

LT1910

Protected High Side MOSFET Driver

DESCRIPTION

Demonstration circuit 2307A is a high input voltage protected high side MOSFET driver featuring the [LT[®]1910ES8](#). This demo board has a wide input voltage range from 8V to 48V and is capable of protecting a voltage source against a short circuit.

This demo board uses an installed 2.43k Ω load resistor to demonstrate the functionality of the LT1910 in a stand-alone mode without external loads. An additional resistive load can be connected to the terminals E6 (VOUT) and E7 (GND). The DC2307A is setup to switch pure resistive loads. If there is a need for verification to switch capacitive loads, then optional circuitry can be installed using C_LOAD capacitor and R7. The ability to switch inductive loads can also be verified by placing an inductive load over the C_LOAD footprint and using diode D4 for dissipating inductive energy at turn-off of the MOSFET switch Q2.

The DC2307A supports two types of short-circuit protection: one with automatic restart and the other with automatic restart defeat. The DC2307A is set up for automatic restart during a short circuit condition. However, automatic restart can be disabled by installing a 2k Ω resistor for R8.

The setup for DC2307A evaluation is shown in Figure 1. Sync pulses can be applied to terminals E4 (SYNC) E5 (GND) for synchronization to an external clock. In this case, the DC2307A supports a low bandwidth PWM. Figure 2 illustrates functionality of such solution with 100Hz switching frequency. Figure 3 shows the waveforms of the high side switch driver during a short-circuit with automatic restart.

The LT1910 has a 50mV trip point for the selection of the current sense resistor RS1. The current sense resistor RS1 installed on the board is 0.1 Ω , 1206 package. However, the RS1 footprint supports multiple sizes from 0805 to 2512. However, the RS1 footprint supports multiple sizes and can be replaced with up to a 2W device. The LT1910 data sheet gives a complete description of this part, operation and application information and must be read in conjunction with this demo manual.

Design files for this circuit board are available at <http://www.linear.com/demo/DC2307A>

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PERFORMANCE SUMMARY

Specifications are at $T_A = 25^\circ\text{C}$

PARAMETER	CONDITIONS/NOTES	VALUE	UNIT
Minimum Input Voltage		8	V
Maximum Input Voltage		48	V
Turn On-Time	$V_{IN} = 24\text{V}$, RUN from OFF to ON	<75	μs
Turn Off-Time	$V_{IN} = 24\text{V}$, RUN from ON to OFF	<10	μs
Maximum Output Current	RS1 = 0.1 Ω , $V_{IN} = 24\text{V}$	0.6	A
Maximum Output Current	RS1 = 0.01 Ω , $V_{IN} = 24\text{V}$	6.0	A

QUICK START PROCEDURE

Demonstration circuit 2307A is easy to set up to evaluate the performance of the LT1910. Set up the circuit according to the diagram in Figure 1.

Before proceeding to test, insert a shunt in header JP1, (RUN) into OFF position, which connects the RUN pins to ground (GND), and thus, shuts down the output.

1. With the DC2307A set up according to the proper measurement and equipment as shown in Figure 1, apply 20V at E1 (VIN). Measure VOUT; it should read 0V.
2. Turn on the protected high side MOSFET driver by inserting the shunt in header JP1 (RUN) into the ON

position. Measure VOUT; it should read 20V. Vary VIN in the available range, and measure the corresponding VOUT. (Do not apply more than the rated maximum voltage of 48V to the board or the part may be damaged).

3. Repeat turning on and off LTC1910, by inserting the shunt in header JP1 (RUN), and measure VIN and VOUT.
4. For verification of the ability of LT1910 to be synced with an external clock, remove the shunt from JP1 (RUN) header and apply a low bandwidth sync signal to terminals E4 (SYNC) E5 (GND). (Do not apply frequencies greater than 1kHz.)

