



**RF360**  
**Europe GmbH**

## **SAW components**

**SAW RF filter**  
Short range devices

Series/type:	B2600
Ordering code:	B39871B2600P810
Date:	January 05, 2018
Version:	2.2

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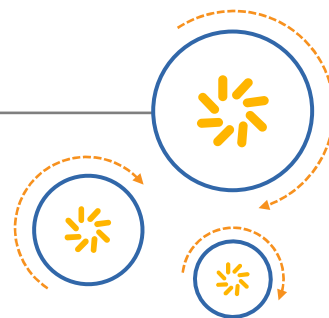
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RF360 Europe GmbH  
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SAW RF filter	869 MHz

Data sheet

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## SAW components

B2600

## SAW RF filter

869 MHz

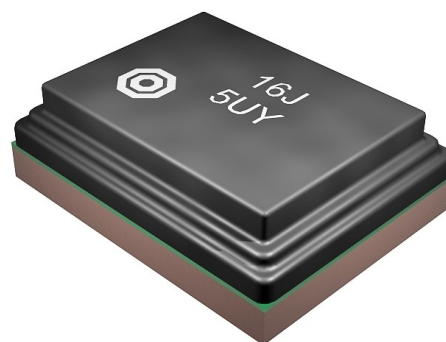
Data sheet

## 1 Application

- Low loss RF filter for remote control receivers
- Usable pass band 14 MHz
- Low insertion attenuation
- No external matching components required at 50 Ω

## 2 Features

- Package size 1.4±0.1 mm × 1.1±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
- Filter surface passivated
- Electrostatic Sensitive Device (ESD)
- Moisture Sensitivity Level 2a (MSL2a)
- AEC-Q200 qualified component family (Grade 1: -40 °C to +125 °C)



