

Product Description

The BSW722T is a reflective SPDT RF switch that can be used in high power and good performance NFC, WLAN 802.11 a/b/g/n/ac/ax and Wireless Communication applications.

This device is packaged in RoHS2-compliant with 6-Lead, 1.7mm x 1.7mm x 0.37mm xTDFN package. It must be used with back side ground soldering.

The BSW722T has robust ESD protection circuits at all pins and temperature performance (operating temperature range : -40 to +105°C).

This switch does not require blocking capacitors. If DC is presented at the RF port, add a blocking capacitor. This device also has a high linearity performance over all temperature range such as IIP3, IIP2.

A functional block diagram is shown in Figure 1.

Block Diagram

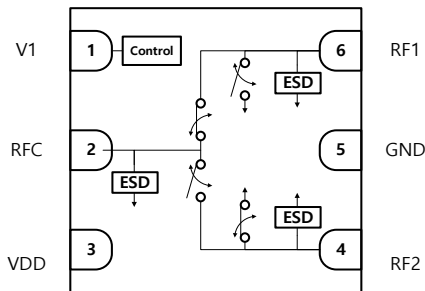


Figure 1 Functional Block Diagram

Applications

- Smart Card
- NFC
- WiMAX 802.16
- WLAN 802.11 a/b/g/n/ac/ax
- Drone
- Bluetooth
- Wireless Infrastructure
- Remote keyless entry
- Telematics / Infotainment
- Two-way radios
- Wireless control systems
- GPS/Navigation

Package Type



1.7mmx1.7mmx0.37mm, 6-Lead xTDFN Package

Figure 2 Package Type

Device Features

- Output frequency range : 5 MHz to 6.0 GHz
- Fast Switching Time : 90 to 135 ns
- Supply Voltage : 2.7V to 3.6V
- Low Insertion loss
 - : 0.31dB @ 13.56MHz
 - : 0.41dB @ 2.45GHz
 - : 0.52dB @ 5.75GHz
- High Isolation
 - : 83dB @ 13.56MHz
 - : 43dB @ 2.45GHz
 - : 29dB @ 5.75GHz
- Input P1dB
 - : 33dBm @ 13.56MHz
 - : 37dBm @ 2.45GHz
 - : 35dBm @ 5.75GHz
- High IIP3
 - : 65dBm @ 2.45GHz
 - : 64dBm @ 5.75GHz
- ESD protection (HBM) : 2.0kV @ all pins
- 6-Lead xTDFN package : 1.7mm x 1.7mm x 0.37mm
- Operating temperature range : -40°C to +105°C
- Lead-free/RoHS2-compliant xTDFN package

Electrical Specifications

Typical conditions are at VDD = 3.3V, T_A = 25°C, V1 Low = 0V, V1 High = 3.3V, Z_L = 50Ω, Excluding SMA Connector and PCB loss⁽¹⁾, unless otherwise noted.

