AN-1817 LMV225/LMV228 WSON Evaluation Board

1 General Description

This board can be used to evaluate the Texas Instruments LMV225/LMV228 RF detectors. These logarithmic power detectors are intended for use in CDMA and WCDMA applications. They have a 30 dB dynamic range and an RF frequency range from 450 MHz to 2 GHz. The LMV228 is designed to be used in combination with a directional coupler, while the LMV225 detector is especially suited for power measurements via a high-resistive tap as well as directional coupler. The LMV225/LMV228 have an integrated filter for low-ripple average power detection of CDMA signals. Additional filtering can be applied using a single external capacitor.

2 Basic Operation

The LMV225/LMV228 provide an accurate temperature and supply compensated DC output voltage that relates linearly to the applied RF input power in dBm. The single supply, ranging from 2.7V to 5.5V, can be applied through connectors P_4 and P_5. The signal applied to connector P_2 puts the detector in an active or a shutdown mode. The detector is active for Enable = HI, otherwise it is in a low power consumption shutdown mode. The RF signal is applied through connector P_1, while the output voltage is measured through connector P_3.

2.1 Input

The LMV225 has an RF power detection range from −30 dBm to 0 dBm and is designed for direct use in combination with resistive taps. The LMV228 has a detection range from −15 dBm to 15 dBm and are intended for use in combination with a directional coupler. Both detectors have an input impedance of 50Ω. Details about the configuration can be found in *LMV225/LMV226/LMV228 RF Power Detector for CDMA and WCDMA* (SNWS013).

2.2 Output

The output voltage range is typically 0.2V to 2V and can be scaled down to meet ADC input range requirements. Since the LMV225/LMV228 have a current controlled output, the voltage range can be adjusted by changing the output resistance. To change this a resistor needs to be placed in R_5. The output impedance of the detector (typical 19.8 kΩ) together with the resistor R_5 translates the current into a voltage. The value of resistor R_5 determines the exact scaling. A value of 19.8 kΩ for example divides the output voltage range by half. Besides scaling the output voltage, the output ripple can be reduced by lowpass filtering. This can be realized with capacitor C_3. Further details can be found in the applications notes information section in *LMV225/LMV226/LMV228 RF Power Detector for CDMA and WCDMA* (SNWS013).

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3 Schematic

The schematic of the evaluation board is shown in Figure 1.

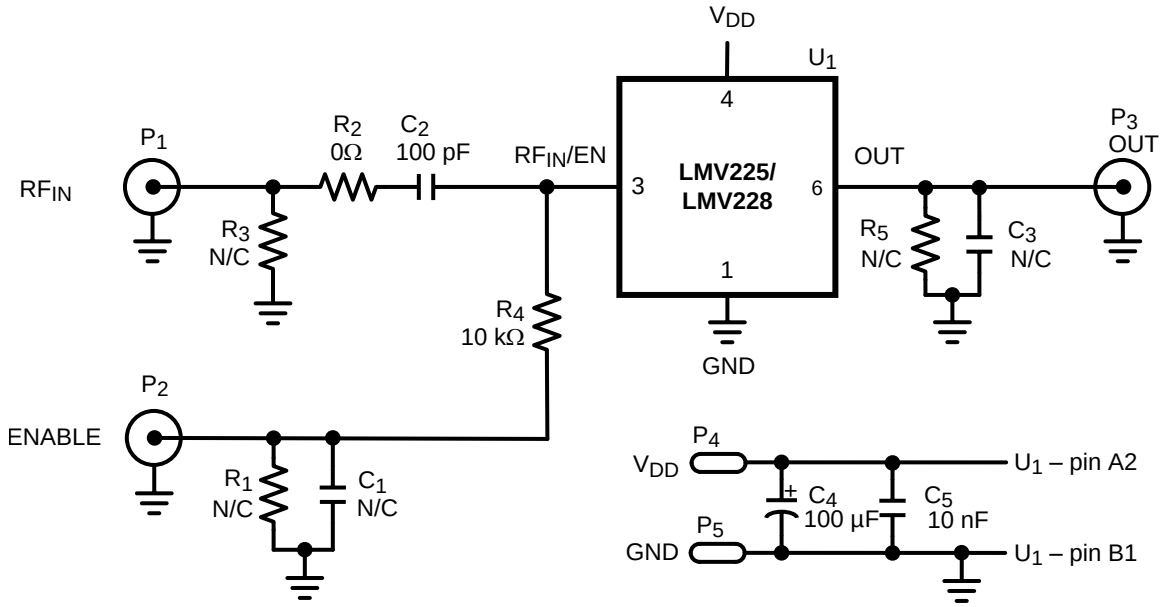

Figure 1. Schematic of the Evaluation Board

4 Bill of Materials

The Bill of Material (BOM) of the evaluation board is listed in Table 1.

