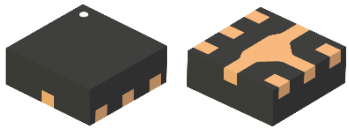
ASWD-S2-0008

0.8 ~ 6GHz SPDT Antenna Switch

Description

The ASWD-S2-0008 is a 1-bit control SPDT switch. The switch is used for WLAN system. The switch features low insertion loss, high isolation for high frequency up to 6GHz, and high handling power performance at 1.8V control voltage. Integrated ESD protection device on each port achieves excellent ESD robustness. Integrated DC blocking capacitors at all RF ports and the ultra-small package of DFN-6L (1x1) offer very small mounting area.



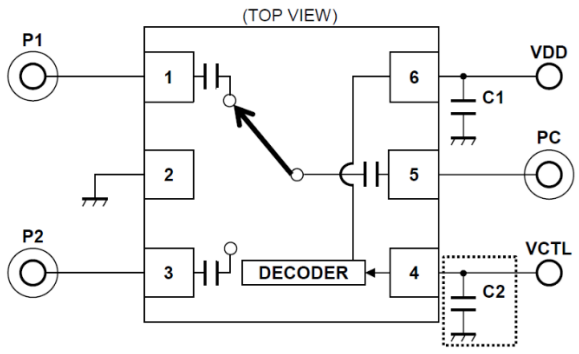
Key Features

- DFN-6L Package: 1.0 mm x 1.0 mm
- Frequency Range: 0.8 ~ 6.0 GHz
- Low Insertion Loss 0.45 dB Typ. @f = 2.4 to 2.5 GHz
  0.40 dB Typ. @f = 4.9 to 6.0 GHz
- High Isolation 25 dB Typ. @f = 2.4 to 2.5 GHz
  25 dB Typ. @f = 4.9 to 6.0GHz
- P_{-1}dB = +31dBm Typ. @f = 2.4 to 6.0 GHz
- Low Control Voltage $V_{CTL(H)}$ = 1.8V Typ.
  Voltage Operation V_{DD} = 3.3V Typ.
- RoHS Compliant | MSL Level 1

Typical Applications

- Wi-Fi 802.11 a/b/g/n/ac/ax Applications
- Transmit/Receive Switching, Antenna Switching and Others Switching Applications
- Wi-Fi/Bluetooth Modules
- Smart Phone and Tablet
- Smart Metering
- Security Cameras
- Data Card and Others Mobile Applications

Functional Block Diagram



Ordering Information

Part No.	Description
ASWD-S2-0008	0.8~ 6GHz SPDT Antenna Switch on Cut Tape
ASWD-S2-0008-T	0.8~ 6GHz SPDT Antenna Switch on Tape & Reel
ASWD-S2-0008-EVB	0.8~ 6GHz SPDT Antenna Switch EVB

Absolute Maximum Ratings

Parameter	Symbol	Absolute Maximum			Unit
Supply Voltage	V_{DD}	-	-	6.0	V
Control Voltage	V_{CTL}	-	-	6.0	V
Max Input Power	$P_{IN, MAX}$	-	-	+31	dBm
Operating Temperature	T_{OP}	-40	-	105	℃
Storage Temperature	T_{STG}	-55	-	150	℃
Moisture Sensitivity Level	-	MSL1			-

Operation of this device outside the parameter ranges given above may cause permanent damage.

Recommended Operating Conditions

Parameter	Min.	Typ.	Max.	Unit
VDD	2.5	3.3	5.0	V

Electrical specifications are measured at specified test conditions. Specifications are not guaranteed over all recommended operating conditions.

RF Electrical Specifications

Parameters		Frequency	Values			Unit
			Minimum	Typical	Maximum	
Insertion Loss1	LOSS1	2.4-2.5GHz	-	0.45	0.65	dB
Insertion Loss2	LOSS2	3.4-3.8GHz	-	0.45	0.65	
Insertion Loss3	LOSS3	4.9-6.0GHz	-	0.40	0.60	
Isolation1	ISL1	2.4-2.5GHz	23	25	-	dB
Isolation2	ISL2	3.4-3.8GHz	22	25	-	
Isolation3	ISL3	4.9-6.0GHz	22	25	-	
Return Loss1	RL1	2.4-2.5GHz	13	16	-	dB
Return Loss2	RL2	3.4-3.8GHz	15	20	-	
Return Loss3	Rl3	4.9-6.0GHz	15	20	-	
Input P_{-1dB}	P_{-1dB}	2.4-6.0GHz	+28	+31	-	dBm
Switching time	T_{SW}	50% CTL to 10%/90% RF	-	150	400	ns

DC Electrical Specifications

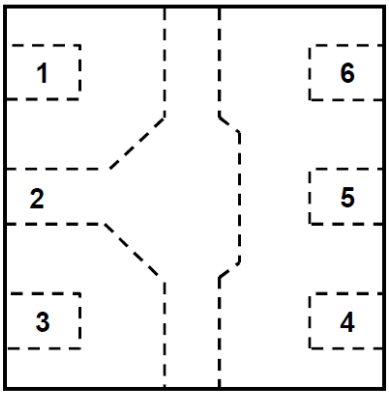
Parameter	Symbol	Minimum	Typical	Maximum	Unit
Supply Voltage	V_{DD}	2.5	3.3	5.0	V
Supply Current	I_{DD}	-	15	30	uA
Control Voltage	V_{CTL_H}	1.35	1.8	5.0	V
	V_{CTL_L}	0	-	0.45	V
Control Current	I_{CTL}	-	3	10	uA

