



RF360 Europe GmbH

A Qualcomm – TDK Joint Venture

## SAW Components

### SAW Extractor

BeiDou/GPS/Glonass

Series/type:	B8666
Ordering code:	B39162B8666L210
Date:	September 8, 2016
Version:	2.9

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Data sheet

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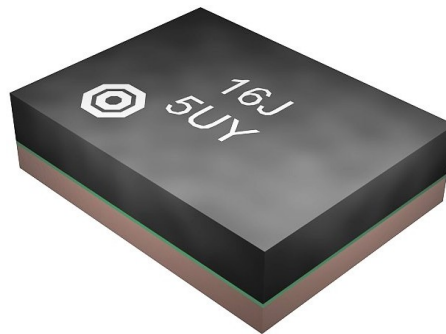
Data sheet

## 1 Application

- Premium-performance BeiDou/GPS/Glonass Extractor with single ended 50  $\Omega$  ports.
- Ultra-low-loss acoustic structure.
- Advanced fully-integrated multiplexer structure (no external matching needed).
- Using common antenna for BeiDou/GPS/Glonass and Cellular bands.
- Placed between antenna and cellular front-end switches and filters.
- Usable GNSS pass bands: 1559.05 – 1563.144 MHz, 1574.42 – 1576.42 MHz, 1597.55 – 1605.89 MHz.
- Usable CELL pass bands: 699 – 960 MHz, 1710 – 2690 MHz, 3400 – 3600 MHz
- No switches and control lines required.

## 2 Features

- Package size 1.7 mm  $\times$  1.3 mm.
- Package height 0.5 mm.
- Approximate weight 0.00225 g.
- RoHS compatible.
- Package for Surface Mount Technology (SMT).
- Ni, gold-plated terminals.
- Electrostatic Sensitive Device (ESD).
- Moisture Sensitivity Level 3 (MSL3).

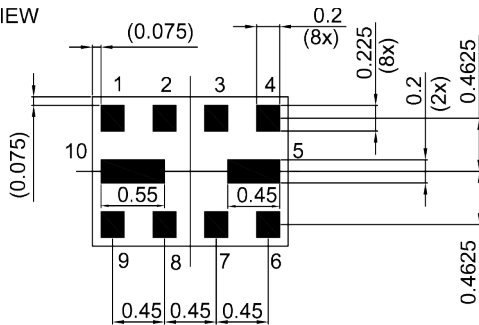


**Figure 1:** Picture of component with example of marking.

Data sheet

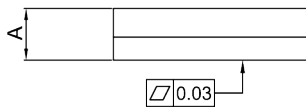
3 Package

BOTTOM VIEW

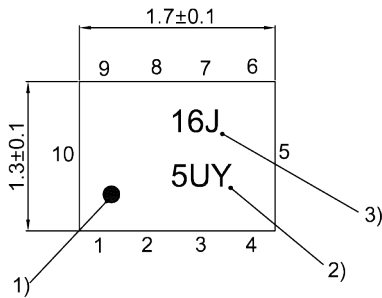


Pad and pitch tolerance  $\pm 0.05$

SIDE VIEW

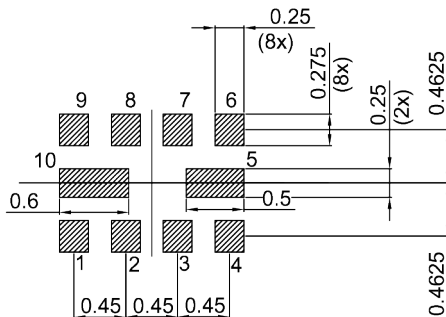


TOP VIEW



- 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  $-0.02$

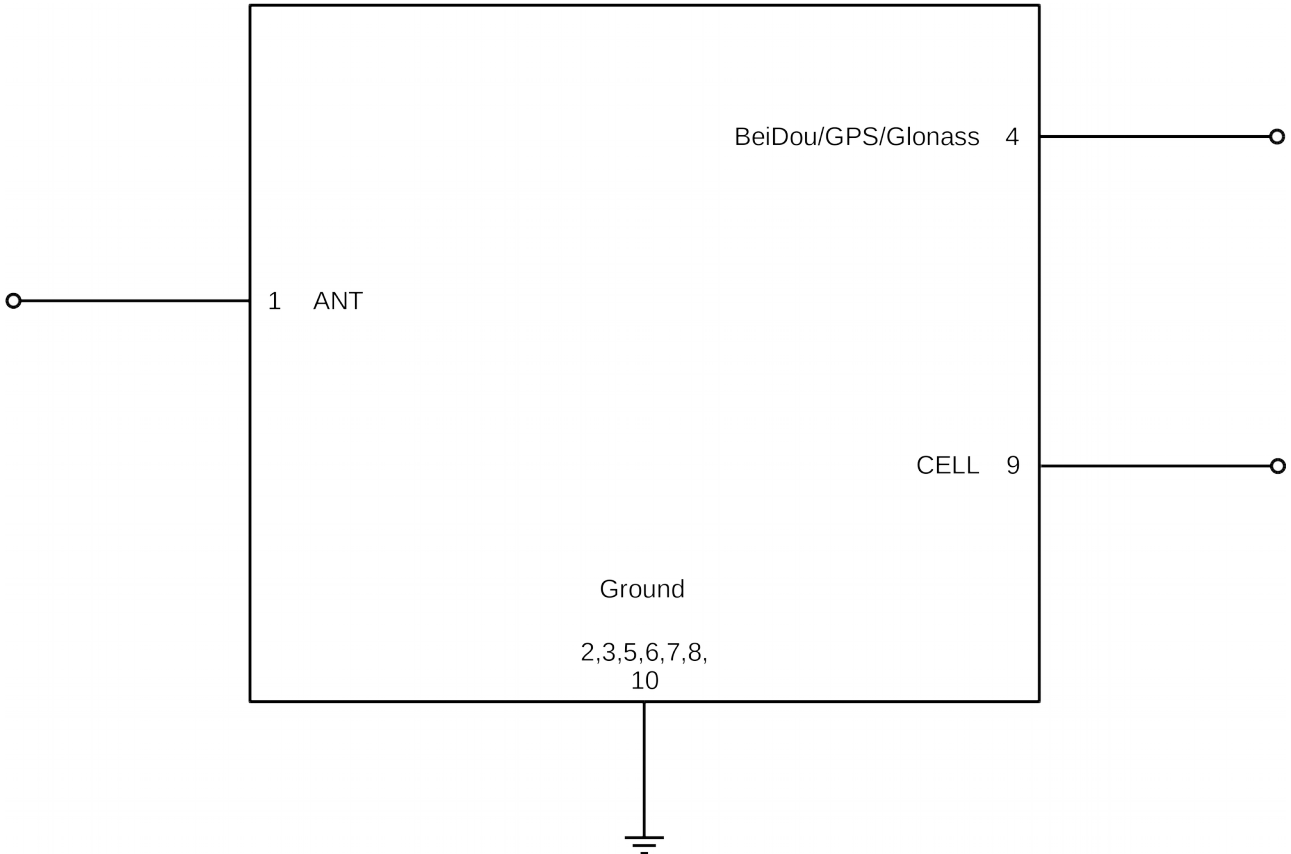
**Figure 2:** Drawing of package with package height  $A = 0.5 \pm 0.1$  mm. See Simplified drawings (p. 21).

