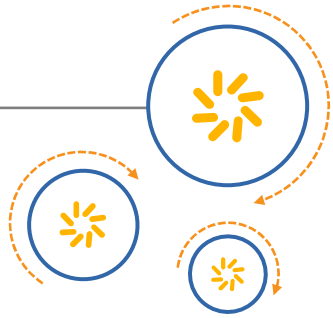
RF360 Europe GmbH

A Qualcomm – TDK Joint Venture



SAW components

SAW duplexer

LTE band 30

Series/type:	B8049
Ordering code:	B39242B8049P810
Date:	October 10, 2017
Version:	2.0

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SAW components **B8049**

SAW duplexer **2310 / 2355 MHz**

Data sheet

Table of contents

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1 Application

- SAW duplexer for mobile telephone LTE Band 30 systems

2 Features

- Package size 1.8±0.1 mm × 1.4±0.1 mm
- Package height 0.45 mm (max.)
- Approximate weight 5 mg
- RoHS compatible
- Package for Surface Mount Technology (SMT)
- Ni/Au-plated terminals
- Electrostatic Sensitive Device (ESD)
- Moisture Sensitivity Level 3 (MSL3)

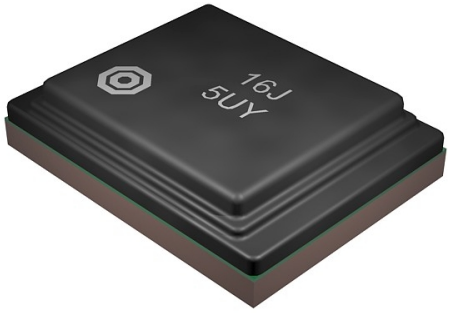

Figure 1: Picture of component with example of product marking.

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3 Package

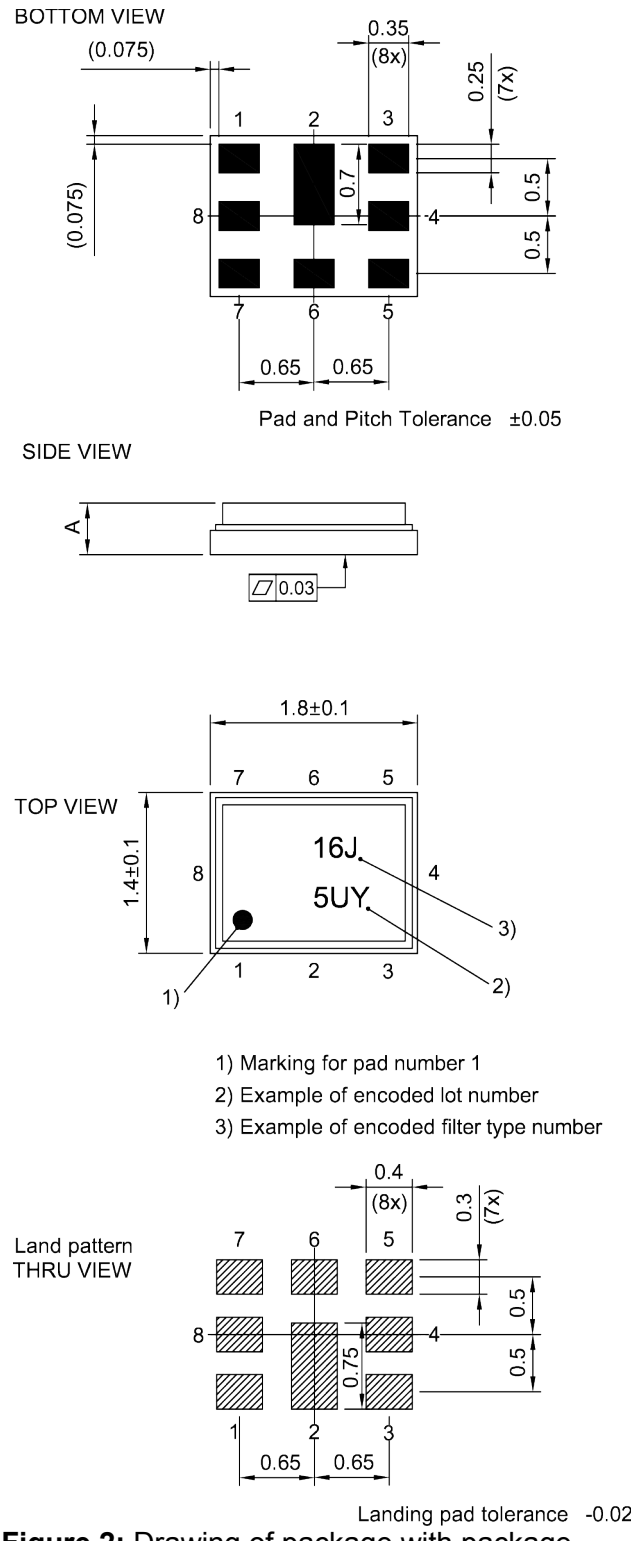

Figure 2: Drawing of package with package height A = 0.45 mm (max.). See Sec. Package information (p. 23).

