Qualcomm

RF360
Europe GmbH

Data sheet

SAW Rx filter
Band 28+20 Rx filter

Series/type:	B8369
Ordering code:	B39781B8369P810
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Version:	2.1

DCN: 80-PA243-368 Rev. B

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Table of contents

1 Application....4
2 Features....4
3 Package....5
4 Pin configuration....5
5 Matching circuit....6
6 Characteristics....7
7 Maximum ratings....8
8 Transmission coefficient....9
9 Reflection coefficients....10
10 Packing material....11
11 Marking....15
12 Soldering profile....16
13 Annotations....17
14 Cautions and warnings....18
15 Important notes....19

1 Application

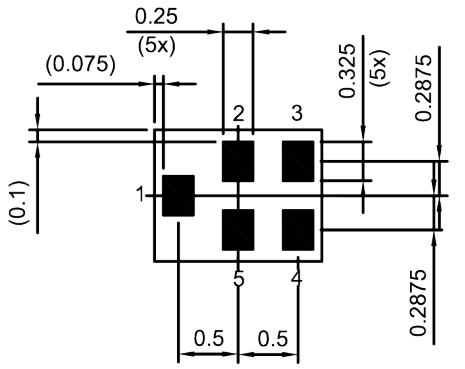
- Low-loss SAW Rx filter for mobile telephone LTE Band 28 systems and LTE Band 20 systems
- Usable pass band 45 MHz for Band 28 and 30 MHz for Band 20
- Low insertion attenuation
- High out of band selectivity
- Unbalanced to unbalanced operation
- Terminating impedances 50 Ω

2 Features

- Package size $1.4_{\pm 0.05}$ mm × $1.1_{\pm 0.05}$ mm
- Package height 0.45 mm (max.)
- Approximate weight 3 mg
- RoHS compatible
- Package for Surface Mount Technology (SMT)
- Ni/Au-plated terminals
- Electrostatic Sensitive Device (ESD)
- Moisture Sensitivity Level 3 (MSL3)

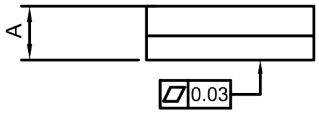
3 Package

BOTTOM VIEW

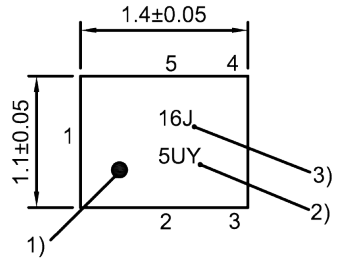


Pad and pitch tolerance ±0.05

SIDE VIEW

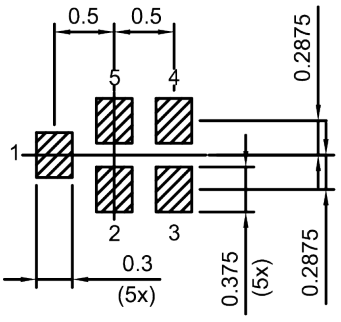


TOP VIEW



1) Marking for pad number 1
2) Example of encoded lot number
3) Example of encoded filter type number

Land pattern
THRU VIEW



Landing pad tolerance -0.02

Figure 1: Drawing of package with package height A = 0.45 mm (max.). See Sec. Package information (p. 18).