4 Pin configuration

- 1 ANT
- 4 BeiDou/GPS/Glonass
- 9 CELL
- 2, 3, 5, 6, 7, 8, 10 Ground

Data sheet

**5 Matching circuit**



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

Data sheet

## 6 Characteristics ANT – BeiDou/GPS/Glonass

Temperature range for specification	$T_{SPEC}$	$= -30\text{ °C to }+85\text{ °C}$
ANT terminating impedance	$Z_{ANT}$	$= 50\ \Omega$
BeiDou/GPS/Glonass terminating impedance	$Z_{BGG}$	$= 50\ \Omega$
CELL terminating impedance	$Z_{CELL}$	$= 50\ \Omega$

Characteristics		min. for $T_{SPEC}$	typ. @+25 °C	max. for $T_{SPEC}$	
<b>Maximum insertion attenuation</b>	$\alpha_{max}$				
ANT-BeiDou	1559.052... 1563.144 MHz	—	1.2	2.6	dB
ANT-GPS	1574.42... 1576.42 MHz	—	0.8	1.5	dB
ANT-Glonass	1597.55... 1605.89 MHz	—	1.5	3.5	dB
<b>Minimum attenuation</b>	$\alpha_{min}$				
	100... 777 MHz	33	38	—	dB
	777... 787 MHz	33	47	—	dB
	787... 960 MHz	33	44	—	dB
	1427.9... 1462.9 MHz	32	41	—	dB
	1710... 1910 MHz	34	40	—	dB
	1910... 2025 MHz	33	39	—	dB
	2110... 2170 MHz	30	38	—	dB
	2300... 2500 MHz	30	38	—	dB
	2500... 2690 MHz	29	36	—	dB
	3400... 3600 MHz	—	28	—	dB
<b>VSWR (ANT port)</b>	$VSWR_{max}$				
	1559.052... 1563.144 MHz	—	1.2	2.0	
	1574.42... 1576.42 MHz	—	1.3	2.0	
	1597.55... 1605.89 MHz	—	1.4	2.0	
<b>VSWR (BeiDou/GPS/Glonass port)</b>	$VSWR_{max}$				
	1559.052... 1563.144 MHz	—	1.3	2.1	
	1574.42... 1576.42 MHz	—	1.3	2.0	
	1597.55... 1605.89 MHz	—	1.3	2.0	



Data sheet

### 7 Characteristics ANT – CELL

Temperature range for specification	$T_{SPEC}$	= -30 °C to +85 °C
ANT terminating impedance	$Z_{ANT}$	= 50 Ω
BeiDou/GPS/Glonass terminating impedance	$Z_{BGG}$	= 50 Ω
CELL terminating impedance	$Z_{CELL}$	= 50 Ω

Characteristics		min. for $T_{SPEC}$	typ. @+25 °C	max. for $T_{SPEC}$	
<b>Maximum insertion attenuation</b>	$\alpha_{max}$				
699... 824 MHz		—	0.95	1.9	dB
824... 960 MHz		—	0.65	1.5	dB
1427.9... 1510.9 MHz		—	0.7	1.7	dB
1710... 1850 MHz		—	1.2	1.8	dB
1850... 2025 MHz		—	1.1	1.7	dB
2110... 2170 MHz		—	1.2	1.9	dB
2300... 2400 MHz		—	1.0	1.6	dB
2400... 2690 MHz		—	0.8	1.5	dB
3400... 3600 MHz		—	1.1	—	dB
<b>VSWR (ANT port)</b>	$VSWR_{max}$				
699... 824 MHz		—	1.1	2.0	
824... 960 MHz		—	1.1	2.0	
1427.9... 1510.9 MHz		—	1.6	2.1	
1710... 2025 MHz		—	1.3	2.0	
2110... 2170 MHz		—	1.3	2.0	
2300... 2400 MHz		—	1.3	2.0	
2400... 2690 MHz		—	1.2	2.0	
3400... 3600 MHz		—	1.5	—	
<b>VSWR (CELL port)</b>	$VSWR_{max}$				
699... 824 MHz		—	1.2	2.0	
824... 960 MHz		—	1.1	2.0	
1427.9... 1510.9 MHz		—	1.6	2.1	
1710... 2025 MHz		—	1.5	2.1	
2110... 2170 MHz		—	1.4	2.0	
2300... 2400 MHz		—	1.4	2.0	
2400... 2690 MHz		—	1.3	2.0	
3400... 3600 MHz		—	1.5	—	

Data sheet

**8 Characteristics BeiDou/GPS/Glonass – CELL**

Temperature range for specification	$T_{SPEC}$	= -30 °C to +85 °C
ANT terminating impedance	$Z_{ANT}$	= 50 Ω
BeiDou/GPS/Glonass terminating impedance	$Z_{BGG}$	= 50 Ω
CELL terminating impedance	$Z_{CELL}$	= 50 Ω

Characteristics		min. for $T_{SPEC}$	typ. @+25 °C	max. for $T_{SPEC}$	
<b>Isolation</b>	$\alpha_{min}$				
	699... 777 MHz	34	48	—	dB
	777... 787 MHz	34	48	—	dB
	787... 960 MHz	34	45	—	dB
	1427.9... 1462.9 MHz	31	40	—	dB
	1710... 1990 MHz	36	44	—	dB
	2110... 2170 MHz	37	45	—	dB
	2400... 2690 MHz	32	40	—	dB
3400... 3600 MHz	—	31	—	dB	

Data sheet

## 9 Maximum ratings

Storage temperature	$T_{STG} = -40\text{ °C to }+85\text{ °C}^{1), 2)}$	
DC voltage	$V_{DC} = 5.0\text{ V (max.)}^{3)}$	
ESD voltage		
	$V_{ESD}$ 50 V (max.) <sup>4)</sup>	Machine model.
	$V_{ESD}$ 350 V (max.) <sup>5)</sup>	Human body model.
	$V_{ESD}$ 600 V (max.) <sup>6)</sup>	Charged device model.
Input power	$P_{IN}$	
@ CELL port: 699 ... 915 MHz	27 dBm	CW signal. 5000 h @ 55 °C.
@ CELL port: 824 ... 849 MHz	35 dBm	GSM, duty cycle 1:8; effective power in On-state. 5000 h @ 55 °C.
@ CELL port: 880 ... 915 MHz	35 dBm	GSM, duty cycle 1:8; effective power in On-state. 5000 h @ 55 °C.
@ CELL port: 1710 ... 2690 MHz	27 dBm	CW signal. 5000 h @ 55 °C.
@ CELL port: 1710 ... 1785 MHz	33 dBm	GSM, duty cycle 1:8; effective power in On-state. 5000 h @ 55 °C.
@ CELL port: 1850 ... 1910 MHz	33 dBm	GSM, duty cycle 1:8; effective power in On-state. 5000 h @ 55 °C.

