



RF360
Europe GmbH

SAW components

SAW RF downlink filter

Base stations
LTE band 28

Series/type:	B5199
Ordering code:	B39781B5199U410
Date:	January 22, 2018
Version:	2.2

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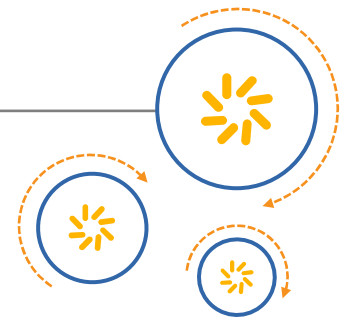
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A Qualcomm – TDK Joint Venture

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Data sheet

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1 Application

- RF filter for E-UTRA band 28 downlink
- Unbalanced to unbalanced operation
- Low amplitude ripple
- Usable pass band 45MHz
- Matching required for operation at 50 Ω

2 Features

- Package code DCC6C
- Package size 3.0±0.1 mm × 3.0±0.1 mm
- Package height 1.1±0.125 mm
- Approximate weight 0.04 g
- RoHS compatible
- Package for Surface Mount Technology (SMT)
- Ni/Au-plated terminals
- Lead free soldering compatible with J-STD20C
- Electrostatic Sensitive Device (ESD)
- Moisture Sensitivity Level 1 (MSL1)

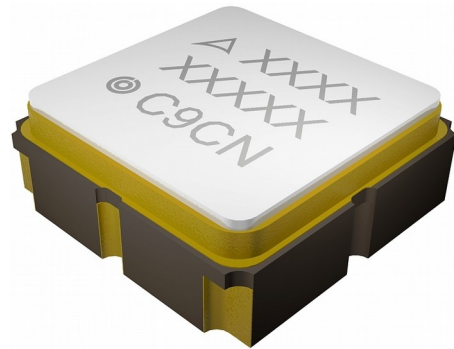


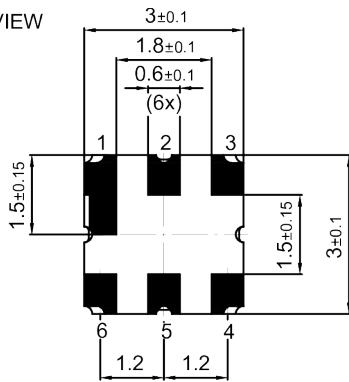
Figure 1: Picture of component with example of product marking.

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SAW RF downlink filter **780.5 MHz**

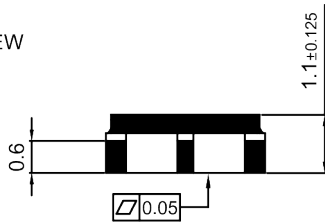
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3 Package

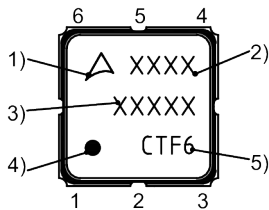
BOTTOM VIEW



SIDE VIEW



TOP VIEW



SIDE VIEW



- 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

Land pattern THRU VIEW

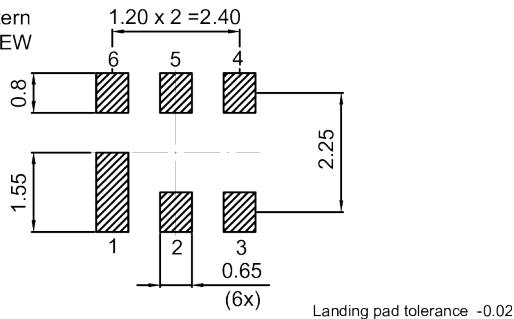


Figure 2: Drawing of package. See Sec. Package information (p. 19).

