Qualcomm

RF360
Europe GmbH

Data sheet

SAW 2in1 Rx input diplex filter

Automotive telematics
LTE bands 25 & 66

Series/type:	B4387
Ordering code:	B39222B4387P810
Date:	February 01, 2019
Version:	2.2

DCN: 80-PA243-314 Rev. A

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RF360 Europe GmbH

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Table of contents

1 Application

- Low-loss 2in1 RF filter for LTE Band 25 and Band 66 systems, receive path (RX)
- Usable pass band:
  Band 25: 65 MHz
  Band 66: 90 MHz

2 Features

- Package size $1.5_{\pm 0.1}$ mm × $1.1_{\pm 0.1}$ mm
- Package height 0.45 mm (max.)
- Approximate weight 3 mg
- RoHS compatible
- Package for Surface Mount Technology (SMT)
- Ni/Au-plated terminals
- Filter surface passivated
- Electrostatic Sensitive Device (ESD)
- Moisture Sensitivity Level 2a (MSL2a)
- AEC-Q200 qualified component family
  (Grade 1: −40 °C to +125 °C)

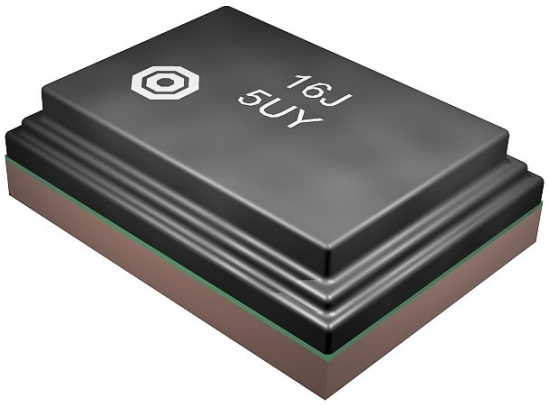

Figure 1: Picture of component with example of product marking.

3 Package

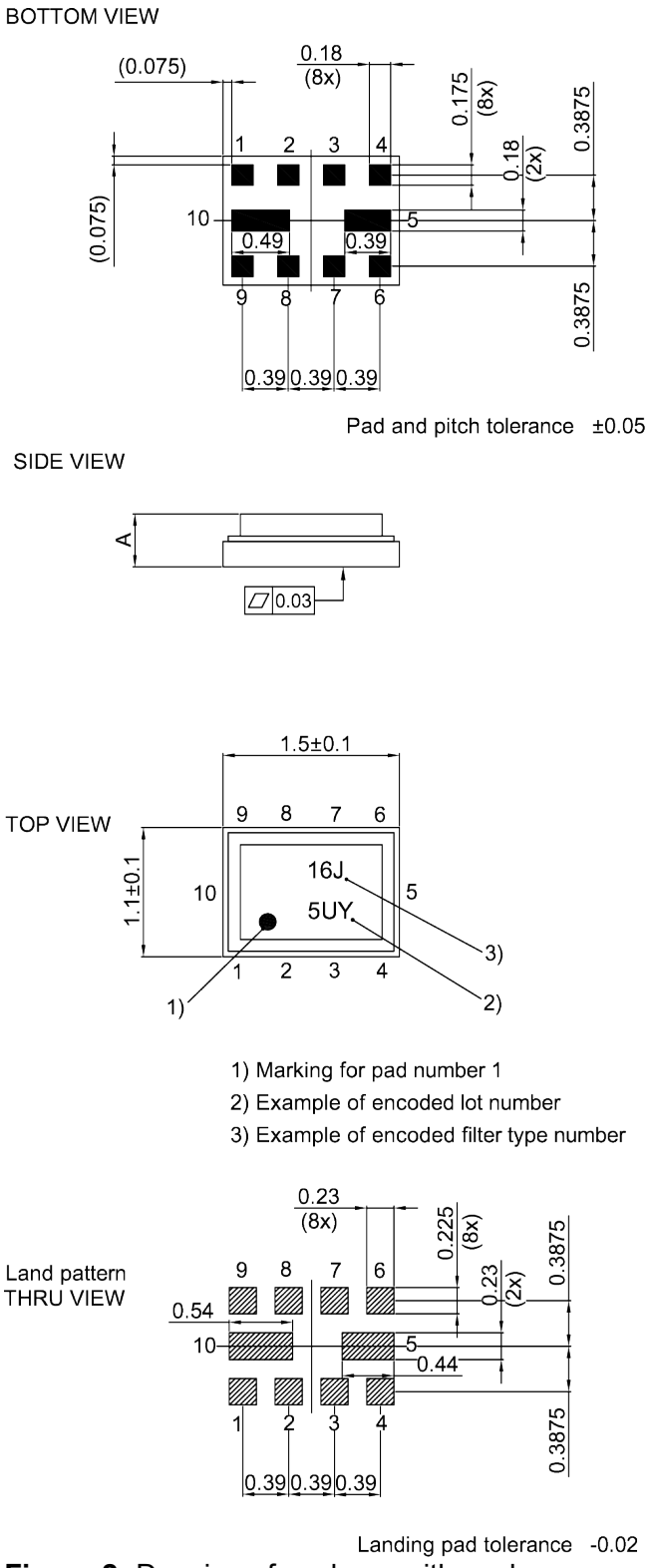

Figure 2: Drawing of package with package height A = 0.45 mm (max.). See Sec. Package information (p. 20).

