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Electrical

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RADIO TEST REPORT

ACCORDING TO 47CFR PART 15, SUBPART C § 15.245 and SUBPART B
for

Visonic Ltd.

EQUIPMENT UNDER TEST:

Dual Technology, Digital MW/PIR Intrusion Detector
Model: Next DUO

Document ID: VISRAD_FCC.15006
Date of Issue: November 02

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Contents

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1 Project information

Description of equipment under test

Test items	: Dual technology, digital MW/PIR intrusion detector
Manufacturer	: Visonic Ltd.
Equipment serial number	: Cat 0-1832-1
Types (Models)	: Next DUO
Equipment FCC code[1]	: DSC

Applicant information

Applicant's responsible person	: Arick Elshtein
Company	: Visonic
Address	: 27 Habarzel street
Postal code	: 69710
City	: Tel Aviv
Country	: Israel
Telephone number	: +972 3 6456714
Telefax number	: +972 3 6456891

Test performance

Project Number:	: 15006
Location	: Hermon Laboratories
Receipt date	: September 18, 2002
Test started	: September 18, 2002
Test completed	: September 23, 2002
Purpose of test	Apparatus compliance verification in accordance with emission requirements
Test specification(s)	47CFR Part 15, §15.249 and subpart B

[1] FCC Equipment codes – see Appendix D

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2 Summary of tests

The tests listed in the table below were performed. The EUT was found complying with the limits of 47CFR Part 15, §15.245 and subpart B.

Parameter	Subclause	C	NC	NT	NA	Tested by	Date tested	Remarks
Transmitter characteristics								
Field strength of fundamental	(a)	**C**				Mrs. E. Pitt, test engineer	September 18, 23, 2002	
Field strength of harmonics	(a)	**C**				Mrs. E. Pitt, test engineer Mr. Y. Neuman, test engineer	September 18, 22, 2002	
Out of band spurious emissions (radiated)	(c)	**C**				Mrs. E. Pitt, test engineer Mr. Y. Neuman, test engineer	February 27, September 18, 22, 2002	
Unintentional radiation, §15.107, §15.109								
Conducted emissions	15.107	**C**						
Radiated emissions	15.109	**C**						
Receiver characteristics, §15.109								
Spurious radiated emissions	15.109				**NA**			
General conditions under Part 15								
The Intentional radiator operates at 2.45 GHz	15.245	**C**						
The intentional radiator has permanently attached antenna or antenna that uses a unique coupling to the intentional radiator.	15.203	**C**						
The intentional radiator has a standard connector and must be professionally installed. To demonstrate that professional installation is required, the following three points must be addressed: (a) the application (or intended use) of the EUT; (b) the installation requirements of the EUT, and (c) the method by which the EUT will be marketed.	15.203				**NA**			
No antenna other than that furnished by the responsible party can be used with the device.	15.203					Responsibility of the end user		

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Parameter	Subclause	C	NC	NT	NA	Tested by	Date tested	Remarks
Antenna technical characteristics, as referred to in "Transmitter description" table in the test report	15.204	**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: Mrs. V. Mednikov, certification engineer

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

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3 EUT description

3.1 General description

The EUT is a dual technology, digital MW/PIR intrusion detector, operating at 2.45 GHz.
The device is powered by 12 V DC from a control panel.

3.2 EUT test configuration

The EUT ports and lines description is given in Table 3.2.1, test configuration is shown in Figure 2.2.1.

Table 3.2.1 EUT ports and lines

Port type	Port description	Connector type	Quantity	Cable type description	Cable length, m	Connected to
Control	TEST	Terminal Block	1	Unshielded	3	Open circuit
Control	TAMP	Terminal Block	2	Unshielded	3	Open circuit
Control	N.C	Terminal Block	2	Unshielded	3	Open circuit
Control	EOL	Terminal Block	1	Unshielded	3	Open circuit
Power	+/-12V	Terminal Block	2	Unshielded	3	DC power supply

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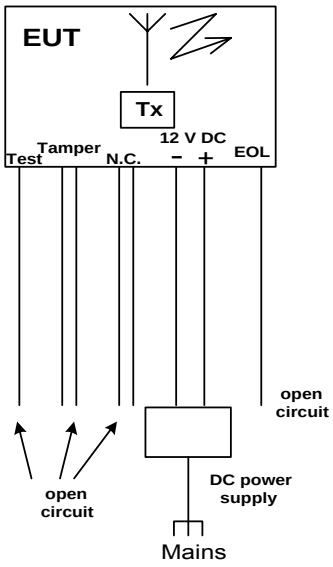
Figure 3.2.1 EUT test configuration



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3.3 Transmitter description

Type of equipment						
X	Stand-alone (Equipment with or without its own control provisions)					
	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)					
	Other:					
Operating frequency	2450 MHz					
Transmitter aggregate data rate (bits per second)	NA					
Normal test signal	Pulses					
Maximum rated output power						
At transmitter permanent external 50 Ω rf output connector (dBm)						
Effective radiated power (for equipment with integral antenna) (dBm)	-21 dBm					
Is transmitter output power variable?	**X**	No				
		Yes		continuous variable		
				stepped variable		
				stepsize (dB):.....		
				minimum RF power (dBm):.....		
				maximum RF power (dBm):.....		
Transmitter power source						
	Battery	**Nominal rated voltage (VDC)**				
	Nickel Cadmium					
	Lithium					
	Other					
	DC	**Nominal rated voltage (VDC)**	12			
	AC mains	**Nominal rated voltage (VAC)**				
Is there common power source for transmitter and receiver				yes		no

Antenna technical characteristics						
			Type	**Manufacturer**	**Model number**	**Gain**
Integral		with temporary RF connector	**Integrated strip**	**Visonic**	**NA**	**NA**
	X	without temporary RF connector				
External						

External antenna connection NA			
	standard connector		unique coupling

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4 Tests results

4.1 Field strength of fundamental according to § 15.245 (a)

METHOD OF MEASUREMENTS	ANSI 63.4 §13.1.4
DATE:	September 18, 23, 2002
RELATIVE HUMIDITY:	49%
AMBIENT TEMPERATURE:	24°
TEST PERFORMED IN:	ANECHOIC CHAMBER
TEST DISTANCE	3 m
OPERATING FREQUENCY RANGE	2435 – 2465 MHz
MODE OF OPERATION	Tx

Peak detector

Carrier frequency, MHz	Field strength, dB(μV/m)	Peak limit, dB(μV/m)	Margin, dB	Reference to Plots in Appendix A
2449.98	73.7	134	60.3	A5
Measurement uncertainty, dB		+5.73.dB / -5.57 dB		

Average detector (Peak detector + Average factor)

Carrier frequency, MHz	Field strength, dB(μV/m)	Average limit, dB(μV/m)	Margin, dB	Reference to Plots in Appendix A
2449.98	40.53	114	73.47	NA
Measurement uncertainty, dB		+5.73.dB / -5.57 dB		

4.1.1 Average factor calculation, §15.35

Tx ON	Duty cycle	Average factor	Reference to Plots in Appendix A
2.2	0.0219*	33.17	A1, A2, A3, A4
Measurement uncertainty (1% of sweep time)			

* For duty cycle calculation refer to page 16.

TEST EQUIPMENT USED:

HL 0041	HL 0337	HL 0521	HL 0589	HL 1430	HL 1947	

LIMIT

Operating frequency range, MHz	Field strength of fundamental, dB(μV/m)
902-928	114
2435-2465	114
5785-5815	114
10500-10550	128
24075-24175	128

The above field strength limits are based on average limits.
The provisions of section 15.35 for limiting peak emissions apply.

TEST PROCEDURE

The EUT was tested, being placed on a wooden table in each of three orthogonal planes in turn. 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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4.2 Field strength of harmonics according to § 15.245 (b)(1)

METHOD OF MEASUREMENTS	ANSI 63.4 §13.1.4
DATE:	September 18, 22, 2002
RELATIVE HUMIDITY:	48%
AMBIENT TEMPERATURE:	25°
TEST PERFORMED IN:	ANECHOIC CHAMBER / OATS
FREQUENCY RANGE	4 – 25 GHz
CARRIER FREQUENCY	2.45 GHz
MODE OF OPERATION	Tx

Peak detector

Carrier frequency, MHz	Field strength @1 m, dB(μV/m)	Peak limit @ 3 m, dB(μV/m)	Margin, dB	Reference to Plots in Appendix A
4893.6*	60.83	74	13.17	A14
Measurement uncertainty, dB		+5.73.dB / -5.57 dB		

Average detector (Peak detector + Average factor)

Carrier frequency, MHz	Field strength @1 m, dB(μV/m)	Peak limit @ 3 m, dB(μV/m)	Margin, dB	Reference to Plots in Appendix A
4893.6*	27.66	54	26.34	NA
Measurement uncertainty, dB		+5.73.dB / -5.57 dB		

* Falls into restricted band

TEST EQUIPMENT USED:

HL 0038	HL 0041	HL 0091	HL 0287	HL 0465	HL 0521	HL 0554
HL 0589	HL 0592	HL 0593	HL 0594	HL 1004	HL 1424	HL 1566
HL 1942	HL 2009					

LIMIT

Operating frequency range, MHz	Field strength of harmonics, dB(μV/m)
902-928	64
2435-2465	64
5785-5815	64
10500-10550	88
24075-24175	88

Harmonic emissions:	Specific requirements
in the restricted bands below 17.7 GHz	below the field strength limits shown in 15.209
at and above 17.7 GHz	
for field disturbance sensors designed for use only within a building or to open building doors	88
for all other field disturbance sensors	78

The above field strength limits are based on average limits.
The provisions of section 15.35 for limiting peak emissions apply.