4 Pin configuration

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

5 Matching circuit

- L_{s1} = 3.5 nH
- L_{s4} = 2.5 nH

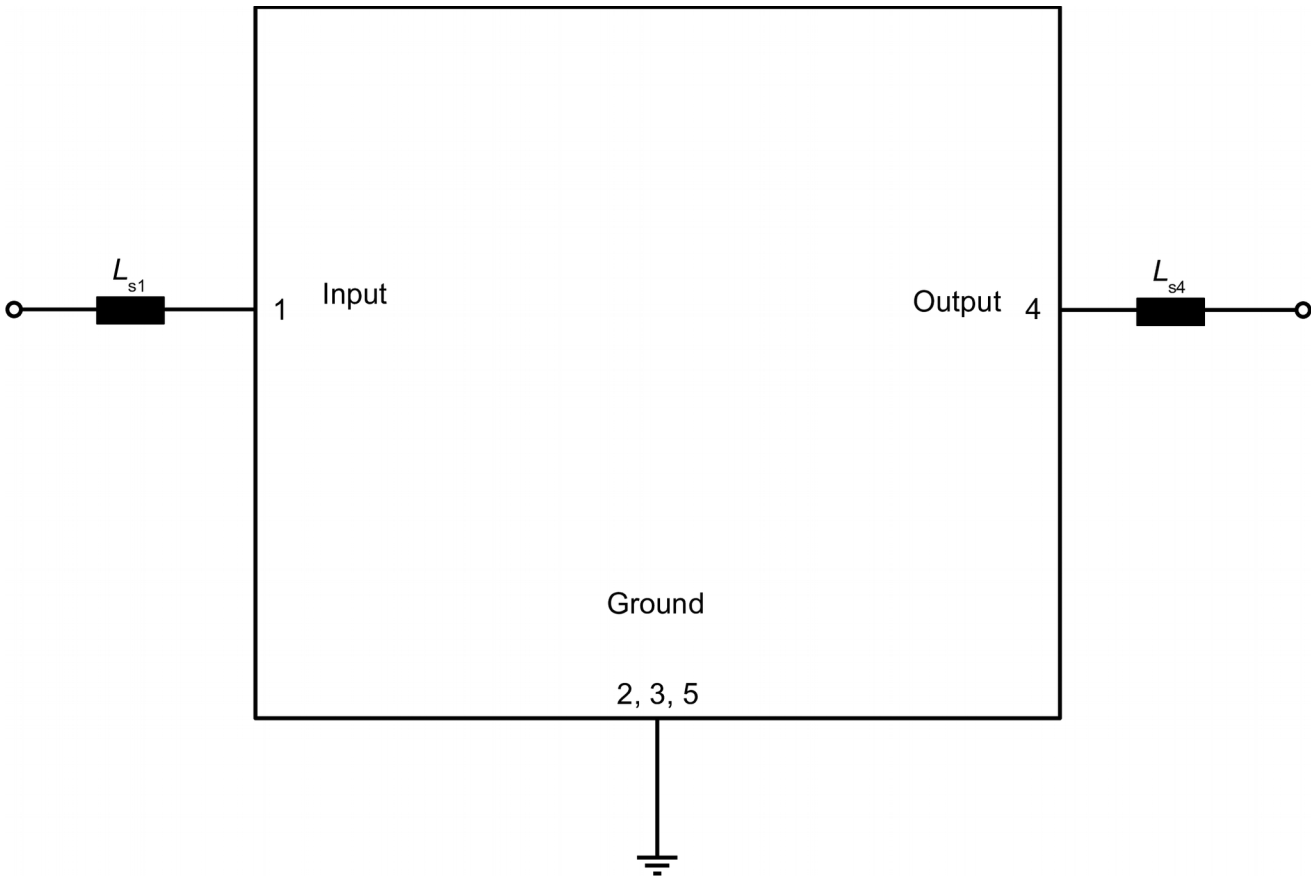


Figure 2: Schematic of matching circuit.

External shunt inductor for ESD protection is recommended at any ports towards antenna.

6 Characteristics

Temperature range for specification T_{SPEC} = −30 °C ... +85 °C
Input terminating impedance Z_{IN} = 50 Ω + 3.5 nH[1)]
Output terminating impedance Z_{OUT} = 50 Ω + 2.5 nH[1)]

Characteristics				min. for T_{SPEC}	typ. @ +25 °C	max. for T_{SPEC}	
Center frequency			f_C	—	—	—	MHz
Maximum insertion attenuation			α_{max}				
	758... 803	MHz		—	2.3	3.0	dB
	758... 821	MHz		—	2.3	3.0	dB
	791... 821	MHz		—	1.8	2.6	dB
Amplitude ripple (p-p)			Δα				
	758... 821	MHz		—	1.7	2.5	dB
Maximum VSWR			$VSWR_{max}$				
@ input port	758... 821	MHz		—	1.7	2.0	
@ output port	758... 821	MHz		—	1.7	2.0	
Minimum attenuation			α_{min}				
	10... 699	MHz		32	35	—	dB
	41... 65	MHz		48	52	—	dB
	703... 733	MHz		38	42	—	dB
	718... 748	MHz		38	42	—	dB
	832... 862	MHz		40	44	—	dB
	880... 915	MHz		36	40	—	dB
	1461... 1683	MHz		28	32	—	dB
	1516... 1642	MHz		28	32	—	dB
	1710... 1990	MHz		32	40	—	dB
	2274... 2463	MHz		30	35	—	dB
	2373... 2500	MHz		30	35	—	dB
	2400... 2483	MHz		30	34	—	dB
	2500... 2570	MHz		28	34	—	dB
	2500... 2690	MHz		28	33	—	dB
	3300... 3800	MHz		25	32	—	dB
	3800... 4200	MHz		25	32	—	dB
	4400... 4900	MHz		25	31	—	dB
	4900... 5950	MHz		25	30	—	dB
	5150... 5850	MHz		25	30	—	dB
	6822... 7389	MHz		25	33	—	dB

[1)] See Sec. Matching circuit (p. 6).

7 Maximum ratings

Storage temperature	T_{STG} [2] = −40 °C ... +85 °C[1]	
DC voltage	$\|V_{DC}\|$ [4] = 0 V (max.)[3]	
ESD voltage		
	V_{ESD} [5] = 300 V (max.)	Machine model.
	V_{ESD} [6] = 825 V (max.)	Human body model.
	V_{ESD} [7] = 700 V (max.)	Charged device model.
Input power	P_{IN}	
@ input port: 703 ... 748 MHz	15 dBm	Continuous wave for 5000 h @ 50 °C.
@ input port: 758 ... 821 MHz	15 dBm	Continuous wave for 5000 h @ 50 °C.
@ input port: 832 ... 862 MHz	15 dBm	Continuous wave for 5000 h @ 50 °C.

1) Extended upperlimit: 96h@125 °C acc. to IEC 60068-2-2 Bb.
2) Not valid for packaging material. Storage temperature for packaging material is −25 °C to +40 °C.
3) In case of applied DC voltage to RF port, a DC blocking capacitor at RF port is mandatory.
4) In case of applied DC voltage blocking capacitors are mandatory.
5) According to JESD22-A115B (MM – Machine Model), 10 negative & 10 positive pulses.
6) According to JESD22-A114F (HBM – Human Body Model), 1 negative & 1 positive pulse.
7) According to JESD22-C101C (CDM – Field Induced Charged Device Model), 3 negative & 3 positive pulses.

