

### Product Description

The BSW7321 is a reflective SPDT RF switch that can be used in high power and good performance WLAN 802.11 a/b/g/n/ac/ax, DOCSIS 3.0/3.1 and Wireless Communication applications.

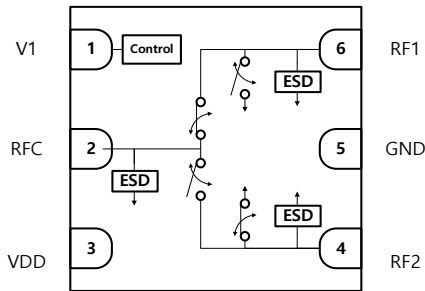
This device is packaged in RoHS2-compliant with 1.5mm x 1.5mm x 0.5mm, 6-Lead UDFN package. It must be used with back side ground soldering.

The BSW7321 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

- WiMAX 802.16
- WLAN 802.11 a/b/g/n/ac/ax
- DOCSIS 3.0/3.1
- Drone
- Bluetooth
- Wireless Infrastructure
- Remote keyless entry
- Telematics / Infotainment
- Two-way radios
- Wireless control systems
- GPS/Navigation

### Package Type



1.5mm x 1.5mm x 0.5mm, 6-Lead UDFN Package

**Figure 2 Package Type**

### Device Features

- Output frequency range : 5 MHz to 8.0 GHz
- Fast Switching Time : 105 to 145 ns
- Supply Voltage : 2.7V to 3.6V
- Low insertion loss
  - : 0.58dB @ 2.45GHz
  - : 0.86dB @ 5.75GHz
- High isolation
  - : 43dB @ 2.45GHz
  - : 30dB @ 5.75GHz
- Input 1 dB output compression
  - : 39dBm @ 2.45GHz
  - : 39dBm @ 5.75GHz
- High IIP3
  - : 65dBm @ 2.45GHz
  - : 65dBm @ 5.75GHz
- ESD protection (HBM) : 2.0kV @ all pins
- 6-Lead UDFN package : 1.5mm x 1.5mm x 0.5mm
- Operating temperature range : -40°C to +105°C
- Lead-free/RoHS2-compliant UDFN package

**Electrical Specifications**

Typical conditions are at VDD = 3.3V, T<sub>A</sub> = 25°C, V1 Low = 0V, V1 High = 3.3V, Z<sub>L</sub> = 50Ω, Excluding SMA Connector and PCB loss<sup>(1)</sup>, unless otherwise noted.

**Table 1 Electrical Specifications**

Parameter	Path	Condition	Min	Typ	Max	Unit
Operating Frequency			5		8000	MHz
Insertion Loss	RFC - RFx	1GHz		0.50		dB
		2GHz		0.57		
		3GHz		0.61		
		4GHz		0.59		
		5GHz		0.65		
		6GHz		0.97		
		7GHz		0.88		
		8GHz		0.96		
Isolation	RFC - RFx	1GHz		52		dB
		2GHz		46		
		3GHz		30		
		4GHz		35		
		5GHz		32		
		6GHz		30		
		7GHz		29		
		8GHz		26		
Isolation	RFx - RFx	1GHz		44		dB
		2GHz		36		
		3GHz		33		
		4GHz		30		
		5GHz		29		
		6GHz		26		
		7GHz		25		
		8GHz		23		
Return Loss	RFC, RF1, RF2	5MHz – 8GHz (Active port)		15		dB
Input P1dB	RFC - RFx	2.45GHz		39		dBm
		5.75GHz		39		
Input IP3 <sup>(2)</sup>	RFC - RFx	2.45GHz		65		dBm
		5.75GHz		65		
Input IP2 <sup>(2)</sup>	RFC - RFx	2.45GHz		100		dBm
		5.75GHz		100		
2 <sup>nd</sup> Harmonic <sup>(3)</sup>	RFC - RFx	2.45GHz		90		dBc
		5.75GHz		90		
3 <sup>rd</sup> Harmonic <sup>(3)</sup>	RFC - RFx	2.45GHz		105		dBc
		5.75GHz		105		
Switching Time	RFC - RFx	50% control to 90% RF		145		ns
		50% control to 10% RF		105		
Settling Time	RFC - RFx	50% CTRL to 0.05dB final value Rising Edge		155		ns
		50% CTRL to 0.05dB final value Falling Edge		115		

