



Let Performance Drive

# CMD196C3

## DC-18 GHz SPDT Non-reflective Switch

### Features

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

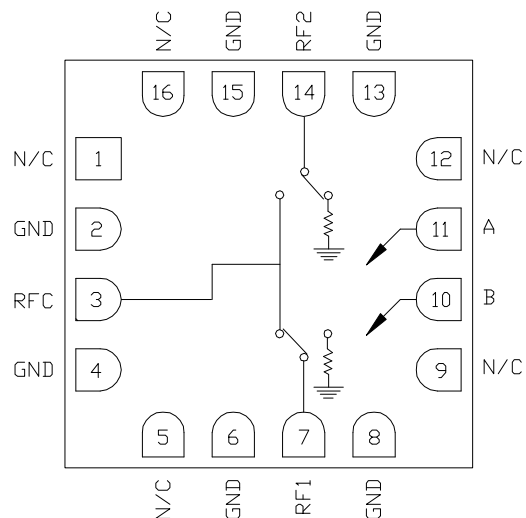
### Applications

- ▶ Microwave radio and VSAT
- ▶ Telecom infrastructure
- ▶ Test instrumentation
- ▶ Military end-use

### Description

The CMD196C3 is a general purpose broadband high isolation non-reflective MMIC SPDT switch housed in a leadless 3x3 mm surface mount package. Covering DC to 18 GHz, the CMD196C3 features a low insertion loss of 1.5 dB and high isolation of 46 dB at 8 GHz. The CMD196C3 operates using complementary control voltage logic lines of 0/-5 V and requires no bias supply.

### Functional Block Diagram



### Electrical Performance - $V_{ctl} = 0/-5\text{ V}$ , $T_A = 25\text{ }^\circ\text{C}$ , $F = 8\text{ GHz}$

Parameter	Min	Typ	Max	Units
Frequency Range	DC - 18			GHz
Insertion Loss		1.5		dB
Isolation		46		dB
Return Loss - On State		17		dB
Return Loss RF1, RF2 - Off State		17		dB
Input P1dB		23		dBm
Switching Speed		1.8		ns

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## DC-18 GHz SPDT 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 <sub>ch</sub>	150 °C
Operating Temperature	-40 to 85 °C
Storage Temperature	-55 to 150 °C

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

#### Control Voltages

State	Bias Condition
Low	0 to -0.5V @ 1 uA Typ
High	-5V @ 1 uA Typ to -7V @ 6 uA Typ

#### Truth Table

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

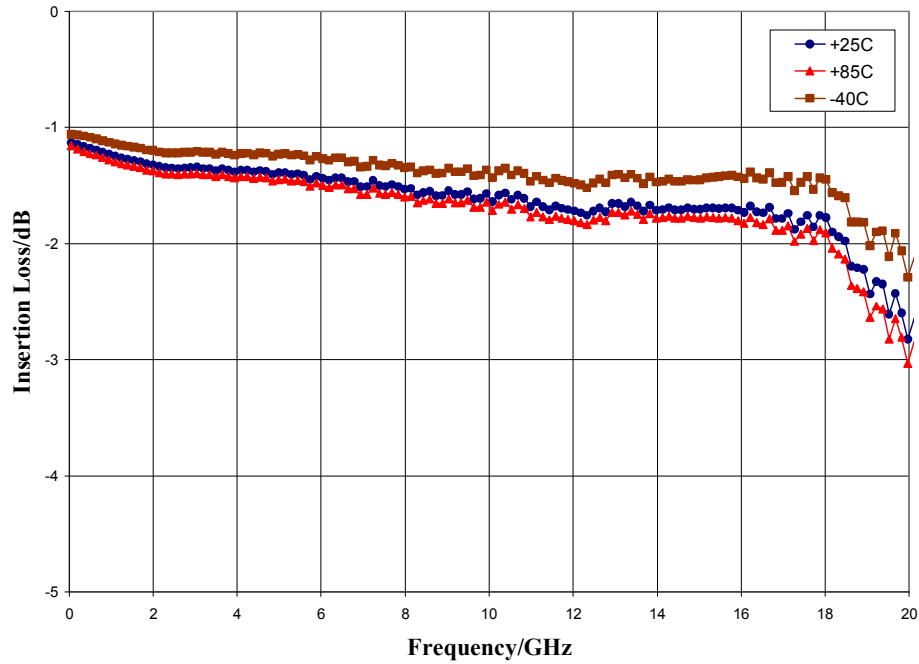
#### Electrical Specifications - V<sub>ctl</sub> = 0/-5 V, T<sub>A</sub> = 25 °C

