



RF360  
Europe GmbH

## SAW Components

### BAW Bandpass Filter

WLAN 2G / Bluetooth

Series/type: B8840  
Ordering code: B39242B8840P810

Date: May 12, 2016  
Version: 2.7

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Data sheet

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## 1 Application

- Low-loss BAW RF single filter for Bluetooth/WLAN with LTE Band 7 / Band 40 / Band 41 coexistence.
- Usable passband 79.0 MHz.
- Unbalanced to unbalanced operation.
- Filter impedance 50  $\Omega$ .
- High out of band selectivity.
- Excellent insertion loss.

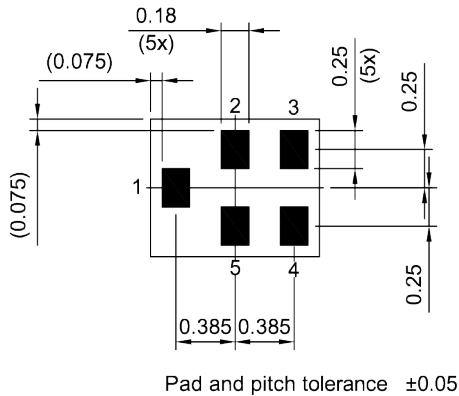
## 2 Features

- Package size 1.1 mm  $\times$  0.9 mm.
- Package height 0.41 $\pm$ 0.04 mm.
- Approximate weight 0.0012 g.
- RoHS compatible.
- Package for Surface Mount Technology (SMT).
- Ni, gold-plated terminals.
- Electrostatic Sensitive Device (ESD).
- Moisture Sensitivity Level 3 (MSL3).

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3 Package

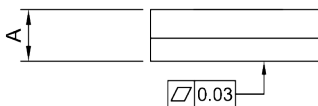
BOTTOM VIEW



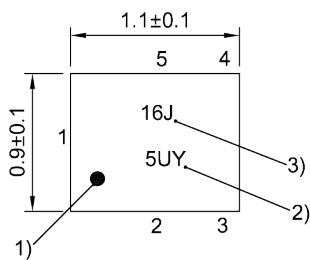
4 Pin configuration

- 1 Input (to PA (unbalanced))
- 4 Output (to ANT (unbalanced))
- 2, 3, 5 Ground

SIDE VIEW

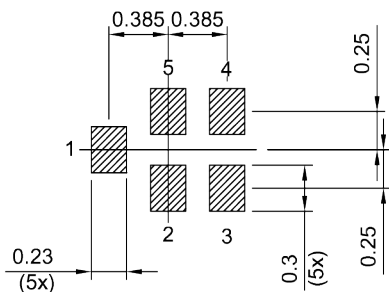


TOP VIEW



- 1) Marking for pad number 1
- 2) Example of encoded lot number
- 3) Example of encoded filter type number

Land pattern THRU VIEW



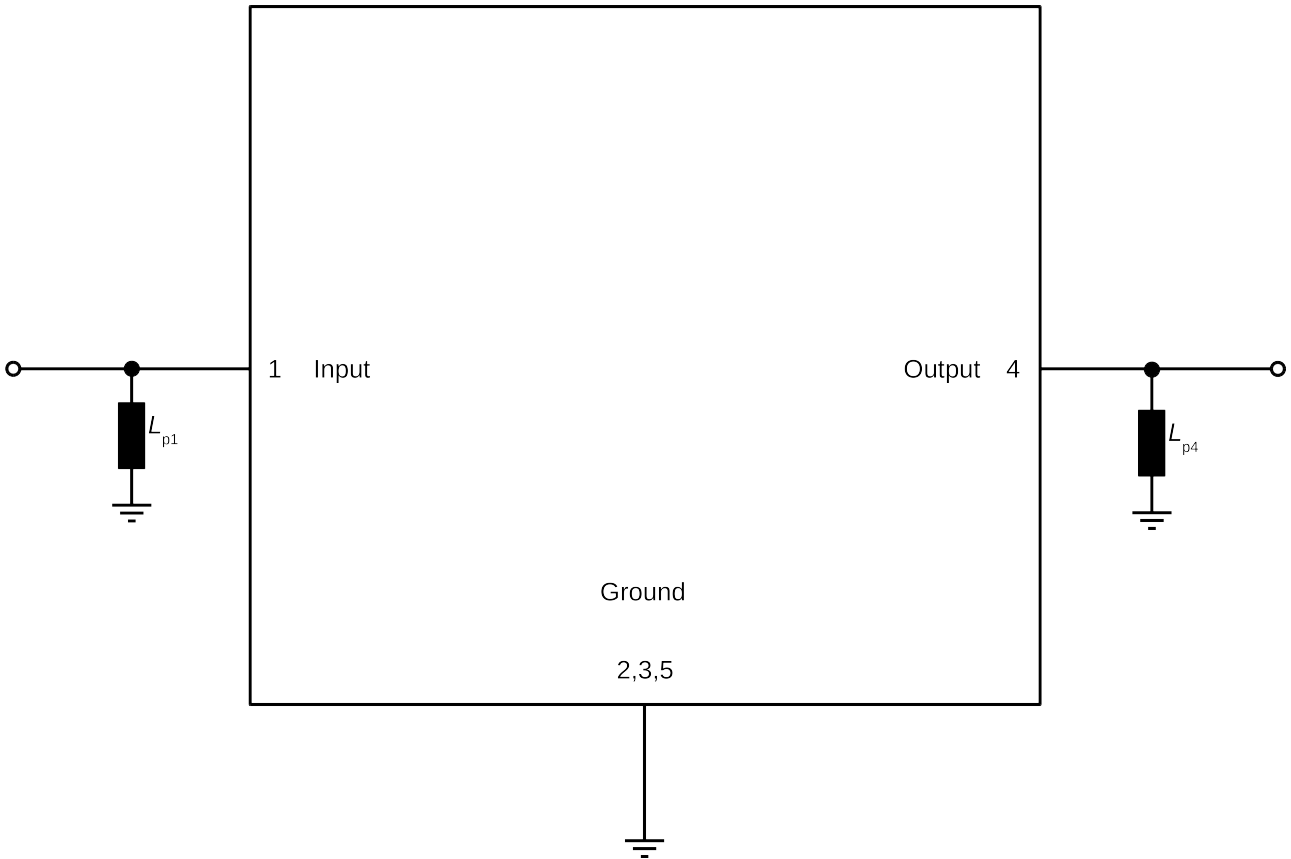
**Figure 1:** Drawing of package with package height  $A = 0.41 \pm 0.04$  mm. See Simplified drawings (p. 17).

