



**RF360  
Europe GmbH**

## **SAW components**

**SAW filter**  
GPS + COMPASS + GLONASS

Series/type: B8813

Ordering code: B39162B8813P810

Date: August 24, 2017

Version: 2.3

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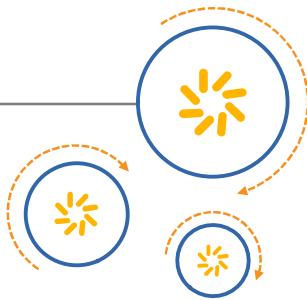
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RF360 Europe GmbH  
A Qualcomm – TDK Joint Venture



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**SAW components****B8813****SAW filter****1582.47 MHz**

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<b>SAW components</b>	<b>B8813</b>
SAW filter	<b>1582.47 MHz</b>

## 1 Application

- Low-loss GPS + COMPASS + GLONASS filter
- Simultaneous usage of GPS, COMPASS and GLONASS bands
- Usable passbands: 2.0 MHz for GPS, 4.092 MHz for COMPASS and 8.34 MHz for GLONASS
- Very low insertion attenuation
- High out of band selectivity
- Filter impedance 50 Ω
- Unbalanced to unbalanced operation
- No matching network required for operation at 50 Ω

## 2 Features

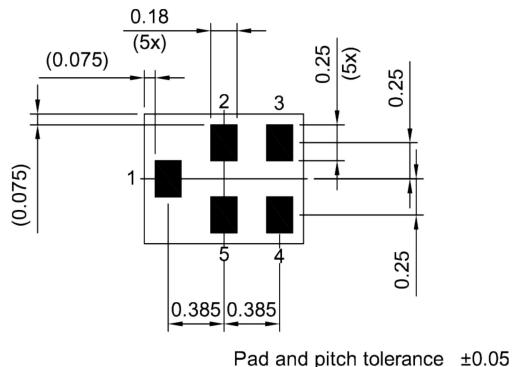
- Package size 1.1 mm × 0.9 mm
- Package height 0.45 mm (max.)
- Approximate weight 0.0012 g
- RoHS compatible
- Package for Surface Mount Technology (SMT)
- Ni/Au-plated terminals
- Electrostatic Sensitive Device (ESD)
- Moisture Sensitivity Level 3 (MSL3)



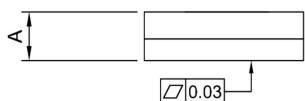
**Figure 1:** Picture of component with example of product marking.

