



RF360
Europe GmbH

Data sheet

SAW RF uplink filter

Base stations
LTE band 4

Series/type:	B5109
Ordering code:	B39172B5109U410

Date:	June 10, 2019
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Version:	2.2
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A Qualcomm – TDK Joint Venture

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1 Application

- Low-loss base-station RF filter
- Unbalanced to unbalanced operation
- Low amplitude ripple
- Usable pass band 45 MHz
- No matching required for operation at 50 Ω

2 Features

- Package code DCC6C
- Package size 3.0 ± 0.1 mm $\times$ 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)

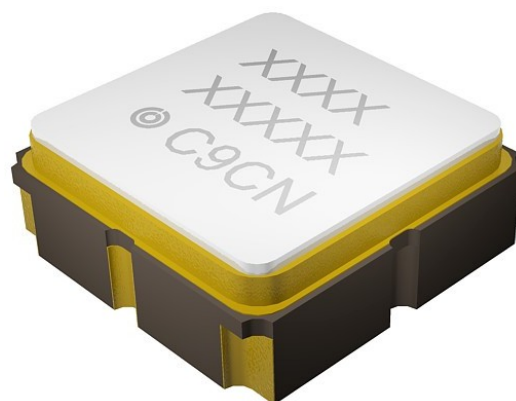
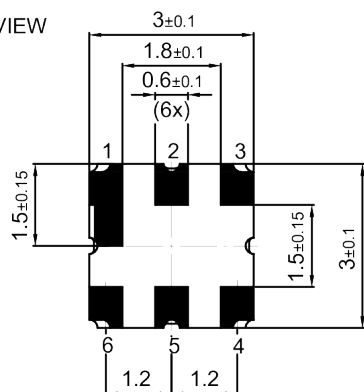


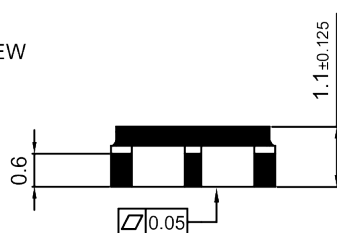
Figure 1: Picture of component with example of product marking.

3 Package

BOTTOM VIEW

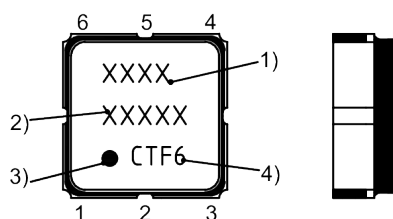


SIDE VIEW



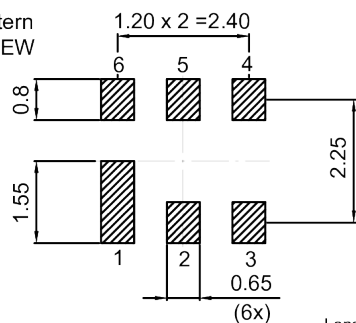
TOP VIEW

SIDE VIEW



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

Land pattern
THRU VIEW



Landing pad tolerance -0.02

Figure 2: Drawing of package. See Sec. Package information (p. 18).

