

# LTC5553

## 3GHz to 20GHz Passive Bidirectional Mixer

### DESCRIPTION

Demonstration circuit DC2566A is optimized for evaluation of the LTC<sup>®</sup>5553 passive double-balanced mixer. Its RF port is broadband matched from 3GHz to 20GHz, and the internal LO amplifier, requiring only a 0dBm drive level, is broadband matched to 50Ω from 1GHz to 20GHz with 10dB Return Loss. The single-ended IF output is broadband matched from 500MHz to 9GHz. The LTC5553 can be used for upconverting and downconverting applications.

Design files for this circuit board are available at <http://www.linear.com/demo/DC2566A>

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### ABSOLUTE MAXIMUM INPUT RATINGS

Supply Voltage ( $V_{CC}$ ) .....	4.0V
Enable Input Voltage (EN) .....	-0.3V to $V_{CC}+0.3V$
LO Input Power (1GHz to 12GHz) .....	10dBm
LO Input DC Voltage.....	$\pm 0.1V$
RF Power (3GHz to 20GHz) .....	20dBm
RF DC Voltage.....	$\pm 0.1V$
IF Power (0.5GHz to 9GHz) .....	20dBm
IF DC Voltage .....	$\pm 0.1V$
Operating Temperature Range ( $T_C$ ) .....	-40°C to 105°C
Junction Temperature ( $T_J$ ) .....	150°C
Storage Temperature Range .....	-65°C to 150°C

**CAUTION: THIS PART IS SENSITIVE TO ELECTRO-STATIC DISCHARGE (ESD). OBSERVE PROPER ESD PRECAUTIONS WHEN HANDLING THE LTC5553.**

