



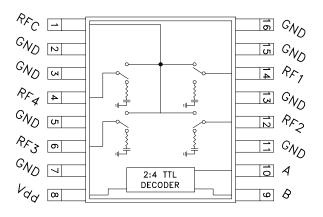
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Typical Applications

The HMC241AQS16 & HMC241AQS16E are ideal for:

- Base Stations & Portable Wireless
- CATV / DBS
- Wireless Local Loop
- Test Equipment

Functional Diagram



GaAs MMIC SP4T NON-REFLECTIVE SWITCH, DC - 3.5 GHz

Features

RoHS Compliant Product Low Insertion Loss (2 GHz): 0.7 dB Single Positive Supply: Vdd = +5V Integrated 2:4 TTL Decoder 16 Lead QSOP Package

General Description

The HMC241AQS16 & HMC241AQS16E are general purpose low-cost non-reflective SP4T switches in 16-lead QSOP packages. Covering DC - 3.5 GHz, this switch offers high isolation and has a low insertion loss of 0.7 dB at 2 GHz. The switch offers a single positive bias and true TTL/CMOS compatibility. A 2:4 decoder is integrated on the switch requiring only 2 control lines and a positive bias to select each path, replacing 8 control lines normally required by GaAs SP4T switches.

Electrical Specifications, $T_A = +25^{\circ}$ C, For TTL Control and Vdd = +5V in a 50 Ohm System

Parameter	Frequency	Min.	Тур.	Max.	Units
Insertion Loss	DC - 1.0 GHz DC - 2.0 GHz DC - 2.5 GHz DC - 3.5 GHz		0.7 0.8 0.8 1.0	1.0 1.1 1.1 1.5	dB dB dB dB
Isolation	DC - 1.0 GHz DC - 2.0 GHz DC - 2.5 GHz DC - 3.5 GHz	40 32 28 23	47 40 36 32		dB dB dB dB
Return Loss "On State"	DC - 2.5 GHz DC - 3.5 GHz	17 9	21 18		dB dB
Return Loss RF1-4 "Off State"	0.3 - 3.5 GHz 0.5 - 2.5 GHz	8 12	12 16		dB dB
Input Power for 1dB Compression	0.3 - 3.5 GHz	26	29		dBm
Input Third Order Intercept (Two-Tone Input Power = +10 dBm Each Tone)	0.3 - 3.5 GHz	40	48		dBm
Switching Characteristics	0.3 - 3.5 GHz				
tRISE, tFALL (10/90% RF) tON, tOFF (50% CTL to 10/90% RF)			40 150		ns ns

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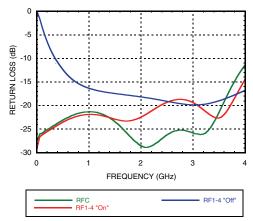
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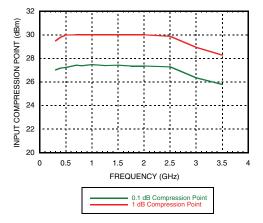
Insertion Loss Isolation 0 0 -10 -0.5 **NSERTION LOSS (dB)** -20 ISOLATION (dB) -1 -30 -1.5 -40 -2 -50 -2.5 -60 -3 -70 2 3 0 1 4 2 3 0 1 FREQUENCY (GHz) FREQUENCY (GHz) RF1 +25 C +85 C -40 C BE2

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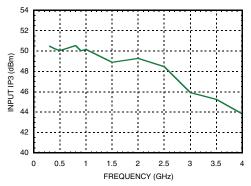




0.1 and 1 dB Input Compression Point



Input Third Order Intercept Point



NOTE:

DC Blocking capacitors are required at ports RFC and RF1, 2, 3, 4.

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4

RF3

RF4



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HMC241AQS16 / 241AQS16E

GaAs MMIC SP4T NON-REFLECTIVE SWITCH, DC - 3.5 GHz

Bias Voltage & Current

Vdd Range = +5 Vdc ± 10%			
Vdd Idd (Typ.) Idd (Max.) (Vdc) (mA) (mA)			
+5	2.5	6.0	

TTL/CMOS Control Voltages

State Bias Condition		Bias Condition
Low 0 to +0.8 Vdc @ 0.5µA Typ.		0 to +0.8 Vdc @ 0.5µA Typ.
	High	+2.0 to +5 Vdc @ 50 μΑ Typ.

