SAW Components

SAW Duplexer
LTE Band 3

Series/type:	B8680
Ordering code:	B39182B8680P810
Date:	06/22/15
Version:	1.0

Table of contents

Preliminary data sheet

1 Application

- Low-loss SAW duplexer for mobile telephone LTE Band 3 systems.
- Low insertion attenuaton.
- Low amplitude ripple.
- Usable passband 75 MHz.
- External matching needed at ANT port parallel 4.0 nH, at RX port serial 1.8 nH.

2 Features

- Package size 1.8 mm × 1.4 mm.
- Package height 0.475 mm max.
- 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).

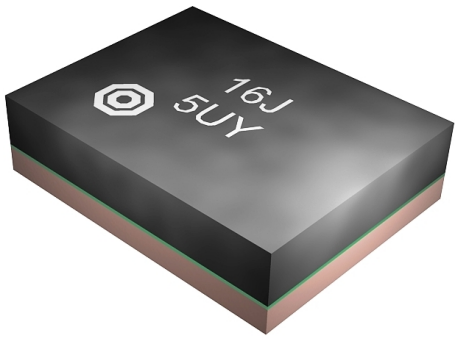

Figure 1: Perspective view.

3 Package

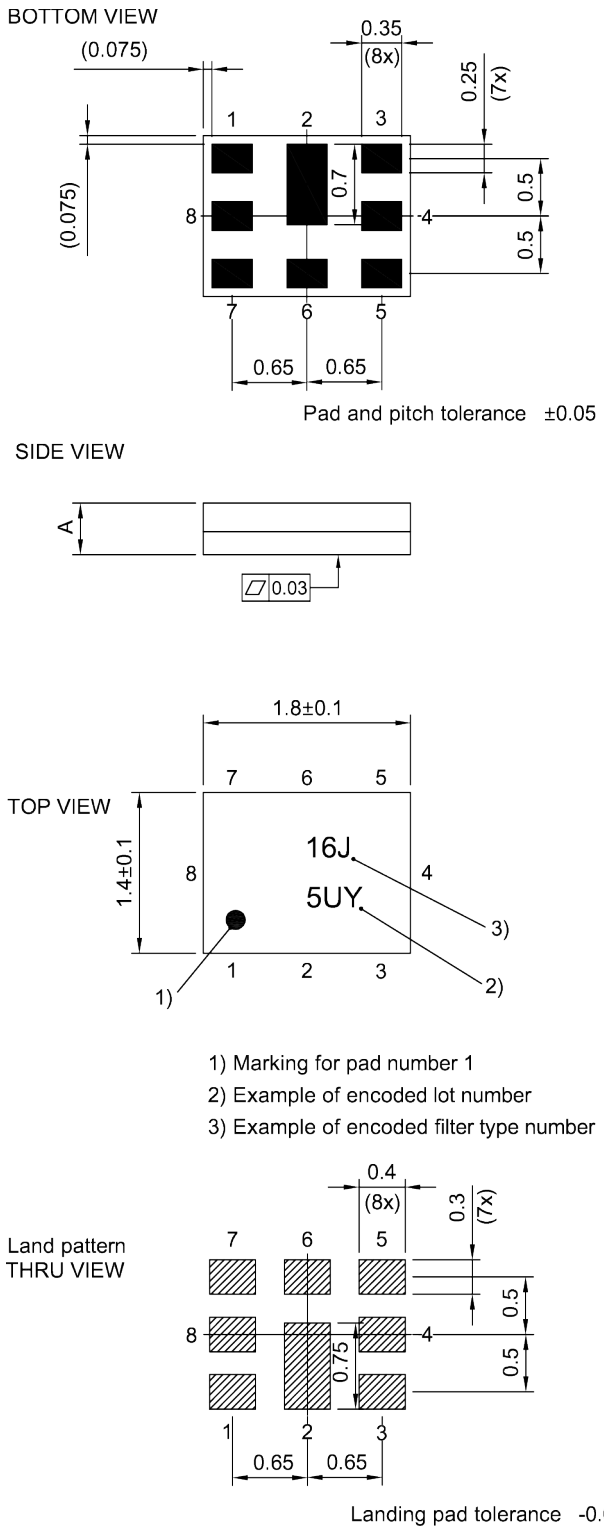

Figure 2: Drawing of package with package height A = 0.475 mm (max.). See Simplified drawings (p. 23).

