RADIO TEST REPORT

For

Shenzhen Chainway Information Technology Co.,Ltd.

UHF RFID Module

Test Model: CM2000-1

Additional Model No.:/

Prepared for	:	Shenzhen Chainway Information Technology Co.,Ltd.
Address	:	9/F, Building 2, Daqian Industrial Park, Longchang Rd., District 67, Bao'an, Shenzhen
Prepared by	:	Shenzhen LCS Compliance Testing Laboratory Ltd.
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Date of receipt of test sample	:	November 15, 2019
Number of tested samples	:	1
Serial number	:	Prototype
Date of Test	:	November 15, 2019 ~ December 30, 2019
Date of Report	:	December 31, 2019

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RADIO TEST REPORT
ETSI EN 302 208 V3.1.1 (2016-11)
Radio Frequency Identification Equipment operating in the band 865 MHz to 868 MHz with power levels up to 2 W and in the band 915 MHz to 921 MHz with power levels up to 4 W; Harmonised Standard covering the essential requirements of article 3.2 of the Directive 2014/53/EU

Report Reference No.	**: LCS191111082AEA**
Date of Issue	: December 31, 2019
Testing Laboratory Name.....	**: Shenzhen LCS Compliance Testing Laboratory Ltd.**
Address	: 101, 601, Xingyuan Industrial Park, Gushu Community, Xixiang Street, Bao' an District, Shenzhen, Guangdong, China
Testing Location/ Procedure.....	: Full application of Harmonised standards ■ Partial application of Harmonised standards □ Other standard testing method □
Applicant's Name.....	**: Shenzhen Chainway Information Technology Co.,Ltd.**
Address	: 9/F, Building 2, Daqian Industrial Park, Longchang Rd., District 67, Bao'an, Shenzhen
Test Specification	
Standard	: ETSI EN 302 208 V3.1.1 (2016-11)
Test Report Form No.	: LCSEMC-1.0
TRF Originator	: Shenzhen LCS Compliance Testing Laboratory Ltd.
Master TRF	: Dated 2017-06

Test Item Description.	**: UHF RFID Module**
Trade Mark.....	: Chainway
Test Model	: CM2000-1
Ratings	: Input: DC 3.5V-5.25V, 8W
Result	**: Positive**

Compiled by:	**Supervised by:**	**Approved by:**
Ray Yang	Jin Wang	
Ray Yang/ File administrators	Jin Wang/ Technique principal	Gavin Liang/ Manager

RADIO -- TEST REPORT

Test Report No. : LCS191111082AEA	December 31, 2019 Date of issue

Test Model.....	: CM2000-1
EUT.....	: UHF RFID Module
Applicant.....	**: Shenzhen Chainway Information Technology Co.,Ltd.**
Address.....	: 9/F, Building 2, Daqian Industrial Park, Longchang Rd., District 67, Bao'an, Shenzhen
Telephone.....	: /
Fax.....	: /
Manufacturer.....	**: Shenzhen Chainway Information Technology Co.,Ltd.**
Address.....	: 9/F, Building 2, Daqian Industrial Park, Longchang Rd., District 67, Bao'an, Shenzhen
Telephone.....	: /
Fax.....	: /
Factory.....	**: Shenzhen Chainway Information Technology Co.,Ltd.**
Address.....	: 9/F, Building 2, Daqian Industrial Park, Longchang Rd., District 67, Bao'an, Shenzhen
Telephone.....	: /
Fax.....	: /

Test Result	**Positive**

The test report merely corresponds to the test sample.
It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

Revision History

Revision	Issue Date	Revisions	Revised By
000	December 31, 2019	Initial Issue	Gavin Liang

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Test Report Description Page

1. GENERAL INFORMATION

1.1. Product Description for Equipment Under Test (EUT)

EUT	:	UHF RFID Module
Test Model	:	CM2000-1
Additional Model No.	:	/
Model Declaration	:	/
Power Supply	:	Input: DC 3.5V-5.25V, 8W
Hardware Version	:	V2.5
Software Version	:	V6.17
RFID	:	
Frequency Range	:	865.7-867.5MHz
Channel Number	:	4 channels(865.7MHz, 866.3MHz, 866.9MHz, 867.5MHz)
Channel Spacing	:	600KHz
Modulation Type	:	ASK
Antenna Description	:	External antenna, 0dBi(Max.)

1.2. Objective

This Type approval report is prepared on behalf of **Shenzhen Chainway Information Technology Co.,Ltd.** in accordance with ETSI EN 302 208 V3.1.1 (2016-11), Radio Frequency Identification Equipment operating in the band 865 MHz to 868 MHz with power levels up to 2 W and in the band 915 MHz to 921 MHz with power levels up to 4 W; Harmonised Standard covering the essential requirements of article 3.2 of the Directive 2014/53/EU.

The objective is to determine compliance with ETSI EN 302 208 V3.1.1 (2016-11).

1.3. Related Submittal(s)/Grant(s)

No Related Submittals.

1.4. Test Methodology

All measurements contained in this report were conducted with ETSI EN 302 208 V3.1.1 (2016-11).

1.5. Description of Test Facility

FCC Registration Number. is 254912.
Industry Canada Registration Number. is 9642A-1.
ESMD Registration Number. is ARCB0108.
UL Registration Number. is 100571-492.
TUV SUD Registration Number. is SCN1081.
TUV RH Registration Number. is UA 50296516-001

1.6. Support equipment List

Manufacturer	Description	Model	Serial Number	Certificate
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1.7. External I/O

I/O Port Description	Quantity	Cable
/	/	/
/	/	/
/	/	/
/	/	/

1.8. Measurement Uncertainty(95% confidence levels, k=2)

Test Items	Measurement Uncertainty(standard)
RF frequency	$\pm 1 \times 10^{-7}$
RF power, conducted	±0.75 dB
RF power, radiated, valid up to 12,75 GHz	±6 dB
Maximum frequency deviation for FM	±5 %
Two-signal measurements	±4 dB
Time	±5 %
Temperature	±1 K
Humidity	±5 %

Note:

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=1.96.

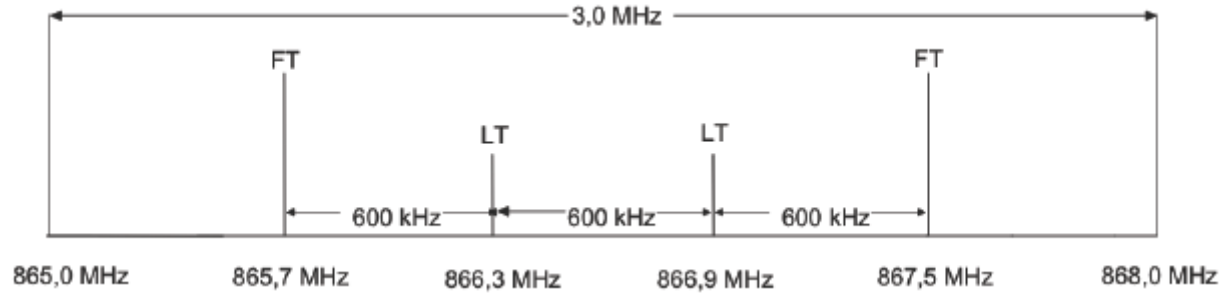
1.9. Test Environment

Items	Required (IEC 68-1)	Actual
Temperature (°C)	15-35	25
Humidity (%RH)	25-75	51
Barometric pressure (mbar)	860-1060	1005

1.10. Description Of Test Modes

The EUT has been tested under typical operating condition. The Applicant provides communication tools software to control the EUT for staying in continous transmitting and receiving mode for testing. There are 4 channels of EUT, and the test carried out at 865.7MHz, 866.3MHz, 866.9MHz, 867.5MHz .

Figure below shows the centre frequencies of the four high power channels permitted for use by interrogators at levels up to 33dBm e.r.p. within the band designated for RFID. Full (FT) and Limited (LT) Tests, as defined, shall be carried out in the applicable channels at the frequencies shown below.



Tests on a single sample for equipment in the lower band

Note:

(1) For portable device, radiated spurious emission was verified over X, Y, Z Axis, and shown the worst case on this report.

(2) The extreme test condition for voltage and temperature were declared by the manufacturer.

(3) Legend: LT: Limit test; FT: Full test

Limited Tests (LT): limited tests are as follows:

- transmitter frequency error and frequency stability under low voltage conditions for mains operated equipment
- transmitter frequency stability under low voltage conditions
- transmitter effective radiated power.

(4) Full Tests (FT): all tests specified in the present report.

2. SYSTEM TEST CONFIGURATION

2.1. Justification

The system was configured for testing in engineering mode.

2.2. EUT Exercise Software

N/A.

2.3. Special Accessories

N/A.

2.4. Block Diagram/Schematics

Please refer to the related document.

2.5. Equipment Modifications

Shenzhen LCS Compliance Testing Laboratory Ltd. has not done any modification on the EUT.

2.6. Configuration of Test Setup

Please refer to the test setup photo.

3. SUMMARY OF TEST RESULT

ETSI EN 302 208 V3.1.1 (2016-11) requirements:

Performed Test Item	Normative References	Test Performed
Frequency error	ETSI EN 302 208 V3.1.1 (2016-11) clause 5.3.1	Yes
Frequency stability under low voltage conditions	ETSI EN 302 208 V3.1.1 (2016-11) clause 5.3.2	Yes
Effective radiated power &Transmitter antenna beamwidth	ETSI EN 302 208 V3.1.1 (2016-11) clause 5.3.3 & clause 5.3.4	Yes*
Transmitter spectrum mask	ETSI EN 302 208 V3.1.1 (2016-11) clause 5.3.5	Yes
Transmitter spurious emissions	ETSI EN 302 208 V3.1.1 (2016-11) clause 5.3.6	Yes
Transmission times	ETSI EN 302 208 V3.1.1 (2016-11) clause 5.3.7	Yes
Mitigation using DAA	ETSI EN 302 208 V3.1.1 (2016-11) clause 5.3.8	N/A
maximum occupied bandwidth	ERC Recommendation 70-03 Annex 11: a2	N/A

Note:
1.The EUT have not receiving function in normal use. Therefore, we have not tested the receiving part..
2.N/A: not applicable
3. *: For transmissions $\leqslant$ 500 mW e.r.p. there shall be no restriction on beamwidth.
For transmissions of > 500 mW e.r.p. to $\leqslant$ 1 000 mW e.r.p. beamwidths shall be $\leqslant 180^{o}$.
For transmissions of > 1 000 mW e.r.p. to 2 000 mW e.r.p. beamwidths shall be $\leqslant 90^{o}$.
4. As declared by the manufacture, the max occupied bandwidth is 80KHz.

4. Frequency error

4.1. Limit

Refer to ETSI EN 302 208 V3.1.1 (2016-11) Sub-clause 8.1.3

The maximum permitted frequency drift, defined as the absolute value of fe-f, shall not exceed ±10 ppm relative to the nominal centre frequency of each of the applicable channels, where:

• f = the frequency measured under normal test conditions (see clause 8.1.2, a)).

• fe = the maximum frequency drift as measured in clause 8.1.2, b).

NOTE: Where multiple interrogators are co-located, tighter limits may be necessary to avoid unacceptable beat tones.

4.2. Test Setup

SPECTRUM ANALYZER

4.3. Test Procedure

The measurements shall be made with the interrogator set to transmit a continuous un-modulated carrier and performed at each of the applicable frequencies specified in clause 4.2.2.3.

Step 1:

• Under normal test conditions: - The signal transmitted by the interrogator shall be connected by suitable means to the input of a frequency counter. The frequency displayed on the frequency counter shall be recorded.

Step 2:

• Under extreme test conditions: - For each combination of extreme voltage and temperature (see clause 5.4) the frequency displayed on the frequency counter shall be recorded. Four values shall be measured.