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**5 Matching circuit**

■  $L_{p1} = 12 \text{ nH}$

■  $L_{p4} = 10 \text{ nH}$



**Figure 2:** Schematic of matching circuit.

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## 6 Characteristics

Temperature range for specification	$T$	= -30 °C to +85 °C
Input terminating impedance	$Z_{IN}$	= 50 $\Omega$ with par. 12 nH
Output terminating impedance	$Z_{OUT}$	= 50 $\Omega$ with par. 10 nH

<b>Characteristics</b>		<b>min.</b>	<b>typ.</b> @+25 °C	<b>max.</b>	
<b>Center frequency</b>	$f_c$	—	2442	—	MHz
<b>Maximum insertion attenuation - WLAN</b>	$\alpha_{max}$				
Channel 1	2403.1... 2420.9 MHz	—	1.90 <sup>1)</sup>	2.80 <sup>1)</sup>	dB
Channel 2	2408.1... 2425.9 MHz	—	1.55 <sup>1)</sup>	2.30 <sup>1)</sup>	dB
Channel 3-10	2413.1... 2465.9 MHz	—	1.45 <sup>1)</sup>	1.75 <sup>1)</sup>	dB
Channel 11	2453.1... 2470.9 MHz	—	1.30 <sup>1)</sup>	1.75 <sup>1)</sup>	dB
Channel 12	2458.1... 2475.9 MHz	—	1.40 <sup>1)</sup>	2.20 <sup>1)</sup>	dB
Channel 13	2463.1... 2480.9 MHz	—	1.90 <sup>1)</sup>	2.90 <sup>1)</sup>	dB
<b>Amplitude ripple (p-p) - WLAN</b>	$\Delta\alpha$				
Channel 1	2403.1... 2420.9 MHz	—	1.80	3.00	dB
Channel 2	2408.1... 2425.9 MHz	—	1.10	2.30	dB
Channel 3	2413.1... 2430.9 MHz	—	0.90	1.70	dB
Channel 4-10	2418.1... 2465.9 MHz	—	0.50	1.40	dB
Channel 11	2453.1... 2470.9 MHz	—	0.80	2.10	dB
Channel 12	2458.1... 2475.9 MHz	—	0.90	2.10	dB
Channel 13	2463.1... 2480.9 MHz	—	1.50	2.70 <sup>2)</sup>	dB
<b>VSWR</b>	VSWR				
Channel 1-12	2403.1... 2475.9 MHz	—	1.65	2.4	
Channel 13	2463.1... 2480.9 MHz	—	1.65	2.7 <sup>2)</sup>	
<b>Attenuation</b>	$\alpha$				
	100... 1805 MHz	31.0	33.0	—	dB
	1805... 2170 MHz	33.0	37.0	—	dB
	2300... 2360 MHz	45.0 <sup>3)</sup>	49.0 <sup>3)</sup>	—	dB
	2360... 2365 MHz	44.0 <sup>3)</sup>	51.0 <sup>3)</sup>	—	dB
	2365... 2370 MHz	43.0 <sup>3)</sup>	51.0 <sup>3)</sup>	—	dB
	2370... 2380 MHz	13.0 <sup>3)</sup>	43.0 <sup>3)</sup>	—	dB
	2496... 2501 MHz	19.0 <sup>3), 4)</sup>	51.0 <sup>3)</sup>	—	dB
	2496... 2501 MHz	19.0 <sup>2), 3)</sup>	51.0 <sup>2), 3)</sup>	—	dB
	2500... 2505 MHz	45.0 <sup>3), 4)</sup>	59.0 <sup>3)</sup>	—	dB
	2505... 2550 MHz	47.0 <sup>3)</sup>	52.0 <sup>3)</sup>	—	dB
	2550... 2570 MHz	43.0 <sup>3)</sup>	47.0 <sup>3)</sup>	—	dB