**SAW components****B8813****SAW filter****1582.47 MHz****3 Package**

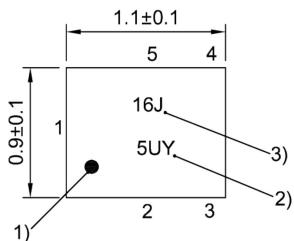
BOTTOM VIEW



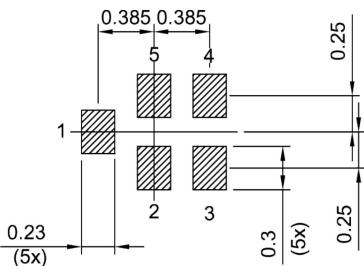
SIDE VIEW



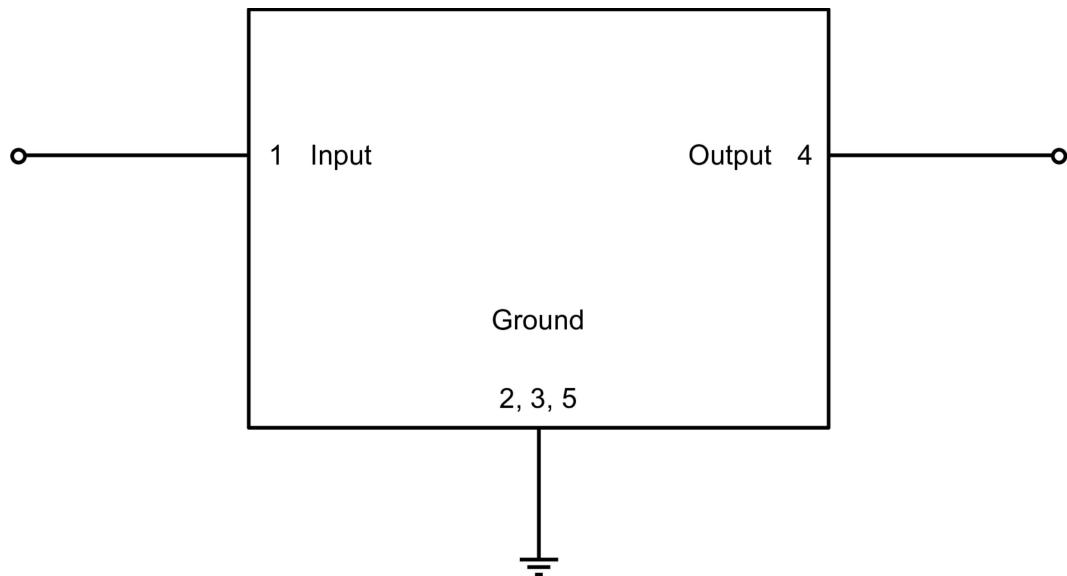
TOP VIEW



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

Land pattern  
THRU VIEW

**Figure 2:** Drawing of package with package height A = 0.45 mm (max.). See Sec. Package information (p. 18).

**SAW components****B8813****SAW filter****1582.47 MHz****5 Matching circuit**

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

**SAW components****B8813****SAW filter****1582.47 MHz****6 Characteristics**

Temperature range for specification	$T_{\text{SPEC}}$	= -30 °C ... +85 °C
Input terminating impedance	$Z_{\text{IN}}$	= 50 Ω
Output terminating impedance	$Z_{\text{OUT}}$	= 50 Ω

