



## GaAs MMIC SPDT NON-REFLECTIVE SWITCH, DC - 18 GHz

### Features

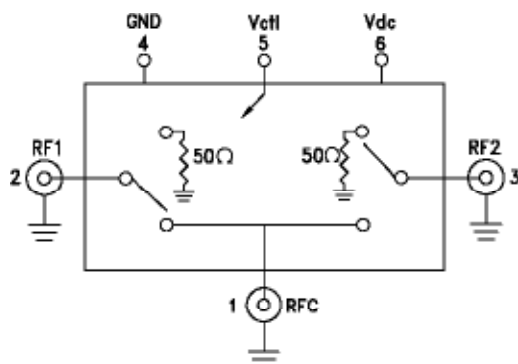
- High Isolation: >65 dB up to 6 GHz  
>50 dB up to 18 GHz
- Low Insertion Loss: 2 dB @ 8 GHz  
2.8 dB @ 12 GHz
- Fast Switching: 3 ns Rise/Fall Times
- Non-Reflective Design
- Hermetically Sealed Module
- Field Replaceable SMA connectors
- 55 to +85 °C Operating Temperature

### Typical Applications

The HMC-C058 is ideal for:

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

### Functional Diagram



### General Description

The HMC-C058 is a general purpose broadband high isolation non-reflective GaAs MESFET SPDT switch housed in a miniature hermetic module with field replaceable SMA connectors. Covering DC to 18 GHz, the switch offers high isolation and low insertion loss. The switch features >65 dB isolation up to 6 GHz and >50 dB isolation up to 18 GHz. A CMOS interface allows a single +5V bias voltage at very low DC currents.

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

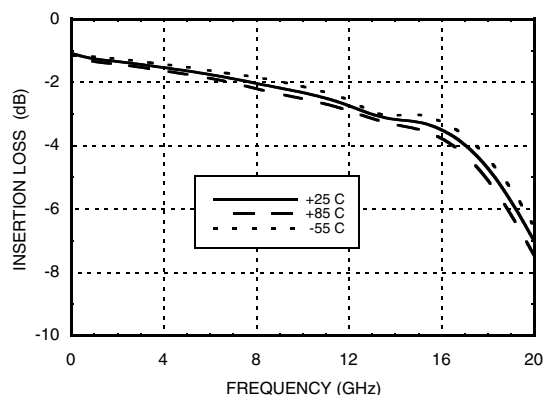
| Parameter                                                               | Frequency    | Min.                             | Typ. | Max. | Units |
|-------------------------------------------------------------------------|--------------|----------------------------------|------|------|-------|
| Insertion Loss                                                          | DC - 6 GHz   |                                  | 1.6  | 2.4  | dB    |
|                                                                         | DC - 10 GHz  |                                  | 2.0  | 2.8  | dB    |
|                                                                         | DC - 18 GHz  |                                  | 3.0  | 5.5  | dB    |
| Isolation                                                               | DC - 6 GHz   | 55                               | 65   |      | dB    |
|                                                                         | DC - 10 GHz  | 50                               | 60   |      | dB    |
|                                                                         | DC - 18 GHz  | 42                               | 55   |      | dB    |
| Return Loss                                                             | "On State"   | DC - 6 GHz                       | 17   |      | dB    |
|                                                                         |              | DC - 18 GHz                      | 12   |      | dB    |
| Return Loss RF1, RF2                                                    | "Off State"  | DC - 6 GHz                       | 14   |      | dB    |
|                                                                         |              | DC - 18 GHz                      | 17   |      | dB    |
| Input Power for 1 dB Compression                                        | 0.5 - 18 GHz | 24                               | 27   |      | dBm   |
| Input Third Order Intercept<br>(Two-Tone Input Power= +7 dBm Each Tone) | 0.5 - 18 GHz |                                  | 46   |      | dBm   |
| Switching Characteristics                                               | DC - 18 GHz  | tRISE, tFALL (10/90% RF)         | 3    |      | ns    |
|                                                                         |              | tON, tOFF (50% CTL to 10/90% RF) | 12   |      | ns    |
|                                                                         |              | Switching Transients             | 12   |      | mVpp  |

