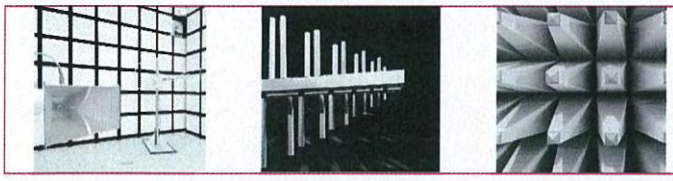

CETECOM™

CETECOM ICT Services
consulting - testing - certification >>>

TEST REPORT

Test report no.: 1-2977/11-95-12

DAkkS Deutsche Akkreditierungsstelle D-PL-12076-01-01

Testing laboratory

CETECOM ICT Services GmbH
Untertuerkheimer Strasse 6 – 10
66117 Saarbruecken / Germany
Phone: + 49 681 5 98 - 0
Fax: + 49 681 5 98 - 9075
Internet: http://www.cetecom.com
e-mail: ict@cetecom.com

Accredited Testing Laboratory:
The testing laboratory (area of testing) is accredited according to DIN EN ISO/IEC 17025 (2005) by the Deutsche Akkreditierungsstelle GmbH (DAkkS)
The accreditation is valid for the scope of testing procedures as stated in the accreditation certificate with the registration number: D-PL-12076-01-01
Area of Testing: Radio/Satellite Communications

Applicant

Sony Ericsson Mobile Communications AB
Nya Vattentornet
22188 Lund / SWEDEN
Phone: +46 46 19 30 00
Fax: +46 46 19 32 95
Contact: Håkan Sjöberg
e-mail: hakan.sjoberg@sonyericsson.com
Phone: +46 46 19 35 59

Manufacturer

Sony Ericsson Mobile Communications AB
Nya Vattentornet
22188 Lund / SWEDEN

Test standard/s

47 CFR Part 15	Title 47 of the Code of Federal Regulations; Chapter I Part 15 - Radio frequency devices
RSS - 210 Issue 8	Spectrum Management and Telecommunications - Radio Standards Specification Low-power Licence-exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment

For further applied test standards please refer to section 3 of this test report.

Test Item

Kind of test item:	**GSM Mobile Phone 850/900/1800/1900; GPRS/EGPRS; UMTS FDDI/FDDII/FDDV/FDDVIII; HSPA; RFID; BT EDR; WLAN b/g/n; ANT+; GPS**
Model name:	**AAD-3880120-AV**
FCC ID:	**PY7A3880120**
IC:	**4170B-A3880120**
Frequency [MHz]:	13.56 MHz
Technology tested:	RFID
Antenna:	Integrated loop antenna
Power Supply:	3.7 V DC by Li-polymer battery
Temperature Range:	-20°C to +50 °C

Test report authorised:

2011-12-21 Stefan Bös
Senior Testing Manager

Test performed:

2011-12-21 Andreas Luckenbill

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2 General information

2.1 Notes and disclaimer

The test results of this test report relate exclusively to the test item specified in this test report. 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.
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In no case this test report can be considered as a Letter of Approval.

This test report is electronically signed and valid without handwritten signature. For verification of the electronical signatures, the public keys can be requested at the testing laboratory.

2.2 Application details

Date of receipt of order:	2011-10-19
Date of receipt of test item:	2011-12-13
Start of test:	2011-12-13
End of test:	2011-12-19
Person(s) present during the test:	-/-

3 Test standard/s

Test standard	Date	Test standard description
47 CFR Part 15	2010-10	Title 47 of the Code of Federal Regulations; Chapter I Part 15 - Radio frequency devices
RSS - 210 Issue 8	2010-12	Spectrum Management and Telecommunications - Radio Standards Specification Low-power Licence-exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment

4 Test environment

Temperature:	T_{nom}	+22 °C during room temperature tests
	T_{max}	+50 °C during high temperature tests
	T_{min}	-20 °C during low temperature tests
Relative humidity content:		42 %
Barometric pressure:		not relevant for this kind of testing
Power supply:	V_{nom}	3.7 V DC by Li-polymer battery
	V_{max}	-/-
	V_{min}	-/-

