



SAW Components

SAW Duplexer LTE Band 13

Series/type:	B8031
Ordering code:	B39781B8031P810
Date:	November 17, 2015
Version:	2.0

Data sheet

Table of contents

1 Application	3
2 Features	3
3 Package	4
4 Pin configuration	4
5 Matching circuit	5
6 Characteristics	6
7 Maximum ratings	10
8 Transmission coefficients	11
9 Reflection coefficients	14
10 Packing material	15
11 Marking	18
12 Soldering profile	20
13 Annotations	21
14 Cautions and warnings	21
Contact and Important notes	22

Data sheet

1 Application

- Low-loss SAW duplexer for mobile telephone LTE Band 13 systems, also suitable for CDMA applications.
- NS07 rejection, public safety frequency band.
- High isolation.
- Single-ended duplexer.
- Near zero temperature drift.

2 Features

- Package size $2.5 \pm 0.1 \text{ mm} \times 2.0 \pm 0.1 \text{ mm}$.
- Package height 0.5 mm (max.).
- Approximate weight 0.007 g.
- RoHS compatible.
- Package for Surface Mount Technology (SMT).
- Ni/Au-plated terminals.
- Electrostatic Sensitive Device (ESD).
- Moisture Sensitivity Level 3 (MSL3).

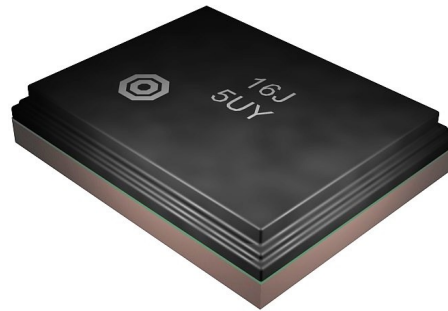
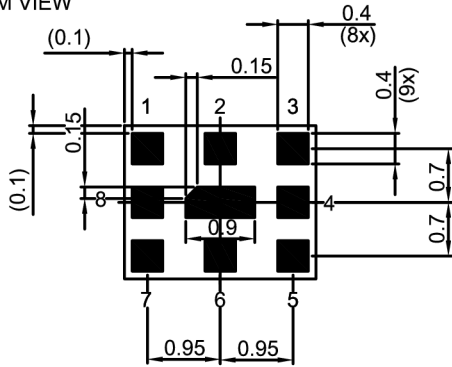


Figure 1: Picture of component with example of marking.

Data sheet

3 Package

BOTTOM VIEW

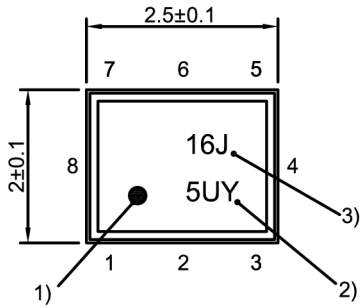


Pad and pitch tolerance ±0.05

SIDE VIEW

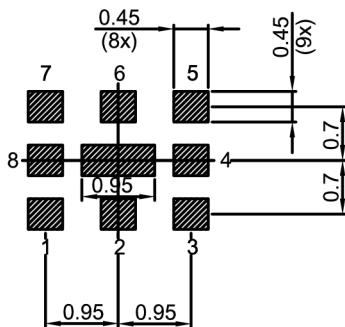


TOP VIEW



- 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 Simplified drawings (p. 21).