TEST PROCEDURE

The EUT was tested, being placed on a wooden table in each of three orthogonal planes in turn. 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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4.3 Out of band spurious emissions according to § 15.245 (b)(3)

METHOD OF MEASUREMENTS	ANSI 63.4 §13.1.4/ §13.1.5
DATE:	September 18, 22, 2002
RELATIVE HUMIDITY:	49%
AMBIENT TEMPERATURE:	25°
TEST PERFORMED IN:	ANECHOIC CHAMBER / OATS
TEST DISTANCE	3 m
OPERATING FREQUENCY RANGE	2435 – 2465 MHz
FREQUENCY RANGE	9 kHz – 25 GHz
MODE OF OPERATION	Tx

Peak detector

Frequency, MHz	Antenna polarization	Radiated emission, dB (µV/m)	Limit, dB(µV/m)	Margin, dB	Reference to Plots in Appendix A
0.009 – 0.15	V	No spurious emissions were found			A6
0.15 – 30	V	No spurious emissions were found			A7
30 – 1000	V / H	All emissions were more than 20 dB below limit			A8
1000 – 2000	V / H	No spurious emissions were found			A9
2000 – 2435	V / H	No spurious emissions were found			A10
2465 – 3000	V / H	No spurious emissions were found			A11
3000 – 4000	V / H	No spurious emissions were found			A12
4000 – 6000	V / H	No spurious emissions except harmonics were found			A13
5500 – 6500	V / H	No spurious emissions were found			A15
6500 – 8000	V / H	No spurious emissions were found			A16
8000 – 10000	V / H	No spurious emissions were found			A17
10000 – 12000	V / H	No spurious emissions were found			A18
12000 – 14000	V / H	No spurious emissions were found			A20
14000 – 16000	V / H	No spurious emissions were found			A21
16000 – 18000	V / H	No spurious emissions were found			A22
18000 – 25000	V / H	No spurious emissions were found			A23
Measurement uncertainty, Db		+5.73.dB / -5.57 dB			

TEST EQUIPMENT USED:

HL 0038	HL 0041	HL 0091	HL 0287	HL 0446	HL 0465	HL 0521
HL 0554	HL 0589	HL 0592	HL 0593	HL 0594	HL 0604	HL 0768
HL 1004	HL 1424	1566	HL 1942	HL 2009		

LIMIT

Radiated emissions, outside of the specified frequency bands, except for harmonics, shall be attenuated at least 50 dB below the level of the fundamental or to the general radiated emission limits in Section 15.209, whichever is the lesser attenuation.

TEST PROCEDURE

The EUT was tested, being placed on a wooden 80 cm height turntable in each of three orthogonal planes 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 – 25 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

METHOD OF MEASUREMENT: ANSI 63.4 §11.6 / ANSI 63.4 §12.1.4
DATE
RELATIVE HUMIDITY
AMBIENT TEMPERATURE:
TEST PERFORMED IN: ANECHOIC CHAMBER
TEST DISTANCE: 3 m
THE EUT WAS TESTED AS: TABLE-TOP
FREQUENCY RANGE: 30 MHz – 1 GHz
DETECTOR TYPE: QUASI-PEAK
RESOLUTION BANDWIDTH: 120 kHz

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

The limits for class B unintentional radiated emissions were used while testing the equipment in Tx mode, refer to paragraph 4.3 and Plot A8.

TEST EQUIPMENT USED:

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 table. 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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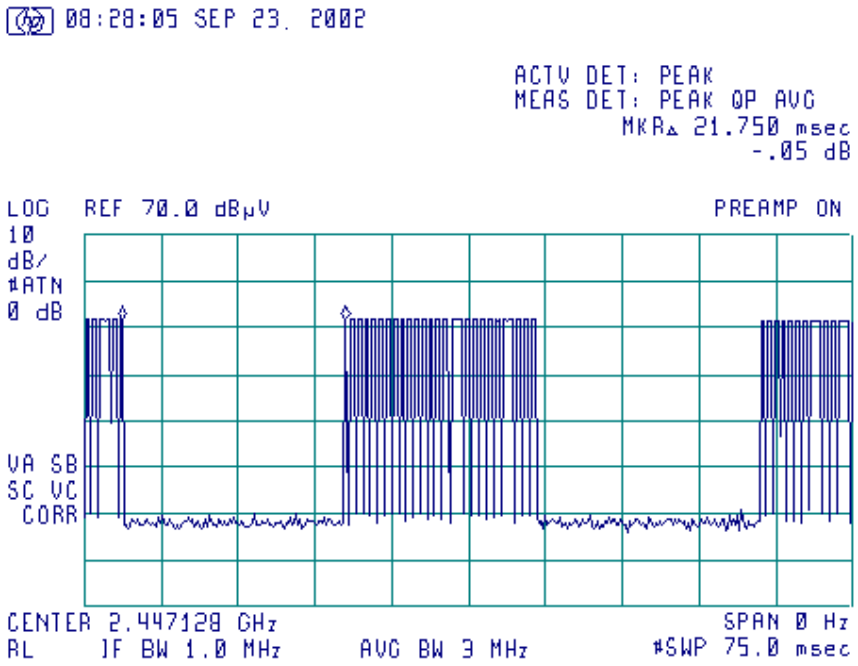
Appendix A Plots

Plot A1

Duty cycle measurements
Time OFF between bursts



Time OFF is 21.75 ms

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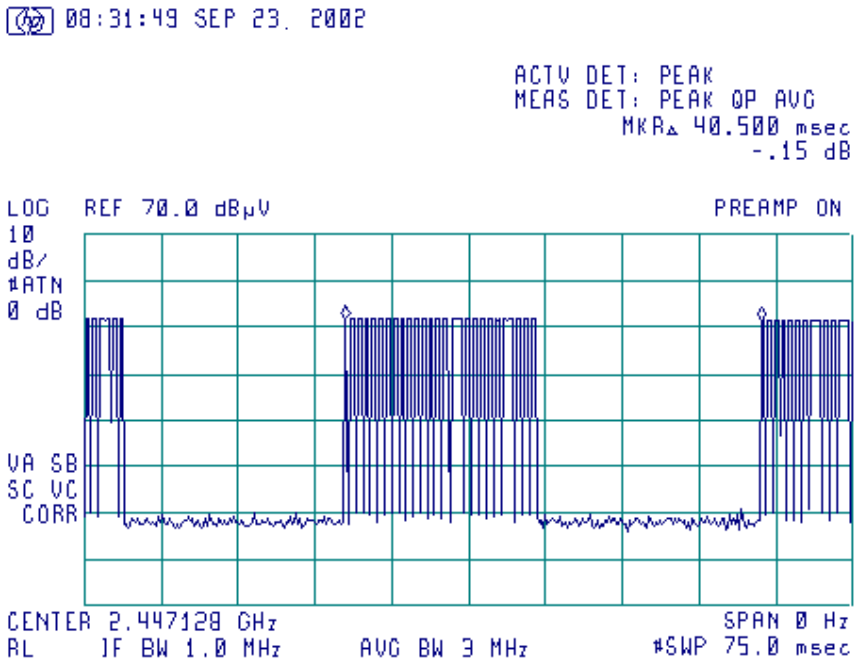
Plot A2

Duty cycle measurements
Bursts period



Burst duration is 40.5 – 21.75 = 18.75 ms

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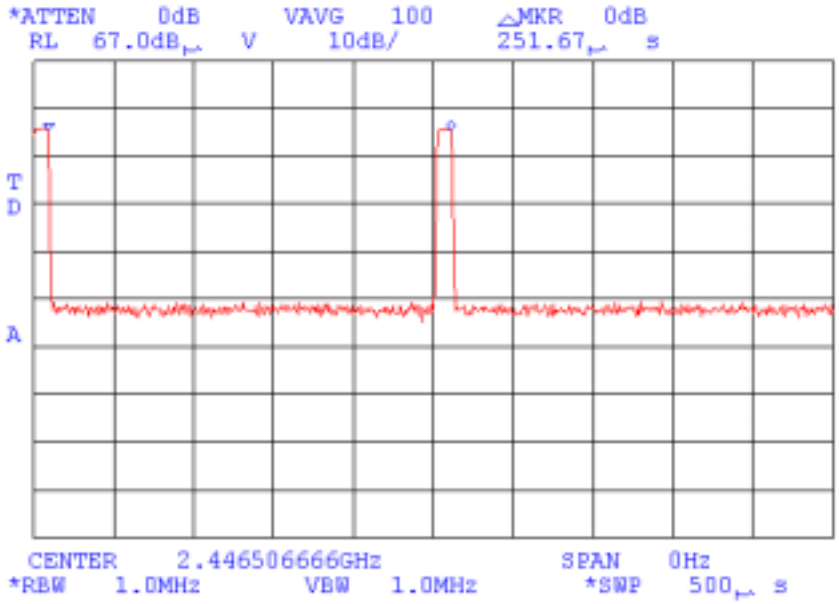
Plot A3

Duty cycle measurements
Time interval between two pulses



Time between two pulses is 251.67 µs

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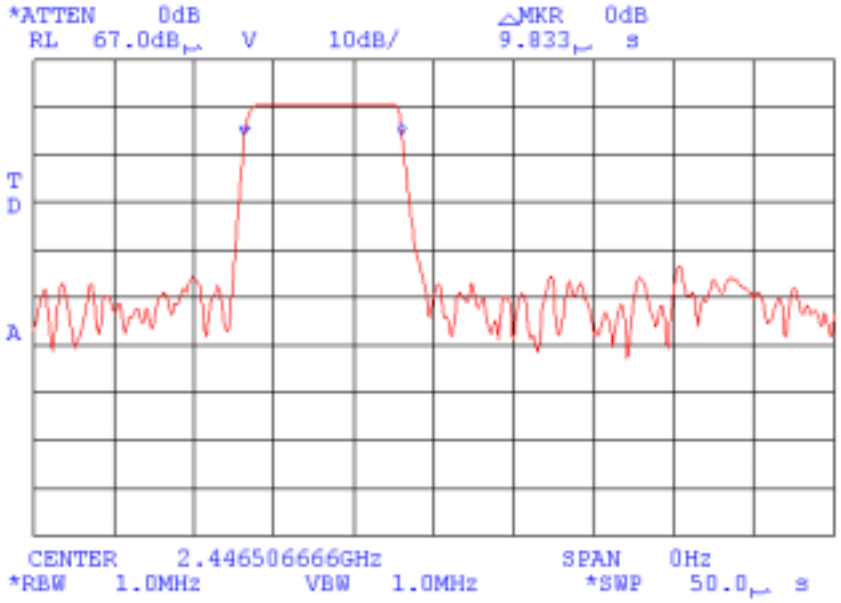
Plot A4

