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Electrical

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RADIO TEST REPORT

ACCORDING TO 47 CFR Part 15 SUBPART C §15.231, §15.205, §15.209 and SUBPART B;
RSS-210 Issue 5:2001; ICES-003 Issue 3:1997
for

VISONIC Ltd.

EQUIPMENT UNDER TEST:

Wireless Power Code digital PIR detector
Model: Next MCW

Document ID: visrad_fcc.15595
Date of Issue: July 2003

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Contents

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1 Project information

EUT attributes

Test item	: Wireless Power Code digital PIR detector
Type (Model)	: Next MCW
Equipment FCC code[1]	: DSC

Applicant information

Applicant's responsible person	: Mr. Arick Elshtein, project manager
Applicant/Manufacturer	: Visonic Ltd.
Address	: 27, Habarzel Street
City	: Tel Aviv
Postal code	: 69710
Country	: Israel
Telephone number	: +972 3 6456714
Telefax number	: +972 3 6456891

Test details

Project Number:	: 15595
Location	: Hermon Laboratories
Receipt date	: July 6, 2003
Test performed	: July 7, 2003
Purpose of test	: Apparatus compliance verification in accordance with emission requirements
Test specification(s)	: 47CFR Part 15, subpart C, §15.231, §15.205, §15.209, and subpart B §15.109; RSS-210 Issue 5: 2001 and ICES-003 Issue 3: 1997

[1] FCC Equipment codes – see Appendix E

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2 Summary of tests and requirements

Parameter	Subclause	Tested by	Date tested	Verdict	Remarks
Transmitter characteristics, §15.231					
Bandwidth of emission	15.231(c)	Mrs. E. Pitt, test engineer	July 6, 2003	**Pass**	
Field strength of fundamental	15.231(b)(2)	Mrs. E. Pitt, test engineer	July 6, 2003	**Pass**	
Field strength of spurious radiation	15.231(b)(3)	Mrs. E. Pitt, test engineer	July 7, 2003	**Pass**	
Unintentional radiation, §15.107, §15.109					
Radiated emissions	15.109	Mrs. E. Pitt, test engineer	July 7, 2003	**Pass**	Tested in Tx mode

Test report prepared by: Mrs. V. Mednikov, MSc, certification engineer

Test report approved by: Mr. M. Nikishin, MSc, EMC group leader

Mr. E. Usoskin, PhD, C.E.O.

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3 EUT description

3.1 General description

The Next MCW is a battery powered wireless digital PIR detector, which shares its housing with a UHF “Power Code” type transmitter.
The EUT general view is shown in Figure 3.1.

Figure 3.1 EUT general view

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3.2 Transmitter description

Operating frequency:				315 MHz			
Maximum rated output power							
	At transmitter permanent external 50 Ω RF output connector (dBm)			NA			
	Equivalent isotropic radiated power (for equipment with integral antenna) (dBm)			-29			
Transmitter duty cycle (worst case, in 100 ms))							
	Tx on (seconds)			0.061			
	Tx off (seconds)			0.039			
Modulation							
	Amplitude						
	Frequency						
X	Other (specify): ASK (ON OFF KEYING)						
Can the transmitter be operated without modulation					yes	**X**	no
Transmitter power source							
X	**Battery**		**Nominal rated voltage (VDC)**	**3**			
	Nickel Cadmium						
X	Lithium						
	Alkaline						
	DC		**Nominal rated voltage (VDC)**				
	AC mains		**Nominal rated voltage (VAC)**				
Is there common power source for transmitter and receiver – **NA**					yes		no
Antenna type							
X	Integral						
	External						
Type of antenna jack[2] - NA							
	standard		connector type		Male		Female
	unique		connector type		Male		Female

[2] Standard antenna jack use is prohibited excluding devices which must be professionally installed

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4 Test results

4.1 Bandwidth of emission according to § 15.231 (c) and RSS-210 § 6.1.1(c)

METHOD OF MEASUREMENT:	ANSI 63.4 §13.1.7
DATE:	July 6, 2003
RELATIVE HUMIDITY:	43 %
AMBIENT TEMPERATURE:	23 °C
AIR PRESSURE	1012 hPa
MODULATION:	ON
DETECTOR USED:	Peak

Carrier frequency, MHz	Occupied bandwidth, kHz	Reference to plot in Annex A
315	323	A1
Measurement uncertainty, ppm	0.168	

TEST EQUIPMENT USED:

HL 0034	HL 0038	HL 0812	HL 1430			

LIMIT (§ 15.231 (c))

The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier.

For 315 MHz frequency the specified limit is 787.5 kHz

TEST PROCEDURE

The spectrum trace data around transmitter fundamental frequency was obtained with the spectrum analyzer in “Max Hold” mode. The bandwidth value was determined between two points 20 dBc.

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4.2 Field strength of fundamental, § 15.231 and RSS-210 § 6.1.1(b)

METHOD OF MEASUREMENT: ANSI 63.4 §13.1.5
DATE: July 6, 2003
RELATIVE HUMIDITY: 51 %
AMBIENT TEMPERATURE: 22 °C
AIR PRESSURE 1013 hPa
SITE DESCRIPTION: OATS
MODULATION: ON
DETECTOR USED: Peak

	§ 15.231 (b)	§ 15.231 (e)
The EUT complies with the requirements of	X	

Peak detector

Frequency, MHz	Measured field strength, dB(µV/m)	Specification limit, dB(µV/m)	Margin, dB	Reference to plot in Appendix A
315	65.9	95.6	29.7	A2
Measurement uncertainty, dB		± 5.3 dB		

Peak detector + average factor

Frequency, MHz	Measured field strength, dB(µV/m)	Average factor, dB	Calculated result, dB(µV/m)	Specification limit, dB(µV/m))	Margin, dB	Reference to plot in Appendix A
315	65.9	-4.3	61.6	75.6	14.0	A2
Measurement uncertainty, dB			± 5.3 dB			

4.2.1 Average factor calculation, §15.35

Tx ON	Duty cycle	Average factor	Reference to plot in Annex A
61	0.61	-4.3	A3 to A4

TEST EQUIPMENT USED:

HL 0034	HL 0038	HL 0812	HL 1430			

LIMIT § 15.231 (b)

Fundamental frequency, MHz	Field strength of fundamental (b) @ 3 m, mV/m
260 – 470	3,750 to 12,500

The specified limit for 315 MHz frequency is 75.6 dB(µV/m)

TEST PROCEDURE

The EUT was tested, being placed on a wooden 80 cm height turntable in vertical and horizontal position in turn. To find maximum radiation the turntable was rotated 360°, measuring antenna height was changed from 1 to 4 m, and the antenna polarization was changed from vertical to horizontal.

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4.3 Field strength of spurious radiation, § 15.231 and RSS-210 § 6.1.1(b)

METHOD OF MEASUREMENT:	ANSI 63.4 §13.1.4
TEST PERFROMED IN:	Anechoic chamber; OATS
DATE:	July 7, 2003
RELATIVE HUMIDITY:	43 %
AMBIENT TEMPERATURE:	23 °C
AIR PRESSURE	1012 hPa
MODULATION	ON
DETECTOR USED:	Peak
RANGE OF MEASUREMENTS	9 kHz to 3200 MHz

Frequency, MHz	RBW, kHz	VBW, kHz	Antenna polarization	Radiated emission, dB (μV/m)	Limit, dB (μV/m)	Margin, dB	Verdict	Reference to plots in Appendix A
629.97	120	300	Vertical	33.1	75.6	42.5	**Pass**	A9
944.96	120	300	Horizontal	52.1	75.6	23.5	**Pass**	A10
1259.95	1000	3000	Vertical	53.5	75.6**	22.1	**Pass**	A12
1574.91	1000	3000	Vertical	47.5	74.0	26.5	**Pass**	A13
2519.84	1000	3000	Vertical	47.7	75.6	27.9	**Pass**	A14
Measurement uncertainty, dB				± 6				

Frequency, MHz	Radiated emission (peak), dB(μV/m)	Radiated emission (avrg)* dB(μV/m)	Limit (avrg), dB(μV/m)	Margin, dB	Verdict	Reference to plots in Appendix A
629.97	33.1	28.8	55.6	26.8	**Pass**	A9
944.96	52.1	47.8	55.6	7.8	**Pass**	A10
1259.95	53.5	49.2	55.6**	6.4	**Pass**	A12
1574.91	47.5	43.2	54.0	10.8	**Pass**	A13
2519.84	47.7	43.4	55.6	12.2	**Pass**	A14
Measurement uncertainty, dB	± 6					

For test results refer to Plots A5 to A15.

