SAW components

SAW RF filter

Short range devices

Series/type:	B3440
Ordering code:	B39871B3440U410
Date:	September 29, 2016
Version:	2.3

EPCOS AG is a TDK Group Company.

Table of contents

1 Application

- Low-loss RF filter for ISM band
- Usable pass band: 2.0 MHz
- Low amplitude ripple

2 Features

- Package size 3.0±0.1 mm × 3.0±0.1 mm
- Package height 1.1±0.125 mm
- Package code DCC6C
- Approximate weight 0.04 g
- RoHS compatible
- Package for Surface Mount Technology (SMT)
- Ni/Au-plated terminals
- Lead free soldering compatible with J-STD20C
- Filter surface passivated
- AEC-Q200 qualified component family
  (Grade 1: −40 °C to +125 °C)
- Electrostatic Sensitive Device (ESD)

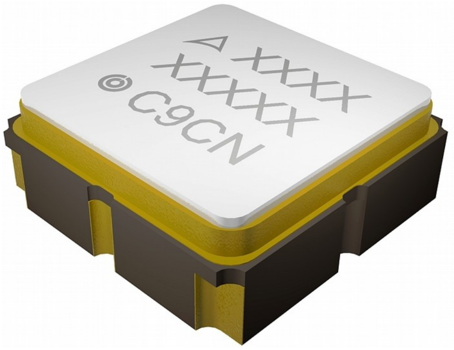
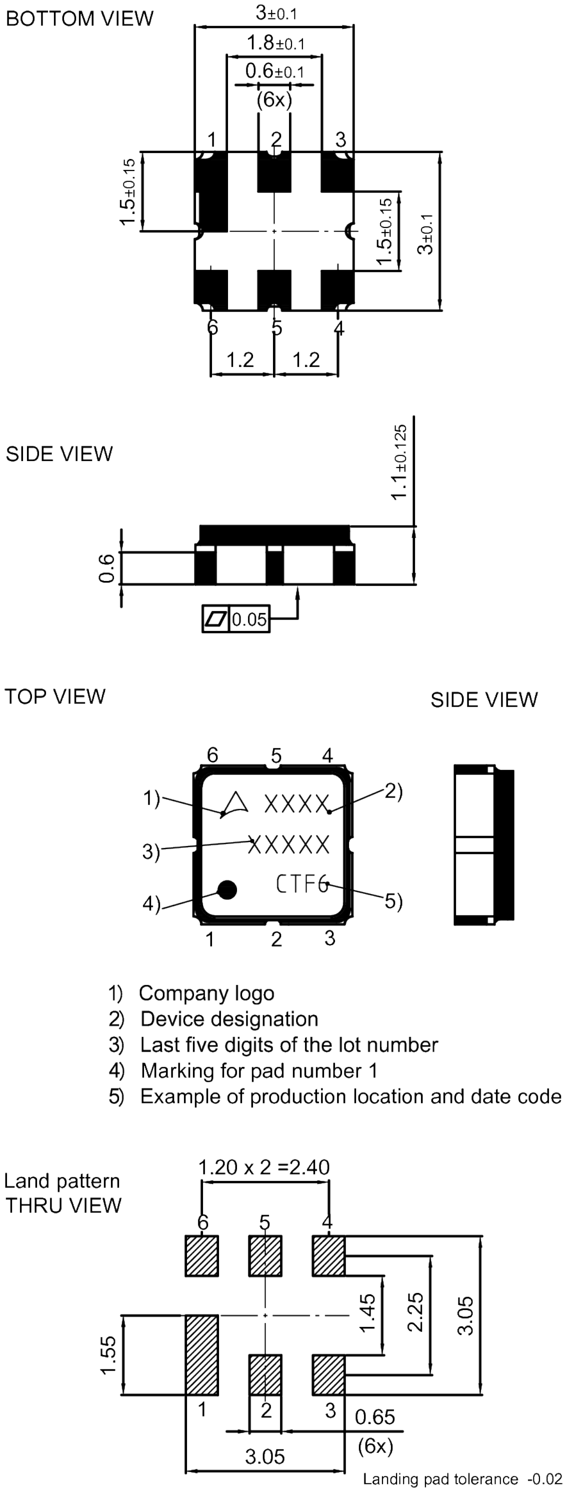


Figure 1: Picture of component with example of product marking.

