WINSOURCE ELECTRONICS

THE DATASHEET OF

CMD203

CMD203

DC-20 GHz SP4T Non-reflective Switch

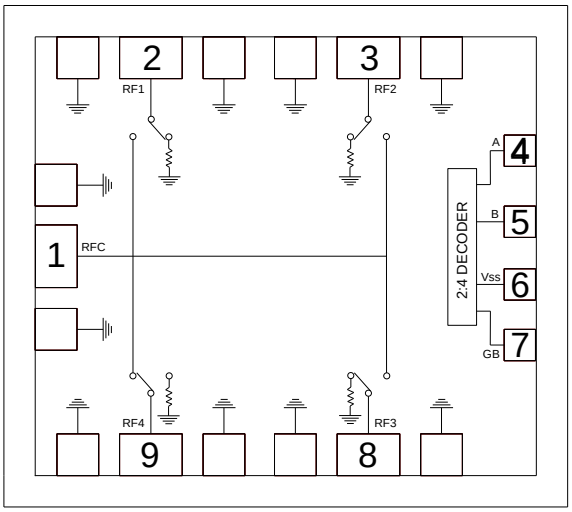
Product Overview

The CMD203 is a broadband MMIC SP4T switch in die form. The CMD203 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 CMD203 operates using complementary control voltage logic lines of 0/-5 V and consumes little DC current.

Key Features

- Low Loss Broadband Performance
- High Isolation
- Non-Reflective Design
- Integrated 2:4 TTL Decoder
- Small Die Size: 1350 um x 1200 um

Functional Block Diagram



Ordering Information

Part No.	Description
CMD203	DC-20 GHz SP4T Non-reflective Switch, 50 Piece WP Sample

Electrical Performance (V_{ctl} = 0/-5 V, V_{ss} = -5 V, T_A = 25 °C, F = 10 GHz)

Parameter		Min	Typ	Max	Units
Frequency Range			DC - 20		GHz
Insertion Loss			2.4		dB
Isolation			45		dB
Return Loss - On State			9		dB
Return Loss RF1, RF2, RF3, RF4 - Off State			11		dB
Input P1dB			21		dBm
Switching Characteristics	tRISE, tFALL (10/90% RF)		66		ns
	tON, tOFF (50% CTL to 10/90% RF)		81/8		

Absolute Maximum Ratings

Parameter	Rating
RF Input Power	+27 dBm
Bias Voltage (V_{ss})	-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
Terminated Power Level	531 mW
Thermal Resistance, θ_{JC}	122.23° C/W

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

Bias Voltage & Current

V_{ss} Range = -5.0V ± 10%		
V_{ss} (V)	I_{ss} (Typ) (mA)	I_{ss} (Max) (mA)
-5	4.5	8.0

TTL/CMOS Control Voltages

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

Truth Table

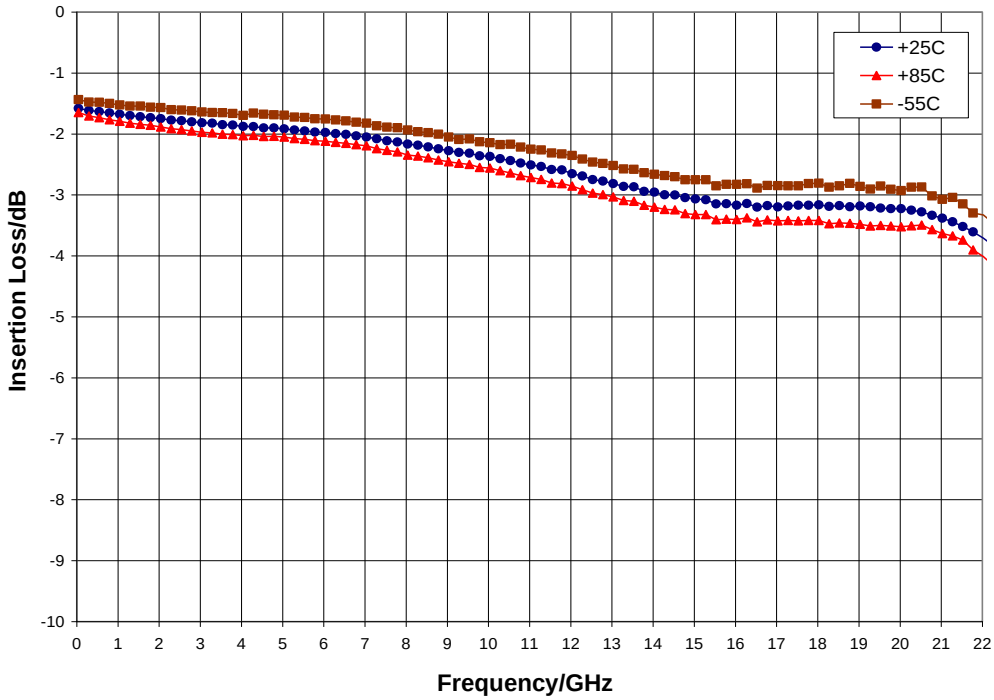
Control Input		Signal Path State
A	B	RFC to:
High	High	RF1
Low	High	RF2
High	Low	RF3
Low	Low	RF4