5 Test item

Kind of test item :	**GSM Mobile Phone 850/900/1800/1900; GPRS/EGPRS; UMTS FDDI/FDDII/FDDV/FDDVIII; HSPA; RFID; BT EDR; WLAN b/g/n; ANT+; GPS**
Type identification :	**AAD-3880120-AV**
S/N serial number :	**Rad. CB511VCYAB; CB511VCYBB**
HW hardware status :	**AP1**
SW software status :	**6.0.A.0.448**
Frequency band [MHz] :	**13.56 MHz**
Type of radio transmission : **Use of frequency spectrum :**	**Modulated carrier**
Channel access method :	**-/-**
Type of modulation :	**N0N**
Number of channels :	**1**
Antenna :	**Integrated loop antenna**
Power supply :	**3.7 V DC by Li-polymer battery**
Temperature range :	**-20°C to +50 °C**

6 Test laboratories sub-contracted

None

7 Summary of measurement results

☒	**No deviations from the technical specifications were ascertained**
☐	There were deviations from the technical specifications ascertained

TC Identifier	Description	Verdict	Date	Remark
RF-Testing	CFR Part 15 RSS 210, Issue 8, Annex 2.6	Passed	2011-12-22	-/-

Test Specification Clause	Test Case	Temperature Conditions	Power Source Voltages	Pass	Fail	NA	NP	Results (max.)
§ 15.35 (c)/ RSS-GEN Issue 2 Section 4.5	Timing of the transmitter (Duty cycle correction factor)	Nominal	Nominal	☒	☐	☐	☐	complies
§ 15.225 (a)/ RSS-210 Issue 8 Annex 2.6	Fieldstrength of Fundamental	Nominal	Nominal	☒	☐	☐	☐	complies
§ 15.209/ RSS-210 Issue 8 Annex 2.6	Fieldstrength of harmonics and spurious	Nominal	Nominal	☒	☐	☐	☐	complies
§ 15.225 (e)/ RSS-210 Issue 8 Annex 2.6	Frequency tolerance	Nominal	Extreme	☒	☐	☐	☐	complies
		Extreme	Nominal	☒	☐	☐	☐	