4.4. Test Result

Test frequency @ 865.70000 MHz				
Environment Temperature Category II (℃)	Power Supplied V (DC)	Frequency Measured		
		MCF (MHz)	Error (ppm)	Limit (ppm)
-10	DV 3.7V	865.699	-1.39	±10
25	DV 3.7V	865.699	-1.39	±10
50	DV 3.7V	865.699	-1.50	±10

Test frequency @ 866.30000 MHz				
Environment Temperature Category II (℃)	Power Supplied V (DC)	Frequency Measured		
		MCF (MHz)	Error (ppm)	Limit (ppm)
-10	DV 3.7V	866.299	-1.16	±10
25	DV 3.7V	866.299	-1.16	±10
50	DV 3.7V	866.299	-1.16	±10

Test frequency @ 866.90000 MHz				
Environment Temperature Category II (℃)	Power Supplied V (DC)	Frequency Measured		
		MCF (MHz)	Error (ppm)	Limit (ppm)
-10	DV 3.7V	866.899	-1.50	±10
25	DV 3.7V	866.899	-1.50	±10
50	DV 3.7V	866.899	-1.50	±10

Test frequency @ 867.50000 MHz				
Environment Temperature Category II (℃)	Power Supplied V (DC)	Frequency Measured		
		MCF (MHz)	Error (ppm)	Limit (ppm)
-10	DV 3.7V	867.499	-1.50	±10
25	DV 3.7V	867.499	-1.50	±10
50	DV 3.7V	867.499	-1.50	±10

5. Frequency stability under low voltage conditions

5.1. Limit

The equipment shall either:

• transmit with a carrier frequency within the limits of ±10 ppm whilst the radiated or conducted power is below the spurious emission limits; or

• automatically cease to function below the provider's declared operating voltage.

NOTE: Where multiple interrogators are co-located, tighter limits may be necessary to avoid unacceptable beat

5.2. Test Setup

SPECTRUM ANALYZER

5.3. Test Procedure

1. Please refer to ETSI EN 302 208 V3.1.1 (2016-11) Sub-clause 5.1 for the test conditions.
2. Please refer to ETSI EN 302 208 V3.1.1 (2016-11) Sub-clause 5.5.1 for the measurement method.

5.4. Test Result

Voltage Supply (Vdc)		Test Frequency (MHz)	Measuremed Frequency (MHz)	Frequency Error (ppm)	Limit (ppm)
Where	3.7	865.7	865.6986	-1.62	±10
		866.3	866.2985	-1.73	±10
		866.9	866.8987	-1.50	±10
		867.5	867.4986	-1.61	±10
" *	3.7	916.3	/	/	/
		917.5	/	/	/
		918.7	/	/	/
		919.9	/	/	/

Spurious Emission when operate at 3.7VDC

Measurement Result @ 865.7MHz

Start Frequency	Stop Frequency	Antenna	Res Bandwidth	Maximum Emission Observed		Limit	Margin
(MHz)	(MHz)	Polarization	(KHz)	Frequency (MHz)	Level (dBm)	(dBm)	(dB)
30	863.7	H	100	421.05	-61.13	-36.00	-25.13
863.7	865.2	H	10	864.69	-45.34	-36.00	-9.34
866.2	867.7	H	10	866.61	-46.33	-36.00	-10.33
867.7	1000	H	100	902.85	-47.53	-36.00	-11.53
1000	5000	H	1000	1731.41	-38.57	-30.00	-8.57
30	863.7	V	100	414.35	-59.83	-36.00	-23.83
863.7	865.2	V	10	864.90	-42.61	-36.00	-6.61
866.2	867.7	V	10	867.14	-41.45	-36.00	-5.45
867.7	1000	V	100	951.42	-43.85	-36.00	-7.85
1000	5000	V	1000	1731.38	-38.41	-30.00	-8.41

Measurement Result @ 866.3MHz

Start Frequency	Stop Frequency	Antenna	Res Bandwidth	Maximum Emission Observed		Limit	Margin
(MHz)	(MHz)	Polarization	(KHz)	Frequency (MHz)	Level (dBm)	(dBm)	(dB)
30	864.3	H	100	446.15	-61.86	-36.00	-25.86
864.3	865.8	H	10	865.60	-45.27	-36.00	-9.27
866.8	868.3	H	10	867.48	-46.50	-36.00	-10.50
868.3	1000	H	100	936.85	-47.58	-36.00	-11.58
1000	5000	H	1000	1732.60	-38.54	-30.00	-8.54
30	864.3	V	100	331.64	-59.72	-36.00	-23.72
864.3	865.8	V	10	865.20	-42.10	-36.00	-6.10
866.8	868.3	V	10	868.06	-41.57	-36.00	-5.57
868.3	1000	V	100	910.63	-43.69	-36.00	-7.69
1000	5000	V	1000	1732.57	-38.88	-30.00	-8.88

Measurement Result @ 866.9MHz

Start Frequency	Stop Frequency	Antenna	Res Bandwidth	Maximum Emission Observed		Limit	Margin
(MHz)	(MHz)	Polarization	(KHz)	Frequency (MHz)	Level (dBm)	(dBm)	(dB)
30	864.9	H	100	455.44	-61.63	-36.00	-25.63
864.9	866.4	H	10	865.41	-45.73	-36.00	-9.73
867.4	868.9	H	10	868.13	-46.51	-36.00	-10.51
868.9	1000	H	100	922.20	-46.85	-36.00	-10.85
1000	5000	H	1000	1733.79	-38.95	-30.00	-8.95
30	864.9	V	100	377.97	-59.80	-36.00	-23.80
864.9	866.4	V	10	865.48	-42.33	-36.00	-6.33
867.4	868.9	V	10	868.62	-41.27	-36.00	-5.27
868.9	1000	V	100	954.56	-43.01	-36.00	-7.01
1000	5000	V	1000	1733.82	-38.49	-30.00	-8.49

Measurement Result @ 867.5MHz

Start Frequency	Stop Frequency	Antenna	Res Bandwidth	Maximum Emission Observed		Limit	Margin
(MHz)	(MHz)	Polarization	(KHz)	Frequency (MHz)	Level (dBm)	(dBm)	(dB)
30	865.5	H	100	344.10	-61.93	-36.00	-25.93
865.5	867.0	H	10	866.29	-45.84	-36.00	-9.84
868.0	869.5	H	10	868.80	-46.42	-36.00	-10.42
869.5	1000	H	100	928.14	-47.51	-36.00	-11.51
1000	5000	H	1000	1735.00	-38.75	-30.00	-8.75
30	865.5	V	100	406.02	-59.55	-36.00	-23.55
865.5	867.0	V	10	866.34	-42.51	-36.00	-6.51
868.0	869.5	V	10	868.58	-41.49	-36.00	-5.49
869.5	1000	V	100	932.89	-43.36	-36.00	-7.36
1000	5000	V	1000	1734.98	-38.42	-30.00	-8.42

Note: The Note: The RFID automatically cease transmitting below 3.7Vdc.

6. Effective radiated power

6.1. Limit

The effective radiated power on each of the four high power channels shall not exceed 2W e.r.p.
The beamwidth(s) of the antenna(s) in the horizontal orientation shall comply with the following limits:

- For transmissions ≤ 500 mW e.r.p. there shall be no restriction on beamwidth.
- For transmissions of > 500 mW e.r.p. to ≤ 1 000 mW e.r.p. beamwidths shall be ≤ 180°.
- For transmissions of > 1 000 mW e.r.p. to 2 000 mW e.r.p. beamwidths shall be ≤ 90°.

For Conducted measurements, Where an interrogator is fitted with an external antenna connector it is permissible to measure the conducted power. In this case the provider shall declare the maximum gain and beamwidth(s) of the external antenna(s) at the time that the equipment is presented for test.

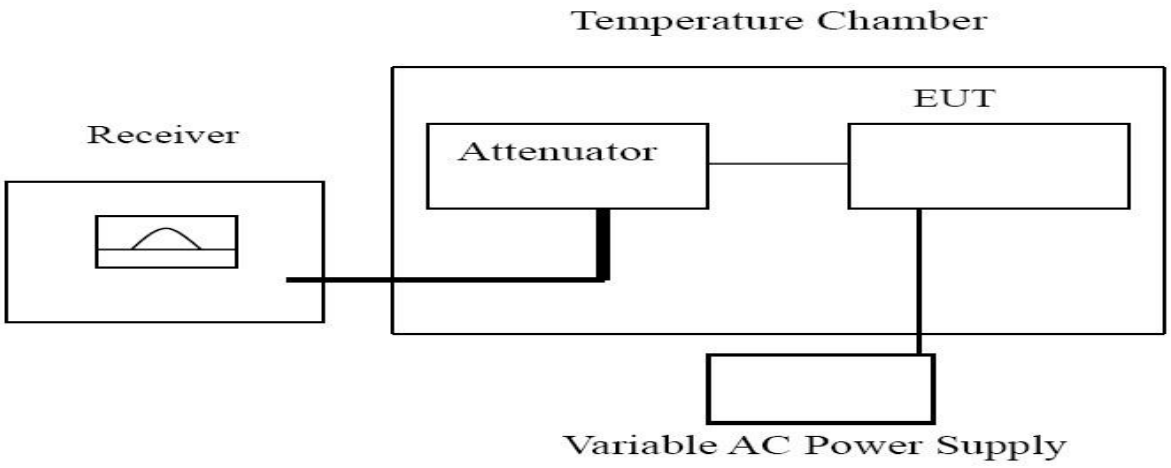
Step 1: The transmitter shall be configured to operate on one of the high power channels shown in figure 2 and shall be connected to an artificial antenna (see clause 6.2). The carrier or mean power delivered to this artificial antenna shall be measured under normal test conditions (see clause 5.3).

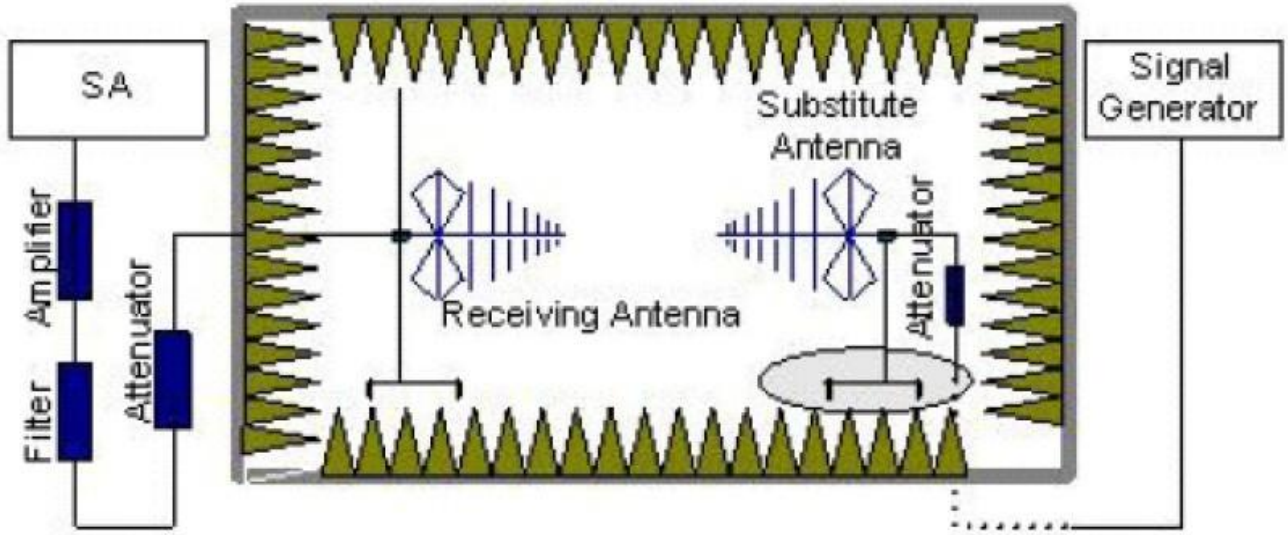
Step 2: The measurement shall be repeated under extreme test conditions (see clauses 5.4.1 and 5.4.2 applied simultaneously).
Step 3: The recorded value shall be corrected for each of the antenna gains and be stated in e.r.p. To calculate the allowed conducted power with a circularly polarized antenna, the following formula shall be used:

$$PC= P_{erp} -G_{IC}+5.15+C_L$$

Where:
P_C = interrogator conducted transmit power in dBm;
G_{IC} = antenna gain of a circular antenna in dBic;
C_L = total cable loss in dB.