### BOARD PHOTO

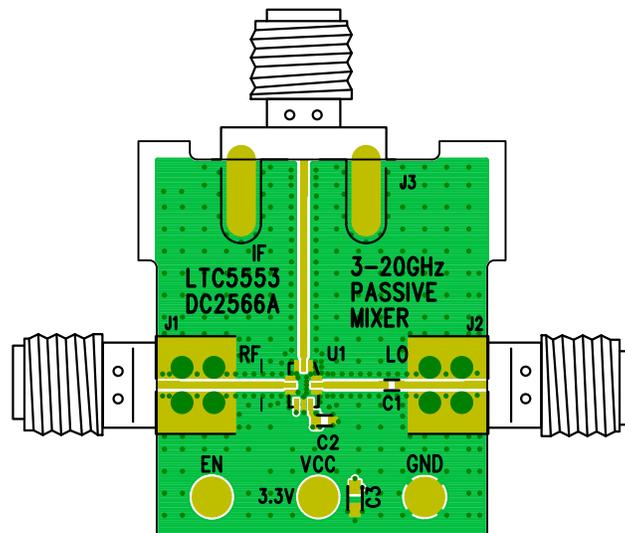


Figure 1. DC2566

## PROPER TEST SETUPS

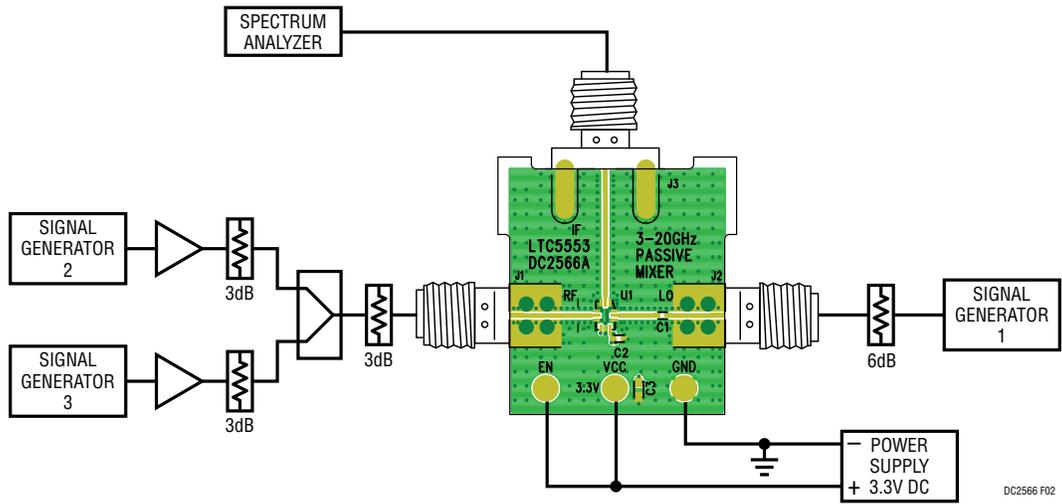


Figure 2. Test Setup for Downconverting Mixer Two-Tone Measurements

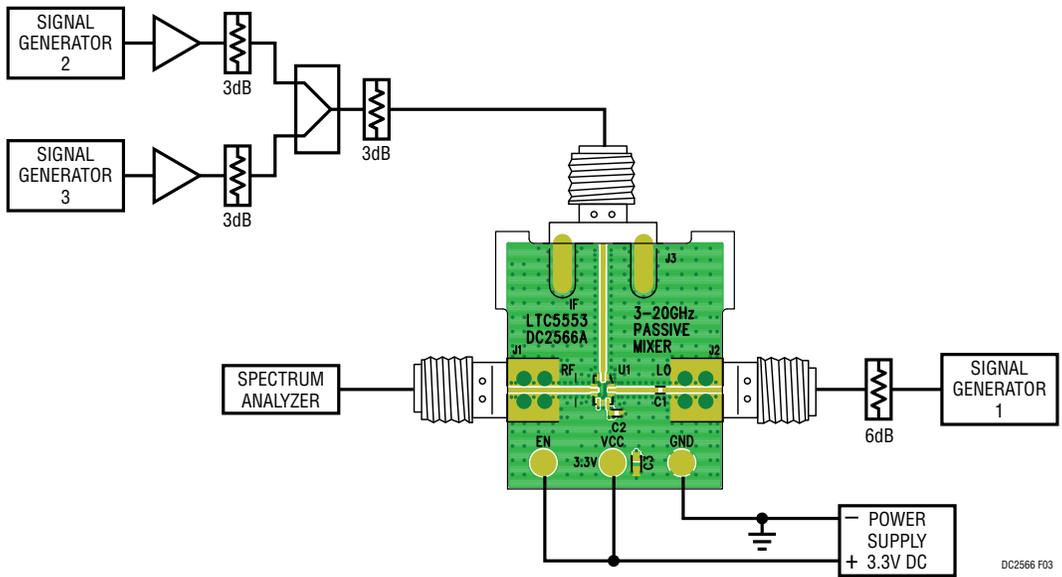


Figure 3. Test Setup for Upconverting Mixer Two-Tone Measurements

## NOTES ON TEST EQUIPMENT SETUP

- High performance signal generators with low harmonic outputs should be used for 2-tone measurements. Otherwise, low-pass filters at the signal generator outputs should be used to suppress harmonics.
- High quality combiners should be used to present a broadband  $50\Omega$  termination on all ports as well as provide good port-to-port isolation. Adding attenuator pads further improves source isolation and helps prevent the signal generators from producing intermodulation products.
- Spectrum analyzers can produce significant internal distortion products if they are overdriven. Generally, spectrum analyzers are designed to operate at their best with about  $-30\text{dBm}$  to  $-40\text{dBm}$  at their input. The spectrum analyzer's input attenuation setting should be used to avoid saturating the instrument.
- Set the spectrum analyzer's input attenuation depending on the spectrum analyzer used.
- Before performing measurements on the DUT, the system performance should be evaluated to ensure that a clean input signal is obtained and that the spectrum analyzer's internal distortion is minimized.

## QUICK START PROCEDURE

1. Connect all test equipment as shown in Figure 2.
2. Set the power supply output voltage to 3.3V and set the current limit to 200mA.
3. Connect the ground and  $V_{CC}$  turrets to the power supply.  
**BE SURE TO CONNECT THE  $V_{CC}$  TURRET BEFORE THE EN TURRET TO ENSURE THAT THE PART DOES NOT GET DAMAGED. ALSO, REMOVE POWER FROM EN TURRET BEFORE REMOVING POWER FROM THE  $V_{CC}$  TURRET.**
4. Connect the EN turret to the power supply.
5. Set the LO signal generator to provide a 7910MHz CW signal at about 0dBm to the demo board's LO port.
6. Set the RF signal generators to provide one 9799MHz CW signal and one 9801MHz CW signal. The signals should be applied to the 2-way combiner. The output of the combiner should be applied to the demo board's RF input port. The two tones should be set to 5dBm each at the mixer's RF input port.
7. Set the spectrum analyzer's center frequency to 1890MHz.
8. Perform various measurements (Conversion Gain, OIP3, LO leakage, etc.).

