

HX13446-374-SQ 0.1 to 6.0 GHz GaAs SPDT Switch

General Description

The HX13446-374-SQ is a GaAs pHEMT I/C antenna switch that efficiently alternates between the antenna and either the TX or RX ports using two control voltages. Its exceptional features, including low loss, high isolation, high linearity, compact size, and cost-effectiveness, render it an optimal choice for dual-band WLAN systems operating within the frequency ranges of 2.4 to 2.5 GHz and 4.9 to 5.9 GHz.

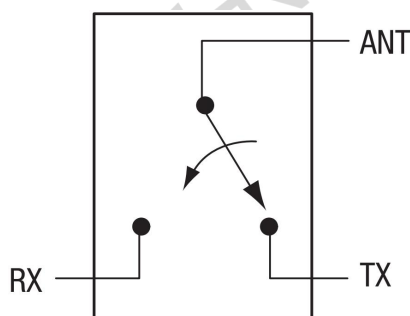
Features

- Positive low voltage control: 0 and 3.0 V
- High isolation: 38 dB @ 2.4 GHz and 30 dB @ 6 GHz
- Low insertion loss: 0.40 dB @ 2.5 GHz and 0.80 dB @ 6.0 GHz
- Advanced pHEMT process
- Excellent linearity performance: P1dB = +32 dBm

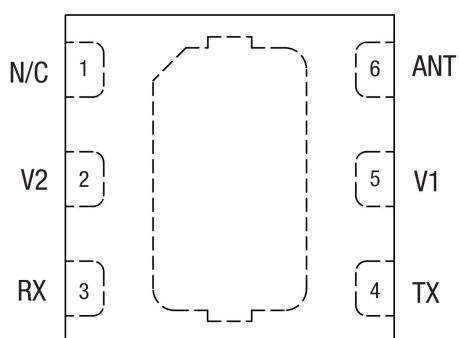
Applications

- Dual-band WLAN systems
- 802.11 a/b/g/n transmit/receive systems

Block Diagram



PIN CONFIGURATIONS AND FUNCTIONS



Pin Descriptio		
Pin	Name	Description
1	N/C	No connection
2	V2	DC control voltage
3	RX	RF port (must be DC blocked)
4	TX	RF port (must be DC blocked)
5	V1	DC control voltage
6	ANT	RF common port (must be DC blocked)

Absolute Maximum Ratings

Parameter	Symbol	Minimum	Maximum	Units
Input power @ 0 and 3 V	PIN		+33	dBm
Input power @ 0 and 5 V	PIN		+35	dBm
Operating voltage	VCTL		6.0	V
Storage temperature	TSTG	-65	+150	°C
Operating temperature	TOP	-40	+85	°C

Electrical Specifications¹

(VCTL = 0 V and +3.0 V, TOP = +25 °C, PIN = 0 dBm, Characteristic Impedance [ZO] = 50 Ω Unless Otherwise Noted)

Parameter	Symbol	Test Condition	Min	Typ	Max	Units
Insertion loss, ANT to TX and RX ports		2.4-2.5 GHz		0.4	0.6	dB
		0.1-3.0 GHz		0.5	0.7	
		3.0-6.0 GHz		0.8	1.0	
Isolation, ANT to TX and RX ports		2.4-2.5 GHz	33	38		dB
		0.1-3.0 GHz	32	38		
		3.0-6.0 GHz	27	30		
Return loss, ANT to TX and RX ports (insertion loss state) ²		2.4-2.5 GHz	14	21		dB
		0.1-3.0 GHz	12	18		
		3.0-6.0 GHz	10	15		
Switching characteristics: Rise/fall time		10/90% or 90/10% RF		50		ns
		50% VCTL to 90/10% RF		150		
Video feedthrough		TRISE = 1 ns @ 500 MHz		50		mV
Input power for 1 dB compression	P1dB	VCTL = 0 and 3.0 V				dBm
		2.4-2.5 GHz		+33		
		4.9-5.9 GHz		+32		
		VCTL = 0 and 1.8 V				
		2.4-2.5 GHz		+26		
		4.9-5.9 GHz		+23		
Error vector magnitude	EVM	802.11a, 54 Mbps		2.5		%
		PIN = <+23 dBm				
		VCTL = 3 V				
		802.11g, 54 Mbps		2.5		
		PIN = <+26 dBm				
		VCTL = 3 V				
Control voltage:						
High	VCTL_H		1.80	3.30	5.00	V
Low	VCTL_L			0	0.25	
Leakage current		VCTL_H and VCTL_L		5	50	μA