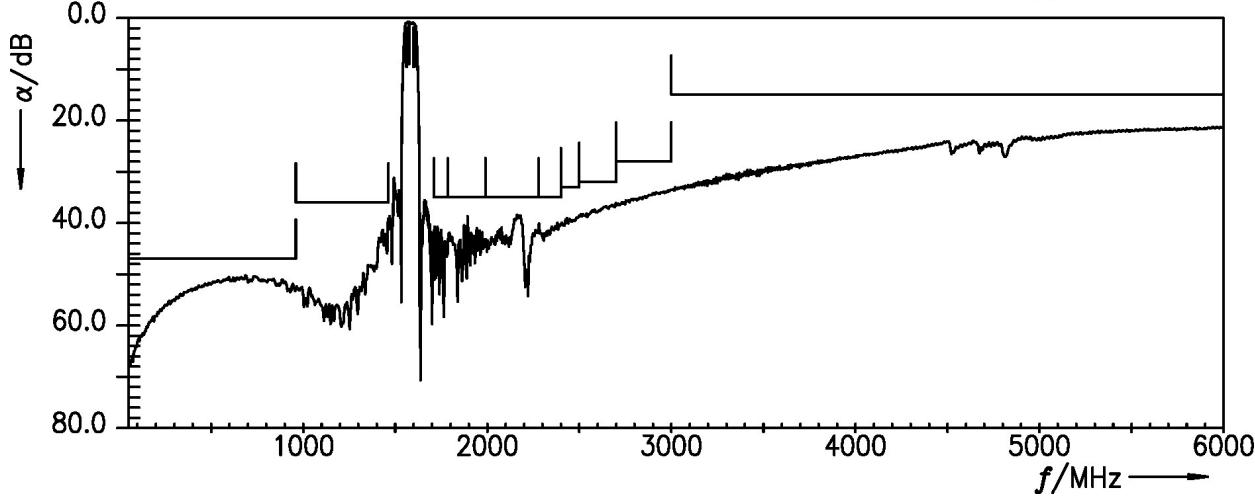
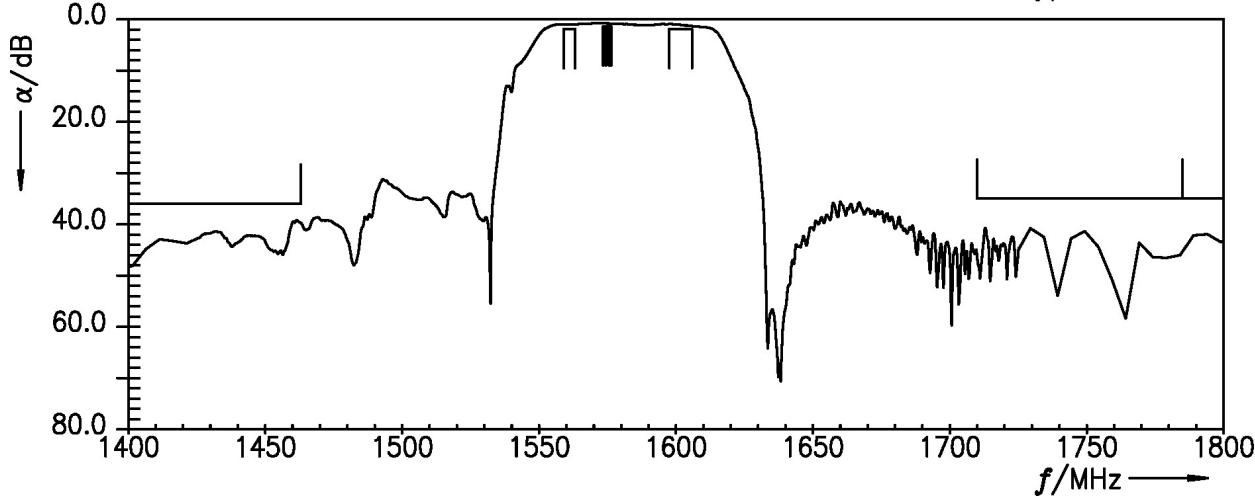
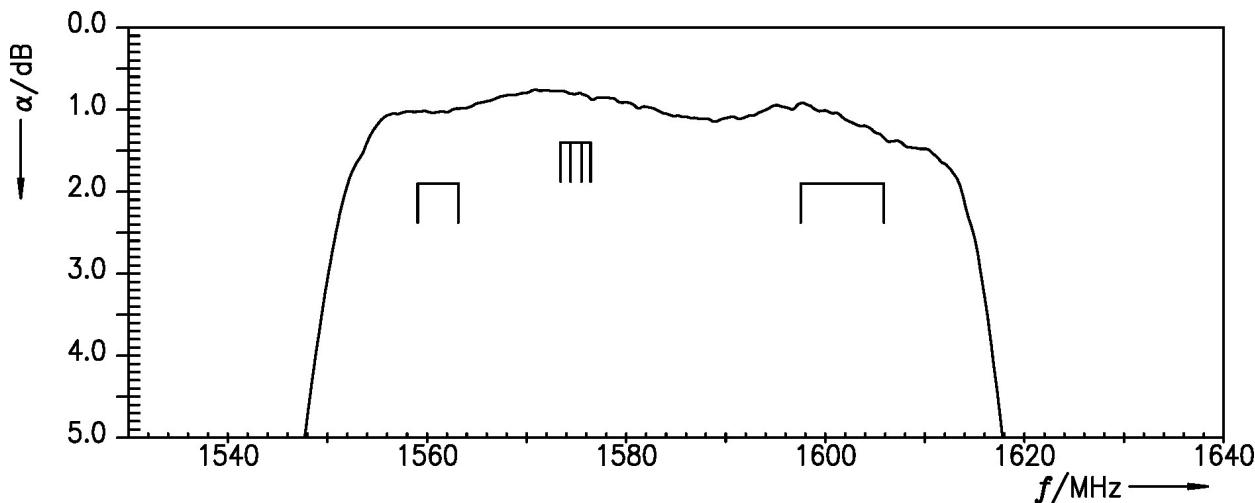
Characteristics		min. for $T_{\text{SPEC}}$	typ. @ +25 °C	max. for $T_{\text{SPEC}}$	
<b>Center frequency</b>	$f_c$	—	1582.47	—	MHz
<b>Maximum insertion attenuation</b>	$\alpha_{\text{max}}$				
1559.052... 1563.144 MHz		—	1.0	1.9	dB
1573.42... 1575.50 MHz		—	0.85	1.4	dB
1574.42... 1576.42 MHz		—	0.85	1.4	dB
1597.55... 1605.89 MHz		—	1.2	1.9	dB
<b>Maximum VSWR</b>	$\text{VSWR}_{\text{max}}$				
@ input port					
1559.052... 1563.144 MHz		—	1.5	1.9	
1573.42... 1575.50 MHz		—	1.25	1.8	
1574.42... 1576.42 MHz		—	1.25	1.8	
1597.55... 1605.89 MHz		—	1.55	1.9	
@ output port					
1559.052... 1563.144 MHz		—	1.5	1.9	
1573.42... 1575.50 MHz		—	1.25	1.8	
1574.42... 1576.42 MHz		—	1.25	1.8	
1597.55... 1605.89 MHz		—	1.55	1.9	
<b>Group delay ripple<sup>1)</sup> (p-p)</b>	$\Delta\tau$				
1597.55... 1605.89 MHz		—	3	12	ns
<b>Minimum attenuation</b>	$\alpha_{\text{min}}$				
10... 960 MHz		47	50	—	dB
960... 1463 MHz		36	40	—	dB
1710... 1785 MHz		37	39	—	dB
1785... 1990 MHz		37	39	—	dB
1990... 2280 MHz		35	39	—	dB
2280... 2400 MHz		35	39	—	dB
2400... 2500 MHz		33	38	—	dB
2500... 2700 MHz		32	36	—	dB
2700... 3000 MHz		28	33	—	dB
3000... 6000 MHz		15	32	—	dB

