SAW components

BAW Filter
WLAN 2G; Bluetooth

Series/type:	B9634
Ordering code:	B39242B9634P810
Date:	May 30, 2016
Version:	2.1

Table of contents

Data sheet

1 Application

- Low-loss BAW RF single filter for Bluetooth/WLAN systems
- Low insertion loss
- High power durability
- Usable pass band 79.0 MHz
- Industrial qualification

2 Features

- Package size 1.4±0.1 mm × 1.1±0.1 mm
- Package height 0.45 mm (max.)
- Approximate weight 5 mg
- RoHS compatible
- Package for Surface Mount Technology (SMT)
- Ni/Au-plated terminals
- Electrostatic Sensitive Device (ESD)
- Moisture Sensitivity Level 2a (MSL2a)

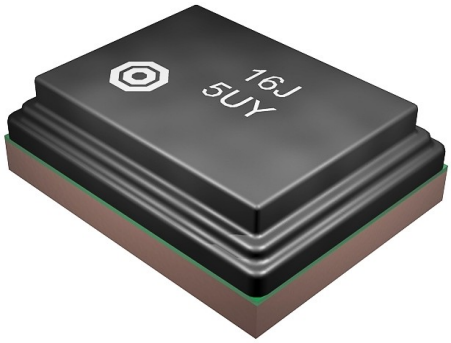


Figure 1: Picture of component with example of product marking.

3 Package

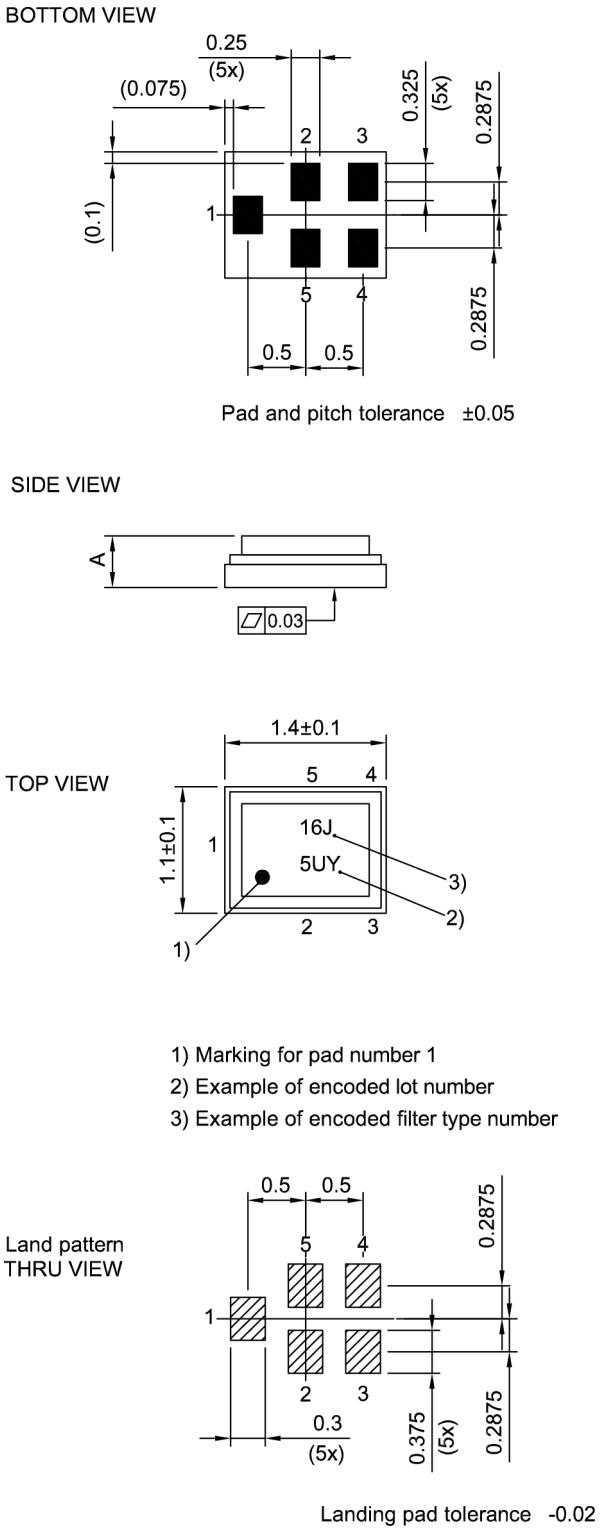


Figure 2: Drawing of package with package height A = 0.45 mm (max.). See Sec. Package information (p. 18).

