# AN-1615 LMH6555 Evaluation Board

## 1 Evaluation Board

Texas Instruments suggests the following evaluation board as a guide for high frequency layout and as an aid in device testing and characterization:

| Device | Package | Evaluation Board Ordering ID |
|---|---|---|
| LMH6555 | 16-Pin WQFN | LMH6555EVAL |

The evaluation board can be ordered when a device sample request is placed with Texas Instruments.

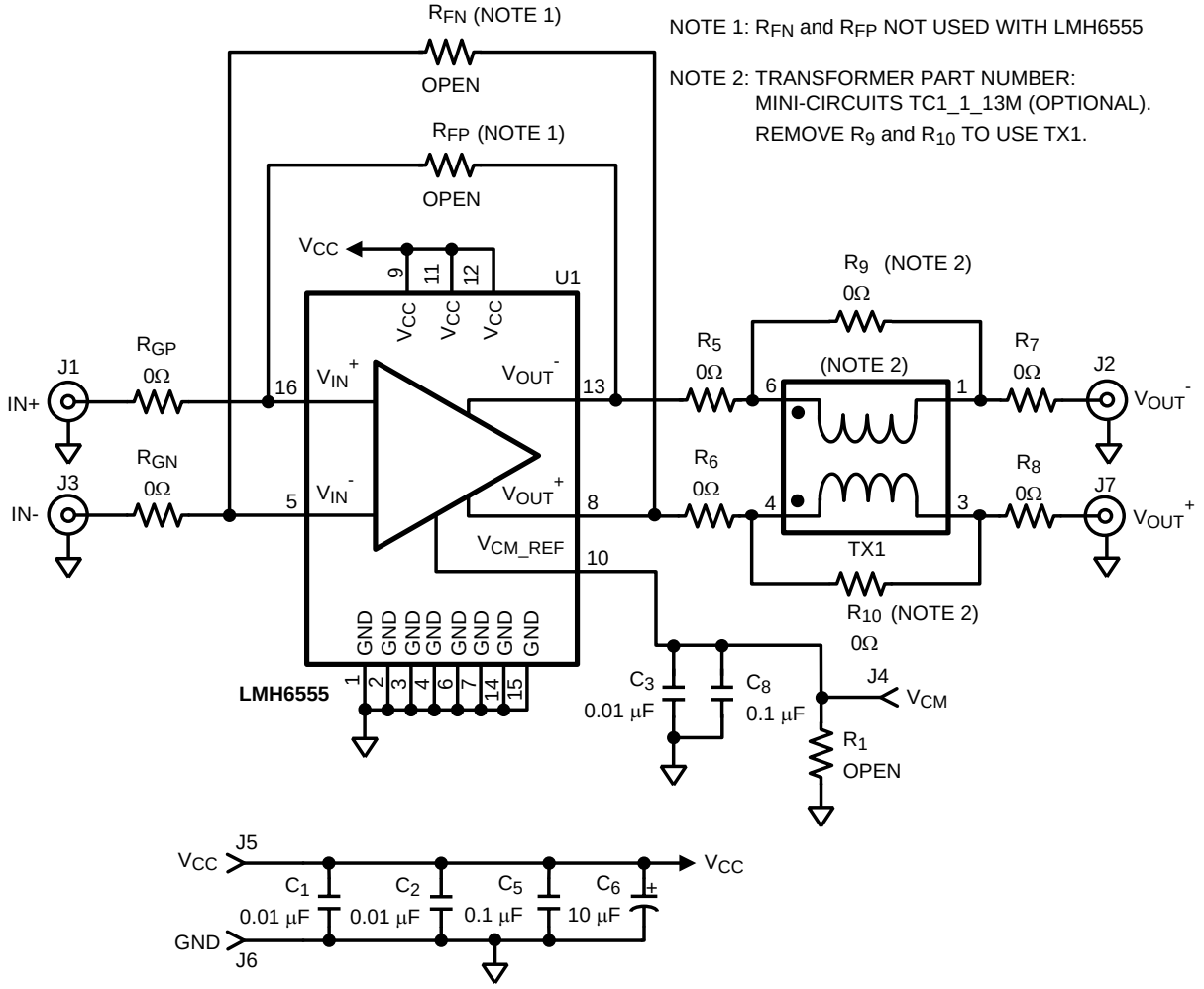


**Figure 1. Evaluation Board Schematic**

# 2 Description

## 2.1 Input Conditions

The LMH6555 evaluation board is intended for use in the following applications:

- Single ended to differential output
- Differential input to differential output

For single ended input applications, either "$IN^+$" (J1) or "$IN^-$" (J3) SMA inputs can be used. As implied, J1 will have positive gain and J3 negative. You can set the value of "$R_{GP}$" and "$R_{GN}$" resistors (0 Ω is installed on the evaluation board). For most single-ended input applications, the driven input (either $R_{GP}$ or $R_{GN}$) would be set to 0 Ω while being driven from a 50 Ω source and the undriven input resistor (either $R_{GN}$ or $R_{GP}$) would be set to 50 Ω (with the SMA connector side of the resistor shorted to ground) to provide impedance matching (50 Ω) between the two inputs. Alternatively, with 0 Ω resistors installed for $R_{GP}$ and $R_{GN}$ on the board, the undriven input (either J1 or J3) can be terminated with a 50 Ω SMA termination to achieve the same effect.

