



RF360
Europe GmbH

SAW components

SAW Duplexer
WCDMA band 5

Series/type:	B8626
Ordering code:	B39881B8626P810
Date:	January 31, 2018
Version:	2.8

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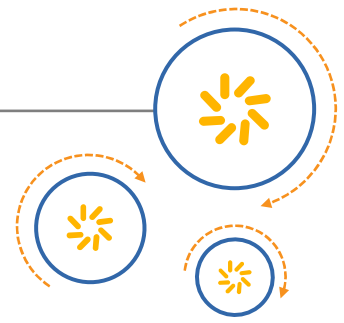
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1 Application

- Multimode SAW duplexer for mobile telephone
Cellular / LTE / WCDMA Band 5 systems
- Low insertion attenuation
- Low amplitude ripple

2 Features

- Package size 1.8 ± 0.1 mm \times 1.4 ± 0.1 mm
- Package height 0.475 mm (max.)
- Approximate weight 4 mg
- RoHS compatible
- Package for Surface Mount Technology (SMT)
- Ni/Au-plated terminals
- Electrostatic Sensitive Device (ESD)
- Moisture Sensitivity Level 3 (MSL3)



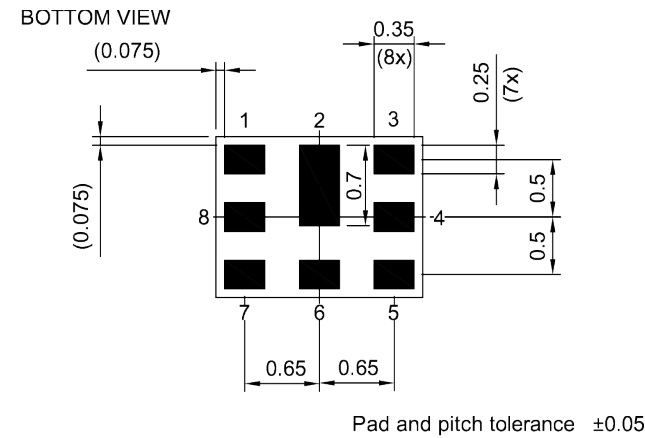
Figure 1: Picture of component with example of product marking.

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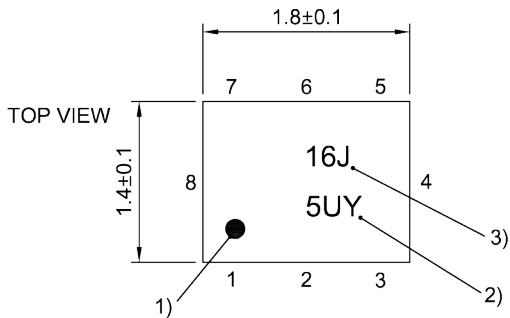
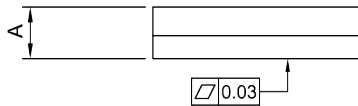
SAW Duplexer **836.5 / 881.5 MHz**

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3 Package



SIDE VIEW



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

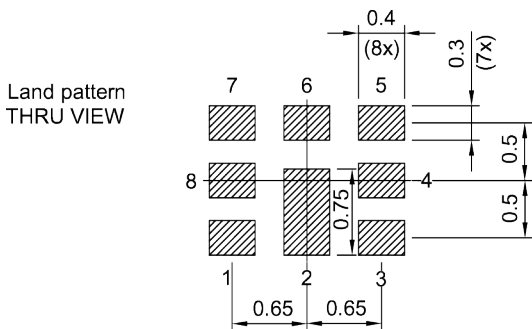


Figure 2: Drawing of package with package height A = 0.475 mm (max.). See Sec. Package information (p. 26).

4 Pin configuration

- 1 RX
- 3 TX
- 6 ANT
- 2, 4, 5, 7, 8 Ground

Data sheet

5 Matching circuit

- $L_{p6} = 8.2 \text{ nH}$

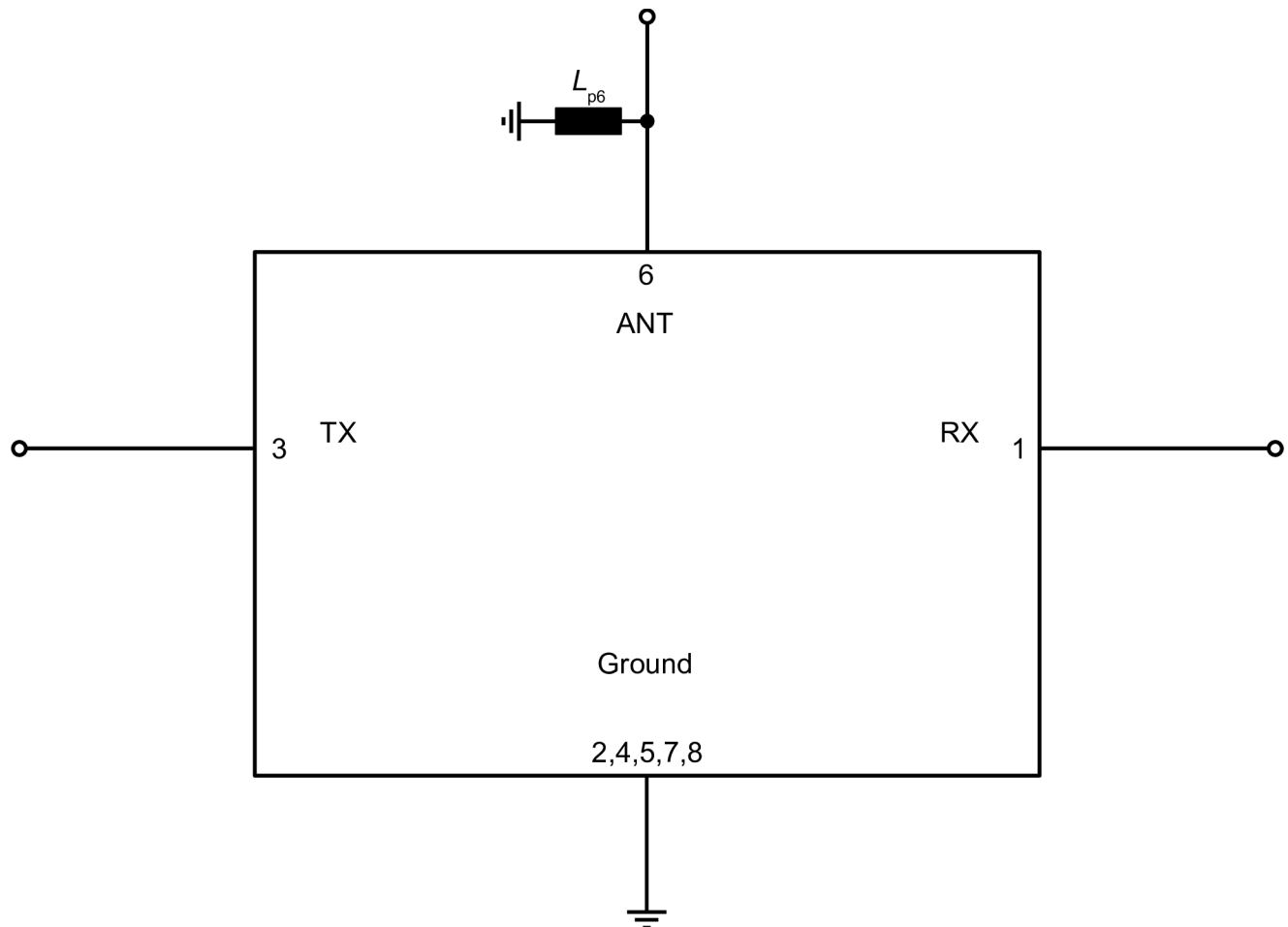


Figure 3: Schematic of matching circuit.

