

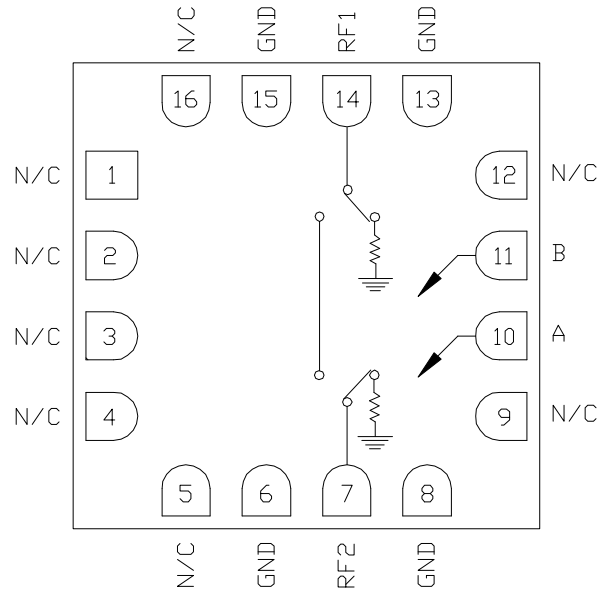
Features

- ▶ Low loss broadband performance
- ▶ High isolation
- ▶ Fast switching speed
- ▶ Non-reflective design - RF1 and RF2
- ▶ Pb-free RoHS compliant 3x3 SMT package

Description

The CMD204C3 is a general purpose broadband high isolation non-reflective MMIC SPST switch housed in a leadless 3x3 mm surface mount package. Covering DC to 20 GHz, the CMD204C3 features a low insertion loss of 1.3 dB and high isolation of 48 dB at 10 GHz. The CMD204C3 operates using complementary control voltage logic lines of 0/-5 V and requires no bias supply.

Functional Block Diagram



Electrical Performance – $V_{ctl} = 0/-5\text{ V}$, $T_A = 25\text{ }^\circ\text{C}$, $F = 10\text{ GHz}$

| Parameter | Min | Typ | Max | Units |
|----------------------------------|---------|------|-----|-------|
| Frequency Range | DC – 20 | | | GHz |
| Insertion Loss | | 1.3 | | dB |
| Isolation | | 48 | | dB |
| Return Loss - On State | | 15 | | dB |
| Return Loss - Off State | | 22 | | dB |
| Input P0.1dB | | 25 | | dBm |
| Switching Characteristics | | | | |
| tRISE, tFALL (10/90% RF) | | 1.8 | | ns |
| tON, tOFF (50% CTL to 10/90% RF) | | 18/7 | | ns |

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CMD204C3

DC-20 GHz SPST Non-reflective Switch

Specifications

Absolute Maximum Ratings

| Parameter | Rating |
|---|----------------|
| RF Input Power | +27 dBm |
| Control Voltage Range (A,B) | +0.5V to -7.5V |
| Channel Temperature, T _{ch} | 150 °C |
| Operating Temperature | -40 to 85 °C |
| Storage Temperature | -55 to 150 °C |
| Power Dissipation, P _{diss} (isolation state) | 631 mW |
| Thermal Resistance, Θ_{JC} (isolation state) | 96.2 °C / W |

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

Control Voltages

| State | Bias Condition |
|-------|----------------------------------|
| Low | 0 to -0.5V @ 1 uA Typ |
| High | -3V @ 1 uA Typ to -7V @ 6 uA Typ |

Truth Table

| Control Input | | Signal Path State |
|---------------|------|-------------------|
| A | B | RF1 to RF2 |
| High | Low | On |
| Low | High | Off |

