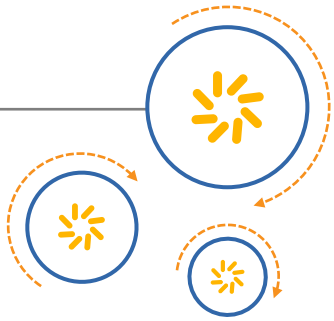
RF360 Europe GmbH

A Qualcomm – TDK Joint Venture



SAW Components

SAW Duplexer

LTE Band 17

Series/type:	B8612
Ordering code:	B39741B8612P810
Date:	September 28, 2015
Version:	2.3

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RF360 Europe GmbH, Anzinger Str. 13, München, Germany

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Table of contents

SAW Duplexer 710 / 740 MHz

Data sheet

1 Application

- Low-loss SAW duplexer for mobile telephone LTE Band 17 systems.
- Single-ended to balanced transformation in Antenna-Rx path.
- Impedance transformation 50Ω to 100Ω in Antenna-Rx path.
- High attenuation and High isolation.
- Low amplitude ripple.
- Usable pass band 12 MHz.
- Very small size and low height.

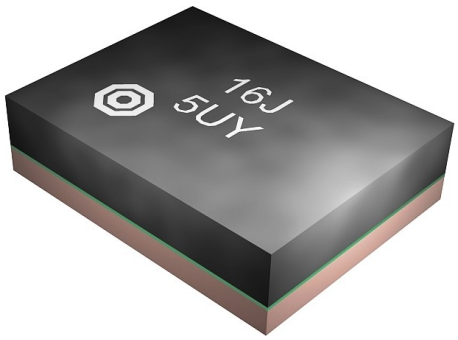
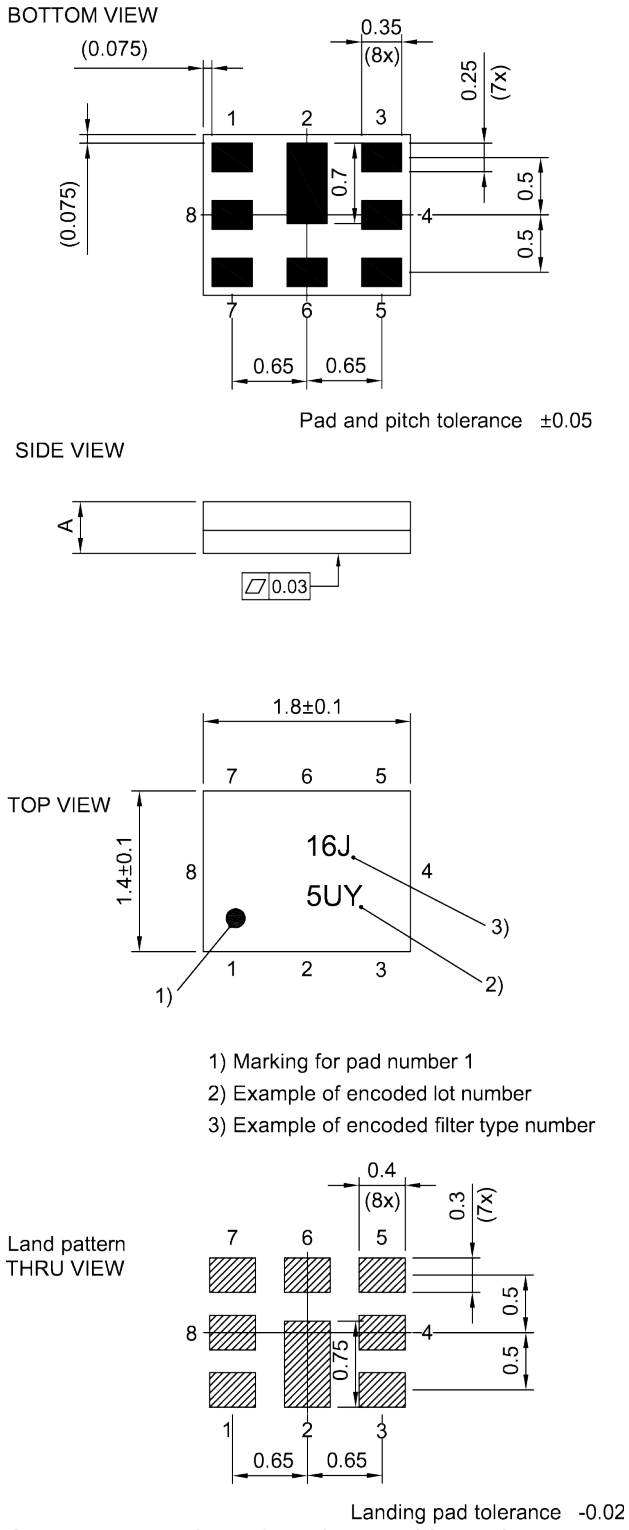


Figure 1: Picture of component with example of marking.

2 Features

- Package size 1.8 mm × 1.4 mm.
- Package height 0.475 mm.
- RoHS compatible.
- Package for Surface Mount Technology (SMT).
- Ni, Au-plated terminals.
- Electrostatic Sensitive Device (ESD).
- Moisture Sensitivity Level 3 (MSL3).

3 Package



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 Simplified drawings (p. 24).