4 Pin configuration

- 1 Input (B25 & B66)
- 6 Output (B66)
- 9 Output (B25)
- 2, 3, 4, 5, 7, 8, 10 Ground

5 Matching circuit

- L_{p1} = 2.5 nH
- L_{s6} = 2.7 nH
- L_{s9} = 3.0 nH

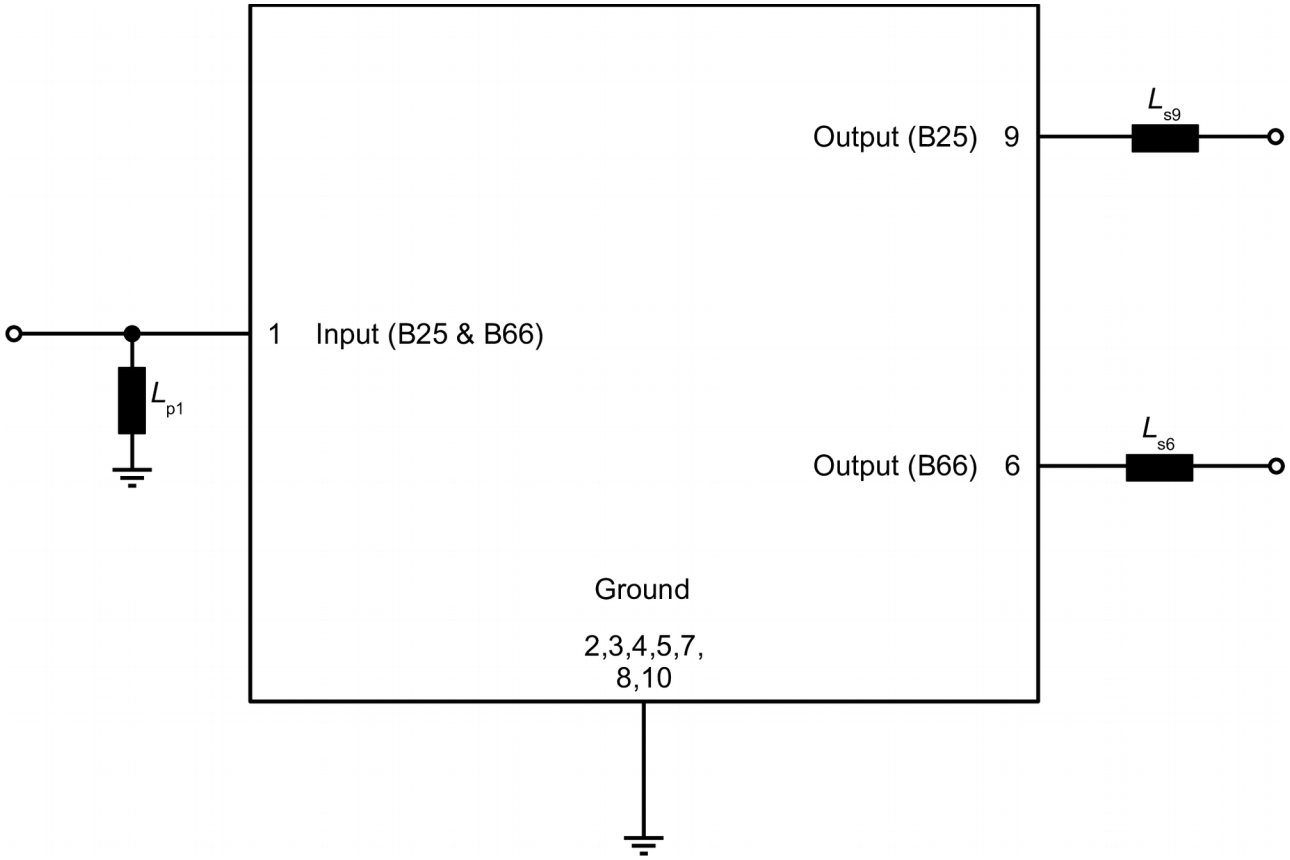

Figure 3: Schematic of matching circuit.

6 Characteristics LTE B25

Temperature range for specification T_{SPEC} = −40 °C ... +85 °C
Input terminating impedance Z_{IN} = 50 Ω // 2.5 nH[1)]
B25 output terminating impedance $Z_{B25\ OUT}$ = 50 Ω + 3.0 nH[1)]
B66 output terminating impedance $Z_{B66\ OUT}$ = 50 Ω + 2.7 nH[1)]

Characteristics LTE B25				min. for T_{SPEC}	typ. @ +25 °C	max. for T_{SPEC}	
Center frequency			f_C	—	1962.5	—	MHz
Maximum insertion attenuation			α_{max}				
	1930.24 ... 1994.76	MHz		—	2.2	3.8	dB
Amplitude ripple (p-p)			$\Delta\alpha$				
	1930.24 ... 1994.76	MHz		—	0.8	2.6	dB
Maximum VSWR			$VSWR_{max}$				
@ input port	1930.24 ... 1994.76	MHz		—	1.5	2.0	
@ B25 output port	1930.24 ... 1994.76	MHz		—	1.5	2.0	
Minimum attenuation			α_{min}				
	10 ... 716	MHz		51	56	—	dB
	716 ... 814	MHz		50	55	—	dB
	814 ... 849	MHz		48	53	—	dB
	849 ... 1710	MHz		40	46	—	dB
	1710.24 ... 1779.76	MHz		40	47	—	dB
	1780 ... 1850	MHz		36	40	—	dB
	1850.24 ... 1909.76	MHz		31	36	—	dB
	1910.24 ... 1914.76	MHz		14	35	—	dB
	2055 ... 2110	MHz		33	36	—	dB
	2110 ... 3000	MHz		37	40	—	dB
	3000 ... 5600	MHz		35	38	—	dB
	5600 ... 6000	MHz		35	39	—	dB

