



**RF360**  
**Europe GmbH**

## **Data sheet**

**Micro-acoustic filter**  
BeiDou + GPS + GLONASS

Series/type:	B7504
Ordering code:	B39162B7504L210
Date:	November 04, 2019
Version:	2.2

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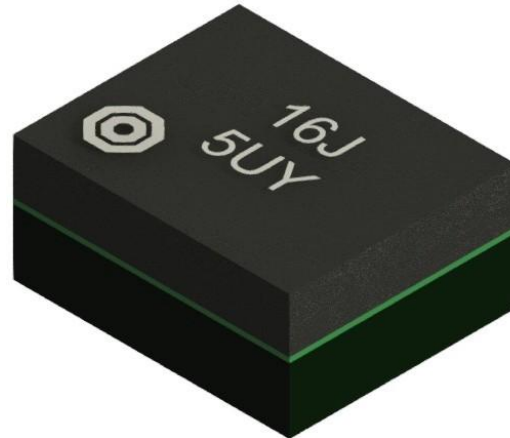
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## 1 Application

- Low-loss RF single filter for BeiDou + GPS + GLONASS application
- Simultaneous usage of BeiDou + GPS + GLONASS bands
- Excellent insertion attenuation
- High out of band selectivity
- Unbalanced to unbalanced operation
- Filter impedance 50  $\Omega$
- No matching network required for operation at 50  $\Omega$

## 2 Features

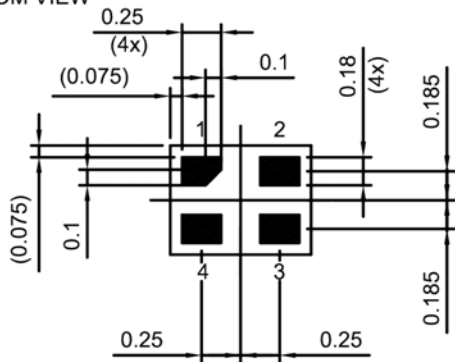
- Package size 0.9 mm  $\times$  0.7 mm
- Package height 0.50 mm (max.)
- Approximate weight 1mg
- RoHS compatible
- Package for Surface Mount Technology (SMT)
- Ni/Au-plated terminals
- Electrostatic Sensitive Device (ESD)
- Moisture Sensitivity Level 3 (MSL3)



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

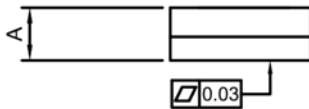
3 Package

BOTTOM VIEW

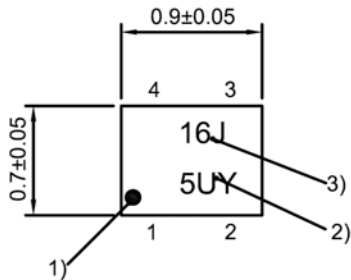


Pad and pitch tolerance ±0.05

SIDE VIEW

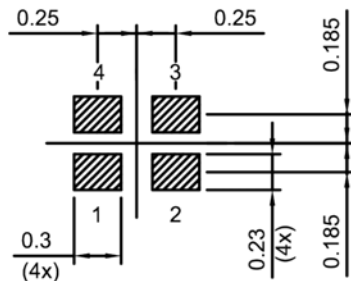


TOP VIEW



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

Land pattern  
THRU VIEW



Landing pad tolerance -0.02

4 Pin configuration

- 1 Input
- 3 Output
- 2, 4 Ground

Figure 2: Drawing of package with package height A = 0.50 mm (max.). See Sec. Package information (p. 18).

5 Matching circuit

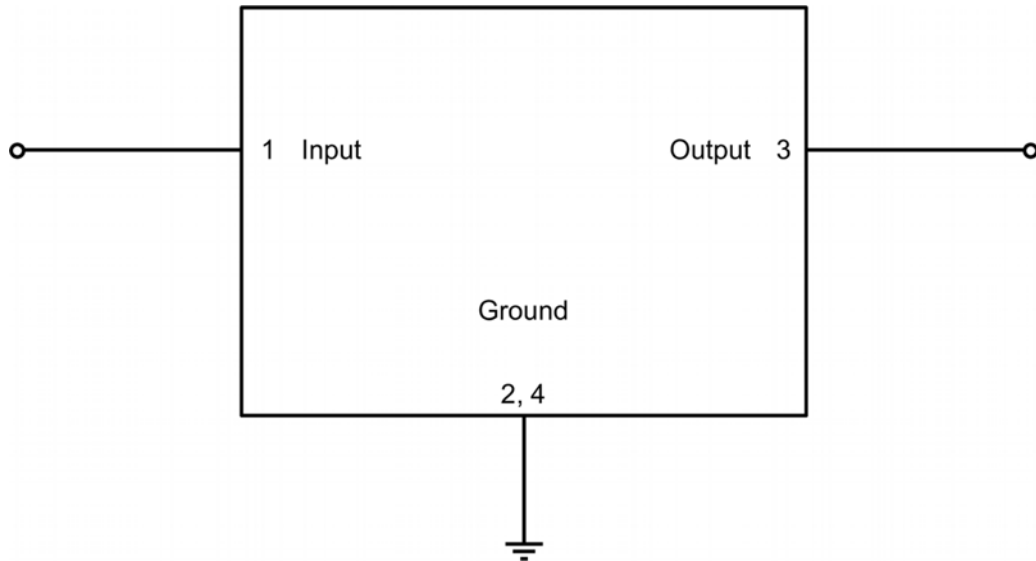


Figure 3: Schematic of matching circuit. No external matching components required.

