LTC5552
3GHz to 20GHz Microwave Mixer with Wideband DC to 6GHz IF

DESCRIPTION

Demonstration circuit 2668A is optimized for evaluation of the LTC®5552 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 differential IF output is usable from DC to 6GHz. The LTC5552 can be used for upconverting and downconverting applications.

Design files for this circuit board are available at http://www.linear.com/demo/DC2668A

ABSOLUTE MAXIMUM INPUTS

Supply Voltage (V_{CC}) 4.0V
Enable Input Voltage (EN) ..... –0.3V to V_{CC}+0.3V
LO Input Power (1GHz to 20GHz) 10dBm
RF Power (3GHz to 20GHz) 20dBm
RF DC Voltage ..... ±0.1V
IF^+/IF^- Power (LF to 6GHz) 20dBm
IF^+/IF^- DC Voltage ..... ±0.3V
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 ELECTROSTATIC DISCHARGE (ESD). OBSERVE PROPER ESD PRECAUTIONS WHEN HANDLING THE LTC5552.

BOARD PHOTO

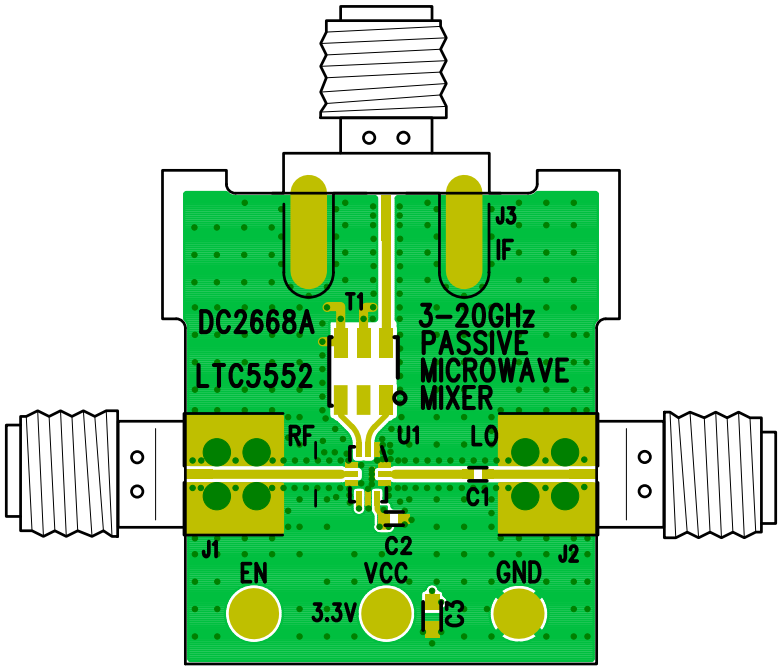


Figure 1. DC2668A

PROPER TEST SETUPS

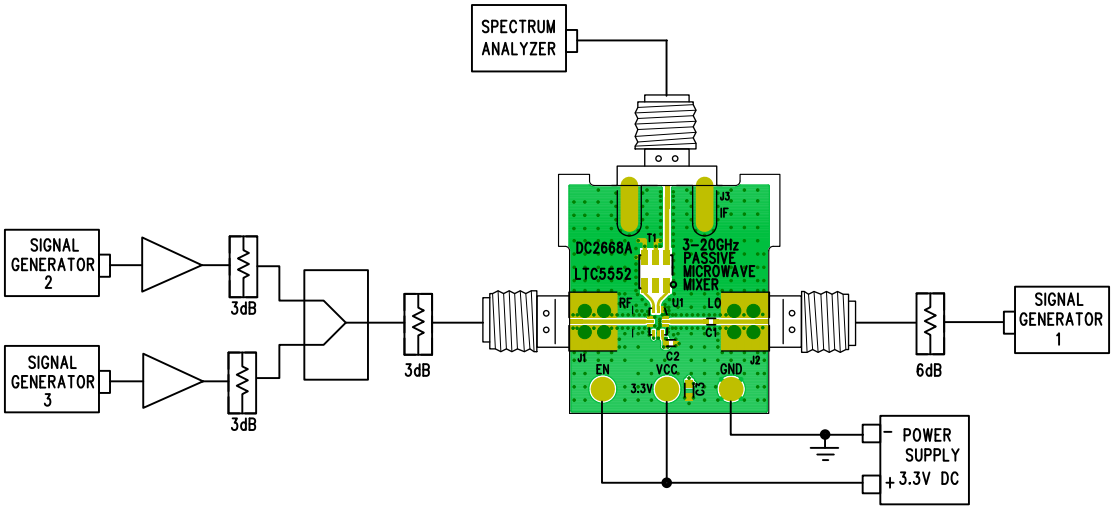


Figure 2. Test Setup for Downconverting Mixer Two-Tone Measurements

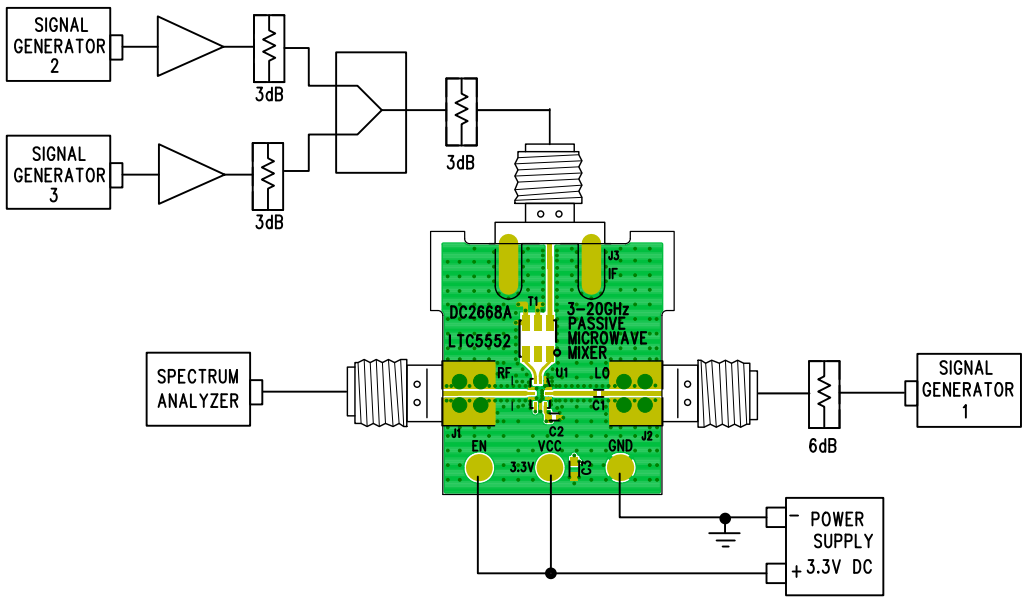


Figure 3. Test Setup for Upconverting Mixer Two-Tone Measurements

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 50Ω 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 –30dBm to –40dBm 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

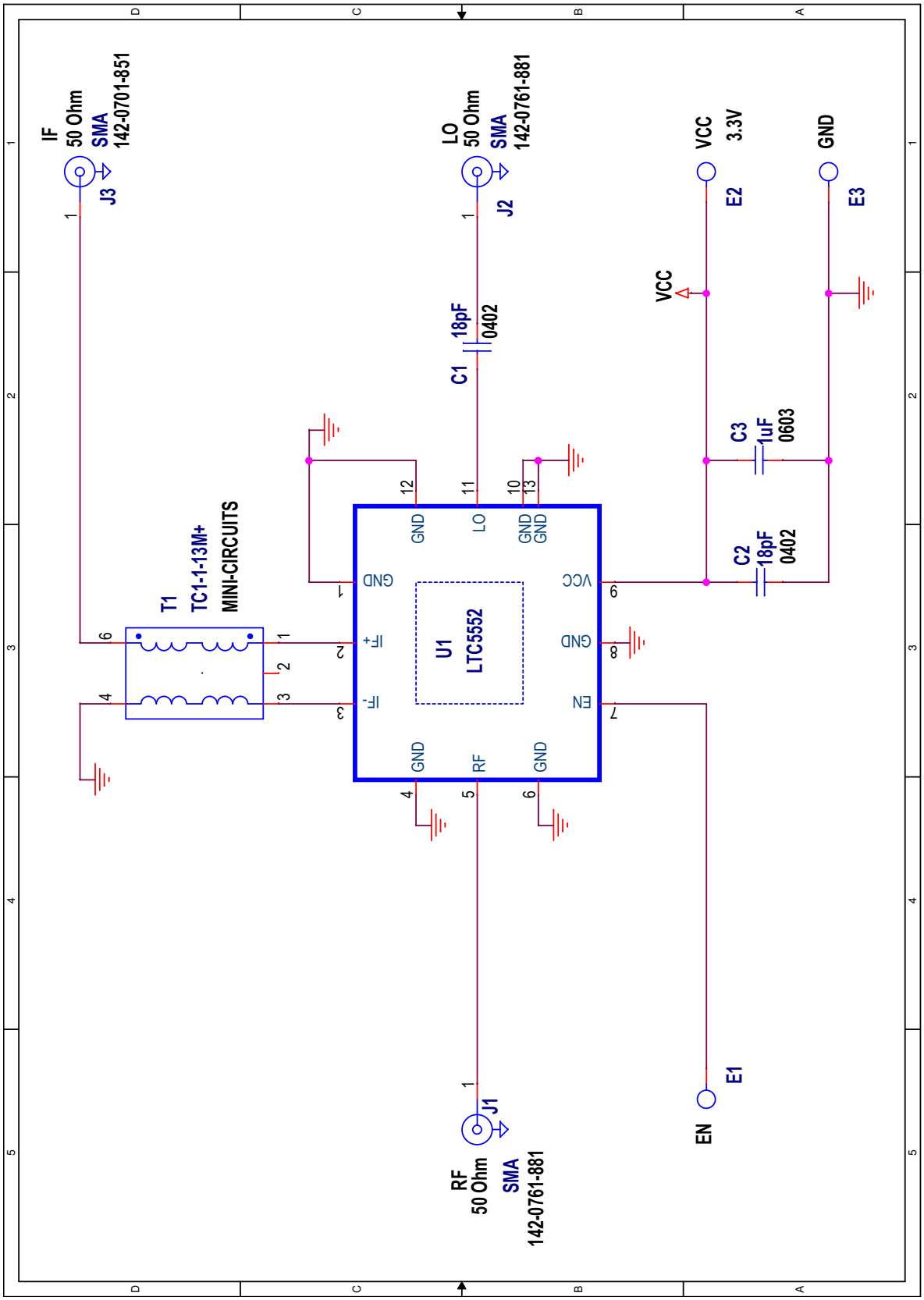
1. Connect all test equipment as shown in Figure 2.
2. Set the power supply output voltage to 3.3V and set the current limit to 200mA.
3. Connect the ground and V_{CC} turrets to the power supply.