<sup>1)</sup> Extended upper limit: 96h@125°C acc. to IEC 60068-2-2 Bb.

<sup>2)</sup> Applicable only for components without tape and reel (unpacked).

<sup>3)</sup> 168h Damp Heat Steady State acc. to IEC60068-2-67 Cy.

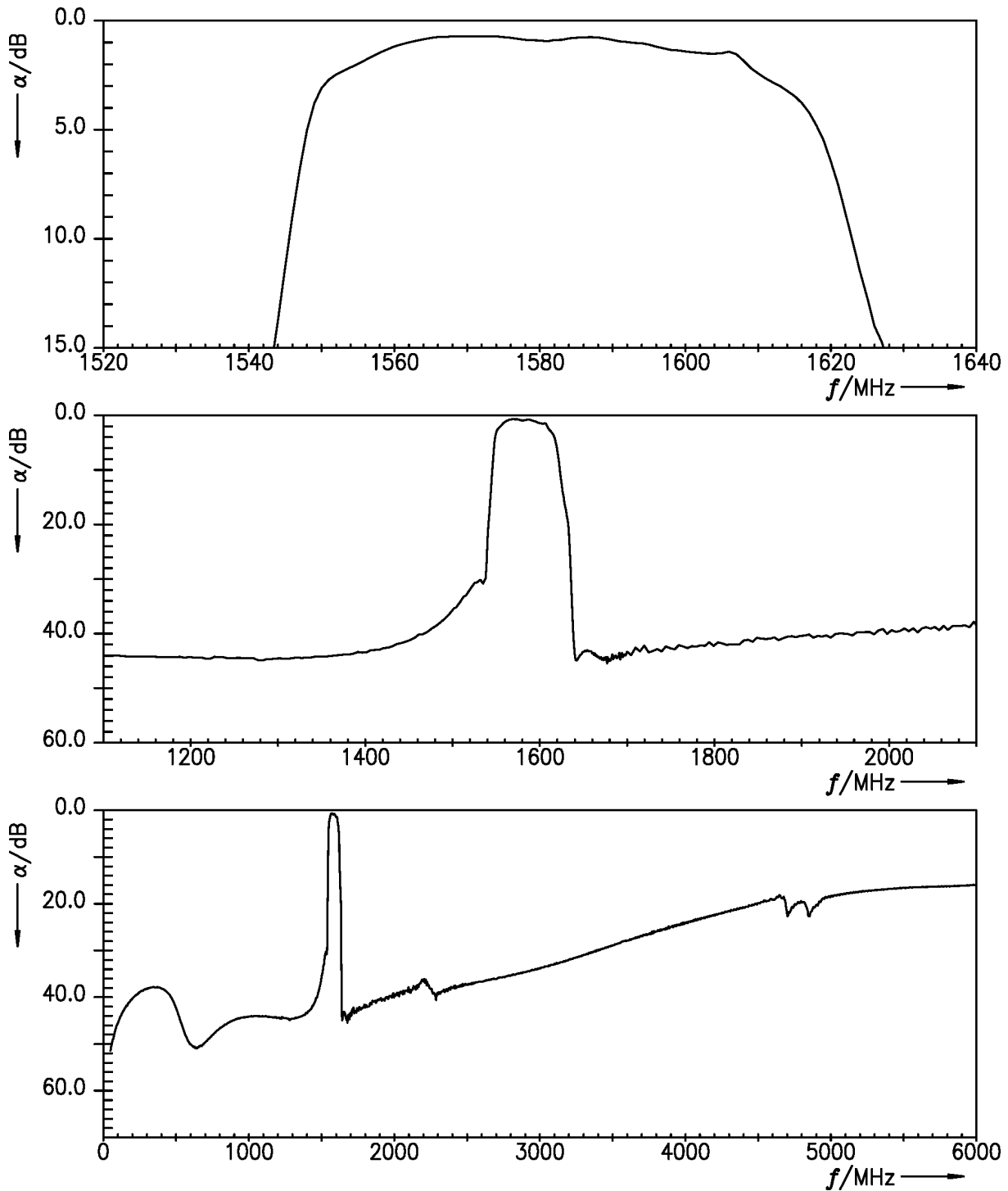
<sup>4)</sup> According to JESD22-A115B (MM – Machine Model), 1 negative & 1 positive pulse.

<sup>5)</sup> According to JESD22-A114F (HBM – Human Body Model), 1 negative & 1 positive pulse.

<sup>6)</sup> According to JESD22-C101C (CDM – Field Induced Charged Device Model), 3 negative & 3 positive pulses.

Data sheet

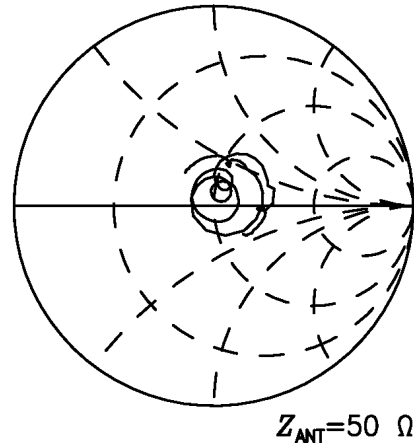
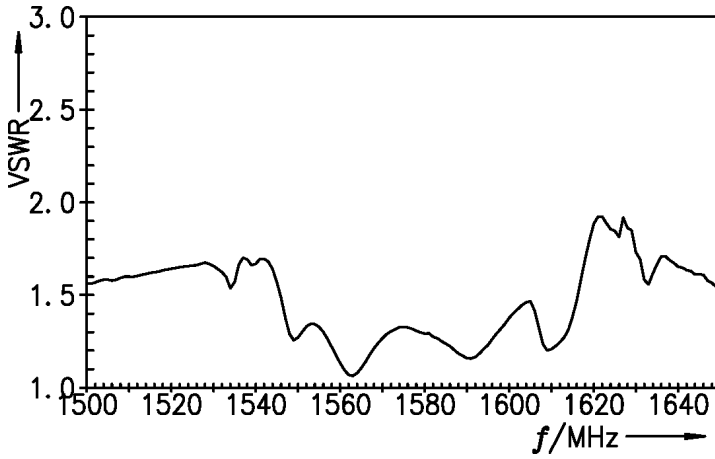
**10 ANT – BeiDou/GPS/Glonass**



