



## Accredited testing-laboratory

**DAR registration number: DAT-P-176/94-D1**

**Federal Motor Transport Authority (KBA)  
DAR registration number: KBA-P 00070-97**

**Recognized by the Federal Communications Commission**

**Anechoic chamber registration no.: 90462 (FCC)**

**Anechoic chamber registration no.: 3462C-1 (IC)**

**Certification ID: DE 0001**

**Accreditation ID: DE 0002**

**Accredited Bluetooth® Test Facility (BQTF)**

*The Bluetooth word mark and logos are owned by the Bluetooth SIG, Inc. and any use of such marks by Cetecom ICT is under license*

**Test report no. : 1-0623-01-04/08\_A**

**Type identification : i.roc, RFx11\_125 kHz,  
RFx11\_134 kHz, RFx10\_13\_56 MHz.**

**Applicant : Ecom engineering GmbH**

**FCC ID : XAM003500000, XAM0027590000,  
XAM0027390000, XAM0027670000.**

**IC Certification No : 8311A-0035000000, 8311A-0027590000,  
8311A-0027390000, 8311A-0027670000.**

**Test standards : 47 CFR Part 15  
RSS – 210 Issue 7**

## Table of contents

<b>1</b>	<b>General information</b> .....	<b>3</b>
1.1	Notes .....	3
1.2	Testing laboratory .....	4
1.3	Details of applicant .....	4
1.4	Application details .....	4
<b>2</b>	<b>Test standard/s:</b> .....	<b>5</b>
<b>3</b>	<b>Technical tests</b> .....	<b>6</b>
3.1	Details of manufacturer.....	6
3.1.1	Test item.....	6
3.1.2	Additional EUT information For IC Canada (appendix 2).....	7
3.1.3	RF Technical Brief Cover Sheet acc. To RSS-102 .....	8
3.1.4	EUT operating modes.....	9
3.1.5	Extreme conditions testing values.....	9
<b>4</b>	<b>Summary of Measurement Results and list of all performed test cases</b> .....	<b>10</b>
<b>5</b>	<b>RF measurement testing</b> .....	<b>11</b>
5.1	Description of test set-up.....	11
5.1.1	Radiated measurements.....	11
5.1.2	Conducted measurements.....	11
5.2	Referenced documents .....	12
5.3	Additional comments .....	12
5.4	Max. peak output power (radiated) § 15.247 (b)(1).....	13
5.5	Band-edge compliance of radiated emissions §15.205 .....	14
5.6	Spurious Emissions > 30 MHz- radiated (Transmitter) § 15.247 (c)(1).....	17
5.7	Spurious Emissions - radiated (Receiver) § 15.109 / 209 .....	26
5.8	Spurious Emissions < 30 MHz – Transmitter and Receiver radiated § 15.209.....	30
5.9	AC Line Conducted Emissions <30 MHz §15.107 / 207.....	31
<b>6</b>	<b>Test equipment and ancillaries used for tests</b> .....	<b>33</b>
<b>7</b>	<b>Photographs of the Test Set-up</b> .....	<b>36</b>
<b>8</b>	<b>Photographs of the EUT</b> .....	<b>38</b>

---

## 1 General information

### 1.1 Notes

The test results of this test report relate exclusively to the test item specified in 3.1.1. The CETECOM ICT Services GmbH does not assume responsibility for any conclusions and generalisations drawn from the test results with regard to other specimens or samples of the type of the equipment represented by the test item. The test report may only be reproduced or published in full. Reproduction or publication of extracts from the report requires the prior written approval of the CETECOM ICT Services GmbH.

#### Test laboratory manager:

2009-05-11

Meheza Kpelou Walla



Date

Name

Signature

#### Technical responsibility for area of testing:

2009-05-11

Stefan Bös



Date

Name

Signature

## 1.2 Testing laboratory

CETECOM ICT Services GmbH

Untertürkheimer Straße 6 - 10  
 66117 Saarbrücken  
 Germany  
 Phone: + 49 681 5 98 - 0  
 Fax: + 49 681 5 98 - 9075  
 e-mail: info@ICT.cetecom.de  
 Internet: http://www.cetecom-ict.de

**State of accreditation:** The test laboratory (area of testing) is accredited according to  
 DIN EN ISO/IEC 17025  
 DAR registration number: DAT-P-176/94-D1

**Accredited by:** Federal Motor Transport Authority (KBA)  
 DAR registration number: KBA-P 00070-97

**Testing location, if different from CETECOM ICT Services GmbH:**

**Name :**  
**Street :**  
**Town :**  
**Country :**  
**Phone :**  
**Fax :**

## 1.3 Details of applicant

Name:	Ecom engineering GmbH
Street:	Industriestr. 2
Town:	97959 Assamstadt
Country:	Germany
Telephone:	+49(0)6294-4224-0
Fax:	+49(0)6294-4224-611
Contact:	Martin Haaf
E-mail:	martin.haaf@ecom-ex.com
Telephone:	+49(0)6294-4224-650

## 1.4 Application details

Date of receipt of order:	2008-09-15
Date of receipt of test item:	2008-10-27
Date of start test:	2009-02-16
Date of end test	2009-05-11
Persons(s) who have been present during the test:	-/-

## 2 Test standard/s:

47 CFR Part 15	2007-09	Title 47 of the Code of Federal Regulations; Chapter I- Federal Communications Commission subchapter A - general, Part 15-Radio frequency devices
RSS - 210 Issue 7	2007-06	Spectrum Management and Telecommunications - Radio Standards Specification Low-power Licence-exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment

### 3 Technical tests

#### 3.1 Details of manufacturer

Name:	Ecom engineering GmbH
Street:	Industriestr. 2
Town:	97959 Assamstadt
Country:	Germany

##### 3.1.1 Test item

Kind of test item :	Industrial PDA
Type identification :	i.roc, RFx11_125 kHz, RFx11_134 kHz, RFx10_13_56 MHz.
S/N serial number :	3566-PMMC-0004 3566-PMMC-0005 3566-PMMC-0007 3566-PMMC-0008
HW hardware status :	-/-
SW software status :	-/-
Frequency Band [MHz] :	ISM 2.400 - 2.483.5
Type of Modulation :	FHSS
Number of channels :	79
Antenna :	Integrated antenna
Power Supply :	115 V AC
Temperature Range :	-20 °C to +55 °C

Max. power radiated: -11.92 dBm  
 Max. power conducted: not performed!

FCC ID: XAM003500000, XAM0027590000, XAM0027390000, XAM0027670000.  
 IC: 8311A-003500000, 8311A-0027590000, 8311A-0027390000, 8311A-0027670000.

**3.1.2 Additional EUT information For IC Canada (appendix 2)**

IC Registration Number:	8311A-0035000000, 8311A-0027590000, 8311A-0027390000, 8311A-0027670000.
Model Name:	i.roc, RFx11_125 kHz, RFx11_134 kHz, RFx10_13_56 MHz.
Manufacturer (complete Address):	Ecom engineering GmbH Industriestr. 2 97959 Assamstadt Germany
Tested to Radio Standards Specification (RSS) No.:	RSS-210 Issue 7
Open Area Test Site Industry Canada Number:	IC 3462 C-1
Frequency Range (or fixed frequency) [MHz]:	2400 – 2483.5 MHz
RF: Power [W] (max):	<b><u>GFSK Modulation:</u></b>  Rad. EIRP: 0.06 mW
Antenna Type:	Integrated antenna
Occupied Bandwidth (99% BW) [kHz]:	930 (GFSK)
Type of Modulation:	GFSK
Emission Designator (TRC-43):	930KFXD
Transmitter Spurious (worst case) [dBμV/m]:	41.27
Receiver Spurious (worst case) [dBμV/m]:	40.13

**ATTESTATION:**

I attest that the testing was performed or supervised by me; that the test measurements were made in accordance with the above-mentioned departmental standard(s), and that the radio equipment identified in this application has been subject to all applicable test conditions specified in the departmental standards and all of the requirements of the standards have been met.

Signature:



Test engineer: Meheza Kpelou Walla

Date: 2009-05-11

### 3.1.3 RF Technical Brief Cover Sheet acc. To RSS-102

All Fields must be completed with the requested information or the following codes: N/A for Not Applicable, N/P for Not Performed or N/V for Not Available. Where applicable, check appropriate box.

1. COMPANY NUMBER: **8311A**
2. MODEL NUMBER: **i.roc, RFx11\_125 kHz, RFx11\_134 kHz, RFx10\_13\_56 MHz.**
3. MANUFACTURER: **Ecom engineering GmbH**
4. TYPE OF EVALUATION: **(c) RF Evaluation**

- Evaluated against exposure limits: General Public Use  Controlled Use
  - Duty cycle used in evaluation: 99 %
  - Standard used for evaluation: RSS-102 Issue 2 (2005-11)
  - Measurement distance: 0.20 m
  - RF value: 0.00012 V/m  A/m  W/m<sup>2</sup>
- Measured  Computed  Calculated

#### Declaration of RF Exposure Compliance

#### ATTESTATION:

I attest that the information provided in this test report are correct; that a Technical Brief was prepared and the information it contains is correct; that the device evaluation was performed or supervised by me; that applicable measurement methods and evaluation methodologies have been followed and that the device meets the SAR and/or RF exposure limits of RSS-102.

