

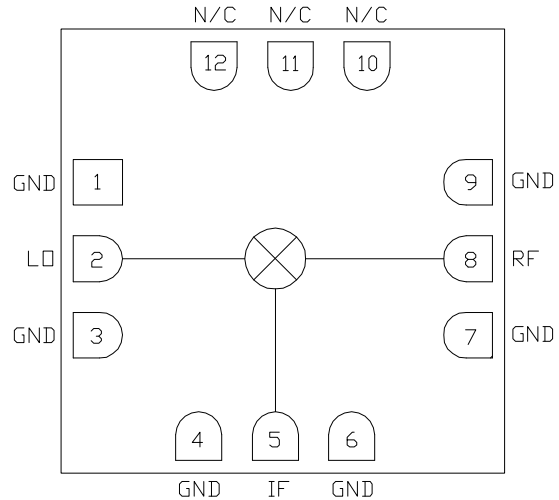
Features

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

Description

The CMD180C3 is a general purpose double balanced mixer in a leadless surface mount package that can be used for up- and downconverting applications between 20 and 32 GHz. The CMD180C3 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 CMD180C3 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 = 26 GHz

| Parameter | Min | Typ | Max | Units |
|--------------------------|---------|-----|-----|-------|
| Frequency Range, RF & LO | 20 - 32 | | | GHz |
| Frequency Range, IF | DC | | 10 | GHz |
| Conversion Loss | | 7 | | dB |
| LO to RF Isolation | | 36 | | dB |
| LO to IF Isolation | | 36 | | dB |
| RF to IF Isolation | | 26 | | dB |
| Input P1dB | | 10 | | dBm |

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



CMD180C3

20-32 GHz Fundamental Mixer

Specifications

Absolute Maximum Ratings

| Parameter | Rating |
|--------------------------------------|---------------|
| RF / IF Input Power | +21 dBm |
| LO Drive | +21 dBm |
| Operating Temperature | -40 to 85 °C |
| Storage Temperature | -55 to 150 °C |
| Thermal Resistance, Θ_{JC} | 651.2 °C / W |
| Power Dissipation, P _{diss} | 99.8 mW |

Exceeding any one or combination of the maximum ratings may cause permanent damage to the device.

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

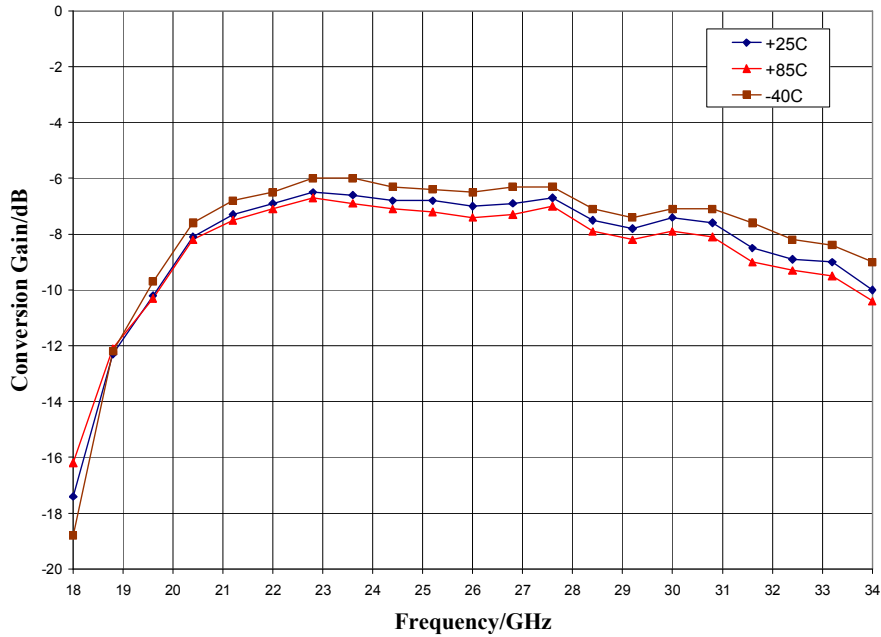
| Parameter | Min | Typ | Max | Min | Typ | Max | Units |
|--------------------------|---------|-----|-----|---------|-----|-----|-------|
| Frequency Range, RF & LO | 22 - 28 | | | 20 - 32 | | | GHz |
| Frequency Range, IF | DC | | 10 | DC | | 10 | GHz |
| Conversion Loss | | 7 | 9 | | 7 | 11 | dB |
| Noise Figure (SSB) | | 7 | 9 | | 7 | 11 | dB |
| LO to RF Isolation | 31 | 36 | | 27 | 36 | | dB |
| LO to IF Isolation | 30 | 38 | | 27 | 38 | | dB |
| RF to IF Isolation | 19 | 26 | | 16 | 26 | | dB |
| Input P _{1dB} | | 10 | | | 9 | | dBm |
| Input IP ₃ | | 18 | | | 18 | | dBm |