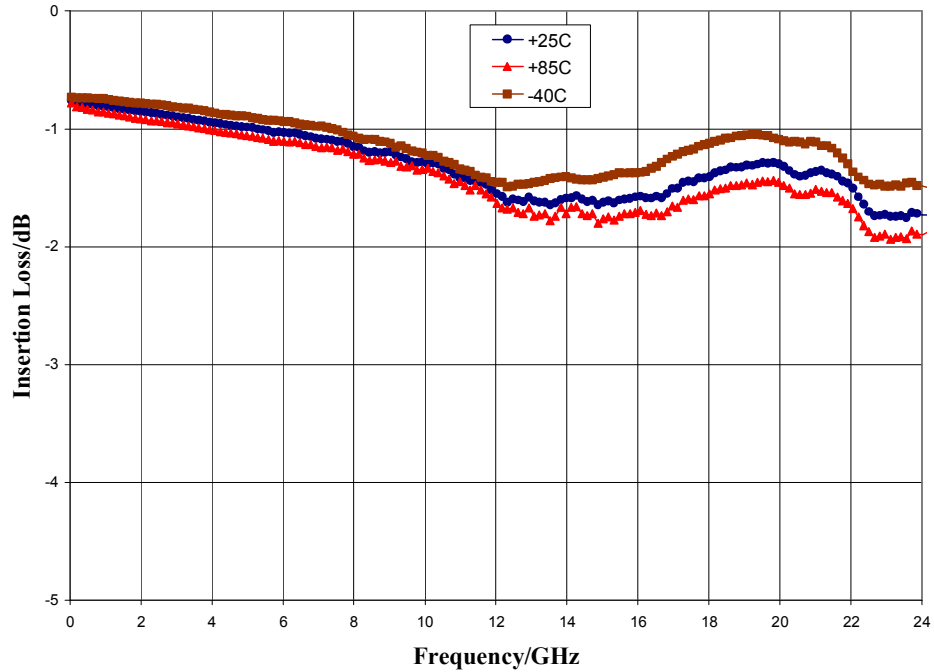
Electrical Specifications - V_{ctl} = 0/-5 V, T_A = 25 °C

| Parameter | Min | Typ | Max | Min | Typ | Max | Units |
|---|---------|-------------|---------|-----|-------------|-----|----------|
| Frequency Range | DC - 10 | | 10 - 18 | | | | GHz |
| Insertion Loss | | 1.0 | 1.7 | | 1.5 | 2.0 | dB |
| Isolation | 43 | 50 | | 35 | 43 | | dB |
| Return Loss - On State | | 20 | | | 12 | | dB |
| Return Loss - RF1, 2 - Off State | | 18 | | | 18 | | dB |
| Input P _{0.1dB} | | 24 | | | 22 | | dBm |
| Input IP ₃ | | 38 | | | 37 | | dBm |
| Switching Characteristics t _{RISE} , t _{FALL} (10/90% RF) t _{ON} , t _{OFF} (50% CTL to 10/90% RF) | | 1.8 18/7 | | | 1.8 18/7 | | ns ns |

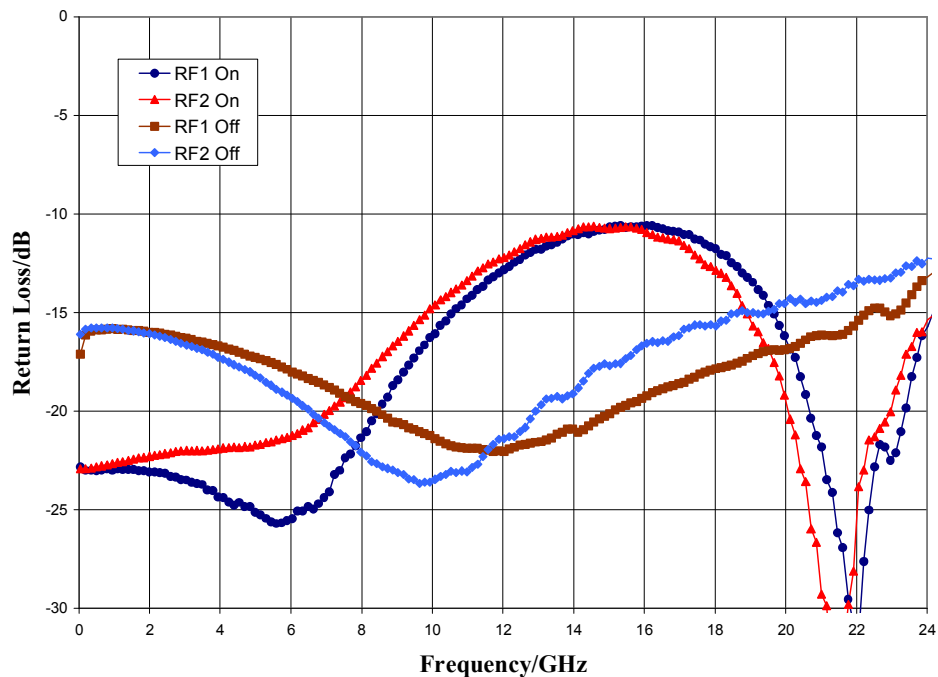
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Typical Performance