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<b>Characteristics</b>	<b>min.</b>	<b>typ.</b> @+25 °C	<b>max.</b>	
2570... 2620 MHz	41.0 <sup>3)</sup>	45.0 <sup>3)</sup>	—	dB
2620... 2690 MHz	40.0 <sup>3)</sup>	43.0 <sup>3)</sup>	—	dB
4800... 5805 MHz	30.0	36.0	—	dB
7200... 7500 MHz	17.0	25.0	—	dB

- 1) Averaged value within each Wifi channel width of 17.8 MHz.
- 2) +25°C.
- 3) Averaged values of linear S-parameter over any 5MHz.
- 4) +25°C to +85°C.

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<b>WLAN 2G / Bluetooth</b>	<b>2442 MHz</b>

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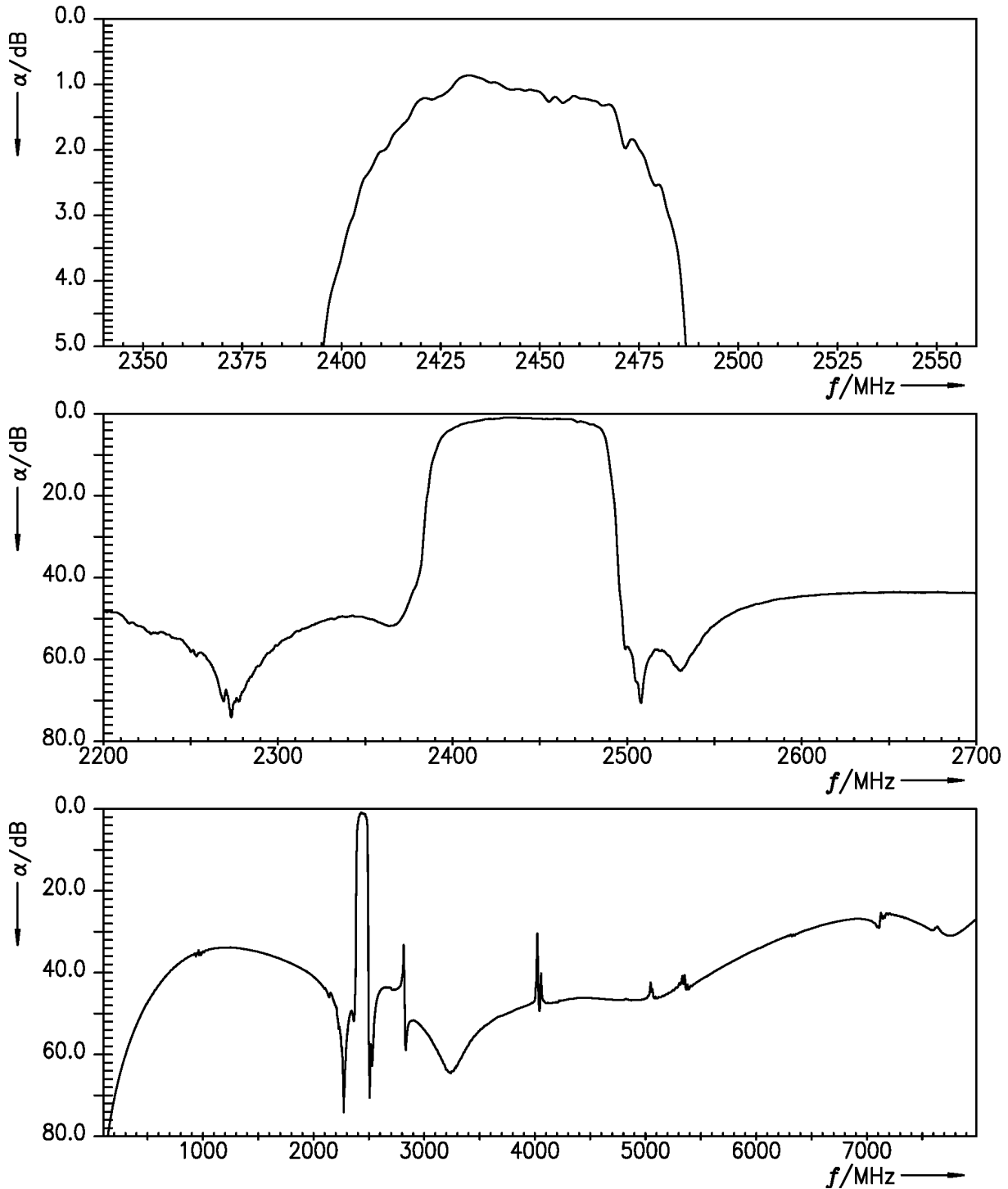
## 7 Maximum ratings

Storage temperature	$T_{STG} = -40\text{ °C to }+90\text{ °C}$	
DC voltage	$V_{DC} = 5.0\text{ V}^{4)}$	
ESD voltage		
	$V_{ESD}^{1)}$ 50 V	Machine model.
	$V_{ESD}^{2)}$ 300 V	Human body model.
	$V_{ESD}^{3)}$ 600 V	Charged device model.
Input power @ input port (WLAN channel 1 to channel 13)	$P_{IN} = 24\text{ dBm}$	20MHz OFDM signal, 5000 h @ 65 °C.

