Qualcomm

RF360
Europe GmbH

SAW Components

SAW RF Filter

Automotive Telematics

Series/type:	B4349
Ordering code:	B39262B4349P810
Date:	December 21, 2015
Version:	2.1

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Data sheet

Table of contents

1 Application

- Low-loss SAW filter for LTE Band 41 systems.
- Low insertion attenuation.
- Usable pass band 194MHz.

2 Features

- Package size 2.0±0.1 mm × 1.6±0.1 mm.
- Package height 0.45 mm (max.).
- Package code QCD9L.
- Approximate weight 0.005 g.
- RoHS compatible.
- Package for Surface Mount Technology (SMT).
- Ni/Au-plated terminals.
- Filter surface passivated.
- AEC-Q200 qualified component family (operable temperature range −40 °C to +85 °C).
- Electrostatic Sensitive Device (ESD).

Figure 1: Picture of component with example of marking.

3 Package

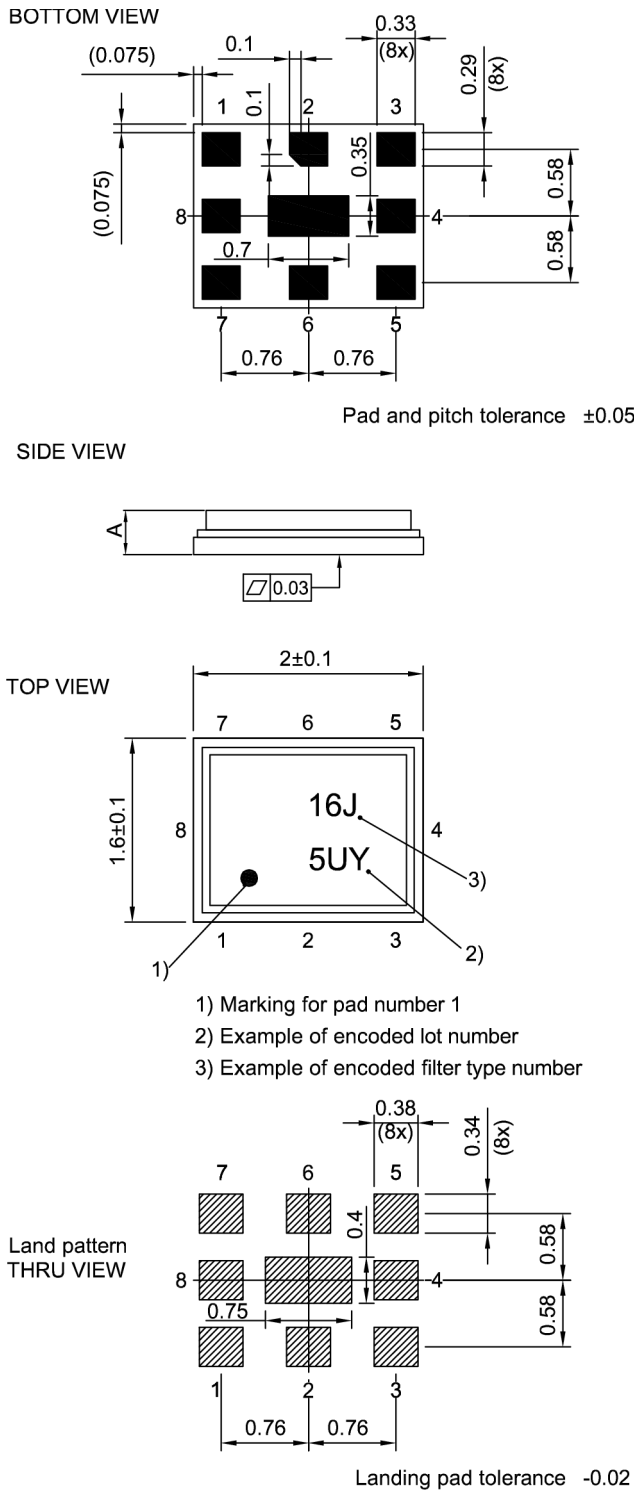

Figure 2: Drawing of package with package height A = 0.45 mm (max.). See Simplified drawings (p. 15).