3 Package



1) Company logo
2) Device designation
3) Last five digits of the lot number
4) Marking for pad number 1
5) Example of production location and date code

Figure 2: Drawing of package. See Sec. Package information (p. 16).

4 Pin configuration

■ 2	Input
■ 5	Output
■ 1, 3, 4, 6	Ground

5 Matching circuit

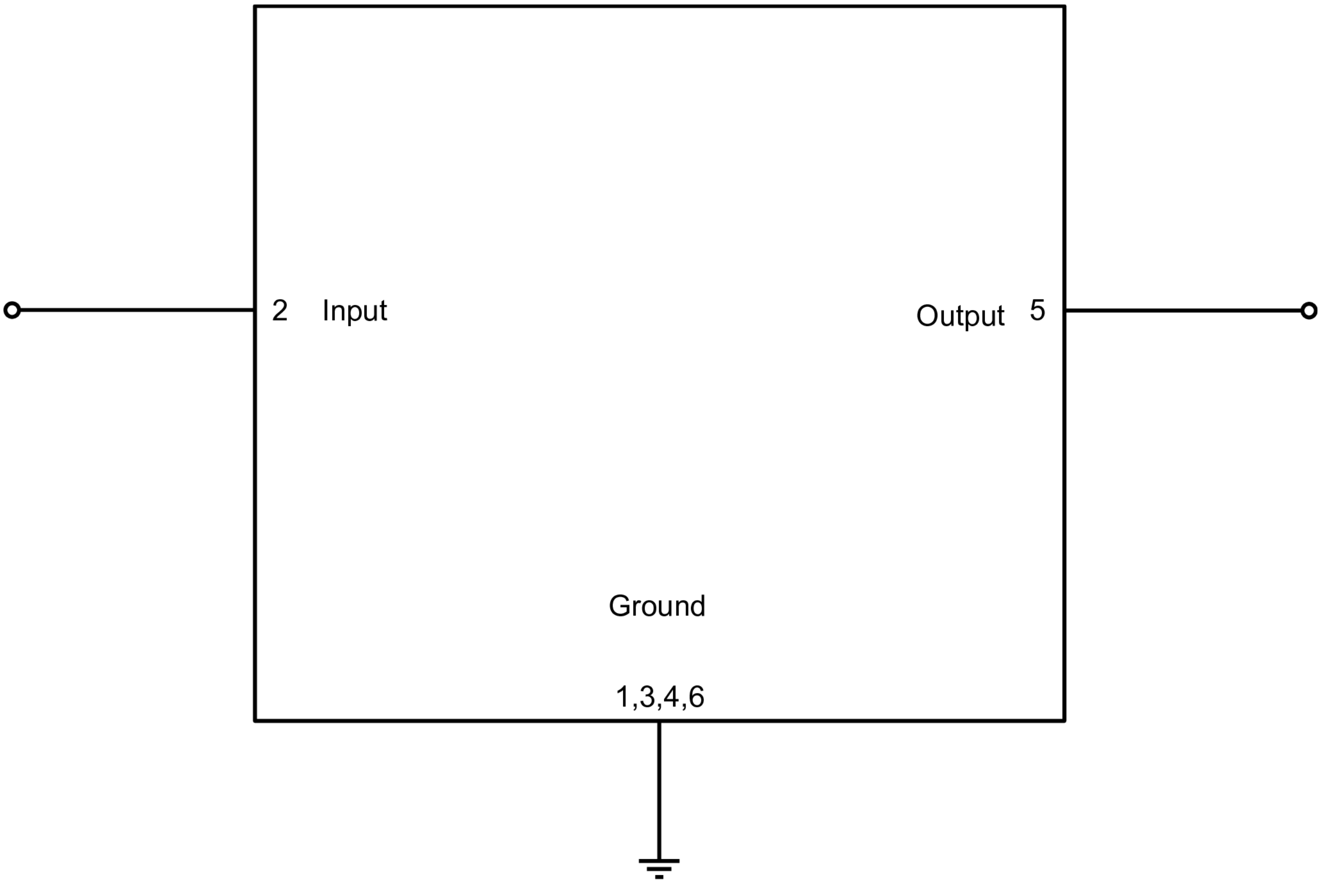


Figure 3: Schematic of matching circuit. No external matching components required.

6 Characteristics

Temperature range for specification T_{SPEC} = −40 °C ... +105 °C
Input terminating impedance Z_{IN} = 50 Ω
Output terminating impedance Z_{OUT} = 50 Ω

Characteristics				**min.** for T_{SPEC}	**typ.** @ +25 °C	**max.** for T_{SPEC}	
Center frequency			f_C	—	869	—	MHz
Maximum insertion attenuation			α_{max}				
	868 ... 870	MHz		—	2.6	3.2	dB
Amplitude ripple (p-p)			$\Delta\alpha$				
	868 ... 870	MHz		—	0.4	1.0	dB
Maximum VSWR			$VSWR_{max}$				
@ input port	868 ... 870	MHz		—	1.3	1.6	
@ output port	868 ... 870	MHz		—	1.3	1.6	
Minimum attenuation			α_{min}				
	50 ... 791	MHz		43	46	—	dB
	791 ... 835	MHz		50	54	—	dB
	835 ... 848	MHz		42	45	—	dB
	848 ... 862	MHz		30[1]	41	—	dB
	848 ... 862	MHz		28	41	—	dB
	880 ... 883	MHz		25	35	—	dB
	883 ... 1000	MHz		49	54	—	dB

[1] Valid for temperature T = −40 °C...+80 °C.

7 Maximum ratings

Operable temperature	T_{OP} = −45 °C ... +125 °C	
Storage temperature	T_{STG}[1] = −45 °C ... +125 °C	
DC voltage	$\lvert V_{DC} \rvert$ = 6.0 V (max.)	
Source power	P_S = 18 dBm	Source impedance 50 Ω.

[1] Not valid for packaging material. Storage temperature for packaging material is −25 °C to +40 °C.