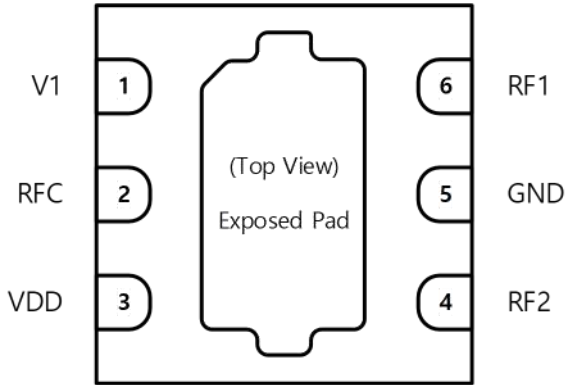
The typical spurious performance of the BSW7321 is -115dBm / 10Hz @ Over 10MHz

(1) Excluding SMA Connector and PCB loss.

1GHz (0.14dB), 2GHz (0.22dB), 3GHz (0.27dB), 4GHz (0.36dB), 5GHz (0.41dB), 6GHz (0.45dB), 7GHz (0.59dB), 8GHz (0.64dB)

(2) The two-tone Power is 18dBm each 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 Recommended Operating Conditions\***

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, Zi=50Ω	-	-	-	30	dBm

\*Specifications are not guaranteed over all recommended operating conditions.

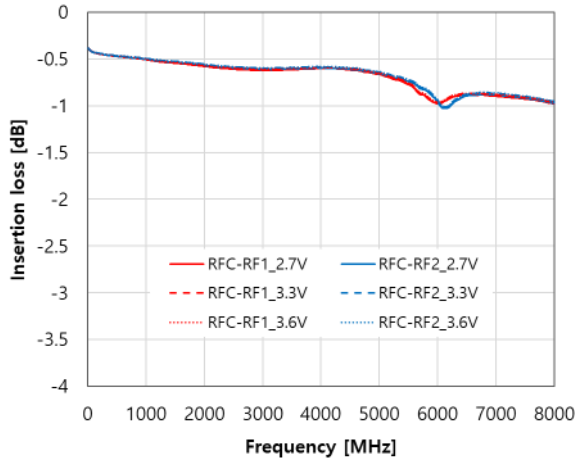
**Table 5 Absolute Maximum Ratings**

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
ESD	HBM	All pins	2000	V
	CDM	All pins	1000	V

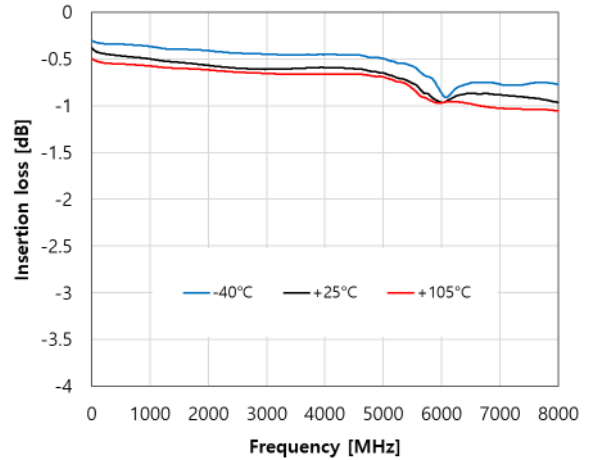
### Typical Performances

Typical conditions are at VDD = 3.3V, T<sub>A</sub> = 25°C, V1 Low = 0V, V1 High = 3.3V, Z<sub>L</sub> = 50Ω, Excluding SMA Connector and PCB loss, unless otherwise noted.