1. Performance is guaranteed only under the conditions listed in this table.

2. Low frequency return loss is limited by the value of DC blocking capacitors (22 pF).

Truth Table1

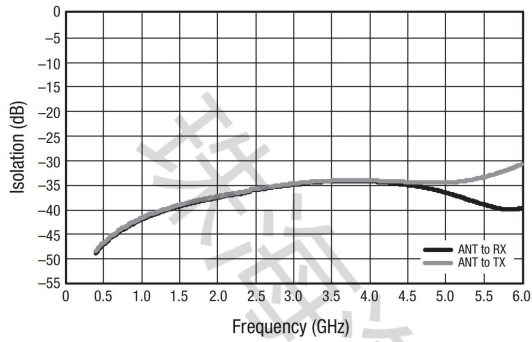
V1 (Pin 5)	V2 (Pin 2)	ANTto RX Path	ANT to TX Path
1	0	Insertion loss	Isolation
0	1	Isolation	Insertion loss

1. "1" = +1.8 V to +5.0 V. "0" = 0 V to +0.25 V. Any state other than described in this table places the switch into an undefined state. An undefined state will not damage the device.

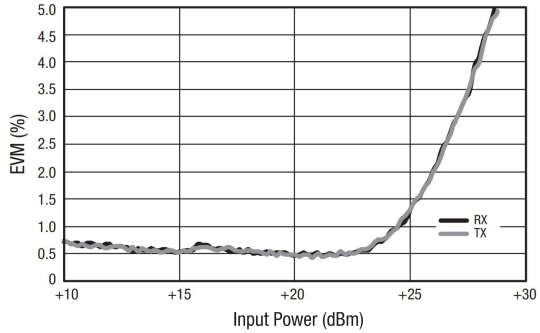
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Typical Performance Characteristics

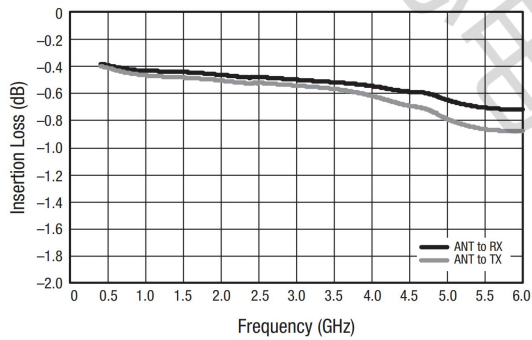
(VCTL = 0 V and +3.0 V, TOP = +25 °C, PIN = 0 dBm, Characteristic Impedance [Zo] = 50 Ω, Unless Otherwise Noted)



