LTC5569
300MHz to 4GHz 3.3V DUAL ACTIVE DOWNCONVERTING MIXER

DESCRIPTION

Demonstration circuit DC1719A is optimized for evaluation of the LTC®5569 dual active downconverting mixer. Its RF and LO input ports are internally matched to 50Ω from 1.4GHz to 3.3GHz, and from 1GHz to 3.5GHz, respectively. The IF output uses a bandpass network followed by an 8:1 transformer to provide a 50Ω match at 190MHz. The LTC5569 dual active mixer is optimized for diversity and for MIMO receiver applications that require low power and small size. Each mixer includes an independent LO buffer amplifier, an active mixer core, and a bias circuit with an enable pin. The symmetry of the IC assures that a phase and amplitude coherent LO is applied to each mixer. Broadband integrated transformers on the RF and LO inputs provide single-ended 50Ω interfaces. The differential IF outputs allow convenient interfacing to differential IF filters and amplifiers.

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

ABSOLUTE MAXIMUM RATINGS

Supply Voltage (V_{CCA}, V_{CCB}, IFA^+, IFA^-, IFB^+, IFB^-) 4V
Enable Input Voltage (ENA, ENB) ..... –0.3V to V_{CC} + 0.3V
Mixer Bias Voltage (BIASA, BIASB) .... –0.3V to V_{CC} + 0.3V
LO Input Power (350MHz to 4.3GHz) 10dBm
LO Input DC Voltage ..... ±0.1V
RF Input Power (300MHz to 4GHz) 15dBm
RF Input DC Voltage (RFA, RFB) ..... ±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 electrostatic discharge (ESD). Observe proper ESD precautions when handling the LTC5569.

BOARD PHOTO

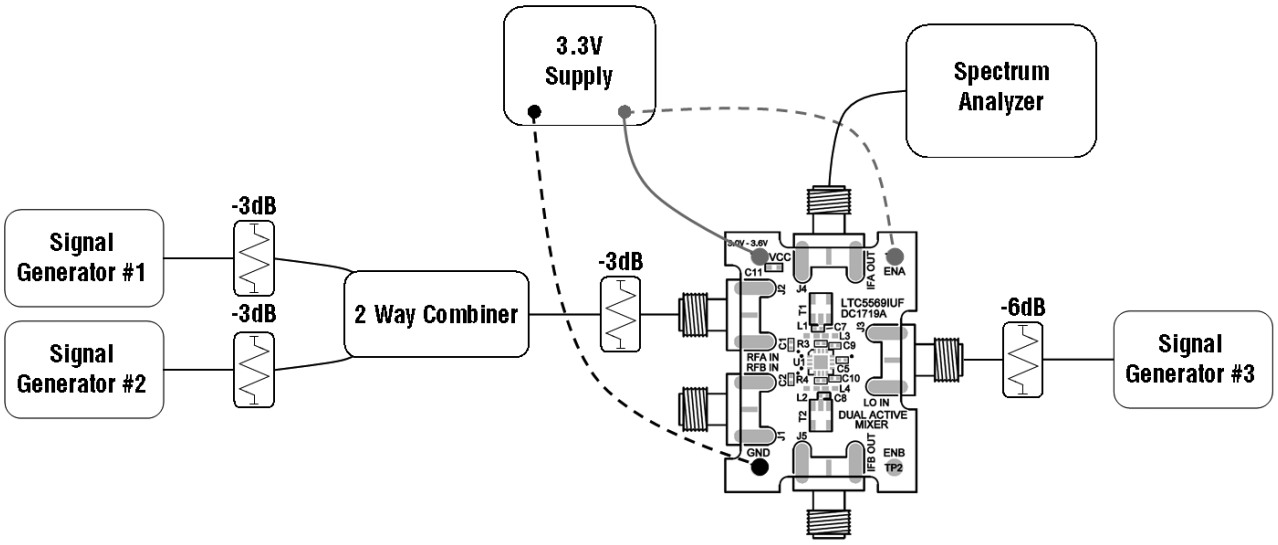

Figure 1. Test Setup for Mixer 2-Tone Measurements

NOTES ON TEST EQUIPMENT AND SETUP

- Use high performance signal generators with low harmonic outputs for 2-tone measurements to avoid distortion. Otherwise, lowpass 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. Attenuator pads may be used on the inputs to the combiner and the RF input port of the LTC5569 mixer, as shown in Figure 1. 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 1.
2. Set the power supply output voltage to 3.3V, and set the current limit to 250mA.
3. Connect the V_{CC} pin to the 3.3V supply. Connect ENA to the 3.3V supply.

   BE SURE TO CONNECT THE V_{CC} PIN *BEFORE* THE ENA PIN TO ENSURE THAT THE PART DOES NOT GET DAMAGED. ALSO, REMOVE POWER FROM ENA PIN *BEFORE* REMOVING POWER FROM THE V_{CC} PIN.
4. Set the LO signal generator to provide a 2140MHz CW signal at about 0dBm to the demo board's LO port.
5. Set the RF signal generators to provide one 1950MHz CW signal and one 1951MHz 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 RFA port. The two tones should be set to about –6dBm each at the mixer's RF input port.
6. Set the spectrum analyzer's center frequency to 190MHz.
7. Perform various measurements (conversion gain, OIP3, LO leakage, etc.).