For differential input applications, use both J1 and J3. Again, "$R_{GP}$" and "$R_{GN}$" resistors are used to ensure that, in a typical application, each LMH6555 input sees 50 Ω to ground. Otherwise, there will be an insertion gain imbalance due to unequal input impedances. A differential source with 100 Ω built-in resistance can be directly plugged into J1 and J3 ($R_{GP} = R_{GN} = 0$ Ω).

## 2.2 Output Conditions

The LMH6555 evaluation board differential output appears across J7 ($V_{OUT}+$) and J2 ($V_{OUT}-$) SMA connectors. The optional Balun Transformer (TX1, not included) combines the two LMH6555 outputs and allows one to observe the combined output at either J7 or J2 down to the frequency of operation of the Balun transformer used (4.5 MHz in the case of the transformer specified in Table 1). To do so both J7 and J2 are each to be terminated with 50 Ω to ground. Most laboratory equipment has 50 Ω input impedance built-in. Thus, the observed output will be properly terminated by the measurement equipment. The unused output needs to be terminated with 50 Ω as well.

Alternatively, both J7 and J2 outputs can be used with a 100 Ω differential load as would be the case when the LMH6555 evaluation board is used to drive the 100 Ω differential input of a high speed ADC such as the ADC081000/ADC081500. The evaluation board is configured for such an application with $R_9$ and $R_{10}$ (0 Ω for both) passing the LMH6555 output signals directly to J7 and J2 and TX1 not installed.

## 2.3 $V_{CM\_REF}$ Input

The LMH6555 output common mode is set by the "$V_{CM\_REF}$" input pin voltage. The evaluation board terminal labeled "$V_{CM}$" should be tied to the appropriate DC source to drive this pin voltage. The range of voltages for this pin is from 0.95 V to 1.50 V and there are decoupling capacitors ($C_3$, $C_8$) on the board. The "$V_{CM}$" input cannot be left floating as this could cause the output to rail in the absence of a common mode control voltage. When used in conjunction with the ADC081000 A/D converter (or equivalent), the "$V_{CMO}$" output pin of that A/D converter can be used to drive the "$V_{CM}$" pin on the LMH6555 evaluation board. In some cases, a general-purpose buffer may be needed to supply the current needed for the "$V_{CM\_REF}$" input pin of the LMH6555. To find out if a buffer is necessary, Consult the A/D converter data sheet.

**NOTE:** ADC081000 "$V_{CMO}$" is limited to ±1 µA and, therefore, an external buffer is necessary in this case.

## 3 Bill of Materials (BOM)

**Table 1. Bill of Materials**

| | Ref. Designator | Description | Quantity |
|---|---|---|---|
| 1 | TX1 | Mini-circuits P/N TC1-1-13M (optional) | 1 (optional) |
| 2 | $R_9$, $R_{10}$ | O Ω Resistors | 2 |
| 3 | U1 | LMH6555SQ | 1 |
| 4 | $R_{GP}$, $R_{GN}$, $R_5$, $R_6$, $R_7$, $R_8$ | O Ω Resistors | 6 |
| 5 | $C_6$ | 10 µF Tantalum size A (3216) | 1 |
| 6 | $C_5$, $C_8$ | 0.1 µF ceramic SMT (0603) | 2 |
| 7 | $C_1$, $C_2$, $C_3$ | 0.01 µF Ceramic SMT (0402) | 3 |
| 8 | J4, J5, J6 | Test Point | 3 |
| 9 | J1, J2, J3, J7 | SMA Connector (Digikey J502–ND) | 4 |

