

Recognized by the
Federal Communications Commission
Anechoic chamber registration no.: 90462 (FCC)
Anechoic chamber registration no.: IC 3462C-1
TCB ID: DE 0001



Accredited by the
German Accreditation Council
DAR-Registration Number
DAT-P-176/94-D1



Accredited Bluetooth® Test Facility (BQTF)

Test report no. : 1-0623-01-06/08_A_2
Applicant : Ecom engineering GmbH
Type : RFx11_134 kHz
Test Standard : FCC Part 15.209
RSS210 Issue 7
FCC ID : XAM0027390000
Certification No. IC : 8311A-0027390000

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1 General information

1.1 Administrative data of the test facility

1.1.1 Identification of the testing laboratory


Company name:	Cetecom ICT Services GmbH
Address:	Untertürkheimerstr. 6-10 D-66117 Saarbruecken Germany
Laboratory accreditation:	DAR-Registration No. DAT-P-176/94-D1 Bluetooth Qualification Test Facility (BQTF) Federal Communications Commission (FCC)
Responsible for testing laboratory:	Identification/Registration No : 90462 Meheza K. Walla Phone: +49 681 598 0 Fax: +49 681 598 9075 email: info@ict.cetecom.de

1.2. Notes

The test results of this test report relate exclusively to the test item specified in 1.5. The CETECOM ICT Services GmbH does not assume responsibility for any conclusions and generalizations 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.



.....
Responsible for testing laboratory
(Meheza K. Walla)



.....
Responsible for test report
(Stefan Bös)

1.3 Details of Applicant

Name :	Ecom engineering GmbH
Address :	Industriestr. 2
City :	97959 Assamstadt
Country :	Germany
Phone :	+49(0)6294/4224-0
Fax :	+49(0)6294/4224-611
Contact :	Martin Haaf
Phone :	+49(0)6294/4224-650
Fax :	+49(0)6294/4224-611
e-mail :	martin.haaf@ecom-ex.com

1.4 Application Details

Date of receipt of application :	2008-09-15
Date of receipt of test item :	2008-10-27
Date(s) of test :	2009-02-15 to 2009-05-11
Date of report :	2009-05-11

1.5 Test Item

Type of equipment	:	RFx11_134 kHz
Model name	:	i.roc
Details of Manufacturer		
Company	:	Ecom engineering GmbH
Address	:	Industriestr. 2
City	:	97959 Assamstadt
Country	:	Germany
Details of EUT		
Tested to Radio Standards Specification(RSS) No.	:	210 Issue 7
Open Area Test Site Industry Canada Number	:	IC 3462C-1
Temperature Range	:	-20 °C to +55 °C
Frequency Range (or fixed frequency)	:	134 kHz
Field Strength (at what distance)	:	61.07 dBµV/m at 10m
Occupied Bandwidth (99% BW)	:	15 kHz
Type of Modulation	:	A1D
Antenna Information	:	Inductive Loop
Transmitter Spurious (worst case)	:	29.70 dBµV/m at 10m
Receiver Spurious (worst case)	:	72.80 dBµV/m at 3m
IC Reg. no.	:	8311A-0027390000
FCC ID	:	XAM0027390000

ATTESTATION:

DECLARATION OF COMPLIANCE:

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

Laboratory Manager :

2009-05-11

Meheza K. Walla



Date

Name

Signature

1.5.1 Test conditions testing

Description	Shortcut	Unit	Value
Nominal Temperature / humidity	T _{nom}	°C / %	+23 / 50
Low Temperature	T _{low}	°C	-20
High Temperature	T _{high}	°C	+55
Nominal Power Source	V _{nom}	V	115 V AC

Type of powersource: **115V AC from Power Supply**

1.6 Test Setup

Hardware	:	-/-
Software	:	-/-
Serial number	:	3566-PMMC-0004

1.7 Test Specifications

FCC:	CFR Part 15 – Radio Frequency Devices CFR Part 15.209 – Radiated emission limits. CFR Part 15.207 – Conducted limits
IC:	RSS 210, Issue 7 Low-power Licence-exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment

2 Statement of Compliance

No deviations from the technical specification(s) were ascertained in the course of the tests performed.

