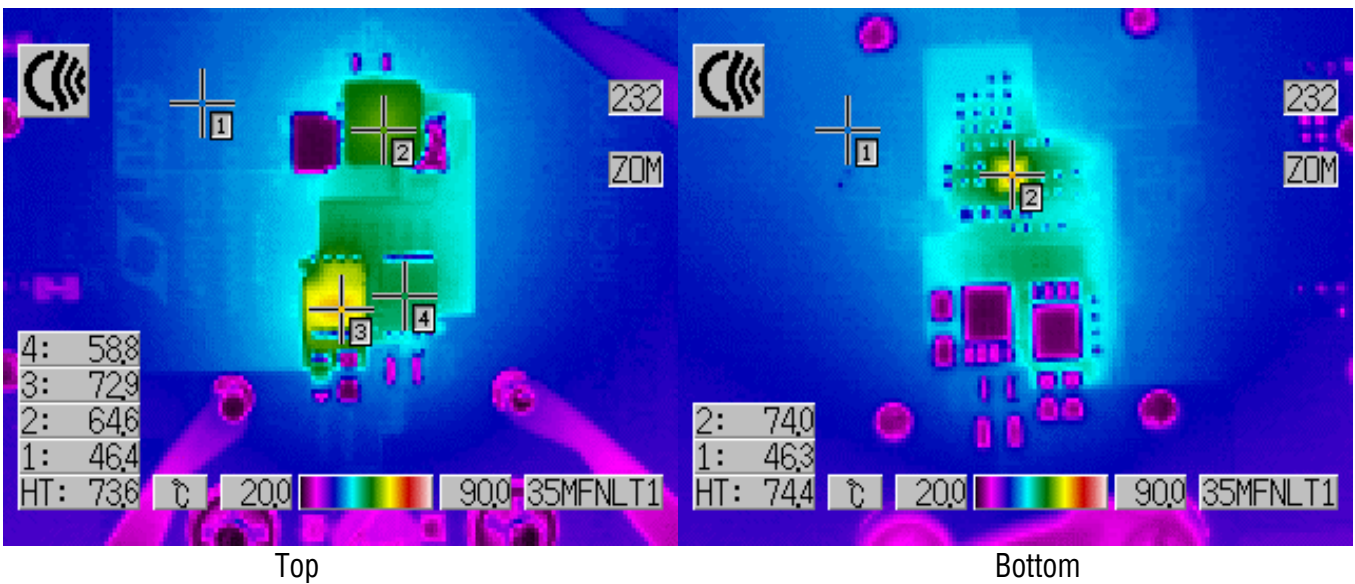
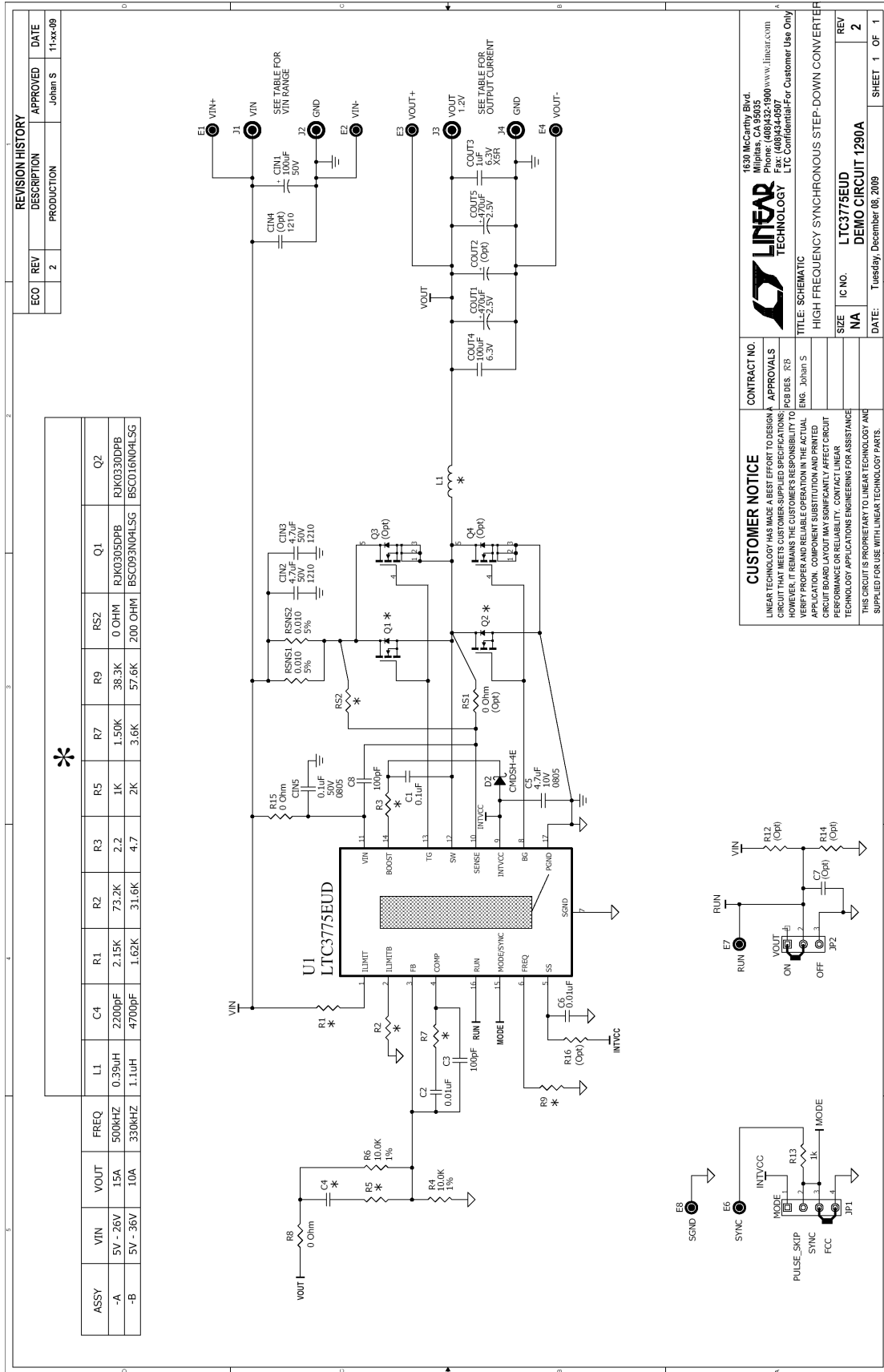


Figure 6. Thermal images of DC1290A-B, 36V_{IN}, 1.2V_{OUT} @ 10A, 22°C ambient



REVISION HISTORY		
ECO	REV	DESCRIPTION
	2	PRODUCTION
		APPROVED John S
		DATE 11-xx-08

ASSY	VIN	VOUT	FREQ	L1	C4	R1	R2	R3	R5	R7	R9	RS2	Q1	Q2
-A	5V - 26V	1.5A	500KHZ	0.39uH	2200pF	2.15K	73.2K	2.2	1K	1.50K	38.3K	0 OHM	RJK030DPB	RJK030DPB
-B	5V - 36V	10A	330KHZ	1.1uH	4700pF	1.62K	31.6K	4.7	2K	3.6K	57.6K	200 OHM	BSC093N04LSG	BSC016N04LSG

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CONTRACT NO. _____
APPROVALS
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 ENG. John S

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TITLE: SCHEMATIC
HIGH FREQUENCY SYNCHRONOUS STEP-DOWN CONVERTER

SIZE NA **IC NO.** LTC3775EUD **REV** 2
DEMO CIRCUIT 1250A

DATE: Tuesday, December 08, 2008 **SHEET** 1 OF 1