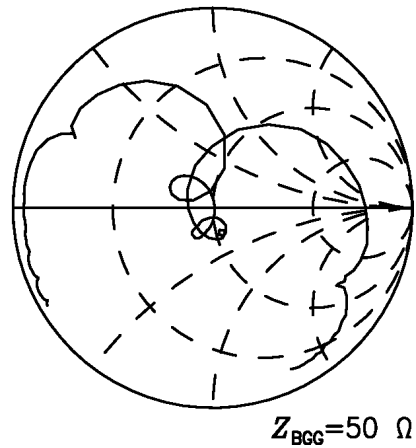
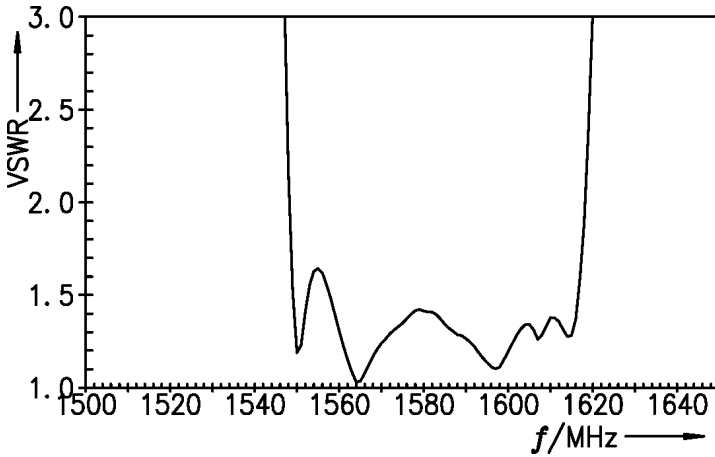
**Figure 4:** ANT – BeiDou/GPS/Glonass transfer function.

Data sheet

**11 Smith charts/VSWR BeiDou/GPS/Glonass**



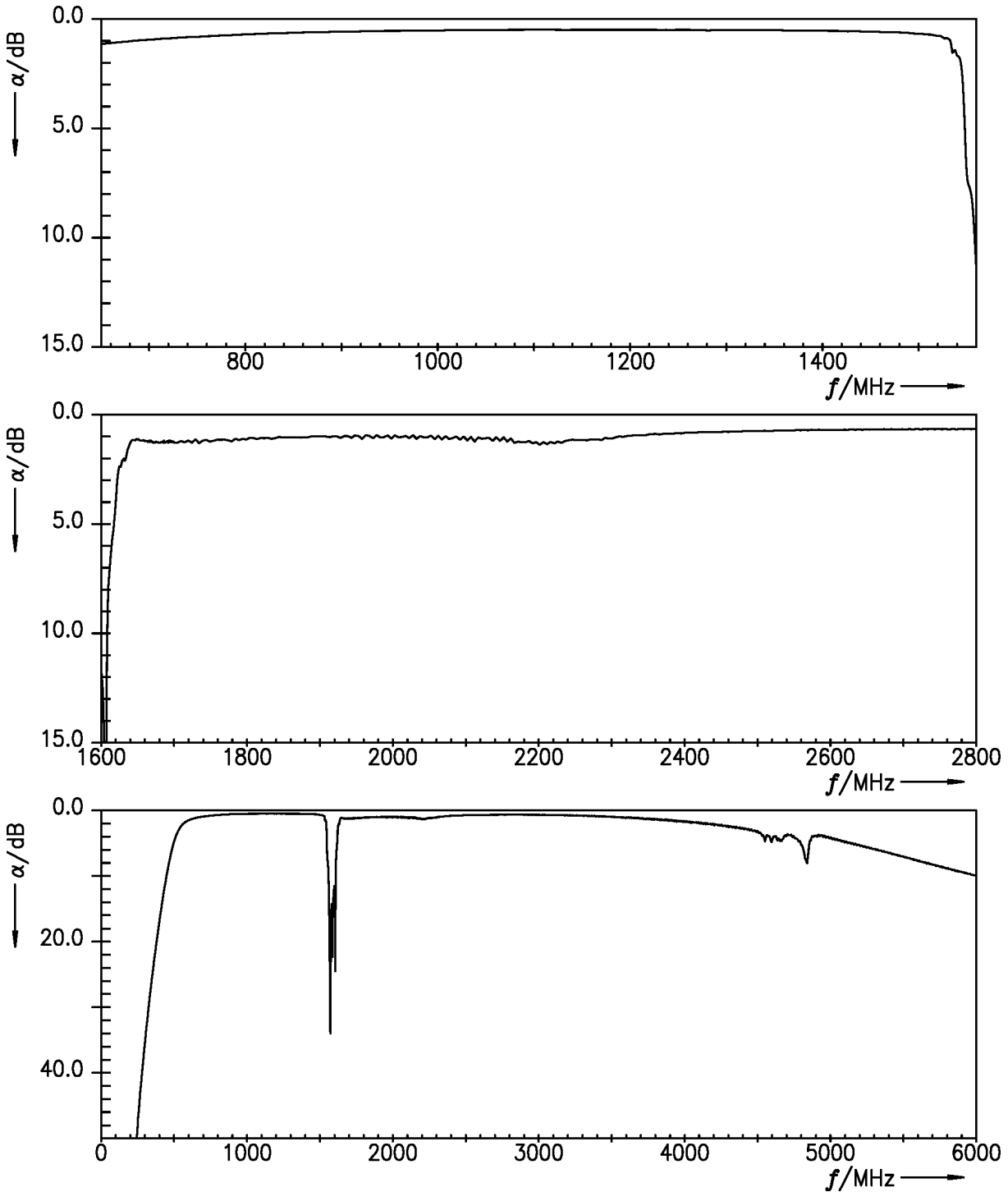
**Figure 5:** VSWR ANT port.



**Figure 6:** VSWR BeiDou/GPS/Glonass port.

Data sheet

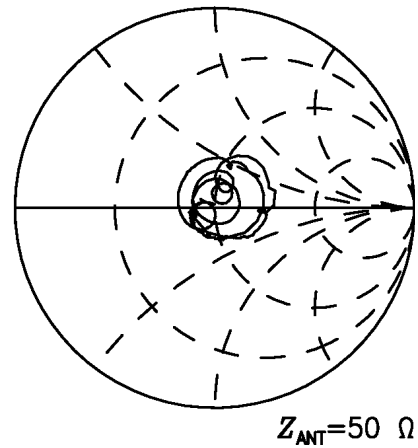
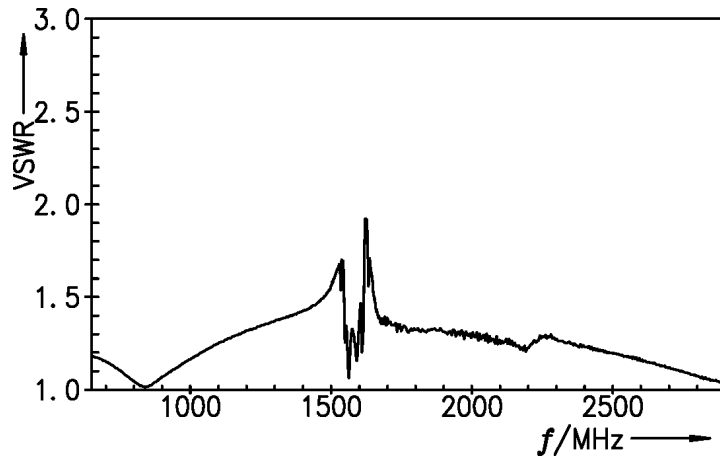
**12 ANT – CELL**