2.1 Summary of Measurement Results

2.1.1 CFR 47 Part 15 Radio frequency devices

Section in this Report	Test Name / Section FCC Part 15	Test Name / Section RSS 210	applicable	Verdict
4.1	§ 15.35 (c) Timing of the transmitter (Duty cycle correction factor)		YES	Pass
4.2	§ 15.209 (a) FIELDSTRENGTH OF FUNDAMENTAL	Annex 2.6	YES	Pass
4.3	§ 15.209 (a) FIELDSTRENGTH OF HARMONICS and SPURIOUS	Annex 2.6	YES	Pass
4.4	§ 15.107 / 15.207 Conducted Limits	Section 6.6 , 7.4	YES	Pass

3 Measurements and results

The radiated measurements are performed in vertical and horizontal plane in the frequency range from 9 kHz to 1 GHz in semi-anechoic chambers or free field. 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 conform 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 set-ups 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 conform with ANSI C63.2-1996 item 15.

150 kHz - 30 MHz: Quasi Peak measurement, 9kHz Bandwidth, passive loop antenna.

30 MHz - 200 MHz: Quasi Peak measurement, 120KHz Bandwidth, biconical antenna

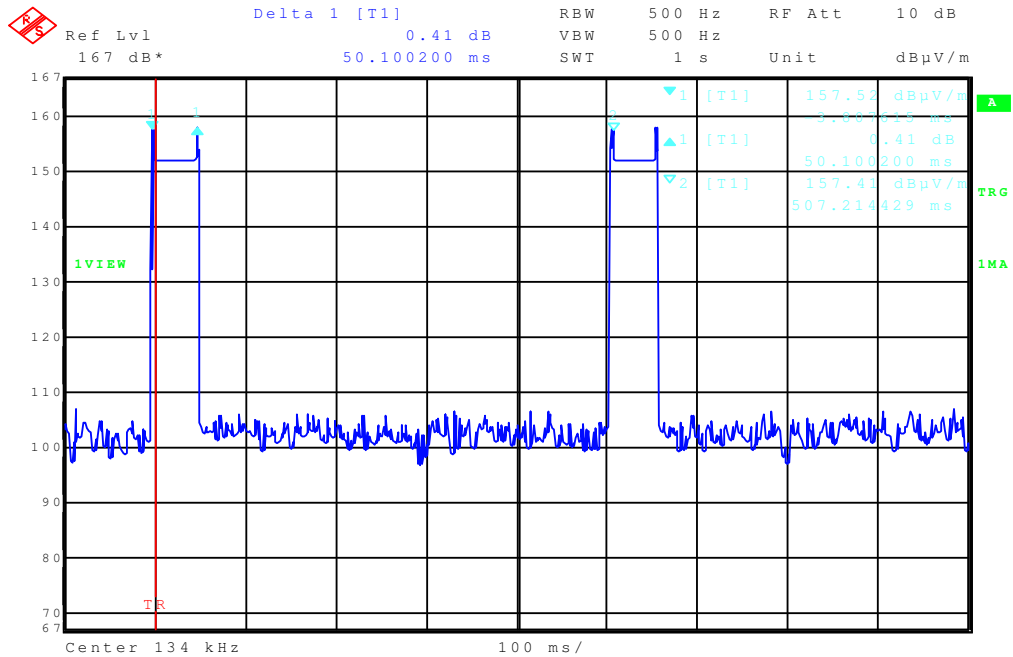
200MHz - 1GHz: Quasi Peak measurement, 120KHz Bandwidth, log periodic antenna

>1GHz: Average, RBW 1MHz, VBW 10 Hz, wave guide horn

All measurement settings are according to FCC 15.209 and 15.207

4 FCC Part 15 Subpart C

4.1 Timing of the transmitter



Reference

FCC:	CFR Part SUBCLAUSE § 15.35 (c)
IC:	RSS 210, ISSUE 7 6.5 Pulsed operation

Limits:

§ 15.35 (c)

(c) Unless otherwise specified, e.g. Section 15.255(b), when the radiated emission limits are expressed in terms of the average value of the emission, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum value. The exact method of calculating the average field strength shall be submitted with any application for certification or shall be retained in the measurement data file for equipment subject to notification or verification.

