

# Test Report

Report Number: F112414E1, 2<sup>nd</sup> version

Applicant:

**EMTEC GmbH**

Manufacturer:

**EMTEC GmbH**

Equipment under Test (EUT):

**Zonescan 820 Logger  
and  
Zonescan 820 Repeater**



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 and  
Industry Canada Test site registration IC3469A-1

## 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 (October 2010)** Radio Frequency Devices
- [3] **FCC Public Notice DA 00-705 (March 2000)**
- [4] **RSS-210 Issue 8 (December 2010)** Licence-exempt Radio Apparatus (All Frequency Bands): Category I Equipment
- [5] **RSS-Gen Issue 3 (December 2010)** General Requirements and Information for the Certification of Radiocommunication Equipment

## 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 <small>Name</small>	 <small>Signature</small>	18 January 2012 <small>Date</small>
Authorized reviewer:	Bernd STEINER <small>Name</small>	 <small>Signature</small>	18 January 2012 <small>Date</small>

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<b>Contents:</b>	<b>Page</b>
1 IDENTIFICATION .....	4
1.1 Applicant .....	4
1.2 Manufacturer .....	4
1.3 Test laboratory .....	4
1.4 EUT (Equipment Under Test) .....	5
1.5 Technical data of equipment.....	5
1.6 Dates .....	6
2 OPERATIONAL STATES .....	6
3 ADDITIONAL INFORMATION .....	7
4 OVERVIEW .....	7
5 TEST RESULTS .....	8
5.1 20 dB bandwidth .....	8
5.1.1 Method of measurement (20 dB bandwidth) .....	8
5.1.2 Test results (20 dB bandwidth).....	9
5.2 Carrier frequency separation .....	11
5.2.1 Method of measurement (carrier frequency separation) .....	11
5.2.2 Test results (carrier frequency separation) .....	12
5.3 Number of hopping frequencies .....	14
5.3.1 Method of measurement (number of hopping frequencies) .....	14
5.3.2 Test results (number of hopping frequencies) .....	15
5.4 Dwell time .....	16
5.4.1 Method of measurement (dwell time) .....	16
5.4.2 Test results (dwell time) .....	17
5.5 Maximum peak output power .....	18
5.5.1 Method of measurement (maximum peak output power) .....	18
5.5.2 Test results (maximum peak output power).....	19
5.6 Radiated emissions .....	21
5.6.1 Method of measurement (radiated emissions).....	21
5.6.2 Test results (radiated emissions).....	26
5.6.2.1 Preliminary radiated emission measurement with external antenna .....	26
5.6.2.2 Final radiated emission measurement (30 MHz to 1 GHz) with external antenna..	35
5.6.2.3 Final radiated emission measurement (1 GHz to 10 GHz) with external antenna..	38
5.6.2.4 Preliminary radiated emission measurement with internal antenna .....	40
5.6.2.5 Final radiated emission measurement (30 MHz to 1 GHz) with internal antenna...	49
5.6.2.6 Final radiated emission measurement (1 GHz to 10 GHz) with internal antenna...	52
6 TEST EQUIPMENT AND ANCILLARIES USED FOR TESTS .....	54
7 REPORT HISTORY .....	54
8 LIST OF ANNEXES .....	55

# 1 IDENTIFICATION

## 1.1 Applicant

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Applicant represented during the test by the following person:	Mr. Hermann WAIBEL; Mr. Stefan LANG

## 1.2 Manufacturer

Name:	EMTEC GmbH
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Country:	Germany
Name for contact purposes:	Mr. Hermann WAIBEL
Phone:	+49 (0)7541 9537-15
Fax:	+49 (0)7541 9537-10
eMail Address:	Hermann.Waibel@emtec-gmbh.de
Manufacturer represented during the test by the following person:	Mr. Hermann WAIBEL; Mr. Stefan LANG

## 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: *	915 MHz FHSS transceiver
Model name: *	Zonescan 820 Logger and Zonescan 820 Repeater
FCC ID: *	<b>ZSSZS820915LR</b>
IC: *	<b>9789A-ZS820915LR</b>
Serial number: *	502416 (Zonescan 820 Logger with internal antenna), 502814 (Zonescan 820 Logger with external antenna), 1500056 (Zonescan 820 Repeater)
PCB identifier: *	ZS820-10b
Hardware version: *	1.3/2
Software version: *	5.0 (Zonescan 820 Logger), 7.3 (Zonescan 820 Repeater)

## 1.5 Technical data of equipment

Channel 0	RX:	904.0 MHz	TX:	904.0 MHz
Channel 24	RX:	911.2 MHz	TX:	911.2 MHz
Channel 49	RX:	918.7 MHz	TX:	918.7 MHz

Antenna type: *	Internal or external monopole type CTA868/5/DT/SM/H1				
Antenna gain: *	1 dBi (internal antenna), 5 dBi (CTA868/5/DT/SM/H1, cable loss excluded)				
Antenna connector: *	None (models with internal antenna) or RP-SMA				
Power supply: *	$U_{Nom} =$	3.6 V DC	$U_{Min} =$	2.6 V DC	$U_{Max} =$ 3.7 V DC
Type of modulation: *	FHSS (GFSK)				
Operating frequency range:*	904.0 MHz to 918.7 MHz				
Number of channels: *	50				
Temperature range: *	-20 °C to 55 ° C				
Lowest / highest Internal clock frequency: *	32.768 kHz / 918.7 MHz				

\* declared by the applicant.

The following external I/O cables were used:

Identification	Connector		Length
	EUT	Ancillary	
Antenna (Zonescan 820 Logger with external antenna only)	RP-SMA	RP-SMA	3.0 m
-	-	-	-

\*: Length during the test if no other specified.

## 1.6 Dates

Date of receipt of test sample:	05 July 2011
Start of test:	05 July 2011
End of test:	07 July 2011

## 2 OPERATIONAL STATES

All used samples were unmodified and could be configured to operate as requested for any test item by the use of the remote station.

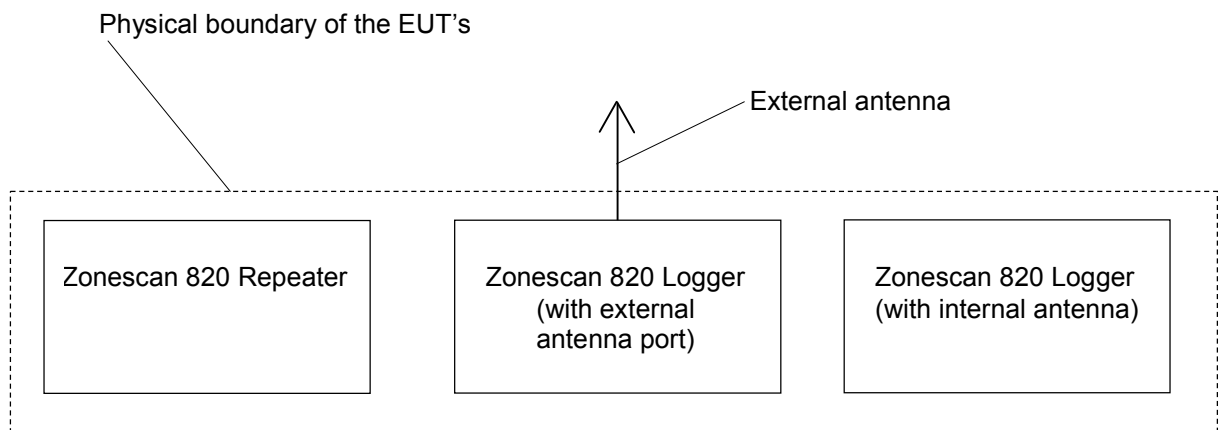
The RF circuit of all samples is identically; the RF output is either connected to the internal antenna or to the external reverse SMA plug. All conducted measurements were carried out with a sample with the external antenna port.

Preliminary measurements have not shown any measurable difference between the Zonescan 820 Logger (with internal antenna) and the Zonescan 820 Repeater was found. Therefore all radiated measurements were carried out with the Logger only.

Because the external antenna (CTA868/5/DT/SM/H1) with RP-SMA connector was not available for testing the antenna with a BNC connector was provided by the applicant. Appropriate adapters were used to connect the antenna to the EUT.

During the tests the test sample was powered with 3.6 V DC via a new internal battery.

Operation mode	Description of the operation mode	Modulation
1	Continuous transmitting on channel 0 (904.0 MHz)	GFSK
2	Continuous transmitting on channel 24 (911.2 MHz)	GFSK
3	Continuous transmitting on channel 49 (918.7) MHz	GFSK
4	Transmitter hopping on all channels	GFSK
5	Continuous receiving on 911.2 MHz	



The following test modes were adjusted during the tests:

Test items	Operation mode
20 dB bandwidth	1, 2, 3
Carrier frequency separation	1, 2, 3
Number of hopping channels	4
Dwell time	2
Maximum peak output power	1, 2, 3
Radiated emissions (transmitter)	1, 2, 3
Radiated emissions (receiver)	5

### 3 ADDITIONAL INFORMATION

Because the external antenna is equipped with an magnetic base and is intended to be installed on a metal surface, during the measurements the antenna was positioned on a metal plate with the dimensions 22 x 32 cm.

During the tests the EUT was not labelled as required by FCC / IC.

### 4 OVERVIEW

Application	Frequency range [MHz]	FCC 47 CFR Part 15 section [2]	RSS 210, Issue 8 [4] or RSS-Gen, Issue 3 [5]	Status	Refer page
20 dB bandwidth	General	15.247 (a) (1) (i)	A8.1 (c) [4]	Passed	8 et seq.
Carrier frequency separation	General	15.247 (a) (1) (i)	-	Passed	11 et seq.
Number of hopping channels	902 - 928	15.247 (a) (1) (i)	A8.1 (c) [4]	Passed	14 et seq.
Dwell time	902 - 928	15.247 (a) (1) (i)	A8.1 (c) [4]	Passed	16 et seq.
Maximum peak output power	902 - 928	15.247 (b) (2)	A8.4 (1) [4]	Passed	18 et seq.
Radiated emissions (transmitter)	0.009 - 10,000	15.247 (d) 15.205 (a) 15.209 (a)	A8.5 [4] 2.5 [4] 7.2.2 [5]	Passed	21 et seq.
Radiated emissions (receiver)	30 – 5,000	15.109 (a)	6.1 [5]	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 and the hopping function has to be disabled, the transmitter shall work with its maximum data rate.

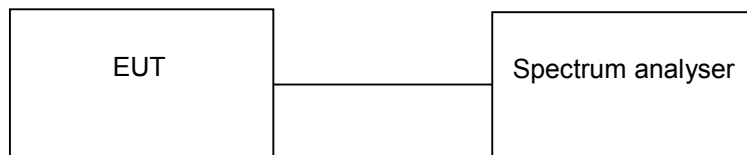
The following spectrum analyser settings shall be used:

- Span: App. 2 to 3 times the 20 dB bandwidth, centred on the actual hopping channel.
- Resolution bandwidth:  $\geq 1\%$  of the 20 dB bandwidth.
- Video bandwidth:  $\geq$  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:

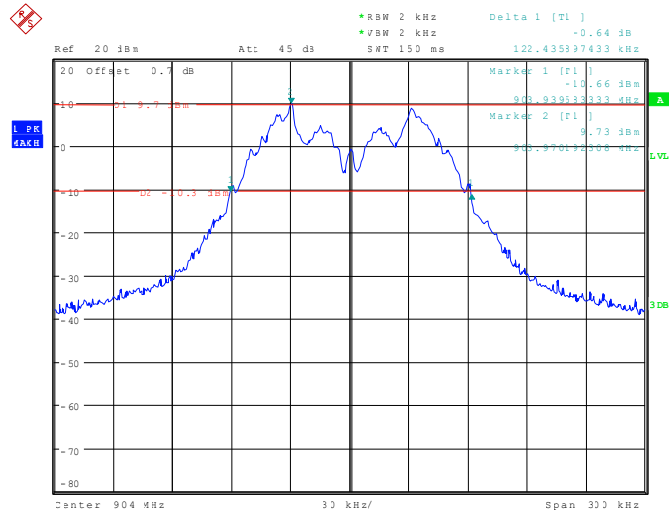




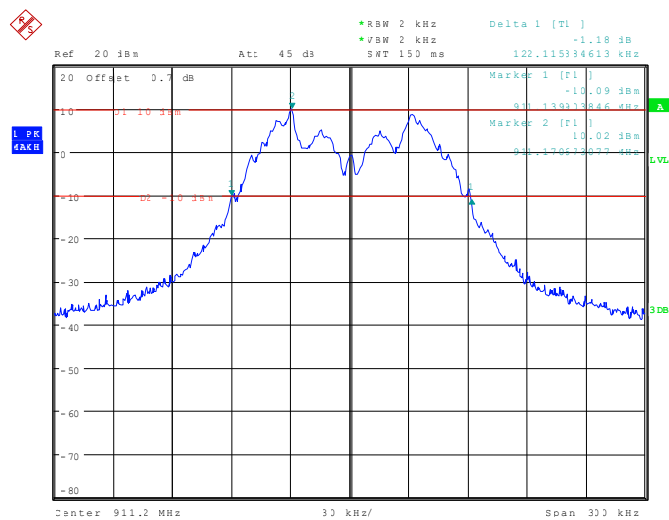
### 5.1.2 Test results (20 dB bandwidth)

Ambient temperature	21 °C	Relative humidity	56 %
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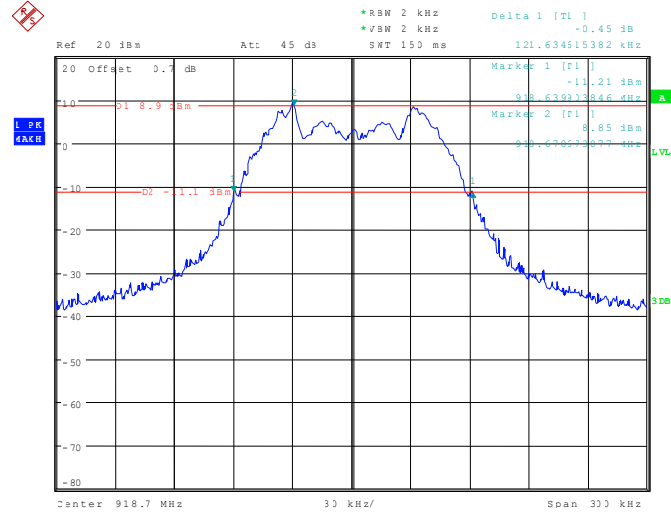
112414\_37.wmf: 20 dB bandwidth at the lower end of the assigned frequency band:



112414\_38.wmf: 20 dB bandwidth at the middle of the assigned frequency band:



112414\_39.wmf: 20 dB bandwidth at the upper end of the assigned frequency band:



Channel number	Channel frequency [MHz]	20 dB bandwidth [kHz]
0	904.000 MHz	122.436
24	911.200 MHz	122.115
49	918.700 MHz	121.635
Measurement uncertainty		+0.66 dB / -0.72 dB

TEST EQUIPMENT USED FOR THE TEST:

30

## 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:  $\geq 1\%$  of the span.
- Video bandwidth:  $\geq$  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.