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

## SAW components

## B2600

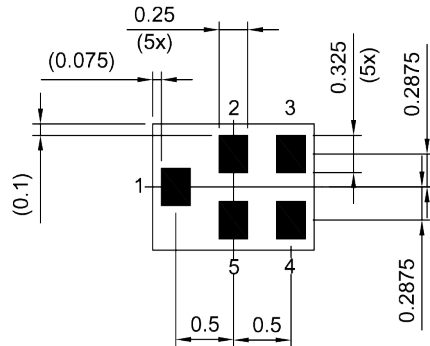
## SAW RF filter

869 MHz

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### 3 Package

BOTTOM VIEW

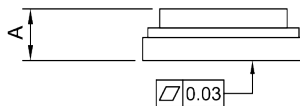


Pad and pitch tolerance  $\pm 0.05$

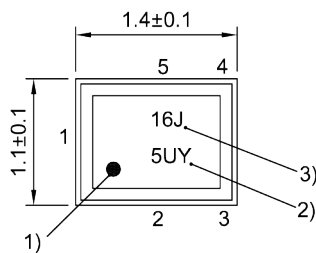
## 4 Pin configuration

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

SIDE VIEW

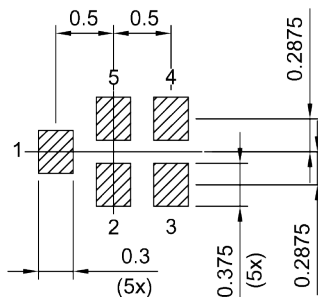


TOP VIEW



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

Land pattern  
THRU VIEW



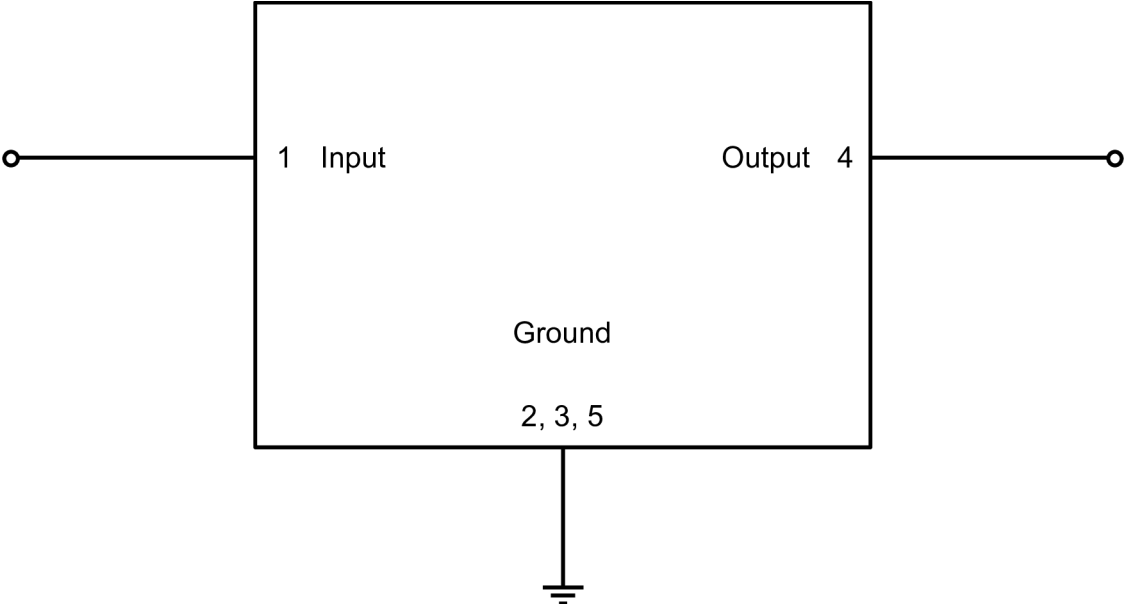
Landing pad tolerance -0.02

**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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## SAW RF filter

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## 6 Characteristics

Temperature range for specification	$T_{\text{SPEC}}$	= -40 °C ... +85 °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>		$f_{\text{C}}$	—	869	—	MHz
<b>Maximum insertion attenuation</b>		$\alpha_{\text{max}}$	—	1.6	3.0	dB
	862... 876	MHz	—	1.6	3.0	dB
<b>Amplitude ripple (p-p)</b>		$\Delta\alpha$	—	0.7	2.0	dB
	862... 876	MHz	—	0.7	2.0	dB
<b>Maximum VSWR</b>		$\text{VSWR}_{\text{max}}$	—	1.5	2.0	
@ input port	862... 876	MHz	—	1.5	2.0	
@ output port	862... 876	MHz	—	1.6	2.0	
<b>Minimum attenuation</b>		$\alpha_{\text{min}}$				
	10... 800	MHz	40	45	—	dB
	800... 838	MHz	40	48	—	dB
	838... 849	MHz	20	39	—	dB
	890... 894	MHz	20	50	—	dB
	894... 960	MHz	40	47	—	dB
	960... 2500	MHz	36	39	—	dB
	2500... 2700	MHz	20	27	—	dB
	2700... 6000	MHz	24	28	—	dB

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7 Maximum ratings

Operable temperature	$T_{OP} = -40\text{ °C} \dots +125\text{ °C}$	
Storage temperature	$T_{STG}^{1)} = -40\text{ °C} \dots +125\text{ °C}$	
DC voltage	$ V_{DC} ^{2)} = 0\text{ V}$	
Input power @ input port: 862 ... 876 MHz	$P_{IN} = 17\text{ dBm}$	Continuous wave for 5000 h @ 55 °C.

1) Not valid for packaging material. Storage temperature for packaging material is -25 °C to +40 °C.  
2) In case of applied DC voltage blocking capacitors are mandatory.

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## SAW RF filter

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## 8 Transmission coefficient