Parameter	Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	Units
Frequency Range	DC - 8			DC - 14			DC - 18			GHz
Insertion Loss		1.5	1.9		1.7	2.1		1.8	2.2	dB
Isolation	41	46		40	45		32	37		dB
Return Loss - On State		18			15			17		dB
Return Loss - RF1, 2 - Off State		17			15			12		dB
Input P1dB		23			23			23		dBm
Input IP3		37			38			38		dBm
Switching Speed		1.8			1.8			1.8		ns

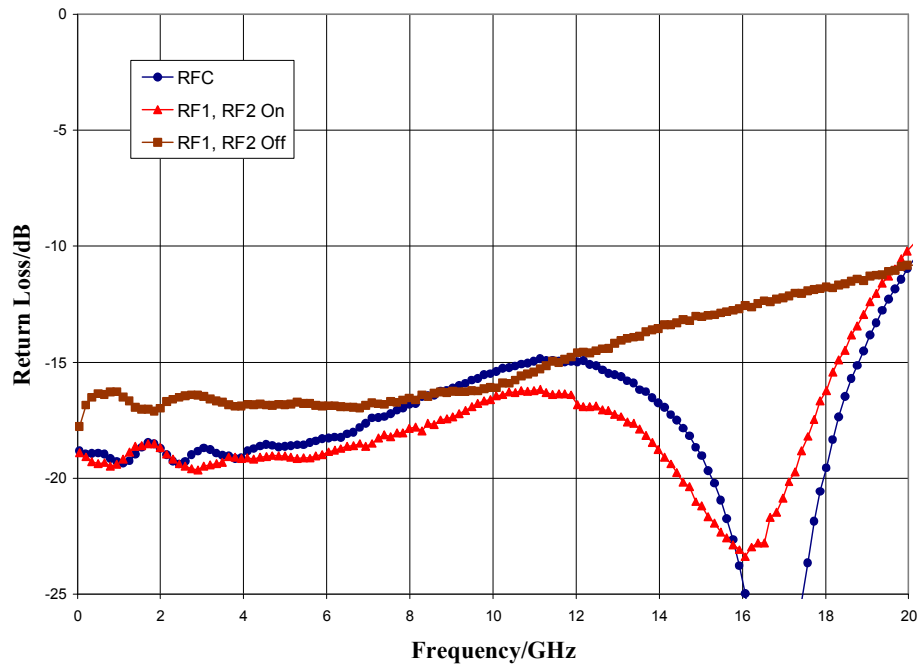
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### Typical Performance

