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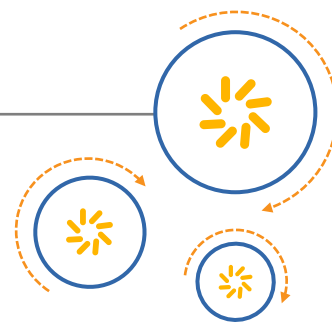
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QUALCOMM®

RF360 Europe GmbH

A Qualcomm – TDK Joint Venture

SAW components

SAW duplexer for small cell

LTE band 3

Series/type: B8018
Ordering code: B39182B8018P810

Date: March 24, 2016
Version: 2.3

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Table of contents

Please read **Cautions and warnings** and **Important notes** at the end of this document.

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1   Application

- Low-loss SAW duplexer for LTE smallcell systems (Band 3)
- Low insertion attenuation
- High power durability
- Industrial qualification
- Usable pass band 75 MHz
- Rx = Uplink = 1710-1785 MHz
- Tx = Downlink = 1805-1880 MHz

2   Features

- Package size 2.5±0.1 mm × 2.0±0.1 mm
- Package height 0.5 mm (max.)
- Approximate weight 1 mg
- RoHS compatible
- Package for Surface Mount Technology (SMT)
- Ni/Au-plated terminals
- Electrostatic Sensitive Device (ESD)
- Moisture Sensitivity Level 2a (MSL2a)
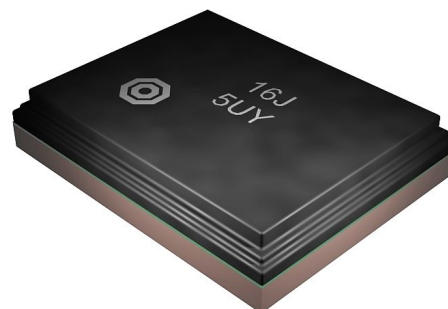
Figure 1: Picture of component with example of product marking.

Please read **Cautions and warnings** and **Important notes** at the end of this document.

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3 Package

BOTTOM VIEW
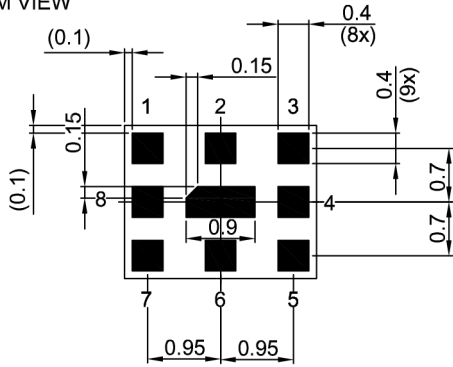
Pad and pitch tolerance ±0.05

SIDE VIEW

TOP VIEW

16J

5UY
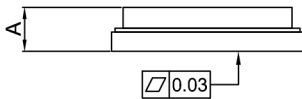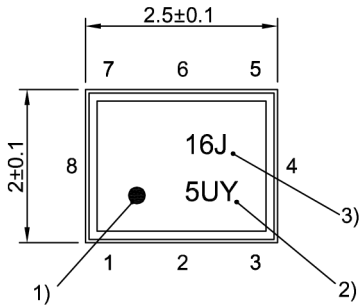
1) Marking for pad number 1

2) Example of encoded lot number

3) Example of encoded filter type number

Land pattern
THRU VIEW
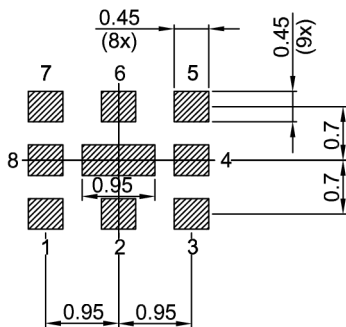
Landing pad tolerance -0.02

Figure 2: Drawing of package with package height A = 0.5 mm (max.). See Sec. Package information (p. 23).

4 Pin configuration

■ 1   TX

■ 3   RX

■ 6   ANT

■ 2, 4, 5, 7,   Ground
   8, 9

Please read **Cautions and warnings** and **Important notes** at the end of this document.

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5   Matching circuit

- L_{p1} = 8.2 nH

- L_{p6} = 3.6 nH

- L_{p3} = 9.1 nH
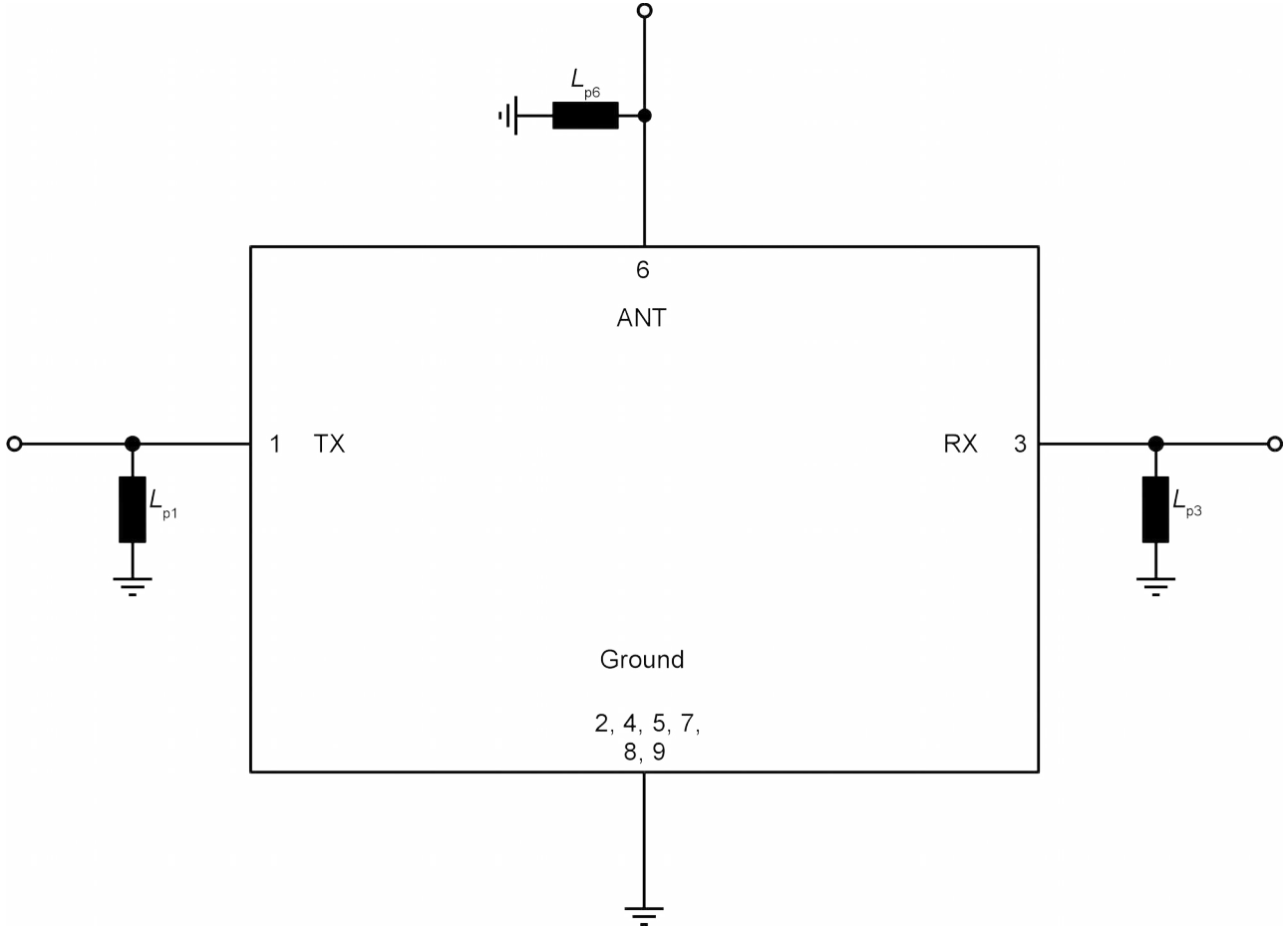
Figure 3: Schematic of matching circuit.

