Qualcomm

RF360
Europe GmbH

Data sheet

SAW multiplexer
4G/5G band n1 + n3 + n66

Part number:	B8981
Ordering code:	B39222B8981L210
Date:	March 30, 2023
Version:	2.0

DCN: 80-PA243-744 Rev. A

Qualcomm products mentioned herein are products of Qualcomm Technologies, Inc. and/or its subsidiaries.

RF360 Europe GmbH
Anzinger Straße 13
81671 Munich, Germany

Table of contents

1 Application

- Low-loss SAW multiplexer for mobile telephone 4G/5G Band n1, 4G/5G Band n66 and 4G/5G Band n3
- 4G/5G band n1 uplink: 1950 MHz (bandwidth 60 MHz)
- 4G/5G band n66 downlink: 2155 MHz (bandwidth 90 MHz)
- 4G/5G band n3 uplink: 1747.5 MHz (bandwidth 75 MHz)
- 4G/5G band n3 downlink: 1842.5 MHz (bandwidth 75 MHz)
- High isolation Tx to Rx
- High out of band selectivity
- Terminating impedance 50 Ω

2 Features

- Package size $2.0_{\pm0.05}$ mm × $1.6_{\pm0.05}$ mm
- Package height 0.6 mm (max.)
- Approximate weight 6 mg
- RoHS compatible
- Package for Surface Mount Technology (SMT)
- Ni/Au-plated terminals
- Electrostatic Sensitive Device (ESD)
- Moisture Sensitivity Level 3 (MSL3)

3 Package

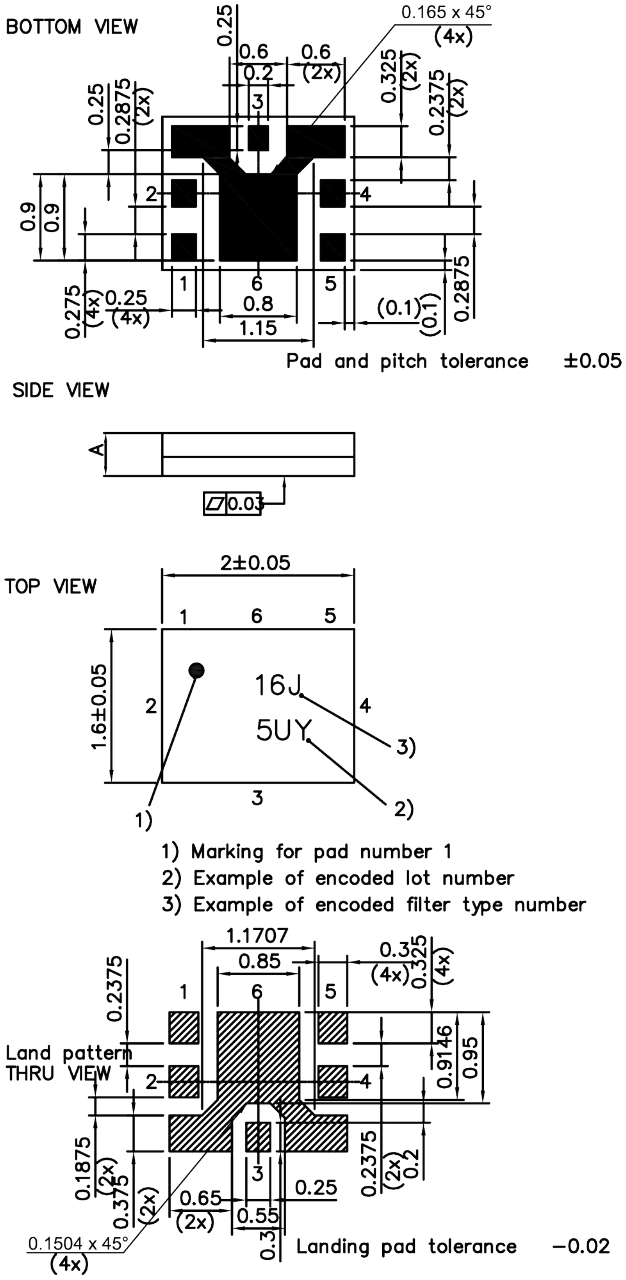

Figure 1: Drawing of package with package height A = 0.6 mm (max.). See Sec. Package information (p. 35).

4 Pin configuration

■ 1	TX (n1)
■ 2	TX (n3)
■ 3	ANT (n1, n3, & n66)
■ 4	RX (n66)
■ 5	RX (n3)
■ 6	Ground

5 Matching circuit

- C_{p2b} = 0.9 pF
- L_{p4} = 4.8 nH
- L_{s1} = 2.4 nH
- L_{s2a} = 4.5 nH
- L_{s5} = 4.6 nH

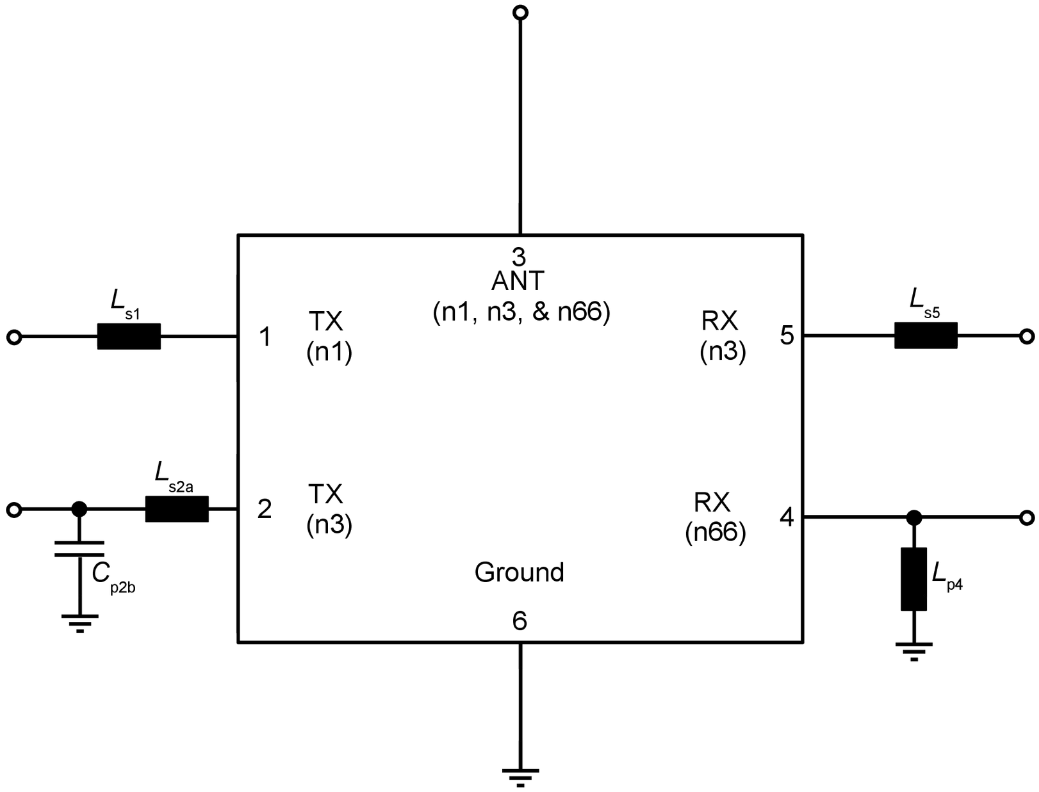

Figure 2: Schematic of matching circuit.

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

6 Characteristics 4G/5G n1

Temperature range for specification	T_{SPEC}	= −30 °C ... +85 °C
n1 TX terminating impedance	$Z_{n1\ TX}$	= 50 Ω + 2.4 nH[1]
ANT terminating impedance	Z_{ANT}	= 50 Ω

Characteristics 4G/5G n1 TX – ANT				min. for T_{SPEC}	typ. @ +25 °C	max. for T_{SPEC}	
Maximum insertion attenuation			α_{max}				
	1920 ... 1980	MHz		—	1.2	1.8	dB
Amplitude ripple (p-p)			$\Delta\alpha$[2]				
	1920 ... 1980	MHz		—	0.1	2.0	dB
Maximum VSWR			$VSWR_{max}$				
@ n1 TX port	1920 ... 1980	MHz		—	1.3	2.0	
@ ANT port	1920 ... 1980	MHz		—	1.3	2.0	
Minimum attenuation			α_{min}				
	10 ... 703	MHz		40	64	—	dB
	703 ... 748	MHz		40	62	—	dB
	758 ... 803	MHz		40	61	—	dB
	791 ... 821	MHz		40	61	—	dB
	807 ... 849	MHz		40	60	—	dB
	832 ... 862	MHz		40	60	—	dB
	852 ... 894	MHz		40	59	—	dB
	880 ... 915	MHz		40	59	—	dB
	925 ... 960	MHz		40	58	—	dB
	1166 ... 1187	MHz		44	55	—	dB
	1427 ... 1517	MHz		45	51	—	dB
	1559 ... 1563	MHz		43	53	—	dB
	1565.42 ... 1573.37	MHz		43	54	—	dB
	1573.37 ... 1577.47	MHz		43	54	—	dB
	1577.47 ... 1585.42	MHz		43	54	—	dB
	1597.55 ... 1605.89	MHz		43	55	—	dB
	1710 ... 1785	MHz		40	43	—	dB
	1805 ... 1880	MHz		46	61	—	dB
	1880 ... 1895	MHz		10	22	—	dB
	2010 ... 2025	MHz		20[3]	23	—	dB
	2110 ... 2200	MHz		45	60	—	dB
	2300 ... 2400	MHz		40	61	—	dB
	2400 ... 2500	MHz		40	63	—	dB
	2496 ... 2690	MHz		45	53	—	dB
	2500 ... 2570	MHz		40	62	—	dB
	3300 ... 4200	MHz		40	48	—	dB
	4400 ... 5000	MHz		40	59	—	dB
	5150 ... 5925	MHz		40	56	—	dB

1) See Sec. Matching circuit (p. 6).
2) Over any 5 MHz.
3) Valid for temperature T = +15 °C...+85 °C.

7 Characteristics 4G/5G n3

7.1 TX – ANT

Temperature range for specification	T_{SPEC}	= −30 °C ... +85 °C
n3 TX terminating impedance	$Z_{n3\ TX}$	= 50 Ω with ext. circuitry.[1)]
ANT terminating impedance	Z_{ANT}	= 50 Ω
n3 RX terminating impedance	$Z_{n3\ RX}$	= 50 Ω + 4.6 nH[1)]

Characteristics 4G/5G n3 TX – ANT				min. for T_{SPEC}	typ. @ +25 °C	max. for T_{SPEC}	
Maximum insertion attenuation			α_{max}				
	1710 ... 1785	MHz		—	1.4	2.3	dB
Amplitude ripple (p-p)			$\Delta\alpha$[2)]				
	1710 ... 1785	MHz		—	0.2	2.0	dB
Maximum VSWR			$VSWR_{max}$				
@ n3 TX port	1710 ... 1785	MHz		—	1.4	2.0	
@ ANT port	1710 ... 1785	MHz		—	1.2	2.0	
Minimum attenuation			α_{min}				
	10 ... 703	MHz		40	62	—	dB
	703 ... 748	MHz		40	60	—	dB
	758 ... 803	MHz		40	59	—	dB
	791 ... 821	MHz		40	59	—	dB
	807 ... 849	MHz		40	58	—	dB
	832 ... 862	MHz		40	58	—	dB
	852 ... 894	MHz		40	57	—	dB
	880 ... 915	MHz		40	57	—	dB
	925 ... 960	MHz		40	56	—	dB
	1166 ... 1187	MHz		44	53	—	dB
	1427 ... 1517	MHz		45	52	—	dB
	1559 ... 1563	MHz		45	61	—	dB
	1565.42 ... 1573.37	MHz		45	58	—	dB
	1573.37 ... 1577.47	MHz		45	57	—	dB
	1577.47 ... 1585.42	MHz		45	54	—	dB
	1597.55 ... 1605.89	MHz		45	50	—	dB
	1805 ... 1880	MHz		45	67	—	dB
	1880 ... 1920	MHz		42	48	—	dB
	1920 ... 1980	MHz		40	45	—	dB
	2110 ... 2200	MHz		45	55	—	dB
	2300 ... 2400	MHz		38	50	—	dB
	2400 ... 2500	MHz		40	46	—	dB
	2496 ... 2690	MHz		45	52	—	dB
	3420 ... 3570	MHz		35	48	—	dB
	4400 ... 5000	MHz		35	58	—	dB
	5130 ... 5925	MHz		35	55	—	dB

1) See Sec. Matching circuit (p. 6).
2) Over any 5 MHz.