Name: Meheza Kpelou Walla  
Title: Dipl.-Ing. (FH)  
Company: Cetecom ICT Services GmbH



### 3.1.4 EUT operating modes

EUT operating mode no. *)	Description of operating modes	Additional information
Op. 0	Normal mode	Normal temperature and power source conditions
Op. 1		low temperature, low power source conditions
Op. 2		low temperature, high power source conditions
Op. 3		high temperature, low power source conditions
Op. 4		high temperature, high power source conditions

\*) EUT operating mode no. is used to simplify the test plan

### 3.1.5 Extreme conditions testing values

Description	Shortcut	Unit	Value
Nominal Temperature	T <sub>nom</sub>	°C	23
Nominal Humidity	H <sub>nom</sub>	%	50
Nominal Power Source	V <sub>nom</sub>	V	115 V AC

Type of power source: **115 V AC from Power Supply**

Deviations from these values are reported in chapter 2

#### 4 Summary of Measurement Results and list of all performed test cases

- No deviations from the technical specifications were ascertained
- There were deviations from the technical specifications ascertained

TC identifier	Description	verdict	date	Remark
RF-Testing	FCC Part 15 §15.107 FCC Part 15 §15.109 FCC Part 15 §15.205 FCC Part 15 §15.207 FCC Part 15 §15.209 FCC Part 15 §15.247  CANADA RSS-210	Pass	2009-05-11	-/-

Test Specification Clause	Test Case	Pass	Fail	Not applicable	Not performed
§ 15.247 (b)(1)	Max. peak output power (radiated)	Yes			
§ 15.205	Band-edge compliance of radiated emissions	Yes			
§ 15.247 (d)	Spurious Emission - radiated (Transmitter) >30MHz	Yes			
§ 15.109	Spurious Emissions - radiated (Receiver)	Yes			
§ 15.209	Spurious Emissions - radiated (Transmitter)<30MHz	Yes			
§ 15.107/207	AC Line Conducted Emissions <30MHz	Yes			

## 5 RF measurement testing

### 5.1 Description of test set-up

#### 5.1.1 Radiated measurements

The radiated measurements are performed in vertical and horizontal plane in the frequency range from 9 kHz to 25 GHz in semi-anechoic chambers. The EUT is positioned on a non-conductive support with a height of 0.80 m above a conductive ground plane that covers the whole chamber. The receiving antennas are confirmed with specifications ANSI C63.2-1996 clause 15 and ANSI C63.4-2003 clause 4.1.5. These antennas can be moved over the height range between 1.0 m and 4.0 m in order to search for maximum field strength emitted from EUT. The measurement distances between EUT and receiving antennas are indicated in the test setups for the various frequency ranges. For each measurement, the EUT is rotated in all three axes until the maximum field strength is received. The wanted and unwanted emissions are received by spectrum analysers where the detector modes and resolution bandwidths over various frequency ranges are set according to requirement ANSI C63-4-2003 clause 4.2. Antennas are confirmed with ANSI C63.2-1996 item 15.

- 9 kHz - 150 kHz: Quasi Peak measurement, 200 Hz Bandwidth, passive loop antenna.
- 150 kHz - 30 MHz: Quasi Peak measurement, 9 kHz Bandwidth, passive loop antenna.
- 30 MHz - 200 MHz: Quasi Peak measurement, 120 kHz Bandwidth, biconical antenna
- 200MHz - 1GHz: Quasi Peak measurement, 120 kHz Bandwidth, log periodic antenna
- >1GHz: Average, RBW 1MHz, VBW 10 Hz, waveguide horn

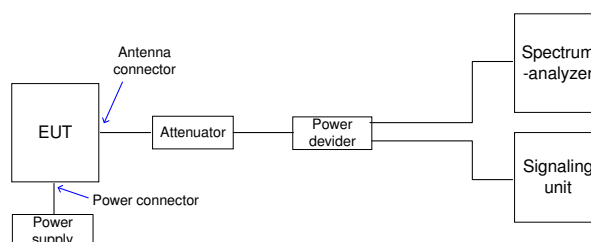
All measurements are done in accordance with the Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems DA 00-705 and Appendix A “BLUETOOTH APPROVALS”

The EUT is powered by an external power supply with nominal voltage. The signalling is performed from outside the chamber with a signalling unit (CMU200 or other) by air link using signalling antenna.

#### 5.1.2 Conducted measurements

**Not performed!**  
**Only delta measurements performed.**

The EUT’s RF signal is coupled out by the antenna connector which is supplied by the manufacturer. The signal is first 10dB attenuated before it is power divided (~6dB loss per branch). One of the signal paths is connected to the communication base Station (CMU200 or other), the other one is connected to the spectrum analyzer. The specific losses for both signal paths are first checked within a calibration. The measurement readings on the signalling unit/spectrum analyzer are corrected by the specific test set-up loss. The attenuator, power divider, signalling unit and the spectrum analyzer are impedance matched on 50 Ohm.



## 5.2 Referenced documents

None

## 5.3 Additional comments

Only delta measurements (radiated measurements) performed.

The manufacturer provided 4 test samples with different FCC ID and IC Nr. 3 of these samples was prepared for the RF testing on a specific RFID frequency (125 kHz, 134 kHz, 13.56 MHz) but remained identical in term of the Bluetooth configuration.

Therefore only one of the test samples was reused for the Bluetooth radio testing.

**5.4 Max. peak output power (radiated) § 15.247 (b)(1)**

Results:

Test conditions		Max. peak output power EIRP [dBm]		
Frequency [MHz]		2402	2442	2480
T <sub>nom</sub>	V <sub>nom</sub>	-12.21	-12.05	<b>-11.92</b>
Measurement uncertainty		±3dB		

RBW / VBW: 3 MHz

Measured at a distance of 3m

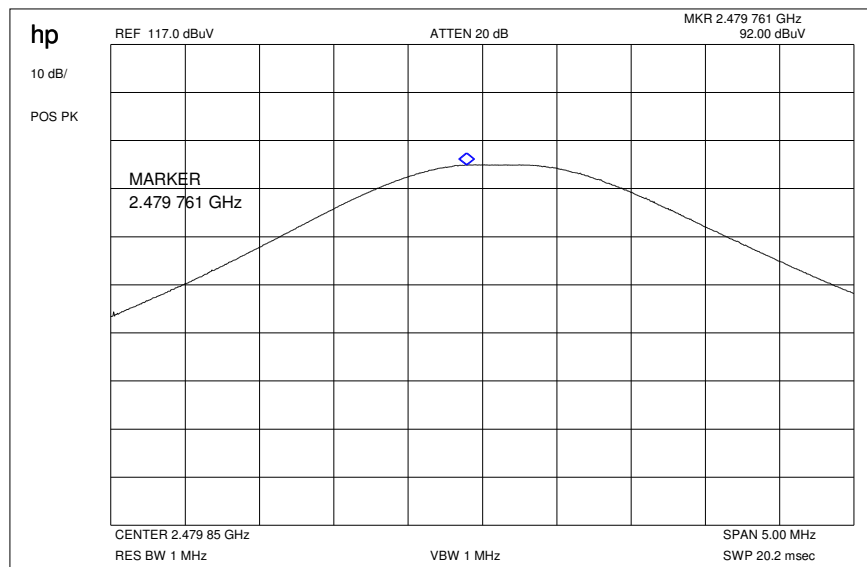
Limits:

Under normal test conditions only, for frequency range 2400-2483.5 MHz	Max. 1.0 Watt
------------------------------------------------------------------------	---------------

### 5.5 Band-edge compliance of radiated emissions §15.205

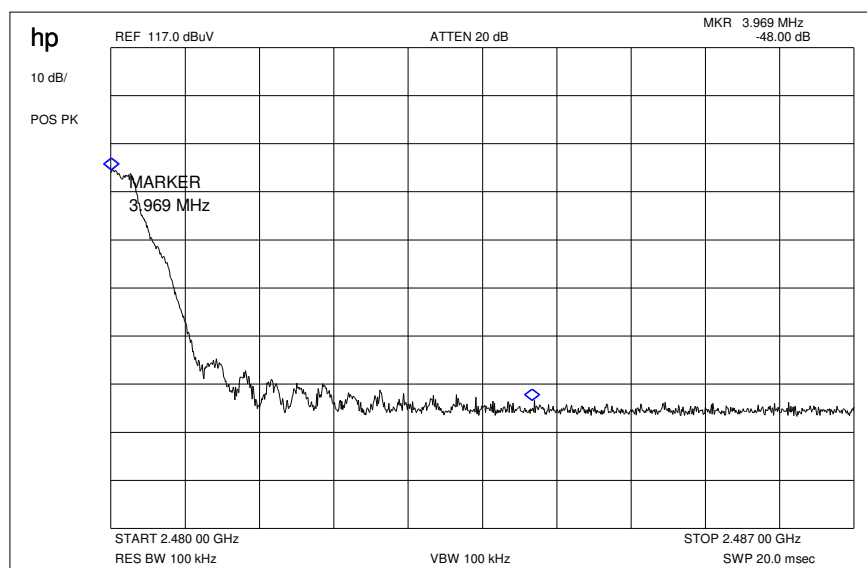
Modulation: GFSK

Plot 1: Max field strength in 3m distance (single frequency)



Result: 92.00 dB $\mu$ V/m

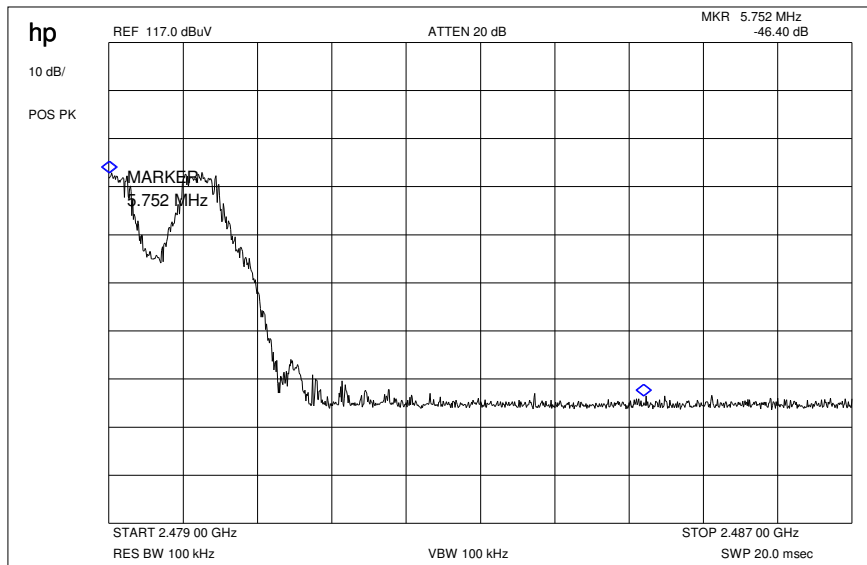
Plot 2: Marker-Delta Method (single carrier)



Marker-Delta-Value: 48.00 dB

This measurement was made to show that the behaviour of the system is conform to FCC 15.205 (restricted bands).

