PHOENIX TESTLAB
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32825 Blomberg
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TEST REPORT

Test Report Reference: F090192E1

Equipment under Test / modelname: EZ13-00102

FCC ID: WSP-EZ1300102

IC: 7994A-EZ1300102

Serial Number: None

Applicant: Hermann Sewerin GmbH

Manufacturer: Hermann Sewerin GmbH

Test Laboratory
(CAB)
accredited by
DATech in der TGA GmbH
in compliance with DIN EN ISO/IEC 17025
under the
Reg. No. DAT-P-105/99-21,
FCC Test site registration number 90877
and
Industry Canada Test site registration IC3469 and
FCC Test site registration number 90877

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1 IDENTIFICATION

1.1 APPLICANT

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1.2 MANUFACTURER

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Country:	Germany
Name for contact purposes:	Mr. Michael BRUCH
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1.3 DATES

Date of receipt of test sample:	29 April 2009
Start of test:	30 April 2009
End of test:	13 May 2009

1.4 TEST LABORATORY

The tests were carried out at: **PHOENIX TESTLAB GmbH**
Königswinkel 10
D-32825 Blomberg **Phone:** **+49 (0) 52 35 / 95 00-0**
Germany **Fax:** **+49 (0) 52 35 / 95 00-10**

accredited by DATech in der TGA GmbH in compliance with DIN EN ISO/IEC 17025 under Reg. No. DAT-P-105/99, Industry Canada Test site registration IC3469 and FCC Test site registration number 90877.

Test engineer:	Thomas KÜHN		18 May 2009
	Name	Signature	Date
Test report checked:	Bernd STEINER		18 May 2009
	Name	Signature	Date

PHOENIX TESTLAB GmbH
Königswinkel 10
32825 Blomberg
Tel. 0 52 35 / 95 00-0
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Stamp

1.5 RESERVATION

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1.6 NORMATIVE REFERENCES

[1] **ANSI C63.4-2003** 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 (October 2008)** Radio Frequency Devices

[3] **FCC Public Notice DA 00-705 (March 2000)**

[4] **RSS-210 Issue 7 (June 2007)** Low-power Licence-exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment

[5] **RSS-Gen Issue 2 (June 2007)** General Requirements and Information for the Certification of Radiocommunication Equipment

1.7 TEST RESULTS

The requirements of this test document are fulfilled by the equipment under test. The complete test results are presented in the following.

2 TECHNICAL DATA OF EQUIPMENT

Type of equipment: *	Transceiver module for audio applications					
Type designation / modelname: *	EZ13-00102					
Hardware version: *	1.0					
Software version: *	1.0					
FCC ID: *	WSP-EZ1300102					
IC: *	7994A-EZ1300102					
Antenna type: *	Dedicated external wire antenna					
Antenna gain: *	<2.1 dBi					
Antenna connector: *	U.F.L.					
Power supply: *	U_{nom}=	3.3 V DC	U_{min}=	3.23 V DC	U_{max}=	3.37 V DC
Type of modulation: *	FHSS (GFSK)					
Operating frequency range:*	2408 MHz to 2476 MHz					
Number of channels: *	38					
Temperature range: *	-20 °C to +60 °C					

*: declared by the applicant

The EUT operates in the unlicensed ISM band at 2.4 GHz. In North America (USA and Canada) a band with a width of 83.5 MHz is available. In this band 38 RF channels spaced at least 1 MHz apart are defined. The channel is represented by a fixed hopping sequence through the 38 channels. The normally occupancy time of one frequency will be 100 µs. The ordinary hopping rate will be 1667 hops/s. All frequencies will be used equally.

The following external I/O cables were used:

Identification	Connector		Lenght
	EUT	Ancillary	
Power supply (carrier board)	USB plug type B	-	2 m
-	-	-	-
-	-	-	-

*: Length during the test if no other specified.

2.1 PERIPHERY DEVICES

The following equipment was used as control unit and ancillary equipment:

- During the conducted emission measurement on AC power supply line, the EUT was powered by an iPod USB power adapter.

3 OPERATIONAL STATES AND PHYSICAL BOUNDARIES

The EUT is intended to be used in several audio applications. All radiated tests were carried out with a sample with dedicated antenna; conductive tests were carried at the antenna connector. During all tests the EUT was mounted on a carrier board. The operation mode could be chosen by pressing a button on the carrier board. The adjusted test mode was displayed on the carrier board.

During the all tests the EUT was powered by an external 5.0 V DC power supply via the carrier board.

If not otherwise stated, for modulating the transmitter, a pseudo random bit sequence was used.

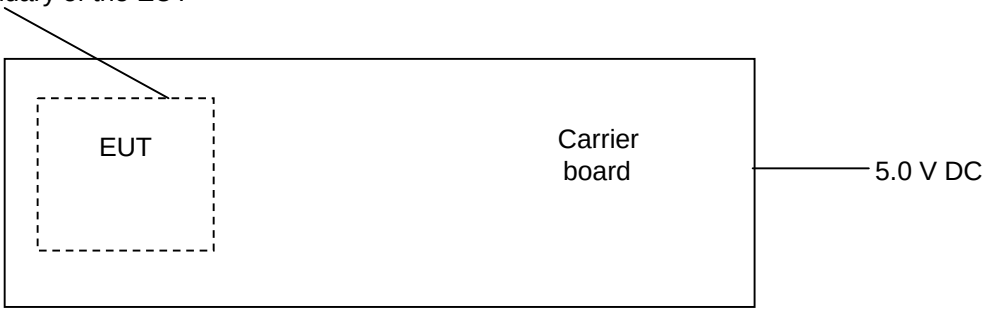
During the tests, the EUT was not labelled with a FCC-label.

Because the EUT is a module, all radiated tests were carried out in three following orthogonal directions of the EUT:
Position 1: EUT (on carrier board) stand up.
Position 2: EUT (on carrier board) lying.
Position 3: EUT (on carrier board) stand up on left hand side.

The following operation modes were used during the tests:

Operation mode	Description of the operation mode
1	Continuous transmitting on 2408 MHz
2	Continuous transmitting on 2444 MHz
3	Continuous transmitting on 2476 MHz
4	Transmitter hopping on all channels
5	Continuous receiving on 2408 MHz
6	Continuous receiving on 2444 MHz
7	Continuous receiving on 2476 MHz
8	Receiver hopping on all channels

Physical boundary of the EUT



4 LIST OF MEASUREMENTS

Application	Frequency range [MHz]	FCC 47 CFR Part 15 section [2]	RSS 210, Issue 7 [4] or RSS-Gen, Issue 2 [5]	Status	Refer page
20 dB bandwitdh	General	15.247 (a) (1)	A8.1 (b) [4]	Passed	8 et seq.
Carrier frequency separation	General	15.247 (a) (1)	A8.1 (b) [4]	Passed	11 et seq.
Number of hopping channels	2400.0 - 2483.5	15.247 (a) (1) (iii)	A8.1 (d) [4]	Passed	14 et seq.
Dwell time	2400.0 - 2483.5	15.247 (a) (1) (iii)	A8.1 (d) [4]	Passed	16 et seq.
Maximum peak output power	2400.0 - 2483.5	15.247 (b) (1)	A8.4 (2) [4]	Passed	18 et seq.
Band edge compliance	2400.0 - 2483.5	15.247 (d)	A8.5 [4]	Passed	21 et seq.
Radiated emissions (transmitter)	0.009 - 25,000	15.205 (a) 15.209 (a)	A8.5 [4] 2.6 [4]	Passed	26 et seq.
Conducted emissions on supply line	0.15 - 30	15.207 (a)	7.2.2 [5]	Passed	46 et seq.
Radiated emissions (receiver)	0.009 - 25,000	15.109 (a)	6 [5] 2.6 [4]	Passed	Annex D 1 et seq.
Conducted emissions on supply line	0.15 - 30	15.207 (a)	7.2.2 [5]	Passed	Annex D 7 et seq.

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 and the hopping function has to be disenabled, the transmitter shall work with its maximum data rate.

The following spectrum analyser settings shall be used:

- Span: App. 2 to 3 times the 20 dB bandwidth, centred on the actual hopping channel.
- Resolution bandwidth: ≥ 1 % of the 20 dB bandwidth.
- Video bandwidth: ≥ the resolution bandwidth.
- Sweep: Auto.
- Detector function: peak.
- Trace mode: Max hold.

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

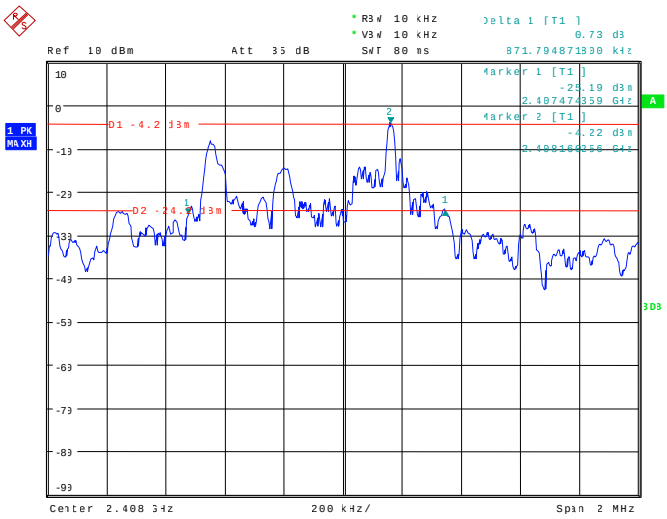
The measurement will be performed at the upper, the lower end and the middle of the assigned frequency band.

Test set-up:

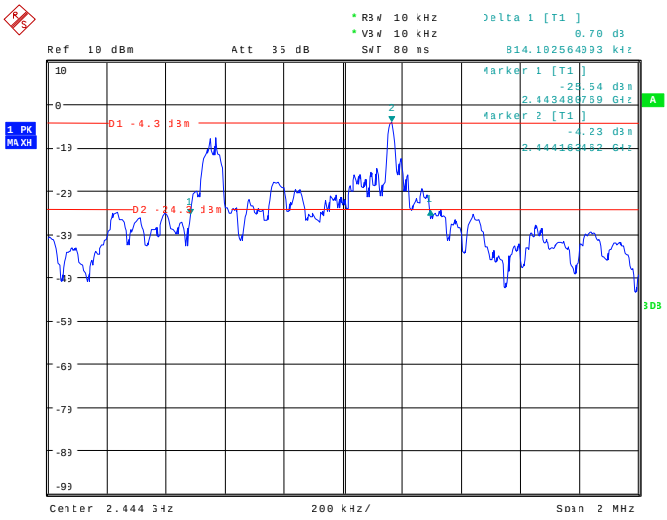
5.1.2 TEST RESULTS (20 dB BANDWIDTH)

Ambient temperature	21 °C	Relative humidity	45 %

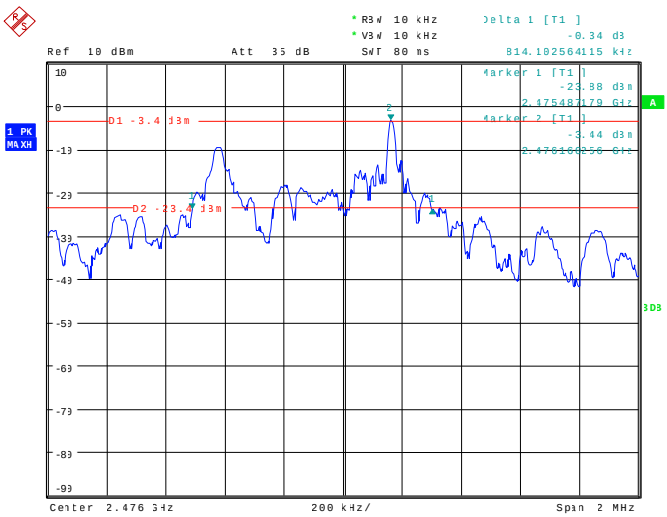
90192_42.wmf: (20 dB bandwidth at the lower end of the assigned frequency band):



90192_43.wmf: (20 dB bandwidth at the middle of the assigned frequency band):



90192_44.wmf: (20 dB bandwidth at the upper end of the assigned frequency band):



Channel number	Channel frequency [MHz]	20 dB bandwidth [kHz]
0	2408	871.795
19	2444	814.103
38	2476	814.103
Measurement uncertainty		+0.66 dB / -0.72 dB

TEST EQUIPMENT USED FOR THE TEST:

46, 54, 55

5.2 CARRIER FREQUENCY SEPARATION

5.2.1 METHOD OF MEASUREMENT (CARRIER FREQUENCY SEPARATION)

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 and the hopping function has to be enabled.

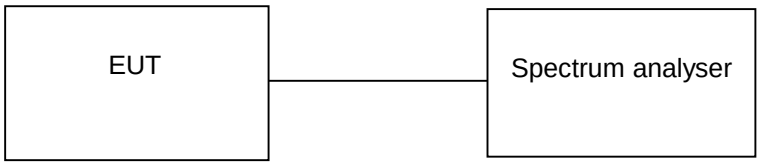
The following spectrum analyser settings shall be used:

- Span: Wide enough to capture the peaks of two adjacent channels.
- Resolution bandwidth: ≥ 1 % of the span.
- Video bandwidth: ≥ the resolution bandwidth.
- Sweep: Auto.
- Detector function: peak.
- Trace mode: Max hold.

After trace stabilisation the marker and the delta marker function will be used to determine the separation between the peaks of two adjacent channel signals.

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

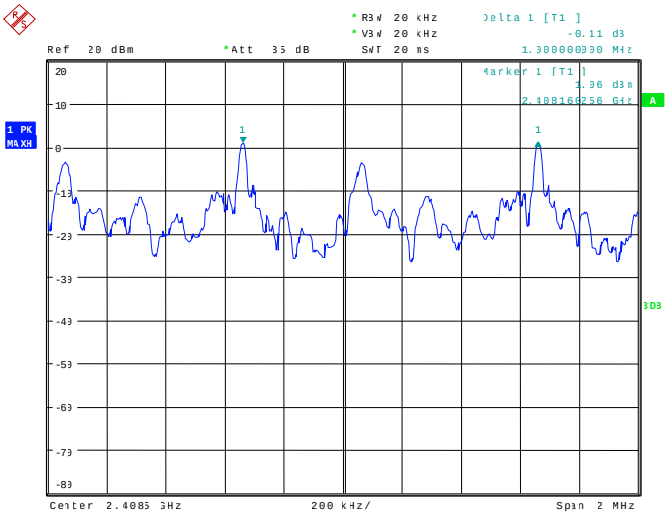
Test set-up:



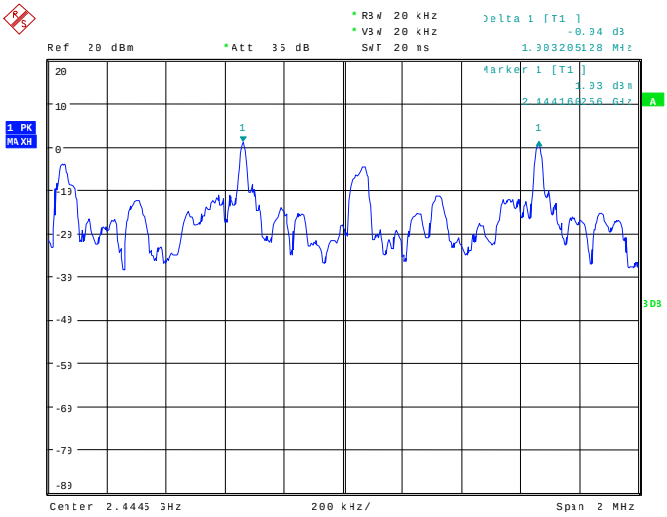
5.2.2 TEST RESULTS (CARRIER FREQUENCY SEPARATION)

Ambient temperature	21 °C	Relative humidity	45 %

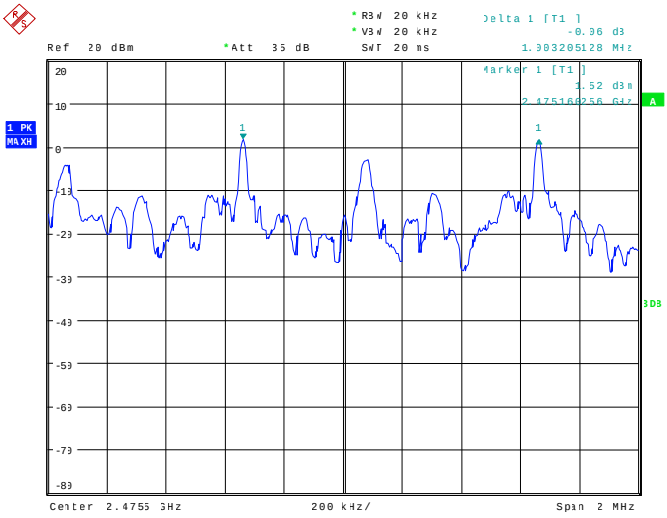
90192_46.wmf: (channel separation at the lower end of the assigned frequency band):



90192_45.wmf: (channel separation at the middle of the assigned frequency band):



90192_47.wmf: (channel separation at the upper end of the assigned frequency band):



Channel number	Channel frequency [MHz]	Channel separation [kHz]	Minimum limit [kHz]
0	2406	1000.000	581.197 (2/3 of the 20 dB bandwidth)
19	2444	1003.205	542.735 (2/3 of the 20 dB bandwidth)
38	2476	1003.205	542.103 (2/3 of the 20 dB bandwidth)
Measurement uncertainty			$<10^{-7}$

Test: Passed

TEST EQUIPMENT USED FOR THE TEST:

46, 54, 55

5.3 NUMBER OF HOPPING FREQUENCIES

5.3.1 METHOD OF MEASUREMENT (NUMBER OF HOPPING FREQUENCIES)

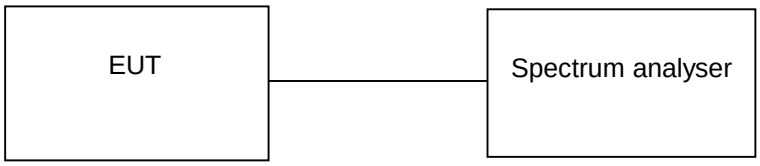
The calibration of the spectrum analyser has to be checked with the help of a known signal from a signal generator. The EUT has to be connected to the spectrum analyser via a low loss cable. If the EUT is not equipped with an antenna connector, a temporary antenna connector has to be installed. The EUT has to be switched on and the hopping function has to be enabled.

The following spectrum analyser settings shall be used:

- Span: Equal to the assigned frequency band.
- Resolution bandwidth: ≥ 1 % of the span.
- Video bandwidth: ≥ the resolution bandwidth.
- Sweep: Auto.
- Detector function: Peak.
- Trace mode: Max hold.

After trace stabilisation the number of hopping channels could be counted. It might be possible to divide the span into some sub ranges in order to clearly show all hopping frequencies.

Test set-up:

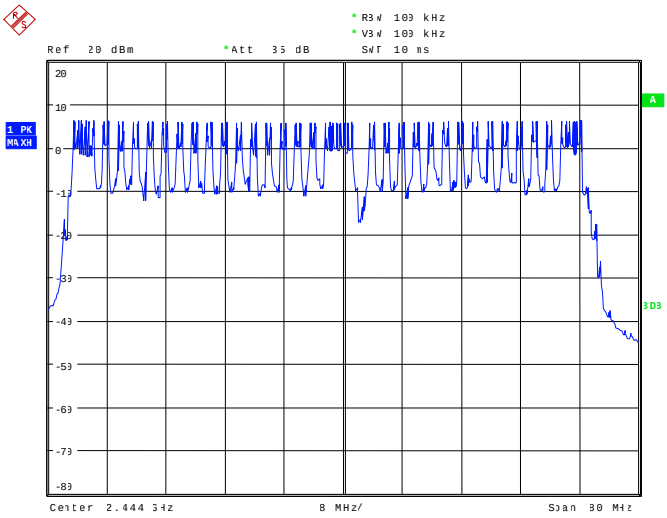


5.3.2 TEST RESULTS (NUMBER OF HOPPING FREQUENCIES)

Ambient temperature	21 °C

Relative humidity	45 %

90192_48.wmf (number of hopping channels):



Number of hopping channels	Limit
38	At least 15

Test: Passed

TEST EQUIPMENT USED FOR THE TEST:

46, 54, 55

5.4 DWELL TIME

5.4.1 METHOD OF MEASUREMENT (DWELL TIME)

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 and the hopping function has to be enabled.

The following spectrum analyser settings shall be used:

- Span: Zero, centred on a hopping channel.
- Resolution bandwidth: 1 MHz.
- Video bandwidth: ≥ the resolution bandwidth.
- Sweep: As necessary to capture the entire dwell time per hopping channel.
- Detector function: peak.
- Trace mode: Max hold.

The marker and delta marker function of the spectrum analyser will be used to determine the dwell time.

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

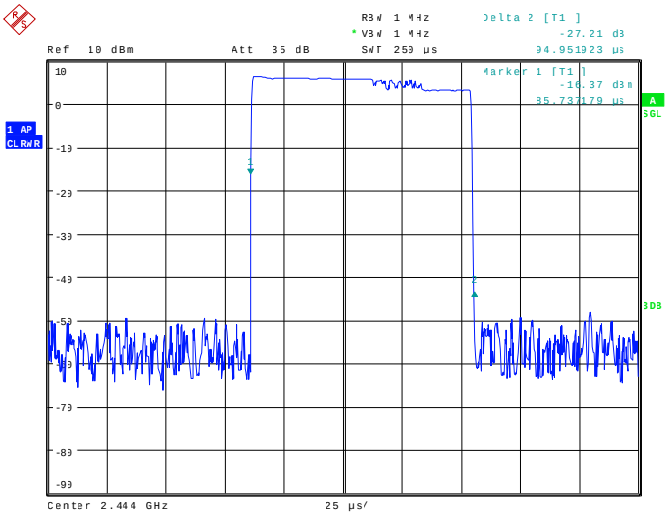
If the EUT is possible to operate with different mode of operation (data rates, modulation formats etc.) the test will be repeated with every different operation mode of the EUT.

Test set-up:

5.4.2 TEST RESULTS (DWELL TIME)

Ambient temperature	21 °C	Relative humidity	45 %

90192_41.wmf: Dwell time at the middle of the assigned frequency band):



The dwell time is calculated with the following formula:

Dwell time = t_{pulse} x n_{hops} / number of hopping channels x 15.2 (equal to 0.4 s x number of hopping channels)

Where:

t_{pulse} is the measured pulse time (pls. refer the plots of the spectrum analyser above) [s],
n_{hops} is the number of hops per second in the actual operating mode of the transmitter [1/s].

The hopping rate of the system is 1667 hops per second and the system uses 38 channels.

Channel number	Channel frequency [MHz]	t_{pulse} [µs]	Dwell time [ms]	Limit [ms]
19	2444	94.952	63.314	400
Measurement uncertainty			$<10^{-7}$	

Test: Passed

TEST EQUIPMENT USED FOR THE TEST:

46, 54, 55

5.5 MAXIMUM PEAK OUTPUT POWER

5.5.1 METHOD OF MEASUREMENT (MAXIMUM PEAK OUTPUT POWER)

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 and the hopping function has to be disenabled.

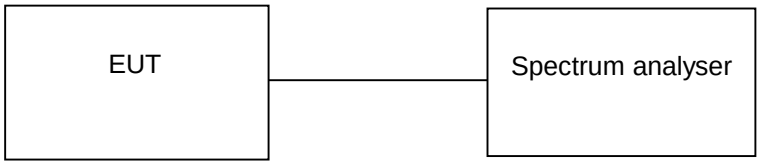
The following spectrum analyser settings shall be used:

- Span: Approx. 5 times the 20 dB bandwidth, centred on a hopping channel.
- Resolution bandwidth: > the 20 dB bandwidth of the emission being measured.
- Video bandwidth: ≥ the resolution bandwidth.
- Sweep: Auto.
- Detector function: peak.
- Trace mode: Max hold.

After trace stabilisation the marker shall be set on the signal peak. The indicated level is the peak output power, which has to be corrected with the value of the cable loss and an external attenuation (if necessary).

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

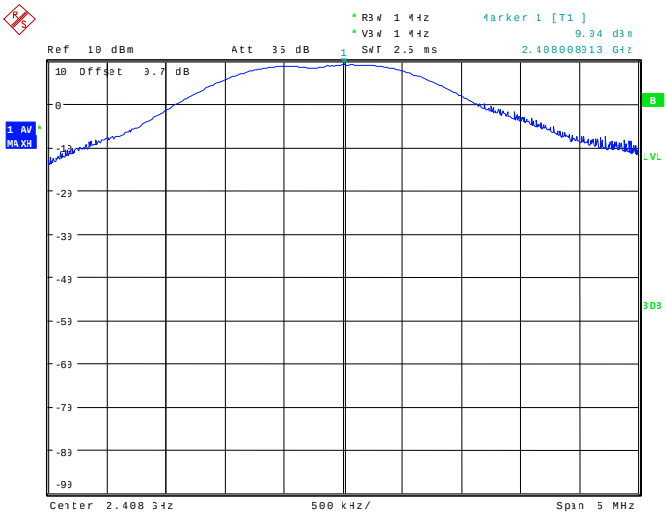
Test set-up:



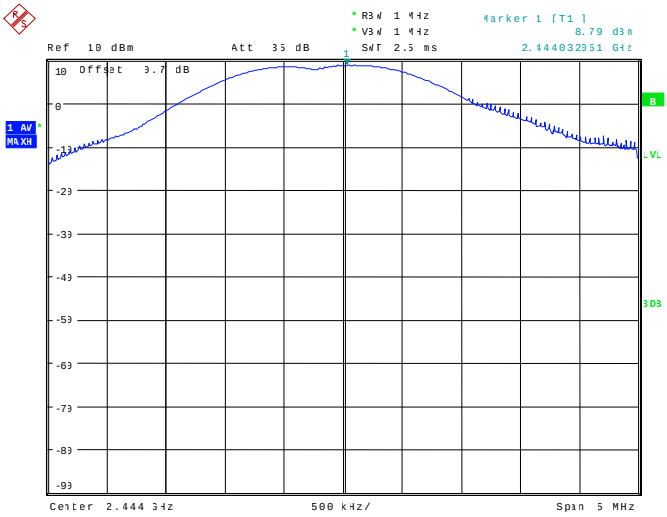
5.5.2 TEST RESULTS (MAXIMUM PEAK OUTPUT POWER)

Ambient temperature	21 °C	Relative humidity	45 %

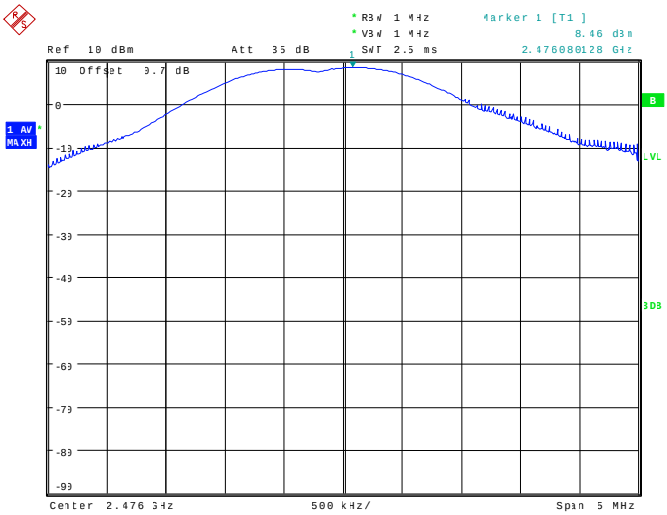
90192_49.wmf (maximum peak output power at the lower end of the assigned frequency band):



90192_50.wmf (maximum peak output power at the middle of the assigned frequency band):



90192_51.wmf (maximum peak output power at the upper end of the assigned frequency band):



Channel number	Channel frequency [MHz]	Maximum peak output power [dBm]	Antenna gain [dBi]	Peak power limit [dBm]
0	2408	9.0	2.1	21.0
19	2444	8.8	2.1	21.0
38	2476	8.5	2.1	21.0
Measurement uncertainty				+0.66 dB / -0.72 dB

Test: Passed

TEST EQUIPMENT USED FOR THE TEST:

46, 54, 55

5.6 BAND-EDGE COMPLIANCE

5.6.1 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 5.8.1 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.

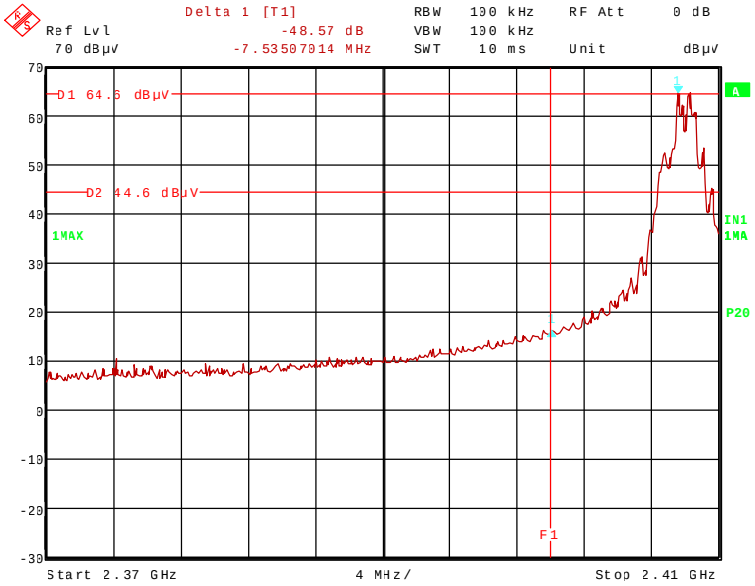
After trace stabilisation the marker shall be set on the signal peak. The first display line has to be set on this value. The second display line has to be set 20 dB below the first line (or the peak marker). The frequency line shall be set on the edge of the assigned frequency band. Set the second marker 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 5.8.1 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 and with hopping on and off.

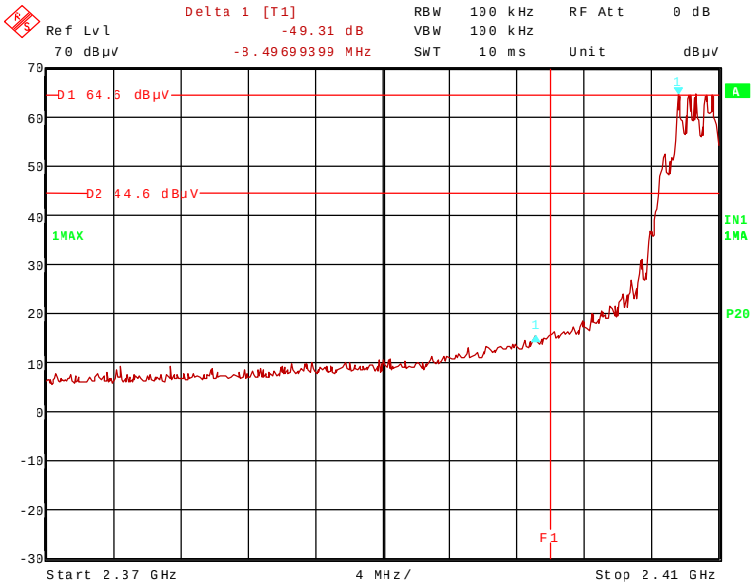
5.6.2 TEST RESULT (BAND-EDGE COMPLIANCE (RADIATED))

Ambient temperature	20 °C	Relative humidity	40 %

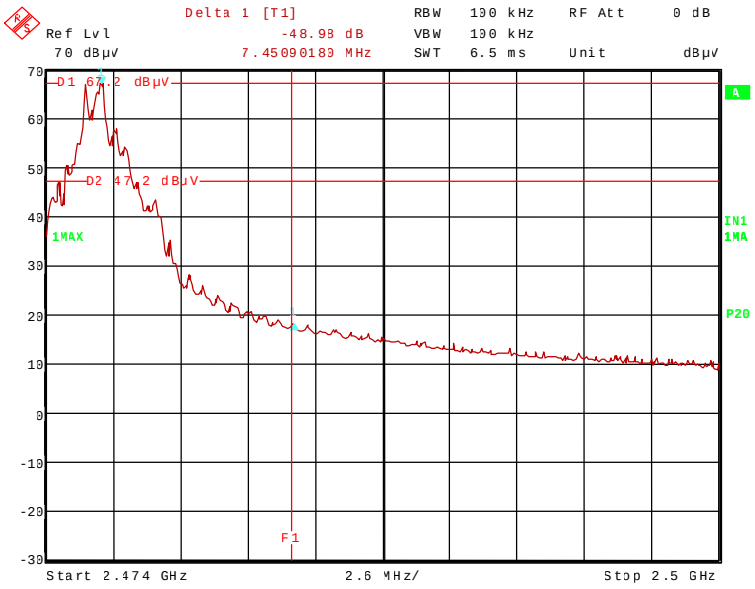
90192_7.wmf (radiated band-edge compliance, lower band edge, hopping off):



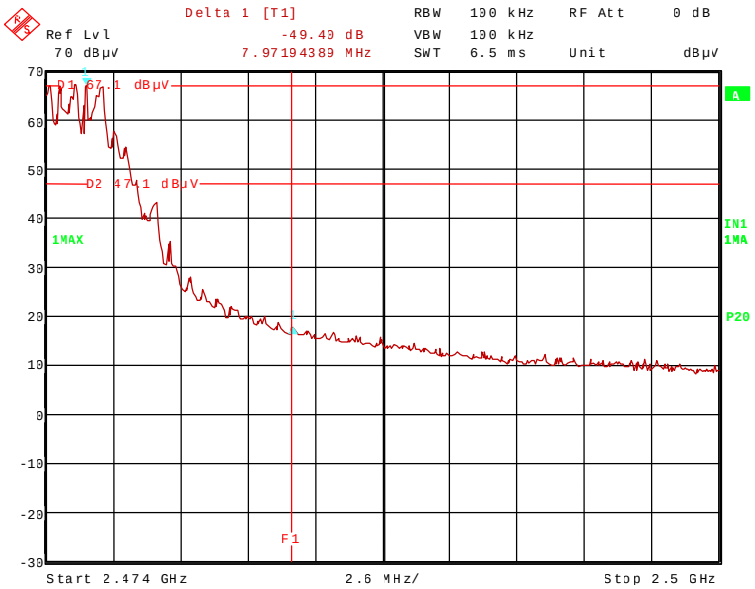
90192_8.wmf (radiated band-edge compliance, lower band edge, hopping on):



90192_10.wmf (radiated band-edge compliance, upper band edge, hopping off):



90192_9.wmf (radiated band-edge compliance, upper band edge, hopping on):



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, hopping disenabled)										
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
2.408	102.8	-	-	70.3	28.8	0.0	3.7	150	Vert.	-
2.4001	54.2	82.8	28.6	21.7	28.8	0.0	3.7	150	Vert.	No
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
2.408	83.2	-	-	50.7	28.8	0.0	3.7	150	Vert.	-
2.4001	34.6	63.2	28.6	2.1	28.8	0.0	3.7	150	Vert.	No
Measurement uncertainty							+2.2 dB / -3.6 dB			

Band-edge compliance (lower band edge, hopping enabled)										
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
2.408	102.8	-	-	70.3	28.8	0.0	3.7	150	Vert.	-
2.3992	53.5	82.8	29.3	21.0	28.8	0.0	3.7	150	Vert.	No
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
2.408	83.2	-	-	50.7	28.8	0.0	3.7	150	Vert.	-
2.3992	33.9	63.2	29.3	1.4	28.8	0.0	3.7	150	Vert.	No
Measurement uncertainty							+2.2 dB / -3.6 dB			

Band-edge compliance (upper band edge, hopping disenabled)										
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
2.476	103.6	-	-	70.9	28.9	0.0	3.8	150	Vert.	-
2.4836	54.6	74.0	19.4	21.9	28.9	0.0	3.8	150	Vert.	Yes
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
2.476	85.3	-	-	52.6	28.9	0.0	3.8	150	Vert.	-
2.4834	36.3	54.0	17.7	3.6	28.9	0.0	3.8	150	Vert.	Yes
Measurement uncertainty							+2.2 dB / -3.6 dB			

Band-edge compliance (upper band edge, hopping enabled)										
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
2.476	103.6	-	-	70.9	28.9	0.0	3.8	150	Vert.	-
2.4836	54.2	74.0	19.8	21.5	28.9	0.0	3.8	150	Vert.	Yes
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
2.476	85.3	-	-	52.6	28.9	0.0	3.8	150	Vert.	-
2.4836	35.9	54.0	18.1	3.2	28.9	0.0	3.8	150	Vert.	Yes
Measurement uncertainty							+2.2 dB / -3.6 dB			

Test: Passed

TEST EQUIPMENT USED FOR THE TEST:

29, 31 – 34, 36, 44, 54

5.7 RADIATED EMISSIONS

5.7.1 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 1 GHz to 25 GHz.
- A final measurement carried out in a fully anechoic chamber with a fixed antenna height in the frequency range 1 GHz to 25 GHz.

All measurements will be carried out with the EUT working on the middle and upper and lower edge of the assigned frequency band. For this reason the hopping function of the EUT has to be disenabled.

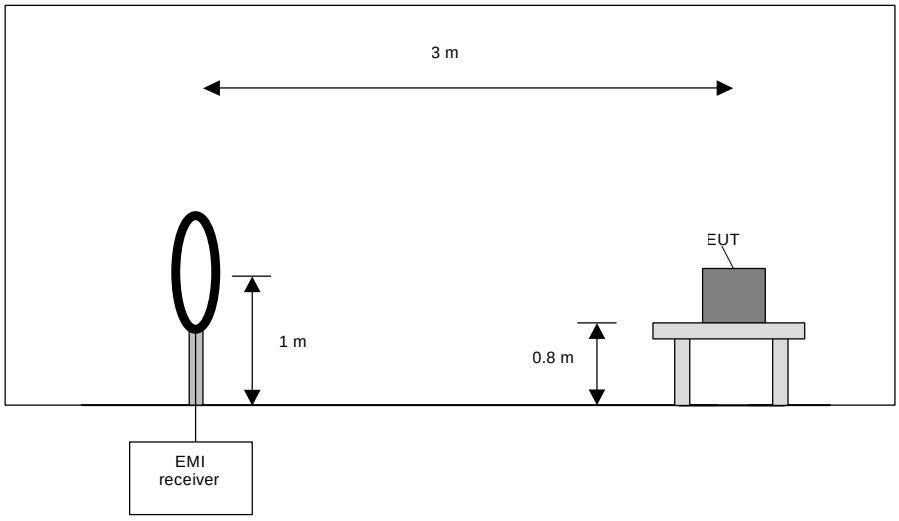
Preliminary measurement (9 kHz to 30 MHz):

In the first stage a preliminary measurement will be performed in a shielded room with a measuring distance of 3 meters. 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 C63.4-2003 [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.

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 frequencies of highest detected emission with a lower span and resolution bandwidth to increase the accuracy and note the frequency value.
6) Repeat steps 1) to 5) with the other orthogonal axes of the EUT (because of EUT is a module and might be used in a handheld equipment application).
7) Rotate the measuring antenna and repeat steps 1) to 5).

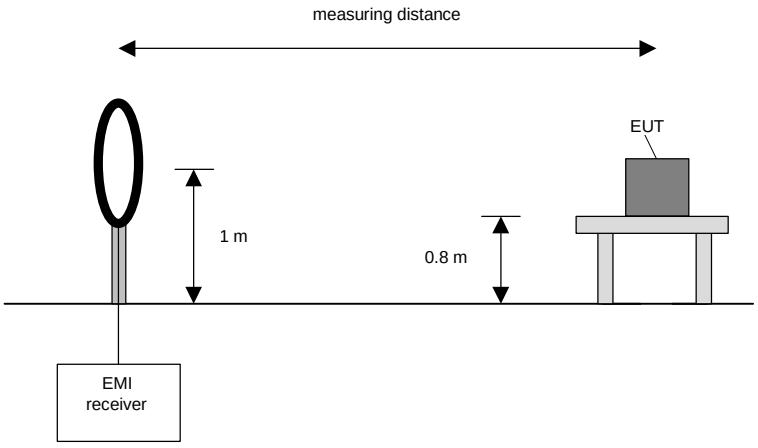
Final measurement (9 kHz to 30 MHz):

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 during the preliminary measurement detected frequencies 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 (because of EUT is a module and might be used in a handheld equipment application).

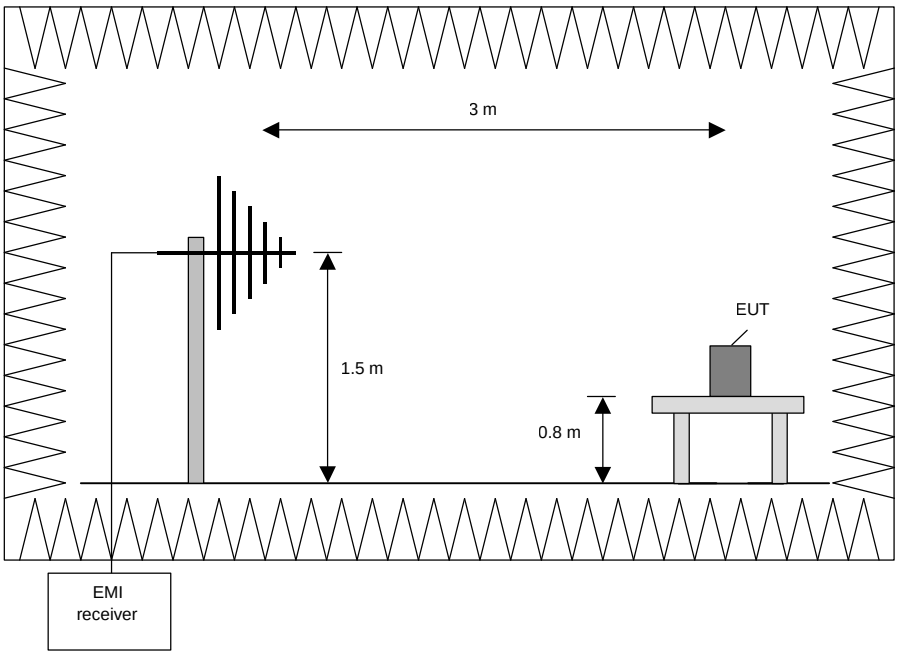
Preliminary measurement (30 MHz to 1 GHz)

In the first stage a preliminary measurement will be performed in a fully anechoic chamber with a measuring distance of 3 meter. 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 C63.4-2003 [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:

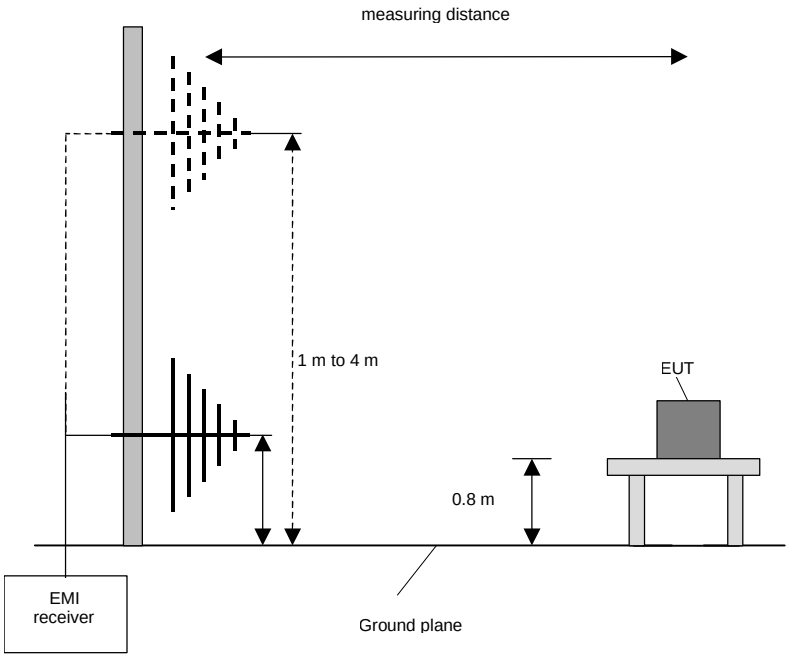
1. Monitor the frequency range at horizontal polarisation and a EUT azimuth of 0 °.
2. Manipulate the system cables within the range to produce the maximum level of emission.
3. Rotate the EUT by 360 ° to maximize the detected signals.
4. Make a hardcopy of the spectrum.
5. Measure the frequency of the 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 25 GHz)

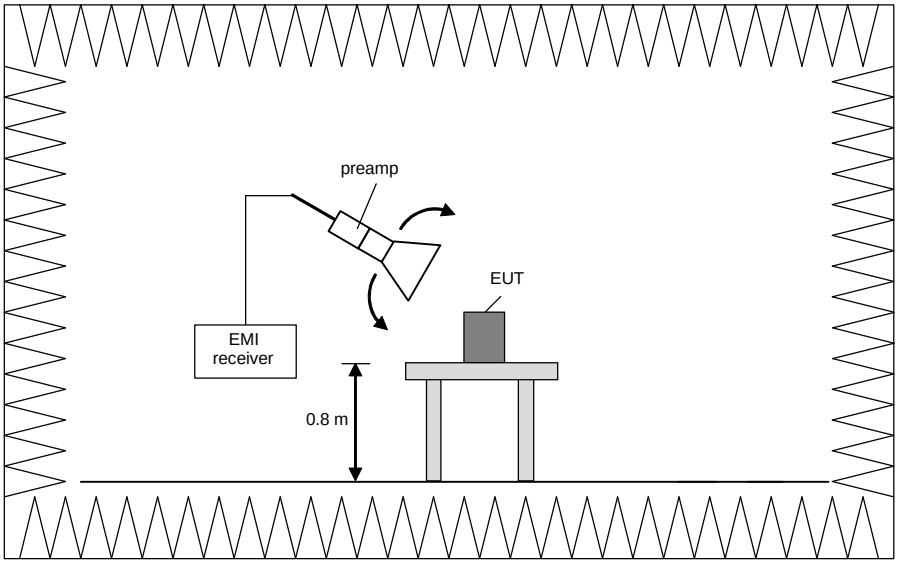
This measurement will be performed in a fully anechoic chamber. Tabletop devices will set up on a non-conducting support with a size of 1 m by 1.5 m and a height of 80 cm. Floor-standing devices will be placed directly on the turntable/ground plane. The set up of the Equipment under test will be in accordance to ANSI C63.4-2003 [1].

Preliminary measurement (1 GHz to 25 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 25 GHz	100 kHz

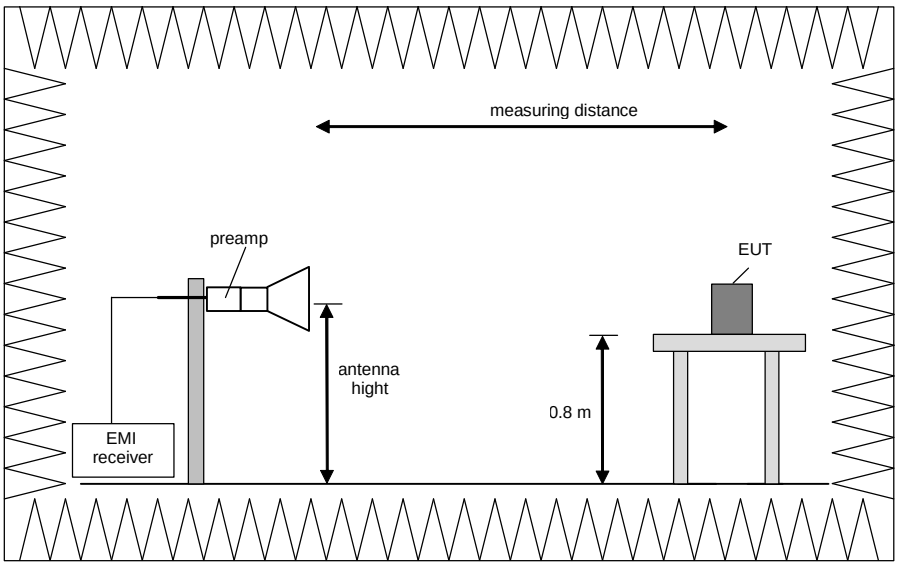


Final measurement (1 GHz to 25 GHz)

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 25 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 and 18 GHz to 25 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.

5.7.2 TEST RESULTS (RADIATED EMISSIONS)

5.7.2.1 PRELIMINARY MEASUREMENT (10 MHz to 25 GHz)

Ambient temperature	20 °C	Relative humidity	45 %

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.

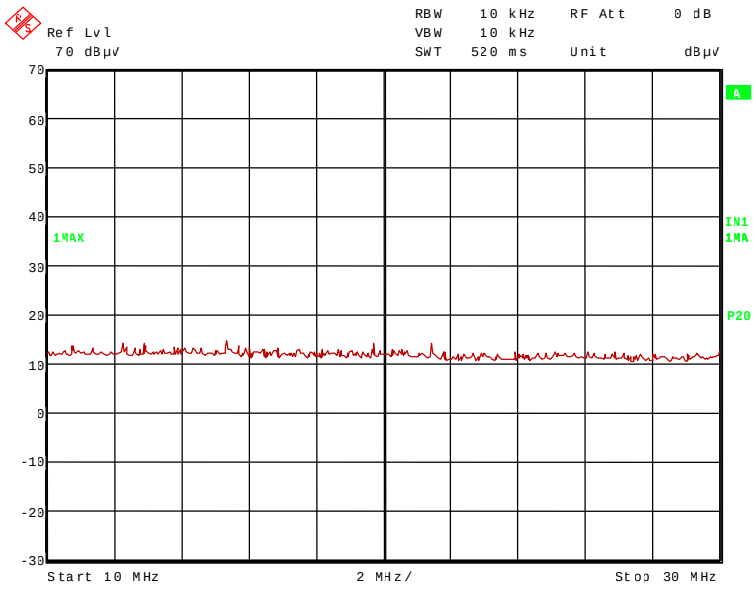
Cable guide: The cable of the EUT was fixed on the non-conducting table. For further information of the cable guide refer to the pictures in annex A of this test report.

Test record: All results are shown in the following.

Supply voltage: During all measurements the EUT was supplied with 5.0 V DC via the carrier board.

Remark: As pre-tests have shown, the emissions in the frequency range 10 MHz to 1 GHz are not depending on the transmitter operation mode or frequency. Therefore the emissions in this frequency range were measured only with the transmitter operates in operation mode 2.

90192_19.wmf: (10 MHz to 30 MHz)

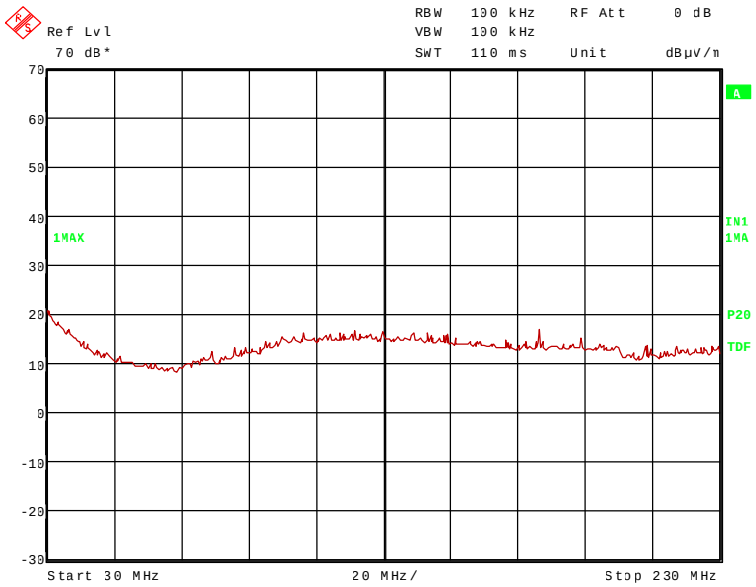


No significant frequencies above the noise floor of the system were found during the preliminary radiated emission test, so no measurements were carried out on the outdoor test site.

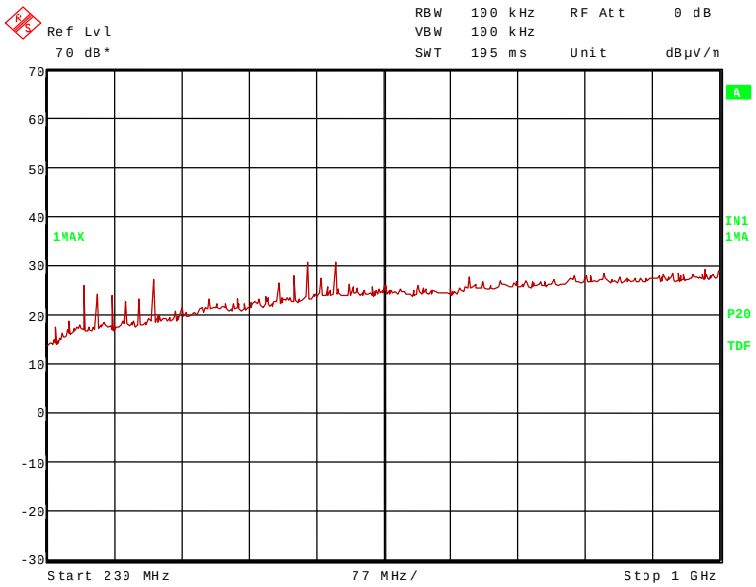
TEST EQUIPMENT USED FOR THE TEST:

29, 31 – 37, 39, 43, 44, 46, 49 – 51, 54, 56

90192_17.wmf (30 MHz to 230 MHz):



90192_18.wmf (230 MHz to 1 GHz):



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

288.005 MHz, 352.006 MHz, 528.009 MHz, 560.009 MHz.

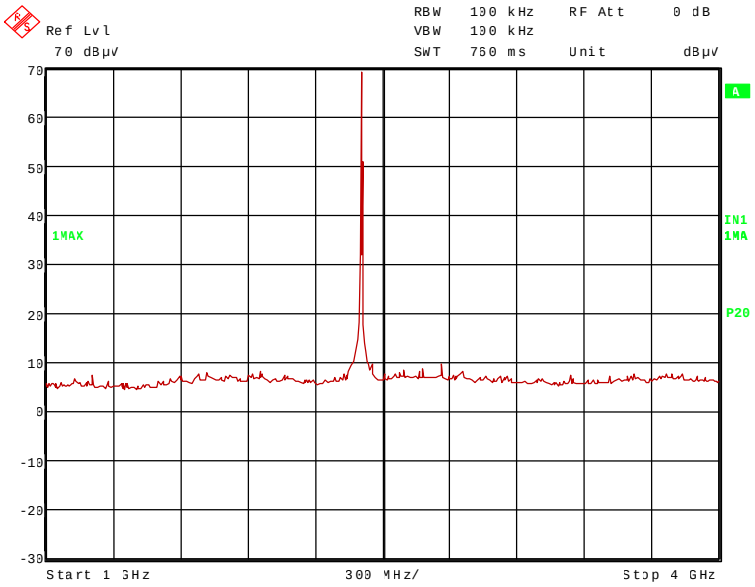
The following frequency was found inside the restricted bands:

272.004 MHz.

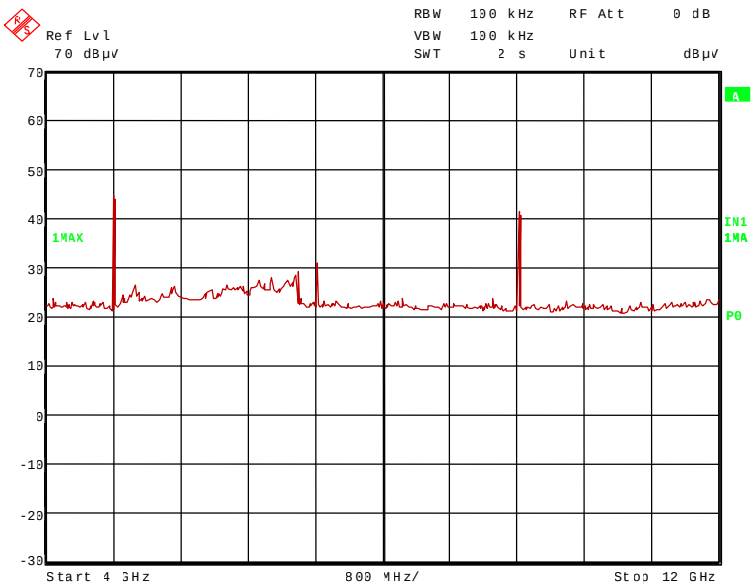
These frequencies have to be measured on the open area test site. The results were presented in the following.

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

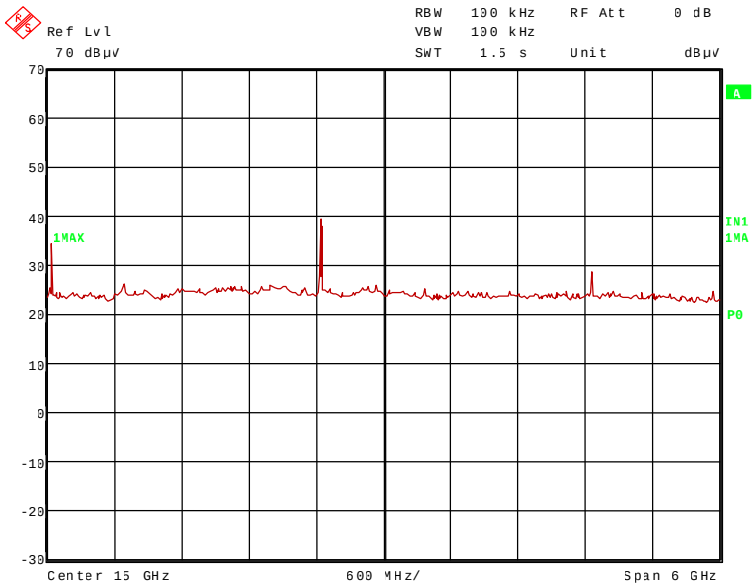
90192_1.wmf (1 GHz to 4 GHz):



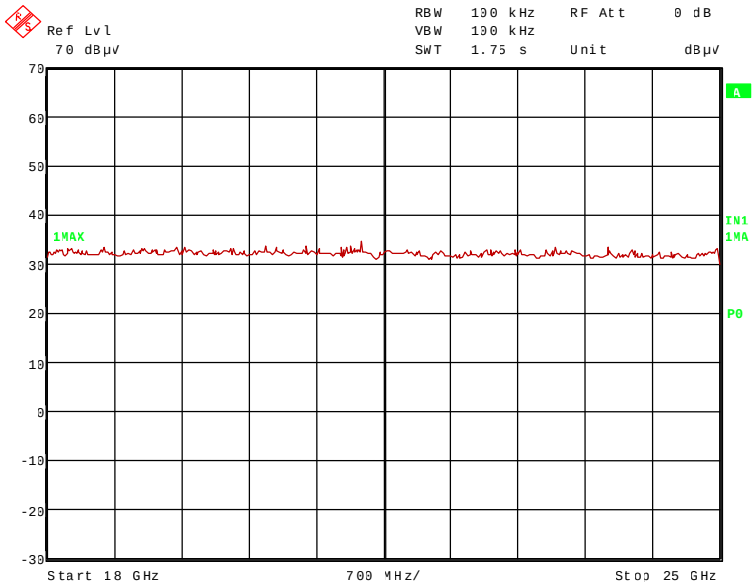
90192_6.wmf (4 GHz to 12 GHz):



90192_13.wmf (12 GHz to 18 GHz):



90192_14.wmf (18 GHz to 25 GHz):



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

- 4.816 GHz and 12.040 GHz.

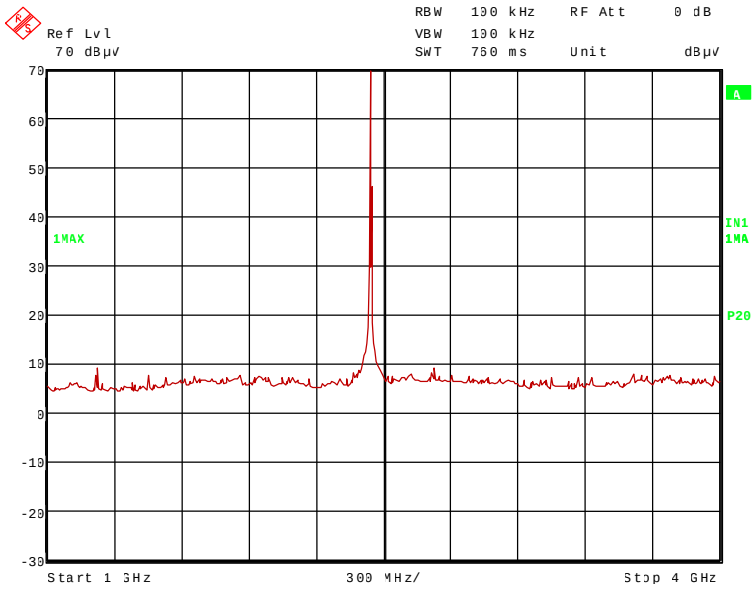
The following frequencies were found outside the restricted bands during the preliminary radiated emission test:

- 2.408 GHz, 7.224 GHz, 9.632 GHz, 14.448 GHz and 16.856 GHz.

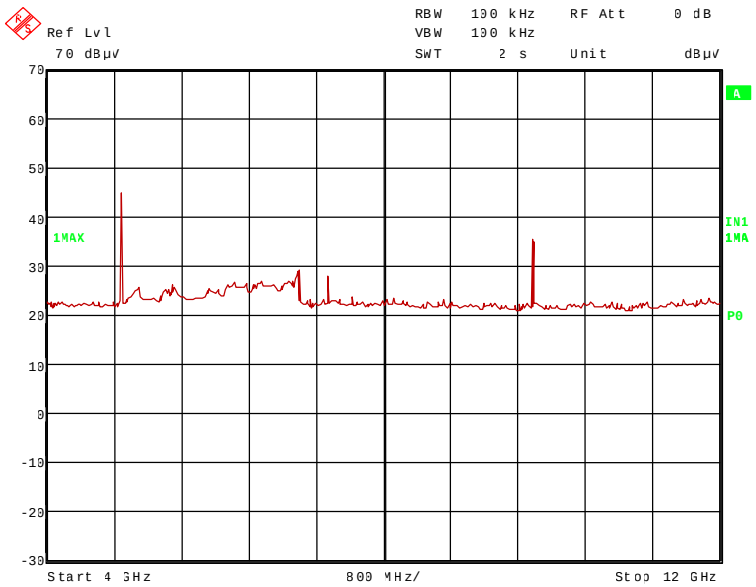
These frequencies have to be measured in a final measurement. The results were presented in the following.

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

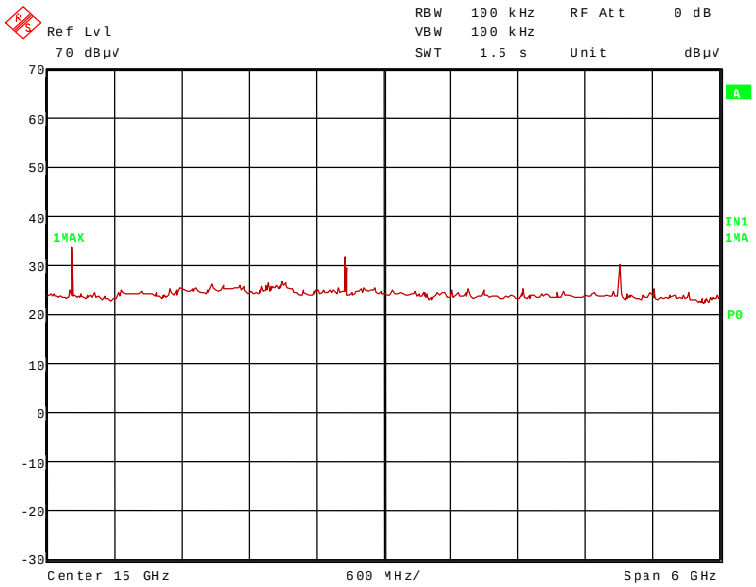
90192_2.wmf (1 GHz to 4 GHz):



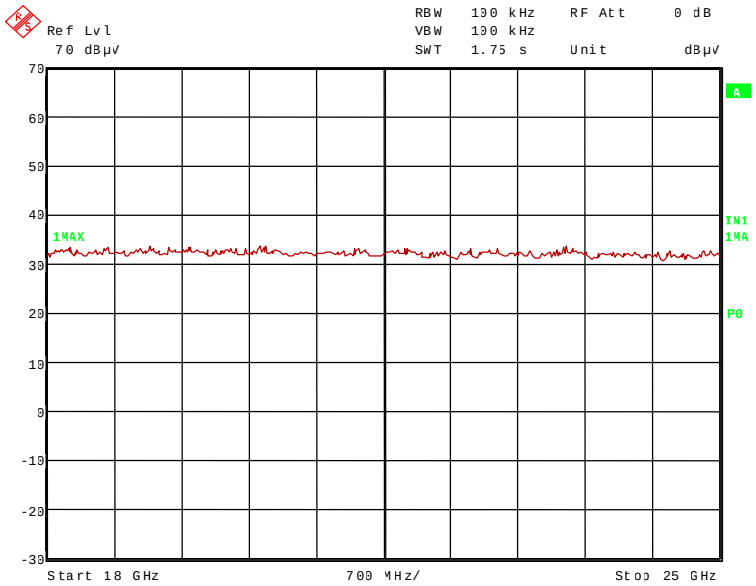
90192_5.wmf (4 GHz to 12 GHz):



90192_12.wmf (12 GHz to 18 GHz):



90192_15.wmf (18 GHz to 25 GHz):



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

- 4.888 GHz, 7.332 GHz and 12.220 GHz.

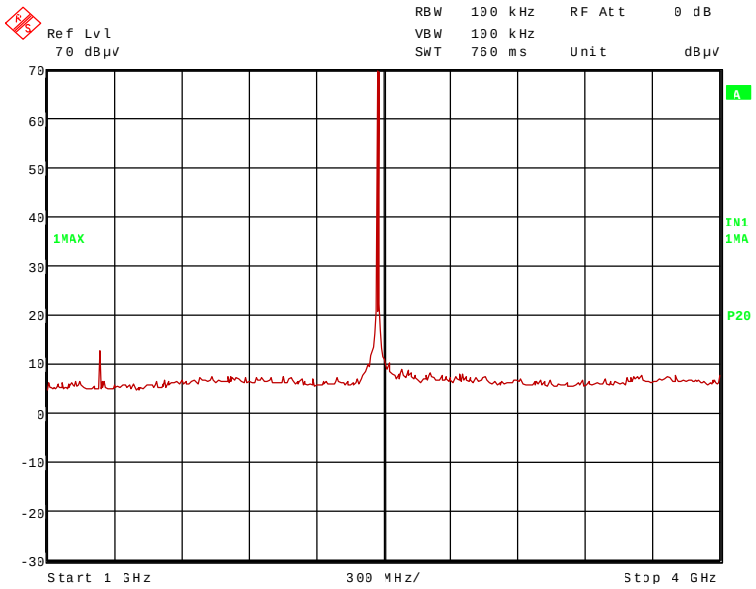
The following frequencies were found outside the restricted bands during the preliminary radiated emission test:

- 2.444 GHz, 9.776 GHz, 14.664 GHz, 17.108 GHz.

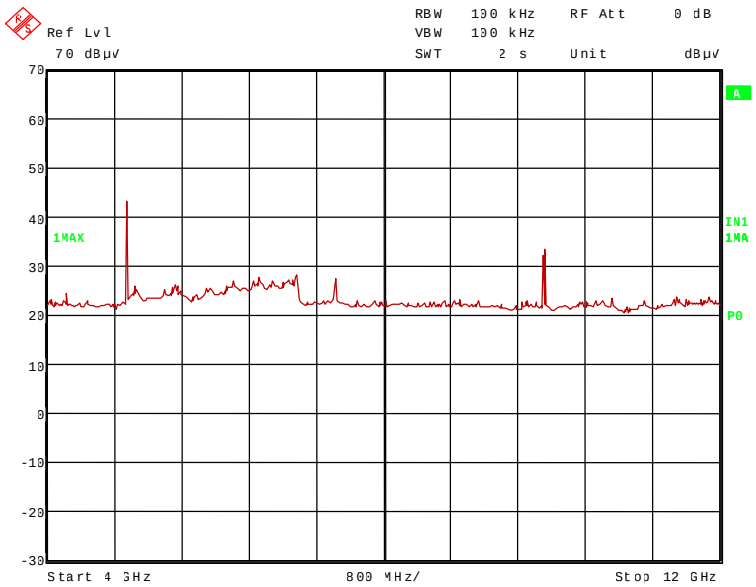
These frequencies have to be measured in a final measurement. The results were presented in the following.

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

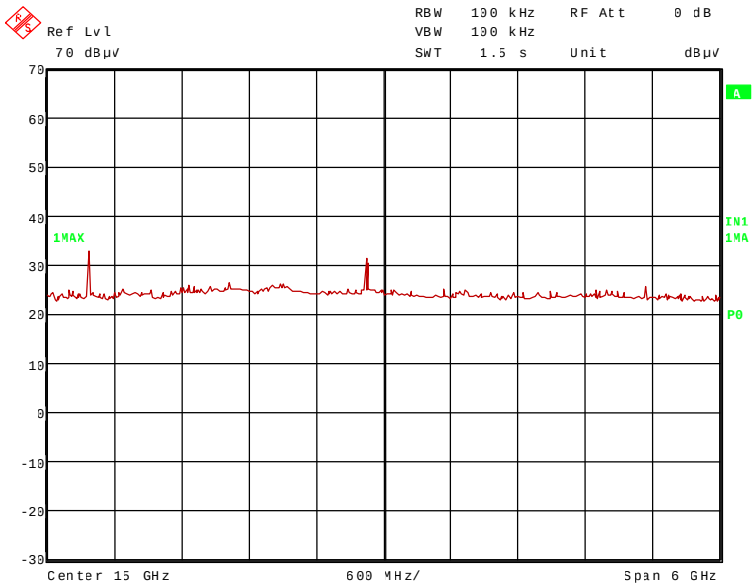
90192_3.wmf (1 GHz to 4 GHz):



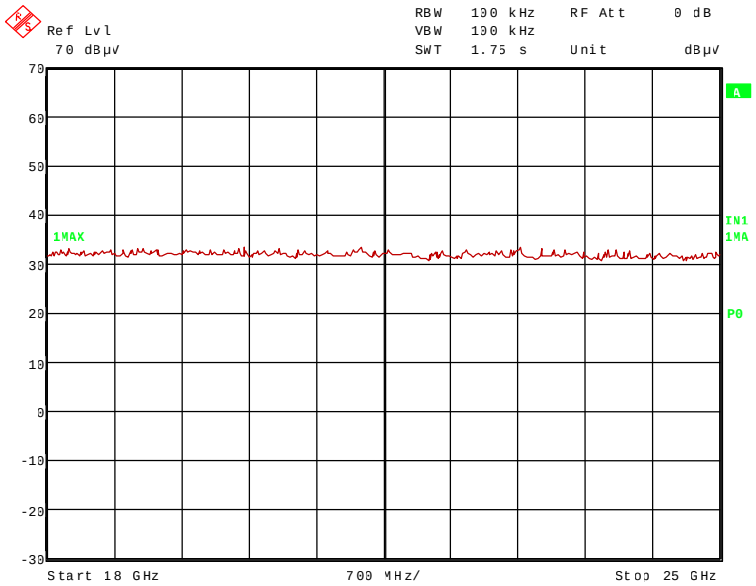
90192_4.wmf (4 GHz to 12 GHz):



90192_11.wmf (12 GHz to 18 GHz):



90192_16.wmf (18 GHz to 25 GHz):



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

- 1.238 GHz, 4.952 GHz, 7.428 GHz and 12.380 GHz.

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

- 2.476 GHz, 9.904 GHz and 14.856 GHz.

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

5.7.2.2 FINAL RADIATED EMISSION TEST (30 MHz to 1 GHz)

Ambient temperature	21 °C	Relative humidity	40 %

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: 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.

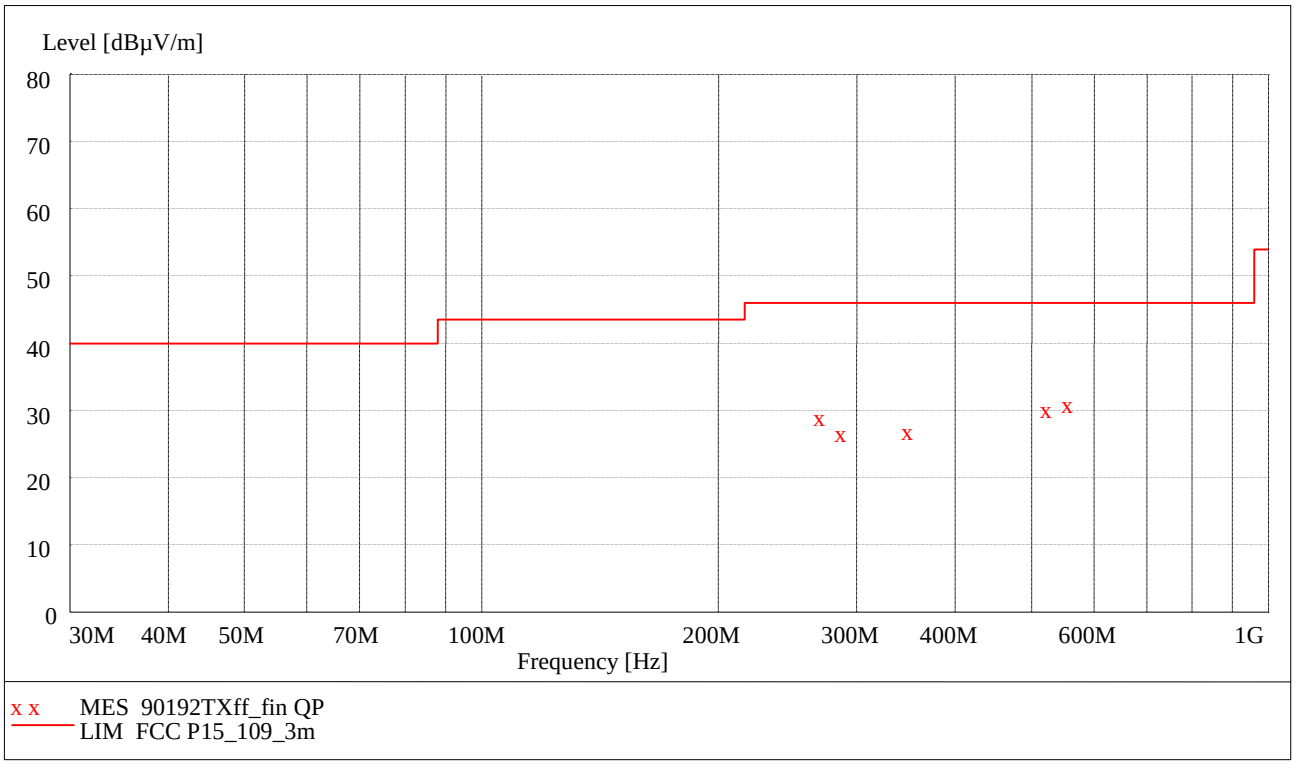
Test record: All results are shown in the following.

Supply voltage: During all measurements the EUT was supplied with 5.0 V DC via the carrier board.

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

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

The measured points and the limit line in the following diagram refer to the standard measurement of the emitted interference in compliance with the above-mentioned standard. The measured points marked with x are the measured results of the standard final measurement on the open area test site.



Data record name: 90192TXff

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 1 second.

Result measured with the quasipeak detector:

(These values are marked in the diagram by an x)

Spurious emissions outside restricted bands									
Frequency MHz	Result dBµV/m	Limit dBµV/m	Margin dB	Readings dBµV	Antenna factor dB/m	Cable loss dB	Height cm	Azimuth deg	Pol.
288.005	27.2	46.0	18.8	12.4	12.9	1.9	112.0	359.0	Hor.
352.006	27.6	46.0	18.4	11.3	14.3	2.0	100.0	353.0	Hor.
528.009	30.8	46.0	15.2	10.3	17.9	2.6	139.0	315.0	Hor.
560.009	31.3	46.0	14.7	8.6	19.9	2.8	142.0	315.0	Hor.
Spurious emissions in restricted bands									
Frequency MHz	Result dBµV/m	Limit dBµV/m	Margin dB	Readings dBµV	Antenna factor dB/m	Cable loss dB	Height cm	Azimuth deg	Pol.
272.004	29.7	46.0	16.3	15.5	12.3	1.9	106.0	209.0	Hor.
Measurement uncertainty				+2.2 dB / -3.6 dB					

The test results were calculated with the following formula:

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

Test: Passed

TEST EQUIPMENT USED FOR THE TEST:

14 – 20, 54

5.7.2.3 FINAL MEASUREMENT (1 GHz to 25 GHz)

Ambient temperature	20 °C	Relative humidity	45 %

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: 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: All results are shown in the following.

Supply voltage: During all measurements the EUT was supplied with 5.0 V DC via the carrier board.

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.
2.408	102.8	-	-	70.3	28.8	0.0	3.7	150	Vert.	-	1
4.816	59.2	74.0	14.8	45.9	33.7	25.7	5.3	150	Vert.	Yes	2
7.224	55.8	82.8	27.0	36.7	36.9	24.6	6.8	150	Vert.	No	2
9.632	66.3	82.8	16.5	43.9	38.4	23.9	7.9	150	Vert.	No	2
12.040	52.1	74.0	21.9	41.9	33.6	25.9	2.5	100	Hor.	Yes	1
14.448	55.2	82.8	27.6	45.5	33.7	26.5	2.5	100	Hor.	No	2
16.856	48.6	82.8	34.2	39.8	33.8	27.5	2.5	100	Vert.	No	1
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.
2.408	83.2	-	-	50.7	28.8	0.0	3.7	150	Vert.	-	1
4.816	37.3	54.0	16.7	24.0	33.7	25.7	5.3	150	Vert.	Yes	2
7.224	38.8	63.2	24.4	19.7	36.9	24.6	6.8	150	Vert.	No	2
9.632	45.1	63.2	18.1	22.7	38.4	23.9	7.9	150	Vert.	No	2
12.040	33.1	54.0	20.9	22.9	33.6	25.9	2.5	100	Hor.	Yes	1
14.448	33.9	63.2	29.3	24.2	33.7	26.5	2.5	100	Hor.	No	2
16.856	30.5	63.2	32.7	21.7	33.8	27.5	2.5	100	Vert.	No	1
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.
2.444	102.8	-	-	70.2	28.9	0.0	3.7	150	Vert.	-	1
4.888	59.8	74.0	14.2	46.3	33.9	25.7	5.3	150	Hor.	Yes	2
7.332	53.2	74.0	20.8	33.9	37.1	24.6	6.8	150	Vert.	Yes	2
9.776	63.3	82.8	19.5	40.8	38.4	23.9	8.0	150	Vert.	No	2
12.220	49.8	74.0	24.2	39.6	33.6	25.9	2.5	100	Vert.	Yes	1
14.664	47.5	82.8	35.3	37.9	33.7	26.6	2.5	100	Vert.	No	1
17.108	46.6	82.8	36.2	37.7	33.8	27.4	2.5	100	Hor.	No	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.
2.444	83.4	-	-	50.8	28.9	0.0	3.7	150	Vert.	-	1
4.888	38.3	54.0	15.7	24.8	33.9	25.7	5.3	150	Hor.	Yes	2
7.332	38.2	54.0	15.8	18.9	37.1	24.6	6.8	150	Vert.	Yes	2
9.776	42.5	63.4	20.9	20.0	38.4	23.9	8.0	150	Vert.	No	2
12.220	32.7	54.0	21.3	22.5	33.6	25.9	2.5	100	Vert.	Yes	1
14.664	31.1	63.4	32.3	21.5	33.7	26.6	2.5	100	Vert.	No	1
17.108	29.9	63.4	33.5	21.0	33.8	27.4	2.5	100	Hor.	No	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.
2.476	103.6	-	-	70.9	28.9	0.0	3.8	150	Vert.	-	1
1.238	45.8	74.0	28.2	18.3	24.8	0.0	2.7	150	Vert.	Yes	1
4.952	61.3	74.0	12.7	47.6	34.0	25.6	5.3	150	Hor.	Yes	2
7.428	54.4	74.0	19.6	34.8	37.3	24.5	6.8	150	Hor.	Yes	2
9.904	65.7	83.6	17.9	43.2	38.5	23.9	7.9	150	Vert.	No	2
12.380	50.1	74.0	23.9	39.8	33.7	25.9	2.5	100	Hor.	Yes	1
14.856	46.8	83.6	36.8	37.3	33.7	26.7	2.5	100	Vert.	No	1
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.
2.476	85.3	-	-	52.6	28.9	0.0	3.8	150	Vert.	-	1
1.238	31.3	54.0	22.7	3.8	24.8	0.0	2.7	150	Vert.	Yes	1
4.952	40.9	54.0	13.1	27.2	34.0	25.6	5.3	150	Hor.	Yes	2
7.428	39.0	54.0	15.0	19.4	37.3	24.5	6.8	150	Hor.	Yes	2
9.904	45.2	65.3	20.1	22.7	38.5	23.9	7.9	150	Vert.	No	2
12.380	32.6	54.0	21.4	22.3	33.7	25.9	2.5	100	Hor.	Yes	1
14.856	31.6	65.3	33.7	22.1	33.7	26.7	2.5	100	Vert.	No	1
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 – 50, 54

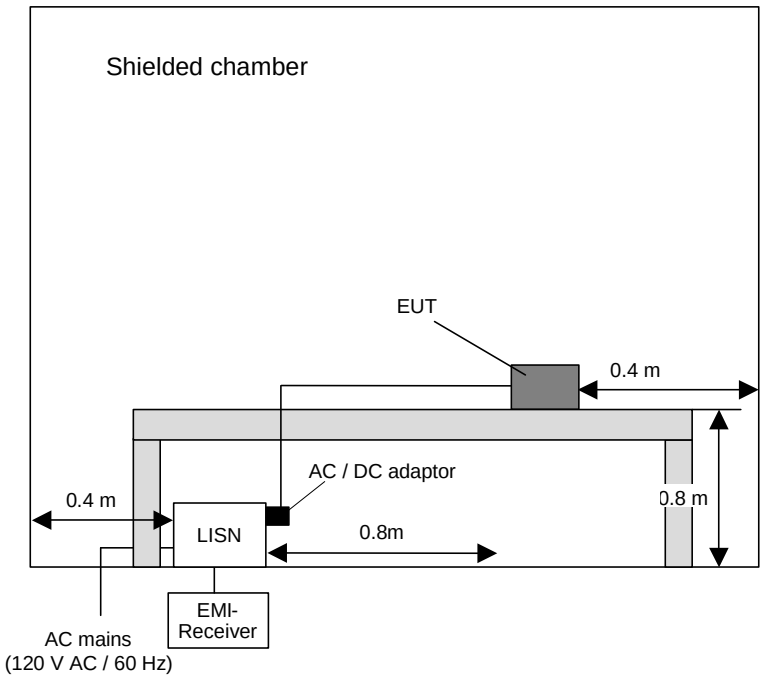
5.8 CONDUCTED EMISSIONS ON POWER SUPPLY LINES (150 kHz to 30 MHz)

5.8.1 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 set up of the Equipment under test will be in accordance to
ANSI C63.4-2003 [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 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



5.8.2 TEST RESULTS (CONDUCTED EMISSIONS ON POWER SUPPLY LINES)

Ambient temperature	21 °C	Relative humidity	40 %

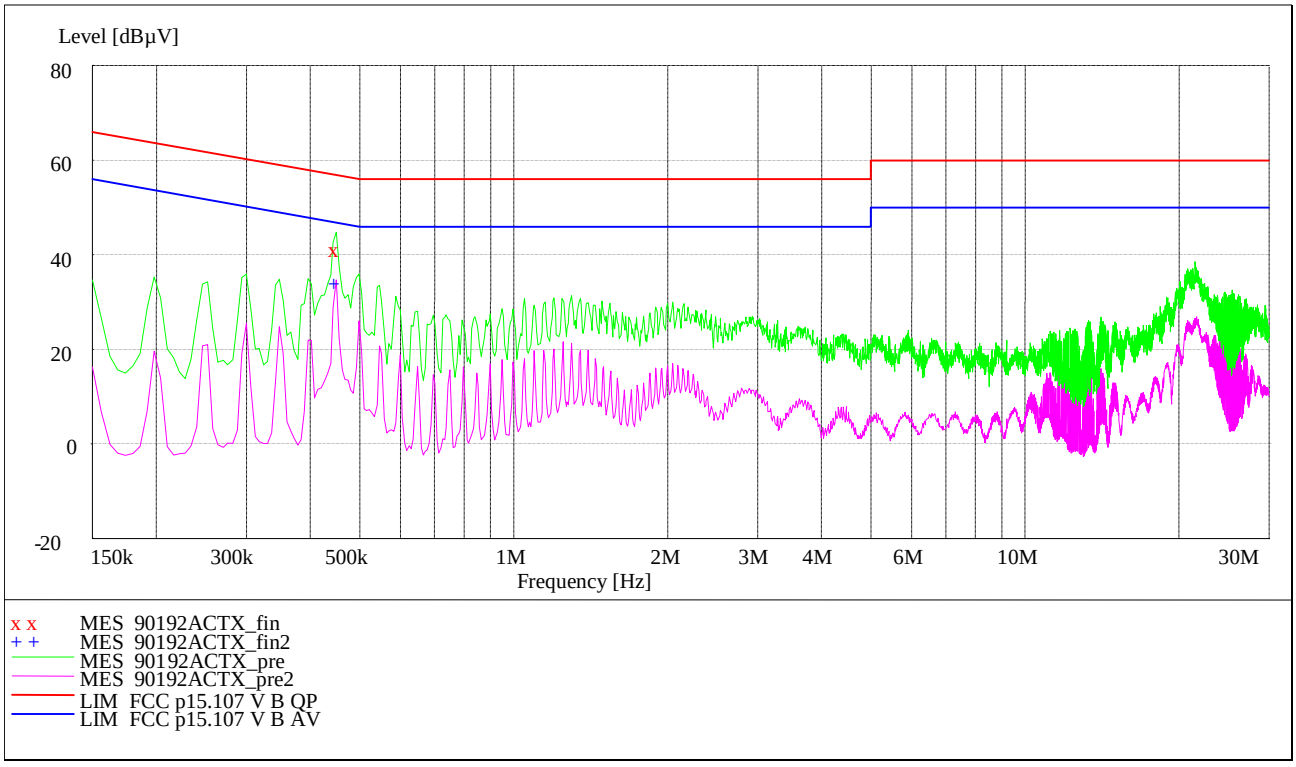
Position of EUT: The EUT was set-up on a non-conducting table of a height of 0.8 m.

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: All results are shown in the following.

Supply voltage: During all measurements the EUT was supplied with 5.0 V DC via the carrier board by an iPod-USB power adapter.

Title: Voltage disturbances measurement with V-LISN receiver ESCS30
EUT: EZ13-00102
Manufacturer: Hermann Sewerin GmbH
Operating Condition: Transmit on all channels
Test site: Phoenix Testlab GmbH, Blomberg; shielded room M47
Operator: Th. KÜHN
Test Specification: Powered by iPod-USB Power adapter



Data record name: 90192ACTX

Result measured with the quasipeak detector:

(These values are marked in the diagram by an x)

Frequency MHz	Level dBµV	Transducer dB	Limit dBµV	Margin dB	Line	PE
0.450600	42.0	0.2	57.0	14.9	L1	FLO

Data record name: 90192ACTX_fin

Result measured with the average detector:

(These values are marked in the diagram by an +)

Frequency MHz	Level dBµV	Transducer dB	Limit dBµV	Margin dB	Line	PE
0.449700	34.7	0.2	47.0	12.2	L1	FLO

Data record name: 90192ACTX_fin2

Test: Passed

TEST EQUIPMENT USED FOR THE TEST:

1 – 3, 6, 7

6 TEST EQUIPMENT AND ANCILLARIES USED FOR TESTS

No.	Test equipment	Type	Manufacturer	Serial No.	PM. No.	Cal. Date	Cal. due
1	Shielded chamber M47	-	Albatross Projects	B83117-C6439-T262	480662	Weekly verification (system cal.)	
2	Measuring receiver	ESCS 30	Rohde & Schwarz	834489/011	580007	02/27/2008	02/2010
3	LISN	ESH2-Z5	Rohde & Schwarz	879675/037	580006	07/14/2008	07/2009
6	EMI-Software	ES-K1	Rohde & Schwarz	-	480111	-	-
7	High-pass filter	HR 0.13-5ENN	FSY Microwave Inc.	DC 0109 SN 001	480339	Weekly verification (system cal.)	
14	Open area test site	-	Phoenix Test-Lab	-	480085	Weekly verification (system cal.)	
15	Measuring receiver	ESIB 7	Rohde & Schwarz	100304	480521	02/26/2008	02/2010
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 A	Chase	1643	480147	08/01/2007	08/2012
20	EMI Software	ES-K1	Rohde & Schwarz	-	480111	-	-
29	Fully anechoic chamber M20	-	Albatross Projects	B83107-E2439-T232	480303	Weekly verification (system cal.)	
31	Measuring receiver	ESI 40	Rohde & Schwarz	100064	480355	02/25/2008	02/2010
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	10/11/2005	10/2010
36	Antenna	3115 A	EMCO	9609-4918	480183	11/04/2008	11/2013
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. 30	RTK 081	Rosenberger	-	410141	Weekly verification (system cal.)	
44	RF-cable No. 31	RTK 081	Rosenberger	-	410142	Weekly verification (system cal.)	
46	RF-cable 1m	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.)	
54	Power supply	TOE 8852	Toellner	51712	480233	-	-
55	Spectrum analyser	FSU	Rohde & Schwarz	200125	480956	02/04/2009	02/2011
56	Loop antenna	HFH2-Z2	Rohde & Schwarz	832609/014	480059	02/19/2009	02/2013

7 LIST OF ANNEXES

ANNEX A	**PHOTOGRAPHS OF THE TEST SET-UPS**:	**8 pages**
	EZ13-00102, test set-up fully anechoic chamber, Position 1	90192_2.jpg
	EZ13-00102, test set-up fully anechoic chamber, Position 2	90192_4.jpg
	EZ13-00102, test set-up fully anechoic chamber	90192_7.jpg
	EZ13-00102, test set-up fully anechoic chamber	90192_5.jpg
	EZ13-00102, test set-up fully anechoic chamber	90192_1.jpg
	EZ13-00102, test set-up fully anechoic chamber	90192_3.jpg
	EZ13-00102, test set-up open area test site	90192_16.jpg
	EZ13-00102, test set-up conducted emission measurement	90192_17.jpg
ANNEX B	**INTERNAL PHOTOGRAPHS OF THE TEST SAMPLE**:	**8 pages**
	EZ13-00102, mounted on carrier board, top view	90192_a.jpg
	carrier board for EZ13-00102, top view	90192_c.jpg
	carrier board for EZ13-00102, EZ13-00102 removed, top view	90192_d.jpg
	carrier board for EZ13-00102, bottom view	90192_e.jpg
	EZ13-00102, top view	90192_f.jpg
	EZ13-00102, top view, shielding removed	90192_h.jpg
	EZ13-00102, bottom view	90192_g.jpg
ANNEX C	**EXTERNAL PHOTOGRAPHS OF THE TEST SAMPLE**:	**- pages**
	Because the EUT is a module, which will be implemented into a final application, no external photographs were available	
ANNEX D	**ADDITIONAL RESULTS FOR INDUSTRY CANADA**:	**8 pages**