7.2 ANT – RX

Temperature range for specification	T_{SPEC}	= −30 °C ... +85 °C
n3 TX terminating impedance	$Z_{n3\ TX}$	= 50 Ω with ext. circuitry.[1)]
ANT terminating impedance	Z_{ANT}	= 50 Ω
n3 RX terminating impedance	$Z_{n3\ RX}$	= 50 Ω + 4.6 nH[1)]

Characteristics 4G/5G n3 ANT – RX				**min.** for T_{SPEC}	**typ.** @ +25 °C	**max.** for T_{SPEC}	
Maximum insertion attenuation			α_{max}				
	1805 ... 1880	MHz		—	1.9	2.8	dB
Amplitude ripple (p-p)			$\Delta\alpha$[2)]				
	1805 ... 1880	MHz		—	0.4	2.0	dB
Maximum VSWR			$VSWR_{max}$				
@ ANT port	1805 ... 1880	MHz		—	1.2	2.0	
@ n3 RX port	1805 ... 1880	MHz		—	1.2	2.0	
Minimum attenuation			α_{min}				
	10 ... 703	MHz		45	73	—	dB
	95	MHz		50	90	—	dB
	703 ... 748	MHz		45	72	—	dB
	807 ... 849	MHz		45	70	—	dB
	832 ... 862	MHz		45	70	—	dB
	880 ... 915	MHz		45	69	—	dB
	1447.9 ... 1462.9	MHz		45	61	—	dB
	1615 ... 1690	MHz		40	67	—	dB
	1710 ... 1785	MHz		45	57	—	dB
	1720 ... 1755	MHz		45	62	—	dB
	1920 ... 1980	MHz		45	58	—	dB
	1940 ... 1965	MHz		45	58	—	dB
	2300 ... 2400	MHz		40	57	—	dB
	2400 ... 2500	MHz		40	60	—	dB
	2496 ... 2690	MHz		40	52	—	dB
	3300 ... 4200	MHz		40	51	—	dB
	4400 ... 5000	MHz		35	67	—	dB
	5150 ... 5925	MHz		35	67	—	dB

1) See Sec. Matching circuit (p. 6).
2) Over any 5 MHz.

7.3 TX – RX

Temperature range for specification	T_{SPEC}	= −30 °C ... +85 °C
n3 TX terminating impedance	$Z_{n3\ TX}$	= 50 Ω with ext. circuitry.[1)]
ANT terminating impedance	Z_{ANT}	= 50 Ω
n3 RX terminating impedance	$Z_{n3\ RX}$	= 50 Ω + 4.6 nH[1)]

Characteristics 4G/5G n3 **TX – RX**				**min.** for T_{SPEC}	**typ.** @ +25 °C	**max.** for T_{SPEC}	
Minimum isolation			α_{min}				
	1710 ... 1785	MHz		55	59	—	dB
	1805 ... 1880	MHz		55	69	—	dB

1) See Sec. Matching circuit (p. 6).

8 Characteristics 4G/5G n66

Temperature range for specification	T_{SPEC}	= −30 °C ... +85 °C
ANT terminating impedance	Z_{ANT}	= 50 Ω
n66 RX terminating impedance	$Z_{n66\ RX}$	= 50 Ω // 4.8 nH[1]

Characteristics 4G/5G n66 **ANT – RX**				**min.** for T_{SPEC}	**typ.** @ +25 °C	**max.** for T_{SPEC}	
Maximum insertion attenuation			α_{max}				
	2110 ... 2200	MHz		—	1.2	2.0	dB
Amplitude ripple (p-p)			$\Delta\alpha$[2]				
	2110 ... 2200	MHz		—	0.2	1.5	dB
Maximum VSWR			$VSWR_{max}$				
@ ANT port	2110 ... 2200	MHz		—	1.2	2.0	
@ n66 RX port	2110 ... 2200	MHz		—	1.4	2.0	
Minimum attenuation			α_{min}				
	10 ... 1785	MHz		36	49	—	dB
	190	MHz		50	109	—	dB
	400	MHz		50	92	—	dB
	663 ... 698	MHz		40	77	—	dB
	699 ... 748	MHz		40	75	—	dB
	777 ... 798	MHz		40	73	—	dB
	814 ... 849	MHz		40	72	—	dB
	1055 ... 1100	MHz		45	65	—	dB
	1310 ... 1355	MHz		45	62	—	dB
	1695 ... 1785	MHz		45	60	—	dB
	1785 ... 1880	MHz		33	38	—	dB
	1850 ... 1915	MHz		35	40	—	dB
	1880 ... 2025	MHz		35	40	—	dB
	1910 ... 1980	MHz		45	59	—	dB
	2015 ... 2025	MHz		37	55	—	dB
	2025 ... 2050	MHz		15	51	—	dB
	2230 ... 2285	MHz		15	42	—	dB
	2285 ... 6000	MHz		25	45	—	dB
	2305 ... 2315	MHz		45	59	—	dB
	2400 ... 2500	MHz		40	53	—	dB
	2496 ... 2690	MHz		45	51	—	dB
	3300 ... 4200	MHz		36	45	—	dB
	4220 ... 4400	MHz		40	51	—	dB
	5150 ... 5950	MHz		40	49	—	dB

1) See Sec. Matching circuit (p. 6).
2) Over any 5 MHz.

9 Cross-isolations

9.1 4G/5G n1 TX – n3 RX

Temperature range for specification	T_{SPEC}	= −30 °C ... +85 °C
n1 TX terminating impedance	$Z_{n1\ TX}$	= 50 Ω + 2.4 nH[1)]
n3 RX terminating impedance	$Z_{n3\ RX}$	= 50 Ω + 4.6 nH[1)]

Characteristics cross-isolation 4G/5G n1 TX – n3 RX				min. for T_{SPEC}	typ. @ +25 °C	max. for T_{SPEC}	
Minimum cross-isolation			α_{min}				
	1805 ... 1880	MHz		55	62	—	dB
	1920 ... 1980	MHz		55	59	—	dB

1) See Sec. Matching circuit (p. 6).

9.2 4G/5G n1 TX – n66 RX

Temperature range for specification	T_{SPEC}	= −30 °C ... +85 °C
n1 TX terminating impedance	$Z_{n1\ TX}$	= 50 Ω + 2.4 nH[1)]
n66 RX terminating impedance	$Z_{n66\ RX}$	= 50 Ω // 4.8 nH[1)]

Characteristics cross-isolation **4G/5G n1 TX – n66 RX**				**min.** for T_{SPEC}	**typ.** @ +25 °C	**max.** for T_{SPEC}	
Minimum cross-isolation			$α_{min}$				
	1574 ... 1577	MHz		45	69	—	dB
	1920 ... 1980	MHz		55	62	—	dB
	2110 ... 2200	MHz		55	62	—	dB
	3830 ... 3970	MHz		35	67	—	dB
	5750 ... 5950	MHz		35	69	—	dB

1) See Sec. Matching circuit (p. 6).

9.3 4G/5G n3 TX – n66 RX

Temperature range for specification	T_{SPEC}	= −30 °C ... +85 °C
n3 TX terminating impedance	$Z_{n3\ TX}$	= 50 Ω with ext. circuitry.[1]
n66 RX terminating impedance	$Z_{n66\ RX}$	= 50 Ω // 4.8 nH[1]

Characteristics cross-isolation **4G/5G n3 TX – n66 RX**				**min.** for T_{SPEC}	**typ.** @ +25 °C	**max.** for T_{SPEC}	
Minimum cross-isolation			α_{min}				
	1710... 1785	MHz		55	64	—	dB
	2110... 2200	MHz		55	60	—	dB

[1] See Sec. Matching circuit (p. 6).

10 Maximum ratings

Operable temperature	T_{OP} = −30 °C ... +85 °C	
Storage temperature	T_{STG}[1)] = −40 °C ... +85 °C	
DC voltage	$\|V_{DC}\|$[2)] = 0 V (max.)	
ESD voltage		
	V_{ESD}[3)] = 300 V (max.)	Human body model.
	V_{ESD}[4)] = 1000 V (max.)	Charged device model.
Input power	P_{IN}	
@ n1 TX port: 1920 ... 1980 MHz	30 dBm	Continuous wave for 5000 h @ 50 °C. 5 MHz LTE uplink signal (1 RB) for 5000 h @ 50 °C. 5 MHz 5G NR (DFT-s-OFDM) (1 RB) for 5000 h @ 50 °C.
@ n1 TX port: 1920 ... 1980 MHz	30 dBm	5 MHz 5G NR (CP-OFDM) (1 RB) for 5000 h @ 50 °C.
@ n3 TX port: 1710 ... 1785 MHz	30 dBm	Continuous wave for 5000 h @ 50 °C. 5 MHz LTE uplink signal (1 RB) for 5000 h @ 50 °C. 5 MHz 5G NR (DFT-s-OFDM) (1 RB) for 5000 h @ 50 °C.
@ n3 TX port: 1710 ... 1785 MHz	30 dBm	5 MHz 5G NR (CP-OFDM) (1 RB) for 5000 h @ 50 °C.

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-A114F (HBM – Human Body Model), 1 negative & 1 positive pulse.
4) According to JESD22-C101C (CDM – Field Induced Charged Device Model), 3 negative & 3 positive pulses.