6 Characteristics

Temperature range for specification  
Input terminating impedance  
Output terminating impedance

$T_{SPEC} = -30\text{ °C} \dots +85\text{ °C}$   
 $Z_{IN} = 50\ \Omega$   
 $Z_{OUT} = 50\ \Omega$

Characteristics		min. for $T_{SPEC}$	typ. @ +25 °C	max. for $T_{SPEC}$			
<b>Center frequency</b>	$f_c$	—	1582.47	—	MHz		
<b>Insertion loss</b>	$\alpha$						
		1559.1... 1563.1	MHz	—	1.1	2.0	dB
		1574.4... 1576.4	MHz	—	0.9	1.4	dB
		1597.5... 1605.9	MHz	—	1.2 <sup>1)</sup>	2.0	dB
<b>Group delay</b>	$\tau$						
		1597.5... 1605.9	MHz	—	4.0	15	ns
<b>Maximum VSWR</b>	VSWR						
@ input port		1559.1... 1563.1	MHz	—	1.4	2.0	
		1574.4... 1576.4	MHz	—	1.3	2.0	
		1597.5... 1605.9	MHz	—	1.6	2.0	
@ output port		1559.1... 1563.1	MHz	—	1.3	2.0	
		1574.4... 1576.4	MHz	—	1.2	2.0	
		1597.5... 1605.9	MHz	—	1.6	2.0	
<b>Minimum attenuation</b>	$\alpha$						
		10... 925	MHz	45	58	—	dB
		814... 915	MHz	45	58	—	dB
		925... 960	MHz	45	60	—	dB
		1427... 1463	MHz	50	55	—	dB
		1695... 1710	MHz	50 <sup>2)</sup>	53	—	dB
		1710... 1785	MHz	50 <sup>2)</sup>	53	—	dB
		1850... 1980	MHz	45	53	—	dB
		2010... 2025	MHz	45	55	—	dB
		2305... 2315	MHz	45	52	—	dB
		2401... 2483	MHz	45	50	—	dB
		2500... 2570	MHz	45	49	—	dB
		4400... 4900	MHz	35	41	—	dB
		5150... 5850	MHz	35	42	—	dB

1) Typical value averaged over indicated frequency range.  
2) Average over any 5 MHz.

## 7 Maximum ratings

Storage temperature	$T_{STG}^{2)} = -40\text{ °C} \dots +85\text{ °C}^{1)}$	
DC voltage	$ V_{DC}  = 5.0\text{ V (max.)}^{3)}$	
ESD voltage	$V_{ESD}^{4)} = 100\text{ V (max.)}$	Machine model.
	$V_{ESD}^{5)} = 150\text{ V (max.)}$	Human Body model.
	$V_{ESD}^{6)} = 600\text{ V (max.)}$	Charged Device model.
Input power & input port:		
915 MHz	$P_{IN} = 23\text{ dBm}$	GSM signal duty cycle 1:8 for 5000h @ 50 °C. Effective power in On-state.
1463 MHz	$P_{IN} = 15\text{ dBm}$	Continuous wave for 5000h @ 50 °C
1710 MHz	$P_{IN} = 15\text{ dBm}$	Continuous wave for 5000h @ 50 °C

<sup>1)</sup> Extended upperlimit: 96h@125°C acc. to IEC 60068-2-2 Bb.

<sup>2)</sup> Not valid for packaging material. Storage temperature for packaging material is -25 °C to +40 °C.

<sup>3)</sup> 168h Damp Heat Steady State acc. IEC 60068-2-67 Cy.

<sup>4)</sup> According to JESD22-A115B (MM – Machine Model), 10 negative & 10 positive pulses.

<sup>5)</sup> According to JESD22-A114F (HBM – Human Body Model), 1 negative & 1 positive pulses.

<sup>6)</sup> According to JESD22-C101C (CDM – Charged Device Model), 3 negative & 3 positive pulses.



