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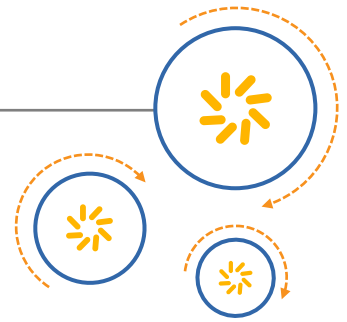
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RF360 Europe GmbH

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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Data sheet

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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.

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).

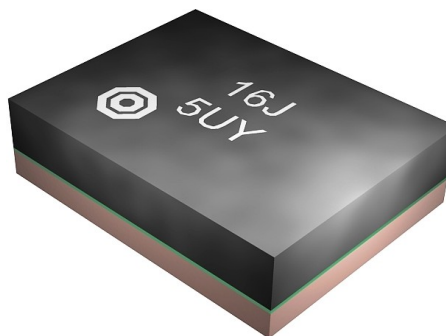
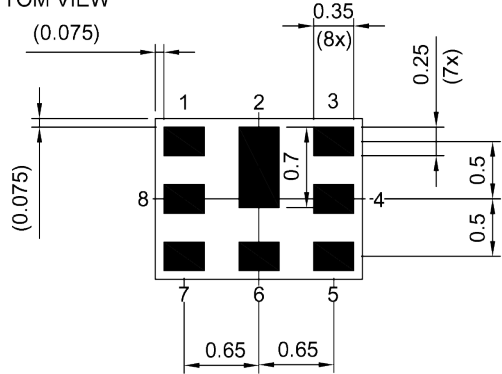


Figure 1: Picture of component with example of marking.

Data sheet

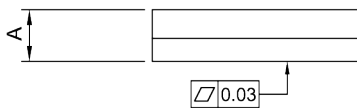
3 Package

BOTTOM VIEW

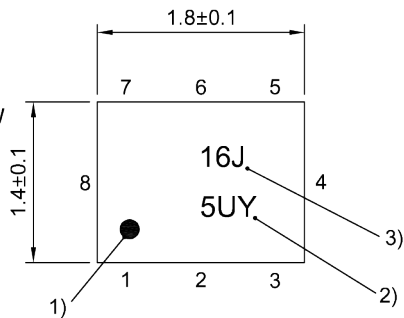


Pad and pitch tolerance ±0.05

SIDE VIEW

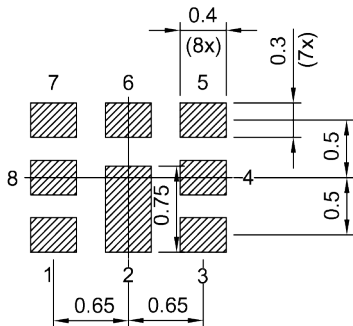


TOP VIEW



- 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

4 Pin configuration

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

Figure 2: Drawing of package with package height A = 0.475 mm (max.). See Simplified drawings (p. 24).

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5 Matching circuit

■ $L_{p6} = 15 \text{ nH}$

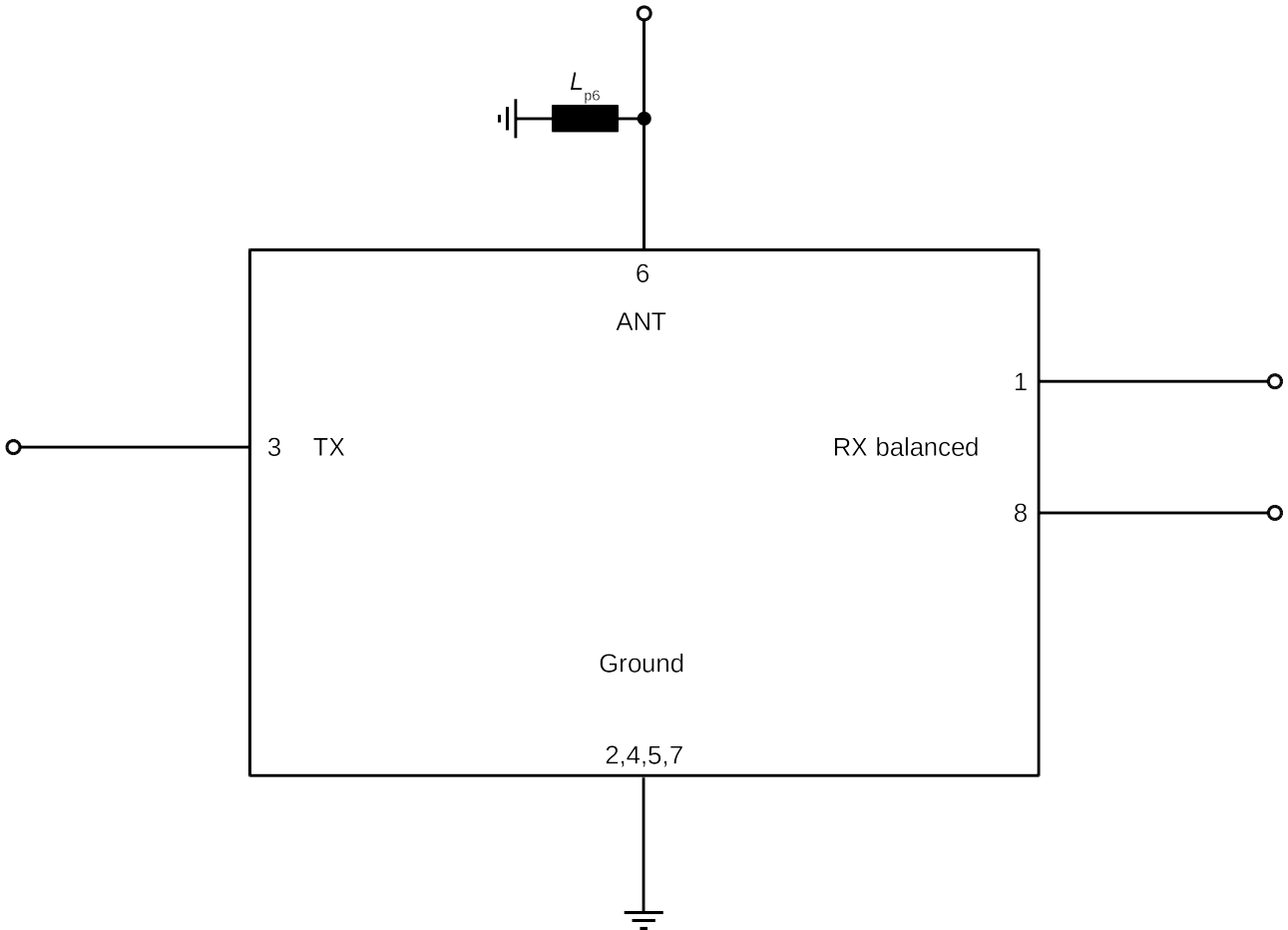


Figure 3: Schematic of matching circuit.