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

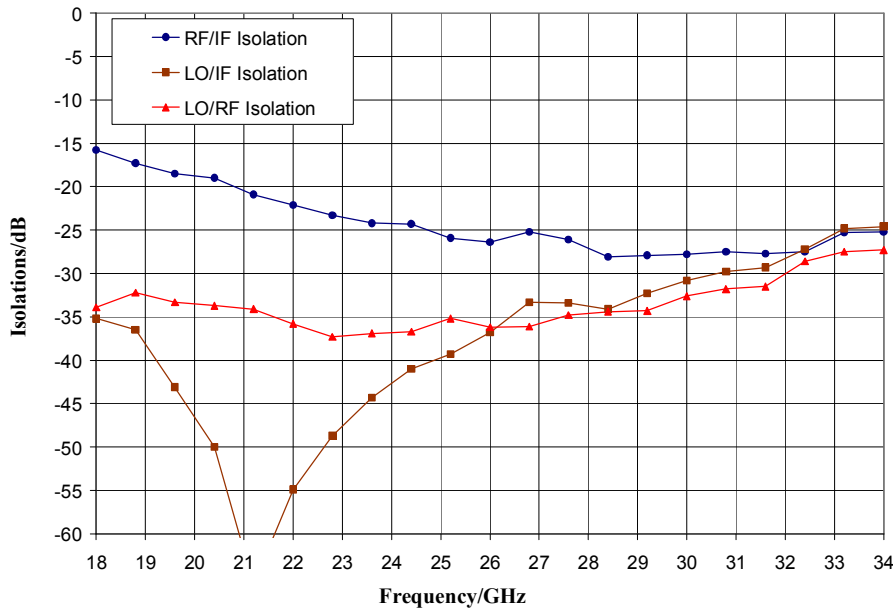
ver 1.8 0419

Typical Performance

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

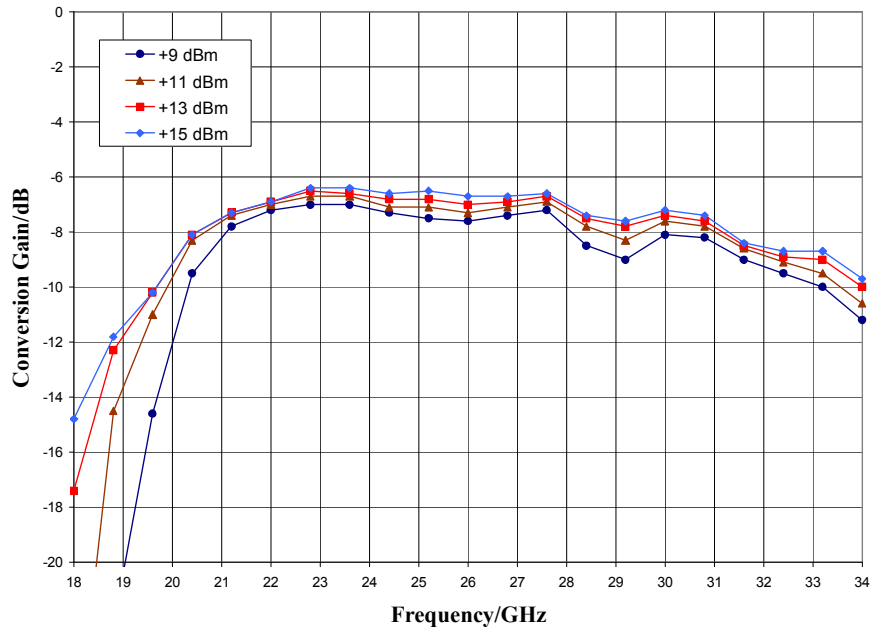