4 Pin configuration

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

5 Matching circuit

■ L_{p6} = 4.0 nH ■ L_{s1} = 1.8 nH

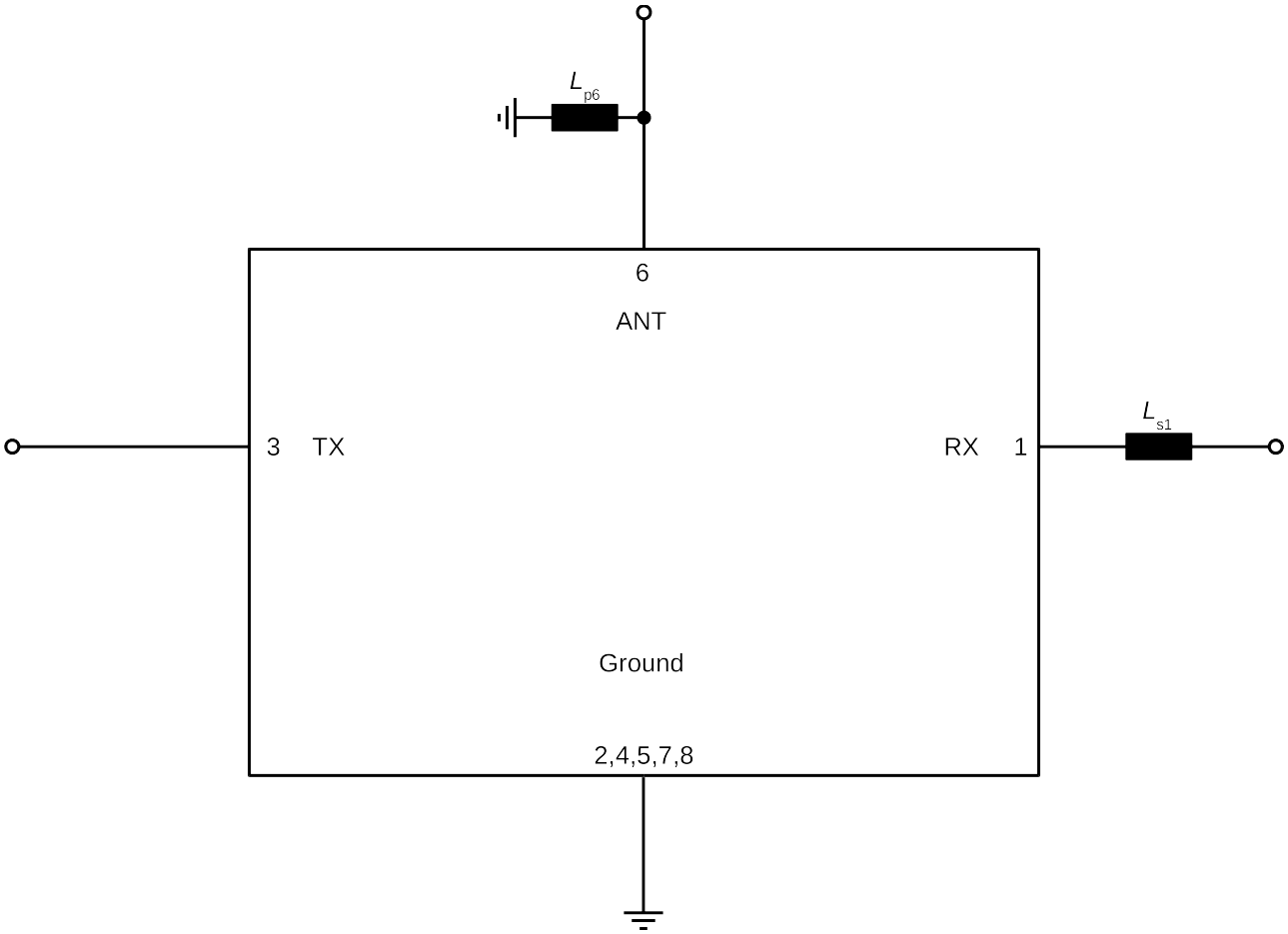

Figure 3: Schematic of matching circuit.

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. 4.0 nH
RX terminating impedance	Z_{RX}	= 50 Ω with ser. 1.8 nH

Characteristics TX – ANT				min.	typ. @+25 °C	max.	
Center frequency			f_C	—	1747.5	—	MHz
Maximum insertion attenuation			$\alpha_{LTE,max}$ [1]				
	1712.5 ... 1782.5	MHz		—	2.30	3.30	dB
Amplitude ripple (p-p)			$\Delta\alpha_{LTE}$ [1]				
	1712.5 ... 1782.5	MHz		—	0.50	2.00	dB
Maximum VSWR			$VSWR_{max}$				
@ TX port	1710.24 ... 1784.76	MHz		—	1.6	2.2	
@ ANT port	1710.24 ... 1784.76	MHz		—	1.8	2.2	
Maximum error vector magnitude			EVM_{max} [2]				
	1712.4 ... 1782.6	MHz		—	1.9	6.0 [3]	%
	1712.4 ... 1782.6	MHz		—	1.9	8.0 [4]	%
Minimum attenuation			α_{min}				
	10 ... 1565.5	MHz		30.0	34.0	—	dB
	716 ... 756	MHz		36.0	41.0	—	dB
	1496 ... 1511	MHz		30.0	37.0	—	dB
	1559 ... 1563	MHz		40.0	46.0	—	dB
	1565.42 ... 1573.37	MHz		40.0	47.0	—	dB
	1573.37 ... 1577.47	MHz		40.0	48.0	—	dB
	1577.47 ... 1585.42	MHz		40.0	46.0	—	dB
	1597.55 ... 1605.89	MHz		35.0	40.0	—	dB
	1605.89 ... 1680	MHz		22.0	32.0	—	dB
	1807.5 ... 1877.5	MHz	α_{LTE} [1]	40.0	48.0	—	dB
	1920 ... 1980	MHz		20.0	28.0	—	dB
	2110 ... 2170	MHz		32.0	38.0	—	dB
	2400 ... 2500	MHz		24.0	31.0	—	dB
	2620 ... 2690	MHz		21.0	28.0	—	dB
	3420 ... 3570	MHz		14.0	18.0	—	dB
	5130 ... 5355	MHz		8.00	23.0	—	dB

Characteristics TX – ANT			min.	typ. @+25 °C	max.	
	4900... 5950	MHz	8.00	19.0	—	dB

1) LTE - Averaged value of linear s-parameter over 5MHz.
2) Error Vector Magnitude (EVM) based on definition given in 3GPP TS 25.141.
3) Valid for temperature *T* = 0 °C...+85 °C.
4) Valid for temperature *T* = -30 °C...0 °C.

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. 4.0 nH
RX terminating impedance	Z_{RX}	= 50 Ω with ser. 1.8 nH

Characteristics ANT – RX				min.	typ. @+25 °C	max.	
Center frequency			f_C	—	1842.5	—	MHz
Maximum insertion attenuation			$\alpha_{LTE,max}$ [1]				
	1807.5 ... 1877.5	MHz		—	2.50	3.80	dB
Amplitude ripple (p-p)			$\Delta\alpha_{LTE}$ [1]				
	1807.5 ... 1877.5	MHz		—	0.80	2.50	dB
Maximum VSWR			$VSWR_{max}$				
@ ANT port	1805.24 ... 1879.76	MHz		—	1.5	2.2	
@ RX port	1805.24 ... 1879.76	MHz		—	1.8	2.2	
Maximum error vector magnitude			EVM_{max} [2]				
	1807.4 ... 1877.6	MHz		—	2.5	6.0 [3]	%
	1807.4 ... 1877.6	MHz		—	2.5	8.0 [4]	%
Minimum attenuation			α_{min}				
	10 ... 200	MHz		50.0	70.0	—	dB
	50 ... 95	MHz		50.0	70.0	—	dB
	1615 ... 1690	MHz		45.0	52.0	—	dB
	95 ... 1710	MHz		40.0	47.0	—	dB
	200 ... 1615	MHz		40.0	47.0	—	dB
	1712.5 ... 1782.5	MHz	α_{LTE} [1]	45.0	54.0	—	dB
	1785 ... 1790	MHz		10.0	45.0	—	dB
	1920 ... 2570	MHz		20.0 [5]	45.0	—	dB
	1920 ... 2570	MHz		30.0 [6]	45.0	—	dB
	2400 ... 2500	MHz		37.0	45.0	—	dB
	2500 ... 2570	MHz		40.0	45.0	—	dB
	2570 ... 3515	MHz		40.0	45.0	—	dB
	3515 ... 3760	MHz		40.0	52.0	—	dB
	4900 ... 5950	MHz		34.0	48.0	—	dB
	3760 ... 6000	MHz		34.0	48.0	—	dB
	5205 ... 5660	MHz		34.0	48.0	—	dB

[1] LTE - Averaged value of linear s-parameter over 5MHz.
[2] Error Vector Magnitude (EVM) based on definition given in 3GPP TS 25.141.

3) Valid for temperature *T* = 0 °C...+85 °C.
4) Valid for temperature *T* = -30 °C...0 °C.
5) Valid for temperature *T* = −35 °C...+25 °C.
6) Valid for temperature *T* = +25 °C...+85 °C.

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. 4.0 nH
RX terminating impedance	Z_{RX}	= 50 Ω with ser. 1.8 nH

Characteristics TX – RX			min.	typ. @+25 °C	max.	
Minimum isolation	$\alpha_{LTE,min}$ [1]					
	1712.5... 1782.5	MHz	52.0	55.0	—	dB
	1807.5... 1877.5	MHz	50.0 [2]	56.0	—	dB
	1807.5... 1877.5	MHz	46.0 [3]	56.0	—	dB

1) LTE - Averaged value of linear s-parameter over 5MHz.
2) Valid for temperature T = 0 °C...+85 °C.
3) Valid for temperature T = -30 °C...0 °C.

