



**RF360**  
**Europe GmbH**

## **Data sheet**

### **SAW Tx post PA filter**

Femtocell

TD-LTE band 40(2320-2370 MHz)

Series/type:	B8364
Ordering code:	B39232B8364L210
Date:	October 22, 2018
Version:	2.0

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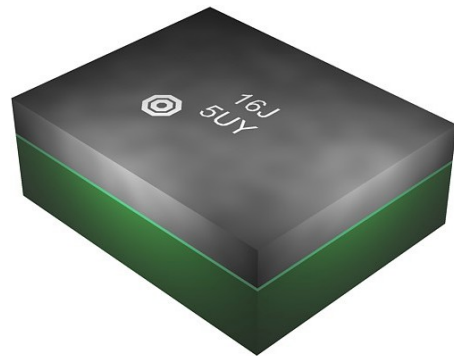
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## 1 Application

- Low-loss SAW Post PA filter (Band 40 partial)
- Usable pass band 50MHz

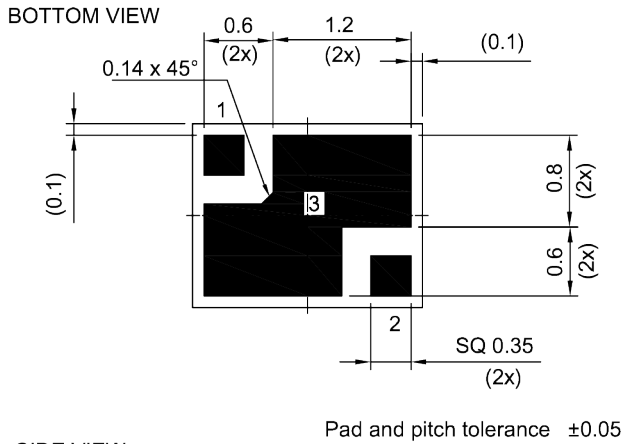
## 2 Features

- Package size  $2.0_{\pm 0.1}$  mm  $\times$   $1.6_{\pm 0.1}$  mm
- Package height 0.7 mm (max.)
- Approximate weight 6 mg
- RoHS compatible
- Package for Surface Mount Technology (SMT)
- Ni/Au-plated terminals
- Electrostatic Sensitive Device (ESD)
- Moisture Sensitivity Level 3 (MSL3)

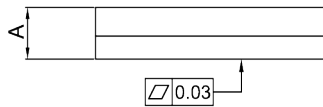


**Figure 1:** Picture of component with example of product marking.

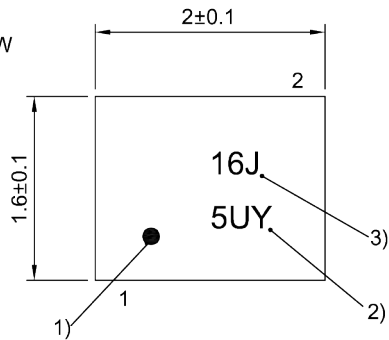
3 Package



SIDE VIEW



TOP VIEW



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

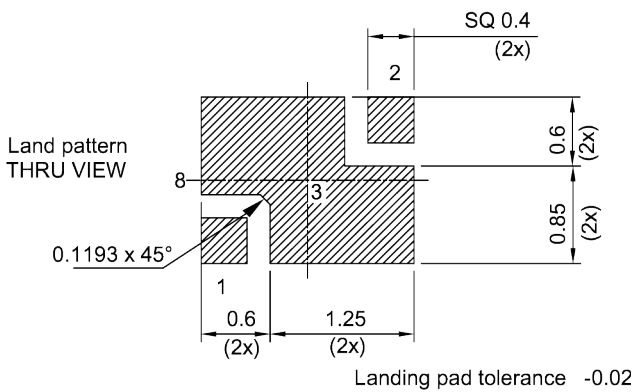


Figure 2: Drawing of package with package height A = 0.7 mm (max.). See Sec. Package information (p. 21).

