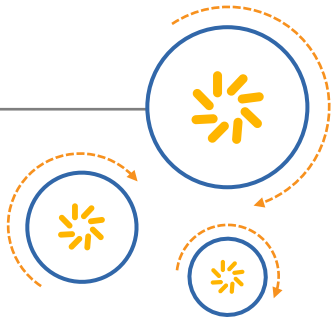
RF360 Europe GmbH

A Qualcomm – TDK Joint Venture



SAW Components

SAW Duplexer

LTE Band 2

Series/type:	B8618
Ordering code:	B39202B8618P810
Date:	October 13, 2015
Version:	2.1

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Table of contents

1 Application

- Low-loss SAW duplexer for mobile telephone LTE Band 2 (PCS) systems.
- Low insertion attenuation.
- Low amplitude ripple.
- Usable pass band 60 MHz.
- Single ended to balanced transformation in Antenna – Rx path.
- Impedance transformation 50Ω to 100Ω in Antenna – Rx path.

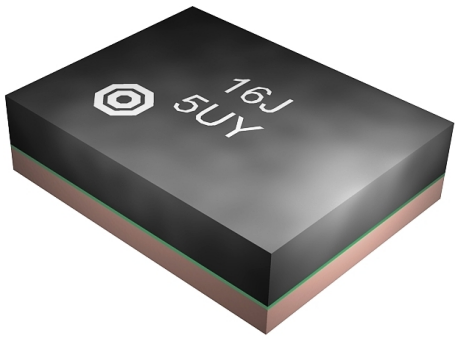

Figure 1: Picture of component with example of marking.

2 Features

- Package size 1.8 mm × 1.4 mm.
- Package height (max.) 0.475 mm.
- Approximate weight 0.0035 g.
- RoHS compatible.
- Package for Surface Mount Technology (SMT).
- Ni, gold-plated terminals.
- Electrostatic Sensitive Device (ESD).
- Moisture Sensitivity Level 3 (MSL3).

3 Package

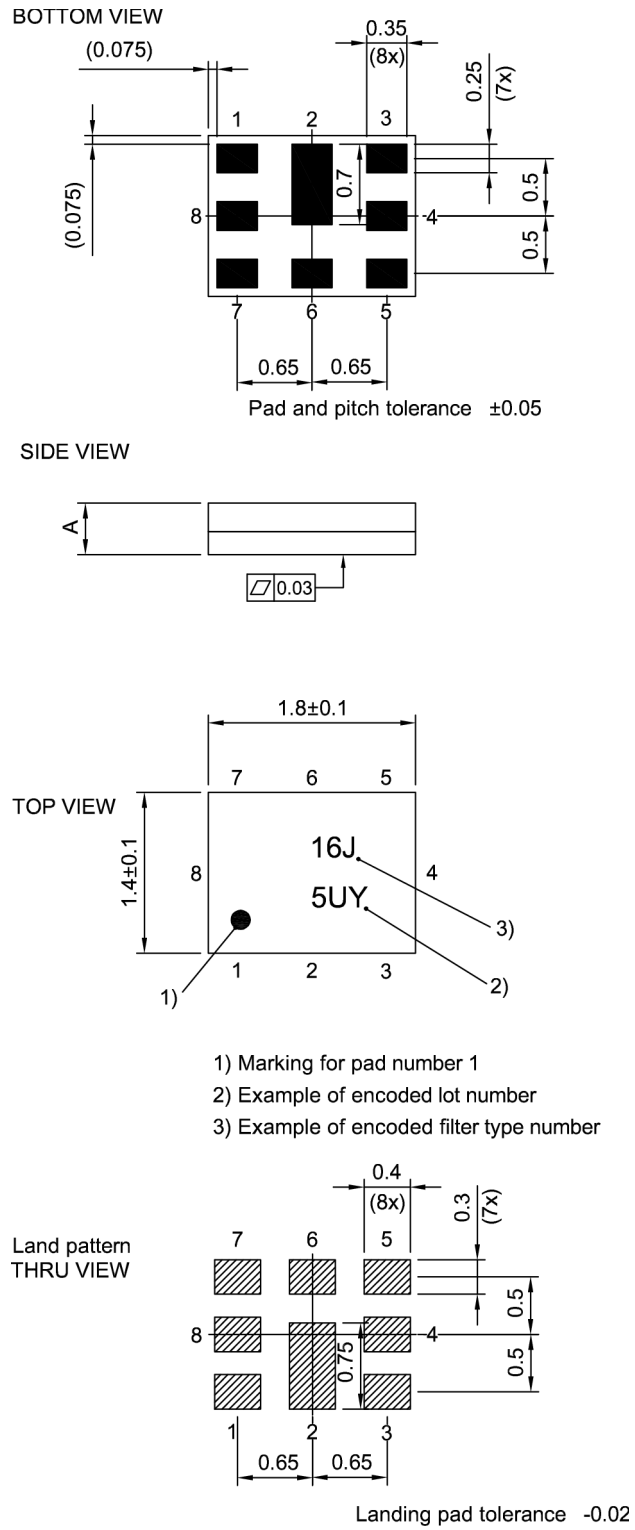

Figure 2: Drawing of package with package height A = 0.475 mm (max.). See Simplified drawings (p. 21).