4.2 Field strength of the fundamental

Reference

FCC:	CFR Part SUBCLAUSE § 15.209 (a)
IC:	RSS 210, Annex 2.6

Measured at 10m distance with peak detector

TEST CONDITIONS		MAXIMUM POWER [dB μ V/m]	
Frequency [kHz]		134 kHz	
		10 m	300 m
T _{nom} = +23 °C	V _{nom} = 115 V	61.07	1.07
Measurement uncertainty		±3dB	

RBW/VBW : 200 Hz up to 150 kHz, 9 kHz up to 30 MHz, 120 kHz up to 1 GHz

Measurement distance 10 m

(to convert the measuring distance from 10m to 30m and 30 to 300m a correction factor from 40 dB/decade was used. Here we use 60 dB to recalculate from 10m to 300m).

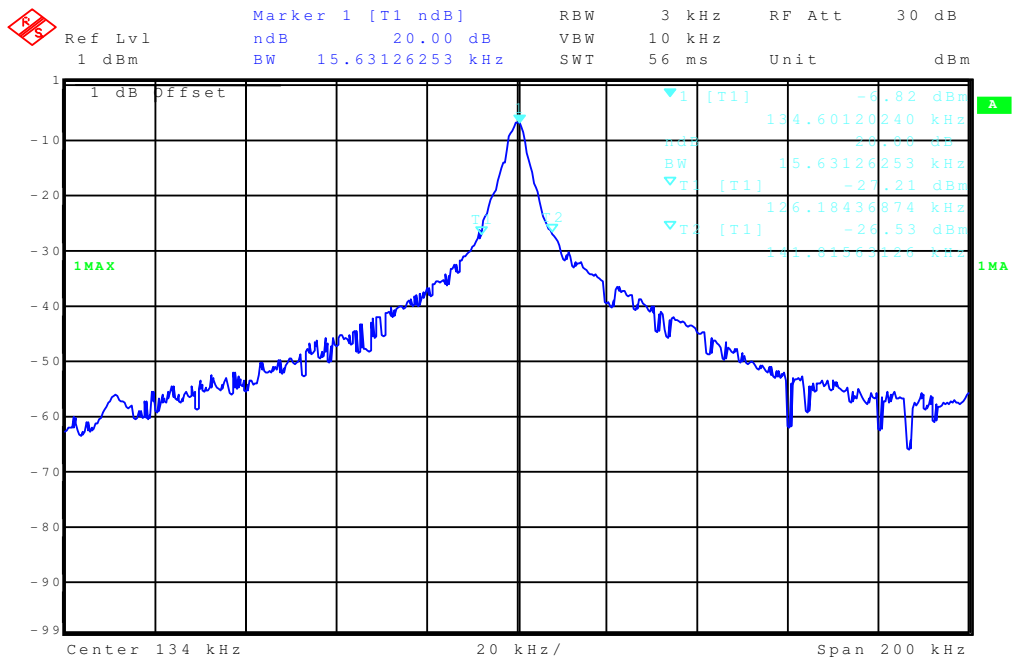
Limits

SUBCLAUSE § 15.209 (a)

Frequency (MHz)	Field strength (μ V/m)	Measurement Distance (meters)
0.009 – 0.490	2400 / F (kHz)	300
0.490 – 1.705	24000 / F (kHz)	30
1.705 – 30.0	30 (29.5 dB μ V/m)	30
30.0 – 88.0	100 (40 dB μ v/m)	3
88 – 216	150 (43.5 dB μ V/m)	3
216 – 960	200 (46 dB μ V/m)	3