Note: NA = Not Applicable; NP = Not Performed

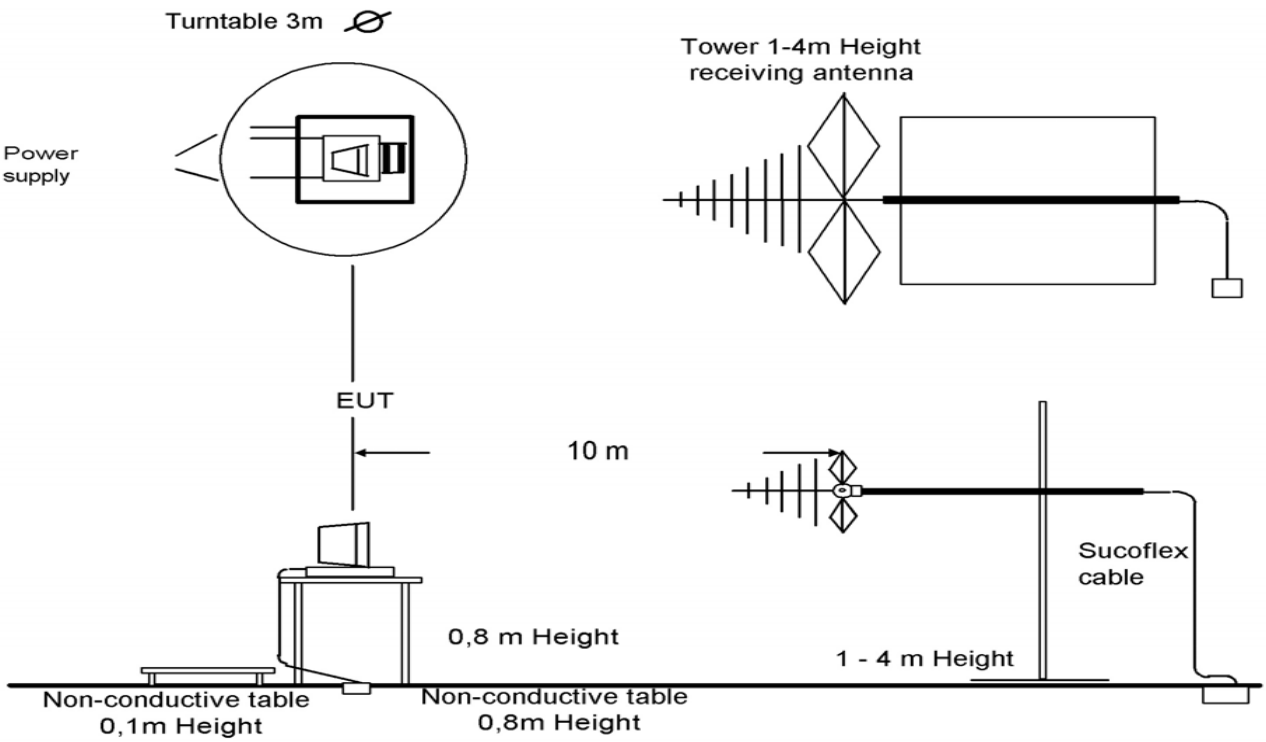
8 RF measurements

8.1 Description of test setup

8.1.1 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 C63.4-2009 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 C63-4-2009 clause 4.2.
Antennas are confirmed with ANSI C63.2-1996 item 15.

Semi anechoic chamber



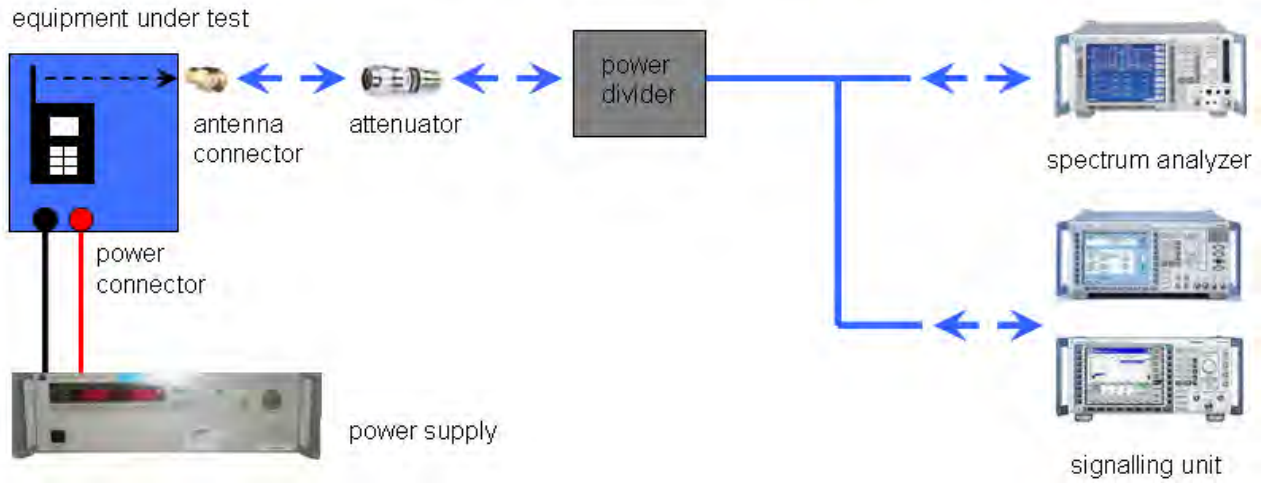
Picture 1: Diagram radiated measurements

9 kHz - 30 MHz:	active loop antenna
30 MHz – 1 GHz:	tri-log antenna
> 1 GHz:	horn antenna

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.

8.1.2 Conducted measurements

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.



Picture 2: Diagram conducted measurements

8.2 Additional comments

Reference documents: None

Special test descriptions: None

Configuration descriptions: None

8.3 RSP100 test report cover sheet / performance test data

Test Report Number	:	1-2977/11-95-12
Equipment Model Number	:	AAD-3880120-AV
Certification Number	:	4170B-A3880120
Manufacturer (complete Address)	:	Sony Ericsson Mobile Communications AB Nya Vattentornet 22188 Lund / SWEDEN
Tested to radio standards specification no.	:	RSS 210, Issue 8, Annex 8
Open Area Test Site IC No.	:	IC 3462C-1
Frequency Range or fixed frequency	:	13.56 MHz
Field Strength [dBµV/m] (at which distance)	:	44 dBµV/m @ 10m
Occupied bandwidth (99%-BW) [kHz]	:	26.0 kHz
Type of modulation	:	N0N
Emission Designator (TRC-43):		26K0N0N
Antenna Information:		Integrated loop antenna
Transmitter Spurious (worst case) [dBµV/m @ 3m]:		30 dBµV/m @ 1 GHz (noise floor)
Receiver Spurious (worst case) [dBµV/m @ 3m]:		no idle mode

