SAW Components

SAW Duplexer
LTE Band 20

Series/type:	B8677
Ordering code:	
Date:	October 21, 2015
Version:	1.0

Preliminary data sheet

Table of contents

Preliminary data sheet

1 Application

- Multimode SAW duplexer for mobile telephone LTE Band 20 system.
- Low insertion attenuation.
- Low amplitude ripple.
- High TX band isolation.
- Usable pass bands: 30 MHz.

2 Features

- Package size 1.8 mm × 1.4 mm.
- Max.package height 0.475 mm.
- Approximate weight 0.0042 g.
- RoHS compatible.
- Package for Surface Mount Technology (SMT).
- Ni, gold-plated terminals.
- Electrostatic Sensitive Device (ESD).
- Moisture Sensitivity Level 3 (MSL3).

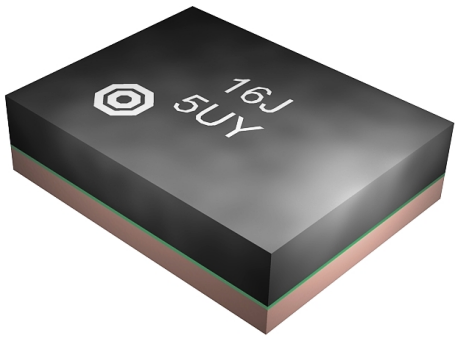

Figure 1: Picture of component with example of marking.

3 Package

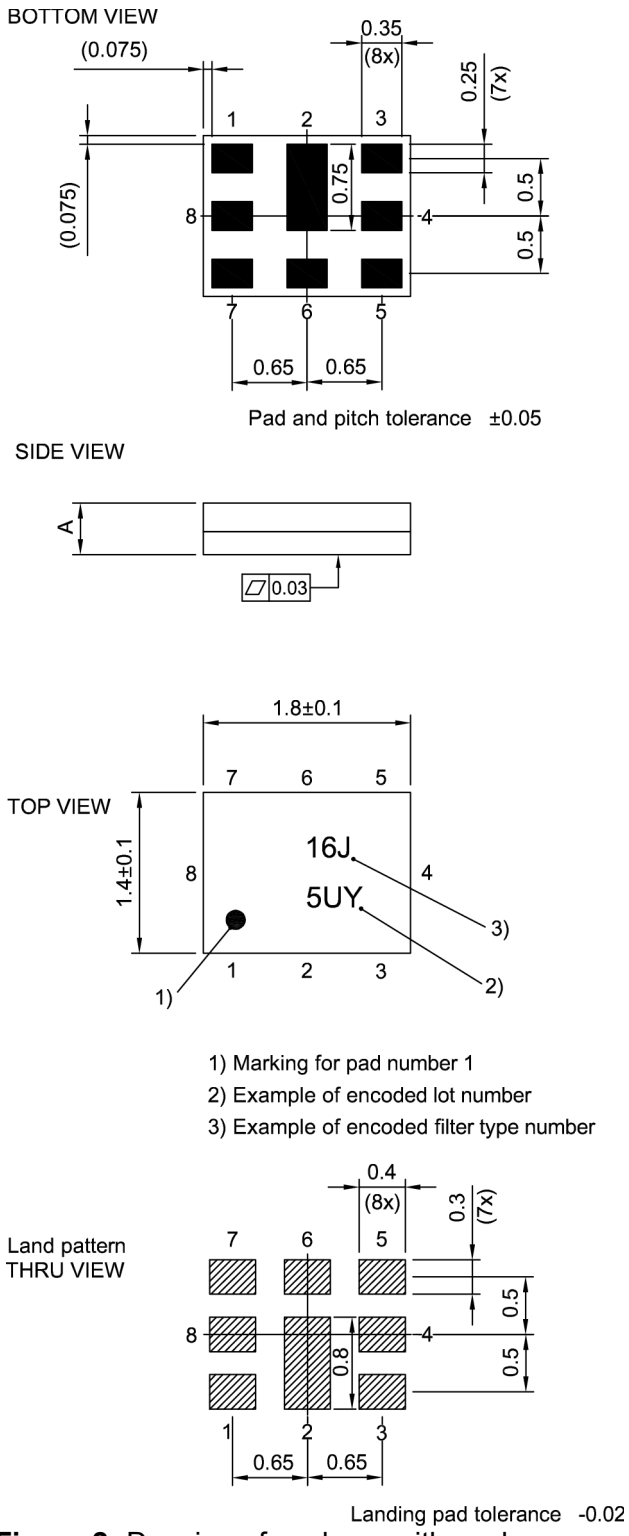

Figure 2: Drawing of package with package height A = 0.475 mm (max.). See Simplified drawings (p. 22).