6.2. Test Setup

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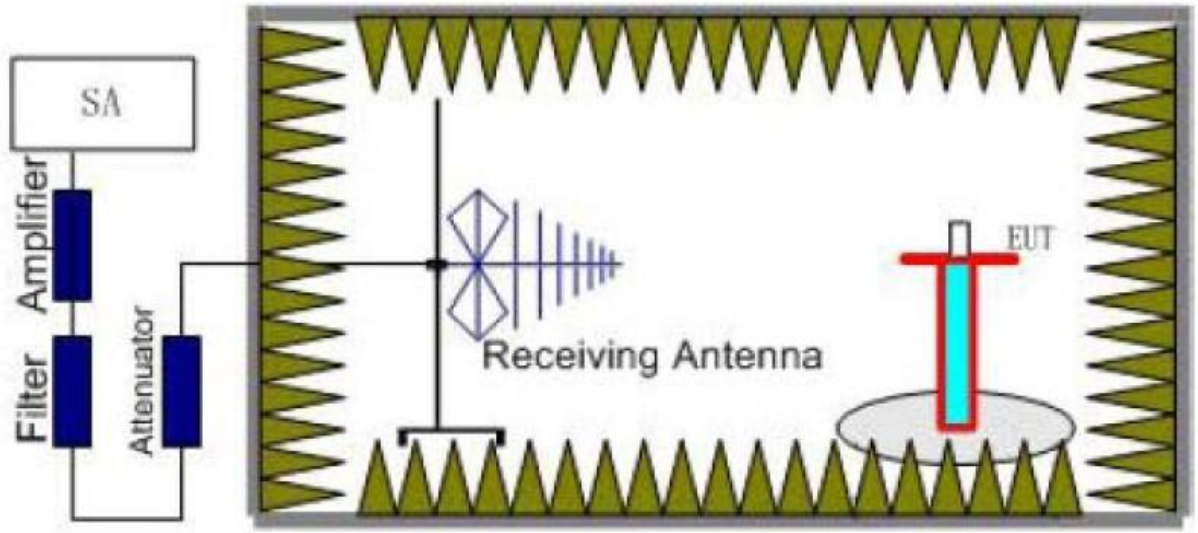
Amplifier
Filter
Attenuator
Substitute
Antenna
Receiving Antenna
Attenuator
Signal
Generator


SA
Amplifier
Filter
Attenuator
Receiving Antenna
EUT

6.3. Test Procedure

Refer to ETSI EN 302 208 V3.1.1 (2016-11) §5.5.3

6.4. Test Result

Conducted power

Test Frequency: 865.70MHz			
Environment Temperature Category II (℃)	**Power Supplied V (DC)**	**Power Measured (dBm)**	**Limit (dBm)**
-10	DV 3.7V	11.944	33
25	DC 3.7V	11.831	33
50	DV 3.7V	11.816	33

Test Frequency: 866.30MHz			
Environment Temperature Category II (℃)	**Power Supplied V (DC)**	**Power Measured (dBm)**	**Limit (dBm)**
-10	DV 3.7V	11.838	33
25	DC 3.7V	11.821	33
50	DV 3.7V	11.809	33

Test Frequency: 866.90MHz			
Environment Temperature Category II (℃)	**Power Supplied V (DC)**	**Power Measured (dBm)**	**Limit (dBm)**
-10	DV 3.7V	11.823	33
25	DC 3.7V	11.813	33
50	DV 3.7V	11.810	33

Test Frequency: 867.50MHz			
Environment Temperature Category II (℃)	**Power Supplied V (DC)**	**Power Measured (dBm)**	**Limit (dBm)**
-10	DV 3.7V	11.956	33
-10	DC 3.7V	11.941	33
50	DV 3.7V	11.935	33

Note:

We have concerned the following formula: $P_C = P_{erp}-G_{IC}+5.15+ C_L$. The antenna gain is 0dBi.

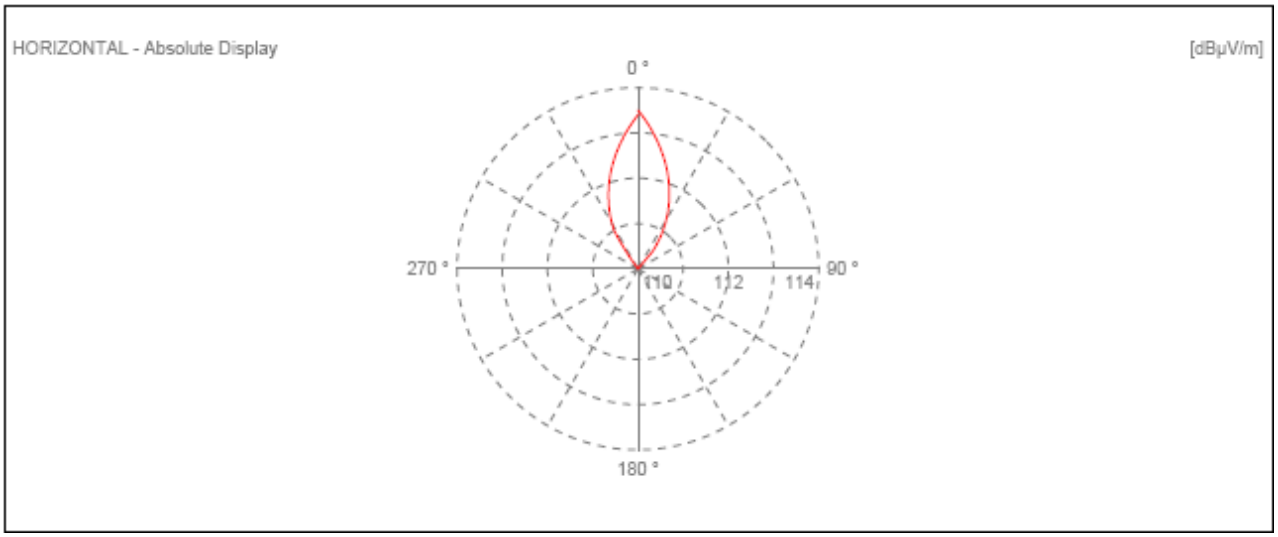
Radiated Power

Test Frequency (MHz)	Pol./Ant.	ERP (dBm)	Limit (dBm)	Margin (dB)	Result
865.7MHz	H	11.15	33	19.85	Pass
	V	5.72	33	25.28	Pass
866.3MHz	H	11.13	33	19.87	Pass
	V	5.45	33	25.55	Pass
866.9MHz	H	11.24	33	19.76	Pass
	V	5.63	33	25.37	Pass
867.5MHz	H	11.20	33	19.80	Pass
	V	5.94	33	25.06	Pass

Transmitter antenna beamwidth :

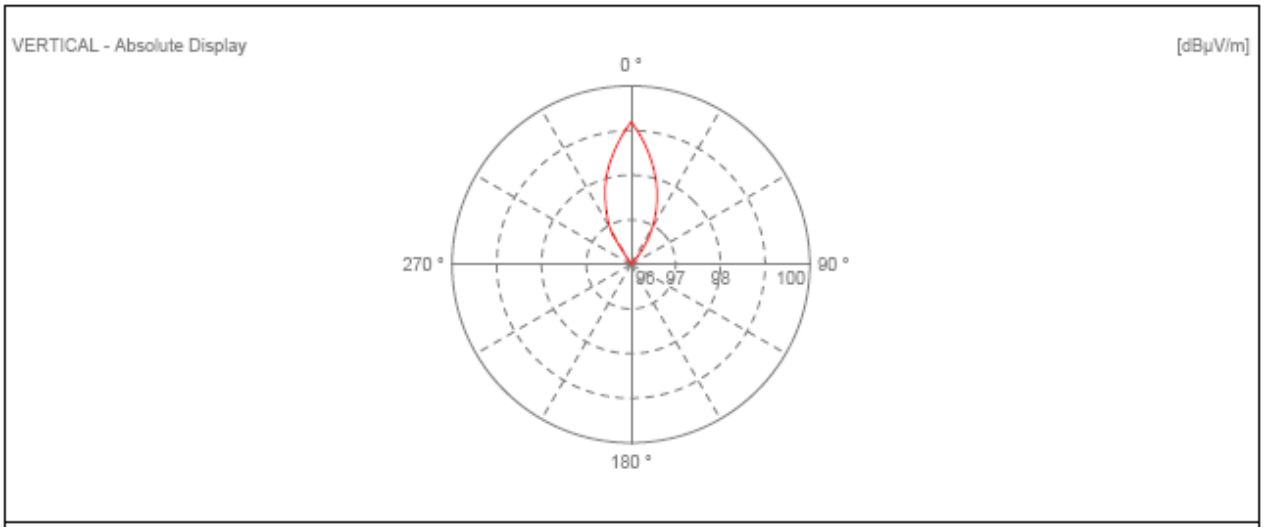
As both the conducted and radiated power is less than 500mW(27dBm), there's no restriction for Transmitter antenna beamwidth

Horizontal



deg	dBuV/m	deg	dBuV/m	deg	dBuV/m	deg	dBuV/m
0.00	99.16	114.21	101.29	208.00	103.35	312.00	108.62
8.00	98.65	113.68	100.51	216.00	100.16	320.00	109.78
16.00	98.27	113.60	100.66	224.00	99.27	328.00	111.73
24.00	97.70	112.45	98.92	232.00	95.86	336.00	112.30
32.00	97.03	111.89	93.40	240.00	99.54	344.00	112.89
40.00	96.15	111.20	93.81	248.00	95.66	352.00	113.38
48.00	91.33	106.36	92.11	256.00	94.26	360.00	113.90
56.00	90.21	105.44	97.16	264.00	98.70		
64.00	87.24	102.55	101.75	272.00	97.38		
72.00	89.90	105.26	98.92	280.00	97.04		
80.00	87.67	102.42	99.73	288.00	105.76		
88.00	87.93	102.88	102.38	296.00	105.92		
96.00	89.16	103.96	103.44	304.00	107.18		

Vertical

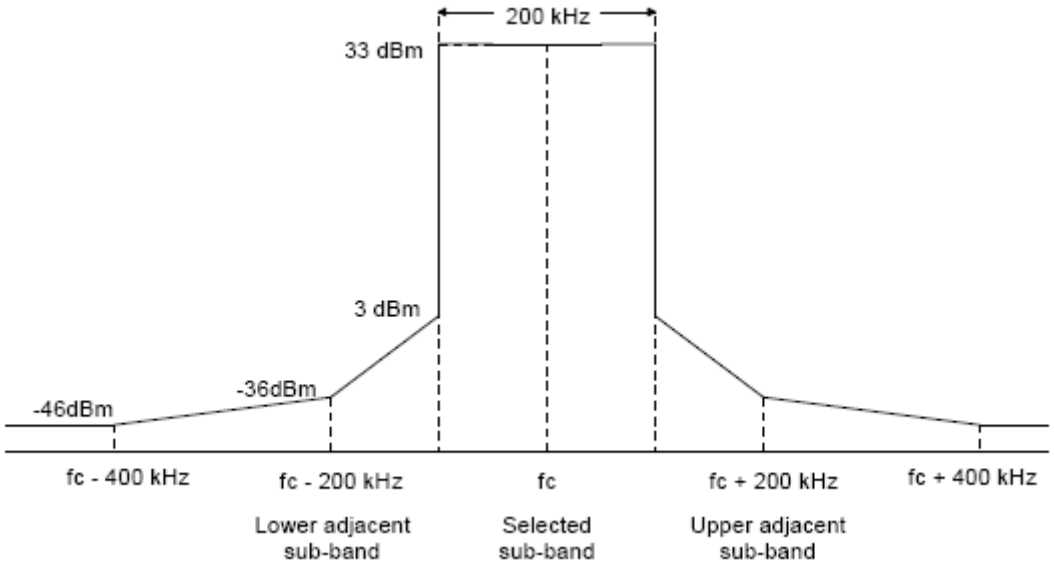


deg	dBuV/m	deg	dBuV/m	deg	dBuV/m	deg	dBuV/m
0.00	114.34	104.00	100.90	208.00	103.01	312.00	108.61
8.00	113.85	112.00	100.52	216.00	99.91	320.00	109.78
16.00	112.82	120.00	100.49	224.00	99.28	328.00	111.64
24.00	112.74	128.00	98.92	232.00	95.88	336.00	112.26
32.00	111.18	136.00	93.26	240.00	99.56	344.00	113.25
40.00	111.38	144.00	93.82	248.00	95.59	352.00	113.64
48.00	106.62	152.00	92.16	256.00	94.01	360.00	114.41
56.00	105.65	160.00	97.34	264.00	98.87		
64.00	102.45	168.00	101.84	272.00	97.33		
72.00	105.14	176.00	99.28	280.00	97.12		
80.00	102.58	184.00	99.31	288.00	105.71		
88.00	102.79	192.00	101.86	296.00	106.16		
96.00	103.90	200.00	103.36	304.00	106.99		

7. Transmitter spectrum mask

7.1. Limit

The absolute levels of RF power at any frequency shall not exceed the limits defined in the spectrum mask envelope at figure 3 in which the X axis shall be in linear frequency and the Y axis shall be scaled in dBm e.r.p.