#### Insertion Loss vs. Temperature



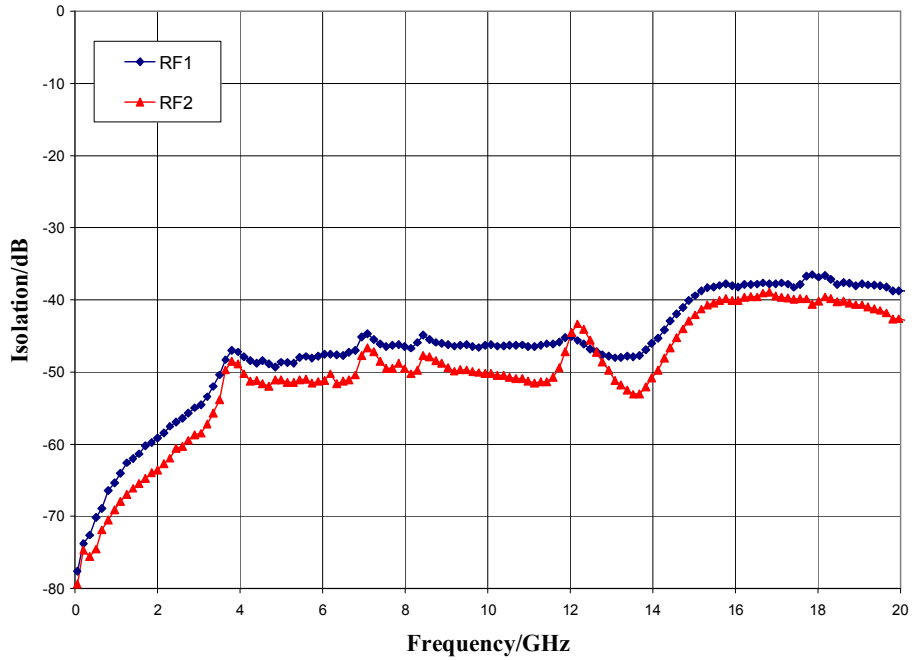
#### Return Loss



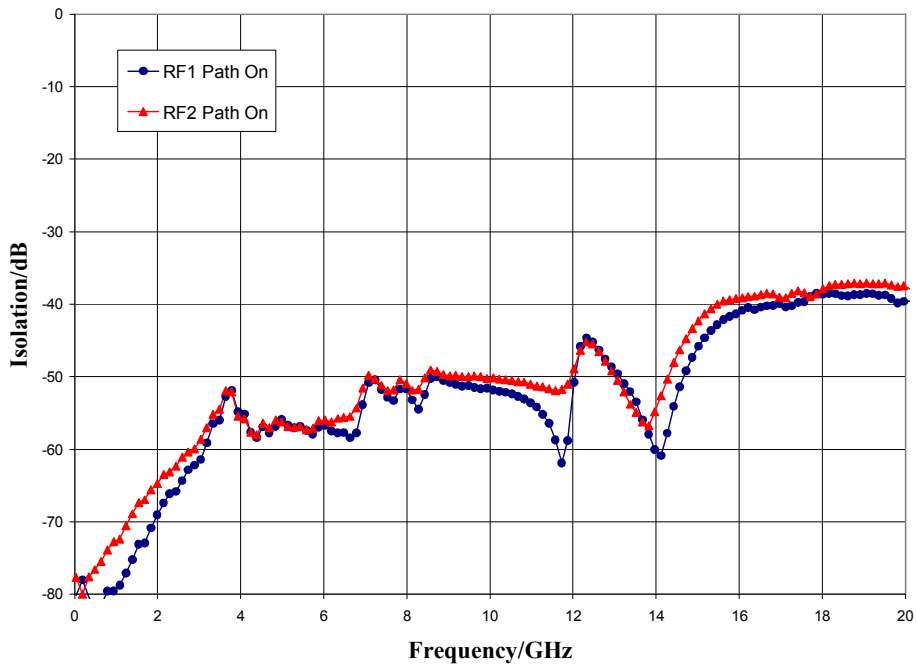
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### Typical Performance

