

Recognized by the
Federal Communications Commission
Anechoic chamber registration no.: 90462 (FCC)
Anechoic chamber registration no.: 3463A-1 (IC)
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.	: 2-4585-01-03/07
Applicant	: Feig Electronics GmbH
Type	: ID ISC.ANT 1300/680-A
Test Standard	: FCC Part 15 RSS210 Issue 7
FCC ID	: PJMANT1300680
Certification No. IC	: 6633A-ANT130068

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1 General information

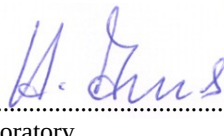
1.1. Administrative data of the test facility

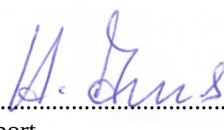
1.1.1 Identification of the testing laboratory

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 Harro Ames 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
(Stefan Bös / Harro Ames)

 / 
.....
Responsible for test report
(Stefan Bös / Harro Ames)

1.3 Details of Applicant

Name : Feig Electronic GmbH
Address : Lange Straße 4
City : D-35781 Weilburg-Waldhausen
Country : Germany
Phone : +49 (0) 6471 31 09-0
Fax : +49 (0) 6471 31 09-99
Contact : Mr. Wolfgang Meissner
Phone : +49 (0) 6471 31 09-436
Fax : +49 (0) 6471 31 09-99
e-mail : wolfgang.meissner@feig.de

1.4 Application Details

Date of receipt of application : 2007-12-10
Date of receipt of test item : 2007-12-10
Date(s) of test : 2007-12-10
Date of report : 2007-12-19

1.5 Test Item

Type of equipment	:	RF-ID Transponder reader system including antennas
Model name	:	ID ISC.ANT 1300/680-A
Manufacturer	:	Feig Electronic GmbH
Address	:	Lange Strasse 4
City	:	D-35781 Weilburg-Waldhausen
Country	:	Germany
Tested to Radio Standards Specification(RSS) No.	:	210 Issue 7
Open Area Test Site Industry Canada Number	:	3463A-1
Frequency Range (or fixed frequency)	:	Tx: 13.56 MHz Rx: 13.56 MHz
Field Strength (at what distance)	:	85 dBµV/m in 10m
Occupied Bandwidth (99% BW)	:	1 kHz
Type of Modulation	:	N0N (inductive loop)
Antenna Information	:	Loop antenna
Emission Designator	:	1K00N0N
Transmitter Spurious (worst case)	:	43 dBµV/m in 10m (QP)
Receiver Spurious (worst case)	:	stand alone RX not possible
IC no.	:	6633A-ANT130068
FCC ID	:	PJMANT1300680

ATTESTATION:

I attest that the information provided above is 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.

Signature:  Date: 2007-12-19

NAME (Please print or type): Stefan Bös

TITLE (Please print or type): Test engineer

COMPANY (Please print or type): Cetecom ICT Services GmbH

1.6 Test Setup

Hardware	:	Reader:	ID ISC.LRM 2000-A
		Multiplexer:	ID ISC.ANT.MUX-M
		Antennas:	2 x ID ISC.ANT 1300/680 Type A
Software	:		

The system consists of the reader and a multiplexer with 2 antennas.

1.7 Test Specifications

FCC:	CFR Part 15.209 and 15.225
IC:	RSS 210, Annex 2.6

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)	6.5 Pulsed Operation	NO	
4.2	§ 15.225 (a) FIELDSTRENGTH OF FUNDAMENTAL	Annex 2.6	YES	pass
4.3	§ 15.225 (b,c,d) FIELDSTRENGTH OF HARMONICS and SPURIOUS	Annex 2.6	YES	pass
4.4	§ 15.225 (e) Frequency tolerance	Annex 2.6	YES	pass
4.5	§ 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 are 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 are conform 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, 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

3.1 FCC Part 15 Subpart C

3.1.1 Timing of the transmitter

Not applicable

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.

