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RF360 Europe GmbH

A Qualcomm – TDK Joint Venture

SAW components

SAW duplexer

Small cell & femtocell
LTE band 28a

Series/type:	B8035
Ordering code:	B39771B8035P810
Date:	May 09, 2018
Version:	2.1

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

SAW components **B8035**

SAW duplexer **718 / 773 MHz**

Data sheet

Table of contents

1 Application

- Low-loss SAW duplexer for 3G/LTE small cell & femtocell systems (Band 28a)
- Usable pass band: 30 MHz
- High power durability in downlink
- Rx = uplink = 703-733 MHz
- Tx = downlink = 758-788 MHz

2 Features

- Industrial grade qualified family
- Package size 2.5±0.1 mm × 2.0±0.1 mm
- Package height 0.5 mm (max.)
- Approximate weight 0.01 g
- RoHS compatible
- Package for Surface Mount Technology (SMT)
- Ni/Au-plated terminals
- Electrostatic Sensitive Device (ESD)
- Moisture Sensitivity Level 2a (MSL2a)

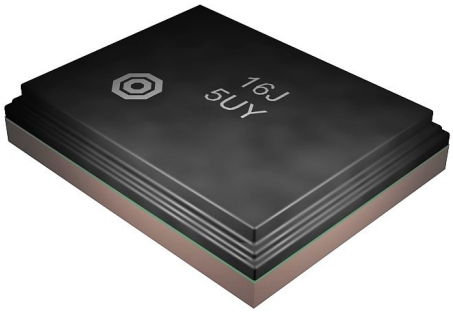

Figure 1: Picture of component with example of product marking.

3 Package

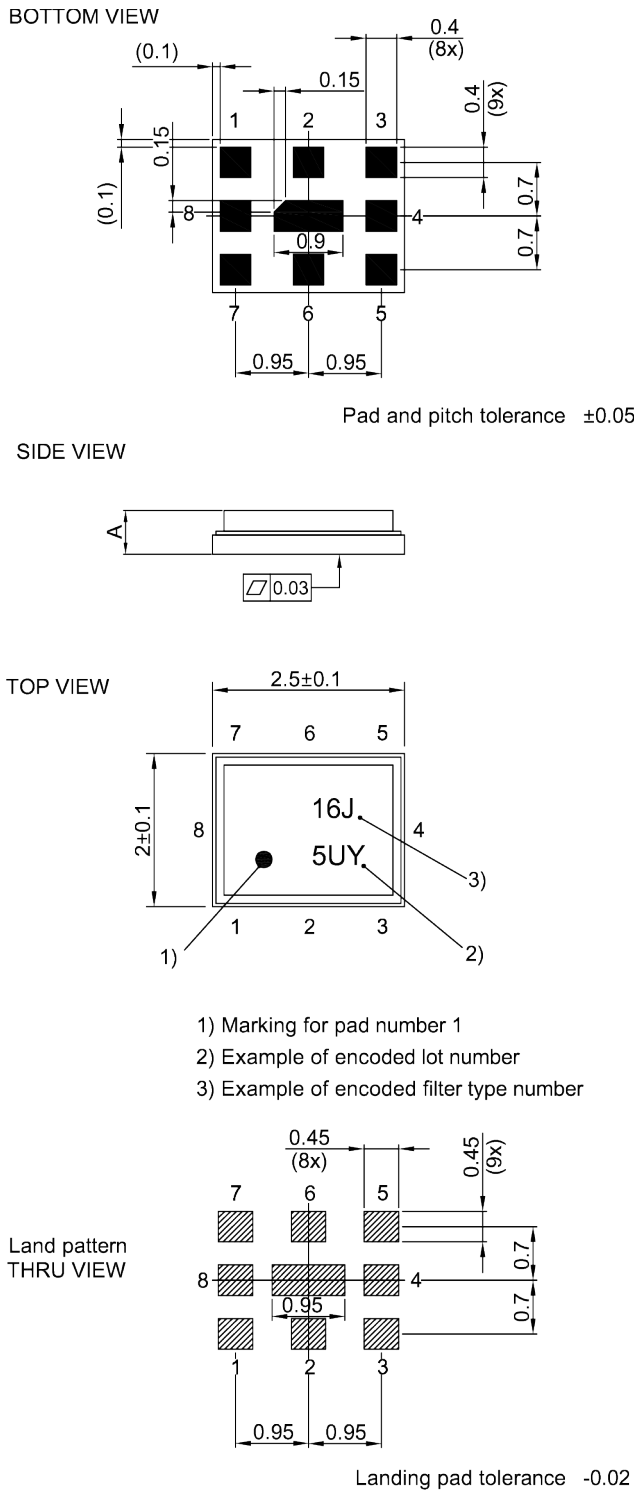

Figure 2: Drawing of package with package height A = 0.5 mm (max.). See Sec. Package information (p. 29).