8 Transmission coefficient

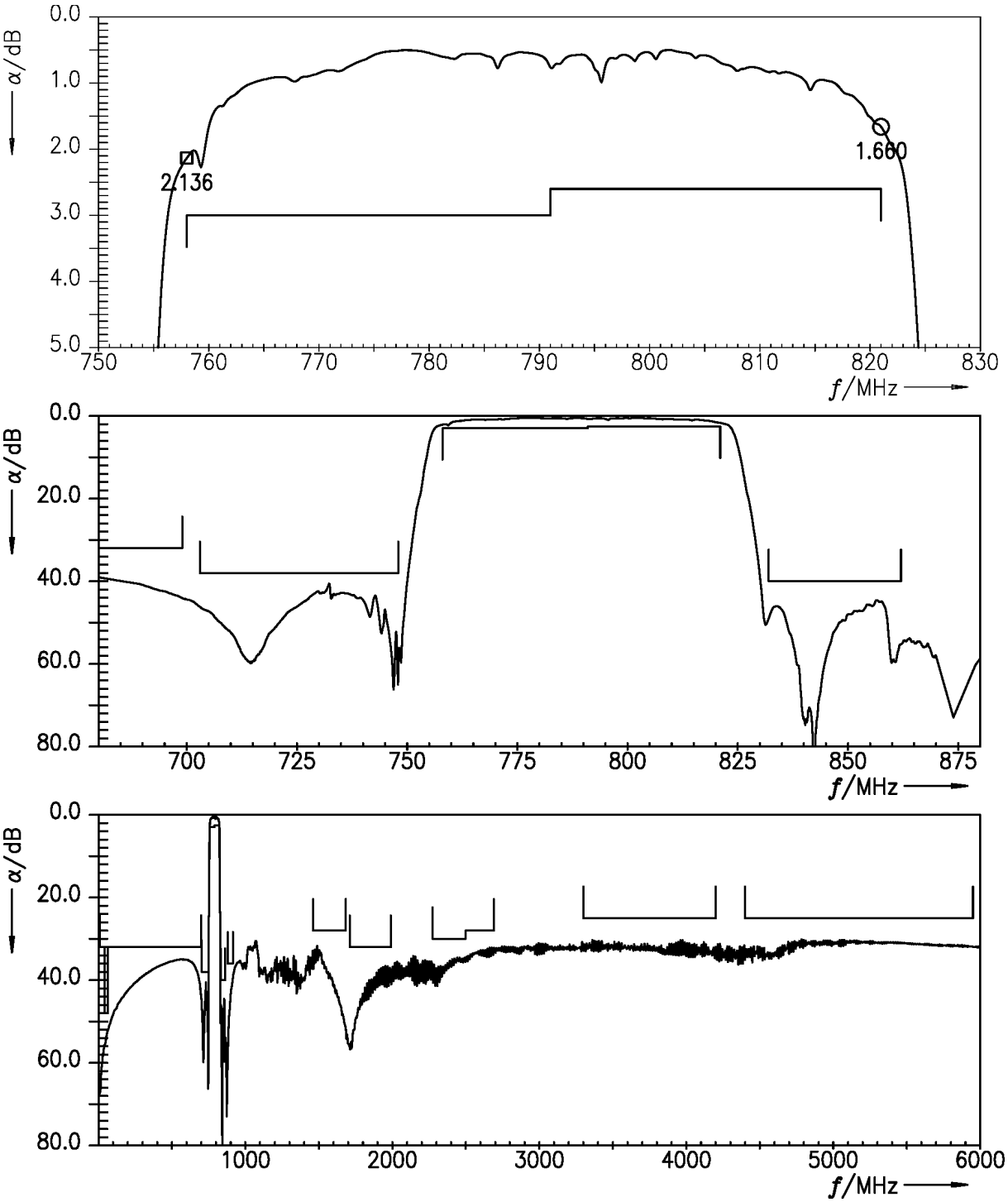


Figure 3: Attenuation.

9 Reflection coefficients

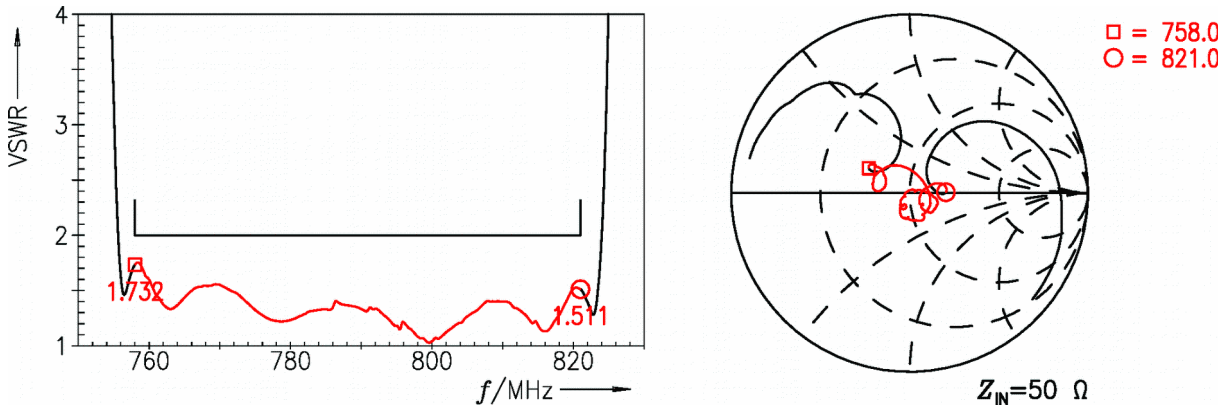


Figure 4: Reflection coefficient at input port.