4 Pin configuration

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

5 Matching circuit

■ L_{p6} = 15 nH

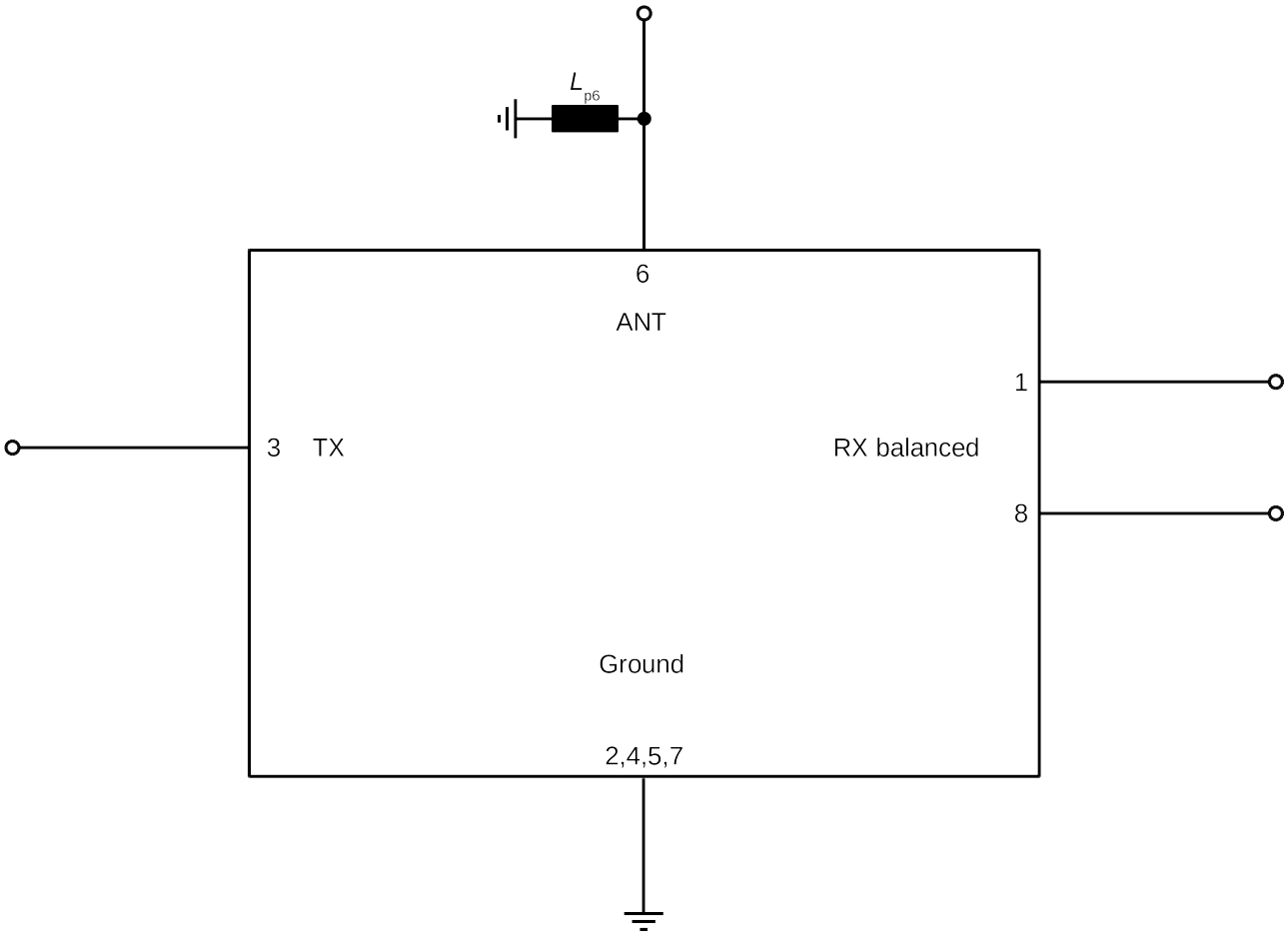


Figure 3: Schematic of matching circuit.

6 Characteristics

6.1 TX – ANT

Temperature range for specification T = −20 °C to +85 °C
TX terminating impedance Z_{TX} = 50 Ω
ANT terminating impedance Z_{ANT} = 50 Ω with par. 15 nH
RX terminating impedance Z_{RX} = 100 Ω

Characteristics TX – ANT				min.	typ. @+25 °C	max.	
Center frequency			f_C	—	710	—	MHz
Maximum insertion attenuation			α_{max}				
	704... 716	MHz		—	1.4	2.2	dB
Amplitude ripple (p-p)			$\Delta\alpha$				
	704... 716	MHz		—	0.4	1.3	dB
Maximum VSWR			$VSWR_{max}$				
@ TX port	704... 716	MHz		—	1.4	2.0	
@ ANT port	704... 716	MHz		—	1.4	2.0	
Maximum error vector magnitude			EVM_{max} [1)]				
	706.4... 712	MHz		—	0.9	3.0	%
	712... 713.6	MHz		—	1.2	3.5	%
Minimum attenuation			α_{min}				
	10... 692	MHz		30	43	—	dB
	692... 698	MHz		2.5	7	—	dB
	722... 728	MHz		2.5	10	—	dB
	728... 734	MHz		20	29	—	dB
	734... 746	MHz		45	55	—	dB
	746... 768	MHz		35	44	—	dB
	768... 805	MHz		35	42	—	dB
	869... 894	MHz		35	46	—	dB
	1408... 1432	MHz		40	46	—	dB
	1565... 1607	MHz		43	48	—	dB
	1805... 1880	MHz		45	51	—	dB
	1930... 1990	MHz		45	53	—	dB
	2110... 2155	MHz		48	55	—	dB
	2155... 2170	MHz		48	55	—	dB
	2400... 2497	MHz		50	61	—	dB
	2816... 2864	MHz		45	55	—	dB

Characteristics TX – ANT	min.	typ. @+25 °C	max.	
Harmonic Level CW tone at 710MHz [2]				
Third Harmonic at 2130MHz	—	−80	—	dBm

[1] Error Vector Magnitude (EVM) based on definition given in 3GPP TS 25.141.
[2] Power level: +27dBm on Tx port

6.2 ANT – RX

Temperature range for specification	T	= −20 °C to +85 °C
TX terminating impedance	Z_{TX}	= 50 Ω
ANT terminating impedance	Z_{ANT}	= 50 Ω with par. 15 nH
RX terminating impedance	Z_{RX}	= 100 Ω

Characteristics ANT – RX				min.	typ. @+25 °C	max.	
Center frequency			f_C	—	740	—	MHz
Maximum insertion attenuation			α_{max}				
	734... 746	MHz		—	1.6	2.3	dB
Amplitude ripple (p-p)			$\Delta\alpha$				
	734... 746	MHz		—	0.3	1.0	dB
Maximum VSWR			$VSWR_{max}$				
@ ANT port	734... 746	MHz		—	1.3	2.0	
@ RX port	734... 746	MHz		—	1.3	2.0	
Minimum attenuation			α_{min}				
	10... 674	MHz		35	64	—	dB
	674... 686	MHz		50	62	—	dB
	686... 704	MHz		35	62	—	dB
	704... 716	MHz		50	62	—	dB
	716... 722	MHz		40	48	—	dB
	722... 725	MHz		20	27	—	dB
	725... 727	MHz		13	21	—	dB
	727... 728	MHz		7	16	—	dB
	777... 793	MHz		35	39	—	dB
	793... 805	MHz		40	53	—	dB
	805... 3300	MHz		40	50	—	dB
	3300... 4500	MHz		38	47	—	dB
	4500... 6000	MHz		35	44	—	dB
Minimum common-mode rejection ratio			$CMRR_{min}$				
	734... 746	MHz		30	34	—	dB

6.3 TX – RX

Temperature range for specification T = −20 °C to +85 °C
TX terminating impedance Z_{TX} = 50 Ω
ANT terminating impedance Z_{ANT} = 50 Ω with par. 15 nH
RX terminating impedance Z_{RX} = 100 Ω

Characteristics TX – RX				min.	typ. @+25 °C	max.	
Minimum isolation			α_{min}				
	704 ... 716	MHz		58	64	—	dB
	734 ... 738	MHz		58	70	—	dB
	738 ... 742	MHz		55	61	—	dB
	742 ... 746	MHz		52	56	—	dB
	1408 ... 1432	MHz		30	69	—	dB
	2112 ... 2148	MHz		30	62	—	dB
	2816 ... 2864	MHz		30	59	—	dB
Minimum common-mode isolation			α_{min}				
	704 ... 716	MHz		52	57	—	dB

7 Maximum ratings

Storage temperature	T_{STG} =	−40 °C to +85 °C	
DC voltage	V_{DC} =	5.0 V (max.)	
ESD voltage	V_{ESD} [1)] =	100 V (max.)	Machine model.
Input power	P_{IN}		
@ TX port: 704 ... 716 MHz		29 dBm	5MHz LTE uplink Signal 5000 h @ 55 °C.
@ TX port: other frequency range(s)		10 dBm	5MHz LTE uplink Signal 5000 h @ 55 °C.