4 Pin configuration

■ 1	RX
■ 3	TX
■ 6	ANT
■ 2, 4, 5, 7, 8	Ground

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5 Matching circuit

■ L_{p6} = 5.6 nH

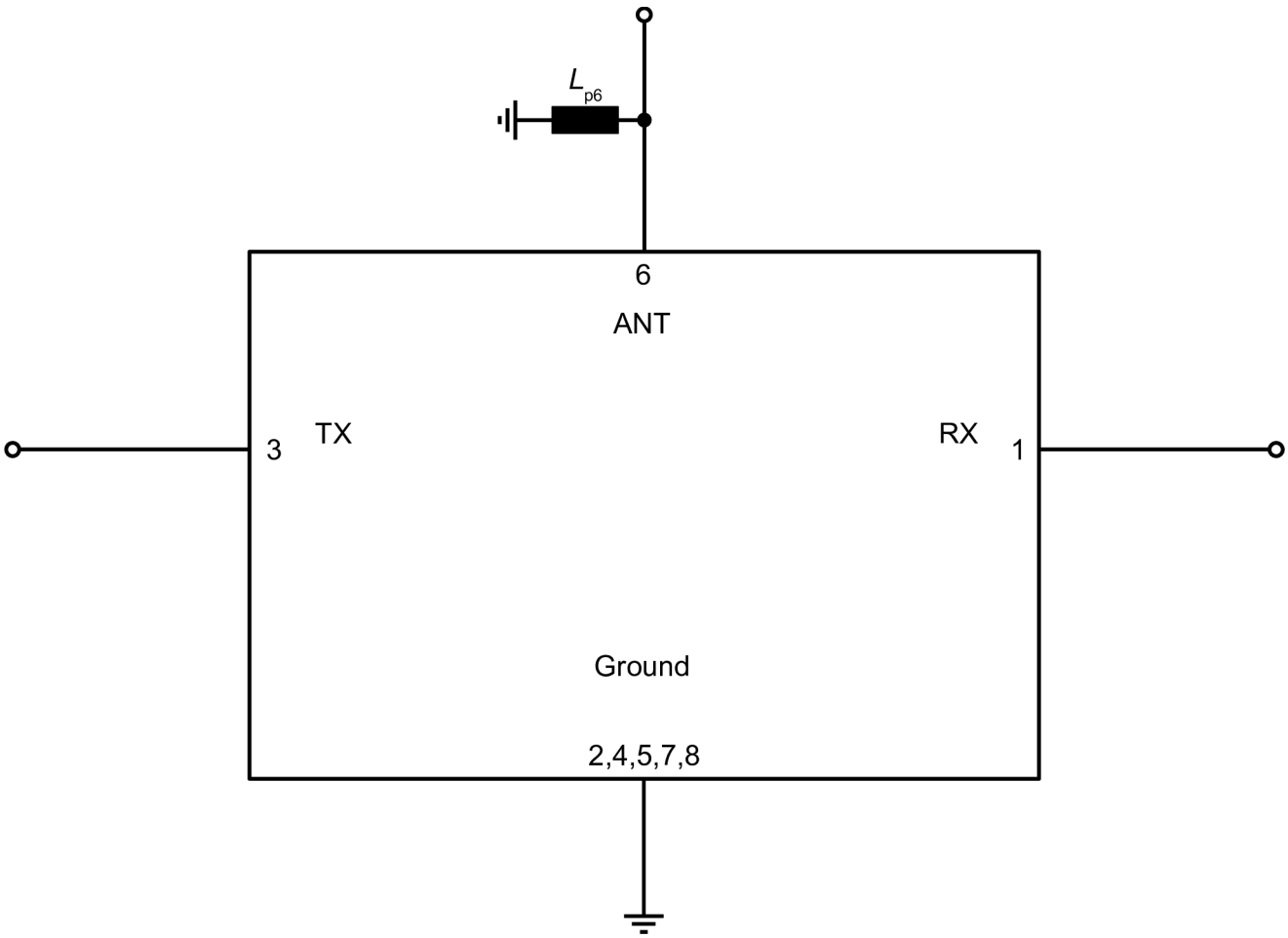

Figure 3: Schematic of matching circuit.

External shunt inductor for ESD protection is recommended at any ports towards antenna.

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6 Characteristics

6.1 TX – ANT

Temperature range for specification	T_{SPEC}	= −30 °C ... +85 °C
TX terminating impedance	Z_{TX}	= 50 Ω
ANT terminating impedance	Z_{ANT}	= 50 Ω with par. 5.6 nH[1)]
RX terminating impedance	Z_{RX}	= 50 Ω

Characteristics TX – ANT[2)]				**min.** for T_{SPEC}	**typ.** @ +25 °C	**max.** for T_{SPEC}	
Center frequency			f_C	—	2310	—	MHz
Maximum insertion attenuation							
	2305 ... 2315	MHz	$\alpha_{INT,max}$[3)]	—	1.9	2.6	dB
	2305.25 ... 2314.75	MHz	α_{max}	—	2.0	2.7	dB
Maximum VSWR			$VSWR_{max}$				
@ TX port	2305.25 ... 2314.75	MHz		—	1.3	2.0	
@ ANT port	2305.25 ... 2314.75	MHz		—	1.3	2.0	
Minimum attenuation			α_{min}				
	50 ... 1565.42	MHz		40	43	—	dB
	729 ... 746	MHz		40	50	—	dB
	869 ... 894	MHz		40	47	—	dB
	1225 ... 1250	MHz		40	43	—	dB
	1559 ... 1605.89	MHz		40	43	—	dB
	1605.89 ... 1680	MHz		40	43	—	dB
	1805 ... 1880	MHz		40	44	—	dB
	1900 ... 1920	MHz		40	45	—	dB
	1930 ... 1990	MHz		40	46	—	dB
	2010 ... 2025	MHz		40	48	—	dB
	2110 ... 2170	MHz		40	52	—	dB
	2170 ... 2200	MHz		40	53	—	dB
	2200 ... 2288	MHz		7	15	—	dB
	2288 ... 2292	MHz		2	10	—	dB
	2292 ... 2296	MHz		1.9	5	—	dB
	2296 ... 2300	MHz		1.7	2.8	—	dB
	2320 ... 2324	MHz		1.6	2.2	—	dB
	2324 ... 2328	MHz		1.8	3.5	—	dB
	2328 ... 2332	MHz		1.9	6	—	dB
	2332 ... 2350	MHz		5	11	—	dB
	2350.25 ... 2359.75	MHz		50	67	—	dB
	2360 ... 2485	MHz		40	50	—	dB
	2570 ... 2620	MHz		30	55	—	dB
	2620 ... 2690	MHz		30	52	—	dB
	4610 ... 4630	MHz		35	44	—	dB

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Characteristics TX – ANT[2]			min. for T_{SPEC}	typ. @ +25 °C	max. for T_{SPEC}	
	4900... 5950	MHz	20	43	—	dB
	6915... 6945	MHz	20	31	—	dB

1) See Sec. Matching circuit (p. 6).
2) Specified min./max. Values are valid for a testing power of +10 dBm.
3) Integrated attenuation α_{INT}: Averaged power $|S_{ij}|^2$ over the center 4.5 MHz of LTE 5 MHz (25 RB) channels.

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6.2 ANT – RX

Temperature range for specification	T_{SPEC}	= −30 °C ... +85 °C
TX terminating impedance	Z_{TX}	= 50 Ω
ANT terminating impedance	Z_{ANT}	= 50 Ω with par. 5.6 nH[1]
RX terminating impedance	Z_{RX}	= 50 Ω

Characteristics ANT – RX[2]				**min.** for T_{SPEC}	**typ.** @ +25 °C	**max.** for T_{SPEC}	
Center frequency			f_C	—	2355	—	MHz
Maximum insertion attenuation			α_{max}				
	2350.25... 2359.75	MHz		—	2.2	2.9	dB
Maximum VSWR			$VSWR_{max}$				
@ ANT port	2350.25... 2359.75	MHz		—	1.3	2.0	
@ RX port	2350.25... 2359.75	MHz		—	1.3	2.0	
Minimum attenuation			α_{min}				
	40... 50	MHz		50	70	—	dB
	50... 2305	MHz		38	42	—	dB
	699... 716	MHz		40	51	—	dB
	824... 849	MHz		40	48	—	dB
	1710... 1780	MHz		39	42	—	dB
	1850... 1910	MHz		39	42	—	dB
	2305... 2315	MHz		50	59	—	dB
	2327... 2337	MHz		20[3]	27	—	dB
	2327... 2337	MHz		15	20	—	dB
	2336.2... 2341.3	MHz		7[4]	20	—	dB
	2336.2... 2341.3	MHz		4	11	—	dB
	2400... 2500	MHz		40	45	—	dB
	2500... 2750	MHz		40	45	—	dB
	2750... 2950	MHz		10	16	—	dB
	2950... 3600	MHz		36	47	—	dB
	3600... 6000	MHz		40	49	—	dB
	4900... 5950	MHz		40	49	—	dB
	6960... 6990	MHz		20	48	—	dB
	7050... 7080	MHz		20	48	—	dB

1) See Sec. Matching circuit (p. 6).
2) Specified min./max. Values are valid for a testing power of +10 dBm.
3) Averaged values of linear S-parameter over 10 MHz.
4) Averaged values of linear S-parameter over 5 MHz.

