Straubing, April 8, 2008

# TEST-REPORT

No. 50235-080167-1 (Edition 2)

for

0566-HIDP (USB)

**Inductive Reader** 

Applicant: Baltech AG

Test Specifications: FCC Code of Federal Regulations,

CFR 47, Part 15,

Sections 15.205, 15.207 and 15.209

Industry Canada Radio Standards

**Specifications** 

RSS-Gen Issue 2, Section 7.2.2 and RSS-210 Issue 7, Sections 2.2, 2.6

(Category I Equipment)

### Note:

The test data of this report is related only to the individual item which has been tested. This report shall not be reproduced except in full extent without the written approval of the testing laboratory.



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# 1 Description of the Equipment Under Test (EUT)

General data of EUT

Type designation<sup>1</sup>: 0566-HIDP (USB)

Parts<sup>2</sup>:
Serial number(s): Prototype
Manufacturer: Baltech AG

Type of equipment: Inductive Reader

Version: USB

FCC ID:
Additional parts/accessories:

Technical data of EUT			
Application frequency range:	<application frequency="" range=""></application>		
Frequency range:	125 kHz		
Operating frequency:	125 kHz		
Type of modulation:	AM		
Pulse train:	N/A		
Pulse width:	N/A		
Number of RF-channels:	1		
Channel spacing:	N/A		
Designation of emissions <sup>3</sup> :	10K0A1D		
Type of antenna:	Integrated		
Size/length of antenna:	N/A		
Connection of antenna:	detachable	⊠ not detachable	
Type of power supply:	DC supply		
Specifications for power supply:	nominal voltage: minimum voltage: maximum voltage:	5.00 V 4.75 V 5.25 V	
	nominal frequency:	Hz	

<sup>&</sup>lt;sup>1</sup> Type designation of the system if EUT consists of more than one part.

<sup>&</sup>lt;sup>2</sup> Type designations of the parts of the system, if applicable.

<sup>&</sup>lt;sup>3</sup> Also known as "Class of Emission".

**Application details** 



## 2 Administrative Data

Applicant (full address): Baltech AG

Lilienthalstraße 27, 85399 Hallbergmoos

Contact person: Juergen Roesch

Contract identification: N/A

Receipt of EUT: 22 February 2008

Date(s) of test: March 2008

Note(s):

Report details

Report number: 50235-080167-1

Edition: 2

Issue date: April 8, 2008



# 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 15.205, 15.207 and 15.209

of the Federal Communication Commission (FCC) and the

Radio Standards Specifications RSS-Gen Issue 2, Section 7.2.2 and RSS-210 Issue 7, Sections 2.2, 2.6 (Category I Equipment)

of Industry Canada (IC).

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



# 5 Operation Mode and Configuration of EUT

## Operation Mode(s)

Continuously reading a Tag

## Configuration(s) of EUT

Reader connected to a Dell Latitude D 620 Notebook PC

List	List of ports and cables			
Port	Description	Classification <sup>4</sup>	Cable type	Cable length
1	USB Port	signal/control port	Shielded	1.2 m

List of devices connected to EUT				
Item	Description	Type Designation	Serial no. or ID	Manufacturer
1	Notebook PC	Latitude D 620		Dell
2				
3				
4				

List	List of support devices			
Item	Description None	Type Designation	Serial no. or ID	Manufacturer

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<sup>&</sup>lt;sup>4</sup> Ports shall be classified as ac power, dc power or signal/control port



### 6 Measurement Procedures

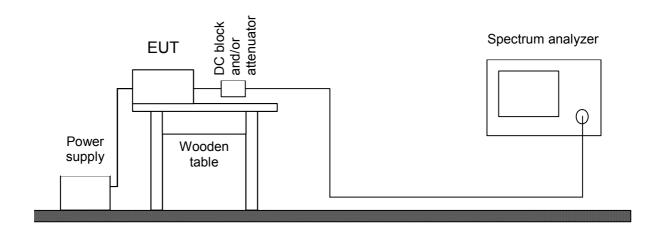
### 6.1 Bandwidth Measurements

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 Measurement 9 kHz to 30 MHz (6.3)	

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).





### 6.2 Conducted AC Powerline Emission

Measurement Procedure:		
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	

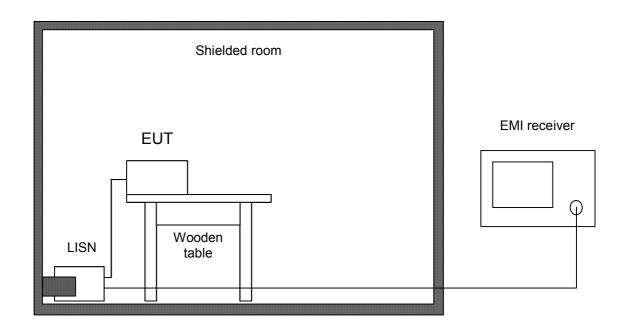
Conducted emission tests in the frequency range 150 kHz to 30 MHz are performed using Line Impedance Stabilization Networks (LISNs). To simplify testing with quasi-peak and average detector the following procedure is used:

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	Туре	Model	Serial No. or ID	Manufacturer
$\boxtimes$	EMI receiver	ESHS 10	860043/016	Rohde & Schwarz
$\boxtimes$	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
$\boxtimes$	Shielded room	No. 4	3FD-100 544	Euroshield



### 6.3 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.

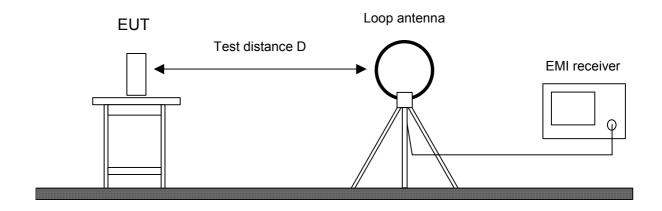
Hand-held or body-worn devices are rotated through three orthogonal axes to determine which attitude and configuration produces the highest emission relative to the limit and therefore shall be used for final testing.

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



## 6.4 Radiated Emission in Fully or Semi Anechoic Room

Measurement Procedure:		
Rules and specifications:	CFR 47 Part 15, section 15.209 IC RSS-210 Issue 7, section 2.6	
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.

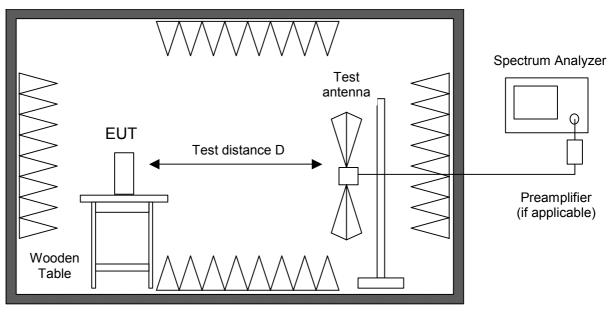
All tests below 18 GHz are performed at a test distance D of 3 meters. For higher frequencies the test distance is reduced (e.g. to 1 meter) due to the sensitivity of the measuring instrument(s) and the test results are calculated according to CFR 47 Part 15 section 15.31(f)(1) using an extrapolation 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	Туре	Model	Serial No. or ID	Manufacturer
$\boxtimes$	Spectrum Analyzer	FSP 30	100063	Rohde & Schwarz
	Spectrum analyzer	R 3271	05050023	Advantest
	EMI test receiver	ESMI	839379/013 839587/006	Rohde & Schwarz
$\boxtimes$	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	FS-Z30	843389/007	Rohde & Schwarz
	Accessories			
	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
$\boxtimes$	Fully anechoic room	No. 2	1452	Albatross Projects
	Semi-anechoic room	No. 3	1453	Siemens



### 6.5 Radiated Emission at Open Field Test Site

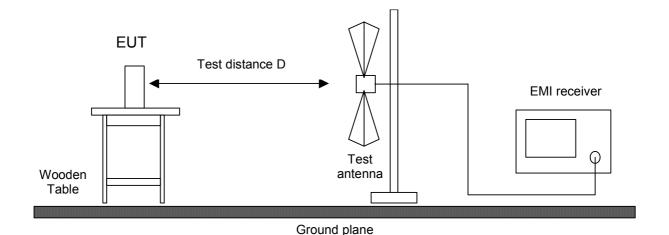
Measurement Procedure:	
Rules and specifications:	CFR 47 Part 15, section 15.209 IC RSS-210 Issue 7, section 2.6
Guide:	ANSI C63.4

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



# 7 Photographs Taken During Testing



# Test setup for conducted AC powerline emission measurement

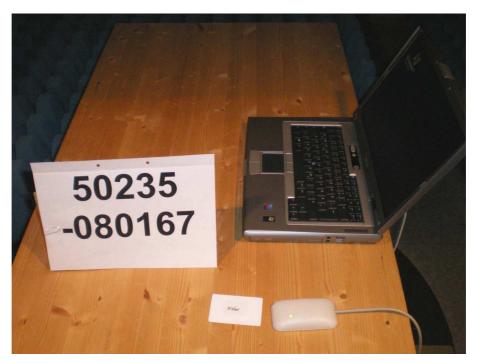






# Test setup for radiated emission measurement (fully anechoic room)







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







# 8 Test Results

FCC CFR 47 Pa	arts 2 and 15		
Section(s)	Test	Page	Result
2.1046(a)	Conducted output power		Not applicable
2.202(a)	Occupied bandwidth	22	Recorded
2.201, 2.202	Class of emission	24	Calculated
15.35(c)	Pulse train measurement for pulsed operation		Not applicable
15.205(a)	Restricted bands of operation	25	Test passed
15.207	Conducted AC powerline emission 150 kHz to 30 MHz	26	Test passed
15.205(b) 15.209	Radiated emission 9 kHz to 30 MHz	29	Test passed
15.205(b) 15.209	Radiated emission 30 MHz to 1 GHz	31	Test passed



IC RSS-Gen I	-Gen Issue 2			
Section(s)	Test	Page	Result	
4.8	Transmitter output power (conducted)		Not applicable	
4.6.1	Occupied Bandwidth	22	Recorded	
3.2(h), 8	Designation of emissions	24	Calculated	
4.5	Pulsed operation		Not applicable	
7.2.2	Transmitter AC power lines conducted emissions 150 kHz to 30 MHz	26	Test passed	
5.5	Exposure of Humans to RF Fields	34	Exempted from SAR and RF evaluation	

IC RSS-210 Issu	ue 7		
Section(s)	Test	Page	Result
2.2(a)	Restricted bands and unwanted emission frequencies	25	Test passed
2.2(b)(c) 2.6	Unwanted emissions 9 kHz to 30 MHz	29	Test passed
2.2(b)(c) 2.6	Unwanted emissions 30 MHz to 1 GHz	31	Test passed



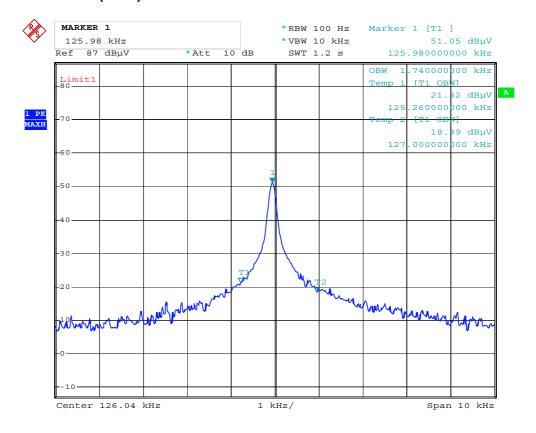
# 8.1 Occupied Bandwidth

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 as the frequency range defined by the the maximum level of the modulated of	points that are 26 dB down relative to
	The resolution bandwidth of the spect greater than 5.0% of the allowed band are given, the following guidelines are	lwidth. If no bandwidth specifications
	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 resolution bandwidth.	three times greater than the
Measurement procedure:	Bandwidth Measurements (6.1)	

Comment:	
Date of test:	06 March 2008
Test site:	Fully anechoic room, cabin no. 2



# Occupied Bandwidth (99 %):



Date: 6.MAR.2008 13:04:55

Occupied Bandwidth (99 %): 1.74 kHz



# 8.2 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:	Amplitude Modulation
---------------------	----------------------

B <sub>n</sub> = Necessary Bandwidth	$B_n = 2BK$
B = Modulation rate	B = 5 kHz
K = Overall numerical factor	K = 1
Calculation:	$B_n = 2 \cdot (5 \text{ kHz}) \cdot 1 = 10 \text{ kHz}$

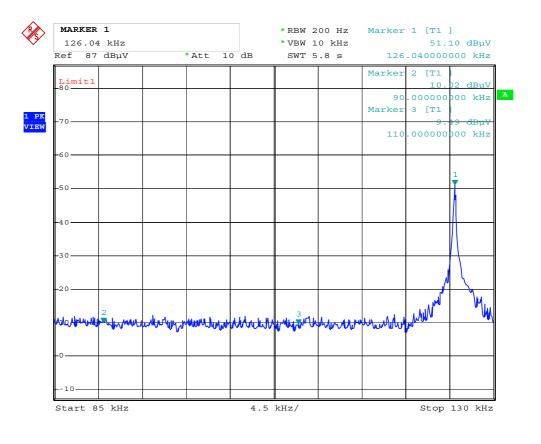
Designation of Emissions:
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# 8.3 Restricted Bands of Operation

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 Measurement 9 kHz to 30 MHz (6.3)

Comment:	
Date of test:	06 March 2008
Test site:	Fully anechoic room, cabin no. 2
Test distance:	3 meters



Date: 6.MAR.2008 13:01:52

Test Result: Test passed	
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# 8.4 Conducted Powerline Emission Measurement 150 kHz to 30 MHz

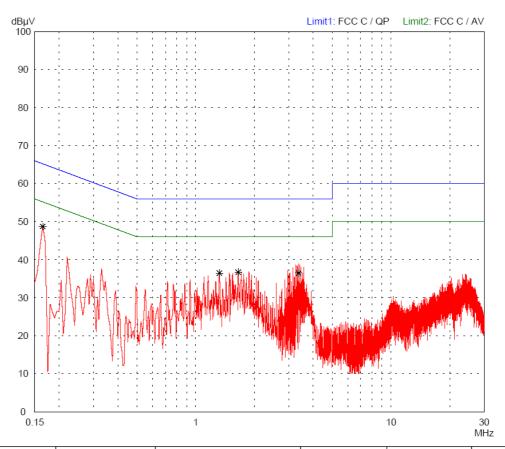
Rules and specifications:	CFR 47 Part 15, section 15.207 IC RSS-Gen Issue 2, section 7.2.2						
Guide:	ANSI C63.4 / CISPR 22						
Limit:	Frequency of Emission	Conducted Limit (dBµV)					
	(MHz)	Quasi-peak	Average				
	0.15 - 0.5	66 to 56	56 to 46				
	0.5 - 5	56	46				
	5 - 30 60 50						
Measurement procedure:	Conducted AC Powerline Emission (6.2)						

Comment:	
Date of test:	05 March 2008
Test site:	Shielded room, cabin no. 1

Test Result:	Test passed



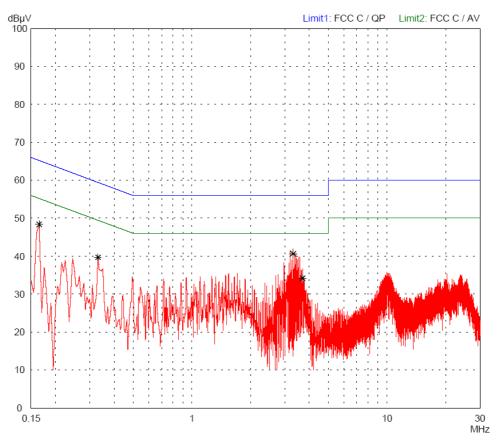
Tested on: Linecord Live Wire



Frequency	Reading	Correction factor	Value	Limit	Margin
MHz	dBμV	dB	dBμV	dBμV	dB
0.165 1.325 1.655 3.370	48.7 36.4 36.7 36.5		48.7 36.4 36.7 36.5	65.2 56.0 56.0 56.0	







Frequency	Reading	Correction factor	Value	Limit	Margin
MHz	dBμV	dB	dBμV	dBµV	dB
0.165	48.4		48.4	65.2	16.8
0.330	39.7		39.7	59.5	19.8
3.310	40.7		40.7	56.0	15.3
3.700	34.2		34.2	56.0	21.8

## Sample calculation of final values:

Final Value ( $dB\mu V$ ) = Reading Value ( $dB\mu V$ ) + Correction Factor (dB)



# 8.5 Radiated Emission Measurement 9 kHz to 30 MHz

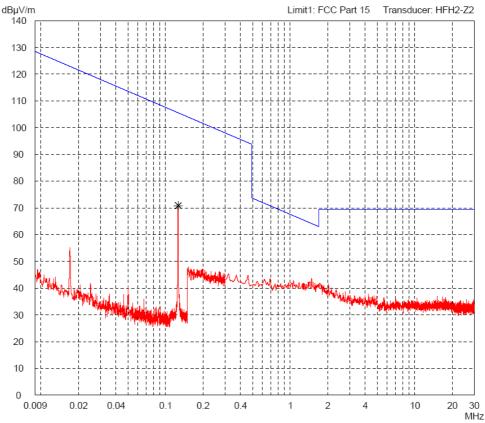
Rules and specifications:	CFR 47 Part 15, sections 15.205 and 15.209 IC RSS-210 Issue 7, sections 2.2 and 2.6							
Guide:	ANSI C63.4							
Limit:	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$							
	0.009 - 0.490							
	1.705 - 30.000 30 29.5 30  Additionally, the level of any unwanted emissions shall not exceed the level of the fundamental emission.							
Measurement procedure:	Radiated Emission	Measurement 9	kHz to 30 MHz (6.3)					

Comment:	
Date of test:	05 March 2008
Test site:	Open field test site

Test Result:	Test passed	
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### Prescan at 3 m distance:



Frequency	Detector	Distance		r Distance		Reading	g Value	Correction	Extrapol	ation	Pulse Train	Final	Limit	Margin
		d1	d2	d	d1	d2	Factor	Facto	or	Correction	Value			
(MHz)		(m)	(m)	(m)	(dBµV)	(dBµV)	(dB/m)	(dB/dec)	(dB)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	
0.12597	PK		10	300		36.8	20.0	-40.0	-59.1		-2.3	25.6	27.9	

## Sample calculation of final values:

Extrapolation Factor (dB) =  $(Log(d) - Log(d_2)) \cdot Extrapolation Factor (dB/decade)$ Final Value (dB $\mu$ V/m) = Reading Value d<sub>2</sub> (dB $\mu$ V) + Correction Factor (dB/m) + Extrapolation Factor (dB) + Pulse Train Correction (dB)

Note: Extrapolation factor (dB) and final value (dBµV/m) are relating to distance d.



# 8.6 Radiated Emission Measurement 30 MHz to 1 GHz

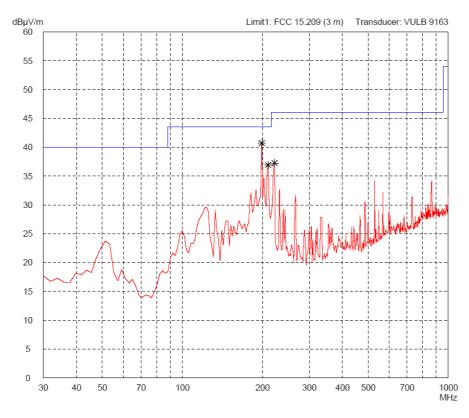
Rules and specifications:	CFR 47 Part 15, section 15.209 IC RSS-210 Issue 7, section 2.6			
Guide:	ANSI C63.4			
Limit:	Frequency of Emission Field Strength (MHz) Field Strength (dBµV/m)			
	30 - 88	100	40.0	
	88 - 216	150	43.5	
	216 - 960	200	46.0	
	Above 960	500	54.0	
	Additionally, the level of any unwanted emissions shall not exceed of the fundamental emission.			
Measurement procedures:	Radiated Emission in Fully or Semi Anechoic Room (6.4) Radiated Emission at Open Field Test Site (6.5)			

Comment:	
Date of test:	05 March 2008
Test site:	Frequencies ≤ 1 GHz: Open field test site Frequencies > 1 GHz: Fully anechoic room, cabin no. 2
Test distance:	3 meters

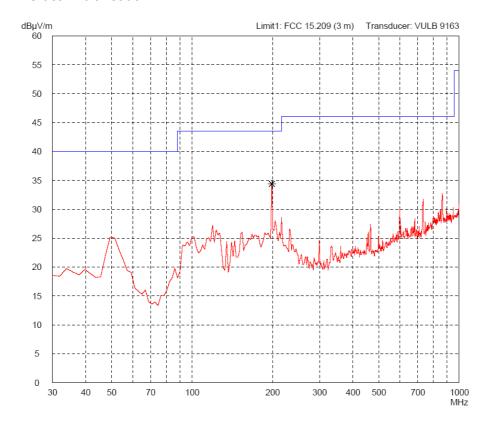
Test Result:	Test passed
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## Prescan at fully-anechoic chamber - horizontal polarisation



### Vertical Polarisation





# Final Results taken on an Open Area Test Site

Frequency	Antenna	Detector	Receiver	Correction	Pulse Train	Final	Limit	Margin
	Polarization		Reading	Factor	Correction	Value		
(MHz)			(dBµV)	(dB/m)	(dB)	(dBµV/m)	(dBµV/m)	(dB)
199.000	horizontal	Quasi-Peak	15.8	16.6		32.4	43.5	11.1

## Sample calculation of final values:

Final Value (dB $\mu$ V/m) = Reading Value (dB $\mu$ V) + Correction Factor (dB/m) + Pulse Train Correction (dB)



# 8.7 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:				
$CP = \dots$ W				
The effective isotropic radiated power (EIRP in watts) is calculated using				
the numerical antenna gain: $G = \dots$ $\mathbf{W}$				
$\Box$ the field strength <sup>5</sup> in V/m: $FS = \dots V/m$				
$EIRP = \frac{(FS \cdot D)^2}{30} \Rightarrow EIRP = \dots \mathbf{W}$				
with:				
Distance between the antennas in m: $D = \dots m$				
□ not detachable				
A field strength measurement is used to determine the effective isotropic radiated power (EIRP in watts) given by <sup>5</sup> :				
$EIRP = \frac{(FS \cdot D)^2}{30} \Rightarrow EIRP = \dots \mathbf{W}$				
with:				
Field strength in V/m: $FS = \dots V/m$				
Distance between the two antennas in m: $D = \dots $ 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 = \dots $ <b>W</b>				

<sup>&</sup>lt;sup>5</sup> 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		$\boxtimes$			
Transmitting device is					
☐ in the vicinity of the human head ☐ body-worn		$\boxtimes$			
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		1		ĺ	



# 9 Referenced Regulations

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

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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, 2007
CFR 47 Part 15	Code of Federal Regulations Part 15 (Radio Frequency Devices) of the Federal Communication Commission (FCC)	September 20, 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 Radiocommunication 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



# 10 Revision History

Revisio	Revision History				
Edition	Date	Issued by	Modifications		
1	31.03.2008	J. Roidt (cj)	First Edition		
2	08.04.2008	C. Jöger	Edition 2 Test "Radiated Emission Measurement 30 MHz to 1 GHz": Graphics and test results changed		