

LX7309EVB - 201

12V to 48V Boost 15W Evaluation Board



Microsemi®

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Introduction to Product

The LX7309EVB-201 is a 12V to 48V Boost Evaluation Board capable of handling 15W of power. It is based on the LX7309 current mode DC-DC controller. The design features an isolated secondary side from primary side. The evaluation board is designed for output current up to 320mA @ 48V.

Features:

12V to 48V Boost converter with 15W of output power

Isolated secondary side

10.8V to 13.2V Input range

The Evaluation board is configured to operate at 200kHz switching frequency

Input and Output Connection Points

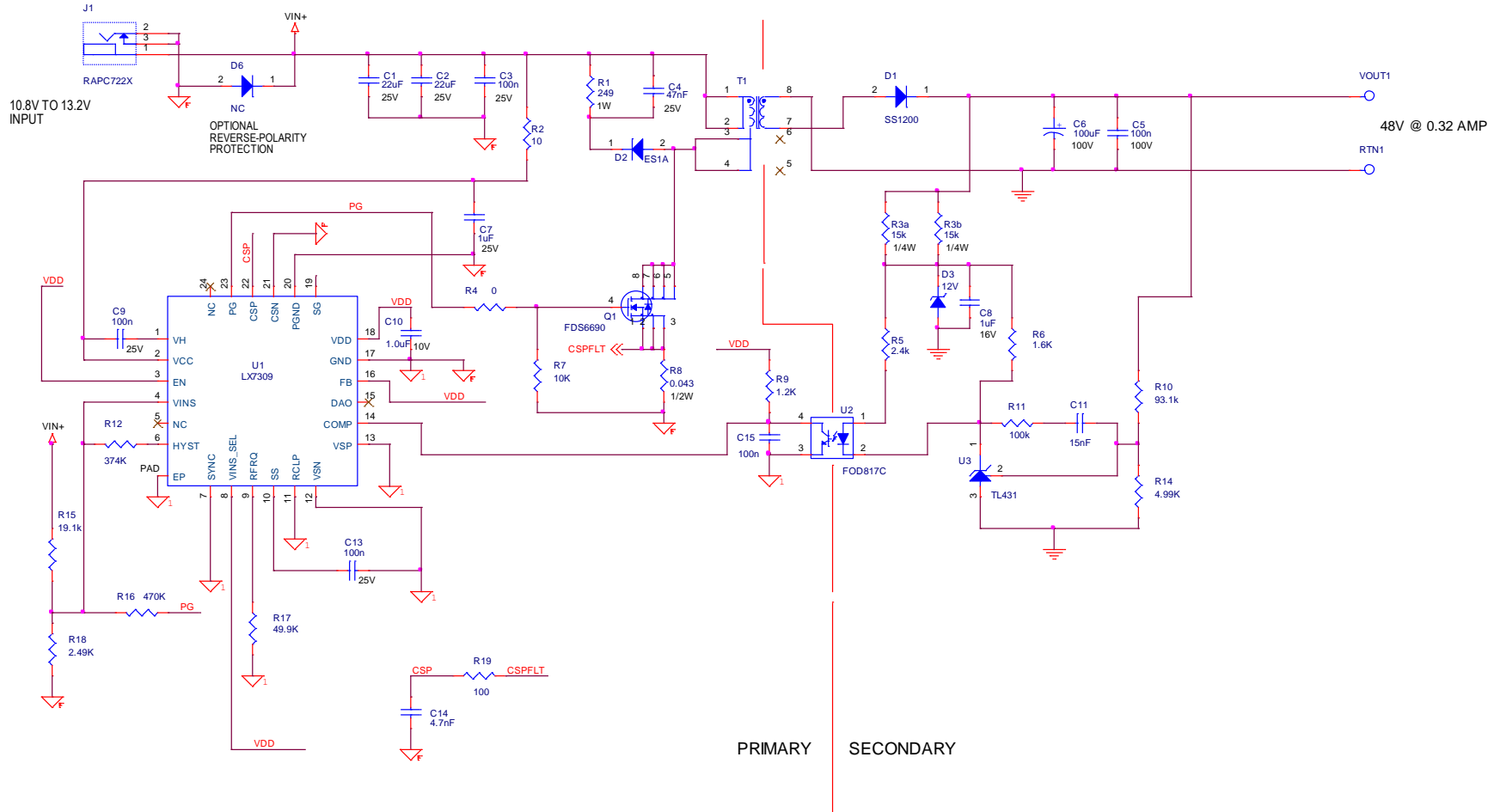
Test Point	Description
J1	Input power connector 12V (+12V center, GND outside ring)
Vout	48V Output
RTN	Output ground