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

7 Characteristics LTE B66

Temperature range for specification T_{SPEC} = −40 °C ... +85 °C
Input terminating impedance Z_{IN} = 50 Ω // 2.5 nH[1)]
B25 output terminating impedance $Z_{B25\ OUT}$ = 50 Ω + 3.0 nH[1)]
B66 output terminating impedance $Z_{B66\ OUT}$ = 50 Ω + 2.7 nH[1)]

Characteristics LTE B66				min. for T_{SPEC}	typ. @ +25 °C	max. for T_{SPEC}	
Center frequency			f_C	—	2155	—	MHz
Maximum insertion attenuation			α_{max}				
	2110.24 ... 2199.76	MHz		—	2.3	3.3	dB
Amplitude ripple (p-p)			$\Delta\alpha$				
	2110.24 ... 2199.76	MHz		—	0.7	2.0	dB
Maximum VSWR			$VSWR_{max}$				
@ input port	2110.24 ... 2199.76	MHz		—	1.5	2.0	
@ B66 output port	2110.24 ... 2199.76	MHz		—	1.5	2.0	
Minimum attenuation			α_{min}				
	10 ... 716	MHz		56	65	—	dB
	716 ... 814	MHz		54	62	—	dB
	814 ... 880	MHz		53	61	—	dB
	880 ... 915	MHz		52	59	—	dB
	915 ... 1500	MHz		40	51	—	dB
	1500 ... 1710	MHz		30	44	—	dB
	1710 ... 1850	MHz		40	47	—	dB
	1850.24 ... 1914.76	MHz		44	53	—	dB
	1915 ... 1980	MHz		40	45	—	dB
	1980 ... 2015	MHz		43	47	—	dB
	2015 ... 2025	MHz		40	53	—	dB
	2025 ... 2050	MHz		32	39	—	dB
	2050 ... 2075	MHz		20	33	—	dB
	2230 ... 2285	MHz		12	25	—	dB
	2285 ... 3200	MHz		32	37	—	dB
	3200 ... 6130	MHz		41	51	—	dB
	6130 ... 6600	MHz		35	50	—	dB

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

8 Maximum ratings

Operable temperature	T_{OP} = −40 °C ... +125 °C	
Storage temperature	T_{STG} [1] = −40 °C ... +125 °C	
DC voltage	$\|V_{DC}\|$ [2] = 0 V	
Input power	P_{IN}	
@ input port: 1710.24 ... 1779.76 MHz	15 dBm	Continuous wave for 2000 h @ 55 °C.
@ input port: 1850.24 ... 1914.76 MHz	15 dBm	Continuous wave for 2000 h @ 55 °C.
@ input port: 1920.34 ... 1979.66 MHz	15 dBm	Continuous wave for 2000 h @ 55 °C.

[1] Not valid for packaging material. Storage temperature for packaging material is −25 °C to +40 °C.
[2] In case of applied DC voltage blocking capacitors are mandatory.

