

## DESCRIPTION

Demonstration Circuit 1314A is a Mean-Squared Power Detector featuring the LT<sup>®</sup>5581 IC.

The LT5581 is a wide dynamic range Mean Squared RF Power Detector, operational from 10MHz to 6GHz. The input dynamic range at 6GHz, with  $\pm 1$ dB nonlinearity, is 40dB (from  $-34$ dBm to  $+6$ dBm, single-ended  $50\Omega$  input). The detector output voltage slope is normally 31mV/dB, and the typical output variation over temperature is  $\pm 0.5$ dB at 880MHz.

The 1314A Demo Circuit is optimized for wide frequency range of 10MHz to 2.2GHz. However, input match can be optimized up to 6GHz with simple external matching.

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

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### Typical Performance Summary ( $V_{CC} = 3.3V$ , $ENBL = 3.3V$ , $T_A = 25^\circ C$ , unless otherwise noted. Test circuit shown in Figure 1.)

PARAMETER	CONDITION	VALUE
Supply Voltage		2.7V to 5.25V
Supply Current		1.4mA
Shutdown Current	ENBL = Low	0.2 $\mu$ A
ENBL Voltage	Low, Chip Disabled HIGH, Chip Enabled	0.3V max 2V min
ENBL Input Current	$V_{ENBL} = 0V$ $V_{ENBL} = 5V$	0 $\mu$ A 20 $\mu$ A
Output Start Voltage	No Input Signal Present	0.2V
Rise Time	0.2V to 1.6V, 10% to 90%, $C_1 = 22nF$ , $F_{RF} = 2140$ MHz	1 $\mu$ s
Fall Time	1.6V to 0.2V, 90% to 10%, $C_1 = 22nF$ , $F_{RF} = 2140$ MHz	8 $\mu$ s
Input Frequency Range	Optimized for DC1314A demo board	10MHz to 6GHz
<b>f = 450MHz</b>		
Linear Dynamic Range	$\pm 1$ dB linearity error	40 dB
Slope		31mV/dB
Logarithmic Intercept		-42dBm
Output Variation vs Temperature	$P_{IN} = -34$ to $+6$ dBm	$\pm 1$ dB
Deviation from CW Response	12 dB peak-to-average ratio (4 carrier WCDMA)	$\pm 0.5$ dB
<b>f = 5800MHz</b>		
Linear Dynamic Range	$\pm 1$ dB linearity error	31dB
Slope		31mV/dB
Logarithmic Intercept		-33dBm
Output Variation vs Temperature	$P_{IN} = -25$ to $+6$ dBm	$\pm 1$ dB
Deviation from CW Response	WiMAX OFDM Burst; $P_{IN} = -25$ to $+6$ dBm	$\pm 0.2$ dB

## QUICK START PROCEDURE

Demonstration Circuit 1314A is easy to set up to evaluate the performance of the LT5581. Refer to Figure 1 for measurement equipment setup and follow the procedure below:

Connect voltmeter's negative (-) lead to demo board GND test point (E4).

Connect voltmeter's positive (+) lead to the demo board OUTPUT test point (J2).

Connect DC power supply's negative (-) output to demo board GND test point (E3 and E4).

Connect DC power supply's positive (+) output (2.7V to 5.25V) to demo board  $V_{CC}$  test point (E1 and E2).

Do not exceed 5.5V, the absolute maximum supply voltage.

Connect signal generator's output to demo board INPUT port (SMA connector J1) via coaxial cable. A 3dB attenuator may be inserted to improve input match.

Using a jumper cable, connect demo board  $V_{CC}$  test point (E1) to ENBL test point (E2). Now the detector is enabled (on) and is ready for measurement.

### NOTES:

- 1. The voltage on the EN test point must never exceed  $V_{CC} + 0.3V$ .**
- 2. For digitally modulated signals, an oscilloscope can be used to observe the AC components of the output.**
- 3. Pins 4, 5 and 6 are internally connected to ground. In the customer designs, the users have the choice to leave them as no connect as in the demo board, or connect them to ground.**

Pin 8,  $C_{SQ}$  is the Optional Low Frequency Range Extension Capacitor. Use this pin for frequencies below 250MHz. Connect 0.01uF from Pin 8 to ground for 10MHz operation.