Spectrum mask for modulated signals in lower band

NOTE:
Where fc is the centre frequency of the carrier transmitted by the interrogator.

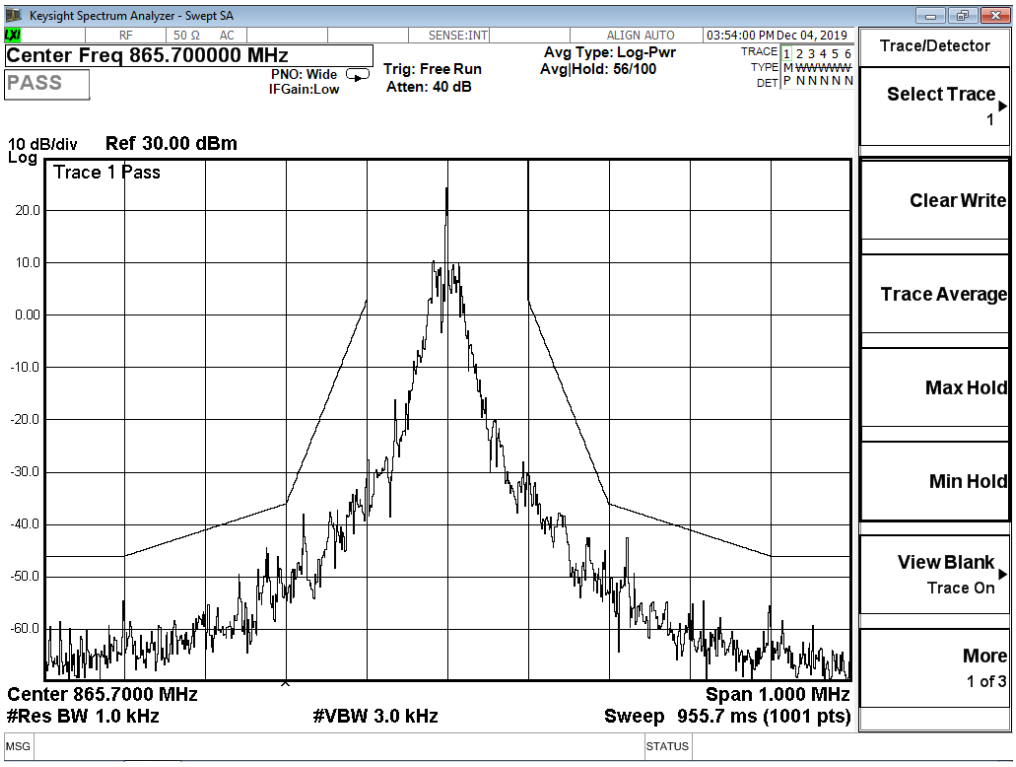
7.2. Test Setup

7.3. Test Procedure

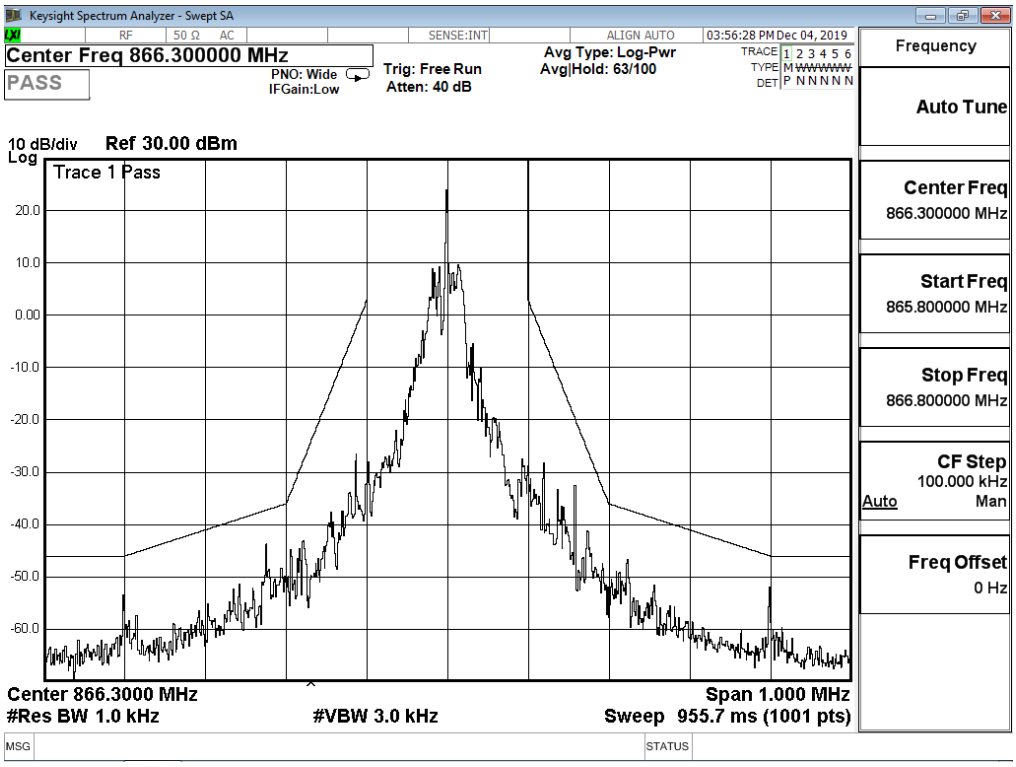
1. Please refer to ETSI EN 302 208 V3.1.1 (2016-11) Sub-clause 5.1 for the test conditions.
2. Please refer to ETSI EN 302 208 V3.1.1 (2016-11) Sub-clause 5.5.5 for the measurement method.

7.4. Test Result

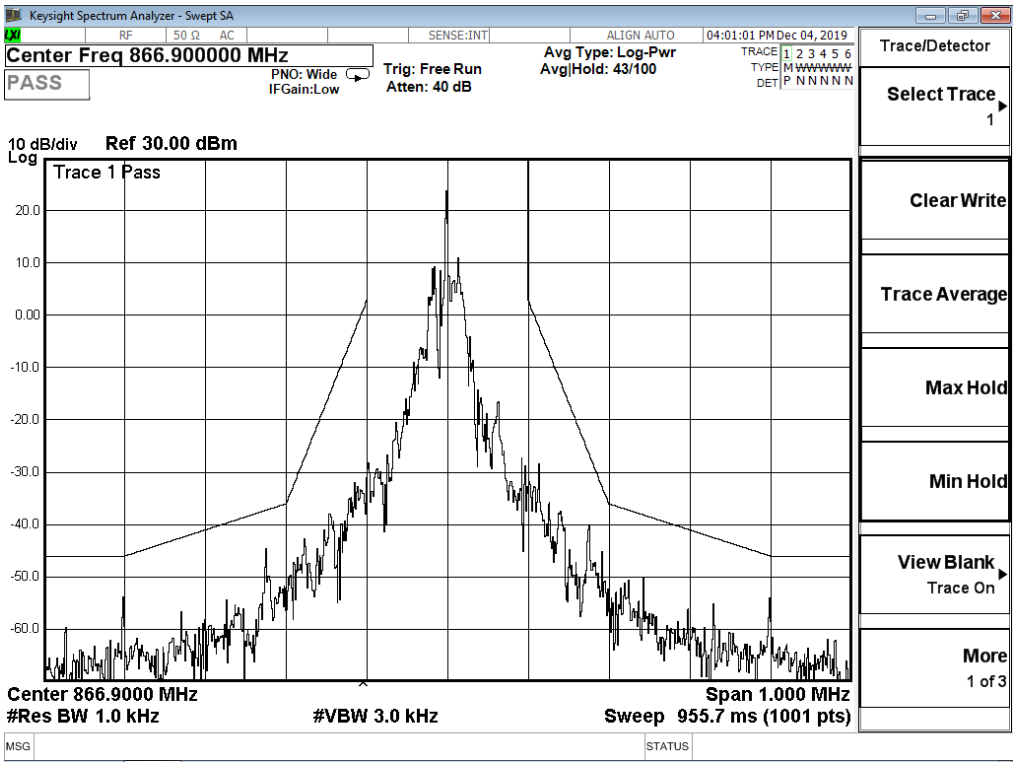
Test frequency 865.70 MHz



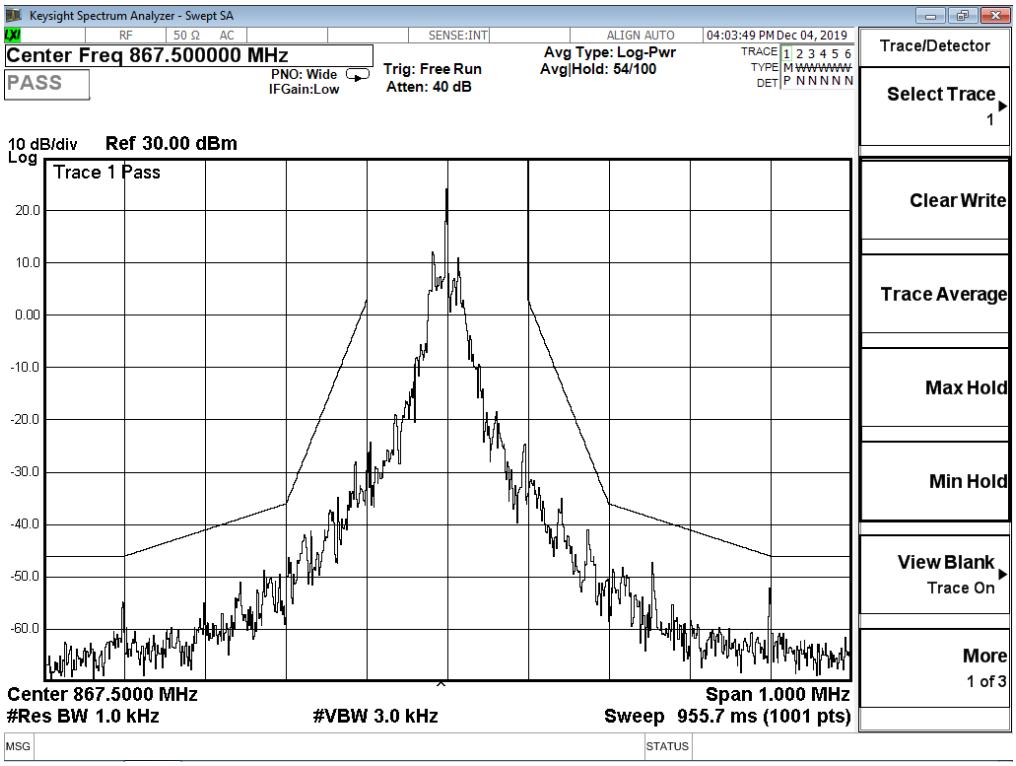
Test frequency 866.30 MHz



Test frequency 866.90 MHz



Test frequency 867.50 MHz



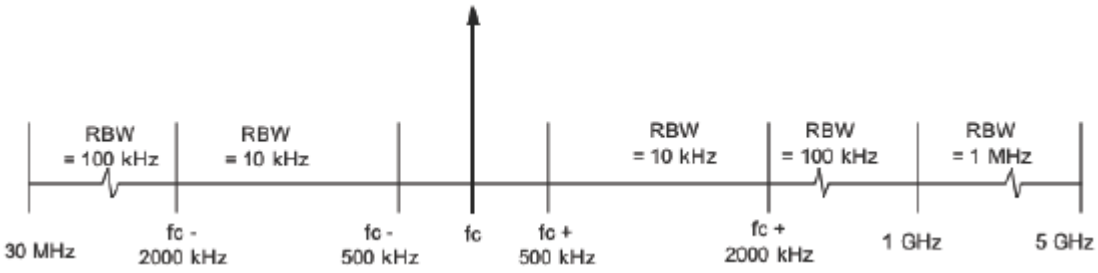
8. Unwanted emissions in the spurious domain

8.1. Limit

Spurious emissions shall be measured at frequencies outside fc ± 500 kHz for the lower band and frequencies outside fc ± 1 000 kHz for the upper band, shall not exceed the values given in table 4.