4 Pin configuration

- 1 Input
- 2 Output
- 3 Ground

5 Matching circuit

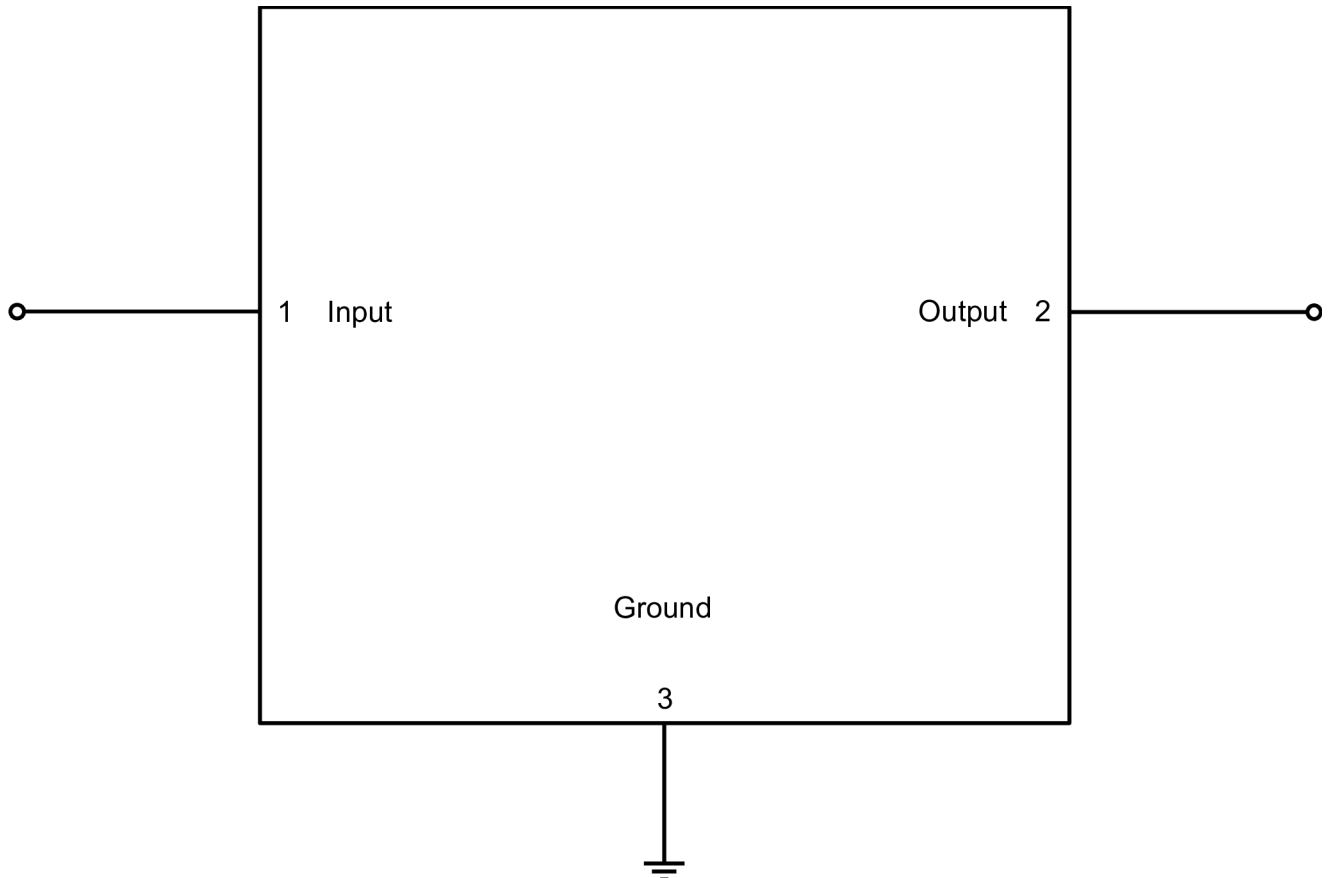


Figure 3: Schematic of matching circuit. No external matching components required.



## 6 Characteristics

Temperature range for specification	$T_{SPEC}$	= -10 °C ... +85 °C
Input terminating impedance	$Z_{IN}$	= 50 $\Omega$
Output terminating impedance	$Z_{OUT}$	= 50 $\Omega$