4 Pin configuration

- 1 RX
- 3 TX
- 6 ANT
- 2, 4, 5, 7, 8, 9 Ground

Data sheet

5 Matching circuit

■ $L_{p6} = 15 \text{ nH}$

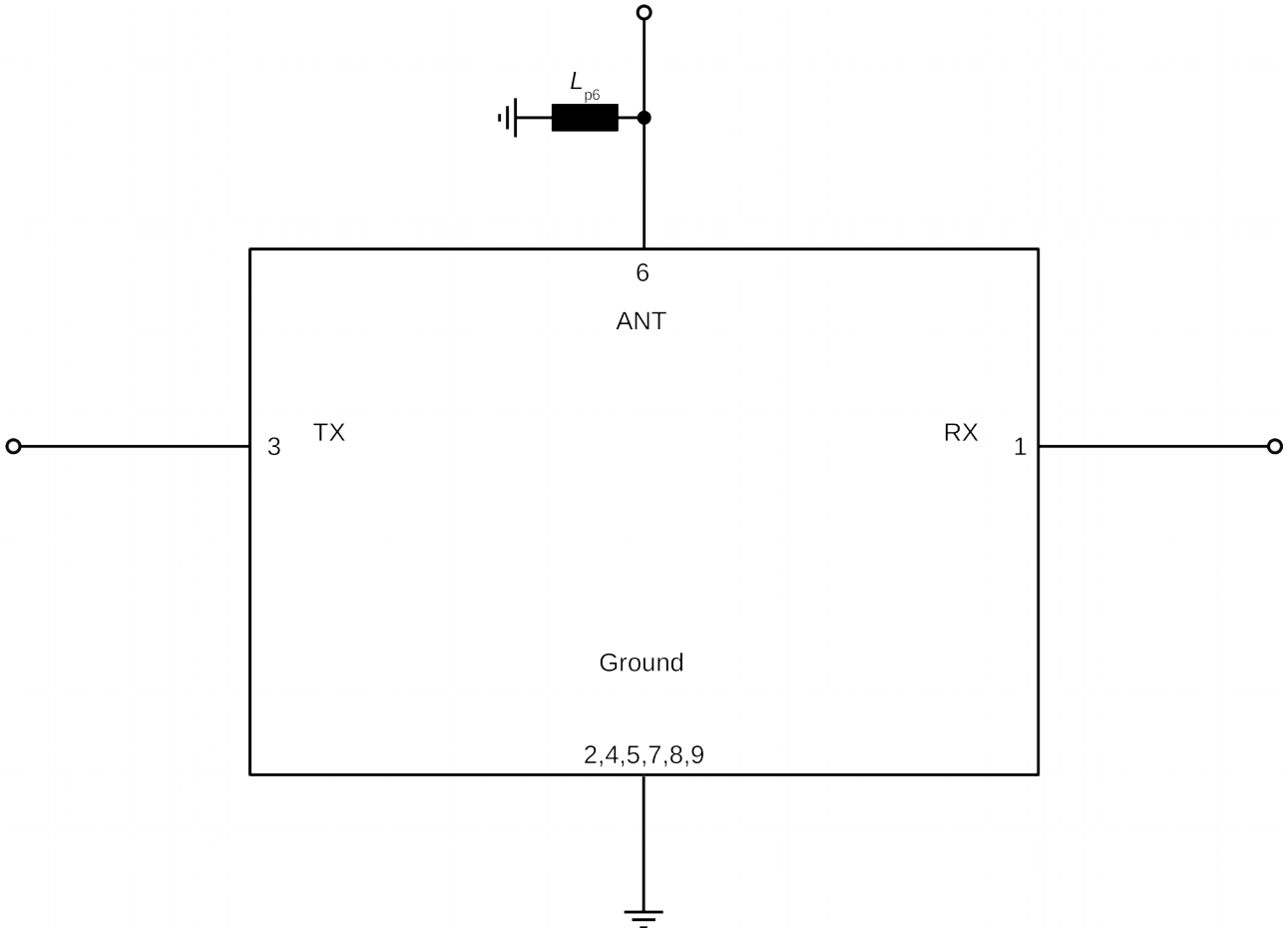


Figure 3: Schematic of matching circuit.

Data sheet

6 Characteristics

6.1 TX – ANT

Temperature range for specification	T	= -20 °C to +90 °C
TX terminating impedance	Z_{TX}	= 50 Ω
ANT terminating impedance	Z_{ANT}	= 50 Ω with par. 15 nH
RX terminating impedance	Z_{RX}	= 50 Ω

Characteristics TX – ANT				min.	typ. @+25 °C	max.	
Center frequency			f_C	—	782	—	MHz
Maximum insertion attenuation			α_{max}				
	777.34... 786.66	MHz		—	2.9	3.6 ¹⁾	dB
	777.5... 786.5	MHz		—	2.7	3.7 ²⁾	dB
	777.5... 786.5	MHz		—	2.7	3.3 ¹⁾	dB
Amplitude ripple (p-p)			$\Delta\alpha^{3)}$				
	777.5... 786.5	MHz		—	1.3	2.4	dB
Maximum VSWR			VSWR _{max}				
@ TX port	777.5... 786.5	MHz		—	1.5	2.0	
@ ANT port	777.5... 786.5	MHz		—	1.6	2.0	
Minimum attenuation			α_{min}				
	10... 716	MHz		30	38	—	dB
	716... 728	MHz		35	43	—	dB
	728... 746	MHz		40	46	—	dB
	746... 756	MHz		45	52	—	dB
	758... 768	MHz		33	37	—	dB
NS07	768... 775	MHz		10 ⁴⁾	21 ⁴⁾	—	dB
	793... 805	MHz		10	20	—	dB
	869... 894	MHz		30	41	—	dB
	1226... 1250	MHz		40	53	—	dB
	1554... 1565	MHz		45	50	—	dB
	1565... 1607	MHz		45	49	—	dB
	1710... 2170	MHz		35	40	—	dB
	2331... 2361	MHz		30	38	—	dB
	2400... 2484	MHz		30	38	—	dB
	3108... 3148	MHz		30	34	—	dB
	4900... 5950	MHz		10	15	—	dB

¹⁾ Valid for temperature $T = +25\text{ °C} \dots +90\text{ °C}$.

²⁾ Valid for temperature $T = -20\text{ °C} \dots +25\text{ °C}$.

Data sheet

- 3) Over any channel with band width of 5 MHz.
- 4) Relative to integrated insertion loss in 777.5 – 786.5MHz over 1RB.

Data sheet

6.2 ANT – RX

Temperature range for specification	T	= -20 °C to +90 °C
TX terminating impedance	Z_{TX}	= 50 Ω
ANT terminating impedance	Z_{ANT}	= 50 Ω with par. 15 nH
RX terminating impedance	Z_{RX}	= 50 Ω

Characteristics ANT – RX		min.	typ. @+25 °C	max.	
Center frequency	f_C	—	751	—	MHz
Maximum insertion attenuation	α_{max}	—	1.7	2.3	dB
746... 756 MHz					
Amplitude ripple (p-p)	$\Delta\alpha$	—	0.5	1.4	dB
746... 756 MHz					
Maximum VSWR	$VSWR_{max}$	—	1.4	2.0	
@ ANT port					
@ RX port			1.5	2.0	
Minimum attenuation	α_{min}	40	45	—	dB
10... 550 MHz					
550... 686 MHz		20	28	—	dB
686... 728 MHz		30	42	—	dB
771... 772 MHz		30	33	—	dB
777... 787 MHz		50	56	—	dB
1523... 1583 MHz		40	45	—	dB
1710... 1755 MHz		40	44	—	dB
1850... 1910 MHz		40	44	—	dB
2238... 2268 MHz		40	44	—	dB
2400... 2500 MHz		40	44	—	dB
4900... 5950 MHz		10	15	—	dB

Data sheet

6.3 TX – RX

Temperature range for specification	T	= -20 °C to +90 °C
TX terminating impedance	Z_{TX}	= 50 Ω
ANT terminating impedance	Z_{ANT}	= 50 Ω with par. 15 nH
RX terminating impedance	Z_{RX}	= 50 Ω

Characteristics TX – RX		min.	typ. @+25 °C	max.	
Minimum isolation	α_{min}				
	746... 751 MHz	51.5	53.5	—	dB
	751... 756 MHz	53	57	—	dB
	777... 787 MHz	56	60	—	dB
	1552... 1574 MHz	30	60	—	dB
	2328... 2361 MHz	30	57	—	dB
	3104... 3148 MHz	30	54	—	dB

SAW Components	B8031
SAW Duplexer	751.0 / 782.0

Data sheet

7 Maximum ratings

Storage temperature	$T_{STG} = -40\text{ °C to }+85\text{ °C}$	
DC voltage	$V_{DC} = 5.0\text{ V (max.)}$	
ESD voltage		
	$V_{ESD}^{1)}$	100 V (max.) Machine model.
	$V_{ESD}^{2)}$	600 V (max.) Charged device model.
	$V_{ESD}^{3)}$	325 V (max.) Human body model.
Input power	P_{IN}	
@ TX port: 777.5 ... 786.5 MHz	29 dBm	Continuous wave for 5000 h @ 50 °C.
@ TX port: other frequency range(s)	10 dBm	Continuous wave for 5000 h @ 50 °C.

¹⁾ According to JESD22-A115B (MM – Machine Model), 10 negative & 10 positive pulses.

²⁾ According to JESD22-C101C (CDM – Field Induced Charged Device Model), 3 negative & 3 positive pulses.

³⁾ According to JESD22-A114F (HBM – Human Body Model), 1 negative & 1 positive pulse.

