

RF360 Europe GmbH  
A Qualcomm – TDK Joint Venture

## SAW components

### SAW filter

Small cell & femtocell  
Beidou B1; GPS; GLONASS

Series/type:	B9621
Ordering code:	B39162B9621P810
Date:	May 16, 2017
Version:	2.2

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SAW components	B9621
SAW filter	1582.47 MHz

Data sheet

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## SAW components

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## SAW filter

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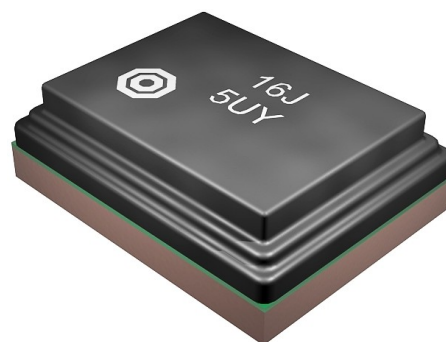
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## 1 Application

- Low-loss RF GPS + Beidou B1 + GLONASS filter for industrial electronics
- Simultaneous usage of GPS, Beidou B1 and GLONASS Bands
- Usable pass band: 2.0 MHz for GPS, 4.092 MHz for Beidou B1 and 8.34 MHz for GLONASS
- Very low insertion attenuation
- No matching network required for operation at 50  $\Omega$

## 2 Features

- Package size 1.4 $\pm$ 0.1 mm  $\times$  1.1 $\pm$ 0.1 mm
- Package height 0.45 mm (max.)
- Approximate weight 3 mg
- RoHS compatible
- Package for Surface Mount Technology (SMT)
- Ni/Au-plated terminals
- Electrostatic Sensitive Device (ESD)
- Moisture Sensitivity Level 2a (MSL2a)



**Figure 1:** Picture of component with example of product marking.

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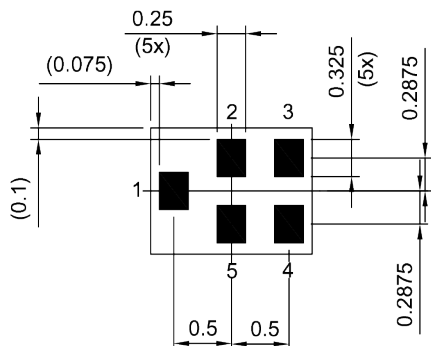
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## 3 Package

BOTTOM VIEW

Pad and pitch tolerance  $\pm 0.05$ 

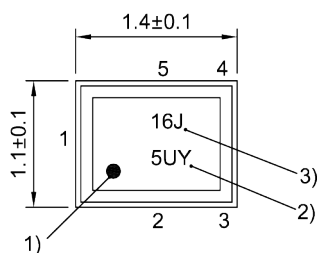
## 4 Pin configuration

- 1 Input
- 4 Output
- 2, 3, 5 Ground

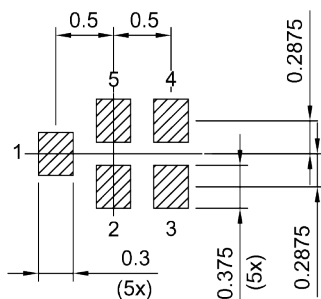
SIDE VIEW



TOP VIEW



- 1) Marking for pad number 1
- 2) Example of encoded lot number
- 3) Example of encoded filter type number

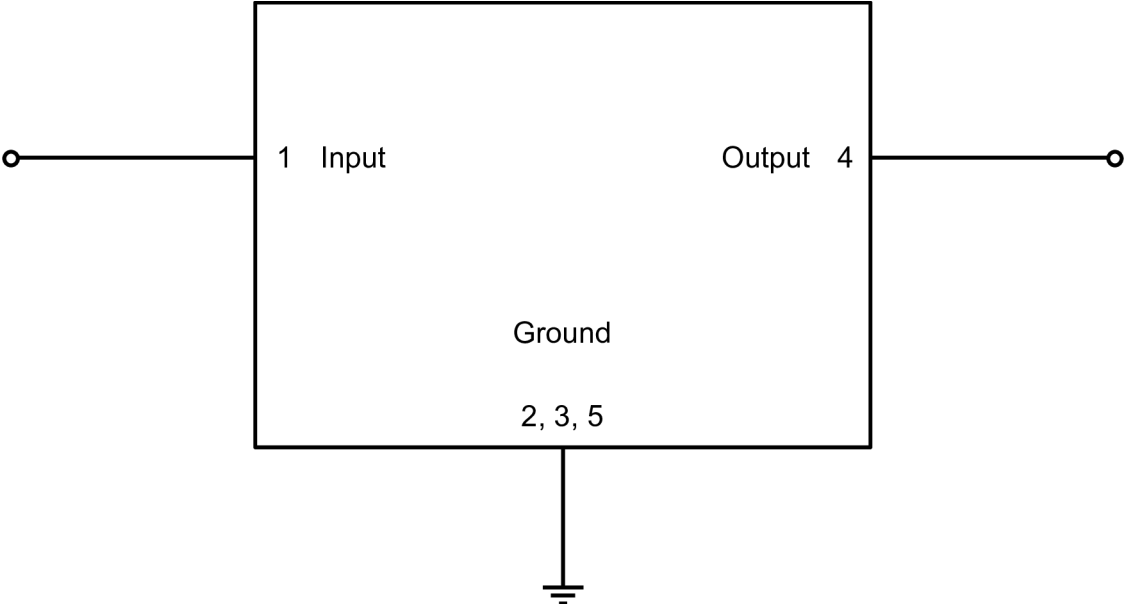
Land pattern  
THRU VIEWLanding pad tolerance  $-0.02$ 