4 Pin configuration

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

5 Matching circuit

■ L_{p6} = 10 nH ■ L_{s1} = 4.7 nH

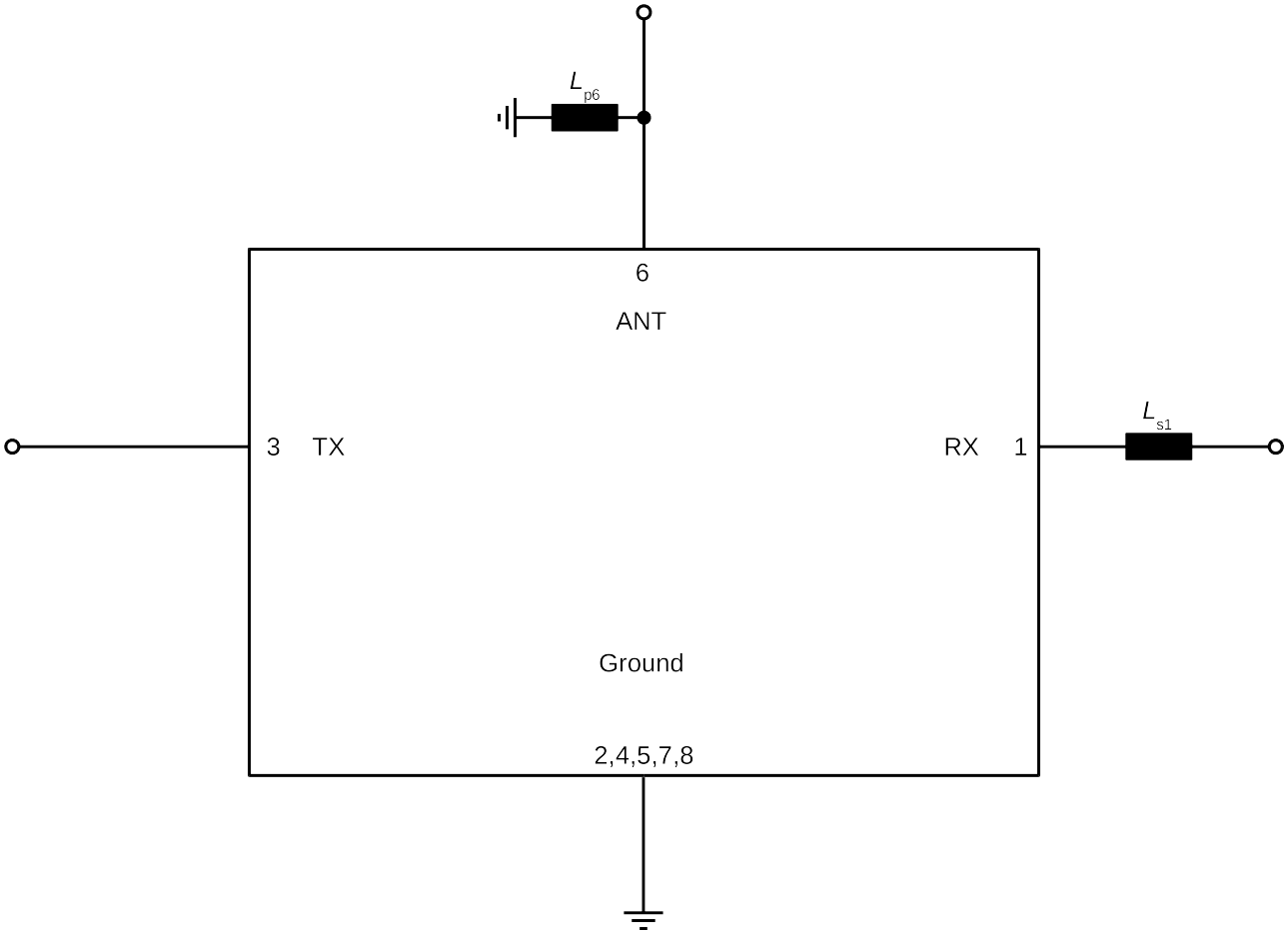

Figure 3: Schematic of matching circuit.

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 with par. 10 nH
RX terminating impedance	Z_{RX}	= 50 Ω with ser. 4.7 nH

Characteristics TX – ANT				min.	typ. @+25 °C	max.	
Center frequency			f_C	—	847	—	MHz
Maximum insertion attenuation			α_{max}				
	832.34 ... 861.66	MHz		—	2.5	3.0[1]	dB
	832.34 ... 861.66	MHz		—	2.5	3.2	dB
Amplitude ripple (p-p)							
	832.34 ... 861.66	MHz	Δα	—	1.3	2.1	dB
	832.34 ... 861.66	MHz	Δα[2]	—	1.3	2.0	dB
Maximum VSWR			$VSWR_{max}$				
@ TX port	832.34 ... 861.66	MHz		—	1.7	2.0	
@ ANT port	832.34 ... 862.66	MHz		—	1.8	2.1	
Maximum error vector magnitude			EVM_{max}[3]				
	834.4 ... 859.6	MHz		—	4.8	5.5	%
Minimum attenuation			α_{min}				
	10 ... 771	MHz		30	40	—	dB
	771 ... 791	MHz		40	45	—	dB
	791 ... 821	MHz		44	55	—	dB
	821 ... 827	MHz		1	9	—	dB
	880 ... 915	MHz		30	46	—	dB
	925 ... 960	MHz		30	43	—	dB
	1559 ... 1563	MHz		35	47	—	dB
	1565.42 ... 1573.374	MHz		35	47	—	dB
	1573.374 ... 1577.466	MHz		35	47	—	dB
	1577.466 ... 1585.42	MHz		35	47	—	dB
	1597.551 ... 1605.886	MHz		35	48	—	dB
	1664 ... 1724	MHz		35	49	—	dB
	1710 ... 1785	MHz		30	50	—	dB
	1805 ... 1880	MHz		30	50	—	dB
	1884.5 ... 1919.6	MHz		30	51	—	dB

Characteristics TX – ANT			min.	typ. @+25 °C	max.	
	2110... 2170	MHz	30	57	—	dB
	2400... 2500	MHz	35	55	—	dB
	2496... 2586	MHz	35	43	—	dB
	2500... 2570	MHz	30	44	—	dB
	2570... 2620	MHz	40	54	—	dB
	2620... 2690	MHz	30	55	—	dB
	3328... 3448	MHz	20	46	—	dB
	4160... 4310	MHz	20	28	—	dB
	4900... 5950	MHz	10	14	—	dB

1) Valid for temperature T = +25 °C (max.).
2) Over any channel with band width of 10 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 with par. 10 nH
RX terminating impedance	Z_{RX}	= 50 Ω with ser. 4.7 nH

Characteristics ANT – RX				min.	typ. @+25 °C	max.	
Center frequency			f_C	—	806	—	MHz
Maximum insertion attenuation			α_{max}				
	791.34 ... 820.66	MHz		—	2.9	4.5[1]	dB
	791.34 ... 820.66	MHz		—	2.9	5.6	dB
Amplitude ripple (p-p)			$\Delta\alpha$				
	791.34 ... 820.66	MHz		—	1.7	4.7	dB
Maximum VSWR			$VSWR_{max}$				
@ ANT port	791.34 ... 820.66	MHz		—	1.5	2.0	
@ RX port	791.34 ... 820.66	MHz		—	1.8	2.1	
Minimum attenuation			α_{min}				
	10 ... 760	MHz		35	37	—	dB
	41	MHz		50	70	—	dB
	760 ... 770	MHz		10	45	—	dB
	832 ... 862	MHz		45	51	—	dB
	862 ... 4000	MHz		25	34	—	dB
	880 ... 915	MHz		35	36	—	dB
	1710 ... 1785	MHz		31	43	—	dB
	2373 ... 2463	MHz		31	35	—	dB
	2400 ... 2500	MHz		31	35	—	dB
	2500 ... 2570	MHz		31	35	—	dB
	4900 ... 5950	MHz		20	24	—	dB
IMD product levels[2]							
IMD2							
Blocker 1	41	MHz		—	−77	−67	dBm
Blocker 3	1653	MHz		—	−117	−100	dBm
IMD3							
Blocker 2	888	MHz		—	−120	−105	dBm
Blocker 4	2500	MHz		—	−122	−112	dBm

[1] Valid for temperature T = +25 °C (max.).

[2] @ f_{TX} = 847.0MHz, f_{RX} = 806.0MHz, f_{RX} - f_{TX} = 41 MHz, IMD product levels for power levels P_{TX} =

21.5 dBm (ANT port output power) and $P_{blocker}$ = −15 dBm (ANT port input power).