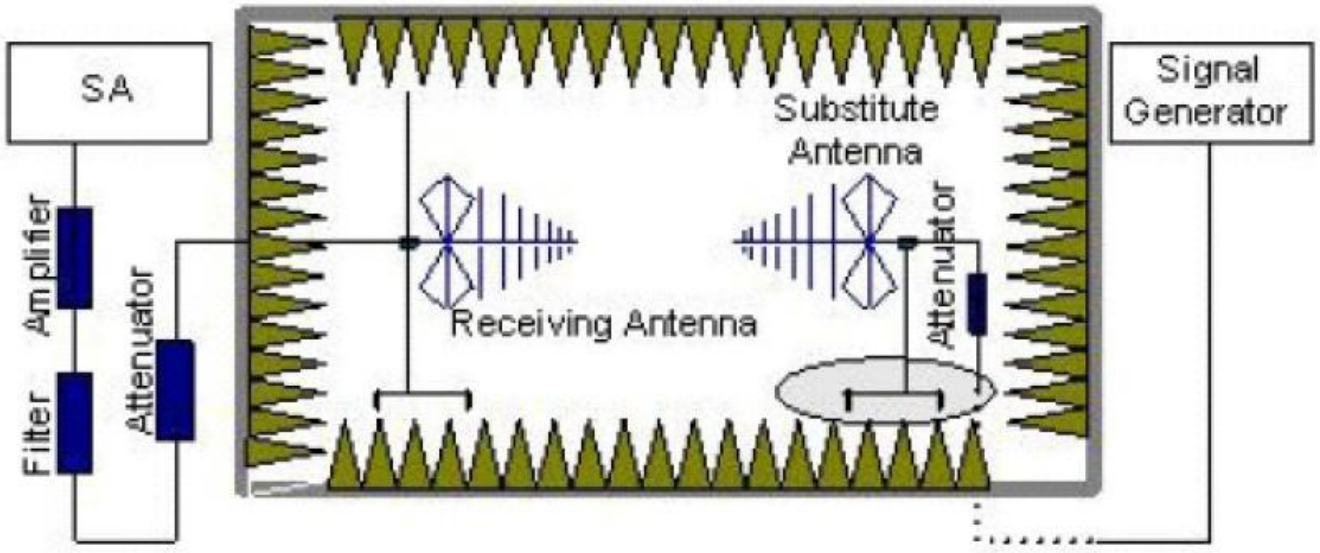
State	47 MHz to 74 MHz 87,5 MHz to 118 MHz 174 MHz to 230 MHz 470 MHz to 862 MHz	Other frequencies below 1 000 MHz	Frequencies above 1 000 MHz
Operating	4 nW (-54 dBm)	250 nW (-36 dBm)	1 µW (-30 dBm)
Standby	2 nW (-57 dBm)	2 nW (-57 dBm)	20 nW (-47 dBm)

Spurious emission limits in e.r.p.



Resolution bandwidths for spurious emission in the lower band

8.2. Test Setup



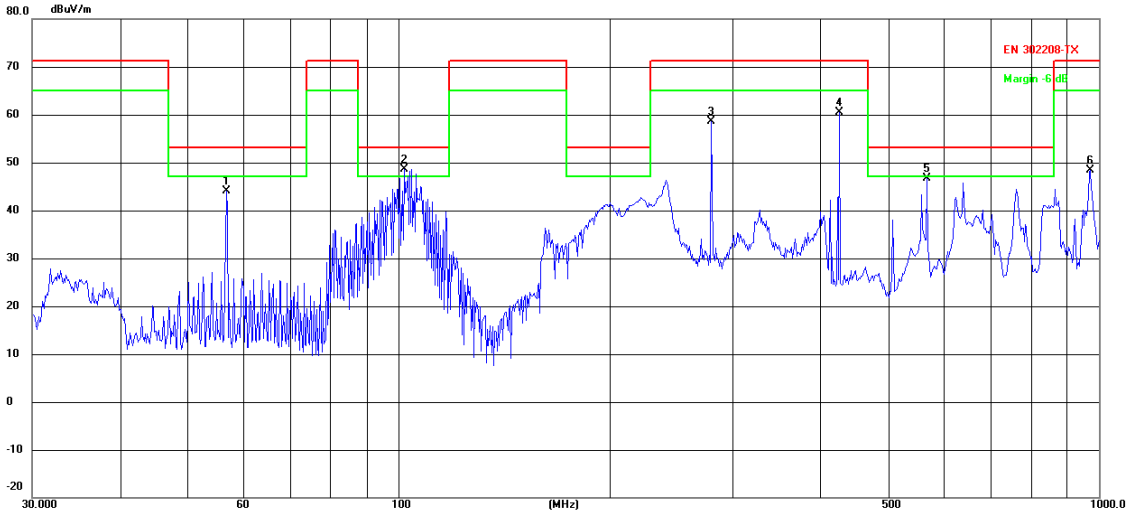
8.3. Test Procedure

1. Please refer to ETSI EN 302 208 V3.1.1 (2016-11) Sub-clause 5.1 for the test conditions.
2. Please refer to ETSI EN 302 208 V3.1.1 (2016-11) Sub-clause 5.5.6 for the measurement method.

8.4. Test Result

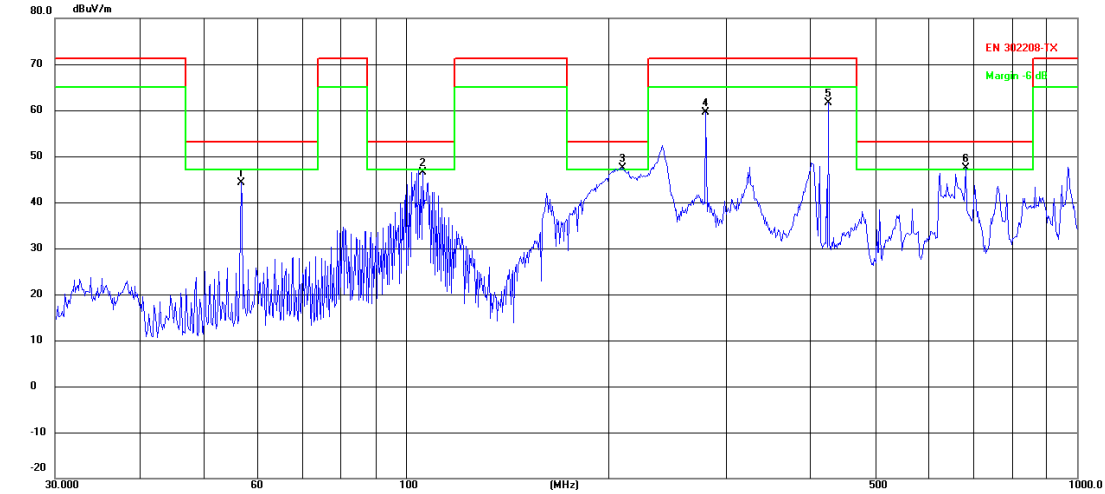
measurement result: PASS

Test frequency 865.70 MHz: Vertical



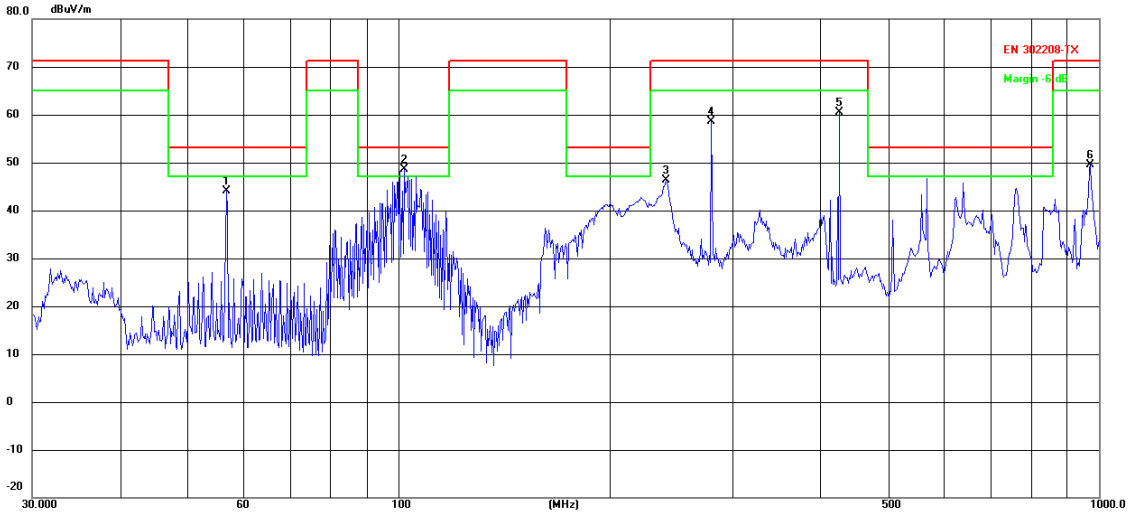
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.
1	56.7916	60.80	-16.70	44.10	53.00	-8.90	ERP
2 *	102.0013	66.14	-17.51	48.63	53.00	-4.37	ERP
3	280.0237	73.92	-15.25	58.67	71.00	-12.33	ERP
4	426.5210	72.13	-11.64	60.49	71.00	-10.51	ERP
5	568.6126	55.24	-8.48	46.76	53.00	-6.24	ERP
6	972.3373	50.92	-2.59	48.33	71.00	-22.67	ERP