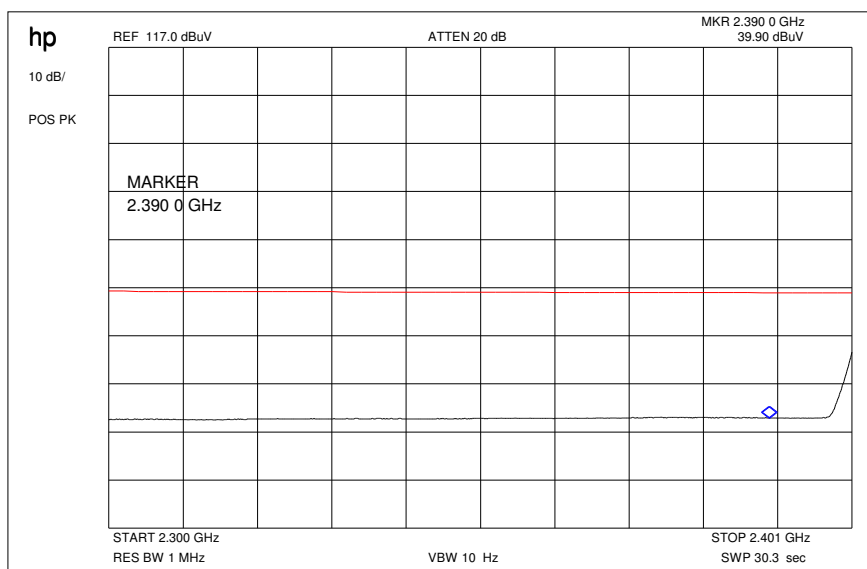
Plot 3: Marker-Delta Method (hopping)



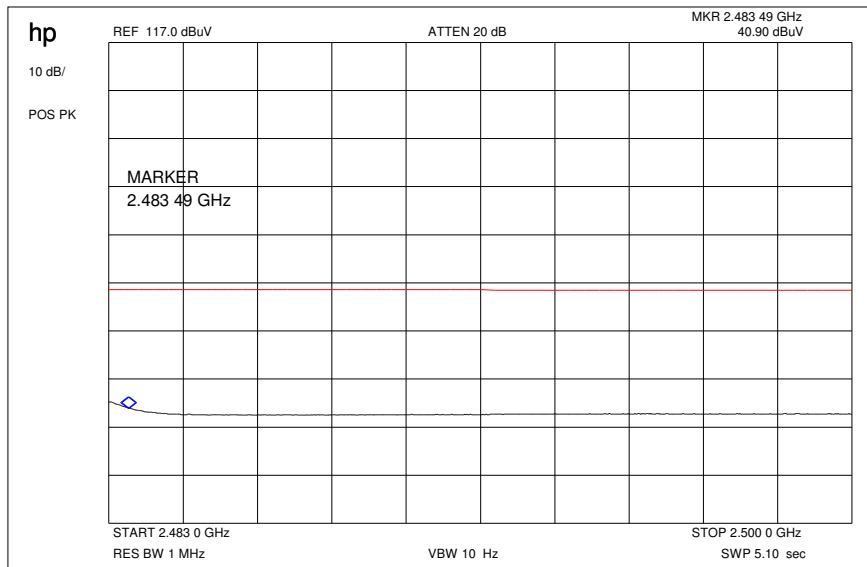
Marker-Delta-Value: 46.40 dB

This measurement was made to show that the behaviour of the system is conform to FCC 15.205 (restricted bands).

Plot 4: Restricted Band low



Plot 5: Restricted Band high



**Results & Limits:**

**Radiated field strength**

The field strength was measured with an EMI measuring receiver and 1 MHz RBW / VBW for peak and with 1MHz RBW / 10Hz VBW for average at a distance of 3m.

High Channel	Setup	Measured Value (3m)	Correction Factor (3m)	Calculated Value (3m)
Max. peak value	1 MHz RBW 1 MHz VBW	92.00 dB $\mu$ V/m	-6.30	85.70 dB $\mu$ V/m
Max. average value	Calculated with duty cycle correction factor	85.70 dB $\mu$ V/m peak	-1,07dB duty cycle correction factor (worst case DH5)	84.63 dB $\mu$ V/m
Delta value	Peak 100 kHz RBW/VBW	48.00 dB (single carrier) 46.40 dB (hopping mode)	-	-
Value at band edge	limit 54 dB $\mu$ V/m			36.63 dB $\mu$ V/m (single carrier) 38.23 dB $\mu$ V/m (hopping mode)
<b>Statement:</b>				<b>Complies</b>



**5.6 Spurious Emissions > 30 MHz- radiated (Transmitter) § 15.247 (c)(1)**

Plot 1: 0.03 - 1 GHz vertical/horizontal (lowest channel)

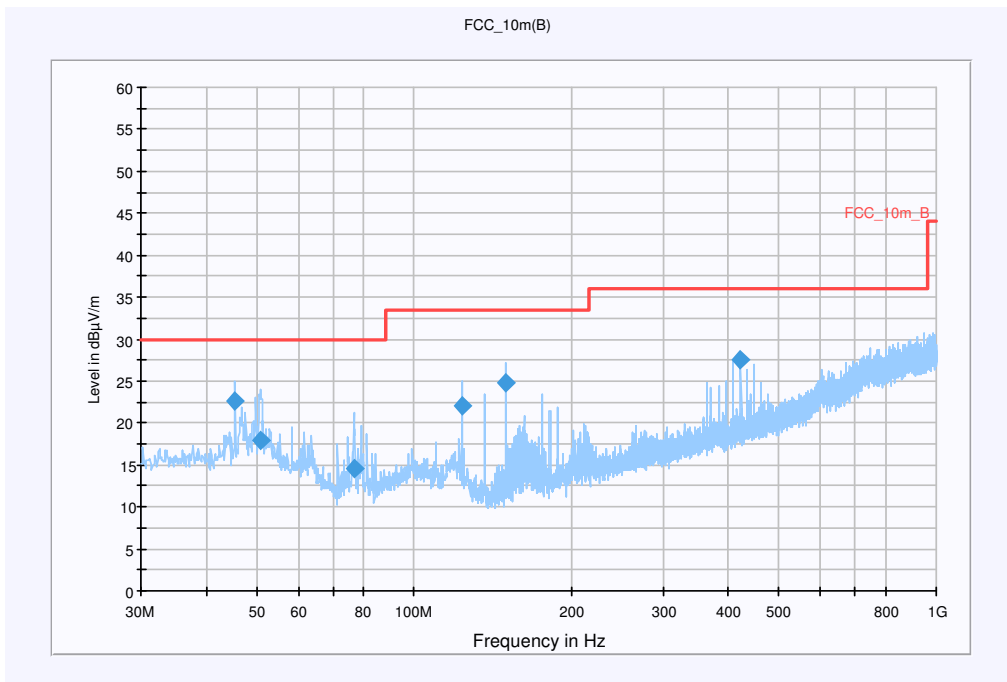
**Information**

EUT:	i.roc and Delta Electronics AC/DC Adaptor EADP-10BB
Serial Number:	3566-PMMC-0007 and 592A401Z9TV1AK
Test Description:	FCC Part 15 class B @ 10m
Operating Conditions:	BT Testmode - Channel 00 + Charging
Operator Name:	Klos
Comment:	Powered by 115 V / 60 Hz

**Scan Setup: STAN\_Fin [EMI radiated]**

Hardware Setup:	Electric Field (NOS)
Level Unit:	dBµV/m

Subrange	Detectors	IF Bandwidth	Meas. Time	Receiver
30 MHz - 1 GHz	QuasiPeak	120 kHz	15 s	Receiver

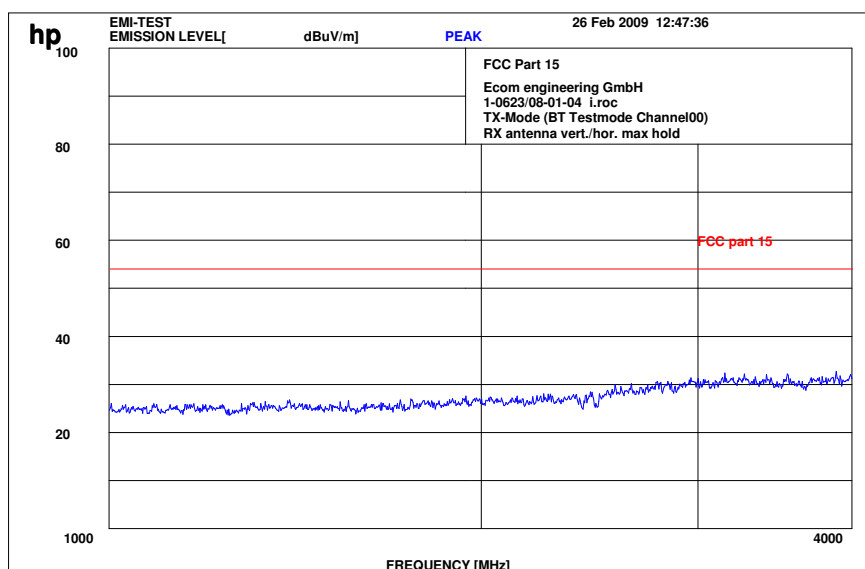


Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
45.491200	22.6	15000.000	120.000	117.0	V	109.0	13.4	7.4	30.0
50.780300	18.0	15000.000	120.000	200.0	V	182.0	13.5	12.0	30.0
76.859750	14.6	15000.000	120.000	331.0	V	184.0	9.4	15.4	30.0
123.493050	22.0	15000.000	120.000	100.0	V	342.0	10.2	11.5	33.5
149.495450	24.8	15000.000	120.000	126.0	V	9.0	9.1	8.7	33.5
422.480850	27.5	15000.000	120.000	100.0	V	0.0	17.7	8.5	36.0

**Hardware Setup: EMI radiated\Electric Field (NOS) - [EMI radiated]**

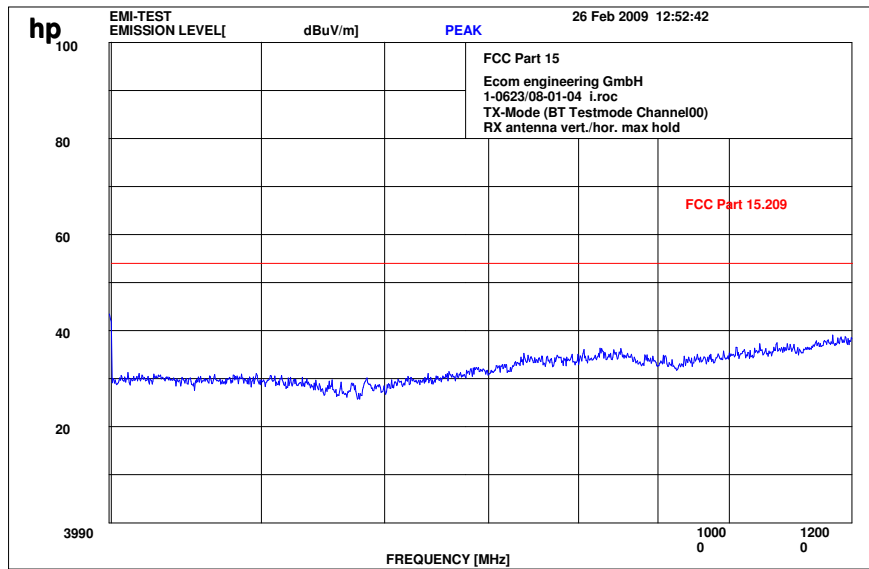
Frequency Range:	30 MHz - 2 GHz
Receiver:	Receiver [ESCI 3] @ GPIB0 (ADR 20), SN 100083/003, FW 4.32, CAL 07.01.2010
Signal Path:	without Notch FW 1.0
Antenna:	VULB 9163 SN 9163-295, FW ---, CAL 08.04.2010 Correction Table (vertical): VULP6113 Correction Table (horizontal): VULP6113 Correction Table: Cable_EN_1GHz (0109)
Antenna Tower:	Tower [EMCO 2090 Antenna Tower] @ GPIB0 (ADR 8), FW REV 3.12
Turntable:	Turntable [EMCO Turntable] @ GPIB0 (ADR 9), FW REV 3.12

