



### Typical Applications

The HMC183QS24 / HMC183QS24E is ideal for:

- Basestation Infrastructure

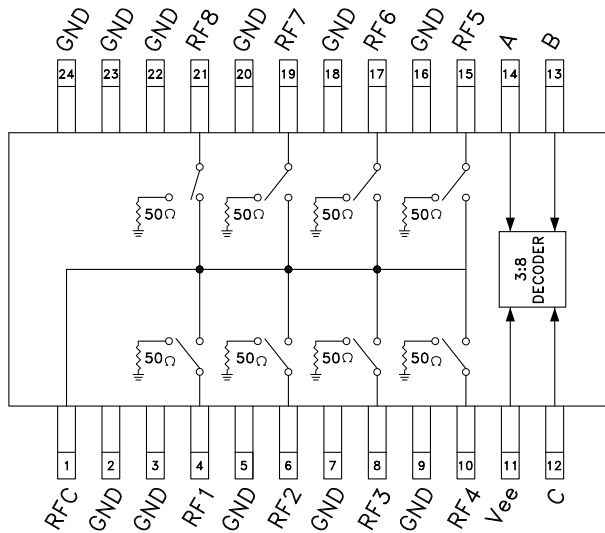
### Features

Low Insertion Loss (1 GHz): 0.8dB

Integrated 3:8 Decoder

24 Lead QSOP Package

### Functional Diagram



### General Description

The HMC183QS24 & HMC183QS24E are low-cost non-reflective SP8T switches in 24-lead QSOP packages for use in antenna diversity, switched filter banks, gain/attenuation selection, and general channel multiplexing applications. A 3:8 decoder is integrated on the switch, requiring only 3 control lines with a negative bias to select an RF path. The 3:8 decoder replaces 16 control lines normally required by GaAs SP8T switches. Switch outputs are terminated when "off". The QSOP24 package occupies the same area as a 14-lead SOIC. See positive bias/TTL version HMC253QS24.

### Electrical Specifications,

$T_A = +25^\circ C$ , For 0I-5V Control and Vee = -5V in a 50 Ohm System

| Parameter  | Frequency     | Min.                             | Typ. | Max. | Units |
|--|---------------|----------------------------------|------|------|-------|
| Insertion Loss   | DC - 1.0 GHz  |                                  | 0.8  | 1.2  | dB    |
|  | DC - 1.5 GHz  |                                  | 1.0  | 1.5  | dB    |
|  | DC - 2.0 GHz  |                                  | 1.3  | 1.8  | dB    |
| Isolation  | DC - 0.5 GHz  | 38                               | 42   |      | dB    |
|  | DC - 1.0 GHz  | 32                               | 36   |      | dB    |
|  | DC - 1.5 GHz  | 29                               | 33   |      | dB    |
|  | DC - 2.0 GHz  | 26                               | 30   |      | dB    |
| Return Loss  | DC - 1.0 GHz  | 16                               | 20   |      | dB    |
|  | DC - 1.5 GHz  | 10                               | 14   |      | dB    |
|  | DC - 2.0 GHz  | 7                                | 11   |      | dB    |
| Return Loss  | DC - 1.0 GHz  | 12                               | 15   |      | dB    |
|  | DC - 1.5 GHz  | 10                               | 13   |      | dB    |
|  | DC - 2.0 GHz  | 10                               | 13   |      | dB    |
| Input Power for 1 dB Compression   | 50 MHz        |                                  | 18   |      | dBm   |
|  | 0.5 - 2.0 GHz |                                  | 20   |      | dBm   |
| Input Third Order Intercept<br>(Two-Tone Input Power = +7 dBm Each Tone) | 50 MHz        | 30                               | 35   |      | dBm   |
|  | 0.5 - 2.0 GHz | 37                               | 42   |      | dBm   |
| Switching Characteristics  | DC - 2.0 GHz  | tRISE, tFALL (10/90% RF)         | 35   |      | ns    |
|  |               | tON, tOFF (50% CTL to 10/90% RF) | 50   |      | ns    |

For price, delivery, and to place orders, please contact Hittite Microwave Corporation:

20 Alpha Road, Chelmsford, MA 01824 Phone: 978-250-3343 Fax: 978-250-3373

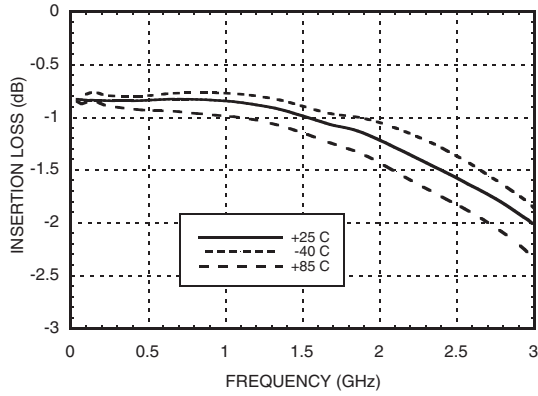
Order On-line at [www.hittite.com](http://www.hittite.com)



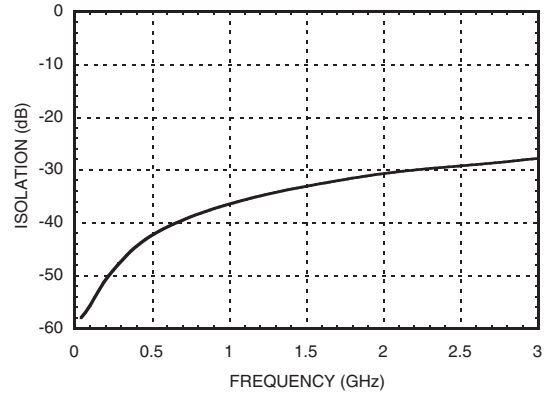
# HMC183QS24 / 183QS24E

## GaAs MMIC SP8T NON-REFLECTIVE SWITCH, DC - 2 GHz

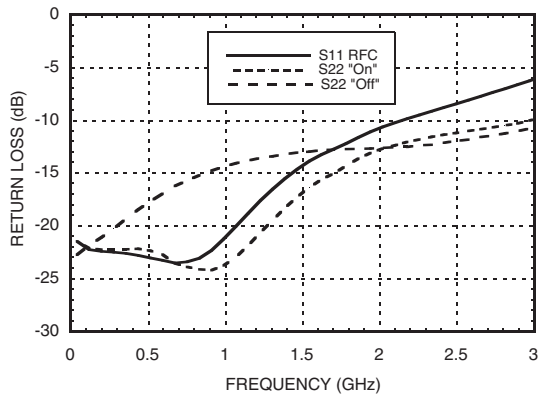
**Insertion Loss**



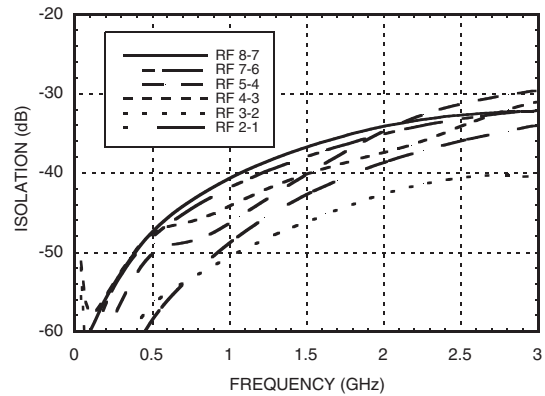
**Isolation**



**Return Loss**



**Isolation Between Several RF I/Os**



**Bias Voltage & Current**

| Vee Range = -5.0 Vdc ± 10% |                 |                 |
|----------------------------|-----------------|-----------------|
| Vee (Vdc)                  | Iee (Typ.) (mA) | Iee (Max.) (mA) |
| -5.0                       | 6.0             | 9.0             |

**Control Voltages**

| State | Bias Condition             |
|-------|----------------------------|
| Low   | 0 to -3 VDC 2.70 uA Typ.   |
| High  | -5 to -4.2 VDC @ 5 uA Typ. |