LX7309EVB-201 Evaluation Board BOM

<u>Item Number</u>	<u>Quantity</u>	<u>Part Reference</u>	<u>Part Value</u>	<u>Description</u>	<u>Manufacturer</u>	<u>Manufacturer Part Number</u>
1	2	C1,C2	22uF	CAP CER 22UF 25V 20% X7R 1210	TAIYOYUDEN	TMK325B7226MM-TR
2	4	C3,C5,C9,C13	100n	CAP CER 0.1UF 25V 10% X7R 0603	TDK	C1608X7R1E104K080AA
3	1	C11	15nF	CAP CER 15nF 16V 10% X7R 0603	Any	Any
4	1	C4	47nF	CAP CER 0.047UF 25V 10% X7R 0805	TDK	CGJ4J2X7R1E473K125AA
5	1	C6	100uF	CAP ALUM 100UF 100V 20% RADIAL	Nichicon	UPW2A101MHD
6	1	C7	1uF	CAP CER 1UF 25V 10% X7R 0805	TDK	C2012X7R1E105K125AB
7	1	C8	1uF	Capacitor, Ceramic, 1uF 16V, 20%, X5R, 0603	Any	Any
8	1	C10	1.0uF	CAP CER 10UF 10V 10% X7R 0805	TDK	C2012X7R1A106K125AC
9	1	C14	4.7nF	Capacitor, Ceramic, X7R, 10V, 0603	Any	Any
10	1	C15	100nF	CAP CER 0.1UF 25V 10% X7R 0603	TDK	C1608X7R1E104K080AA
11	1	D1	SS1200	DIODE SCHOTTKY 200V 1A SMA	Micro Commercial Co	SS1200-LTP
12	1	D2	ES1A	DIODE FAST REC 1A 50V DO214AC	Micro Commercial Co	ES1A-TP
13	1	D3	12V	DIODE ZENER 12V 150MW EMD2	Rohm Semiconductor	EDZTE6112B
14	1	D6	NC	DIODE GEN PURPOSE 50V 1A DO214AC	Micro Commercial Co	GS1A-LTP
15	1	J1	RAPC722X	DC Power Jack 16V 5A TH	Switchcraft	RAPC722X
16	1	Q1	FDS6690	MOSFET N-CH 30V 11A 8-SOIC	Fairchild	FDS6690
17	1	R1	249	RES 249 OHM 1W 1% 2512 SMD	Vishay	CRCW2512249RFKEG
18	1	R2	10	Resistor, 5%, 1/10W, 0603	Any	Any
19	2	R3a,R3b	15k	Resistor, 5%, 1/4W, 0805	Panasonic	ERJ-P06J752V
20	1	R4	0	Resistor, 5%, 1/10W, 0603	Any	Any
21	1	R5	2.4K	Resistor, 5%, 1/10W, 0603	Any	Any
22	1	R6	1.6K	Resistor, 5%, 1/10W, 0603	Any	Any
23	1	R7	10K	Resistor, 5%, 1/10W, 0603	Any	Any

<u>Item Number</u>	<u>Quantity</u>	<u>Part Reference</u>	<u>Part Value</u>	<u>Description</u>	<u>Manufacturer</u>	<u>Manufacturer Part Number</u>
24	1	R8	0.043	RES .043 OHM 1/2W 1% 0805 SMD	Panasonic	ERJ-6BWFR043V
25	1	R9	1.2K	Resistor, 5%, 1/10W, 0603	Any	Any
26	1	R10	93.1k	Resistor, 1%, 1/8W, 0805	Any	Any
27	1	R11	100k	Resistor, 5%, 1/10W, 0603	Any	Any
28	1	R12	374K	Resistor, 1%, 1/16W, 0603	Any	Any
30	1	R14	4.99K	Resistor, 1%, 1/16W, 0603	Any	Any
31	1	R15	19.1k	Resistor, 1%, 1/16W, 0603	Any	Any
32	1	R16	470K	Resistor, 5%, 1/10W, 0603	Any	Any
33	1	R17	49.9K	Resistor, 1%, 1/16W, 0603	Any	Any
34	1	R18	2.49K	Resistor, 1%, 1/16W, 0603	Any	Any
35	1	R19	100	Resistor, 5%, 1/10W, 0603	Any	Any
36	1	T1	Transformer	Transformer; Flyback, EFD20 Core	TMP	Custom
37	1	U1	LX7309	IC, PWM Controller, 24 pin 4mm x 4mm QFN	Microsemi	LX7309ILQ
38	1	U2	FOD817C	OPTOCOUPLER PHOTOTRANS OUT 4-SMD	Fairchild Semiconductor	FOD817CSD
39	1	U3	TL431	IC VREF SHUNT PREC ADJ SOT-23-3	Texas Instruments	TL431AIDBZR