*** Radiated emission value was calculated: peak value + average factor (-4.3 dB)**

**** In Canada this frequency falls into restricted band, therefore the limit @ 3 m is 74.0 dB(μV/m) (peak) and 54.0 dB(μV/m) (average).**

Notes to table: RBW: resolution bandwidth; VBW: video bandwidth

TEST EQUIPMENT USED:

HL 0034	HL 0415	HL 0446	HL 0566	HL 0569	HL 0812	HL 1365
HL 1425	HL 1430	HL 1553	HL 1566	HL 1942	HL 1947	HL 1984
HL 2109	HL 2258	HL 2273				

LIMIT § 15.231 (b)

Fundamental frequency (MHz)	Field strength of harmonics (b) (mV/m) @ 3 m
260 – 470	375 to 1,250

The specified limit for 315 MHz frequency is 55.6 dB(μV/m)

TEST PROCEDURE

The EUT was tested, being placed on a wooden 80 cm height turntable in vertical and horizontal position in turn.

9 kHz – 30 MHz frequency range. 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.

30 MHz – 3.2 GHz frequency range. To find maximum radiation the turntable was rotated 360°, measuring antenna height was changed from 1 to 4 m, and the antennas polarization was changed from vertical to horizontal.

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4.4 Unintentional radiated emissions test according to §15.109 and ICES-003

METHOD OF MEASUREMENT:	ANSI 63.4 §11.6 / ANSI 63.4 §12.1.4
TEST PERFORMED IN:	Anechoic chamber
DATE:	July 7, 2003
RELATIVE HUMIDITY:	43 %
AMBIENT TEMPERATURE:	23 °C
AIR PRESSURE	1012 hPa
DISTANCE BETWEEN ANTENNA AND EUT:	3 m
THE EUT WAS TESTED AS:	TABLE-TOP
FREQUENCY RANGE:	30 MHz – 2 GHz
DETECTOR TYPE:	Peak
RESOLUTION BANDWIDTH:	120 kHz below 1 GHz, 1 MHz above 1 GHz

The EUT highest used frequency (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

The EUT was tested in Tx mode, no unintentional emissions except harmonics were found, refer to Plots A7, A8 and A11 in Appendix A.

TEST EQUIPMENT USED:

HL 0566	HL 0569	HL 1425	HL 1553	HL 1566	HL 1942	HL 1984

LIMIT (§ 15.109)

Frequency, MHz	Class A equipment @ 10 m dB(μV/m)	Class B equipment @ 3 m dB(μV/m)
30 - 88	39.0	40
88 - 216	43.5	43.5
216 - 960	46.4	46
960 - 5000	49.5	54

TEST PROCEDURE

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

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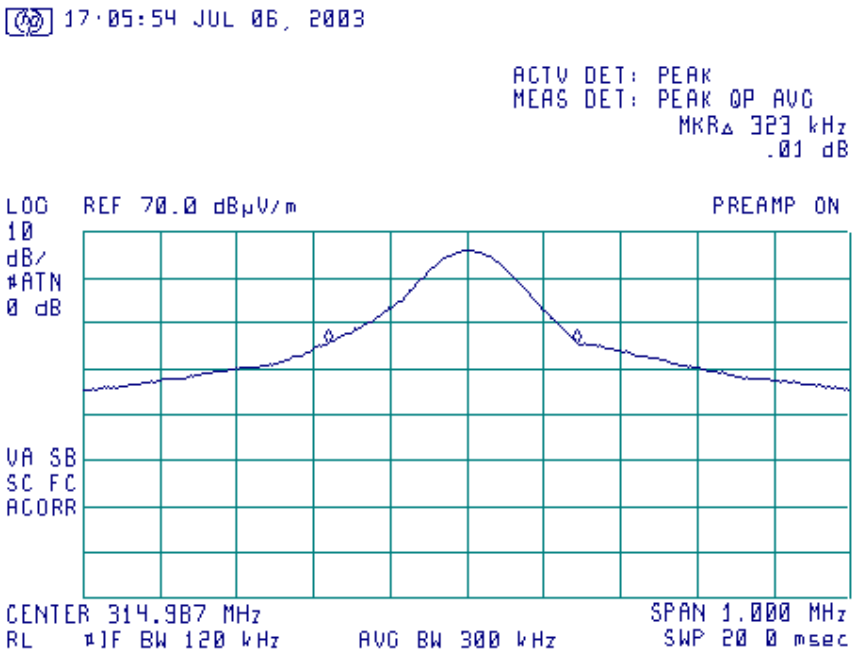
Appendix A - Plots

Plot A1

Occupied bandwidth measurements



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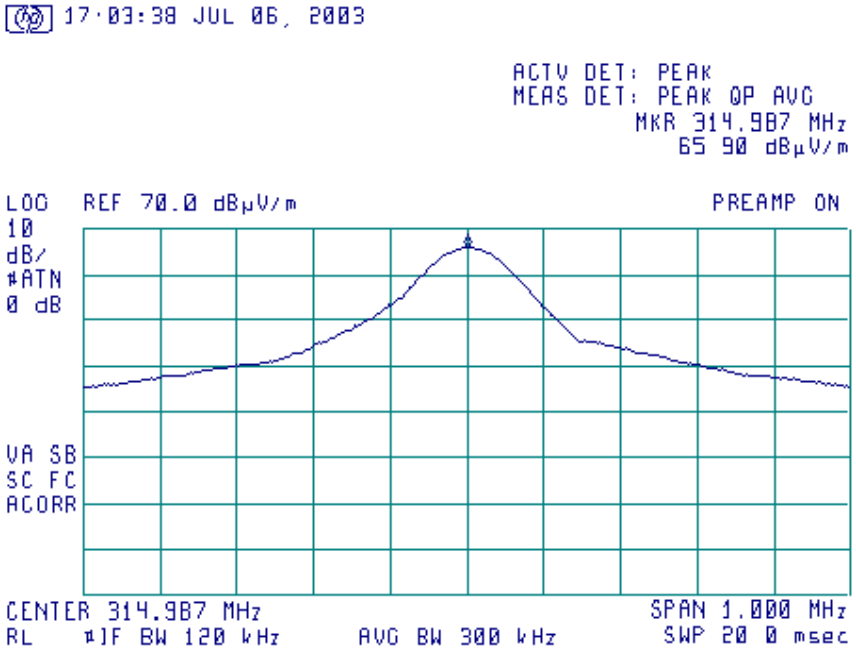
Plot A2

Field strength of fundamental

Note Horizontal polarization



$LIMIT_{peak}$ =95.6 dB(µV/m) @3m

Measured value = 65.9 dB(µV/m)

$LIMIT_{average}$ =75.6 dB(µV/m) @3m

$E_{avrg} = E_{peak}$ + Average Factor = 65.9 dB(µV/m) – 4.3 dB = 61.6 dB(µV/m)

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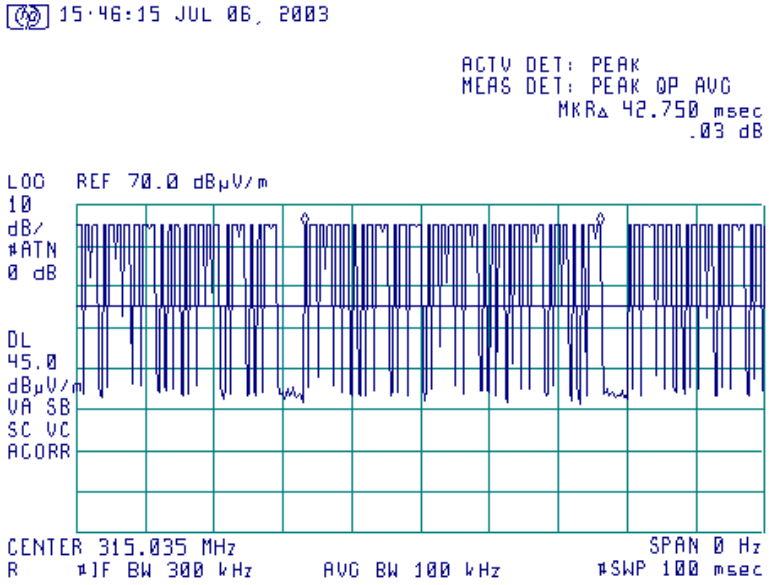
Plot A3

Transmission duration



One transmission duration is 42.75 ms

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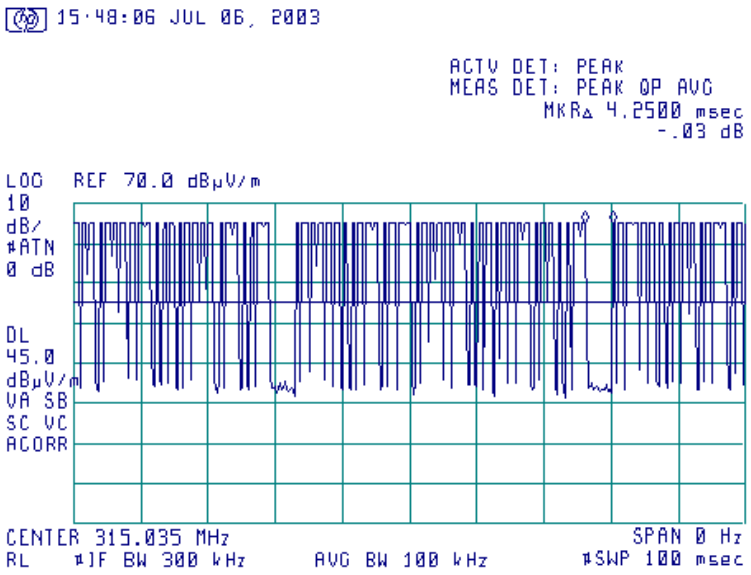
Plot A4

Duty cycle measurements



The time between the end of one transmission and the beginning of the other one is 4.25 ms.