Please read **Cautions and warnings** and **Important notes** at the end of this document.

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6 Characteristics

6.1 TX – ANT

Temperature range for specification	T_{SPEC}	= −10 °C ... +85 °C
TX terminating impedance	Z_{TX}	= 50 Ω with par. 8.2 nH[1]
ANT terminating impedance	Z_{ANT}	= 50 Ω with par. 3.6 nH[1]
RX terminating impedance	Z_{RX}	= 50 Ω with par. 9.1 nH[1]

Characteristics TX – ANT				min. for T_{SPEC}	typ. @+25 °C	max. for T_{SPEC}	
Center frequency			f_C	—	1842.5	—	MHz
Maximum insertion attenuation			α_{max}				
	1805 ... 1880	MHz		—	2.6	4.0	dB
	1840 ... 1870	MHz		—	1.7	2.5	dB
Amplitude ripple (p-p)			$\Delta\alpha$				
	1805 ... 1880	MHz		—	1.2	3.0	dB
	1840 ... 1870	MHz		—	0.3	1.0	dB
Maximum VSWR			$VSWR_{max}$				
@ TX port	1805 ... 1880	MHz		—	1.4	2.0	
@ ANT port	1805 ... 1880	MHz		—	1.5	2.0	
Average error vector magnitude			EVM_{avg} [2]				
	1807.5 ... 1877.5	MHz		—	1.6	3.5	%
Minimum attenuation			α_{min}				
	10 ... 1710	MHz		30	34	—	dB
	1710 ... 1745	MHz		42	46	—	dB
	1745 ... 1780	MHz		45	49	—	dB
	1780 ... 1785	MHz		35	48	—	dB
	1900 ... 1911	MHz		5	18	—	dB
	1911 ... 1920	MHz		20	63	—	dB
	1920 ... 1980	MHz		40	45	—	dB
	1980 ... 2400	MHz		35	40	—	dB
	2400 ... 2500	MHz		35	41	—	dB
	2500 ... 3680	MHz		30	41	—	dB
	3680 ... 3740	MHz		30	49	—	dB
	3740 ... 5150	MHz		30	38	—	dB
	5150 ... 5725	MHz		25	33	—	dB

[1] See Sec. Matching circuit (p. 5).
[2] Error Vector Magnitude (EVM) based on definition given in 3GPP TS 25.141.

Please read **Cautions and warnings** and **Important notes** at the end of this document.

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6.2   ANT – RX

Temperature range for specification T_{SPEC} = −10 °C ... +85 °C
TX terminating impedance Z_{TX} = 50 Ω with par. 8.2 nH[1]
ANT terminating impedance Z_{ANT} = 50 Ω with par. 3.6 nH[1]
RX terminating impedance Z_{RX} = 50 Ω with par. 9.1 nH[1]

Characteristics ANT – RX				min. for T_{SPEC}	typ. @+25 °C	max. for T_{SPEC}	
Center frequency			f_C	—	1747.5	—	MHz
Maximum insertion attenuation			α_{max}				
	1710... 1785	MHz		—	3.5	5.3	dB
	1745... 1775	MHz		—	2.5	3.0	dB
Amplitude ripple (p-p)			$\Delta\alpha$				
	1710... 1785	MHz		—	2.2	4.0	dB
	1745... 1775	MHz		—	1.0	1.5	dB
Maximum VSWR			$VSWR_{max}$				
@ ANT port	1710... 1785	MHz		—	1.6	2.0	
@ RX port	1710... 1785	MHz		—	1.8	2.2	
Average error vector magnitude			EVM_{avg} [2]				
	1712.5... 1782.5	MHz		—	2.5	4.0	%
Minimum attenuation			α_{min}				
	10... 1500	MHz		40	49	—	dB
	1500... 1660	MHz		40	48	—	dB
	1660... 1690	MHz		10	15	—	dB
	1805... 1840	MHz		40	44	—	dB
	1840... 1880	MHz		43	47	—	dB
	1880... 2400	MHz		40	45	—	dB
	2400... 2500	MHz		40	45	—	dB
	2500... 3490	MHz		35	50	—	dB
	3490... 3550	MHz		35	51	—	dB
	3500... 5235	MHz		35	42	—	dB
	5235... 5325	MHz		35	42	—	dB

[1]   See Sec. Matching circuit (p. 5).
[2]   Error Vector Magnitude (EVM) based on definition given in 3GPP TS 25.141.

6.3 TX – RX

Temperature range for specification	T_{SPEC}	= −10 °C ... +85 °C
TX terminating impedance	Z_{TX}	= 50 Ω with par. 8.2 nH[1]
ANT terminating impedance	Z_{ANT}	= 50 Ω with par. 3.6 nH[1]
RX terminating impedance	Z_{RX}	= 50 Ω with par. 9.1 nH[1]

Characteristics TX – RX				min. for T_{SPEC}	typ. @+25 °C	max. for T_{SPEC}	
Minimum isolation			α_{min}				
	1710 ... 1745	MHz		43	46	—	dB
	1745 ... 1780	MHz		45	49	—	dB
	1780 ... 1785	MHz		37	49	—	dB
	1805 ... 1840	MHz		40	43	—	dB
	1840 ... 1880	MHz		45	48	—	dB

[1] See Sec. Matching circuit (p. 5).

Please read **Cautions and warnings** and
Important notes at the end of this document.