#### Isolation Between Ports RFC and RF1/RF2



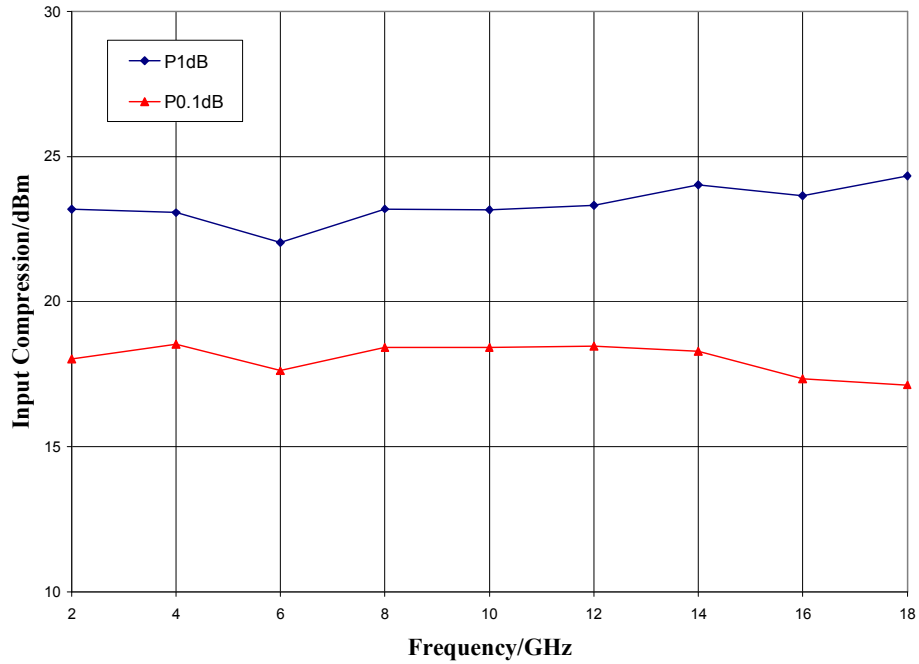
#### Isolation Between Ports RF1 and RF2



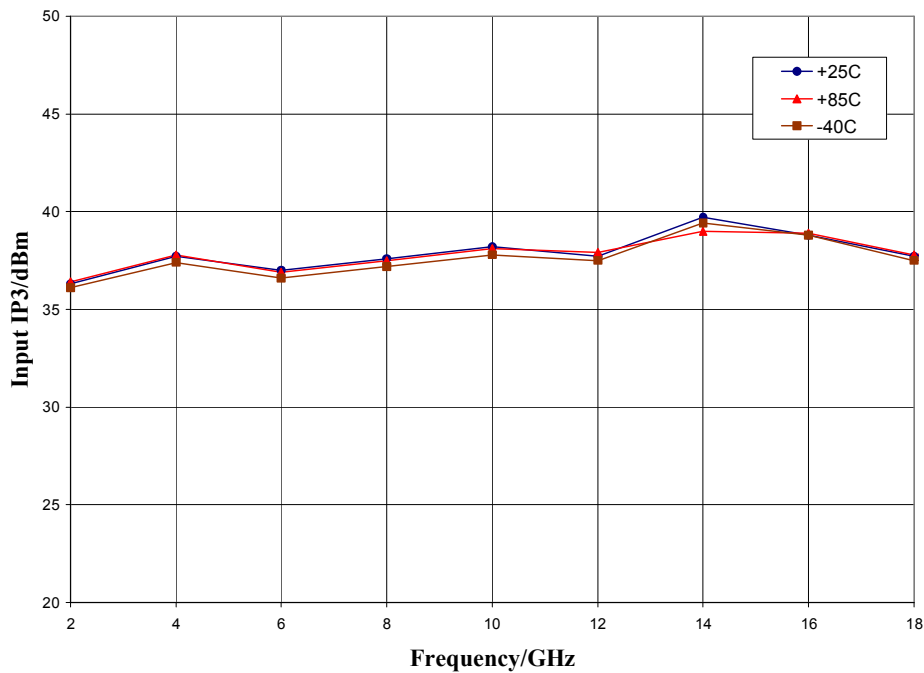
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### Typical Performance

