

RF360 Europe GmbH  
A Qualcomm – TDK Joint Venture

## SAW components

### SAW filter

Short range devices

Series/type:	B3719
Ordering code:	B39321B3719H110
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SAW filter	315.00 MHz

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## SAW components

B3719

## SAW filter

315.00 MHz

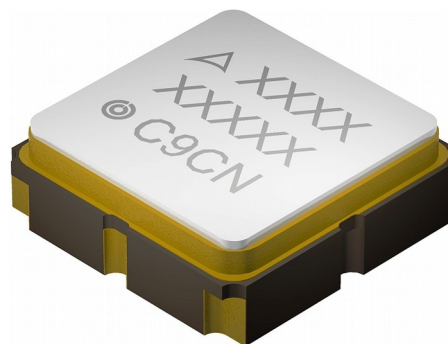
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## 1 Application

- Low-loss RF filter for remote control receivers
- No matching network required for operation at 50 Ω

## 2 Features

- Package size 3.0±0.1 mm × 3.0±0.1 mm
- Package height 1.0±0.115 mm
- Package code DCC6E
- 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
- Electrostatic Sensitive Device (ESD)
- Moisture Sensitivity Level 1 (MSL1)
- AEC-Q200 qualified component family (Grade 1: -40 °C to +125 °C)

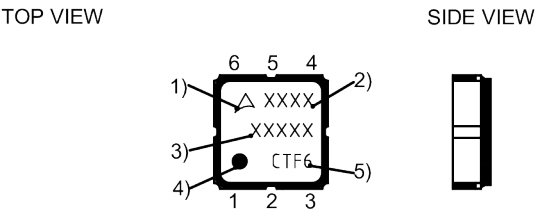
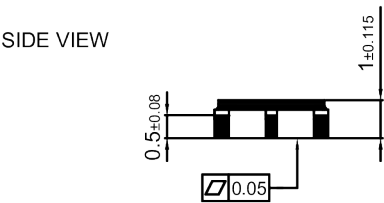
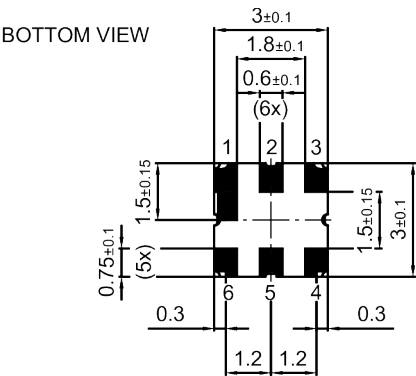


**Figure 1:** Picture of component with example of product marking.

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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

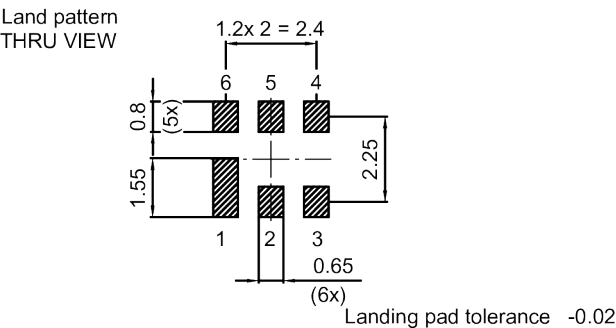


Figure 2: Drawing of package. See Sec. Package information (p. 16).

4 Pin configuration

- 1 Input (recommend or ground)
- 4 Output (recommend or ground)
- 2 Ground (recommend or input)
- 3, 6 Ground
- 5 Ground (recommend or output)