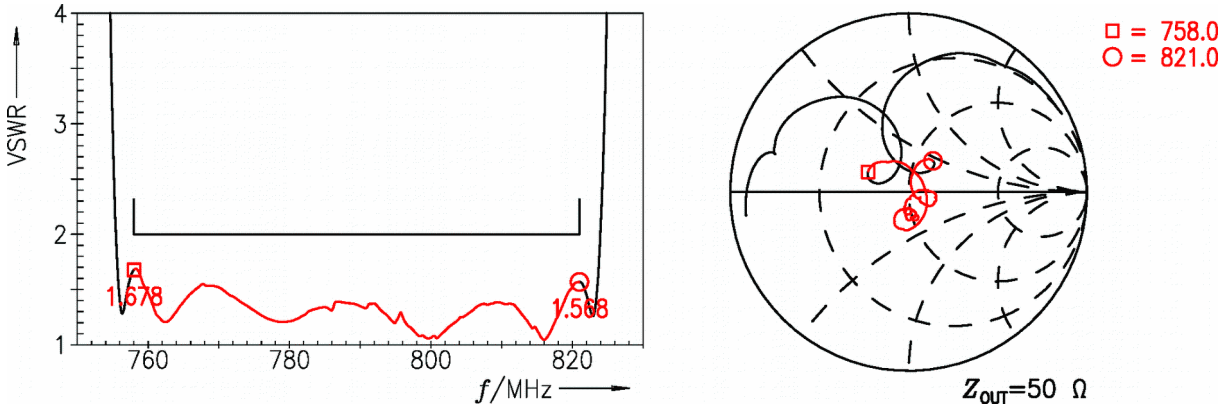


Figure 5: Reflection coefficient at output port.

10 Packing material

10.1 Tape

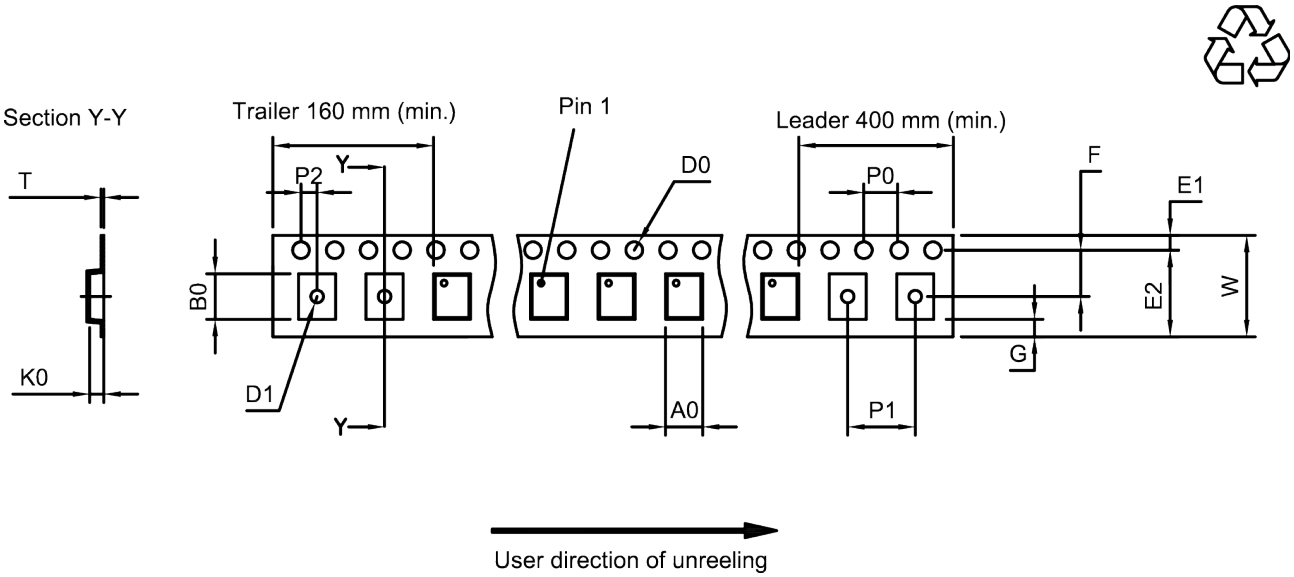


Figure 6: Drawing of tape (first-angle projection) for illustration only and not to scale. The valid tape dimensions are listed in Table 1.