"Power code" means transmission of a sequence of "0" (1/3 ON; 2/3 OFF) or "1" (2/3 ON; 1/3 OFF). The worst case is when all "1" are transmitted.
Tx ON in 100 ms interval = (100 – 2x4.25) x 2/3 = 61 ms.

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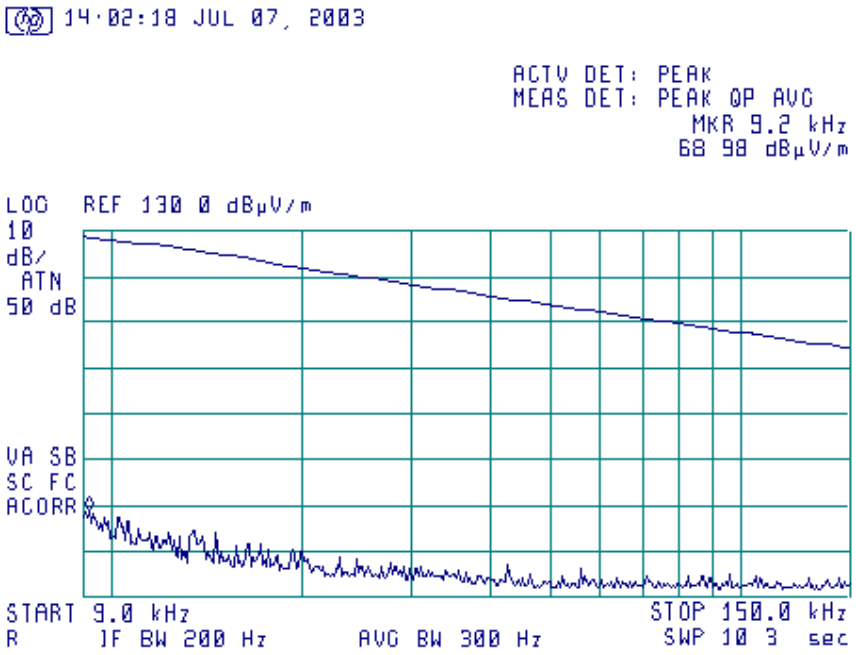
Plot A5

Spurious emission measurements
in 9 – 150 kHz range



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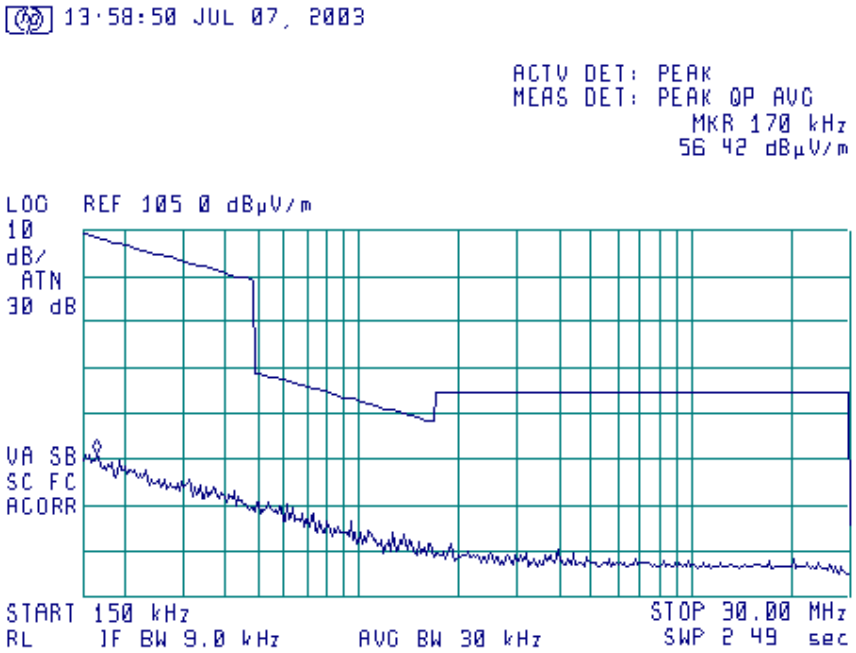
Plot A6

Spurious emission measurements
in 150 kHz – 30 MHz range



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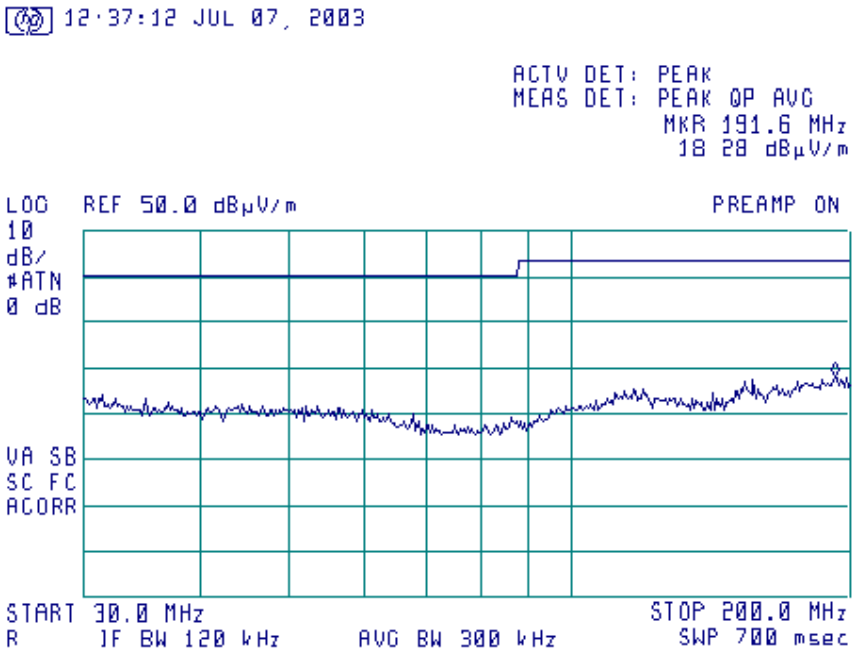
Plot A7

**Spurious emission measurements
in 30 – 200 MHz range,
vertical & horizontal polarization**



No spurious emissions were found.

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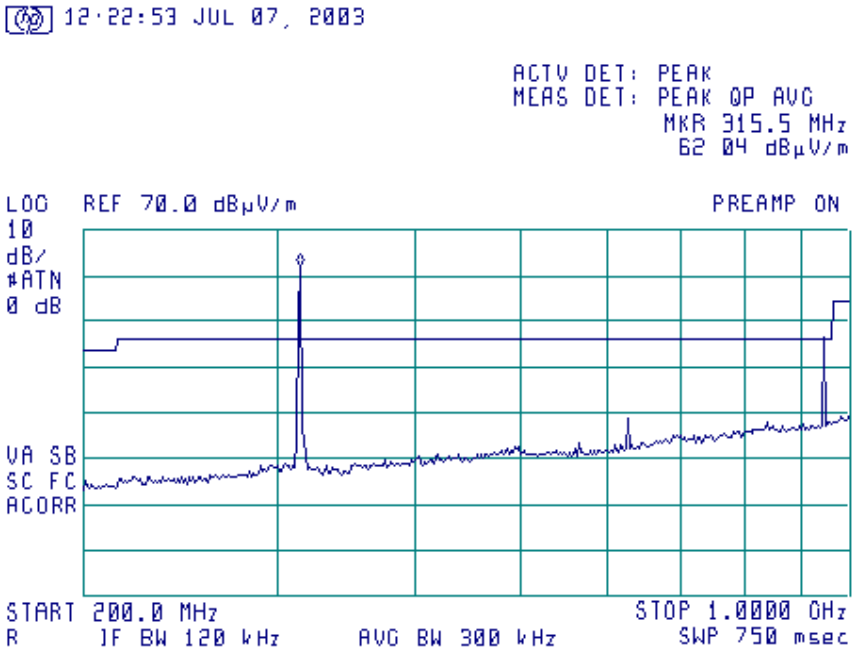
Plot A8

**Spurious emission measurements
in 200 – 1000 MHz range,
vertical & horizontal polarization**



No spurious emissions except fundamental and harmonics were found.

