



RF360  
Europe GmbH

## SAW components

Micro-acoustic extractor  
WLAN 2G

Series/type:	B1224
Ordering code:	B39242B1224L210
Date:	January 30, 2018
Version:	2.0

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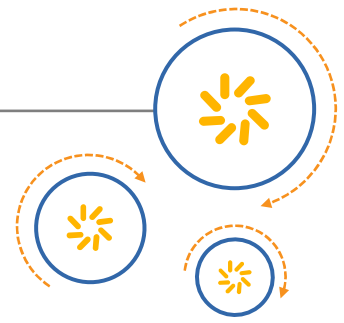
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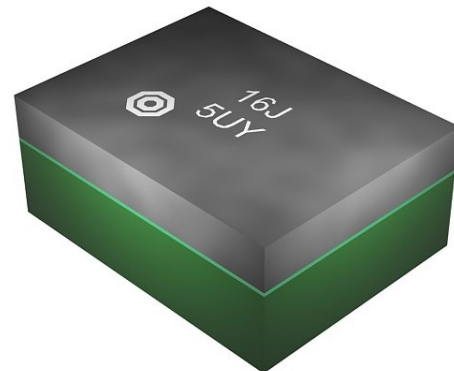
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## 1 Application

- High-performance WLAN Extractor with single ended 50  $\Omega$  ports.
- Ultra-low-loss acoustic structure.
- Full band 7 coexistence.
- Advanced highly-integrated multiplexer structure (no external matching needed).
- Using common antenna for WLAN and Cellular bands.
- Placed between antenna and cellular front-end switches and filters.
- Usable WLAN pass band: 2402.0 – 2481.5 MHz.
- Usable CELL pass band: 1427 – 2690 MHz.
- No switches and control lines required.

## 2 Features

- Package size 1.7 mm  $\times$  1.3 mm
- Package height 0.6 mm
- Approximate weight 4 mg
- RoHS compatible
- Package for Surface Mount Technology (SMT)
- Ni/Au-plated terminals
- Electrostatic Sensitive Device (ESD)
- Moisture Sensitivity Level 3 (MSL3)



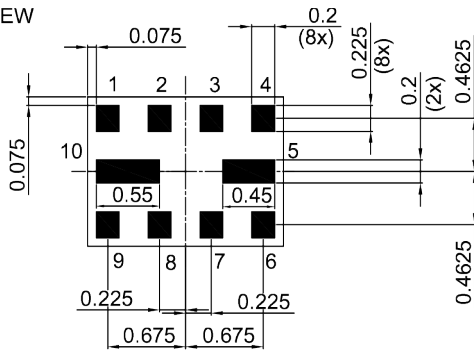
**Figure 1:** Picture of component with example of product marking.

**SAW components** **B1224**  
**Micro-acoustic extractor** **1427 - 2690 MHz**

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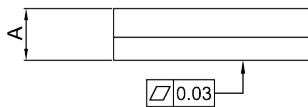
**3 Package**

BOTTOM VIEW

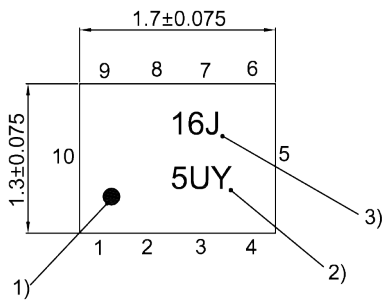


Pad and pitch tolerance ±0.03  
 Pad to package edge tolerance ±0.055

SIDE VIEW

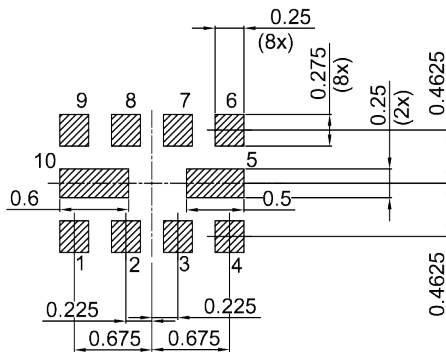


TOP VIEW



- 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 = 0.6±0.1 mm. See Sec. Package information (p. 23).

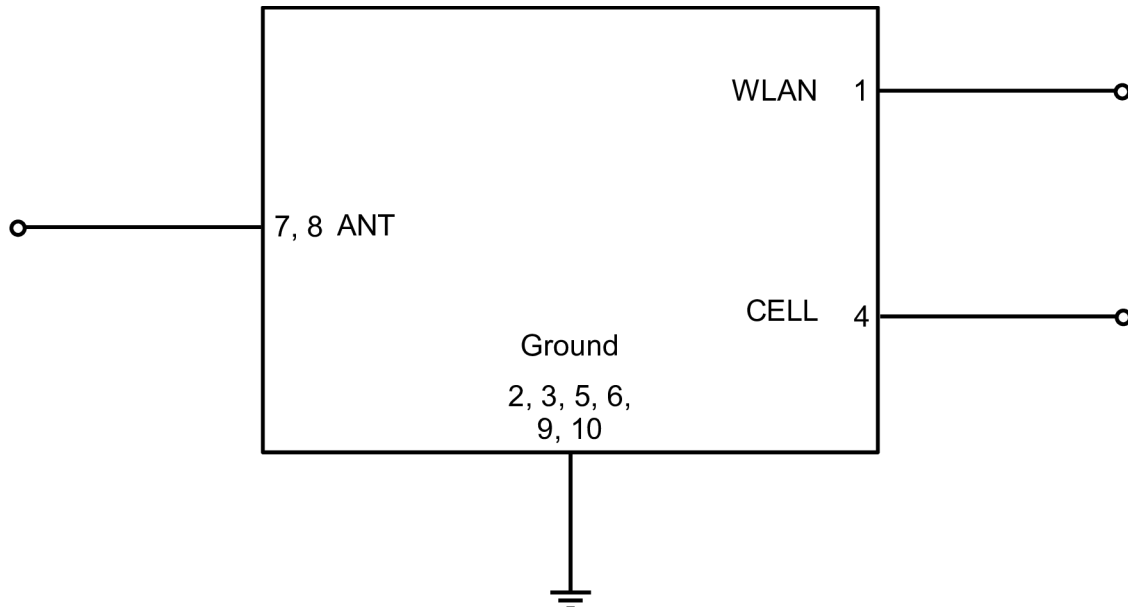
**4 Pin configuration**

- 1           WLAN
- 4           CELL
- 7, 8        ANT
- 2, 3, 5, 6, 9, 10   Ground

(pins 7 and 8 connected on PCB level)

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## 5 Matching circuit



**Figure 3:** Schematic of matching circuit. No external matching components required. Antenna pins 7 and 8 have to be directly connected together on PCB level.



