

Hermon Laboratories Ltd.
Harakevet Industrial Zone, Binyamina 30500,
Israel
Tel. +972-4-6288001
Fax. +972-4-6288277
E-mail: mail@hermonlabs.com

TEST REPORT

ACCORDING TO: FCC CFR 47 PART 15 subpart C, section 15.225 and subpart B;
RSS-210 issue 7 Annex 2 and ICES-003 issue 4

FOR:

Verifone Inc.

Payment terminal

Model:PINpad 1000se

This report is in conformity with ISO/ IEC 17025. The "A2LA Accredited" symbol endorsement applies only to the tests and calibrations that are listed in the scope of Hermon Laboratories accreditation. The test results relate only to the items tested. This test report shall not be reproduced in any form except in full with the written approval of Hermon Laboratories Ltd.



Table of contents

1	Applicant information.....	3
2	Equipment under test attributes	3
3	Manufacturer information	3
4	Test details.....	3
5	Tests summary.....	4
6	EUT description.....	5
6.1	General information.....	5
6.2	Ports and lines	5
6.3	Support and test equipment	5
6.4	Operating frequencies	5
6.5	Changes made in the EUT	5
6.6	Test configuration.....	6
6.7	Transmitter characteristics	7
7	Transmitter tests according to 47CFR part 15 subpart C requirements	8
7.1	In band radiated emissions	8
7.2	Out of band radiated emissions.....	12
7.3	Frequency stability test.....	18
7.4	Conducted emissions	20
7.5	Occupied bandwidth.....	25
8	Unintentional emission tests.....	27
8.1	Conducted emissions	27
8.2	Radiated emission measurements	33
9	APPENDIX A Test equipment and ancillaries used for tests.....	41
10	APPENDIX B Measurement uncertainties.....	42
11	APPENDIX C Test laboratory description	43
12	APPENDIX D Specification references	43
13	APPENDIX E Test equipment correction factors.....	44
14	APPENDIX F Abbreviations and acronyms.....	52



HERMON LABORATORIES

1 Applicant information

Client name: VeriFone Inc.
Address: 11 Ha'amal Street, Park Afek, Rosh Ha'yain 48092, Israel
Telephone: +972 3902 9730/8198
Fax: +972 3902 9731
E-mail: ilan_g1@verifone.com
Contact name: Mr. Ilan Gabrieli

2 Equipment under test attributes

Product name: Payment terminal
Model(s): PINpad 1000se
Hardware version: E
Software release: NOS 7.50.36a+CL_L102.1600a
Receipt date: 12/8/2008

3 Manufacturer information

Manufacturer name: VeriFone Inc.
Address: 11 Ha'amal Street, Park Afek, Rosh Ha'yain 48092, Israel
Telephone: +972 3902 9730/8198
Fax: +972 3902 9731
E-Mail: ilan_g1@verifone.com
Contact name: Mr. Ilan Gabrieli

4 Test details

Project ID: 19283
Location: Hermon Laboratories Ltd. Harakevet Industrial Zone, Binyamina 30500, Israel
Test started: 12/8/2008
Test completed: 12/17/2008
Test specification(s): FCC Part 15, subpart C, §15.225 and subpart B;
RSS-210 issue 7:2007, ICES-003 issue 4:2004



5 Tests summary

Test	Status
Transmitter characteristics	
FCC sections 15.225(a) (b) (c) / RSS-210, section A2.6, In band radiated emissions	Pass
FCC section 15.225(d) / RSS-210, section A2.6, Out of band radiated emissions	Pass
FCC section 15.225(e) / RSS-210, section A2.6, Frequency stability	Pass
FCC section 15.207(a) / RSS-Gen, section 7.2.2, Conducted emission	Pass
FCC Part 15, Section 203 / RSS-Gen, section 7.1.4, Antenna requirements	Pass
FCC section 15.215 /RSS-Gen, section 4.6.1, Occupied bandwidth	Pass
Unintentional emissions	
FCC Part 15, Section 107 / ICES-003, Section 5.3, Conducted emission at AC power port	Pass
FCC Part 15, Section 109 / ICES-003, Section 5.5 Radiated emission	Pass
FCC Part 15, Section 111 / RSS-Gen, Section 7.2.3.1, Conducted emission at receiver antenna port	Not required

Testing was completed against all relevant requirements of the test standard. The results obtained indicate that the product under test complies in full with the requirements tested.
The test results relate only to the items tested. Pass/ fail decision was based on nominal values.

This test report replaces the previously issued test report identified by Doc ID:VERRAD_FCC.19283.

	Name and Title	Date	Signature
Tested by:	Mrs. E. Pitt, test engineer	December 17, 2008	
Reviewed by:	Mrs. M. Cherniavsky, certification engineer	December 25, 2008	
Approved by:	Mr. M. Nikishin, EMC and radio group manager	December 26, 2008	



6 EUT description

6.1 General information

The EUT is a payment terminal powered from the mains via AC/DC power supply. The EUT has 2 configurations which differ by a PC connection cable. One configuration has USB connection and the other RS232 connection.

6.2 Ports and lines

Port type	Port description	Connected		Connector type	Qty.	Cable type	Cable length
		From	To				
Power/signal	DC power/signal	EUT	PC	RJ11	1	shielded	2 m
Power	DC power	PC	AC/DC power supply	DB9 or USB	1	shielded	1.8 m
Power	AC power	AC/DC power supply	mains	IEC 60320	1	unshielded	1.8 m
Power	DC power	PC	AC/DC adapter	DC jack	1	unshielded	1.8 m
Signal	Parallel COM	PC	Printer	DB-25	1	shielded	1.5 m
Signal	Serial COM	PC	Mouse	USB	1	shielded	1.8 m
Power	AC power	AC/DC adapter	mains	IEC 60320	1	unshielded	1.8 m

6.3 Support and test equipment

Description	Manufacturer	Model number	Serial number
PC for CE test	Dell	BCM92045MD	349890528
PC for RE test	IBM	P/N 13N5432	Z90U44E0BN
DC power supply	VeriFone / Elementech	P/N CPS 11212-1CR / P/N AU1121206u	NA
AC/DC adapter	IBM	P/N 02K6654	1Z0Z4028ESY
AC/DC adapter	Dell	P/N DF263	71615-79F-E85D
Mouse	Microsoft	P/N x08-70400	56180
Printer	Epson	LX-810	44B1127035

6.4 Operating frequencies

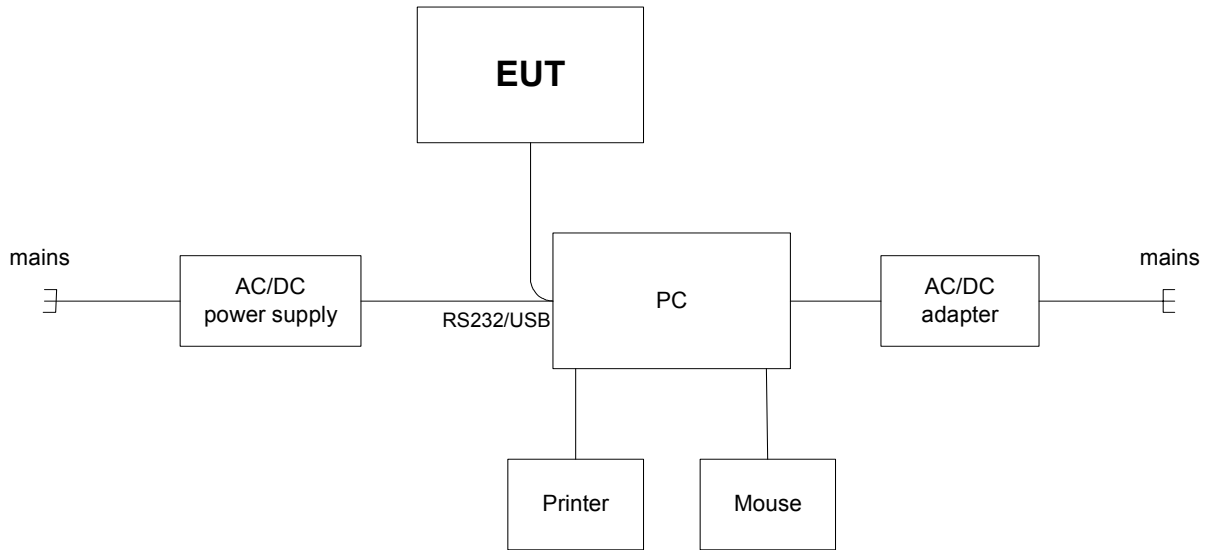
Source	Frequency, MHz	
Clock	20	27.12
Internal generator	0.5	

6.5 Changes made in the EUT

No changes were implemented.



6.6 Test configuration





HERMON LABORATORIES

6.7 Transmitter characteristics

Type of equipment						
	Stand-alone (Equipment with or without its own control provisions)					
V	Combined equipment (Equipment where the radio part is fully integrated within another type of equipment)					
	Plug-in card (Equipment intended for a variety of host systems)					
Intended use		Condition of use				
	fixed	Always at a distance more than 2 m from all people				
	mobile	Always at a distance more than 20 cm from all people				
V	portable	May operate at a distance closer than 20 cm to human body				
Assigned frequency range		13.110-14.01 MHz				
Operating frequency		13.56 MHz				
Maximum rated output power		At transmitter 50 Ω RF output connector			dBm	
		Effective radiated power (for equipment with no RF connector)			-16.7 dBm	
Is transmitter output power variable?		V	No			
			Yes	continuous variable		
				stepped variable with stepsize		dB
				minimum RF power		dBm
		maximum RF power		dBm		
Antenna connection						
	unique coupling	standard connector	V	integral	with temporary RF connector	
					V without temporary RF connector	
Antenna/s technical characteristics						
Type	Manufacturer	Model number		Gain		
PCB Loop Antenna	Hannstar, Unitech	VeriFone P/N PCB11509-C		Un-known		
Type of modulation		AM				
Modulating test signal (baseband)		According to the Standards ISO/IEC 1443-2, 3				
Maximum transmitter duty cycle in normal use		100%	Tx ON time	msec	Period	
Transmitter duty cycle supplied for test		100%	Tx ON time	msec	Period	
Transmitter power source						
	Battery	Nominal rated voltage	VDC	Battery type		
V	DC	Nominal rated voltage	5.8 VDC via AC/DC power supply			
	AC mains	Nominal rated voltage	VAC	Frequency	Hz	
Common power source for transmitter and receiver		yes				



Test specification:	FCC Sections 15.225(a) (b) (c)/ RSS-210, Section A2.6(a) (b) (c), In band radiated emissions			
Test procedure:	ANSI C63.4, Sections 5.3 and 13.1.4			
Test mode:	Compliance	Verdict:		PASS
Date & Time:	12/14/2008 3:32:09 PM			
Temperature: 22°C	Air Pressure: 1010 hPa	Relative Humidity: 40%	Power Supply: 120 VAC	
Remarks:				

7 Transmitter tests according to 47CFR part 15 subpart C requirements

7.1 In band radiated emissions

7.1.1 General

This test was performed to measure field strength of fundamental emission and modulation products from the EUT within the assigned band. Specification test limits are given in Table 7.1.1.

Table 7.1.1 Radiated emission limits

Frequency, MHz	Field strength at 30 m distance*		Field strength at 3 m distance*	
	µV/m	dB(µV/m)	µV/m	dB(µV/m)**
13.110 – 13.410	106	40.5	10600	80.5
13.410 – 13.553	334	50.5	33400	90.5
13.553 – 13.567	15848	84.0	1584800	124.0
13.567 – 13.710	334	50.5	33400	90.5
13.710 – 14.010	106	40.5	10600	80.5

*- The limit is provided in quasi peak values.

** - The limit for 3 m test distance was calculated using the inverse square distance extrapolation factor as follows:

$$\text{Lim}_{S_2} = \text{Lim}_{S_1} + 40 \log(S_1/S_2),$$

where S_1 and S_2 – standard defined and test distance respectively in meters.

7.1.2 Test procedure

7.1.2.1 The EUT was set up as shown in Figure 7.1.1 energized and the performance check was conducted.

7.1.2.2 The specified frequency range was investigated with loop antenna connected to spectrum analyzer/ EMI receiver. To find maximum radiation the turntable was rotated 360°, the measuring antenna was rotated around its vertical axis and the measuring antenna polarization was switched from vertical to horizontal.

7.1.2.3 The worst test results (the lowest margins) were found in the EUT X-axis position, recorded in Table 7.1.2 and shown in the associated plots.

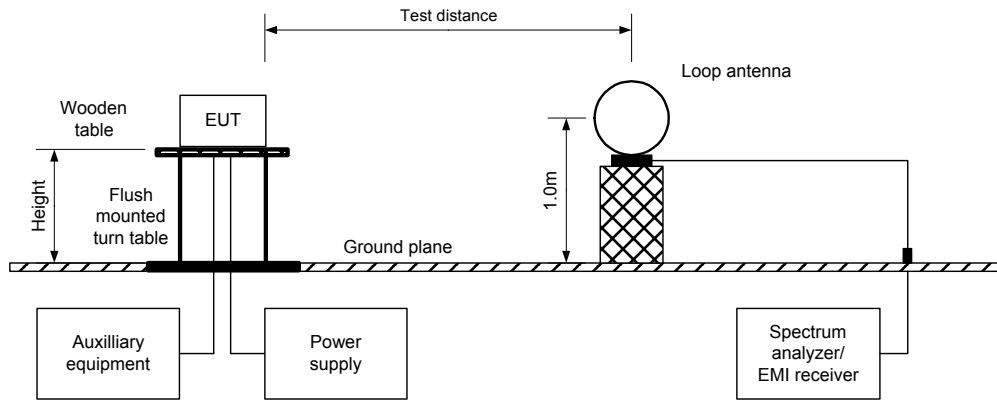
7.1.2.4 The worst test results (the lowest margins) were recorded in Table 7.1.2 and shown in the associated plots.