8 Transmission coefficient

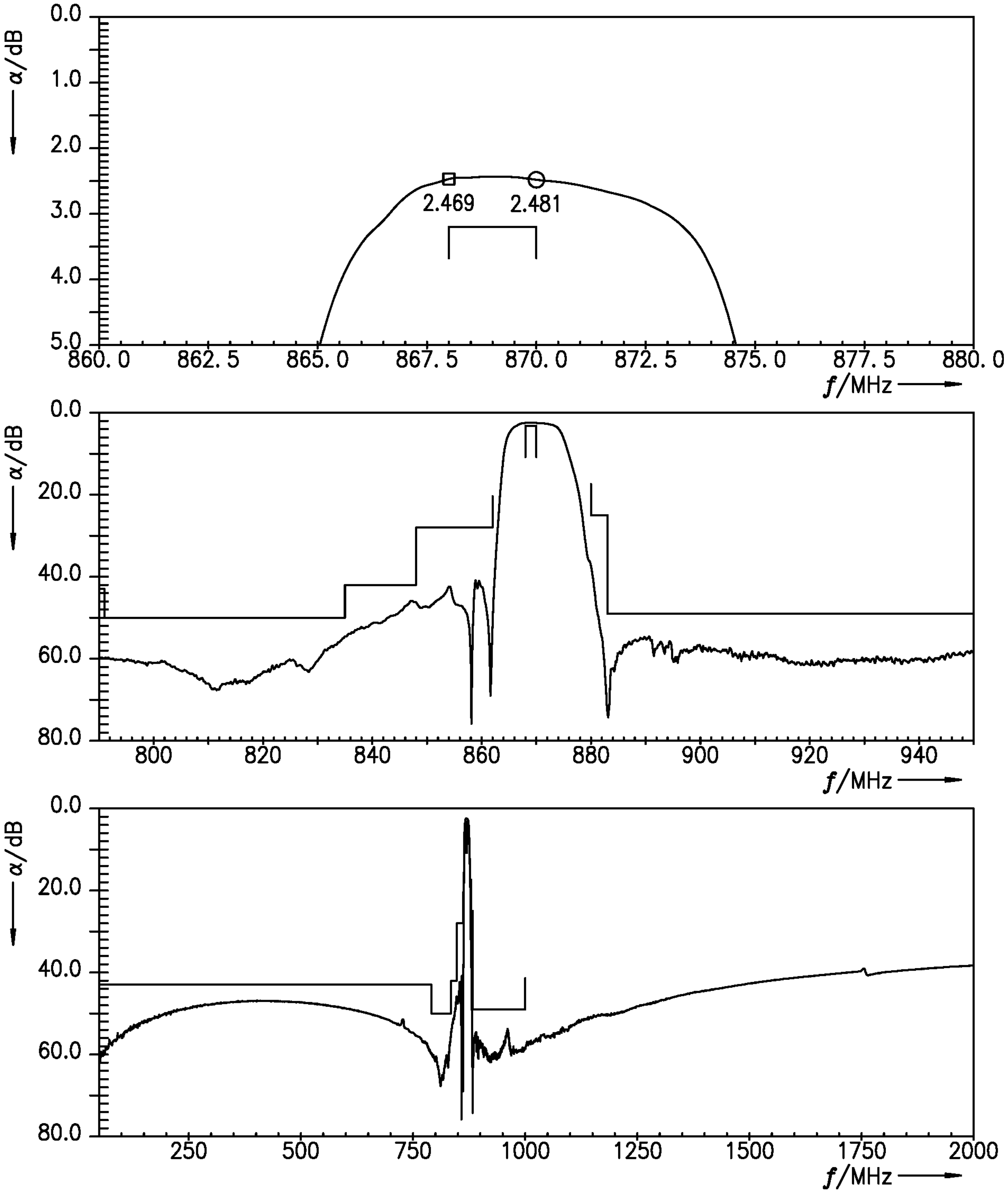


Figure 4: Attenuation.

9 Reflection coefficients

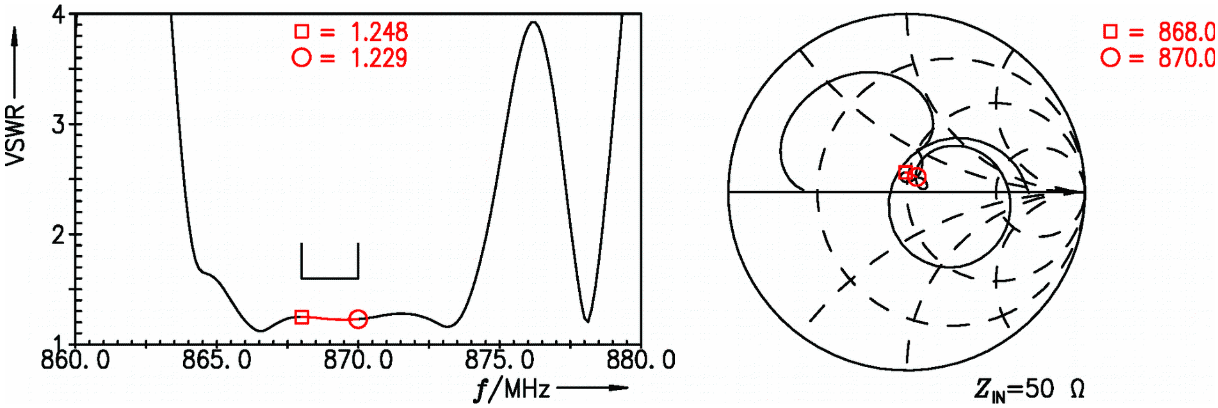


Figure 5: Reflection coefficient at IN port.

