

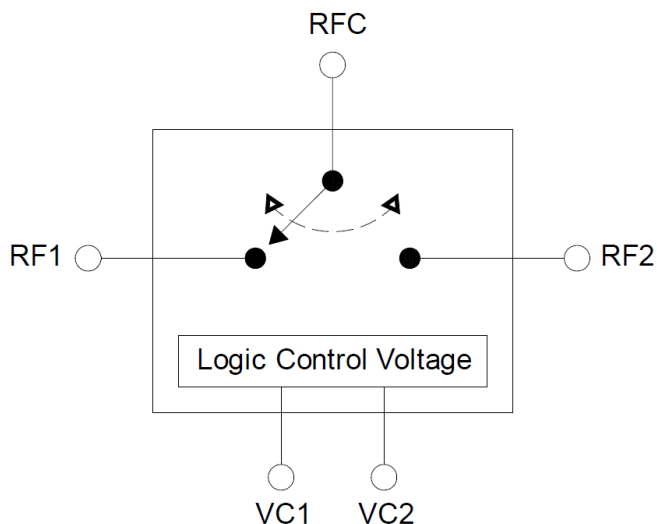
■ Description

The HWS541A is a Gallium Arsenide (GaAs), PHEMT MMIC Single-Pole, Double-Throw (SPDT) switch. The HWS541A features low insertion loss with very low DC power consumption. The device can be used in many wireless digital communication systems like WLAN, IEEE 802.11 a/b/g/n/ac/ax and Bluetooth® for transmit/receive selection or antenna diversity function. The HWS541A SPDT switch operating frequency from 2.0 to 6.0 GHz in a low cost 1.0mm x 1.0mm x 0.4mm LUSON-6L plastic lead (Pb) free package.

■ Features

- **Frequency Range** : 2.0 to 6.0 GHz
- **Low Insertion Loss** : 0.41 dB @ 2.45 GHz
0.62 dB @ 5.85 GHz
- **Isolation** : 29 dB @ 2.45 GHz
26 dB @ 5.85 GHz
- **High IP1dB** : 29 dBm @ 2.45 GHz
33 dBm @ 5.85 GHz
- **Low DC Power Consumption**
- **Miniature LUSON6L (1.0x1.0x0.4 mm)**
Using Lead (Pb) free materials with
RoHS compliant
- **PHEMT Process**

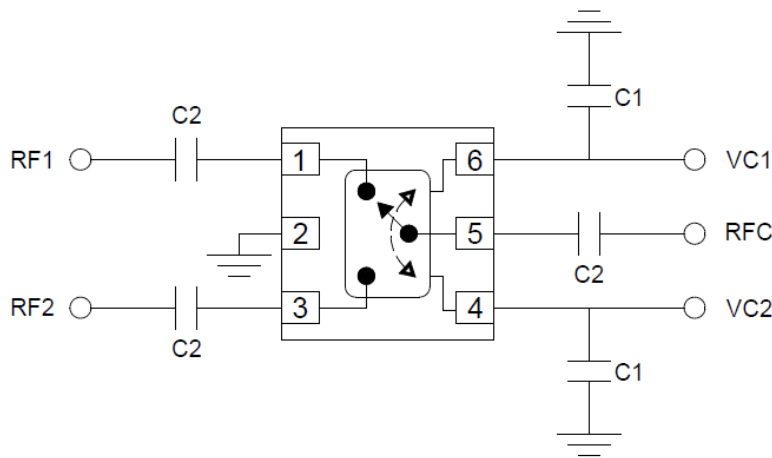
■ Functional Block Diagram



■ Applications

- IEEE 802.11 a/b/g/n/ac/ax WLAN
- Bluetooth®

Application Circuit



Pin Assignments

Pin No.	Name	Description
1	RF1	RF Signal Port
2	GND	Ground
3	RF2	RF Signal Port
4	VC2	DC Logic Control Voltage and supply Voltage
5	RFC	RF Signal Port
6	VC1	DC Logic Control Voltage and supply Voltage

