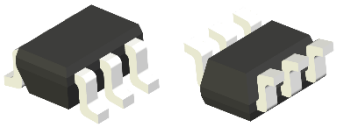
ASWD-S2-0003

0.1~ 3GHz SPDT Antenna Switch

Description



The ASWD-S2-0003 is a GaAs MMIC single-pole two-throw (SP2T) high power switch in a low-cost miniature SOT363-6 package with ±1.5kV HBM ESD Protection. The ASWD-S2-0003 is ideally suited for applications where high power, low insertion loss, small size, and low cost are required. Typical applications are for handset systems that connect separate transmit and receive functions to a common antenna, as well as other related handset and general-purpose applications. This part can be used in all systems operating up to 3 GHz requiring high power at low control voltage. The ASWD-S2-0003 is available in a small lead-free, RoHS-Compliant, SOT363 6-pin package.

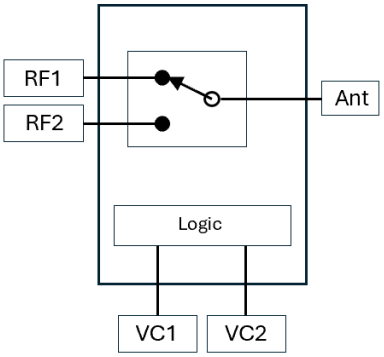
Key Features

- Frequency Range: 100~3000MHz
- Low Insertion Loss: 0.35dB@1.0GHz
- Low Current Consumption: 1.5μA
- ±1.5kV HBM ESD Protection
- Slim SOT363-6L package
- Ease of Assembly & Manufacturability

Typical Applications

- Smart Phones, Tablets, PCs
- GSM/WCDMA/LTE band and Mode Switching
- Antenna Selection / Tuning Switch
- RF Combo Modules (Wi-Fi/BT, LTE/GNSS)
- AR/VR, Wi-Fi Speakers
- Access Point, Routers and Gateways

Functional Block Diagram



Ordering Information

Part No.	Description
ASWD-S2-0003	0.1~ 3GHz SPDT Antenna Switch on Cut Tape
ASWD-S2-0003-T	0.1~ 3GHz SPDT Antenna Switch on Tape & Reel
ASWD-S2-0003-EVB	0.1~ 3GHz SPDT Antenna Switch EVB

Absolute Maximum Ratings

Parameter	Symbol	Absolute Maximum			Unit
Control Voltage	V_{CTL}	-	-	6.0	V
Max Input Power	P_{INMAX}	-	-	+33	dBm
Operating Temperature	T_{OP}	-40	-	85	℃
Storage Temperature	T_{STG}	-65	-	150	℃
Electrostatic Discharge, HBM[1]	V_{ESD}	-	-	±1500	V
Electrostatic Discharge, CDM[2]		-	-	±2000	V

1. HBM: ESDA/JEDEC JS-001-2017
2. CDM: ESDA/JEDEC JS-002-2018

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

Recommended Operating Conditions

Parameter	Min.	Typ.	Max.	Unit
VCTL	1.5	3.3	3.6	V
Pin (RFC – RFX), CW, 50 Ω			30	dBm
T_j at MTTF>105 hrs.	-	150	-	℃

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

RF Electrical Specifications

Parameters		Condition	Values			Unit
			Minimum	Typical	Maximum	
Insertion Loss	IL	< 1.0 GHz	-	0.35	-	dB
		1.0-2.0 GHz	-	0.55	-	
		2.0-3.0 GHz	-	1.75	-	
Isolation	ISL	-	-	30	-	dB
Return Loss	RL		-	20	-	dB
Input P0.1dB	$P_{0.1dB}$		-	32	-	dBm
2nd Harmonics	2F0	f=433MHz Pin = 25dBm	-	65	-	dBc
3rd Harmonics	3F0	f=433MH Pin = 25dBm	-	52	-	dBc
Turn-on switching time	t_{SW_ON}	-	-	20	-	ns
Turn-off switching time	t_{SW_Off}	-	-	20	-	ns

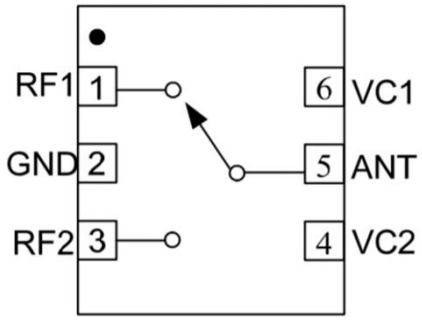
DC Electrical Specifications

Parameter	Symbol	Absolute Maximum			Unit
Control Voltage	V_{CTL_H}	1.5	3.3	3.6	V
	V_{CTL_L}	0	-	0.45	V
Control Current	I_{CTL}	-	1.5	-	uA

Control Logic

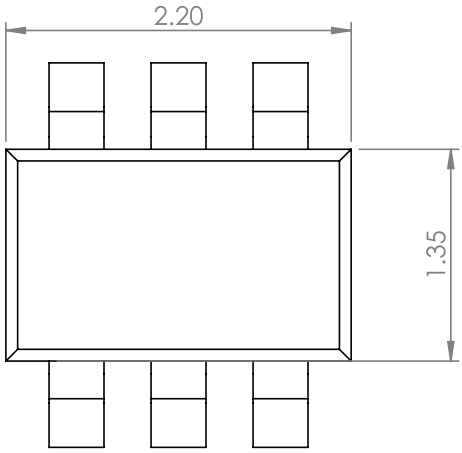
Control Pin	VC1	VC2	RF1	RF2
1	0	1	ON	OFF
2	1	0	OFF	ON

Pin Configuration

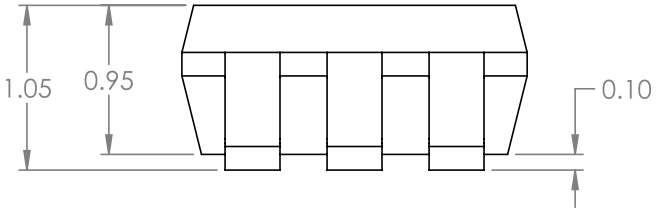


Pin	Name	Description
1	RF1	RF I/O
2	GND	Ground
3	RF2	RF I/O
4	VC2	Logic Control
5	ANT	Antenna Port
6	VC1	Logic Control

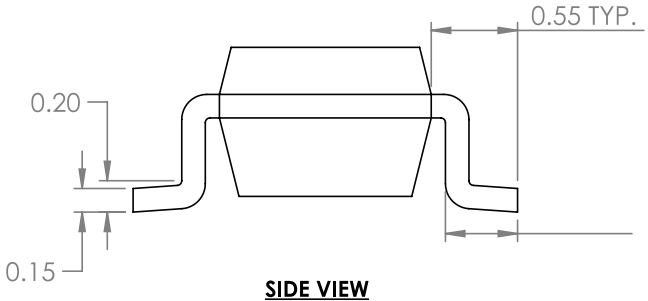
Product Dimensions



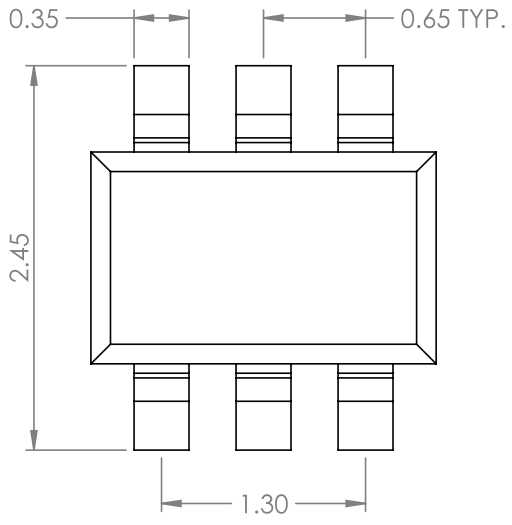
TOP VIEW



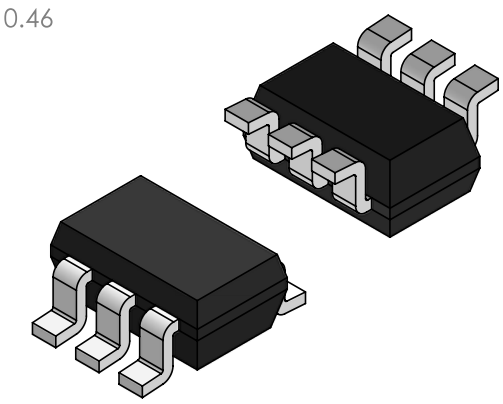
FRONT VIEW



SIDE VIEW

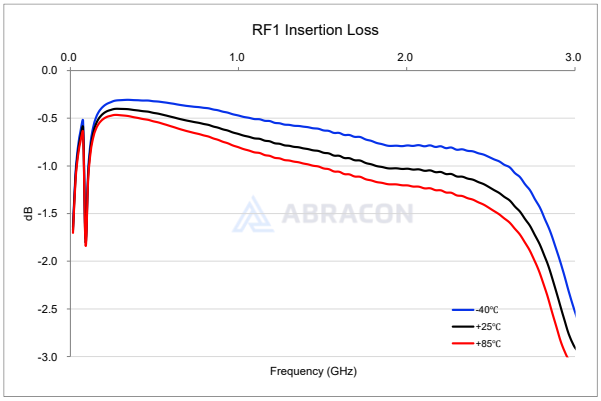


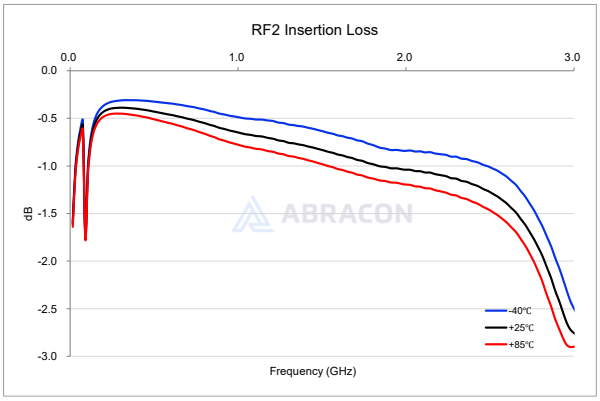
BOTTOM VIEW

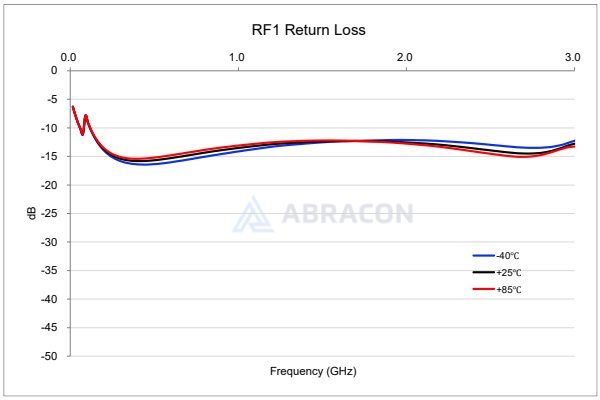


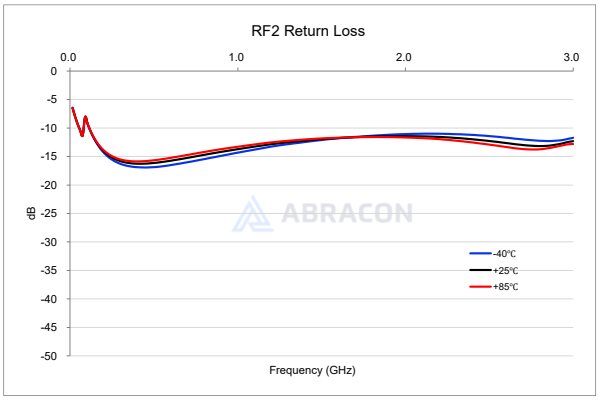
Unit: mm

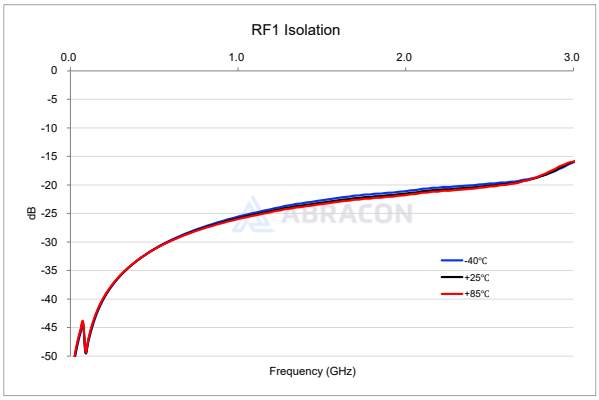
Performance Plots

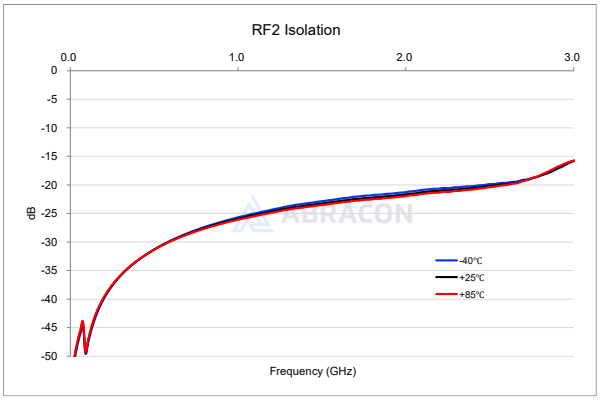




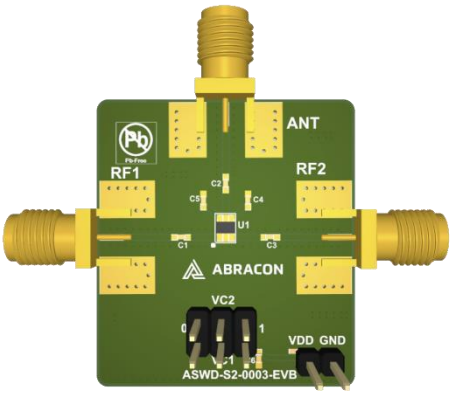




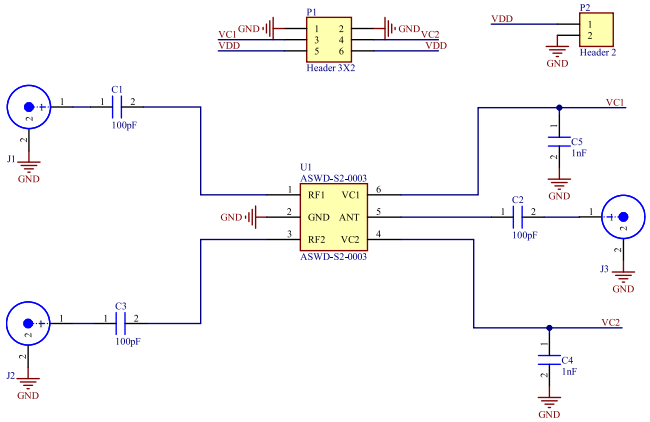




Evaluation Board ASWD-S2-0003-EVB



EVB



Schematic

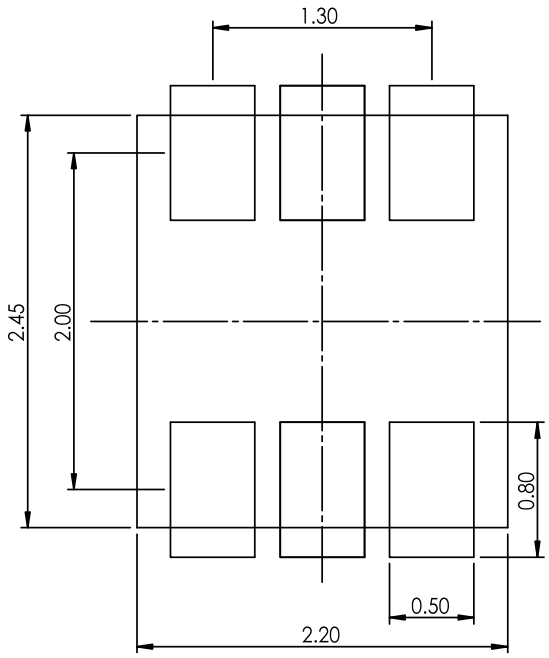
Bill of Material

Component	Description	Manufacturer	Manufacturer Part	QTY
U1	SPDT Antenna Switch	Abracon	ASWD-S2-0003	1
C1, C2, C3	Capacitor (100pF)	Murata	GRM0222C0J101GA02	3
C4, C5	Capacitor (1nF)	Murata	GRM022R60J102KE19	2

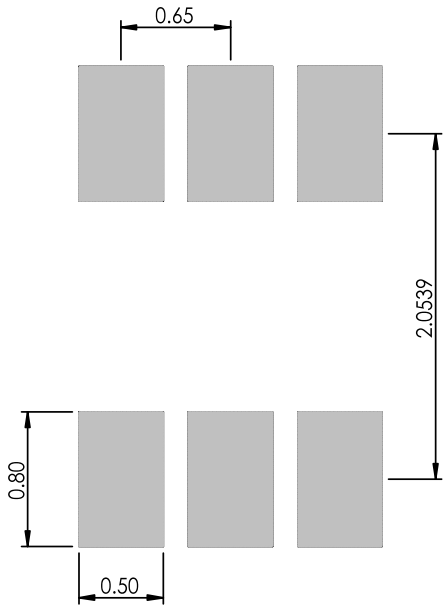
NOTES:

1. Input and output are 50-ohm lines.

IC Footprint & PCB Land Pattern



Footprint



Land Pattern

Reflow Profile [JEDEC J-STD-020]

Solder paste: Sn/3.0Ag/0.5Cu

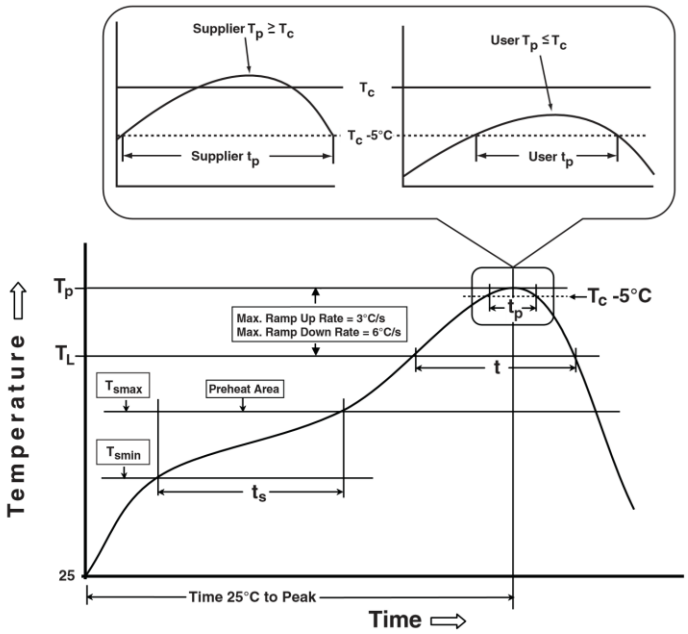


Table 1

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

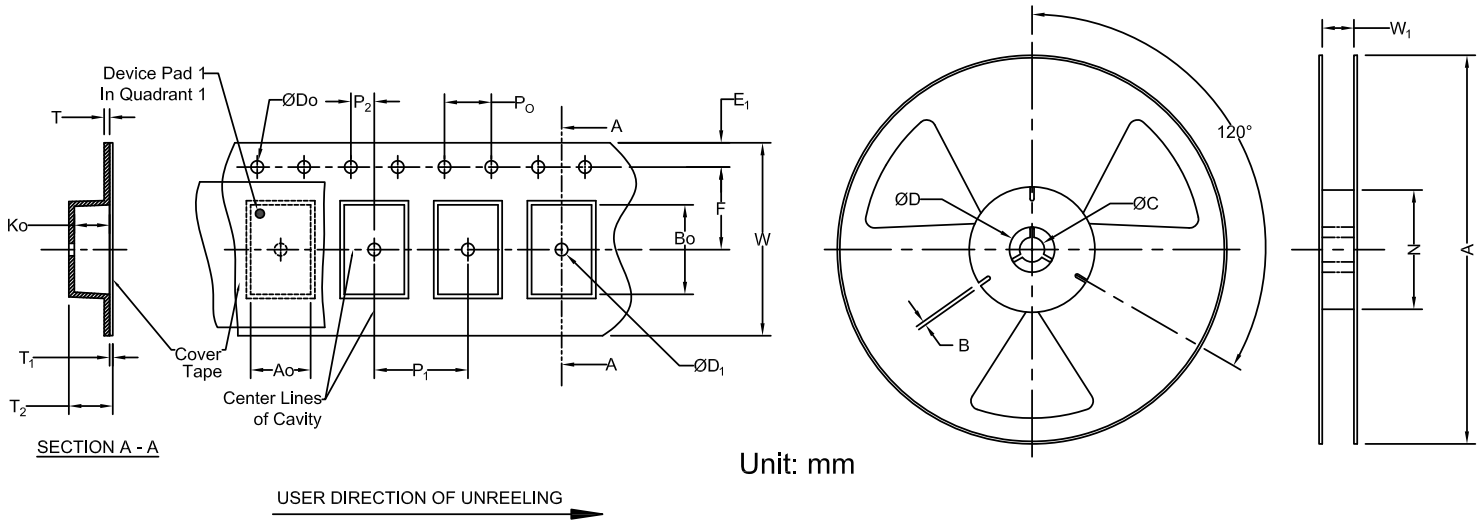
Pb-Free Process Classification Temperatures (T_c)			
Package Thickness	**Volume mm³ <350**	**Volume mm³ 350-2000**	**Volume mm³ >2000**
<1.6mm	260℃	260℃	260℃
1.6mm - 2.5mm	260℃	250℃	245℃
>2.5mm	250℃	245℃	245℃

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	1.50 ± 0.1	4.0 ± 0.1	2.0 ± 0.1	3.5 ± 0.1	4.0 ± 0.1	8.0 ± 0.2	2.28 ± 0.1	2.35 ± 0.1	1.2 ± 0.1	3,000

Reel Specifications (mm)				
A	W_1	N	B	C
178	12.4 ± 0.5	54.5 ± 2.0	2.4 ± 0.3	13.3 ± 0.3