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

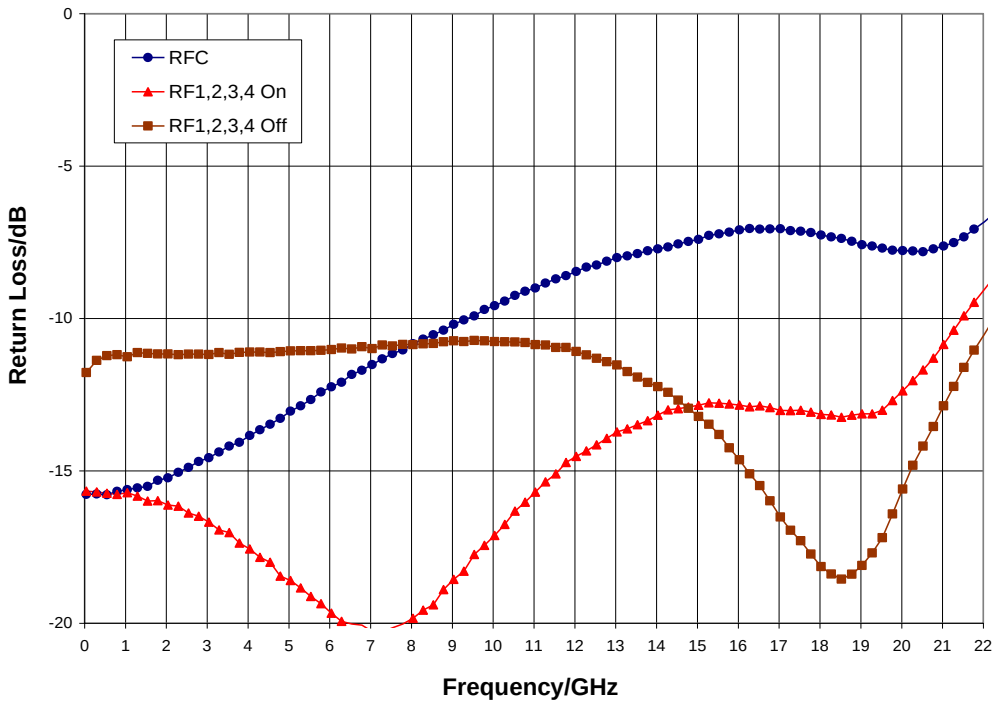
Parameter		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	Units
Frequency Range			DC - 6			DC - 14			DC - 20		GHz
Insertion Loss			2	2.4		2.9	3.7		3.2	4	dB
Isolation		36	50		27.5	40		24	32		dB
Return Loss - On State			11			8			8		dB
Return Loss - Off State			11			12			15		dB
Input P1dB			19.5			21			22		dBm
Input IP3			28			30			30		dBm
Switching Characteristics	tON, tOFF (50% CTL to 10/90% RF)		66			66			66		ns
	tRISE, tFALL (10/90% RF)		81/8			81/8			81/8		