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

8 Transmission coefficients

8.1 TX – ANT

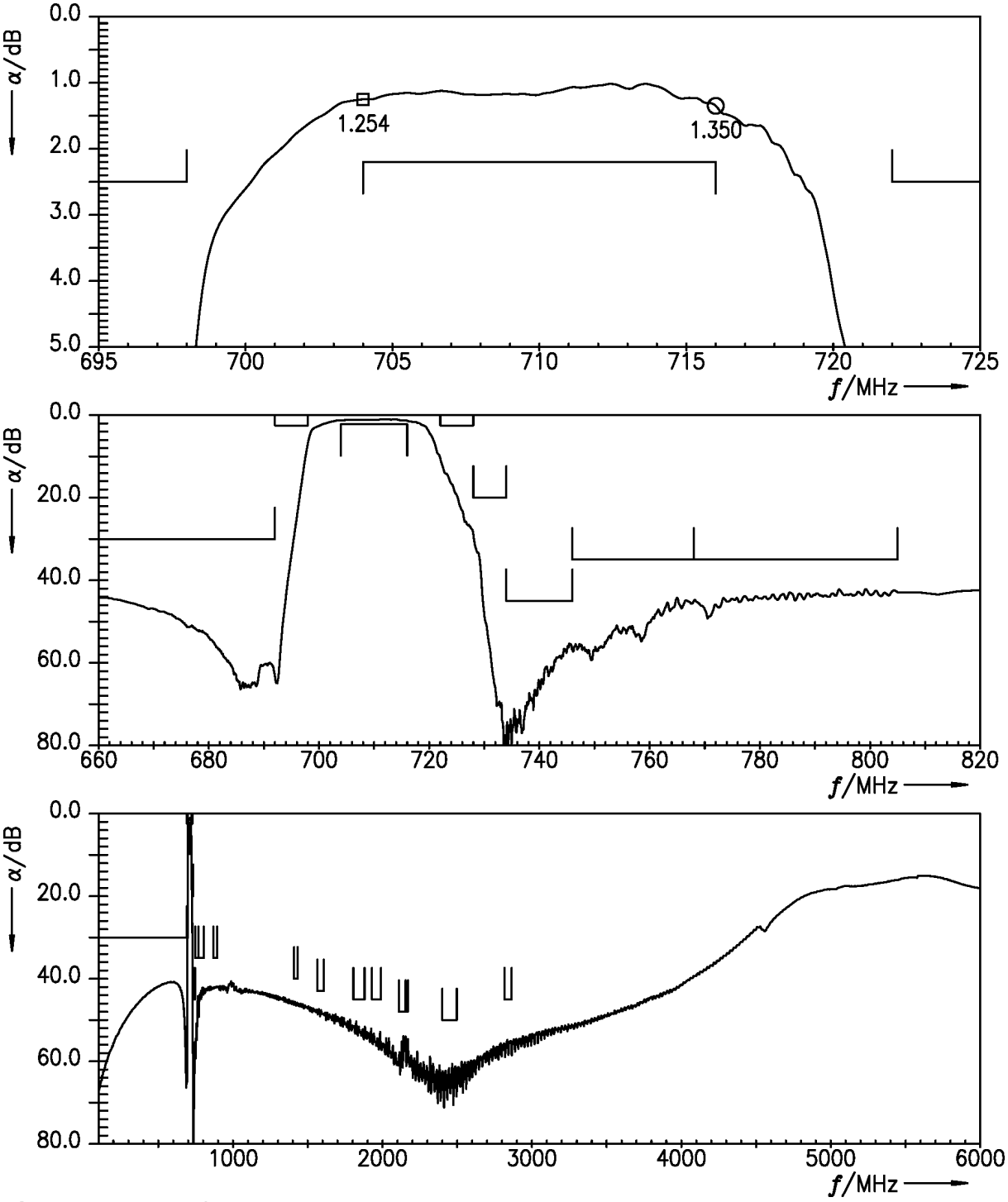


Figure 4: Attenuation TX – ANT.

8.2 ANT – RX

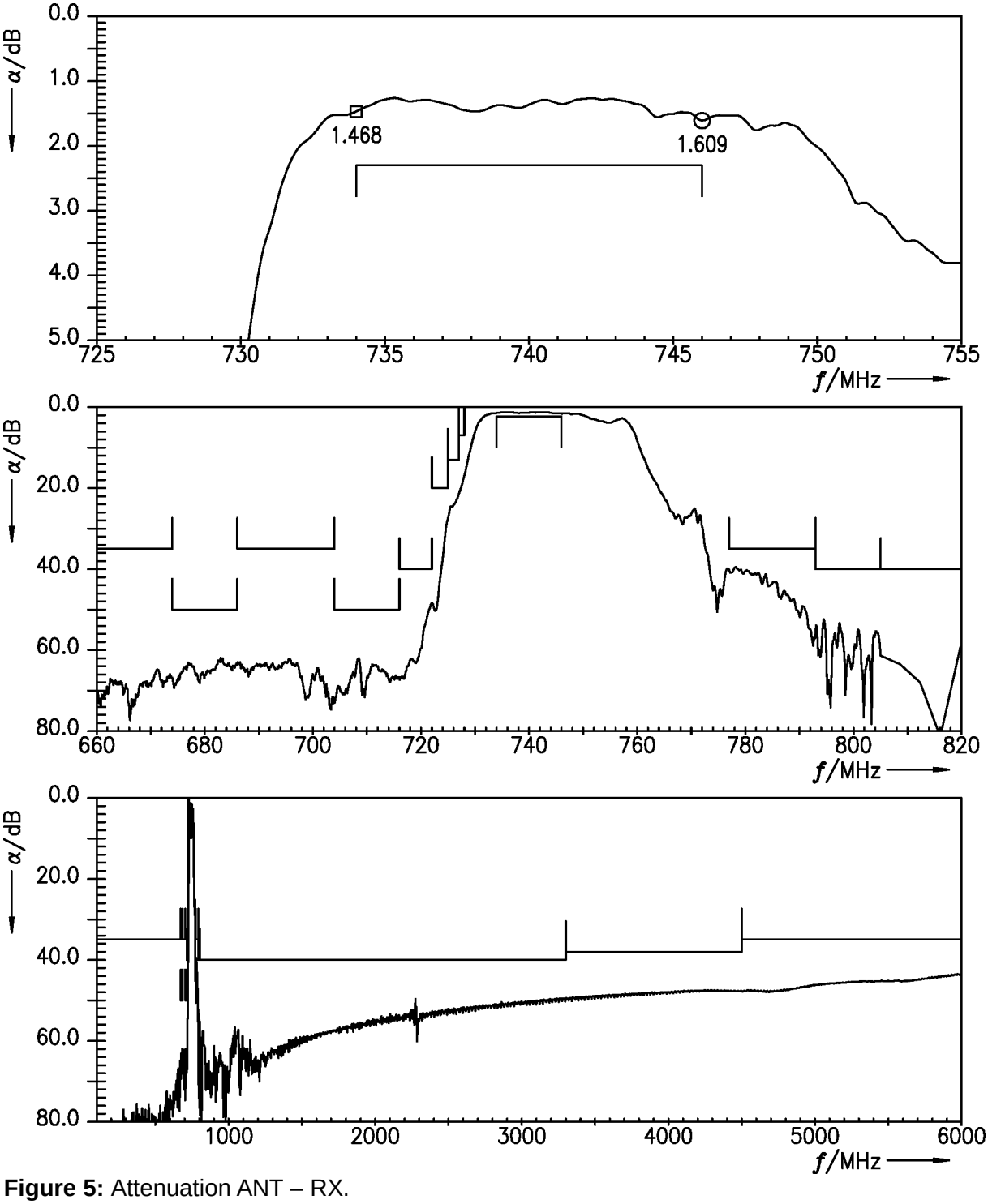


Figure 5: Attenuation ANT – RX.

