PHOENIX TESTLAB

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Test Report

Report Number:

F210895E1

Equipment under Test (EUT):

Desk motion sensor
AL-602-03-902 EnoPuck BASIC

Applicant:

DEUTA Controls GmbH

Manufacturer:

DEUTA Controls GmbH

ilac-MRA

DAkkS
Deutsche
Akkreditierungsstelle
D-PL-17186-01-01
D-PL-17186-01-02
D-PL-17186-01-03

References

[1] **ANSI C63.10: 2013** American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices

[2] **FCC CFR 47 Part 15** Radio Frequency Devices

[3] **RSS-210 Issue 10 (December 2019) Amendment (April 2020)**
License-exempt Radio Apparatus (All Frequency Bands): Category I Equipment

[4] **RSS-Gen Issue 5 (April 2018) Amendment 1 (March 2019) Amendment 2 (February 2021)**
General Requirements for Compliance of Radio Apparatus

Test Result

The requirements of the tests performed as shown in the overview (clause 4) were fulfilled by the equipment under test. The complete test results are presented in the following.

“Passed” indicates that the equipment under test conforms with the relevant limits of the testing standard without taking any measurement uncertainty into account as stated in clause 1.3 of ANSI C63.10 (2013). However, the measurement uncertainty is calculated and shown in this test report.

Tested and written by:	Mohamed Yassine KHALEK		02.07.2021
	Name	Signature	Date
Reviewed and approved by:	Manuel Bastert		02.07.2021
	Name	Signature	Date

This test report is only valid in its original form.

The test results herein refer only to the tested sample. PHOENIX TESTLAB GmbH is not responsible for any generalisations or conclusions drawn from these test results concerning further samples. Any modification of the tested samples is prohibited and leads to the invalidity of this test report. Each page necessarily contains the PHOENIX TESTLAB Logo and the TEST REPORT NUMBER.

Contents: Page

1 Identification

1.1 Applicant

Name:	DEUTA Controls GmbH
Address:	Hauptstrasse 76, 32479 Hille
Country:	Germany
Name for contact purposes:	Mr. Michael Pohl
Phone:	+49 5734-51466-10
eMail address:	info@deuta-controls.de
Applicant represented during the test by the following person:	None

1.2 Manufacturer

Name:	DEUTA Controls GmbH
Address:	Hauptstrasse 76, 32479 Hille
Country:	Germany
Name for contact purposes:	Mr. Michael Pohl
Phone:	+49 5734-51466-10
eMail address:	info@deuta-controls.de
Manufacturer represented during the test by the following person:	None

1.3 Test Laboratory

The tests were carried out by:

PHOENIX TESTLAB GmbH
Königswinkel 10
32825 Blomberg
Germany

Accredited by Deutsche Akkreditierungsstelle GmbH (DAkkS) in compliance with DIN EN ISO/IEC 17025 under Reg. No. D-PL-17186-01-06 and D-PL-17186-01-05, FCC Test Firm Designation Number DE0004, FCC Test Firm Registration Number 469623, CAB Identifier DE0003 and ISED# 3469A.

1.4 EUT (Equipment under Test)

Test object: *	Desk motion sensor
Model name: *	AL-602-03-902 EnoPuck BASIC
Model number: *	12408
Order number: *	12408
FCC ID: *	2AZTH-AL-602-03-902
IC certification number: *	27242-60203902
PMN: *	AL-602-03-902
HVIN: *	2.0
FVIN: *	1.0

	EUT number		
	1	2	3
Serial number: *	PR763	PR913	-
PCB identifier: *	None	None	-
Hardware version: *	2.0	2.0	-
Software version: *	1.0	1.0	-

* Declared by the applicant

2 EUTs were used for the tests. In the overview (chapter 4) is shown which EUT was used for each test case.
EUT 1 has been prepared by the manufacturer to transmit PN9 sequence continuously.
EUT 2 is as marketed and transmits a telegram of 2 pulses when a presence is detected by the PIR or vibration sensor.

Note: PHOENIX TESTLAB GmbH does not take samples. The samples used for tests are provided exclusively by the applicant.

1.5 Technical Data of Equipment

General:

Power supply EUT: *	DC through internal batteries		
Supply voltage EUT: *	U_{nom} = 3.0 V	U_{min} = 1.8 V	U_{max} = 3.2 V
Temperature range: *	0 °C to 50 °C		
Lowest / highest internal frequency: *	16 MHz (CPU) / 902.875 MHz		

RF part

Power supply RF module: *	DC		
Supply voltage RF module: *	U_{nom} = 3.0 V	U_{min} = 1.8 V	U_{max} = 3.2 V
Operating frequency: *	902.875 MHz		
Number of channels: *	1		
Type of modulation: *	FSK		
Data rate: *	125 kbps		
Antenna type: *	PCB Antenna		
Antenna connector: *	None		

Ports / Connectors				
Identification	Connector		Length during test	Shielding (Yes / No)
	EUT	Ancillary		
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Equipment used for testing	
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--	--

*1 Provided by the applicant
*2 Provided by the laboratory

Ancillary equipment	
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*1 Provided by the applicant

1.6 Dates

Date of receipt of test sample:	10.06.2021
Start of test:	18.06.2021
End of test:	24.06.2021

2 Operational States

Description of function of the EUT:

The EUT is a desk sensor used to detect the presence of people by an integrated vibration sensor and a PIR sensor in the front.

The following states were defined as the operating conditions:

The EUT was supplied by 3.0 V DC through 2xAA batteries during all tests. The EUT was set by the manufacturer to transmit a PN9 sequence continuously for the test purposes. There is no external wired interface.

The system was setup as follows:

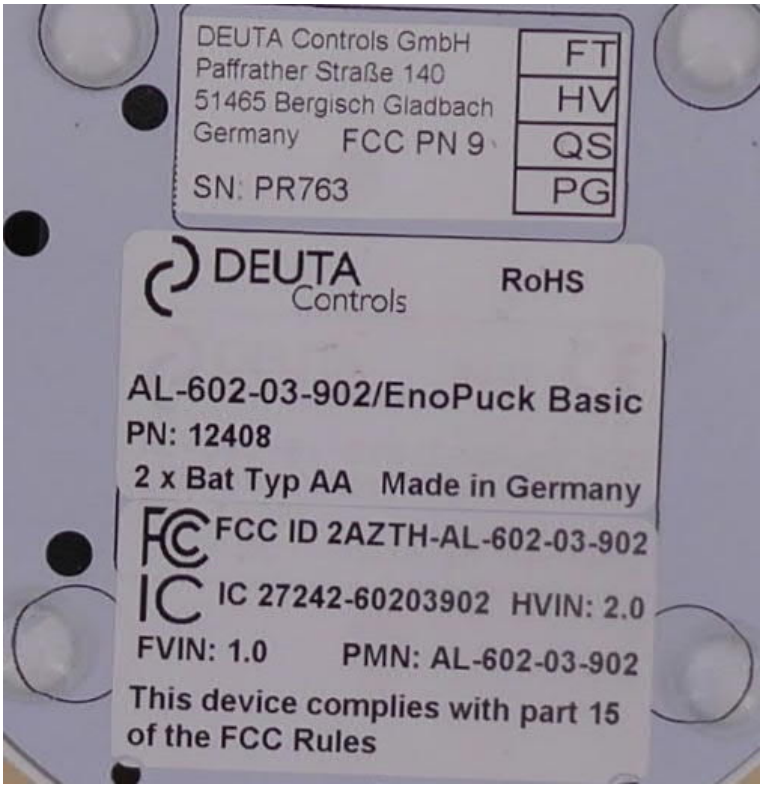
Setup for measurements below 1 GHz

Setup for measurement above 1 GHz

The radiated emission measurement is divided into three stages:

1. A preliminary measurement inside a semi anechoic chamber with 3 m distance;
2. A final measurement inside a semi anechoic chamber with 3 m distance for frequencies above 30 MHz;
3. A final measurement on an outdoor test site without reflecting ground plane and 3 m / 10 m distance for frequencies below 30 MHz.