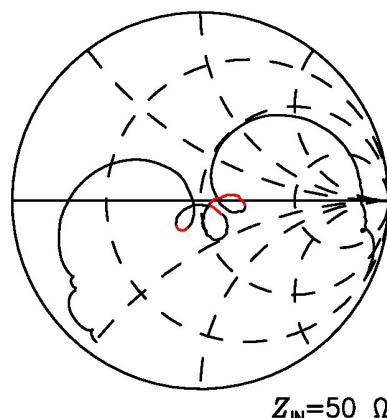
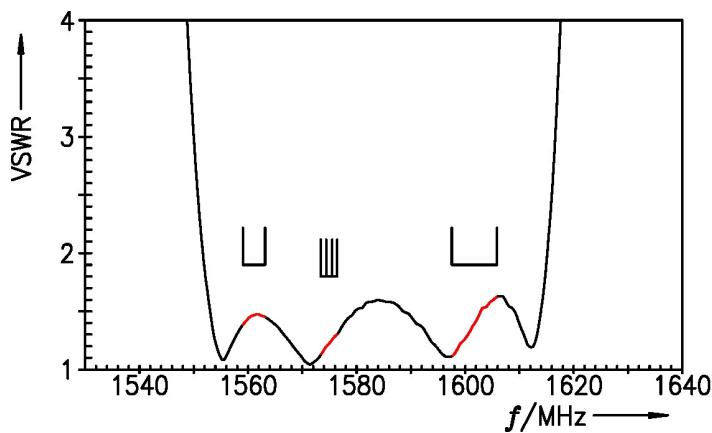
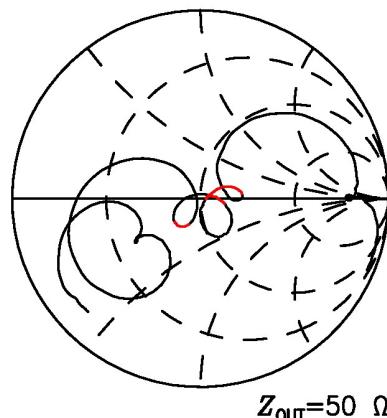
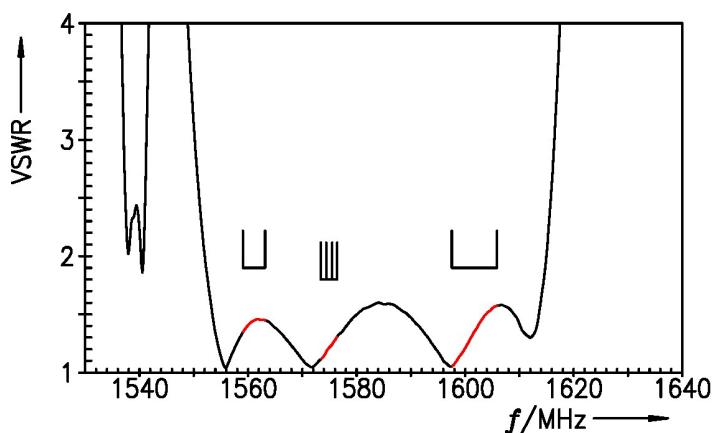
<sup>1)</sup> Measured with an aperture of 2 MHz.

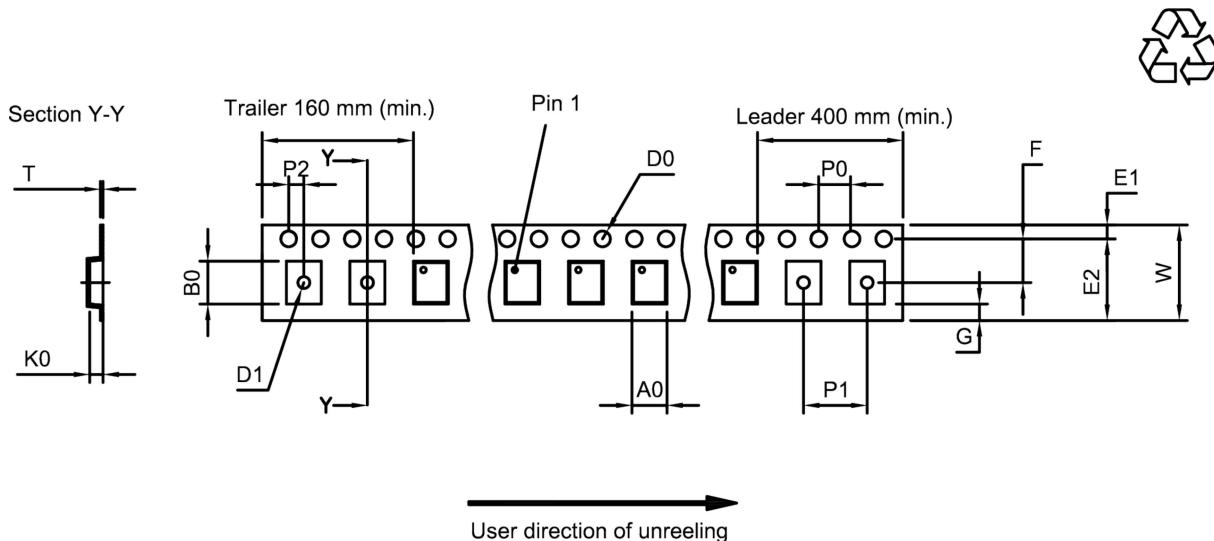
**SAW components****B8813****SAW filter****1582.47 MHz****7 Maximum ratings**

Operable temperature range	$T = -30 \text{ }^{\circ}\text{C} \dots +85 \text{ }^{\circ}\text{C}$	
Storage temperature	$T_{\text{STG}} = -40 \text{ }^{\circ}\text{C} \dots +85 \text{ }^{\circ}\text{C}$	
DC voltage	$ V_{\text{DC}}  = 5.0 \text{ V}^1)$	
ESD voltage	$V_{\text{ESD}} = 50 \text{ V}^2)$	Machine model.
Input power (10000 h, 55°C)		
777 to 915 MHz	$P_{\text{IN}} = 28 \text{ dBm}$	1/8 duty cycle, effective power in the on-state
1710 to 2200 MHz	$P_{\text{IN}} = 28 \text{ dBm}$	1/8 duty cycle, effective power in the on-state

<sup>1)</sup> 168h Damp Heat Steady State acc. IEC 60068-2-67 Cy.<sup>2)</sup> According to JESD22-A115B (MM – Machine Model), 10 negative & 10 positive pulses.

**SAW components****B8813****SAW filter****1582.47 MHz****8 Transmission coefficient**

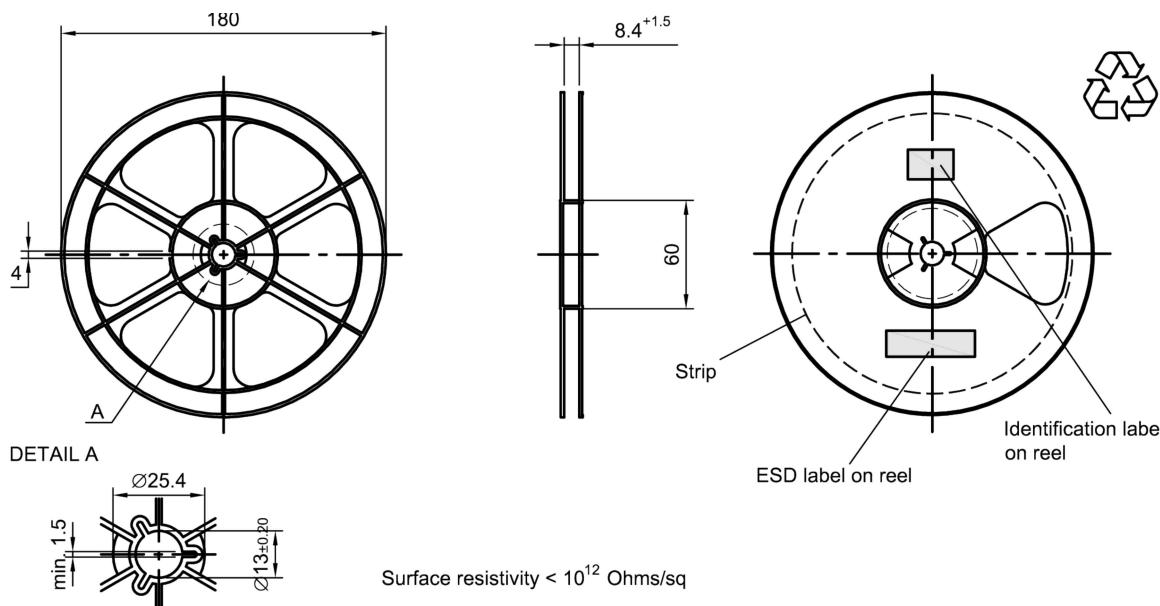
**SAW components****B8813****SAW filter****1582.47 MHz****9 Reflection coefficients****Figure 4:** Reflection coefficient at IN port.**Figure 5:** Reflection coefficient at OUT port.

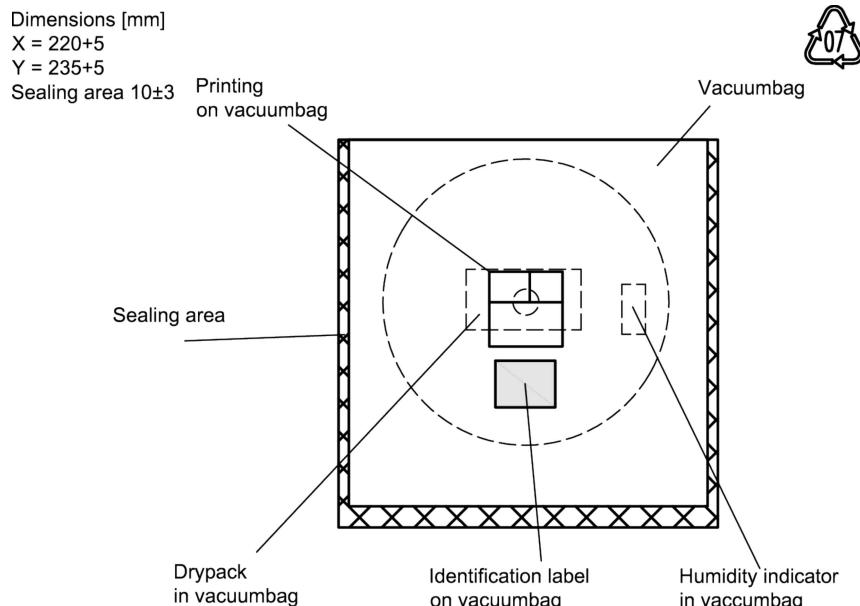
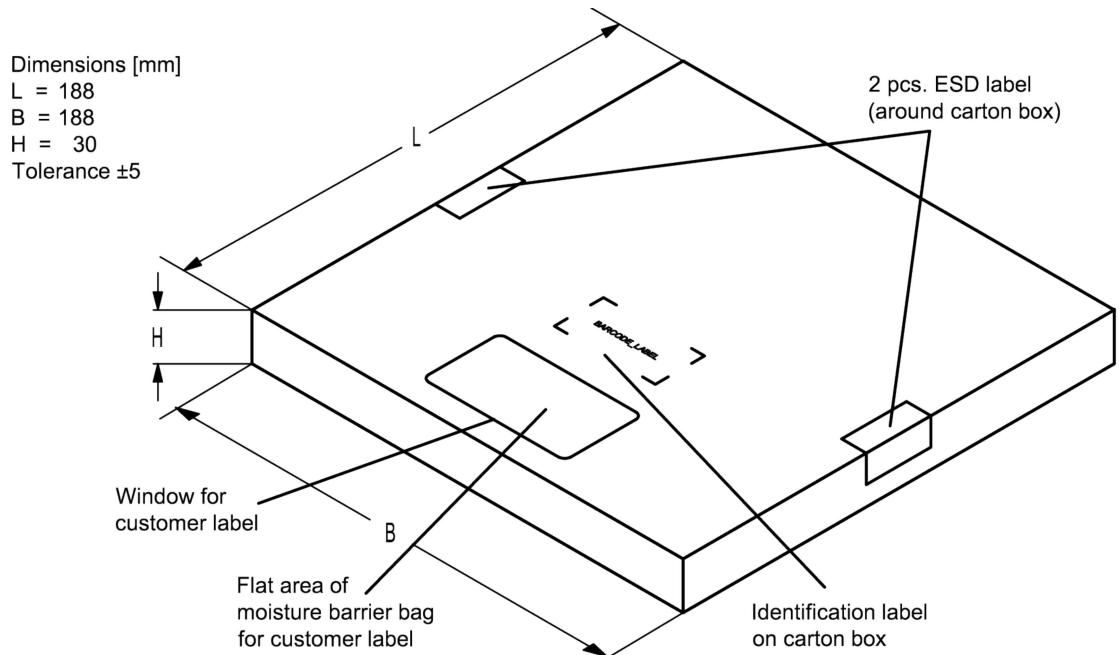
**SAW components****B8813****SAW filter****1582.47 MHz****10 Packing material****10.1 Tape****Figure 6:** Drawing of tape (first-angle projection) with tape dimensions according to Table 1.