Apply RF input signal and measure OUTPUT DC voltages.

Do not exceed +15dBm, the absolute maximum RF input power.

## DEMO BOARD MODIFICATIONS:

Modifications at RF input port for other frequency ranges:

FREQUENCY RANGE	RF <sub>IN</sub> MATCH	
	L1	C1
1GHz to 2.2GHz	2.2nH	1.5pF
2GHz to 2.6GHz	1.2nH	1.5pF
2.6GHz to 3.4GHz	0	1pF
3.8GHz to 5.5GHz	0	0.5pF
4.6GHz to 6GHz	0	0

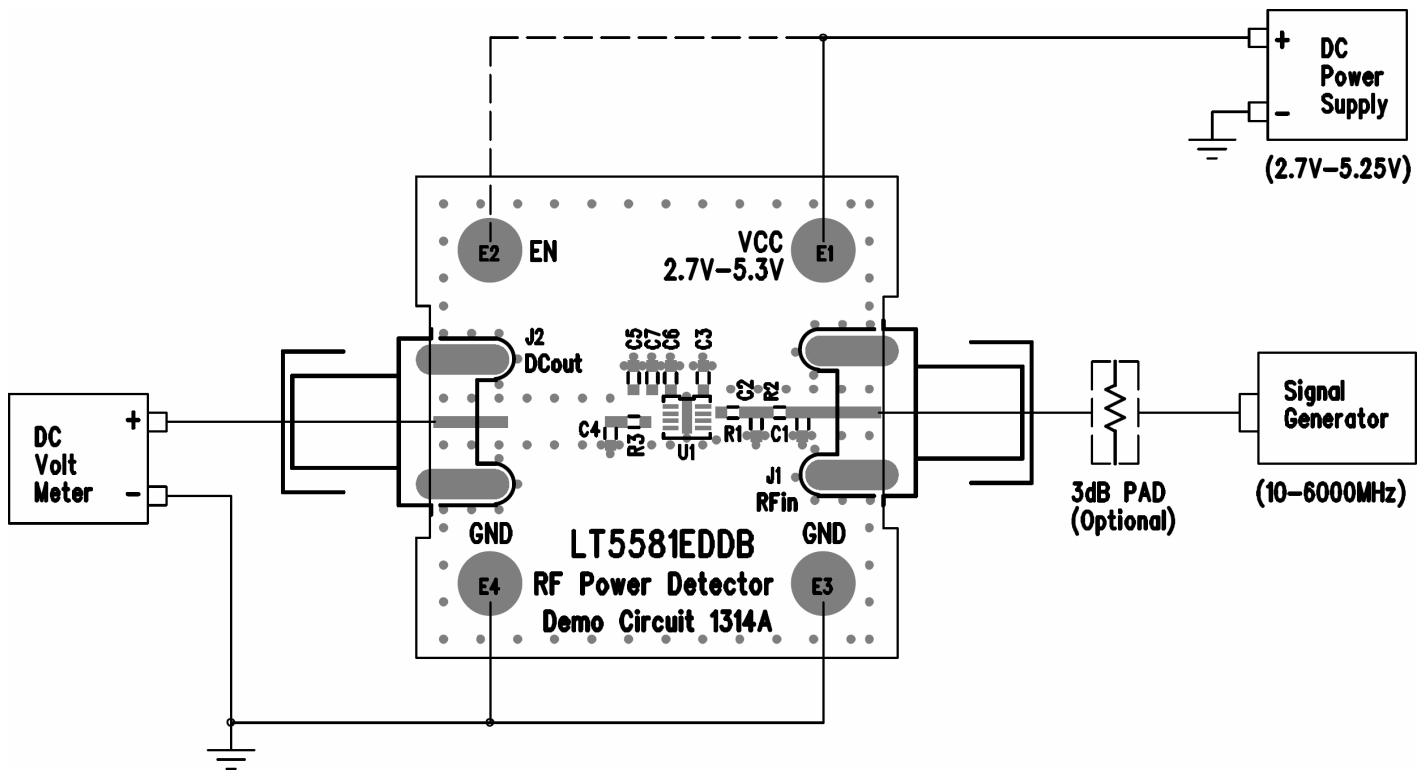