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7   Maximum ratings

Storage temperature	T_{STG}	= −40 °C ... +85 °C	
DC voltage	V_{DC}	= 0 V (max.)	
ESD voltage	V_{ESD}	= 50 V (max.)[1]	
Input power	P_{IN}		
@ TX port: 1805 ... 1880 MHz	27 dBm		Source and load impedance 50Ω. LTE 5MHz downlink. T=55°C, 50.000h.[2]
@ TX port: 1805 ... 1880 MHz	26 dBm		Source and load impedance 50Ω. LTE 5MHz downlink. T=55°C, 100.000h.[2]
@ TX port: other frequency range(s)	10 dBm		Source and load impedance 50Ω.
Operating lifetime with output power at antenna	P_{OUT}		
@ ANT port: 1805 ... 1880 MHz	21 dBm		Continuous wave T= 55 °C, 100khrs.[3]

[1]   According to JESD22-A115A (machine model), 1 negative and 1 positive pulses.
[2]   Time to failure (TTF) according to accelerated power durability tests, and wear out models.
[3]   According to accelerated high temperature operating life (HOTL) test.

8 Transmission coefficients

8.1 TX – ANT
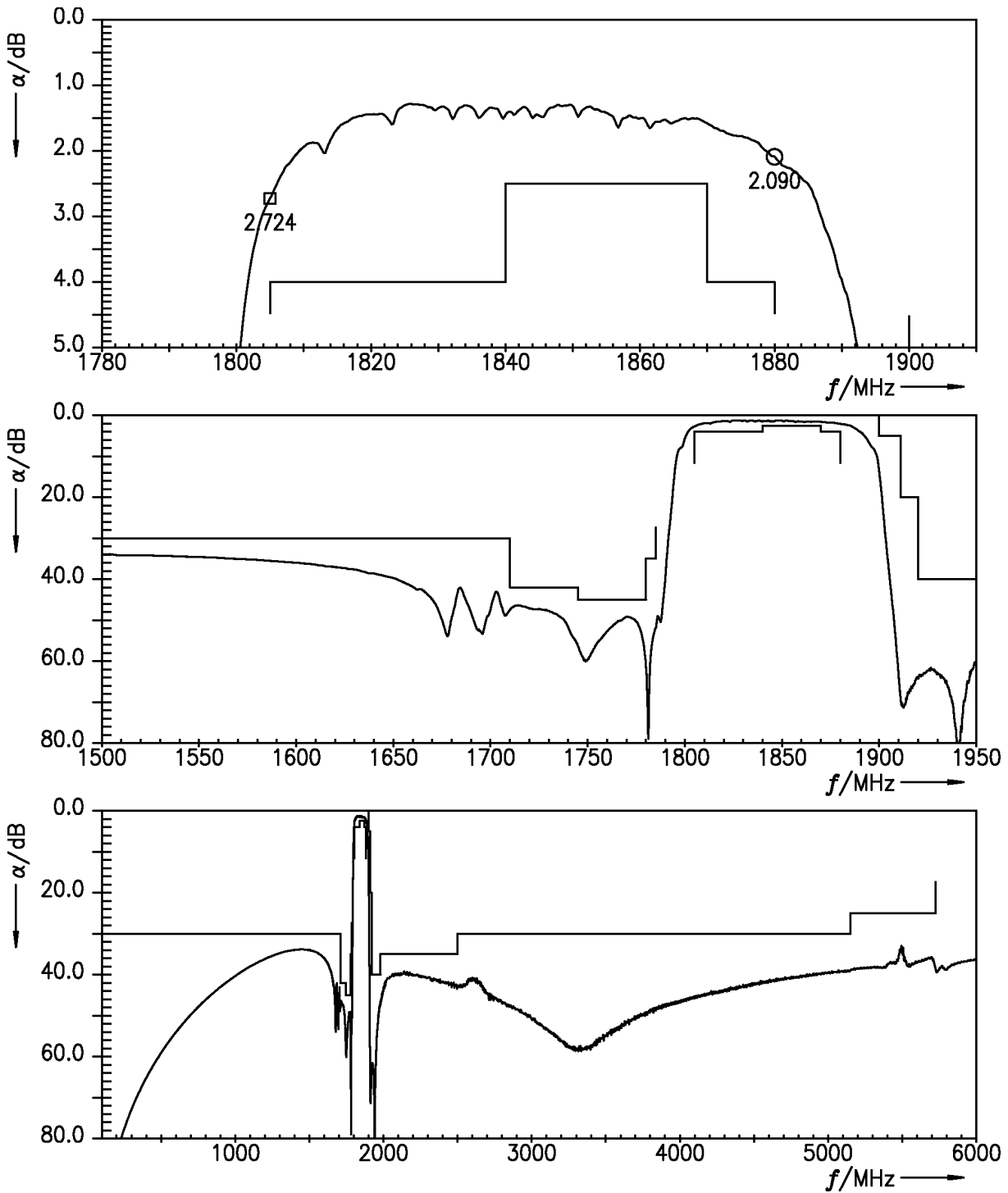
Figure 4: Attenuation TX – ANT.

Please read **Cautions and warnings** and **Important notes** at the end of this document.

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8.2 ANT – RX
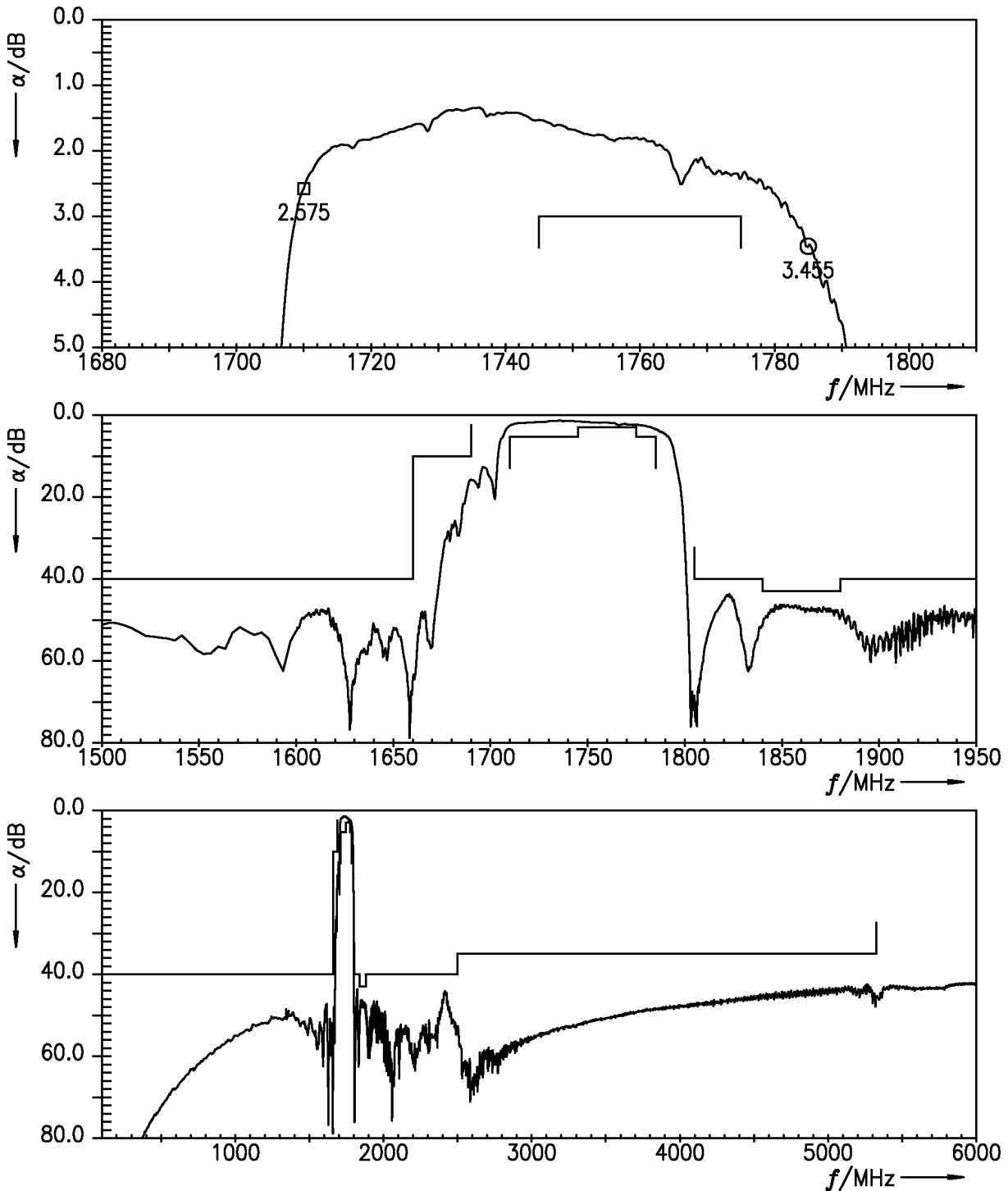
Figure 5: Attenuation ANT – RX.

