Qualcomm

RF360
Europe GmbH

SAW components

Micro-acoustic extractor
WLAN 2G

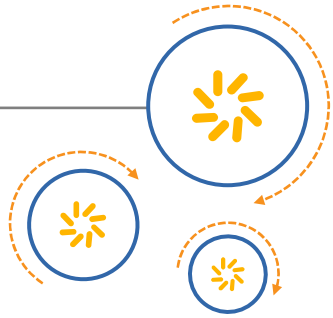
Series/type:	B8688
Ordering code:	B39242B8688L210
DCN:	80-PA243-61 Rev. B
Date:	February 02, 2018
Version:	2.2

RF360 products mentioned within this document are products of RF360 Europe GmbH and other subsidiaries of RF360 Holdings Singapore Pte. Ltd. (collectively, the “RF360 Subsidiaries”).

RF360 Europe GmbH, Anzinger Str. 13, München, Germany

RF360 Europe GmbH

A Qualcomm – TDK Joint Venture



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SAW components **B8688**

Micro-acoustic extractor **699 – 2690 MHz**

Data sheet

SAW components **B8688**

Micro-acoustic extractor **699 – 2690 MHz**

Data sheet

Table of contents

1 Application

- High-performance WLAN Extractor with single ended 50 Ω ports.
- Ultra-low-loss acoustic structure.
- 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: 699 – 960 MHz, 1710 – 2690 MHz.
- No switches and control lines required.

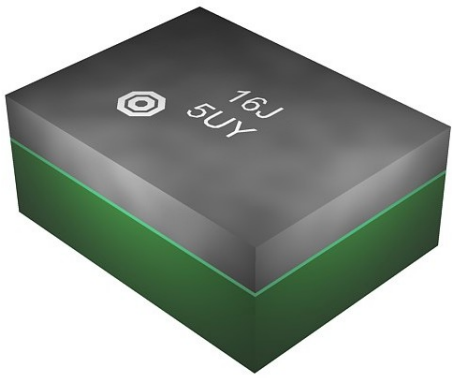

Figure 1: Picture of component with example of product marking.

2 Features

- Package size 1.7 mm × 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)

3 Package

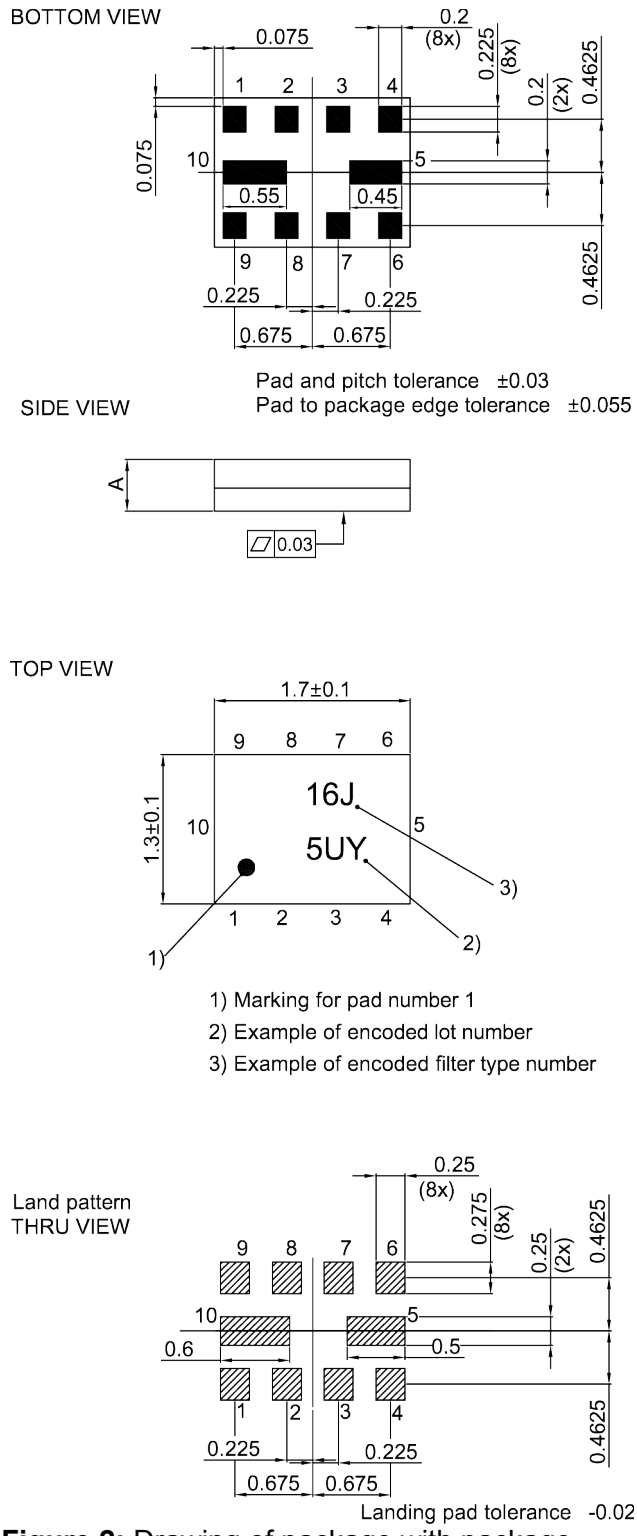

Figure 2: Drawing of package with package height A = 0.6±0.1 mm. See Sec. Package information (p. 23).

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)

5 Matching circuit

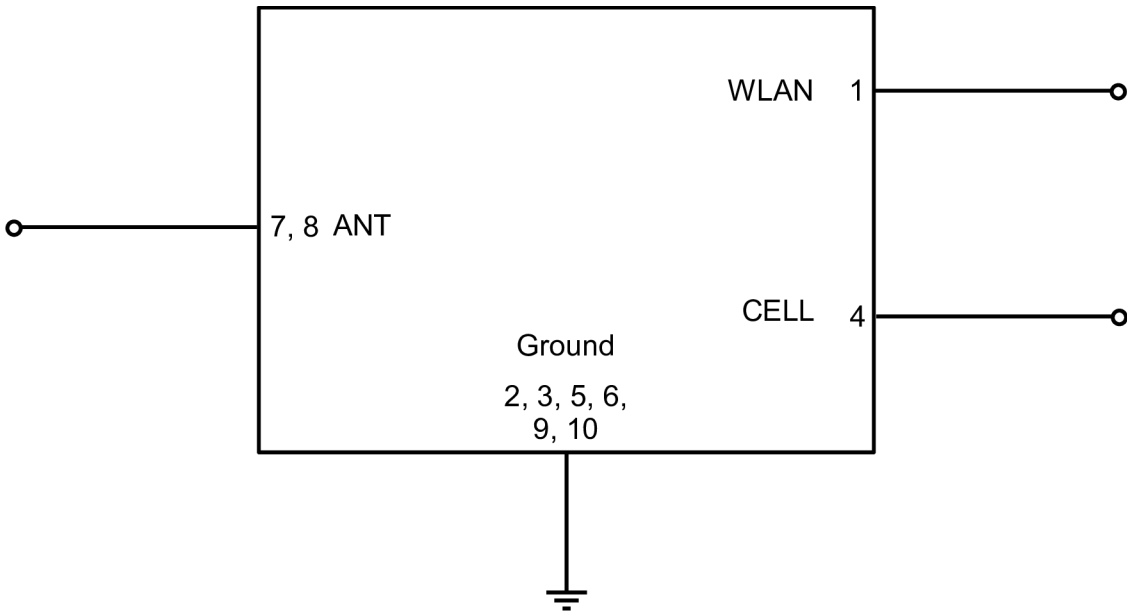

Figure 3: Schematic of matching circuit. No external matching components required. Antenna pins 7 and 8 have to be directly connected together on PCB level.