Isolation, LO = +13 dBm

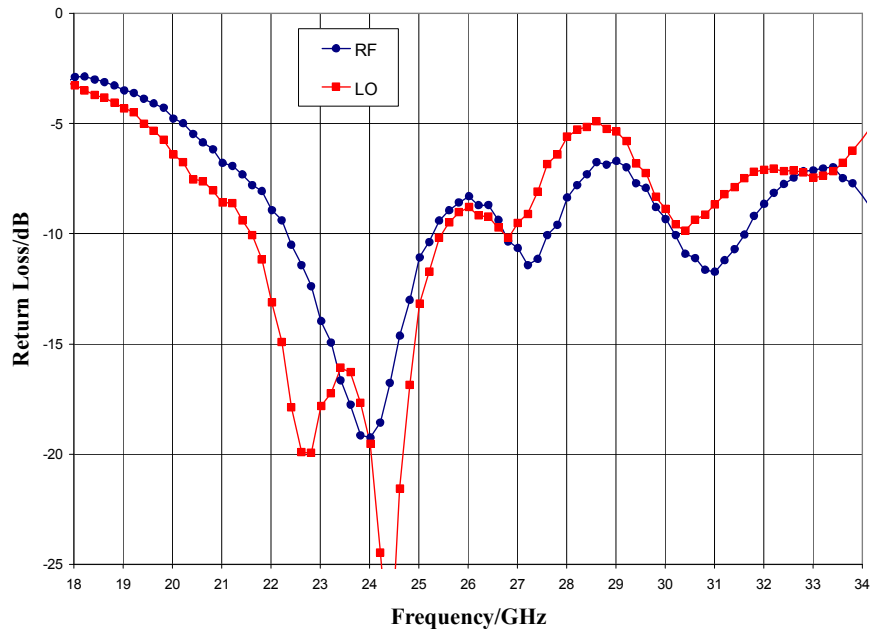


Typical Performance

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



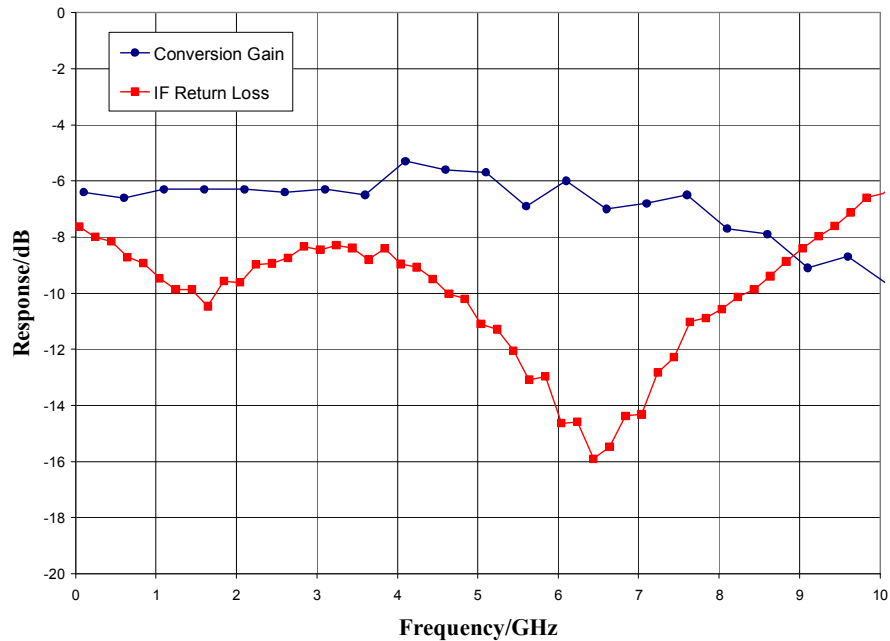
Return Loss, LO = + 13 dBm