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 with par. 10 nH
RX terminating impedance	Z_{RX}	= 50 Ω with ser. 4.7 nH

Characteristics TX – RX			min.	typ. @+25 °C	max.	
Minimum isolation	α_{min}					
	791.34 ... 820.66	MHz	53	56	—	dB
	832.34 ... 861.66	MHz	51	54	—	dB
	1574 ... 1577	MHz	40	56	—	dB
	1664 ... 1724	MHz	20	56	—	dB
	2496 ... 2568	MHz	20	52	—	dB

7 Maximum ratings

Storage temperature	T_{STG} =	−40 °C to +85 °C	
DC voltage	V_{DC} =	5.0 V (max.)[1]	
ESD voltage	V_{ESD}[2] =	100 V (max.)	Machine model.
Input power	P_{IN}		
@ TX port: 832 ... 862 MHz		28 dBm	5MHz LTE uplink signal 5000 h @ 50 °C.
@ TX port: other frequency range(s)		10 dBm	5MHz LTE uplink signal 5000 h @ 50 °C.

1) 168h Damp Heat Steady State acc. IEC 60068-2-67 Cy.
2) According to JESD22-A115B (MM – Machine Model), 10 negative & 10 positive pulses.

8 Transmission coefficients

8.1 TX – ANT

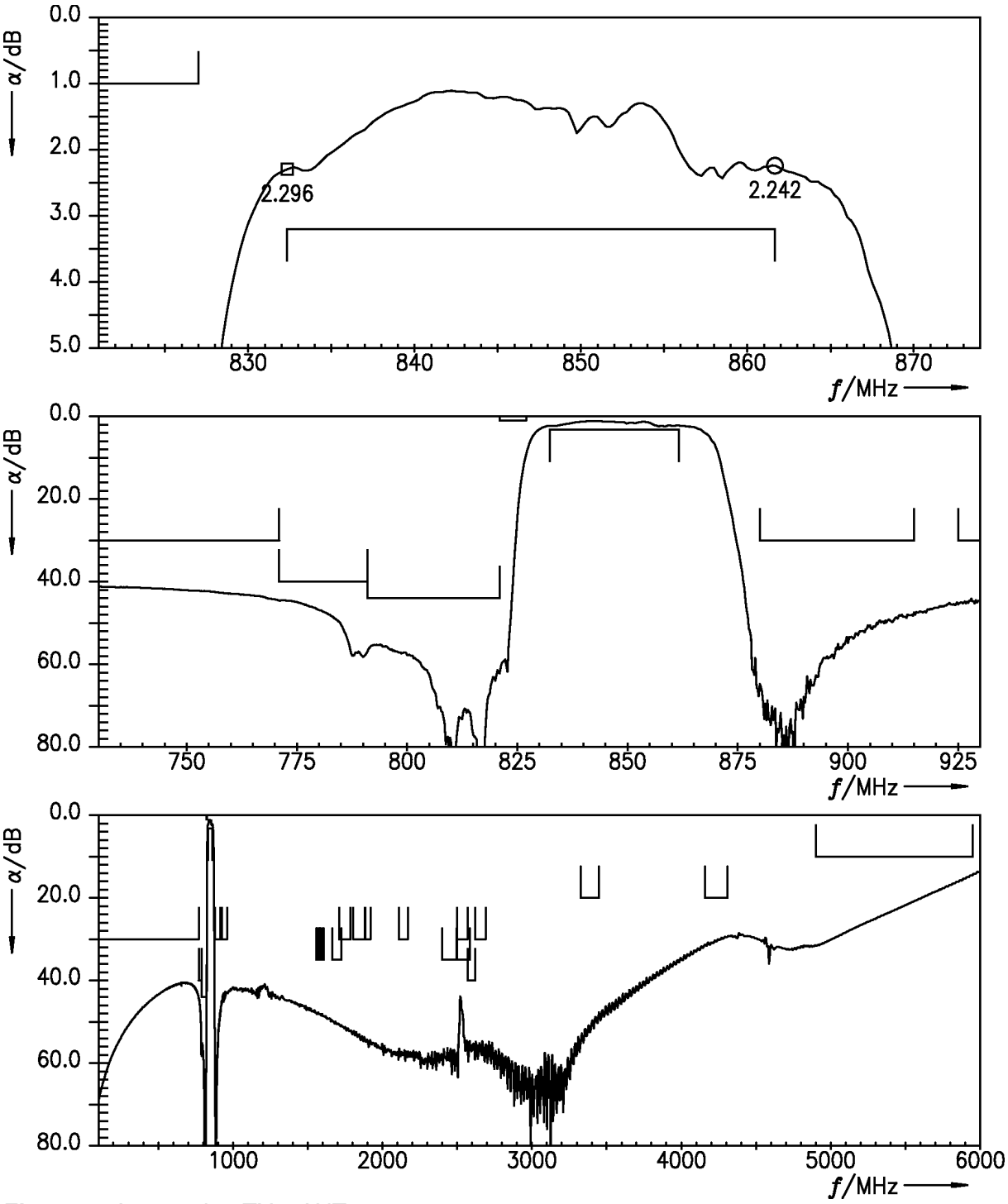

Figure 4: Attenuation TX – ANT.