4 Pin configuration

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

5 Matching circuit

■ $L_{p1,8}$ = 9.5 nH

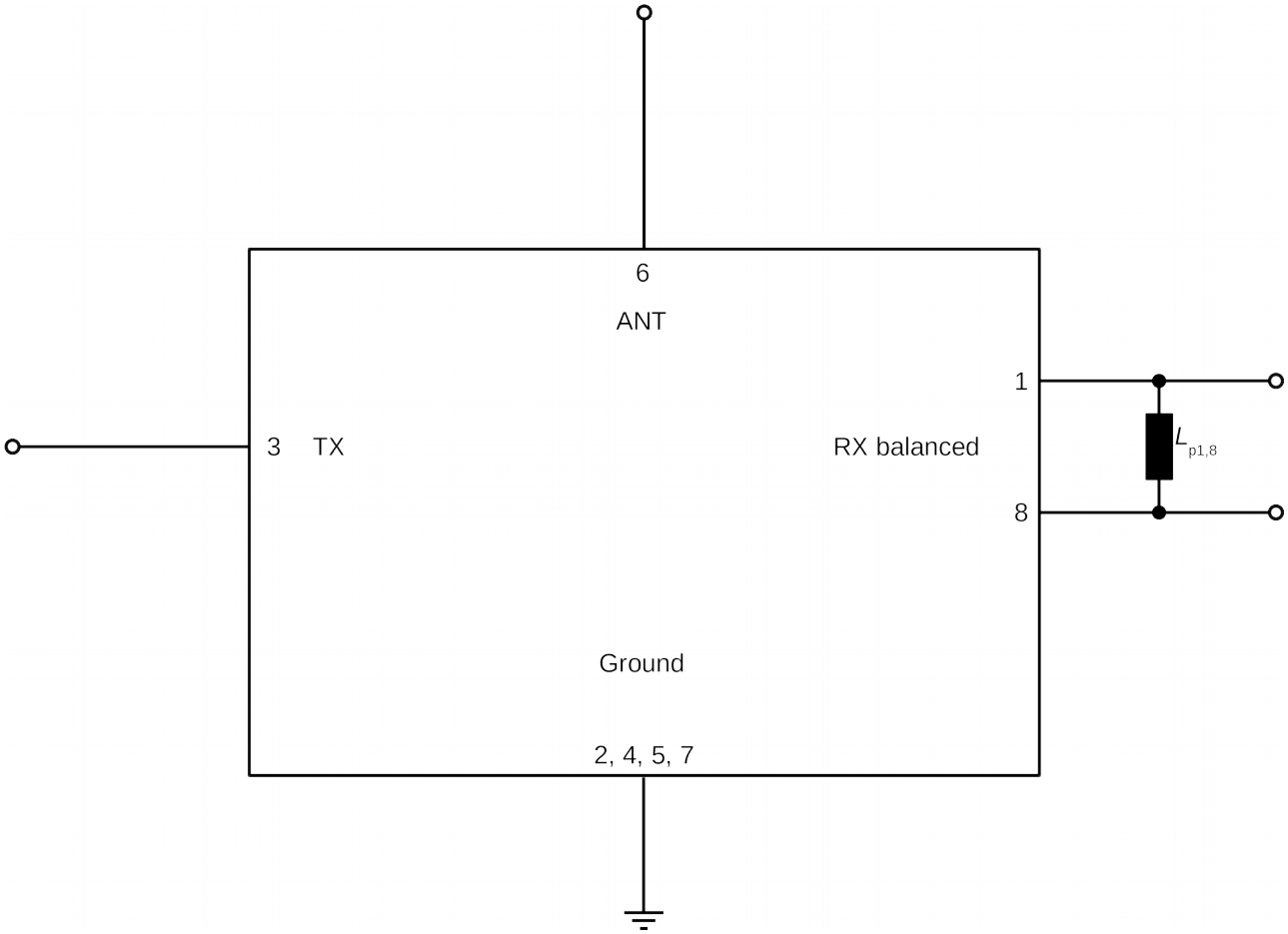

Figure 3: Schematic of matching circuit.

6 Characteristics

6.1 TX – ANT

Temperature range for specification	T	= −30 °C to +85 °C
TX terminating impedance	Z_{TX}	= 50 Ω
ANT terminating impedance	Z_{ANT}	= 50 Ω
RX terminating impedance	Z_{RX}	= 100 Ω with par. 9.5 nH (differential mode)
RX terminating impedance	Z_{RX}	= 25 Ω (common mode)

Characteristics TX – ANT[1]				**min.**	**typ.** @+25 °C	**max.**	
Center frequency			f_C	—	1880	—	MHz
Maximum insertion attenuation			α_{max}				
	1850.24 ... 1909.76	MHz		—	1.9	2.5	dB
Amplitude ripple (p-p)			$\Delta\alpha$[2]				
	1850.24 ... 1909.76	MHz		—	0.3	1.5	dB
Maximum VSWR			$VSWR_{max}$				
@ TX port	1850.24 ... 1909.76	MHz		—	1.4	2.0	
@ ANT port	1850.24 ... 1909.76	MHz		—	1.4	2.0	
Maximum error vector magnitude			EVM_{max}[3]				
	1852.4 ... 1907.6	MHz		—	0.5	3.0	%
Minimum attenuation			α_{min}				
	50 ... 787	MHz		30	42	—	dB
	728 ... 764	MHz		40	43	—	dB
	869 ... 894	MHz		40	43	—	dB
	1226 ... 1250	MHz		43	50	—	dB
	1559 ... 1606	MHz		43	54	—	dB
	1605.9 ... 1680	MHz		30	54	—	dB
	1930.24 ... 1989.76	MHz		44	57	—	dB
	2010 ... 2025	MHz		20	52	—	dB
	2110 ... 2155	MHz		44	49	—	dB
	2400 ... 2500	MHz		25	35	—	dB
	3700 ... 3820	MHz		26	29	—	dB
	4900 ... 5950	MHz		21	29	—	dB
	5550 ... 5730	MHz		23	27	—	dB

1) Specified min/max values are valid for a testing power of +10 dBm.
2) Over any channel with band width of 5 MHz.
3) Error Vector Magnitude (EVM) based on definition given in 3GPP TS 25.141.

6.2 ANT – RX

Temperature range for specification	T	= −30 °C to +85 °C
TX terminating impedance	Z_{TX}	= 50 Ω
ANT terminating impedance	Z_{ANT}	= 50 Ω
RX terminating impedance	Z_{RX}	= 100 Ω with par. 9.5 nH (differential mode)
RX terminating impedance	Z_{RX}	= 25 Ω (common mode)

Characteristics ANT – RX[1)]				**min.**	**typ.** @+25 °C	**max.**	
Center frequency			f_C	—	1960	—	MHz
Maximum insertion attenuation			α_{max}				
	1930.24 ... 1989.76	MHz		—	2.7	3.5	dB
Maximum VSWR			$VSWR_{max}$				
@ ANT port	1930.24 ... 1989.76	MHz		—	1.6	2.0	
@ RX port	1930.24 ... 1989.76	MHz		—	1.6	2.0	
Minimum attenuation			α_{min}				
	50 ... 1850	MHz		45	49	—	dB
	80	MHz		50	>60	—	dB
	1850.24 ... 1909.76	MHz		45	52	—	dB
	2050 ... 2075	MHz		25	39	—	dB
	2075 ... 2350	MHz		30	37	—	dB
	2350 ... 2550	MHz		20	31	—	dB
	2550 ... 6000	MHz		40	51	—	dB
	5610 ... 5845	MHz		48	52	—	dB

1) Specified min/max values are valid for a testing power of +10 dBm.

6.3 TX – RX

Temperature range for specification	T	= −30 °C to +85 °C
TX terminating impedance	Z_{TX}	= 50 Ω
ANT terminating impedance	Z_{ANT}	= 50 Ω
RX terminating impedance	Z_{RX}	= 100 Ω with par. 9.5 nH (differential mode)
RX terminating impedance	Z_{RX}	= 25 Ω (common mode)

Characteristics TX – RX[1)]			min.	typ. @+25 °C	max.	
Minimum differential-mode isolation		α_{min}				
	1574 ... 1577	MHz	40	67	—	dB
	1850.24 ... 1909.76	MHz	54	57	—	dB
	1930.24 ... 1989.76	MHz	55	61	—	dB
	3700 ... 3820	MHz	20	58	—	dB
	5550 ... 5850	MHz	20	49	—	dB
Minimum common-mode isolation		α_{min}				
	1850.24 ... 1909.76	MHz	43	48	—	dB

1) Specified min/max values are valid for a testing power of +10 dBm.

7 Maximum ratings

Storage temperature	T_{STG}	= −40 °C to +90 °C	
DC voltage	V_{DC}	= 0 V (max.)[1]	
ESD voltage			
	V_{ESD} [2]	300 V (max.)	Human body model.
	V_{ESD} [3]	600 V (max.)	Charged device model.
Input power @ TX port: 1850.24 ... 1909.76 MHz elsewhere	P_{IN}	= 29 dBm = 10 dBm	Continuous wave for 5000 h @ 50 °C.