9 Transmission coefficient LTE B25

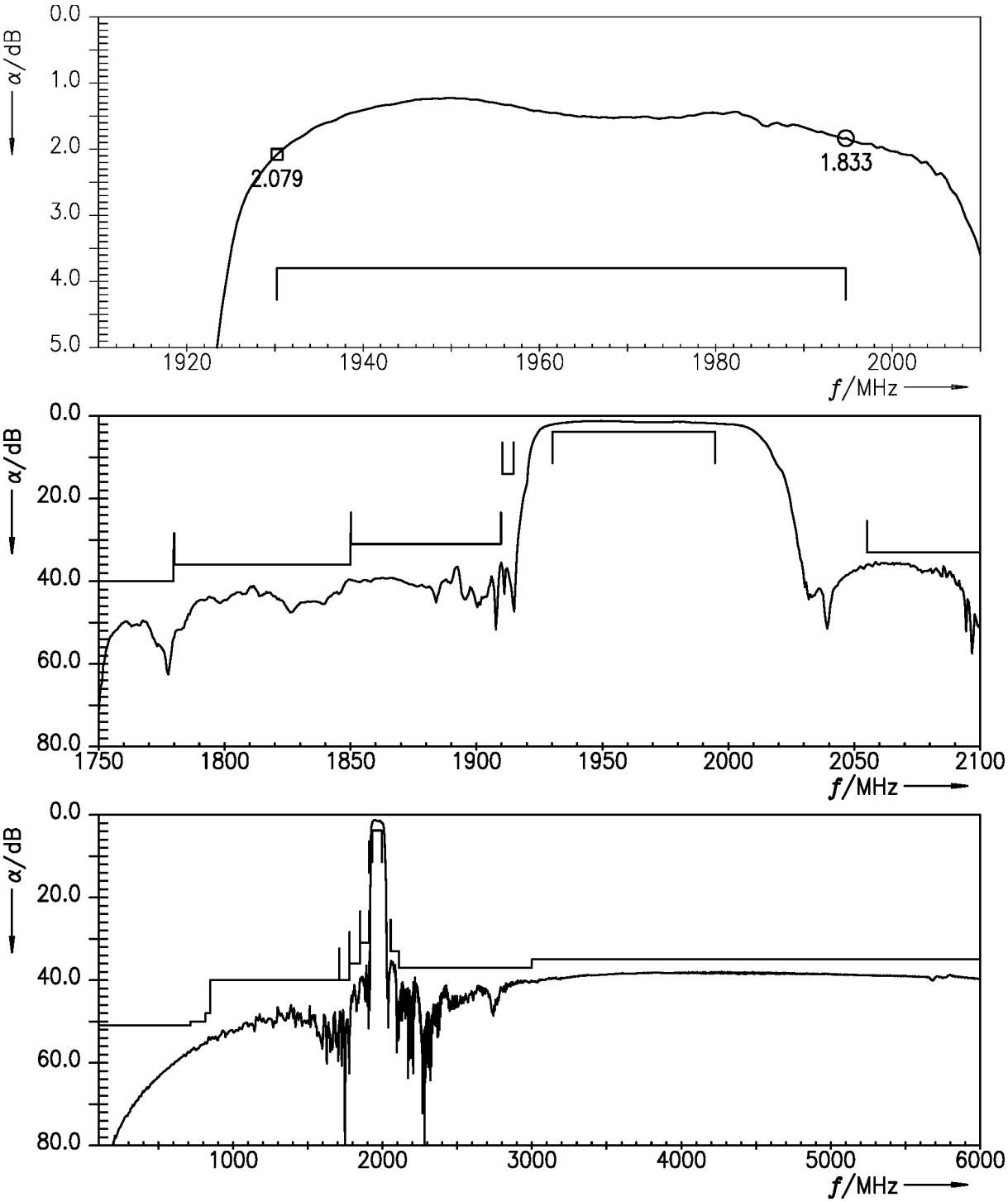

Figure 4: Attenuation LTE B25.

10 Reflection coefficients LTE B25

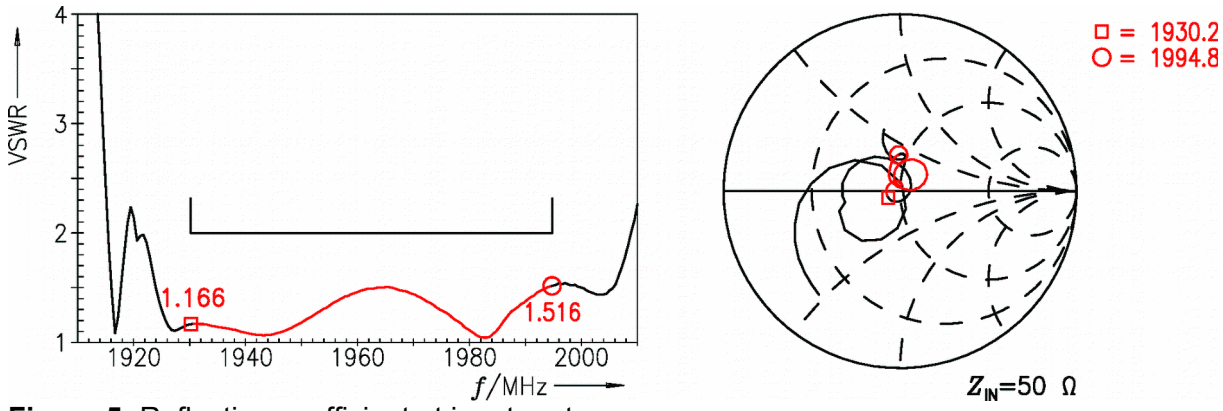

Figure 5: Reflection coefficient at input port.

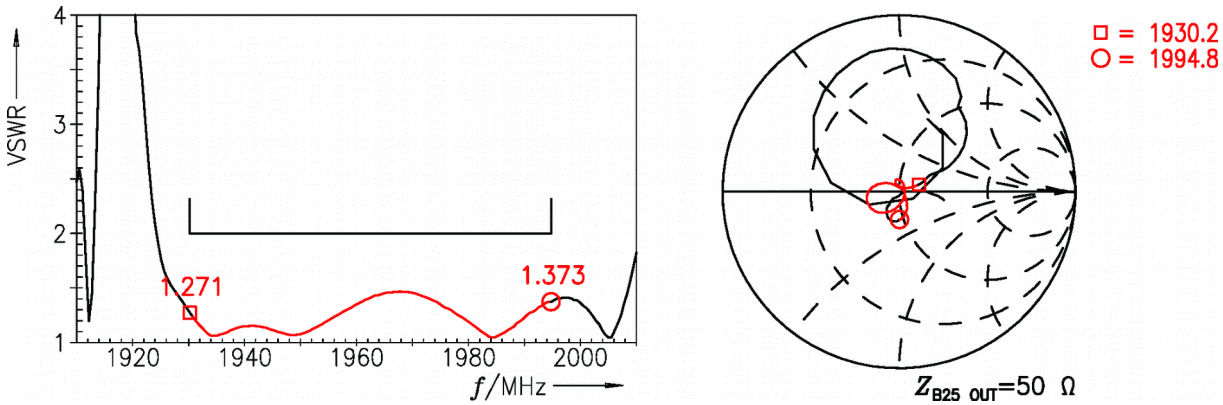

Figure 6: Reflection coefficient at B25 OUT port.

