DEMO CIRCUIT 1290A
QUICK START GUIDE

LTC3775EUD

HIGH FREQUENCY SYNCHRONOUS STEP-DOWN CONVERTER

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 36Vin 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	5		26	V
		DC1290A-B	5		36	
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		15		A
		DC1290A-B		10		A
f_{SW}	Typical Free Running Switching Frequency	DC1290A-A		500		kHz
		DC1290A-B		330		kHz
	Efficiency See Figures 3 and 4 for efficiency curves	DC1290A-A, V_{IN} = 12V, I_{OUT} = 15A		85.5		%
		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 Vin or Vout and GND terminals or directly across relevant capacitor.

See Figure 2 for proper scope probe technique.

1. Place jumpers in the following positions:

   JP1 FCC

   JP2 ON

2. With power off, connect the input power supply to Vin and GND.

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 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.

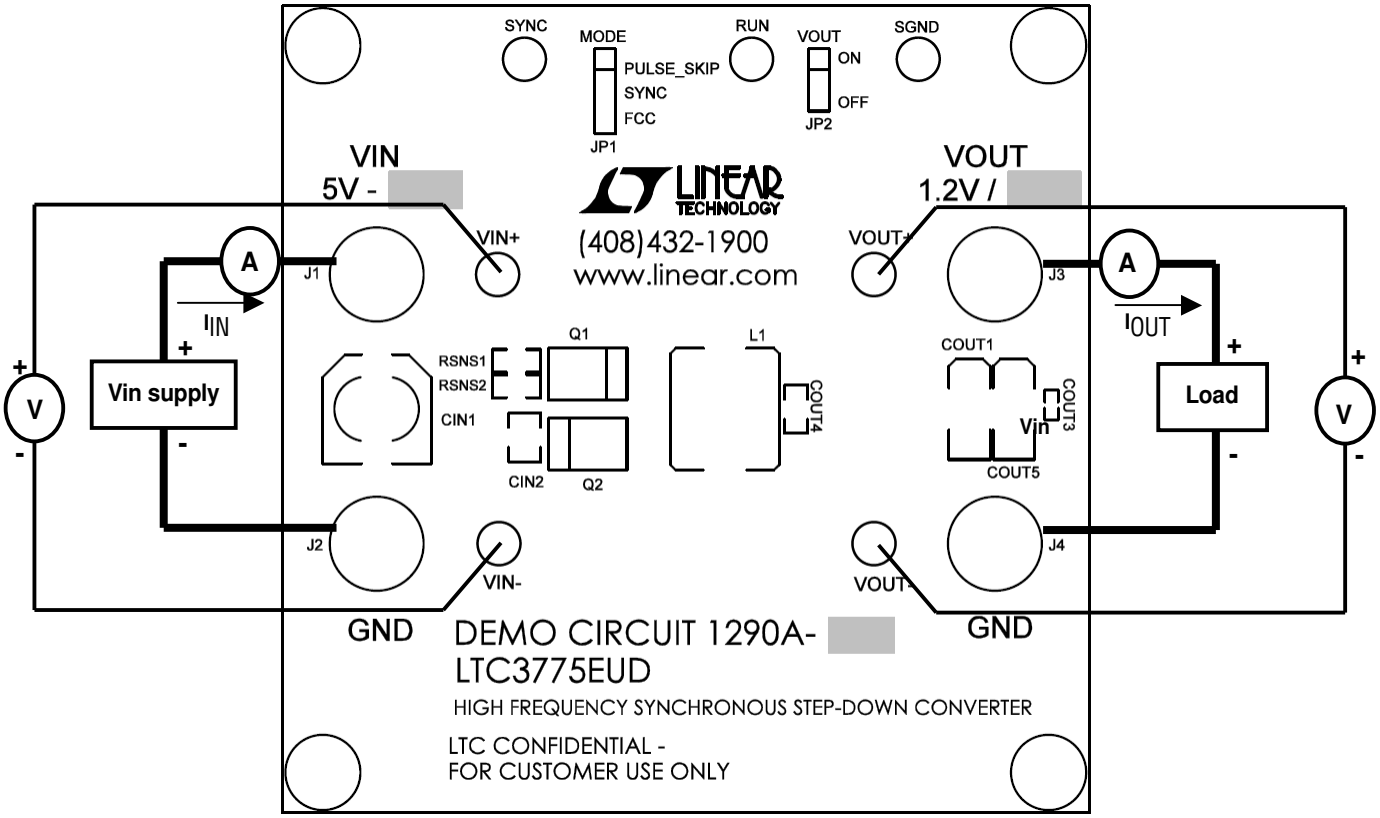


Figure 1. Proper Measurement Equipment Setup

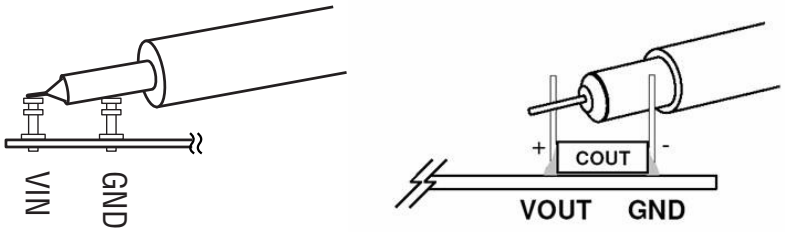


Figure 2. Measuring Input or Output Ripple Across Terminals or Directly Across Bulk Capacitor

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'

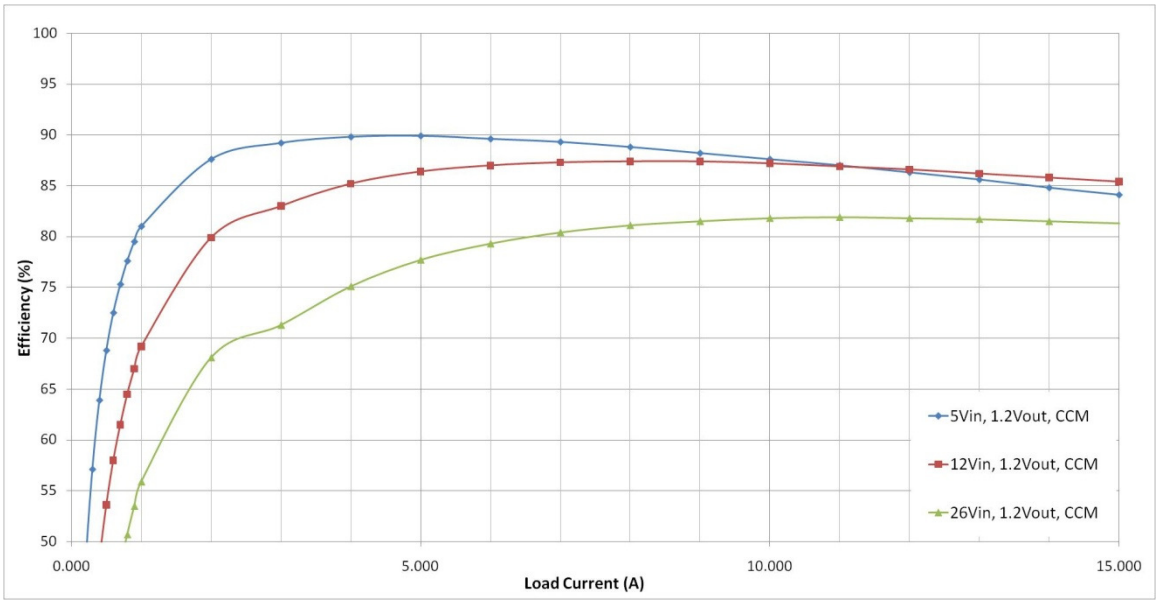


Figure 3. Typical Efficiency vs. Load Current for DC1290A-A

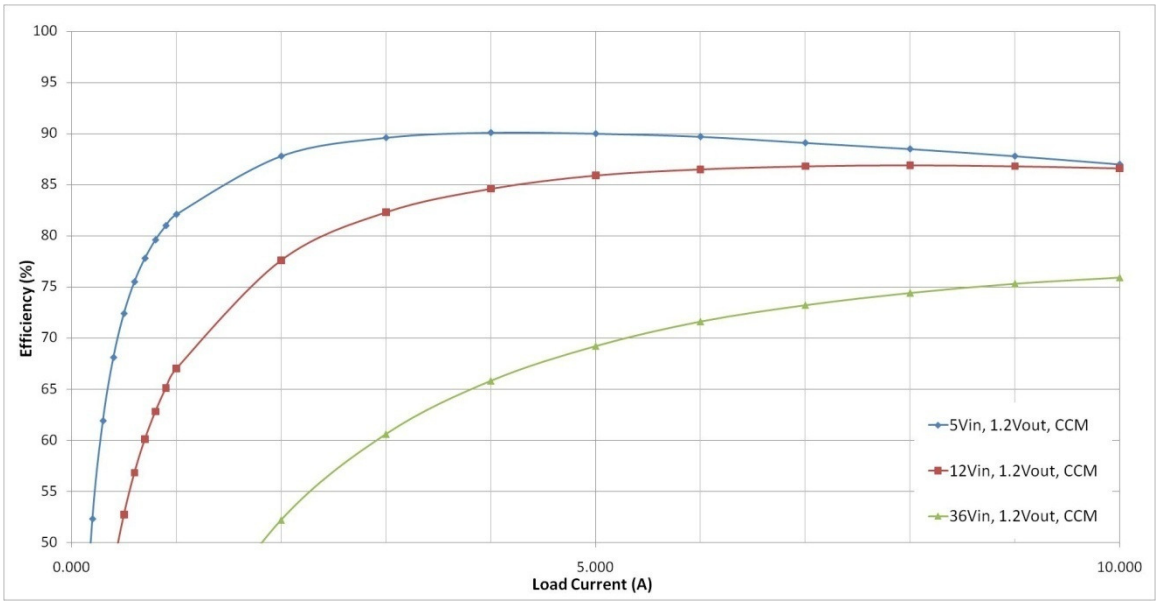
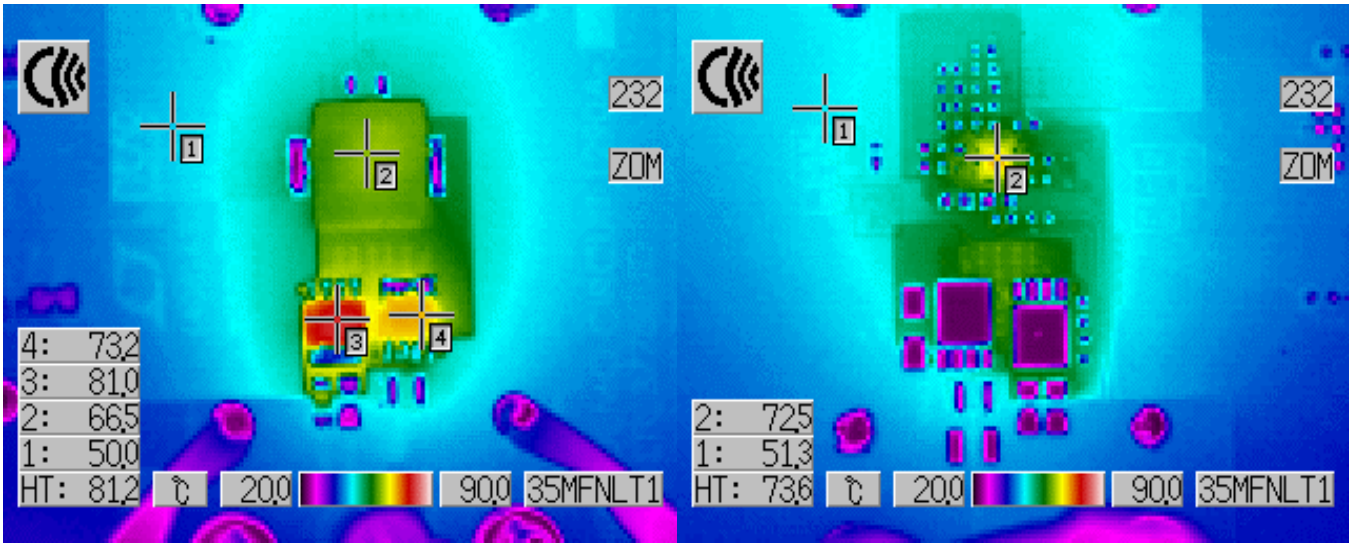


Figure 4. Typical Efficiency vs. Load Current for DC1290A-B

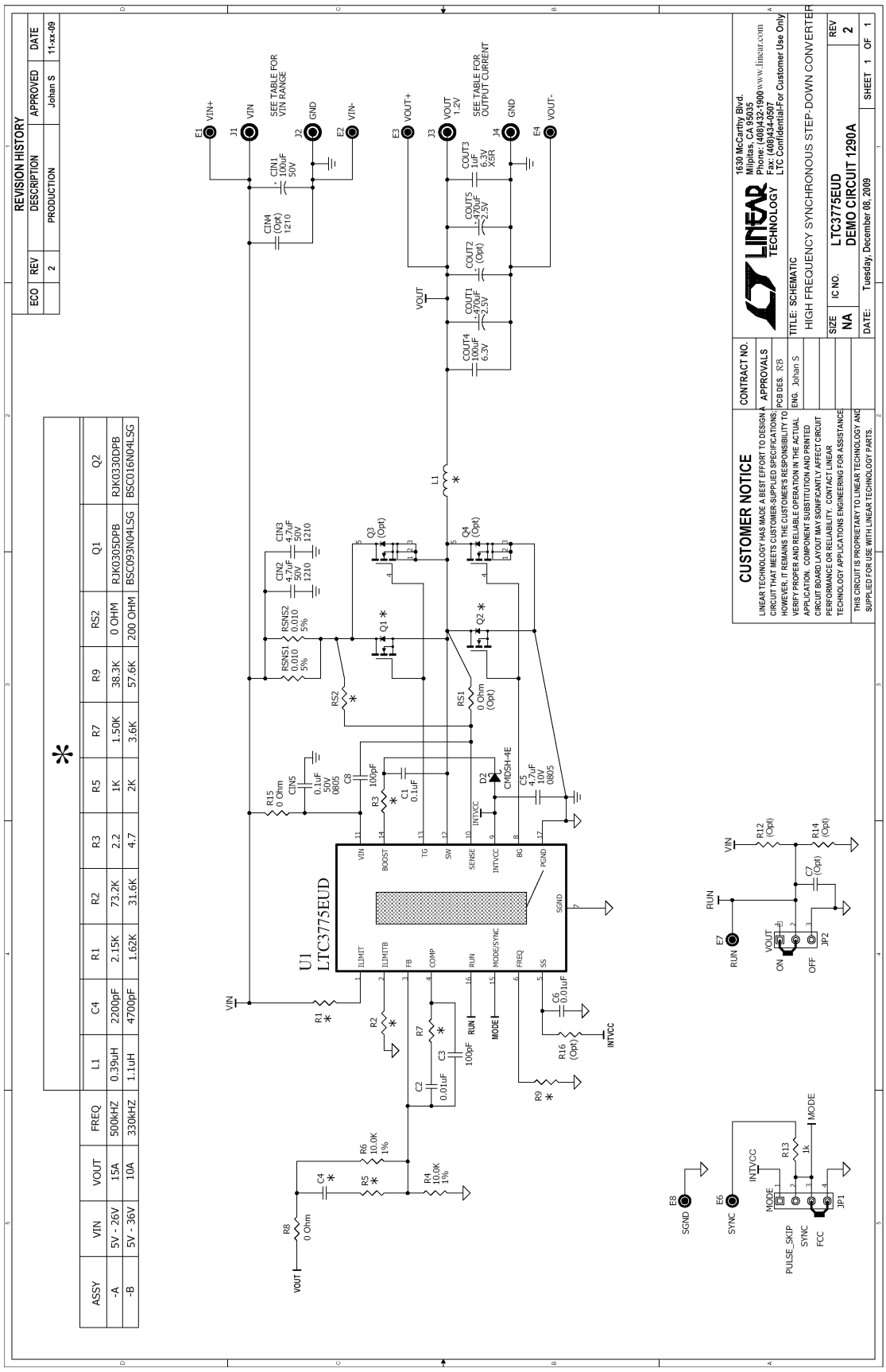


Top Bottom

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

Top Bottom

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



ASSY	VIN	VOUT	FREQ	L1	C4	R1	R2	R3	R5	R7	R9	RS2	Q1	Q2
-A	5V - 26V	15A	500kHZ	0.39uH	2200pF	2.15K	73.2K	2.2	1K	1.50K	38.3K	0 OHM	RJK0305DPB	RJK0330DPB
-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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