

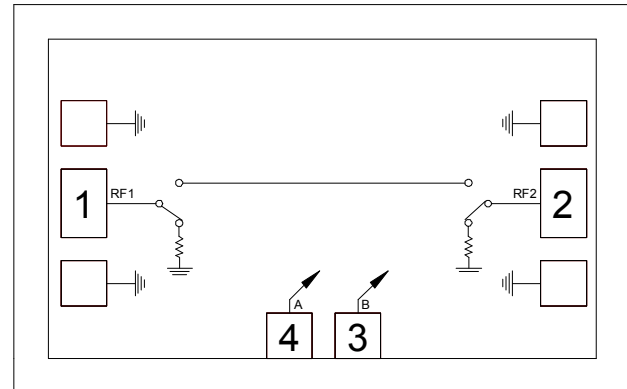
Features

- ▶ Low loss broadband performance
- ▶ High isolation
- ▶ Fast switching speed
- ▶ Non-reflective design - RF1 and RF2
- ▶ Small die size

Description

The CMD204 die is a general purpose broadband high isolation non-reflective MMIC SPST switch. Covering DC to 20 GHz, the CMD204 features a low insertion loss of 1.0 dB and high isolation of 50 dB at 10 GHz. The switch operates using complementary control voltage logic lines of 0/-5 V and requires no bias supply. The CMD204 offers full passivation for increased reliability and moisture protection.

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		1.0		dB
Isolation		50		dB
Return Loss - On State		17		dB
Return Loss - Off State		17		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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CMD204

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	-55 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

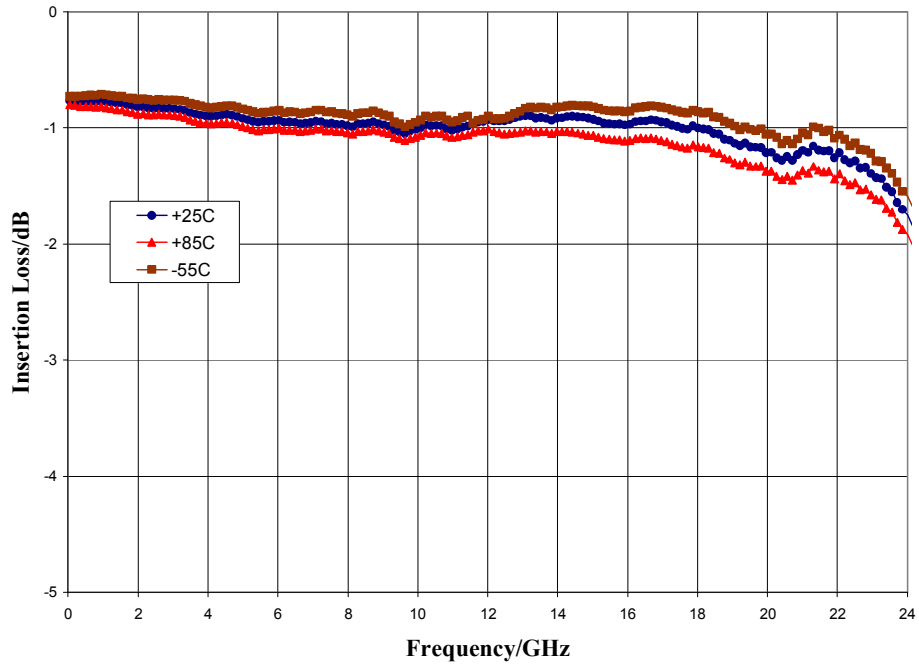
Electrical Specifications - V_{ctl} = 0/-5 V, T_A = 25 °C

Parameter	Min	Typ	Max	Min	Typ	Max	Units
Frequency Range	DC - 10		10 - 20				GHz
Insertion Loss		0.9	1.4		1.0	1.6	dB
Isolation	45	50		36	43		dB
Return Loss - On State		17			17		dB
Return Loss - RF1, 2 - Off State		17			17		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