4 Pin configuration

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

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5 Matching circuit

■ $L_{p2} = 6.2 \text{ nH}$

■ $L_{p5} = 8.2 \text{ nH}$

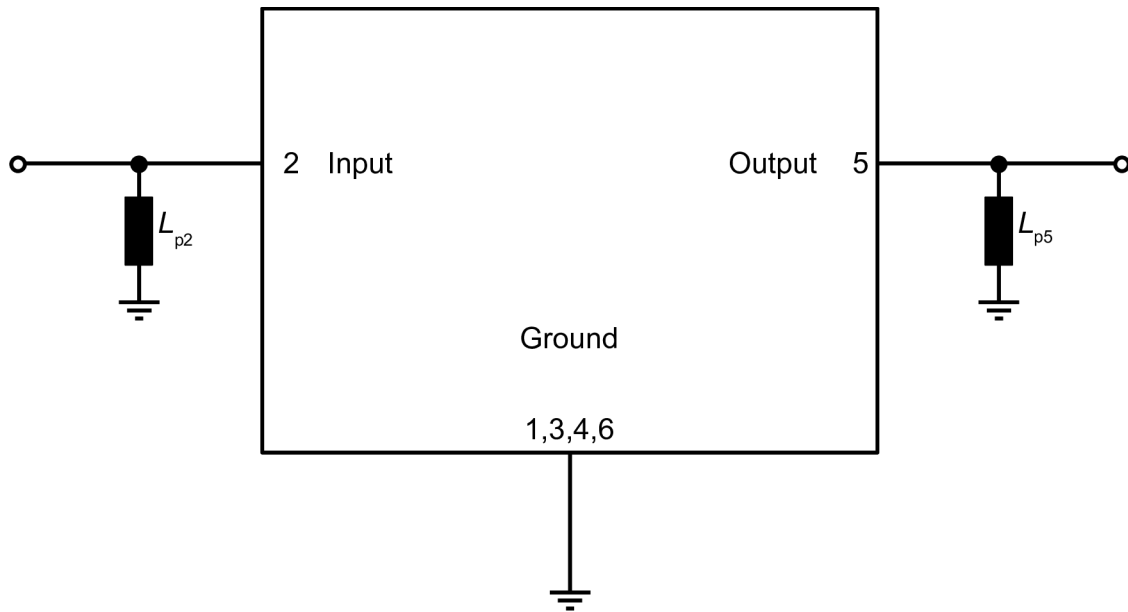


Figure 3: Schematic of matching circuit.

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6 Characteristics

Temperature range for specification	T_{SPEC}	= -20 °C ... +85 °C
Input terminating impedance	Z_{IN}	= 50 Ω with par. 6.2 nH ¹⁾
Output terminating impedance	Z_{OUT}	= 50 Ω with par. 8.2 nH ¹⁾

Characteristics			min. for T_{SPEC}	typ. @ +25 °C	max. for T_{SPEC}		
Center frequency		f_{C}	—	780.5	—	MHz	
Maximum insertion attenuation	758... 803	MHz	α_{max}	—	3.0	4.0	dB
Amplitude ripple (p-p)	758... 803	MHz	$\Delta\alpha$	—	1.4	2.3	dB
Maximum VSWR			VSWR_{max}				
@ input port	758... 803	MHz		—	1.8	2.5	
@ output port	758... 803	MHz		—	1.6	2.5	
Minimum attenuation			α_{min}				
	703... 738	MHz		30	37	—	dB
	738... 748	MHz		30	33	—	dB

¹⁾ See Sec. Matching circuit (p. 6).

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Temperature range for specification	T_{SPEC}	= -40 °C ... -20 °C
Input terminating impedance	Z_{IN}	= 50 Ω with par. 6.2 nH ¹⁾
Output terminating impedance	Z_{OUT}	= 50 Ω with par. 8.2 nH ¹⁾

Characteristics				min. for T_{SPEC}	typ. @ +25 °C	max. for T_{SPEC}	
Maximum insertion attenuation			α_{max}	—	3.0	4.5	dB
	758... 803	MHz					
Amplitude ripple (p-p)			$\Delta\alpha$	—	1.4	2.8	dB
	758... 803	MHz					
Maximum VSWR			VSWR_{max}				
@ input port	758... 803	MHz		—	1.8	2.5	
@ output port	758... 803	MHz		—	1.6	2.5	
Minimum attenuation			α_{min}				
	703... 738	MHz		30	37	—	dB
	738... 748	MHz		30	33	—	dB

¹⁾ See Sec. Matching circuit (p. 6).