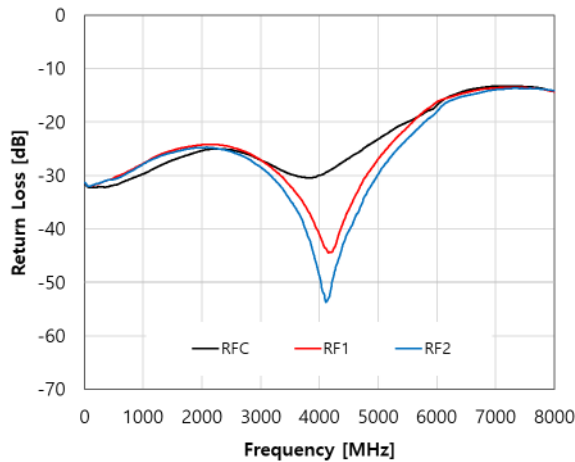
**Figure 4 Insertion Loss vs. Vdd (RFC - RFx)**



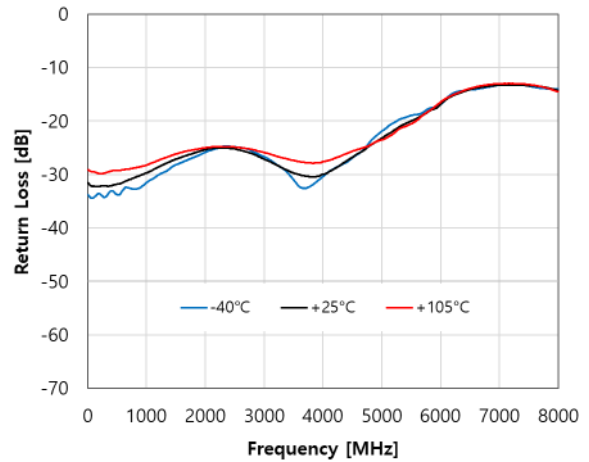
**Figure 5 Insertion Loss vs. Temp (RFC - RFx)**



**Figure 6 Return Loss (RFC, RFx)**



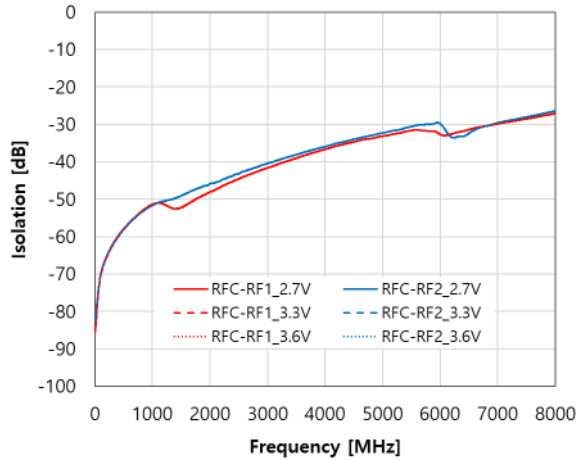
**Figure 7 Return Loss vs. Temp (RFC)**



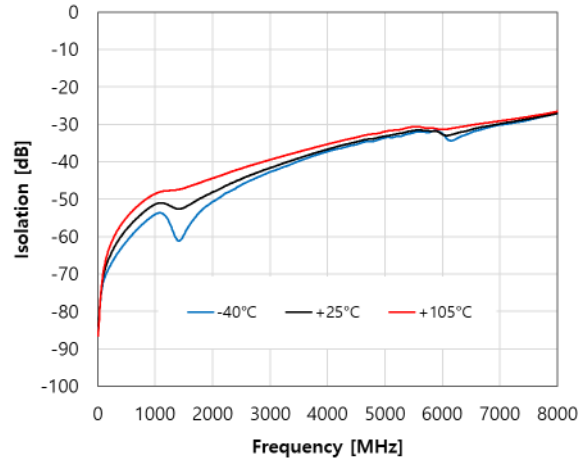
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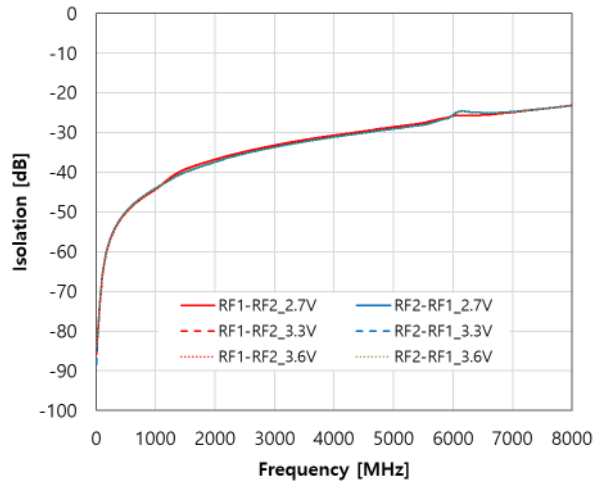
**Figure 8 Isolation vs. Vdd (RFC - RFx)**