4 Pin configuration

- 1 Input
- 4 Output
- 2, 3, 5 Ground

5 Matching circuit

- L_{p1} = 10 nH
- L_{s4} = 1.2 nH

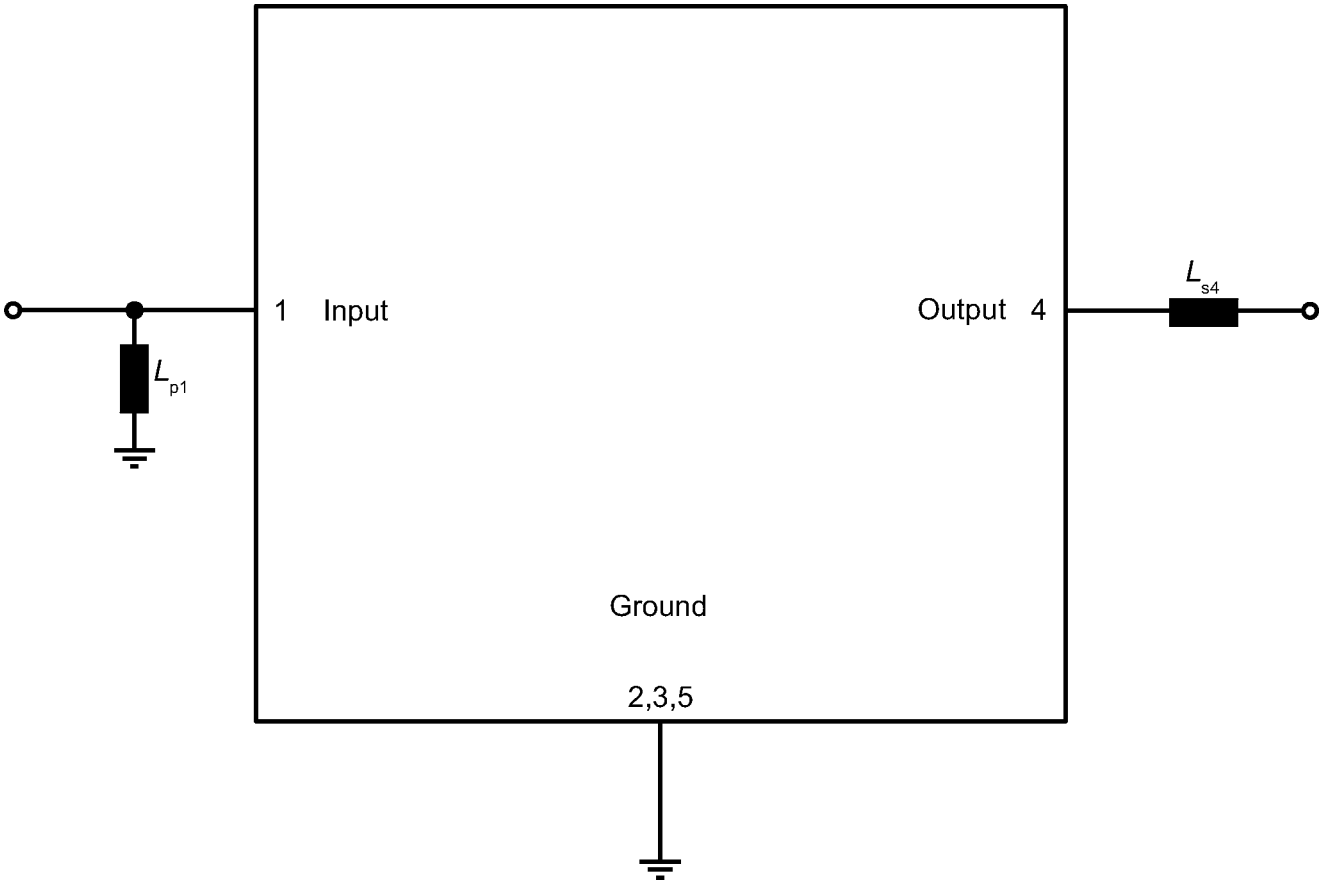


Figure 3: Schematic of matching circuit.

6 Characteristics

Temperature range for specification T_{SPEC} = −10 °C ... +85 °C
Input terminating impedance Z_{IN} = 50 Ω with par. 10 nH[1)]
Output terminating impedance Z_{OUT} = 50 Ω with ser. 1.2 nH[1)]