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6.3 TX – RX

Temperature range for specification	T_{SPEC}	= −30 °C ... +85 °C
TX terminating impedance	Z_{TX}	= 50 Ω
ANT terminating impedance	Z_{ANT}	= 50 Ω with par. 5.6 nH[1)]
RX terminating impedance	Z_{RX}	= 50 Ω

Characteristics TX – RX[2)]			**min.** for T_{SPEC}	**typ.** @ +25 °C	**max.** for T_{SPEC}	
Minimum isolation	α_{min}					
	1574... 1577	MHz	30	64	—	dB
	2305... 2315	MHz	55	59	—	dB
	2350... 2360	MHz	55	64	—	dB
	4610... 4620	MHz	30	52	—	dB
	6915... 6945	MHz	—	52	—	dB

1) See Sec. Matching circuit (p. 6).
2) Specified min./max. Values are valid for a testing power of +10 dBm.

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7 Maximum ratings

Storage temperature	T_{STG} [1] = −40 °C ... +90 °C	
DC voltage	$\lvert V_{DC}\rvert$ [2] = 0 V (max.)	
ESD voltage		
	V_{ESD} [3] = 50 V (max.)	Machine model.
	V_{ESD} [4] = 150 V (max.)	Human body model.
	V_{ESD} [5] = 400 V (max.)	Charged device model.
Input power @ TX port: 2305 ... 2315 MHz	P_{IN} = 30 dBm (max.)	Continuous wave for 5000 h @ 50 °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.
3) According to JESD22-A115B (MM – Machine Model), 10 negative & 10 positive pulses.
4) According to JESD22-A114F (HBM – Human Body Model), 1 negative & 1 positive pulse.
5) According to JESD22-C101C (CDM – Field Induced Charged Device Model), 3 negative & 3 positive pulses.

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8 Transmission coefficients

8.1 TX – ANT

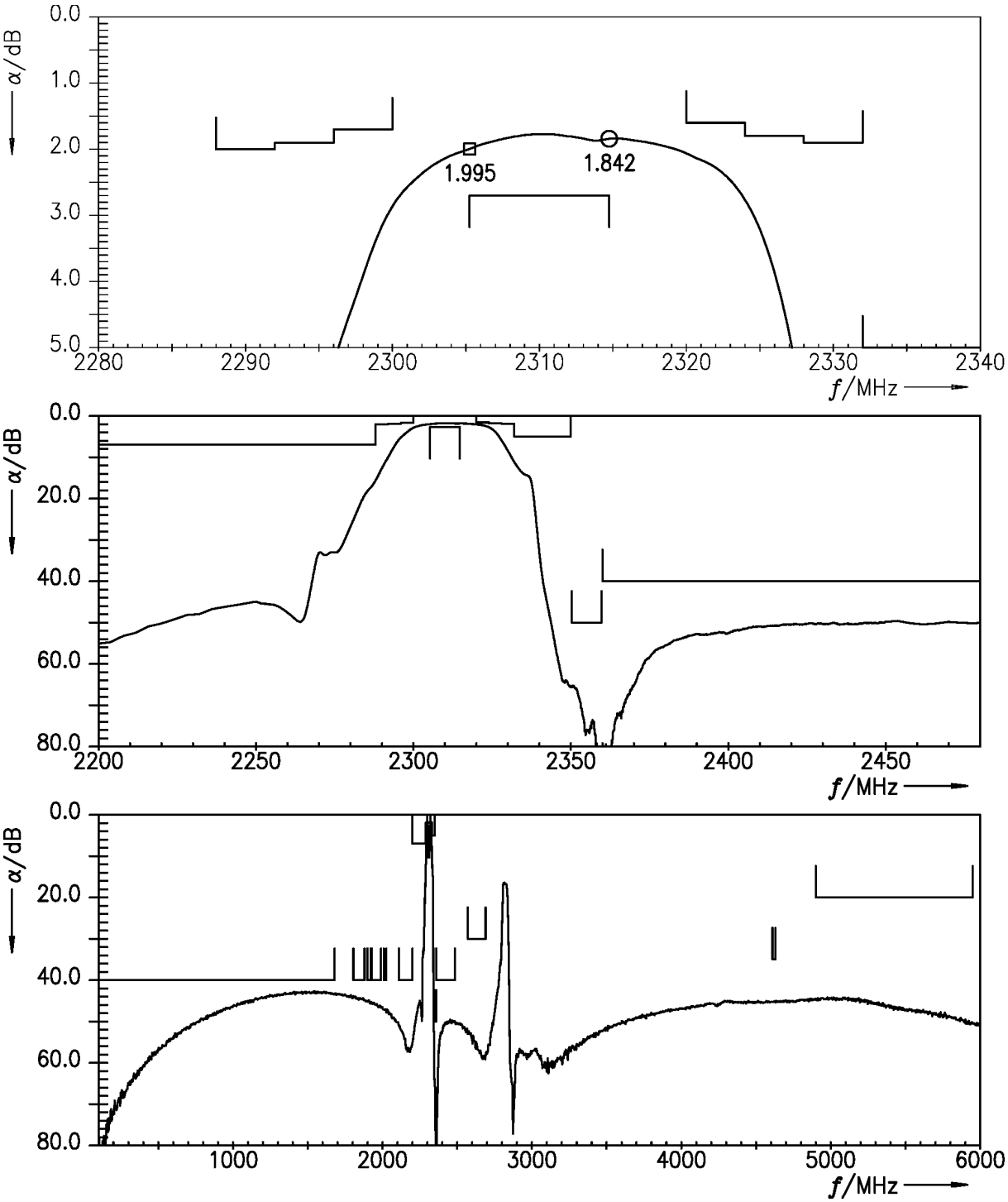

Figure 4: Attenuation TX – ANT.