Duty cycle measurements
One pulse duration



One pulse duration is 9.833 µs

Duty cycle within one burst is 9.833/251.67 = 0.039

Tx ON within 100 ms = 18.75 x 3 x 0.039 = 2.19 ms

Average factor = 20 log (2.19/100) = -33.17 dB

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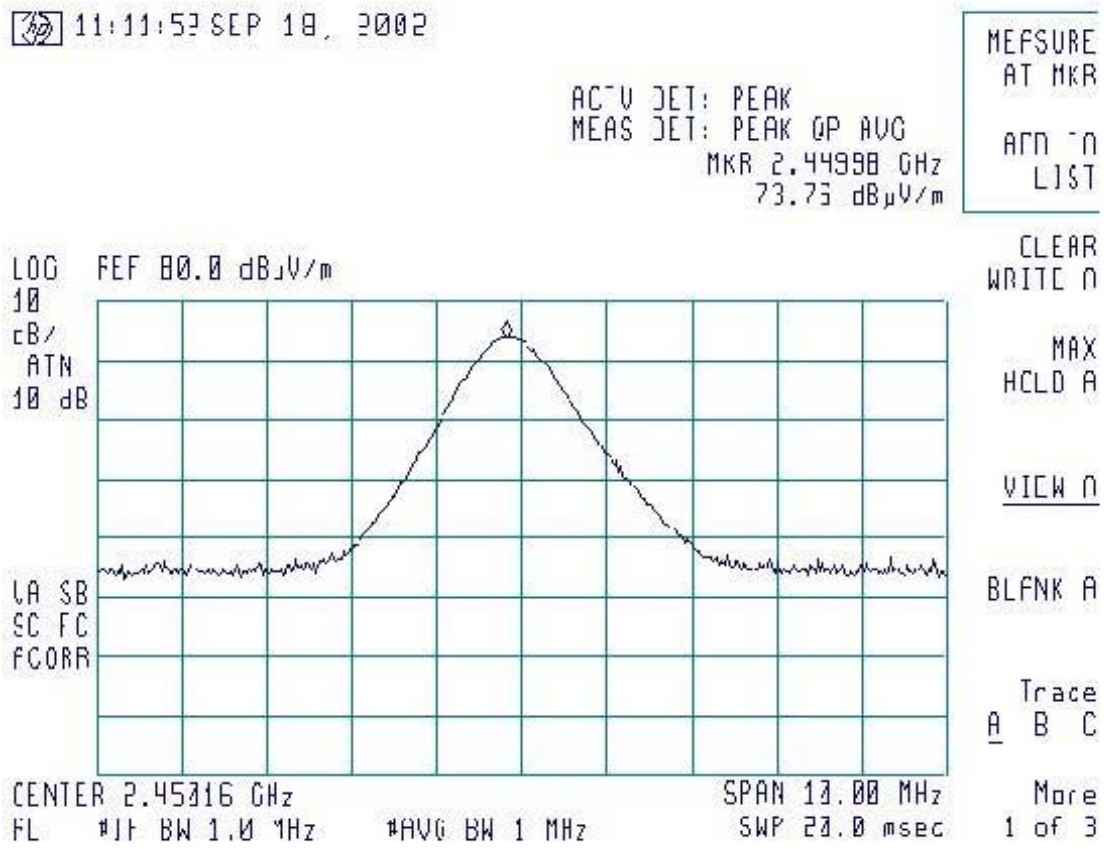
Plot A5

Anechoic chamber @ 3 m
Field strength of fundamental



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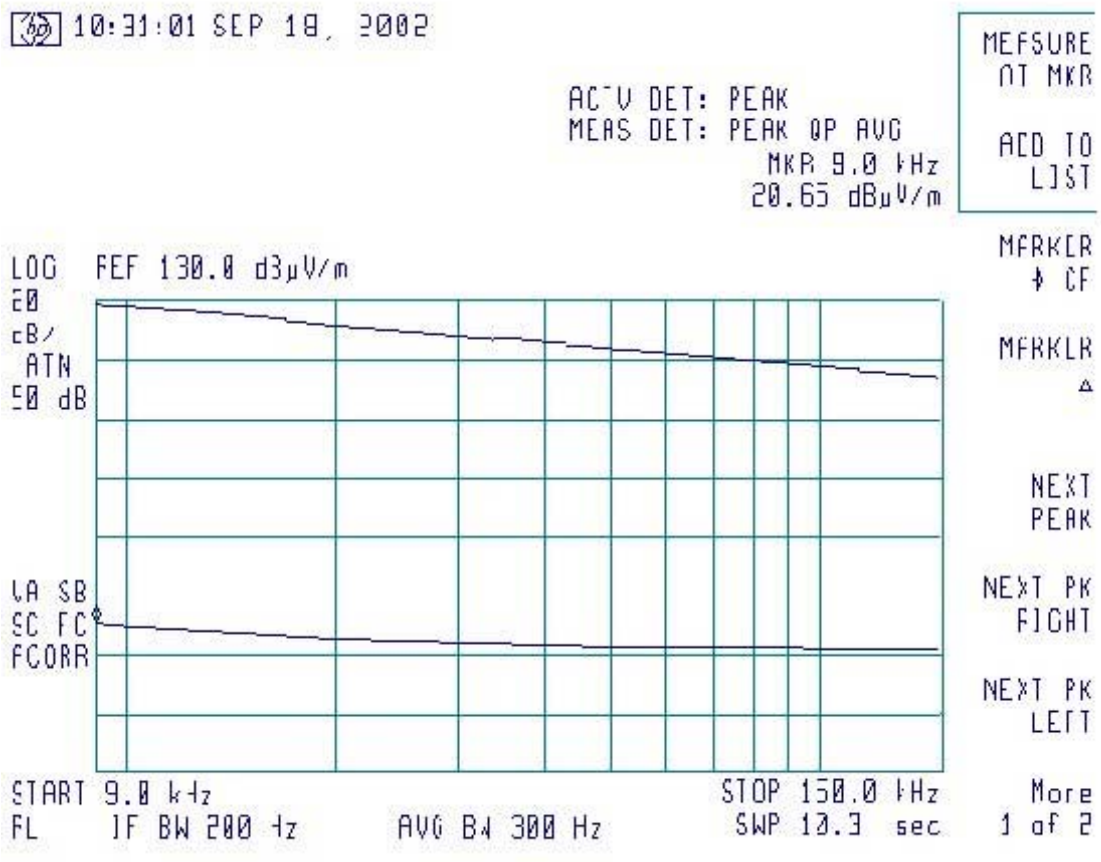
Plot A6

Spurious emission measurements
Anechoic chamber @ 3 m
9 kHz – 150 kHz frequency range



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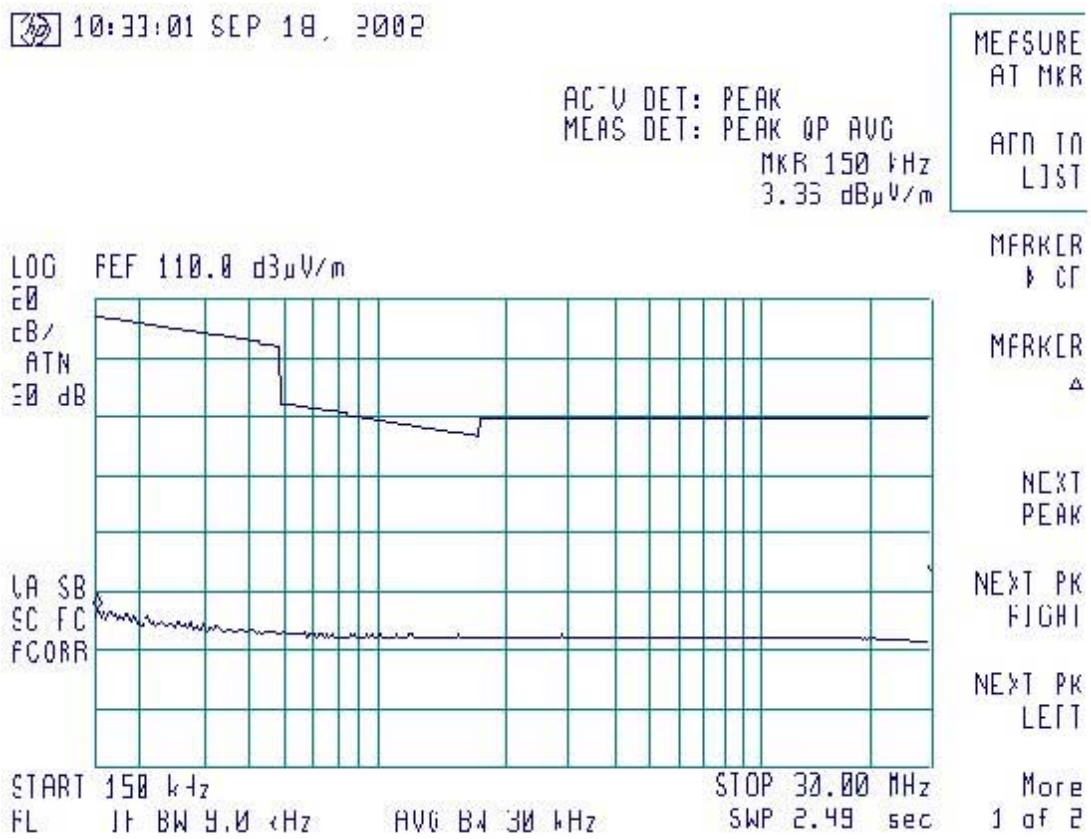
Plot A7

Spurious emission measurements
Anechoic chamber @ 3 m
150 kHz – 30 MHz frequency range



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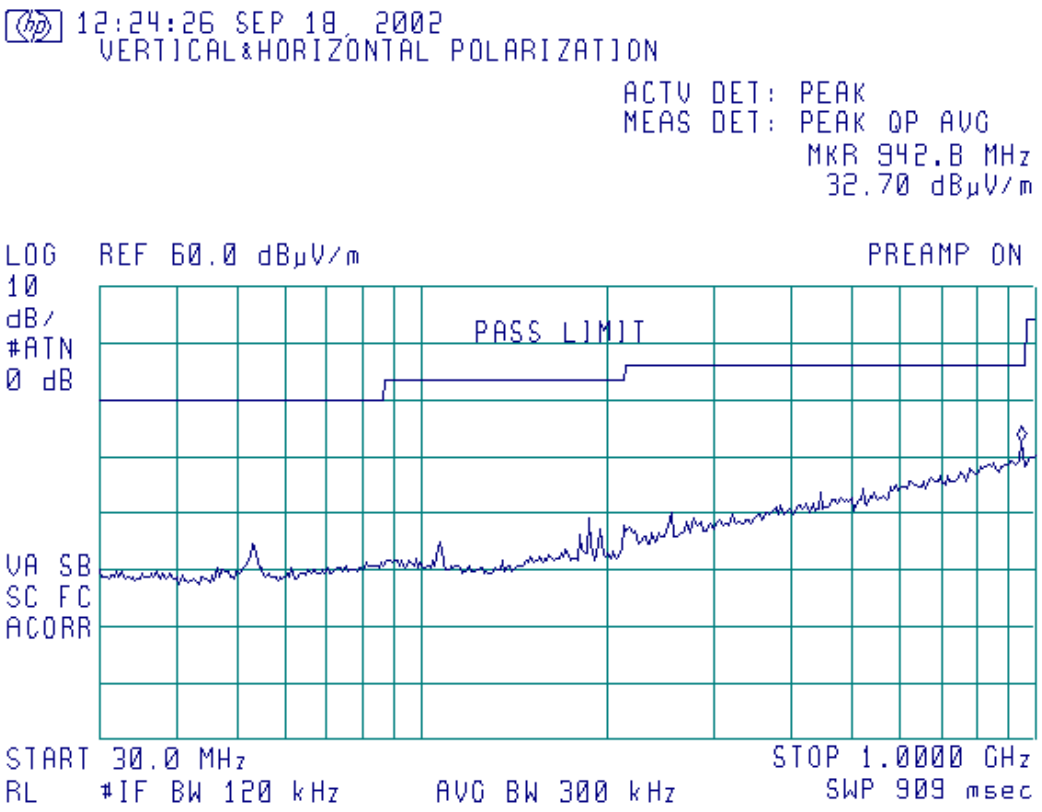
Plot A8

