



Let Performance Drive

CMD203C4

DC-20 GHz SP4T Non-reflective Switch

Features

- ▶ Low loss broadband performance
- ▶ High isolation
- ▶ Non-reflective design
- ▶ Integrated 2:4 TTL decoder
- ▶ Pb-free RoHS compliant 4x4 SMT package

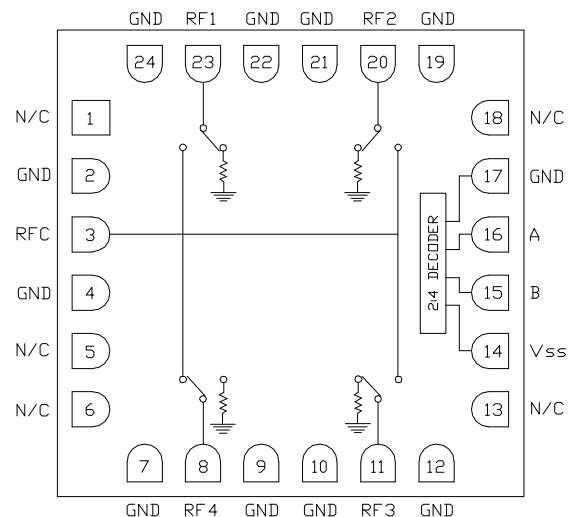
Description

The CMD203C4 is a broadband MMIC SP4T switch housed in a leadless 4x4 mm surface mount package. The CMD203C4 covers DC to 20 GHz and offers a low insertion loss of 2.4 dB and high isolation of 39 dB at 10 GHz. The switch also includes an on board binary decoder circuit which reduces the number of required logic control lines from four to two. The CMD203C4 operates using complementary control voltage logic lines of 0/-5 V and consumes little DC current.

Applications

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

Functional Block Diagram



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

Parameter	Min	Typ	Max	Units
Frequency Range	DC - 20			GHz
Insertion Loss		2.4		dB
Isolation		39		dB
Return Loss - On State		9		dB
Return Loss RF1, RF2, RF3, RF4 - Off State		9		dB
Input P1dB		21		dBm
Switching Speed		66		ns

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Specifications

Absolute Maximum Ratings

Parameter	Rating
RF Input Power	+27 dBm
Bias Voltage (Vss)	-7V
Control Voltage Range (A,B)	+0.5V to -7.5V
Channel Temperature, Tch	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.

Bias Voltage & Current

Vss Range = -5.0V ± 10%		
Vss (V)	Iss (Typ) (mA)	Iss (Max) (mA)
-5	4.5	8.0

TTL/CMOS Control Voltages

State	Bias Condition
Low	-1V to 0V @ 0.5 mA Typ
High	-5V to -3V @ 1 uA Typ

Truth Table

Control Input		Signal Path State
A	B	RFC to:
High	High	RF1
Low	High	RF2
High	Low	RF3
Low	Low	RF4

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

Parameter	Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	Units
Frequency Range	DC - 6			DC - 14			DC - 20			GHz
Insertion Loss		2	2.4		2.7	3.1		3.2	3.6	dB
Isolation	37	44		27	35		22	30		dB
Return Loss - On State		11			8			8		dB
Return Loss - Off State		17			14			13		dB
Input P1dB		19.5			21			22		dBm
Input IP3		28			30			30		dBm
Switching Speed		66			66			66		ns

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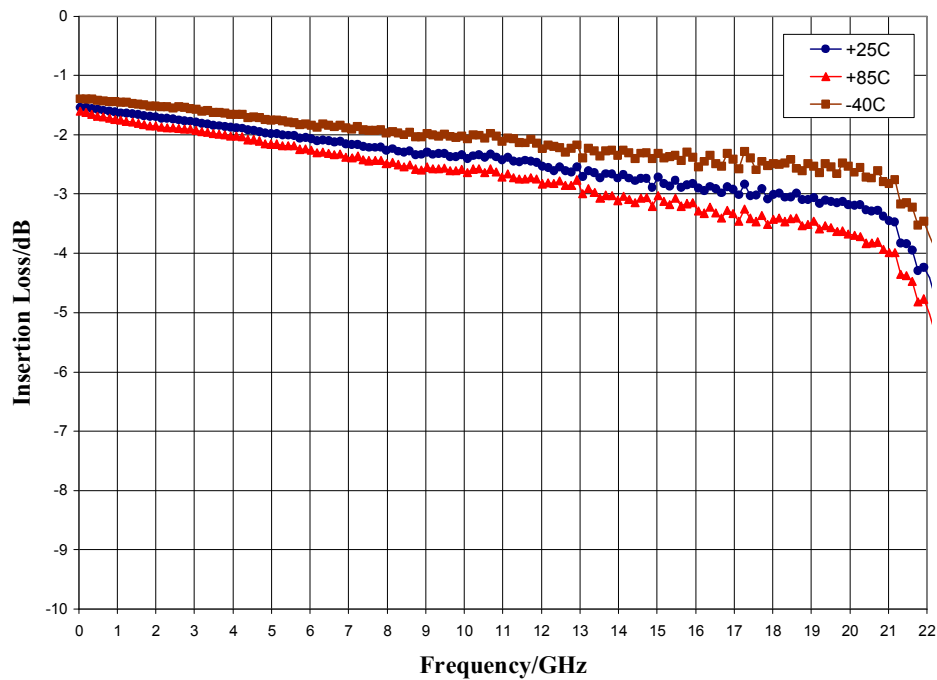


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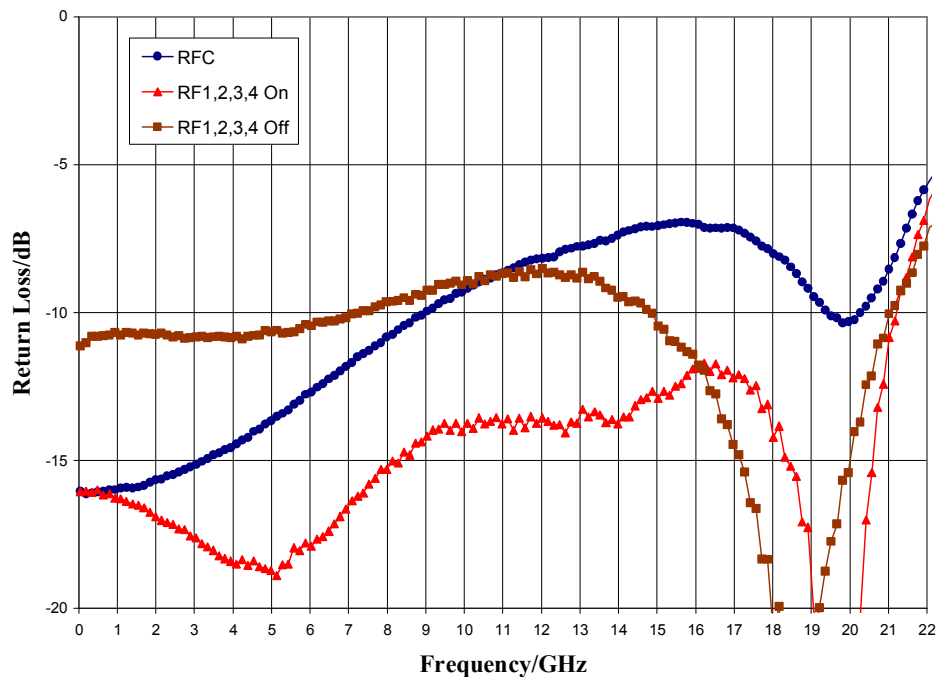
DC-20 GHz SP4T Non-reflective Switch

Typical Performance

Insertion Loss vs. Temperature



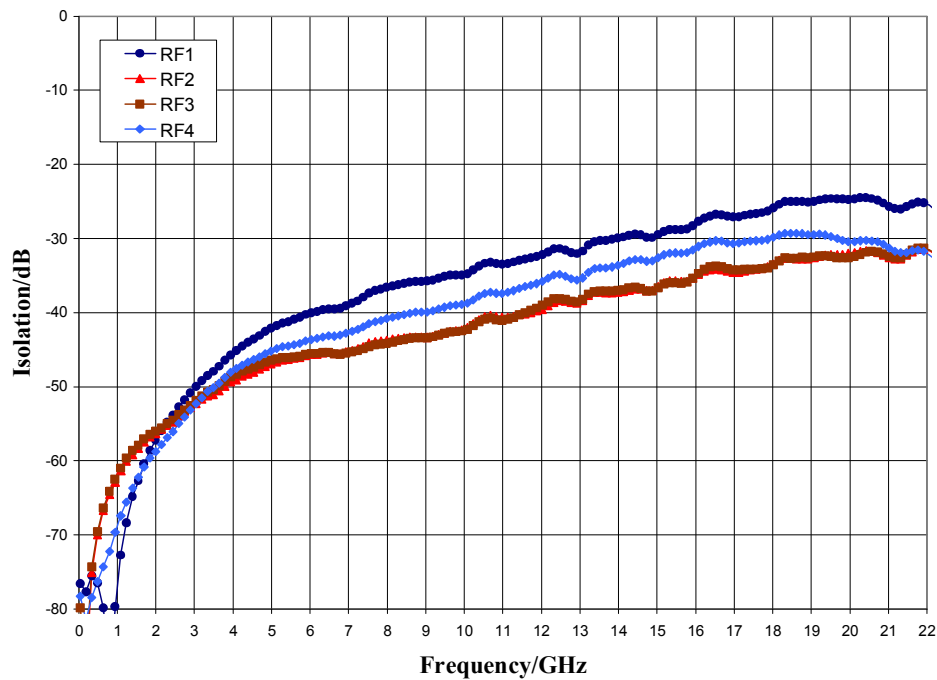
Return Loss



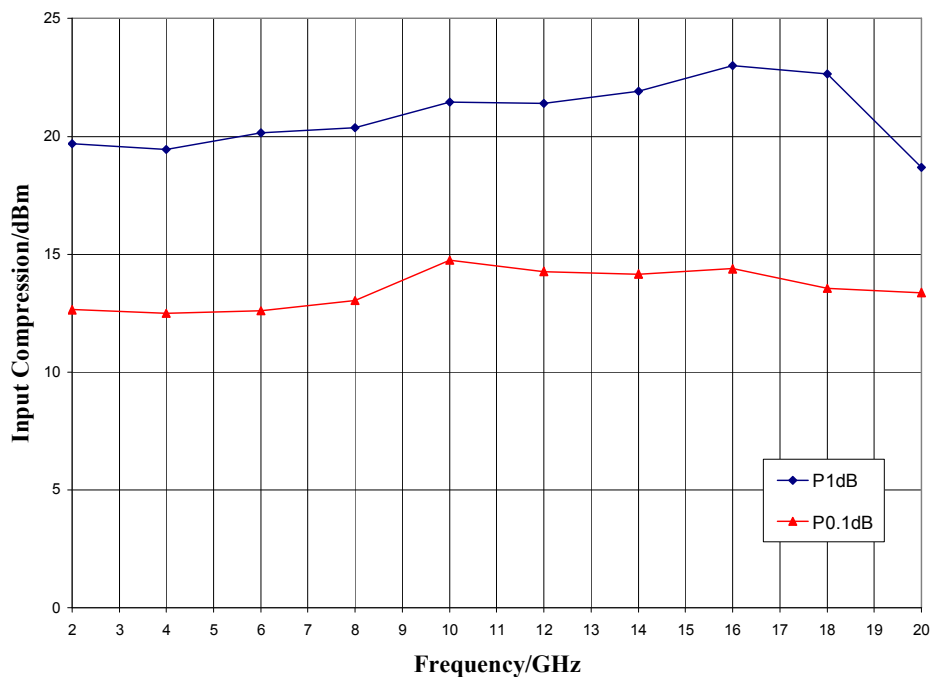
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Typical Performance

Isolation Between Ports RFC and RF1/RF2/RF3/RF4



Input P1dB and P0.1dB Compression Point



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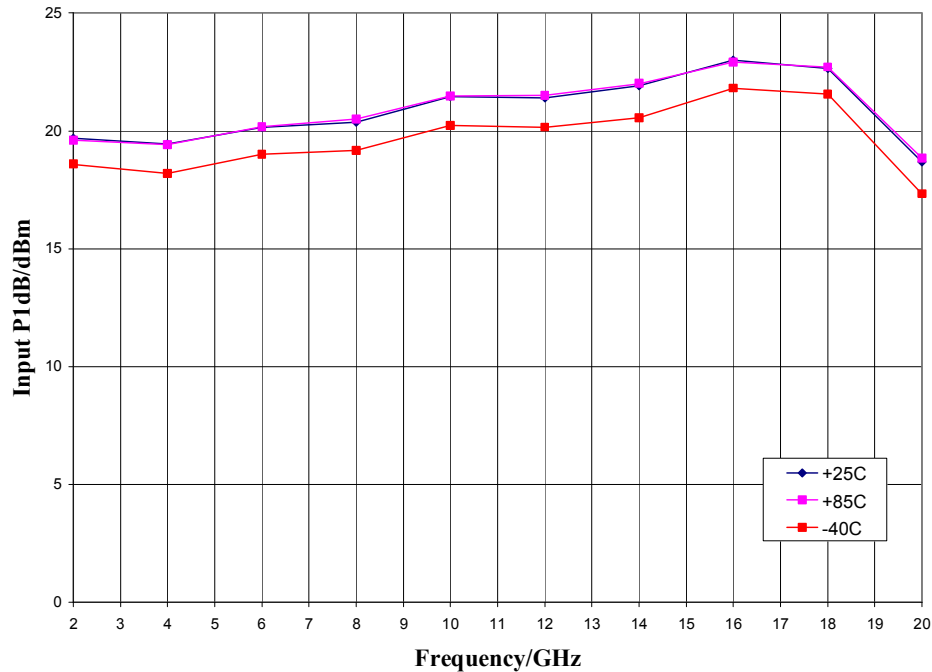


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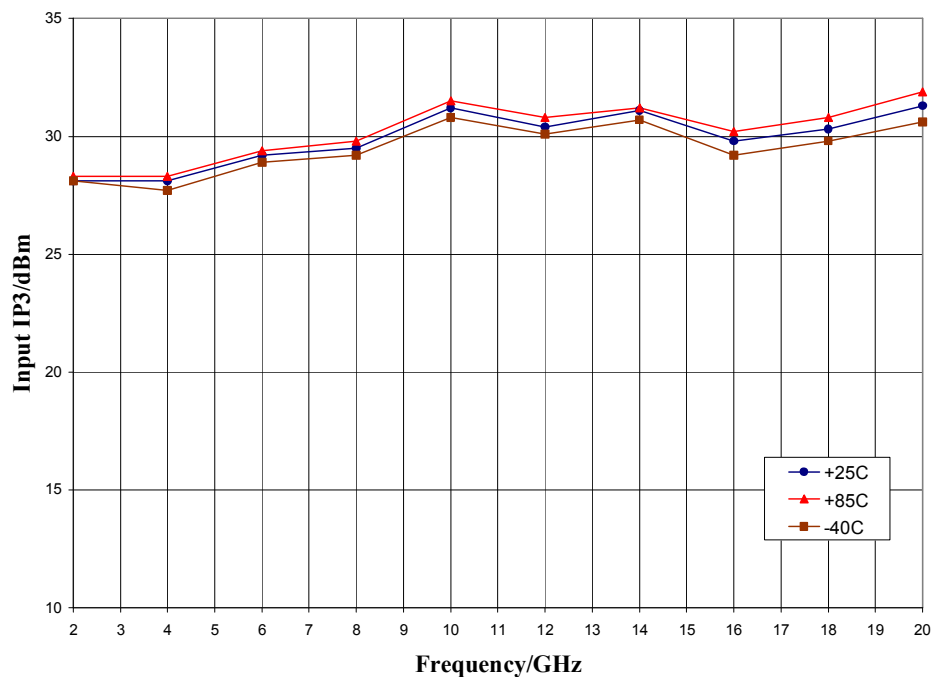
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Typical Performance

Input P1dB vs. Temperature



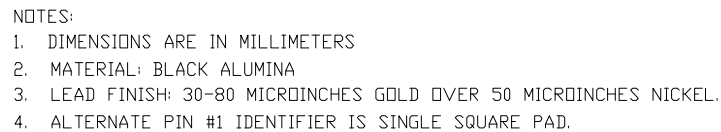
Input Third Order Intercept Point vs. Temperature



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Package Information and Dimensions



The image displays two technical drawings of a microchip package, showing the METALIZATION and SOLDER MASK layers. The package is square, with a central square area containing a 3x3 grid of circular vias.

METALIZATION Layer (Left): This drawing shows the metalization layer in green. The central square area has a side length of 2.69. The package has a total width of 2.69 and a total height of 2.69. The dimensions are as follows:

- Top edge: .25 (left margin), .66 (top margin), .25 (right margin).
- Left edge: .50 (left margin), .25 (left margin).
- Bottom edge: .25 (bottom margin).
- Right edge: .25 (right margin).

SOLDER MASK Layer (Right): This drawing shows the solder mask layer in red. The central square area has a side length of 2.49. The package has a total width of 2.49 and a total height of 2.49. The dimensions are as follows:

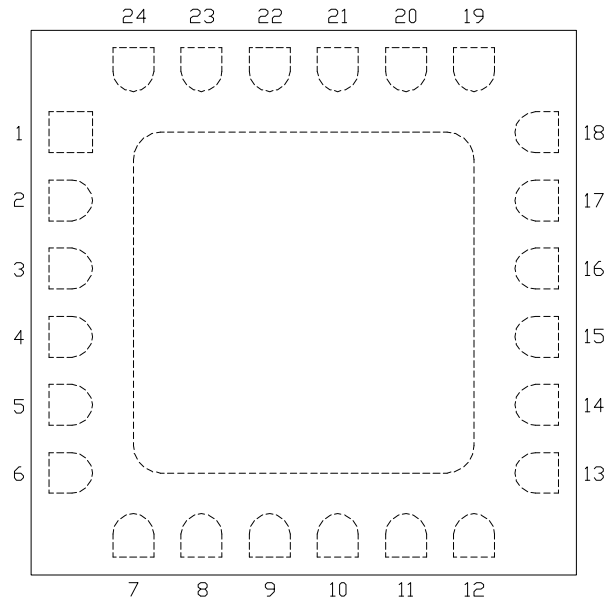
- Top edge: .35 (left margin), .71 (top margin), .30 (right margin).
- Left edge: .50 (left margin), .25 (left margin).
- Bottom edge: .30 (bottom margin).
- Right edge: .30 (right margin).

A note "CHAMFER FOR PIN 1" with an arrow points to the top-left corner of the package.

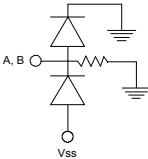
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Visit us online at www.custommmic.com

Pin Description

Pin Diagram



Functional Description

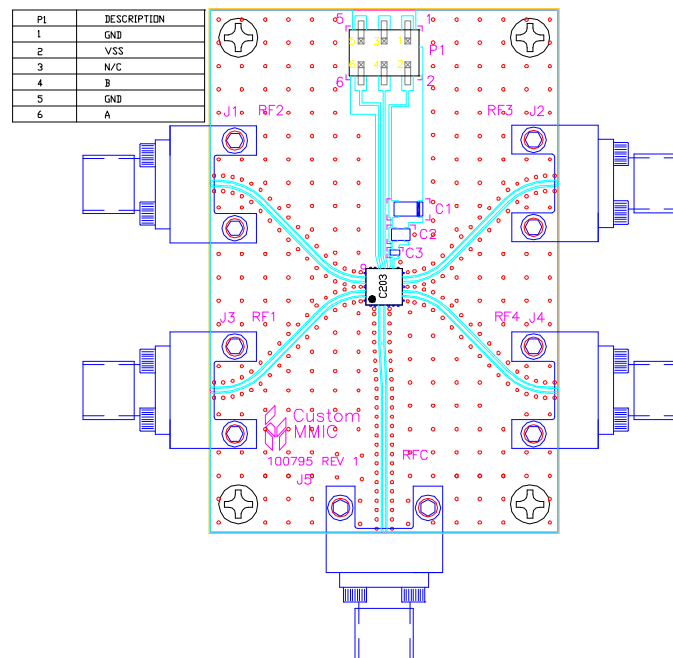
Pin	Function	Description	Schematic
1,5,6,13,18	N/C	No connection required. These pins may be connected to RF/DC ground	
2,4,7,9,10,12,17,19,21,22,24 and die paddle	Ground	Connect to RF / DC ground	
3,8,11,20,23	RFC, RF4, RF3, RF2, RF1	These pins are DC coupled and matched to 50 Ohm. Blocking capacitors are required if RF line potential is not equal to 0V	
14	Vss	Power supply voltage	
15	CTLB	See truth table and control voltage table	
16	CTLA	See truth table and control voltage table	

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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 - J5		SMA End Launch Connector
P1		6 Pin Header
C1	0.33 μ F	Capacitor, Tantalum
C2	1000 pF	Capacitor, 0603
C3	100 pF	Capacitor, 0402
U1		CMD203C4 SP4T Switch
PCB		100795 Evaluation PCB

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

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