Characteristics				min. for $T_{SPEC}$	typ. @ +25 °C	max. for $T_{SPEC}$	
<b>Center frequency</b>			$f_C$	—	2345	—	MHz
<b>Average insertion attenuation</b>			$\alpha_{INT,avg}^{1)}$				
	2320... 2325	MHz		—	1.6	2.1	dB
	2325... 2365	MHz		—	1.5	2.1	dB
	2365... 2370	MHz		—	1.5	2.5	dB
<b>Maximum insertion attenuation</b>			$\alpha_{max}$				
	2320... 2370	MHz		—	1.7	2.5	dB
<b>Amplitude ripple (p-p)</b>			$\Delta\alpha$				
	2320... 2370	MHz		—	0.7	1.5	dB
<b>Maximum VSWR</b>			VSWR <sub>max</sub>				
@ input port	2320... 2370	MHz		—	1.8	2.2	
@ output port	2320... 2370	MHz		—	1.7	2.1	
<b>Maximum error vector magnitude</b>			EVM <sub>max</sub> <sup>2)</sup>				
	2322.4... 2367.6	MHz		—	0.7	3.0	%
<b>Minimum attenuation</b>			$\alpha_{min}$				
	50... 960	MHz		33	38	—	dB
	960... 1710	MHz		33	38	—	dB
	1710... 1880	MHz		33	40	—	dB
	1920... 2170	MHz		33	42	—	dB
	2170... 2200	MHz		33	55	—	dB
	2200... 2215	MHz		33	50	—	dB
	2215... 2280	MHz		20	30	—	dB
	2280... 2295	MHz		9	19	—	dB
	2295... 2300	MHz		4	13	—	dB
	2395... 2400	MHz		9	30	—	dB
	2400... 2405	MHz		20	49	—	dB
	2405... 2410	MHz		42	50	—	dB
	2410... 2420	MHz		42	52	—	dB
	2420... 2440	MHz		45	52	—	dB
	2440... 2480	MHz		40	50	—	dB
	2480... 2500	MHz		36	46	—	dB
	2500... 2690	MHz		33	43	—	dB
	2690... 3400	MHz		33	43	—	dB
	3400... 3800	MHz		38	48	—	dB
	3800... 4600	MHz		34	44	—	dB
	4600... 4800	MHz		35	42	—	dB

Characteristics			min. for $T_{SPEC}$	typ. @ +25 °C	max. for $T_{SPEC}$	
	4800... 5150	MHz	30	40	—	dB
	5150... 5850	MHz	25	38	—	dB
	5850... 6000	MHz	25	38	—	dB
<b>Group delay ripple</b>						
			$\Delta\tau_{var}$			
	2320... 2370	MHz	—	10	20	ns
<b>Variation of phase</b>						
			$\varphi_{var}$			
	2320... 2370	MHz	—	30	50	°

<sup>1)</sup> Integrated attenuation  $\alpha_{INT}$ : Averaged power  $|S_{ij}|^2$  over the center 4.5 MHz of LTE 5 MHz (25 RB) channels.

<sup>2)</sup> Error Vector Magnitude (EVM) based on definition in 3GPP TS 25.141.

Temperature range for specification	$T_{SPEC}$	= -40 °C ... +85 °C
Input terminating impedance	$Z_{IN}$	= 50 $\Omega$
Output terminating impedance	$Z_{OUT}$	= 50 $\Omega$

Characteristics			min. for $T_{SPEC}$	typ. @ +25 °C	max. for $T_{SPEC}$	
<b>Center frequency</b>		$f_C$	—	2345	—	MHz
<b>Average insertion attenuation</b>		$\alpha_{INT,avg}^{1)}$				
	2320... 2325	MHz	—	1.6	2.2	dB
	2325... 2365	MHz	—	1.5	2.1	dB
	2365... 2370	MHz	—	1.5	2.6	dB
<b>Maximum insertion attenuation</b>		$\alpha_{max}$				
	2320... 2370	MHz	—	1.7	2.6	dB
<b>Amplitude ripple (p-p)</b>		$\Delta\alpha$				
	2320... 2370	MHz	—	0.7	1.6	dB
<b>Maximum VSWR</b>		VSWR <sub>max</sub>				
@ input port	2320... 2370	MHz	—	1.8	2.2	
@ output port	2320... 2370	MHz	—	1.7	2.1	
<b>Maximum error vector magnitude</b>		EVM <sub>max</sub> <sup>2)</sup>				
	2322.4... 2367.6	MHz	—	0.7	3.0	%
<b>Minimum attenuation</b>		$\alpha_{min}$				
	50... 960	MHz	33	38	—	dB
	960... 1710	MHz	33	38	—	dB
	1710... 1880	MHz	33	40	—	dB
	1920... 2170	MHz	33	42	—	dB
	2170... 2200	MHz	33	55	—	dB
	2200... 2215	MHz	33	50	—	dB
	2215... 2280	MHz	20	30	—	dB
	2280... 2295	MHz	9	19	—	dB
	2295... 2300	MHz	4	13	—	dB
	2395... 2400	MHz	4	30	—	dB
	2400... 2405	MHz	11	49	—	dB
	2405... 2410	MHz	26	50	—	dB
	2410... 2420	MHz	42	52	—	dB
	2420... 2440	MHz	45	52	—	dB
	2440... 2480	MHz	40	50	—	dB
	2480... 2500	MHz	36	46	—	dB
	2500... 2690	MHz	33	43	—	dB
	2690... 3400	MHz	33	43	—	dB
	3400... 3800	MHz	38	48	—	dB
	3800... 4600	MHz	34	44	—	dB
	4600... 4800	MHz	35	42	—	dB
	4800... 5150	MHz	30	40	—	dB

Characteristics			min. for $T_{SPEC}$	typ. @ +25 °C	max. for $T_{SPEC}$	
Group delay ripple	5150... 5850	MHz	25	38	—	dB
	5850... 6000	MHz	25	38	—	
Variation of phase	2320... 2370	MHz	—	10	25	ns
	2320... 2370	MHz	—	30	55	

<sup>1)</sup> Integrated attenuation  $\alpha_{INT}$ : Averaged power  $|S_{ij}|^2$  over the center 4.5 MHz of LTE 5 MHz (25 RB) channels.