ATTESTATION:
DECLARATION OF COMPLIANCE:

I attest 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:

2011-12-21	Andreas Luckenbill	
Date	Name	Signature

9 Measurement results

9.1 Timing of the transmitter

Measurement:

Measurement parameter	
Detector:	-/-
Sweep time:	-/-
Resolution bandwidth:	-/-
Video bandwidth:	-/-
Span:	-/-
Trace-Mode:	-/-

Limits:

FCC	IC
CFR Part SUBCLAUSE § 15.35 (c)	RSS-GEN Issue 2 Section 4.5
Timing of the transmitter	
(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.	

Note:

Duty cycle 100%.

Result: **The result of the measurement is passed.**

9.2 Field strength of the fundamental

Measurement:

Measurement parameter	
Detector:	Quasi Peak
Sweep time:	Auto
Resolution bandwidth:	200 Hz up to 150 kHz, 9 kHz up to 30 MHz, 120 kHz up to 1 GHz
Video bandwidth:	≥ RBW
Span:	10 kHz
Trace-Mode:	Max Hold

Limits:

FCC		IC
CFR Part SUBCLAUSE § 15.231 (b)		RSS-210 Issue 8 Section A1.1.2 / 2.7 Table 4
Fundamental Frequency (MHz)	**Field strength of Fundamental (µV/m)**	**Measurement distance (m)**
13.553 to 13.567	15848 µV/m (84 dBµV/m)	30
	158489 µV/m (104 dBµV/m)	10 (Recalculated acc. to FCC part15.31 (f2))

Result:

TEST CONDITIONS		MAXIMUM POWER (dBµV/m)	
Frequency		13.56 MHz	13.56 MHz
Mode		at 10 m distance	at 30 m distance
T_{nom}	V_{nom}	44.0	64.0
Measurement uncertainty		±3dB	

Result: **The result of the measurement is passed.**

9.3 Field strength of the harmonics and spurious

Measurement:

Measurement parameter	
Detector:	Quasi Peak / Average
Sweep time:	Auto
Resolution bandwidth:	200 Hz up to 150 kHz, 9 kHz up to 30 MHz, 120 kHz up to 1 GHz
Video bandwidth:	≥ RBW
Span:	Steps 100 MHz
Trace-Mode:	Max hold

Limits:

FCC		IC
SUBCLAUSE § 15.209		
Field strength of the harmonics and spurious.		
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	30 (29.5 dBµV/m)	30
30 – 88	100 (40 dBµv/m)	3
88 – 216	150 (43.5 dBµV/m)	3
216 – 960	200 (46 dBµV/m)	3

Result:

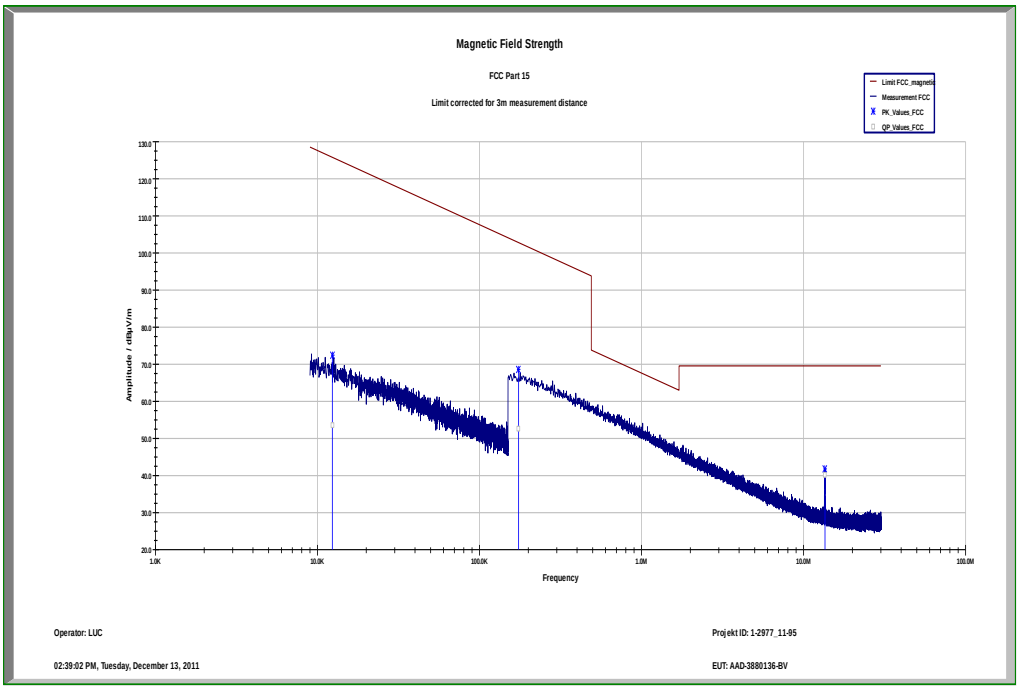
EMISSION LIMITATIONS				
f [MHz]	Detector	Limit max. allowed [dBµV/m]	Amplitude of emission [dBµV/m]	Results
no critical emissions detected!				