- 1) According to JESD22-A115B (MM – Machine Model), 10 negative & 10 positive pulses.
- 2) According to JESD22-A114F (HBM – Human Body Model), 1 negative & 1 positive pulse.
- 3) According to JESD22-C101C (CDM – Field Induced Charged Device Model), 3 negative & 3 positive pulses.
- 4) 168h Damp Heat Steady State acc. To IEC60068-2-67 Cy.

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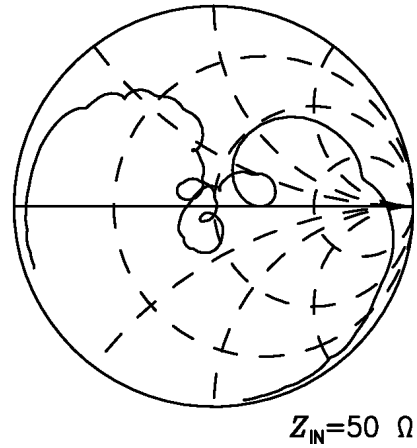
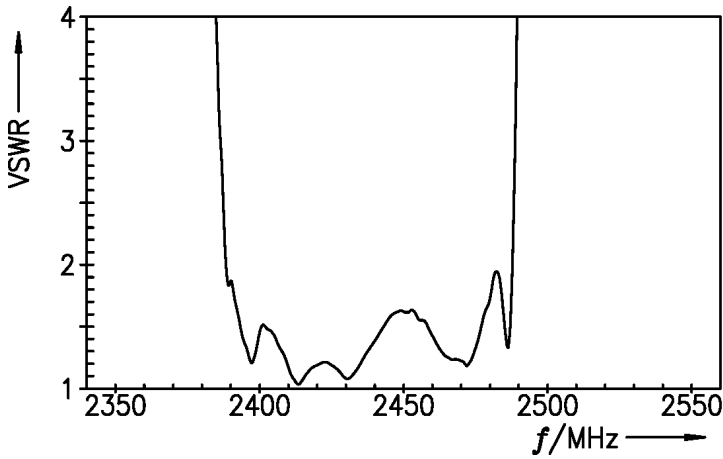
**8 Transmission coefficient**



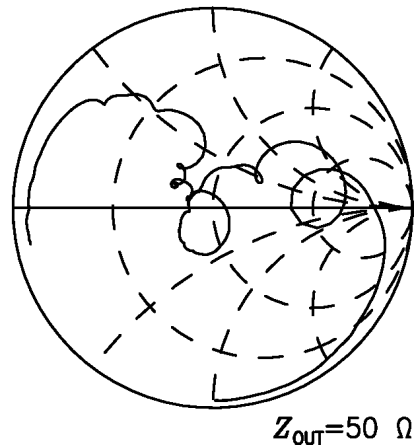
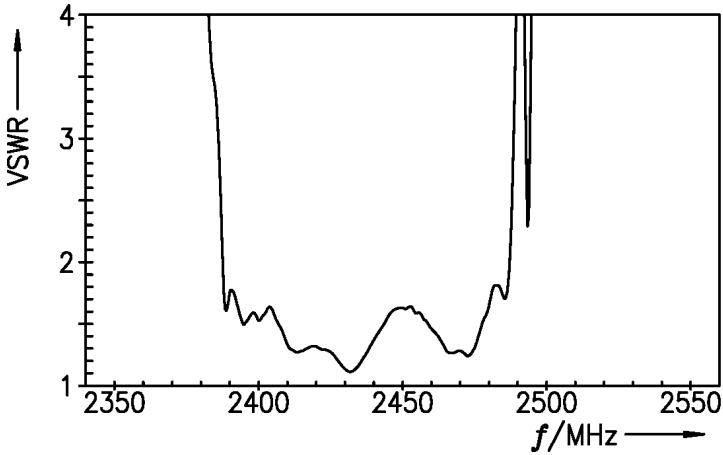
**Figure 3:** Attenuation.