6 Characteristics ANT-WLAN

Temperature range for specification T_{SPEC} = −30 °C ... +85 °C
ANT terminating impedance Z_{ANT} = 50 Ω
CELL terminating impedance Z_{CELL} = 50 Ω
WLAN terminating impedance Z_{WLAN} = 50 Ω

Characteristics ANT-WLAN				min. for T_{SPEC}	typ. @ +25 °C	max. for T_{SPEC}	
Maximum insertion attenuation[1]			α_{max}				
Channel 1	2403.1 ... 2420.9	MHz		—	1.25	2.0[2), 3)]	dB
Channel 2	2408.1 ... 2425.9	MHz		—	1.15	1.9	dB
Channel 3	2413.1 ... 2430.9	MHz		—	1.1	1.9	dB
Channel 4	2418.1 ... 2435.9	MHz		—	1.15	1.9	dB
Channel 5	2423.1 ... 2440.9	MHz		—	1.2	2.0	dB
Channel 6	2428.1 ... 2445.9	MHz		—	1.25	2.1	dB
Channel 7	2433.1 ... 2450.9	MHz		—	1.3	2.2	dB
Channel 8	2438.1 ... 2455.9	MHz		—	1.35	2.3	dB
Channel 9	2443.1 ... 2460.9	MHz		—	1.4	2.4	dB
Channel 10	2448.1 ... 2465.9	MHz		—	1.45	2.4	dB
Channel 11	2453.1 ... 2470.9	MHz		—	1.5	2.4[4), 5)]	dB
Channel 12	2458.1 ... 2475.9	MHz		—	1.65	2.4[4), 6)]	dB
Channel 13	2463.1 ... 2480.9	MHz		—	1.85	2.4[4), 7)]	dB
Maximum VSWR			$VSWR_{max}$				
@ ANT port	2403.1 ... 2480.9	MHz		—	1.5	2.1[4), 8)]	
@ WLAN port	2403.1 ... 2480.9	MHz		—	1.6	2.1[4), 9)]	
Minimum attenuation			α_{min}				
	699 ... 960	MHz		31	35	—	dB
	1559 ... 1606	MHz		30	35	—	dB
	1710 ... 2025	MHz		31	35	—	dB
	2110 ... 2200	MHz		31	38	—	dB
	2300 ... 2370	MHz	[10)]	37[4), 11)]	42	—	dB
	2500 ... 2550	MHz	[10)]	33[2)]	41	—	dB
	2550 ... 2690	MHz		35	43	—	dB
	4804 ... 4963	MHz		20	28	—	dB

1) Average over each WLAN channel with band width of 17.8 MHz.
2) +25°C to +85°C.
3) 2.5dB over temperature range -30°C to +85°C.
4) +25°C.
5) 2.6dB over temperature range -30°C to +85°C.
6) 2.8dB over temperature range -30°C to +85°C.
7) 3.2dB over temperature range -30°C to +85°C.
8) 2.5 over temperature range -10°C to +85°C.
9) 2.3 over temperature range -30°C to +85°C.
10) Average over any 5.0 MHz.
11) 30dB over temperature range -30°C to +85°C.

7 Characteristics ANT-CELL

Temperature range for specification T_{SPEC} = −30 °C ... +85 °C
ANT terminating impedance Z_{ANT} = 50 Ω
CELL terminating impedance Z_{CELL} = 50 Ω
WLAN terminating impedance Z_{WLAN} = 50 Ω

Characteristics ANT-CELL				**min.** for T_{SPEC}	**typ.** @ +25 °C	**max.** for T_{SPEC}	
Maximum insertion attenuation[1]			α_{max}				
	699 ... 960	MHz		—	0.3	0.7	dB
	1559 ... 1606	MHz		—	0.4	0.8	dB
	1710 ... 2025	MHz		—	0.5	1.2	dB
	2110 ... 2170	MHz		—	0.65	1.2	dB
	2300 ... 2370	MHz		—	1.4	2.1[2), 3)]	dB
	2550 ... 2655	MHz		—	1.15	1.7	dB
	2655 ... 2690	MHz		—	1.35	1.9	dB
Maximum VSWR			$VSWR_{max}$				
@ ANT port	699 ... 960	MHz		—	1.3	1.8	
	1559 ... 1606	MHz		—	1.2	1.8	
	1710 ... 2200	MHz		—	1.3	1.8	
	2300 ... 2370	MHz		—	1.3	2.0	
	2550 ... 2690	MHz		—	1.3	2.0	
@ CELL port	699 ... 960	MHz		—	1.3	1.8	
	1559 ... 1606	MHz		—	1.25	1.8	
	1710 ... 2200	MHz		—	1.3	1.8	
	2300 ... 2370	MHz		—	1.4	2.0	
	2550 ... 2690	MHz		—	1.5	2.1	
Minimum attenuation[4]			α_{min}				
	2403.1 ... 2480.9	MHz		12	15	—	dB

1) Average over any 5.0 MHz.
2) +25°C.
3) 2.9dB over temperature range -30°C to +85°C.
4) Average over each WLAN channel with band width of 17.8 MHz.

8 Characteristics CELL-WLAN

Temperature range for specification T_{SPEC} = −30 °C ... +85 °C
ANT terminating impedance Z_{ANT} = 50 Ω
CELL terminating impedance Z_{CELL} = 50 Ω
WLAN terminating impedance Z_{WLAN} = 50 Ω

Characteristics CELL-WLAN				**min.** for T_{SPEC}	**typ.** @ +25 °C	**max.** for T_{SPEC}	
Isolation			α_{min}				
	699 ... 960	MHz		31	34	—	dB
	1559 ... 1606	MHz		30	34	—	dB
	1710 ... 2025	MHz		31	35	—	dB
	2110 ... 2170	MHz		31	38	—	dB
	2300 ... 2370	MHz	1)	16	43	—	dB
	2403.1 ... 2480.9	MHz	2)	12	17	—	dB
	2550 ... 2690	MHz		33	41	—	dB

1) Average over any 5.0 MHz.
2) Average over each WLAN channel with band width of 17.8 MHz.