Table 1 Electrical Specifications

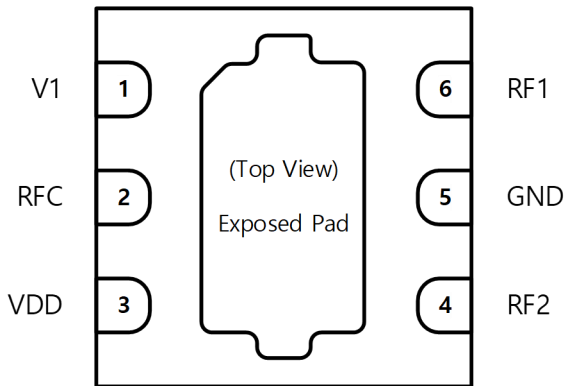
Parameter	Path	Condition	Min	Typ	Max	Unit
Operating Frequency			5		6000	MHz
Insertion Loss	RFc - RFx	13.56MHz		0.31		dB
		1GHz		0.37		
		2GHz		0.40		
		2.45GHz		0.41		
		3GHz		0.45		
		4GHz		0.47		
		5GHz		0.64		
		5.75GHz		0.52		
Isolation	RFc - RFx	13.56MHz		83		dB
		1GHz		52		
		2GHz		47		
		2.45GHz		43		
		3GHz		40		
		4GHz		34		
		5GHz		35		
		5.75GHz		29		
Isolation	RFx - RFx	13.56MHz		80		dB
		1GHz		45		
		2GHz		36		
		2.45GHz		34		
		3GHz		33		
		4GHz		29		
		5GHz		25		
		5.75GHz		26		
6GHz		25				
Return Loss	RFc, RF1, RF2	5MHz – 6GHz (Active port)		20		dB
Input P1dB	RFc - RFx	13.56MHz		33		dBm
		2.45GHz		37		
		5.75GHz		35		
Input IP3 ⁽²⁾	RFc - RFx	2.45GHz		65		dBm
		5.75GHz		64		
Input IP2 ⁽²⁾	RFc - RFx	2.45GHz		105		dBm
		5.75GHz		90		
2 nd Harmonic ⁽³⁾	RFc - RFx	2.45GHz		95		dBc
		5.75GHz		80		
3 rd Harmonic ⁽³⁾	RFc - RFx	2.45GHz		100		dBc
		5.75GHz		100		
Switching Time	RFc - RFx	50% control to 90% RF		135		ns
		50% control to 10% RF		90		
Settling Time	RFc - RFx	50% CTRL to 0.05dB final value Rising Edge		145		ns
		50% CTRL to 0.05dB final value Falling Edge		110		

The typical spurious performance of the BSW722T is -115dBm / 10Hz @ Over 10MHz

(1) Excluding SMA Connector and PCB loss. 1GHz (0.12dB), 2GHz (0.20dB), 3GHz (0.27dB), 4GHz (0.35dB), 5GHz (0.51dB), 6GHz (0.52dB)

(2) Tone Power is 18dBm and Tone spacing is 20KHz.

(3) Tone Power is 18dBm.

Product Description

Figure 3 Functional Block Diagram
Table 2 Pin Descriptions

No.	Pin Name	Descriptions
1	V1	Digital Control Logic Input
2	RFC	RF Common port
3	VDD	Supply Voltage
4	RF2	RF2 port
5	GND	Ground
6	RF1	RF1 port
Pad	Exposed Pad	Ground

Table 3 V1 Control Truth Table

V1	RFC-RF1	RFC-RF2
0	OFF	ON
1	ON	OFF

Table 4 Operating Ranges*

Parameter	Symbol	Min	Typ	Max	Unit
Supply Voltage	VDD	2.7	3.3	3.6	V
Supply Current	IDD	-	170	-	μA
Digital Input Control (V1)	V1 High	1.0	-	3.3	V
	V1 Low	0	-	0.7	V
Operating Temperature Range	To	-40	+25	+105	°C
RF Input Power, CW Freq.=2.45GHz, 5.75GHz any port, Z _L =50Ω	-	-	-	30	dBm

*Specifications are not guaranteed over all recommended operating conditions.

Table 5 Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Unit
Supply Voltage	VDD	-0.3	3.6	V
Digital Input Voltage (V1)	V1	-0.3	3.6	V
Maximum Input Power, CW (+25°C)	-	-	Input P1dB	dBm
Storage Temperature range	-	-65	+150	°C
Maximum Junction Temperature	-	-	+150	°C
ESD	HBM	All pins	2000	V
	CDM	All pins	1000	V

Typical Performances

Typical conditions are at VDD = 3.3V, T_A = 25°C, V1 Low = 0V, V1 High = 3.3V, Z_L = 50Ω, Excluding SMA Connector and PCB loss, unless otherwise noted.