**Figure 2:** Drawing of package with package height A = 0.45 mm (max.). See Sec. Package information (p. 18).

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5 Matching circuit



**Figure 3:** Schematic of matching circuit. No external matching components required.

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## 6 Characteristics

Temperature range for specification

 $T_{\text{SPEC}} = -10\text{ °C} \dots +85\text{ °C}$ 

Input terminating impedance

 $Z_{\text{IN}} = 50\ \Omega$ 

Output terminating impedance

 $Z_{\text{OUT}} = 50\ \Omega$ 

Characteristics		min. for $T_{\text{SPEC}}$	typ. @ +25 °C	max. for $T_{\text{SPEC}}$	
<b>Center frequency</b>	$f_{\text{C}}$	—	1582.47	—	MHz
<b>Maximum insertion attenuation</b>	$\alpha_{\text{max}}$				
	1559.052... 1563.144 MHz	—	1.4	1.9	dB
	1574.42... 1576.42 MHz	—	1.0	1.4	dB
	1597.55... 1605.89 MHz	—	1.4	1.9	dB
<b>Maximum VSWR</b>	$\text{VSWR}_{\text{max}}$				
@ input port	1559.052... 1563.144 MHz	—	1.8	2.2	
	1574.42... 1576.42 MHz	—	1.2	1.8	
	1597.55... 1605.89 MHz	—	1.6	2.0	
@ output port	1559.052... 1563.144 MHz	—	1.8	2.2	
	1574.42... 1576.42 MHz	—	1.2	1.8	
	1597.55... 1605.89 MHz	—	1.5	2.0	
<b>Maximum error vector magnitude</b>	$\text{EVM}_{\text{max}}^{1)}$				
	1561.452... 1603.49 MHz	—	1.0	2.0	%
<b>Minimum attenuation</b>	$\alpha_{\text{min}}$				
	10... 960 MHz	45	49	—	dB
	960... 1463 MHz	36	45	—	dB
	1710... 1785 MHz	33	42	—	dB
	1785... 1990 MHz	32	41	—	dB
	1990... 2280 MHz	34	39	—	dB
	2280... 2400 MHz	38	51	—	dB
	2400... 2500 MHz	40	54	—	dB
	2500... 2700 MHz	40	54	—	dB
	2700... 3000 MHz	40	58	—	dB
	3000... 6000 MHz	25	39	—	dB
<b>Group delay ripple</b>	$\Delta\tau_{\text{var}}$				
	1597.55... 1605.89 MHz	—	4.0	16	ns

<sup>1)</sup> Error Vector Magnitude (EVM) based on definition in 3GPP TS 25.141.

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## 7 Maximum ratings

Operable temperature	$T_{OP} = -40\text{ °C} \dots +95\text{ °C}$	
Storage temperature	$T_{STG}^{1)} = -40\text{ °C} \dots +95\text{ °C}$	
DC voltage	$ V_{DC} ^{2)} = 0\text{ V (max.)}$	
ESD voltage		
	$V_{ESD}^{3)} = 50\text{ V (max.)}$	Machine model.
	$V_{ESD}^{4)} = 225\text{ V (max.)}$	Human body model.
Input power	$P_{IN}$	
@ input port: 777 ... 915 MHz	28 dBm <sup>5)</sup>	GSM signal duty cycle 1:8 for 10000 h @ 55 °C.
@ input port: 1710 ... 2200 MHz	28 dBm <sup>5)</sup>	GSM signal duty cycle 1:8 for 10000 h @ 55 °C.

<sup>1)</sup> Not valid for packaging material. Storage temperature for packaging material is -25 °C to +40 °C.