Insertion Loss vs. Temperature



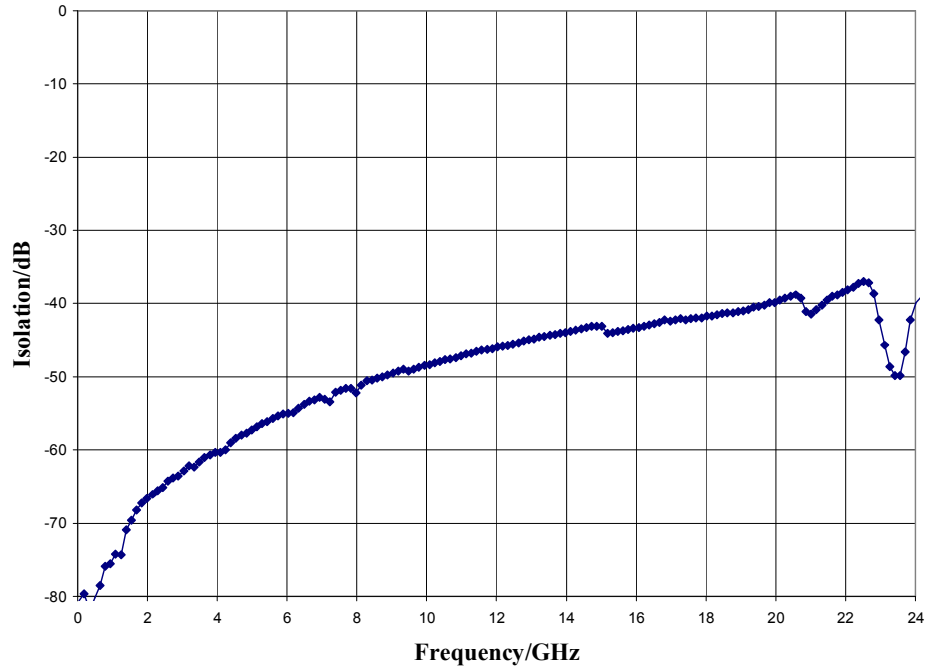
Return Loss



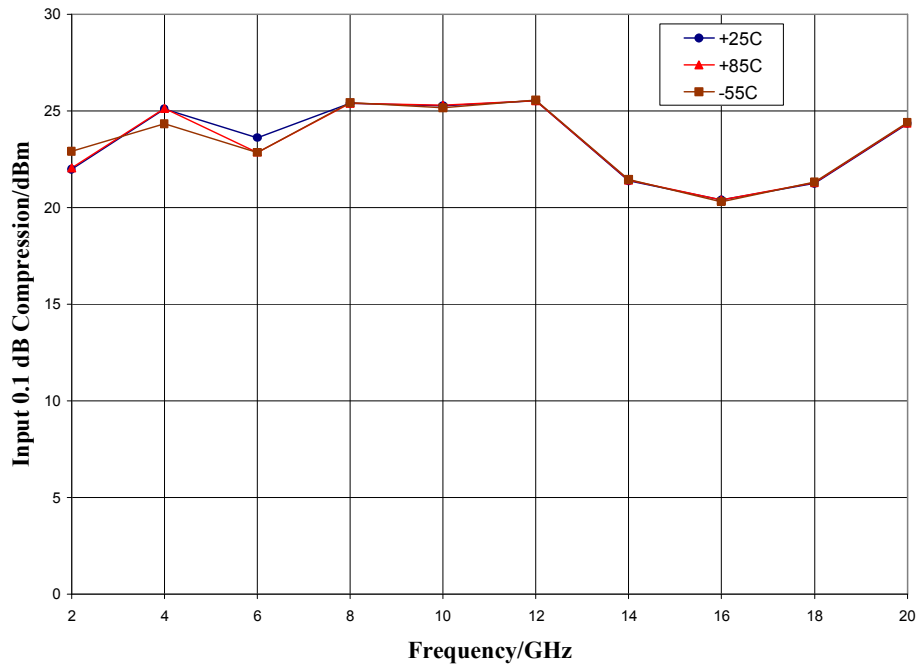
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Typical Performance

