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High Signal Level Upconverting Mixer

FEATURES

- Wide RF Output Frequency Range to 3000MHz
- Broadband RF and IF Operation
- +17dBm Typical Input IP3 (at 950MHz)
- +6dBm IF Input for 1dB RF Output Compression
- Integrated LO Buffer: -10dBm Drive Level
- Single-Ended or Differential LO Input
- Double-Balanced Mixer
- Enable Function
- Single 4.0V – 5.25V Supply Voltage Range
- 16-Pin TSSOP Exposed Pad Package

APPLICATIONS

- CATV Downlink Infrastructure
- Wireless Infrastructure
- High Linearity Mixer Applications

DESCRIPTION

The LT[®]5511 mixer is designed to meet the high linearity requirements of cable TV infrastructure downstream transmitters and wireless infrastructure transmit systems. The IC includes a differential LO buffer amplifier driving a double-balanced mixer. The LO, RF and IF ports can be easily matched to a broad range of frequencies for different applications. The high performance capability of the LO buffer allows the use of a single-ended source, thus eliminating the need for an LO balun.

The LT5511 mixer delivers +17dBm typical input 3rd order intercept point at 950MHz, and +15.5dBm IIP3 at 1900MHz, with IF input signal levels of -5dBm. The input 1dB compression point is typically +6dBm.

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TYPICAL APPLICATION

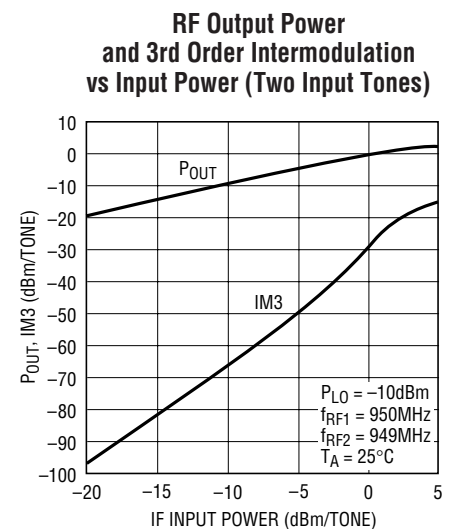
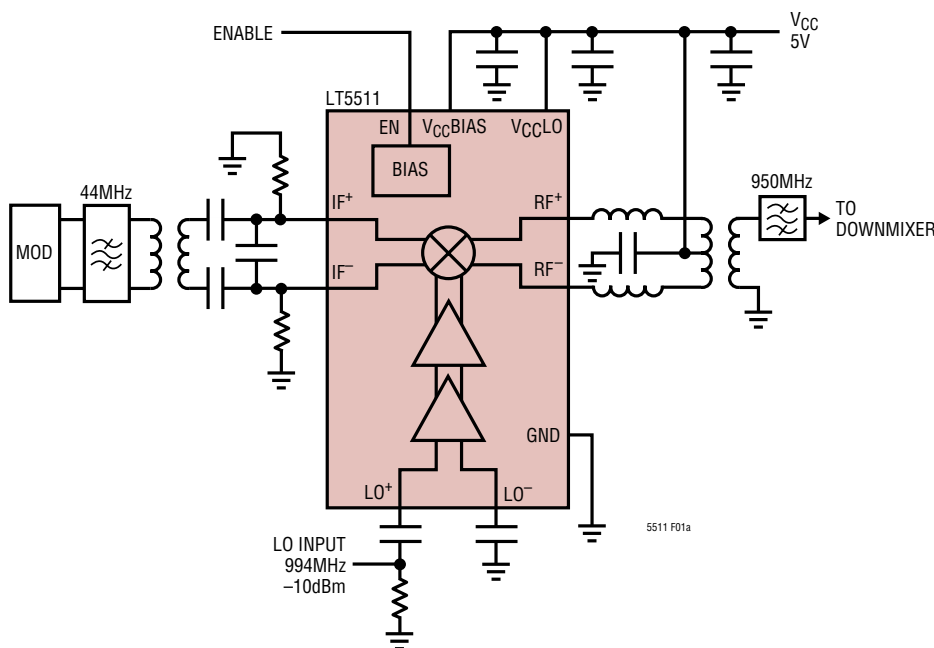


Figure 1. High Signal Level Upmixer for CATV Downlink Infrastructure.

ABSOLUTE MAXIMUM RATINGS

(Note 1)

| | |
|---|--------------------------|
| Supply Voltage | 5.5V |
| Enable Voltage | -0.3V to $V_{CC} + 0.3V$ |
| LO Input Power (Differential) | 10dBm |
| IF Input Power (Differential) | 10dBm |
| IF ⁺ , IF ⁻ DC Currents | 25mA |
| Operating Temperature Range | -40°C to 85°C |
| Storage Temperature Range | -65°C to 150°C |
| Lead Temperature (Soldering, 10sec)..... | 300°C |

PACKAGE/ORDER INFORMATION

| | |
|---|-------------------|
| <p>TOP VIEW</p> <p>FE PACKAGE 16-LEAD PLASTIC TSSOP</p> <p>$T_{JMAX} = 150^{\circ}C$, $\theta_{JA} = 38^{\circ}C/W$ EXPOSED PAD IS GROUND (MUST BE SOLDERED TO PRINTED CIRCUIT BOARD)</p> | ORDER PART NUMBER |
| | LT5511EFE |
| | FE PART MARKING |
| | 5511EFE |

Consult LTC Marketing for parts specified with wider operating temperature ranges.

ELECTRICAL CHARACTERISTICS

| PARAMETER | CONDITIONS | MIN | TYP | MAX | UNITS |
|--|--|-----|------------|-----|-------|
| $V_{CC} = 5V_{DC}$, EN = High, $T_A = 25^{\circ}C$ | | | | | |
| IF Input Frequency Range (Note 6) | | | 1 to 300 | | MHz |
| LO Input Frequency Range (Note 6) | | | 30 to 2700 | | MHz |
| RF Output Frequency Range (Note 6) | | | 10 to 3000 | | MHz |
| 950MHz Application: (Test Circuit Shown in Figure 2) $V_{CC} = 5V_{DC}$, EN = High, $T_A = 25^{\circ}C$, IF Input = 50MHz at -5dBm, LO Input = 1GHz at -10dBm, RF Output Measured at 950MHz, unless otherwise noted. (Notes 2, 3) | | | | | |
| IF Input Return Loss | With External Matching, $Z_0 = 50\Omega$ | | 14 | | dB |
| LO Input Power | | | -15 to -5 | | dBm |
| LO Input Return Loss | With External Matching, $Z_0 = 50\Omega$ | | 14 | | dB |
| RF Output Return Loss | With External Matching, $Z_0 = 50\Omega$ | | 17 | | dB |
| Conversion Gain | | | 0 | | dB |
| LO to RF Leakage | | | -46 | | dBm |
| Input 1dB Compression | | | 5.9 | | dBm |
| Input 3rd Order Intercept | Two-Tone, -5dBm/Tone, $\Delta f = 1MHz$ | | 17 | | dBm |
| Input 2nd Order Intercept | Single-Tone, -5dBm | | 52 | | dBm |
| SSB Noise Figure | | | 15 | | dB |