Spurious emission measurements
Anechoic chamber @ 3 m
30 MHz – 1000 MHz frequency range



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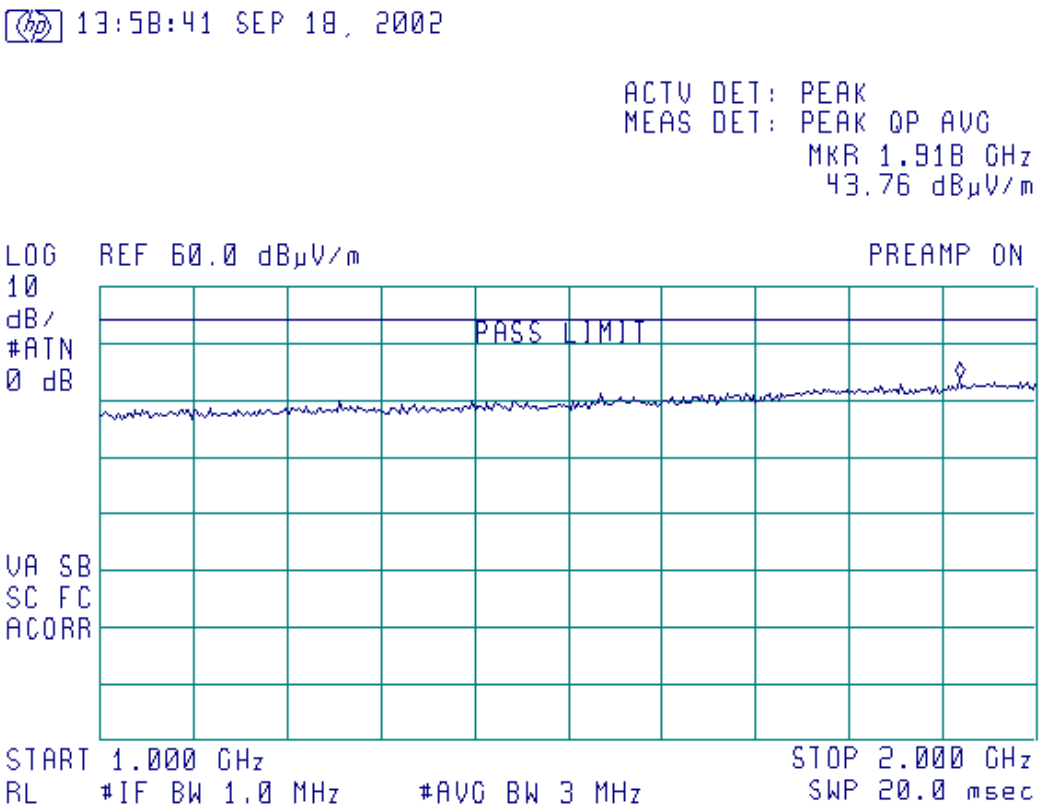
Plot A9

Spurious emission measurements
Anechoic chamber @ 3 m
1 GHz – 2 GHz frequency range



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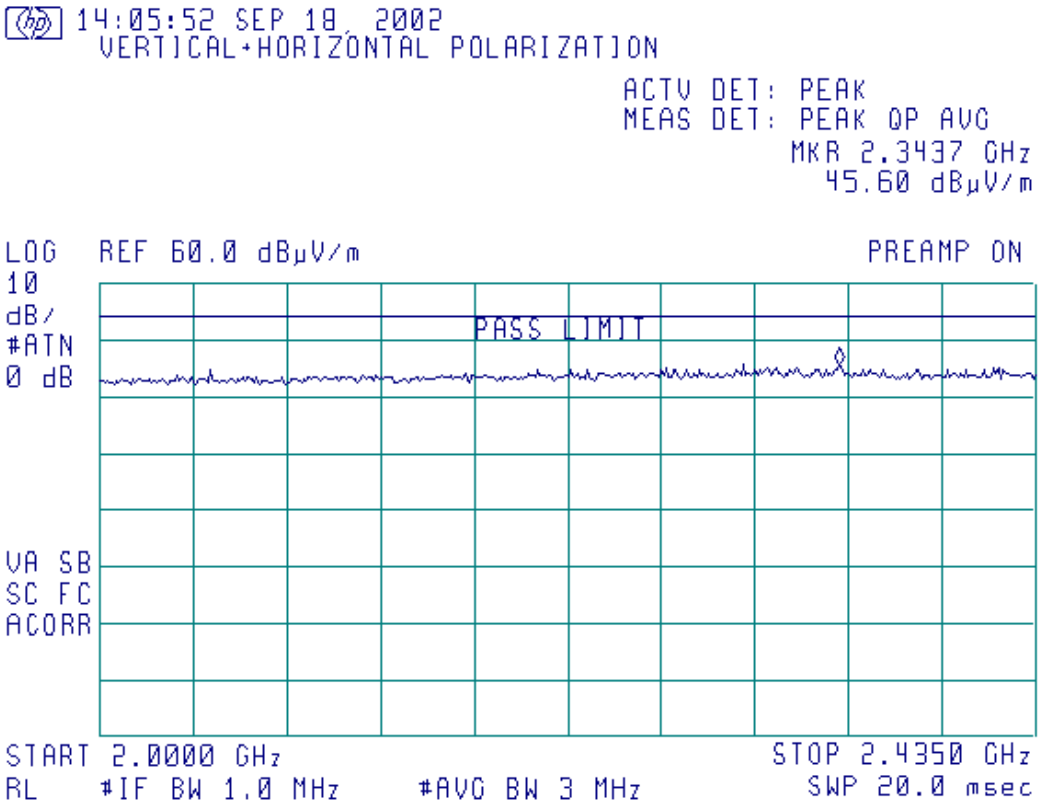
Plot A10

Spurious emission measurements
Anechoic chamber @ 3 m
2 GHz – 2.435 GHz frequency range



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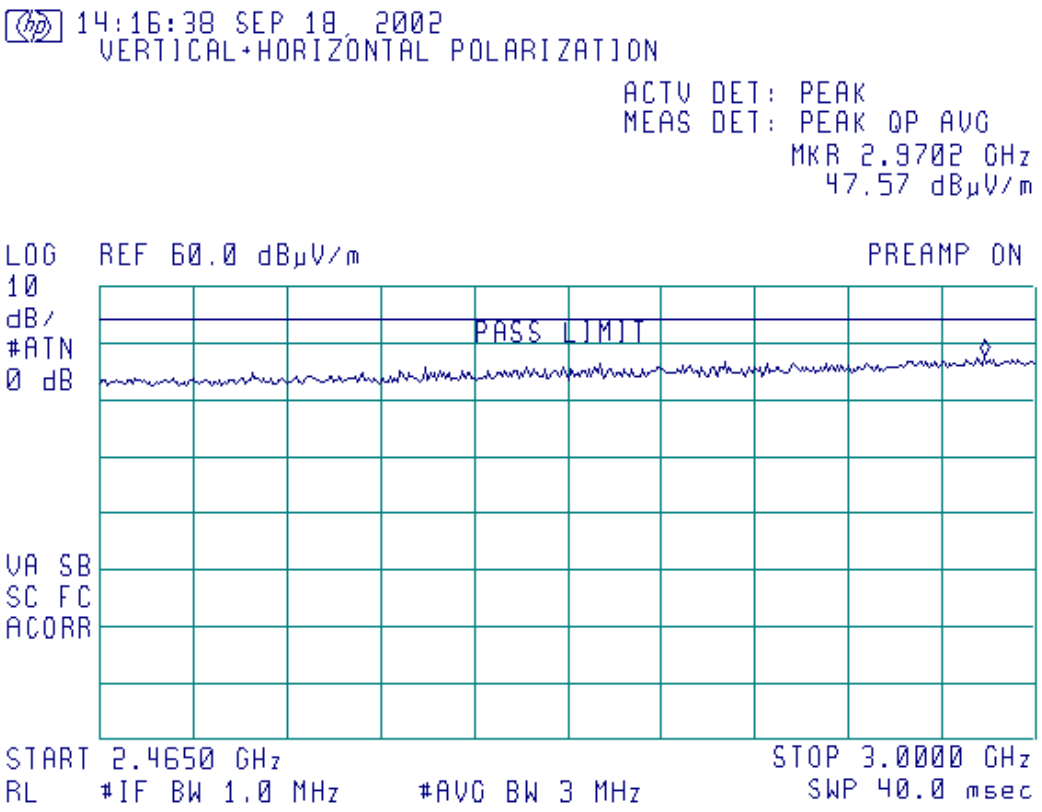
Plot A11

Spurious emission measurements
Anechoic chamber @ 3 m
2.462 GHz – 3 GHz frequency range



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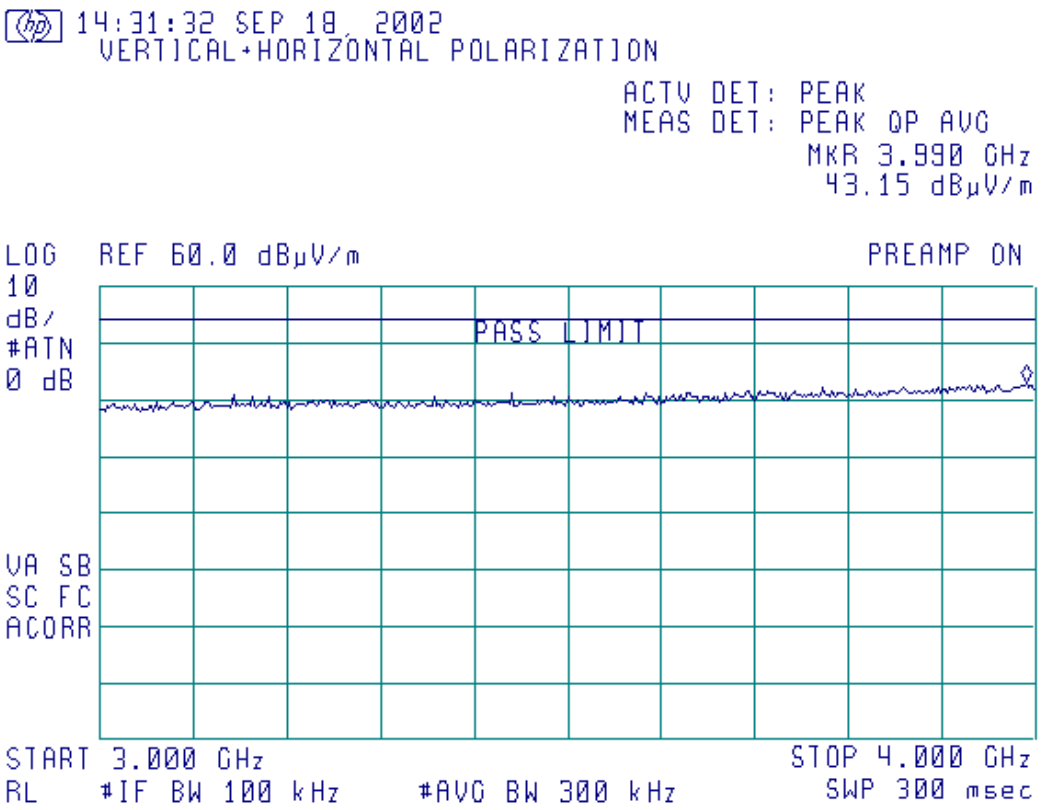
Plot A12