1) DC resistance at RX output might be less than 100 MΩ at elevated temperatures. Hence, using blocking capacitors is recommended.
2) According to JESD22-A114F (HBM – Human Body Model), 1 negative & 1 positive pulse.
3) According to JESD22-C101C (CDM – Field Induced Charged Device Model), 3 negative & 3 positive pulses.

8 Transmission coefficients

8.1 TX – ANT

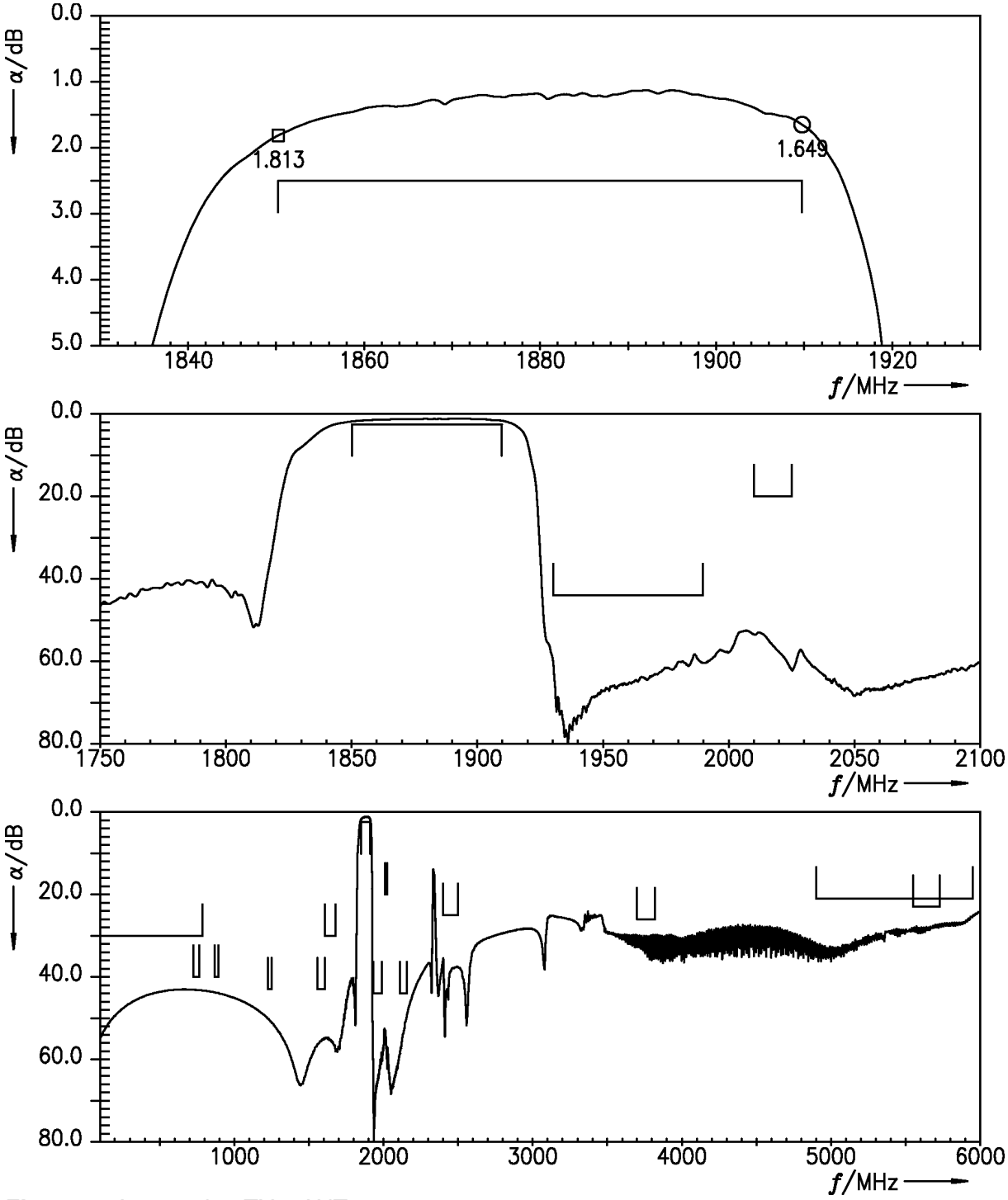

Figure 4: Attenuation TX – ANT.