<sup>2)</sup> In case of applied DC voltage blocking capacitors are mandatory.

<sup>3)</sup> According to JESD22-A115B (MM – Machine Model), 10 negative & 10 positive pulses.

<sup>4)</sup> According to JESD22-A114F (HBM – Human Body Model), 1 negative & 1 positive pulse.

<sup>5)</sup> Expected Lifetime according to accelerated power durability simulation and wear out models.



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## 8 Transmission coefficient

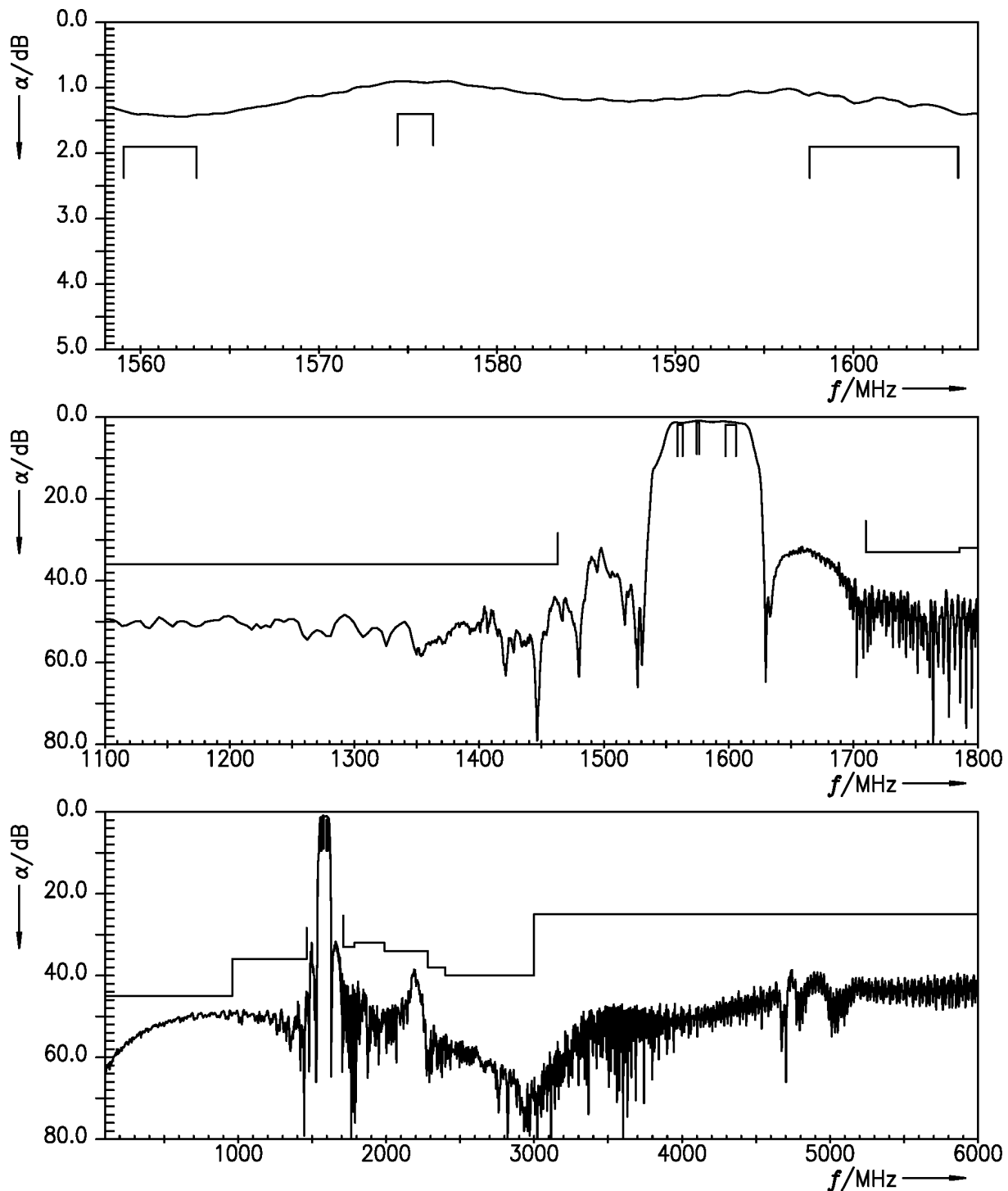


Figure 4: Attenuation.