4 Pin configuration

- 1 TX
- 3 RX
- 6 ANT
- 2, 4, 5, 7, 8, 9 Ground

5 Matching circuit

■ L_{p6} = 8.4 nH ■ L_{s3} = 7.7 nH

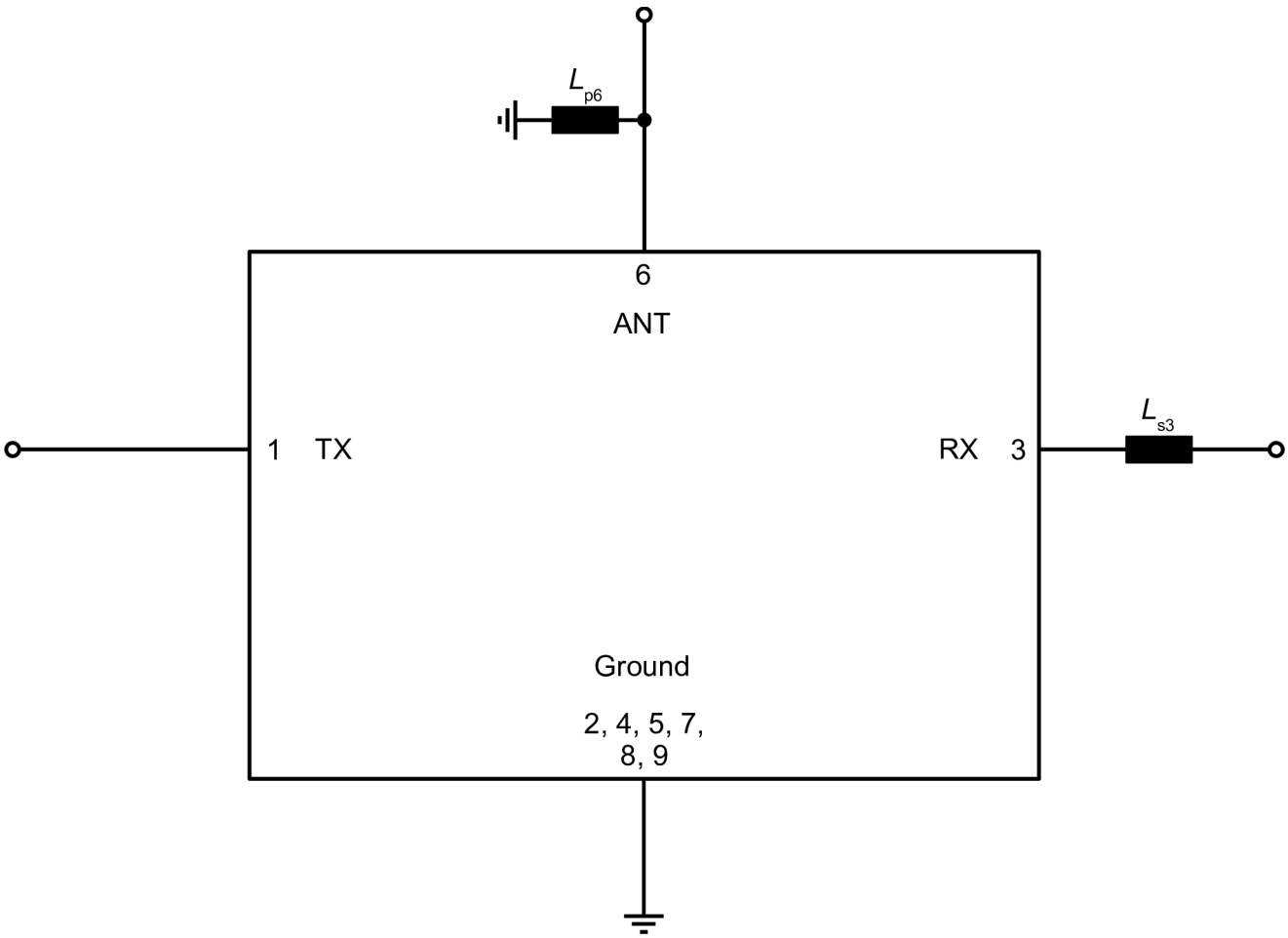

Figure 3: Schematic of matching circuit.

6 Characteristics

6.1 TX – ANT

Temperature range for specification T_{SPEC} = −10 °C ... +85 °C
TX terminating impedance Z_{TX} = 50 Ω
ANT terminating impedance Z_{ANT} = 50 Ω with par. 8.4 nH[1)]
RX terminating impedance Z_{RX} = 50 Ω with ser. 7.7 nH[1)]

Characteristics TX – ANT				**min.** for T_{SPEC}	**typ.** @ +25 °C	**max.** for T_{SPEC}	
Center frequency			f_C	—	773	—	MHz
Average insertion attenuation			$\alpha_{INT,avg}$ [2)]				
	758... 763	MHz		—	1.6	2.5	dB
	763... 783	MHz		—	1.5	2.1	dB
	783... 788	MHz		—	1.7	2.5	dB
Maximum insertion attenuation			α_{max}				
	758... 788	MHz		—	2.0	3.2	dB
Amplitude ripple (p-p)			$\Delta\alpha$				
	758... 788	MHz		—	1.0	2.1	dB
Maximum VSWR			$VSWR_{max}$				
@ TX port	758... 788	MHz		—	1.8	2.2	
@ ANT port	758... 788	MHz		—	1.9	2.2	
Maximum error vector magnitude			EVM_{max} [3)]				
	760.4... 785.6	MHz		—	2.0	4.0	%
Average attenuation			$\alpha_{INT,avg}$ [2)]				
	703... 733	MHz		46	50	—	dB
Minimum attenuation			α_{min}				
	50... 699	MHz		30	38	—	dB
	703... 733	MHz		45	48	—	dB
	733... 748	MHz		23	27	—	dB
	803... 814	MHz		30	48	—	dB
	880... 915	MHz		36	42	—	dB
	925... 960	MHz		36	42	—	dB
	1710... 1785	MHz		34	36	—	dB
	1805... 1880	MHz		33	36	—	dB
	1920... 1980	MHz		33	36	—	dB
	2110... 2170	MHz		27	34	—	dB
	2400... 2500	MHz		27	35	—	dB
	2500... 2570	MHz		24	35	—	dB
	2620... 2690	MHz		24	31	—	dB
	3000... 5150	MHz		10	12	—	dB

	5150... 5850	MHz	8	10	—	dB

1) See Sec. Matching circuit (p. 6).
2) Integrated attenuation α_{INT}: Averaged power $|S_{ij}|^2$ over the center 4.5 MHz of LTE 5 MHz (25 RB) channels.
3) Error Vector Magnitude (EVM) based on definition in 3GPP TS 25.141.

Temperature range for specification T_{SPEC} = −40 °C ... +95 °C
TX terminating impedance Z_{TX} = 50 Ω
ANT terminating impedance Z_{ANT} = 50 Ω with par. 8.4 nH[1)]
RX terminating impedance Z_{RX} = 50 Ω with ser. 7.7 nH[1)]

Characteristics TX – ANT				**min.** for T_{SPEC}	**typ.** @ +25 °C	**max.** for T_{SPEC}	
Center frequency			f_C	—	773	—	MHz
Average insertion attenuation			$\alpha_{INT,avg}$ [2)]				
	758... 763	MHz		—	1.6	2.6	dB
	763... 783	MHz		—	1.5	2.1	dB
	783... 788	MHz		—	1.7	2.6	dB
Maximum insertion attenuation			α_{max}				
	758... 788	MHz		—	2.0	3.4	dB
Amplitude ripple (p-p)			Δα				
	758... 788	MHz		—	1.0	2.3	dB
Maximum VSWR			$VSWR_{max}$				
@ TX port	758... 788	MHz		—	1.8	2.2	
@ ANT port	758... 788	MHz		—	1.9	2.2	
Maximum error vector magnitude			EVM_{max} [3)]				
	760.4... 785.6	MHz		—	2.0	5.0	%
Average attenuation			$\alpha_{INT,avg}$ [2)]				
	703... 733	MHz		46	50	—	dB
Minimum attenuation			α_{min}				
	50... 699	MHz		30	38	—	dB
	703... 733	MHz		45	48	—	dB
	733... 748	MHz		23	27	—	dB
	803... 814	MHz		30	48	—	dB
	880... 915	MHz		36	42	—	dB
	925... 960	MHz		36	42	—	dB
	1710... 1785	MHz		34	36	—	dB
	1805... 1880	MHz		33	36	—	dB
	1920... 1980	MHz		33	36	—	dB
	2110... 2170	MHz		27	34	—	dB
	2400... 2500	MHz		27	35	—	dB
	2500... 2570	MHz		24	35	—	dB
	2620... 2690	MHz		24	31	—	dB
	3000... 5150	MHz		10	12	—	dB
	5150... 5850	MHz		8	10	—	dB

1) See Sec. Matching circuit (p. 6).
2) Integrated attenuation α_{INT}: Averaged power $|S_{ij}|^2$ over the center 4.5 MHz of LTE 5 MHz (25 RB) channels.
3) Error Vector Magnitude (EVM) based on definition in 3GPP TS 25.141.