Data sheet

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	704... 716	MHz	α_{max}	—	1.4	2.2	dB
Amplitude ripple (p-p)	704... 716	MHz	$\Delta\alpha$	—	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

SAW Components **B8612**

SAW Duplexer **710 / 740 MHz**

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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

SAW Components	B8612
SAW Duplexer	710 / 740 MHz

Data sheet

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	—	740	—	MHz
Maximum insertion attenuation	—	1.6	2.3	dB
	734... 746	MHz		
Amplitude ripple (p-p)	—	0.3	1.0	dB
	734... 746	MHz		
Maximum VSWR	—	1.3	2.0	
@ ANT port	734... 746	MHz		
@ RX port	734... 746	MHz		
Minimum attenuation	35	64	—	dB
	10... 674	MHz		
	50	62	—	dB
	674... 686	MHz		
	35	62	—	dB
	686... 704	MHz		
	50	62	—	dB
	40	48	—	dB
	704... 716	MHz		
	20	27	—	dB
	13	21	—	dB
	7	16	—	dB
	35	39	—	dB
	40	53	—	dB
	40	50	—	dB
	38	47	—	dB
	35	44	—	dB
	777... 793	MHz		
	40	53	—	dB
	40	50	—	dB
	38	47	—	dB
	35	44	—	dB
	793... 805	MHz		
	40	50	—	dB
	38	47	—	dB
	35	44	—	dB
	722... 725	MHz		
	20	27	—	dB
	13	21	—	dB
	7	16	—	dB
	35	39	—	dB
	40	53	—	dB
	40	50	—	dB
	38	47	—	dB
	35	44	—	dB
	725... 727	MHz		
	13	21	—	dB
	7	16	—	dB
	35	39	—	dB
	40	53	—	dB
	40	50	—	dB
	38	47	—	dB
	35	44	—	dB
	727... 728	MHz		
	7	16	—	dB
	35	39	—	dB
	40	53	—	dB
	40	50	—	dB
	38	47	—	dB
	35	44	—	dB
	777... 793	MHz		
	35	39	—	dB
	40	53	—	dB
	40	50	—	dB
	38	47	—	dB
	35	44	—	dB
	793... 805	MHz		
	40	53	—	dB
	40	50	—	dB
	38	47	—	dB
	35	44	—	dB
Minimum common-mode rejection ratio	30	34	—	dB
	734... 746	MHz		

Data sheet

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						
	704... 716	MHz	52	57	—	dB

SAW Components	B8612
SAW Duplexer	710 / 740 MHz

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7 Maximum ratings

Storage temperature	$T_{STG} = -40\text{ °C to }+85\text{ °C}$	
DC voltage	$V_{DC} = 5.0\text{ V (max.)}$	
ESD voltage	$V_{ESD}^{1)} = 100\text{ V (max.)}$	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.

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8 Transmission coefficients

8.1 TX – ANT

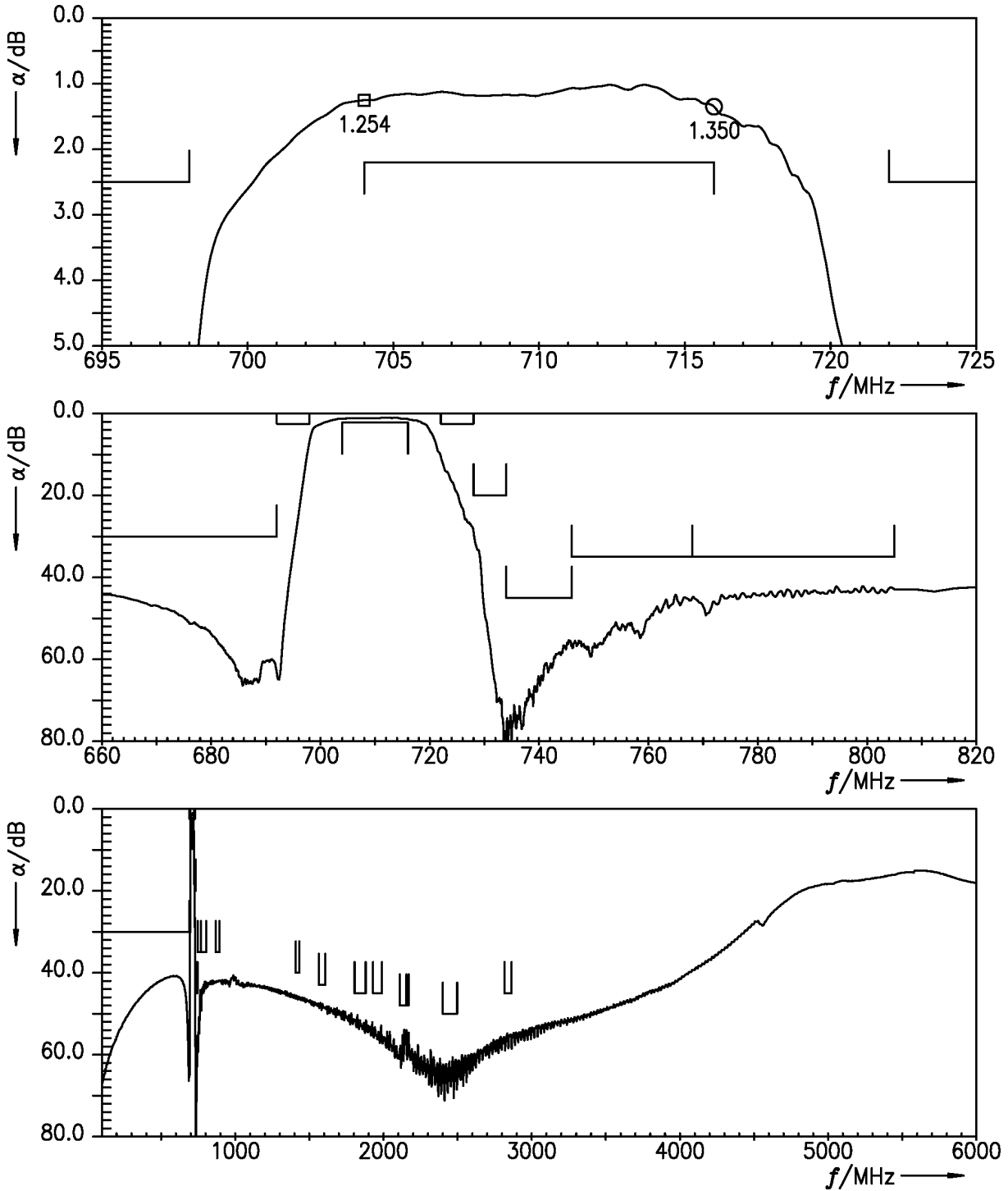


Figure 4: Attenuation TX – ANT.