Evaluation Board Bill of Material

Component	Value	Description	Supplier	Part Number
IC		HWS541A	Hexawave	
C1	100pF	By-pass Capacitor	Murata	GRM1555C1H101JA01D
C2	8pF	DC blocking Capacitor	Murata	GRM1555C1H8R0CA01D

Note :

1. C2 = 8pF for operation frequency of 2.0 ~ 6.0 GHz is required on all RF ports.
2. A larger DC blocking capacitor is recommended for lower frequency operation.
3. For good RF performance, DC blocking capacitors have to be placed at IC RF ports, bypass capacitors should be placed close to terminal of DC to reduce strip line influence of RF characteristics.

■ Absolute Maximum Ratings

<i>Parameter</i>	<i>Symbol</i>	<i>Maximum</i>	<i>Units</i>
Control Voltage	VC	6	V
RF Input Power	Pin	+33	dBm
Operating Temperature	T _{op}	-40 to +85	°C
Storage Temperature	T _{STG}	-65 to +150	°C

Note : If the satisfied of any one or more of the above conditions will lead to equipment damage.

■ Recommended Operating Ranges

<i>Parameter</i>	<i>Symbol</i>	<i>Min</i>	<i>Typ</i>	<i>Max</i>	<i>Unit</i>
Operation Frequency	Freq.	2.0		6.0	GHz
Control Voltage (Low)	VC_L	0	0	0.2	V
Control Voltage (High)	VC_H	1.8	3.0	5.0	V

■ Logic Truth Table of Switch (ON-Path)

<i>VC1 (Pin6)</i>	<i>VC2 (Pin4)</i>	<i>Insertion Loss Path</i>
H	L	RFC to RF2
L	H	RFC to RF1

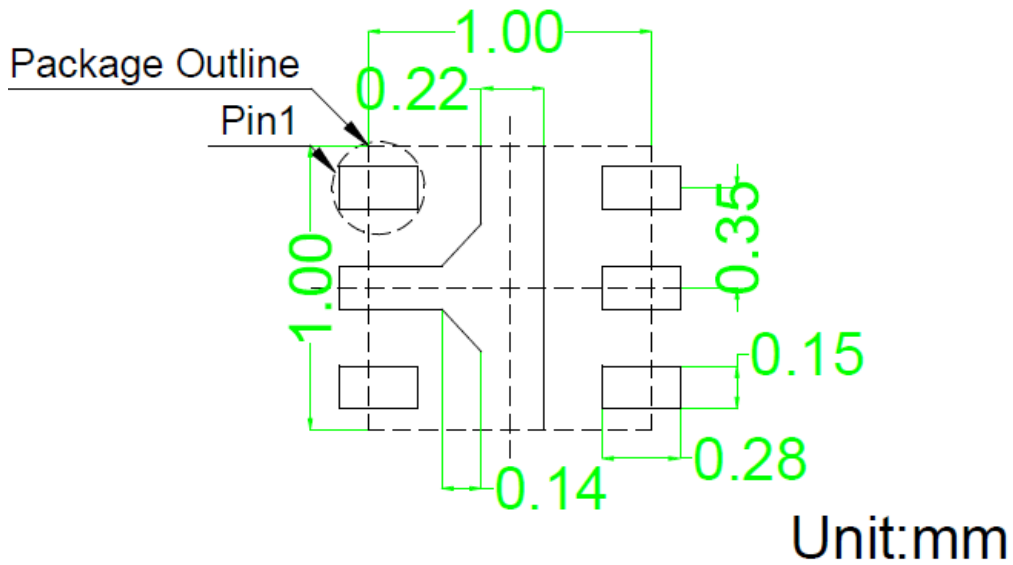
Note : "H" = VC_H, "L" = VC_L.