Control Logic

ON PATH	PC-P1	PC-P2
VCTL	H	L

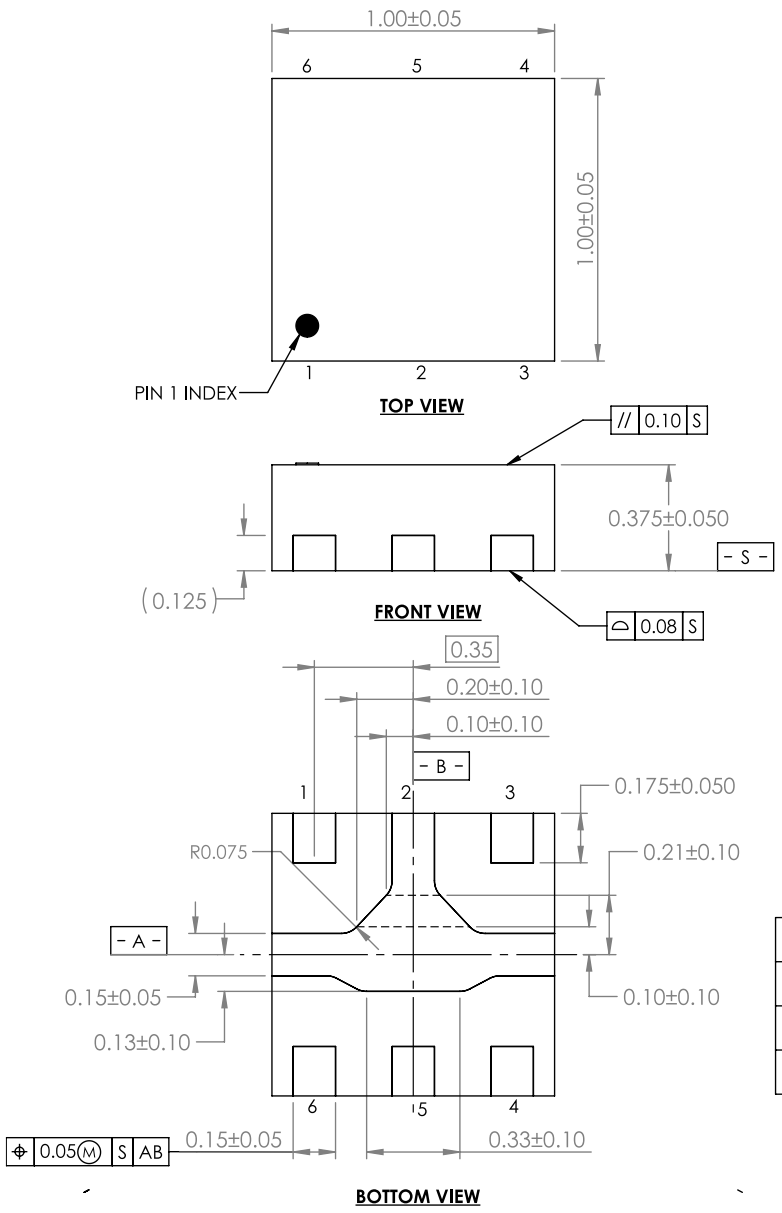
Pin Configuration

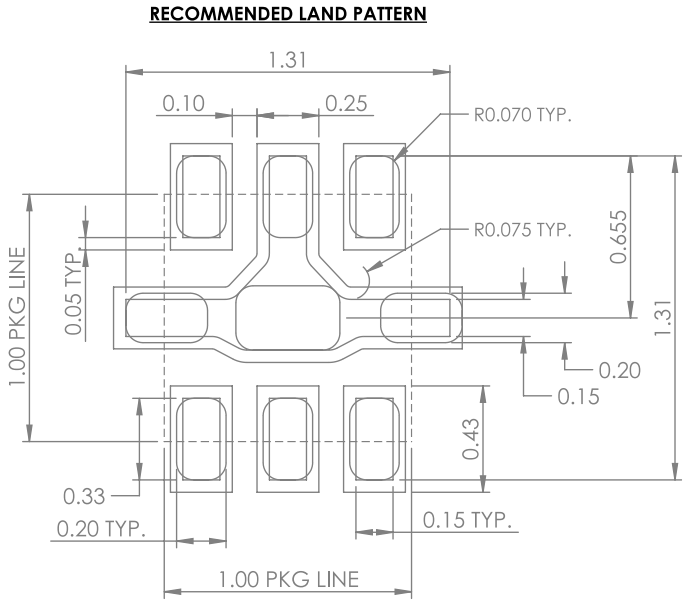
(Top view)



Pin	Name	Description
1	P1	RF terminal. No DC blocking capacitor is required for this port because of internal capacitor.
2	GND	Ground terminal. Please connect this terminal with the ground plane as close as possible for excellent RF performance.
3	P2	RF terminal. No DC blocking capacitor is required for this port because of internal capacitor.
4	VCTL	Control voltage input terminal. This terminal is set to High-Level (+1.35 to +5.0V) or Low-Level (0 to +0.45V).
5	PC	Common RF terminal. No DC blocking capacitor is required for this port because of internal capacitor.
6	VDD	Positive voltage supply terminal. The positive voltage (+2.5 to +5.0V) has to be supplied. Please connect a bypass capacitor with GND terminal for excellent RF performance.