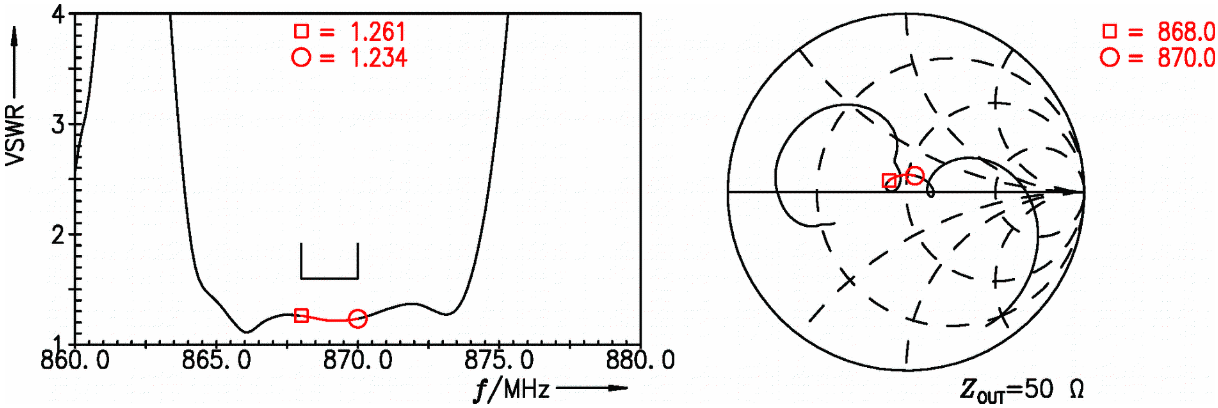


Figure 6: Reflection coefficient at OUT port.

10 Packing material

10.1 Tape

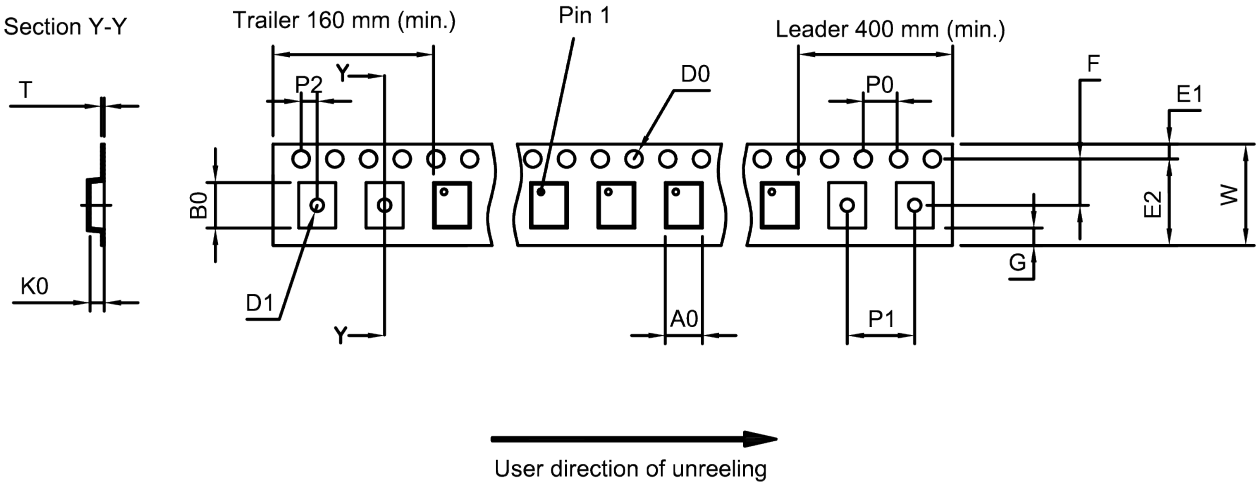


Figure 7: Drawing of tape (first-angle projection) with tape dimensions according to Table 1.