PARTS LIST

ITEM	QTY	REFERENCE	PART DESCRIPTION	MANUFACTURER/PART NUMBER
1	2	C1, C2	0402 2.7pF ±0.25pF 50V NPO	AVX, 04025A2R7CAT2A
2	1	C5	CAP, 0402 3.9pF ±0.1pF 50V NPO	AVX, 04025A3R9BAT
3	4	C7, C8, C9, C10	CAP, 0402 10nF 10% 25V X7R	AVX, 04023C103KAT
4	1	C11	CAP, 0603 2.2µF 10% 6.3V X5R	AVX, 06036D225KAT
5	5	J1, J2, J3, J4, J5	CONN, BNC, SMA 50Ω EDGE-LANCH	E. F. JOHNSON, 142-0701-851
6	4	L1, L2, L3, L4	0603 180nH 2%	COILCRAFT, 0603HP-R18XGL
7	0	R1, R2, R3, R4	RES, 0402 OPTION	OPTION
8	4	TP1, TP2, TP3, TP4	TURRET	MILL-MAX, 2308-2-00-80-00-00-07-0
9	2	T1, T2	XFMR, WIDEBAND 2MHz TO 500MHz	MINI-CIRCUITS, TC8-1+
10	1	U1	IC, DUAL ACTIVE DOWNCONVERTING MIXER	LINEAR TECHNOLOGY, LTC5569IUF

SCHEMATIC DIAGRAM

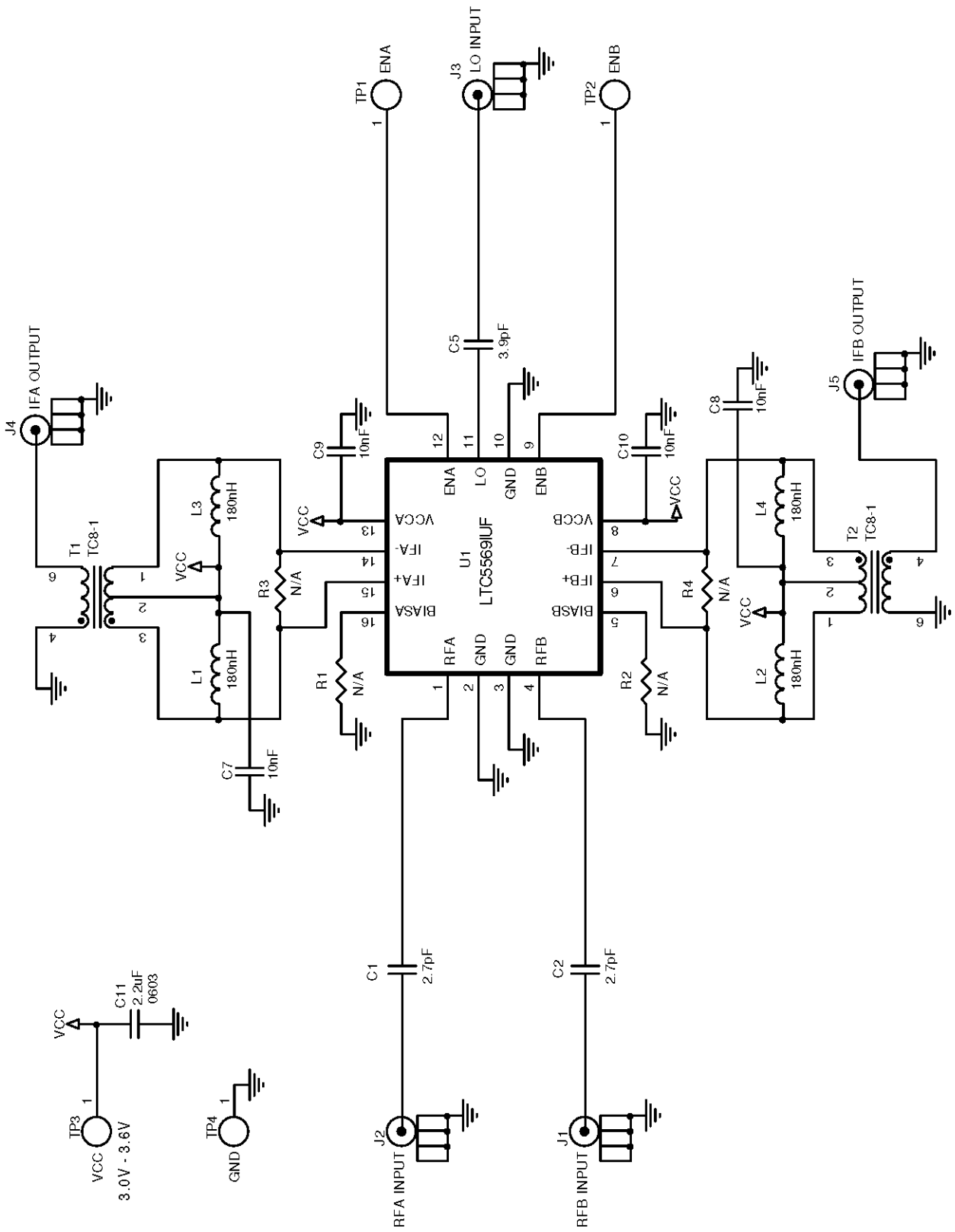

Figure 2. Dual Active Mixer

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

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