6.2 ANT – RX

Temperature range for specification	T_{SPEC}	= −10 °C ... +85 °C
TX terminating impedance	Z_{TX}	= 50 Ω
ANT terminating impedance	Z_{ANT}	= 50 Ω with par. 8.4 nH[1)]
RX terminating impedance	Z_{RX}	= 50 Ω with ser. 7.7 nH[1)]

Characteristics ANT – RX				**min.** for T_{SPEC}	**typ.** @ +25 °C	**max.** for T_{SPEC}	
Center frequency			f_C	—	718	—	MHz
Average insertion attenuation			$\alpha_{INT,avg}$ [2)]				
	703... 708	MHz		—	1.6	2.8	dB
	708... 728	MHz		—	1.8	2.4	dB
	728... 733	MHz		—	2.0	2.8	dB
Maximum insertion attenuation			α_{max}				
	703... 733	MHz		—	2.2	3.5	dB
Amplitude ripple (p-p)			Δα				
	703... 733	MHz		—	1.2	2.3	dB
Maximum VSWR			$VSWR_{max}$				
@ ANT port	703... 733	MHz		—	1.6	2.2	
@ RX port	703... 733	MHz		—	1.5	2.3	
Maximum error vector magnitude			EVM_{max} [3)]				
	705.4... 730.6	MHz		—	2.9	6.0	%
Average attenuation			$\alpha_{INT,avg}$ [2)]				
	758... 788	MHz		51	55	—	dB
Minimum attenuation			α_{min}				
	50... 694	MHz		28	32	—	dB
	694... 695	MHz		22	35	—	dB
	758... 788	MHz		46	50	—	dB
	788... 803	MHz		30	58	—	dB
	791... 821	MHz		30	58	—	dB
	869... 894	MHz		30	62	—	dB
	925... 960	MHz		30	62	—	dB
	1805... 1880	MHz		30	64	—	dB
	1930... 1995	MHz		30	64	—	dB
	2110... 2170	MHz		30	62	—	dB
	2400... 2484	MHz		35	63	—	dB
	2620... 2690	MHz		30	63	—	dB
	5150... 5850	MHz		35	53	—	dB

1) See Sec. Matching circuit (p. 6).
2) Integrated attenuation α_{INT}: Averaged power $|S_{ij}|^2$ over the center 4.5 MHz of LTE 5 MHz (25 RB) channels.

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

Temperature range for specification	T_{SPEC}	= −40 °C ... +95 °C
TX terminating impedance	Z_{TX}	= 50 Ω
ANT terminating impedance	Z_{ANT}	= 50 Ω with par. 8.4 nH[1)]
RX terminating impedance	Z_{RX}	= 50 Ω with ser. 7.7 nH[1)]

Characteristics ANT – RX				**min.** for T_{SPEC}	**typ.** @ +25 °C	**max.** for T_{SPEC}	
Center frequency			f_C	—	718	—	MHz
Average insertion attenuation			$\alpha_{INT,avg}$ [2)]				
	703... 708	MHz		—	1.6	3.6	dB
	708... 728	MHz		—	1.8	2.4	dB
	728... 733	MHz		—	2.0	3.6	dB
Maximum insertion attenuation			α_{max}				
	703... 733	MHz		—	2.2	4.5	dB
Amplitude ripple (p-p)			Δα				
	703... 733	MHz		—	1.2	3.2	dB
Maximum VSWR			$VSWR_{max}$				
@ ANT port	703... 733	MHz		—	1.6	4.0	
@ RX port	703... 733	MHz		—	1.5	4.0	
Maximum error vector magnitude			EVM_{max} [3)]				
	705.4... 730.6	MHz		—	2.9	8.0	%
Average attenuation			$\alpha_{INT,avg}$ [2)]				
	758... 788	MHz		51	55	—	dB
Minimum attenuation			α_{min}				
	50... 694	MHz		28	32	—	dB
	694... 695	MHz		22	35	—	dB
	758... 788	MHz		46	50	—	dB
	788... 803	MHz		30	58	—	dB
	791... 821	MHz		30	58	—	dB
	869... 894	MHz		30	62	—	dB
	925... 960	MHz		30	62	—	dB
	1805... 1880	MHz		30	64	—	dB
	1930... 1995	MHz		30	64	—	dB
	2110... 2170	MHz		30	62	—	dB
	2400... 2484	MHz		35	63	—	dB
	2620... 2690	MHz		30	63	—	dB
	5150... 5850	MHz		35	53	—	dB

1) See Sec. Matching circuit (p. 6).
2) Integrated attenuation α_{INT}: Averaged power $|S_{ij}|^2$ over the center 4.5 MHz of LTE 5 MHz (25 RB) channels.
3) Error Vector Magnitude (EVM) based on definition in 3GPP TS 25.141.

6.3 TX – RX

Temperature range for specification	T_{SPEC}	= −10 °C ... +85 °C
TX terminating impedance	Z_{TX}	= 50 Ω
ANT terminating impedance	Z_{ANT}	= 50 Ω with par. 8.4 nH[1)]
RX terminating impedance	Z_{RX}	= 50 Ω with ser. 7.7 nH[1)]

Characteristics TX – RX				**min.** for T_{SPEC}	**typ.** @ +25 °C	**max.** for T_{SPEC}	
Average isolation			$\alpha_{INT,avg}$[2)]				
	703... 733	MHz		49	51	—	dB
	758... 788	MHz		51	53	—	dB
Minimum isolation			α_{min}				
	703... 733	MHz		48	51	—	dB
	758... 788	MHz		49	51	—	dB

1) See Sec. Matching circuit (p. 6).
2) Integrated attenuation α_{INT}: Averaged power $|S_{ij}|^2$ over the center 4.5 MHz of LTE 5 MHz (25 RB) channels.

Temperature range for specification	T_{SPEC}	= −40 °C ... +95 °C
TX terminating impedance	Z_{TX}	= 50 Ω
ANT terminating impedance	Z_{ANT}	= 50 Ω with par. 8.4 nH[1)]
RX terminating impedance	Z_{RX}	= 50 Ω with ser. 7.7 nH[1)]

Characteristics TX – RX				**min.** for T_{SPEC}	**typ.** @ +25 °C	**max.** for T_{SPEC}	
Average isolation			$\alpha_{INT,avg}$ [2)]				
	703... 733	MHz		49	51	—	dB
	758... 788	MHz		51	53	—	dB
Minimum isolation			α_{min}				
	703... 733	MHz		48	51	—	dB
	758... 788	MHz		49	51	—	dB

1) See Sec. Matching circuit (p. 6).
2) Integrated attenuation α_{INT}: Averaged power $|S_{ij}|^2$ over the center 4.5 MHz of LTE 5 MHz (25 RB) channels.