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8.2 ANT – RX

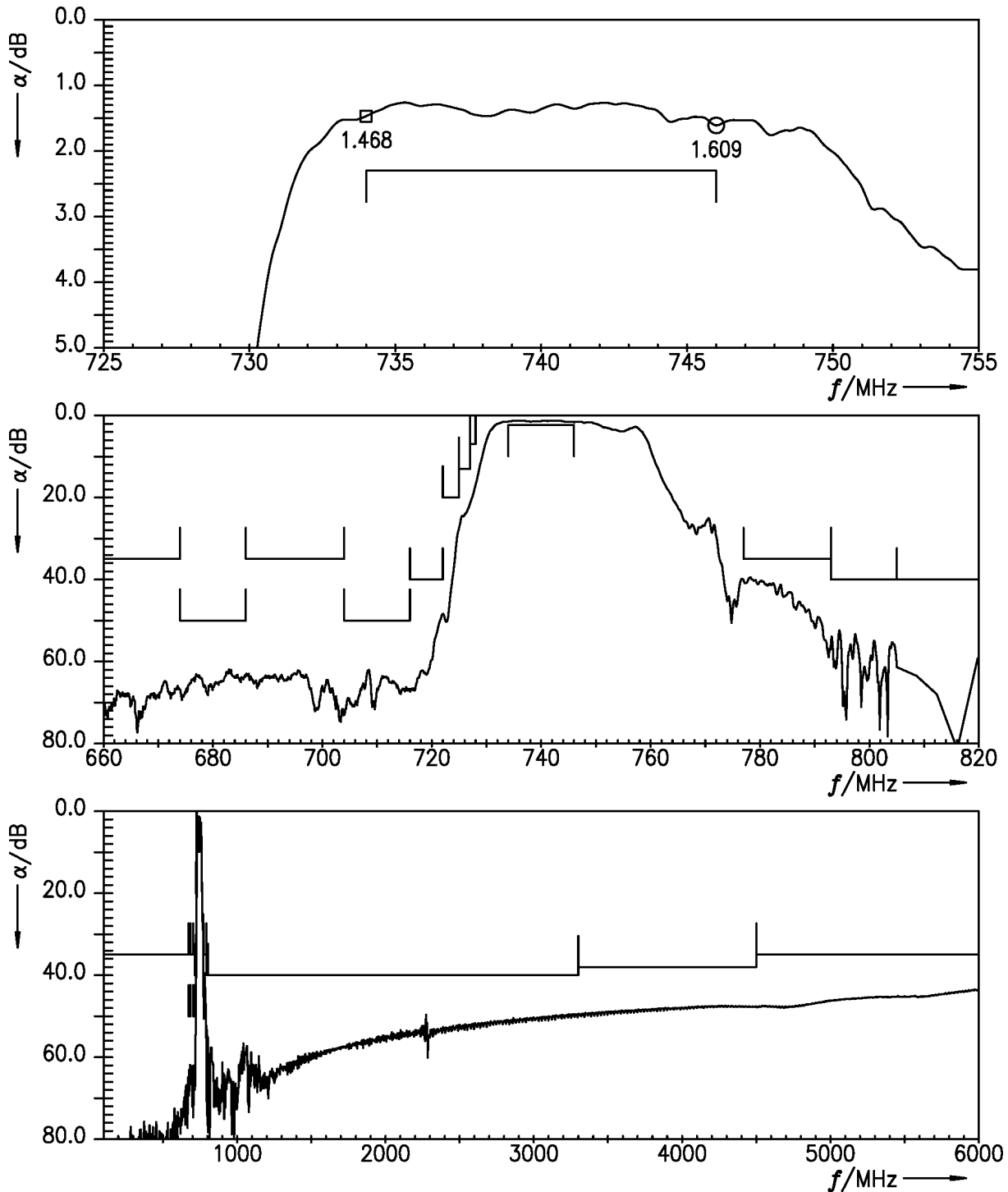


Figure 5: Attenuation ANT – RX.

Data sheet

8.3 TX – RX

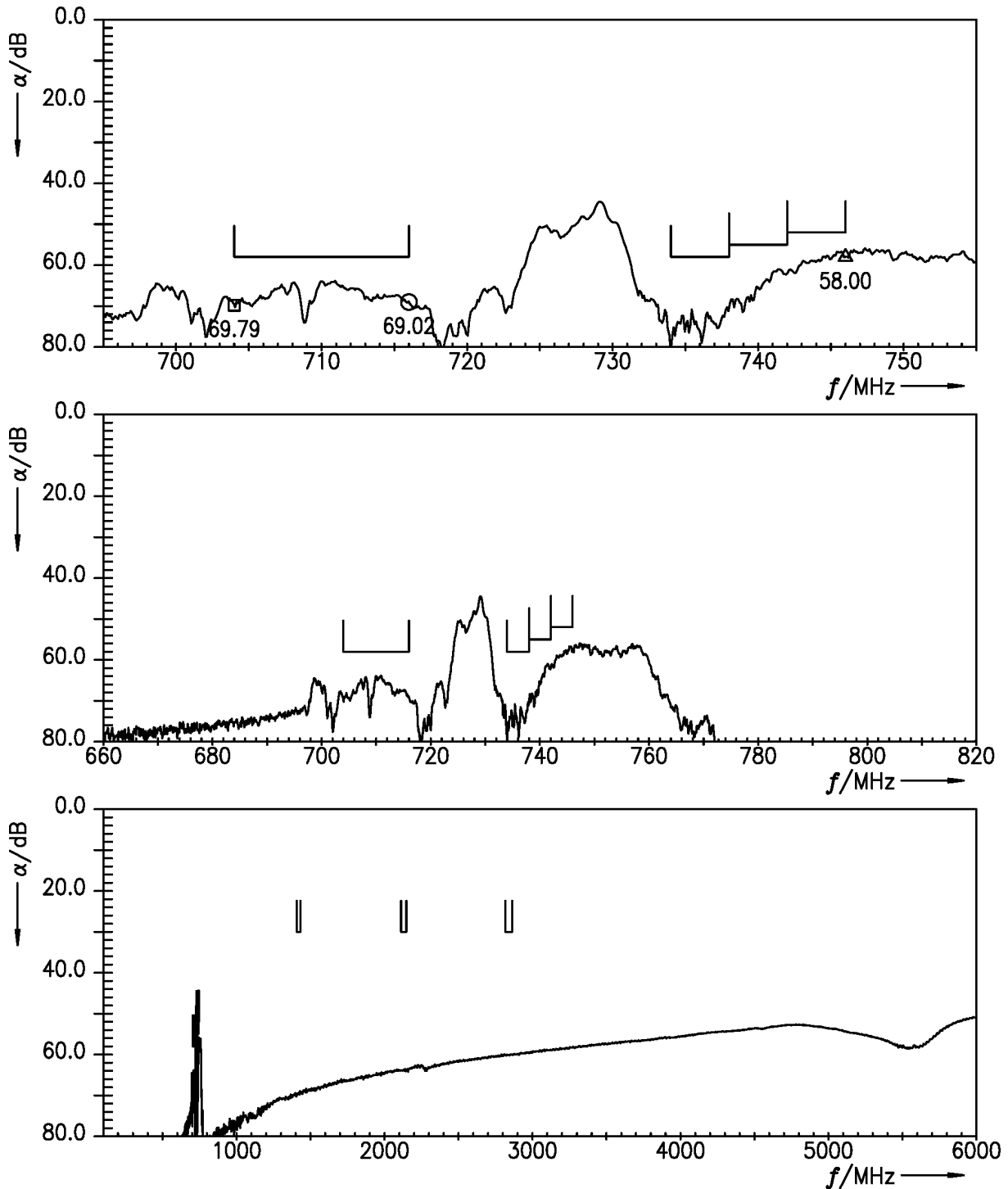


Figure 6: Isolation TX – RX.