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Temperature range for specification	T_{SPEC}	= -20 °C ... +105 °C
Input terminating impedance	Z_{IN}	= 50 Ω with par. 6.2 nH ¹⁾
Output terminating impedance	Z_{OUT}	= 50 Ω with par. 8.2 nH ¹⁾

Characteristics				min. for T_{SPEC}	typ. @ +25 °C	max. for T_{SPEC}	
Maximum insertion attenuation			α_{max}	—	3.0	4.2	dB
	758... 803	MHz					
Amplitude ripple (p-p)			$\Delta\alpha$	—	1.4	2.3	dB
	758... 803	MHz					
Maximum VSWR			$VSWR_{max}$				
@ input port	758... 803	MHz		—	1.8	2.5	
@ output port	758... 803	MHz		—	1.6	2.5	
Minimum attenuation			α_{min}				
	703... 738	MHz		30	37	—	dB
	738... 748	MHz		25	33	—	dB

¹⁾ See Sec. Matching circuit (p. 6).

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7 Maximum ratings

Operable temperature	$T_{OP} = -40\text{ °C} \dots +125\text{ °C}$	
Storage temperature	$T_{STG}^{1)} = -40\text{ °C} \dots +125\text{ °C}$	
DC voltage	$ V_{DC} = 5.0\text{ V (max.)}$	
ESD voltage		
	$V_{ESD}^{2)} = 125\text{ V}$	Machine model.
	$V_{ESD}^{3)} = 250\text{ V}$	Human body model.
Input power	P_{IN}	
@ input port: 758 ... 803 MHz	15 dBm	Continuous wave for 100000 h @ 85 °C.
@ input port: 758 ... 803 MHz	20 dBm	Continuous wave for 1000 h @ 85 °C.

¹⁾ Not valid for packaging material. Storage temperature for packaging material is -25 °C to $+40\text{ °C}$.

²⁾ According to JESD22-A115B (MM – Machine Model), 10 negative & 10 positive pulses.

³⁾ According to JESD22-A114F (HBM – Human Body Model), 1 negative & 1 positive pulse.