RBW/VBW : 200 Hz up to 150 kHz, 9 kHz up to 30 MHz, 120 kHz up to 1 GHz

Occupied Bandwidth

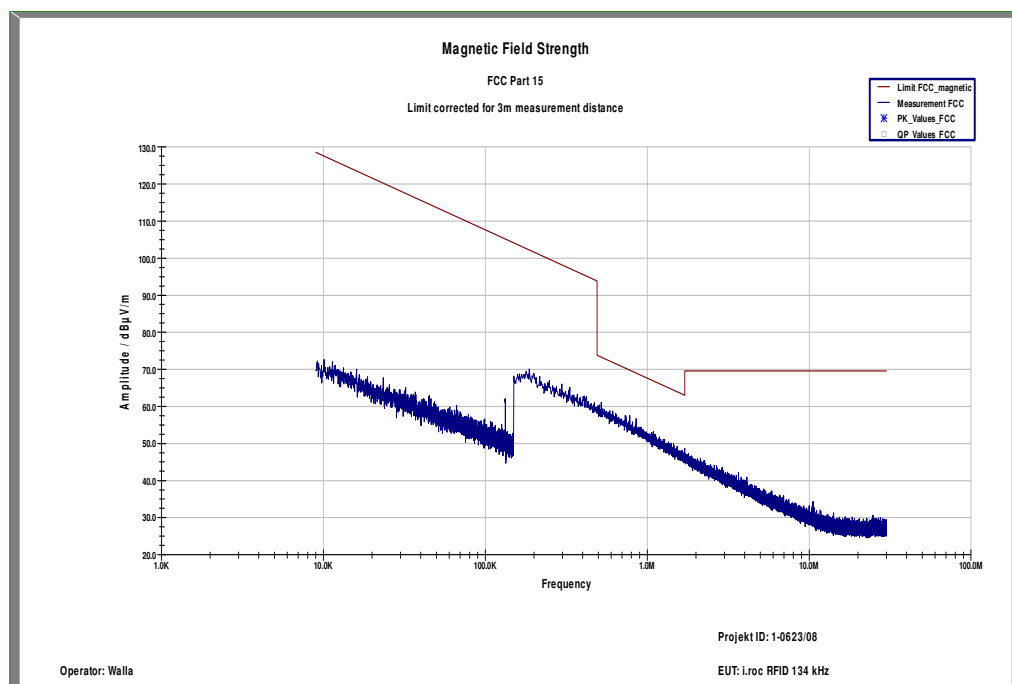


4.3 Field strength of the harmonics and the spurious

Reference

FCC:	CFR Part SUBCLAUSE § 15.209 (a)
IC:	RSS 210, Annex 2.6

Plot 1: TX – Mode



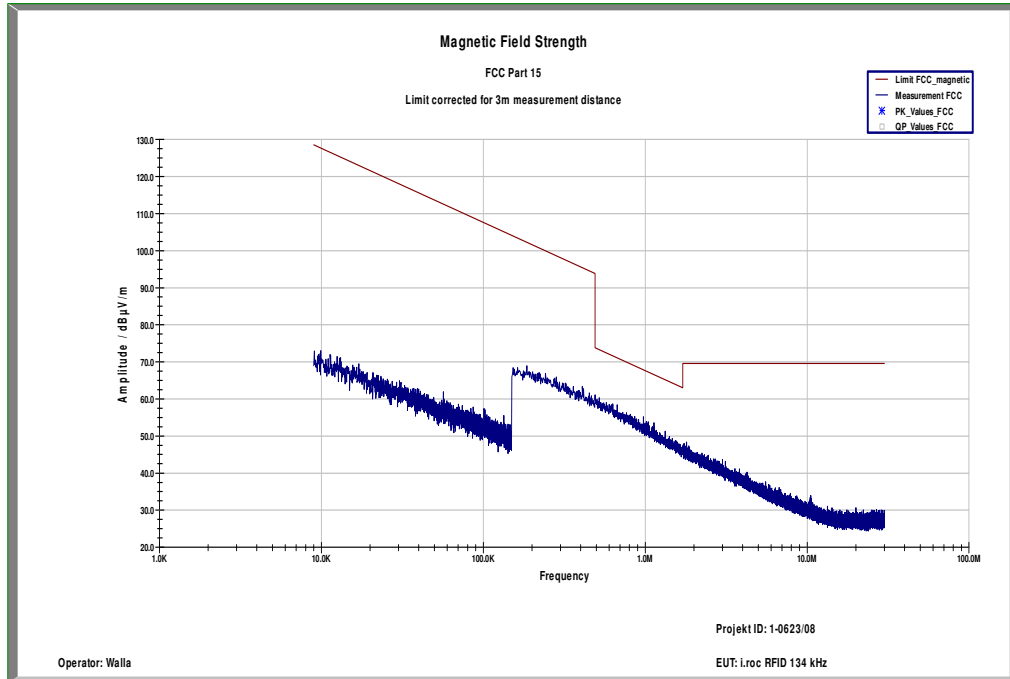
Limits

SUBCLAUSE § 15.209 (a)

Frequency (MHz)	Field strength (µV/m)	Measurement Distance (meters)
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
30.0 – 88.0	100 (40 dBµV/m)	3
88 – 216	150 (43.5 dBµV/m)	3
216 – 960	200 (46 dBµV/m)	3