Result: **The result of the measurement is passed.**

Plots of the measurements:

Plot 1: 9 kHz – 30 MHz;
Part 15.209 Magnetics, Measurement distance 3m

Transmit frequency 13.56 MHz



Plot 2: 30 MHz – 1000 MHz

Transmit frequency 13.56 MHz

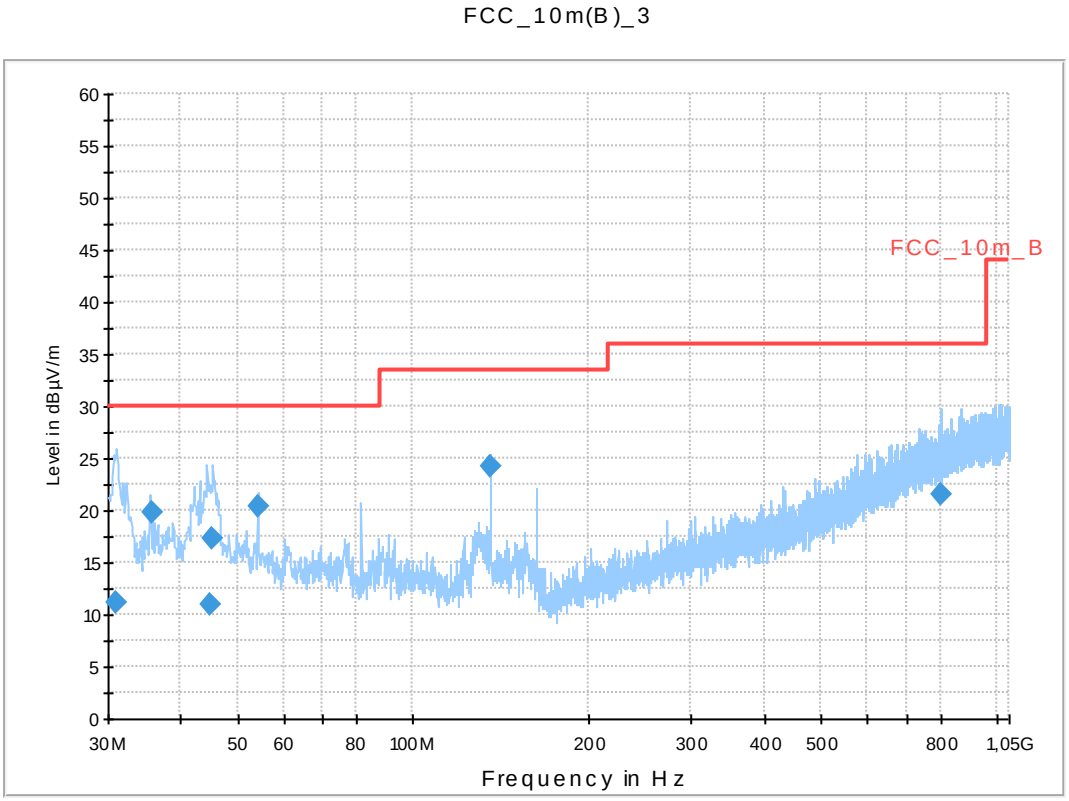
Common Information

EUT:	AAD-3880120-AV (2x)
Serial Number:	CB511VCYAB + CB511VCYBB
Test Description:	FCC part 15 B class B @ 10 m
Operating Conditions:	RFID + charging
Operator Name:	Hennemann
Comment:	AC: 115 V / 60 Hz