8.2 ANT – RX

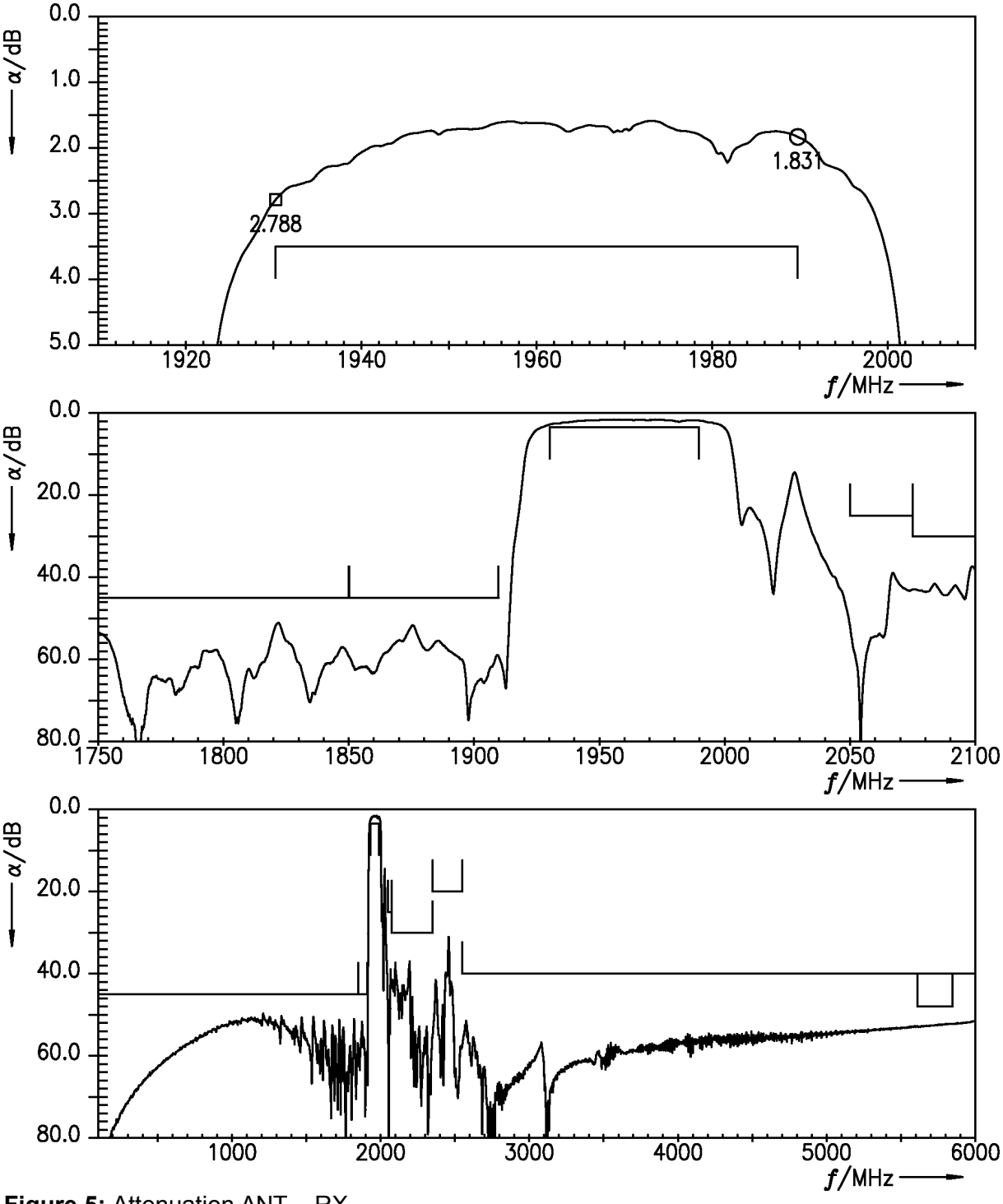

Figure 5: Attenuation ANT – RX.

8.3 TX – RX

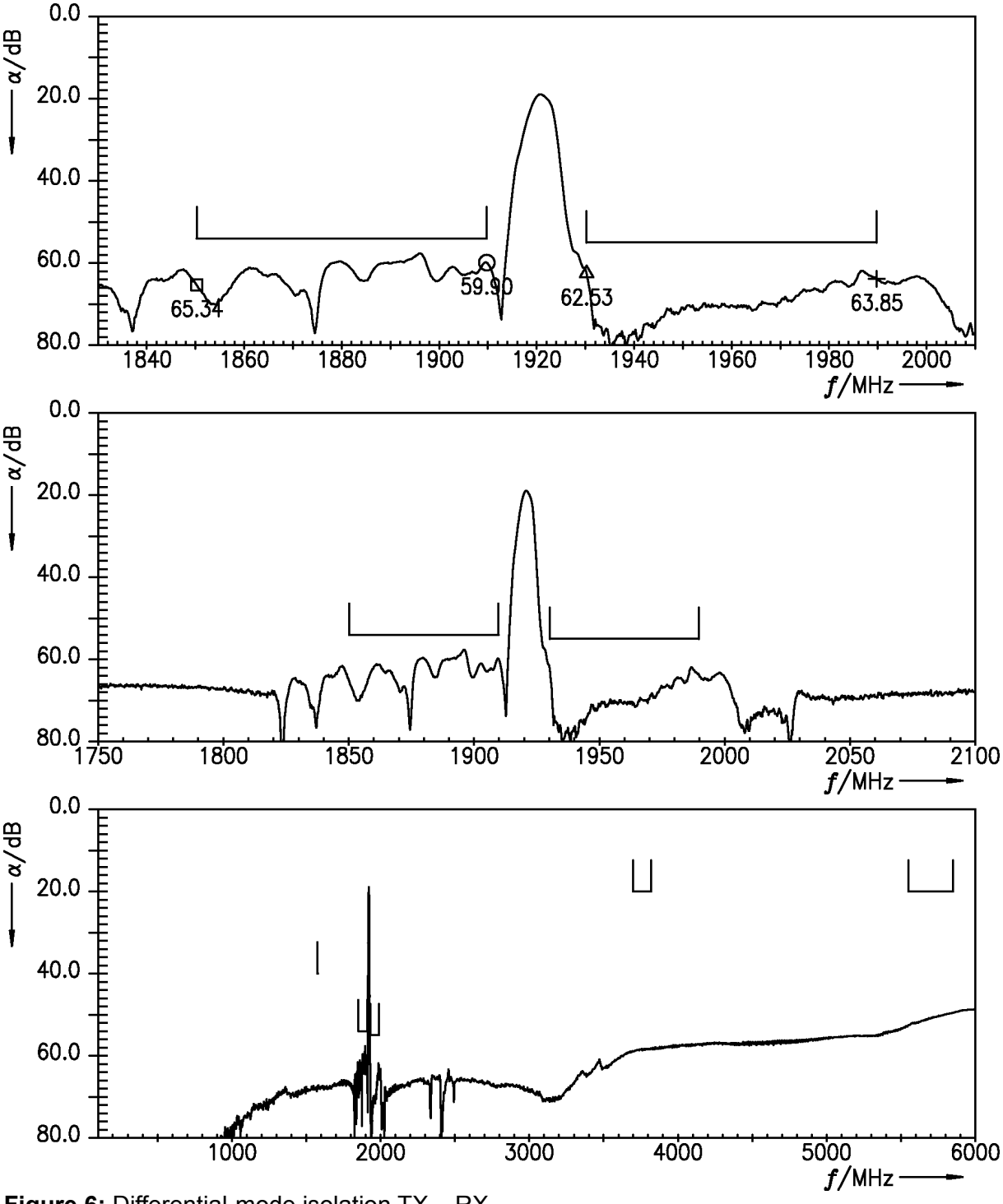

Figure 6: Differential-mode isolation TX – RX.