8.3 TX – RX

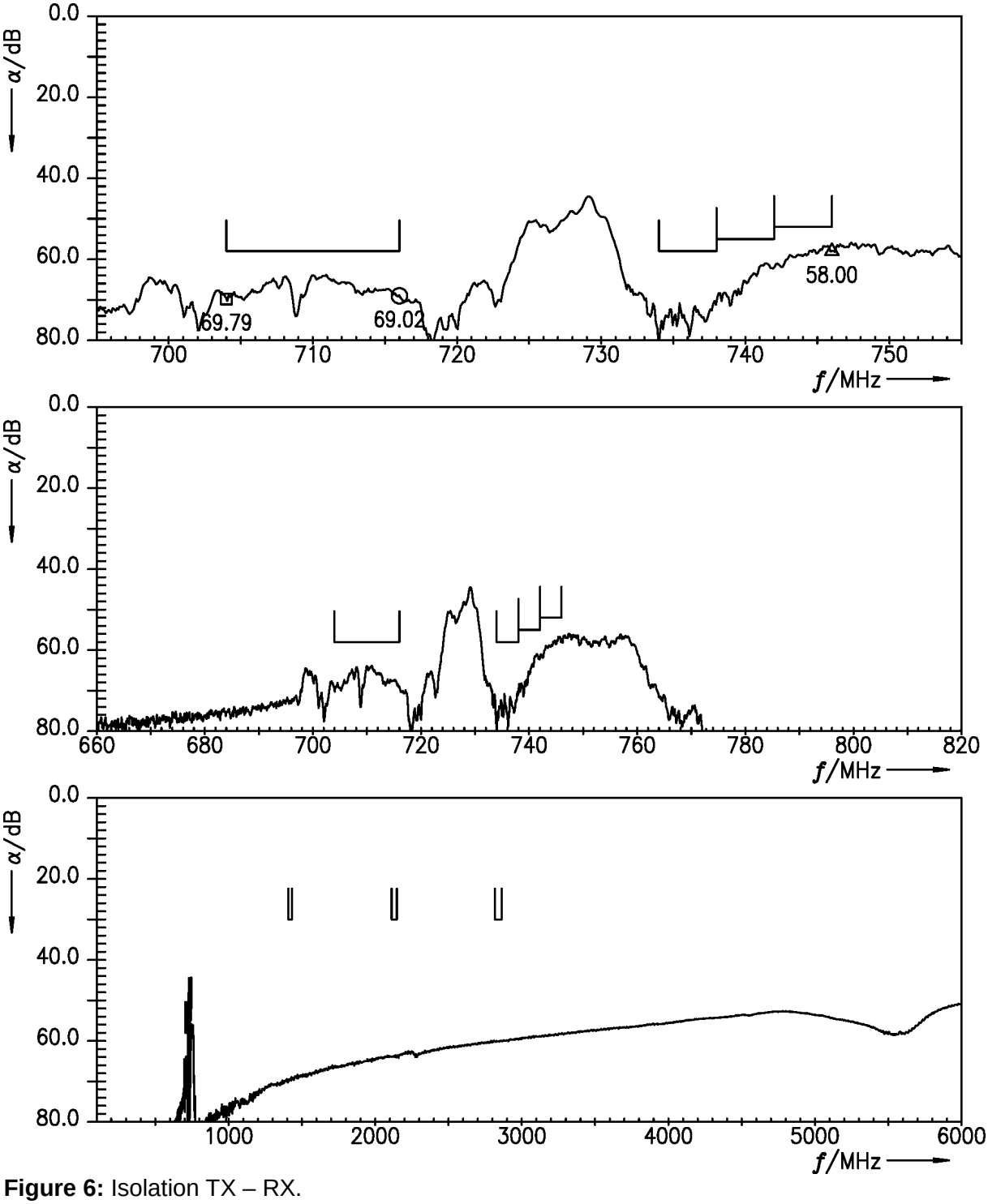


Figure 6: Isolation TX – RX.

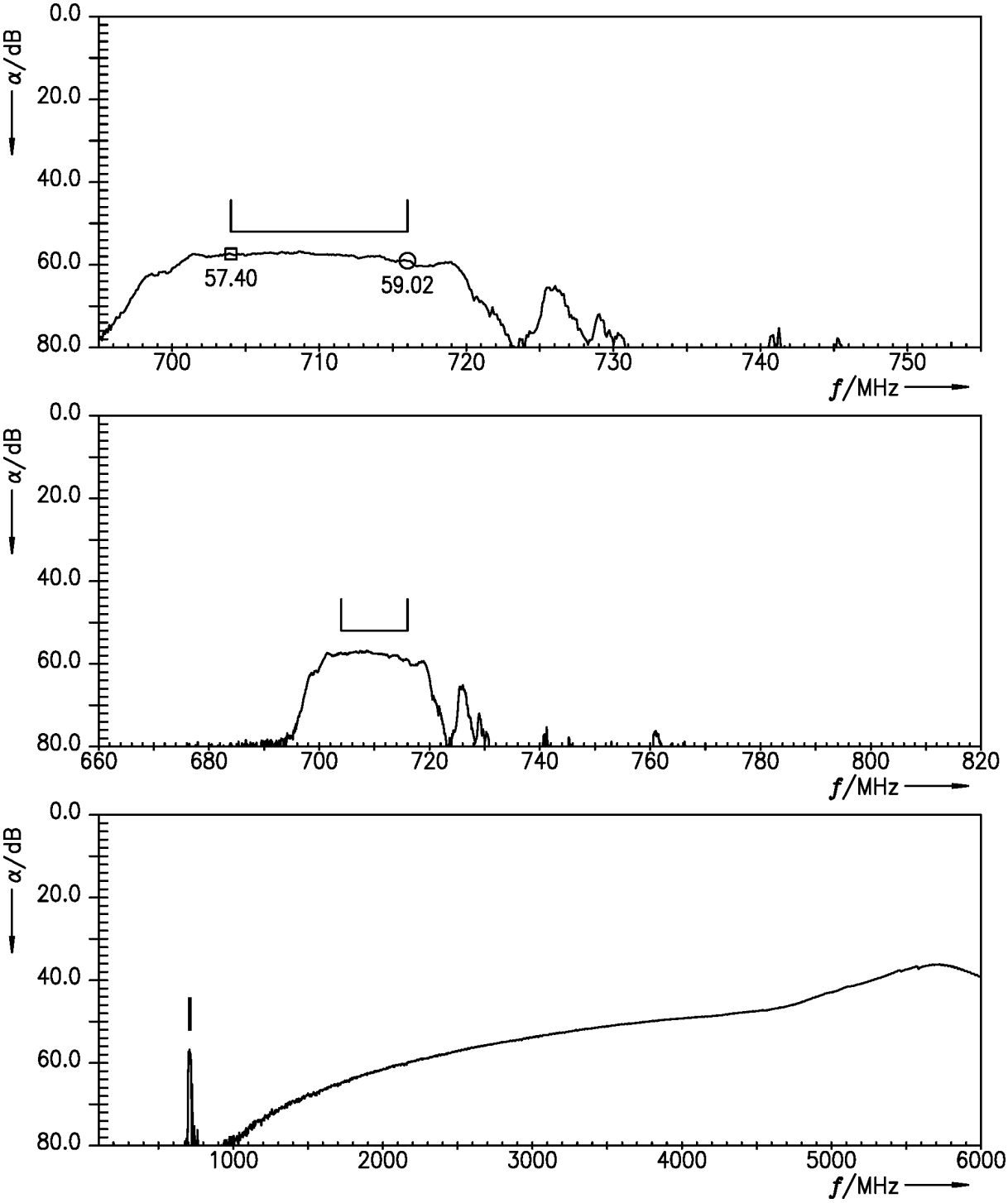


Figure 7: Common-mode isolation TX – RX.

9 Reflection coefficients

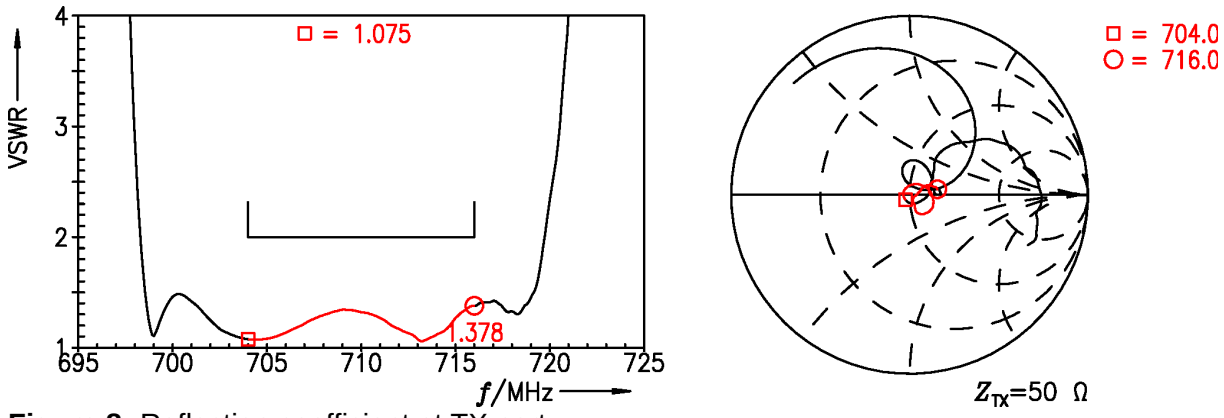


Figure 8: Reflection coefficient at TX port.

