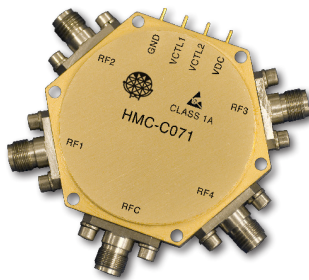




**THE DATASHEET OF  
ADG5413FBRUZ**



## GaAs MMIC SP4T NON-REFLECTIVE SWITCH, DC - 20 GHz

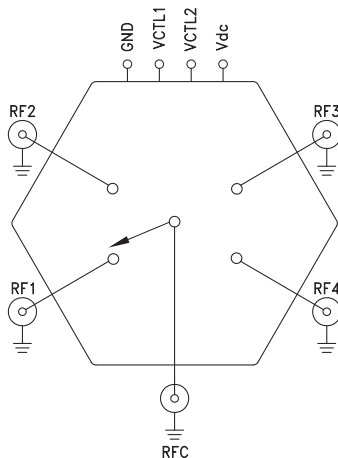


### Typical Applications

The HMC-C071 is ideal for:

- Fiber Optics & Broadband Telecom
- Microwave Radio & VSAT
- Military Radios, Radar, & ECM
- Test Instrumentation

### Functional Diagram



### Features

- High Isolation: >42 dB up to 12 GHz  
>32 dB up to 20 GHz
- Low Insertion Loss: 2 dB @ 2 GHz  
2.8 dB @ 12 GHz
- Fast Switching: 17 ns Rise/Fall Times
- Non-Reflective Design
- Hermetically Sealed Module
- Field Replaceable SMA connectors
- 55 °C to +85 °C Operating Temperature

### General Description

The HMC-C071 is a general purpose broadband high isolation non-reflective GaAs pHEMT SP4T switch housed in a miniature hermetic module with field replaceable SMA connectors. Covering DC to 20 GHz, the switch offers high isolation and low insertion loss. The switch features >42 dB isolation up to 12 GHz and >32 dB isolation up to 20 GHz. The HMC-C071 also provides 2.8 dB insertion loss up to 12 GHz with very fast rise and fall times of 17ns. A CMOS interface allows a single +5V bias voltage at very low DC currents.

### Electrical Specifications, $T_A = +25^\circ \text{C}$ , With $V_{dc} = +5\text{V}$ & 0/+5V Control, 50 Ohm System

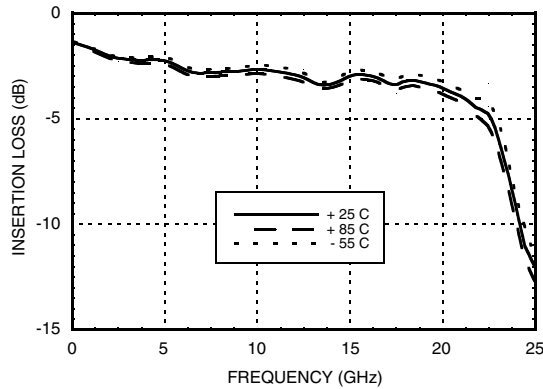
Parameter	Frequency	Min.	Typ.	Max.	Units
Insertion Loss	DC - 6 GHz		-2.7	-3.2	dB
	DC - 12 GHz		-2.8	-3.8	dB
	DC - 20 GHz		-3.8	-5	dB
Isolation	DC - 6 GHz	44	48		dB
	DC - 12 GHz	36	42		dB
	DC - 20 GHz	35	38		dB
Return Loss	"On State"	DC - 12 GHz	12		dB
		DC - 20 GHz	10		dB
Return Loss RF1, RF2	"Off State"	DC - 12 GHz	15		dB
		DC - 20 GHz	10		dB
Input Power for 1 dB Compression	0.5 - 20 GHz	20.5	24		dBm
Input Third Order Intercept (Two-Tone Input Power= +7 dBm Each Tone)	0.5 - 20 GHz	36.5	40		dBm
Switching Characteristics	DC - 20 GHz	tRISE, tFALL (10/90% RF)	17		ns
		tON, tOFF (50% CTL to 10/90% RF)	130		ns