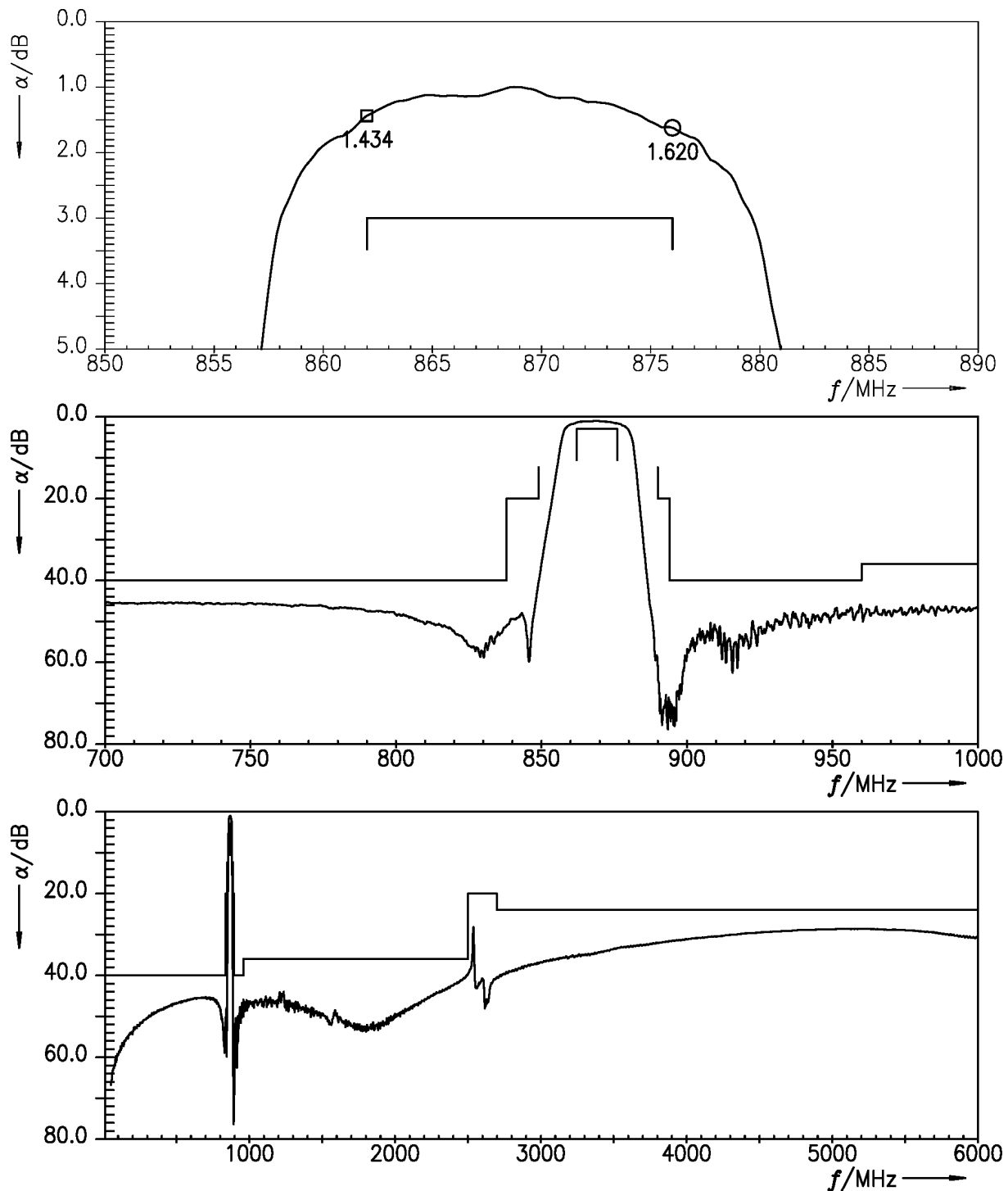


Figure 4: Attenuation.

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9 Reflection coefficients

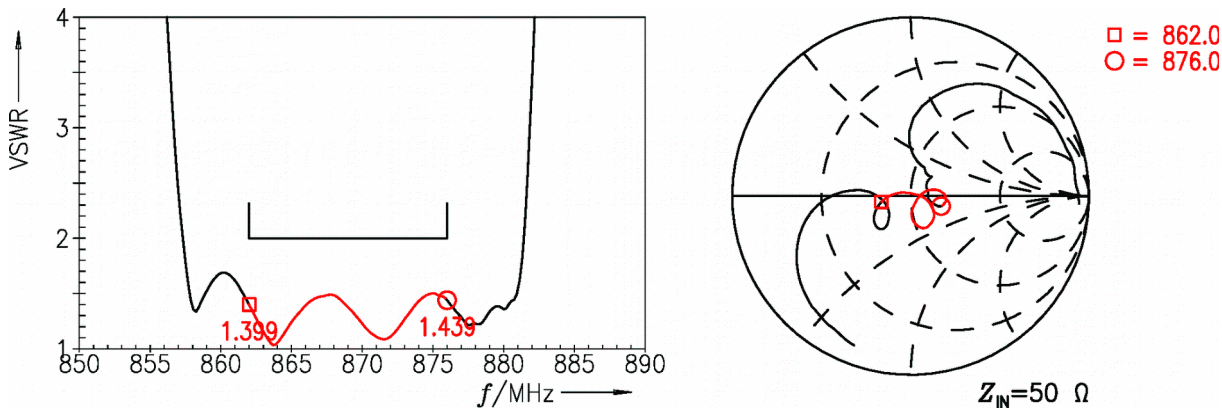


Figure 5: Reflection coefficient at IN port.