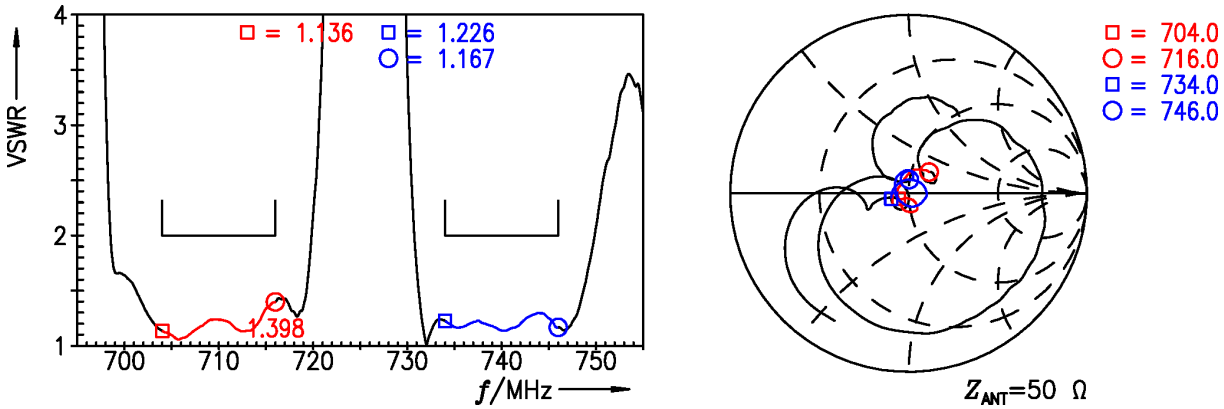


Figure 9: Reflection coefficient at ANT port (TX and RX frequencies).

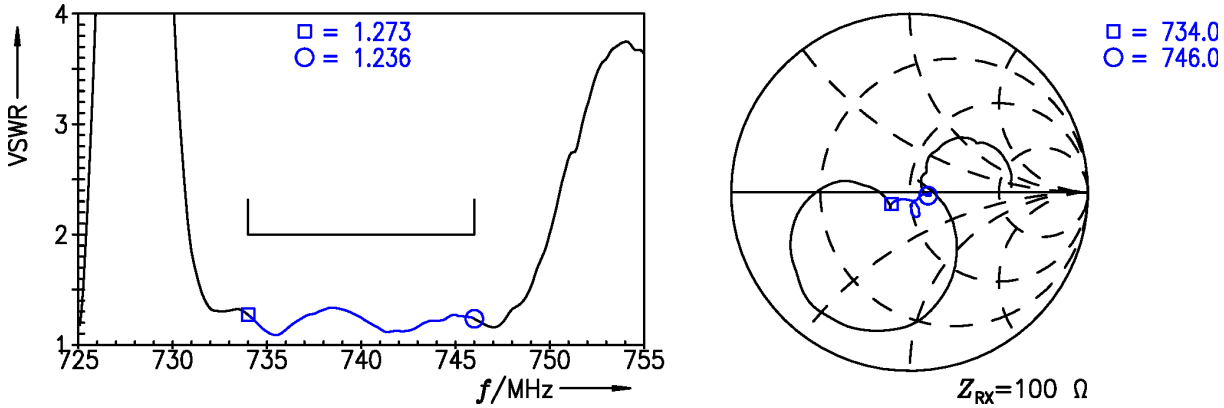


Figure 10: Reflection coefficient at RX port.

10 EVM

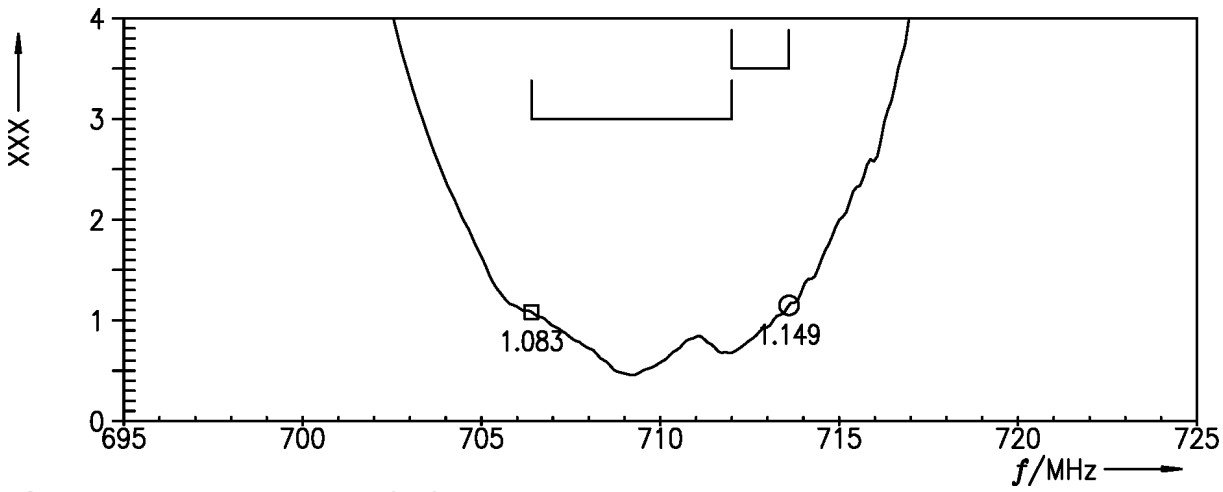


Figure 11: Error vector magnitude TX – ANT.

