## DESCRIPTION

Demonstration circuit 821 is a precision dual RF power detector featuring the LTC®5533.

The LTC5533 is a dual channel RF power detector for RF applications operating in the 300MHz to 11GHz range. Two independent temperature compensated Schottky diode peak detectors and buffer amplifiers are combined in a small 4mm x 3mm DFN package.

The RF input voltage is peak detected using on-chip Schottky diodes. The detected voltage is buffered and supplied to the $V_{OUT}$ pins. A power saving shutdown mode reduces current to less than 2µA/channel. The initial output starting voltages of 130mV±35mV can be precisely adjusted using the $V_{OS}$ pins.

The LTC5533 operates with input power levels from -32dBm to 12dBm.

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



**Table 1. Typical Performance Summary ($V_{CC}$ = 3.6V, $\overline{SHDN}$ = 3V, $T_A$ = 25°C, source impedance = 50Ω, unless otherwise noted. Test circuit shown in Figure 2.)**

| PARAMETER | CONDITION | VALUE |
|---|---|---|
| $V_{CC}$ Operating Voltage | | 2.7V to 6V |
| $I_{VCC}$ Operating Current, per channel | $I_{VOUT}$ = 0mA | 0.45mA |
| $I_{VCC}$ Shutdown Current, per channel | $\overline{SHDN}$ = LO | 0.01µA |
| $\overline{SHDN}$ Voltage, Chip Disabled | $V_{CC}$ = 2.7V to 6V | 0.35V max |
| $\overline{SHDN}$ Voltage, Chip Enabled | $V_{CC}$ = 2.7V to 6V | 1.4V min |
| $\overline{SHDN}$ Input Current, per channel | $\overline{SHDN}$ = 3.6V | 22µA |
| $RF_{IN}$ Input Frequency Range | | 300MHz to 11GHz |
| $RF_{IN}$ Input Power Range | RF Frequency = 300MHz to 7GHz, $V_{CC}$ = 2.7V to 6V | -32dBm to 12dBm |
| Channel to Channel Isolation | f = 2GHz | 45dB |
| $V_{OS}$ Voltage Range | | 0V to 1V |
| $V_{OS}$ Input Current | $V_{OS}$ = 1V | -0.5µA to 0.5µA |
| $V_{OUT}$ Start Voltage (No RF Input) | $R_{LOAD}$ = 2kΩ, $V_{OS}$ = 0V | 110mV to 150mV |
| | $\overline{SHDN}$ = LO | 1mV |
| $V_{OUT}$ Output Current | $V_{OUT}$ = 1.75V, $V_{CC}$ = 2.7V, $\Delta V_{OUT}$ < 10mV | 4mA |
| $V_{OUT}$ Load Capacitance | | 33pF max |
| $V_{OUT}$ Bandwidth | $C_{LOAD}$ = 33pF, $R_{LOAD}$ = 2kΩ | 2MHz |
| $V_{OUT}$ Slew Rate | $V_{RFIN}$ = 1V Step, $C_{LOAD}$ = 33pF, $R_{LOAD}$ = 2kΩ | 3V/µs |
| $V_{OUT}$ Noise | $V_{CC}$ = 3V, Noise BW = 1.5MHz, 50Ω RF Input Termination | $1mV_{P-P}$ |
| $V_{OUT}$ Enable Time | $\overline{SHDN}$ = LO to HI, $C_{LOAD}$ = 33pF, $R_{LOAD}$ = 2k | 8µs |

## QUICK START PROCEDURE

Demonstration circuit 821 is easy to set up to evaluate the performance of the LTC5533. Refer to Figure 1 for proper measurement equipment setup and follow the procedure below:

1. Connect all DC power supplies' negative (-) outputs to demo board Gnd test points (E5 and E10).
2. Connect $V_{CC}$ DC power supplies' positive (+) outputs (2.7V to 6V) to demo board $V_{CC}$ test points (E1 and E6).

   **NOTE:** Do not exceed 6.5V, the absolute maximum supply voltage.
3. Connect $V_{OS}$ DC power supplies' positive (+) outputs (0V to 1V) to demo board $V_{OS}$ test points (E3 and E9).
4. Connect voltmeters' negative (-) leads to demo board Gnd test points (E5 and E10).
5. Connect voltmeters' positive (+) leads to the demo board Vout test points (E2 and E7).
6. Connect RF signal generators' outputs to demo board RF in ports (SMA connectors J1 and J2) via coaxial cables.
7. Using jumper cables, connect demo board $V_{CC}$ test points (E1 and E6) to $\overline{\text{SHDN}}$ test points (E4 and E8). Now both the detectors are enabled (on) and are ready for measurement.