7 Maximum ratings

Operable temperature	T_{OP} = −40 °C ... +95 °C	
Storage temperature	T_{STG} [1] = −40 °C ... +95 °C	
DC voltage	$\|V_{DC}\|$ [2] = 0 V (max.)	
ESD voltage		
	V_{ESD} [3] = 100 V (max.)	Machine model.
	V_{ESD} [4] = 225 V (max.)	Human body model.
Input power	P_{IN}	
@ TX port: 758 ... 788 MHz	30 dBm [5, 6]	5 MHz LTE downlink signal (25 RB) for 100000 h @ 55 °C. P_{IN} average – 41 dBm peak. Source and load impedance 50Ω.
@ RX port: 703 ... 733 MHz	27 dBm [5]	5 MHz LTE uplink signal (25 RB) for 5000 h @ 55 °C. P_{IN} average – 38 dBm peak. Source and load impedance 50Ω.
Operating lifetime with output power at antenna 758 ... 788 MHz	P_{OUT} [7] = 24 dBm	Continuous wave for 100000 h @ 55 °C. Source and load impedance 50Ω.

1) Not valid for packaging material. Storage temperature for packaging material is −25 °C to +40 °C.
2) In case of applied DC voltage blocking capacitors are mandatory.
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) Expected lifetime according to accelerated power durability test and wear out models.
6) T_{SPEC} is the ambient temperature of the PCB at component position. Specified min./max values from section 6 "characteristics" for maximum input power 30dBm are valid for temperature up to 56.5°C.
7) According to accelerated high temperature operating life (HTOL) test.

8 Transmission coefficients

8.1 TX – ANT

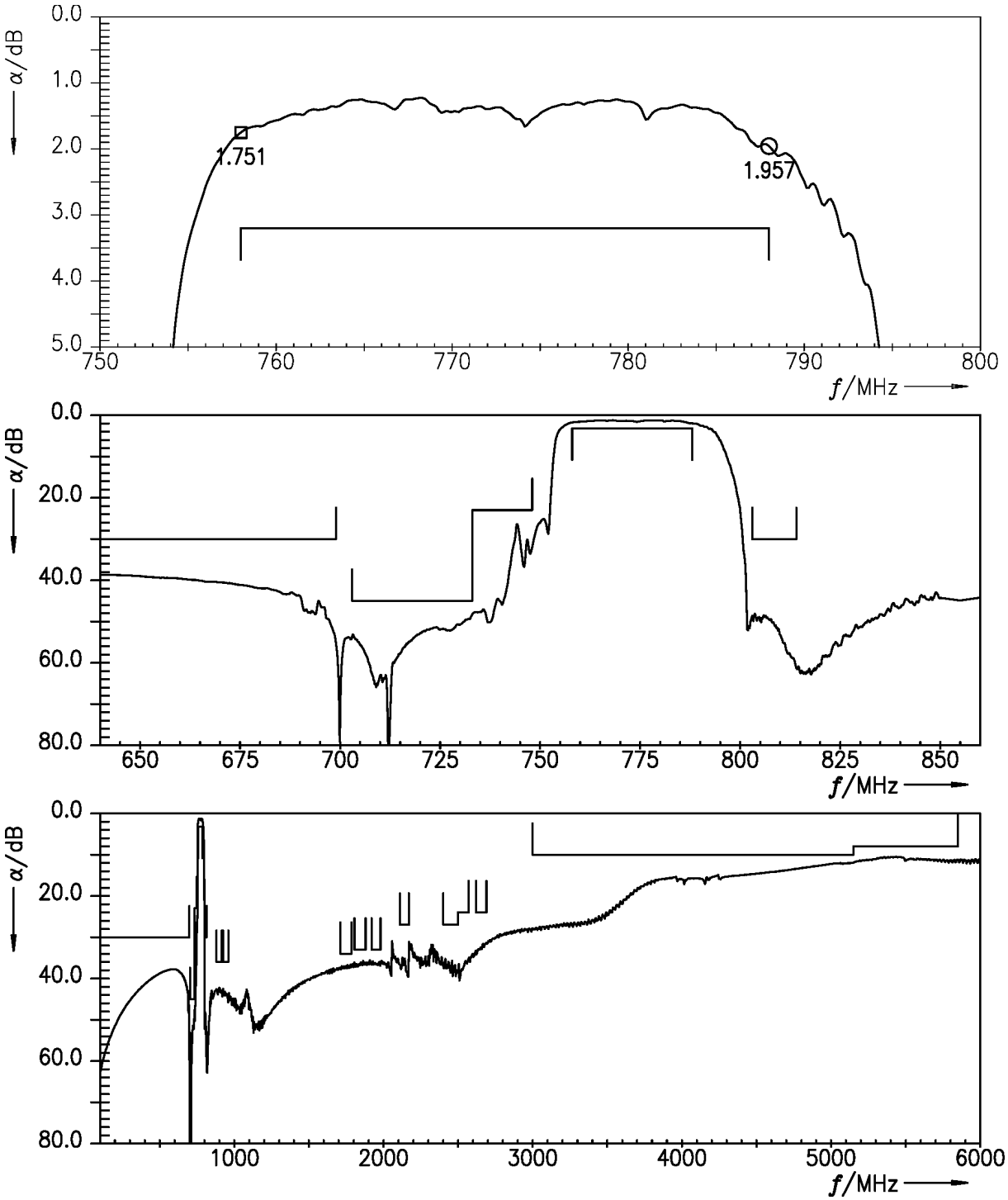

Figure 4: Attenuation TX – ANT.