4 Pin configuration

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

5 Matching circuit

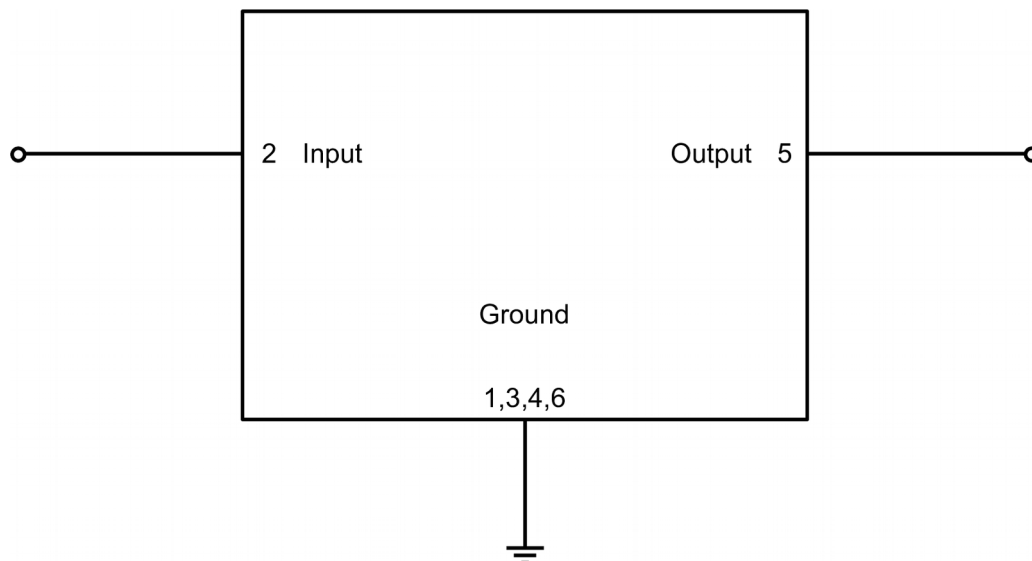


Figure 3: Schematic of matching circuit. No external matching components required.

6 Characteristics

Temperature range for specification	T_{SPEC}	= -40 °C ... +85 °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	—	1732.5	—	MHz
Minimum insertion attenuation		α_{min}				
	1710... 1755	MHz	—	1.7	2.5	dB
Maximum insertion attenuation		α_{max}				
	1710... 1755	MHz	—	2.2	3.5	dB
Amplitude ripple (p-p)		$\Delta\alpha$				
	1710... 1755	MHz	—	0.5	1.8	dB
Maximum VSWR		VSWR _{max}				
@ input port	1710... 1755	MHz	—	1.7	2.0	
@ output port	1710... 1755	MHz	—	1.5	2.0	
Minimum attenuation (relative to α_{min})		$\alpha_{rel,min}$				
	10... 1680	MHz	20	23	—	dB
	1680... 1690	MHz	4	10	—	dB
	1690... 1694	MHz	1.5	6	—	dB
	1771... 1778	MHz	1.5	9.5	—	dB
	1778... 1785	MHz	5	22	—	dB
	1785... 1805	MHz	10	28	—	dB
	1805... 1850	MHz	25	28	—	dB
	1850... 1880	MHz	30	33	—	dB
	1880... 3200	MHz	20	27	—	dB
	3200... 5200	MHz	4	7	—	dB
Band width at attenuation level of 1.8 dB (relative to α_{min})		B_{rel}	45	62	—	MHz

Temperature range for specification	T_{SPEC}	= -40 °C ... +95 °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	—	1732.5	—	MHz
Minimum insertion attenuation	1710... 1755	MHz	α_{min}	—	1.7	2.7 dB
Maximum insertion attenuation	1710... 1755	MHz	α_{max}	—	2.2	3.8 dB
Amplitude ripple (p-p)	1710... 1755	MHz	$\Delta\alpha$	—	0.5	2.1 dB
Maximum VSWR		$VSWR_{max}$				
@ input port	1710... 1755	MHz		—	1.7	2.2
@ output port	1710... 1755	MHz		—	1.5	2.2
Minimum attenuation (relative to α_{min})		$\alpha_{rel,min}$				
	10... 1680	MHz		15	23	— dB
	1680... 1690	MHz		3	10	— dB
	1690... 1694	MHz		1	6	— dB
	1771... 1778	MHz		1	9.5	— dB
	1778... 1785	MHz		5	22	— dB
	1785... 1805	MHz		10	28	— dB
	1805... 1850	MHz		23	28	— dB
	1850... 1880	MHz		28	33	— dB
	1880... 3200	MHz		20	27	— dB
	3200... 5200	MHz		4	7	— dB
Band width at attenuation level of 1.8 dB (relative to α_{min})		B_{rel}	44	62	—	MHz

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} = 5.0\text{ V}$	
ESD voltage		
	$V_{ESD}^{2)} = 50\text{ V}$	Machine model.
	$V_{ESD}^{3)} = 225\text{ V}$	Human body model.
Input power @ input port: 1710 ... 1755 MHz	$P_{IN} = 10\text{ dBm}$	Continuous wave

¹⁾ Not valid for packaging material. Please refer to definition of Shelf life (p. 17).