<sup>2)</sup> Error Vector Magnitude (EVM) based on definition in 3GPP TS 25.141.

## 7 Maximum ratings

Operable temperature	$T_{OP} = -40\text{ °C} \dots +85\text{ °C}$	
Storage temperature	$T_{STG}^{1)} = -40\text{ °C} \dots +85\text{ °C}$	
DC voltage	$ V_{DC} ^{2)} = 0\text{ V}$	
ESD voltage		
	$V_{ESD}^{3)} = 150\text{ V}$	Machine model.
	$V_{ESD}^{4)} = 250\text{ V}$	Human body model.
Input power @ input port: 2320 ... 2370 MHz	$P_{IN} = 29\text{ dBm}^{5), 6)}$	5 MHz LTE downlink (25 RB), ON-state power 70% DC for 27000 h @ 55 °C. Source and load impedance 50Ω.

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

<sup>2)</sup> In case of applied DC voltage blocking capacitors are mandatory.

<sup>3)</sup> According to JESD22-A115B (MM – Machine Model), 10 negative & 10 positive pulses.

<sup>4)</sup> According to JESD22-A114F (HBM – Human Body Model), 1 negative & 1 positive pulse.

<sup>5)</sup> Expected lifetime according to accelerated power durability test and wear out models.

<sup>6)</sup>  $T_{SPEC}$  is the ambient temperature of the PCB at component position. Specified min./max values from section 6 "characteristics" for maximum input power 29dBm are valid for temperature up to 55°C.