Typical Performance

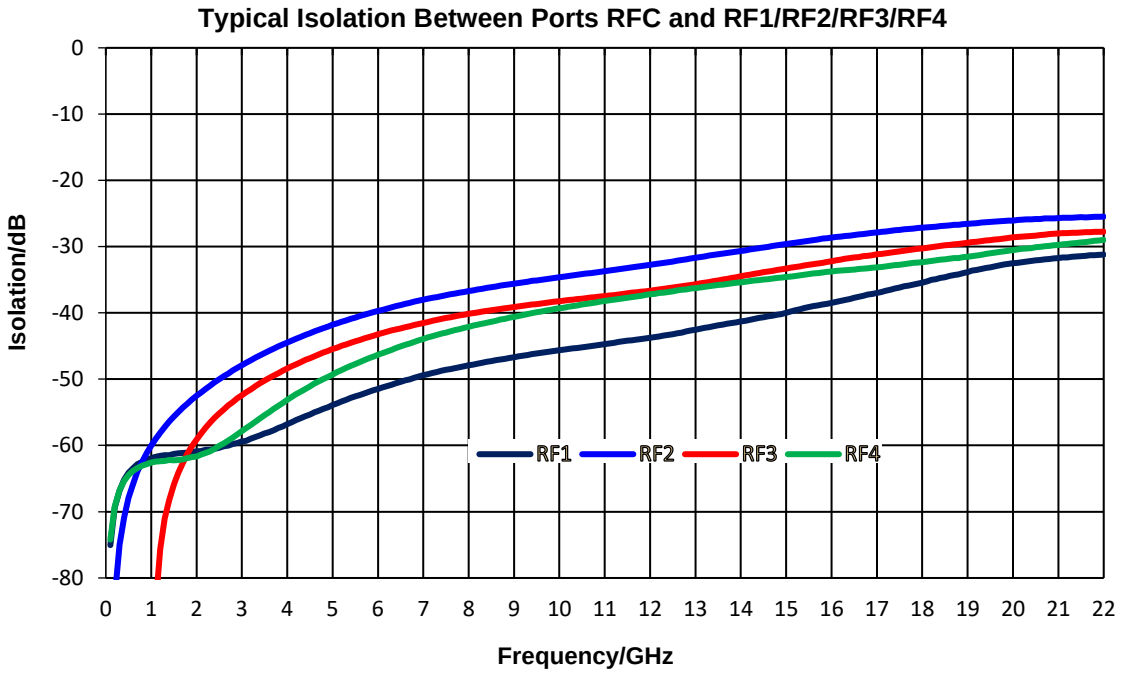
Insertion Loss vs. Temperature

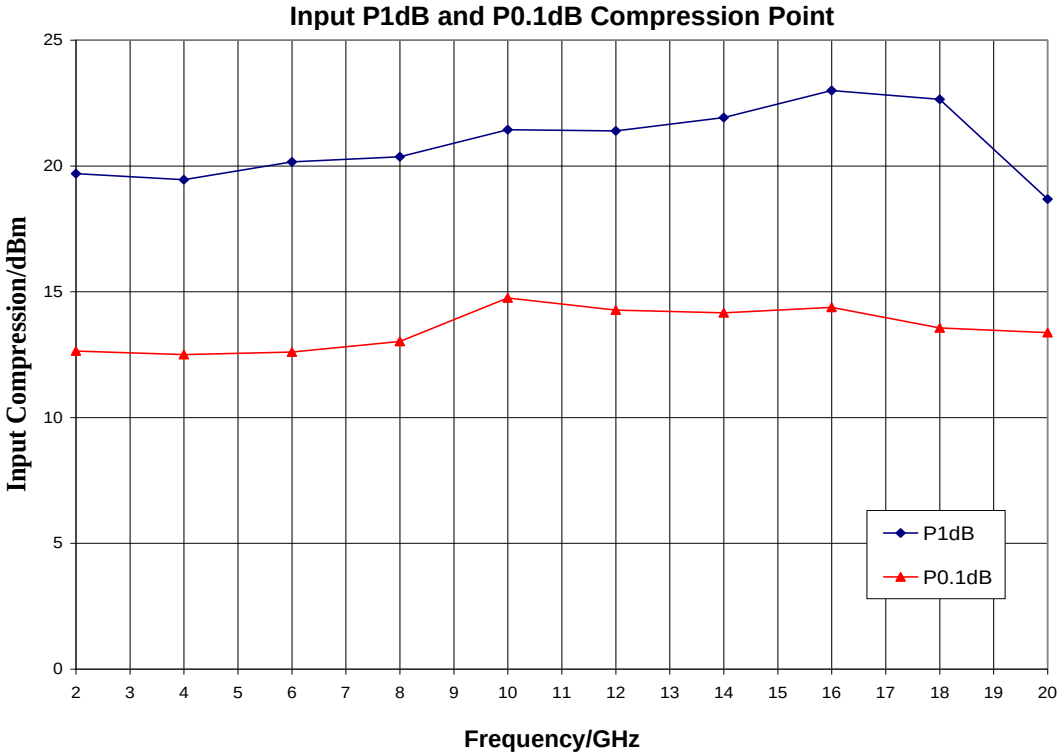


Return Loss



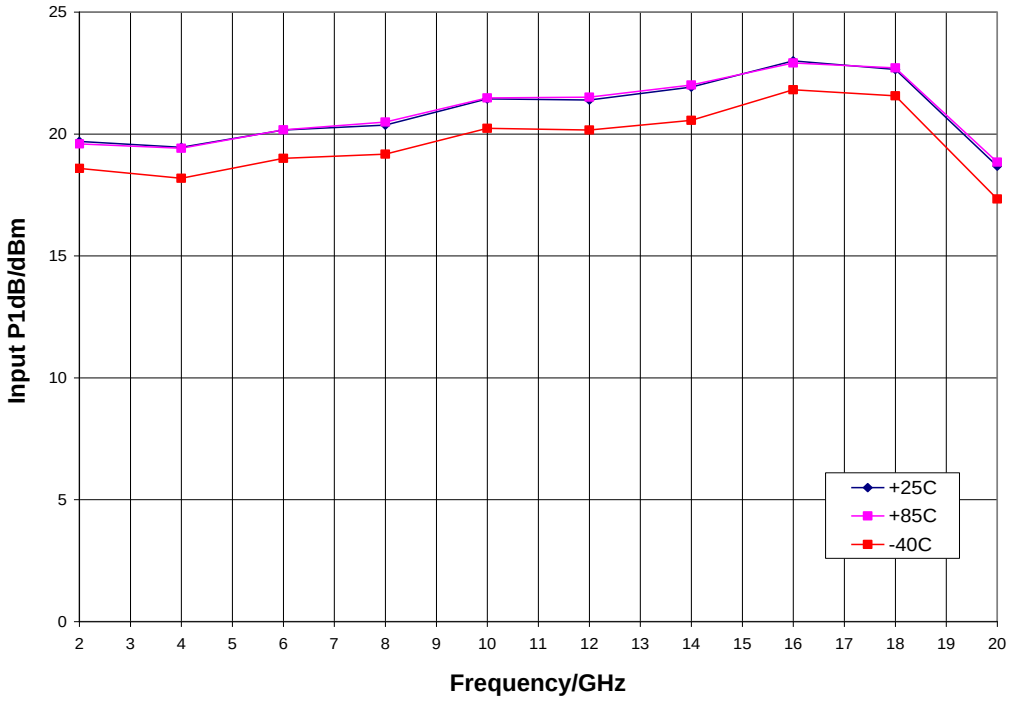
Typical Performance



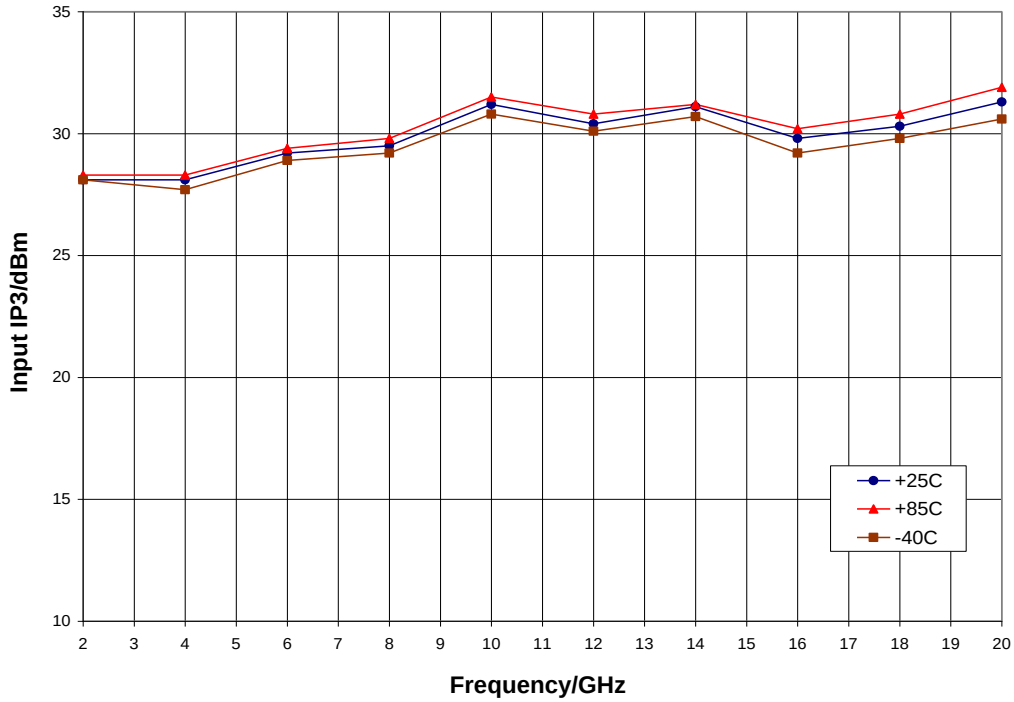


Typical Performance

Input P1dB vs. Temperature

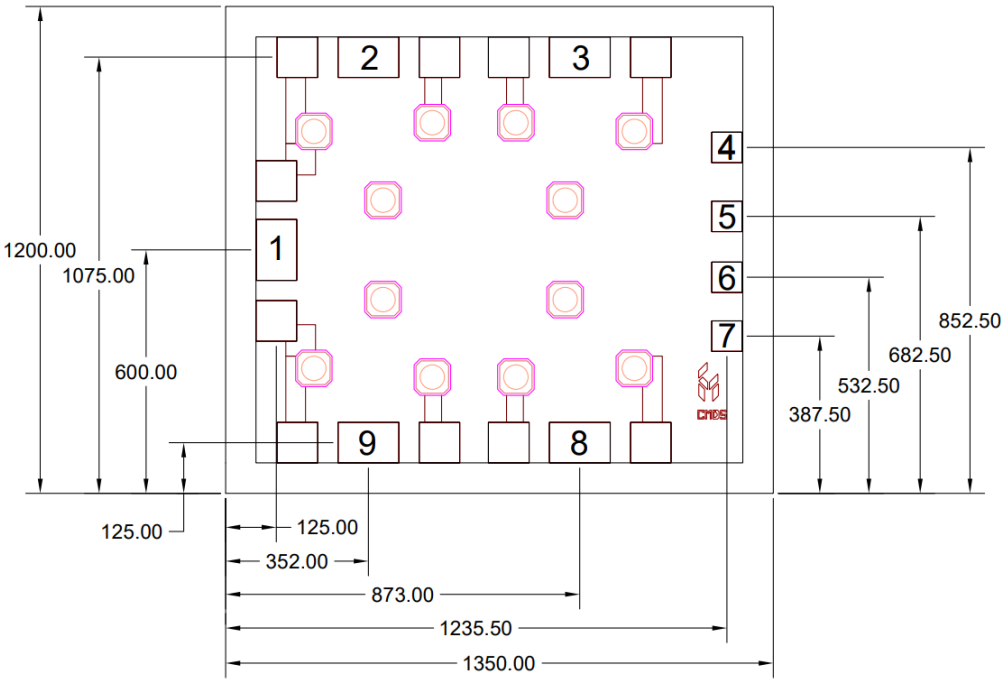