Data sheet

8 Transmission coefficients

8.1 TX – ANT

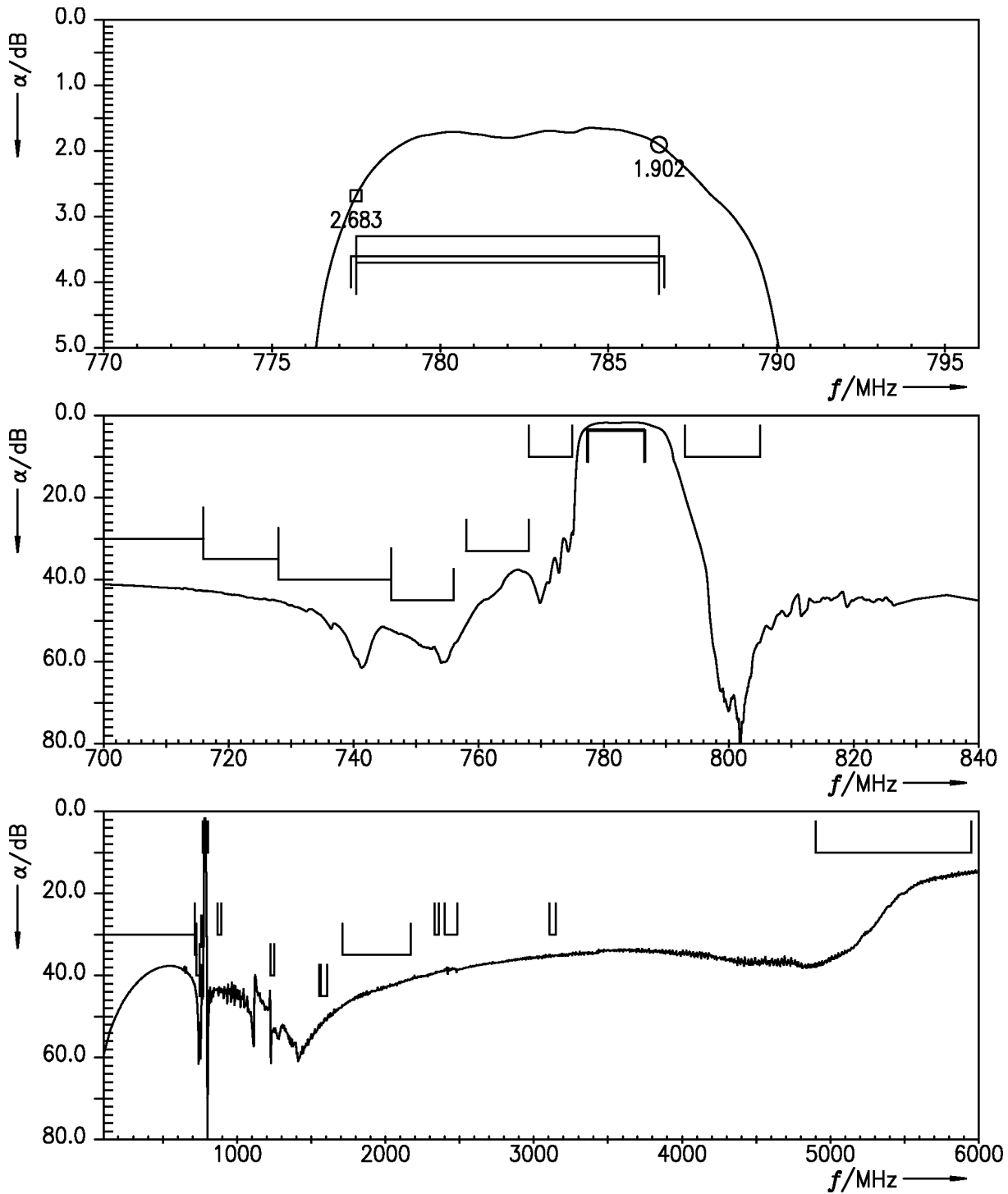


Figure 4: Attenuation TX – ANT.