Product Dimensions



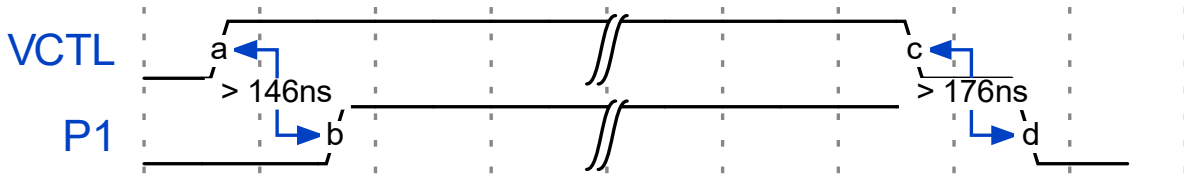


BOARD	COPPER
TERMINAL.TREAT	Ni/Pd/Au
MOLDING MATERIAL	EPOXY RESIN
WEIGHT	1.2 mg

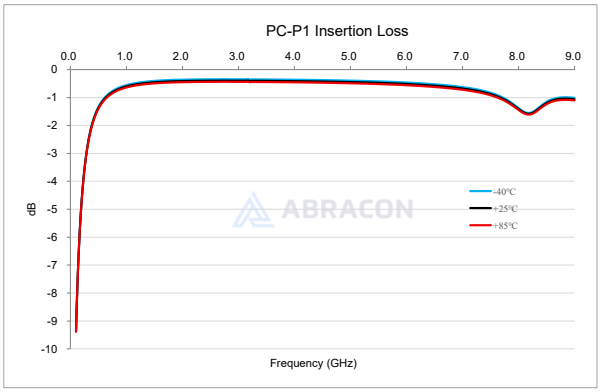
Unit: mm

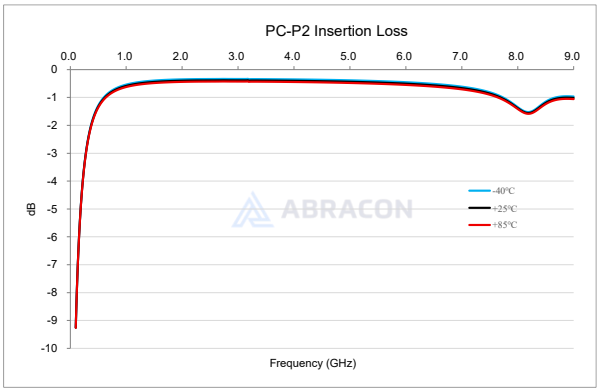
Timing Requirements

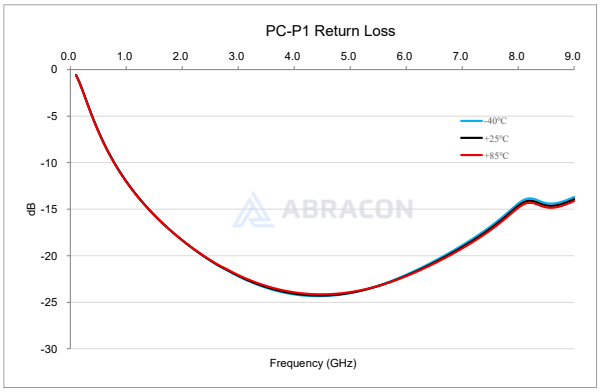
(PC-P1 path, V_{DD}=3.3V, $V_{CTL(H)}$=1.8V)

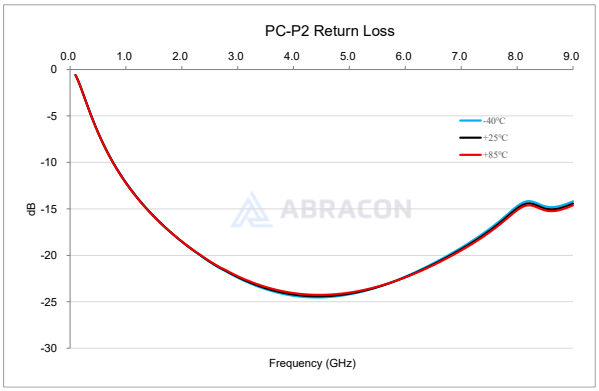


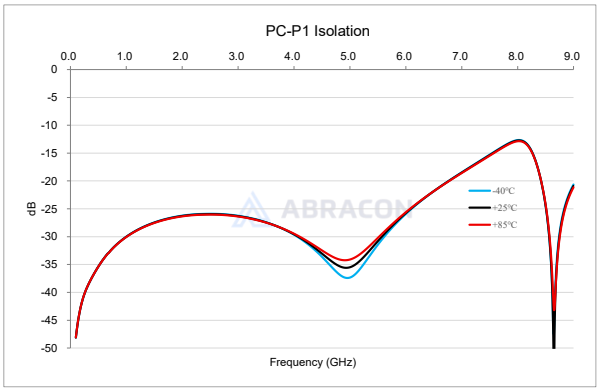
Performance Plots

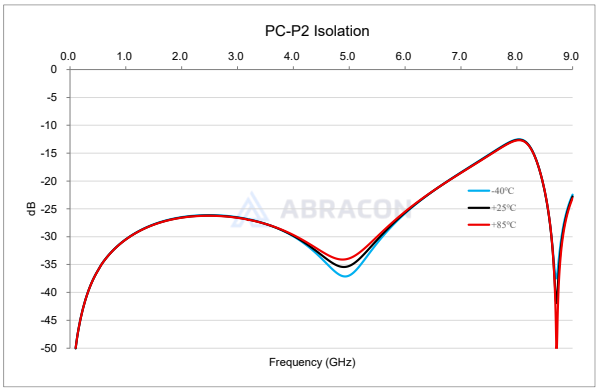












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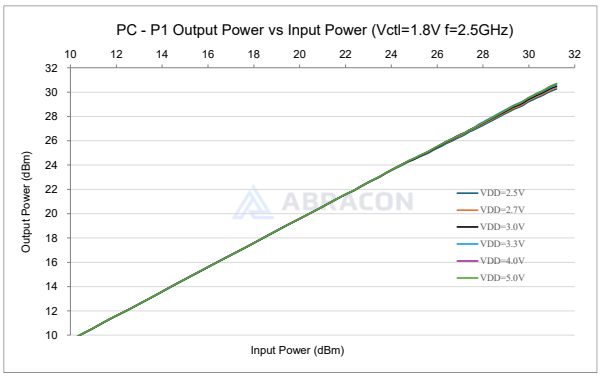