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

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6 Characteristics

6.1 TX – ANT

Temperature range for specification	T_{SPEC}	= -30 °C ... +90 °C
TX terminating impedance	Z_{TX}	= 50 Ω
ANT terminating impedance	Z_{ANT}	= 50 Ω with par. 8.2 nH ¹⁾
RX terminating impedance	Z_{RX}	= 50 Ω

Characteristics TX – ANT				min. for T_{SPEC}	typ. @ +25 °C	max. for T_{SPEC}		
Center frequency				f_C	—	836.5	—	MHz
Maximum insertion attenuation								
		824... 849	MHz	α_{max}	—	1.4	2.0	dB
	@ $f_{carrier}$	826.4... 846.6	MHz	$\alpha_{WCDMA,max}^{2)}$	—	1.4	1.8	dB
Amplitude ripple (p-p)								
		824... 849	MHz	$\Delta\alpha$	—	0.5	1.1	dB
		824... 849	MHz	$\Delta\alpha^{3)}$	—	0.4	1.0	dB
	@ $f_{carrier}$	826.4... 846.6	MHz	$\Delta\alpha_{WCDMA}^{2)}$	—	0.5	0.9	dB
Maximum VSWR				$VSWR_{max}$				
@ TX port		824... 849	MHz		—	1.6	2.0	
@ ANT port		824... 849	MHz		—	1.6	2.0	
Maximum error vector magnitude				$EVM_{max}^{4)}$				
		826.4... 846.6	MHz		—	1.3	2.5	%
Minimum attenuation								
		10... 420	MHz	α_{min}	35	43	—	dB
		420... 494	MHz	α_{min}	35	40	—	dB
		494... 701	MHz	α_{min}	32	35	—	dB
		701... 728	MHz	α_{min}	32	35	—	dB
		728... 764	MHz	α_{min}	32	35	—	dB
		764... 804	MHz	α_{min}	30	37	—	dB
		860... 864	MHz	α_{min}	3	10	—	dB
		864... 869	MHz	α_{min}	14	51	—	dB
		869... 894	MHz	α_{min}	44	50	—	dB
	@ $f_{carrier}$	871.4... 891.6	MHz	$\alpha_{WCDMA,min}^{2)}$	45	52	—	dB
		1559... 1563	MHz	α_{min}	39	42	—	dB
		1565.42... 1573.374	MHz	α_{min}	39	42	—	dB
		1573.374... 1577.466	MHz	α_{min}	39	42	—	dB
		1577.466... 1585.42	MHz	α_{min}	39	42	—	dB
		1597.5515... 1605.886	MHz	α_{min}	39	43	—	dB
		1638... 1708	MHz	α_{min}	39	42	—	dB
		1844.9... 1879.9	MHz	α_{min}	40	47	—	dB

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Characteristics TX – ANT				min. for T_{SPEC}	typ. @ +25 °C	max. for T_{SPEC}	
1884.5... 1919.6	MHz	α_{min}	40	49	—	dB	
1930... 1990	MHz	α_{min}	44	49	—	dB	
2110... 2170	MHz	α_{min}	44	47	—	dB	
2400... 2547	MHz	α_{min}	36	39	—	dB	
3286... 3406	MHz	α_{min}	30	35	—	dB	
4110... 4255	MHz	α_{min}	20	35	—	dB	
4900... 5950	MHz	α_{min}	24	30	—	dB	

¹⁾ See Sec. Matching circuit (p. 6).

²⁾ Attenuation of WCDMA signal ("power transfer function"). Please refer to definition of Power Transfer Function (PTF) of WCDMA signal (p. 25).

³⁾ Over any channel with band width of 5 MHz.

⁴⁾ Error Vector Magnitude (EVM) based on definition in 3GPP TS 25.141.

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6.2 ANT – RX

Temperature range for specification	T_{SPEC}	= -30 °C ... +90 °C
TX terminating impedance	Z_{TX}	= 50 Ω
ANT terminating impedance	Z_{ANT}	= 50 Ω with par. 8.2 nH ¹⁾
RX terminating impedance	Z_{RX}	= 50 Ω

Characteristics ANT – RX				min. for T_{SPEC}	typ. @ +25 °C	max. for T_{SPEC}		
Center frequency			f_C	—	881.5	—	MHz	
Maximum insertion attenuation								
		869... 894	MHz	α_{max}	—	1.5	2.1	dB
	@ $f_{carrier}$	871.4... 891.6	MHz	$\alpha_{WCDMA,max}^{2)}$	—	1.4	1.8	dB
Amplitude ripple (p-p)								
		869... 894	MHz	$\Delta\alpha$	—	0.3	0.9	dB
		869... 894	MHz	$\Delta\alpha^{3)}$	—	0.5	0.8	dB
	@ $f_{carrier}$	871.4... 891.6	MHz	$\Delta\alpha_{WCDMA}^{2)}$	—	0.2	0.6	dB
Maximum VSWR				$VSWR_{max}$				
@ ANT port		869... 894	MHz		—	1.6	2.0	
@ RX port		869... 894	MHz		—	1.6	2.0	
Maximum error vector magnitude				$EVM_{max}^{4)}$				
		871.4... 891.6	MHz		—	1.8	2.5	%
Minimum attenuation								
		10... 477	MHz	α_{min}	50	65	—	dB
		45	MHz	α_{min}	50	100	—	dB
		477... 824	MHz	α_{min}	50	59	—	dB
		779... 804	MHz	α_{min}	50	68	—	dB
		824... 849	MHz	α_{min}	45	60	—	dB
	@ $f_{carrier}$	826.4... 846.6	MHz	$\alpha_{WCDMA,min}^{2)}$	51	61	—	dB
		849... 854	MHz	α_{min}	30	57	—	dB
		909... 920	MHz	α_{min}	10	18	—	dB
		920... 979	MHz	α_{min}	25	29	—	dB
		979... 1710	MHz	α_{min}	45	51	—	dB
		1693... 1743	MHz	α_{min}	45	53	—	dB
		1710... 1785	MHz	α_{min}	50	53	—	dB
		1785... 1788	MHz	α_{min}	45	53	—	dB
		1850... 1920	MHz	α_{min}	45	52	—	dB
		1920... 1980	MHz	α_{min}	45	52	—	dB
		1980... 2400	MHz	α_{min}	40	49	—	dB
		2400... 2500	MHz	α_{min}	40	49	—	dB
		2517... 2592	MHz	α_{min}	40	47	—	dB

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Characteristics ANT – RX				min. for T_{SPEC}	typ. @ +25 °C	max. for T_{SPEC}	
	2607... 2682	MHz	α_{min}	40	48	—	dB
	3476... 3576	MHz	α_{min}	40	47	—	dB
	4345... 4470	MHz	α_{min}	40	49	—	dB
	4900... 5950	MHz	α_{min}	40	52	—	dB
	5214... 5364	MHz	α_{min}	40	57	—	dB
IMD product levels							
IMD2 ⁵⁾							
Blocker 1	45	MHz		—	-128	-109	dBm
Blocker 3	1718	MHz		—	-104	-94	dBm
IMD3 ⁵⁾							
Blocker 2	791.5	MHz		—	-106	-96	dBm
Blocker 4	2554.5	MHz		—	-110	-100	dBm

¹⁾ See Sec. Matching circuit (p. 6).