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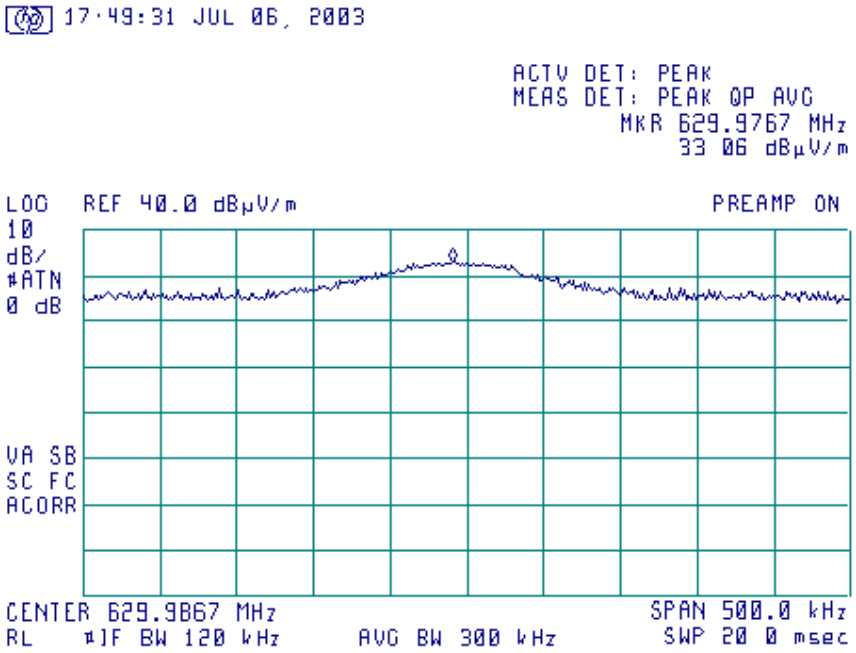
Plot A9

**Field strength of 2nd harmonic,
vertical polarization**



$LIMIT_{peak}$ = 75.6 dB(µV/m) @3m

Measured value = 33.1 dB(µV/m)

$LIMIT_{average}$ = 55.6 dB(µV/m) @3m

Average value = 33.1 dB(µV/m) – 4.3 dB (avrg.factor) = 28.8 dB(µV/m)

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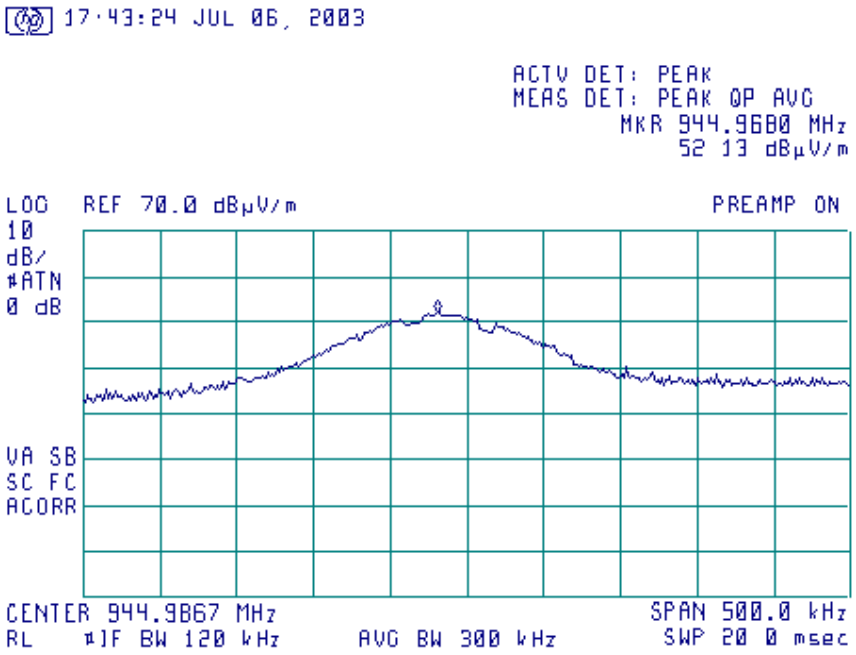
Plot A10

**Field strength of 3rd harmonic,
Horizontal polarization**



$LIMIT_{peak}$ = 75.6 dB(µV/m) @3m

Measured value = 52.1 dB(µV/m)

$LIMIT_{average}$ = 55.6 dB(µV/m) @3m

Average value = 52.1 dB(µV/m) – 4.3 dB (avrg.factor) = 47.8 dB(µV/m)

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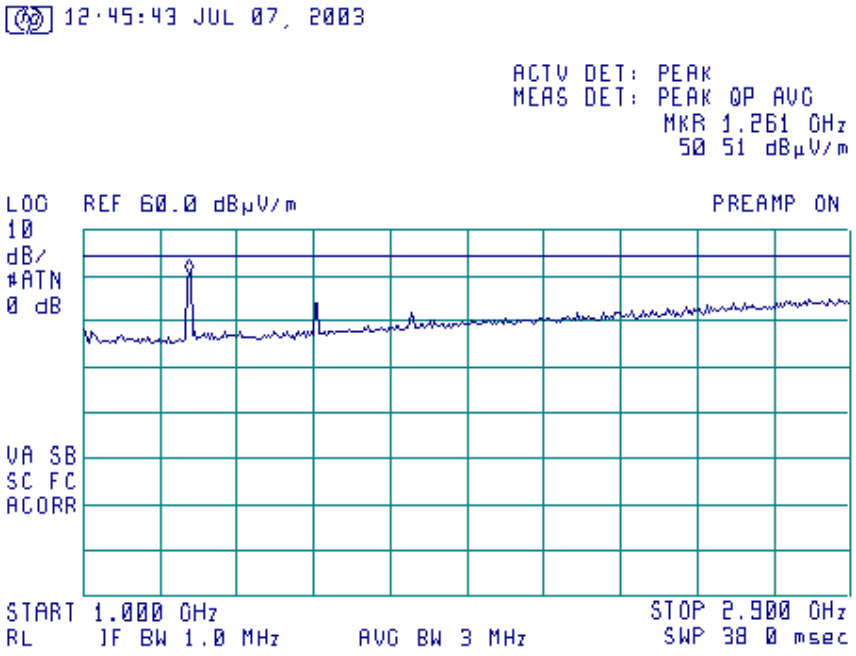
Plot A11

**Spurious emission measurements
in 1 – 2.9 GHz range,
vertical & horizontal polarization**



No spurious emissions were found except harmonics.

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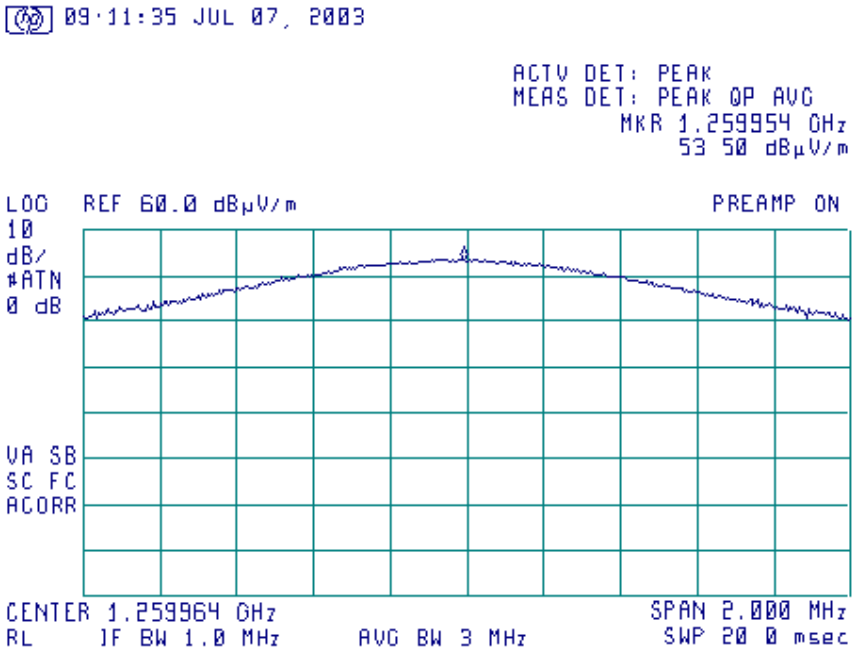
Plot A12

**Field strength of 4th harmonic,
vertical polarization**



$LIMIT_{peak}$ = 75.6 dB(µV/m) @3m

Measured value = 53.5 dB(µV/m)

$LIMIT_{average}$ = 55.6 dB(µV/m) @3m

Average value = 53.5 dB(µV/m) – 4.3 dB (avrg.factor) = 49.2 dB(µV/m)