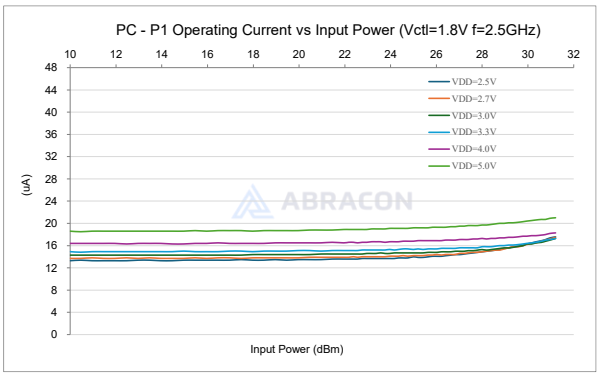

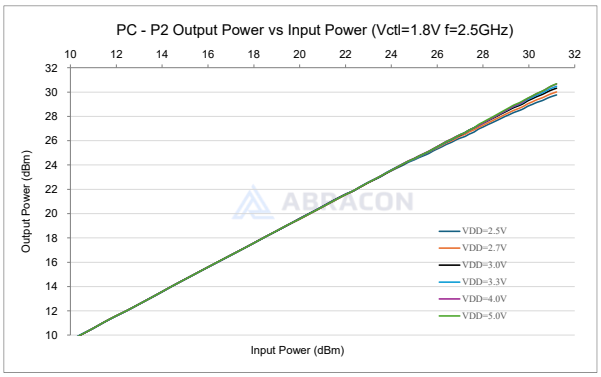

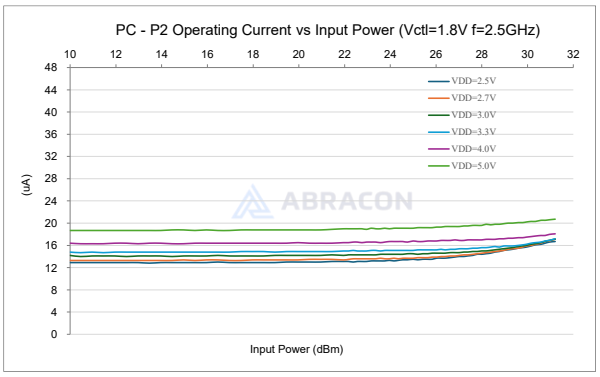

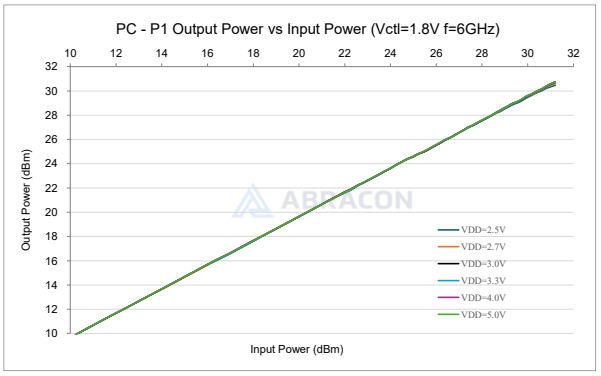

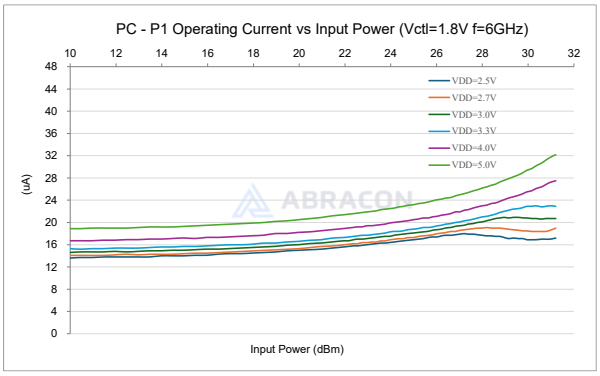

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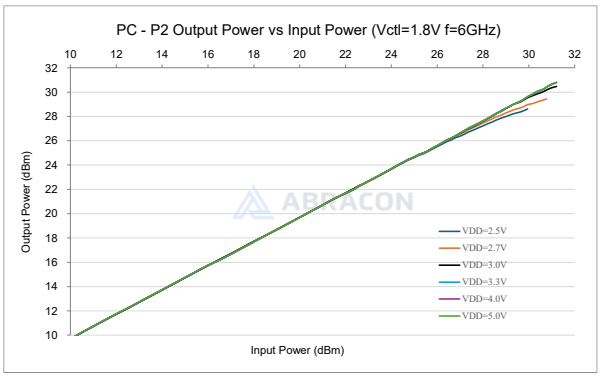