9 Maximum ratings

Storage temperature	T_{STG} [3] = −40 °C ... +85 °C [1), 2)]	
DC voltage	$\|V_{DC}\|$ = 5.0 V (max.)[4]	
ESD voltage		
	V_{ESD} [5] = 100 V (max.)	Machine model.
	V_{ESD} [6] = 250 V (max.)	Human body model.
	V_{ESD} [7] = 600 V (max.)	Charged device model.
Input power	P_{IN}	
@ WLAN port: 2402.5 ... 2481.5 MHz	24 dBm	19 MHz WLAN signal for 5000 h @ 55 °C.
@ CELL port: 824 ... 849 MHz	33 dBm	GSM signal duty cycle 1:8 for 5000 h @ 55 °C. Effective power in On-state.
@ CELL port: 880 ... 915 MHz	33 dBm	GSM signal duty cycle 1:8 for 5000 h @ 55 °C. Effective power in On-state.
@ CELL port: 1710 ... 1785 MHz	33 dBm	GSM signal duty cycle 1:8 for 5000 h @ 55 °C. Effective power in On-state.
@ CELL port: 1710 ... 2370 MHz	26 dBm	Continuous wave for 5000 h @ 55 °C.
@ CELL port: 1850 ... 1910 MHz	33 dBm	GSM signal duty cycle 1:8 for 5000 h @ 55 °C. Effective power in On-state.
@ CELL port: 2550 ... 2690 MHz	26 dBm	Continuous wave for 5000 h @ 55 °C.

1) Extended upper limit: 96h@125°C acc. to IEC 60068-2-2-Bb;.
2) Applicable only for components without tape and reel (unpacked).
3) Not valid for packaging material. Storage temperature for packaging material is −25 °C to +40 °C.
4) 168h Damp Heat Steady State acc. to IEC60068-2-67 Cy.
5) According to JESD22-A115B (MM – Machine Model), 10 negative & 10 positive pulses.
6) According to JESD22-A114F (HBM – Human Body Model), 1 negative & 1 positive pulse.
7) According to JESD22-C101C (CDM – Field Induced Charged Device Model), 3 negative & 3 positive pulses.

10 Transmission coefficient ANT-WLAN

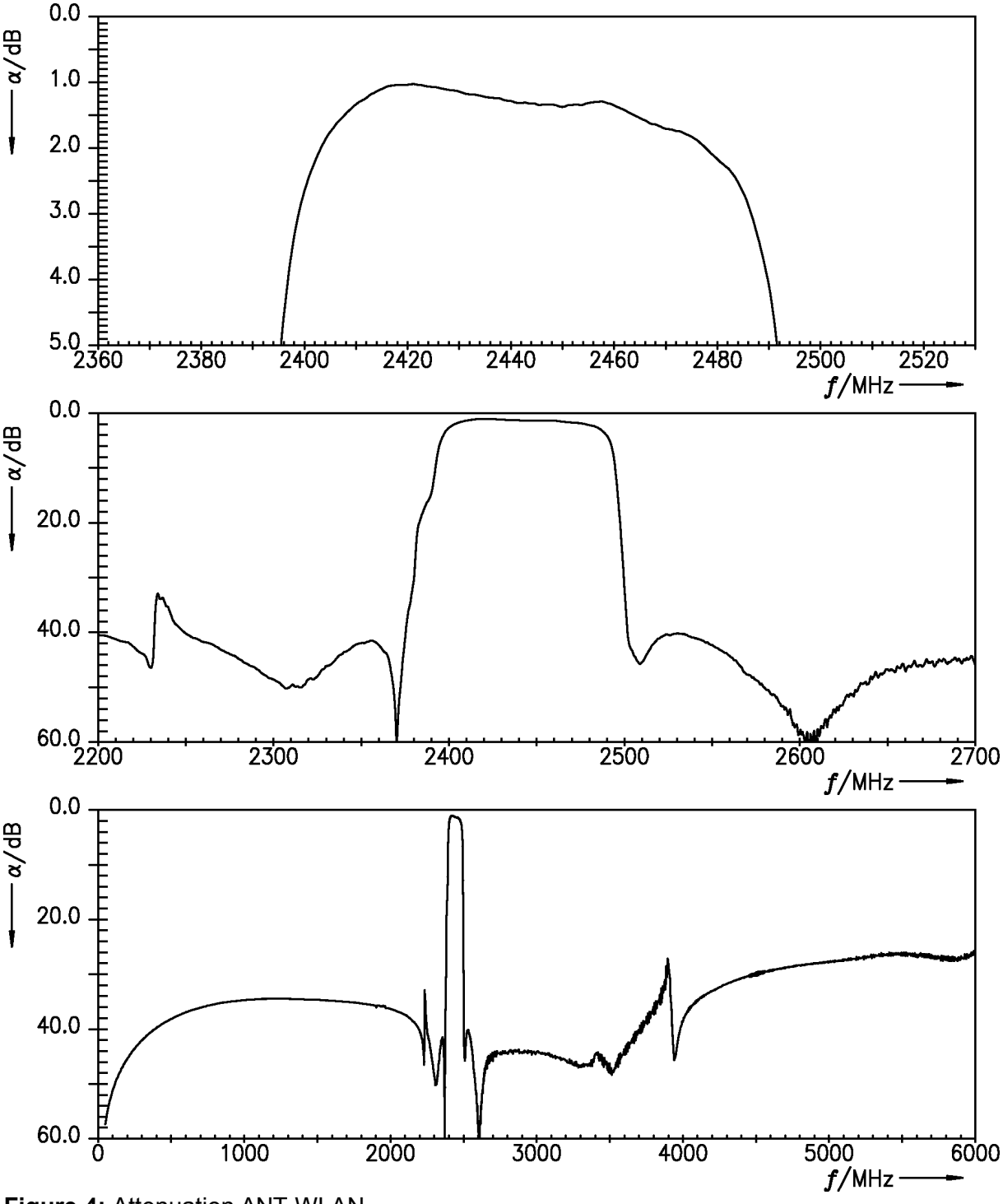

Figure 4: Attenuation ANT-WLAN.

11 Reflection coefficients ANT-WLAN

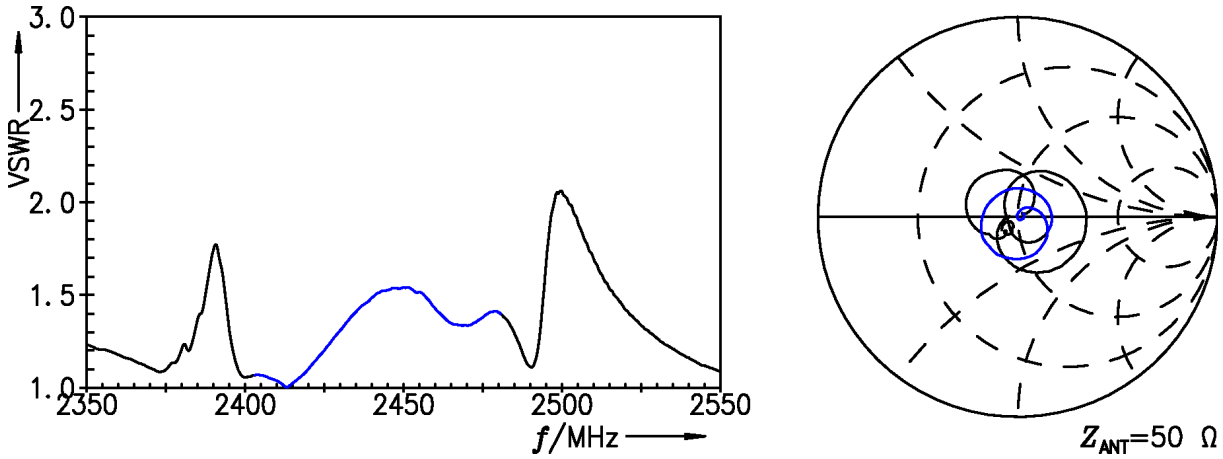

Figure 5: Reflection coefficient at ANT port.