4 Pin configuration

- 3 Output
- 8 Input
- 1, 2, 4, 5, 6, 7, 9 Ground

5 Matching circuit

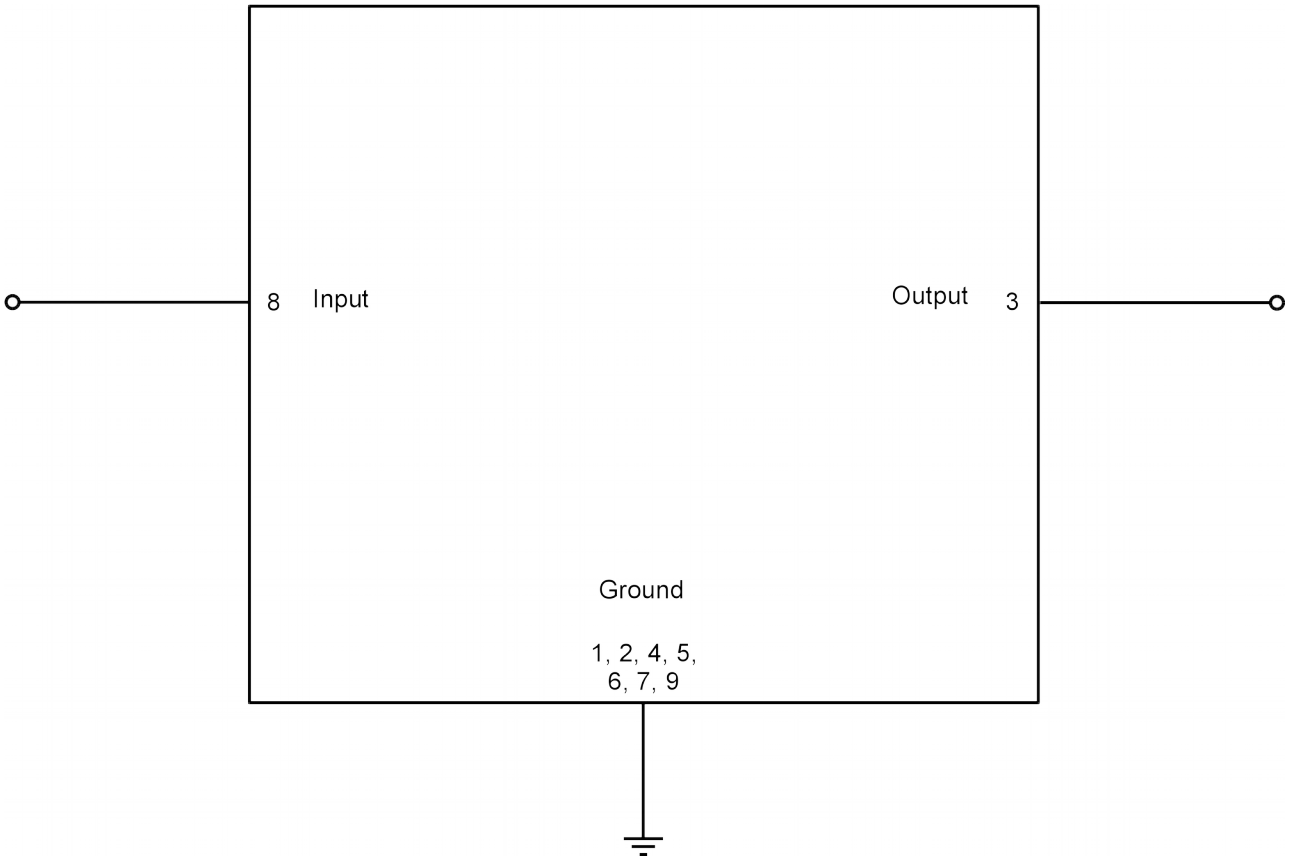

Figure 3: Schematic of matching circuit. No external matching components required.