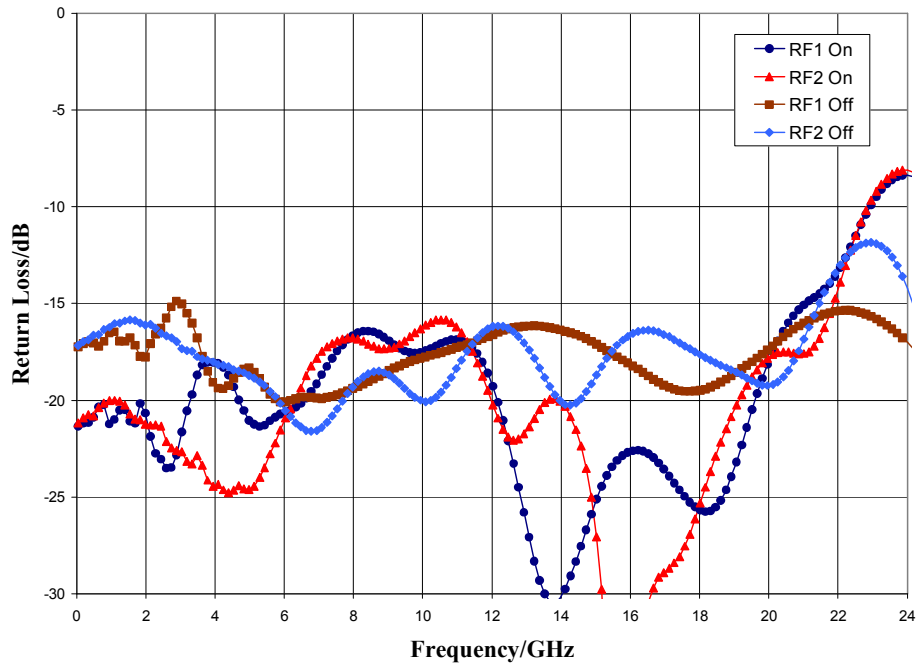
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Typical Performance