Data sheet

8.2 ANT – RX

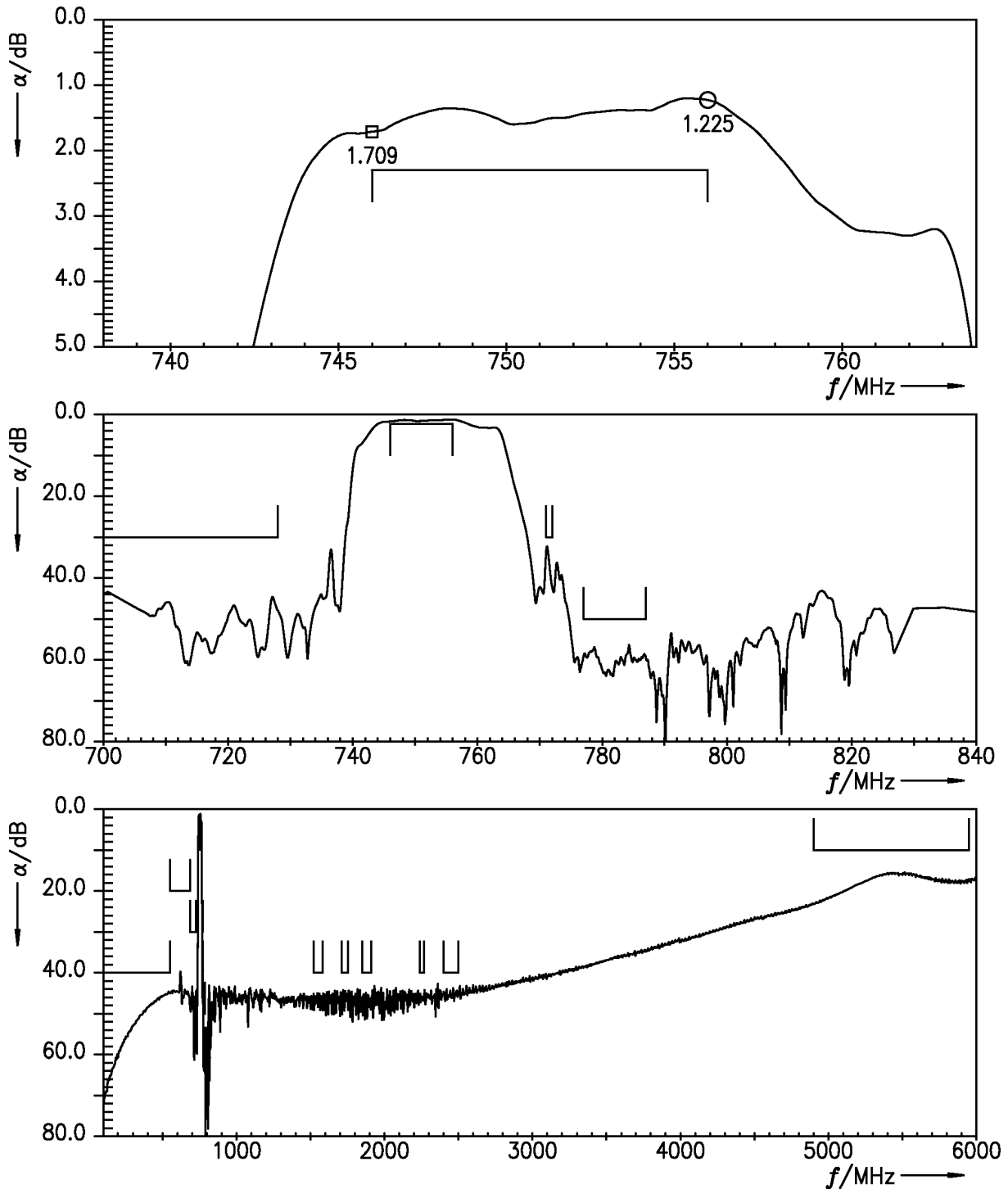


Figure 5: Attenuation ANT – RX.

Data sheet

8.3 TX – RX

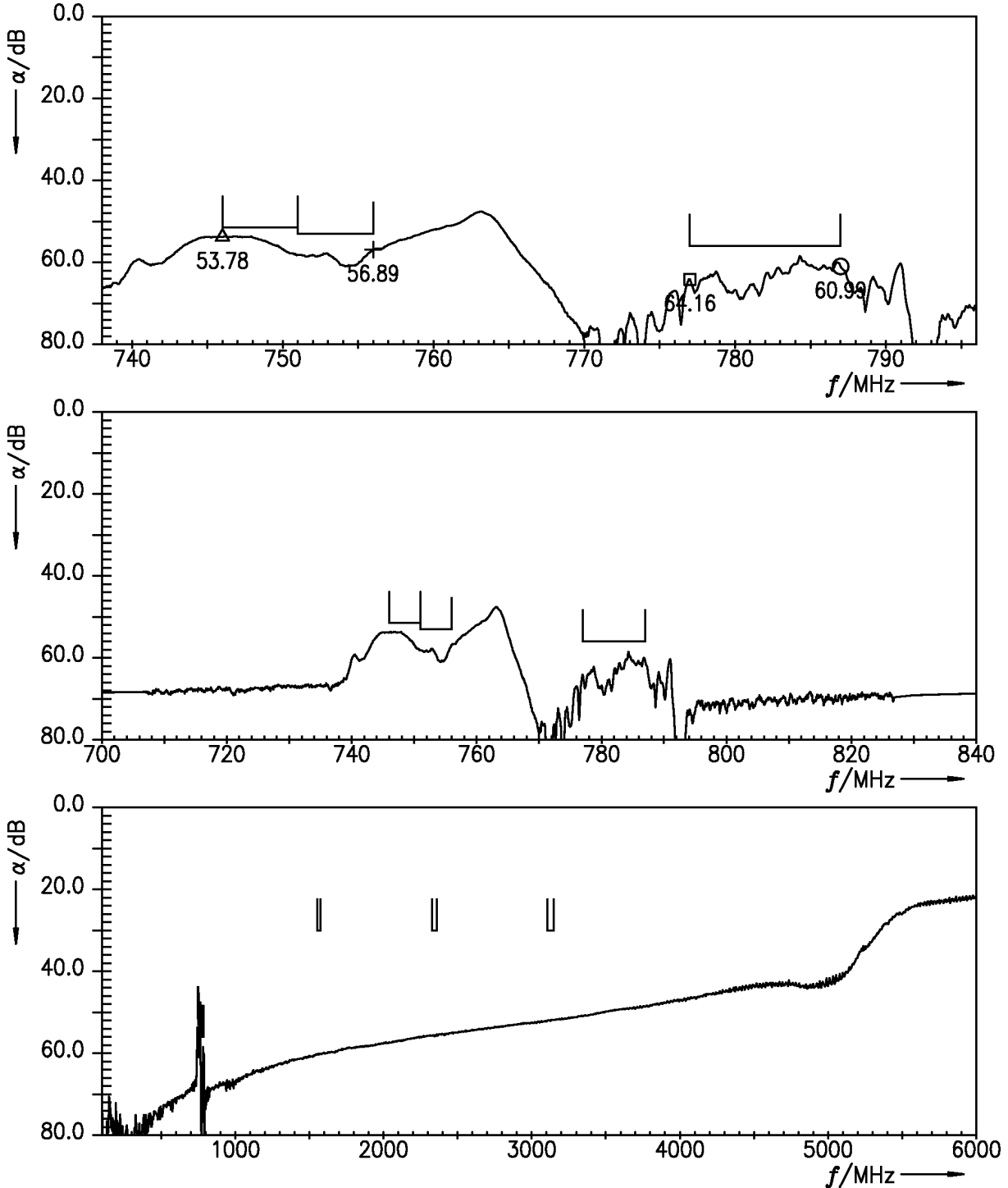


Figure 6: Isolation TX – RX.

Data sheet

9 Reflection coefficients

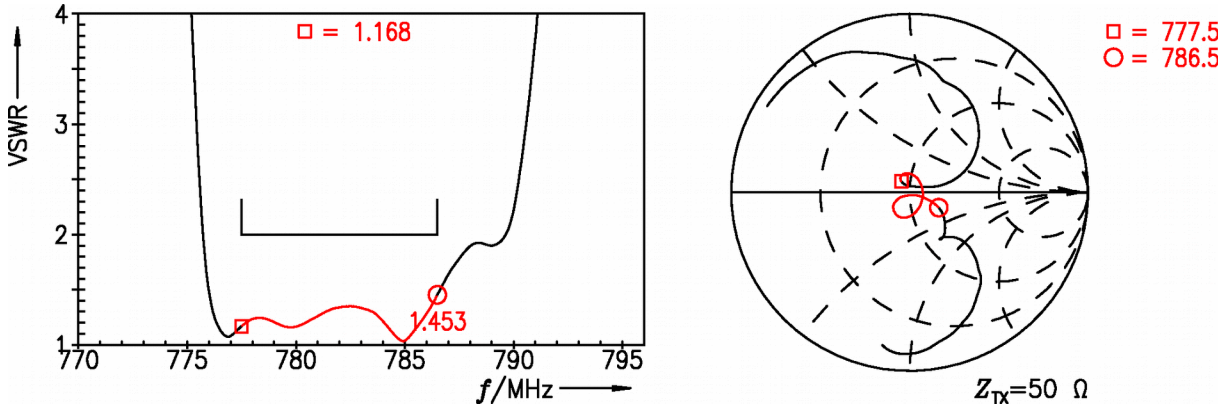


Figure 7: Reflection coefficient at TX port.

