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Electrical

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ELECTROMAGNETIC EMISSIONS TEST REPORT

according to 47CFR Part 90, subpart I and part 15, subpart B
for

Telematics Wireless Ltd.

EQUIPMENT UNDER TEST:

Hand held reader
Model:FP100HH

Document ID: TELRAD_FCC.15852.doc
Date of Issue: April 04

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Contents

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1 Project information

Equipment under test information

Test items	: Hand held reader
Manufacturer	: Telematics Wireless Ltd.
Types (Models)	: FP100HH
Serial number	: 2139-32011-00 rev.F
Software revision	: 2.00

Applicant information

Applicant's responsible person	: Mr. Roman Sternberg, VP marketing
Company	: Telematics Wireless Ltd.
Address	: 26, Hamelacha street
P.O.Box	: 1911
City	: Holon
Postal code	: 58117
Country	: Israel
Telephone number	:+972-3557 5750
Telefax number	:+972-3557 5753

Test details

Project number:	: 15852
Location	: Hermon Laboratories
Test started	: March 15, 2004
Test completed	: March 21, 2004
Purpose of test	: Apparatus compliance verification in accordance with emission requirements
Test specification(s)	47CFR part 90, §§90.205, 90.209, 90.210, 90.213, part 15 §15.107, §15.109

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2 Summary and signatures

The EUT, FP100HH reader, was tested according to FCC part 90 subpart I, §§90.205(k), 90.209, 90.210(k)(3), part 15 §§15.107, 15.109 and found to comply with the standard requirements.

Test description	Specification reference	Tested by	Date tested	Test report paragraph	Verdict
RF output power	90.205(k); 2.1046	Mr. Y. Neuman, test engineer	March 15, 2004	4.1	Pass
Occupied bandwidth	90.209; 2.1049	Mr. Y. Neuman, test engineer	March 16, 2004	4.2	Pass
Emission mask	90.210(k)(3); 2.1051	Mr. Y. Neuman, test engineer	March 16, 2004	4.3	Pass
Radiated spurious emissions	90.210; 2.1053	Mr. Y. Neuman, test engineer	March 16, 2004	4.3	Pass
Radiated emissions	15.109	Mr. Y. Neuman, test engineer	March 16, 2004	4.4	Pass
Frequency stability	90.213, 2.1055	Mr. Y. Neuman, test engineer	March 21, 2004	4.5	Tested
Conducted emissions	15.107	Mr. B. Efros, test engineer	March 17, 2004	4.6	Pass

Test report prepared by:

Mrs. M. Cherniavsky, MScEE, certification engineer

Test report approved by:

Mr. Michael Nikishin, MScEE, group leader

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

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3 EUT description

3.1 General description

The EUT, a hand held reader with a pocket PC, is a part of electronic seal monitoring system, operating at 915 MHz with ASK modulation and utilizing 2.0 dBi integral antenna. Data bit rate is 500 kbps. The device is powered from internal rechargeable battery.
The frequencies generated or used in the EUT are: 8 MHz, 16 MHz (reference clock), 204.6 MHz (PC pocket CPU).

3.1.1 Changes made in the EUT

To withstand the FCC part 15 subpart B requirements the ferrite bead, P/N 0444164281, manufactured by Fair-Rite, was installed on the DC output cable inside the charger.

3.2 EUT test configuration

The EUT ports and lines description is given in Table 3.2.1, support/test equipment list is provided in Table 3.2.2, test configuration is shown in Figure 3.2.1.

Table 3.2.1

EUT ports and lines

Port type	Port description	Connector type	Quantity	Cable type description	Cable length, m	Connected to
Tx mode						
Signal	RS232	D-type 9 pin	1	Unshielded	1.5	Open circuit
Data exchange mode/Rx/Charge						
Signal	RS232	D-type 9 pin	1	Unshielded	1.5	PC
Signal	LPT	D-type 25 pin	1	Shielded	3	Printer
Signal	Mouse	PS2	1	Shielded	2	Mouse
Power	DC	HRS HR30-6R-6P	1	Unshielded	1.5	Charger
Power	AC	IEC 320	2	Unshielded	2	Mains
Power	DC	DC jack (Laptop)	1	Unshielded	1.5	AC/DC adapter

Table 3.2.2
EUT support/test equipment

Description	Manufacturer	Model number	Serial number
Laptop	Compaq	IPAQ H3760	4G1CDW38Z04P
Charger	Telematics Wireless	NA	NA
Printer	Epson	P80SA	44B1127035
Mouse	Microsoft	1.1A	OEM-4240747-4 0346

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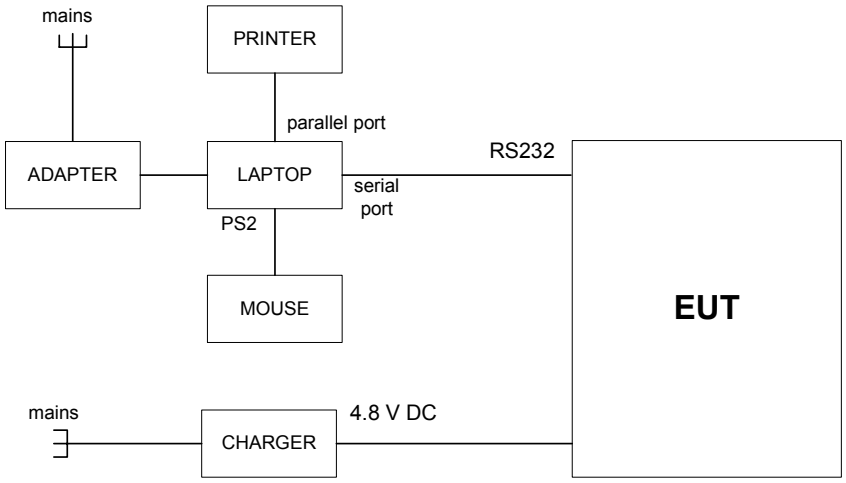
Figure 3.2.1

EUT test configuration



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4 Test results

4.1 Peak output power test according to part 90 §90.205(k)

DATE of TEST: March 15, 2004
AMBIENT TEMPERATURE: 20°C
RELATIVE HUMIDITY: 43 %
AIR PRESSURE: 1020 hPa
MEASUREMENT UNCERTAINTY: ±4.5 dB

Frequency, MHz	Field strength, dB(µV/m)	RF generator output, dBm	Antenna gain, dBd	Cable loss, dB	Peak output power, dBm	Limit, dBm	Verdict	Reference to plot in Annex 1
914.904	111.50	15.7	0.4	1.8 + 0.5	13	44.7	Pass	A1

ERP=P_{gen}-CL+G_{ant}=15.7 dBm-1.8 dB-0.5 dB-0.4 dBd=13.0 dBm=20 mW

LIMITATION ON POWER

Operating frequency range, MHz	Maximum effective radiated power (ERP)
902 - 927.25	30 W (44.7 dBm)

TEST PROCEDURE

The EUT was set up on the 80 cm height wooden table as shown in Figure 4.2.1. Field strength of fundamental was measured at 3-m test distance in the anechoic chamber the biconilog antenna, test results was recorded in plot A1.
The test equipment was set up as shown in Figure 4.2.2 for substitution method.
The EUT was replaced with a substitution antenna connected to signal generator. The measuring antenna height was changed from 1 to 4 m to find a maximum radiation from substitution antenna. The level of the signal generator output was adjusted to produce the same field strength as was measured from the EUT. The above procedure was performed in both, horizontal and vertical, polarizations of the test and substitution antennas.

$$ERP\ (dBm) = P_{out\ gen}\ (dBm) - \text{cable loss (dB)} + \text{antenna gain (dBd)}$$

TEST EQUIPMENT USED FOR FIELD STRENGTH MEASUREMENT:

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

TEST EQUIPMENT USED FOR SUBSTITUTION METHOD MEASUREMENT:

HL 0661	HL 1565	HL 1947	HL 2400			

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Figure 4.1.1

Set up for radiated emissions measurement with biconilog antenna

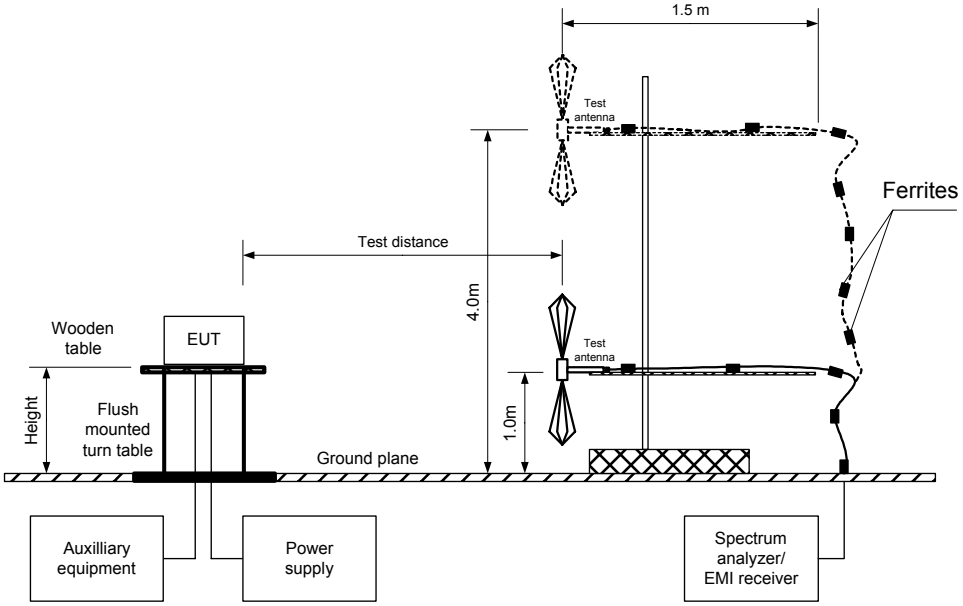
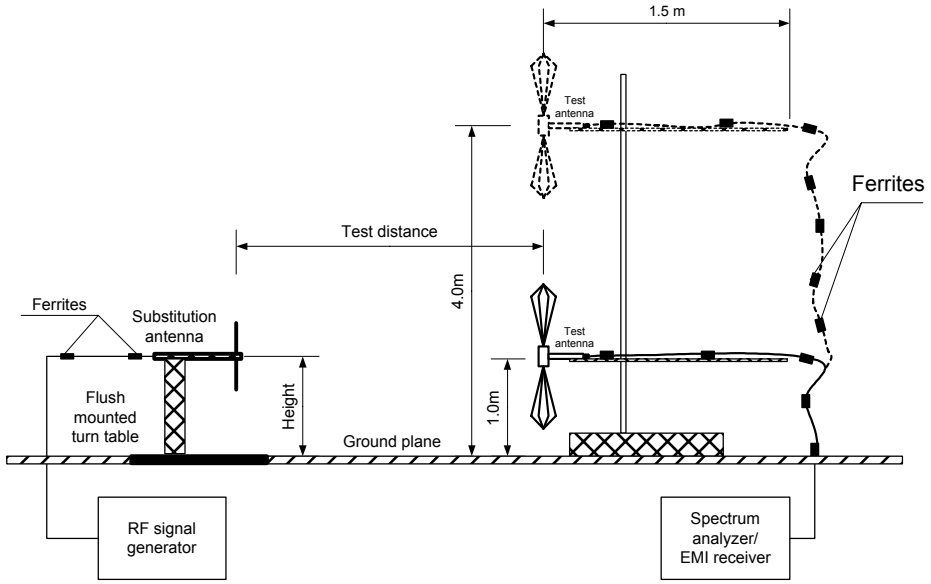


Figure 4.1.2

Setup for substitution ERP measurements of spurious



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4.2 Occupied bandwidth according to part 90 §90.209(5)

METHOD OF MEASUREMENTS	ANSI C63.4 §13.1.7
DATE of TEST:	March 16, 2004
AMBIENT TEMPERATURE:	21°C
RELATIVE HUMIDITY:	43 %
AIR PRESSURE:	1020 hPa
MEASUREMENT UNCERTAINTY:	±8%

Carrier frequency, MHz	Measured 26 dB bandwidth, MHz	Authorized bandwidth, MHz	Margin, MHz	Reference to plots in Appendix A	Verdict
914.90	7.4	12	4.6	A2, A3	Pass

LIMIT

Operating frequency range, MHz	Authorized bandwidth, MHz
909.75 – 921.75	12

TEST PROCEDURE

The EUT was setup as shown in Figure 4.2.1. The measurements were performed in continuous transmit mode of operation at frequencies between 26 dBc points.

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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4.3 Emission mask and radiated spurious emissions test according to part 90 §90.210(k)(3)

METHOD OF MEASUREMENTS	ANSI 63.4 §13.1.4
DATE of TEST:	March 16, 22, 2004
AMBIENT TEMPERATURE:	25°C
RELATIVE HUMIDITY:	32 %
AIR PRESSURE:	1020 hPa
FREQUENCY RANGE:	9 kHz – 9.2 GHz
MEASUREMENT UNCERTAINTY:	±4.5 dB

The peak power of any emission shall be attenuated below the power of the highest emission contained within the licensee's sub-band in accordance with the following schedule:

1) On any frequency within the authorized bandwidth: zero dB;
2) On any frequency outside the licensee's sub-band edges: 55 + 10 log (P) dB, where (P) is the highest emission (in watts) of the transmitter inside the licensee's sub-band.

4.3.1 Test procedure

Radiated spurious emissions were measured at 3-m test distance in the anechoic chamber from 9 kHz up to 6.5 GHz and at OATS from 6.5 GHz up to 9.2 GHz:
with the loop antenna in the 9 kHz to 30 MHz range,
the biconilog - in the 30 MHz to 1000 MHz range,
the double ridged guide – in the 1 GHz to 9.2 GHz range.
The EUT was set up on the 80 cm height wooden table as shown in Figures 4.3.1 and 4.3.2.

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 – 9.2 GHz frequency range. To find maximum radiation the turntable was rotated 360^{o}, measuring antenna height was changed from 1 to 4 m, and the antennas polarization was changed from vertical to horizontal.

The specified limit 55 + 10 log (P) was converted in 72.4 dB(μV/m) equivalent field strength at 3 m:
E = sqrt(30Px1.64) /r, where
P = –25 dBm = 3.16 x10^{-6} W, 1.64 is a numeric gain of an ideal dipole, r - 3 meter distance.
E [dBμV/m] = 20 log {10^{6} x sqrt (30x3x10^{-6} x1.64)/3} = 72.4 dBμV/m.
This limit was applied to spurious emissions testing in transmit mode throughout the following frequency ranges:
9 kHz to 909.75 MHz and 921.75 MHz to 9.2 GHz. The test results were recorded in Table 4.3.1 and shown in Plots A4 to A30.

The test equipment was set up as shown in Figures 4.3.3. The found spurious emissions were retested by substitution method.
The EUT was replaced with a substitution antenna (double ridge guide for the mentioned range) connected to signal generator. The measuring antenna height was changed from 1 to 4 m to find a maximum radiation from substitution antenna. The level of the signal generator output was adjusted to produce the same field strength as was measured from the EUT and depicted in Tables 4.3.1, 4.3.2 The above procedure was performed in both, horizontal and vertical, polarizations of the test and substitution antennas.