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**9 Reflection coefficients**



**Figure 4:** Reflection coefficient at IN port.

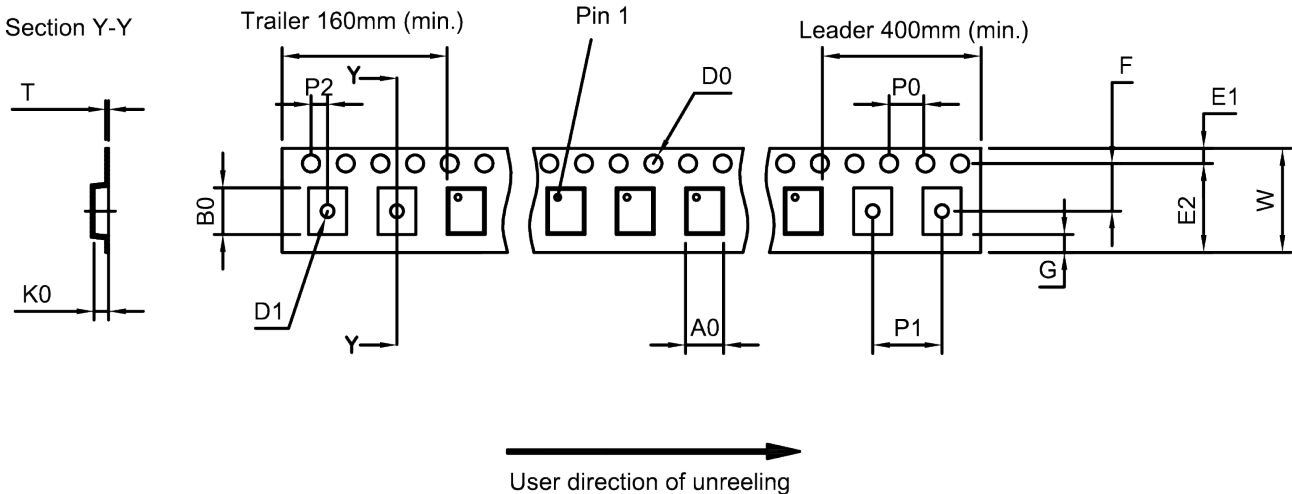


**Figure 5:** Reflection coefficient at OUT port.

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**10 Packing material**

**10.1 Tape**



**Figure 6:** Drawing of tape (first-angle projection) with tape dimensions according to Table 1.

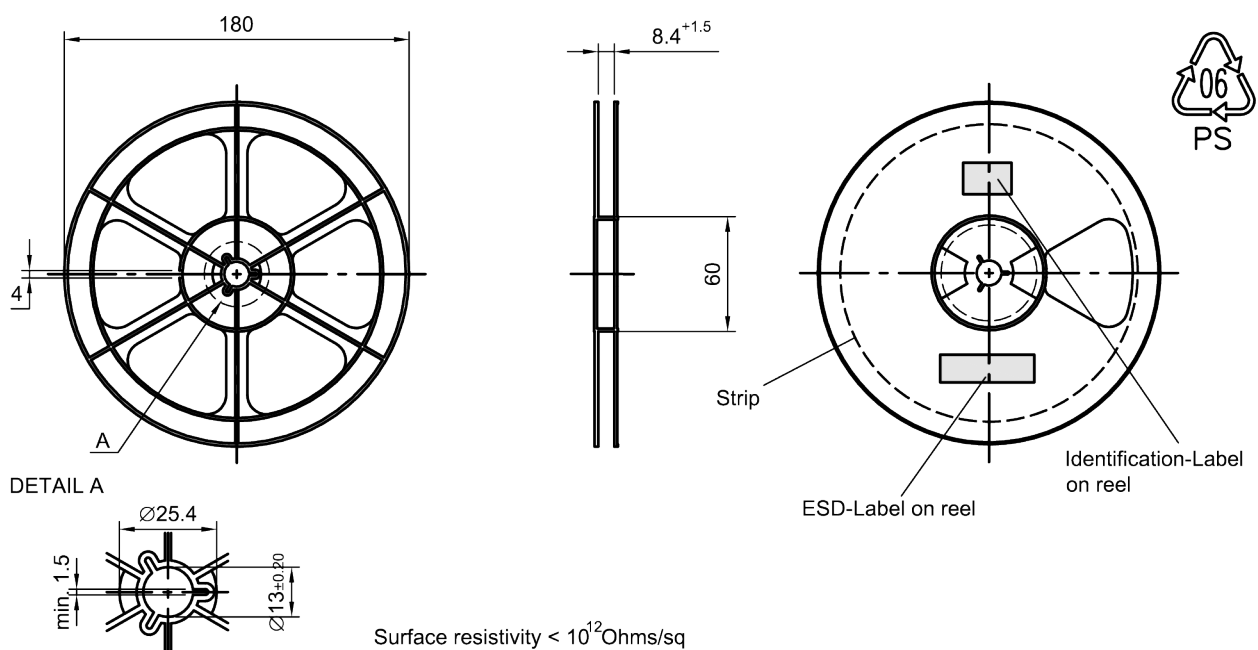
A <sub>0</sub>	1.02±0.05 mm
B <sub>0</sub>	1.22±0.05 mm
D <sub>0</sub>	1.55±0.05 mm
D <sub>1</sub>	0.55±0.1 mm
E <sub>1</sub>	1.75±0.1 mm

E <sub>2</sub>	6.25 mm (min.)
F	3.5±0.05 mm
G	–
K <sub>0</sub>	0.6±0.05 mm
P <sub>0</sub>	4.0±0.1 mm

P <sub>1</sub>	2.0±0.1 mm
P <sub>2</sub>	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 7:** Drawing of reel (first-angle projection) with diameter of 180 mm.