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8.2 ANT – RX

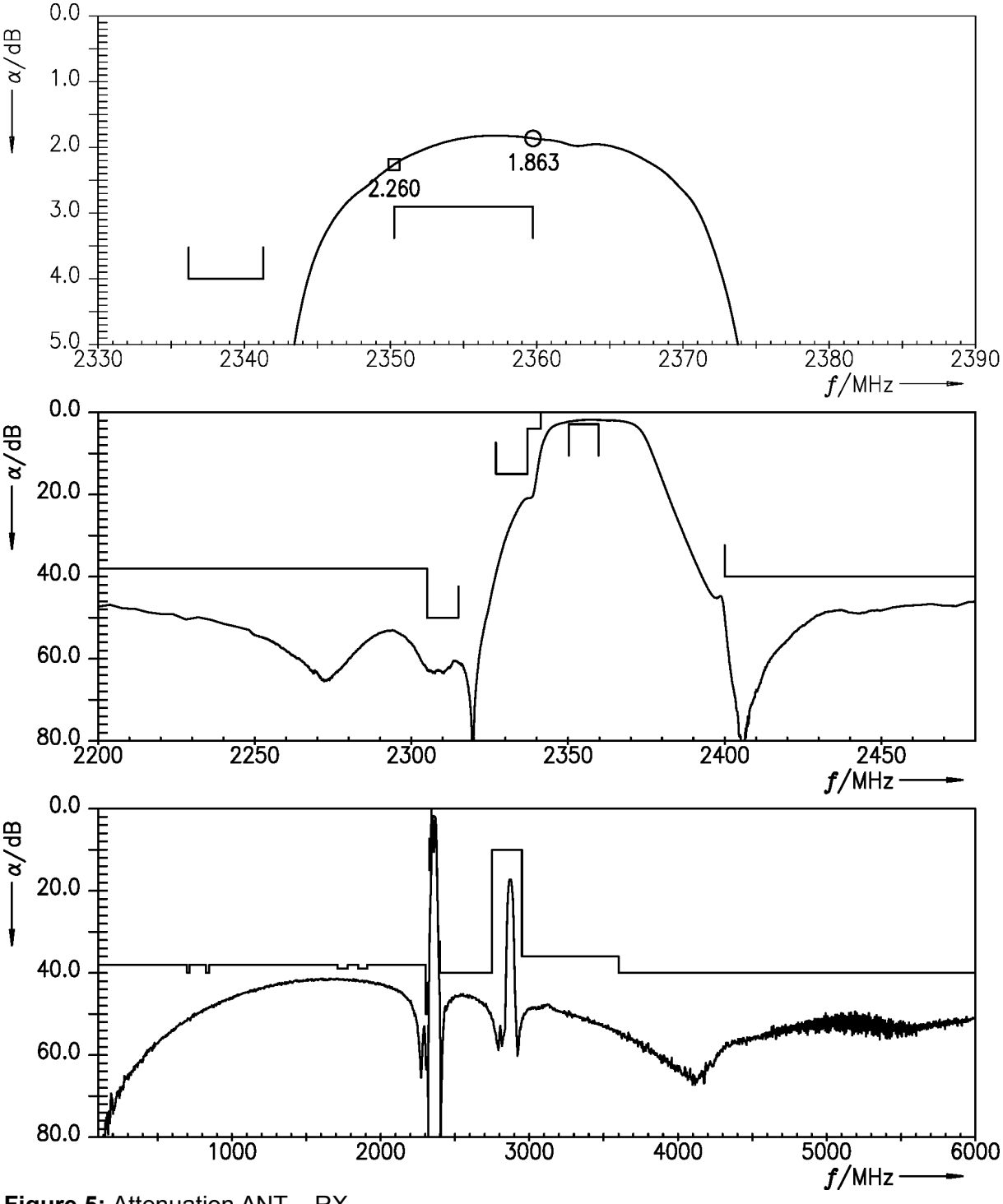

Figure 5: Attenuation ANT – RX.

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8.3 TX – RX

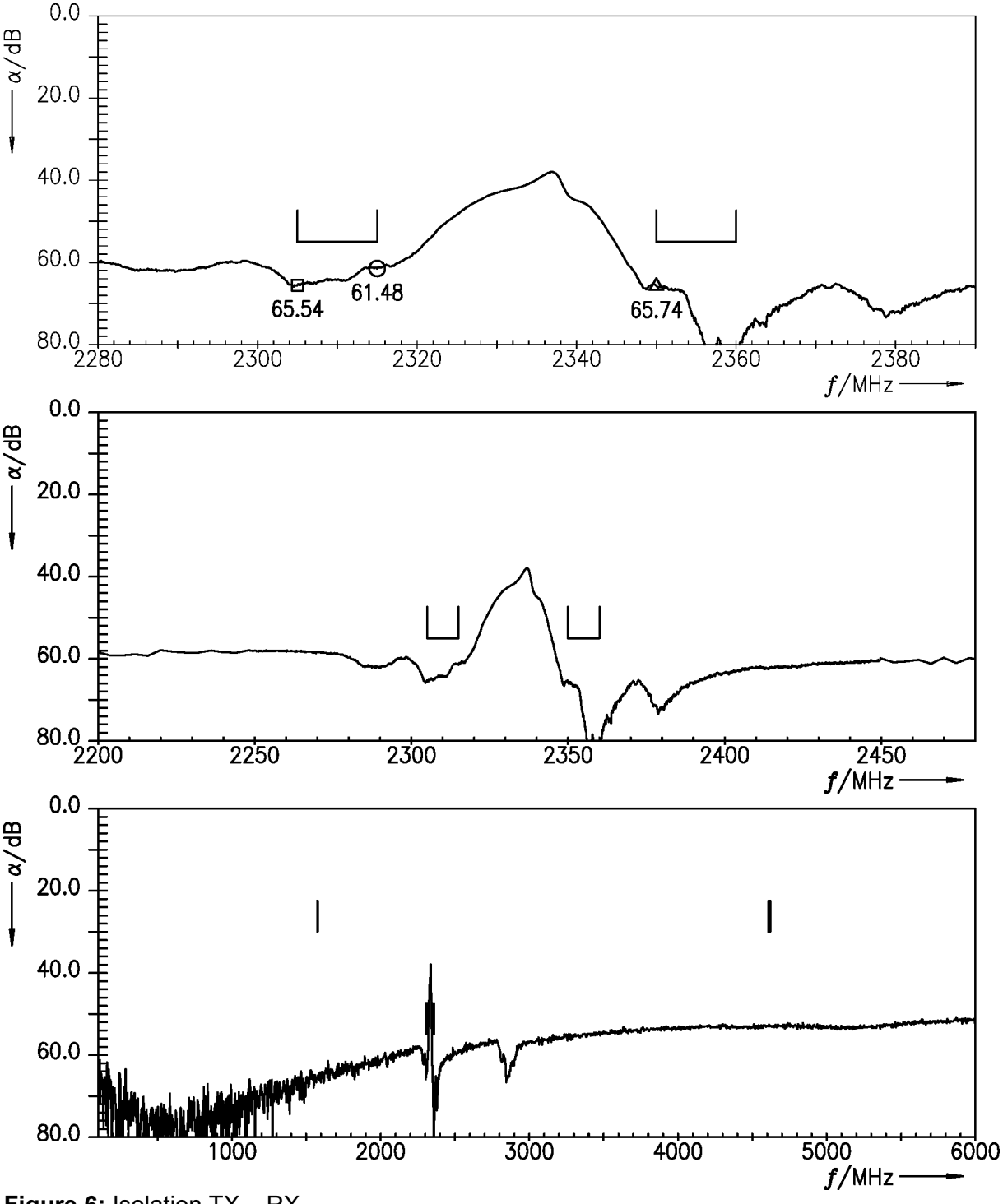

Figure 6: Isolation TX – RX.

