HERMON LABORATORIES

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Electrical

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ELECTROMAGNETIC EMISSION TEST REPORT

ACCORDING TO 47CFR PART 15, SUBPART C § 15.209, 15.207, SUBPART B

for

Rokonet Electronics Ltd.

EQUIPMENT UNDER TEST:

Proximity keypad
Brand name: ProSys
Model: RP128KCLP

Document ID: ROKRAD_FCC.15061K.doc
Date of Issue: July 2002

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Contents

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1 Project information

Description of equipment under test

Test items	LCD proximity keypad with transmitter operating at 125 kHz
Manufacturer	Rokonet Electronics Ltd.
Brand name	ProSys
LCD proximity keypad model	RP128KCLP
Receipt date	March 31, 2002

Applicant information

Applicant's responsible person	Mr. David Kartoun, Corporate Chief Technology Officer
Company	Rokonet Electronics Ltd.
Address	14 Hachoma street
Postal code	75655
City	Rishon Le Zion
Country	Israel
Telephone number	+972 39616555
Telefax number	+972 39616584

Test performance

Project number:	15061
Location	Hermon Laboratories
Test started	March 31, 2002
Test completed	June 30, 2002
Purpose of test	Apparatus compliance verification in accordance with emission requirements
Test specifications	FCC Part 15, subpart C §15.209, 15.207; subpart B, Class B

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2 Summary of tests

The LCD proximity keypad was found complying with the limits of 47CFR Part 15, §15.209, 15.205, 15.207 and subpart B Class B.

Parameter	Subclause	C	NC	NT	NA	Tested by	Date tested	Remarks
Intentional radiation, §15.209								
Field strength of fundamental	15.209(a)	**C**				Mrs. E. Pitt, test engineer	May 1, 2002	
Out of band spurious emissions (radiated)	15.209(c)	**C**				Mrs. E. Pitt, test engineer Mr. Y. Neuman, test engineer	May 1, 2002 June 30, 2002	
Conducted emissions	15.207	**C**				Mr. Y. Neuman, test engineer	June 30, 2002	
Unintentional radiation, §15.107, §15.109								
Conducted emissions	15.107	**C**				Mr. Y. Neuman, test engineer	June 30, 2002	
Radiated emissions	15.109	**C**				Mr. Y. Neuman, test engineer	June 30, 2002	
General conditions under Part 15								
The Intentional radiator operates at 125 kHz.	15.209	**C**						
The intentional radiator does not operate in the restricted bands of operation.	15.205	**C**						
The intentional radiator has permanently attached antenna or antenna that uses a unique coupling to the intentional radiator.	15.203	**C**						

NOTE: C: The parameter is compliant with the requirements.
NC: The parameter is not compliant with the requirements.
NT: The parameter is not tested.
NA: The test of this parameter is not applicable.

Test report prepared by: Ms. N. Averin, certification engineer

Mr. M. Nikishin, EMC group leader

Test report approved by: Mr. A. Usoskin, QA manager

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3 EUT description

3.1 General description

The EUT, LDC proximity keypad, is a part of an integrated security system that combines wired and wireless alarm protection for residential and commercial installations, access control and basic home automation systems. The LDC proximity keypad comprises a transmitter operating at 125 kHz, with integral antenna and powered by 13.8 V DC.
The alarm system has a built-in dialer for communication to a central station, a phone for sending voice notifications and software for easier system programming.
The system is powered from 15 V AC and equipped with a backup battery.

3.2 EUT test configuration

The keypad ports and lines description is given in Table 3.2.1, the system ports and lines description is depicted in Table 3.2.2, support/test equipment is provided in Table 3.2.3, test configurations are shown in Figures 3.2.1 and 3.2.2.
The system operating frequencies are given in Table 3.2.4 and components description is provided in Table 3.2.5. The 120 V AC / 15 V AC adapter, manufactured by MIDAS, model AA-5715166, s/n 86110806320, was used during the system testing.

Table 3.2.1 LCD proximity keypad ports and lines

Port type	Port description	Connector type	Quantity	Cable type description	Cable length, m	Connected to
Power	AUX	Terminal block	1	0.5 mm	3	DC power supply
Power	COM	Terminal block	1	24 GAUGE	3	DC power supply
Signal	BUS (RS 485)	Terminal block	2	24 GAUGE	3	2.2 kΩ termination

Table 3.2.2 Alarm system ports and lines

Port type	Port description	Connector type	Quantity	Cable type description	Cable length, m	Connected
Power	15 V AC	Terminal block	1	Unshielded	1.5	From EUT to 120VAC/15VAC adapter
Signal	Control	Terminal block	8	Unshielded	3.5*	From voice unit to voice keypad
Signal	Zone (sensors)	Terminal block	3	Unshielded	3.5*	2.2 kΩ termination
Signal	Bus	Terminal block	4 (2 DC and 2 data)	Unshielded	3.5*	From main control panel through LCD proximity keypad to 16 LEDs keypad
Signal	Bell	Terminal block	2	Unshielded	3.5*	2.2 kΩ termination
Signal	Output (U02)	Terminal block	2	Unshielded	3.5*	Termination
Signal	Dry contact (Relay, U01)	Terminal block	2	Unshielded	3.5*	Shortening
Signal	Telephone	Terminal block	2	Unshielded	> 3	From main control panel to line simulator

*May be up to 300 m.

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Table 3.2.3 System support/test equipment

Description	Manufacturer	Model number	Serial number
Line simulator	Hermon Labs	LS-01	1856

Table 3.2.4 System operating frequencies

Frequency, MHz	Card ID		
	Main control panel	Voice unit	LCD proximity keypad
0.125			●
8.0		●	●
16.0	●		

Table 3.2.5 System components

Component	Rokonet catalog number
Main control panel	RP128MC00ENA
16 LEDs keypad	RP128KL1600A
LCD proximity keypad	RP128KCLP00A
Voice unit	RP128EV00ENA
Voice keypad	RP128EVM000A
Access control module	RP128EAC000A

3.2.1 Changes made in equipment

To withstand the standard requirements the following changes were made in the equipment during the testing.

1) Two 10 nF capacitors were installed at bus communication interface of main control panel between GRN and COM, YEL and COM.
2) One 10 nF capacitor was installed at 16 LEDs keypad between AUX and COM.

It is manufacturer responsibility to implement the changes in the production version of the EUT. In any case the test report applies to the tested items only.