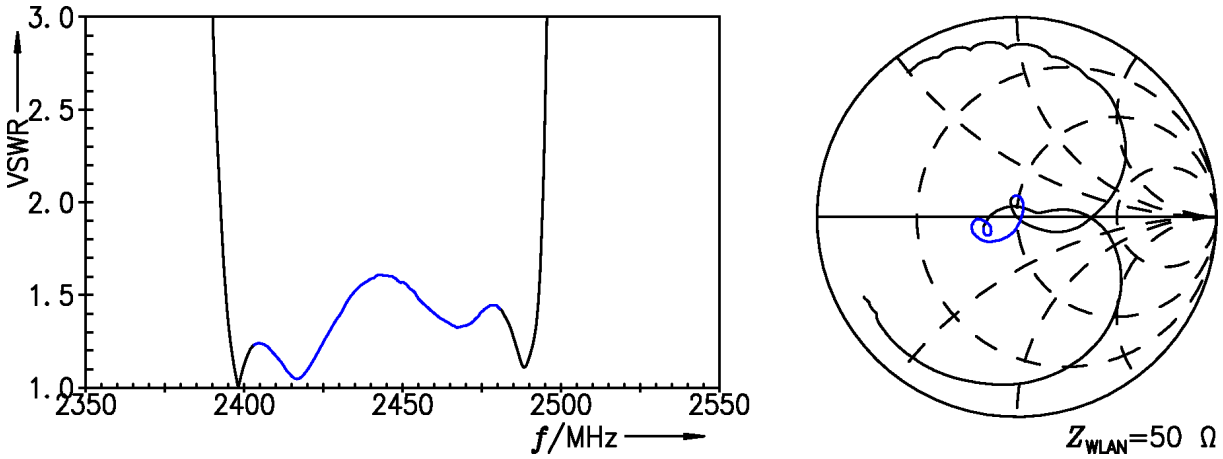

Figure 6: Reflection coefficient at WLAN port.

12 Transmission coefficient ANT-CELL

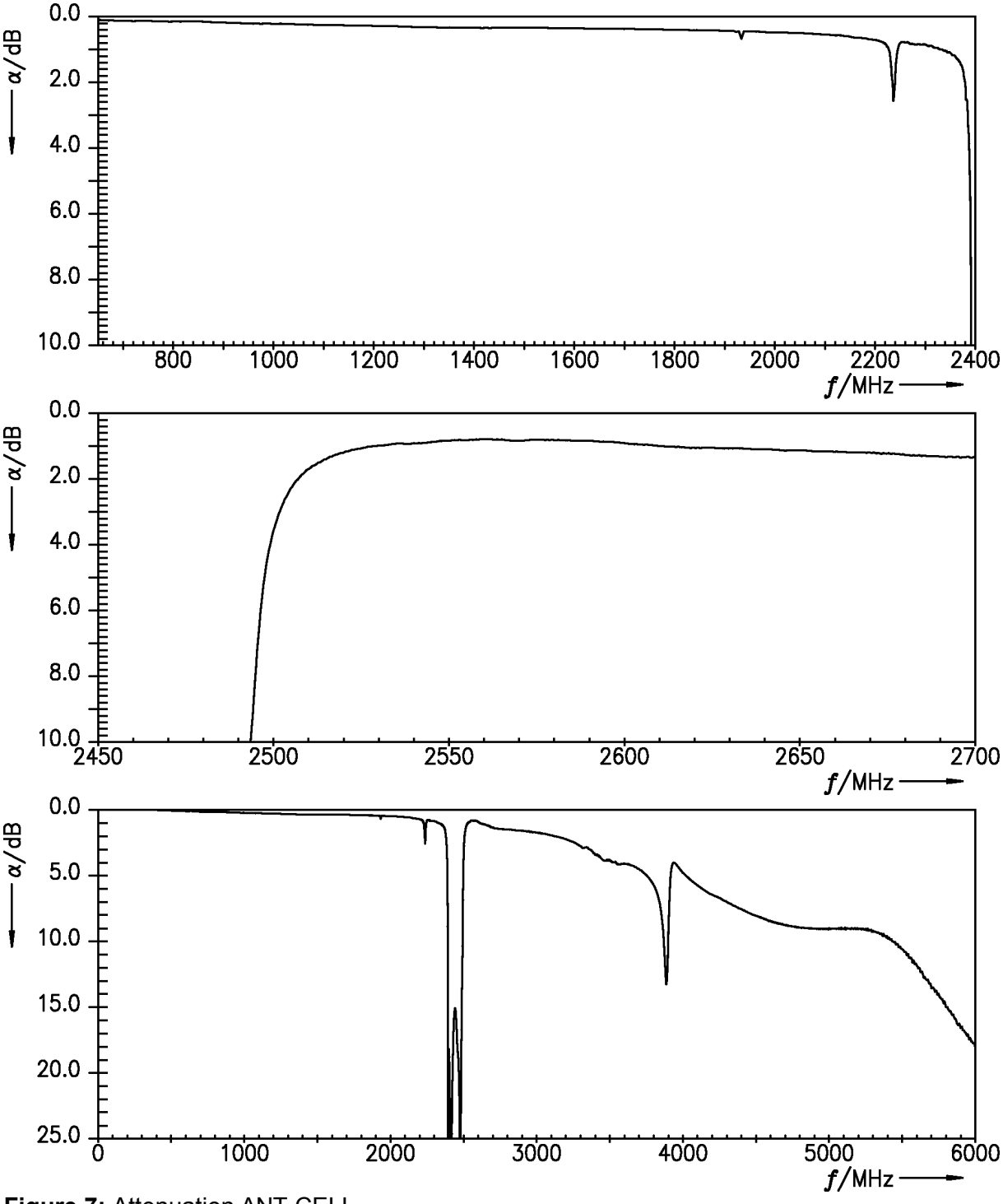

Figure 7: Attenuation ANT-CELL.

