Senton GmbH
Aeussere Fruehlingstrasse 45
D-94315 Straubing

Straubing, December 21 2007

T E S T - R E P O R T

No. 55456-070771-1 (Edition 4)

for

i-PORT M-350

Tag reader for active tags

Applicant:	IDENTEC Solutions AG
Test Specifications:	FCC Code of Federal Regulations, CFR 47, Part 15, Sections 15.107, 15.109, 15.111(a), 15.205, 15.207, 15.215 and 15.249 Industry Canada Radio Standards Specifications RSS-Gen Issue 2, Sections 7.2.2, 7.2.3 and RSS-210 Issue 7, Sections 2.2, A2.9 (Category I Equipment)

Table of Contents

1 Description of the Equipment Under Test (EUT)

General data of EUT	
Type designation[1]:	i-PORT M-350
Parts[2]:	
Serial number(s):	07042M0191
Manufacturer:	IDENTEC Solutions AG
Type of equipment:	Tag reader for active tags
Version:	as received
FCC ID:	
Additional parts/accessories:	

[1] Type designation of the system if EUT consists of more than one part.
[2] Type designations of the parts of the system, if applicable.

Technical data of EUT	
Application frequency range:	902 - 928 MHz
Frequency range:	920 - 921 MHz
Operating frequency:	920 MHz 921 MHz
Type of modulation:	FSK
Pulse train:	---
Pulse width:	---
Number of RF-channels:	2
Channel spacing:	1 MHz
Designation of emissions [3]:	40K0F1D
Type of antennas [4]:	External rod antenna: HG903RD-RSP Elliptical polarized antenna: DH-8195 Linear polarized planar antenna: 900R
Size/length of antennas:	External rod antenna: 219 mm Elliptical polarized antenna: 130 x 130 x 180 mm Linear polarized planar antenna: 335 x 335 mm
Connection of antenna:	☒ detachable ☐ not detachable
Type of power supply:	AC supply
Specifications for power supply:	nominal voltage: 110 V nominal frequency: 60 Hz

[3] Also known as "Class of Emission".
[4] For every antenna the applicant declares a maximum carrier power. The applicant is responsible that the carrier power is not more than the maximum allowed carrier power for each antenna. Please see 5 Operation Mode and Configuration of EUT for details.

2 Administrative Data

Application details	
Applicant (full address):	IDENTEC Solutions AG Millennium Park 2 6890 Lustenau Austria
Contact person:	Mr. Adalgiso Castrignano Mr. Simon Prior
Contract identification:	Email August 29, 2007
Receipt of EUT:	September 24, 2007 November 26, 2007
Date(s) of test:	October 2007 December 2007
Note(s):	

Report details	
Report number:	55456-070771-1
Edition:	4
Issue date:	December 21 2007

3 Identification of the Test Laboratory

Details of the Test Laboratory	
Company name:	Senton GmbH EMI/EMC Test Center
Address:	Aeussere Fruehlingstrasse 45 D-94315 Straubing Germany
Laboratory accreditation:	DAR-Registration No. DAT-P-171/94-02
FCC test site registration number	90926
Industry Canada test site registration:	3050A-1
Contact person:	Mr. Johann Roidt Phone: (+49) (0)9421 5522-0 Fax: (+49) (0)9421 5522-99

4 Summary

Summary of test results
The tested sample complies with the requirements set forth in the **Code of Federal Regulations CFR 47, Part 15, Sections 15.107, 15.109, 15.111(a), 15.205, 15.207, 15.215 and 15.249** of the Federal Communication Commission (FCC) and the **Radio Standards Specifications** **RSS-Gen Issue 2, Section 7.2.2, 6(a), 7.2.3.2, 6(b), 7.2.3.1 and** **RSS-210 Issue 7, Sections 2.2, 2.6, A2.9 (Category I Equipment)** of Industry Canada (IC).

Personnel involved in this report	
Laboratory Manager:	 Mr. Johann Roidt
Responsible for testing:	 Mr. Martin Steindl
Responsible for test report:	Mr. Martin Steindl

5 Operation Mode and Configuration of EUT

Operation Modes
Full tests were performed for transmitting-mode with 920 MHz and 921 MHz. With a nominal carrier power of -3 dBm and receive-mode with the 1/2-Wave-Whip-Antenna. With a nominal carrier power of -8 dBm with the Elliptical-Polarized-Antenna and with a nominal carrier power of -12 dBm with the Linear-Polarized-Antenna. For each antenna the maximum allowed carrier power was used as declared by the applicant.

Configuration of EUT
The EUT was configured as external device of a laptop PC connected to the PC with a RS 442 serial interface convertor. The applicant provided test software to adjust frequency channel and carrier power. The EUT was configured with three antennas: 1/2-Wave-Whip-Antenna, Elliptical-Polarized Antenna and Linear-Polarized Antenna

List of ports and cables

Port	*Description*	*Classification*[5]	*Cable type*	*Cable length*
1	AC supply of AC/DC adapter	ac power	Unshielded	Direct contact
2	DC supply of interface convertor	dc power	Unshielded	2 m
3	USB interface of interface convertor	signal/control port	Shielded	2 m
4	RS 442 Master	signal/control port	Shielded	1 m
5	RS 442 Slave	signal/control port	Shielded	1 m

[5] Ports shall be classified as ac power, dc power or signal/control port

List of devices connected to EUT				
Item	*Description*	*Type Designation*	*Serial no. or ID*	*Manufacturer*
1	1/2-wave length antenna	HG903RD-RSP		Identec
2	Elliptical polarized antenna	DH-8195		Identec
3	Linear polarized antenna	900R		Identec

List of support devices				
Item	*Description*	*Type Designation*	*Serial no. or ID*	*Manufacturer*
1	AC/DC apdater	Type 2123	Part no.: 2123 2450 00	MASCOT
2	USB-442/485 interface convertor	---	---	---

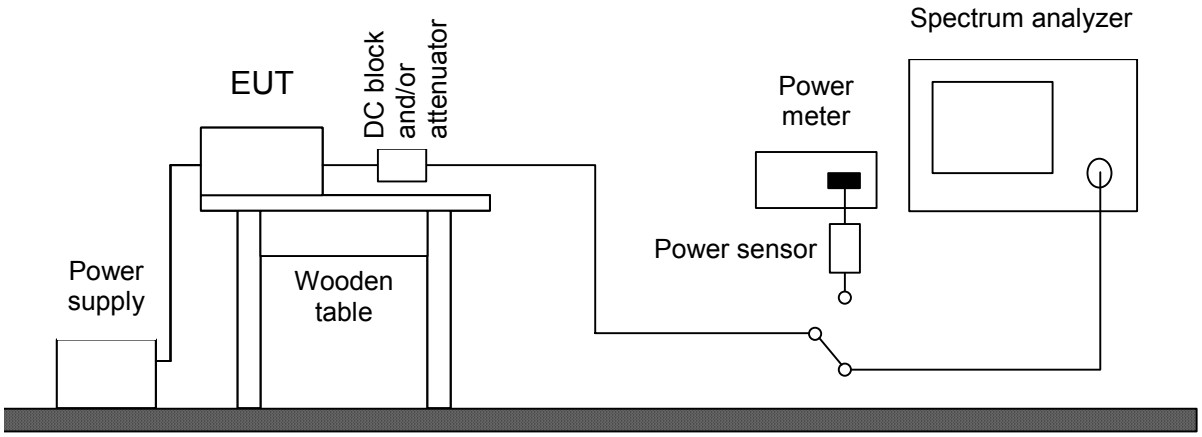
6 Measurement Procedures

6.1 Conducted Output Power

Measurement Procedure:	
Rules and specifications:	CFR 47 Part 2, section 2.1046(a) IC RSS-Gen Issue 2, section 4.8
Guide:	CFR 47 Part 2, section 2.1046 / IC RSS-Gen Issue 2

Conducted output power is measured at the RF output terminals (e.g. antenna connector if antenna is detachable) when the transmitter is adjusted in accordance with the tune-up procedure, if applicable. The RF output terminals are connected to a spectrum analyzer and/or a power meter with appropriate sensor. If required, a resistive matching network equal to the impedance specified or employed for the antenna is used as well as dc block and appropriate attenuators (50 Ohms). The electrical characteristics of the radio frequency load attached to the output terminals shall be stated, if applicable.

If a spectrum analyzer is used and no other settings are specified resolution bandwidth shall be selected according to the carrier frequency f_c and set to 10 kHz (150 kHz ≤ f_c< 30 MHz), 100 kHz (30 MHz ≤ f_c < 1 GHz) or 1 MHz (f_c ≥ 1 GHz). The video bandwidth shall be at least three times greater than the resolution bandwidth. The settings used have to be indicated within the appropriate test record(s).

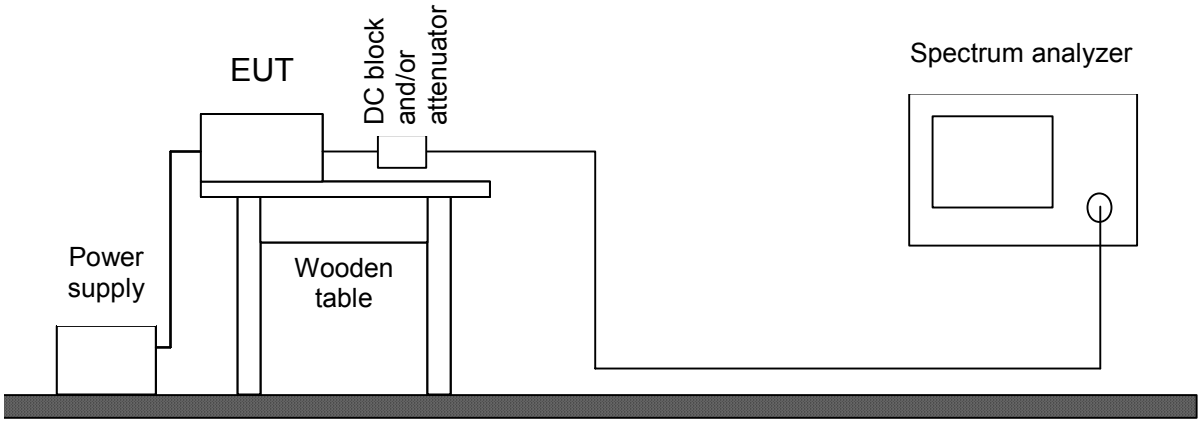


Test instruments used:

Used	Type	Model	Serial No. or ID	Manufacturer
☐	Spectrum Analyzer	FSP 30	100063	Rohde & Schwarz
☐	EMI test receiver	ESPI7	836914/0002	Rohde & Schwarz
☐	EMI test receiver	ESMI	839379/013 839587/006	Rohde & Schwarz
☒	Power meter	NRVS	836856/015	Rohde & Schwarz
☒	Peak power sensor	NRV-Z31	8579604.03	Rohde & Schwarz
☐	Power sensor	NRV-Z52	837901/030	Rohde & Schwarz
☐	Power sensor	NRV-Z4	863828/015	Rohde & Schwarz
☐	DC-block	7006	A2798	Weinschel
☐	Attenuator	4776-10	9412	Narda
☐	Attenuator	4776-20	9503	Narda

6.2 Bandwidth Measurements

Measurement Procedure:	
Rules and specifications:	CFR 47 Part 2, section 2.202(a) CFR 47 Part 15, section 15.215(c) IC RSS-Gen Issue 2, sections 4.6.1 and 4.6.2 IC RSS-210 Issue 7, section A1.1.3 ANSI C63.4, annex H.6
Guide:	ANSI C63.4 / IC RSS-Gen Issue 2, sections 4.6.1 and 4.6.2
Measurement setup:	☒ Conducted: See below ☐ Radiated: Radiated Emission in Fully or Semi Anechoic Room (6.5)
If antenna is detachable bandwidth measurements shall be performed at the antenna connector (conducted measurement) when the transmitter is adjusted in accordance with the tune-up procedure, if applicable. The RF output terminals are connected to a spectrum analyzer. If required, a resistive matching network equal to the impedance specified or employed for the antenna is used as well as dc block and appropriate attenuators (50 Ohms). The electrical characteristics of the radio frequency load attached to the output terminals shall be stated, if applicable. If radiated measurements are performed the same test setups and instruments are used as with radiated emission measurements for the appropriate frequency range. The analyzer settings are specified by the test description of the appropriate test record(s).	