Isolation Between Ports RF1 and RF2



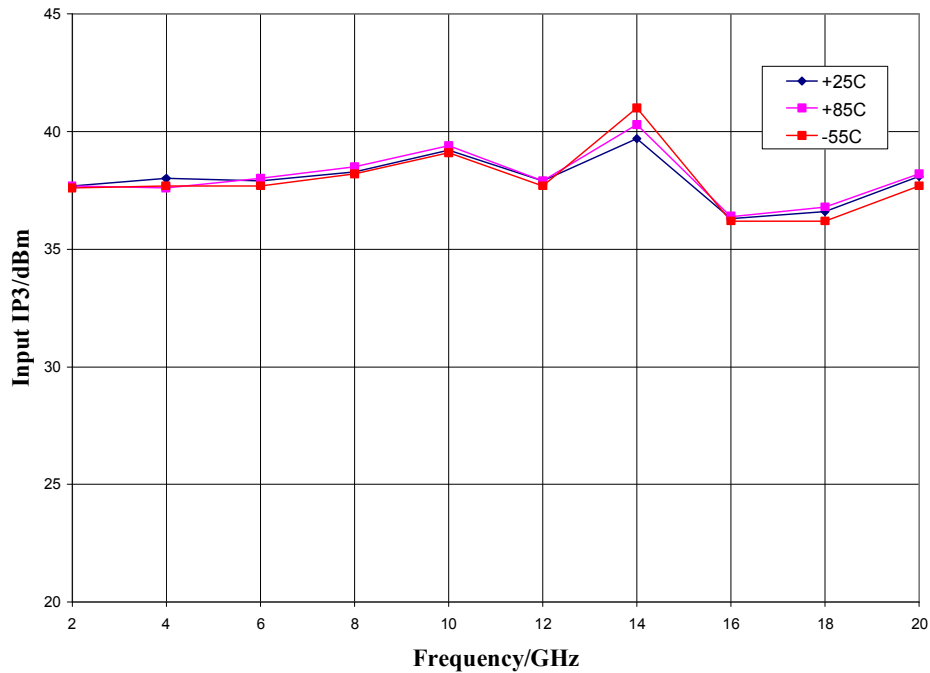
Input P0.1dB Compression Point vs. Temperature



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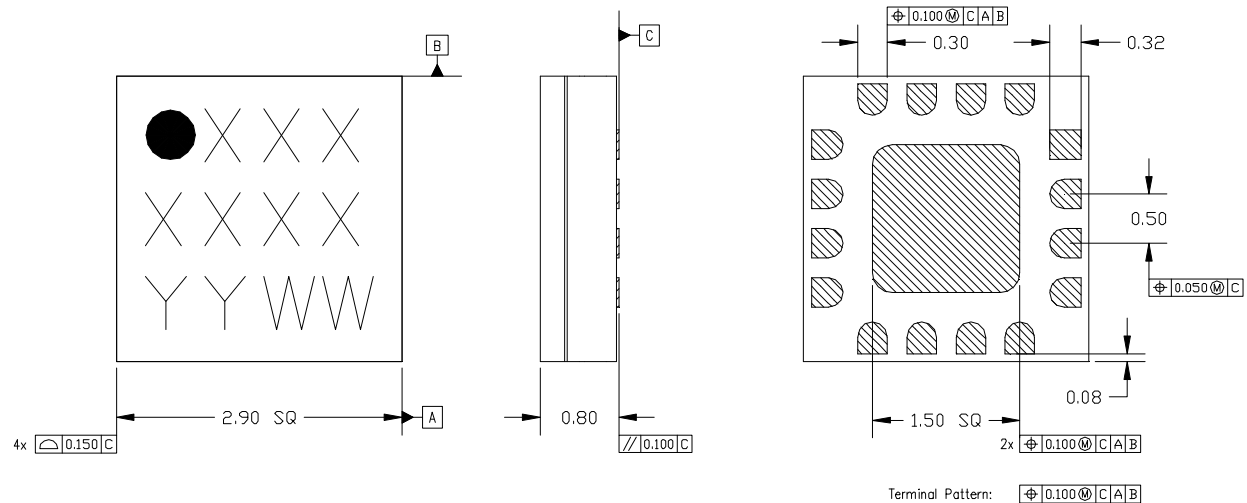
Typical Performance