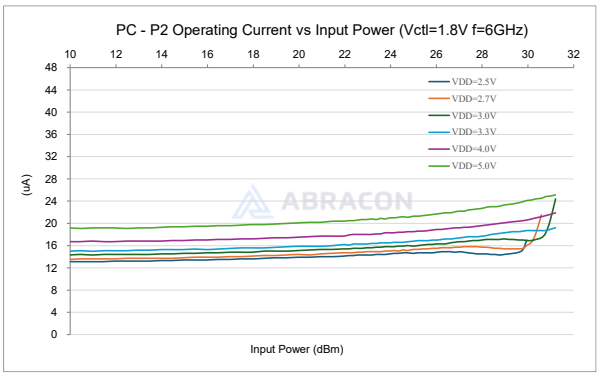

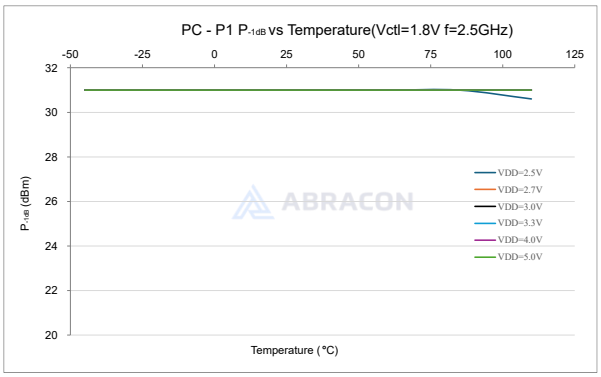

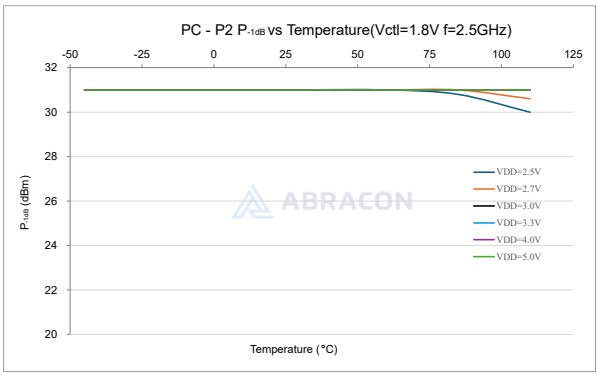

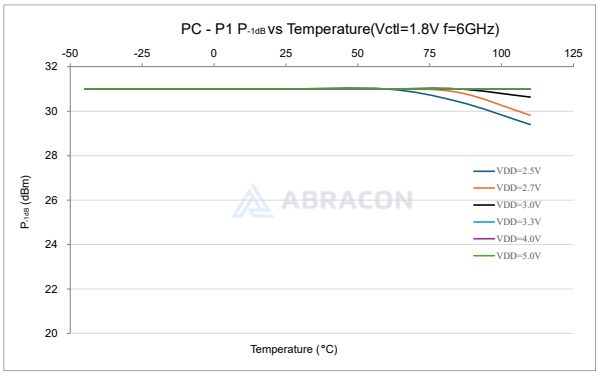

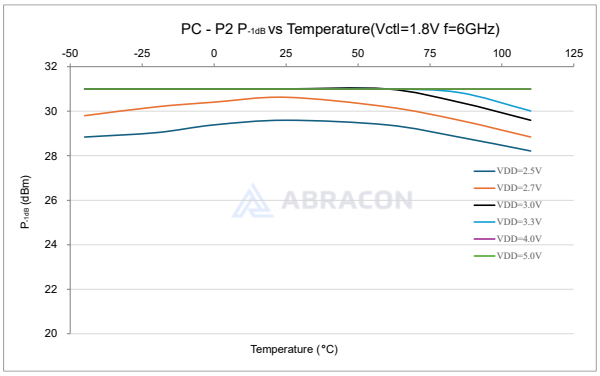

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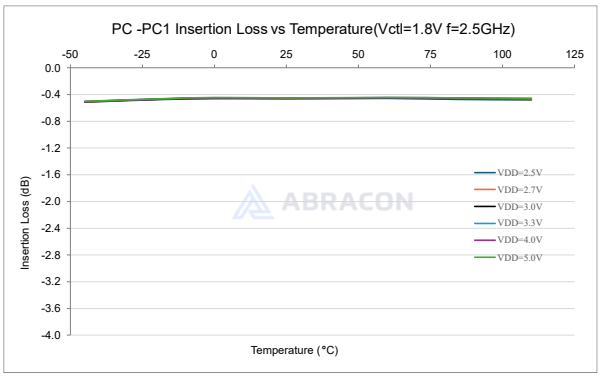