ELECTRICAL CHARACTERISTICS

| PARAMETER | CONDITIONS | MIN | TYP | MAX | UNITS |
|---|--|-----|-------------|-----|----------|
| 1.9GHz Application: (Test Circuit Shown in Figure 3) $V_{CC} = 5V_{DC}$, EN = High, $T_A = 25^\circ C$, IF Input = 50MHz at $-5dBm$, LO Input = 1.95GHz at $-10dBm$, RF Output Measured at 1900MHz, unless otherwise noted. (Notes 3, 4) | | | | | |
| IF Input Return Loss | With External Matching, $Z_0 = 50\Omega$ | | 14 | | dB |
| LO Input Power | | | -15 to -5 | | dBm |
| LO Input Return Loss | With External Matching, $Z_0 = 50\Omega$ | | 11.5 | | dB |
| RF Output Return Loss | With External Matching, $Z_0 = 50\Omega$ | | 11.5 | | dB |
| Conversion Gain | | | -0.7 | | dB |
| LO to RF Leakage | | | -47 | | dBm |
| Input 1dB Compression | | | 5.2 | | dBm |
| Input 3rd Order Intercept | Two-Tone, $-5dBm/Tone$, $\Delta f = 1MHz$ | | 15.5 | | dBm |
| Input 2nd Order Intercept | Single-Tone, $-5dBm$ | | 51 | | dBm |
| SSB Noise Figure | | | 14 | | dB |
| Power Supply Requirements: $V_{CC} = 5V_{DC}$, EN = High, $T_A = 25^\circ C$, unless otherwise noted. | | | | | |
| Supply Voltage | | | 4.0 to 5.25 | | V_{DC} |
| Supply Current | | | 56 | 65 | mA |
| Shutdown Current (Chip Disabled) | EN = Low | | 1 | 30 | μA |
| Enable Mode Threshold | EN = High | 3 | | | V_{DC} |
| Disable Mode Threshold | EN = Low | | | 0.5 | V_{DC} |
| Turn ON Time (Note 5) | | | 2 | | μs |
| Turn OFF Time (Note 5) | | | 6 | | μs |
| Enable Input Current | EN = 5V | | 1 | | μA |

Note 1: Absolute Maximum Ratings are those values beyond which the life of a device may be impaired.

Note 2: External components on the final test circuit are optimized for operation at $f_{RF} = 950MHz$, $f_{LO} = 1GHz$ and $f_{IF} = 50MHz$ (Figure 2).

Note 3: Specifications over the $-40^\circ C$ to $85^\circ C$ temperature range are assured by design, characterization and correlation with statistical process controls.

Note 4: External components on the final test circuit are optimized for operation at $f_{RF} = 1900MHz$, $f_{LO} = 1.95GHz$ and $f_{IF} = 50MHz$ (Figure 3).

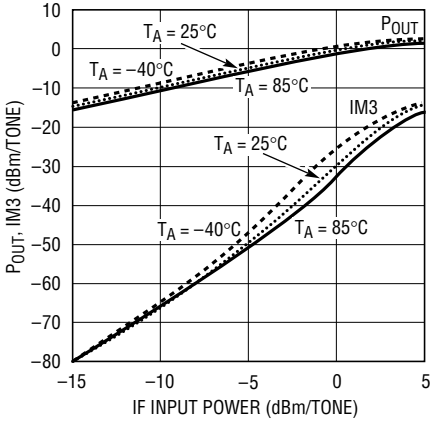
Note 5: Turn On and Turn Off times are based on rise and fall times of RF output envelope from full power to $-40dBm$ with an IF input power of $-5dBm$.

Note 6: Part can be used over a broader range of operating frequencies. Consult factory for applications assistance.

TYPICAL PERFORMANCE CHARACTERISTICS (950MHz Application)

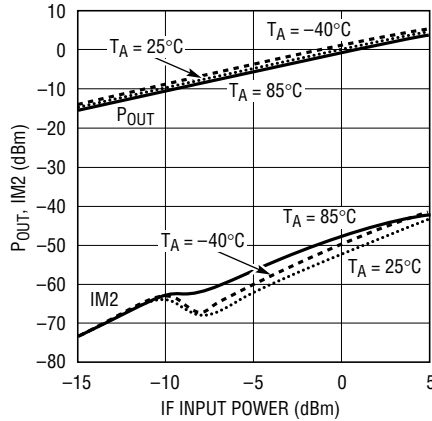
$V_{CC} = 5V_{DC}$, EN = High, $T_A = 25^\circ C$, IF Input = 50MHz at -5dBm, LO Input = 1GHz at -10dBm, RF Output Measured at 950MHz, unless otherwise noted. For 2-Tone Measurements: 2nd IF Input = 51MHz at -5dBm. (Test Circuit Shown in Figure 2).

RF Output Power and 3rd Order Intermodulation vs IF Input Power (Two Input Tones)



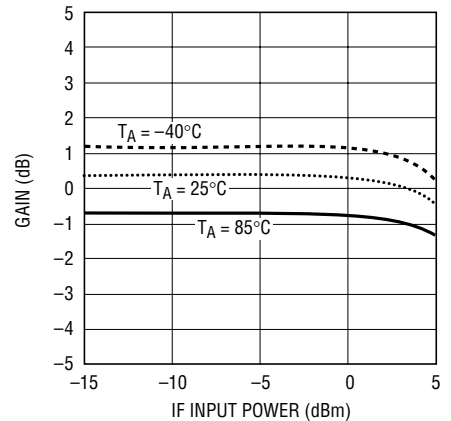
5511 G01

RF Output Power and 2nd Order Intermodulation vs IF Input Power (Single Input Tone)



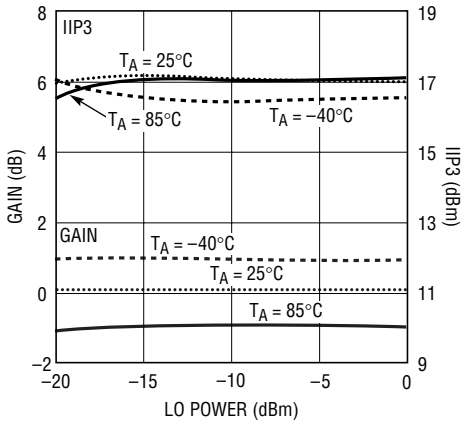
5511 G02

Conversion Gain vs IF Input Power (Single Input Tone)