6 Characteristics

Temperature range for specification T = −30 °C to +85 °C
Input terminating impedance Z_{IN} = 50 Ω
Output terminating impedance Z_{OUT} = 50 Ω

Characteristics				min.	typ. @+25 °C	max.	
Center frequency			f_C	—	2593	—	MHz
Maximum insertion attenuation			α_{max}				
	2496 ... 2690	MHz		—	3.5	6.0	dB
Amplitude ripple (p-p)			$\Delta\alpha$				
	2496 ... 2690	MHz		—	1.7	4.3	dB
Maximum VSWR			$VSWR_{max}$				
@ input port	2496 ... 2690	MHz		—	1.7	2.2	
@ output port	2496 ... 2690	MHz		—	1.6	2.2	
Minimum attenuation			α_{min}				
	10 ... 1360	MHz		30	34	—	dB
	1361 ... 1564	MHz		25	28	—	dB
	1565 ... 1615	MHz		24	27	—	dB
	1920 ... 1980	MHz		20	22	—	dB
	2400 ... 2451.5	MHz		25	30	—	dB
	2452.5 ... 2466.5	MHz		27	32	—	dB
	2467.5 ... 2471.5	MHz		14	38	—	dB
	2472.5 ... 2476.5	MHz		5	38	—	dB
	4992 ... 5380	MHz		23	30	—	dB
	5381 ... 7000	MHz		23	33	—	dB
	7001 ... 7487	MHz		13	19	—	dB
	7488 ... 7990	MHz		7	14	—	dB

7 Maximum ratings

Operable temperature	T_{OP} = −40 °C to +85 °C	
Storage temperature	T_{STG} = −40 °C to +85 °C	
DC voltage	V_{DC} = 0 V (max.)	
Input power @ input port: 2496 ... 2690 MHz	P_{IN} = 21 dBm	Continuous wave for 10000 h @ 55 °C.