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8 Transmission coefficient

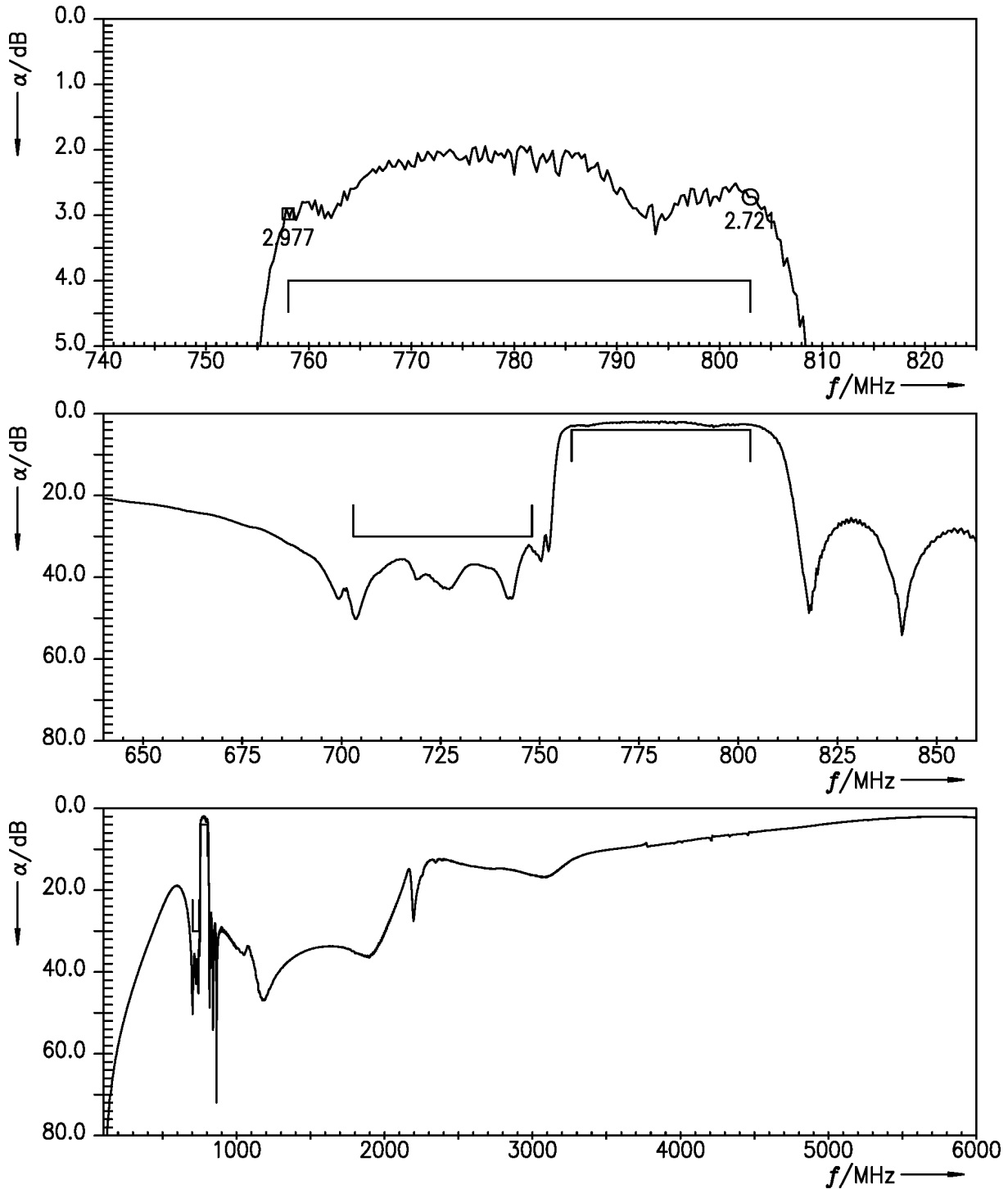


Figure 4: Attenuation.

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9 Reflection coefficients

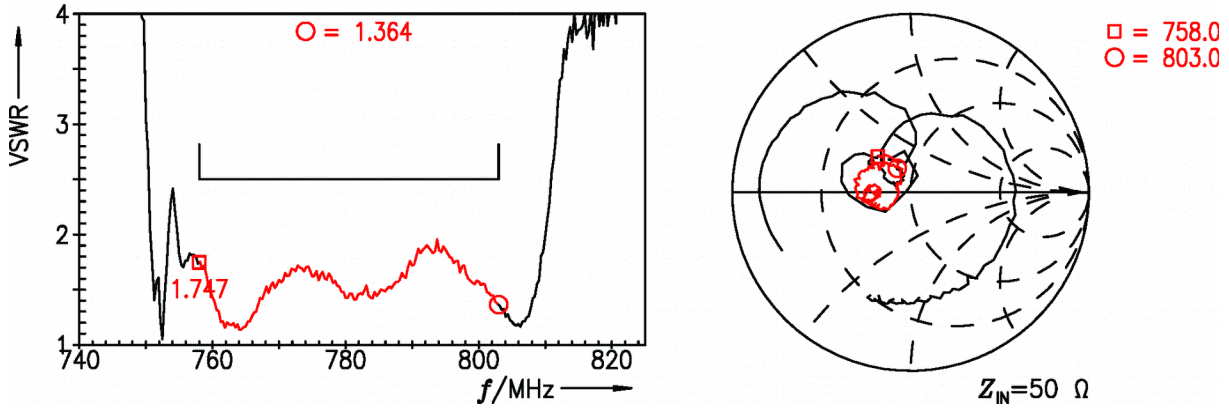


Figure 5: Reflection coefficient at IN port.