   **NOTE:** Make sure that the power is not applied to the $\overline{\text{SHDN}}$ test points before it is applied to the $V_{CC}$ test points. The voltages on the $\overline{\text{SHDN}}$ test points must never exceed $V_{CC}$.
8. Apply RF input signals and measure Vout DC voltages.

   **NOTE:** Do not exceed +12dBm, the absolute maximum RF input power.

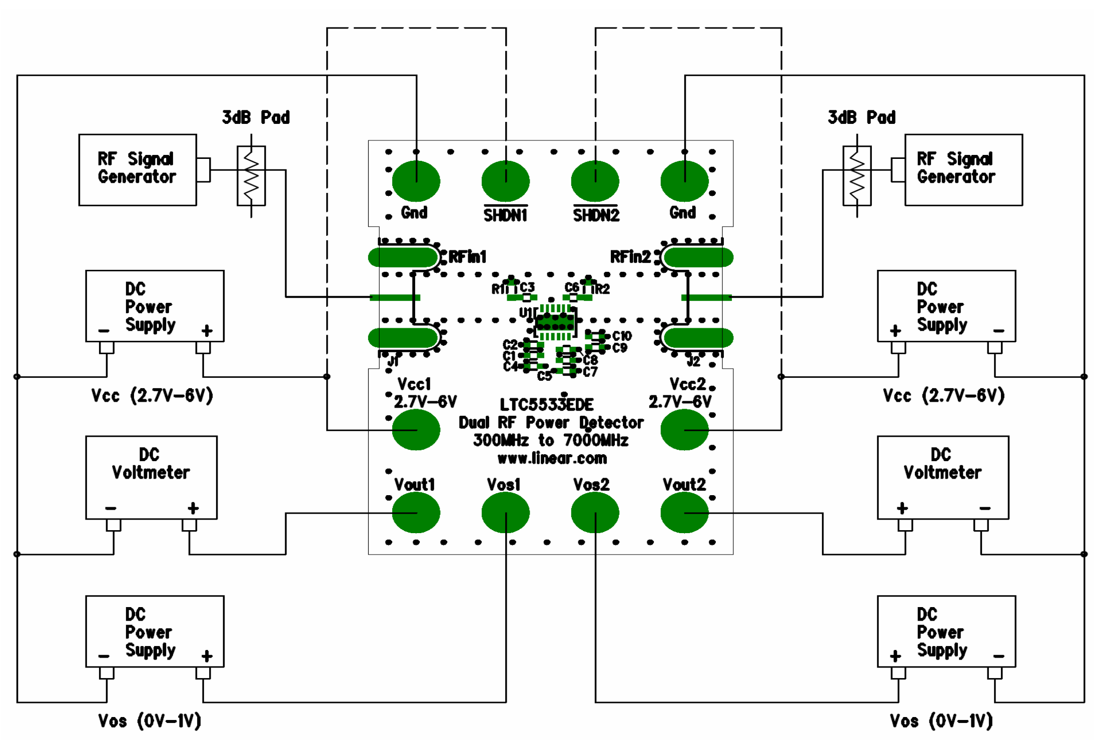
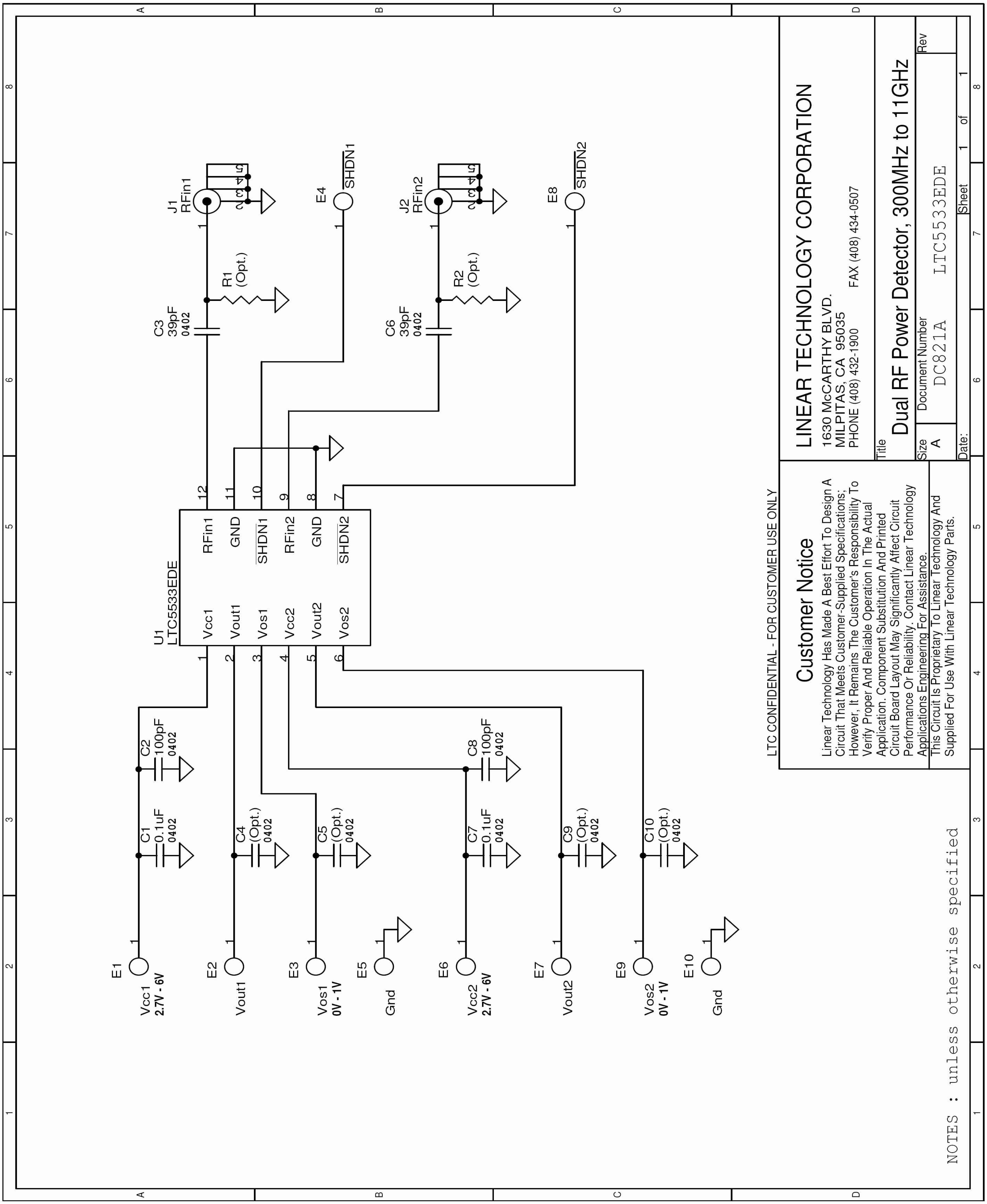



**Figure 1. Proper Measurement Equipment Setup**



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Title
Dual RF Power Detector, 300MHz to 11GHz
Size
A
Document Number
DC821A
LTC5533EDE
Rev
1
Date:
Sheet 1 of 1
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Customer Notice
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.
This Circuit Is Proprietary To Linear Technology And Supplied For Use With Linear Technology Parts.
NOTES : unless otherwise specified
U1
LTC5533EDE
Vcc1
Vout1
Vos1
Vcc2
Vout2
Vos2
RFin1
GND
SHDN1
RFin2
GND
SHDN2
J1
RFin1
J2
RFin2
R1
(Opt.)
R2
(Opt.)
C3
39pF
0402
C6
39pF
0402
E4
SHDN1
E8
SHDN2
C1
0.1uF
0402
C2
100pF
0402
C4
(Opt.)
0402
C5
(Opt.)
0402
C7
0.1uF
0402
C8
100pF
0402
C9
(Opt.)
0402
C10
(Opt.)
0402
E1
Vcc1
2.7V - 6V
E2
Vout1
E3
Vos1
0V - 1V
E5
Gnd
E6
Vcc2
2.7V - 6V
E7
Vout2
E9
Vos2
0V - 1V
E10
Gnd