²⁾ Attenuation of WCDMA signal ("power transfer function"). Please refer to definition of Power Transfer Function (PTF) of WCDMA signal (p. 25).

³⁾ Over any channel with band width of 5 MHz.

⁴⁾ Error Vector Magnitude (EVM) based on definition in 3GPP TS 25.141.

⁵⁾ IMD product level limits for power levels $P_{TX} = 21.5$ dBm (antenna port output power) and $P_{blocker} = -15$ dBm (antenna port input power).

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6.3 TX – RX

Temperature range for specification	T_{SPEC}	= -30 °C ... +90 °C
TX terminating impedance	Z_{TX}	= 50 Ω
ANT terminating impedance	Z_{ANT}	= 50 Ω with par. 8.2 nH ¹⁾
RX terminating impedance	Z_{RX}	= 50 Ω

Characteristics TX – RX					min. for T_{SPEC}	typ. @ +25 °C	max. for T_{SPEC}	
Minimum isolation								
		824... 849	MHz	α_{min}	55	60	—	dB
	@ $f_{carrier}$	826.4... 846.6	MHz	$\alpha_{WCDMA,min}^{2)}$	55	63	—	dB
		869... 894	MHz	α_{min}	50	54	—	dB
	@ $f_{carrier}$	871.4... 891.6	MHz	$\alpha_{WCDMA,min}^{2)}$	50	55	—	dB
		1574... 1577	MHz	α_{min}	40	59	—	dB
		1638... 1708	MHz	α_{min}	20	58	—	dB
		2462... 2557	MHz	α_{min}	20	53	—	dB

¹⁾ See Sec. Matching circuit (p. 6).

²⁾ Attenuation of WCDMA signal ("power transfer function"). Please refer to definition of Power Transfer Function (PTF) of WCDMA signal (p. 25).

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7 Maximum ratings

Storage temperature	$T_{\text{STG}}^{1)} = -40\text{ °C} \dots +85\text{ °C}$	
DC voltage	$ V_{\text{DC}} = 5.0\text{ V (max.)}^{2)}$	
ESD voltage		
	$V_{\text{ESD}}^{3)} = 100\text{ V (max.)}$	Machine model.
	$V_{\text{ESD}}^{4)} = 225\text{ V (max.)}$	Human body model.
	$V_{\text{ESD}}^{5)} = 600\text{ V (max.)}$	Charged device model.
Input power	P_{IN}	
@ TX port: 824 ... 849 MHz	30 dBm	5 MHz LTE uplink signal for 5000 h @ 50 °C.
@ TX port: other frequency ranges	10 dBm	5 MHz LTE uplink signal for 5000 h @ 50 °C.

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

²⁾ 168h Damp Heat Steady State acc. IEC 60068-2-67 Cy.

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

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

⁵⁾ According to JESD22-C101C (CDM – Field Induced Charged Device Model), 3 negative & 3 positive pulses.

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8 Transmission coefficients

8.1 TX – ANT

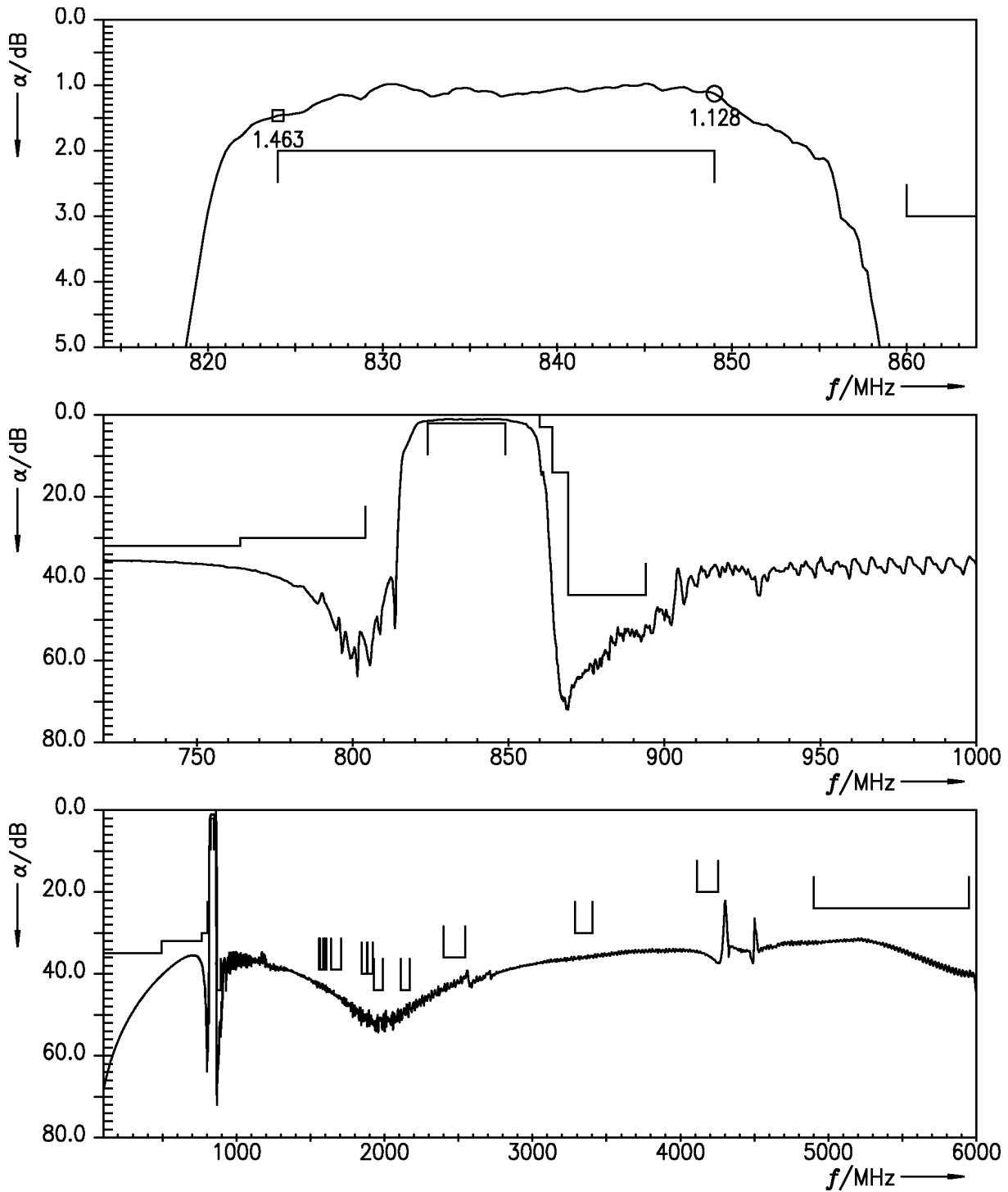


Figure 4: Attenuation TX – ANT.