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.

8 Transmission coefficient

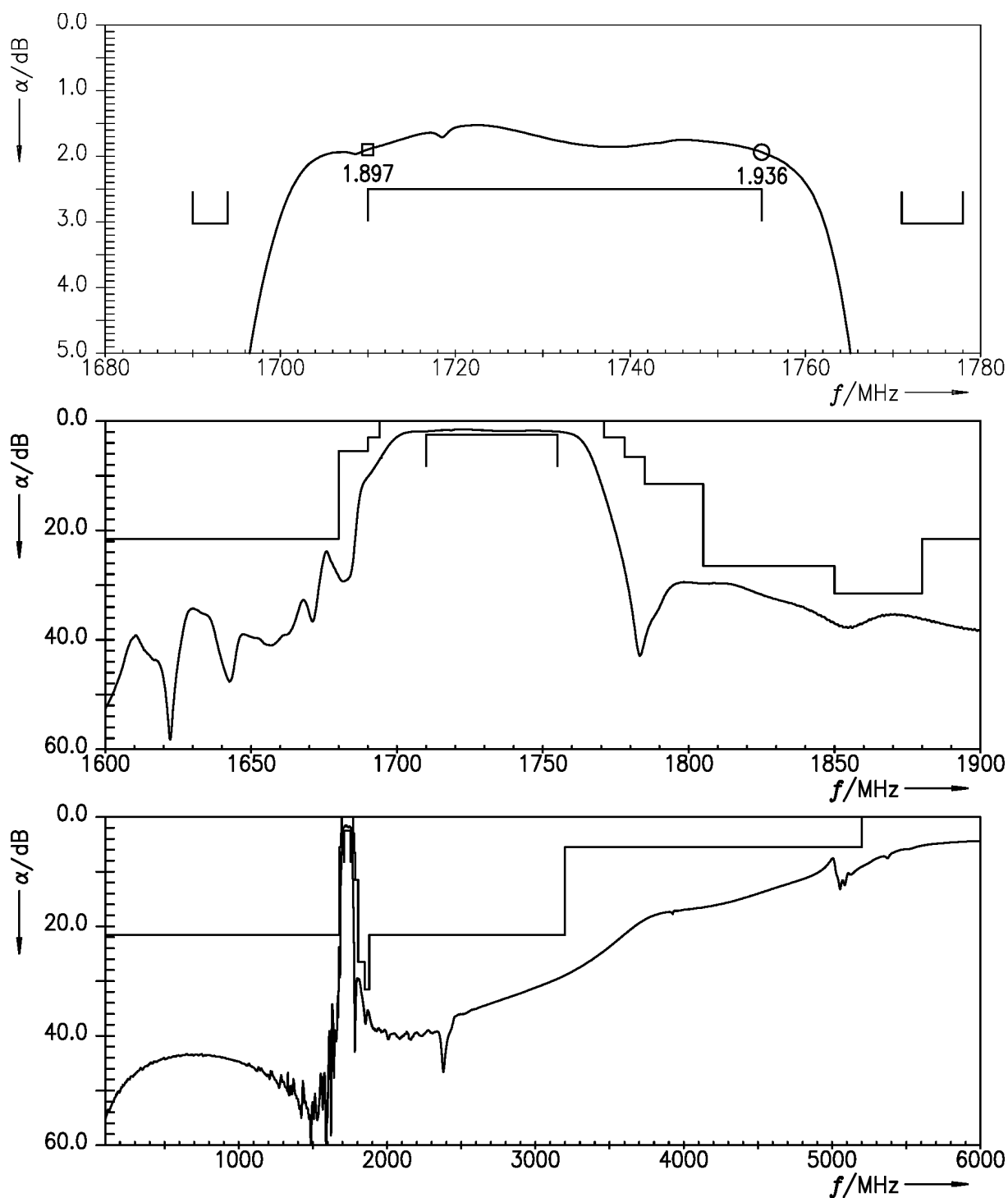


Figure 4: Attenuation.