Plot 2: 1 - 4 GHz vertical/horizontal (lowest channel)

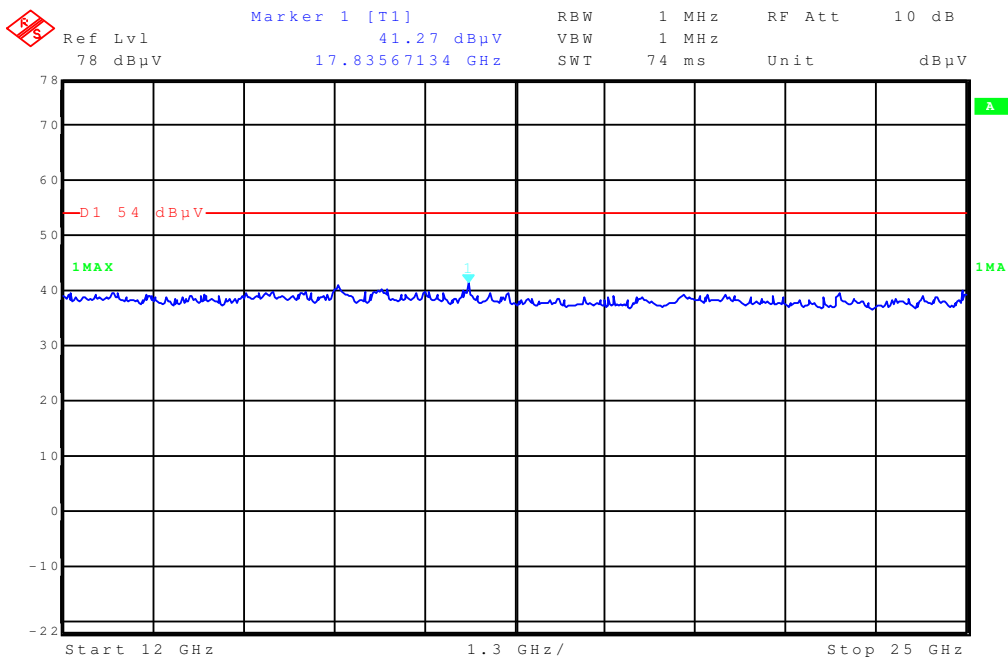


Carrier rejected with 2.4 GHz notch filter.

Plot 3: 4 - 12 GHz vertical/horizontal (lowest channel)



Plot 4: 12 - 25 GHz vertical/horizontal (valid for all channels)



Plot 5: 0.03 - 1 GHz vertical/horizontal (middle channel)

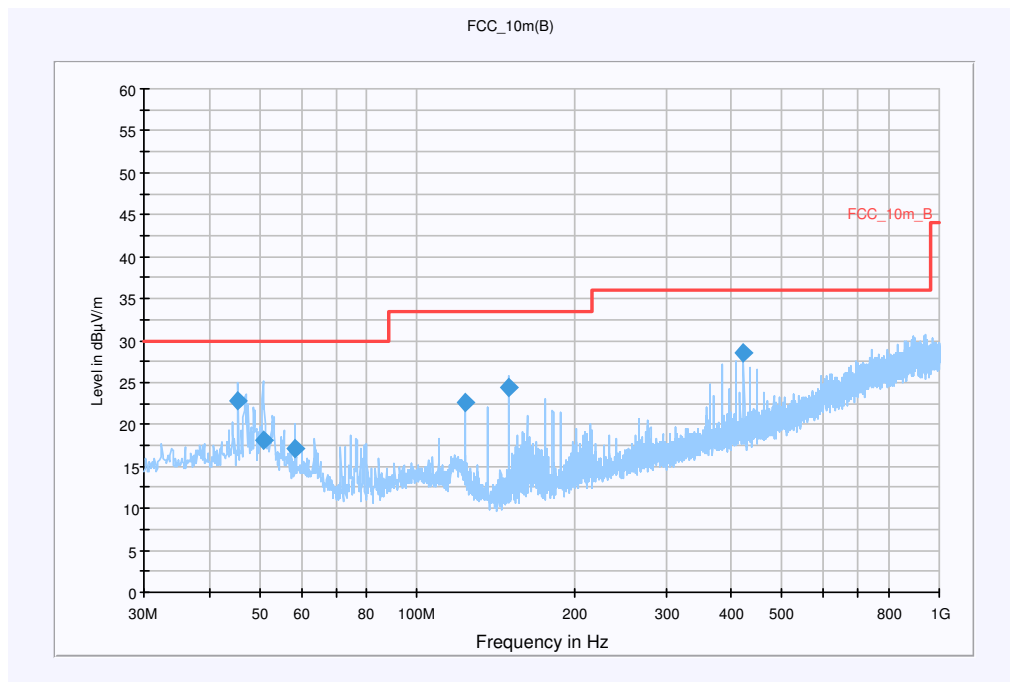
**Information**

EUT:	i.roc and Delta Electronics AC/DC Adaptor EADP-10BB
Serial Number:	3566-PMMC-0007 and 592A401Z9TV1AK
Test Description:	FCC Part 15 class B @ 10m
Operating Conditions:	BT Testmode - Channel 39 + Charging
Operator Name:	Klos
Comment:	Powered by 115 V / 60 Hz

**Scan Setup: STAN\_Fin [EMI radiated]**

Hardware Setup:	Electric Field (NOS)
Level Unit:	dB $\mu$ V/m

Subrange	Detectors	IF Bandwidth	Meas. Time	Receiver
30 MHz - 1 GHz	QuasiPeak	120 kHz	15 s	Receiver

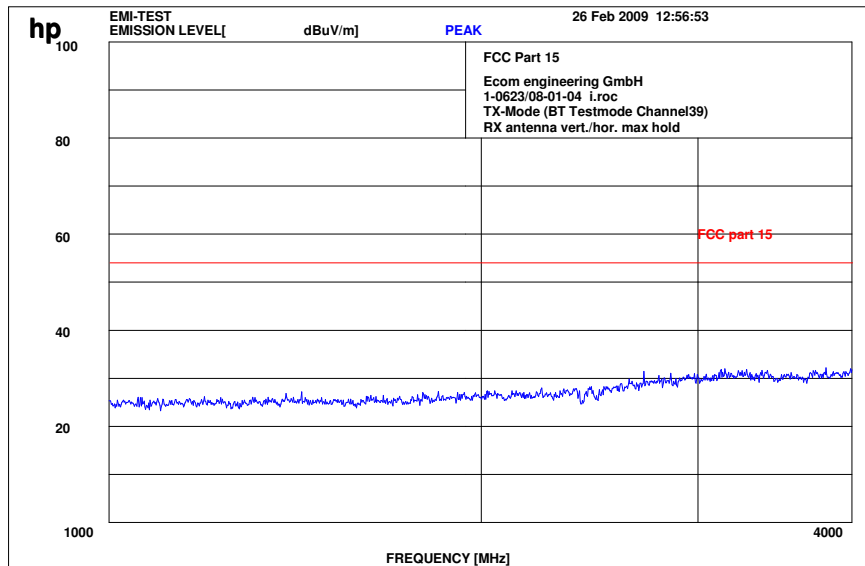


Frequency (MHz)	QuasiPeak (dB $\mu$ V/m)	Meas. Time (ms)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Margin (dB)	Limit (dB $\mu$ V/m)
45.489700	22.7	15000.000	120.000	100.0	V	204.0	13.4	7.3	30.0
50.787150	18.0	15000.000	120.000	100.0	V	233.0	13.5	12.0	30.0
58.491200	17.1	15000.000	120.000	323.0	V	58.0	12.2	12.9	30.0
123.502200	22.5	15000.000	120.000	100.0	V	54.0	10.2	11.0	33.5
149.489450	24.5	15000.000	120.000	106.0	V	343.0	9.1	9.0	33.5
422.484600	28.4	15000.000	120.000	400.0	V	329.0	17.7	7.6	36.0

**Hardware Setup: EMI radiated\Electric Field (NOS) - [EMI radiated]**

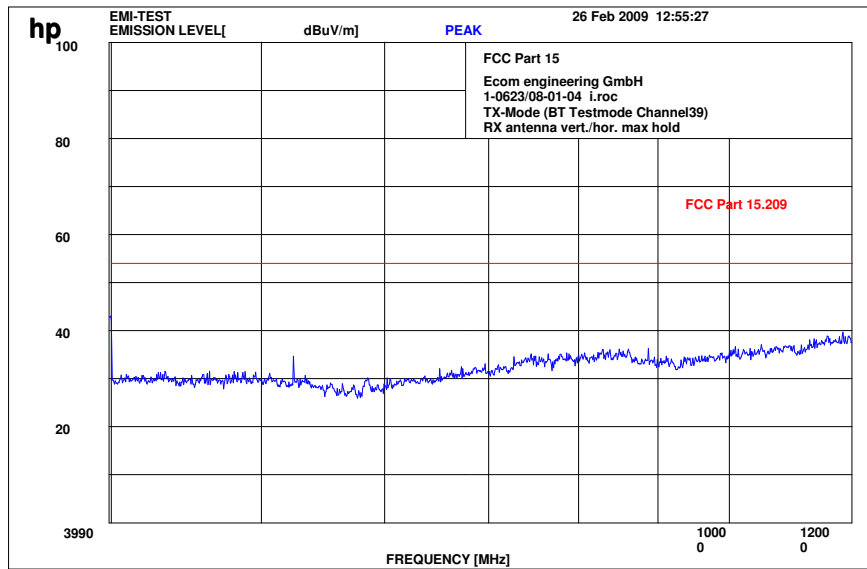
Frequency Range:	30 MHz - 2 GHz
Receiver:	Receiver [ESCI 3] @ GPIB0 (ADR 20), SN 100083/003, FW 4.32, CAL 07.01.2010
Signal Path:	without Notch FW 1.0
Antenna:	VULB 9163 SN 9163-295, FW ---, CAL 08.04.2010 Correction Table (vertical): VULP6113 Correction Table (horizontal): VULP6113 Correction Table: Cable_EN_1GHz (0109)
Antenna Tower:	Tower [EMCO 2090 Antenna Tower] @ GPIB0 (ADR 8), FW REV 3.12
Turntable:	Turntable [EMCO Turntable] @ GPIB0 (ADR 9), FW REV 3.12

Plot 6: 1 - 4 GHz vertical/horizontal (middle channel)



Carrier rejected with 2.4 GHz notch filter.