Input Third Order Intercept Point vs. Temperature



Mechanical Information

Die Outline (all dimensions in microns)



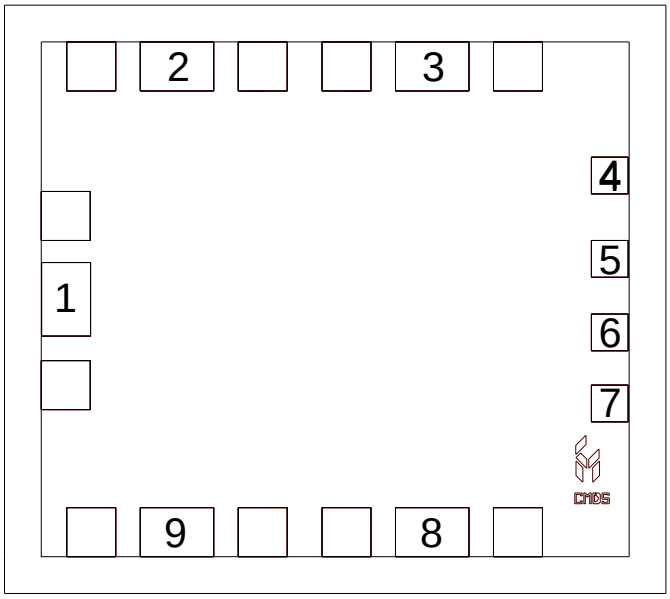
Notes:

1. No connection required for unlabeled pads
2. Backside is RF and DC ground
3. Backside and bond pad metal: Gold
4. Die is 85 microns thick
5. DC bond pads (4, 5, 6, 7) are 100 x 100 microns
6. RF bond pads (1, 2, 3, 8, 9) are 100 x 150 microns

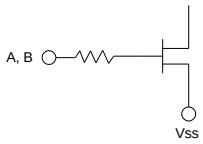
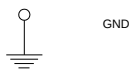
GaAs MMIC devices are susceptible to damage from Electrostatic Discharge. Proper precautions should be observed during handling, assembly and test.

Pin Description

Pad Diagram



Functional Description

Pin	Function	Description	Schematic
1, 2, 3, 8, 9	RFC, RF1, RF2, RF3, RF4	These pins are DC coupled and matched to 50 ohm Blocking capacitors are required if RF line potential is not equal to 0 V	
4	CTLA	See truth table and control voltage table	
5	CTLB	See truth table and control voltage table	
6	V_{ss}	Power supply voltage	
7	GB	Connect to DC ground	
Backside	Ground	Connect to RF / DC ground	

Applications Information

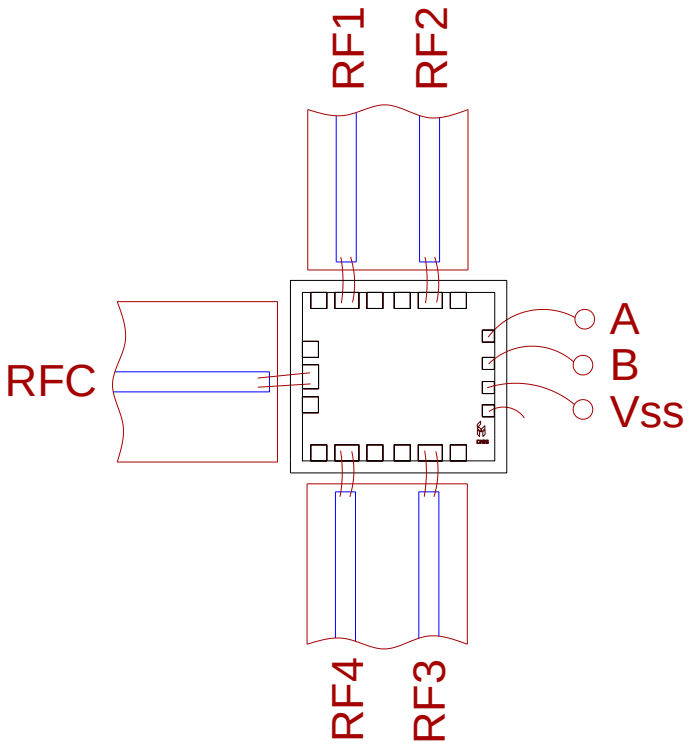
Assembly Guidelines

The backside of the CMD203 is RF ground. Die attach should be accomplished with electrically and thermally conductive epoxy only. Eutectic attach is not recommended. Standard assembly procedures should be followed for high frequency devices. The top surface of the semiconductor should be made planar to the adjacent RF transmission lines, and the RF decoupling capacitors placed in close proximity to the DC connections on chip.

RF connections should be made as short as possible to reduce the inductive effect of the bond wire. Use of a 0.8 mil thermosonic wedge bonding is highly recommended as the loop height will be minimized. The RF inputs and outputs require a double bond wire as shown.

The semiconductor is 85 um thick and should be handled by the sides of the die or with a custom collet. Do not make contact directly with the die surface as this will damage the monolithic circuitry. Handle with care.

Assembly Diagram



Handling Precautions

Parameter	Rating	Standard
ESD – Human Body Model (HBM)	Class 1A	ESDA / JEDEC JS-001-2012



Caution!
ESD-Sensitive Device

RoHS Compliance

This part is compliant with 2011/65/EU RoHS directive (Restrictions on the Use of Certain Hazardous Substances in Electrical and Electronic Equipment) as amended by Directive 2015/863/EU.

This product also has the following attributes:

- Lead Free
- Antimony Free
- TBBP-A ($C_{15}H_{12}Br_40_2$) Free
- SVHC Free
- Halogen Free
- PFOS Free

Contact Information

For the latest specifications, additional product information, worldwide sales and distribution locations:

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Tel: **1-844-890-8163**

Email: customer.support@qorvo.com

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