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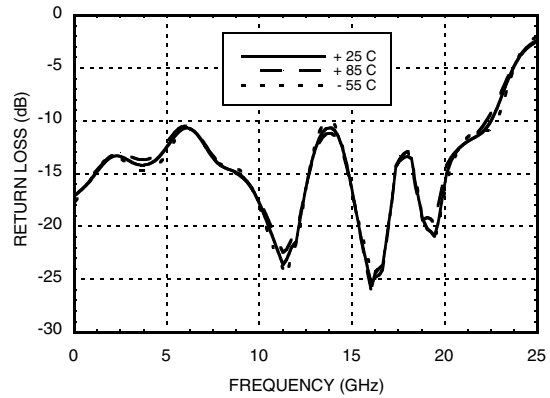
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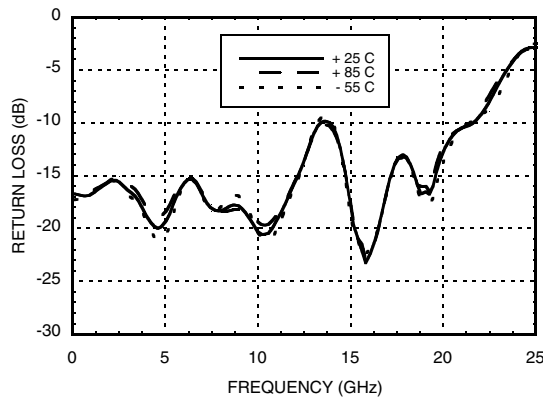
**Insertion Loss**



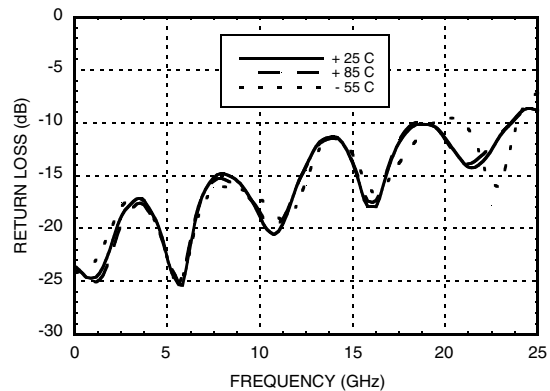
**Return Loss RFC**



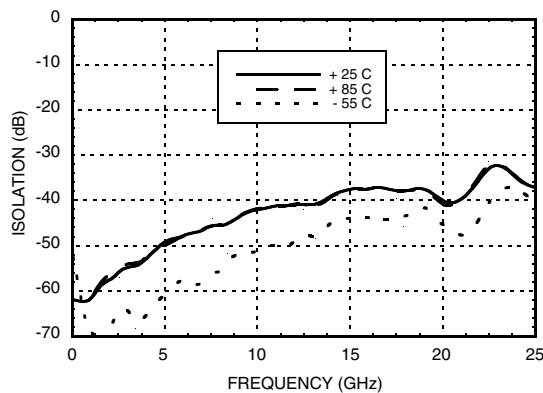
**Return Loss RF1, RF2, RF3, RF4 On**



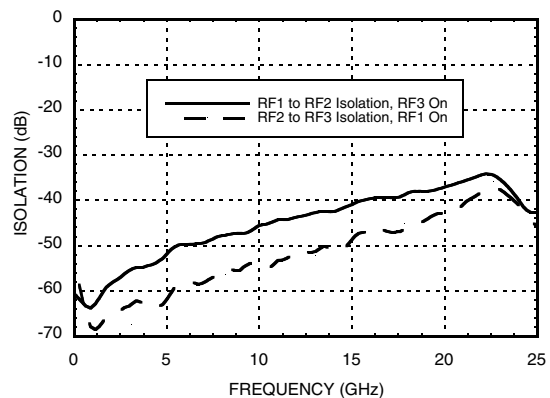
**Return Loss RF1, RF2, RF3, RF4 Off**



**Isolations**

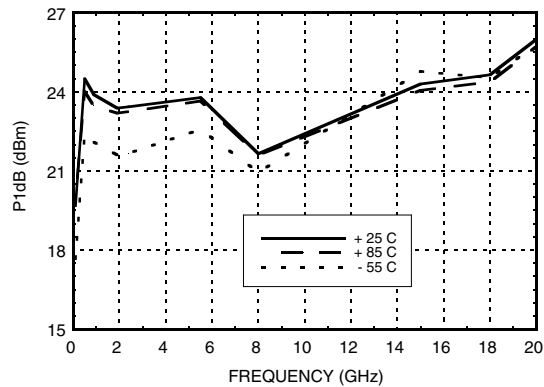


**Isolation Between Ports RF1 and RF2**

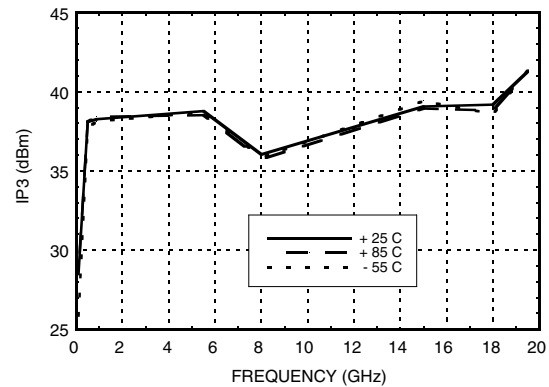


**GaAs MMIC SP4T NON-REFLECTIVE  
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**Input P1dB Compression Point**



**Input Third Order Intercept Point**



**Absolute Maximum Ratings**

RF Input Power	+24 dBm
Supply Voltage (Vdc)	+7V
Control Voltage Range (Vctl)	-0.5V to Vdc +1V
Storage Temperature	-65 to +150 °C
Operating Temperature	-55 to +85 °C

**Control Voltages**

State	Bias Condition
High	+3.0 to Vdc @ 1 mA Typ.
Low	0 to +1.5V @ 20 µA Typ.



**ELECTROSTATIC SENSITIVE DEVICE  
OBSERVE HANDLING PRECAUTIONS**

**Truth Table**

Control Input	Signal Path State	
	VCTL2	RFC to:
LOW	LOW	RF1
LOW	HIGH	RF2
HIGH	LOW	RF3
HIGH	HIGH	RF4


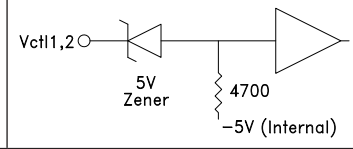
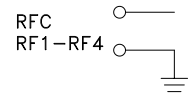
**Bias Voltage & Current**

Vdc Range = +5 Vdc ± 10%	
Vdc (V)	Idc (Typ.) (mA)
+5.0	1.4

(Bias current increases with switching rate to 15 - 20 mA.)