8 Transmission coefficient

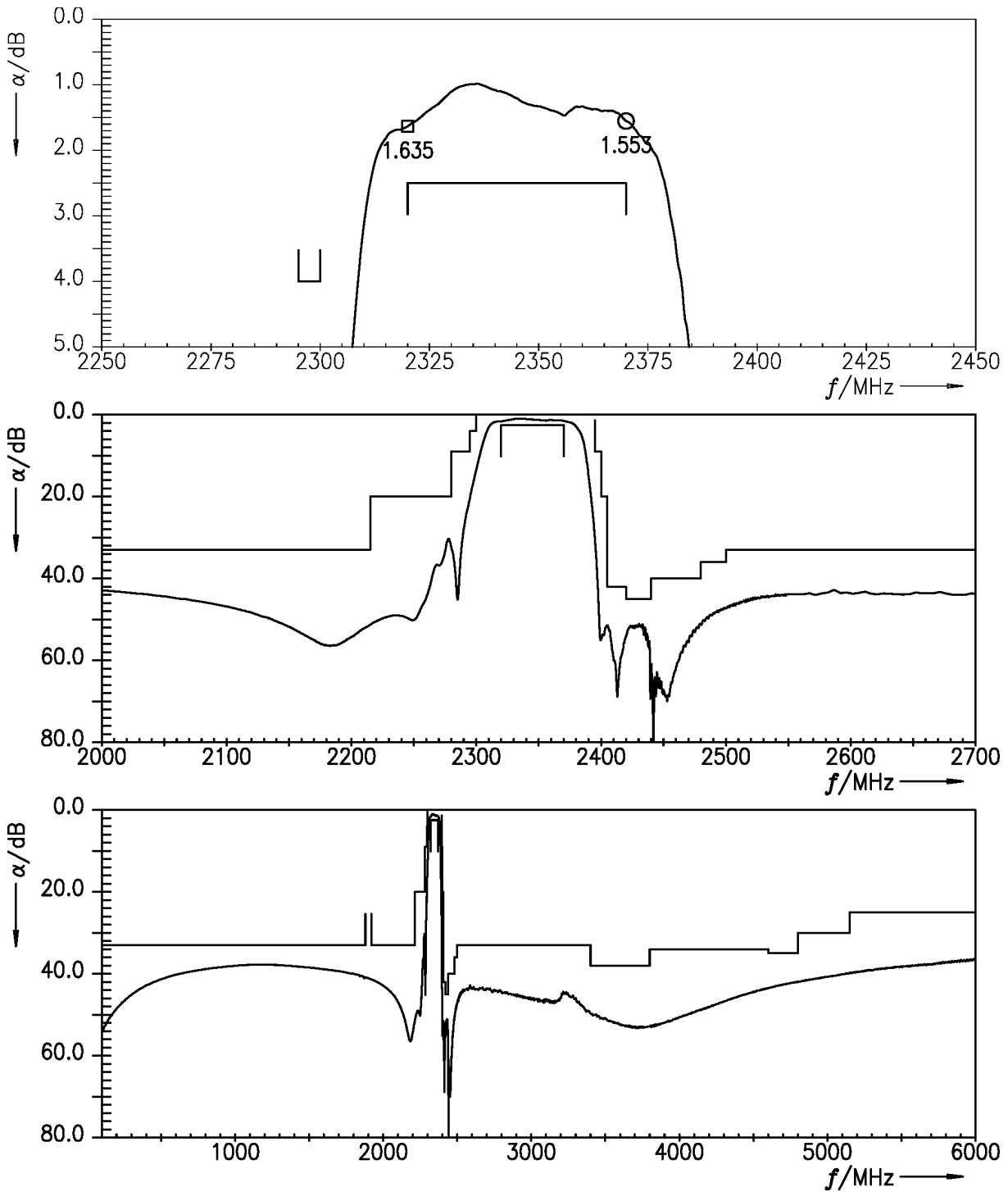


Figure 4: Attenuation .

9 Reflection coefficients

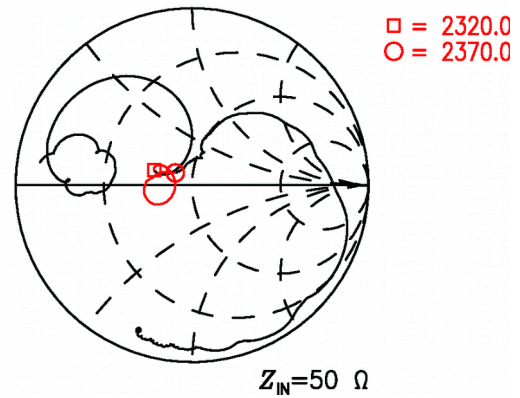
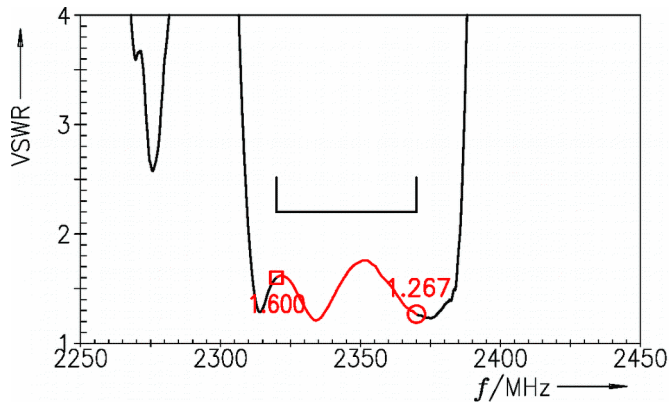


Figure 5: Reflection coefficient at input port.

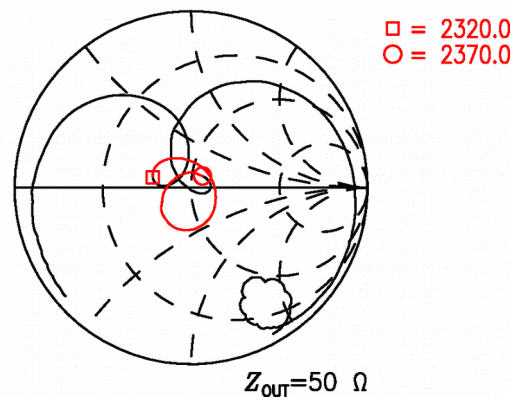
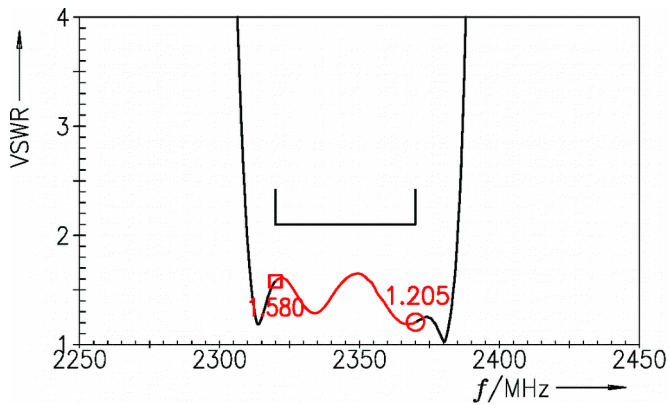


Figure 6: Reflection coefficient at output port.