9 Reflection coefficients

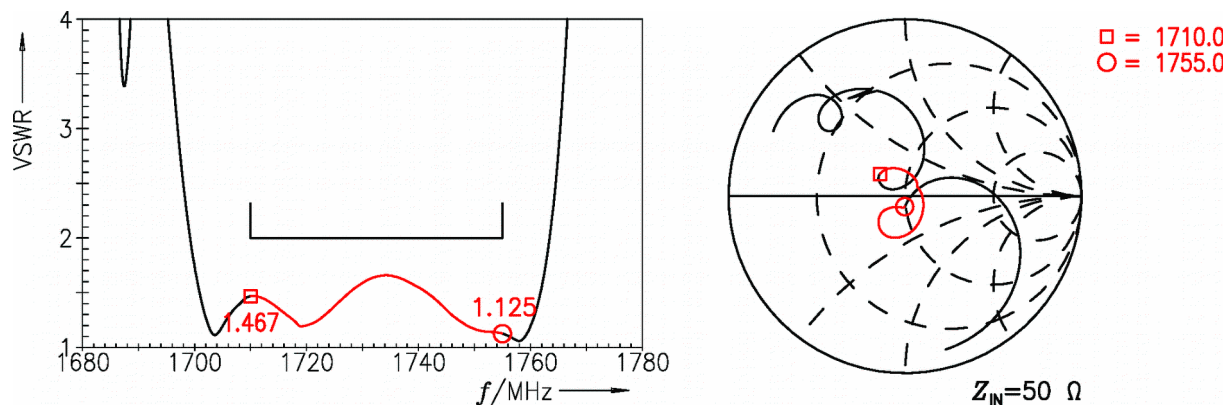


Figure 5: Reflection coefficient at input port.

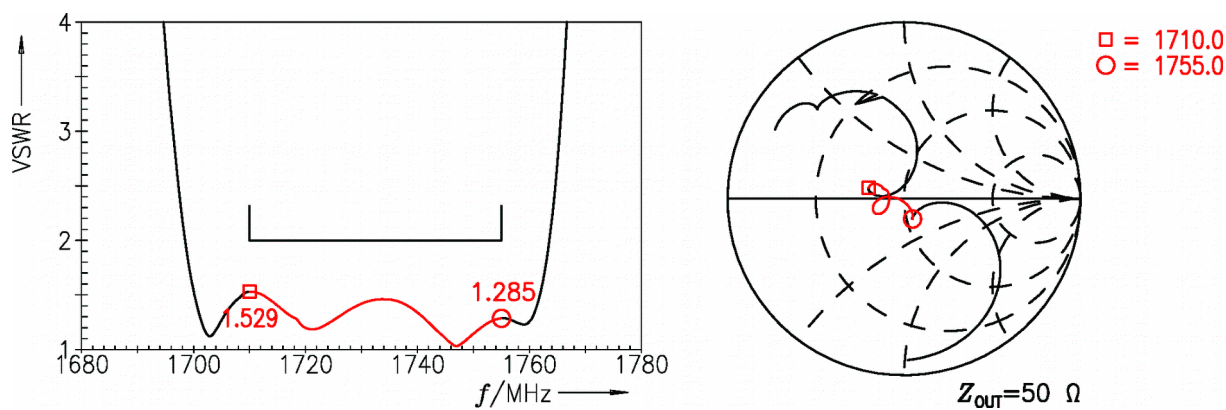


Figure 6: Reflection coefficient at output port.