RBW/VBW : 200 Hz up to 150 kHz, 9 kHz up to 30 MHz, 120 kHz up to 1 GHz

Plot 2: RX – Mode



Limits

SUBCLAUSE § 15.209 (a)

Frequency (MHz)	Field strength (µV/m)	Measurement Distance (meters)
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
30.0 – 88.0	100 (40 dBµV/m)	3
88 – 216	150 (43.5 dBµV/m)	3
216 – 960	200 (46 dBµV/m)	3

RBW/VBW : 200 Hz up to 150 kHz, 9 kHz up to 30 MHz, 120 kHz up to 1 GHz

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Plot 3: TX – Mode, 30 MHz to 1 GHz

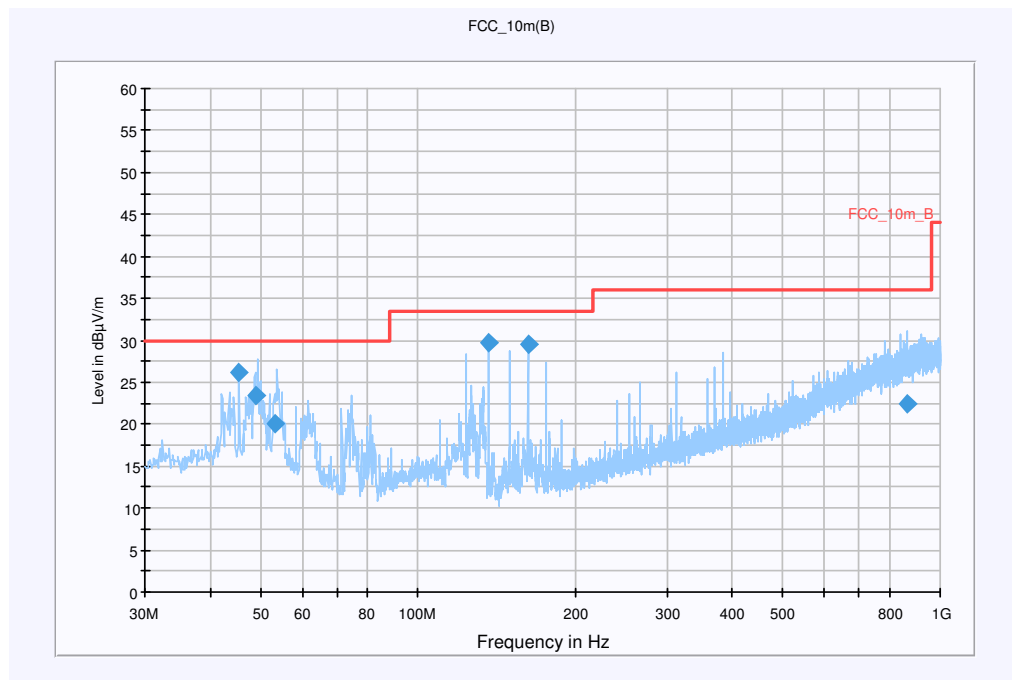
Information

EUT:	RFx11_134 kHz and Delta Electronics AC/DC Adaptor EADP-10BB
Serial Number:	3566-PMMC-0004 and 592A401Z9TV1AK
Test Description:	FCC Part 15 class B @ 10m
Operating Conditions:	Traffic RFI 134 kHz
Operator Name:	Kraus
Comment:	Power 115V / 60Hz

Scan Setup: STAN_Fin [EMI radiated]

Hardware Setup:	Electric Field (NOS)
Level Unit:	dB μ V/m

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



Frequency (MHz)	QuasiPeak (dB μ V/m)	Meas. Time (ms)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Margin (dB)	Limit (dB μ V/m)
45.507350	26.2	15000.000	120.000	107.0	V	100.0	13.4	3.8	30.0
48.852800	23.3	15000.000	120.000	107.0	V	103.0	13.5	6.7	30.0
53.438500	20.0	15000.000	120.000	100.0	V	92.0	13.2	10.0	30.0
136.502800	29.7	15000.000	120.000	107.0	V	266.0	9.2	3.8	33.5
162.486450	29.6	15000.000	120.000	100.0	V	252.0	9.6	3.9	33.5
865.374750	22.4	15000.000	120.000	377.0	H	64.0	25.3	13.6	36.0