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8.2 ANT – RX

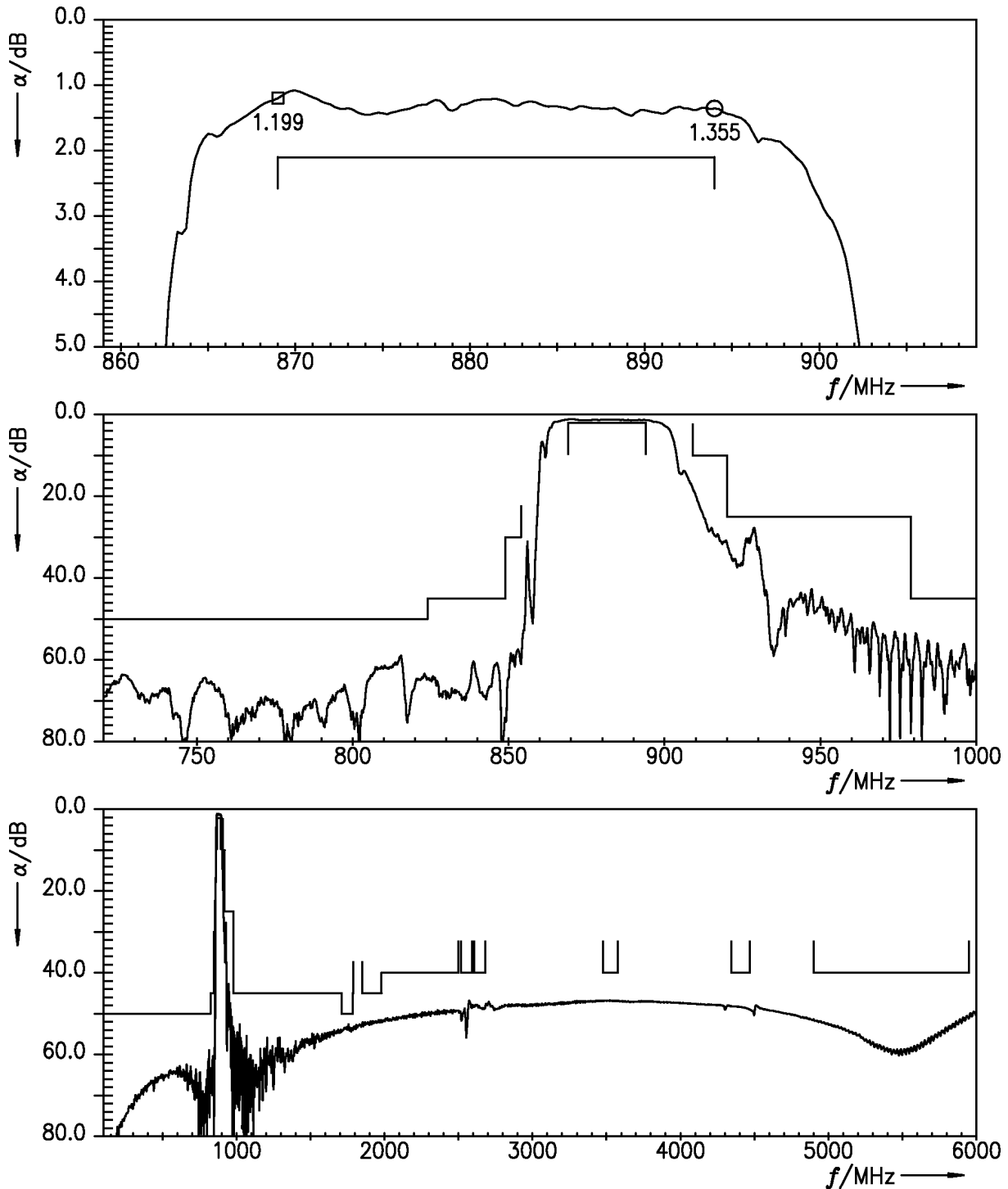


Figure 5: Attenuation ANT – RX.

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8.3 TX – RX

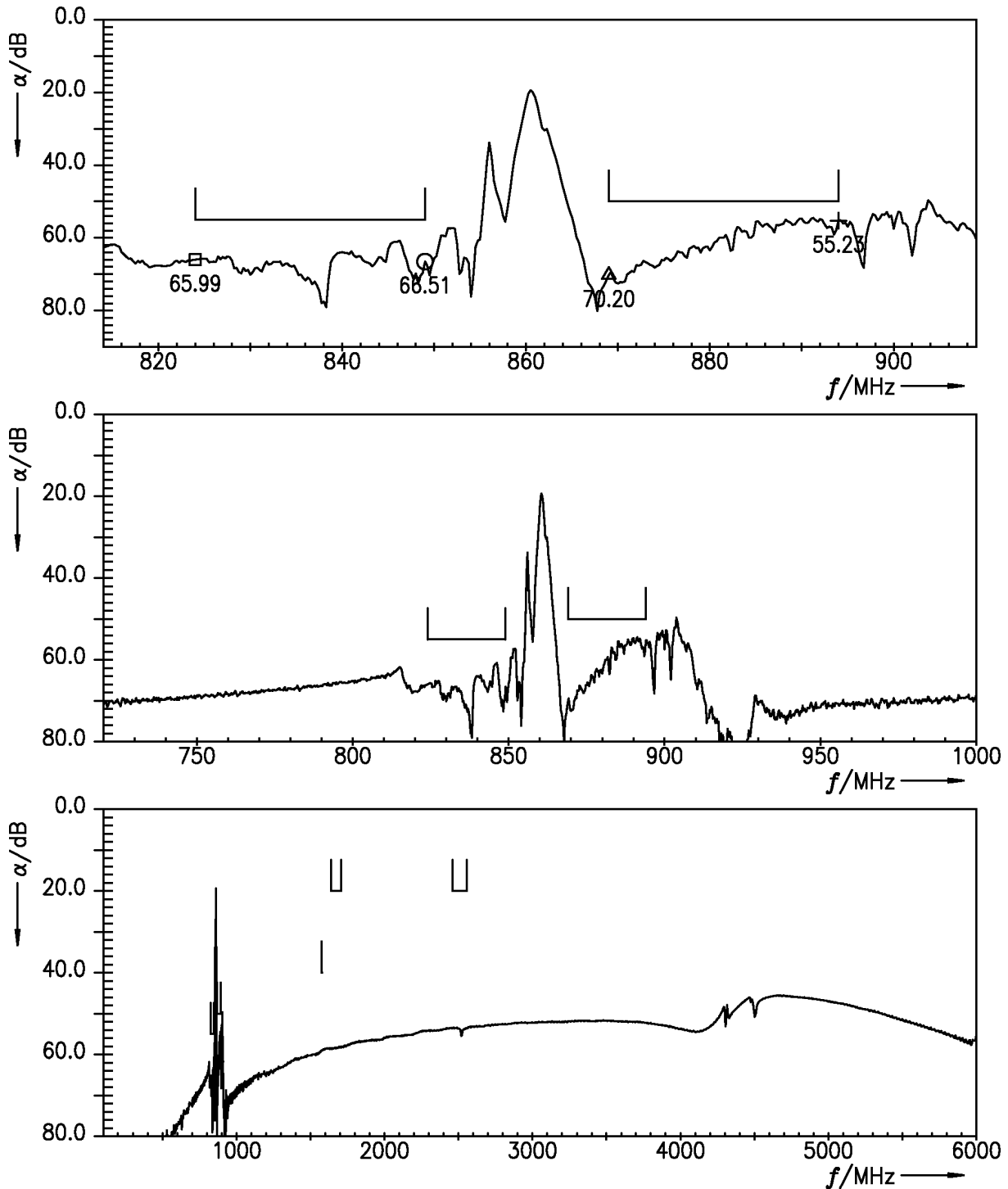


Figure 6: Isolation TX – RX.