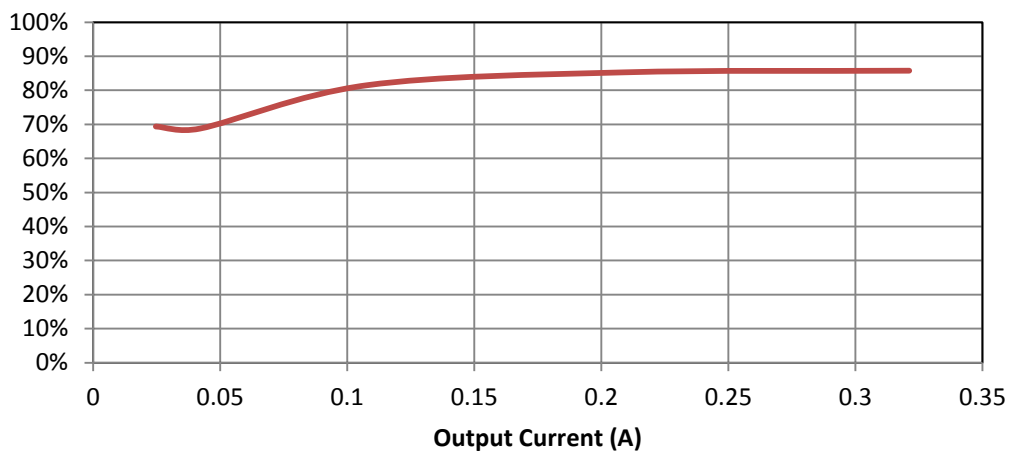
LX7309EVB-201 Evaluation Board Schematic