Characteristics				min. for T_{SPEC}	typ. @+25 °C	max. for T_{SPEC}	
Center frequency			f_C	—	2442	—	MHz
Maximum insertion attenuation			α_{max}				
Bluetooth	2401.5 ... 2480.5	MHz		—	1.5[2)]	2.1[2)]	dB
Channel 1	2403.1 ... 2420.9	MHz		—	1.9[3)]	2.5[3)]	dB
Channel 2	2408.1 ... 2425.9	MHz		—	1.6[3)]	2.0[3)]	dB
Channel 3-11	2413.1 ... 2470.9	MHz		—	1.4[3)]	1.8[3)]	dB
Channel 12	2458.1 ... 2475.9	MHz		—	1.5[3)]	2.2[3)]	dB
Channel 13	2463.1 ... 2480.9	MHz		—	1.8[3)]	2.7[3)]	dB
Amplitude ripple (p-p)			$\Delta\alpha$				
Channel 1	2403.1 ... 2420.9	MHz		—	1.2	3.6	dB
Channel 2	2408.1 ... 2425.9	MHz		—	0.7	2.0	dB
Channel 3-11	2413.1 ... 2470.9	MHz		—	0.6	1.6	dB
Channel 12	2458.1 ... 2475.9	MHz		—	0.6	2.0	dB
Channel 13	2463.1 ... 2480.9	MHz		—	1.4	5.7	dB
Maximum VSWR			$VSWR_{max}$				
@ input port	2403.1 ... 2475.9	MHz		—	1.5	2.3	
	2403.1 ... 2480.9	MHz		—	1.8	2.5	
@ output port	2403.1 ... 2480.9	MHz		—	1.6	2.3	
Minimum attenuation			α_{min}				
	10 ... 800	MHz		40	44	—	dB
	800 ... 1805	MHz		32	37	—	dB
	1805 ... 2170	MHz		35	38	—	dB
	2170 ... 2300	MHz		35	45	—	dB
	2300 ... 2360	MHz		38	41	—	dB
	2360 ... 2365	MHz		38[4)]	43[4)]	—	dB
	2365 ... 2370	MHz		40[4)]	45[4)]	—	dB
	2370 ... 2375	MHz		35[4)]	48[4)]	—	dB
	2375 ... 2380	MHz		15[4)]	50[4)]	—	dB
	2377.5 ... 2382.5	MHz		10[4)]	48[4)]	—	dB
	2496 ... 2501	MHz		13[4)]	54[4)]	—	dB
	2500 ... 2505	MHz		34[4),5)]	65[4)]	—	dB
	2500 ... 2505	MHz		43[4),6)]	65[4)]	—	dB
	2505 ... 2570	MHz		45	52	—	dB
	2570 ... 2620	MHz		42	48	—	dB
	2620 ... 2690	MHz		40	47	—	dB

Characteristics			min. for T_{SPEC}	typ. @+25 °C	max. for T_{SPEC}	
	2690... 3400	MHz	28	38	—	dB
	3400... 3800	MHz	28	33	—	dB
	3800... 4800	MHz	20	25	—	dB
	4800... 5150	MHz	20	29	—	dB
	5150... 5850	MHz	25	29	—	dB

1) See Sec. Matching circuit (p. 5).
2) Averaged values over whole pass band due to frequency hopping in Bluetooth mode.
3) Averaged value within each Wifi channel width of 17.8 MHz.
4) Averaged values of linear S-parameter over any 5MHz.
5) Valid for temperature T_{SPEC} = −10 °C...+25 °C.
6) Valid for temperature T_{SPEC} = +25 °C...+85 °C.

7 Maximum ratings

Storage temperature	T_{STG} = −40 °C ... +90 °C	
DC voltage	V_{DC} = 0 V (max.)	
ESD voltage	V_{ESD} = 50 V (max.)[1)]	
Input power	P_{IN}	
@ input port: 2401.5 ... 2480.5 MHz	29.5 dBm	Source and load impedance 50Ω. LTE 5MHz downlink. T=55°C, 100.000h.[2)]
@ input port: other frequency range(s)	10 dBm	Source and load impedance 50Ω.
Operating lifetime with output power at antenna	P_{OUT}	
@ output port: 2401.5 ... 2480.5 MHz	t.b.d. dBm[3)]	Continuous wave T= 55 °C, 100khrs.[4)]

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) Target is 24 dBm.
4) According to accelerated high temperature operating life (HOTL) test.