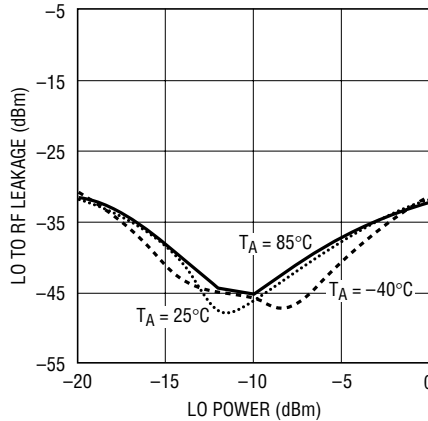
5511 G03

Conversion Gain and IIP3 vs LO Power



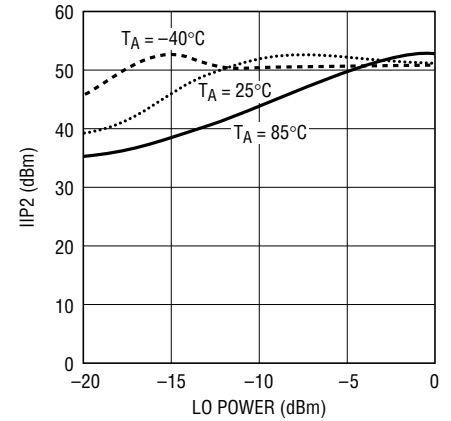
5511 G04

LO to RF Leakage vs LO Power



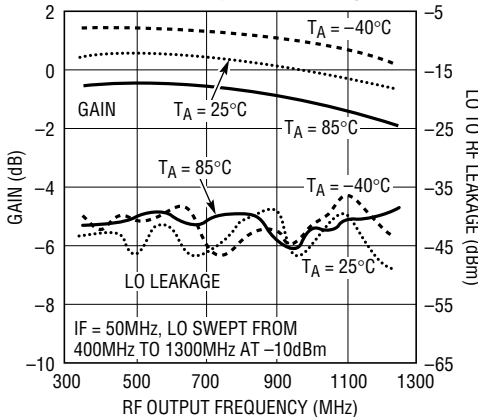
5511 G05

IIP2 vs LO Power



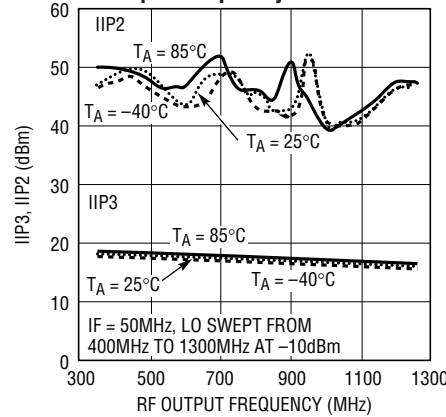
5511 G06

Conversion Gain and LO to RF Leakage vs Output Frequency



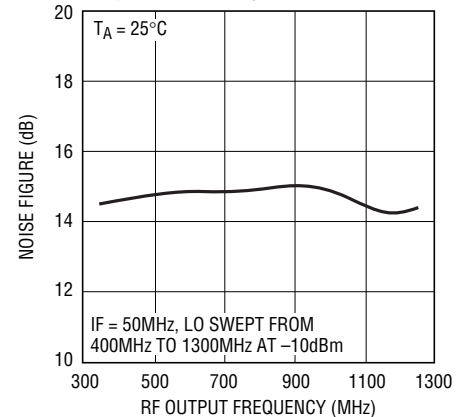
5511 G07

IIP3 and IIP2 vs Output Frequency



5511 G08

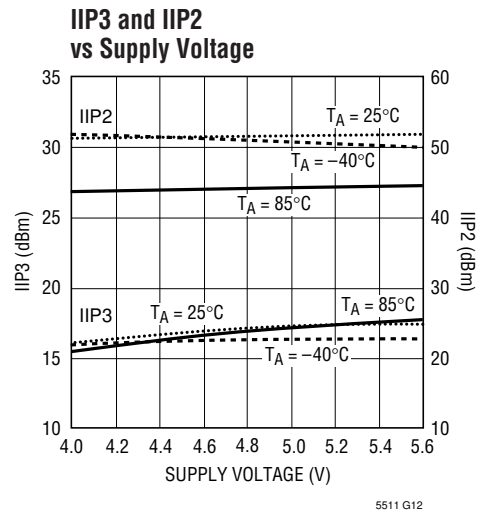
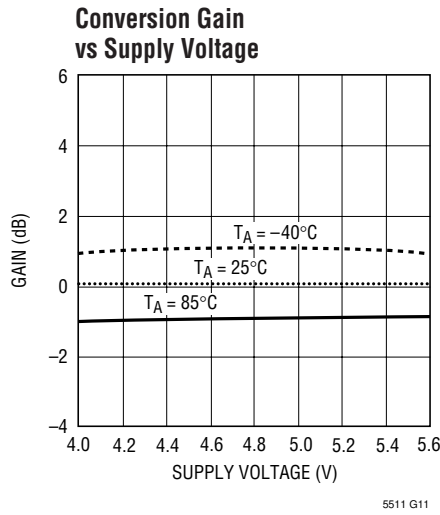
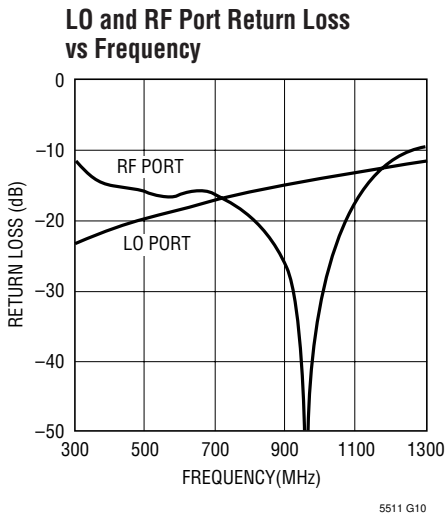
SSB Noise Figure vs Output Frequency



5511 G09

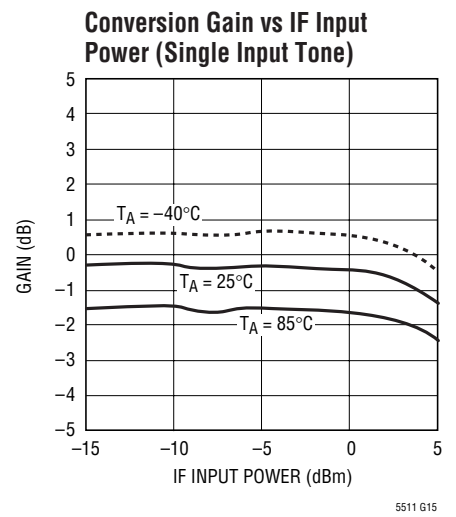
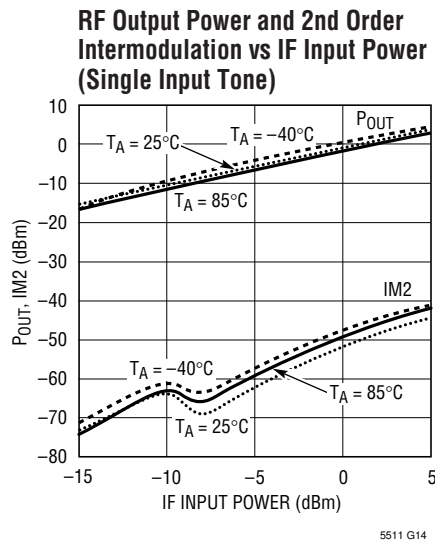
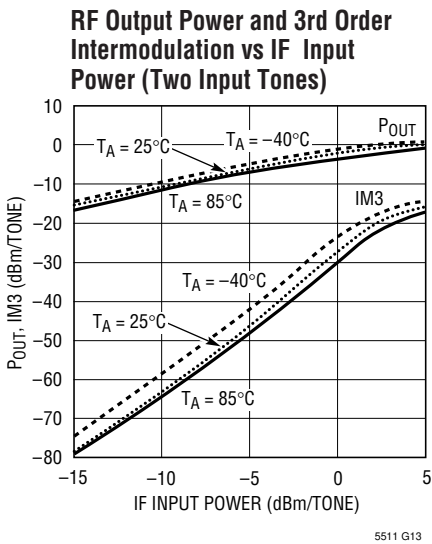
TYPICAL PERFORMANCE CHARACTERISTICS (950MHz Application)

$V_{CC} = 5V_{DC}$, EN = High, $T_A = 25^\circ C$, IF Input = 50MHz at -5dBm, LO Input = 1GHz at -10dBm, RF Output Measured at 950MHz, unless otherwise noted. For 2-Tone Measurements: 2nd IF Input = 51MHz at -5dBm. (Test Circuit Shown in Figure 2).