Insertion Loss vs. Temperature



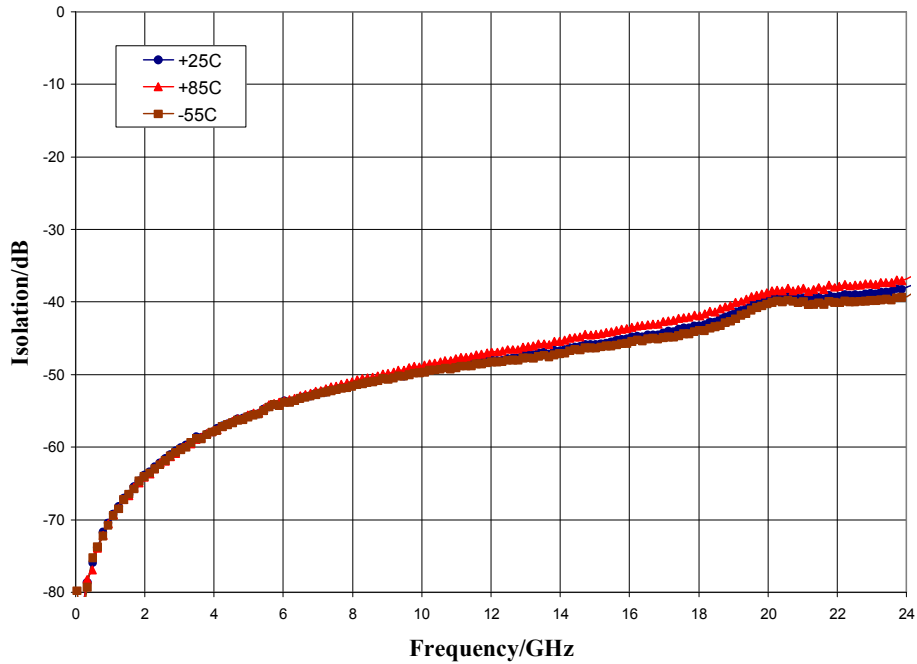
Return Loss



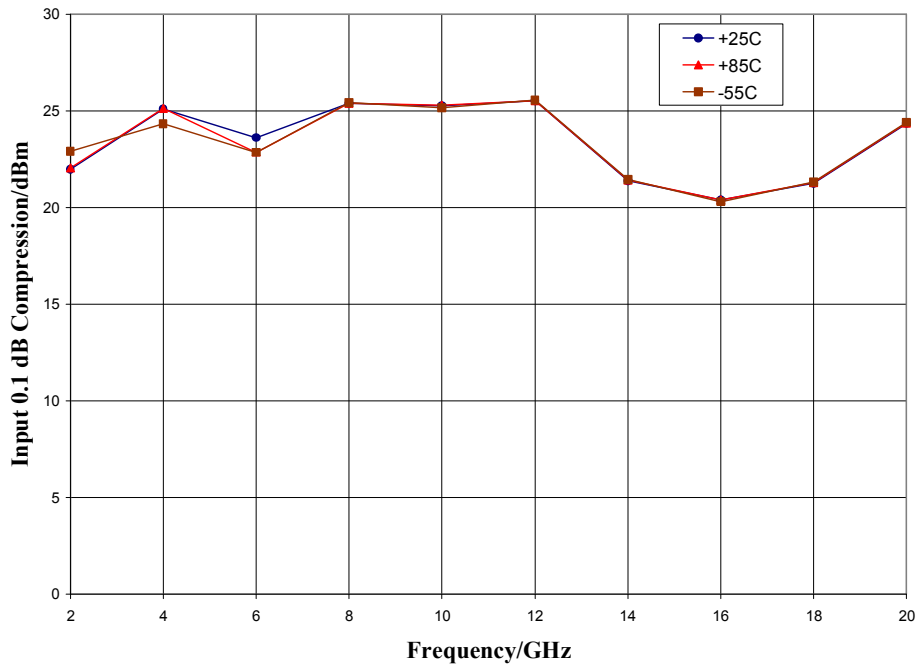
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Typical Performance

Isolation Between Ports RF1 and RF2 vs. Temperature



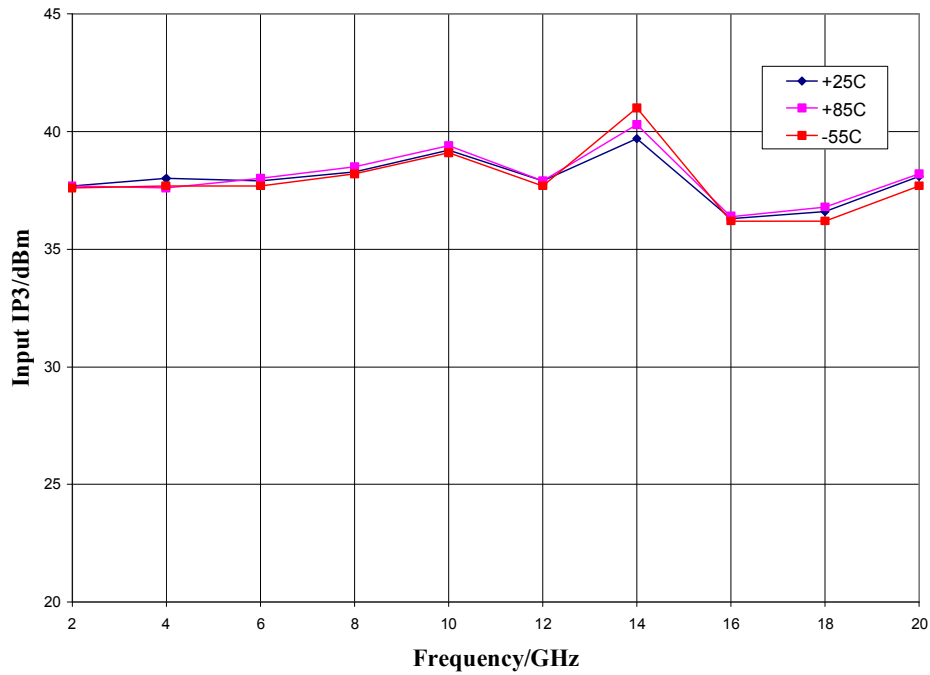
Input P0.1dB Compression Point vs. Temperature