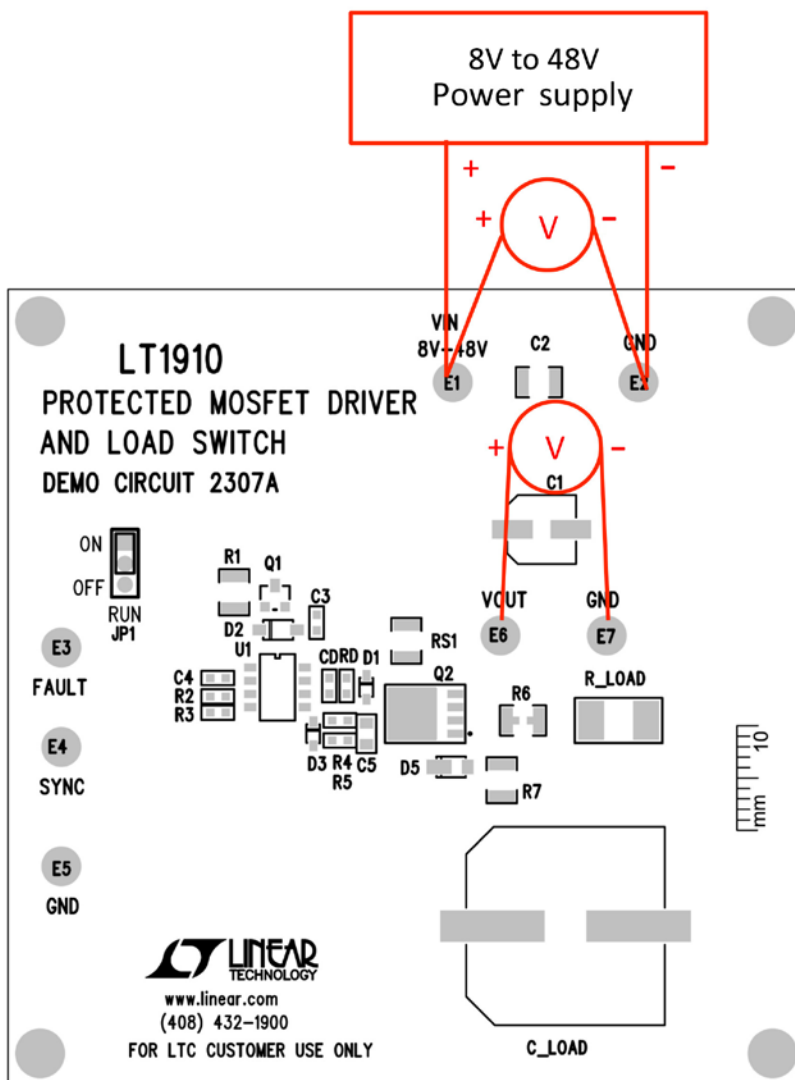


Figure 1. Proper Measurement Equipment Setup

QUICK START PROCEDURE



Figure 2. High Side Driver Voltage Waveforms. CH 1 Q2 Gate Voltage Relatively to Source (5V/DIV), CH 2 VOUT, CH 3 Sync Signal.

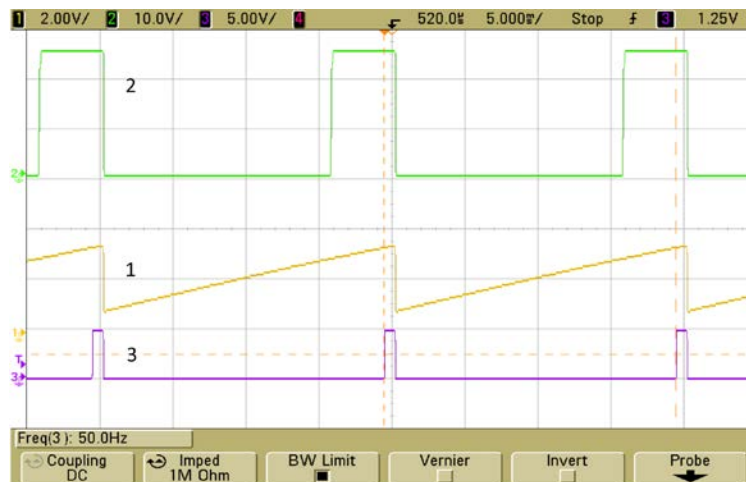


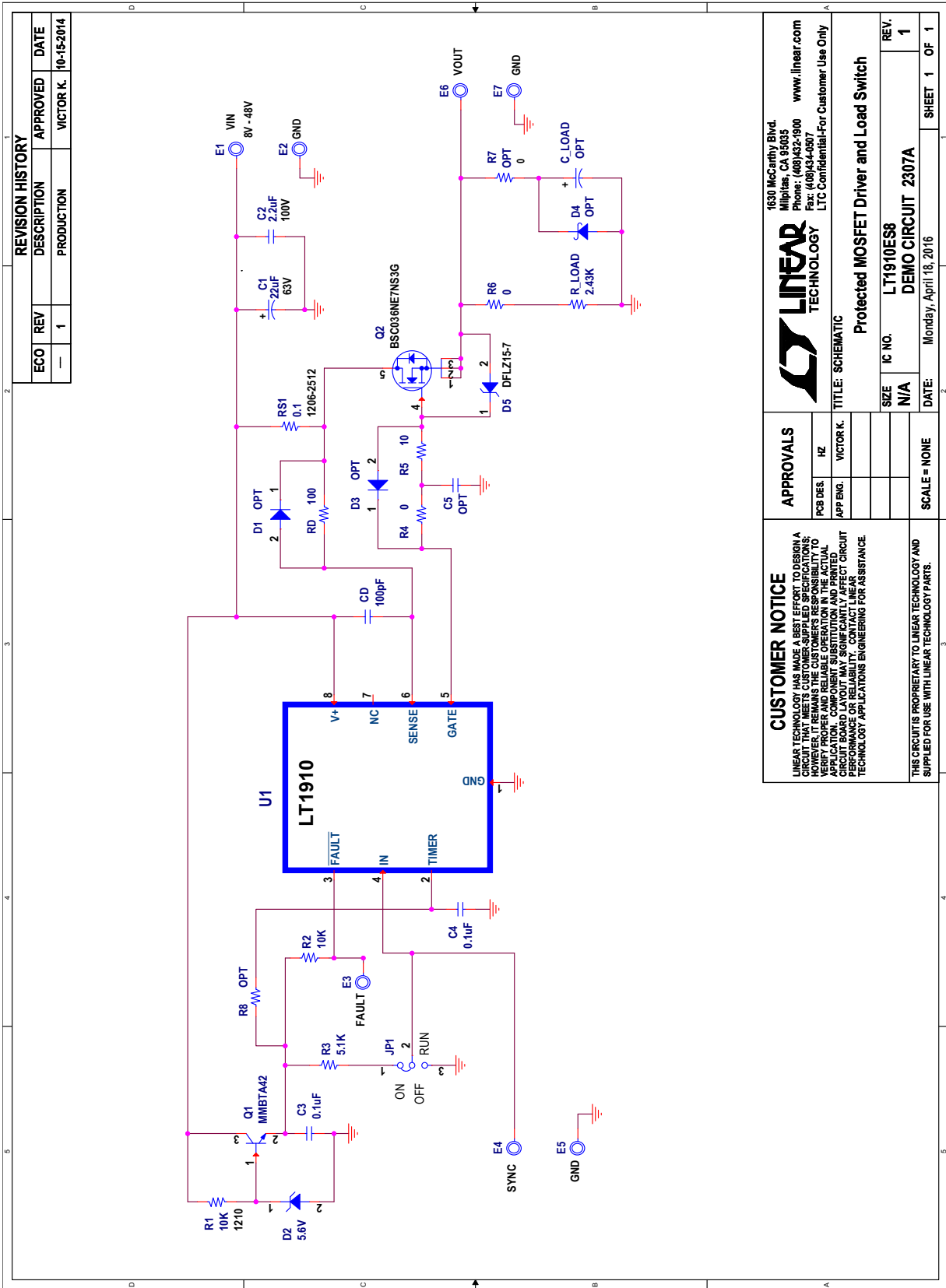
Figure 3. Short-Circuit with Automatic Restart Voltage Waveforms. CH 1 Pin 2 (TIMER), CH 2 VOUT, CH 3 Pin 3 (FAULT).