The EUT was labeled as follows:



3 Overview

Application	Frequency range in MHz	FCC 47 CFR Part 15 section [2]	RSS-Gen, Issue 5 [4] and RSS-210, Issue 10 [3]	Tested EUT	Status
Transmission time control	902.875	15.231 (a) (1)	A1.1 (a) [3]	2	Passed
Radiated emissions (Fundamental field strength and spurious emissions)	0.009 – 10,000**	15.231 (b) 15.205 (a) 15.209 (a)	8.9 and 8.10 [4] 7.1 and 7.3 [3] A.1.2 [3]	1	Passed
20 % bandwidth	902.875	15.231 (c)	6.7 [4]	1	Passed
99 % bandwidth	902.875	-	6.7 [4] A.1.3 [3]	1	Passed
Antenna requirement	-	15.203 [2]	6.8 [4]	1	Passed *

*: Integrated antenna only, requirement fulfilled.

**: As declared by the applicant, the highest operating frequency is 902.875 MHz.
Therefore the radiated emission measurement must be carried out up to 10th of the highest operating frequency in this case 10 GHz.

4 Results

4.1 Transmission time control

4.1.1 Method of measurement

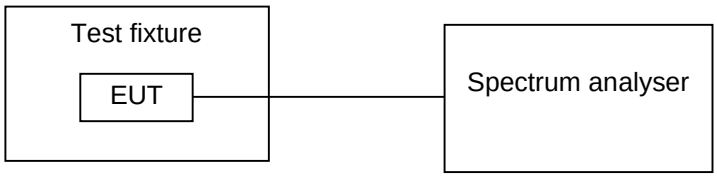
1. The calibration of the spectrum analyser has to be checked with the help of a known signal from a signal generator. The EUT has to be connected to the spectrum analyser via a low loss cable. If the EUT is not equipped with an antenna connector, a temporary antenna connector has to be installed or a test fixture has to be used. The EUT has to be switched on, the transmitter shall work with its maximum data rate.

The following spectrum analyser settings shall be used:

- Span: = 0 Hz.
- Resolution bandwidth: 3 MHz.
- Video bandwidth: ≥ the resolution bandwidth.
- Sweep: Single sweep with at least 5 seconds.
- Detector function: peak.
- Trace mode: Max hold.

The frequency line shall be set at the point, where the transmitter will be released. The sweep shall start, when the transmitter started to operate, the transmitter shall be released when the trace crosses the frequency line. One marker shall be set to the point of the frequency line, a delta marker to the time, where the transmitter stopped transmission.
-

Test set-up:

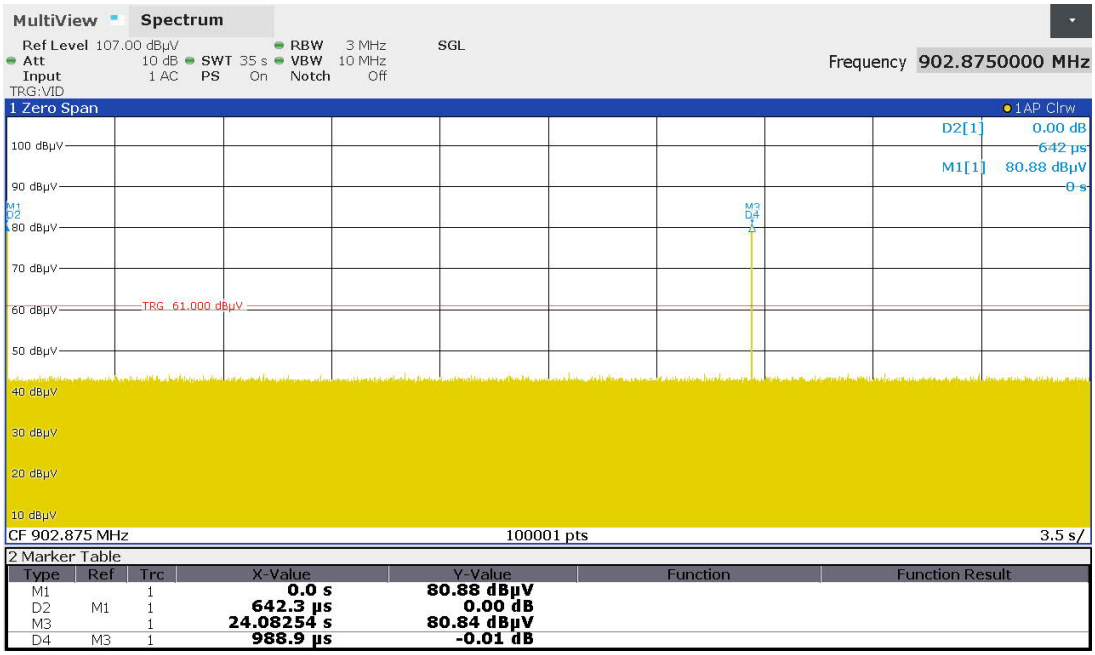


4.1.2 Test results

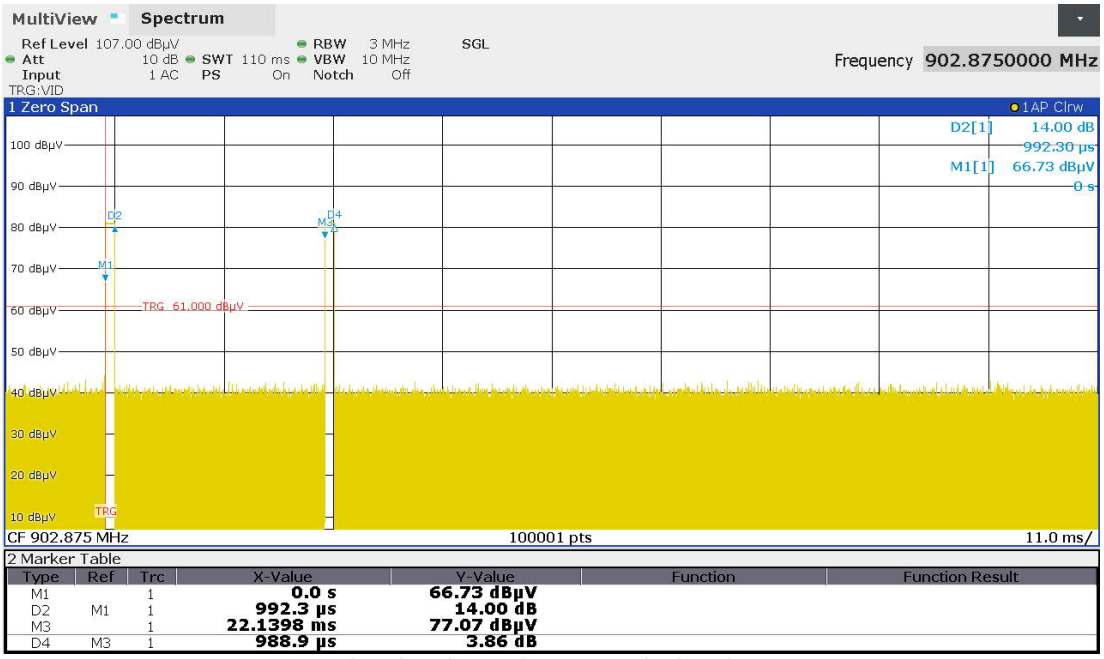
Ambient temperature:	22 °C
Relative humidity:	55 %

Date:	24.06.2021
Tested by:	Y. KHALEK

The EUT transmits only two pulses after a manual detection of a presence through the PIR or Vibration sensors. The following plots show compliance to the timing requirements of the FCC rules §15.231.(a) and the Canadian standard RSS 210 A1.1.



Plot showing transmission deactivation after a time not exceeding 5 sec



Plot showing pulse transmission time

Duty cycle correction factor calculation:

The pulse transmission time is used to calculate the duty cycle to convert Peak values to average values, as the device does not transmit continuously.
The following formula is used:
DC = (t_1 + t_2 + t_3+…t_n)/T where t_n = pulse width and T = pulse train length

The plot above shows that the device transmits two pulses.

t_1 = 0.9923 ms
t_2 = 0.9889 ms

T = 0.9923 ms + 22.1398 ms + 0.9889 ms = 24.121 ms

DC = (0.9923 ms + 0.9889 ms) / 24.121 ms 0.082

→DC = 20 * Log_{10} (0.082) = -21.7 dB

The maximum duty factor to be used as per § 15.35 (b) is then -**20 dB**.

This factor is used in the following for calculating the average field strength.

Test equipment (please refer to chapter 6 for details)
13-14

4.2 Radiated emissions (Field strength of fundamental and spurious emissions)

4.2.1 Test method

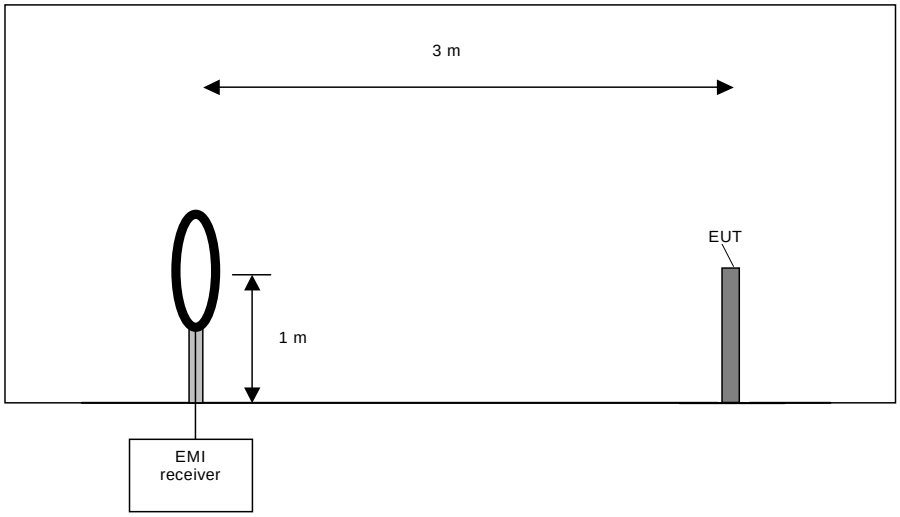
Preliminary measurement 9 kHz to 30 MHz

In the first stage a preliminary measurement is performed in an anechoic chamber with a measuring distance of 3 meters. Table-top devices are set up on a non-conducting support with a size of 1 m by 1.5 m and a height of 80 cm. Floor-standing devices are placed directly on the turntable / ground plane. The setup of the equipment under test is in accordance to [1].

The frequency range 9 kHz to 30 MHz is monitored with an EMI receiver while the system and its cables are manipulated to find out the configuration with the maximum emission levels if applicable. The EMI receiver is set to MAX hold mode. The EUT and the measuring antenna are rotated around their vertical axis to find the maximum emission levels.

The resolution bandwidth of the EMI receiver is set to the following values:

Frequency range	Resolution bandwidth
9 kHz to 150 kHz	200 Hz
150 kHz to 30 MHz	9 kHz



Procedure preliminary measurement:

Pre-scans are performed in the frequency range 9 kHz to 150 kHz and 150 kHz to 30 MHz.
The following procedure is used:

1) Monitor the frequency range with the measuring antenna facing the EUT and an EUT / turntable azimuth of 0 °.
2) Manipulate the system cables to produce the maximum levels of emissions.
3) Rotate the EUT by 360 ° to maximize the detected signals.
4) Measure the frequencies of the highest detected emissions with a lower span and resolution bandwidth to increase the accuracy and note the frequency values.

5) If the EUT is portable or ceiling mounted, repeat steps 1 to 4 with other orientations (x,y,z) of the EUT.
6) Rotate the measuring antenna and repeat steps 1 to 5.

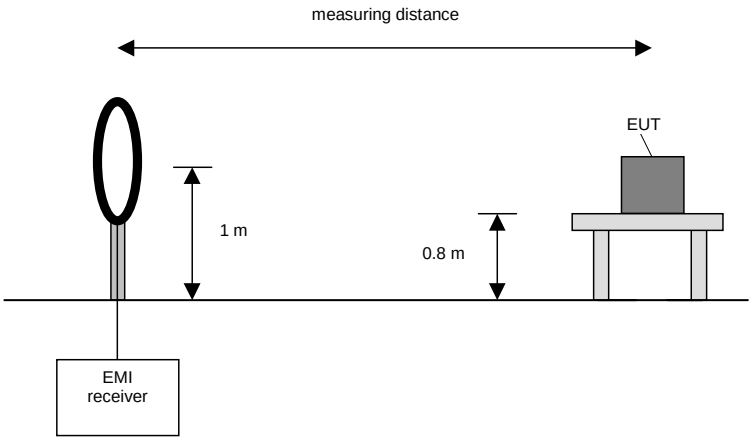
Final measurement 9 kHz to 30 MHz

In the second stage a final measurement is performed on an open area test site with no conducting ground plane in a measuring distances of 3 m, 10 m or 30 m. In the case where larger measuring distances are required the results are extrapolated based on the values measured on the closer distances according to section 15.31 (f) (2) [2]. The final measurement is performed with an EMI receiver set to Quasi-Peak detector, except for the frequency bands 9 kHz to 90 kHz and 110 kHz to 490 kHz where an Average detector is used according section 15.209 (d) [2].

At the frequencies, which were detected during the preliminary measurements, the final measurement is performed while rotating the EUT and the measuring antenna in the range of 0 ° to 360 ° around their vertical axis until the maximum level value is found.

The resolution bandwidth of the EMI receiver is set to the following values:

Frequency range	Resolution bandwidth
9 kHz to 150 kHz	200 Hz
150 kHz to 30 MHz	9 kHz



Procedure final measurement:

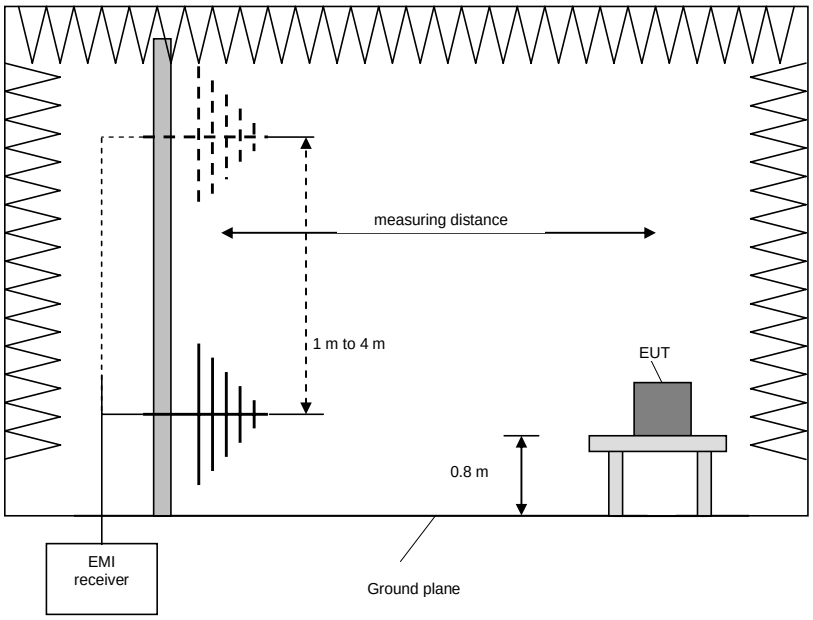
The following procedure is used:
1) Monitor the selected frequencies from the preliminary measurement with the measuring antenna facing the EUT and an EUT azimuth of 0 °.
2) Rotate the EUT by 360 ° to maximize the detected signals.
3) Rotate the measuring antenna and repeat steps 1 to 2 until the maximum value is found and note it.
4) If the EUT is portable or ceiling mounted, repeat steps 1 to 3 with other orientations (x,y,z) of the EUT.

Preliminary and final measurement 30 MHz to 1 GHz

The preliminary and final measurements are performed in a semi-anechoic chamber with a metal ground plane in a 3 m distance.
During the tests the EUT is rotated in the range of 0 ° to 360 °, the measuring antenna is set to horizontal and vertical polarization and raised and lowered in the range from 1 m to 4 m to find the maximum level of emissions.

The resolution bandwidth of the EMI Receiver is set to the following values:

Test	Frequency range	Resolution bandwidth
Preliminary measurement	30 MHz to 1 GHz	100 kHz
Frequency peak search	+ / - 1 MHz	10 kHz
Final measurement	30 MHz to 1 GHz	120 kHz



Procedure preliminary measurement:

The following procedure is used:

1) Set the measuring antenna to 1 m height.
2) Monitor the frequency range at horizontal polarisation of the measuring antenna and an EUT / turntable azimuth of 0 °.
3) Rotate the EUT by 360° to maximize the detected signals.
4) Repeat steps 2 to 3 with the vertical polarisation of the measuring antenna.
5) Increase the height of the measuring antenna for 0.5 m and repeat steps 2 to 4 until the final height of 4 m is reached.
6) The highest values for each frequency are saved by the software, including the measuring antenna height and polarization and the turntable azimuth for that value.

Procedure final measurement:

The following procedure is used:

1) Select the highest frequency peaks (lowest margin to the limit) for the final measurement.
2) The software determines the exact peak frequencies by doing a partial scan with reduced RBW with +/- 10 times the RBW of the pre-scan of the selected peaks.
3) If the EUT is portable or ceiling mounted, find the worst-case EUT orientation (x,y,z) for the final test.
4) The worst-case measuring antenna height is found via varying the height by +/- 0.5 m from the value obtained in the preliminary measurement while monitoring the emission level.
5) The worst-case turntable position is found via varying the turntable azimuth by +/- 30° from the value obtained in the preliminary measurement while monitoring the emission level.
6) The final measurement is performed at the worst-case measuring antenna height and the worst-case turntable azimuth.
7) Steps 2 to 6 are repeated for each frequency peak selected in step 1.

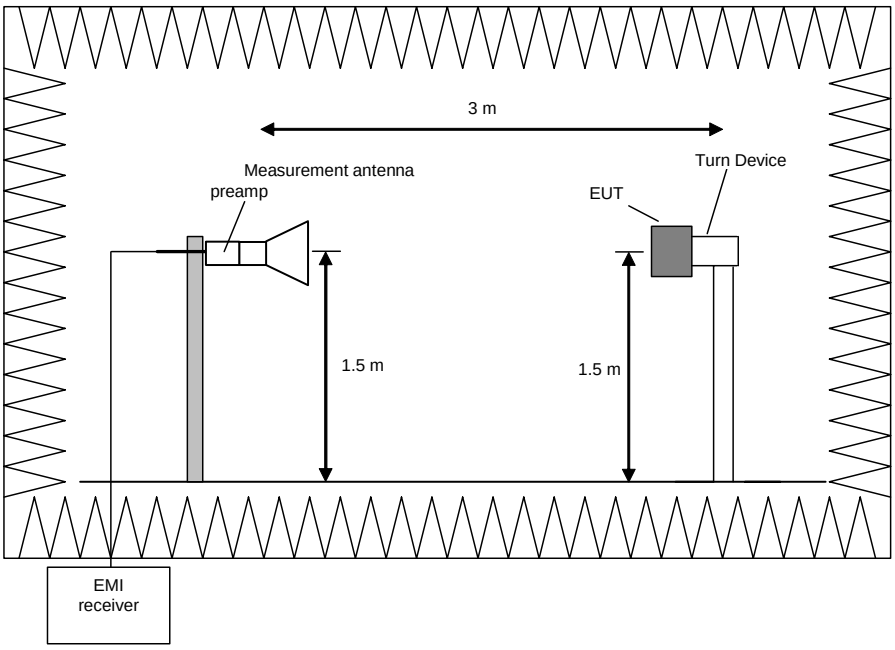
Preliminary and final measurement > 1 GHz

The preliminary and final measurements are performed in a fully anechoic chamber. Table-top devices are set up on a non-conducting turn device at the height of 1.5 m. The setup of the equipment under test is in accordance to [1].

The frequency range is divided into different sub-ranges depending on the frequency range of the used horn antenna. The frequency range 30 MHz to 1 GHz is monitored with an EMI receiver which is set to MAX hold mode. The EUT is rotated in the range of 0 ° to 360 ° and the measuring antenna is set to horizontal and vertical polarisation to find the maximum levels of emissions. After these steps, the measurement is repeated after reorientating the EUT in 30 ° steps according to [1].

The resolution bandwidth of the EMI receiver is set to the following values:

Frequency range	Resolution bandwidth
1 GHz to 4 GHz	1 MHz
4 GHz to 12 GHz	1 MHz
12 GHz to 18 GHz	1 MHz
18 GHz to 26.5 GHz	1 MHz
26.5 GHz to 40 GHz	1 MHz
40 GHz to 60 GHz	1 MHz
50 GHz to 75 GHz	1 MHz
75 GHz to 110 GHz	1 MHz



Procedure preliminary measurement:

Pre-scans are performed in the frequency range 1 to 110 GHz.
The following procedure is used:

1) Monitor the frequency range at horizontal polarisation of the measuring antenna and an EUT / turntable azimuth of 0 °.
2) Rotate the EUT by 360° to maximize the detected signals.
3) Repeat steps 1 to 2 with the vertical polarisation of the measuring antenna.
4) Repeat steps 1 to 3 with the EUT reorientated by an angle of 30° (60°, 90°, 120° and 150°), according to 6.6.5.4 in [1].
5) Measure the frequencies of the detected emissions with a lower span and resolution bandwidth to increase the accuracy and note the resulting frequencies.
6) The highest emissions (smallest margin to the limit) will be used for the final measurement.

Procedure of measurement:

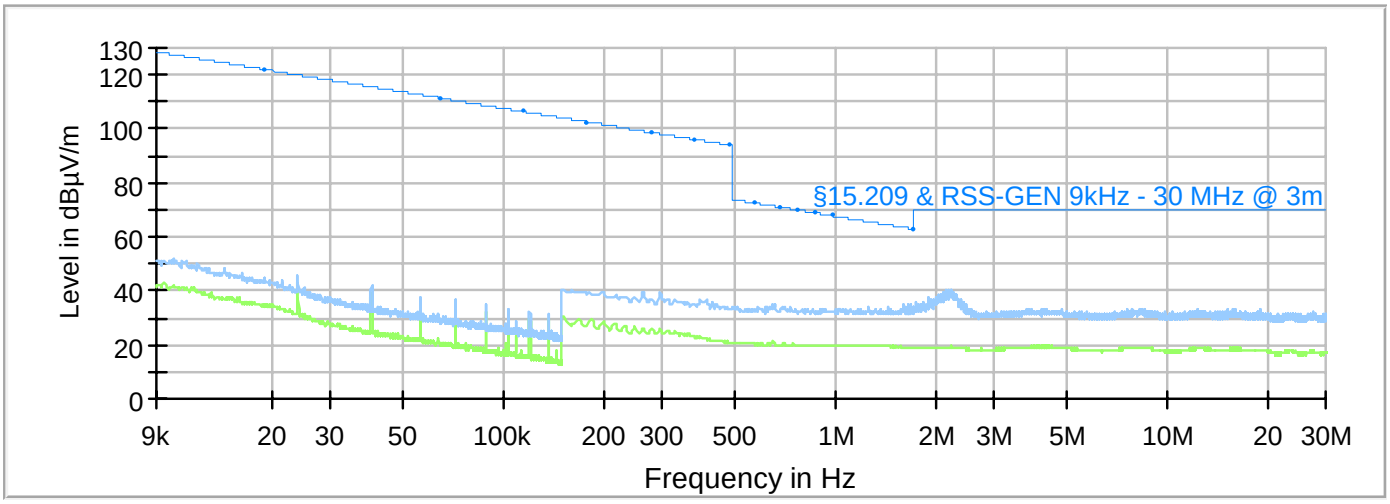
The following procedure is used:

1) Set the turntable and the turn device to the position which leads to the highest emission for the first frequency identified in the preliminary measurements.
2) Set the measurement antenna to the polarisation which leads to the highest emission for the first frequency identified in the preliminary measurements.
3) Set the spectrum analyser to EMI mode with Peak and Average detector activated.
4) Rotate the turntable from 0° to 360° to find the EUT angle that results in the highest emission level.
5) Note the highest displayed peak and average values.
6) Repeat steps 1 to 5 for each frequency detected during the preliminary measurements.

4.2.2 Test results preliminary measurement 9 kHz to 30 MHz

Ambient temperature:	22 °C
Relative humidity:	55 %

Date:	24.06.2021
Tested by:	Y. KHALEK



Preliminary test results from 9 kHz to 30 MHz

Preliminary measurement shows that the emissions are more than 20 dB below the limits of §15.209. Therefore, no final measurements have been performed

4.2.3 Test results final measurement 9 kHz to 30 MHz

Ambient temperature:	- °C
Relative humidity:	- %

Date:	-
Tested by:	-

The results of the standard subsequent measurement on the outdoor test site are indicated in the table below. The limits as well as the measured results (levels) refer to the above-mentioned standard while taking account of the specified requirements for a 30 / 300 m measuring distance.

Results 9 kHz - 30 MHz										
Frequency in MHz	Reading in dB(µV)	Result* in dB(µV/m)	Result* in dB(µA/m)	Limit acc. 15.209 in dB(µV/m)	Limit acc. RSS-Gen Table 6 in dB(µA/m)	Margin** in dB	Detector	Antenna factor in dB/m	Measuring Distance in m	Distance correction factor*** in dB
-	-	-	-	-	-	-	-	-	-	-

Measurement uncertainty: 4.36 dB

* Result @ norm dist. = Reading + Antenna factor - Distance correction factor;
Result [dBµA/m] = Result [dBµV/m] - 20*log(377 Ω)
** Margin = Limit [dBµ{V|A}/m] - Result @ norm dist.
*** 40dB/decade according Part §15.31 (f) (2)

No final measurements have been performed, as the results of preliminary tests were more than 20 dB below the limits.

Test result: Passed

Test equipment (please refer to chapter 6 for details)
5-12

4.2.4 Test results final measurement 30 MHz to 1 GHz

Ambient temperature:	22 °C
Relative humidity:	55 %

Date:	24.06.2021
Tested by:	Y. KHALEK

The measured points and the limit line in the following diagram refer to the standard measurement of the emitted interference in compliance with the above-mentioned standard. The measured points marked with "◆" are the measured results of the standard subsequent measurement in a semi-anechoic chamber.

Final test results from 30 MHz to 1 GHz

The results of the standard subsequent measurement in a semi-anechoic chamber are indicated in the table below. The limits as well as the measured results (levels) refer to the above-mentioned standard while taking account of the specified requirements for a 3 m measuring distance.

Frequency in MHz	QuasiPeak in dB(µV/m)	Average Value in dB(µV/m)	Limit in dB(µV/m)	Margin in dB	Meas. Time in ms	Bandwidth in kHz	Height in cm	Pol	Azimuth in deg	Raw Rec (dBµV)	Corr. in dB
30.270	20.98	--	40.0	19.0	1000	120.000	192.0	V	55	-4.8	25.8
34.750	21.48	--	40.0	18.5	1000	120.000	300.0	V	12	-1.7	23.2
86.170	10.50	--	40.0	29.5	1000	120.000	135.0	V	203	-6.5	17.0
769.820	22.33	--	46.0	23.7	1000	120.000	144.0	H	268	-6.0	28.3
891.280	28.70	--	46.0	17.3	1000	120.000	100.0	H	15	-1.3	30.0
902.820*	101.11 (Peak)	81.11	81.9	0.79	1000	120.000	100.0	H	18	71.0	30.0
902.930*	101.14 (Peak)	81.14	81.9	0.76	1000	120.000	100.0	H	16	71.0	30.0
998.510	23.35	--	54.0	30.6	1000	120.000	406.0	H	303	-7.5	30.9

*Fundamental frequency
Average Value = QP Value – Duty cycle correction factor (as calculated in 4.2.1 of this test report)

Measurement uncertainty ±5.12 dB

Test result: Passed

The correction factor was calculated as follows:
Corr. (dB) = cable attenuation (dB) + 6 dB attenuator (dB) + antenna factor (dB)

Therefore, the reading can be calculated as follows:
Reading (dBµV/m) = result QuasiPeak (dBµV/m) - Corr. (dB)

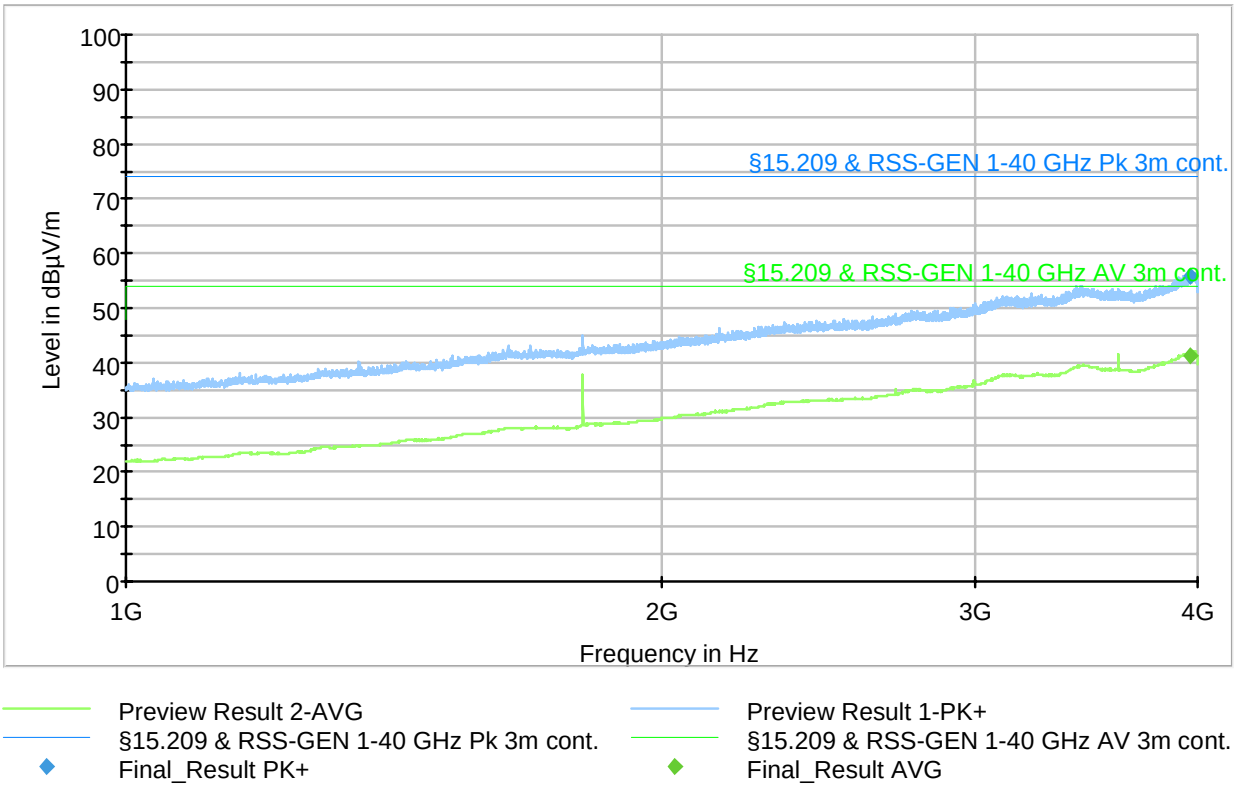
Test equipment (please refer to chapter 6 for details)
3-4, 6-12

4.2.5 Test results final measurement above 1 GHz

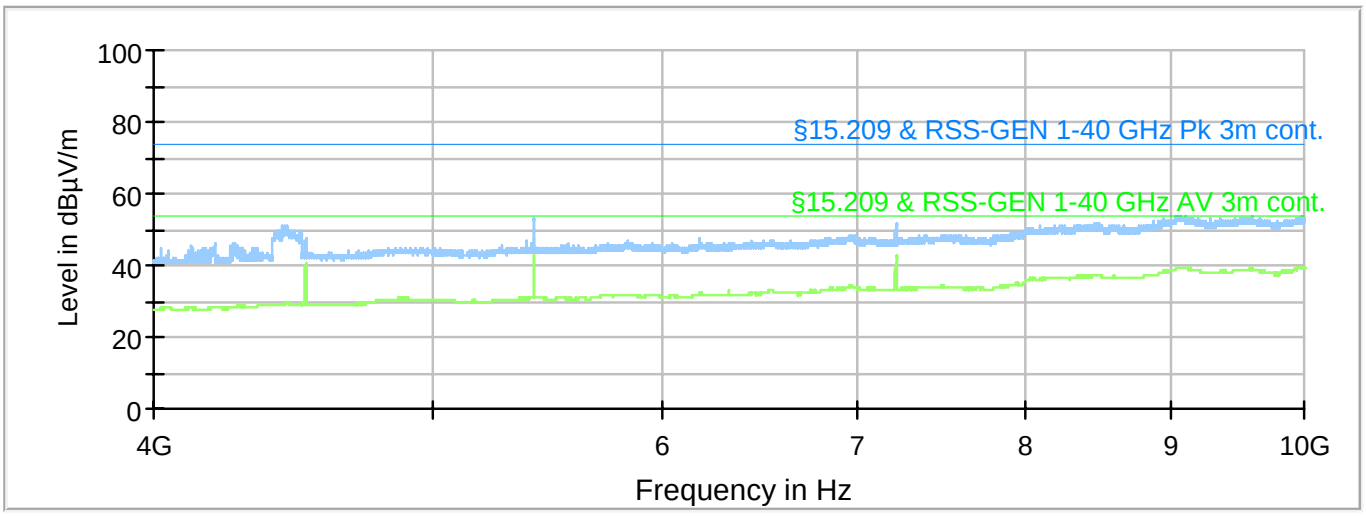
Ambient temperature:	23 °C
Relative humidity:	50 %

Date:	22.06.2021
Tested by:	Y.Khalek

The curves in the diagram only represent the maximum measured value for each frequency point of all preliminary measurements, which were carried out with the EUT in various positions.
The top measured curve represents the peak measurement. The measured points marked with "◆" are frequency points for the final peak detector measurement. These values are indicated in the following table. The bottom measured curve represents the average measurement. The measured points marked with "◆" are frequency points for the final average detector measurement.



Final test results from 1 GHz to 4 GHz



Preview Result 2-AVG
Critical_Freqs AVG
§15.209 & RSS-GEN 1-40 GHz Pk 3m cont.
Final_Result PK+
Preview Result 1-PK+
Critical_Freqs PK+
§15.209 & RSS-GEN 1-40 GHz AV 3m cont.
Final_Result CAV

Final test results from 4 GHz to 10 GHz

The results of the standard subsequent measurement above 1 GHz in a fully anechoic chamber are indicated in the table below. The limits as well as the measured results (levels) refer to the above-mentioned standard while taking account of the specified requirements for a 3 m measuring distance.

Frequency in MHz	MaxPeak in dB(µV/m)	Average in dB(µV/m)	Limit in dB(µV/m)	Margin in dB	Meas. Time in ms	Bandwidth in MHz	Height in cm	Pol	Azimuth in deg	Elevation in deg	Corr. in dB	Raw Rec (dBµV)
3965.250	55.85	---	74.0	18.1	100	1000.000	150.0	V	118	150	41.0	14.9
3965.250	---	41.26	54.0	12.7	100	1000.000	150.0	V	118	150	41.0	0.3

Measurement uncertainty ±5.14 dB

Test result: Passed

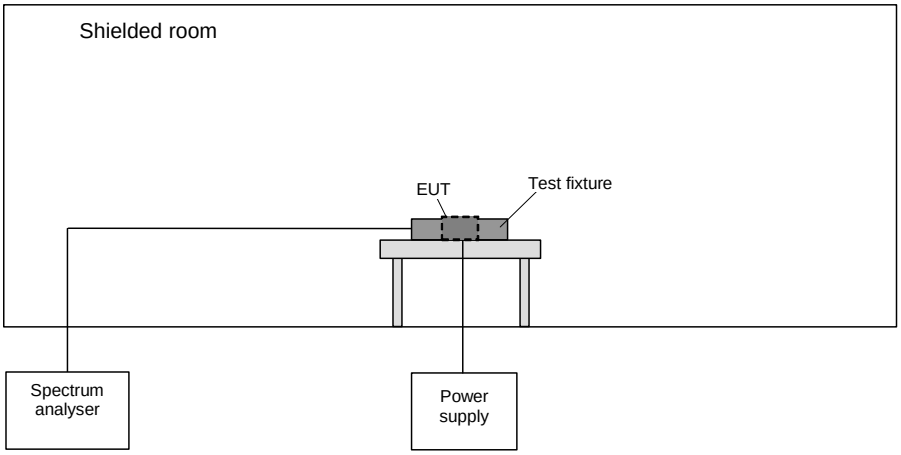
The correction factor was calculated as follows:
Corr. (dB) = cable attenuation (dB) + preamplifier (dB) + antenna factor (dB)

Therefore, the reading can be calculated as follows:
Reading (dBµV/m) = result Peak or Average (dBµV/m) - Corr. (dB)

Test equipment (please refer to chapter 6 for details)
1-2, 6-12, 15

4.3 99 % bandwidth

4.3.1 Test method



The following procedure is used for the occupied bandwidth measurement according to [1]:

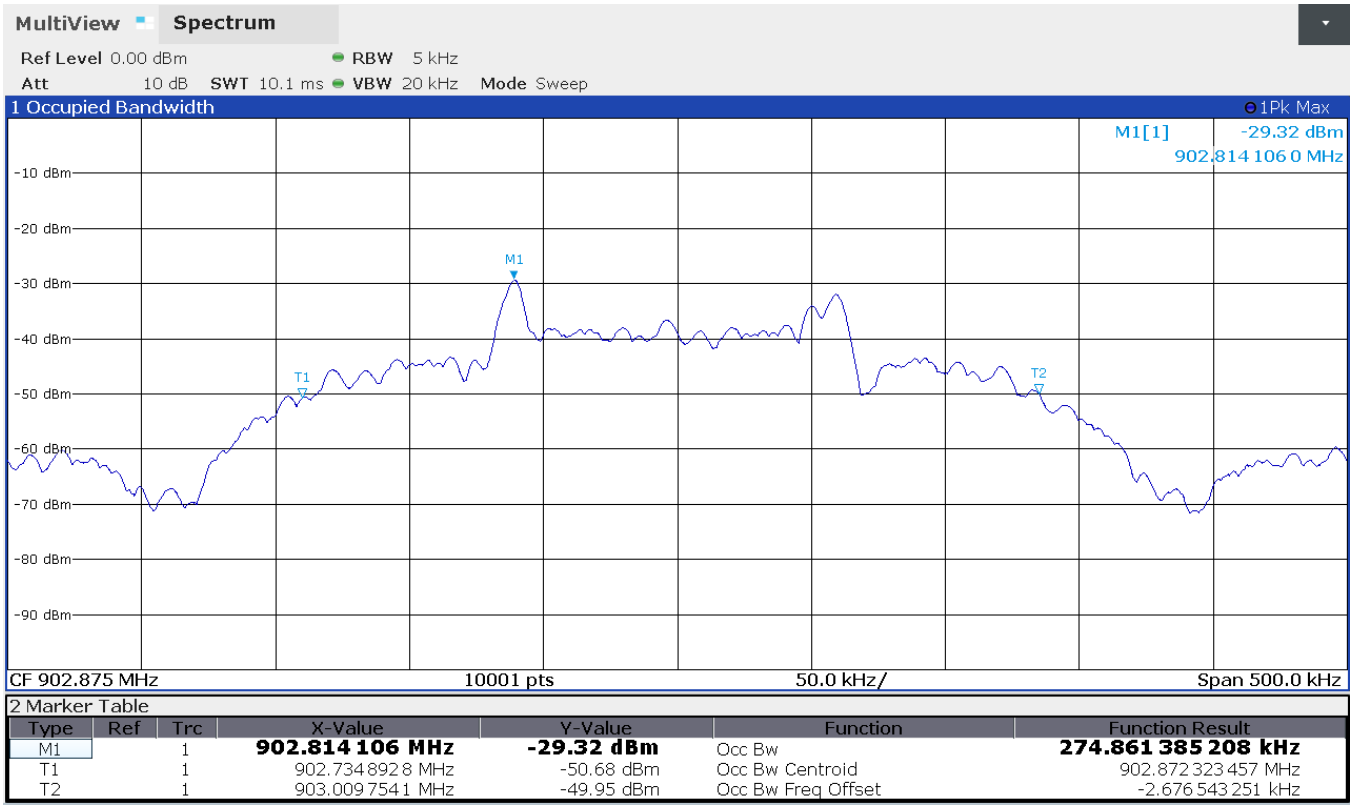
The occupied bandwidth is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers are each equal to 0.5% of the total mean power of the given emission. The following procedure is used for measuring the 99% power bandwidth:

1) The instrument center frequency is set to the nominal EUT channel center frequency. The frequency span for the spectrum analyzer shall be between 1.5 times and 5.0 times the OBW.
2) The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1% to 5% of the OBW, and VBW shall be approximately three times the RBW, unless otherwise specified by the applicable requirement.
3) Set the reference level of the instrument as required, keeping the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope shall be more than [10 log (OBW/RBW)] below the reference level. Specific guidance is given in 4.1.5.2.
4) Step 1) through step 3) might require iteration to adjust within the specified range.

4.3.2 Test results

Ambient temperature:	22 °C
Relative humidity:	50 %

Date:	10.06.2021
Tested by:	Y. KHALEK



F_L	F_U	99 % BW (F_U - F_L)	Limit (0.5% x Nominal center frequency)
902.7349 MHz	903.0097 MHz	274.9 kHz	4.514375 MHz

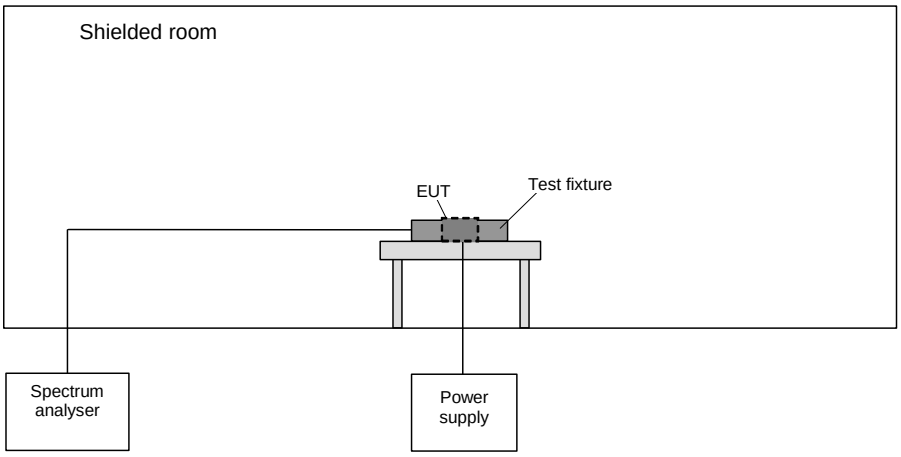
Measurement uncertainty < $1*10^{-7}$

Test result: Passed

Test equipment (please refer to chapter 6 for details)
13-14

4.4 The 20 dB bandwidth

4.4.1 Test method



The EUT has to be connected to the spectrum analyser via a low loss cable. If the EUT is not equipped with an antenna connector, a temporary antenna connector has to be installed or a test fixture has to be used. The EUT has to be switched on; the transmitter shall work with its maximum data rate.

The following spectrum analyser settings shall be used:

- Span: App. 2 to 5 times the OBW, centred on the actual channel.
- Resolution bandwidth: Between 1 % to 5 % of the required bandwidth.
- Video bandwidth: ≥ 3 times the resolution bandwidth.
- Sweep: Auto.
- Detector function: peak.
- Trace mode: Max hold.

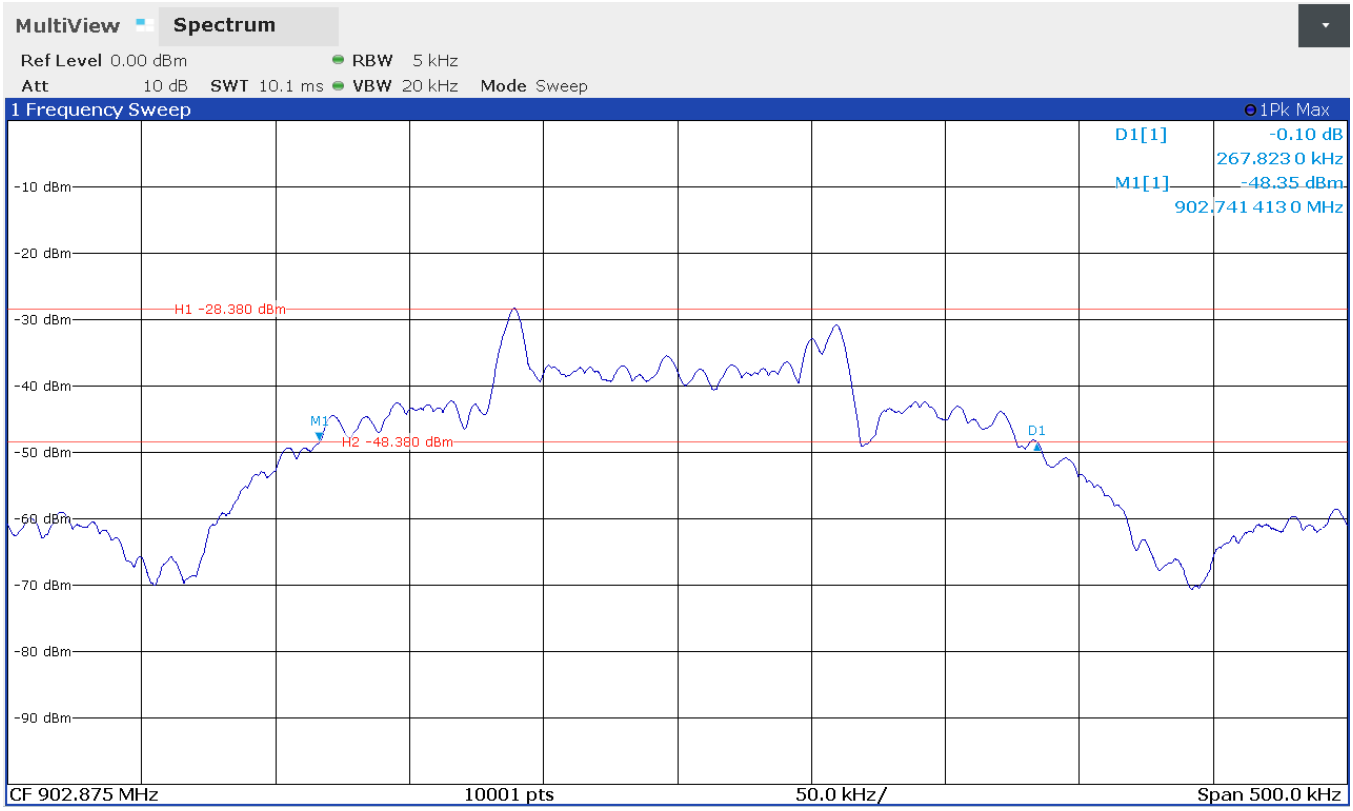
After trace stabilisation the marker shall be set on the signal peak. The first display line has to be set on this value. The second display line has to be set 20 dB below the first line (or the peak marker). The frequency lines shall be set on the intersection points between the second display line and the measured curve.

The measurement will be performed at the middle of the assigned frequency band.

4.4.2 Test results

Ambient temperature:	22 °C
Relative humidity:	50 %

Date:	10.06.2021
Tested by:	Y. KHALEK



F_L	F_U	BW (F_U - F_L)	Limit (0.5%x Nominal center frequency)
902.7414 MHz	903.0092 MHz	267.8 kHz	4.514375 MHz

Measurement uncertainty < $1*10^{-7}$

Test result: Passed

Test equipment (please refer to chapter 6 for details)
13-14

5 Test Equipment used for Tests

No.	Test equipment	Type	Manufacturer	Serial No.	PM. No.	Cal. Date	Cal Due
1	Low Noise Amplifier 100 MHz - 18 GHz	LNA-30-00101800-25-10P	Narda-Miteq	2110917	482967	18.02.2020	02.2022
2	Log.-Per. antenna	HL050	Rohde & Schwarz	100908	482977	13.08.2019	08.2022
3	Attenuator 6 dB	WA2-6	Weinschel	-	482793	Calibration not necessary	
4	Ultralog Antenna	HL562E	Rohde & Schwarz	101079	482978	18.03.2021	03.2024
5	loop antenna	HFH2-Z2	Rohde & Schwarz	100417	481912	25.02.2021	02.2022
6	Turntable	TT3.0-3t	Maturo	825/2612/.01	483224	Calibration not necessary	
7	Antennasupport	BAM 4.5-P-10kg	Maturo	222/2612.01	483225	Calibration not necessary	
8	EMI Testreceiver	ESW44	Rohde & Schwarz	101828	482979	14.11.2019	11.2021
9	RF Switch Matrix	OSP220	Rohde & Schwarz	-	482976	Calibration not necessary	
10	Systemsoftware EMC32 M276	EMC32	Rohde & Schwarz	100970	482972	Calibration not necessary	
11	Controller	NCD	Maturo	474/2612.01	483226	Calibration not necessary	
12	Semi Anechoic Chamber M276	SAC5-2	Albatross Projects	C62128-A540-A138-10-0006	483227	Calibration not necessary	
13	test fixture	Für Funk 50 Ohm-System	PHOENIX TESTLAB GmbH	-	410160	Calibration not necessary	
14	Signal & Spectrum Analyzer	FSW43	Rohde & Schwarz	100586 & 100926	481720	30.03.2021	03.2023
15	Highpassfilter 1 GHz	WHKX12-935-1000-15000-40ST	Wainwright Instruments GmbH	12	482908	Calibration not necessary	

6 Test site Validation

Test equipment	PM. No.	Frequency range	Type of validation	According to	Val. Date	Val Due
Semi anechoic chamber M276	483227	30 – 1000 MHz	NSA/RSM	CISPR 16-1-4 + Cor1:2010 + A1:2012 +A2:2017	03.03.2021	02.03.2023
Semi anechoic chamber M276	483227	1 -18 GHz	SVSWR	CISPR 16-1-4 + Cor1:2010 + A1:2012 +A2:2017	25.02.2021	24.02.2023

7 Report History

Report Number	Date	Comment
F210895E1	02.07.2021	Initial Test Report
-	-	-
-	-	-

8 List of Annexes

Annex A	Test Setup Photos	3 pages
Annex B	EUT External Photos	3 pages
Annex C	EUT Internal Photos	3 pages