8 Transmission coefficient

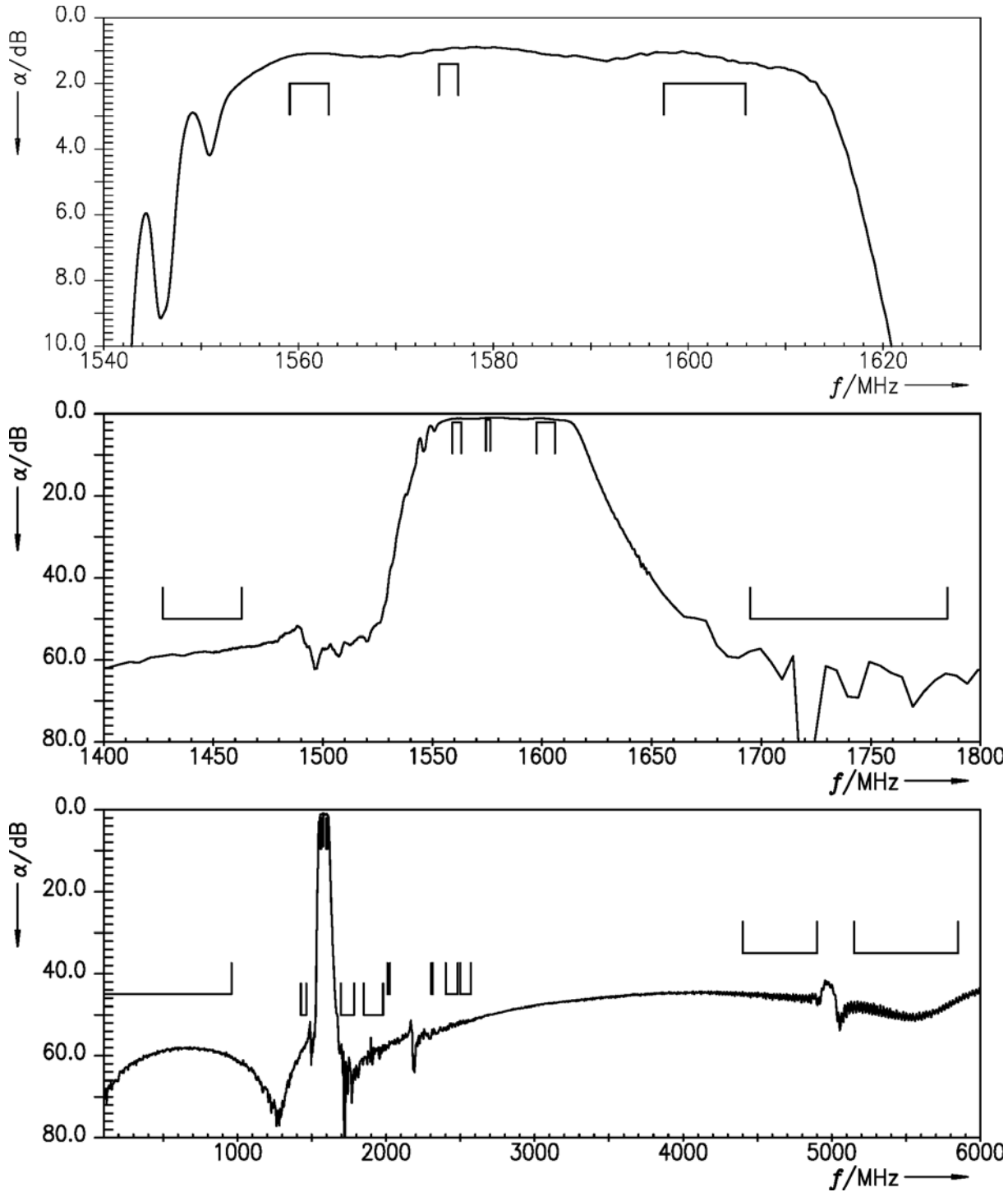


Figure 4: Attenuation.

9 Reflection coefficients

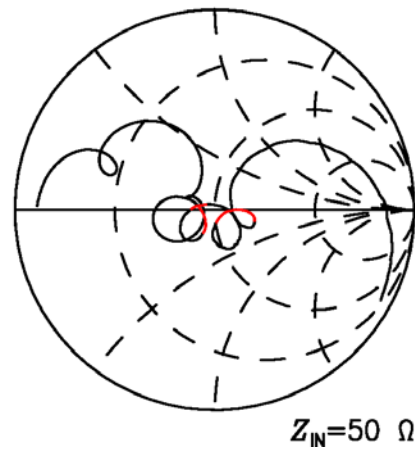
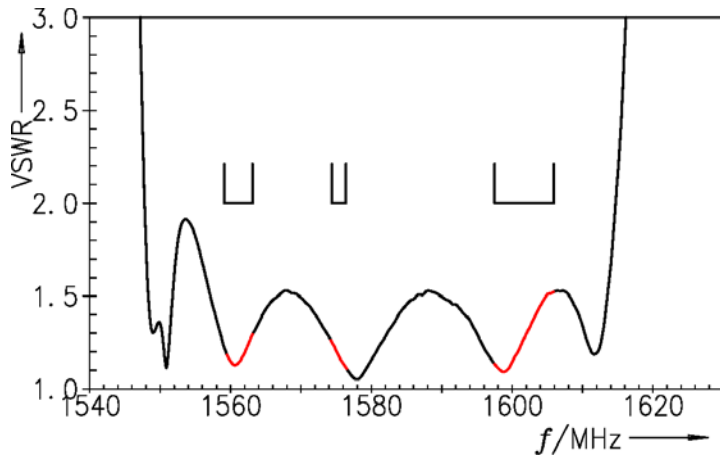


Figure 5: Reflection coefficient at input port.