Spurious emission measurements
Anechoic chamber @ 3 m
3 GHz – 4 GHz frequency range



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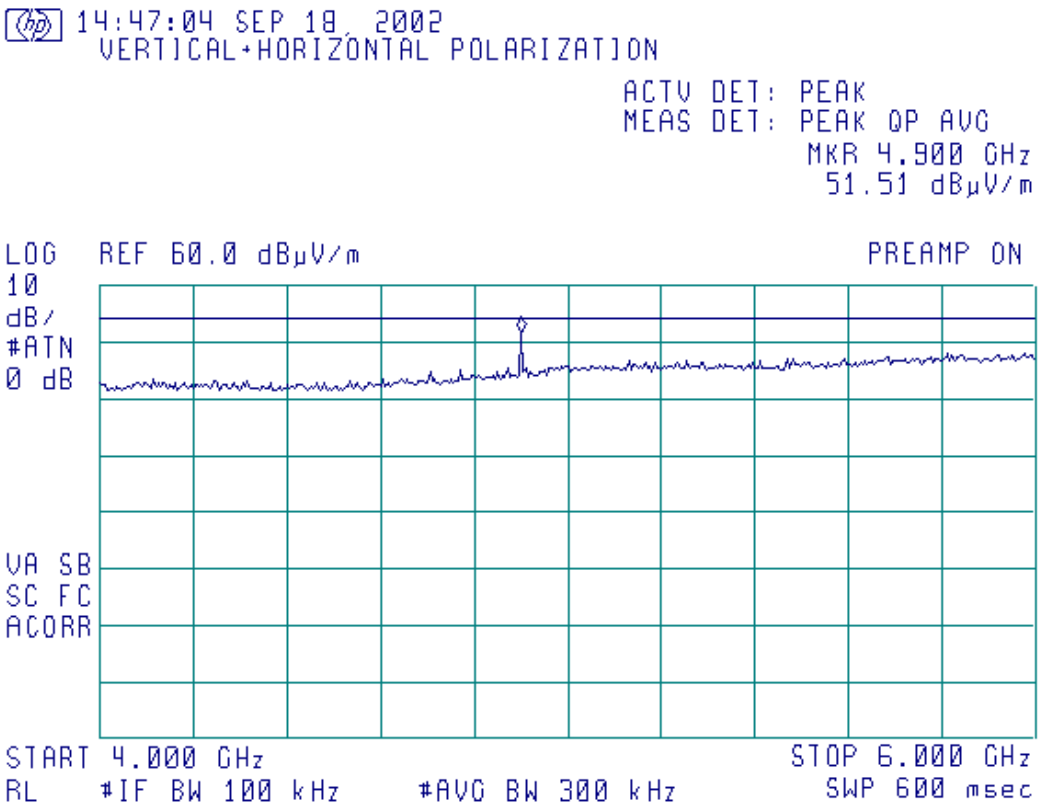
Plot A13

Spurious emission measurements
Anechoic chamber @ 3 m
4 GHz – 6 GHz frequency range



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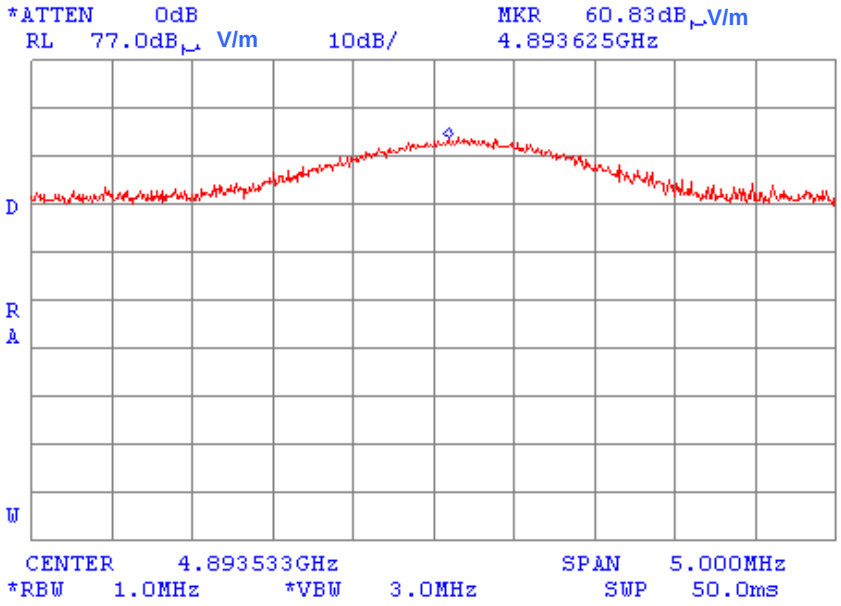
Plot A14

Spurious emission measurements
OATS @ 1 m
Center frequency 4.8935 GHz



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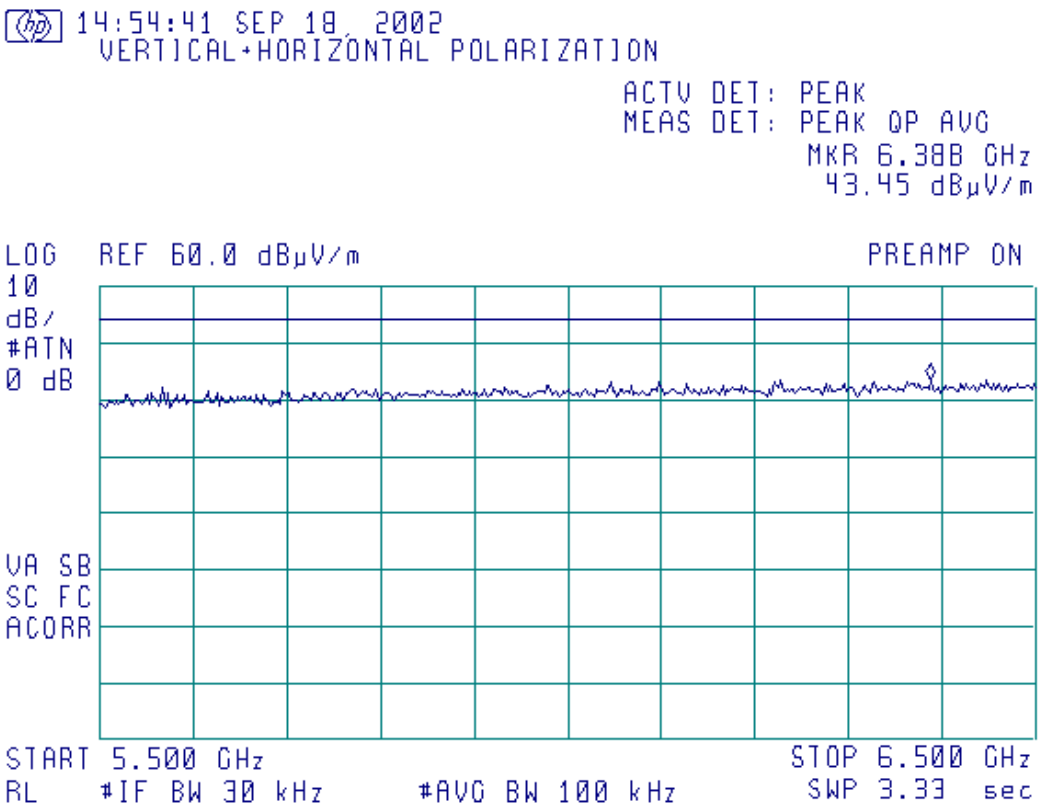
Plot A15

Spurious emission measurements
Anechoic chamber @ 3 m
5.5 GHz – 6.5 GHz frequency range



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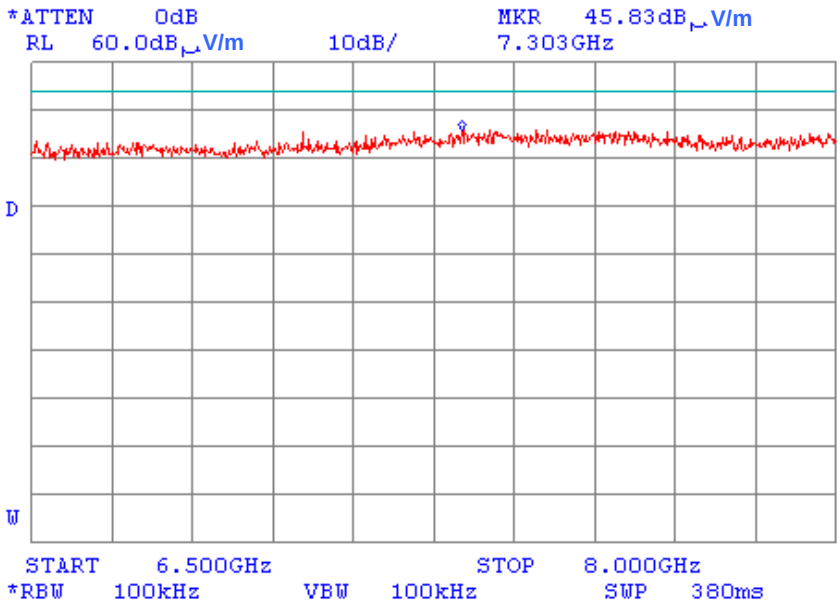
Plot A16

Spurious emission measurements
Anechoic chamber @ 3 m
6.5 GHz – 8 GHz frequency range