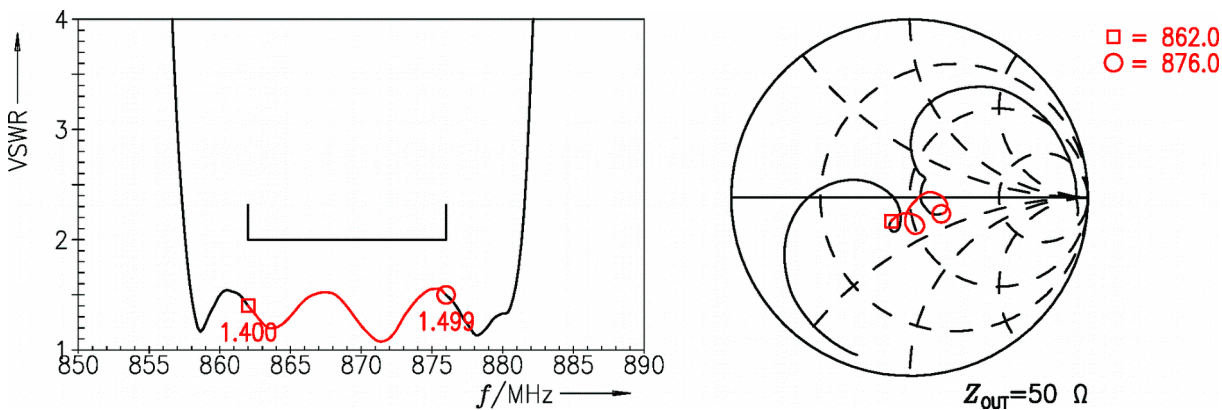


Figure 6: Reflection coefficient at OUT port.

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10 Packing material

10.1 Tape

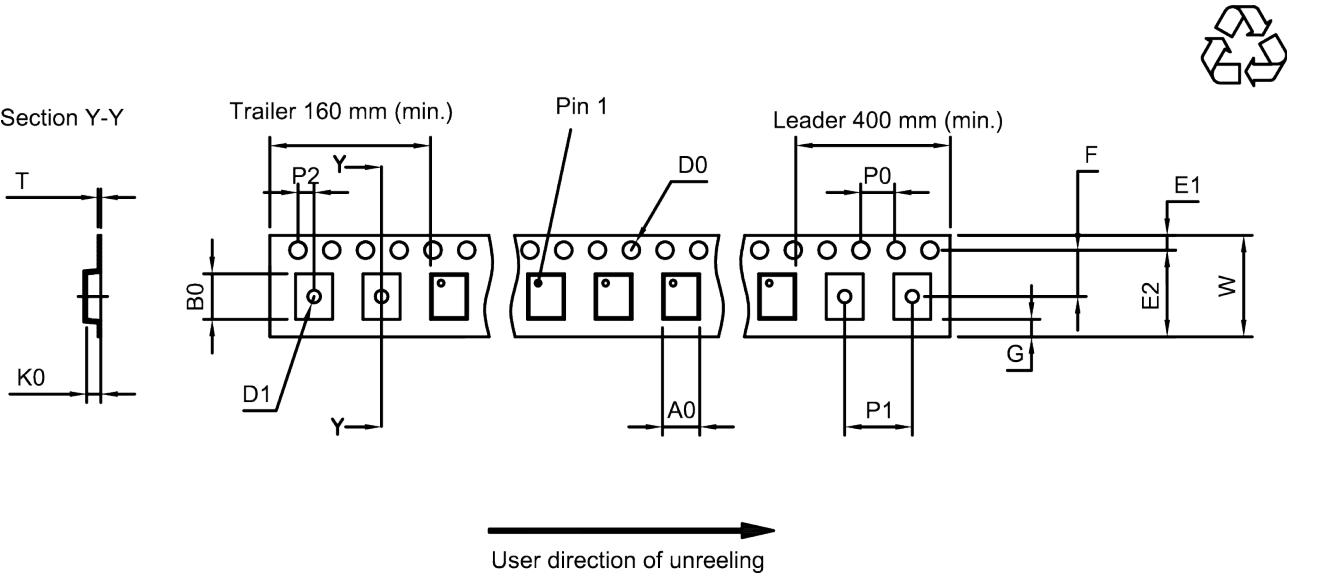


Figure 7: Drawing of tape (first-angle projection) with tape dimensions according to Table 1.