11 Transmission coefficient LTE B66

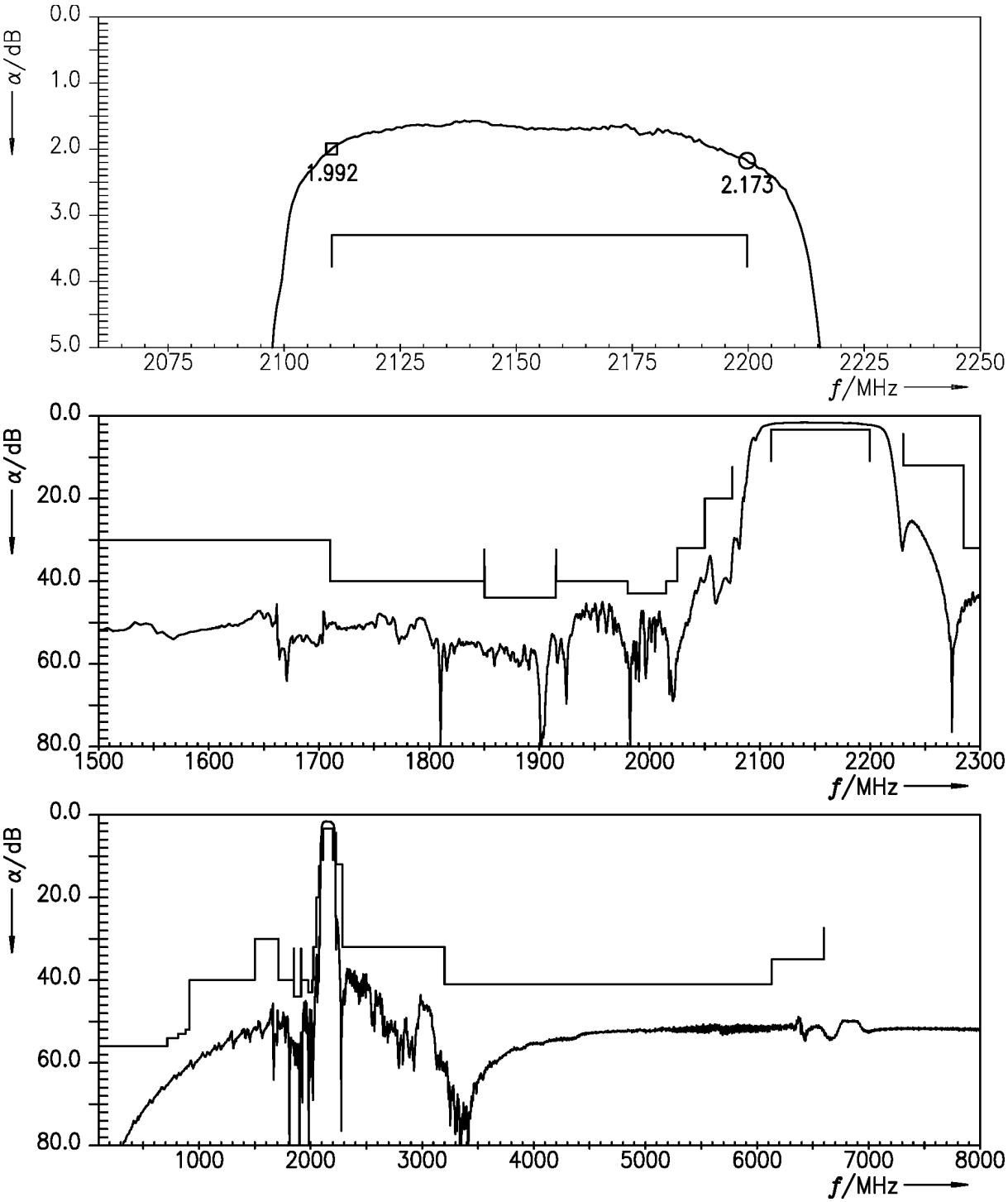

Figure 7: Attenuation LTE B66.

12 Reflection coefficients LTE B66

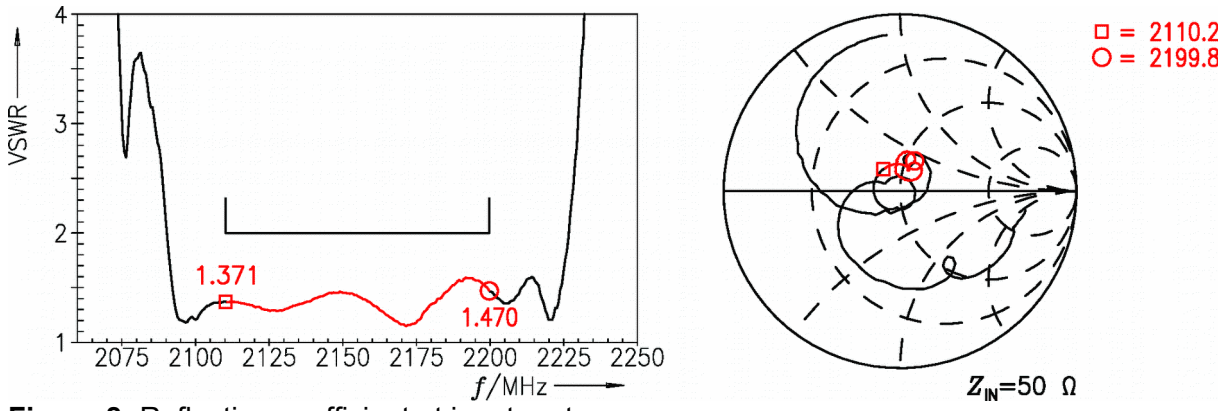

Figure 8: Reflection coefficient at input port.

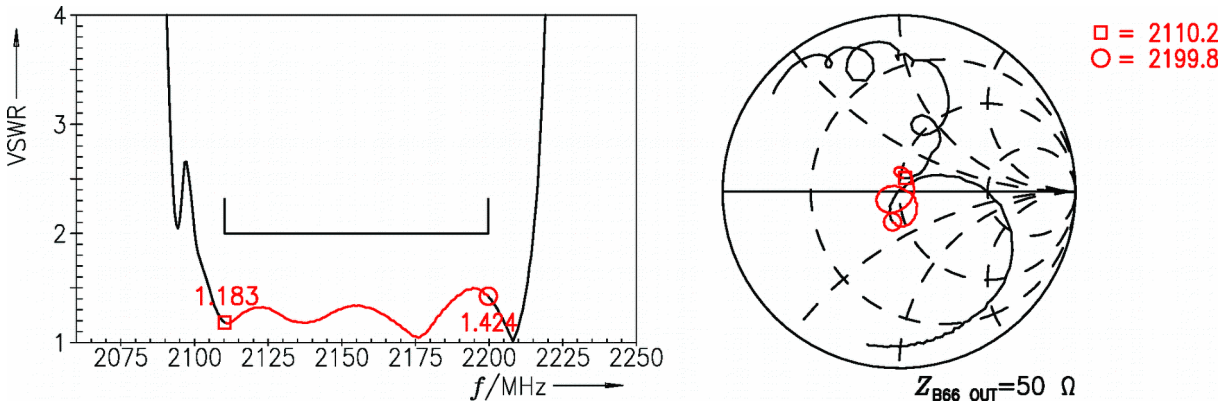

Figure 9: Reflection coefficient at B66 OUT port.

13 Packing material

13.1 Tape

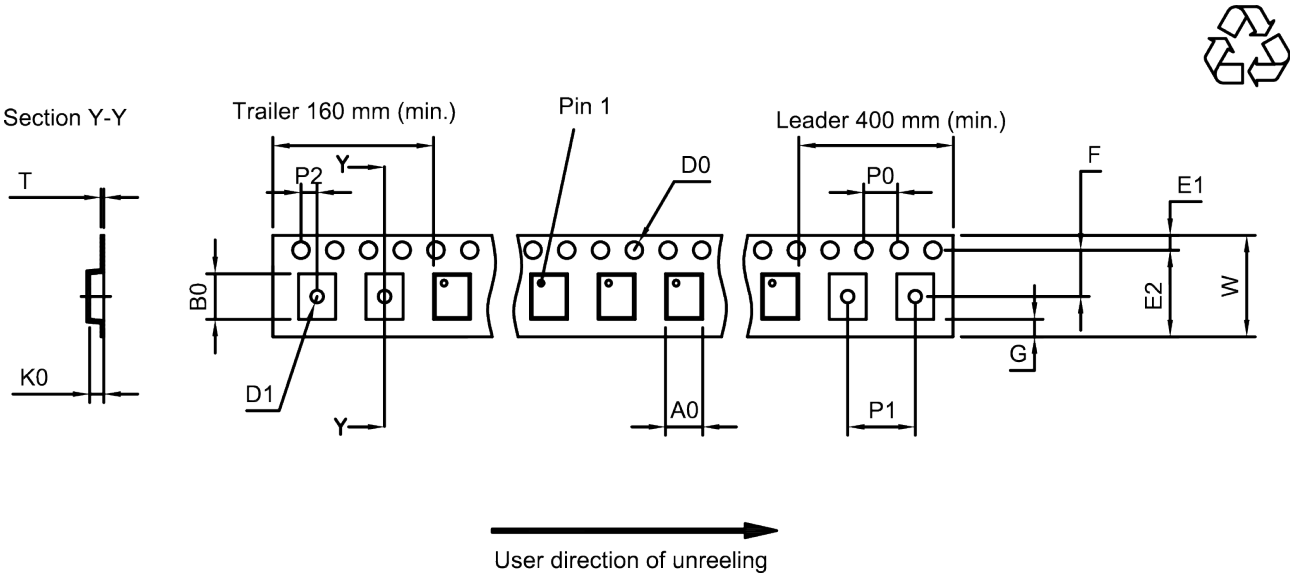

Figure 10: Drawing of tape (first-angle projection) for illustration only and not to scale. The valid tape dimensions are listed in Table 1.

A_0	1.27±0.05 mm
B_0	1.67±0.05 mm
D_0	1.5+0.1/−0 mm
D_1	0.5+0.1/−0 mm
E_1	1.75±0.1 mm

E_2	6.25 mm (min.)
F	3.5±0.05 mm
G	0.75 mm (min.)
K_0	0.55±0.05 mm
P_0	4.0±0.1 mm

P_1	4.0±0.1 mm
P_2	2.0±0.05 mm
T	0.25±0.03 mm
W	8.0+0.3/−0.1 mm

Table 1: Tape dimensions.