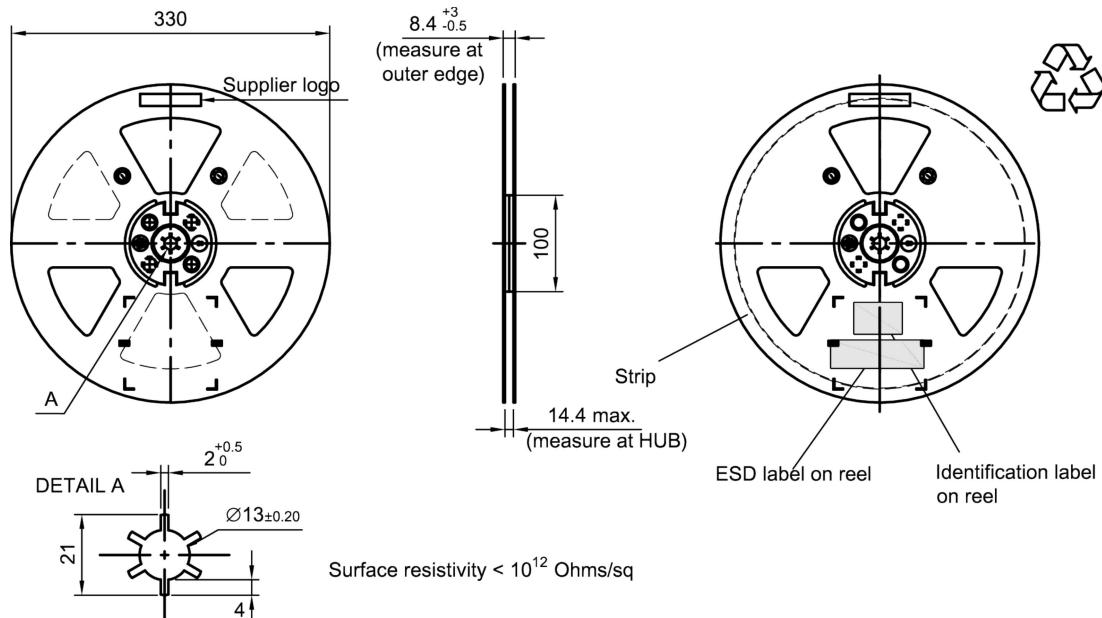
A <sub>0</sub>	1.02±0.05 mm
B <sub>0</sub>	1.22±0.05 mm
D <sub>0</sub>	1.55±0.05 mm
D <sub>1</sub>	0.55±0.1 mm
E <sub>1</sub>	1.75±0.1 mm

E <sub>2</sub>	6.25 mm (min.)
F	3.5±0.05 mm
G	–
K <sub>0</sub>	0.6±0.05 mm
P <sub>0</sub>	4.0±0.1 mm

P <sub>1</sub>	2.0±0.1 mm
P <sub>2</sub>	2.0±0.05 mm
T	0.25±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.

**SAW components****B8813****SAW filter****1582.47 MHz****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.

**SAW components****B8813****SAW filter****1582.47 MHz****10.3 Reel with diameter of 330 mm****Figure 10:** Drawing of reel (first-angle projection) with diameter of 330 mm.

Dimensions [mm]