10 EVM

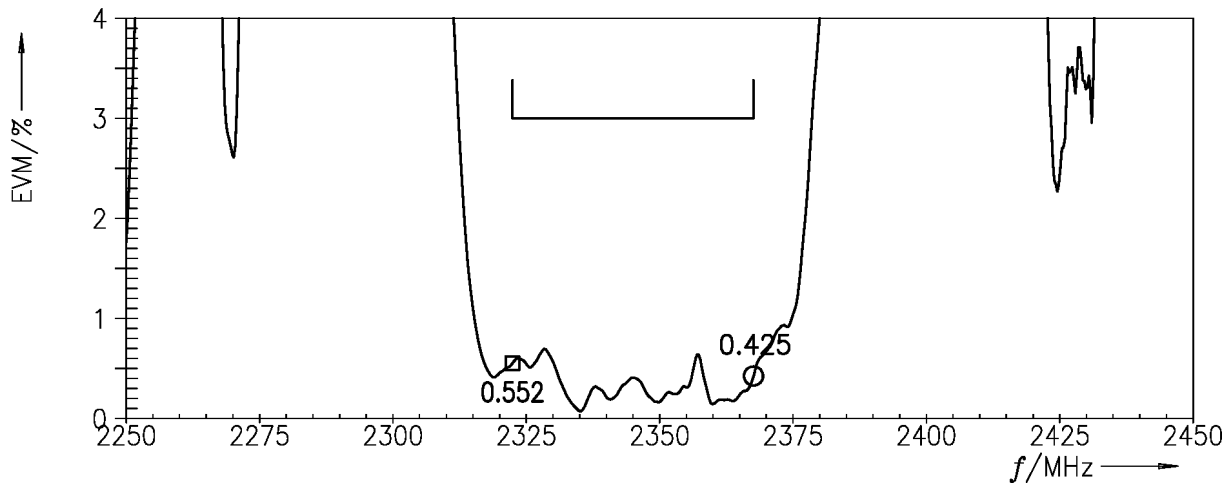
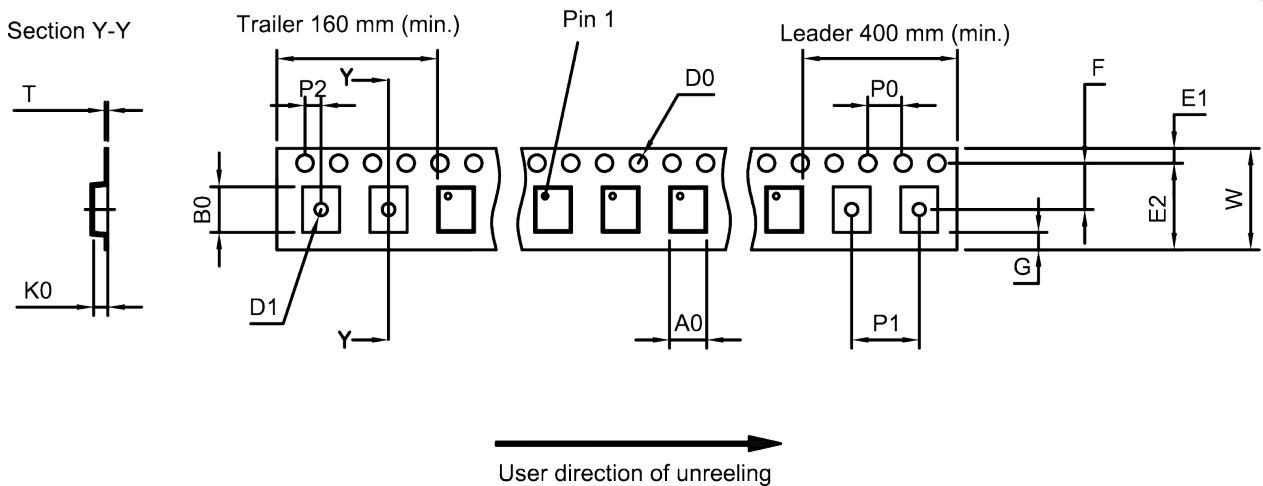


Figure 7: Error vector magnitude .



## 11 Packing material

### 11.1 Tape



**Figure 8:** Drawing of tape (first-angle projection) for illustration only and not to scale. The valid tape dimensions are listed in Table 1.