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Figure 3.2.1 EUT configuration for field strength of fundamental and out of band spurious emissions tests

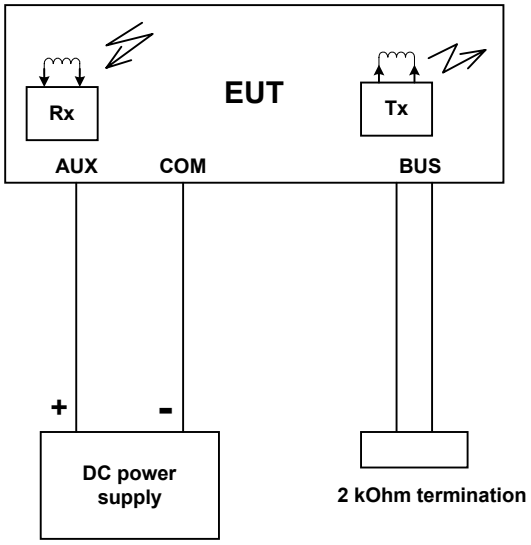

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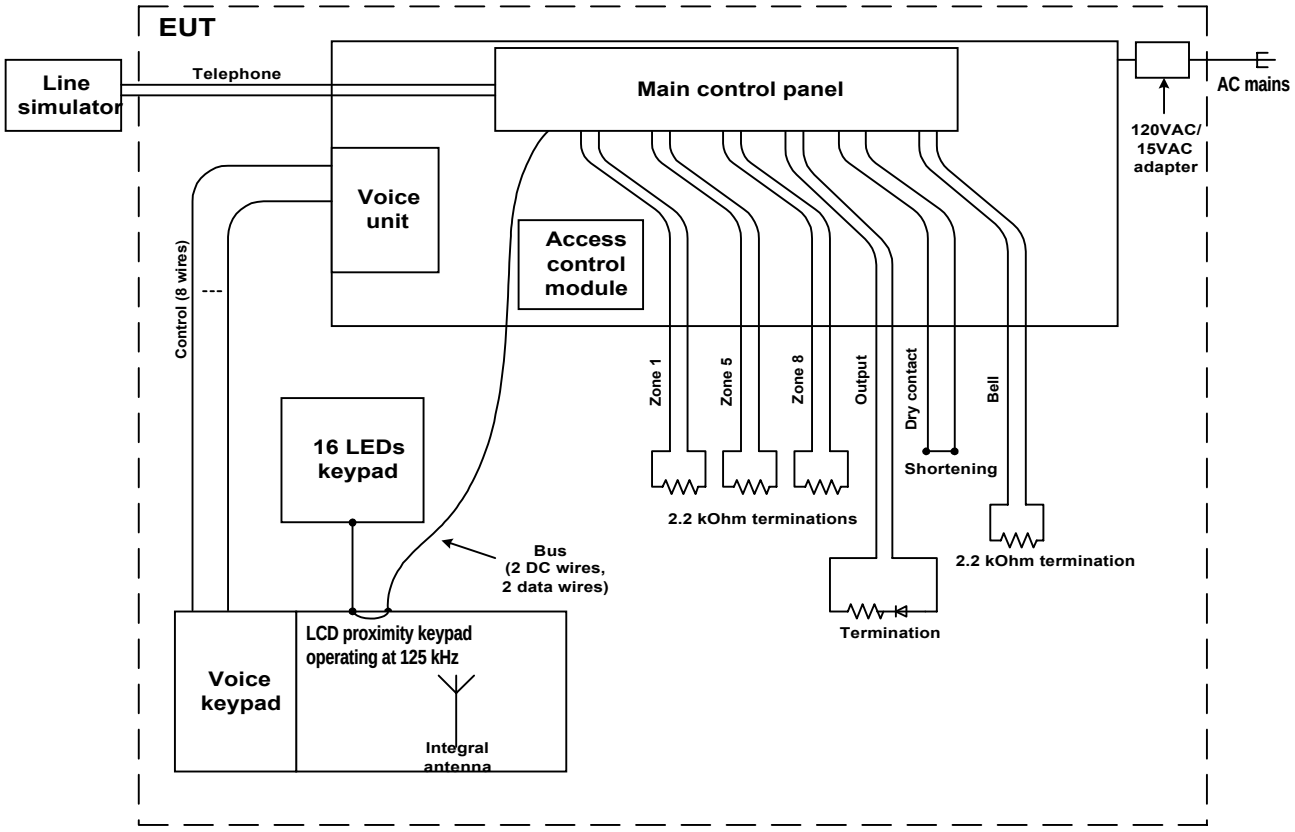
Figure 3.2.2 EUT configuration for conducted and radiated emissions tests



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4 Tests results

4.1 Field strength of fundamental according to § 15.209(a)

METHOD OF MEASUREMENTS: ANSI 63.4 §13.1.4
DATE: May 1, 2002
RELATIVE HUMIDITY: 47 %
AMBIENT TEMPERATURE: 24 °C
TEST PERFORMED AT: OATS
DISTANCE BETWEEN ANTENNA AND EUT: 10 m
ANTENNA TYPE: LOOP

Carrier frequency, kHz	Peak detector measurement, dB(μV/m)	Average detector measurement, dB(μV/m)	Limit[1], dB(μV/m)	Margin, dB	Reference to Plots in Appendix A
123.5	75.3	65.2	84.7	19.5	A1
Measurement uncertainty, dB		±4			

[1] The limit is based on measurements employing an average detector according to §15.209(d).
The § 15.35 (b) peak limits (20 dB above average limits) were met since the measurements were performed with peak detector function.

LIMIT

Frequency, MHz	Specification limit dB(μV/m)	Measurement distance, m
0.009 – 0.490	67.60-20logF*	300**

* F is frequency in kHz.

**The limit for 10 m distance was calculated using the inverse square distance extrapolation factor as follows:

$Lim S_2 = Lim S_1 + 40 \log (S_1/S_2)$, where $S_1 = 300$ m, $S_2 = 10$ m.

At 125 kHz frequency the limit was calculated:

$Lim_{10m} = 67.60 – 20 \log 125 + 40 \log (300/10) = 84.7$ dB(μV/m)

TEST PROCEDURE

The EUT was tested, being placed on a wooden 80 cm height table in each of three orthogonal planes in turn.

The loop antenna was positioned with its plane vertical. The loop center was 1 meter above the ground plane. To find maximum radiation the turntable was rotated 360° and the measuring antenna was rotated about its vertical axis.