Table 1. Bill of Materials of the Evaluation Board

Designator	Description	Comment
C2	0603 Capacitor	100 pF
C4	Case_C Capacitor	100 µF
C5	0603 Capacitor	10 nF
C1, C3	0603 Capacitor	Not Connected
P1	Connector	SMA
P2	Connector	BNC
P3	Connector	BNC
P4	Connector	Banana
P5	Connector	Banana
R2	0603 Resistor	0Ω
R4	0603 Resistor	10 kΩ
R1, R3, R5	0603 Resistor	Not Connected
U1	WSON	LMV225 or LMV228

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5 Layout

The layout of the evaluation board is shown in Figure 2.

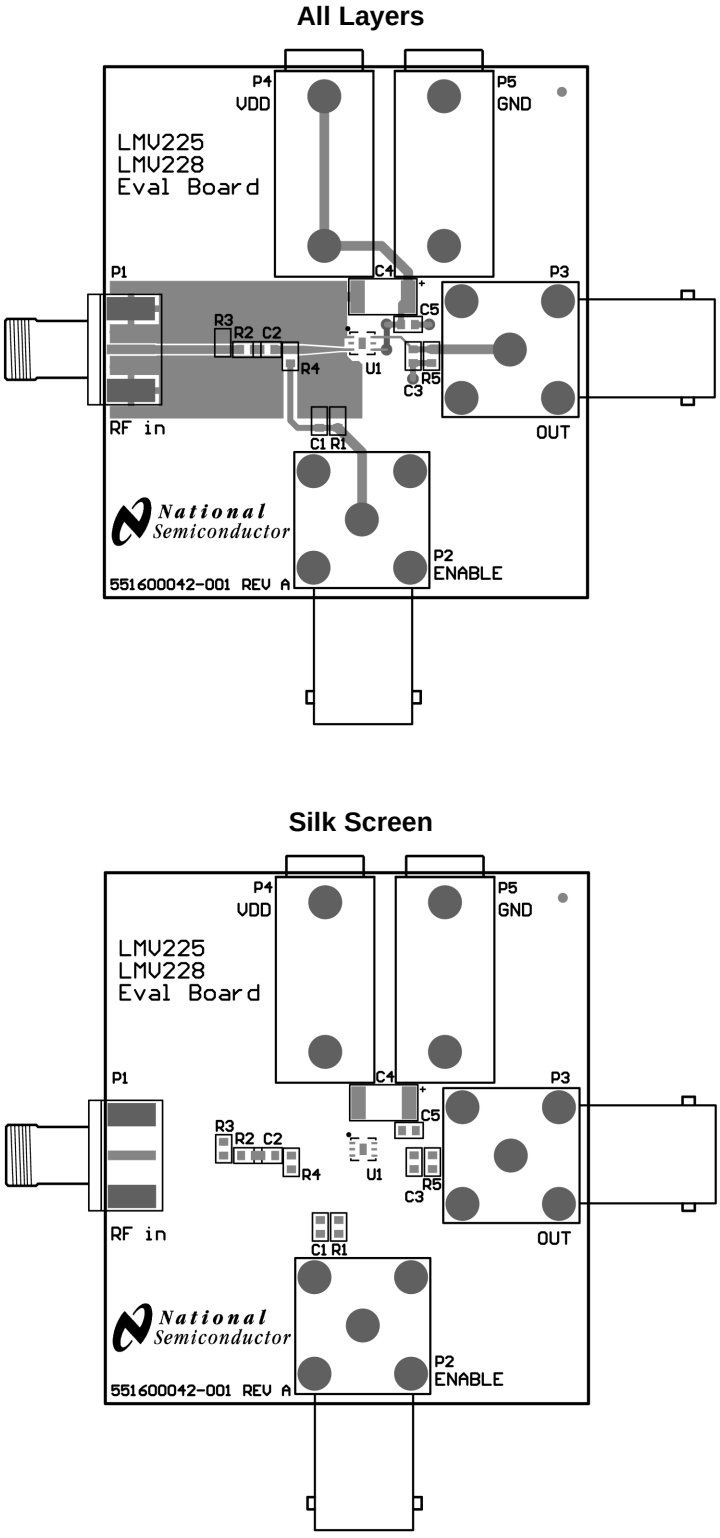

Figure 2. Layout of the Evaluation Board

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6 Measurement Procedure

The performance of the LMV225/LMV228 can be measured with the setup given in Figure 3.