3.1.2 Field strength of the fundamental

Reference

FCC:	CFR Part SUBCLAUSE § 15.225 (a)
IC:	RSS 210, Annex 2.6

Maximum output power (quasi peak) - (radiated)

Measured at 10m distance, recalculated to 30m according to FCC part15.31 (f2)

TEST CONDITIONS		MAXIMUM POWER (dB μ V/m)	
Frequency		13.56 MHz	13.56 MHz
		In 10m	Calculated in 30m
T _{nom} +23 °C	88.0 dB μ V/m	85.0 dB μ V/m	65 dB μ V/m
Maximum deviation from output power under extreme test conditions (dBc)		not applicable	
Measurement uncertainty		±3dB	

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

Limits for fundamental

SUBCLAUSE § 15.225 (a)

Fundamental Frequency (MHz)	Field strength of Fundamental (μ V/m)	Measurement Distance (meters)
13.553 to 13.567	15848 μ V/m (84 dB μ V/m)	30
	158489 μ V/m (104 dB μ V/m)	10
		Recalculated acc. to FCC part15.31 (f2)

3.1.3 Field strength of the harmonics and the spurious

Reference

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

EMISSION LIMITATIONS				
f (MHz)		amplitude of emission (dB μ V/m) Average/QP	limit max. allowed field strength	results
13.56		85 dB μ V/m QP		Operating frequency
27.1		20 dB μ V/m QP	29.5 dB μ V/m	pass
40.8		25 dB μ V/m QP	40.0 dB μ V/m	pass
67.8		27 dB μ V/m QP	40.0 dB μ V/m	pass
150.3		33 dB μ V/m QP	43.5 dB μ V/m	pass
203.1		27 dB μ V/m QP	43.5 dB μ V/m	pass
298.6		43 dB μ V/m QP	46.0 dB μ V/m	pass
487.6		31 dB μ V/m QP	46.0 dB μ V/m	pass
Measurement uncertainty			± 3 dB	

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

Limits

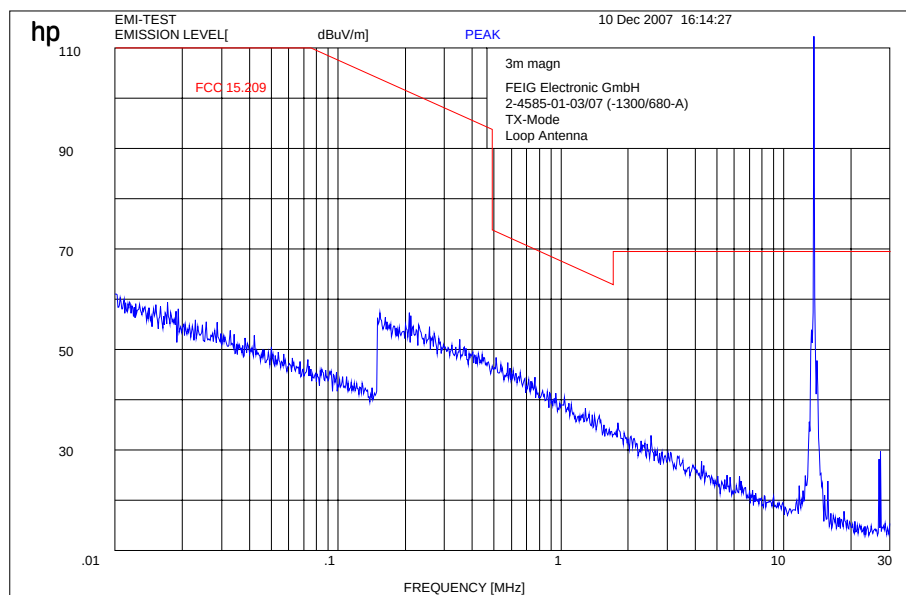
SUBCLAUSE § 15.209 (a)