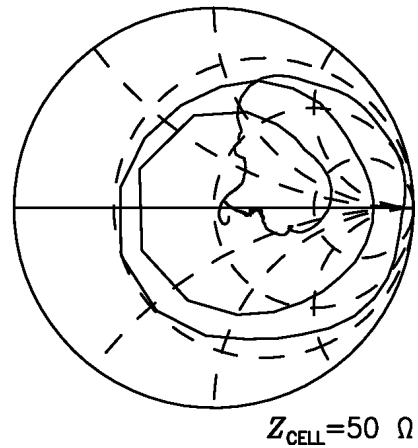
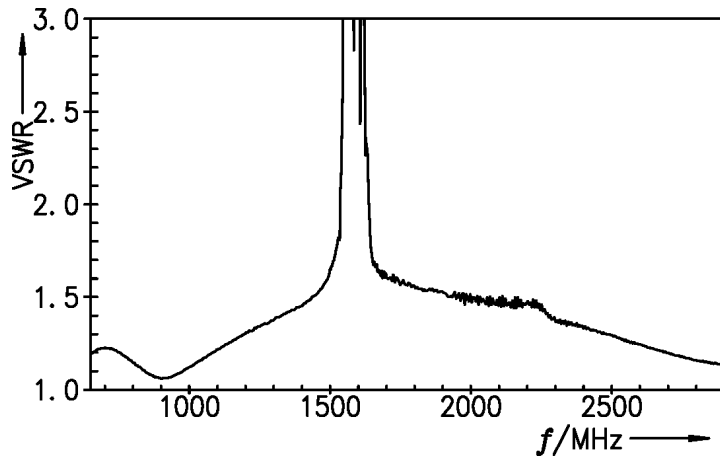
**Figure 7:** ANT – CELL transfer function.

Data sheet

**13 Smith charts/VSWR CELL**



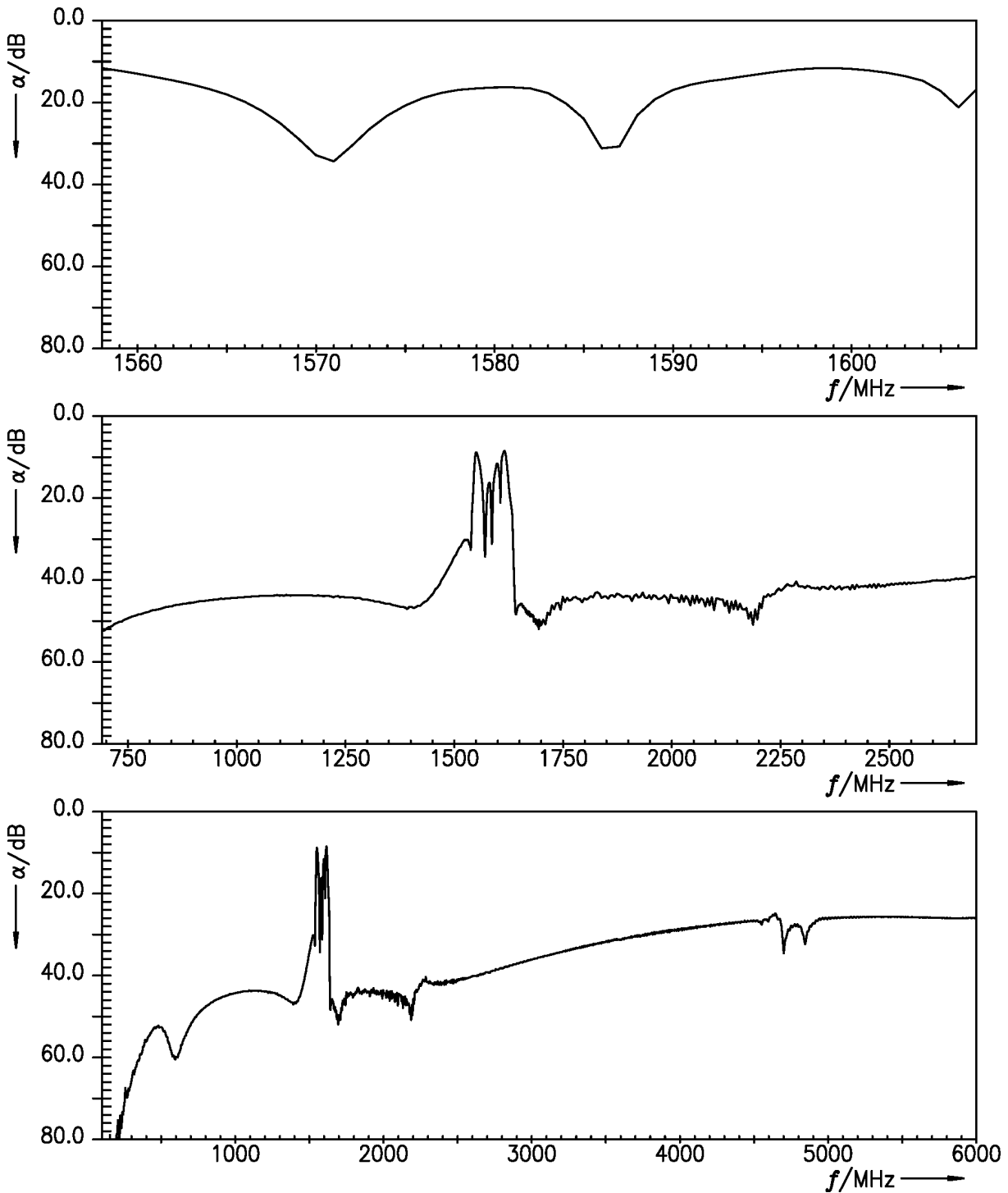
**Figure 8:** VSWR ANT port.