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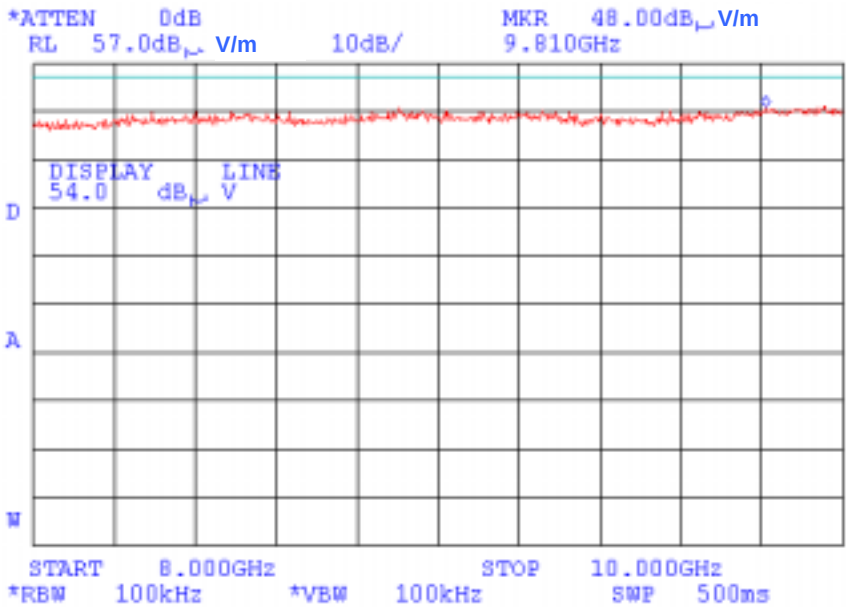
Plot A17

Spurious emission measurements
Anechoic chamber @ 3 m
8 GHz – 10 GHz frequency range



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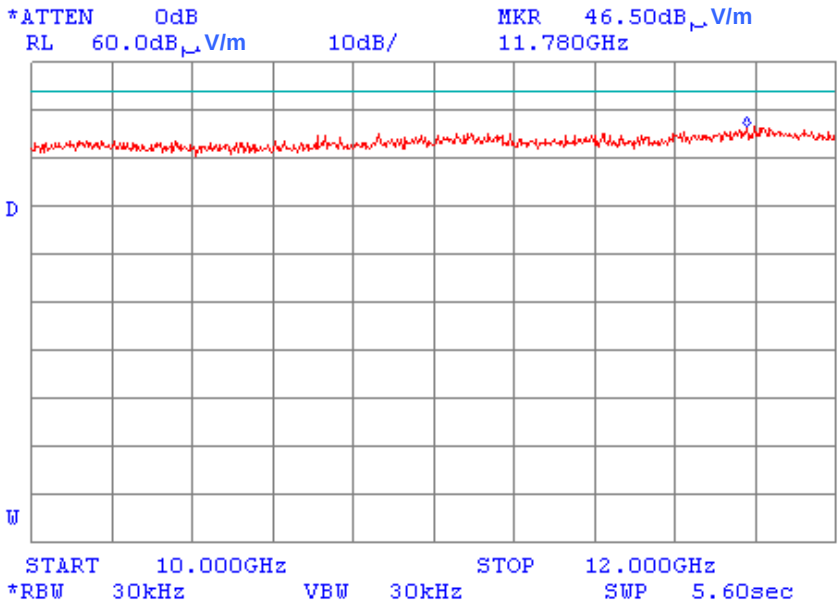
Plot A18

Spurious emission measurements
Anechoic chamber @ 3 m
10 GHz – 12 GHz frequency range



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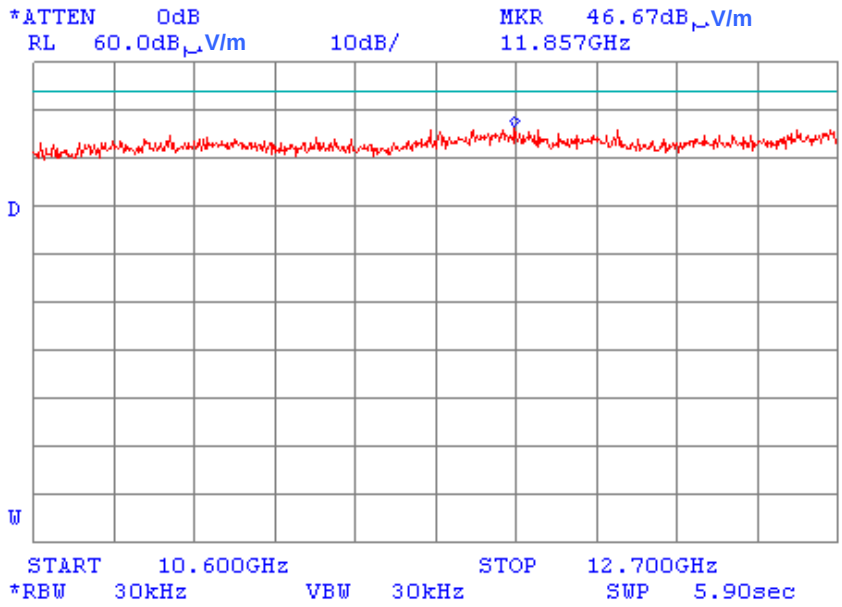
Plot A19

Spurious emission measurements
Anechoic chamber @ 3 m
10.6 GHz – 12.7 GHz frequency range



Restricted band; no spurious emission found

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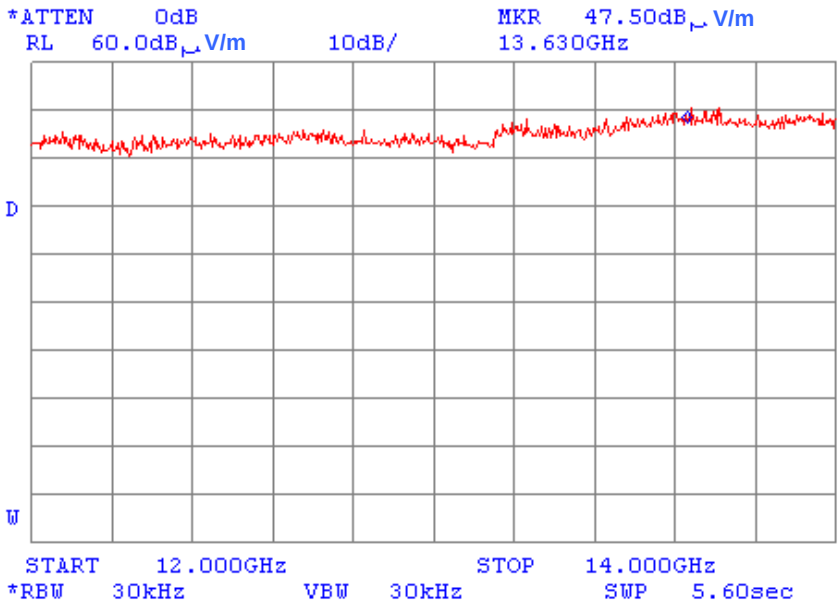
Plot A20

Spurious emission measurements
Anechoic chamber @ 3 m
12 GHz – 14 GHz frequency range



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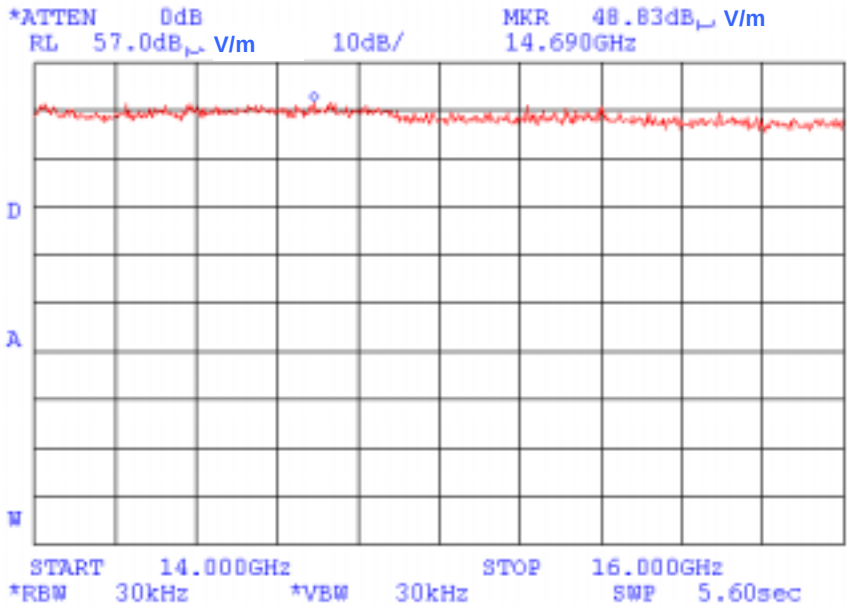
Plot A21

Spurious emission measurements
Anechoic chamber @ 3 m
14 GHz – 16 GHz frequency range



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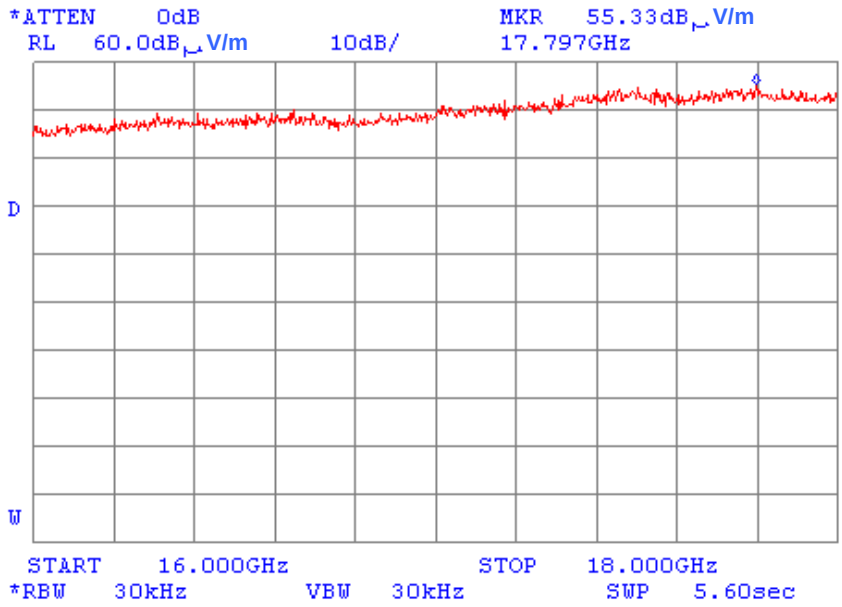
Plot A22

Spurious emission measurements
Anechoic chamber @ 3 m
16 GHz – 18 GHz frequency range