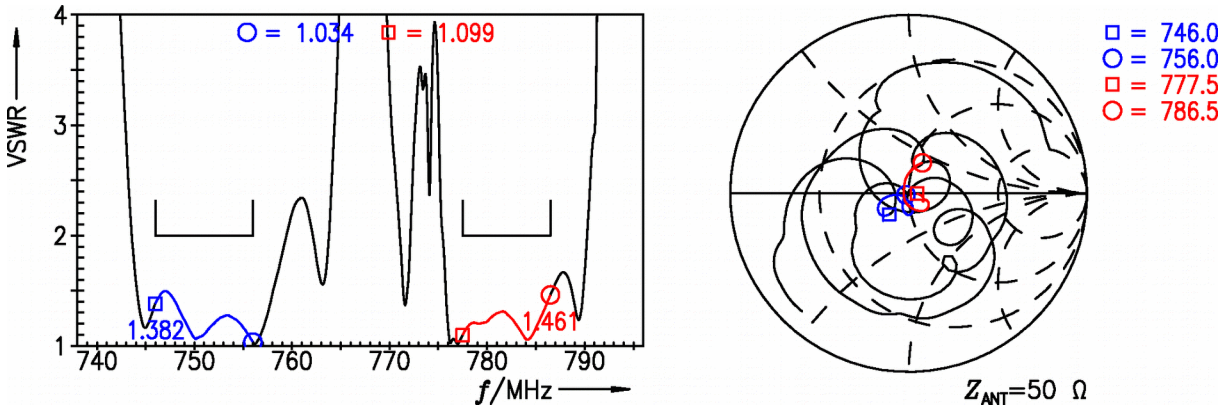


Figure 8: Reflection coefficient at ANT port (TX and RX frequencies).

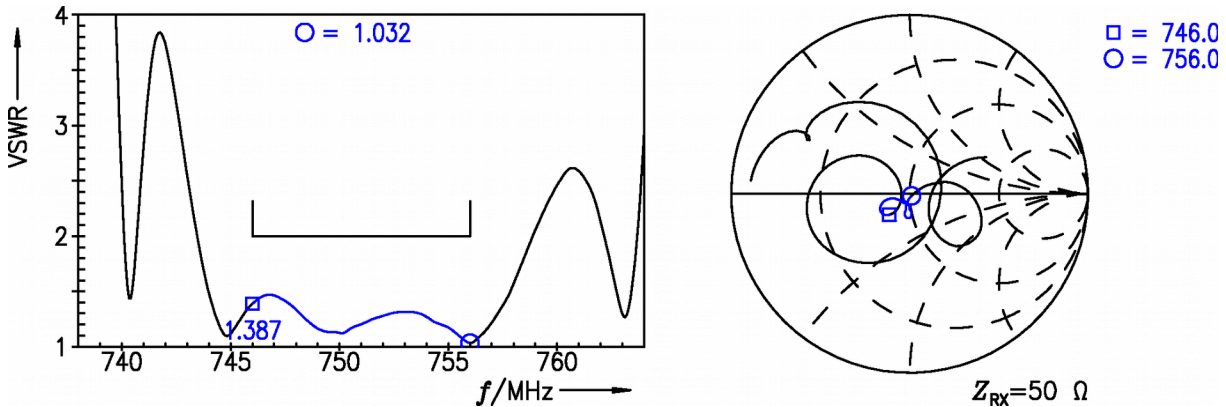


Figure 9: Reflection coefficient at RX port.

Data sheet

10 Packing material

10.1 Tape

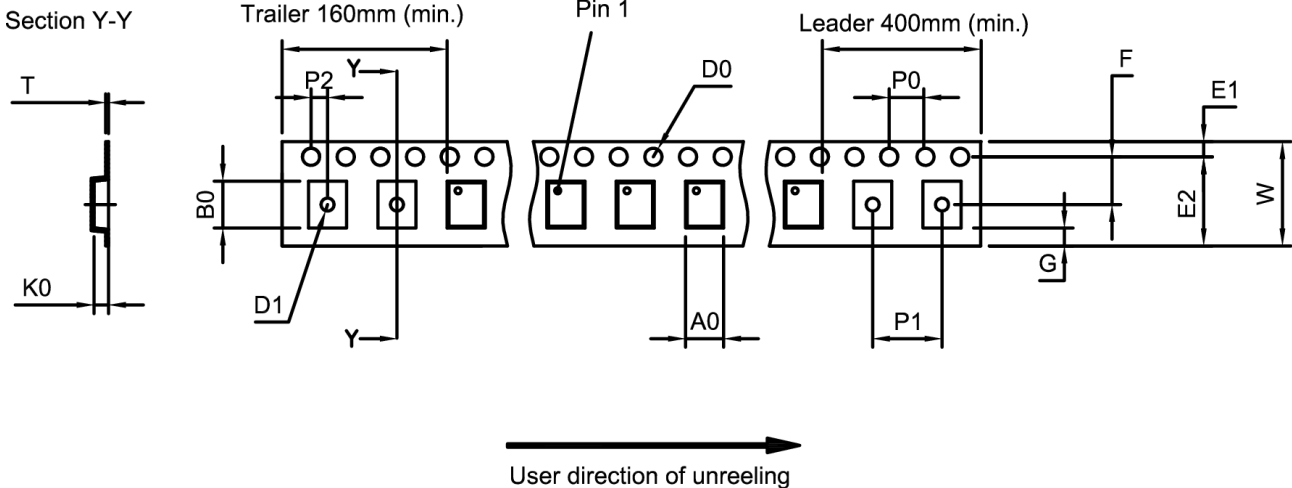


Figure 10: Drawing of tape (first-angle projection) with tape dimensions according to Table 1.

A ₀	2.25±0.05 mm
B ₀	2.75±0.05 mm
D ₀	1.5+0.1/-0 mm
D ₁	1.0 mm (min.)
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	0.6±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±0.03 mm
W	8.0+0.3/-0.1 mm

Table 1: Tape dimensions.