Figure 4 Insertion Loss vs. Vdd (RFC - RFx)

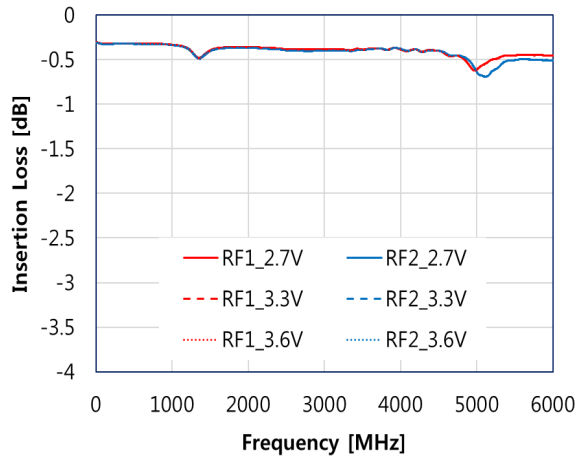


Figure 5 Insertion Loss vs. Temp (RFC - RFx)

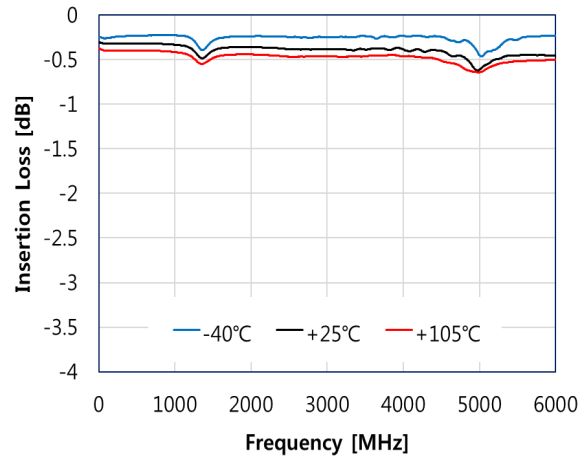


Figure 6 Return Loss (RFC, RFx)

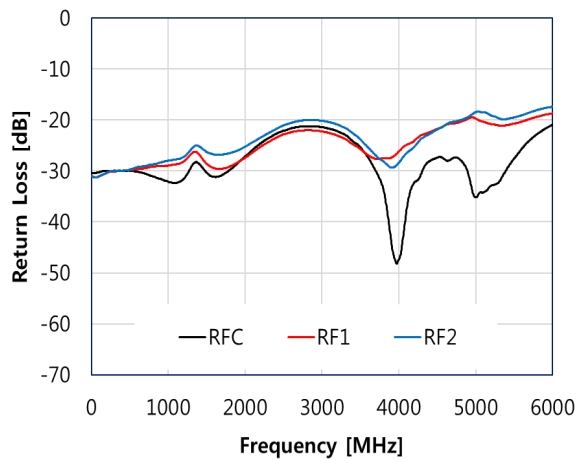
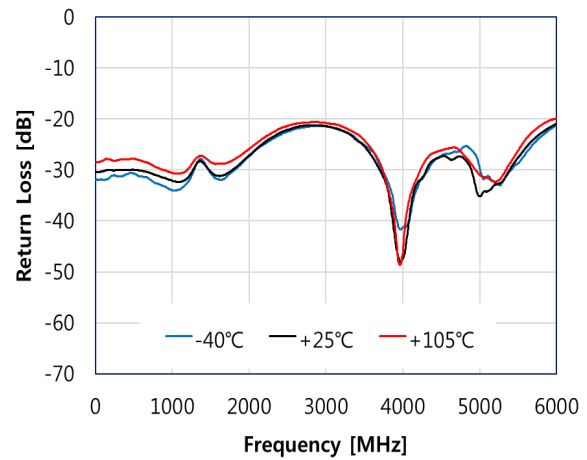


Figure 7 Return Loss vs. Temp (RFC)



Typical Performances

Typical conditions are at $V_{DD} = 3.3V$, $T_A = 25^\circ C$, $V1\ Low = 0V$, $V1\ High = 3.3V$, $Z_L = 50\Omega$, Excluding SMA Connector and PCB loss, unless otherwise noted.