7 Maximum ratings

Storage temperature	T_{STG} = −40 °C to +90 °C	
DC voltage	V_{DC} = 5.0 V (max.)[1)]	
ESD voltage	V_{ESD}[2)] = 50 V (max.)	Machine model.
Input power @ TX port: 1715 ... 1780 MHz	P_{IN} = 29 dBm	10 MHz LTE uplink for 5000 h @ 50 °C.

1) 168h Damp Heat Steady State acc. to IEC60068-2-67 Cy.
2) According to JESD22-A115B (MM – Machine Model), 10 negative & 10 positive pulses.

8 Transmission coefficients

8.1 TX – ANT

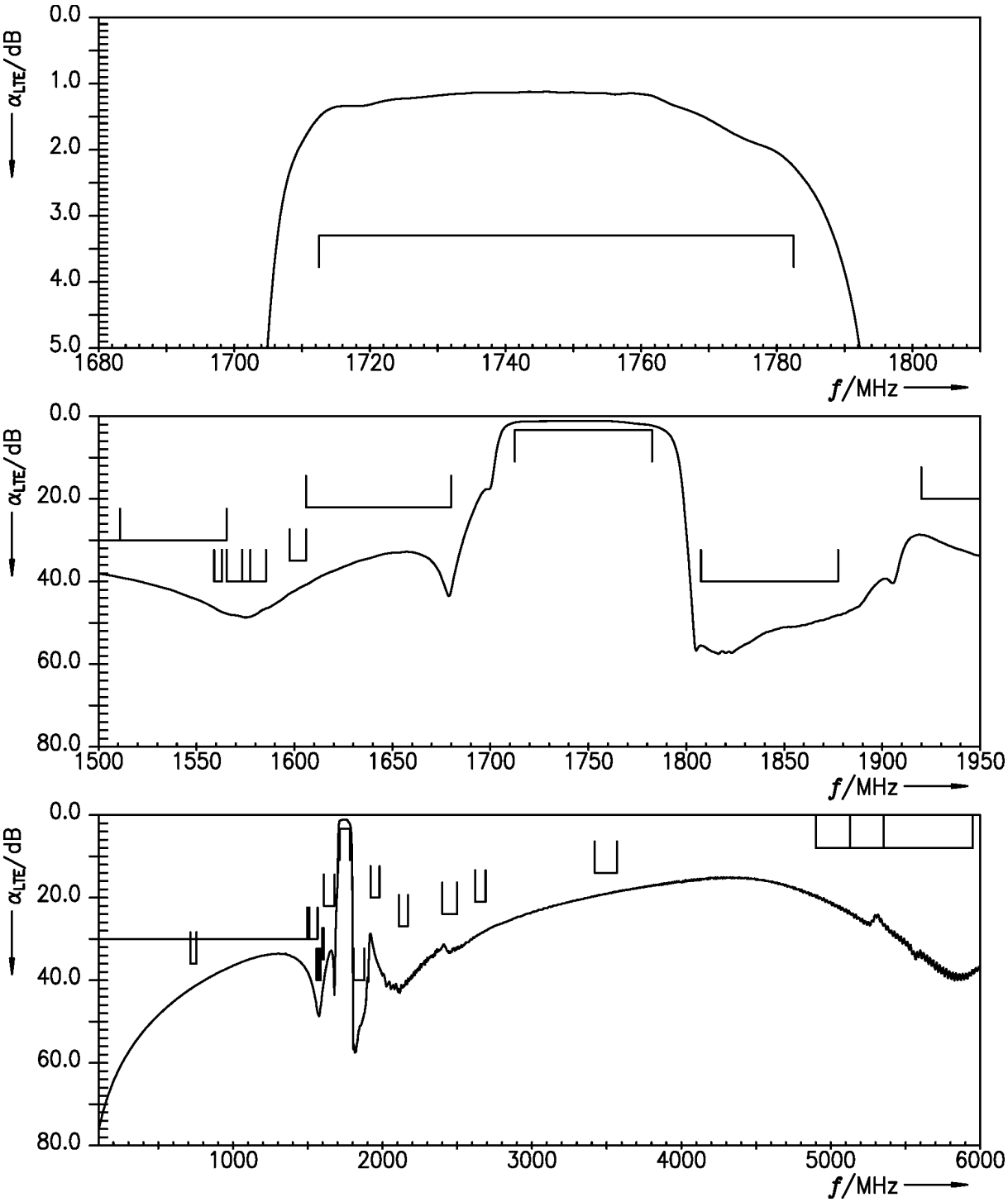

Figure 4: Attenuation TX – ANT.