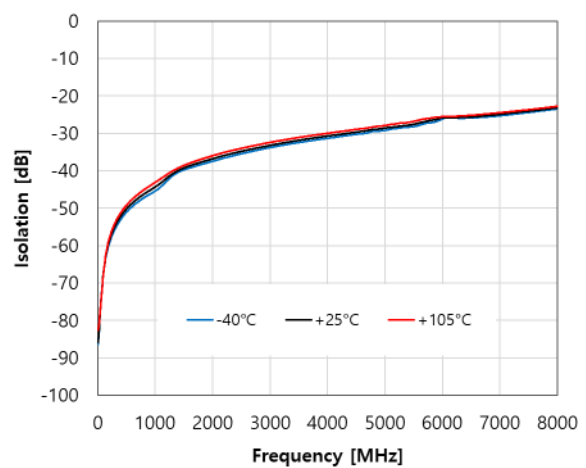
**Figure 9 Isolation vs. Temp (RFC-RFx)**



**Figure 10 Isolation vs. Vdd (RFx - RFx)**



**Figure 11 Isolation vs. Temp (RFx - RFx)**



### Evaluation Board

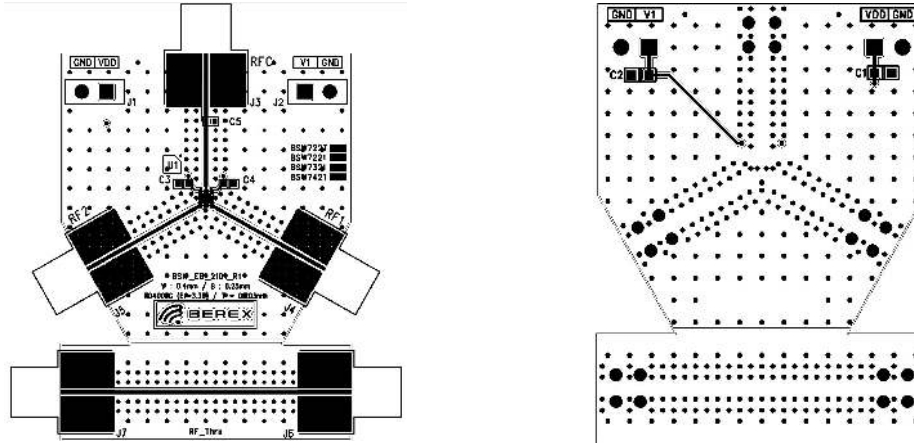


Figure 12 Evaluation Board Layout

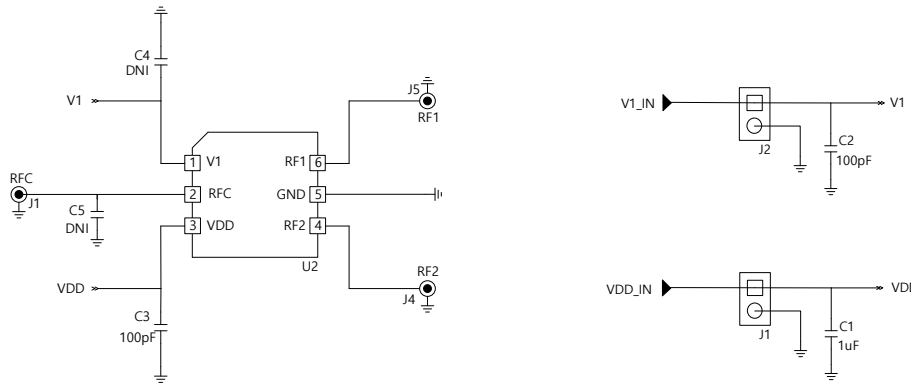


Figure 13 Evaluation Board Schematic

RO4003C Er : 3.38	COPPER : 1oz (0.035mm), Top Layer	<p>FINISH THICKNESS : 1.63T</p>
FR-4 Er : 4.5~4.8	RO4003C / 0.2mm	
	COPPER : 1oz (0.035mm), Inner 1 Layer	
FR-4 Er : 4.5~4.8	FR-4 / 0.36mm	
	COPPER : 1oz (0.035mm), Inner 2 Layer	
	FR-4 / 0.93mm	
	COPPER : 1oz (0.035mm), Bottom Layer	

Figure 14 Evaluation Board PCB Layer Information

No.	Ref Des	Part Qty	Part Number	Remark
1	C1	1	CAP 1005 1uF J 50V	
2	C2,C3*	2	CAP 1005 100pF J 50V	
3	C4	2	CAP 1005 DNI	
4	C5	1	CAP 0603 DNI	
6	J1,J2	2	2 Pin Header	
7	RFC, RF1, RF2	3	SMA_END_LAUNCH	
8	U1	1	BSW7321	

\* C3 should be placed near the device.

