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Test Report

Report Number: F120019E1

Applicant:

Bron Elektronik AG

Manufacturer:

Bron Elektronik AG

Equipment under Test (EUT):

RFS 2

Laboratory (CAB) accredited by
Deutsche Gesellschaft für Akkreditierung mbH
in compliance with DIN EN ISO/IEC 17025
under the Reg. No. DGA-PL-105/99-22,
FCC Test site registration number 90877

REFERENCES

[1] **ANSI C63.4-2009** American National Standard for Methods of Measuring of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz.

[2] **FCC CFR 47 Part 15 (August 2011)** Radio Frequency Devices

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:	Thomas KÜHN		20 January 2012
	Name	Signature	Date
Authorized reviewer:	Bernd STEINER		20 January 2012
	Name	Signature	Date

RESERVATION

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.

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1 IDENTIFICATION

1.1 Applicant

Name:	Bron Elektronik AG
Address:	Hagmattstrasse 7 CH – 4123 Allschwil
Country:	Switzerland
Name for contact purposes:	Mr. Mario BORER
Phone:	+41 61 485 85 85
Fax:	+41 61 485 85 00
eMail Address:	info@bron.ch
Applicant represented during the test by the following person:	-

1.2 Manufacturer

Name:	Bron Elektronik AG
Address:	Hagmattstrasse 7 CH – 4123 Allschwil
Country:	Switzerland
Name for contact purposes:	Mr. Mario BORER
Phone:	+41 61 485 85 85
Fax:	+41 61 485 85 00
eMail Address:	info@bron.ch
Manufacturer represented during the test by the following person:	-

1.3 Test laboratory

The tests were carried out at: **PHOENIX TESTLAB GmbH**
Königswinkel 10
32825 Blomberg
Germany

accredited by DGA Deutsche Gesellschaft für Akkreditierung mbH in compliance with DIN EN ISO/IEC 17025 under Reg. No. DGA-PL-105/99-22, FCC Test site registration number 90877 and Industry Canada Test site registration IC3469A-1.

1.4 EUT (Equipment Under Test)

Test object: *	Remote control transceiver for flash units
Type: *	RFS 2
FCC ID: *	**RW3RFS24**
Serial number: *	None
PCB identifier: *	A0449B
Hardware version: *	L8277.01
Software version: *	46.02

1.5 Technical data of equipment

Channel 1	RX:	2403 MHz	TX:	2403 MHz
Channel 20	RX:	2441 MHz	TX:	2441 MHz
Channel 40	RX:	2481 MHz	TX:	2481 MHz

Antenna type: *	Integral					
Antenna gain: *	1 dB					
Rated output power: *	6 dBm					
Power supply: *	U_{nom}=	3.3 V DC	U_{min}=	3.0 V DC	U_{max}=	6.0 V DC
Type of modulation: *	FSK					
Operating frequency range: *	2403 MHz to 2481 MHz					
Number of channels: *	40					
Temperature range: *	0 °C to +45 °C					
Lowest / highest Internal clock frequency: *	16 MHz / 2.483 GHz					
Ancillary equipment:	Battery pack type MW3312, AC/DC adaptor type NK120P100PGS					

* declared by the applicant.

The following external I/O cables were used:

Identification	Connector		Length
	EUT	Ancillary	
DC in	Fixed (EUT is battery powered, wires connected for testing)	-	2 m *
Sync in	3.5 mm phone jack	-	Not used
Sync out	3.5 mm phone jack	-	Not used
USB	Mini USB plug	-	1.4 m

*: Length during the test if no other specified.

1.6 Dates

Date of receipt of test sample:	09 January 2012
Start of test:	10 January 2012
End of test:	17 January 2012

2 OPERATIONAL STATES

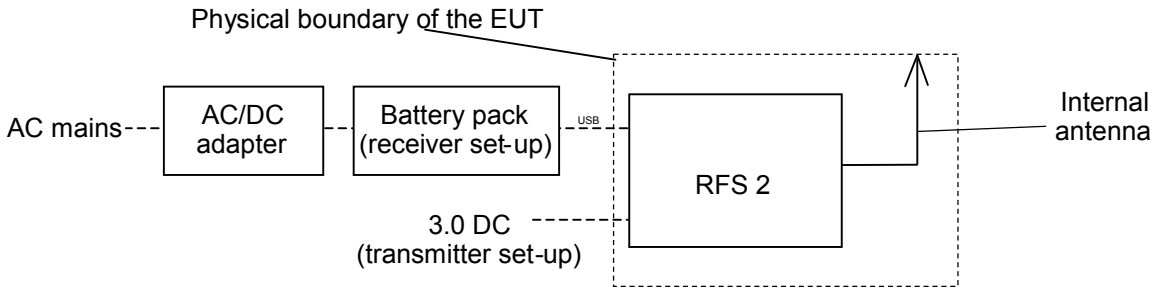
The EUT is professional photo equipment and will be used for remote controlling of flashlights. In combination with a receiver it is used to set the connected flashlights in operation wireless.

Normally the EUT is battery powered. During the tests the test sample was powered with 3 V DC via an external power supply. The EUT was modified by the applicant accordingly. Neither a battery nor a battery holder was supplied for testing.

For selecting an operation mode via the buttons of the EUT the test-engineer was instructed by the applicant.

The following operation modes were used during the tests:

Operation mode	Description of the operation mode
1	Continuous transmitting on 2403 MHz with normal modulation
2	Continuous transmitting on 2441 MHz with normal modulation
3	Continuous transmitting on 2481 MHz with normal modulation
4	Continuous receiving on 2403 MHz
5	Continuous receiving on 2440 MHz
6	Continuous receiving on 2481 MHz



The EUT is intended to be installed on the hotshoe of the camera. Therefore it was tested in two orthogonal directions to cover the two possible positions of the camera.

The two orthogonal axes were defined as Pos.1 EUT lying flat, Pos.2 EUT standing vertical on the longer side (of the carrier board).

3 ADDITIONAL INFORMATION

The EUT is a unidirectional transceiver. Only the transmitter of the EUT is active when the EUT is supplied by the internal battery. In case of a DC voltage on the USB connector, the EUT operates as receiver only. The results of the receiver measurements were documented in Annex D of this test report. During the receiver measurements the EUT was supplied by an external battery pack, which was connected to the EUT via a suitable USB cable and was charged by an AC/DC adaptor NK120P100PGS.

During the tests the sample was not labeled.

4 OVERVIEW

Application	Frequency range [MHz]	FCC 47 CFR Part 15 section [2]	Status	Refer page
20 dB bandwidth	General	15.215 (c)	Passed	8 et seq.
Radiated emissions (transmitter)	0.009 - 25,000	15.249 (a), (c), (e) 15.205 (a) 15.209 (a)	Passed	14 et seq.
Conducted emissions on supply line (transmitter)	0.15 - 30	15.207 (a)	Not applicable (battery powered device)	-
Conducted emissions on supply line (receiver)	0.15 - 30	15.107 (a)	Passed (receiver only)	Annex D
Radiated emissions (receiver)	30 - 12,500	15.109 (a)	Passed	Annex D

5 TEST RESULTS

5.1 20 dB bandwidth

5.1.1 Method of measurement (20 dB bandwidth)

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

The following spectrum analyser settings shall be used:

- Span: App. 2 times the 20 dB bandwidth, centred on the actual channel.
- Resolution bandwidth: 1% to 5% of the signal bandwidth requirements. When no bandwidth requirements are specified, the minimum resolution bandwidth of the measuring instrument is given in the table below.
- Video bandwidth: 3 times the resolution bandwidth.
- Sweep: Auto.
- Detector function: peak.
- Trace mode: Max hold.

Minimum instrument bandwidth

Fundamental frequency	Minimum resolution bandwidth
9 kHz to 30 MHz	1 kHz
30 MHz to 1000 MHz	10 kHz
1000 MHz to 40 GHz	100 kHz

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

The measurement will be performed at the upper, the lower end and the middle of the assigned frequency band.

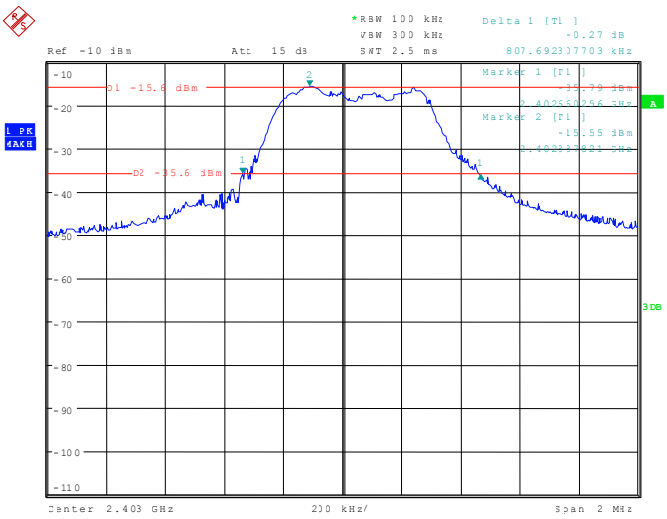
Test set-up:

5.1.2 Test results (20 dB bandwidth)

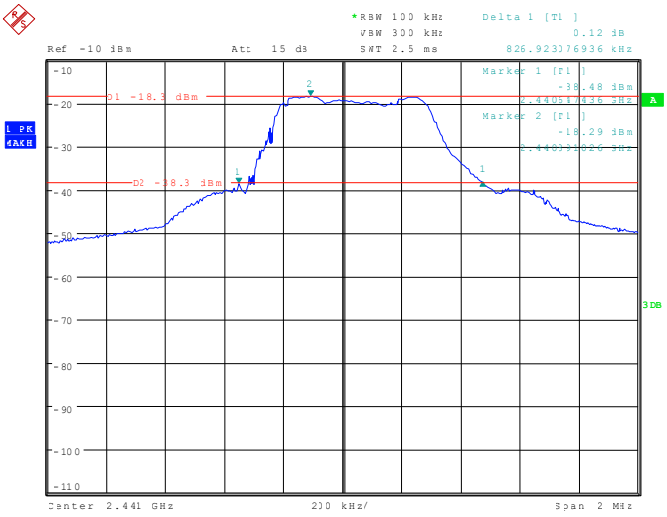
Ambient temperature	20 °C

Relative humidity	32 %

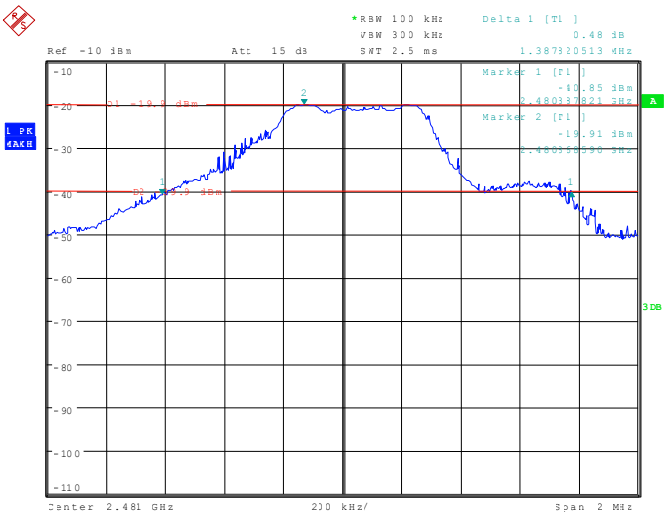
120019_23.wmf: 20 dB bandwidth at the lower end of the assigned frequency band:



120019_22.wmf: 20 dB bandwidth at the middle of the assigned frequency band:



120019_24.wmf: 20 dB bandwidth at the upper end of the assigned frequency band:



Operation mode 1 to 3			
Channel number	Channel frequency [MHz]	20 dB bandwidth [kHz]	Bandwidth limit [kHz]
1	2403	807.692	Within the assigned frequency band
20	2441	826.923	Within the assigned frequency band
40	2481	1387.821	Within the assigned frequency band
Measurement uncertainty		$< \pm 1*10^{-7}$	

Test: Passed

TEST EQUIPMENT USED FOR THE TEST:
26, 30

5.2 Band-edge compliance

5.2.1 Method of measurement (band-edge compliance (radiated))

The same test set-up as used for the final radiated emission measurement shall be used (refer also subclause 5.3.1 of this test report). The measurements shall be carried out with using a resolution bandwidth of 100 kHz.

The following spectrum analyser settings shall be used:

- Span: Wide enough to capture the peak level of the emission on the channel closest to the band-edge, as well as any modulation products, which fall outside the assigned frequency band.
- Resolution bandwidth: 100 kHz.
- Video bandwidth: ≥ the resolution bandwidth.
- Sweep: Auto.
- Detector function: Peak.
- Trace mode: Max hold.

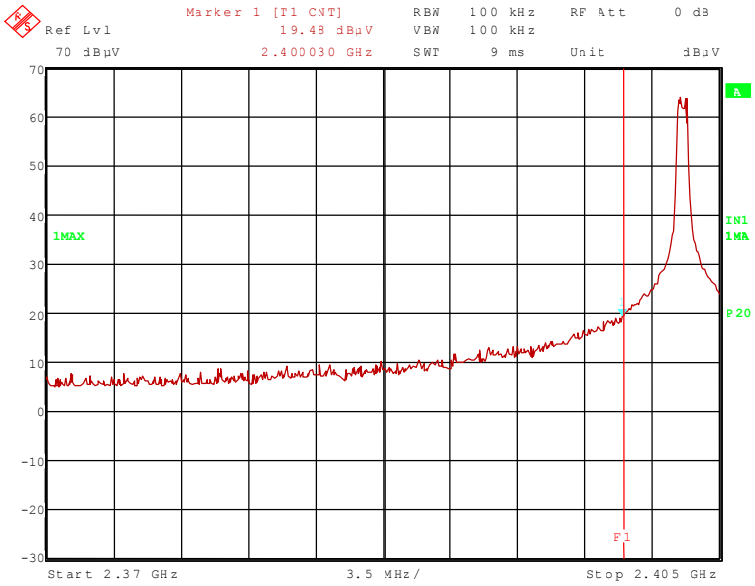
Wait after trace stabilisation. The frequency line shall be set on the edge of the assigned frequency band. Set the marker on the emission at the band-edge, or on the highest modulation product outside of the band, if this level is higher than that at the band-edge. This frequency shall be measured with the EMI receiver as described in subclause 5.7.1 of this test report, but 100 kHz resolution bandwidth shall be used.

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

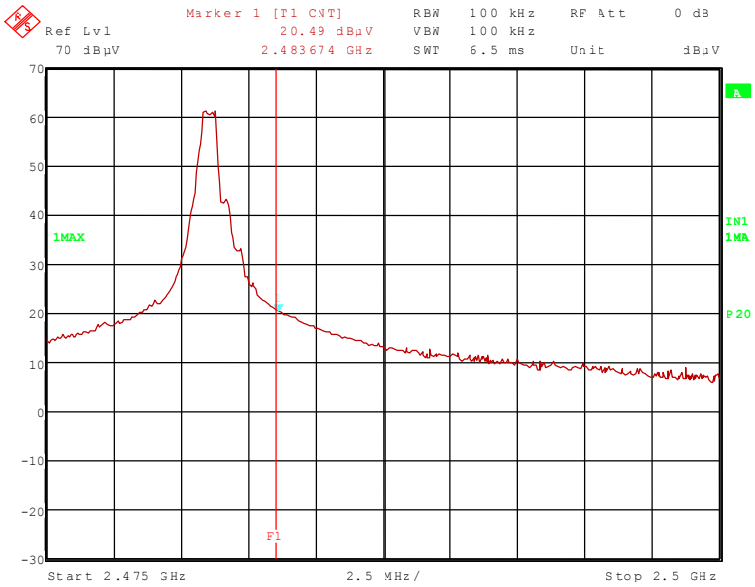
5.2.2 Test result (band-edge compliance (radiated))

Ambient temperature	21 °C		Relative humidity	32 %

120019_2.wmf: Radiated band-edge compliance, lower band edge (operation mode 1):



120019_5.wmf: Radiated band-edge compliance, upper band edge (operation mode 3):



The plots on the page before are showing the radiated band-edge compliance for the upper band-edge, with and without hopping. The display line 1 (D1) in these plots represents the highest level within the assigned frequency band. The display line 2 (D2) represents the 20 dB offset to this highest level and shows the compliance with FCC 47 CFR Part 15.247 (d). The frequency line 1 (F1) shows the edge of the assigned frequency.

Band-edge compliance (lower band edge)											
Result measured with the peak detector:											
Frequency GHz	Corr. value dBµV/m	Limit dBµV/m	Margin dB	Reading dBµV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Restr. Band	Pos.
2.403	95.6	-	-	63.6	28.3	0.0	3.7	150	Vert.	-	2
2.40003	51.9	74.0	22.1	19.9	28.3	0.0	3.7	150	Vert.	No	2
Result measured with the average detector:											
Frequency GHz	Corr. value dBµV/m	Limit dBµV/m	Margin dB	Reading dBµV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Restr. Band	Pos.
2.403	88.7	-	-	56.7	28.3	0.0	3.7	150	Vert.	-	2
2.40003	29.2	54.0	24.8	-2.8	28.3	0.0	3.7	150	Vert.	No	2
Measurement uncertainty							+2.2 dB / -3.6 dB				

Band-edge compliance (upper band edge)											
Result measured with the peak detector:											
Frequency GHz	Corr. value dBµV/m	Limit dBµV/m	Margin dB	Reading dBµV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Restr. Band	Pos.
2.481	94.6	-	-	62.3	28.5	0.0	3.8	150	Vert.	-	2
2.48367	52.2	74.0	21.8	19.9	28.5	0.0	3.8	150	Vert.	Yes	2
Result measured with the average detector:											
Frequency GHz	Corr. value dBµV/m	Limit dBµV/m	Margin dB	Reading dBµV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Restr. Band	Pos.
2.481	87.7	-	-	55.4	28.5	0.0	3.8	150	Vert.	-	2
2.48367	29.8	54.0	24.2	-2.5	28.5	0.0	3.8	150	Hor.	Yes	2
Measurement uncertainty							+2.2 dB / -3.6 dB				

Test: Passed

TEST EQUIPMENT USED FOR THE TEST:
29, 31 – 34, 36, 44

5.3 Radiated emissions

5.3.1 Method of measurement (radiated emissions)

The radiated emission measurement is subdivided into four stages.

- A preliminary measurement carried out in a fully anechoic chamber with a fixed antenna height in the frequency range 30 MHz to 1 GHz.
- 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 1 GHz to 110 GHz.
- A final measurement carried out in a fully anechoic chamber with a fixed antenna height in the frequency range 1 GHz to 110 GHz.

All measurements will be carried out with the EUT working on the middle of the assigned frequency band.

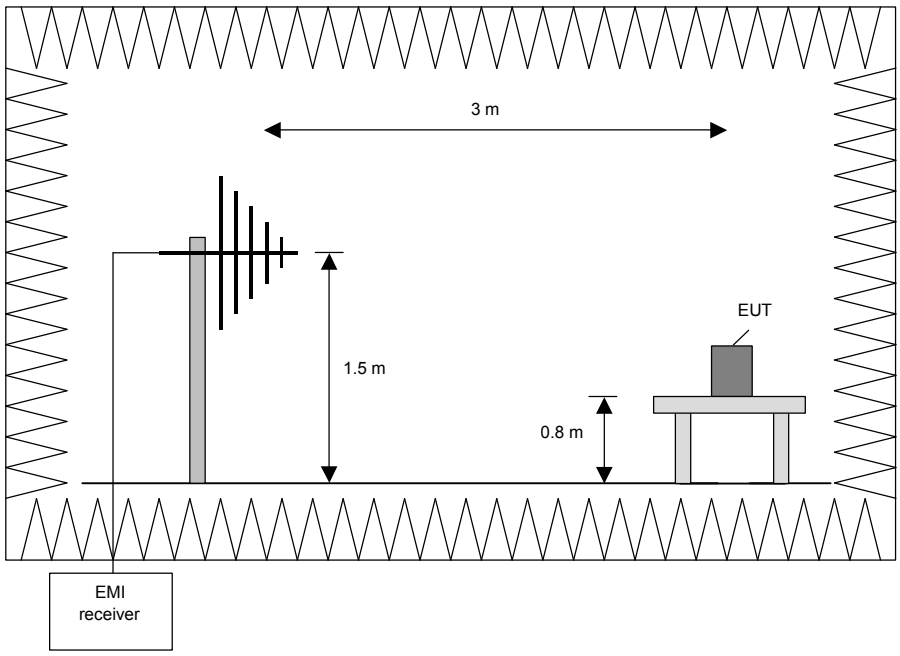
Preliminary measurement (30 MHz to 1 GHz)

In the first stage a preliminary measurement will be performed in a fully anechoic chamber with a measuring distance of 3 meter. 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. 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 ANSI C63.4-2009 [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 polarisation of the measuring antenna and while rotating the EUT in its vertical axis in the range of 0 ° to 360 °.

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:

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

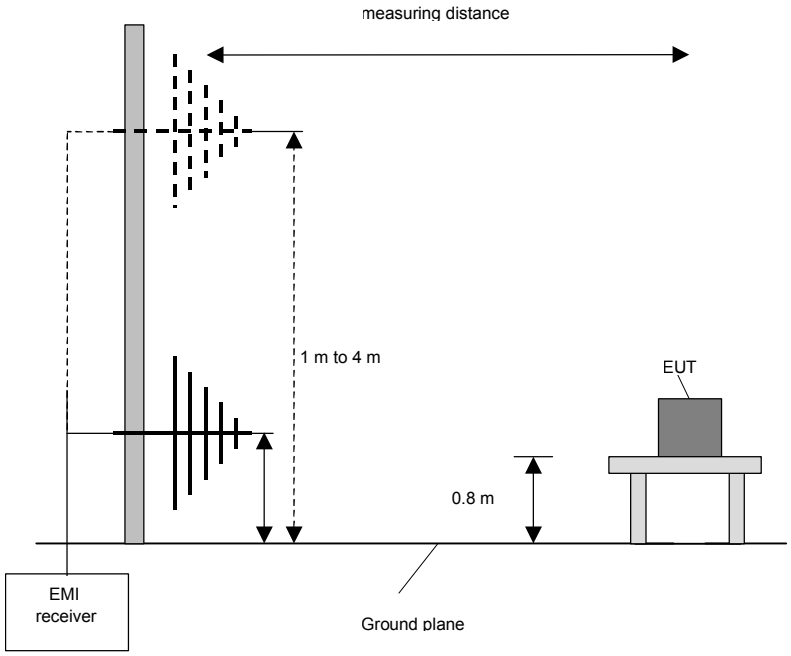
1. Monitor the frequency range at horizontal polarisation and a EUT azimuth of 0 °.
2. Manipulate the system cables within the range to produce the maximum level of emission.
3. Rotate the EUT by 360 ° to maximize the detected signals.
4. Make a hardcopy of the spectrum.
5. Measure the frequency of the detected emissions with a lower span and resolution bandwidth to increase the accuracy and note the frequency value.
6. Repeat 1) to 4) with the other orthogonal axes of the EUT (because of EUT is a module and might be used in a handheld equipment application).
7. Repeat 1) to 5) with the vertical polarisation of the measuring antenna.

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 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 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 110 GHz)

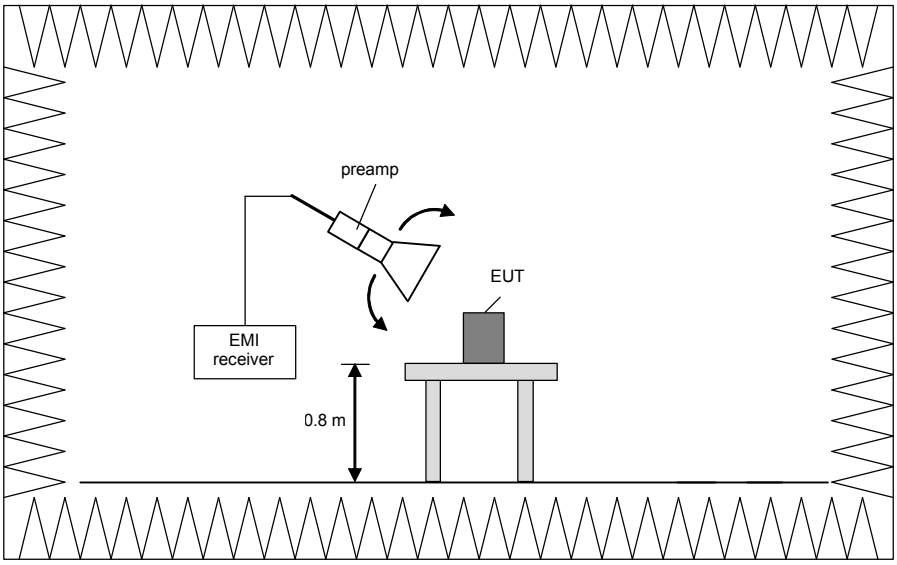
This measurement will be performed in a fully anechoic chamber. Tabletop devices will set up on a non-conducting support with a size of 1 m by 1.5 m and a height of 80 cm. Floor-standing devices will be placed directly on the turntable/ground plane. The set up of the Equipment under test will be in accordance to ANSI C63.4-2009 [1].

Preliminary measurement (1 GHz to 110 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, the antenna close to the EUT and while moving the antenna over all sides of the EUT. With the spectrum analyser in CLEAR / WRITE mode the cone of the emission should be found and than the measuring distance will be set to 3 m with the receiving antenna moving in this cone of emission. At this position the final measurement will be carried out.

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 26.5 GHz	100 kHz
26.5 GHz to 40 GHz	100 kHz
40 GHz to 60 GHz	100 kHz
50 GHz to 75 GHz	100 kHz
75 GHz to 110 GHz	100 kHz

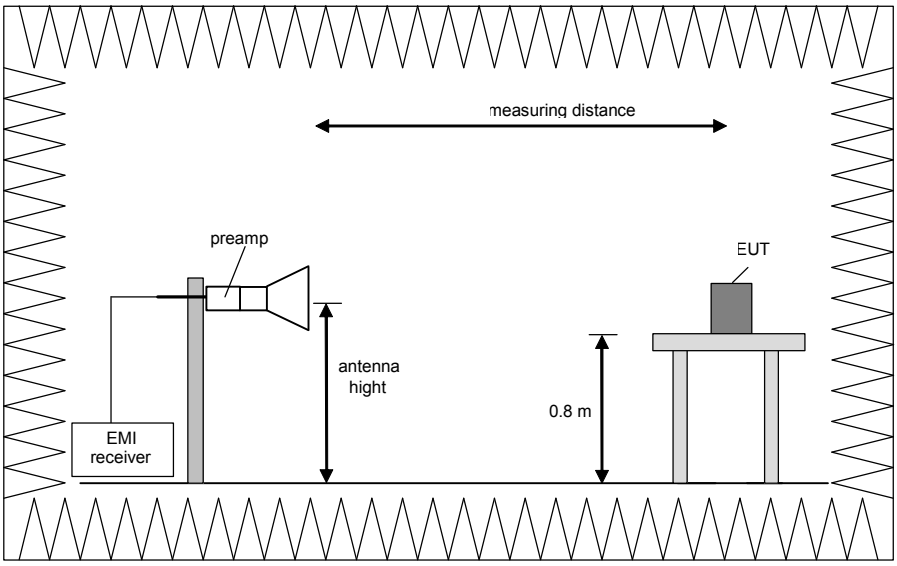


Final measurement (1 GHz to 110 GHz)

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 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 ° in order to have the antenna inside the cone of radiation.

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 26.5 GHz	1 MHz
26.5 GHz to 40 GHz	1 MHz
40 GHz to 60 GHz	1 MHz
50 GHz to 75 GHz	1 MHz
75 GHz to 110 GHz	1 MHz



Procedure of measurement:

The measurements were performed in the frequency range 1 GHz to 4 GHz, 4 GHz to 12 GHz, 12 GHz to 18 GHz, 18 GHz to 26.5 GHz, 26.5 GHz to 40 GHz, 40 GHz to 60 GHz, 60 GHz to 75 GHz and 75 GHz to 110 GHz.
The following procedure will be used:

1) Monitor the frequency range at horizontal polarisation and move the antenna over all sides of the EUT (if necessary move the EUT to another orthogonal axis).
2) Change the antenna polarisation and repeat 1) with vertical polarisation.
3) Make a hardcopy of the spectrum.
4) Measure the frequency of the detected emissions with a lower span and resolution bandwidth to increase the accuracy and note the frequency value.
5) Change the analyser mode to Clear / Write and found the cone of emission.
6) Rotate and move the EUT, so that the measuring distance can be enlarged to 3 m and the antenna will be still inside the cone of emission.
7) Measure the level of the detected frequency with the correct resolution bandwidth, with the antenna polarisation and azimuth and the peak and average detector, which causes the maximum emission.
8) Repeat steps 1) to 7) for the next antenna spot if the EUT is larger than the antenna beamwidth.

Step 1) to 6) are defined as preliminary measurement.

5.3.2 Test results (radiated emissions)

5.3.2.1 Preliminary emission measurement (1 MHz to 25 GHz)

Ambient temperature	20 °C	Relative humidity	32 %

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 3 m.

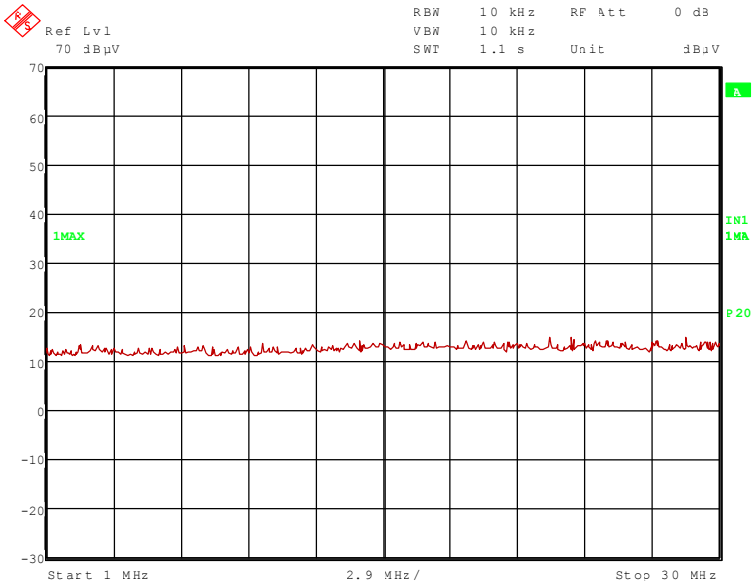
Cable guide: For detail information of test set-up and the cable guide refer to the pictures in annex A of this test report.

Test record: All results are shown in the following.

Supply voltage: During all measurements the EUT was supplied with 3.0 V DC by an external power supply.

Remark: No emissions were emitted in the frequency range 1 MHz to 1 GHz independent of the transmitter operation mode. Therefore the emissions in this frequency range were documented only with the transmitter operates in operation mode 2.

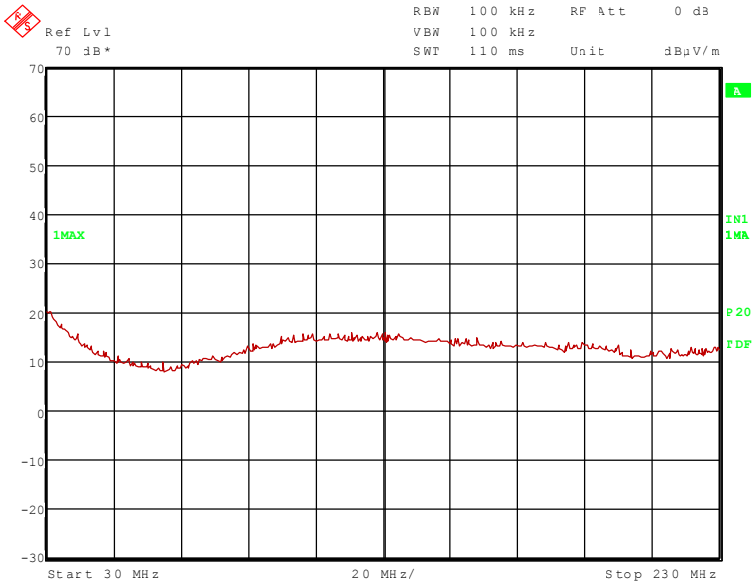
120019_17.wmf: Spurious emissions from 1 MHz to 30 MHz (operation mode 2):



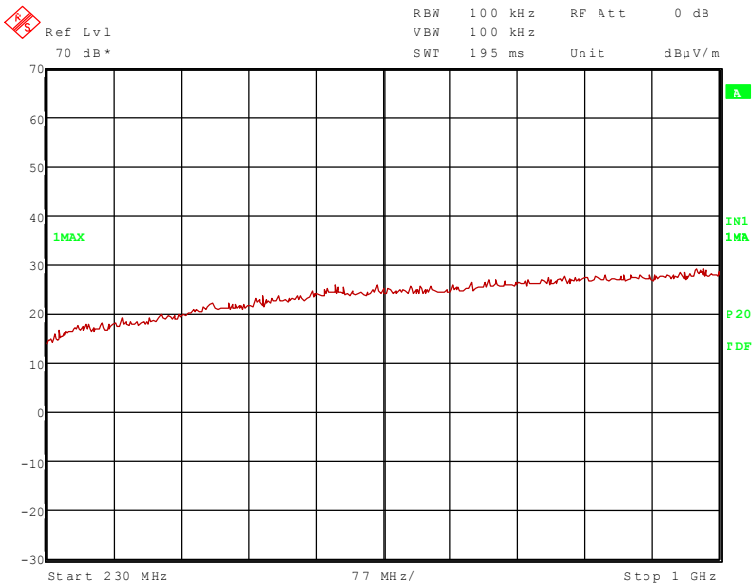
No significant frequencies above the noise floor of the system were found during the preliminary radiated emission test, so no measurements were carried out on the outdoor test site.

TEST EQUIPMENT USED FOR THE TEST:
29, 31 - 37, 39, 43, 44, 46, 49 - 51, 55, 72

120019_15.wmf: Spurious emissions from 30 MHz to 230 MHz (operation mode 2):



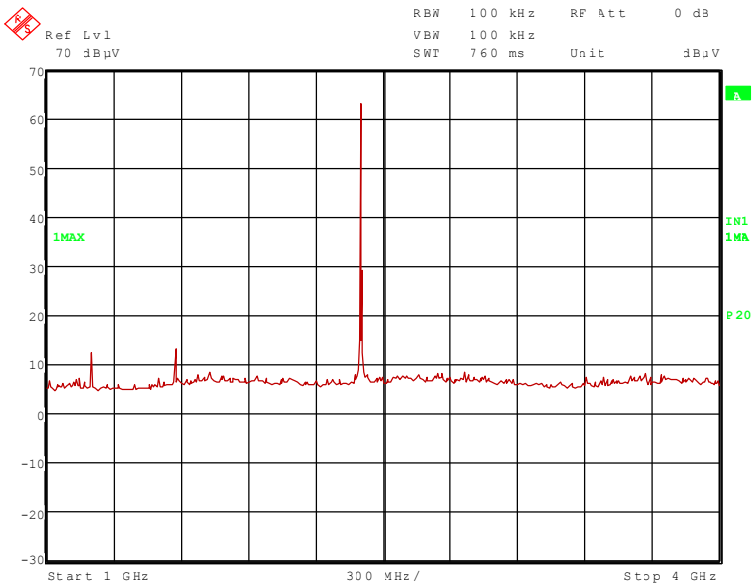
120019_16.wmf: Spurious emissions from 230 MHz to 1 GHz (operation mode 2):



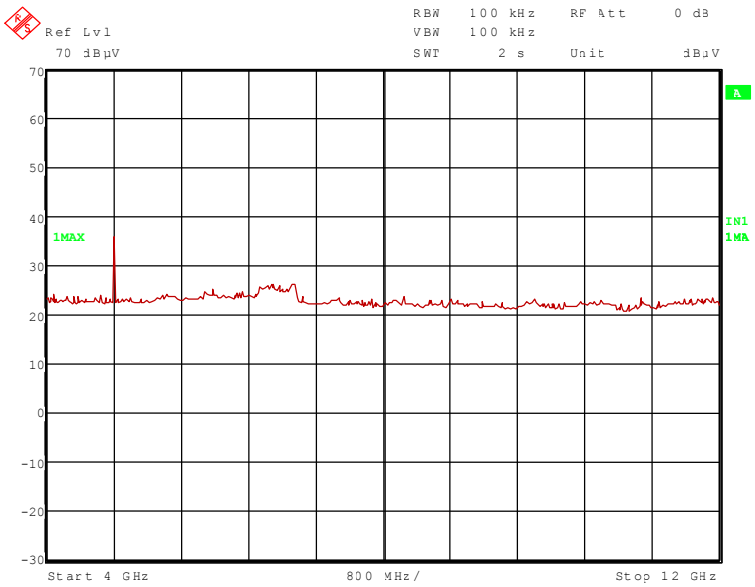
No significant frequencies above the noise floor of the system were found during the preliminary radiated emission test, so no measurements were carried out on the open area test site.

Transmitter operates at the lower end of the assigned frequency band

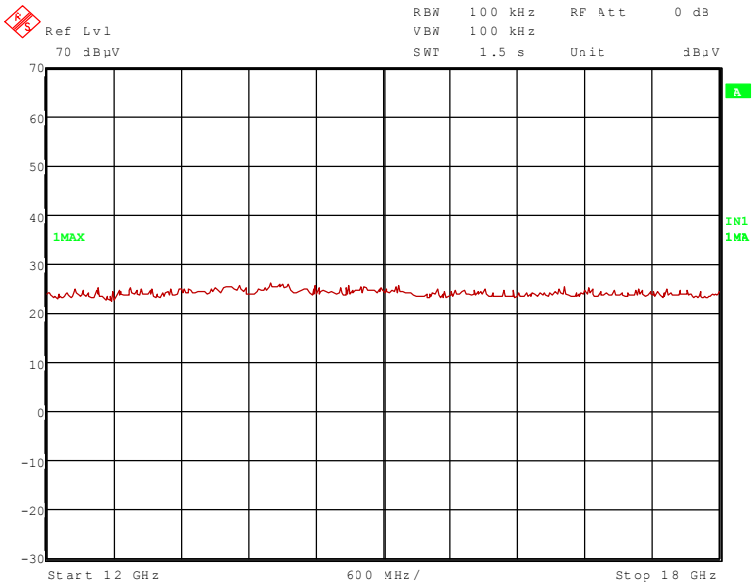
120019_1.wmf: Spurious emissions from 1 GHz to 4 GHz (operation mode 1):



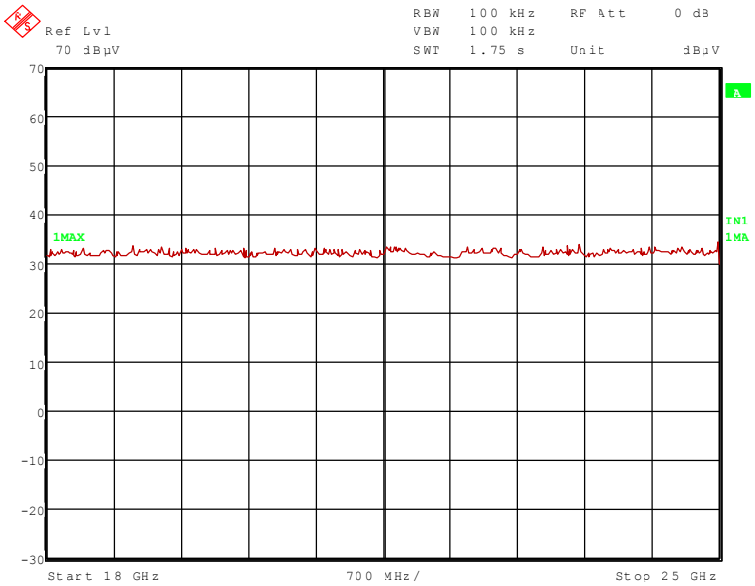
120019_6.wmf: Spurious emissions from 4 GHz to 12 GHz (operation mode 1):



120019_13.wmf: Spurious emissions from 12 GHz to 18 GHz (operation mode 1):



120019_14.wmf: Spurious emissions from 18 GHz to 25 GHz (operation mode 1):



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

- 1.2015 GHz, 1.577 GHz and 4.806 GHz.

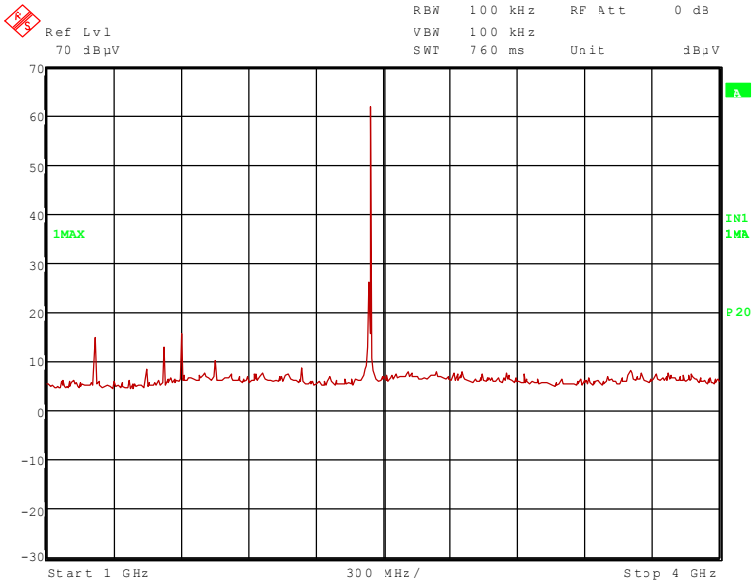
The following frequency was found outside the restricted bands during the preliminary radiated emission test:

- 2.403 GHz.

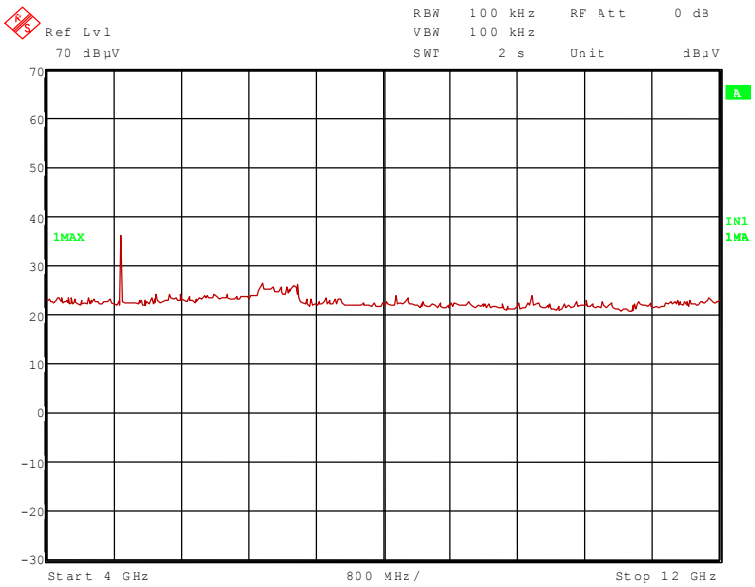
These frequencies have to be measured in a final measurement. The results were presented in the following.

Transmitter operates on the middle of the assigned frequency band

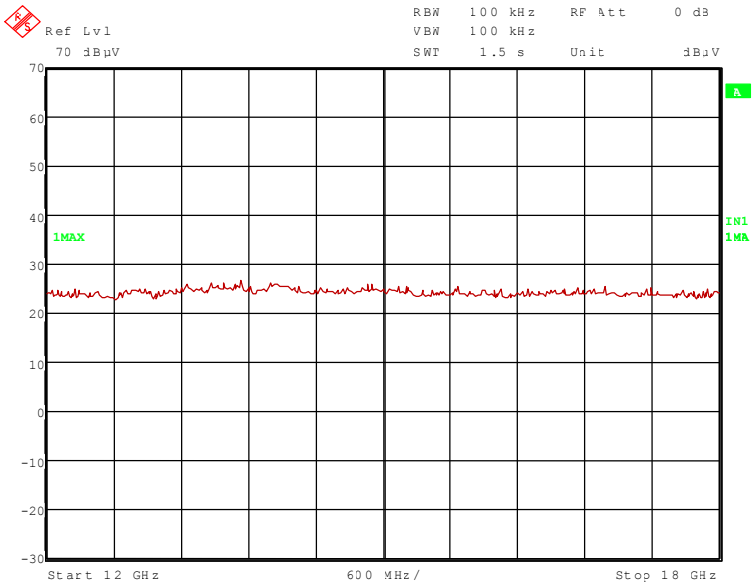
120019_3.wmf: Spurious emissions from 1 GHz to 4 GHz (operation mode 2):



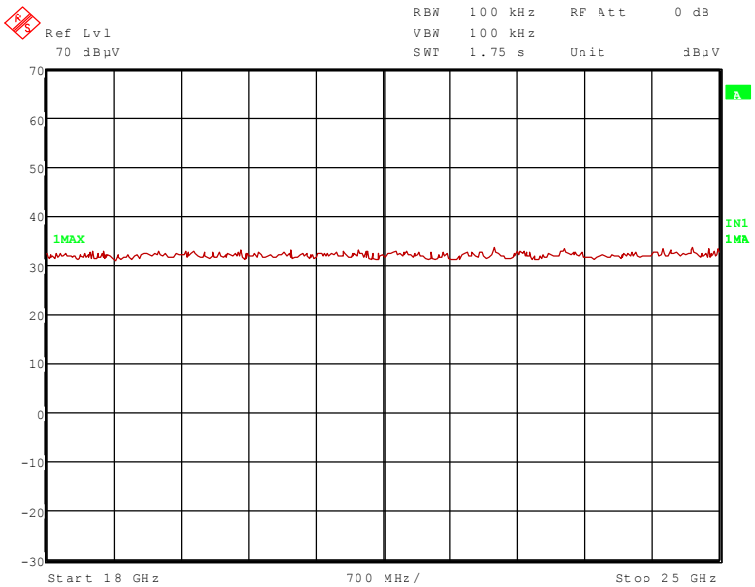
120019_7.wmf: Spurious emissions from 4 GHz to 12 GHz (operation mode 2):



120019_12.wmf: Spurious emissions from 12 GHz to 18 GHz (operation mode 2):



120019_11.wmf: Spurious emissions from 18 GHz to 25 GHz (operation mode 2):



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

- 1.2205 GHz, 1.5256 GHz, 1.6020 GHz and 4.882 GHz.

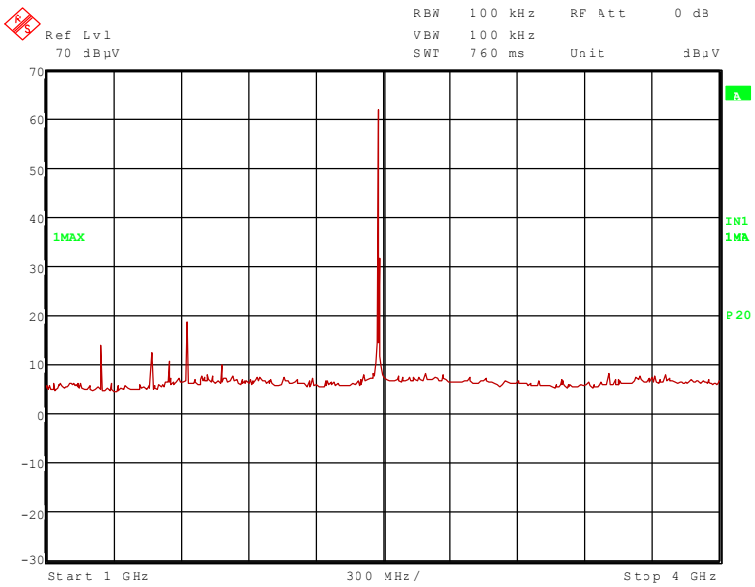
The following frequency was found outside the restricted bands during the preliminary radiated emission test:

- 2.441 GHz.

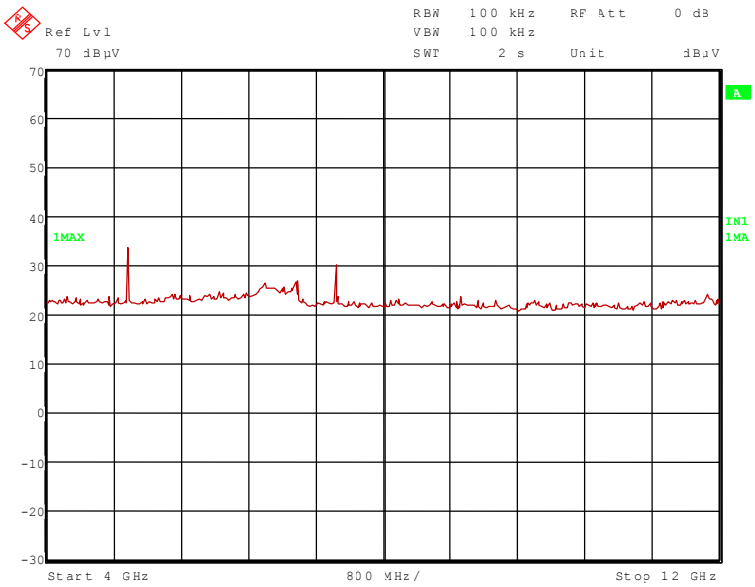
These frequencies have to be measured in a final measurement. The results were presented in the following.

Transmitter operates on the upper end of the assigned frequency

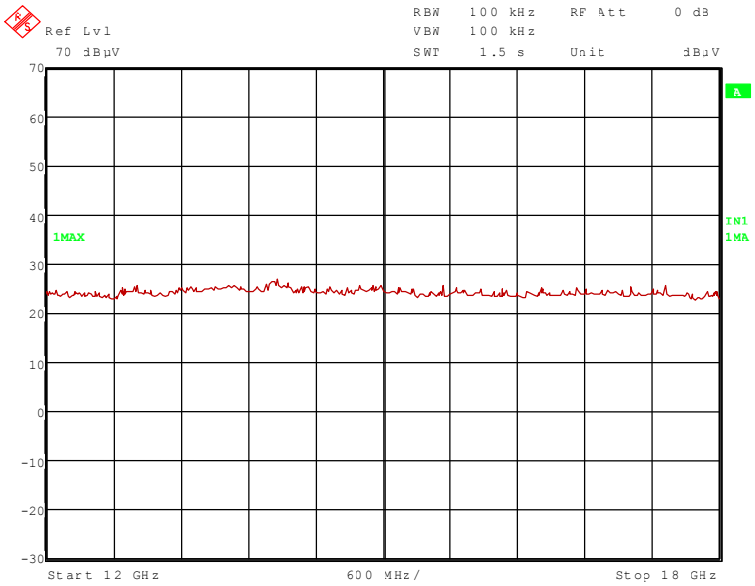
120019_4.wmf: Spurious emissions from 1 GHz to 4 GHz (operation mode 3):



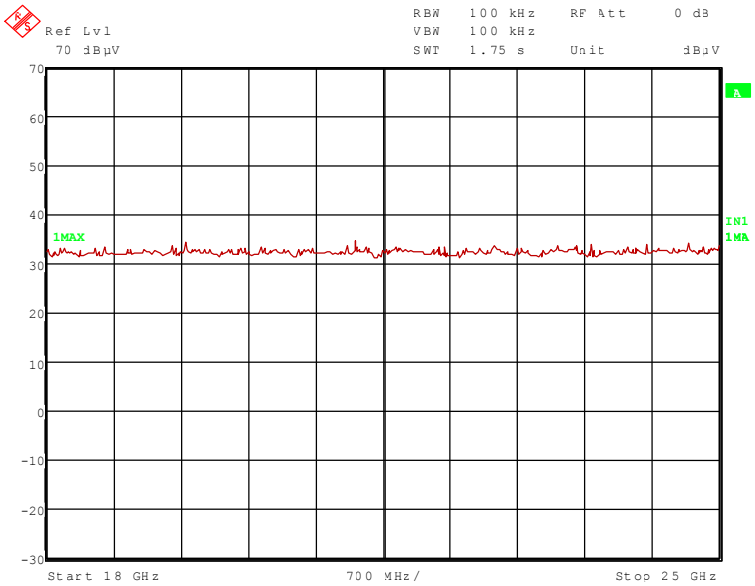
120019_8.wmf: Spurious emissions from 4 GHz to 12 GHz (operation mode 3):



120019_9.wmf: Spurious emissions from 12 GHz to 18 GHz (operation mode 3):



120019_10.wmf: Spurious emissions from 18 GHz to 25 GHz (operation mode 3):



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

- 1.4730 GHz, 4.962 GHz and 7.443 GHz.

The following frequency was found outside the restricted bands during the preliminary radiated emission test:

- 1.2405 GHz, 1.6281 GHz and 2.481 GHz.

These frequencies have to be measured in a final measurement. The results were presented in the following.

5.3.2.2 Final radiated emission measurement (1 GHz to 25 GHz)

Ambient temperature	20 °C	Relative humidity	32 %

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 3 m.

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: During all measurements the EUT was supplied with 3.0 V DC by an external power supply.

Resolution bandwidth: For all measurements a resolution bandwidth of 1 MHz was used.

Transmitter operates at the lower end of the assigned frequency band (operation mode 1)

Result measured with the peak detector:

Frequency GHz	Corr. value dBµV/m	Limit dBµV/m	Margin dB	Readings dBµV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Restr. Band	Pos.
2.403	95.6	114.0	18.4	63.6	28.3	0.0	3.7	150	Vert.	-	2
1.2015	46.4	74.0	27.6	18.9	24.9	0.0	2.6	150	Vert.	Yes	2
1.577	48.3	74.0	25.7	20.0	25.3	0.0	3.0	150	Hor.	Yes	2
4.806	52.9	74.0	21.1	40.7	32.6	25.7	5.3	150	Hor.	Yes	2
Measurement uncertainty						+2.2 dB / -3.6 dB					

Result measured with the average detector:

Frequency GHz	Corr. value dBµV/m	Limit dBµV/m	Margin dB	Readings dBµV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Restr. Band	Pos.
2.403	88.7	94.0	5.3	56.7	28.3	0.0	3.7	150	Vert.	-	2
1.2015	36.3	54.0	17.7	8.8	24.9	0.0	2.6	150	Vert.	Yes	2
1.577	37.2	54.0	16.8	8.9	25.3	0.0	3.0	150	Hor.	Yes	2
4.806	43.0	54.0	11.0	30.8	32.6	25.7	5.3	150	Hor.	Yes	2
Measurement uncertainty						+2.2 dB / -3.6 dB					

Transmitter operates at the middle of the assigned frequency band (operation mode 2)

Result measured with the peak detector:

Frequency GHz	Corr. value dBµV/m	Limit dBµV/m	Margin dB	Readings dBµV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Restr. Band	Pos.
2.441	95.2	114.0	18.8	63.1	28.4	0.0	3.7	150	Vert.	-	2
1.2205	47.7	74.0	26.3	20.2	24.9	0.0	2.6	150	Vert.	Yes	2
1.5256	47.2	74.0	26.8	19.0	25.3	0.0	2.9	150	Hor.	Yes	2
1.6020	49.6	74.0	24.4	21.3	25.3	0.0	3.0	150	Hor.	Yes	2
4.882	53.1	74.0	20.9	40.7	32.8	25.7	5.3	150	Vert.	Yes	2
Measurement uncertainty						+2.2 dB / -3.6 dB					

Result measured with the average detector:

Frequency GHz	Corr. value dBµV/m	Limit dBµV/m	Margin dB	Readings dBµV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Restr. Band	Pos.
2.441	88.2	94.0	5.8	56.1	28.4	0.0	3.7	150	Vert.	-	2
1.2205	38.2	54.0	15.8	10.7	24.9	0.0	2.6	150	Vert.	Yes	2
1.525.	36.1	54.0	17.9	7.9	25.3	0.0	2.9	150	Hor.	Yes	2
1.6020	38.6	54.0	15.4	10.3	25.3	0.0	3.0	150	Hor.	Yes	2
4.882	42.8	54.0	11.2	30.4	32.8	25.7	5.3	150	Vert.	Yes	2
Measurement uncertainty						+2.2 dB / -3.6 dB					

Transmitter operates at the upper end of the assigned frequency band (operation mode 3)

Result measured with the peak detector:

Frequency GHz	Corr. value dBµV/m	Limit dBµV/m	Margin dB	Readings dBµV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Restr. Band	Pos.
2.481	94.6	114.0	19.4	62.3	28.5	0.0	3.8	150	Vert.	-	2
1.2405	46.8	74.0	27.2	19.2	24.9	0.0	2.7	150	Hor.	No	2
1.4730	46.3	74.0	27.7	18.1	25.3	0.0	2.9	150	Vert.	Yes	2
1.6281	51.8	74.0	22.2	23.3	25.4	0.0	3.1	150	Hor.	No	2
4.962	50.8	74.0	23.2	38.2	32.9	25.6	5.3	150	Hor.	Yes	2
7.443	53.8	74.0	20.2	35.2	36.3	24.5	6.8	150	Vert.	Yes	2
Measurement uncertainty						+2.2 dB / -3.6 dB					

Result measured with the average detector:

Frequency GHz	Corr. value dBµV/m	Limit dBµV/m	Margin dB	Readings dBµV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Restr. Band	Pos.
2.481	87.7	94.0	6.3	55.4	28.5	0.0	3.8	150	Vert.	-	2
1.2405	36.0	54.0	18.0	8.4	24.9	0.0	2.7	150	Hor.	No	2
1.4730	34.3	54.0	19.7	6.1	25.3	0.0	2.9	150	Vert.	Yes	2
1.6281	41.6	54.0	12.4	13.1	25.4	0.0	3.1	150	Hor.	No	2
4.962	40.2	54.0	13.8	27.6	32.9	25.6	5.3	150	Hor.	Yes	2
7.443	41.3	54.0	12.7	22.7	36.3	24.5	6.8	150	Vert.	Yes	2
Measurement uncertainty						+2.2 dB / -3.6 dB					

Test: Passed

TEST EQUIPMENT USED FOR THE TEST:
29, 31 –34, 36, 37, 39, 44, 46, 49 - 51, 72

6 TEST EQUIPMENT AND ANCILLARIES USED FOR TESTS

No.	Test equipment	Type	Manufacturer	Serial No.	PM. No.	Cal. Date	Cal. due
1	Shielded chamber M4	-	Siemens AG	B83117-S1-X158	480088	Weekly verification (system cal.)	
2	EMI Receiver	ESIB 26	Rohde & Schwarz	1088.7490	481182	02/08/2010	02/2012
3	LISN	NSLK8128	Schwarzbeck	8128161	480138	12/13/2011	12/2012
4	High pass filter	HR 0.13-5ENN	FSY Microwave Inc.	DC 0109 SN 002	480340	Weekly verification (system cal.)	
14	Open area test site	-	Phoenix Test-Lab	-	480085	Weekly verification (system cal.)	
15	Measuring receiver	ESIB7	Rohde & Schwarz	100304	480521	03/15/2010	03/2012
16	Controller	HD100	Deisel	100/670	480139	-	-
17	Turntable	DS420HE	Deisel	420/620/80	480087	-	-
18	Antenna support	AS615P	Deisel	615/310	480086	-	-
19	Antenna	CBL6111 D	Chase	25761	480894	09/18/2008	09/2012
20	EMI Software	ES-K1	Rohde & Schwarz	-	480111	-	-
26	Test fixture	-	Phoenix Test-Lab	-	410160	Weekly verification (system cal.)	
29	Fully anechoic chamber M20	-	Albatross Projects	B83107-E2439-T232	480303	Weekly verification (system cal.)	
30	Spectrum analyser	FSU	Rohde & Schwarz	200125	480956	04/15/2010	04/2012
31	Measuring receiver	ESI 40	Rohde & Schwarz	100064	480355	07/29/2011	07/2013
32	Controller	MCU	Maturo	MCU/043/971107	480832	-	-
33	Turntable	DS420HE	Deisel	420/620/80	480315	-	-
34	Antenna support	AS615P	Deisel	615/310	480187	-	-
35	Antenna	CBL6112 B	Chase	2688	480328	04/21/2011	04/2014
36	Antenna	3115 A	EMCO	9609-4918	480183	11/09/2011	11/2014
37	Standard Gain Horn 11.9 GHz – 18 GHz	18240-20	Flann Microwave	483	480294	Six month verification (system cal.)	
39	Standard Gain Horn 17.9 GHz – 26.7 GHz	20240-20	Flann Microwave	411	480297	Six month verification (system cal.)	
43	RF-cable No. 36	Sucoflex 106B	Suhner	0522/6B	480571	Weekly verification (system cal.)	
44	RF-cable No. 31	RTK 081	Rosenberger	-	410142	Weekly verification (system cal.)	
46	RF-cable 1 m	KPS-1533-400-KPS	Insulated Wire	-	480301	Six month verification (system cal.)	
49	Preamplifier	JS3-00101200-23-5A	Miteq	681851	480337	Six month verification (system cal.)	
50	Preamplifier	JS3-12001800-16-5A	Miteq	571667	480343	Six month verification (system cal.)	
51	Preamplifier	JS3-18002600-20-5A	Miteq	658697	480342	Six month verification (system cal.)	
55	Loop antenna	HFH2-Z2	Rohde & Schwarz	832609/014	480059	03/10/2010	03/2012
72	4 GHz High Pass Filter	WHKX4.0/18G-8SS	Wainwright Instruments	1	480587	Weekly verification (system cal.)	

7 REPORT HISTORY

Report Number	Date	Comment
F120019E1	20 January 2012	Document created

8 LIST OF ANNEXES

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120019_2.JPG: RFS 2 transmitter, test set-up fully anechoic chamber (Pos. 2)
120019_10.JPG: RFS 2 receiver, test set-up fully anechoic chamber (Pos. 1)
120019_13.JPG: RFS 2 receiver, test set-up fully anechoic chamber (Pos. 2)
120019_6.JPG: RFS 2 transmitter, test set-up fully anechoic chamber
120019_5.JPG: RFS 2 transmitter, test set-up fully anechoic chamber
120019_1.JPG: RFS 2 transmitter, test set-up fully anechoic chamber
120019_16.JPG: RFS 2 receiver, test set-up shielded room

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120019_e.JPG: RFS 2, PCB, top view
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120019_b.JPG: RFS 2, 3-D view 2

ANNEX D RESULTS OF THE RECEIVER MEASUREMENTS 8 pages