$$ERP\ (dBm) = P_{out\ gen}\ (dBm) - cable\ loss\ (dB) + antenna\ gain\ (dBd)$$

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Figure 4.3.1

Set up for radiated emissions measurement in 9 kHz to 30 MHz band

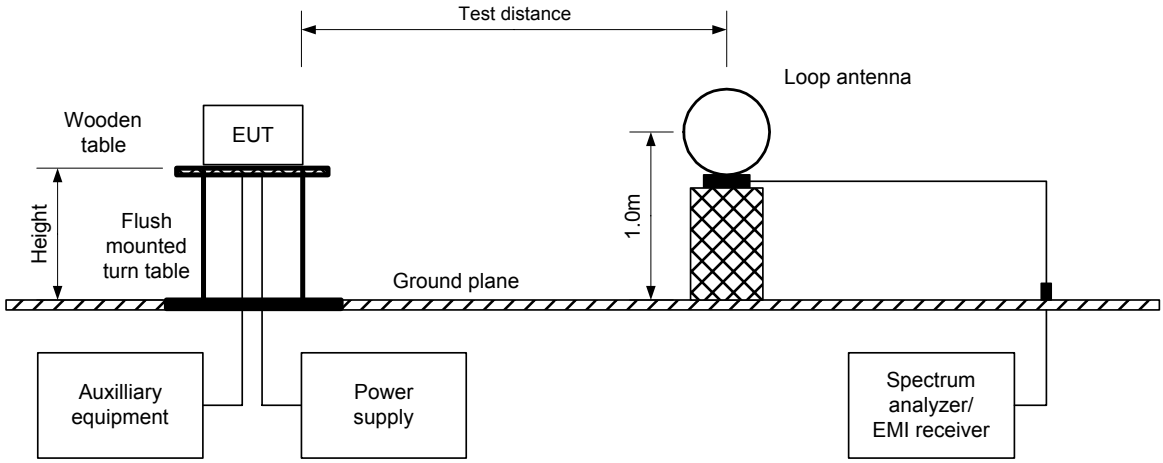

Figure 4.3.2

Set up for radiated emissions measurement above 30 MHz

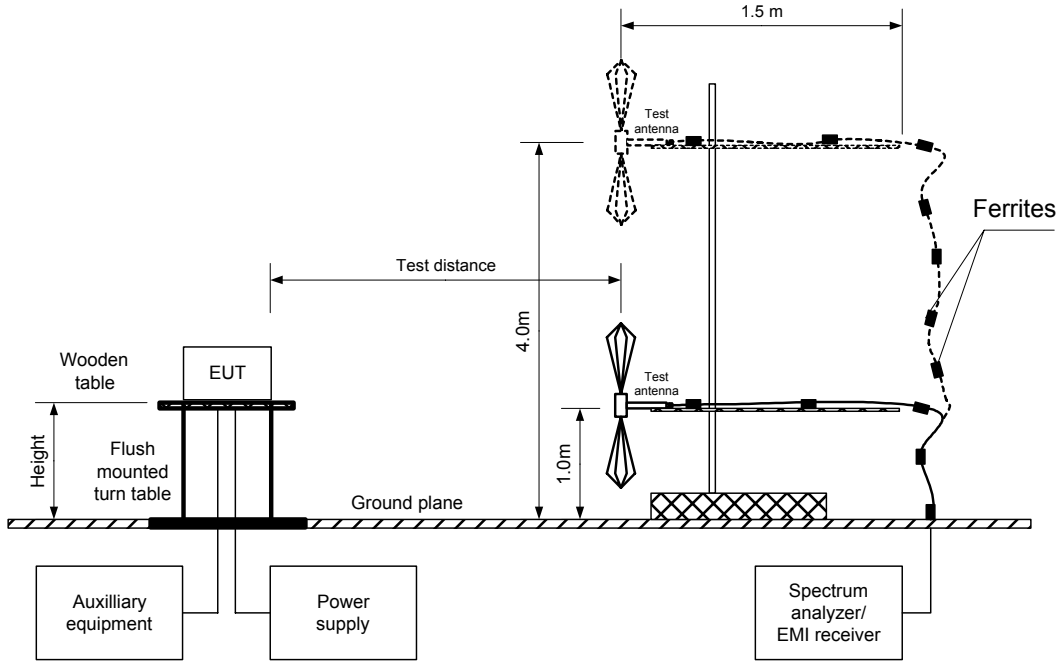

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Figure 4.3.3

Setup for substitution ERP measurements of spurious

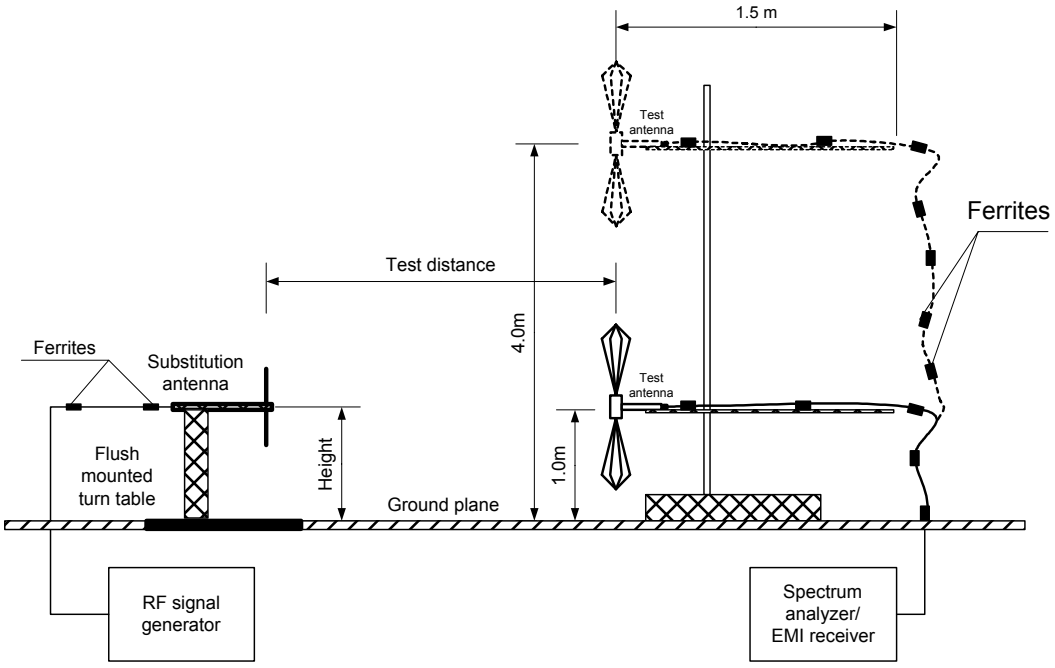

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Table 4.3.1

Radiated emissions measurement results

Frequency, MHz	Field strength of spurious, dB(μV/m)	Limit, dB(μV/m)	Margin, dB*	Antenna polarization	Antenna height, m	TT position, degrees	Reference to Plots in Appendix A
239.998	58.6	72.4	13.8	Horizontal	1.0	0	A7
909.458	70.4	72.4	2.0	Vertical	1.0	0	A9
922.57	69.8	72.4	2.6	Vertical	1.0	0	A10
1829.81	71.0	72.4	1.4	Horizontal	1.0	0	A13
2744.69	66.1	72.4	6.3	Vertical	1.0	0	A14
3659.616	49.5	72.4	22.9	Vertical	1.3	2	A15
4574.520	63.5	72.4	8.9	Vertical	1.1	4	A17
5489.424	70.3	72.4	2.1	Vertical	1.7	44	A19
6404.328	67.3	72.4	5.1	Vertical	1.5	38	A21
7319.232	59.3	72.4	13.1	Vertical	1.0	40	A25
8234.136	50.6	72.4	21.8	Vertical	1.3	12	A27
9149.040	52.6	72.4	19.8	Vertical	1.6	8	A29

Margin = dB below (negative if above) specification limit
EUT front panel refer to 0 degrees position of turntable
The listed in table above test results were obtained throughout measurements at 100 kHz resolution bandwidth.

Table 4.3.2

Substitution ERP of spurious test results

Frequency, MHz	Field strength, dB(μV/m)	RF generator output, dBm	Antenna gain, dBd	Cable loss, dB	Spurious emission, dBm	Limit, dBm	Margin, dB	Verdict
239.998	58.6	-39.6	-0.1	1.2	-40.9	-25	15.9	Pass
909.458	70.4	-25.2	-0.4	2.3	-27.9	-25	2.9	Pass
922.57	69.8	-26	-0.4	2.3	-28.7	-25	3.7	Pass
1829.81	71.0	-33.5	6.4	0.8	-27.9	-25	2.9	Pass
2744.69	66.1	-38.3	6.8	1.0	-32.5	-25	7.5	Pass
3659.616	49.5	-51.1	7.14	4.82	-46.0	-25	21.0	Pass
4574.520	63.5	-36.6	8.25	5.37	-33.7	-25	8.7	Pass
5489.424	70.3	-29.7	7.77	5.9	-27.8	-25	2.8	Pass
6404.328	67.3	-32.93	9.18	6.55	-30.3	-25	5.3	Pass
7319.232	59.3	-39.6	8.15	6.99	-38.4	-25	13.4	Pass
8234.136	50.6	-48.2	8.63	7.48	-47.1	-25	22.1	Pass
9149.040	52.6	-48.8	8.98	7.81	-42.7	-25	17.7	Pass

Margin = dB below (negative if above) specification limit

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TEST EQUIPMENT USED IN ANECHOIC CHAMBER:

HL 0446	HL 0465	HL 0521	HL 0589	HL 0592	HL 0593	HL 0594
HL 0604	HL 0616	HL 0661	HL 1004	HL 1565	HL 1947	HL 1984
HL 2009	HL 2400	HL 2432				

TEST EQUIPMENT USED AT OPEN AREA TEST SITE:

HL 0025	HL 0038	HL 0091	HL 0287	HL 0547	HL 0661	HL 1365
HL 1430	HL 1947	HL 1984	HL 2258	HL 2387	HL 2400	HL 2404
HL 2432						

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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 PERFROMED IN:	Anechoic chamber
DATE of TEST:	March 16, 2004
AMBIENT TEMPERATURE:	20°C
RELATIVE HUMIDITY:	43 %
AIR PRESSURE:	1020 hPa
DISTANCE BETWEEN ANTENNA AND EUT:	3 m
THE EUT WAS TESTED AS:	Table-top
FREQUECNY RANGE:	30 MHz – 5 GHz
MEASUREMENT UNCERTAINTY:	± 6 dB max

For test procedure and setup refer to section 4.3, radiated emissions. For full test results refer to plots A31 to A33.