Scan Setup: STAN_Fin [EMI radiated]

Hardware Setup:	Electric Field (NOS)
Receiver:	[ESCI 3]
Level Unit:	dBµV/m

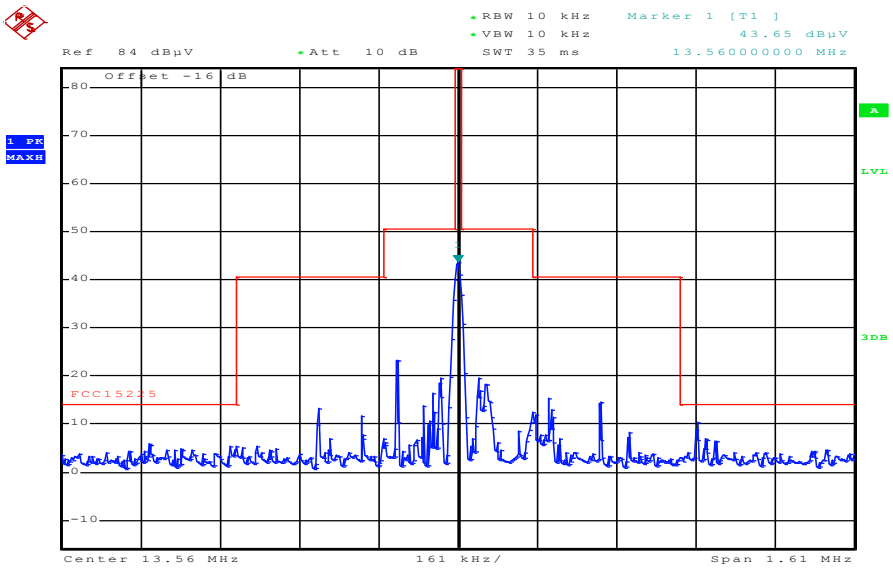
Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
30 MHz - 2 GHz	60 kHz	QPK	120 kHz	1 s	20 dB



Final Result 1

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
30.949800	11.2	1000.0	120.000	165.0	V	106.0	12.6	18.8	30.0	
35.754450	19.7	1000.0	120.000	98.0	V	8.0	13.1	10.3	30.0	
44.732850	11.0	1000.0	120.000	98.0	V	260.0	13.3	19.0	30.0	
45.128550	17.3	1000.0	120.000	98.0	V	-6.0	13.3	12.7	30.0	
54.242850	20.5	1000.0	120.000	131.0	V	196.0	13.0	9.5	30.0	
135.596550	24.3	1000.0	120.000	144.0	V	106.0	9.0	9.2	33.5	
802.561350	21.5	1000.0	120.000	98.0	H	94.0	23.8	14.5	36.0	

Plot 3: Spectrum mask part15.225 (a,b,c,d)



Date: 20.DEC.2011 09:34:19

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

RBW /VBW 9 kHz

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

9.4 Frequency tolerance

Measurement:

Measurement parameter	
Detector:	Peak
Sweep time:	Auto
Resolution bandwidth:	100 Hz
Video bandwidth:	300 Hz
Span:	30 kHz
Trace-Mode:	Max hold

Limits:

FCC	IC
SUBCLAUSE § 15.225	**RSS-210 Issue 8 Annex 2.6**
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.	

Result: **The result of the measurement is passed.**

Frequency tolerance								
Over temperature variation			Over voltage variation					
Limit is +/- 1.356 kHz			Limit is +/- 1.356 kHz			MHz		
T (°C)]	Frequency	result	Power voltage	Frequency	result	F [MHz]	Detector	Level [µV/m]
-20°	13.559 980	Pass	98V	13.560	Pass			
-10°	13.560 012	Pass	104V	13.560	Pass			
0°	13.560 026	Pass	110V	13.560	Pass			
10°	13.560 000	Pass	115V	13.560	Pass			
20°	13.559 932	Pass	121V	13.560	Pass			
30°	13.559 888	Pass	127V	13.560	Pass			
40°	13.559 832	Pass	132V	13.560	Pass			
50°	13.559 758	Pass						
Measurement uncertainty			±100 Hz					