A_0	3.25 ±0.1 mm	E_2	10.25 mm (min.)	P_1	4.0 ±0.1 mm
B_0	3.3 ±0.1 mm	F	5.5 ±0.05 mm	P_2	2.0 ±0.1 mm
D_0	1.5 +0.1/−0 mm	G	0.75 mm (min.)	T	0.2 ±0.05 mm
D_1	1.5 mm (min.)	K_0	1.5 ±0.1 mm	W	12.0 +0.3/−0.1 mm
E_1	1.75 ±0.1 mm	P_0	4.0 ±0.1 mm		

Table 1: Tape dimensions.

10.2 Reel with diameter of 330 mm

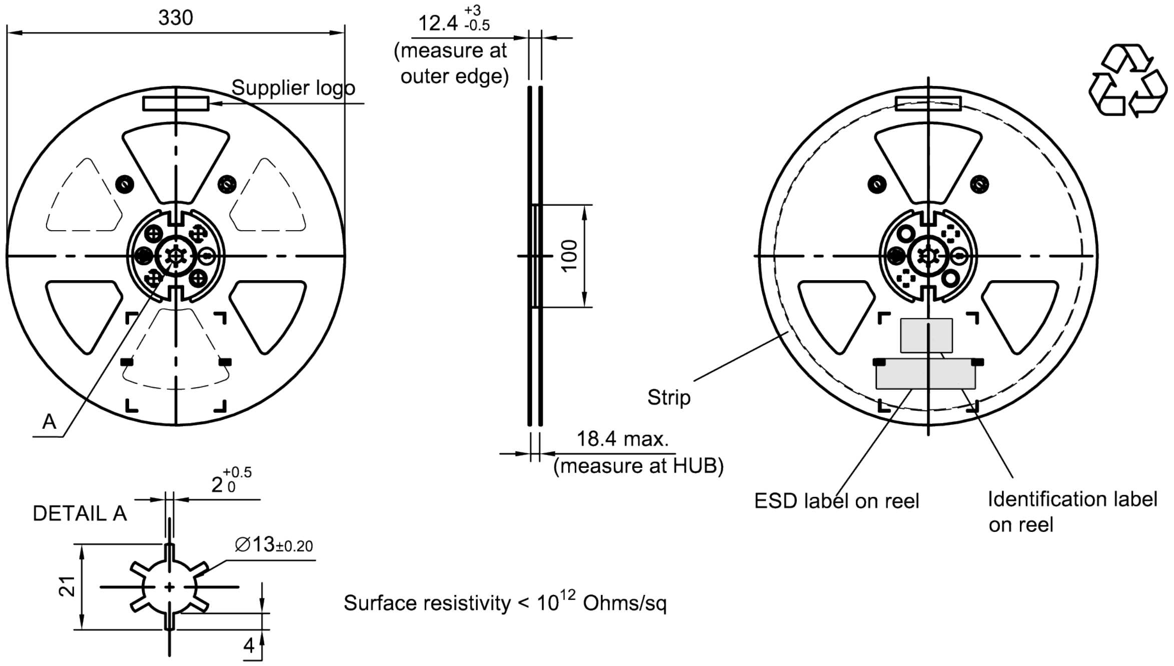
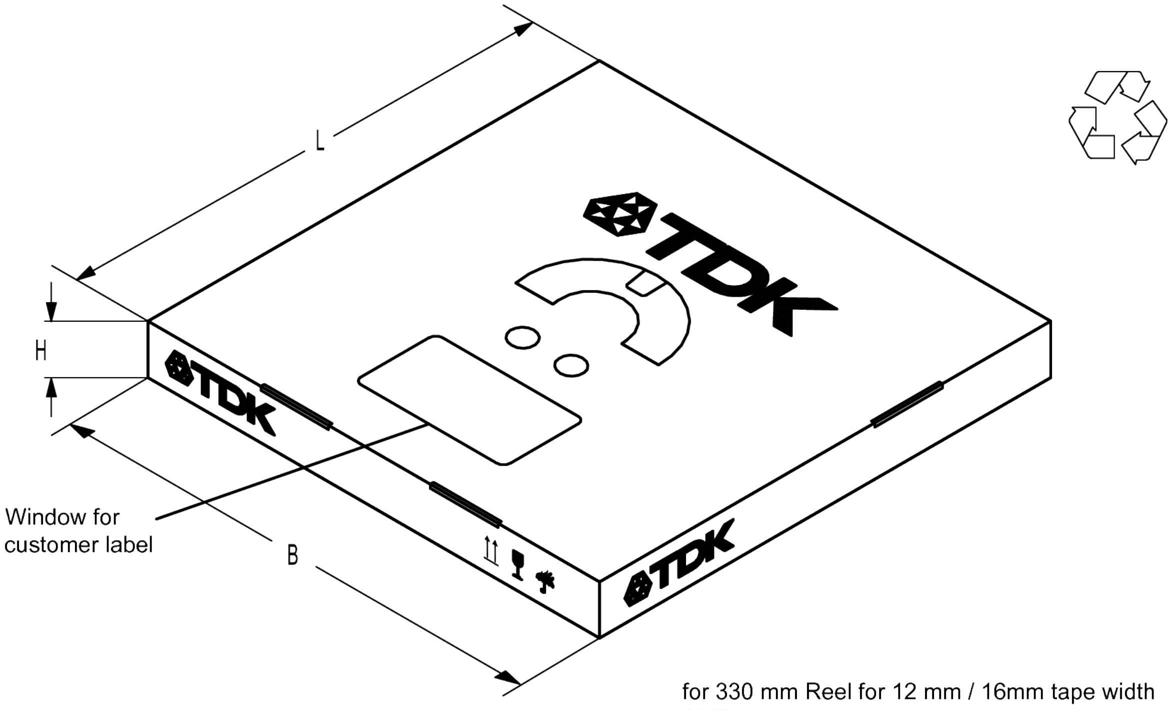