A_0	$1.02_{\pm 0.05}$ mm
B_0	$1.22_{\pm 0.05}$ mm
D_0	$1.55_{\pm 0.05}$ mm
D_1	$0.55_{\pm 0.1}$ mm
E_1	$1.75_{\pm 0.1}$ mm

E_2	6.25 mm (min.)
F	$3.5_{\pm 0.05}$ mm
G	–
K_0	$0.6_{\pm 0.05}$ mm
P_0	$4.0_{\pm 0.1}$ mm

P_1	$2.0_{\pm 0.1}$ 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

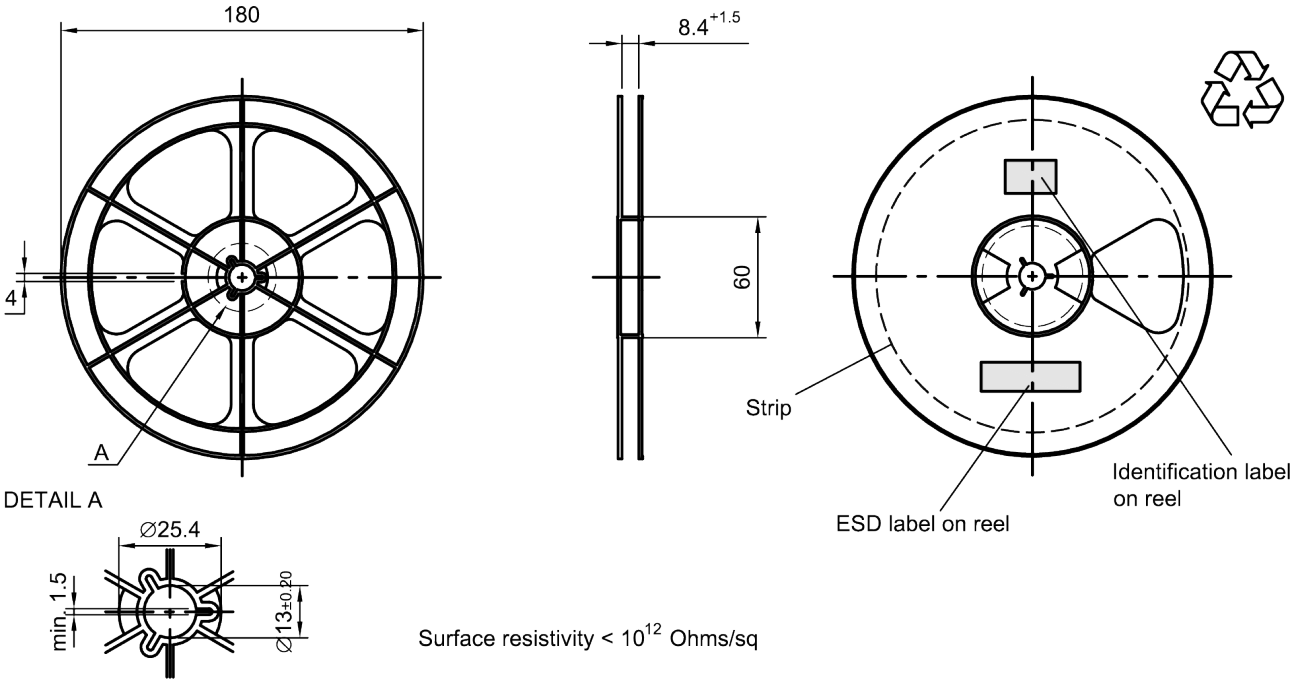


Figure 7: Drawing of reel (first-angle projection) with diameter of 180 mm.

Dimensions [mm]
X = 220+5
Y = 235+5
Sealing area 10±3

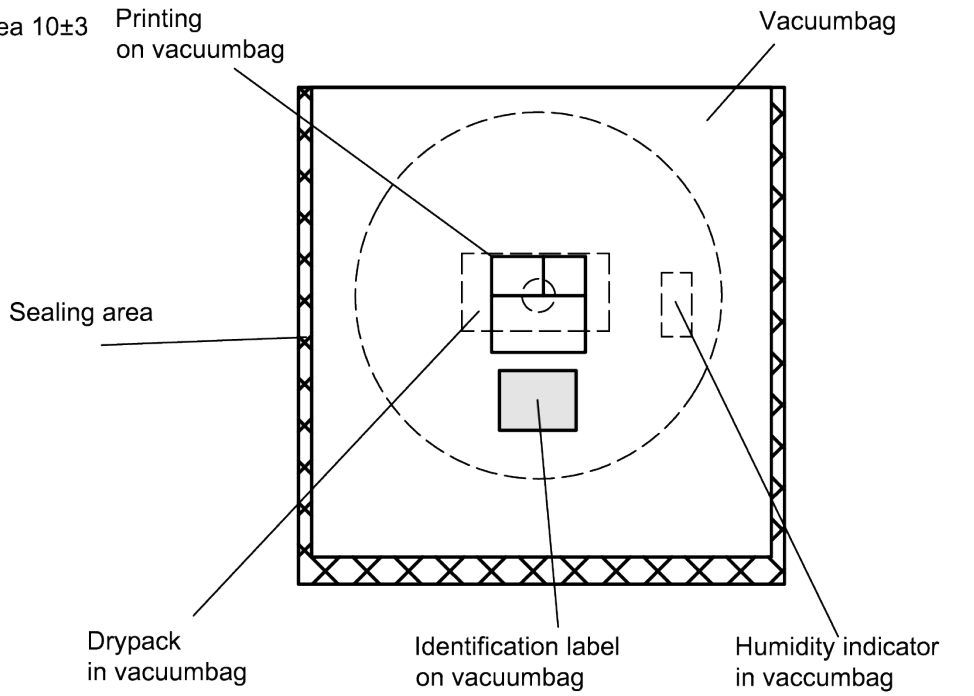


Figure 8: Drawing of moisture barrier bag (MBB) for reel with diameter of 180 mm.