8.2 ANT – RX

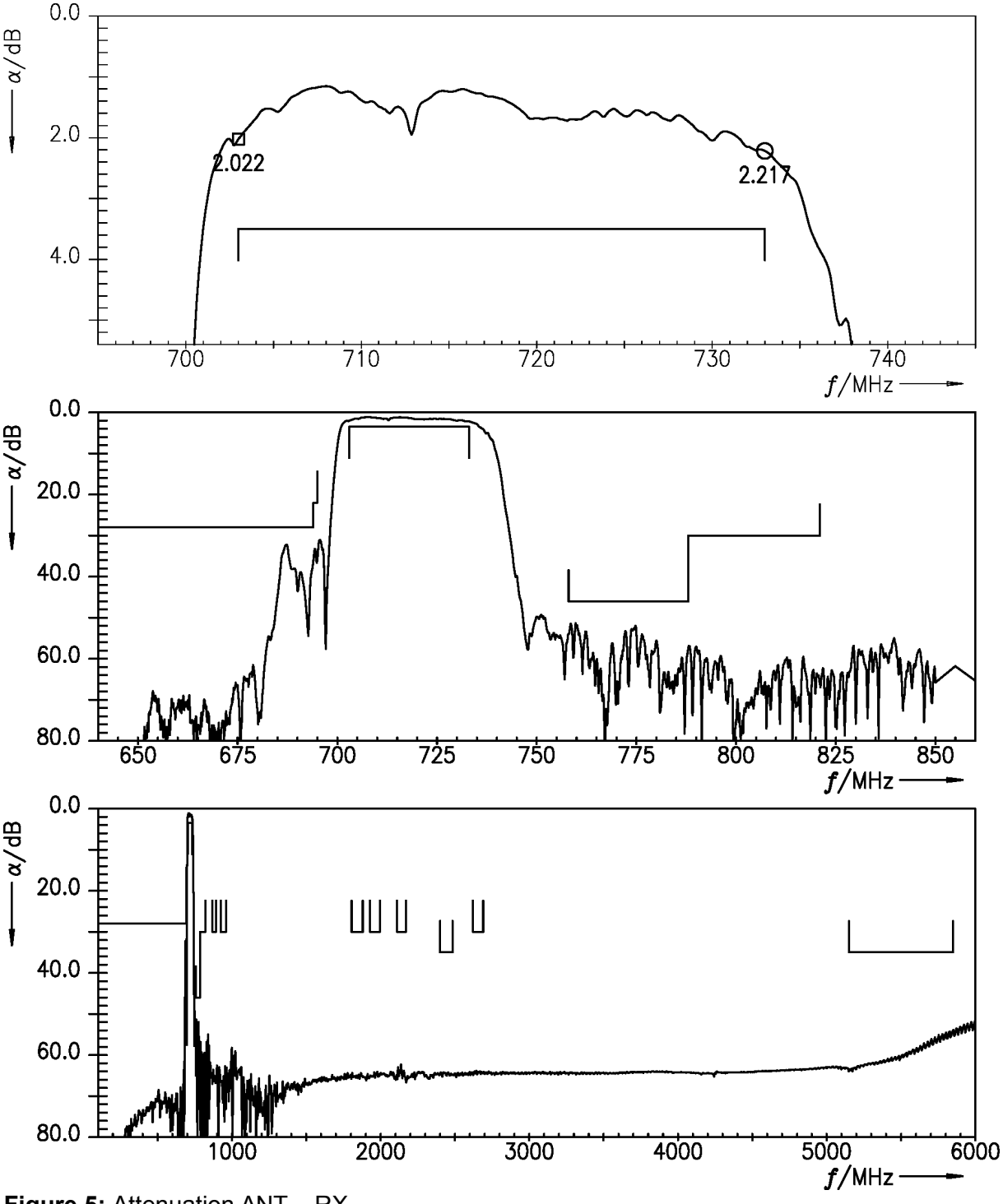

Figure 5: Attenuation ANT – RX.

8.3 TX – RX

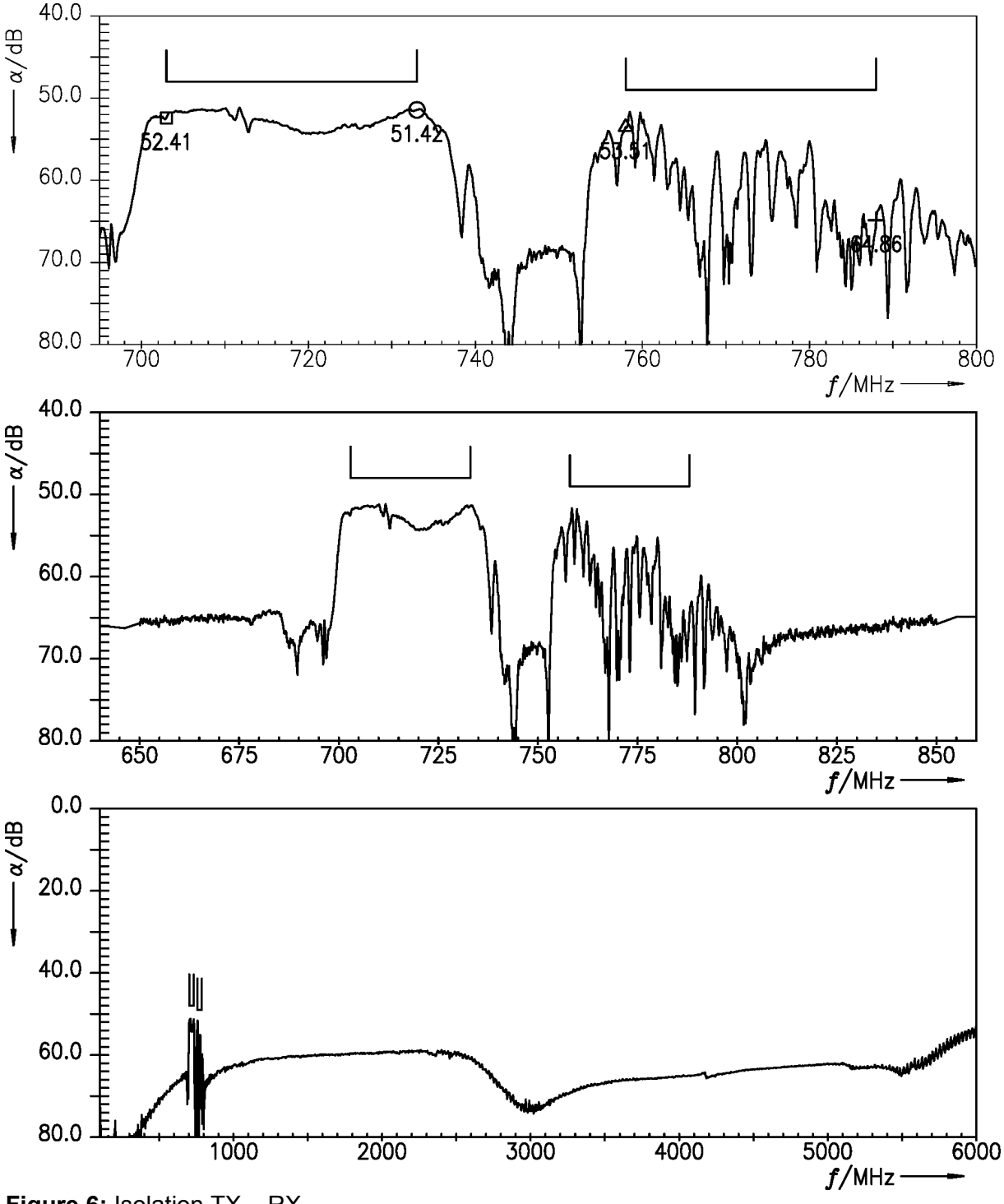

Figure 6: Isolation TX – RX.