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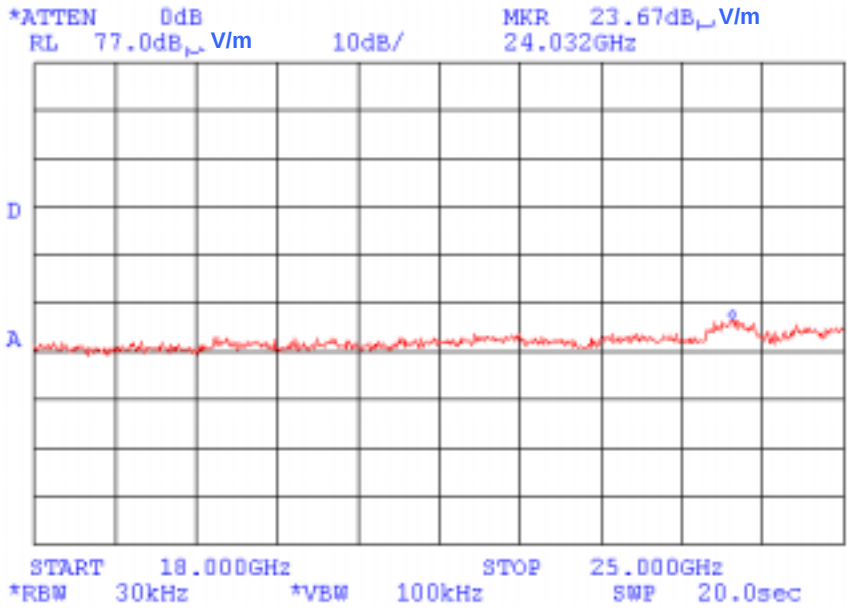
Plot A23

Spurious emission measurements
OATS @ 1m
18 GHz – 25 GHz frequency range



Noise floor
E = 23.67 dB(µV/m) (measured)+ 32 dB(1/m) (Antenna factor) + 1.8 dB (Cable loss) = 57.5 dB(µV/m)
Limit @ 1 m distance = 63.6 dB(µV/m)
Margin 6 dB

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Appendix B Test setup photographs

Photograph 1
Test setup with loop antenna (9 kHz to 30 MHz frequency range)

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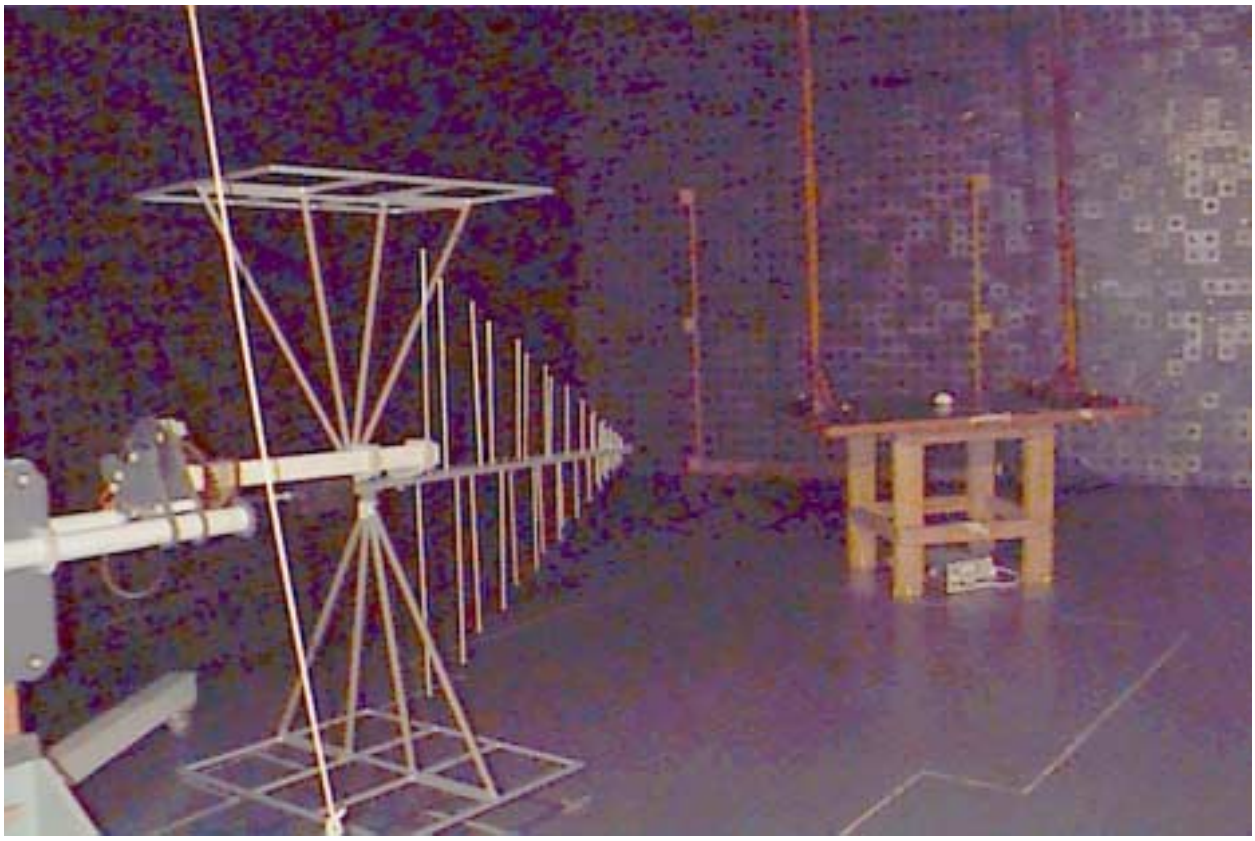
Photograph 2
Test setup with biconilog antenna (30 to 2000 MHz frequency range)



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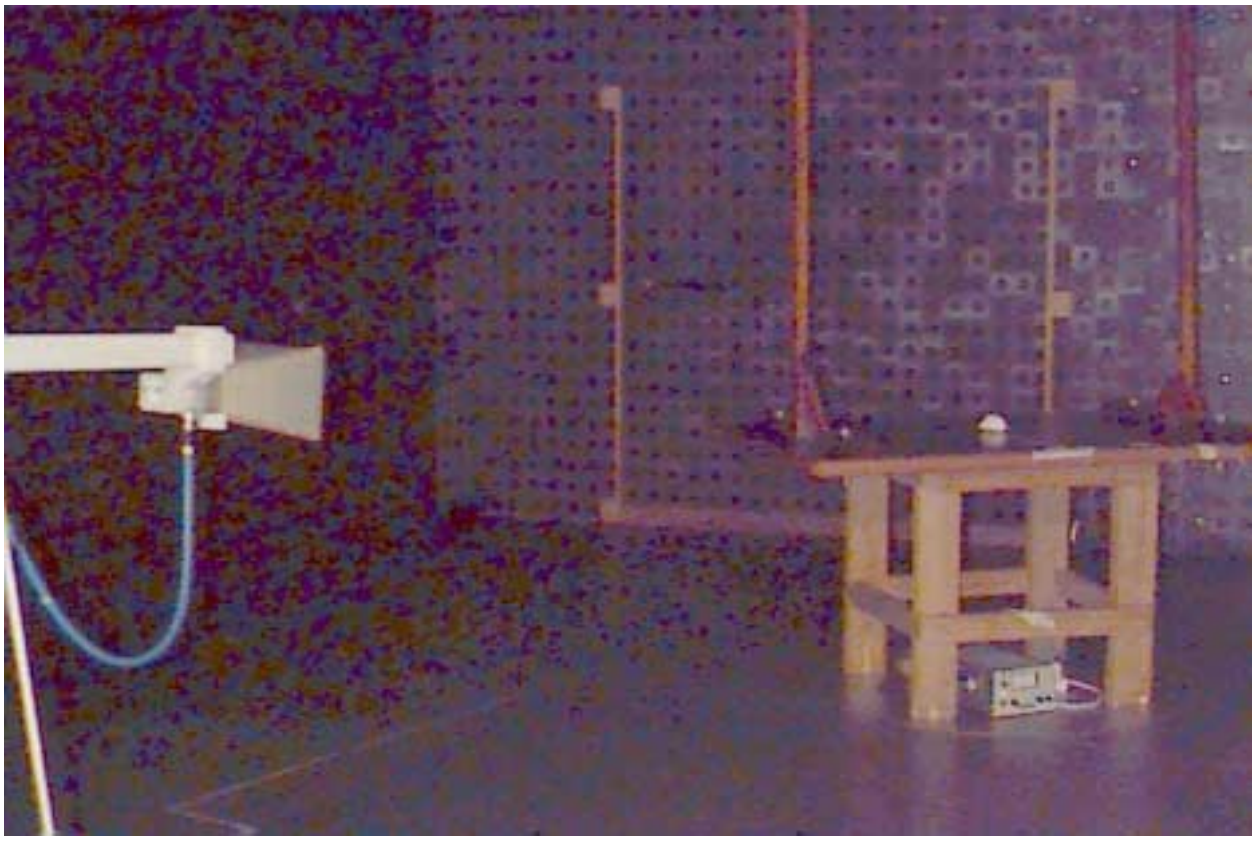
Photograph 3
Test setup with double ridged guide antenna (2 to 18 GHz frequency range)



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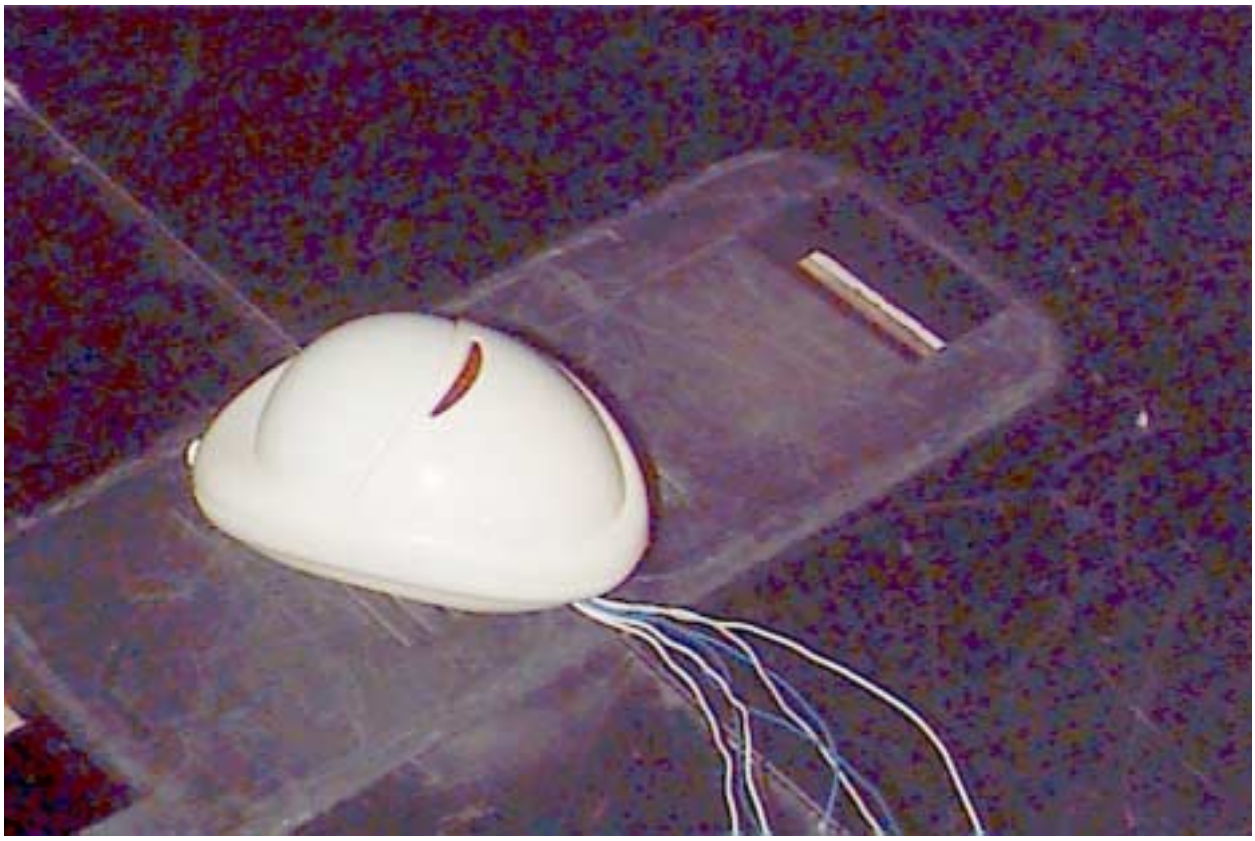
Photograph 4
EUT test setup