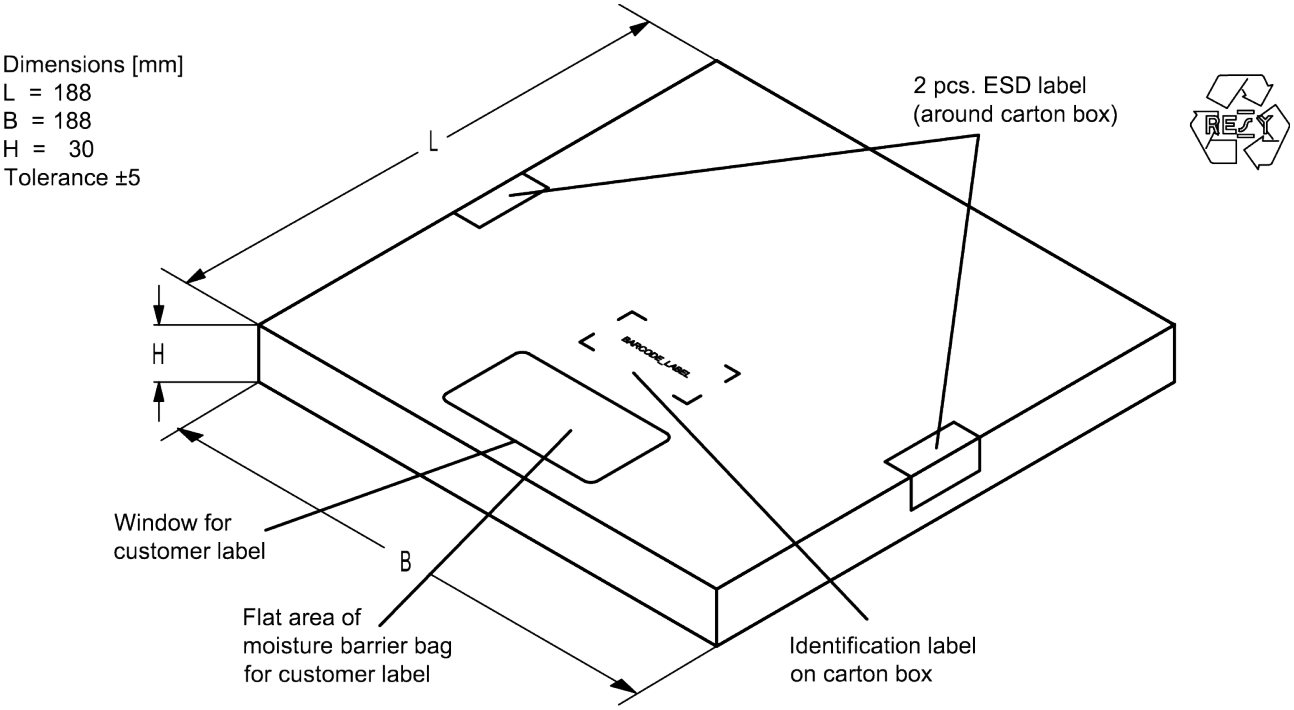


Figure 9: Drawing of folding box for reel with diameter of 180 mm.

10.3 Reel with diameter of 330 mm

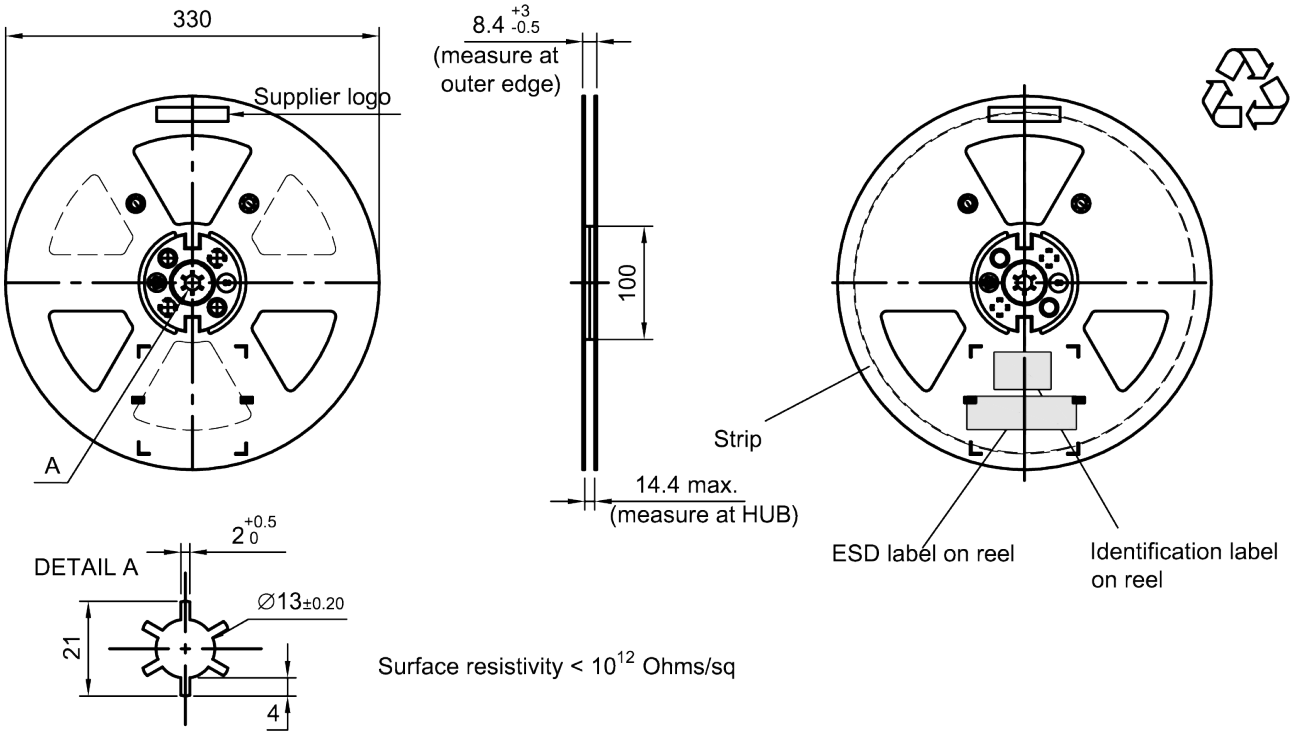


Figure 10: Drawing of reel (first-angle projection) with diameter of 330 mm.

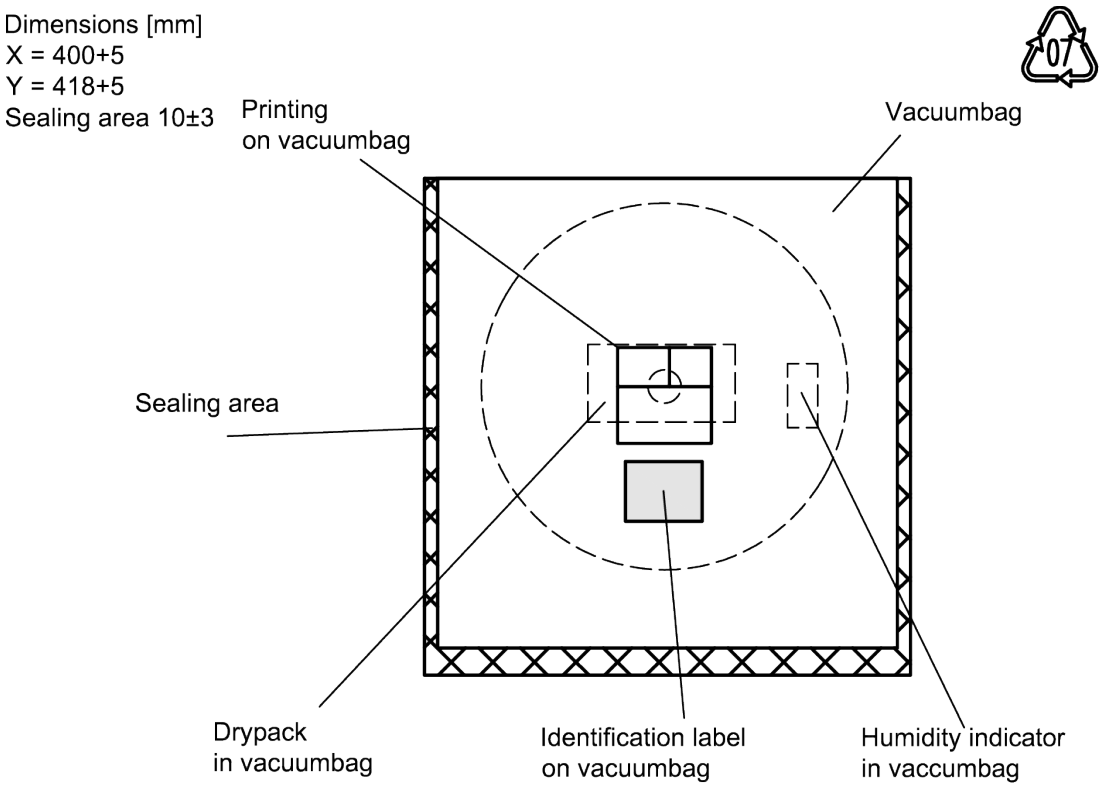


Figure 11: Drawing of moisture barrier bag (MBB) for reel with diameter of 330 mm.

