LTC5576
3GHz to 8GHz High Linearity Active Upconverting Mixer

DESCRIPTION

Demonstration circuit 2322A is designed for evaluation of the LTC®5576 active upconverting mixer with very wide input bandwidth and low distortion. Its OUT port is optimized for 4GHz to 6GHz applications, but is easily retuned for output frequencies as low as 3GHz, or as high as 8GHz with minor performance degradation. The IN port is optimized for 30MHz to 6GHz operation while the LO port is always 50Ω matched from 1GHz to 8GHz.

The LTC5576 is optimized for 5V operation, but can be used with a 3.3V supply with slightly reduced performance. The enable function allows the part to be easily shut down for further power savings.

ABSOLUTE MAXIMUM RATINGS

Supply Voltage (V_{CC}) 6.0V
Enable Input Voltage (EN) ..... –0.3V to V_{CC} + 0.3V
IADJ Pin Voltage ..... –0.3V to 2.7V
LO Port Power (1GHz to 8GHz) ..... +10dBm
IN Port Power (30MHz to 6GHz) ..... +15dBm
TEMP Input Current 10mA
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 LT5576.

Design files for this circuit board are available at http://www.linear.com/demo/DC2322A

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PROPER TEST SETUP

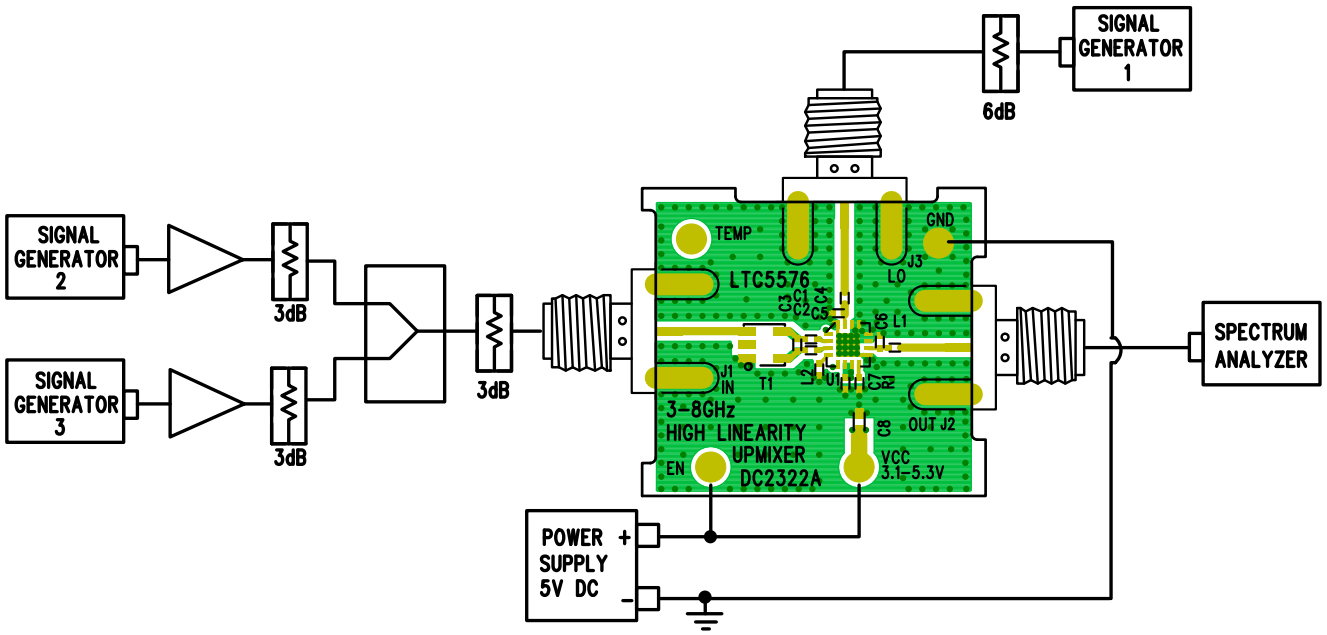


Figure 1. Test Setup for Mixer Two-Tone Measurements

NOTES ON TEST EQUIPMENT AND 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 1.
2. Set the power supply output voltage to 5V, and set the current limit to 150mA.
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 4900MHz CW signal at about 0dBm to the demo board's LO port.
6. Set the RF signal generators to provide one 899MHz CW signal and one 901MHz 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 IN port. The two tones should be set to –10dBm each at the mixer's IN port.
7. Set the spectrum analyzer's center frequency to 5.8GHz.
8. Perform various measurements (Conversion Gain, OIP3, LO leakage, etc.)