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

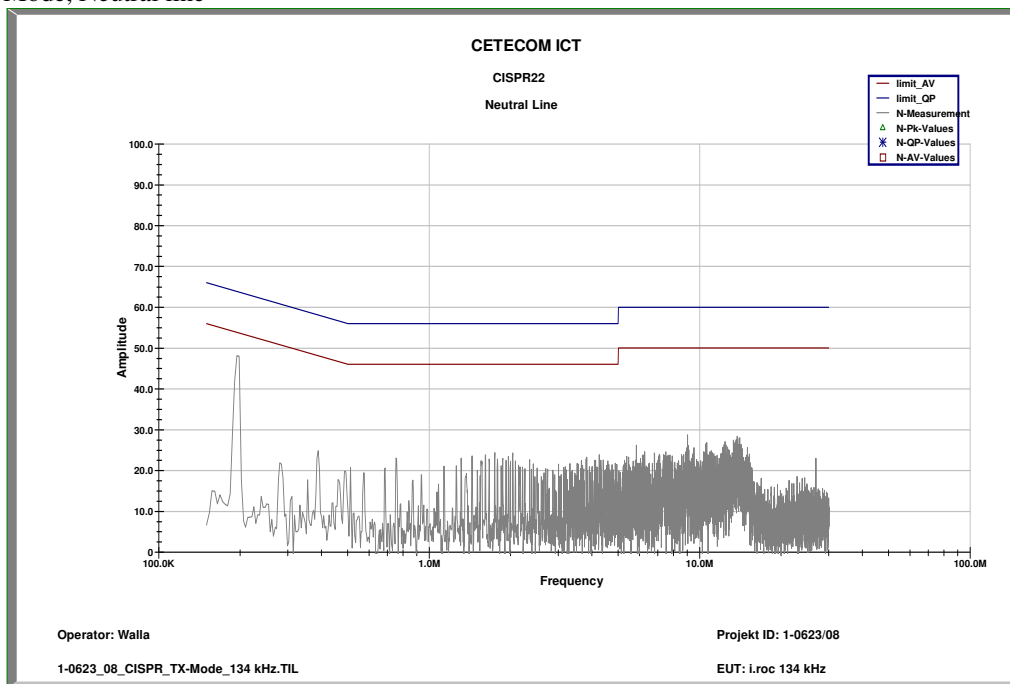
Frequency Range:	30 MHz - 2 GHz
Receiver:	Receiver [ESCI 3] @ GPIB0 (ADR 20), SN 100083/003, FW 4.32, CAL 07.01.2010
Signal Path:	without Notch FW 1.0
Antenna:	VULB 9163 SN 9163-295, FW ---, CAL 08.04.2010 Correction Table (vertical): VULP6113 Correction Table (horizontal): VULP6113 Correction Table: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