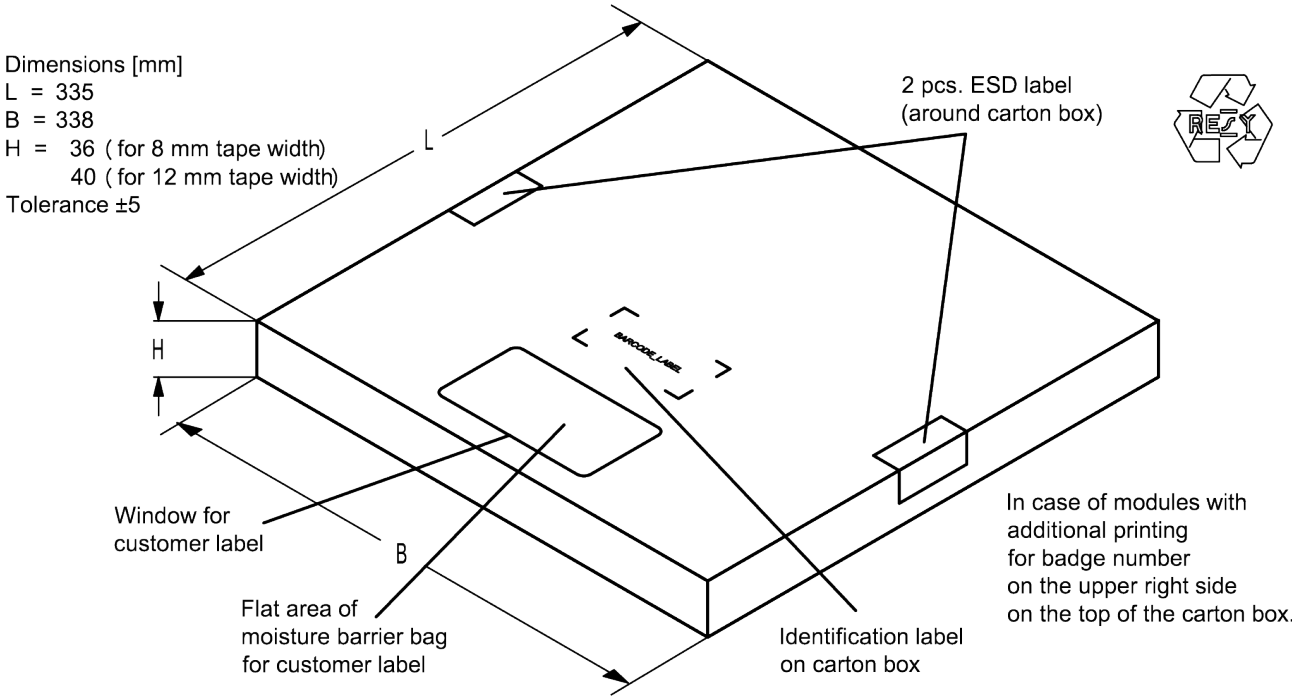


Figure 12: Drawing of folding box for reel with diameter of 330 mm.

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 B8369 is 85H.

- 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).

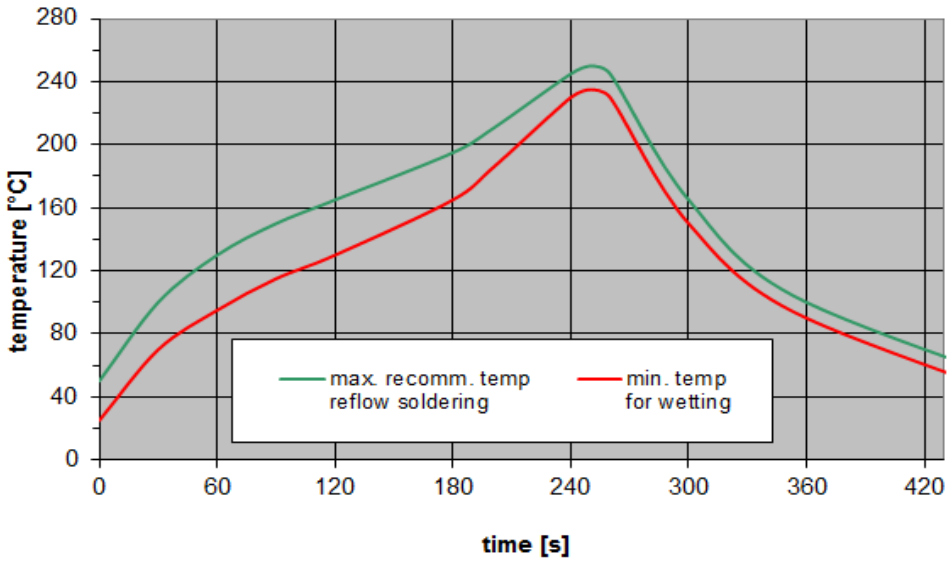


Figure 13: Recommended reflow profile for convection and infrared soldering – lead-free solder.

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 Ordering codes and packing units

Ordering code	Packing unit
B39781B8369P810	15000 pcs
B39781B8369P810S 5	5000 pcs

Table 4: Ordering codes and packing units.

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 https://rffe.qualcomm.com/.

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.
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.**
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 (https://rffe.qualcomm.com). Should you have any more detailed questions, please contact our sales offices.
5. We constantly strive to improve our products. Consequently, **the products described in this publication may change from time to time**. The same is true of the corresponding product specifications. Please check therefore to what extent product descriptions and specifications contained in this publication are still applicable before or when you place an order. We also **reserve the right to discontinue production and delivery of products**. Consequently, we cannot guarantee that all products named in this publication will always be available.
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