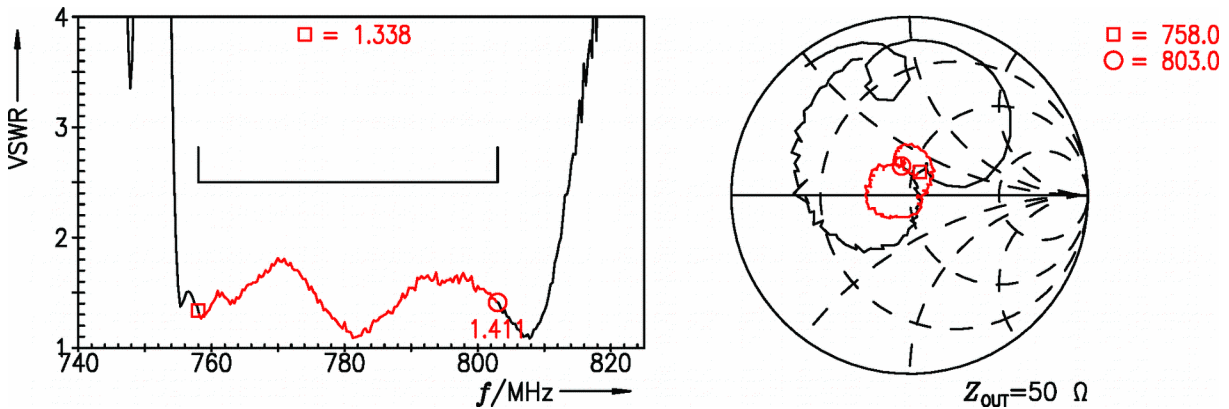


Figure 6: Reflection coefficient at OUT port.

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10 Packing material

10.1 Tape

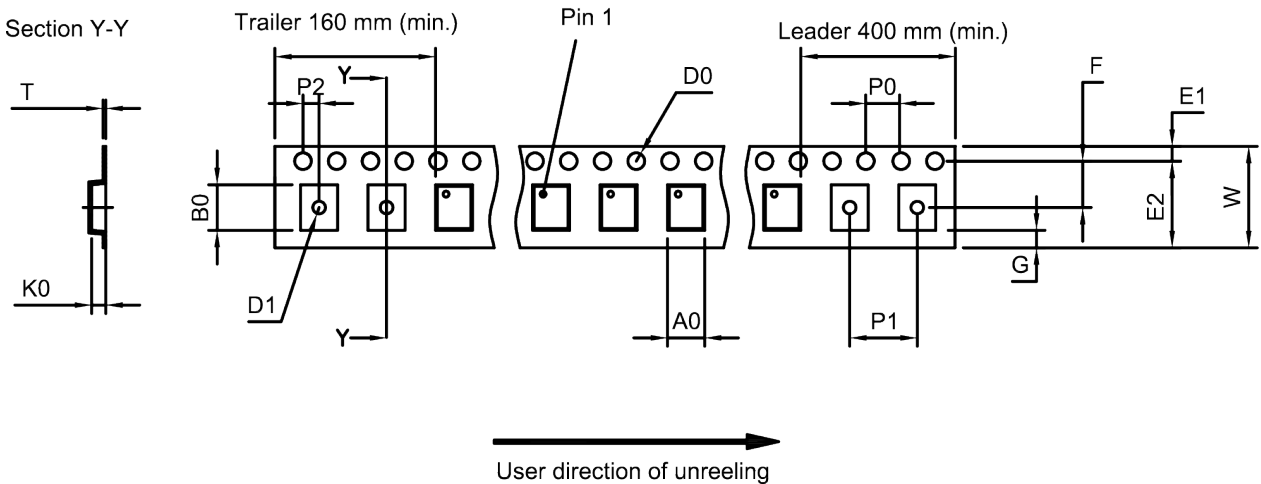


Figure 7: Drawing of tape (first-angle projection) with tape dimensions according to Table 1.

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.

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10.2 Reel with diameter of 180 mm