11 Transmission coefficient 4G/5G n1

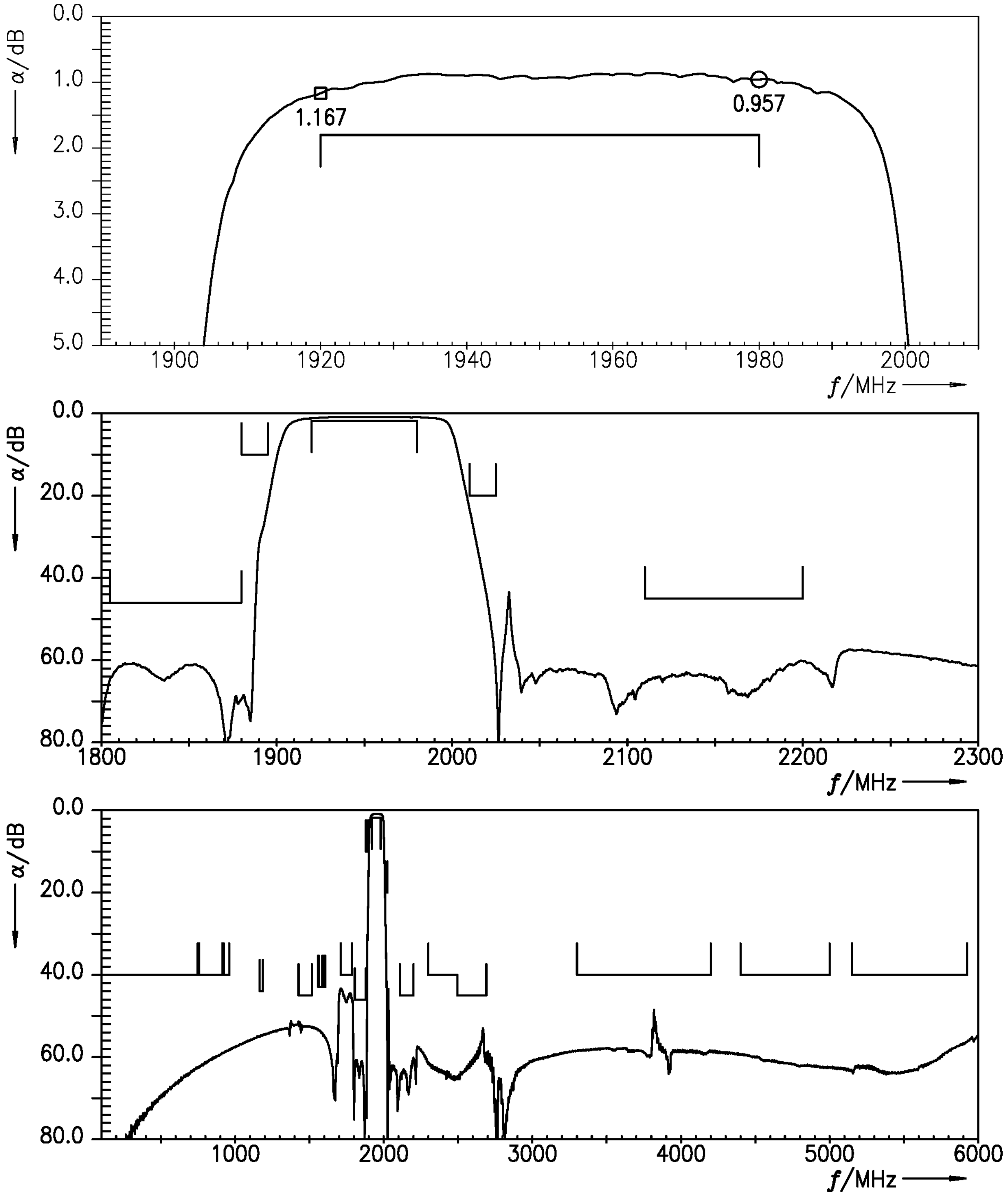

Figure 3: Attenuation TX – ANT.

12 Reflection coefficients 4G/5G n1

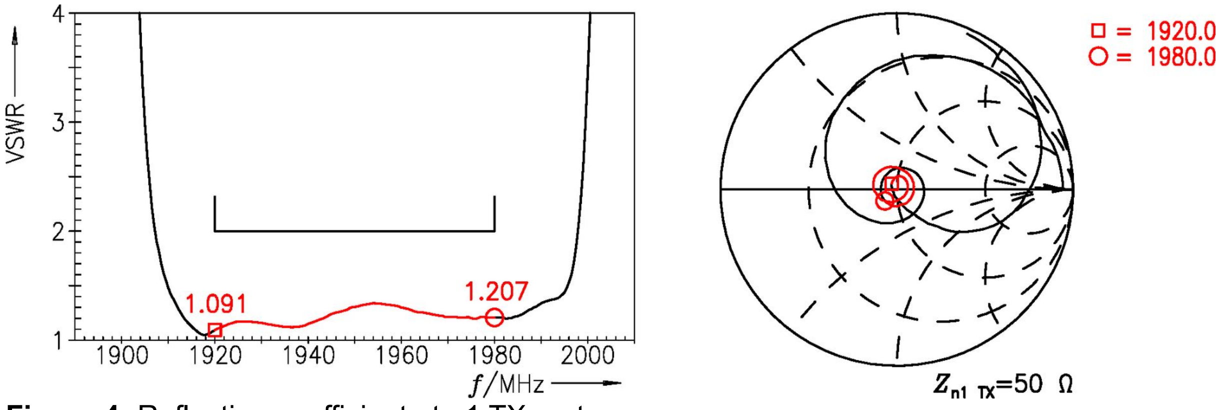

Figure 4: Reflection coefficient at n1 TX port.

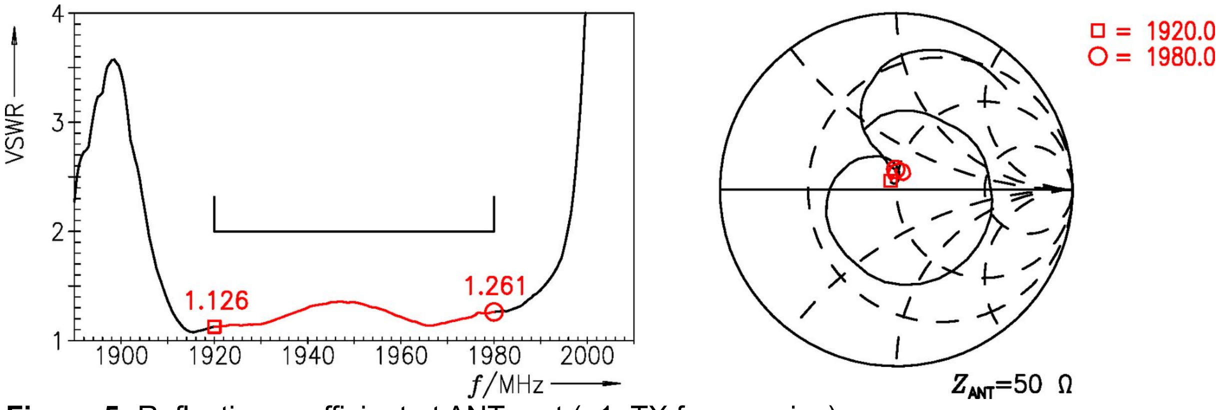

Figure 5: Reflection coefficient at ANT port (n1_TX frequencies).

13 Transmission coefficients 4G/5G n3

13.1 TX – ANT

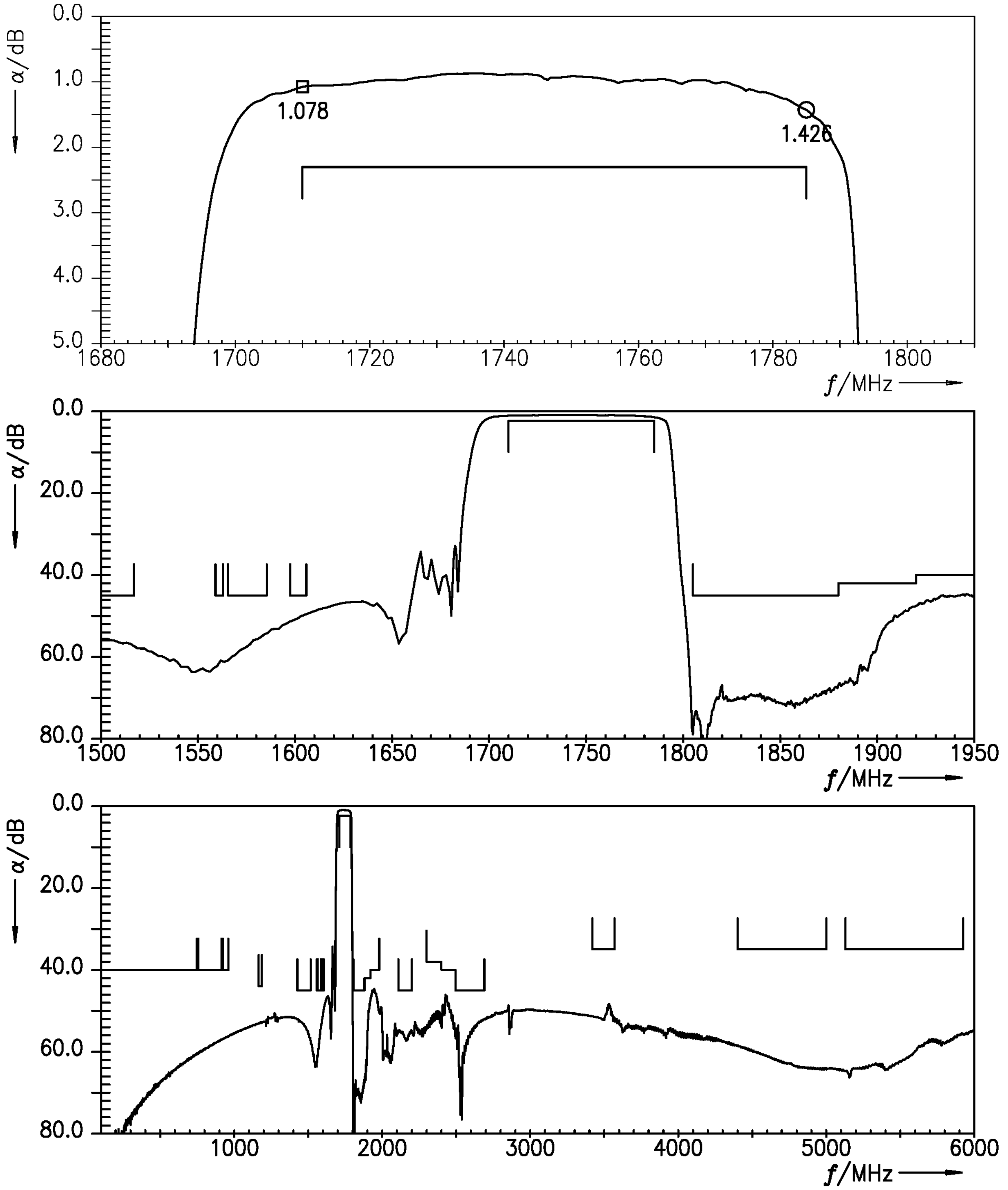

Figure 6: Attenuation TX – ANT.