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9 Reflection coefficients

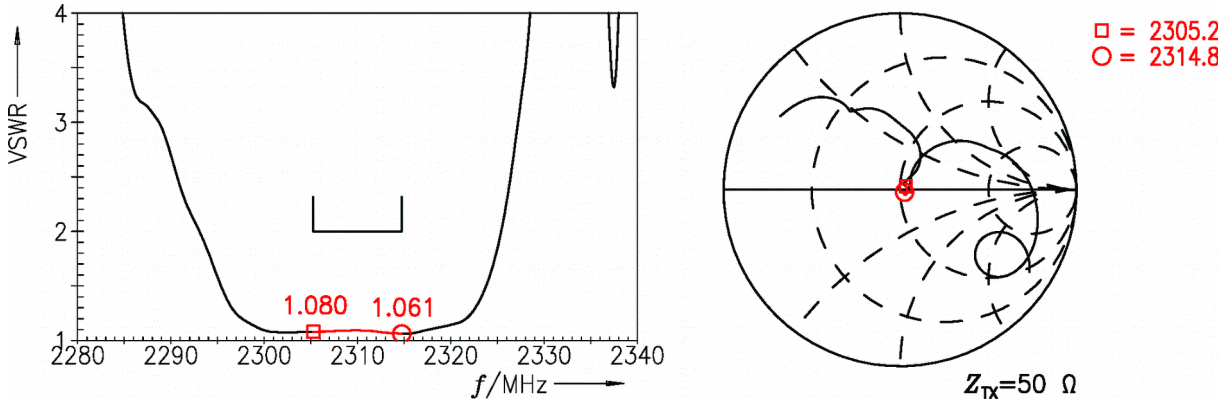

Figure 7: Reflection coefficient at TX port.

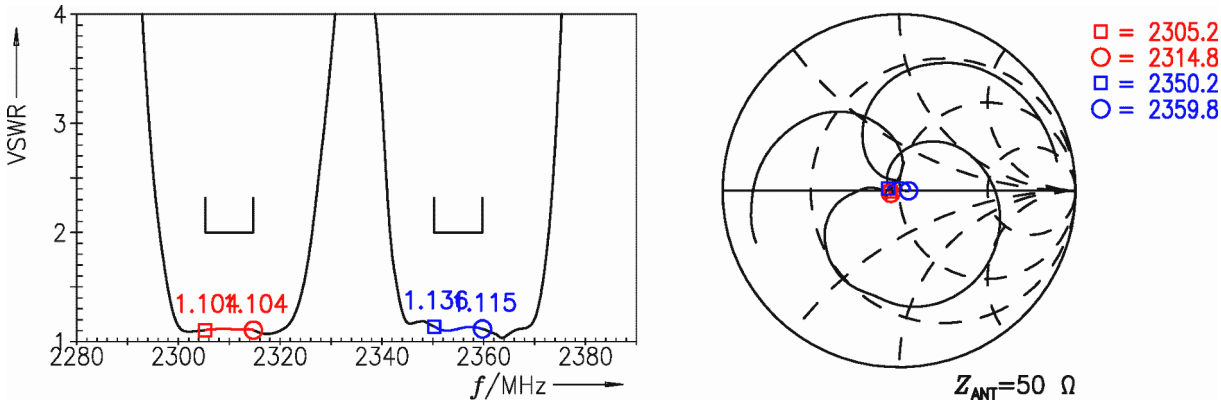

Figure 8: Reflection coefficient at ANT port.

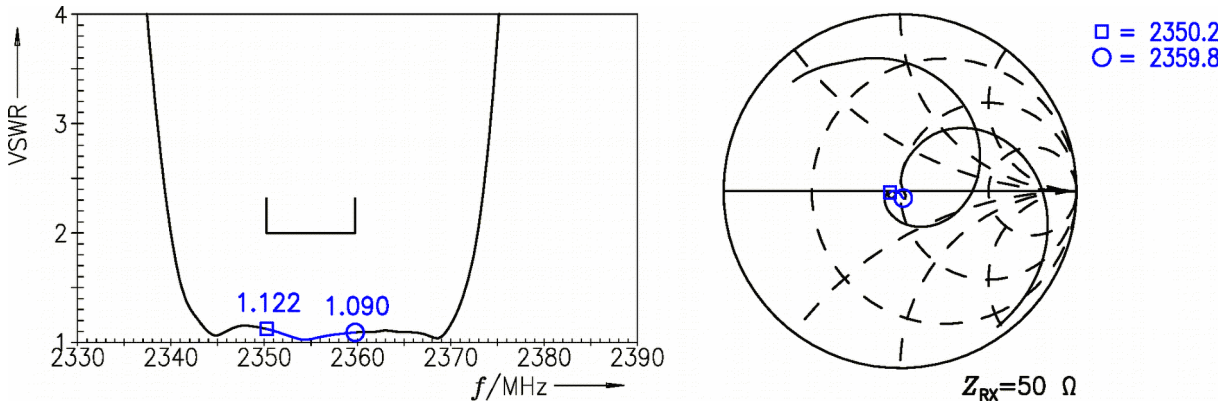

Figure 9: Reflection coefficient at RX port.