10.2 Reel with diameter of 180 mm

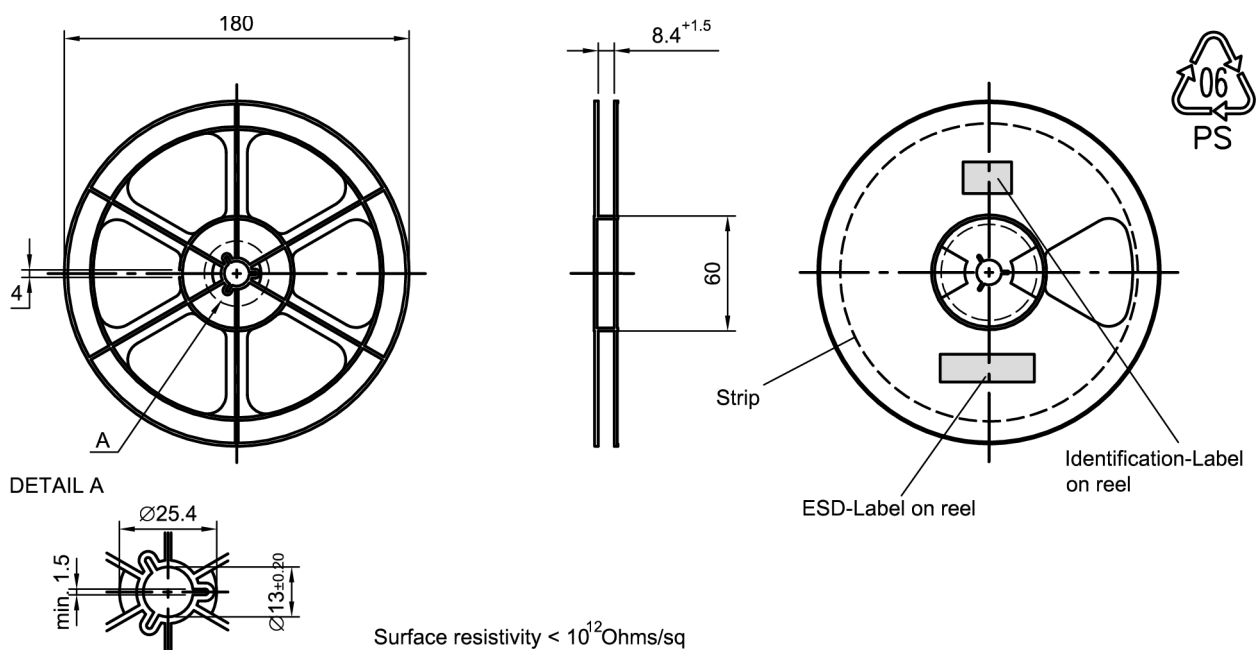


Figure 11: Drawing of reel (first-angle projection) with diameter of 180 mm.

Data sheet

Dimensions [mm]

X = 220±5

Y = 235±5

Sealing area 10 ±3

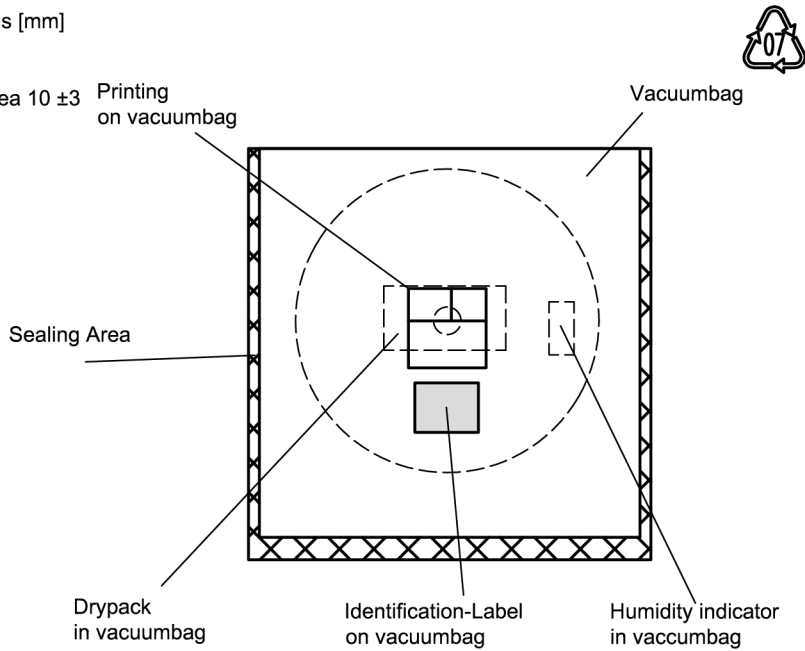


Figure 12: Drawing of moisture barrier bag (MBB) for reel with diameter of 180 mm.

Dimensions [mm]