13.2 ANT – RX

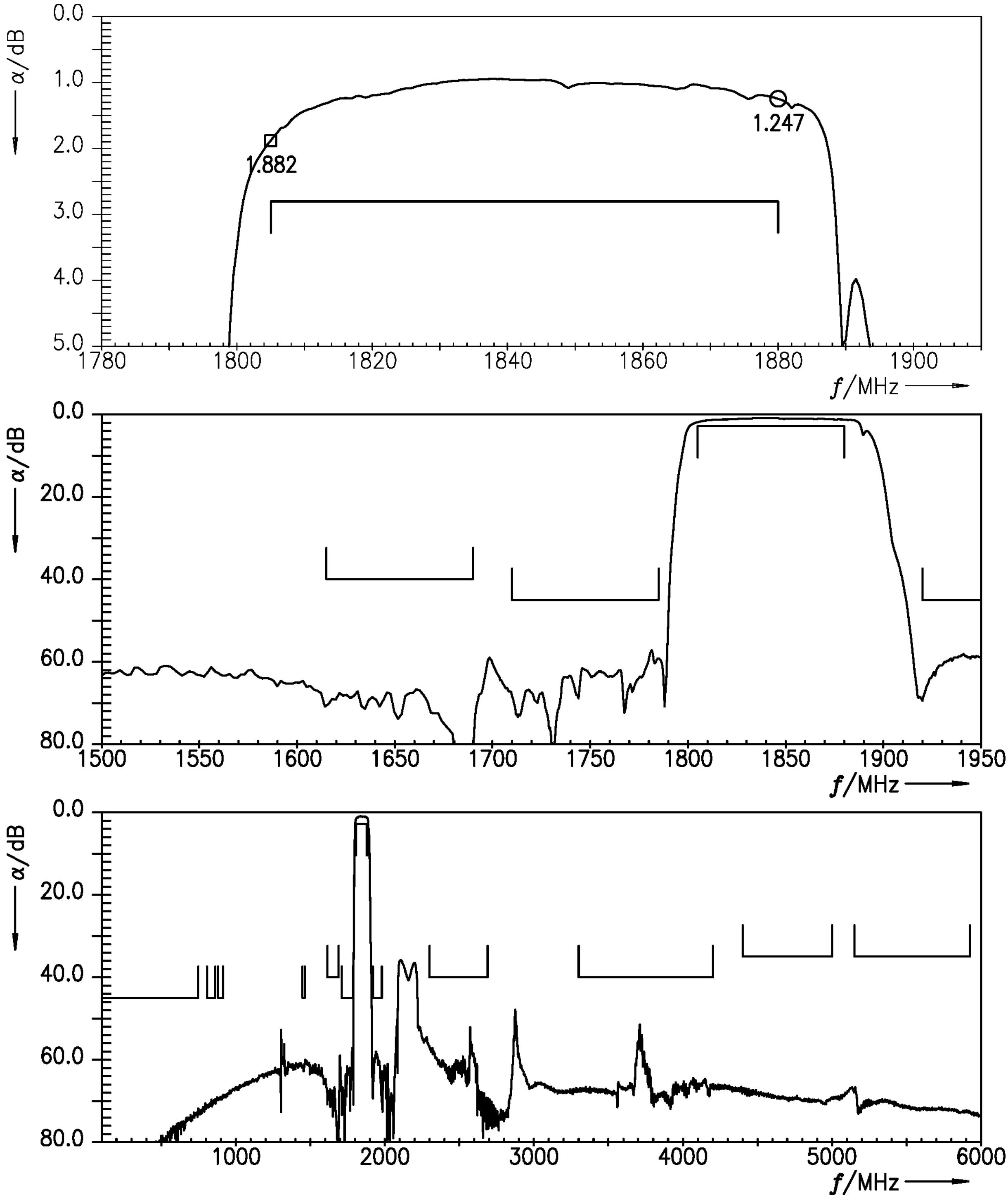

Figure 7: Attenuation ANT – RX.

13.3 TX – RX

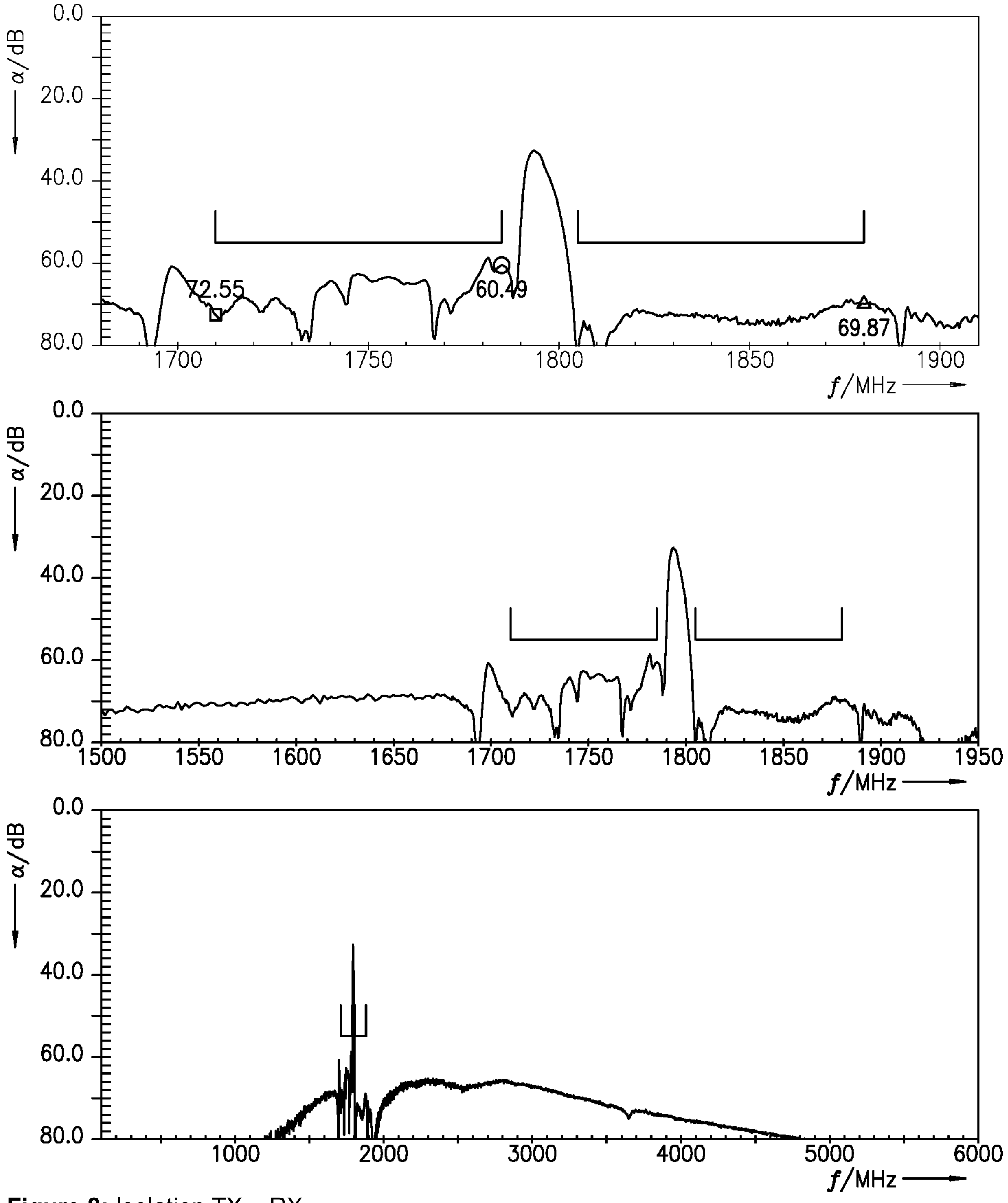

Figure 8: Isolation TX – RX.

14 Reflection coefficients 4G/5G n3

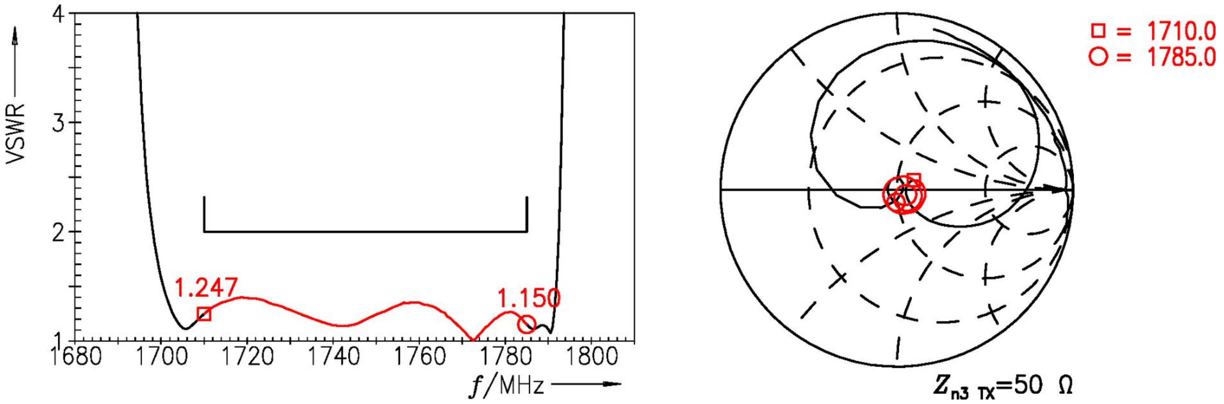

Figure 9: Reflection coefficient at n3 TX port.

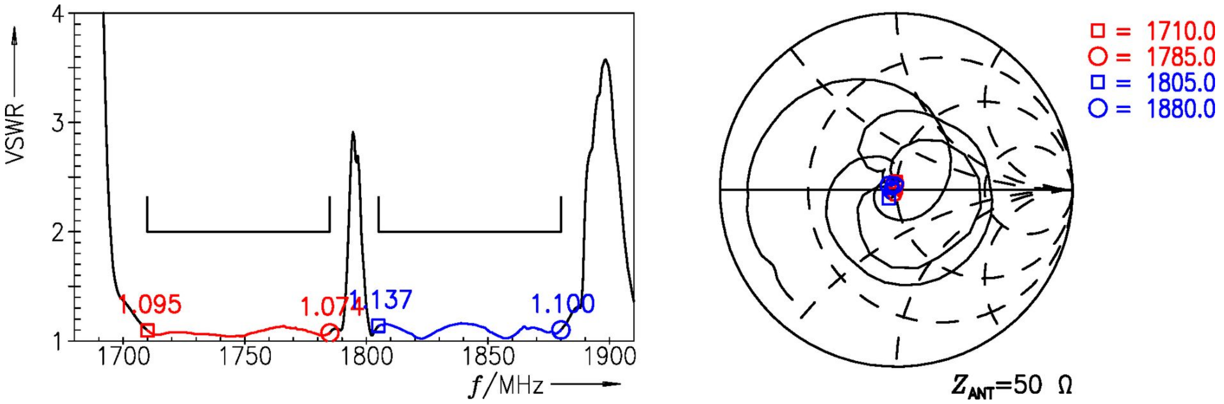

Figure 10: Reflection coefficient at ANT port (n3_TX and n3_RX frequencies).

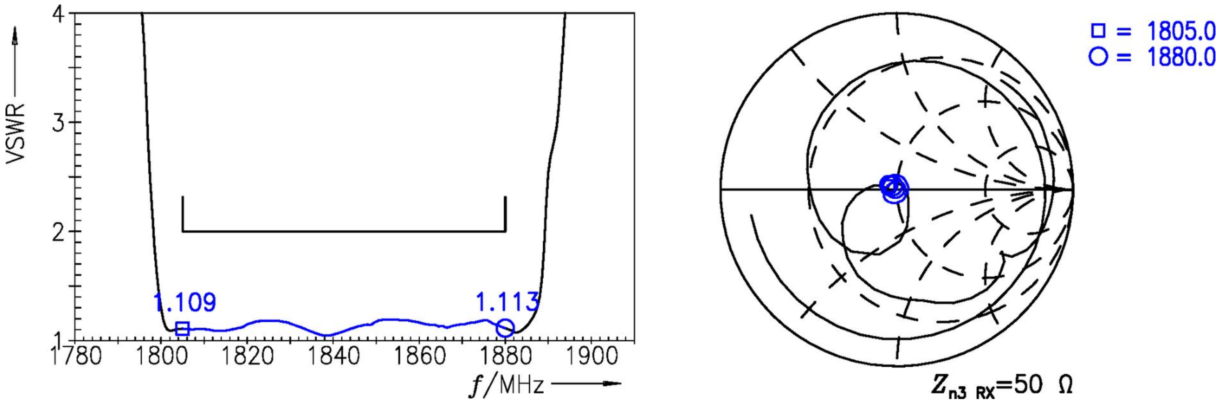

Figure 11: Reflection coefficient at n3 RX port.