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9 Reflection coefficients

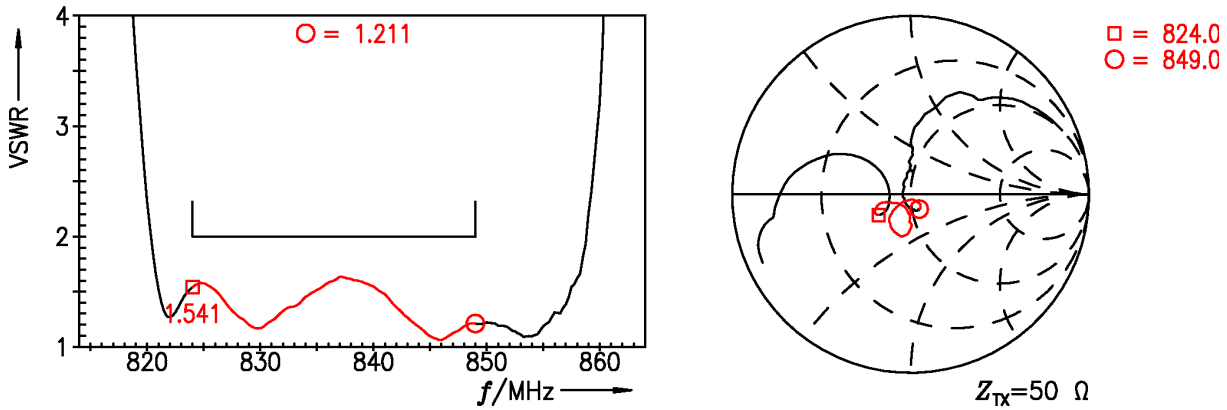


Figure 7: Reflection coefficient at TX port.

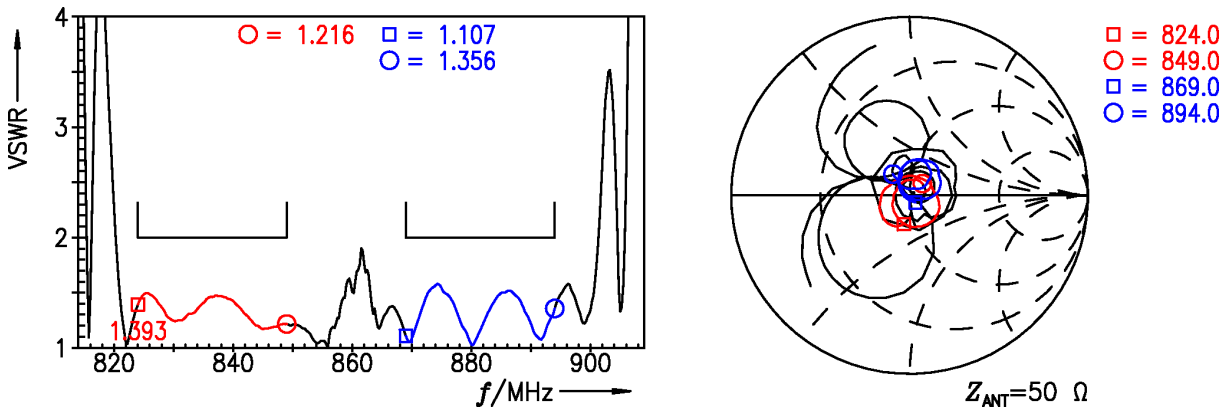


Figure 8: Reflection coefficient at ANT port.

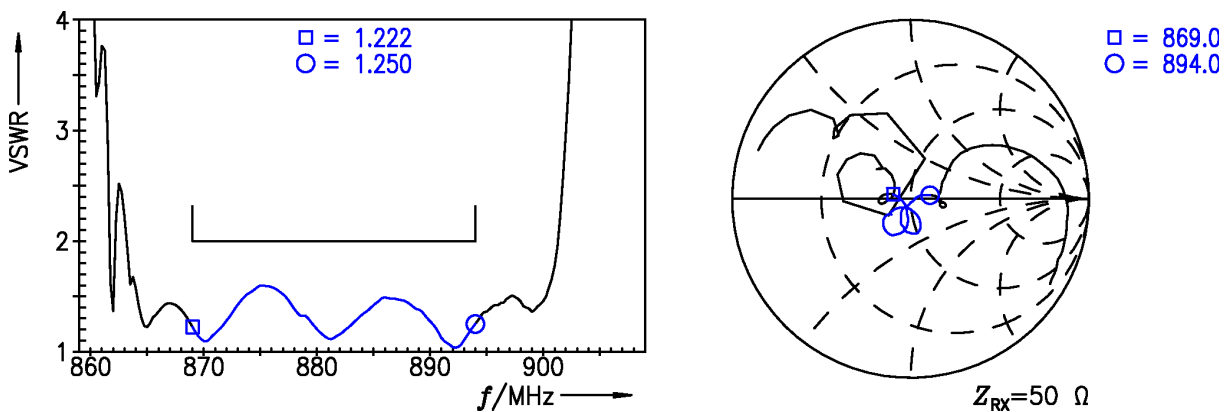
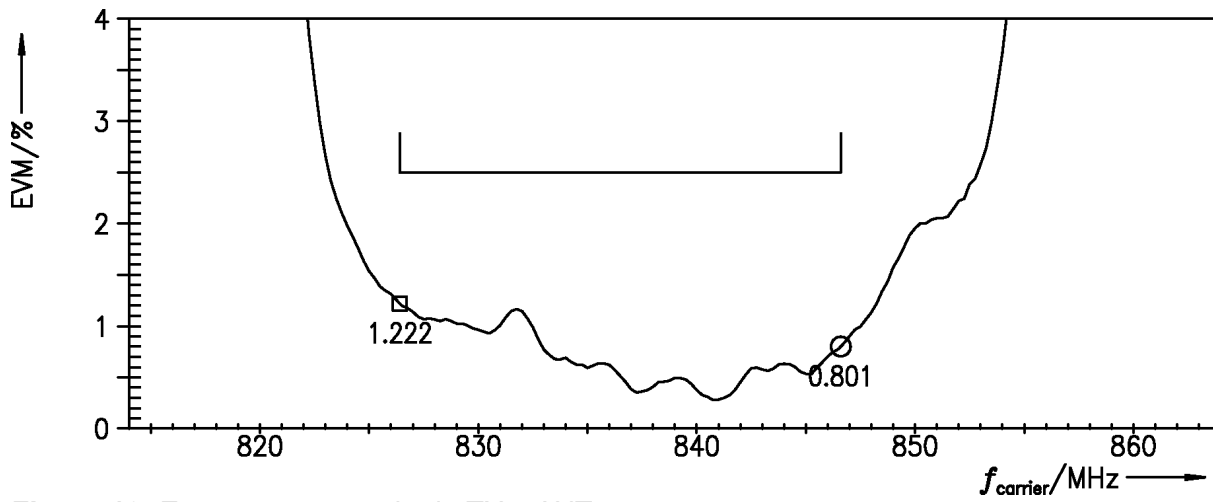


Figure 9: Reflection coefficient at RX port.

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10 EVMs**10.1 TX – ANT****Figure 10:** Error vector magnitude TX – ANT.