## SAW components

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## Micro-acoustic extractor

1427 - 2690 MHz

## Data sheet

## 6 Characteristics ANT-WLAN

Temperature range for specification	$T_{SPEC}$	= -30 °C ... +85 °C
ANT terminating impedance	$Z_{ANT}$	= 50 $\Omega$
CELL terminating impedance	$Z_{CELL}$	= 50 $\Omega$
WLAN terminating impedance	$Z_{WLAN}$	= 50 $\Omega$

Characteristics ANT-WLAN				min. for $T_{SPEC}$	typ. @ +25 °C	max. for $T_{SPEC}$	
<b>Insertion attenuation<sup>1)</sup></b>				$\alpha$			
Channel 1	2403.1... 2420.9	MHz		—	1.5	2.2 <sup>2)</sup>	dB
Channel 2	2408.1... 2425.9	MHz		—	1.3	2.0	dB
Channel 3	2413.1... 2430.9	MHz		—	1.2	2.0	dB
Channel 4-10	2418.1... 2465.9	MHz		—	1.1	2.0	dB
Channel 11	2453.1... 2470.9	MHz		—	1.1	2.0	dB
Channel 12	2458.1... 2475.9	MHz		—	1.2	2.0	dB
Channel 13	2463.1... 2480.9	MHz		—	1.4	2.2 <sup>3)</sup>	dB
<b>VSWR</b>				VSWR			
Channel 1-12 @ ANT port	2403.1... 2475.9	MHz		—	1.5	2.3	
Channel 13 @ ANT port	2463.1... 2480.9	MHz		—	1.6	2.4 <sup>3)</sup>	
Channel 1-12 @ WLAN port	2403.1... 2475.9	MHz		—	1.4	2.3	
Channel 13 @ WLAN port	2463.1... 2480.9	MHz		—	1.6	2.4 <sup>3)</sup>	
<b>Attenuation</b>				$\alpha$			
	1427... 1510	MHz		28	32	—	dB
	1559... 1606	MHz		29	32	—	dB
	1710... 2025	MHz		30	33	—	dB
	2110... 2200	MHz		32	36	—	dB
	2300... 2370	MHz	4)	34	37	—	dB
	2500... 2505	MHz	4)	27 <sup>2)</sup>	38	—	dB
	2505... 2550	MHz	4)	32	38	—	dB
	2550... 2690	MHz		35	37	—	dB
	4804... 4963	MHz		15	28	—	dB
	4963... 5805	MHz		10	17	—	dB

1) Average over each WLAN channel with band width of 17.8 MHz.

2) +25°C to +85°C.

3) -30°C to +25°C.

4) Average over any 5 MHz.

## SAW components

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## Micro-acoustic extractor

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## 7 Characteristics ANT-CELL

Temperature range for specification	$T_{SPEC}$	= -30 °C ... +85 °C
ANT terminating impedance	$Z_{ANT}$	= 50 $\Omega$
CELL terminating impedance	$Z_{CELL}$	= 50 $\Omega$
WLAN terminating impedance	$Z_{WLAN}$	= 50 $\Omega$

Characteristics ANT-CELL				min. for $T_{SPEC}$	typ. @ +25 °C	max. for $T_{SPEC}$	
<b>Insertion attenuation</b>				$\alpha$			
	1427... 1510	MHz		—	0.6	1.0	dB
	1559... 1615	MHz		—	0.5	1.0	dB
	1710... 2025	MHz		—	0.5	1.0	dB
	2110... 2170	MHz		—	0.7	1.2	dB
	2300... 2365	MHz	<sup>1)</sup>	—	1.2	1.9	dB
	2365... 2370	MHz	<sup>1)</sup>	—	1.4	2.1 <sup>2)</sup>	dB
	2500... 2550	MHz	<sup>1)</sup>	—	0.6	1.3	dB
	2550... 2690	MHz		—	0.7	1.1	dB
<b>Attenuation<sup>3)</sup></b>				$\alpha$			
Channel 1-12	2403.1... 2475.9	MHz		10	16	—	dB
Channel 13	2463.1... 2480.9	MHz		10 <sup>2)</sup>	16	—	dB
<b>VSWR</b>				VSWR			
@ ANT port	1427... 1510	MHz		—	1.7	2.0	
	1559... 1615	MHz		—	1.6	2.0	
	1710... 2200	MHz		—	1.5	2.0	
	2300... 2370	MHz		—	1.2	2.0	
	2500... 2550	MHz		—	1.2	2.0	
	2550... 2690	MHz		—	1.3	2.0	
@ CELL port	1427... 1510	MHz		—	1.7	2.0	
	1559... 1615	MHz		—	1.6	2.0	
	1710... 2200	MHz		—	1.5	2.0	
	2300... 2370	MHz		—	1.2	2.0	
	2500... 2550	MHz		—	1.2	2.0	
	2550... 2690	MHz		—	1.3	2.0	

<sup>1)</sup> Average over any 5 MHz.

<sup>2)</sup> -30°C to +25°C.

<sup>3)</sup> Average over each WLAN channel with band width of 17.8 MHz.

## SAW components

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## Micro-acoustic extractor

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## 8 Characteristics CELL-WLAN

Temperature range for specification	$T_{SPEC}$	= -30 °C ... +85 °C
ANT terminating impedance	$Z_{ANT}$	= 50 $\Omega$
CELL terminating impedance	$Z_{CELL}$	= 50 $\Omega$
WLAN terminating impedance	$Z_{WLAN}$	= 50 $\Omega$

Characteristics CELL-WLAN				min. for $T_{SPEC}$	typ. @ +25 °C	max. for $T_{SPEC}$	
Isolation	$\alpha$	1427... 1510	MHz	28	31	—	dB
		1559... 1606	MHz	28	31	—	dB
		1710... 2025	MHz	29	32	—	dB
		2110... 2170	MHz	34	38	—	dB
		2300... 2370	MHz	<sup>1)</sup> 34	37	—	dB
		2403.1... 2480.9	MHz	<sup>2)</sup> 11	17	—	dB
		2500... 2505	MHz	<sup>1)</sup> 25 <sup>3)</sup>	40	—	dB
		2505... 2550	MHz	<sup>1)</sup> 32	39	—	dB
		2550... 2690	MHz	37	40	—	dB

<sup>1)</sup> Average over any 5 MHz.

<sup>2)</sup> Average over each WLAN channel with band width of 17.8 MHz.

<sup>3)</sup> +25°C to +85°C.

## SAW components

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## Micro-acoustic extractor

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## 9 Maximum ratings

Storage temperature	$T_{\text{STG}}^{3)} = -40\text{ °C} \dots +85\text{ °C}^{1), 2)}$	
DC voltage	$ V_{\text{DC}}  = 5.0\text{ V (max.)}^{4)}$	
ESD voltage		
	$V_{\text{ESD}}^{5)} = 175\text{ V (max.)}$	Machine model.
	$V_{\text{ESD}}^{6)} = 250\text{ V (max.)}$	Human body model.
	$V_{\text{ESD}}^{7)} = 700\text{ V (max.)}$	Charged device model.
Input power	$P_{\text{IN}}$	
@ WLAN port: 2403.1 ... 2480.9 MHz	24 dBm	17.8 MHz WLAN signal for 5000 h @ 55 °C.
@ CELL port: 1710 ... 2370 MHz	26 dBm	Continuous wave for 5000 h @ 55 °C.
@ CELL port: 2500 ... 2690 MHz	26 dBm	Continuous wave for 5000 h @ 55 °C.