**Figure 9:** VSWR CELL port.

Data sheet

**14 Isolations**



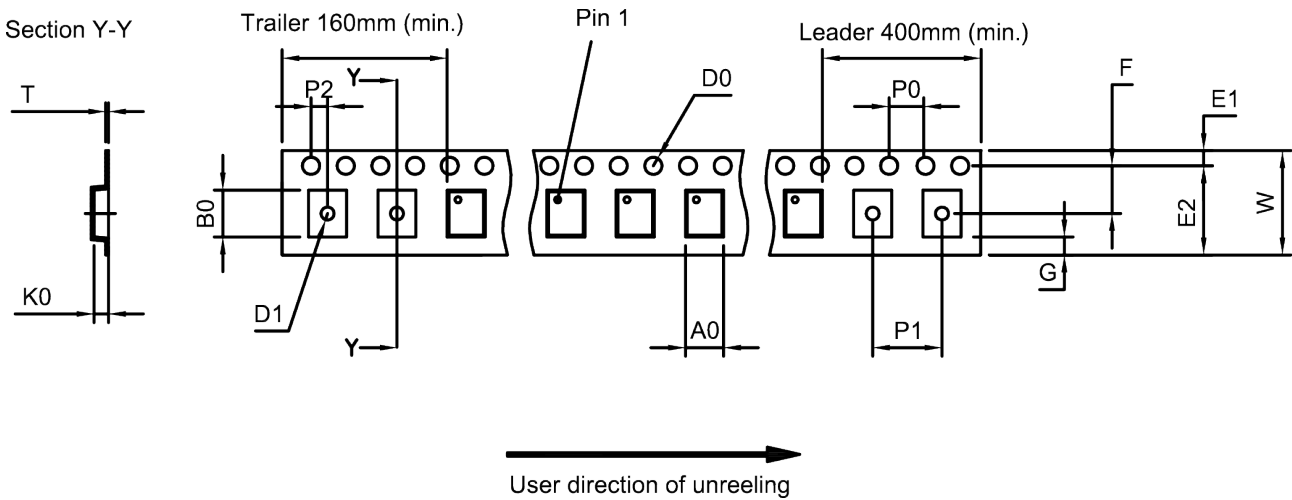
**Figure 10:** Isolation BeiDou/GPS/Glonass – CELL.



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**15 Packing material**
**15.1 Tape**

Section Y-Y

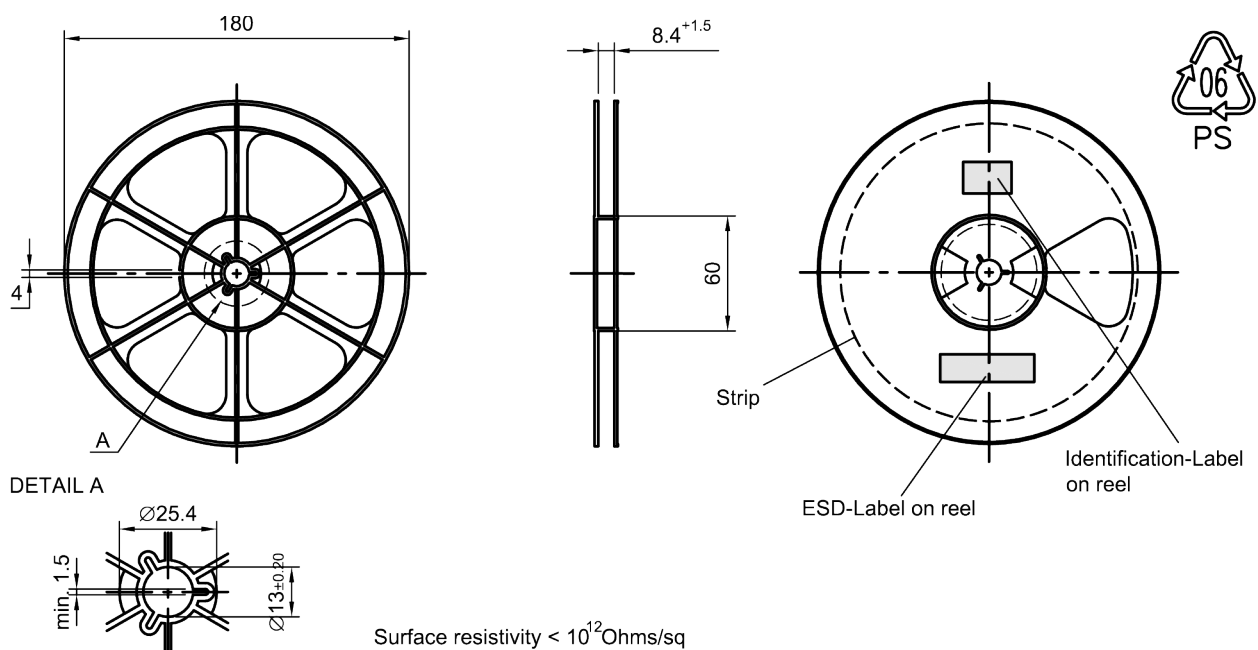

**Figure 11:** Drawing of tape (first-angle projection) with tape dimensions according to Table 1.

A <sub>0</sub>	1.52±0.05 mm
B <sub>0</sub>	1.94±0.05 mm
D <sub>0</sub>	1.55±0.05 mm
D <sub>1</sub>	0.50±0.05 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	0.75 mm (min.)
K <sub>0</sub>	0.62±0.05 mm
P <sub>0</sub>	4.0±0.1 mm

P <sub>1</sub>	4.0±0.1 mm
P <sub>2</sub>	2.0±0.1 mm
T	0.25±0.03 mm
W	8.0+0.3/-0 mm

**Table 1:** Tape dimensions.

**15.2 Reel with diameter of 180 mm**

**Figure 12:** Drawing of reel (first-angle projection) with diameter of 180 mm.

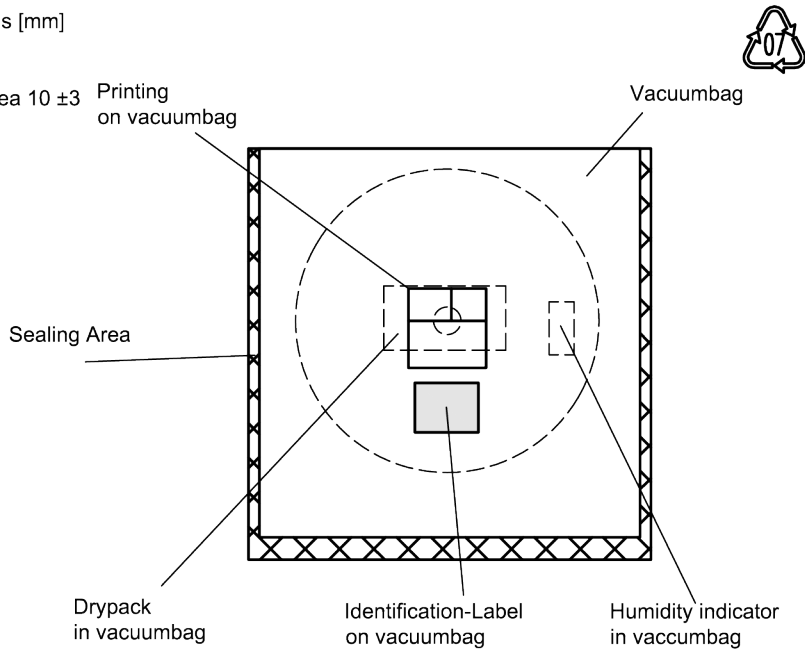
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Dimensions [mm]