Schematic 12V to 48V 15W Boost Circuit

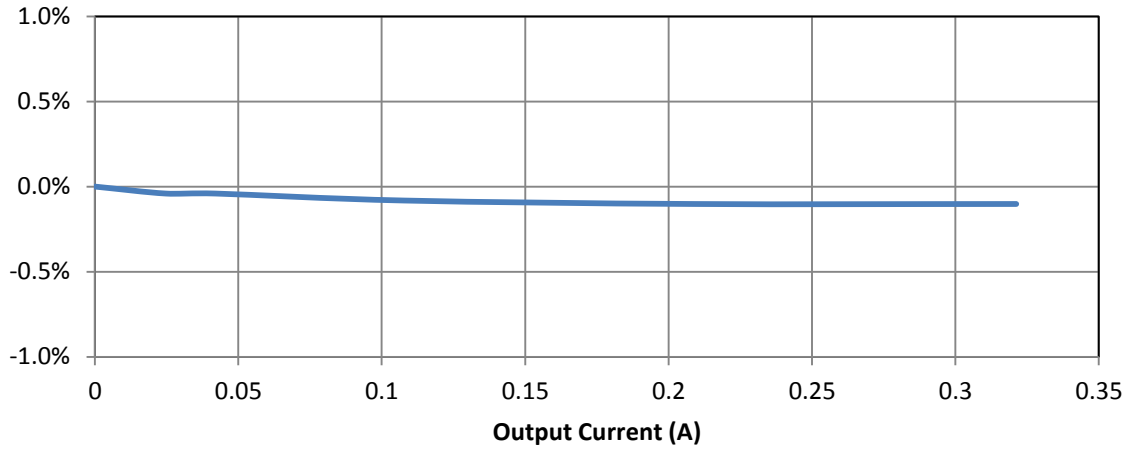
Test Data

Efficiency

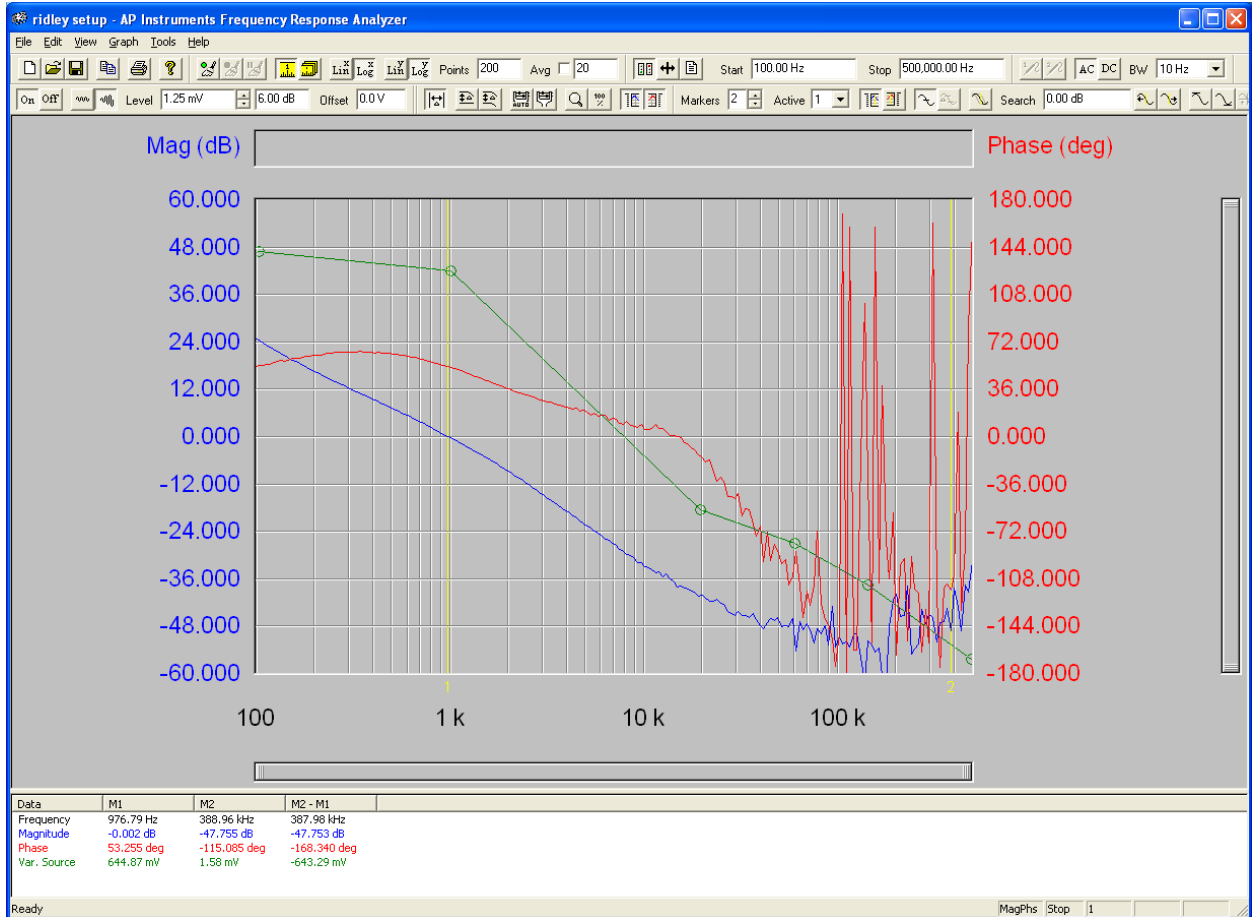


Efficiency Calculation				
Vin (V)	Iin (A)	Pout (W)	Pin (W)	Efficiency
11.989	0.145	1.206	1.738	69.4%
11.98	0.249	2.051	2.983	68.8%
11.956	0.54	5.262	6.456	81.5%
11.919	1.002	10.185	11.943	85.3%
11.875	1.539	15.675	18.276	85.8%