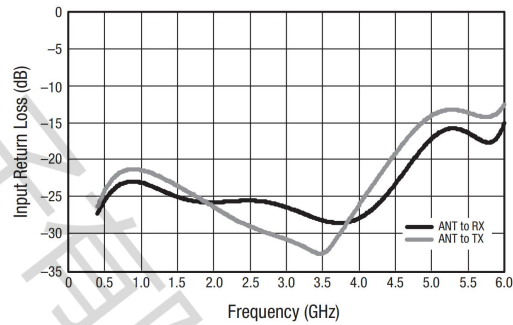
Isolation vs Frequency



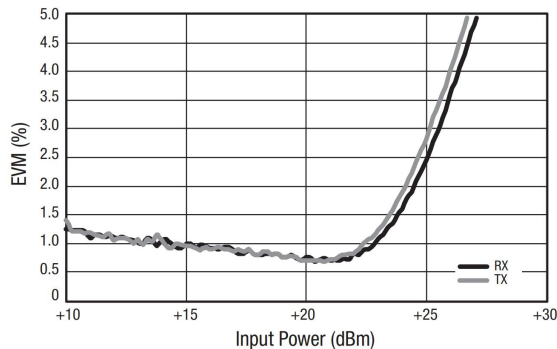
EVM vs Input Power (@ 2.45 GHz, 54 bps)



Insertion Loss vs Frequency

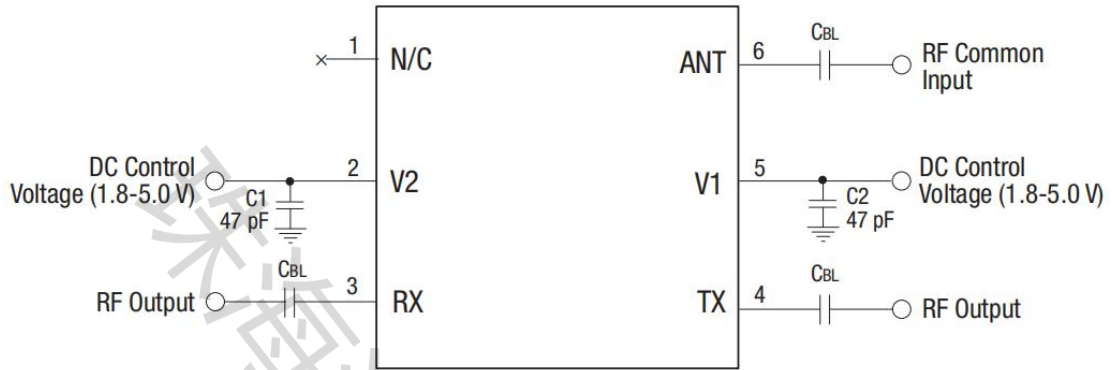


Input Return Loss vs Frequency



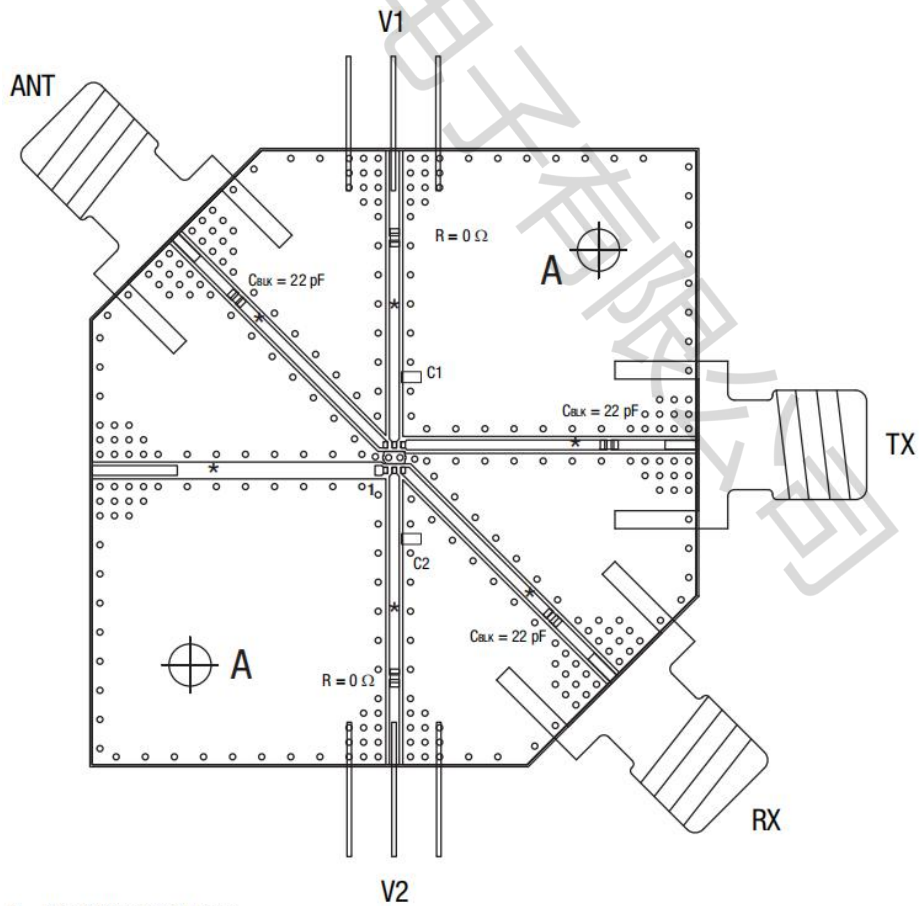
EVM vs Input Power (@ 5.5 GHz, 54 bps)