15 Transmission coefficient 4G/5G n66

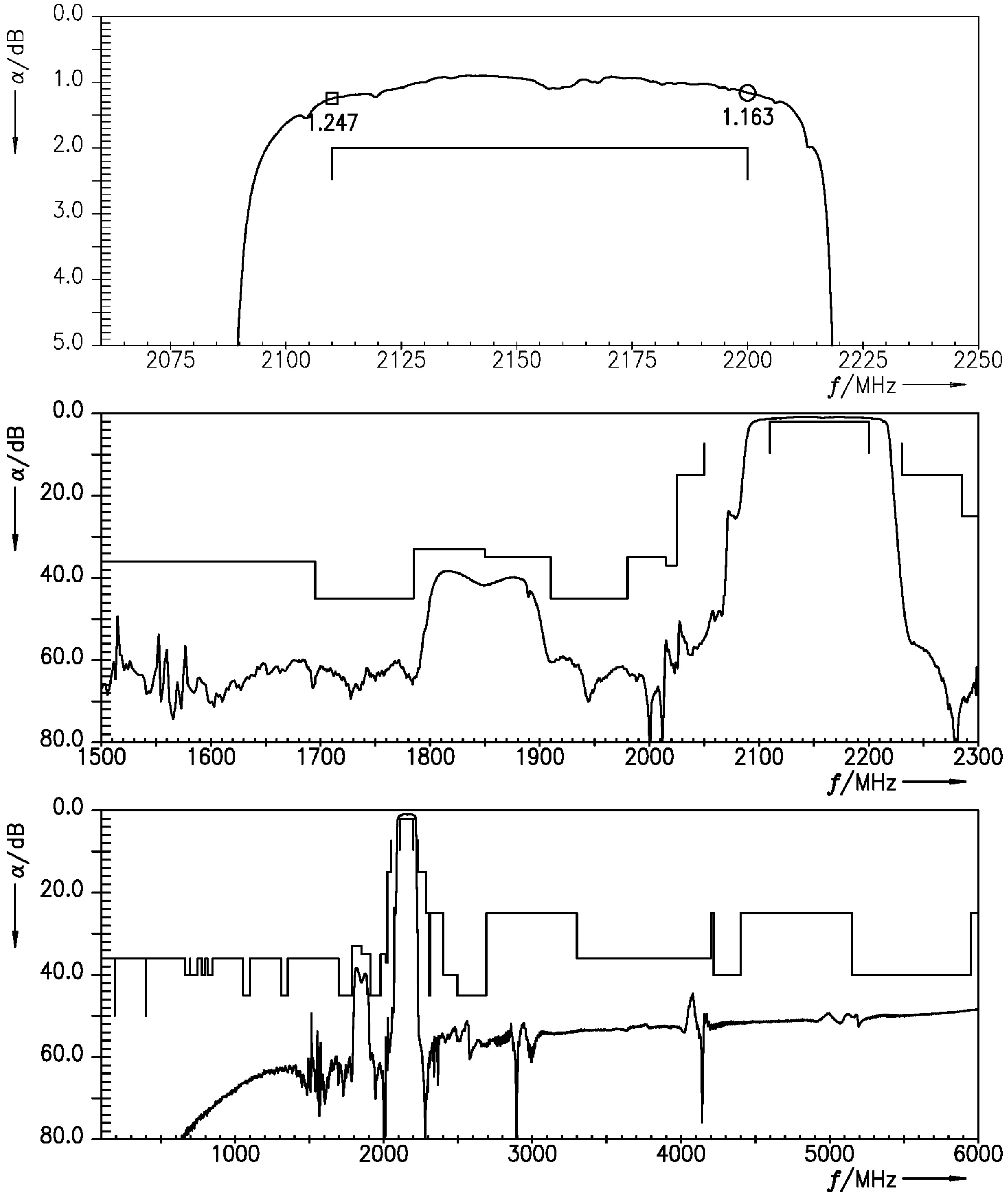

Figure 12: Attenuation ANT – RX.

16 Reflection coefficients 4G/5G n66

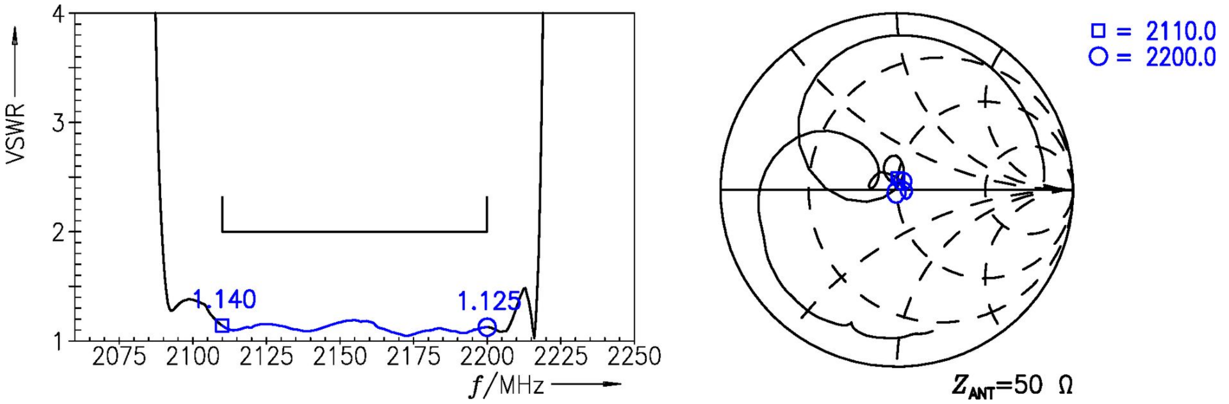

Figure 13: Reflection coefficient at ANT port (n66_RX frequencies).

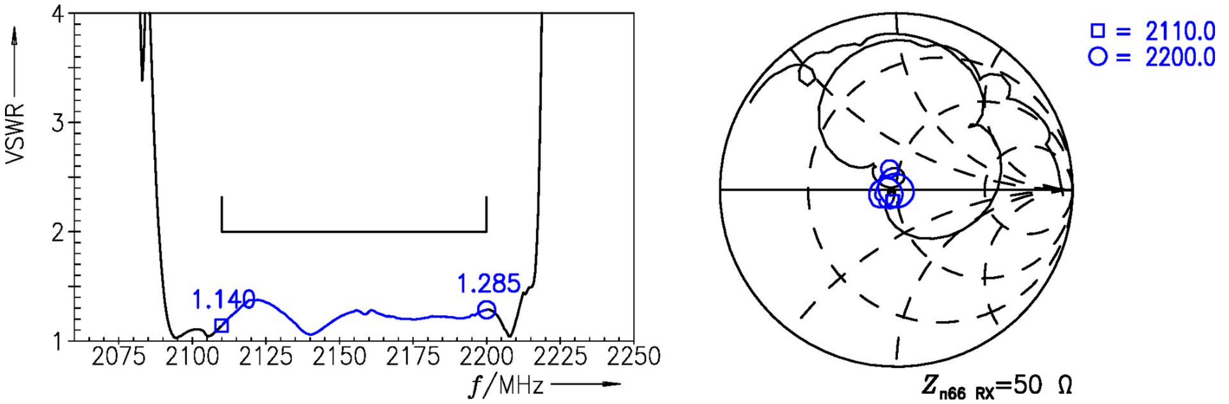

Figure 14: Reflection coefficient at n66 RX port.

17 Transmission coefficients cross-isolations

17.1 4G/5G n1 TX – n3 RX

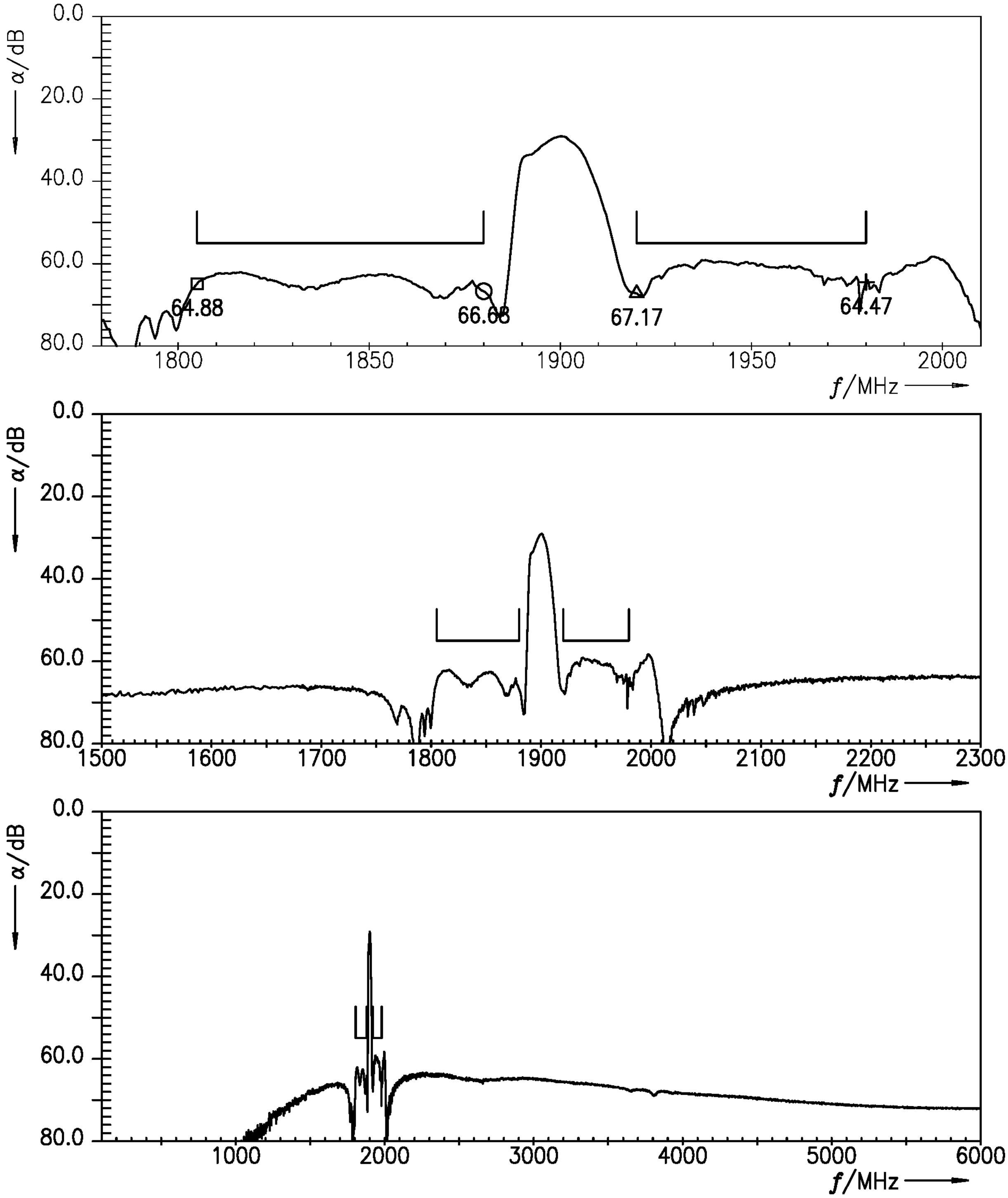

Figure 15: Cross-isolation 4G/5G n1 TX – n3 RX.