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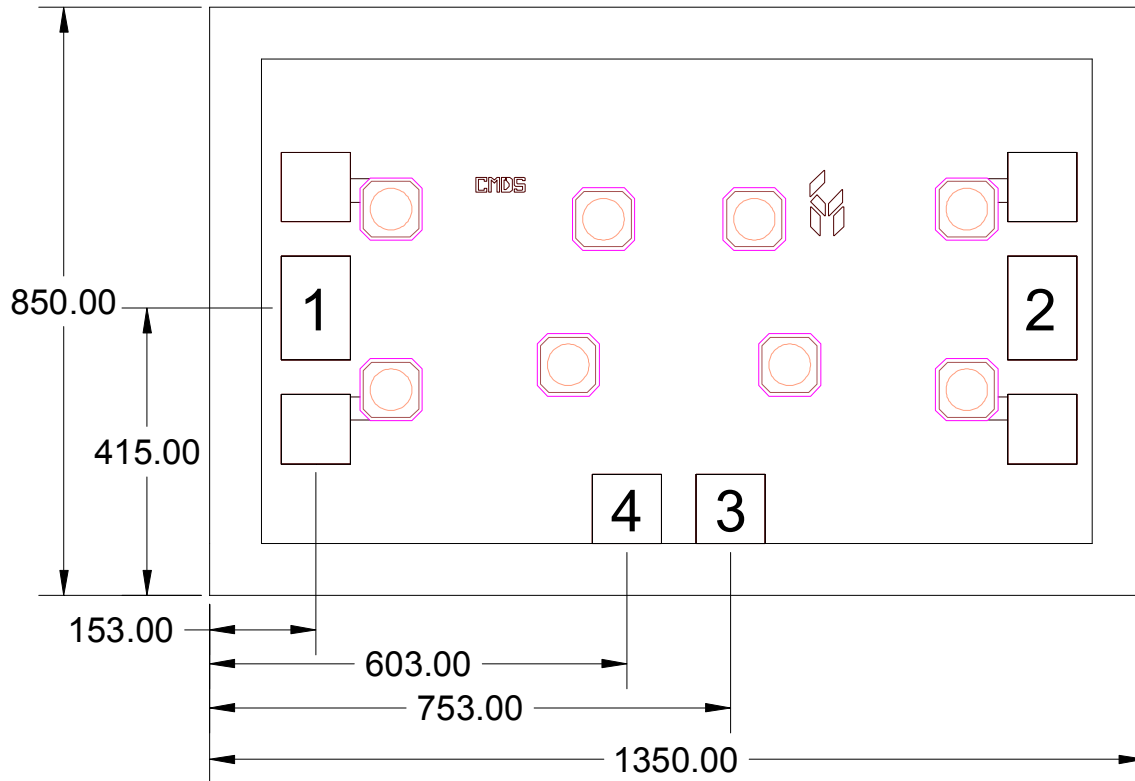
Typical Performance

Input Third Order Intercept Point vs. Temperature



Mechanical Information

Die Outline (all dimensions in microns)