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10.2 ANT – RX

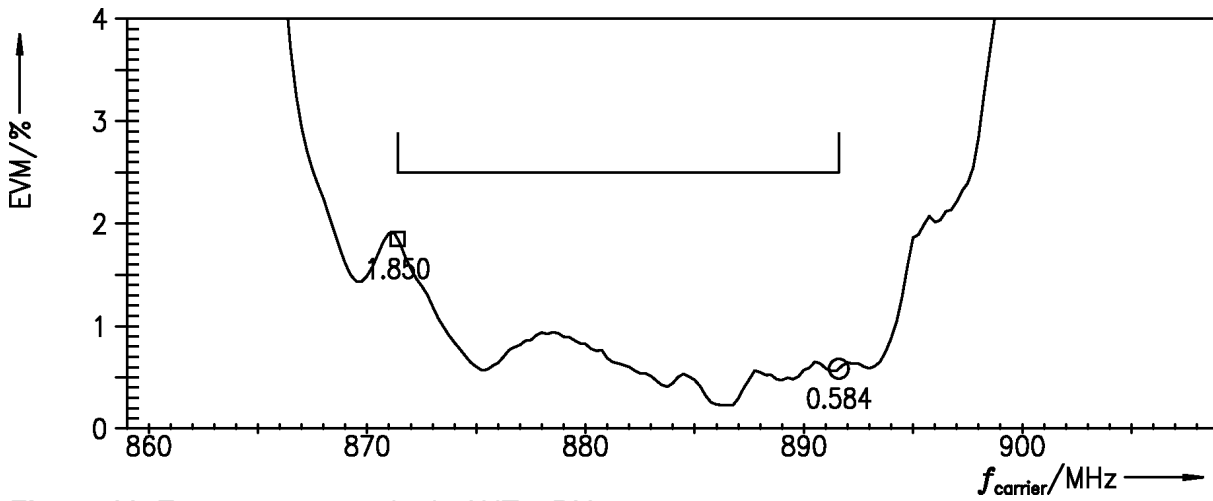


Figure 11: Error vector magnitude ANT – RX.

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11 Packing material

11.1 Tape

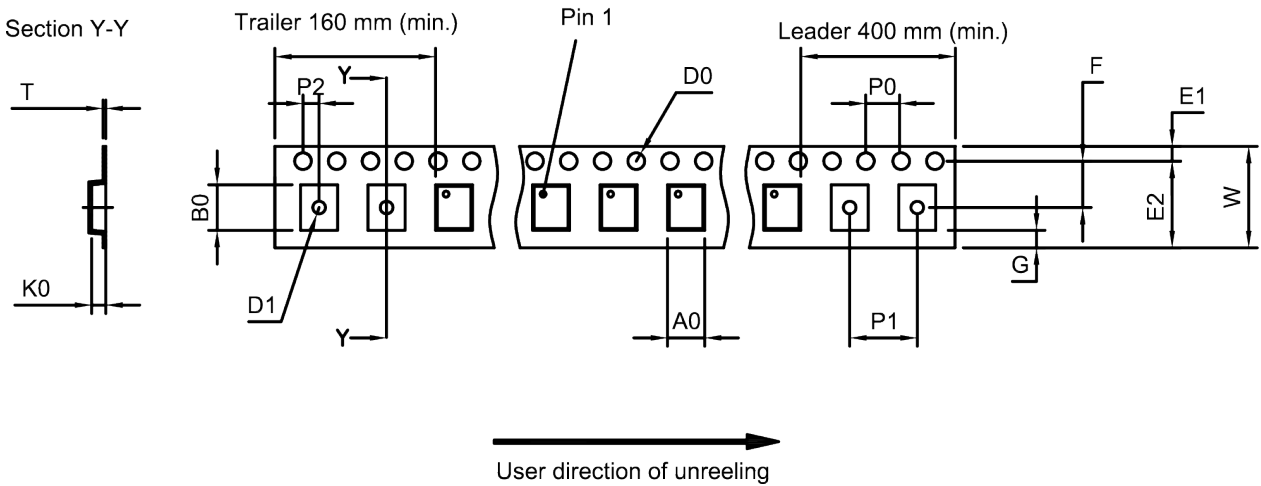


Figure 12: Drawing of tape (first-angle projection) with tape dimensions according to Table 1.

A ₀	1.62±0.05 mm	E ₂	6.25 mm (min.)	P ₁	4.0±0.1 mm
B ₀	2.04±0.05 mm	F	3.5±0.05 mm	P ₂	2.0±0.05 mm
D ₀	1.5+0.1/-0 mm	G	0.75 mm (min.)	T	0.25±0.05 mm
D ₁	0.8±0.05 mm	K ₀	0.62±0.05 mm	W	8.0±0.1 mm
E ₁	1.75±0.1 mm	P ₀	4.0±0.1 mm		

Table 1: Tape dimensions.

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11.2 Reel with diameter of 180 mm

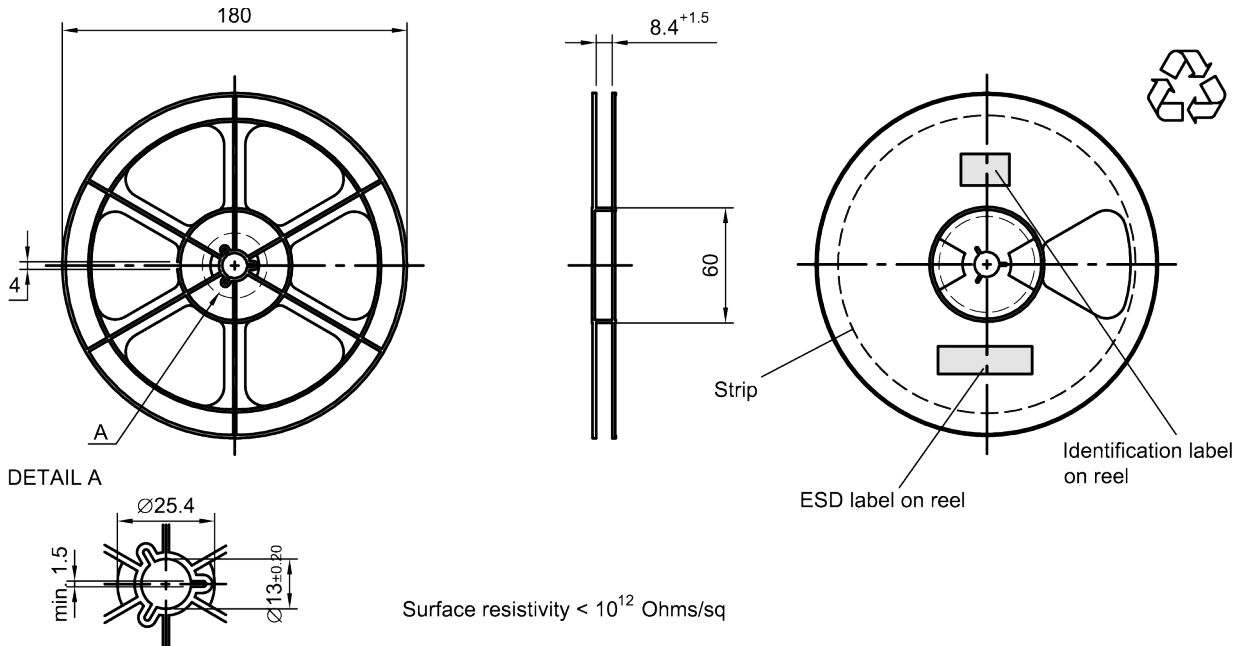


Figure 13: Drawing of reel (first-angle projection) with diameter of 180 mm.