Truth Table

Control Input		Signal Path State
A	В	RFCOM to:
LOW	LOW	RF1
HIGH	LOW	RF2
LOW	HIGH	RF3
HIGH	HIGH	RF4

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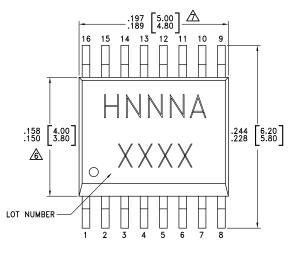


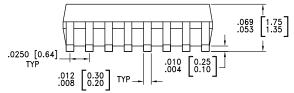
Absolute Maximum Ratings

Bias Voltage Range (Port Vdd)	+7.0 Vdc
Control Voltage Range (A & B)	-0.5V to Vdd +1 Vdc
Channel Temperature	150 °C
Thermal Resistance Insertion Loss Path	150 °C/W
Terminated Path	297 °C/W
Storage Temperature	-65 to +150 °C
Operating Temperature	-40 to +85 °C
Maximum Input Power Vdd = +5 Vdc	
Insertion Loss Path	+28.5 dBm
Terminated Path	+23.4 dBm
ESD Sensitivity (HBM)	Class 1A

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Outline Drawing





NOTES: 1. LEADFRAME MATERIAL: COPPER ALLOY

2. DIMENSIONS ARE IN INCHES [MILLIMETERS].

8° 0°

.050 1.27 .016 0.41

A DIMENSION DOES NOT INCLUDE MOLDFLASH OF 0.15mm PER SIDE.

.010 0.25 .007 0.18

- A DIMENSION DOES NOT INCLUDE MOLDFLASH OF 0.25mm PER SIDE.
- 5. ALL GROUND LEADS MUST BE SOLDERED TO PCB RF GROUND.

Package Information

Part Number		Package Body Material	Leadframe Plating	MSL Rating	Package Marking [3]
HMC241AQS1	6	Low Stress Injection Molded Plastic Silica and Silicon Impregnated	Sn/Pb Solder	MSL1 ^[1]	HMC241A XXXX
HMC241AQS16E RoHS-compliant Low Stress Injection Molded Plastic Silica and Silicon Impregnated		100% Matte Tin	MSL1 ^[2]	HMC241A 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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ELECTROSTATIC SENSITIVE DEVICE **OBSERVE HANDLING PRECAUTIONS**



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GaAs MMIC SP4T NON-REFLECTIVE SWITCH, DC - 3.5 GHz

Pin Descriptions

Pin Number	Function	Description	Interface Schematic
1, 4, 6, 12, 14	RF4, RF3, RF2, RF1, RFC	This pin is DC coupled and matched to 50 Ohms. Blocking capacitors are required.	
2, 3, 5, 7, 11, 13, 15, 16	GND	This pin must be connected to PCB RF ground to maximize isolation.	
8	Vdd	Supply Voltage +5 Vdc ±10%	
9	В	See truth table and control voltage table.	A,B 57K
10	A	See truth table and control voltage table.	$ \begin{array}{cccccccccccccccccccccccccccccccccccc$

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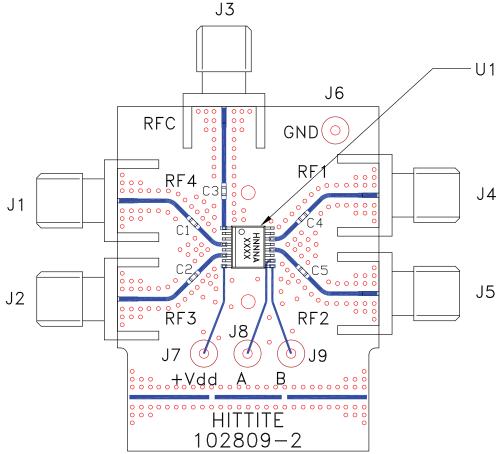


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GaAs MMIC SP4T NON-REFLECTIVE SWITCH, DC - 3.5 GHz

Evaluation PCB



List of Materials for Evaluation PCB EV1HMC241AQS16^[1]

Item	Description
J1 - J5	PCB Mount SMA RF Connector
J6 - J9	DC Pin
C1 - C5	330 pF capacitor, 0402 Pkg.
U1	HMC241AQS16 / 241AQS16E SP4T Switch
PCB [2]	102809 Evaluation PCB

[1] Reference this number when ordering complete evaluation PCB [2] Circuit Board Material: Rogers 4350

The circuit board used in the 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 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.

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