<sup>1)</sup> Extended upper limit: 96h@125 acc. to IEC 60068-2-2-Bb;

<sup>2)</sup> Applicable only for components without tape and reel (unpacked).

<sup>3)</sup> Not valid for packaging material. Storage temperature for packaging material is -25 °C to +40 °C.

<sup>4)</sup> 168h Damp Heat Steady State acc. to IEC60068-2-67 Cy.

<sup>5)</sup> According to JESD22-A115B (MM – Machine Model), 10 negative & 10 positive pulses.

<sup>6)</sup> According to JESD22-A114F (HBM – Human Body Model), 1 negative & 1 positive pulse.

<sup>7)</sup> According to JESD22-C101C (CDM – Field Induced Charged Device Model), 3 negative & 3 positive pulses.

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10 Transmission coefficient ANT-WLAN

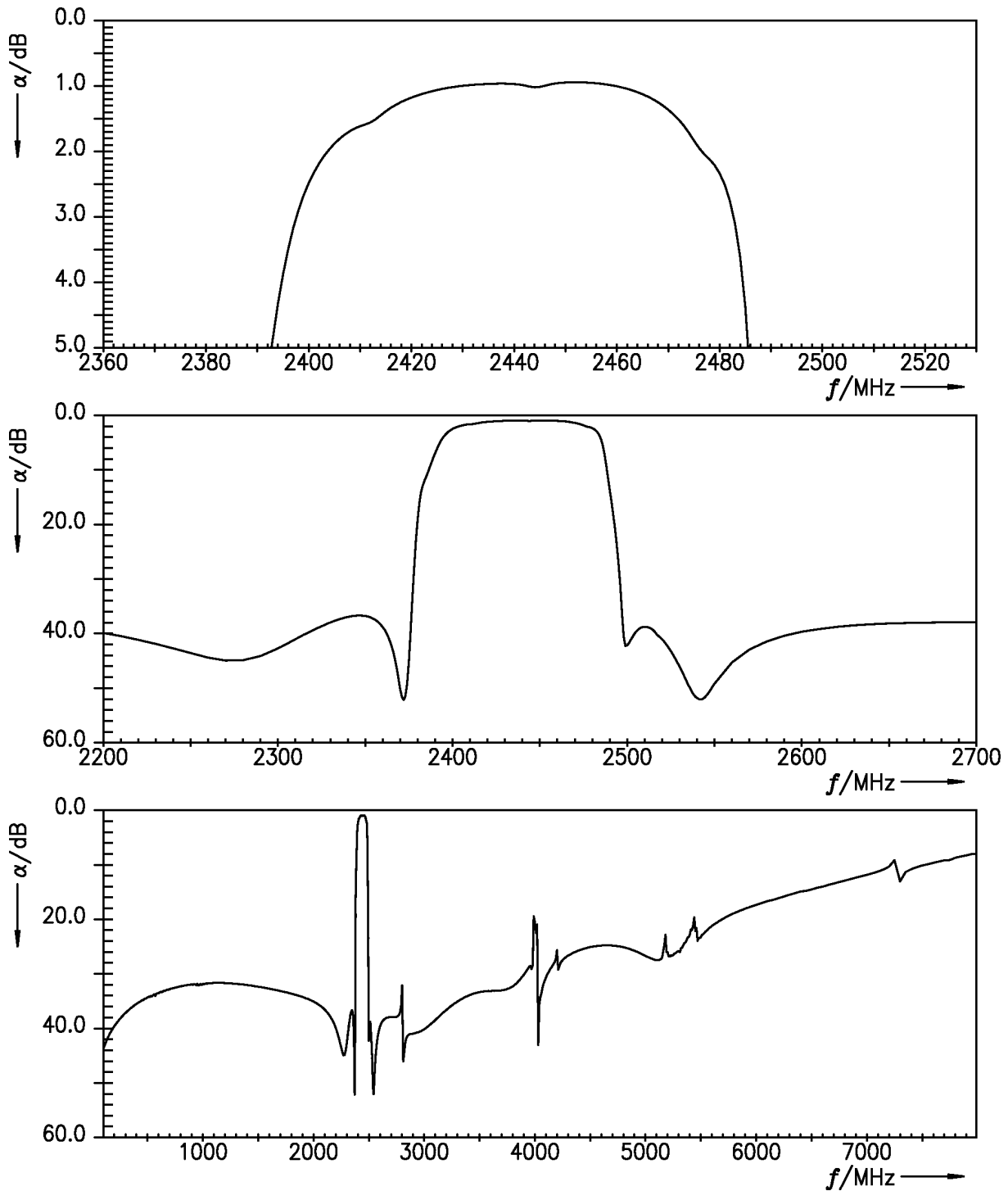


Figure 4: Attenuation ANT-WLAN.

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11 Reflection coefficients ANT-WLAN

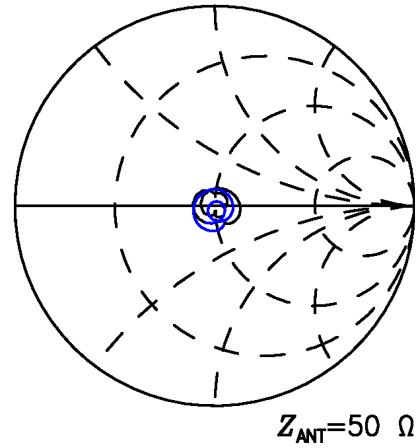
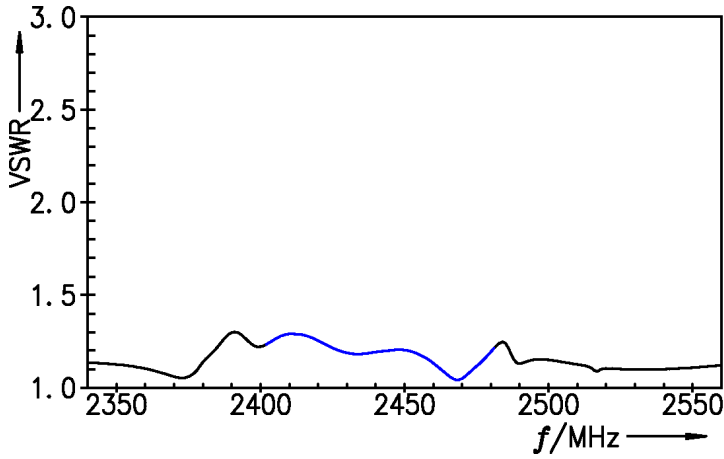


Figure 5: Reflection coefficient ANT-WLAN at ANT port.