L = 188

B = 188

H = 30

Tolerance ±5

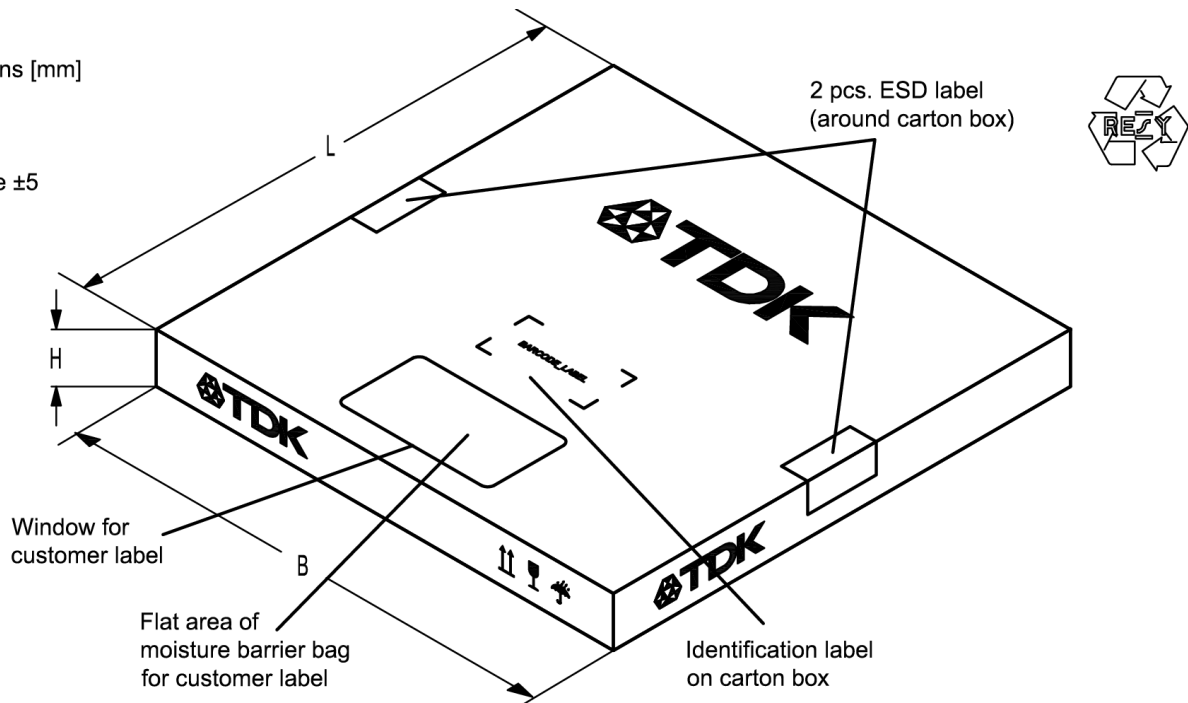


Figure 13: Drawing of folding box for reel with diameter of 180 mm.

Data sheet

10.3 Reel with diameter of 330 mm

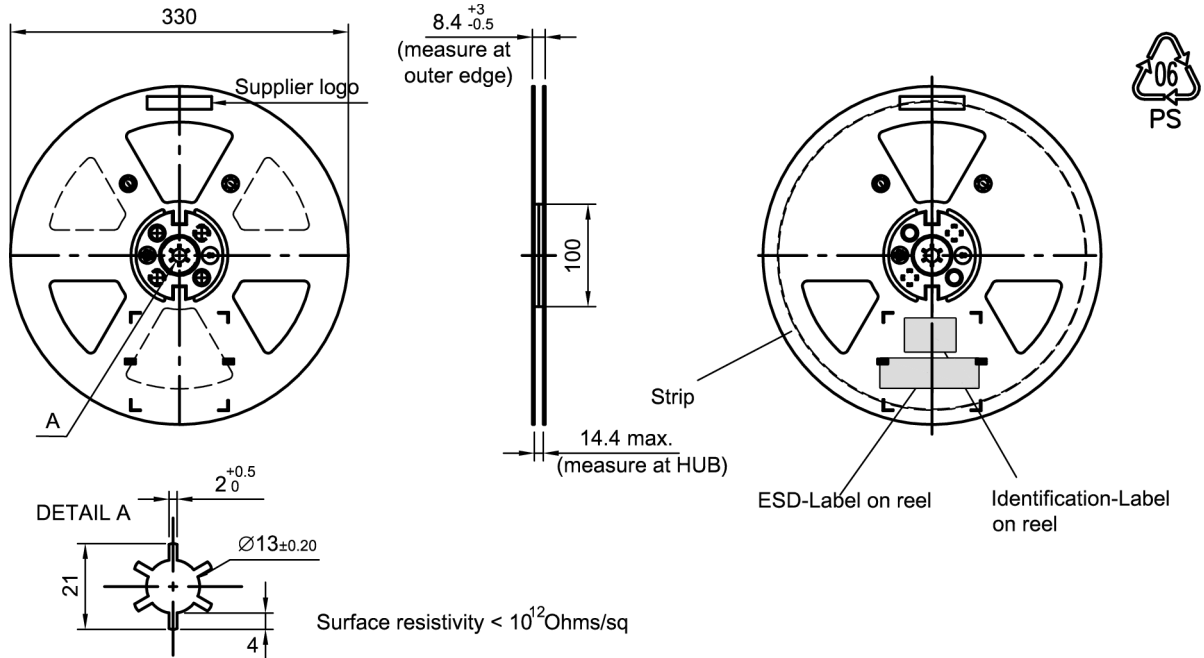


Figure 14: Drawing of reel (first-angle projection) with diameter of 330 mm.

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

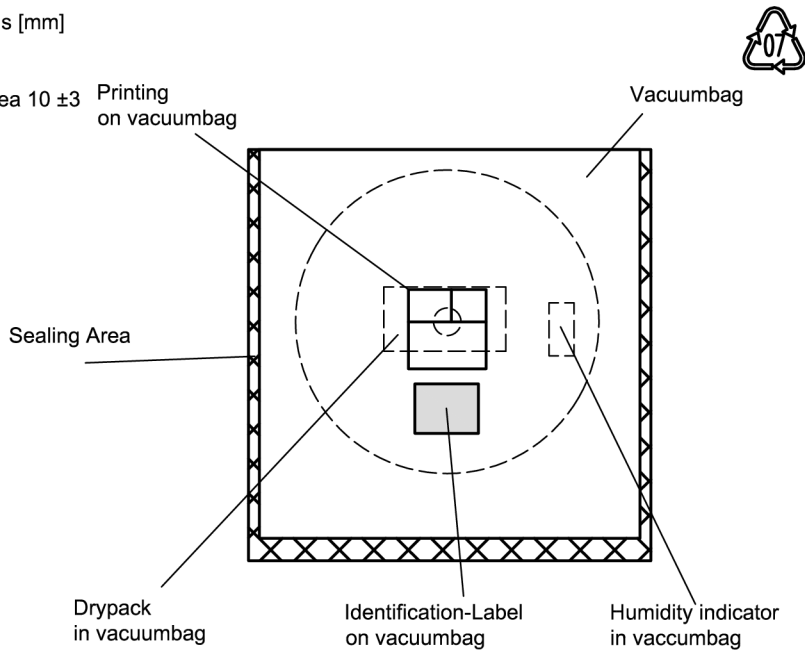


Figure 15: Drawing of moisture barrier bag (MBB) for reel with diameter of 330 mm.