13.2 Reel with diameter of 180 mm

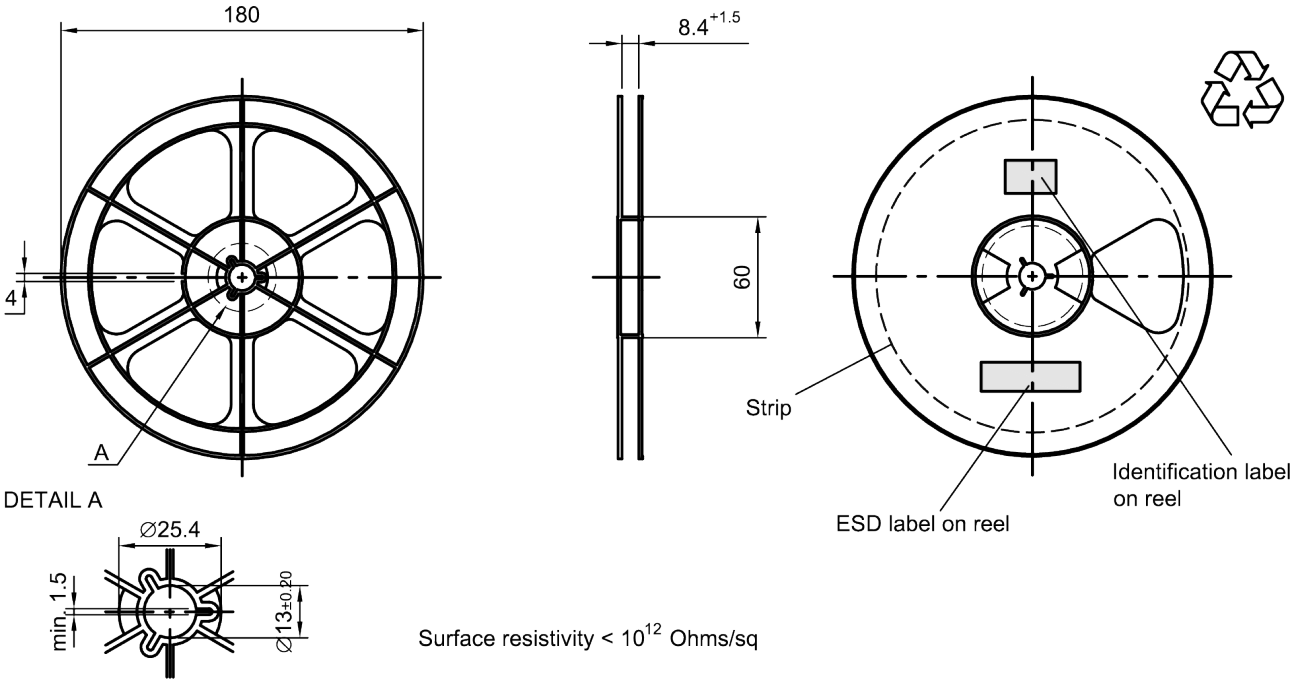

Figure 11: Drawing of reel (first-angle projection) with diameter of 180 mm.

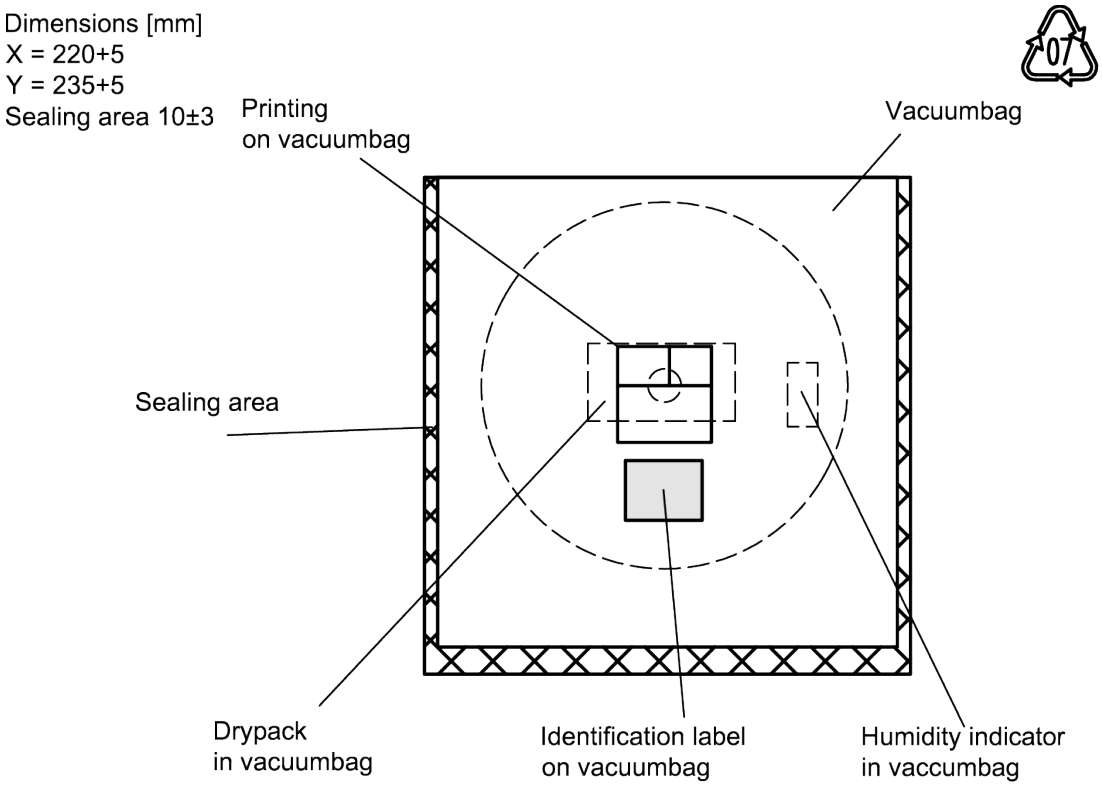

Figure 12: Drawing of moisture barrier bag (MBB) for reel with diameter of 180 mm.