Quasi-peak detector, RBW = 120 kHz

Frequency, MHz	Antenna polarization	Antenna height, m	Turntable position (°)	Radiated emissions, dB (µV/m)	Limit, dB (µV/m)	Margin, dB	Verdict
36.008	Vertical	1.0	334	38.99	40.00	1.01	Pass
38.400	Vertical	1.0	210	22.30	40.00	17.70	Pass
44.825	Vertical	1.0	296	37.05	40.00	2.95	Pass
86.050	Vertical	1.0	306	32.82	40.00	7.18	Pass
279.993	Horizontal	1.0	83	39.89	46.00	6.11	Pass
311.991	Horizontal	1.0	272	37.44	46.00	8.56	Pass
336.000	Horizontal	1.0	269	40.05	46.00	5.95	Pass
359.991	Horizontal	1.0	180	37.72	46.00	8.28	Pass
367.989	Horizontal	1.0	168	38.05	46.00	7.95	Pass
383.988	Horizontal	1.0	275	35.97	46.00	10.03	Pass
399.878	Vertical	1.0	342	43.69	46.00	2.31	Pass
800.075	Vertical	1.4	0	43.53	46.00	2.47	Pass

The recorded test results were obtained through measurements with biconilog antenna.

Average detector, RBW = 1 MHz

Frequency, MHz	Antenna polarization	Antenna height, m	Turntable position (°)	Radiated emissions, dB (µV/m)	Limit, dB (µV/m)	Margin, dB	Verdict
1333.125	Vertical	1.0	104	35.86	54.00	18.14	Pass

The recorded test results were obtained through measurements with double ridged guide antenna.

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LIMIT (§ 15.109)

Frequency, MHz	Class B equipment @ 3 m dB(μV/m)
30 - 88	40.0
88 - 216	43.5
216 - 960	46.0
960 - 5000	54.0

TEST EQUIPMENT USED:

HL 0465	HL 0521	HL 0589	HL 0592	HL 0593	HL 0594	HL 0604
HL 1004	HL 1947	HL 2009	HL 2432			

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4.5 Frequency stability measurement according to §90.213

DATE of TEST:	March 21, 2004
AMBIENT TEMPERATURE:	24°C
RELATIVE HUMIDITY:	48 %
AIR PRESSURE:	1020 hPa
OPERATING FREQUENCY:	915 MHz
NOMINAL POWER VOLTAGE:	4.8 V DC
POWER DURING TEMPERATURE TRANSITION:	Off
SPECTRUM ANALYZER MODE:	Counter
RESOLUTION BANDWIDTH:	1 kHz
VIDEO BANDWIDTH:	1 kHz
MODULATION:	Unmodulated

TEST PROCEDURE

This test was performed to measure frequency stability of transmitter RF carrier
The EUT was set up as shown in Figure 4.5.1, energized and its proper operation was checked.
The EUT power was turned off. Temperature within test chamber was set to +30˚C and a period of time sufficient to stabilize all of the oscillator circuit components was allowed.
The EUT was powered on and carrier frequency was measured at start up moment and then every minute until frequency had been stabilized or 10 minutes elapsed whichever reached the last. The EUT was powered off.
The above procedure was repeated at 0˚C and at the lowest test temperature.
The EUT was powered on and carrier frequency was measured at start up moment and at the end of stabilization period at the rest of test temperatures and voltages. The EUT was powered off.
Frequency displacement was calculated and compared with the limit as provided in Table 4.5.1.

Figure 4.5.1

Frequency stability test setup

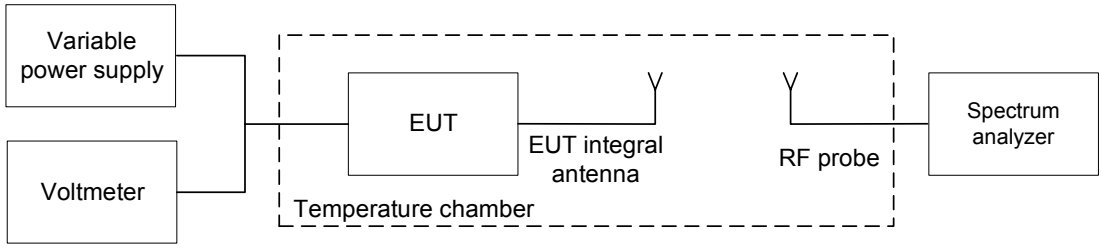

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Table 4.5.1

Frequency stability test results

T, ºC	Voltage, V	Frequency, MHz							Max frequency drift, Hz
		Start up	1st min	2nd min	3rd min	4th min	5th min	10th min	
-30	nominal	914.76891	914.76729	914.76455	914.76300	914.76144	914.75990	914.74636	-174180
-20	nominal	914.81690	NA	NA	NA	NA	914.81761	NA	-103640
-10	nominal	914.85017	NA	NA	NA	NA	914.85090	NA	-70370
0	nominal	914.98943	914.88458	914.88314	914.88248	914.87939	914.88098	914.88196	-39560
10	nominal	914.89308	NA	NA	NA	NA	914.89698	NA	-27460
20	nominal	914.91918	914.91938	914.91900	914.91989	914.92022	**914.92054***	NA	0
20	4.7 V**	914.89455	NA	NA	NA	NA	914.89680	NA	-25990
30	nominal	914.90437	914.90514	914.90663	914.90672	914.90702	914.90698	914.90743	-16170
40	nominal	914.91687	NA	NA	NA	NA	914.90943	NA	-11110
50	nominal	914.90823	NA	NA	NA	NA	914.91355	NA	-12310

* - Reference frequency
** - Battery operating end point specified by the manufacturer

Reference frequency: 914 920 540 Hz

For information only: 2.5 ppm = ± 2287 Hz

TEST EQUIPMENT USED:

HL 0026	HL 0203	HL 0493				

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4.6 Conducted emissions test according to §15.107

METHOD OF MEASUREMENTS	ANSI 63.4 §13.1.3
DATE of TEST:	March 17, 2004
AMBIENT TEMPERATURE:	21°C
RELATIVE HUMIDITY:	41%
AIR PRESSURE:	1018 hPa
THE EUT WAS TESTED AS:	TABLE-TOP
FREQUECNY RANGE:	150 kHz – 30 MHz
RESOLUTION BANDWIDTH:	9 kHz
MEASUREMENT UNCERTAINTY, dB	± 3.9 dB in 9 – 150 kHz ± 3.8 dB in 150 kHz – 30 MHz

EUT power lines
Quasi-peak detector

Frequency, MHz	Line identification	Measured emissions, dB (µV)	Specification QP limit, dB (µV)	Margin, dB	Verdict	Reference to Plots in Appendix A
0.206	1	47.58	63.42	15.84	Pass	A34
0.412	1	46.23	57.65	11.42	Pass	A34
0.721	1	41.49	56.00	14.51	Pass	A34
0.826	1	42.12	56.00	13.88	Pass	A34
0.928	1	38.84	56.00	17.16	Pass	A34
1.340	2	41.19	56.00	14.81	Pass	A35
1.857	2	41.10	56.00	14.90	Pass	A35
2.477	2	41.23	56.00	14.77	Pass	A35
2.884	1	37.50	56.00	18.50	Pass	A34
2.992	2	41.02	56.00	14.98	Pass	A35

Average detector

Frequency, MHz	Line identification	Measured emissions, dB (µV)	Specification AVRG limit, dB (µV)	Margin, dB	Verdict	Reference to Plots in Appendix A
0.206	1	42.95	53.42	10.47	Pass	A34
0.412	1	46.07	47.65	1.58	Pass	A34
0.721	1	39.90	46.00	6.10	Pass	A34
0.826	1	41.06	46.00	4.94	Pass	A34
0.928	1	37.52	46.00	8.48	Pass	A34
1.340	2	39.34	46.00	6.66	Pass	A35
1.857	2	39.36	46.00	6.64	Pass	A35
2.477	2	39.47	46.00	6.53	Pass	A35
2.884	1	32.76	46.00	13.24	Pass	A34
2.992	2	38.65	46.00	7.35	Pass	A35