9 Reflection coefficients

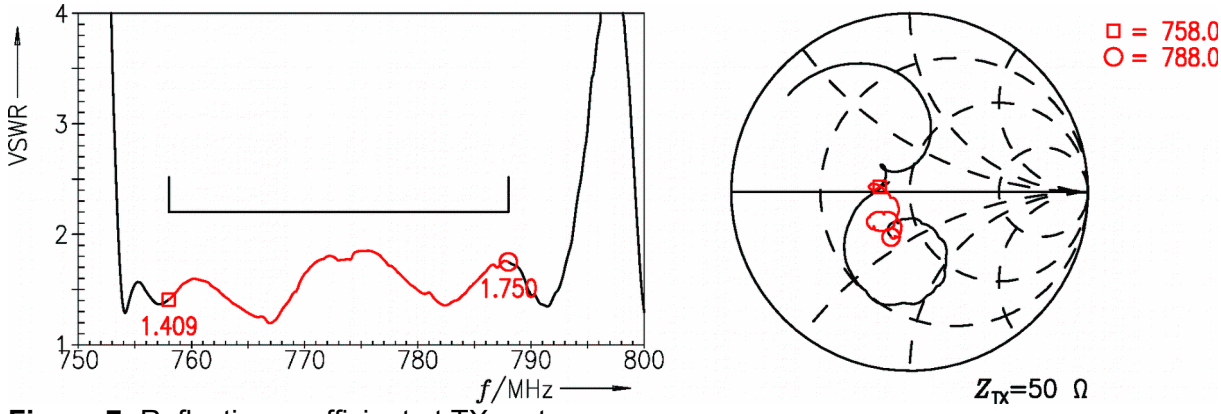

Figure 7: Reflection coefficient at TX port.

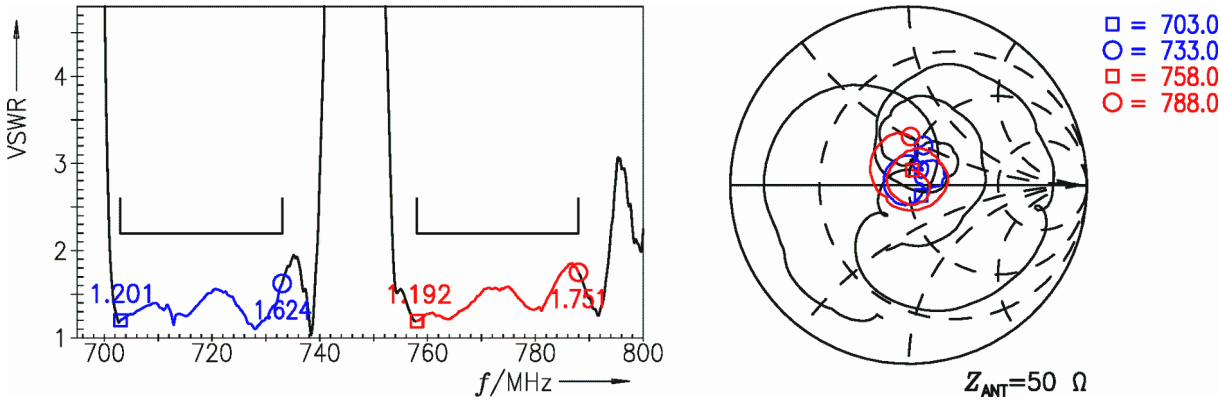

Figure 8: Reflection coefficient at ANT port.

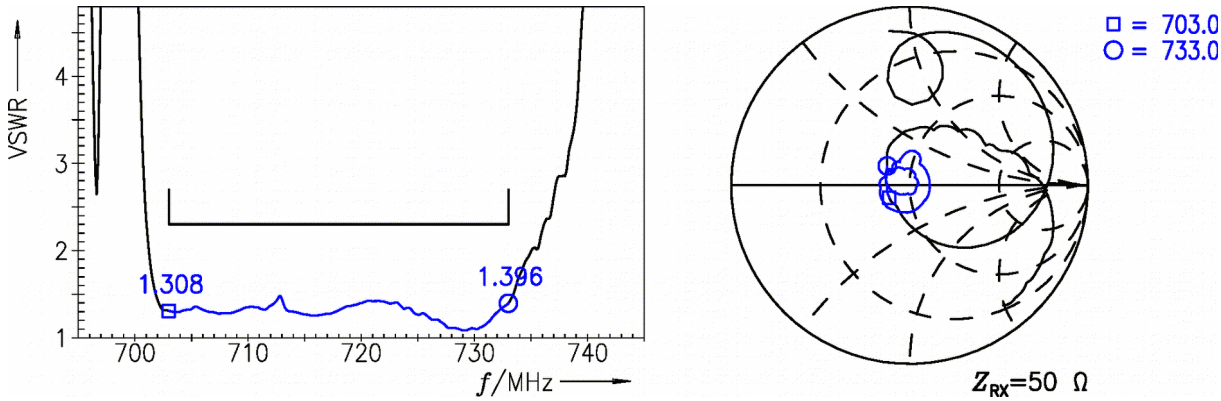

Figure 9: Reflection coefficient at RX port.

10 EVMs

10.1 TX – ANT

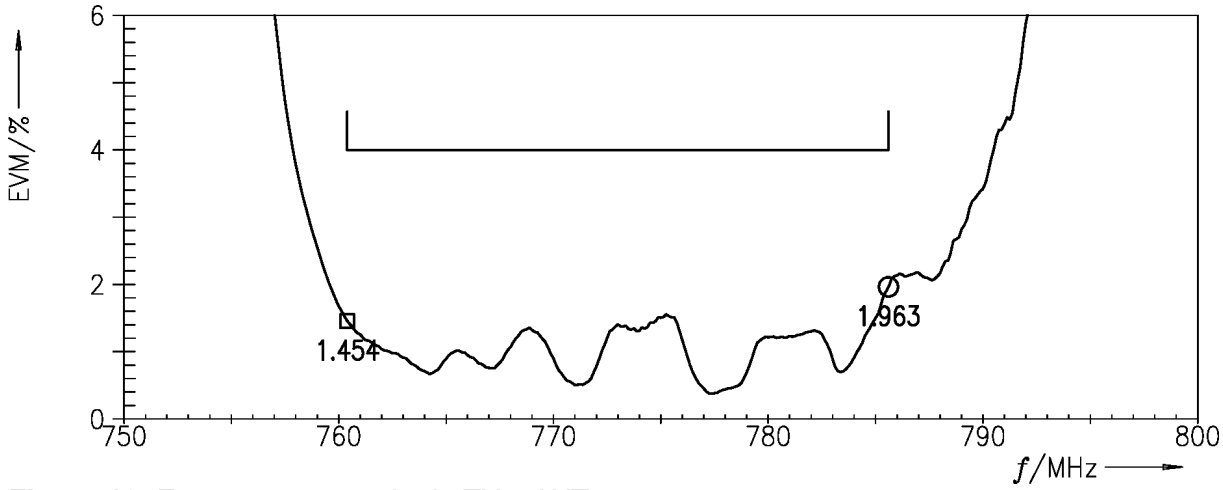

Figure 10: Error vector magnitude TX – ANT.