Test instruments used for conducted measurements:

Used	Type	Model	Serial No. or ID	Manufacturer
☐	Spectrum Analyzer	FSP 30	100063	Rohde & Schwarz
☒	EMI test receiver	ESPI7	836914/0002	Rohde & Schwarz
☐	EMI test receiver	ESMI	839379/013 839587/006	Rohde & Schwarz
☐	Power meter	NRVS	836856/015	Rohde & Schwarz
☐	Peak power sensor	NRV-Z31	8579604.03	Rohde & Schwarz
☐	Power sensor	NRV-Z52	837901/030	Rohde & Schwarz
☐	Power sensor	NRV-Z4	863828/015	Rohde & Schwarz
☐	DC-block	7006	A2798	Weinschel
☐	Attenuator	4776-10	9412	Narda
☐	Attenuator	4776-20	9503	Narda

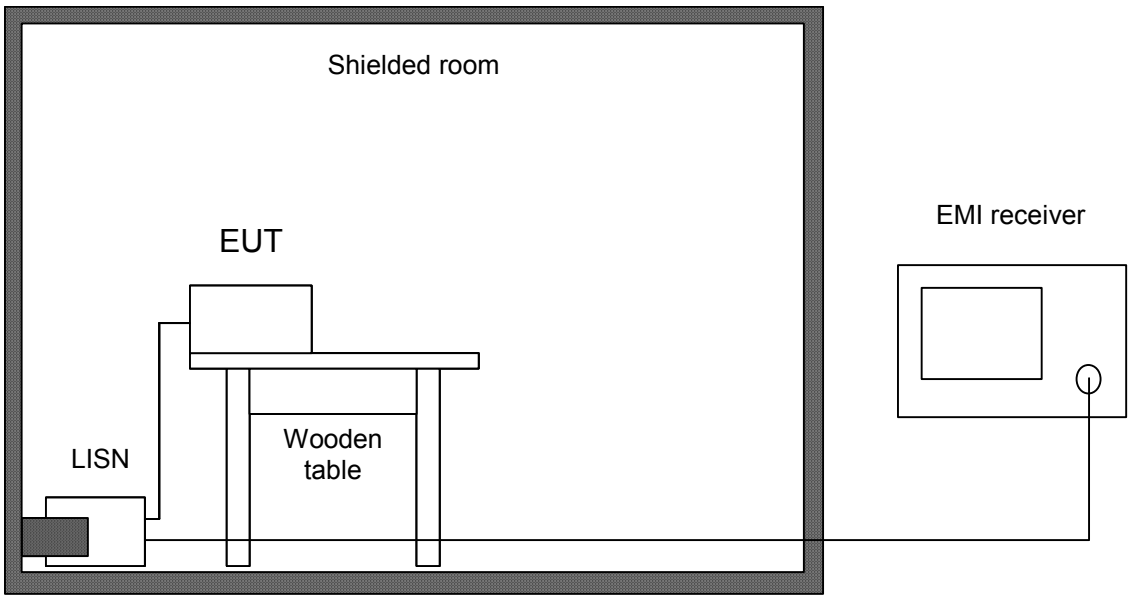
6.3 Conducted AC Powerline Emission

Measurement Procedure:	
Rules and specifications:	CFR 47 Part 15, sections 15.107 and 15.207 IC RSS-Gen Issue 2, section 7.2.2
Guide:	ANSI C63.4 (CISPR 22)

Conducted emission tests in the frequency range 150 kHz to 30 MHz are performed using Line Impedance Stabilization Networks (LISNs). To simplify testing with quasi-peak and average detector the following procedure is used:

First the whole spectrum of emission caused by the equipment under test (EUT) is recorded with detector set to peak using CISPR bandwidth of 10 kHz. After that all emission levels having less margin than 10 dB to or exceeding the average limit are retested with detector set to quasi-peak.
If average limit is kept with quasi-peak levels no additional scan with average detector is necessary. In cases of emission levels between quasi-peak and average limit an additional scan with detector set to average is performed.

According to ANSI C63.4, section 13.1.3.1, testing of intentional radiators with detachable antenna shall be performed using a suitable dummy load connected to the antenna output terminals. Otherwise, the tests shall be made with the antenna connected and, if adjustable, fully extended.
Testing with dummy load may be necessary to distinguish (unintentional) conducted emissions on the supply lines from (intentional) emissions radiated by the antenna and coupling directly to supply lines and/or LISN. Usage of dummy load has to be stated in the appropriate test record(s) and notes should be added to clarify the test setup.



Test instruments used:

Used	Type	Model	Serial No. or ID	Manufacturer
☒	EMI receiver	ESHS 10	860043/016	Rohde & Schwarz
☒	LISN	ESH3-Z5	862770/021	Rohde & Schwarz
☐	LISN	ESH3-Z5	830952/025	Rohde & Schwarz
☐	Artificial mains network	ESH 2-Z5	842966/004	Rohde & Schwarz
☐	Shielded room	No. 1	1451	Albatross Projects
☒	Shielded room	No. 4	3FD-100 544	Euroshield

6.4 Radiated Emission Measurement 9 kHz to 30 MHz

Measurement Procedure:	
Rules and specifications:	CFR 47 Part 15, sections 15.205 and 15.209 IC RSS-210 Issue 7, sections 2.2 and 2.6
Guide:	ANSI C63.4

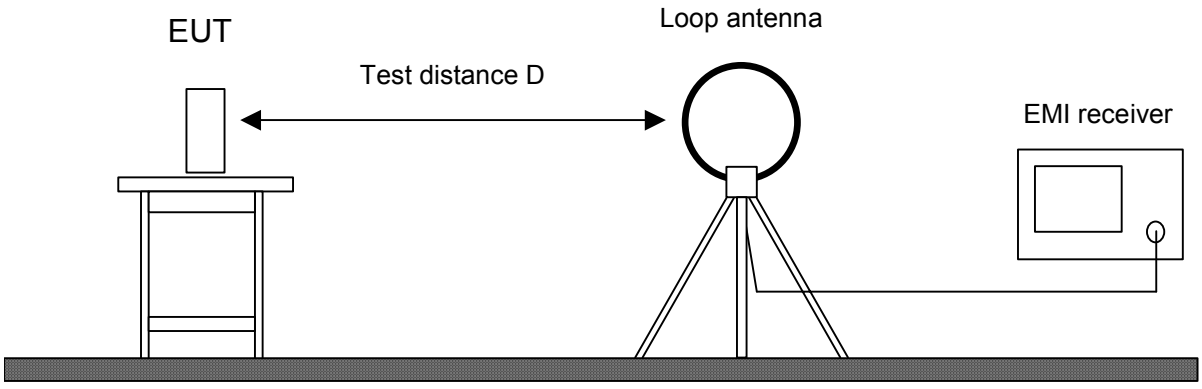
Radiated emission in the frequency range 9 kHz to 30 MHz is measured using an active loop antenna. First the whole spectrum of emission caused by the equipment is recorded at a distance of 3 meters in a fully or semi anechoic room with the detector of the spectrum analyzer or EMI receiver set to peak. This configuration is also used for recording the spectrum of intentional radiators.

Hand-held or body-worn devices are rotated through three orthogonal axes to determine which attitude and configuration produces the highest emission relative to the limit and therefore shall be used for final testing.

EUT is rotated all around to find the maximum levels of emissions. Equipment and cables are placed and moved within the range of position likely to find their maximum emissions.
If worst case emission of the EUT cannot be recorded with EUT in standard position and loop antenna in vertical polarization the EUT (or the radiating part of the EUT) is rotated by 90 degrees instead of changing the loop antenna to horizontal polarization. This procedure is selected to minimize the influence of the environment (e.g. effects caused by the floor especially with longer distances).

Final measurement is performed at a test distance D of 30 meters using an open field test site. In case the regulation requires testing at other distances, the result is extrapolated by either making measurements at an additional distance D of 10 meters to determine the proper extrapolation factor or by using the square of an inverse linear distance extrapolation factor (40 dB/decade). In cases of very low emissions measurements are performed at shorter distances and results are extrapolated to the required distance. The provisions of CFR 47 Part 15 sections 15.31(d) and (f)(2) apply. According to CFR 47 Part 15 section 15.209(d) final measurement is performed with detector function set to quasi-peak except for the frequency bands 9 to 90 kHz and 110 to 490 kHz where, for non-pulsed operation, average detector is employed.

If the radiated emission limits are expressed in terms of the average value of the emission there also is a peak limit corresponding to 20 dB above the maximum permitted average limit. Additionally, if pulsed operation is employed, the average field strength is determined by averaging over one complete pulse train, including blanking intervals, as specified in CFR 47 Part 15 section 15.35(c). If the pulse train exceeds 0.1 second that 0.1 second interval during which the value of the emission is at its maximum is selected for calculation. The pulse train correction is added to the peak value of the emission to get the average value.



Test instruments used:

Used	Type	Model	Serial No. or ID	Manufacturer
☒	Spectrum Analyzer	FSP 30	100063	Rohde & Schwarz
☐	EMI test receiver	ESMI	839379/013 839587/006	Rohde & Schwarz
☒	Test receiver	ESHS 10	860043/016	Rohde & Schwarz
☐	Preamplifier	CPA9231A	3393	Schaffner
☒	Loop antenna	HFH2-Z2	882964/1	Rohde & Schwarz
☒	Fully anechoic room	No. 2	1452	Albatross Projects
☐	Semi-anechoic room	No. 3	1453	Siemens
☒	Open field test site	EG 1	1450	Senton

6.5 Radiated Emission in Fully or Semi Anechoic Room

Measurement Procedure:	
Rules and specifications:	CFR 47 Part 15, sections 15.109, 15.215(b) and 15.249 IC RSS-Gen Issue 2, sections 6(a), 7.2.3.2 IC RSS-210 Issue 7, section A2.9
Guide:	ANSI C63.4

Radiated emission in fully or semi anechoic room is measured in the frequency range from 30 MHz to the maximum frequency as specified in CFR 47 Part 15 section 15.33.

Measurements are made in both the horizontal and vertical planes of polarization in a fully anechoic room using a spectrum analyzer with the detector function set to peak and resolution as well as video bandwidth set to 100 kHz (below 1 GHz) or 1 MHz (above 1 GHz).

Testing up to 1 GHz is performed with a linear polarized logarithmic periodic antenna combined with a 4:1 broadband dipole ("Trilog broadband antenna"). For testing above 1 GHz horn antennas are used.

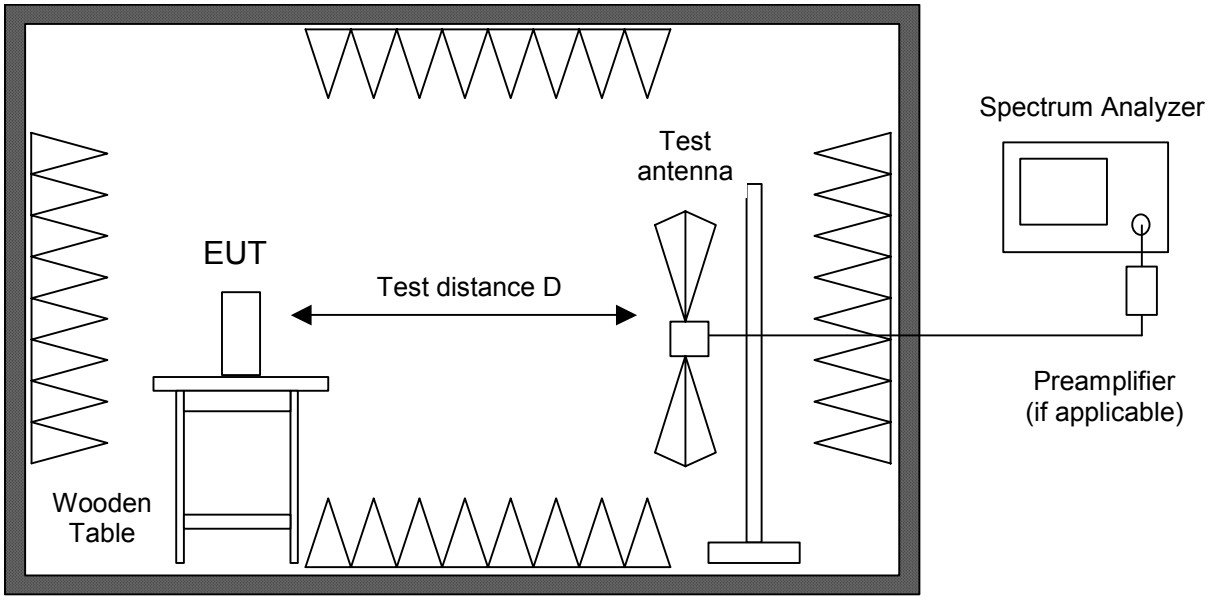
All tests below 18 GHz are performed at a test distance D of 3 meters. For higher frequencies the test distance is reduced (e.g. to 1 meter) due to the sensitivity of the measuring instrument(s) and the test results are calculated according to CFR 47 Part 15 section 15.31(f)(1) using an extrapolation factor of 20 dB/decade. If required, preamplifiers are used for the whole frequency range. Special care is taken to avoid overload, using appropriate attenuators and filters, if necessary.

If the radiated emission limits are expressed in terms of the average value of the emission there also is a peak limit corresponding to 20 dB above the maximum permitted average limit. Additionally, if pulsed operation is employed, the average field strength is determined by averaging over one complete pulse train, including blanking intervals, as specified in CFR 47 Part 15 section 15.35(c). If the pulse train exceeds 0.1 second that 0.1 second interval during which the value of the emission is at its maximum is selected for calculation. The pulse train correction is added to the peak value of the emission to get the average value.

Hand-held or body-worn devices are rotated through three orthogonal axes to determine which attitude and configuration produces the highest emission relative to the limit and therefore shall be used for final testing.

During testing the EUT is rotated all around to find the maximum levels of emissions. Equipment and cables are placed and moved within the range of position likely to find their maximum emissions.

For final testing below 1 GHz an open field test-site is used and the plots recorded in the fully or semi anechoic room are indicated as prescans.