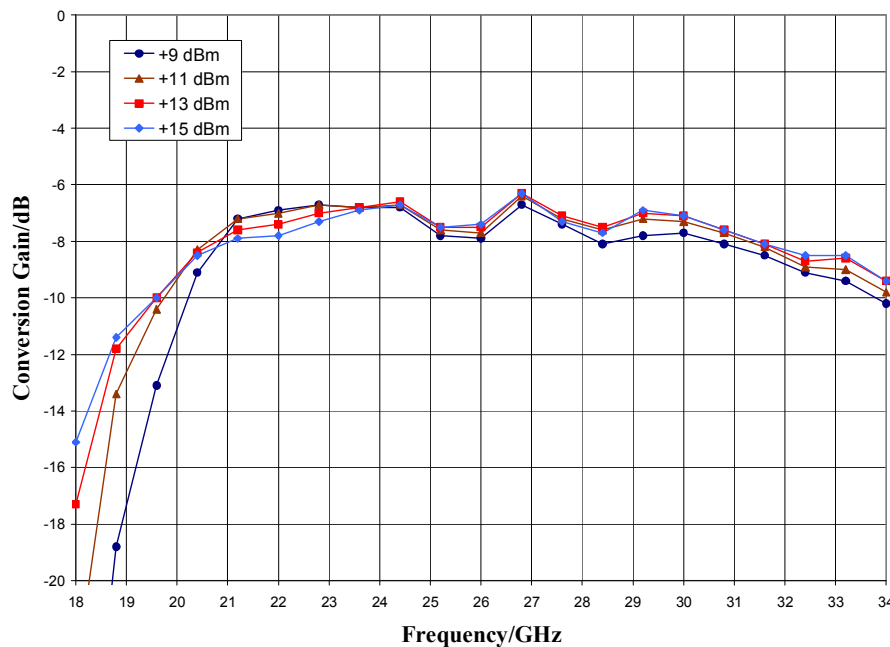
ver 1.8 0419

Typical Performance

IF Bandwidth, LO = +13 dBm



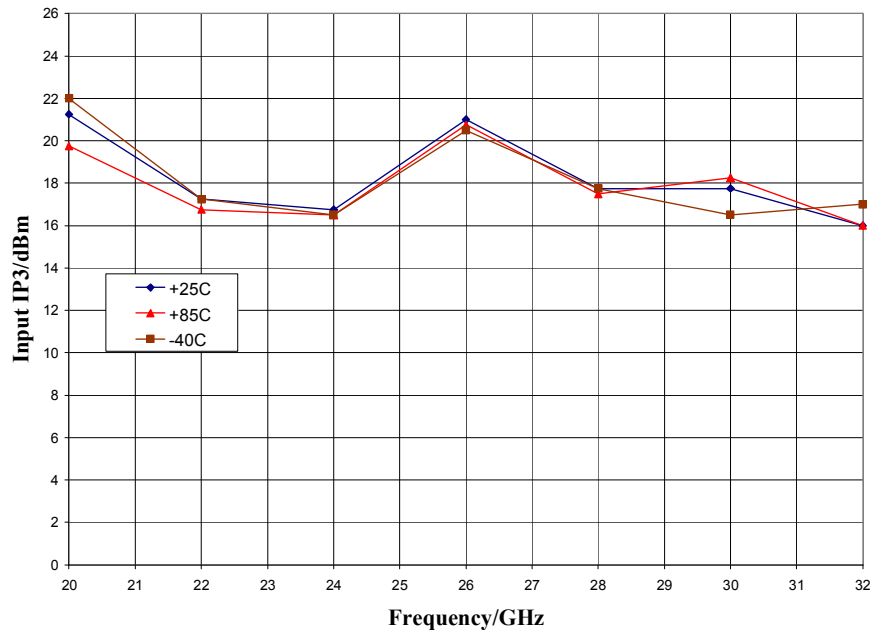
Upconverter Performance, Conversion Gain vs. LO Drive, IF input = 100 MHz