10.2 ANT – RX

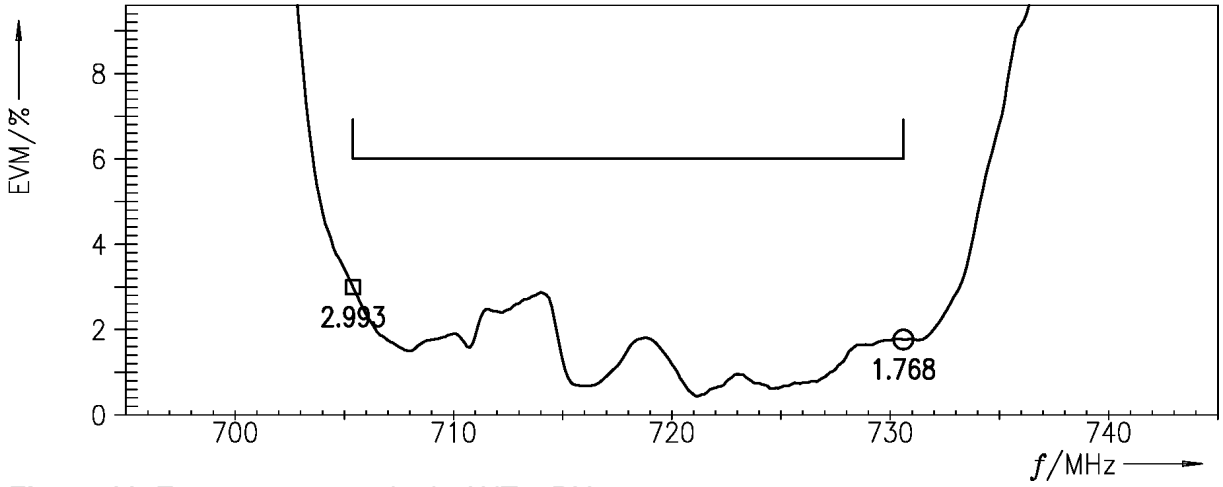

Figure 11: Error vector magnitude ANT – RX.

11 Packing material

11.1 Tape

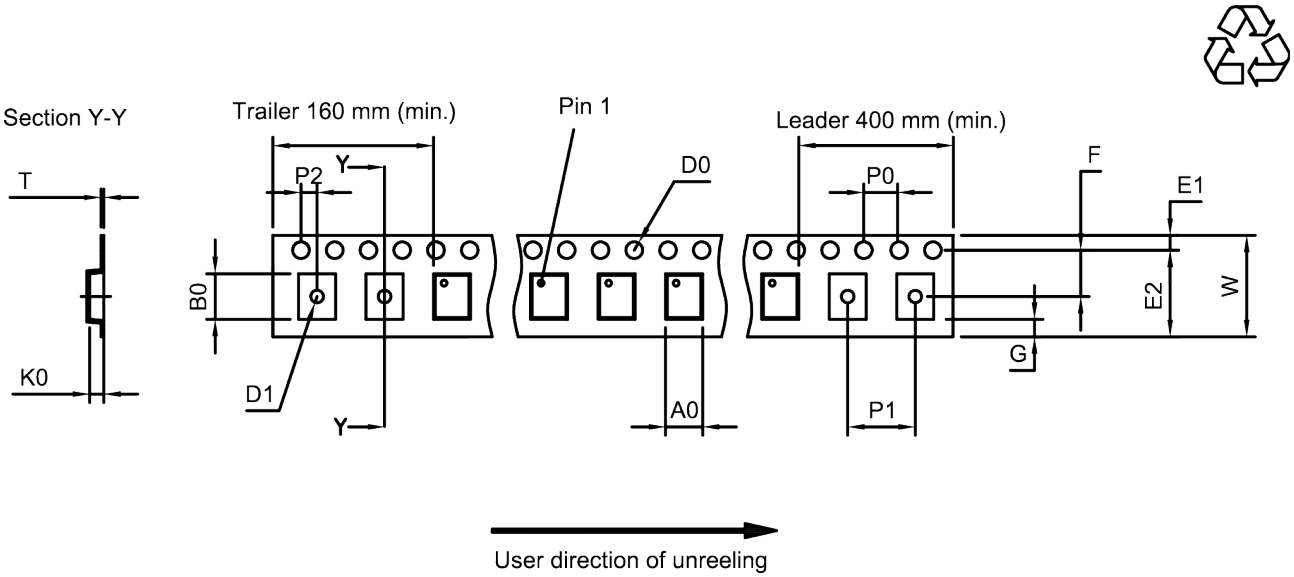

Figure 12: Drawing of tape (first-angle projection) with tape dimensions according to Table 1.

A_0	2.25±0.05 mm
B_0	2.75±0.05 mm
D_0	1.5+0.1/−0 mm
D_1	1.0 mm (min.)
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	0.6±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±0.03 mm
W	8.0+0.3/−0.1 mm

Table 1: Tape dimensions.

