

TEST REPORT # EMCC-081095AB/051008FB, 2009-01-09**EQUIPMENT UNDER TEST:**

Model: CRS100-120
Units: Two, CRS100 and CRS120
Serial No: 001196, 001197
Equipment Category: Receiver
Manufacturer: WEER s.r.l.
Address: Regione San Vito, 32/A
14042 Calamandrana (AT)
Italy

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RELEVANT STANDARD:

47 CFR Part 15B - Unintentional Radiators

MEASUREMENT PROCEDURE USED:

☒ ANSI C63.4-2003 ☐ FCC/OET MP-4 (1987) ☒ CISPR 22

TEST REPORT PREPARED BY:

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TEST PERSONNEL:

Reinhard Sauerschell

HEAD OF LABORATORY:

Winfried Hoffmann

TEST OF WEER S.R.L. TYPE CRS100-120 TO 47 CFR PART 15B - UNINTENTIONAL RADIATORS

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1 GENERAL INFORMATION

1.1 Purpose

The purpose of this report is to show compliance to the FCC regulations for unintentional radiators operating under section 15.101 ff. of the Code of Federal Regulations title 47.

1.2 Limits and Reservations

The test results in this report apply only to the particular Equipment Under Test (EUT) as declared in this report.

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1.3 Test Location

Company Name: EMCC DR. RAŠEK GmbH & Co. KG
Street: Moggast, Boelwiese 8
City: 91320 Ebermannstadt
Country: Germany
Laboratory: EMCCCons DR. RAŠEK GmbH & Co. KG Test Laboratory IV
located at Stoernhofer Berg 15, 91364 Unterleinleiter, Germany
This site has been fully described in a report submitted to the FCC, and
accepted in the letter dated January 18, 2008, Registration Number 878769.
Phone: +49-9194-9016
Fax: +49-9194-8125
E-Mail: emc.cons@emcc.de
Web: www.emcc.de

1.4 Manufacturer

Company Name: WEER s.r.l.
Street: Regione San Vito, 32/A
City: 14042 Calamandrana (AT)
Country: Italy
Name for contact purposes: Mr Mauro Santamaria
Phone: +39-0141 718079
Cell: +39-334 2007399
E-mail: mauro.santamaria@weer.it

1.5 Dates

Date of receipt of EUT: CW 01/2009
Test date: CW 02/2009

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2 PRODUCT DESCRIPTION

2.1 Equipment Under Test (EUT)

Device: Receiver
 Units: two, CRS100 and CRS120
 Model: CRS100-120
 Serial Number: 001196, 001197
 Power: 10 ... 16 VDC
 Receive Frequency: 6.78 MHz
 Highest frequency used: 20 MHz

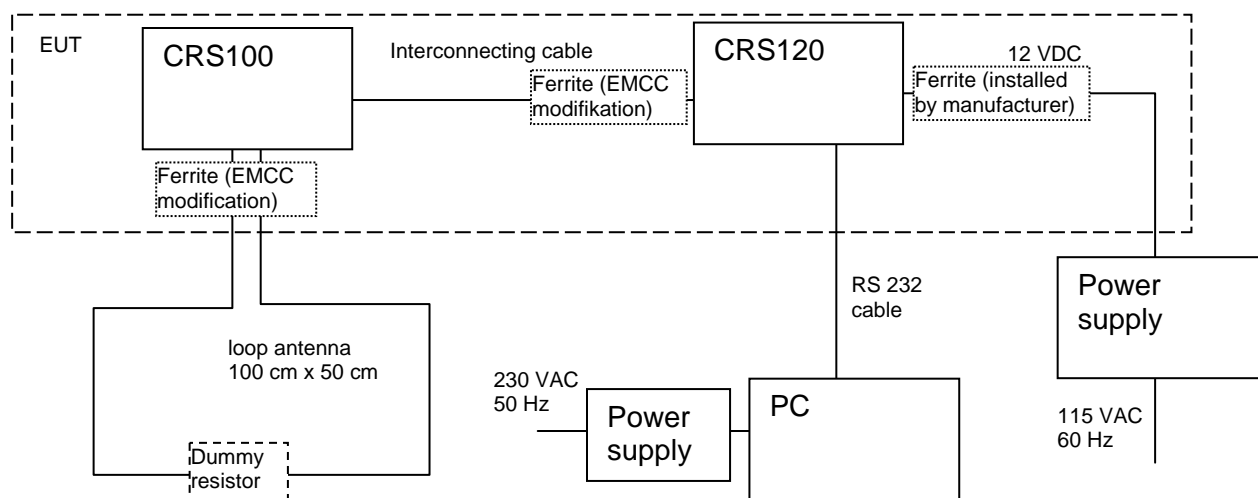
Ports:

Port at unit	Type
CRS100	Loop Antenna
	Interconnecting cable (fix attached)
	Banana sockets *
CRS120	Power DC in
	Interconnecting plug
	RS232 interface
	USB interface *
	Headphone *

* Ports left open during testing, because they are for service purposes, only (as stated by manufacturer).

2.2 System configuration

The EUT consists of receiver box CRS100 and PC interface CRS120 with interconnecting cable.
 A power supply cable (two wires with ferrite) was delivered from the manufacturer together with the two electronic units.
 A receiving loop antenna and a PC for data transfer via RS 232 interface was connected during testing.

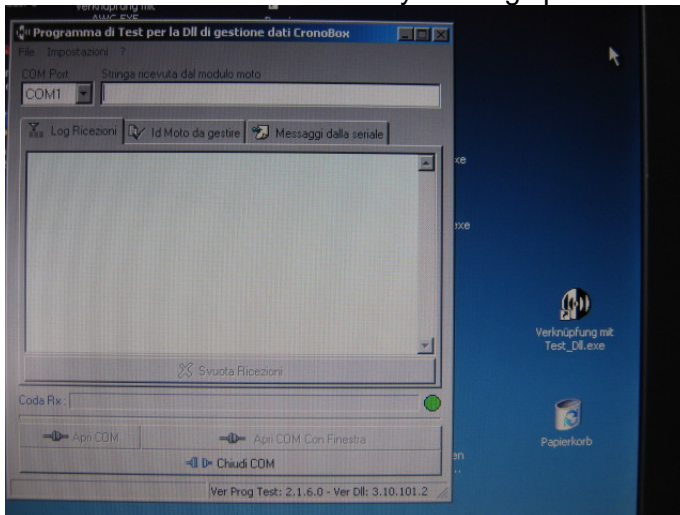


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2.3 EUT Peripherals

The peripherals not belonging to the EUT are:

- PC (provided by the laboratory EMCCons DR. RAŠEK GmbH & Co. KG) to transfer data via RS 232 interface to the CRS120 by running special software (provided by manufacturer),

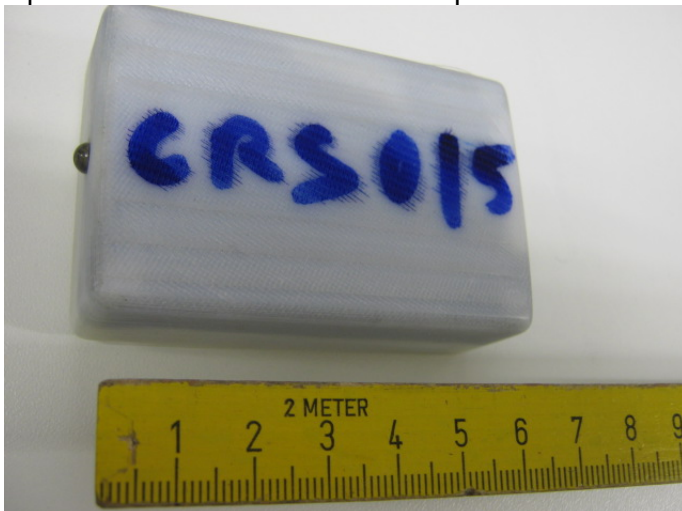


- loop antenna (100 cm x 50 cm, with feeding line, provided by the laboratory EMCCons DR. RAŠEK GmbH & Co. KG) and dummy resistor (provided by manufacturer); emissions were tested with and w/o to get worst case results,
- DC power supply (transformer, rectifier, capacitor, no further regulation; provided by the laboratory EMCCons DR. RAŠEK GmbH & Co. KG).

2.4 Mode of Operation During Testing

The EUT was powered during test (= receiver mode). Specific software was driven on the connected PC to transfer data via RS 232 interface.