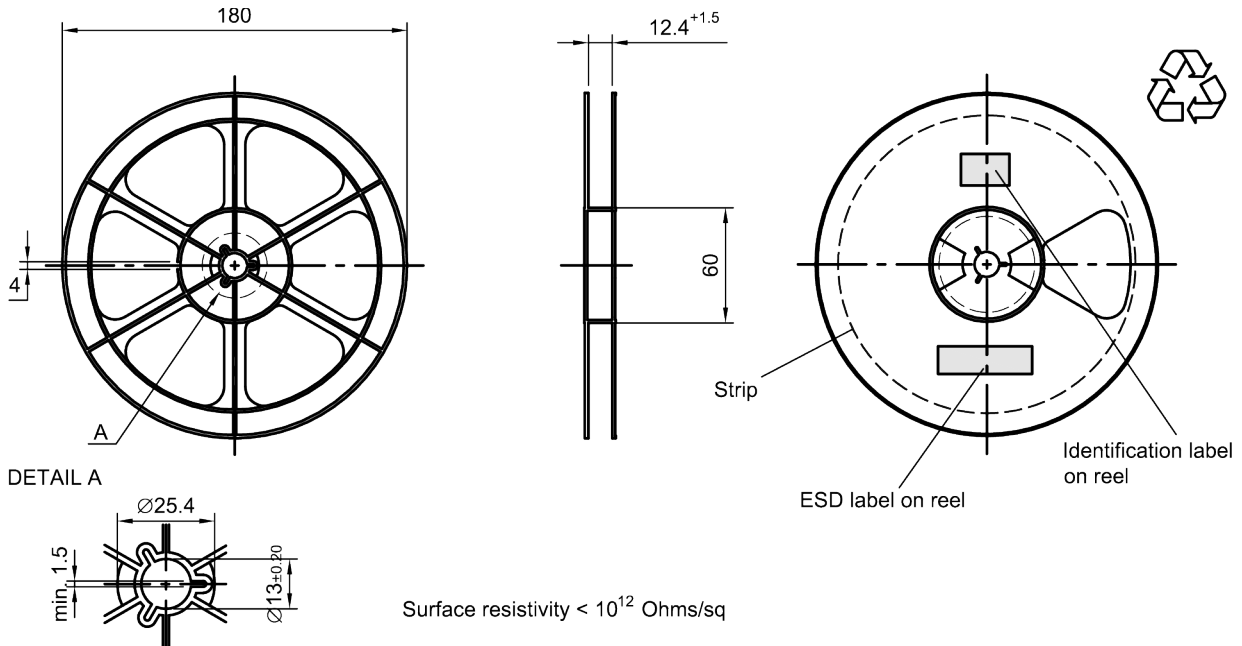


Figure 8: Drawing of reel (first-angle projection) with diameter of 180 mm.

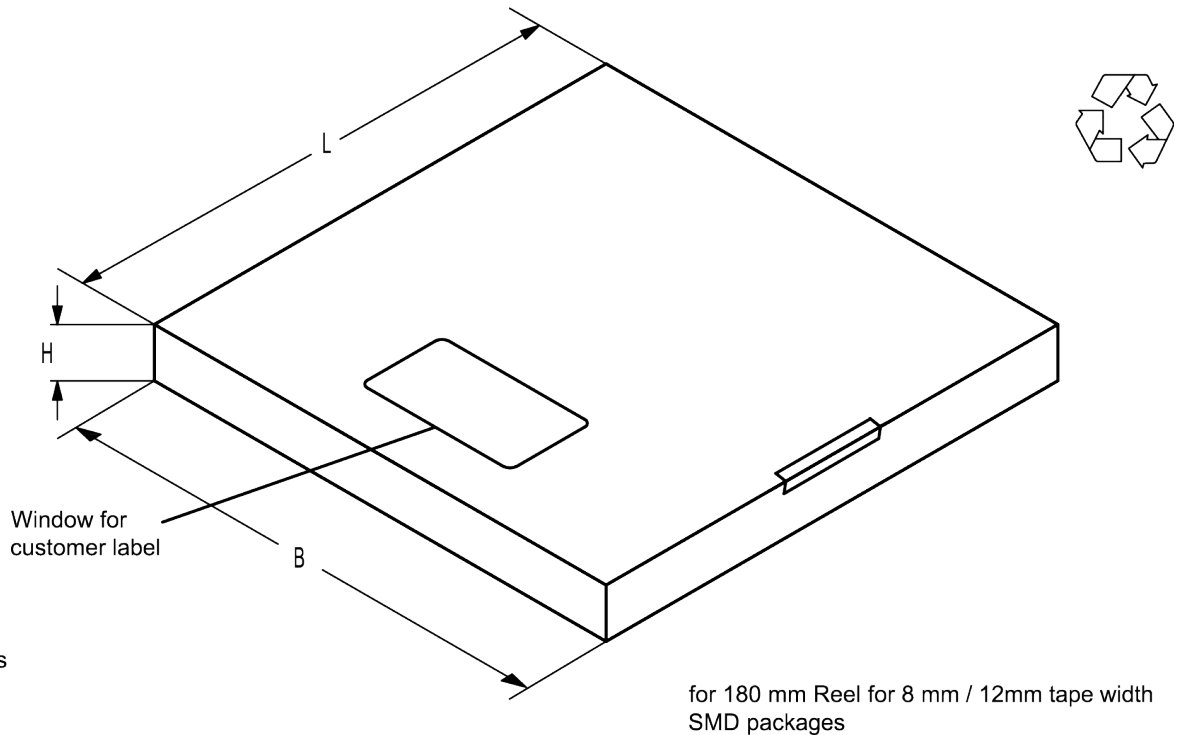


Figure 9: Drawing of folding box for reel with diameter of 180 mm.

