

DESCRIPTION

Demonstration circuit 1078 (DC1078A) is a Mean-Squared RF Power detector featuring the LT5570.

The LT5570 is a wide dynamic range RF detector, operational from 40MHz to 2700MHz. The input dynamic range at 2140MHz with ± 1 dB nonlinearity is 51dB (from -38 dBm to $+13$ dBm. The detector output voltage slope is normally 37mV/dB, and the typical output variation over temperature is ± 0.3 dB at 2140MHz.

NOTE: DC1078A demo circuit is optimized for input frequency of 2140MHz +/- 150MHz. Refer to page 3 for modifications for 2700MHz and 880MHz.

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

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Table 1. Typical Performance Summary ($V_{CC} = 5V$, $ENBL = 5V$, $T_A = 25^\circ C$, unless otherwise noted. Test circuit shown in Figure 2.)

PARAMETER	CONDITION	VALUE
Supply Voltage		4.75V to 5.25V
Supply Current		26.5mA
Shutdown Current	ENBL = Low	0.1 μ A
ENBL Voltage	Low, Chip Disabled	1V max
	HIGH, Chip Enabled	2V min
ENBL Input Current	$V_{ENBL} = 0V$	0 μ A
	$V_{ENBL} = 5V$	68 μ A
Output Start Voltage	No Input Signal Present	0.1V
Rise Time	0.2V to 1.6V, 10% to 90%, $C_1 = 22nF$, $F_{RF} = 2140$ MHz	0.5 μ s
Fall Time	1.6V to 0.2V, 90% to 10%, $C_1 = 22nF$, $F_{RF} = 2140$ MHz	8 μ s
Input Frequency Range		2140MHz to 2700MHz
f = 2140MHz		
Linear Dynamic Range	± 1 dB linearity error	51 dB
Slope		36.5mV/dB
Logarithmic Intercept		-42.4dBm
Output Variation vs Temperature	$P_{IN} = -50$ to $+13$ dBm	± 0.3 dB
Deviation from CW Response	12 dB peak-to-average ratio (4 carrier WCDMA)	0.2 dB
f = 2700MHz		
Linear Dynamic Range	± 1 dB linearity error	48 dB
Slope		36.4mV/dB
Logarithmic Intercept		-38.5dBm
Output Variation vs Temperature	$P_{IN} = -50$ to $+13$ dBm	± 0.2 dB
Deviation from CW Response	12 dB peak-to-average ratio (4 carrier WCDMA)	0.5 dB

QUICK START PROCEDURE

Demonstration circuit 1078 is easy to set up to evaluate the performance of the LT5570. Refer to Figure 1 for proper measurement equipment setup and follow the procedure below:

1. Connect voltmeter's negative (-) lead to demo board GND test point (TP2).
2. Connect voltmeter's positive (+) lead to the demo board OUTPUT test point (TP4).
3. Connect DC power supply's negative (-) output to demo board GND test point (TP2).
4. Connect DC power supply's positive (+) output (4.75V to 5.25V) to demo board V_{CC} test point (TP1).

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

5. 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.
6. Using a jumper cable, connect demo board V_{CC} test point (E3) to ENBL test point (TP3). Now the detector is enabled (on) and is ready for measurement.

NOTE: Make sure that the power is not applied to Enable (EN) test point before it is applied to V_{CC}. The voltage on the EN test point must never exceed V_{CC} + 0.2V.