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10 Packing material

10.1 Tape

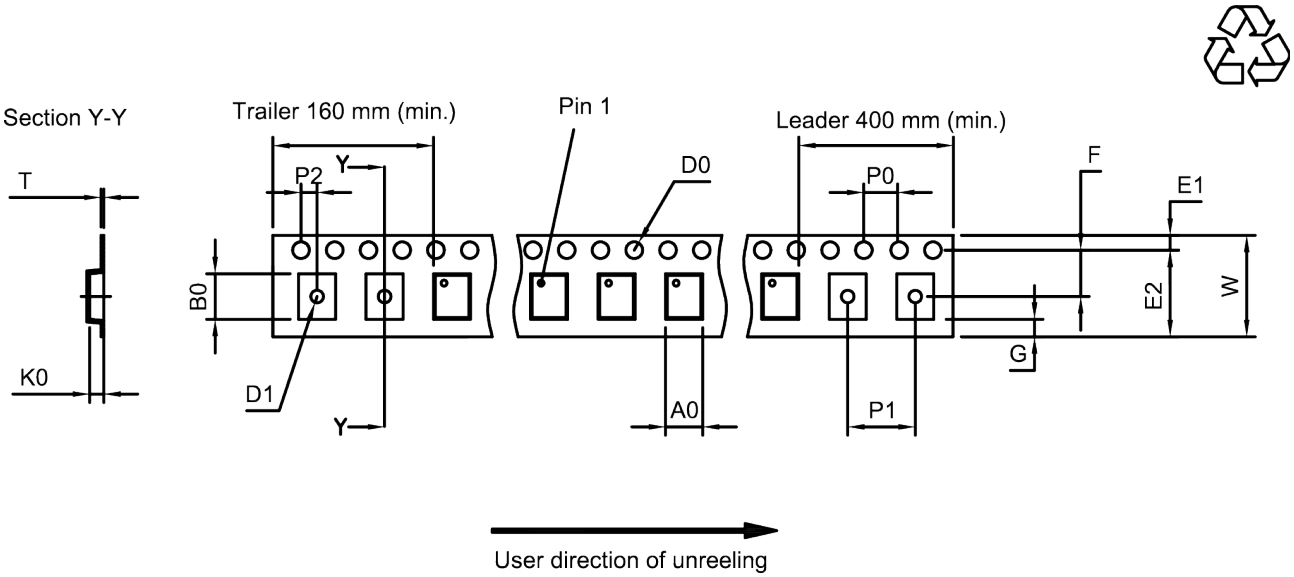

Figure 10: Drawing of tape (first-angle projection) with tape dimensions according to Table 1.

A_0	1.62±0.05 mm
B_0	2.04±0.05 mm
D_0	1.5+0.1/−0 mm
D_1	0.8±0.05 mm
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	0.62±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±0.05 mm
W	8.0±0.1 mm

Table 1: Tape dimensions.

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10.2 Reel with diameter of 180 mm

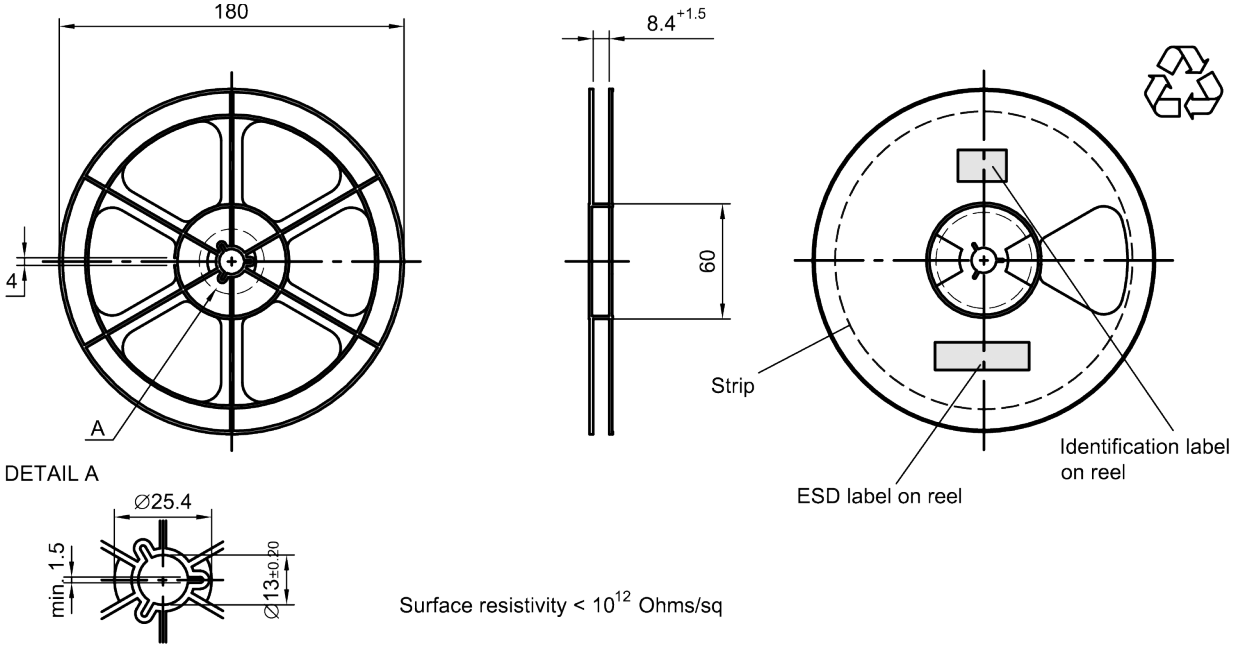

Figure 11: Drawing of reel (first-angle projection) with diameter of 180 mm.

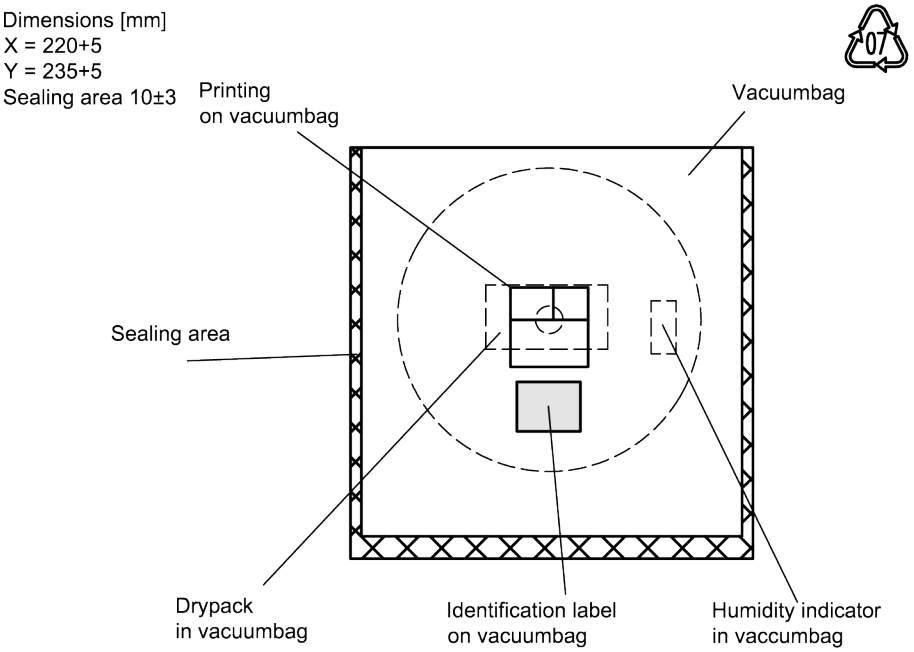

Figure 12: Drawing of moisture barrier bag (MBB) for reel with diameter of 180 mm.