Horizontal



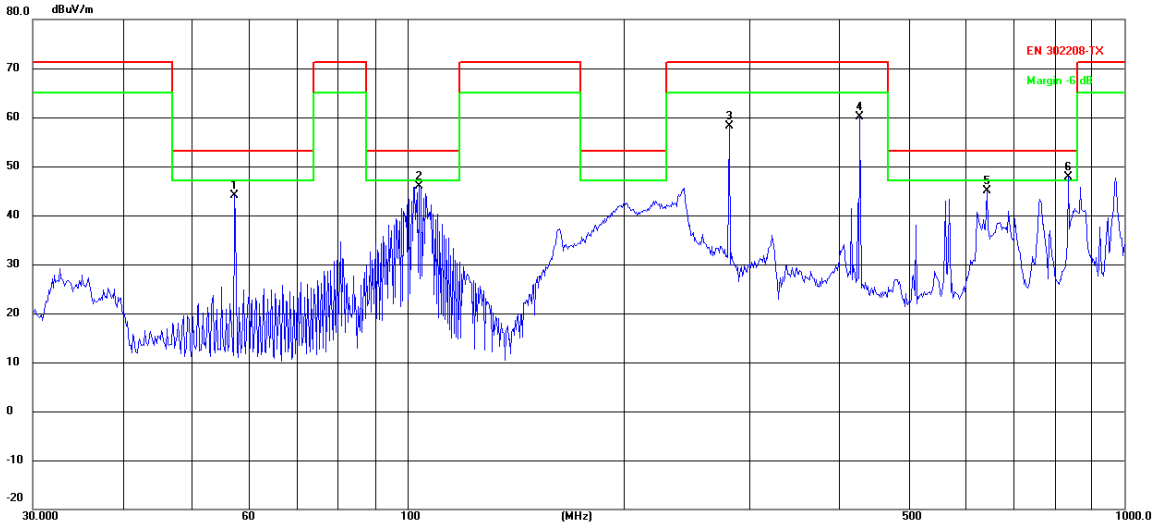
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.
1	56.7916	61.03	-16.70	44.33	53.00	-8.67	ERP
2	106.0126	64.02	-17.54	46.48	53.00	-6.52	ERP
3 *	210.0481	64.56	-17.06	47.50	53.00	-5.50	ERP
4	280.0237	74.83	-15.25	59.58	71.00	-11.42	ERP
5	426.5210	73.28	-11.64	61.64	71.00	-9.36	ERP
6 !	682.3483	54.14	-6.70	47.44	53.00	-5.56	ERP

Test frequency 866.30 MHz: Vertical



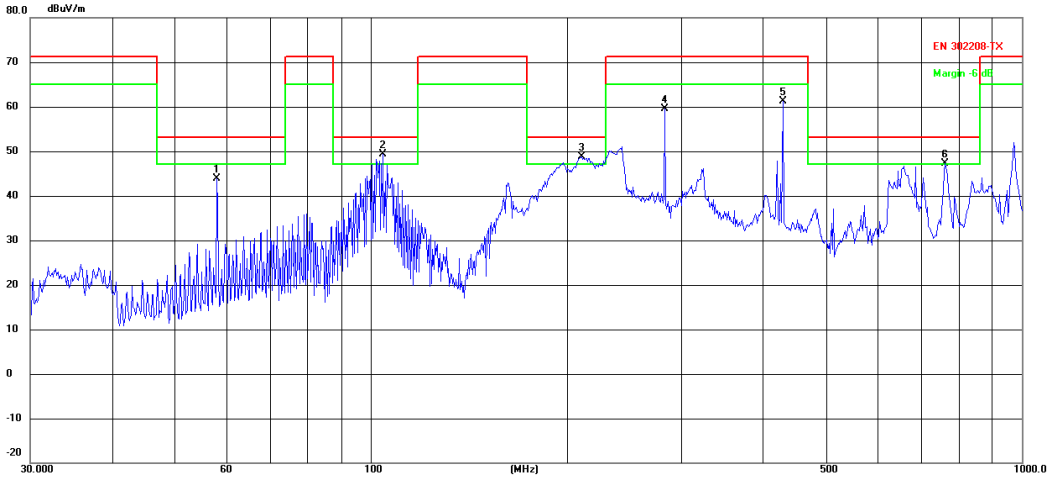
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.
1	56.7916	60.80	-16.70	44.10	53.00	-8.90	ERP
2 *	102.0013	66.14	-17.51	48.63	53.00	-4.37	ERP
3	240.8302	62.45	-16.19	46.26	71.00	-24.74	ERP
4	280.0237	73.92	-15.25	58.67	71.00	-12.33	ERP
5	426.5210	72.13	-11.64	60.49	71.00	-10.51	ERP
6	972.3373	52.08	-2.59	49.49	71.00	-21.51	ERP

Horizontal



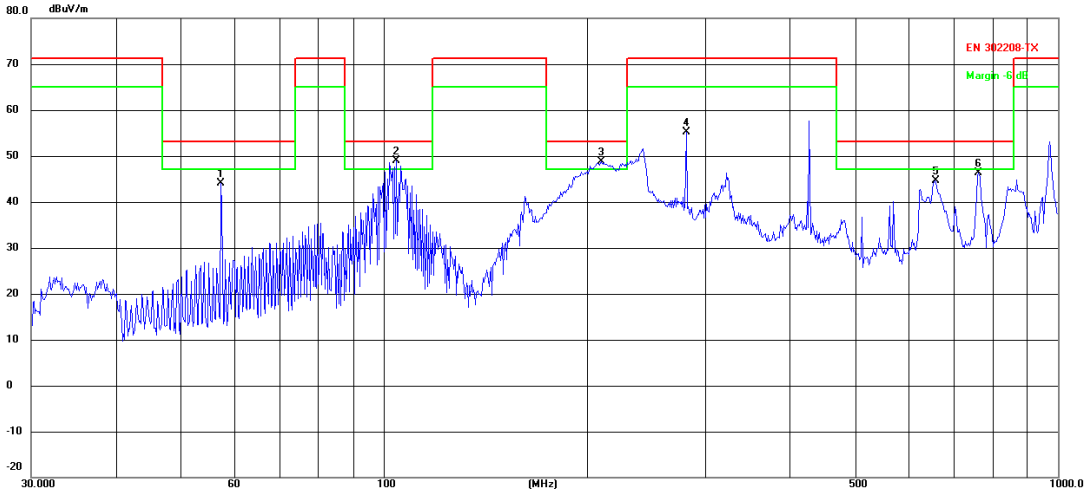
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.
1	57.3922	60.84	-16.78	44.06	53.00	-8.94	ERP
2	103.8054	63.43	-17.53	45.90	53.00	-7.10	ERP
3	281.0074	73.43	-15.23	58.20	71.00	-12.80	ERP
4	428.0192	71.68	-11.60	60.08	71.00	-10.92	ERP
5	642.8612	52.26	-7.19	45.07	53.00	-7.93	ERP
6 *	836.2441	52.26	-4.37	47.89	53.00	-5.11	ERP

Test frequency 866.90 MHz: Vertical



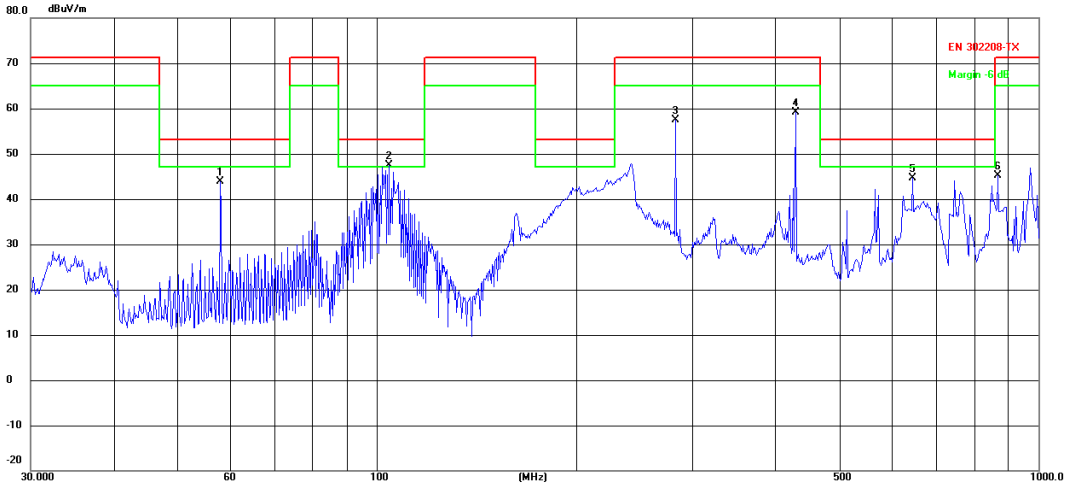
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.
1	57.9992	60.80	-16.88	43.92	53.00	-9.08	ERP
2 *	104.5360	66.94	-17.54	49.40	53.00	-3.60	ERP
3 !	210.7860	65.86	-17.04	48.82	53.00	-4.18	ERP
4	282.9849	74.74	-15.18	59.56	71.00	-11.44	ERP
5	429.5228	72.72	-11.57	61.15	71.00	-9.85	ERP
6 !	763.3757	52.75	-5.51	47.24	53.00	-5.76	ERP

Horizontal



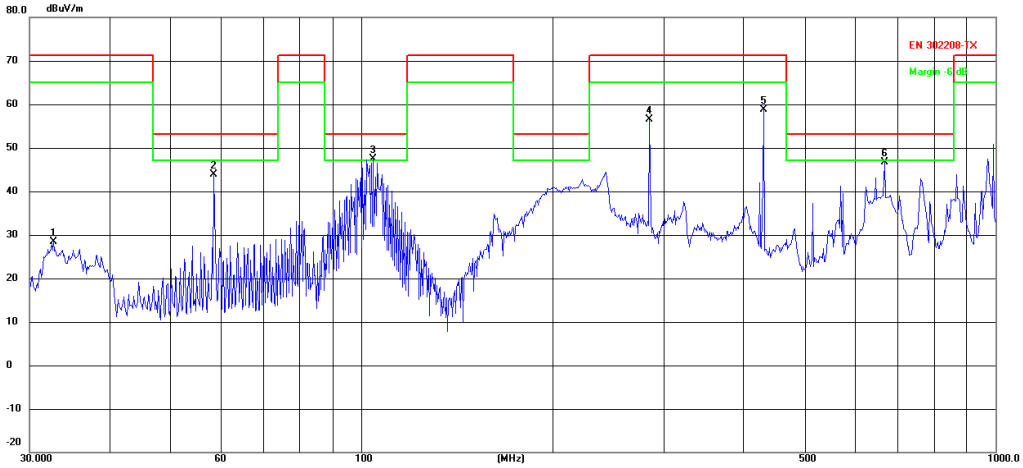
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.
1	57.3922	60.86	-16.78	44.08	53.00	-8.92	ERP
2 *	104.5360	66.55	-17.54	49.01	53.00	-3.99	ERP
3 !	210.0481	65.78	-17.06	48.72	53.00	-4.28	ERP
4	281.0074	70.42	-15.23	55.19	71.00	-15.81	ERP
5	656.5300	51.69	-7.02	44.67	53.00	-8.33	ERP
6	763.3757	51.76	-5.51	46.25	53.00	-6.75	ERP

Test frequency 867.50 MHz: Vertical



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.
1	57.9992	60.73	-16.88	43.85	53.00	-9.15	ERP
2 *	104.5360	65.08	-17.54	47.54	53.00	-5.46	ERP
3	282.9849	72.56	-15.18	57.38	71.00	-13.62	ERP
4	429.5228	70.73	-11.57	59.16	71.00	-11.84	ERP
5	645.1194	51.78	-7.16	44.62	53.00	-8.38	ERP
6	869.1301	48.94	-3.83	45.11	71.00	-25.89	ERP

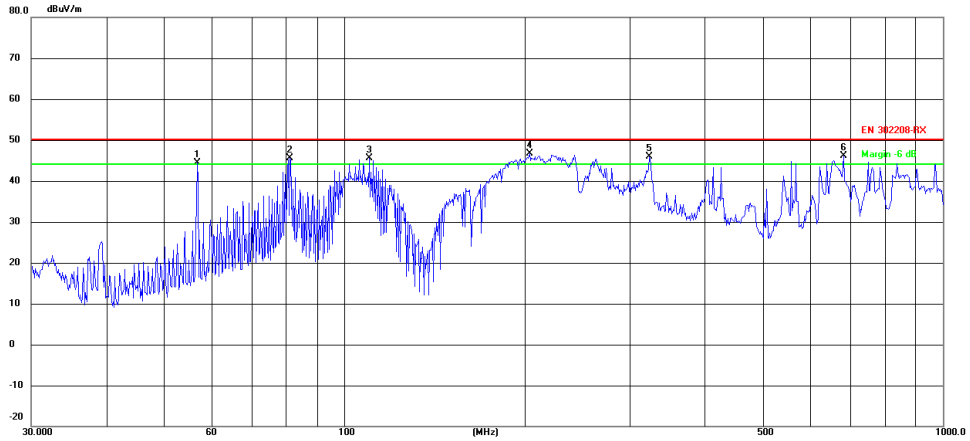
Horizontal



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.
1	32.7486	46.86	-18.37	28.49	71.00	-42.51	ERP
2	58.6126	60.76	-16.98	43.78	53.00	-9.22	ERP
3 *	104.5360	65.02	-17.54	47.48	53.00	-5.52	ERP
4	284.9766	71.65	-15.14	56.51	71.00	-14.49	ERP
5	431.0314	70.35	-11.54	58.81	71.00	-12.19	ERP
6	668.1422	53.63	-6.87	46.76	53.00	-6.24	ERP