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10.3 Reel with diameter of 330 mm

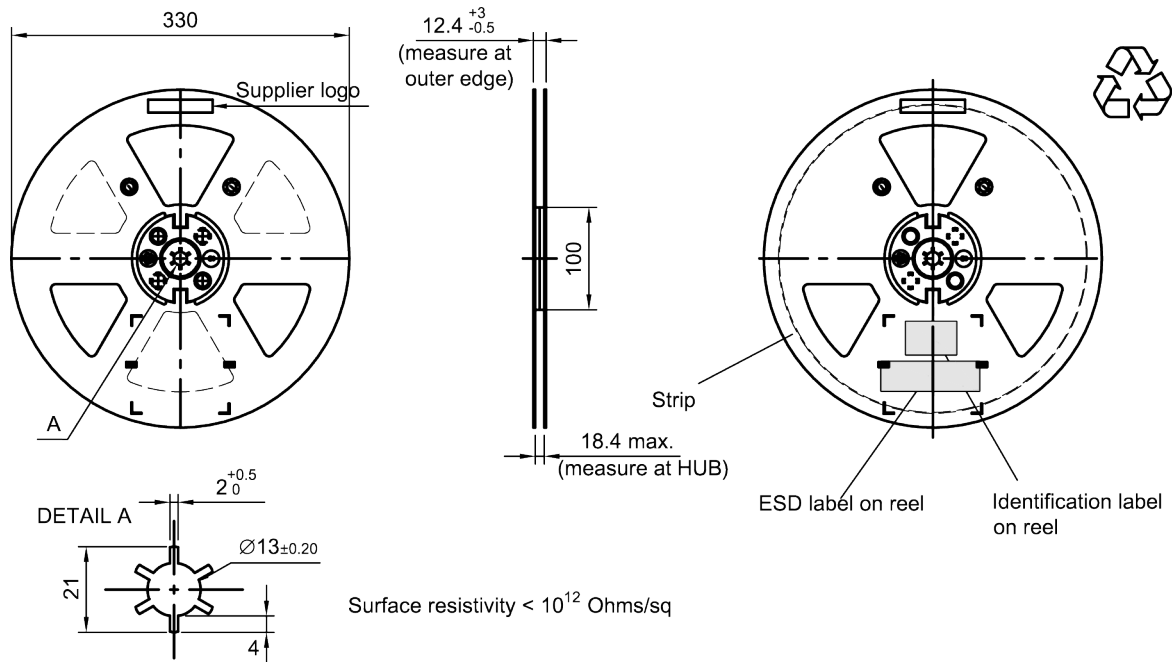
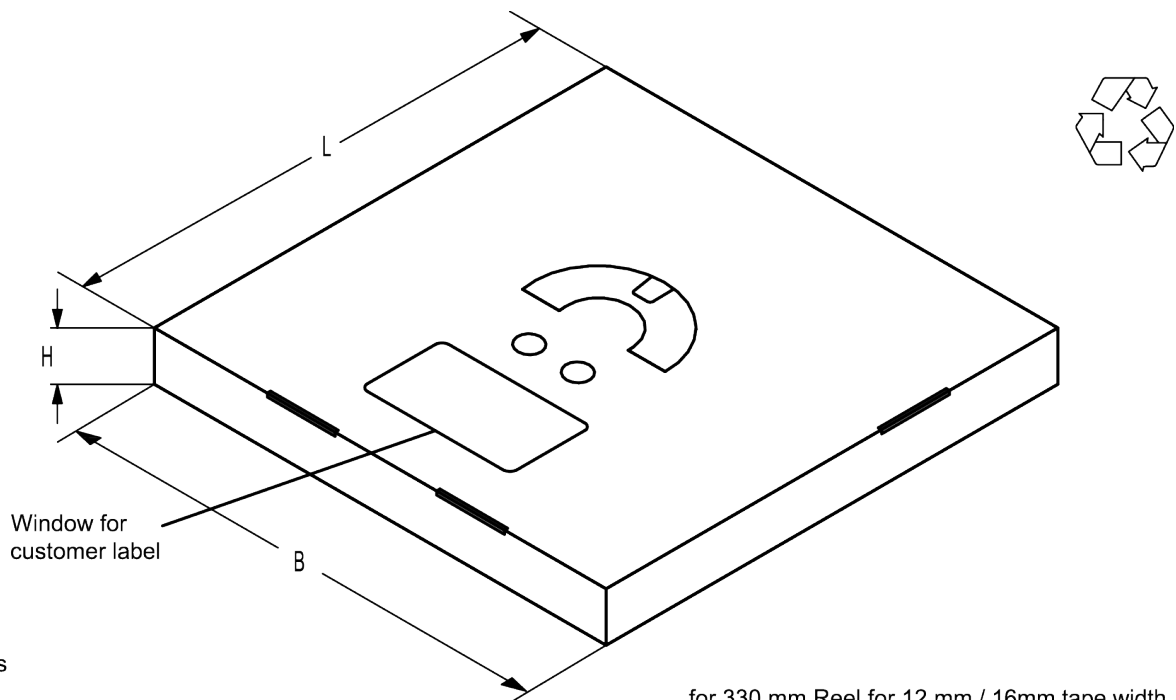