Plot 7: 4 - 12 GHz vertical/horizontal (middle channel)



Plot 8: 0.03 - 1 GHz vertical/horizontal (highest channel)

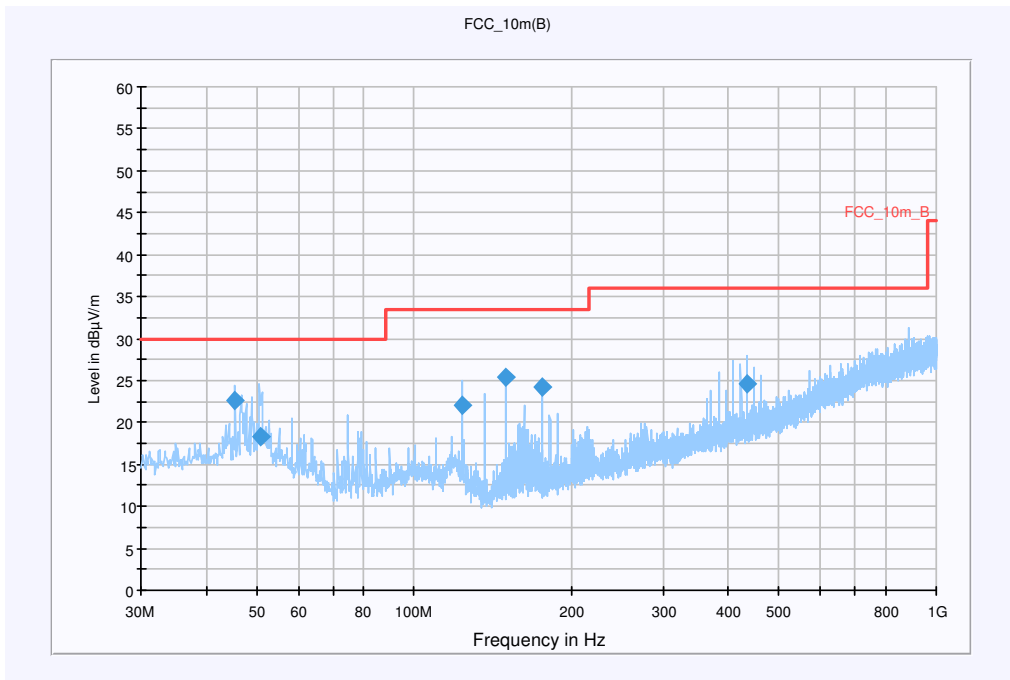
**Information**

EUT:	i.roc and Delta Electronics AC/DC Adaptor EADP-10BB
Serial Number:	3566-PMMC-0007 and 592A401Z9TV1AK
Test Description:	FCC Part 15 class B @ 10m
Operating Conditions:	BT Testmode - Channel 78 + Charging
Operator Name:	Klos
Comment:	Powered by 115 V / 60 Hz

**Scan Setup: STAN\_Fin [EMI radiated]**

Hardware Setup:	Electric Field (NOS)
Level Unit:	dB $\mu$ V/m

Subrange	Detectors	IF Bandwidth	Meas. Time	Receiver
30 MHz - 1 GHz	QuasiPeak	120 kHz	15 s	Receiver

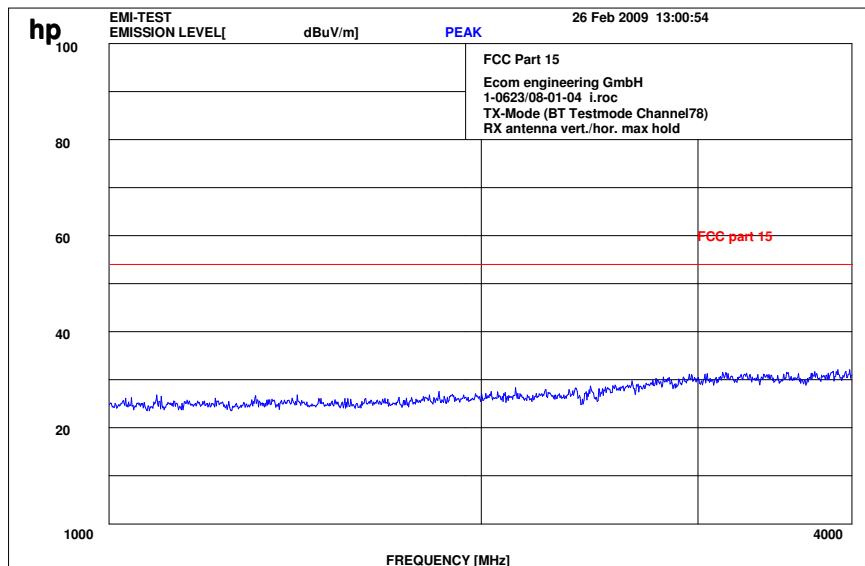


Frequency (MHz)	QuasiPeak (dB $\mu$ V/m)	Meas. Time (ms)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Margin (dB)	Limit (dB $\mu$ V/m)
45.489100	22.5	15000.000	120.000	107.0	V	185.0	13.4	7.5	30.0
50.721550	18.2	15000.000	120.000	308.0	V	52.0	13.5	11.8	30.0
123.490950	22.0	15000.000	120.000	200.0	V	330.0	10.2	11.5	33.5
149.493950	25.3	15000.000	120.000	200.0	V	0.0	9.1	8.2	33.5
175.484550	24.1	15000.000	120.000	200.0	V	221.0	10.4	9.4	33.5
435.448900	24.7	15000.000	120.000	100.0	V	0.0	17.8	11.3	36.0

**Hardware Setup: EMI radiated\Electric Field (NOS) - [EMI radiated]**

Frequency Range:	30 MHz - 2 GHz
Receiver:	Receiver [ESCI 3] @ GPIB0 (ADR 20), SN 100083/003, FW 4.32, CAL 07.01.2010
Signal Path:	without Notch FW 1.0
Antenna:	VULB 9163 SN 9163-295, FW ---, CAL 08.04.2010 Correction Table (vertical): VULP6113 Correction Table (horizontal): VULP6113 Correction Table: Cable_EN_1GHz (0109)
Antenna Tower:	Tower [EMCO 2090 Antenna Tower] @ GPIB0 (ADR 8), FW REV 3.12
Turntable:	Turntable [EMCO Turntable] @ GPIB0 (ADR 9), FW REV 3.12

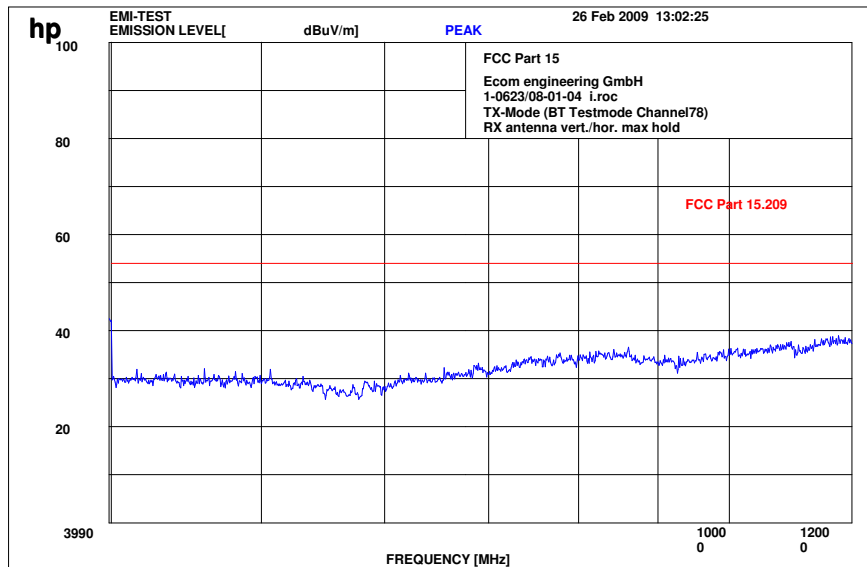
Plot 9: 1 - 4 GHz vertical/horizontal (highest channel)



Carrier rejected with 2.4 GHz notch filter.



Plot 10: 4 - 12 GHz vertical/horizontal (highest channel)



**Results:**

SPURIOUS EMISSIONS LEVEL (dB $\mu$ V/m)								
2402 MHz			2441 MHz			2480 MHz		
Frequency [MHz]	Detector	Level [dB $\mu$ V/m]	Frequency [MHz]	Detector	Level [dB $\mu$ V/m]	Frequency [MHz]	Detector	Level [ $\mu$ V/m]
No critical peaks detected!			No critical peaks detected!			No critical peaks detected!		
Measurement uncertainty			±3 dB					

f < 1 GHz : RBW/VBW: 100 kHz

f ≥ 1GHz : RBW/VBW: 1 MHz

**Limits:**

§ 15.247 (c)

In any 100 kHz bandwidth outside the frequency band at least 20dB below the highest level of the desired power. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

**Limits:**

§ 15.209

Frequency [MHz]	Field strength [ $\mu$ V/m]	Measurement distance (m)
30 - 88	100 (40 dB $\mu$ V/m)	3
88 - 216	150 (43.5 dB $\mu$ V/m)	3
216 - 960	200 (46 dB $\mu$ V/m)	3
above 960	500 (54 dB $\mu$ V/m)	3

### 5.7 Spurious Emissions - radiated (Receiver) § 15.109 / 209

Plot 1: 0.03 - 1 GHz vertical/horizontal (receiver)

