



January 8, 2014

Page 1 of 47

## Prüfbericht / Test Report

Nr. / No. 1300020030-16397-4 (Edition 1)

Applicant: Texas Instruments Deutschland GmbH

Type of equipment: RF Test Board

Type designation: RF430F5978EVM

Order No.: 4512457160

Test standards: FCC Code of Federal Regulations,  
CFR 47, Part 15,  
Sections 15.107, 15.109, 15.205, 15.207, 15.215 and 15.231

Industry Canada Radio Standards Specifications  
RSS-GEN Issue 3, Sections 6, 7.2.2, and 7.2.4 and  
RSS-210 Issue 8, Sections A1.1 (Category I Equipment)

### Note:

The test data of this report is related only to the individual item which has been tested. This report shall not be reproduced except in full extent without the written approval of the testing laboratory.

Trade Register Munich  
HRB 85742  
VAT ID No. DE129484267  
Information pursuant to Section 2(1)  
DL-InfoV (Germany) at  
[www.tuev-sued.com/imprint](http://www.tuev-sued.com/imprint)

Management:  
Robert Kees  
Dr. Jens Butenandt

Phone: +49 9421 55 22-0  
Fax: +49 9421 55 22-99  
[www.tuev-sued.de](http://www.tuev-sued.de)  
**TÜV**®

TÜV SÜD Product Service GmbH  
Äußere Frühlingstraße 45  
94315 Straubing  
Germany

## Table of Contents

1	Description of the Equipment Under Test (EUT) .....	3
2	Administrative Data .....	4
3	Identification of the Test Laboratory .....	5
4	Summary .....	6
5	Operation Mode and Configuration of EUT .....	7
6	Measurement Procedures .....	8
6.1	Bandwidth Measurements.....	8
6.2	Pulse Train Measurement .....	9
6.3	Radiated Emission Measurement 9 kHz to 30 MHz.....	10
6.4	Radiated Emission in Fully or Semi Anechoic Room .....	12
6.5	Radiated Emission at Alternative Test Site .....	14
7	Photographs Taken During Testing.....	16
8	Test Results for Transmitter .....	21
8.1	Occupied Bandwidth .....	23
8.2	Bandwidth of the Emission.....	27
8.3	Bandwidth of Momentary Signals.....	29
8.4	Designation of Emissions.....	30
8.5	Pulse Train Measurement .....	31
8.6	Restricted Bands of Operation .....	33
8.7	Periodic Operation Requirements .....	34
8.8	Radiated Emission Measurement 9 kHz to 30 MHz.....	35
8.9	Radiated Emission Measurement 30 MHz to 5 GHz .....	37
8.10	Exposure of Humans to RF Fields .....	39
9	Test Results for Receiver .....	41
9.1	Radiated Emission Measurement 30 MHz to 2.5 GHz.....	42
10	Referenced Regulations .....	44
11	Test Equipment List with Calibration Data.....	46
12	Revision History .....	47

## 1 Description of the Equipment Under Test (EUT)

General data of EUT	
Type designation <sup>1</sup> :	RF430F5978EVM
Parts <sup>2</sup> :	
Serial number(s):	1
Manufacturer:	Texas Instruments Deutschland GmbH
Type of equipment:	RF Test Board
Version:	As received
FCC ID:	DFORF430F5978
Industry Canada ID:	2138A-RF430F5978
Additional parts/accessories:	

Technical data of EUT	
Application frequency range:	134.2 kHz (Receiver) and 433.4 - 434.4 MHz
Frequency range:	433.4 – 434.4 MHz
Operating frequency:	433.92 MHz
Type of modulation:	2-GFSK
Pulse train:	---
Pulse width:	---
Number of RF-channels:	1
Channel spacing:	---
Designation of emissions <sup>3</sup> :	36K0F1D
Type of antenna:	Integrated chip antenna
Size/length of antenna:	---
Connection of antenna:	<input type="checkbox"/> detachable <input checked="" type="checkbox"/> not detachable
Type of power supply:	Battery supply
Specifications for power supply:	nominal voltage: 3.6 V

<sup>1</sup> Type designation of the system if EUT consists of more than one part.

<sup>2</sup> Type designations of the parts of the system, if applicable.

<sup>3</sup> Also known as "Class of Emission".

## 2 Administrative Data

### Application details

Applicant (full address):	Texas Instruments Deutschland GmbH Haggertystraße 1 D-85356 Freising
Contact person:	Mr. Claus Kuch
Order number:	4512457160
Receipt of EUT:	2013-02-13; 2013-08-23
Date(s) of test:	2013-02-12 to 2013-08-23
Note(s):	

### Report details

Report number:	1300020030-16397-4
Edition:	2
Issue date:	2014-01-08

### 3 Identification of the Test Laboratory

Details of the Test Laboratory	
Company name:	TÜV SÜD Product Service GmbH
Address:	Aeussere Fruehlingstrasse 45 D-94315 Straubing Germany
FCC test site registration number	90926
Industry Canada test site registration:	3050A-2
Contact person:	Mr. Johann Roidt
	Phone: +49 9421 5522-0 Fax: +49 9421 5522-99

## 4 Summary

### Summary of test results

The tested sample complies with the requirements set forth in the

**Code of Federal Regulations CFR 47, Part 15, Sections 15.107, 15.109, 15.205, 15.207, 15.215 and  
15.231(a)-(d)**

of the Federal Communication Commission (FCC) and the

**Radio Standards Specifications  
RSS-Gen Issue 3, Sections 7.2.2, 7.2.3 and  
RSS-210 Issue 8, Sections 2.2, A1.1.1 to A1.1.4 (Category I Equipment)**

of Industry Canada (IC).

### Personnel involved in this report

Laboratory Manager:



Mr. Johann Roidt

Responsible for testing:



Mr. Martin Steindl

Responsible for test report:

Mr. Martin Steindl

## 5 Operation Mode and Configuration of EUT

### Operation Mode(s)

The EUT was operated in continuous transmitting mode and receiving mode on 433.92 MHz. The receiver at 134.2 kHz was continuously active.

### Configuration(s) of EUT

The EUT was configured as stand alone device

### List of ports and cables

Port	Description	Classification <sup>4</sup>	Cable type	Cable length
---				

### List of devices connected to EUT

Item	Description	Type Designation	Serial no. or ID	Manufacturer
---				

### List of support devices

Item	Description	Type Designation	Serial no. or ID	Manufacturer
---				

<sup>4</sup> Ports shall be classified as ac power, dc power or signal/control port

## 6 Measurement Procedures

### 6.1 Bandwidth Measurements

<b>Measurement Procedure:</b>	
Rules and specifications:	CFR 47 Part 2, section 2.202(a) CFR 47 Part 15, section 15.215(c) IC RSS-Gen Issue 3, sections 4.6.1 and 4.6.2 IC RSS-210 Issue 8, section A1.1.3 ANSI C63.4, annex H.6
Guide:	ANSI C63.4 / IC RSS-Gen Issue 3, sections 4.6.1 and 4.6.2
Measurement setup:	<input type="checkbox"/> Conducted: See below <input checked="" type="checkbox"/> Radiated: Radiated Emission in Fully or Semi Anechoic Room (6.4)
<p>If antenna is detachable bandwidth measurements shall be performed at the antenna connector (conducted measurement) when the transmitter is adjusted in accordance with the tune-up procedure, if applicable. The RF output terminals are connected to a spectrum analyzer. If required, a resistive matching network equal to the impedance specified or employed for the antenna is used as well as dc block and appropriate attenuators (50 Ohms). The electrical characteristics of the radio frequency load attached to the output terminals shall be stated, if applicable.</p> <p>If radiated measurements are performed the same test setups and instruments are used as with radiated emission measurements for the appropriate frequency range.</p> <p>The analyzer settings are specified by the test description of the appropriate test record(s).</p>	

## 6.2 Pulse Train Measurement

<b>Measurement Procedure:</b>	
Rules and specifications:	CFR 47 Part 15, section 15.35(c) IC RSS-Gen Issue 3, section 4.5
Guide:	ANSI C63.4
Measurement setup:	<input type="checkbox"/> Conducted: See below (direct connection or via test fixture) <input checked="" type="checkbox"/> Radiated: Radiated Emission in Fully or Semi Anechoic Room (6.4)
<p>If antenna is detachable pulse train measurements shall be performed at the antenna connector (conducted measurement). The RF output terminals are connected to a spectrum analyzer or to a diode detector in combination with an oscilloscope. If required, a resistive matching network equal to the impedance specified or employed for the antenna is used as well as dc block and appropriate attenuators (50 Ohms). The electrical characteristics of the radio frequency load attached to the output terminals shall be stated, if applicable.</p> <p>If antenna is not detachable a test fixture may be used instead of direct connection to RF output terminals.</p> <p>If radiated measurements are performed similar test setups and instruments are used as with radiated emission measurements for the appropriate frequency range. However, the spectrum analyzer may be replaced by a diode detector connected to an oscilloscope.</p>	

### 6.3 Radiated Emission Measurement 9 kHz to 30 MHz

#### Measurement Procedure:

Rules and specifications: CFR 47 Part 15, sections 15.215(b) and 15.231(b)(3)  
IC RSS-210 Issue 8, section A1.1.2(b)

Guide: ANSI C63.4

Radiated emission in the frequency range 9 kHz to 30 MHz is measured using an active loop antenna. First the whole spectrum of emission caused by the equipment is recorded at a distance of 3 meters in a fully or semi anechoic room with the detector of the spectrum analyzer or EMI receiver set to peak. This configuration is also used for recording the spectrum of intentional radiators.

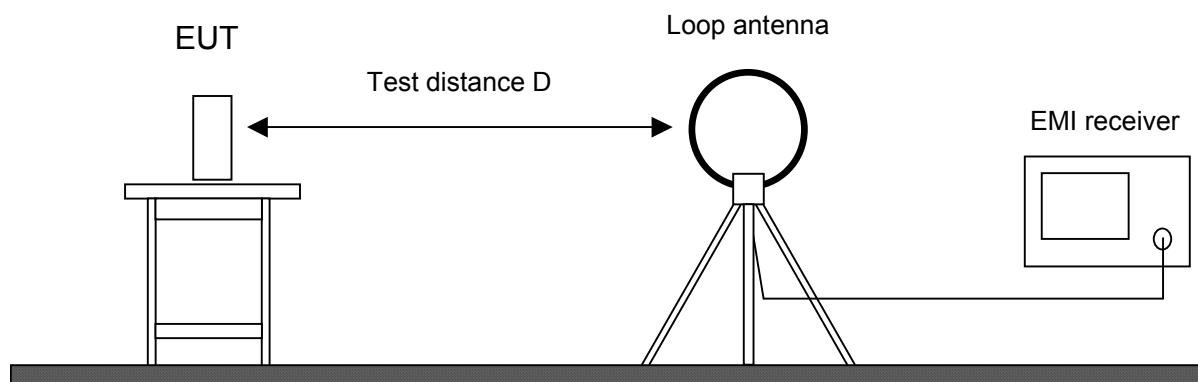
Hand-held or body-worn devices are rotated through three orthogonal axes to determine which attitude and configuration produces the highest emission relative to the limit and therefore shall be used for final testing.

EUT is rotated all around to find the maximum levels of emissions. Equipment and cables are placed and moved within the range of position likely to find their maximum emissions.

If worst case emission of the EUT cannot be recorded with EUT in standard position and loop antenna in vertical polarization the EUT (or the radiating part of the EUT) is rotated by 90 degrees instead of changing the loop antenna to horizontal polarization. This procedure is selected to minimize the influence of the environment (e.g. effects caused by the floor especially with longer distances).

Final measurement is performed at a test distance D of 30 meters using an open field test site. In case the regulation requires testing at other distances, the result is extrapolated by either making measurements at an additional distance D of 10 meters to determine the proper extrapolation factor or by using the square of an inverse linear distance extrapolation factor (40 dB/decade). In cases of very low emissions measurements are performed at shorter distances and results are extrapolated to the required distance. The provisions of CFR 47 Part 15 sections 15.31(d) and (f)(2) apply. According to CFR 47 Part 15 section 15.209(d) final measurement is performed with detector function set to quasi-peak except for the frequency bands 9 to 90 kHz and 110 to 490 kHz where, for non-pulsed operation, average detector is employed.

If the radiated emission limits are expressed in terms of the average value of the emission there also is a peak limit corresponding to 20 dB above the maximum permitted average limit. Additionally, if pulsed operation is employed, the average field strength is determined by averaging over one complete pulse train, including blanking intervals, as specified in CFR 47 Part 15 section 15.35(c). If the pulse train exceeds 0.1 second that 0.1 second interval during which the value of the emission is at its maximum is selected for calculation. The pulse train correction is added to the peak value of the emission to get the average value.



Test instruments used:

Type	Designation	Inv.-no.	Serial No. or ID	Manufacturer
<input checked="" type="checkbox"/> Spectrum analyzer	FSP30	1666	100036	Rohde & Schwarz
<input type="checkbox"/> EMI test receiver	ESMI	1569	839379/013 839587/006	Rohde & Schwarz
<input type="checkbox"/> Test receiver	ESHS 10	1028	860043/016	Rohde & Schwarz
<input type="checkbox"/> Preamplifier	CPA9231A	1716	3557	Schaffner
<input checked="" type="checkbox"/> Loop antenna	HFH2-Z2	1016	882964/1	Rohde & Schwarz
<input checked="" type="checkbox"/> Fully anechoic room	No. 2	1452	---	Albatross
<input type="checkbox"/> Semi anechoic room	No. 3	1453	---	Siemens
<input type="checkbox"/> Semi anechoic room	No. 8	2057	---	Albatross

## 6.4 Radiated Emission in Fully or Semi Anechoic Room

### Measurement Procedure:

Rules and specifications: CFR 47 Part 15, sections 15.109, 15.215(b) and 15.231  
IC RSS-GEN Issue 3, section 6.1  
IC RSS-210 Issue 8, section A1.1.2

Guide: ANSI C63.4

Radiated emission in fully or semi anechoic room is measured in the frequency range from 30 MHz to the maximum frequency as specified in CFR 47 Part 15 section 15.33.

Measurements are made in both the horizontal and vertical planes of polarization using a spectrum analyzer with the detector function set to peak and resolution as well as video bandwidth set to 100 kHz (below 1 GHz) or 1 MHz (above 1 GHz).

Testing up to 1 GHz is performed with a linear polarized logarithmic periodic antenna combined with a 4:1 broadband dipole ("Trilog broadband antenna"). For testing above 1 GHz horn antennas are used.

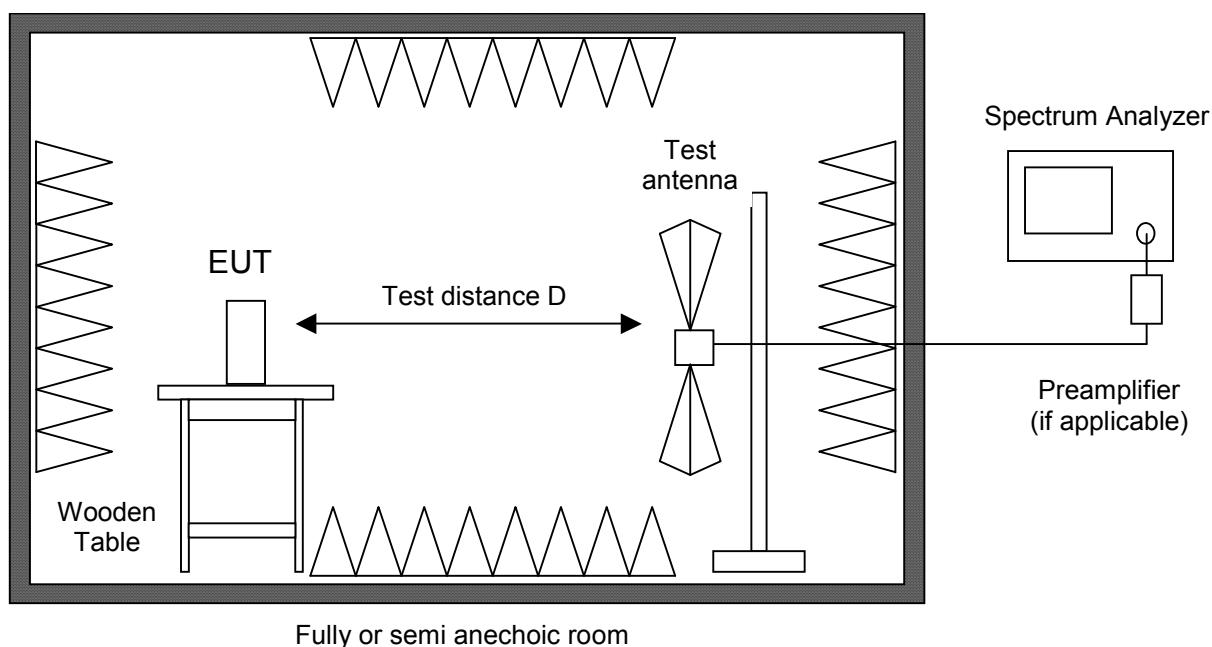
All tests below 8.2 GHz are performed at a test distance D of 3 meters. For higher frequencies the test distance may be reduced (e.g. to 1 meter) due to the sensitivity of the measuring instrument(s) and the test results are calculated according to CFR 47 Part 15 section 15.31(f)(1) using an extrapolation factor of 20 dB/decade. If required, preamplifiers are used for the whole frequency range. Special care is taken to avoid overload, using appropriate attenuators and filters, if necessary.

If the radiated emission limits are expressed in terms of the average value of the emission there also is a peak limit corresponding to 20 dB above the maximum permitted average limit. Additionally, if pulsed operation is employed, the average field strength is determined by averaging over one complete pulse train, including blanking intervals, as specified in CFR 47 Part 15 section 15.35(c). If the pulse train exceeds 0.1 second that 0.1 second interval during which the value of the emission is at its maximum is selected for calculation. The pulse train correction is added to the peak value of the emission to get the average value.

Hand-held or body-worn devices are rotated through three orthogonal axes to determine which attitude and configuration produces the highest emission relative to the limit and therefore shall be used for final testing.

During testing the EUT is rotated all around to find the maximum levels of emissions. Equipment and cables are placed and moved within the range of position likely to find their maximum emissions.

For final testing below 1 GHz a semi anechoic room complying with the NSA requirements of ANSI C63.4 for alternative test sites is used (see 6.5). If prescans are recorded in fully anechoic room they are indicated appropriately.



#### Test instruments used:

Type	Designation	Inv.-no.	Serial No. or ID	Manufacturer
<input checked="" type="checkbox"/> Spectrum analyzer	FSP30	1666	100036	Rohde & Schwarz
<input type="checkbox"/> EMI test receiver	Cabin no. 3	2010	101018	Rohde & Schwarz
<input type="checkbox"/> EMI test receiver		2044	100232	Rohde & Schwarz
<input type="checkbox"/> EMI test receiver		1569	839379/013 839587/006	Rohde & Schwarz
<input type="checkbox"/> Preamplifier	Cabin no. 2	1716	3557	Schaffner
<input type="checkbox"/> Preamplifier		1142	13120026	Advantest
<input checked="" type="checkbox"/> Preamplifier (1 - 8 GHz)	AFS3-00100800-32-LN	1684	847743	Miteq
<input type="checkbox"/> Preamplifier (0.5 - 8 GHz)	AMF-4D-005080-25-13P	1685	860149	Miteq
<input type="checkbox"/> Preamplifier (8 - 18 GHz)	ACO/180-3530	1484	32641	CTT
<input type="checkbox"/> External Mixer	WM782A	1576	845881/005	Tektronix
<input type="checkbox"/> Harmonic Mixer Accessories	FS-Z30	1577	624413/003	Rohde & Schwarz
<input type="checkbox"/> Trilog antenna	Cabin no. 2	1802	9163-214	Schwarzbeck
<input type="checkbox"/> Trilog antenna		1722	9163-188	Schwarzbeck
<input type="checkbox"/> Trilog antenna	Cabin no. 8	2058	9163-408	Schwarzbeck
<input checked="" type="checkbox"/> Horn antenna		3115	1516	EMCO
<input type="checkbox"/> Horn antenna	3160-03	1010	9112-1003	EMCO
<input type="checkbox"/> Horn antenna	3160-04	1011	9112-1001	EMCO
<input type="checkbox"/> Horn antenna	3160-05	1012	9112-1001	EMCO
<input type="checkbox"/> Horn antenna	3160-06	1013	9112-1001	EMCO
<input type="checkbox"/> Horn antenna	3160-07	1014	9112-1008	EMCO
<input type="checkbox"/> Horn antenna	3160-08	1015	9112-1002	EMCO
<input type="checkbox"/> Horn antenna	3160-09	1265	9403-1025	EMCO
<input type="checkbox"/> Horn antenna	3160-10	1575	399185	EMCO
<input checked="" type="checkbox"/> Fully anechoic room	No. 2	1452	---	Albatross
<input type="checkbox"/> Semi anechoic room	No. 3	1453	---	Siemens
<input type="checkbox"/> Semi anechoic room	No. 8	2057	---	Albatross

## 6.5 Radiated Emission at Alternative Test Site

### Measurement Procedure:

Rules and specifications:  
CFR 47 Part 15, sections 15.109, 15.215(b) and 15.231  
IC RSS-GEN Issue 3, sections 6.1  
IC RSS-210 Issue 8, section A1.1.2

Guide: ANSI C63.4

Radiated emission in the frequency range 30 MHz to 1 GHz is measured within a semi-anechoic room with groundplane complying with the NSA requirements of ANSI C63.4 for alternative test sites. A linear polarized logarithmic periodic antenna combined with a 4:1 broadband dipole ("Trilog broadband antenna") is used. The measurement bandwidth of the test receiver is set to 120 kHz with quasi-peak detector selected.

If the radiated emission limits are expressed in terms of the average value of the emission there also is a peak limit corresponding to 20 dB above the maximum permitted average limit. Additionally, if pulsed operation is employed, the average field strength is determined by averaging over one complete pulse train, including blanking intervals, as specified in CFR 47 Part 15 section 15.35(c). If the pulse train exceeds 0.1 second that 0.1 second interval during which the value of the emission is at its maximum is selected for calculation. The pulse train correction is added to the peak value of the emission to get the average value.

Hand-held or body-worn devices are tested in the position producing the highest emission relative to the limit as verified by prescans in fully anechoic room.

If no prescan in a fully anechoic room is used first a peak scan is performed in four positions to get the whole spectrum of emission caused by EUT with the measuring antenna raised and lowered from 1 to 4 m to find table position, antenna height and antenna polarization for the maximum emission levels.

Data reduction is applied to these results to select those levels having less margin than 10 dB to or exceeding the limit using subranges and limited number of maximums. Further maximization is following.

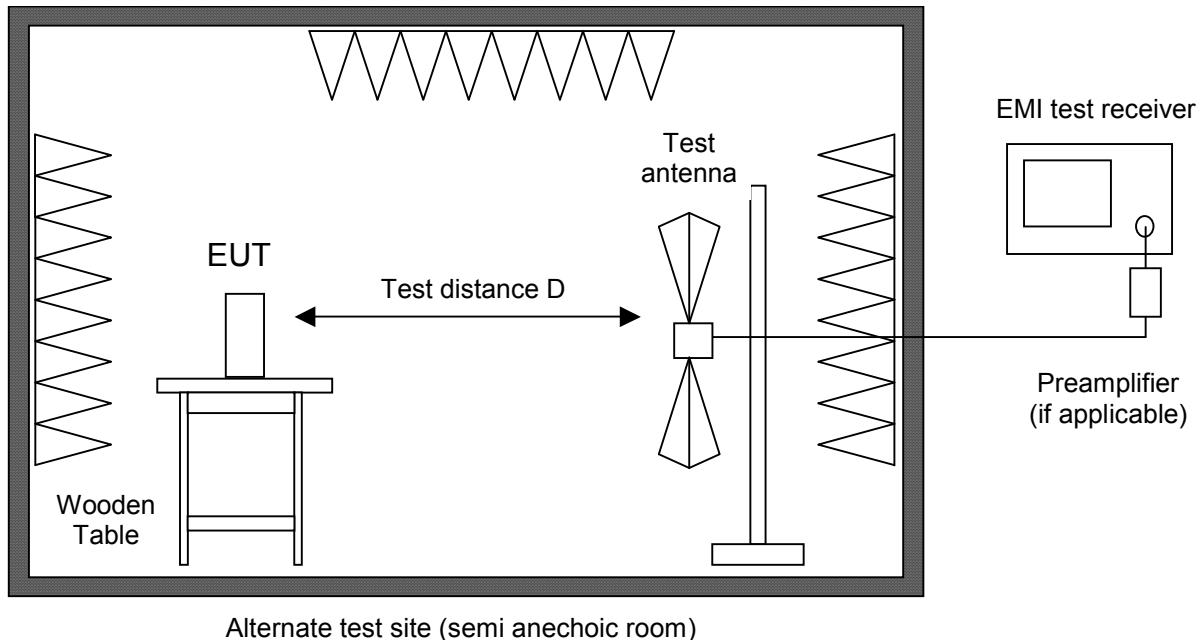
With detector of the test receiver set to quasi-peak final measurements are performed immediately after frequency zoom (for drifting disturbances) and maximum adjustment.

Equipment and cables are placed and moved within the range of position likely to find their maximum emissions.

In cases where prescans in a fully anechoic room are taken (e. g. if EUT is operating for a short time only or battery is discharged quickly) final measurements with quasi-peak detector are performed manually at frequencies indicated by prescan with EUT rotating all around and receiving antenna raising and lowering within 1 meter to 4 meters to find the maximum levels of emission.

Equipment and cables are placed and moved within the range of position likely to find their maximum emissions.

For measuring emissions of intentional radiators and receivers a test distance D of 3 meters is selected. Testing of unintentional radiators is performed at a distance of 10 meters. If limits specified for 3 meters shall be used for measurements performed at 10 meters distance the limits are calculated according to CFR 47 Part 15 section 15.31(d) and (f)(1) using an inverse linear-distance extrapolation factor of 20 dB/decade.

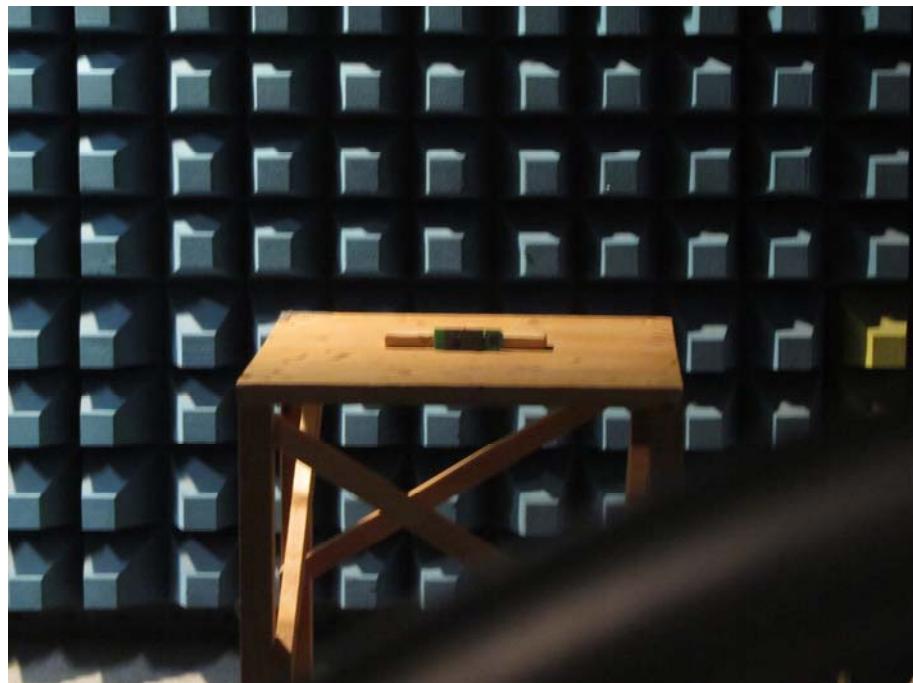


Test instruments used:

Type	Designation	Inv.-no.	Serial No. or ID	Manufacturer
<input checked="" type="checkbox"/> EMI test receiver	ESU8	2044	100232	Rohde & Schwarz
<input checked="" type="checkbox"/> Trilog antenna Cabin no. 8	VULB 9163	2058	9163-408	Schwarzbeck
<input checked="" type="checkbox"/> Semi anechoic room	No. 8	2057	---	Albatross

## 7 Photographs Taken During Testing

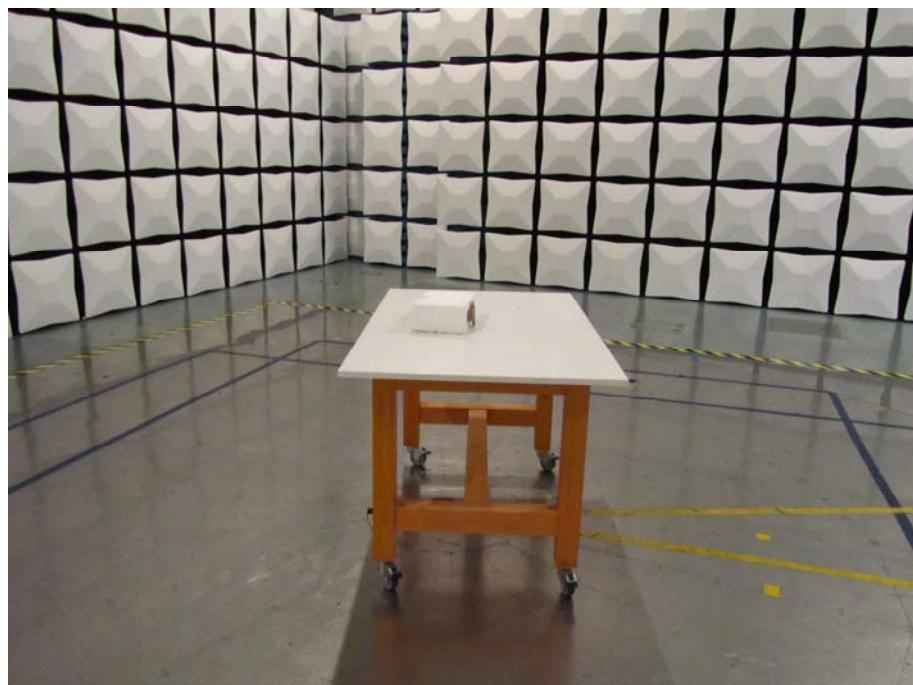
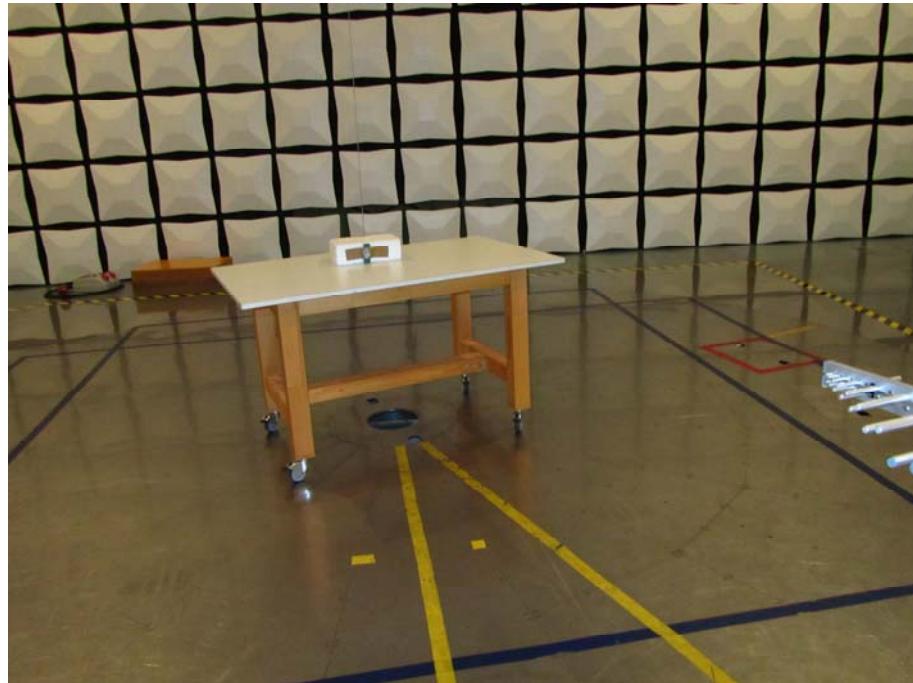
**Test setup for radiated emission measurement 9 kHz – 30 MHz**



**Test setup for radiated emission measurement  
(fully anechoic room)**



### Test setup for radiated emission measurement (alternate test site)



## Test setup for radiated emission measurement (alternate test site) - continued -



## 8 Test Results for Transmitter

<b>FCC CFR 47 Parts 2 and 15</b>			
<i>Section(s)</i>	<i>Test</i>	<i>Page</i>	<i>Result</i>
2.1046(a)	Conducted output power	---	Not applicable
2.202(a)	Occupied bandwidth	23	Recorded
15.215(c) 15.231(c)	Bandwidth of the emission	27	Test passed
2.201, 2.202	Class of emission	30	Calculated
15.35(c)	Pulse train measurement for pulsed operation	31	Recorded
15.205(a)	Restricted bands of operation	33	Test passed
15.207	Conducted AC powerline emission 150 kHz to 30 MHz	---	Not applicable
15.231(a)	Periodic operation requirements	34	Test passed
15.205(b) 15.231(b)	Radiated emission 9 kHz to 30 MHz	35	Test passed
15.205(b) 15.215(b) 15.231(b)	Radiated emission 30 MHz to 5 GHz	37	Test passed
15.231(d)	Carrier frequency stability	---	Not applicable

**IC RSS-Gen Issue 3**

<i>Section(s)</i>	<i>Test</i>	<i>Page</i>	<i>Result</i>
4.8	Transmitter output power (conducted)	---	Not applicable
4.6.1	Occupied Bandwidth	23	Recorded
8	Designation of emissions	30	Calculated
4.5	Pulsed operation	31	Recorded
7.2.4	Conducted AC powerline emission 150 kHz to 30 MHz	---	Not applicable
7.2.2(a)	Restricted bands and unwanted emission frequencies	33	Test passed
7.2.2(b)(c), 7.2.5	Unwanted emissions 9 kHz to 30 MHz	35	Test passed
7.2.2(b)(c), 7.2.6	Unwanted emissions 30 MHz to 5 GHz	37	Test passed
5.5	Exposure of Humans to RF Fields	39	Exempted from SAR and RF evaluation

**IC RSS-210 Issue 8**

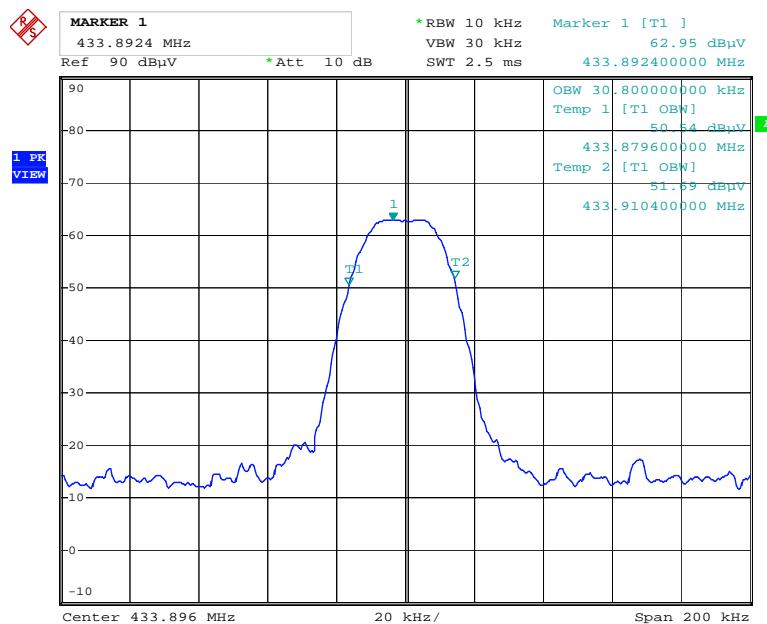
<i>Section(s)</i>	<i>Test</i>	<i>Page</i>	<i>Result</i>
A1.1.1	Requirements for momentarily operated devices	34	Test passed
A1.1.2	Unwanted emissions 9 kHz to 30 MHz	35	Test passed
A1.1.2	Unwanted emissions 30 MHz to 5 GHz	37	Test passed
A1.1.3	Bandwidth of momentary signals	29	Test passed
A1.1.4	Carrier frequency stability	---	Not applicable

## 8.1 Occupied Bandwidth

Rules and specifications:	CFR 47 Part 2, section 2.202(a) ANSI C63.4, annex H.6								
Guide:	ANSI C63.4								
Description:	<p>The occupied bandwidth according to CFR 47 Part 2, section 2.202(a), is measured as the 99% emission bandwidth, i.e. below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5% of the total mean power radiated by a given emission.</p> <p>The occupied bandwidth according to ANSI C63.4, annex H.6; is measured as the frequency range defined by the points that are 26 dB down relative to the maximum level of the modulated carrier.</p> <p>The resolution bandwidth of the spectrum analyzer shall be set to a value greater than 5.0% of the allowed bandwidth. If no bandwidth specifications are given, the following guidelines are used:</p> <table border="1"><thead><tr><th>Fundamental frequency</th><th>Minimum resolution bandwidth</th></tr></thead><tbody><tr><td>9 kHz to 30 MHz</td><td>1 kHz</td></tr><tr><td>30 MHz to 1000 MHz</td><td>10 kHz</td></tr><tr><td>1000 MHz to 40 GHz</td><td>100 kHz</td></tr></tbody></table> <p>The video bandwidth shall be at least three times greater than the resolution bandwidth.</p>	Fundamental frequency	Minimum resolution bandwidth	9 kHz to 30 MHz	1 kHz	30 MHz to 1000 MHz	10 kHz	1000 MHz to 40 GHz	100 kHz
Fundamental frequency	Minimum resolution bandwidth								
9 kHz to 30 MHz	1 kHz								
30 MHz to 1000 MHz	10 kHz								
1000 MHz to 40 GHz	100 kHz								
Measurement procedure:	Bandwidth Measurements (6.1)								

Comment:	
Date of test:	2013-03-08
Test site:	Fully anechoic room, cabin no. 2

### Occupied Bandwidth (99 %):



Date: 8.MAR.2013 11:07:15

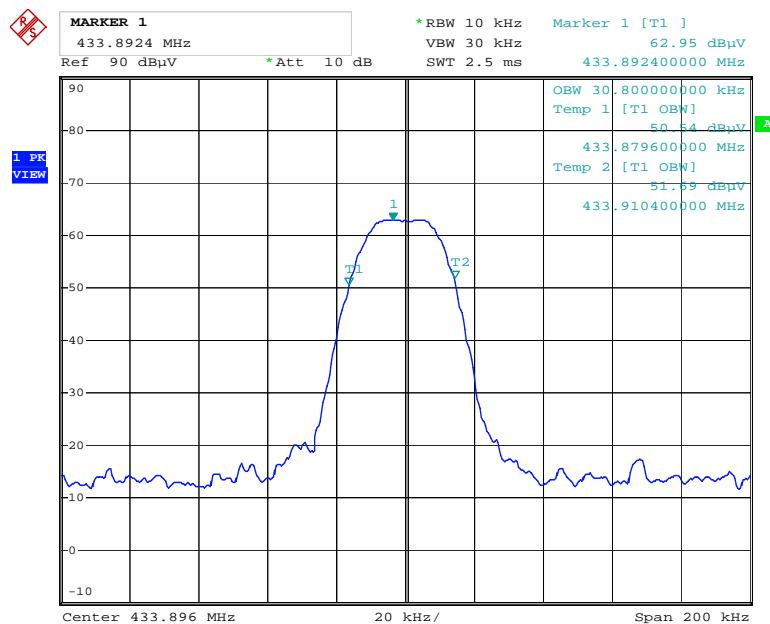
Occupied Bandwidth (99 %): **30.80 kHz**

## Occupied Bandwidth (continued)

Rules and specifications:	IC RSS-Gen Issue 3, section 4.6.1
Guide:	IC RSS-Gen Issue 3, section 4.6.1
Description:	<p>If not specified in the applicable RSS the occupied bandwidth is measured as the 99% emission bandwidth.</p> <p>The span of the analyzer shall be set to capture all products of the modulation process, including the emission skirts. The resolution bandwidth shall be set to as close to 1% of the selected span as is possible without being below 1%. The video bandwidth shall be set to 3 times the resolution bandwidth.</p> <p>The trace data points are recovered and are directly summed in linear terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5% of the total is reached and that frequency recorded. The process is repeated for the highest frequency data points. This frequency is also recorded. The span between the two recorded frequencies is the occupied bandwidth.</p>
Measurement procedure:	Bandwidth Measurements (6.1)

Comment:	
Date of test:	2013-03-08
Test site:	Fully anechoic room, cabin no. 2

### Occupied Bandwidth (99 %):



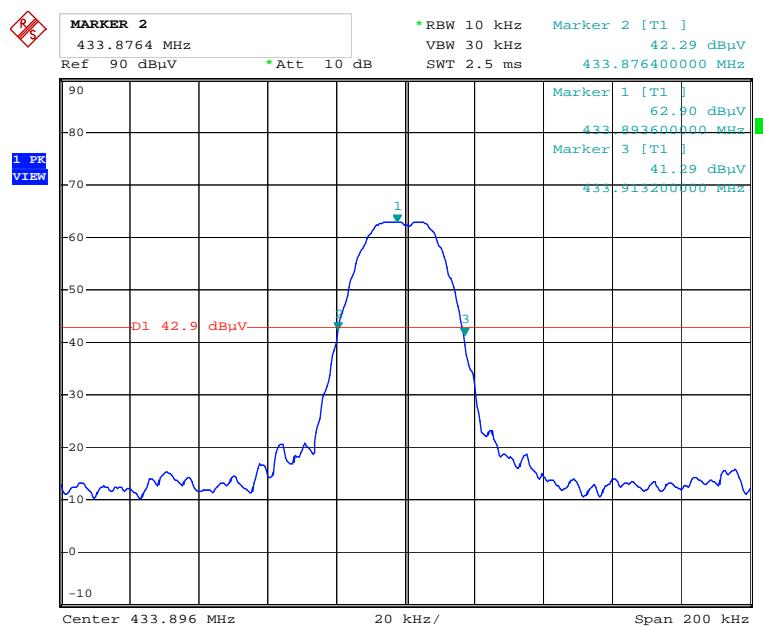
Date: 8.MAR.2013 11:07:15

Occupied Bandwidth (99 %): **30.8 kHz**

## 8.2 Bandwidth of the Emission

Rules and specifications:	CFR 47 Part 15, section 15.215(c)								
Guide:	ANSI C63.4								
Description:	<p>The 20 dB bandwidth of the emission is measured as the frequency range defined by the points that are 20 dB down relative to the maximum level of the modulated carrier.</p> <p>For intentional radiators operating under the alternative provisions to the general emission limits the requirement to contain the 20 dB bandwidth of the emission within the specified frequency band includes the effects from frequency sweeping, frequency hopping and other modulation techniques that may be employed as well as the frequency stability of the transmitter over expected variations in temperature and supply voltage. If a frequency stability is not specified in the regulations, it is recommended that the fundamental emission be kept within at least the central 80% of the permitted band in order to minimize the possibility of out-of-band operation.</p> <p>The resolution bandwidth of the spectrum analyzer shall be set to a value greater than 5.0% of the allowed bandwidth. If no bandwidth specifications are given, the following guidelines are used:</p> <table border="1"><thead><tr><th>Fundamental frequency</th><th>Minimum resolution bandwidth</th></tr></thead><tbody><tr><td>9 kHz to 30 MHz</td><td>1 kHz</td></tr><tr><td>30 MHz to 1000 MHz</td><td>10 kHz</td></tr><tr><td>1000 MHz to 40 GHz</td><td>100 kHz</td></tr></tbody></table> <p>The video bandwidth shall be at least three times greater than the resolution bandwidth.</p>	Fundamental frequency	Minimum resolution bandwidth	9 kHz to 30 MHz	1 kHz	30 MHz to 1000 MHz	10 kHz	1000 MHz to 40 GHz	100 kHz
Fundamental frequency	Minimum resolution bandwidth								
9 kHz to 30 MHz	1 kHz								
30 MHz to 1000 MHz	10 kHz								
1000 MHz to 40 GHz	100 kHz								
Measurement procedure:	Bandwidth Measurements (6.1)								

Comment:	
Date of test:	2013-03-08
Test site:	Fully anechoic room, cabin no. 2



Date: 8.MAR.2013 11:06:31

Permitted frequency band:	<b>134.2 kHz (Receiver) and 433.4 - 434.4 MHz</b>	
20 dB bandwidth:	<b>36.8 kHz</b>	
Carrier frequency stability:	<input type="checkbox"/> specified	<input checked="" type="checkbox"/> not specified
Maximum frequency tolerances:		
Bandwidth of the emission:	<b>36.8 kHz</b>	<b>within permitted frequency band<sup>5</sup>:</b> <input checked="" type="checkbox"/> yes <input type="checkbox"/> no

Test Result:	Test passed
--------------	-------------

<sup>5</sup> If a frequency stability is not specified, it is recommended that the fundamental emission is kept within at least the central 80% of the permitted band in order to minimize the possibility of out-of-band operation.

### 8.3 Bandwidth of Momentary Signals

Rules and specifications:	IC RSS-210 Issue 8, section A1.1.3
Guide:	IC RSS-Gen Issue 3, section 4.6.1
Limit:	For the purpose of Section A1.1, the 99% bandwidth shall be no wider than 0.25% of the centre frequency for devices operating between 70 and 900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the centre frequency.

Operating frequency:	<b>433.92 MHz</b>
Bandwidth limit:	<b>10848 MHz</b>
Occupied bandwidth:	<b>36.8 kHz</b>
Emission bandwidth within bandwidth limit:	<input checked="" type="checkbox"/> yes <input type="checkbox"/> no

Test Result:	Test passed
--------------	-------------

## 8.4 Designation of Emissions

Rules and specifications:	CFR 47 Part 2, sections 2.201 and 2.202 IC RSS-Gen Issue 3, sections 8
Guide:	ANSI C63.4 / TRC-43

Type of modulation:	Frequency Shift Keying (FSK)
---------------------	------------------------------

$B_n = \text{Necessary Bandwidth}$	$B_n = 2DK + B$
$D = \text{Peak deviation}$	$D = 17.8 \text{ kHz}$
$K = \text{Overall numerical factor}$	$K = 1$
$B = \text{Modulation rate}$	$B = 1.2 \text{ kHz}$
Calculation:	$B_n = 2 \cdot (17.8 \text{ kHz}) \cdot 1 + 2 \cdot (1.2 \text{ kHz}) = 36.8 \text{ kHz}$

Designation of Emissions:	<b>36K8F1D</b>
---------------------------	----------------

## 8.5 Pulse Train Measurement

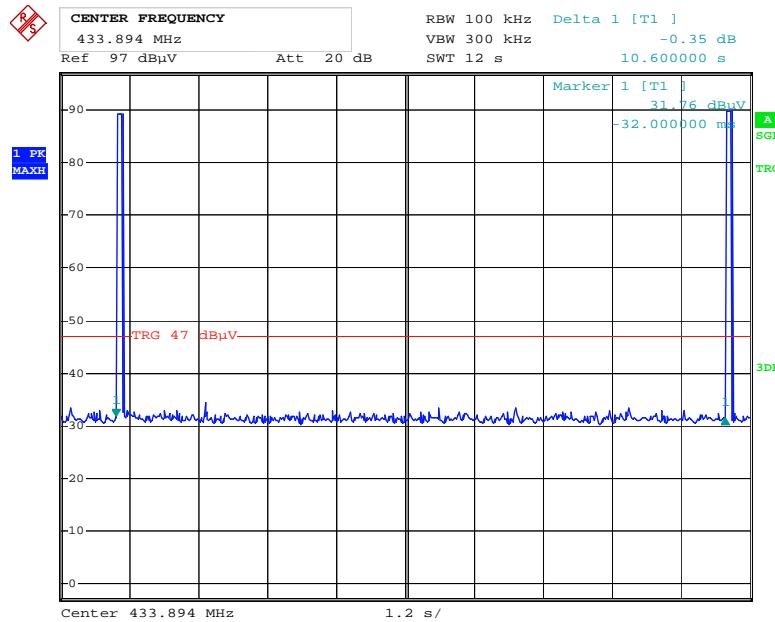
Rules and specifications:	CFR 47 Part 15, section 15.35(c) IC RSS-Gen Issue 3, section 4.5
Guide:	ANSI C63.4
Measurement procedure:	Pulse Train Measurement (6.2)

Comment:	
Date of test:	2013-07-290
Test site:	Fully anechoic room, cabin no. 2

### Calculation of pulse train correction:

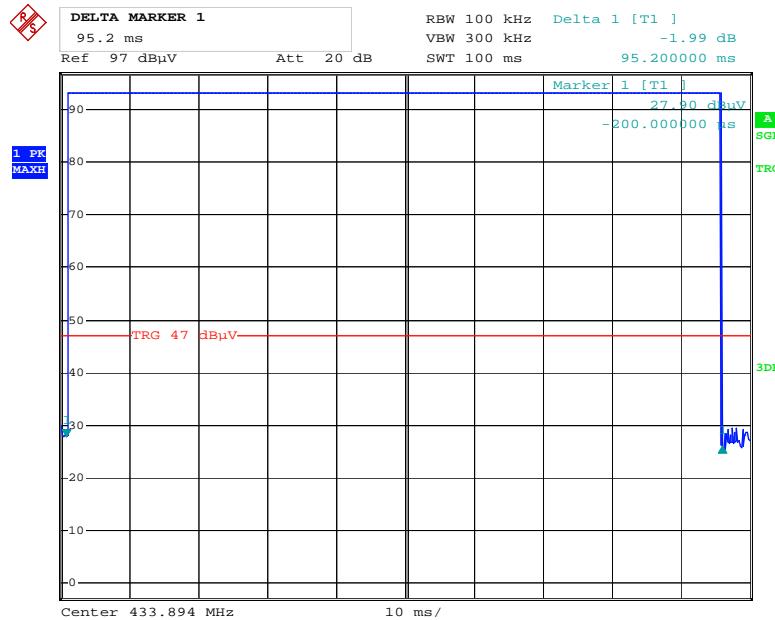
TX-On-Time (worst case):	$T_{on} = 95.2 \text{ ms}$
Pulse Train Time:	$T_{pt} = 10.6 \text{ s}$
Period Time:	$T_{period} = 100 \text{ ms}$
Pulse Train Correction:	$\begin{aligned} C_{pt} &= 20 \cdot \text{Log}(T_{on} / T_{period}) \text{ dB} \\ &= \mathbf{-0.43 \text{ dB}} \end{aligned}$

## Total Pulse Train:



Date: 29.JUL.2013 16:19:30

## Worst case 0.1 second interval:

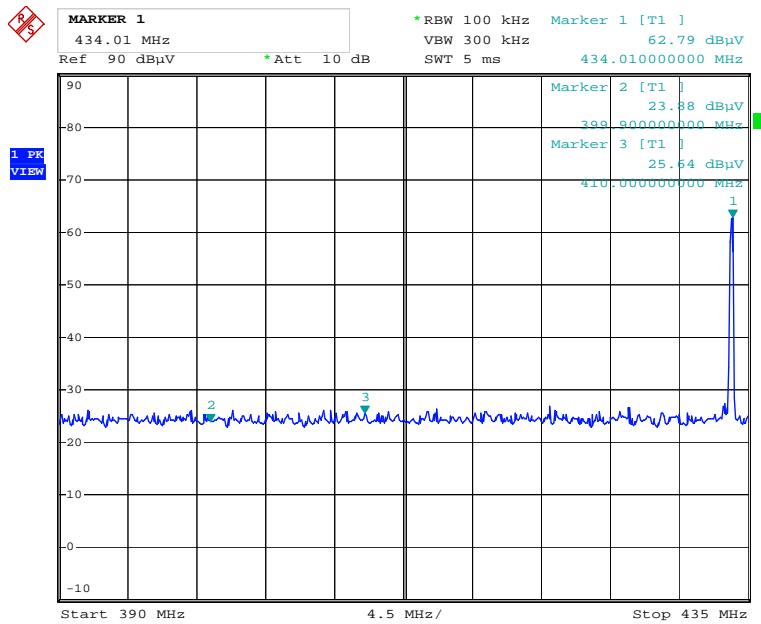


Date: 29.JUL.2013 16:21:37

## 8.6 Restricted Bands of Operation

Rules and specifications:	CFR 47 Part 15, section 15.205(a) IC RSS-210 Issue 8, section 7.2.2(a)
Guide:	ANSI C63.4
Limit:	Only spurious emissions are permitted in any of the frequency bands listed in CFR 47 Part 15, section 15.205(a) or IC RSS-210 Issue 7, section 2.2(a).
Measurement procedure:	Radiated Emission in Fully or Semi Anechoic Room (6.4)

Comment:	
Date of test:	2013-03-08
Test site:	Fully anechoic room, cabin no. 2
Test distance:	3 meters



Date: 8.MAR.2013 11:01:56

Test Result:	Test passed
--------------	-------------

## 8.7 Periodic Operation Requirements

Rules and specifications:	CFR 47 Part 15, section 15.231(a) IC RSS-210 Issue 8, section A1.1.1
Guide:	---

Periodic operation requirements	Applicable	Declared by applicant	Test performed	Passed
The transmitter is used for	<input type="checkbox"/> security or safety applications	<input type="checkbox"/> other applications	<input checked="" type="checkbox"/>	<input type="checkbox"/>
The transmitter is operated	<input type="checkbox"/> manually	<input type="checkbox"/> automatically	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Periodic operation according to	<input type="checkbox"/> CFR 47 Part 15, section 15.231(a) / IC RSS-210 Issue 7, section A1.1.1			
Only control signals are sent and there is no continuous transmission	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
A manually operated transmitter employs a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
A transmitter activated automatically ceases transmission within 5 seconds after activation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Periodic transmissions at regular predetermined intervals are	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> not performed				
<input type="checkbox"/> performed with total transmission time of two seconds per hour or less (for polling or supervision transmissions to determine system integrity of transmitters used in security or safety applications)				
<input checked="" type="checkbox"/> CFR 47 Part 15, section 15.231(e) / IC RSS-210 Issue 7, section A1.1.5				
The device is provided with a means for automatically limiting operation so that the duration of each transmission is not greater than one second and the silent period between transmissions is at least 30 times the duration of the transmission but in no case less than 10 seconds.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Note: Result may be based on the appropriate declaration of the applicant (i.e. no test is performed). However, in this case there is no verification by the test laboratory.

## 8.8 Radiated Emission Measurement 9 kHz to 30 MHz

Rules and specifications:	CFR 47 Part 15, sections 15.215(b) and 15.231(b)(3) IC RSS-210 Issue 8, section A1.1.2(b)			
Guide:	ANSI C63.4			
Limit:	Frequency of Emission (MHz)	Field Strength ( $\mu$ V/m)	Field Strength ( $\text{dB}\mu\text{V}/\text{m}$ )	Measurement Distance d (meters)
	0.009 - 0.490	2400/F(kHz)	67.6 - 20 · log(F(kHz))	300
	0.490 - 1.705	24000/F(kHz)	87.6 - 20 · log(F(kHz))	30
	1.705 - 30.000	30	29.5	30
	Additionally, the level of any unwanted emissions shall not exceed the level of the fundamental emission.			
Measurement procedure:	Radiated Emission Measurement 9 kHz to 30 MHz (6.3)			

Comment:	Test was performed as prescan in a test distance of 3 m
Date of test:	2013-02-22
Test site:	Open field test site

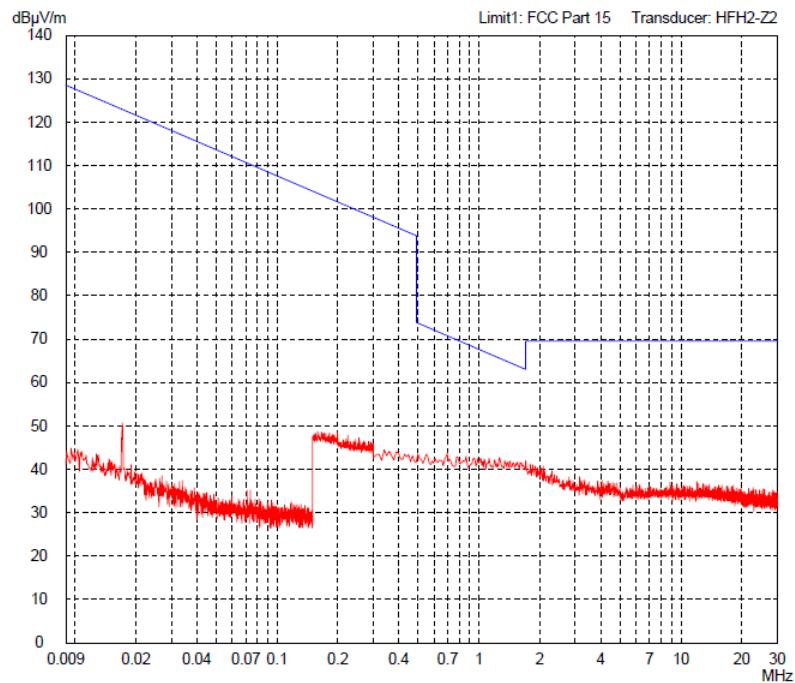
Test Result:	Test passed
--------------	-------------

### No emissions above noise level detected

#### Sample calculation of final values:

$$\begin{aligned}
 \text{Extrapolation Factor (dB)} &= (\text{Log}(d) - \text{Log}(d_1)) \cdot \text{Extrapolation Factor (dB/decade)} \\
 \text{Final Value (dB}\mu\text{V/m)} &= \text{Reading Value } d_1 \text{ (dB}\mu\text{V)} + \text{Correction Factor (dB/m)} \\
 &\quad + \text{Extrapolation Factor (dB)} + \text{Pulse Train Correction (dB)}
 \end{aligned}$$

Note: Extrapolation factor (dB) and final value (dB}\mu\text{V/m) are relating to distance d.



## 8.9 Radiated Emission Measurement 30 MHz to 5 GHz

Rules and specifications:	CFR 47 Part 15, sections 15.205, 15.215(b) and 15.231(b) IC RSS-210 Issue 8, section A1.1.2				
Guide:	ANSI C63.4				
Limit:	In addition to the provisions of section 15.205, the field strength shall not exceed the levels as listed in the table below or the general limits shown in section 15.209, whichever limit permits a higher field strength. In no case shall the level of the unwanted emissions exceed the field strength of the fundamental emission.				
Frequency of Emission (MHz)	Field Strength of Fundamental (µV/m)	Field Strength of Fundamental (dBµV/m)	Field Strength of Spurious Emissions (µV/m)	Field Strength of Spurious Emissions (dBµV/m)	
40.66 - 40.70	2,250	67.0	225 **	47.0	
70 - 130	1,250	61.9	125	41.9	
130 - 174	1,250 to 3,750 *	61.9 to 71.5	125 to 375 *	41.9 to 51.5	
174 - 260	3,750	71.5	375	51.5	
260 - 470	3,750 to 12,500 *	71.5 to 81.9	375 to 1,250 *	51.5 to 61.9	
Above 470	12,500	81.9	1,250	61.9	

\* linear interpolations

\*\* for harmonics only

Measurement procedures: Radiated Emission in Fully or Semi Anechoic Room (6.4)  
Radiated Emission at Alternative Test Site (6.5)

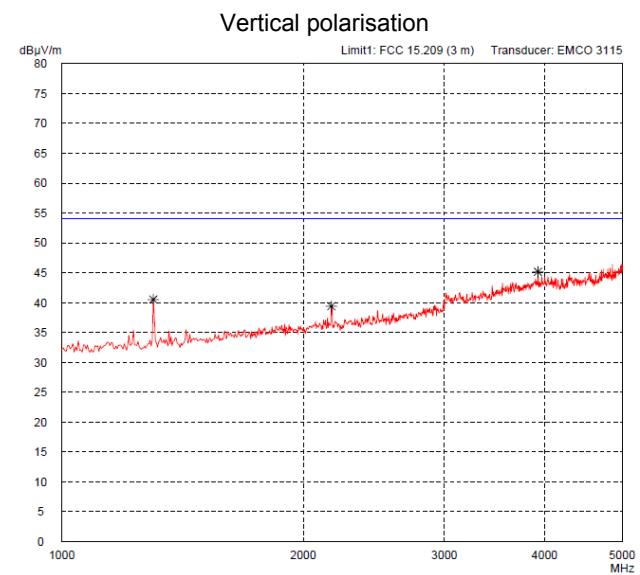
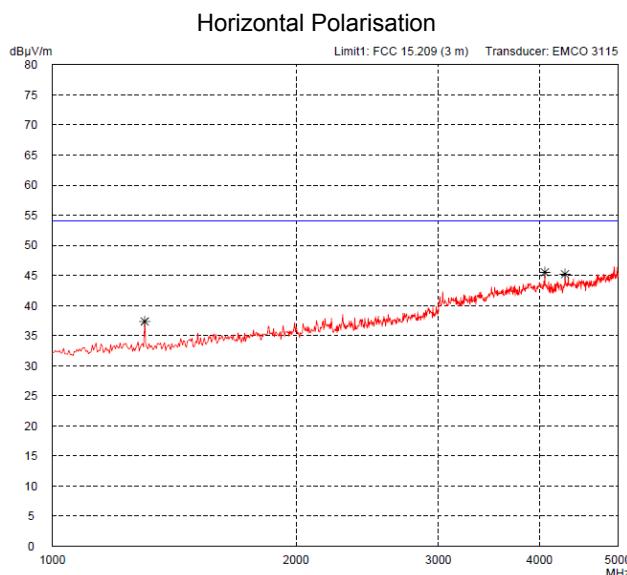
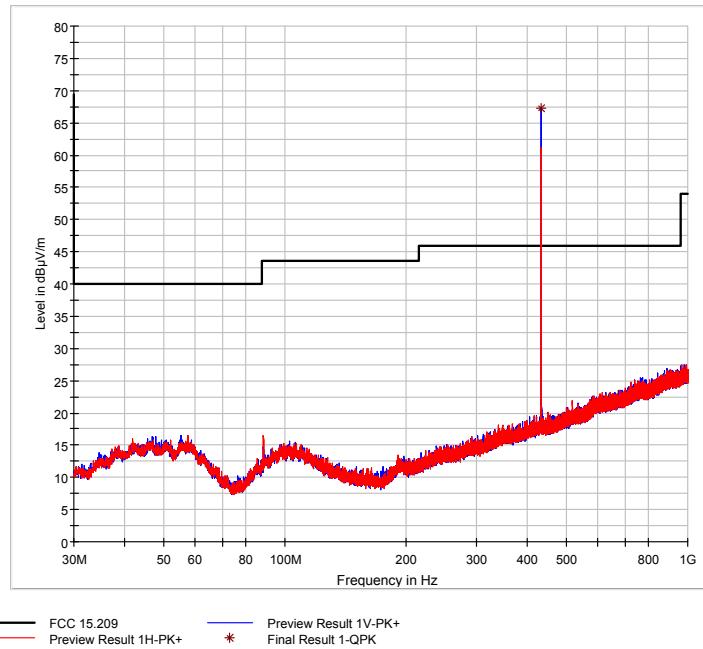
Comment:	
Date of test:	; 2013-08-22
Test site:	Frequencies ≤ 1 GHz: Semi-anechoic room, cabin no. 8 Frequencies > 1 GHz: Fully anechoic room, cabin no. 2
Test distance:	3 meters

Test Result: Test passed

Frequency (MHz)	Antenna Polarization	Detector	Receiver Reading (dBµV)	Correction Factor (dB/m)	Pulse Train Correction (dB)	Final Value (dBµV/m)	Limit (dBµV/m)	Margin (dB)
433,910	vertical	Peak	49,5	17,8	-0,4	66,9	72,9	6,0
1300,000	vertical	Peak	11,6	28,9	-0,4	40,1	54,0	13,9
2168,000	vertical	Peak	6,7	32,7	-0,4	39,0	54,0	15,0
3924,000	vertical	Peak	6,1	39,1	-0,4	44,7	54,0	9,3
4060,000	horizontal	Peak	6,2	39,4	-0,4	45,1	54,0	8,9
4300,000	horizontal	Peak	5,7	39,5	-0,4	44,8	54,0	9,2

### Sample calculation of final values:

$$\text{Final Value (dB}\mu\text{V/m)} = \text{Reading Value (dB}\mu\text{V)} + \text{Correction Factor (dB/m)} + \text{Pulse Train Correction (dB)}$$



## 8.10 Exposure of Humans to RF Fields

Rules and specifications:	IC RSS-Gen Issue 3, section 5.6
Guide:	IC RSS-102 Issue 4, section 2.5

Exposure of Humans to RF Fields		Applicable	Declared by applicant	Measured	Exemption
The antenna is					
<input type="checkbox"/> detachable <p>The conducted output power (CP in watts) is measured at the antenna connector:</p> $CP = \dots \text{ W}$ <p>The effective isotropic radiated power (EIRP in watts) is calculated using</p> <p><input type="checkbox"/> the numerical antenna gain: <math>G = \dots</math></p> $EIRP = G \cdot CP \Rightarrow EIRP = \dots \text{ W}$ <p><input type="checkbox"/> the field strength<sup>6</sup> in V/m: <math>FS = \dots \text{ V/m}</math></p> $EIRP = \frac{(FS \cdot D)^2}{30} \Rightarrow EIRP = \dots \text{ W}$ <p>with:</p> <p>Distance between the antennas in m: <math>D = \dots \text{ m}</math></p>					
<input checked="" type="checkbox"/> not detachable <p>A field strength measurement is used to determine the effective isotropic radiated power (EIRP in watts) given by<sup>6</sup>:</p> $EIRP = \frac{(FS \cdot D)^2}{30} \Rightarrow EIRP = 1.47 \mu\text{W}$ <p>with:</p> <p>Field strength in V/m: <math>FS = 2.2 \mu\text{V/m}</math></p> <p>Distance between the two antennas in m: <math>D = 3 \text{ m}</math></p>					
Selection of output power					
<p>The output power TP is the higher of the conducted or effective isotropic radiated power (e.i.r.p.):</p> $TP = 1.47 \mu\text{W}$					

<sup>6</sup> The conversion formula is valid only for properly matched antennas. In other cases the transmitter output power may have to be measured by a terminated measurement when applying the exemption clauses. If an open area test site is used for field strength measurement, the effect due to the metal ground reflecting plane should be subtracted from the maximum field strength value in order to reference it to free space, before calculating TP.

		Applicable	Declared by applicant	Measured	Exemption
Exposure of Humans to RF Fields (continued)					
Separation distance between the user and the transmitting device is					
<input type="checkbox"/> less than or equal to 20 cm <input checked="" type="checkbox"/> greater than 20 cm			<input checked="" type="checkbox"/>		
Transmitting device is					
<input type="checkbox"/> in the vicinity of the human head <input type="checkbox"/> body-worn			<input checked="" type="checkbox"/>		
SAR evaluation					
<p>SAR evaluation is required if the separation distance between the user and the device is less than or equal to 20 cm.</p> <p><input type="checkbox"/> The device operates from 3 kHz up to 1 GHz inclusively and with output power (i.e. the higher of the conducted or equivalent isotropically radiated power (e.i.r.p.) source-based, time-averaged output power) that is less than or equal to 200 mW for general public use and 1000 mW for controlled use.</p> <p><input type="checkbox"/> The device operates above 1 GHz and up to 2.2 GHz inclusively and with output power (i.e. the higher of the conducted or radiated (e.i.r.p.) source-based, time-averaged output power) that is less than or equal to 100 W for general public use and 500 W for controlled use.</p> <p><input type="checkbox"/> The device operates above 2.2 GHz and up to 3 GHz inclusively and with output power (i.e. the higher of the conducted or radiated (e.i.r.p.) source-based, time-averaged output power) that is less than or equal to 20 mW for general public use and 100 mW for controlled use.</p> <p><input type="checkbox"/> The device operates above 3 GHz and up to 6 GHz inclusively and with output power (i.e. the higher of the conducted or radiated (e.i.r.p.) source-based, time-averaged output power) that is less than or equal to 10 mW for general public use and 50 mW for controlled use.</p> <p><input type="checkbox"/> SAR evaluation is documented in test report no. ....</p>					<input type="checkbox"/>
RF exposure evaluation					
<p>RF exposure evaluation is required if the separation distance between the user and the device is greater than 20 cm.</p> <p><input checked="" type="checkbox"/> The device operates below 1.5 GHz and the maximum e.i.r.p. of the device is equal to or less than 2.5 W.</p> <p><input type="checkbox"/> The device operates at or above 1.5 GHz and the maximum e.i.r.p. of the device is equal to or less than 5 W.</p> <p><input type="checkbox"/> RF exposure evaluation is documented in test report no. ....</p>			<input checked="" type="checkbox"/>		<input type="checkbox"/>

## 9 Test Results for Receiver

<b>FCC CFR 47 Part 15</b>			
<i>Section(s)</i>	<i>Test</i>	<i>Page</i>	<i>Result</i>
15.107	Conducted AC powerline emission 150 kHz to 30 MHz	---	Not applicable
15.109	Radiated emission 30 MHz to 2.5 GHz	42	Test passed
15.111(a)	Antenna power conduction emission of receivers 9 kHz to 2.5 GHz	---	Not applicable

<b>IC RSS-Gen Issue 3</b>			
<i>Section(s)</i>	<i>Test</i>	<i>Page</i>	<i>Result</i>
7.2.4	Conducted AC powerline emission 150 kHz to 30 MHz	---	Not applicable
6.1	Receiver spurious emissions (radiated) 30 MHz to 2.5 GHz	42	Test passed
6.2	Receiver spurious emissions (antenna conducted) 9 kHz to 2.5 GHz	---	Not applicable

## 9.1 Radiated Emission Measurement 30 MHz to 2.5 GHz

Rules and specifications:	CFR 47 Part 15, section 15.109 (Class B) IC RSS-Gen Issue 3, sections 6.1		
Guide:	ANSI C63.4		
Limit:	Frequency of Emission (MHz)	Field Strength (μV/m)	Field Strength (dBμV/m)
	30 - 88	100	40.0
	88 - 216	150	43.5
	216 - 960	200	46.0
	Above 960	500	54.0
Measurement procedures:	Radiated Emission in Fully or Semi Anechoic Room (6.4) Radiated Emission at Alternative Test Site (6.5)		

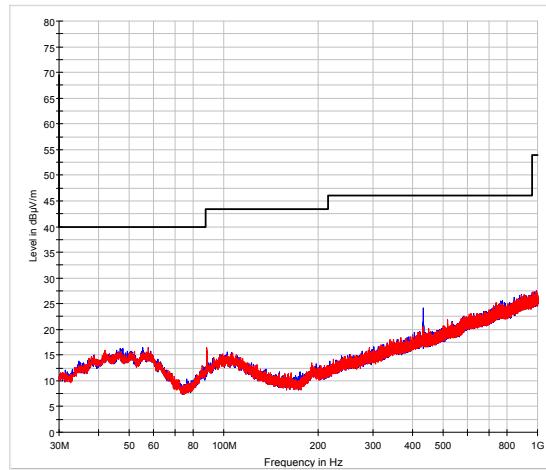
Comment:	
Date of test:	2013-08-23
Test site:	Frequencies $\leq$ 1 GHz: Semi-anechoic room, cabin no. 8 Frequencies $>$ 1 GHz: Fully anechoic room, cabin no. 2
Test distance:	3 meters

Test Result:	Test passed
--------------	-------------

**No emissions above noise level detected**

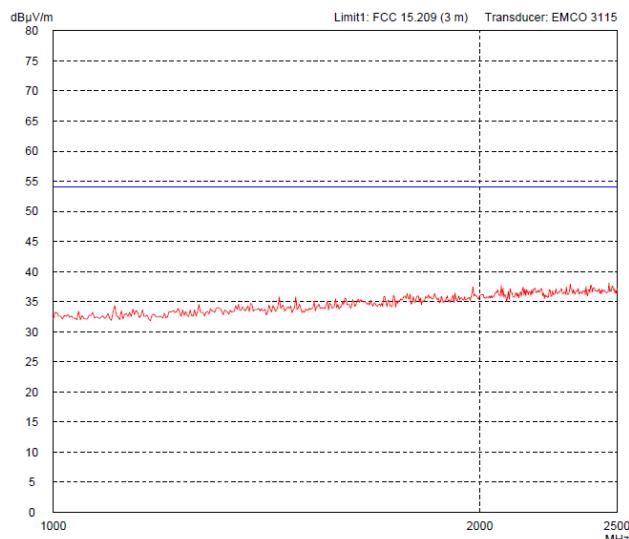
### Sample calculation of field final values:

Final Value (dBμV/m) = Reading Value (dBμV) + Correction Factor (dB/m)



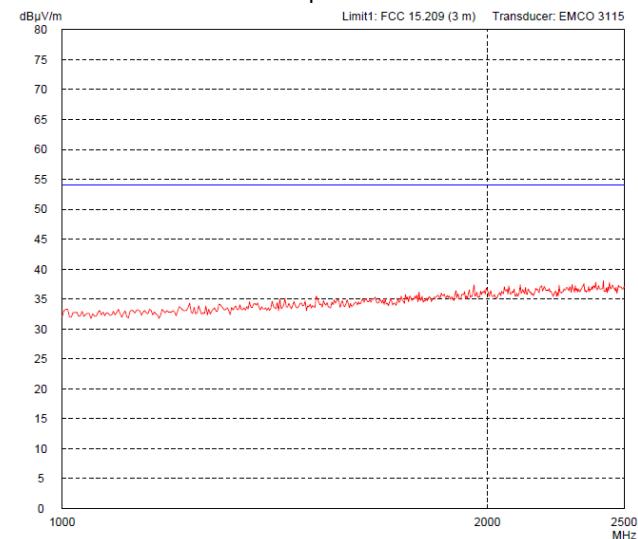
— FCC 15.209    — Preview Result 1V-PK+    — Preview Result 1H-PK+

Horizontal Polarisation



Limit1: FCC 15.209 (3 m)    Transducer: EMCO 3115

Vertical polarisation



Limit1: FCC 15.209 (3 m)    Transducer: EMCO 3115

## 10 Referenced Regulations

All tests were performed with reference to the following regulations and standards:

<input checked="" type="checkbox"/>	CFR 47 Part 2	Code of Federal Regulations Part 2 (Frequency allocation and radio treaty matters; General rules and regulations) of the Federal Communication Commission (FCC)	October 1, 2013
<input checked="" type="checkbox"/>	CFR 47 Part 15	Code of Federal Regulations Part 15 (Radio Frequency Devices) of the Federal Communication Commission (FCC)	October 1, 2013
<input checked="" type="checkbox"/>	ANSI C63.4	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz	December 11, 2003 (published on January 30, 2004)
<input type="checkbox"/>	ANSI C63.4	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz	June 7, 2009 (published on September 15, 2009)
<input checked="" type="checkbox"/>	RSS-Gen	Radio Standards Specification RSS-Gen Issue 3 containing General Requirements and Information for the Certification of Radiocommunication Equipment, published by Industry Canada	December 2010
<input checked="" type="checkbox"/>	RSS-210	Radio Standards Specification RSS-210 Issue 8 for Low Power Licence-Exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment, published by Industry Canada	December 2010
<input type="checkbox"/>	RSS-310	Radio Standards Specification RSS-310 Issue 3 for Low-power Licence-exempt Radiocommunication Devices (All Frequency Bands): Category II Equipment, published by Industry Canada	December 2010
<input checked="" type="checkbox"/>	RSS-102	Radio Standards Specification RSS-102 Issue 4: Radio Frequency (RF) Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands), published by Industry Canada	March 2010, footnote 13 updated December 2010
<input type="checkbox"/>	ICES-003	Interference-Causing Equipment Standard ICES-003 Issue 4 for Digital Apparatus, published by Industry Canada	February 7, 2004
<input checked="" type="checkbox"/>	CISPR 22	Third Edition of the International Special Committee on Radio Interference (CISPR), Pub. 22, "Information Technology Equipment – Radio Disturbance Characteristics – Limits and Methods of Measurement"	1997

<input type="checkbox"/>	CAN/CSA- CEI/IEC CISPR 22	Limits and Methods of Measurement of Radio Disturbance Characteristics of Information Technology Equipment	2002
		CAN/CSA CISPR 22-10 Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement (Adopted IEC CISPR 22:2008, sixth edition, 2008-09)	
<input type="checkbox"/>	CAN/CSA CISPR 22-10	Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement (Adopted IEC CISPR 22:2008, sixth edition, 2008-09)	2010
<input checked="" type="checkbox"/>	TRC-43	Notes Regarding Designation of Emissions (Including Necessary Bandwidth and Classification), Class of Station and Nature of Service, published by Industry Canada	October, 2008

## 11 Test Equipment List with Calibration Data

Type	Inv.-No.	Type Designation	Serial Number	Manufacturer	Calibration Organization	Last Calibration	Next Calibration
EMI test receiver	2044	ESU8	100232	Rohde & Schwarz	Rohde & Schwarz	07/2012	01/2014
Spectrum analyser	1666	FSP30	100063	Rohde & Schwarz	Rohde & Schwarz	11/2012	05/2014
Preamplifier	1684	AFS3-00100800-32-LN	847743	MITEQ	TÜV SÜD PS-EMC-STR	10/2011	10/2013
Double ridged waveguide horn antenna	1516	3115	9508-4553	EMCO Elektronik	Seibersdorf Laboratories	11/2012	11/2014
Loop antenna	1016	HFH2-Z2	882964/0001	Rohde & Schwarz	Rohde & Schwarz	11/2012	05/2014
TRILOG Broadband Antenna	2058	VULB 9163	9163-408	Schwarzbeck	Rohde & Schwarz	11/2012	05/2014

Note 1: No calibration required.

Note 2: Not calibrated separately but with the whole test system when recording calibration data.

Note 3: No calibration required. Devices are checked before use.

Note 4: No calibration required. Devices are checked by calibrated equipment during test.

## 12 Revision History

<b>Revision History</b>			
<i>Edition</i>	<i>Date</i>	<i>Issued by</i>	<i>Modifications</i>
1	2013-08-26	Martin Steindl (gz)	First Edition
2	2014-01-08	M. Steindl	Update of normative references; Correction of calibration table and typedesignation