8 Transmission coefficient

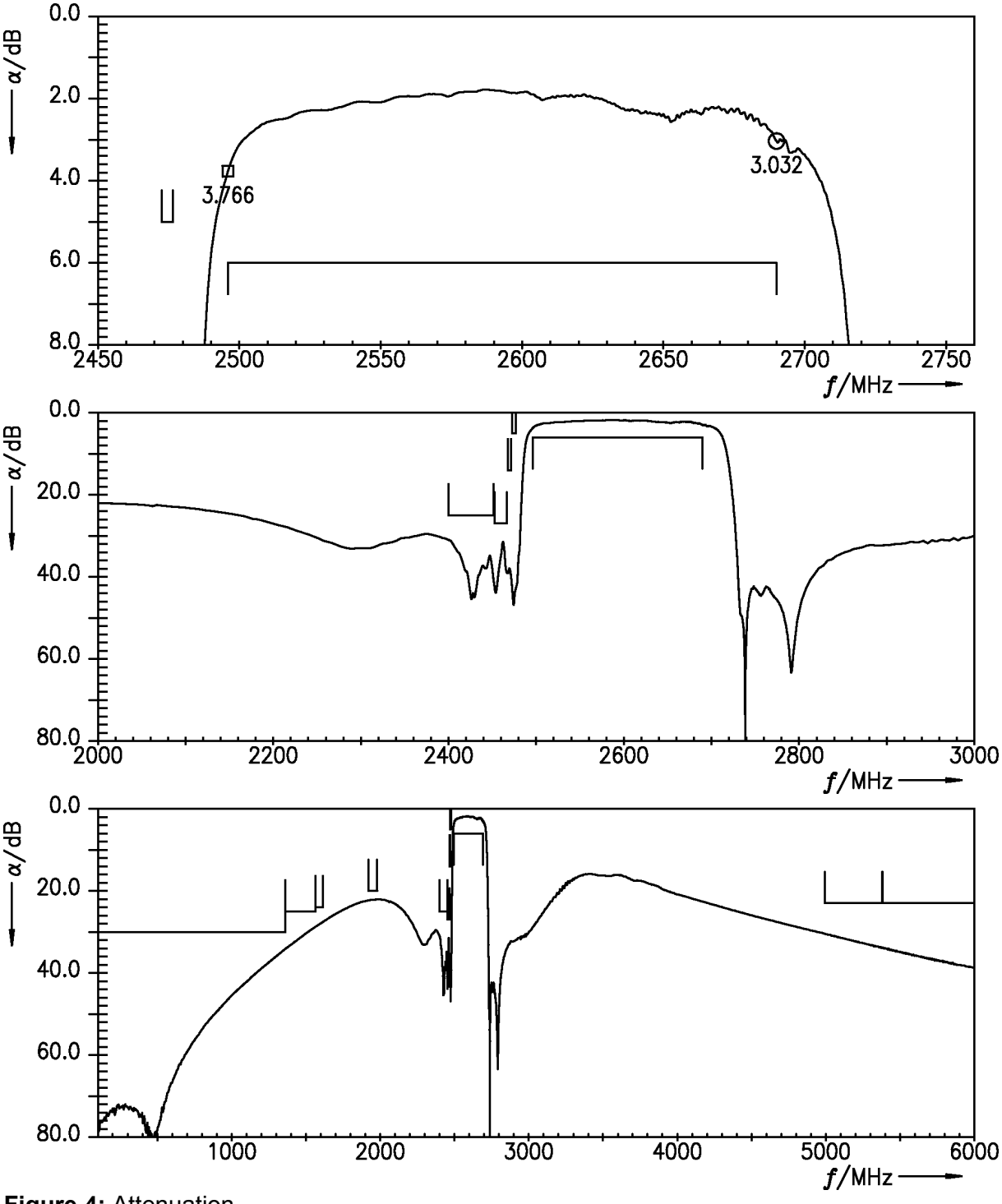

Figure 4: Attenuation.

9 Reflection coefficients

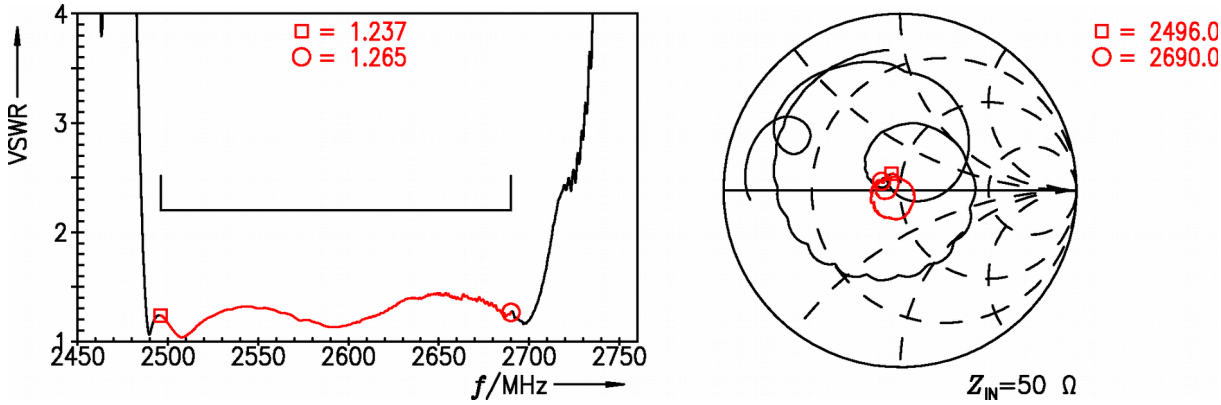

Figure 5: Reflection coefficient at IN port.