Data sheet

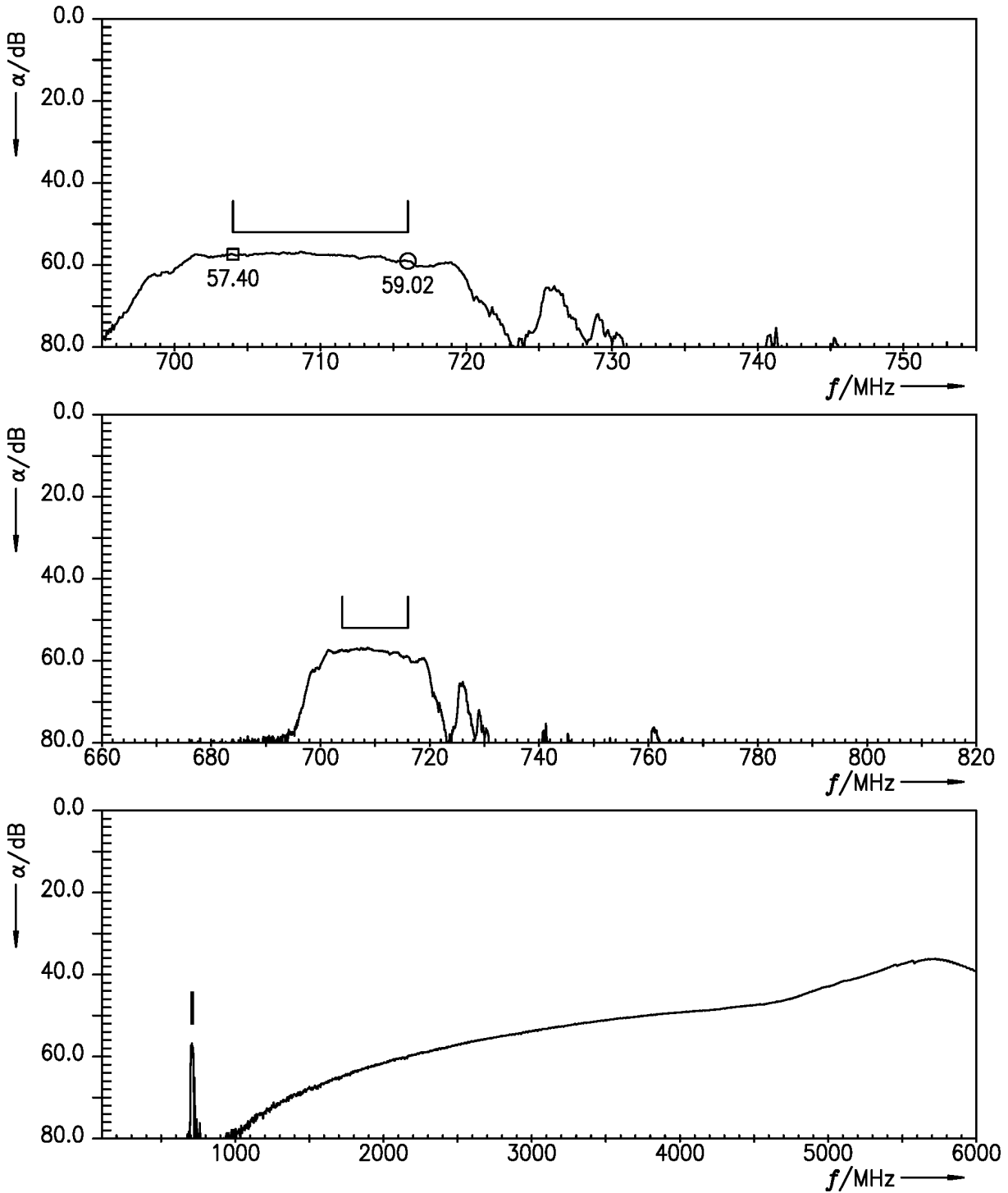


Figure 7: Common-mode isolation TX – RX.

Data sheet

9 Reflection coefficients

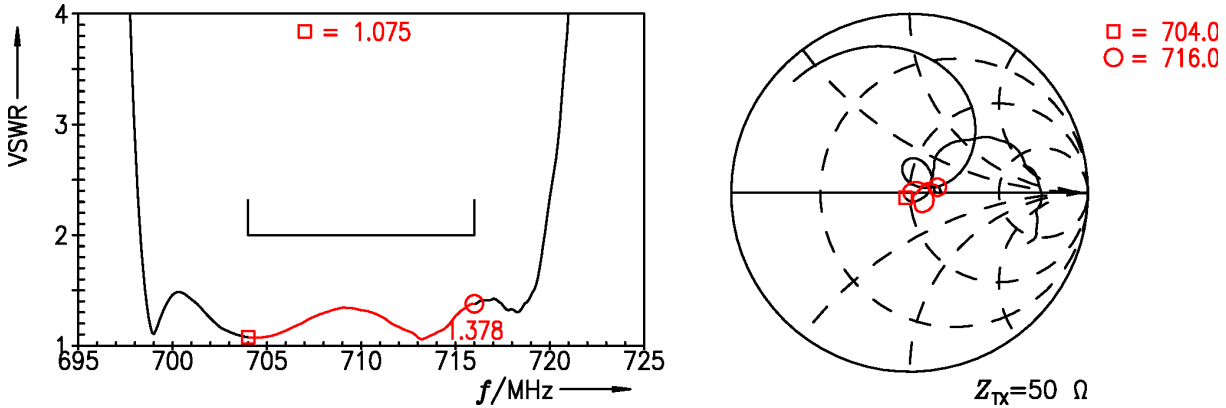


Figure 8: Reflection coefficient at TX port.

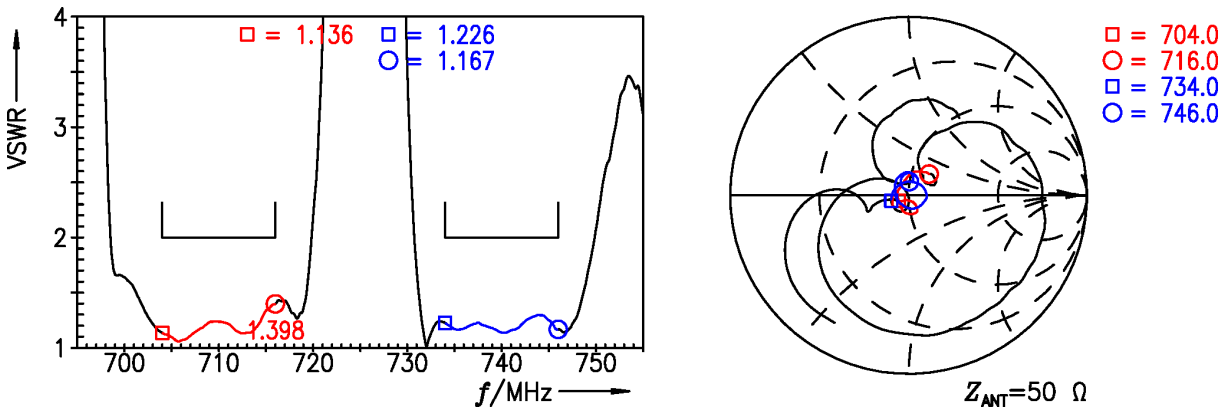


Figure 9: Reflection coefficient at ANT port (TX and RX frequencies).