$A_0$	$1.8 \pm 0.05$ mm	$E_2$	6.25 mm (min.)	$P_1$	$4.0 \pm 0.1$ mm
$B_0$	$2.25 \pm 0.05$ mm	F	$3.5 \pm 0.05$ mm	$P_2$	$2.0 \pm 0.05$ mm
$D_0$	$1.5^{+0.1/-0}$ mm	G	0.75 mm (min.)	T	$0.3 \pm 0.05$ mm
$D_1$	1.0 mm (min.)	$K_0$	$0.9 \pm 0.05$ mm	W	$8.0^{+0.3/-0.1}$ mm
$E_1$	$1.75 \pm 0.1$ mm	$P_0$	$4.0 \pm 0.1$ mm		

**Table 1:** Tape dimensions.

11.2 Reel with diameter of 180 mm

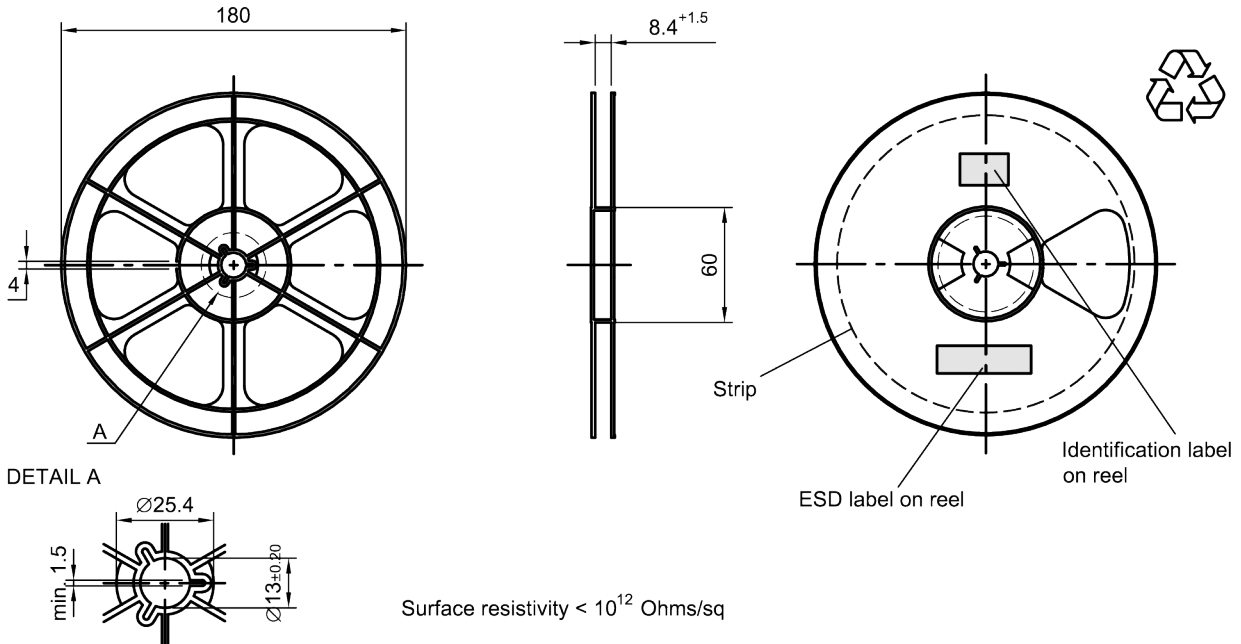


Figure 9: Drawing of reel (first-angle projection) with diameter of 180 mm.

Dimensions [mm]