13 Reflection coefficients ANT-CELL

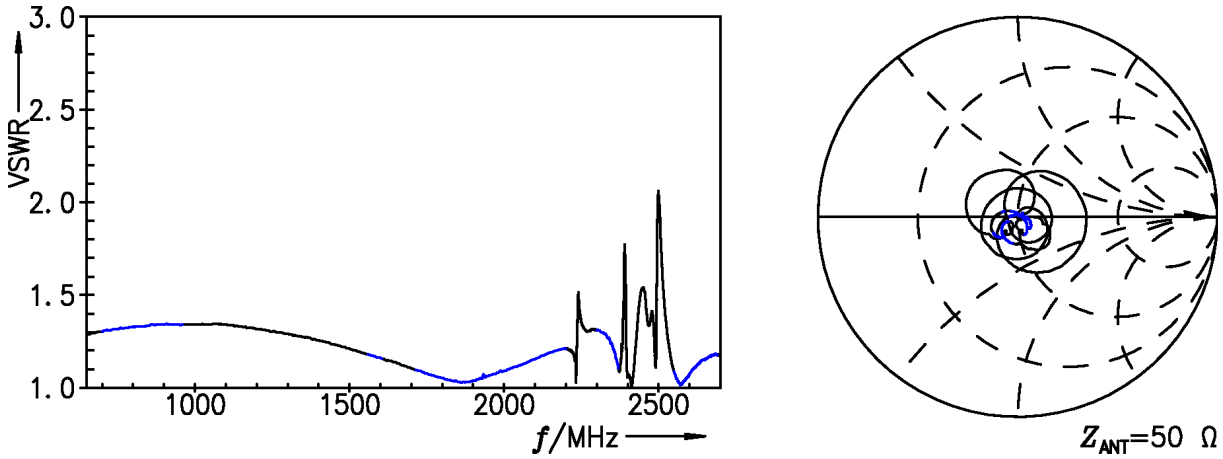

Figure 8: Reflection coefficient at ANT port.

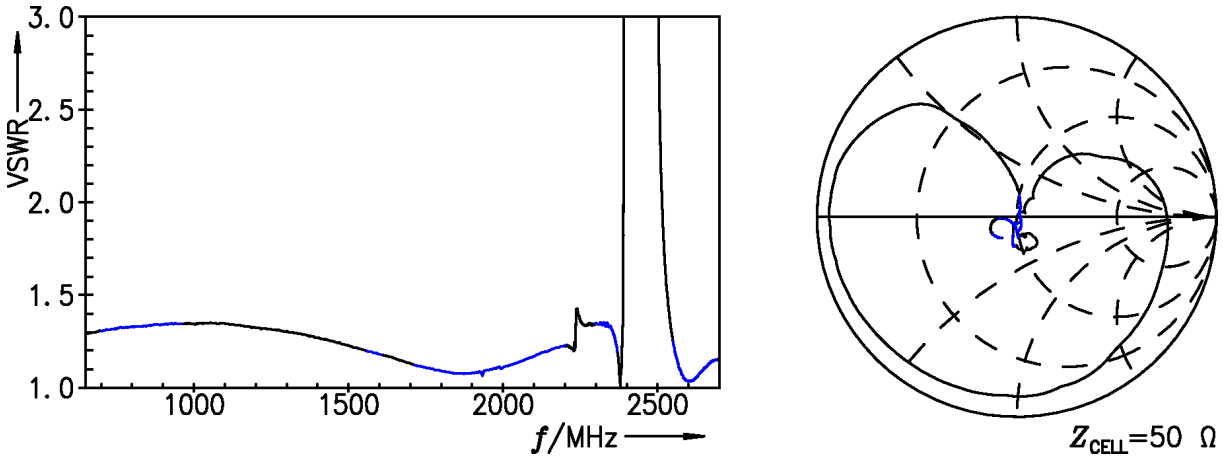

Figure 9: Reflection coefficient at CELL port.

14 Transmission coefficient CELL-WLAN

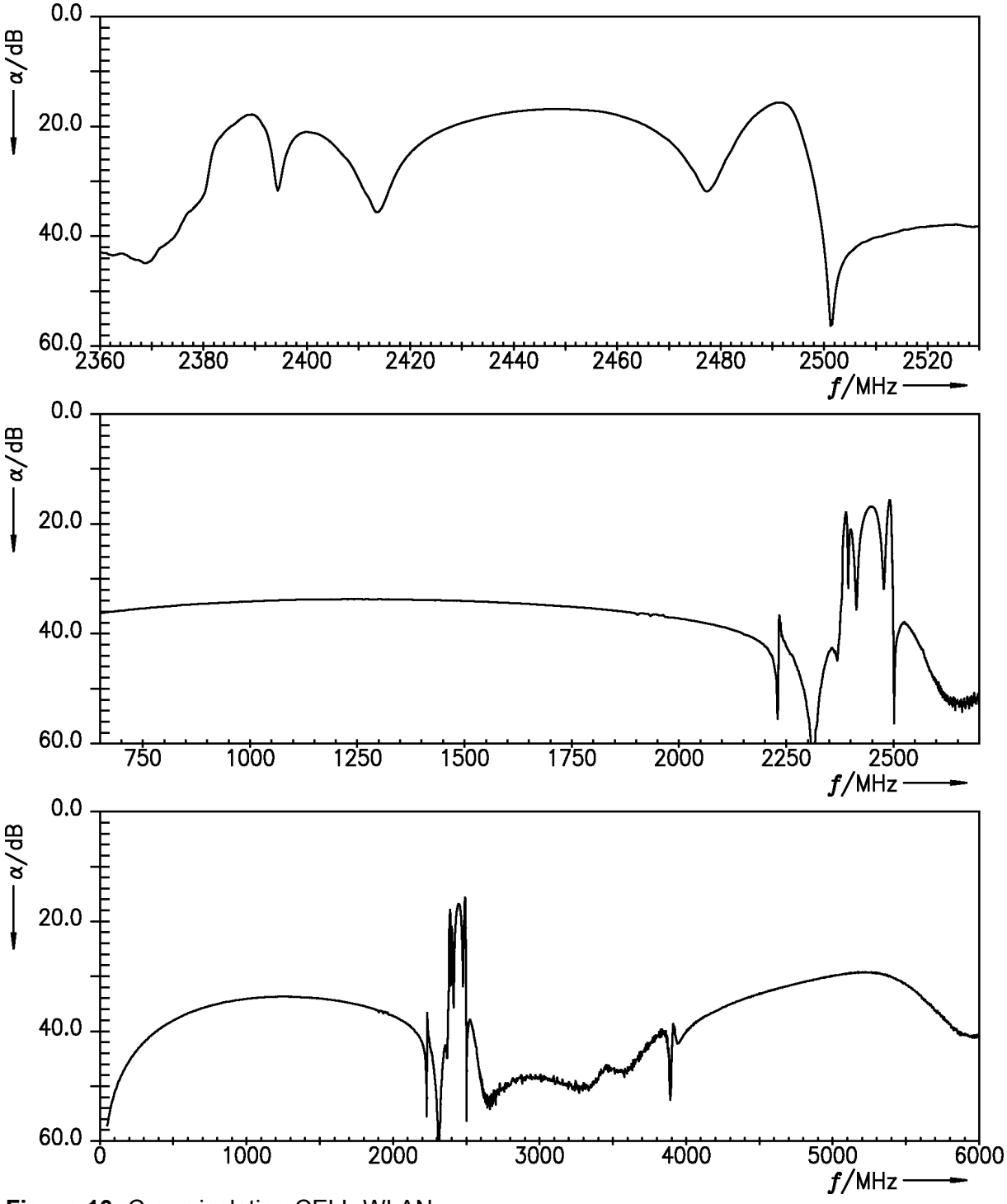

Figure 10: Cross-isolation CELL-WLAN.