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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10.2 Reel with diameter of 180 mm

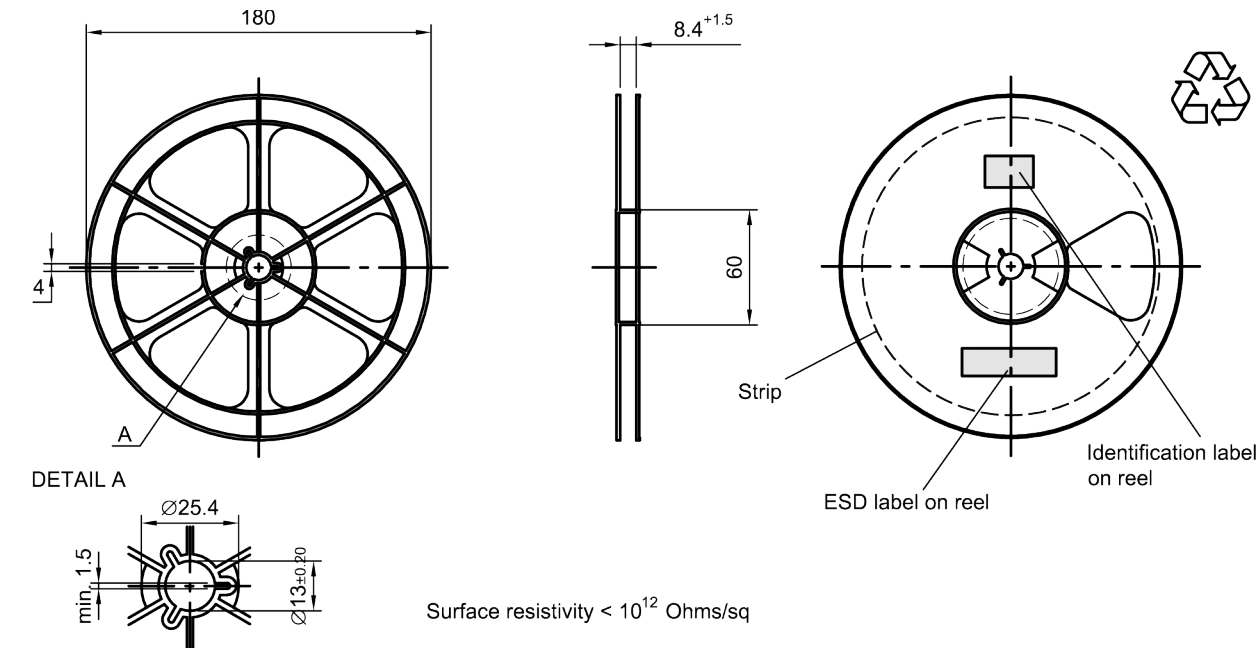


Figure 8: Drawing of reel (first-angle projection) with diameter of 180 mm.