11 Common-mode rejection ratio

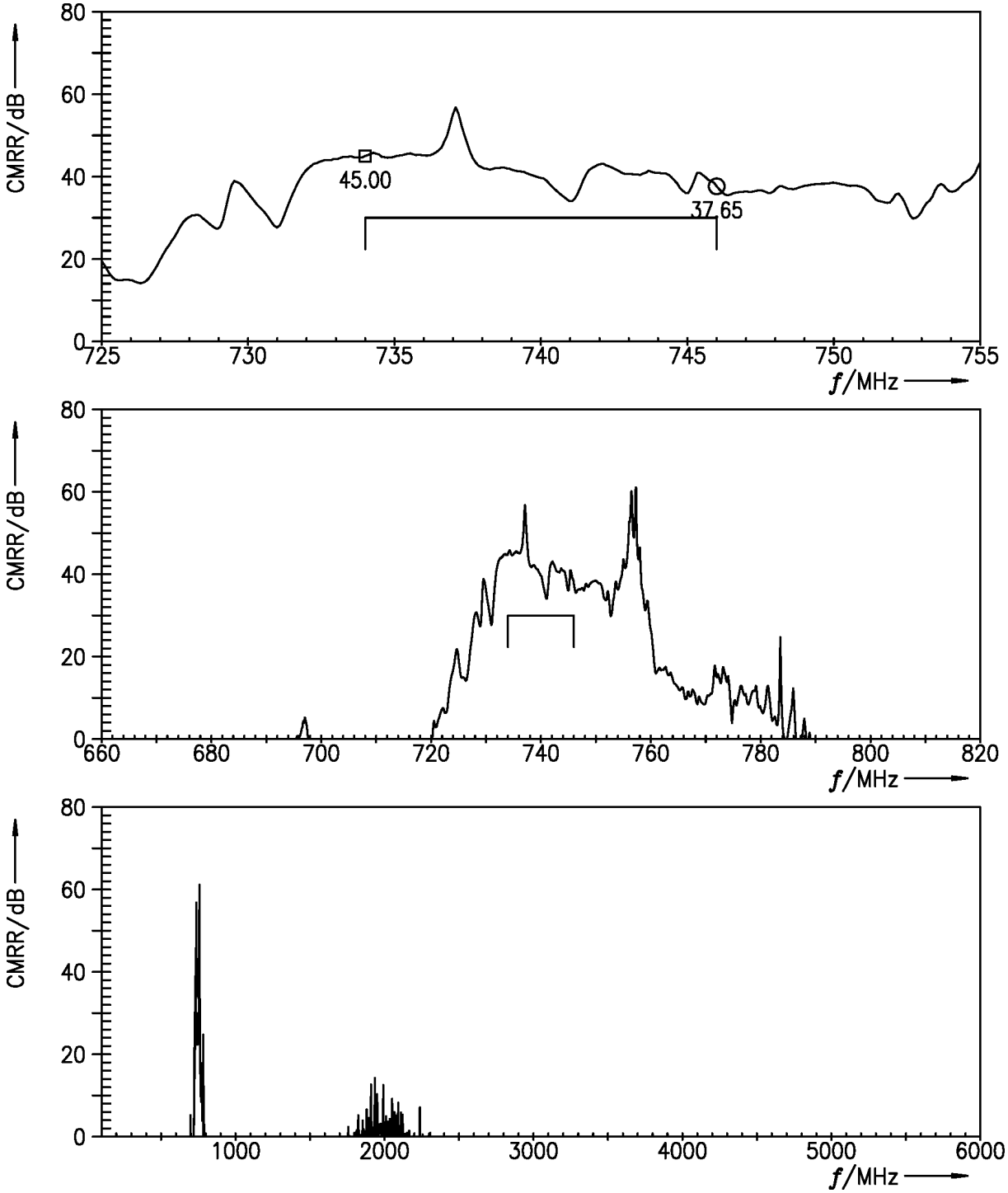


Figure 12: Common-mode rejection ratio ANT – RX.

12 Packing material

12.1 Tape

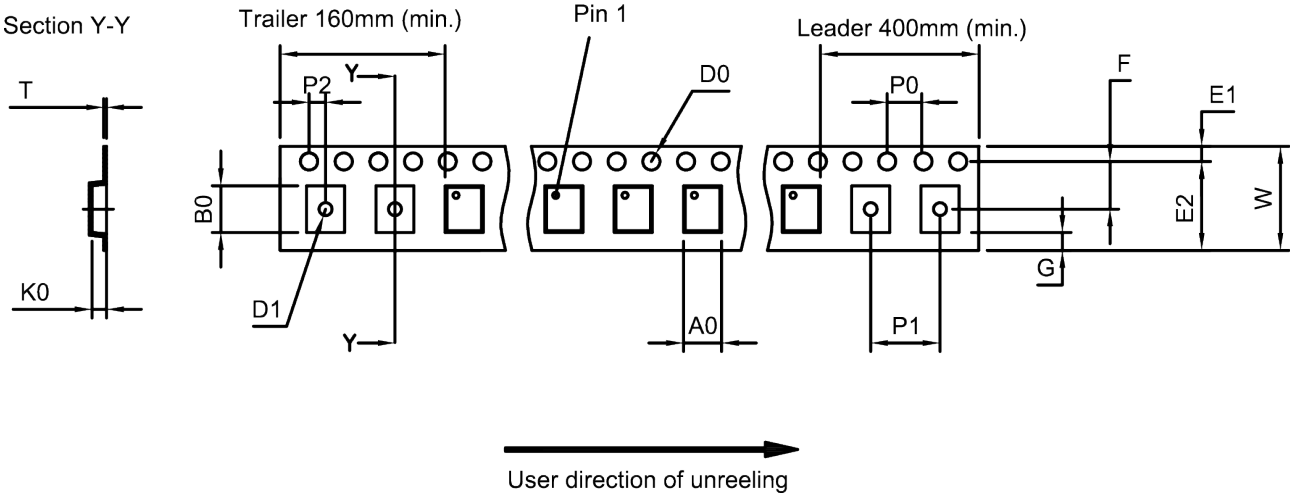


Figure 13: Drawing of tape (first-angle projection) with tape dimensions according to Table 1.

A_0	$1.62_{\pm 0.05}$ mm
B_0	$2.04_{\pm 0.05}$ mm
D_0	$1.5_{\pm 0.05}$ mm
D_1	$0.8_{\pm 0.05}$ mm
E_1	$1.75_{\pm 0.1}$ mm

E_2	6.25 mm (min.)
F	$3.5_{\pm 0.05}$ mm
G	0.75 mm (min.)
K_0	$0.62_{\pm 0.05}$ mm
P_0	$4.0_{\pm 0.1}$ mm

P_1	$4.0_{\pm 0.1}$ mm
P_2	$2.0_{\pm 0.05}$ mm
T	$0.25_{\pm 0.02}$ mm
W	$8.0_{\pm 0.1}$ mm

Table 1: Tape dimensions.

12.2 Reel with diameter of 180 mm

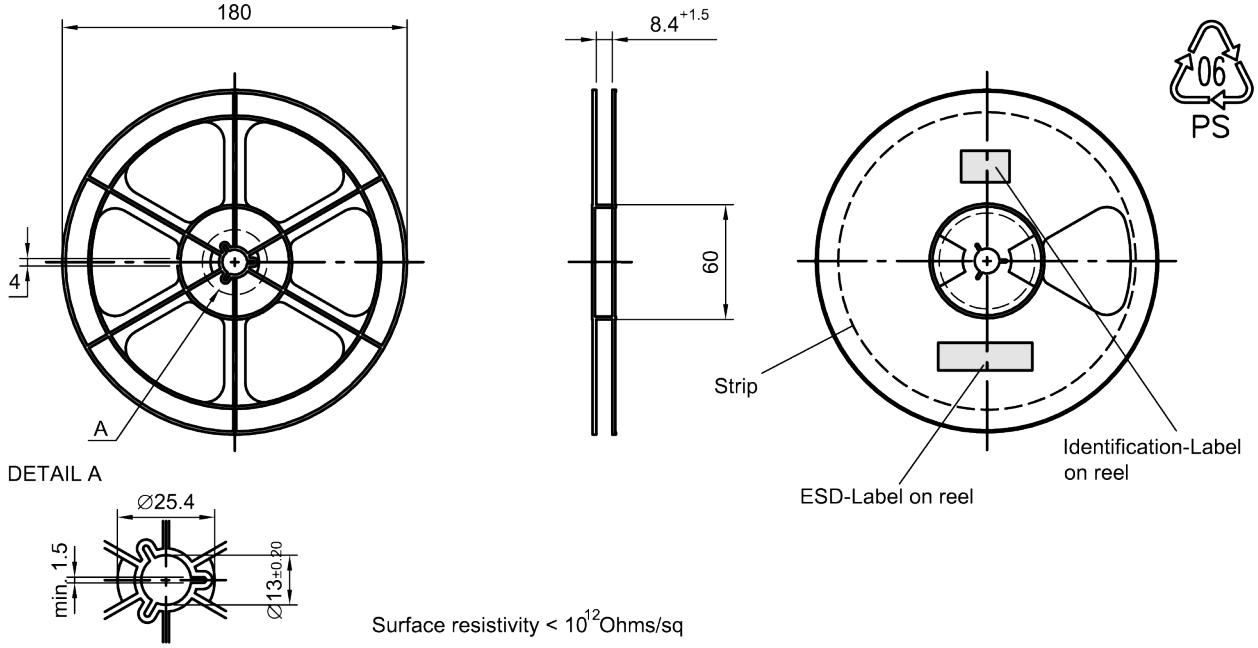


Figure 14: Drawing of reel (first-angle projection) with diameter of 180 mm.