Figure 8 Isolation vs. Vdd (RFC - RFx)

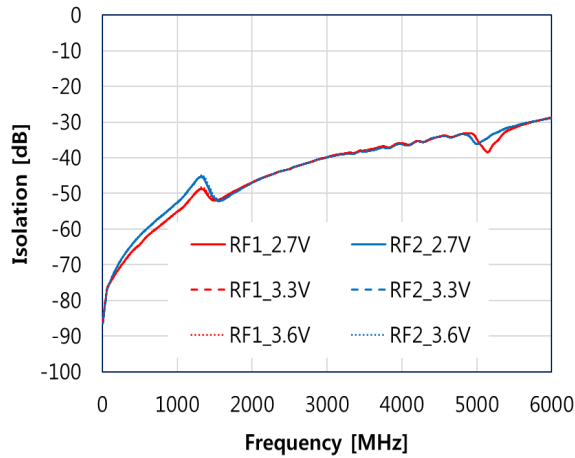


Figure 9 Isolation vs. Temp (RFC-RFx)

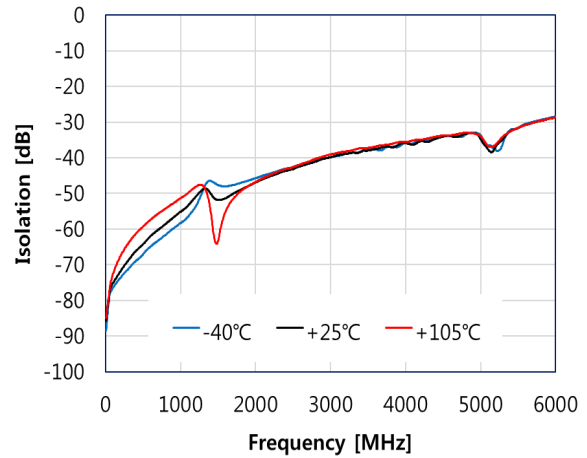


Figure 10 Isolation vs. Vdd (RFx - RFx)

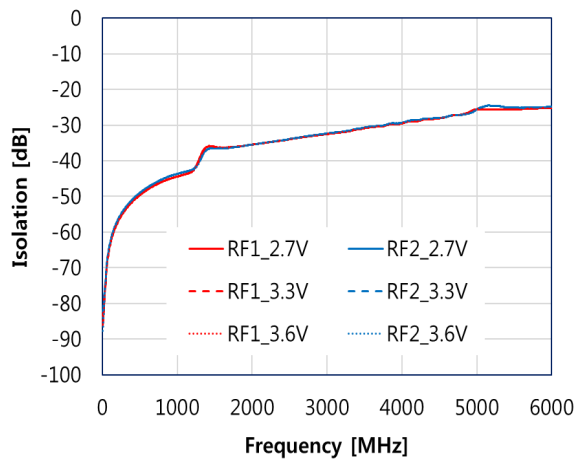
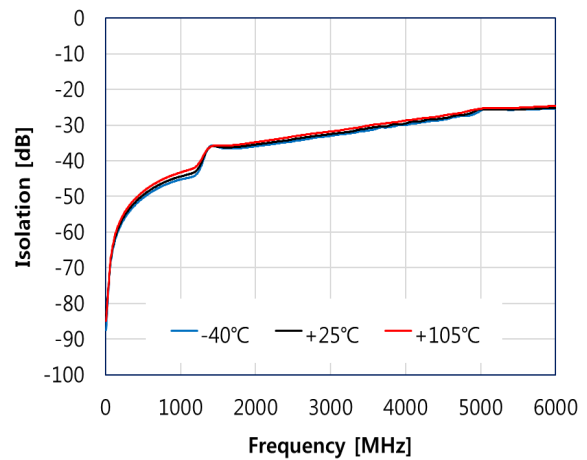