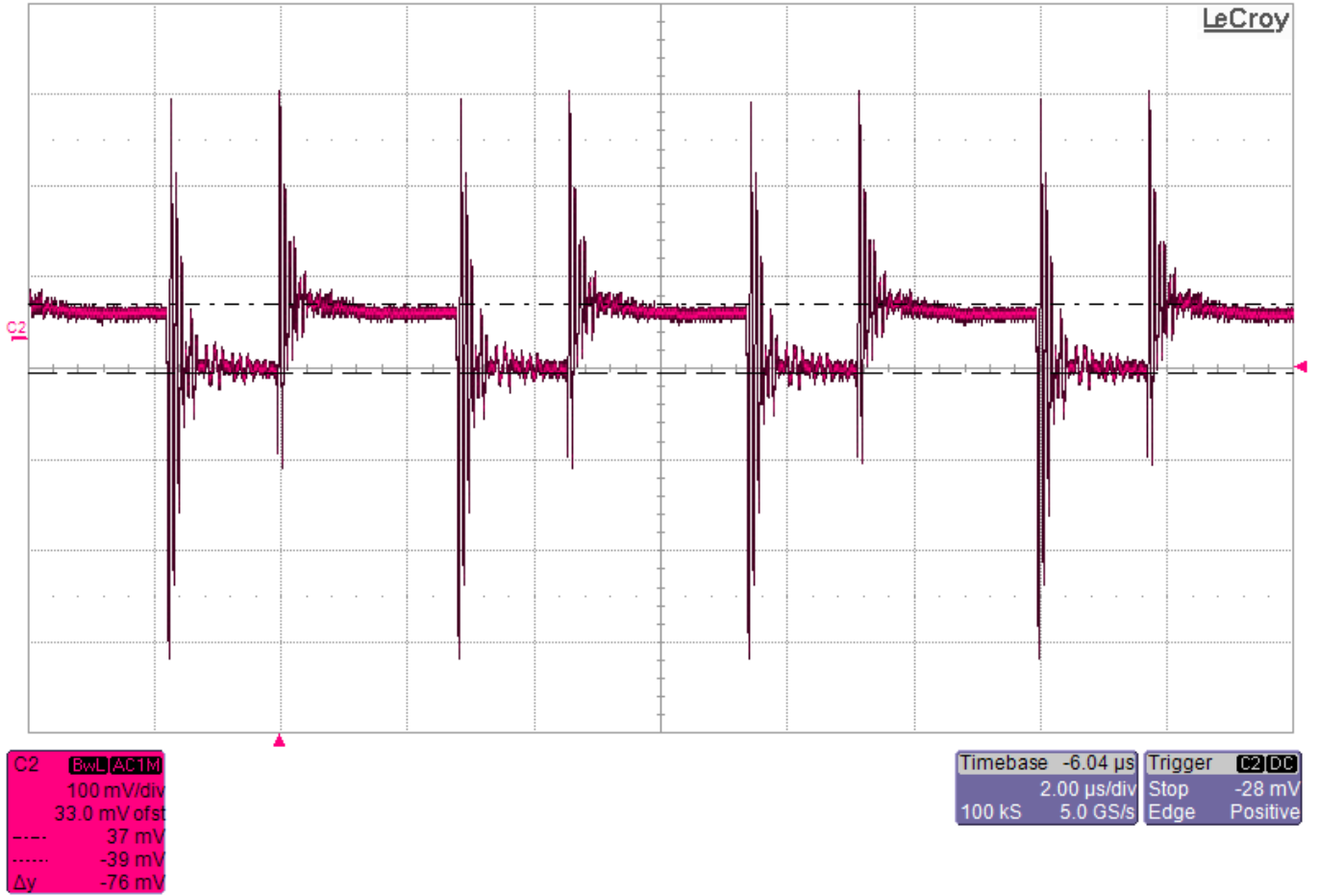
Load Regulation



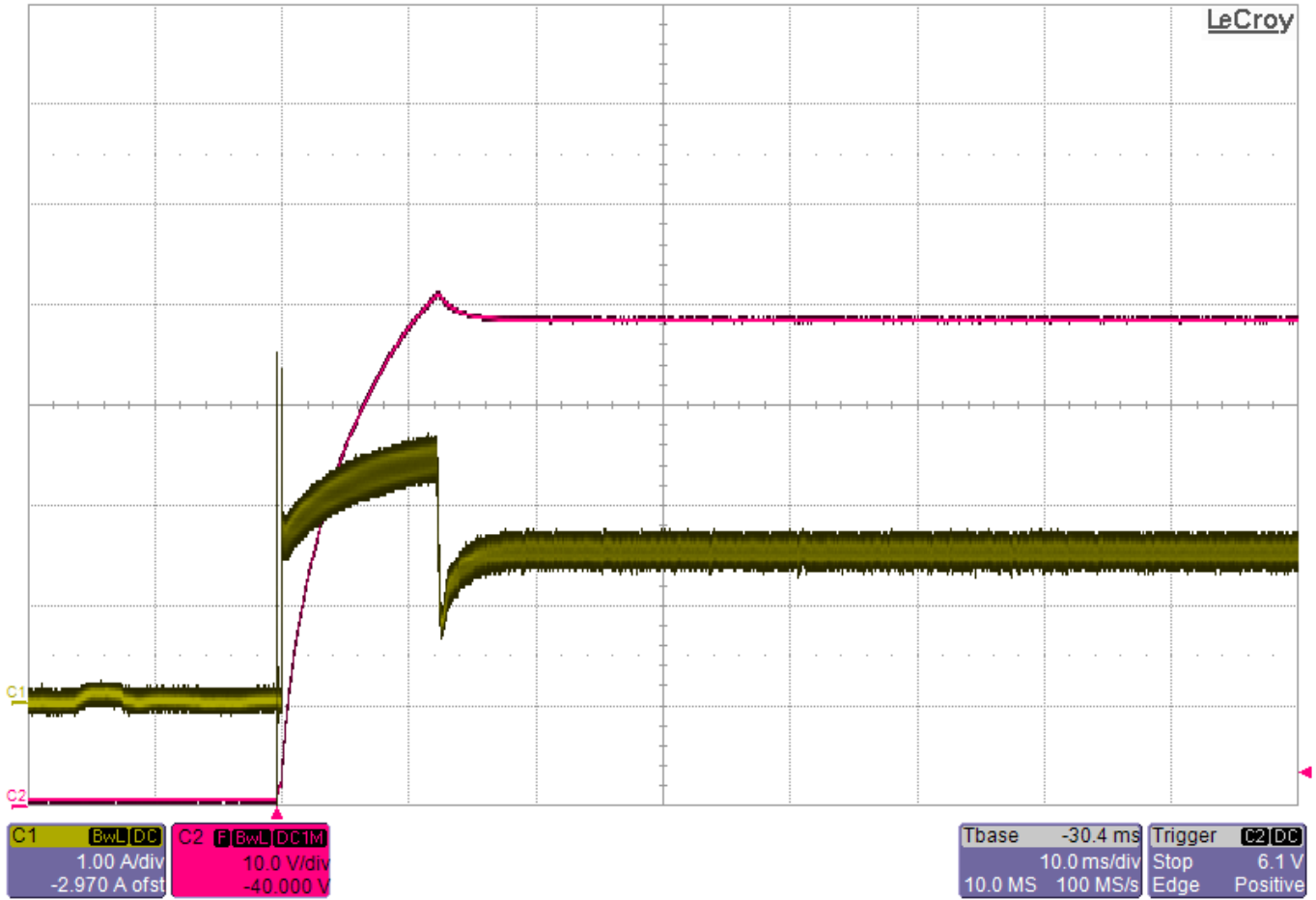
Load Regulation	
Load Current (A)	Vout (V)
0	48.85
0.0247	48.83
0.042	48.83
0.1078	48.81
0.2087	48.8
0.3212	48.8