8 Transmission coefficient

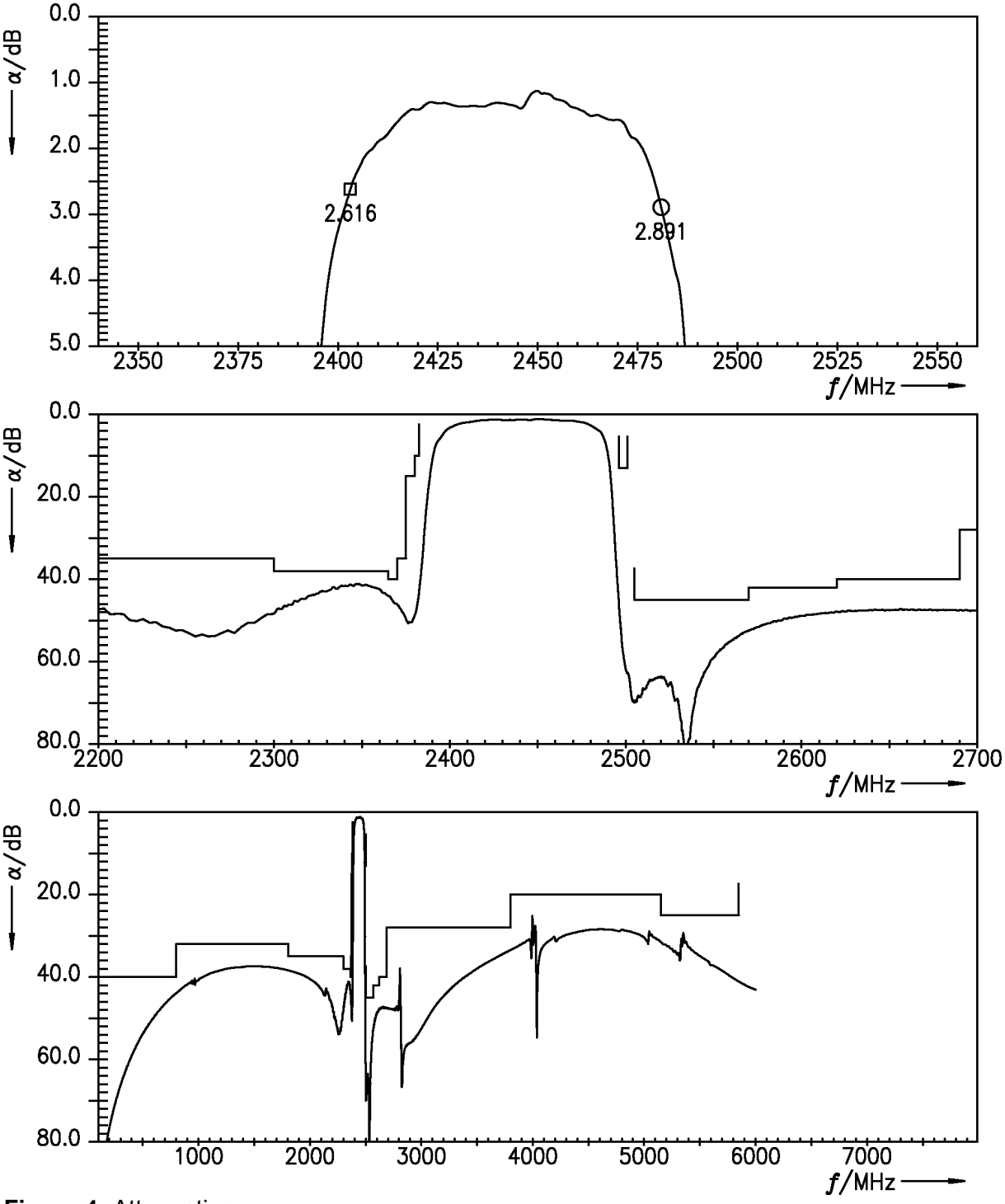
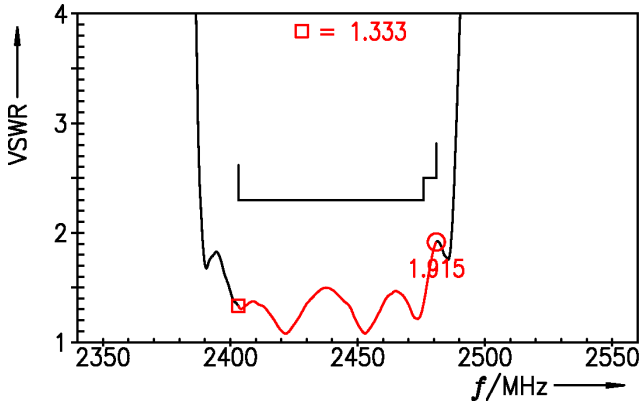


Figure 4: Attenuation.

9 Reflection coefficients



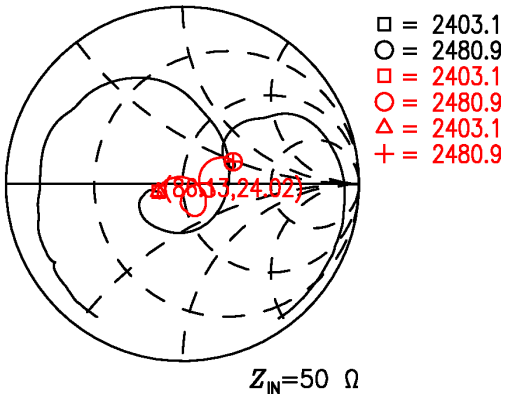
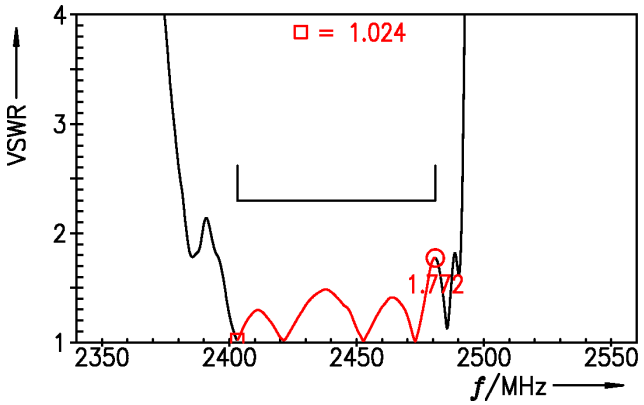


Figure 5: Reflection coefficient at IN port.



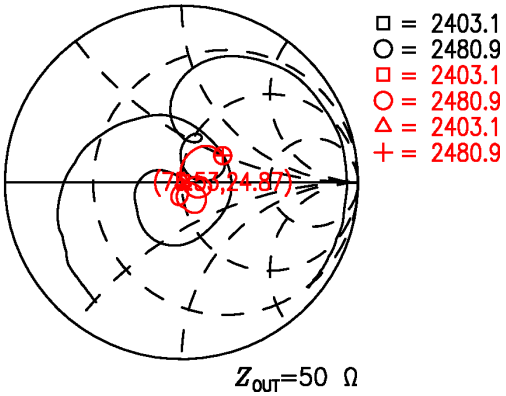


Figure 6: Reflection coefficient at OUT port.