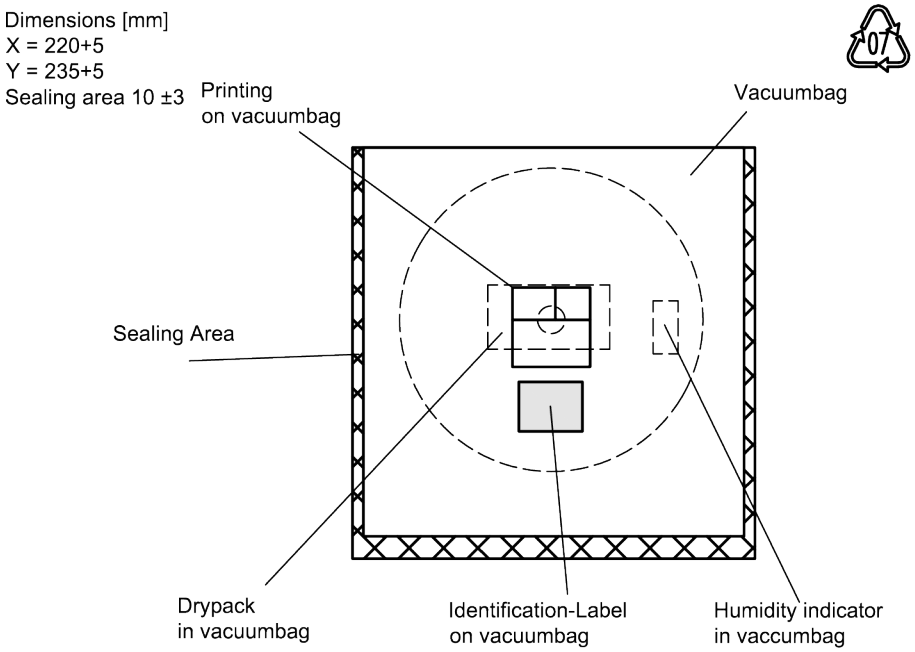


Figure 15: Drawing of moisture barrier bag (MBB) for reel with diameter of 180 mm.

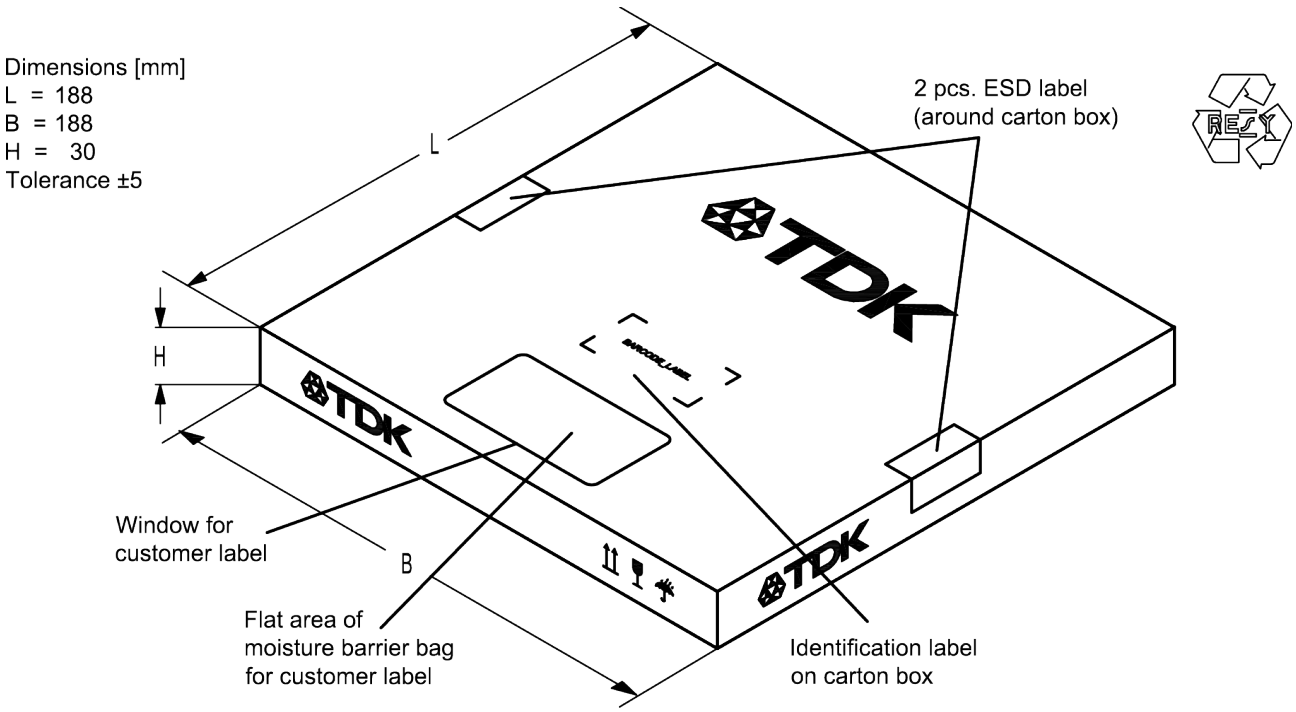


Figure 16: Drawing of folding box for reel with diameter of 180 mm.

12.3 Reel with diameter of 330 mm

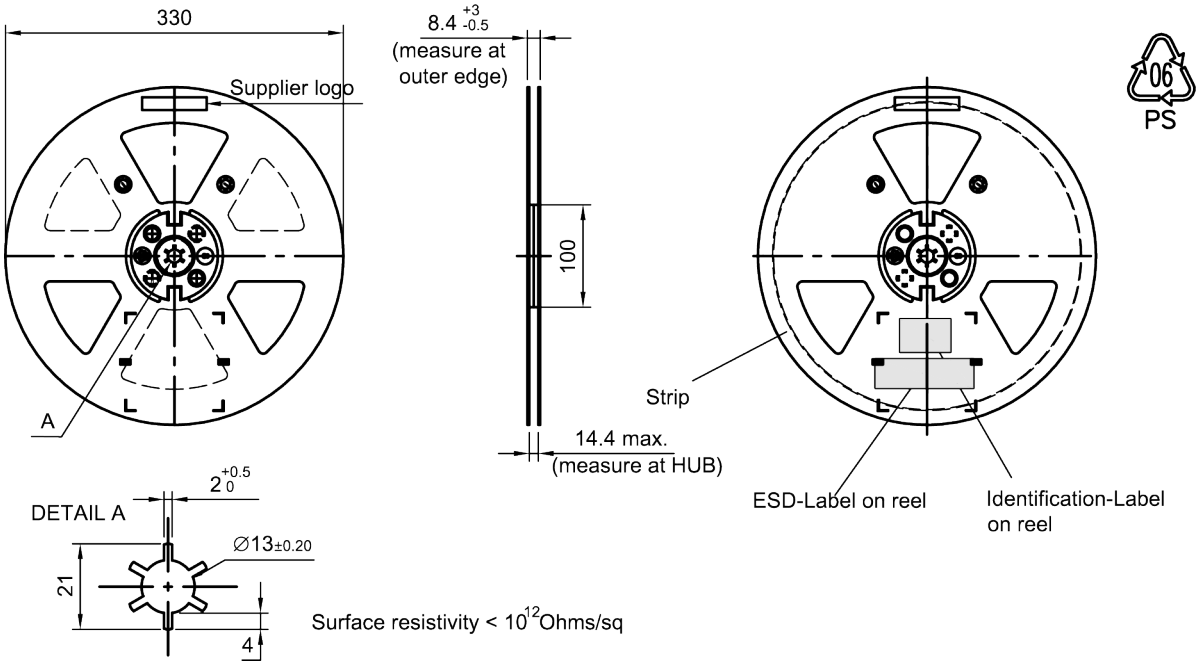


Figure 17: Drawing of reel (first-angle projection) with diameter of 330 mm.