15 Packing material

15.1 Tape

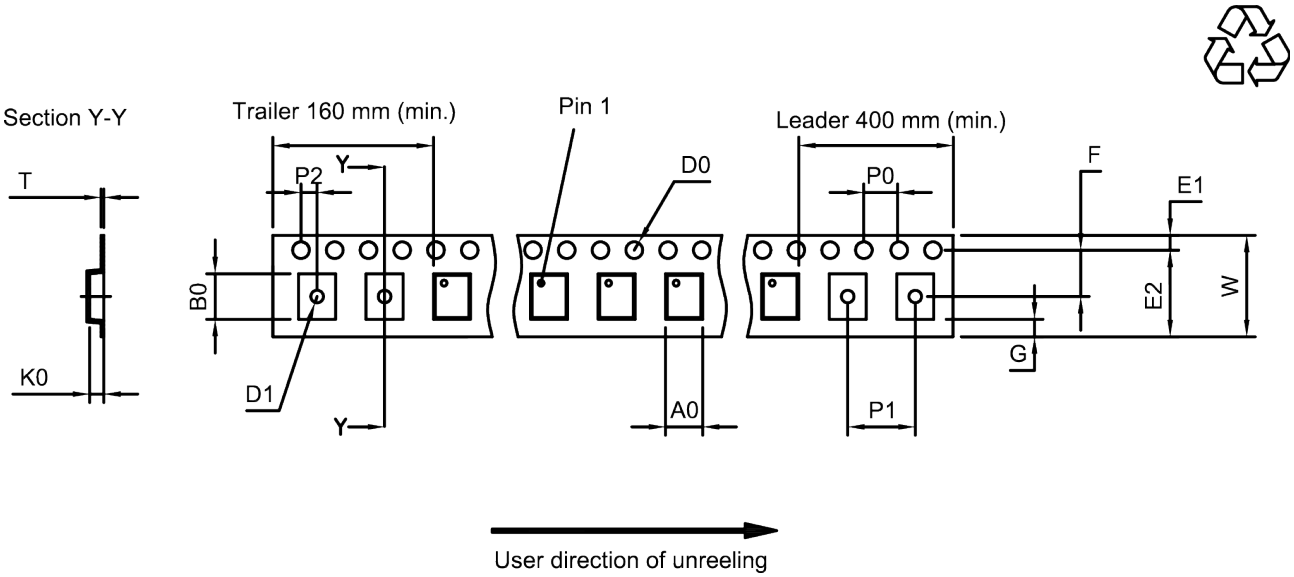

Figure 11: Drawing of tape (first-angle projection) with tape dimensions according to Table 1.

A_0	1.6±0.05 mm
B_0	2.0±0.05 mm
D_0	1.5+0.1/−0 mm
D_1	0.8 mm (min.)
E_1	1.75±0.1 mm

E_2	6.25 mm (min.)
F	3.5±0.05 mm
G	0.75 mm (min.)
K_0	0.8±0.05 mm
P_0	4.0±0.1 mm

P_1	4.0±0.1 mm
P_2	2.0±0.05 mm
T	0.25±0.03 mm
W	8.0+0.3/−0.1 mm

Table 1: Tape dimensions.

15.2 Reel with diameter of 180 mm

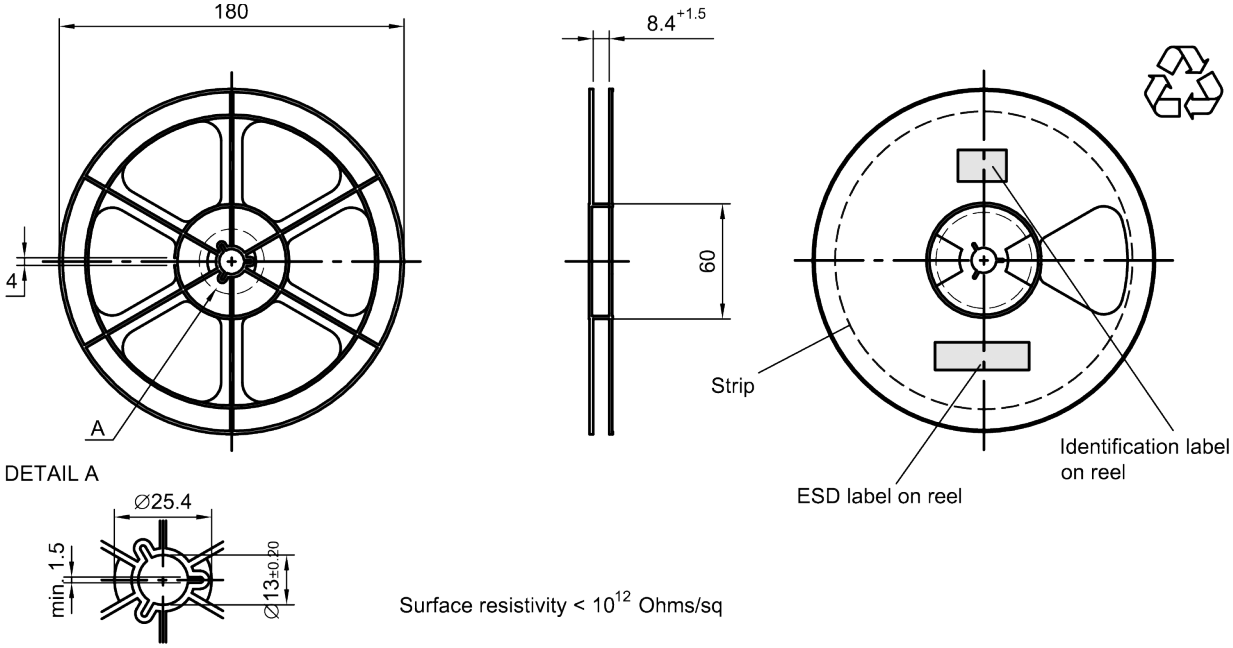

Figure 12: Drawing of reel (first-angle projection) with diameter of 180 mm.

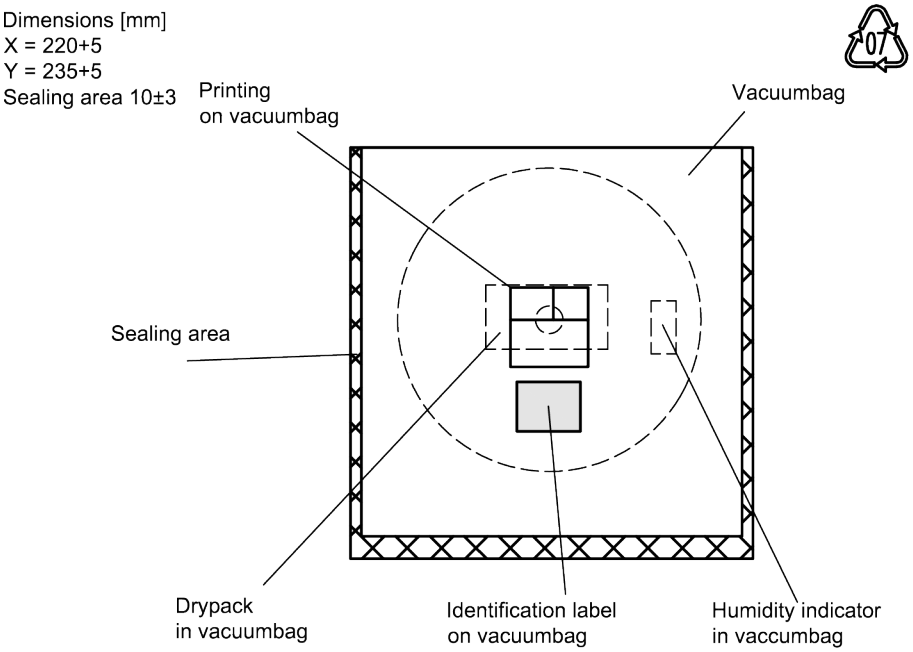

Figure 13: Drawing of moisture barrier bag (MBB) for reel with diameter of 180 mm.