Data sheet

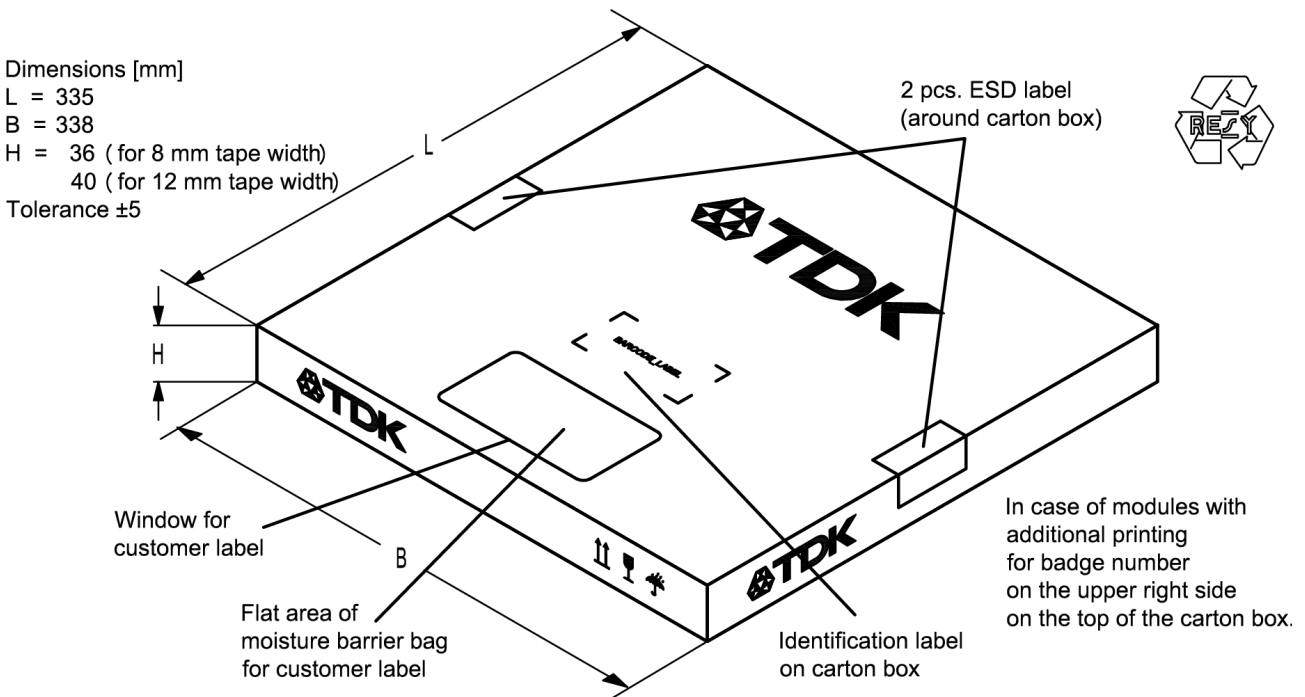


Figure 16: Drawing of folding box for reel with diameter of 330 mm.

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.
 $16J \Rightarrow 1234$
 $1 \times 32^2 + 6 \times 32^1 + 18 (=J) \times 32^0 = 1234$

The BASE32 code for product type B8031 is 7TZ.

■ 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.
 $5UY \Rightarrow 12345$
 $5 \times 47^2 + 27 (=U) \times 47^1 + 31 (=Y) \times 47^0 = 12345$

Data sheet

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.

Data sheet

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
$T \geq 255$ °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).

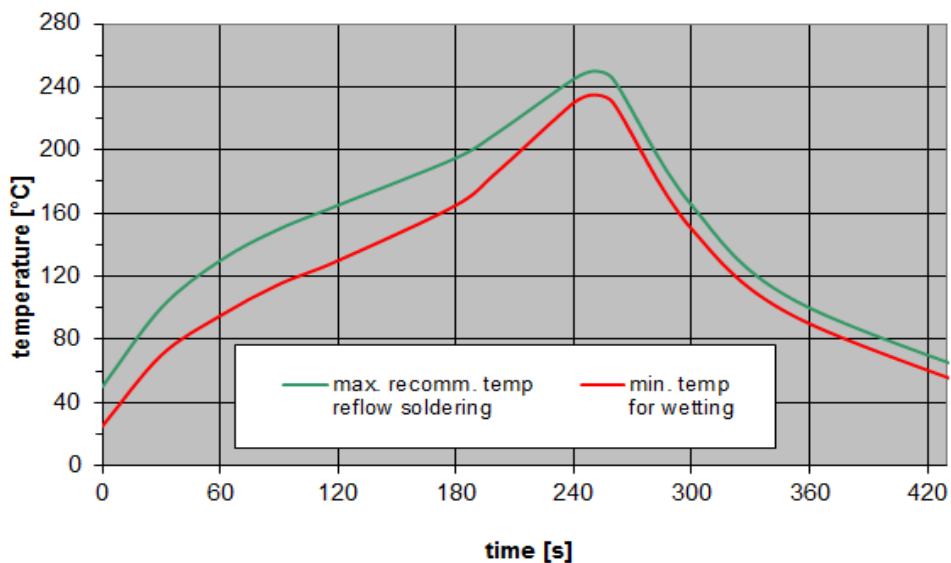


Figure 17: Recommended reflow profile for convection and infrared soldering – lead-free solder.

Data sheet

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 codes and packing units

Ordering code	Packing unit
B39781B8031P810	15.000 pcs
B39781B8031P810S 5	5.000 pcs

Table 4: Ordering codes and packing units.

14 Cautions and warnings

14.1 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.

14.2 Moldability

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

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).

Dimensions do not include burrs.

Projection method

Data sheet

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.

Published by EPCOS AG
Systems, Acoustics, Waves Business Group
P.O. Box 80 17 09, 81617 Munich, GERMANY

© EPCOS AG 2015. This brochure replaces the previous edition.

For questions on technology, prices and delivery please contact the sales offices of EPCOS AG or the international representatives.

Due to technical requirements components may contain dangerous substances. For information on the type in question please also contact one of our sales offices.

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, EPCOS is 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 EPCOS 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.epcos.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.
6. Unless otherwise agreed in individual contracts, **all orders are subject to the current version of the “General Terms of Delivery for Products and Services in the Electrical Industry” published by the German Electrical and Electronics Industry Association (ZVEI)**.
7. The trade names EPCOS, Alu-X, CeraDiode, CeraLink, CeraPad, CeraPlas, CSMP, CSSP, CTVS, DeltaCap, DigiSiMic, DSSP, ExoCore, FilterCap, FormFit, LeaXield, MiniBlue, MiniCell, MKD, MKK, MotorCap, PCC, PhaseCap, PhaseCube, PhaseMod, PhiCap, PQSine, SIFERRIT, SIFI, SIKOREL, SilverCap, SIMDAD, SiMic, SIMID, SineFormer, SIOV, SIP5D, SIP5K, TFAP, ThermoFuse, WindCap are **trademarks registered or pending** in Europe and in other countries. Further information will be found on the Internet at www.epcos.com/trademarks.