Operation was checked with Transponder CRS015:



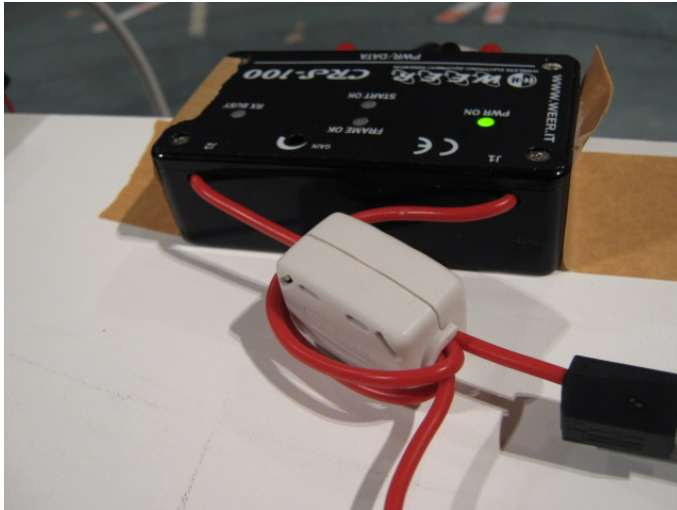
2.5 Modifications Required for Compliance

Clip-on ferrites (Würth 742 711 32) were attached to cables:

- interconnecting cable of the CRS100 at the connector side



- feeding line to loop antenna at CRS100; ferrite with two turns:



3 TEST RESULTS SUMMARY

Summary of Test Results
Receiver, type CRS100-120

3.1.1.1.1 Requirement	CFR Section	Report Section	Test Result
Conducted Emissions	15.107	4	Pass
Radiated Spurious Emissions	15.109, 15.205(b)	5	Pass

The client has made the determination that EUT Condition, Characterization, and Mode of Operation are representative of production units, and meet the requirements of the specifications referenced herein.

Consistent with Industry practice, measurement and test equipment not directly involved in obtaining measurement results but having an impact on measurements (such as cable loss, antenna factors, etc.) are factored into the "Correction Factor" documented in certain test results. Instrumentation employed for testing meets tolerances consistent with known Industry Standards and Regulations.

The measurements contained in this report were made in accordance with the procedure ANSI C63.4 - 2003 and CISPR 22 and all applicable Public Notices received prior to the date of testing. All emissions from the device were found to be within the limits outlined in this report.

The test results in this report apply only to the particular Equipment Under Test (EUT) as declared in this report.

Test Personnel: Reinhard Sauerschell
Issuance Date: 2009-01-09

TEST OF WEER S.R.L. TYPE CRS100-120 TO 47 CFR PART 15B - UNINTENTIONAL RADIATORS

4 CONDUCTED EMISSIONS TESTS

Test Requirement: FCC CFR47, Part 15B

Test Procedure: ANSI C63.4:2003, CISPR 22

4.1 Regulation

Section 15.107 (a) Except for Class A digital devices, for equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 μ H/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the band edges.

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.

(d) Measurements to demonstrate compliance with the conducted limits are not required for devices which only employ battery power for operation and which do not operate from the AC power lines or contain provisions for operation while connected to the AC power lines. Devices that include, or make provision for, the use of battery chargers which permit operating while charging, AC adaptors or battery eliminators or that connect to the AC power lines indirectly, obtaining their power through another device which is connected to the AC power lines, shall be tested to demonstrate compliance with the conducted limits.

4.2 Test Equipment

Type	Manufacturer/ Model No.	EMCC Ident. No.	Last Calibration	Next Calibration
Receiver (30 MHz - 1 GHz)	Rohde & Schwarz ESS	339	2008-11	2009-11
V-LISN 50 ohms/(50 μ H + 5 ohms)	Schwarzbeck NSLK8126	368	2008-01	2010-01
Power supply		568	n/a	n/a
PC laptop		2099	n/a	n/a

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4.3 Test Procedures

For tabletop equipment, the EUT is placed on a 1 meter by 1.5 meters wide and 0.8 meter high nonconductive table that is placed above the groundplane. Floor standing equipment is placed directly on the groundplane. Any supplemental grounding mechanisms are connected, if appropriate. The EUT is connected to its associated peripherals, with any excess I/O cabling bundled to approximately 1 meter. The EUT is connected to a dedicated LISN and all peripherals are connected to a second separate LISN circuit. The LISNs are bonded to the groundplane.