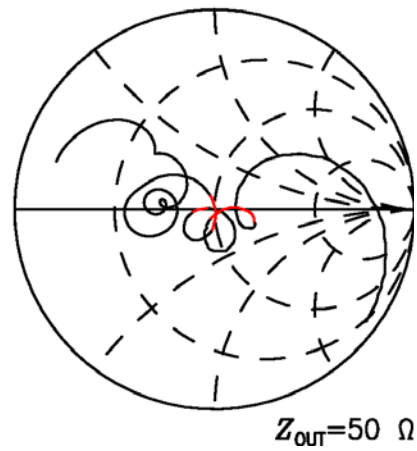
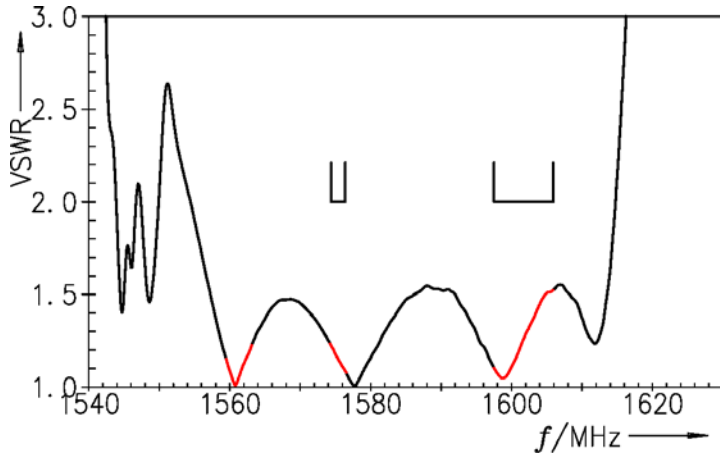


Figure 6: Reflection coefficient at output port.

10 Packing material

10.1 Tape

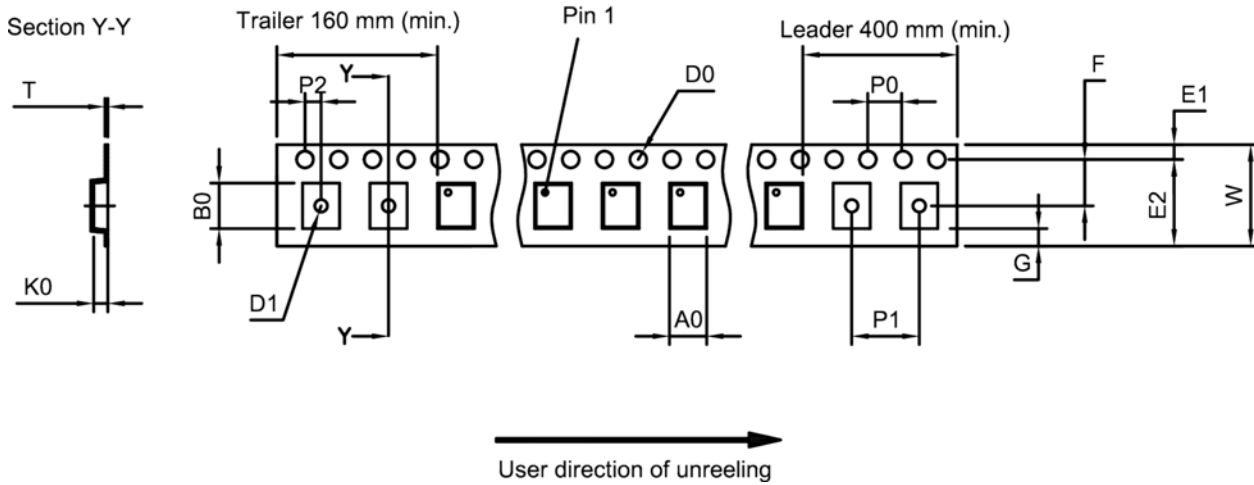


Figure 7: Drawing of tape (first-angle projection) for illustration only and not to scale. The valid tape dimensions are listed in Table 1.

A <sub>0</sub>	0.85±0.05 mm	E <sub>2</sub>	0.625 mm (min.)	P <sub>1</sub>	2.0±0.05 mm
B <sub>0</sub>	1.05±0.05 mm	F	3.5±0.05 mm	P <sub>2</sub>	2.0±0.05 mm
D <sub>0</sub>	1.5+0.05 mm	G	0.75 mm (min.)	T	0.25±0.02 mm
D <sub>1</sub>	0.4±0.05 mm	K <sub>0</sub>	0.69±0.03 mm	W	8.2±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.