Dimensions [mm]

X = 220+5

Y = 235+5

Sealing area 10±3

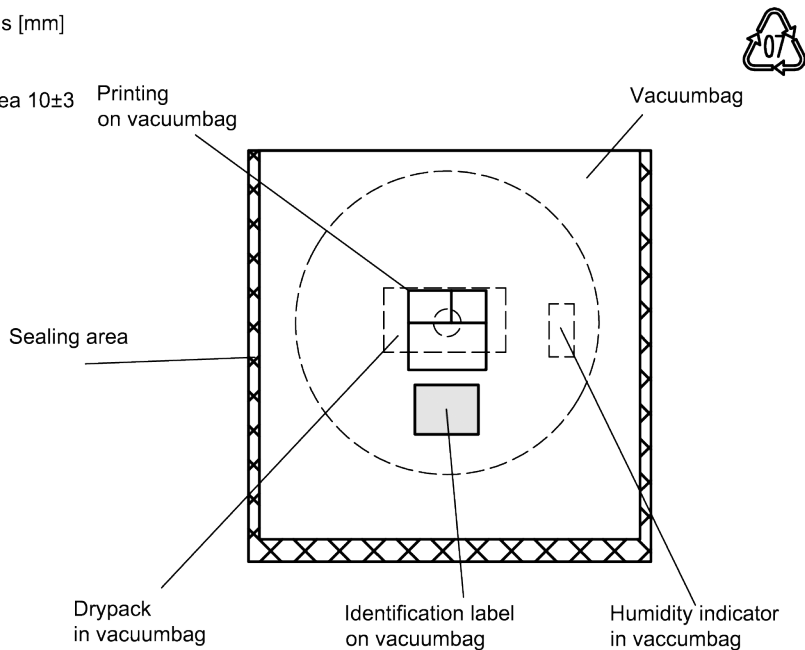


Figure 14: Drawing of moisture barrier bag (MBB) for reel with diameter of 180 mm.

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Dimensions [mm]
 L = 188
 B = 188
 H = 30
 Tolerance ±5

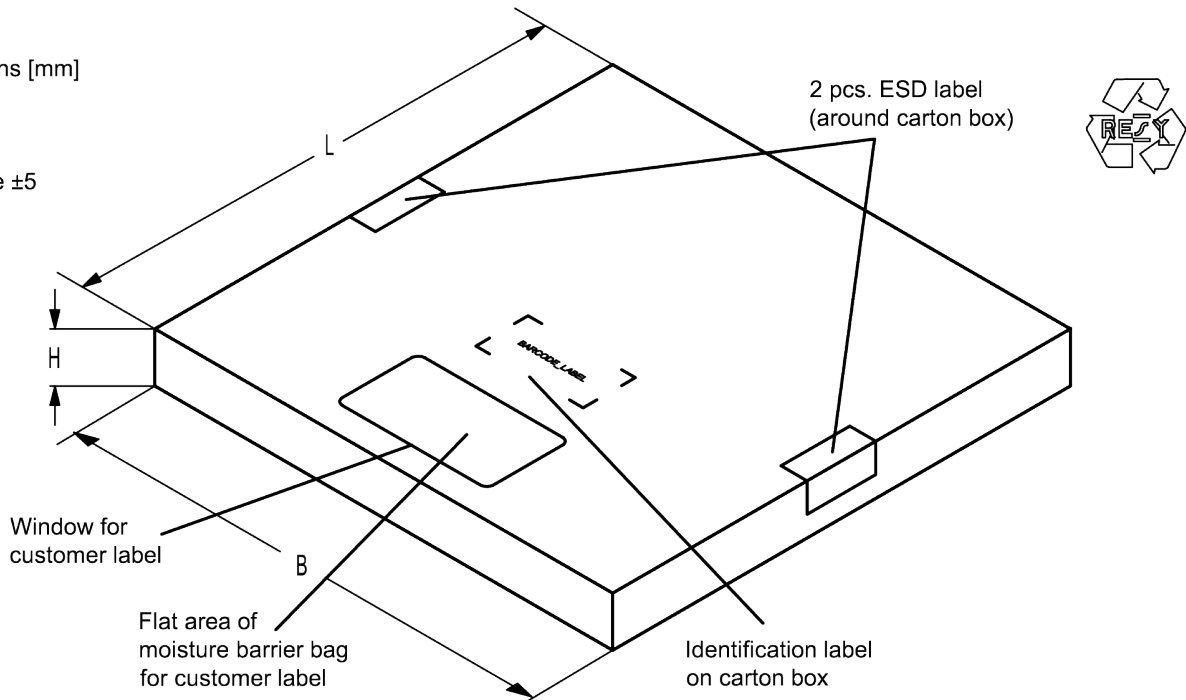


Figure 15: Drawing of folding box for reel with diameter of 180 mm.

11.3 Reel with diameter of 330 mm

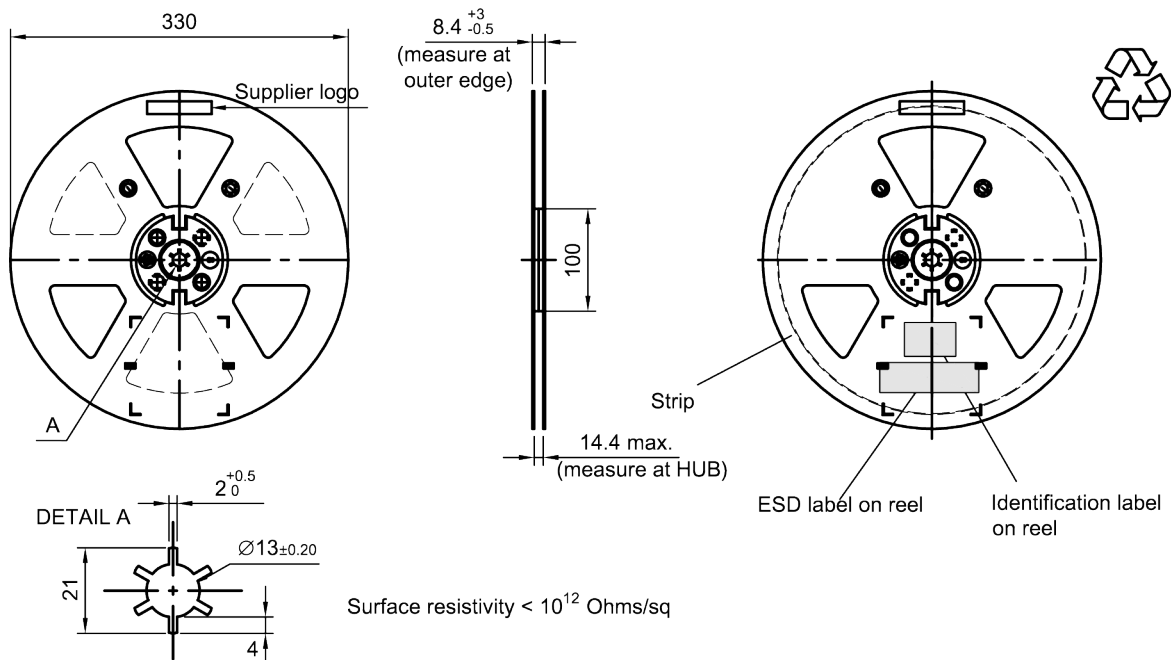


Figure 16: Drawing of reel (first-angle projection) with diameter of 330 mm.