8.3   TX – RX
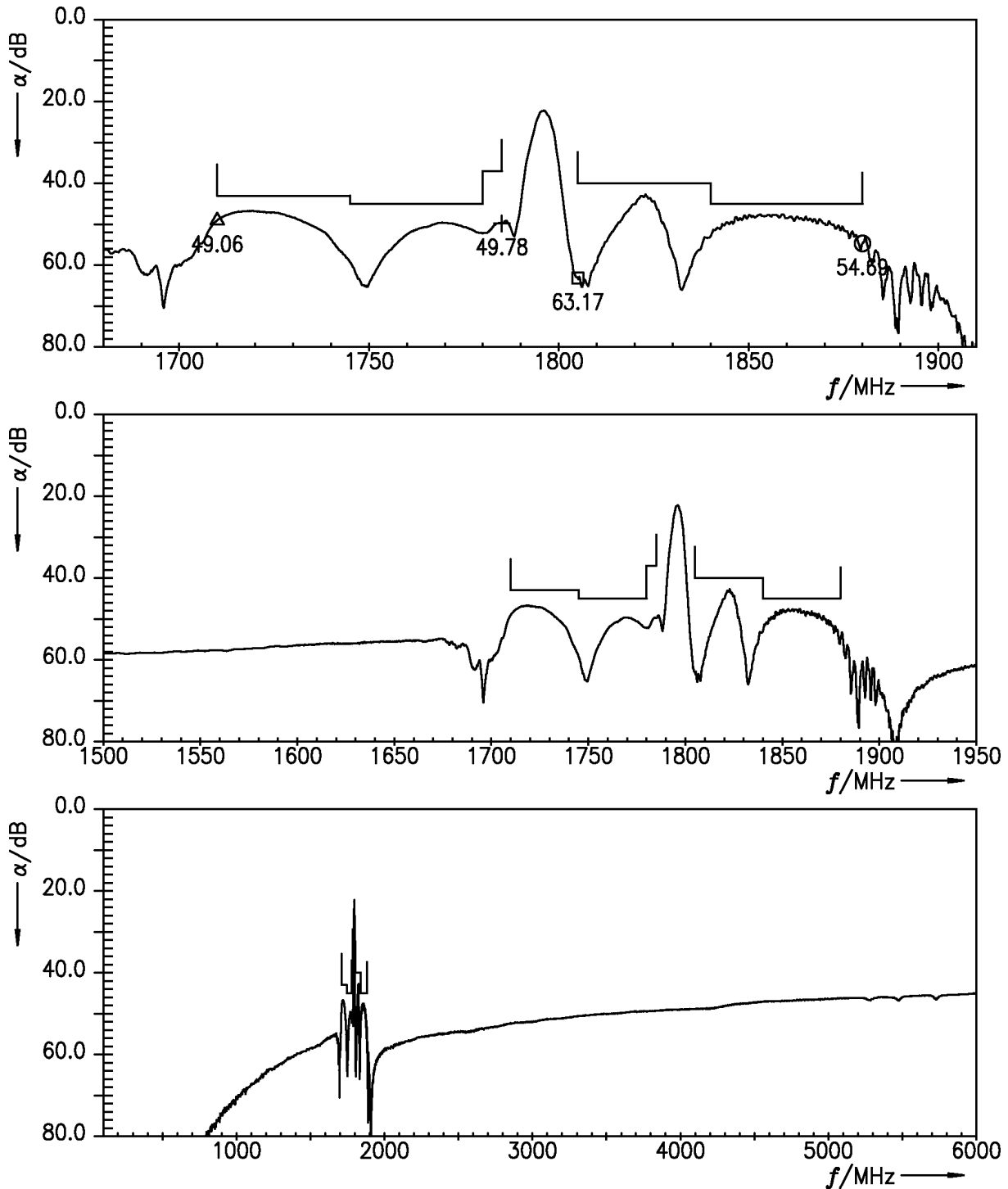
Figure 6: Isolation TX – RX.

9　Reflection coefficients
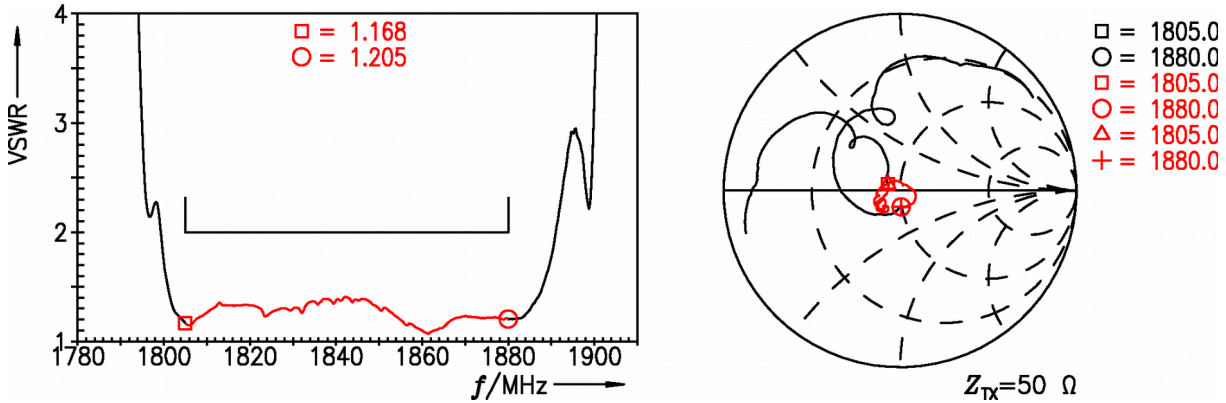
Figure 7: Reflection coefficient at TX port.
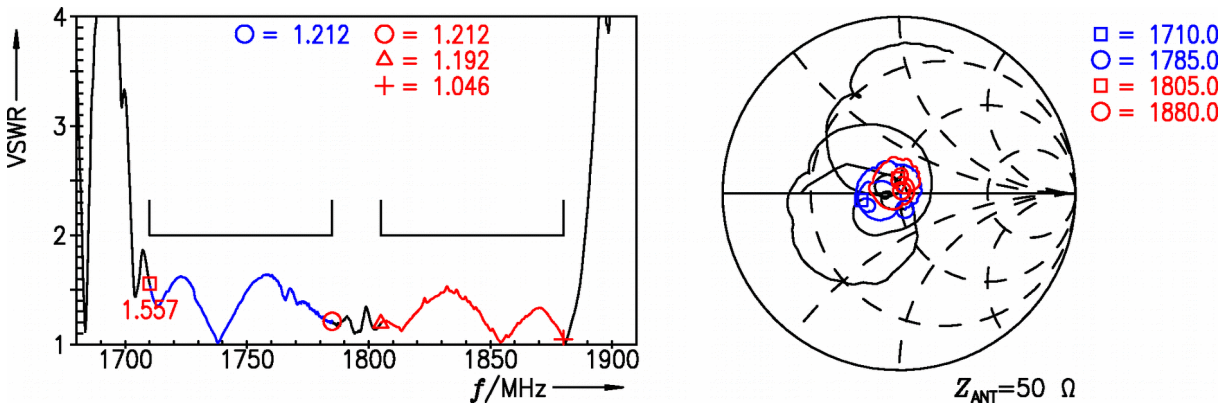
Figure 8: Reflection coefficient at ANT port (TX and RX frequencies).