Board Schematic



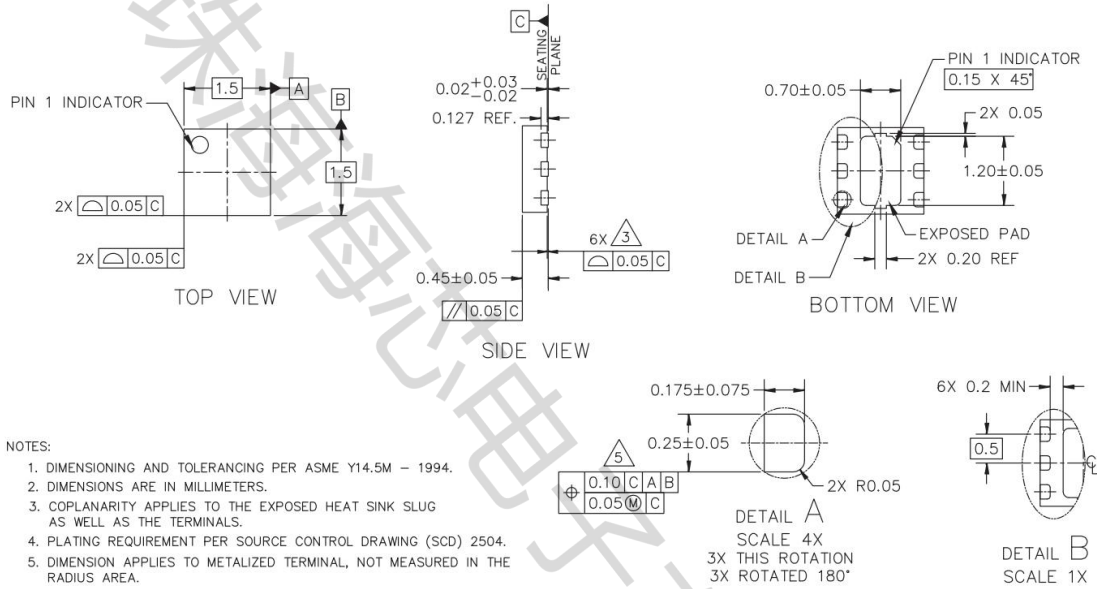
$C_{BL} = 22 \text{ pF}$ for 2.4-6.0 GHz operation.
Exposed ground paddle should be grounded for best performance.

Board Assembly Diagram



$R = 0 \Omega$ (0402 size) 2 places
 $C_{BLK} = 22 \text{ pF}$ (0402 size) 3 places
 $C1$ and $C2 = 47 \text{ pF}$ (0402 size), 2 places

Package Dimensions



Part Number	Package Type	package	quantity
HX13446-374-SQ	QFN-6	Taping	3000

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