8.2 ANT – RX

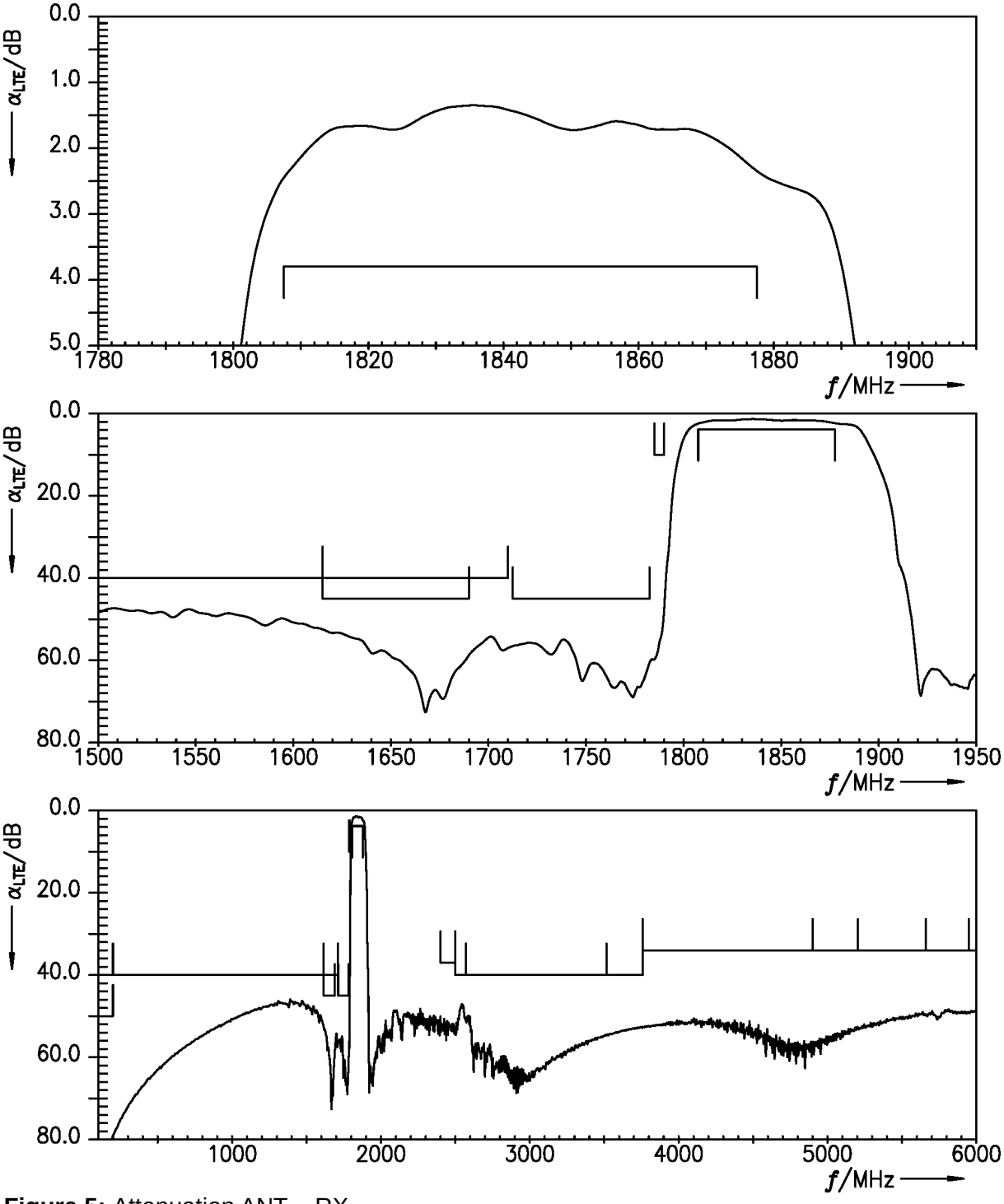

Figure 5: Attenuation ANT – RX.

8.3 TX – RX

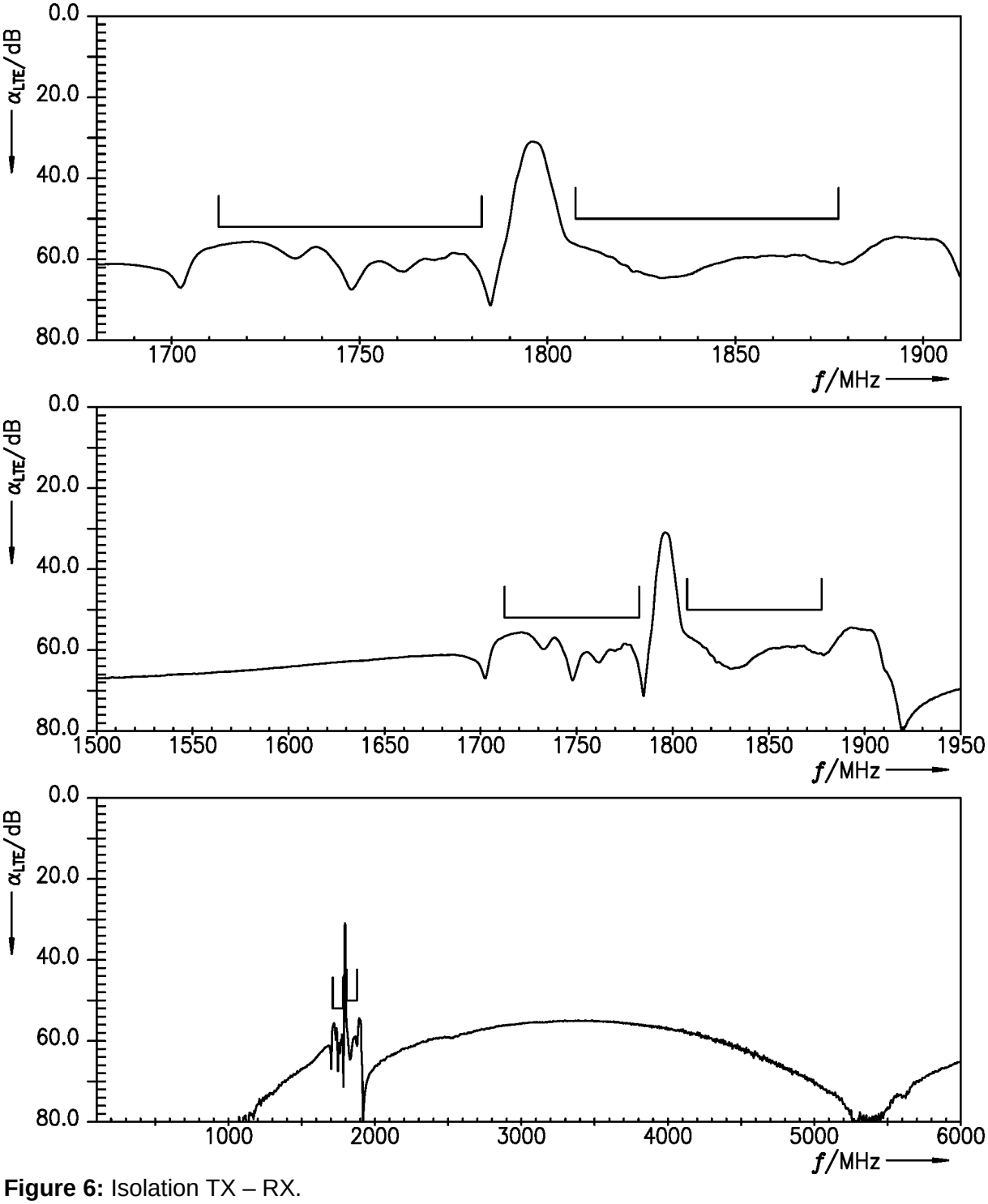

Figure 6: Isolation TX – RX.

9 Reflection coefficients

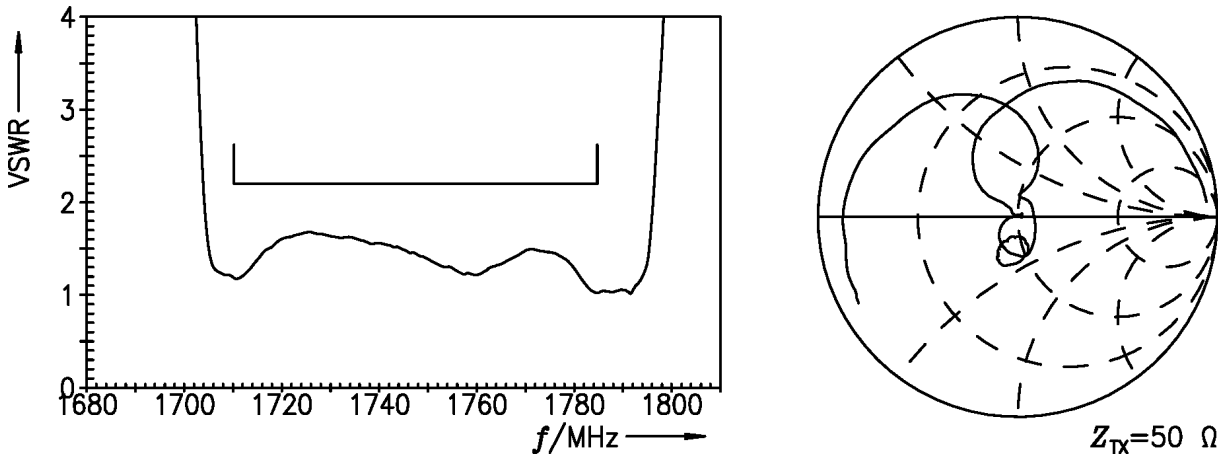

Figure 7: Reflection coefficient at TX port.

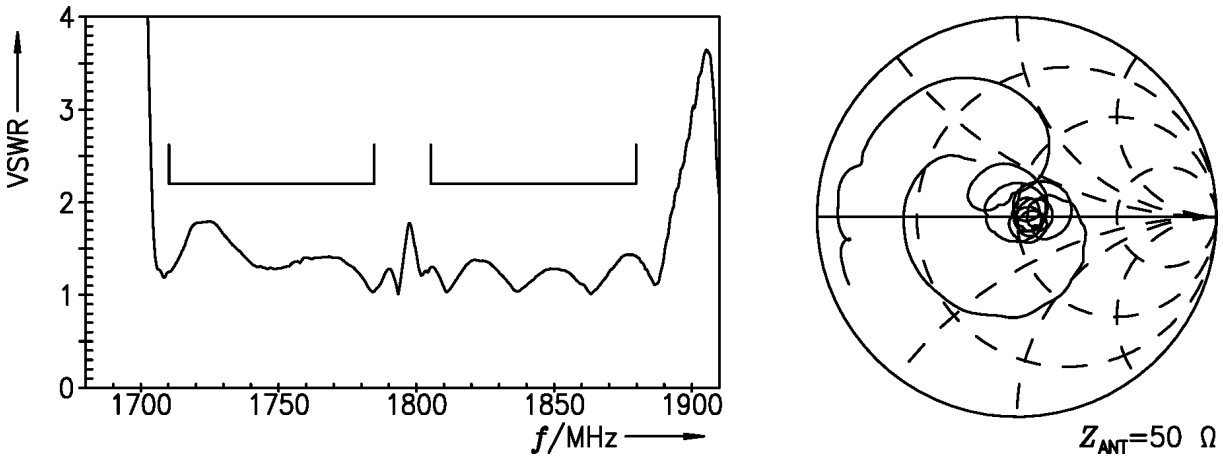

Figure 8: Reflection coefficient at ANT port (TX and RX frequencies).

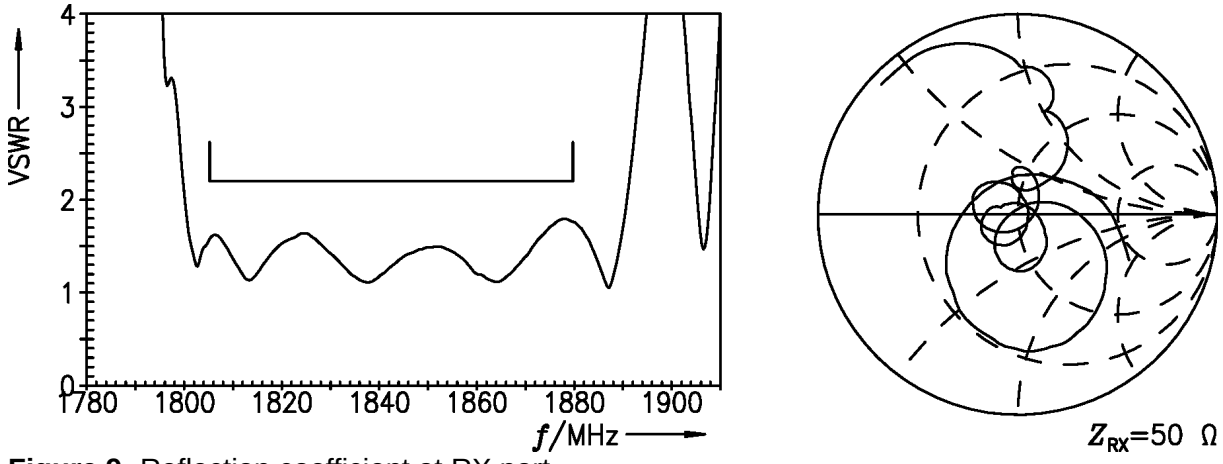

Figure 9: Reflection coefficient at RX port.

10 EVMs

10.1 TX – ANT

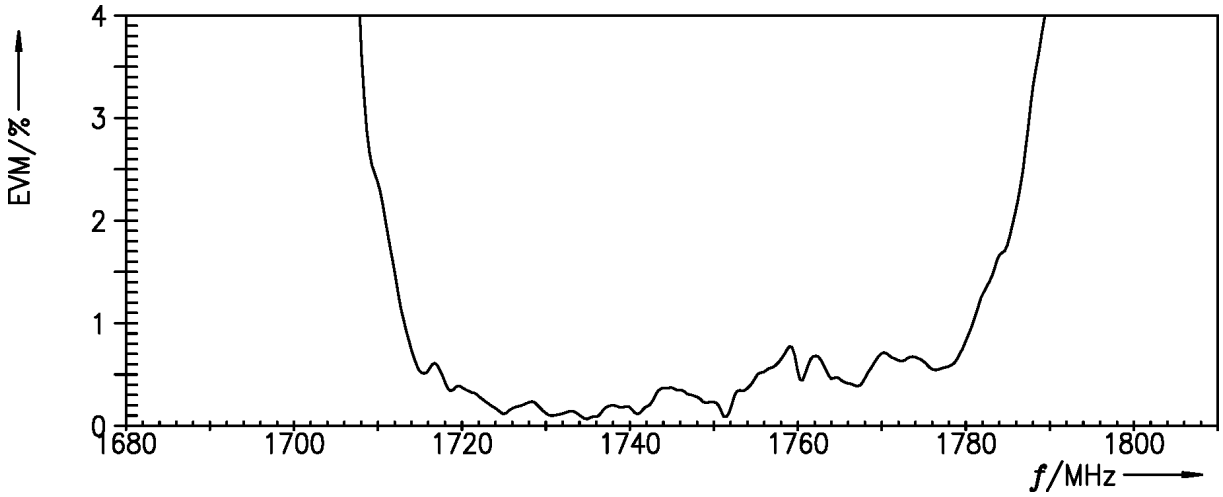

Figure 10: Error vector magnitude TX – ANT.

10.2 ANT – RX

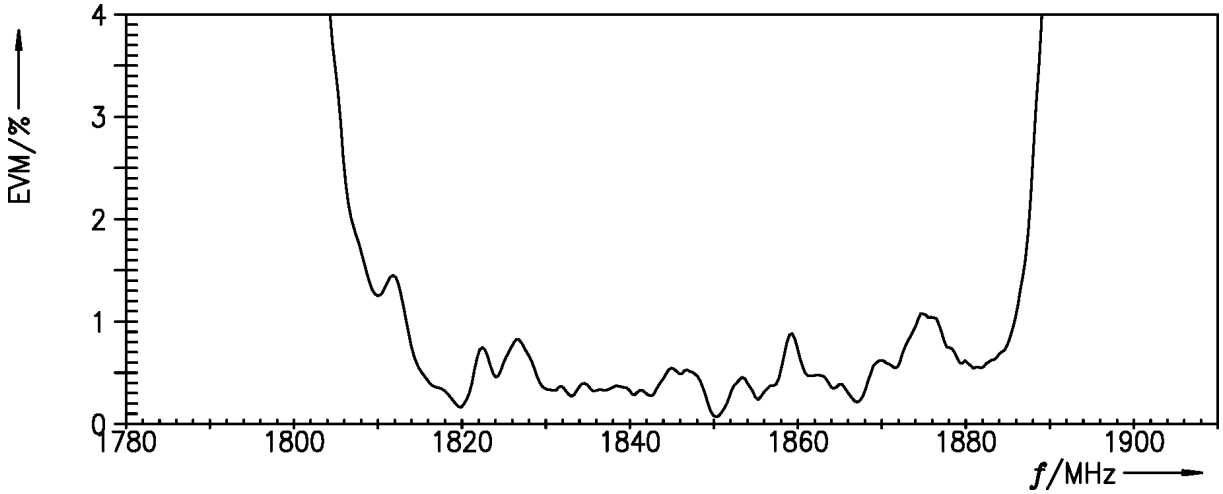

Figure 11: Error vector magnitude ANT – RX.

11 Packing material

11.1 Tape

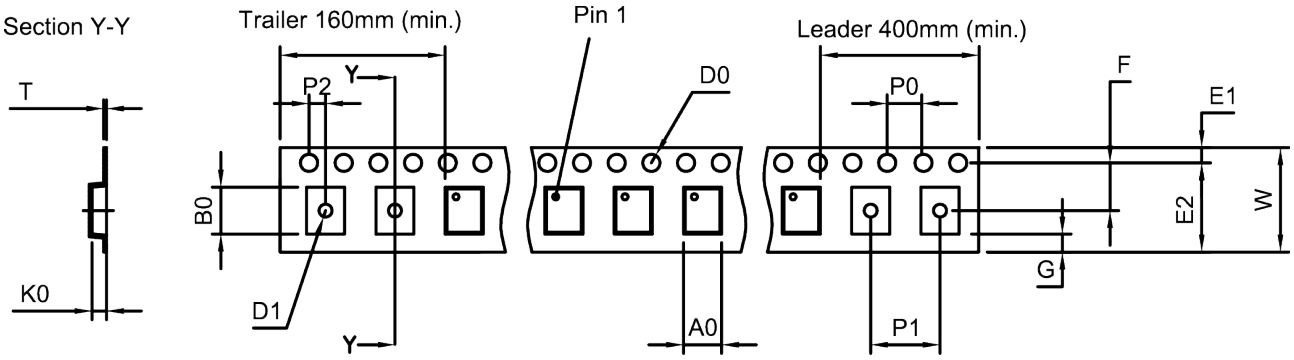

Figure 12: Drawing of tape (first-angle projection) with tape dimensions according to Table 1.

A_0	$1.62_{\pm 0.05}$ 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

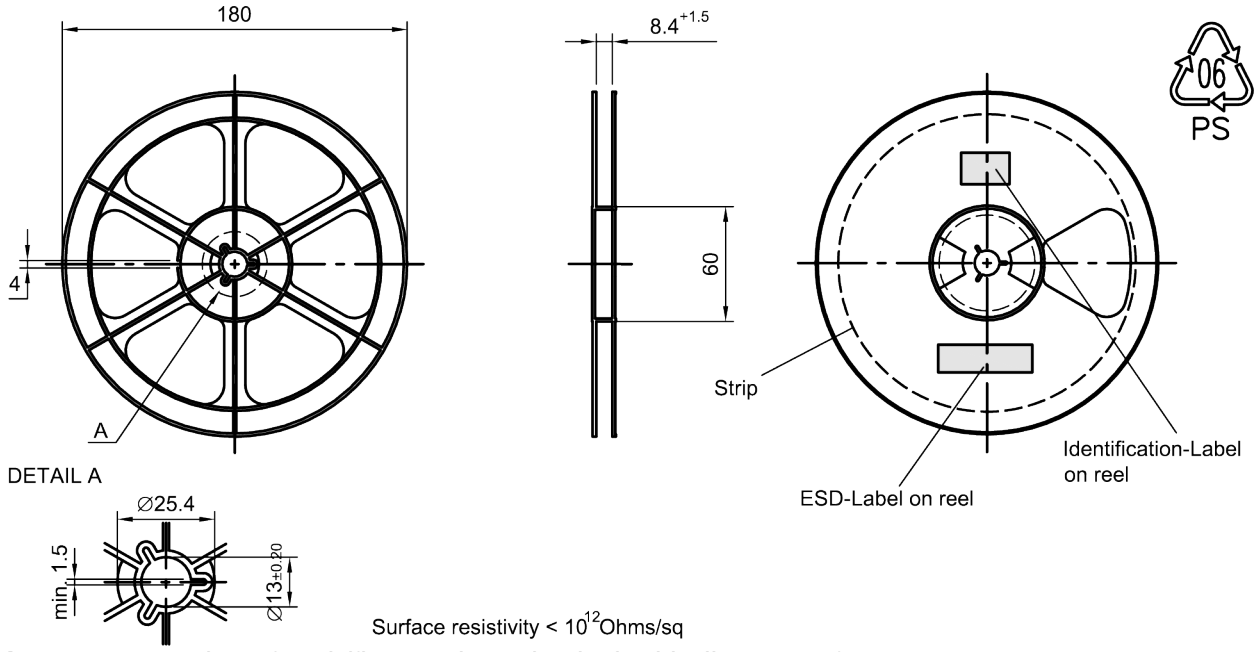

Figure 13: Drawing of reel (first-angle projection) with diameter of 180 mm.

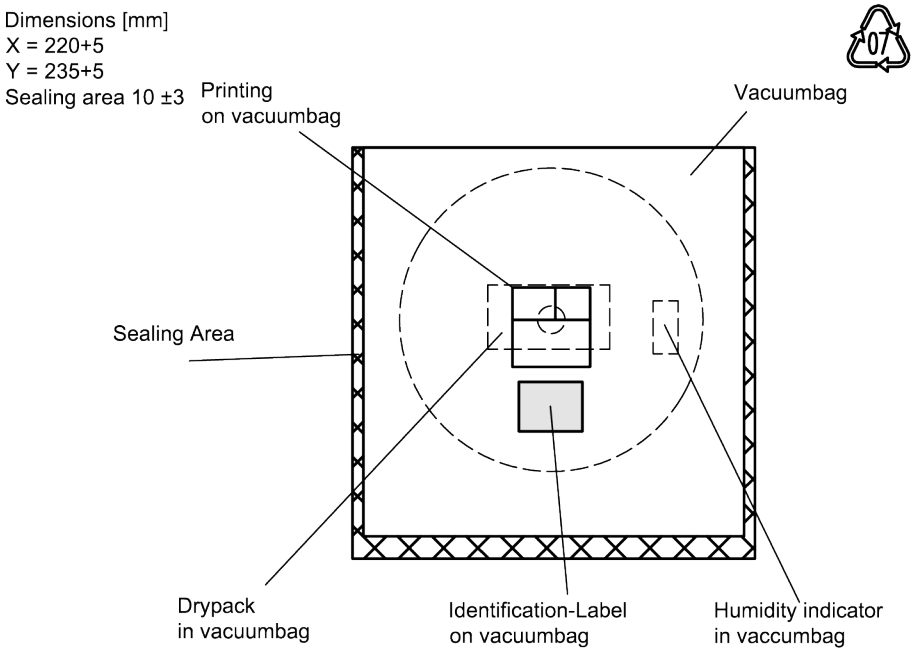

Figure 14: Drawing of moisture barrier bag (MBB) for reel with diameter of 180 mm.

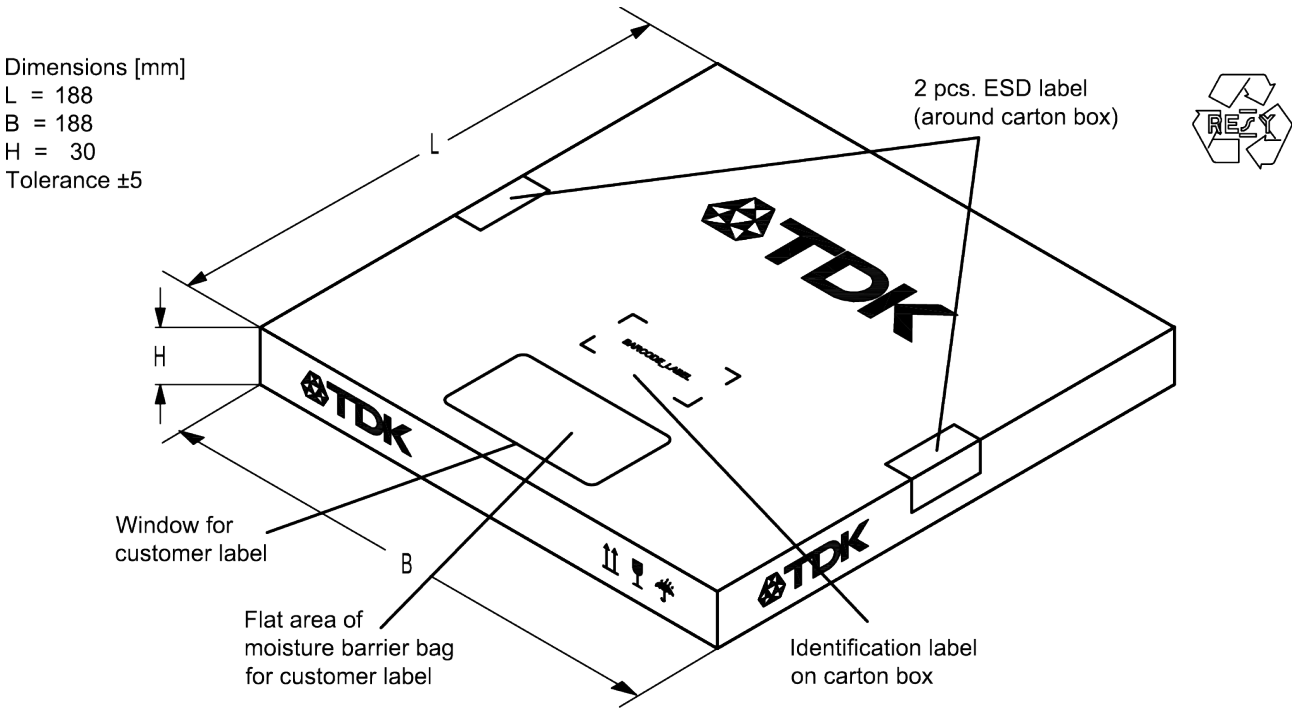

Figure 15: Drawing of folding box for reel with diameter of 180 mm.

11.3 Reel with diameter of 330 mm

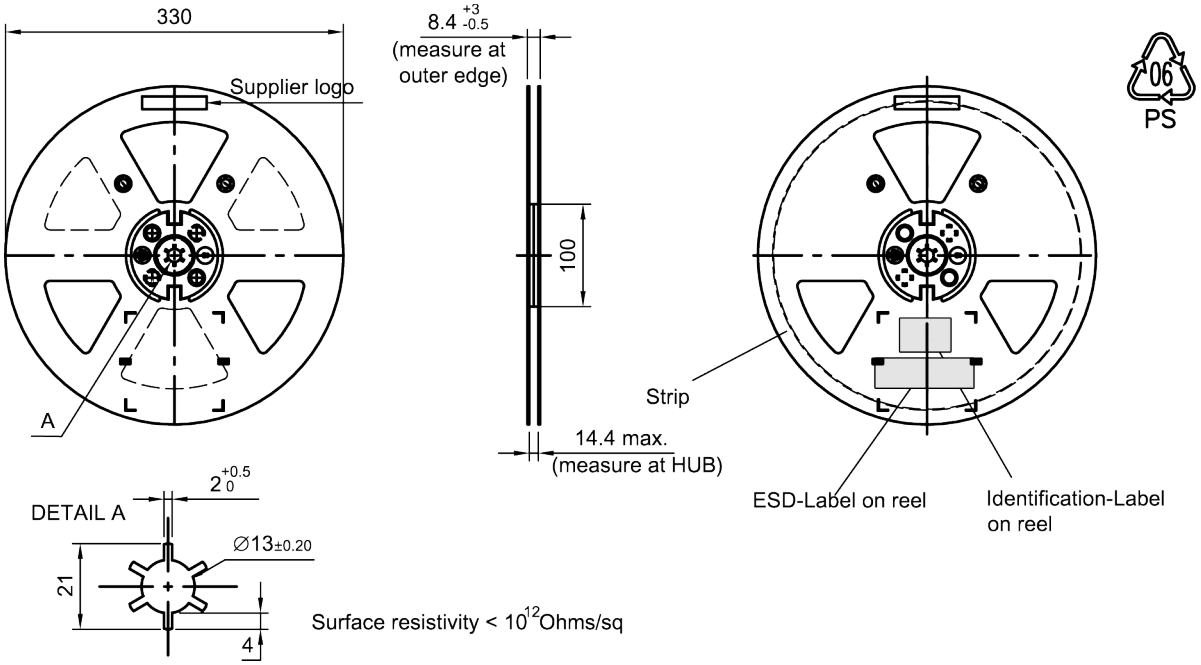

Figure 16: Drawing of reel (first-angle projection) with diameter of 330 mm.

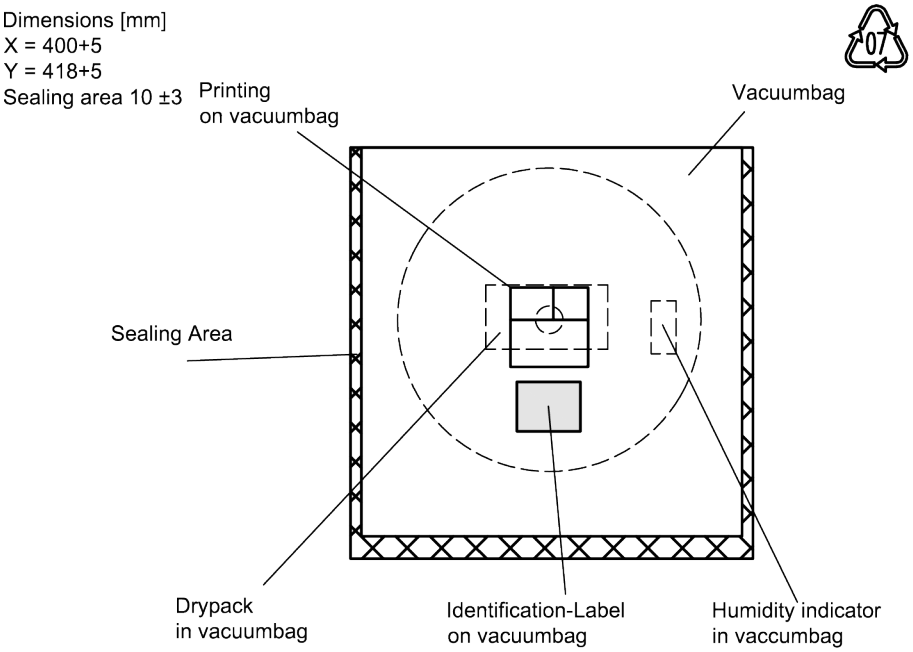

Figure 17: Drawing of moisture barrier bag (MBB) for reel with diameter of 330 mm.

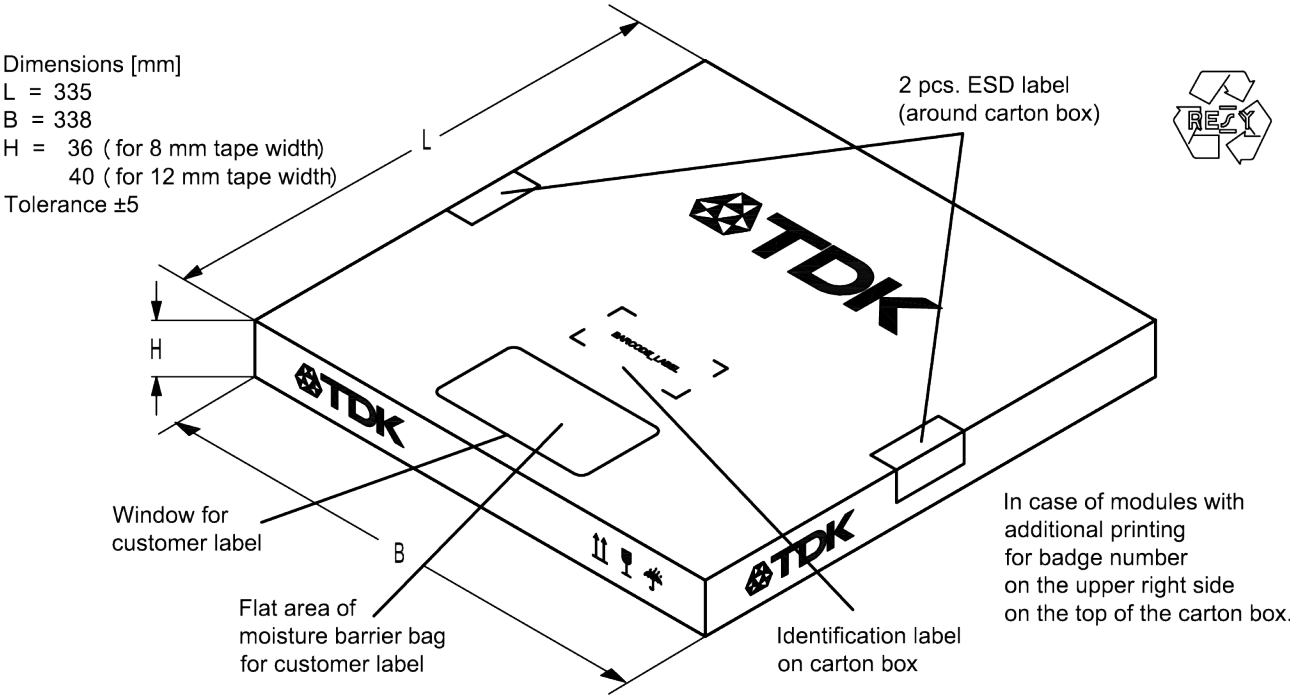

Figure 18: Drawing of folding box for reel with diameter of 330 mm.

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).

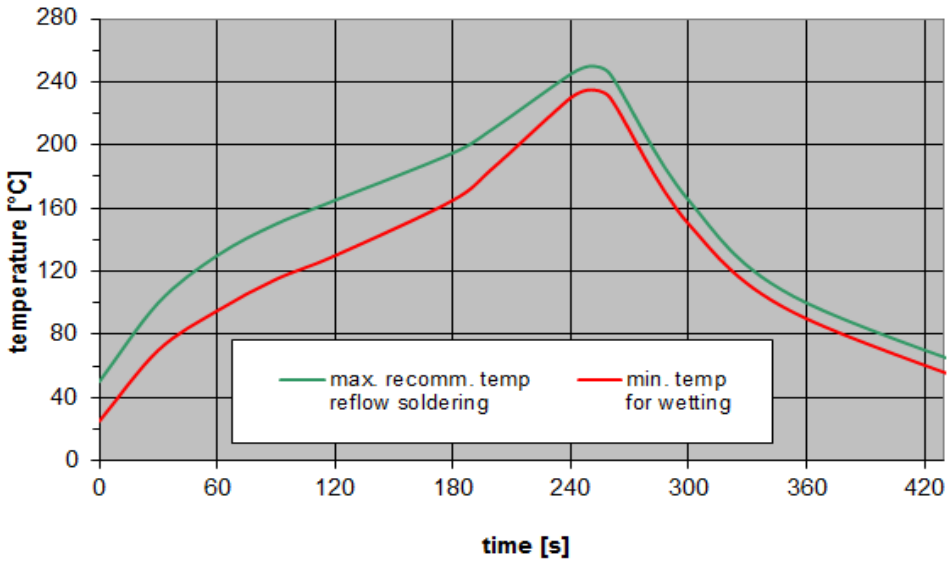

Figure 19: Recommended reflow profile for convection and infrared soldering – lead-free solder.

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

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.

15 Revision history

Changes compared to previously issued iteration.

Version	Originator	Detailed specification changes	Date
0.1	C. Drexler		Jun 16, 2015
1.0	C. Drexler		Jun 17, 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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