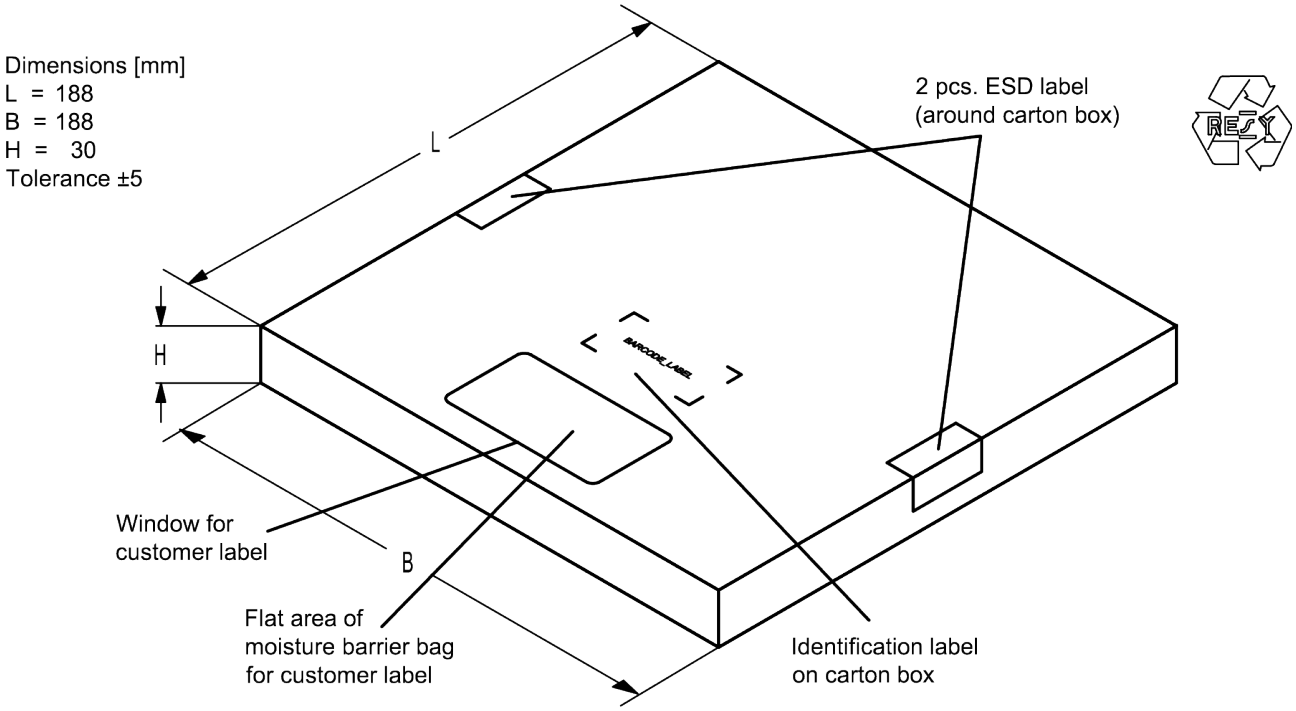

Figure 14: Drawing of folding box for reel with diameter of 180 mm.

15.3 Reel with diameter of 330 mm

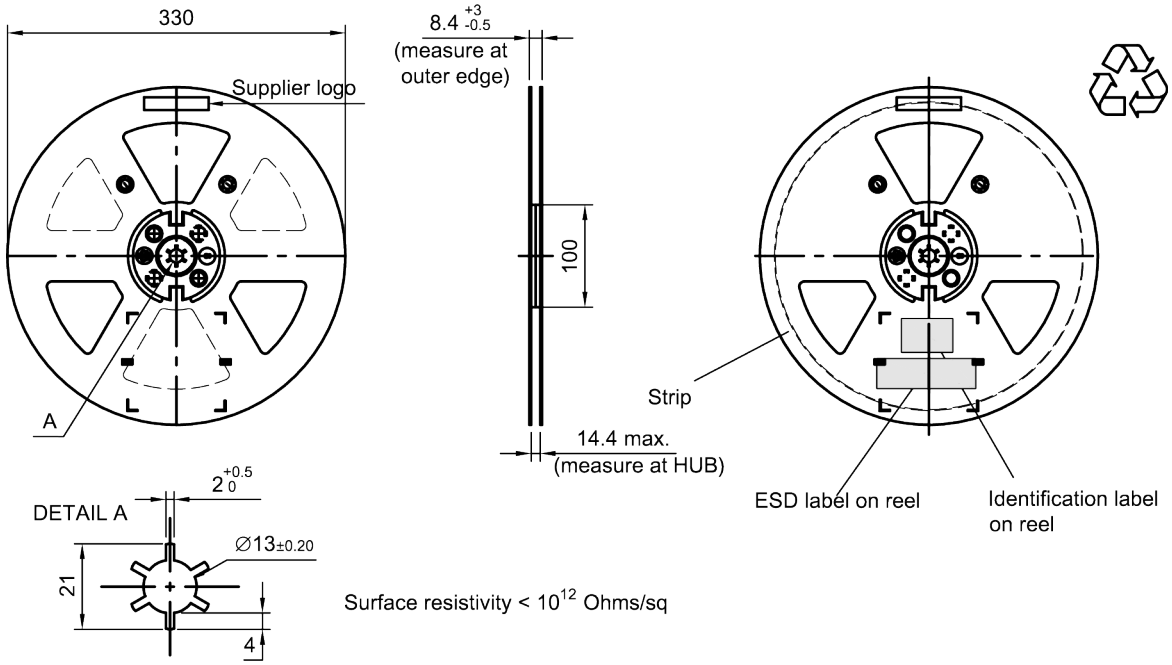

Figure 15: Drawing of reel (first-angle projection) with diameter of 330 mm.