11.2 Reel with diameter of 180 mm

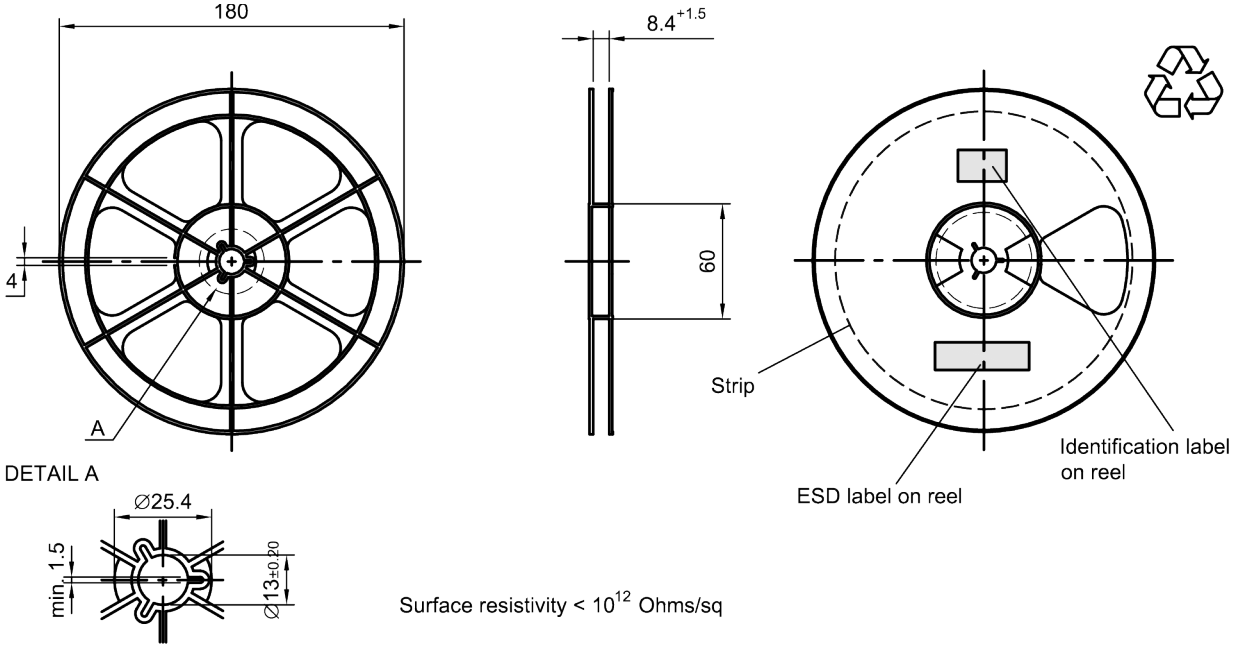

Figure 13: Drawing of reel (first-angle projection) with diameter of 180 mm.

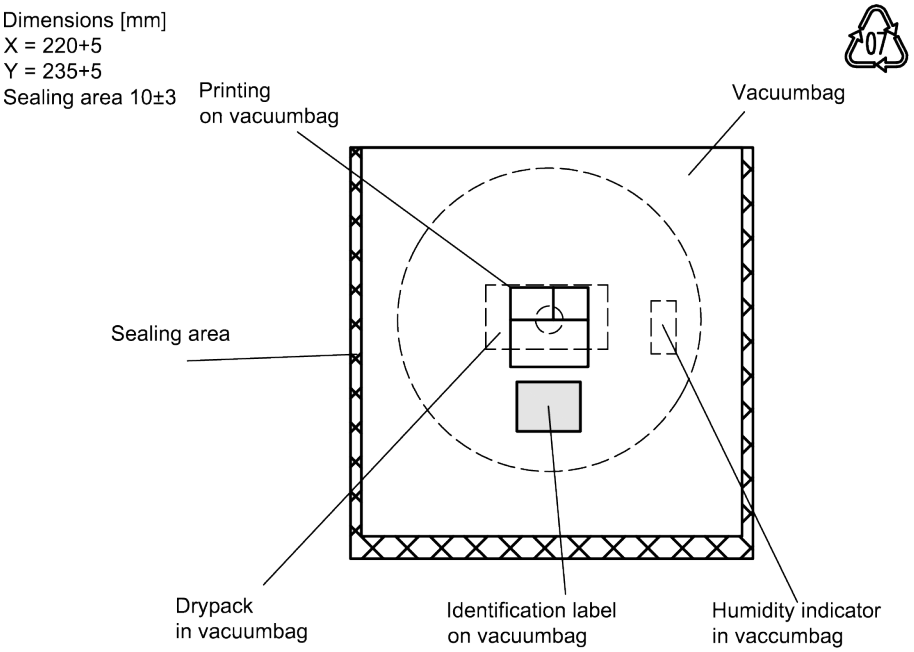

Figure 14: Drawing of moisture barrier bag (MBB) for reel with diameter of 180 mm.

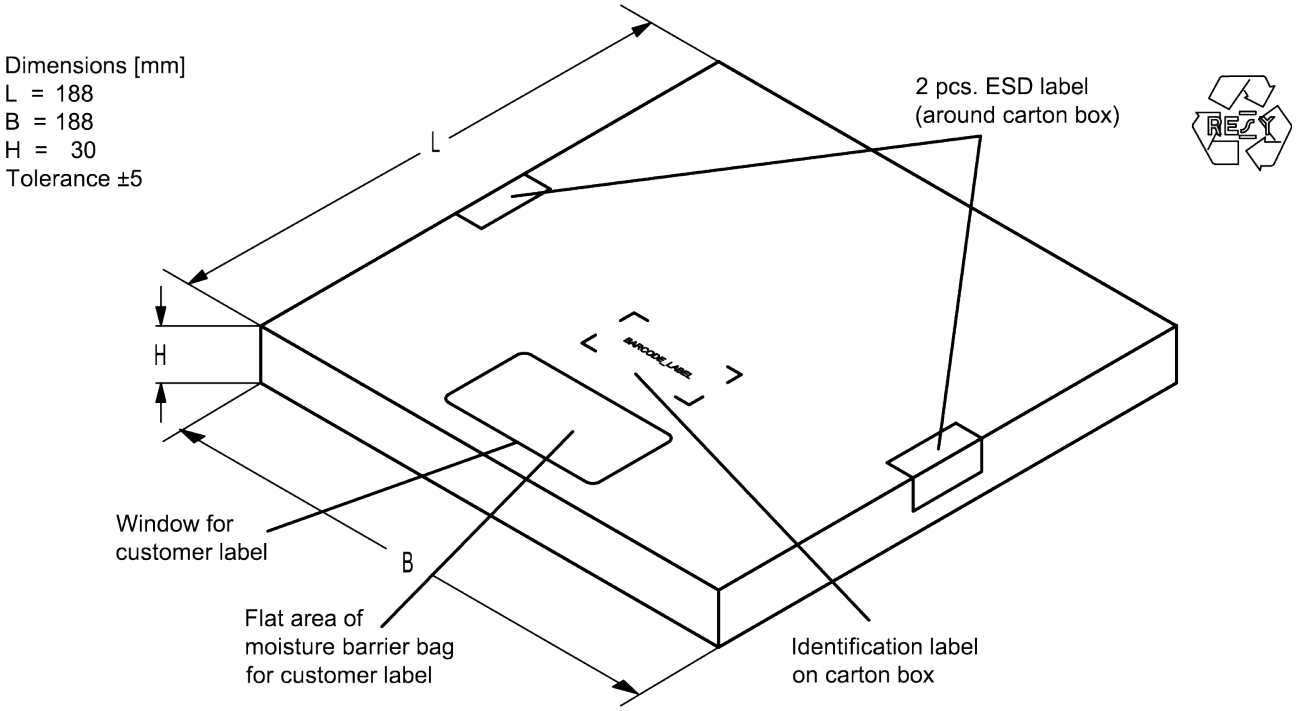

Figure 15: Drawing of folding box for reel with diameter of 180 mm.