TEST EQUIPMENT USED:

HL 0813	HL 1430	HL 1552	HL 1915			

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4.2 Field strength of emission according to §15.209(c)

METHOD OF MEASUREMENTS: ANSI 63.4 §13.1.4
DATE: May 1, 2002
RELATIVE HUMIDITY: 47 %
AMBIENT TEMPERATURE: 24 °C
TEST PERFORMED IN: ANECHOIC CHAMBER
DISTANCE BETWEEN ANTENNA AND EUT: 3 m
ANTENNA TYPE: LOOP

Peak detector

Frequency, MHz	Radiated emission, dB(μV/m)	Limit dB(μV/m)	Margin, dB	Reference to Plots in Appendix A
0.009 – 30	All spurious emissions including the third harmonic were found at least 20 dB below specified limit			A2, A3
Measurement uncertainty, dB	±4			

LIMIT

Frequency, MHz	Specification limit dB(μV/m)	Measurement distance, m	Calculated 3m limit**, dB(μV/m)
0.009 – 0.490	67.60-20logF*	300	147.60-20logF*
0.490 – 1.705	87.60-20logF*	30	127.60-20logF*
1.705 - 30	29.5	30	69.5

* F is frequency in kHz.

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

$LimS_2 = Lim\ S_1 + 40 \log (S_1/S_2)$, where S_1 = 300 m or 30 m, S_2 = 3 m.

TEST EQUIPMENT USED:

HL 0465	HL 0521	HL 0589	HL 0592	HL 0593	HL 0594	HL 1004
HL 1915						

TEST PROCEDURE

The EUT was tested, being placed on a wooden 80 cm height table in each of three orthogonal planes in turn.

The loop antenna was positioned with its plane vertical. The loop center was 1 meter above the ground plane. To find maximum radiation the turntable was rotated 360° and the measuring antenna was rotated about its vertical axis.

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4.3 Conducted emissions test according to §15.207, 15.107

METHOD OF MEASUREMENTS: ANSI 63.4 §13.1.3
DATE: June 30, 2002
RELATIVE HUMIDITY: 44 %
AMBIENT TEMPERATURE: 24 °C
THE EUT WAS TESTED AS: TABLE-TOP
DETECTOR USED: QUASI-PEAK
FREQUECNY RANGE: 450 kHz – 30 MHz
RESOLUTION BANDWIDTH: 9 kHz

Frequency, MHz	Line identification	Measured emissions, dB (µV)	Specification limit, dB (µV)	Margin, dB	Pass/ Fail	Reference to Plots in Appendix A
2.384565	Phase	29.35	48.00	18.65	**Pass**	A6
8.032500	Neutral	28.53	48.00	19.47	**Pass**	A7
19.114780	Phase	36.22	48.00	11.78	**Pass**	A6
19.364275	Phase	40.82	48.00	7.18	**Pass**	A6
19.613475	Phase	41.96	48.00	6.04	**Pass**	A6
19.862045	Phase	39.42	48.00	8.58	**Pass**	A6
20.110400	Phase	36.30	48.00	11.70	**Pass**	A6
Measurement uncertainty, dB			+2.43 / -2.22			

LIMIT

Frequency, MHz	Class B equipment, dB(µV)
0.45 – 1.705	48
1.705 - 30	48

TEST PROCEDURE
The measurements were performed at mains terminals by means of LISN, connected to spectrum analyzer in the frequency range as referred to in the table above. The unused coaxial connector of the LISN was terminated with 50 Ω. The measurements were made with quasi-peak detector as referred to in the table.
The position of the EUT cables was varied to determine maximum emission level.

TEST EQUIPMENT USED:

HL 0447	HL 0580	HL 0591	HL 0746	HL 1207	HL 1425	HL 1535

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4.4 Unintentional radiated emissions test according to §15.109

METHOD OF MEASUREMENT: ANSI 63.4 §11.6 / ANSI 63.4 §12.1.4
TEST PERFORMED IN: ANECHOIC CHAMBER
DATE: June 30, 2002
RELATIVE HUMIDITY: 46 %
AMBIENT TEMPERATURE: 26 °C
DISTANCE BETWEEN ANTENNA AND EUT: 3 m
THE EUT WAS TESTED AS: TABLE-TOP
FREQUENCY RANGE: 30 MHz – 1 GHz
DETECTOR TYPE: QUASI-PEAK
RESOLUTION BANDWIDTH: 120 kHz
ANTENNA TYPE: BICONILOG

Frequency, MHz	Ant. pol.	Ant. hgt., m	TT pos., (°)	Radiated emissions, dB (μV/m)	Limit dB(μV/m)	Margin, dB	Pass/ Fail	Reference to Plots in Appendix A
76.189325	V	1.84	0	33.61	40.00	6.39	**Pass**	A4
77.419325	V	1.11	0	30.91	40.00	9.09	**Pass**	A4
78.652475	V	1.63	6	28.11	40.00	11.89	**Pass**	A4
104.453900	H	3.02	0	37.49	43.50	6.01	**Pass**	A5
120.527900	H	1.81	84	37.46	43.50	6.04	**Pass**	A5
128.566000	H	2.00	98	40.82	43.50	2.68	**Pass**	A5
144.632900	H	2.56	344	39.03	43.50	4.47	**Pass**	A5
152.021250	V	1.00	77	36.15	43.50	7.35	**Pass**	A4

Table calculations and abbreviations:
Radiated emission dB(μV/m) = measured results dB(μV) + correction factor dB(1/m).
Correction factor = antenna factor + cable loss (for antenna factor and cable loss refer to Appendix B).
Ant. pol. = antenna polarization (V-vertical, H-horizontal).
Ant. hgt. = antenna height.
TT pos. = turntable position in degrees, (EUT front panel = 0°).
Margin = dB below (negative if above) specification limit.

	The EUT highest used frequency (not including operating frequency), MHz	Upper frequency of measurement range, MHz
	Below 1.705	30
	1.705 – 108	1000
	108 – 500	2000
	500 – 1000	5000
	Above 1000	5th harmonic of the highest frequency or 40 GHz, whichever is lower

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LIMIT

Frequency, MHz	Class B equipment @ 3 m test distance dB(μV/m)
30 - 88	40
88 - 216	43.5
216 - 960	46
960 - 5000	54

TEST PROCEDURE

The EUT was placed on a wooden 80 cm height turntable. To find maximum radiation the turntable was rotated 360^{o}, measuring antenna height was changed from 1 to 4 m, the antennas polarization was changed from vertical to horizontal and the cables were moved.

TEST EQUIPMENT USED:

HL 0465	HL 0521	HL 0589	HL 0592	HL 0593	HL 0594	HL 0604
HL 1004	HL 2009					

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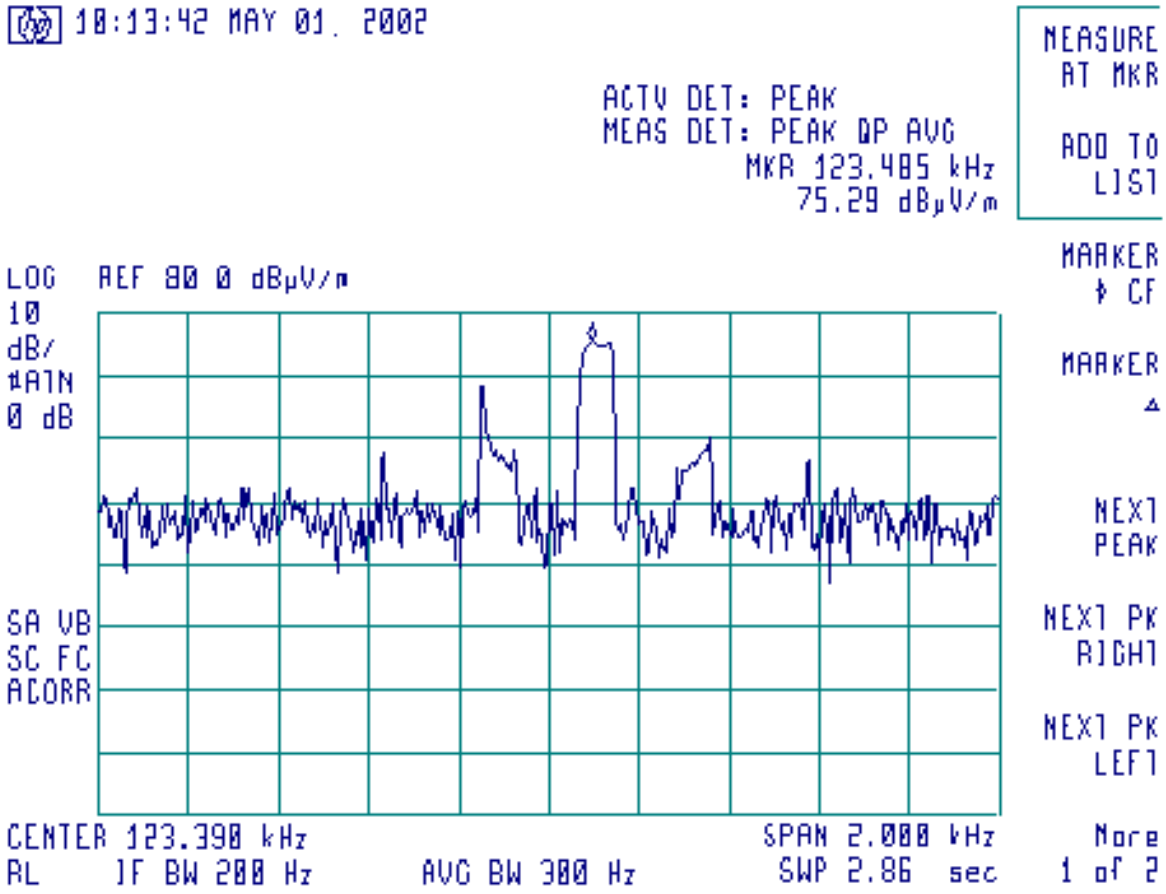
Appendix A Plots

Plot A1
Field strength of fundamental test result, 125 kHz carrier



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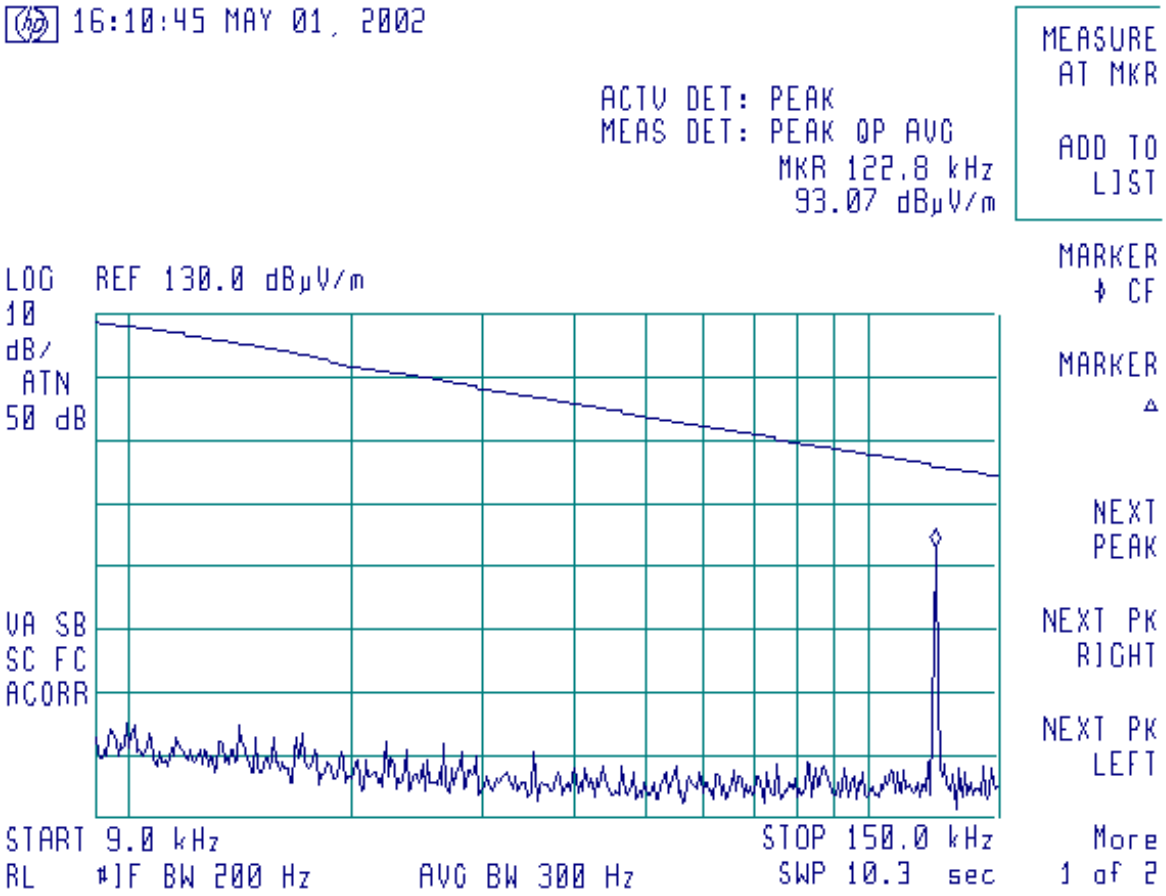
Plot A2
Field strength of emission test results

FREQUENCY RANGE: 9 – 150 kHz



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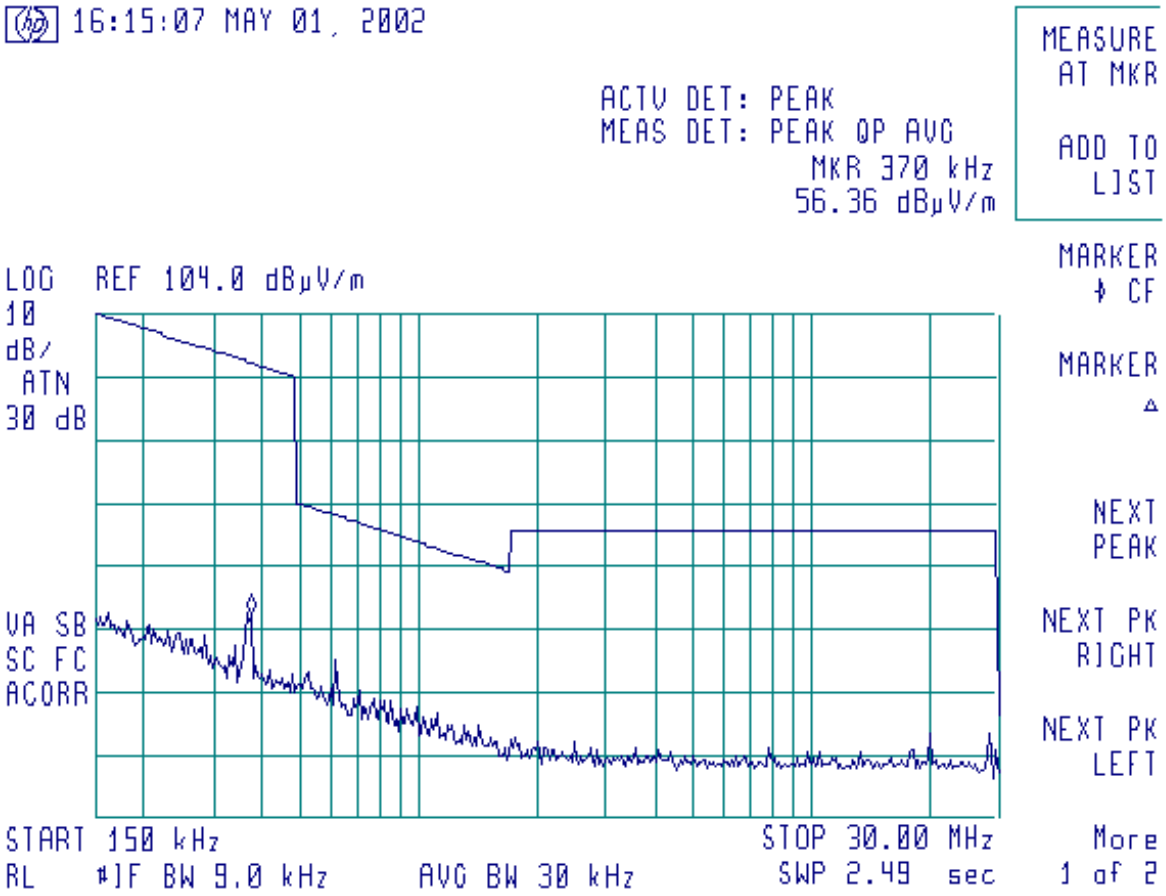
Plot A3
Field strength of emission test results

FREQUENCY RANGE: 0.15 – 30 MHz



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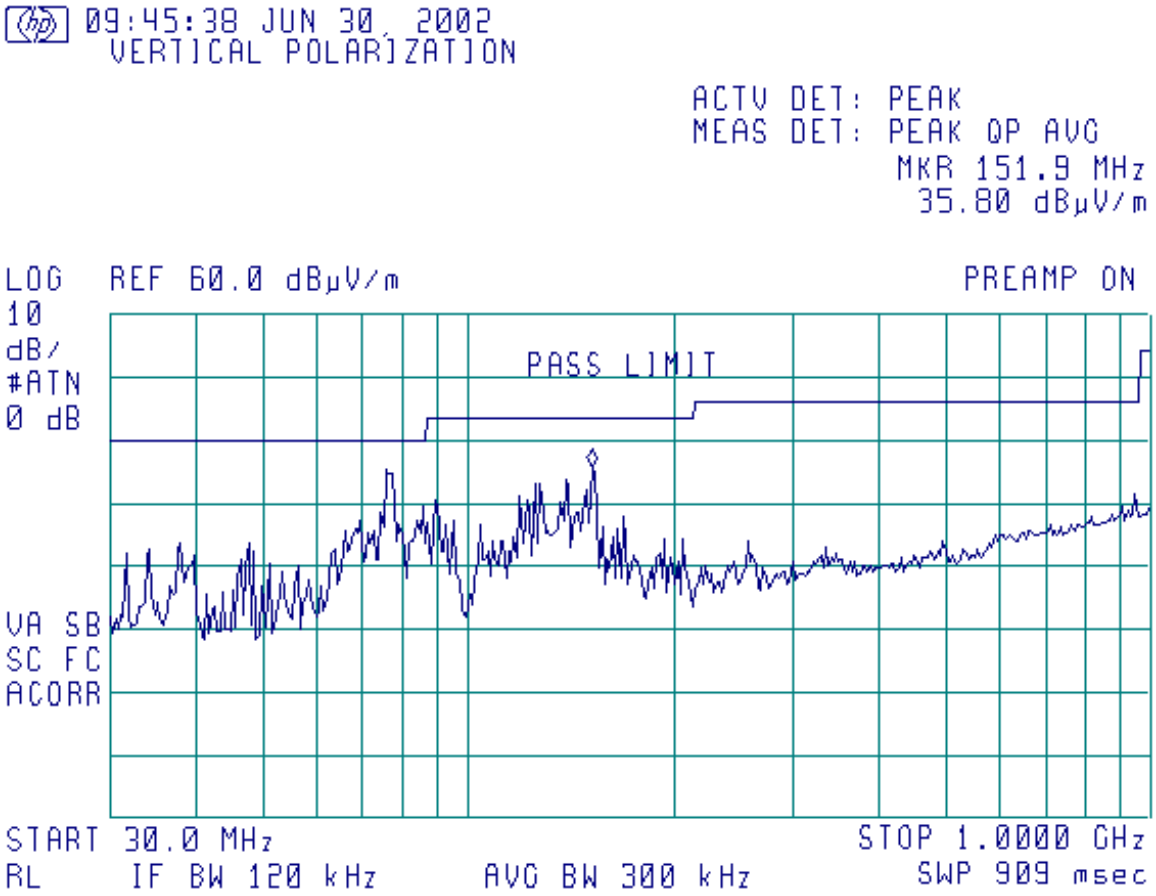
Plot A4
Field strength of emission test results

FREQUENCY RANGE:	30 – 1000 MHz
POLARIZATION:	VERTICAL



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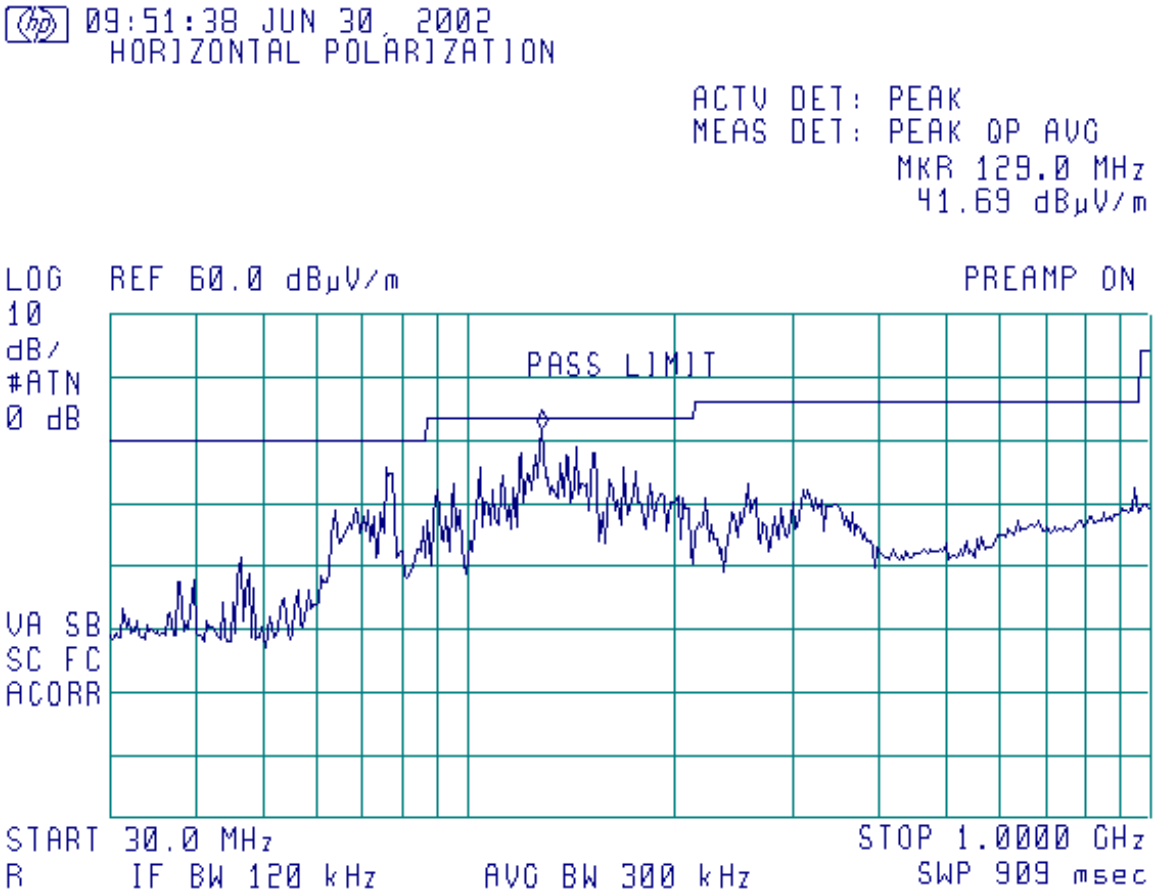
Plot A5
Field strength of emission test results

FREQUENCY RANGE:	30 – 1000 MHz
POLARIZATION:	HORIZONTAL



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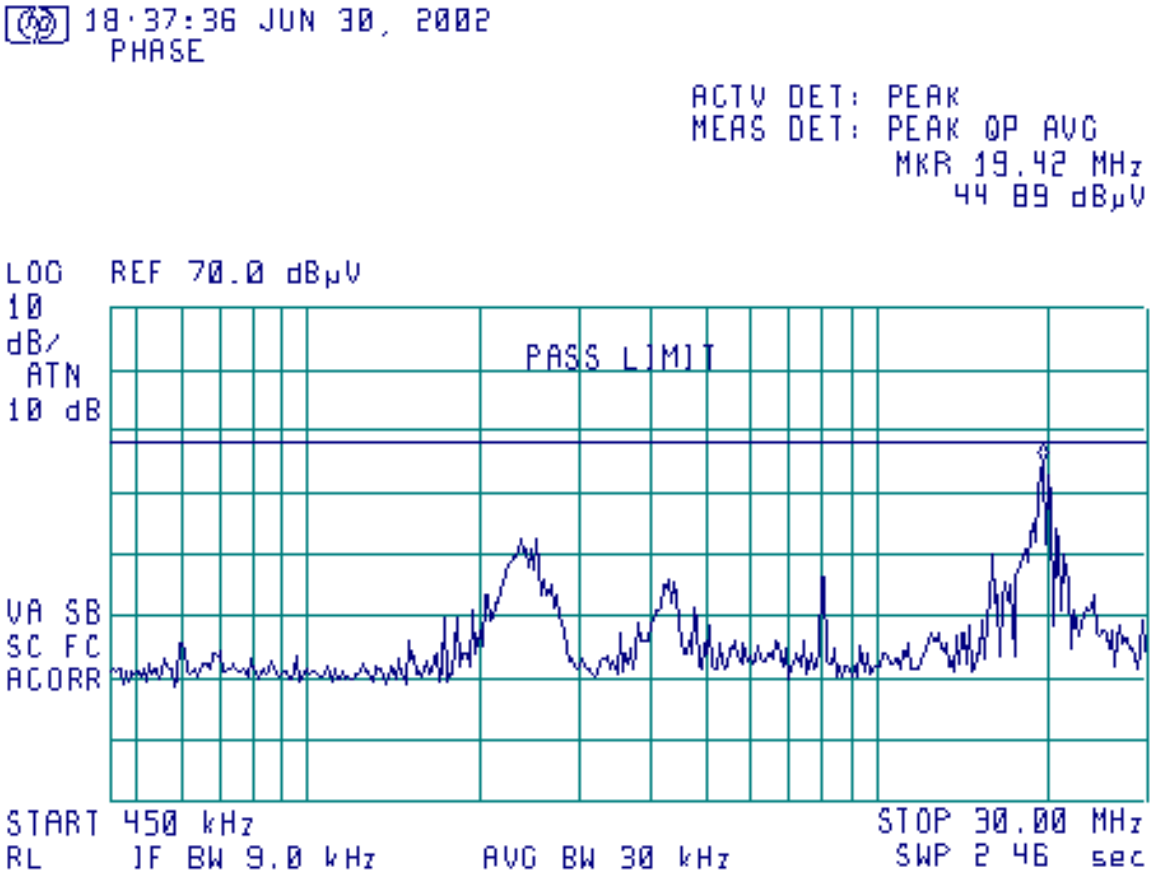
Plot A6
Conducted emissions on power line

LINE: PHASE



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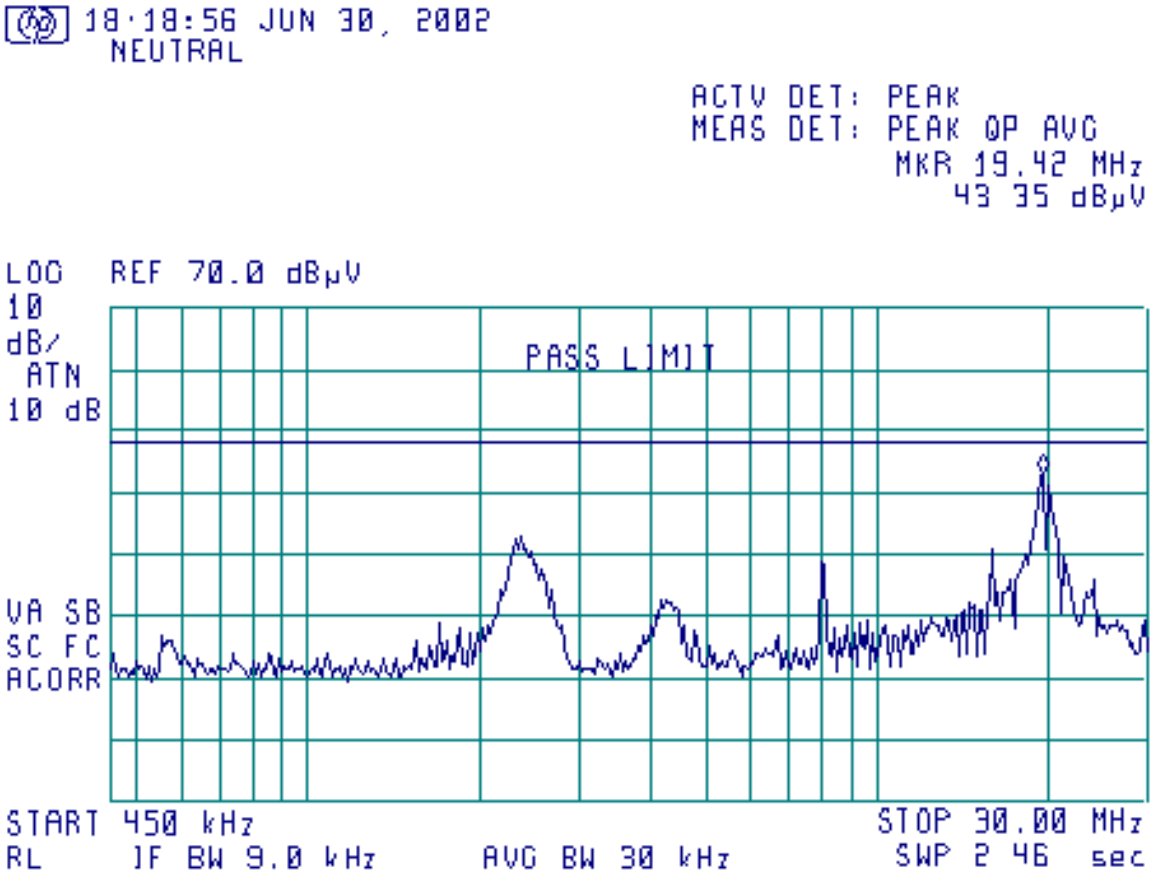
Plot A7
Conducted emissions on power line

LINE: NEUTRAL



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Appendix B Test equipment used for tests

HL Serial No.	Description	Manufacturer information			Due Calibr. Month/Year
		Name	Model No.	Serial No.	
0447	LISN, 16/2, 300 V RMS	Hermon Labs	LISN 16-1	0447	11/02
0465	Anechoic chamber 9 (L) x 6.5 (W) x 5.5 (H) m	Hermon Labs	AC-1	023	2/03
0521	Spectrum analyzer with RF filter section (EMI receiver 9 kHz - 6.5 GHz)	Hewlett Packard	8546A	0319	9/02
0580	DC block adaptor 10 kHz-2.2 GHz	Anritsu	MA8601 A	580	12/02
0589	Cable coaxial, GORE A2POL118.2, 3m	Hermon Labs	GORE-3	589	11/02
0591	Attenuator 10 dB, 50 Ohm, N-type, 2W	Elisra Electronic Systems	MW2100-N-Type	3	1/03
0592	Position controller	Hermon Labs	L2-SR3000	100	5/03 Check
0593	Antenna mast, 1-4 m/ 1-6 m Pneumatic	Hermon Labs	AM-F1	101	2/03 Check
0594	Turntable for anechoic chamber, flush mounted, d=1.2 m, pneumatic	Hermon Labs	WDC1	102	1/03 Check
0604	Antenna biconilog log-periodic/T Bow-Tie, 26 - 2000 MHz	EMCO	3141	9611-1011	1/03
0746	Transformer isolation, 230 V, 1 kVA	Hermon Labs	75	NA	5/03 Check
0813	Cable, coax, RG-214, 12 m, N-type connectors	Hermon Labs	C214-12	149	12/02
1004	Cable, coaxial ANDREW PSWJ4, 6 m	Hermon Labs	ANDREW-6	163	12/02
1207	One phase voltage regulator, 2 kVA, 0-250V	Hermon Labs	TDGC-2	NA	6/03 Check
1425	EMI receiver, 9 kHz – 2.9 GHz	Agilent Technologies	8542E	3710A00222, 3705A00204	9/02
1430	EMI receiver, 9 kHz – 2.9 GHz	Agilent Technologies	8542E	3807A00262, 3705A00217	9/02
1535	Cable RF, 12 m	Alpha Wire	RG-214/U	NA	12/02
1552	Cable RF, 8 m	Alpha Wire	RG-214-8m	1552	12/02
1915	Active receiving loop antenna, 1 kHz – 30 MHz	EMC Test Systems	6507	1457	6/03
2009	Cable RF, 8 m	Alpha Wire	RG-214	C-56	12/02

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Appendix C General information

Test facility description

Tests were performed at Hermon Laboratories Ltd., which is a fully independent, private EMC, Safety 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) and by Industry Canada for electromagnetic emissions (file numbers IC 2186-1 for OATS and IC 2186-2 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), assessed by TNO Certification EP&S (Netherlands) for a number of EMC, Telecommunications, 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).

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Person for contact: Mr. Alex Usoskin, QA manager.

Abbreviations and acronyms

The following abbreviations and acronyms are applicable to this test report:

cm	centimeter
dB	decibel
dBm	decibel referred to one milliwatt
dB(μV)	decibel referred to one microvolt
dB(μV/m)	decibel referred to one microvolt per meter
EMC	electromagnetic compatibility
EUT	equipment under test
GHz	gigahertz
H	height
Hz	hertz
kHz	kilohertz
kV	kilovolt
L	length
LISN	line impedance stabilization network
m	meter
MHz	megahertz
NA	not applicable
QP	quasi-peak
RF	radio frequency
RE	radiated emission
rms	root mean square
s	second
V	volt
W	width

Specification references

47CFR part 15: 2001	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: 1992	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.

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Appendix D Test equipment correction factors

Antenna factor
Active loop antenna
Model 6507
S/N 1457

Frequency, MHz	Magnetic Antenna Factor, dB(S/m)	Electric Antenna Factor, dB
0.001	-0.8	50.7
0.002	-6.1	45.4
0.003	-10.0	41.5
0.005	-15.3	36.2
0.007	-18.5	33.0
0.009	-20.8	30.7
0.010	-21.9	29.7
0.020	-27.1	24.5
0.050	-31.0	20.5
0.075	-31.7	19.8
0.100	-31.9	19.6
0.150	-32.1	19.4
0.250	-32.3	19.2
0.500	-32.6	18.9
0.750	-32.7	18.8
1.000	-32.8	18.7
2.000	-33.2	18.3
3.000	-33.5	18.0
4.000	-33.9	17.6
5.000	-34.1	17.4
10.000	-34.8	16.7
15.000	-35.3	16.3
20.000	-35.3	16.3
25.000	-35.8	15.7
30.000	-35.9	15.7

Antenna factor is to be added to receiver meter reading in dB(μV) to convert to field intensity in dB(μV)/meter

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Antenna Factor
Biconilog Antenna EMCO Model 3141
Ser.No.1011

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 is to be added to receiver meter reading in dB(μV) to convert to field intensity in dB(μV/meter).

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Cable loss
Cable Coaxial, GORE A2P01POL118, 2.3 m, model:GORE-3, HL 0589
+ Cable Coaxial, ANDREW PSWJ4, 6m, model: ANDREW-6, HL 1004

No.	Frequency, MHz	Cable loss, dB	Tolerance (Specification), dB	Measurement uncertainty, dB
1	30	0.33	≤ 6.5	±0.12
2	50	0.40		
3	100	0.57		
4	300	0.97		
5	500	1.25		
6	800	1.59		
7	1000	1.81		
8	1200	1.97		
9	1400	2.15		
10	1600	2.28		
11	1800	2.43		
12	2000	2.61		
13	2200	2.75		
14	2400	2.89		
15	2600	2.97		
16	2800	3.21	≤ 6.5	±0.12
17	3000	3.32		
18	3300	3.47		
19	3600	3.62		
20	3900	3.84		
21	4200	3.92		±0.17
22	4500	4.07		
23	4800	4.36		
24	5100	4.62		
25	5400	4.78		
26	5700	5.16		
27	6000	5.67		
28	6500	5.99		

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Cable loss
RF cable 8 m, model RG-214, HL 2009

No.	Frequency, MHz	Cable loss, dB	Tolerance (Specification), dB	Measurement uncertainty, dB
1	1	0.10	NA	±0.12
2	10	0.14		
3	30	0.25		
4	50	0.34		
5	100	0.53		
6	300	0.99		
7	500	1.31		
8	800	1.73		
9	1000	1.98		
10	1100	2.11		
11	1200	2.21		
12	1300	2.35		
13	1400	2.46		
14	1500	2.55		
15	1600	2.68		
16	1700	2.78		
17	1800	2.88		
18	1900	2.98		
19	2000	3.09		

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Cable loss
Cable RG-214, HL 0813

Frequency, MHz	Cable Loss,dB		Frequency, MHz	Cable Loss,dB		Frequency, MHz	Cable Loss,dB		Frequency, MHz	Cable Loss,	
	3 m	10 m		3 m	10 m		3 m	10 m		3 m	10 m
30	0.8	0.8	115	1.8	1.8	200	2.5	2.6	625	4.7	5.0
35	0.9	0.9	120	1.8	1.8	225	2.7	2.8	650	4.8	5.2
40	1.0	1.0	125	1.8	1.9	250	2.8	2.9	675	4.9	5.3
45	1.1	1.1	130	1.9	1.9	275	2.9	3.1	700	5.0	5.4
50	1.1	1.1	135	1.9	2.0	300	3.0	3.2	725	5.1	5.6
55	1.2	1.2	140	1.9	2.0	325	3.1	3.4	750	5.2	5.7
60	1.3	1.3	145	2.0	2.1	350	3.3	3.6	775	5.3	5.8
65	1.3	1.3	150	2.0	2.1	375	3.5	3.8	800	5.4	5.9
70	1.4	1.4	155	2.1	2.2	400	3.6	3.9	825	5.6	6.0
75	1.4	1.4	160	2.1	2.2	425	3.7	4.0	850	5.7	6.1
80	1.5	1.5	165	2.2	2.3	450	3.8	4.1	875	5.9	6.2
85	1.5	1.5	170	2.2	2.3	475	3.9	4.2	900	6.0	6.3
90	1.6	1.6	175	2.3	2.4	500	4.0	4.3	925	6.1	6.4
95	1.6	1.6	180	2.3	2.4	525	4.1	4.4	950	6.2	6.5
100	1.7	1.7	185	2.4	2.5	550	4.2	4.6	975	6.3	6.6
105	1.7	1.7	190	2.5	2.6	575	4.4	4.8	1000	6.4	6.7
110	1.7	1.7	195	2.5	2.6	600	4.6	4.9			

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

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Correction factor
Line impedance stabilization network
Model LISN 16 - 1
Hermon Laboratories

Frequency, kHz	Correction Factor
10	4.9
15	2.86
20	1.83
25	1.25
30	0.91
35	0.69
40	0.53
50	0.35
60	0.25
70	0.18
80	0.14
90	0.11
100	0.09
125	0.06
150	0.04

The correction factor dB is to be added to the meter readings (dB/μV) of the interference analyzer or spectrum analyzer.