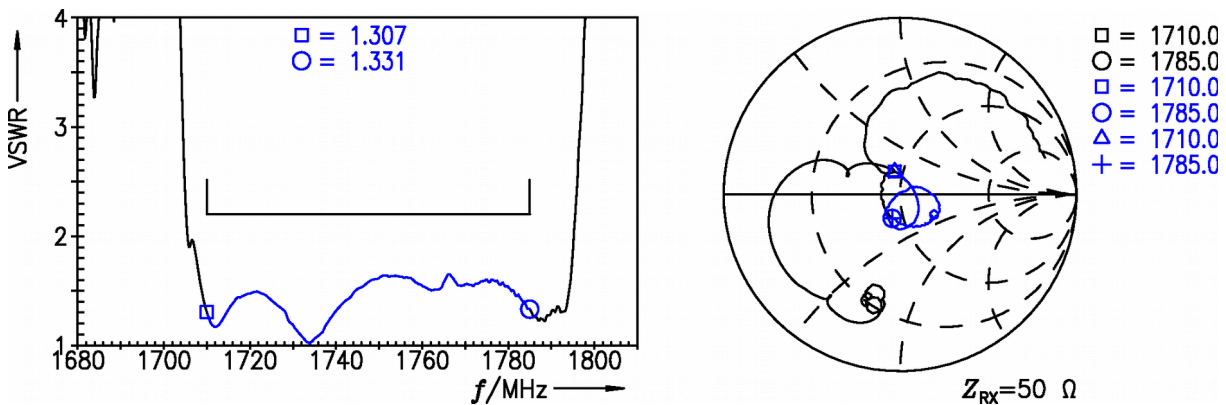
Figure 9: Reflection coefficient at RX port.

10   EVMs

10.1 TX – ANT
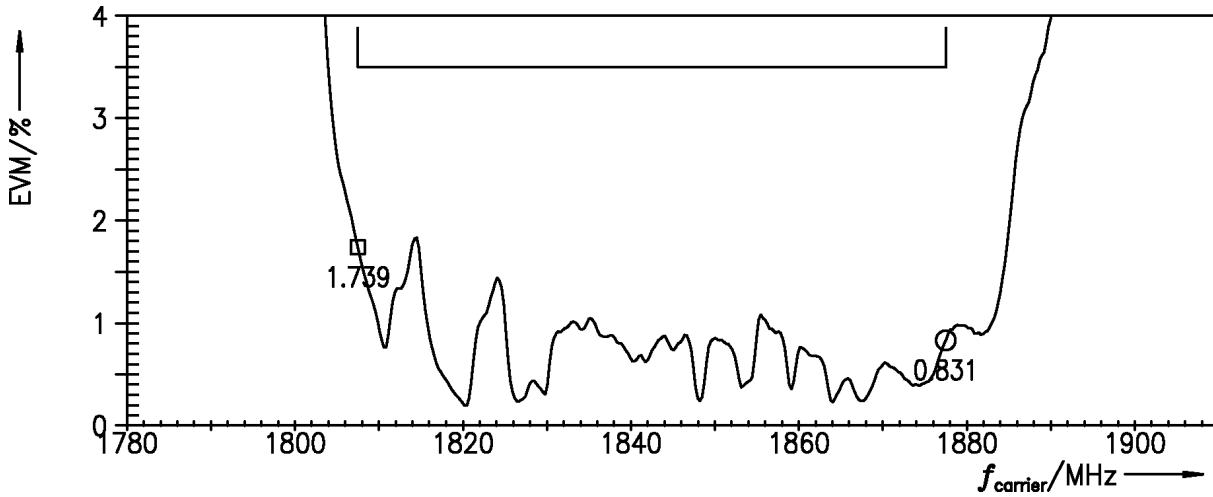
Figure 10: Error vector magnitude TX – ANT.

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Important notes at the end of this document.