4.4 Conducted Limits

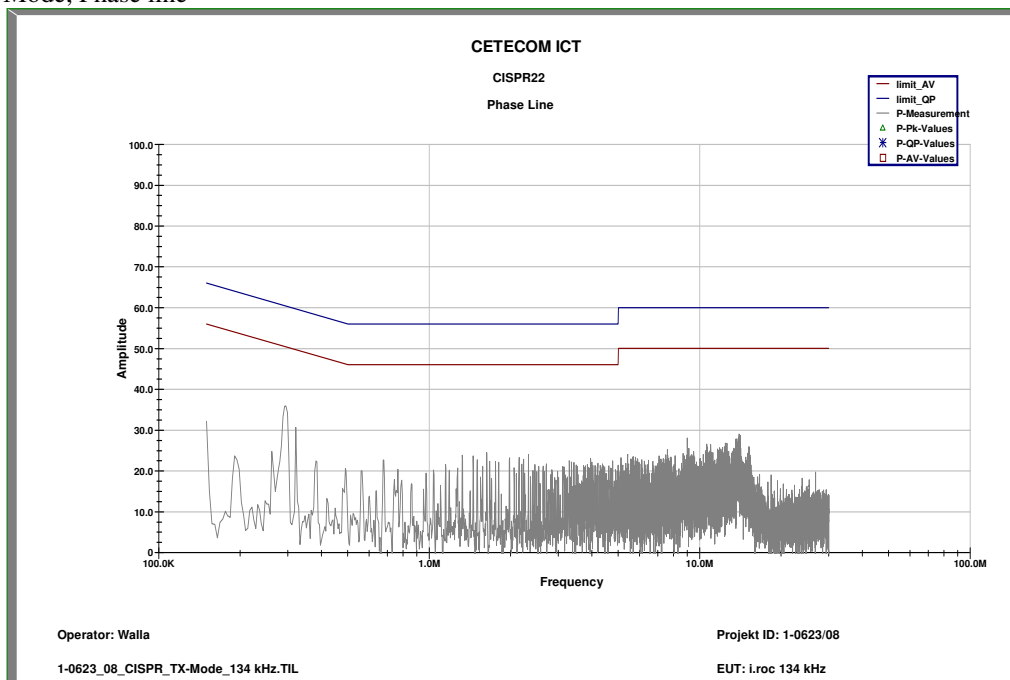
Reference

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

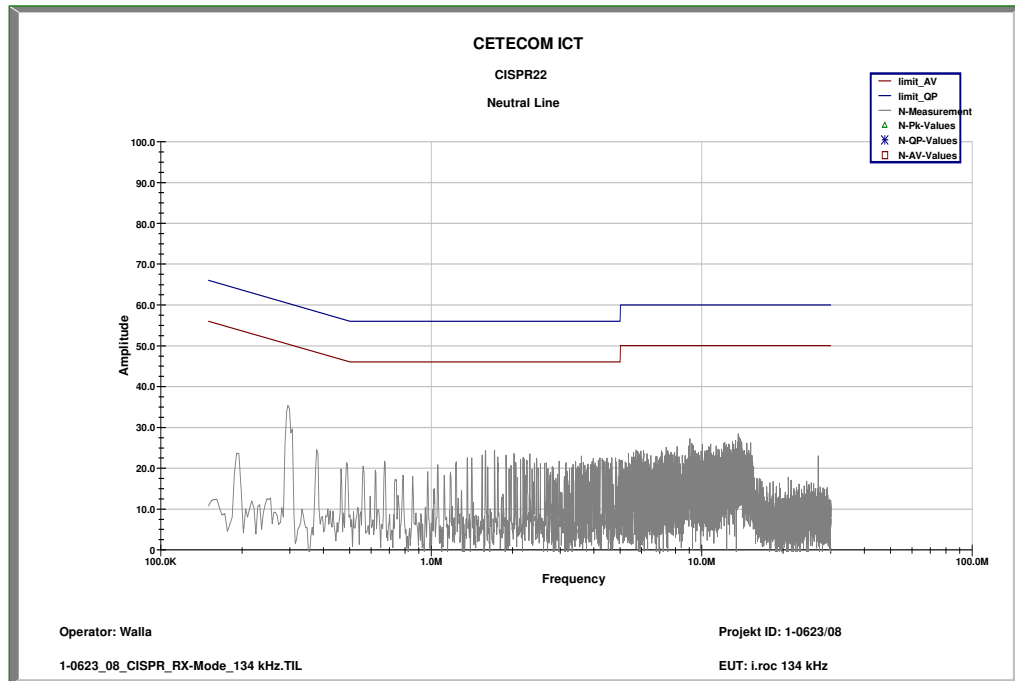
Plot 4: TX – Mode, Neutral line



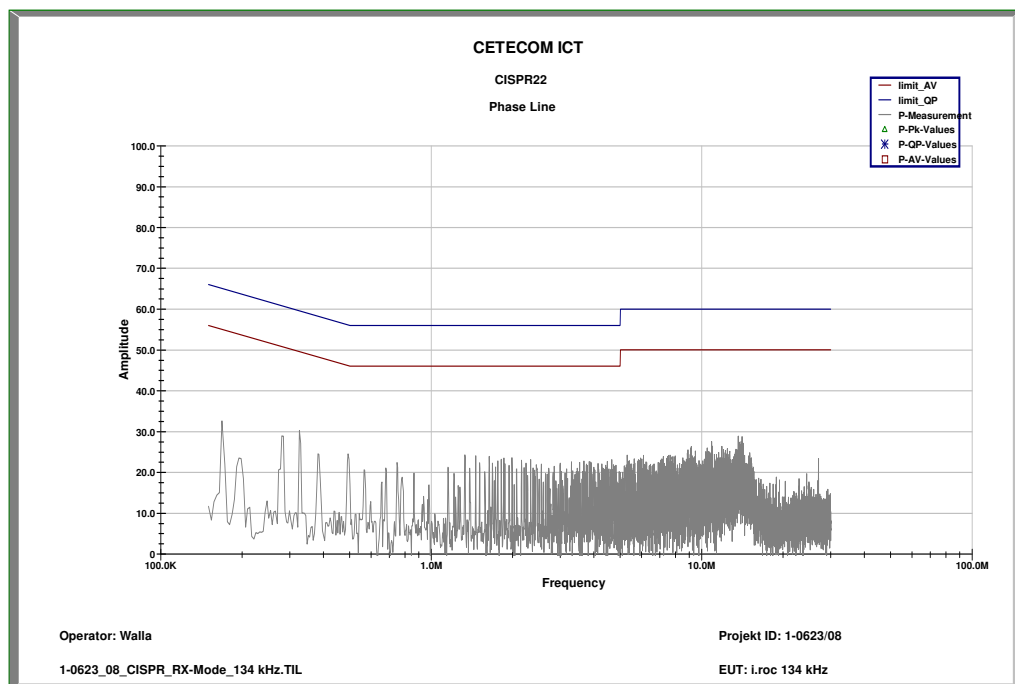
Plot 5: TX – Mode, Phase line



Plot 6: RX – Mode, Neutral line



Plot 7: RX – Mode, Phase line



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Limits:

§ 15.107 / 15.207

Frequency of Emission (MHz)	Conducted Limit (dB μ V)	
	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

5 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	13.12.2009	24	13.12.2011
5	Spektrum Analyzer Display 85662A	HP	3144A28627	300001208	13.12.2009	24	13.12.2011