X = 220+5

Y = 235+5

Sealing area 10±3

Printing on vacuumbag

Sealing area

Drypack in vacuumbag

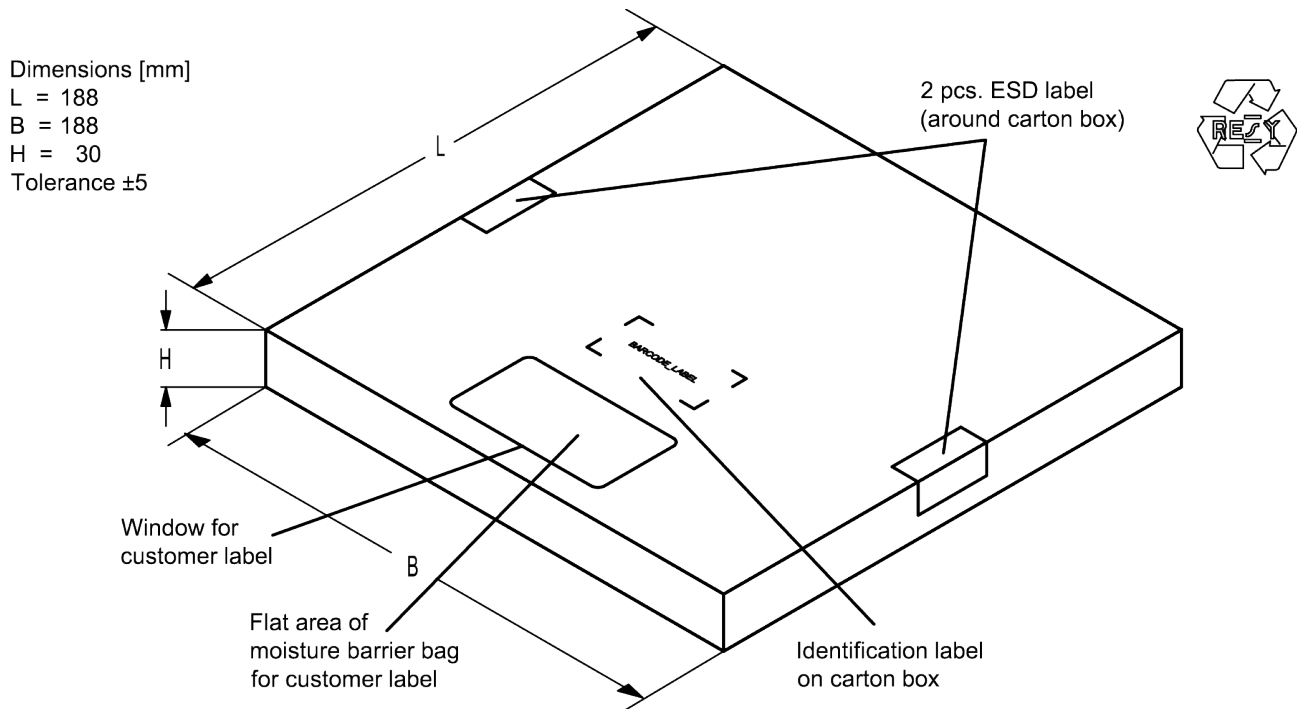
Identification label on vacuumbag

Humidity indicator in vacuumbag

Vacuumbag



Figure 10: Drawing of moisture barrier bag (MBB) for reel with diameter of 180 mm.



**Figure 11:** Drawing of folding box for reel with diameter of 180 mm.

**12 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**  
 $1 \times 32^2 + 6 \times 32^1 + 18 (=J) \times 32^0 =$  **1234**  
 The BASE32 code for product type B8364 is 85C.

■ 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**  
 $5 \times 47^2 + 27 (=U) \times 47^1 + 31 (=Y) \times 47^0 =$  **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		

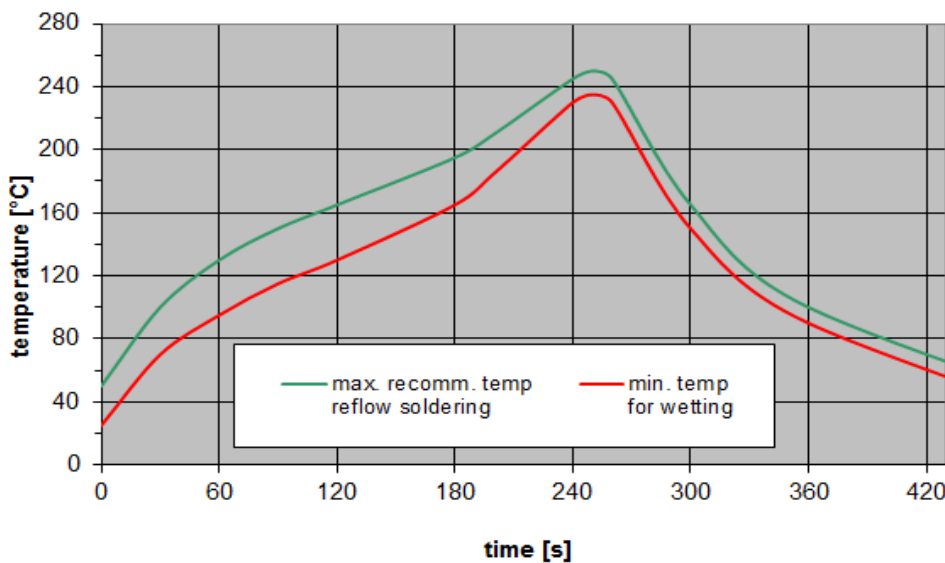
**Table 2:** Lists for encoding and decoding of marking.

### 13 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 $T_{peak}$	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.

## 14 Annotations

### 14.1 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.

### 14.2 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.

### 14.3 Ordering codes and packing units

Ordering code	Packing unit
B39232B8364L210	5000 pcs

**Table 4:** Ordering codes and packing units.

## 15 Cautions and warnings

### 15.1 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](http://www.rf360jv.com/orderingcodes).

### 15.2 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.

### 15.3 Moldability

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

### 15.4 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.

## 16 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.**
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