   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 9560MHz 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 240MHz.
8. Perform various measurements (Conversion Gain, OIP3, LO leakage, etc.).

PARTS LIST

ITEM	QTY	REFERENCE	PART DESCRIPTION	MANUFACTURER/PART NUMBER
Required Circuit Components				
1	1	C1	CAP., 18pF, C0G, 10V, 2%, 0402	AVX, 0402ZK180GBSTR
2	1	C2	CAP., 18pF, C0G, 50V, 1%, 0402	MURATA, GJM1555C1H180FB01
3	1	C3	CAP., 1µF, X7R, 10V, 10%, 0603	MURATA, GRM188R71A105KA61
4	3	E1-E3	TEST POINT, TURRET, 0.061" MTG. HOLE	MILL-MAX, 2308-2-00-80-00-00-07-0
5	2	J1, J2	CONN., SMA, 50Ω, EDGE-LAUNCH	E.F. JOHNSON, 142-0761-881
6	1	J3	CONN., SMA, 50Ω, EDGE-LAUNCH	E.F. JOHNSON, 142-0701-851
7	1	T1	XFMR., 1:1, 4.5-3000MHz	MINI-CIRCUITS, TC1-1-13M+
8	1	U1	I.C., LTC5552IUDB, QFN 12 PIN, 3mm × 2mm	LINEAR TECHNOLOGY, LTC5552IUDB#PBF

SCHEMATIC DIAGRAM



DEMONSTRATION BOARD IMPORTANT NOTICE

Linear Technology Corporation (LTC) provides the enclosed product(s) under the following **AS IS** conditions:

This demonstration board (DEMO BOARD) kit being sold or provided by Linear Technology is intended for use for **ENGINEERING DEVELOPMENT OR EVALUATION PURPOSES ONLY** and is not provided by LTC for commercial use. As such, the DEMO BOARD herein may not be complete in terms of required design-, marketing-, and/or manufacturing-related protective considerations, including but not limited to product safety measures typically found in finished commercial goods. As a prototype, this product does not fall within the scope of the European Union directive on electromagnetic compatibility and therefore may or may not meet the technical requirements of the directive, or other regulations.

If this evaluation kit does not meet the specifications recited in the DEMO BOARD manual the kit may be returned within 30 days from the date of delivery for a full refund. THE FOREGOING WARRANTY IS THE EXCLUSIVE WARRANTY MADE BY THE SELLER TO BUYER AND IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED, IMPLIED, OR STATUTORY, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE. EXCEPT TO THE EXTENT OF THIS INDEMNITY, NEITHER PARTY SHALL BE LIABLE TO THE OTHER FOR ANY INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES.

The user assumes all responsibility and liability for proper and safe handling of the goods. Further, the user releases LTC from all claims arising from the handling or use of the goods. Due to the open construction of the product, it is the user's responsibility to take any and all appropriate precautions with regard to electrostatic discharge. Also be aware that the products herein may not be regulatory compliant or agency certified (FCC, UL, CE, etc.).

No License is granted under any patent right or other intellectual property whatsoever. **LTC assumes no liability for applications assistance, customer product design, software performance, or infringement of patents or any other intellectual property rights of any kind.**

LTC currently services a variety of customers for products around the world, and therefore this transaction **is not exclusive**.

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.

Mailing Address:

Linear Technology
1630 McCarthy Blvd.
Milpitas, CA 95035

LT 0717 REV A • PRINTED IN USA