**Bode Plot Full load with VIN = 12V
Phase Margin = 53°**

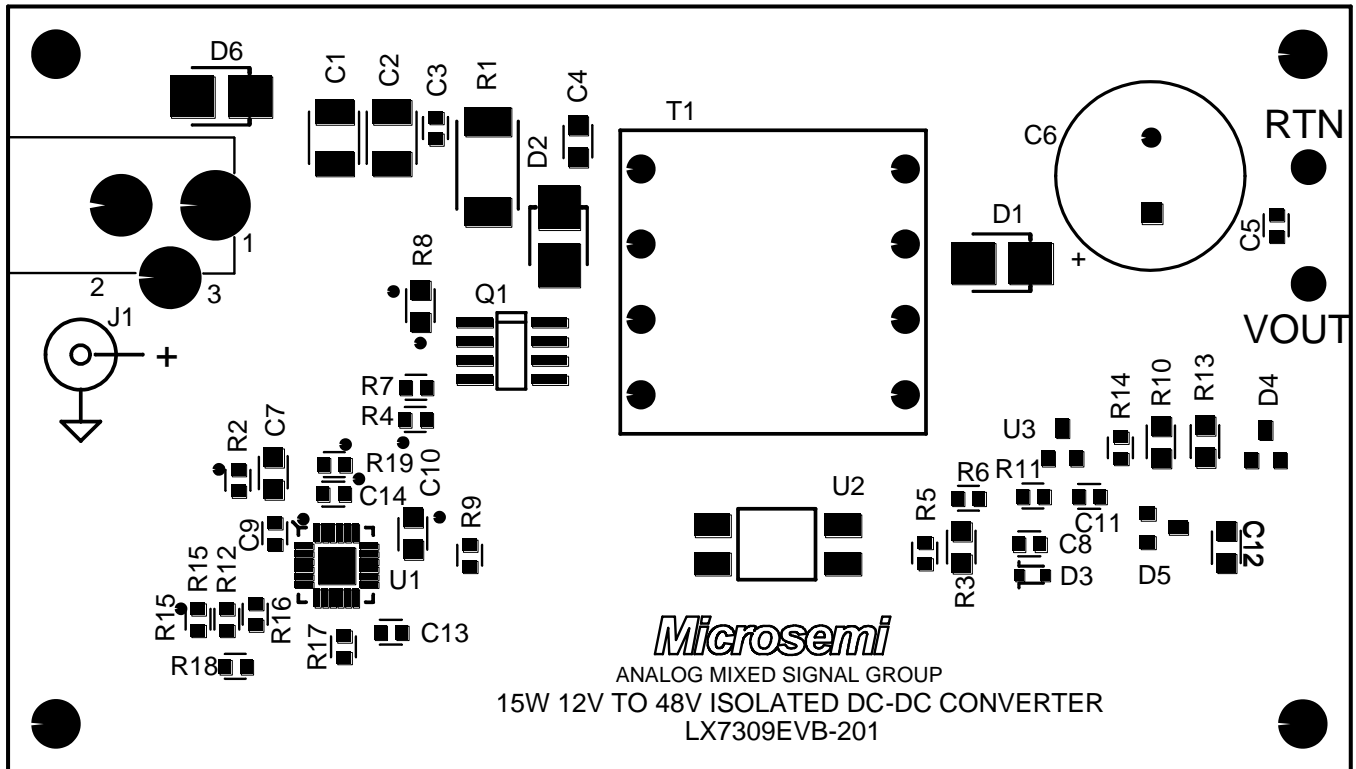


Output Ripple Voltage @ Full Load

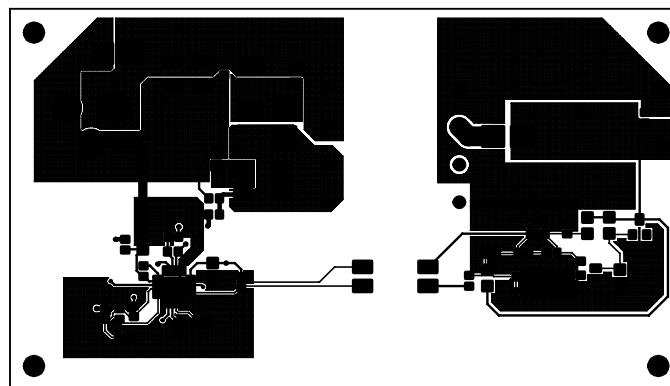


Start Up Behavior @ Full Load

PCB Silkscreen and PCB Layout

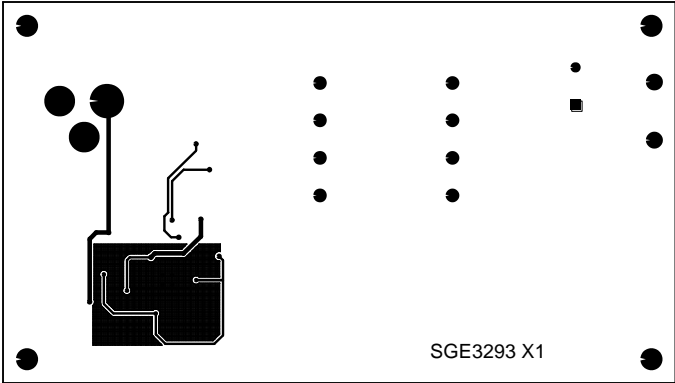


PCB SILKSCREEN



PCB Layout – Top Layer

PCB Dimensions (L x W): 3.50" x 2.00" (88.9mm x 50.8mm)



PCB Layout – Bottom Layer