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5 Matching circuit

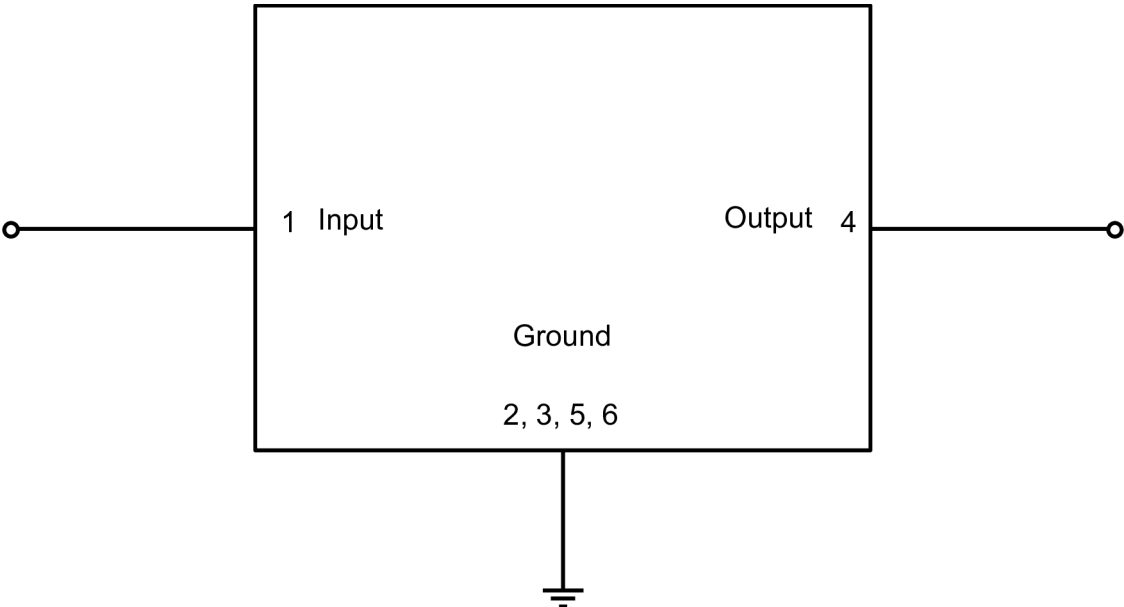


Figure 3: Schematic of matching circuit. No external matching components required.

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## 6 Characteristics

Temperature range for specification

$$T_{\text{SPEC}} = -40\text{ °C} \dots +85\text{ °C}$$

Input terminating impedance

$$Z_{\text{IN}} = 50\ \Omega$$

Output terminating impedance

$$Z_{\text{OUT}} = 50\ \Omega$$

Characteristics				min. for $T_{\text{SPEC}}$	typ. @ +25 °C	max. for $T_{\text{SPEC}}$	
Center frequency			$f_{\text{C}}$	—	315	—	MHz
Maximum insertion attenuation			$\alpha_{\text{max}}$	—	1.4	2.0 <sup>1)</sup>	
	314.5... 315.5	MHz		—	1.4	1.9	dB
	314.5... 315.5	MHz		—	1.4	1.9	dB
Amplitude ripple (p-p)			$\Delta\alpha$	—	0.4	1.0 <sup>1)</sup>	
	314.5... 315.5	MHz		—	0.4	1.0	dB
	314.5... 315.5	MHz		—	0.4	1.0	dB
Maximum VSWR			VSWR <sub>max</sub>	—	1.3	1.6 <sup>1)</sup>	
@ input port	314.5... 315.5	MHz		—	1.3	1.6	
	314.5... 315.5	MHz		—	1.3	1.6	
@ output port	314.5... 315.5	MHz		—	1.3	1.6 <sup>1)</sup>	
	314.5... 315.5	MHz		—	1.3	1.6	
Minimum attenuation			$\alpha_{\text{min}}$	60 <sup>1)</sup>	68	—	dB
	270... 286	MHz		60	68	—	dB
	270... 286	MHz		60	68	—	dB
	293... 293.9	MHz		56 <sup>1)</sup>	64	—	dB
	293... 293.9	MHz		56	64	—	dB
	304... 304.6	MHz		49 <sup>1)</sup>	53	—	dB
	304... 304.6	MHz		49	53	—	dB
	325.4... 326	MHz		29 <sup>1)</sup>	33	—	dB
	325.4... 326	MHz		29	33	—	dB
	336.1... 337	MHz		52 <sup>1)</sup>	60	—	dB
	336.1... 337	MHz		52	60	—	dB
	357.5... 358.7	MHz		55 <sup>1)</sup>	63	—	dB
	357.5... 358.7	MHz		55	63	—	dB

<sup>1)</sup> Valid for temperature  $T = -40\text{ °C} \dots +105\text{ °C}$ .

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7 Maximum ratings

Operable temperature	$T_{OP} = -45\text{ °C} \dots +125\text{ °C}$	
Storage temperature	$T_{STG}^{1)} = -45\text{ °C} \dots +125\text{ °C}$	
DC voltage	$ V_{DC}  = 6.0\text{ V}$	
Source power	$P_S = 13\text{ dBm}$	Source impedance 50 Ω.

<sup>1)</sup> Not valid for packaging material. Storage temperature for packaging material is -25 °C to +40 °C.