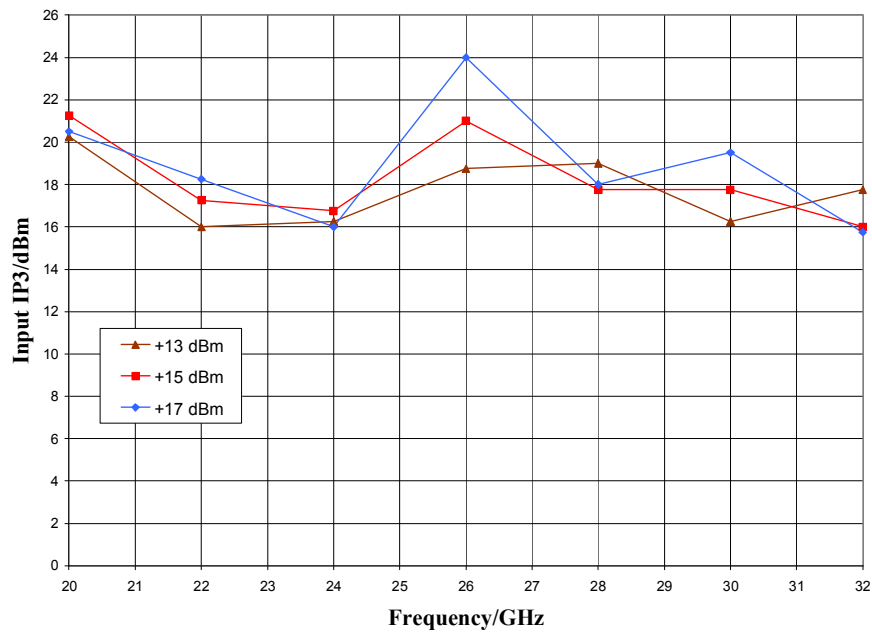
ver 1.8 0419

Typical Performance

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



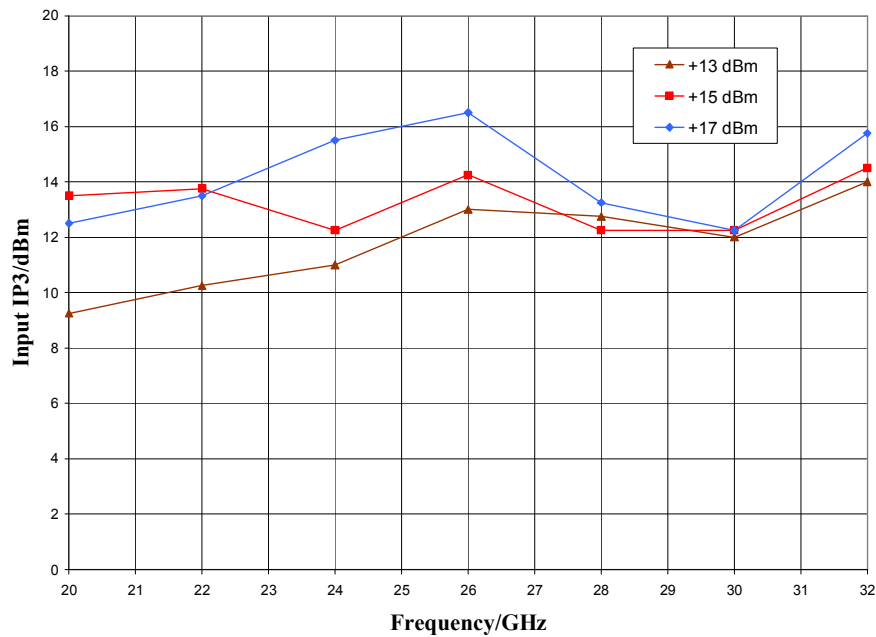
Input IP3 vs. LO Drive, IF = 100 MHz



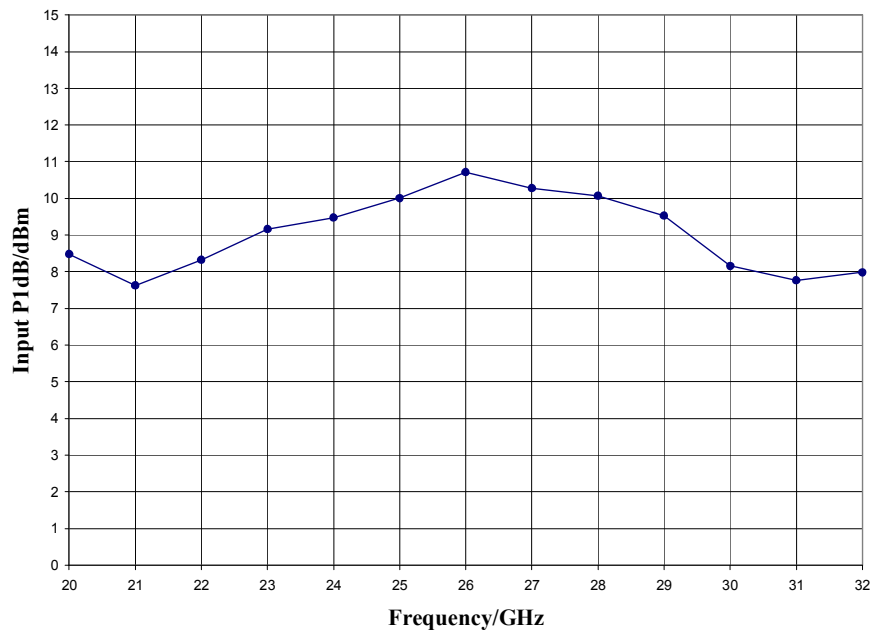
ver 1.8 0419

Typical Performance

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



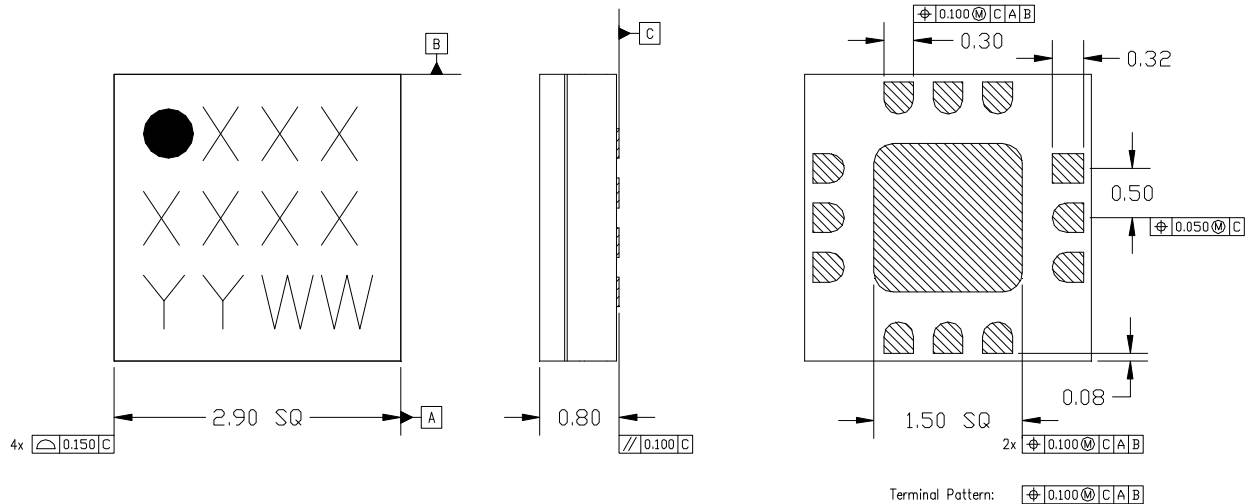
Input P1dB, LO = +13 dBm, IF = 100 MHz USB



ver 1.8 0419

Mechanical Information

Package Information and Dimensions



NOTES:

1. ALL DIMENSIONS SHOWN IN mm.
2. MATERIAL: BLACK ALUMINA
3. LEAD FINISH:
 - 3.1. Ni: 8.89 μ m MAX, 1.27 μ m MIN
 - 3.2. Pd: 0.17 μ m MAX, 0.07 μ m MIN
 - 3.3. Au: 0.254 μ m MAX, 0.03 μ m MIN
4. MARKING
 - 4.1. LINE 1: PART NUMBER
 - 4.1.1. EXAMPLE: CMD177C3 SHALL BE MARKED AS 177
 - 4.2. LINE 2: LDT NUMBER
 - 4.3. LINE 3: DATE CODE - LAST 2 DIGITS OF THE YEAR OF MANUFACTURE FOLLOWED BY A 2 DIGIT WEEK CODE