10 Packing material

10.1 Tape

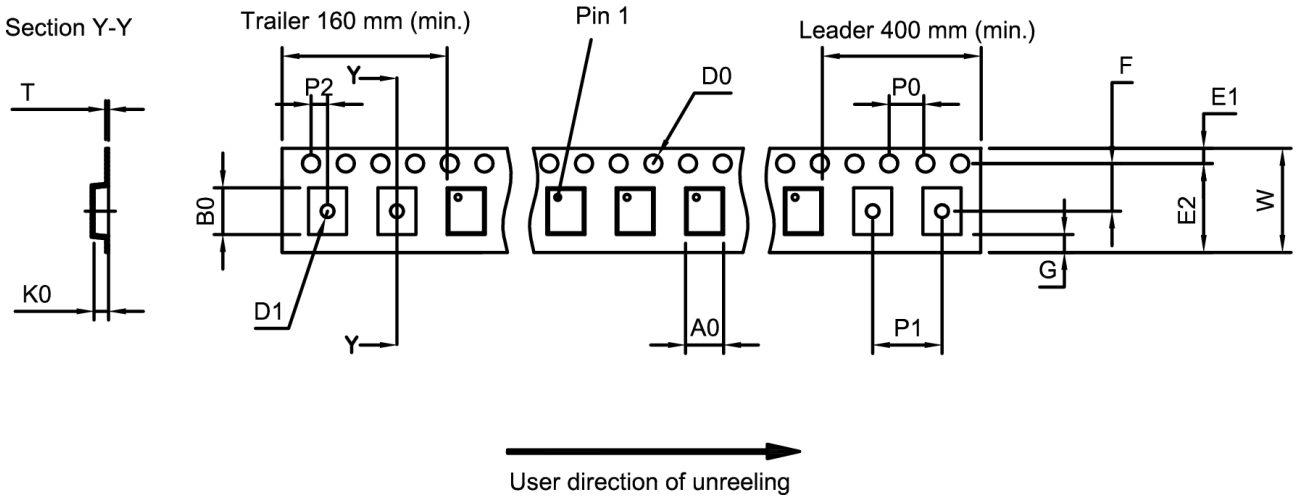


Figure 7: Drawing of tape (first-angle projection) with tape dimensions according to Table 1.

A_0	1.27±0.05 mm
B_0	1.57±0.05 mm
D_0	1.5+0.1/−0 mm
D_1	0.5±0.1 mm
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	0.62±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

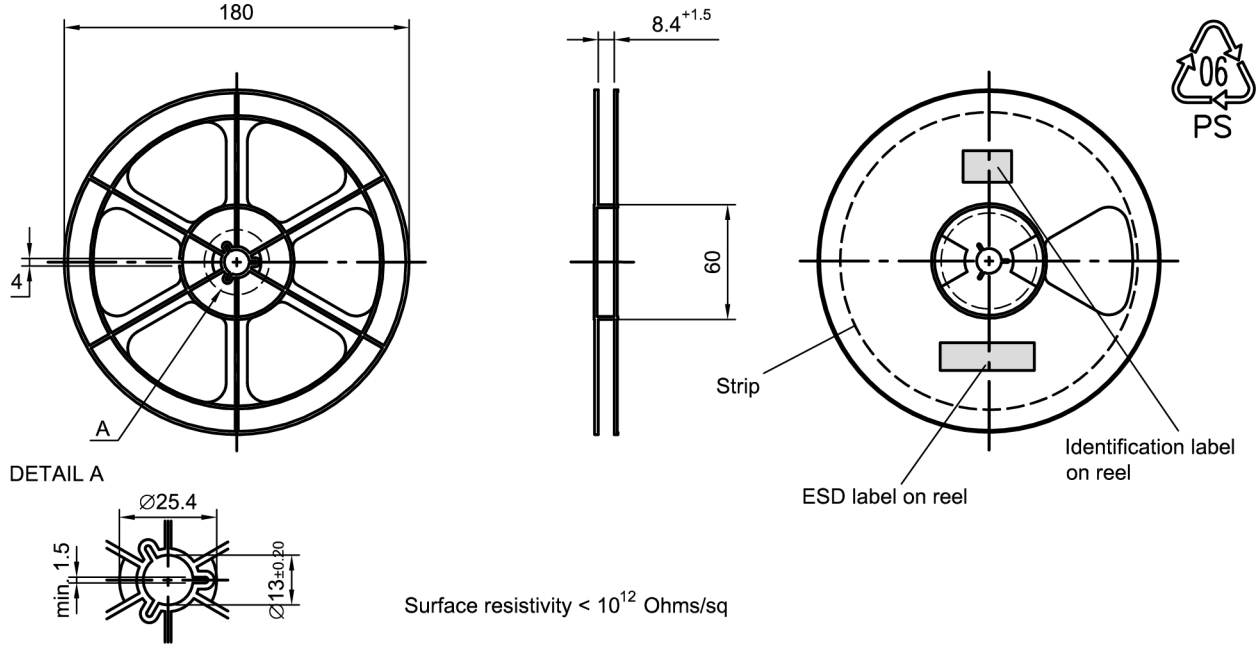


Figure 8: Drawing of reel (first-angle projection) with diameter of 180 mm.

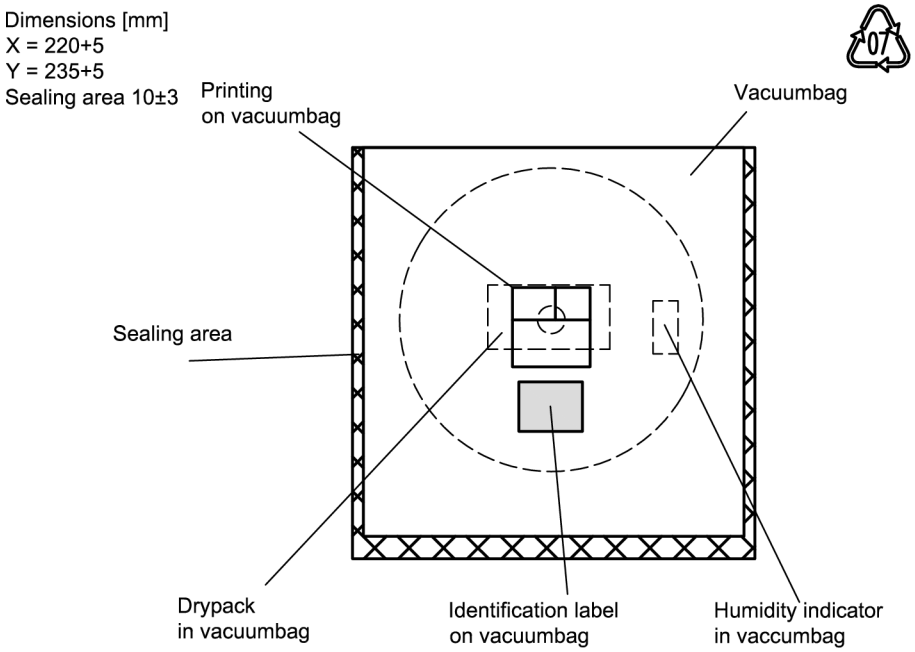


Figure 9: Drawing of moisture barrier bag (MBB) for reel with diameter of 180 mm.

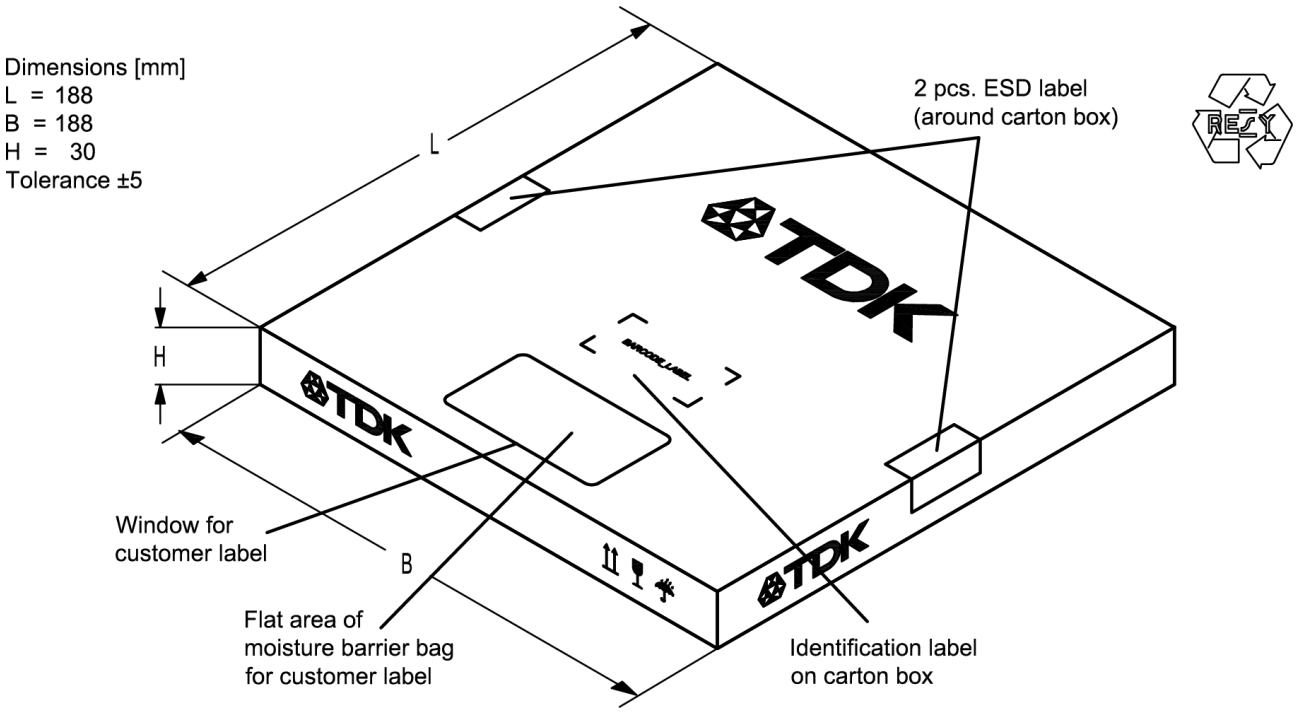


Figure 10: Drawing of folding box for reel with diameter of 180 mm.