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8 Transmission coefficient

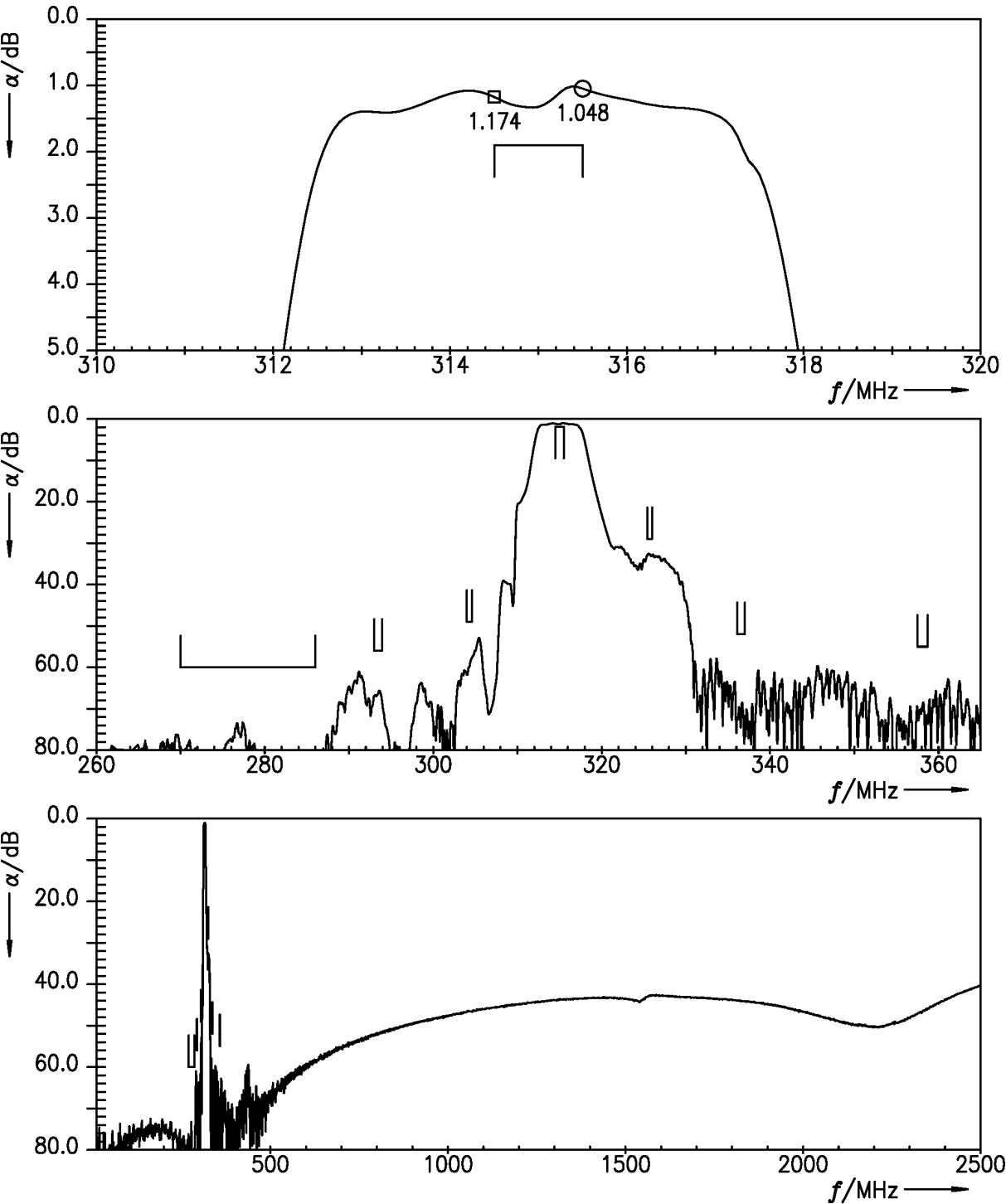


Figure 4: Attenuation.