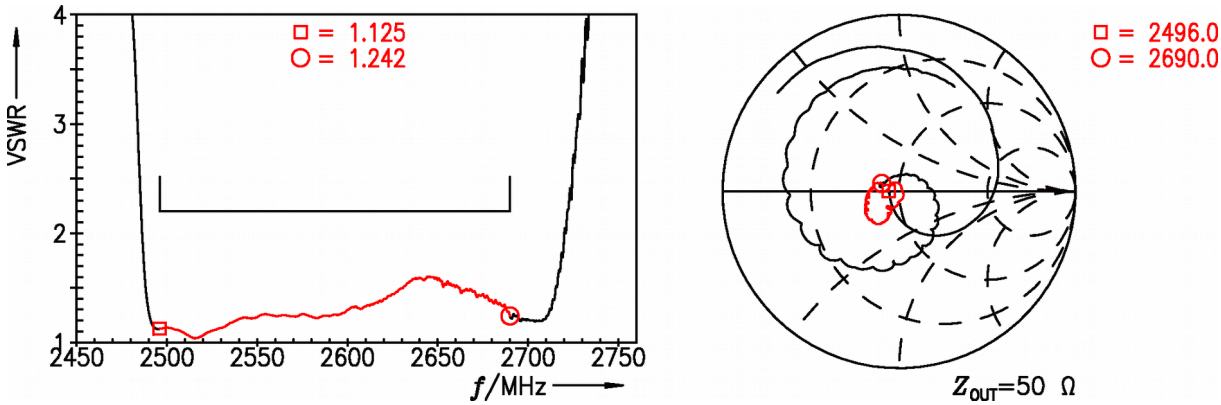

Figure 6: Reflection coefficient at OUT port.

10 Packing material

10.1 Tape

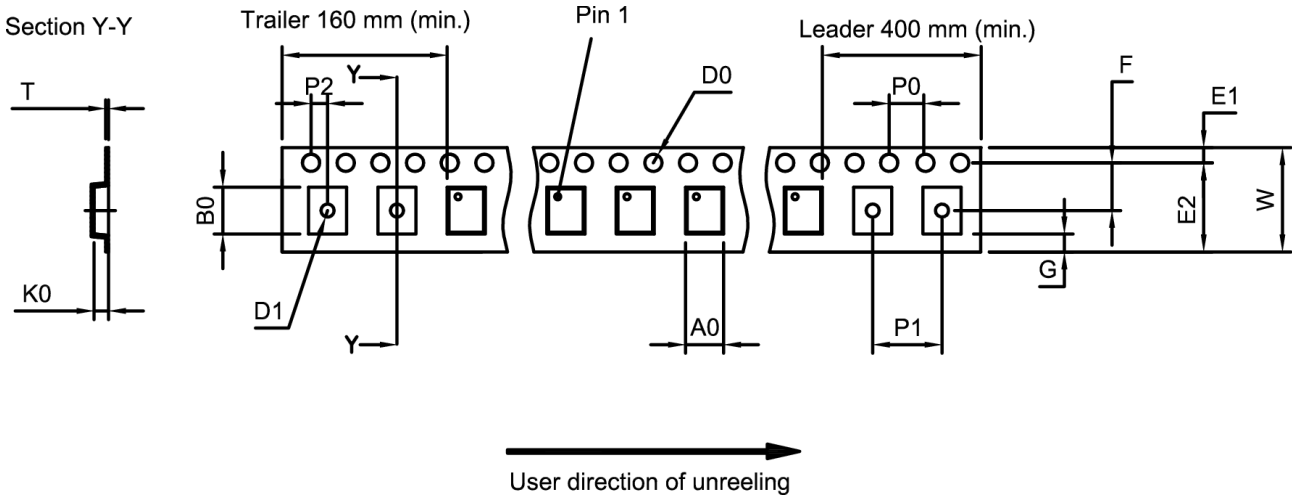

Figure 7: Drawing of tape (first-angle projection) with tape dimensions according to Table 1.

A_0	$1.8_{\pm 0.05}$ mm
B_0	$2.25_{\pm 0.05}$ mm
D_0	$1.5^{+0.1/-0}$ mm
D_1	1.0 mm (min.)
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	$0.6_{\pm 0.05}$ 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	$0.25_{\pm 0.03}$ mm
W	$8.0^{+0.3/-0.1}$ mm

Table 1: Tape dimensions.