X = 400+5

Y = 418+5

Sealing area 10±3

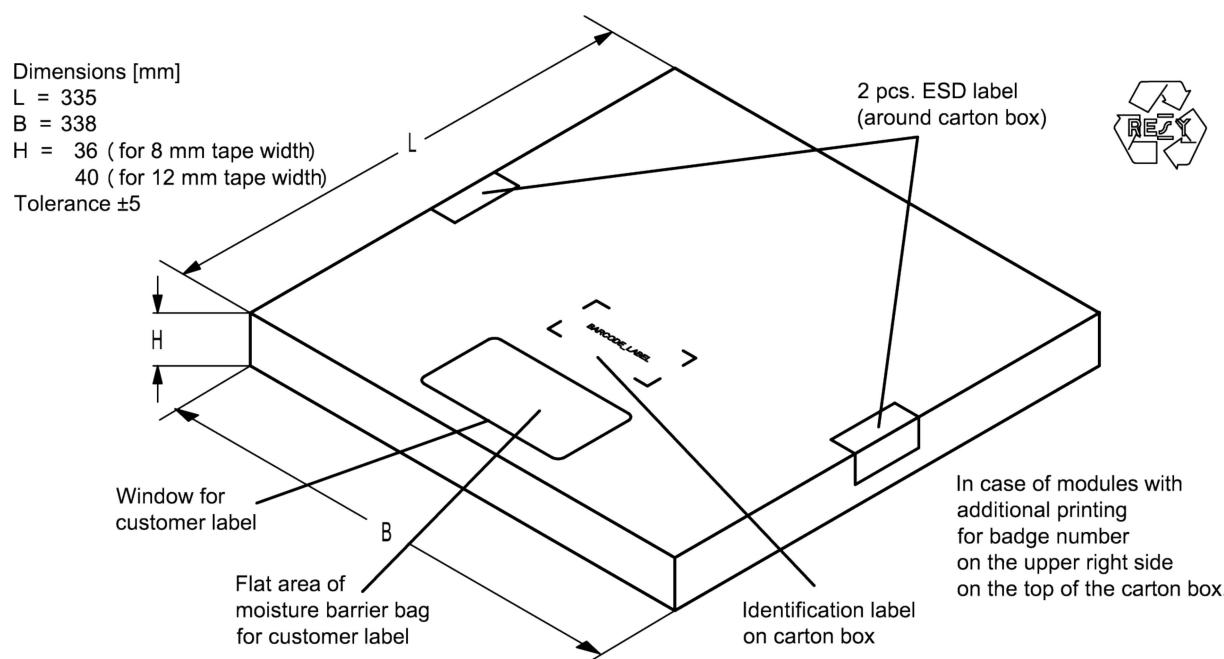
Printing  
on vacumbag

Sealing area

Drypack  
in vacumbagIdentification label  
on vacumbag

Vacuumbag

Humidity indicator  
in vacumbag**Figure 11:** Drawing of moisture barrier bag (MBB) for reel with diameter of 330 mm.

**SAW components****B8813****SAW filter****1582.47 MHz****Figure 12:** Drawing of folding box for reel with diameter of 330 mm.

## SAW components

**B8813**

## SAW filter

1582.47 MHz

## 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., B3xxxxxB1234xxxxx is encoded by a special BASE32 code into a 3 digit marking.

Example of decoding type number marking on device in decimal code.

$$\begin{array}{rcl} \textbf{16J} & \Rightarrow & \textbf{1234} \\ 1 \times 32^2 + 6 \times 32^1 + 18 (\textbf{=}J) \times 32^0 & = & \textbf{1234} \end{array}$$

The BASE32 code for product type B8813 is 8KD.

■ 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.

$$\begin{array}{rcl} \textbf{5UY} & => & 12345 \\ 5 \times 47^2 + 27 (\textbf{=U}) \times 47^1 + 31 (\textbf{=Y}) \times 47^0 & = & 12345 \end{array}$$

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		

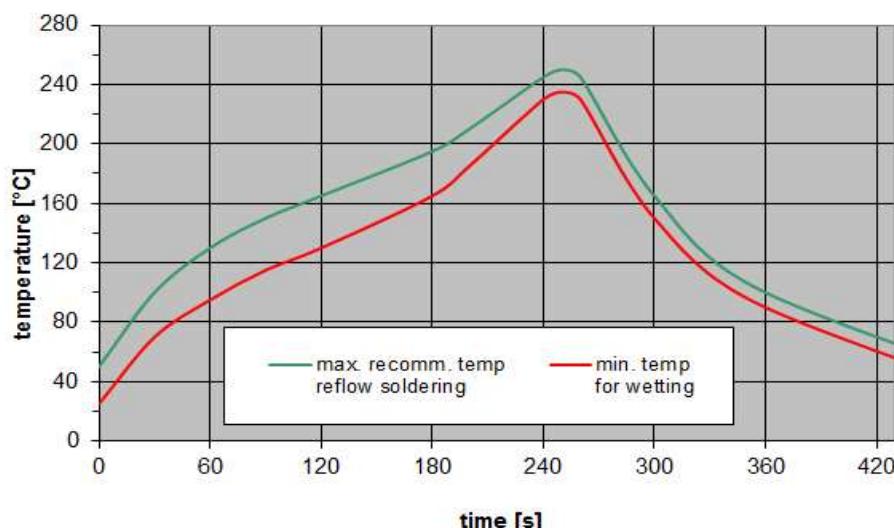
**Table 2:** Lists for encoding and decoding of marking.

**12 Soldering profile**

The recommended soldering process is in accordance with IEC 60068-2-58 – 3<sup>rd</sup> edit and IPC/JEDEC J-STD-020B.

ramp rate	$\leq 3 \text{ K/s}$
preheat	125 °C to 220 °C, 150 s to 210 s, 0.4 K/s to 1.0 K/s
$T > 220 \text{ }^{\circ}\text{C}$	30 s to 70 s
$T > 230 \text{ }^{\circ}\text{C}$	min. 10 s
$T > 245 \text{ }^{\circ}\text{C}$	max. 20 s
$T \geq 255 \text{ }^{\circ}\text{C}$	–
peak temperature $T_{\text{peak}}$	250 °C +0/-5 °C
wetting temperature $T_{\text{min}}$	230 °C +5/-0 °C for 10 s ± 1 s
cooling rate	$\leq 3 \text{ K/s}$
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.

<b>SAW components</b>	<b>B8813</b>
SAW filter	<b>1582.47 MHz</b>

### 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.

#### 13.4 Ordering codes and packing units

Ordering code	Packing unit
B39162B8813P810	15000pcs
B39162B8813P810S 5	5000pcs

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

<b>SAW components</b>	<b>B8813</b>
SAW filter	<b>1582.47 MHz</b>

## 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](http://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

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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