# HMC183QS24 / 183QS24E

## GaAs MMIC SP8T NON-REFLECTIVE SWITCH, DC - 2 GHz

### Absolute Maximum Ratings

|                               |  |
|-------------------------------|--|
| Bias Voltage Range (Port Vee) | -7.0 Vdc                                 |
| Control Voltage Range (A & B) | Vee -0.5 to +1.0 Vdc                     |
| Storage Temperature           | -65 to +150 °C                           |
| Operating Temperature         | -40 to +85 °C                            |
| Maximum Input Power           | +26 dBm (<500 MHz)<br>+29 dBm (>500 MHz) |

### Truth Table

| Control Input |      |      | Signal Path State |
|---------------|------|------|-------------------|
| A             | B    | C    | RFCOM to:         |
| High          | High | High | RF1               |
| Low           | High | High | RF2               |
| High          | Low  | High | RF3               |
| Low           | Low  | High | RF4               |
| High          | High | Low  | RF5               |
| Low           | High | Low  | RF6               |
| High          | Low  | Low  | RF7               |
| Low           | Low  | Low  | RF8               |

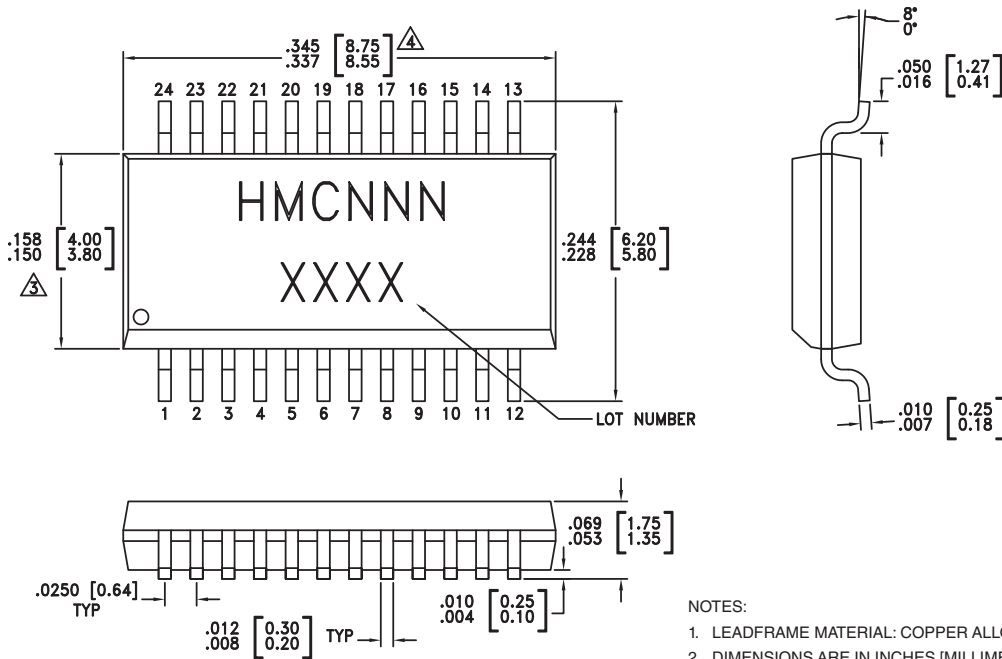


ELECTROSTATIC SENSITIVE DEVICE  
OBSERVE HANDLING PRECAUTIONS

10

SWITCHES - SMT

### Outline Drawing



NOTES:

- LEADFRAME MATERIAL: COPPER ALLOY
- DIMENSIONS ARE IN INCHES [MILLIMETERS].
- $\triangle$  DIMENSION DOES NOT INCLUDE MOLDFLASH OF 0.15mm PER SIDE.
- $\triangle$  DIMENSION DOES NOT INCLUDE MOLDFLASH OF 0.25mm PER SIDE.
- ALL GROUND LEADS MUST BE SOLDERED TO PCB RF GROUND.

### Package Information

| Part Number | Package Body Material  | Leadframe Plating | MSL Rating          | Package Marking <sup>[3]</sup> |
|-------------|--|-------------------|---------------------|--------------------------------|
| HMC183QS24  | Low Stress Injection Molding Plastic Silica and Silicon Impregnated                | Sn/Pb Solder      | MSL1 <sup>[1]</sup> | HMC183<br>XXXX                 |
| HMC183QS24E | RoHS-compliant Low Stress Injection Molding Plastic Silica and Silicon Impregnated | 100% Matte Tin    | MSL1 <sup>[2]</sup> | HMC183<br>XXXX                 |

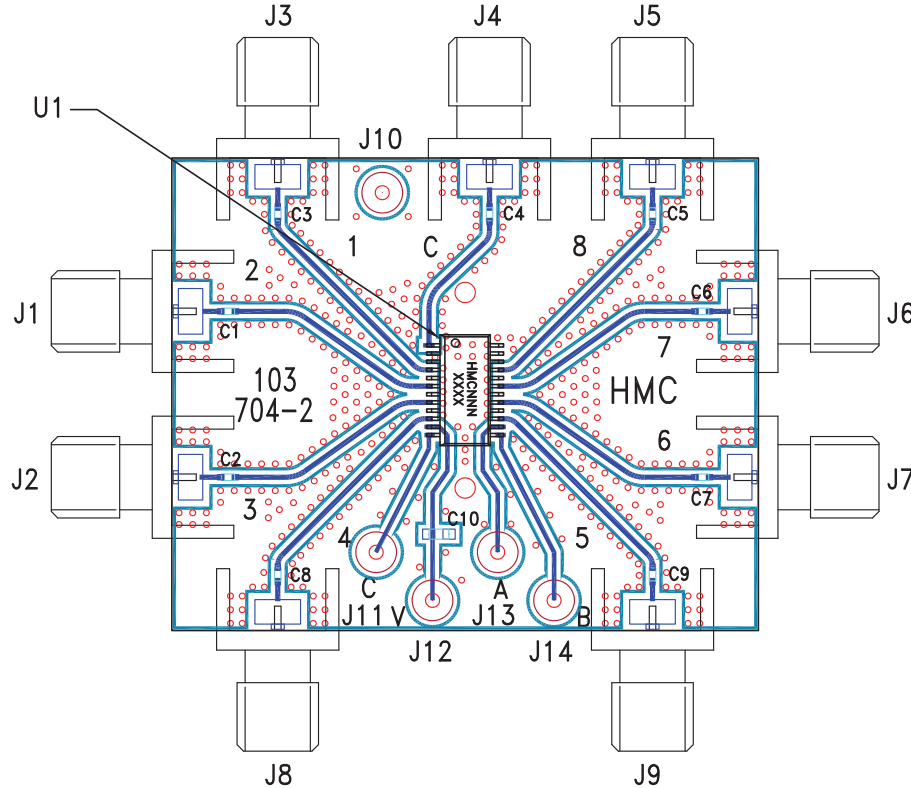
[1] Max peak reflow temperature of 235 °C

[2] Max peak reflow temperature of 260 °C

[3] 4-Digit lot number XXXX

For price, delivery, and to place orders, please contact Hittite Microwave Corporation:  
 20 Alpha Road, Chelmsford, MA 01824 Phone: 978-250-3343 Fax: 978-250-3373  
 Order On-line at [www.hittite.com](http://www.hittite.com)

### Evaluation Circuit Board



### List of Materials for Evaluation PCB 103706 [1]

| Item      | Description                          |
|-----------|--------------------------------------|
| J1 - J9   | PCB Mount SMA RF Connector           |
| J10 - J14 | DC Pin                               |
| C1 - C9   | 100 pF capacitor, 0402 Pkg.          |
| C10       | 10,000 pF capacitor, 0603 Pkg.       |
| U1        | HMC183QS24 / HMC183QS24E SP8T Switch |
| PCB*      | 103704 Evaluation PCB                |

[1] Reference this number when ordering complete evaluation PCB

[2] Circuit Board Material: Rogers 4350

The circuit board used in the final application should be generated with proper RF circuit design techniques. Signal lines at the RF port should have 50 ohm impedance and the package ground leads and package bottom should be connected directly to the ground plane similar to that shown above. The evaluation circuit board shown above is available from Hittite Microwave Corporation upon request.