Fundamental Frequency (MHz)	Field strength of Fundamental (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

Plots of measurements

Plot 1:

Part 15.209 Magnetics



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

(to convert the measuring distance from 3m to 30m and 30m to 300m a correction factor from 40 dB/decade was used. Here we use 80 dB to recalculate from 3m to 300m)

Measurement distance 3 m

This measurement was done in 3 planes, the plot shows the worst case

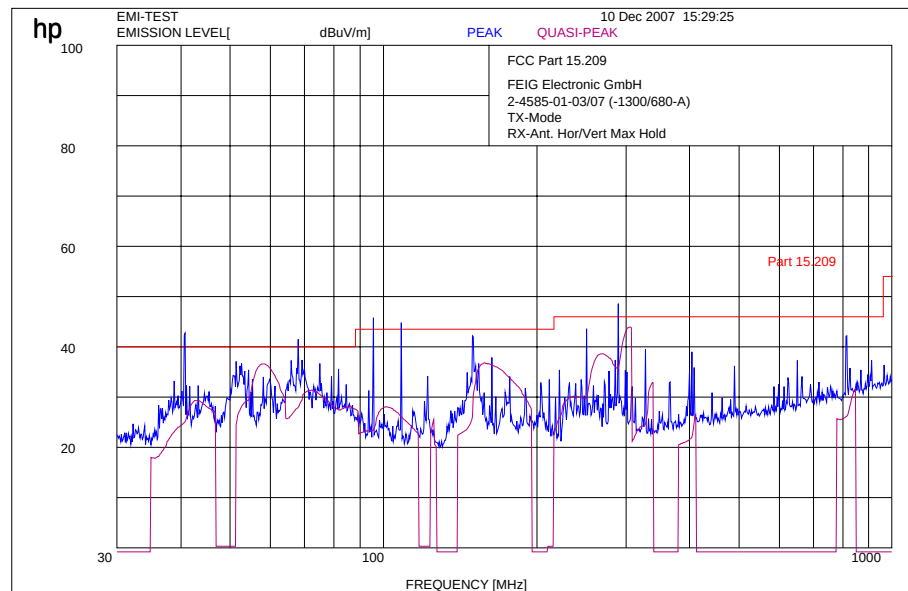
Limits

SUBCLAUSE § 15.209

Frequency (MHz)	Field strength ($\mu\text{V/m}$)	Measurement distance (m)
0.0009 – 0.490	2400 / F (kHz)	300
0.490 – 1.705	24000 / F (kHz)	30
1.705 - 30	30 (29.5 dB $\mu\text{V/m}$)	30
30 - 88	100 (40 dB $\mu\text{V/m}$)	3
88 - 216	150 (43.5 dB $\mu\text{V/m}$)	3
216 - 960	200 (46 dB $\mu\text{V/m}$)	3

Plot 2:

TX (30 MHz to 1 GHz)



