QUICK START GUIDE FOR DEMONSTRATION CIRCUIT 508
LOW COST, HIGH EFFICIENCY SYNCHRONOUS FORWARD CONVERTER WITHOUT OPTO-ISOLATOR

LT1725

DESCRIPTION

Demonstration circuit 508 is an isolated 48V (36 to 72 V_{DC}) input to a jumper selectable 2.5V/3.3V, 10A single output forward converter. The supply utilizes the LT1725 controller to regulate the isolated output voltage without using an opto-isolator. A self-driven synchronous forward converter is implemented to achieve excellent supply efficiency with minimum additional circuitry and cost. High reliability is achieved with soft-start, under-voltage lockout and cycling short circuit protection. The overall supply is within the 2.3"x1.45" standard quarter-brick footprint area. Printed circuit board layout and magnetics are designed to meet UL1950/EN60950.

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

TABLE 1. PERFORMANCE SUMMARY

PARAMETER	CONDITION	MIN	TYP	MAX	UNITS
Input Voltage Range		36	48	72	V
UVLO	Rising		31.4		V
	Falling		30.5		V
Maximum Input Current at Full Load	V_{IN}=36V, V_{OUT}=2.5V			0.9	A
	V_{IN}=36V, V_{OUT}=3.3V			1.1	A
Output Voltage V_{OUT}	Jumper Selectable		2.5 or 3.3		V
Output Regulation	Full load and line range			± 5	%
Output Current I_{OUT}	NO Cooling Fan Required. Ambient T_A = 25°C		10		A
Output Current Limit	48Vin, V_{OUT}=2.5V		14		A
	48Vin, V_{OUT}=3.3V		13		A
Output Short Circuit	Cycling, auto restart		280		ms
Typical Output Ripple V_{OUT}	V_{IN} = 48V, V_{OUT}=2.5V, I_{OUT} = 10A		44		mV_{P-P}
	V_{IN} = 48V, V_{OUT}=3.3V, I_{OUT} = 10A		53		mV_{P-P}
Temperature Rise at Full Load	PCB Hotspot, no air flow, V_{IN} = 72V, V_{OUT}=2.5V		26°C		
	PCB Hotspot, no air flow, V_{IN} = 72V, V_{OUT}=3.3V		31°C		
Efficiency at Full Load	See Typical Efficiency in Graph Below, V_{IN} = 48V, V_{OUT}=2.5V		89.4		%
	V_{IN} = 48V, V_{OUT}=3.3V		90.4		%
Isolation Voltage	Basic Insulation of PCB Layout and Magnetics			1500	V_{DC}
Isolation Capacitance			2200		pF
Dynamic Response Load Step 25% to 75%	Peak Deviation		± 5		%
Switching Frequency			250		KHz

QUICK START PROCEDURE

Demonstration circuit 508 is easy to set up to evaluate the performance of the LT1725. 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. Connect a 36 to 72V_{DC} / 1.5A power supply between +Vin and –Vin pins.
2. Connect a 0-10A electronic load or resistive load between Vout+ and Vout- banana wire socket. There is no minimum load requirement.
3. Set the Vo Select jumper JP1 to set the proper output voltages. The output voltage should be 2.5V±0.125V or 3.3V±0.165V, depending on the JP1 selection. Default JP1 setting is for 3.3V output.

   The output voltage should be measured across the measurement pins (E3 and E4) of Vout+ and Vout-.
4. Once the proper output voltages are established, adjust the loads within the operating range and observe the output voltage regulation, ripple voltage, efficiency and other parameters.

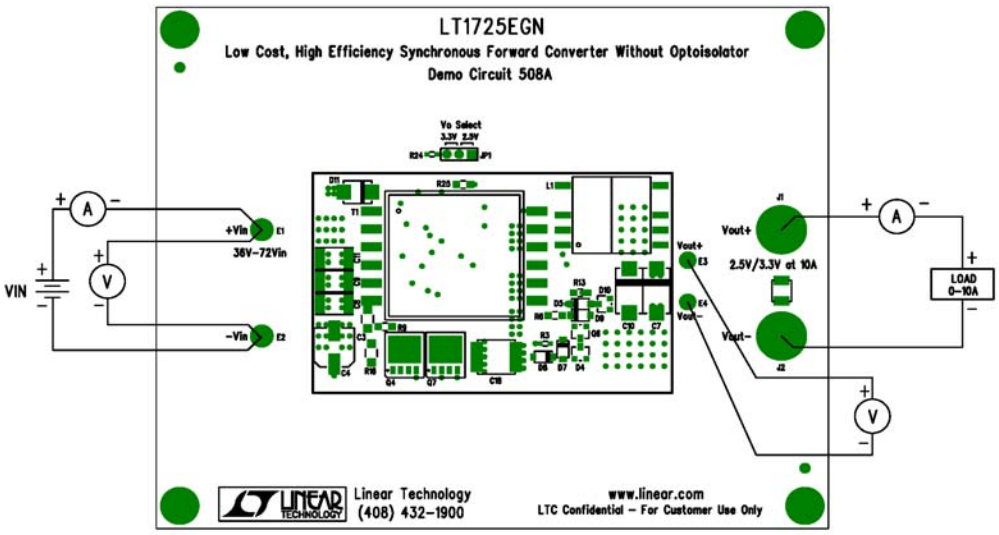


Figure 1. Proper Measurement Equipment Setup

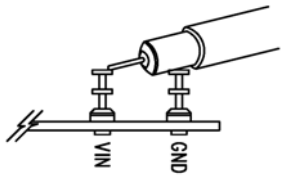


Figure 2. Scope Probe Placement for Measuring Input or Output Ripple

MEASUREMENT DATA

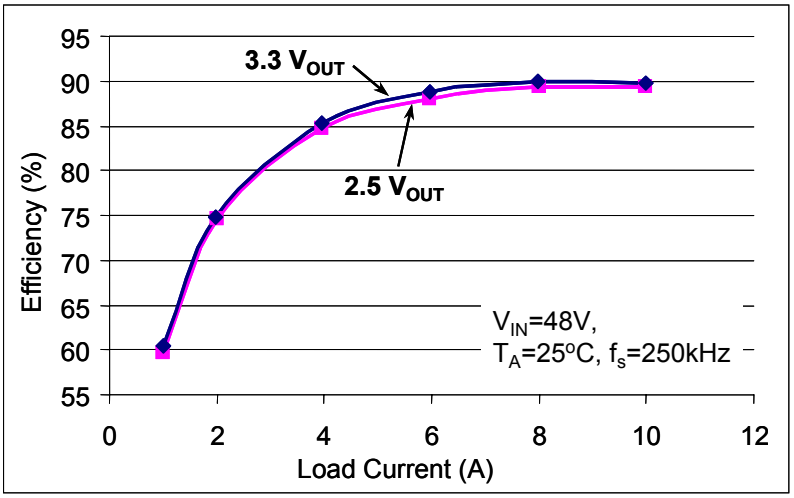


Figure 3. Measured Supply Efficiency vs. Load Current

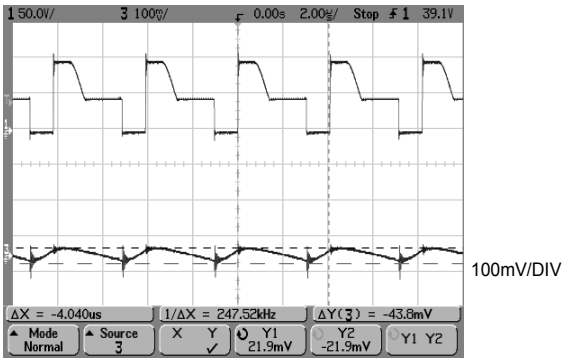


Figure 4. MOSFET Q4 V_{DS} and Output Ripple (V_{IN} = 48V, V_{OUT} = 2.5V, I_{OUT} = 10A)

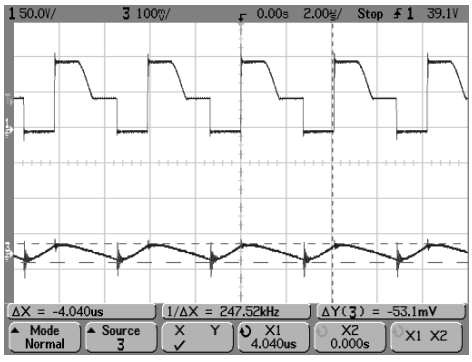
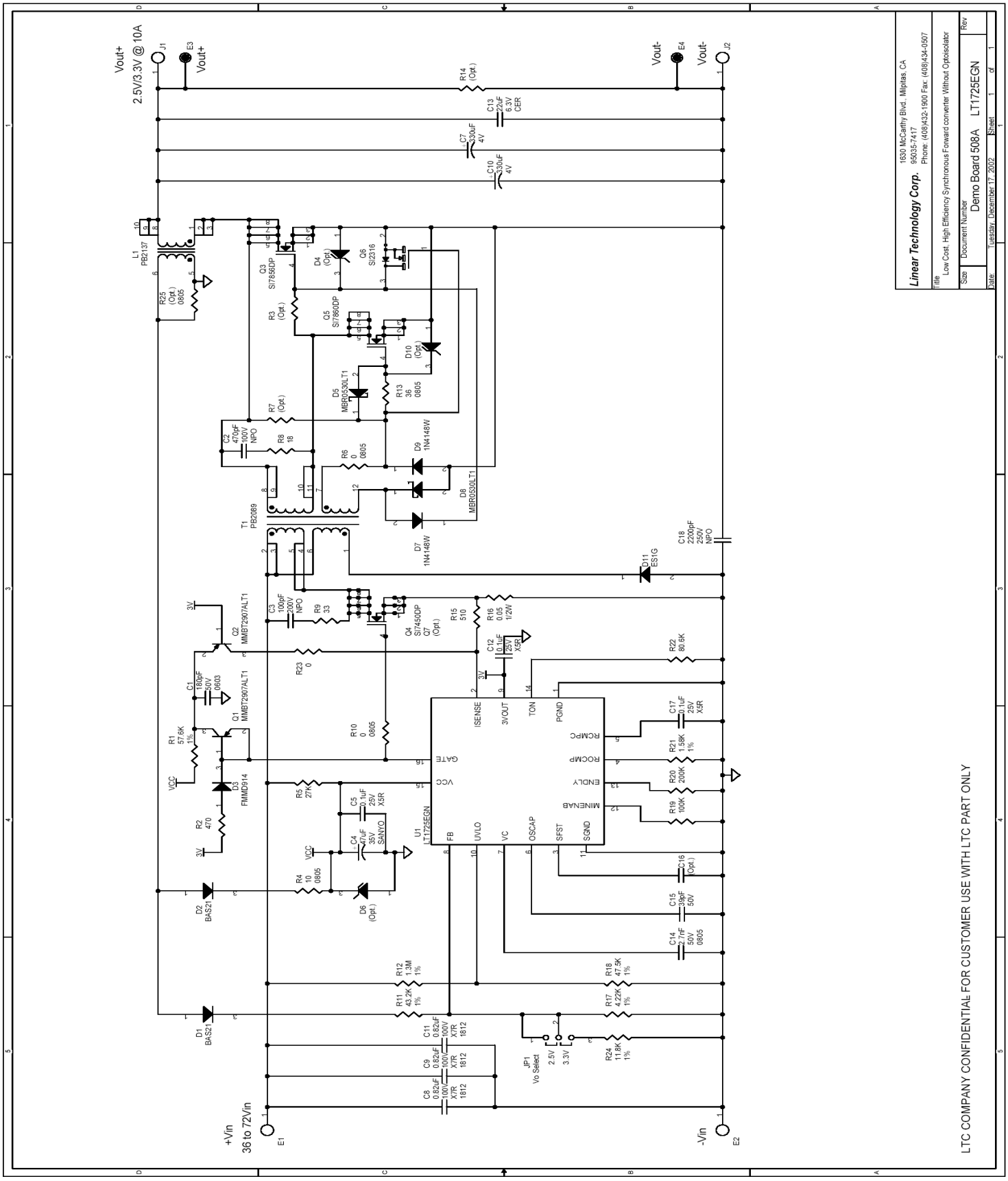
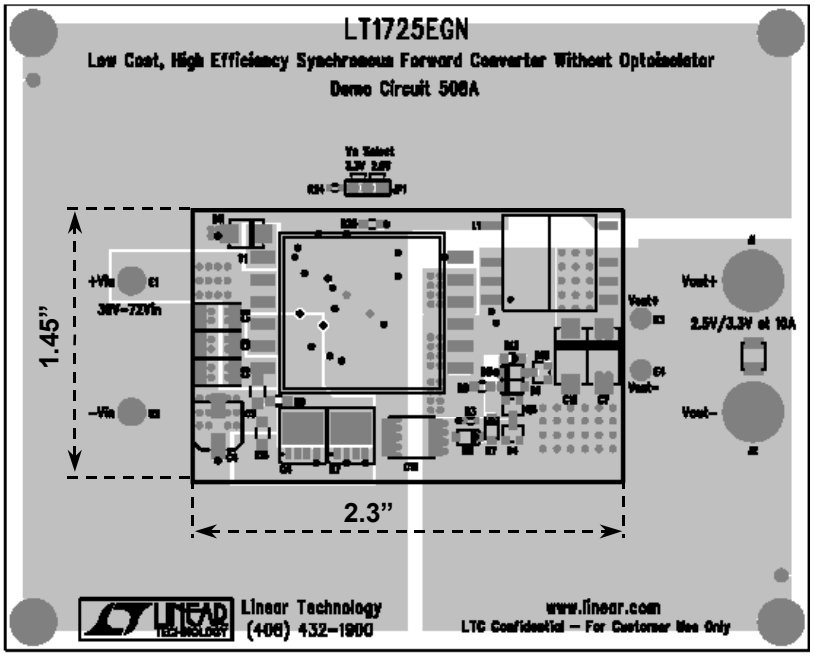


Figure 5. MOSFET Q4 V_{DS} and Output Ripple (V_{IN} = 48V, V_{OUT} = 3.3V, I_{OUT} = 10A)

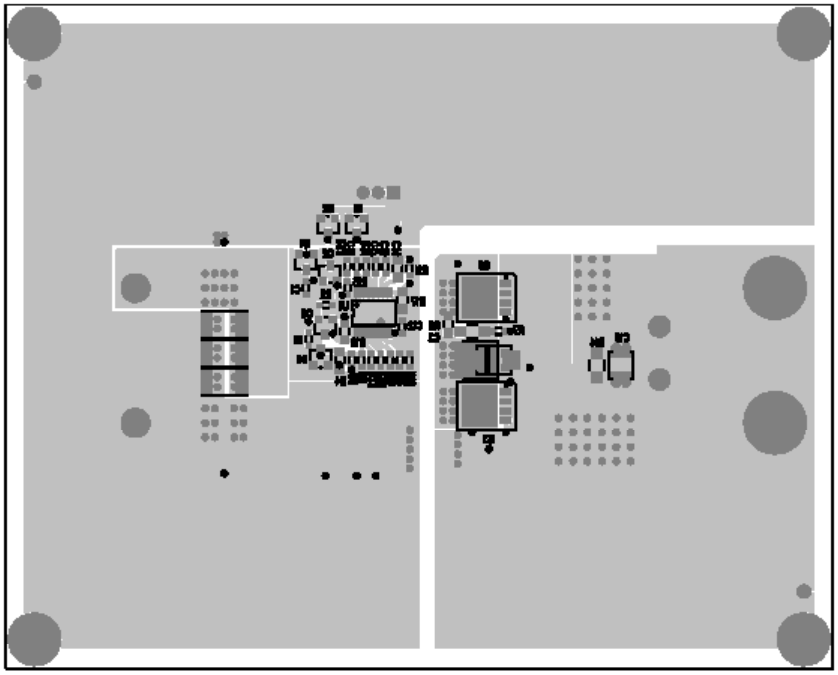

Vout+
2.5V/3.3V @ 10A
Vout-
+Vin
36 to 72Vin
-Vin
LTC COMPANY CONFIDENTIAL FOR CUSTOMER USE WITH LTC PART ONLY
Linear Technology Corp.
1630 McCarthy Blvd., Milpitas, CA
95035-7417
Phone: (408)432-1900 Fax: (408)434-0507
Low Cost, High Efficiency Synchronous Forward converter Without Optoisolator
Demo Board 508A
LT1725EGN

PCB GUIDE

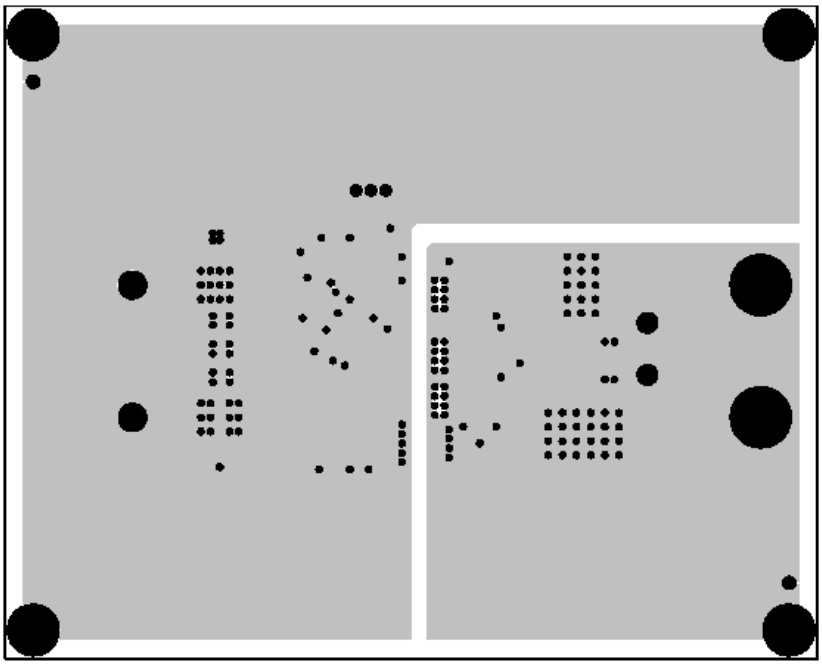
TOP LAYER



BOTTOM LAYER

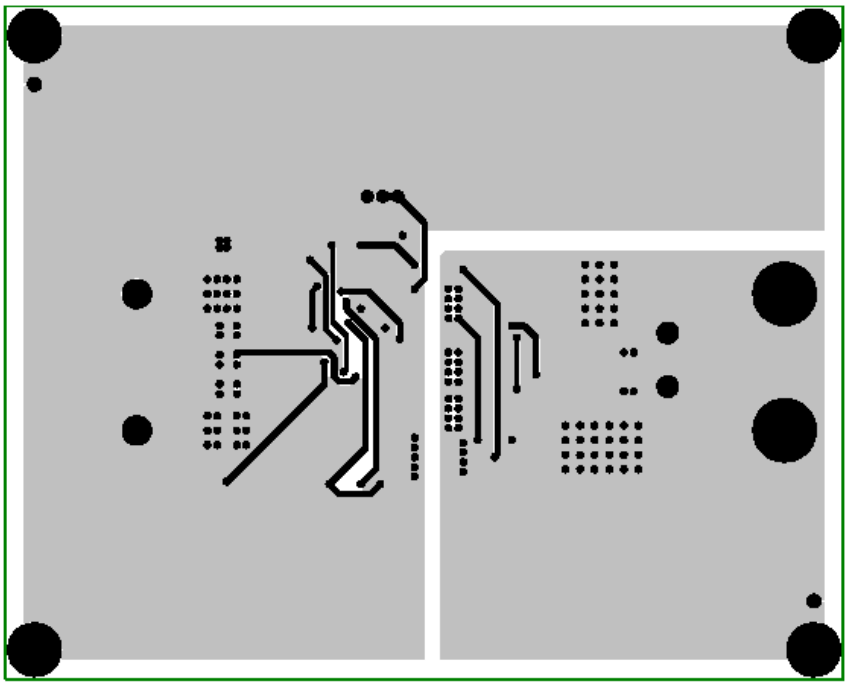


INTERNAL LAYER2



COPPER LAYER 2 (GND,SIGNAL)

INTERNAL LAYER3



COPPER LAYER 3 (GND)