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Test Report

Report Number:

F170754E3

Equipment under Test (EUT):

Control-Panel for welding inverters

Einschub TT/MW Smart 210mm

Applicant:

Fronius International GmbH

Manufacturer:

Fronius International 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 (June 2017)**, Radio Frequency Devices

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

[4] **RSS-Gen Issue 5 (April 2018)**, 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:	Bernward ROHDE		03.06.2019
	Name	Signature	Date
Authorized reviewer:	Bernd STEINER		03.06.2019
	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

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Applicant partly represented during the test by the following person:	Jan HERNDLER

1.2 Manufacturer

Name:	Fronius International GmbH
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Applicant partly represented during the test by the following person:	Mr. Jan HERNDLER

1.3 Test Laboratory

The tests were carried out by: **PHOENIX TESTLAB GmbH**
Königswinkel 10
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Germany

accredited by Deutsche Akkreditierungsstelle GmbH (DAkkS) in compliance with DIN EN ISO/IEC 17025 under Reg. No. D-PL-17186-01-02 and D-PL-17186-01-05, FCC Test Firm Accreditation with the registration number 469623, designation number DE0004 and Industry Canada Test site registration SITE# IC3469A-1.

1.4 EUT (Equipment Under Test)

EUT	
Test object: *	Control panel for welding inverters
Type / PMN	Einschub TT/MW Smart 210mm
FCC ID: *	QKWSPBBCU1
ISED Certification number: * IC: *	12270A-SPBBCU1
HVIN (Hardware Version Identification Number): *	Einschub TT/MW Smart 210mm
FVIN (Firmware Version Identification Number): *	V1.4B
HMN (Host model name): *	N/A
Order number:*	43,0001,3533
Serial number: *	N/A
PCB identifier: *	1654600

* Declared by the applicant

BLE 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

EUT – Control Unit						
Fulfills Bluetooth specification:*	Bluetooth ® 4.0, 1 Mbps					
Antenna type:*	Dipole Antenna					
Antenna name:*	GW.40.2153					
Antenna gain:*	3.74dBi					
Antenna connector:*	RP SMA					
Power supply:*	DC					
Supply voltage EUT – Control Unit:*	U_{nom} =	24 V DC	U_{min} =	21.6 V DC	U_{max} =	26.4 V DC
Supply voltage radio module:*	U_{nom} =	3.3 V DC	U_{min} =	2.5 V DC	U_{max} =	3.6 V DC
Type of modulation:*	GFSK					
Operating frequency range:*	2402 – 2480 MHz					
Number of channels:*	40					
Temperature range:*	-10 °C to +60 °C					
Lowest / highest internal clock frequency:*	32.768 kHz / 2480 MHz					

* Declared by the applicant

Ancillary Equipment:	
Laptop PC:*	Fujitsu Lifebook S751 (PM No. 201036)
Power (AC-Adaptor)	UE36LCP1-240150SPA** by UE electronic

*Provided by the laboratory

**Provided by the applicant

The following external I/O cables were used:

Identification	Connector		Length
	EUT	Ancillary	
Power (DC)*	2 x Measuring cables were used		~2 m
Ethernet*	HSD	RJ45	3 m
Power (AC-Adaptor)**		CE	~2 m

*: Length during the test if no other specified.

** Used for the “Conducted emissions on power supply lines”, delivered by the applicant

1.6 Dates

Date of receipt of test sample:	19.10.2017
Start of test:	19.10.2017
End of test:	29.03.2018

2 Operational States

The equipment under test (EUT) is the Bluetooth-radio part of a control panel for welding units.

During the Bluetooth LE radio tests the RFID module was active and continuously transmitting.
So both transmitters were operating simultaneously.

EUT:

As declared by the applicant, only the 13.56.MHz RFID, Bluetooth low energy and Wi-Fi (2.4 GHz) will be used in the final application.

During the BLE radio tests the RFID module was active and continuously transmitting.
So BLE and RFID were operating simultaneously. BLE and Wi-Fi share the same antenna and can't send simultaneously.

For the radio tests the "Dut labtool" as provided by the applicant was used to configure the rf-parameter of the EUT via a controlling laptop. A LAN connection was used to control the settings of the EUT.

2.1 The following states were defined as the operating conditions

For the tests the EUT was supplied with 24 V DC via laboratory power supply if not otherwise mentioned.
As pre-tests have shown the following operation modes are the worst cases:

Operation mode	Description of the operation mode	mode	channel	Power-setting [dBm]	Data rate / Mbps
1	Continuous transmitting on 2402 MHz	BTLE	0	8	1 Mbps
2	Continuous transmitting on 2440 MHz	BTLE	19	8	1 Mbps
3	Continuous transmitting on 2480 MHz	BTLE	39	8	1 Mbps

This test-report incorporates the worst case results for Bluetooth low energy only.

3 Additional Information

All tests were done with an unmodified sample.

The EUT was not labeled with the final label.

As declared by the applicant, the USB port of the EUT is only used for service purposes. Therefore no lines were connected to the USB port of the EUT during the tests.

This test-report covers the simultaneous transmission of the BLE part with the 13.56 MHz NFC part only. The NFC specific test-cases are documented in PHOENIX TESTLAB test report F170756E1.

WLAN test cases are documented in in PHOENIX TESTLAB test report F170756E2.

4 Overview

Application	Frequency range [MHz]	FCC 47 CFR Part 15 section [2]	RSS-247 [3] or RSS-Gen, Issue 5 [4]	Status	Refer page
Maximum Peak Output Power	2400.0 - 2483.5	15.247 (b) (3), (4)	5.4 (d) [3]	Passed	12 et seq
DTS Bandwidth	2400.0 - 2483.5	15.247 (a) (2)	5.2 (a) [3]	Passed	17 et seq
Peak Power Spectral Density	2400.0 - 2483.5	15.247 (e)	5.2 (b) [3]	Passed	22 et seq
Band edge compliance	2400.0 - 2483.5	15.247 (d)	5.5 [3] 8.9 [4], 8.10 [4]	Passed	24 et seq.
Radiated emissions (transmitter)	0.009 – 26,500	15.247 (d) 15.205 (a) 15.209 (a)	5.5 [3] 8.9 [4], 8.10 [4]	Passed	27 et seq.
Conducted emissions on supply line	0.15 - 30	15.207 (a)	8.8 [4]	Passed	45 et seq.

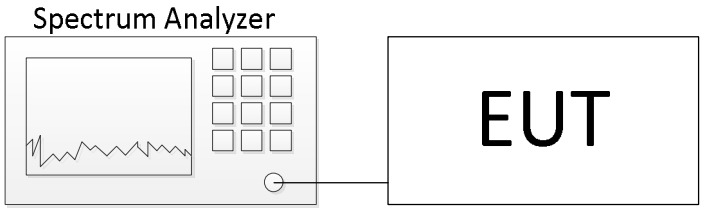
Antenna requirements fulfilled, EUT is fixed installed in a host (welding machine), the antenna is therefore not accessible.

5 Results

5.1 Duty cycle

The measurement was performed as an antenna port conducted measurement, as shown below.

Test Setup:



The method described in chapter 11.6.0 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.

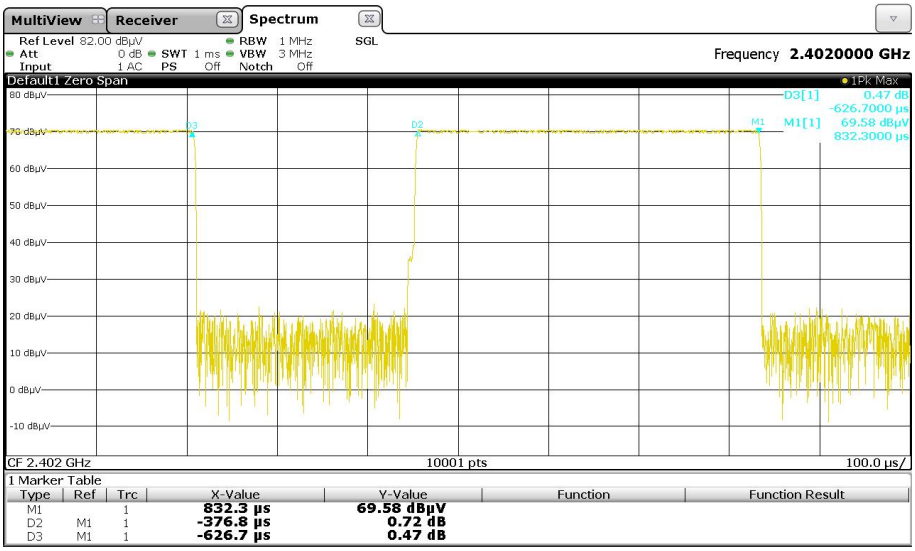
- Set the center frequency of the instrument to the center frequency of the transmission.
- Set RBW ≥ OBW if possible; otherwise, set RBW to the largest available value.
- Set VBW ≥ RBW.
- Set detector = peak or average.
- The zero-span measurement method shall not be used unless both RBW and VBW are > 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 %
Tested by	B. Rohde	Date	23.10.2017

Since Bluetooth Low Energy only has one modulation, only one duty cycle plot is submitted below.

DutyCycle BTLE_CH00.PNG: Duty cycle measurement on channel 00 (operation mode 1):



$$T_{TX\_On} = 376.8\,ms \quad , \; T_{TX\_Period} = 626.7\,ms \qquad (1)$$

$$\frac{50}{T_{TX\_On}} = \frac{50}{376.8\,ms} = 132.696\,kHz \le RBW \le VBW \qquad (2)$$

Measurement Points 10001 for 1000 ms à 626.7 ms = 6267 measurement points à Signal has 6267 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.

$$x = \frac{376.8\,ms}{626.7\,ms} = 0.6012 = 60.12\% \qquad (3)$$

Correction factor: $10 \times \log\left(\frac{1}{x}\right) = 10 \times \log\left(\frac{1}{0.6012}\right) = 2.21\,dB$ (4)

Therefore, for average measurements a correction factor of 2.21 dB is used for all tests.

Test equipment (please refer to chapter 6 for details)
1 - 10

5.2 Maximum peak output power

The maximum peak output power was tested radiated in a fully anechoic room with the internal antenna.

Acceptable measurement configuration

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

The following procedure shall be used when an instrument with a resolution bandwidth that is greater than the DTS bandwidth is available to perform the measurement:

a) Set the RBW ≥ DTS bandwidth.
b) Set VBW ≥ [3 × RBW].
c) Set span ≥ [3 × RBW].
d) Sweep time = auto couple.
e) Detector = peak.
f) Trace mode = max hold.
g) Allow trace to fully stabilize.
h) Use peak marker function to determine the peak amplitude level.

The measurement was performed at the lower end of the assigned frequency band.