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9 Packing material

9.1 Tape

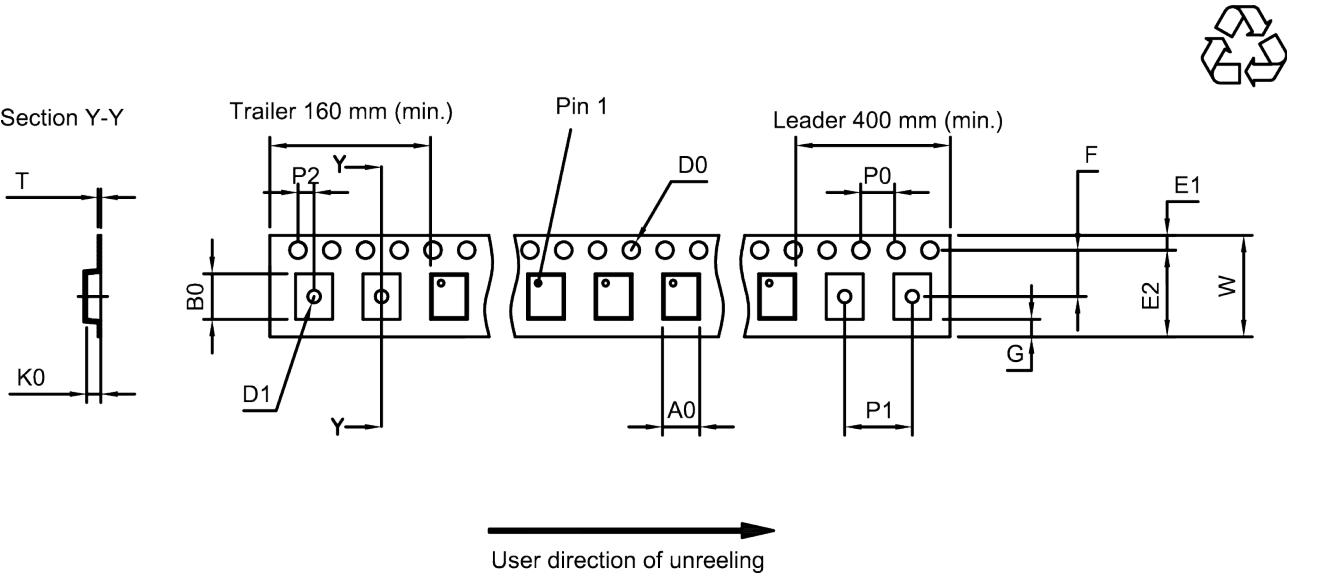


Figure 5: Drawing of tape (first-angle projection) with tape dimensions according to Table 1.

A <sub>0</sub>	3.25±0.1 mm	E <sub>2</sub>	10.25 mm (min.)	P <sub>1</sub>	4.0±0.1 mm
B <sub>0</sub>	3.3±0.1 mm	F	5.5±0.05 mm	P <sub>2</sub>	2.0±0.1 mm
D <sub>0</sub>	1.5+0.1/-0 mm	G	0.75 mm (min.)	T	0.2±0.05 mm
D <sub>1</sub>	1.5 mm (min.)	K <sub>0</sub>	1.5±0.1 mm	W	12.0+0.3/-0.1 mm
E <sub>1</sub>	1.75±0.1 mm	P <sub>0</sub>	4.0±0.1 mm		

Table 1: Tape dimensions.

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9.2 Reel with diameter of 330 mm