10.3 Reel with diameter of 330 mm

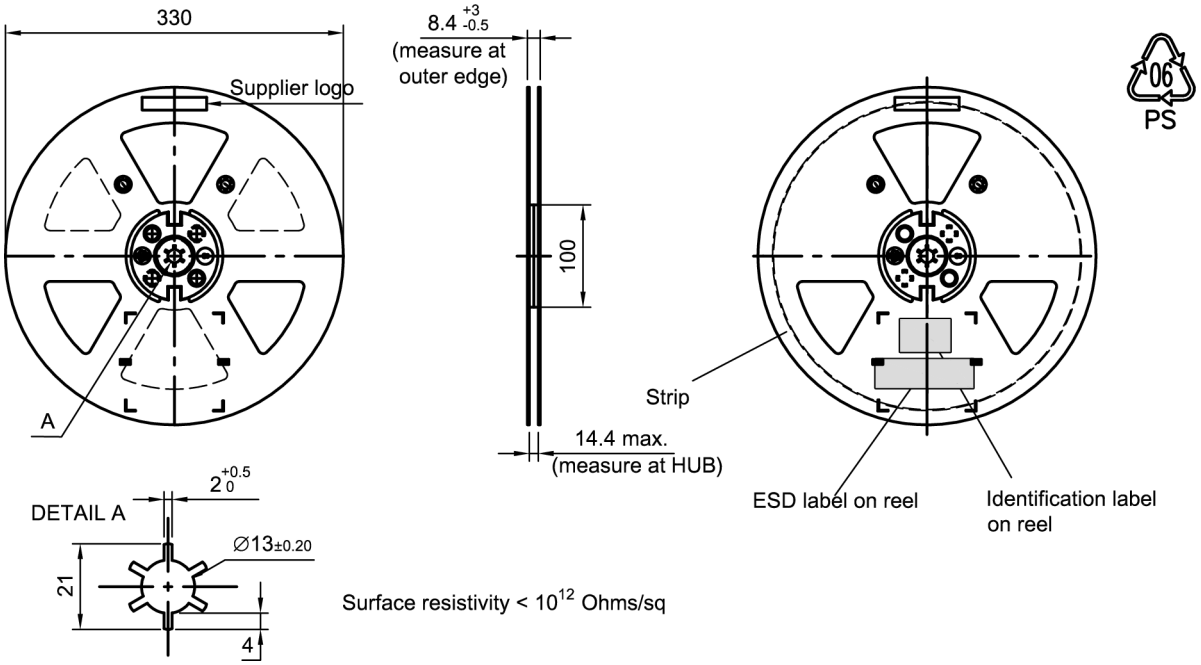


Figure 11: Drawing of reel (first-angle projection) with diameter of 330 mm.

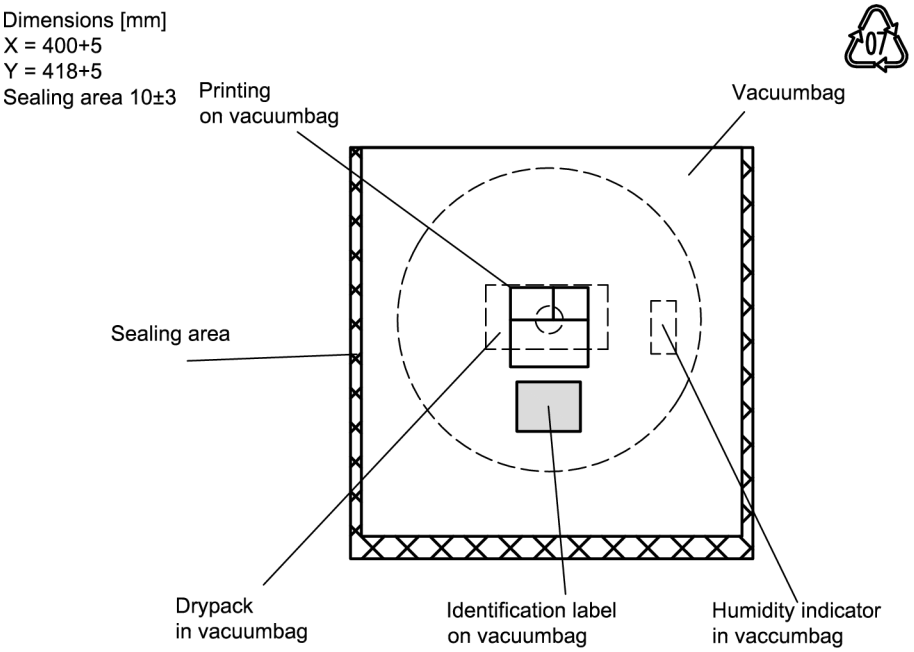


Figure 12: Drawing of moisture barrier bag (MBB) for reel with diameter of 330 mm.