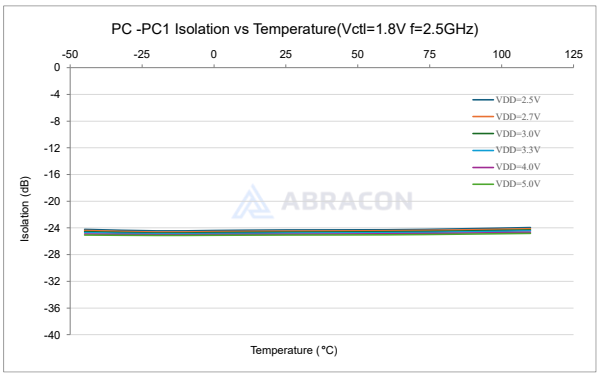

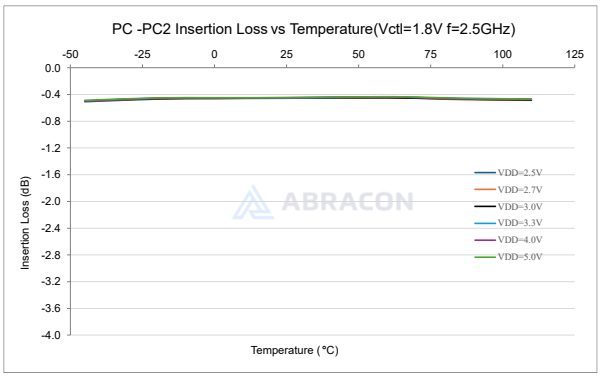

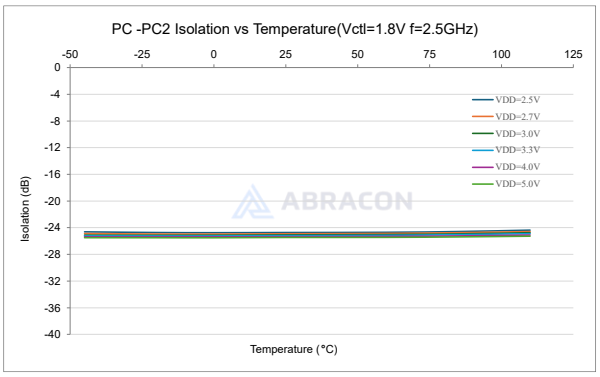

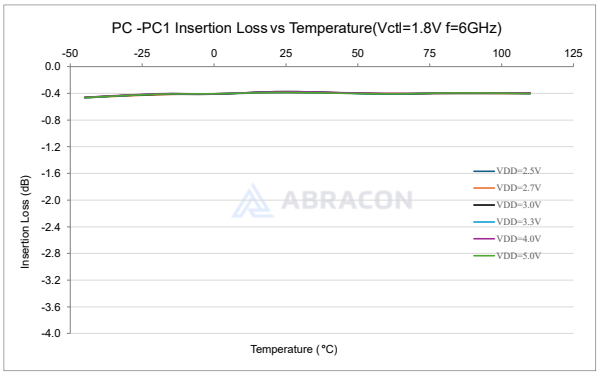

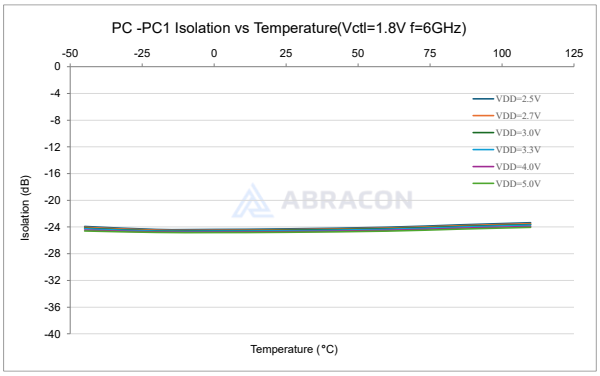

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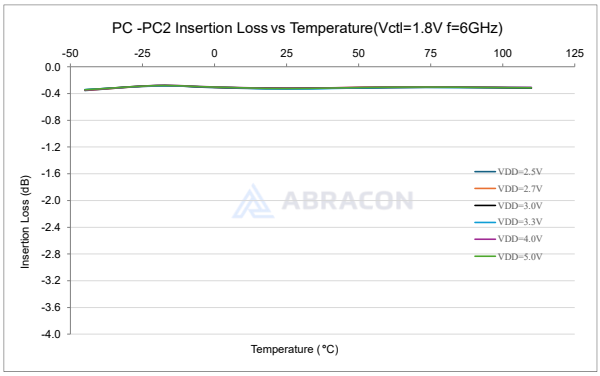
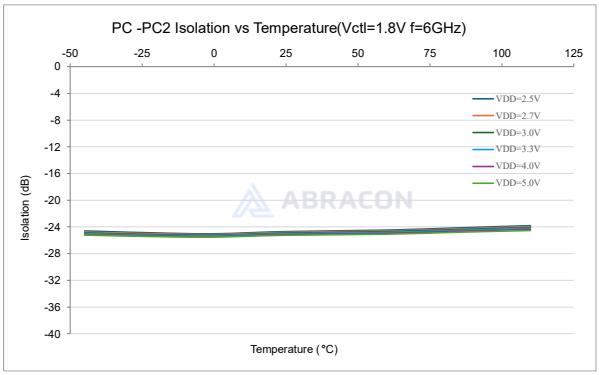
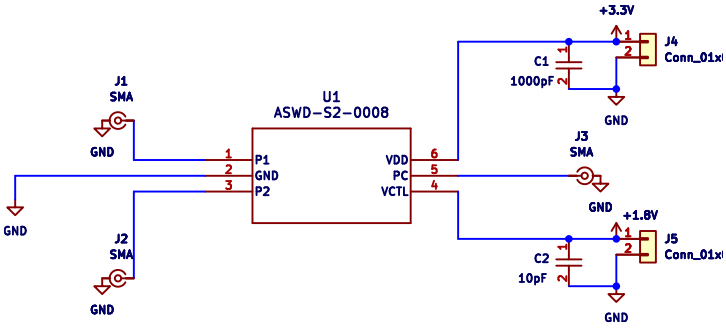
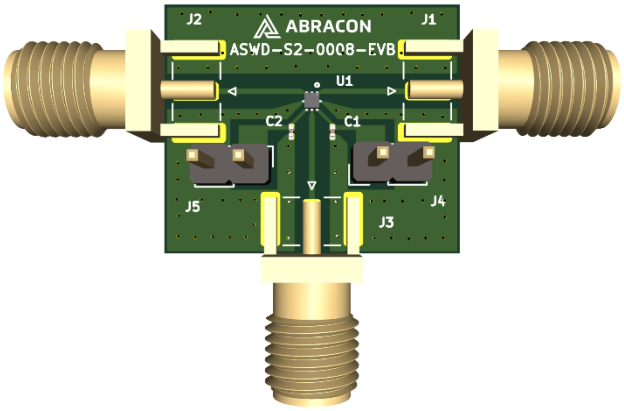




Schematic



Evaluation Board ASWD-S2-0008-EVB



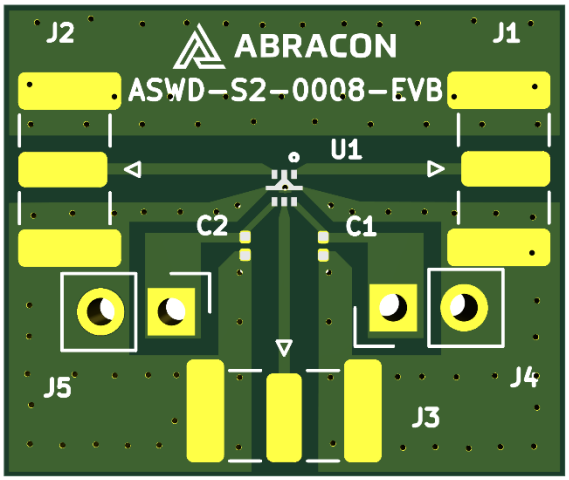
Bill of Material

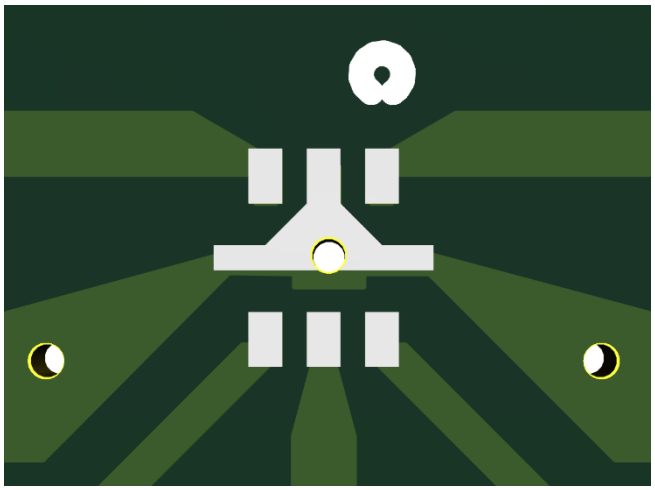
Component	Description	Manufacturer	Manufacturer Part	QTY
U1	SPDT Antenna Switch	Abracon	ASWD-S2-0008	1
C1	1000pF Capacitor (0201 / 0603 Metric)	Murata MFG	GRM03 series	1
C2	10pF Capacitor (0201 / 0603 Metric)	Murata MFG	GRM03 series	1

NOTES:

1. Input and output are 50-ohm lines.

Layout Guide





PCB: FR-4, t=0.2mm
Capacitor Size: 0201 (0603 Metric) (0.6 x 0.3 mm)
Strip Line Width: 0.4 mm
PCB Size: 20.1 x 16.9 mm
Through Hole Diameter: 0.2 mm

Losses of PCB and connectors

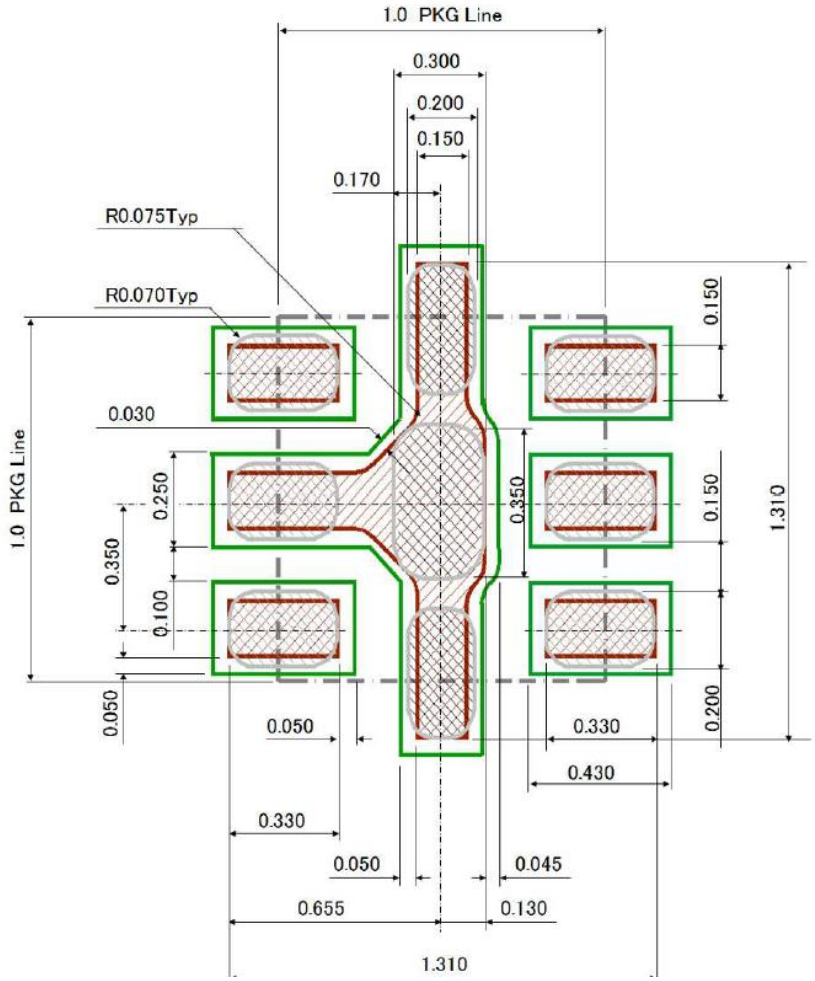
Freq (GHz)	Loss (dB)
2.4	0.28
2.5	0.28
3.4	0.35
3.8	0.39
4.9	0.52
6.0	0.72

PRECAUTIONS
For good RF performance, the exposed pad should be connected to PCB ground plane as close as possible.

Transmission Line

The transmission line should be kept as short as possible and be designed to have a characteristic impedance of 50Ω. Abracon recommends using a Co-Planar Waveguide with Ground (CPWG), which dimensions can be derived by any trusted calculator, using the correct input for PCB materials and layer stack-up.

Footprint Land Pattern



Unit: mm

Package: 1.0mm x 1.0mm
Pin pitch: 0.35mm

: Land
: Mask (Open area) *Metal mask thickness: 100μm
: Resist (Open area)

Reflow Profile [JEDEC J-STD-020]

Solder paste: Sn/3.0Ag/0.5Cu

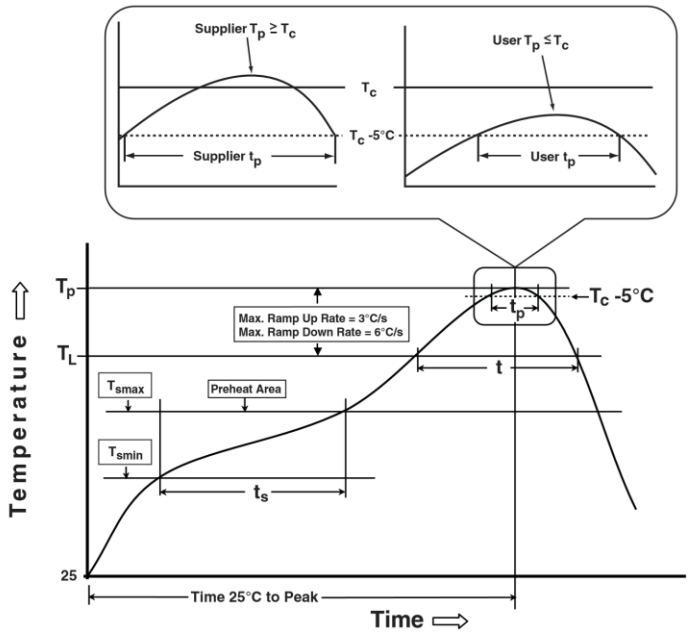


Table 1

SnPb Eutectic Process Classification Temperatures (T_c)		
Package Thickness	**Volume mm³ <350**	**Volume mm³ ≧350**
<2.5mm	235℃	220℃
≧2.5mm	220℃	220℃

Table 2

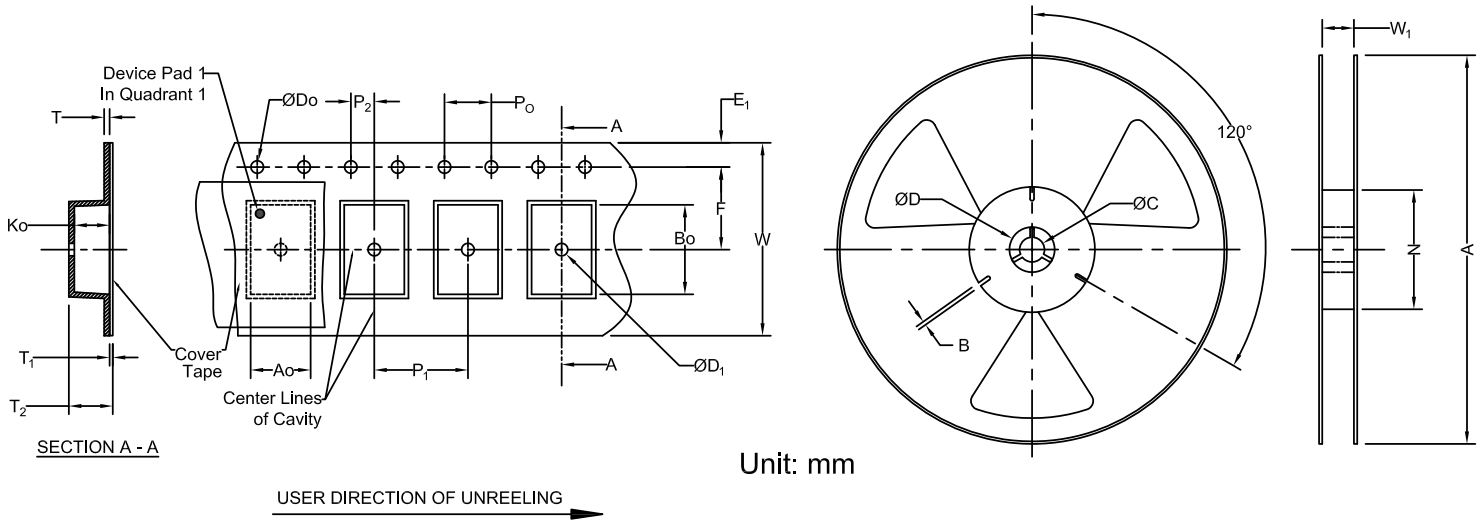
Pb-Free Process Classification Temperatures (T_c)			
Package Thickness	**Volume mm³ <350**	**Volume mm³ 350-2000**	**Volume mm³ >2000**
<1.6mm	260℃	260℃	260℃
1.6mm - 2.5mm	260℃	250℃	245℃
>2.5mm	250℃	245℃	245℃

Profile Feature	Sn-Pb Eutectic Assembly	Pb-Free Assembly
Preheat / soak		
Temperature minimum (T_{smin})	100℃	150℃
Temperature maximum (T_{smax})	150℃	200℃
Time (T_{smin} to T_{smax}) (t_s)	60 – 120 sec.	60 – 120 sec.
Average ramp-up rate (T_{smax} to T_p)	3℃/sec. max	3℃/sec. max
Liquidous temperature (T_L)	183℃	217℃
Time at Liquidous (T_L)	60 – 90 sec.	60 – 90 sec.
Peak package body temperature (T_p)*	**See Table 1**	**See Table 2**
Time (T_p)** within 5℃ of the specified classification temperature (T_c)	20 sec.	10 sec.
Ramp-down rate (T_p to T_{smax})	3℃/sec. max	3℃/sec. max
Time 25℃ to peak temperature	6 min. max	8 min. max
Reflow cycles	2 max	2 max

*Tolerance for peak profile temperature (T_p) is defined as a supplier minimum and a user maximum.
**Tolerance for time at peak profile temperature (t_p) is defined as a supplier minimum and a user maximum.

Packaging

Tape & Reel Dimension



Unit: mm

Carrier Tape Specifications (mm)										
E1	D0	P0	P2	F	P1	W	A0	B0	K_0	Reel Qty
1.75 ± 0.1	1.5 + 0.1/-0	4.0 ± 0.1	2.0 ± 0.05	3.5 ± 0.05	4.0 ± 0.1	8.0 ± 0.1	1.19 +0.04/-0.01	1.19 +0.04/-0.01	0.69 ± 0.1	5,000

Reel Specifications (mm)					
A	W_1	N	C	D	B
180 +0/-1.5	9 +0.3/-0	60 +1/-0	13 ± 0.2	21 ± 0.8	2 ± 0.5