10.2 Reel with diameter of 180 mm

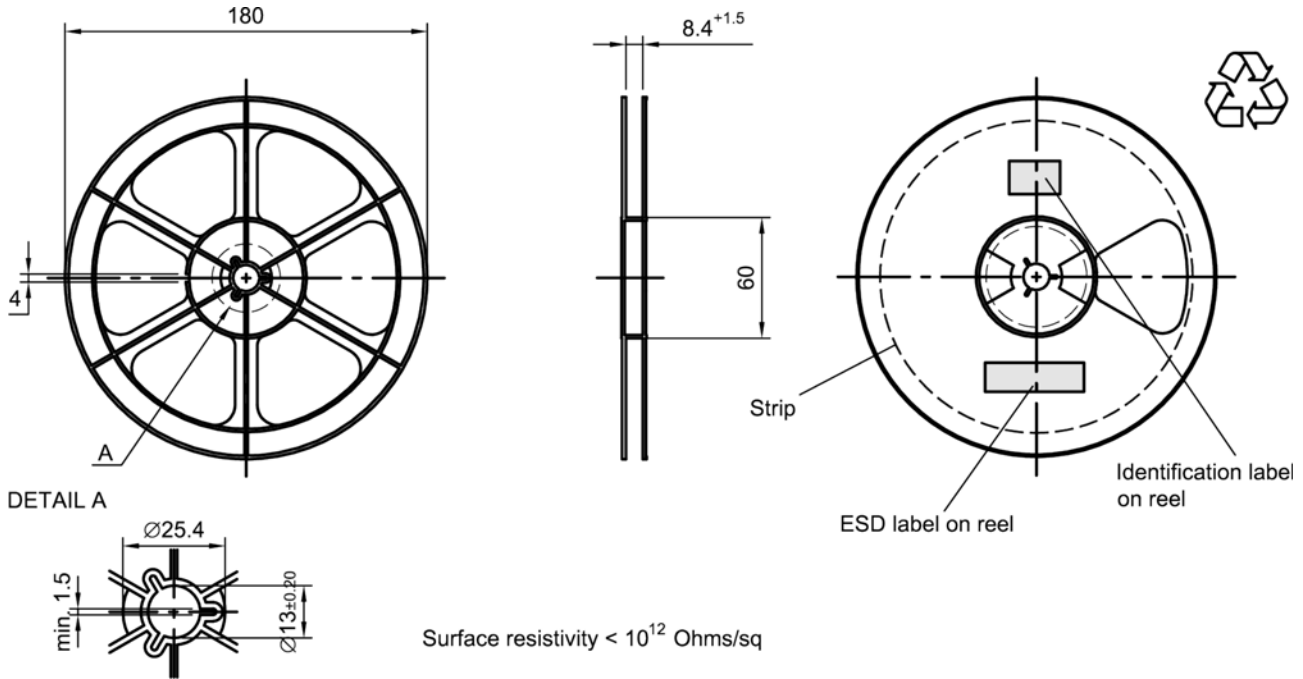


Figure 8: Drawing of reel (first-angle projection) with diameter of 180 mm.

Dimensions [mm]

X = 220+5

Y = 235+5

Sealing area 10±3

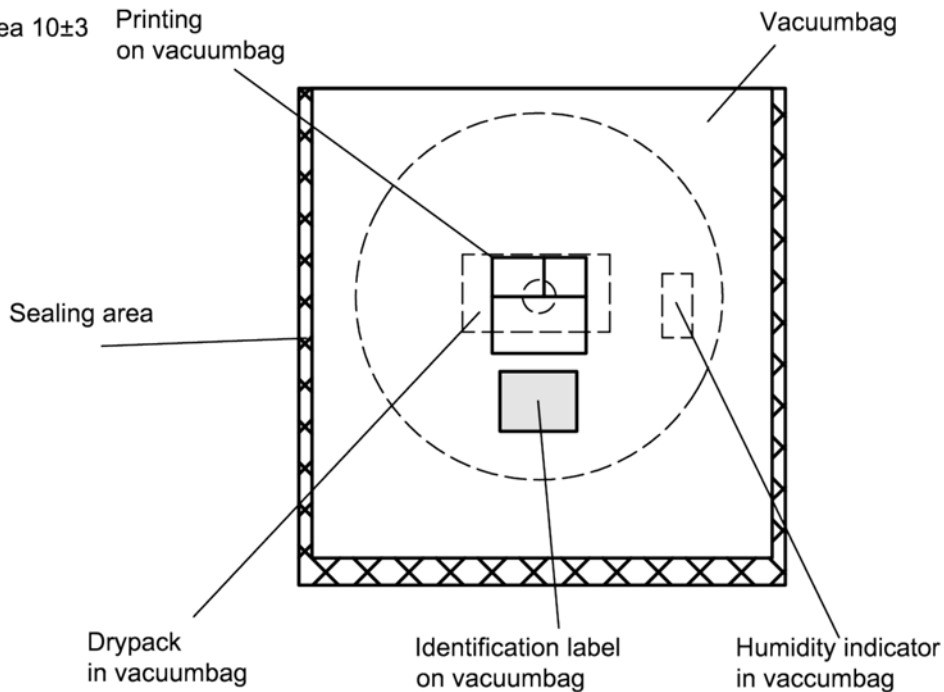


Figure 9: Drawing of moisture barrier bag (MBB) for reel with diameter of 180 mm.