5. ALTERNATE PIN #1 IDENTIFIER IS A SINGLE SQUARE PAD
6. ALTERNATE DIE PADDLE MAY HAVE CHAMFERED CORNERS

Recommended PCB Land Pattern

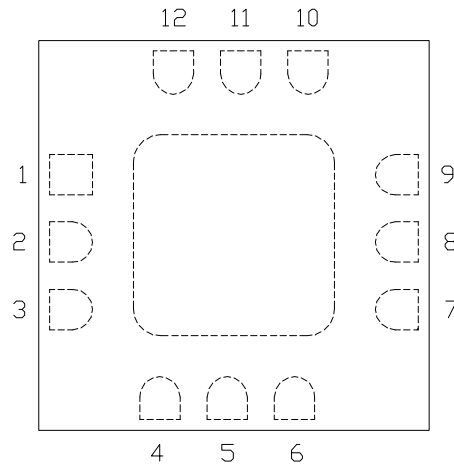
Custom MMIC recommends that the user develop the land pattern that will provide the best design for proper solder reflow and device attach for their specific application. Please review Custom MMIC Application Note AN 105 for a recommended land pattern approach.

Recommended Solder Reflow Profile


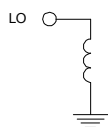
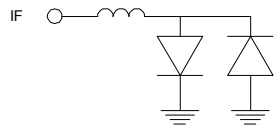
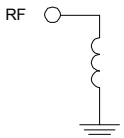
Custom MMIC recommends screen printing with belt furnace reflow to ensure proper solder reflow and device attach. Please review Custom MMIC Application Note AN 102 for a recommended solder reflow profile.

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 1.8 0419