Fully or semi anechoic room

Test instruments used:

Used	Type	Model	Serial No. or ID	Manufacturer
☒	Spectrum Analyzer	FSP 30	100063	Rohde & Schwarz
☐	Spectrum analyzer	R 3271	05050023	Advantest
☐	EMI test receiver	ESMI	839379/013 839587/006	Rohde & Schwarz
☒	Preamplifier	CPA9231A	3393	Schaffner
☐	Preamplifier	R14601		Advantest
☒	Preamplifier 1-8 GHz	AFS3-00100800-32-LN	847743	Miteq
☒	Preamplifier 0.5-8 GHz	AMF-4D-005080-25-13P	860149	Miteq
☐	Preamplifier 8-18 GHz	ACO/180-3530	32641	CTT
☐	External Mixer	WM782A	845881/005	Tektronix
☐	Harmonic Mixer Accessories	FS-Z30	843389/007	Rohde & Schwarz
☒	Trilog broadband antenna	VULB 9163	9163-188	Schwarzbeck
☒	Horn antenna	3115	9508-4553	EMCO
☐	Horn antenna	3160-03	9112-1003	EMCO
☐	Horn antenna	3160-04	9112-1001	EMCO
☒	Horn antenna	3160-05	9112-1001	EMCO
☒	Horn antenna	3160-06	9112-1001	EMCO
☒	Horn antenna	3160-07	9112-1008	EMCO
☐	Horn antenna	3160-08	9112-1002	EMCO
☐	Horn antenna	3160-09	9403-1025	EMCO
☐	Horn antenna	3160-10	399185	EMCO
☐	Fully anechoic room	No. 2	1452	Albatross Projects
☐	Semi-anechoic room	No. 3	1453	Siemens

6.6 Radiated Emission at Open Field Test Site

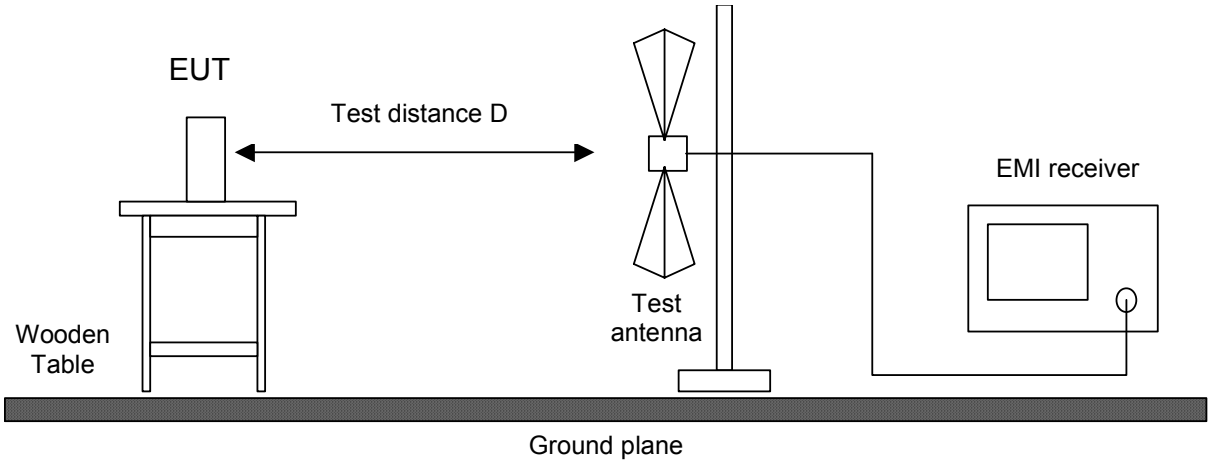
Measurement Procedure:	
Rules and specifications:	CFR 47 Part 15, sections 15.109, 15.215(b) and 15.249 IC RSS-Gen Issue 2, sections 6(a), 7.2.3.2 IC RSS-210 Issue 7, section A2.9
Guide:	ANSI C63.4

Radiated emission at open field test site is measured in the frequency range 30 MHz to 1 GHz using a biconical antenna up to 300 MHz and a logarithmic periodic antenna above. The measurement bandwidth of the test receiver is set to 120 kHz with quasi-peak detector selected.

If the radiated emission limits are expressed in terms of the average value of the emission there also is a peak limit corresponding to 20 dB above the maximum permitted average limit. Additionally, if pulsed operation is employed, the average field strength is determined by averaging over one complete pulse train, including blanking intervals, as specified in CFR 47 Part 15 section 15.35(c). If the pulse train exceeds 0.1 second that 0.1 second interval during which the value of the emission is at its maximum is selected for calculation. The pulse train correction is added to the peak value of the emission to get the average value.

Hand-held or body-worn devices are tested in the position producing the highest emission relative to the limit as verified by prescans in the fully anechoic room. EUT is rotated all around and receiving antenna is raised and lowered within 1 meter to 4 meters to find the maximum levels of emission. Equipment and cables are placed and moved within the range of position likely to find their maximum emissions.

For measuring emissions of intentional radiators and receivers a test distance D of 3 meters is selected. Testing of unintentional radiators is performed at a distance of 10 meters. If limits specified for 3 meters shall be used for measurements performed at 10 meters distance the limits are calculated according to CFR 47 Part 15 section 15.31(d) and (f)(1) using an inverse linear-distance extrapolation factor of 20 dB/decade.



Test instruments used:

Used	Type		Model	Serial No. or ID	Manufacturer
☒	EMI receiver		ESVP	881120/024	Rohde & Schwarz
☒	Biconical antenna	EG 1	HK 116	842204/001	Rohde & Schwarz
☒	Log. per. antenna	EG 1	HL 223	841516/023	Rohde & Schwarz
☒	Open field test site		EG 1	1450	Senton

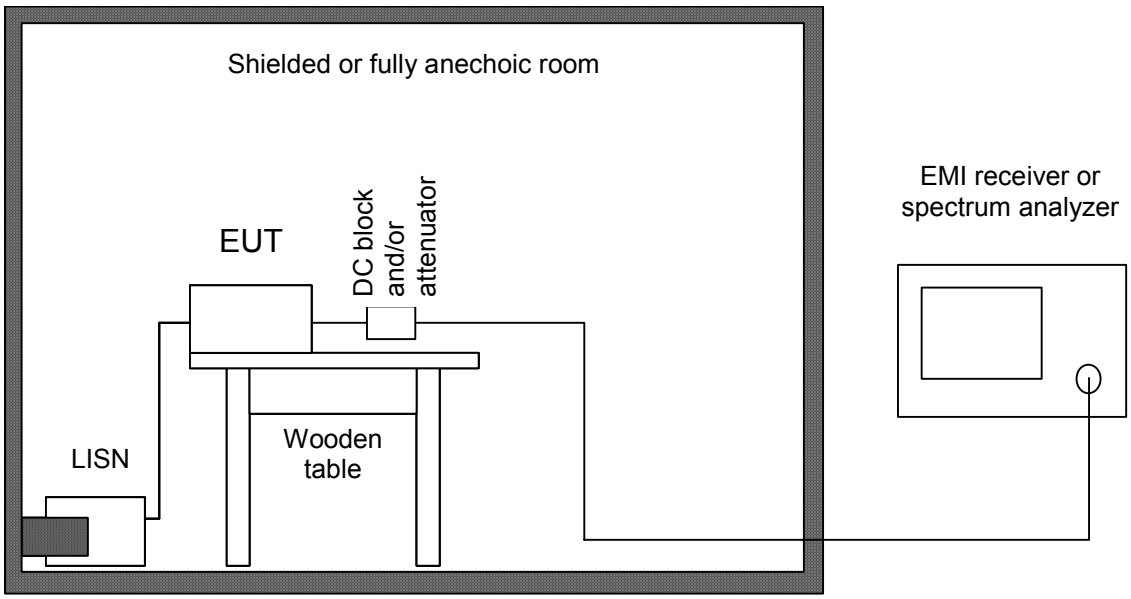
6.7 Antenna Power Conduction Emission of Receivers

Measurement Procedure:	
Rules and specifications:	CFR 47 Part 15, section 15.111(a) IC RSS-Gen Issue 2, sections 6(b) and 7.2.3.1
Guide:	ANSI C63.4

The receiver antenna terminal is connected to the spectrum analyzer. If required, a resistive matching network equal to the impedance specified or employed for the antenna is used as well as dc block and appropriate attenuators (50 Ohms). The power at the antenna terminal is measured in the frequency range as specified in CFR 47 Part 15 section 15.33.

The peak detector of the spectrum analyzer is selected and resolution as well as video bandwidth are set to 100 kHz (below 1 GHz) or 1 MHz (above 1 GHz).

If required, preamplifiers are used. Special care is taken to avoid overload (using appropriate attenuators and filters if necessary).

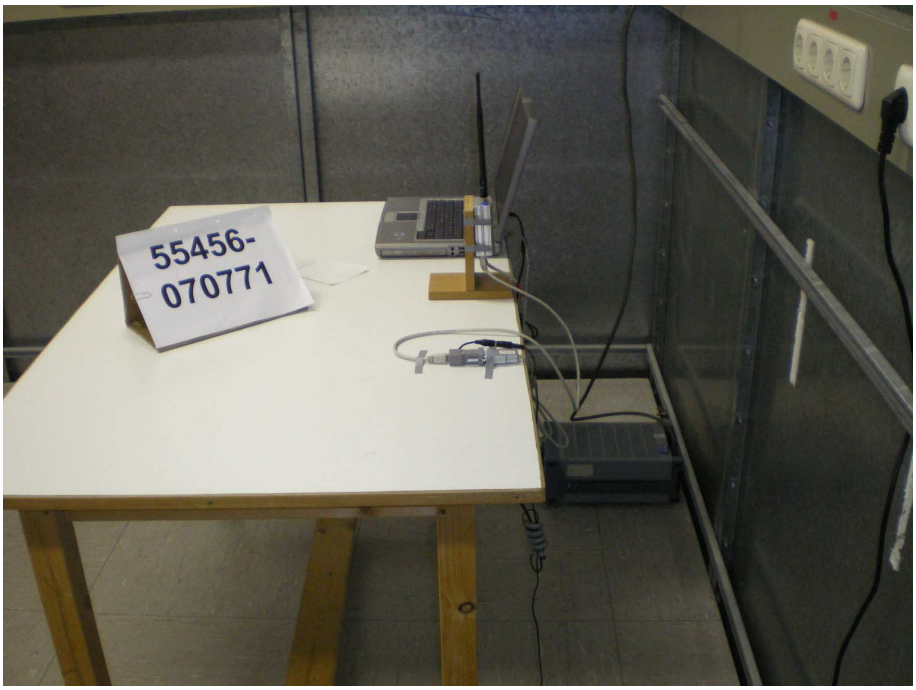


Test instruments used:

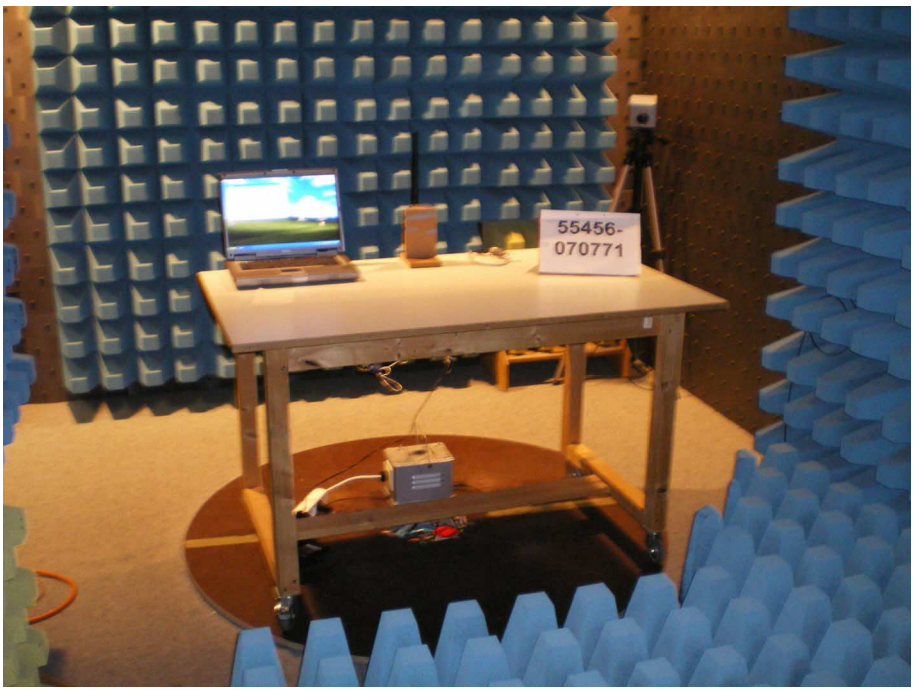
Used	Type	Model	Serial No. or ID	Manufacturer
☒	Spectrum Analyzer	FSP 30	100063	Rohde & Schwarz
☐	EMI test receiver	ESMI	839379/013 839587/006	Rohde & Schwarz
☒	DC-block	7006	A2798	Weinschel
☐	Attenuator	4776-10	9412	Narda
☐	Attenuator	4776-20	9503	Narda
☐	Preamplifier	CPA9231A	3393	Schaffner
☐	Preamplifier 1-8 GHz	AFS3-00100800-32-LN	847743	Miteq
☐	Preamplifier 0.5-8 GHz	AMF-4D-005080-25-13P	860149	Miteq
☐	Preamplifier 8-18 GHz	ACO/180-3530	32641	CTT
☐	Shielded room	No. 1	1451	Albatross Projects
☒	Fully anechoic room	No. 2	1452	Albatross Projects
☐	Shielded room	No. 4	3FD-100 544	Euroshield
☐	Shielded room	No. 5	5468	Ray Proof Division

7 Photographs Taken During Testing

Test setup for conducted AC powerline emission measurement



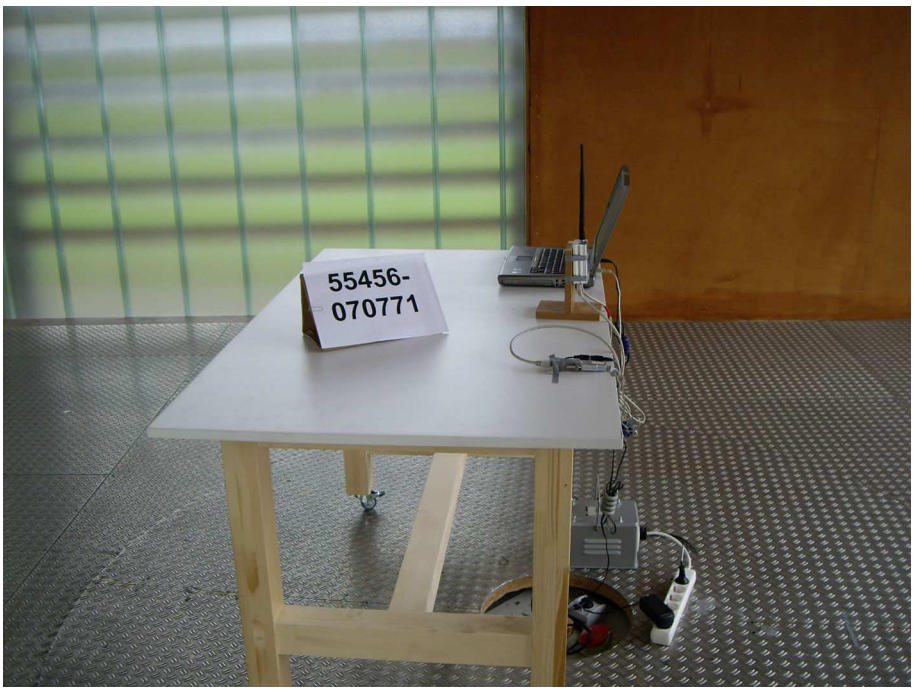
Test setup for radiated emission measurement (fully anechoic room)



Test setup for radiated emission measurement (fully anechoic room) - continued

Test setup for radiated emission measurement (fully anechoic room) - continued

Test setup for radiated emission measurement (open field test site)



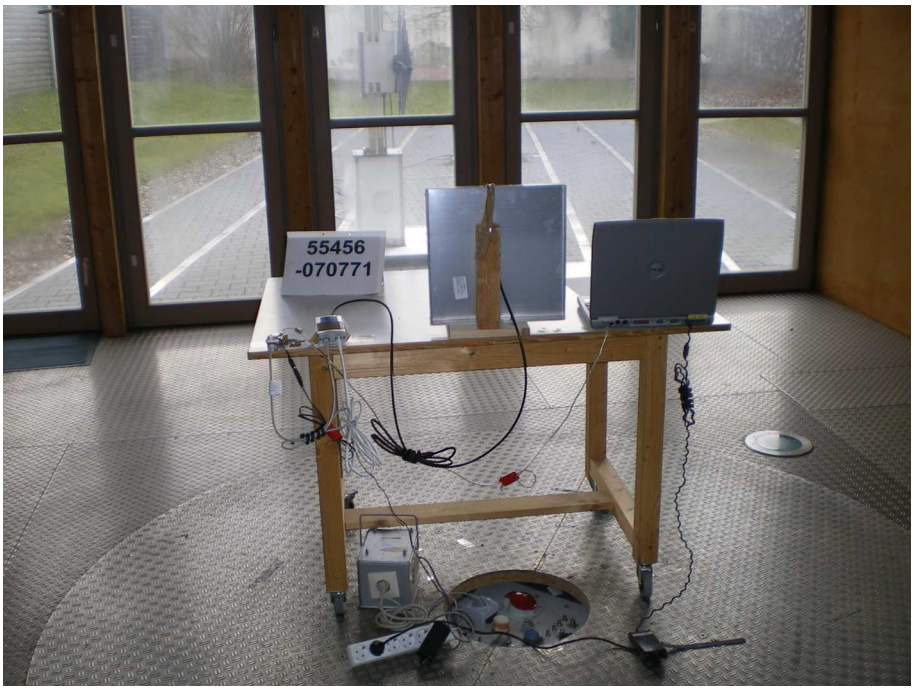
Test setup for radiated emission measurement (open field test site) - continued -

Test setup for radiated emission measurement (open field test site) - continued -

Test setup for radiated emission measurement (open field test site) - continued -

Test setup for radiated emission measurement (open field test site) - continued -

Test setup for radiated emission measurement (open field test site) - continued -



8 Test Results for Transmitter

FCC CFR 47 Parts 2 and 15			
Section(s)	*Test*	*Page*	*Result*
2.1046(a)	Conducted output power	36	Recorded
2.202(a)	Occupied bandwidth	37	Recorded
15.215(c)	Bandwidth of the emission	41	Test passed
2.201, 2.202	Class of emission	44	Calculated
15.205(a)	Restricted bands of operation	45	Test passed
15.207	Conducted AC powerline emission 150 kHz to 30 MHz	47	Test passed
15.205(b) 15.249	Radiated emission 9 kHz to 30 MHz	48	Test passed
15.205(b) 15.215(b) 15.249	Radiated emission 30 MHz to 10 GHz	52	Test passed

IC RSS-Gen Issue 2			
Section(s)	*Test*	*Page*	*Result*
4.8	Transmitter output power (conducted)	36	Recorded
4.6.1	Occupied Bandwidth	37	Recorded
3.2(h), 8	Designation of emissions	44	Calculated
7.2.2	Transmitter AC power lines conducted emissions 150 kHz to 30 MHz	47	Test passed
5.5	Exposure of Humans to RF Fields	63	Exempted from SAR and RF evaluation

IC RSS-210 Issue 7			
Section(s)	*Test*	*Page*	*Result*
2.2(a)	Restricted bands and unwanted emission frequencies	45	Test passed
2.2(b)(c), 2.6 A2.9	Unwanted emissions 9 kHz to 30 MHz	48	Test passed
2.2(b)(c), 2.6 A2.9	Unwanted emissions 30 MHz to 10 GHz	52	Test passed

8.1 Conducted Output Power

Rules and specifications:	CFR 47 Part 2, section 2.1046(a) IC RSS-Gen Issue 2, section 4.8
Guide:	CFR 47 Part 2, section 2.1046 / IC RSS-Gen Issue 2
Description:	Conducted output power shall be measured at the RF output terminals (e.g. antenna connector if antenna is detachable) when the transmitter is adjusted in accordance with the tune-up procedure, if applicable. The electrical characteristics of the radio frequency load attached to the output terminals when this test is made shall be stated.
Measurement procedure:	Conducted Output Power (6.1)

Comment:	Nominal carrier power: -3 dBm
Date of test:	October 10, 2007
Test site:	Unshielded room

Antenna gain: dBi

Mode	Frequency (MHz)	Power Type	Reading (dBm)	Correction (dB)	Output Power (dBm)	Limit (dBm)	Margin (dB)
	920.0	PEP	-1.9	0.0	-1.9		
	921.0	PEP	-1.9	0.0	-1.9		

Note 1: If applicable, PEP (peak envelope power) and RMS values are measured using a power meter with appropriate sensor.

Note 2: If applicable, peak or average values are measured using a spectrum analyzer with resolution and video bandwidth set to: RBW = ..., VBW = ...

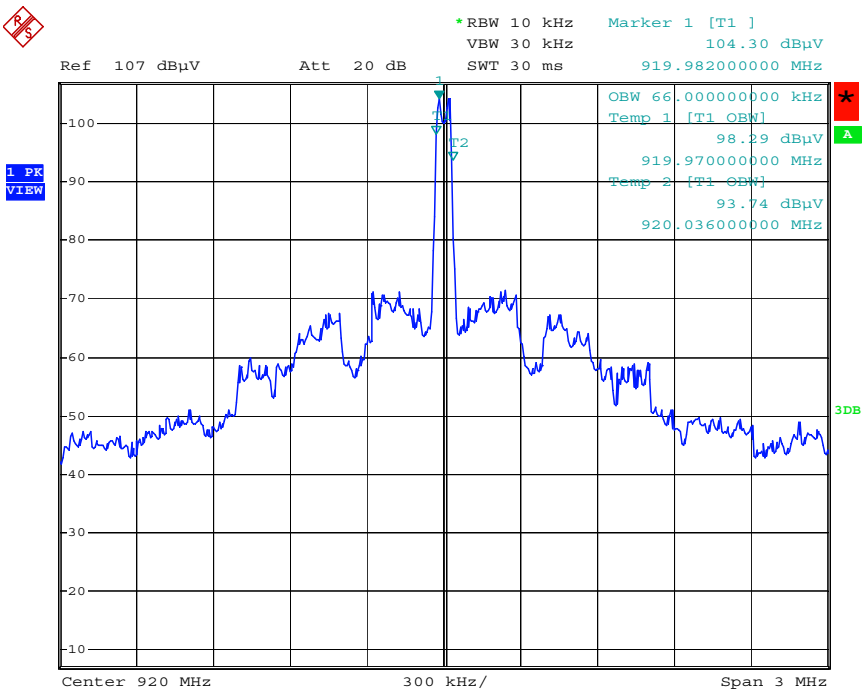
Note 3: If transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power limit is reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

8.2 Occupied Bandwidth

Rules and specifications:	CFR 47 Part 2, section 2.202(a) ANSI C63.4, annex H.6	
Guide:	ANSI C63.4	
Description:	The occupied bandwidth according to CFR 47 Part 2, section 2.202(a), is measured as the 99% emission bandwidth, i.e. below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5% of the total mean power radiated by a given emission. The occupied bandwidth according to ANSI C63.4, annex H.6; is measured as the frequency range defined by the points that are 26 dB down relative to the maximum level of the modulated carrier. The resolution bandwidth of the spectrum analyzer shall be set to a value greater than 5.0% of the allowed bandwidth. If no bandwidth specifications are given, the following guidelines are used:	
	Fundamental frequency	Minimum resolution bandwidth
	9 kHz to 30 MHz	1 kHz
	30 MHz to 1000 MHz	10 kHz
	1000 MHz to 40 GHz	100 kHz
	The video bandwidth shall be at least three times greater than the resolution bandwidth.	
Measurement procedure:	Bandwidth Measurements (6.2)	

Comment:	
Date of test:	October 10, 2007
Test site:	Fully anechoic room, cabin no. 2

Occupied Bandwidth (99 %):



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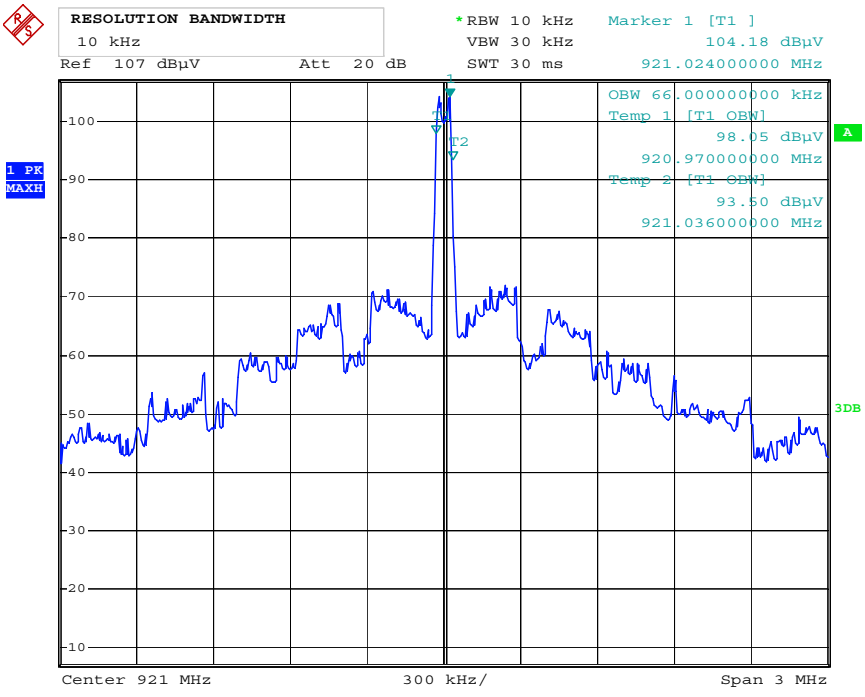

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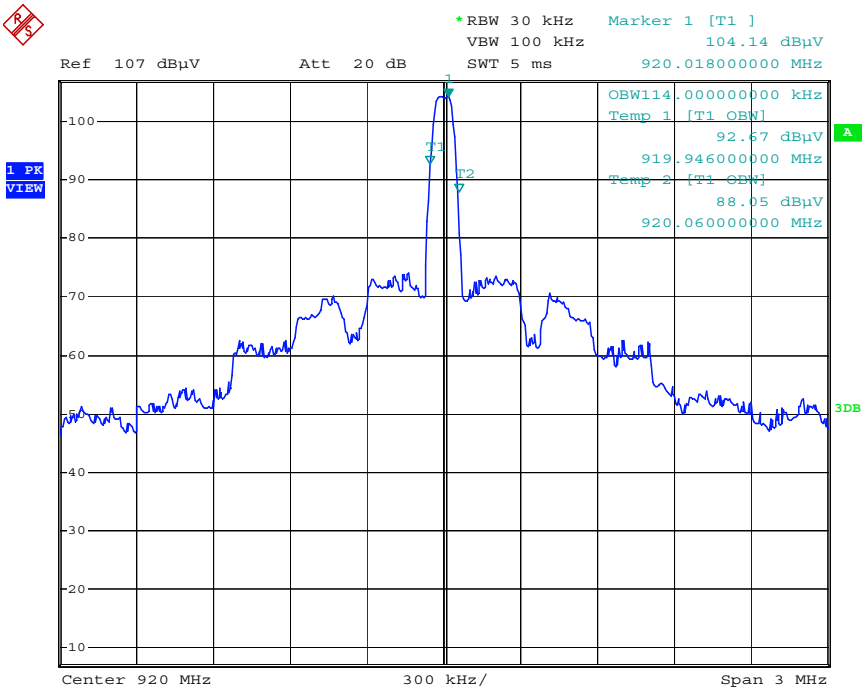
Occupied Bandwidth (99 %):	**66.0 kHz**

Occupied Bandwidth (continued)

Rules and specifications:	IC RSS-Gen Issue 2, section 4.6.1
Guide:	IC RSS-Gen Issue 2, section 4.6.1
Description:	If not specified in the applicable RSS the occupied bandwidth is measuredas the 99% emission bandwidth. The span of the analyzer shall be set to capture all products of the modulation process, including the emission skirts. The resolution bandwidth shall be set to as close to 1% of the selected span as is possible without being below 1%. The video bandwidth shall be set to 3 times the resolution bandwidth. The trace data points are recovered and are directly summed in linear terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5% of the total is reached and that frequency recorded. The process is repeated for the highest frequency data points. This frequency is also recorded. The span between the two recorded frequencies is the occupied bandwidth.
Measurement procedure:	Bandwidth Measurements (6.2)

Comment:	
Date of test:	October 10, 2007
Test site:	Fully anechoic room, cabin no. 2

Occupied Bandwidth (99 %):



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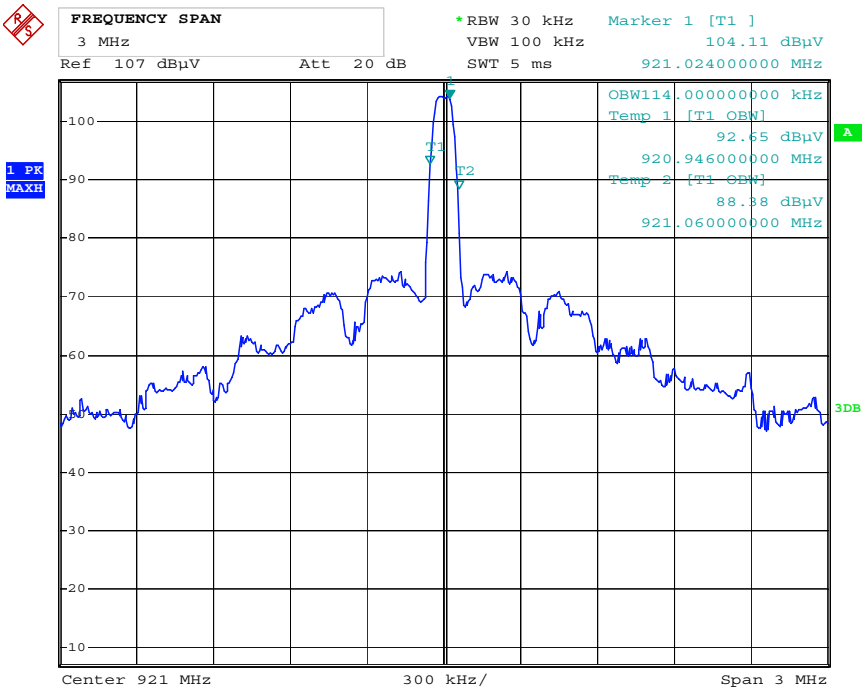

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Occupied Bandwidth (99 %):	**114 kHz**

8.3 Bandwidth of the Emission

Rules and specifications:	CFR 47 Part 15, section 15.215(c)
Guide:	ANSI C63.4
Description:	The 20 dB bandwidth of the emission is measured as the frequency range defined by the points that are 20 dB down relative to the maximum level of the modulated carrier. For intentional radiators operating under the alternative provisions to the general emission limits the requirement to contain the 20 dB bandwidth of the emission within the specified frequency band includes the effects from frequency sweeping, frequency hopping and other modulation techniques that may be employed as well as the frequency stability of the transmitter over expected variations in temperature and supply voltage. If a frequency stability is not specified in the regulations, it is recommended that the fundamental emission be kept within at least the central 80% of the permitted band in order to minimize the possibility of out-of-band operation. The resolution bandwidth of the spectrum analyzer shall be set to a value greater than 5.0% of the allowed bandwidth. If no bandwidth specifications are given, the following guidelines are used:

Fundamental frequency	Minimum resolution bandwidth
9 kHz to 30 MHz	1 kHz
30 MHz to 1000 MHz	10 kHz
1000 MHz to 40 GHz	100 kHz

The video bandwidth shall be at least three times greater than the resolution bandwidth.

Measurement procedure:	Bandwidth Measurements (6.2)

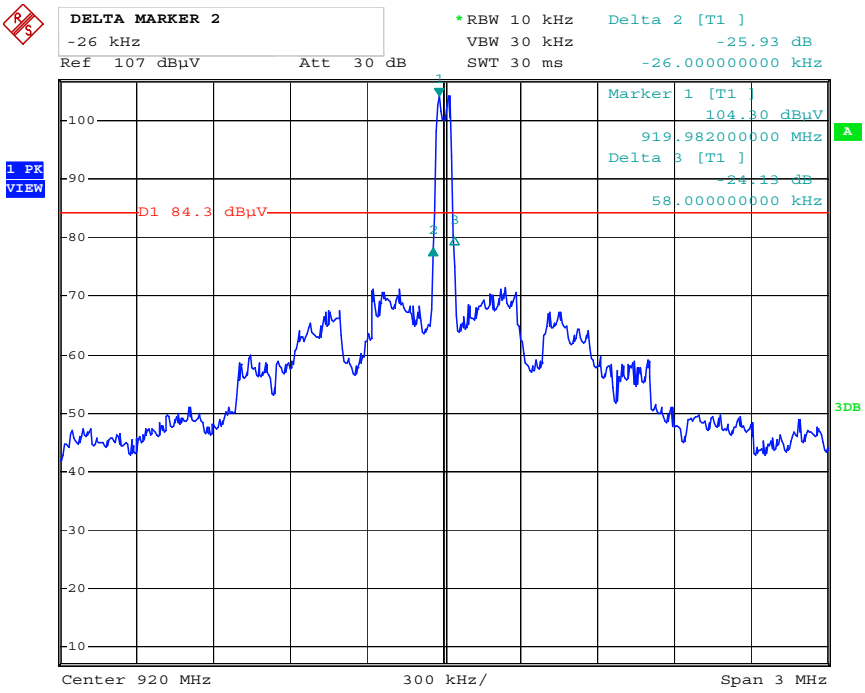
Comment:	
Date of test:	October 10, 2007
Test site:	Fully anechoic room, cabin no. 2

Permitted frequency band:	**902 - 928 MHz**	
20 dB bandwidth:	**84 kHz**	
Carrier frequency stability: Maximum frequency tolerances:	☐ **specified**	☒ **not specified**
Bandwidth of the emission:		**within permitted frequency band[6]:** ☒ **yes** ☐ **no**

Test Result:	Test passed

[6] If a frequency stability is not specified, it is recommended that the fundamental emission is kept within at least the central 80% of the permitted band in order to minimize the possibility of out-of-band operation.

Emission Bandwidth



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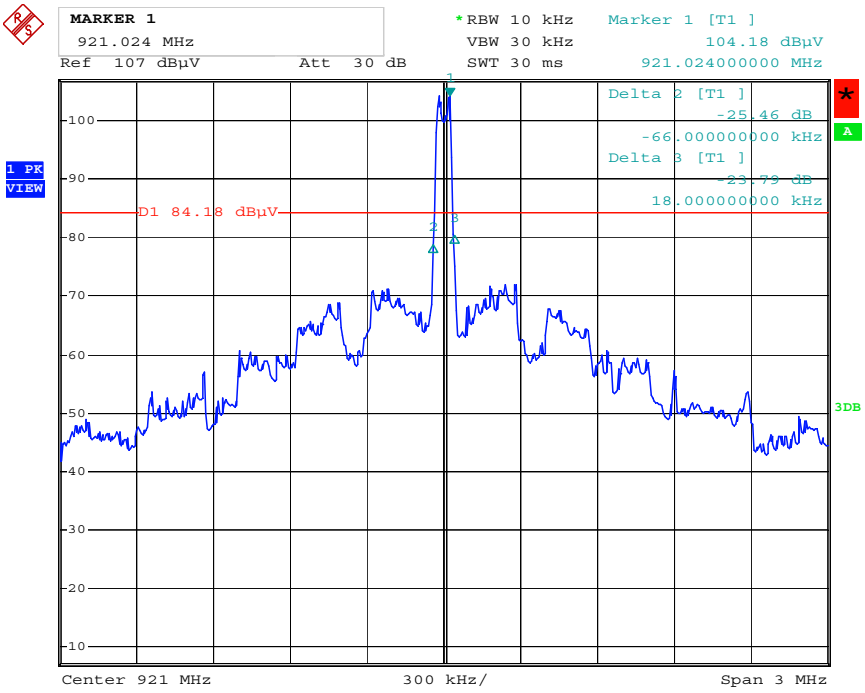

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8.4 Designation of Emissions

Rules and specifications:	CFR 47 Part 2, sections 2.201 and 2.202 IC RSS-Gen Issue 2, sections 3.2(h) and 8
Guide:	ANSI C63.4 / TRC-43

Type of modulation:	Frequency Shift Keying (FSK)

B_n = Necessary Bandwidth	$B_n = 2DK + B$
D = Peak deviation	D = 20 kHz
K = Overall numerical factor	K = 1
B = Modulation rate	B = 19.2 kHz
Calculation:	$B_n = 2 \cdot (20\ kHz) \cdot 1 + (19.2\ kHz) = 40.0\ kHz$

Designation of Emissions:	**40K0F1D**

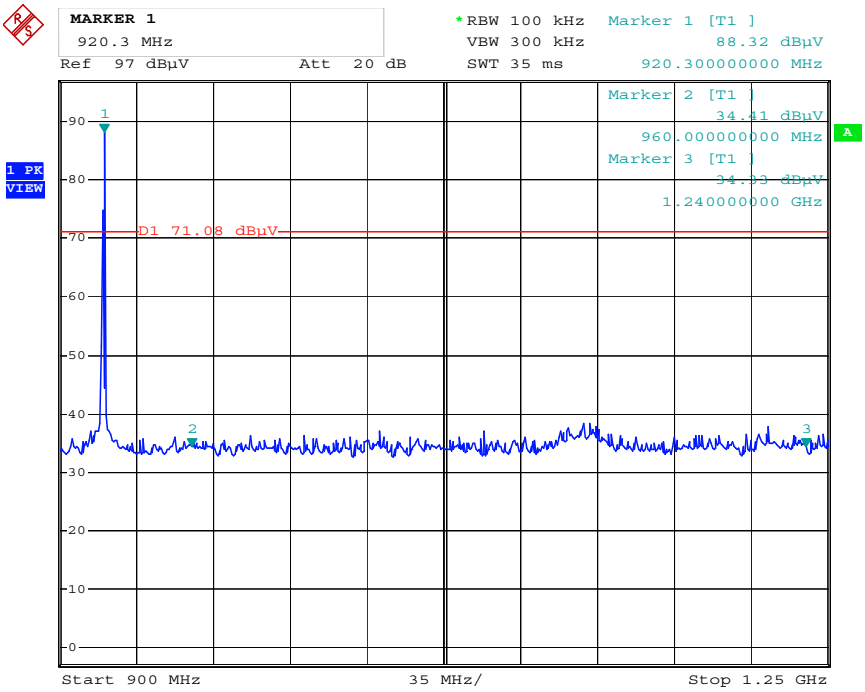
8.5 Restricted Bands of Operation

Rules and specifications:	CFR 47 Part 15, section 15.205(a) IC RSS-210 Issue 7, section 2.2(a)
Guide:	ANSI C63.4
Limit:	Only spurious emissions are permitted in any of the frequency bands listed in CFR 47 Part 15, section 15.205(a) or IC RSS-210 Issue 7, section 2.2(a).
Measurement procedure:	Radiated Emission in Fully or Semi Anechoic Room (6.5)

Comment:	
Date of test:	October 10, 2007
Test site:	Fully anechoic room, cabin no. 2
Test distance:	3 meters

Test Result:	Test passed

Restricted Bands of Operation



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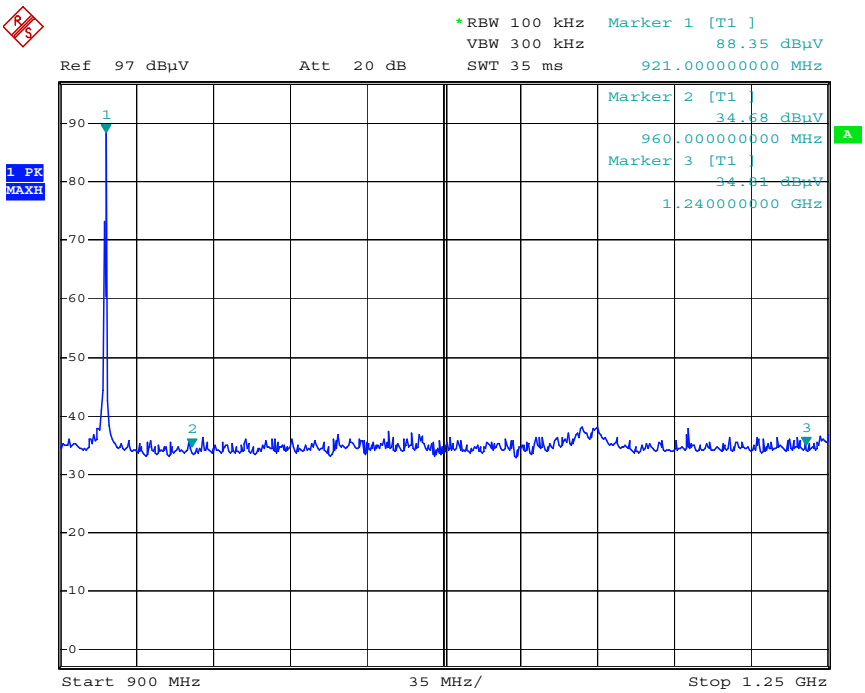

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8.6 Conducted Powerline Emission Measurement 150 kHz to 30 MHz

Rules and specifications:	CFR 47 Part 15, section 15.207 IC RSS-Gen Issue 2, section 7.2.2		
Guide:	ANSI C63.4 / CISPR 22		
Limit:	Frequency of Emission (MHz)	Conducted Limit (dBµV)	
		Quasi-peak	Average
	0.15 - 0.5 0.5 - 5 5 - 30	66 to 56 56 60	56 to 46 46 50
Measurement procedure:	Conducted AC Powerline Emission (6.3)		

Comment:	
Date of test:	October 10, 2007
Test site:	Shielded room, cabin no. 1

Test Result:	Test passed

Tested on:	L1

Frequency (MHz)	Detector	Reading Value (dBµV)	Correction Factor (dB)	Final Value (dBµV)	Limit (dBµV)	Margin (dB)
0.165	Quasi-Peak	45.2	0.0	45.2	65.2	20.0
0.330	Quasi-Peak	40.8	0.0	40.8	59.5	**18.7**
3.440	Quasi-Peak	34.1	0.0	34.1	56.0	21.9
3.795	Quasi-Peak	35.5	0.0	35.5	56.0	20.5

Tested on:	N

Frequency (MHz)	Detector	Reading Value (dBµV)	Correction Factor (dB)	Final Value (dBµV)	Limit (dBµV)	Margin (dB)
0.165	Quasi-Peak	44.2	0.0	44.2	65.2	**21.0**
3.470	Quasi-Peak	34.4	0.0	34.4	56.0	21.6
3.840	Quasi-Peak	34.3	0.0	34.3	56.0	21.7

Sample calculation of final values:

Final Value (dBµV) = Reading Value (dBµV) + Correction Factor (dB)

8.7 Radiated Emission Measurement 9 kHz to 30 MHz

Rules and specifications:	CFR 47 Part 15, sections 15.205 and 15.209 IC RSS-210 Issue 7, sections 2.2 and 2.6			
Guide:	ANSI C63.4			
Limit:	Frequency of Emission (MHz)	Field Strength (µV/m)	Field Strength (dBµV/m)	Measurement Distance d (meters)
	0.009 - 0.490	2400/F(kHz)	67.6 - 20 · log(F(kHz))	300
	0.490 - 1.705	24000/F(kHz)	87.6 - 20 · log(F(kHz))	30
	1.705 - 30.000	30	29.5	30
	Additionally, the level of any unwanted emissions shall not exceed the level of the fundamental emission.			
Measurement procedure:	Radiated Emission Measurement 9 kHz to 30 MHz (6.4)			

Comment:	With rod antenna
Date of test:	October 4, 2007
Test site:	Open field test site

Test Result:	Test passed

No emissions above noise level detected.

Comment:	With antenna DH-8195
Date of test:	December 5, 2007
Test site:	Open field test site

Test Result:	Test passed

No emissions above noise level detected.

Comment:	With antenna 900R
Date of test:	December 5, 2007
Test site:	Open field test site

Test Result:	Test passed

No emissions above noise level detected.

8.8 Radiated Emission Measurement 30 MHz to 10 GHz

Rules and specifications:	CFR 47 Part 15, sections 15.215(b) and 15.249 IC RSS-210 Issue 7, section A2.9		
Guide:	ANSI C63.4		
Limit:	Frequency of Emission (MHz)	Field Strength (µV/m)	Field Strength (dBµV/m)
	30 - 88	100	40.0
	88 - 216	150	43.5
	216 - 960	200	46.0
	Above 960	500	54.0
	Additionally, the level of any unwanted emissions shall not exceed the level of the fundamental emission.		
Measurement procedures:	Radiated Emission in Fully or Semi Anechoic Room (6.5) Radiated Emission at Open Field Test Site (6.6)		

Test Result:	Test passed

Comment:	With rod antenna
Date of test:	October 12, 2007
Mode:	Transmitting at 920 MHz
Test site:	Frequencies ≤ 1 GHz: Open field test site Frequencies > 1 GHz: Fully anechoic room, cabin no. 2
Test distance:	Frequencies ≤ 8.2 GHz: 3 meters Frequencies > 8.2 GHz: 1 meters

Test Result:	Test passed

Sample calculation of final values:

Final Value (dBµV/m) = Reading Value (dBµV) + Correction Factor (dB/m)
+ Pulse Train Correction (dB)

Frequency (MHz)	Antenna Polarization	Detector	Receiver Reading (dBµV)	Correction Factor (dB/m)	Pulse Train Correction (dB)	Final Value (dBµV/m)	Limit (dBµV/m)	Margin (dB)
32.200	vertical	Quasi-Peak	22.8	13.9		36.7	40.0	3.3
33.400	vertical	Quasi-Peak	26.1	13.6		39.7	40.0	**0.3**
34.000	vertical	Quasi-Peak	23.4	13.4		36.8	40.0	3.2
37.200	vertical	Quasi-Peak	21.9	12.6		34.5	40.0	5.5
38.200	vertical	Quasi-Peak	25.9	12.3		38.2	40.0	1.8
38.900	vertical	Quasi-Peak	23.5	12.2		35.7	40.0	4.3
40.000	vertical	Quasi-Peak	19.2	11.9		31.1	40.0	8.9
47.900	vertical	Quasi-Peak	18.1	10.6		28.7	40.0	11.3
59.600	horizontal	Quasi-Peak	13.7	9.6		23.3	40.0	16.7
60.400	horizontal	Quasi-Peak	14.9	9.6		24.5	40.0	15.5
64.900	horizontal	Quasi-Peak	21.5	9.6		31.1	40.0	8.9
66.000	horizontal	Quasi-Peak	24.6	9.6		34.2	40.0	5.8
67.300	horizontal	Quasi-Peak	18.6	9.6		28.2	40.0	11.8
71.100	vertical	Quasi-Peak	12.5	9.5		22.0	40.0	18.0
72.000	vertical	Quasi-Peak	25.4	9.5		34.9	40.0	5.1
74.500	horizontal	Quasi-Peak	12.5	9.4		21.9	40.0	18.1
80.100	horizontal	Quasi-Peak	18.3	9.5		27.8	40.0	12.2
95.400	horizontal	Quasi-Peak	14.9	10.3		25.2	43.5	18.3
95.900	vertical	Quasi-Peak	25.6	10.4		36.0	43.5	7.5
96.100	horizontal	Quasi-Peak	12.2	10.4		22.6	43.5	20.9
96.200	vertical	Quasi-Peak	25.7	10.4		36.1	43.5	7.4
137.300	vertical	Quasi-Peak	19.9	13.6		33.5	43.5	10.0
140.300	vertical	Quasi-Peak	18.3	13.8		32.1	43.5	11.4
144.000	vertical	Quasi-Peak	24.2	13.7		37.9	43.5	5.6
148.300	horizontal	Quasi-Peak	15.1	13.8		28.9	43.5	14.6
158.000	horizontal	Quasi-Peak	14.8	14.4		29.2	43.5	14.3
158.800	horizontal	Quasi-Peak	14.6	14.4		29.0	43.5	14.5
159.800	vertical	Quasi-Peak	14.8	14.4		29.2	43.5	14.3
161.400	horizontal	Quasi-Peak	14.7	14.5		29.2	43.5	14.3
163.100	horizontal	Quasi-Peak	13.9	14.6		28.5	43.5	15.0
165.300	horizontal	Quasi-Peak	15.0	14.7		29.7	43.5	13.8
168.000	vertical	Quasi-Peak	17.8	15.0		32.8	43.5	10.7
168.200	vertical	Quasi-Peak	19.3	15.0		34.3	43.5	9.2
173.600	horizontal	Quasi-Peak	11.8	15.1		26.9	43.5	16.6
262.700	vertical	Quasi-Peak	2.9	18.8		21.7	46.0	24.3
264.000	vertical	Quasi-Peak	3.5	18.9		22.4	46.0	23.6
265.500	horizontal	Quasi-Peak	4.7	19.0		23.7	46.0	22.3
300.700	vertical	Quasi-Peak	2.4	15.8		18.2	46.0	27.8
304.500	vertical	Quasi-Peak	4.1	15.9		20.0	46.0	26.0
447.900	vertical	Quasi-Peak	17.5	19.5		37.0	46.0	9.0
796.900	horizontal	Quasi-Peak	7.7	24.7		32.4	46.0	13.6
797.800	horizontal	Quasi-Peak	8.1	24.7		32.8	46.0	13.2
798.200	vertical	Quasi-Peak	13.1	24.7		37.8	46.0	8.2
799.200	vertical	Quasi-Peak	13.5	24.8		38.3	46.0	7.7
799.500	vertical	Quasi-Peak	12.5	24.8		37.3	46.0	8.7
920.000	vertical	Quasi-Peak	66.5	26.2		92.7	94.0	1.3
1078.000	vertical	Peak	17.5	28.0		45.5	54.0	8.5
1468.000	horizontal	Peak	14.5	29.5		44.0	54.0	10.1
1474.000	vertical	Peak	17.0	29.5		46.5	54.0	7.5
2494.000	vertical	Peak	16.6	33.6		50.2	54.0	3.8

Comment:	With rod antenna
Date of test:	October 12, 2007
Mode:	Transmitting at 921 MHz
Test site:	Frequencies ≤ 1 GHz: Open field test site Frequencies > 1 GHz: Fully anechoic room, cabin no. 2
Test distance:	Frequencies ≤ 8.2 GHz: 3 meters Frequencies > 8.2 GHz: 1 meters

Test Result:	Test passed

Sample calculation of final values:

Final Value (dBµV/m) = Reading Value (dBµV) + Correction Factor (dB/m) + Pulse Train Correction (dB)

Frequency (MHz)	Antenna Polarization	Detector	Receiver Reading (dBµV)	Correction Factor (dB/m)	Pulse Train Correction (dB)	Final Value (dBµV/m)	Limit (dBµV/m)	Margin (dB)
32.200	vertical	Quasi-Peak	22.3	13.9		36.2	40.0	3.8
33.500	vertical	Quasi-Peak	25.8	13.5		39.3	40.0	**0.7**
34.100	vertical	Quasi-Peak	22.8	13.4		36.2	40.0	3.8
37.100	vertical	Quasi-Peak	20.2	12.6		32.8	40.0	7.2
38.100	vertical	Quasi-Peak	25.7	12.4		38.1	40.0	1.9
38.500	vertical	Quasi-Peak	24.7	12.3		37.0	40.0	3.0
40.100	vertical	Quasi-Peak	18.8	11.9		30.7	40.0	9.3
60.200	horizontal	Quasi-Peak	14.5	9.6		24.1	40.0	15.9
61.300	horizontal	Quasi-Peak	13.7	9.6		23.3	40.0	16.7
62.200	vertical	Quasi-Peak	19.5	9.6		29.1	40.0	10.9
65.500	horizontal	Quasi-Peak	24.2	9.6		33.8	40.0	6.2
72.000	horizontal	Quasi-Peak	16.3	9.5		25.8	40.0	14.2
95.800	horizontal	Quasi-Peak	17.8	10.4		28.2	43.5	15.3
95.900	vertical	Quasi-Peak	26.6	10.4		37.0	43.5	6.5
96.100	horizontal	Quasi-Peak	17.2	10.4		27.6	43.5	15.9
96.200	vertical	Quasi-Peak	26.8	10.4		37.2	43.5	6.3
137.300	vertical	Quasi-Peak	23.8	13.6		37.4	43.5	6.1
139.800	vertical	Quasi-Peak	24.1	13.7		37.8	43.5	5.7
144.000	vertical	Quasi-Peak	27.5	13.7		41.2	43.5	2.3
144.200	vertical	Quasi-Peak	24.5	13.7		38.2	43.5	5.3
150.600	horizontal	Quasi-Peak	19.5	14.0		33.5	43.5	10.0
151.600	horizontal	Quasi-Peak	21.3	14.1		35.4	43.5	8.1
159.800	vertical	Quasi-Peak	25.1	14.4		39.5	43.5	4.0
160.200	horizontal	Quasi-Peak	20.5	14.4		34.9	43.5	8.6
162.800	horizontal	Quasi-Peak	20.6	14.6		35.2	43.5	8.3
168.000	vertical	Quasi-Peak	25.0	15.0		40.0	43.5	3.5
168.200	vertical	Quasi-Peak	25.6	15.0		40.6	43.5	2.9
169.200	horizontal	Quasi-Peak	15.7	15.1		30.8	43.5	12.7
262.700	vertical	Quasi-Peak	1.5	18.8		20.3	46.0	25.7
264.000	vertical	Quasi-Peak	3.1	18.9		22.0	46.0	24.0
267.100	vertical	Quasi-Peak	2.8	19.2		22.0	46.0	24.0
300.700	vertical	Quasi-Peak	1.8	15.8		17.6	46.0	28.4
447.900	vertical	Quasi-Peak	17.0	19.5		36.5	46.0	9.5
797.800	horizontal	Quasi-Peak	8.3	24.7		33.0	46.0	13.0
798.200	vertical	Quasi-Peak	14.3	24.7		39.0	46.0	7.0
799.200	vertical	Quasi-Peak	14.8	24.8		39.6	46.0	6.4
921.000	vertical	Quasi-Peak	65.9	26.2		92.1	94.0	1.9
1132.000	vertical	Peak	18.1	28.3		46.4	54.0	7.6
1360.000	vertical	Peak	18.4	29.1		47.5	54.0	6.5
1474.000	horizontal	Peak	12.4	29.5		41.9	54.0	12.1
1480.000	vertical	Peak	17.6	29.5		47.1	54.0	6.9
2494.000	vertical	Peak	16.9	33.6		50.5	54.0	3.5

Comment:	With elliptical polarized antenna
Date of test:	December 6, 2007
Mode:	Transmitting at 920 MHz
Test site:	Frequencies ≤ 1 GHz: Open field test site Frequencies > 1 GHz: Fully anechoic room, cabin no. 2
Test distance:	Frequencies ≤ 8.2 GHz: 3 meters Frequencies > 8.2 GHz: 1 meters

Test Result:	Test passed

Sample calculation of final values:

Final Value (dBµV/m) = Reading Value (dBµV) + Correction Factor (dB/m) + Pulse Train Correction (dB)

Frequency (MHz)	Antenna Polarization	Detector	Receiver Reading (dBµV)	Correction Factor (dB/m)	Pulse Train Correction (dB)	Final Value (dBµV/m)	Limit (dBµV/m)	Margin (dB)
48.000	vertical	Quasi-Peak	25.1	10.6		35.7	40.0	4.3
93.160	vertical	Quasi-Peak	25.5	10.1		35.6	43.5	7.9
95.180	vertical	Quasi-Peak	30.0	10.3		40.3	43.5	3.2
97.500	vertical	Quasi-Peak	32.0	10.5		42.5	43.5	**1.0**
98.300	vertical	Quasi-Peak	30.3	10.6		40.9	43.5	2.6
99.000	vertical	Quasi-Peak	29.5	10.7		40.2	43.5	3.3
109.900	vertical	Quasi-Peak	20.1	11.4		31.5	43.5	12.0
120.000	vertical	Quasi-Peak	25.8	12.6		38.4	43.5	5.1
149.000	vertical	Quasi-Peak	12.7	13.8		26.5	43.5	17.0
168.280	vertical	Quasi-Peak	22.6	15.0		37.6	43.5	5.9
171.870	horizontal	Quasi-Peak	13.8	15.1		28.9	43.5	14.6
172.070	vertical	Quasi-Peak	23.8	15.1		38.9	43.5	4.6
173.500	horizontal	Quasi-Peak	10.1	15.1		25.2	43.5	18.3
447.900	horizontal	Quasi-Peak	21.8	19.5		41.3	46.0	4.7
920.000	vertical	Quasi-Peak	64.7	26.2		90.9	94.0	3.1
1840.000	vertical	Peak	13.5	31.5		44.9	54.0	9.1

Comment:	With elliptical polarized antenna
Date of test:	December 6, 2007
Mode:	Transmitting at 921 MHz
Test site:	Frequencies ≤ 1 GHz: Open field test site Frequencies > 1 GHz: Fully anechoic room, cabin no. 2
Test distance:	Frequencies ≤ 8.2 GHz: 3 meters Frequencies > 8.2 GHz: 1 meters

Test Result:	Test passed

Sample calculation of final values:

Final Value (dBµV/m) = Reading Value (dBµV) + Correction Factor (dB/m)
+ Pulse Train Correction (dB)

Frequency (MHz)	Antenna Polarization	Detector	Receiver Reading (dBµV)	Correction Factor (dB/m)	Pulse Train Correction (dB)	Final Value (dBµV/m)	Limit (dBµV/m)	Margin (dB)
48.000	vertical	Quasi-Peak	27.0	10.6		37.6	40.0	2.4
94.000	vertical	Quasi-Peak	27.5	10.2		37.7	43.5	5.8
95.200	horizontal	Quasi-Peak	11.7	10.3		22.0	43.5	21.5
95.600	vertical	Quasi-Peak	30.4	10.4		40.8	43.5	2.7
97.280	vertical	Quasi-Peak	29.0	10.5		39.5	43.5	4.0
98.880	vertical	Quasi-Peak	26.7	10.7		37.4	43.5	6.1
115.140	vertical	Quasi-Peak	20.5	12.2		32.7	43.5	10.8
149.800	vertical	Quasi-Peak	15.6	13.9		29.5	43.5	14.0
171.420	horizontal	Quasi-Peak	13.2	15.1		28.3	43.5	15.2
171.800	vertical	Quasi-Peak	19.5	15.1		34.6	43.5	8.9
173.650	vertical	Quasi-Peak	18.2	15.1		33.3	43.5	10.2
447.910	horizontal	Quasi-Peak	17.0	19.5		36.5	46.0	9.5
921.000	vertical	Quasi-Peak	65.5	26.2		91.7	94.0	**2.3**
1840.000	vertical	Peak	12.5	31.5		43.9	54.0	10.1

Comment:	With linear polarized antenna
Date of test:	December 6, 2007
Mode:	Transmitting at 920 MHz
Test site:	Frequencies ≤ 1 GHz: Open field test site Frequencies > 1 GHz: Fully anechoic room, cabin no. 2
Test distance:	Frequencies ≤ 8.2 GHz: 3 meters Frequencies > 8.2 GHz: 1 meters

Test Result:	Test passed

Sample calculation of final values:

Final Value (dBµV/m) = Reading Value (dBµV) + Correction Factor (dB/m) + Pulse Train Correction (dB)

Frequency (MHz)	Antenna Polarization	Detector	Receiver Reading (dBµV)	Correction Factor (dB/m)	Pulse Train Correction (dB)	Final Value (dBµV/m)	Limit (dBµV/m)	Margin (dB)
37.290	vertical	Quasi-Peak	16.0	12.6		28.6	40.0	11.4
93.460	horizontal	Quasi-Peak	14.8	10.2		25.0	43.5	18.5
97.600	vertical	Quasi-Peak	28.0	10.5		38.5	43.5	5.0
99.200	vertical	Quasi-Peak	25.5	10.7		36.2	43.5	7.3
119.440	vertical	Quasi-Peak	20.2	12.5		32.7	43.5	10.8
145.190	vertical	Quasi-Peak	13.4	13.7		27.1	43.5	16.4
171.720	horizontal	Quasi-Peak	13.2	15.1		28.3	43.5	15.2
171.970	horizontal	Quasi-Peak	13.1	15.1		28.2	43.5	15.3
172.280	vertical	Quasi-Peak	22.9	15.1		38.0	43.5	5.5
177.240	vertical	Quasi-Peak	18.8	15.3		34.1	43.5	9.4
187.300	vertical	Quasi-Peak	10.6	15.9		26.5	43.5	17.0
447.900	horizontal	Quasi-Peak	21.7	19.5		41.2	46.0	4.8
547.440	horizontal	Quasi-Peak	14.6	20.9		35.5	46.0	10.5
920.000	horizontal	Quasi-Peak	67.7	26.2		93.9	94.0	**0.1**
1840.000	vertical	Average	22.3	31.5		53.7	54.0	0.3

Comment:	With linear polarized antenna
Date of test:	December 6, 2007
Mode:	Transmitting at 921 MHz
Test site:	Frequencies ≤ 1 GHz: Open field test site Frequencies > 1 GHz: Fully anechoic room, cabin no. 2
Test distance:	Frequencies ≤ 8.2 GHz: 3 meters Frequencies > 8.2 GHz: 1 meters

Test Result:	Test passed

Sample calculation of final values:

Final Value (dBµV/m) = Reading Value (dBµV) + Correction Factor (dB/m)
+ Pulse Train Correction (dB)

Frequency (MHz)	Antenna Polarization	Detector	Receiver Reading (dBµV)	Correction Factor (dB/m)	Pulse Train Correction (dB)	Final Value (dBµV/m)	Limit (dBµV/m)	Margin (dB)
37.700	vertical	Quasi-Peak	19.1	12.5		31.6	40.0	8.4
92.630	vertical	Quasi-Peak	27.9	10.1		38.0	43.5	5.5
94.050	vertical	Quasi-Peak	29.9	10.2		40.1	43.5	3.4
97.650	vertical	Quasi-Peak	28.5	10.5		39.0	43.5	4.5
98.340	vertical	Quasi-Peak	27.6	10.6		38.2	43.5	5.3
99.220	vertical	Quasi-Peak	24.6	10.7		35.3	43.5	8.2
115.580	vertical	Quasi-Peak	20.7	12.2		32.9	43.5	10.6
149.860	vertical	Quasi-Peak	12.5	13.9		26.4	43.5	17.1
170.200	vertical	Quasi-Peak	21.2	15.1		36.3	43.5	7.2
172.760	horizontal	Quasi-Peak	11.6	15.1		26.7	43.5	16.8
173.600	vertical	Quasi-Peak	20.1	15.1		35.2	43.5	8.3
173.760	horizontal	Quasi-Peak	11.2	15.1		26.3	43.5	17.2
447.900	horizontal	Quasi-Peak	24.1	19.5		43.6	46.0	2.4
547.440	horizontal	Quasi-Peak	16.7	20.9		37.6	46.0	8.4
921.000	vertical	Quasi-Peak	67.7	26.2		93.9	94.0	**0.1**
1842.016	vertical	Average	22.0	31.5		53.5	54.0	0.5

8.9 Exposure of Humans to RF Fields

Rules and specifications:	IC RSS-Gen Issue 2, section 5.5
Guide:	IC RSS-102 Issue 2, section 2.5

Exposure of Humans to RF Fields	Applicable	Declared by applicant	Measured	Exemption
The antenna is				
☒ detachable				
The conducted output power (CP in watts) is measured at the antenna connector: CP = **-1.9 dBm = 0.65 mW**			☒	
The effective isotropic radiated power (EIRP in watts) is calculated using				
☒ the numerical antenna gain: G = **2**; $EIRP = G \cdot CP \Rightarrow EIRP$ = **1.3 mW**		☒		
☒ the field strength[7] in V/m: FS = **92.7 dBµV/m** = **43.15 · 10^{-3} V/m**; $EIRP = \frac{(FS \cdot D)^2}{30} \Rightarrow EIRP$ = **558.63 µW**			☒	
with: Distance between the antennas in m: D = **3 m**			☒	
☐ not detachable				
A field strength measurement is used to determine the effective isotropic radiated power (EIRP in watts) given by[7]: $EIRP = \frac{(FS \cdot D)^2}{30} \Rightarrow EIRP$ = **..... W**				
with: Field strength in V/m: FS = **..... V/m**			☐	
Distance between the two antennas in m: D = **..... m**			☐	
Selection of output power				
The output power TP is the higher of the conducted or effective isotropic radiated power (e.i.r.p.): TP = **1.3 mW**				

[7] The conversion formula is valid only for properly matched antennas. In other cases the transmitter output power may have to be measured by a terminated measurement when applying the exemption clauses.
If an open area test site is used for field strength measurement, the effect due to the metal ground reflecting plane should be subtracted from the maximum field strength value in order to reference it to free space, before calculating TP.

Exposure of Humans to RF Fields	Applicable	Declared by applicant	Measured	Exemption
The antenna is				
☒ detachable				
The conducted output power (CP in watts) is measured at the antenna connector: CP = **-6.9 dBm = 0.20 mW**			☒	
The effective isotropic radiated power (EIRP in watts) is calculated using				
☒ the numerical antenna gain: G = **3** $EIRP = G \cdot CP \Rightarrow EIRP$ = **0.61 mW**		☒		
☒ the field strength[8] in V/m: FS = **91.7 dBµV/m** = **38.46 · 10^{-3} V/m** $EIRP = \frac{(FS \cdot D)^2}{30} \Rightarrow EIRP$ = **443.73 µW** with: Distance between the antennas in m: D = **3 m**			☒ ☒	
☐ not detachable				
A field strength measurement is used to determine the effective isotropic radiated power (EIRP in watts) given by[7]: $EIRP = \frac{(FS \cdot D)^2}{30} \Rightarrow EIRP$ = **..... W** with: Field strength in V/m: FS = **..... V/m** Distance between the two antennas in m: D = **..... m**			☐ ☐	
Selection of output power				
The output power TP is the higher of the conducted or effective isotropic radiated power (e.i.r.p.): TP = **0.61 mW**				

[8] The conversion formula is valid only for properly matched antennas. In other cases the transmitter output power may have to be measured by a terminated measurement when applying the exemption clauses.
If an open area test site is used for field strength measurement, the effect due to the metal ground reflecting plane should be subtracted from the maximum field strength value in order to reference it to free space, before calculating TP.

Exposure of Humans to RF Fields	Applicable	Declared by applicant	Measured	Exemption
The antenna is				
☒ detachable				
The conducted output power (CP in watts) is measured at the antenna connector: CP = **-10.9 dBm = 81.28 µW**			☒	
The effective isotropic radiated power (EIRP in watts) is calculated using				
☒ the numerical antenna gain: G = **16** $EIRP = G \cdot CP \Rightarrow EIRP$ = **1.30 mW**		☒		
☒ the field strength[9] in V/m: FS = **93.9 dBµV/m** = **49.55 · 10^{-3} V/m** $EIRP = \frac{(FS \cdot D)^2}{30} \Rightarrow EIRP$ = **736.41 µW** with: Distance between the antennas in m: D = **3 m**			☒ ☒	
☐ not detachable				
A field strength measurement is used to determine the effective isotropic radiated power (EIRP in watts) given by[7]: $EIRP = \frac{(FS \cdot D)^2}{30} \Rightarrow EIRP$ = **..... W** with: Field strength in V/m: FS = **..... V/m** Distance between the two antennas in m: D = **..... m**			☐ ☐	
Selection of output power				
The output power TP is the higher of the conducted or effective isotropic radiated power (e.i.r.p.): TP = **1.3 mW**				

[9] The conversion formula is valid only for properly matched antennas. In other cases the transmitter output power may have to be measured by a terminated measurement when applying the exemption clauses.
If an open area test site is used for field strength measurement, the effect due to the metal ground reflecting plane should be subtracted from the maximum field strength value in order to reference it to free space, before calculating TP.

Exposure of Humans to RF Fields (continued)	Applicable	Declared by applicant	Measured	Exemption
Separation distance between the user and the transmitting device is				
☐ less than or equal to 20 cm ☒ greater than 20 cm		☒		
Transmitting device is				
☐ in the vicinity of the human head ☐ body-worn		☒		
SAR evaluation				
SAR evaluation is required if the separation distance between the user and the device is less than or equal to 20 cm.				
☐ The device operates from 3 kHz up to 1 GHz inclusively and its source-based time-averaged output power is less than, or equal to 200 mW for General Public Use and 1000 mW for Controlled Use.				☐
☐ The device operates above 1 GHz up to 2.2 GHz inclusively and its source-based time-averaged output power is less than, or equal to 100 mW for General Public Use and 500 mW for Controlled Use.				☐
☐ The device operates above 2.2 GHz up to 3 GHz inclusively and its source-based time-averaged output power is less than, or equal to 20 mW for General Public Use and 100 mW for Controlled Use.				☐
☐ The device operates above 3 GHz up to 6 GHz inclusively and its source-based time-averaged output power) is less than, or equal to 10 mW for General Public Use and 50 mW for Controlled Use.				☐
☐ SAR evaluation is documented in test report no.				
RF exposure evaluation				
RF exposure evaluation is required if the separation distance between the user and the device is greater than 20 cm.				
☒ The device operates below 1.5 GHz and its e.i.r.p. is equal to or less than 2.5 W.				☒
☐ The device operates at or above 1.5 GHz and the e.i.r.p. of the device is equal to or less than 5 W.				☐
☐ RF exposure evaluation is documented in test report no.				

9 Test Results for Receiver

FCC CFR 47 Part 15			
Section(s)	*Test*	*Page*	*Result*
15.107	Conducted AC powerline emission 150 kHz to 30 MHz	68	Test passed
15.109	Radiated emission 30 MHz to 5 GHz	69	Test passed
15.111(a)	Antenna power conduction emission of receivers 9 kHz to 5 GHz	71	Test passed

IC RSS-Gen Issue 2			
Section(s)	*Test*	*Page*	*Result*
7.2.2	Transmitter AC power lines conducted emissions 150 kHz to 30 MHz	68	Test passed
6(a), 7.2.3.2	Receiver spurious emissions (radiated) 30 MHz to 5 GHz	69	Test passed
6(b), 7.2.3.1	Receiver spurious emissions (antenna conducted) 9 kHz to 5 GHz	71	Test passed

9.1 Conducted Powerline Emission Measurement 150 kHz to 30 MHz

Rules and specifications:	CFR 47 Part 15, section 15.107 IC RSS-Gen Issue 2, section 7.2.2		
Guide:	ANSI C63.4 / CISPR 22		
Limit:	Frequency of Emission (MHz)	Conducted Limit (dBµV)	
		Quasi-peak	Average
	0.15 - 0.5 0.5 - 5 5 - 30	66 to 56 56 60	56 to 46 46 50
Measurement procedure:	Conducted AC Powerline Emission (6.3)		

Comment:	
Date of test:	October 10, 2007
Test site:	Shielded room, cabin no. 1

Test Result:	Test passed

Tested on:	L1

Frequency (MHz)	Detector	Reading Value (dBµV)	Correction Factor (dB)	Final Value (dBµV)	Limit (dBµV)	Margin (dB)
0.165	Quasi-Peak	45.4	0.0	45.4	65.2	19.8
0.325	Quasi-Peak	41.6	0.0	41.6	59.6	**18.0**
0.365	Quasi-Peak	37.0	0.0	37.0	58.6	21.6
3.390	Quasi-Peak	33.7	0.0	33.7	56.0	22.3
3.730	Quasi-Peak	35.1	0.0	35.1	56.0	20.9

Tested on:	N

Frequency (MHz)	Detector	Reading Value (dBµV)	Correction Factor (dB)	Final Value (dBµV)	Limit (dBµV)	Margin (dB)
0.165	Quasi-Peak	45.0	0.0	45.0	65.2	**20.2**
3.485	Quasi-Peak	33.8	0.0	33.8	56.0	22.2
3.790	Quasi-Peak	35.0	0.0	35.0	56.0	21.0

Sample calculation of final values:

Final Value (dBµV) = Reading Value (dBµV) + Correction Factor (dB)

9.2 Radiated Emission Measurement 30 MHz to 5 GHz

Rules and specifications:	CFR 47 Part 15, section 15.109 (Class B) IC RSS-Gen Issue 2, sections 6(a) and 7.2.3.2		
Guide:	ANSI C63.4		
Limit:	Frequency of Emission (MHz)	Field Strength (µV/m)	Field Strength (dBµV/m)
	30 - 88	100	40.0
	88 - 216	150	43.5
	216 - 960	200	46.0
	Above 960	500	54.0
Measurement procedures:	Radiated Emission in Fully or Semi Anechoic Room (6.5) Radiated Emission at Open Field Test Site (6.6)		

Comment:	
Date of test:	September 27, 2007
Test site:	Frequencies ≤ 1 GHz: Open field test site Frequencies > 1 GHz: Fully anechoic room, cabin no. 2
Test distance:	3 meters

Test Result:	Test passed

Frequency (MHz)	Antenna Polarization	Detector	Receiver Reading (dBµV)	Correction Factor (dB/m)	Final Value (dBµV/m)	Limit (dBµV/m)	Margin (dB)
30.300	vertical	Quasi-Peak	20.0	14.4	34.4	40.0	5.6
31.200	vertical	Quasi-Peak	22.8	14.1	36.9	40.0	**3.1**
31.450	horizontal	Quasi-Peak	8.1	14.1	22.2	40.0	17.8
32.260	vertical	Quasi-Peak	21.0	13.9	34.9	40.0	5.1
37.960	vertical	Quasi-Peak	20.0	12.4	32.4	40.0	7.6
42.660	vertical	Quasi-Peak	18.0	11.4	29.4	40.0	10.6
60.730	vertical	Quasi-Peak	21.8	9.6	31.4	40.0	8.6
60.960	horizontal	Quasi-Peak	21.9	9.6	31.5	40.0	8.5
95.330	vertical	Quasi-Peak	16.5	10.3	26.8	43.5	16.7
116.560	horizontal	Quasi-Peak	11.9	12.3	24.2	43.5	19.3
132.280	vertical	Quasi-Peak	12.3	13.4	25.7	43.5	17.8
135.840	vertical	Quasi-Peak	17.7	13.5	31.2	43.5	12.3
140.380	vertical	Quasi-Peak	15.9	13.8	29.7	43.5	13.8
144.380	vertical	Quasi-Peak	14.0	13.7	27.7	43.5	15.8
151.890	vertical	Quasi-Peak	11.4	14.1	25.5	43.5	18.0
168.000	vertical	Quasi-Peak	18.6	15.0	33.6	43.5	9.9
168.600	vertical	Quasi-Peak	12.5	15.0	27.5	43.5	16.0
480.000	horizontal	Quasi-Peak	12.8	19.8	32.6	46.0	13.4
600.000	horizontal	Quasi-Peak	6.7	22.0	28.7	46.0	17.3
767.970	horizontal	Quasi-Peak	7.6	24.2	31.8	46.0	14.2
797.700	vertical	Quasi-Peak	8.6	24.7	33.3	46.0	12.7
1144.000	vertical	Peak	16.7	28.3	45.1	54.0	9.0
1354.000	vertical	Peak	16.2	29.1	45.3	54.0	8.7
1366.000	vertical	Peak	16.7	29.2	45.9	54.0	8.1
1864.000	vertical	Peak	12.7	31.6	44.3	54.0	9.7
2494.000	vertical	Peak	15.8	33.6	49.4	54.0	4.6

Sample calculation of field final values:

Final Value (dBµV/m) = Reading Value (dBµV) + Correction Factor (dB/m)

9.3 Antenna Power Conduction Emission of Receivers 9 kHz to 5 GHz

Rules and specifications:	CFR 47 Part 15, section 15.111(a) IC RSS-Gen Issue 2, sections 6(b) and 7.2.3.1		
Guide:	ANSI C63.4		
Limit:	Frequency of Emission (MHz)	Antenna power conduction limits for receivers	
		CFR 47 Part 15	IC RSS-Gen
	30 - 1000 Above 1000	2 nW (-57 dBm) 2 nW (-57 dBm)	2 nW (-57 dBm) 5 nW (-53 dBm)
Measurement procedure:	Antenna Power Conduction Emission of Receivers (6.7)		

Comment:	
Date of test:	October 10, 2007
Test site:	Shielded room, cabin no. 2
Tested on:	

Test Result:	Test passed

Frequency (MHz)	Detector	Reading Value (dBm)	Correction Factor (dB)	Final Value (dBm)	CFR 47 Part 15		RSS-210	
					Limit (dBm)	Margin (dB)	Limit (dBm)	Margin (dB)
747.000	Peak	-85.1	7.4	-77.7	-57.0	20.7	-57.0	20.7
846.000	Peak	-85.4	7.4	-78.0	-57.0	21.0	-57.0	21.0
3032.000	Peak	-73.8	8.3	-65.4	-57.0	**8.4**	-53.0	**12.4**

Sample calculation of final values:

Final Value (dBm) = Reading Value (dBm) + Correction Factor (dB)

10 Referenced Regulations

All tests were performed with reference to the following regulations and standards:

☒	CFR 47 Part 2	Code of Federal Regulations Part 2 (Frequency allocation and radio treaty matters; General rules and regulations) of the Federal Communication Commission (FCC)	October 1, 2006
☒	CFR 47 Part 15	Code of Federal Regulations Part 15 (Radio Frequency Devices) of the Federal Communication Commission (FCC)	May 4, 2007
☒	ANSI C63.4	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz	December 11, 2003 (published on January 30, 2004)
☒	RSS-Gen	Radio Standards Specification RSS-Gen Issue 2 containing General Requirements and Information for the Certification of Radiocommunication Equimpment, published by Industry Canada	June 2007
☒	RSS-210	Radio Standards Specification RSS-210 Issue 7 for Low Power Licence-Exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment, published by Industry Canada	June 2007
☐	RSS-310	Radio Standards Specification RSS-310 Issue 1 for Low Power Licence-Ecempt Radiocommunicaton Devices (All Frequency Bands): Category II Equipment, published by Industry Canada	September 2005
☒	RSS-102	Radio Standards Specification RSS-102 Issue 2: Radio Frequency Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands)	November 2005
☐	ICES-003	Interference-Causing Equipment Standard ICES-003 Issue 4 for Digital Apparatus, published by Industry Canada	February 7, 2004
☒	CISPR 22	Third Edition of the International Special Committee on Radio Interference (CISPR), Pub. 22, “Information Technology Equipment – Radio Disturbance Characteristics – Limits and Methods of Measurement”	1997
☐	CAN/CSA-CEI/IEC CISPR 22	Limits and Methods of Measurement of Radio Disturbance Characteristics of Information Technology Equipment	2002
☒	TRC-43	Notes Regarding Designation of Emission (Including Necessary Bandwidth and Classification), Class of Station and Nature of Service, published by Industry Canada	October 9, 1982

11 Revision History

Revision History			
Edition	*Date*	*Issued by*	*Modifications*
1	October 10, 2007	Martin Steindl (cj)	First Edition
2	November 15, 2007	Christa Jäger	Edition 2: According to Mr. Prior / email November 2, 2007 Model designation changed to "i-PORT M-350"
3	December 7, 2007	Martin Steindl	Additional antennas "A-9185" and "W-900R" added.
4	December 21, 2007	Christa Jäger	Antenna designations changed according to manual / email regarding FCC certification (December 21, 2007 / Mr. Prior)

12 Charts taken during testing