Dimensions [mm]

L = 188

B = 188

H = 30

Tolerance  $\pm 5$

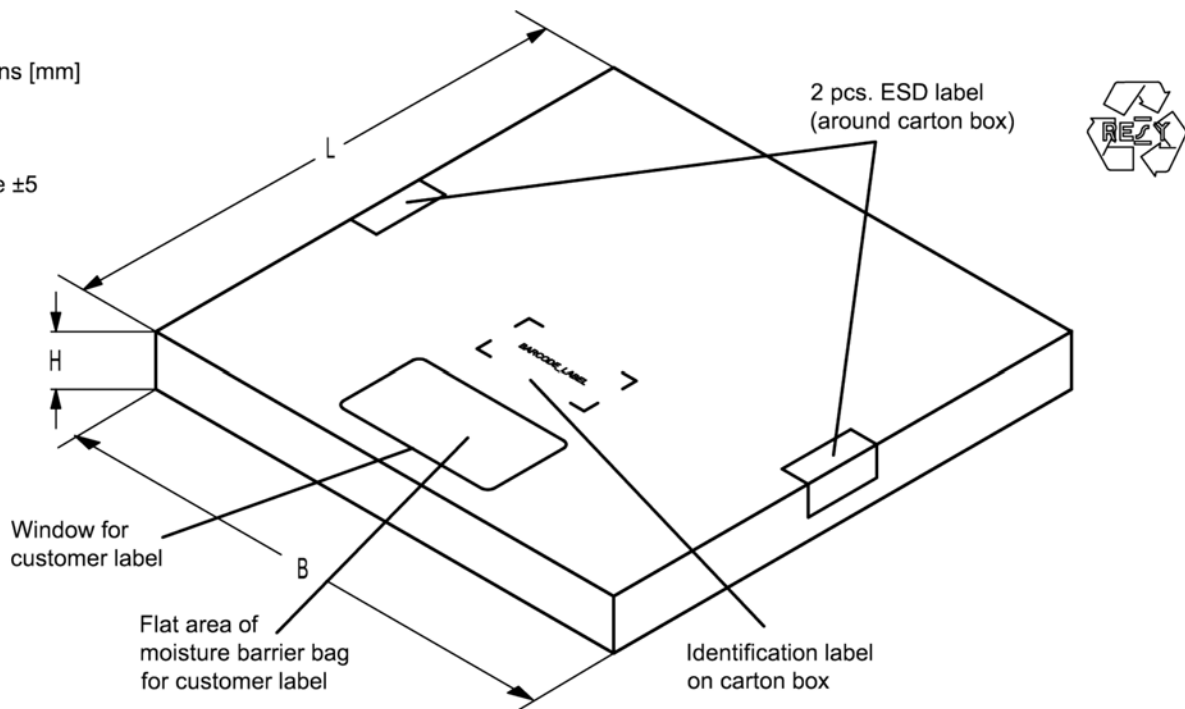


Figure 10: Drawing of folding box for reel with diameter of 180 mm.

### 10.3 Reel with diameter of 330 mm

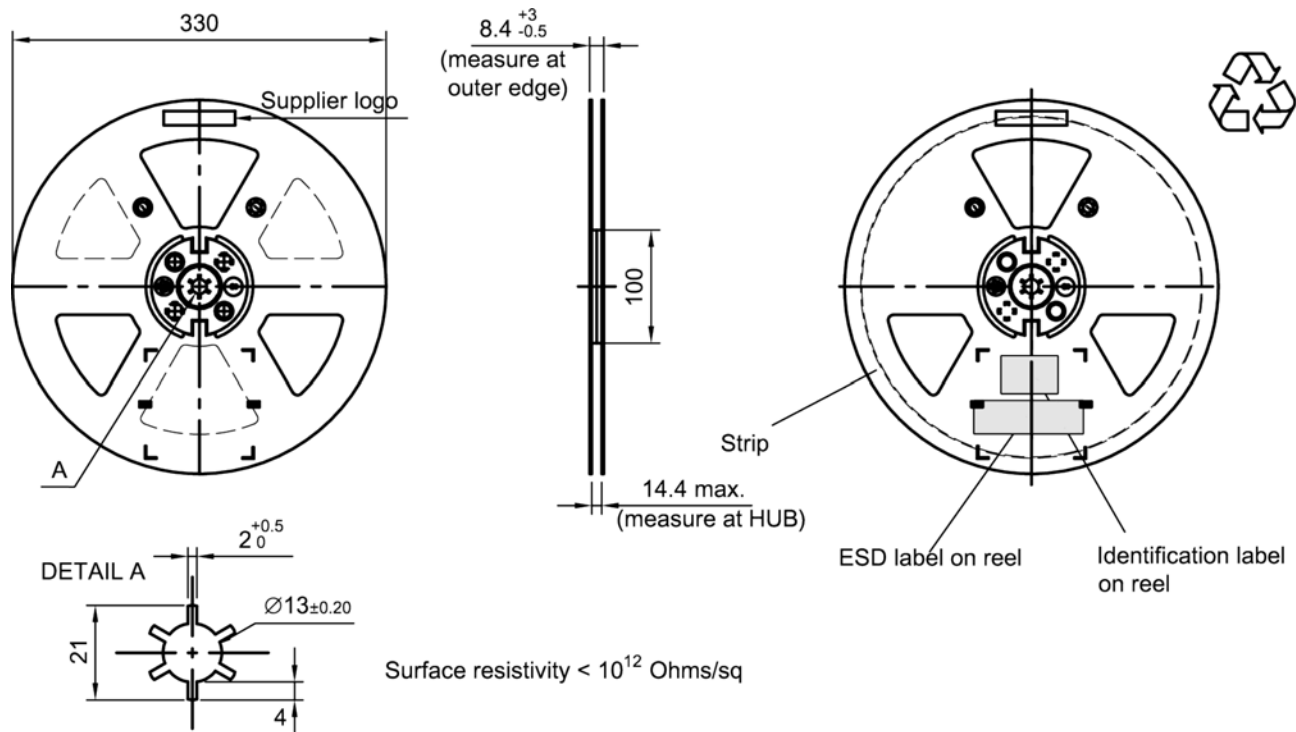


Figure 11: Drawing of reel (first-angle projection) with diameter of 330 mm.

Dimensions [mm]

X = 400+5

Y = 418+5

Sealing area 10±3

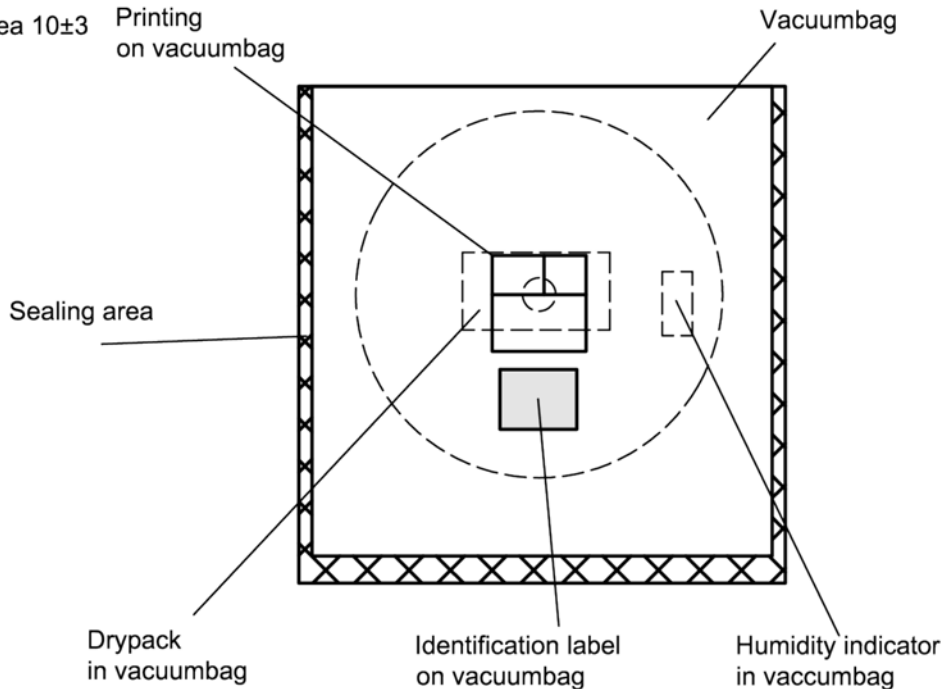


Figure 12: Drawing of moisture barrier bag (MBB) for reel with diameter of 330 mm.

Dimensions [mm]

L = 335

B = 338

H = 36 (for 8 mm tape width)

40 (for 12 mm tape width)

Tolerance ±5

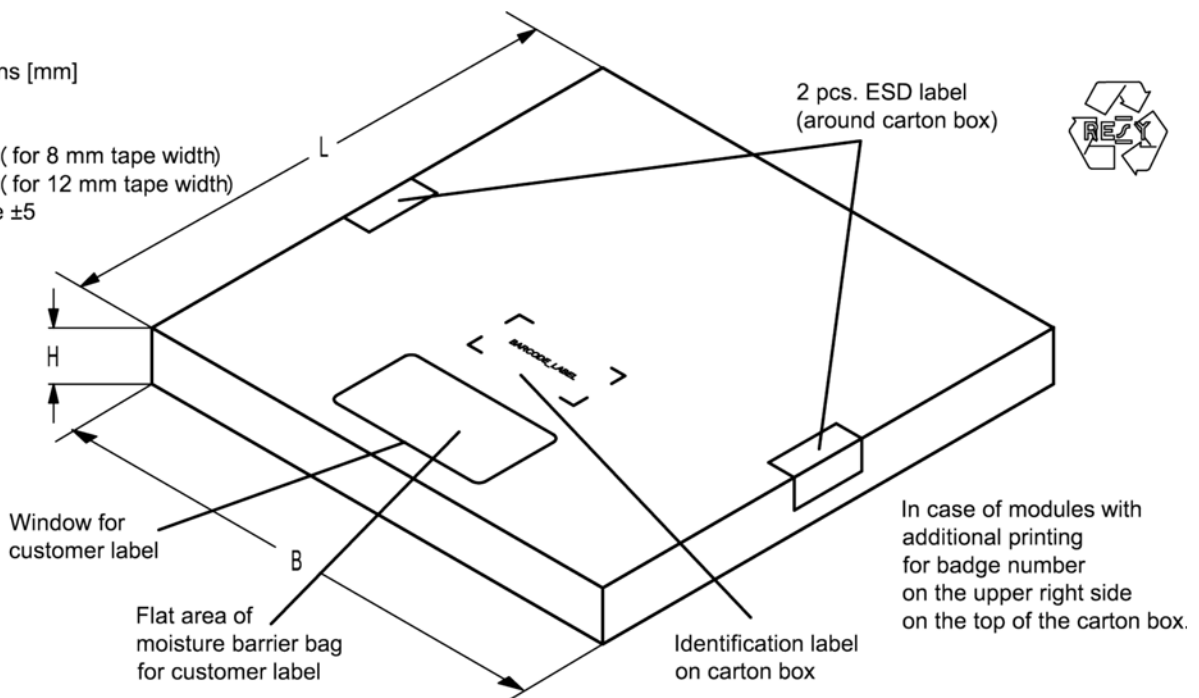


Figure 13: Drawing of folding box for reel with diameter of 330 mm.