(1.9GHz Application)

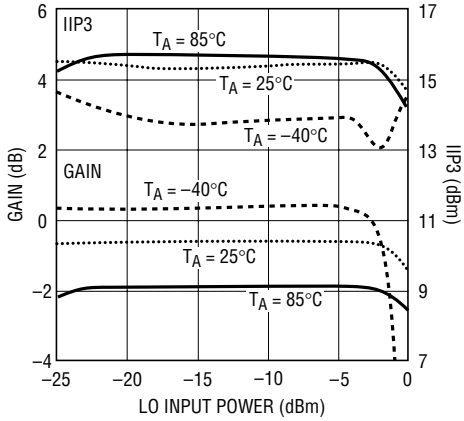
$V_{CC} = 5V_{DC}$, EN = High, $T_A = 25^\circ C$, IF Input = 50MHz at -5dBm, LO Input = 1.95GHz at -10dBm, RF Output Measured at 1900MHz, unless otherwise noted. For 2-Tone Measurements: 2nd IF Input = 51MHz at -5dBm. (Test Circuit Shown in Figure 3).



TYPICAL PERFORMANCE CHARACTERISTICS (1.9GHz Application)

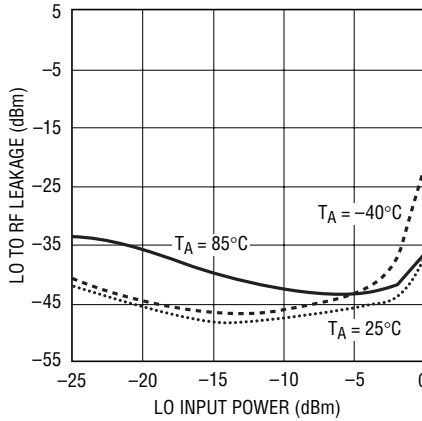
$V_{CC} = 5V_{DC}$, $EN = High$, $T_A = 25^\circ C$, IF Input = 50MHz at -5dBm, LO Input = 1.95GHz at -10dBm. RF Output Measured at 1900MHz, unless otherwise noted. For 2-Tone Measurements: 2nd IF Input = 51MHz at -5dBm. (Test Circuit Shown in Figure 3).

Conversion Gain and IIP3 vs LO Input Power



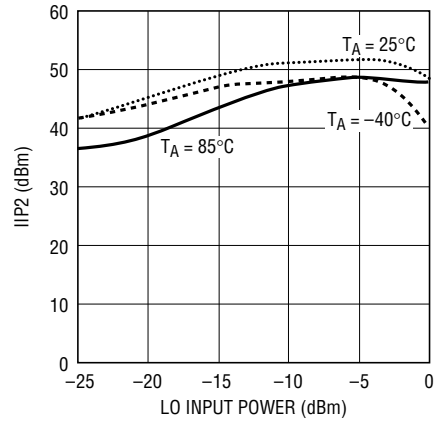
5511 G16

LO to RF Leakage vs LO Input Power



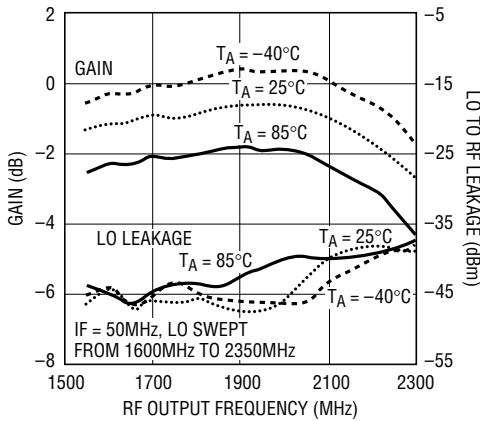
5511 G17

IIP2 vs LO Input Power



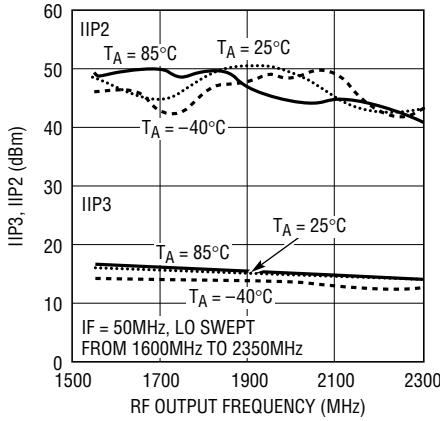
5511 G18

Conversion Gain and LO to RF Leakage vs RF Output Frequency



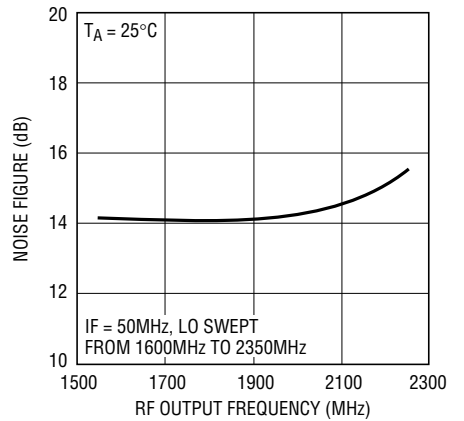
5511 G19

IIP3 and IIP2 vs Output Frequency



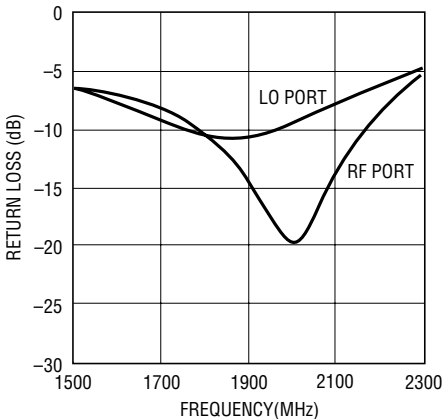
5511 G20

SSB Noise Figure vs Output Frequency



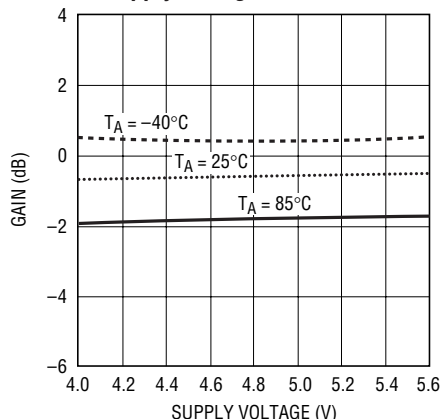
5511 G21

LO and RF Port Return Loss vs Frequency



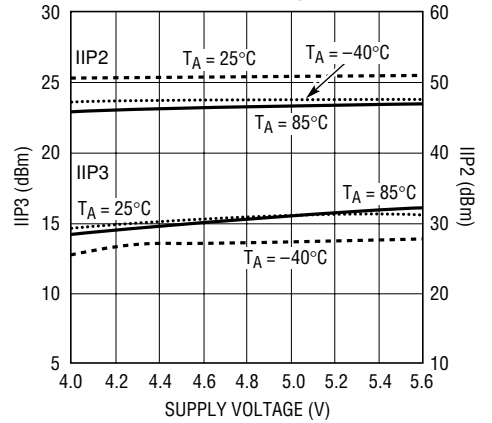
5511 G22

Conversion Gain vs Supply Voltage



5511 G23

IIP3 and IIP2 vs Supply Voltage



5511 G24

TYPICAL PERFORMANCE CHARACTERISTICS

Table 1. Typical S-Parameters for the IF, RF and LO Ports (referenced to 50Ω). $V_{CC} = 5V_{DC}$, EN = High, $T_A = 25^\circ C$. For each Port Measurement, the other Ports are Terminated as Shown in Figure 2.

| Frequency (MHz) | Differential IF Port | | Differential RF Port | | Differential LO Port | | Single LO Port | |
|--------------------|----------------------|-------|----------------------|-------|----------------------|-------|----------------|-------|
| | Mag. | Ang. | Mag. | Ang. | Mag. | Ang. | Mag. | Ang. |
| 10 | 0.65 | 179.2 | – | – | – | – | – | – |
| 50 | 0.648 | 176.2 | 0.644 | –0.8 | 0.814 | –0.6 | 0.788 | –1.0 |
| 100 | 0.645 | 173.3 | 0.643 | –2.0 | 0.836 | –0.8 | 0.808 | –1.5 |
| 150 | 0.627 | 170.6 | 0.642 | –3.0 | 0.804 | –1.0 | 0.780 | –2.1 |
| 200 | 0.626 | 168.5 | 0.642 | –4.0 | 0.823 | –1.6 | 0.789 | –3.0 |
| 250 | 0.619 | 166.7 | 0.639 | –5.0 | 0.803 | –1.8 | 0.779 | –3.7 |
| 300 | 0.617 | 165.0 | 0.635 | –6.1 | 0.815 | –2.5 | 0.773 | –4.7 |
| 350 | 0.609 | 164.1 | 0.632 | –7.2 | 0.806 | –2.9 | 0.777 | –5.9 |
| 400 | 0.597 | 162.7 | 0.629 | –8.3 | 0.804 | –3.8 | 0.760 | –7.2 |
| 450 | 0.586 | 162.2 | 0.626 | –9.5 | 0.805 | –4.4 | 0.776 | –8.9 |
| 500 | 0.567 | 161.3 | 0.623 | –10.7 | 0.798 | –5.2 | 0.749 | –10.0 |
| 600 | 0.527 | 160.6 | 0.622 | –13.0 | 0.797 | –6.6 | 0.746 | –12.9 |
| 700 | 0.484 | 160.0 | 0.620 | –15.4 | 0.799 | –7.8 | 0.750 | –15.7 |
| 800 | 0.438 | 160.6 | 0.617 | –18.0 | 0.804 | –8.9 | 0.753 | –18.0 |
| 900 | 0.451 | 167.8 | 0.615 | –20.3 | 0.808 | –9.6 | 0.756 | –19.5 |
| 1000 | 0.554 | 162.3 | 0.613 | –22.4 | 0.814 | –10.2 | 0.763 | –20.5 |
| 1100 | 0.581 | 150.0 | 0.611 | –24.6 | 0.817 | –10.7 | 0.765 | –21.6 |
| 1200 | 0.574 | 141.4 | 0.607 | –26.6 | 0.813 | –11.2 | 0.755 | –22.7 |
| 1300 | 0.567 | 137.2 | 0.602 | –28.6 | 0.811 | –12.2 | 0.751 | –24.7 |
| 1400 | 0.557 | 135.1 | 0.594 | –30.7 | 0.805 | –13.7 | 0.743 | –27.7 |
| 1500 | 0.540 | 135.6 | 0.585 | –32.9 | 0.795 | –15.6 | 0.731 | –31.2 |
| 1600 | 0.520 | 136.5 | 0.576 | –35.3 | 0.790 | –18.0 | 0.727 | –35.3 |
| 1700 | 0.495 | 136.9 | 0.567 | –37.8 | 0.789 | –20.6 | 0.726 | –39.3 |
| 1800 | 0.462 | 135.3 | 0.557 | –40.7 | 0.791 | –22.9 | 0.728 | –42.6 |
| 1900 | 0.432 | 131.0 | 0.548 | –43.8 | 0.793 | –24.8 | 0.728 | –45.0 |
| 2000 | 0.405 | 124.4 | 0.540 | –47.0 | 0.795 | –26.2 | 0.728 | –46.7 |
| 2100 | 0.390 | 116.1 | 0.529 | –50.2 | 0.796 | –27.3 | 0.724 | –48.0 |
| 2200 | 0.366 | 108.1 | 0.521 | –53.9 | 0.796 | –28.4 | 0.718 | –49.8 |
| 2300 | 0.310 | 110.2 | 0.513 | –57.4 | 0.790 | –29.8 | 0.703 | –52.4 |
| 2400 | 0.417 | 127.5 | 0.503 | –61.4 | 0.782 | –31.8 | 0.687 | –56.5 |
| 2500 | 0.489 | 121.5 | 0.495 | –65.3 | 0.765 | –34.8 | 0.668 | –62.7 |
| 2600 | 0.491 | 122.0 | 0.486 | –69.0 | 0.748 | –38.8 | 0.656 | –70.5 |
| 2700 | 0.472 | 126.7 | 0.479 | –73.2 | 0.731 | –43.3 | 0.652 | –78.7 |
| 2800 | 0.445 | 132.0 | 0.472 | –76.8 | 0.721 | –48.3 | 0.663 | –85.9 |
| 2900 | 0.412 | 138.9 | 0.468 | –80.4 | 0.720 | –52.5 | 0.680 | –91.2 |
| 3000 | 0.375 | 142.4 | 0.463 | –83.1 | 0.722 | –55.9 | 0.701 | –94.2 |

PIN FUNCTIONS

LO⁻, LO⁺ (Pins 1, 16): Differential Inputs for the Local Oscillator Signal. They can also be driven single-ended by connecting one to an RF ground through a DC blocking capacitor. For single-ended drive, use LO⁺ for the signal input, as this results in less interference from unwanted coupling of the LO signal to other pins. These pins are internally biased to about 1.4V; thus, DC blocking capacitors are required. An impedance transformation is required to match the LO input to 50Ω (or 75Ω). At frequencies below 1.5GHz this input can be resistively matched with a shunt resistor.

NC (Pins 2, 9): Not Connected Internally. Connect to ground for improved isolation between pins.

GND (Pins 3, 6, 8, 11, 14): Internal Grounds. These pins are used to improve isolation and are not intended as DC or RF grounds for the IC. Connect these pins to ground for best performance.

IF⁺, IF⁻ (Pins 4, 5): Differential Inputs for the IF Signal. A differential signal must be applied to these pins. These pins are internally biased to about 1.2V, and thus require DC blocking capacitors. These pins should be DC isolated from each other for best LO suppression. Imbalances in amplitude or phase between these two signals will degrade the linearity of the mixer.

V_{CC}BIAS (Pin 7): Supply Voltage for the LO Buffer Bias and Enable Circuits. This pin should be connected to V_{CC} and have appropriate RF bypass capacitors. Care should be taken to ensure that RF signal leakage to the V_{CC} line is minimized.

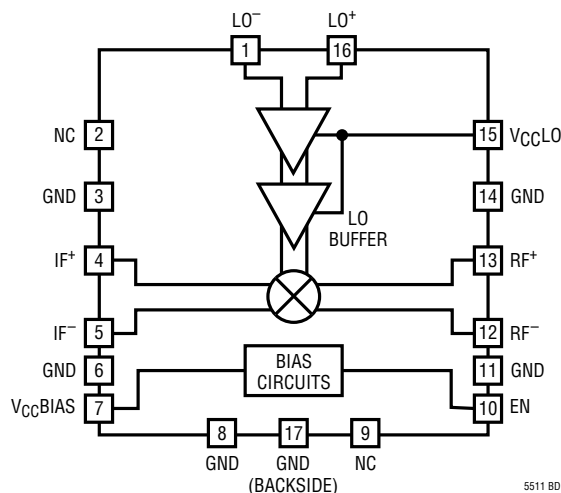
EN (Pin 10): Chip Enable/Disable. When the applied voltage is greater than 3V, the IC is enabled. When the applied voltage is less than 0.5V, the IC is disabled and the DC current drops to about 1μA. Under no conditions should the voltage on this pin exceed V_{CC} + 0.3V, even at power on.

RF⁻, RF⁺ (Pins 12, 13): Differential Outputs for the RF Output Signal. An impedance transformation may be required to match the outputs. These pins are also used to connect the mixer to the DC supply through impedance-matching inductors, RF chokes or transformer center-tap. Care should be taken to ensure that the RF signal leakage to V_{CC}LO and V_{CC}BIAS is minimized.

V_{CC}LO (Pin 15): Supply Voltage for the LO Buffer Amplifier. This pin should be connected to V_{CC} and have appropriate RF bypass capacitors. Care should be taken to ensure that RF signal leakage to the V_{CC} line is minimized.

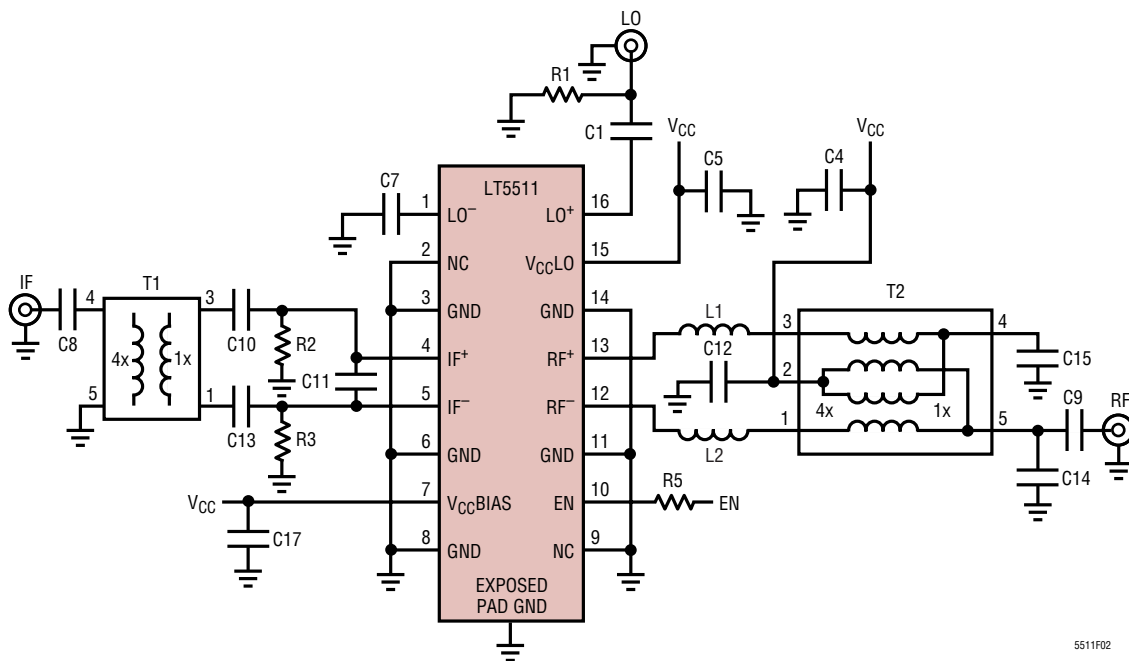
GROUND (Backside Contact) (Pin 17): DC and RF Ground Return for the Entire IC. This contact must be connected to a low impedance ground plane for proper operation.

BLOCK DIAGRAM



5511 BD

TEST CIRCUIT

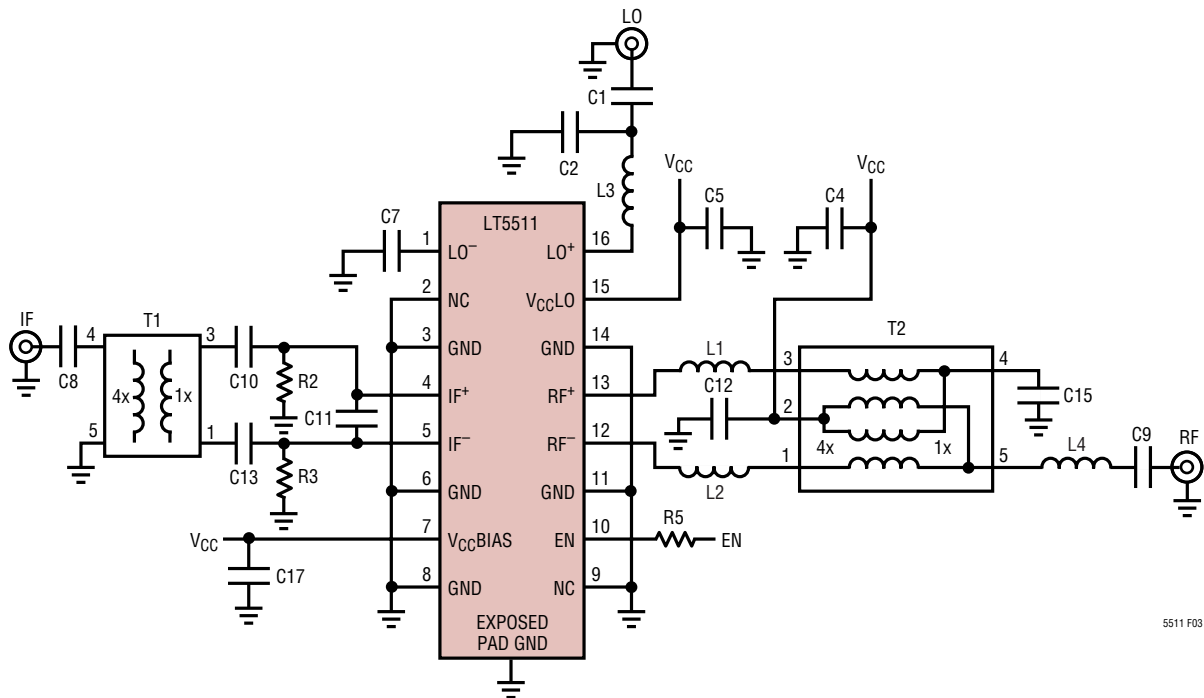


5511F02

| Component | Value | Comments |
|------------------|-----------|----------------------|
| C1, C9, C11, C15 | 22pF | 0402 |
| C5, C7, C17 | 100pF | 0402 |
| C4 | 0.1μF | 0402 |
| C8 | 220pF | 0402 |
| C10, C12, C13 | 1000pF | 0402 |
| C14 | 1.5pF | 0402 |
| L1, L2 | 6.8nH | 0402 |
| R1 | 62Ω | 0402 |
| R2, R3 | 75Ω, 0.1% | 0603 |
| R5 | 10kΩ | 0402 |
| T1 | 4:1 | Coilcraft TTWB-4-A |
| T2 | 4:1 | M/A-Com ETC1.6-4-2-3 |

Figure 2. Test Circuit and Evaluation Board Schematic for 950MHz Application.

TEST CIRCUIT



5511 F03

| Component | Value | Comments |
|------------------|-----------|----------------------|
| C1, C9, C11, C15 | 22pF | 0402 |
| C5, C7, C17 | 100pF | 0402 |
| C4 | 0.1μF | 0402 |
| C8 | 220pF | 0402 |
| C10, C12, C13 | 1000pF | 0402 |
| C2 | 1.2pF | 0402 |
| L3 | 6.8nH | 0402 |
| L1, L2 | 4.7nH | 0402 |
| L4 | 1.8nH | 0402 |
| R2, R3 | 75Ω, 0.1% | 0603 |
| R5 | 10kΩ | 0402 |
| T1 | 4:1 | Coilcraft TTWB-4-A |
| T2 | 4:1 | M/A-Com ETC1.6-4-2-3 |

Figure 3. Test Circuit and Evaluation Board Schematic for 1.9GHz Application.

APPLICATIONS INFORMATION

The LT5511 consists of a double-balanced mixer driven by a high-performance, differential, limiting LO buffer. The mixer has been optimized for high linearity and high signal level operation. The LT5511 is intended for applications with LO frequencies of 0.4GHz to 2.7GHz and IF input frequencies from 10MHz to 300MHz, but can be used at other frequencies with excellent results. The LT5511 can be used in applications using either a low side or high side LO.

LO Input Port

The LO buffer on the LT5511 consists of differential high speed amplifiers and limiters that are designed to drive the mixer quad to achieve high linearity and performance at high IF input signal levels. The LO⁺ and LO⁻ pins are the differential inputs to the LO buffer. Though the LO signal can be applied differentially, the LO buffer performs well with only one input driven, thus eliminating the need for a balun. In this case, a capacitor should be connected between the unused LO input pin and ground. The LO pins are biased internally to about 1.4V, and thus must be DC isolated from the external LO signal source.

The LO input should be matched to 50Ω. The impedance match can be accomplished through the use of a reactive impedance matching network. However, for lower LO frequencies (below about 1.5GHz), an easier approach is to use a shunt 62Ω resistor to resistively match the port. (The resistor must be DC isolated from the LO input pin). This method is broadband and requires LO power levels of only -10dBm. At higher frequencies, a better match can be realized with reactive components. Transmission lines and parasitics should be considered when designing the matching circuits. Typical S-parameter data for the LO input is included in Table 1 to facilitate the design of the matching network.

IF Input Port

The IF⁺ and IF⁻ pins are the differential inputs to the mixer. These inputs drive the emitters of the switching transistors, and thus have a low impedance. The DC current through these transistors is set by external resistors from each IF pin to ground. The typical internal voltage on the emitters is 1.2V; thus, the current through each IF pin is approximately:

$$I_{IF} = 1.2/R_{IF}$$

R_{IF} is the value of the external resistors to ground. Best performance is obtained when the IF inputs are perfectly balanced and 0.1% tolerance resistors are recommended here. The LT5511 has been characterized with 75Ω resistors on each of the IF inputs.

The IF signal to the mixer must be differential. To realize this, an RF balun transformer or lumped element balun can be used. The RF transformer is recommended, as it is easier to realize broadband operation, and also does not have the component sensitivity issues of a lumped element balun.

The differential input impedance of the IF input is approximately 12.5Ω; therefore, a 4:1 impedance transformation is required to match to 50Ω. Selecting a transformer with this impedance ratio will reduce the amount of additional components required, as the full impedance transformation is realized by the transformer. DC-isolating transformers or transmission-line transformers can be used, as could lumped element transformation networks. Because the IF ports are internally biased, they must be DC isolated from the IF source. Additionally, IF⁺ and IF⁻ must be DC isolated from each other in order to maintain good LO suppression.

APPLICATIONS INFORMATION

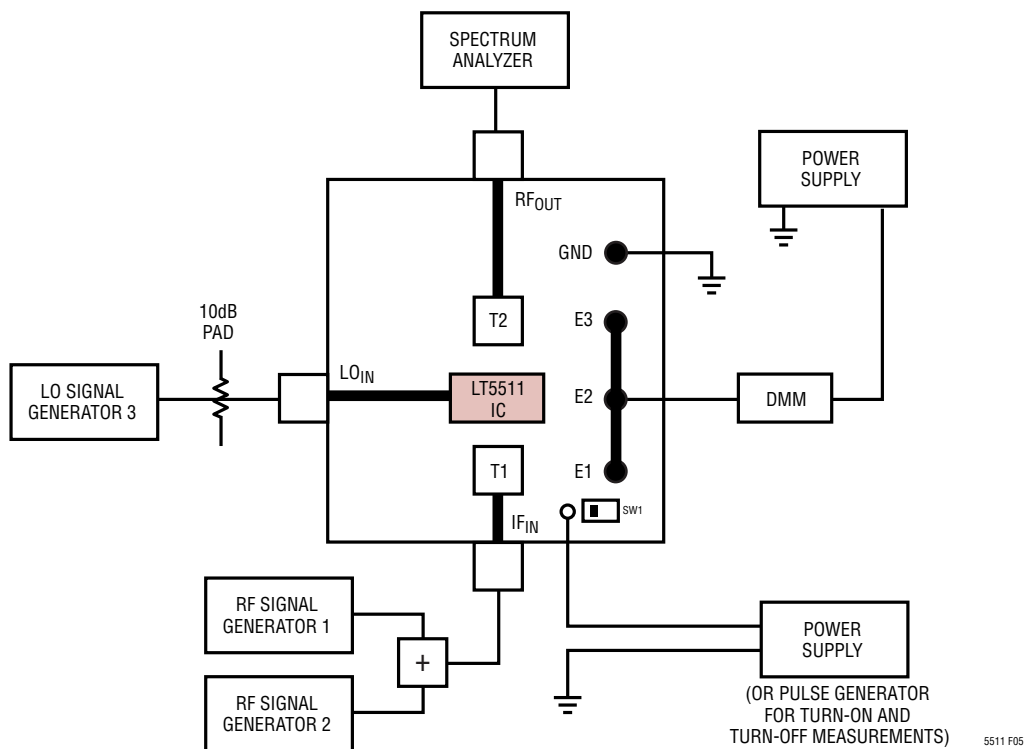
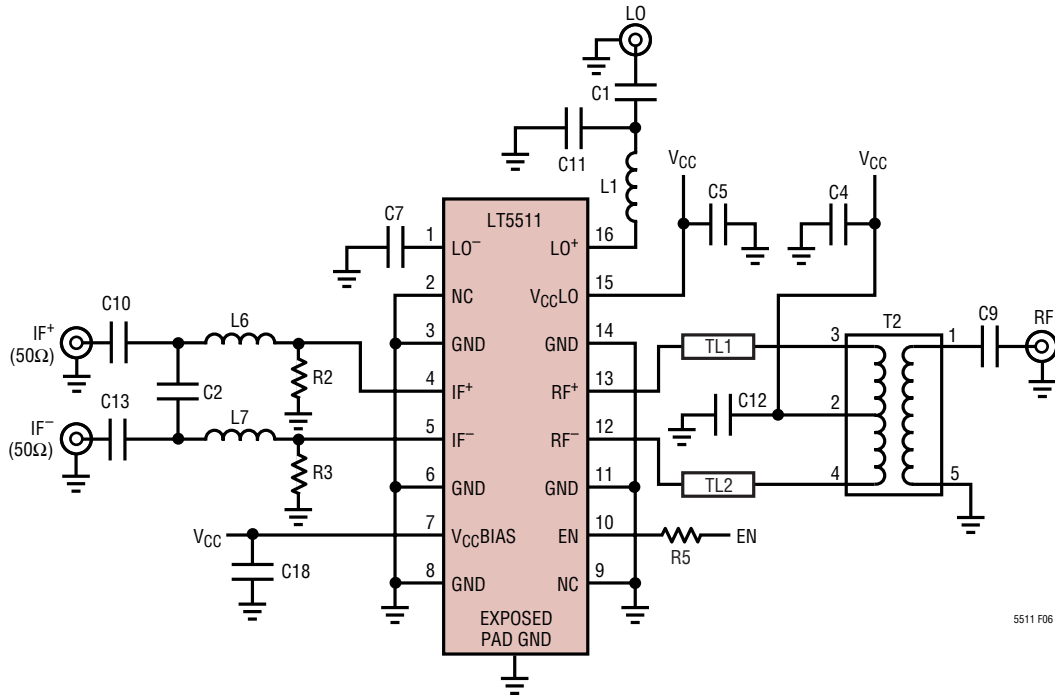