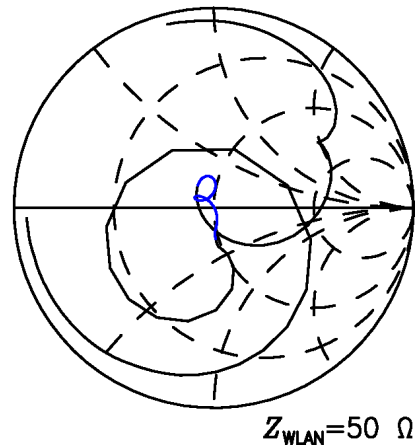
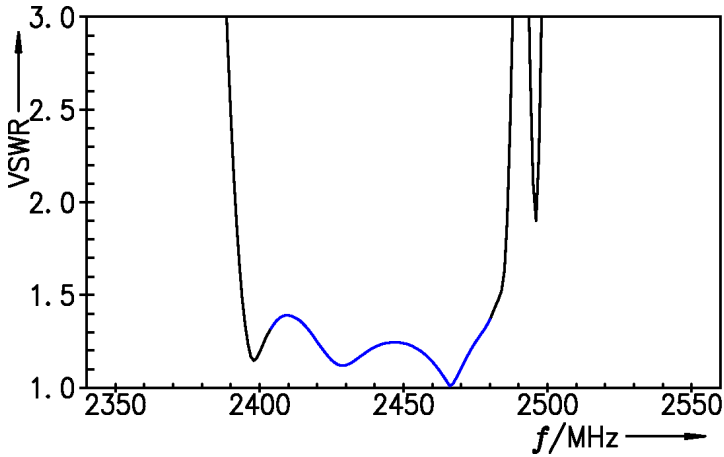


Figure 6: Reflection coefficient ANT-WLAN at TRX port.

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12 Transmission coefficient ANT-CELL

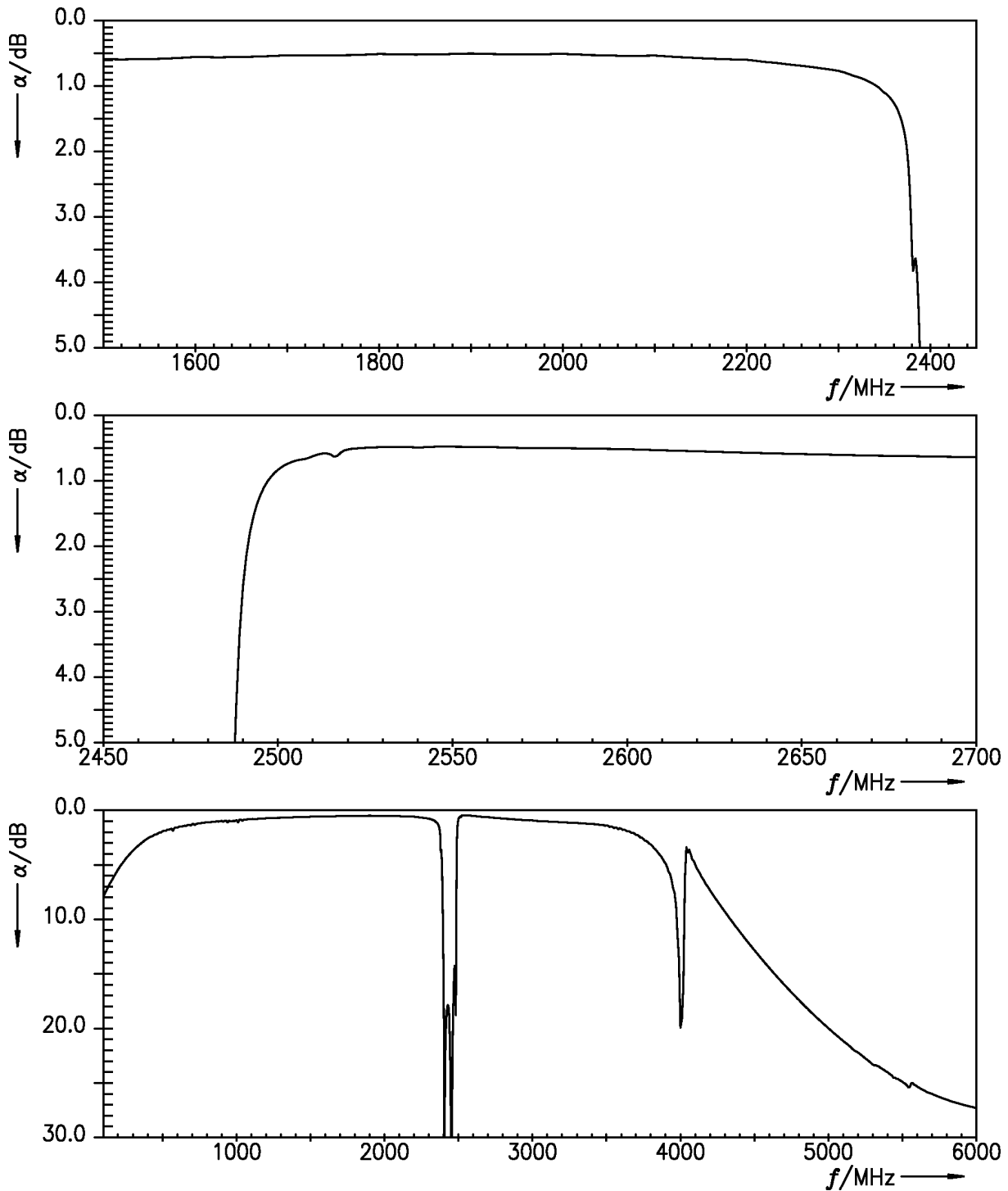
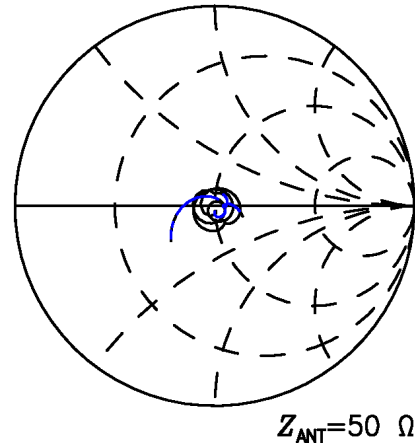
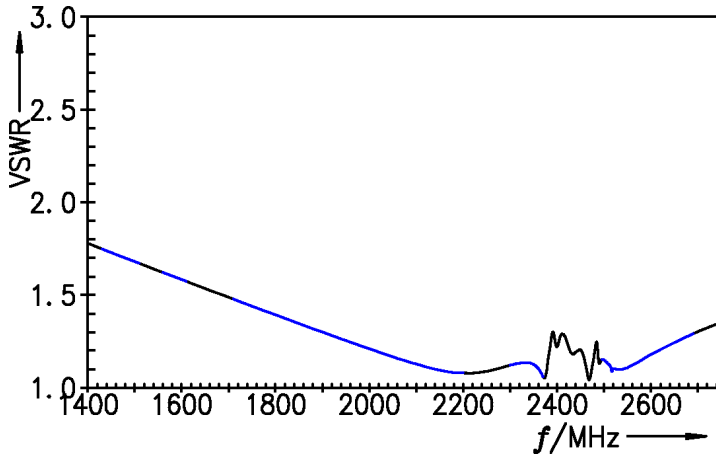


Figure 7: Attenuation ANT-CELL.