Figure 8: Drawing of reel (first-angle projection) with diameter of 330 mm.



for 330 mm Reel for 12 mm / 16mm tape width SMD packages

Dimensions

L = 340
B = 340
H = 25

Figure 9: Drawing of folding box for reel with diameter of 330 mm.

11 Marking

Products are marked with device designation, lot number, as well as production location and date code.

- Device designation: The 4-character device designation of the ordering code is used for the marking.

  Example for 4-character device designation: B3xxxxB**1234**xxxx

- Lot number: The last 5 digits of the lot number are used for the marking.

  Example: **12345**

- Production location and date code: The production location is Wuxi (encoded in the first character 'C'). The production date code is encoded in the last three characters according to Table 2.

1st digit (day)						2nd digit (year)				3rd digit (month)			
Day	Code	Day	Code	Day	Code	Year	Code	Year	Code	Month	Code	Month	Code
1	1	11	A	21	M	2010	A	2022	P	Jan	1	Jul	7
2	2	12	B	22	N	2011	B	2023	R	Feb	2	Aug	8
3	3	13	C	23	P	2012	C	2024	S	Mar	3	Sep	9
4	4	14	D	24	R	2013	D	2025	T	Apr	4	Oct	0
5	5	15	E	25	S	2014	E	2026	U	May	5	Nov	N
6	6	16	F	26	T	2015	F	2027	V	Jun	6	Dec	D
7	7	17	H	27	U	2016	H	2028	W				
8	8	18	J	28	V	2017	J	2029	X				
9	9	19	K	29	W	2018	K	2030	Z				
10	0	20	L	30	X	2019	L	2031	A				
				31	Z	2020	M	2032	B				
						2021	N	and so on					

Table 2: Production date code.