7.1.2.5 The test was repeated at ±15% change of power supply voltage. The test results were recorded in Table 7.1.2.



Test specification:	FCC Sections 15.225(a) (b) (c)/ RSS-210, Section A2.6(a) (b) (c), In band radiated emissions		
Test procedure:	ANSI C63.4, Sections 5.3 and 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	12/14/2008 3:32:09 PM		
Temperature: 22°C	Air Pressure: 1010 hPa	Relative Humidity: 40%	Power Supply: 120 VAC
Remarks:			

Figure 7.1.1 Setup for in band radiated emission measurements





HERMON LABORATORIES

Test specification:	FCC Sections 15.225(a) (b) (c)/ RSS-210, Section A2.6(a) (b) (c), In band radiated emissions		
Test procedure:	ANSI C63.4, Sections 5.3 and 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	12/14/2008 3:32:09 PM		
Temperature: 22°C	Air Pressure: 1010 hPa	Relative Humidity: 40%	Power Supply: 120 VAC
Remarks:			

Table 7.1.2 In band radiated emission test results

TEST DISTANCE: 3 m
EUT POSITION: 3 orthogonal (X / Y / Z)
MODULATION: AM

TRANSMITTER OUTPUT POWER: Maximum
INVESTIGATED FREQUENCY RANGE: 13.110 – 14.010 MHz
RESOLUTION BANDWIDTH: 9.0 kHz
VIDEO BANDWIDTH: 30.0 kHz

Frequency, MHz	Peak emission, dB(μV/m)	Quasi-peak			Antenna polarization	Azimuth**, degrees	Verdict	
		Measured emission, dB(μV/m)	Limit, dB(μV/m)	Margin, dB*				
Nominal power supply voltage 120 VAC								
13.348	56.00	NA	80.50	-24.50	V	180	Pass	
13.563	78.53	NA	124.00	-45.47	V	180		
13.778	55.50	NA	80.50	-25.00	V	180		
Power supply voltage 102 VAC								
13.563	78.53	NA	124.00	-45.47	V	180		
Power supply voltage 138 VAC								
13.563	78.53	NA	124.00	-45.47	V	180		

The recorded results were obtained in the EUT X-axis position.

*- Margin = Measured emission - specification limit.

** - EUT front panel refer to 0 degrees position of turntable.

Reference numbers of test equipment used

HL 0446	HL 3122	HL 3123					
---------	---------	---------	--	--	--	--	--

Full description is given in Appendix A.



HERMON LABORATORIES

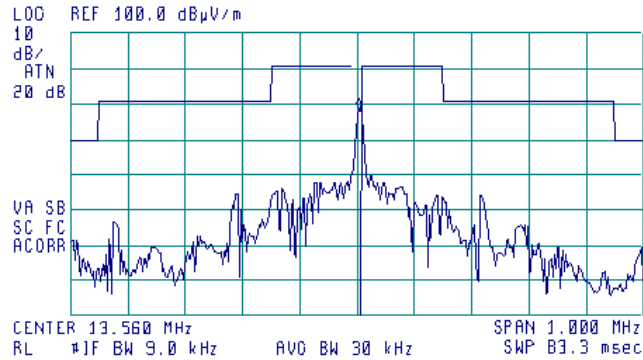
Test specification:	FCC Sections 15.225(a) (b) (c)/ RSS-210, Section A2.6(a) (b) (c), In band radiated emissions		
Test procedure:	ANSI C63.4, Sections 5.3 and 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	12/14/2008 3:32:09 PM		
Temperature: 22°C	Air Pressure: 1010 hPa	Relative Humidity: 40%	Power Supply: 120 VAC
Remarks:			

Plot 7.1.1 In band radiated emission test results

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
DETECTOR: Peak hold



ACTV DET: PEAK
MERS DET: PEAK QP AVG
MKR 13.563 MHz
78.53 dBμV/m





Test specification:	FCC Section 15.225(d) / RSS-210, Section A2.6 (d), Out of band radiated emissions		
Test procedure:	ANSI C63.4, Sections 5.3 and 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	12/14/2008 3:43:23 PM		
Temperature: 22°C	Air Pressure: 1010 hPa	Relative Humidity: 40%	Power Supply: 120 VAC
Remarks:			

7.2 Out of band radiated emissions

7.2.1 General

This test was performed to measure field strength of spurious emissions from the EUT. Specification test limits are given in Table 7.2.1.

Table 7.2.1 Radiated emission limits

Frequency, MHz	Field strength at 3 m within restricted bands, dB(μV/m)***		
	Peak	Quasi Peak	Average
0.009 – 0.090	148.5 – 128.5	NA	128.5 – 108.5**
0.090 – 0.110	NA	108.5 – 106.8**	NA
0.110 – 0.490	126.8 – 113.8	NA	106.8 – 93.8**
0.490 – 1.705	NA	73.8 – 63.0**	NA
1.705 – 30.0*		69.5**	
30 – 88		40.0	
88 – 216		43.5	
216 – 960		46.0	
960 - 1000		54.0	

*- The above field strength limits applied from the lowest radio frequency generated in the device, without going below 9 kHz up to the tenth harmonic of the highest fundamental frequency.

** - The limit for 3 m test distance was calculated using the inverse square distance extrapolation factor as follows:

$$\text{Lim}_{S_2} = \text{Lim}_{S_1} + 40 \log(S_1/S_2),$$

where S_1 and S_2 – standard defined and test distance respectively in meters.

*** - The limit decreases linearly with the logarithm of frequency.

7.2.2 Test procedure for spurious emission field strength measurements in 9 kHz to 30 MHz band

7.2.2.1 The EUT was set up as shown in Figure 7.2.1, energized and the performance check was conducted.

7.2.2.2 The specified frequency range was investigated with loop antenna connected to spectrum analyzer/ EMI receiver. To find maximum radiation the turntable was rotated 360°, the measuring antenna was rotated around its vertical axis and the measuring antenna polarization was switched from vertical to horizontal.

7.2.2.3 The worst test results (the lowest margins) were recorded in Table 7.2.2 and shown in the associated plots.

7.2.3 Test procedure for spurious emission field strength measurements above 30 MHz

7.2.3.1 The EUT was set up as shown in Figure 7.2.2, energized and the performance check was conducted.

7.2.3.2 The specified frequency range was investigated with antenna connected to spectrum analyzer/ EMI receiver. To find maximum radiation the turntable was rotated 360°, the measuring antenna height was changed from 1 to 4 m, its polarization was switched from vertical to horizontal.

7.2.3.3 The worst test results (the lowest margins) were recorded in Table 7.2.2 and shown in the associated plots.



Test specification:	FCC Section 15.225(d) / RSS-210, Section A2.6 (d), Out of band radiated emissions		
Test procedure:	ANSI C63.4, Sections 5.3 and 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	12/14/2008 3:43:23 PM		
Temperature: 22°C	Air Pressure: 1010 hPa	Relative Humidity: 40%	Power Supply: 120 VAC
Remarks:			

Figure 7.2.1 Radiated emissions below 30 MHz test set up

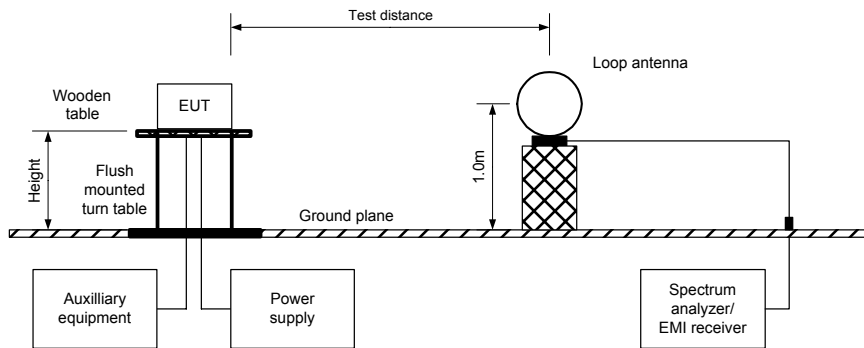
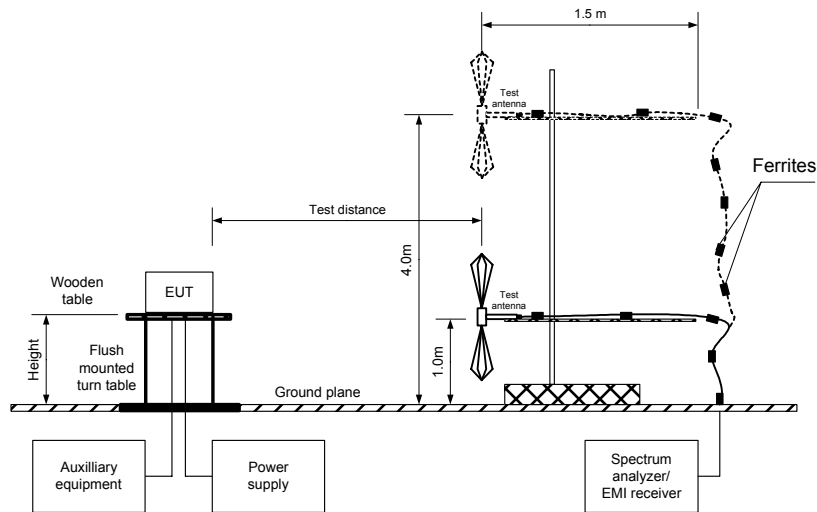


Figure 7.2.2 Radiated emissions above 30 MHz test set up





HERMON LABORATORIES

Test specification:		FCC Section 15.225(d) / RSS-210, Section A2.6 (d), Out of band radiated emissions	
Test procedure:		ANSI C63.4, Sections 5.3 and 13.1.4	
Test mode:	Compliance	Verdict:	PASS
Date & Time:	12/14/2008 3:43:23 PM		
Temperature: 22°C	Air Pressure: 1010 hPa	Relative Humidity: 40%	Power Supply: 120 VAC
Remarks:			

Table 7.2.2 Out of band radiated emissions test results

TEST DISTANCE: 3 m
EUT POSITION: X-axis
MODULATION: AM

TRANSMITTER OUTPUT POWER: Maximum
INVESTIGATED FREQUENCY RANGE: 0.009 – 1000 MHz
RESOLUTION BANDWIDTH: 0.2 kHz (9 kHz – 150 kHz)
9.0 kHz (150 kHz – 30 MHz)
120 kHz (30 MHz – 1000 MHz)
VIDEO BANDWIDTH: ≥ Resolution bandwidth
TEST ANTENNA TYPE: Active loop (9 kHz – 30 MHz)
Biconilog (30 MHz – 1000 MHz)

Frequency, MHz	Peak emission, dB(μV/m)	Quasi-peak			Antenna polarization	Antenna height, m	Turn-table position**, degrees	Verdict
		Measured emission, dB(μV/m)	Limit, dB(μV/m)	Margin, dB*				
40.687500	38.63	36.44	40.00	-3.56	V	1	270	Pass
119.997550	39.79	38.87	43.50	-4.63	V	1	170	
479.975000	41.16	38.19	46.00	-7.81	V	1	170	
599.975000	42.85	41.72	46.00	-4.28	H	1	340	
721.550000	41.11	39.62	46.00	-6.38	H	1	175	
781.661000	42.02	40.23	46.00	-5.77	H	1	175	
959.962500	44.82	43.29	46.00	-2.71	V	1	270	

*- Margin = Measured emission - specification limit.

**- EUT front panel refer to 0 degrees position of turntable.

Reference numbers of test equipment used

HL 0446	HL 0604	HL 3122	HL 3123				
---------	---------	---------	---------	--	--	--	--

Full description is given in Appendix A.

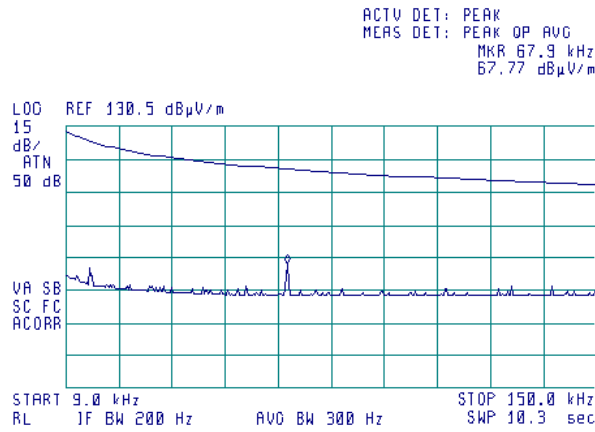


HERMON LABORATORIES

Test specification:		FCC Section 15.225(d) / RSS-210, Section A2.6 (d), Out of band radiated emissions	
Test procedure:		ANSI C63.4, Sections 5.3 and 13.1.4	
Test mode:	Compliance	Verdict:	PASS
Date & Time:	12/14/2008 3:43:23 PM		
Temperature: 22°C	Air Pressure: 1010 hPa	Relative Humidity: 40%	Power Supply: 120 VAC
Remarks:			

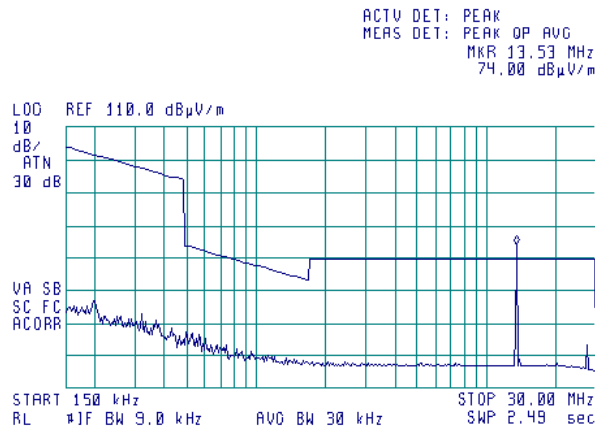
Plot 7.2.1 Radiated emission measurements from 9 to 150 kHz

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical, Horizontal
DETECTOR: Peak hold
NOTE: Split cable connected to RS232 connector



Plot 7.2.2 Radiated emission measurements from 0.15 to 30 MHz

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical, Horizontal
DETECTOR: Peak hold
NOTE: Split cable connected to RS232 connector



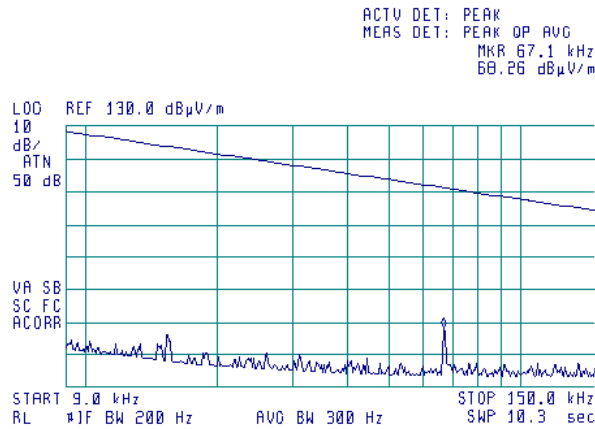


HERMON LABORATORIES

Test specification: FCC Section 15.225(d) / RSS-210, Section A2.6 (d), Out of band radiated emissions			
Test procedure: ANSI C63.4, Sections 5.3 and 13.1.4			
Test mode: Compliance	Verdict: PASS		
Date & Time: 12/14/2008 3:43:23 PM			
Temperature: 22°C	Air Pressure: 1010 hPa	Relative Humidity: 40%	Power Supply: 120 VAC
Remarks:			

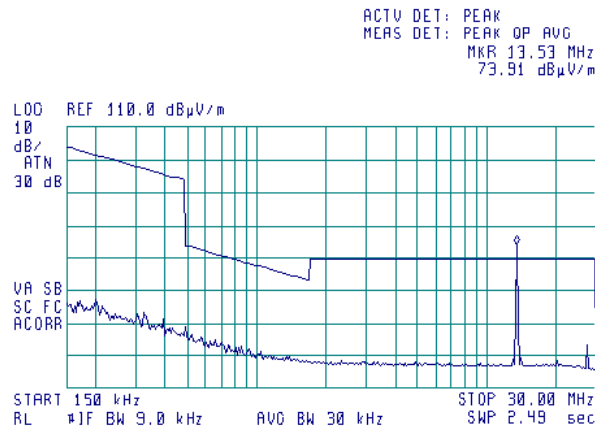
Plot 7.2.3 Radiated emission measurements from 9 to 150 kHz

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical, Horizontal
DETECTOR: Peak hold
NOTE: Split cable connected to USB connector



Plot 7.2.4 Radiated emission measurements from 0.15 to 30 MHz

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical, Horizontal
DETECTOR: Peak hold
NOTE: Split cable connected to USB connector



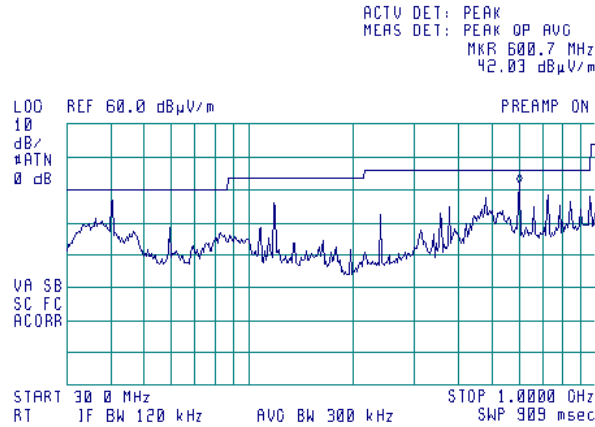


HERMON LABORATORIES

Test specification:		FCC Section 15.225(d) / RSS-210, Section A2.6 (d), Out of band radiated emissions	
Test procedure: ANSI C63.4, Sections 5.3 and 13.1.4			
Test mode: Compliance		Verdict: PASS	
Date & Time: 12/14/2008 3:43:23 PM			
Temperature: 22°C	Air Pressure: 1010 hPa	Relative Humidity: 40%	Power Supply: 120 VAC
Remarks:			

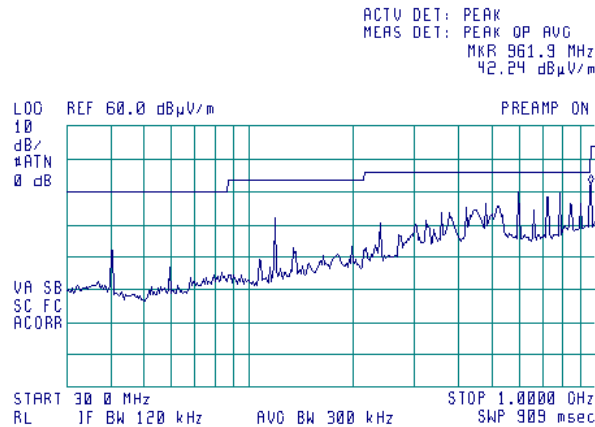
Plot 7.2.5 Radiated emission measurements from 30 to 1000 MHz

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical
DETECTOR: Peak hold
NOTE: Split cable connected to USB connector



Plot 7.2.6 Radiated emission measurements from 30 to 1000 MHz

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Horizontal
DETECTOR: Peak hold
NOTE: Split cable connected to USB connector





Test specification:	FCC Section 15.225(e) / RSS-210, Section A2.6, Frequency stability		
Test procedure:	ANSI C63.4, Section 13.1.6		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	12/14/2008 12:52:48 PM		
Temperature: 22°C	Air Pressure: 1010 hPa	Relative Humidity: 40%	Power Supply: 120 VAC
Remarks:			

7.3 Frequency stability test

7.3.1 General

This test was performed to measure frequency stability of transmitter RF carrier. Specification test limits are given in Table 7.3.1.

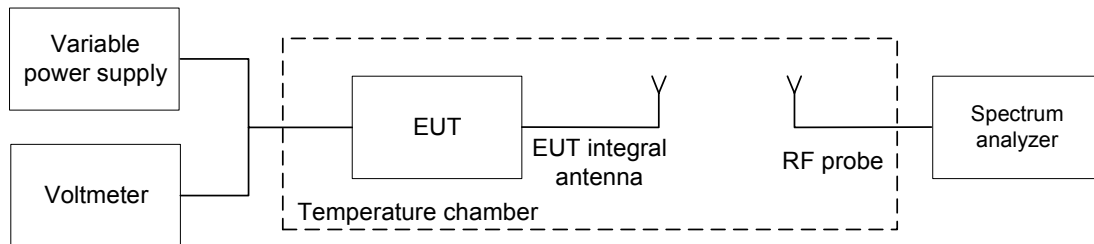
Table 7.3.1 Frequency stability limits

Assigned frequency, MHz	Maximum allowed frequency displacement	
	%	Hz
13.560	± 0.01 %	1356

7.3.2 Test procedure

- 7.3.2.1 The EUT was set up as shown in Figure 7.3.1, energized and its proper operation was checked.
- 7.3.2.2 The EUT power was turned off. Temperature within test chamber was set to the required one and a period of time sufficient to stabilize all of the oscillator circuit components was allowed.
- 7.3.2.3 The EUT was powered on and carrier frequency was measured at start up moment and then after 2, 5 and 10 minutes. The EUT was powered off.
- 7.3.2.4 The above procedure was repeated at the rest of the test temperatures and voltages as provided in Table 7.3.2.
- 7.3.2.5 Frequency displacement was calculated and compared with the limit as provided in Table 7.3.2.

Figure 7.3.1 Frequency stability test setup





Test specification:		FCC Section 15.225(e) / RSS-210, Section A2.6, Frequency stability	
Test procedure:		ANSI C63.4, Section 13.1.6	
Test mode:	Compliance	Verdict:	PASS
Date & Time:	12/14/2008 12:52:48 PM		
Temperature: 22°C	Air Pressure: 1010 hPa	Relative Humidity: 40%	Power Supply: 120 VAC
Remarks:			

Table 7.3.2 Frequency stability test results

OPERATING FREQUENCY: 13.560 MHz
 NOMINAL POWER VOLTAGE: 120 VAC
 TEMPERATURE STABILIZATION PERIOD: 20 min
 POWER DURING TEMPERATURE TRANSITION: Off
 SPECTRUM ANALYZER MODE: Counter
 RESOLUTION BANDWIDTH: 1 kHz
 VIDEO BANDWIDTH: 30 Hz
 MODULATION: Unmodulated

Temperature, °C	Voltage, V	Frequency, MHz				Max frequency drift, Hz		Limit, Hz	Margin, Hz	Verdict
		Start up	2 nd min	5 th min	10 th min	Positive	Negative			
-20	nominal	13.561380	13.561382	13.561386	13.561386	NA	314	1356	-1042	Pass
20	nominal +15%	13.561880	13.561832	13.561800	13.561700	180	NA		-1176	
20	nominal	13.561880	13.561832	13.561800	13.561700*	180	NA		-1176	
20	nominal -15%	13.561880	13.561832	13.561800	13.561700	180	NA		-1176	
50	nominal	13.561480	13.561460	13.561428	13.561388	NA	312		-1044	

* - Reference frequency

Reference numbers of test equipment used

HL 0493	HL 0495	HL 0808	HL 3310				
---------	---------	---------	---------	--	--	--	--

Full description is given in Appendix A.



Test specification: FCC Section 15.207(a) / RSS-Gen, Section 7.2.2, Conducted emission			
Test procedure: ANSI C63.4, Section 13.1.3			
Test mode: Compliance	Verdict: PASS		
Date & Time: 12/9/2008 7:13:00 PM			
Temperature: 22°C	Air Pressure: 1013 hPa	Relative Humidity: 44%	Power Supply: 120 VAC
Remarks:			

7.4 Conducted emissions

7.4.1 General

This test was performed to measure common mode conducted emissions at the power port. Specification test limits are given in Table 7.4.1.

Table 7.4.1 Limits for conducted emissions

Frequency, MHz	Class B limit, dB(μV)	
	QP	AVRG
0.15 - 0.5	66 - 56*	56 - 46*
0.5 - 5.0	56	46
5.0 - 30	60	50

* The limit decreases linearly with the logarithm of frequency.

7.4.2 Test procedure

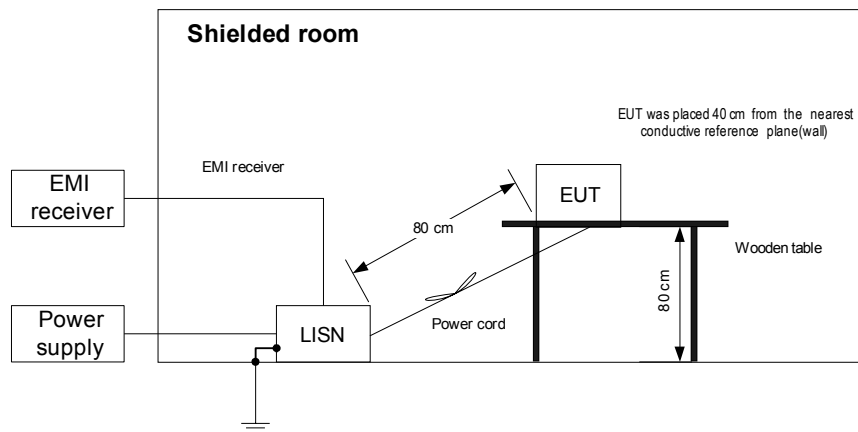
7.4.2.1 The EUT was set up as shown in Figure 7.4.1, energized and the performance check was conducted.

7.4.2.2 The measurements were performed at power terminals with the LISN, connected to a spectrum analyzer in the frequency range referred to in Table 7.4.2. Unused coaxial connector of the LISN was terminated with 50 Ohm. Quasi-peak and average detectors were used throughout the testing.

7.4.2.3 The position of the device cables was varied to determine maximum emission level.

7.4.2.4 The worst test results (the lowest margins) were recorded in Table 7.4.2 and shown in the associated plots.

Figure 7.4.1 Setup for conducted emission measurements, table-top equipment





HERMON LABORATORIES

Test specification: FCC Section 15.207(a) / RSS-Gen, Section 7.2.2, Conducted emission	
Test procedure: ANSI C63.4, Section 13.1.3	
Test mode: Compliance	Verdict: PASS
Date & Time: 12/9/2008 7:13:00 PM	
Temperature: 22°C	Air Pressure: 1013 hPa
Relative Humidity: 44%	
Power Supply: 120 VAC	
Remarks:	

Table 7.4.2 Conducted emission test results

LINE: AC mains
 EUT OPERATING MODE: Transmit
 EUT SET UP: TABLE-TOP
 TEST SITE: SHIELDED ROOM
 DETECTORS USED: PEAK / QUASI-PEAK / AVERAGE
 FREQUENCY RANGE: 150 kHz - 30 MHz
 RESOLUTION BANDWIDTH: 9 kHz
 NOTE: Split cable connected to RS232 connector

Frequency, MHz	Peak emission, dB(µV)	Quasi-peak			Average			Line ID	Verdict
		Measured emission, dB(µV)	Limit, dB(µV)	Margin, dB*	Measured emission, dB(µV)	Limit, dB(µV)	Margin, dB*		
0.331250	54.23	52.03	59.47	-7.44	42.65	49.47	-6.82	L1	Pass
0.340000	54.55	51.75	59.26	-7.51	40.01	49.26	-9.25		
0.380750	53.49	49.20	58.29	-9.09	34.98	48.29	-13.31		
0.383148	53.66	50.35	58.23	-7.88	36.56	48.23	-11.67		
0.671250	51.60	47.74	56.00	-8.26	33.61	46.00	-12.39		
27.122950	45.54	44.74	60.00	-15.26	41.57	50.00	-8.43		
0.336515	54.28	52.00	59.34	-7.34	42.71	49.34	-6.63	L2	Pass
0.337000	54.68	51.96	59.33	-7.37	42.44	49.33	-6.89		
0.380500	53.50	49.16	58.30	-9.14	34.33	48.30	-13.97		
0.564625	48.01	44.21	56.00	-11.79	30.40	46.00	-15.60		
0.680500	51.90	48.22	56.00	-7.78	31.35	46.00	-14.65		
27.123500	45.14	44.36	60.00	-15.64	41.21	50.00	-8.79		



HERMON LABORATORIES

Test specification:		FCC Section 15.207(a) / RSS-Gen, Section 7.2.2, Conducted emission	
Test procedure:		ANSI C63.4, Section 13.1.3	
Test mode:	Compliance	Verdict:	PASS
Date & Time:	12/9/2008 7:13:00 PM		
Temperature: 22°C	Air Pressure: 1013 hPa	Relative Humidity: 44%	Power Supply: 120 VAC
Remarks:			

LINE: AC mains
 EUT OPERATING MODE: Transmit
 EUT SET UP: TABLE-TOP
 TEST SITE: SHIELDED ROOM
 DETECTORS USED: PEAK / QUASI-PEAK / AVERAGE
 FREQUENCY RANGE: 150 kHz - 30 MHz
 RESOLUTION BANDWIDTH: 9 kHz
 NOTE: Split cable connected to USB connector

Frequency, MHz	Peak emission, dB(μV)	Quasi-peak			Average			Line ID	Verdict
		Measured emission, dB(μV)	Limit, dB(μV)	Margin, dB*	Measured emission, dB(μV)	Limit, dB(μV)	Margin, dB*		
0.327250	54.49	51.31	59.57	-8.26	37.74	49.57	-11.83	L1	Pass
0.390000	53.56	50.56	58.07	-7.51	39.35	48.07	-8.72		
0.682100	52.67	48.83	56.00	-7.17	32.30	46.00	-13.70		
1.110000	47.49	43.59	56.00	-12.41	30.40	46.00	-15.60		
2.060000	44.94	40.41	56.00	-15.59	28.07	46.00	-17.93		
27.122950	43.76	42.76	60.00	-17.24	39.57	50.00	-10.43		
0.338500	55.49	49.43	59.30	-9.87	35.71	49.30	-13.59	L2	Pass
0.384950	52.66	46.66	58.19	-11.53	31.84	48.19	-16.35		
0.400000	50.80	44.33	57.87	-13.54	28.20	47.87	-19.67		
0.742000	48.33	40.79	56.00	-15.21	22.59	46.00	-23.41		
1.188395	45.62	40.14	56.00	-15.86	22.63	46.00	-23.37		
27.124500	42.14	40.64	60.00	-19.36	36.26	50.00	-13.74		

*- Margin = Measured emission - specification limit.

Reference numbers of test equipment used

HL 0787	HL 1513	HL 2888	HL 3612			
---------	---------	---------	---------	--	--	--

Full description is given in Appendix A.

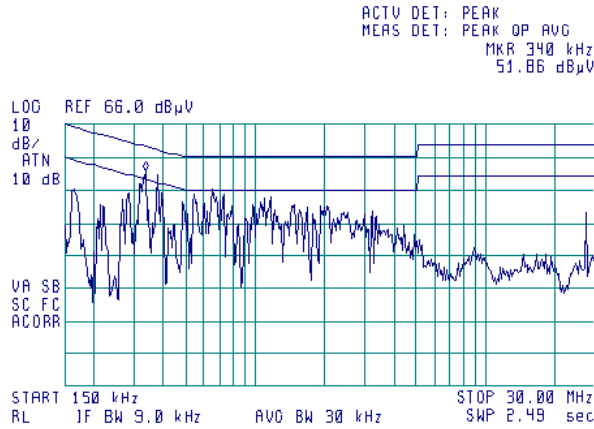


HERMON LABORATORIES

Test specification: FCC Section 15.207(a) / RSS-Gen, Section 7.2.2, Conducted emission			
Test procedure: ANSI C63.4, Section 13.1.3			
Test mode: Compliance	Verdict: PASS		
Date & Time: 12/9/2008 7:13:00 PM			
Temperature: 22°C	Air Pressure: 1013 hPa	Relative Humidity: 44%	Power Supply: 120 VAC
Remarks:			

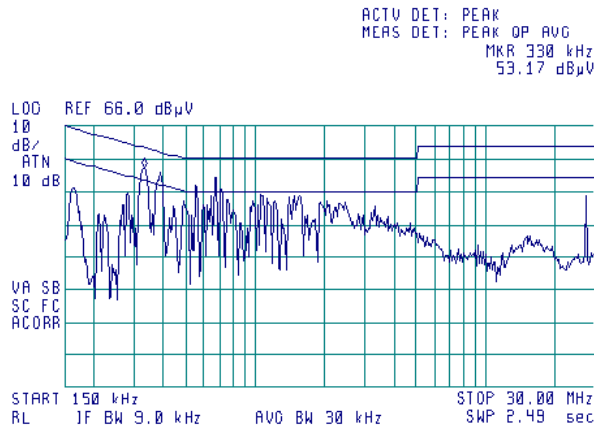
Plot 7.4.1 Conducted emission measurements

LINE: L1
EUT OPERATING MODE: Transmit
LIMIT: QUASI-PEAK, AVERAGE
DETECTOR: PEAK
NOTE: Split cable connected to RS232 connector



Plot 7.4.2 Conducted emission measurements

LINE: L2
EUT OPERATING MODE: Transmit
LIMIT: QUASI-PEAK, AVERAGE
DETECTOR: PEAK
NOTE: Split cable connected to RS232 connector



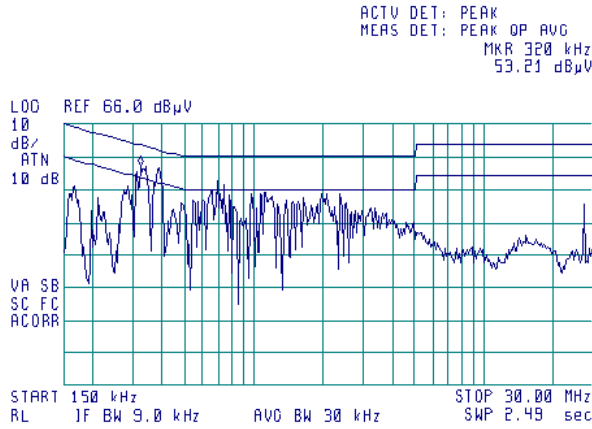


HERMON LABORATORIES

Test specification: FCC Section 15.207(a) / RSS-Gen, Section 7.2.2, Conducted emission			
Test procedure: ANSI C63.4, Section 13.1.3			
Test mode: Compliance	Verdict: PASS		
Date & Time: 12/9/2008 7:13:00 PM			
Temperature: 22°C	Air Pressure: 1013 hPa	Relative Humidity: 44%	Power Supply: 120 VAC
Remarks:			

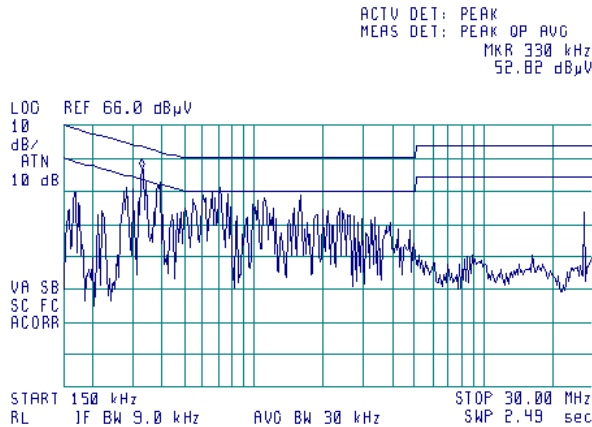
Plot 7.4.3 Conducted emission measurements

LINE: L1
EUT OPERATING MODE: Transmit
LIMIT: QUASI-PEAK, AVERAGE
DETECTOR: PEAK
NOTE: Split cable connected to USB connector



Plot 7.4.4 Conducted emission measurements

LINE: L2
EUT OPERATING MODE: Transmit
LIMIT: QUASI-PEAK, AVERAGE
DETECTOR: PEAK
NOTE: Split cable connected to USB connector





Test specification:	FCC section 15.215 /RSS-Gen, section 4.6.1, Occupied bandwidth		
Test procedure:	ANSI C63.4, Section 13.1.7		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	12/9/2008 4:53:00 PM		
Temperature: 22°C	Air Pressure: 1013 hPa	Relative Humidity: 44%	Power Supply: 120 VAC
Remarks:			

7.5 Occupied bandwidth

7.5.1 General

This test was performed to verify that the 20 dB bandwidth of the emissions was contained within the standard specified frequency band. Specification test limits are given in Table 7.5.1.

Table 7.5.1 Modulation bandwidth limits

Assigned frequency band, MHz	Emission bandwidth limit, dB
13.11 – 14.01	20

7.5.2 Test procedure

- 7.5.2.1 The EUT was set up as shown in Figure 7.5.1, energized and the performance check was conducted.
- 7.5.2.2 The spectrum analyzer sweep time and bandwidth were set to capture all major modulation sidebands of emission and sweep time was set sufficiently slow to ensure peak measurements. Spectrum analyzer was set in peak hold mode and time sufficient for trace stabilization was allowed.
- 7.5.2.3 The peak of emission was measured. The frequency of modulation envelope points at which power level drops below 20 dB level was measured.
- 7.5.2.4 Modulation bandwidth was calculated by adding of the negative frequency drift to the lower measured frequency and the positive frequency drift to the higher measured frequency. The obtained modulation bandwidth was verified to be within the allowed frequency range.
- 7.5.2.5 The test results were recorded in Table 7.5.2 and shown in the associated plot.

Figure 7.5.1 Occupied bandwidth measurements test setup





Test specification: FCC section 15.215 /RSS-Gen, section 4.6.1, Occupied bandwidth			
Test procedure: ANSI C63.4, Section 13.1.7			
Test mode: Compliance	Verdict: PASS		
Date & Time: 12/9/2008 4:53:00 PM			
Temperature: 22°C	Air Pressure: 1013 hPa	Relative Humidity: 44%	Power Supply: 120 VAC
Remarks:			

Table 7.5.2 Occupied bandwidth test results

DETECTOR USED: Peak hold
 RESOLUTION BANDWIDTH: 1 kHz
 VIDEO BANDWIDTH: 3 kHz
 MODULATION: AM
 TRANSMITTER OUTPUT POWER SETTINGS: Maximum

Assigned frequency band, kHz	Measured occupied bandwidth, kHz	Margin, kHz	Verdict
900	4.25	895.75	Pass

Assigned frequency band is 14.01 – 13.11 = 0.9 MHz = 900 kHz

Reference numbers of test equipment used

HL 1461	HL 3001						
---------	---------	--	--	--	--	--	--

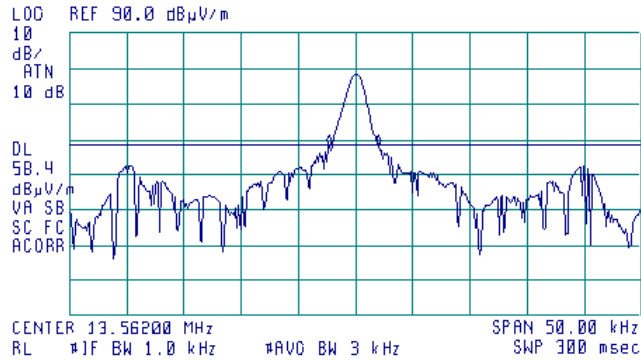
Full description is given in Appendix A.

Plot 7.5.1 The 20 dB occupied bandwidth

TEST SITE: Semi anechoic chamber
 TEST DISTANCE: 3 m
 DETECTOR: Peak hold



ACTV DET: PEAK
 MEAS DET: PEAK OP AVG
 MKRΔ 4.25 kHz
 .14 dB





Test specification:	FCC section 15.107 / ICES-003 Section 5.3, Class B conducted emissions		
Test procedure:	ANSI C63.4, Section 11.5/ CAN/CSA-CEI/IEC CISPR 22, Section 5.1		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	12/14/2008 3:30:35 PM		
Temperature: 22°C	Air Pressure: 1010 hPa	Relative Humidity: 40%	Power Supply: 120 VAC
Remarks:			

8 Unintentional emission tests

8.1 Conducted emissions

8.1.1 General

This test was performed to measure common mode conducted emissions at the mains power port. Specification test limits are given in Table 8.1.1.

Table 8.1.1 Limits for conducted emissions according to FCC Part 15, Section 107 and ICES-003, Section 5

Frequency, MHz	Class B limit, dB(μV)		Class A limit, dB(μV)	
	QP	AVRG	QP	AVRG
0.15 - 0.5	66 - 56*	56 - 46*	79	66
0.5 - 5.0	56	46	73	60
5.0 - 30	60	50	73	60

- The limit decreases linearly with the logarithm of frequency.

8.1.2 Test procedure

8.1.2.1 The EUT was set up as shown in Figure 8.1.1, energized and the performance check was conducted.

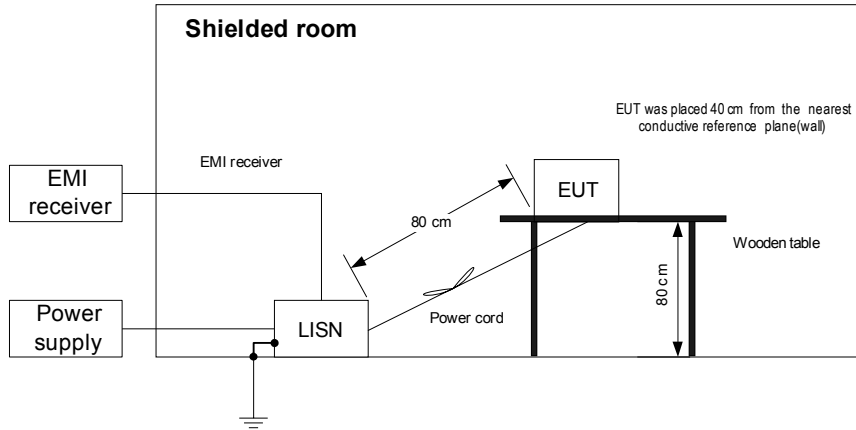
8.1.2.2 The measurements were performed at power terminals with the LISN, connected to a spectrum analyzer in the frequency range referred to in Table 8.1.2, Table 8.1.3. Unused coaxial connector of the LISN was terminated with 50 Ohm. Quasi-peak and average detectors were used throughout the testing.

8.1.2.3 The position of the device cables was varied to determine maximum emission level. The worst test results (the lowest margins) were recorded in Table 8.1.2, Table 8.1.3 and shown in the associated plots.



Test specification:	FCC section 15.107 / ICES-003 Section 5.3, Class B conducted emissions		
Test procedure:	ANSI C63.4, Section 11.5/ CAN/CSA-CEI/IEC CISPR 22, Section 5.1		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	12/14/2008 3:30:35 PM		
Temperature: 22°C	Air Pressure: 1010 hPa	Relative Humidity: 40%	Power Supply: 120 VAC
Remarks:			

Figure 8.1.1 Setup for conducted emission measurements, table-top equipment





HERMON LABORATORIES

Test specification:	FCC section 15.107 / ICES-003 Section 5.3, Class B conducted emissions		
Test procedure:	ANSI C63.4, Section 11.5/ CAN/CSA-CEI/IEC CISPR 22, Section 5.1		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	12/14/2008 3:30:35 PM		
Temperature: 22°C	Air Pressure: 1010 hPa	Relative Humidity: 40%	Power Supply: 120 VAC
Remarks:			

Table 8.1.2 Conducted emission test results

LINE: AC mains
 EUT SET UP: TABLE-TOP
 TEST SITE: SHIELDED ROOM
 DETECTORS USED: PEAK / QUASI-PEAK / AVERAGE
 FREQUENCY RANGE: 150 kHz - 30 MHz
 RESOLUTION BANDWIDTH: 9 kHz
 Connector type: USB

Frequency, MHz	Peak emission, dB(μV)	Quasi-peak			Average			Line ID	Verdict
		Measured emission, dB(μV)	Limit, dB(μV)	Margin, dB*	Measured emission, dB(μV)	Limit, dB(μV)	Margin, dB*		
0.336000	62.89	56.31	59.35	-3.04	45.03	49.35	-4.32	L1	Pass
0.397000	58.77	54.08	57.92	-3.84	41.74	47.92	-6.18		
0.680000	56.40	51.45	56.00	-4.55	37.43	46.00	-8.57		
0.738000	56.80	49.89	56.00	-6.11	34.72	46.00	-11.28		
1.174000	51.65	46.87	56.00	-9.13	32.47	46.00	-13.53		
1.494000	51.30	45.50	56.00	-10.50	30.00	46.00	-16.00		
0.344616	60.61	55.61	59.15	-3.54	40.11	49.15	-9.04	L2	Pass
0.405726	55.32	48.32	57.76	-9.44	33.36	47.76	-14.40		
0.540996	50.81	46.15	56.00	-9.85	30.47	46.00	-15.53		
0.619026	49.91	44.86	56.00	-11.14	25.42	46.00	-20.58		
0.759966	51.09	45.90	56.00	-10.10	26.13	46.00	-19.87		
1.121856	50.97	44.36	56.00	-11.64	22.68	46.00	-23.32		

*- Margin = Measured emission - specification limit.

Reference numbers of test equipment used

HL 1430	HL 1513	HL 3016	HL 3612				
---------	---------	---------	---------	--	--	--	--

Full description is given in Appendix A.

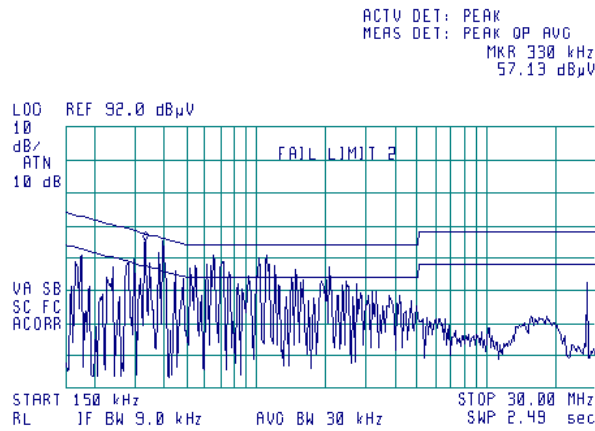


HERMON LABORATORIES

Test specification: FCC section 15.107 / ICES-003 Section 5.3, Class B conducted emissions			
Test procedure: ANSI C63.4, Section 11.5/ CAN/CSA-CEI/IEC CISPR 22, Section 5.1			
Test mode: Compliance	Verdict: PASS		
Date & Time: 12/14/2008 3:30:35 PM			
Temperature: 22°C	Air Pressure: 1010 hPa	Relative Humidity: 40%	Power Supply: 120 VAC
Remarks:			

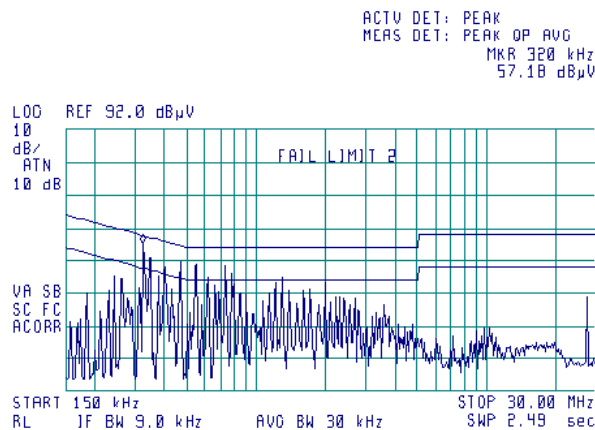
Plot 8.1.1 Conducted emission measurements

LINE: L1
LIMIT: QUASI-PEAK, AVERAGE
DETECTOR: PEAK
Connector: USB



Plot 8.1.2 Conducted emission measurements

LINE: L2
LIMIT: QUASI-PEAK, AVERAGE
DETECTOR: PEAK
Connector: USB





Test specification:	FCC section 15.107 / ICES-003 Section 5.3, Class B conducted emissions		
Test procedure:	ANSI C63.4, Section 11.5/ CAN/CSA-CEI/IEC CISPR 22, Section 5.1		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	12/14/2008 3:30:35 PM		
Temperature: 22°C	Air Pressure: 1010 hPa	Relative Humidity: 40%	Power Supply: 120 VAC
Remarks:			

Table 8.1.3 Conducted emission test results

LINE: AC mains
 EUT SET UP: TABLE-TOP
 TEST SITE: SHIELDED ROOM
 DETECTORS USED: PEAK / QUASI-PEAK / AVERAGE
 FREQUENCY RANGE: 150 kHz - 30 MHz
 RESOLUTION BANDWIDTH: 9 kHz
 Connector type: RS 232

Frequency, MHz	Peak emission, dB(μV)	Quasi-peak			Average			Line ID	Verdict
		Measured emission, dB(μV)	Limit, dB(μV)	Margin, dB*	Measured emission, dB(μV)	Limit, dB(μV)	Margin, dB*		
0.330500	62.50	56.90	59.49	-2.59	43.90	49.49	-5.59	L1	Pass
0.392330	59.33	54.72	58.02	-3.30	42.97	48.02	-5.05		
0.442730	52.89	47.35	57.07	-9.72	30.49	47.07	-16.58		
0.501770	53.91	48.17	56.00	-7.83	34.07	46.00	-11.93		
0.727130	54.64	49.67	56.00	-6.33	34.57	46.00	-11.43		
1.105040	53.99	48.53	56.00	-7.47	32.80	46.00	-13.20		
0.340215	60.83	54.92	59.26	-4.34	39.69	49.26	-9.57	L2	Pass
0.391875	59.74	52.63	58.03	-5.40	38.03	48.03	-10.00		
0.554055	52.56	47.32	56.00	-8.68	30.72	46.00	-15.28		
0.667815	56.60	49.69	56.00	-6.31	32.55	46.00	-13.45		
0.734415	55.96	48.85	56.00	-7.15	30.75	46.00	-15.25		
1.123575	51.46	47.87	56.00	-8.13	26.43	46.00	-19.57		

*- Margin = Measured emission - specification limit.

Reference numbers of test equipment used

HL 1430	HL 1513	HL 3016	HL 3612				
---------	---------	---------	---------	--	--	--	--

Full description is given in Appendix A.

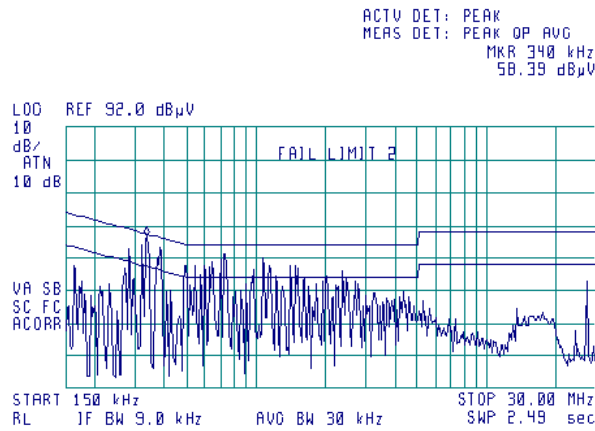


HERMON LABORATORIES

Test specification: FCC section 15.107 / ICES-003 Section 5.3, Class B conducted emissions			
Test procedure: ANSI C63.4, Section 11.5/ CAN/CSA-CEI/IEC CISPR 22, Section 5.1			
Test mode: Compliance	Verdict: PASS		
Date & Time: 12/14/2008 3:30:35 PM			
Temperature: 22°C	Air Pressure: 1010 hPa	Relative Humidity: 40%	Power Supply: 120 VAC
Remarks:			

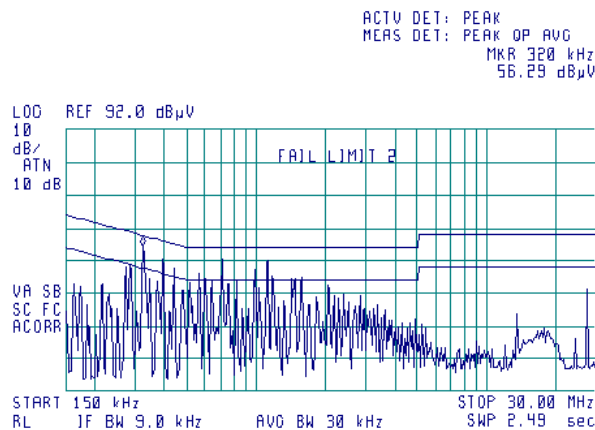
Plot 8.1.3 Conducted emission measurements

LINE: L1
LIMIT: QUASI-PEAK, AVERAGE
DETECTOR: PEAK
Connector: RS 232



Plot 8.1.4 Conducted emission measurements

LINE: L2
LIMIT: QUASI-PEAK, AVERAGE
DETECTOR: PEAK
Connector: RS 232





Test specification:	FCC Section 15.109 /ICES-003 Section 5.5, Class B Radiated disturbance measurements			
Test procedure:	ANSI C63.4, Section 11.6/CAN/CSA-CEI/IEC CISPR 22, Section 6			
Test mode:	Compliance	Verdict:		PASS
Date & Time:	12/14/2008 11:43:20 AM			
Temperature: 22°C	Air Pressure: 1010 hPa	Relative Humidity: 40%	Power Supply: 120 VAC	
Remarks:				

8.2 Radiated emission measurements

8.2.1 General

This test was performed to measure radiated emissions from the EUT enclosure. The specification test limits are given in Table 8.2.1, Table 8.2.2.

Table 8.2.1 Radiated emission test limits according to FCC Part 15, Section 109

Frequency, MHz	Class B limit, dB(μ V/m)		Class A limit, dB(μ V/m)	
	10 m distance	3 m distance	10 m distance	3 m distance
30 - 88	29.5*	40.0	39.0	49.5*
88 - 216	33.0*	43.5	43.5	54.0*
216 - 960	35.5*	46.0	46.4	56.9*
Above 960	43.5*	54.0	49.5	60.0*

* - The limit for a test distance other than specified was calculated using the inverse linear distance extrapolation factor as follows: $Lim_{S_2} = Lim_{S_1} + 20 \log(S_1/S_2)$, where S_1 and S_2 – the standard defined and the test distance respectively in meters.

Table 8.2.2 Radiated disturbance test limits according to ICES-003, Section 5

Frequency, MHz	Class B limit, dB(μ V/m)		Class A limit, dB(μ V/m)	
	10 m distance	3 m distance	10 m distance	3 m distance
30 - 230	30.0	40.5*	40.0	50.5*
230 - 1000	37.0	47.5*	47.0	57.5*

* The limit for test distance other than specified was calculated using the inverse linear distance extrapolation factor as follows: $Lim_{S_2} = Lim_{S_1} + 20 \log(S_1/S_2)$, where S_1 and S_2 – standard defined and test distance respectively in meters.

8.2.2 Test procedure

8.2.2.1 The EUT was set up as shown in Figure 8.2.1, energized and the EUT performance was checked.

8.2.2.2 The preliminary measurements were performed in the anechoic chamber at 3 m test distance. The specified frequency range was investigated with the antenna connected to the EMI receiver. To find the highest emission the turntable was rotated 360° and the measuring antenna height was swept from 1 to 4 m in both, vertical and horizontal polarizations. The EUT cables position was varied to maximize emission.

8.2.2.3 The EUT was set up as shown in Figure 8.2.2, energized and the EUT performance was checked.

8.2.2.4 The final measurements were performed at the open area test site at 10 m test distance with the antenna connected to the EMI receiver. The EUT wires and cables were arranged to produce the highest emission as it was found during the preliminary measurements. The frequencies, produced the highest emissions with respect to the limits during the preliminary test were investigated. To find the highest emission the turntable was rotated 360° and the measuring antenna height was swept from 1 to 4 m in both, vertical and horizontal polarizations. At frequencies, where the high ambient noise was encountered, the final measurements were taken at 3 m distance.

8.2.2.5 The worst test results with respect to the limits were recorded in Table 8.2.3, Table 8.2.4 and shown in the associated plots.



Test specification:	FCC Section 15.109 /ICES-003 Section 5.5, Class B Radiated disturbance measurements		
Test procedure:	ANSI C63.4, Section 11.6/CAN/CSA-CEI/IEC CISPR 22, Section 6		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	12/14/2008 11:43:20 AM		
Temperature: 22°C	Air Pressure: 1010 hPa	Relative Humidity: 40%	Power Supply: 120 VAC
Remarks:			

Figure 8.2.1 Setup for radiated emission measurements in anechoic chamber, table-top EUT

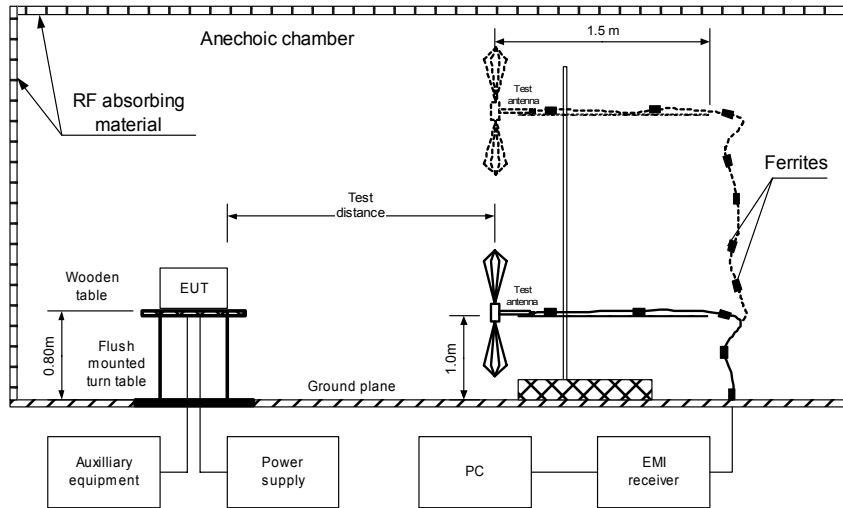
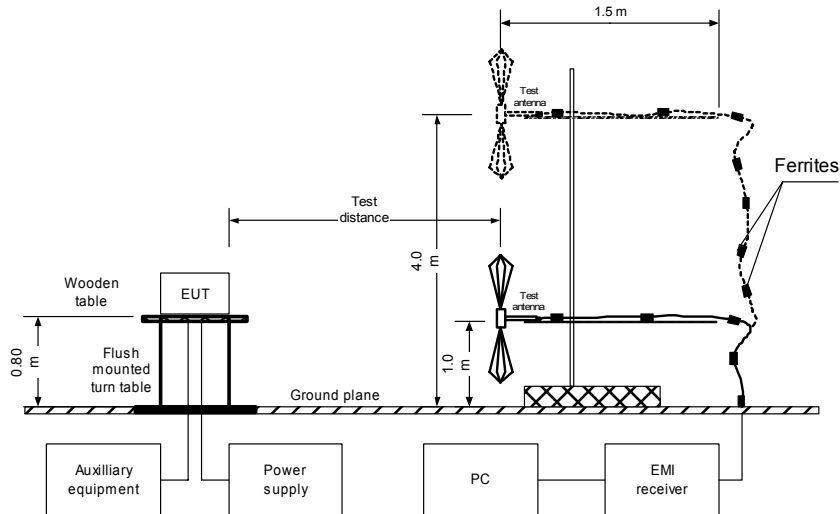


Figure 8.2.2 Setup for radiated emission measurements at OATS, table-top EUT





Test specification:	FCC Section 15.109 /ICES-003 Section 5.5, Class B Radiated disturbance measurements		
Test procedure:	ANSI C63.4, Section 11.6/CAN/CSA-CEI/IEC CISPR 22, Section 6		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	12/14/2008 11:43:20 AM		
Temperature: 22°C	Air Pressure: 1010 hPa	Relative Humidity: 40%	Power Supply: 120 VAC
Remarks:			

Table 8.2.3 Radiated emission test results according to FCC part 15 limit

EUT SET UP: TABLE-TOP
LIMIT: Class B
TEST SITE: SEMI ANECHOIC CHAMBER
TEST DISTANCE: 3 m
DETECTORS USED: PEAK / QUASI-PEAK
FREQUENCY RANGE: 30 MHz – 1000 MHz
RESOLUTION BANDWIDTH: 120 kHz
NOTE: Split cable connected to USB connector

Frequency, MHz	Peak emission, dB(μV/m)	Quasi-peak			Antenna polarization	Antenna height, m	Turn-table position**, degrees	Verdict
		Measured emission, dB(μV/m)	Limit, dB(μV/m)	Margin, dB*				
40.687500	38.63	36.44	40.00	-3.56	V	1	270	Pass
119.997550	39.79	38.87	43.50	-4.63	V	1	0	
479.975000	41.16	38.19	46.00	-7.81	V	1		
599.975000	42.85	41.72	46.00	-4.28	H	1	340	
721.550000	41.11	39.62	46.00	-6.38	H	1	175	
781.661000	42.02	40.23	46.00	-5.77	H	1	175	
959.962500	44.82	43.29	46.00	-2.71	V	1	270	

EUT SET UP: TABLE-TOP
LIMIT: Class B
TEST SITE: SEMI ANECHOIC CHAMBER
TEST DISTANCE: 3 m
DETECTORS USED: PEAK / QUASI-PEAK
FREQUENCY RANGE: 30 MHz – 1000 MHz
RESOLUTION BANDWIDTH: 120 kHz
NOTE: Split cable connected to RS232 connector

Frequency, MHz	Peak emission, dB(μV/m)	Quasi-peak			Antenna polarization	Antenna height, m	Turn-table position**, degrees	Verdict
		Measured emission, dB(μV/m)	Limit, dB(μV/m)	Margin, dB*				
40.687500	36.23	33.98	40.00	-6.02	V	1	180	Pass
119.997550	32.64	31.75	43.50	-11.75	V	1	180	
379.762500	37.96	33.65	46.00	-12.35	V	1	180	
721.563500	42.58	40.96	46.00	-5.04	H	1	180	
901.950000	41.05	38.75	46.00	-7.25	H	1	170	
962.075000	44.43	42.98	54.00	-11.02	H	1	170	

Reference numbers of test equipment used

HL 0287	HL 0784	HL 0813	HL 1430	HL 1552	HL 1848		
---------	---------	---------	---------	---------	---------	--	--

Full description is given in Appendix A.

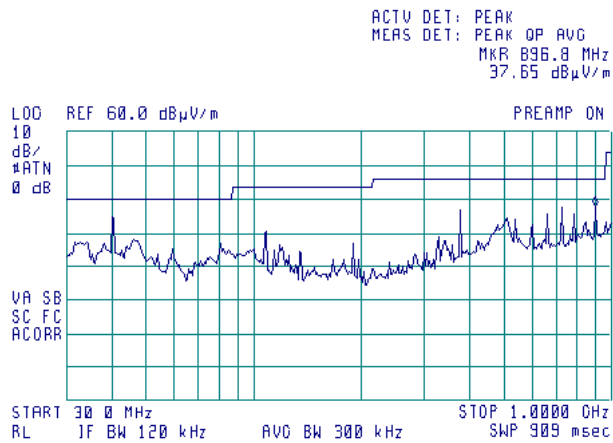


HERMON LABORATORIES

Test specification:	FCC Section 15.109 /ICES-003 Section 5.5, Class B Radiated disturbance measurements		
Test procedure:	ANSI C63.4, Section 11.6/CAN/CSA-CEI/IEC CISPR 22, Section 6		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	12/14/2008 11:43:20 AM		
Temperature: 22°C	Air Pressure: 1010 hPa	Relative Humidity: 40%	Power Supply: 120 VAC
Remarks:			

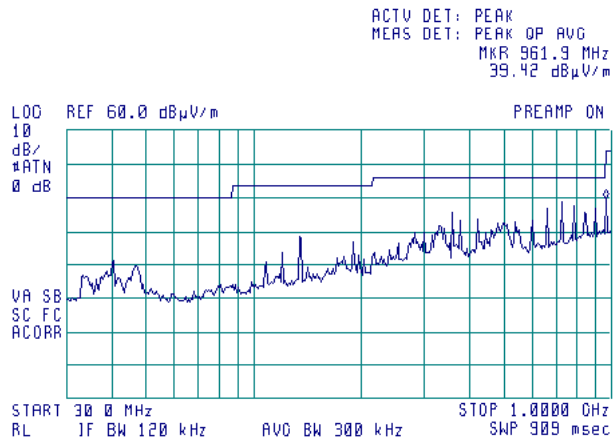
Plot 8.2.1 Radiated emission measurements in 30 - 1000 MHz range, vertical antenna polarization

TEST SITE: Anechoic chamber
 TEST DISTANCE: 3 m
 NOTE: Split cable connected to RS232 connector



Plot 8.2.2 Radiated emission measurements in 30 - 1000 MHz range, horizontal antenna polarization

TEST SITE: Anechoic chamber
 TEST DISTANCE: 3 m
 NOTE: Split cable connected to RS232 connector



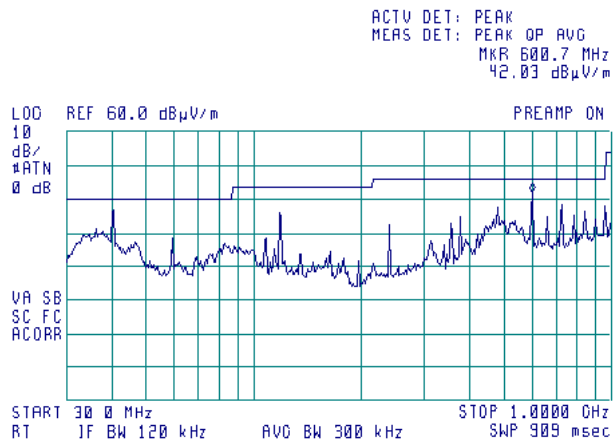


HERMON LABORATORIES

Test specification:	FCC Section 15.109 /ICES-003 Section 5.5, Class B Radiated disturbance measurements		
Test procedure:	ANSI C63.4, Section 11.6/CAN/CSA-CEI/IEC CISPR 22, Section 6		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	12/14/2008 11:43:20 AM		
Temperature: 22°C	Air Pressure: 1010 hPa	Relative Humidity: 40%	Power Supply: 120 VAC
Remarks:			

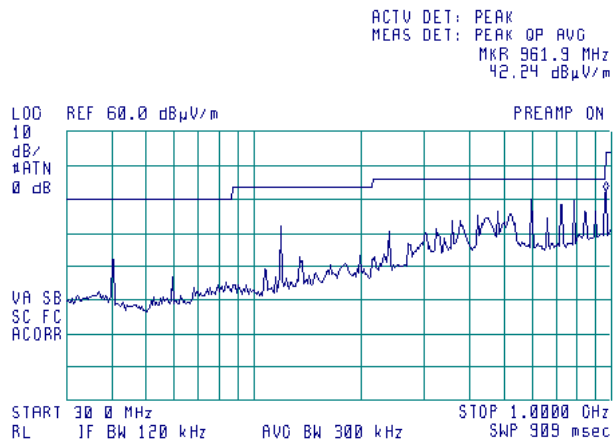
Plot 8.2.3 Radiated disturbance measurements in 30 - 1000 MHz range, vertical antenna polarization

TEST SITE: Anechoic chamber
 TEST DISTANCE: 3 m
 NOTE: Split cable connected to USB connector



Plot 8.2.4 Radiated disturbance measurements in 30 - 1000 MHz range, horizontal antenna polarization

TEST SITE: Anechoic chamber
 TEST DISTANCE: 3 m
 NOTE: Split cable connected to USB connector





HERMON LABORATORIES

Test specification:	FCC Section 15.109 /ICES-003 Section 5.5, Class B Radiated disturbance measurements		
Test procedure:	ANSI C63.4, Section 11.6/CAN/CSA-CEI/IEC CISPR 22, Section 6		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	12/14/2008 11:43:20 AM		
Temperature: 22°C	Air Pressure: 1010 hPa	Relative Humidity: 40%	Power Supply: 120 VAC
Remarks:			

Table 8.2.4 Radiated disturbance test results according to ICES-003 limits

EUT SET UP: TABLE-TOP
LIMIT: Class B
TEST SITE: OATS
TEST DISTANCE: 10 m
DETECTORS USED: PEAK / QUASI-PEAK
FREQUENCY RANGE: 30 MHz – 1000 MHz
RESOLUTION BANDWIDTH: 120 kHz
NOTE: Split cable connected to USB connector

Frequency, MHz	Peak emission, dB(μV/m)	Quasi-peak			Antenna polarization	Antenna height, m	Turn-table position**, degrees	Verdict
		Measured emission, dB(μV/m)	Limit, dB(μV/m)	Margin, dB*				
40.0550	38.00	26.20	30	-3.80	V	1	270	Pass
119.9976	28.10	20.10	30	-9.90	V	1	256	
135.6185	29.00	24.70	30	-5.30	V	1	125	
162.7420	32.1	23.10	30	-6.90	V	1	76	
721.5500	34.10	31.00	37	-6.00	H	1	147	
781.7933	33.42	29.94	37	-7.06	H	1	218	
902.0654	34.40	31.00	37	-6.00	H	1	35	
962.2010	37.40	34.10	37	-2.90	H	1	119	

EUT SET UP: TABLE-TOP
LIMIT: Class B
TEST SITE: OATS
TEST DISTANCE: 10 m
DETECTORS USED: PEAK / QUASI-PEAK
FREQUENCY RANGE: 30 MHz – 1000 MHz
RESOLUTION BANDWIDTH: 120 kHz
NOTE: Split cable connected to RS232 connector

Frequency, MHz	Peak emission, dB(μV/m)	Quasi-peak			Antenna polarization	Antenna height, m	Turn-table position**, degrees	Verdict
		Measured emission, dB(μV/m)	Limit, dB(μV/m)	Margin, dB*				
39.5200	40.8	26.5	30	-3.5	V	1.1	179	Pass
108.5000	26.6	21.2	30	-8.8	V	1.1	163	
135.6185	31.8	22.1	30	-7.9	V	1.0	163	
120.3042	28.6	19.1	30	-10.9	H	1.1	155	
721.5623	34.6	31.0	37	-6.0	H	1.2	146	
901.9429	34.1	30.2	37	-6.8	H	1.1	157	
962.0702	36.8	33.3	37	-3.7	H	1.3	155	

*- Margin = Measured emission - specification limit.
**- EUT front panel refers to 0 degrees position of turntable.

Reference numbers of test equipment used

HL 0287	HL 0784	HL 0813	HL 1430	HL 1552	HL 1848		
---------	---------	---------	---------	---------	---------	--	--

Full description is given in Appendix A.

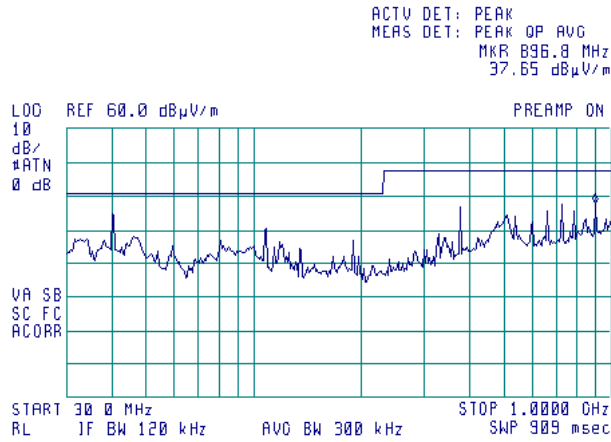


HERMON LABORATORIES

Test specification:	FCC Section 15.109 /ICES-003 Section 5.5, Class B Radiated disturbance measurements		
Test procedure:	ANSI C63.4, Section 11.6/CAN/CSA-CEI/IEC CISPR 22, Section 6		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	12/14/2008 11:43:20 AM		
Temperature: 22°C	Air Pressure: 1010 hPa	Relative Humidity: 40%	Power Supply: 120 VAC
Remarks:			

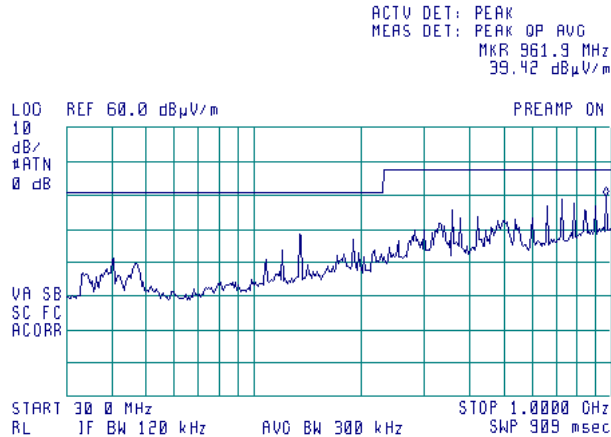
Plot 8.2.5 Radiated disturbance measurements in 30 - 1000 MHz range, vertical antenna polarization

TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m
NOTE: Split cable connected to RS232 connector



Plot 8.2.6 Radiated disturbance measurements in 30 - 1000 MHz range, horizontal antenna polarization

TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m
NOTE: Split cable connected to RS232 connector



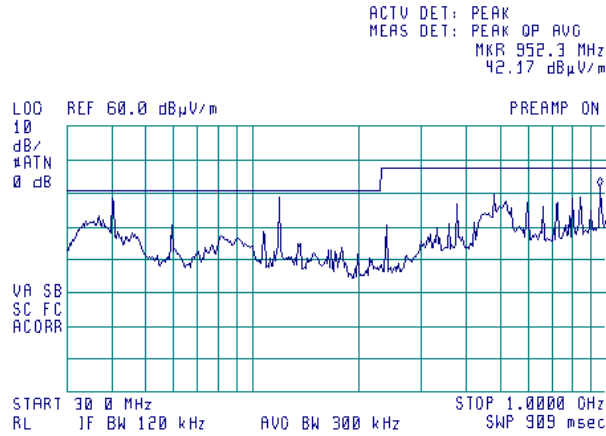


HERMON LABORATORIES

Test specification:	FCC Section 15.109 /ICES-003 Section 5.5, Class B Radiated disturbance measurements		
Test procedure:	ANSI C63.4, Section 11.6/CAN/CSA-CEI/IEC CISPR 22, Section 6		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	12/14/2008 11:43:20 AM		
Temperature: 22°C	Air Pressure: 1010 hPa	Relative Humidity: 40%	Power Supply: 120 VAC
Remarks:			

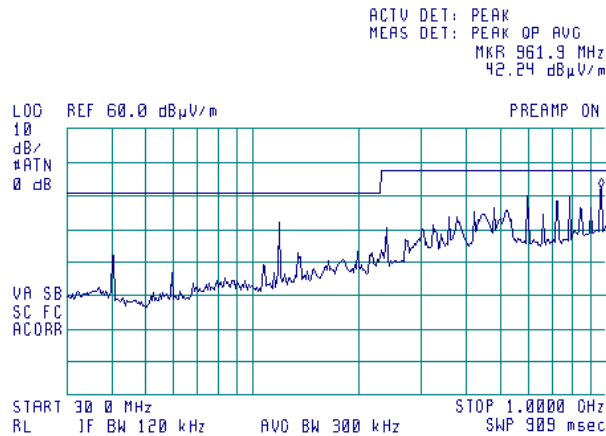
Plot 8.2.7 Radiated disturbance measurements in 30 - 1000 MHz range, vertical antenna polarization

TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m
NOTE: Split cable connected to USB connector



Plot 8.2.8 Radiated disturbance measurements in 30 - 1000 MHz range, horizontal antenna polarization

TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m
NOTE: Split cable connected to USB connector



**9 APPENDIX A Test equipment and ancillaries used for tests**

HL No	Description	Manufacturer	Model	Ser. No.	Last Cal.	Due Cal.
0287	Turntable, Motorized Diameter, 2 m (OATS)	Hermon Laboratories	TMD-2	042	11-Nov-08	11-Nov-09
0446	Antenna, Loop, Active, 10 kHz - 30 MHz	EMCO	6502	2857	29-Jun-08	29-Jun-09
0493	Temperature Chamber -45...175 deg C	Thermotron	S-1.2 Mini-Max	14016	19-May-08	19-May-09
0495	Autotransformer 0-255V, 10A	Variac	EMPL01	495	14-Aug-08	14-Aug-09
0604	Antenna BiconiLog Log-Periodic/T Bow-TIE, 26 - 2000 MHz	EMCO	3141	9611-1011	10-Jan-08	10-Jan-09
0784	Antenna X-WING BILOG, 20 MHz - 2 GHz	Schaffner-Chase EMC	CBL6140 A	1120	10-Jan-08	10-Jan-09
0787	Transient Limiter 9 kHz-200 MHz	Hewlett Packard Co	11947A	3107A018 77	16-Oct-08	16-Oct-09
0808	Analyzer, Spectrum, 100 Hz to 2.2 GHz	Anritsu	MS2601B	M178731	27-Mar-07	27-Mar-09
0813	Cable Coax, RG-214, 12 m, N-type connectors	Hermon Laboratories	C214-12	149	02-Dec-08	02-Dec-09
1430	EMI Receiver, 9 kHz - 2.9 GHz, System: HL1431, HL1432	Agilent Technologies	8542E	3807A002 62,3705A0 0217	31-Aug-08	31-Aug-09
1461	Cable, 1 m	Harbour Industries	MIL 17/60- RG142	1461	02-Sep-08	02-Sep-09
1513	Cable RF, 8 m, BNC/BNC	Belden	M17/167 MIL-C-17	1513	03-Sep-08	03-Sep-09
1552	Cable RF, 8 m	Alpha Wire	RG-214	1552	02-Dec-08	02-Dec-09
1848	Antenna mast 4m/6m with polarity control	Sh. I. Machines	AM-5	1	03-Feb-08	03-Feb-09
2888	LISN Two-line V-Network 50 Ohm / 50 uH + 5 Ohm, 16A, MIL STD 461E, CISPR 16-1	Rolf Heine	NNB- 2/16Z	02/10018	09-Jul-08	09-Jul-09
3001	EMC Analyzer, 9 kHz to 3 GHz	Agilent Technologies	E7402A	US394401 80	22-Nov-07	22-Nov-09
3016	LISN, Two-line V-network, 9 kHz to 30 MHz, (50 uH+5 Ohm), CISPR16-1	Rohde & Schwarz	ESH 3-Z5	892239/00 2	10-Dec-08	10-Dec-09
3122	Microwave Cable Assembly, 18 GHz, 6.4 m, SMA - SMA	Huber-Suhner	198-9155- 00	3122	07-Dec-08	07-Dec-09
3123	Microwave Cable Assembly, 18 GHz, 6.4 m, SMA - SMA	Huber-Suhner	198-9155- 00	3123	07-Dec-08	07-Dec-09
3310	Multimeter	Fluke	115C	94321810	29-Jul-08	29-Jul-09
3612	Cable RF, 17.5 m, N type-N type	Teldor	RG-214/U	NA	17-Nov-08	17-Nov-09

10 APPENDIX B Measurement uncertainties

Expanded uncertainty at 95% confidence in Hermon Labs EMC measurements

Test description	Expanded uncertainty
Conducted emissions with LISN	9 kHz to 150 kHz: ± 3.9 dB 150 kHz to 30 MHz: ± 3.8 dB
Radiated emissions at 10 m measuring distance Horizontal polarization Vertical polarization	Biconilog antenna: ± 5.0 dB Biconical antenna: ± 5.0 dB Log periodic antenna: ± 5.1 dB Double ridged horn antenna: ± 5.3 dB Biconilog antenna: ± 5.5 dB Biconical antenna: ± 5.5 dB Log periodic antenna: ± 5.6 dB Double ridged horn antenna: ± 5.8 dB
Radiated emissions at 3 m measuring distance Horizontal polarization Vertical polarization	Biconilog antenna: ± 5.3 dB Biconical antenna: ± 5.0 dB Log periodic antenna: ± 5.3 dB Double ridged horn antenna: ± 5.3 dB Biconilog antenna: ± 6.0 dB Biconical antenna: ± 5.7 dB Log periodic antenna: ± 6.0 dB Double ridged horn antenna: ± 6.0 dB
Conducted emissions at RF antenna connector	9 kHz to 2.9 GHz: ± 2.6 dB 2.9 GHz to 6.46 GHz: ± 3.5 dB 6.46 GHz to 13.2 GHz: ± 4.3 dB 13.2 GHz to 22.0 GHz: ± 5.0 dB 22.0 GHz to 26.8 GHz: ± 5.5 dB 26.8 GHz to 40.0 GHz: ± 4.8 dB

Hermon Laboratories is accredited by A2LA for calibration according to present requirements of ISO/IEC 17025 and NCSL Z540-1. The accreditation is granted to perform calibration of parameters that are listed in the Scope of Hermon Laboratories Accreditation.

Hermon Laboratories calibrates its reference and transfer standards by calibration laboratories accredited to ISO/IEC 17025 by a mutually recognized Accreditation Body or by a recognized national metrology institute. All reference and transfer standards used in the calibration system are traceable to national or international standards.

In-house calibration of all test and measurement equipment is performed on a regular basis according to Hermon Laboratories calibration procedures, manufacturer calibration/verification procedures or procedures defined in the relevant standards. The Hermon Laboratories test and measurement equipment is calibrated within the tolerances specified by the manufacturers and/or by the relevant standards.

11 APPENDIX C Test laboratory description

Tests were performed at Hermon Laboratories Ltd., which is a fully independent, private, EMC, safety, environmental and telecommunication testing facility.

Hermon Laboratories is listed by the Federal Communications Commission (USA) for all parts of Code of Federal Regulations 47 (CFR 47), Registration Numbers 90624 for OATS and 90623 for the anechoic chamber; by Industry Canada for electromagnetic emissions (file numbers IC 2186A-1 for OATS and IC 2186A-2 for anechoic chamber), certified by VCCI, Japan (the registration numbers are R-808 for OATS, R-1082 for anechoic chamber, C-845 for conducted emissions site), has a status of a Telefication - Listed Testing Laboratory, Certificate No. L138/00; assessed by TNO Certification EP&S (Netherlands) for a number of EMC, telecommunications, environmental, safety standards, and by AMTAC (UK) for safety of medical devices. The laboratory is accredited by American Association for Laboratory Accreditation (USA) according to ISO/IEC 17025 for electromagnetic compatibility, product safety, telecommunications testing and environmental simulation (for exact scope please refer to Certificate No. 839.01).

Address: P.O. Box 23, Binyamina 30500, Israel.
Telephone: +972 4628 8001
Fax: +972 4628 8277
e-mail: mail@hermonlabs.com
website: www.hermonlabs.com

Person for contact: Mr. Alex Usoskin, CEO.

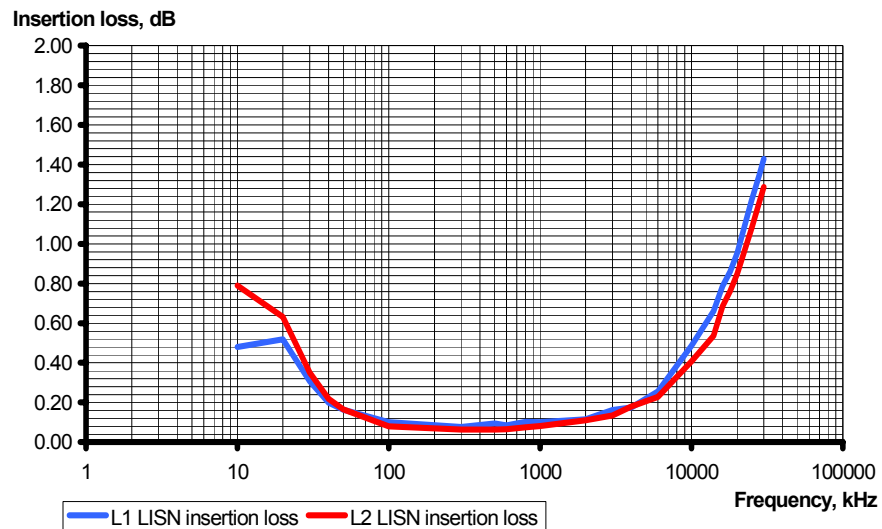
12 APPENDIX D Specification references

47CFR part 15: 2007	Radio Frequency Devices.
ANSI C63.2: 1996	American National Standard for Instrumentation-Electromagnetic Noise and Field Strength, 10 kHz to 40 GHz-Specifications.
ANSI C63.4: 2003	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.
RSS-210 Issue 7: 2007	Low Power Licence- Exempt Radiocommunication Devices
RSS-Gen Issue 2, September 2007	General Requirements and Information for the certification of Radiocommunication Equipment
ICES-003 Issue 4: 2004	Digital Apparatus
CAN/CSA-CEI/IEC CISPR 22: 2002	Information Technology Equipment- Radio Disturbance Characteristics- Limits and Methods of measurement
CISPR 16-1-1: 2006	Specification for radio disturbance and immunity measuring apparatus and methods. Part 1-1: Radio disturbance and immunity measuring apparatus – Measuring apparatus

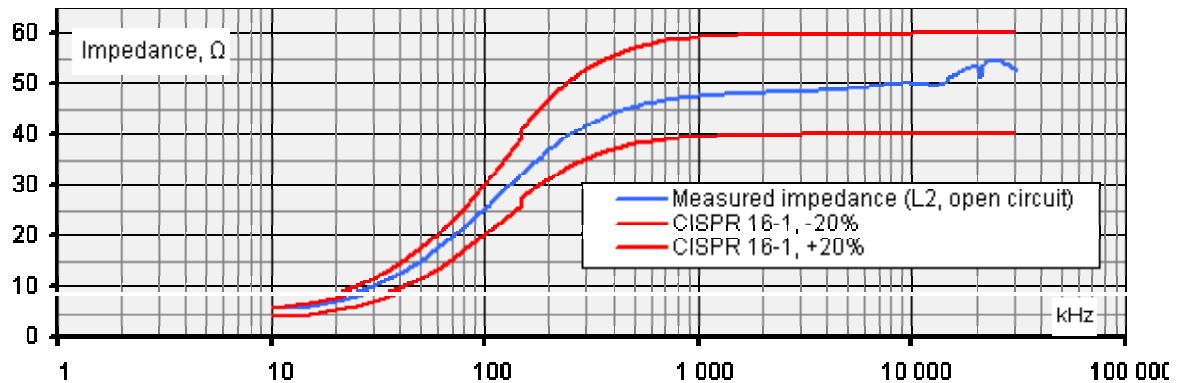
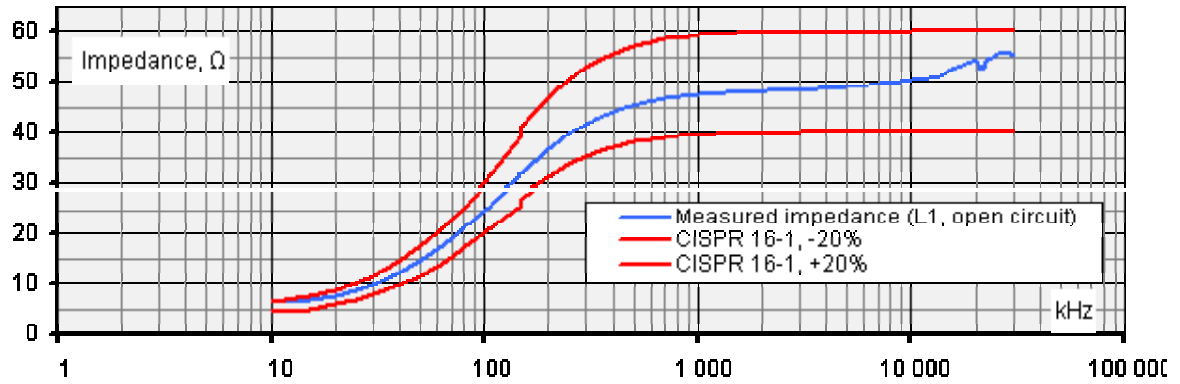
13 APPENDIX E Test equipment correction factors

Correction factor
Line impedance stabilization network
Model NNB-2/16Z, Rolf Heine, HL 2888

Frequency, kHz	Insertion loss, dB		Measurement Uncertainty, dB
	L1	N	
10	0.48	0.79	±0.6
20	0.52	0.63	
30	0.31	0.35	
40	0.20	0.22	
50	0.16	0.17	
100	0.10	0.08	
300	0.08	0.06	
500	0.10	0.06	
600	0.09	0.07	
800	0.10	0.07	
1000	0.10	0.08	
2000	0.12	0.11	
3000	0.16	0.14	
4000	0.17	0.18	
6000	0.26	0.23	
10000	0.49	0.41	
14000	0.66	0.54	
16000	0.79	0.69	
18000	0.86	0.76	
20000	0.96	0.85	
25000	1.22	1.08	
28000	1.35	1.21	
30000	1.43	1.29	



Correction factor
Line impedance stabilization network
Model ESH 3-Z5, Rhode&Schwarz, HL 3016





Antenna factor
Active loop antenna
Model 6502, S/N 2857, HL 0446

Frequency, MHz	Magnetic antenna factor, dB	Electric antenna factor, dB
0.009	-32.8	18.7
0.010	-33.8	17.7
0.020	-38.3	13.2
0.050	-41.1	10.4
0.075	-41.3	10.2
0.100	-41.6	9.9
0.150	-41.7	9.8
0.250	-41.6	9.9
0.500	-41.8	9.8
0.750	-41.9	9.7
1.000	-41.4	10.1
2.000	-41.5	10.0
3.000	-41.4	10.2
4.000	-41.4	10.1
5.000	-41.5	10.1
10.000	-41.9	9.6
15.000	-41.9	9.6
20.000	-42.2	9.3
25.000	-42.8	8.7
30.000	-44.0	7.5

Antenna factor in dB(1/m) is to be added to receiver meter reading in dB(μ V) to convert it into field intensity in dB(μ V/m).

**Antenna factor
Biconilog antenna EMCO Model 3141
Ser.No.1011, HL 0604**

Frequency, MHz	Antenna Factor, dB(1/m)	Frequency, MHz	Antenna Factor, dB(1/m)
26	7.8	940	24.0
28	7.8	960	24.1
30	7.8	980	24.5
40	7.2	1000	24.9
60	7.1	1020	25.0
70	8.5	1040	25.2
80	9.4	1060	25.4
90	9.8	1080	25.6
100	9.7	1100	25.7
110	9.3	1120	26.0
120	8.8	1140	26.4
130	8.7	1160	27.0
140	9.2	1180	27.0
150	9.8	1200	26.7
160	10.2	1220	26.5
170	10.4	1240	26.5
180	10.4	1260	26.5
190	10.3	1280	26.6
200	10.6	1300	27.0
220	11.6	1320	27.8
240	12.4	1340	28.3
260	12.8	1360	28.2
280	13.7	1380	27.9
300	14.7	1400	27.9
320	15.2	1420	27.9
340	15.4	1440	27.8
360	16.1	1460	27.8
380	16.4	1480	28.0
400	16.6	1500	28.5
420	16.7	1520	28.9
440	17.0	1540	29.6
460	17.7	1560	29.8
480	18.1	1580	29.6
500	18.5	1600	29.5
520	19.1	1620	29.3
540	19.5	1640	29.2
560	19.8	1660	29.4
580	20.6	1680	29.6
600	21.3	1700	29.8
620	21.5	1720	30.3
640	21.2	1740	30.8
660	21.4	1760	31.1
680	21.9	1780	31.0
700	22.2	1800	30.9
720	22.2	1820	30.7
740	22.1	1840	30.6
760	22.3	1860	30.6
780	22.6	1880	30.6
800	22.7	1900	30.6
820	22.9	1920	30.7
840	23.1	1940	30.9
860	23.4	1960	31.2
880	23.8	1980	31.6
900	24.1	2000	32.0
920	24.1		

Antenna factor in dB(1/m) is to be added to receiver meter reading in dB(μ V) to convert it into field intensity in dB(μ V/m).

**Antenna factor
Biconilog antenna
CHASE Model CBL6140A
Serial no: 1120, HL 0784**

Frequency, MHz	Antenna factor, dB
30.0	4.3
35.0	7.3
40.0	8.8
45.0	9.3
50.0	9.6
60.0	9.9
70.0	9.2
80.0	7.6
90.0	7.6
100.0	8.8
120.0	7.2
125.0	7.5
140.0	7.7
150.0	7.9
160.0	11.4
175.0	8.6
180.0	8.8
200.0	9.8
250.0	12.5
300.0	12.2
350.0	14.8
400.0	16.1
450.0	16.5
500.0	17.6
550.0	18.3
600.0	18.5
650.0	19.8
700.0	20.1
750.0	20.8
800.0	21.2
850.0	22.0
900.0	22.2
950.0	23.2
1000.0	23.8

Antenna factor in dB(1/m) is to be added to receiver meter reading in dB(μ V) to convert it into field intensity in dB(μ V/m).



HERMON LABORATORIES

Cable loss
Cable RG-214, HL 0813

No.	Frequency, MHz	Cable loss, dB
1	10	0.15
2	20	0.40
3	30	0.51
4	40	0.61
5	50	0.68
6	60	0.76
7	70	0.80
8	80	0.92
9	90	0.96
10	100	0.99
11	200	1.60
12	300	1.85
13	400	2.25
14	500	2.43
15	600	2.80
16	700	3.14
17	800	3.34
18	900	3.75
19	1000	4.05
20	1200	4.41
21	1400	4.81
22	1600	5.18
23	1800	5.58
24	2000	6.09
25	2500	7.27
26	2900	8.01



Cable loss
RF cable 8 m, model RG-214, HL 1552

No.	Frequency, MHz	Cable loss, dB	Measurement uncertainty, dB	Notes
1	0.010	0.01	±0.05	
2	0.1	0.01		
3	1	0.03		
4	10	0.12		
5	20	0.23		
6	30	0.30		
7	40	0.32		
8	50	0.34		
9	60	0.39		
10	70	0.43		
11	80	0.48		
12	90	0.50		
13	100	0.55		
14	200	0.78		
15	300	1.04		
16	400	1.16		
17	500	1.33		
18	600	1.51		
19	700	1.65		
20	800	1.77		
21	900	1.92		
22	1000	2.04		
23	1200	2.26		
24	1400	2.49		
25	1600	2.74		
26	1800	2.94		
27	2000	3.18		
28	2500	3.65		
29	2900	4.08		

Cable loss
Microwave Cable Assembly, 18 GHz, 6.4 m, SMA – SMA, Huber-Suhner, model 198-9155-00
HL 3123

Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB
10.0	0.11	3600	1.97	7400	3.12	11200	3.90	15100	4.74
30	0.17	3700	1.97	7500	3.13	11300	3.93	15200	4.70
50	0.25	3800	2.03	7600	3.16	11400	3.88	15300	4.73
100	0.32	3900	2.04	7700	3.18	11500	3.87	15400	4.78
200	0.46	4000	2.10	7800	3.20	11600	3.90	15500	4.75
300	0.58	4100	1.97	7900	3.23	11700	3.86	15600	4.76
400	0.65	4200	1.97	8000	3.25	11800	3.88	15700	4.75
500	0.74	4300	2.03	8100	3.26	11900	3.86	15800	4.78
600	0.82	4400	2.04	8200	3.28	12000	3.89	15900	4.79
700	0.89	4500	2.10	8300	3.31	12100	3.94	16000	4.73
800	0.95	4600	1.97	8400	3.31	12200	3.92	16100	4.78
900	1.01	4700	1.97	8500	3.32	12300	3.96	16200	4.84
1000	1.07	4800	2.03	8600	3.34	12400	4.01	16300	4.90
1100	1.11	4900	2.04	8700	3.35	12500	4.07	16400	4.87
1200	1.17	5000	2.10	8800	3.37	12600	4.08	16500	4.90
1300	1.22	5100	2.53	8900	3.39	12700	4.17	16600	4.98
1400	1.27	5200	2.55	9000	3.42	12800	4.26	16700	5.05
1500	1.29	5300	2.60	9100	3.43	12900	4.16	16800	5.04
1600	1.35	5400	2.61	9200	3.51	13000	4.21	16900	5.02
1700	1.40	5500	2.64	9300	3.52	13100	4.24	17000	5.09
1800	1.44	5600	2.70	9400	3.54	13200	4.27	17100	5.07
1900	1.51	5700	2.67	9500	3.63	13300	4.31	17200	5.10
2000	1.49	5800	2.71	9600	3.61	13400	4.33	17300	5.13
2100	1.55	5900	2.74	9700	3.71	13500	4.25	17400	5.23
2200	1.58	6000	2.80	9800	3.66	13600	4.27	17500	5.21
2300	1.62	6100	2.79	9900	3.77	13700	4.33	17600	5.22
2400	1.72	6200	2.81	10000	3.75	13800	4.33	17700	5.36
2500	1.76	6300	2.83	10100	3.77	13900	4.31	17800	5.35
2600	1.78	6400	2.86	10200	3.80	14000	4.30	17900	5.45
2700	1.80	6500	2.88	10300	3.79	14100	4.30	18000	5.43
2800	1.86	6600	2.90	10400	3.87	14200	4.31		
2900	1.90	6700	2.92	10500	3.83	14300	4.37		
3000	1.90	6800	2.98	10600	3.88	14400	4.35		
3100	1.97	6900	2.98	10700	3.86	14600	4.53		
3200	1.97	7000	3.00	10800	3.87	14700	4.50		
3300	2.03	7100	3.02	10900	3.90	14800	4.62		
3400	2.04	7200	3.04	11000	3.84	14900	4.65		
3500	2.10	7300	3.06	11100	3.88	15000	4.79		

14 APPENDIX F Abbreviations and acronyms

A	ampere
AC	alternating current
A/m	ampere per meter
AM	amplitude modulation
AVRG	average (detector)
BB	broad band
cm	centimeter
dB	decibel
dBm	decibel referred to one milliwatt
dB(μ V)	decibel referred to one microvolt
dB(μ V/m)	decibel referred to one microvolt per meter
dB(μ A)	decibel referred to one microampere
dB Ω	decibel referred to one Ohm
DC	direct current
EIRP	equivalent isotropically radiated power
ERP	effective radiated power
EUT	equipment under test
F	frequency
GHz	gigahertz
GND	ground
H	height
HL	Hermon laboratories
Hz	hertz
ITE	information technology equipment
k	kilo
kHz	kilohertz
LISN	line impedance stabilization network
LO	local oscillator
m	meter
MHz	megahertz
min	minute
mm	millimeter
ms	millisecond
μ s	microsecond
NA	not applicable
NB	narrow band
NT	not tested
OATS	open area test site
Ω	Ohm
PCB	printed circuit board
PM	pulse modulation
PS	power supply
ppm	part per million (10^{-6})
QP	quasi-peak
RE	radiated emission
RF	radio frequency
rms	root mean square
Rx	receive
s	second
T	temperature
Tx	transmit
V	volt
VA	volt-ampere
WB	wideband

END OF DOCUMENT