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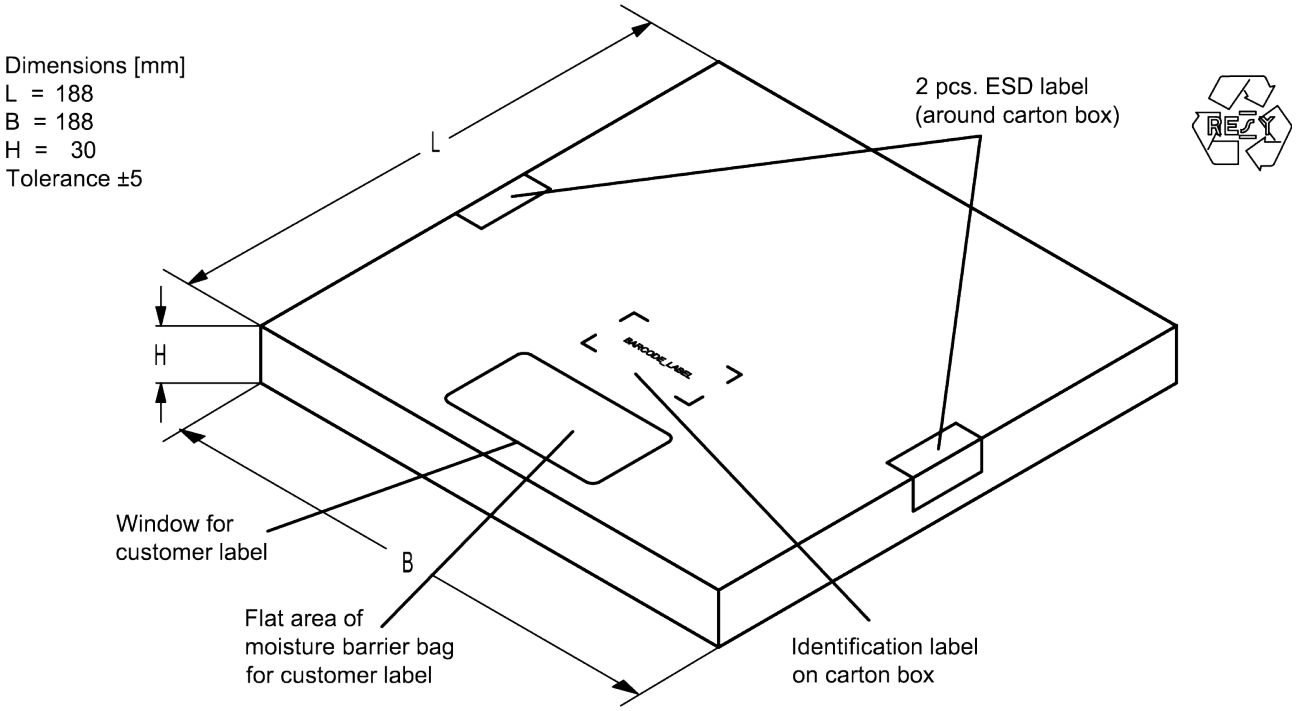

Figure 13: Drawing of folding box for reel with diameter of 180 mm.

10.3 Reel with diameter of 330 mm

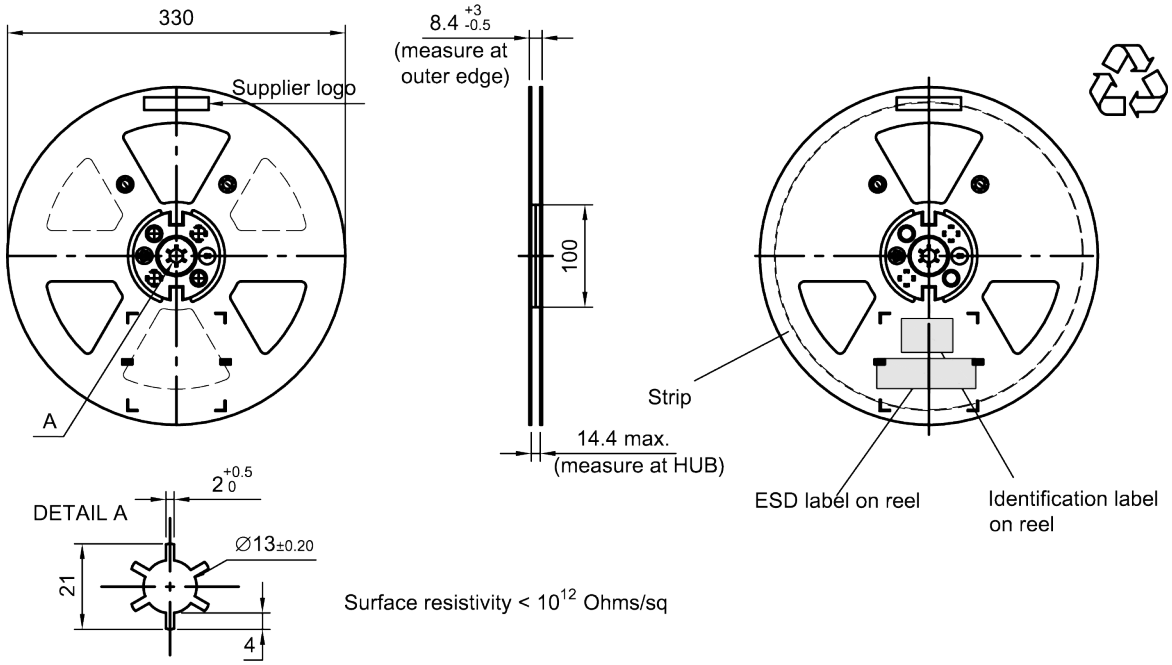

Figure 14: Drawing of reel (first-angle projection) with diameter of 330 mm.