6	Quasi-Peak-Adapter 85650A	HP	2811A01204	300002308	13.12.2009	24	13.12.2011
7	RF-Preselector 85685A	HP	2837A00778	300002448	13.12.2009	24	13.12.2011
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.)		

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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	Verified with path compensation		
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	23.12.2008	24	23.12.2010
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

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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	-/-	-/-	-/-	-/-

6 Annex B: Photographs of Test site

Photo 1:

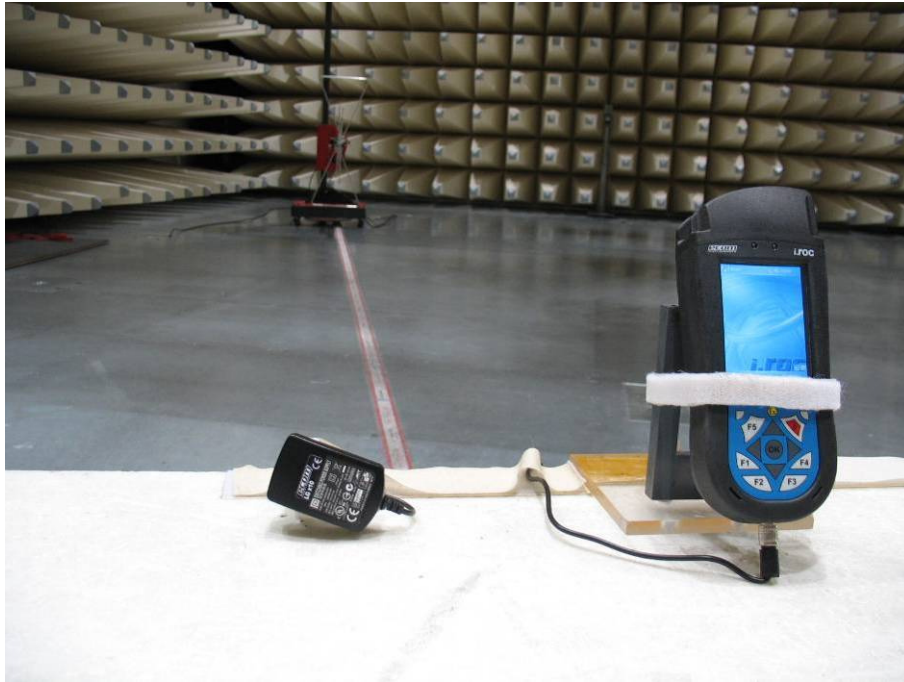


Photo 2:



Photo 3:

