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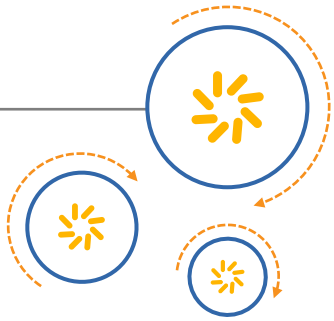

SAW Components

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

SAW Components

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LTE Band 17

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Table of contents

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.

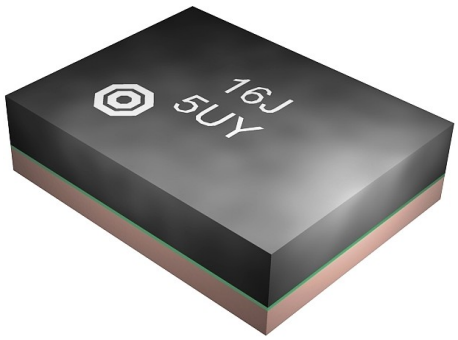
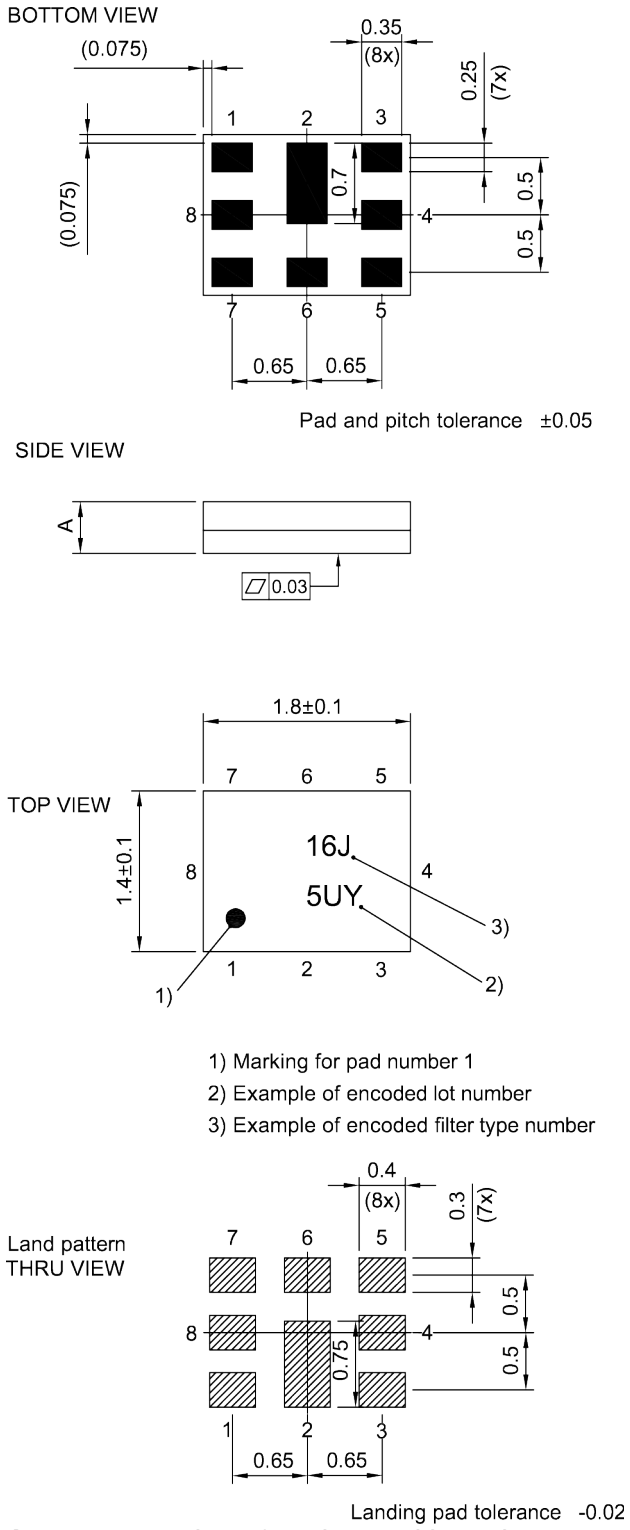


Figure 1: Picture of component with example of marking.

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

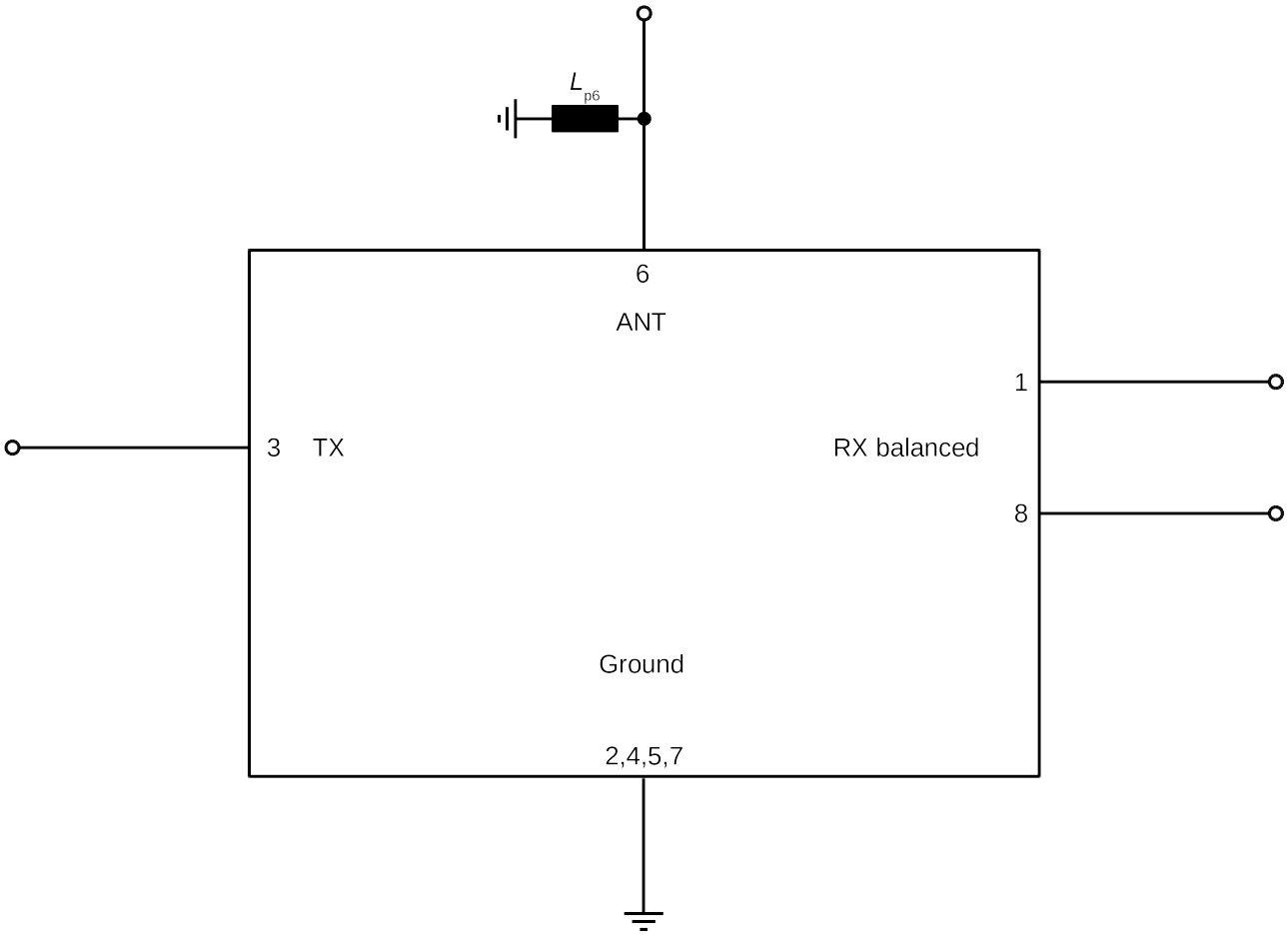


Figure 3: Schematic of matching circuit.

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

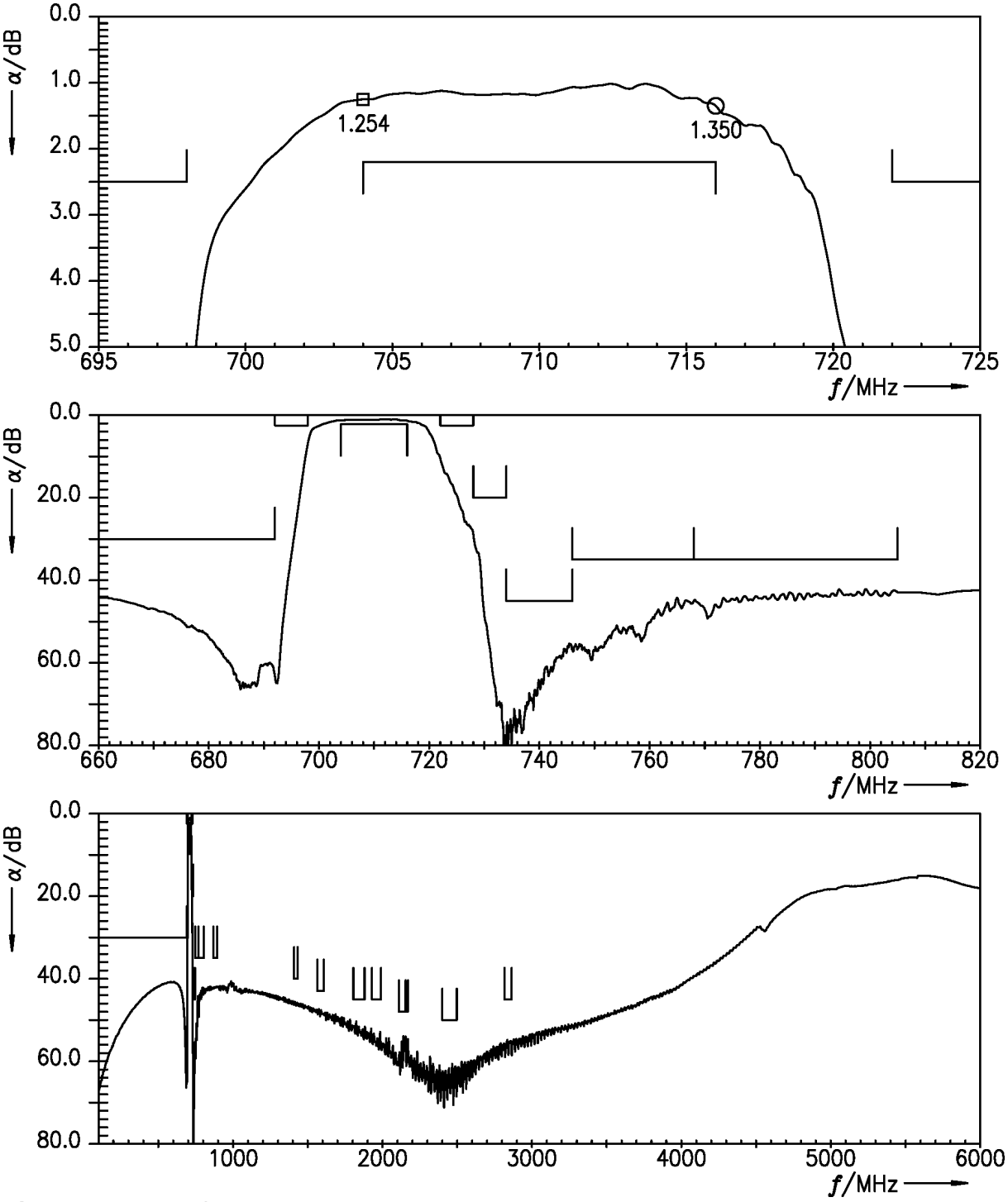


Figure 4: Attenuation TX – ANT.