#### Input P1dB and P0.1dB Compression Point



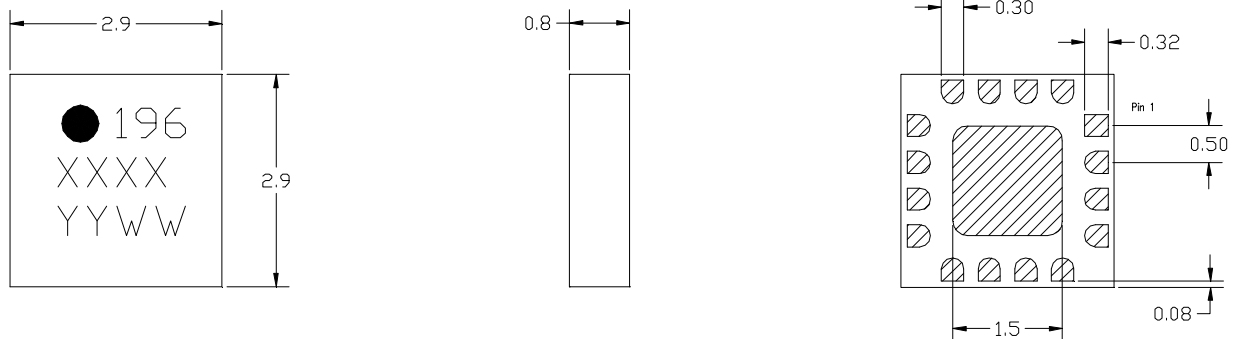
#### Input Third Order Intercept Point



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### Mechanical Information

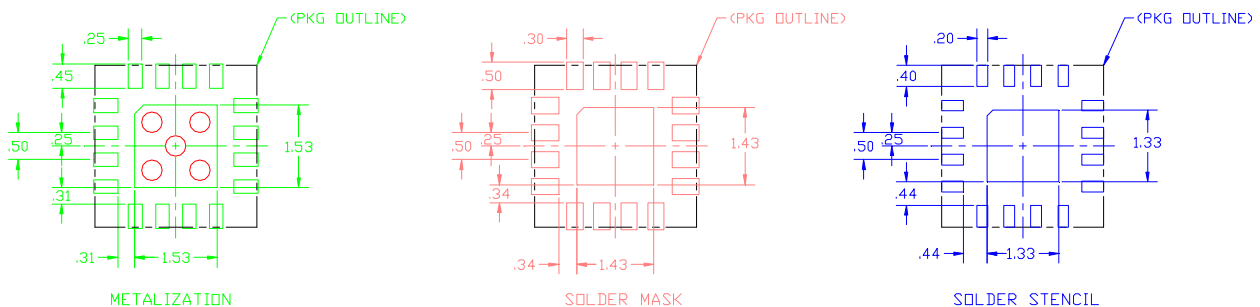
#### Package Information and Dimensions



#### NOTES:

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

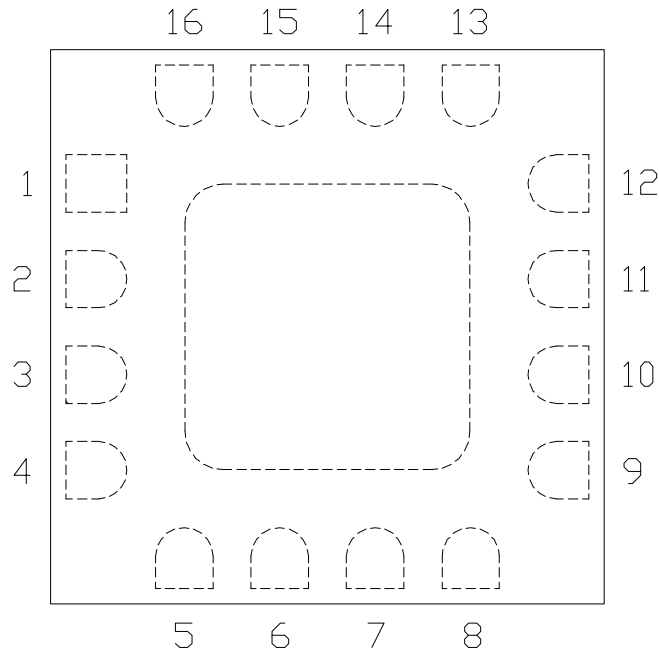
#### Recommended PCB Land Pattern




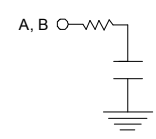
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### Pin Description