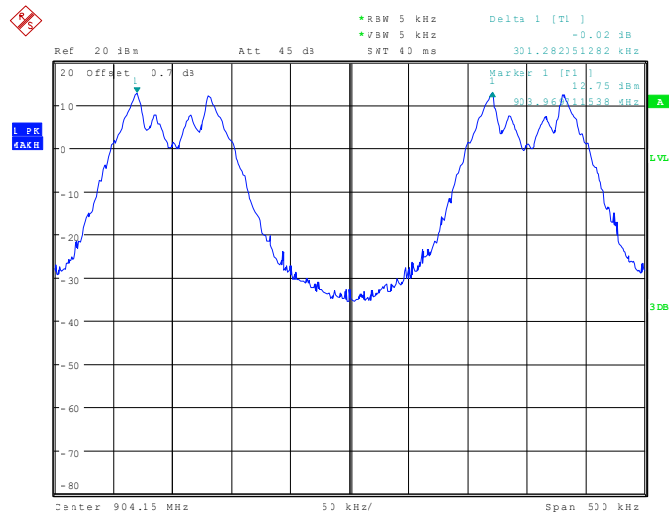
Test set-up:



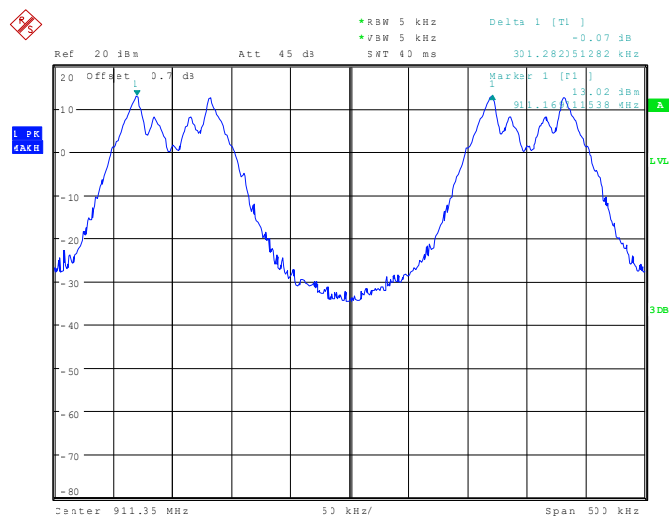
## 5.2.2 Test results (carrier frequency separation)

Ambient temperature	21 °C	Relative humidity	56 %
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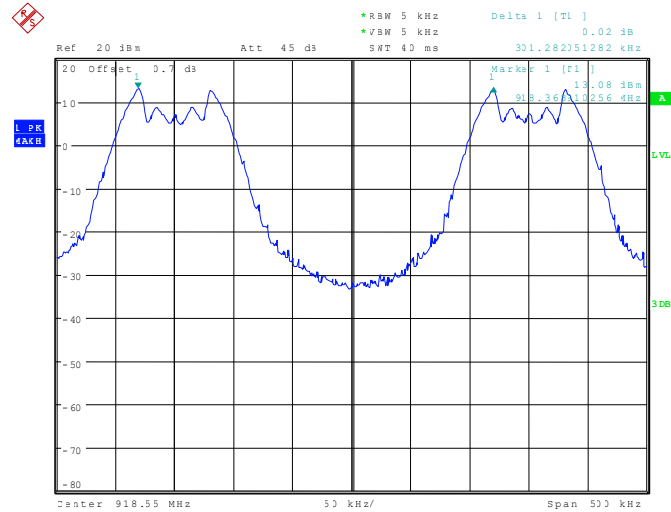
112414\_40.wmf: Channel separation at the lower end of the assigned frequency band:



112414\_41.wmf: Channel separation at the middle of the assigned frequency band:



112414\_42.wmf: Channel separation at the upper end of the assigned frequency band:



Channel number	Channel frequency [MHz]	Channel separation [kHz]	Minimum limit [kHz]
0	904.000	301.282	122.435 (the 20 dB bandwidth)
24	911.200	301.282	122.115 (the 20 dB bandwidth)
49	918.700	301.282	121.635 (the 20 dB bandwidth)
Measurement uncertainty			<10 <sup>-7</sup>

Test:

Passed

TEST EQUIPMENT USED FOR THE TEST:

30

## 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:  $\geq 1\%$  of the span.
- Video bandwidth:  $\geq$  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.

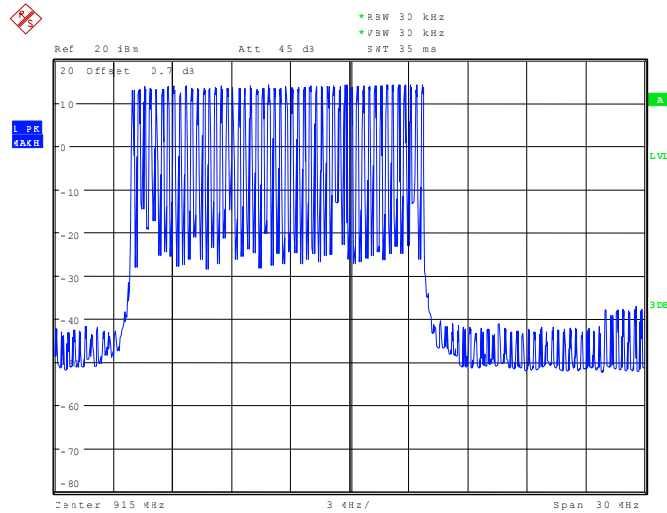
Test set-up:



### 5.3.2 Test results (number of hopping frequencies)

Ambient temperature	21 °C	Relative humidity	56 %
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112414\_43.wmf: Number of hopping channels:



Number of hopping channels	Limit
Operation mode 4	
50	At least 15

Test: Passed

TEST EQUIPMENT USED FOR THE TEST:

30

## 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:  $\geq$  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:

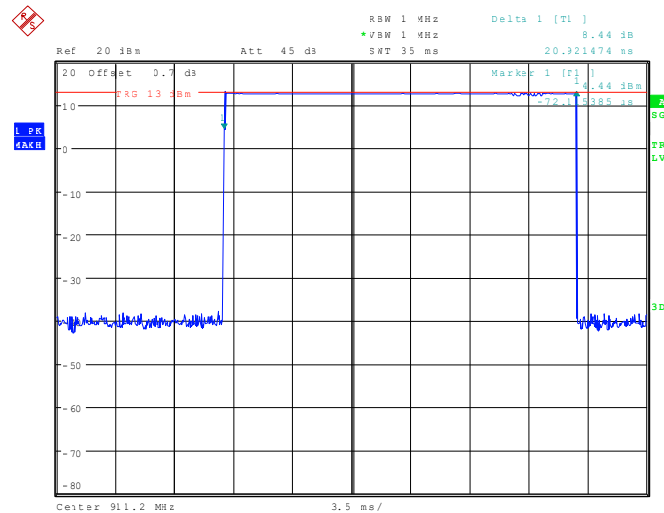




### 5.4.2 Test results (dwell time)

Ambient temperature	21 °C	Relative humidity	56 %
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112414\_44.wmf: Dwell time at the middle of the assigned frequency band:



The dwell time is calculated with the following formula:

$$\text{Dwell time} = t_{\text{pulse}} \times n_{\text{hops}} / \text{number of hopping channels} \times 20 \text{ s}$$

Where:

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

The hopping rate of the system is 25 hops per second and the system uses 50 channels.

Channel number	Channel frequency [MHz]	$t_{\text{pulse}}$ [ms]	Dwell time [ms]	Limit [ms]
24	911.200	20.921	209.210	400
Measurement uncertainty			$<10^{-7}$	

Test: Passed

TEST EQUIPMENT USED FOR THE TEST:

30

## 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 disabled.

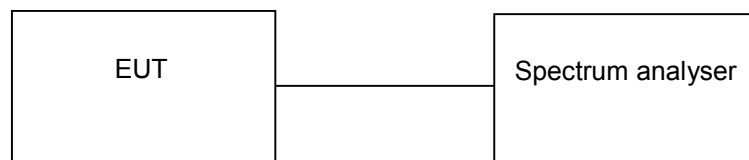
The following spectrum analyser settings shall be used:

- 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:  $\geq$  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.

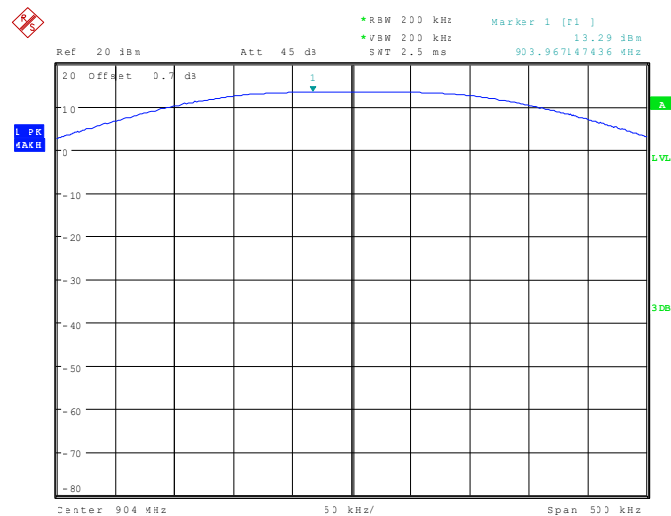
Test set-up:



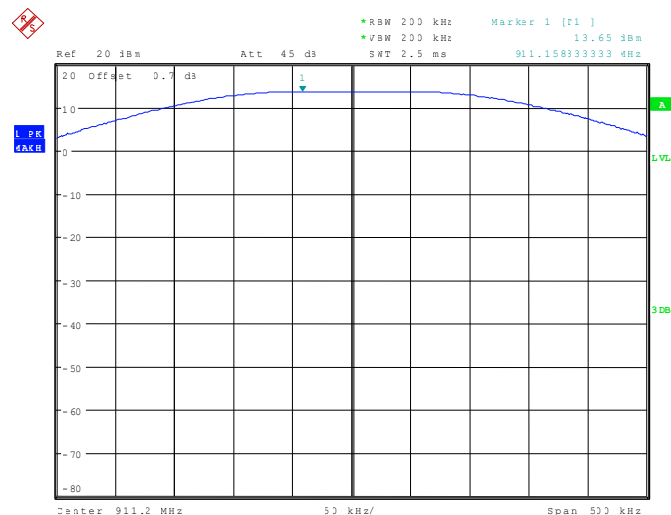
### 5.5.2 Test results (maximum peak output power)

Ambient temperature	21 °C	Relative humidity	56 %
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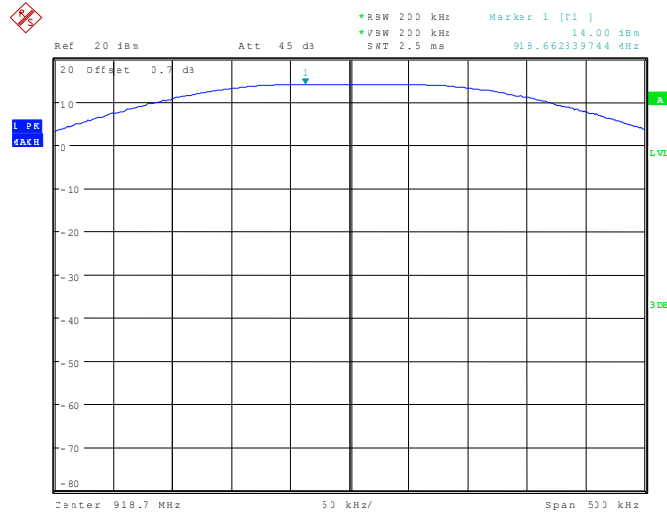
112414\_45.wmf: Maximum peak output power at the lower end of the assigned frequency band (operation mode 1):



112414\_46.wmf: Maximum peak output power at the middle of the assigned frequency band (operation mode 2):



112414\_47.wmf: Maximum peak output power at the upper end of the assigned frequency band (operation mode 3):



Operation mode	Channel number	Channel frequency [MHz]	Maximum peak output power [dBm]	Antenna gain [dBi]	Peak power limit [dBm]
1	0	904.000	13.3	5.0	30.0
2	24	911.200	13.7	5.0	30.0
3	49	918.700	14.0	5.0	30.0
Measurement uncertainty				+0.66 dB / -0.72 dB	

Test: Passed

TEST EQUIPMENT USED FOR THE TEST:

30

## 5.6 Radiated emissions

### 5.6.1 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 site 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.

