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Test Report

Report Number:

F200675E1

Equipment under Test (EUT):

A400, A406
Display with Bluetooth interface

Applicant:

Endress+Hauser Flowtec AG

Manufacturer:

Endress+Hauser Flowtec AG

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-247 Issue 2 (March 2017)**, Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices

[4] **RSS-Gen Issue 5 (March 2019)**, 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.

Test engineer:	Paul NEUFELD		03.12.2020
	Name	Signature	Date
Authorized reviewer:	Bernward ROHDE		03.12.2020
	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.

This test report is valid in hardcopy form as well as in electronic form.

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1 Identification

1.1 Applicant

Name:	Endress+Hauser Flowtec AG
Address:	Kägenstrasse 7, 4153 Reinach
Country:	Switzerland
Name for contact purposes:	Mr. Lukas TANNER
Phone:	+41 61 715 6826
eMail Address:	lukas.tanner@endress.com
Applicant represented during the test by the following person:	None

1.2 Manufacturer

Name:	Endress+Hauser Flowtec AG
Address:	Kägenstrasse 7, 4153 Reinach
Country:	Switzerland
Name for contact purposes:	Mr. Lukas TANNER
Phone:	+41 61 715 6826
eMail Address:	lukas.tanner@endress.com
Applicant 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-17186-01-05 and D-PL-17186-01-06, FCC Test Firm Accreditation designation number DE0004, FCC Test Firm Registration Number 469623, CAB Identifier DE0003 and ISED# 3469A.

1.4 EUT (Equipment Under Test)

Test object: *	Display with Buetooth interface
Type / PMN: *	A400, A406
FCC ID: *	2AIMC-A40NAA
IC: *	21529- A40NAA
Serial number (Radiated meas.): *	A400 (0000000016), A406 (0000000073)
Serial number (Antenna port cond. meas.): *	A400 (0000000010), A406 (0000000051)
PCB identifier: *	A400: 342347 A406: 342347
HVIN (Hardware Version Identification Number): *	A400, A406
FVIN (Firmware Version Identification Number): *	-
Hardware version: *	A400: A, Assembly Variation -00 A406: A, Assembly Variation -01
Software version: *	A400: 01.00.02_29 (Bluetooth SoftDevice S140 v6.1.1) A406: 01.00.02_25 (Bluetooth SoftDevice S140 v6.1.1)

* Declared by the applicant

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

Bluetooth LE frequencies				
Channel 00	RX	2402 MHz	TX	2402 MHz
Channel 19	RX	2440 MHz	TX	2440 MHz
Channel 39	RX	2480 MHz	TX	2480 MHz

1.5 Technical Data of Equipment

Fulfills specifications: *	Bluetooth 5.0 low energy only (1 + 2 Mbps, 125 + 500 kbps)					
Antenna type: *	PCB antenna					
Antenna name: *	-					
Antenna gain: *	A400: max. 4 dBi A406: max. 4 dBi					
Antenna connector: *	None					
Supply voltage EUT: *	U_{nom}=	3.1 V DC	U_{min}=	2.8 V DC	U_{min}=	3.4 V DC
Supply voltage radiated test sample: *	U_{nom}=	3.1 V DC	U_{min}=	2.8 V DC	U_{max}=	3.4 V DC
Type of modulation: *	GFSK					
Operating frequency range: *	2402 – 2480 MHz					
Number of channels: *	40					
Temperature range: *	-40 °C to +85 °C					
Lowest / highest Internal clock frequency: *	32.768 kHz / 2480 MHz					

* Declared by the applicant

Equipment used for testing	
Cables (connected to the EUT): *1	Ribbon cable (~ 10 cm)
Test adapter + cables: *1	USB to UART converter Power Supply (USB + external)
Laptop PC:*2	Fujitsu Lifebook S751 (PM No. 201036)

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

1.6 Dates

Date of receipt of test sample:	14.10.2020
Start of test:	19.10.2020
End of test:	23.10.2020

2 Operational States

The EUT is a display with Bluetooth interface, which allows wireless access via the SmartBlue-App.

The antenna port conducted tests were performed using a sample with a temporary antenna connector, which was provided by the applicant.

To power the display and to control the Direct Test Mode, a test adapter by Endress+Hauser Flowtec AG was used. It consisted of a USB to UART converter that provided a virtual COM port on the PC.
Furthermore, it allowed for changing the supply voltage of the display by changing jumper settings or by applying an external voltage from a bench top power supply.
The direct test mode was activated using a switch on the back side of the EUT. Since the test software will not be installed in the final product the functionality switching on the test mode will not be available in the final EUT.

During the tests the EUT was supplied with 3.1 V DC via the USB interface of the Test adapter.

Power Settings for all measurements:

Modulation	Power setting ch. 0 - 39
1 Mbps	0 dBm
2 Mbps	0 dBm
125 kbps	0 dBm
500 kbps	0 dBm

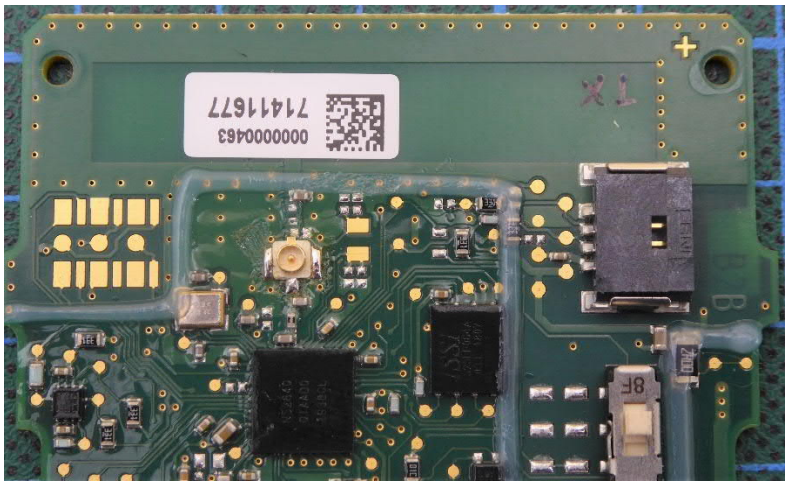
Operation mode	EUT	Description of the operation mode	mode	channel	Modulation	Data rate / Mbps
1	A400	Continuous transmitting on 2402 MHz	BLE	0	GFSK	1 Mbps
2	A400	Continuous transmitting on 2440 MHz	BLE	19	GFSK	1 Mbps
3	A400	Continuous transmitting on 2480 MHz	BLE	39	GFSK	1 Mbps
4	A400	Continuous transmitting on 2402 MHz	BLE	0	GFSK	2 Mbps
5	A400	Continuous transmitting on 2440 MHz	BLE	19	GFSK	2 Mbps
6	A400	Continuous transmitting on 2480 MHz	BLE	39	GFSK	2 Mbps
7	A400	Continuous transmitting on 2402 MHz	BLE	0	GFSK	125 kbps
8	A400	Continuous transmitting on 2440 MHz	BLE	19	GFSK	125 kbps
9	A400	Continuous transmitting on 2480 MHz	BLE	39	GFSK	125 kbps
10	A400	Continuous transmitting on 2402 MHz	BLE	0	GFSK	500 kbps
11	A400	Continuous transmitting on 2440 MHz	BLE	19	GFSK	500 kbps
12	A400	Continuous transmitting on 2480 MHz	BLE	39	GFSK	500 kbps
13	A406	Continuous transmitting on 2402 MHz	BLE	0	GFSK	1 Mbps
14	A406	Continuous transmitting on 2440 MHz	BLE	19	GFSK	1 Mbps
15	A406	Continuous transmitting on 2480 MHz	BLE	39	GFSK	1 Mbps
16	A406	Continuous transmitting on 2402 MHz	BLE	0	GFSK	2 Mbps
17	A406	Continuous transmitting on 2440 MHz	BLE	19	GFSK	2 Mbps
18	A406	Continuous transmitting on 2480 MHz	BLE	39	GFSK	2 Mbps
19	A406	Continuous transmitting on 2402 MHz	BLE	0	GFSK	125 kbps
20	A406	Continuous transmitting on 2440 MHz	BLE	19	GFSK	125 kbps
21	A406	Continuous transmitting on 2480 MHz	BLE	39	GFSK	125 kbps
22	A406	Continuous transmitting on 2402 MHz	BLE	0	GFSK	500 kbps
23	A406	Continuous transmitting on 2440 MHz	BLE	19	GFSK	500 kbps
24	A406	Continuous transmitting on 2480 MHz	BLE	39	GFSK	500 kbps

3 Additional Information

The radiated tests were performed with an unmodified sample.

For the antenna port conducted tests, a sample with a temporary antenna connector was provided by the applicant.

The photograph below shows the EUT with the temporary antenna connector, which was used for the antenna port conducted measurements:



4 Overview

Application	Frequency range [MHz]	FCC 47 CFR Part 15 section [2]	RSS-247 [3] or RSS-Gen [4]	Status	Refer page
Maximum peak conducted output power	2400.0 - 2483.5	15.247 (b) (3), (4)	5.4 (d) [3]	Passed	12 et seq
DTS Bandwidth / 99% Bandwidth	2400.0 - 2483.5	15.247 (a) (2)	5.2 (a) [3]	Passed	14 et seq
Peak Power Spectral Density	2400.0 - 2483.5	15.247 (e)	5.2 (b) [3]	Passed	17 et seq
Band edge compliance	2400.0 - 2483.5	15.247 (d) 15.205 (a) 15.209 (a)	5.5 [3]	Passed	17 et seq.
Maximum unwanted emissions	0.009 – 26,500	15.247 (d) 15.205 (a) 15.209 (a)	5.5 [3] 8.9 [4], 8.10 [4]	Passed	23 et seq.
Conducted emissions on supply line	0.15 - 30	15.207 (a)	8.8 [4]	Passed	36 et seq.
Antenna Requirement	-	15.203 15.247 (b)	5.4 (f) (ii) [4]	Passed*1	-

* Not tested, because not ordered by the applicant.
*1 Fixed Antenna, gain below 6 dBi, no power reduction necessary.

5 Results

5.1 Duty cycle

The EUT was measured conducted on a sample with a temporary antenna connector, which was provided by the applicant.

The method described in chapter 11.6 b) of document [1] was used to perform the following test.

The following measurement technique was used:

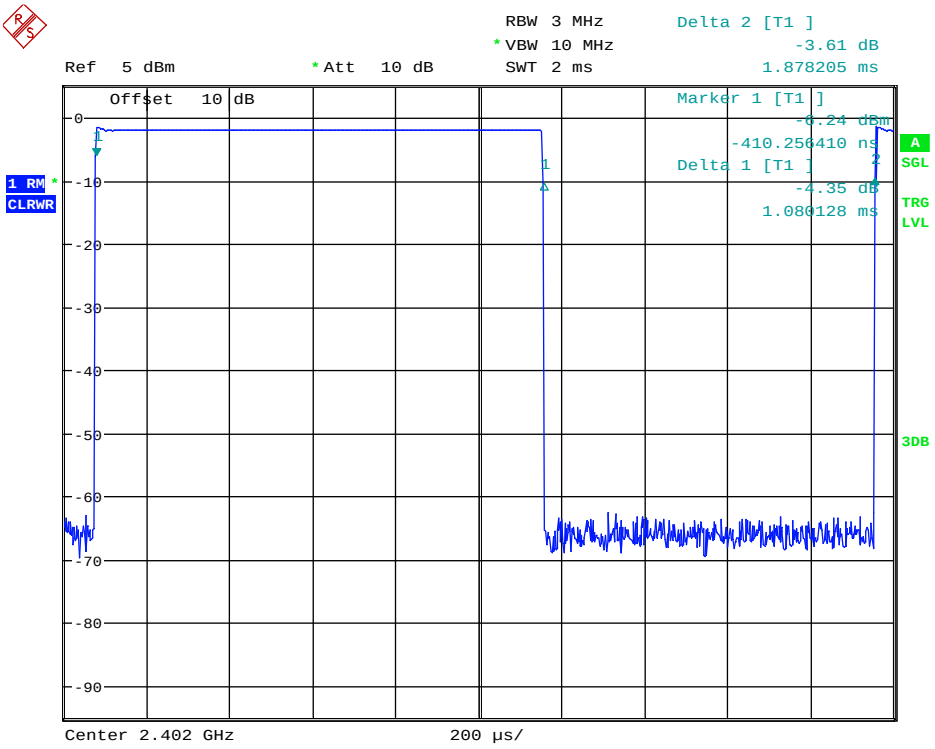
The zero-span mode on a spectrum analyzer or EMI receiver if the response time and spacing between two bins on the sweep are sufficient to permit accurate measurements of the on and off times of the transmitted signal.

- Set the center frequency of the instrument to the center frequency of the transmission.
- Set RBW ≥ OBW if possible; otherwise, set RBW to the largest available value.
- Set VBW ≥ RBW.
- Set detector = peak or average.
- The zero-span measurement method shall not be used unless both RBW and VBW are > 50/T and the number of sweep points across duration T exceeds 100. (For example, if VBW and/or RBW are limited to 3 MHz, then the zero-span method of measuring duty cycle shall not be used if T ≤ 16.7 microseconds.)

5.1.1 Test results

Ambient temperature	22 °C	Relative humidity	40 %

200674_DutyCycle_2M_2402MHz.wmf: Duty cycle measurement on channel 0 (operation mode 16):



$$\frac{50}{T_{TX_{On}}} = \frac{50}{1.080\ ms} = 46.296\ kHz \leq RBW \leq VBW \qquad \textbf{(2)}$$

Measurement Points 4001 for 2 ms → 1.080 ms = 2160 measurement points → Signal has 2160 measurement points (and fulfils the requirement of at least 100 Points resolution for the signal).

If power averaging (RMS) mode was used in step f), then the applicable correction factor is 10 log(1/x), where x is the duty cycle.

$$x_{DutyCycle} = \frac{T_{Tx\_On}}{T_{Tx\_Cycle}}, \qquad correction\ factor = F_{DCCF} = 10 \cdot log\left(\frac{1}{x}\right) \qquad \textbf{(3)}$$

$125\ kbps\ Mode: Tx_{On}: 17.059\ ms;\ Tx_{Cycle}: 17.521\ ms; x_{DutyCycle}: 0.974; F_{DCCF}: 0.1\ dB$
$500\ kbps\ Mode: Tx_{On}: 4.570\ ms;\ Tx_{Cycle}: 5.011\ ms; x_{DutyCycle}: 0.912; F_{DCCF}: 0.4\ dB$
$1\ Mbps\ Mode: Tx_{On}: 2.144\ ms;\ Tx_{Cycle}: 2.514\ ms; x_{DutyCycle}: 0.853; F_{DCCF}: 0.7\ dB$
$2\ Mbps\ Mode: Tx_{On}: 1.080\ ms;\ Tx_{Cycle}: 1.878\ ms; x_{DutyCycle}: 0.575; F_{DCCF}: 2.4\ dB$

TEST EQUIPMENT USED FOR THE TEST:

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5.2 Maximum peak conducted output power

5.2.1 Method of measurement

The EUT was measured conducted on a sample with a temporary antenna connector, which was provided by the applicant.

Acceptable measurement configurations

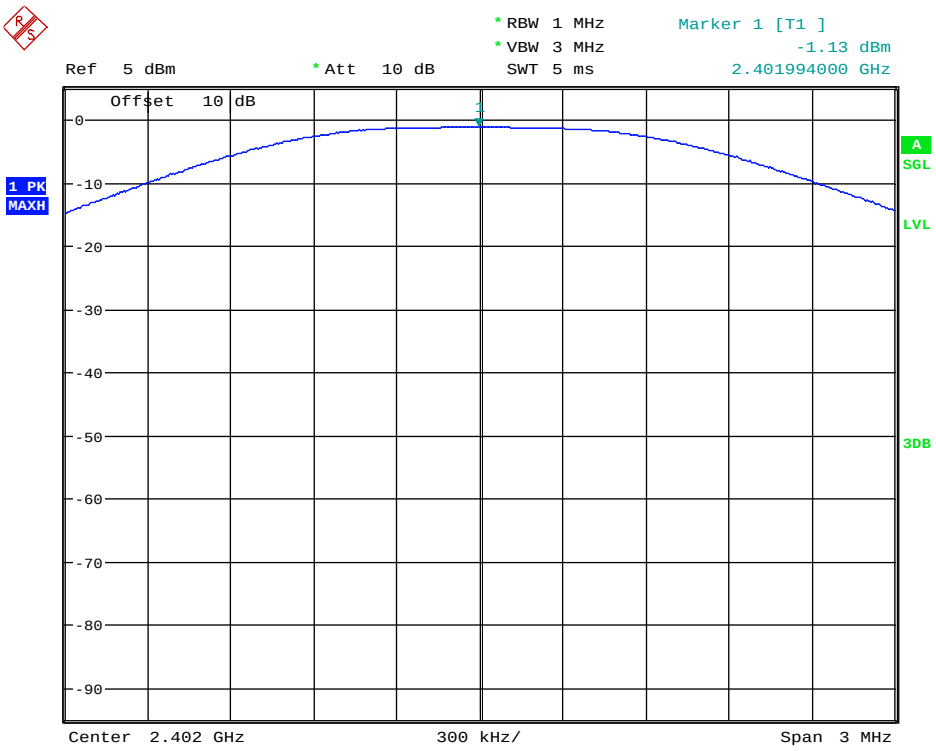
Procedure 11.9.1.1 in [1] was used for the following test.

5.2.2 Test results

Ambient temperature	22 °C	Relative humidity	62 %

The plot below shows the worst-case result. All other results are submitted in the table below

200675_MaxPeakPwr_1M_2402MHz.wmf: Maximum output power measured on channel 0 (operation mode 1):



The antenna gain is below 6 dBi, therefore no conducted output limit reduction is necessary.

Operation mode		EUT	Frequency [MHz]	Peak Power [dBm]	Margin [dB]	Limit [dBm]
1	1 Mbps	A400	2402	-1.1	31.1	30
2	1 Mbps	A400	2440	-1.7	31.7	30
3	1 Mbps	A400	2480	-2.3	32.3	30
4	2 Mbps	A400	2402	-1.2	31.2	30
5	2 Mbps	A400	2440	-1.7	31.7	30
6	2 Mbps	A400	2480	-2.3	32.3	30
7	125 kbps	A400	2402	-1.2	31.2	30
8	125 kbps	A400	2440	-1.7	31.7	30
9	125 kbps	A400	2480	-2.3	32.3	30
10	500 kbps	A400	2402	-1.2	31.2	30
11	500 kbps	A400	2440	-1.7	31.7	30
12	500 kbps	A400	2480	-2.3	32.3	30
13	1 Mbps	A406	2402	-1.5	31.5	30
14	1 Mbps	A406	2440	-2.0	32.0	30
15	1 Mbps	A406	2480	-2.6	32.6	30
16	2 Mbps	A406	2402	-1.4	31.4	30
17	2 Mbps	A406	2440	-2.0	32.0	30
18	2 Mbps	A406	2480	-2.6	32.6	30
19	125 kbps	A406	2402	-1.5	31.5	30
20	125 kbps	A406	2440	-2.0	32.0	30
21	125 kbps	A406	2480	-2.6	32.6	30
22	500 kbps	A406	2402	-1.5	31.5	30
23	500 kbps	A406	2440	-2.0	32.0	30
24	500 kbps	A406	2480	-2.6	32.6	30
Measurement uncertainty			+/- 2.71 dB			

Test: Passed

Test equipment (refer to chapter 6)

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5.3 DTS Bandwidth / 99% Bandwidth

5.3.1 Method of measurement

The EUT was measured conducted on a sample with a temporary antenna connector, which was provided by the applicant.

Acceptable measurement configurations

The measurement for the DTS bandwidth procedure refers to part 11.8.1 of document [1].

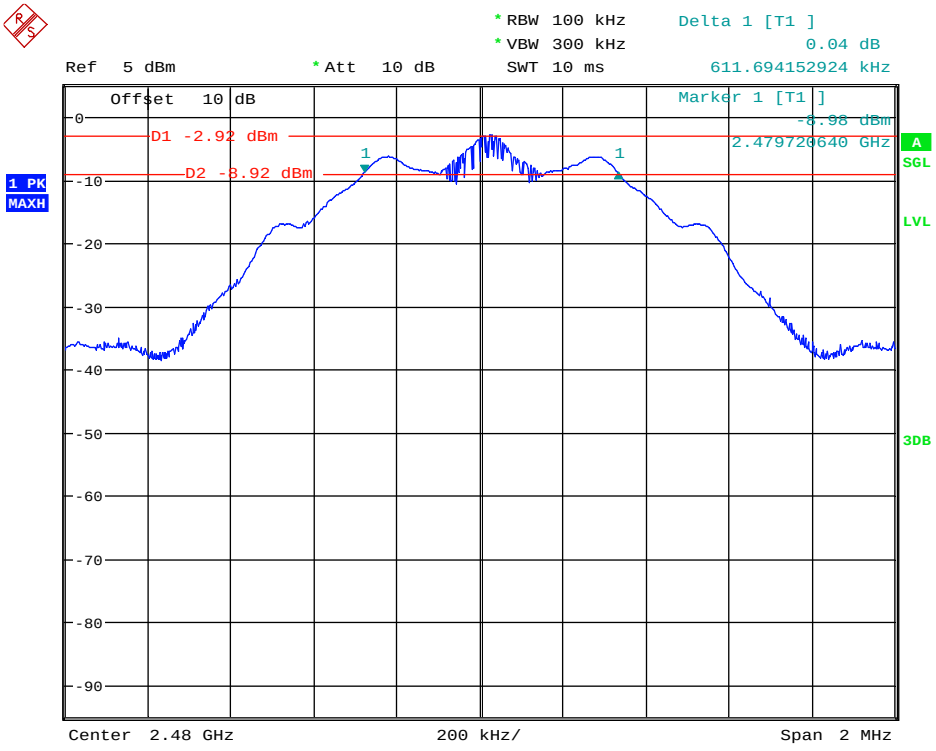
The measurement for the 99 % bandwidth procedure refers to part 6.9.3 of document [1].

5.3.2 Test result

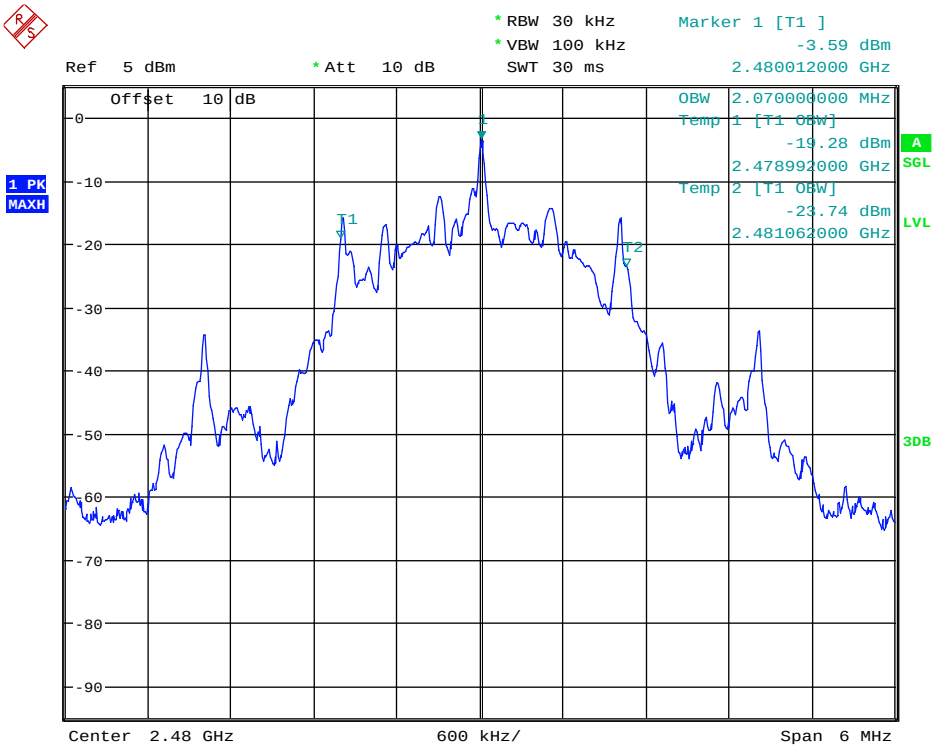
Ambient temperature	22 °C	Relative humidity	59 %

The plots show an exemplary measurement result for the worst documented case. The other results are listed in the following tables.

200675_6dB-BW_1M_2480MHz.wmf: 6-dB Bandwidth (operation mode 9):



200674_99%BW_1M_2480MHz.wmf: 99% Bandwidth (operation mode 18):



Operation Mode		EUT	Center Frequency [MHz]	Minimum 6-dB Bandwidth Limit [MHz]	6 dB Bandwidth [MHz]	99 % Bandwidth [MHz]	Result
1	1 Mbps	A400	2402	0.5	0.687	1.051	Passed
2	1 Mbps	A400	2440	0.5	0.687	1.055	Passed
3	1 Mbps	A400	2480	0.5	0.687	1.051	Passed
4	2 Mbps	A400	2402	0.5	0.904	2.064	Passed
5	2 Mbps	A400	2440	0.5	0.908	2.064	Passed
6	2 Mbps	A400	2480	0.5	0.906	2.064	Passed
7	125 kbps	A400	2402	0.5	0.613	1.077	Passed
8	125 kbps	A400	2440	0.5	0.613	1.083	Passed
9	125 kbps	A400	2480	0.5	0.612	1.083	Passed
10	500 kbps	A400	2402	0.5	0.640	1.062	Passed
11	500 kbps	A400	2440	0.5	0.639	1.071	Passed
12	500 kbps	A400	2480	0.5	0.638	1.074	Passed
13	1 Mbps	A406	2402	0.5	0.682	1.057	Passed
14	1 Mbps	A406	2440	0.5	0.685	1.061	Passed
15	1 Mbps	A406	2480	0.5	0.683	1.057	Passed
16	2 Mbps	A406	2402	0.5	0.912	2.064	Passed
17	2 Mbps	A406	2440	0.5	0.914	2.064	Passed
18	2 Mbps	A406	2480	0.5	0.908	2.070	Passed
19	125 kbps	A406	2402	0.5	0.612	1.069	Passed
20	125 kbps	A406	2440	0.5	0.612	1.073	Passed
21	125 kbps	A406	2480	0.5	0.612	1.065	Passed
22	500 kbps	A406	2402	0.5	0.639	1.061	Passed
23	500 kbps	A406	2440	0.5	0.638	1.065	Passed
24	500 kbps	A406	2480	0.5	0.638	1.065	Passed
Measurement uncertainty				$4.47*10^{-8}$ at 40 GHz			

Test: Passed

Test equipment (refer to chapter 6)

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5.1 Peak Power Spectral Density

5.1.1 Method of measurement

The EUT was measured conducted on a sample with a temporary antenna connector, which was provided by the applicant.

Acceptable measurement configurations

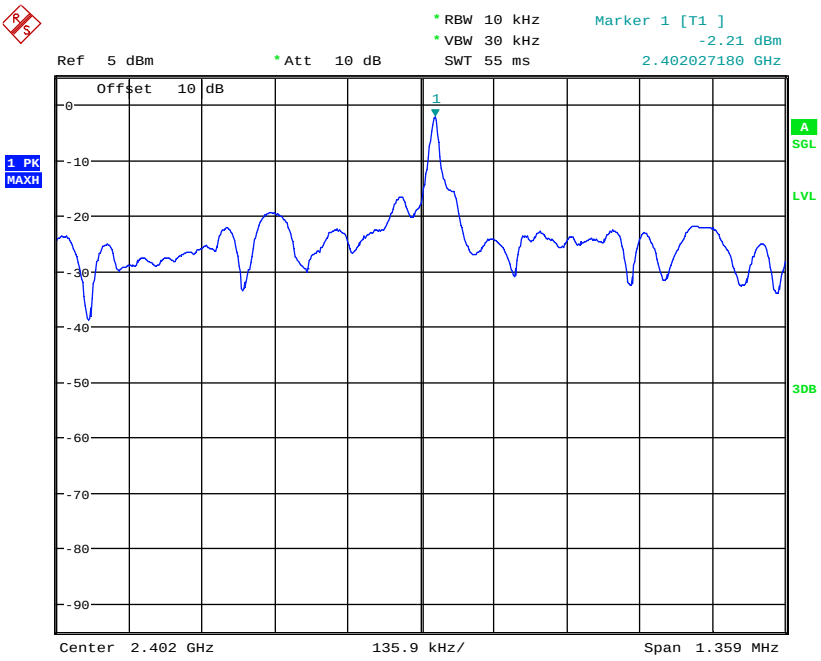
The measurement procedure refers to part 11.10.2 of document [1].

5.1.2 Test result

Ambient temperature	22 °C		Relative humidity	59 %

The plots show an exemplary measurement result for the worst documented case. The other results are listed in the following tables.

200675_MaxPeakPwr_2M_2402MHz.wmf: Peak Power Spectral Density (operation mode 4):



Operation Mode		EUT	Peak Frequency [MHz]	PkPSD Reading [dBm/10 kHz]	Margin [dB]	PkPSD Limit [dBm/3kHz]
1	1 Mbps	A400	2402.027	-2.3	10.3	8
2	1 Mbps	A400	2440.027	-2.8	10.8	8
3	1 Mbps	A400	2480.027	-3.5	11.5	8
4	2 Mbps	A400	2402.027	-2.2	10.2	8
5	2 Mbps	A400	2440.027	-2.8	10.8	8
6	2 Mbps	A400	2480.027	-3.4	11.4	8
7	125 kbps	A400	2401.776	-7.7	15.7	8
8	125 kbps	A400	2439.777	-8.1	16.1	8
9	125 kbps	A400	2479.777	-8.7	16.7	8
10	500 kbps	A400	2401.897	-3.5	11.5	8
11	500 kbps	A400	2439.897	-4.1	12.1	8
12	500 kbps	A400	2479.898	-4.7	12.7	8
13	1 Mbps	A406	2402.014	-2.6	10.6	8
14	1 Mbps	A406	2440.014	-3.1	11.1	8
15	1 Mbps	A406	2480.014	-3.7	11.7	8
16	2 Mbps	A406	2402.014	-2.5	10.5	8
17	2 Mbps	A406	2440.014	-3.0	11.0	8
18	2 Mbps	A406	2480.015	-3.6	11.6	8
19	125 kbps	A406	2401.763	-8.0	16.0	8
20	125 kbps	A406	2439.764	-8.5	16.5	8
21	125 kbps	A406	2479.764	-9.1	17.1	8
22	500 kbps	A406	2401.885	-3.8	11.8	8
23	500 kbps	A406	2439.885	-4.3	12.3	8
24	500 kbps	A406	2479.885	-4.9	12.9	8
Measurement uncertainty				+/- 2.71 dB		

Test: Passed

Test equipment (refer to chapter 6)

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5.2 Band-edge compliance

5.2.1 Method of measurement (band edges next to unrestricted bands (radiated))

The EUT was measured conducted on a sample with a temporary antenna connector, which was provided by the applicant.

Acceptable measurement configurations

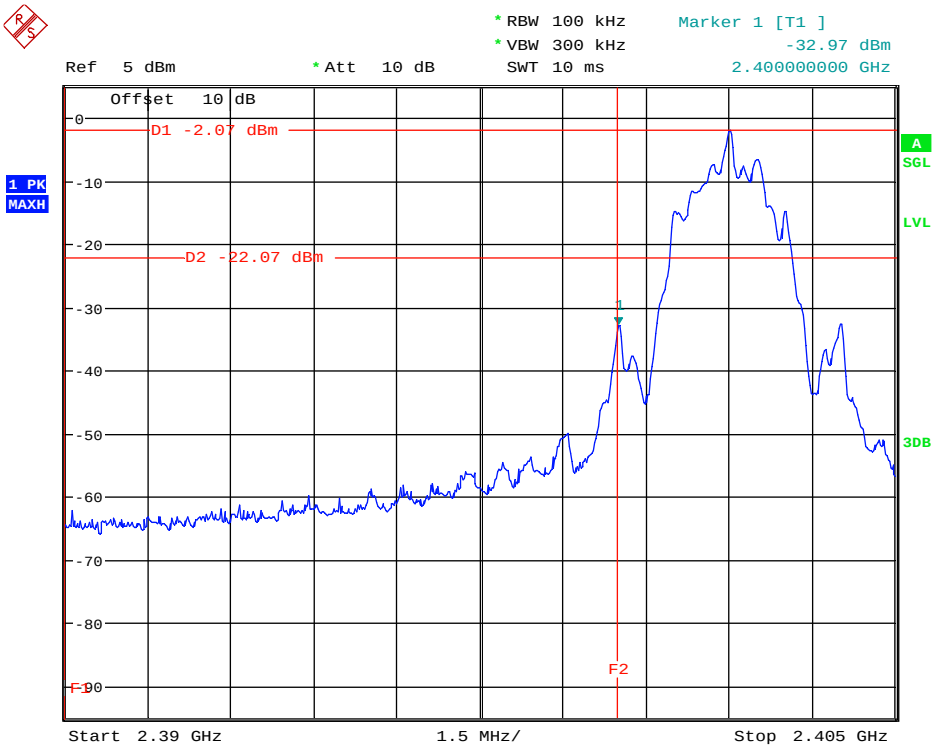
The measurement procedure refers to part 11.11.2 and 11.11.3 of document [1].

The measurement procedure at the band edges was simplified by performing the measurement in just one plot. Both, the in-band-emission and the unwanted emission were be encompassed by the span. After trace stabilization, the maximum peak was be determined by a peak detector and the value was marked by an appropriate limit line. The second limit line, which is 20 dB below the first, marks the limit for the emissions in the unrestricted band. A maximum-peak-detector marks the highest emission in the unrestricted band next to the band edge.

The measurements were performed at the lower end of the 2.4 GHz band.

5.2.2 Test result (band edges next to unrestricted bands (radiated))

200674_BandEdgeUnrestr_1M_2402MHz.wmf: Antenna port conducted band-edge compliance at an unrestricted band-edge (operation mode 4):



Operation Mode		Tx Frequency [MHz]	Emission Frequency [MHz]	Reference Level [dBm]	Limit [dBm]	Emisson Level [dBm]	Margin [dB]	Result
1	1 Mbps	2402	2399.986	-1.7	-21.7	-48.2	26.5	Passed
4	2 Mbps	2402	2400.000	-1.8	-21.8	-33.1	11.3	Passed
7	125 kbps	2402	2399.979	-1.9	-21.9	-48.7	26.9	Passed
10	500 kbps	2402	2400.000	-1.9	-21.9	-48.5	26.7	Passed
13	1 Mbps	2402	2400.000	-2.0	-22.0	-48.3	26.3	Passed
16	2 Mbps	2402	2400.000	-2.1	-22.1	-33.0	10.9	Passed
19	125 kbps	2402	2399.655	-2.1	-22.1	-50.1	27.9	Passed
22	500 kbps	2402	2399.982	-2.2	-22.2	-49.6	27.5	Passed
Measurement uncertainty					+/- 2.71 dB			

Test: Passed

Test equipment (refer to chapter 6)

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5.2.3 Method of measurement (band edges next to restricted bands (radiated))

The EUT was measured radiated in the anechoic chamber using the procedures described in 5.3.1.

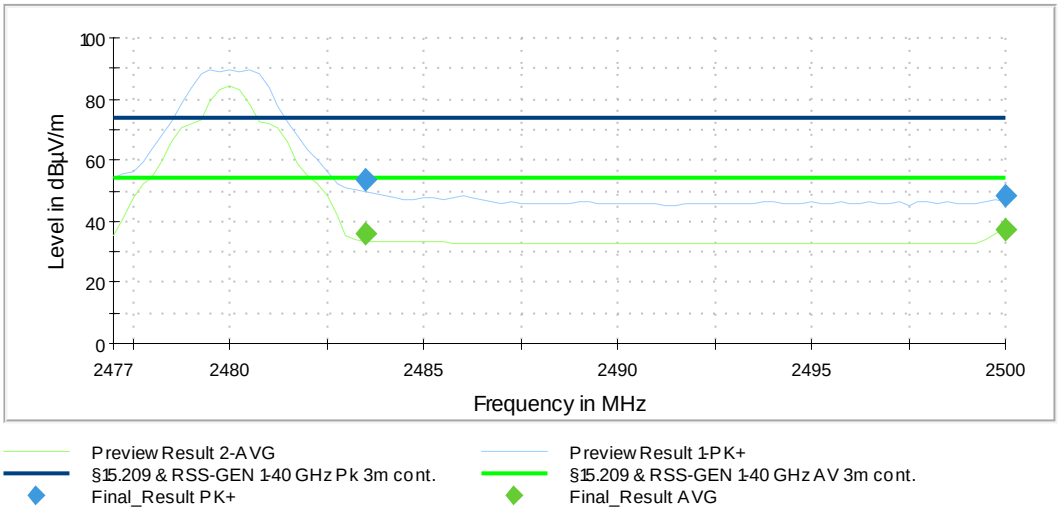
Acceptable measurement configurations

The same measurement configurations as described in 5.3.1. were used for the preview and final measurement.

5.2.4 Test result (band edges next to restricted bands (radiated))

The radiated band-edge was only performed at the worst-case modulation of the conducted pre-tests., which was 2 Mbps.

200674_2M_ch0_HighBE: radiated band-edge compliance at a restricted band-edge (operation mode 6):



Transmitter operates at the lower end of the assigned frequency band (operation mode 4, 2 Mbps)

Frequency [MHz]	MaxPeak [dBµV/m]	Average [dBµV/m]	Limit [dBµV/m]	Margin (dB)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB)
2370.000000	46.26	---	74.00	27.74	V	291.0	90.0	34.3
2370.000000	---	34.05	54.00	19.95	V	291.0	90.0	34.3
Measurement uncertainty				+2.2 dB / -3.6 dB				

Transmitter operates at the upper end of the assigned frequency band (operation mode 6, 2 Mbps)

Frequency [MHz]	MaxPeak [dBµV/m]	Average [dBµV/m]	Limit [dBµV/m]	Margin (dB)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB)
2484.000000	---	37.80	54.00	16.20	V	282.0	60.0	34.6
2484.000000	58.85	---	74.00	15.15	V	282.0	60.0	34.6
Measurement uncertainty				+2.2 dB / -3.6 dB				

Transmitter operates at the lower end of the assigned frequency band (operation mode 16, 2 Mbps)

Frequency [MHz]	MaxPeak [dBµV/m]	Average [dBµV/m]	Limit [dBµV/m]	Margin (dB)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB)
2375.000000	47.08	---	74.00	26.92	V	294.0	90.0	34.3
2375.000000	---	35.19	54.00	18.81	V	294.0	90.0	34.3
Measurement uncertainty				+2.2 dB / -3.6 dB				

Transmitter operates at the upper end of the assigned frequency band (operation mode 18, 2 Mbps)

Frequency [MHz]	MaxPeak [dBµV/m]	Average [dBµV/m]	Limit [dBµV/m]	Margin (dB)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB)
2500.000000	---	37.38	54.00	16.62	V	294.0	120.0	34.7
2500.000000	48.60	---	74.00	25.40	V	294.0	120.0	34.7
Measurement uncertainty				+2.2 dB / -3.6 dB				

Test: Passed

Test equipment (refer to chapter 6)

1 - 8

5.3 Maximum unwanted emissions

5.3.1 Method of measurement (radiated emissions)

The radiated emission measurement is subdivided into five stages.

- A preliminary measurement carried out in a semi-anechoic chamber with a fixed antenna height in the frequency range 9 kHz to 1 GHz.
- A preliminary and final measurement was carried out in semi-anechoic chamber with reflecting ground plane and various antenna height in the frequency range 30 MHz to 1 GHz.
- A preliminary measurement carried out in a semi-anechoic chamber with a variable antenna distance and height in the frequency range above 1 GHz.
- A final measurement carried out in a fully anechoic chamber with a fixed antenna height in the frequency range above 1 GHz.

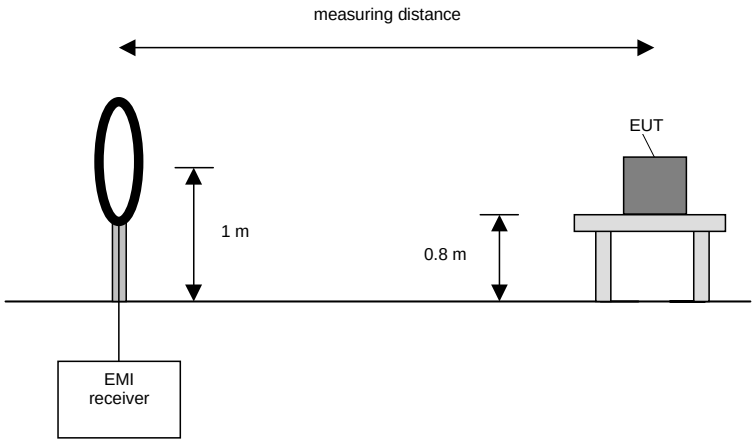
Preliminary measurement (9 kHz to 30 MHz):

In the first stage a preliminary measurement will be performed in a shielded room with a measuring distance of 3 meters. Table top devices will set up on a non-conducting turn device on the height of 1.5m. Floor-standing devices will be placed directly on the turntable/ground plane. The set-up of the Equipment under test will be in accordance to [1].

The frequency range 9 kHz to 30 MHz will be monitored with a spectrum analyser while the system and its cables will be manipulated to find out the configuration with the maximum emission levels if applicable. The EMI Receiver will be set to MAX Hold mode. The EUT and the measuring antenna will be rotated around their vertical axis to found the maximum emissions.

The resolution bandwidth of the spectrum analyser will be set to the following values:

Frequency range	Resolution bandwidth
9 kHz to 150 kHz	200 Hz
150 kHz to 30 MHz	10 kHz



Preliminary measurement procedure:

Prescans were performed in the frequency range 9 kHz to 150 kHz and 150 kHz to 30 MHz.

Prescans were performed in the frequency range 30 MHz to 230 MHz and 230 MHz to 1 GHz.
The following procedure will be used:

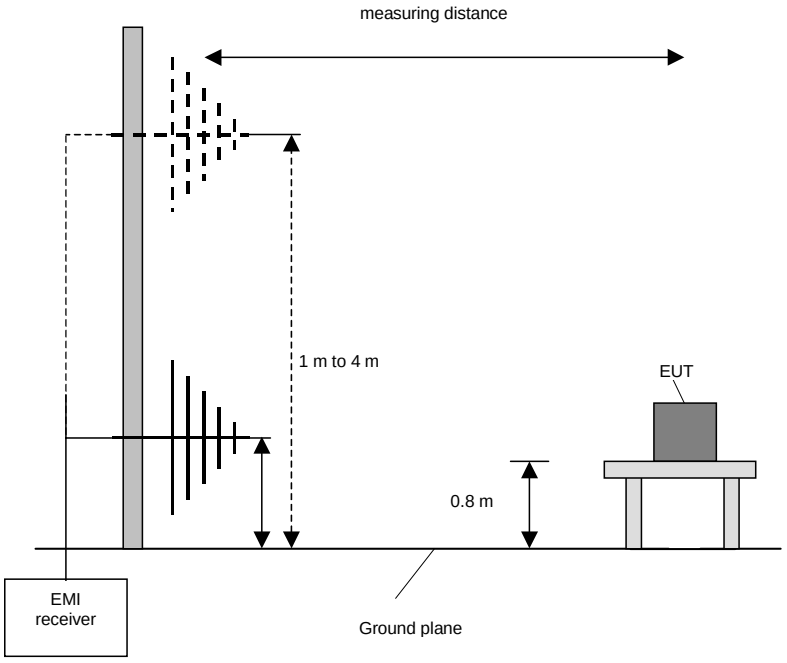
1. Monitor the frequency range at horizontal polarisation and a EUT azimuth of 0 °.
2. Manipulate the system cables within the range to produce the maximum level of emission.
3. Rotate the EUT by 360 ° to maximize the detected signals.
4. Repeat 1) to 3) with the vertical and the ground-parellel polarisation of the measuring antenna.
5. Make a hardcopy of the spectrum.
6. The steps before are performed using a test software, which saves the worst-case positions and values for each Antenna and azimuth of the turntable.

Preliminary and final measurement (30 MHz to 1 GHz)

A preliminary and final measurement in a semi-anechoic chamber with reflective ground plane will be performed on selected frequencies found in the preliminary measurement. During this test the EUT will be rotated in the range of 0 ° to 360 °, the measuring antenna will be set to horizontal and vertical polarisation 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 will be set to the following values:

Frequency range	Resolution bandwidth
30 MHz to 1 GHz	120 kHz



Procedure final measurement:

The following procedure will be used:

1) Measure the frequency range 30 MHz to 1 GHz at an antenna height of 1 m and a EUT azimuth of 6 °.
2) Move the antenna from 1 m to 4 m and note the maximum value at each frequency.
3) Rotate the Turntable by 30 ° and repeat 2) until an azimuth of 366 ° is reached.
4) Repeat 1) to 3) for the other orthogonal antenna polarization.
5) Move the antenna and the turntable to the position where the maximum values are detected.
6) Measure while moving the antenna slowly +/- 1 m.
7) Set the antenna to the position where the maximum value is found.
8) Measure while moving the turntable +/- 45 °.
9) Set the turntable to the azimuth where the maximum value is found.
10) Measure with Final detector (QP and AV) and note the value.
11) Repeat 5) to 10) for each final frequency.
12) Repeat 1) to 11) for each orthogonal axes of the EUT (if the EUT is a module and might be used in a handheld equipment application).
13) The steps before are performed using a test software, which saves the worst-case positions and values for each Antenna and azimuth of the turntable.

Preliminary and final measurement (1 GHz to 40 GHz)

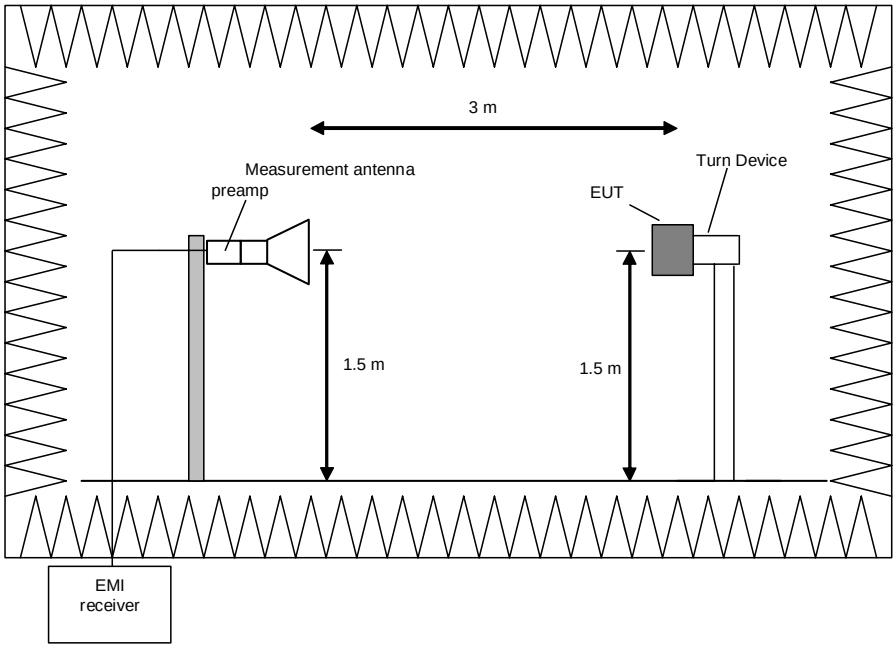
This measurement will be performed in a fully anechoic chamber. Tabletop devices will set up on a non-conducting turn device on the height of 1.5m. The set-up of the Equipment under test will be in accordance to [1].

Preliminary measurement (1 GHz to 40 GHz)

The frequency range will be divided into different sub ranges depending of the frequency range of the used horn antenna. The spectrum analyser set to MAX Hold mode and a resolution bandwidth of 100 kHz. The measurement will be performed in horizontal and vertical polarisation of the measuring antenna and while rotating the EUT in its vertical axis in the range of 0 ° to 360 °. This measurement is repeated after raising the EUT in 30° steps according 6.6.5.4 in [1].

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

Frequency range	Resolution bandwidth
1 GHz to 4 GHz	100 kHz
4 GHz to 12 GHz	100 kHz
12 GHz to 18 GHz	100 kHz
18 GHz to 25 / 26.5 GHz	100 kHz
26.5 GHz to 40 GHz	100 kHz



Procedure preliminary measurement:

Prescans were performed in the frequency range 1 to 40 GHz.
The following procedure will be used:

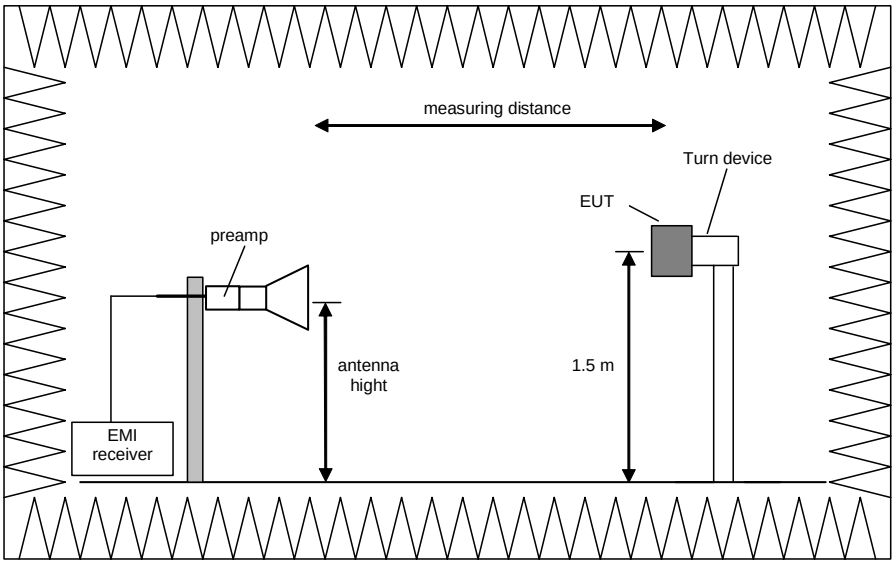
1. Monitor the frequency range at horizontal polarisation and a EUT azimuth of 0 °.
2. Rotate the EUT by 360° to maximize the detected signals.
3. Repeat 1) to 2) with the vertical polarisation of the measuring antenna.
4. Make a hardcopy of the spectrum.
5. Repeat 1) to 4) with the EUT raised by an angle of 30° (60°, 90°, 120° and 150°) according to 6.6.5.4 in [1].
6. Measure the frequency of the detected emissions with a lower span and resolution bandwidth to increase the accuracy and note the frequency value.
7. The measurement antenna polarisation, with the according EUT position (Turntable and Turn device) which produces the highest emission for each frequency will be used for the final measurement. The six closest values to the applicable limit will be used for the final measurement.

Final measurement (1 GHz to 40 GHz)

The frequency range will be divided into different sub ranges depending of the frequency range of the used horn antenna. The EMI Receiver set to peak and average mode and a resolution bandwidth of 1 MHz. The measurement will be performed by rotating the turntable through 0 to 360° in the worst-case EUT orientation which was obtained during the preliminary measurements.

The resolution bandwidth of the EMI Receiver will be 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 25 / 26.5 GHz	1 MHz
26.5 GHz to 40 GHz	1 MHz



Procedure of measurement:

The measurements were performed in the frequency ranges 1 GHz to 4 GHz, 4 GHz to 12 GHz, 12 GHz to 18 GHz, 18 GHz to 25 /26.5 GHz and 26.5 GHz to 40 GHz.
The following procedure will be used:

1) Set the turntable and the turn device to obtain the worst-case emission for the first frequency identified in the preliminary measurements.
2) Set the measurement antenna polarisation to the orientation with 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 TT Pos. that produces the highest emissions.
5) Note the highest displayed peak and average values
6) Repeat the steps 1) to 5) for each frequency detected during the preliminary measurements.

5.3.2 Test results (radiated emissions) – Emissions from 30 MHz – 26.5 GHz (internal antenna)

5.3.2.1 Preliminary radiated emission measurement 9 kHz – 26.5 GHz

Ambient temperature	22 °C	Relative humidity	59 %

Position of EUT: The EUT was set-up on an EUT turn device of a height of 1.5 m for f > 1 GHz .The distance between EUT and antenna was 3 m.

For the test for f < 1 GHz on the open area test site with the EUT was placed on a table with the height of 0.8 m. The distance between EUT and antenna was 3 m.

Cable guide: For detail information of test set-up and the cable guide refer to the pictures in the annex A in the test report.

Test record: Only the plot of the worst-case emission is submitted below.

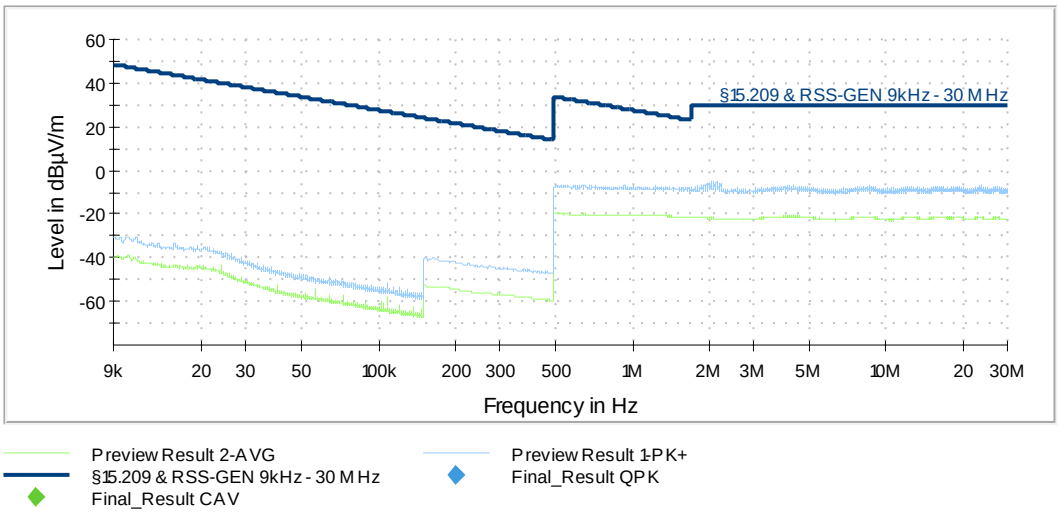
Remark: Since there were no differences in the spectrum for f < 1 GHz, only one representative plot is submitted below.

Since no emissions closer than 20 dB to the limit line were found during the preliminary measurement for f < 30 MHz, no final measurement was performed.

Antenna port conducted pre-tests have shown that the fundamental and spurious emissions for BLE with 500 kbps were in all cases the worst case, therefore all tests were performed using this modulation.

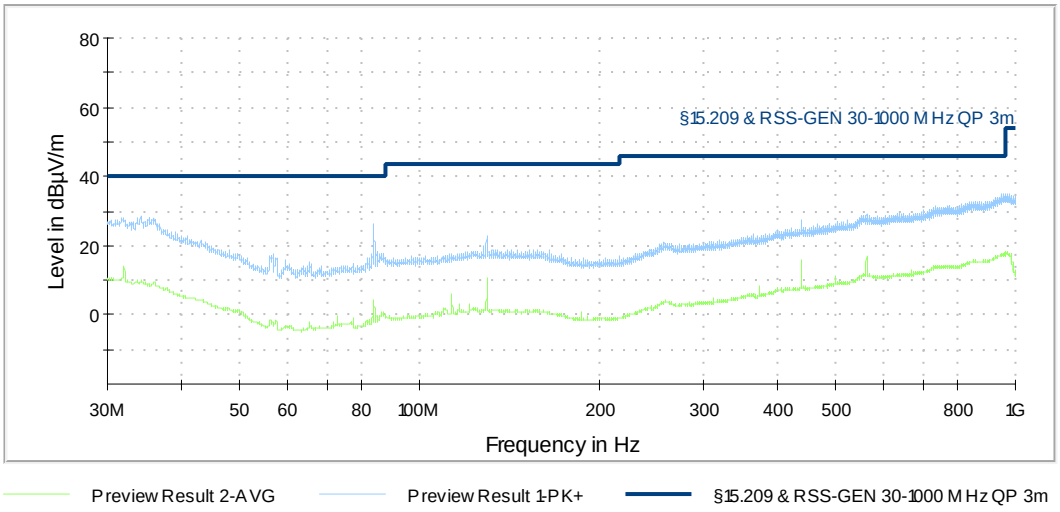
Plots of the worst-case transmitter spurious emissions

200674_500k_ch0_9k-30M: Spurious emissions from 9 kHz to 30 MHz (operation mode 10):

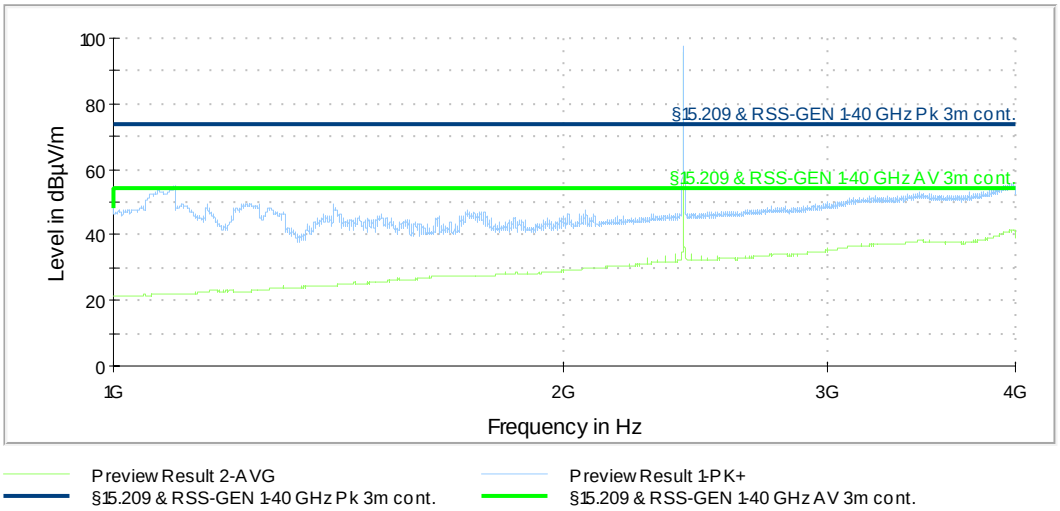


Remark: In the shown plot a distance correction factor was added to the measurement results to account for the different measuring distances according to standard (9 kHz to 490 kHz @ 300 m; 490 kHz to 30 MHz @ 30 m).

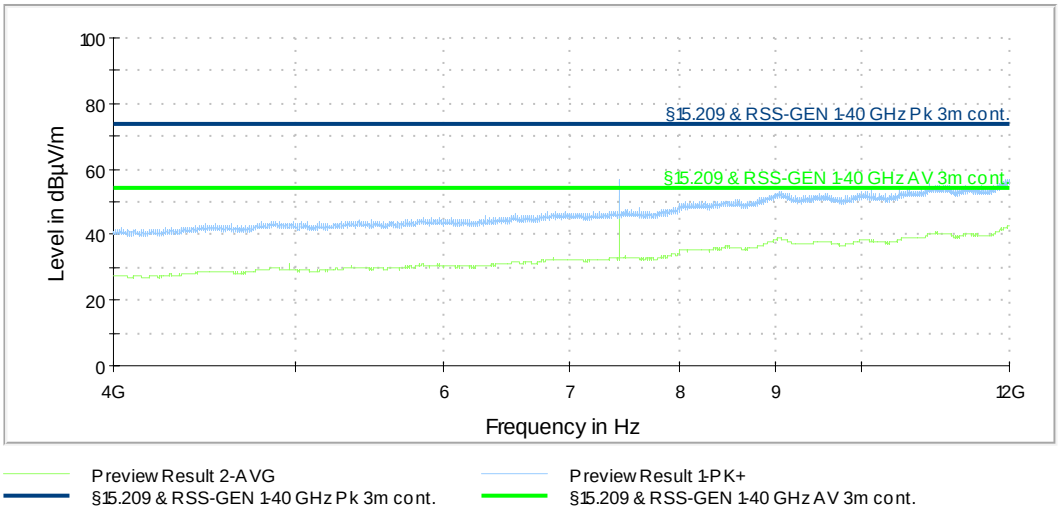
200675_500k_ch19_30M-1G: Spurious emissions from 30 MHz to 1 GHz (operation mode 11):



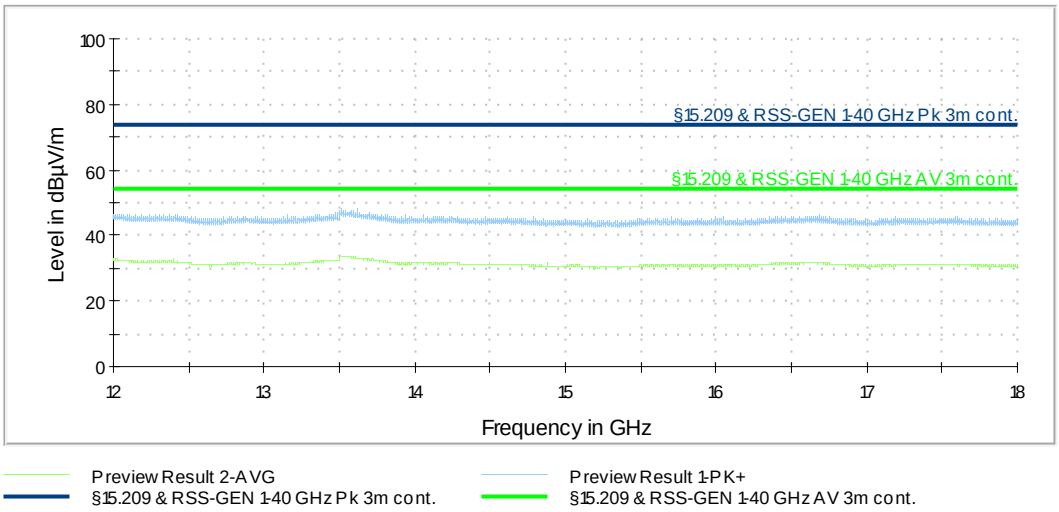
200675_500k_ch0_1-4G: Spurious emissions from 1 GHz to 4 GHz (operation mode 10)



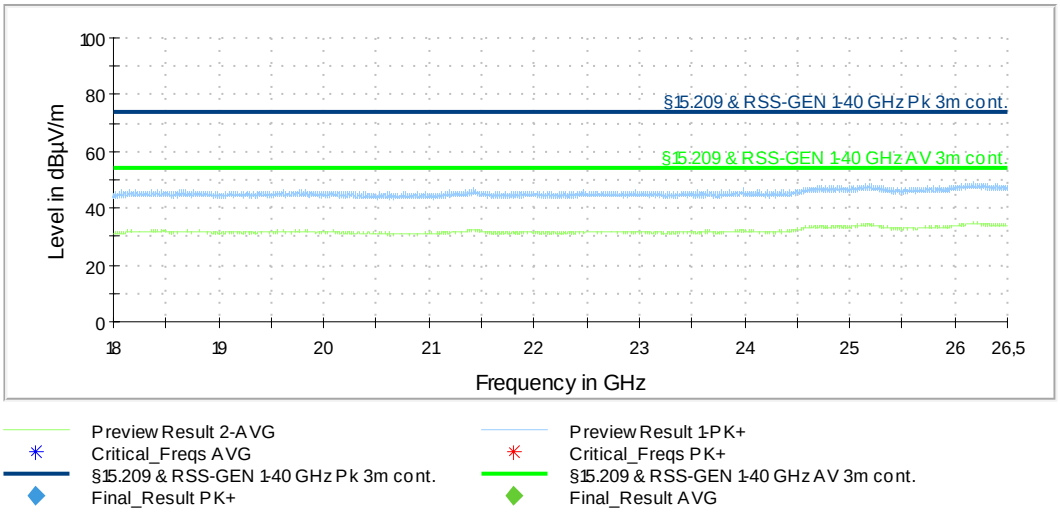
200674_500k_ch39_4-12G: Spurious emissions from 4 GHz to 12 GHz (operation mode 24):



200674_500k_ch39_12-18G: Spurious emissions from 12 GHz to 18 GHz (operation mode 24):



200674_500k_ch39_18-26,5G: Spurious emissions from 18 GHz to 26.5 GHz (operation mode 24):



5.3.2.2 Final radiated measurements (A400)

200675_500k_ch19_30M-1G (operation mode 11, 500 kbps)

Frequency [MHz]	QuasiPeak [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Meas. Time [ms]	Bandwidth [kHz]	Height [cm]	Pol	Azimuth [deg]	Corr. [dB]
32.000000	21.22	40.00	18.78	1000.0	120.000	102.0	V	337.0	27.6
35.850000	18.31	40.00	21.69	1000.0	120.000	118.0	V	111.0	25.8
84.080000	5.64	40.00	34.36	1000.0	120.000	102.0	V	30.0	16.0
129.800000	11.18	43.52	32.34	1000.0	120.000	293.0	V	253.0	18.7
437.510000	19.04	46.02	26.98	1000.0	120.000	102.0	V	45.0	24.7
562.520000	20.36	46.02	25.66	1000.0	120.000	100.0	H	75.0	28.4
Measurement uncertainty					+2.2 dB / -3.6 dB				

Transmitter operates at the lower end of the assigned frequency band (operation mode 10, 500 kbps)

Frequency [MHz]	MaxPeak [dBµV/m]	Average [dBµV/m]	Limit [dBµV/m]	Margin (dB)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB)
1070.100	---	23.56	54	30.44	H	139	150	25.8
1070.100	35.58	---	74	38.42	H	139	150	25.8
1099.700	---	23.72	54	30.28	H	130	150	25.8
1099.700	35.49	---	74	38.51	H	130	150	25.8
2401.800	---	96.77	Fund.	-	V	284	60	34.4
2401.800	97.71	---	Fund.	-	V	284	60	34.4
2995.050	---	36.76	54	17.24	V	46	0	36.9
2995.050	48.52	---	74	25.48	V	46	0	36.9
3994.800	---	43.17	54	10.83	V	110	60	40.3
3994.800	54.45	---	74	19.55	V	110	60	40.3
4803.450	---	31.6	54	22.4	H	237	90	8.7
4803.450	42.2	---	74	31.8	H	237	90	8.7
7205.350	---	45.75	54	8.25	V	62	150	12.8
7205.350	52.43	---	74	21.57	V	62	150	12.8
Measurement uncertainty				+2.2 dB / -3.6 dB				

Transmitter operates at the middle of the assigned frequency band (operation mode 11, 500 kbps)

Frequency [MHz]	MaxPeak [dBµV/m]	Caverage [dBµV/m]	Limit [dBµV/m]	Margin (dB)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB)
1146.650	---	24.36	54	29.64	V	202	120	26.4
1146.650	35.85	---	74	38.15	V	202	120	26.4
1405.500	38.72	---	74	35.28	V	126	120	28.3
1405.500	---	26.34	54	27.66	V	126	120	28.3
2376.100	46.63	---	74	27.37	V	121	120	34.3
2376.100	---	34.21	54	19.79	V	121	120	34.3
2439.800	---	96.29	Fund.	-	V	271	60	34.6
2439.800	97.24	---	Fund.	-	V	271	60	34.6
2630.900	46.77	---	74	27.23	V	283	60	35.3
2630.900	---	34.82	54	19.18	V	283	60	35.3
3991.500	54.82	---	74	19.18	V	1	90	40.3
3991.500	---	43.15	54	10.85	V	1	90	40.3
4879.800	---	32.57	54	21.43	H	248	90	9.2
4879.800	43.78	---	74	30.22	H	248	90	9.2
7319.350	---	46.03	54	7.97	V	251	60	13.5
7319.350	52.51	---	74	21.49	0	251	60	13.5
Measurement uncertainty				+2.2 dB / -3.6 dB				

Transmitter operates at the upper end of the assigned frequency band (operation mode 12, 500 kbps)

Frequency [MHz]	MaxPeak [dBµV/m]	Caverage [dBµV/m]	Limit [dBµV/m]	Margin (dB)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB)
1005.300	34.74	---	74	39.26	V	137	120	25.2
1005.300	---	23.04	54	30.96	V	137	120	25.2
1202.900	---	24.64	54	29.36	H	96	150	26.8
1202.900	36.25	---	74	37.75	H	96	150	26.8
2351.800	45.94	---	74	28.06	V	222	60	34.3
2351.800	---	34.28	54	19.72	V	222	60	34.3
2480.300	---	94.28	Fund.	-	V	281	60	34.6
2480.300	96.82	---	Fund.	-	V	281	60	34.6
2513.400	46.89	---	74	27.11	V	23	60	34.7
2513.400	---	34.29	54	19.71	V	23	60	34.7
4959.400	---	32.41	54	21.59	H	255	90	9.1
4959.400	44.21	---	74	29.79	H	255	90	9.1
7439.350	---	45.94	54	8.06	V	266	90	13.9
7439.350	52.3	---	74	21.7	V	266	90	13.9
Measurement uncertainty				+2.2 dB / -3.6 dB				

5.3.2.3 Final radiated measurements (A406)

200674_500k_ch19_30M-1GG (operation mode 23, 500 kbps)

Frequency [MHz]	QuasiPeak [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Meas. Time [ms]	Bandwidth [kHz]	Height [cm]	Pol	Azimuth [deg]	Corr. [dB]
37.090000	16.72	40.00	23.28	1000.0	120.000	100.0	V	-24.0	25.2
50.820000	6.72	40.00	33.28	1000.0	120.000	100.0	V	79.0	17.0
113.610000	8.12	43.52	35.40	1000.0	120.000	123.0	H	66.0	17.6
129.820000	14.43	43.52	29.09	1000.0	120.000	302.0	V	172.0	18.7
437.510000	20.25	46.02	25.77	1000.0	120.000	102.0	V	21.0	24.7
562.510000	24.09	46.02	21.93	1000.0	120.000	102.0	V	266.0	28.4
Measurement uncertainty					+2.2 dB / -3.6 dB				

Transmitter operates at the lower end of the assigned frequency band (operation mode 22, 500 kbps)

Frequency [MHz]	MaxPeak [dBµV/m]	Caverage [dBµV/m]	Limit [dBµV/m]	Margin (dB)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB)
2402.000	---	86.24	Fund.	-	H	218	90	34.4
2402.000	87.22	---	Fund.	-	H	218	90	34.4
3992.500	---	43.09	54	10.91	H	322	90	40.3
3992.500	55.04	---	74	18.96	H	322	90	40.3
4803.650	---	30.39	54	23.61	V	294	60	8.7
4803.650	41.61	---	74	32.39	V	294	60	8.7
5017.700	41.43	---	74	32.57	H	15	120	9.1
5017.700	---	28.91	54	25.09	H	15	120	9.1
7206.800	---	41.70	54	12.30	V	246	60	12.9
7206.800	54.99	---	74	19.01	V	246	60	12.9
11984.450	52.19	---	74	21.81	H	67	150	21.8
11984.450	---	39.77	54	14.23	H	67	150	21.8
12008.850	43.12	---	74	30.88	V	293	90	12
12008.850	---	31.23	54	22.77	V	293	90	12
14411.100	42.22	---	74	31.78	H	116	90	11.5
14411.100	---	30.11	54	23.89	0	116	90	11.5
Measurement uncertainty				+2.2 dB / -3.6 dB				

Transmitter operates at the middle of the assigned frequency band (operation mode 23, 500 kbps)

Frequency [MHz]	MaxPeak [dBµV/m]	Caverage [dBµV/m]	Limit [dBµV/m]	Margin (dB)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB)
1687.500	44.96	---	74	29.04	H	256	120	30.7
1687.500	---	37.72	54	16.28	H	256	120	30.7
2123.800	---	31.73	54	22.27	V	82	60	33.1
2123.800	44.40	---	74	29.60	V	82	60	33.1
2439.700	---	87.53	Fund.	-	H	142	120	34.6
2439.700	88.65	---	Fund.	-	H	142	120	34.6
2500.000	47.82	---	74	26.18	V	305	0	34.7
2500.000	---	36.74	54	17.26	V	305	0	34.7
4879.400	43.89	---	74	30.11	V	268	60	9.2
4879.400	---	30.96	54	23.04	V	268	60	9.2
7319.250	57.06	---	74	16.94	V	252	60	13.5
7319.250	---	52.06	54	1.94	V	252	60	13.5
12198.450	42.86	---	74	31.14	V	268	90	12
12198.450	---	31.44	54	22.56	V	268	90	12
Measurement uncertainty				+2.2 dB / -3.6 dB				

Transmitter operates at the upper end of the assigned frequency band (operation mode 24, 500 kbps)

Frequency [MHz]	MaxPeak [dBµV/m]	Caverage [dBµV/m]	Limit [dBµV/m]	Margin (dB)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB)
1028.600	---	23.02	54	30.98	H	33	30	25.3
1028.600	35.53	---	74	38.47	H	33	30	25.3
2480.000	89.58	---	Fund.	-	H	146	120	34.6
2480.000	---	88.58	Fund.	-	H	146	120	34.6
3991.550	55.02	---	74	18.98	H	228	30	40.3
3991.550	---	43.12	54	10.88	H	228	30	40.3
4959.500	---	31.63	54	22.37	V	275	60	9.1
4959.500	42.9	---	74	31.1	V	275	60	9.1
7439.200	---	52.91	54	1.09	V	279	60	13.9
7439.200	57.98	---	74	16.02	V	279	60	13.9
11983.350	---	39.8	54	14.2	V	131	90	21.8
11983.350	51.43	---	74	22.57	V	131	90	21.8
12398.750	43.41	---	74	30.59	V	270	90	11.9
12398.750	---	31.67	54	22.33	V	270	90	11.9
Measurement uncertainty				+2.2 dB / -3.6 dB				

Test equipment (refer to chapter 6)
1 - 15

5.1 Conducted emissions on power supply lines (150 kHz to 30 MHz)

Ambient temperature	20 °C	Relative humidity	52 %

Position of EUT: For this test, the EUTs were operated in test mode, the EUTs waere transmitting continuously on ch 0 with 500 kbps data-rate. The EUTs were powered via the test box with an off-the-shelf power supply.

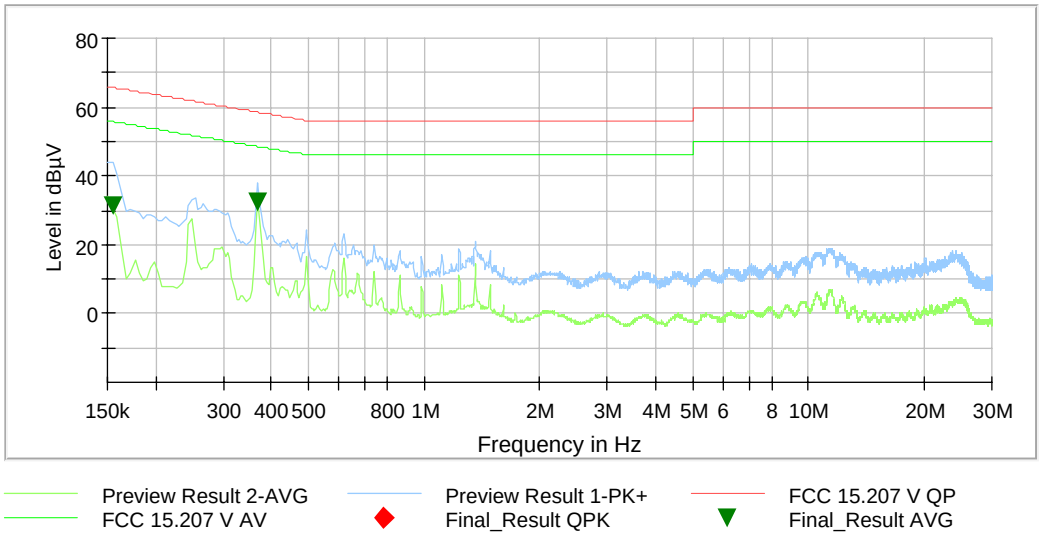
Cable guide: For detail information of test set-up and the cable guide refer to the pictures in annex A of this test report.

Test record: All results are shown in the following.

Supply voltage: Measurement performed with US 120V/60Hz.
For the test an AC/DC Adaptor from erercell™ AC adapter type “CAT. NO. 273-316”, which had an output voltage of 3.1 V DC.

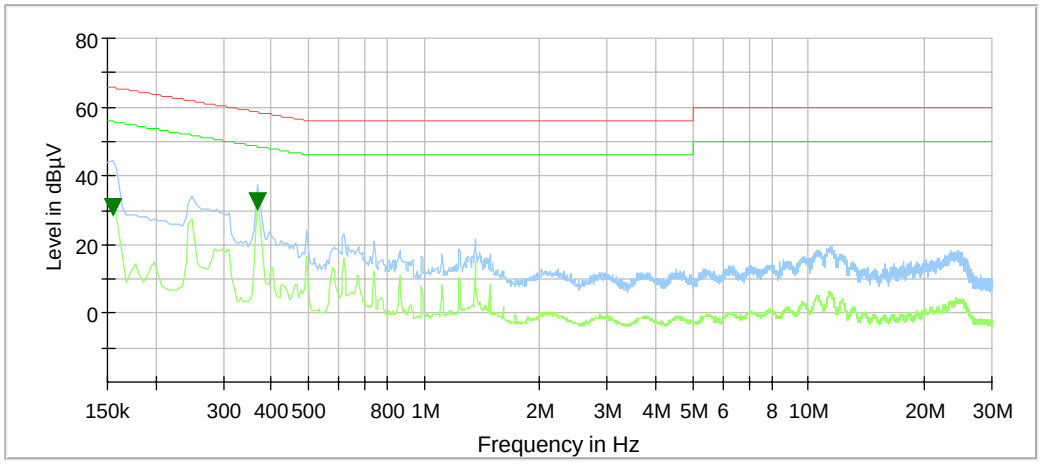
The curves in the diagram only represent for each frequency point the maximum measured value of all preliminary measurements which were made for each power supply line. The top measured curve represents the peak measurement and the bottom measured curve the average measurement. The quasi-peak measured points are marked by “♦” and the average measured points by “▼”.

5.1.1 Test results for A400 (0000000016



Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	PE	Transducer (dB)
0.154500	---	31.34	55.75	24.41	5000.0	9.000	N	FLO	9.8
0.370500	---	32.66	48.49	15.83	5000.0	9.000	L1	FLO	9.9
Measurement uncertainty				+2.76 dB / -2.76 dB					

5.1.2 Test results for A406 (0000000073)



Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	PE	Transducer (dB)
0.154500	---	31.03	55.75	24.73	5000.0	9.000	L1	GND	9.8
0.370500	---	32.66	48.49	15.83	5000.0	9.000	N	GND	9.9
Measurement uncertainty				+2.76 dB / -2.76 dB					

Test: Passed

TEST EQUIPMENT USED FOR THE TEST:
17 - 23

6 Test equipment and ancillaries used for tests

No.	Test equipment	Type	Manufacturer	Serial No.	PM. No.	Cal. Date	Cal. Due
1	Semi anechoic chamber	M276	Albatross Projects	C62128-A540-A138-10-0006	483227	Calibration not necessary	
2	Antenna mast	BAM4.5-P-10kg	maturo	222/2612.01	483225	Calibration not necessary	
3	Turntable	DS412	Deisel	412/316	480087	Calibration not necessary	
4	Controller	HD100	Deisel	100/349	480139	Calibration not necessary	
5	Software	EMC32	Rohde & Schwarz	ID: 1300.7010.12-100970-Be	482972	Calibration not necessary	
6	Antenne (Bilog)	CBL6111D	Schaffner	22921	480674	27.03.2018	03.2021
7	EMI Testreceiver	ESW	Rohde & Schwarz	101828	482979	12.04.2019	04.2021
8	Log.-Per. antenna	HL050	Rohde & Schwarz	100908	482977	13.08.2019	08.2022
9	Low Noise Amplifier 100 MHz - 18 GHz	LNA-30-00101800-25-10P	Narda MITEQ	2110917	482967	18.02.2020	02.2022
10	Standard Gain Horn 12 GHz-18 GHz	18240-20	Flann	267220	483025	Calibration not necessary	
11	Low Noise Amplifier 12 GHz - 18 GHz	LNA-30-12001800-13-10P	Narda MITEQ	2089798	482968	17.02.2020	02.2022
12	Standard Gain Horn 18 GHz -26 GHz	20240-20	Flann	266399	483026	Calibration not necessary	
13	Low Noise Amplifier 18 GHz - 26.5 GHz	LNA-30-18002650-20-10P	Narda MITEQ	2110911	482969	17.02.2020	02.2022
14	Loop antenna	HFH2-Z2	Rohde & Schwarz	832609/014	480059	14.02.2020	02.2022
15	4 GHz High Pass Filter	WHKX4.0/18G-8SS	Wainwright Instruments	1	480587	Calibration not necessary	
16	Spectrum Analyser	FSU46	Rohde & Schwarz	200125	480956	13.02.2020	03.2021
17	Shielded chamber M4	-	Albatross Projects	B83117-C6439-T262	480662	Calibration not necessary	
18	EMI Receiver	ESIB 26	Rohde & Schwarz	1088.7490	481182	12.02.2020	02.2022
19	LISN	NSLK8128	Schwarzbeck	8128155	480058	11.02.2020	02.2022
20	High pass filter	HR 0.13-5ENN	FSY Microwave	DC 0109 SN 002	480340	Calibration not necessary	
21	EMI Software	ES-K1	Rohde & Schwarz	-	480111	Calibration not necessary	
22	Power supply AC	AC6803A AC Quelle 2000VA	Keysight	JPVJ002509	482350	Calibration not necessary	
23	EMI Software	EMC32	Rohde & Schwarz	100061	481022	Calibration not necessary	

7 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	ANSI C63.4-2017	19.09.2019	09.2021
Semi anechoic chamber M276	483227	1 -18 GHz	SVSWR[*1]	CISPR 16-1-4 + Cor1:2010 + A1:2012 +A2:2017	19.09.2019	09.2021

8 Report History

Report Number	Date	Comment
F200675E2	03.12.2020	Initial Test Report

9 List of Annexes

ANNEX A	TEST SETUP PHOTOS	18 pages
ANNEX B	EXTERNAL PHOTOS	4 pages
ANNEX C	INTERNAL PHOTOS	10 pages