PARTS LIST

ITEM	QTY	REFERENCE	PART DESCRIPTION	MANUFACTURER/PART NUMBER
1	2	C1, C2	CAP., 1000pF, C0G, 50V, 5%, 0402	MURATA, GRM1555C1H102JA01
2	0	C3	DNI, 0402	
3	1	C4	CAP., 100pF, C0G, 50V, 5%, 0402	MURATA, GRM1555C1H101JA01
4	1	C5	CAP., 0.3pF, C0G, 50V, ±0.05pF, 0402	AVX, 04021J0R3ZBS
5	1	C6	CAP., 0.2pF, C0G, 50V, ±0.05pF, 0402	AVX, 04021J0R2ZBS
6	1	C7	CAP., 0.01µF, X7R, 50V, 10%, 0402	MURATA, GRM155R71H103KA88
7	1	C8	CAP., 1µF, X7R,10V,10%, 0603	MURATA, GRM188R71A105KA61
8	4	E1-E4	TEST POINT, TURRET, .064 MTG. HOLE	MILL-MAX,2308-2-00-80-00-00-07-0
9	3	J1-J3	CON., SMA, 50Ω, EDGE-LANCH	E.F. JOHNSON, 142-0701-851
10	2	L1, L2	RES., 0Ω, 0402	VISHAY, CRCW04020000Z0ED
11	1	R1	RES., 2.61k, 1/16W, 1%, 0402	VISHAY, CRCW04022K61FKED
12	1	T1	TRANS., 50Ω, 4.5MHz – 3000MHz, TC1-1-13M+	MINI CIRCUITS, TC1-1-13M+
13	1	U1	IC., HIGH DYNAMIC RANGE ACTIVE MIXER	LINEAR TECH., LTC5576IUF

SCHEMATIC DIAGRAM

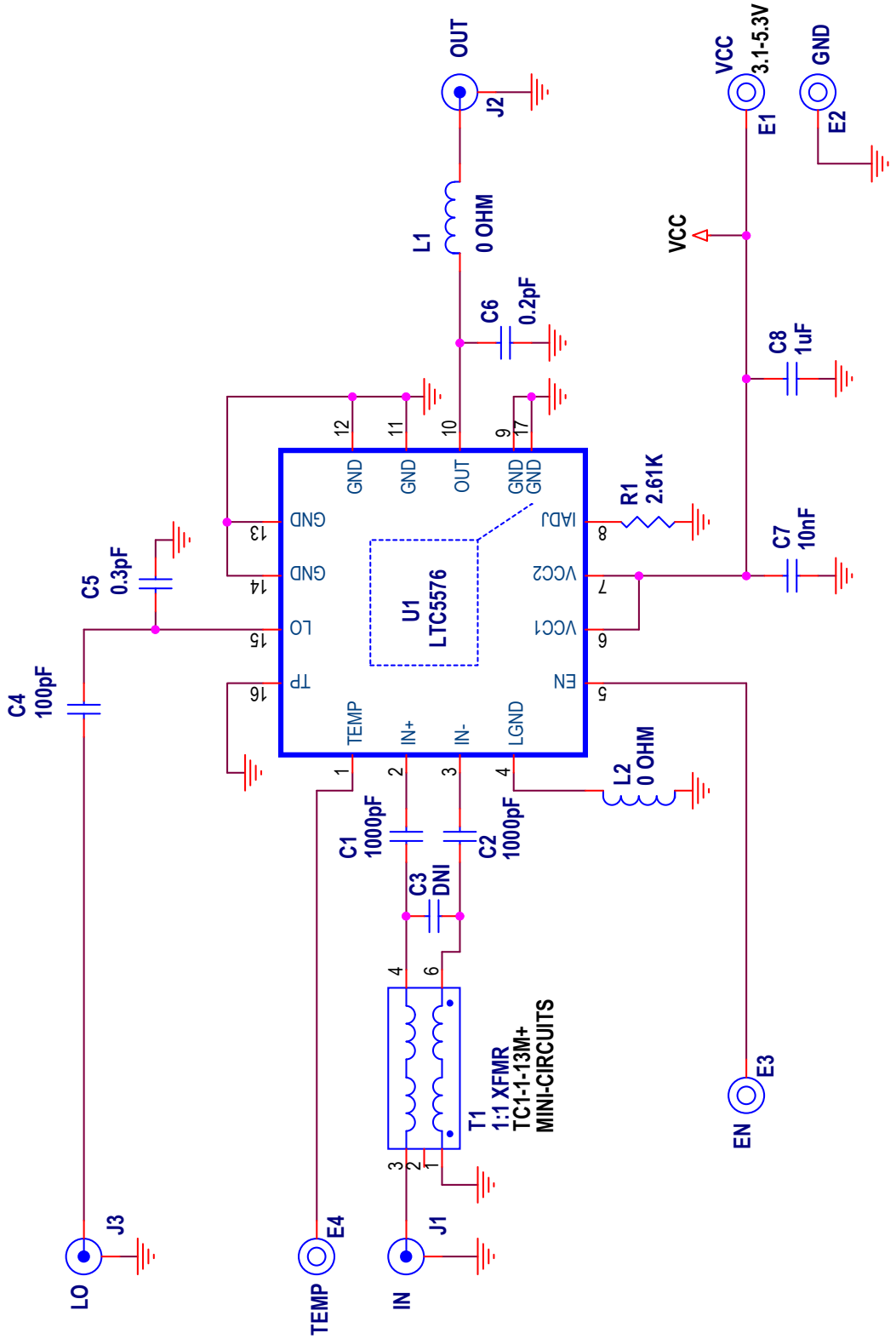


Figure 2: High Linearity Active Upconverting Mixer Schematic

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