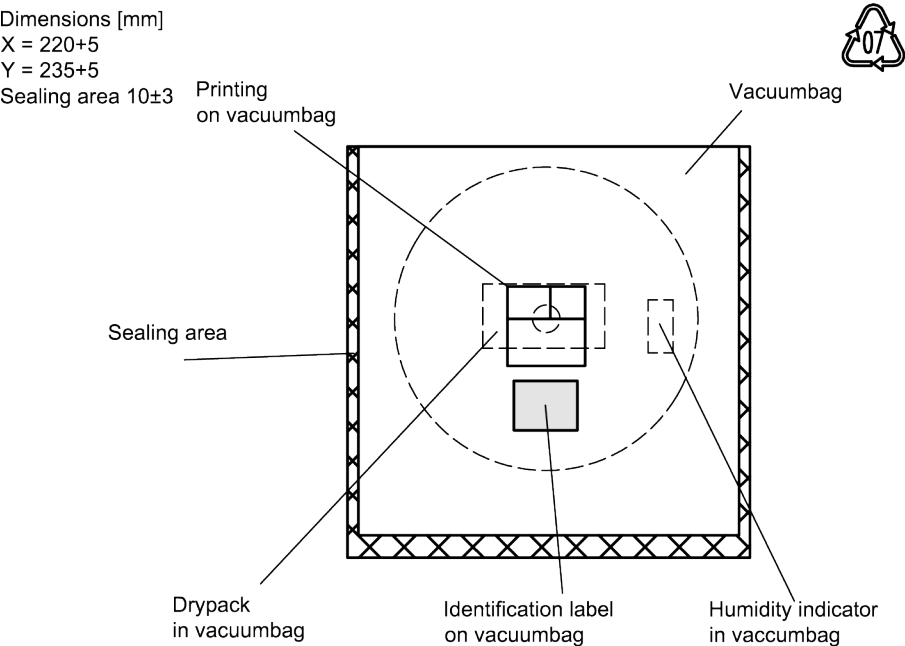


Figure 9: Drawing of moisture barrier bag (MBB) for reel with diameter of 180 mm.

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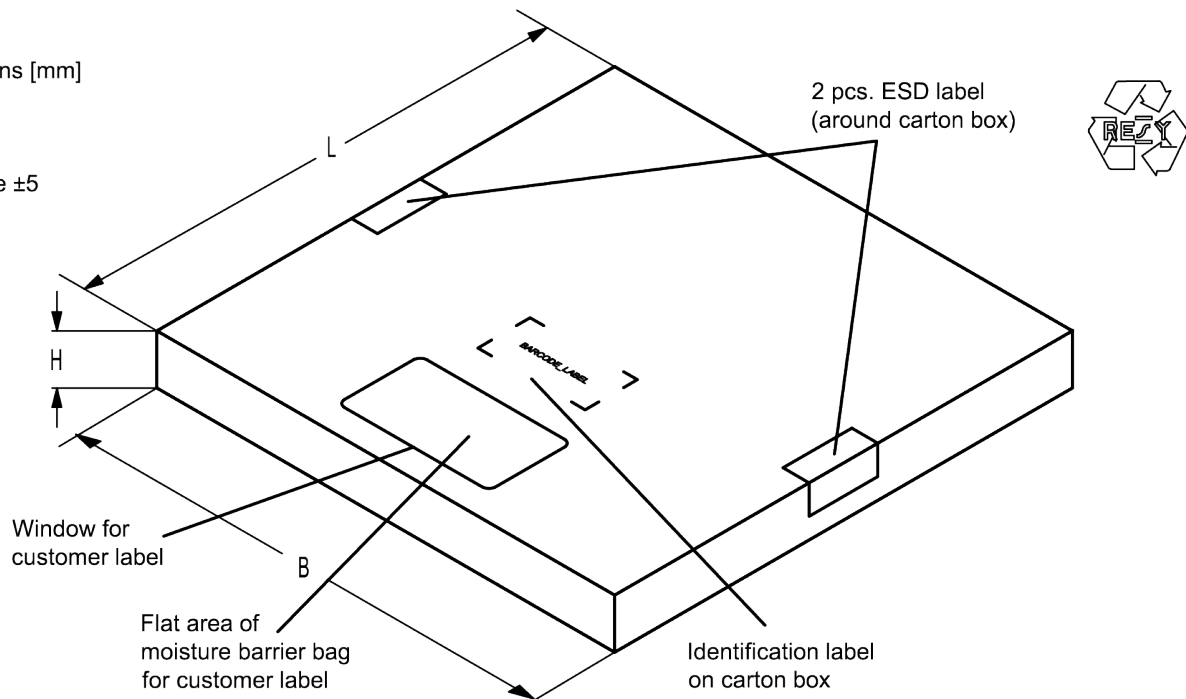
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## Dimensions [mm]

L = 188

B = 188

H = 30

Tolerance  $\pm 5$ **Figure 10:** Drawing of folding box for reel with diameter of 180 mm.

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## 11 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 B2600 is 2H8.

## ■ 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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12 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).

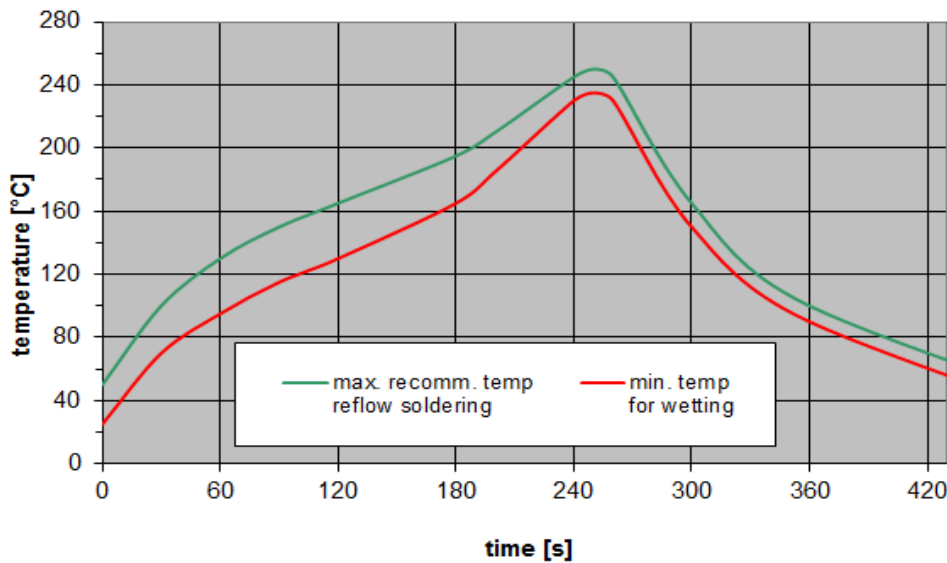


Figure 11: Recommended reflow profile for convection and infrared soldering – lead-free solder.

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**13 ESD protection of SAW filters**

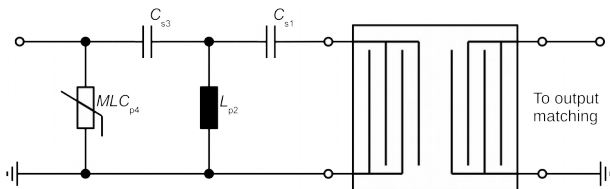
SAW filters are **E**lectro **S**tatic **D**ischarge sensitive devices. To reduce the probability of damages caused by ESD, special matching topologies have to be applied.

In general, “ESD matching” has to be ensured at that filter port, where electrostatic discharge is expected.

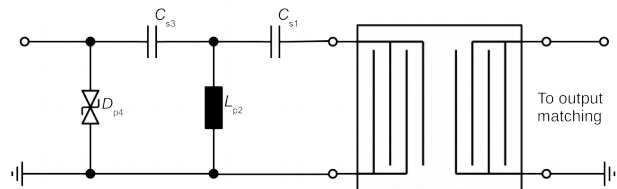
Electrostatic discharges predominantly appear at the antenna input of RF receivers. Therefore, only the input matching of the SAW filter has to be designed to short circuit or to block the ESD pulse.

Below three figures show recommended “ESD matching” topologies.

For wide band filters the high-pass ESD matching structure needs to be at least of 3<sup>rd</sup> order to ensure a proper matching for any impedance value of antenna and SAW filter input. The required component values have to be determined from case to case.

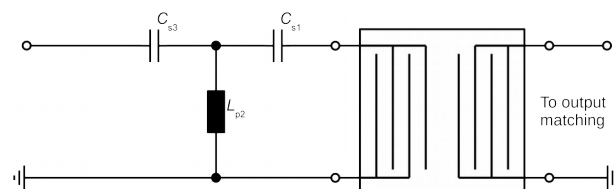


**Figure 12:** MLC varistor plus ESD matching.



**Figure 13:** Suppressor diode plus ESD matching.

In cases where minor ESD occur, following simplified “ESD matching” topologies can be used alternatively.



**Figure 14:** 3<sup>rd</sup> order high-pass structure for basic ESD protection.

In all three figures the shunt inductor  $L_{p2}$  could be replaced by a shorted microstrip with proper length and width. If this configuration is possible depends on the operating frequency and available PCB space.

Effectiveness of the applied ESD protection has to be checked according to relevant industry standards or customer specific requirements.

For further information, please refer to RF360 Application report: “**ESD protection for SAW filters**”. This report can be found under [www.rf360jv.com/rke](http://www.rf360jv.com/rke). Click on “Applications Notes”.

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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.

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**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

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