10.2 Reel with diameter of 180 mm

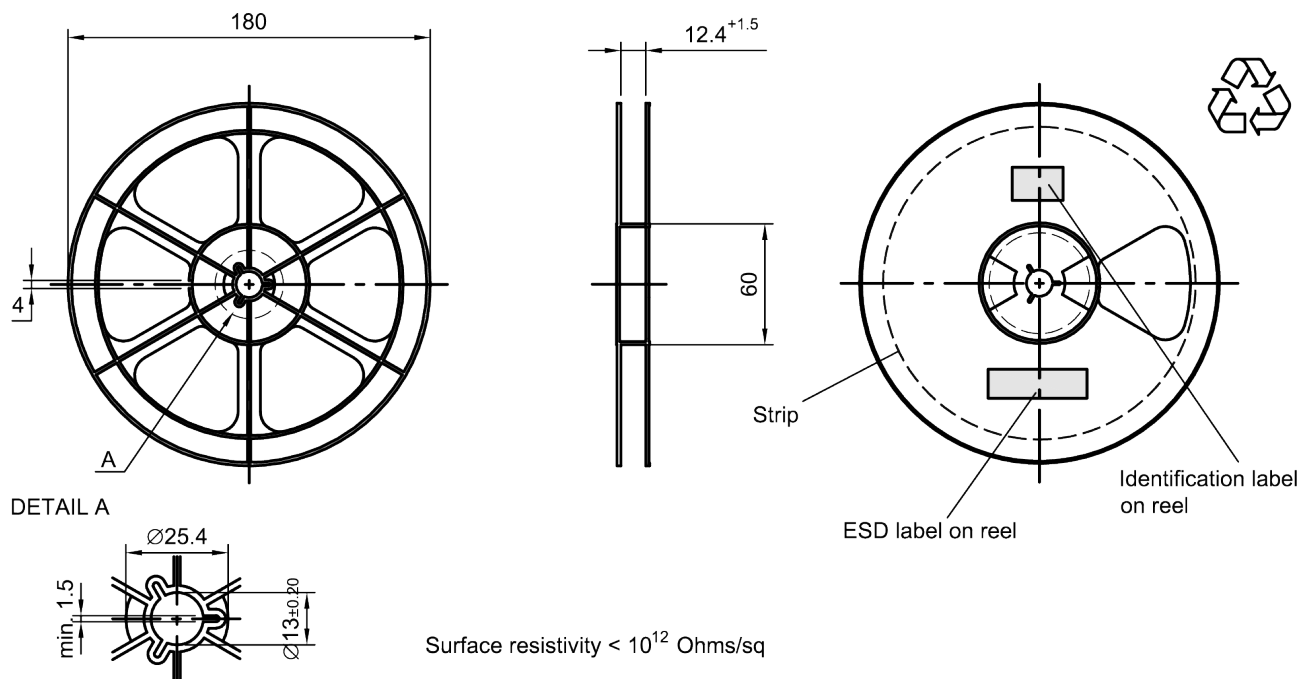


Figure 8: Drawing of reel (first-angle projection) with diameter of 180 mm.

