

## 20mA Six White LED Driver and OLED driver with Integrated Schottky

**WARNING!**

DO NOT LOOK AT OPERATING LED.  
This circuit produces light that can damage eyes.

### DESCRIPTION


Demonstration circuit 1137 is a 20mA Six White LED Driver and OLED driver with Integrated Schottky featuring the LT3498. The LT3498 is a dual output boost converter featuring a 2.3MHz PWM LED driver and a PFM (Pulse Frequency Modulation) OLED driver. The demo board is designed to operate from 3V to 5V, ideal for Li-Ion battery powered dual display applications, such as main and sub-displays for cell phones.

The LED driver runs at 2.3MHz fixed frequency, results in tiny circuit size. It can drive 6 white LEDs at 20mA from a minimum of 3V. The demo board offers flexible LED dimming methods. Users can use DC dimming, filter PWM dimming or direct PWM dimming. A MOSFET in series with the LED string disconnects the output capacitor discharge path if PWM terminal becomes low. This results in higher direct PWM dimming ratio. The high side LED current sensing is versatile. The parts functions as a “one-wire” current source from the LED string point of view. The circuit protection clamps LED driver output to 27V (typ) in open circuit condition.

When CTRL2 is higher than 1.5V, the demo board OLED side output is 16V. It can deliver up to 24mA from a 3V source. The OLED driver features a novel PFM control technique. This technique results in low output voltage ripple and high efficiency over a wide load range. An internal PMOS output disconnect switch turns itself off in shutdown, disconnecting the output from the input source. This disconnect function is often required in OLED applications. This switch also minimizes leakage current drain from the battery.

The LT3498 datasheet gives complete description of the part, operation and application information. The datasheet must be read in conjunction with this quick start guide for working on or modifying the demo circuit 1137.

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

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## PERFORMANCE SUMMARY

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

SYMBOL	PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
$V_{IN}$	Input Supply Range *		3		5	V
$I_{OUT}$	Output Current	LED Driver OLED Driver	19	20	21 24	mA
$V_{OUT}$	Output Voltage	LED Driver OLED Driver	15.4	16	26 16.6	V
$V_{OPEN}$	CAP1 pin Over voltage Protection	LED Driver, LED Open	26	27	28	V
$\eta$	Efficiency	LED Driver, $V_{IN}=3.6\text{V}$ OLED Driver, $V_{IN}=3.6\text{V}$ , $V_{OUT2}=16\text{V}$ , 24mA		75 74		%
$F_s$	Switching Frequency	LED Driver	1.8	2.3	2.8	MHz

\* The Input Supply Range of the demo circuit 1137 is limited by the input capacitor. The input voltage absolute maximum rating of the LT3498 is 12V.

## QUICK START PROCEDURE

Demonstration circuit 1137 is easy to set up to evaluate the performance of the LT3498. 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 input or output and GND terminals. See Figure 2 for proper scope probe technique for  $V_{OUT2}$ .

1. Place jumper in the following positions to test the LED driver circuit:

**JP1 ON**

2. Place jumper in the following positions to test the OLED driver circuit:

**JP2 ON**

3. With power off, connect the input power supply to  $V_{IN}$  and GND.

4. With power off, connect the input power supply to PWM.

5. Turn on the power at the input.

NOTE. Make sure that the input voltage does not exceed 5V.

6. Check for the proper voltages and currents.

NOTE. If the LEDs do not light up, check all the jumper settings.

- Once the proper operations are established, adjust the input within the operating range and observe the parameters interested.
- For the LED driver, to test filtered PWM dimming or direct DC dimming, remove jumper JP1, apply a PWM or a DC signal to CTRL1 and observe the brightness of the LED output.
- To test direct PWM dimming, remove jumper JP1, remove C4, short out R4, disconnect PWM from  $V_{IN}$  and reconnect PWM and CTRL1 to the direct PWM source. Direct PWM dimming is not applicable to the OLED driver.
- For OLED driver, to alter  $V_{OUT2}$  by adjusting CTRL2, remove jumper JP2, apply a voltage between 0 and 1.5V to CTRL2 and observe the  $V_{OUT2}$  voltage.