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Dimensions [mm]
 X = 400+5
 Y = 418+5
 Sealing area 10±3

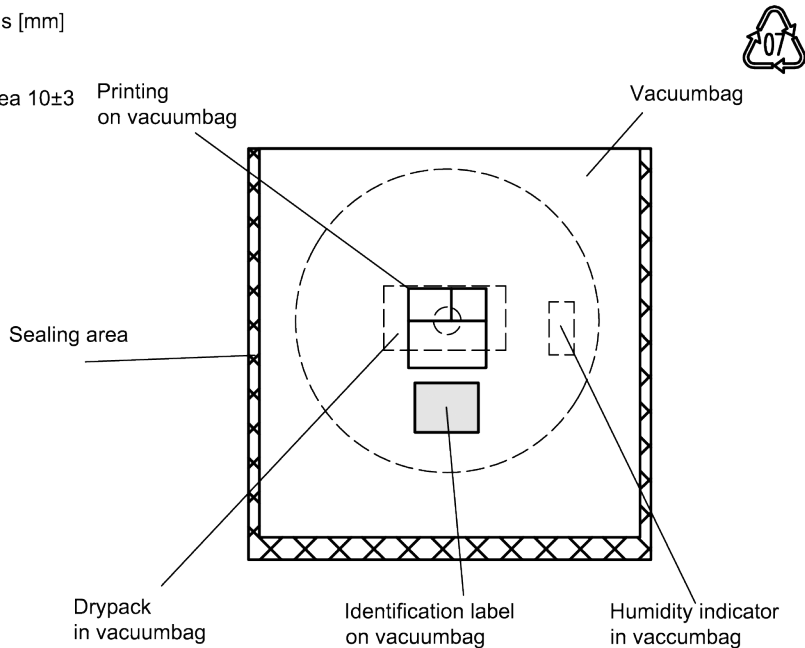


Figure 17: Drawing of moisture barrier bag (MBB) for reel with diameter of 330 mm.

Dimensions [mm]
 L = 335
 B = 338
 H = 36 (for 8 mm tape width)
 40 (for 12 mm tape width)
 Tolerance ±5

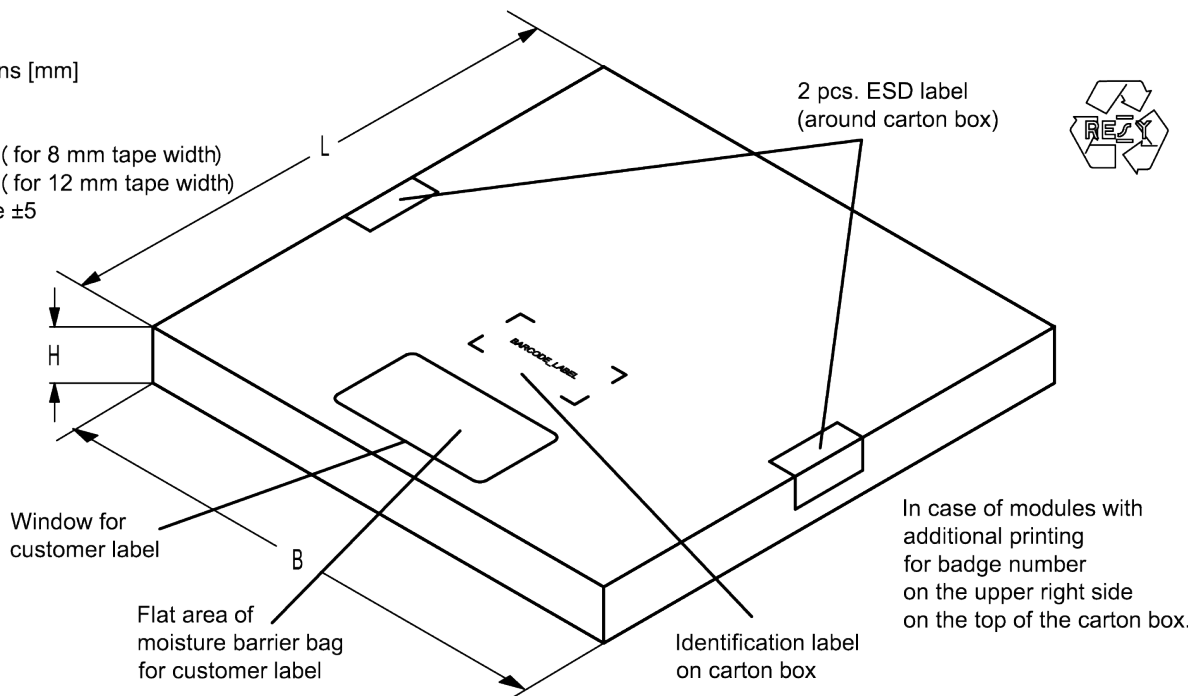


Figure 18: Drawing of folding box for reel with diameter of 330 mm.

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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 B8626 is 8DJ.

■ 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.

Data sheet

13 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
$T \geq 255$ °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).

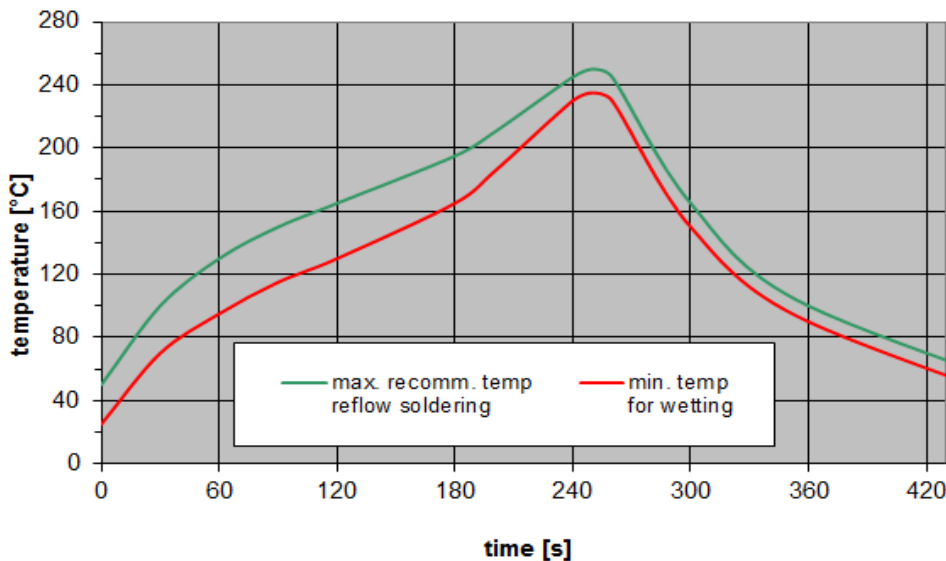


Figure 19: Recommended reflow profile for convection and infrared soldering – lead-free solder.

Data sheet

14 Annotations

14.1 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>.

14.2 Power Transfer Function (PTF) of WCDMA signal

Attenuation of WCDMA signal, α_{WCDMA} , is defined by

$$\alpha_{\text{WCDMA}}(f_{\text{carrier}}) = 10 \log_{10} \left| \frac{1}{\text{PTF}(f_{\text{carrier}})} \right| \text{dB}$$

and

$$\text{PTF}(f_{\text{carrier}}) = \int_{-\infty}^{+\infty} |S_{21}(f) H_{\text{RRC}}(f - f_{\text{carrier}})|^2 df$$

with f_{carrier} according to 3GPP TS 25.101 (e.g., for the WCDMA B8 pass band, f_{carrier} ranges from 882.4 MHz to 912.6 MHz which correspond to the lowest and highest TX channels, respectively). $H_{\text{RRC}}(f)$ is the transfer function of the root-raised cosine transmit pulse shaping filter according to 3GPP TS 25.101 using the normalization

$$\int_{-\infty}^{+\infty} |H_{\text{RRC}}(f)|^2 df = 1 \quad .$$

14.3 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.

14.4 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.

14.5 Ordering codes and packing units

Ordering code	Packing unit
B39881B8626P810	15000 pcs
B39881B8626P810S 5	5000 pcs

Table 4: Ordering codes and packing units.

Data sheet

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.

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.

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 (www.rf360jv.com/material). Should you have any more detailed questions, please contact our sales offices.
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