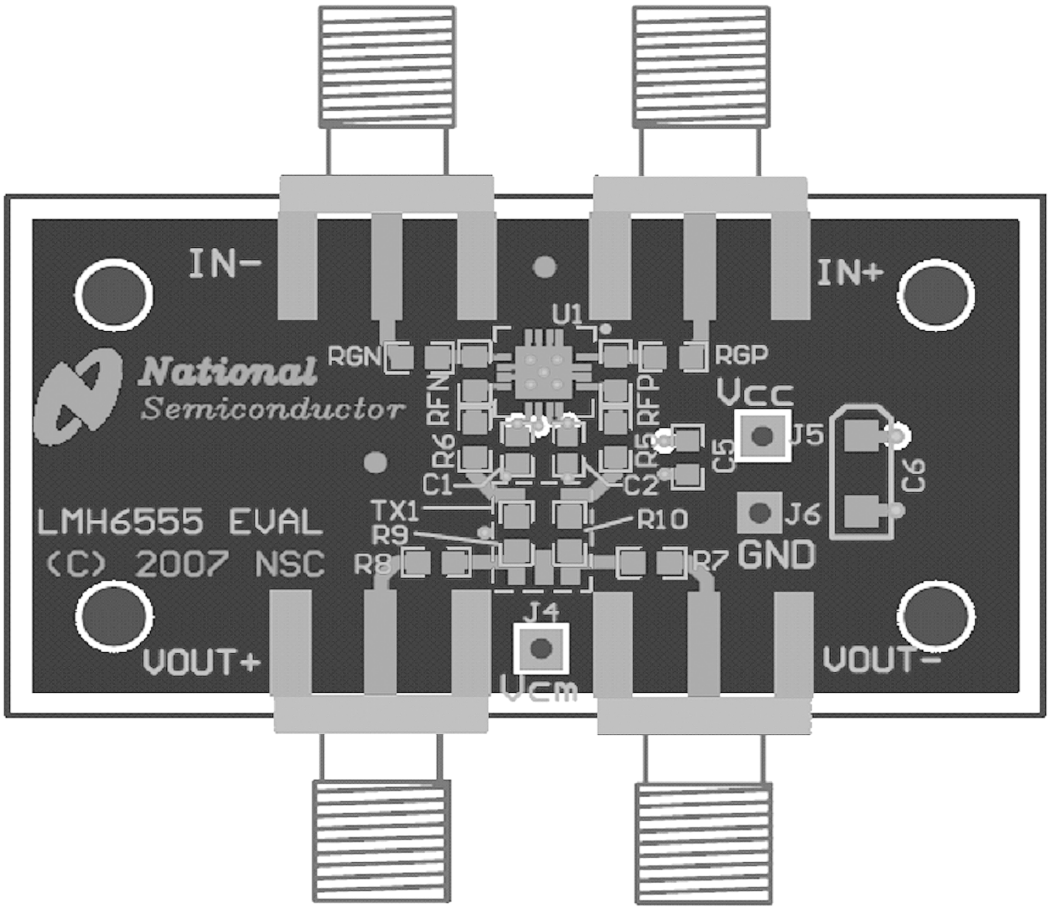


**Figure 2. LMH6555 Evaluation Board Top View With Components**

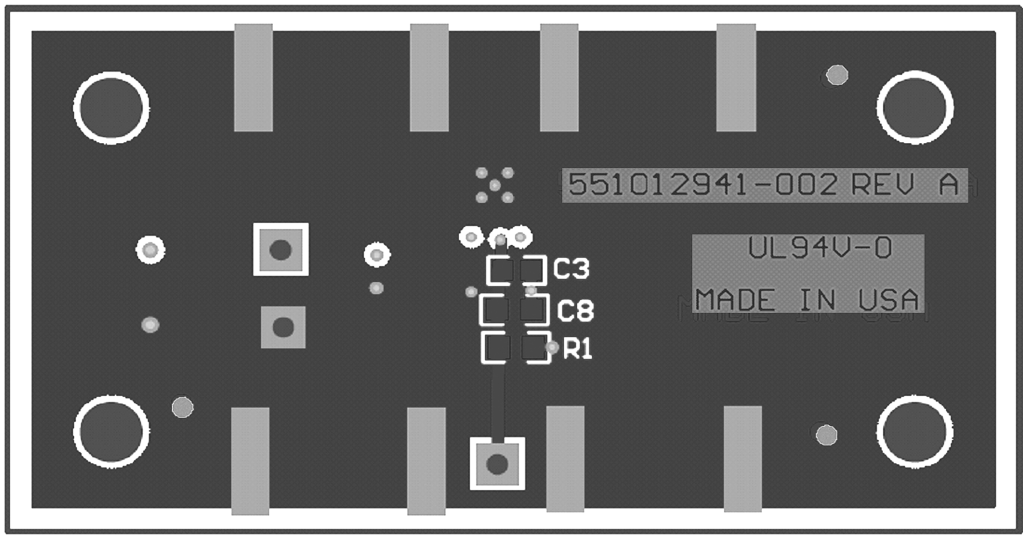


**Figure 3. LMH6555 Evaluation Board Bottom View With Circuit**

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