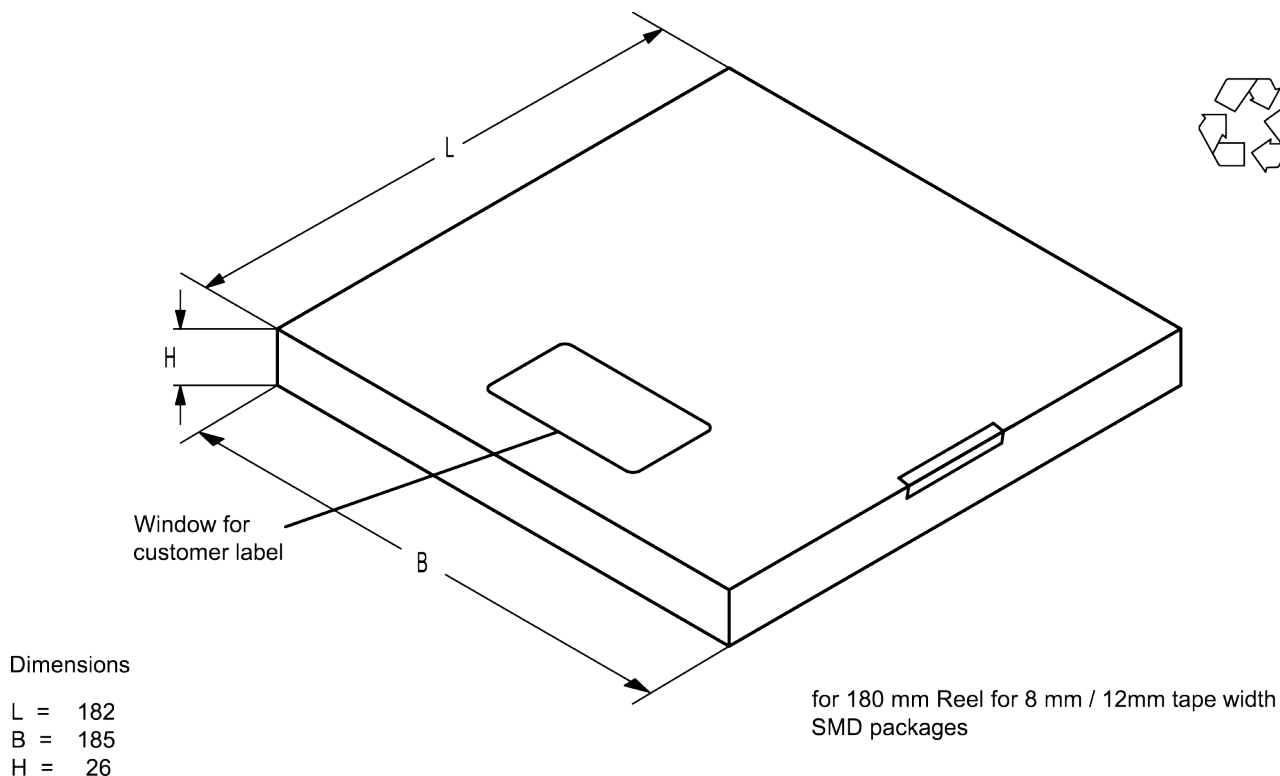


Figure 9: Drawing of folding box for reel with diameter of 180 mm.