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Laptop power lines

Quasi-peak detector

Frequency, MHz	Line identification	Measured emissions, dB (µV)	Specification QP limit, dB (µV)	Margin, dB	Verdict	Reference to Plots in Appendix A
0.155	2	55.18	65.74	10.56	Pass	A37
0.161	1	51.97	65.44	13.47	Pass	A36
0.229	2	47.33	62.55	15.22	Pass	A37
0.411	2	41.09	57.65	16.56	Pass	A37
0.615	1	37.45	56.00	18.55	Pass	A36
0.723	1	37.46	56.00	18.54	Pass	A36
1.078	2	37.95	56.00	18.05	Pass	A37
1.091	1	37.30	56.00	18.70	Pass	A36

Average detector

Frequency, MHz	Line identification	Measured emissions, dB (µV)	Specification AVRG limit, dB (µV)	Margin, dB	Verdict	Reference to Plots in Appendix A
0.155	2	40.50	55.74	15.24	Pass	A37
0.161	1	38.57	55.44	16.87	Pass	A36
0.229	2	36.57	52.55	15.98	Pass	A37
0.411	2	38.91	47.65	8.74	Pass	A37
0.615	1	30.96	46.00	15.04	Pass	A36
0.723	1	31.18	46.00	14.82	Pass	A36
1.078	2	29.48	46.00	16.52	Pass	A37
1.091	1	29.26	46.00	16.74	Pass	A36

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LIMIT

Frequency, MHz	Class B equipment, dB(μV)	
	QP	AVRG
0.15 - 0.5	66 - 56*	56 - 46*
0.5 - 5	56	46
5 - 30	60	50

*The limit decreases linearly with the logarithm of frequency.

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 and average detectors as referred to in the tables.
The position of the EUT cables was varied to determine maximum emission level.

TEST EQUIPMENT USED:

HL 0163	HL 0447	HL 0580	HL 0590	HL 0672	HL 1430	HL 1502
HL 1510						

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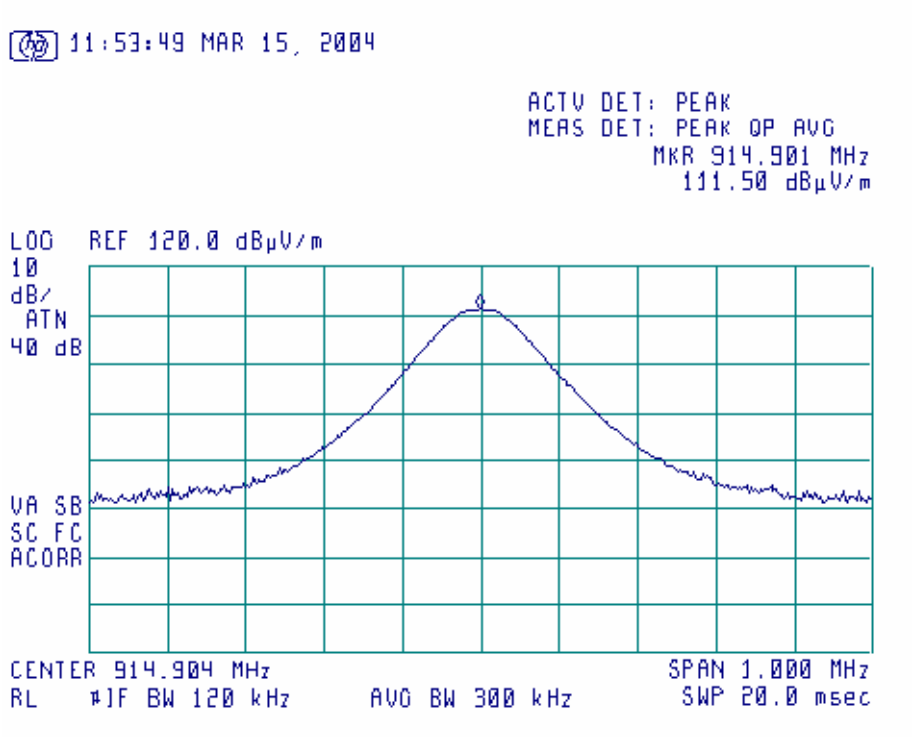
Appendix A Plots

Plot A 1

Field strength measurement result in the anechoic chamber, horizontal antenna polarization



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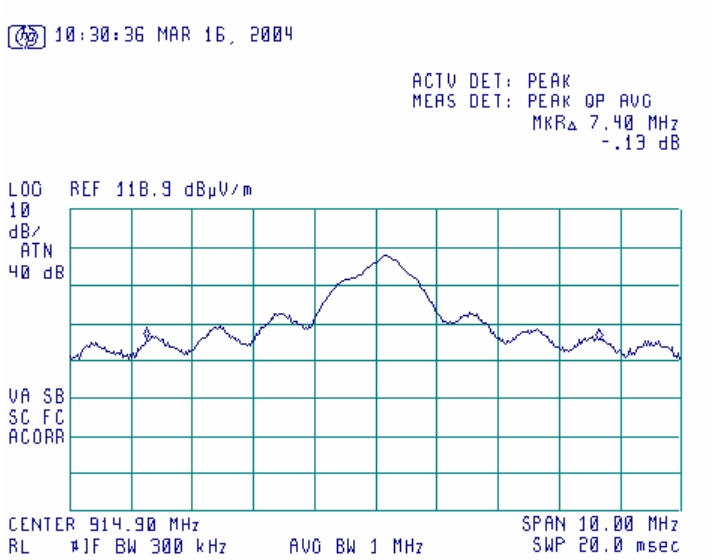
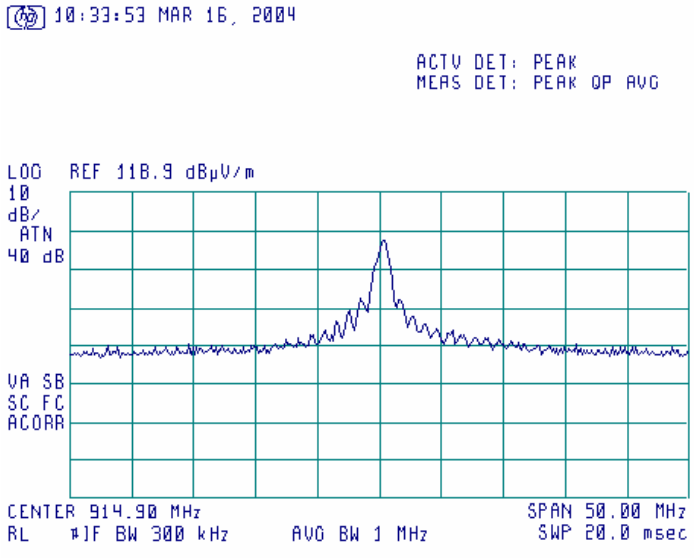
Plot A 2
26 dB bandwidth measurement result



Plot A 3
26 dB bandwidth measurement result



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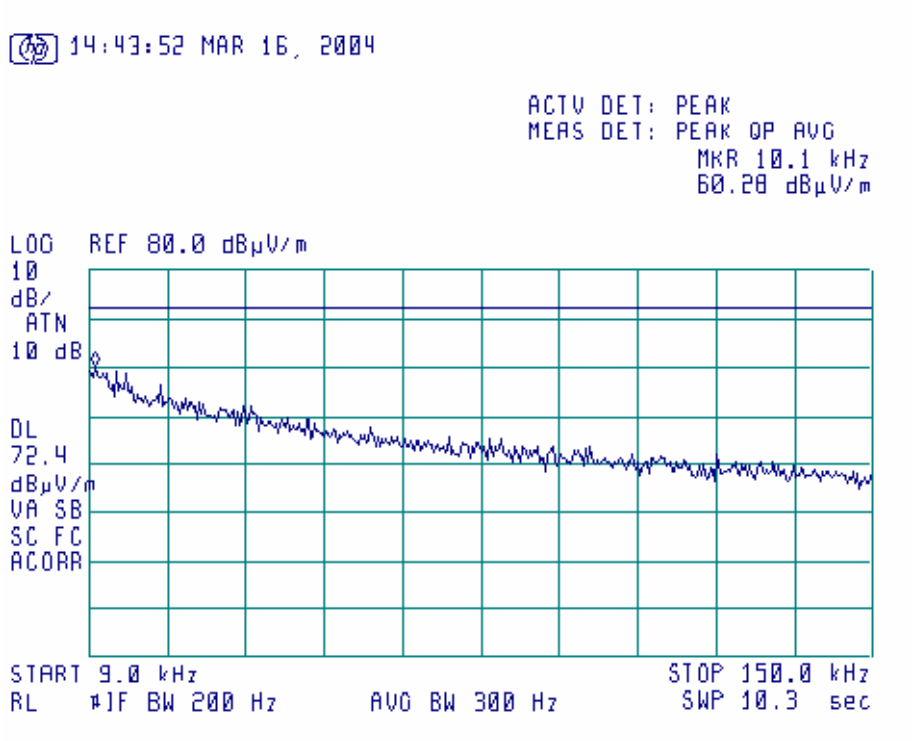
Plot A 4