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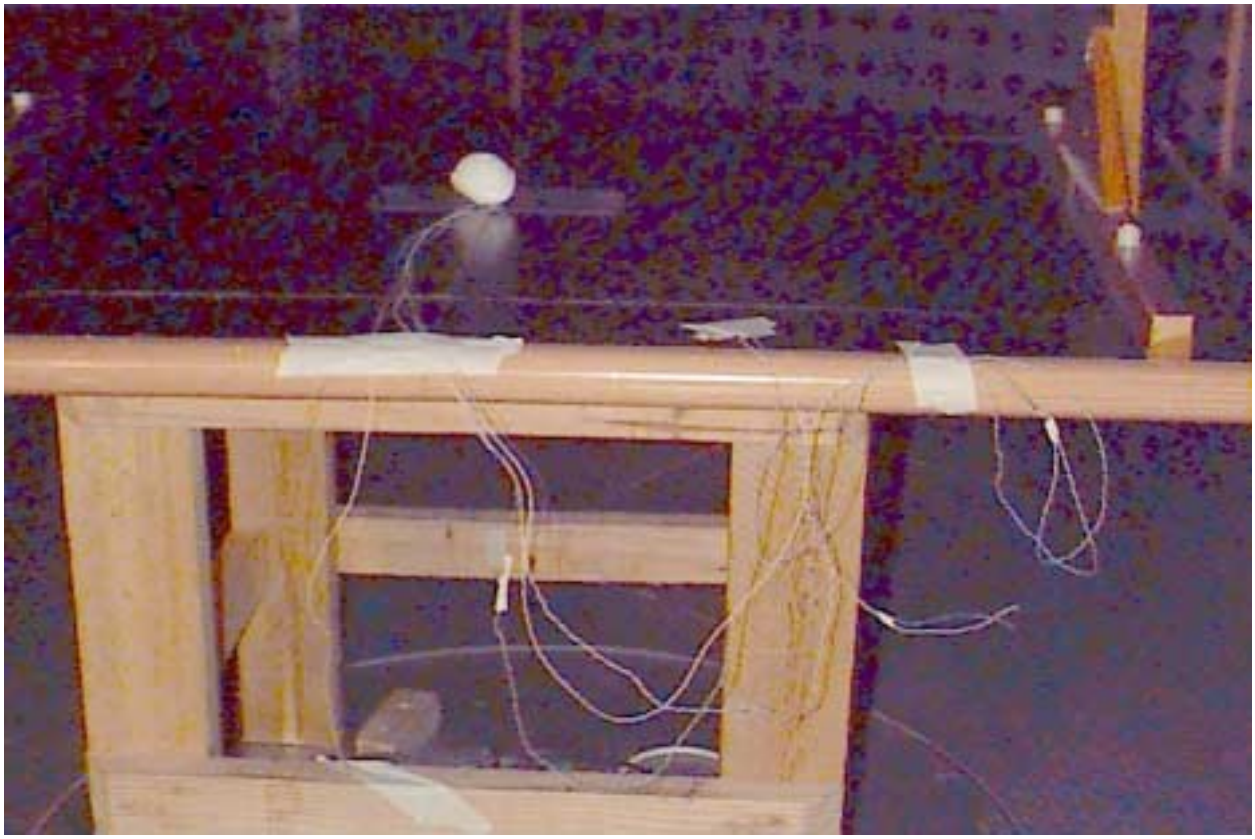
Photograph 5
EUT position during the testing



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Appendix C Test equipment used for tests and correction factors

HL Serial No.	Description	Manufacturer information			Due Calibr. Month/ year
		Name	Model No.	Serial No.	
0038	Antenna Mast, 1-4 m	Hermon Labs	AM-1	028	2/03 check
0041	Double ridged guide antenna, 1-18 GHz	Electro-Metrics	RGA 50/60	2811	8/03
0091	Position controller for antenna mast + turntable, OFTS	Hermon Labs	CRL-2	NA	4/03 check
0287	Turntable, motorized diameter, 2m	Hermon Labs	TMD-2	042	11/03 check
0337	Probe set, hand held, 5 probes	Electro-Metrics	EHFP-30	238	6/03
0446	Active Loop Antenna 10 kHz-30 MHz	Electro-Mechanics	6502	2857	11/03
0465	Anechoic Chamber 9 (L) x 6.5 (W) x 5.5 (H) m	Hermon Labs	AC-1	023	11/03 check
0521	Spectrum Analyzer with RF filter section (EMI Receiver 9 kHz - 6.5 GHz)	Hewlett Packard	8546A	0319	7/03
0554	Amplifier, 2 – 18 GHz RF	Miteq	AFD-4	4300	12/02
0589	Cable Coaxial, GORE A2POL118.2, 3m	Hermon Labs	GORE-3	589	11/03
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	12/02
0768	Antenna standard gain horn 18-26.5 GHz, WR-42, K-band, gain – 25 dB	Quinstar Technology	QWH-4200-BA	110	07/04 check
1004	Cable coaxial, ANDREW PSWJ4, 6 m	Hermon Labs	ANDREW-6	163	12/02
1424	Spectrum analyzer, 30 Hz - 40 GHz	Agilent Technologies	8564EC	3946A00219	9/03
1430	EMI Receiver System, 9 kHz - 2.9 GHz	Agilent Technologies	8542E	3807A00262	9/03
1566	Cable RF, 2 m	Huber-Suhner	Sucoflex 104PE	13094/4 PE	12/02
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
2009	Cable RF, 8 m	Alpha Wire	RG-214	NA	12/02

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Antenna Factor
Active Loop Antenna
Model 6502
S/N 2857

Frequency, MHz	Antenna Factor, dB
0.009	-32.8
0.010	-33.8
0.020	-38.3
0.050	-41.1
0.075	-41.3
0.100	-41.6
0.150	-41.7
0.250	-41.6
0.500	-41.8
0.750	-41.9
1.000	-41.4
2.000	-41.5
3.000	-41.4
4.000	-41.4
5.000	-41.5
10.000	-41.9
15.000	-41.9
20.000	-42.2
25.000	-42.8
30.000	-44.0

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

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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 it to field intensity in dB(μV/m).

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Antenna Factor
Double Ridged Guide Antenna
Model RGA-50/60
S/N 2811

Frequency, MHz	Antenna Factor, dB(1/m)	Frequency, MHz	Antenna Factor, dB(1/m)
1000	24.3	10500	38.5
1500	25.4	11000	39.0
2000	28.4	11500	40.1
2500	29.2	12000	40.2
3000	30.5	12500	39.3
3500	31.6	13000	39.9
4000	33.7	13500	40.6
4500	32.2	14000	41.1
5000	34.5	14500	40.5
5500	34.5	15000	39.9
6000	34.6	15500	37.8
6500	35.3	16000	39.1
7000	35.5	16500	41.1
7500	35.9	17000	41.7
8000	36.6	17500	45.1
8500	37.3	18000	44.3
9000	37.7	17500	45.1
9500	37.7	18000	44.3
10000	38.2		

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

Antenna factor
for standard gain horn antenna
Model: QWH-4200-BA
S/N 110

Fmin, MHz	Fmax, MHz	Antenna factor dB(1/m)
18000	26500	32.01

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

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Cable Coaxial, GORE A2P01POL118, 2.3 m, model:GORE-3, s/n 176 (HL 0589)
+ Cable Coaxial, ANDREW PSWJ4, 6m, model: ANDREW-6, s/n 163 (HL 1004)
Calibration data

No.	Parameter	SET, MHz	Measured, dB	Deviation, dB	Tolerance (Specification), dB	Meas. Uncert., dB	Notes
1	Insertion Loss	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	Insertion Loss	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 RF, 2m, model: Sucoflex 104PE, s/n 13094/4PE (HL 1566)
Calibration data

No.	Parameter	SET, MHz	Measured, dB	Deviation, dB	Tolerance (Specification), dB	Meas. Uncert., dB	Notes
1	Insertion Loss	30	0.10	-	≤ 5.0	±0.12	
2		50	0.13	-			
3		100	0.20	-			
4		300	0.33	-			
5		500	0.45	-			
6		800	0.60	-			
7		1000	0.65	-			
8		1500	0.91	-			
9		2000	1.08	-			
10		2500	1.19	-			
11		3000	1.28	-			
12		3500	1.49	-			
13		4000	1.63	-			
14	Insertion Loss	4500	1.63	-	≤ 5.0	±0.17	
15		5000	1.66	-			
16		5500	1.88	-			
17		6000	1.96	-			
18		6500	1.93	-			
19		7000	2.07	-			
20		7500	2.37	-			
21		8000	2.34	-			
22		8500	2.64	-			
23		9000	2.68	-			
24		9500	2.64	-			
25		10000	2.70	-			
26		10500	2.84	-			
27		11000	2.88	-			
28		11500	3.19	-			
29		12000	3.15				
30	Insertion Loss	12500	3.20		≤ 5.0	±0.26	
31		13000	3.22				
32		13500	3.47				
33		14000	3.41				
34		14500	3.59				
35		15000	3.79				
36		15500	4.24				
37		16000	4.12				
38		16500	4.46				
39		17000	4.50				
40		17500	4.49				
41		18000	4.45				

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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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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 RF, 8 m, model:RG-214, s/n C-56 (HL 2009)
Calibration data

No.	Parameter	SET, MHz	Measured, dB	Deviation	Tolerance (Specification)	Meas. Uncert., dB	Notes
1	Insertion Loss	1	0.10	NA	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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Appendix D 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:

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: 2001	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