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9 Reflection coefficients

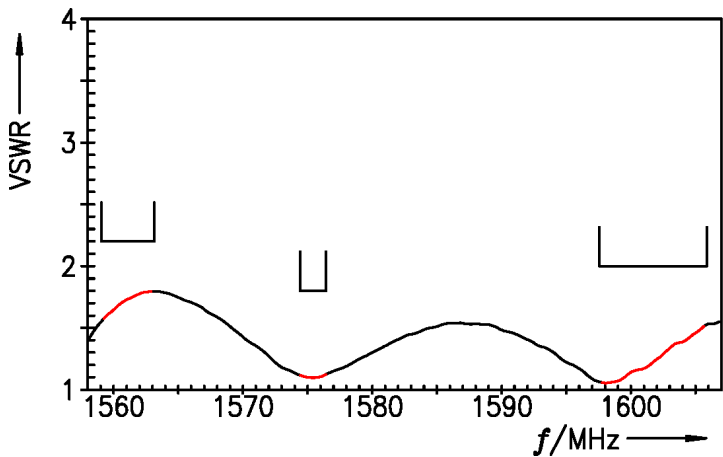


Figure 5: Reflection coefficient at IN port.

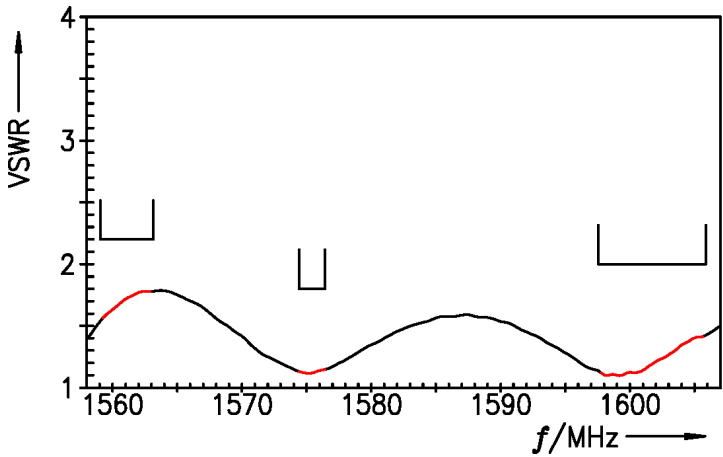
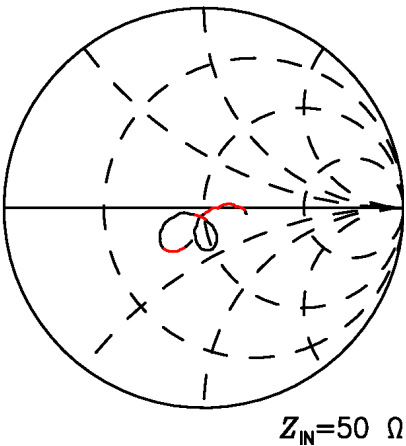
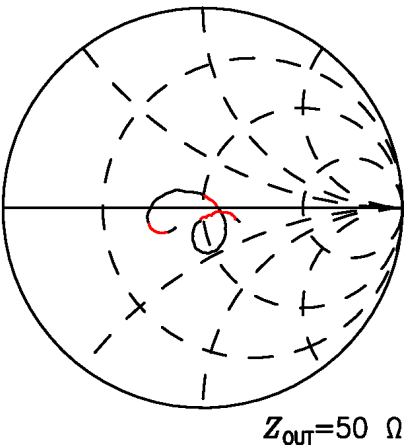


Figure 6: Reflection coefficient at OUT port.