9.5 AC line conducted

Measurement:

Measurement parameter	
Detector:	Peak
Sweep time:	Auto
Resolution bandwidth:	200 Hz up to 150 kHz, 9 kHz up to 30 MHz, 120 kHz up to 1 GHz
Video bandwidth:	≥ RBW
Trace-Mode:	Max hold

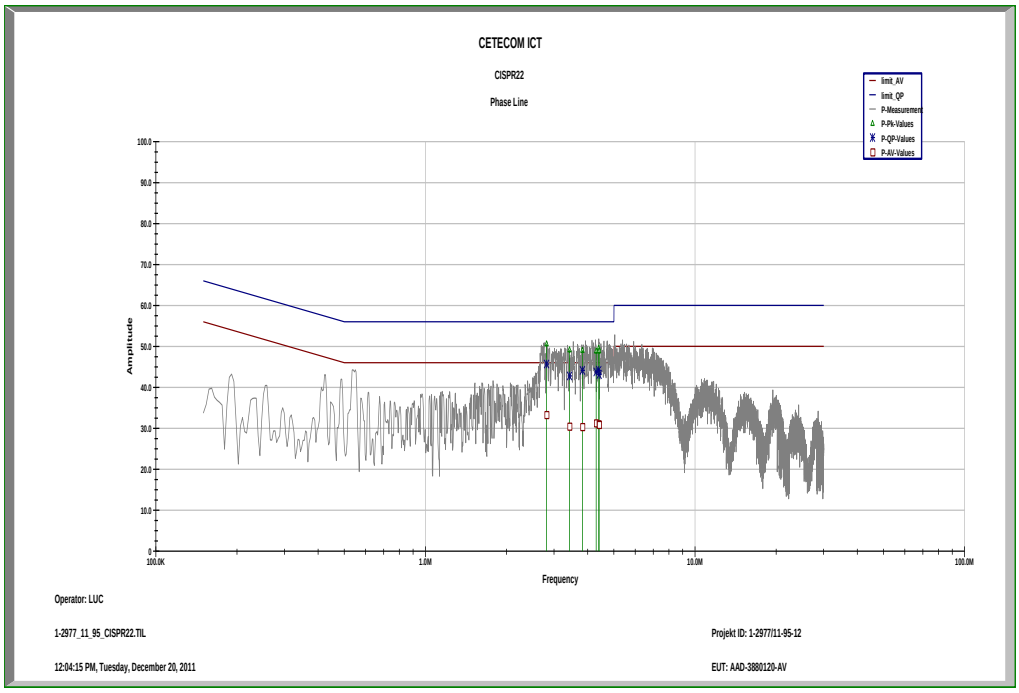
Limits:

FCC	IC	
SUBCLAUSE § 15.107 / 15.207	**RSS-210 Issue 8 Section 6.6, 7.4**	
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

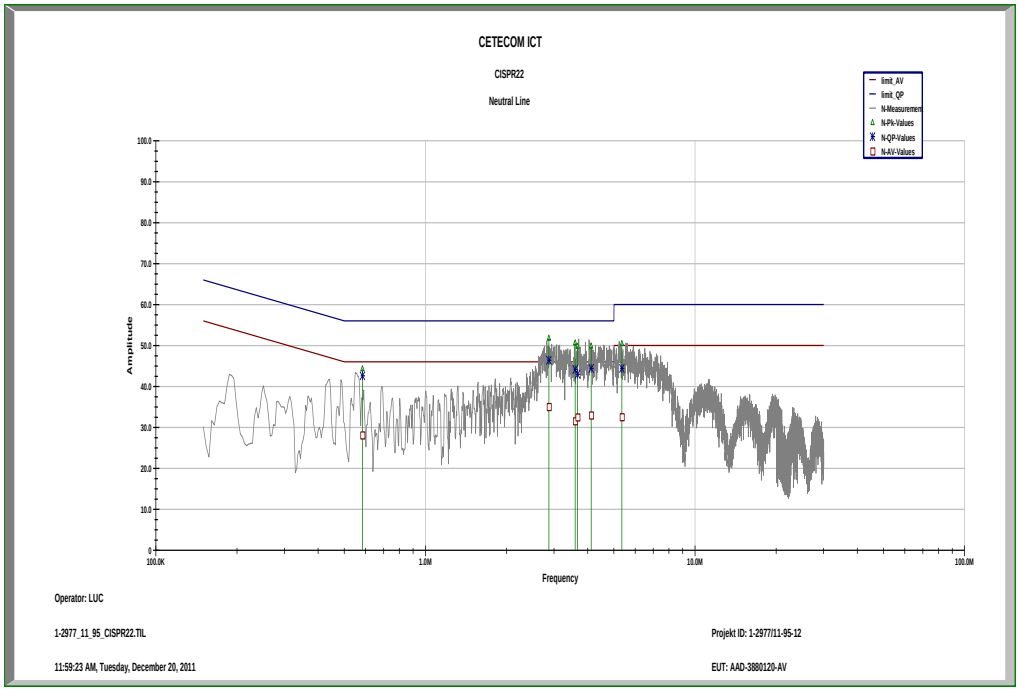
Result: **The result of the measurement is passed.**

Plots:

Plot 1: Phase line



Plot 2: Neutral line:



10 Test equipment and ancillaries used for tests

Typically, the calibrations of the test apparatus are commissioned to and performed by an accredited calibration laboratory. The calibration intervals are determined in accordance with the DIN EN ISO/IEC 17025. In addition to the external calibrations, the laboratory executes comparison measurements with other calibrated test systems or effective verifications. Weekly chamber inspections and range calibrations are performed. Where possible, rf-generating and signalling equipment as well as measuring receivers and analyzers are connected to an external high-precision 10 MHz reference (GPS-based or rubidium frequency standard).

In order to simplify the identification of the equipment used at some special tests, some items of test equipment and ancillaries can be provided with an identifier or number in the equipment list below (Labor/Item).

No.	Lab / Item	Equipment	Type	Manufact.	Serial No.	INV. No Cetecom	Kind of Calibration	Last Calibration	Next Calibration
1	n. a.	Test Receiver	ESH2	R&S	871921/095	300002505	Ve	12.02.2010	12.02.2012
2	n. a.	Loop Antenna 9 KHz - 30 MHz	HFH2-Z2	R&S	872096/61	300001824	vlKl!	18.11.2008	18.03.2012
3	n. a.	Spectrum Analyzer 9kHz to 30GHz - 140..+30dBm	FSP30	R&S	100886	300003575	k	07.09.2010	07.09.2012
4	n. a.	Temperature Test Chamber	VT 4002	Heraeus Voetsch	521/83761	300002326	Ve	20.09.2011	20.09.2013
5	n. a.	Double-Ridged Waveguide Horn Antenna 1-18.0GHz	3115	EMCO	8812-3088	300001032	vlKl!	11.05.2011	11.05.2013
6	n. a.	Active Loop Antenna	6502	EMCO	2210	300001015	ne		
7	n. a.	Anechoic chamber	FAC 3/5m	MWB / TDK	87400/02	300000996		23.03.2009	
8	n. a.	Relais Matrix	3488A	HP Meßtechnik	2719A15013	300001156	ne		
9	n. a.	Switch / Control Unit	3488A	HP	2605e08770	300001443	ne		
10	n. a.	Amplifier	js42-00502650-28-5a	Parzich GMBH	928979	300003143	ne		
11	n. a.	TILE-Software Emission	Quantum Change, Modell TILE-ICS/FULL	EMCO	none	300003451	ne		
12	n. a.	PSA Spectrum Analyzer 3 Hz - 26.5 GHz	E4440A	Agilent Technologies	MY48250080	300003812	k	08.09.2010	08.09.2012
13	n. a.	TRILOG Broadband Test-Antenna 30 MHz - 3 GHz	VULB9163	Schwarzbeck	371	300003854	vlKl!	14.10.2011	14.10.2014

Agenda: Kind of Calibration

k	calibration / calibrated	EK	limited calibration
ne	not required (k, ev, izw, zw not required)	zw	cyclical maintenance (external cyclical maintenance)
ev	periodic self verification	izw	internal cyclical maintenance
Ve	long-term stability recognized	g	blocked for accredited testing
vlkl!	Attention: extended calibration interval		
NK!	Attention: not calibrated	*)	next calibration ordered / currently in progress

11 Observations

No observations exceeding those reported with the single test cases have been made.