Figure 11 Isolation vs. Temp (RFx - RFx)



Evaluation Board

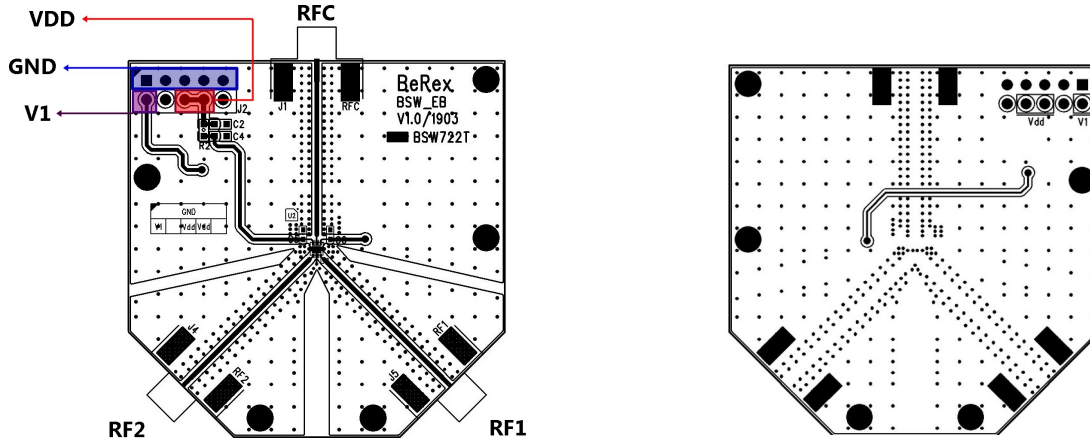


Figure 12 Evaluation Board Layout

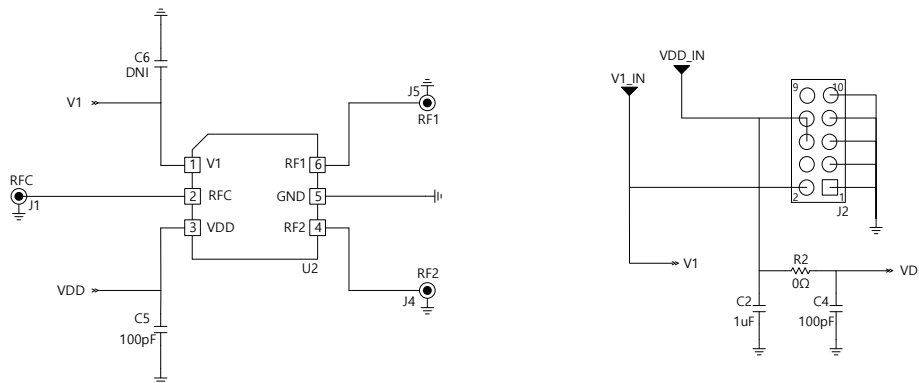


Figure 13 Evaluation Board Schematic

	COPPER : 1oz (0.035mm), Top Layer	FINISH THICKNESS : 1.55T
RO4003C Er : 3.38	RO4003C / 0.305mm	
	COPPER : 1oz (0.035mm), Inner Layer	
FR-4 Er : 4.5~4.8	FR-4 / 0.36mm	
	COPPER : 1oz (0.035mm), Inner Layer	
	FR-4 Er : 4.5~4.8	
	COPPER : 1oz (0.035mm), Bottom Layer	

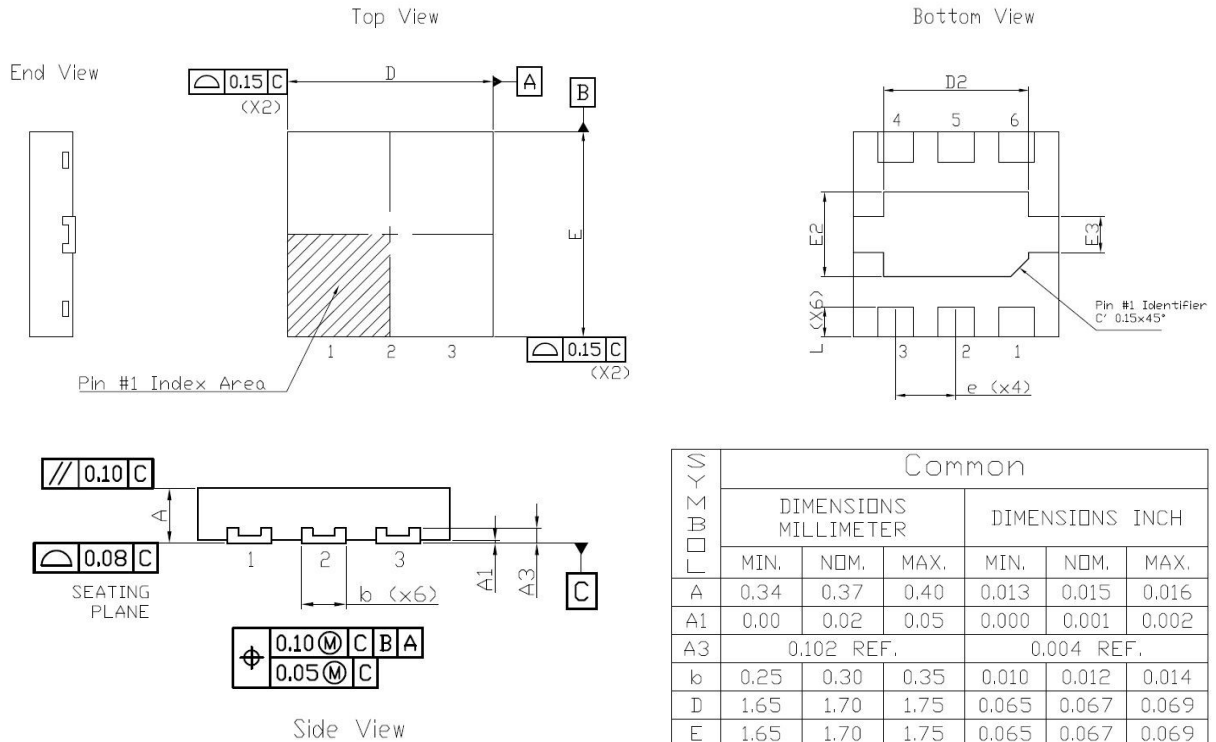
Figure 14 Evaluation Board PCB Layer Information

Table 6 Bill of Material - Evaluation Board

No.	Ref Des	Part Qty	Part Number	Remark
1	C2	1	CAP 1608 1uF J 50V	
2	C4	1	CAP 1608 100pF J 50V	
3	C5*	1	CAP 1005 100pF J 50V	
4	C6	1	CAP 1005 DNI	
5	R2	1	RES 1608 J 0ohm	
6	J2	1	10 Pin Header	
7	RFC, RF1, RF2	3	SMA_END_LAUNCH	
8	U2	1	BSW722T	

* C5 should be placed near the device.

Package Outline Drawing



- NOTES :
1. DIMENSION AND TOLERANCING CONFORM TO ASME Y14.5M-1994.
 2. CONTROLLING DIMENSIONS : MILLIMETER. CONVERTED INCH DIMENSION ARE NOT NECESSARILY EXACT.

Figure 15 Package Outline Drawing

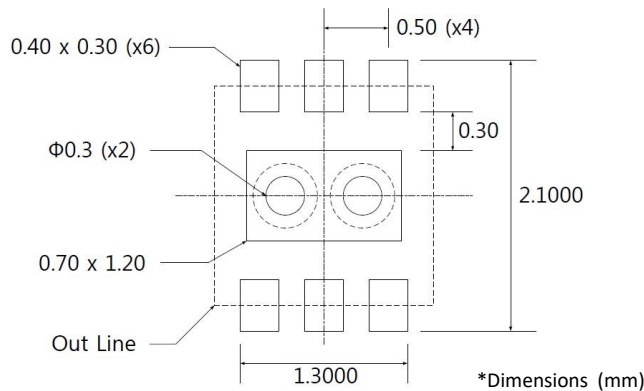
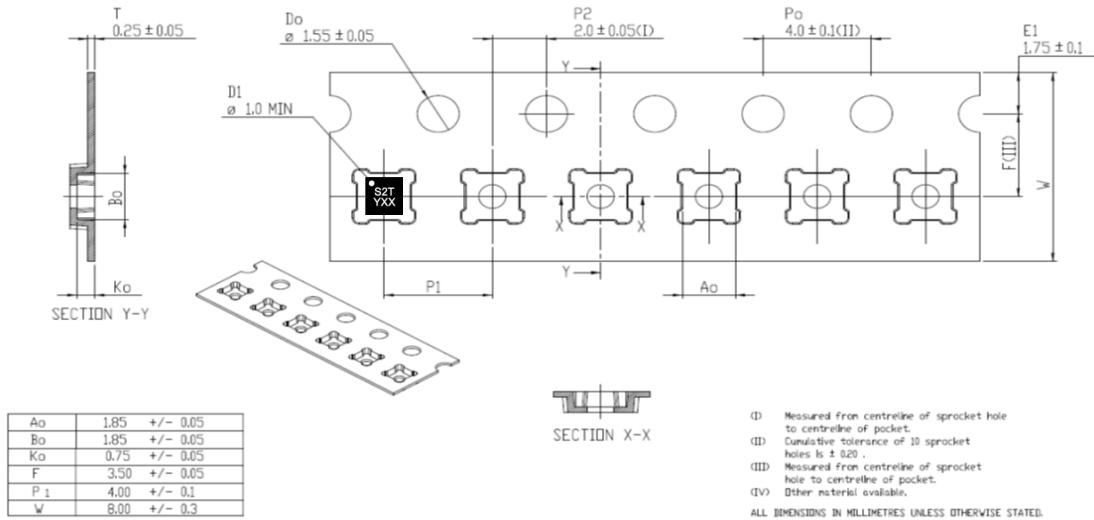


Figure 16 Recommended Land Pattern

Tape & Reel



Packaging information:	
Tape Width	8mm
Reel Size	7inch
Device Cavity Pitch	4mm
Device Per Reel	3000EA

Figure 17 Tape & Reel

Package Marking



Marking information:	
S	RF Switch
2	The number of switch throw
T	Sequential Number
Y	Work Year
XX	Wafer Lot Number

Figure 18 Package Marking

Lead plating finish

100% Tin Matte finish

(All BeRex products undergoes a 1 hour, 150 degree C, Anneal bake to eliminate thin whisker growth concerns.)

MSL / ESD Rating

ESD information:	
Rating	Class 2 (2000V)
Test	Human Body Model (HBM)
Standard	JS-001-2017

MSL information:	
Rating	Level 1 at +260°C convection reflow
Standard	JEDEC Standard J-STD-020



Proper ESD procedures should be followed when handling the device.

RoHS Compliance

This part is compliant with Restrictions on the use of certain Hazardous Substances in Electrical and Electronic Equipment (RoHS) Directive 2011/65/EU as amended by Directive 2015/863/EU.

This product also is compliant with a concentration of the Substances of Very High Concern (SVHC) candidate list which are contained in a quantity of less than 0.1%(w/w) in each components of a product and/or its packaging placed on the European Community market by the BeRex and Suppliers.

NATO CAGE code:

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