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10.2 ANT – RX
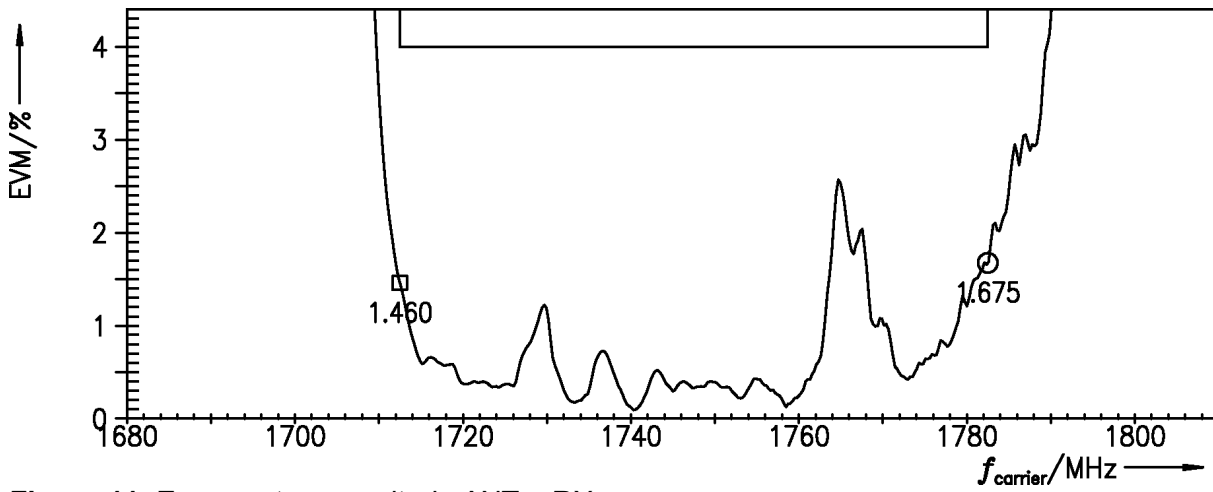
Figure 11: Error vector magnitude ANT – RX.

11 Packing material

11.1 Tape
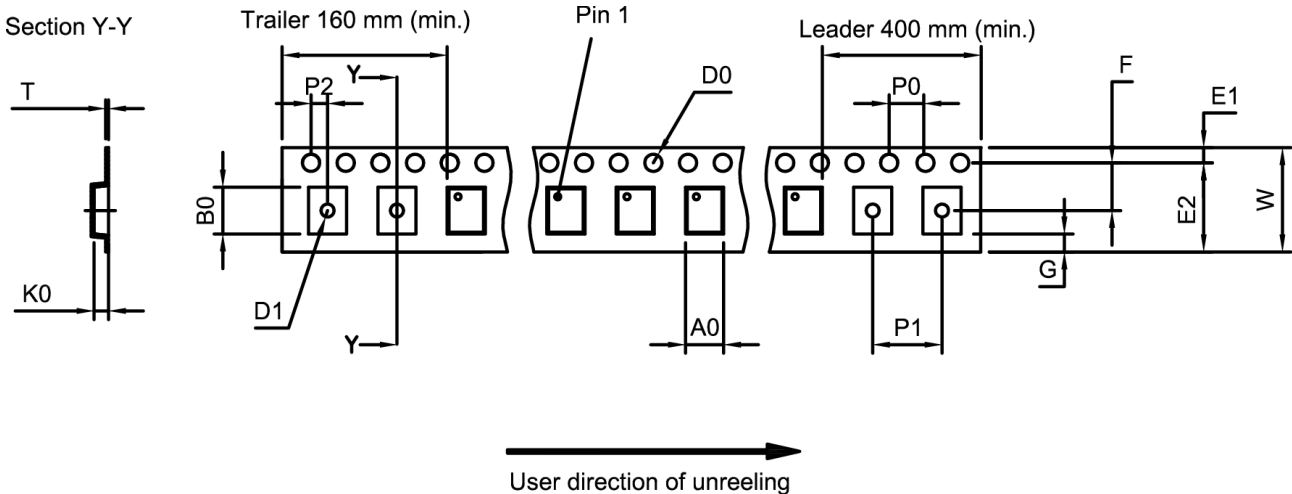
Figure 12: Drawing of tape (first-angle projection) with tape dimensions according to Table 1.

|							
A_0	2.25±0.05 mm	E_2	6.25 mm (min.)	P_1	4.0±0.1 mm
B_0	2.75±0.05 mm	F	3.5±0.05 mm	P_2	2.0±0.05 mm
D_0	1.5+0.1/−0 mm	G	0.75 mm (min.)	T	0.25±0.03 mm
D_1	1.0 mm (min.)	K_0	0.6±0.05 mm	W	8.0+0.3/−0.1 mm
E_1	1.75±0.1 mm	P_0	4.0±0.1 mm		

Table 1: Tape dimensions.

11.2 Reel with diameter of 180 mm

Surface resistivity < 10^{12} Ohms/sq

Figure 13: Drawing of reel (first-angle projection) with diameter of 180 mm.

Dimensions [mm]
X = 220+5
Y = 235+5
Sealing area 10±3

Printing
on vacuumbag

Vacuumbag

Sealing area

Drypack
in vacuumbag

Identification label
on vacuumbag

Humidity indicator
in vaccumbag
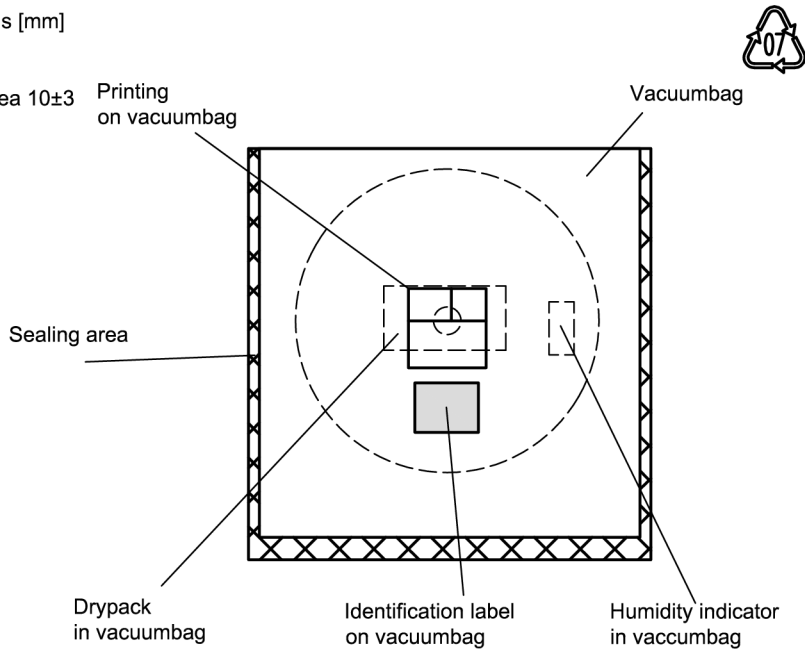
Figure 14: Drawing of moisture barrier bag (MBB) for reel with diameter of 180 mm.