Table 6 Bill of Material - Evaluation Board

### Package Outline Drawing

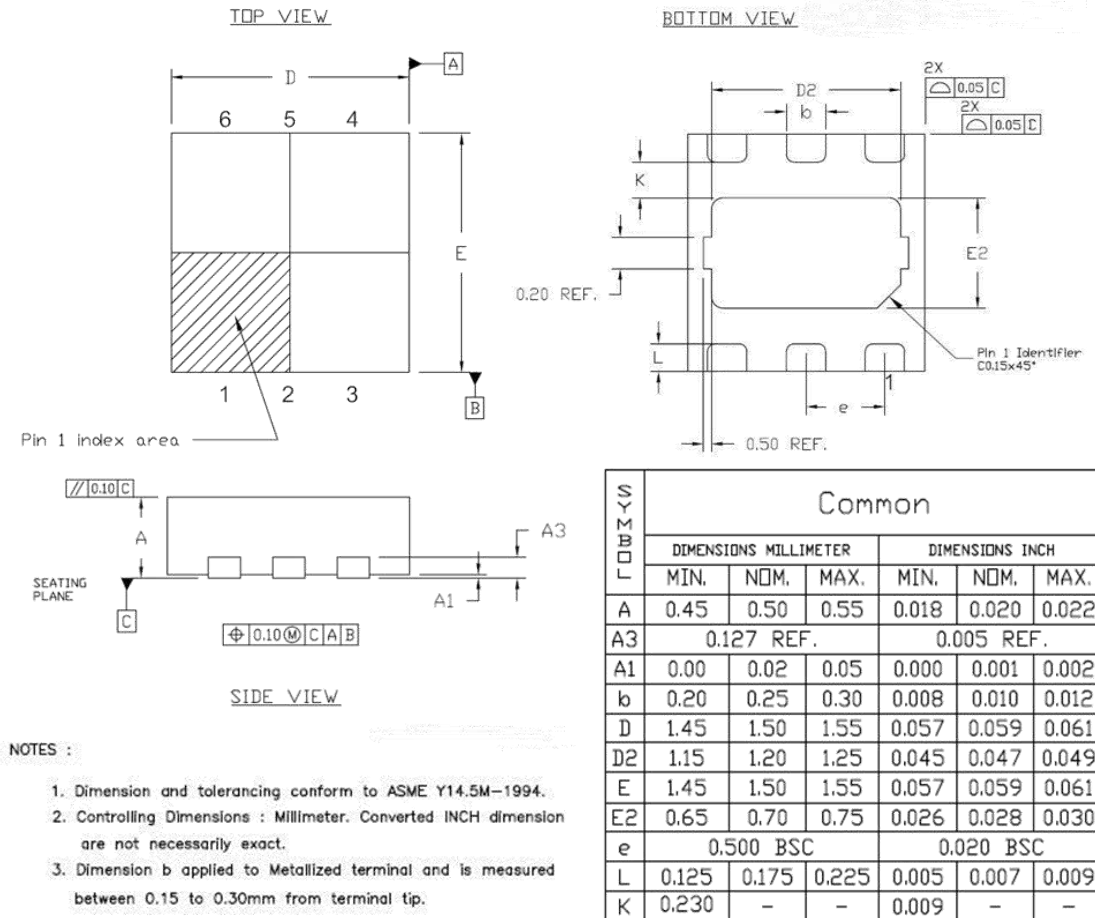


Figure 15 Package Outline Drawing

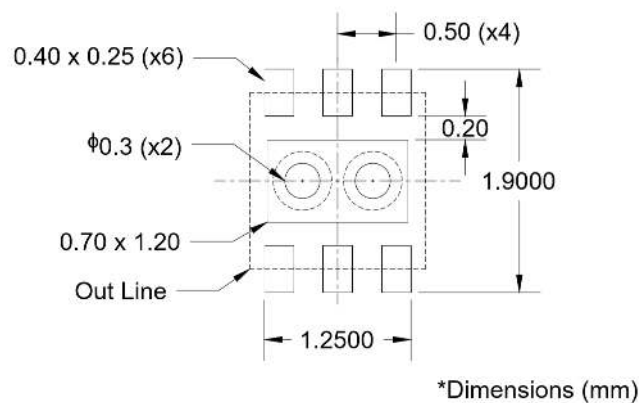
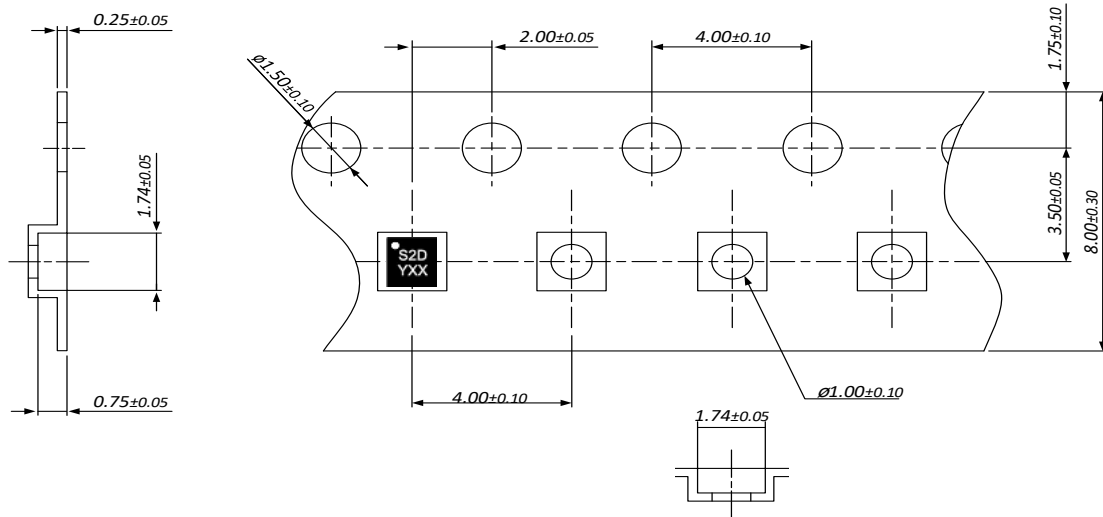


Figure 16 Recommended Land Pattern

**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:			
Marking Code 1		Marking Code 2	
S	RF Switch	2	The number of switch throw
2	The number of switch throw	D	Sequential Number
D	Sequential Number	XX	Wafer Lot 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:**

2	N	9	6	F
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