The measured Electric field strength was corrected with the following correction factor:

Antenna Factor [dB] + Cable Attenuation [dB] - Amplifier Gain[dB] = correction factor [dB]

The formula in 11.22.2.2 e) in [1] was used to calculate the EIRP power:

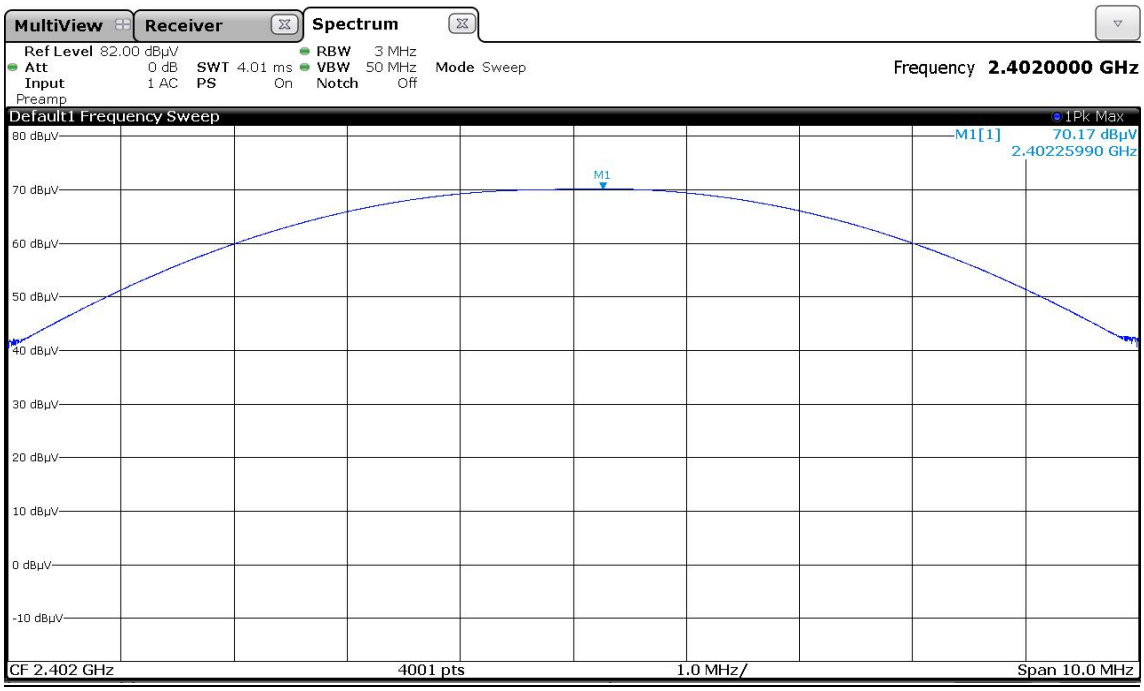
$E = EIRP - 20\log(d) + 104.8$
$EIRP = E - 95.3$

$MPOP = EIRP - G$

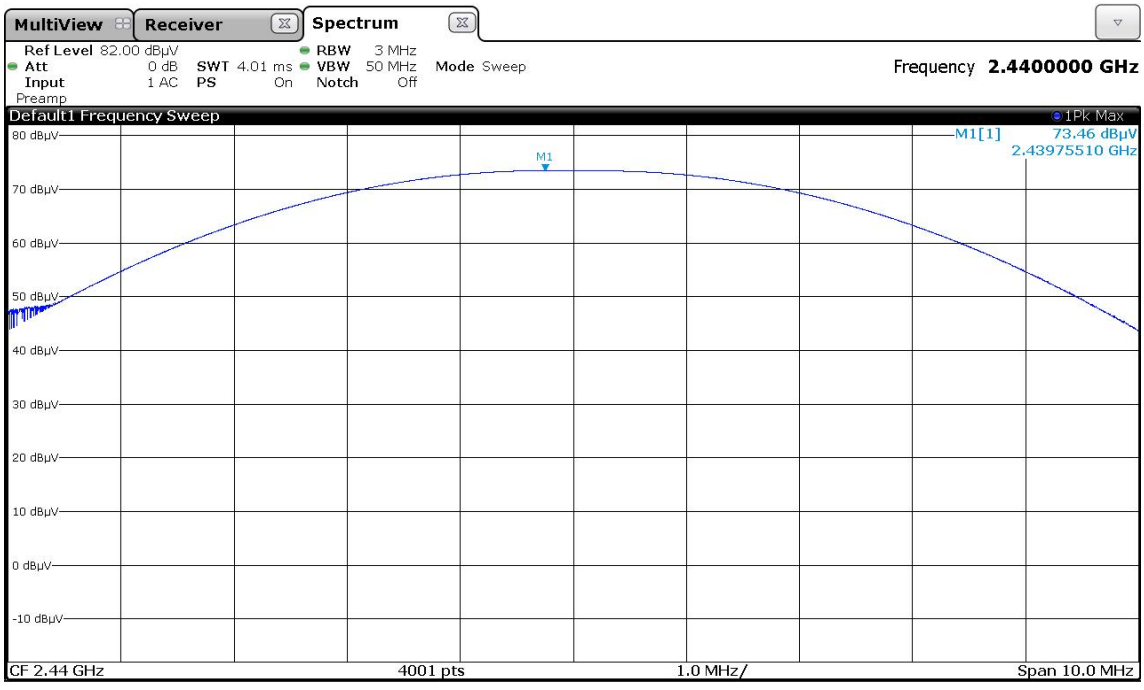
E is the electric field strength in dBµV/m
EIRP is the equivalent isotropically radiated power in dBm
d is the specified measurement distance in m
G is the antenna gain in dBi
MPOP is the maximum peak output power – measured antenna port conducted – in dBm

Result: radiated measurement on sample with integral antenna

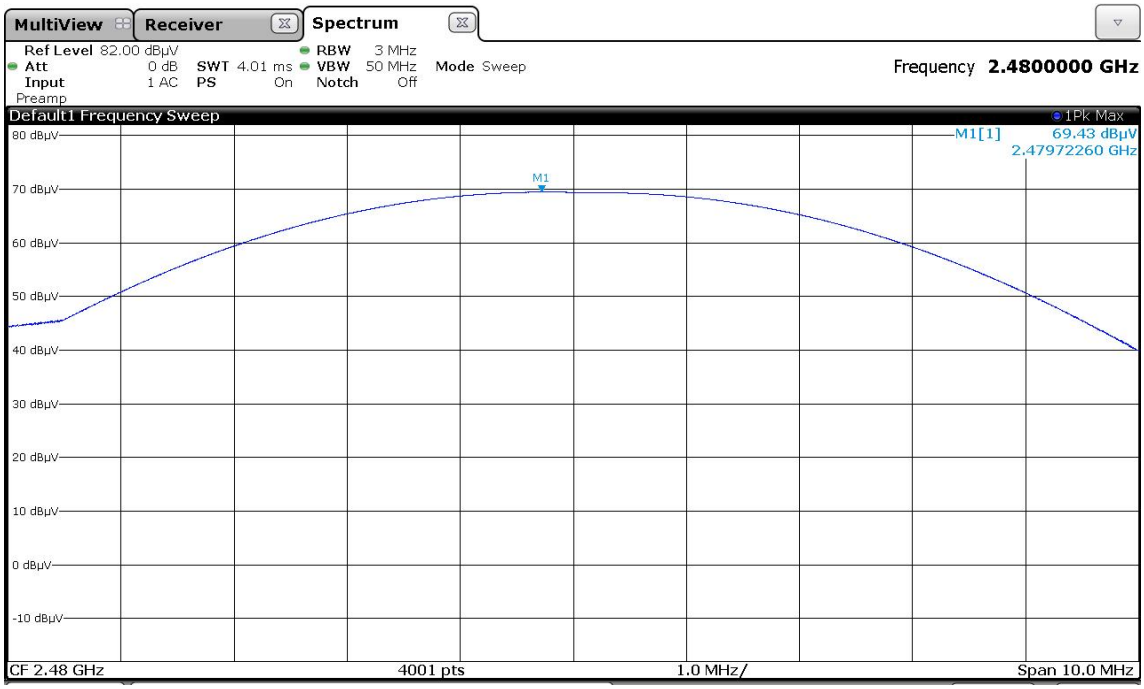
BTLE MPOP_ch00.PNG: Maximum peak output power measured on channel 0 (operation mode 1):



BTLE MPOP_ch19.PNG: Maximum peak output power measured on channel 19 (operation mode 2):



BTLE MPOP_ch39.PNG: Maximum peak output power measured on channel 39 (operation mode 3):



Operation mode	Frequency [MHz]	Reading [dBµV]	Corr. Fact. [dB]	Fieldstrength @ 3m [dBµV/m]	EIRP [dBm]	Results [dBm]	Limit [dBm]
1	2402	70.2	34.0	104.2	8.9	5.2	30.00
2	2440	73.5	34.2	107.7	12.4	8.7	30.00
3	2480	69.4	34.1	103.5	8.2	4.5	30.00

Test: Passed

Test equipment (please refer to chapter 6 for details)
1 - 10

5.3 DTS Bandwidth / 99% Bandwidth

5.3.1 Method of measurement

For the DTS bandwidth measurement, the EUT was measured radiated in the anechoic chamber using the procedures described in 5.6.1.

Acceptable measurement configurations

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

- Set RBW = 100 kHz.
- Set the video bandwidth (VBW) ≥ 3 x RBW.
- Detector = Peak.
- Trace mode = max hold.
- Sweep = auto couple.
- Allow the trace to stabilize.
- Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

The following procedure was used for measuring the 99 % bandwidth:

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 shall be used for measuring 99% power bandwidth:

- 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.
- 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.
- 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.
- Step a) through step c) might require iteration to adjust within the specified range.
- e) Video averaging is not permitted. Where practical, a sample detection and single sweep mode shall be used. Otherwise, peak detection and max hold mode (until the trace stabilizes) shall be used.
- f) Use the 99% power bandwidth function of the instrument (if available) and report the measured bandwidth.
- g) If the instrument does not have a 99% power bandwidth function, then the trace data points are recovered and directly summed in linear power terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5% of the total is reached; that frequency is recorded as the lower frequency. The process is repeated until 99.5% of the total is reached; that frequency is recorded as the upper frequency. The 99% power bandwidth is the difference between these two frequencies.
- The occupied bandwidth shall be reported by providing plot(s) of the measuring instrument display; the plot axes and the scale units per division shall be clearly labelled. Tabular data maybe reported in addition to the plot(s).

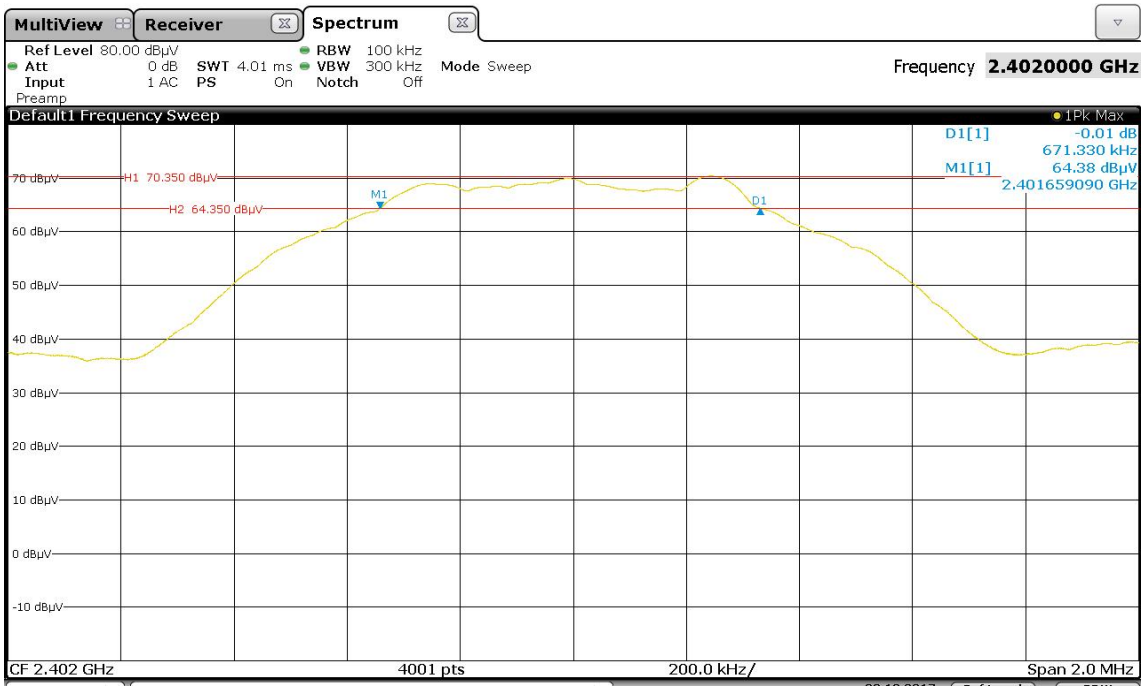
Since this is only a relative measurement, no measurement level correction was performed.

5.3.2 Test result

Ambient temperature	22 °C
Tested by	B. Rohde

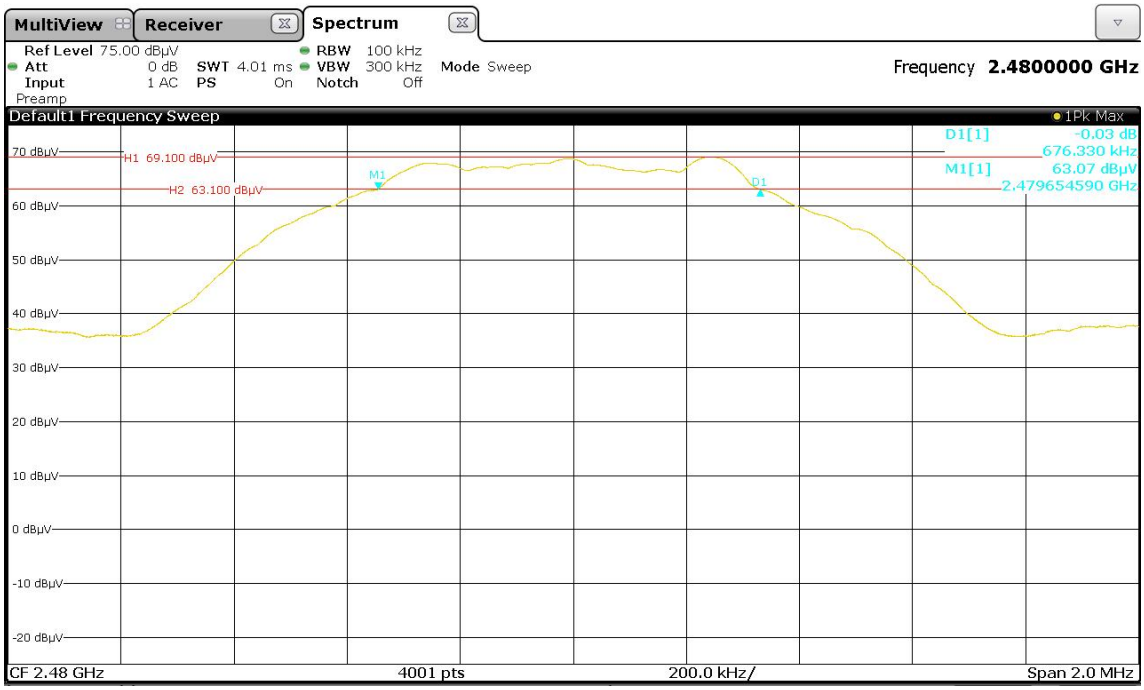
Relative humidity	40 %
Date	23.10.2017

DTS_BW_ch00.wmf: 6-dB Bandwidth (operation mode 1):

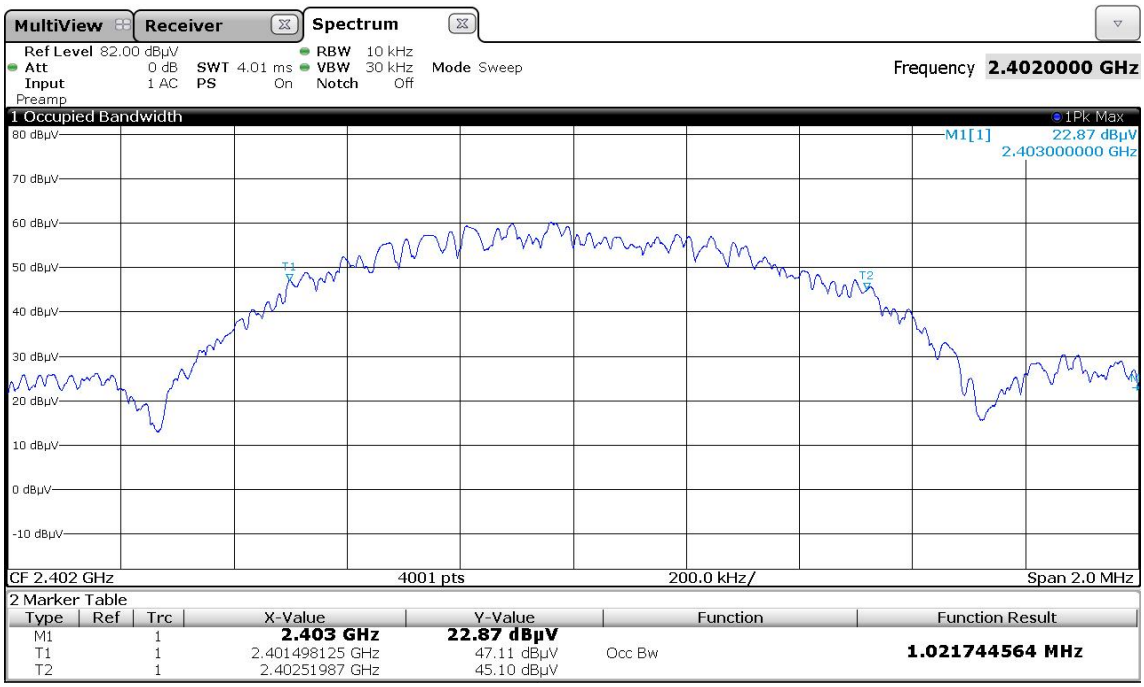


DTS_BW_ch06.wmf: 6-dB Bandwidth (operation mode 2):

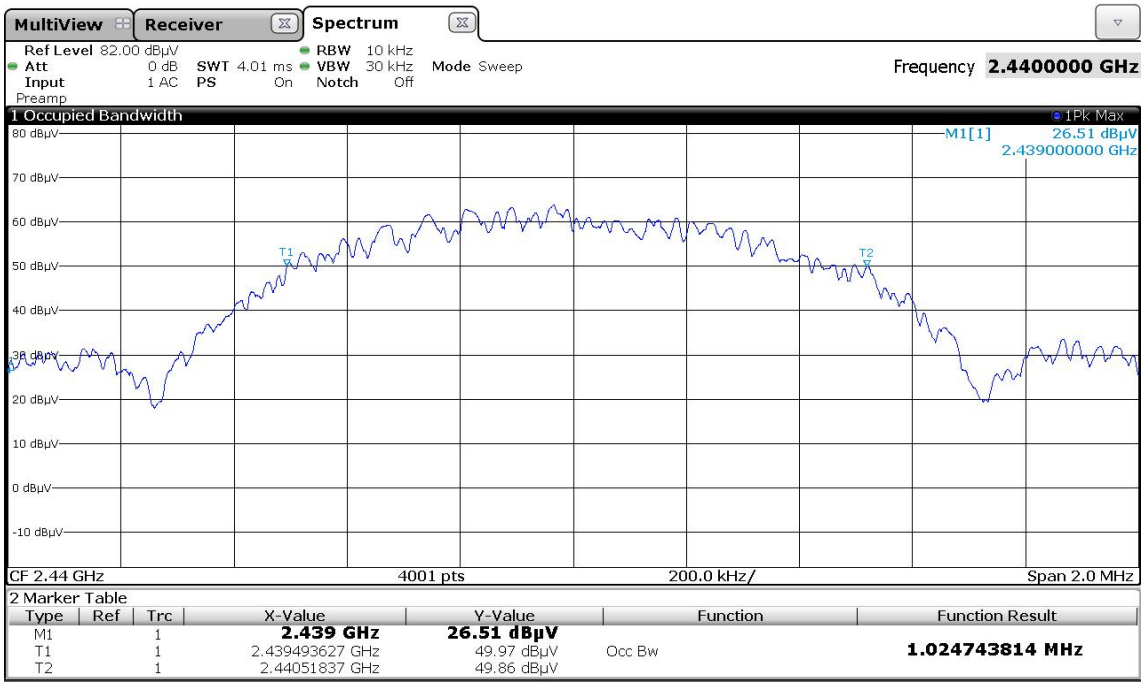
DTS_BW_ch11.wmf: 6-dB Bandwidth (operation mode 3):



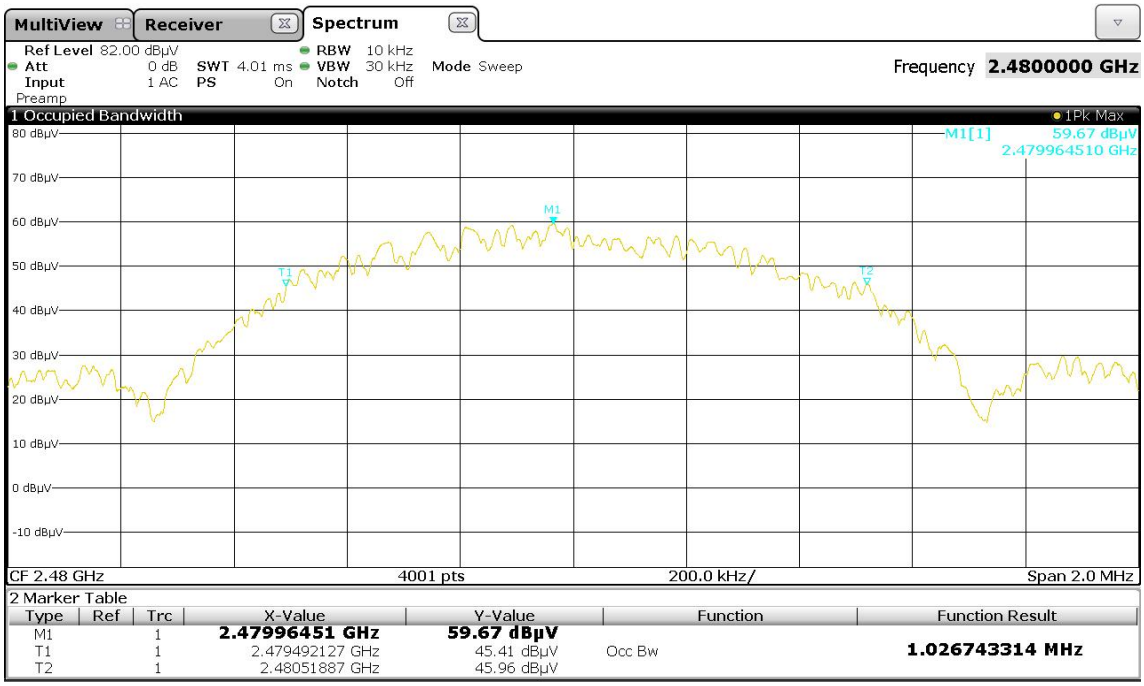
99%_BW_ch01.png: 99% Bandwidth (operation mode 1):



99%_BW_ch06.png: 99% Bandwidth (operation mode 2):



99%_BW_ch11.png: 99% Bandwidth (operation mode 3):



Operation Mode	Center Frequency [MHz]	Minimum 6-dB Bandwidth Limit [MHz]	6 dB Bandwidth [MHz]	99 % Bandwidth [MHz]	Result
1	2402	0.5	0.671	1.022	Passed
2	2440	0.5	0.675	1.025	Passed
3	2480	0.5	0.676	1.027	Passed

Test: Passed

Test equipment (please refer to chapter 6 for details)
1 - 10

5.4 Peak Power Spectral Density

5.4.1 Method of measurement

For the peak power spectral density measurement, the EUT was measured radiated in the anechoic chamber.

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

- Set analyser center frequency to DTS channel center frequency
- Set the span to 1.5 times the DTS bandwidth.
- Set the RBW to: 3 kHz ≤ RBW ≤ 100 kHz.
- Set the VBW ≥ 3 x RBW.
- Detector = peak.
- Sweep time = auto couple.
- Trace mode = max hold.
- Allow trace to fully stabilize.
- Use the peak marker function to determine the maximum amplitude level within the RBW.
- If measured value exceeds limit, reduce RBW (not less than 3 kHz) and repeat.

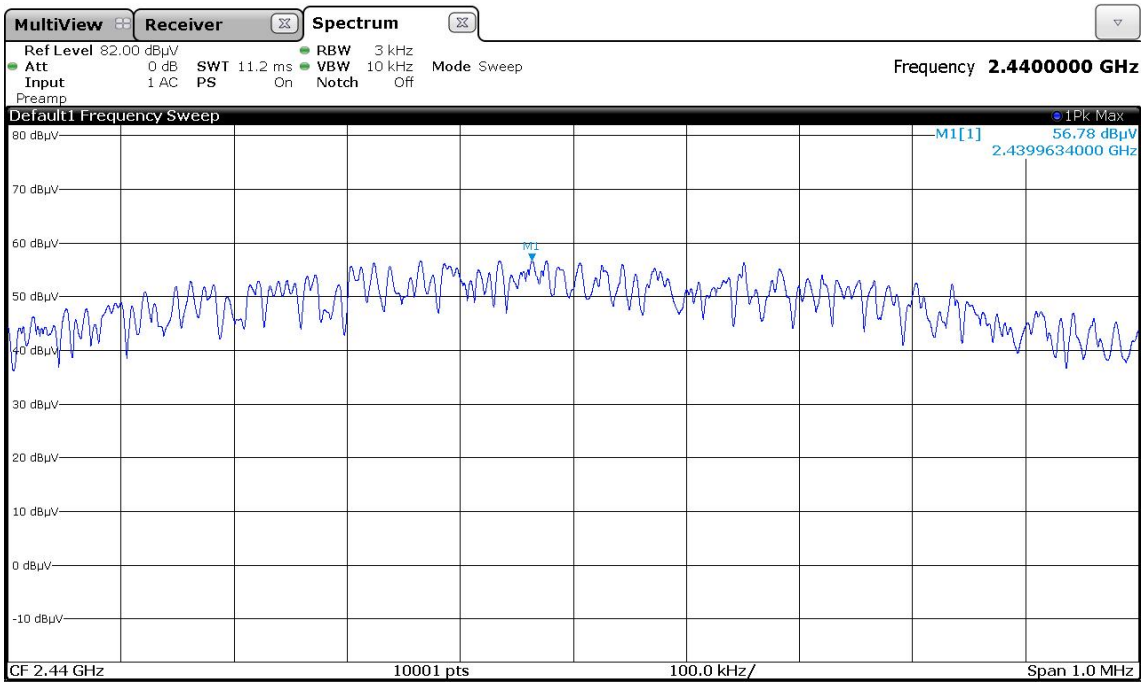
The measurement result in [dBmV/m] was calculated to [dBm] using the formula
in chapter 11.12.2.2 e) in [1].

5.4.2 Test result

Ambient temperature	22 °C	Relative humidity	40 %
Tested by	B. Rohde	Date	23.10.2017

The plot shows an exemplary measurement result for the worst documented case.
The other results are listed in the following table.

BTLE MPSD Ch19.wmf: Power Spectral Density (operation mode 2):



Operation Mode	Frequency [MHz]	Reading [dBµV]	Corr. Fact. [dB]	Power Spectral Density Reading [dBm / 3 kHz]	Limit [dBm]	Result
1	2401.973	54.9	34.0	-6.3	8	Passed
2	2439.964	56.8	34.2	-4.2	8	Passed
3	2479.963	56.1	34.1	-4.9	8	Passed
Measurement uncertainty				+0.66 dB / -0.72 dB		

Test: Passed

Test equipment (please refer to chapter 6 for details)
1 - 10

5.5 Band-edge compliance

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

The EUT was measured radiated in the anechoic chamber using the procedures described in 5.6.1.

Acceptable measurement configurations

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

Measurement Procedure Reference – Reference Level:

- RBW = 100 kHz.
- VBW ≥ 300 kHz.
- Set the span to ≥ 1.5 times the DTS Bandwidth.
- Detector = Peak.
- Sweep time = auto couple.
- Trace mode = max hold.
- Allow trace to fully stabilize.
- Use the peak marker function to determine the maximum PSD level.

Measurement Procedure – Unwanted Emissions

- Set the center frequency and span to encompass the frequency range to be measured.
- RBW = 100 kHz.
- VBW ≥ 300 kHz.
- Detector = Peak.
- Ensure that the number of measurement points ≥ span/RBW.
- Sweep time = auto couple.
- Trace Mode = max hold.
- Allow the trace to stabilize.
- Use the peak marker function to determine the maximum amplitude level.

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.

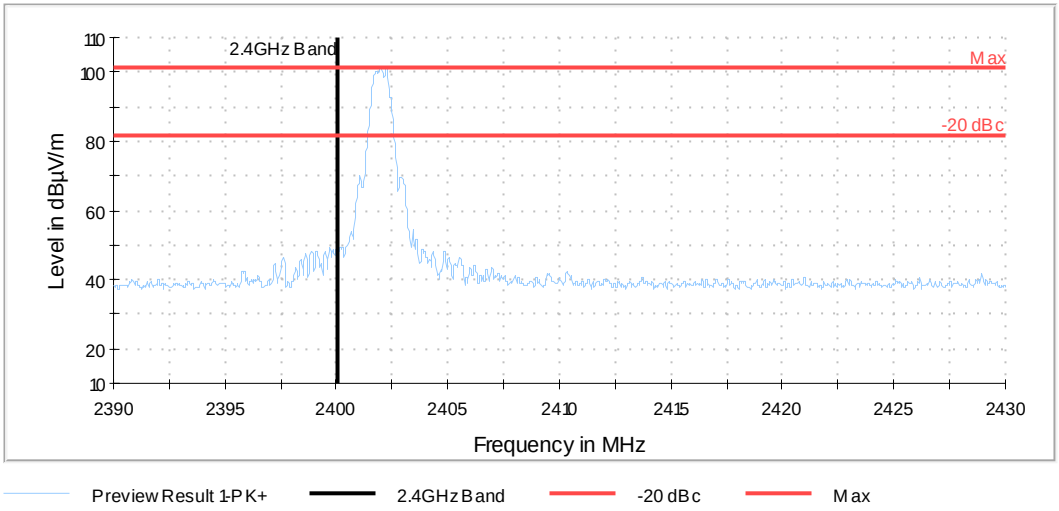
The measurements were performed at the lower end of the 2.4 GHz band.

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

Ambient temperature	22 °C
Relative humidity	52 %

Date	26.10.2017
Tested by	B. ROHDE

LowerBandEdge_ch00.wmf: radiated band-edge compliance at an unrestricted band-edge (operation mode 1):



Operation mode 1									
Frequency [MHz]	Max Peak [dBµV/m]	Average [dBµV/m]	Limit [dBµV/m]	Margin dB	Pol	Azimuth [°]	Elevation [°]	Correction [dB]	Result
2399.700000	49.3	---	81.6	32.3	V	180	120	33.8	Passed

Test: Passed

Test equipment (please refer to chapter 6 for details)
1 - 10

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

The EUT was measured radiated in the anechoic chamber using the procedures described in 5.6.1.

Acceptable measurement configurations

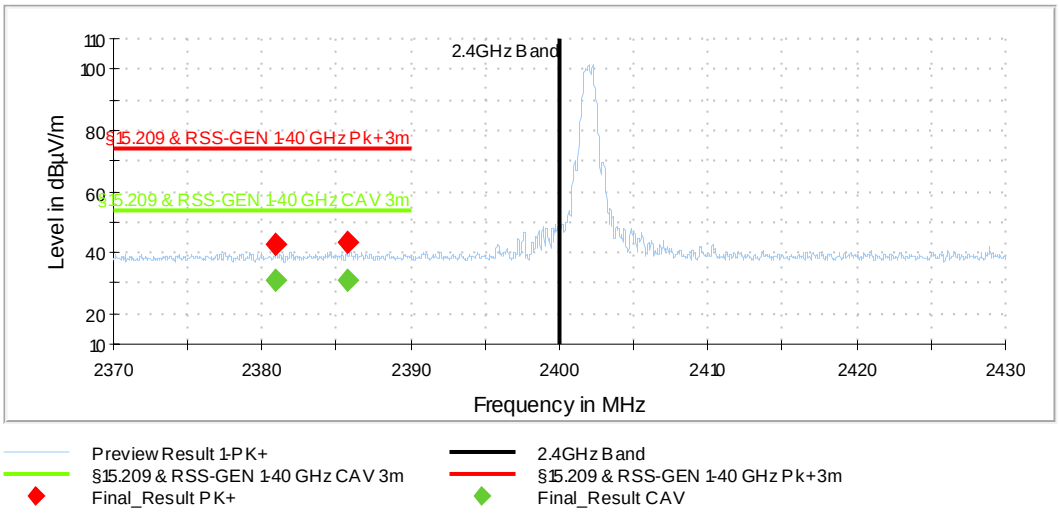
The same measurement configurations as described in 5.6.1. were used for the preview and final measurement.

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

Ambient temperature	22 °C
Relative humidity	52 %

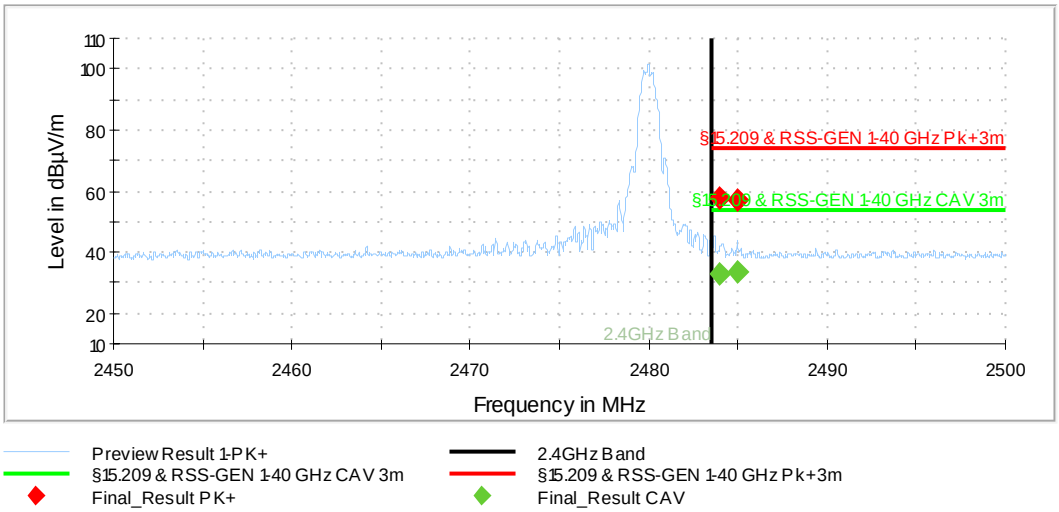
Date	26.10.2017
Tested by	B. ROHDE

LowerBandEdge_ch00.wmf: radiated band-edge compliance at a restricted band-edge (operation mode 1):



Operation mode 1			Duty cycle correction factor of 2.21 dB was applied for the Average reading						
Frequency [MHz]	Max Peak [dBµV/m]	Average [dBµV/m]	Limit [dBµV/m]	Margin dB	Pol	Azimuth [°]	Elevation [°]	Correction [dB]	Result
2380.950000	---	30.8	54	23.2	H	293	60	35.8	Passed
2380.950000	42.6	---	74	31.4	H	293	60	33.6	Passed
2385.720000	---	30.9	54	23.1	V	10	0	35.9	Passed
2385.720000	43.3	---	74	30.7	V	10	0	33.7	Passed

UpperBandEdge_ch39.wmf: radiated band-edge compliance at a restricted band-edge (operation mode 3):



Operation mode 3			Duty cycle correction factor of 2.21 dB was applied for the Average reading						
Results			1 - 12.75 GHz		Measurement uncertainty			+2.2 dB	-3.6 dB
Frequency [MHz]	Max Peak [dBµV/m]	Average [dBµV/m]	Limit [dBµV/m]	Margin dB	Pol	Azimuth [°]	Elevation [°]	Correction [dB]	Result
2484.000000	---	32.8	54	21.2	V	121	120	36.2	Passed
2484.000000	57.6	---	74	16.4	V	121	120	34.0	Passed
2484.950000	---	33.4	54	20.6	V	148	60	36.2	Passed
2484.950000	57.3	---	74	16.7	V	148	60	34.0	Passed

Test: Passed

Test equipment (please refer to chapter 6 for details)
1 - 10

5.6 Maximum unwanted emissions

5.6.1 Method of measurement (radiated emissions)

The radiated emission measurement is subdivided into five stages.

- A preliminary measurement carried out in a fully anechoic chamber with a fixed antenna height in the frequency range 9 kHz to 1 GHz.
- A final measurement carried out on an outdoor test side without reflecting ground plane and a fixed antenna height in the frequency range 9 kHz to 30 MHz.
- A final measurement carried out on an open area test side with reflecting ground plane and various antenna height in the frequency range 30 MHz to 1 GHz.
- A preliminary measurement carried out in a fully 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.

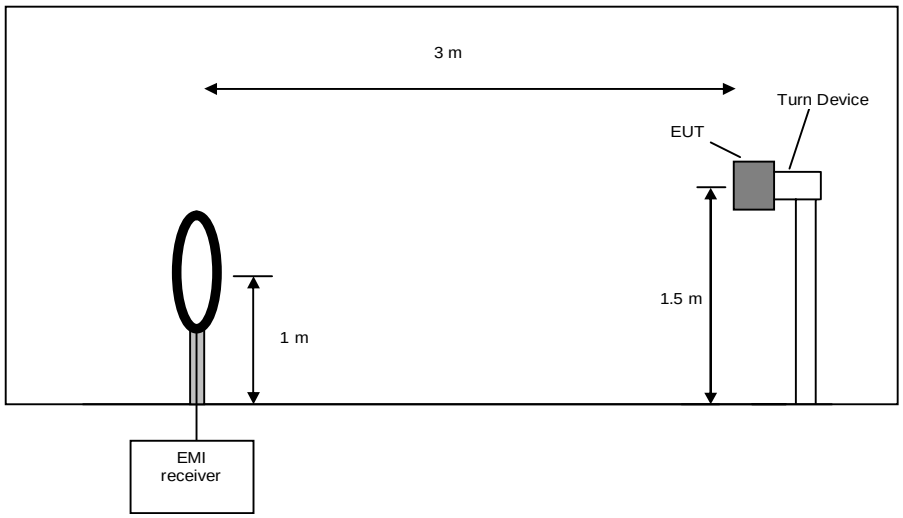
Preliminary measurement (9 kHz to 30 MHz):

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 analyzer 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 analyzer 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:

Pre-scans were performed in the frequency range 9 kHz to 150 kHz and 150 kHz to 30 MHz.

Pre-scans 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 polarization 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 polarization of the measuring antenna.
5. Make a hardcopy of the spectrum.
6. Repeat 1) to 5) with the EUT raised by an angle of 0° (45°, 90°) according to 6.6.5.4 in [1].
7. Measure the frequency of the detected emissions with a lower span and resolution bandwidth to increase the accuracy and note the frequency value.

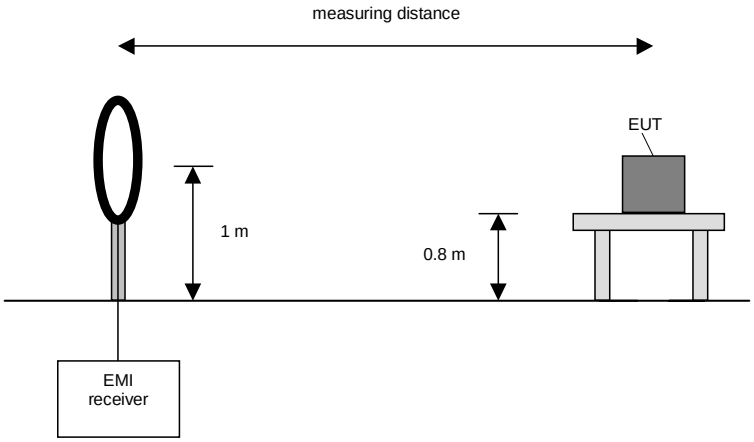
Final measurement (9 kHz to 30 MHz):

In the second stage a final measurement will be performed on an open area test site with no conducting ground plane in a measuring distances of 3 m, 10 m and 30 m. In the case where larger measuring distances are required the results will be extrapolated based on the values measured on the closer distances according to Section 15.31 (f) (2) [2]. The final measurement will be performed with a 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 will be used according Section 15.209 (d) [2].

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

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

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



Final measurement procedure:

The following procedure will be used:

1) Monitor the frequency range with the measuring antenna at vertical orientation parallel to the EUT at an azimuth of 0 °.
2) Rotate the EUT by 360 ° to maximize the detected signals and note the azimuth and orientation.
3) Rotate the measuring antenna to find the maximum and note the value.
4) Rotate the measuring antenna and repeat steps 1) to 3) until the maximum value is found.
5) Repeat steps 1) to 4) with the other orthogonal axes of the EUT (if the EUT is a module and might be used in a handheld equipment application).

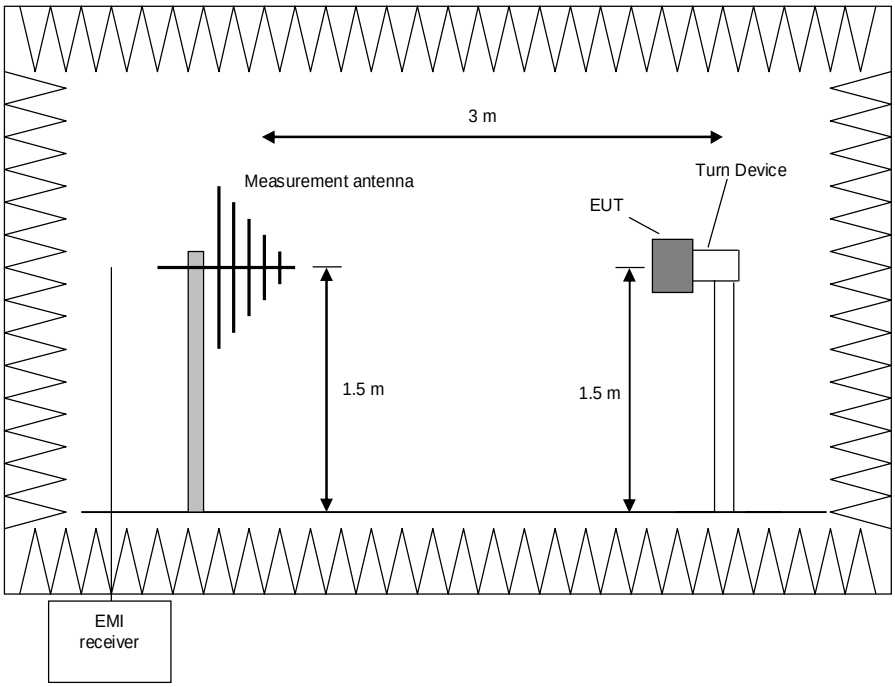
Preliminary measurement (30 MHz to 1 GHz)

In the first stage a preliminary measurement will be performed in a fully anechoic chamber with a measuring distance of 3 meter. 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 setup of the Equipment under test will be in accordance to [1].

The frequency range 30 MHz to 1 GHz will be measured with an EMI Receiver set to MAX Hold mode and a resolution bandwidth of 100 kHz. The measurement will be performed in horizontal and vertical polarization 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
30 MHz to 230 MHz	100 kHz
230 MHz to 1 GHz	100 kHz



Procedure preliminary measurement:

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

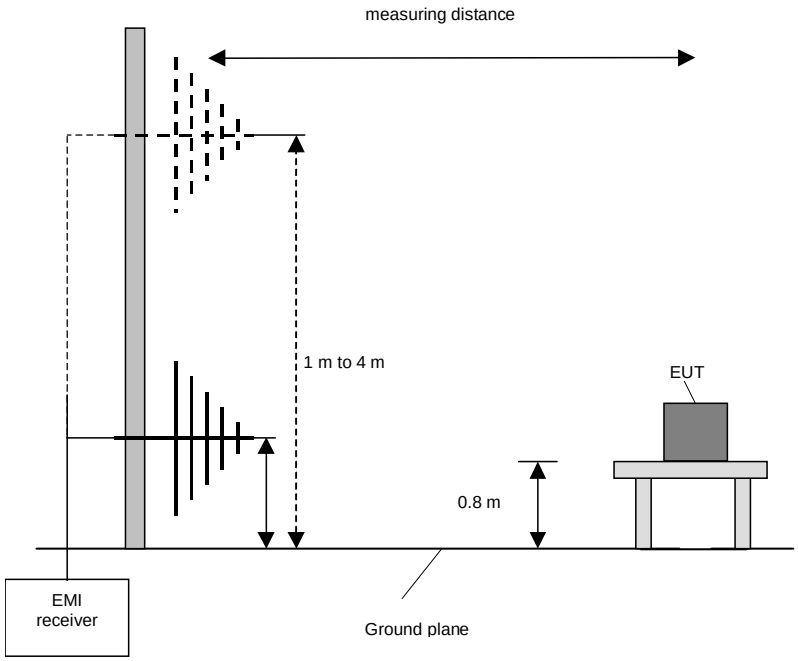
8. Monitor the frequency range at horizontal polarization and a EUT azimuth of 0 °.
9. Manipulate the system cables within the range to produce the maximum level of emission.
10. Rotate the EUT by 360 ° to maximize the detected signals.
11. Repeat 1) to 3) with the vertical polarization of the measuring antenna.
12. Make a hardcopy of the spectrum.
13. Repeat 1) to 5) with the EUT raised by an angle of 0° (45°, 90°) according to 6.6.5.4 in [1].
14. Measure the frequency of the detected emissions with a lower span and resolution bandwidth to increase the accuracy and note the frequency value.

Final measurement (30 MHz to 1 GHz)

A final measurement on an open area test site 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 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 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 on the selected frequencies at an antenna height of 1 m and a EUT azimuth of 23 °.
2) Move the antenna from 1 m to 4 m and note the maximum value at each frequency.
3) Rotate the EUT by 45 ° and repeat 2) until an azimuth of 337 ° 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 value is 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 frequency.
12) Repeat 1) to 11) for each orthogonal axes of the EUT (because of EUT is a module and might be used in a handheld equipment application).

Preliminary and final measurement (1 GHz to 40 GHz)

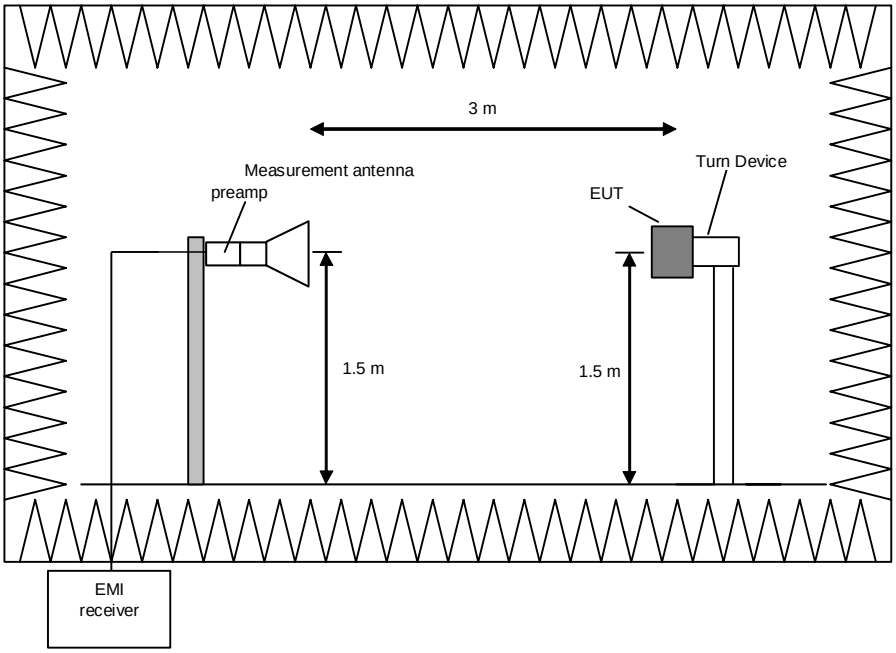
This measurement will be performed in a fully anechoic chamber. Table top devices will set up on a non-conducting turn device on the height of 1.5m. The set-up of the Equipment under test will be in accordance to [1].

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 analyzer set to MAX Hold mode and a resolution bandwidth of 100 kHz. The measurement will be performed in horizontal and vertical polarization 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:

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

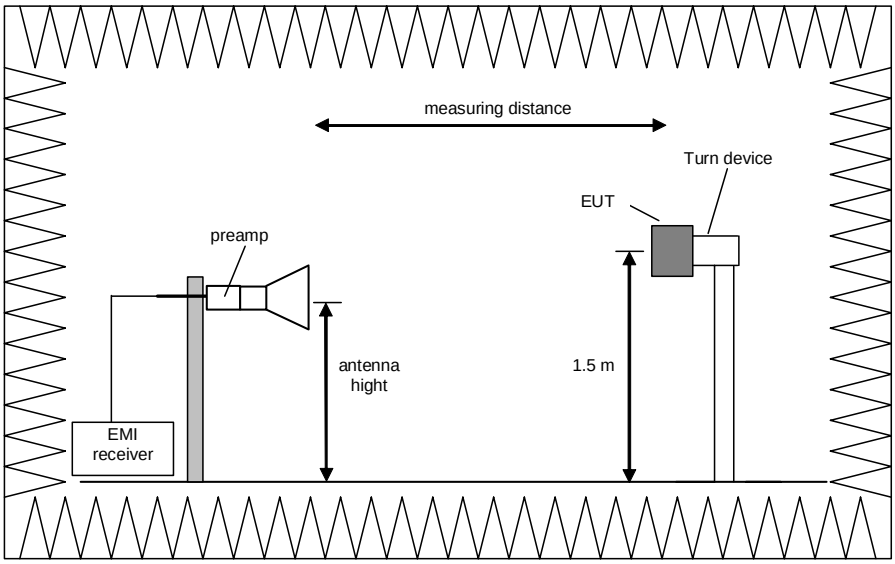
1. Monitor the frequency range at horizontal polarization and a EUT azimuth of 0 °.
2. Rotate the EUT by 360° to maximize the detected signals.
3. Repeat 1) to 2) with the vertical polarization of the measuring antenna.
4. Make a hardcopy of the spectrum.
5. Repeat 1) to 4) with the EUT raised by an 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 polarization, 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 polarization to the orientation with the highest emission for the first frequency identified in the preliminary measurements.
3) Set the spectrum analyzer 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.

5.6.2 Results preliminary measurement 9 kHz to 30 MHz

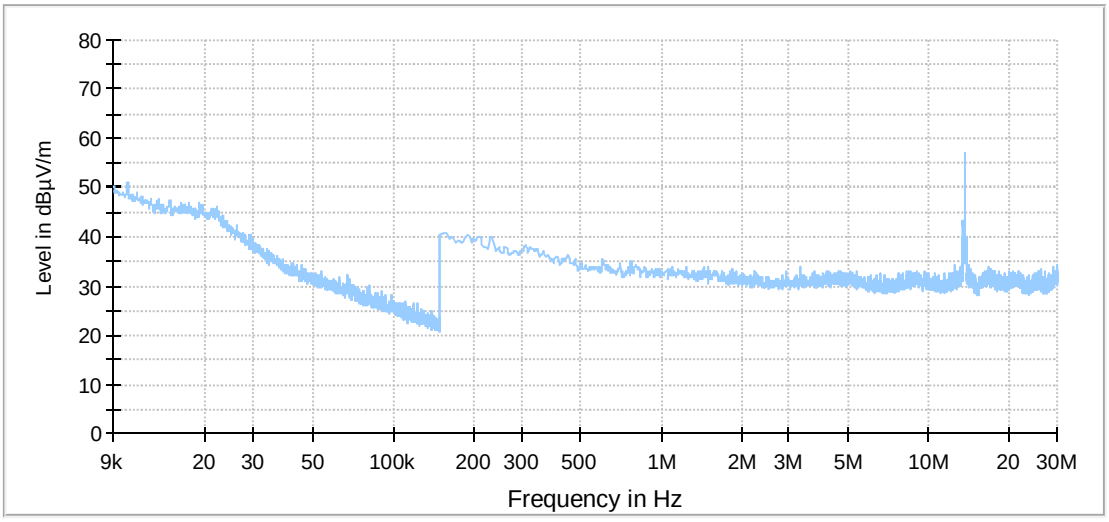
Ambient temperature	22 °C	Relative humidity	45 %
Tested by	M. BASTERT	Date	14.11.2017

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

Cable guide: The cable of the EUT was fixed on the non-conducting table. For further information of the cable guide refer to the pictures in annex A of this test report.

Test record: The test was carried out in test mode of the EUT.

Power supply: During this test the EUT was powered with 24 V DC by an laboratory power supply.



The following emission was found:

13.56 MHz.

This frequency had to be measured on the outdoor test site. The result is presented in the following.

Test equipment (please refer to chapter 6 for details)
3, 5, 10 - 13

5.6.3 Results preliminary measurement 30 MHz – 1 GHz

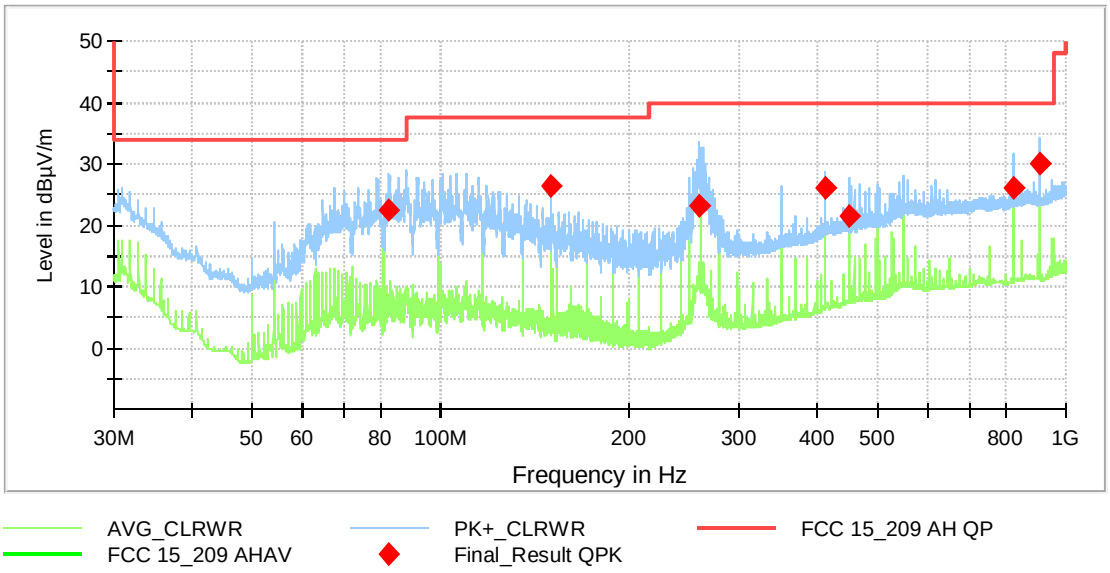
Ambient temperature	22 °C	Relative humidity	45 %
Tested by	M. BASTERT	Date	26.10.2017

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

Cable guide: The cable of the EUT was fixed on the non-conducting table. For further information of the cable guide refer to the pictures in annex A of this test report.

Test record: The test was carried out in test mode of the EUT.

Power supply: During this test the EUT was powered with 24 V DC by an laboratory power supply.



The following frequencies were found emission test outside restricted bands during the preliminary radiated:

- 82.746 MHz, 411.444 MHz, 450.0 MHz, 822.87 MHz and 909.492 MHz

The following frequency was found inside the restricted bands during the preliminary radiated.

- 150.0 MHz and 259.158 MHz.

These frequencies have to be measured on the open area test site. The results were presented in the following.

Test equipment (please refer to chapter 6 for details)
1 – 3, 5 , 9 – 10, 14 - 17

5.6.4 Results preliminary measurement above 1 GHz

Ambient temperature	22 °C
Tested by	B. ROHDE

Relative humidity	45 %
Date	19.10.2017 20.10.2017 27.10.2017

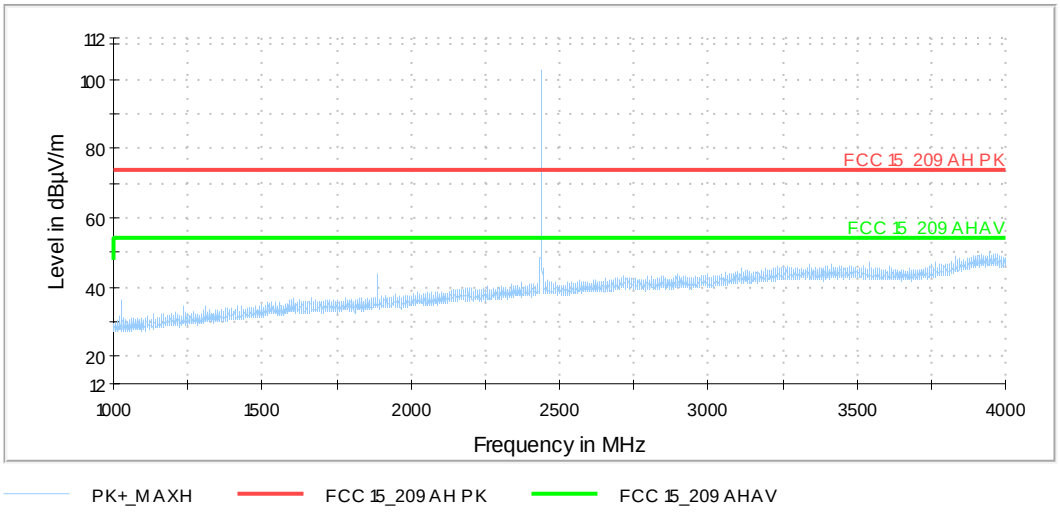
Position of EUT: The EUT was set-up on an EUT turn device of a height of 1.5 m. The distance between EUT and antenna was 3 m.

Cable guide: The cable of the EUT was fixed on the non-conducting table. For further information of the cable guide refer to the pictures in annex A of this test report.

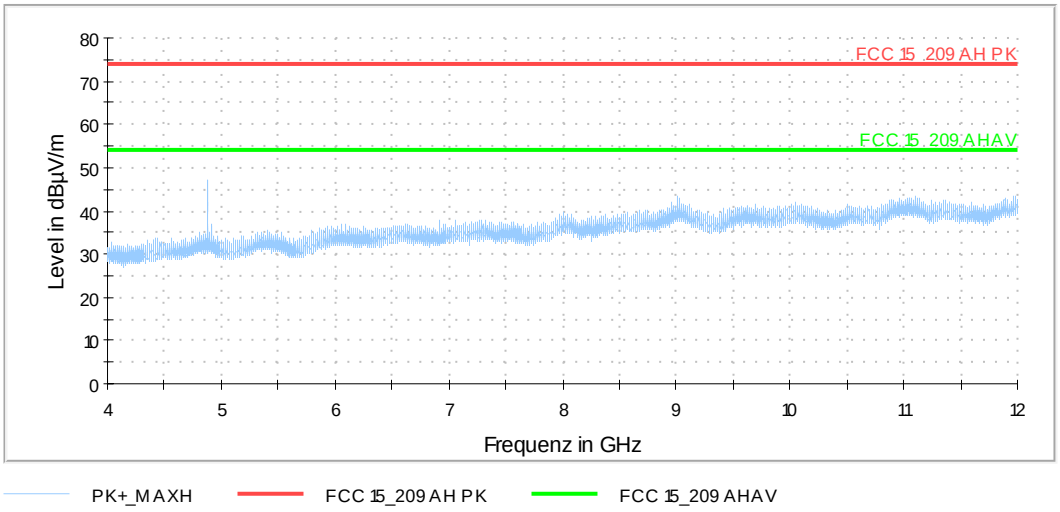
Test record: The test was carried out in test mode of the EUT.

Power supply: During this test the EUT was powered with 24 V DC by an laboratory power supply.

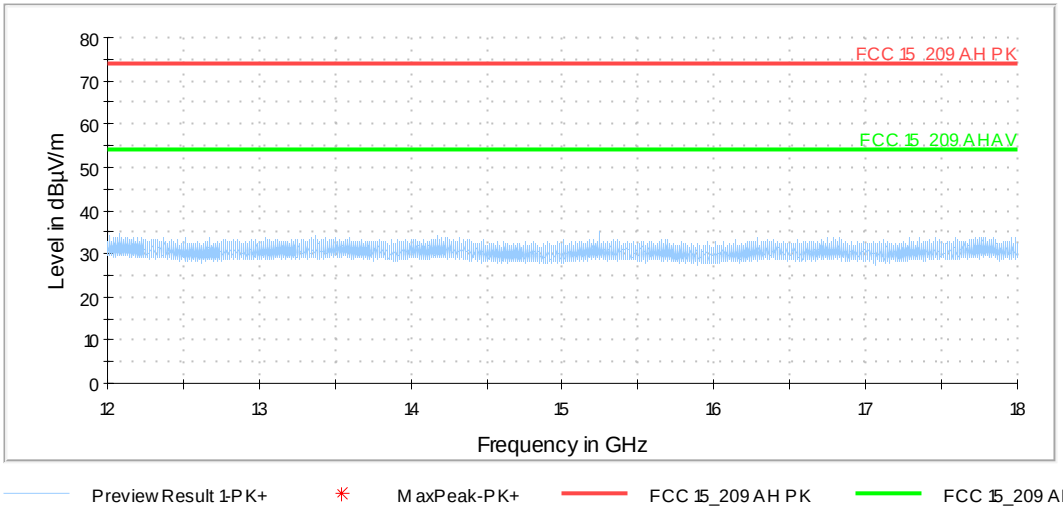
170756 1-4GHz ch19: Spurious emissions from 1 GHz to 4 GHz (operation mode 2):



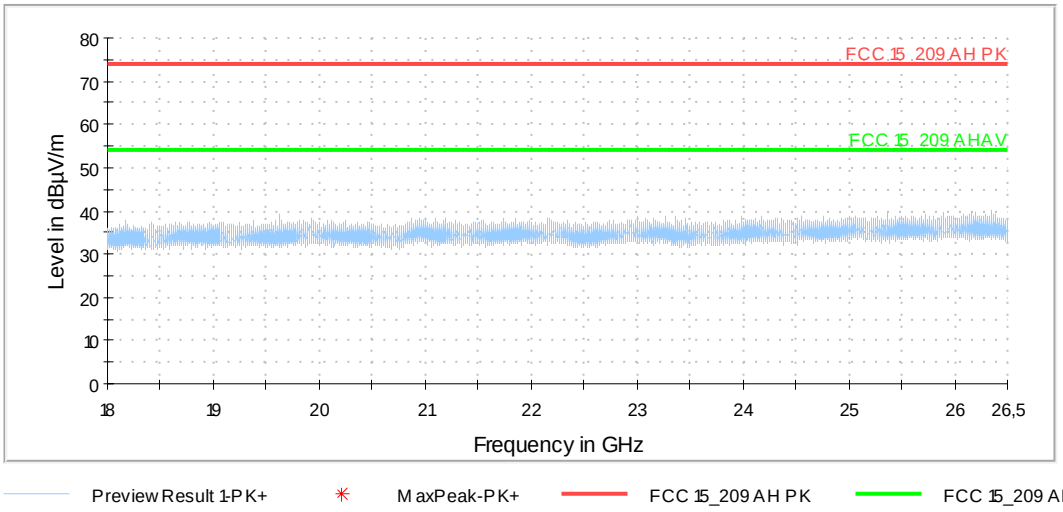
170756 4-12GHz ch19: Spurious emissions from 4 GHz to 12 GHz (operation mode 2):



170756 12-18GHz ch19: Spurious emissions from 12 GHz to 18 GHz (operation mode 2):



170756 18-25GHz ch19: Spurious emissions from 18 GHz to 26.5 GHz (operation mode 2):



Test equipment (please refer to chapter 6 for details)
1 – 7, 9 – 10, 15, 18 - 24

5.6.5 Result final measurement from 9 kHz to 30 MHz

Ambient temperature	12 °C	Relative humidity	69 %
Tested by	M. BASTERT	Date	17.11.2018

Position of EUT: The EUT was set-up on a non-conducting table of a height of 0.8 m. The distance between EUT and antenna was 10 m.

Cable guide: The cable of the EUT was fixed on the non-conducting support. For further information of the cable guide refer to the pictures in annex A of this test report.

Test record: The test was carried out in test mode of the EUT. All results are shown in the following.

Power supply: During this test the EUT was powered with 24 V DC by an battery.

Test results:

Frequency [MHz]	Reading [dBµV]	Result* [dBµV/m]	Limit acc. 15.209 [dBµV/m]	Margin [dB]	Detector (acc. To §15.209 (d)	Antenna factor [dB/m]	Measuring Distance [m]	Distance correction factor** [dB]
13.560000	17.9	19.1 @ 30m	29.5	10.4	QP	20.3	10	19.1
Measurement uncertainty: +2.2 dB / -3.6 dB								

Note: *Result @ normative distance = Reading + Antenna factor – Distance correction factor

** 40dB/decade according Part §15.31 (f) (2)

Test: Passed

Test equipment (please refer to chapter 6 for details)
25 - 27

5.6.6 Result final measurement from 30 MHz to 1 GHz

Ambient temperature	22 °C	Relative humidity	45 %
Tested by	M. BASTERT	Date	27.04.2018

Position of EUT: The EUT was setup on a non-conducting table of a height of 0.8 m. The distance between EUT and antenna was 3 m.

Test record: The test was carried out in test mode of the EUT (refer also clause 2 of this test report). All results are shown in the following.

Power supply: During this test the EUT was powered with 24 V_{AC} by an AC adapter (see chapter 1.6), which was itself supplied with 120 V_{AC} / 60 Hz.

Test results: The test results were calculated with the following formula:

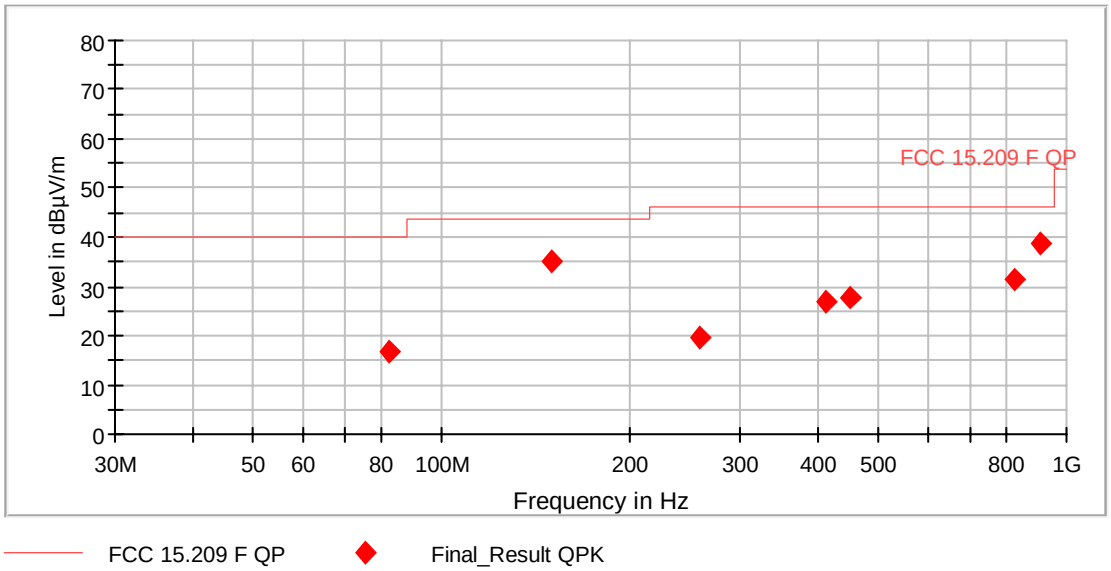
Result [dBµV/m] = reading [dBµV] + cable loss [dB] + antenna factor [dB/m] + 6 dB

The measured points and the limit line in the following diagrams refer to the standard measurement of the emitted interference in compliance with the above-mentioned standard. The measured points marked with an are the

- measured results of the standard final measurement on the open area test site.

The results of the standard subsequent measurement on the open area 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 3 m measuring distance.

The measurement time with the quasi-peak measuring detector is 5 seconds.



Spurious Emissions (All Operation modes) 30 MHz - 1 GHz								
Frequency [MHz]	QuasiPeak [dBµV/m]	Limit [dBµV/m]	Margin dB	Pol	Azimuth [°]	Height [cm]	Correction [dB]	Result
82.746000	16.8	40	23.2	V	0	353	16.2	Passed
150.000000	35.0	43.5	8.5	V	90	235	19.1	Passed
259.158000	19.5	46	26.5	H	22	228	21.6	Passed
411.444000	26.9	46	19.1	V	110	103	25.1	Passed
450.000000	27.6	46	18.4	V	115	226	25.4	Passed
822.870000	31.3	46	14.7	V	7	102	29.9	Passed
909.492000	38.9	46	7.1	H	13	109	30.4	Passed
Measurement uncertainty				+/- 4.78 dB				

Test: Passed

Test equipment (please refer to chapter 6 for details)
28 - 34

5.6.7 Results preliminary measurement above 1 GHz

Ambient temperature	22 °C	Relative humidity	45 %
Tested by	B. ROHDE	Date	19.10.2017 20.10.2017 27.10.2017

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

Cable guide: The cable of the EUT was fixed on the non-conducting table. For further information of the cable guide refer to the pictures in annex A of this test report.

Test record: The test was carried out in test mode of the EUT.

Power supply: During this test the EUT was powered with 24 V DC by an laboratory power supply.

No final plots done, spectrum see preliminary measurement.

Spurious Emissions 1 – 25 GHz (Operation mode 1)									
Operation mode 1			Duty cycle correction factor of 2.2 dB was applied for the Average reading						
Frequency	Max Peak	Average	Limit	Margin	Pol	Azimuth	Elevation	Correction	Result
[MHz]	[dBµV]	[dBµV]	[dBµV]	dB		[°]	[°]	[dB/m]	
4823.950000	---	50.6	54	3.4	V	274	90	0.5	Passed
4823.950000	51.8	---	74	22.2	V	274	90	-1.7	Passed
4831.950000	---	38.2	54	15.8	V	261	90	0.6	Passed
4831.950000	46.0	---	74	28.0	V	261	90	-1.6	Passed
9048.900000	---	40.2	54	13.8	V	123	150	11.5	Passed
9048.900000	50.3	---	74	23.7	V	123	150	9.3	Passed
Measurement uncertainty				+/- 5.38 dB					

Spurious Emissions 1 – 25 GHz (Operation mode 2)									
Operation mode 2			Duty cycle correction factor of 2.2 dB was applied for the Average reading						
Frequency	Max Peak	Average	Limit	Margin	Pol	Azimuth	Elevation	Correction	Result
[MHz]	[dBµV]	[dBµV]	[dBµV]	dB		[°]	[°]	[dB/m]	
4873.950000	---	48.9	54	5.1	V	254	90	0.7	Passed
4873.950000	50.7	---	74	23.3	V	254	90	-1.5	Passed
10746.250000	---	38.9	54	15.1	H	101	90	9.1	Passed
10746.250000	49.1	---	74	24.9	H	101	90	6.9	Passed
11897.100000	---	40.5	54	13.5	H	322	120	8.5	Passed
11897.100000	50.4	---	74	23.6	H	322	120	6.3	Passed
Measurement uncertainty				+/- 5.38 dB					

Spurious Emissions 1 – 25 GHz (Operation mode 3)									
Operation mode 3			Duty cycle correction factor of 2.2 dB was applied for the Average reading						
Frequency	Max Peak	Average	Limit	Margin	Pol	Azimuth	Elevation	Correction	Result
[MHz]	[dBµV]	[dBµV]	[dBµV]	dB		[°]	[°]	[dB/m]	
4923.950000	---	48.4	54	5.6	V	247	90	0.6	Passed
4923.950000	50.3	---	74	23.7	V	247	90	-1.6	Passed
7255.650000	---	35.4	54	18.6	V	112	60	6.8	Passed
7255.650000	46.1	---	74	27.9	V	112	60	4.6	Passed
11032.150000	---	40.6	54	13.4	H	218	0	10.5	Passed
11032.150000	50.7	---	74	23.3	H	218	0	8.3	Passed
Measurement uncertainty				+/- 5.38 dB					

Test: passed

Test equipment (please refer to chapter 6 for details)
1 – 7, 9 – 10, 15, 18 - 24

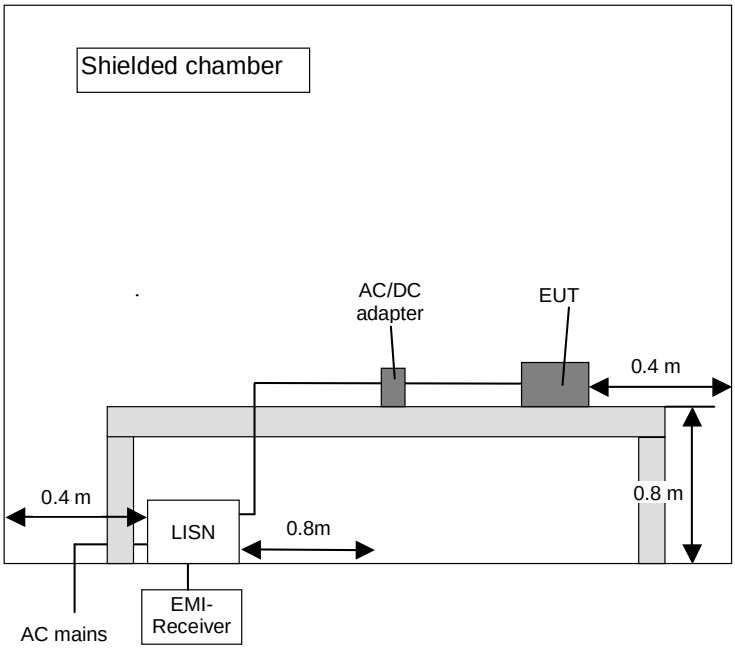
5.7 Conducted emissions on power supply lines (150 kHz to 30 MHz)

5.7.1 Method of measurement

This test will be carried out in a shielded chamber. Tabletop devices will set up on a non-conducting support with a size of 1 m by 1.5 m and a height of 80 cm above the ground plane. Floor-standing devices will be placed directly on the ground plane. The setup of the Equipment under test will be in accordance to [1].

The frequency range 150 kHz to 30 MHz will be measured with an EMI Receiver set to MAX Hold mode with peak and average detector and a resolution bandwidth of 9 kHz. A scan will be carried out on the phase (or plus pole in case of DC powered devices) of the AC mains network. If levels detected 10 dB below the appropriable limit, this emission will be measured with the average and quasi-peak detector on all lines.

Frequency range	Resolution bandwidth
150 kHz to 30 MHz	9 kHz



5.7.2 Test results (conducted emissions on power supply lines)

Ambient temperature	22 °C
Relative humidity	45 %

Date	29.03.2018
Tested by	B. ROHDE

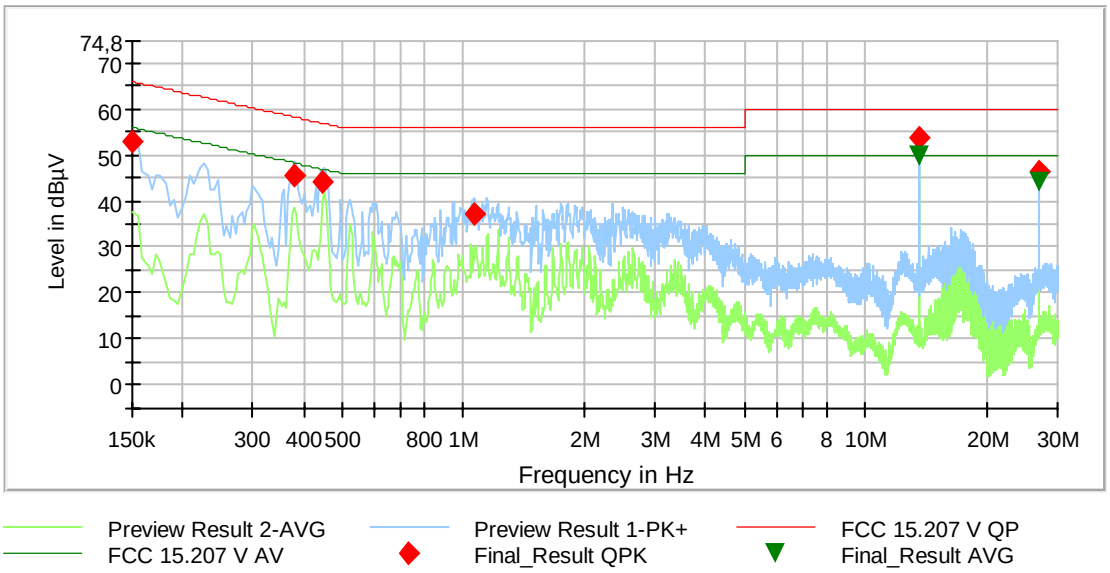
Position of EUT: The EUT was set-up on a non-conducting table of a height of 0.8 m.

Cable guide: The cables of the EUT were fixed on the non-conducting table. For further information of the cable guide refer to the pictures in annex A of this test report.

Test record: The test was carried out in test mode of the EUT (refer also clause 2 of this test report). All results are shown in the following.

Supply voltage: During this test the EUT was powered with 24 V_{AC} by an AC adapter (see chapter 1.6), which was itself supplied with 120 V_{AC} / 60 Hz.

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 +.



Final result

Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	PE	Corr. (dB)
0.150000	53.02	---	66.00	12.98	5000	9	N	GND	9.8
0.381300	45.34	---	58.25	12.91	5000	9	N	GND	9.9
0.445200	44.04	---	56.96	12.93	5000	9	N	GND	9.9
1.060800	37.37	---	56.00	18.63	5000	9	N	FLO	9.9
13.560000	---	49.92	50.00	0.08	5000	9	N	GND	10.8
13.560000	53.61	---	60.00	6.39	5000	9	N	FLO	10.8
27.119400	---	44.02	50.00	5.98	5000	9	N	GND	11.2
27.119400	46.19	---	60.00	13.81	5000	9	N	GND	11.2
Measurement uncertainty: +/- 2.76 dB									

Test: Passed

Test equipment (please refer to chapter 6 for details)
32, 35 - 38

6 Test equipment and ancillaries used for tests

No.	Test equipment	Type	Manufacturer	Serial No.	PM. No.	Cal. Date	Cal Due
1	Antenna mast	AS615P	Deisel	615/310	480187	Calibration not necessary	
2	Fully anechoic chamber M20	B83117-E2439-T232	Albatross Projects	103	480303	Calibration not necessary	
3	Turntable	DS420 HE	Deisel	420/620/00	480315	Calibration not necessary	
4	RF-cable No.3	Sucoflex 106B	Suhner	0563/6B / Kabel 3	480670	Calibration not necessary	
5	Multiple Control Unit	MCU	Maturo GmbH	MCU/043/971107	480832	Calibration not necessary	
6	Antenna (Log.Per.)	HL050	Rohde & Schwarz	100438	481170	09.10.2017	10.2020
7	RF-Cable No. 40	Sucoflex 106B	Suhner	0708/6B / Kabel 40	481330	Calibration not necessary	
8	RF-Cable	Sucoflex 104	Huber+Suhner	517406	482391	Calibration not necessary	
9	Positioners	TDF 1.5- 10Kg	Maturo	15920215	482034	Calibration not necessary	
10	EMI Receiver / Spectrum Analyser	ESW44	Rohde & Schwarz	101635	482467	22.06.2017	06.2019
11	Fully anechoic chamber M20	B83117-E2439-T232	Albatross Projects	103	480303	Calibration not necessary	
12	Antenna support	AS620P	Deisel	620/375	480325	Calibration not necessary	
13	loop antenna	HFH2-Z2	Rohde & Schwarz	832609/014	480059	29.02.2016	03.2018
14	Antenna (Bilog)	CBL6112B	Schaffner EMV GmbH (-Chase)	2688	480328	19.06.2017	06.2020
15	Software	WMS32	Rohde & Schwarz		481800	Calibration not necessary	
16	RF-cable No.36	Sucoflex 106B	Suhner	0587/6B / Kabel 36	480865	Calibration not necessary	
17	RF-Cable	Sucoflex 104	Huber+Suhner	517402	482392	Calibration not necessary	
18	standard gain horn antenna	18240-20	Flann Microwave	483	480294	Calibration not necessary	
19	standard gain horn antenna	20240-20	Flann Microwave	411	480297	Calibration not necessary	
20	Microwave cable 2m	Insulated Wire Inc.	Insulated Wire	KPS-1533-800-KPS	480302	Calibration not necessary	
21	Preamplifier 100 MHz - 13 GHz	JS3-00101200-23-5A	MITEQ Hauppauge N.Y.	681851	480337	18.02.2016	02.2018
22	Preamplifier 18 GHz - 26 GHz	JS4-18002600-20-5A	MITEQ Hauppauge N.Y.	658697	480342	17.02.2016	02.2018
23	Preamplifier 12 GHz - 18 GHz	JS3-12001800-16-5A	MITEQ Hauppauge N.Y.	571667	480343	18.02.2016	02.2018
24	High pass Filter	WHKX4.0/18G-8SS	Wainwright Instruments GmbH	1	480587	Calibration not necessary	
25	Outdoor test site	-	PHOENIX TESTLAB GmbH	-	480293	Calibration not necessary	
26	EMI Receiver / Spectrum Analyser	ESI 40	Rohde & Schwarz	100064/040	480355	27.02.2018	02.2019
27	loop antenna	HFH2-Z2	Rohde & Schwarz	100417	481912	19.12.2017	12.2018
28	Open area test site M6	Freifeld M6	Phoenix Contact	-	480085	Calibration not necessary	
29	Antenna mast	MA240-0	Inn-Co GmbH	MA240-0/030/6600603	480086	Calibration not necessary	

No.	Test equipment	Type	Manufacturer	Serial No.	PM. No.	Cal. Date	Cal Due
30	Turntable	DS412	Deisel	412/316	480087	Calibration not necessary	
31	Controller	HD100	Deisel	100/349	480139	Calibration not necessary	
32	Software	EMC32	Rohde & Schwarz	100061	481022	Calibration not necessary	
33	Antenna (Bilog)	CBL6111D	Schaffner Elektrotest GmbH / Teseq GmbH	25761	480894	19.10.2017	10.2020
34	EMI Receiver / Spectrum Analyser	ESIB 26	Rohde & Schwarz	100292	481182	15.02.2016	02.2018
35	LISN	NSLK8128	Schwarzbeck	8128155	480058	14.03.2018	03.2020
36	Shielded chamber M4	B83117-S1-X158	Siemens	190075	480088	Calibration not necessary	
37	EMI Receiver / Spectrum Analyser	ESIB 26	Rohde & Schwarz	100292	481182	28.02.2018	02.2020
38	Transient Filter Limiter	CFL 9206A	Teseq GmbH	38268	481982	14.03.2018	03.2020

7 Report History

Report Number	Date	Comment
F170756E3	03.06.2019	Initial Test Report

8 List of Annexes

Annex A Test Setup Photos 8 pages