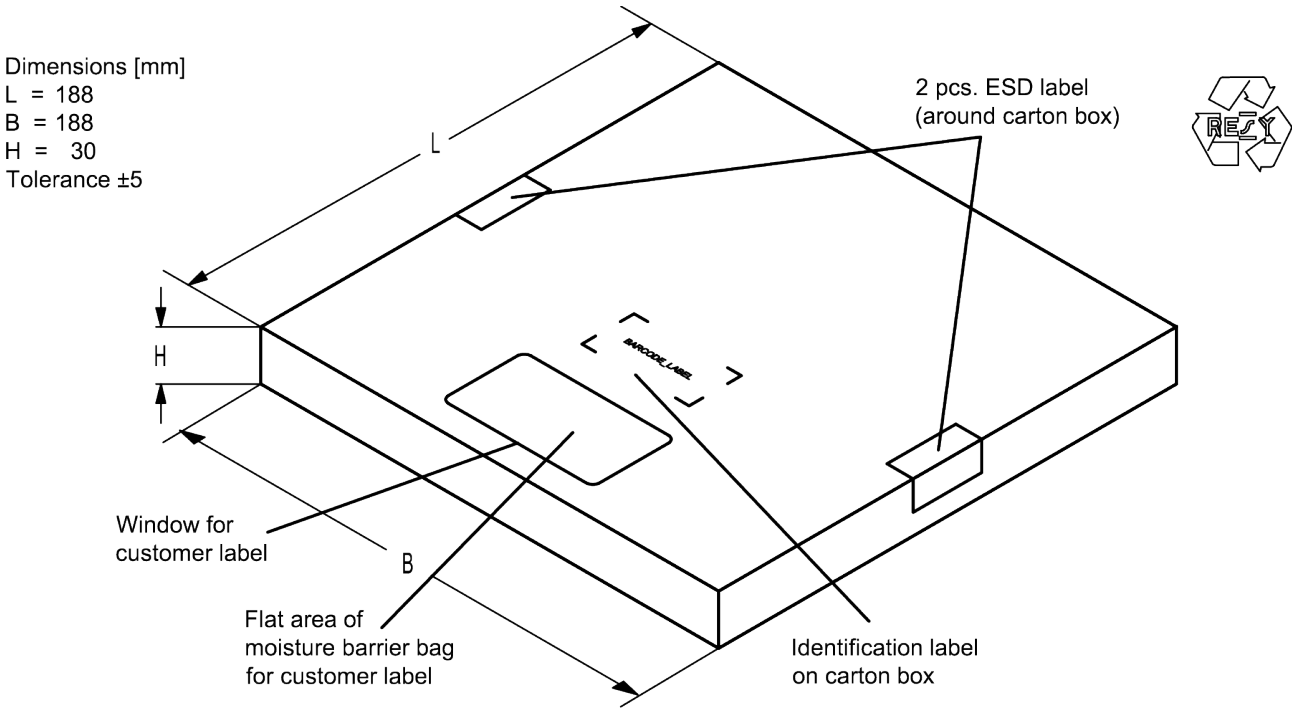

Figure 13: Drawing of folding box for reel with diameter of 180 mm.

14 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 B4387 is 493.

- 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.

15 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).

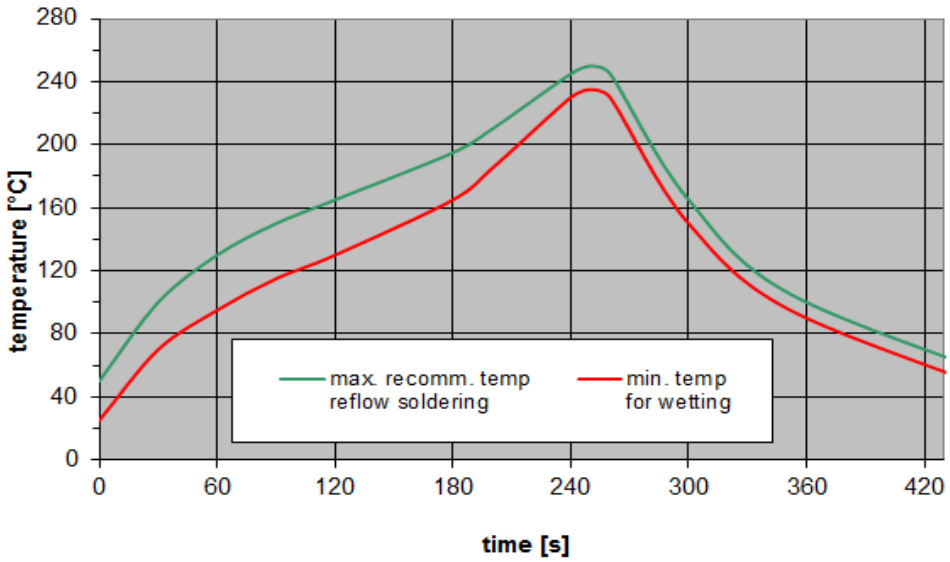

Figure 14: Recommended reflow profile for convection and infrared soldering – lead-free solder.

16 Annotations

16.1 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.

16.2 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.

17 Cautions and warnings

17.1 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.

17.2 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.

17.3 Moldability

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

17.4 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).

Dimensions do not include burrs.

Projection method

Unless otherwise specified first-angle projection is applied.

18 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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