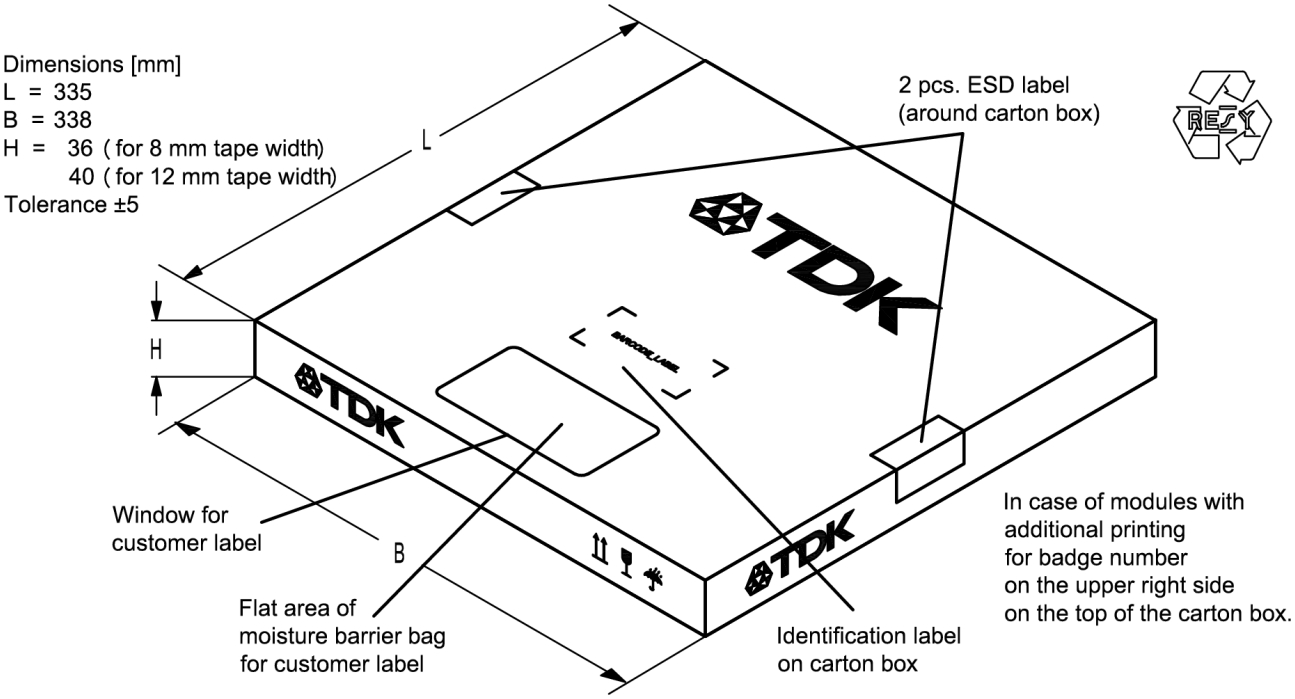


Figure 13: Drawing of folding box for reel with diameter of 330 mm.

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 B9634 is 9D2.

- 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).

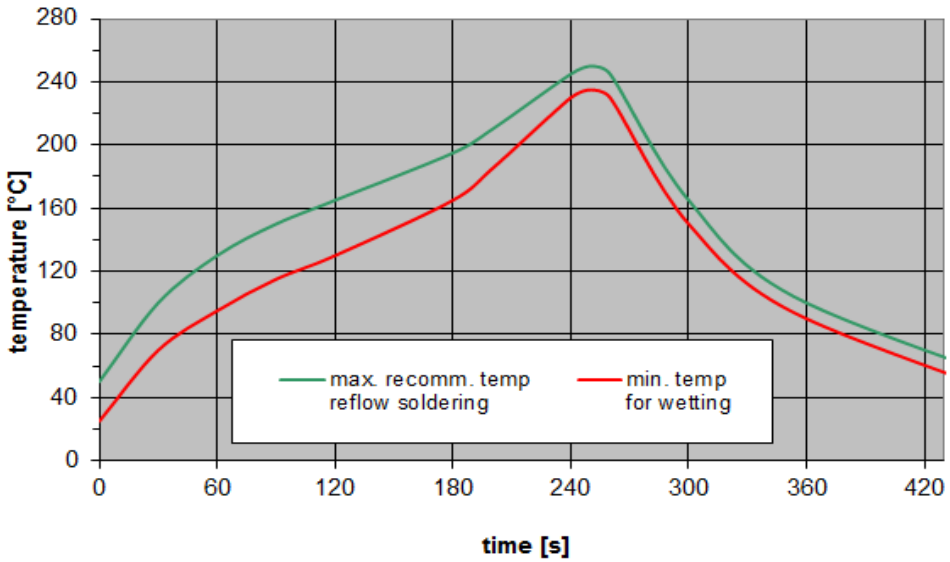


Figure 14: Recommended reflow profile for convection and infrared soldering – lead-free solder.

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 codes and packing units

Ordering code	Packing unit
B39242B9634P810	5000 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 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.

14.3 Moldability

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

14.4 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.

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.**
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