Figure 10: Drawing of reel (first-angle projection) with diameter of 330 mm.



Dimensions

- L = 340
- B = 340
- H = 25

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

Figure 11: Drawing of folding box for reel with diameter of 330 mm.

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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.

1 st digit (day)						2 nd digit (year)				3 rd 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

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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
$T \geq 255$ °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).

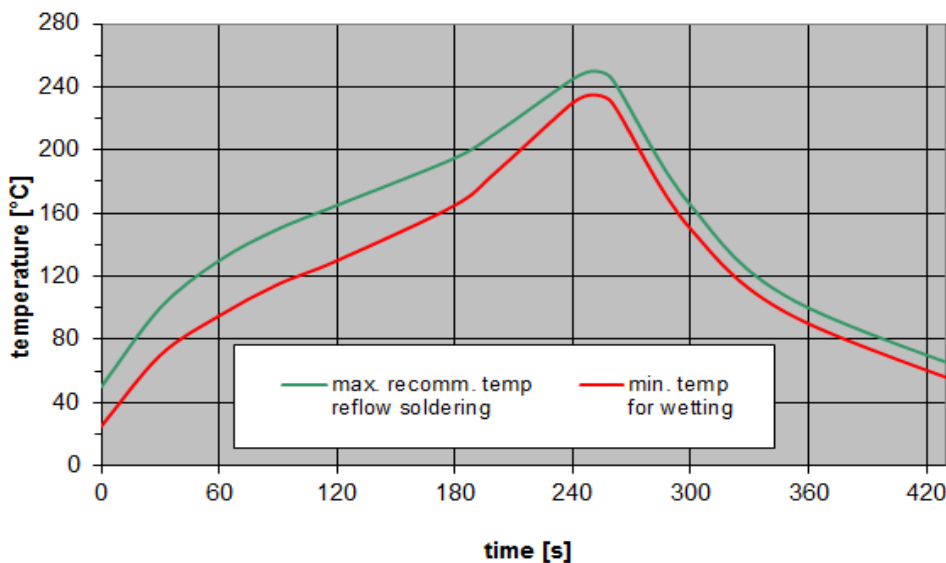


Figure 12: Recommended reflow profile for convection and infrared soldering – lead-free solder.

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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 RF360 sales office.

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14 Cautions and warnings

14.1 Display of ordering codes for RF360 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 RF360, 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.rf360jv.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.

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

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3. **The warnings, cautions and product-specific notes must be observed.**
4. In order to satisfy certain technical requirements, **some of the products described in this publication may contain substances subject to restrictions in certain jurisdictions (e.g. because they are classed as hazardous)**. Useful information on this will be found in our Material Data Sheets on the Internet (www.rf360jv.com/material). Should you have any more detailed questions, please contact our sales offices.
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