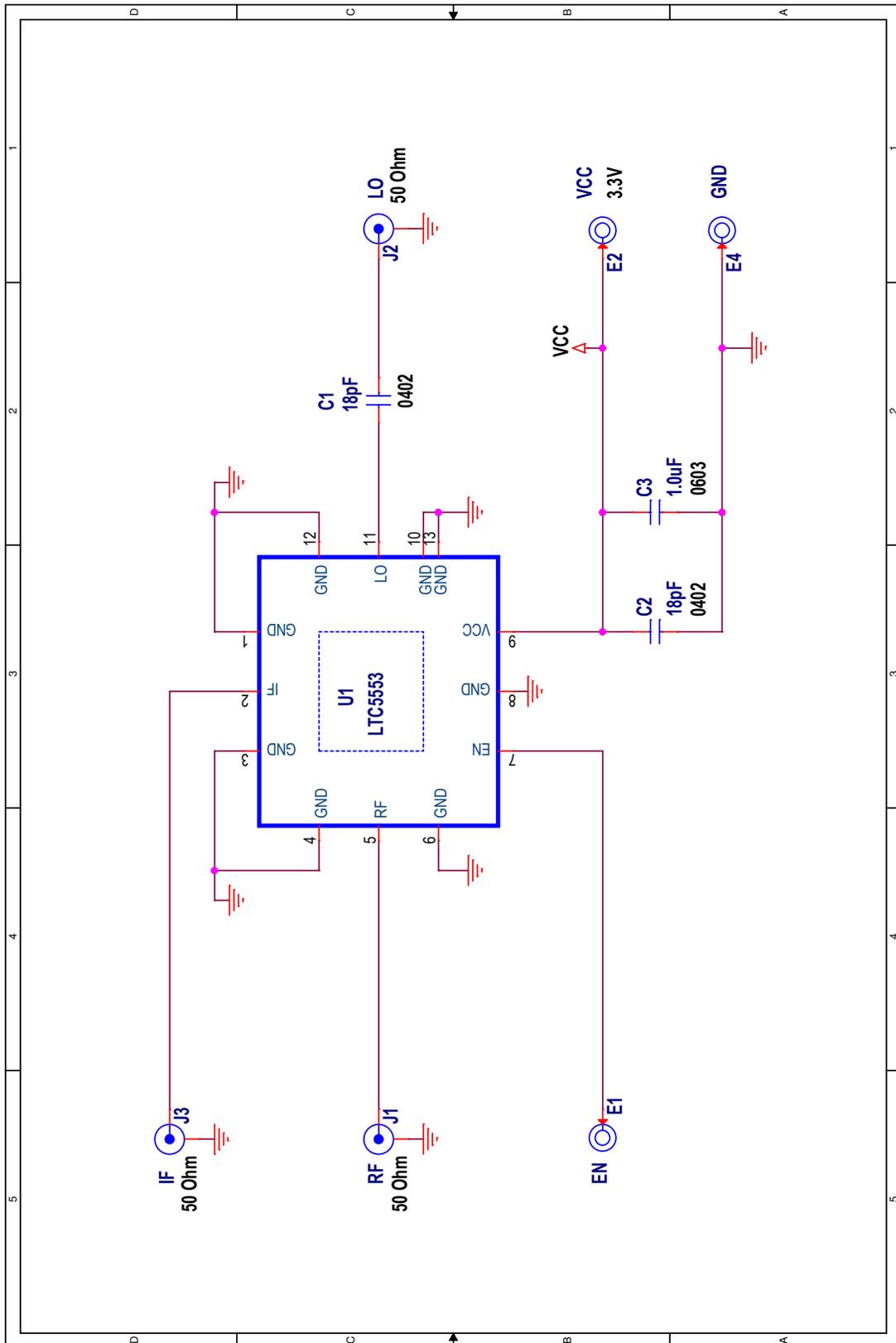
# DEMO MANUAL DC2566A

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## PARTS LIST

ITEM	QTY	REFERENCE	PART DESCRIPTION	MANUFACTURER/PART NUMBER
<b>Required Circuit Components</b>				
1	2	C1,C2	CAP, 18pF, C0G, 50V, 1%, 0402	MURATA, GJM1555C1H180FB01
2	1	C3	CAP, 1μF, X7R, 10V, 10%, 0603	MURATA, GRM188R71A105KA61
3	3	E1-E3	TEST POINT, TURRET, 0.061" MTG. HOLE	MILL-MAX, 2308-2-00-80-00-00-07-0
4	2	J1, J2	CONN., SMA 50Ω EDGE-LAUNCH	E. F. JOHNSON, 142-0761-881
5	1	J3	CONN., SMA 50Ω EDGE-LAUNCH	E. F. JOHNSON, 142-0701-851
6	1	U1	I.C. LTC5553IUDB, QFN 12 PIN, 3mm x 2mm	LINEAR TECHNOLOGY, LTC5553IUDB#PBF

**SCHEMATIC DIAGRAM**



# DEMO MANUAL DC2566A

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**Please read the DEMO BOARD manual prior to handling the product.** Persons handling this product must have electronics training and observe good laboratory practice standards. **Common sense is encouraged.**

This notice contains important safety information about temperatures and voltages. For further safety concerns, please contact a LTC application engineer.

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