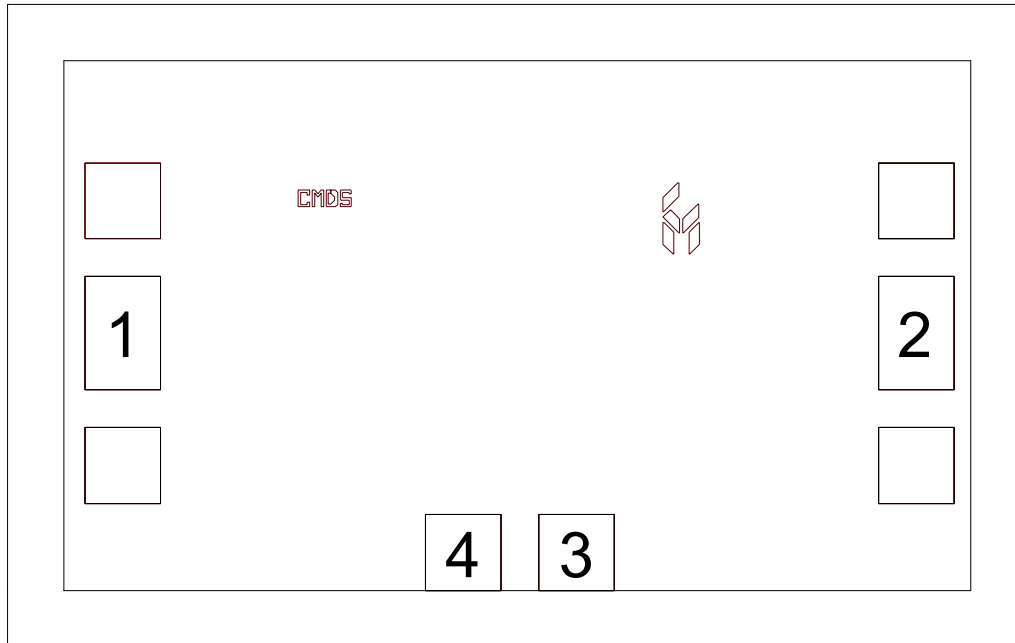


Notes:

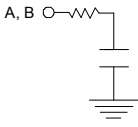

1. No connection required for unlabeled pads
2. Backside is RF and DC ground
3. Backside and bond pad metal: Gold
4. Die is 85 microns thick
5. DC bond pads (3, 4) are 100 x 100 microns
6. RF bond pads (1, 2) are 100 x 150 microns

Pad Description

Pad Diagram

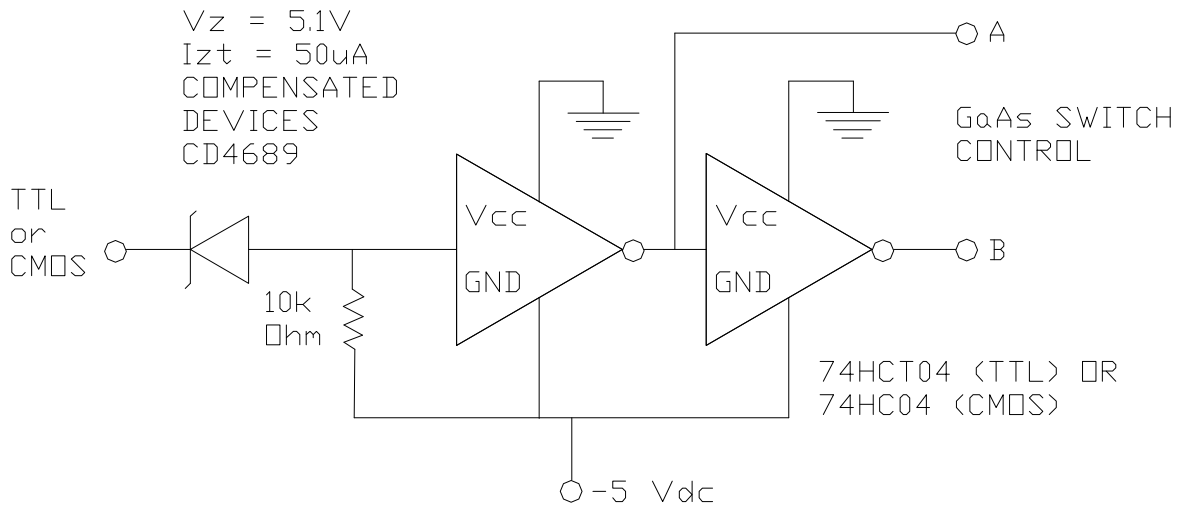


Functional Description

Pin	Function	Description	Schematic
1, 2	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	
3	CTLB	See truth table and control voltage table	
4	CTLA	See truth table and control voltage table	
Backside	Ground	Connect to RF / DC ground	

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

Assembly Guidelines

The backside of the CMD204 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 input and output require a double bond wire as shown.

The semiconductor is 85 μm 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