17.2 4G/5G n1 TX – n66 RX

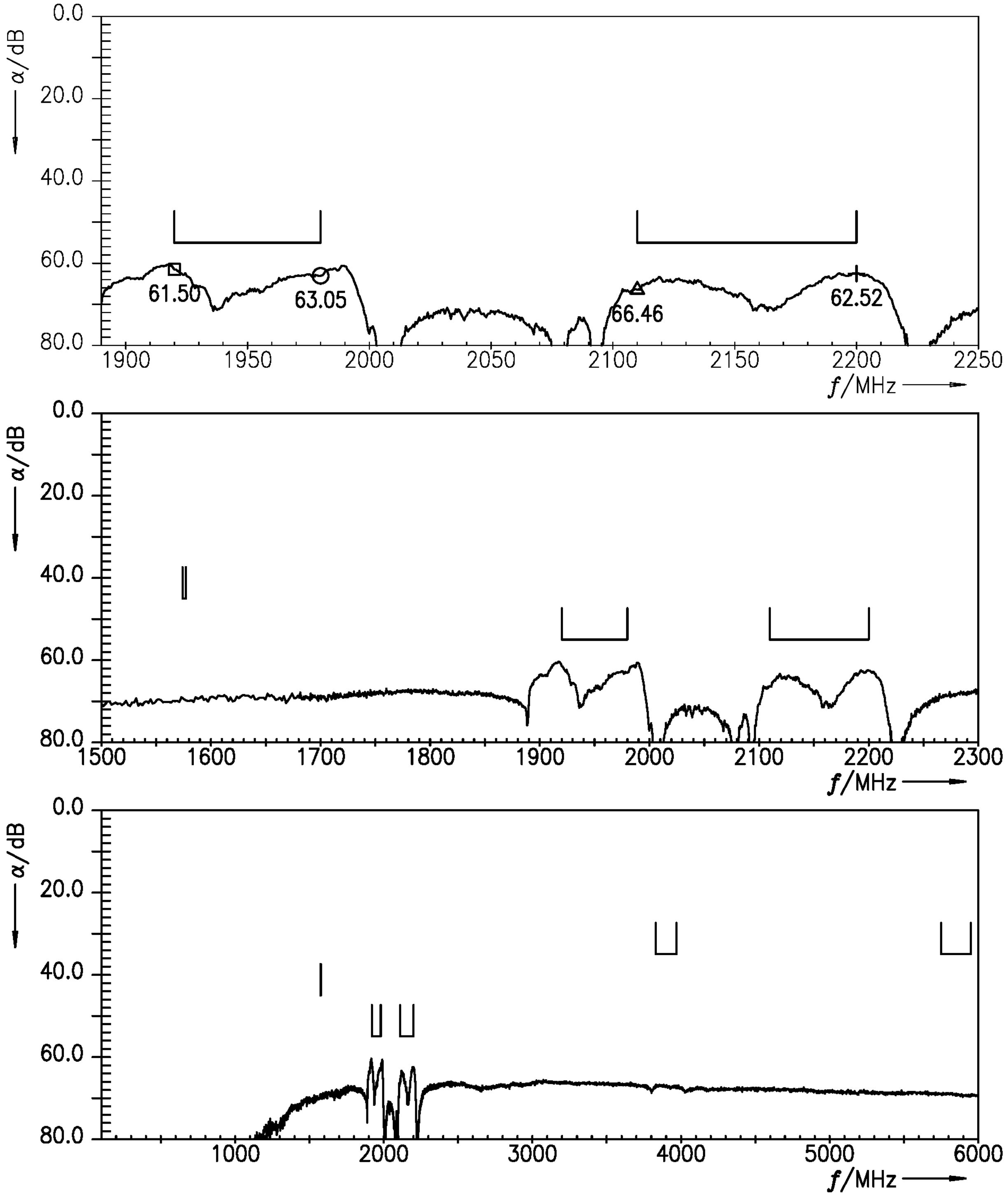

Figure 16: Cross-isolation 4G/5G n1 TX – n66 RX.

17.3 4G/5G n3 TX – n66 RX

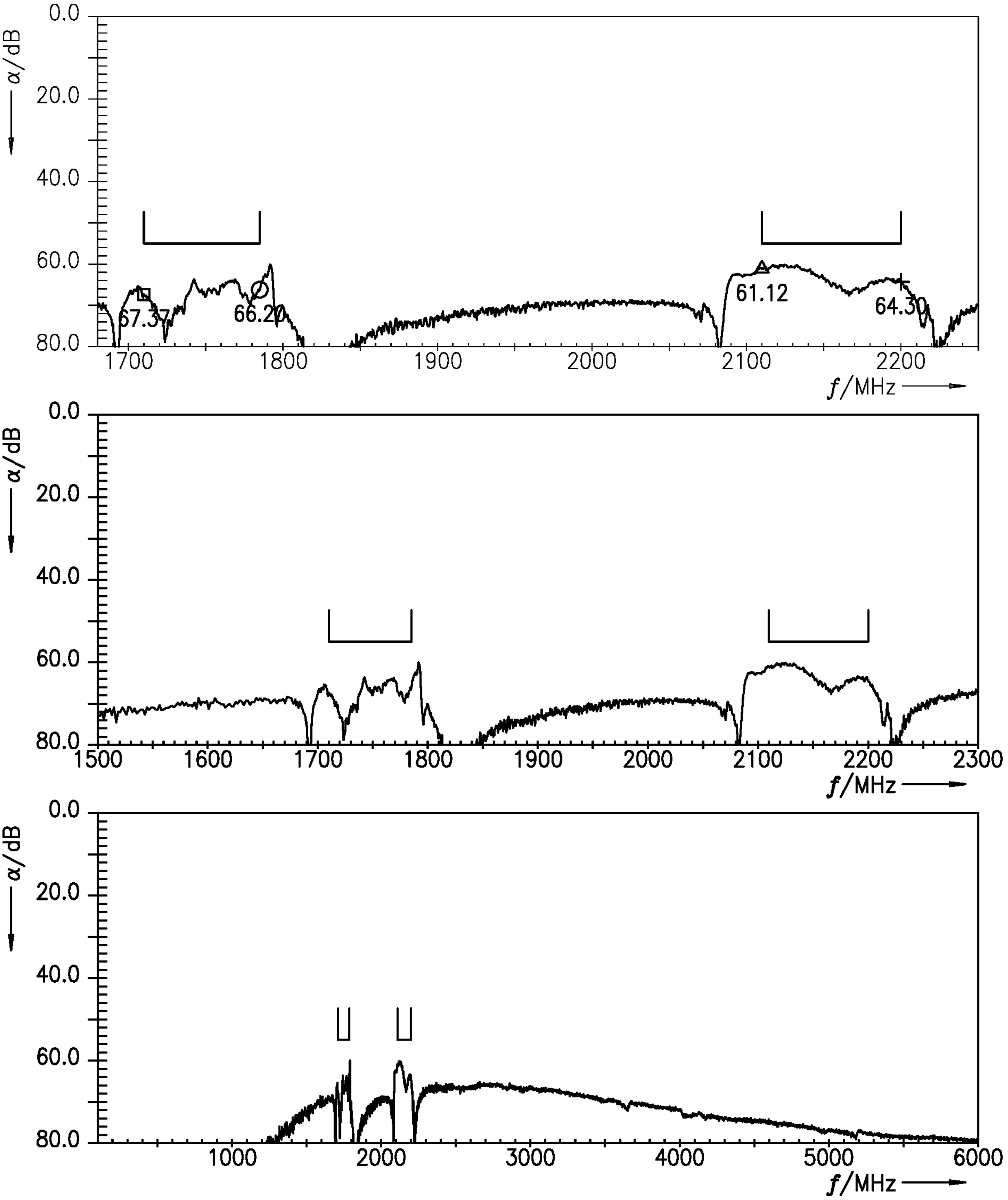

Figure 17: Cross-isolation 4G/5G n3 TX – n66 RX.

18 Packing material

18.1 Tape

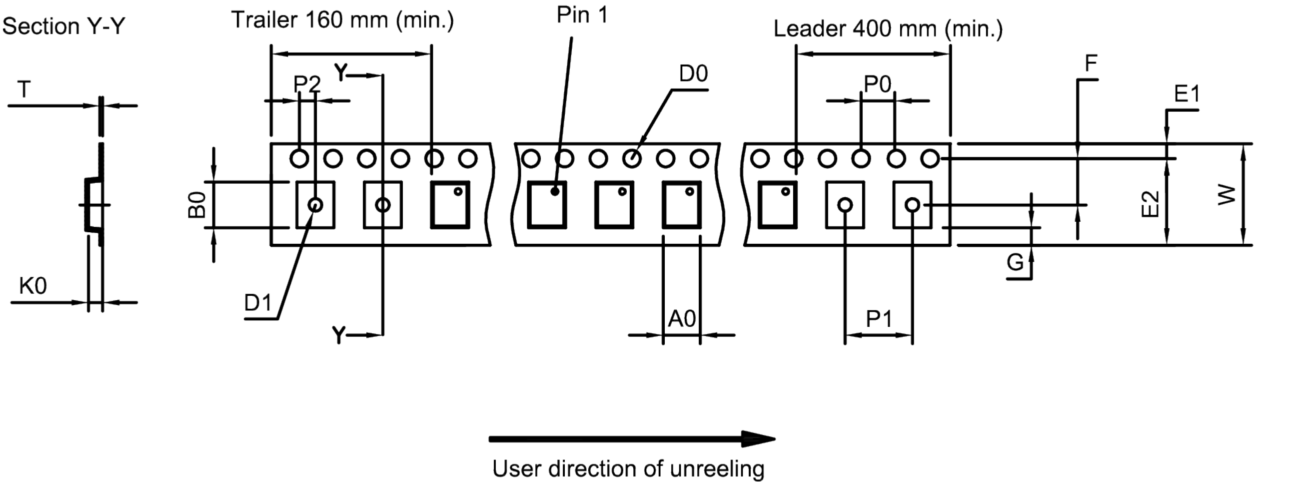

Figure 18: Drawing of tape (first-angle projection) for illustration only and not to scale. The valid tape dimensions are listed in Table 1.

A_0	1.8±0.05 mm		E_2	6.25 mm (min.)		P_1	4.0±0.1 mm
B_0	2.2±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±0.03 mm
D_1	1.0+0.1/−0 mm		K_0	0.8±0.05 mm		W	8.0+0.3/−0.1 mm
E_1	1.75±0.1 mm		P_0	4.0±0.1 mm			

Table 1: Tape dimensions.