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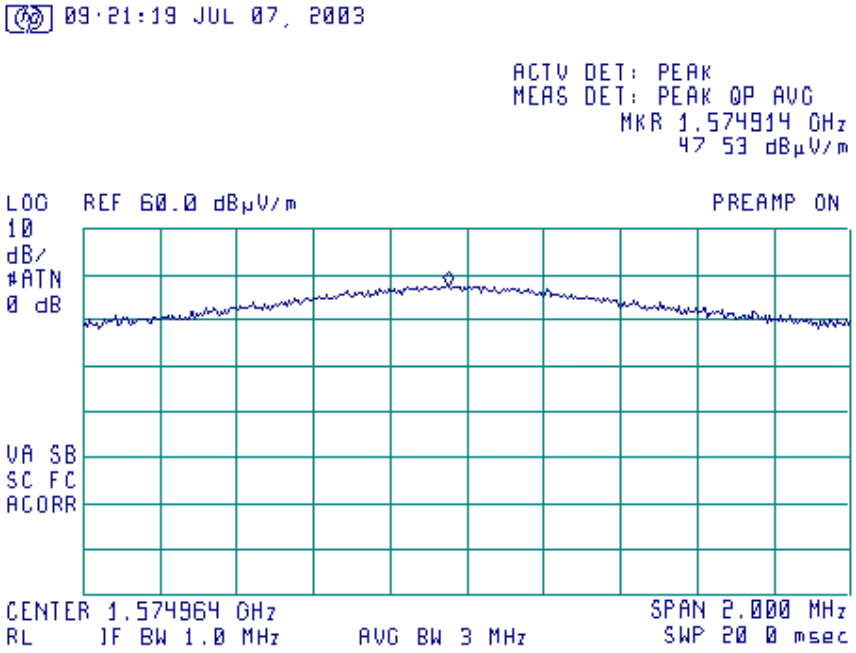
Plot A13

**Field strength of 5th harmonic,
vertical polarization**



$LIMIT_{peak}$ = 74.0 dB(µV/m) @3m

Measured value = 47.5 dB(µV/m)

$LIMIT_{average}$ = 54.0 dB(µV/m) @3m

Average value = 47.5 dB(µV/m) – 4.3 dB (avrg.factor) = 43.2 dB(µV/m)

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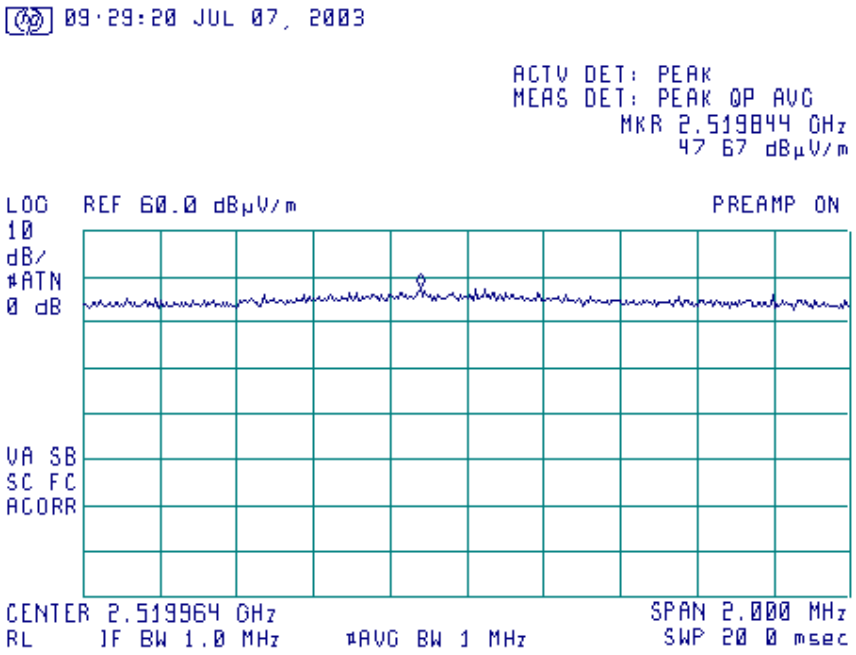
Plot A14

**Field strength of 8th harmonic,
vertical polarization**



LIMIT$_{peak}$ = 75.6 dB(µV/m) @3m

Measured value = 47.7 dB(µV/m)

LIMIT$_{average}$ = 55.6 dB(µV/m) @3m

Average value = 47.7 dB(µV/m) – 4.3 dB (avrg.factor) = 43.4 dB(µV/m)

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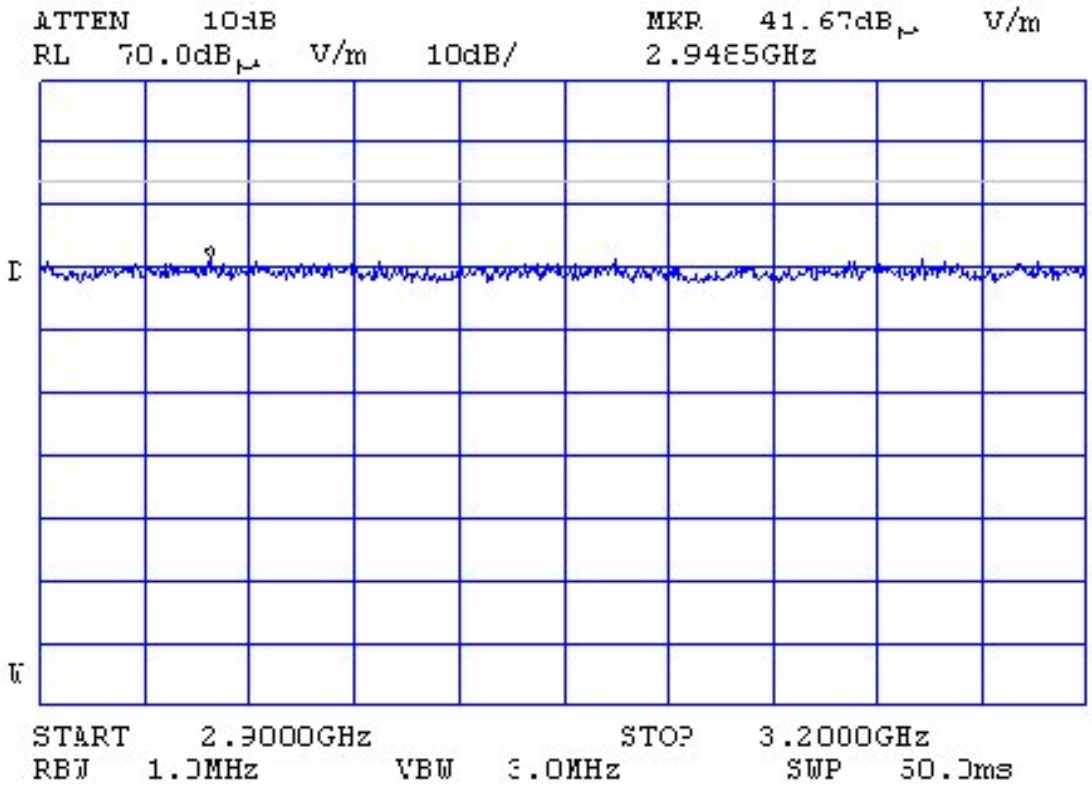
Plot A15

**Spurious emission measurements
in 2.9 – 3.2 GHz range,
vertical & horizontal polarization**



No spurious emissions were found

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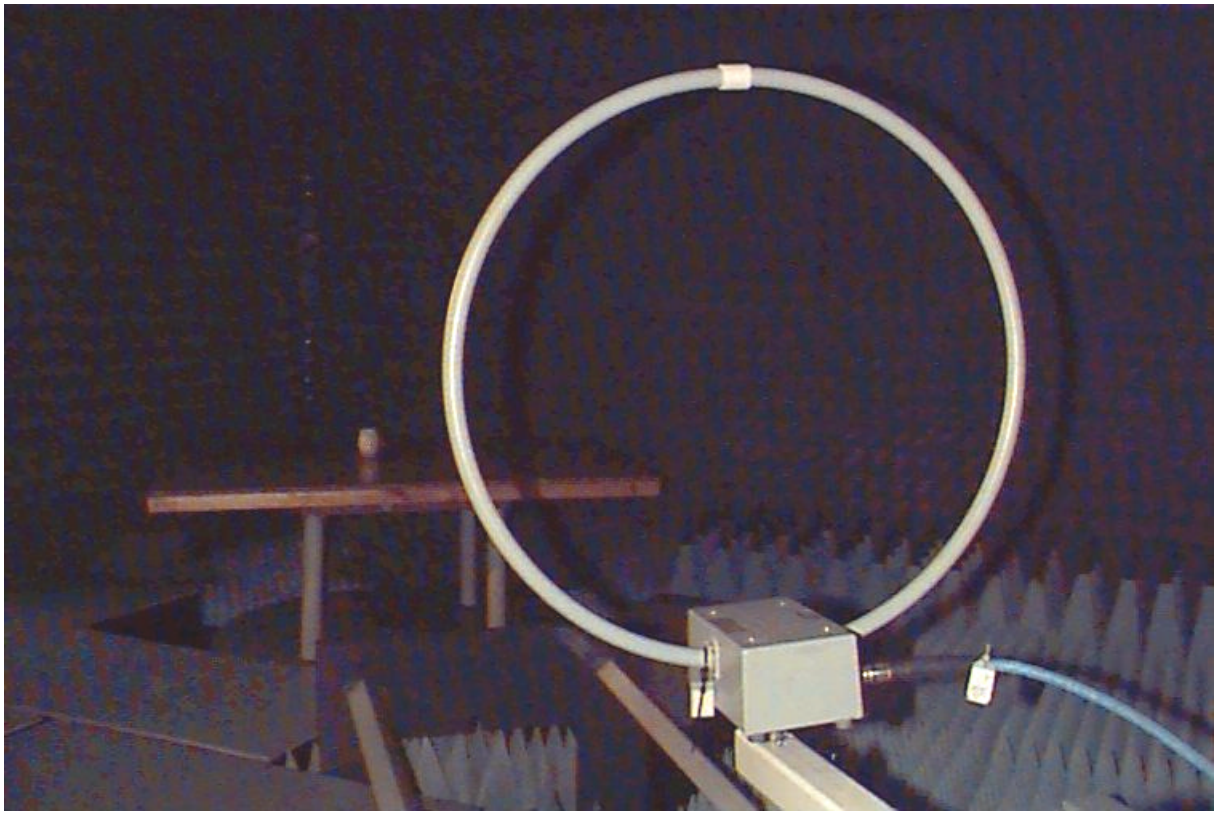
Appendix B – Test setup photographs