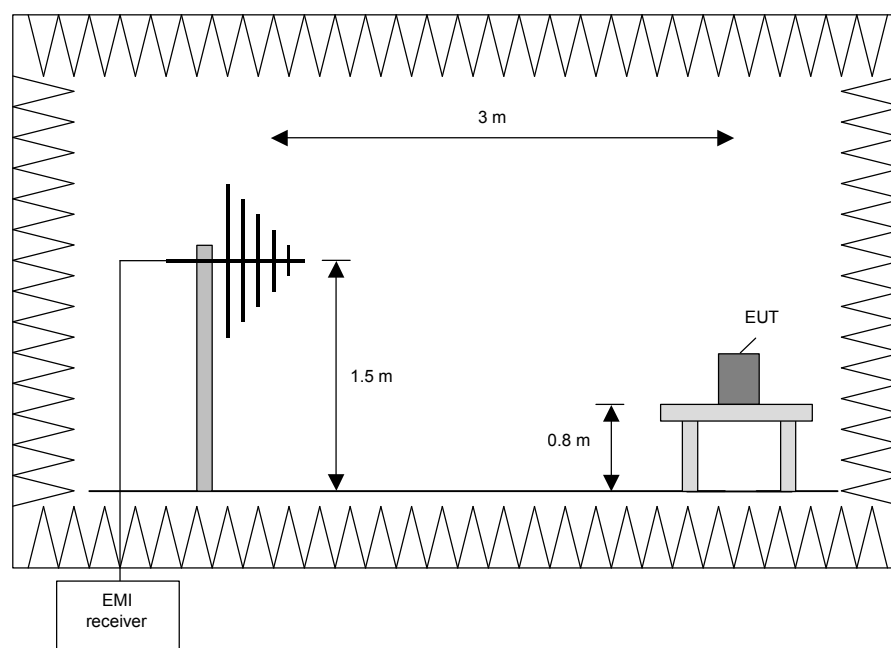
#### Preliminary measurement (30 MHz to 1 GHz)

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:

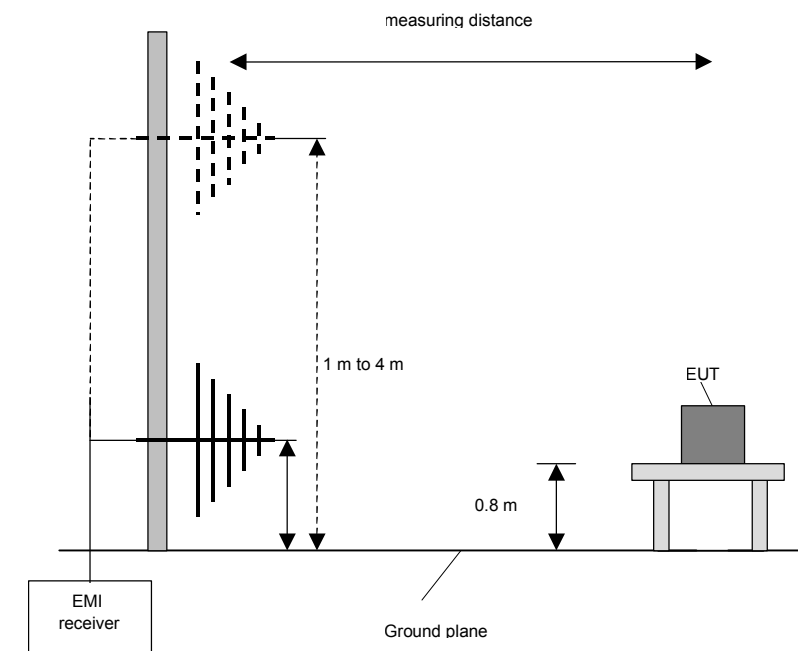
1. Monitor the frequency range at horizontal polarisation and a EUT azimuth of 0 °.
2. Manipulate the system cables within the range to produce the maximum level of emission.
3. Rotate the EUT by 360 ° to maximize the detected signals.
4. Make a hardcopy of the spectrum.
5. Measure the frequency of the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

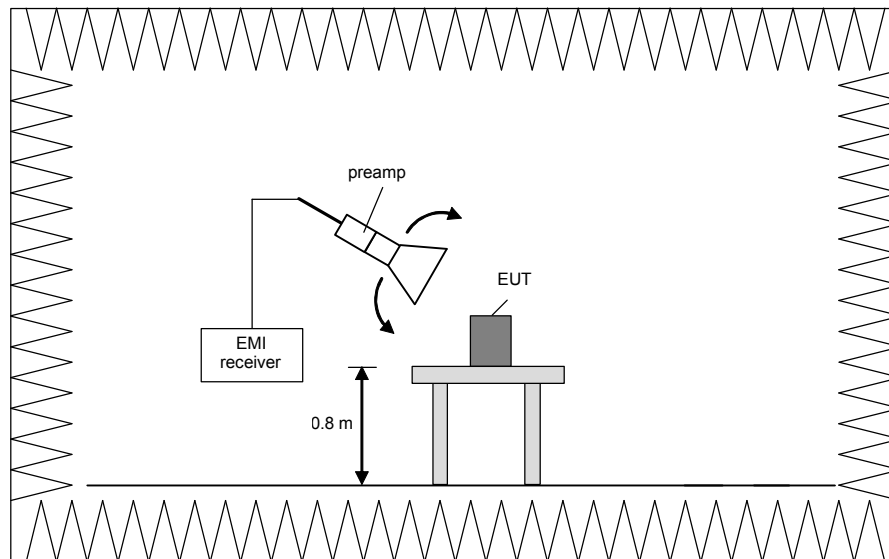
This measurement will be performed in a fully anechoic chamber. Tabletop devices will set up on a non-conducting support with a size of 1 m by 1.5 m and a height of 80 cm. Floor-standing devices will be placed directly on the turntable/ground plane. The set up of the Equipment under test will be in accordance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



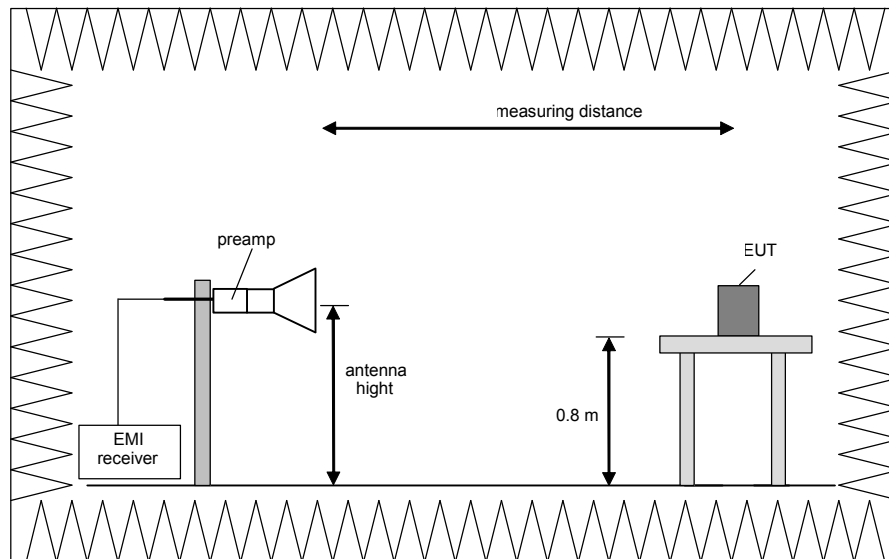
### **Final measurement (1 GHz to 110 GHz)**

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.

## 5.6.2 Test results (radiated emissions)

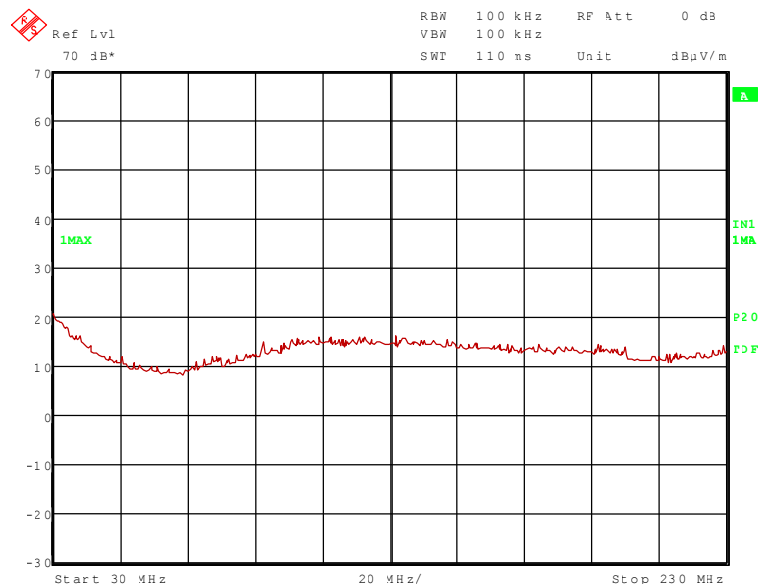
### 5.6.2.1 Preliminary radiated emission measurement with external antenna

Ambient temperature	20 °C	Relative humidity	54 %
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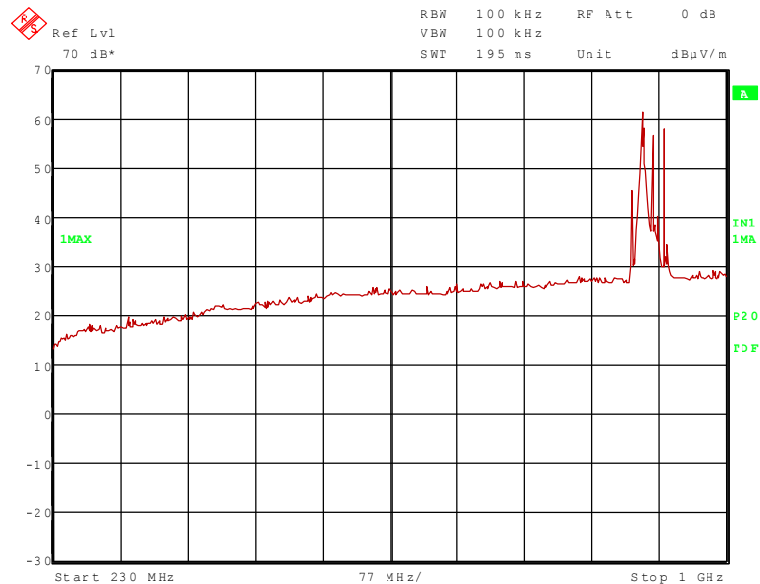
Position of EUT:	The EUT was set-up on a non-conducting table of a height of 0.8 m. The distance between EUT and antenna was 3 m.
Cable guide:	For detail information of test set-up and the cable guide refer to the pictures in annex A of this test report.
Test record:	All results are shown in the following.
Supply voltage:	During all measurements the EUT was supplied by a new internal battery.
Remark:	As pre-tests have shown, the emissions in the frequency range 9 kHz to 30 MHz are not depending on the transmitter operation mode. Therefore the emissions in this frequency range were measured only with the transmitter operates in operation mode 2.

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

##### 112414\_3.wmf: Spurious emissions from 30 MHz to 230 MHz (operation mode 1):



112414\_4.wmf: Spurious emissions from 230 MHz to 1 GHz (operation mode 1, carrier notched):



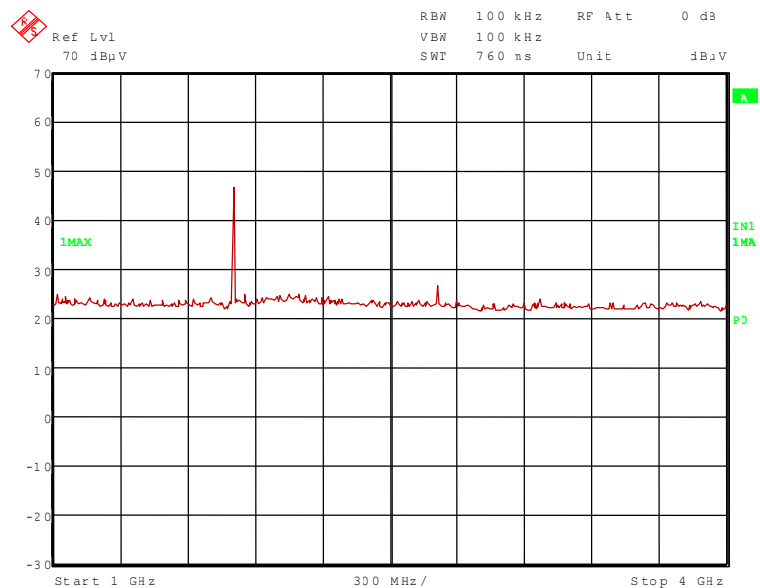
No frequencies were found inside the restricted bands during the preliminary radiated emission test.

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

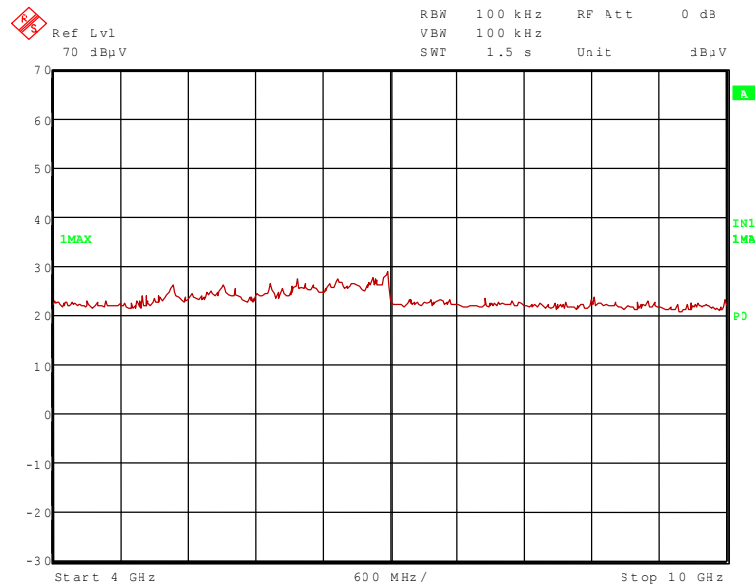
- 892.000 MHz, 904.000 MHz, 916.000 MHz and 928.000 MHz.

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

112414\_23.wmf: Spurious emissions from 1 GHz to 4 GHz (operation mode 1):



112414\_24.wmf: Spurious emissions from 4 GHz to 10 GHz (operation mode 1):



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

- 2.71200 GHz.

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

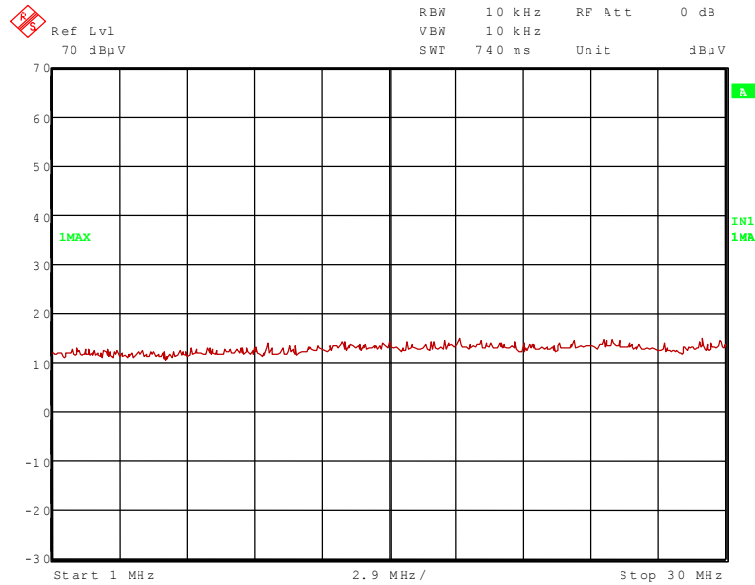
- 1.80800 GHz.

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

TEST EQUIPMENT USED FOR THE TEST:
29, 31 - 36, 43, 44, 49, 55, 73

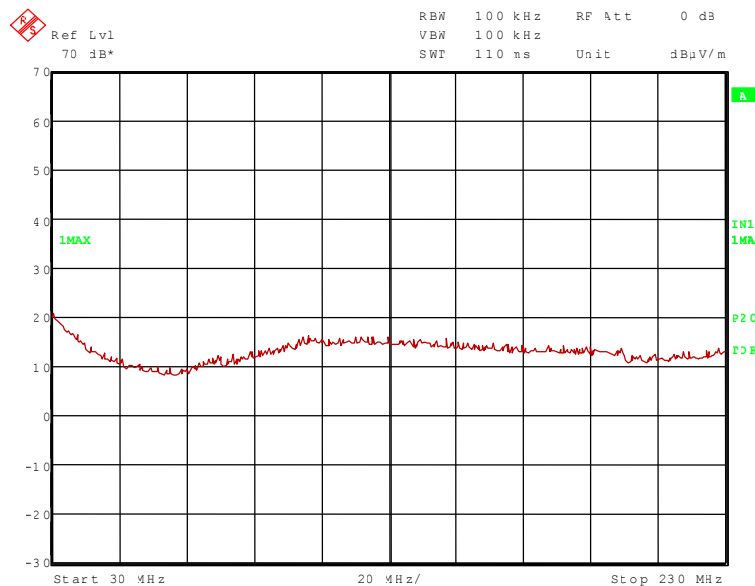


112414\_27.wmf: Spurious emissions from 1 MHz to 30 MHz (operation mode 2):

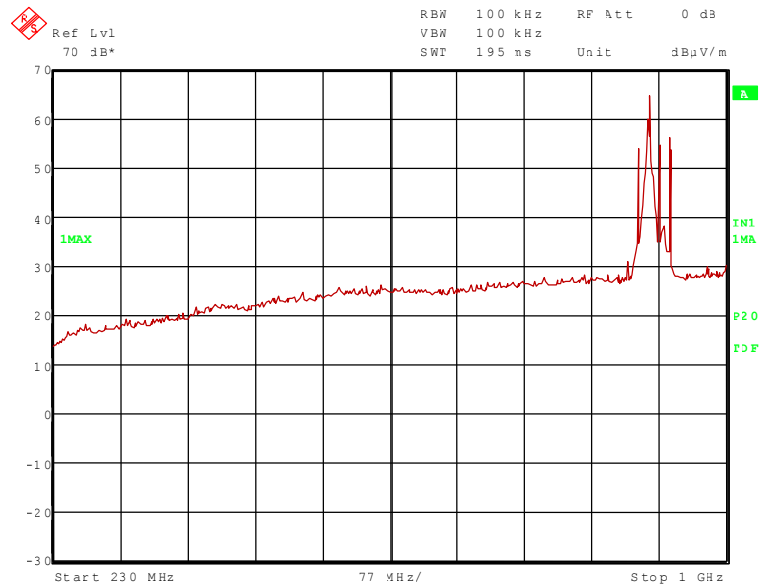


No significant frequencies above the noise floor of the system were found during the preliminary radiated emission test, so no measurements were carried out on the outdoor test site.

112414\_2.wmf: Spurious emissions from 30 MHz to 230 MHz (operation mode 2):



112414\_1.wmf: Spurious emissions from 230 MHz to 1 GHz (operation mode 2, carrier notched):



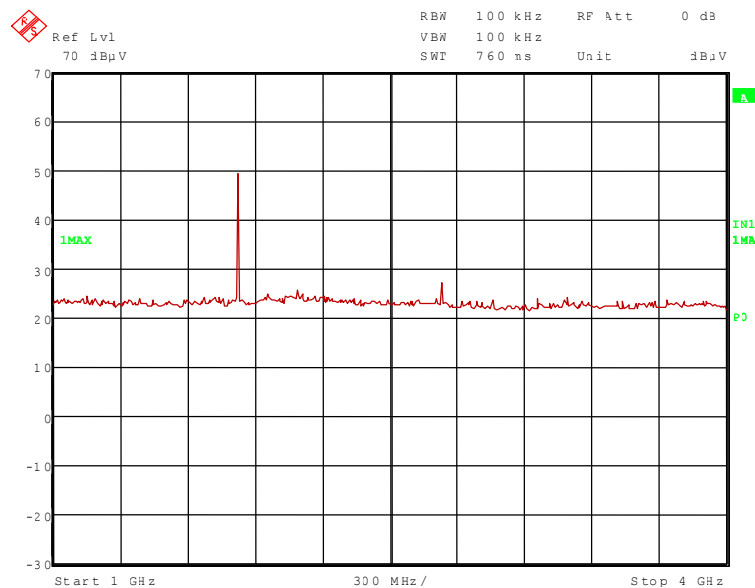
No frequencies were found inside the restricted bands during the preliminary radiated emission test.

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

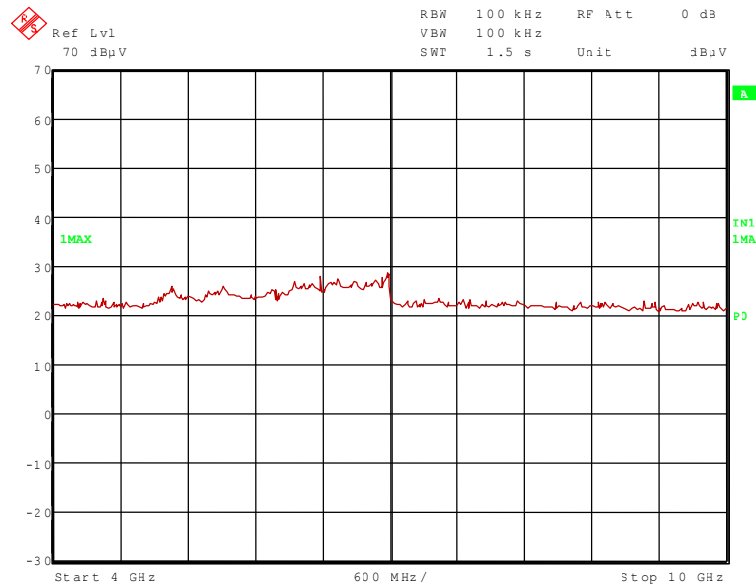
- 899.200 MHz, 911.200 MHz, 923.200 MHz and 935.200 MHz.

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

112414\_22.wmf: Spurious emissions from 1 GHz to 4 GHz (operation mode 2):



112414\_21.wmf: Spurious emissions from 4 GHz to 10 GHz (operation mode 2):



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

- 2.73360 GHz.

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

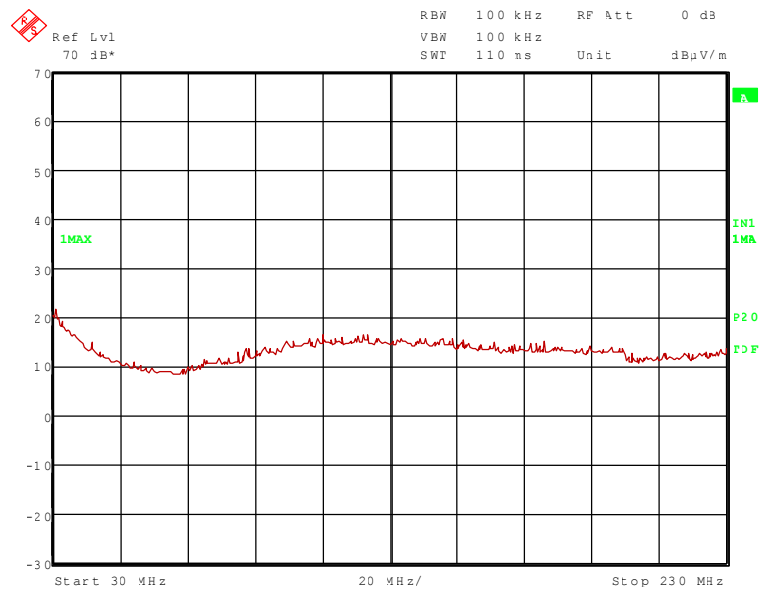
- 1.82240 GHz.

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

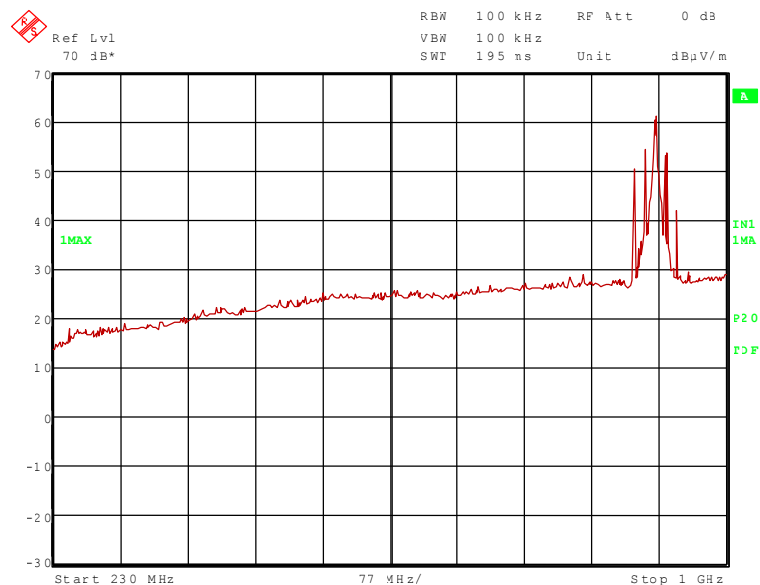


**Transmitter operates on the upper end of the assigned frequency (operation mode 3)**

112414\_9.wmf: Spurious emissions from 30 MHz to 230 MHz (operation mode 3):



112414\_10.wmf: Spurious emissions from 230 MHz to 1 GHz (operation mode 3, carrier notched):



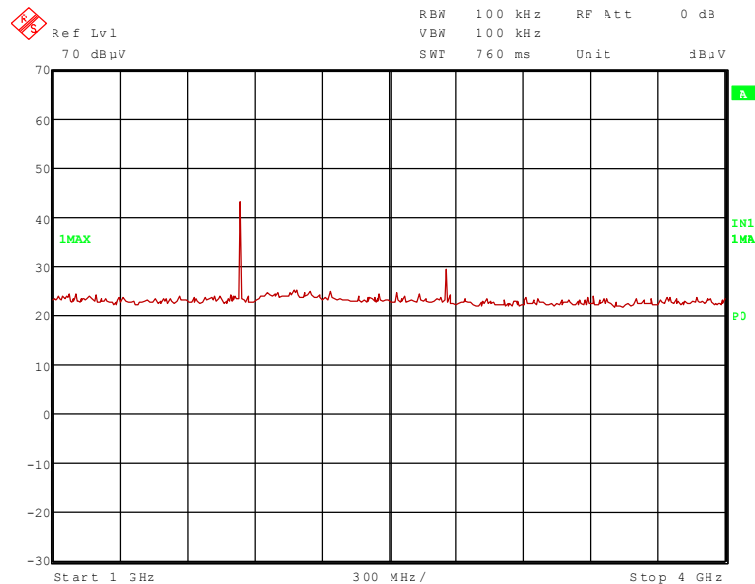
No frequencies were found inside the restricted bands during the preliminary radiated emission test.

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

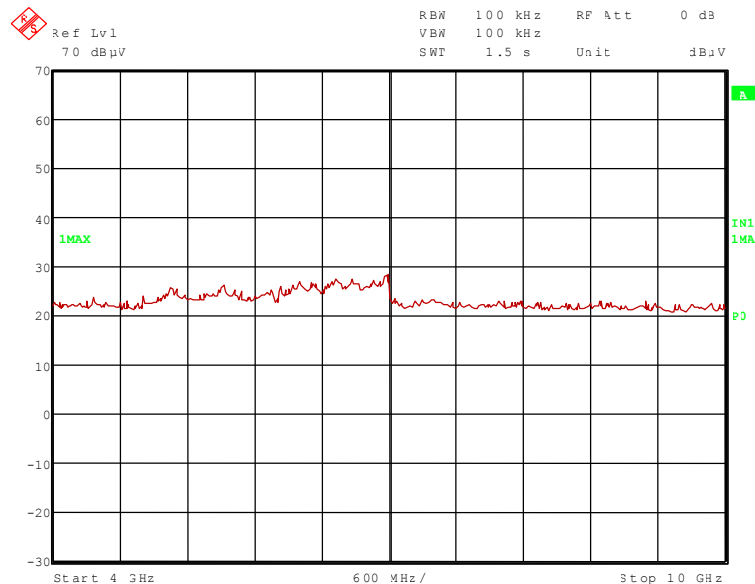
- 894.700 MHz, 906.700 MHz, 918.700 MHz, 930.700 MHz and 942.700 MHz.

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

112414\_19.wmf: Spurious emissions from 1 GHz to 4 GHz (operation mode 3):



112414\_20.wmf: Spurious emissions from 4 GHz to 10 GHz (operation mode 3):



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

- 2.75610 GHz.

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

- 1.83740 GHz.

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

### 5.6.2.2 Final radiated emission measurement (30 MHz to 1 GHz) with external antenna

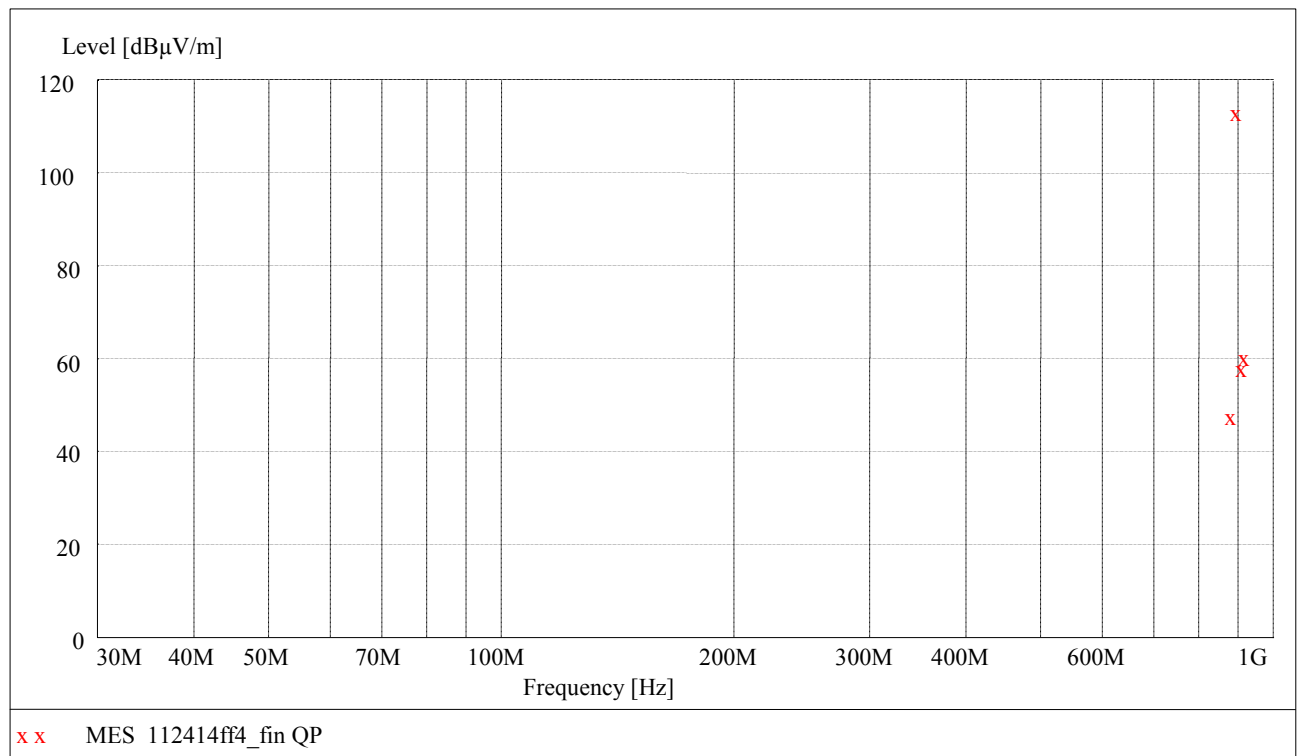
Ambient temperature	21 °C	Relative humidity	56 %
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- Position of EUT: The EUT was set-up on a non-conducting table of a height of 0.8 m. The distance between EUT and antenna was 3 m.
- Cable guide: For detail information of test set-up and the cable 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 by a new internal battery.
- Test results: The test results were calculated with the following formula:

$$\text{Result [dB}\mu\text{V/m]} = \text{reading [dB}\mu\text{V]} + \text{cable loss [dB]} + \text{antenna factor [dB/m]}$$

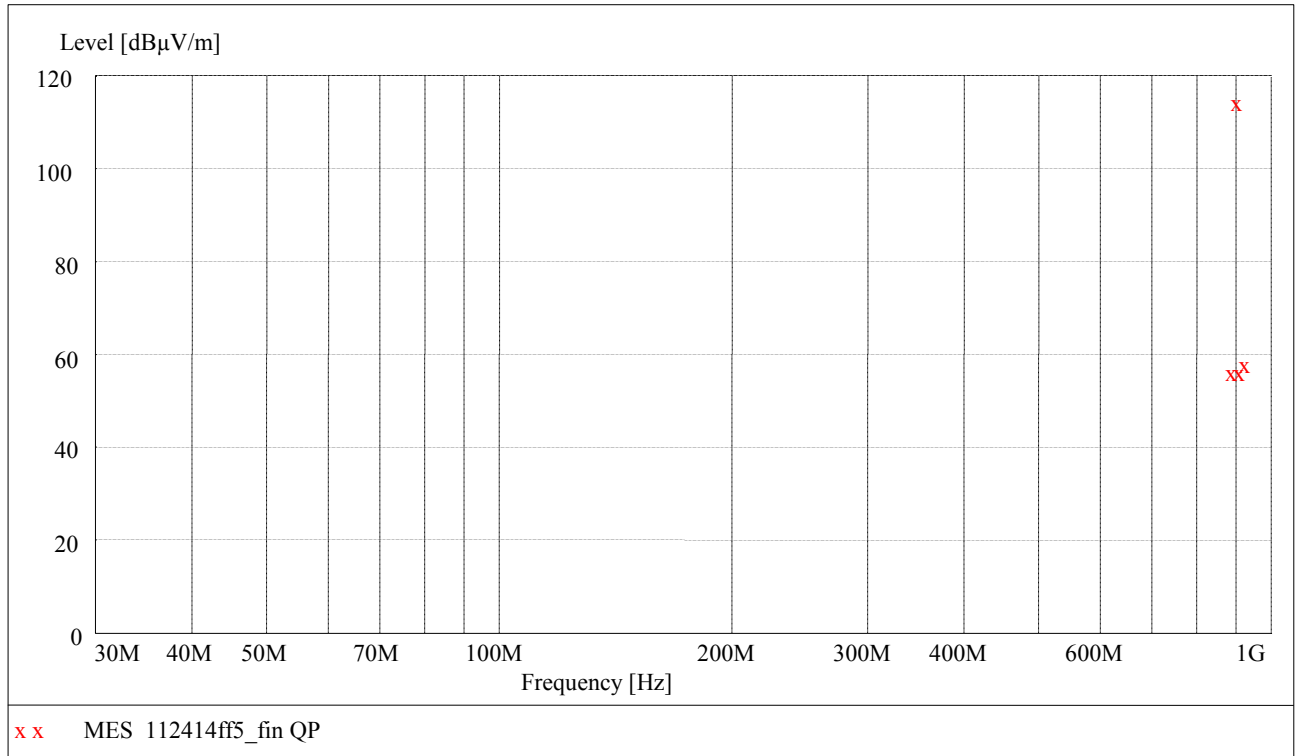
The measured points and the limit line in the following diagrams refer to the standard measurement of the emitted interference in compliance with the above-mentioned standard. The measured points marked with an x are the measured results of the standard final measurement on the open area test site.

#### Transmitter operates on the lower end of the assigned frequency (operation mode 1)



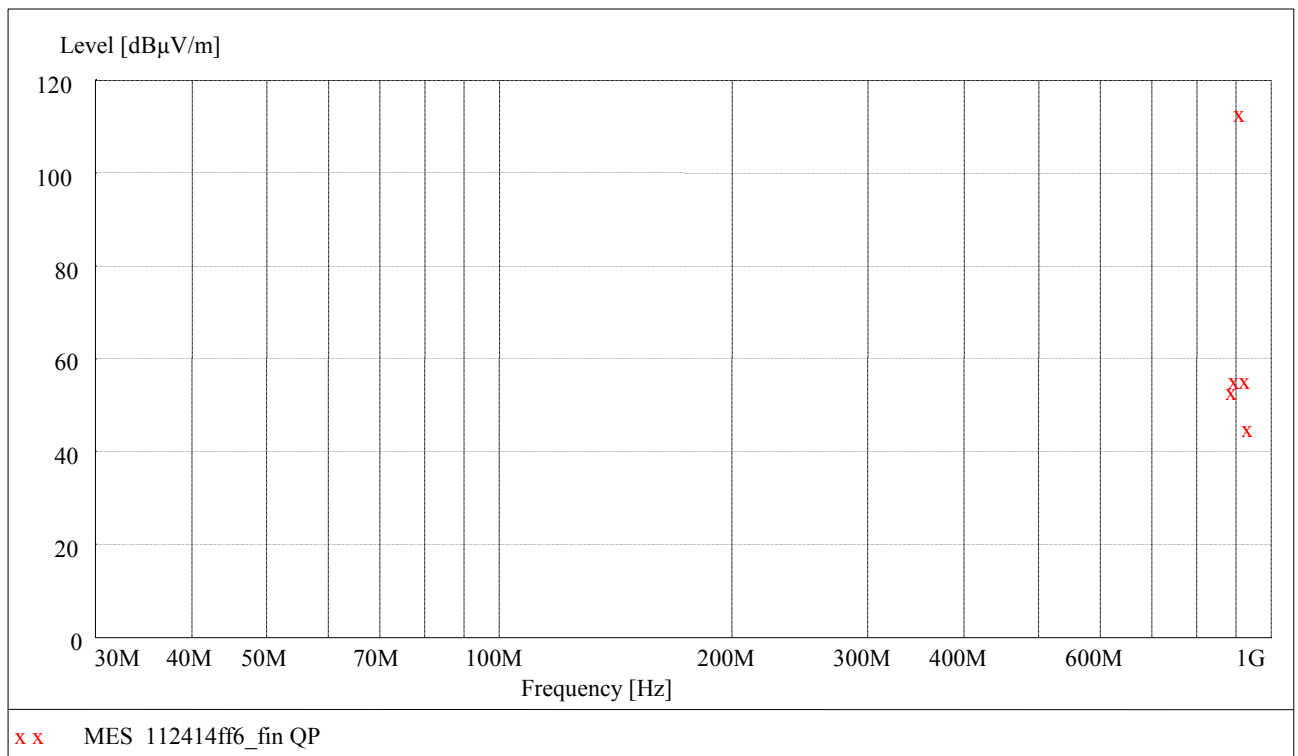
Data record name: 112414ff4

**Transmitter operates on the middle of the assigned frequency (operation mode 2)**



Data record name: 112414ff5

**Transmitter operates on the upper end of the assigned frequency (operation mode 3)**



Data record name: 112414ff6

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 quasi-peak detector:**  
(These values were marked in the diagrams by an x)

Transmitter operates on the lower end of the assigned frequency band (operation mode 1)									
Spurious emissions outside restricted bands									
Frequency	Result	Limit	Margin	Readings	Antenna factor	Cable loss	Height	Azimuth	Pol.
MHz	dB $\mu$ V/m	dB $\mu$ V/m	dB	dB $\mu$ V	dB/m	dB	cm	deg	
892.000	48.2	93.7	45.5	22.5	22.2	3.5	107.0	191.0	Vert.
904.000	113.7	carrier	-	87.8	22.5	3.4	100.0	190.0	Vert.
916.000	58.7	93.7	35.0	32.4	22.9	3.4	102.0	182.0	Vert.
928.000	61.2	93.7	32.5	34.4	23.4	3.4	101.0	180.0	Vert.
Transmitter operates on the middle of the assigned frequency band (operation mode 2)									
Spurious emissions outside restricted bands									
Frequency	Result	Limit	Margin	Readings	Antenna factor	Cable loss	Height	Azimuth	Pol.
MHz	dB $\mu$ V/m	dB $\mu$ V/m	dB	dB $\mu$ V	dB/m	dB	cm	deg	
899.200	56.7	95.2	38.5	30.8	22.4	3.5	107.0	165.0	Vert.
911.200	115.2	carrier	-	89.1	22.7	3.4	100.0	180.0	Vert.
923.200	57.1	95.2	38.1	30.5	23.2	3.4	104.0	1.0	Vert.
935.200	58.9	95.2	36.3	31.8	23.7	3.4	104.0	2.0	Vert.
Transmitter operates on the upper end of the assigned frequency band (operation mode 3)									
Spurious emissions outside restricted bands									
Frequency	Result	Limit	Margin	Readings	Antenna factor	Cable loss	Height	Azimuth	Pol.
MHz	dB $\mu$ V/m	dB $\mu$ V/m	dB	dB $\mu$ V	dB/m	dB	cm	deg	
894.700	53.7	93.7	40.0	28.0	22.2	3.5	105.0	165.0	Vert.
906.700	56.4	93.7	37.3	30.5	22.5	3.4	100.0	270.0	Vert.
918.700	113.7	carrier	-	87.3	23.0	3.4	100.0	270.0	Vert.
930.700	56.0	93.7	37.7	29.1	23.5	3.4	100.0	270.0	Vert.
942.700	46.0	93.7	47.7	18.8	23.8	3.4	100.0	168.0	Vert.
Measurement uncertainty				+2.2 dB / -3.6 dB					

The test results were calculated with the following formula:

$$\text{Result [dB}\mu\text{V/m]} = \text{reading [dB}\mu\text{V]} + \text{cable loss [dB]} + \text{antenna factor [dB/m]}$$

Test: Passed

TEST EQUIPMENT USED FOR THE TEST:
14 - 20

### 5.6.2.3 Final radiated emission measurement (1 GHz to 10 GHz) with external antenna

Ambient temperature	20 °C	Relative humidity	54 %
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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 by a new internal battery.

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 dB $\mu$ V/m	Limit dB $\mu$ V/m	Margin dB	Readings dB $\mu$ V	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Restr. Band
1.80800	50.9	93.7	42.8	47.9	26.5	26.5	3.0	150	Vert.	No
2.71200	40.1	74.0	33.9	33.8	28.7	26.4	4.0	150	Vert.	Yes
Measurement uncertainty						+2.2 dB / -3.6 dB				

#### Result measured with the average detector:

Frequency GHz	Corr. value dB $\mu$ V/m	Limit dB $\mu$ V/m	Margin dB	Readings dB $\mu$ V	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Restr. Band
1.80800	49.3	93.7	44.4	46.3	26.5	26.5	3.0	150	Vert.	No
2.71200	27.7	54.0	26.3	21.4	28.7	26.4	4.0	150	Vert.	Yes
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 dB $\mu$ V/m	Limit dB $\mu$ V/m	Margin dB	Readings dB $\mu$ V	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Restr. Band
1.82240	54.0	95.2	41.2	50.6	26.7	26.5	3.2	150	Vert.	No
2.73360	40.7	74.0	33.3	34.2	28.8	26.4	4.1	150	Vert.	Yes
Measurement uncertainty						+2.2 dB / -3.6 dB				

**Result measured with the average detector:**

Frequency GHz	Corr. value dB $\mu$ V/m	Limit dB $\mu$ V/m	Margin dB	Readings dB $\mu$ V	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Restr. Band
1.82240	52.6	95.2	42.6	49.2	26.7	26.5	3.2	150	Vert.	No
2.73360	29.9	54.0	24.1	23.4	28.8	26.4	4.1	150	Vert.	Yes
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 dB $\mu$ V/m	Limit dB $\mu$ V/m	Margin dB	Readings dB $\mu$ V	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Restr. Band
1.83740	48.6	93.7	45.1	44.9	26.8	26.5	3.4	150	Vert.	No
2.75610	42.0	74.0	32.0	35.4	28.9	26.4	4.1	150	Vert.	Yes
Measurement uncertainty						+2.2 dB / -3.6 dB				

**Result measured with the average detector:**

Frequency GHz	Corr. value dB $\mu$ V/m	Limit dB $\mu$ V/m	Margin dB	Readings dB $\mu$ V	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Restr. Band
1.83740	46.4	93.7	47.1	42.7	26.8	26.5	3.4	150	Vert.	No
2.75610	34.6	54.0	19.4	28.0	28.9	26.4	4.1	150	Vert.	Yes
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, 73

### 5.6.2.4 Preliminary radiated emission measurement with internal antenna

Ambient temperature	20 °C	Relative humidity	54 %
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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: No cables were connectable to the EUT. For detail information of test set-up refer to the pictures in annex A of this test report.

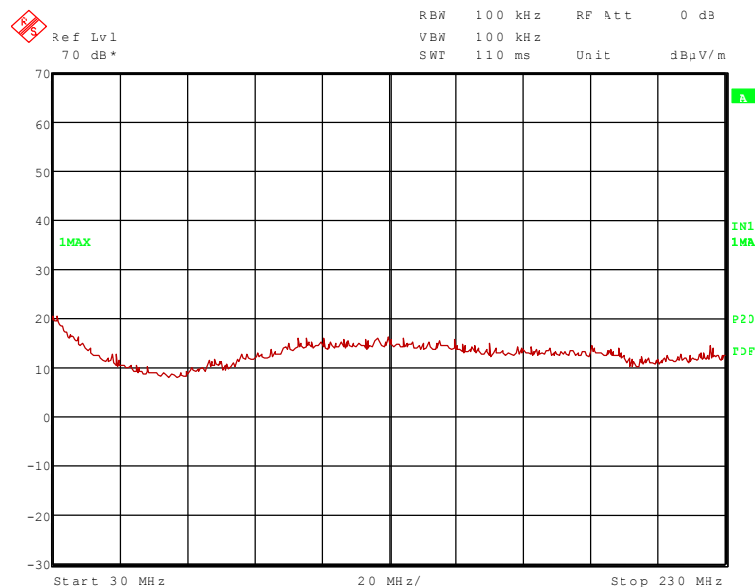
Test record: All results are shown in the following.

Supply voltage: During all measurements the EUT was supplied by a new internal battery.

Remark: As pre-tests have shown, the emissions in the frequency range 9 kHz to 30 MHz are not depending on the transmitter operation mode. Therefore the emissions in this frequency range were measured only with the transmitter operates in operation mode 2.

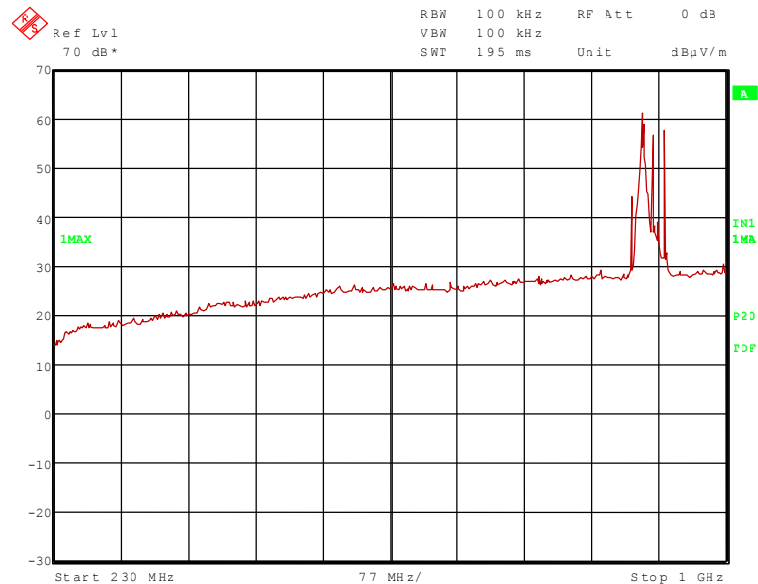
#### Transmitter operates at the lower end of the assigned frequency band (operation mode 1)

112414\_6.wmf: Spurious emissions from 30 MHz to 230 MHz (operation mode 1):





112414\_5.wmf: Spurious emissions from 230 MHz to 1 GHz (operation mode 1, carrier notched):



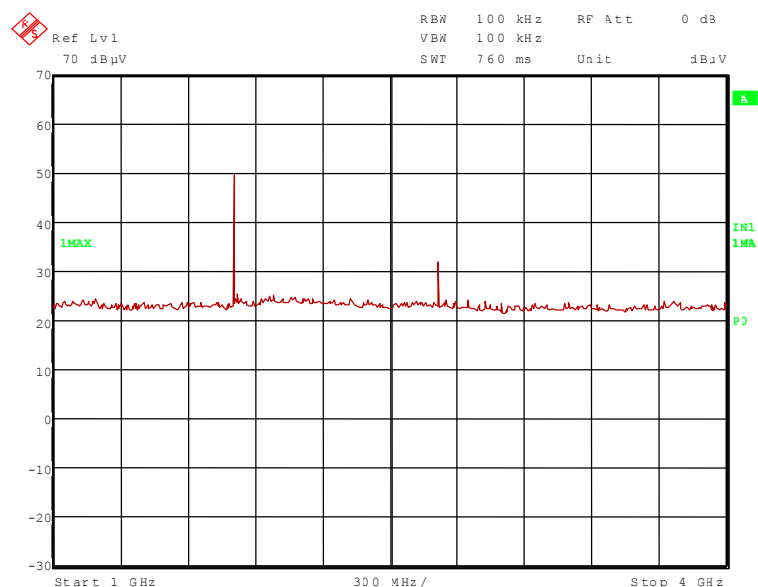
No frequencies were found inside the restricted bands during the preliminary radiated emission test.

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

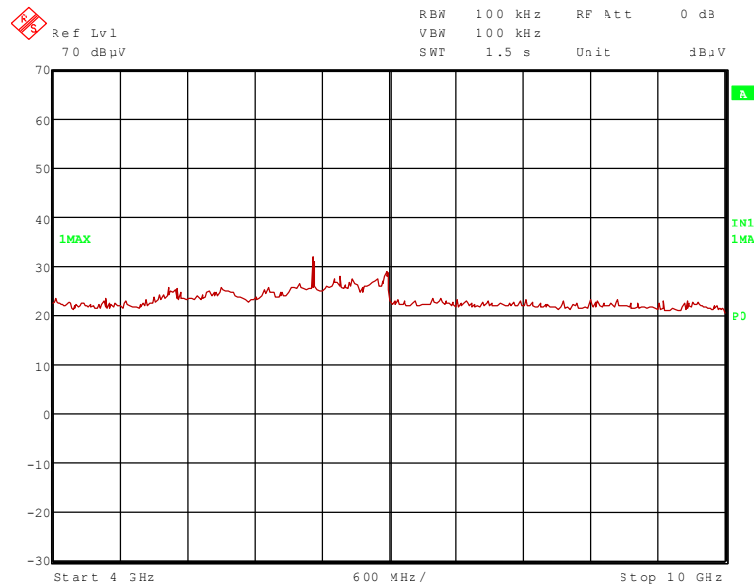
- 892.000 MHz, 904.000 MHz, 916.000 MHz and 928.000 MHz.

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

112414\_13.wmf: Spurious emissions from 1 GHz to 4 GHz (operation mode 1):



112414\_18.wmf: Spurious emissions from 4 GHz to 10 GHz (operation mode 1):



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

- 2.71200 GHz.

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

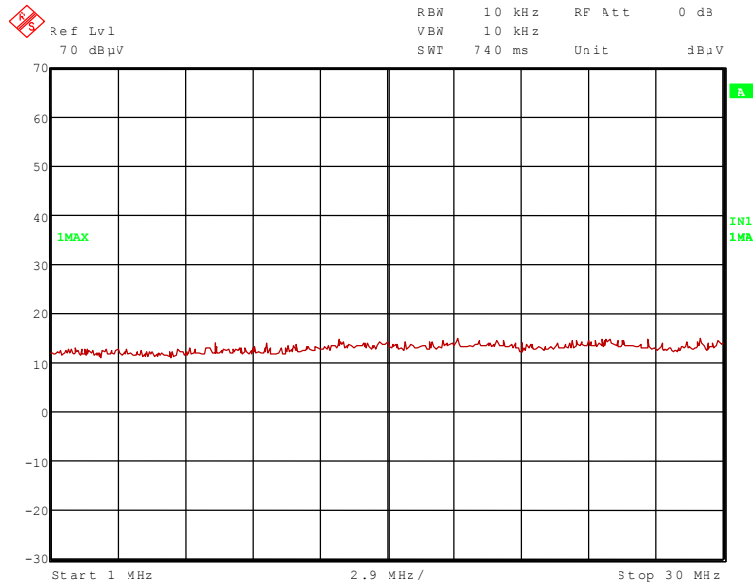
- 1.80800 GHz and 6.32800 GHz.

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

TEST EQUIPMENT USED FOR THE TEST:
29, 31 - 39, 43, 44, 46, 49 - 51, 55, 73

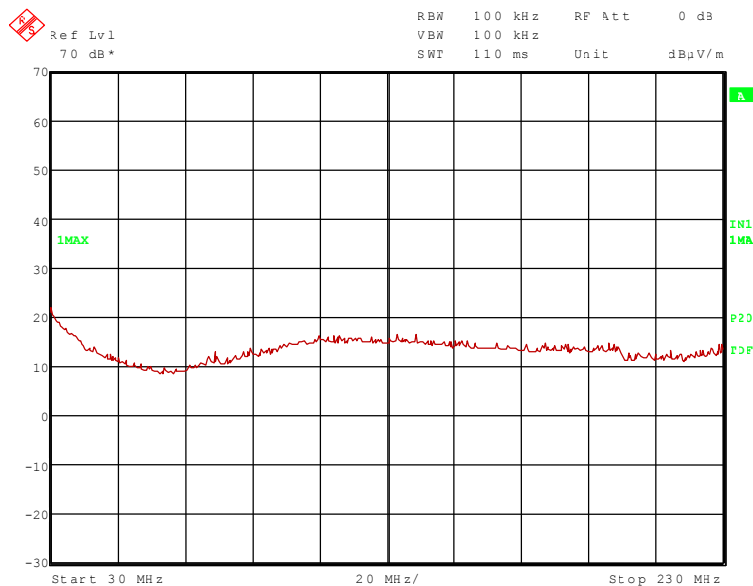


112414\_28.wmf: Spurious emissions from 1 MHz to 30 MHz (operation mode 2):

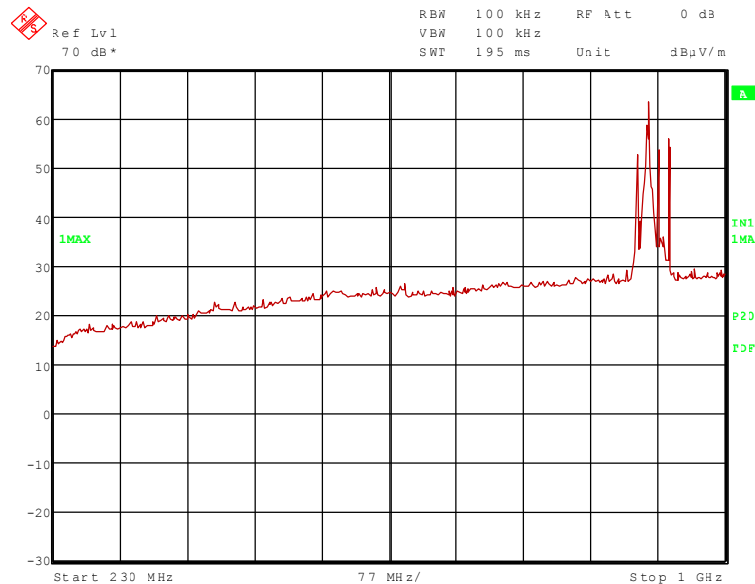


No significant frequencies above the noise floor of the system were found during the preliminary radiated emission test, so no measurements were carried out on the outdoor test site.

112414\_7.wmf: Spurious emissions from 30 MHz to 230 MHz (operation mode 2):



112414\_8.wmf: Spurious emissions from 230 MHz to 1 GHz (operation mode 2, carrier notched):



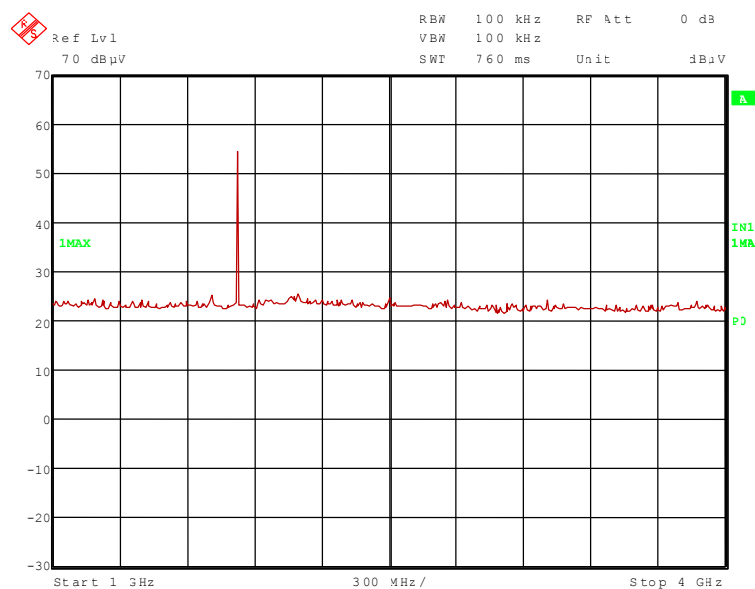
No frequencies were found inside the restricted bands during the preliminary radiated emission test.

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

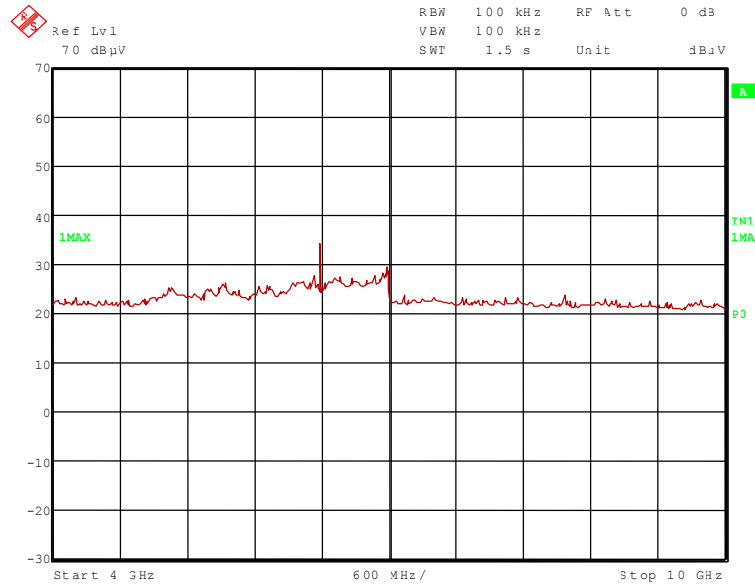
- 899.200 MHz, 911.200 MHz, 923.200 MHz and 935.200 MHz.

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

112414\_14.wmf: Spurious emissions from 1 GHz to 4 GHz (operation mode 2):



112414\_17.wmf: Spurious emissions from 4 GHz to 10 GHz (operation mode 2):



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

none

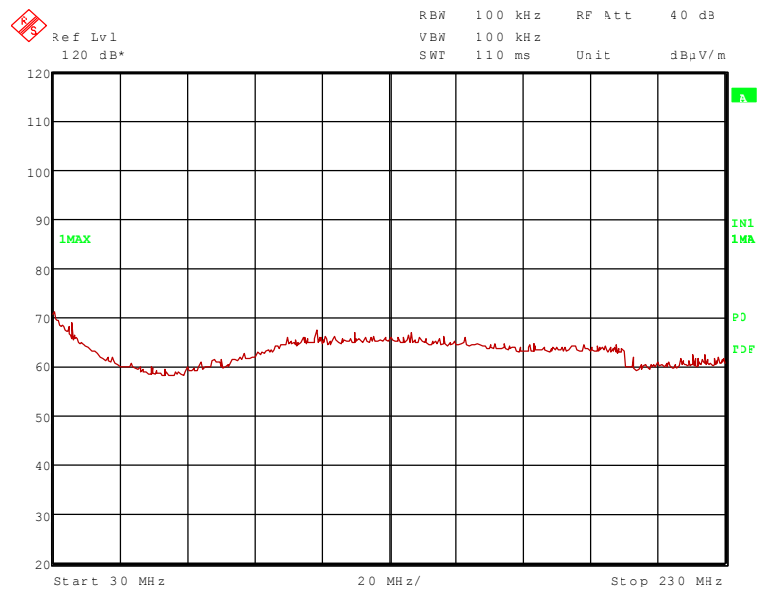
The following frequency was found outside the restricted bands during the preliminary radiated emission test:

- 1.82240 GHz, 6.37840 GHz

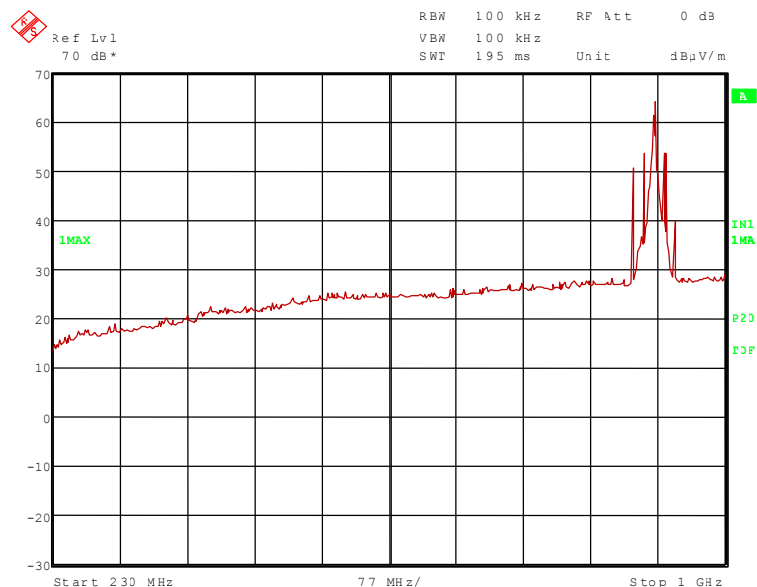
These frequencies have to be measured in a final measurement. The results were presented in the following.

**Transmitter operates on the upper end of the assigned frequency (operation mode 3)**

112414\_11.wmf: Spurious emissions from 30 MHz to 230 MHz (operation mode 3):



112414\_12.wmf: Spurious emissions from 230 MHz to 1 GHz (operation mode 3, carrier notched):



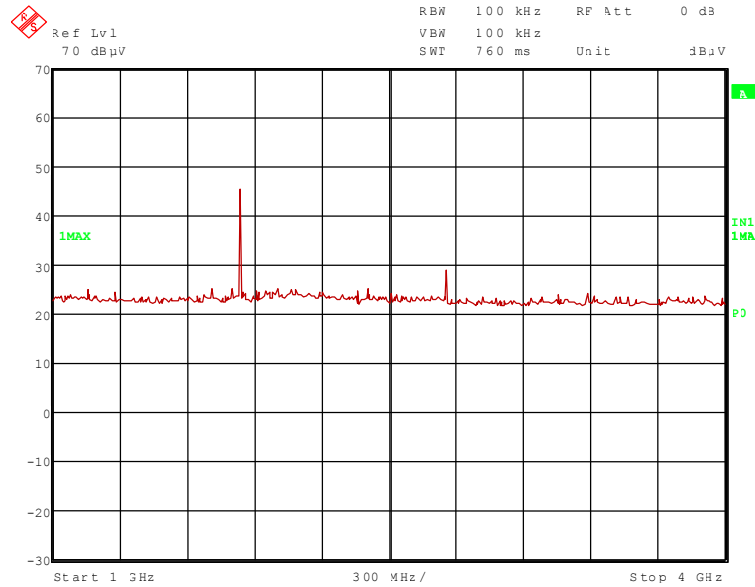
No frequencies were found inside the restricted bands during the preliminary radiated emission test.

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

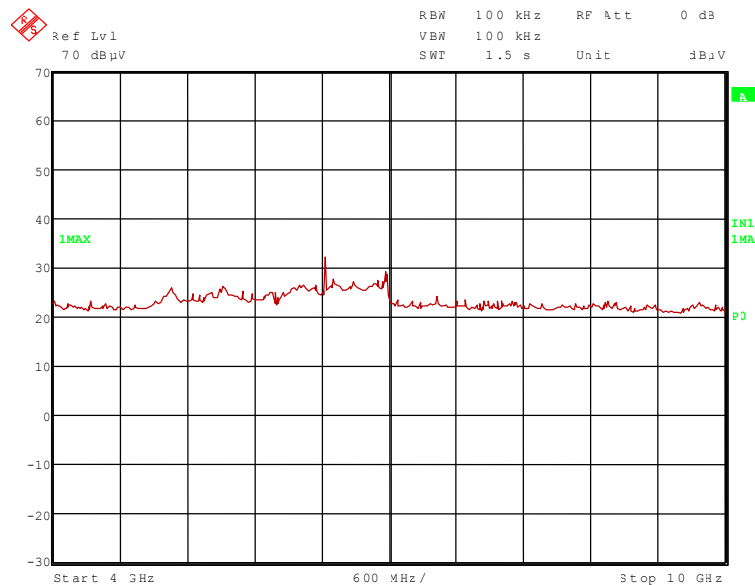
- 894.700 MHz, 906.700 MHz, 918.700 MHz, 930.700 MHz and 942.700 MHz.

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

112414\_15.wmf: Spurious emissions from 1 GHz to 4 GHz (operation mode 3):



112414\_16.wmf: Spurious emissions from 4 GHz to 10 GHz (operation mode 3):



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

- 2.75610 GHz.

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

- 1.83740 GHz, 6.43090 GHz

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



### 5.6.2.5 Final radiated emission measurement (30 MHz to 1 GHz) with internal antenna

Ambient temperature	21 °C	Relative humidity	56 %
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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: No cables were connectable to the EUT. For detail information of test set-up refer to the pictures in annex A of this test report.

Test record: All results are shown in the following.

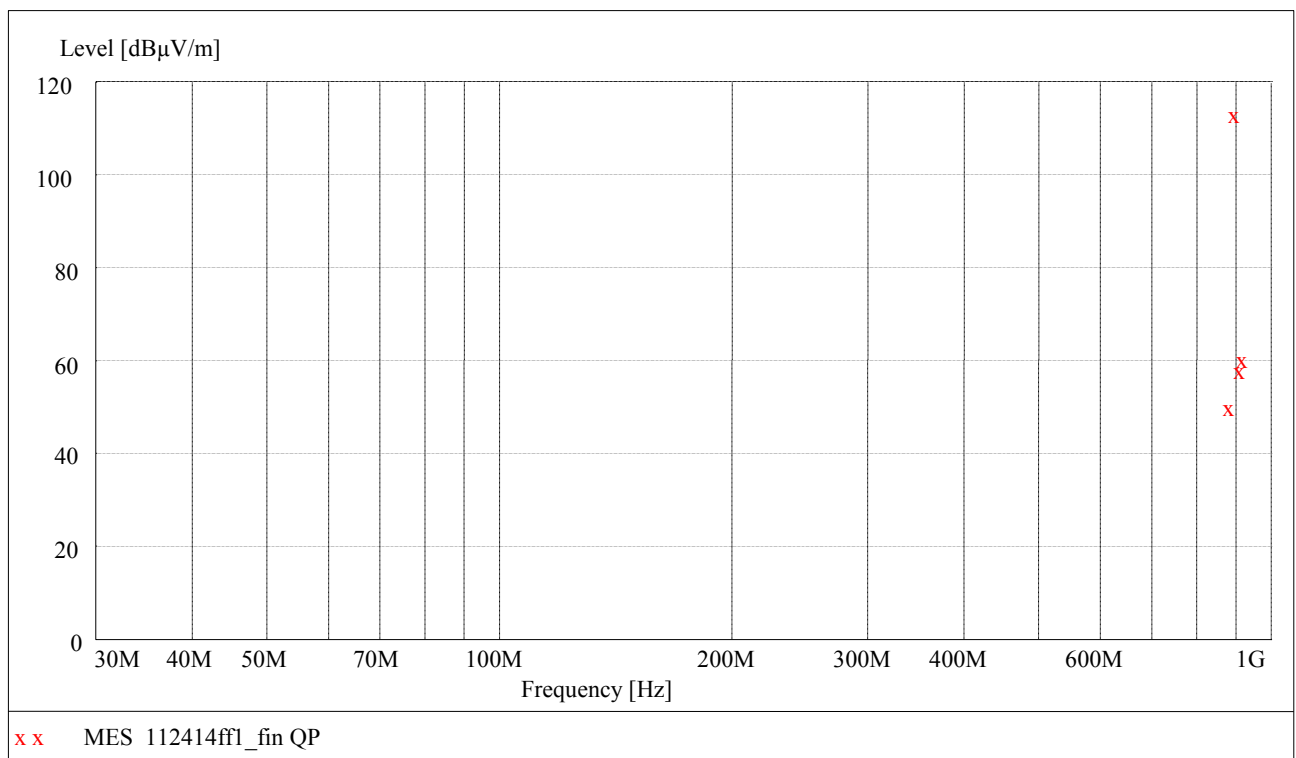
Supply voltage: During all measurements the EUT was supplied by a new internal battery.

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

$$\text{Result [dB}\mu\text{V/m]} = \text{reading [dB}\mu\text{V]} + \text{cable loss [dB]} + \text{antenna factor [dB/m]}$$

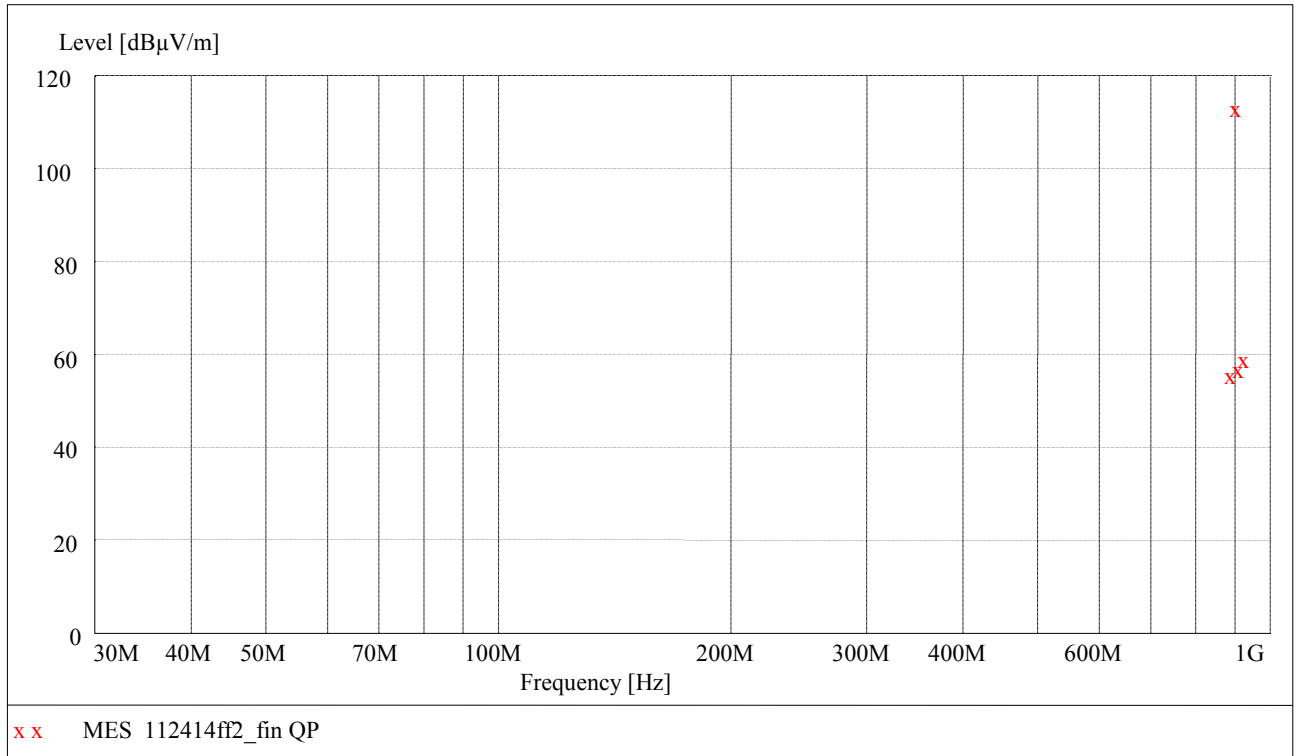
The measured points and the limit line in the following diagrams refer to the standard measurement of the emitted interference in compliance with the above-mentioned standard. The measured points marked with an x are the measured results of the standard final measurement on the open area test site.

#### Transmitter operates on the lower end of the assigned frequency (operation mode 1)



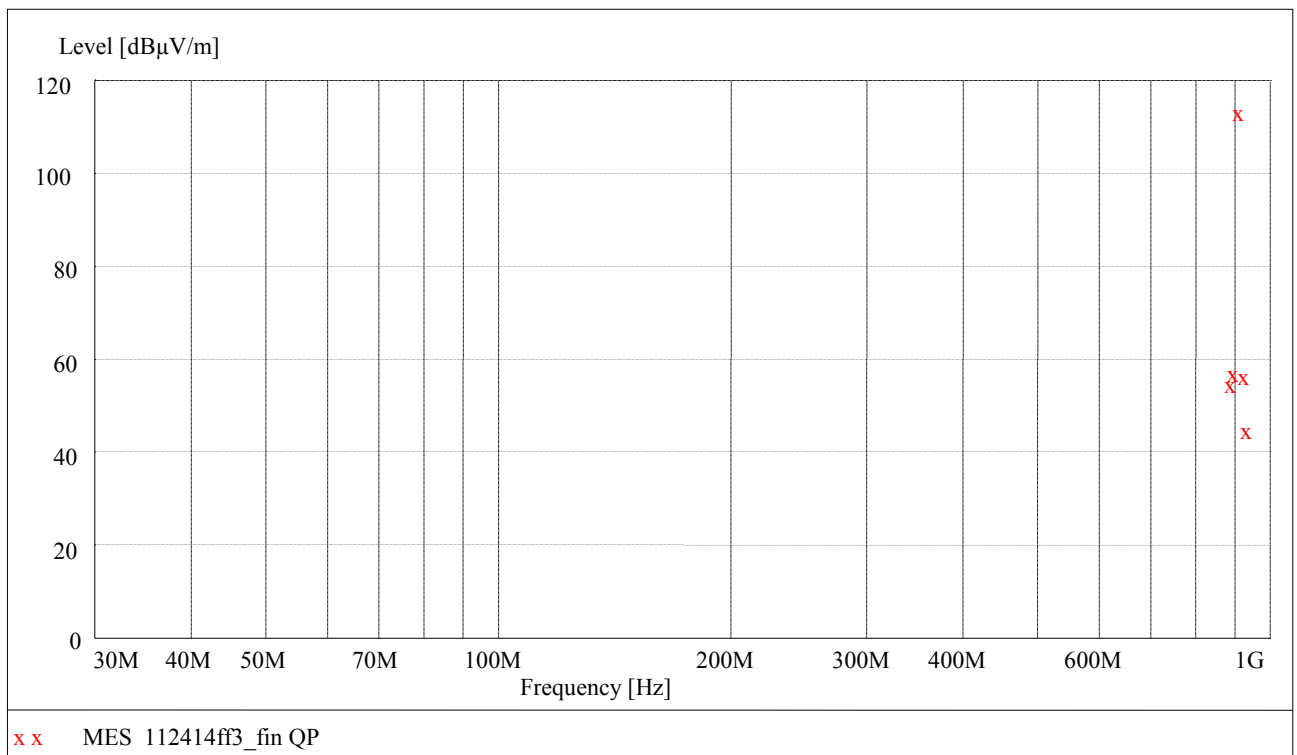
Data record name: 112414ff1

**Transmitter operates on the middle of the assigned frequency (operation mode 2)**



Data record name: 112414ff2

**Transmitter operates on the upper end of the assigned frequency (operation mode 3)**



Data record name: 112414ff3

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 quasi-peak detector:**  
(These values were marked in the diagrams by an x)

Transmitter operates on the lower end of the assigned frequency band (operation mode 1)									
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.
892.000	50.4	93.9	43.5	24.7	22.2	3.5	105.0	119.0	Vert.
904.000	113.9	carrier	-	88.0	22.5	3.4	104.0	123.0	Vert.
916.000	58.7	93.9	35.2	32.4	22.9	3.4	104.0	122.0	Vert.
928.000	60.9	93.9	33.0	34.1	23.4	3.4	103.0	122.0	Vert.
Transmitter operates on the middle of the assigned frequency band (operation mode 2)									
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.
899.200	56.4	93.7	37.3	30.5	22.4	3.5	106.0	243.0	Vert.
911.200	113.7	carrier	-	87.6	22.7	3.4	102.0	121.0	Vert.
923.200	57.6	93.7	36.1	31.0	23.2	3.4	102.0	289.0	Vert.
935.200	59.8	93.7	33.9	32.7	23.7	3.4	102.0	295.0	Vert.
Transmitter operates on the upper end of the assigned frequency band (operation mode 3)									
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.
894.700	55.6	93.9	38.3	29.9	22.2	3.5	108.0	289.0	Vert.
906.700	57.4	93.9	36.5	31.5	22.5	3.4	106.0	290.0	Vert.
918.700	113.9	carrier	-	87.5	23.0	3.4	103.0	288.0	Vert.
930.700	57.3	93.9	36.6	30.4	23.5	3.4	103.0	294.0	Vert.
942.700	45.9	93.9	48.0	18.7	23.8	3.4	103.0	295.0	Vert.
Measurement uncertainty				+2.2 dB / -3.6 dB					

The test results were calculated with the following formula:

$$\text{Result [dB}\mu\text{V/m]} = \text{reading [dB}\mu\text{V]} + \text{cable loss [dB]} + \text{antenna factor [dB/m]}$$

Test: Passed

TEST EQUIPMENT USED FOR THE TEST:
14 - 20

### 5.6.2.6 Final radiated emission measurement (1 GHz to 10 GHz) with internal antenna

Ambient temperature	20 °C	Relative humidity	54 %
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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: No cables were connectable to the EUT. For detail information of test set-up 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 by a new internal battery.

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 dB $\mu$ V/m	Limit dB $\mu$ V/m	Margin dB	Readings dB $\mu$ V	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Restr. Band
1.80800	53.5	93.9	40.4	50.5	26.5	26.5	3.0	150	Vert.	No
2.71200	43.0	74.0	31.0	36.7	28.7	26.4	4.0	150	Vert.	Yes
6.32800	53.6	93.9	40.3	38.1	34.3	25.0	6.2	150	Vert.	No
Measurement uncertainty						+2.2 dB / -3.6 dB				

#### Result measured with the average detector:

Frequency GHz	Corr. value dB $\mu$ V/m	Limit dB $\mu$ V/m	Margin dB	Readings dB $\mu$ V	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Restr. Band
1.80800	52.2	93.9	41.7	49.2	26.5	26.5	3.0	150	Vert.	No
2.71200	37.0	54.0	17.0	30.7	28.7	26.4	4.0	150	Vert.	Yes
6.32800	44.5	93.9	49.4	29.0	34.3	25.0	6.2	150	Vert.	No
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 dB $\mu$ V/m	Limit dB $\mu$ V/m	Margin dB	Readings dB $\mu$ V	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Restr. Band
1.82240	58.1	93.7	35.6	54.7	26.7	26.5	3.2	150	Vert.	No
6.37840	54.9	93.7	38.8	39.3	34.3	25.0	6.3	150	Vert.	No
Measurement uncertainty						+2.2 dB / -3.6 dB				

**Result measured with the average detector:**

Frequency GHz	Corr. value dB $\mu$ V/m	Limit dB $\mu$ V/m	Margin dB	Readings dB $\mu$ V	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Restr. Band
1.82240	57.3	93.7	36.4	53.9	26.7	26.5	3.2	150	Vert.	No
6.37840	47.5	93.7	46.2	31.9	34.3	25.0	6.3	150	Vert.	No
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 dB $\mu$ V/m	Limit dB $\mu$ V/m	Margin dB	Readings dB $\mu$ V	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Restr. Band
1.83740	50.1	93.9	43.8	46.4	26.8	26.5	3.4	150	Vert.	No
2.75610	41.8	74.0	32.2	35.2	28.9	26.4	4.1	150	Vert.	Yes
6.43090	53.6	93.9	40.3	38.1	34.2	25.0	6.3	150	Vert.	No
Measurement uncertainty						+2.2 dB / -3.6 dB				

**Result measured with the average detector:**

Frequency GHz	Corr. value dB $\mu$ V/m	Limit dB $\mu$ V/m	Margin dB	Readings dB $\mu$ V	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Restr. Band
1.83740	48.3	93.9	45.6	44.6	26.8	26.5	3.4	150	Vert.	No
2.75610	34.0	54.0	20.0	27.4	28.9	26.4	4.1	150	Vert.	Yes
6.43090	45.3	93.9	48.6	29.8	34.2	25.0	6.3	150	Vert.	No
Measurement uncertainty						+2.2 dB / -3.6 dB				

Test: Passed

TEST EQUIPMENT USED FOR THE TEST:
29, 31 - 34, 36, 44, 49, 73

## 6 TEST EQUIPMENT AND ANCILLARIES USED FOR TESTS

No.	Test equipment	Type	Manufacturer	Serial No.	PM. No.	Cal. Date	Cal. due
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	-	-
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	03/17/2010	03/2012
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	11/04/2008	11/2011
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.)	
49	Preamplifier	JS3-00101200-23-5A	Miteq	681851	480337	Six month verification (system cal.)	
55	Loop antenna	HFH2-Z2	Rohde & Schwarz	832609/014	480059	03/10/2010	03/2012
73	High Pass Filter	WHJS1000C 11/60EF	Wainwright Instruments GmbH	1	480413	Weekly verification (system cal.)	

## 7 REPORT HISTORY

Report Number	Date	Comment
F112414E1	16 August 2011	Document created
F112414E1, 2 <sup>nd</sup> version	18 January 2011	Editorial changes

## 8 LIST OF ANNEXES

ANNEX A TEST SET-UP PHOTOS 7 pages

112414\_1.JPG: Zonescan 820 Logger with internal antenna, test setup fully anechoic chamber  
112414\_4.JPG: Zonescan 820 Logger with external antenna, test setup fully anechoic chamber  
112414\_8.JPG: Zonescan 820 Logger with external antenna, test setup fully anechoic chamber  
112414\_2.JPG: Zonescan 820 Logger with internal antenna, test setup fully anechoic chamber  
112414\_7.JPG: Zonescan 820 Logger with external antenna, test setup fully anechoic chamber  
112414\_9.JPG: Zonescan 820 Logger with internal antenna, test setup open area test site  
112414\_10.JPG: Zonescan 820 Logger with external antenna, test setup open area test site

ANNEX B INTERNAL PHOTOGRAPHS 6 pages

112414\_a.JPG: Zonescan 820 Logger (internal antenna), internal view  
112414\_t.JPG: Zonescan 820 Logger (external antenna), internal view  
112414\_o.JPG: Zonescan 820 repeater, internal view  
112414\_f.JPG: Zonescan 820 Logger, PCB, top view  
112414\_s.JPG: Zonescan 820 Repeater, PCB, top view  
112414\_f.JPG: Zonescan 820 Logger and Repeater, PCB, bottom view

ANNEX C EXTERNAL PHOTOGRAPHS 7 pages

112414\_h.JPG: Zonescan 820 Logger (with internal antenna), 3-D view 1  
112414\_i.JPG: Zonescan 820 Logger (with internal antenna), 3-D view 2  
112414\_k.JPG: Zonescan 820 Logger (with external antenna), 3-D view 1  
112414\_l.JPG: Zonescan 820 Logger (with external antenna), 3-D view 2  
112414\_l.JPG: Zonescan 820 Logger (with external antenna), connector view  
112414\_m.JPG: Zonescan 820 Repeater, 3-D view 1  
112414\_n.JPG: Zonescan 820 Repeater, 3-D view 2

ANNEX D RESULTS OF THE RECEIVER MEASUREMENTS 4 PAGES