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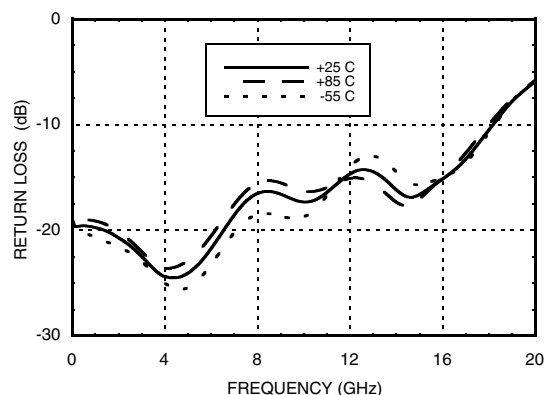
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Phone: 781-329-4700 • Order online at [www.analog.com](http://www.analog.com)  
Application Support: Phone: 1-800-ANALOG-D

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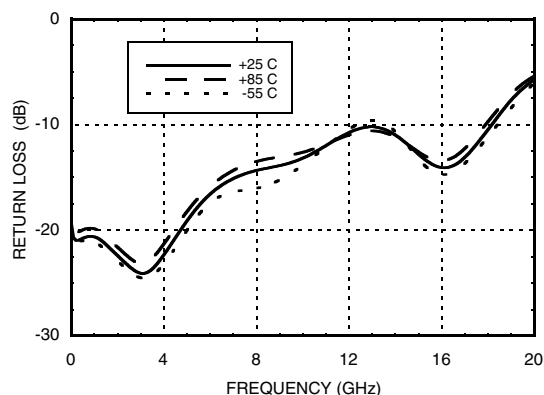
**Insertion Loss**