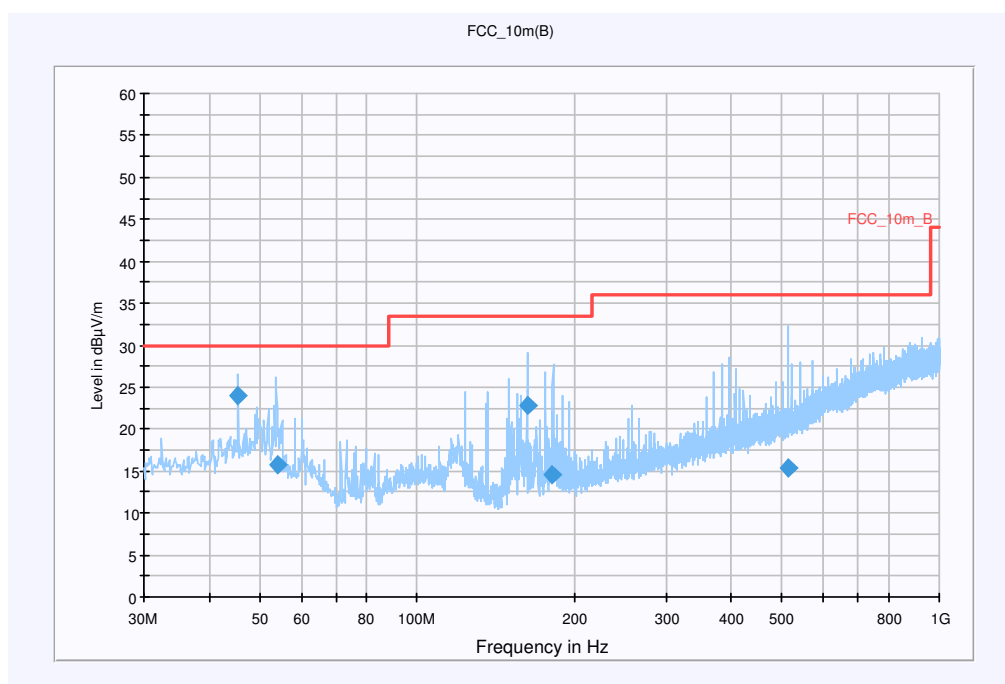
#### Information

EUT:	i.roc and Delta Electronics AC/DC Adaptor EADP-10BB
Serial Number:	3566-PMMC-0007 and 592A401Z9TV1AK
Test Description:	FCC Part 15 class B @ 10m
Operating Conditions:	Idle + Charging
Operator Name:	Kraus
Comment:	Power 115V / 60Hz

#### Scan Setup: STAN\_Fin [EMI radiated]

Hardware Setup:	Electric Field (NOS)
Level Unit:	dBµV/m

Subrange	Detectors	IF Bandwidth	Meas. Time	Receiver
30 MHz - 1 GHz	QuasiPeak	120 kHz	15 s	Receiver

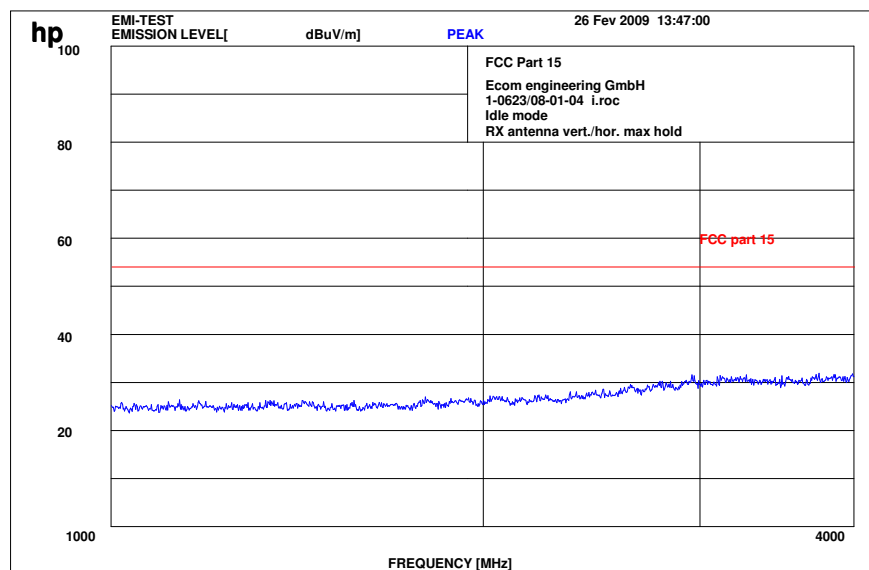


Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
45.513400	24.1	15000.000	120.000	166.0	V	50.0	13.4	5.9	30.0
53.937200	15.8	15000.000	120.000	200.0	V	226.0	13.2	14.2	30.0
162.492400	22.9	15000.000	120.000	200.0	V	224.0	9.6	10.6	33.5
181.539750	14.6	15000.000	120.000	161.0	V	268.0	10.8	18.9	33.5
514.738050	15.3	15000.000	120.000	200.0	V	83.0	19.3	20.7	36.0

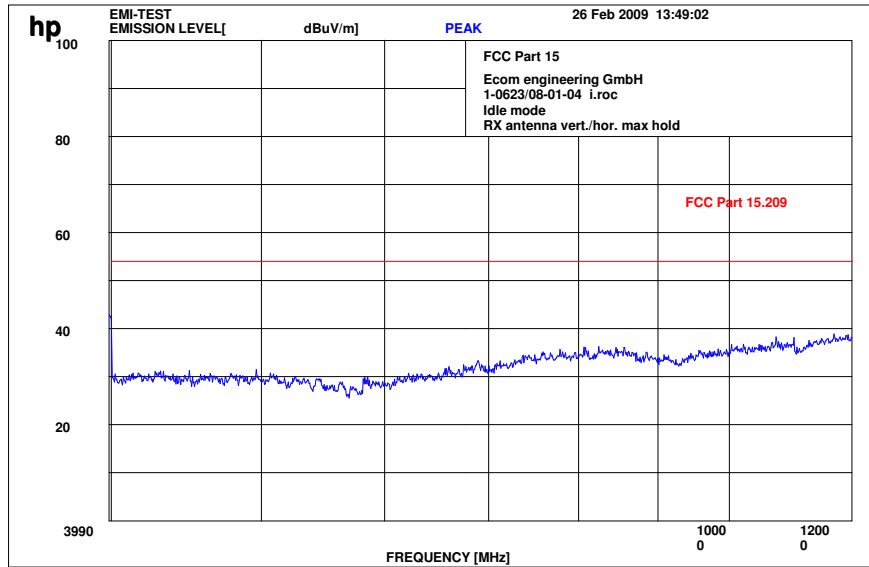
**Hardware Setup: EMI radiated\Electric Field (NOS) - [EMI radiated]**

Frequency Range:	30 MHz - 2 GHz
Receiver:	Receiver [ESCI 3] @ GPIB0 (ADR 20), SN 100083/003, FW 4.32, CAL 07.01.2010
Signal Path:	without Notch FW 1.0
Antenna:	VULB 9163 SN 9163-295, FW ---, CAL 08.04.2010 Correction Table (vertical): VULP6113 Correction Table (horizontal): VULP6113 Correction Table: Cable_EN_1GHz (0109)
Antenna Tower:	Tower [EMCO 2090 Antenna Tower] @ GPIB0 (ADR 8), FW REV 3.12
Turntable:	Turntable [EMCO Turntable] @ GPIB0 (ADR 9), FW REV 3.12

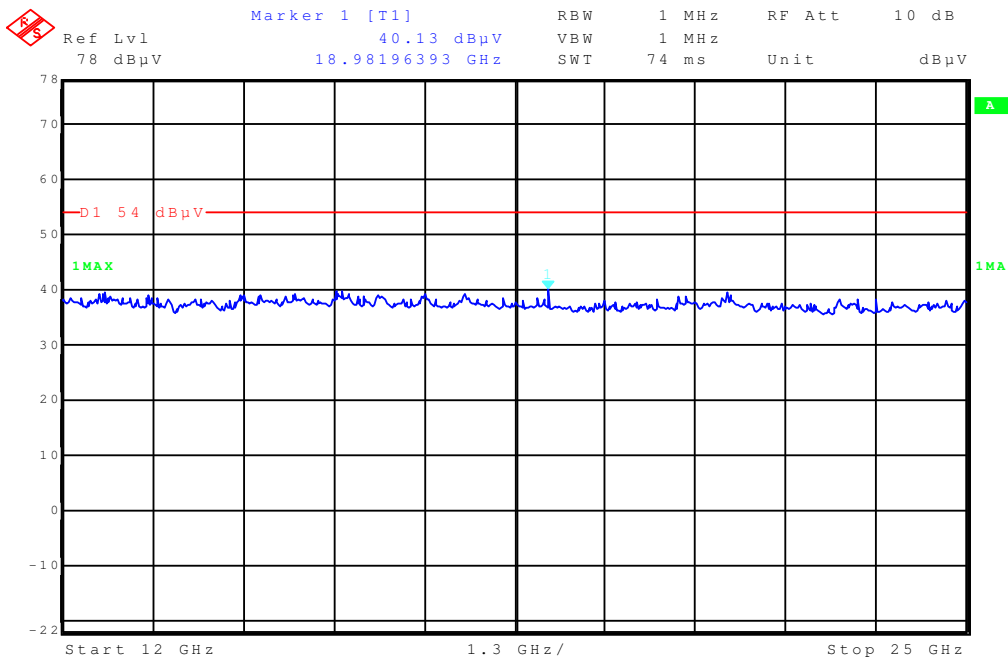
Plot 2: 1 - 4 GHz vertical/horizontal (receiver)



Plot 3: 4 - 12 GHz vertical/horizontal (receiver)



Plot 4: 12 - 25 GHz vertical/horizontal (receiver)



Results:

Spurious Emissions level [dBμV/m]		
Frequency [MHz]	Detector	Level [dBμV/m]
No critical peaks detected!		
Measurement uncertainty	±3 dB	

f < 1 GHz: RBW/VBW: 100 kHz

f ≥ 1GHz : RBW/VBW: 1 MHz

See above plots

Measurement distance see table

Limits:

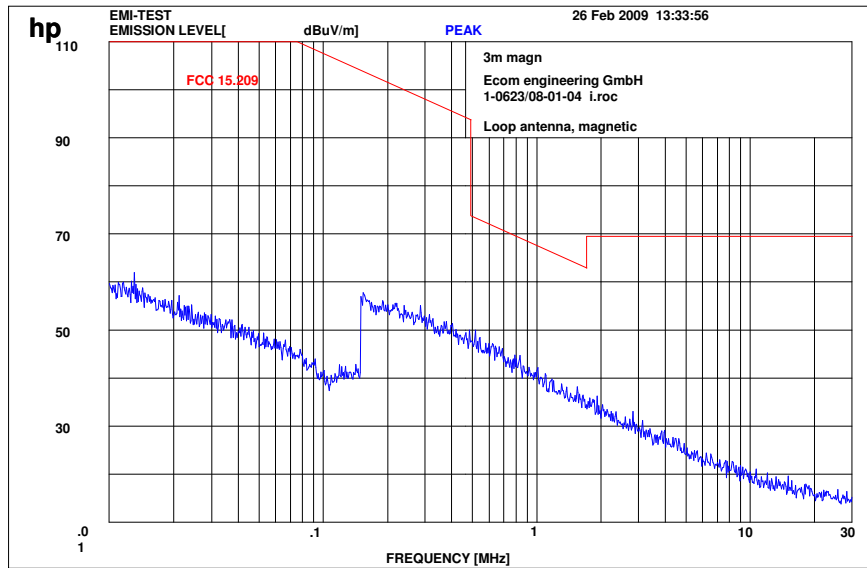
§ 15.109

Frequency (MHz)	Field strength (μV/m)	Measurement distance (m)
30 - 88	100 (40 dBμV/m)	3
88 - 216	150 (43.5 dBμV/m)	3
216 - 960	200 (46 dBμV/m)	3
above 960	500 (54 dBμV/m)	3

**5.8 Spurious Emissions < 30 MHz – Transmitter and Receiver radiated § 15.209**

Measured at 10 m distance.  
 Values recalculated with 40 dB/decade according to FCC rules.

