



### Typical Applications

The HMC183QS24 / HMC183QS24E is ideal for:

- Basestation Infrastructure

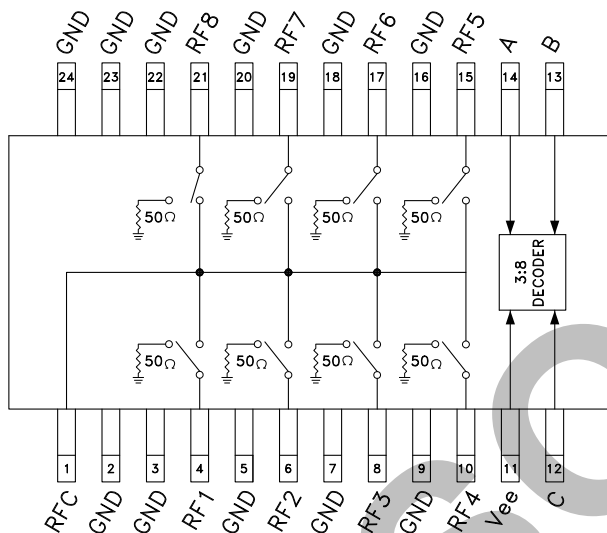
### Features

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,

$T_A = +25^\circ\text{C}$ , For 0/-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	RFC	DC - 1.0 GHz	16	20	dB
		DC - 1.5 GHz	10	14	dB
		DC - 2.0 GHz	7	11	dB
Return Loss	RF 1-8 'ON' and 'OFF'	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 (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

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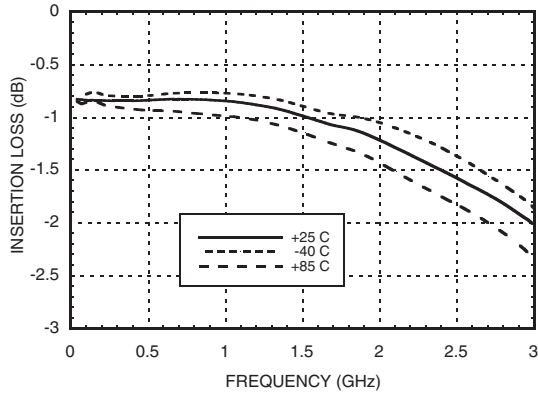
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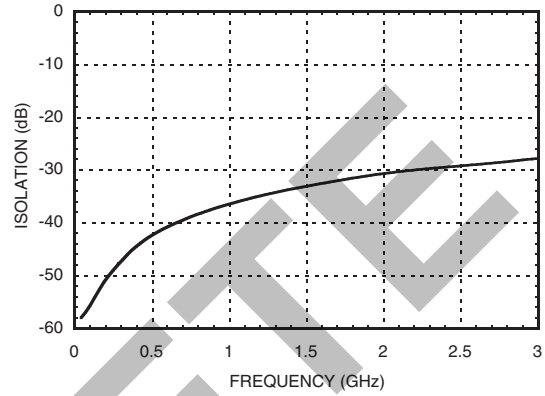
# HMC183QS24 / 183QS24E

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

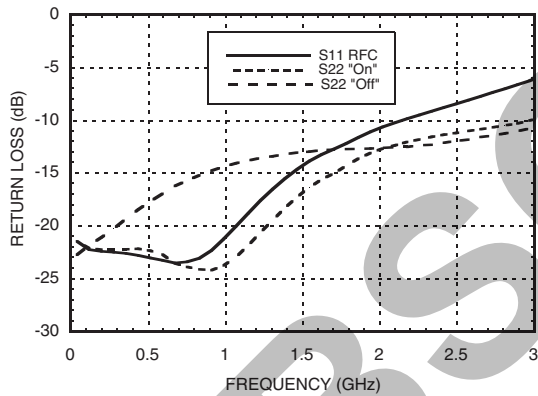
**Insertion Loss**



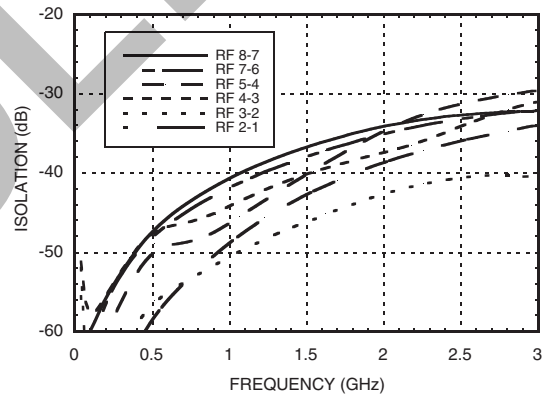
**Isolation**



**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.

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### 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) +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

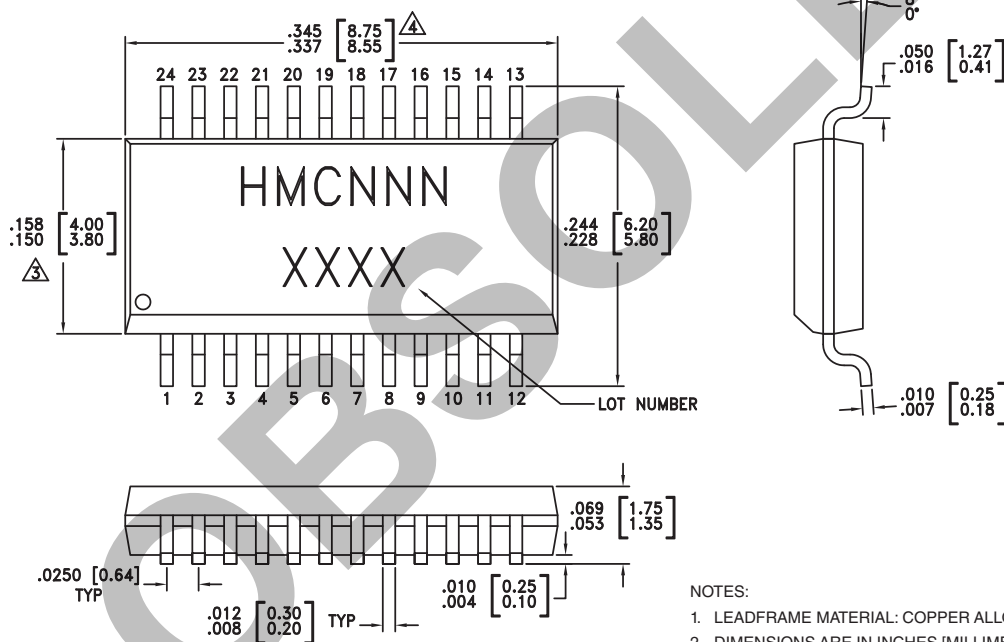


**ELECTROSTATIC SENSITIVE DEVICE  
OBSERVE HANDLING PRECAUTIONS**

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SWITCHES - SMT

### Outline Drawing



- NOTES:
- LEADFRAME MATERIAL: COPPER ALLOY
  - DIMENSIONS ARE IN INCHES [MILLIMETERS].
  - $\Delta$  DIMENSION DOES NOT INCLUDE MOLDFLASH OF 0.15mm PER SIDE.
  - $\nabla$  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 Molded Plastic Silica and Silicon Impregnated	Sn/Pb Solder	MSL1 <sup>[1]</sup>	HMC183 XXXX
HMC183QS24E	RoHS-compliant Low Stress Injection Molded Plastic Silica and Silicon Impregnated	100% Matte Tin	MSL1 <sup>[2]</sup>	HMC183 XXXX

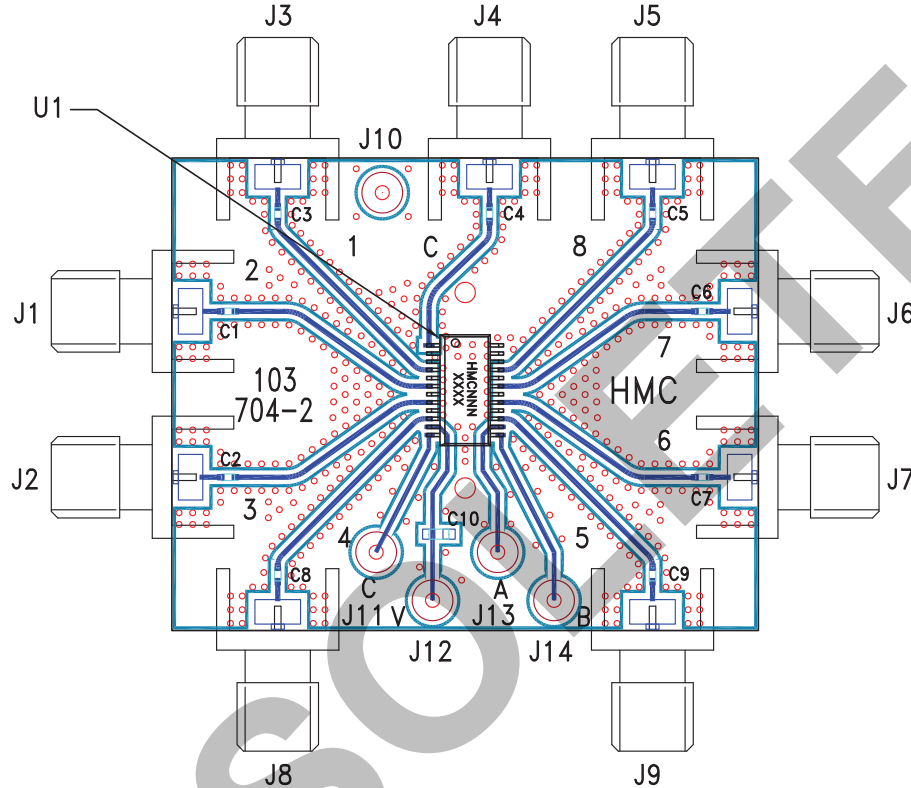
[1] Max peak reflow temperature of 235 °C  
 [2] Max peak reflow temperature of 260 °C  
 [3] 4-Digit lot number XXXX

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**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.