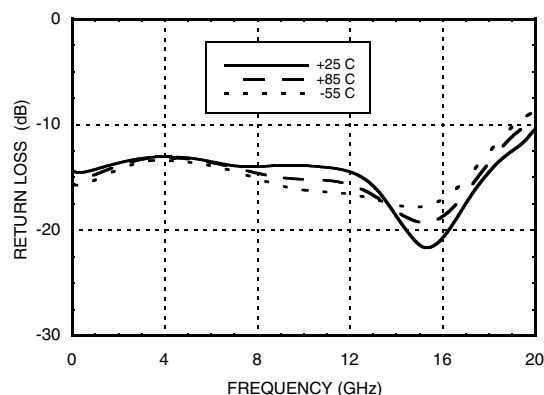
**Return Loss RFC**



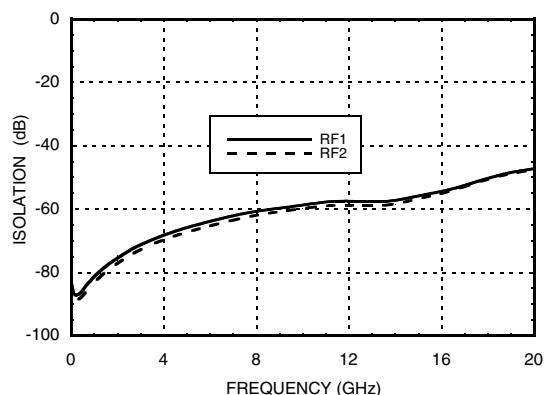
**Return Loss RF1, RF2 On**



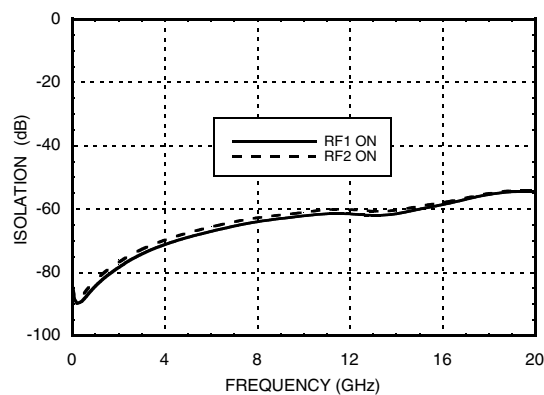
**Return Loss RF1, RF2 Off**



**Isolations**



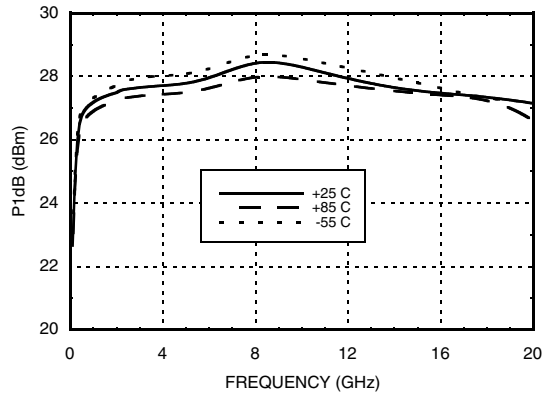
**Isolation Between Ports RF1 and RF2**



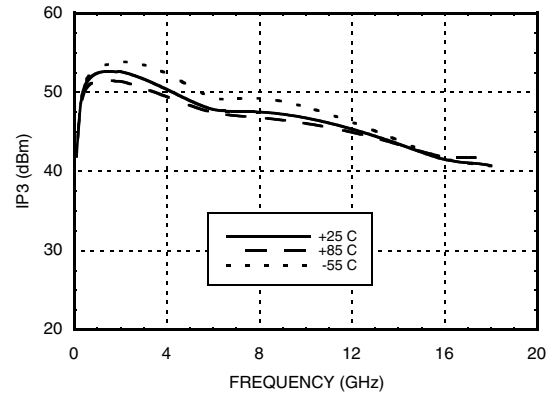


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### Input P1dB Compression Point



### Input Third Order Intercept Point



### Absolute Maximum Ratings

|                              |                    |
|------------------------------|--------------------|
| RF Input Power               | +30 dBm            |
| Supply Voltage (Vdc)         | +7 V               |
| Control Voltage Range (Vctl) | -0.5V to Vdc +0.5V |
| Hot Switch Power Level       | +27 dBm            |
| Storage Temperature          | -65 to +150 °C     |
| Operating Temperature        | -55 to +85 °C      |



**ELECTROSTATIC SENSITIVE DEVICE  
OBSERVE HANDLING PRECAUTIONS**

### Control Voltages

| State | Bias Condition          |
|-------|-------------------------|
| High  | +3.5 to Vdc @ 1 mA Typ. |
| Low   | 0 to +1.5V @ 20 µA Typ. |

### Truth Table

| Control Input | Signal Path State |            |
|---------------|-------------------|------------|
|               | RFC to RF1        | RFC to RF2 |
| High          | On                | Off        |
| Low           | Off               | On         |

### Bias Voltage & Current

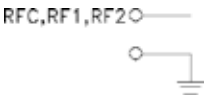
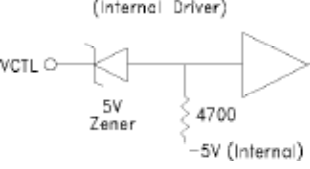
| Vdc Range = +5 Vdc ± 10% |                 |
|--------------------------|-----------------|
| Vdc (V)                  | Idc (Typ.) (mA) |
| +5.0                     | 1.4             |

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

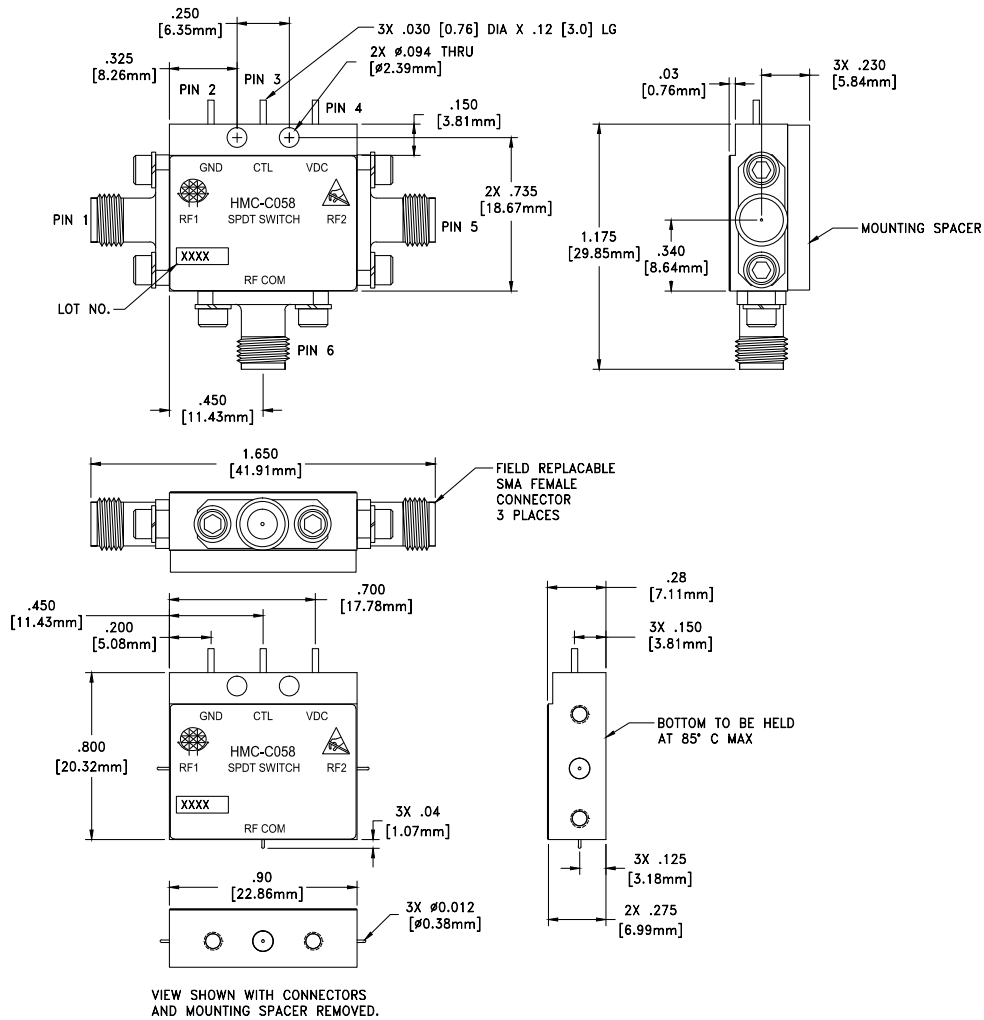


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### Pin Descriptions

| Pin Number | Function      | Description                                                                                                                                                                                | Interface Schematic                                                                 |
|------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| 1, 2, 3    | RFC, RF1, RF2 | RF connector, SMA female, field replaceable.<br>These pins are DC coupled and matched to 50 Ohms.<br>DC blocking capacitors are required if external RF line potential is not equal to 0V. |  |
| 4          | GND           | Power supply ground.                                                                                                                                                                       |  |
| 5          | Vctl          | CMOS interface, control voltages per table.<br>Requires active pullup to +5V ( $V_{dc}$ ).                                                                                                 |  |
| 6          | Vdc           | Supply voltage                                                                                                                                                                             |                                                                                     |

**GaAs MMIC SPDT NON-REFLECTIVE  
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**Outline Drawing**

**Package Information**

|              |      |
|--------------|------|
| Package Type | C-14 |
|--------------|------|

**NOTES:**

1. PACKAGE, LEADS, COVER MATERIAL: KOVAR™
2. PLATING: ELECTROLYTIC GOLD 50 MICROINCHES MIN., OVER ELECTROLYTIC NICKEL 75 MICROINCHES MIN.
3. SPACER MATERIAL: NICKEL PLATED ALUMINUM
4. DIMENSIONS ARE IN INCHES [MILLIMETERS].
5. TOLERANCES ±0.010 [0.25] UNLESS OTHERWISE SPECIFIED
6. FIELD REPLACEABLE SMA CONNECTORS. TENSOLITE 5602-5CCSF OR EQUIVALENT.



# HMC-C058

v01.0711

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