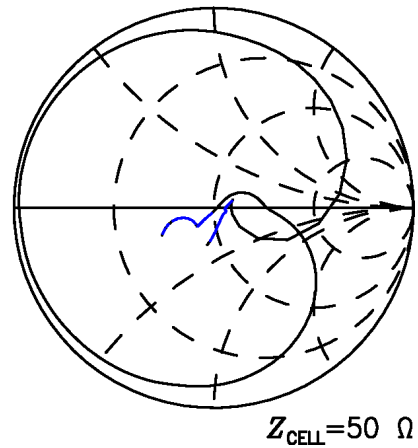
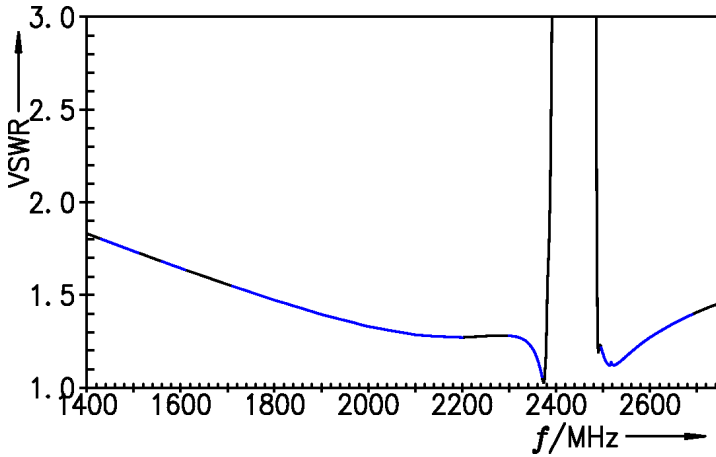
<b>SAW components</b>	<b>B1224</b>
<b>Micro-acoustic extractor</b>	<b>1427 - 2690 MHz</b>

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**13 Reflection coefficients ANT-CELL**



**Figure 8:** Reflection coefficient ANT-CELL at ANT port.



**Figure 9:** Reflection coefficient ANT-CELL at TRX port.



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14 Transmission coefficient CELL-WLAN

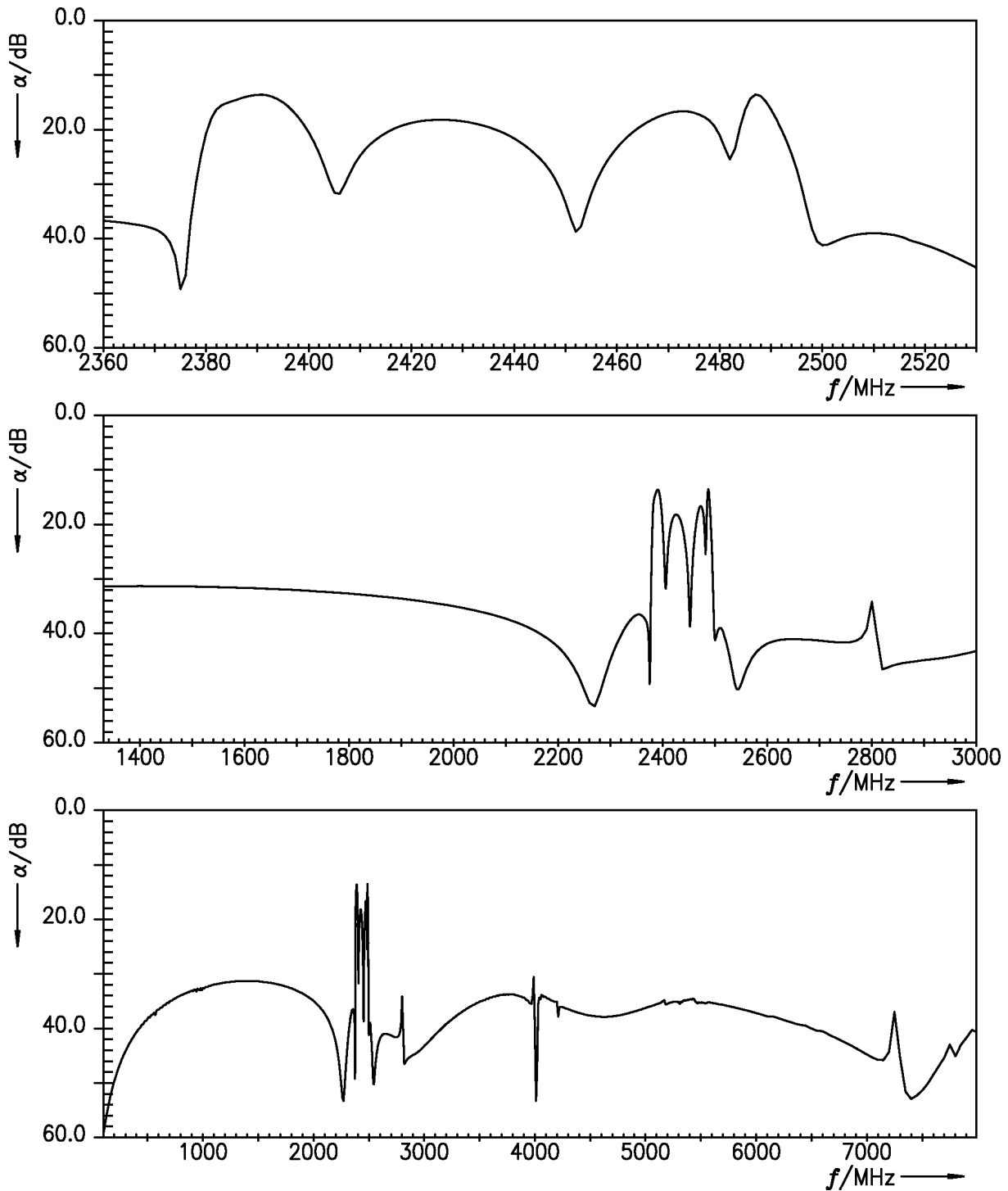
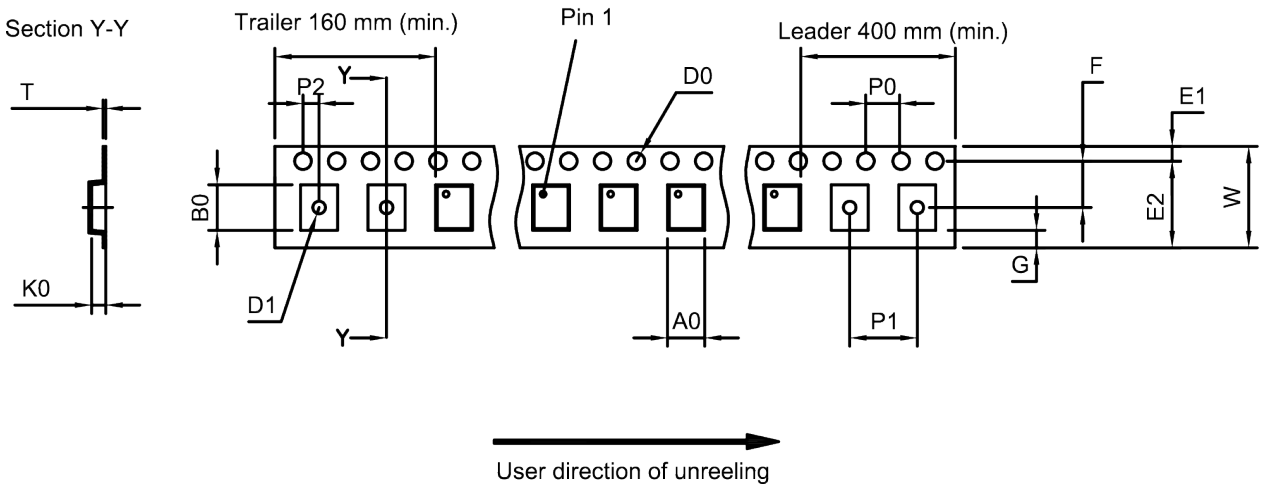