10.2 Reel with diameter of 180 mm

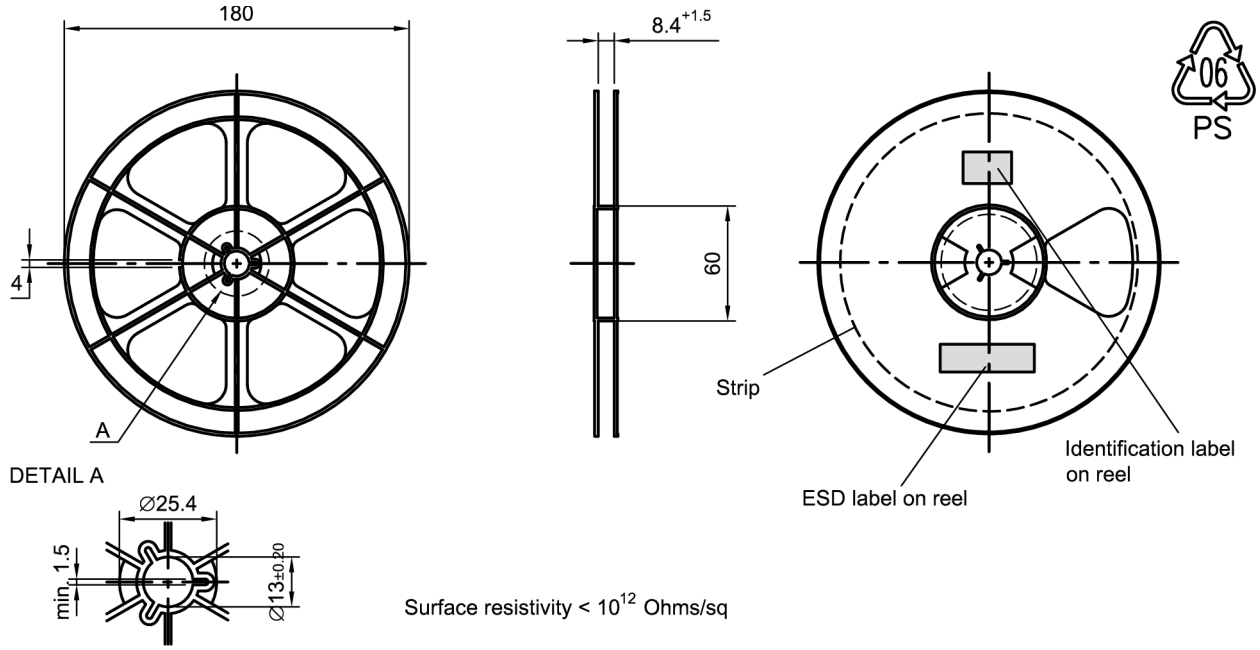

Figure 8: Drawing of reel (first-angle projection) with diameter of 180 mm.

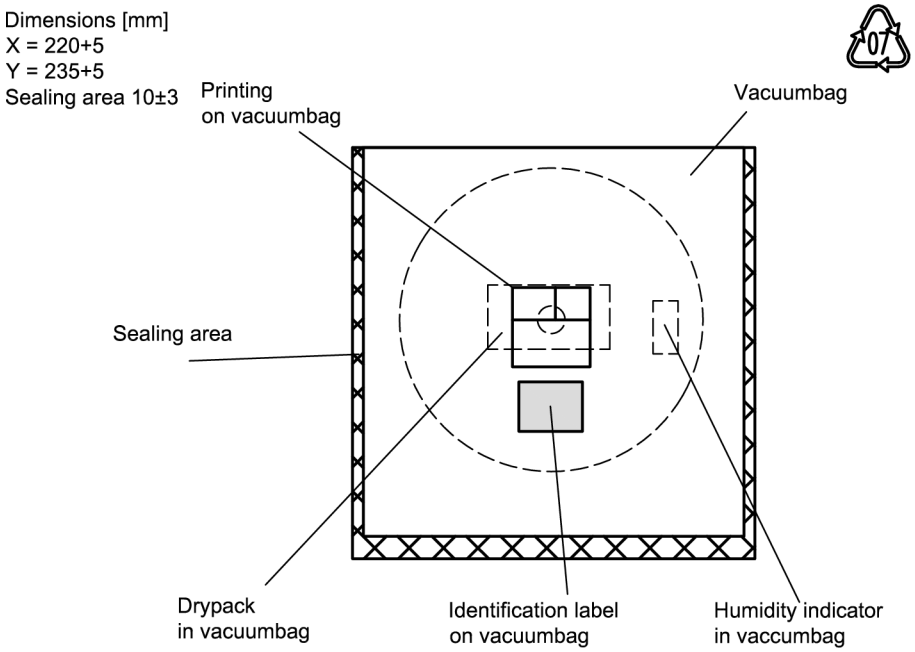

Figure 9: Drawing of moisture barrier bag (MBB) for reel with diameter of 180 mm.