Radiated spurious emission measurements from 9 kHz to 150 kHz in the anechoic chamber



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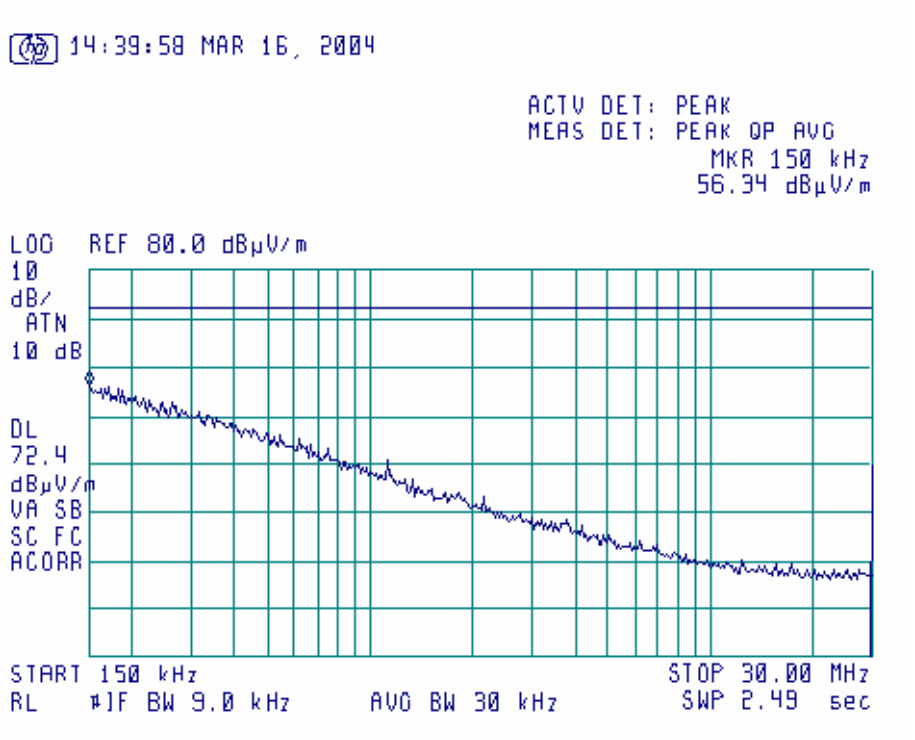
Plot A 5

Radiated spurious emission measurements from 150 kHz to 30 MHz in the anechoic chamber



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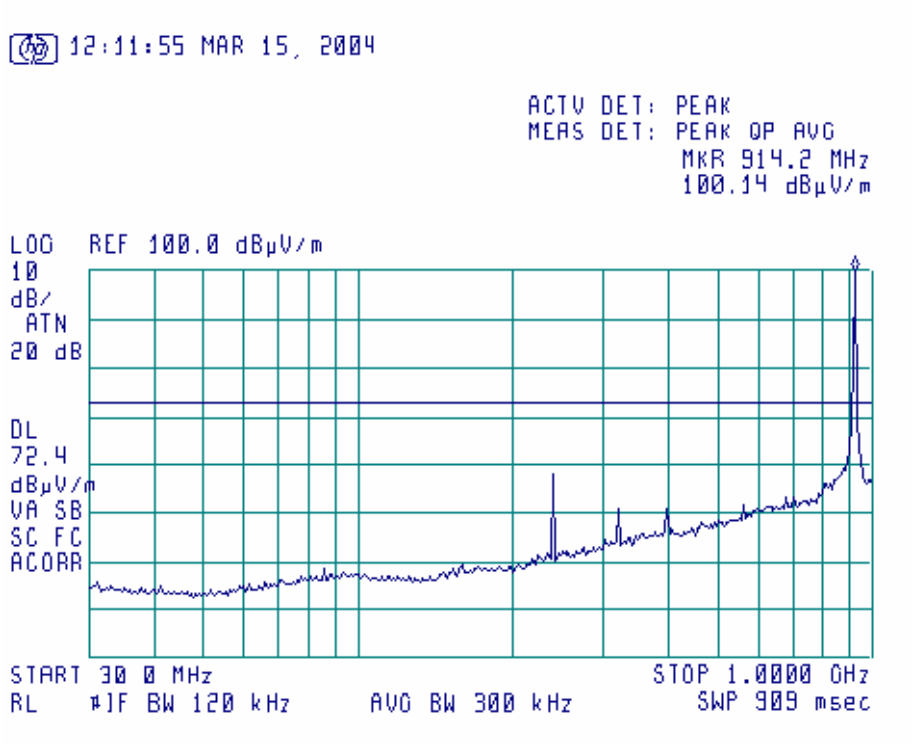
Plot A 6

Radiated spurious emission measurements from 30 MHz to 1000 MHz in the anechoic chamber, vertical and horizontal antenna polarization



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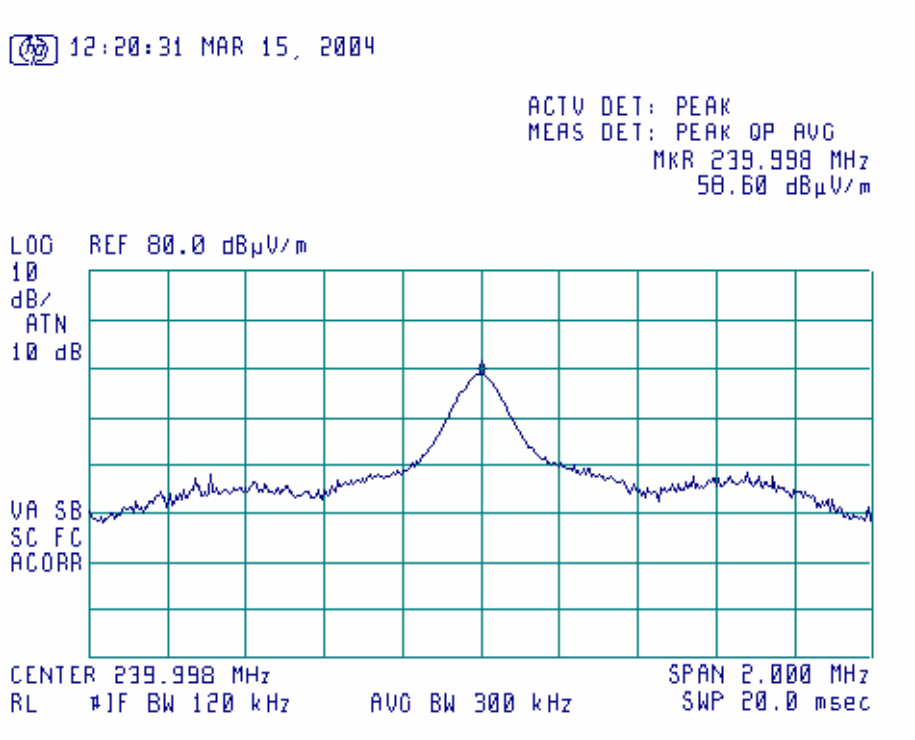
Plot A 7

Radiated spurious emission measurements in the anechoic chamber, horizontal antenna polarization



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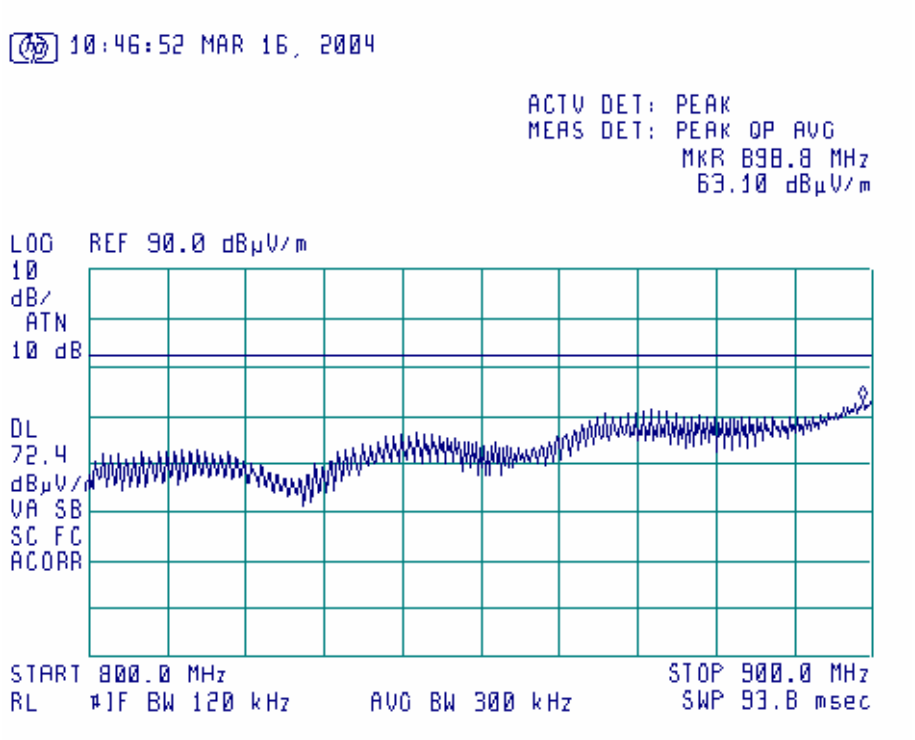
Plot A 8