7. Apply RF input signal and measure OUTPUT DC voltages.

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

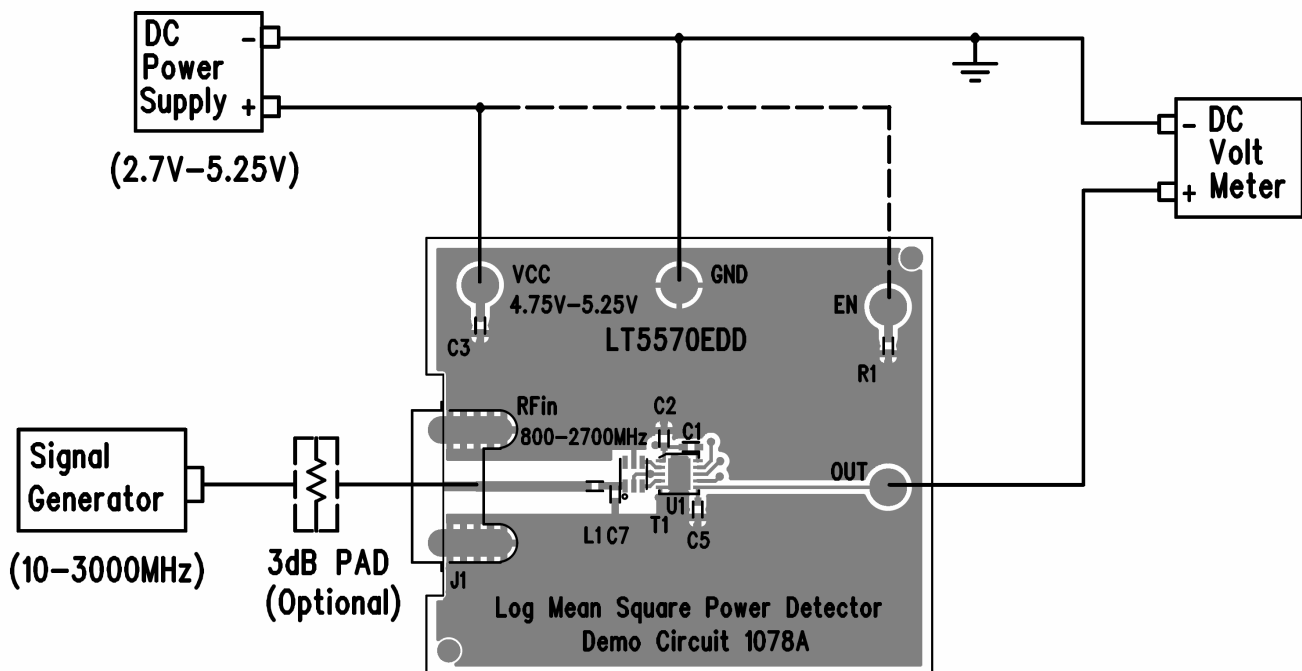


Figure 1. Proper Measurement Equipment Setup

DEMO BOARD MODIFICATIONS:

Demo board modifications for RF input frequency of 2700MHz

Part	Notes	Value	Manufacturer Part Number
L1	Remove L1 inductor. Place 1.2pF capacitor instead of inductor L1.	1.2pF	Murata, GRM1555C1H1R2CZ01
C7	Remove capacitor C7. Place 2.2nH inductor instead of capacitor C7.	2.2nH	TOKO, LL1005-FHL2N2S
T1	Remove T1 balun (LDB212G1020C-001). Place LDB212G4020C-001 Murata balun instead.		Murata, LDB212G4020C-001