Plot 1:



**Limits:**

Frequency (MHz)	Field strength (µV/m)	Measurement distance (m)
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30.0	30 / 29.5 dBµV/m	30

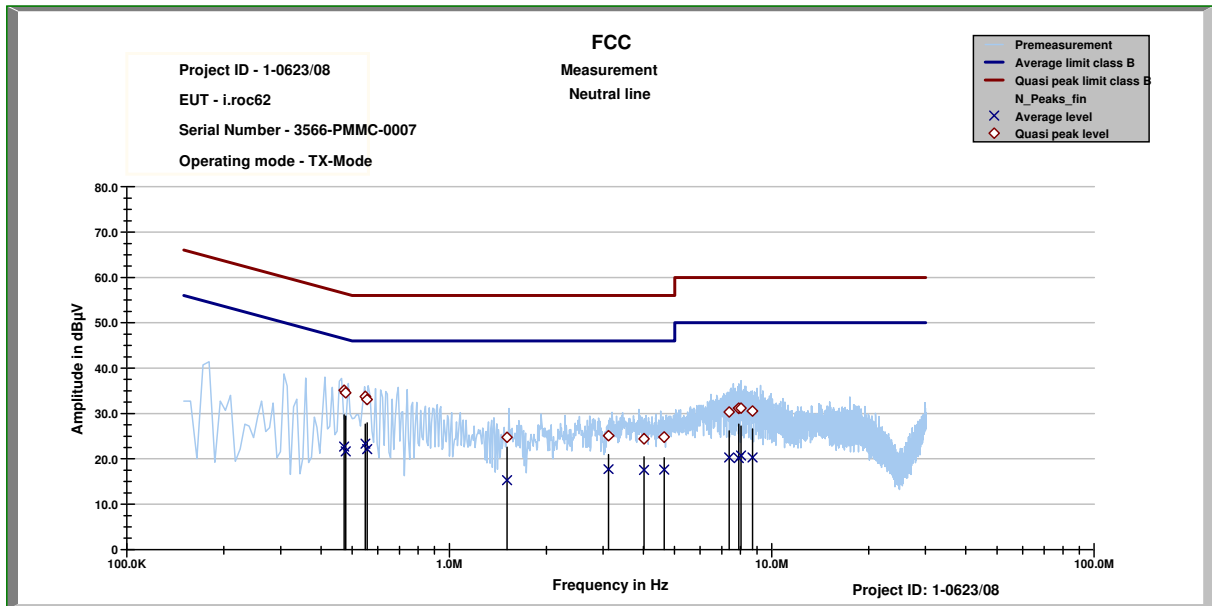
**5.9 AC Line Conducted Emissions <30 MHz §15.107 / 207**

We measured in TX and RX mode, L1 and N floating and grounded, max value was hold.

**Reference**

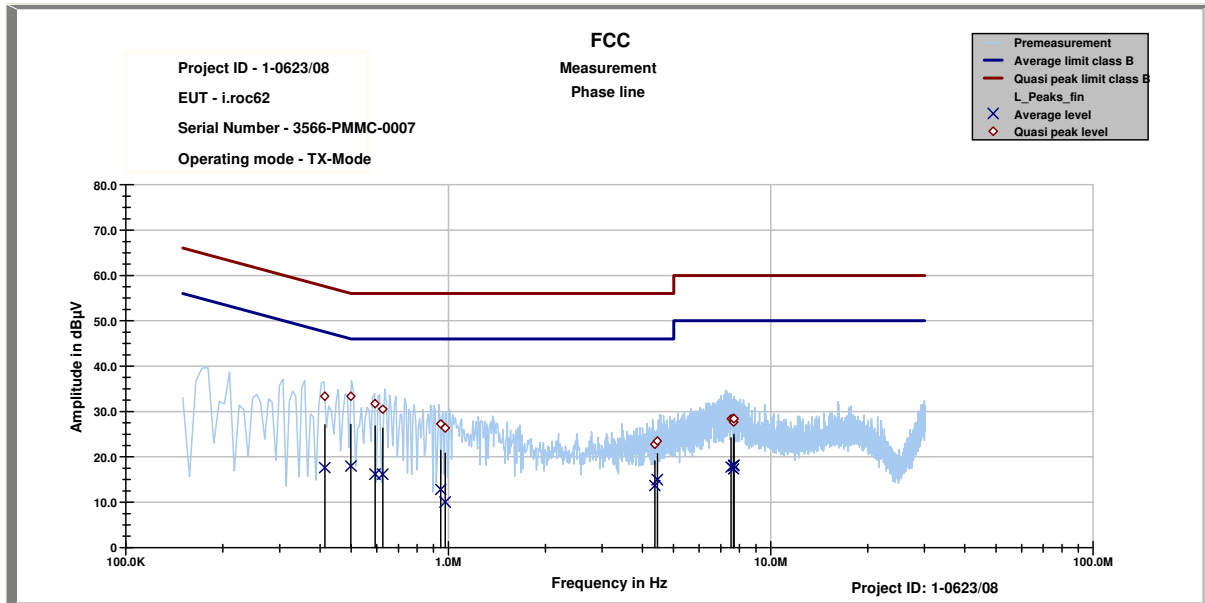
FCC:	CFR Part 15.207, 15.107
IC:	RSS 210, Issue 7, Section 6.6 , 7.4

**Plot 1: CISPR 22 Neutral line**



Frequency MHz	Quasi peak level dBµV	Margin quasi peak dBµV	Average level dBµV	Margin average dBµV
0.4716	35.08	21.40	22.68	24.13
0.4768	34.58	21.81	21.65	25.01
0.5493	33.73	22.27	23.36	22.64
0.5558	33.08	22.92	22.15	23.85
1.5098	24.75	31.25	15.27	30.73
3.1203	25.10	30.90	17.71	28.29
4.0161	24.42	31.58	17.51	28.49
4.6349	24.79	31.21	17.60	28.40
7.3758	30.31	29.69	20.27	29.73
7.8967	31.13	28.87	20.18	29.82
8.0258	31.15	28.85	20.68	29.32
8.7093	30.52	29.48	20.30	29.70

Plot 2: CISPR 22 Phase line



Frequency MHz	Quasi peak level dBµV	Margin quasi peak dBµV	Average level dBµV	Margin average dBµV
0.4138	33.37	24.21	17.61	30.85
0.4989	33.36	22.66	17.96	28.07
0.5922	31.73	24.27	16.18	29.82
0.6261	30.49	25.51	16.14	29.86
0.9474	27.26	28.74	12.82	33.18
0.9777	26.38	29.62	10.04	35.96
4.3712	22.75	33.25	13.64	32.36
4.4463	23.50	32.50	14.95	31.05
7.5369	28.38	31.62	17.75	32.25
7.6661	27.66	32.34	17.32	32.68
7.6749	28.46	31.54	18.03	31.97
7.6905	28.39	31.61	18.19	31.81

Limits:

§ 15.107 / 15.207

Frequency of Emission (MHz)	Conducted Limit (dBµV)	
	Quasi-peak	Average
0.15 – 0.5	66 to 56 *	56 to 46 *
0.5 – 5	56	46
5 - 30	60	50

\* Decreases with the logarithm of the frequency



## 6 Test equipment and ancillaries used for tests

To simplify the identification on each page of the test equipment used, on each page of the test report, each item of test equipment and ancillaries such as cables are identified (numbered) by the Test Laboratory, below.

All reported calibration intervals are calibrations according to the EN/ISO/IEC 17025 standard. These calibrations were performed from an accredited external calibration laboratory.

Additional to these calibrations the laboratory performed comparison measurements with other calibrated systems and performed a weekly chamber inspection.

All used devices are connected with a 10 MHz external reference.

According to the manufacturers' instruction is it possible to establish a calibration interval for the FSP unit of 24 month, if the device has an external 10 MHz reference.

### *Anechoic chamber C:*

No	Equipment/Type	Manuf.	Serial Nr.	Inv. No. Cetecom	Last Calibration	Frequency (months)	Next Calibration
1	Anechoic chamber	MWB	87400/02	300000996	Monthly verification		
2	System-Rack 85900	HP I.V.	*	300000222	n.a.		
3	Measurement System 1						
4	Spektrum Analyzer 8566B	HP	3138A07614	300001207	13.12.2007	24	13.12.2009
5	Spektrum Analyzer Display 85662A	HP	3144A28627	300001208	13.12.2007	24	13.12.2009
6	Quasi-Peak-Adapter 85650A	HP	2811A01204	300002308	13.12.2007	24	13.12.2009
7	RF-Preselector 85685A	HP	2837A00778	300002448	13.12.2007	24	13.12.2009
8	PC Vectra VL	HP		300001688	n.a.		
9	Software EMI	HP		300000983	n.a.		
10	Measurement System 2						
11	FSP 30	R&S	100886	300003575	25.08.2008	24	25.08.2010
12	PC	F+W			n.a.		
13	TILE	TILE			n.a.		
14	Biconical antenna	EMCO	S/N: 860 942/003		Monthly verification (System cal.)		
15	Log. Period. Antenna 3146	EMCO	2130	300001603	Monthly verification (System cal.)		
16	Double Ridged Antenna HP 3115P	EMCO	3088	300001032	Monthly verification (System cal.)		
17	Active Loop Antenna 6502	EMCO	2210	300001015	Monthly verification (System cal.)		
18	Power Supply 6032A	HP	2818A03450	300001040	12.05.2007	36	12.05.2010
19	Busisolator	Kontron		300001056	n.a.		
20	Leitungsteiler 11850C	HP		300000997	Monthly verification (System cal.)		
21	Power attenuator 8325	Byrd	1530	300001595	Monthly verification (System cal.)		
22	Band reject filter WRCG1855/1910	Wainwright	7	300003350	Monthly verification (System cal.)		
23	Band reject filter WRCG2400/2483	Wainwright	11	300003351	Monthly verification (System cal.)		