10.3 Reel with diameter of 330 mm

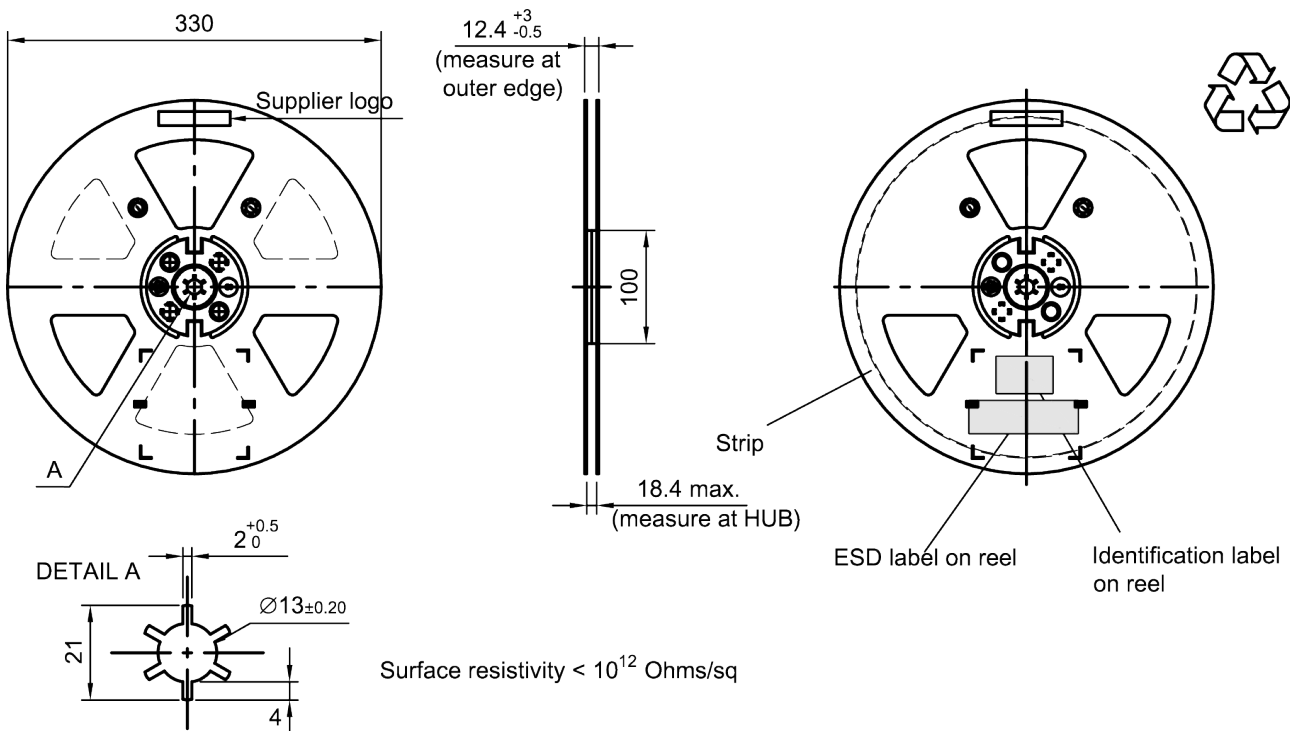


Figure 10: Drawing of reel (first-angle projection) with diameter of 330 mm.

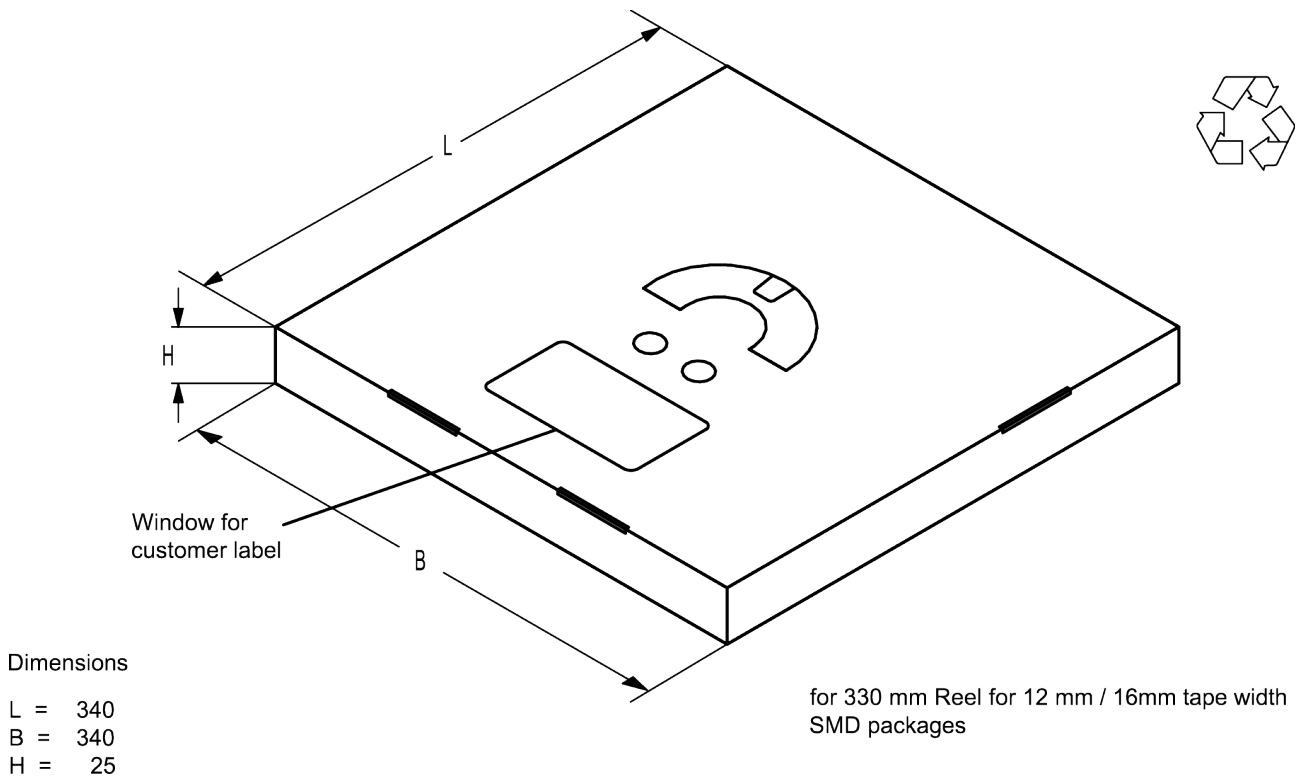


Figure 11: Drawing of folding box for reel with diameter of 330 mm.

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: 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 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

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
$T > 220\text{ °C}$	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).

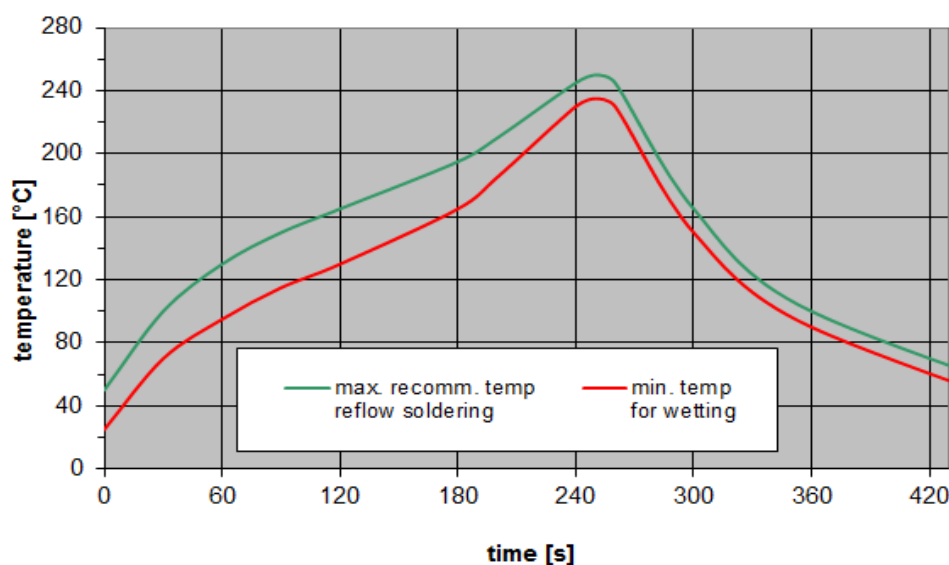


Figure 12: Recommended reflow profile for convection and infrared soldering – lead-free solder.

13 Annotations

13.1 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.

13.2 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.

13.3 Shelf life

The shelf life of components is determined by solderability of the package terminals. It is specified as 2 years from manufacturing date assuming the following conditions:

- storage in original packaging and non-aggressive atmosphere,
- storage temperature ranging from $-25\text{ }^{\circ}\text{C}$ to $+40\text{ }^{\circ}\text{C}$, and
- storage humidity with $\leq 75\text{ \% r.h.}$ mean annual humidity, $\leq 95\text{ \% r.h.}$ for max. 30 days / year, and no dew condensation.

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.

15 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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