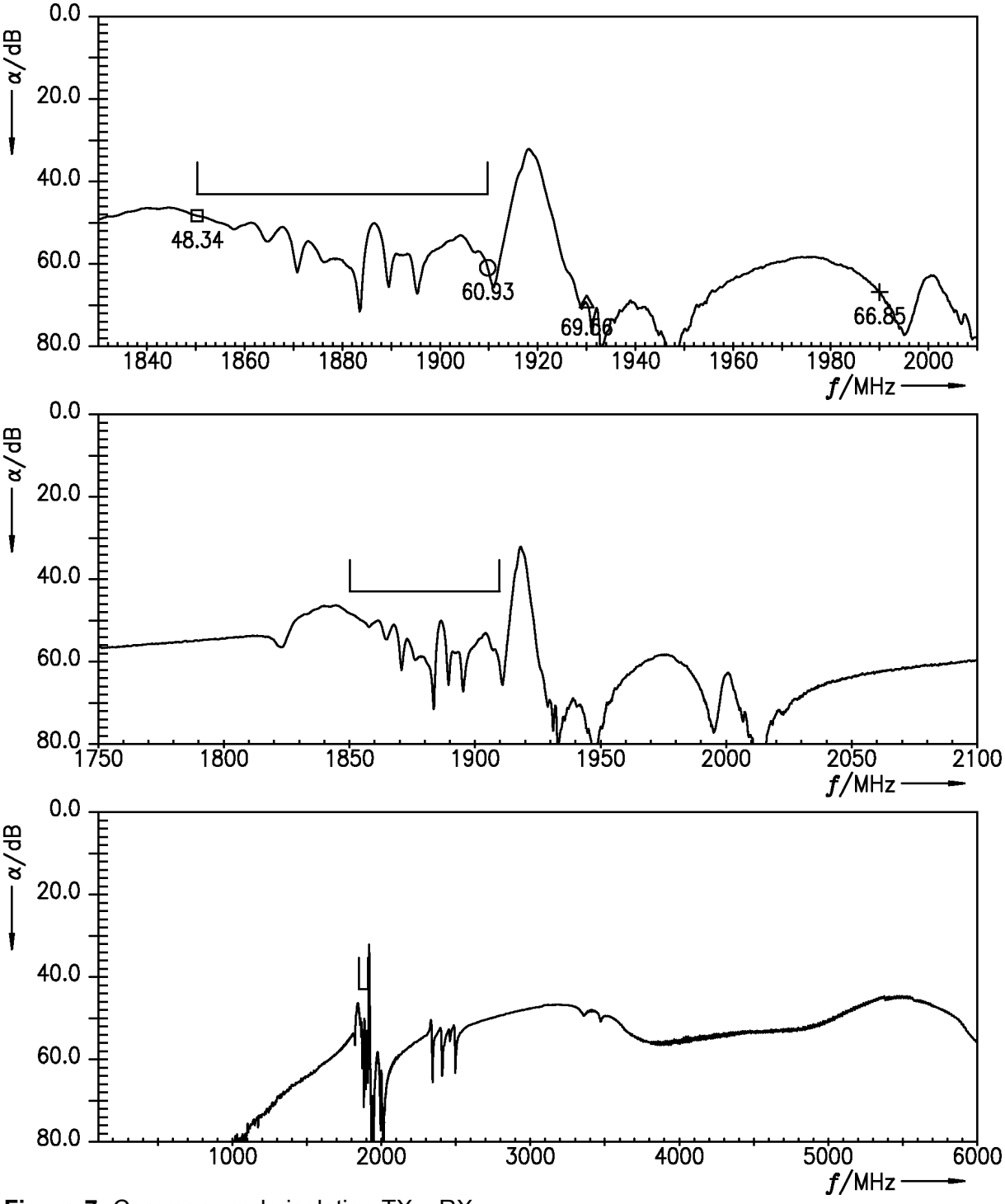

Figure 7: Common-mode isolation TX – RX.

9 Reflection coefficients

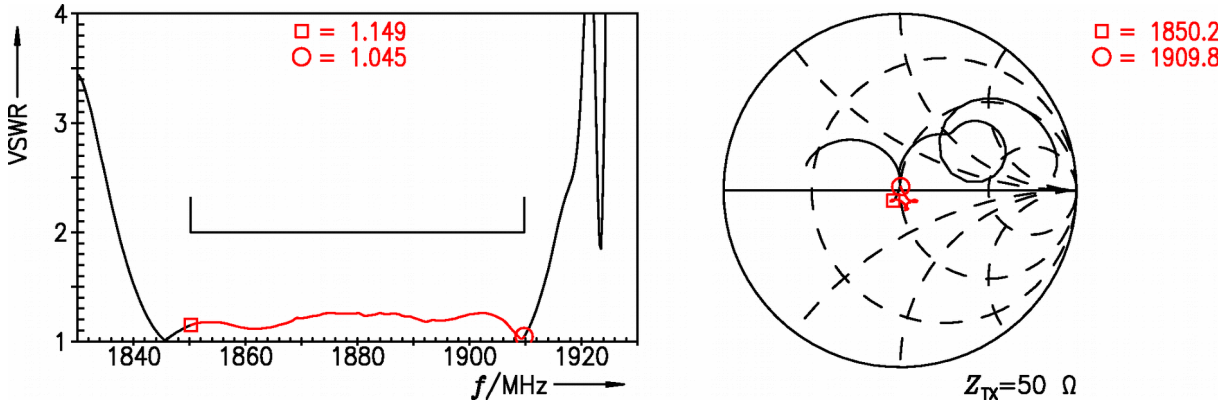

Figure 8: Reflection coefficient at TX port.

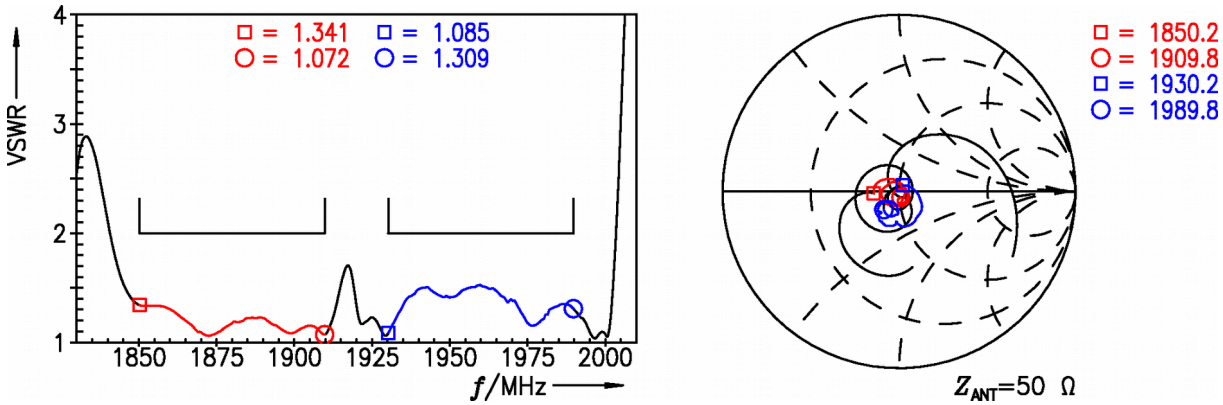

Figure 9: Reflection coefficient at ANT port (TX and RX frequencies).

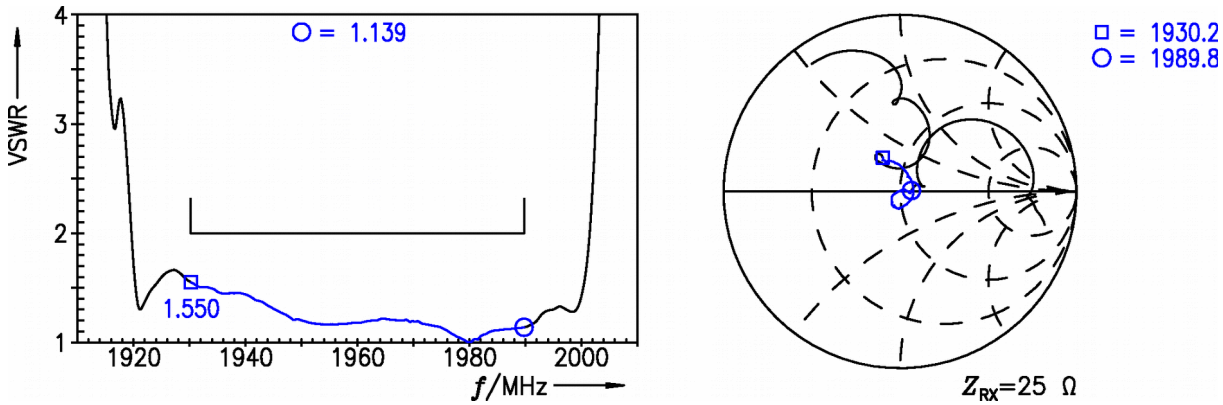

Figure 10: Reflection coefficient at RX port.