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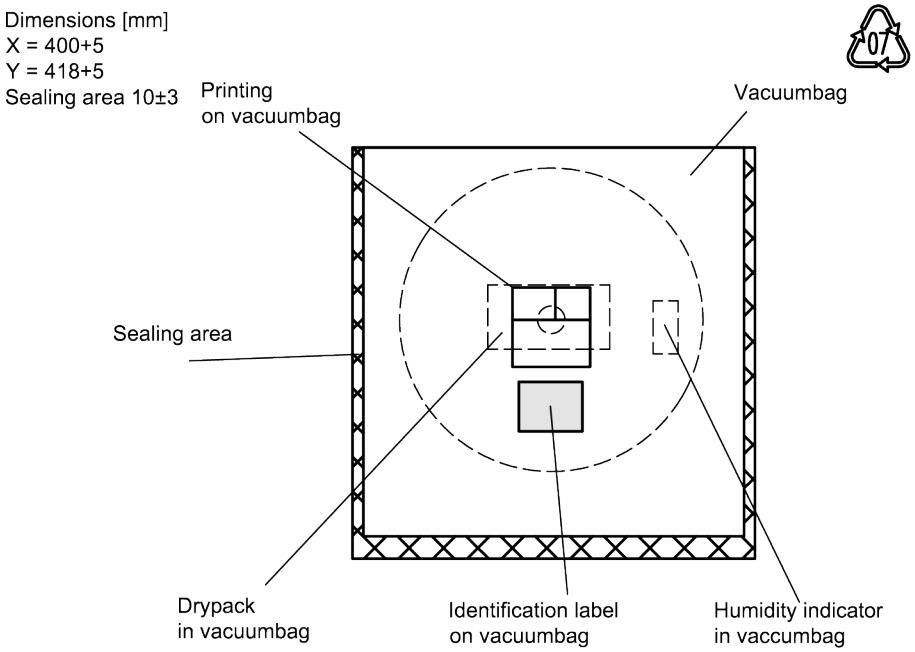

Figure 15: Drawing of moisture barrier bag (MBB) for reel with diameter of 330 mm.

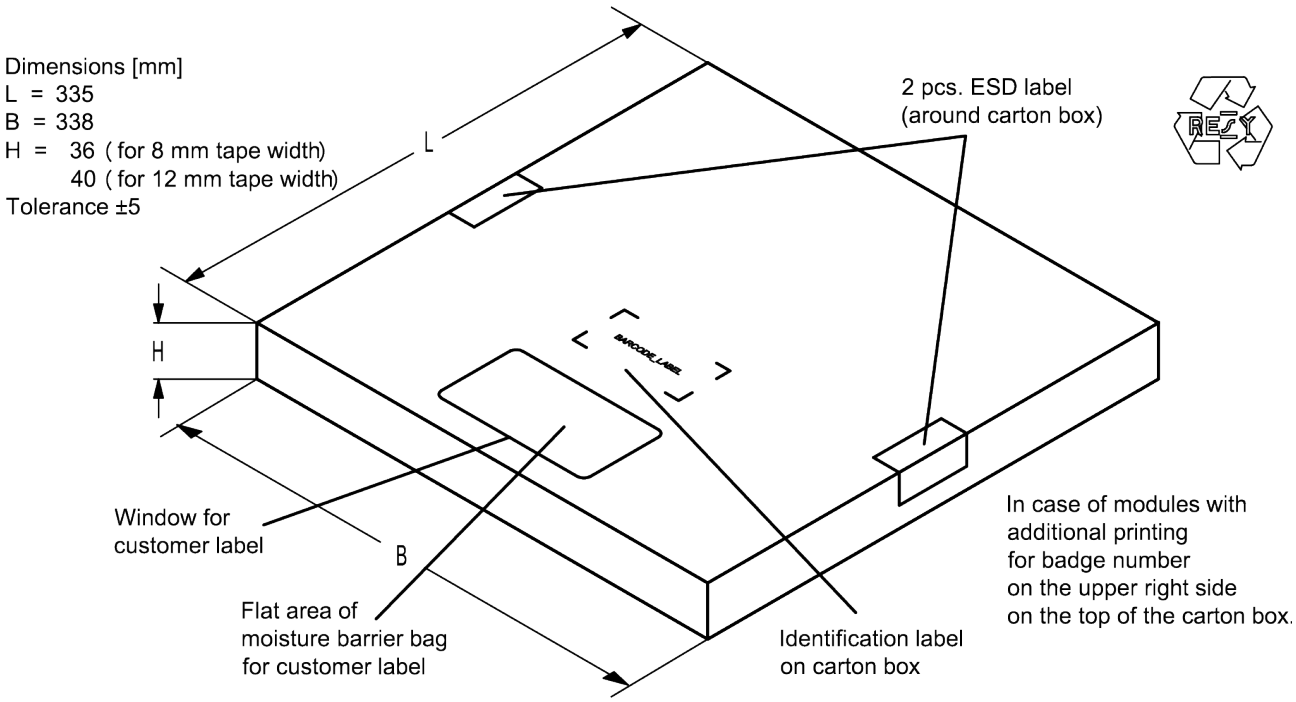

Figure 16: Drawing of folding box for reel with diameter of 330 mm.

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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.
  16J **=>** **1234**
  1 x 32^2 + **6** x 32^1 + **18 (=J)** x 32^0 **=** **1234**
  The BASE32 code for product type B8049 is 7VH.

- 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.

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12 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).

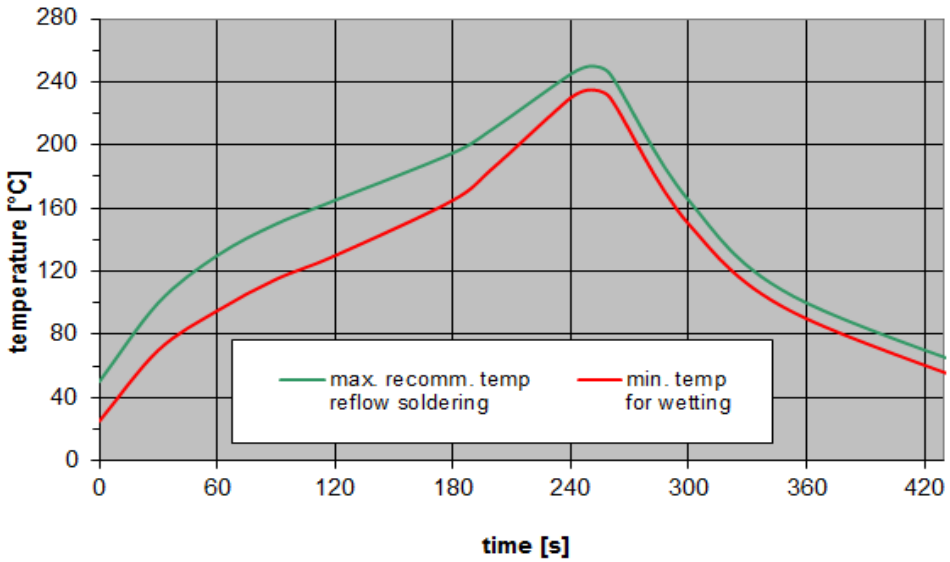

Figure 17: Recommended reflow profile for convection and infrared soldering – lead-free solder.

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13 Annotations

13.1 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.

13.2 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.

13.3 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.

13.4 Ordering codes and packing units

Ordering code	Packing unit
B39242B8049P810	15000 pcs
B39242B8049P810S 5	5000 pcs

Table 4: Ordering codes and packing units.

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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.

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).

Dimensions do not include burrs.

Projection method

Unless otherwise specified first-angle projection is applied.

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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.
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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