#### Pin Diagram



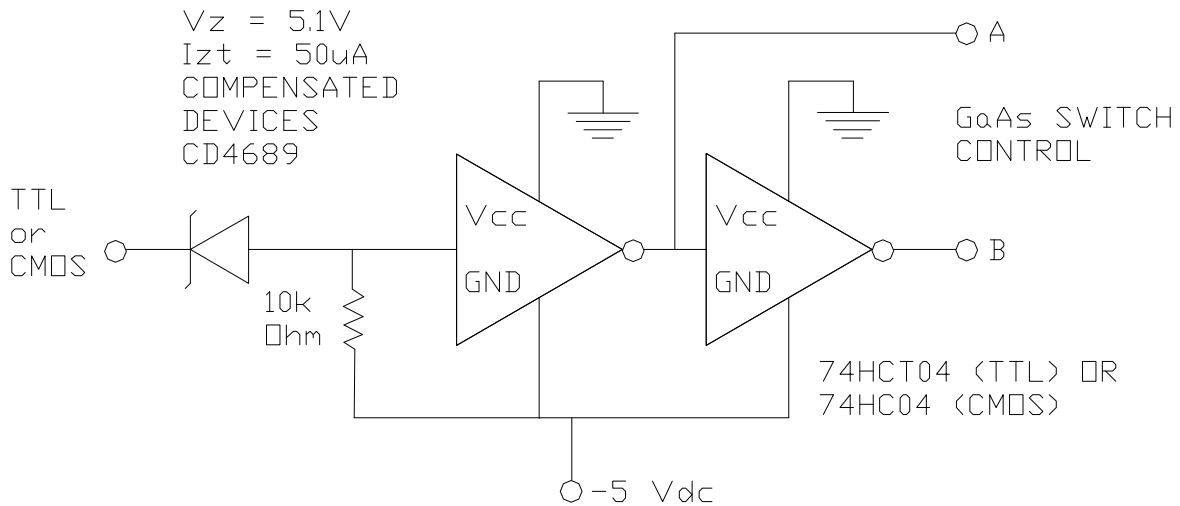
#### Functional Description

Pin	Function	Description	Schematic
1,5,9,12,16	N/C	No connection required. These pins may be connected to RF/DC ground	
2,4,6,8,13,15 and die paddle	Ground	Connect to RF / DC ground	
3,7,14	RFC, RF1, RF2	These pins are DC coupled and matched to 50 Ohm. Blocking capacitors are required if RF line potential is not equal to 0V	
10	CTLB	See truth table and control voltage table	
11	CTLA	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.**

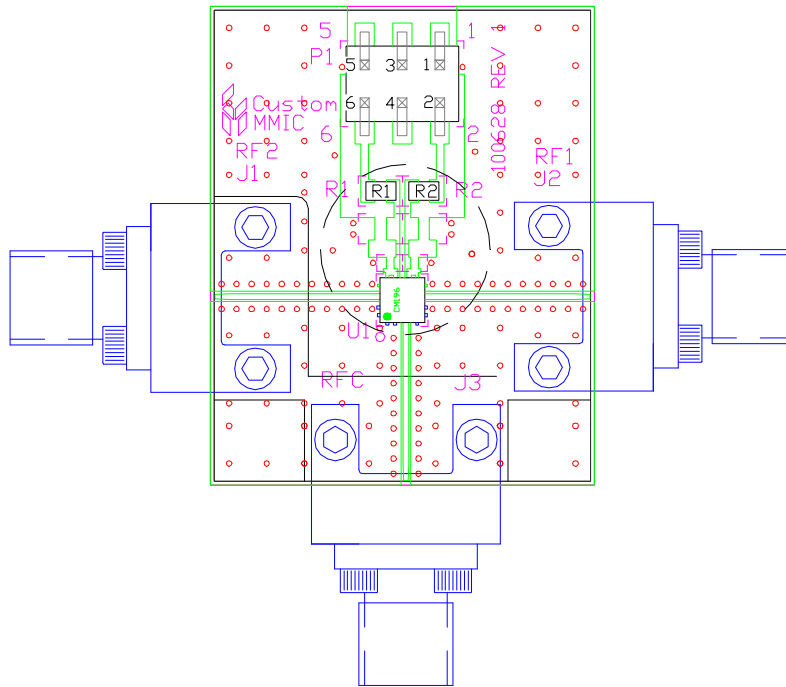
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### Applications Information

#### 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, J3		SMA End Launch Connector
P1		6 Pin Header
R1, R2	100 $\Omega$	Resistor, 0805
U1		CMD196C3 SPDT Switch
PCB		100628 Evaluation PCB