Radiated spurious emission measurements from 800 MHz to 900 MHz in the anechoic chamber



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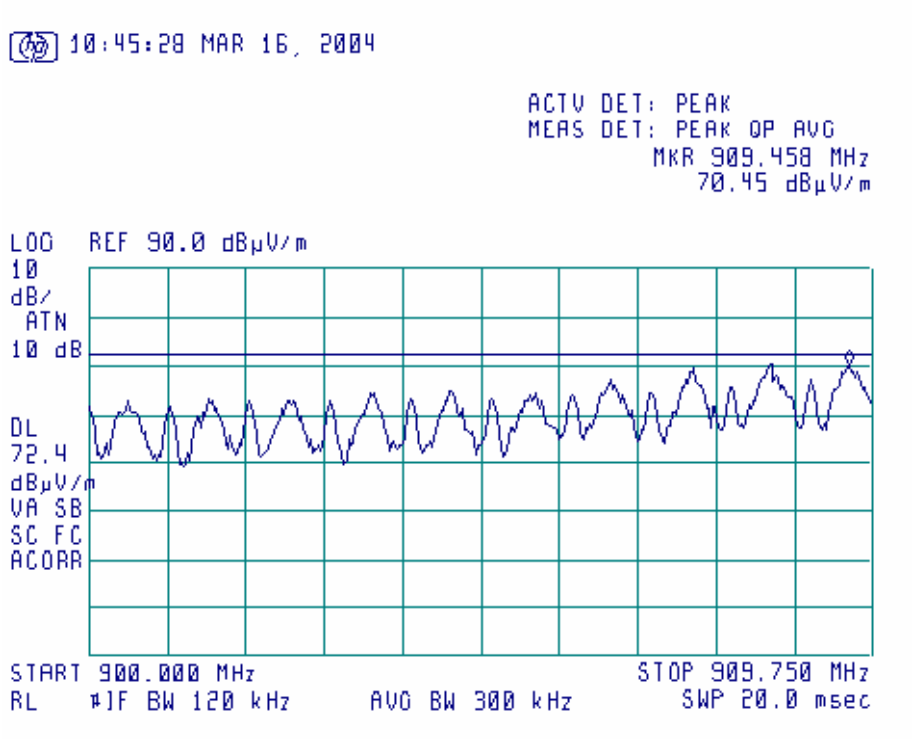
Plot A 9

Radiated spurious emission measurements from 900 MHz to 909.75 MHz in the anechoic chamber



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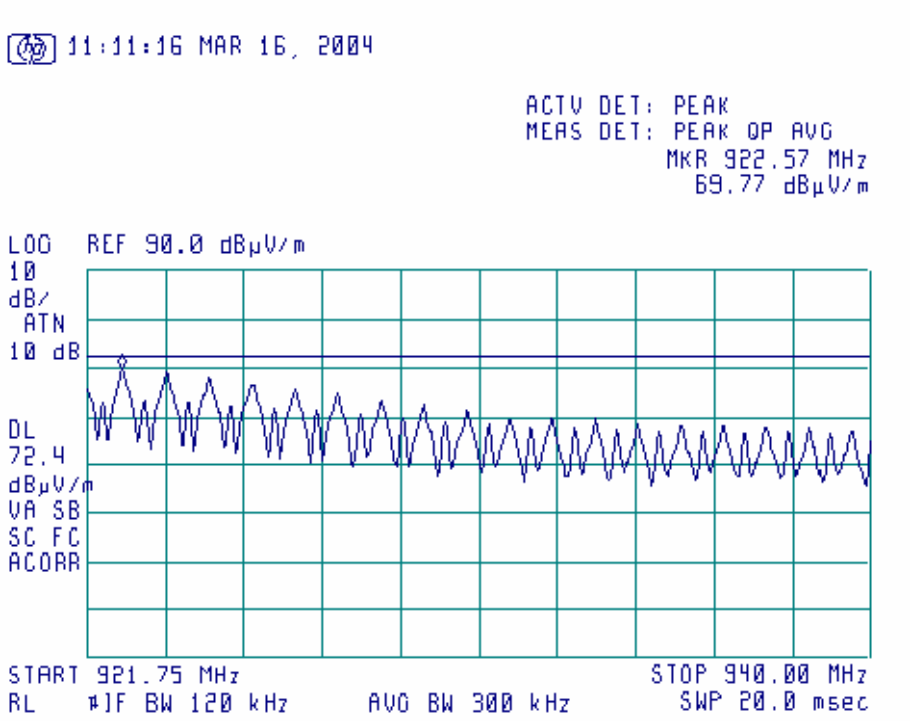
Plot A 10

Radiated spurious emission measurements from 921.75 MHz to 940 MHz in the anechoic chamber



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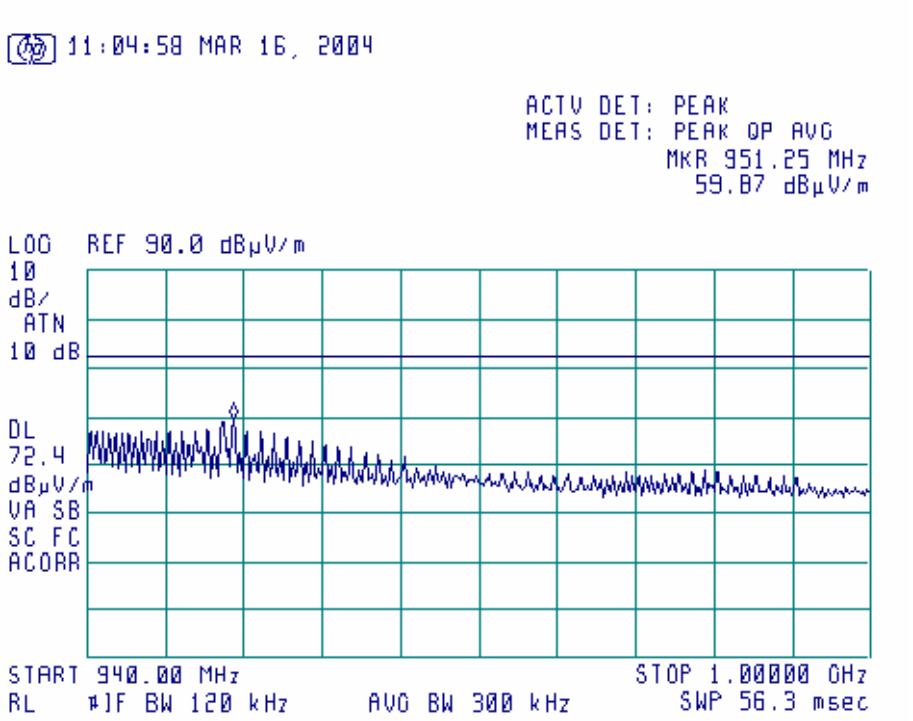
Plot A 11

Radiated spurious emission measurements from 940 MHz to 1000 MHz in the anechoic chamber