8.2 ANT – RX

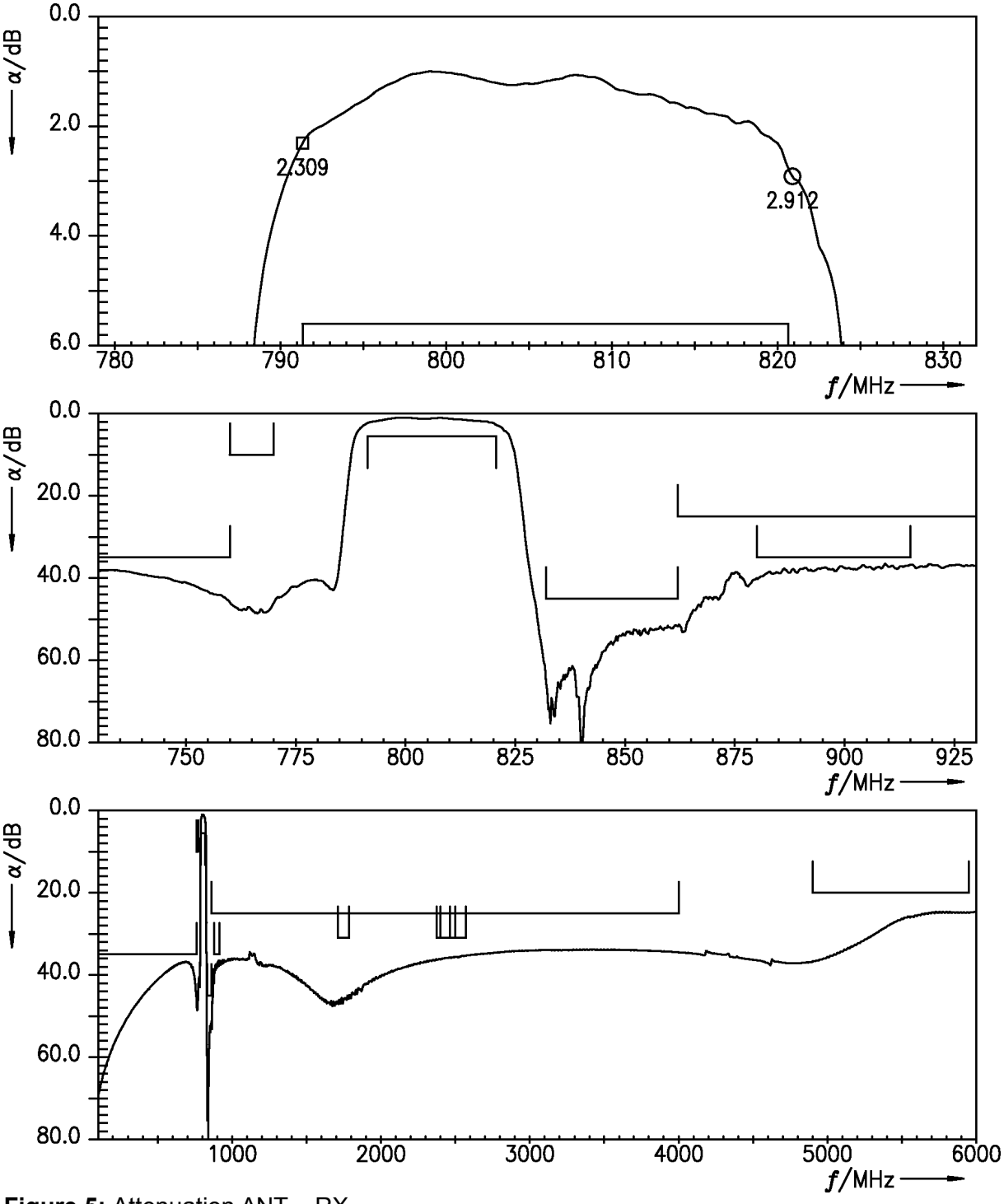

Figure 5: Attenuation ANT – RX.

8.3 TX – RX

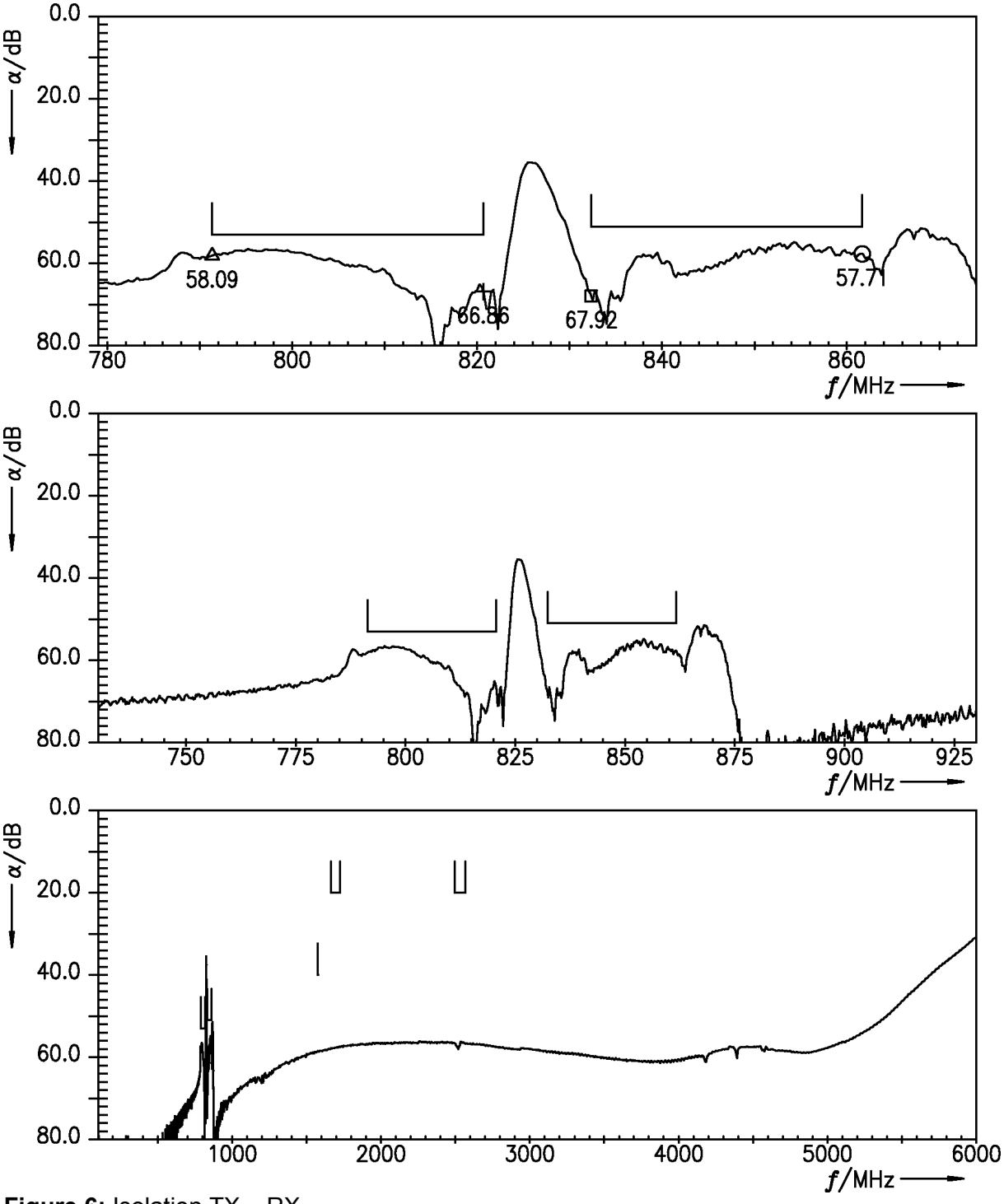

Figure 6: Isolation TX – RX.

9 Reflection coefficients

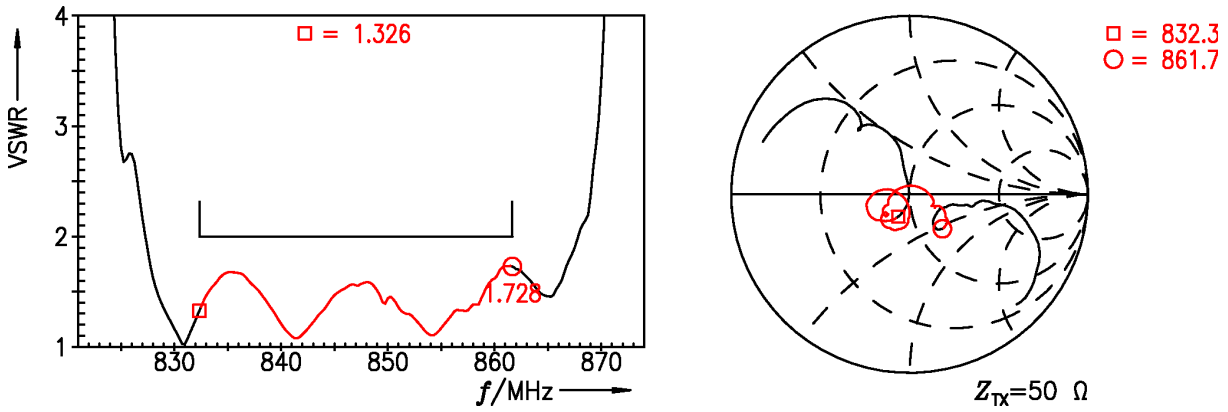

Figure 7: Reflection coefficient at TX port.

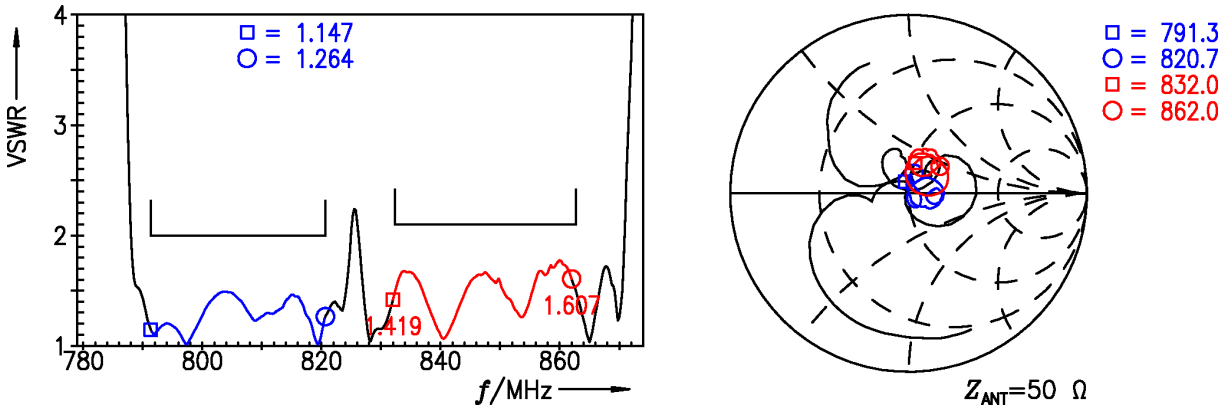

Figure 8: Reflection coefficient at ANT port (TX and RX frequencies).

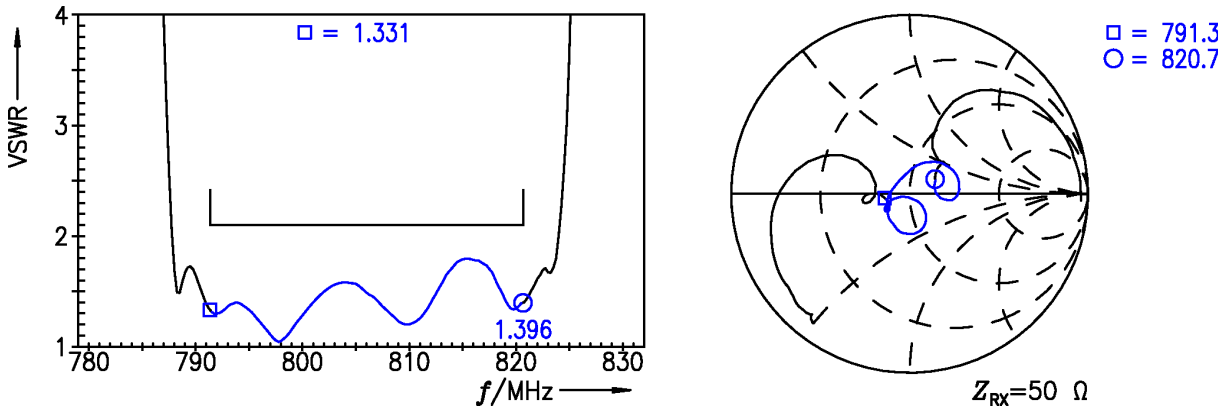

Figure 9: Reflection coefficient at RX port.

10 EVM

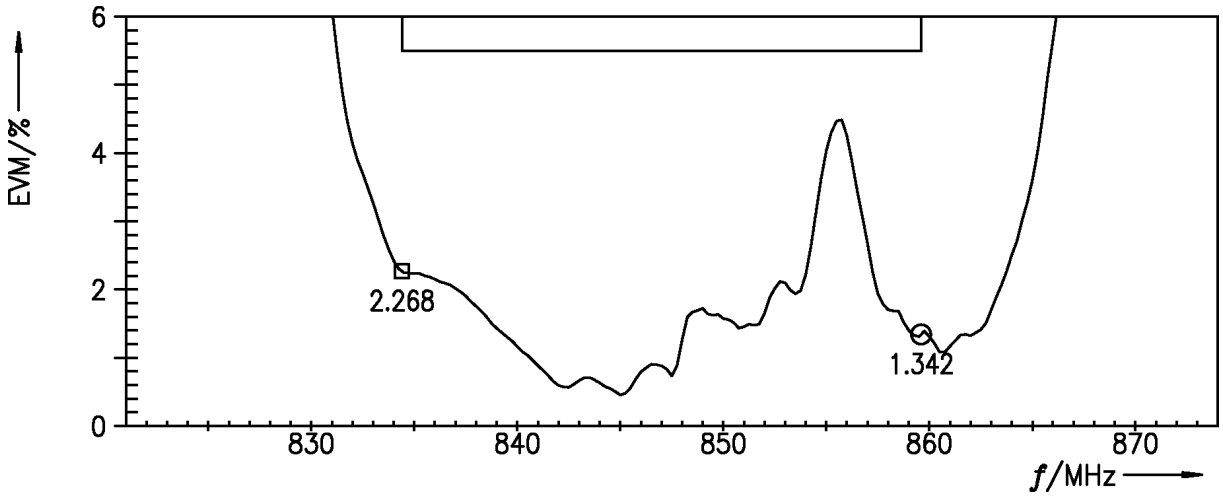

Figure 10: Error vector magnitude TX – ANT.

11 Packing material

11.1 Tape

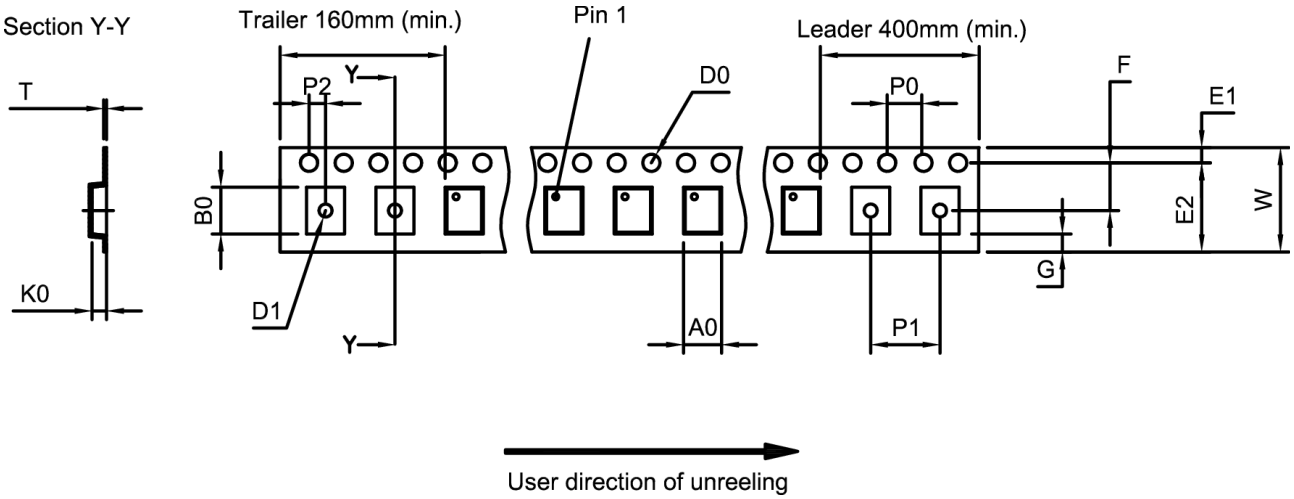

Figure 11: Drawing of tape (first-angle projection) with tape dimensions according to Table 1.

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.

11.2 Reel with diameter of 180 mm

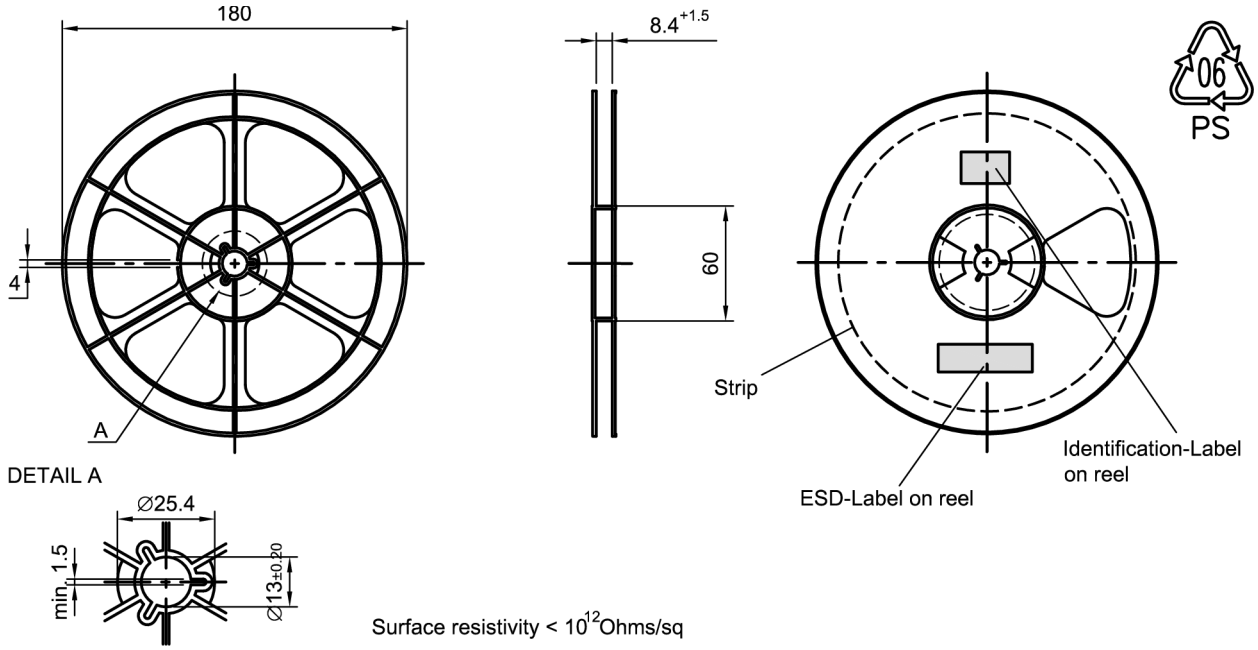

Figure 12: Drawing of reel (first-angle projection) with diameter of 180 mm.

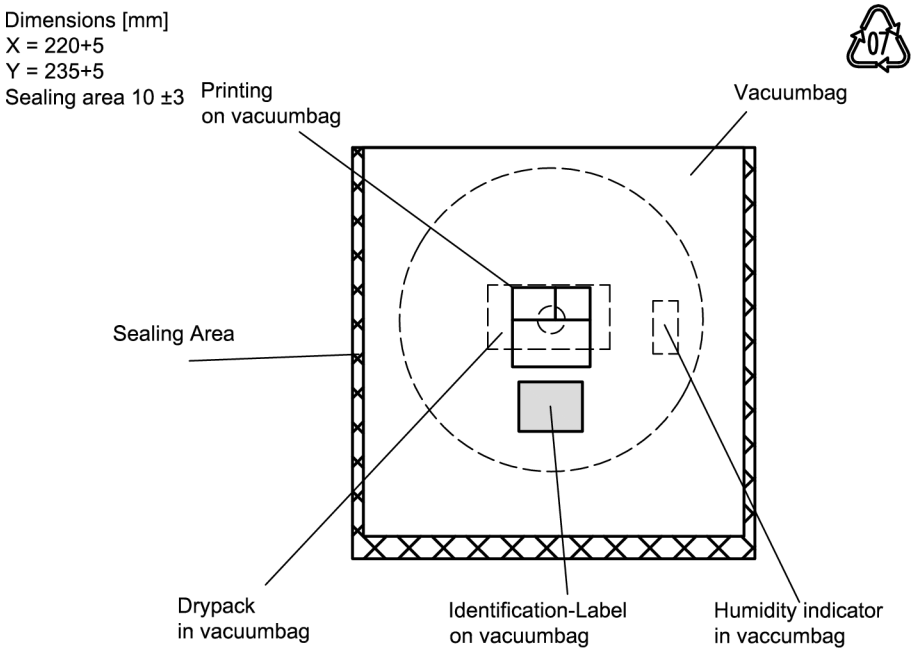

Figure 13: Drawing of moisture barrier bag (MBB) for reel with diameter of 180 mm.

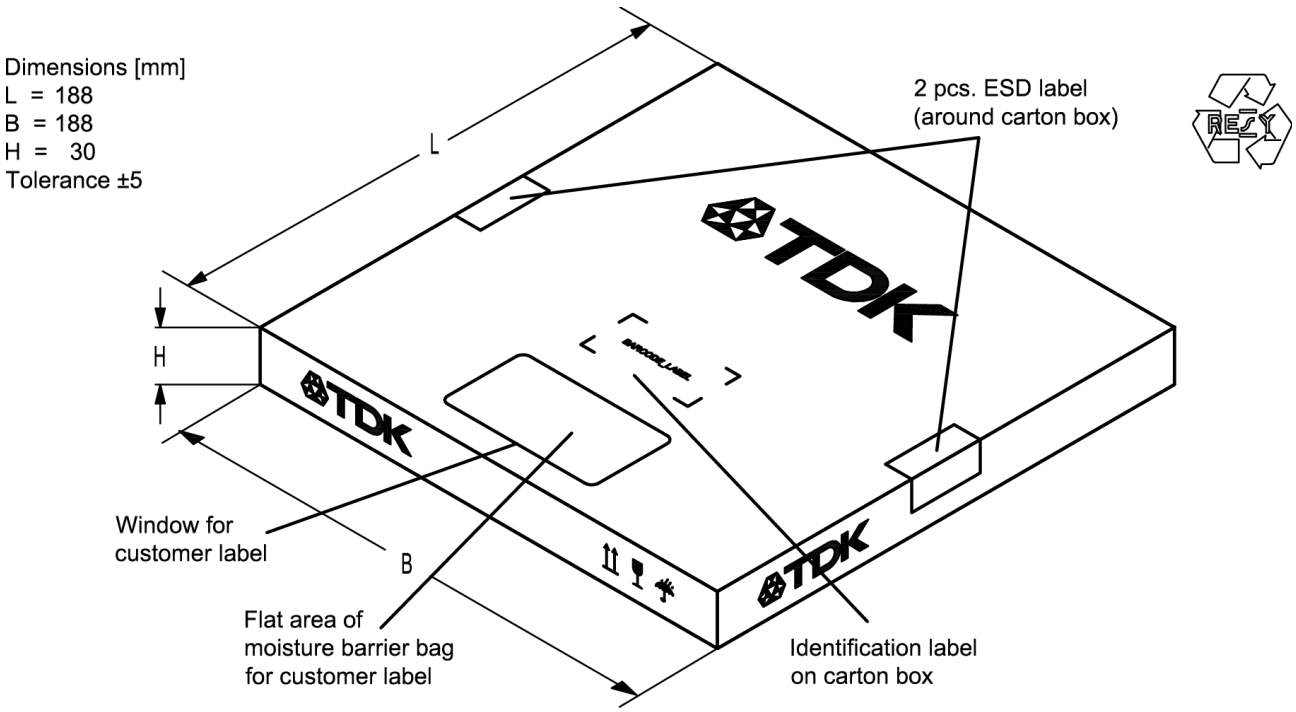

Figure 14: Drawing of folding box for reel with diameter of 180 mm.

11.3 Reel with diameter of 330 mm

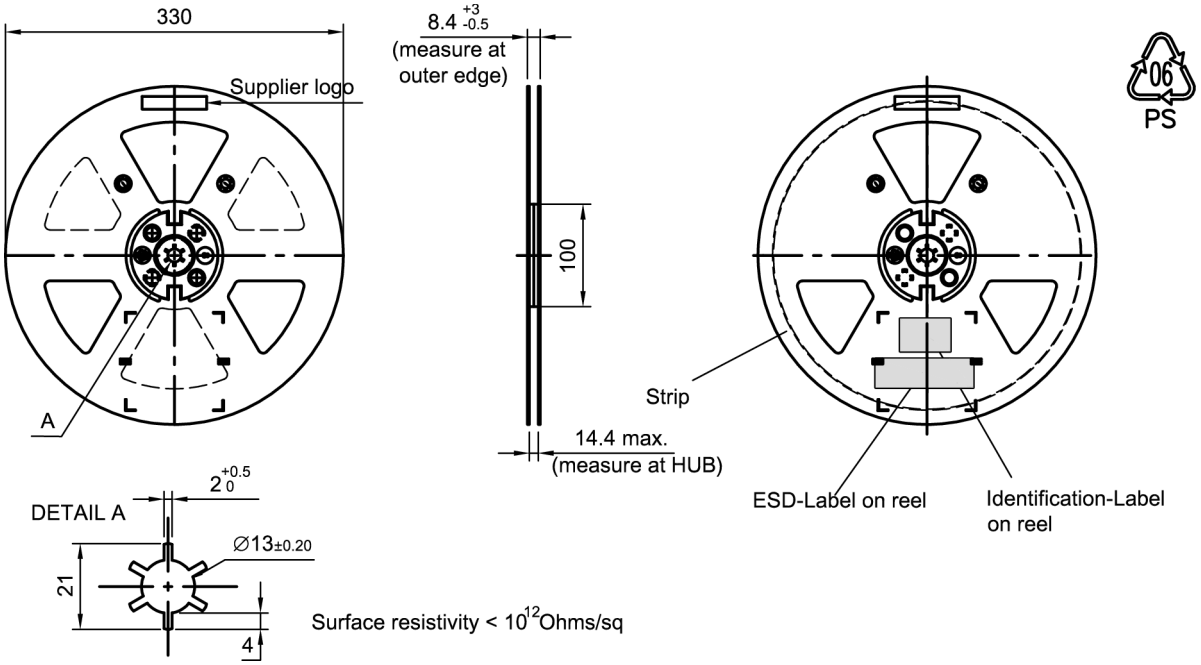

Figure 15: Drawing of reel (first-angle projection) with diameter of 330 mm.

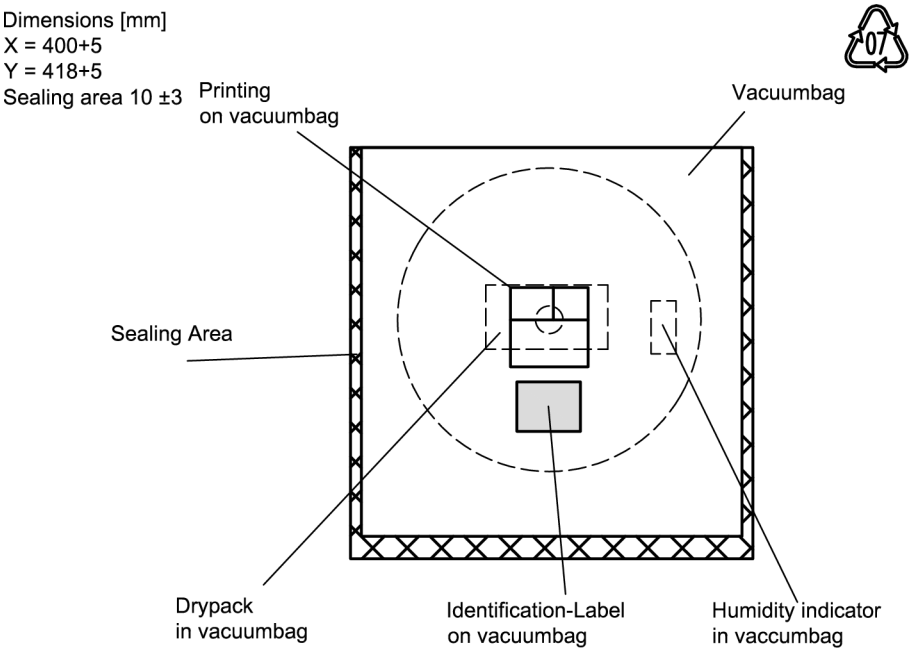

Figure 16: Drawing of moisture barrier bag (MBB) for reel with diameter of 330 mm.

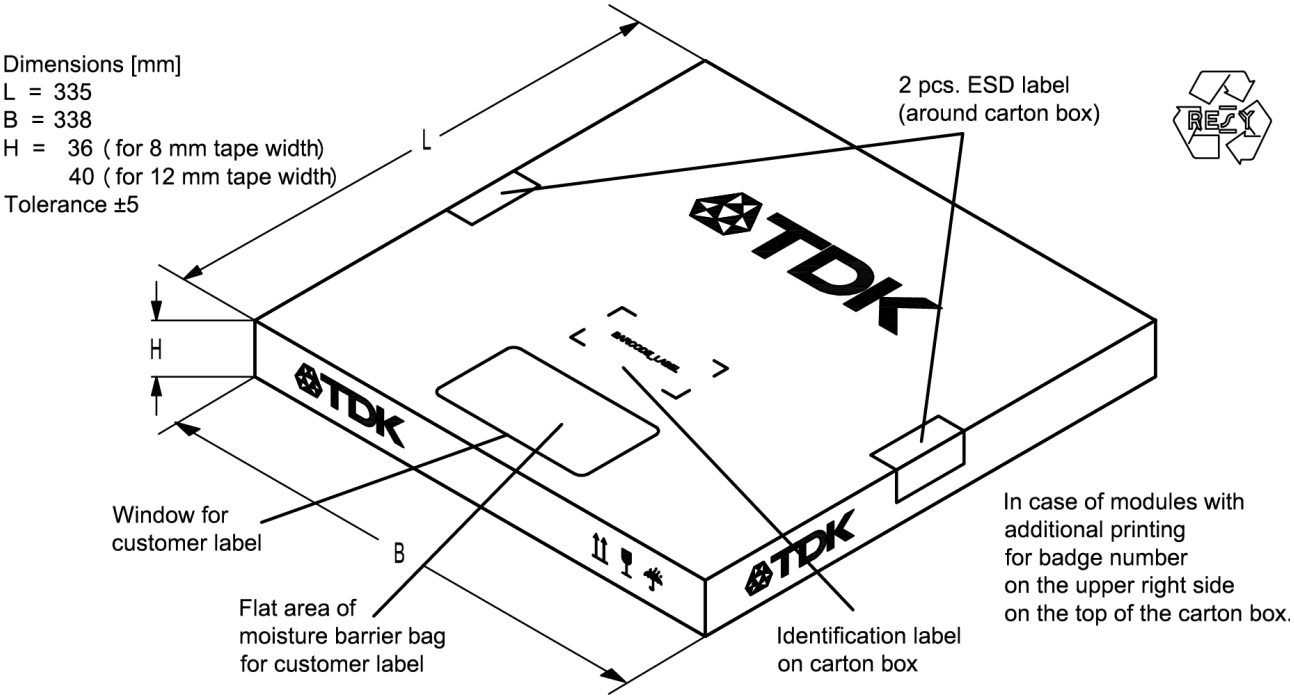

Figure 17: Drawing of folding box for reel with diameter of 330 mm.

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 2: Characteristics of recommended soldering profile for lead-free solder (Sn95.5Ag3.8Cu0.7).

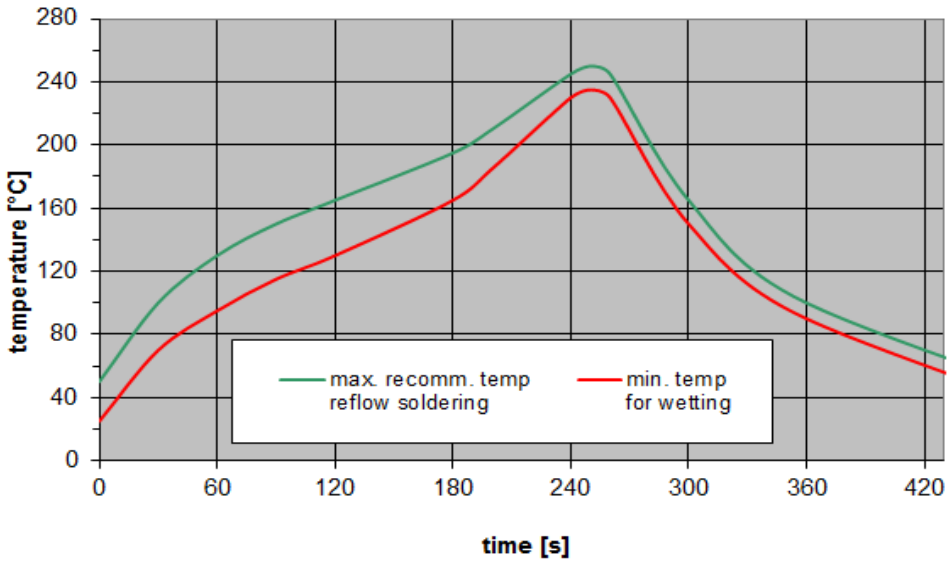

Figure 18: Recommended reflow profile for convection and infrared soldering – lead-free solder.

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.

14 Cautions and warnings

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14.2 Moldability

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14.3 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.

15 Revision history

Changes compared to previously issued iteration.

Version	Originator	Detailed specification changes	Date
1.0	S. IC / JoelZhou	Initial release.	Oct 21, 2015

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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