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

2 pcs. ESD label
(around carton box)

L

H

Window for
customer label

B

Flat area of
moisture barrier bag
for customer label

Identification label
on carton box
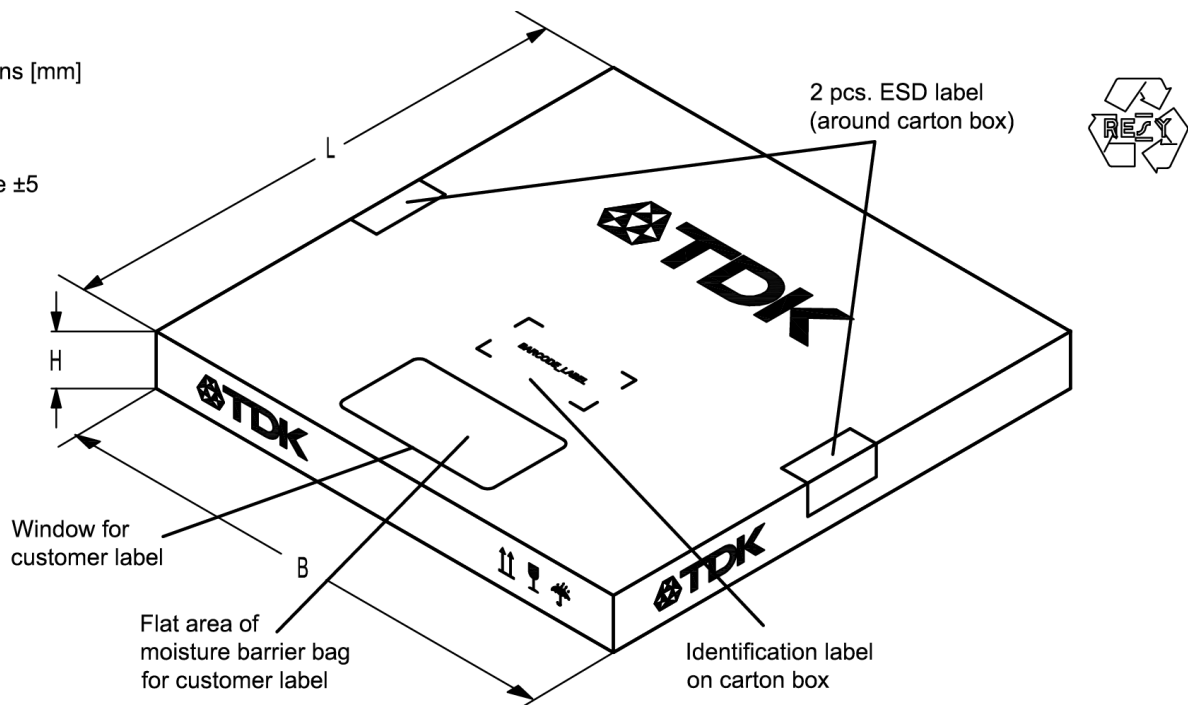
Figure 15: Drawing of folding box for reel with diameter of 180 mm.

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11.3 Reel with diameter of 330 mm

Figure 16: Drawing of reel (first-angle projection) with diameter of 330 mm.

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

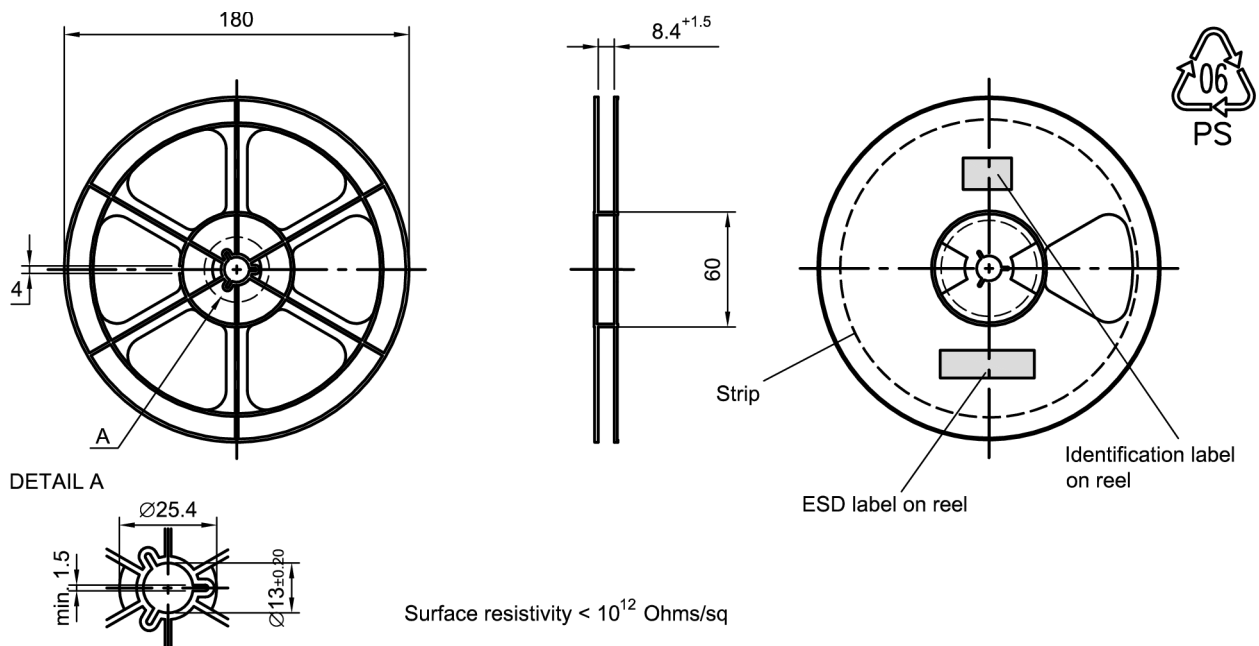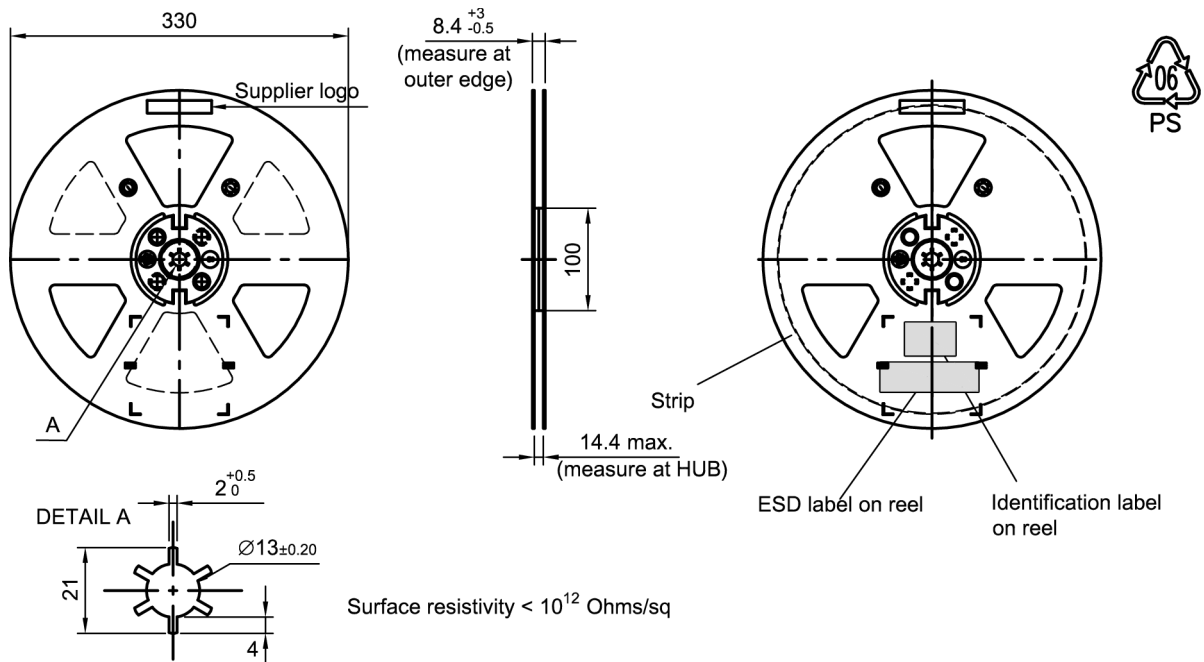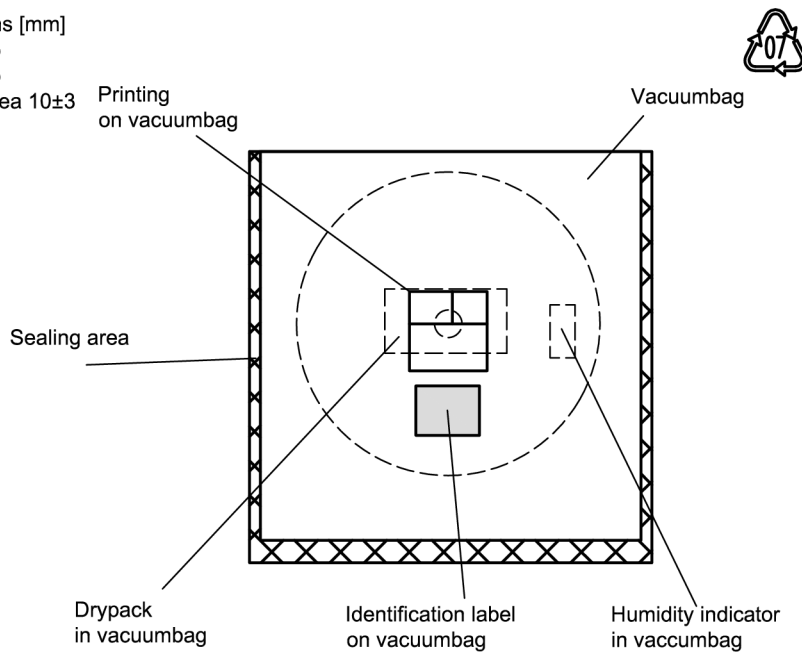**Figure 17:** Drawing of moisture barrier bag (MBB) for reel with diameter of 330 mm.