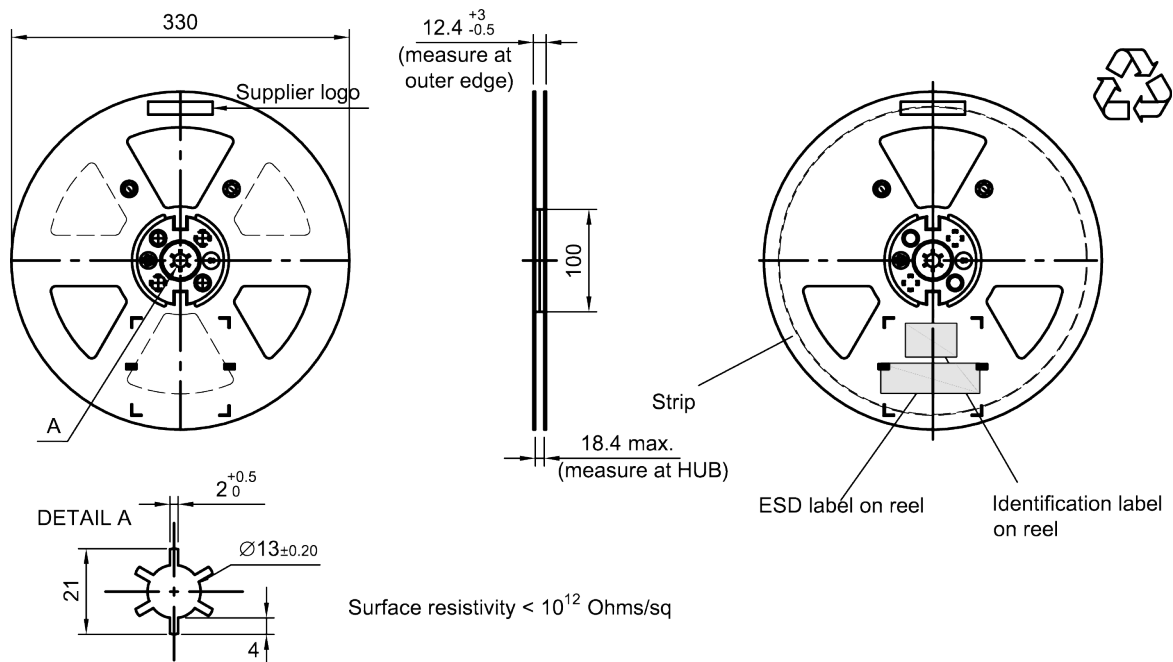
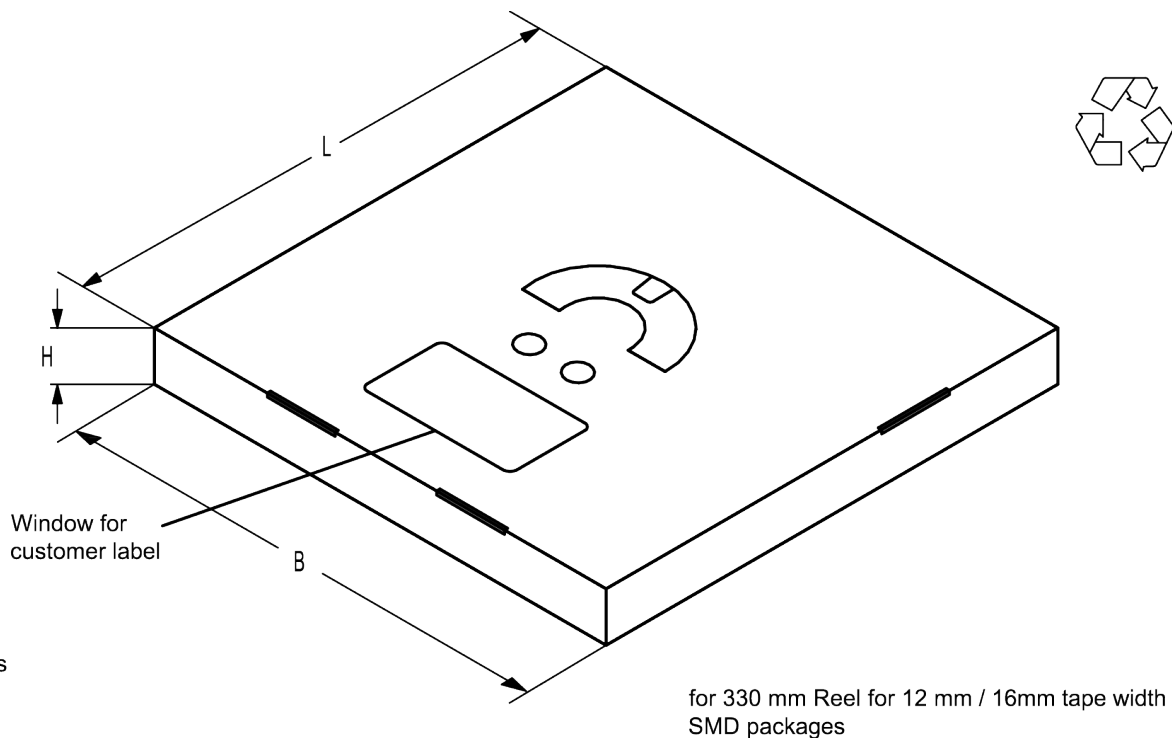


Figure 6: Drawing of reel (first-angle projection) with diameter of 330 mm.



Dimensions

L = 340  
B = 340  
H = 25

Figure 7: Drawing of folding box for reel with diameter of 330 mm.

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## 10 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: B3xxxxB1234xxxx

- 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.

1 <sup>st</sup> digit (day)						2 <sup>nd</sup> digit (year)				3 <sup>rd</sup> 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 → 26<sup>th</sup>

Year: F → 2015

Month: 6 → June

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11 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 °C	30 s to 70 s
T > 230 °C	min. 10 s
T > 245 °C	max. 20 s
T ≥ 255 °C	–
peak temperature T <sub>peak</sub>	250 °C +0/-5 °C
wetting temperature T <sub>min</sub>	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).