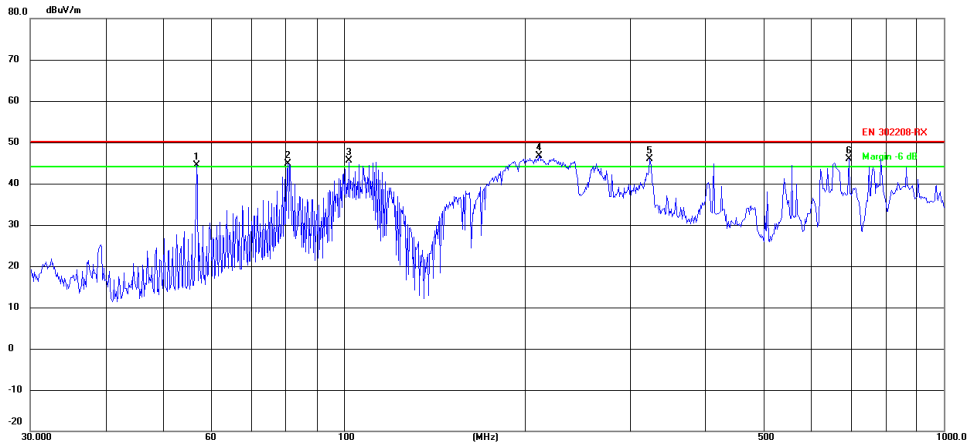
Test frequency 865.70 MHz: The band is the worst working mode

Vertical



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.
1 !	56.7916	61.09	-16.70	44.39	50.00	-5.61	ERP
2 !	81.2116	66.83	-21.25	45.58	50.00	-4.42	ERP
3 !	110.1816	63.08	-17.60	45.48	50.00	-4.52	ERP
4 *	204.2376	63.86	-17.23	46.63	50.00	-3.37	ERP
5 !	323.3202	60.11	-14.19	45.92	50.00	-4.08	ERP
6 !	682.3483	52.75	-6.70	46.05	50.00	-3.95	ERP

Horizontal



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.
1 !	56.7916	61.09	-16.70	44.39	50.00	-5.61	ERP
2 !	80.6440	66.16	-21.39	44.77	50.00	-5.23	ERP
3 !	102.0013	63.14	-17.51	45.63	50.00	-4.37	ERP
4 *	211.5263	63.67	-17.02	46.65	50.00	-3.35	ERP
5 !	323.3202	60.11	-14.19	45.92	50.00	-4.08	ERP
6 !	694.4174	52.51	-6.55	45.96	50.00	-4.04	ERP

Radiated spurious emissions test results

Measurement Result @ 865.7MHz

Start Frequency	Stop Frequency	Antenna	Res Bandwidth	Maximum Emission Observed		Limit	Margin
(MHz)	(MHz)	Polarization	(KHz)	Frequency (MHz)	Level (dBm)	(dBm)	(dB)
30	863.7	H	100	475.62	-61.67	-54.00	-7.67
863.7	865.2	H	10	864.31	-45.69	-36.00	-9.69
866.2	867.7	H	10	866.88	-46.89	-36.00	-10.89
867.7	1000	H	100	955.95	-47.43	-36.00	-11.43
1000	5000	H	1000	1731.42	-38.50	-30.00	-8.50
30	863.7	V	100	495.05	-59.11	-54.00	-5.11
863.7	865.2	V	10	864.58	-42.95	-36.00	-6.95
866.2	867.7	V	10	866.98	-41.21	-36.00	-5.21
867.7	1000	V	100	911.56	-43.59	-36.00	-7.59
1000	5000	V	1000	1731.42	-38.38	-30.00	-8.38

Measurement Result @ 867.5MHz

Start Frequency	Stop Frequency	Antenna	Res Bandwidth	Maximum Emission Observed		Limit	Margin
(MHz)	(MHz)	Polarization	(KHz)	Frequency (MHz)	Level (dBm)	(dBm)	(dB)
30	865.5	H	100	385.33	-61.17	-36.00	-25.17
865.5	867.0	H	10	866.23	-45.56	-36.00	-9.56
868.0	869.5	H	10	868.42	-46.55	-36.00	-10.55
869.5	1000	H	100	951.09	-47.34	-36.00	-11.34
1000	5000	H	1000	1734.97	-38.31	-30.00	-8.31
30	865.5	V	100	422.50	-59.56	-36.00	-23.56
865.5	867.0	V	10	865.93	-42.13	-36.00	-6.13
868.0	869.5	V	10	868.58	-41.83	-36.00	-5.83
869.5	1000	V	100	949.37	-43.55	-36.00	-7.55
1000	5000	V	1000	1735.03	-38.47	-30.00	-8.47

Remark:

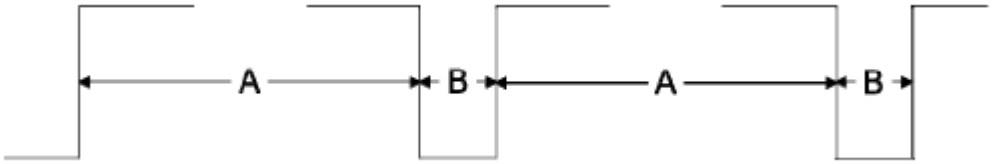
1.Margin=Limit-Emission Level

2.Measuring frequencies from 30 MHz to the 5GHz.

9. Transmission times

9.1. Limit

The maximum length of continuous transmission and the interval between repeated transmissions measured shall comply with the two limits



Repeated transmissions on the same channel

Where:

• the on-duration of A shall not exceed 4 s;

• the off-duration of B shall be not less than 100 ms.

9.2. Test Setup

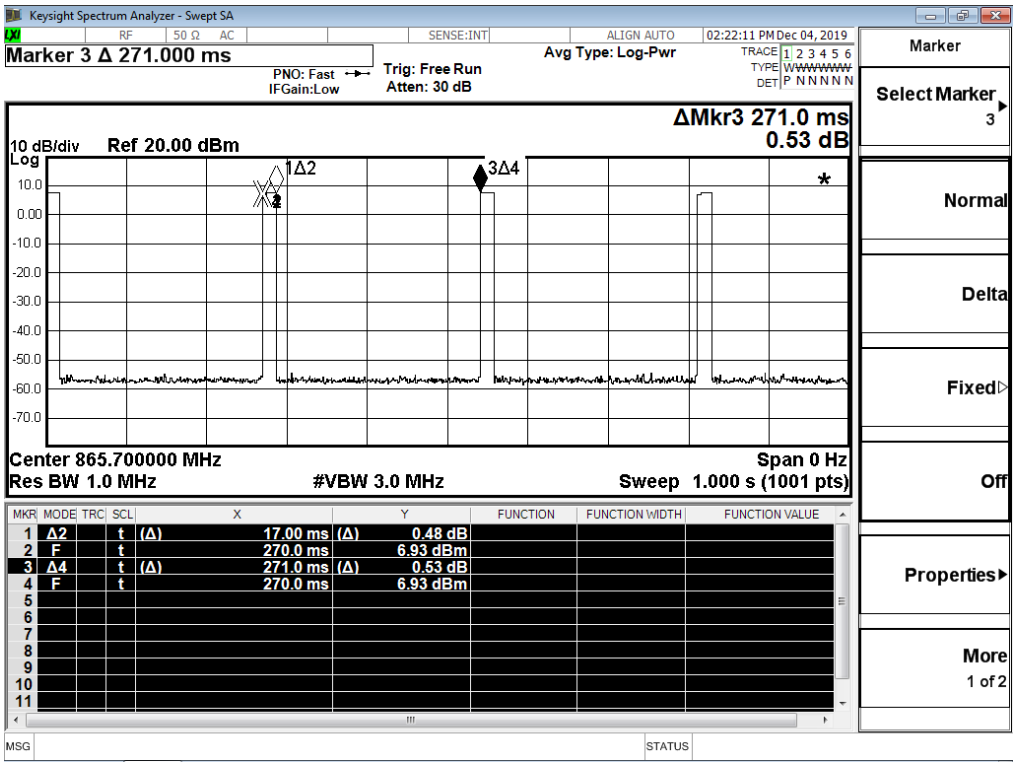
9.3. Test Procedure

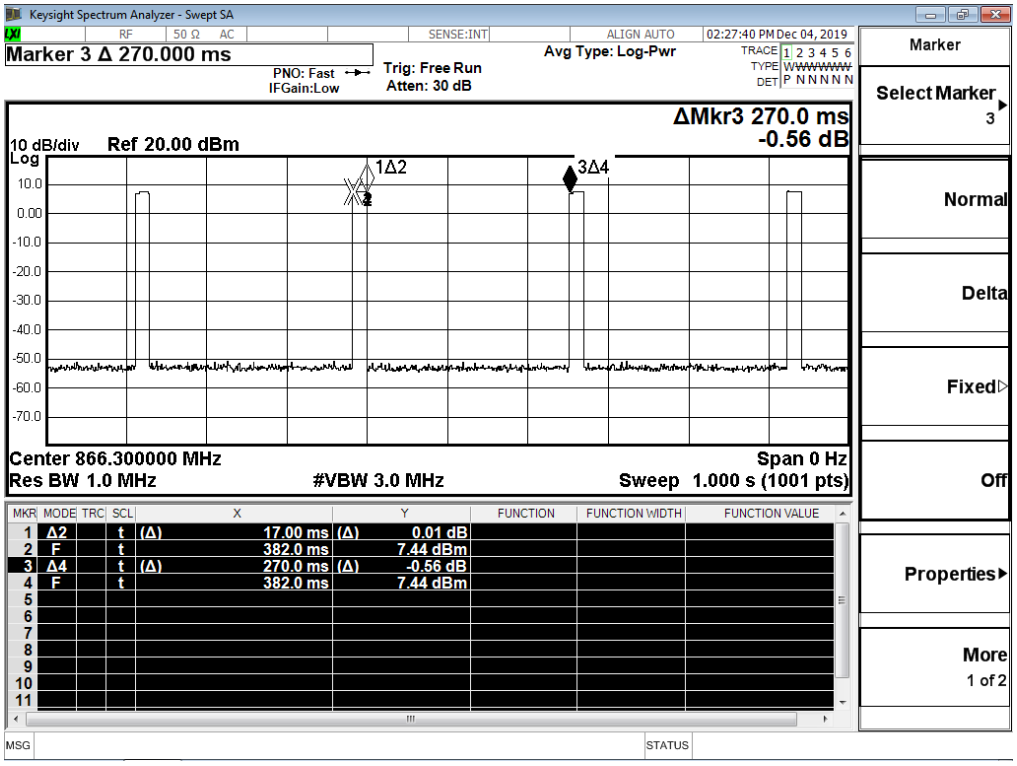
1. Please refer to ETSI EN 302 208 V3.1.1 (2016-11) Sub-clause 5.1 for the test conditions.
2. Please refer to ETSI EN 302 208 V3.1.1 (2016-11) Sub-clause 5.3.7 for the measurement method.

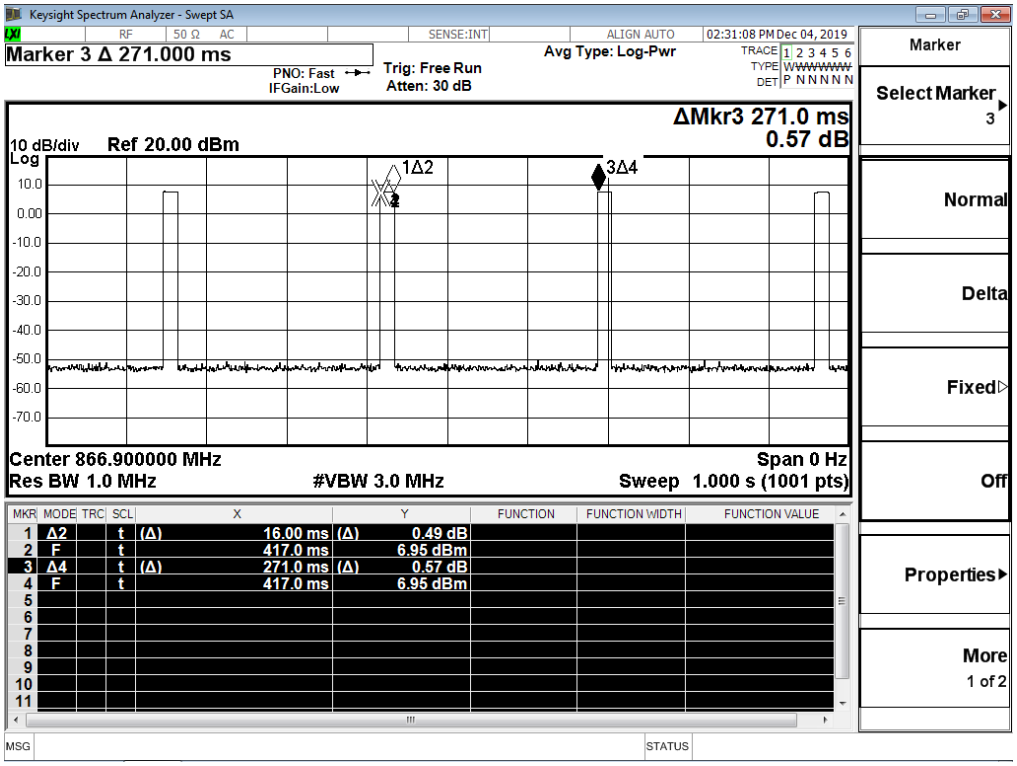
9.4. Test Result

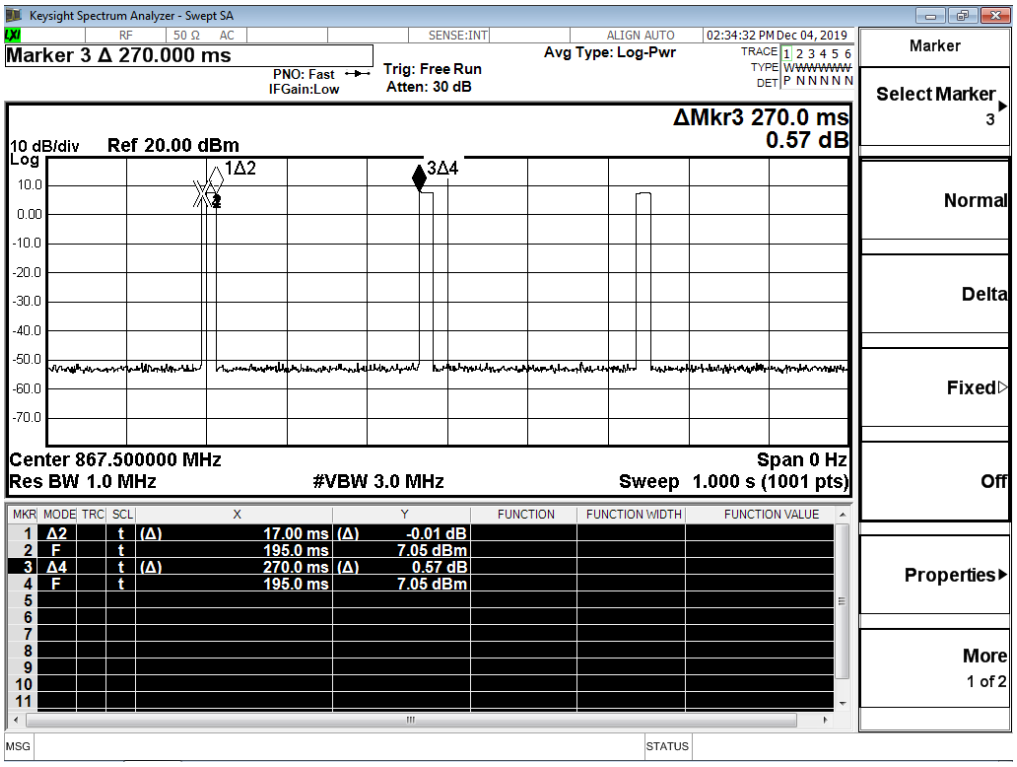
The measurement was conducted under normal test conditions.

Test Mode	On-duration(s)	On-duration Max Limit(s)	Off-duration(ms)	Off-duration Min Limit(ms)
Normal operation	0.017	4	253	100
Result	Pass		Pass	









The manufacturer declare:

the measured length of transmission as above plot no greater than is required to read the tags present in the field and to verify that there are no additional tags present.

10. LIST OF MEASURING EQUIPMENT

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1	X-series USB Peak and Average Power Sensor Aglient	Agilent	U2021XA	MY54080022	2019-10-27	2020-10-26
2	4 CH. Simultaneous Sampling 14 Bits 2MS/s	Agilent	U2531A	MY54080016	2019-10-27	2020-10-26
3	Test Software	Ascentest	AT890-SW	20160630	N/A	N/A
4	RF Control Unit	Ascentest	AT890-RFB	N/A	2019-06-17	2020-06-16
5	ESA-E SERIES SPECTRUM ANALYZER	Agilent	E4407B	MY41440754	2019-11-18	2020-11-17
6	MXA Signal Analyzer	Agilent	N9020A	MY49100040	2019-06-17	2020-06-16
7	SPECTRUM ANALYZER	R&S	FSP	100503	2019-06-17	2020-06-16
8	MXG Vector Signal Generator	Agilent	N5182A	MY47071151	2019-11-18	2020-11-17
9	ESG VECTOR SIGNAL GENERATOR	Agilent	E4438C	MY42081396	2019-11-18	2020-11-17
10	PSG Analog Signal Generator	Agilent	E8257D	MY4520521	2019-11-18	2020-11-17
11	Universal Radio Communication Tester	R&S	CMU 200	105788	2019-06-17	2020-06-16
12	WIDEBAND RADIO COMMUNICATION TESTER	R&S	CMW 500	103818	2019-06-17	2020-06-16
13	RF Control Unit	Tonscend	JS0806-1	N/A	2019-06-17	2020-06-16
14	DC Power Supply	Agilent	E3642A	N/A	2019-11-18	2020-11-17
15	LTE Test Software	Tonscend	JS1120-1	N/A	N/A	N/A
16	Temperature & Humidity Chamber	GUANGZHOU GOGNWEN	GDS-100	70932	2019-10-11	2020-10-10
17	DC Source	CHROMA	62012P-80-60	34782951	2019-10-11	2020-10-10
18	RF Filter	Micro-Tronics	BRC50718	S/N-017	2019-06-17	2020-06-16
19	RF Filter	Micro-Tronics	BRC50719	S/N-011	2019-06-17	2020-06-16
20	RF Filter	Micro-Tronics	BRC50720	S/N-011	2019-06-17	2020-06-16
21	RF Filter	Micro-Tronics	BRC50721	S/N-013	2019-06-17	2020-06-16
22	RF Filter	Micro-Tronics	BRM50702	S/N-195	2019-06-17	2020-06-16
23	Splitter/Combiner	Micro-Tronics	PS2-15	CB11-20	2019-06-17	2020-06-16
24	Splitter/Combiner	Micro-Tronics	CB11-20	N/A	2019-06-17	2020-06-16
25	Attenuator	Micro-Tronics	PAS-8-10	S/N23466	2019-06-17	2020-06-16
26	3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH03-HY	2019-06-17	2020-06-16
27	Positioning Controller	MF	MF-7082	/	2019-06-17	2020-06-16
28	EMI Test Software	AUDIX	E3	N/A	2019-06-17	2020-06-16
29	EMI Test Receiver	R&S	ESR 7	101181	2019-06-17	2020-06-16
30	AMPLIFIER	QuieTek	QTK-A2525G	CHM10809065	2019-11-18	2020-11-17
31	Active Loop Antenna	SCHWARZBECK	FMZB 1519B	00005	2019-06-23	2020-06-22
32	By-log Antenna	SCHWARZBECK	VULB9163	9163-470	2019-05-02	2020-05-01
33	Horn Antenna	EMCO	3115	6741	2019-06-23	2020-06-22
34	RF Cable-R03m	Jye Bao	RG142	CB021	2019-06-17	2020-06-16

35	RF Cable-HIGH	SUHNER	SUCOFLEX 106	03CH03-HY	2019-06-17	2020-06-16
36	TEST RECEIVER	R&S	ESCI	101142	2019-06-17	2020-06-16
37	RF Cable-CON	UTIFLEX	3102-26886-4	CB049	2019-06-17	2020-06-16
38	10dB Attenuator	SCHWARZBECK	MTS-IMP136	261115-001-0032	2019-06-17	2020-06-16
39	Artificial Mains	R&S	ENV216	101288	2019-06-17	2020-06-16
40	Power Analyzer Test System	Voltech	PM6000	20000670053	2019-06-17	2020-06-16
41	ESD Simulator	SCHLODER	SESD 230	604035	2019-06-17	2020-06-16
42	RF POWER AMPLIFIER	OPHIR	5225R	1052	2019-03-22	2020-03-21
43	RF POWER AMPLIFIER	OPHIR	5273F	1019	2019-03-24	2020-03-23
44	Stacked Broadband Log Periodic Antenna	SCHWARZBECK	STLP 9128	9128ES-145	2019-04-28	2020-04-27
45	Stacked Mikrowellen Log.-Per Antenna	SCHWARZBECK	STLP 9149	9149-482	2019-04-28	2020-04-27
46	Electric field probe	Narda S.TS./PMM	EP601	611WX70332	2019-02-05	2020-02-04
47	Power Meter	Agilent	E4419B	MY45104493	2019-06-17	2020-06-16
48	Power Sensor	Agilent	E9301H	MY41495234	2019-06-17	2020-06-16
49	Power Sensor	Agilent	E4412A	MY41500229	2019-06-17	2020-06-16
50	Immunity Simulative Generator	EM TEST	UCS500-M4	0101-34	2019-11-18	2020-11-17
51	Simulator	FRANKONIA	CIT-10	A126A1195	2019-06-17	2020-06-16
52	CDN	FRANKONIA	CDN-M2	5100100100	2019-06-17	2020-06-16
53	CDN	FRANKONIA	CDN-M3	0900-11	2019-06-17	2020-06-16
54	Attenuator	FRANKONIA	ATT6	0010222A	2019-06-17	2020-06-16
55	Infuse tongs	EM TEST	EM-Clamp	0513A031201	2019-06-17	2020-06-16
56	Voltage dips and up generator	3CTEST	VDG-1105G	EC0171014	2019-06-17	2020-06-16
57	Sound Level meter	BK Precision	735	735008731001020	2019-06-18	2020-06-17
58	Audio Analyzer	R&S	UPV	1146.2003K02-101782-XP	2019-06-18	2020-06-17
59	Mouse Simulation	Bruel & Kjaer	4227	A0304216	2019-06-18	2020-06-17
60	Ear Simulation and supply	Bruel & Kjaer	2669.4182.5935	A0305284	2019-06-18	2020-06-17
61	Acoustical Calibrators	Bruel & Kjaer	4231	A0304215	2019-06-18	2020-06-17
Note: All equipment is calibrated through GUANGZHOU LISAI CALIBRATION AND TEST CO.,LTD.						

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