Figure 10: Cross-isolation CELL-WLAN.

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**15 Packing material**

**15.1 Tape**



**Figure 11:** Drawing of tape (first-angle projection) with tape dimensions according to Table 1.

A <sub>0</sub>	1.6±0.05 mm
B <sub>0</sub>	2.0±0.05 mm
D <sub>0</sub>	1.5+0.1/-0 mm
D <sub>1</sub>	0.8 mm (min.)
E <sub>1</sub>	1.75±0.1 mm

E <sub>2</sub>	6.25 mm (min.)
F	3.5±0.05 mm
G	0.75 mm (min.)
K <sub>0</sub>	0.8±0.05 mm
P <sub>0</sub>	4.0±0.1 mm

P <sub>1</sub>	4.0±0.1 mm
P <sub>2</sub>	2.0±0.05 mm
T	0.25±0.03 mm
W	8.0+0.3/-0.1 mm

**Table 1:** Tape dimensions.

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Micro-acoustic extractor	1427 - 2690 MHz

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15.2 Reel with diameter of 180 mm

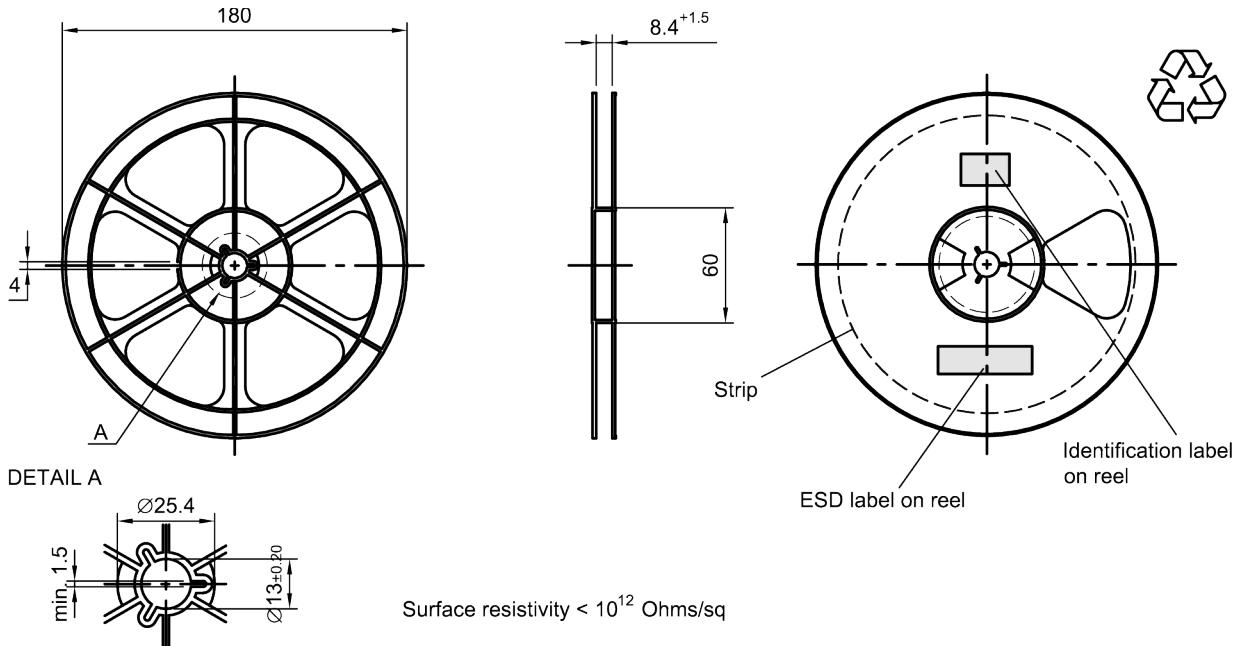


Figure 12: Drawing of reel (first-angle projection) with diameter of 180 mm.

Dimensions [mm]

X = 220+5

Y = 235+5

Sealing area 10±3

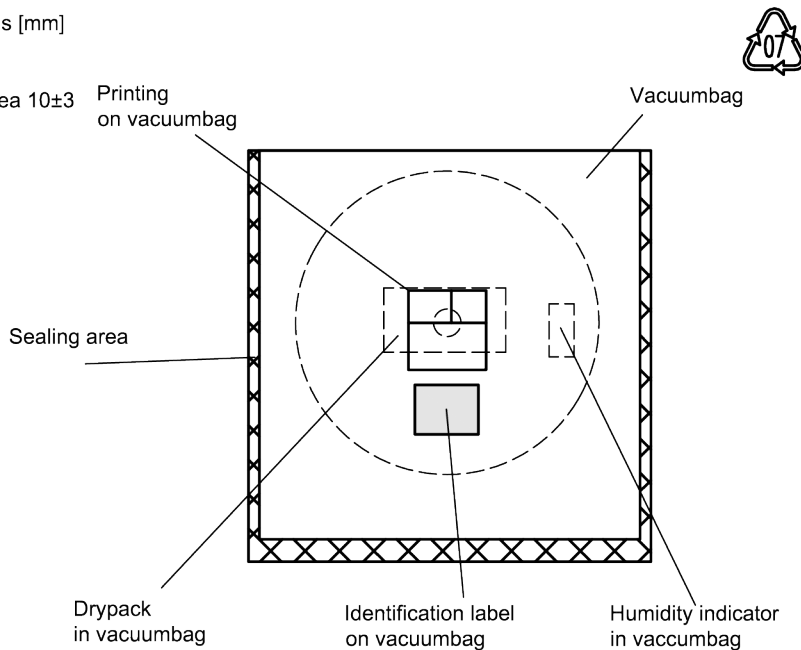


Figure 13: Drawing of moisture barrier bag (MBB) for reel with diameter of 180 mm.