NOTE: Refer to demo board schematic on Page 4

Demo board modifications for RF input frequency of 880MHz

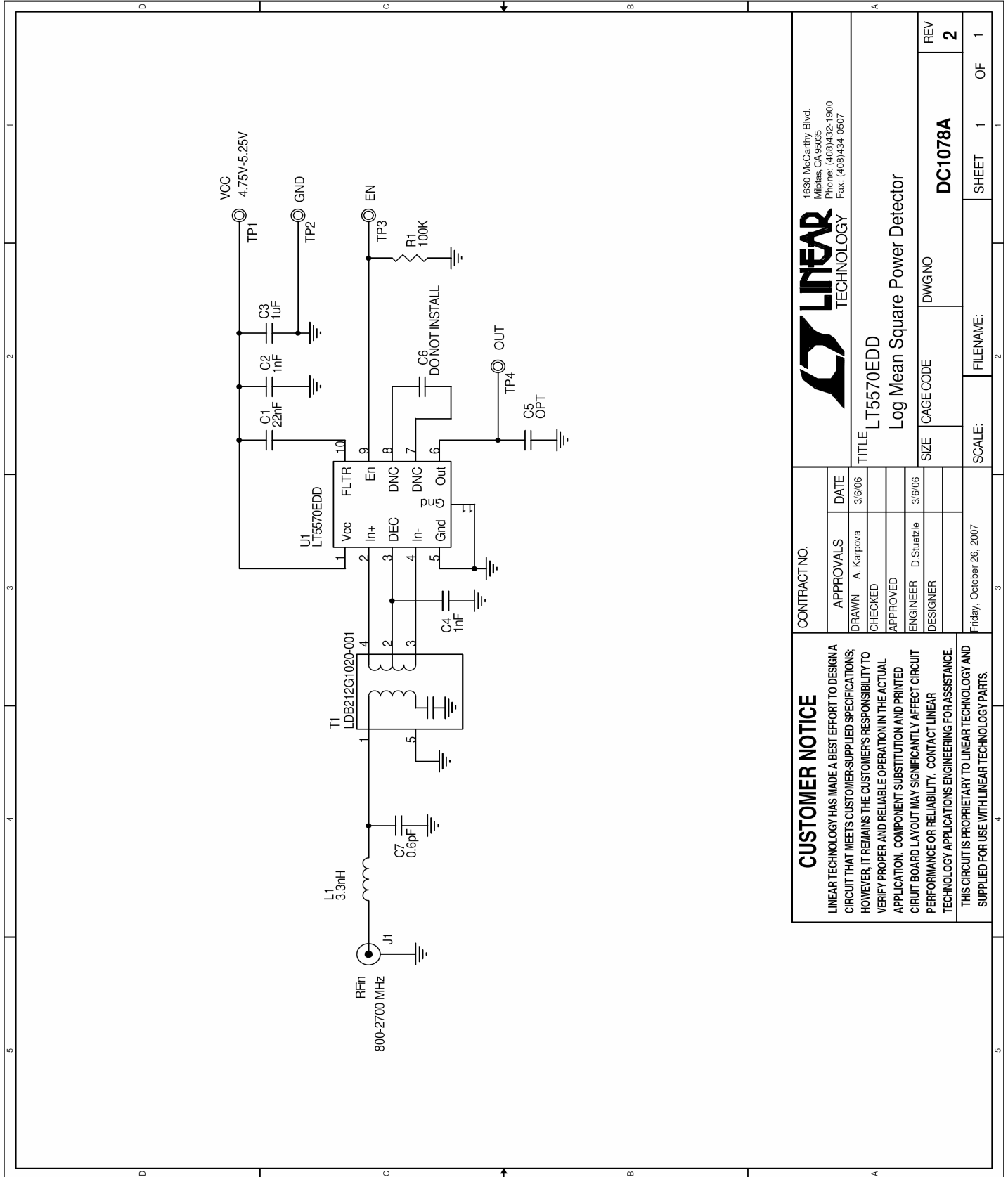
Part	Notes	Value	Manufacturer Part Number
L1	Remove L1 inductor. Place 1.8nH inductor instead.	1.8nH	TOKO, LL1005-FHL1N8S
C7	Remove capacitor C7.	No placement	n/a
T1	Remove T1 balun (LDB212G1020C-001). Place LDB21869M20C-001 Murata balun instead.		Murata, LDB21869M20C-001

NOTE: Refer to demo board schematic on Page 4

Note: Consult factory for demo board modifications for other frequencies.

QUICK START GUIDE FOR DEMONSTRATION CIRCUIT 1078

MEAN-SQUARED RF POWER DETECTOR



CUSTOMER NOTICE		CONTRACT NO.	
LINEAR TECHNOLOGY HAS MADE A BEST EFFORT TO DESIGN A CIRCUIT THAT MEETS CUSTOMER-SUPPLIED SPECIFICATIONS; HOWEVER, IT REMAINS THE CUSTOMER'S RESPONSIBILITY TO VERIFY PROPER AND RELIABLE OPERATION IN THE ACTUAL APPLICATION. COMPONENT SUBSTITUTION AND PRINTED CIRCUIT BOARD LAYOUT MAY SIGNIFICANTLY AFFECT CIRCUIT PERFORMANCE OR RELIABILITY. CONTACT LINEAR TECHNOLOGY APPLICATIONS ENGINEERING FOR ASSISTANCE.		APPROVALS	DATE
THIS CIRCUIT IS PROPRIETARY TO LINEAR TECHNOLOGY AND SUPPLIED FOR USE WITH LINEAR TECHNOLOGY PARTS.		DRAWN A. Karpova	3/6/06
		CHECKED	
		APPROVED	
		ENGINEER D. Smetzle	3/6/06
		DESIGNER	
		SCALE: Friday, October 26, 2007	
		FILENAME:	
		SIZE	DWG/NO
		CAGE CODE	DC1078A
		REV	2
		TITLE	LT5570EDD Log Mean Square Power Detector
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		SHEET 1	OF 1