10 Packing material

10.1 Tape

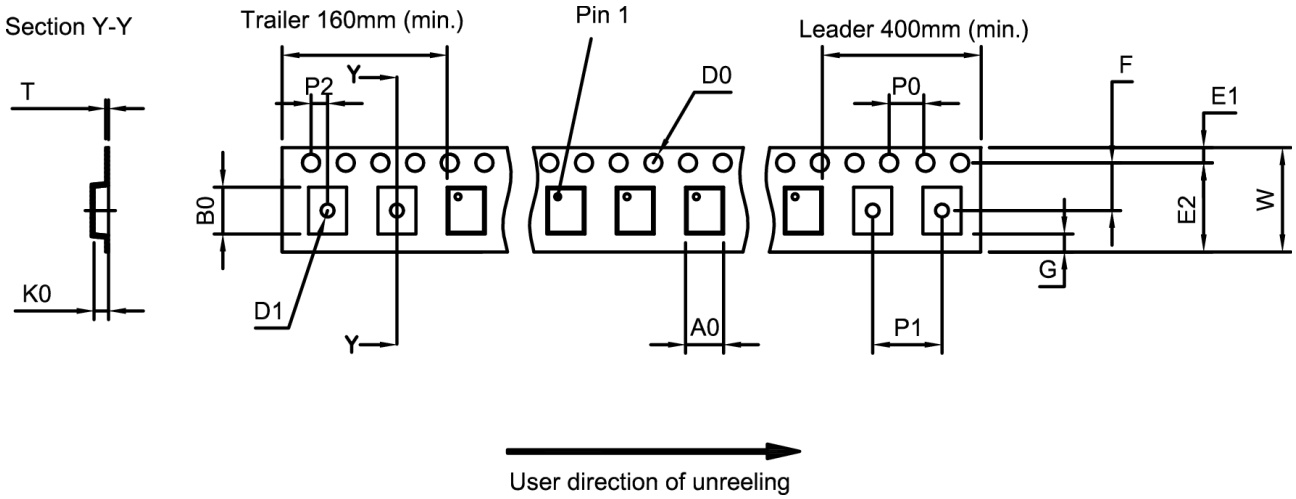

Figure 11: Drawing of tape (first-angle projection) with tape dimensions according to Table 1.

A_0	$1.62_{\pm 0.05}$ mm
B_0	$2.04_{\pm 0.05}$ mm
D_0	$1.5_{\pm 0.05}$ mm
D_1	$0.8_{\pm 0.05}$ mm
E_1	$1.75_{\pm 0.1}$ mm

E_2	6.25 mm (min.)
F	$3.5_{\pm 0.05}$ mm
G	0.75 mm (min.)
K_0	$0.62_{\pm 0.05}$ mm
P_0	$4.0_{\pm 0.1}$ mm

P_1	$4.0_{\pm 0.1}$ mm
P_2	$2.0_{\pm 0.05}$ mm
T	$0.25_{\pm 0.02}$ mm
W	$8.0_{\pm 0.1}$ mm

Table 1: Tape dimensions.

10.2 Reel with diameter of 180 mm

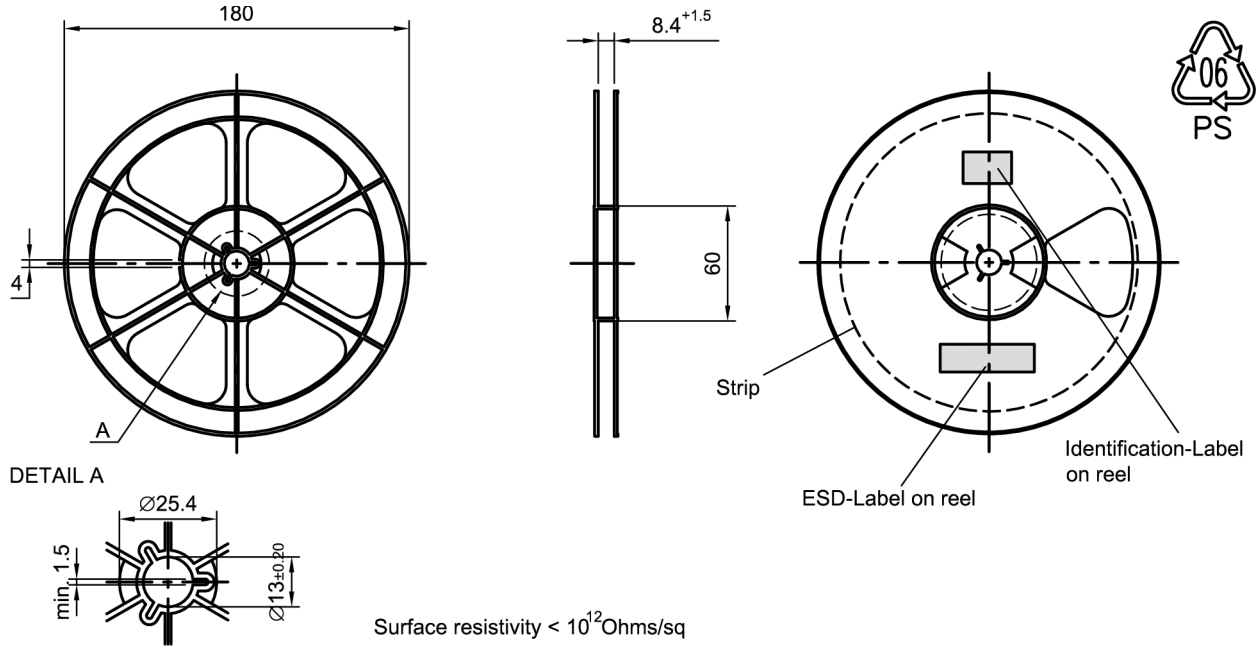

Figure 12: Drawing of reel (first-angle projection) with diameter of 180 mm.

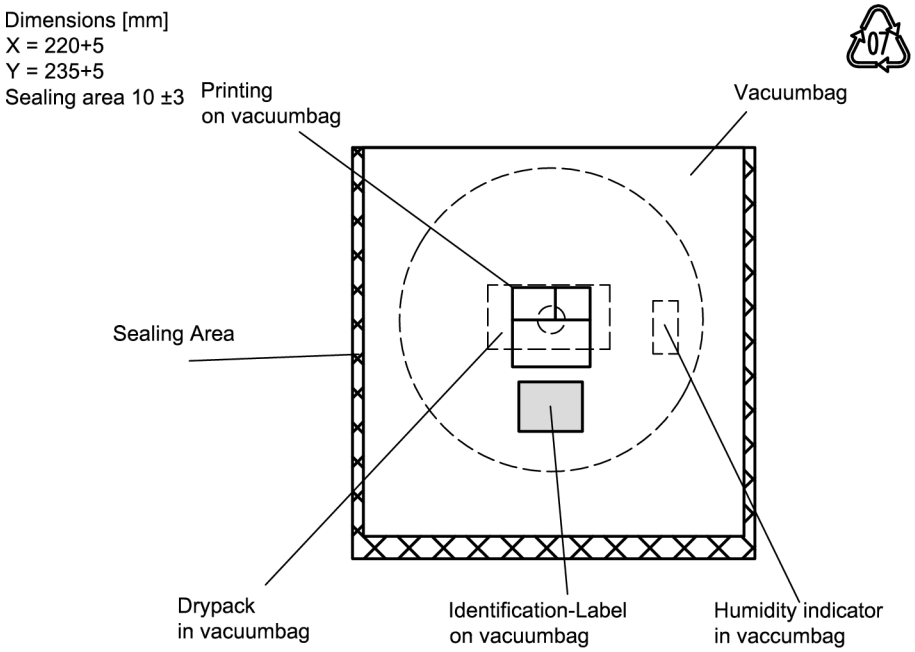

Figure 13: Drawing of moisture barrier bag (MBB) for reel with diameter of 180 mm.