Input Third Order Intercept Point vs. Temperature



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: CMD196C3 SHALL BE MARKED AS 196
 - 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

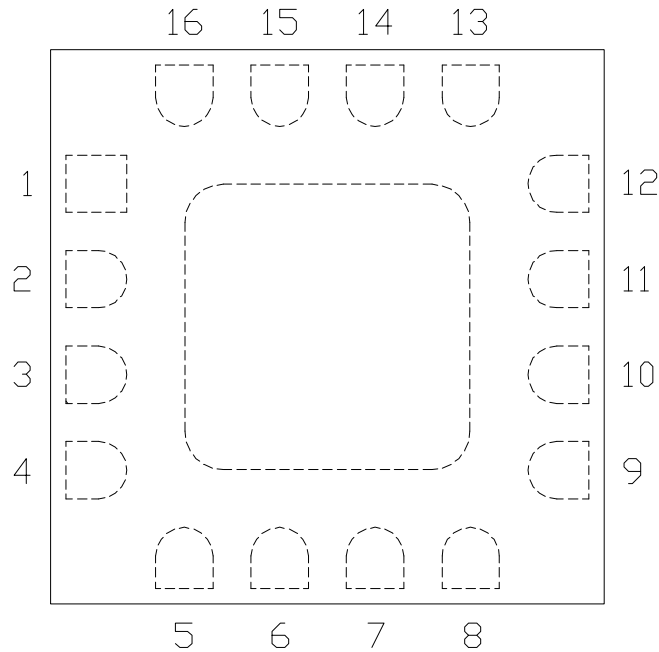
Custom MMIC Design Services recommends that the user develop the land pattern that will provide the best design for proper solder reflow and device attach for their specific application. Please review Custom MMIC Application Note AN 105 for a recommended land pattern approach.

Recommended Solder Reflow Profile


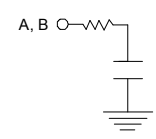
Custom MMIC Design Services recommends screen printing with belt furnace reflow to ensure proper solder reflow and device attach. Please review Custom MMIC Application Note AN 102 for a recommended solder reflow profile.