18.2 Reel with diameter of 180 mm

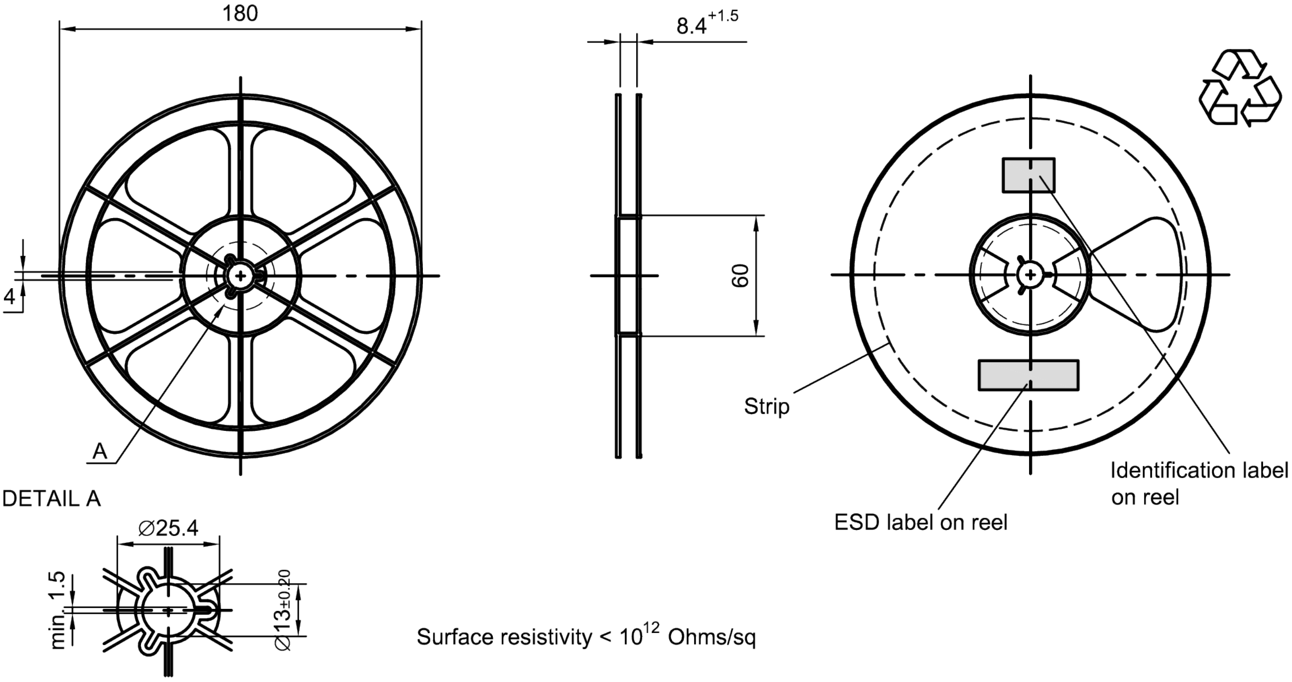

Figure 19: Drawing of reel (first-angle projection) with diameter of 180 mm.

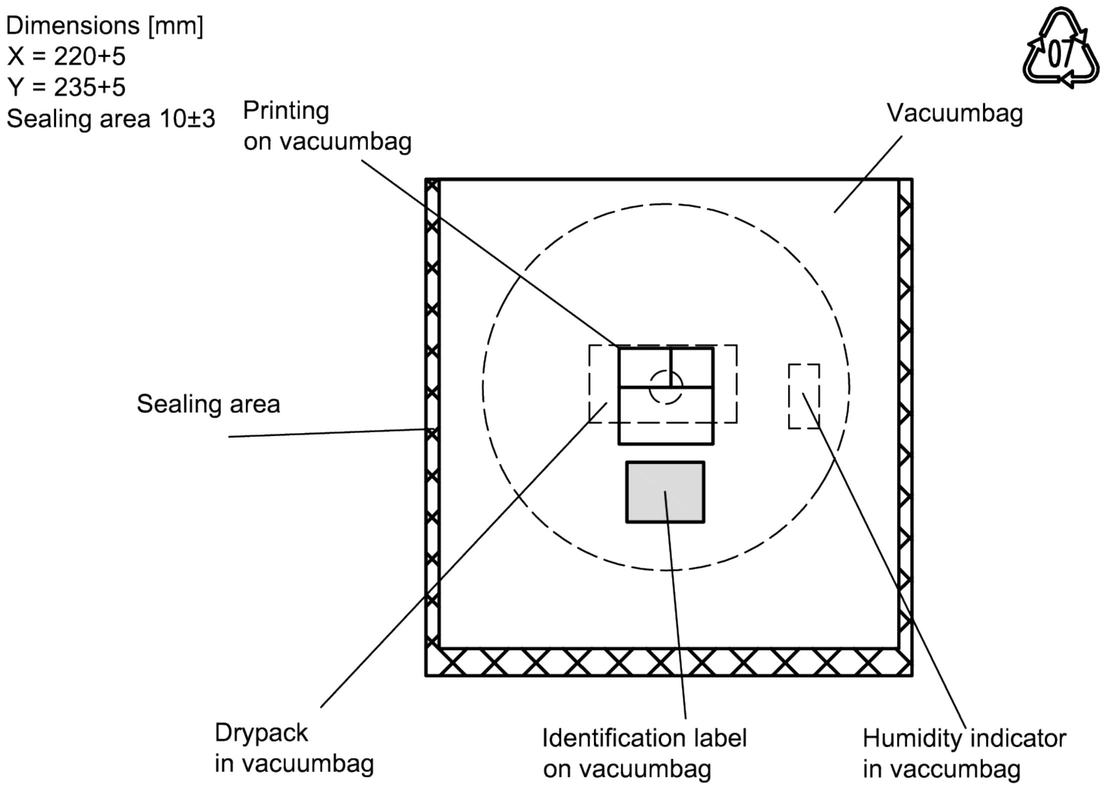

Figure 20: Drawing of moisture barrier bag (MBB) for reel with diameter of 180 mm.

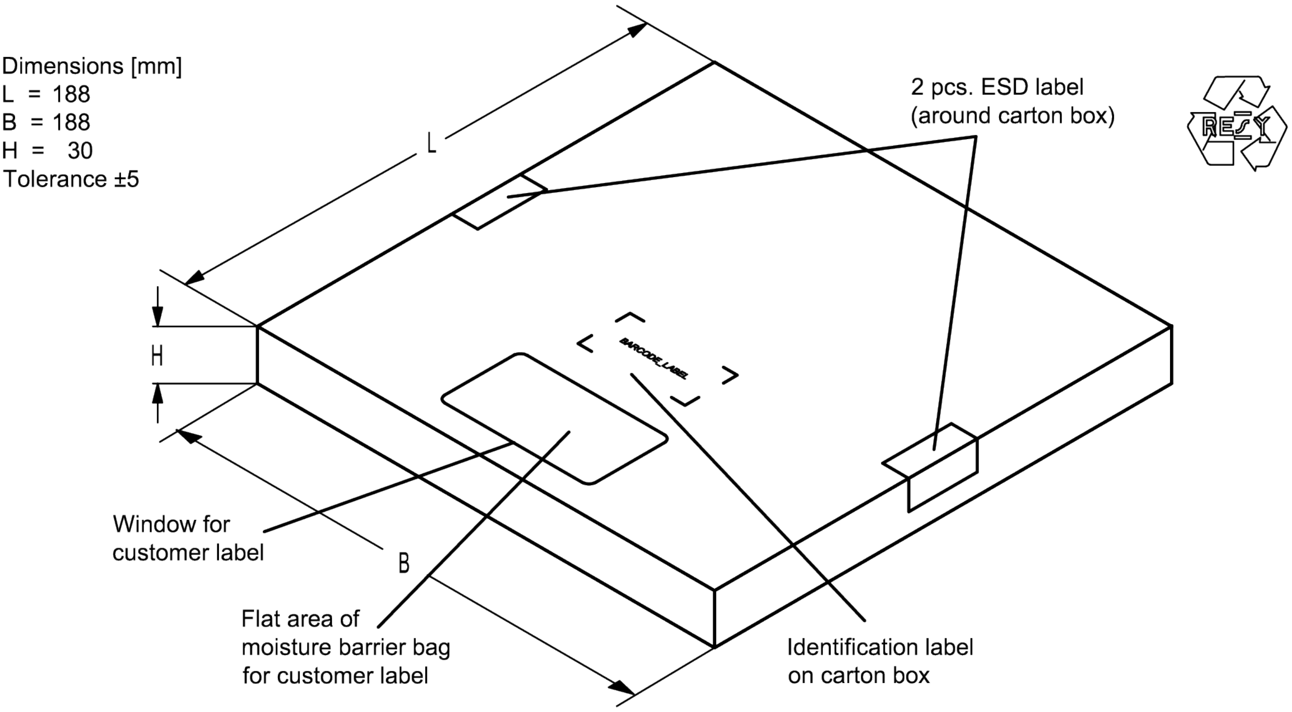

Figure 21: Drawing of folding box for reel with diameter of 180 mm.

18.3 Reel with diameter of 330 mm

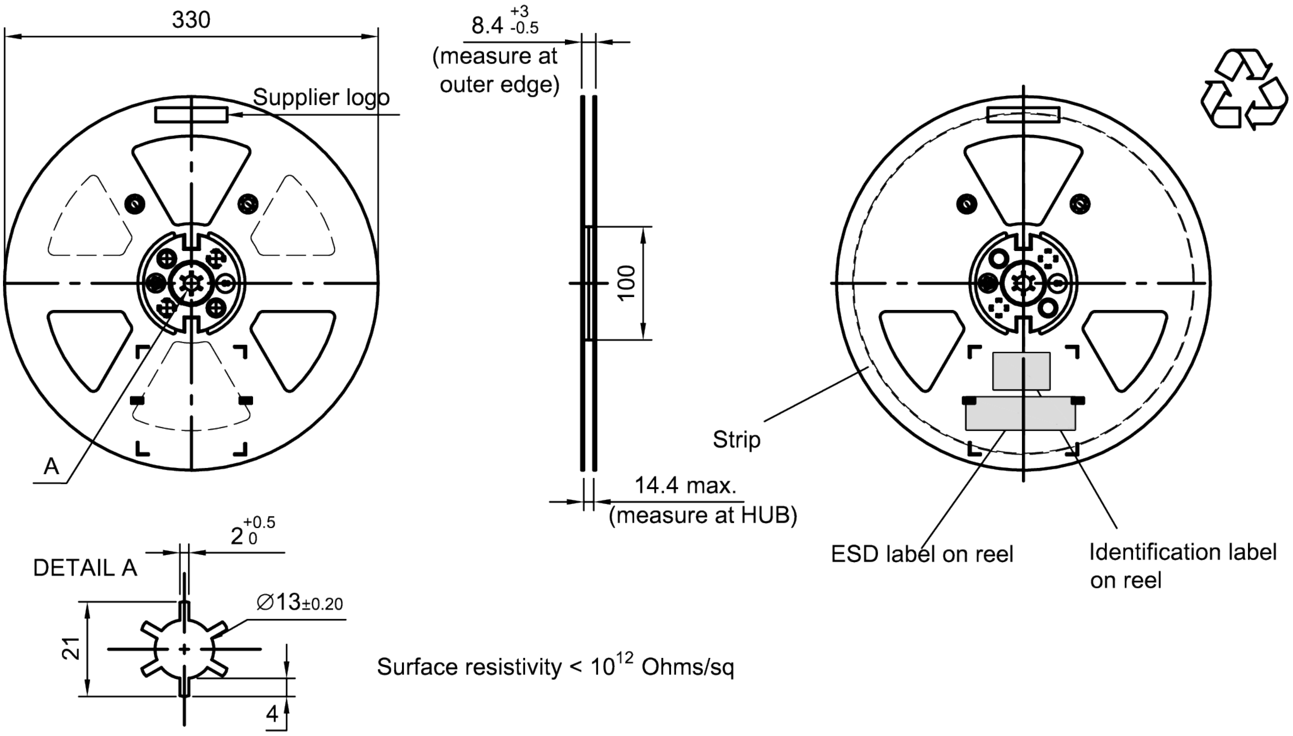

Figure 22: Drawing of reel (first-angle projection) with diameter of 330 mm.