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10 EVM

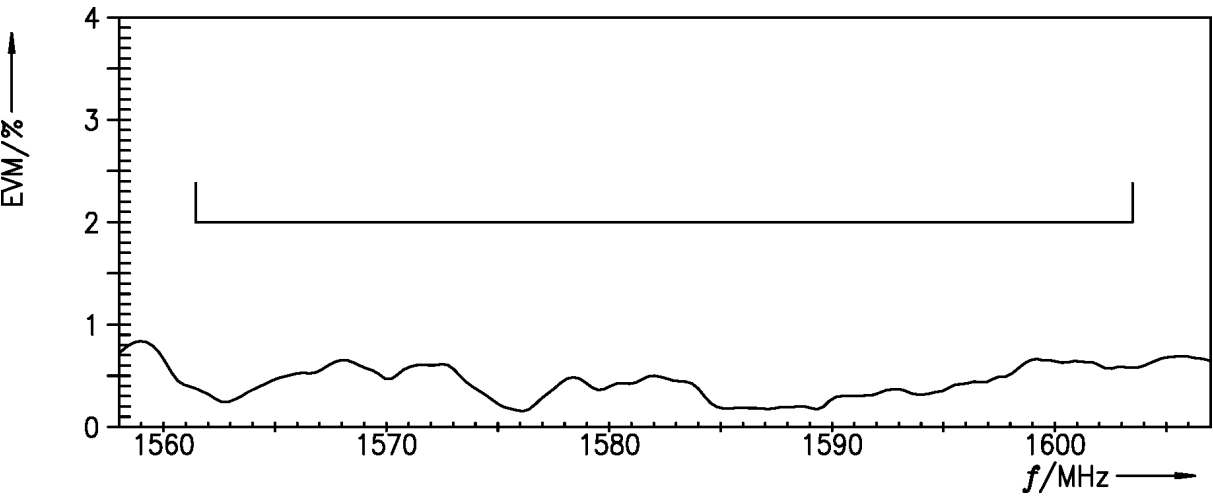


Figure 7: Error vector magnitude.

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11 Packing material

11.1 Tape

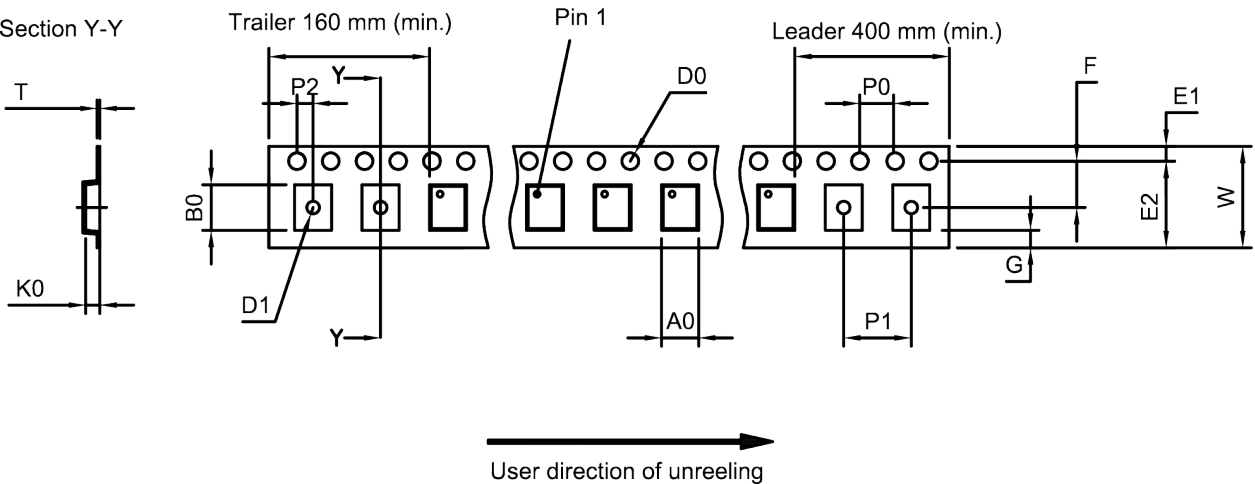


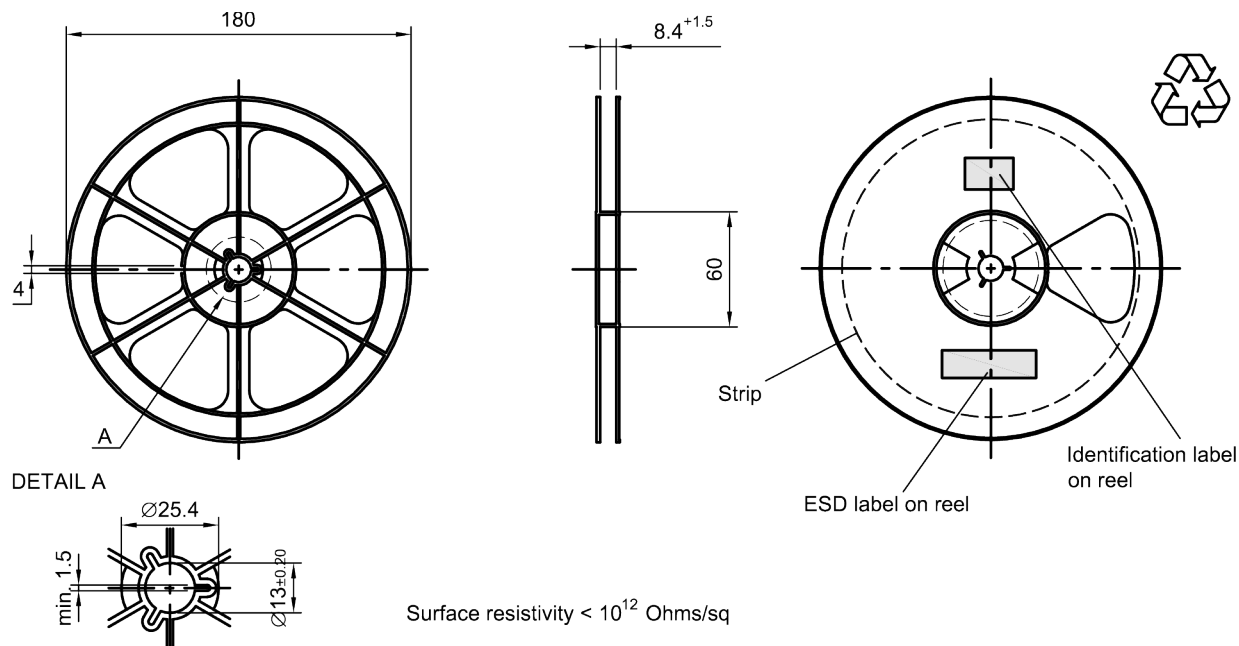
Figure 8: Drawing of tape (first-angle projection) with tape dimensions according to Table 1.