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Important notes at the end of this document.

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Dimensions [mm]
L = 335
B = 338
H = 36 (for 8 mm tape width)
       40 (for 12 mm tape width)
Tolerance ±5

2 pcs. ESD label
(around carton box)

Window for
customer label

Flat area of
moisture barrier bag
for customer label

Identification label
on carton box

In case of modules with
additional printing
for badge number
on the upper right side
on the top of the carton box.

Figure 18: Drawing of folding box for reel with diameter of 330 mm.

12 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 B8018 is 7TJ.

■ 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					Adopted BASE47 code for lot number			
Decimal value	Base32 code	Decimal value	Base32 code		Decimal value	Base47 code	Decimal value	Base47 code
0	0	16	G		0	0	24	R
1	1	17	H		1	1	25	S
2	2	18	J		2	2	26	T
3	3	19	K		3	3	27	U
4	4	20	M		4	4	28	V
5	5	21	N		5	5	29	W
6	6	22	P		6	6	30	X
7	7	23	Q		7	7	31	Y
8	8	24	R		8	8	32	Z
9	9	25	S		9	9	33	b
10	A	26	T		10	A	34	d
11	B	27	V		11	B	35	f
12	C	28	W		12	C	36	h
13	D	29	X		13	D	37	n
14	E	30	Y		14	E	38	r
15	F	31	Z		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.

13 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
$T \geq 255$ °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).
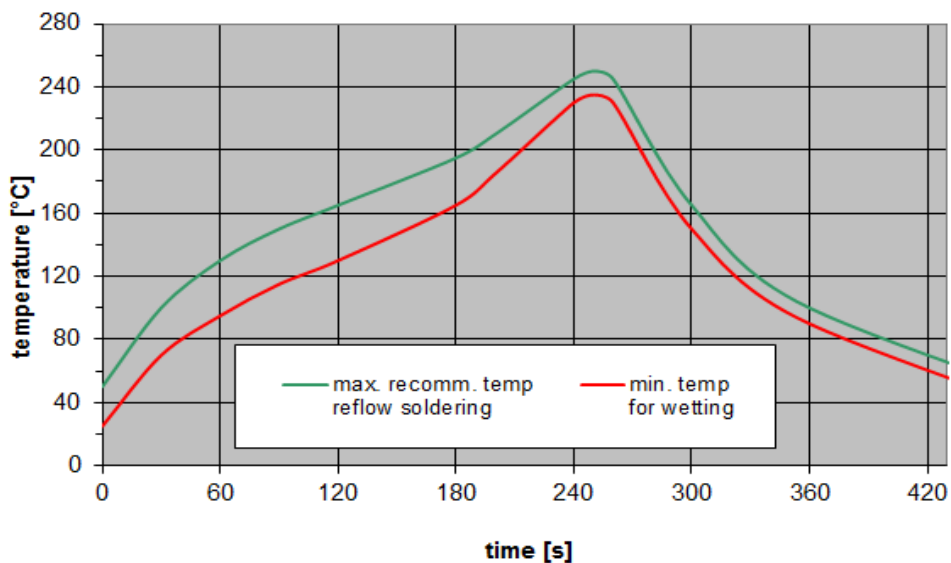

Figure 19: Recommended reflow profile for convection and infrared soldering – lead-free solder.

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14 Annotations

14.1 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.

14.2 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.

14.3 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.

14.4 Ordering codes and packing units

Ordering code	Packing unit
B39182B8018P810	5000 pcs

Table 4: Ordering codes and packing units.

15 Cautions and warnings

15.1 Display of ordering codes for EPCOS 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 EPCOS, 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.epcos.com/orderingcodes**.

15.2 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.

15.3 Moldability

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

15.4 Package information

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).

Dimensions do not include burrs.

Projection method

Unless otherwise specified first-angle projection is applied.

Please read **Cautions and warnings** and **Important notes** at the end of this document.

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