■ Electrical Specifications

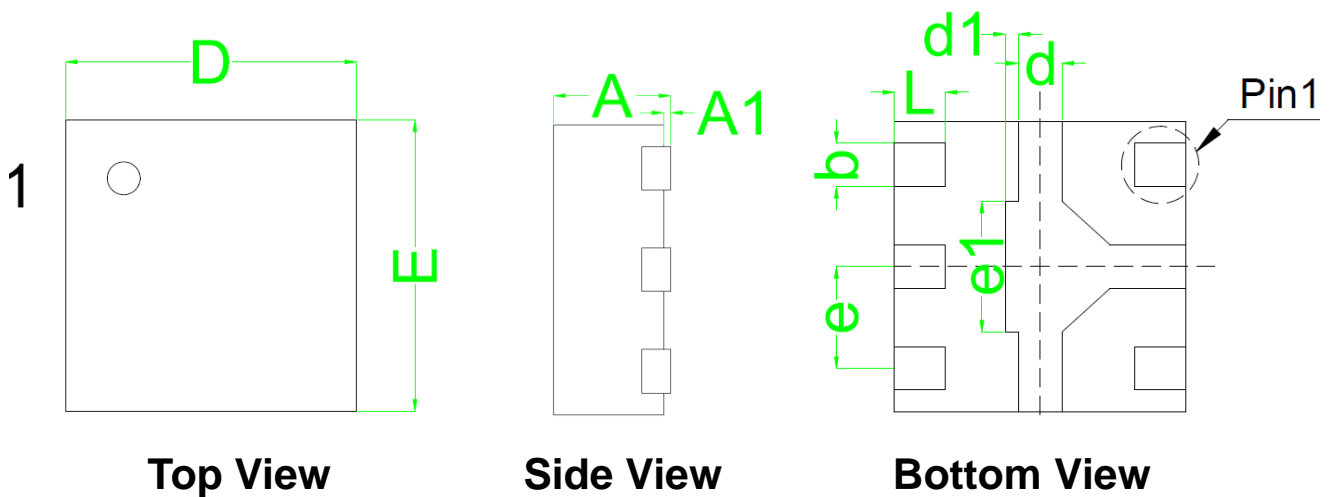
Temperature = 25°C, Impedance 50Ω with VC = 0/3.0V, Pin = 0dBm, unless otherwise noted

<i>Parameter</i>	<i>Symbol</i>	<i>Test Conditions</i>	<i>Min</i>	<i>Typ</i>	<i>Max</i>	<i>Unit</i>
Insertion Loss	IL	2.0 – 3.0 GHz		0.41	0.43	dB
		3.0 – 6.0 GHz		0.62	0.79	dB
Isolation (RF1, RF2 to RFC)	ISO-1	2.0 – 3.0 GHz	28.7	29		dB
		3.0 – 6.0 GHz	20	26		dB
Isolation (RF1 to RF2)	ISO-2	2.0 – 3.0 GHz	29.5	31		dB
		3.0 – 6.0 GHz	23.2	31.5		dB
Return Loss	RL	2.0 – 3.0 GHz	14.9	18.3		dB
		3.0 – 6.0 GHz	11.4	15		dB
Input Power for one dB Compression	P1dB	@ 2.45 GHz @ 5.85 GHz		29 33		dBm
Switching Rise/Fall Time	T _{sw}	10/90% RF to 90/10% RF		80		ns
Switching on/off Time	T _s	50% VC to 90/10% RF		80		ns
Control Current	I _{ctrl}	VC = 3.0V		5		uA

Recommended Footprint Patterns



Package Dimensions



Symbol	Min	Max	Unit
A	0.370	0.400	mm
A1	0.000	0.050	
b	0.100	0.200	
D	0.950	1.030	
d	0.100	0.200	
d1	0.055 REF		
E	0.950	1.030	
e	0.350 TYP.		
e1	0.450 REF		
L	0.125	0.225	