A <sub>0</sub>	1.27±0.05 mm	E <sub>2</sub>	6.25 mm (min.)	P <sub>1</sub>	4.0±0.1 mm
B <sub>0</sub>	1.57±0.05 mm	F	3.5±0.05 mm	P <sub>2</sub>	2.0±0.05 mm
D <sub>0</sub>	1.5+0.1/-0 mm	G	0.75 mm (min.)	T	0.25±0.03 mm
D <sub>1</sub>	0.5±0.1 mm	K <sub>0</sub>	0.62±0.05 mm	W	8.0+0.3/-0.1 mm
E <sub>1</sub>	1.75±0.1 mm	P <sub>0</sub>	4.0±0.1 mm		

Table 1: Tape dimensions.

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## 11.2 Reel with diameter of 180 mm



**Figure 9:** Drawing of reel (first-angle projection) with diameter of 180 mm.

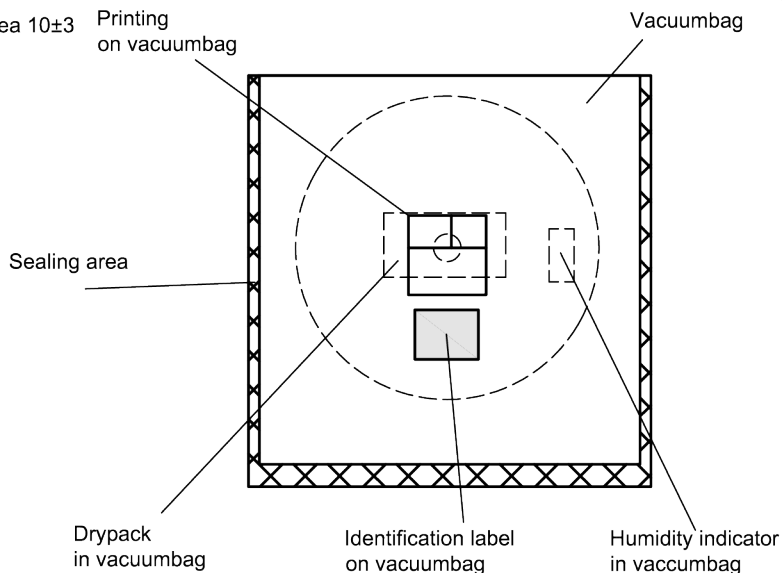
Dimensions [mm]

X = 220+5

Y = 235+5

Sealing area 10±3

Printing  
on vacuumbag



**Figure 10:** Drawing of moisture barrier bag (MBB) for reel with diameter of 180 mm.

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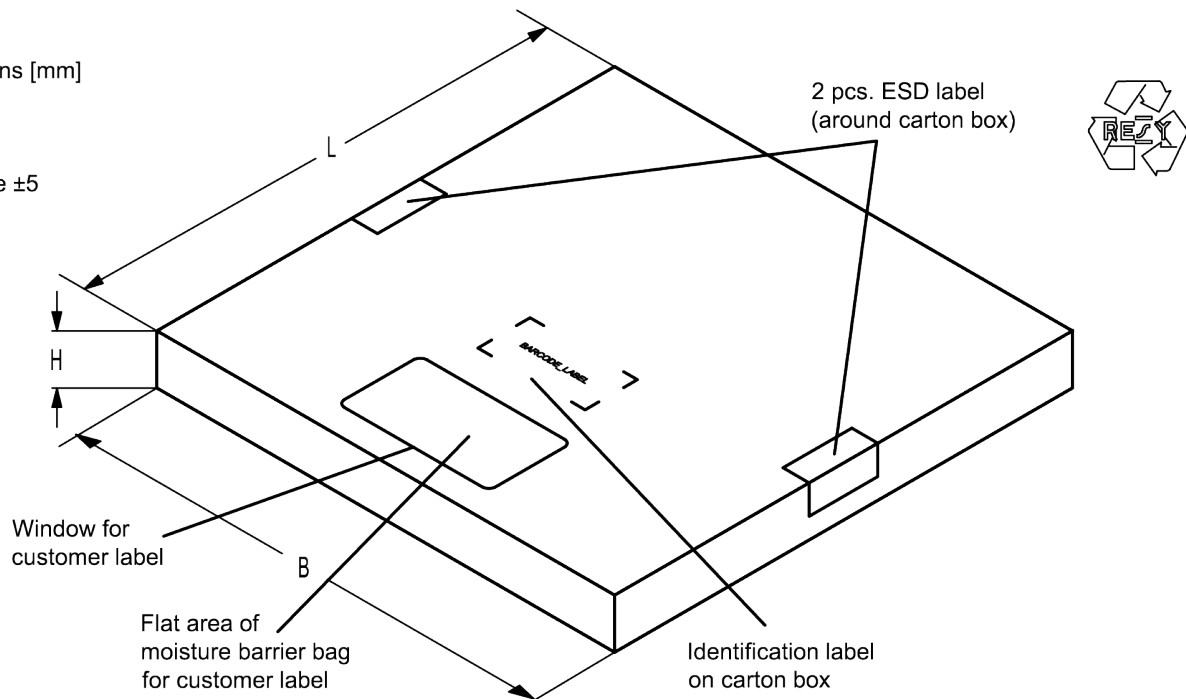
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## Dimensions [mm]

L = 188

B = 188

H = 30

Tolerance  $\pm 5$ **Figure 11:** Drawing of folding box for reel with diameter of 180 mm.

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## 12 Marking

Products are marked with product type number and lot number encoded according to Table 2:

## ■ Type number:

The 4 digit type number of the ordering code, e.g., B3xxxxB**1234**xxxx,  
is encoded by a special BASE32 code into a 3 digit marking.

Example of decoding	type number marking on device	in decimal code.
<b>16J</b>	<b>=&gt;</b>	<b>1234</b>
$1 \times 32^2 + 6 \times 32^1 + 18 (=J) \times 32^0$	<b>=</b>	<b>1234</b>

The BASE32 code for product type B9621 is 9CN.

## ■ Lot number:

The last 5 digits of the lot number, e.g., **12345**,  
are encoded based on a special BASE47 code into a 3 digit marking.

Example of decoding lot number marking on device		in decimal code.
<b>5UY</b>	<b>=&gt;</b>	<b>12345</b>
$5 \times 47^2 + 27 (=U) \times 47^1 + 31 (=Y) \times 47^0$	<b>=</b>	<b>12345</b>

Adopted BASE32 code for type number			
Decimal value	Base32 code	Decimal value	Base32 code
0	0	16	G
1	1	17	H
2	2	18	J
3	3	19	K
4	4	20	M
5	5	21	N
6	6	22	P
7	7	23	Q
8	8	24	R
9	9	25	S
10	A	26	T
11	B	27	V
12	C	28	W
13	D	29	X
14	E	30	Y
15	F	31	Z

Adopted BASE47 code for lot number			
Decimal value	Base47 code	Decimal value	Base47 code
0	0	24	R
1	1	25	S
2	2	26	T
3	3	27	U
4	4	28	V
5	5	29	W
6	6	30	X
7	7	31	Y
8	8	32	Z
9	9	33	b
10	A	34	d
11	B	35	f
12	C	36	h
13	D	37	n
14	E	38	r
15	F	39	t
16	G	40	v
17	H	41	\
18	J	42	?
19	K	43	{
20	L	44	}
21	M	45	<
22	N	46	>
23	P		

**Table 2:** Lists for encoding and decoding of marking.

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13 Soldering profile

The recommended soldering process is in accordance with IEC 60068-2-58 – 3<sup>rd</sup> edit and IPC/JEDEC J-STD-020B.

ramp rate	≤ 3 K/s
preheat	125 °C to 220 °C, 150 s to 210 s, 0.4 K/s to 1.0 K/s
T > 220 °C	30 s to 70 s
T > 230 °C	min. 10 s
T > 245 °C	max. 20 s
T ≥ 255 °C	–
peak temperature T <sub>peak</sub>	250 °C +0/-5 °C
wetting temperature T <sub>min</sub>	230 °C +5/-0 °C for 10 s ± 1 s
cooling rate	≤ 3 K/s
soldering temperature T	measured at solder pads

Table 3: Characteristics of recommended soldering profile for lead-free solder (Sn95.5Ag3.8Cu0.7).

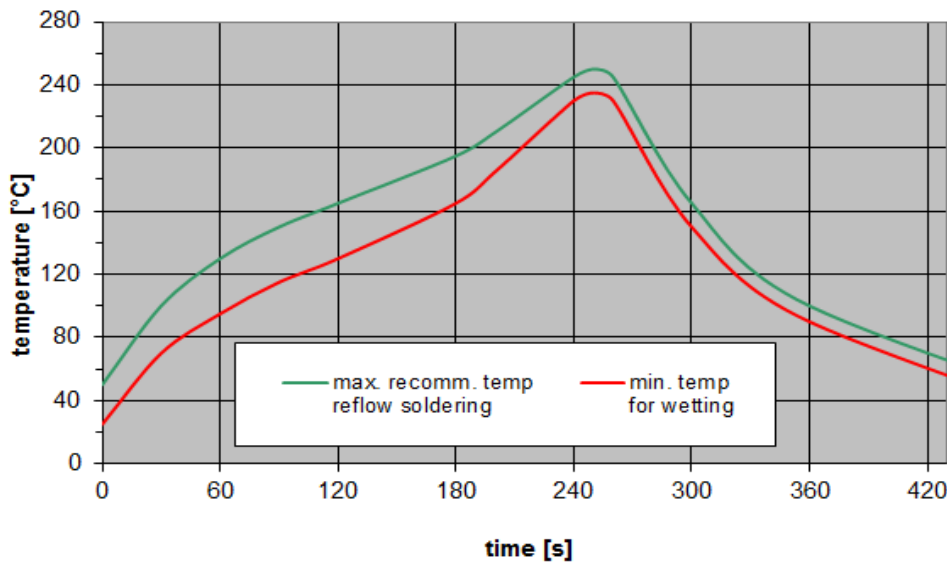


Figure 12: Recommended reflow profile for convection and infrared soldering – lead-free solder.



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**14 Annotations****14.1 Matching coils**

See TDK inductor pdf-catalog <http://www.tdk.co.jp/tefe02/coil.htm#aname1> and Data Library for circuit simulation <http://www.tdk.co.jp/etvcl/index.htm>.

**14.2 RoHS compatibility**

ROHS-compatible means that products are compatible with the requirements according to Art. 4 (substance restrictions) of Directive 2011/65/EU of the European Parliament and of the Council of June 8th, 2011, on the restriction of the use of certain hazardous substances in electrical and electronic equipment ("Directive") with due regard to the application of exemptions as per Annex III of the Directive in certain cases.

**14.3 Scattering parameters (S-parameters)**

The pin/port assignment is available in the headers of the S-parameter files. Please contact your local RF360 sales office.

**14.4 Ordering codes and packing units**

Ordering code	Packing unit
B39162B9621P810	5000 pcs

**Table 4:** Ordering codes and packing units.

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**15 Cautions and warnings****15.1 Display of ordering codes for RF360 products**

The ordering code for one and the same product can be represented differently in data sheets, data books, other publications and the website of RF360, or in order-related documents such as shipping notes, order confirmations and product labels. The varying representations of the ordering codes are due to different processes employed and do not affect the specifications of the respective products. Detailed information can be found on the Internet under [www.rf360jv.com/orderingcodes](http://www.rf360jv.com/orderingcodes).

**15.2 Material information**

Due to technical requirements components may contain dangerous substances. For information on the type in question please also contact one of our sales offices.

For information on recycling of tapes and reels please contact one of our sales offices.

**15.3 Moldability**

Before using in overmolding environment, please contact your local RF360 sales office.

**15.4 Package information****Landing area**

The printed circuit board (PCB) land pattern (landing area) shown is based on RF360 internal development and empirical data and illustrated for example purposes, only. As customers' SMD assembly processes may have a plenty of variants and influence factors which are not under control or knowledge of RF360, additional careful process development on customer side is necessary and strongly recommended in order to achieve best soldering results tailored to the particular customer needs.

**Dimensions**

Unless otherwise specified all dimensions are understood using unit millimeter (mm).

Dimensions do not include burrs.

**Projection method**

Unless otherwise specified first-angle projection is applied.

## Important notes

The following applies to all products named in this publication:

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3. **The warnings, cautions and product-specific notes must be observed.**
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### Офис по работе с юридическими лицами:

105318, г.Москва, ул.Щербаковская д.3, офис 1107, 1118, ДЦ «Щербаковский»

Телефон: +7 495 668-12-70 (многоканальный)

Факс: +7 495 668-12-70 (доб.304)

E-mail: [info@moschip.ru](mailto:info@moschip.ru)

Skype отдела продаж:

moschip.ru

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