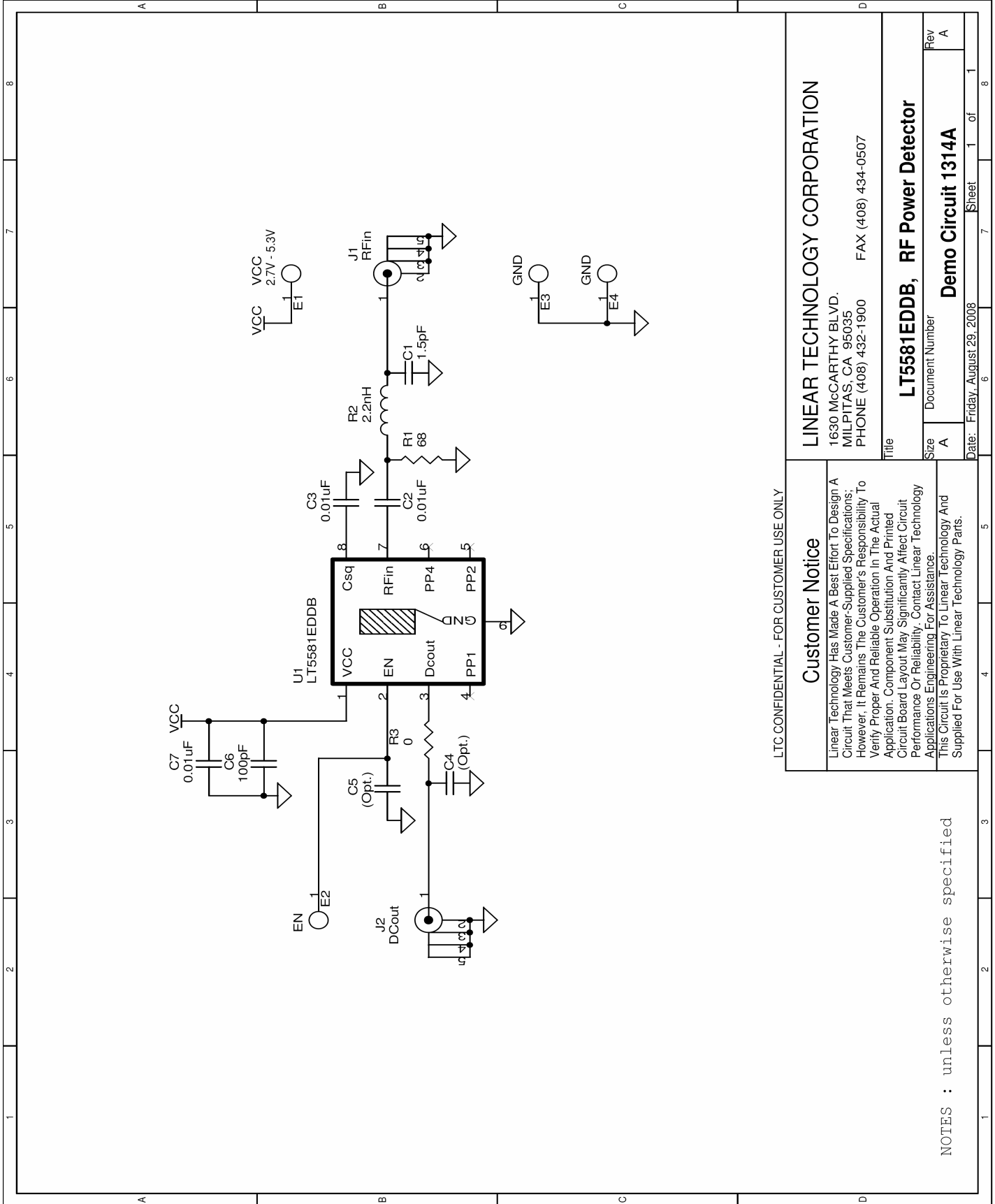


Figure 1. Proper Measurement Equipment Setup

# QUICK START GUIDE FOR DEMONSTRATION CIRCUIT 1314A

## RF POWER DETECTOR



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### LT5581EDDB, RF Power Detector

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NOTES : unless otherwise specified

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