Limits

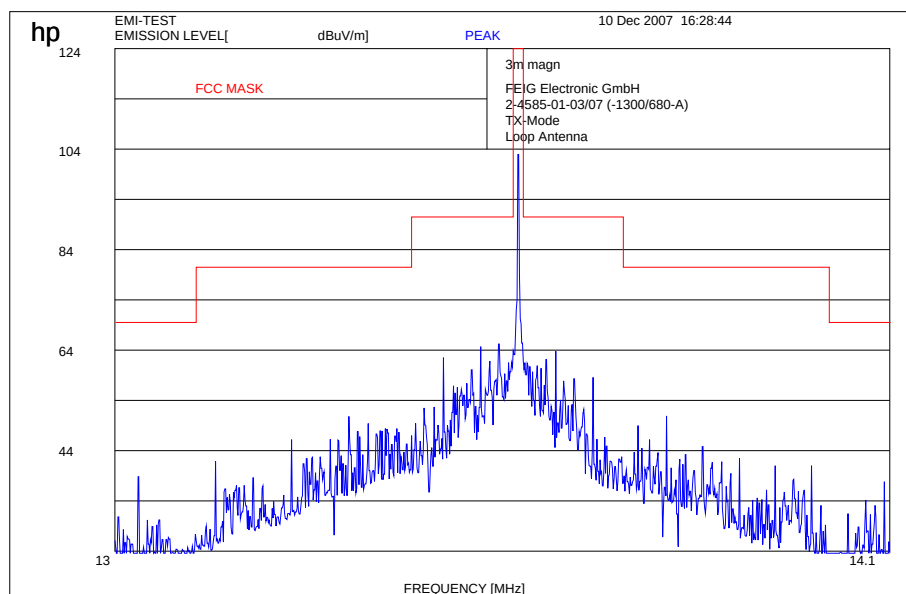
SUBCLAUSE § 15.209

Frequency (MHz)	Field strength ($\mu\text{V/m}$)	Measurement distance (m)
0.0009 – 0.490	2400 / F (kHz)	300
0.490 – 1.705	24000 / F (kHz)	30
1.705 - 30	30 (29.5 dB $\mu\text{V/m}$)	30
30 - 88	100 (40 dB $\mu\text{V/m}$)	3
88 - 216	150 (43.5 dB $\mu\text{V/m}$)	3
216 - 960	200 (46 dB $\mu\text{V/m}$)	3

Plot 3

Spectrum mask part15.225 (a,b,c,d)

Limits recalculated from 30m to 3m with 40 dB/decade according to FCC 15.31 (f2)



RBW /VBW 9 kHz

The transmitter holds the requirements of FCC 15.225 (a,b,c and d)

Fundamental Frequency (MHz)	Field strength of Fundamental ($\mu\text{V/m}$)	Measurement Distance (meters)
13.553 to 13.567	15848 $\mu\text{V/m}$ (84 dB $\mu\text{V/m}$)	30
13.410 to 13.553 and 13.567 to 13.710	334 $\mu\text{V/m}$ (50.5 dB $\mu\text{V/m}$)	30
13.110 to 13.410 and 13.710 to 14.010	106 $\mu\text{V/m}$ (40.5 dB $\mu\text{V/m}$)	30
outside 13.110 to 14.010	generale mission limits 15.209	300 or 30 m

3.1.4 Frequency tolerance

Reference

FCC:	CFR Part SUBCLAUSE § 15.225 (e)
IC:	RSS 210, Annex 2.6

Frequency tolerance								
Over temperature variation			Over voltage variation					
Limit is +/- 1.356 kHz (+/-0.01%)			Limit is +/- 1.356 kHz(+/-0.01%)			MHz		
T (°C)	Frequency error (kHz)	Result	Power voltage	Frequency error (kHz)	Result	F [MHz]	Detector	Level [µV/m]
-20°	0.100	0.0008%	98V	0.018	0.0001%			
-10°	0.104	0.0008%	104V	0.032	0.0002%			
0°	0.098	0.0008%	110V	0.050	0.0004%			
10°	0.080	0.0006%	115V	0.064	0.0005%			
20°	0.064	0.0005%	121V	0.070	0.0005%			
30°	0.052	0.0004%	127V	0.068	0.0005%			
40°	0.040	0.0003%	132V	0.060	0.0004%			
50°	0.028	0.0002%						
Measurement uncertainty			±20 Hz					

f < 1 GHz : RBW/VBW: 20 Hz

Limits

SUBCLAUSE § 15.225(e)