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Dimensions [mm]  
 L = 188  
 B = 188  
 H = 30  
 Tolerance ±5

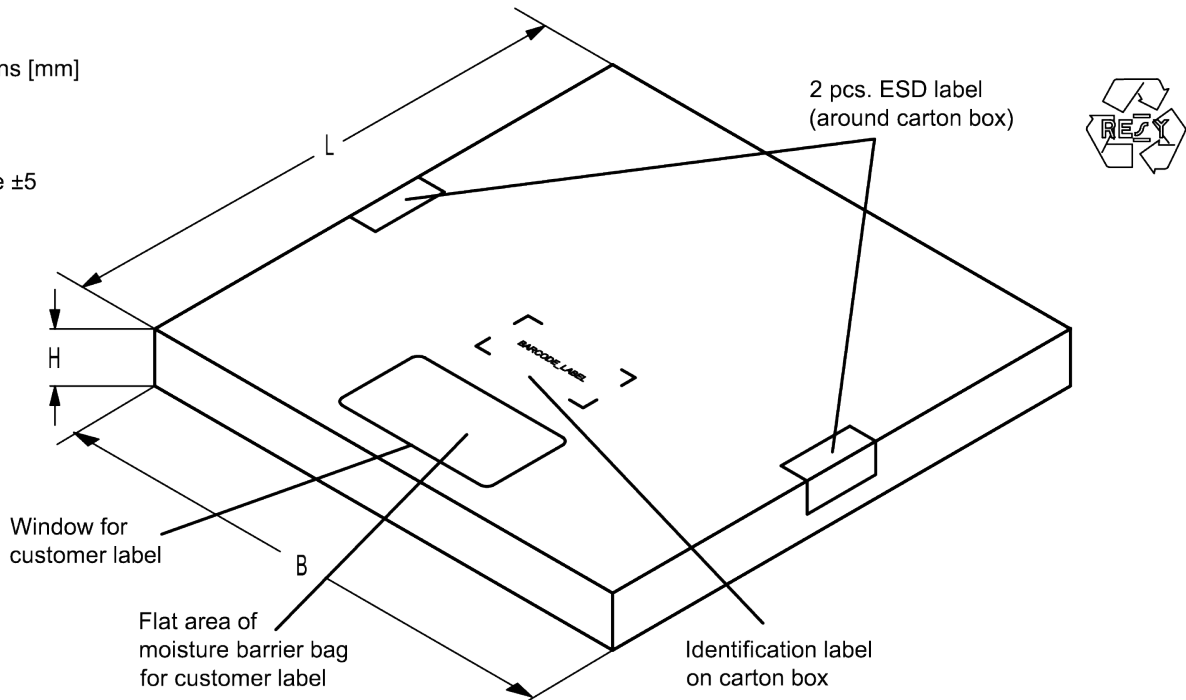


Figure 14: Drawing of folding box for reel with diameter of 180 mm.

15.3 Reel with diameter of 330 mm

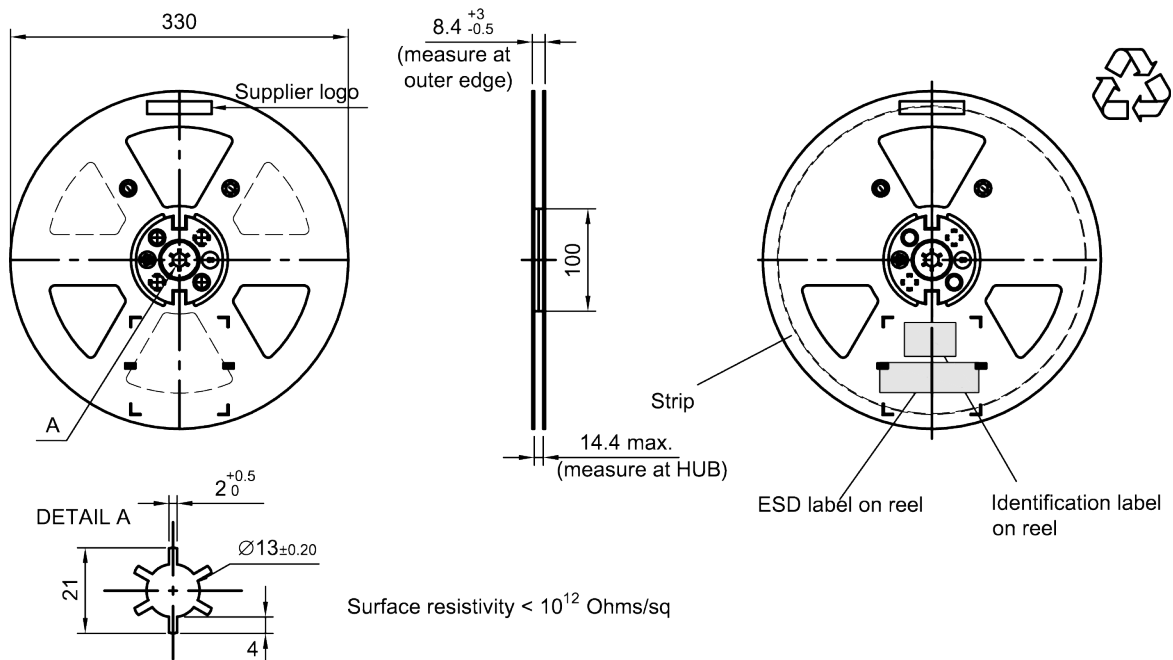
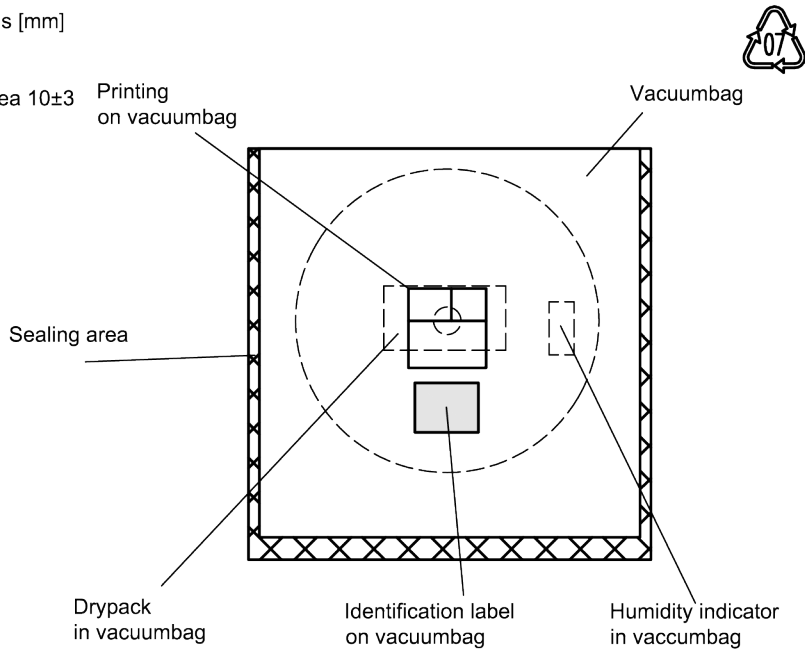


Figure 15: Drawing of reel (first-angle projection) with diameter of 330 mm.