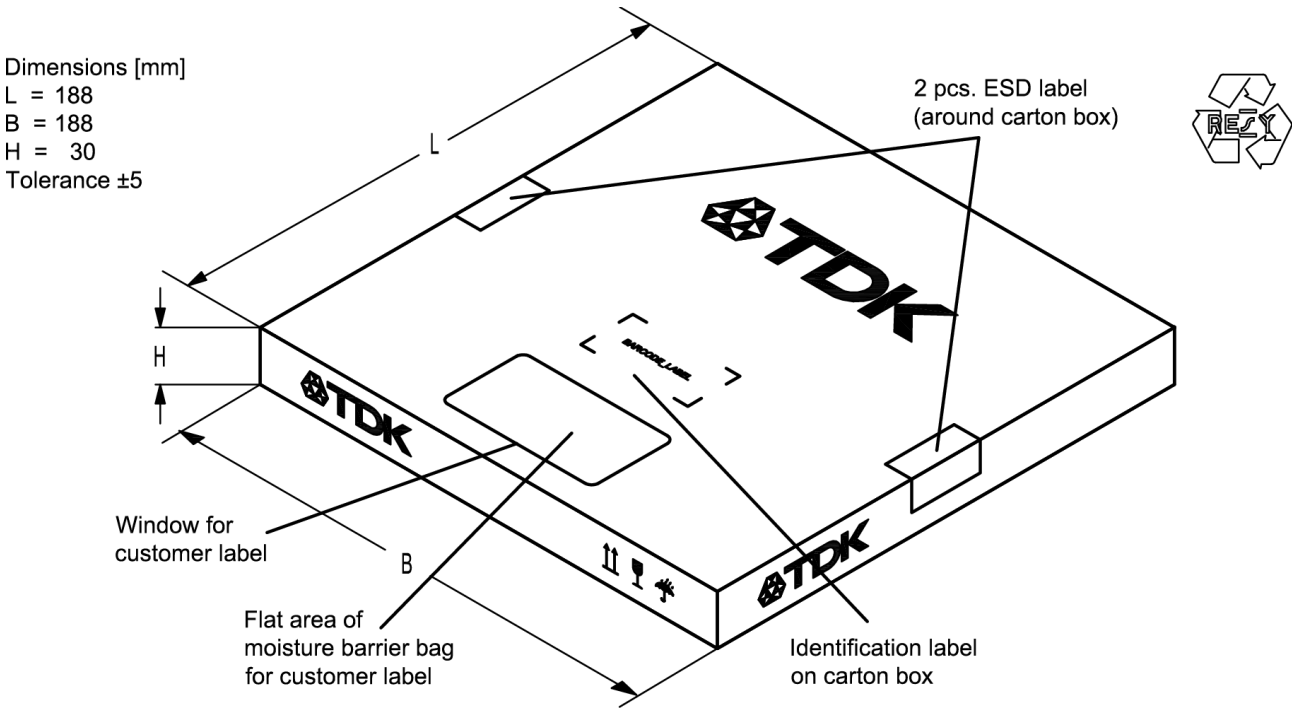

Figure 14: Drawing of folding box for reel with diameter of 180 mm.

10.3 Reel with diameter of 330 mm

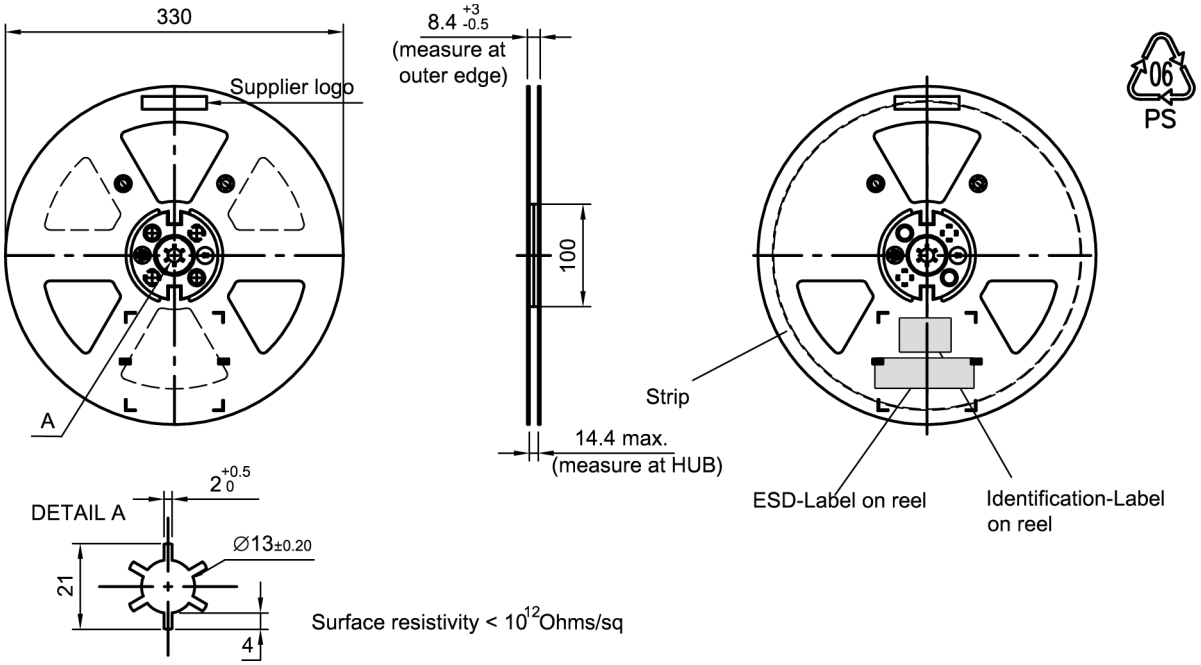

Figure 15: Drawing of reel (first-angle projection) with diameter of 330 mm.