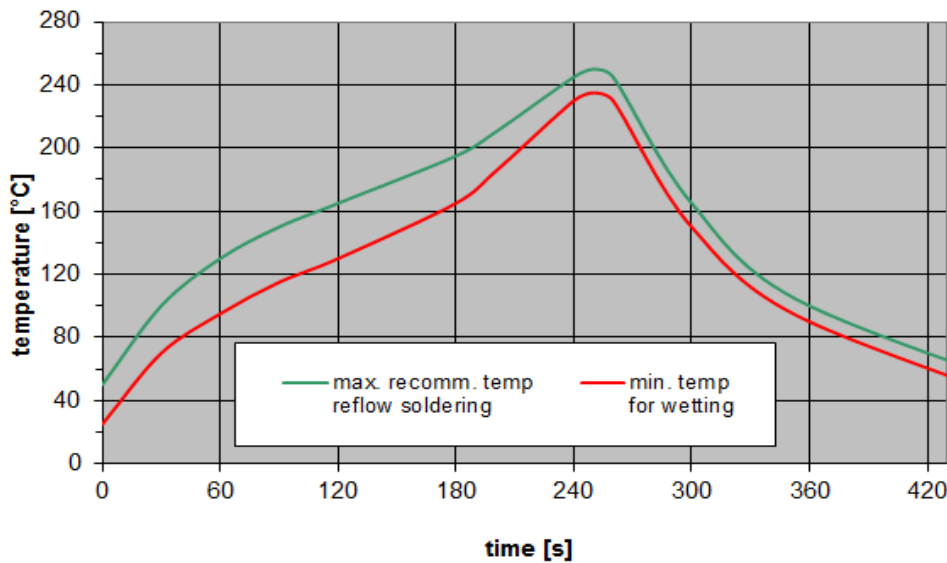


Figure 8: Recommended reflow profile for convection and infrared soldering – lead-free solder.

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## 12 ESD protection of SAW filters

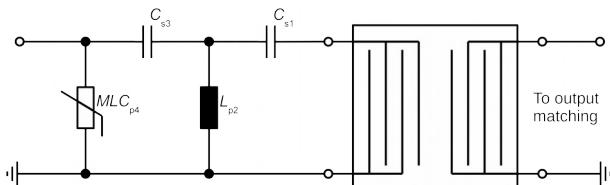
SAW filters are **E**lectro **S**tatic **D**ischarge sensitive devices. To reduce the probability of damages caused by ESD, special matching topologies have to be applied.

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

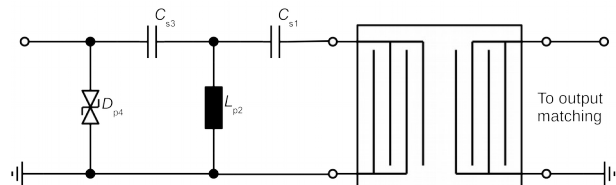
Electrostatic discharges predominantly appear at the antenna input of RF receivers. Therefore, only the input matching of the SAW filter has to be designed to short circuit or to block the ESD pulse.

Below three figures show recommended “ESD matching” topologies.

For wide band filters the high-pass ESD matching structure needs to be at least of 3<sup>rd</sup> 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.

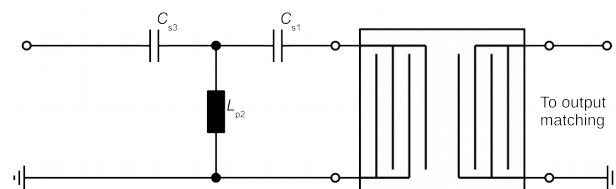


**Figure 9:** MLC varistor plus ESD matching.



**Figure 10:** Suppressor diode plus ESD matching.

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



**Figure 11:** 3<sup>rd</sup> 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 RF360 Application report: “**ESD protection for SAW filters**”. This report can be found under [www.rf360jv.com/rke](http://www.rf360jv.com/rke). Click on “Applications Notes”.

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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 RF360 sales office.

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**14 Cautions and warnings****14.1 Display of ordering codes for RF360 products**

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**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.

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

**14.3 Moldability**

Before using in overmolding environment, please contact your local RF360 sales office.

**14.4 Package information****Landing area**

The printed circuit board (PCB) land pattern (landing area) shown is based on RF360 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 RF360, 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

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, RF360 Europe GmbH and its affiliates are 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 RF360 product with the properties described in the product specification is suitable for use in a particular customer application.
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3. **The warnings, cautions and product-specific notes must be observed.**
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