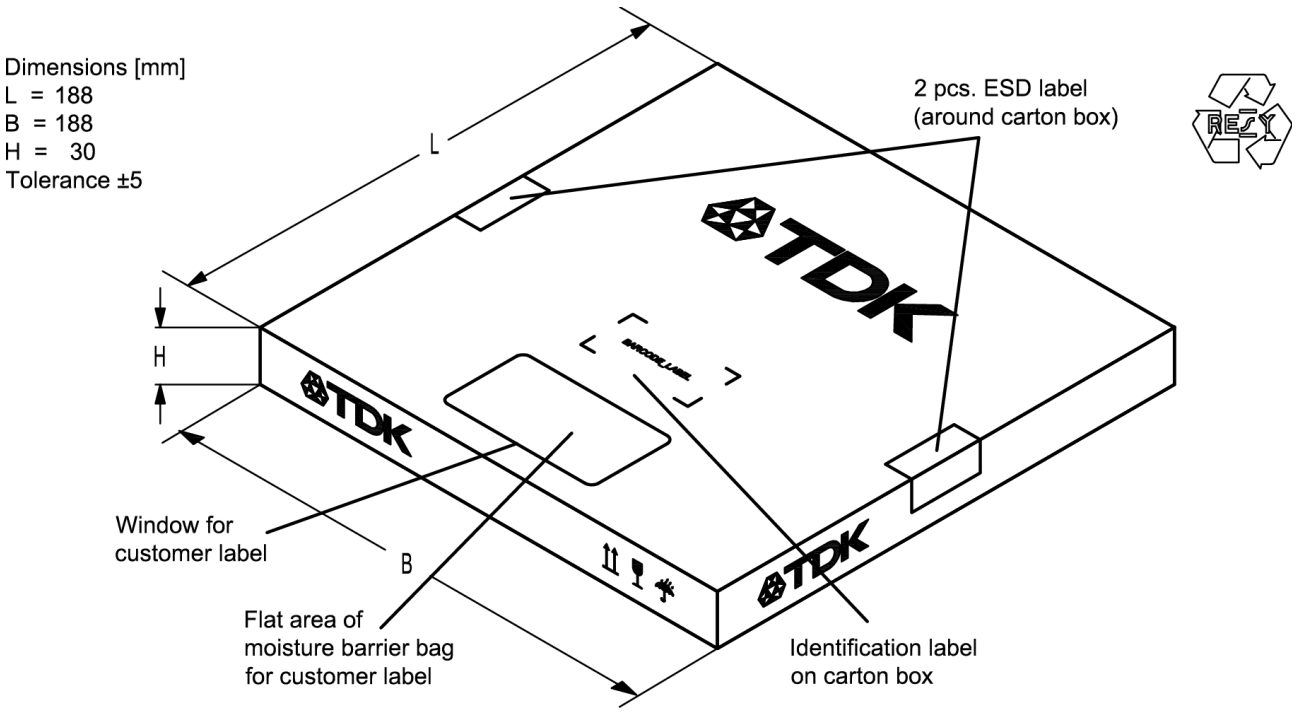

Figure 10: Drawing of folding box for reel with diameter of 180 mm.

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 B4349 is 47X.

- 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).