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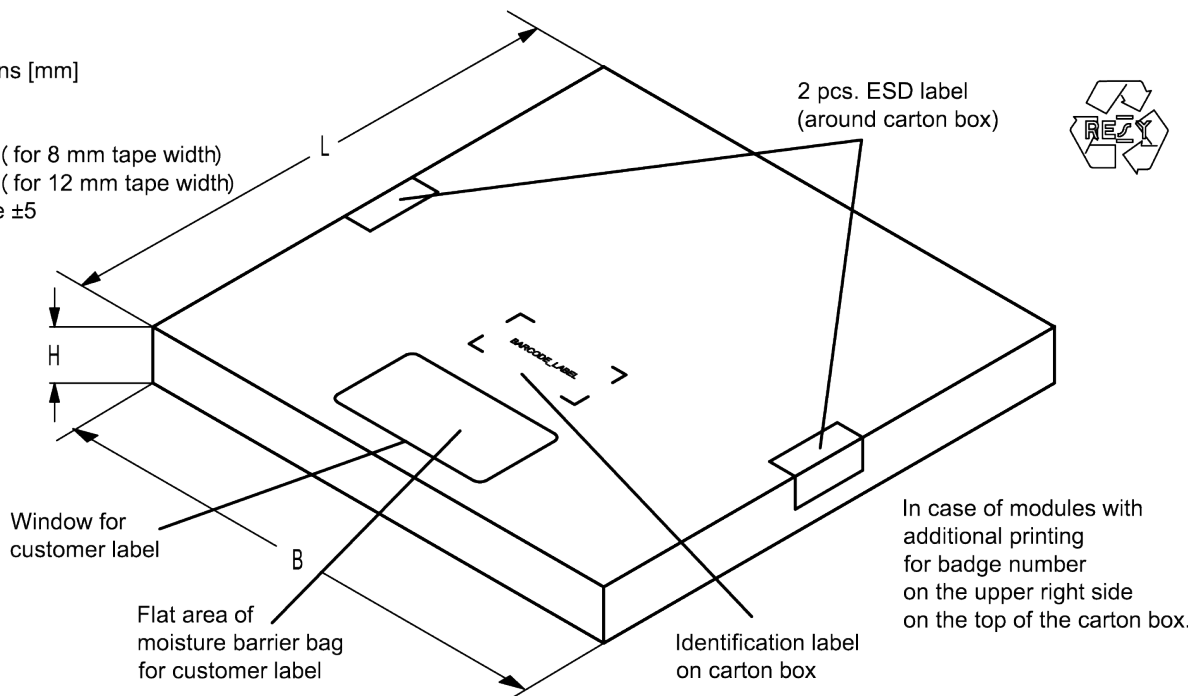
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Dimensions [mm]  
 X = 400+5  
 Y = 418+5  
 Sealing area 10±3



**Figure 16:** 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 17:** Drawing of folding box for reel with diameter of 330 mm.

## SAW components

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## Micro-acoustic extractor

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## 16 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>1234</b>
	$1 \times 32^2 + 6 \times 32^1 + 18 (=J) \times 32^0$	<b>1234</b>

The BASE32 code for product type B1224 is 168.

## ■ 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>12345</b>
$5 \times 47^2 + 27 (=U) \times 47^1 + 31 (=Y) \times 47^0$	$=$	<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.

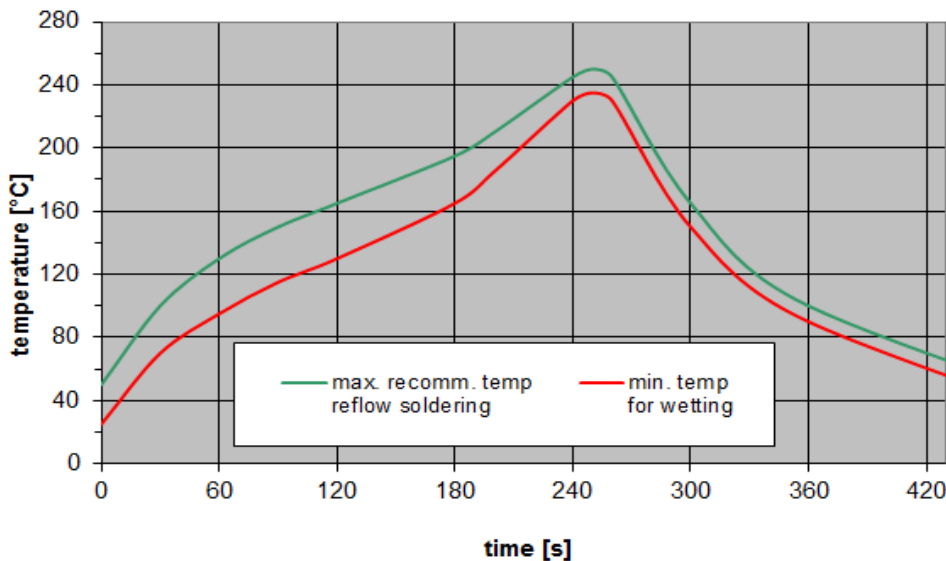
Data sheet

## 17 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
$T \geq 255$ °C	–
peak temperature $T_{\text{peak}}$	250 °C +0/-5 °C
wetting temperature $T_{\text{min}}$	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 18:** Recommended reflow profile for convection and infrared soldering – lead-free solder.

Data sheet

## 18 Annotations

### 18.1 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>.

### 18.2 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.

### 18.3 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.

### 18.4 Ordering codes and packing units

Ordering code	Packing unit
B39242B1224L210	9000 pcs
B39242B1224L210S 3	3000 pcs

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



Data sheet

## 19 Cautions and warnings

### 19.1 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).

### 19.2 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.

### 19.3 Moldability

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

### 19.4 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.

**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.
5. We constantly strive to improve our products. Consequently, **the products described in this publication may change from time to time**. The same is true of the corresponding product specifications. Please check therefore to what extent product descriptions and specifications contained in this publication are still applicable before or when you place an order. We also **reserve the right to discontinue production and delivery of products**. Consequently, we cannot guarantee that all products named in this publication will always be available.  
The aforementioned does not apply in the case of individual agreements deviating from the foregoing for customer-specific products.

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