**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.  
**16J** => **1234**  
 $1 \times 32^2 + 6 \times 32^1 + 18 (=J) \times 32^0$  = **1234**

The BASE32 code for product type B7504 is 7AG.

■ 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.  
**5UY** => **12345**  
 $5 \times 47^2 + 27 (=U) \times 47^1 + 31 (=Y) \times 47^0$  = **12345**

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		

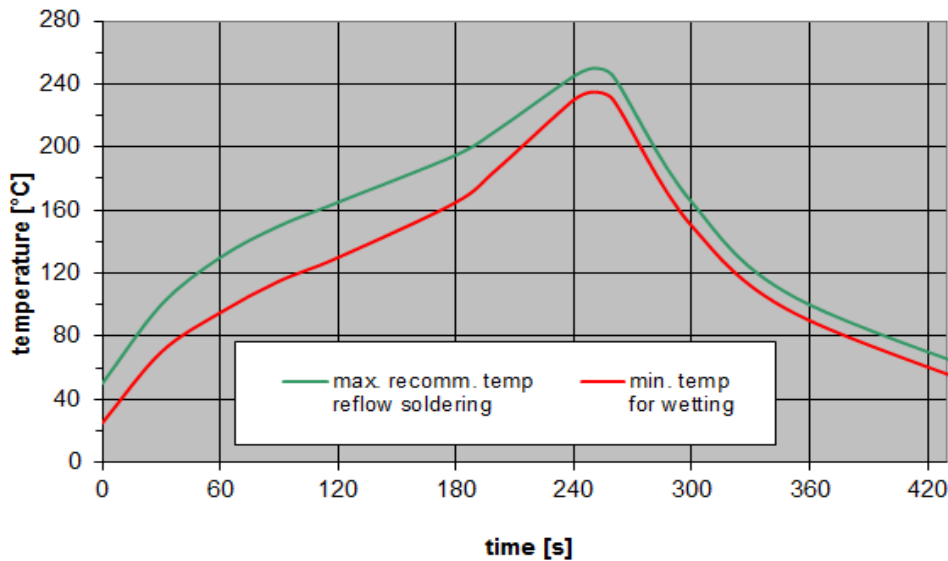
**Table 2:** Lists for encoding and decoding of marking.

## 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 $T_{peak}$	250 °C +0/-5 °C
wetting temperature $T_{min}$	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 14:** Recommended reflow profile for convection and infrared soldering – lead-free solder.



**13 Annotations**

**13.1 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.

**13.2 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.

**13.3 Ordering codes and packing units**

Ordering code	Packing unit
B39162B7504L210	15000 pcs
B39162B7504L210S 5	5000 pcs

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

## 14 Cautions and warnings

### 14.1 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).

### 14.2 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.

### 14.3 Moldability

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

### 14.4 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).

#### Projection method

Unless otherwise specified first-angle projection is applied.

## 15 Important notes

The following applies to all products named in this publication:

1. Some parts of this publication contain **statements about the suitability of our products for certain areas of application**. These statements are based on our knowledge of typical requirements that are often placed on our products in the areas of application concerned. We nevertheless expressly point out **that such statements cannot be regarded as binding statements about the suitability of our products for a particular customer application**. As a rule, RF360 Europe GmbH and its affiliates are either unfamiliar with individual customer applications or less familiar with them than the customers themselves. For these reasons, it is always ultimately incumbent on the customer to check and decide whether an RF360 product with the properties described in the product specification is suitable for use in a particular customer application.
2. We also point out that **in individual cases, a malfunction of electronic components or failure before the end of their usual service life cannot be completely ruled out in the current state of the art, even if they are operated as specified**. In customer applications requiring a very high level of operational safety and especially in customer applications in which the malfunction or failure of an electronic component could endanger human life or health (e.g. in accident prevention or life-saving systems), it must therefore be ensured by means of suitable design of the customer application or other action taken by the customer (e.g. installation of protective circuitry or redundancy) that no injury or damage is sustained by third parties in the event of malfunction or failure of an electronic component.
3. **The warnings, cautions and product-specific notes must be observed.**
4. In order to satisfy certain technical requirements, **some of the products described in this publication may contain substances subject to restrictions in certain jurisdictions (e.g. because they are classed as hazardous)**. Useful information on this will be found in our Material Data Sheets on the Internet ([www.rf360jv.com/material](http://www.rf360jv.com/material)). Should you have any more detailed questions, please contact our sales offices.
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