X = 220±5

Y = 235±5

Sealing area 10 ±3



**Figure 13:** Drawing of moisture barrier bag (MBB) for reel with diameter of 180 mm.

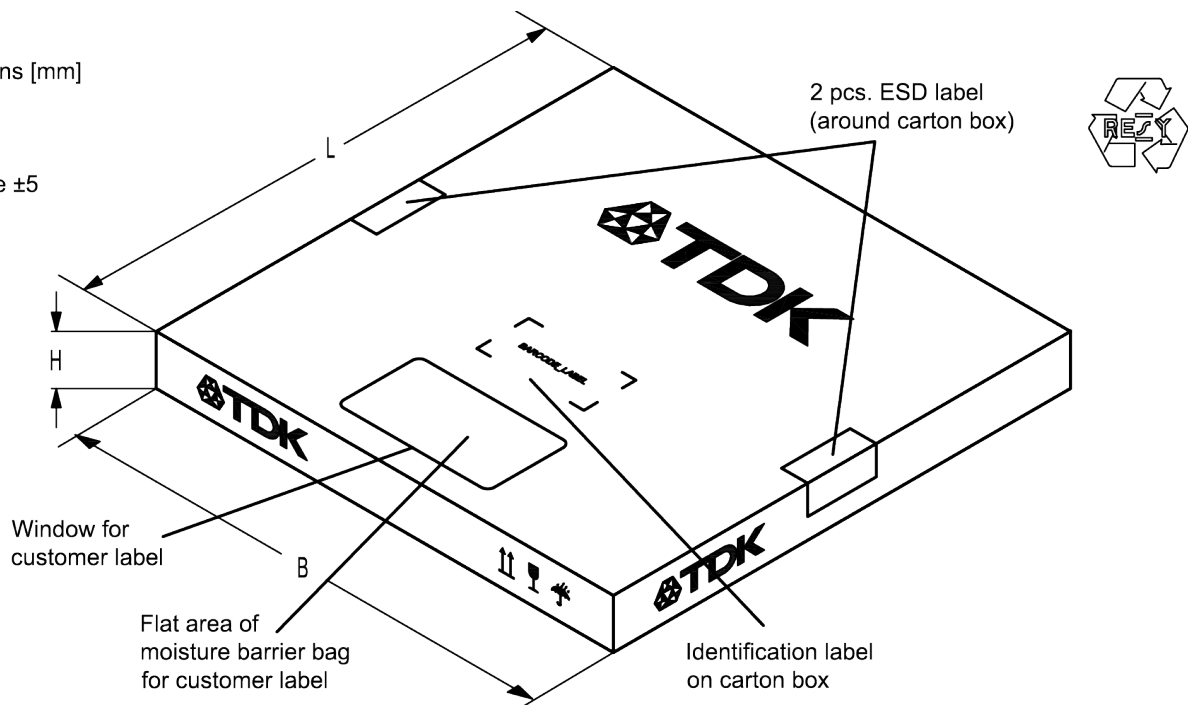
Dimensions [mm]

L = 188

B = 188

H = 30

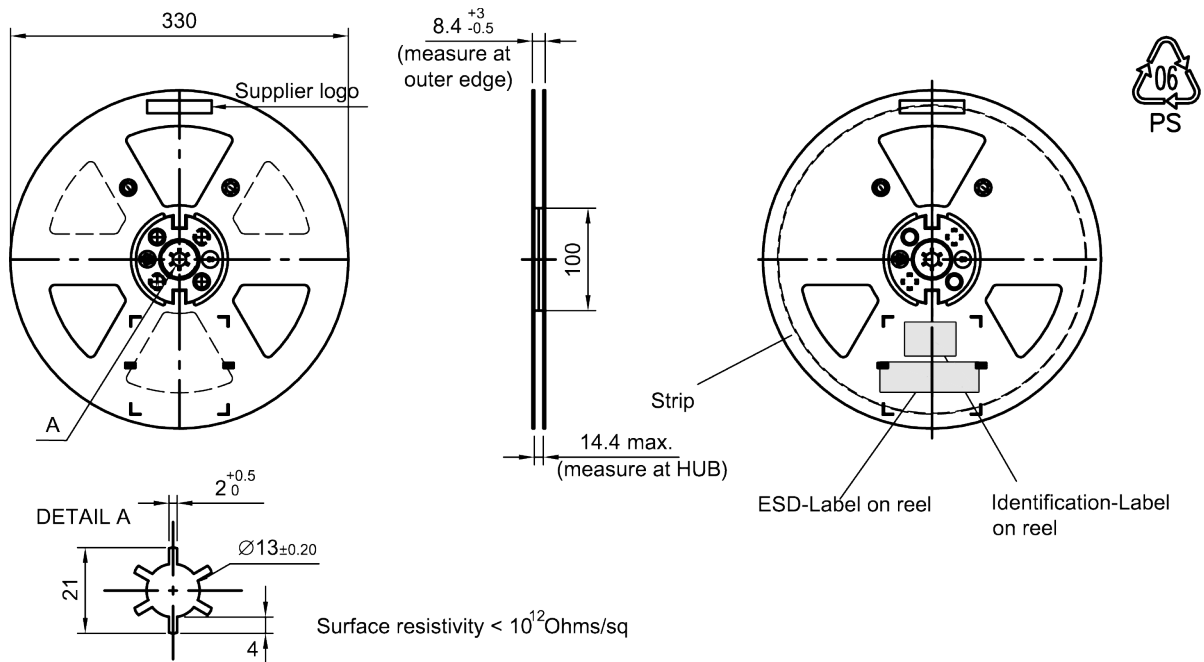
Tolerance ±5



**Figure 14:** Drawing of folding box for reel with diameter of 180 mm.

Data sheet

**15.3 Reel with diameter of 330 mm**



**Figure 15:** Drawing of reel (first-angle projection) with diameter of 330 mm.

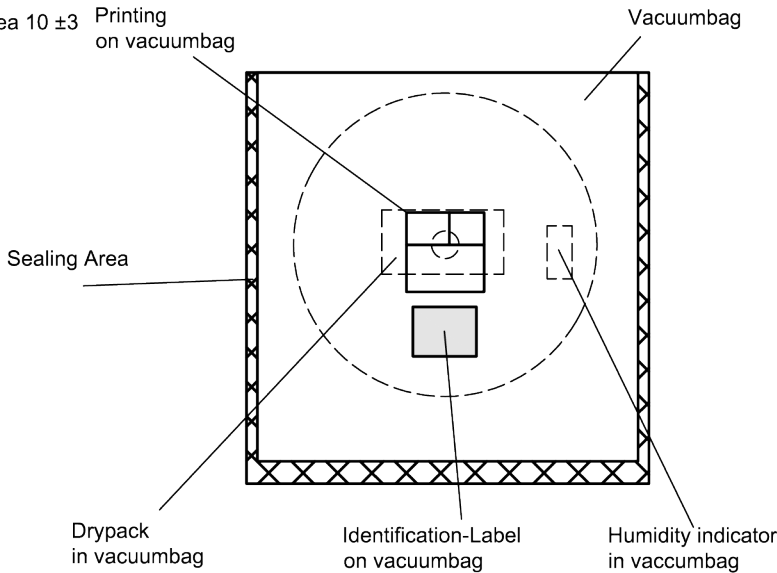
Dimensions [mm]