DEMO MANUAL DC2307A

PARTS LIST

ITEM	QTY	REFERENCE	PART DESCRIPTION	MANUFACTURER/PART NUMBER
Required Circuit Components				
1	1	C1	CAP, 22uF 20% 63V SIZE D8	PANASONIC., EEHZA1J220XP
2	1	C2	CAP, X7R, 2.2uF 100V 10% 1210	MURATA, GRM32ER72A225KA35L
3	2	C3, C4	CAP, X7R, 0.1uF 50V 10% 0603	TDK, C1608X7R1H104K
4	1	CD	CAP, NPO, 100pF 50V 5% 0603	AVX 06035A101JAT
5	1	D2	DIODE, ZENER, 5.6V, 0.5W SOD-123	FAIRCHILD, MMSZ5232B
6	1	D5	DIODE, ZENER, 15V, 1.0W	DIODES INC., DFLZ15-7
7	1	Q1	TRANSISTOR, NPN, SOT-23	FAIRCHILD, MMBTA42
8	1	Q2	MOSFET, 75V, N-CHANNEL	INFINEON., BSC036NE7NS3G
9	2	R4	RES, 0603 0Ω JUMPER	VISHAY CRCW06030000Z0EA
10	1	R6	RES, 1210 0Ω JUMPER	VISHAY CRCW12100000Z0EA
11	1	RS1	RES, 0.1Ω 0.5W 1% 1206	TT ELECTRONICS/IRC, LR1206LF-01-R100-F
12	1	RD	RES 100Ω 1% 0603 SMD	VISHAY, CRCW0603100RFKEA
13	1	R _{LOAD1}	RES 2.43k 1W 1% 2512 SMD	PANASONIC, ERJ-1TNF2431U
14	1	R1	RES., 10k 1% 1210	VISHAY, CRCW121010K0FKEA
15	1	R2	RES., 10k 1% 0603	VISHAY, CRCW060310K0FKEA
16	1	R3	RES., 5.1k 1% 0603	VISHAY, CRCW06035K10FKEA
17	1	R5	RES., 10Ω 1% 0603	VISHAY, CRCW060310R0FKEA
18	1	U1	High Side MOSFET Driver	LINEAR, LT1910ES8#PBF
Additional Demo Board Circuit Components				
1	0	C5	CAP, 0805	OPT
2	0	C _{LOAD}	CAP, K16 SIZE	OPT
3	0	D1, D3	DIODE, SOD-323	OPT
4	0	D4	DIODE, SMC	OPT
5	0	R7	1206	OPT
6	0	R8	0603	OPT
Hardware: For Demo Board Only				
1	7	E1, E2, E3, E4, E5, E6, E7	TESTPOINT, TURRET, .095"	MILL-MAX, 2305-2-00-80-00-00-07-0
2	1	JP1	0.079 SINGLE ROW HEADER, 3 PIN	SAMTEC,TMM-103-02-L-S
3	1	XJP1	SHUNT	SAMTEC, 2SN-BK-G

SCHEMATIC DIAGRAM



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DEMO MANUAL DC2307A

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