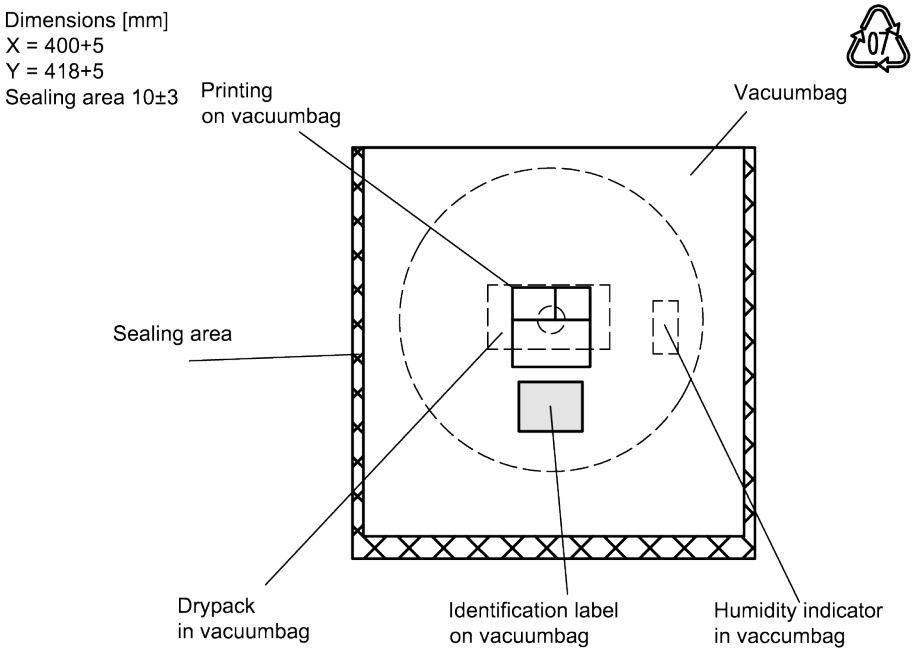

Figure 16: Drawing of moisture barrier bag (MBB) for reel with diameter of 330 mm.

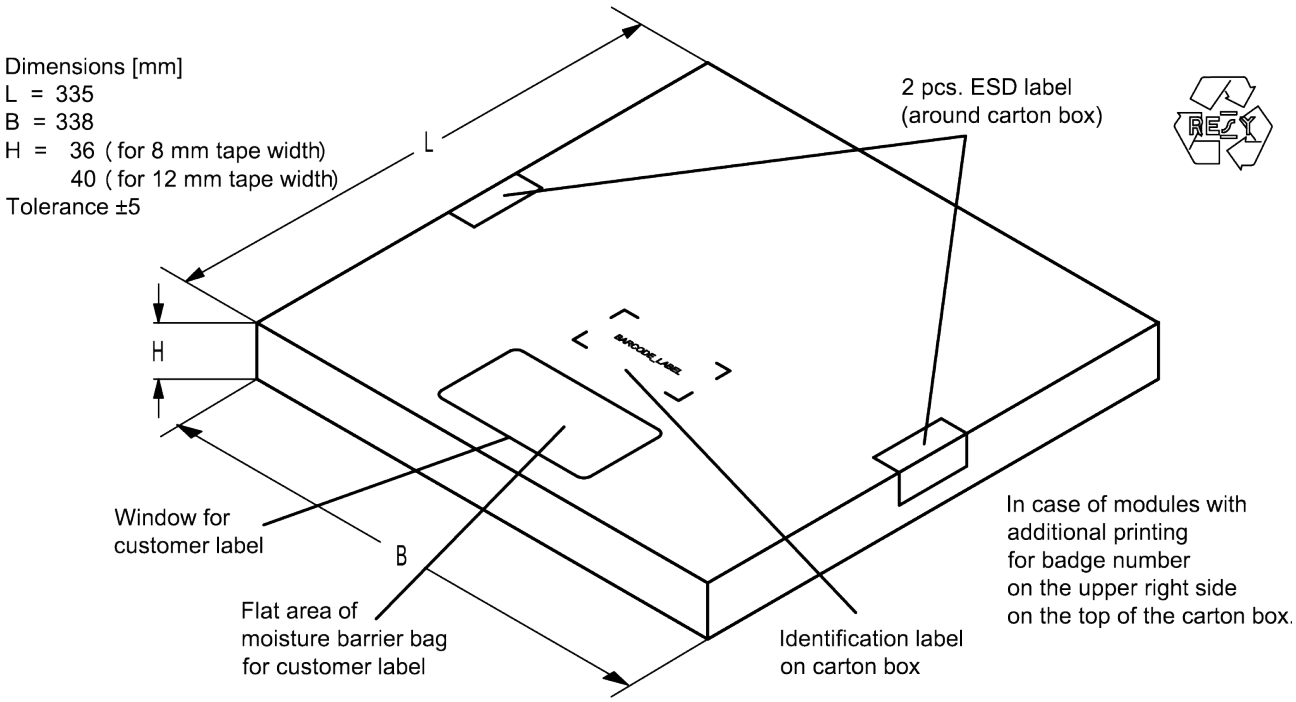

Figure 17: Drawing of folding box for reel with diameter of 330 mm.

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.
  16J **=>** **1234**
  1 x 32^2 + **6** x 32^1 + **18 (=J)** x 32^0 **=** **1234**
  The BASE32 code for product type B8688 is 8FG.

- 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 x 47^2 + **27 (=U)** x 47^1 + **31 (=Y)** x 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.

17 Soldering profile

The recommended soldering process is in accordance with IEC 60068-2-58 – 3rd 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).

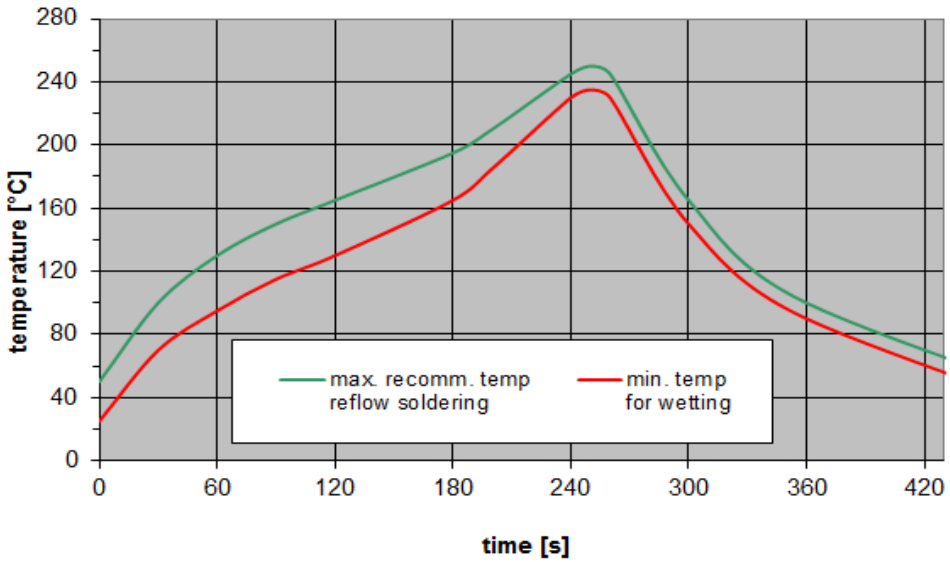

Figure 18: Recommended reflow profile for convection and infrared soldering – lead-free solder.

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
B39242B8688L210	15000 pcs
B39242B8688L210S 5	5000 pcs

Table 4: Ordering codes and packing units.

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.

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). Should you have any more detailed questions, please contact our sales offices.
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