X = 400+5

Y = 418+5

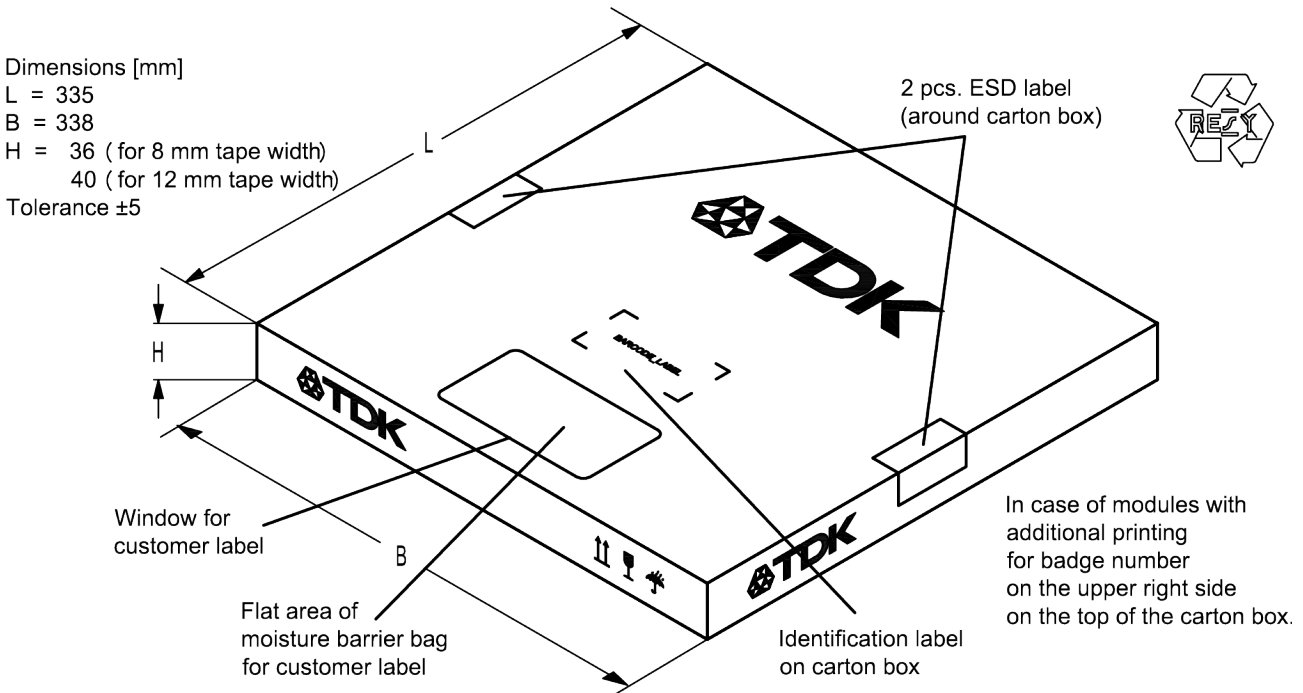
Sealing area 10 ±3

Printing on vacuumbag



**Figure 16:** Drawing of moisture barrier bag (MBB) for reel with diameter of 330 mm.

## Data sheet


**Figure 17:** Drawing of folding box for reel with diameter of 330 mm.

**16 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.
<b>16J</b>	=>	<b>1234</b>
$1 \times 32^2 + 6 \times 32^1 + 18 (=J) \times 32^0$	=	<b>1234</b>

The BASE32 code for product type B8666 is 8ET.

**■ 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.
<b>5UY</b>	=>	<b>12345</b>
$5 \times 47^2 + 27 (=U) \times 47^1 + 31 (=Y) \times 47^0$	=	<b>12345</b>

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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.

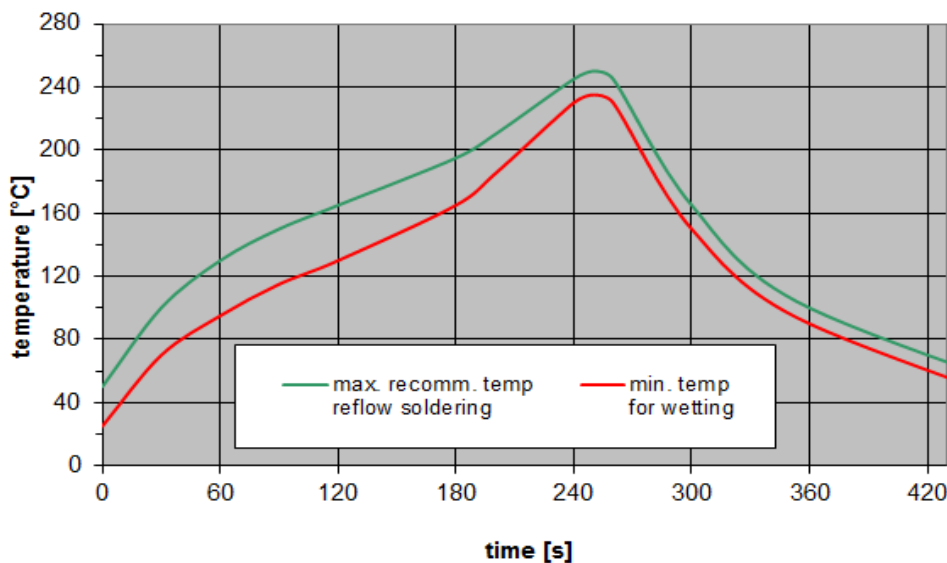
Data sheet

### 17 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
$T > 220\text{ °C}$	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 $T_{\text{peak}}$	250 °C +0/-5 °C
wetting temperature $T_{\text{min}}$	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 18:** Recommended reflow profile for convection and infrared soldering – lead-free solder.

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## 18 Annotations

### 18.1 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>.

### 18.2 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.

### 18.3 Scattering parameters (S-parameters)

The pin/port assignment is available in the headers of the S-parameter files. Please contact your local EPCOS sales office.

### 18.4 Ordering code and packing units

Ordering code	Packing units
B39162B8666L210	15000 pcs

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

## 19 Cautions and warnings

### 19.1 Moldability

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

### 19.2 Simplified drawings

#### Landing area

The printed circuit board (PCB) land pattern (landing area) shown is based on EPCOS 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 EPCOS, 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.

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**Contact and Important notes**

For further information please contact your local EPCOS sales office or visit our web page at [www.epcos.com](http://www.epcos.com).

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