### *System Rack Room 005 :*

No	Equipment/Type	Manuf.	Serial Nr.	Inv. No. Cetecom	Last Calibration	Frequency (months)	Next Calibration
1	FSP 30	R&S	100886	300003575	25.08.2008	24	25.08.2010
2	CBT	R&S	100313	300003516	03.09.2008	24	03.09.2010
3	Switch Matrix	HP		300000929	n.a.		
4	Power Supply	HP	3041A00544	300002270	13.05.2007	36	13.05.2010
5	Signal Generator	R&S	836206/0092	300002680	30.05.2007	36	30.05.2010

**SRD Laboratory Room 002:**

No	Equipment/Type	Manuf.	Serial Nr.	Inv. No. Cetecom	Last Calibration	Frequency (months)	Next Calibration
1	System Controller PSM 12	R&S	835259/007	3000002681-00xx	n.a.		
2	Memory Extension PSM-K10	R&S	To 1	3000002681	n.a.		
3	Operating Software PSM-B2	R&S	To 1	3000002681	n.a.		
4	19" Monitor		22759020-ED	3000002681	n.a.		
5	Mouse		LZE 0095/6639	3000002681	n.a.		
6	Keyboard		G00013834L461	3000002681	n.a.		
7	Spectrum Analyser FSIQ 26	R&S	835540/018	3000002681-0005	10.01.2008	24	10.01.2010
8	Tracking Generator FSIQ-B10	R&S	835107/015	3000002681	s.No.7		
10	RF-Generator SMIQ03 (B1 Signal)	R&S	835541/056	3000002681-0002	26.08.2008	36	26.08.2011
11	Modulation Coder SMIQ-B20	R&S	To 10	3000002681	s.No.10		
12	Data Generator SMIQ-B11	R&S	To 10	3000002681	s.No.10		
13	RF Rear Connection SMIQ-B19	R&S	To 10	3000002681	s.No.10		
14	Fast CPU SM-B50	R&S	To 10	3000002681	s.No.10		
15	FM Modulator SM-B5	R&S	835676/033	3000002681	s.No.10		
16	RF-Generator SMIQ03 (B2 Signal)	R&S	835541/055	3000002681-0001	25.08.2008	36	25.08.2011
17	Modulation Coder SMIQ-B20	R&S	To 16	3000002681	s.No.16		
18	Data Generator SMIQ-B11	R&S	To 16	3000002681	s.No.16		
19	RF Rear Connection SMIQ-B19	R&S	To 16	3000002681	s.No.16		
20	Fast CPU SM-B50	R&S	To 16	3000002681	s.No.16		
21	FM Modulator SM-B5	R&S	836061/022	3000002681	s.No.16		
22	RF-Generator SMP03 (B3 Signal)	R&S	835133/011	3000002681-0003	26.08.2008	36	26.08.2011
23	Attenuator SMP-B15	R&S	835136/014	3000002681	S.No.22		
24	RF Rear Connection SMP-B19	R&S	834745/007	3000002681	S.No.22		
25	Power Meter NRVD	R&S	835430/044	3000002681-0004	26.08.2008	24	26.08.2010
26	Power Sensor NRVD-Z1	R&S	833894/012	3000002681-0013	26.08.2008	24	26.08.2010
27	Power Sensor NRVD-Z1	R&S	833894/011	3000002681-0010	26.08.2008	24	26.08.2010
28	Rubidium Standard RUB	R&S		3000002681-0009	27.08.2008	24	27.08.2010
29	Switching and Signal Conditioning Unit SSCU	R&S	338864/003	3000002681-0006	27.08.2008	24	27.08.2010
30	Laser Printer HP Deskjet 2100	HP	N/A	3000002681-0011	n.a.		
31	19" Rack	R&S	11138363000004	3000002681	n.a.		
32	RF-cable set	R&S	N/A	3000002681	n.a.		
33	IEEE-cables	R&S	N/A	3000002681	n.a.		
34	Sampling System FSIQ-B70	R&S	835355/009	3000002681	s.No.7		
35	RSP programmable attenuator	R&S	834500/010	3000002681-0007	26.08.2008	24	26.08.2010
36	Signalling Unit	R&S	838312/011	3000002681	n.a.		
37	NGPE programmable Power Supply for EUT	R&S	192.033.41	3000002681			
39	Power Splitter 6005-3	Inmet Corp.	none	300002841	26.08.2008	24	26.08.2010
40	SMA Cables SPS-1151-985-SPS	Insulated Wire	different	different	n.a.		
41	CBT32 with EDR Signaling Unit	R&S					
42	Coupling unit	Narda	N/A	--	n.a.		
43	2xSwitch Matrix PSU	R&S	872584/021	300001329	n.a.		
44	RF-cable set	R&S	N/A	different	n.a.		
45	IEEE-cables	R&S	N/A	--	n.a.		

Note: 3000002681-00xx inventoried as a system

*Anechoic chamber F:*

No	Equipment/Type	Manuf.	Serial Nr.	Inv. No. Cetecom	Last Calibration	Frequency (months)	Next Calibration
1	Control Computer	F+W	FW0502032	300003303	-/-	-/-	-/-
2	Trilog Antenna	9163-295	-/-	-/-	30.04.2008	24	30.04.2010
3	Amplifier - 0518C-138	Veritech Micro- wave Inc.	-/-	-/-	-/-	-/-	-/-
4	Switch - 3488A	HP		300000368	-/-	-/-	-/-
5	EMI Test receiver - ESCI	R&S	100083	300003312	31.01.2009	24	31.01.2011
6	Turntable Controller - 1061 3M	EMCO	1218	300000661	-/-	-/-	-/-
7	Tower Controller 1051 Controller	EMCO	1262	300000625	-/-	-/-	-/-
8	Tower - 1051	EMCO	1262	300000625	-/-	-/-	-/-
10	Ultra Notch-Filter Rejected band Ch. 62	WRCD	9	-/-	-/-	-/-	-/-

## 7 Photographs of the Test Set-up

Photo documentation

Photo 1:

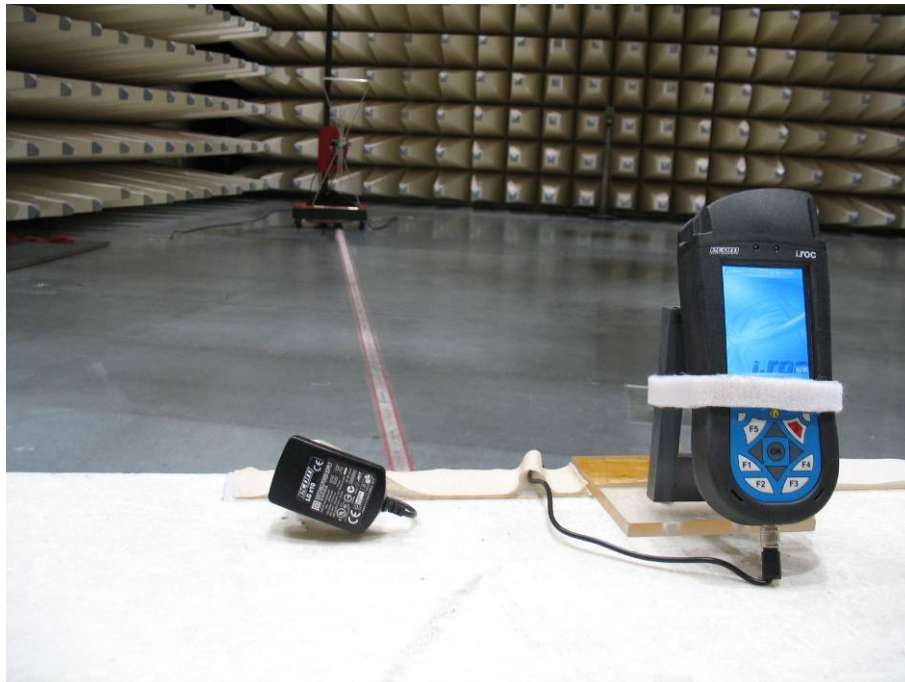
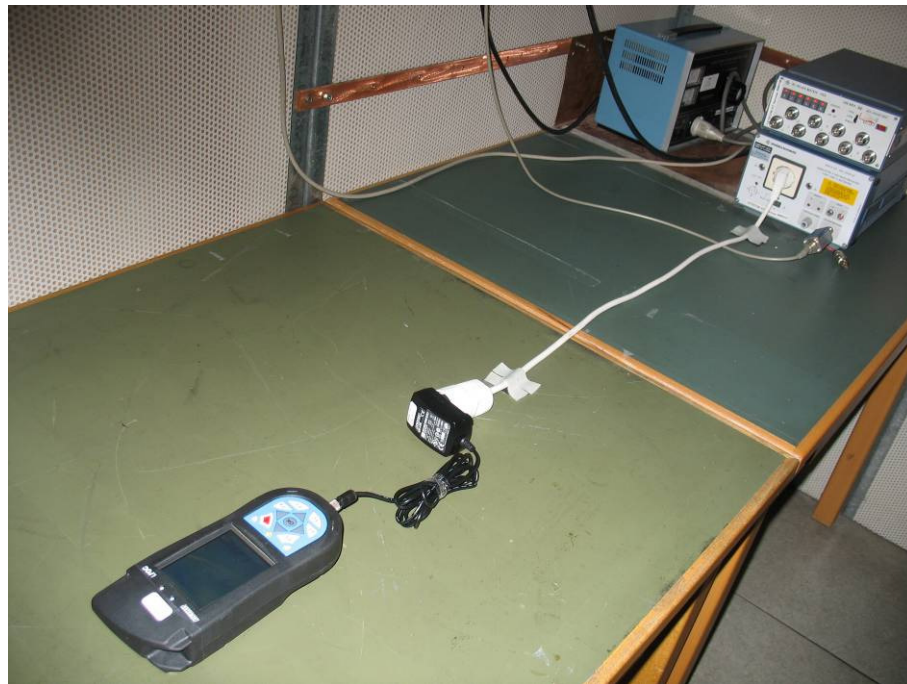


Photo 2:



Photo 3:





### 8 Photographs of the EUT

Photo documentation

Photo 1:



Photo 2:



Photo 3:



Photo 4:



Photo 5:



Photo 6:





Photo 7:



Photo 8:



Photo 9:



Photo 10:



Photo 11:



Photo 12:



Photo 13:

