ADC081000, ADC081500, LMH6555

Application Note 1615 LMH6555 Evaluation Board



Literature Number: SNOA489

LMH6555 Evaluation Board

National Semiconductor Application Note 1615 Hooman Hashemi June 2007



Evaluation Board

National Semiconductor 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 LLP	LMH6555EVAL

The evaluation board can be ordered when a device sample request is placed with National Semiconductor.



FIGURE 1. Evaluation Board Schematic

AN-1615

Description

Input Conditions

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

- 1. Single ended to differential output
- 2. 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. The user can set the value of "R_{GP}" and "R_{GN}" resistors (0 Ω is installed on the evaluation board). For most sinle-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 builtin resistance can be directly plugged into J1 and J3 ($R_{GP} = R_{GN} = 0\Omega$).

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 the Bill of Materials). 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 100Ω differential load as would be the case when the LMH6555 evaluation board is used to drive the 100Ω differ-

ential input of a high speed ADC such as the ADC081000/ ADC081500. The evaluation board is configured for such an application with R_9 and $R_{10}~(0\Omega$ for both) passing the LMH6555 output signals directly to J7 and J2 and TX1 not installed.

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 0.95V to 1.50V 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 BEF}" input pin of the LMH6555. Consult the A/D converter datasheet to find out if a buffer is necessary (Note: ADC081000 " V_{CMO} " is limited to ±1 µA and therefore an external buffer is necessary in this case).

Bill of Materials

	Ref.	Description	Quantity
	Designator		
1.	TX1	Mini-circuits P/N	1
		TC1-1-13M (optional)	(optional)
2.	R ₉ , R ₁₀	$O\Omega$ Resistors	2
3.	U1	LMH6555SQ	1
4.	R _{GP} , R _{GN} , R ₅ , R ₆ , R ₇ , R ₈	$O\Omega$ 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





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FIGURE 3. LMH6555 Evaluation Board Bottom View with Circuit

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