8.2 ANT – RX

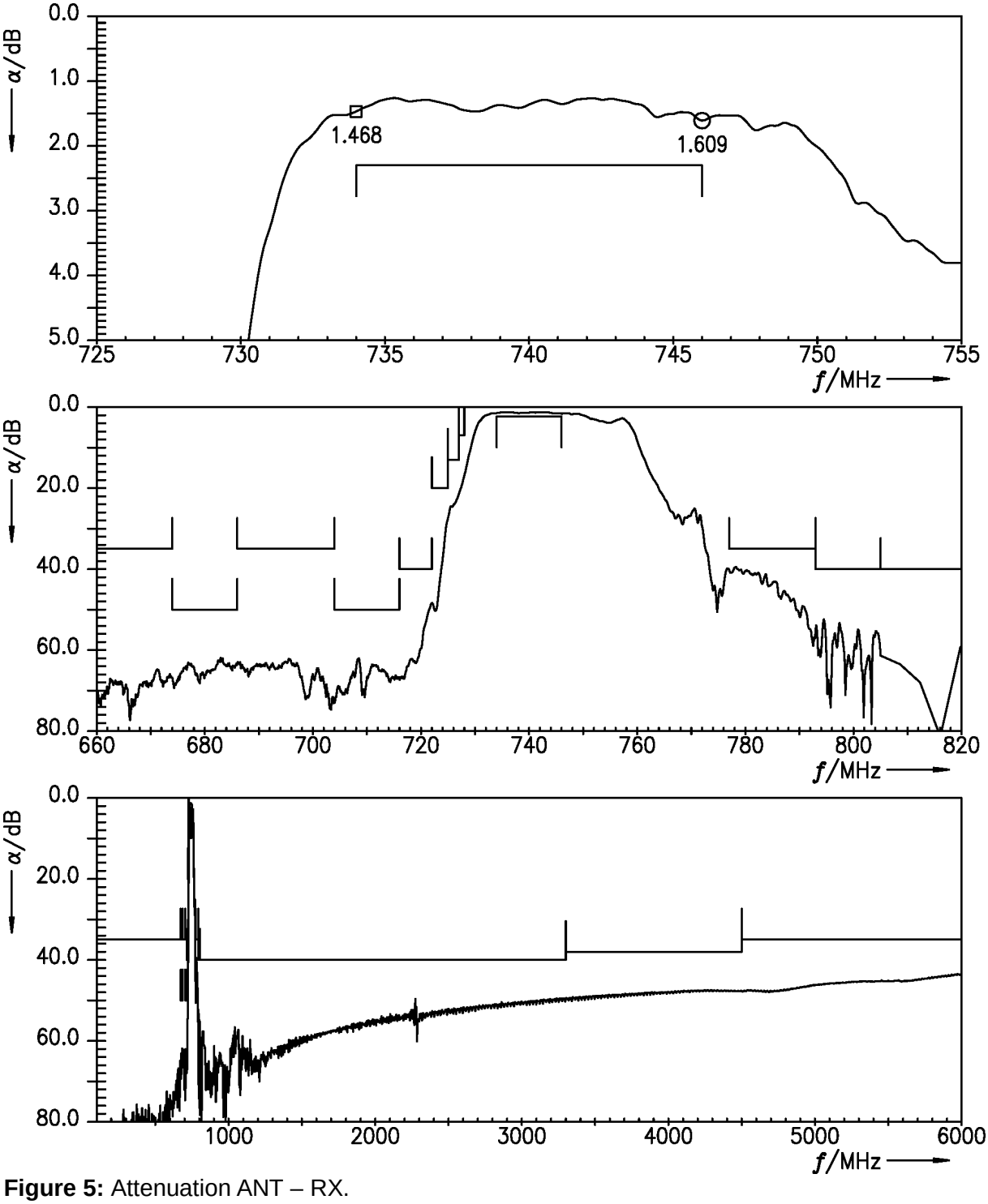


Figure 5: Attenuation ANT – RX.

8.3 TX – RX

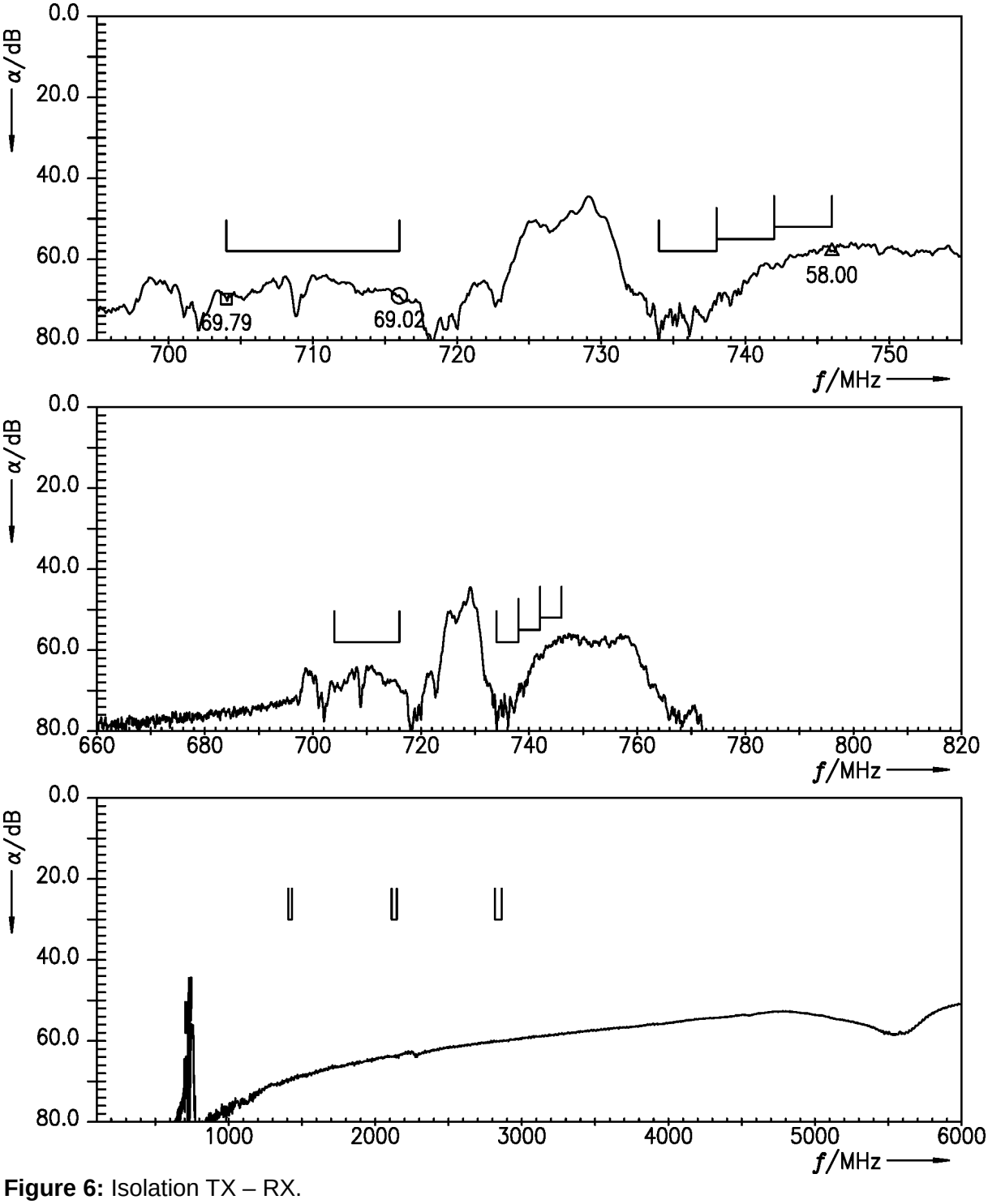


Figure 6: Isolation TX – RX.

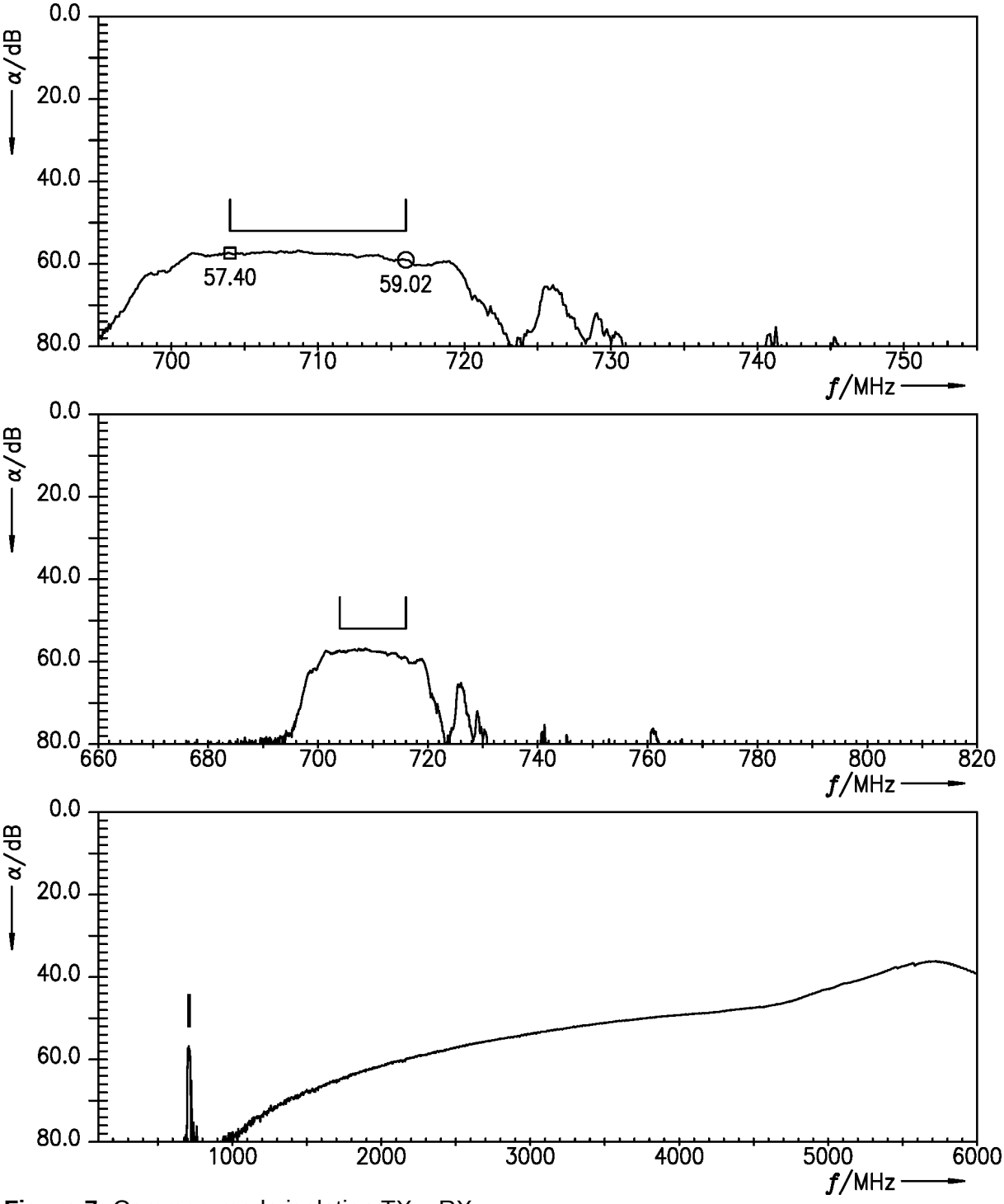


Figure 7: Common-mode isolation TX – RX.

9 Reflection coefficients

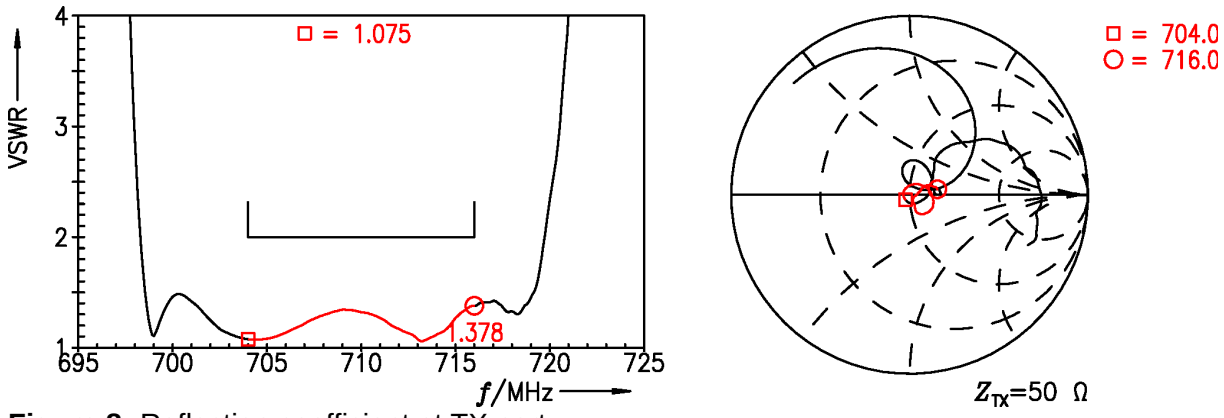


Figure 8: Reflection coefficient at TX port.

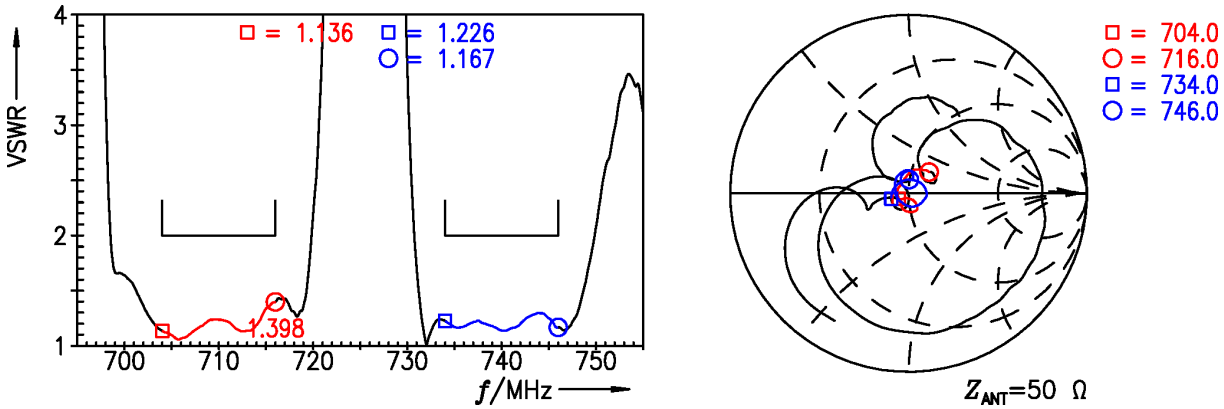


Figure 9: Reflection coefficient at ANT port (TX and RX frequencies).

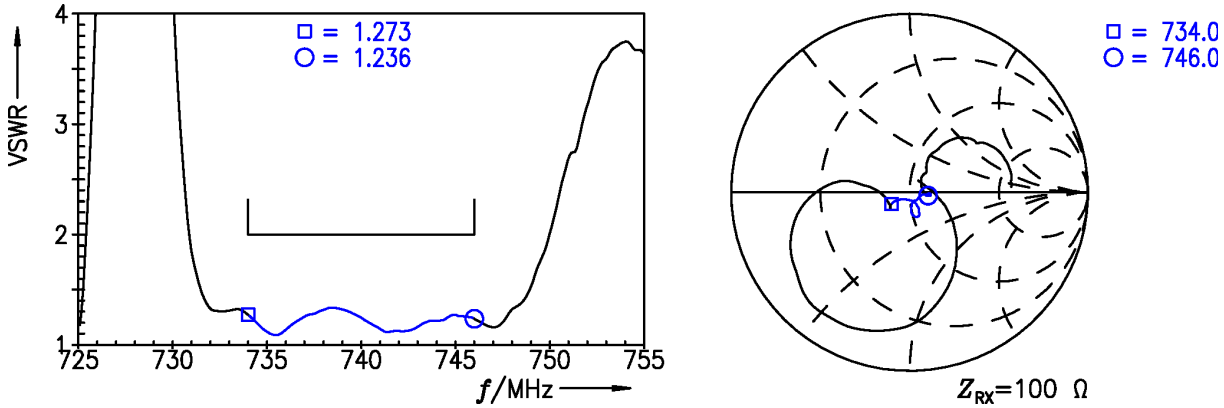


Figure 10: Reflection coefficient at RX port.

10 EVM

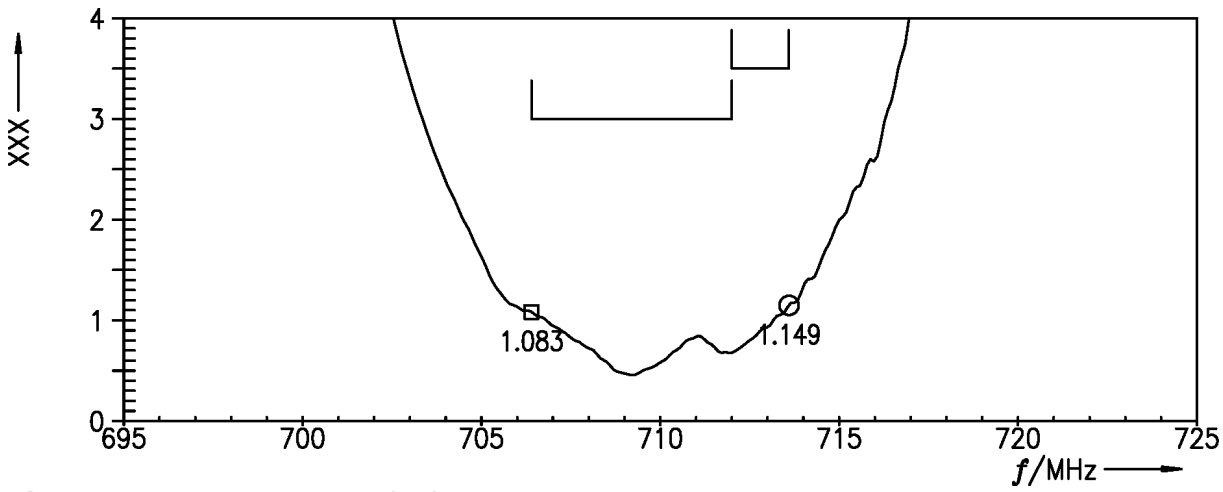


Figure 11: Error vector magnitude TX – ANT.

11 Common-mode rejection ratio

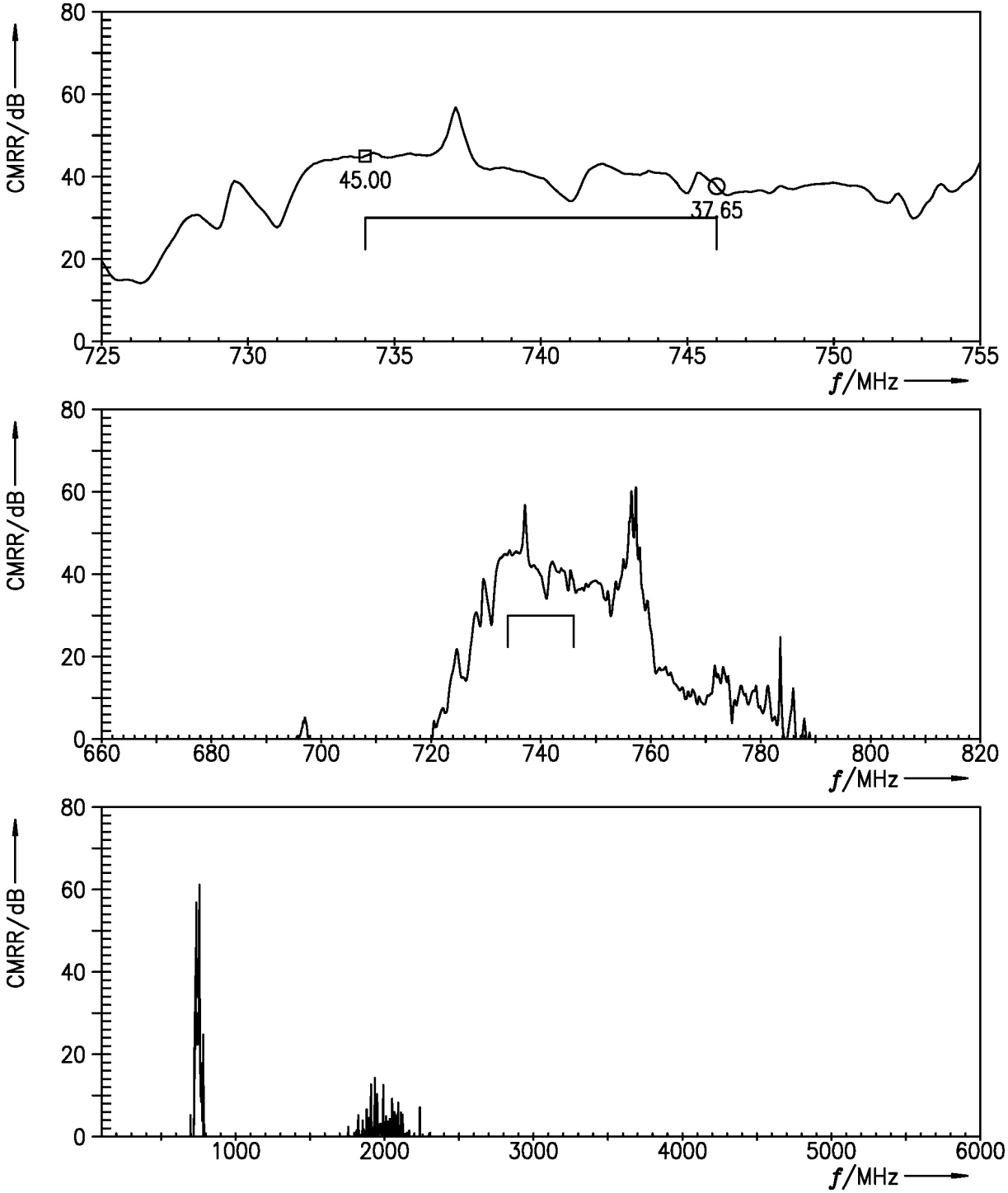


Figure 12: Common-mode rejection ratio ANT – RX.

12 Packing material

12.1 Tape

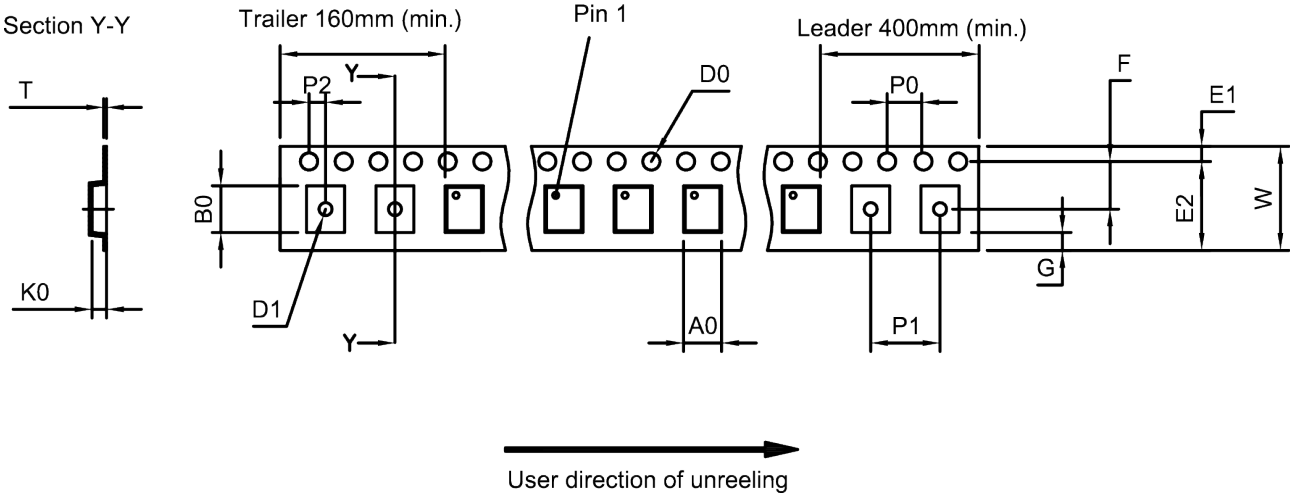


Figure 13: Drawing of tape (first-angle projection) with tape dimensions according to Table 1.

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

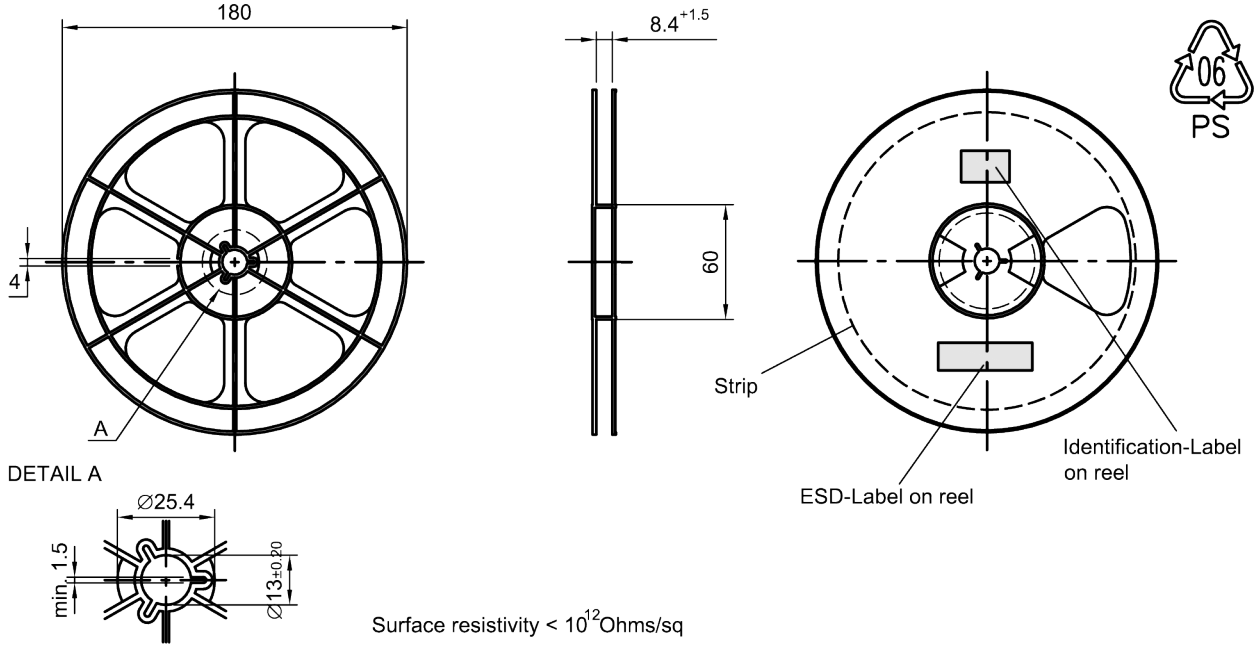


Figure 14: Drawing of reel (first-angle projection) with diameter of 180 mm.

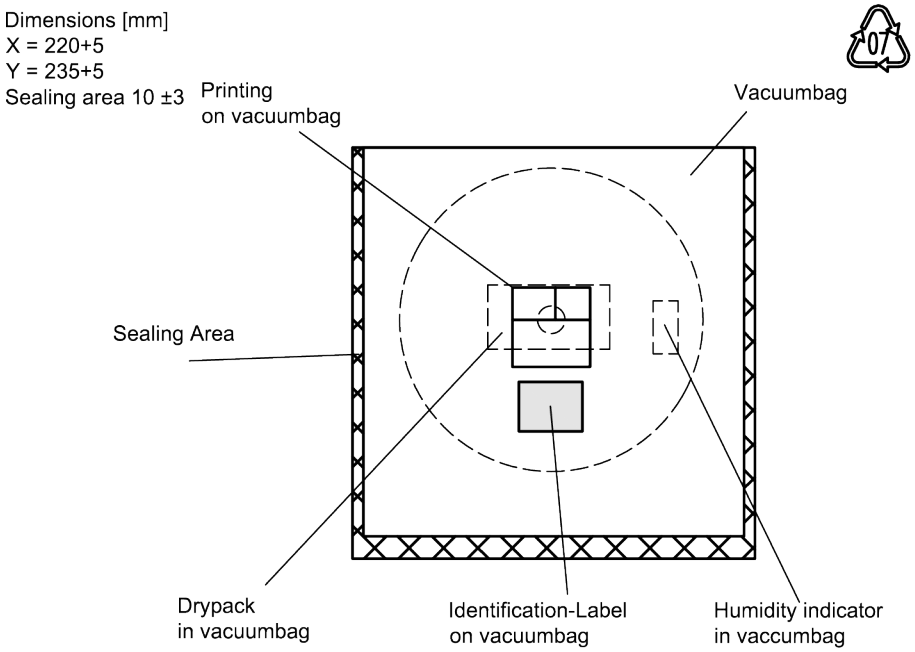


Figure 15: Drawing of moisture barrier bag (MBB) for reel with diameter of 180 mm.

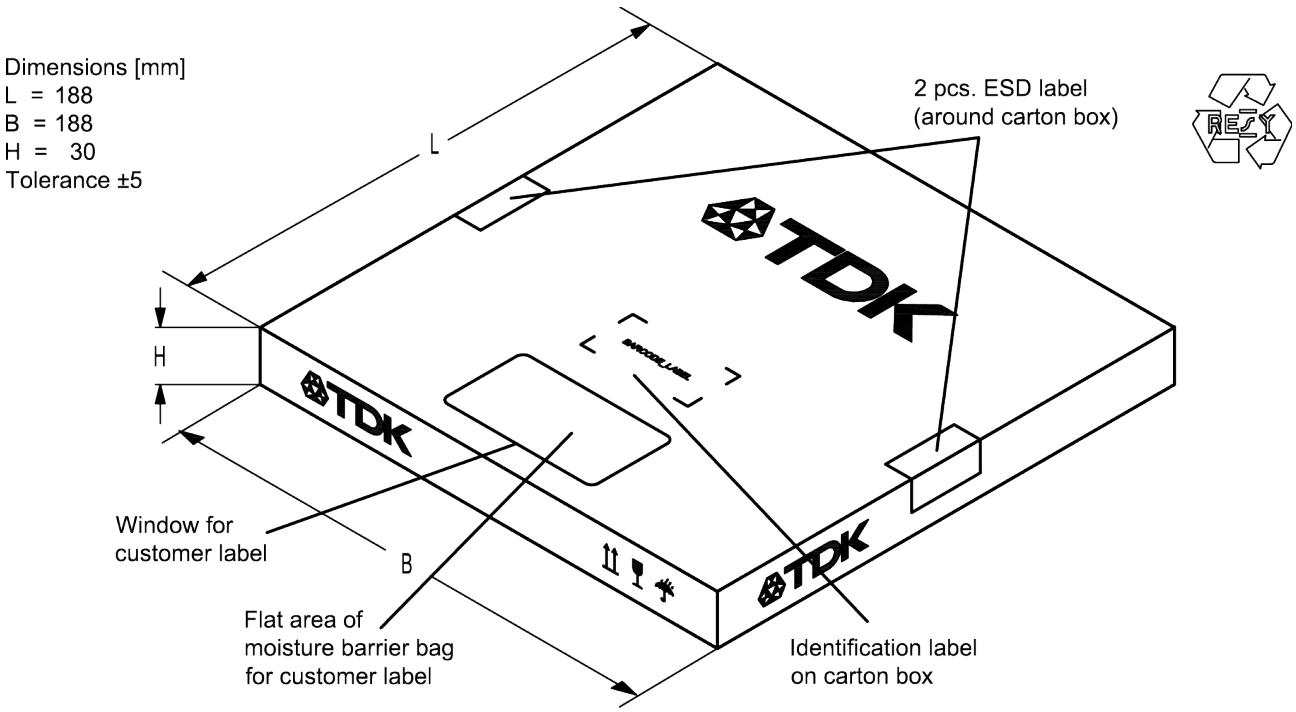


Figure 16: Drawing of folding box for reel with diameter of 180 mm.

12.3 Reel with diameter of 330 mm

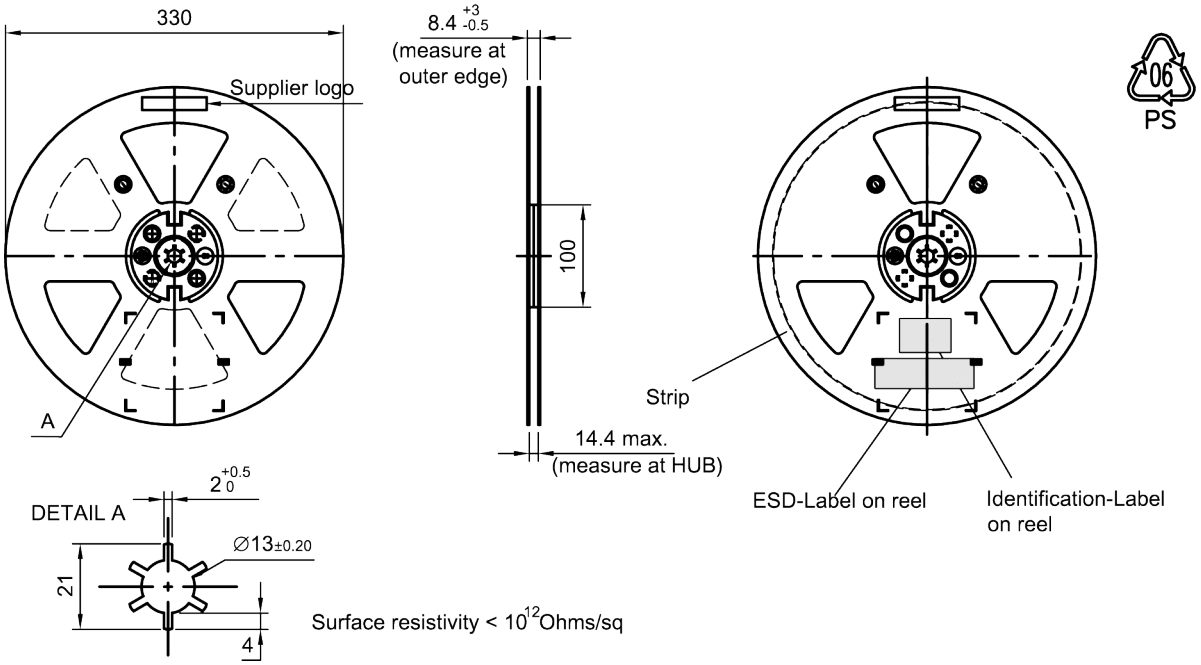


Figure 17: Drawing of reel (first-angle projection) with diameter of 330 mm.

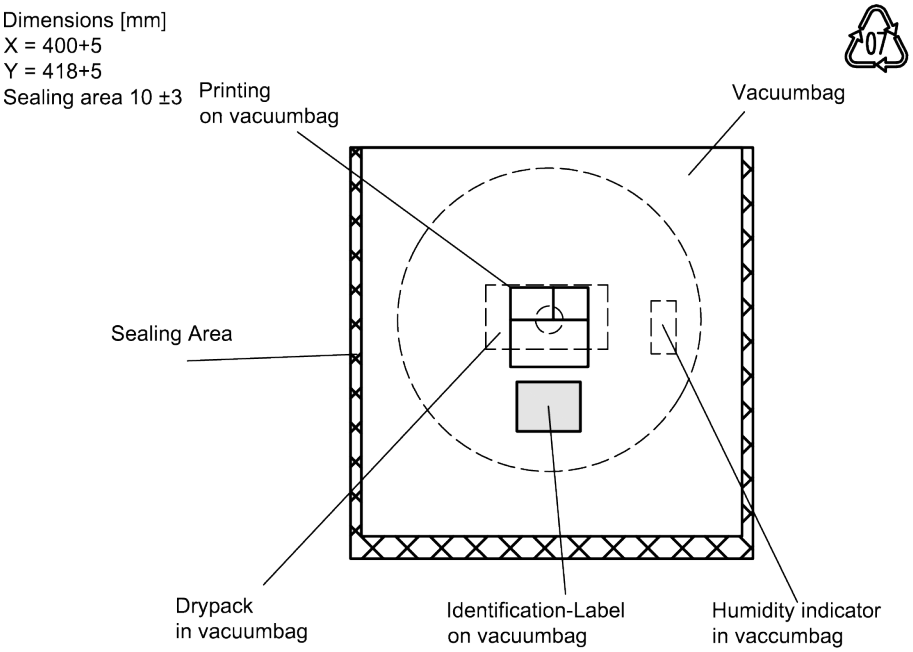


Figure 18: Drawing of moisture barrier bag (MBB) for reel with diameter of 330 mm.

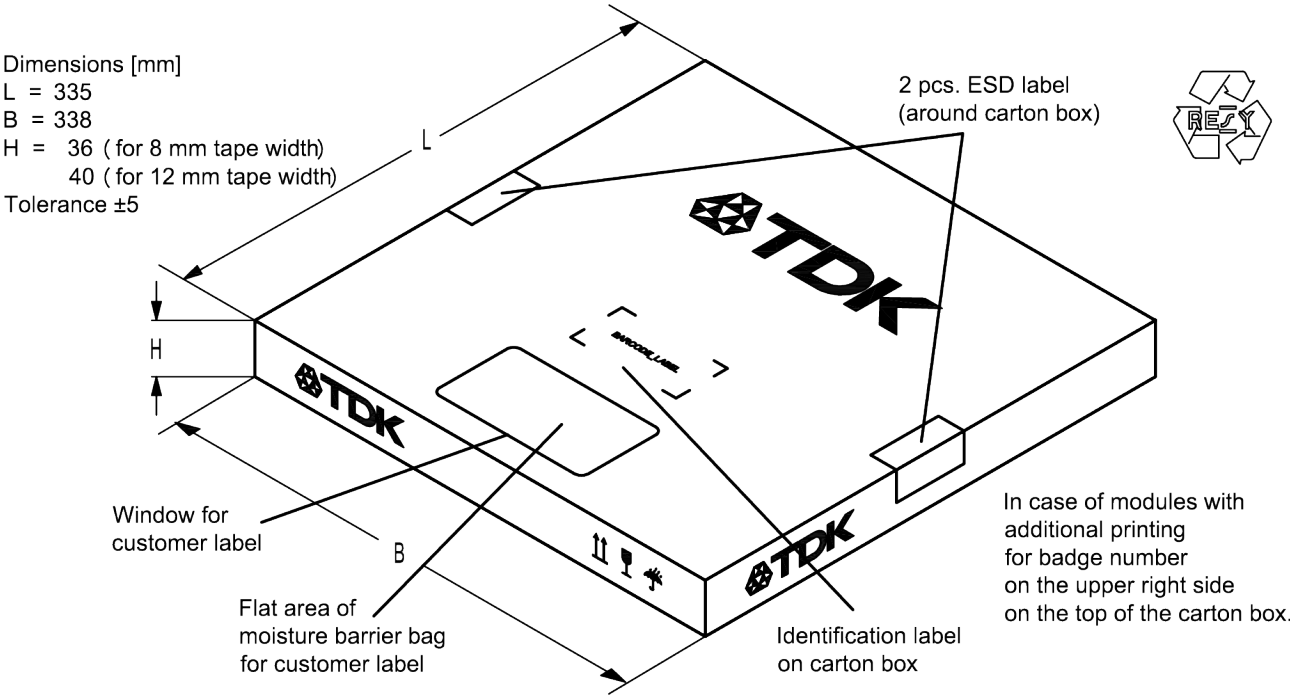


Figure 19: Drawing of folding box for reel with diameter of 330 mm.

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).

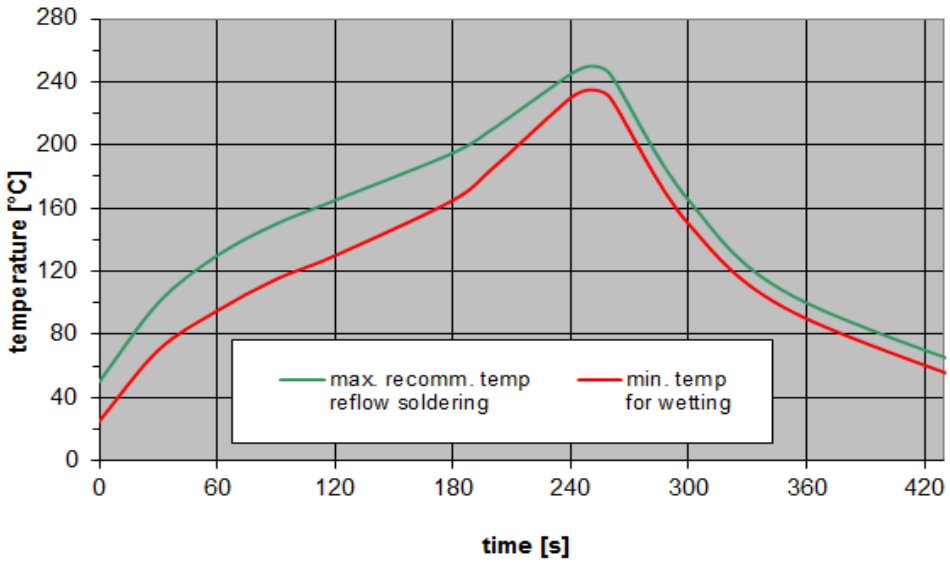


Figure 20: Recommended reflow profile for convection and infrared soldering – lead-free solder.