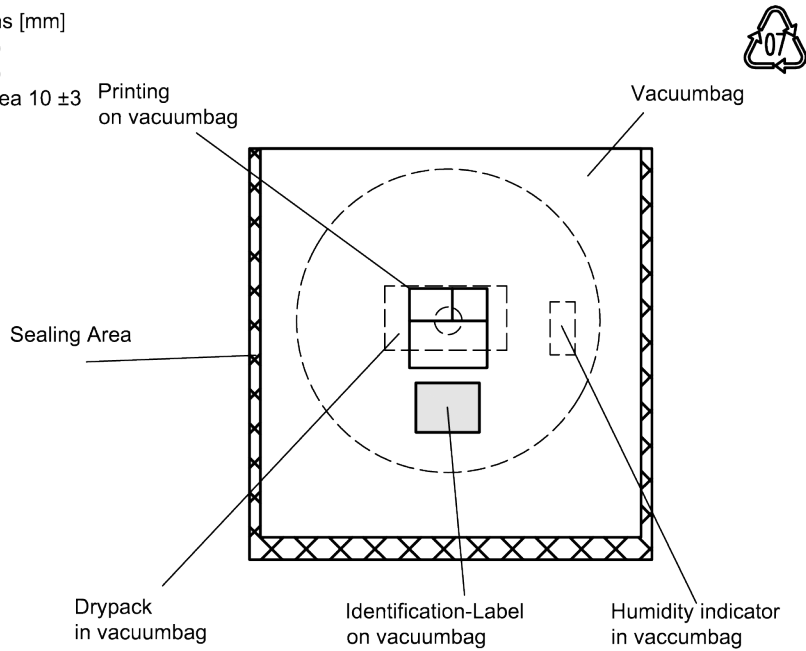
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Dimensions [mm]

X = 220+5

Y = 235+5

Sealing area 10 ±3



**Figure 8:** Drawing of moisture barrier bag (MBB) for reel with diameter of 180 mm.

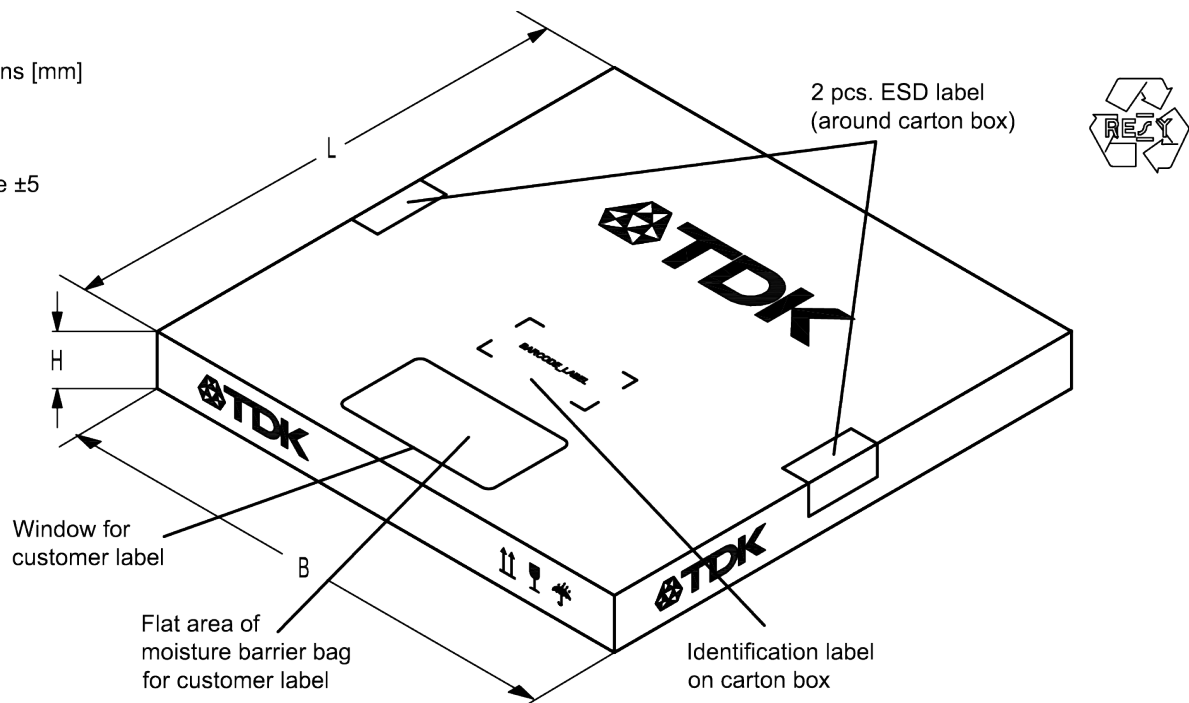
Dimensions [mm]