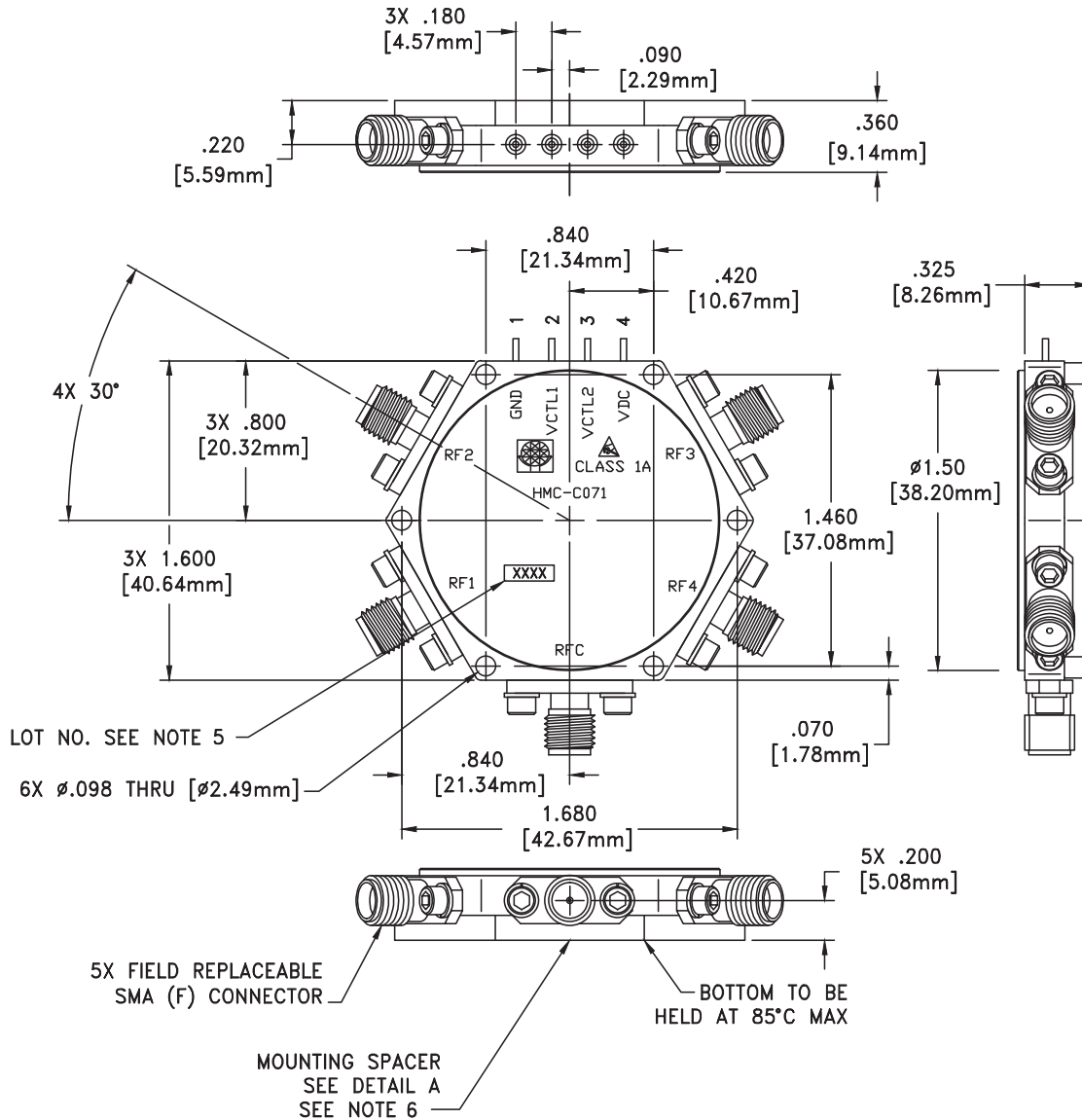
## GaAs MMIC SP4T NON-REFLECTIVE SWITCH, DC - 20 GHz

### Pin Descriptions

Pin Number	Function	Description	Interface Schematic
1	GND	Power supply ground.	
2, 3	Vctl1, 2	CMOS interface, control voltages per table. Requires active pull up to +5V ( $V_{dc}$ ).	<p>(Internal Driver)</p> 
4	Vdc	Supply voltage	
5 - 9	RFC, RF1, RF2, RF3, RF4	RF connector, SMA female, field replaceable. These pins are DC coupled and matched to 50 Ohms. DC blocking capacitors are required if external RF line potential is not equal to 0V.	

**GaAs MMIC SP4T NON-REFLECTIVE SWITCH, DC - 20 GHz**

**Outline Drawing**



**Package Information**

Package Type	C-15
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**NOTES:**

1. PACKAGE, LEADS, COVER MATERIAL: KOVAR™
2. FINISH: GOLD PLATE OVER NICKEL PLATE
3. ALL DIMENSIONS ARE IN INCHES [MILLIMETERS].
4. TOLERANCES:
  - 4.1 .XX = ±.02 [.51]
  - 4.2 .XXX = ±.010 [.25]
5. MARK LOT NUMBER ON .080 X .250 LABEL WHERE SHOWN, WITH .030 MIN TEXT HEIGHT.
6. MOUNTING SPACER PART NUMBER: 123811.

**GaAs MMIC SP4T NON-REFLECTIVE  
SWITCH, DC - 20 GHz****Notes:**

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