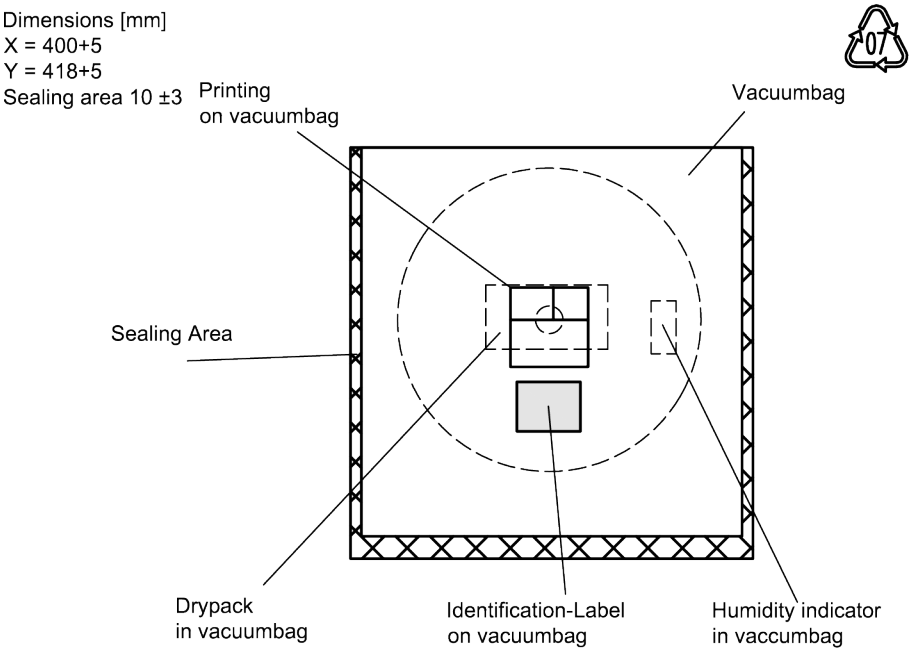


Figure 18: Drawing of moisture barrier bag (MBB) for reel with diameter of 330 mm.

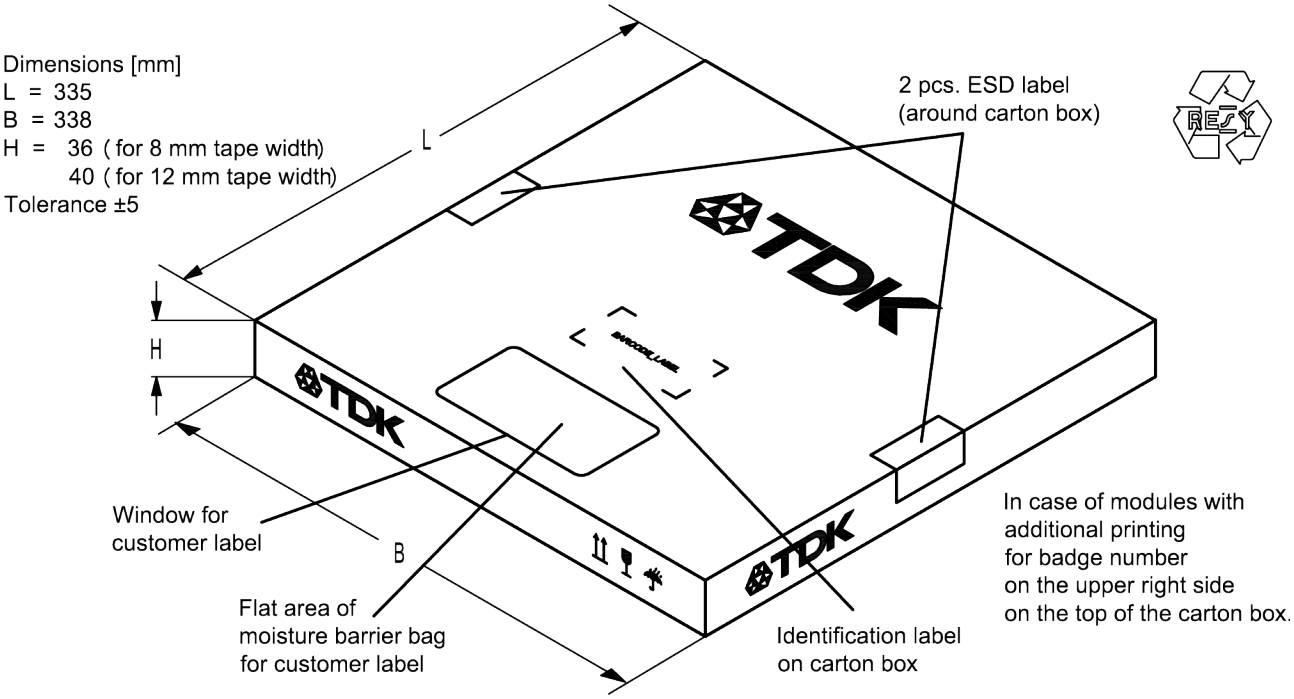


Figure 19: Drawing of folding box for reel with diameter of 330 mm.

13 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 B8612 is 8D4.

- 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.

14 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).

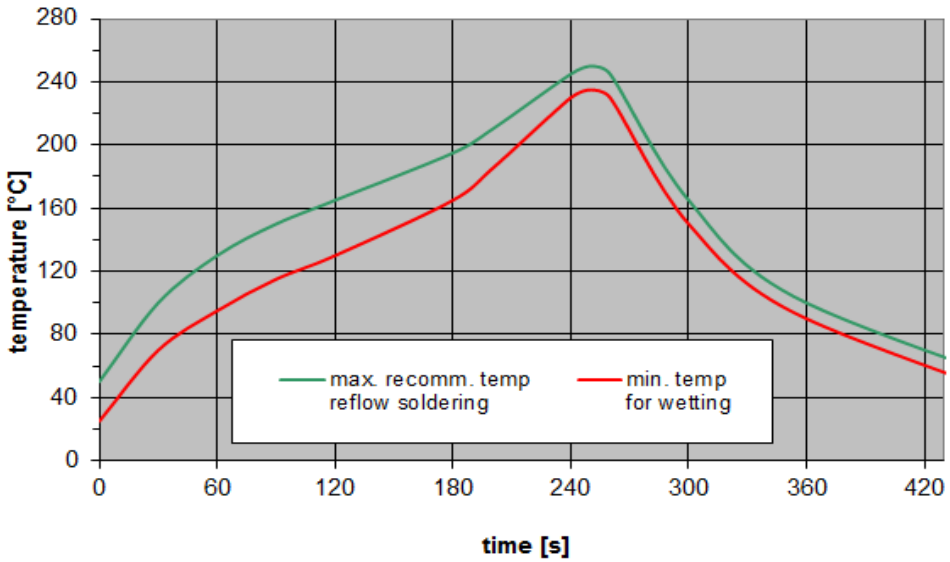


Figure 20: Recommended reflow profile for convection and infrared soldering – lead-free solder.

15 Annotations

15.1 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.

15.2 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.

15.3 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.

15.4 Ordering code and packing units

Ordering code	Packing units
B39741B8612P810	15000 pcs
B39741B8612P810S 5	5000 pcs

Table 4: Ordering codes and packing units.

16 Cautions and warnings

16.1 Moldability

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

16.2 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.

Contact and Important notes

For further information please contact your local EPCOS sales office or visit our web page at www.epcos.com.

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