Example of how to decode production location and date code:

Code: **C T F 6**

Location: C → Wuxi
Day: T → 26th
Year: F → 2015
Month: 6 → June

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).

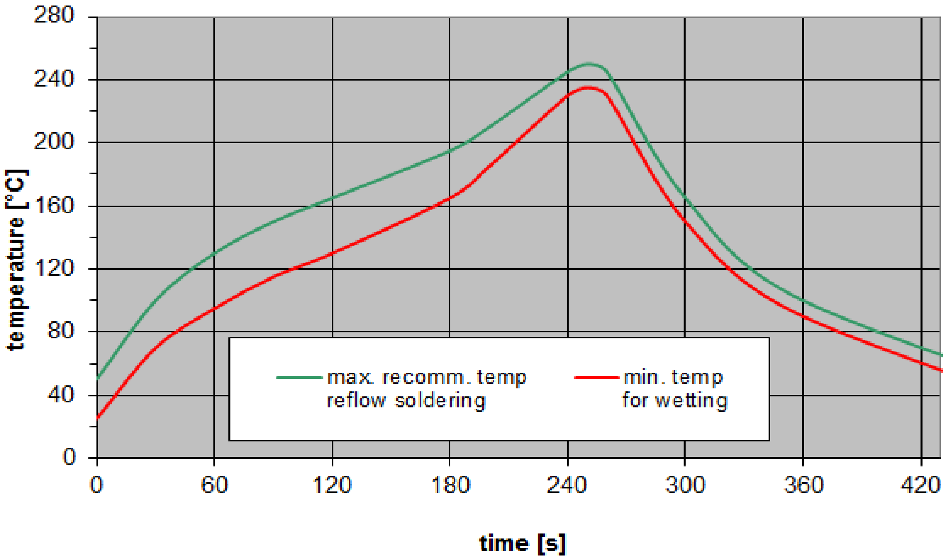


Figure 10: Recommended reflow profile for convection and infrared soldering – lead-free solder.

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.

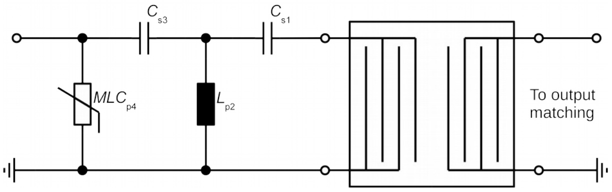


Figure 11: MLC varistor plus ESD matching.

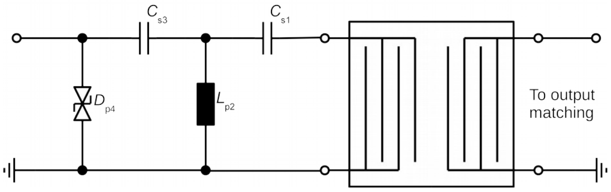


Figure 12: Suppressor diode plus ESD matching.

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

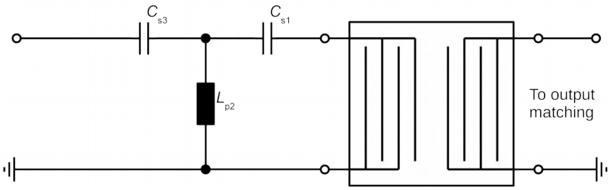


Figure 13: 3rd order high-pass structure for basic ESD protection.

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.

14.2 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.

14.3 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.

15 Cautions and warnings

15.1 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**.

15.2 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.

For information on recycling of tapes and reels please contact one of our sales offices.

15.3 Moldability

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

15.4 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).

Projection method

Unless otherwise specified first-angle projection is applied.

Important notes

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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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