Pin Description

Pin Diagram



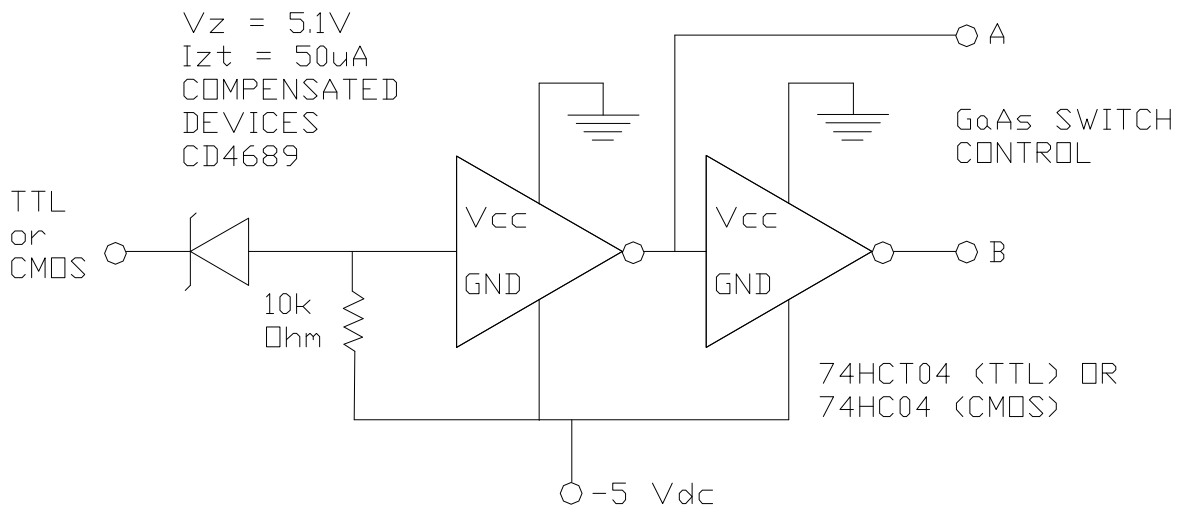
Functional Description

| Pin | Function | Description | Schematic |
|--------------------------|----------|---|---|
| 1-5,9,12,16 | N/C | No connection required. These pins may be connected to RF/DC ground | |
| 6,8,13,15 and die paddle | Ground | Connect to RF / DC ground |  |
| 7,14 | RF2, RF1 | These pins are DC coupled and matched to 50 Ohm. Blocking capacitors are required if RF line potential is not equal to 0V | |
| 10 | CTLA | See truth table and control voltage table |  |
| 11 | CTLB | See truth table and control voltage table | |

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Applications Information

Suggested Driver Circuit



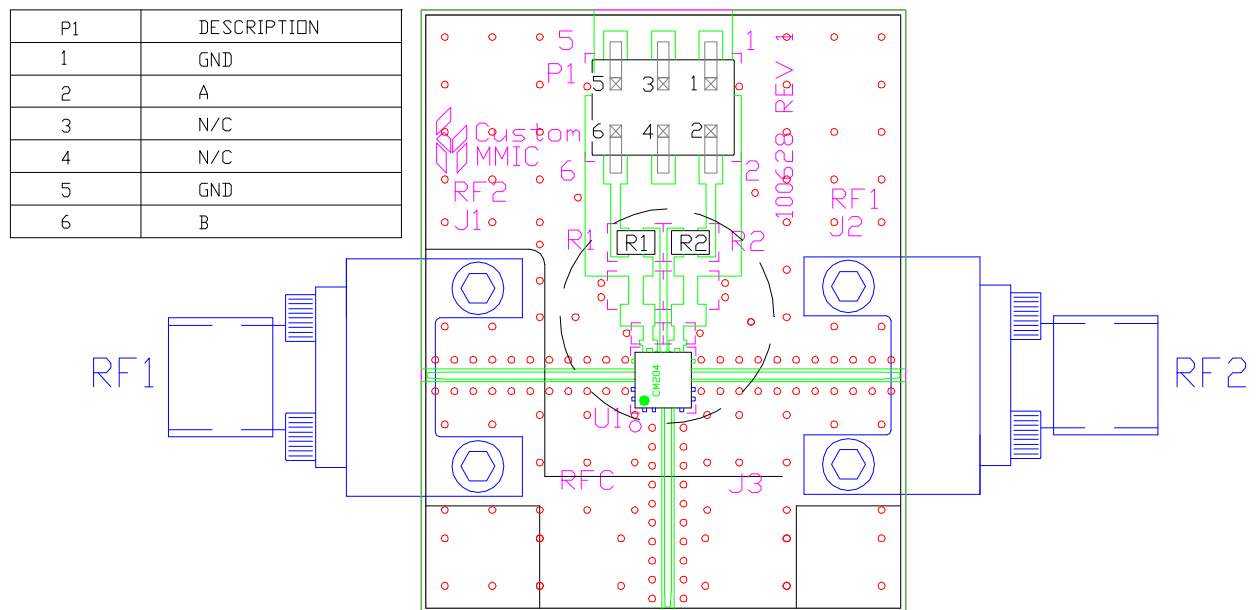
GaAs MMIC devices are susceptible to damage from Electrostatic Discharge. Proper precautions should be observed during handling, assembly and test.

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Applications Information

Evaluation Board

The circuit board shown has been developed for optimized assembly at CMDS. 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, J2 | | SMA End Launch Connector |
| P1 | | 6 Pin Header |
| R1, R2 | 100 Ω | Resistor, 0805 |
| U1 | | CMD204C3 SPST Switch |
| PCB | | 100628 Evaluation PCB |