L = 188

B = 188

H = 30

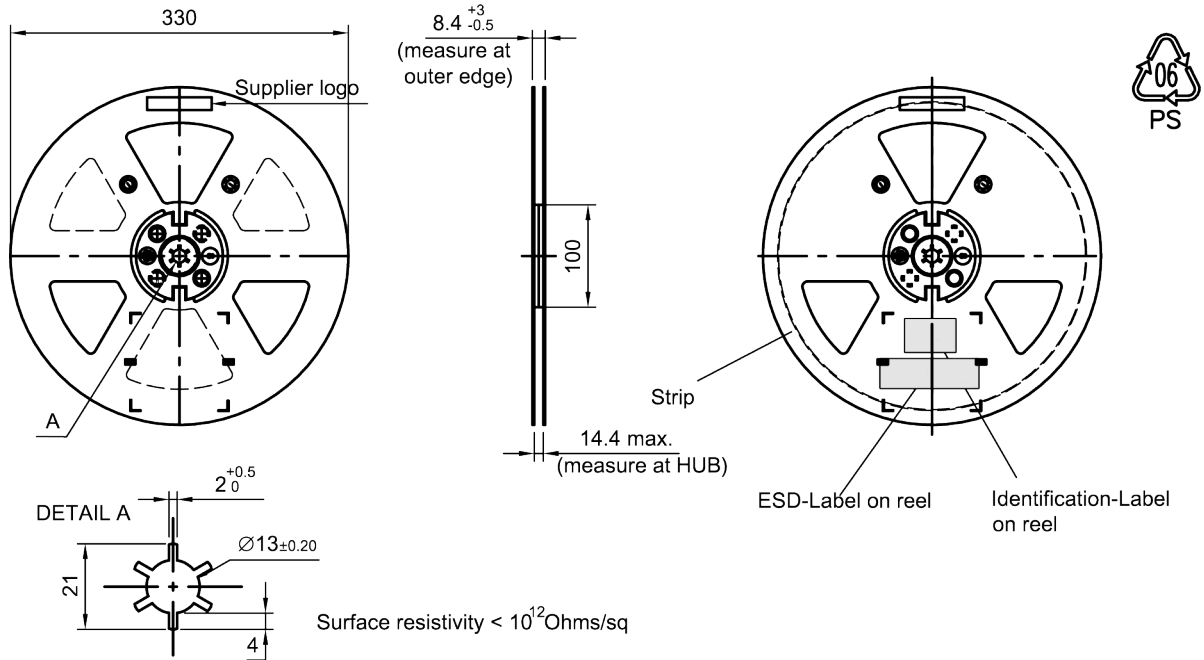
Tolerance ±5



**Figure 9:** Drawing of folding box for reel with diameter of 180 mm.

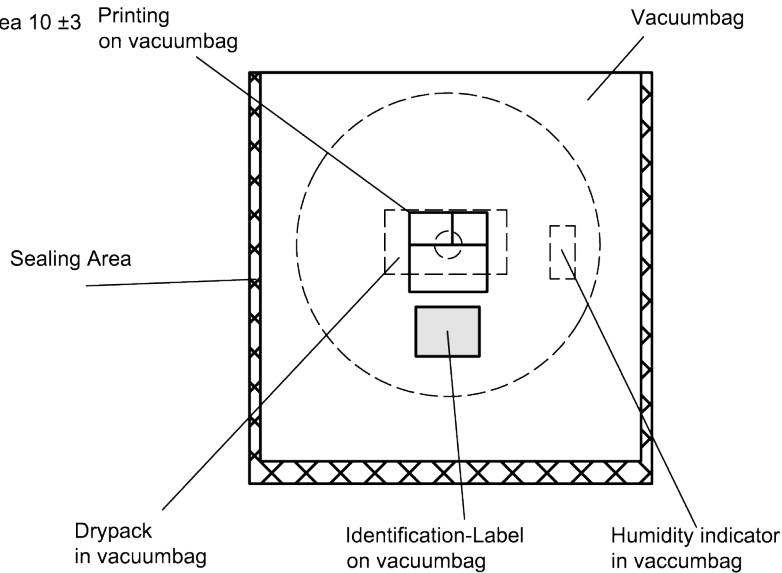
Data sheet

**10.3 Reel with diameter of 330 mm**



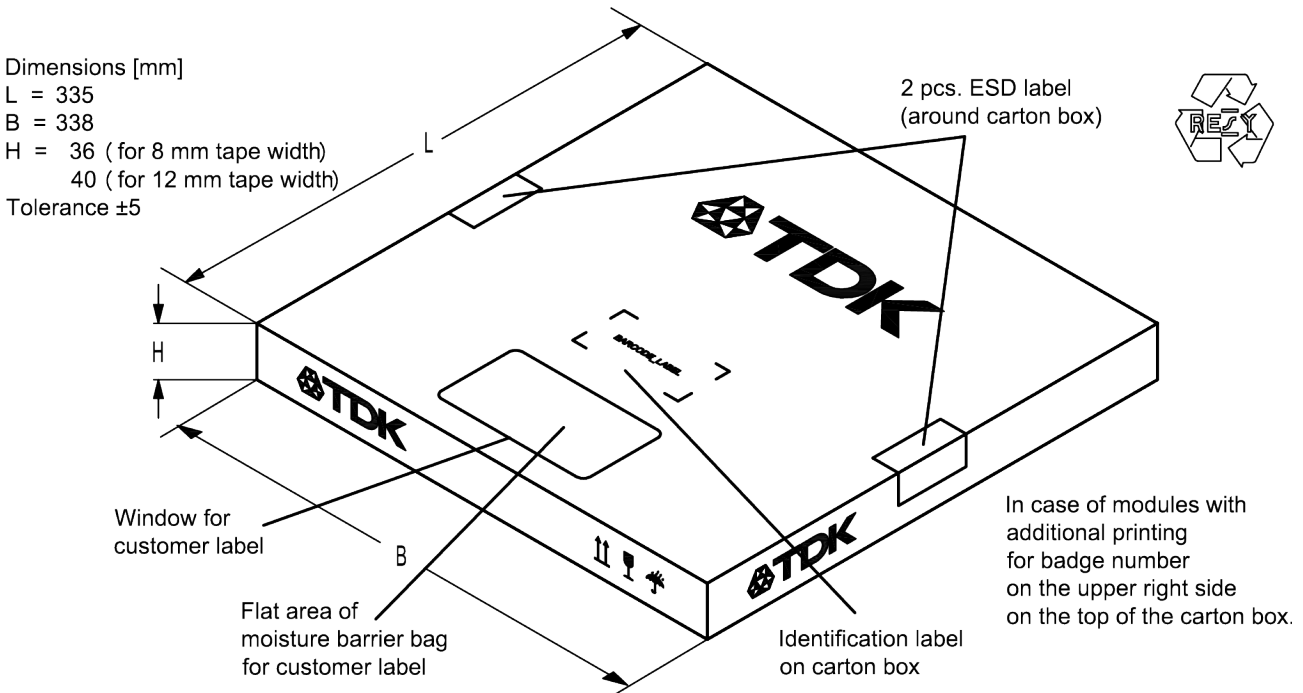
**Figure 10:** Drawing of reel (first-angle projection) with diameter of 330 mm.

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



**Figure 11:** Drawing of moisture barrier bag (MBB) for reel with diameter of 330 mm.

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**Figure 12:** 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.
<b>16J</b>	=>	<b>1234</b>
$1 \times 32^2 + 6 \times 32^1 + 18 (=J) \times 32^0$	=	<b>1234</b>

The BASE32 code for product type B8840 is 8M8.

**■ 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.
<b>5UY</b>	=>	<b>12345</b>
$5 \times 47^2 + 27 (=U) \times 47^1 + 31 (=Y) \times 47^0$	=	<b>12345</b>



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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.

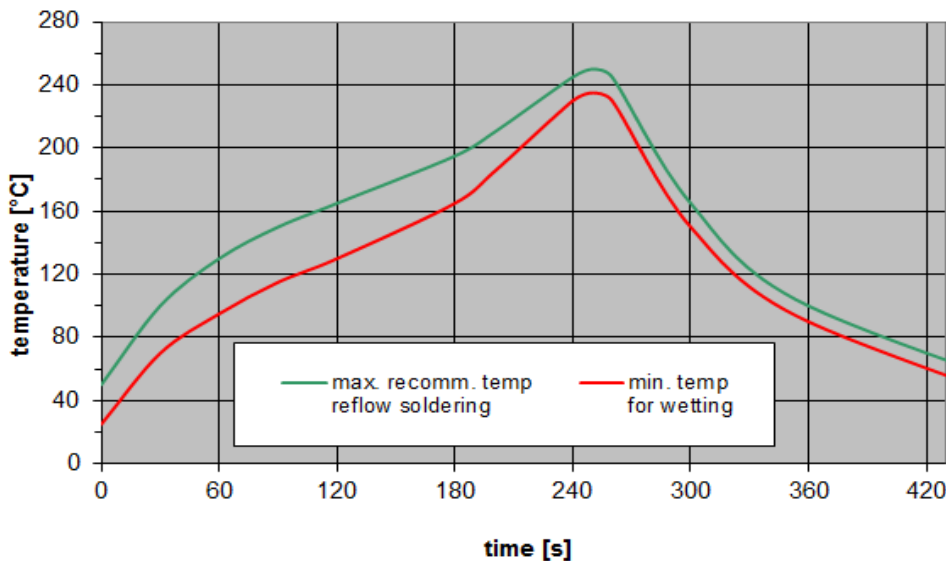
Data sheet

## 12 Soldering profile

The recommended soldering process is in accordance with IEC 60068-2-58 – 3<sup>rd</sup> 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
$T > 220\text{ °C}$	30 s to 70 s
$T > 230\text{ °C}$	min. 10 s
$T > 245\text{ °C}$	max. 20 s
$T \geq 255\text{ °C}$	–
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 13:** Recommended reflow profile for convection and infrared soldering – lead-free solder.

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### 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 code and packing units

Ordering code	Packing units
B39242B8840P810	15000 pcs

**Table 4:** Ordering codes and packing units.

### 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.

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### Contact and Important notes

For further information please contact your local EPCOS sales office or visit our web page at [www.epcos.com](http://www.epcos.com).

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

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