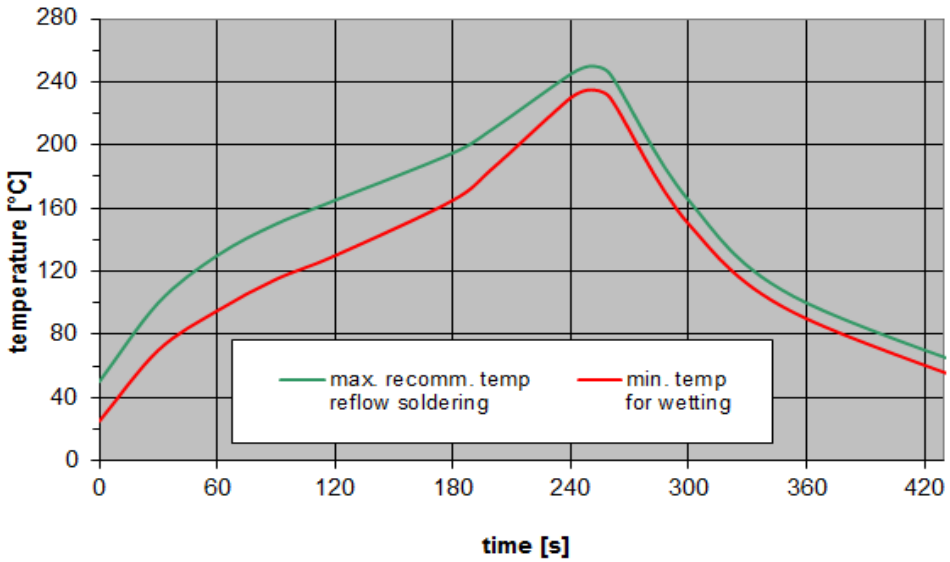

Figure 11: Recommended reflow profile for convection and infrared soldering – lead-free solder.

13 ESD protection of SAW filters

SAW filters are **E**lectro **S**tatic **D**ischarge sensitive devices. To reduce the probability of damages caused by ESD, special matching topologies have to be applied.

In general, “ESD matching” has to be ensured at that filter port, where electrostatic discharge is expected.

Electrostatic discharges predominantly appear at the antenna input of RF receivers. Therefore, only the input matching of the SAW filter has to be designed to short circuit or to block the ESD pulse.

Below three figures show recommended “ESD matching” topologies.

For wide band filters the high-pass ESD matching structure needs to be at least of 3rd order to ensure a proper matching for any impedance value of antenna and SAW filter input. The required component values have to be determined from case to case.

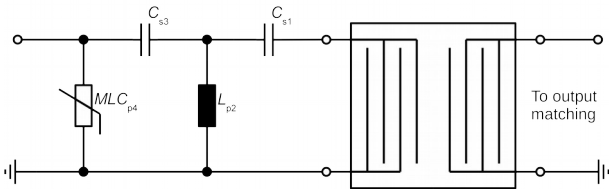

Figure 12: MLC varistor plus ESD matching.

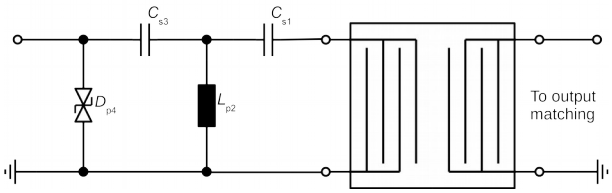

Figure 13: Suppressor diode plus ESD matching.

In cases where minor ESD occur, following simplified “ESD matching” topologies can be used alternatively.

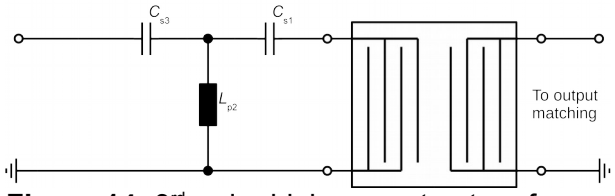

Figure 14: 3rd order high-pass structure for basic ESD protection.

In all three figures the shunt inductor L_{p2} could be replaced by a shorted microstrip with proper length and width. If this configuration is possible depends on the operating frequency and available PCB space.

Effectiveness of the applied ESD protection has to be checked according to relevant industry standards or customer specific requirements.

For further information, please refer to EPCOS Application report: **“ESD protection for SAW filters”.** This report can be found under www.epcos.com/rke. Click on “Applications Notes”.

14 Annotations

14.1 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.

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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.

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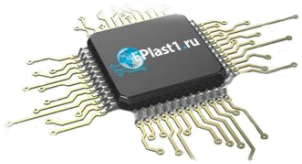

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