In this measurement example a supply voltage of 2.7V is applied by the power supply. To put the LMV225/LMV228 in active mode, the Enable (P_2) is connected to 2.7V as well. The resulting DC output voltage is measured with a multimeter connected to P_3. A 900 MHz RF signal is applied by the RF generator to connector P_1, where the RF power is swept from −50 dBm to +20 dBm.

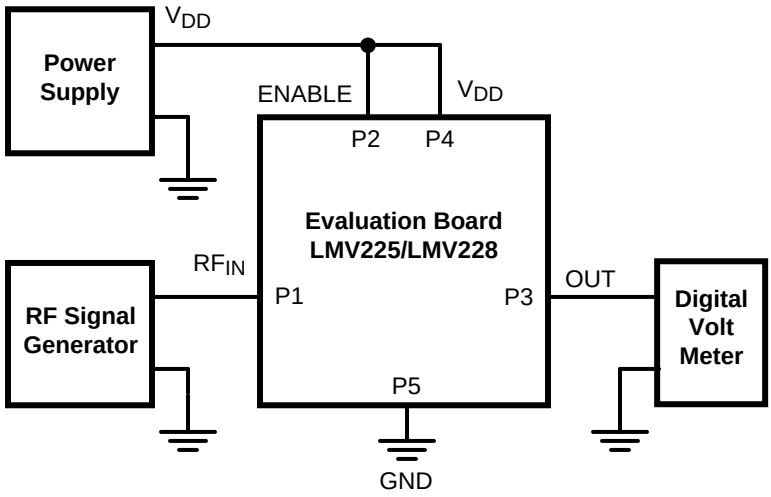

Figure 3. Measurement Setup

7 Measurement Results

Figure 4 and Figure 5 show the measurement results for the LMV225/LMV228 respectively. For each plot the RF power is swept at 900 MHz for different temperatures. Also the error in dBs with respect to an ideal straight line is plotted (Log conformance).

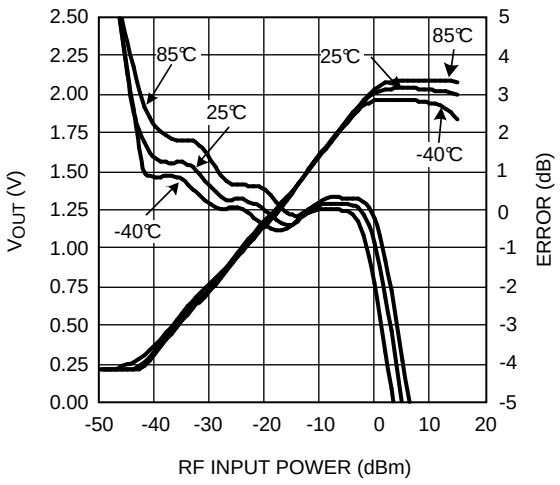

Figure 4. LMV225 Output Voltage and Log Conformance vs. RF Input Power at 900 MHz

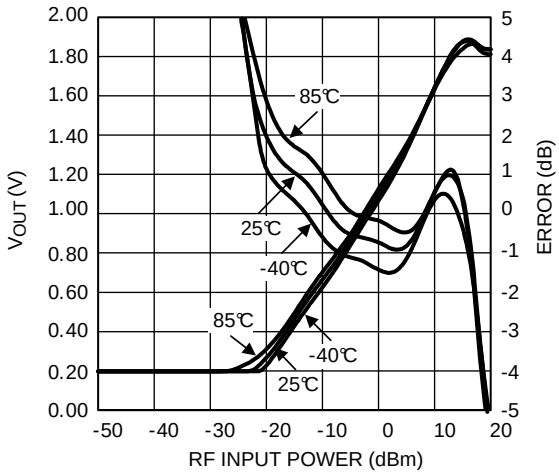

Figure 5. LMV228 Output Voltage and Log Conformance vs. RF Input Power at 900 MHz

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