Figure 5. Test Set-Up for Mixer Measurements

TYPICAL APPLICATIONS



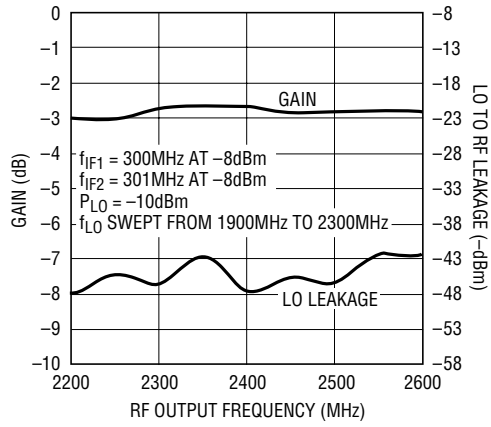
5511 F06

| Component | Value | Comments |
|---------------------------|----------------------|-----------------------|
| C1, C9 | 22pF | 0402 |
| C5, C7, C18 | 100pF | 0402 |
| C4 | 0.1μF | 0402 |
| C2 | 12pF | 0402 |
| C10, C12, C13 | 1000pF | 0402 |
| C11 | 1pF | 0402 |
| L1 | 5.2nH | 0402 |
| L6, L7 | 5.6nH | 0402 |
| R2, R3 | 75Ω, 0.1% | 0603 |
| R5 | 10kΩ | 0402 |
| T2 | 1:1 | MURATA LDB15C500A2400 |
| Transmission Lines | | |
| TL1, TL2 | Z ₀ = 80Ω | L = 16° AT 2.4GHz |

Figure 6. Test Circuit Schematic for 2.4GHz RF Application with 300MHz IF Input Frequency

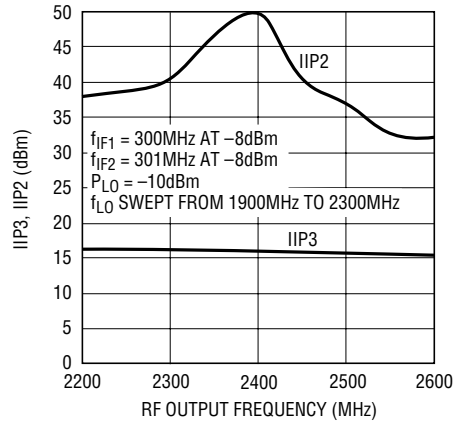
TYPICAL APPLICATIONS

Conversion Gain and LO to RF Leakage vs Output Frequency (Figure 6)



5511 F06a

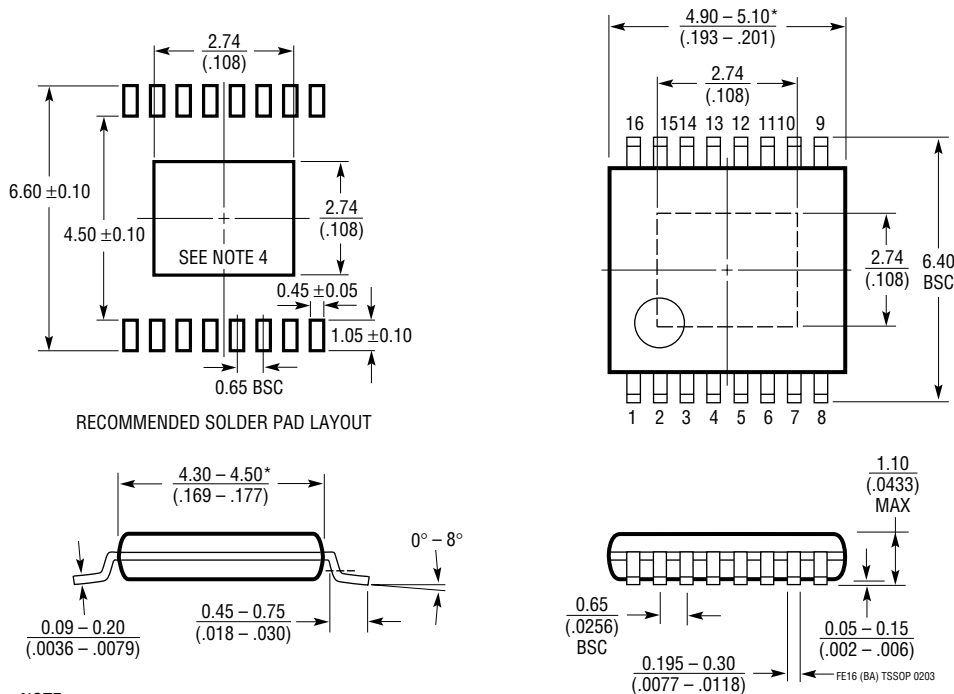
IIP3 and IIP2 vs Output Frequency (Figure 6)



5511 F06a

PACKAGE DESCRIPTION

FE Package
16-Lead Plastic TSSOP (4.4mm)
 (Reference LTC DWG # 05-08-1663)
Exposed Pad Variation BA



- NOTE:
 1. CONTROLLING DIMENSION: MILLIMETERS
 2. DIMENSIONS ARE IN $\frac{\text{MILLIMETERS}}{(\text{INCHES})}$
 3. DRAWING NOT TO SCALE
 4. RECOMMENDED MINIMUM PCB METAL SIZE FOR EXPOSED PAD ATTACHMENT
 *DIMENSIONS DO NOT INCLUDE MOLD FLASH. MOLD FLASH SHALL NOT EXCEED 0.150mm (.006") PER SIDE

RELATED PARTS

| PART NUMBER | DESCRIPTION | COMMENTS |
|-----------------------|---|---|
| LT5500 | 1.8GHz to 2.7GHz Receiver-Front End | 1.8V to 5.25V Supply, Dual-Gain LNA, Mixer, LO Buffer |
| LT5502 | 400MHz Quadrature IF Demodulator with RSSI | 1.8V to 5.25V Supply, 70MHz to 400MHz IF, 84dB Limiting Gain, 90db RSSI Range |
| LT5503 | 1.2GHz to 2.7GHz Direct IQ Modulator and Upconverting Mixer | 1.8V to 5.25V Supply, Four-Step RF Power Control, 120MHz Modulation Bandwidth |
| LT5504 | 800MHz to 2.7GHz Measuring Receiver | 80dB Dynamic Range, Temperature Compensated, 2.7V to 5.5V Supply |
| LTC [®] 5505 | RF Power Detectors with >40dB Dynamic Range | 300MHz to 3GHz, Temperature Compensated, 2.7V to 6V Supply |
| LT5506 | 500MHz Quadrature Demodulator with VGA | 1.8V to 5.25V Supply, -4dB to 57dB Linear Power Gain |
| LT5507 | 100kHz to 1GHz RF Power Detector | 48dB Dynamic Range, Temperature Compensated, 2.7V to 6V Supply |
| LTC5508 | 300MHz to 7GHz RF Power Detector | >40dB Dynamic Range, SC70 Package |
| LT5512 | High Signal Level Down Converting Mixer | Up to 3GHz, 20dBm IIP3, Integrated LO Buffer |