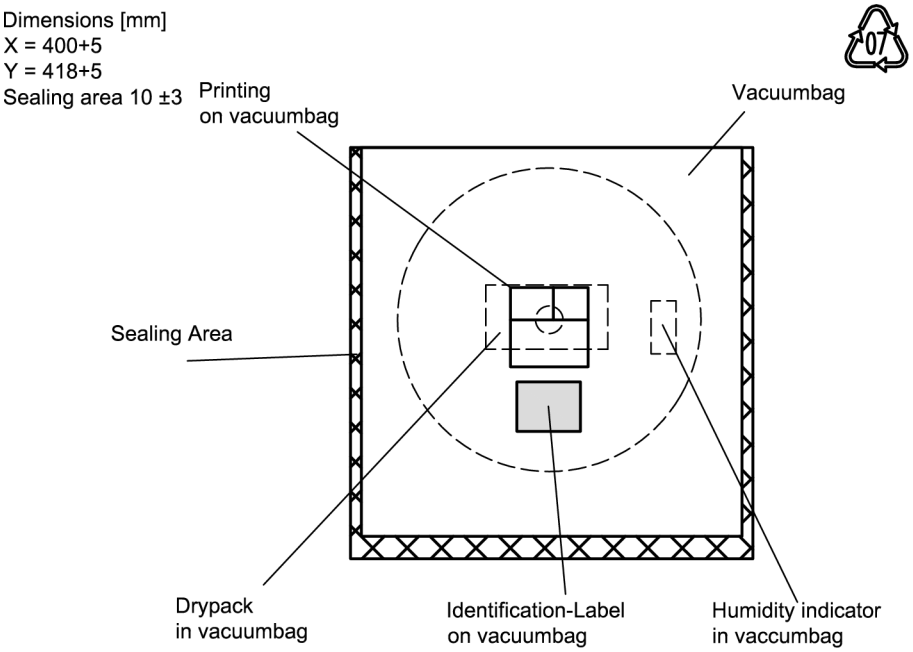

Figure 16: Drawing of moisture barrier bag (MBB) for reel with diameter of 330 mm.

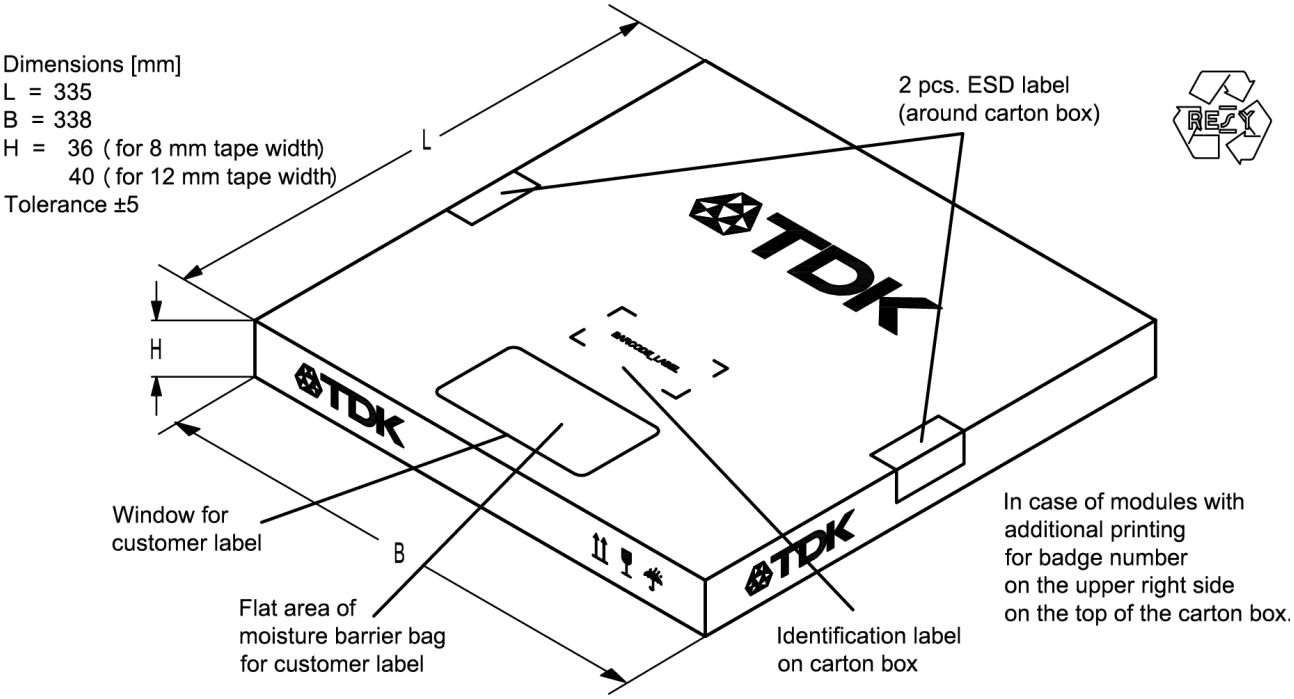

Figure 17: Drawing of folding box for reel with diameter of 330 mm.

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 B8618 is 8DA.

- 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.

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).

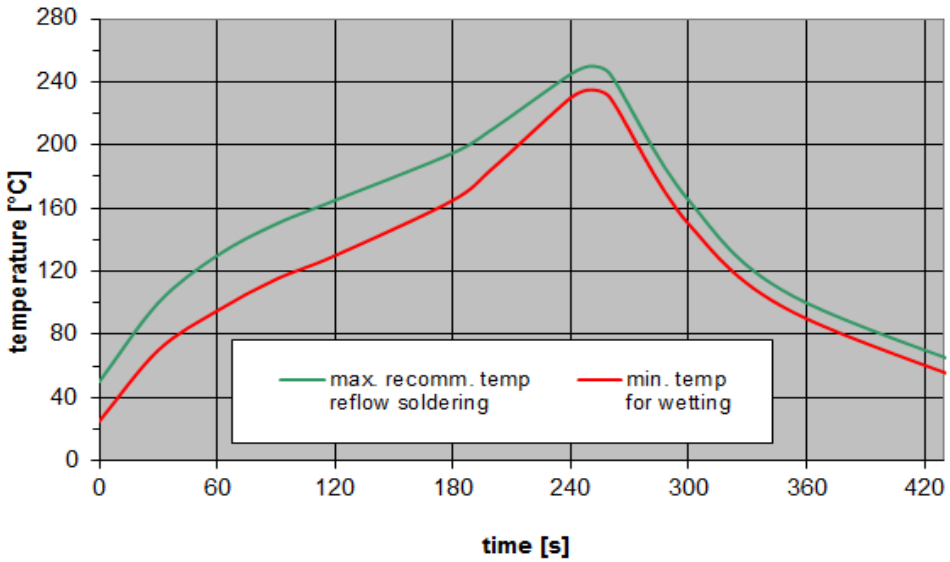

Figure 18: Recommended reflow profile for convection and infrared soldering – lead-free solder.

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 EPCOS sales office.

13.4 Ordering code and packing units

Ordering code	Packing units
B39202B8618P810	15000 pcs
B39202B8618P810S 5	5000 pcs

Table 4: Ordering codes and packing units.

14 Cautions and warnings

14.1 Moldability

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

14.2 Simplified drawings

Landing area

The printed circuit board (PCB) land pattern (landing area) shown is based on EPCOS 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 EPCOS, 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.

Contact and Important notes

For further information please contact your local EPCOS sales office or visit our web page at www.epcos.com.

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