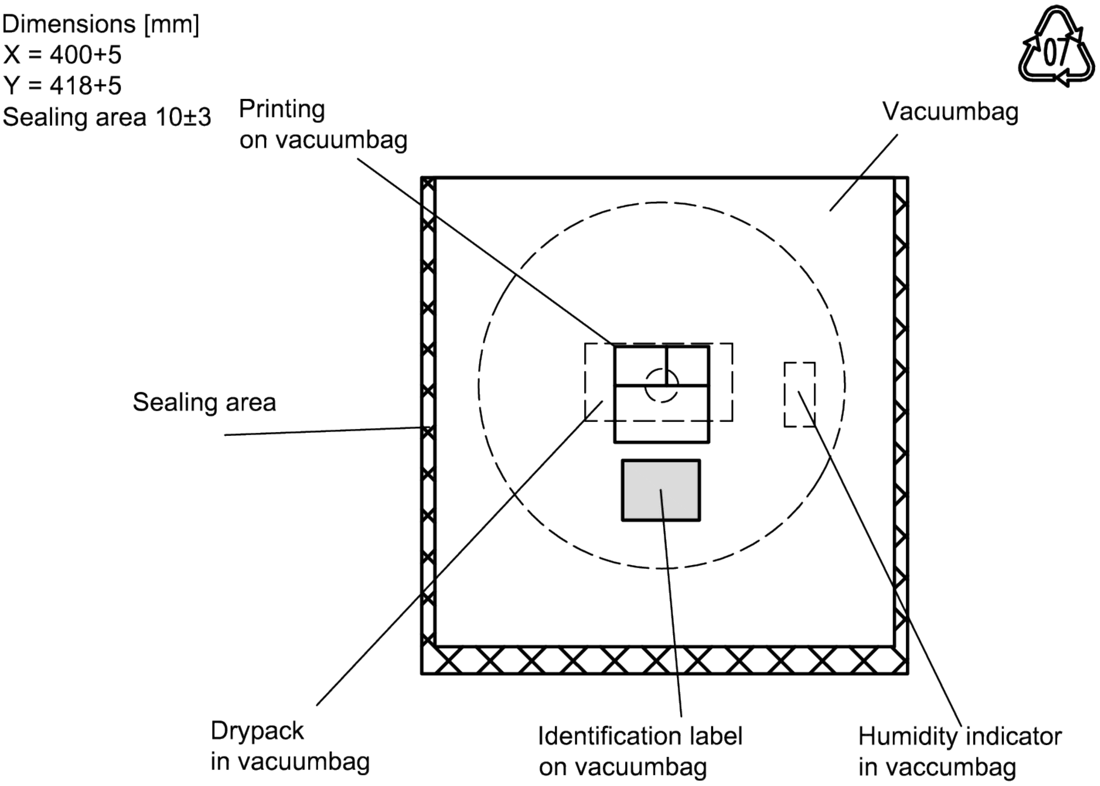

Figure 23: Drawing of moisture barrier bag (MBB) for reel with diameter of 330 mm.

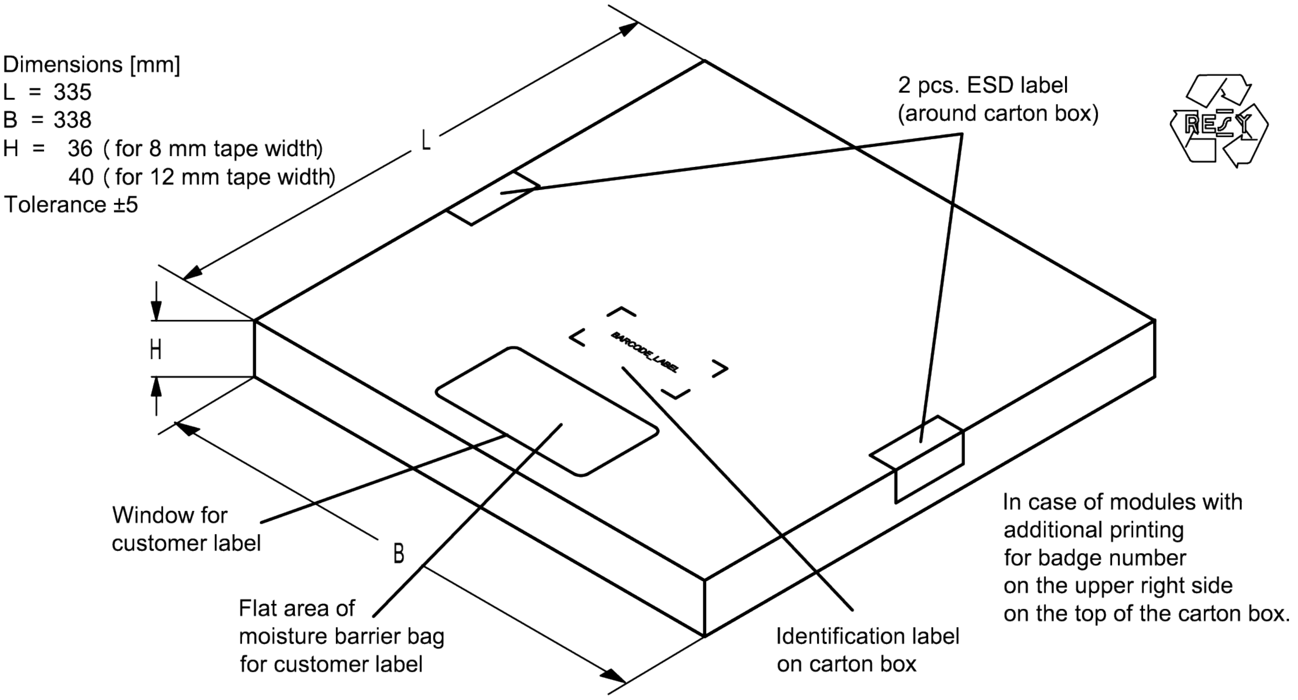

Figure 24: Drawing of folding box for reel with diameter of 330 mm.

19 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<u>**1234**</u>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 B8981 is 8RN.

- 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.

20 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).

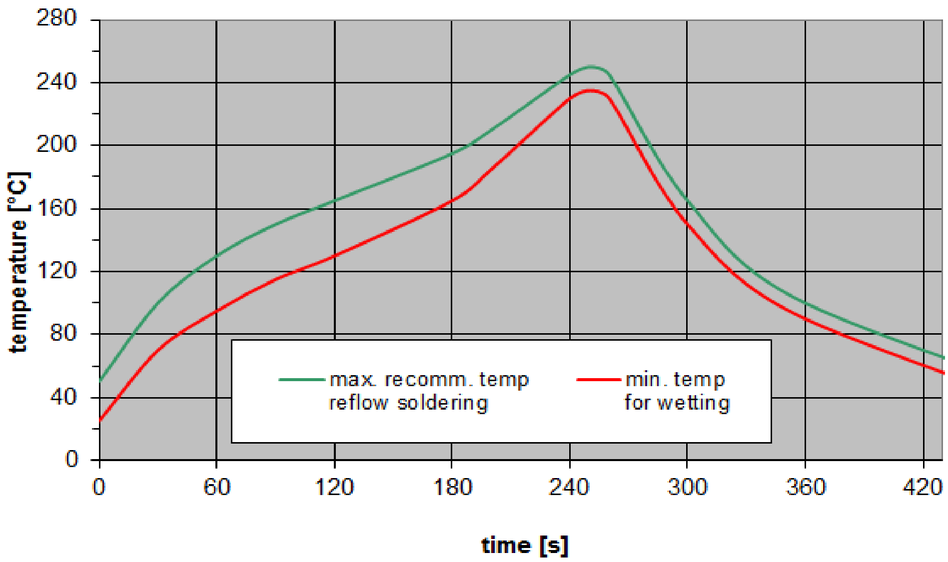

Figure 25: Recommended reflow profile for convection and infrared soldering – lead-free solder.

21 ESD protection of acoustic devices

Acoustic devices are **E**lectro **S**tatic **D**ischarge sensitive devices. To reduce the probability of damages caused by ESD, special matching topologies must be applied.

In general, “ESD matching” must be ensured at that electrical port, where electrostatic discharge is expected.

Electrostatic discharges predominantly appear at the antenna input of RF receivers. Therefore, only the input matching of the acoustic device must be designed to short circuit or to block the ESD pulse.

Below three figures show recommended “ESD matching” topologies.

For wide band acoustic devices the high-pass ESD matching structure needs to be at least of 3rd order to ensure a proper matching for any impedance value of antenna and input port. The required component values must be determined from case to case.

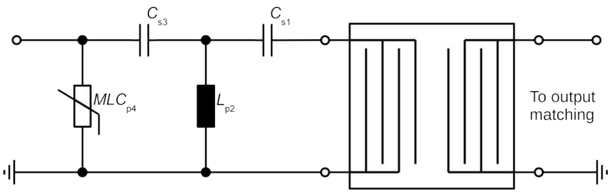

Figure 26: MLC varistor plus ESD matching.

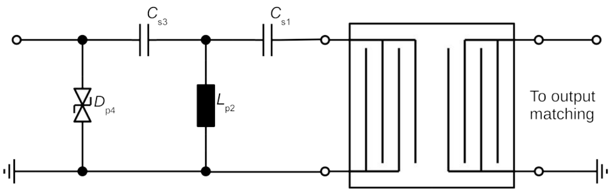

Figure 27: Suppressor diode plus ESD matching.

In cases where minor ESD occur, following simplified “ESD matching” topologies can be used alternatively.

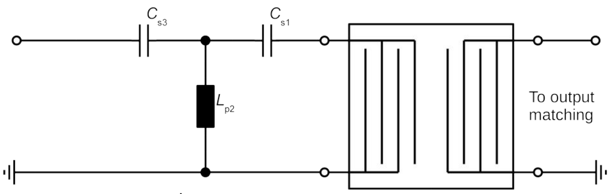

Figure 28: 3rd order high-pass structure for basic ESD protection.

In all three figures the shunt inductor L_{p2} could be replaced by a shorted microstrip with proper length and width. If this configuration is possible depends on the operating frequency and available PCB space.

Effectiveness of the applied ESD protection has to be checked according to relevant industry standards or customer specific requirements.

For further information, please refer to RF360 Application report: **“ESD protection for SAW filters”.** This report can be found under https://rffe.qualcomm.com.

22 Annotations

22.1 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.

22.2 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.

22.3 Ordering codes, product IDs, labels, and packing units

Ordering code	Product ID	RF360 label	Packing unit
B39222B8981L210	B39222-B8981-L210-W05	B39222B8981L210W 5	5000 pcs

Table 4: Ordering codes / product IDs and packing units. Shipment will come from either Singapore or Wuxi location.

23 Cautions and warnings

23.1 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 https://rffe.qualcomm.com/.

23.2 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.

23.3 Moldability

Before using in overmolding environment, please contact your local RF360 sales office.

23.4 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.

24 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 (https://rffe.qualcomm.com). Should you have any more detailed questions, please contact our sales offices.
5. We constantly strive to improve our products. Consequently, **the products described in this publication may change from time to time**. The same is true of the corresponding product specifications. Please check therefore to what extent product descriptions and specifications contained in this publication are still applicable before or when you place an order. We also **reserve the right to discontinue production and delivery of products**. Consequently, we cannot guarantee that all products named in this publication will always be available.
   The aforementioned does not apply in the case of individual agreements deviating from the foregoing for customer-specific products.