Conducted measurements are made on each current carrying conductor with respect to ground.

The initial step in collecting conducted data is a peak and average scan of the measurement range with an EMI test receiver. The significant peaks are then measured with quasi-peak and average detector.

Conducted Emissions Test Characteristics	
Frequency range	0.15 MHz - 30.0 MHz
Test instrumentation resolution bandwidth	9 / 10 kHz
Lines Tested	Line 1 (L) / Line 2 (N)

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4.4 Test Results

EMCC DR. RASEK

05. Jan 09 10:37

Conducted Interference TEST

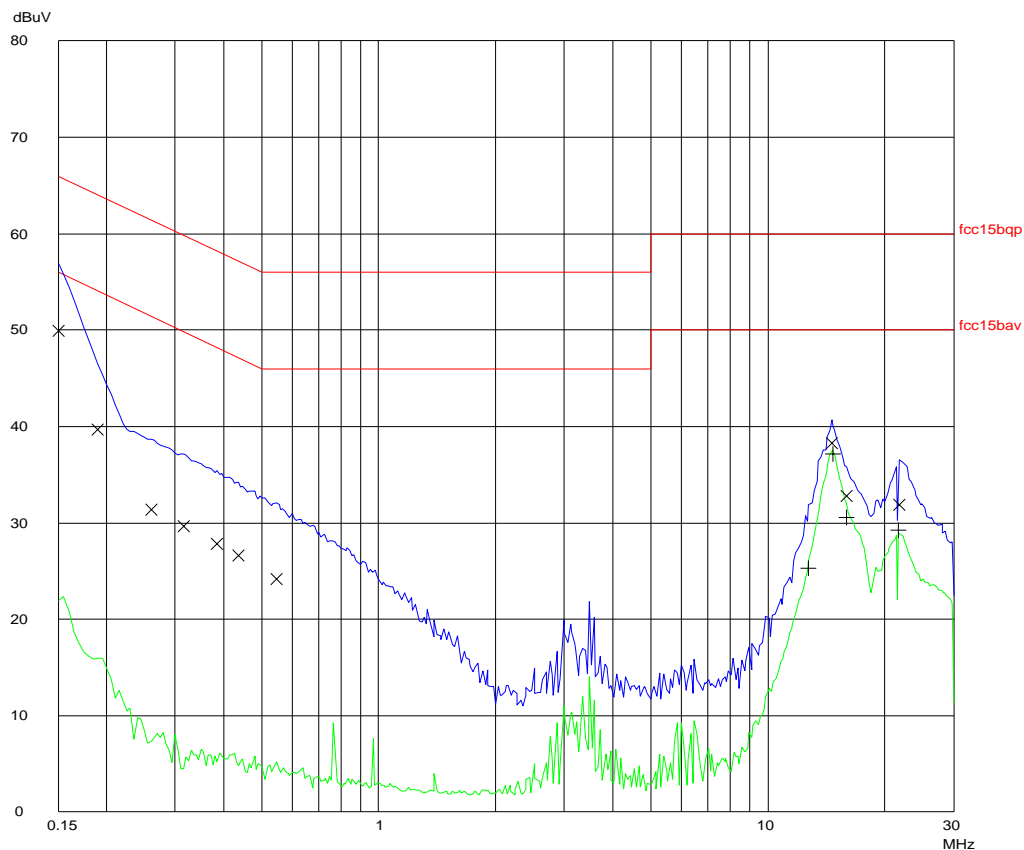
EUT: CRS-120 in conjunction with CRS-100
 Manuf: Weer s.r.l.
 Op Cond: power on, no transponder CRS 015
 Operator: Sauerschell
 Test Spec: FCC Part15, Subpart B, Class B
 Comment: 115 V 60 Hz, test on line I
 EMCC PWRS, with loop wire antenna

Scan Settings (1 Range)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
150k	30M	5k	10k	PK+AV	10ms	AUTO	LN OFF	60dB

Final Measurement: x QP / + AV
 Meas Time: 1 s
 Subranges: 25
 Acc Margin: 25dB

Transducer No.	Start	Stop	Name
1	150k	30M	esh3z2



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TEST OF WEER S.R.L. TYPE CRS100-120 TO 47 CFR PART 15B - UNINTENTIONAL RADIATORS

EMCC DR. RASEK
Conducted Interference TEST

05. Jan 09 10:37

EUT: CRS-120 in conjunction with CRS-100
Manuf: Weer s.r.l.
Op Cond: power on, no transponder CRS 015
Operator: Sauerschell
Test Spec: FCC Part15, Subpart B, Class B
Comment: 115 V 60 Hz, test on line I
EMCC PWRS, with loop wire antenna

Scan Settings (1 Range)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
150k	30M	5k	10k	PK+AV	10ms	AUTO	LN OFF	60dB

Final Measurement Results:

Frequency MHz	QP Level dBuV	QP Limit dBuV
0.15000	49.9	66.0
0.19000	39.7	64.1
0.26000	31.3	61.4
0.31500	29.7	59.8
0.38500	27.8	58.1
0.43500	26.6	57.2
0.54500	24.1	56.0
14.62000	38.3	60.0
15.92000	32.8	60.0
21.82500	31.8	60.0

Frequency MHz	AV Level dBuV	AV Limit dBuV
12.72000	25.3	50.0
14.67000	37.1	50.0
15.97000	30.5	50.0
21.62000	29.2	50.0

* limit exceeded

TEST OF WEER S.R.L. TYPE CRS100-120 TO 47 CFR PART 15B - UNINTENTIONAL RADIATORS

EMCC DR. RASEK
Conducted Interference TEST

05. Jan 09 10:52

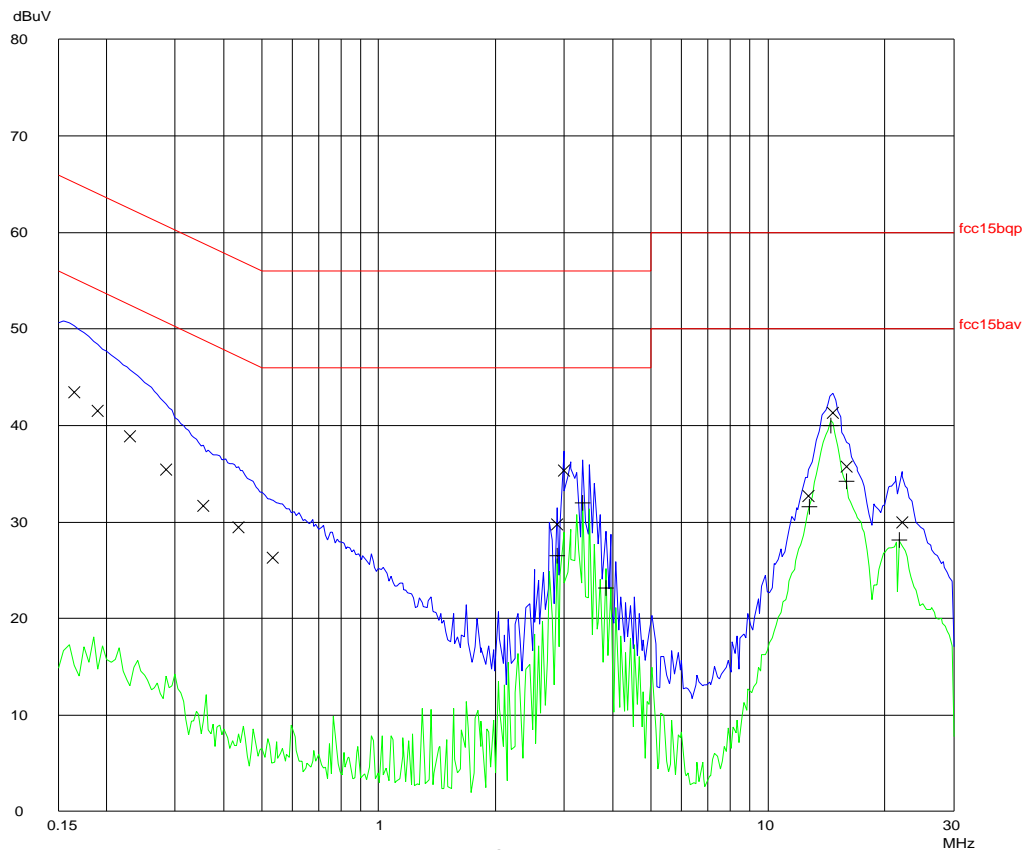
EUT: CRS-120 in conjunction with CRS-100
 Manuf: Weer s.r.l.
 Op Cond: power on, no transponder CRS 015
 Operator: Sauerschell
 Test Spec: FCC Part15, Subpart B, Class B
 Comment: 115 V 60 Hz, test on line 2
 EMCC PWRS, with loop wire antenna

Scan Settings (1 Range)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
150k	30M	5k	10k	PK+AV	10ms	AUTO	LN OFF	60dB

Final Measurement: x QP / + AV
 Meas Time: 1 s
 Subranges: 25
 Acc Margin: 25dB

Transducer No.	Start	Stop	Name
1	150k	30M	esh3z2



PAGE 1

TEST OF WEER S.R.L. TYPE CRS100-120 TO 47 CFR PART 15B - UNINTENTIONAL RADIATORS

EMCC DR. RASEK
Conducted Interference TEST

05. Jan 09 10:52

EUT: CRS-120 in conjunction with CRS-100
Manuf: Weer s.r.l.
Op Cond: power on, no transponder CRS 015
Operator: Sauerschell
Test Spec: FCC Part15, Subpart B, Class B
Comment: 115 V 60 Hz, test on line 2
EMCC PWRS, with loop wire antenna

Scan Settings (1 Range)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
150k	30M	5k	10k	PK+AV	10ms	AUTO	LN OFF	60dB

Final Measurement Results:

Frequency MHz	QP Level dBuV	QP Limit dBuV
0.16500	43.4	65.2
0.19000	41.5	64.1
0.23000	38.8	62.4
0.28500	35.4	60.7
0.35500	31.7	58.8
0.43500	29.4	57.2
0.53500	26.2	56.0
2.87000	29.7	56.0
2.99000	35.3	56.0
12.69500	32.7	60.0
14.69500	41.2	60.0
15.89000	35.7	60.0
22.08000	29.9	60.0

Frequency MHz	AV Level dBuV	AV Limit dBuV
2.87000	26.5	46.0
3.35000	31.9	46.0
3.83000	23.1	46.0
12.79500	31.5	50.0
14.54500	40.0	50.0
15.89000	34.2	50.0
21.73500	28.1	50.0

* limit exceeded

The EUT meets the requirements of this section.Test Personnel: Reinhard Sauerschell
Test Date: 2009-01-05

5 RADIATED EMISSIONS TEST

Test Requirement: FCC CFR47,Part 15B

Test Procedure: CISPR 22

5.1 Regulation

Section 15.109 Radiated emission limits.

(f) For a receiver which employs terminals for the connection of an external receiving antenna, the receiver shall be tested to demonstrate compliance with the provisions of this Section with an antenna connected to the antenna terminals unless the antenna conducted power is measured as specified in Section 15.111(a). If a permanently attached receiving antenna is used, the receiver shall be tested to demonstrate compliance with the provisions of this Section.

(g) As an alternative to the radiated emission limits shown in paragraphs (a) and (b) of this section, digital devices may be shown to comply with the standards contained in Third Edition of the International Special Committee on Radio Interference (CISPR), Pub. 22, "Information Technology Equipment - Radio Disturbance Characteristics - Limits and Methods of Measurement" (incorporated by reference, see § 15.38). In addition:

(1) The test procedure and other requirements specified in this Part shall continue to apply to digital devices.

(3) The measurement distances shown in CISPR Pub. 22, including measurements made in accordance with this paragraph above 1000 MHz, are considered, for the purpose of Section 15.31(f)(4) of this Part, to be the measurement distances specified in the regulations.

Section 15.33 Frequency range of radiated measurements:

(b) For unintentional radiators: (1) Except as otherwise indicated in paragraphs (b)(2) or (b)(3), for an unintentional radiator, including a digital device, the spectrum shall be investigated from the lowest radio frequency signal generated or used in the device, without going below the lowest frequency for which a radiated emission limit is specified, up to the frequency shown in the following table:

Highest frequency generated or used in the device or on which the range device operates or tunes (MHz)	Upper frequency of measurement (MHz)
Below 1.705	30
1.705 - 108	1000
108 - 500	2000
500 - 1000	5000
Above 1000	5th harmonic of the highest frequency or 40 GHz, whichever is lower

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Section 15.35 Measurement detector functions and bandwidths.

(a) On any frequency or frequencies below or equal to 1000 MHz, the limits shown are based on measuring equipment employing a CISPR quasi-peak detector function and related measurement bandwidths, unless otherwise specified. (...)

(b) On any frequency of frequencies above 1000 MHz, the radiated limits shown are based upon the use of measurement instrumentation employing an average detector function. When average radiated emission measurements are specified in the regulations, including emission measurements below 1000 MHz, there is also a limit on the radio frequency emissions, as measured using instrumentation with a peak detector function, corresponding to 20 dB above the maximum permitted average limit for the frequency being investigated unless a different peak emission limit is otherwise specified in the rules, e.g., see Section 15.255. Unless otherwise specified, measurements above 1000 MHz shall be performed using a minimum resolution bandwidth of 1 MHz.

5.2 Test Equipment

Type	Manufacturer/ Model No.	EMCC Ident. No.	Last Calibration	Next Calibration
Receiver (30 MHz - 1 GHz)	Rohde & Schwarz ESS	339	2008-11	2009-11
Antenna (30 MHz - 1 GHz)	EMCO 3143	898	2007-09	2009-09
Power supply		568	n/a	n/a
PC laptop		2099	n/a	n/a

5.3 Test Procedures

For tabletop equipment, the EUT is placed on a 1 meter by 1.5 meters wide and 0.8 meter high nonconductive table that sits on a flush mounted metal turntable. Floor standing equipment is placed directly on the flush mounted metal turntable *[Remark: Not applicable]*. The EUT is connected to its associated peripherals with any excess I/O cabling bundled to approximately 1 meter.

Preview tests are performed to determine the "worst case" mode of operation. With the EUT operating in "worst case" mode, emissions from the unit are maximized by adjusting the polarization and rotating the EUT on the turntable. Manipulating the system cables also maximizes EUT emissions.

Radiated Emissions Test Characteristics	
Frequency range	30 MHz - 1,000 MHz
Test distance	10 m
Test instrumentation resolution bandwidth	120 kHz
Receive antenna scan height	1 m - 4 m
Receive antenna polarization	Vertical/Horizontal

5.4 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor. The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CF$$

where

FS = Field Strength in dB(μV/m)

RA = Receiver Amplitude in dB(μV)

AF = Antenna Factor in dB(1/m)

CF = Cable Attenuation Factor in dB

Assume a receiver reading of 23.5 dB(μV) is obtained. The Antenna Factor of 7.4 dB(1/m) and a Cable Factor of 1.1 dB are added, giving a field strength of 32 dB(μV/m). The 32 dB(μV/m) value can be mathematically converted to its corresponding level in μV/m.

$$FS = 23.5 \text{ dB}(\mu\text{V}) + 7.4 \text{ dB}(1/\text{m}) + 1.1 \text{ dB} = 32 \text{ dB}(\mu\text{V}/\text{m})$$

$$FS = 10^{(32/20)} \mu\text{V}/\text{m} = 39.8 \mu\text{V}/\text{m}$$

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5.5 Test Results

Prescan spectrum at 10 m test distance:

EMCCons DR. RASEK
 Radiated Emissions Prescan d=10m

05. Jan 09 14:22

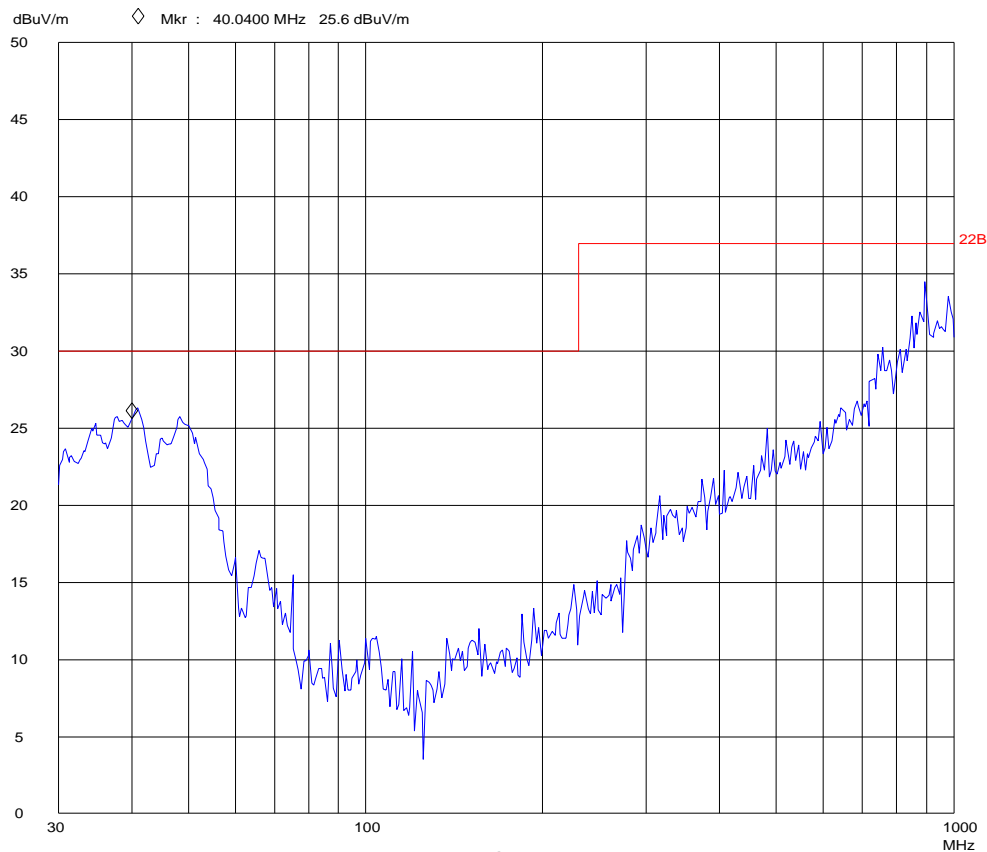
EUT: CRS100, CRS120
 Manuf: WEER
 Op Cond: power on
 Operator: Sauerscheil
 Test Spec: EN 55022B, FCC15B
 Comment: 4 sides, h/v, 4 heights
 with ferrites

Fast Scan Settings (1 Range)

Frequencies				Receiver Settings			
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp OpRge
30M	1000M	40k	120k	PK	0.10ms	0dBLN ON	60dB

Final Measurement: x Hor-Max / + Vert-Max
 Meas Time: 1 s
 Subranges: 25
 Acc Margin: 15dB

Transducer No.	Start	Stop	Name
21	30M	1000M	89821K10



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FINAL RESULTS: PRODUCT EMISSIONS DATA

No	Emission Frequency	Receiver Mode and Bandwidth	Test Distance	Receiver Reading	Correction Factor		Result = Corrected Reading	Spec Limit	Polarization	Margin	Notes
	[MHz]	[kHz]	[m]	RA [dB(μV)]	AF+CF [dB(1/m)]	DF [dB]	FS [dB(μV/m)]	[dB(μV/m)]	Antenna	[dB]	
1	37.9	120, QP	10	12.5	11	0	23.5	30 QP	v	6.5	
2	40	120, QP	10	13.5	10.2	0	23.7	30 QP	v	6.3	
3	41	120, QP	10	14	10	0	24	30 QP	v	6	
4	48.04	120, QP	10	15.2	7.8	0	23	30 QP	v	7	
5	60	120, QP	10	12.9	6.6	0	19.5	30 QP	v	10.5	
6	100	120, QP	10	5.3	7.7	0	13	30 QP	v	17	
7	482	120, QP	10	2.7	21.8	0	24.5	37 QP	h	12.5	

The EUT meets the requirements of this section.

Test Personnel: Reinhard Sauerschell
 Test Date: 2009-01-05

6 MISCELLANEOUS COMMENTS AND NOTES

None.

7 LIST OF ANNEXES

Following annexes are separated parts to this test report.

Description	Pages
Annex 1: Photographs of test setups	3
Annex 2: Photographs of equipment under test (EUT) external views	8
Annex 3: Photographs of equipment under test (EUT) internal views	5