

QUICK START GUIDE FOR DEMONSTRATION CIRCUIT 448

DUAL OUTPUT ISOLATED POWER SUPPLY

LT3710

DESCRIPTION

Demonstration circuit 448 is a dual output high efficiency isolated DC/DC power supply with 36V to 72V input range. It has two outputs: 3.3V at 10A max and 1.8V or 2.5V at 10A max. LT3710, a secondary side synchronous post regulator controller, is used to generate a tightly regulated second output directly from the transformer secondary winding, thus minimizing the size of

the output inductor and capacitor at the first output stage. Synchronous MOSFETs significantly improve efficiency, making it suitable for low output voltage applications. The complete design is mounted within a standard half brick PCB area with about half inch height.

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

Table 1. Performance Summary ($T_A = 25^\circ\text{C}$)

PARAMETER	CONDITION	VALUE
Minimum Input Voltage		36V
Maximum Input Voltage		72V
V_{OUT1}	$V_{IN} = 36\text{V to } 72\text{V}$, $I_{OUT1} = 0\text{A to } 10\text{A}$, $I_{OUT2} = 0\text{A to } 10\text{A}$	$3.3\text{V} \pm 2\%$
V_{OUT2}	$V_{IN} = 36\text{V to } 72\text{V}$, $I_{OUT1} = 0\text{A to } 10\text{A}$, $I_{OUT2} = 0\text{A to } 10\text{A}$	$1.83\text{V} \pm 2\%$ (JP1, JP2: 1.8V position) or $2.53\text{V} \pm 2\%$ (JP1, JP2: 2.5V position)
Typical Output Ripple V_{OUT1}	$V_{IN} = 48\text{V}$, $I_{OUT1} = 10\text{A}$ (20MHz BW)	70mV _{p-p}
Typical Output Ripple V_{OUT2}	$V_{IN} = 48\text{V}$, $I_{OUT2} = 10\text{A}$ (20MHz BW)	50mV _{p-p} for 1.8Vo 60mV _{p-p} for 2.5Vo
Output Regulation	Line	$\pm 0.1\%$
	Load	$\pm 0.2\%$
Nominal Switching Frequency		230kHz
Efficiency	$V_{IN} = 48\text{V}$, $V_{OUT1} = 3.3\text{V}$, $V_{OUT2} = 1.8\text{V}$, $I_{OUT1} = I_{OUT2} = 10\text{A}$	86% Typical
	$V_{IN} = 48\text{V}$, $V_{OUT1} = 3.3\text{V}$, $V_{OUT2} = 2.5\text{V}$, $I_{OUT1} = I_{OUT2} = 10\text{A}$	87% Typical
Output Voltage V_{OUT1} Trim	$V_{O1 \text{ TRIM}} = 3.3\text{V}$	5% Typical
	$V_{O1 \text{ TRIM}} = 0\text{V}$	-5% Typical
On/Off Control	Logic Low Voltage-Off	0.6V Max
	Logic High Voltage-On	1V Min
Isolation Voltage	Basic Insulation	1500VDC

OPERATING PRINCIPLES

Demonstration circuit 448A features the LT3710, LT3781 and LTC1698 controllers. The basic power stage topology is a two-switch forward converter with synchronous rectification. The primary side controller uses the LT3781, a current mode two-switch forward controller with built-in MOSFET drivers. On the secondary side, an LTC1698 is used to provide the voltage feedback for the 3.3V output, as well as the gate drive for the synchronous MOSFETs in the 3.3V output stage. The error amplifier output of the 3.3V circuit is fed into the optocoupler and then relayed to LT3781 on the primary side to complete the 3.3V regulation. The second 1.8V/2.5V output is directly regulated by the LT3710 circuit.

A planar transformer PA0191 built by Pulse Engineering is employed as the power transformer in this design. This transformer is constructed on a PQ20 core with nine turns of primary windings, two turns of secondary

windings and seven turns of auxiliary windings for the LT3781 bias supply. A Vishay Si7892DP is used due to its low $R_{DS(ON)}$, 30V V_{DSS} rating and its compact and thermally enhanced PowerPak SO-8 package.

The switching frequency of the circuit is about 230KHz. 1500V input to output isolation is provided. Additional features of this demo board include primary side on/off control, $\pm 5\%$ secondary side trimming on the 3.3V output, input overvoltage protection, under voltage lockout, 3.3V output overvoltage protection, 1.8V/2.5V output current limit and board overtemperature shutdown.

The demo board can deliver the full rated currents (10A at both outputs) at room temperature without airflow. The hottest spot on the demo board (T1 transformer) has a temperature rise of 50°C at 48V input and full loads (without airflow).

QUICK START PROCEDURE

Demonstration circuit DC448 is easy to set up to evaluate the performance of the LT3710, LT3781 and LTC1698. 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.

Default jumper setting: both jumpers at 1.8V position

1. Select Vout2 1.8V (or 2.5V): Place both jumpers JP1 and JP2 at 1.8V (or 2.5V) position.
2. With power off, connect the input power supply to +Vin (36V–72V) and –Vin (input return).

3. The on/off control pin should be left open for normal operation. (Connecting the on/off pin to the –Vin turns off the converter.)
4. For normal 3.3V output, Vo1 Trim pin should be left open.
5. Connect the 3.3V load (Load 1 in Figure 1) between +Vo1 and Vo RTN; connect the 1.8V/2.5V load (Load 2 in Figure 1) between +Vo2 and Vo RTN.
6. Connect the DVMs to the input and outputs.
7. Turn on the input power supply and check for the proper output voltages. Vo1 should be 3.3V $\pm 2\%$. Vo2 should be 1.83V $\pm 2\%$ if 1.8Vo is selected (or Vo2 should be 2.53V $\pm 2\%$ if 2.5Vo is selected).

QUICK START GUIDE FOR DEMONSTRATION CIRCUIT 448

DUAL OUTPUT ISOLATED POWER SUPPLY

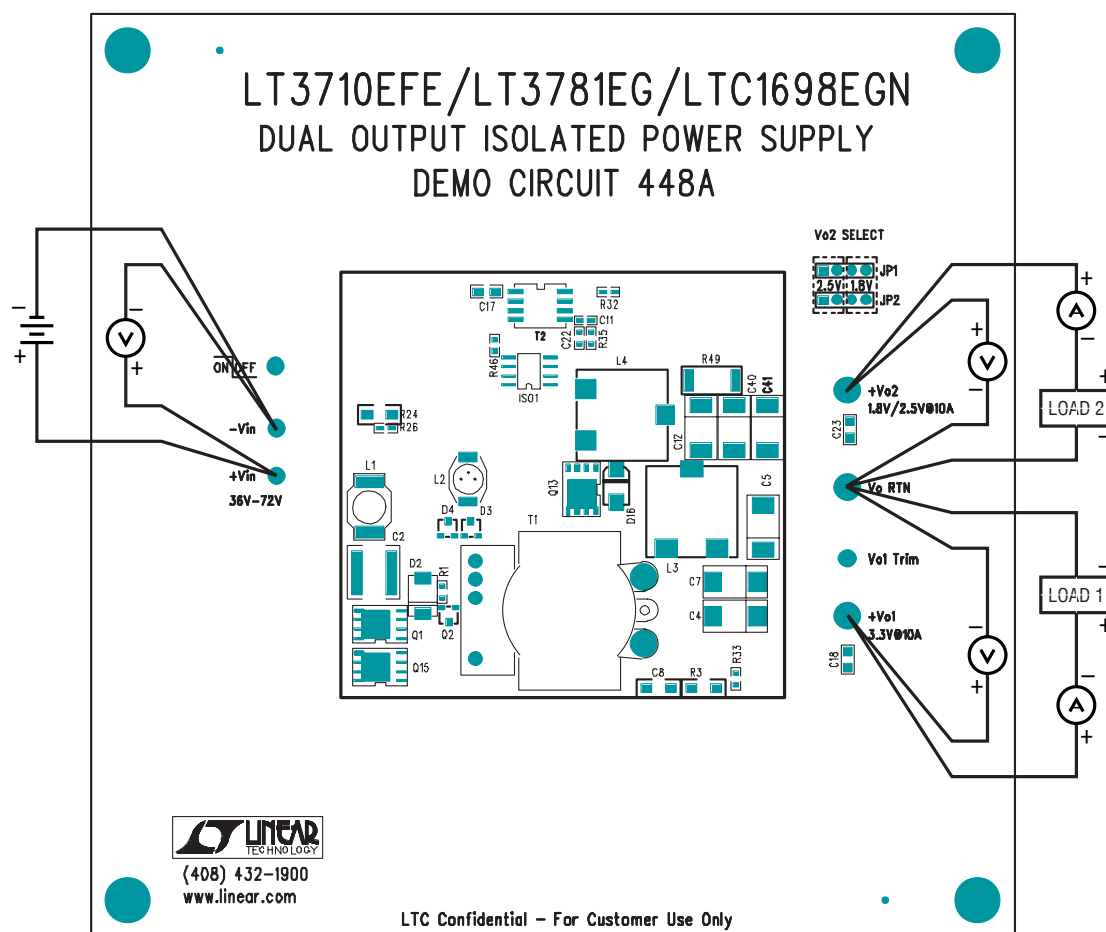


Figure 1. Proper Measurement Equipment Setup

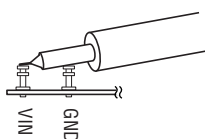


Figure 2. Measuring Input or Output Ripple

QUICK START GUIDE FOR DEMONSTRATION CIRCUIT 448

DUAL OUTPUT ISOLATED POWER SUPPLY

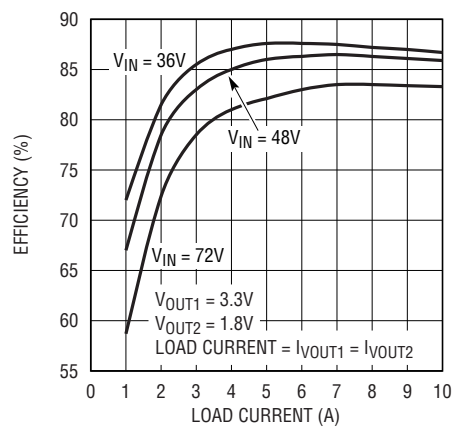


Figure 3. Efficiency vs load current: $V_{out1}=3.3V$ and $V_{out2}=1.8V$

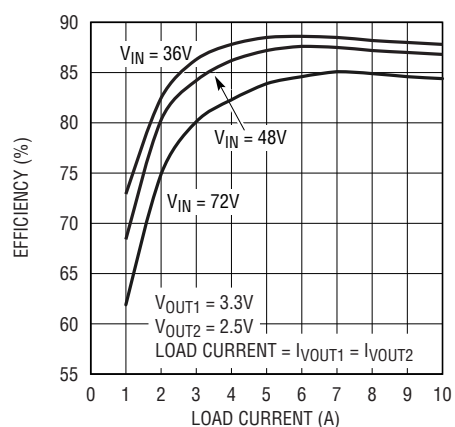
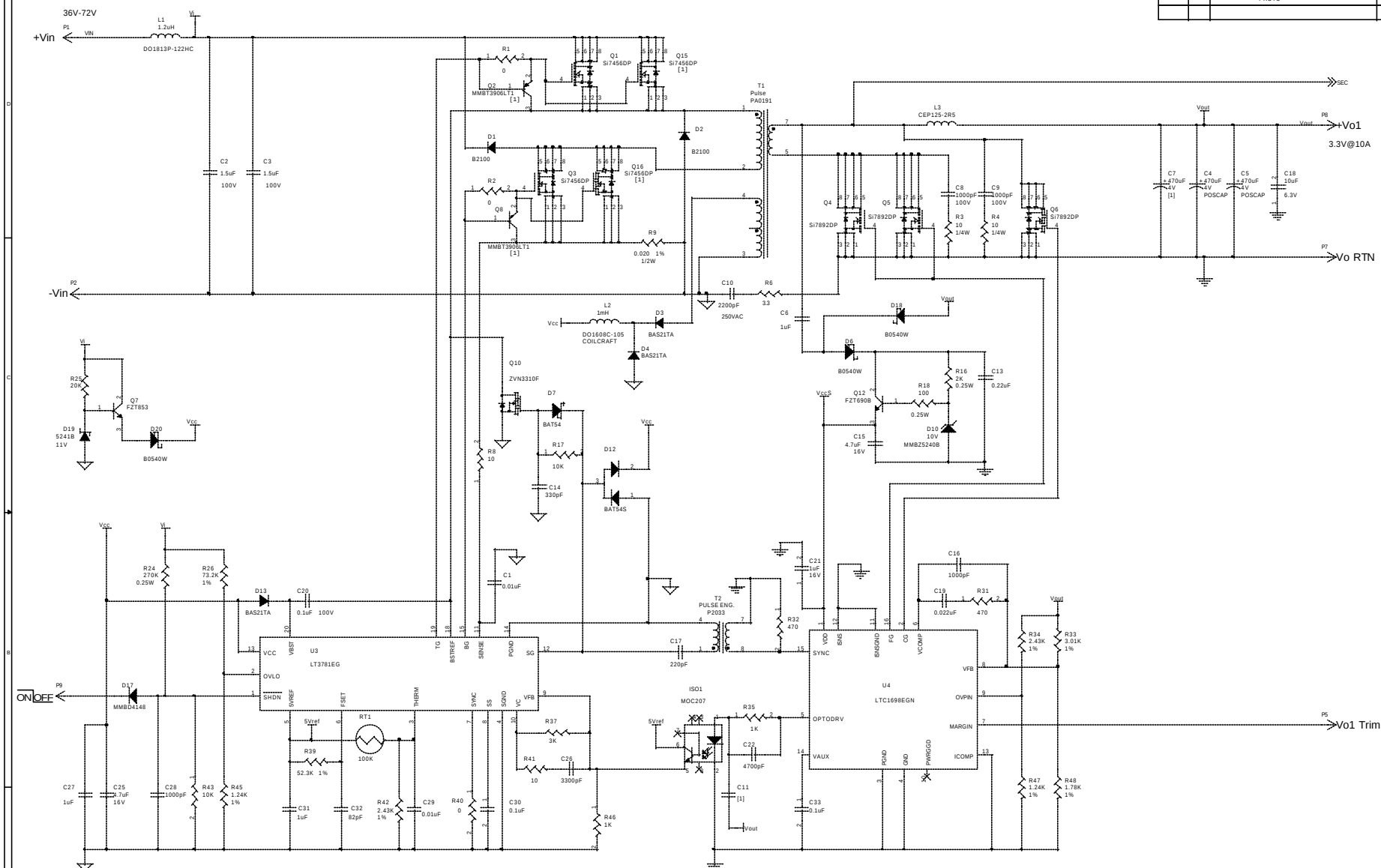


Figure 4. Efficiency vs load current: $V_{out1}=3.3V$ and $V_{out2}=2.5V$

		1830 McCarthy Blvd. Milpitas, CA 95035 Phone: (408) 433-8000 Fax: (408) 433-8007	
TITLE SCH, LT1370EFLT3781EGALC1698NGN DUAL OUTPUT ISOLATED POWER SUPPLY			
SIZE CAGE CODE		DWG NO	
C		DC448A	
SCALE NONE	FILE NAME 448A.DSN	SHEET 1	OF 5



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 MEI	07/15/0
CHECKED	
APPROVED	
ENGINEER	
DESIGNER	
Friday, October 25, 2002	



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Milpitas, CA 95035
Phone: (408)432-1900

02	TITLE	SCH, LT3710EFE/LT3781EG/LTC1698EGN DUAL OUTPUT ISOLATED POWER SUPPLY
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SIZE	CAGE CODE	DWG NO	REV
C		DC448A	

SCALE NONE	FILENAME: 448A-5.DSN	SHEET 1 OF 2
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1 2 3 4 5

REVISON HISTORY

ECO	REV	DESCRIPTION	DATE	APPROVED
>	5	Proto	?	<

SEC

VccS

Vout

[NOT USED]

C45 10pF

R5

C34 0.01uF

U5 LT3710EFE

BOOST

GBIAS

TGATE

SS

VCC

CSET

PGND

ILCOMP

VAOUT

VFB

CL-

CL+

BGATE

SW

D14 CMDSH-3

C36 4.7uF 16V

C44 0.1uF 16V

R56 10

Q13 SI7892DP

D15 CMDSH-3

R7 0 [1]

Q14 SI7892DP

Q17 SI7892DP

B340A

C46 1000pF [1]

R64 10 1/4W [1]

L4 CEP125-1R8

R49 0.004 1%

R59 100

R51 3.01K 1%

R52 2.32K 1%

R54 3.40K 1%

JP1

2.5V

Vo2 SELECT

1.8V

C42 4700pF

C12 +680uF 4V [1]

C40 +680uF 4V POSCAP

C41 +680uF 4V POSCAP

C23 10uF 6.3V

P10 +Vo2 1.8V/2.5V@10A

C35 180pF 50V

R57 10K

C37 680pF

R50 3.30K

C38 0.033uF

C39 330pF

R60 9.1K

JP2

R61 6.2K

2.5V

1.8V

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCE ON ANGLE . . .
2 PLACES . . . 3 PLACES . . .
INTERPRET DIM AND TOL
PER ASME Y14.5M -1994

THIRD ANGLE PROJECTION

DO NOT SCALE DRAWING

CONTRACT NO.

APPROVALS

CHECKED

APPROVED

ENGINEER

DESIGNER

DATE 08-02-01

TITLE SCH, LT3710EFE/LT3781EG/LTC1698EGN DUAL OUTPUT
ISOLATED POWER SUPPLY

SIZE B

CAGE CODE

DWG NO DC448A

REV 5

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LINEAR TECHNOLOGY

Friday, October 25, 2002

SCALE NONE

FILENAME: 448A-5.PCB

SHEET 2 OF 2



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- Защита от снятия компонента с производства.



Как с нами связаться

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