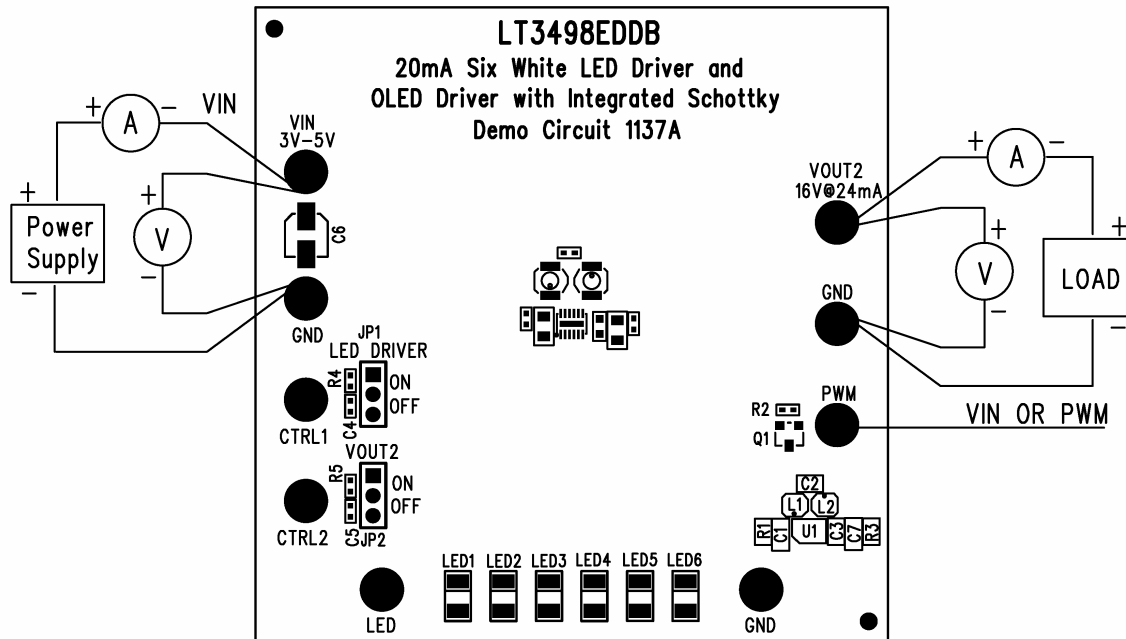


Figure 1. Proper Measurement Equipment Setup

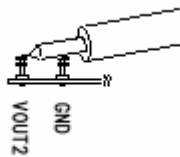
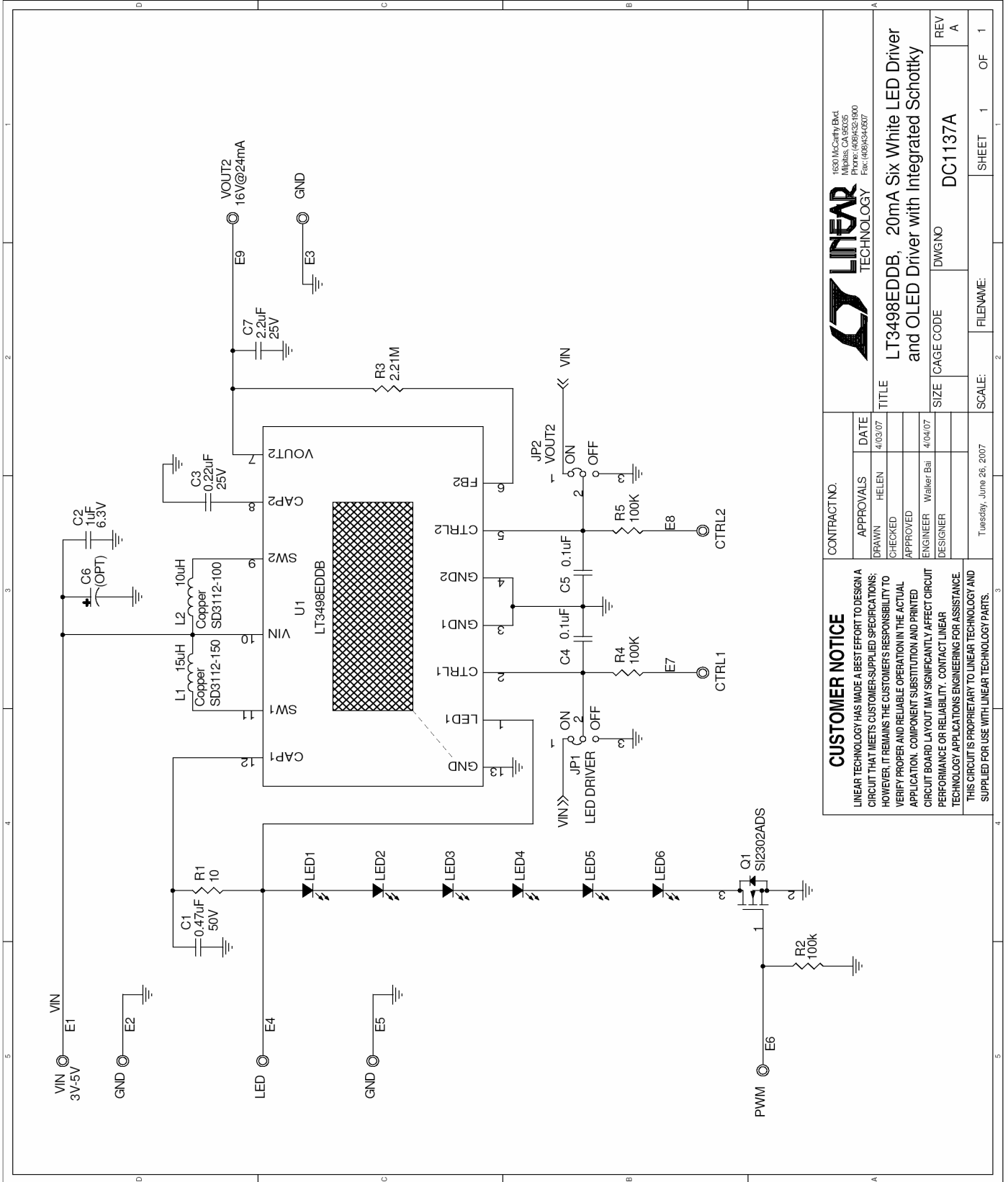


Figure 2. Measuring Input or Output Ripple



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DRAWN HELEN	4/03/07	<b>LINEAR TECHNOLOGY</b>	
CHECKED		TITLE	
APPROVED		LT3498EEDB, 20mA Six White LED Driver and OLED Driver with Integrated Schottky	
ENGINEER Walker Bai	4/04/07	SIZE	DWG NO
DESIGNER		CAGE CODE	DC1137A
		SCALE:	FILENAME:
	Tuesday, June 26, 2007	SHEET	1 OF 1