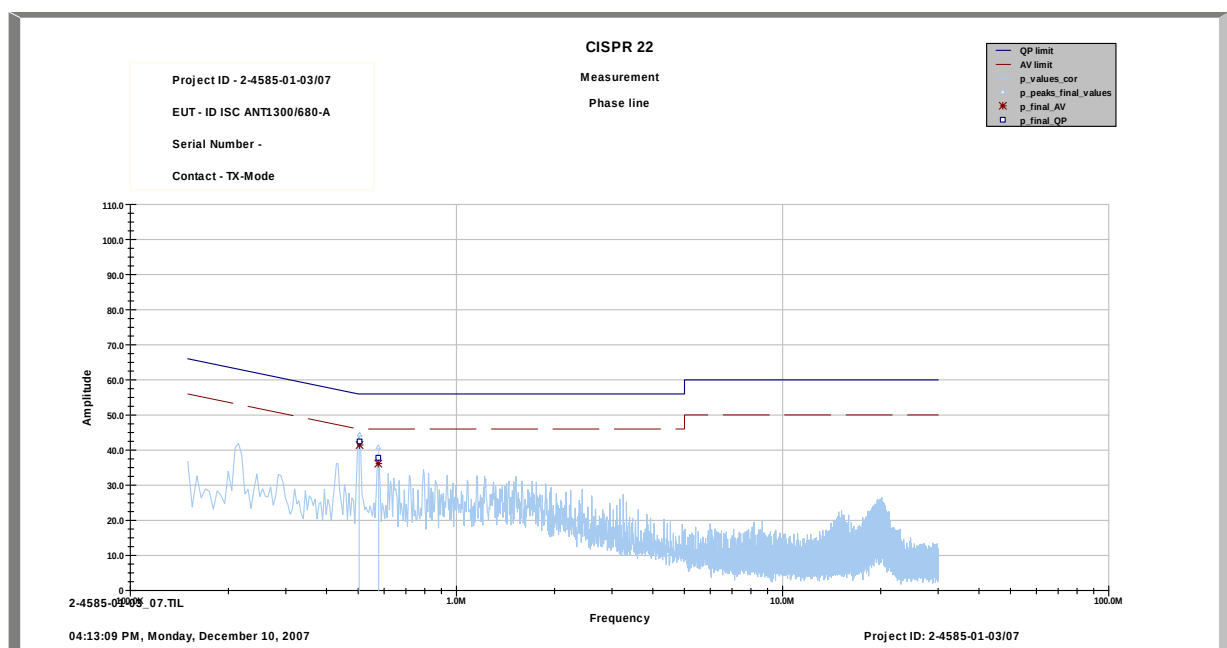
The frequency tolerance of the carrier signal shall be maintained within +/- 0.01% of the operating frequency over a temperature variation of -20 degrees to +50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C.

3.1.5 Conducted Limits

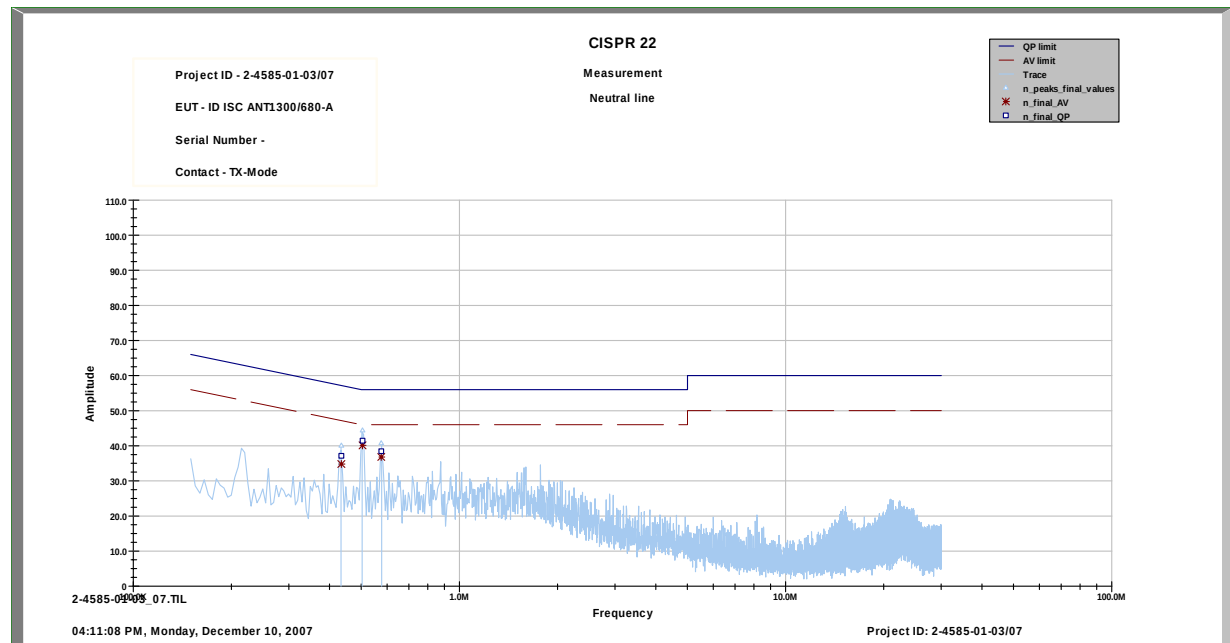
Reference

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

L1-system



N-system



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

4 Used Testequipment

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	2747A05306	300001000	05.10.2006	24	05.10.2008
5	Spektrum Analyzer Display 85662A	HP	2816A16541	300002297	05.10.2006	24	05.10.2008
6	Quasi-Peak-Adapter 85650A	HP	2811A01131	300000999	05.10.2006	24	05.10.2008
7	RF-Preselector 85685A	HP	2837A00779	300000218	08.11.2006	24	08.11.2008
8	PC Vectra VL	HP		300001688	n.a.		
9	Software EMI	HP		300000983	n.a.		
10	Measurement System 2						
11	FSP 30	R&S	100623	ICT 300003464	26.10.2006	12	26.10.2007
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		G00013834L 461	3000002681	n.a.		
7	Spectrum Analyser FSIQ 26	R&S	835540/018	3000002681-0005	01.08.2006	24	01.08.2008
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	01.08.2006	36	01.08.2009
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	01.08.2006	36	01.08.2009
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	01.08.2006	36	01.08.2009
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	01.08.2006	24	01.08.2008
26	Power Sensor NRVD-Z1	R&S	833894/012	3000002681-0013	01.08.2006	24	01.08.2008
27	Power Sensor NRVD-Z1	R&S	833894/011	3000002681-0010	01.08.2006	24	01.08.2008
28	Rubidium Standard RUB	R&S		3000002681-0009	01.08.2006	24	01.08.2008
29	Switching and Signal Conditioning Unit SSCU	R&S	338864/003	3000002681-0006	01.08.2006	24	01.08.2008
30	Laser Printer HP Deskjet 2100	HP	N/A	3000002681-0011	n.a.		
31	19" Rack	R&S	11138363000 004	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	01.08.2006	24	01.08.2008
36	Signalling Unit	R&S	838312/011	3000002681	n.a.		
37	NGPE programmable Power Supply for EUT	R&S	192.033.41	3000002681			
38	Climatic box VT 4002	Heraeus Vötsch	58566046820 010	300003019	11.05.2007	24	11.05.2009
39	Signaling Unit CMU200	R&S	832221/0055	300002862	12.01.2006	24	12.01.2008
40	Power Splitter 6005-3	Inmet Corp.	none	300002841	23.12.2006	24	23.12.2008
41	SMA Cables SPS-1151-985-SPS	Insulated Wire	different	different	n.a.		
42	CBT32 with EDR Signaling Unit	R&S					
43	Coupling unit	Narda	N/A	--	n.a.		
44	2xSwitch Matrix PSU	R&S	872584/021	300001329	n.a.		
45	RF-cable set	R&S	N/A	different	n.a.		
46	IEEE-cables	R&S	N/A	--	n.a.		