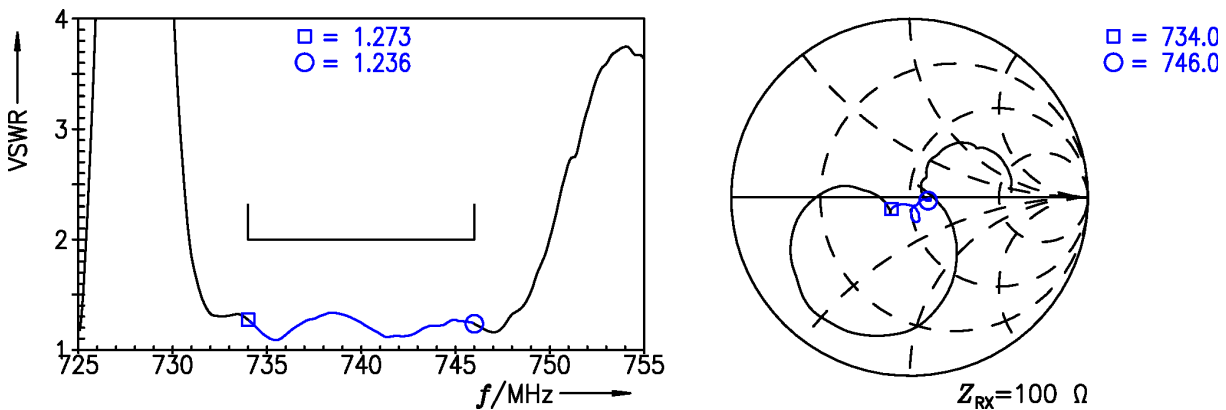


Figure 10: Reflection coefficient at RX port.

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10 EVM

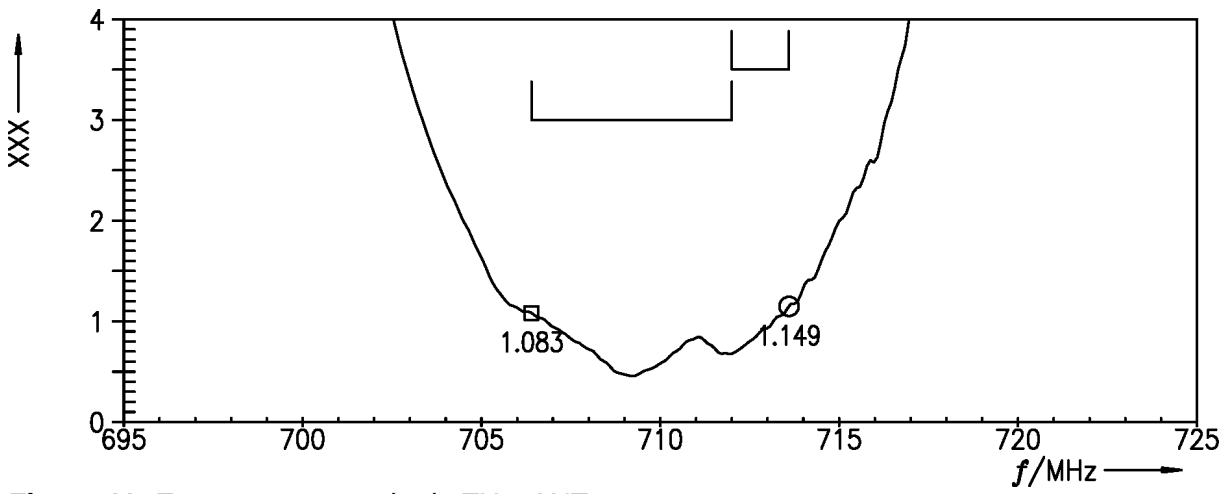


Figure 11: Error vector magnitude TX – ANT.

Data sheet

11 Common-mode rejection ratio

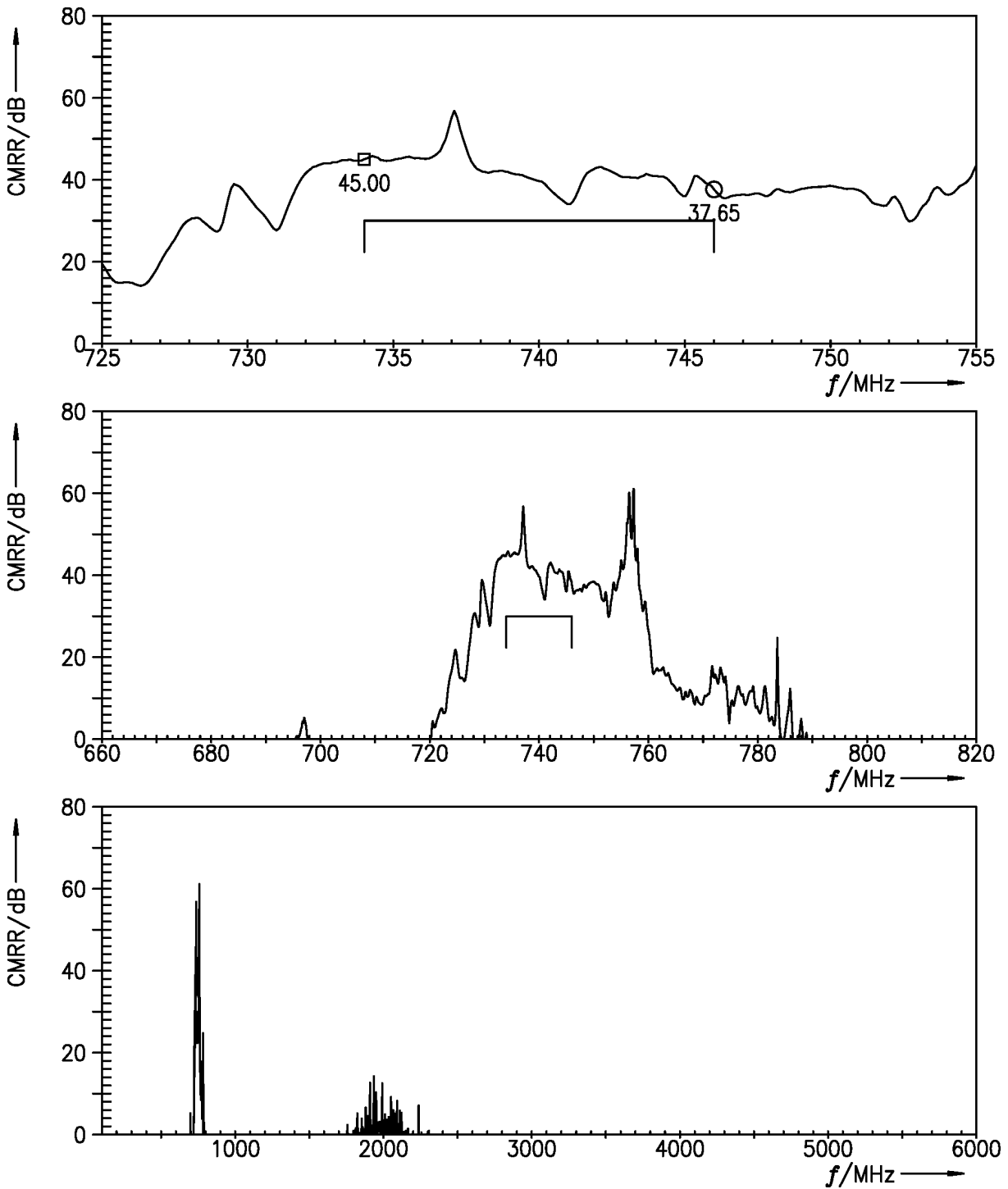


Figure 12: Common-mode rejection ratio ANT – RX.

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12 Packing material

12.1 Tape

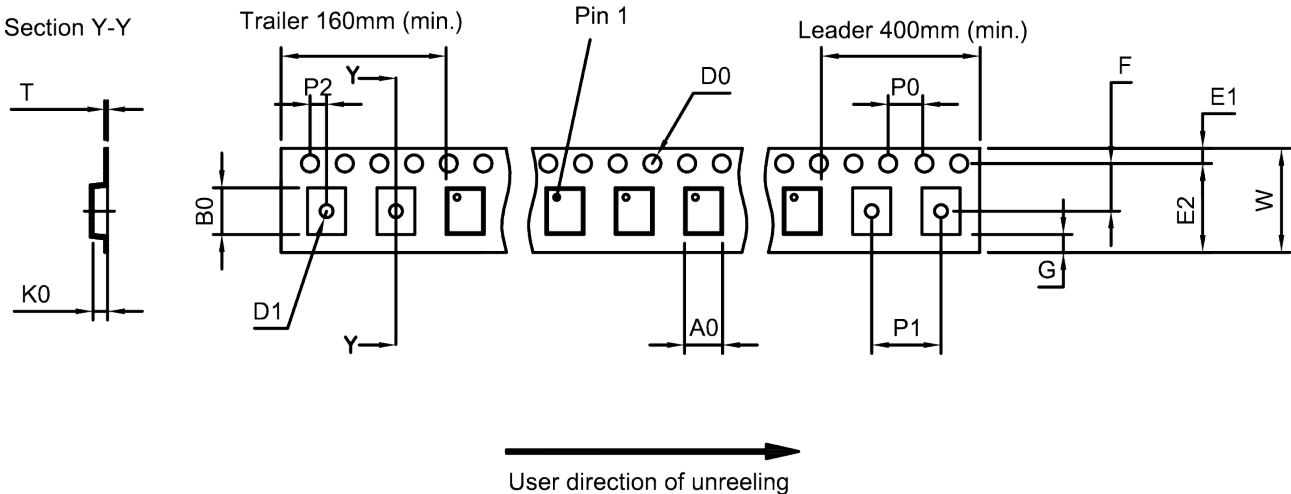


Figure 13: Drawing of tape (first-angle projection) with tape dimensions according to Table 1.

A ₀	1.62±0.05 mm
B ₀	2.04±0.05 mm
D ₀	1.5±0.05 mm
D ₁	0.8±0.05 mm
E ₁	1.75±0.1 mm

E ₂	6.25 mm (min.)
F	3.5±0.05 mm
G	0.75 mm (min.)
K ₀	0.62±0.05 mm
P ₀	4.0±0.1 mm

P ₁	4.0±0.1 mm
P ₂	2.0±0.05 mm
T	0.25±0.02 mm
W	8.0±0.1 mm

Table 1: Tape dimensions.

12.2 Reel with diameter of 180 mm

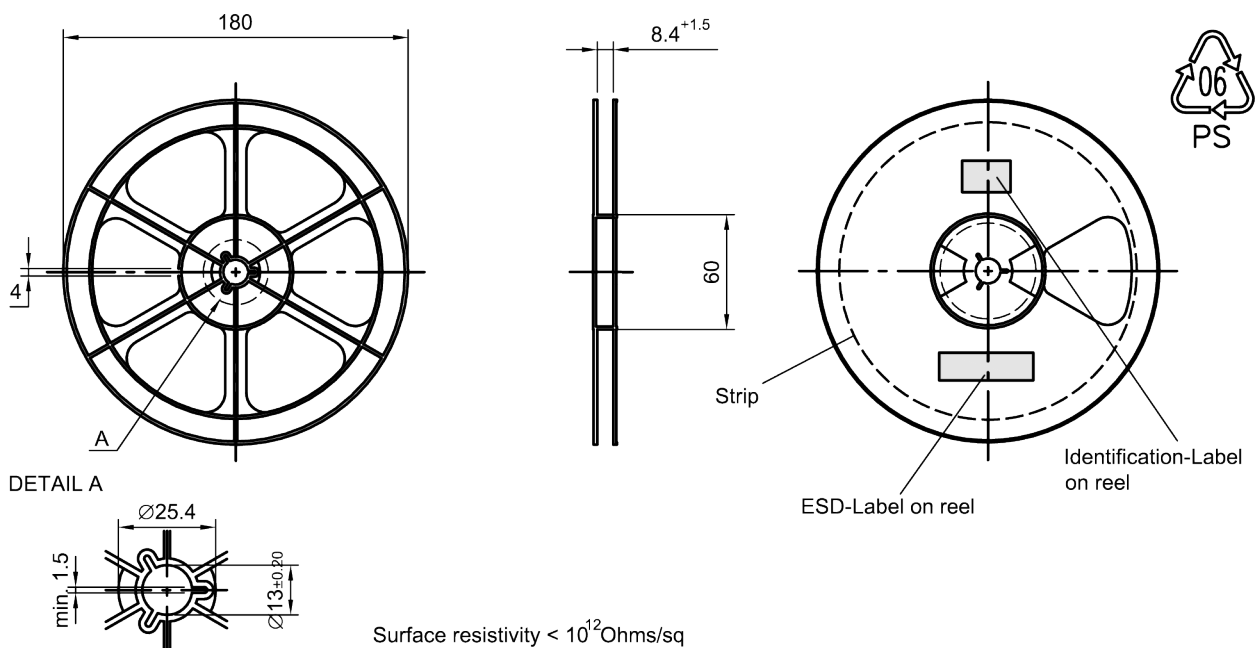


Figure 14: Drawing of reel (first-angle projection) with diameter of 180 mm.

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Dimensions [mm]

X = 220±5

Y = 235±5

Sealing area 10 ±3

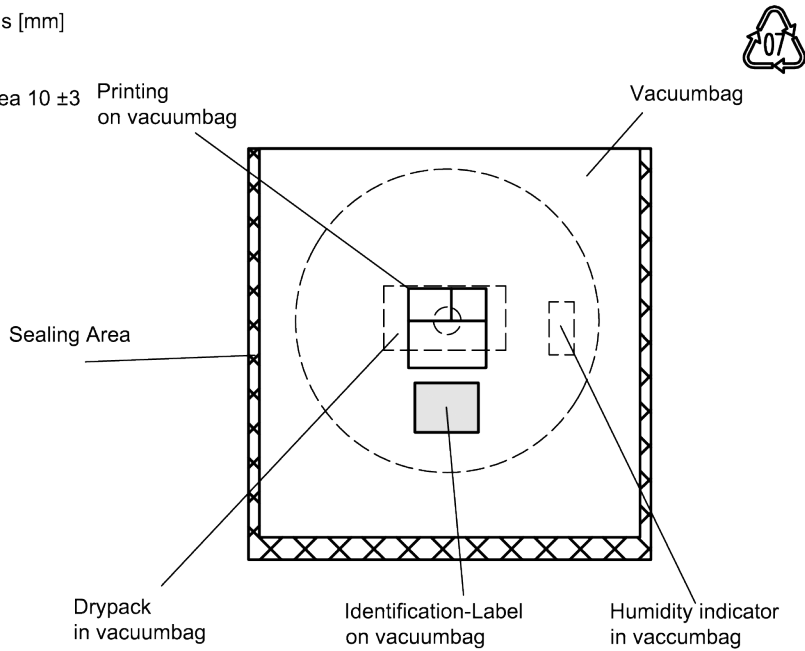


Figure 15: Drawing of moisture barrier bag (MBB) for reel with diameter of 180 mm.

Dimensions [mm]

L = 188

B = 188

H = 30

Tolerance ±5

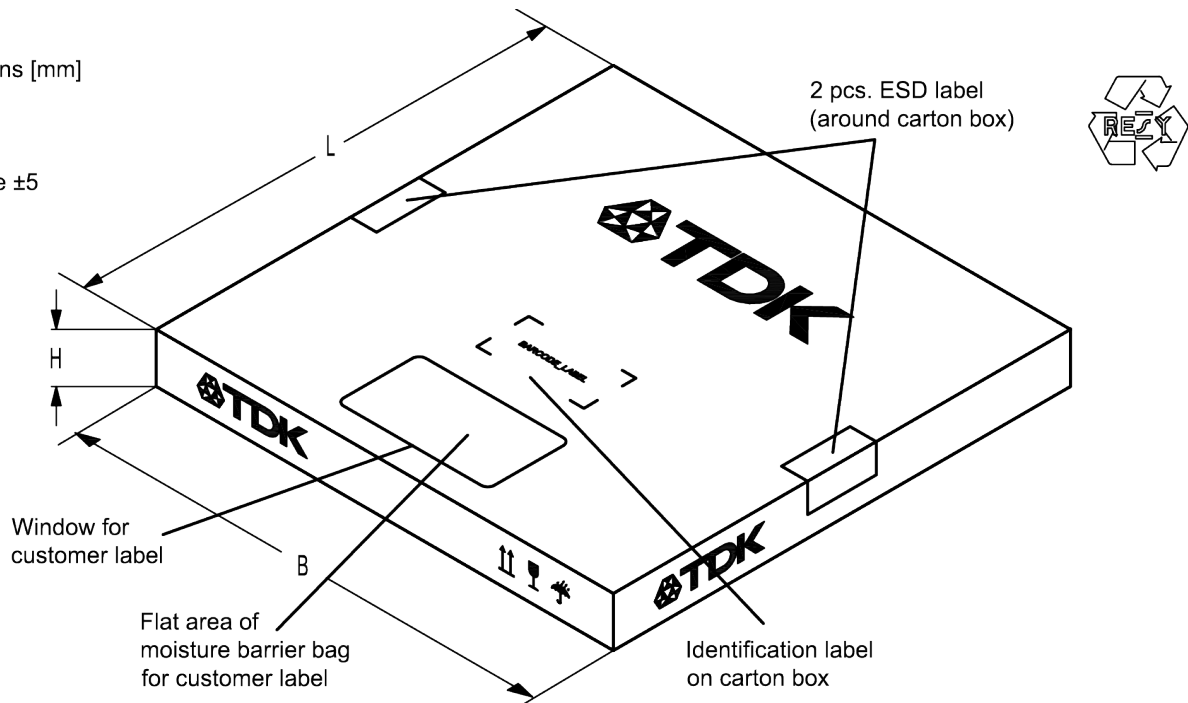


Figure 16: Drawing of folding box for reel with diameter of 180 mm.

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12.3 Reel with diameter of 330 mm

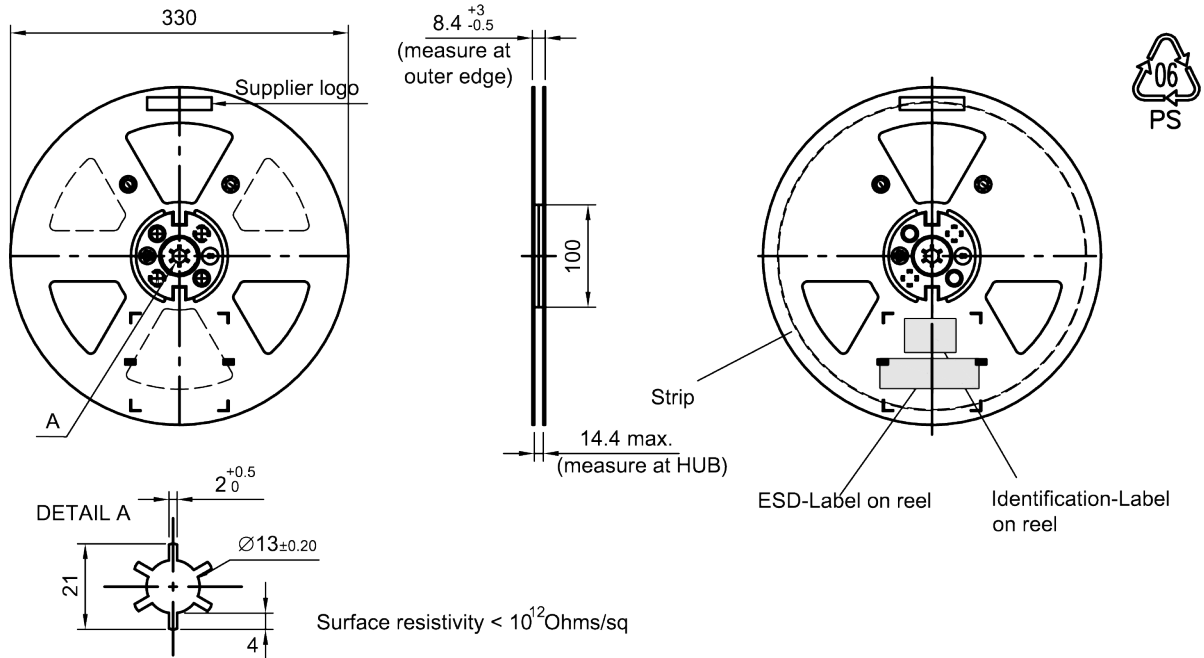


Figure 17: Drawing of reel (first-angle projection) with diameter of 330 mm.

Dimensions [mm]

X = 400+5

Y = 418+5

Sealing area 10 ±3

Printing on vacuumbag

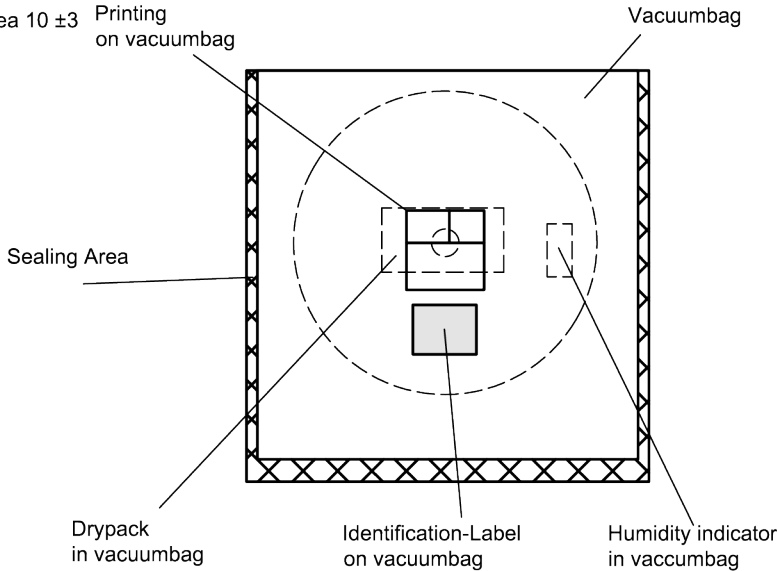
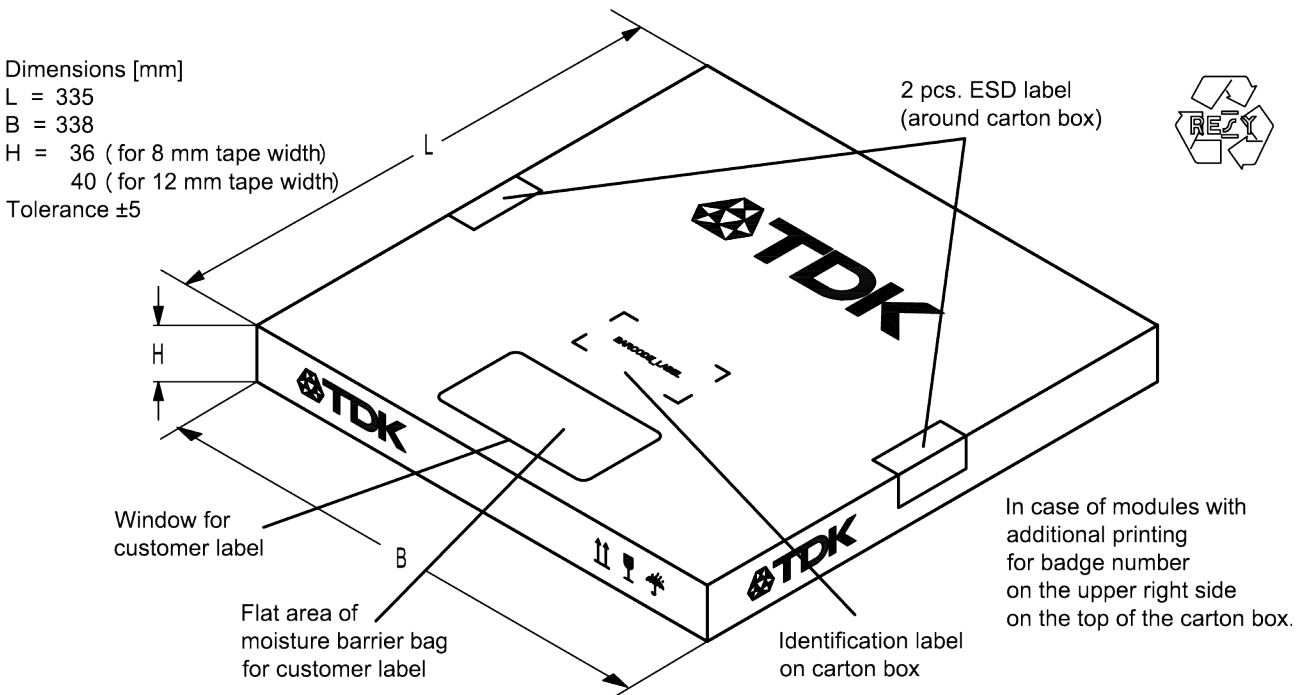


Figure 18: Drawing of moisture barrier bag (MBB) for reel with diameter of 330 mm.

Data sheet


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.

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

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.

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

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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.

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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
$T > 220\text{ °C}$	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_{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).

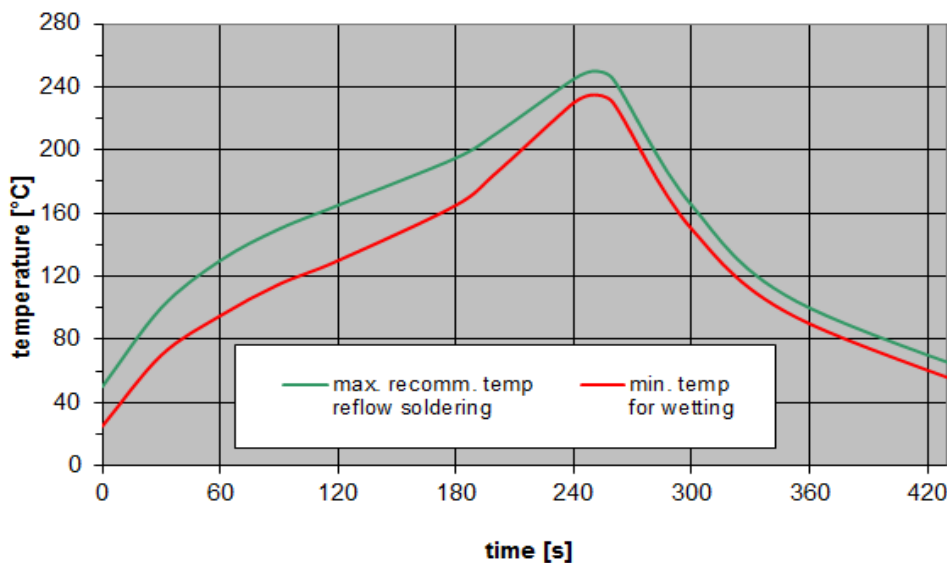


Figure 20: Recommended reflow profile for convection and infrared soldering – lead-free solder.