Photograph 1

Spurious emission measurement setup in 9 kHz – 30 MHz range,

loop antenna in vertical polarization



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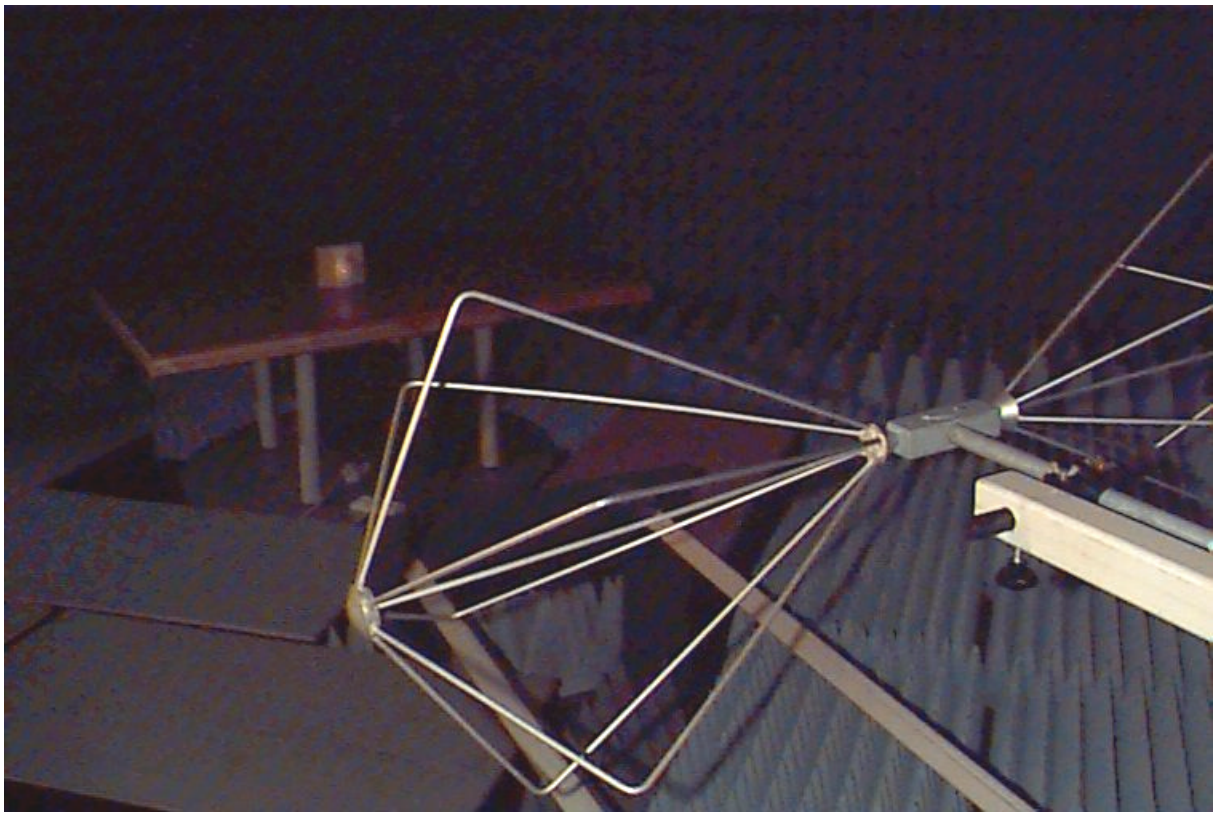
Photograph 2

Spurious emission measurement setup in 30 – 200 MHz range,

Biconical antenna in horizontal polarization



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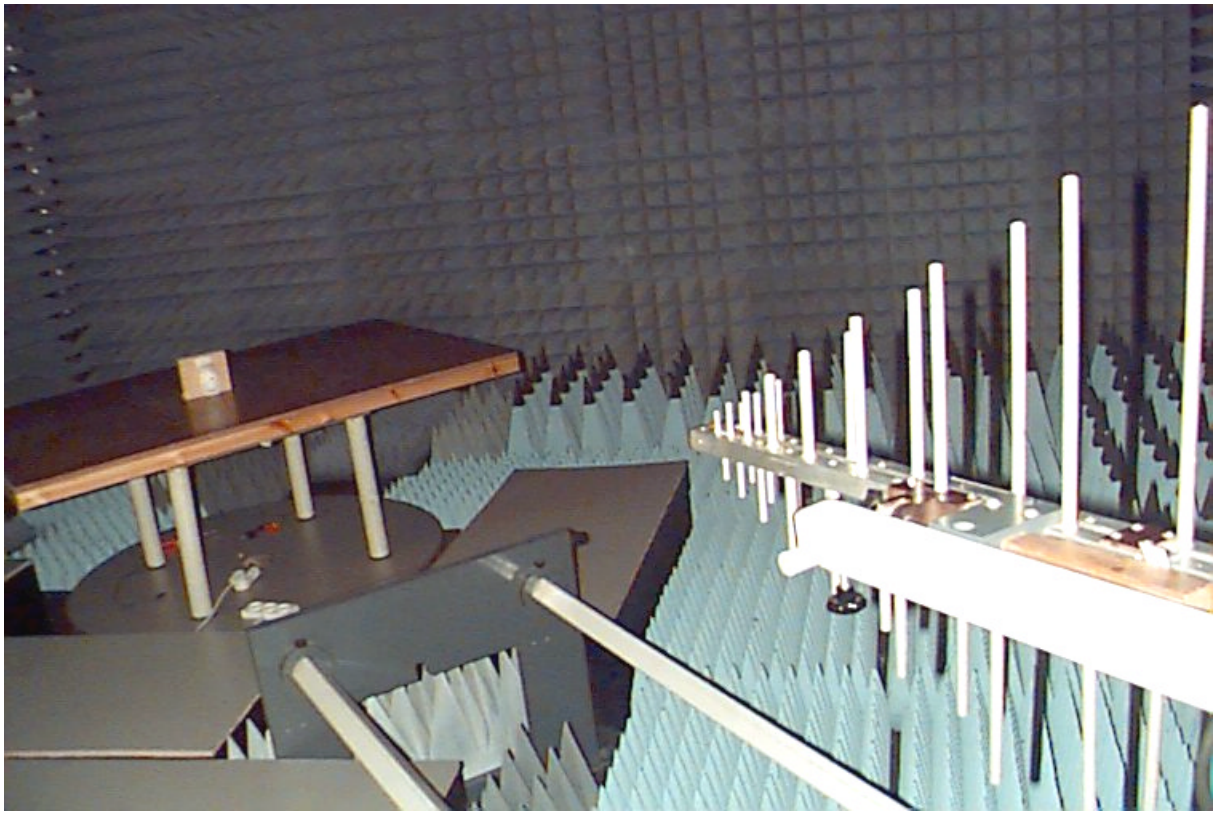
Photograph 3

Spurious emission measurement setup in 200 – 1000 MHz range,

Log periodic antenna in vertical polarization



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Photograph 4

Spurious emission measurement setup in 1 – 3.2 GHz range,

Horn antenna in vertical polarization

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Photograph 5

20 dB bandwidth measurement setup,

Log periodic antenna in horizontal polarization

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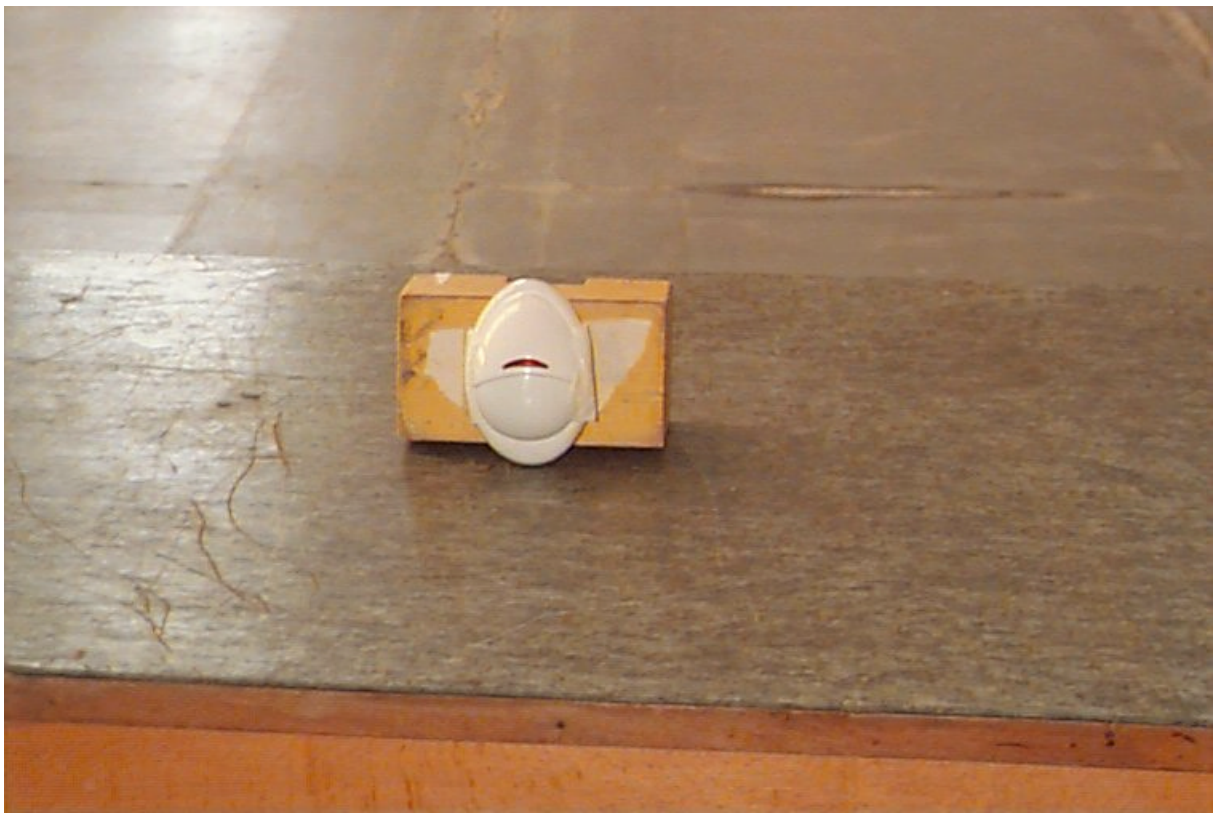
Photograph 6

Spurious emission test setup,

EUT view



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Appendix C - Test equipment used for tests

HL Serial No.	Description	Manufacturer information			Due Calibration Month/ year
		Name	Model No.	Serial No.	
0034	Log periodic antenna, 200 - 1000 MHz	Electro-Metrics	LPA 25/30	1988	1/04
0038	Antenna Mast, 1-4 m	Hermon Labs	AM-1	028	2/04 check
0415	Cable coax RF, RG-58,	Hermon Labs	CC-3	056	5/04
0446	Active Loop Antenna 10 kHz-30 MHz	Electro-Mechanics	6502	2857	10/03
0566	Antenna, Biconical, 20-200 MHz	Electro-Metrics	BIA 25/30	3566	11/03
0569	Antenna, Log Periodic, 200-1000MHz	Electro-Metrics	LPA 25/30	1953	1/04
0812	Cable, coax, RG-214, 11.5 m, N-type connectors	Hermon Labs	C214-11	148	5/04
1365	Cable coaxial, RG-214, 5 m	Hermon Labs	C214-5	1365	4/04
1425	EMI Receiver System, 9 kHz - 2.9 GHz	Agilent Technologies	8542E	3710A00222	9/03
1430	EMI Receiver System, 9 kHz - 2.9 GHz	Agilent Technologies	8542E	3807A00262	9/03
1553	Cable RF, 3.5 m	Alpha wire	RG-214	149	12/03
1566	Cable RF, 2 m	Huber-Suhner	Sucoflex 104PE	13094/4PE	12/03
1942	Cable 18 GHz, 4 m, blue	Rhophase Microwave Ltd	SPS-1803A-4000-NPS	T4658	10/03
1947	Cable 18 GHz, 6.5 m, blue	Rhophase Microwave Ltd	NPS-1803A-6500-NPS	T4974	10/03
1984	Antenna, double ridged waveguide horn, 1-18 GHz, 300W, N-type	EMC Test Systems	3115	9911-5964	3/04
2109	Anechoic chamber 6 (L) x 5.5 (W) x 2.95 (H) m	Hermon Labs	AC-2	2109	12/03 check
2258	Amplifier Low Noise 2-20 GHz	Sophia Wireless	LNA0220-C	0222	11/03
2273	Power Supply 11V for HL2258, HL2259, HL2260	Hermon Labs	S-11	2273	12/03

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Appendix D Test equipment correction factors

Antenna factor, Active loop antenna (HL 0446)
Model 6502, Ser.No. 2857

Frequency, MHz	Electric antenna Factor, dB
0.009	18.7
0.010	17.7
0.020	13.2
0.050	10.4
0.075	10.2
0.100	9.9
0.150	9.8
0.250	9.9
0.500	9.8
0.750	9.7
1.000	10.1
2.000	10.0
3.000	10.2
4.000	10.1
5.000	10.1
10.000	9.6
15.000	9.6
20.000	9.3
25.000	8.7
30.000	7.5

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

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Antenna factor
log periodic antenna (HL 0034)
Electro-Metrics, model LPA-25/30
Ser.No.1988

Frequency, MHz	Antenna factor dB(1/m)	Frequency, MHz	Antenna factor dB(1/m)
200	12.6	625	20.4
225	12.2	650	20.9
250	13.4	675	22.0
275	14.3	700	22.2
300	15.2	725	22.7
325	15.7	750	22.5
350	15.9	775	22.7
375	16.4	800	22.8
400	17.0	825	23.2
425	17.4	850	23.5
450	17.9	875	23.9
475	18.6	900	24.0
500	19.1	925	24.0
525	19.3	950	24.2
550	19.6	975	24.7
575	19.8	1000	25.1
600	20.0		

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

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Antenna factor
Biconical antenna (HL 0566)
Electro-Metrics, model BIA-25/30
Ser.No.3566

Frequency, MHz	Antenna factor, dB(1/m)	Frequency, MHz	Antenna factor, dB(1/m)
30	14.7	120	16.8
35	12.9	125	15.5
40	12.6	130	15.5
45	12.8	135	15.1
50	12.6	140	14.8
55	11.8	145	15.1
60	11.7	150	16.9
65	10.4	155	17.2
70	9.2	160	17.3
75	9.1	165	17.8
80	9.1	170	18.3
85	9.5	175	19.0
90	11.2	180	19.5
95	12.6	185	20.0
100	13.7	190	20.4
105	14.2	195	20.5
110	15.3	200	20.6
115	17.1		

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

Antenna factor
Log periodic antenna (HL 0569)
Electro-Metrics, model LPA-25/30
Ser.No.1953

Frequency, MHz	Antenna factor, dB(1/m)	Frequency, MHz	Antenna factor, dB(1/m)
200	15.2	625	25.2
225	15.1	650	25.8
250	16.3	675	27.2
275	17.2	700	27.6
300	19.6	725	27.6
325	18.4	750	27.6
350	19.0	775	28.0
375	20.0	800	28.2
400	20.9	825	29.4
425	21.3	850	29.9
450	22.1	875	30.0
475	22.7	900	30.4
500	23.2	925	30.6
525	23.9	950	30.8
550	24.2	975	31.6
575	24.6	1000	32.1
600	24.7		

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

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Antenna factor
Double-ridged wave guide horn antenna (HL 1984)
Model 3115
Ser.No: 9911-5964

Frequency, MHz	Antenna factor, dB(1/m)
1000.0	24.7
1500.0	25.7
2000.0	27.6
2500.0	28.9
3000.0	31.2
3500.0	32.0
4000.0	32.5
4500.0	32.7
5000.0	33.6
5500.0	35.1
6000.0	35.4
6500.0	34.9
7000.0	36.1
7500.0	37.8
8000.0	38.0
8500.0	38.1
9000.0	39.1
9500.0	38.3
10000.0	38.6
10500.0	38.2
11000.0	38.7
11500.0	39.5
12000.0	40.0
12500.0	40.4
13000.0	40.5
13500.0	41.1
14000.0	41.6
14500.0	41.7
15000.0	38.7
15500.0	38.2
16000.0	38.8
16500.0	40.5
17000.0	42.5
17500.0	45.9
18000.0	49.4

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

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Cable coaxial, RG-58/RG-214, model:CC-3, s/n 056 (HL 0415)
+ Cable coaxial, RG-214, 11.5m, model: C214-11, s/n 148 (HL 0812)
Calibration data

No.	Parameter	Set, MHz	Measured, dB	Deviation, dB	Tolerance (specification), dB	Measured uncertainty dB
1	Insertion Loss	20	0.73	-	NA	±0.12
2		30	0.91	-		
3		50	1.2	-		
4		80	1.56	-		
5		100	1.76	-		
6		200	2.59	-		
7		300	3.26	-		
8		400	3.93	-		
9		500	4.42	-		
10		600	4.92	-		
11		700	5.36	-		
12		800	5.88	-		
13		900	6.41	-		
14		1000	6.71	-		
15		1500	8.63	-		
16		2000	10.39	-		

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Cable Coaxial, S-FLC 12-50, 5 m,
Model C214-5, s/n 1365 (HL 1365)
Calibration data

No.	Parameter	SET, MHz	Measured, dB	Deviation, dB	Tolerance (Specification), dB	Meas. Uncert., dB
1	Insertion Loss	1000	0.41	-	NA	±0.12
2		1200	0.44	-		
3		1400	0.48	-		
4		1600	0.52	-		
5		1800	0.55	-		
6		2000	0.58	-		
7		2200	0.61	-		
8		2400	0.64	-		±0.17
9		2600	0.67	-		
10		2800	0.7	-		
11		3000	0.73	-		
12		3300	0.79	-		
13		3600	0.84	-		
14		3900	0.94	-		
15		4200	1.22	-		

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Cable RF, 2 m
Model: Sucoflex 104PE; s/n 13094/4PE (HL 1566)

No.	Parameter	SET, MHz	Measured, dB	Deviation, dB	Tolerance (Specification), dB	Meas. Uncert., dB
1	Insertion Loss	30	0.12	-	NA	±0.12
2		50	0.15	-		
3		100	0.22	-		
4		300	0.39	-		
5		500	0.52	-		
6		800	0.65	-		
7		1000	0.76	-		
8		1500	1.01	-		
9		2000	1.13	-		
10		2500	1.24	-		
11		3000	1.39	-		
12		3500	1.55	-		
13		4000	1.69	-		
14		4500	1.92	-		±0.17
15		5000	1.92	-		
16		5500	2.05	-		
17		6000	2.21	-		
18		6500	2.28	-		
19		7000	2.39	-		
20		7500	2.67	-		
21	Insertion Loss	8000	2.66	-	NA	±0.17
22		8500	2.91	-		
23		9000	2.91	-		
24		9500	2.95	-		
25		10000	3.08	-		
26		10500	3.3	-		
27		11000	3.6	-		
28		11500	3.58	-		
29		12000	3.63	-		
30		12500	3.58	-		±0.26
31		13000	3.82	-		
32		13500	4.19	-		
33		14000	4.14	-		
34		14500	4.67	-		
35		15000	4.77	-		
36		15500	4.77	-		
37		16000	4.71	-		
38		16500	5.46	-		
39		17000	5.78	-		
40		17500	5.98	-		
41		18000	5.88	-		

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Cable, RF, 3.5 m
Model: RG-214 (HL 1553)

No.	Parameter	Set		Measured, dBm	Attenuation, dB	Meas. Uncert., dB
		MHz	dBm			
1	Attenuation	1	-0.12	-0.13	0.01	±0.12
2		10	0.00	-0.07	0.07	
3		30	-0.10	-0.22	0.12	
4		50	-0.09	-0.31	0.22	
5		100	-0.13	-0.39	0.26	
6		200	-0.08	-0.48	0.40	
7		300	-0.12	-0.64	0.52	
8		400	-0.03	-0.63	0.60	
9		500	0.19	-0.51	0.70	
10		600	0.05	-0.72	0.77	
11		700	-0.06	-0.90	0.84	
12		800	-0.01	-1.01	1.00	
13		900	0.03	-0.97	1.00	
14		1000	-0.08	-1.13	1.05	
15		2000	-0.19	-1.89	1.70	

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Cable 18GHz, 6.5 m, blue, model: NPS-1803A-6500-NPS, s/n T4974 (HL 1947)
Calibration data

Frequency, GHz	Insertion Loss, dB
	HL1947
0.03	0.30
0.05	0.38
0.10	0.53
0.20	0.74
0.30	0.91
0.40	1.05
0.50	1.18
0.60	1.29
0.70	1.40
0.80	1.50
0.90	1.59
1.00	1.68
1.10	1.77
1.20	1.86
1.30	1.94
1.40	2.01
1.50	2.08
1.60	2.16
1.70	2.22
1.80	2.29
1.90	2.36
2.00	2.42
2.10	2.48
2.20	2.54
2.30	2.60
2.40	2.66
2.50	2.71
2.60	2.77
2.70	2.83
2.80	2.89
2.90	2.95
3.10	3.06
3.30	3.17
3.50	3.28
3.70	3.39
3.90	3.51
4.10	3.62
4.30	3.76
4.50	3.87
4.70	4.01
4.90	4.10
5.10	4.21
5.30	4.31
5.50	4.43
5.70	4.56
5.90	4.71

Frequency, GHz	Insertion Loss, dB
	HL1947
6.10	4.87
6.30	4.95
6.50	4.94
6.70	4.88
6.90	4.87
7.10	4.83
7.30	4.85
7.50	4.86
7.70	4.91
7.90	4.96
8.10	5.03
8.30	5.08
8.50	5.13
8.70	5.21
8.90	5.22
9.10	5.34
9.30	5.35
9.50	5.52
9.70	5.51
9.90	5.66
10.10	5.70
10.30	5.78
10.50	5.79
10.70	5.82
10.90	5.86
11.10	5.94
11.30	6.06
11.50	6.21
11.70	6.44
11.90	6.61
12.10	6.76
12.40	6.68
13.00	6.66
13.50	6.81
14.00	6.90
14.50	6.90
15.00	6.97
15.50	7.17
16.00	7.28
16.50	7.27
17.00	7.38
17.50	7.68
18.00	7.92

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Cable 18GHz, 4 m, blue, model: SPS-1803A-4000-NPS, s/nT4658 (HL 1942)
Calibration data

Frequency, GHz	Insertion Loss, dB
	HL1942
0.03	0.21
0.05	0.26
0.10	0.36
0.20	0.50
0.30	0.61
0.40	0.70
0.50	0.78
0.60	0.85
0.70	0.93
0.80	0.99
0.90	1.04
1.00	1.10
1.10	1.16
1.20	1.22
1.30	1.26
1.40	1.31
1.50	1.35
1.60	1.41
1.70	1.45
1.80	1.49
1.90	1.53
2.00	1.57
2.10	1.61
2.20	1.65
2.30	1.69
2.40	1.72
2.50	1.76
2.60	1.79
2.70	1.83
2.80	1.87
2.90	1.90
3.10	1.97
3.30	2.04
3.50	2.11
3.70	2.18
3.90	2.24
4.10	2.31
4.30	2.38
4.50	2.43
4.70	2.53
4.90	2.53
5.10	2.63
5.30	2.65
5.50	2.72
5.70	2.76
5.90	2.79

Frequency, GHz	Insertion Loss, dB
	HL1942
6.10	2.88
6.30	2.90
6.50	2.97
6.70	3.02
6.90	3.04
7.10	3.07
7.30	3.12
7.50	3.13
7.70	3.19
7.90	3.24
8.10	3.30
8.30	3.36
8.50	3.45
8.70	3.41
8.90	3.45
9.10	3.42
9.30	3.55
9.50	3.48
9.70	3.58
9.90	3.61
10.10	3.66
10.30	3.68
10.50	3.70
10.70	3.70
10.90	3.75
11.10	3.78
11.30	3.86
11.50	3.98
11.70	4.10
11.90	4.12
12.10	4.09
12.40	4.13
13.00	4.23
13.50	4.35
14.00	4.40
14.50	4.44
15.00	4.57
15.50	4.66
16.00	4.64
16.50	4.66
17.00	4.75
17.50	4.85
18.00	4.93

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Appendix E - General information

Test facility 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) 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, 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).

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Abbreviations and acronyms

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

AC	alternating current
AE	auxiliary equipment
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: 2003	Radio Frequency Devices
ANSI C63.2:96	American National Standard for Instrumentation-Electromagnetic Noise and Field Strength, 10 kHz to 40 GHz-Specifications.
ANSI C63.4:92	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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FCC Equipment codes and descriptions

CYY	Communications Receiver used w/ P.15 transmitter
DCD	Part 15 Low Power transmitter Below 1705 kHz
DSC	Part 15 Security/Remote Control Transmitter
DSR	Part 15 Remote Control/Security Device Transceiver
DSS	Part 15 Spread Spectrum Transmitter
DXX	Part 15 Low Power Communication Device Transmitter
EAV	Part 15 Automatic Vehicle Identification System
ETB	Part 15 Cordless Telephone Base Transceiver
ETR	Part 15 Cordless Telephone Remote Transceiver
ETS	Part 15 Cordless telephone system
FAP	Part 15 Anti-Pilferage Device
FDS	Part 15 Field Disturbance Sensor
GAT	Part 15 Auditory Assistance Device (Transmitter)
HID	Part 15 TV Interface Device
JBC	Part 15 Class B Computing Device/ Personal Computer
JBP	Part 15 Class B Computing Device Peripheral
PUB	Part 15 Unlicensed PCS base station
PUE	Part 15 Unlicensed PCS portable Tx held to ear
PUF	Part 15 Unlicensed PCS portable Tx held to face
PUT	Part 15 Unlicensed PCS portable Tx worn on body