Anmerkung: 3000002681-00xx als Systeme inventarisiert

5 Annex A: Photographs of Test site

Photo 1 (Radiated Emissions)



Photo 2 (Conducted Emissions):



6 Annex B: Internal Photographs of the Equipment

Photo 1: LR2000-A

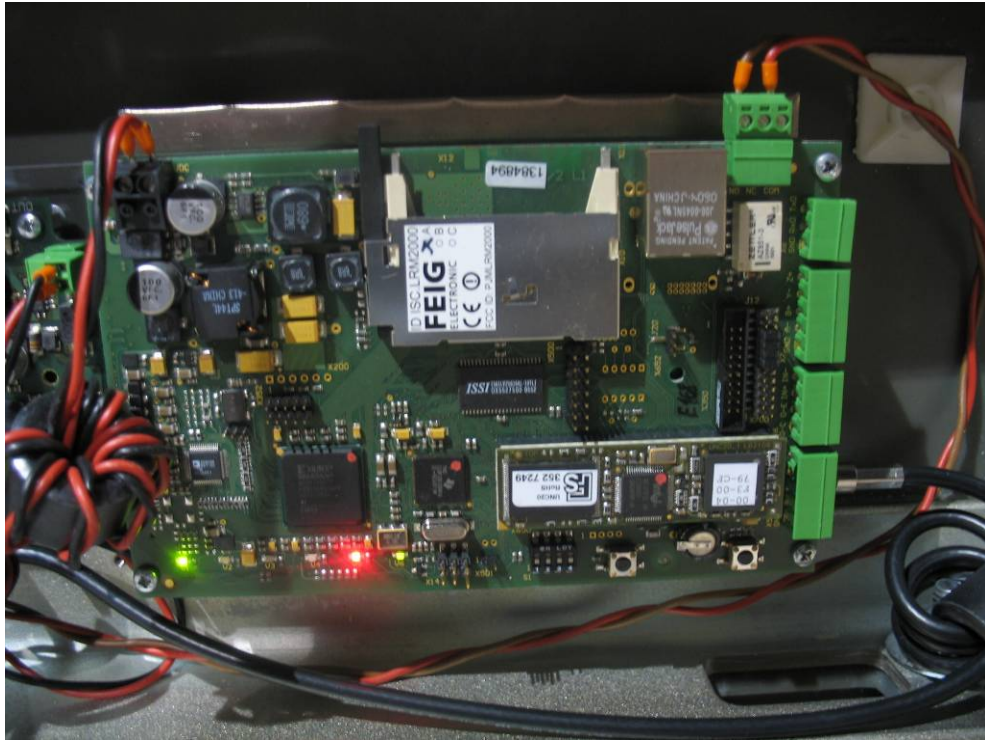


Photo 2: Multiplexer

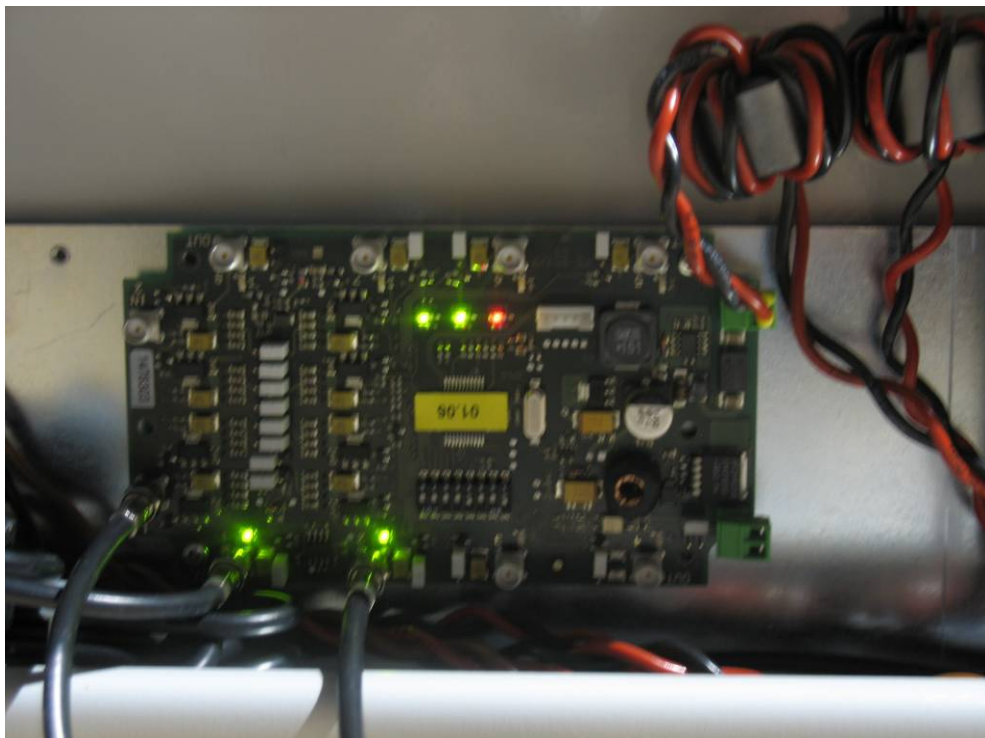


Photo 3: Antennamatching



Photo 4

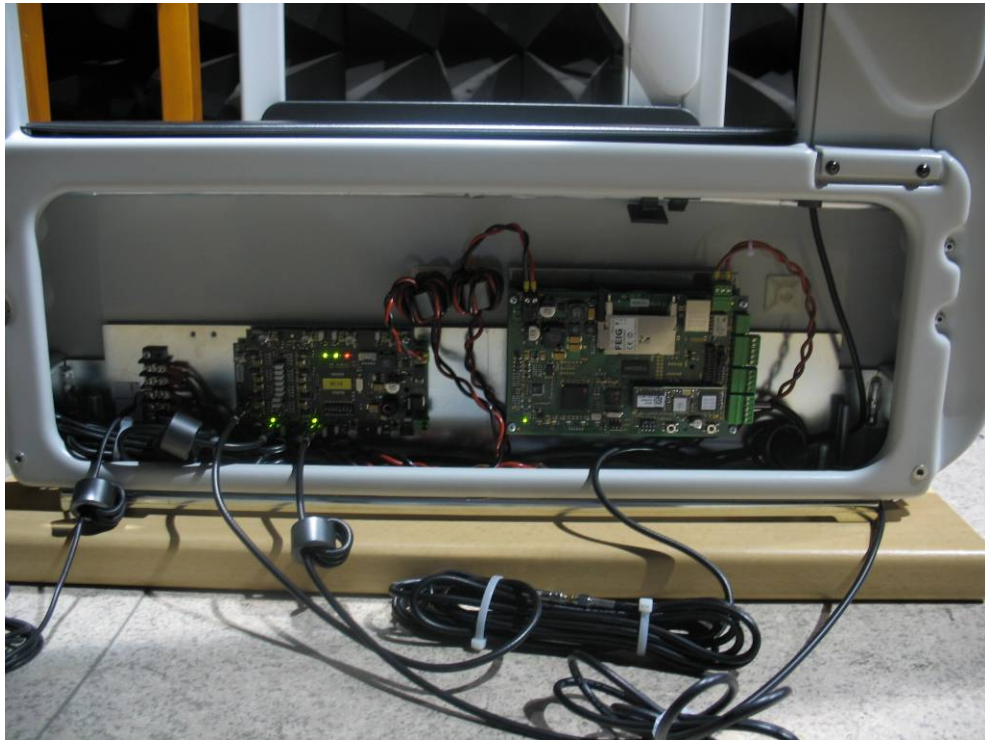


Photo 5: Multiplexer

