

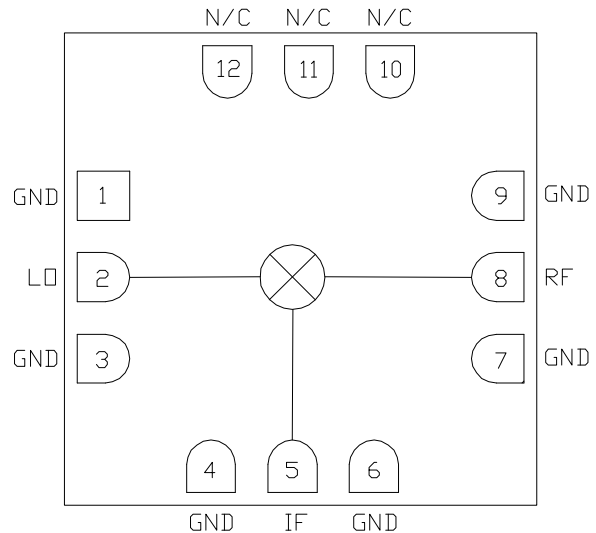
Features

- ▶ Low conversion loss
- ▶ High isolation
- ▶ Wide IF bandwidth
- ▶ Passive double balanced topology
- ▶ Pb-free RoHs compliant 3x3 mm SMT package

Description

The CMD177C3 is a general purpose double balanced mixer in a leadless surface mount package that can be used for up- and downconverting applications between 6 and 14 GHz. The CMD177C3 has very high isolation to both the RF and IF ports due to the optimized balun structures, and can operate with an LO drive level as low as +9 dBm. The CMD177C3 can easily be configured as an image reject mixer or single sideband modulator with external hybrids and power splitters.

Functional Block Diagram



Electrical Performance - IF = 100 MHz, LO = +13 dBm, T_A = 25 °C, F = 10 GHz

| Parameter | Min | Typ | Max | Units |
|--------------------------|--------|-----|-----|-------|
| Frequency Range, RF & LO | 6 - 14 | | | GHz |
| Frequency Range, IF | DC | | 5 | GHz |
| Conversion Loss | | 6.5 | | dB |
| LO to RF Isolation | | 43 | | dB |
| LO to IF Isolation | | 37 | | dB |
| RF to IF Isolation | | 22 | | dB |
| Input P1dB | | 9.5 | | dBm |

Unless otherwise noted, all measurements performed as a downconverter, IF = 100 MHz

ver 1.6 0616



CMD177C3

6-14 GHz Fundamental Mixer

Specifications

Absolute Maximum Ratings

| Parameter | Rating |
|-----------------------|---------------|
| RF / IF Input Power | +25 dBm |
| LO Drive | +25 dBm |
| Operating Temperature | -40 to 85 °C |
| Storage Temperature | -55 to 150 °C |

Operation of this device outside the maximum ratings may cause permanent damage.

Electrical Specifications - IF = 100 MHz, LO = +13 dBm, T_A = 25 °C

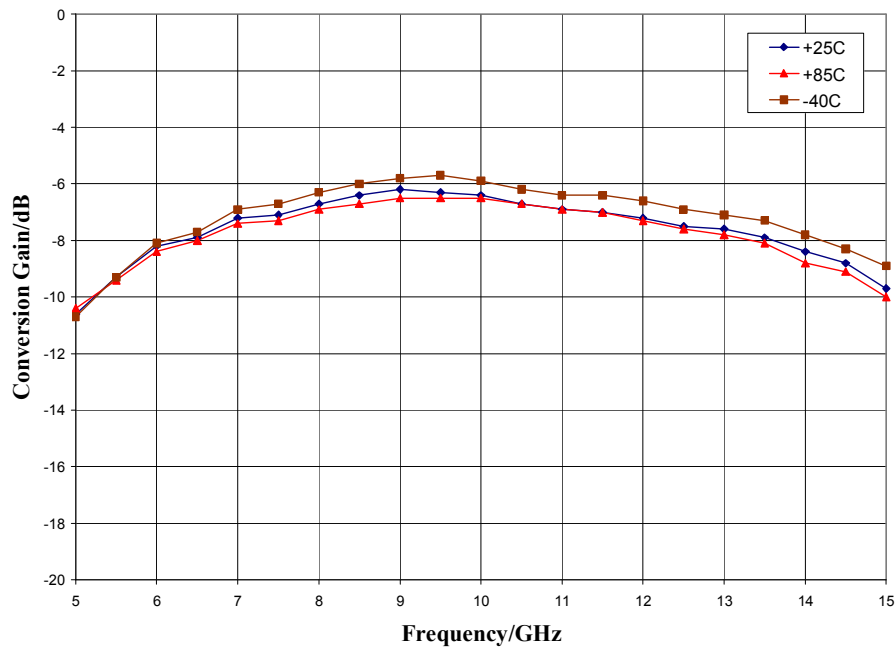
| Parameter | Min | Typ | Max | Min | Typ | Max | Units |
|--------------------------|--------|-----|-----|--------|-----|-----|-------|
| Frequency Range, RF & LO | 8 - 12 | | | 6 - 14 | | | GHz |
| Frequency Range, IF | DC | | 5 | DC | | 5 | GHz |
| Conversion Loss | | 6.5 | 8 | | 7 | 10 | dB |
| Noise Figure (SSB) | | 6.5 | 8 | | 7 | 10 | dB |
| LO to RF Isolation | 37 | 43 | | 34 | 43 | | dB |
| LO to IF Isolation | 28 | 37 | | 28 | 37 | | dB |
| RF to IF Isolation | 15 | 22 | | 12 | 22 | | dB |
| Input P1dB | | 9.5 | | | 9.5 | | dBm |
| Input IP3 | | 16 | | | 16 | | dBm |

Unless otherwise noted, all measurements performed as a downconverter, IF = 100 MHz

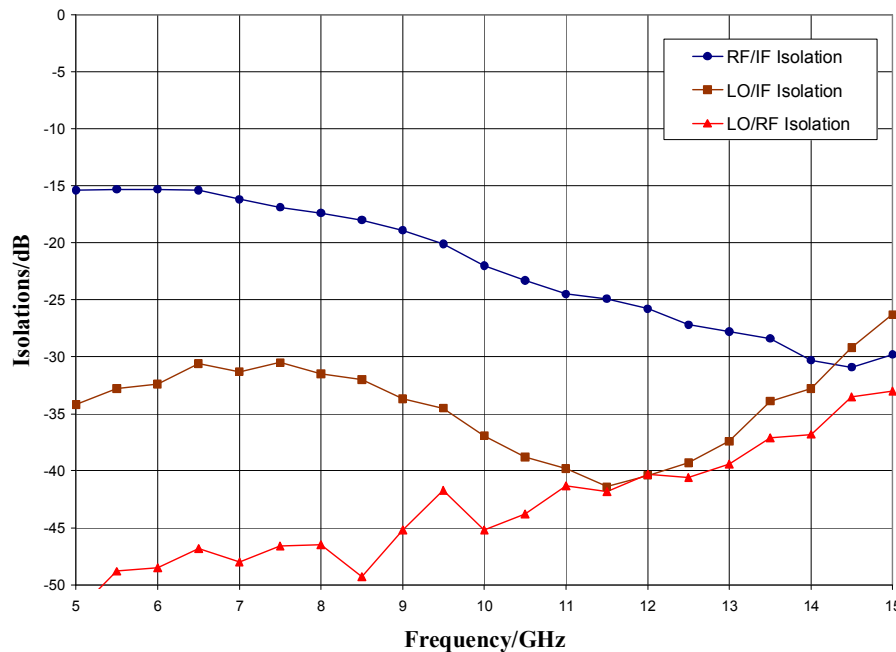
ver 1.6 0616

Typical Performance

Conversion Gain vs. Temperature, LO = +13 dBm, IF = 100 MHz USB



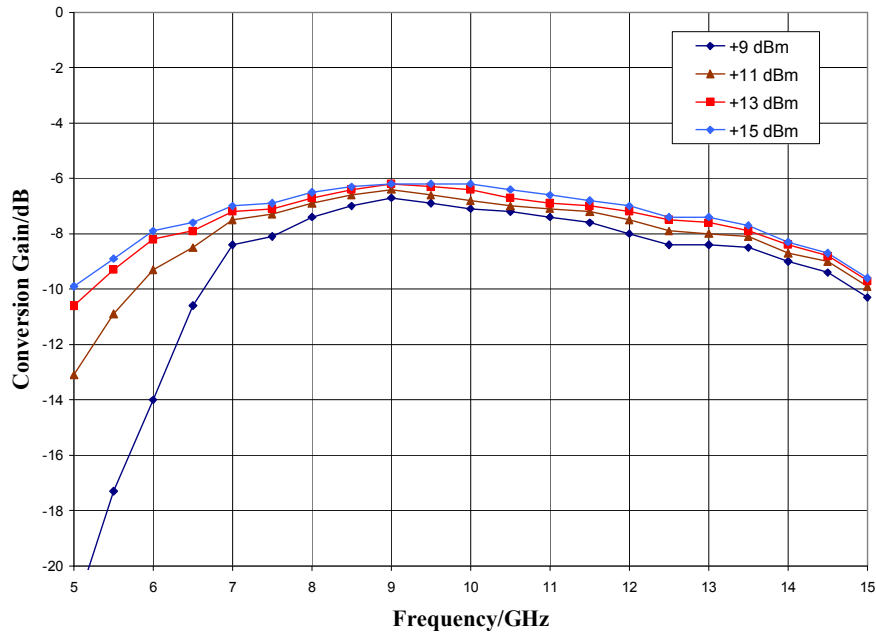
Isolation, LO = +13 dBm



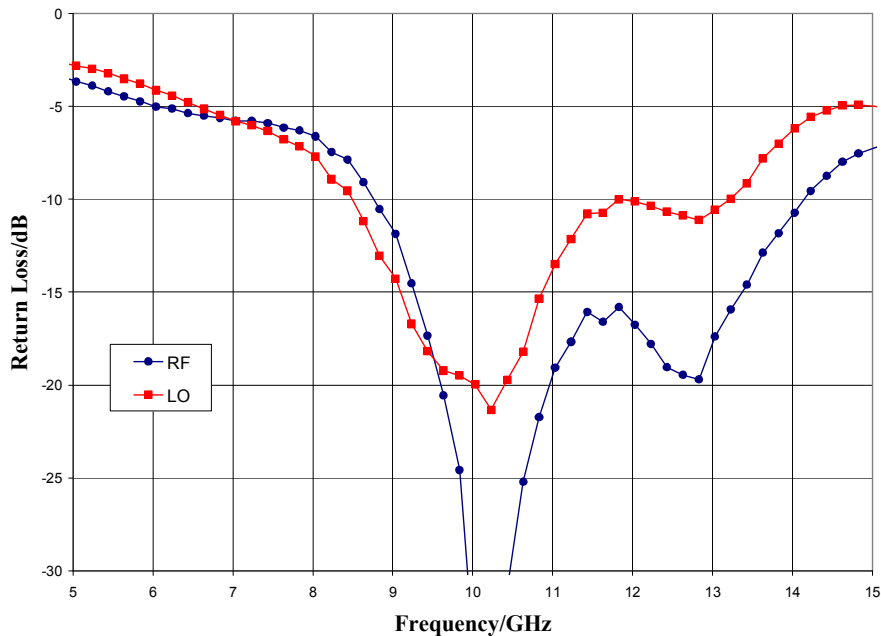
ver 1.6 0616

Typical Performance

Conversion Gain vs. LO Drive, IF = 100 MHz USB



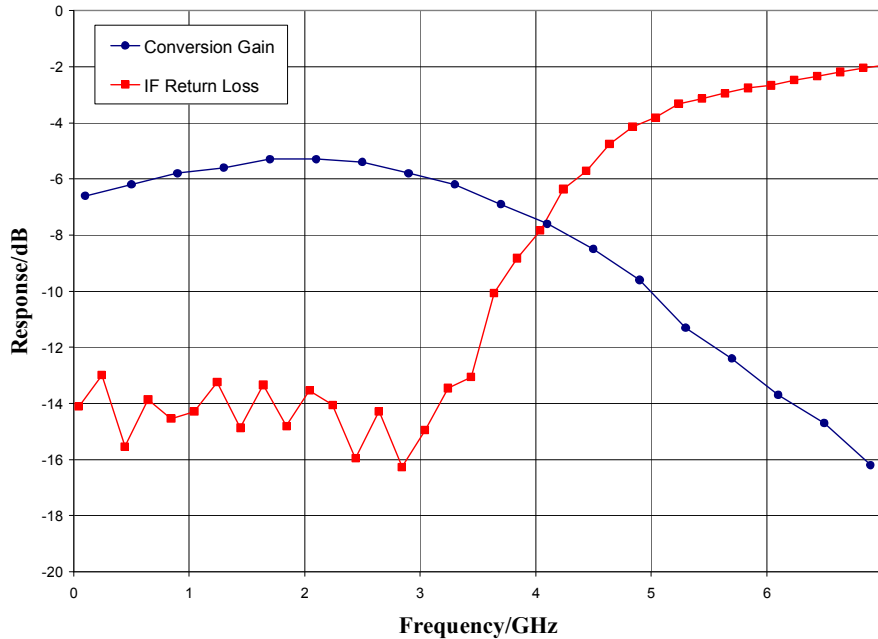
Return Loss, LO = + 13 dBm



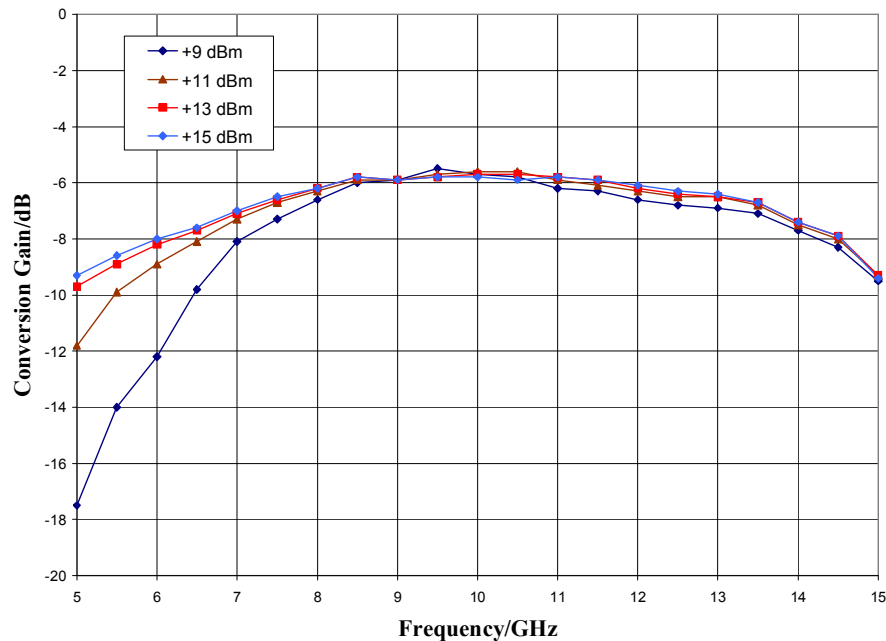
ver 1.6 0616

Typical Performance

IF Bandwidth, LO = +13 dBm



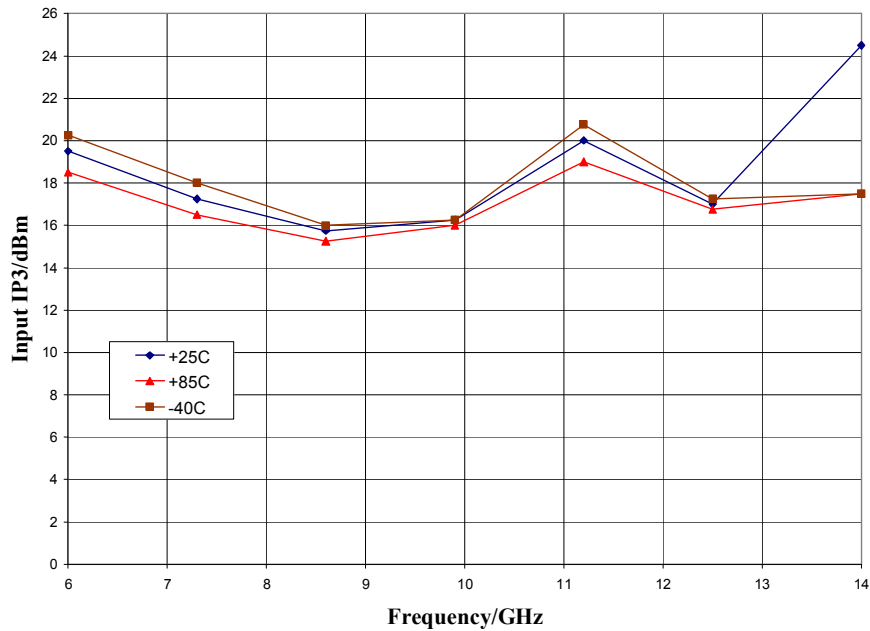
Upconverter Performance, Conversion Gain vs. LO Drive, IF input = 100 MHz



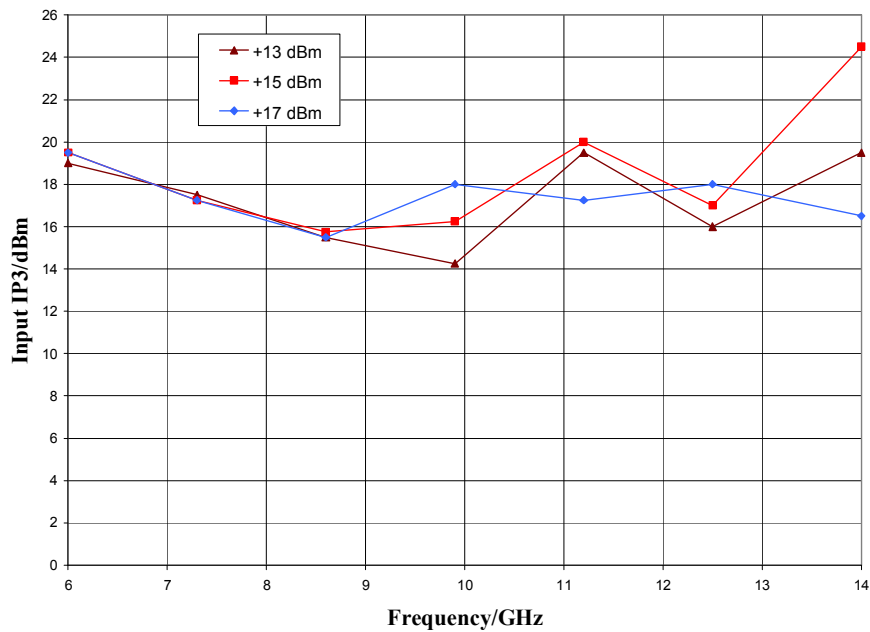
ver 1.6 0616

Typical Performance

Input IP3 vs. Temperature, LO = +15 dBm, IF = 100 MHz



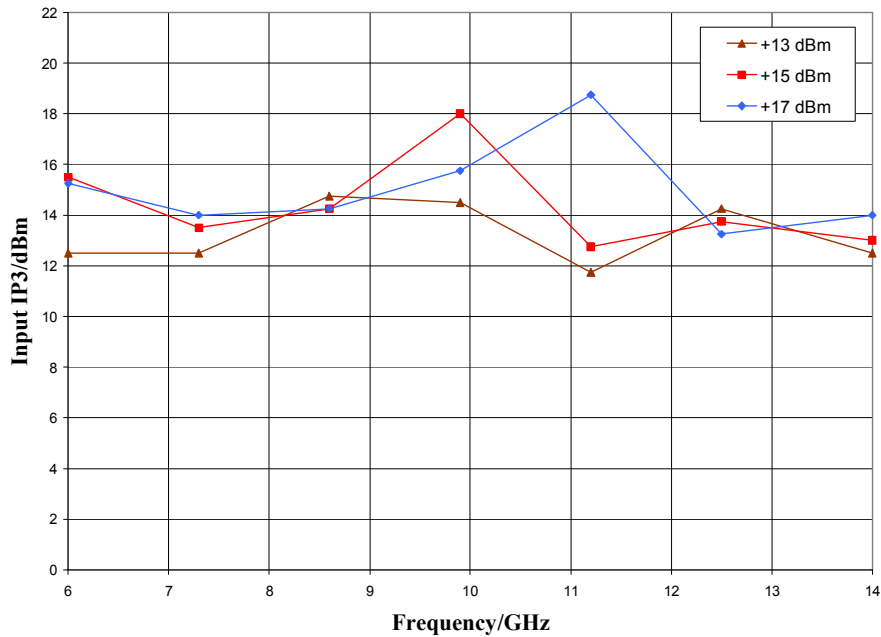
Input IP3 vs. LO Drive, IF = 100 MHz



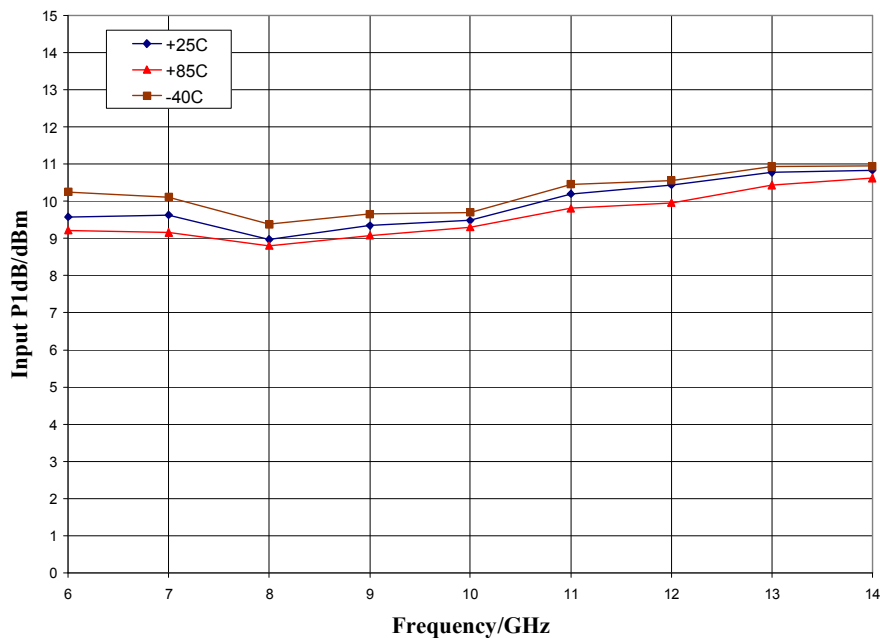
ver 1.6 0616

Typical Performance

Upconverter Performance, Input IP3 vs. LO Drive, IF = 100 MHz



Input P1dB vs. Temperature, LO = +13 dBm, IF = 100 MHz USB



ver 1.6 0616

Typical Performance

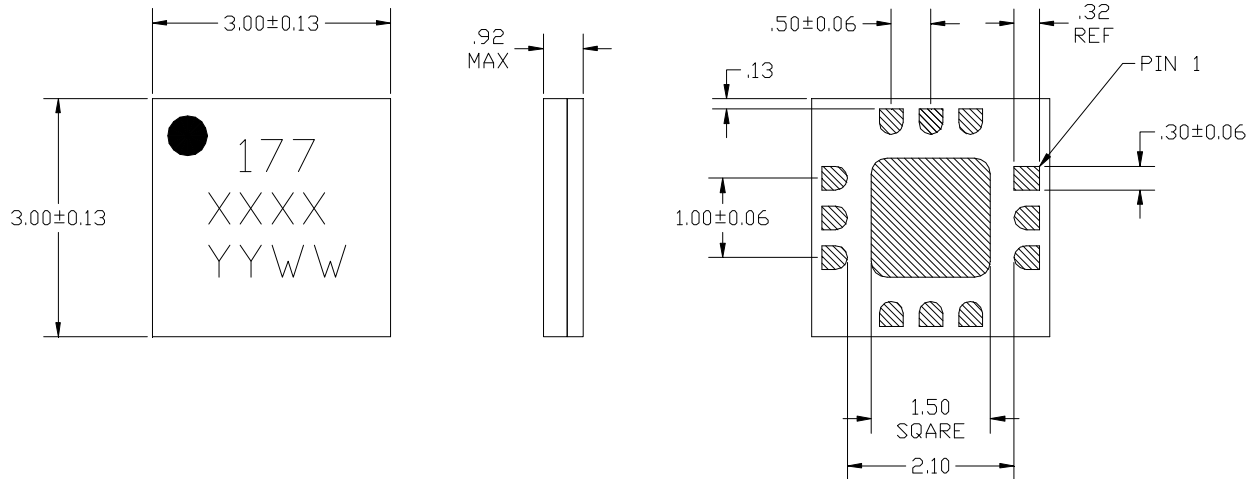
MxN Spurious Outputs

| mRF | nLO | | | | |
|-----|------|------|------|------|------|
| | 0 | 1 | 2 | 3 | 4 |
| 0 | xx | 6.5 | 33.5 | 30.5 | 29.5 |
| 1 | 17.5 | 0 | 37.5 | 38.5 | 57.5 |
| 2 | >75 | 69.5 | 66.5 | 66.5 | > 75 |
| 3 | > 75 | > 75 | > 75 | 62.5 | > 75 |
| 4 | > 75 | > 75 | > 75 | > 75 | > 75 |

RF = 10.1 GHz @ -10 dBm
 LO = 10.0 GHz @ +13 dBm
 All values in dBc below the IF output power level (1RF - 1LO)

Mechanical Information

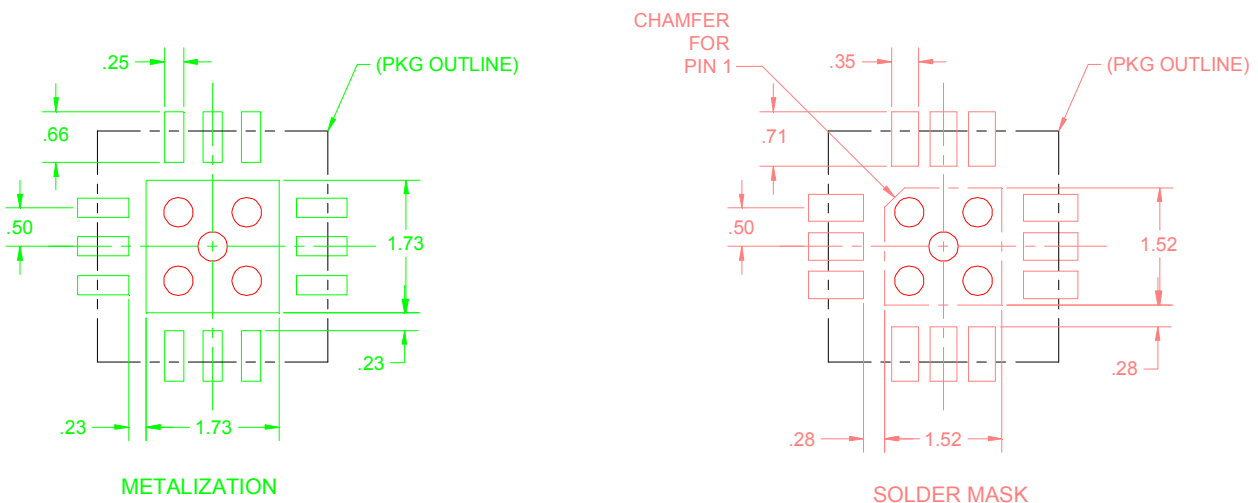
Package Information and Dimensions



NOTES:

1. DIMENSIONS ARE IN MILLIMETERS
2. MATERIAL: BLACK ALUMINA
3. LEAD FINISH: 30-80 MICROINCHES GOLD OVER 50 MICROINCHES NICKEL.
4. ALTERNATE PIN #1 IDENTIFIER IS SINGLE SQUARE PAD.

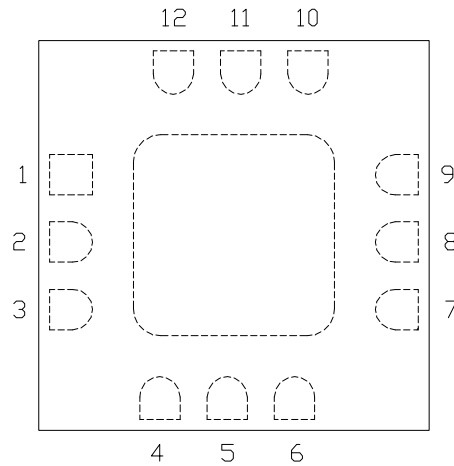
Recommended PCB Land Pattern




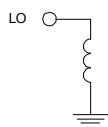
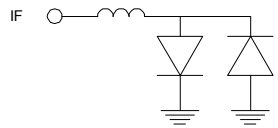
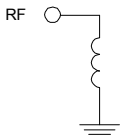
ver 1.6 0616

Pin Description

Pin Diagram



Functional Description

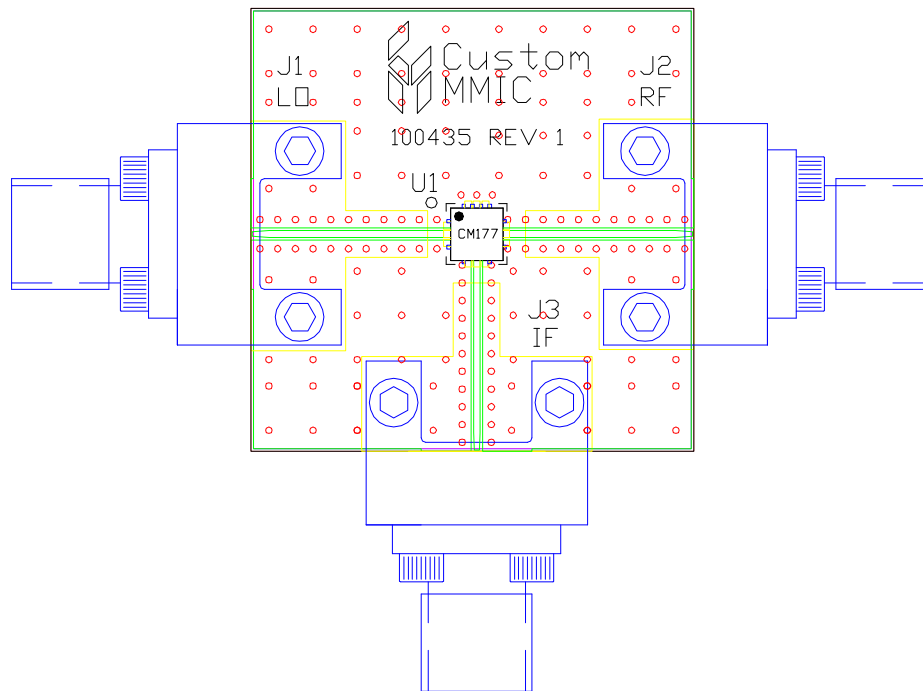
| Pin | Function | Description | Schematic |
|----------------------------|----------|--|---|
| 1,3,4,6,7,9 and die paddle | Ground | Connect to RF / DC ground. |  |
| 2 | LO | This pin is DC coupled and matched to 50 ohms. |  |
| 5 | IF | This pin is DC coupled. For applications not requiring operation to DC, this port should be DC blocked externally using a series capacitor whose value has been chosen to pass the necessary IF frequency range. For operation to DC, this pin must not source or sink more than 16 mA of current or part non-function or part failure may result. |  |
| 8 | RF | This pin is DC coupled and matched to 50 ohms. |  |
| 10-12 | N/C | No connection required. These pins may be connected to RF/DC ground | |

ver 1.6 0616

Applications Information

Evaluation Board

The circuit board shown has been developed for optimized assembly at Custom MMIC. A sufficient number of via holes should be used to connect the top and bottom ground planes. As surface mount processes vary, careful process development is recommended.



Bill of Material

| Designator | Value | Description |
|------------|-------|----------------------------|
| J1 - J3 | | SMA End Launch Connector |
| U1 | | CMD177C3 Fundamental Mixer |
| PCB | | 100435 Evaluation PCB |

GaAs MMIC devices are susceptible to damage from Electrostatic Discharge. Proper precautions should be observed during handling, assembly and test.

ver 1.6 0616