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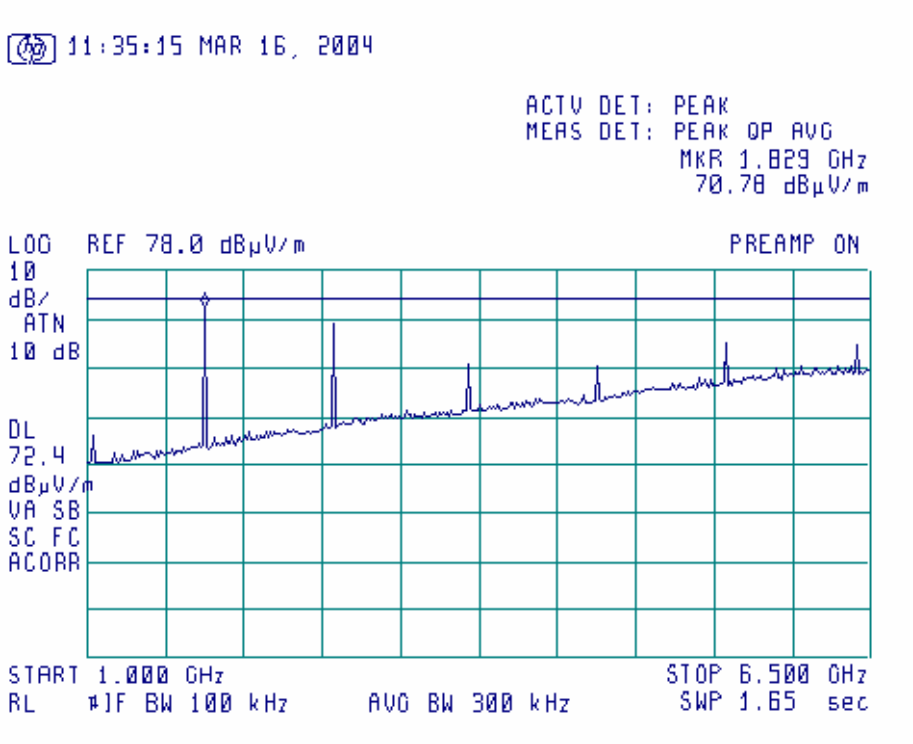
Plot A 12

Radiated spurious emission measurements from 1.000 GHz to 6.500 GHz in the anechoic chamber



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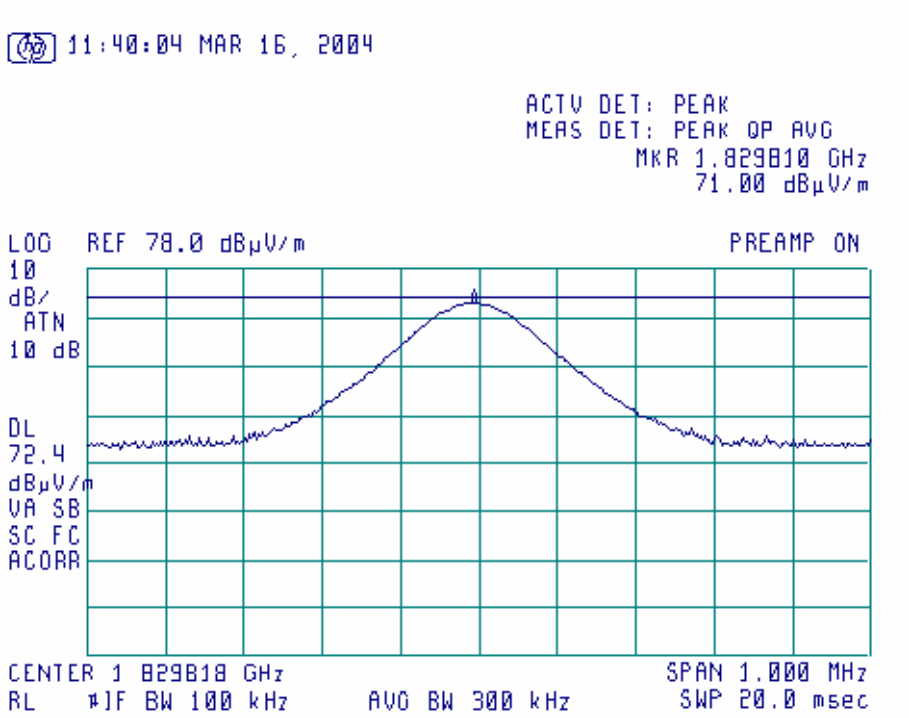
Plot A 13

Radiated spurious emission measurements in the anechoic chamber, 2nd harmonic, horizontal antenna polarization



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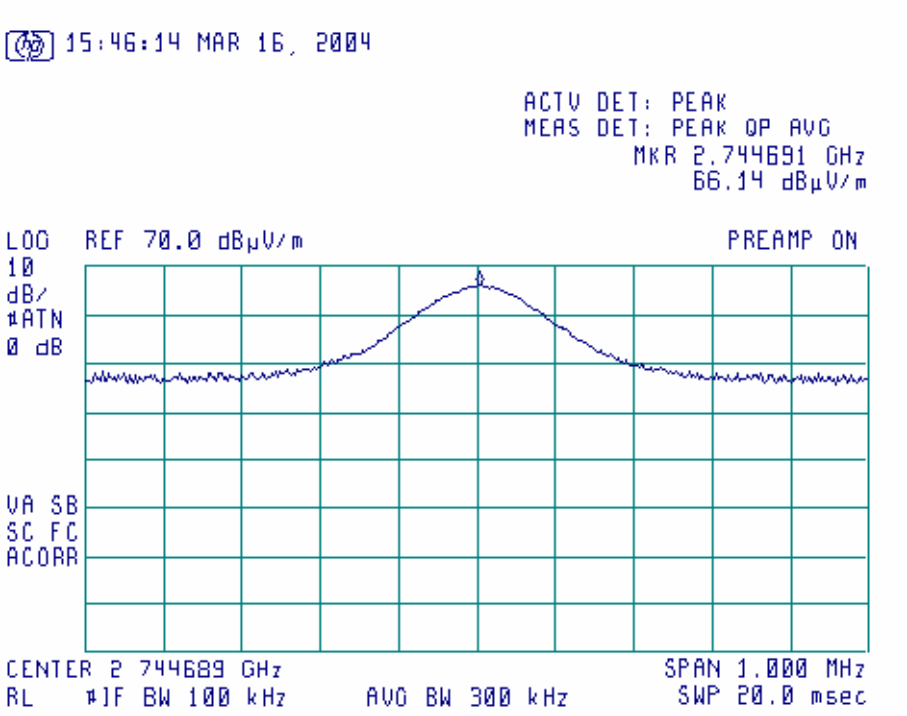
Plot A 14

Radiated spurious emission measurements in the anechoic chamber, 3rd harmonic, vertical antenna polarization



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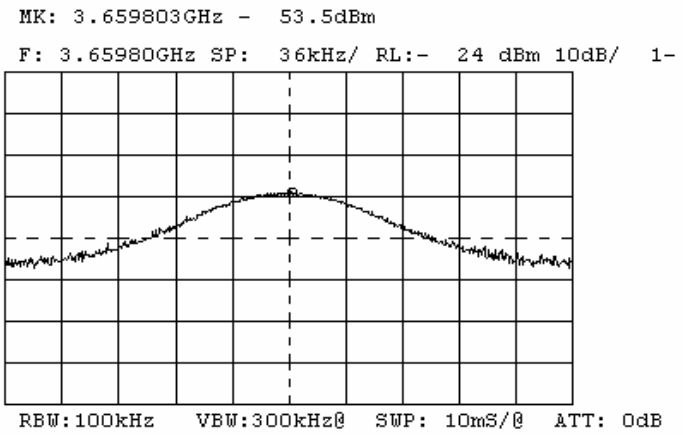
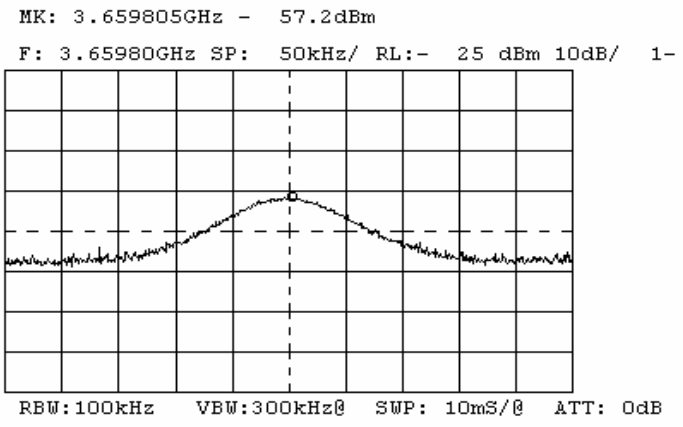
Plot A 15

Radiated spurious emission measurements at the OATS, 4th harmonic, vertical antenna polarization



Plot A 16

Radiated spurious emission measurements at the OATS, 4th harmonic, horizontal antenna polarization



Frequency, MHz	U, dBm	AF, dB	CL, dB	E, dBuV/m	Limit, dBuV/m	Margin, dB
3659.616	-53.5	32.18	3.80	49.5	72.4	-22.9

E(dBuV/m)=UdBm+107(dBuV/dBm)+ AF(dB)+CL(dB)-AG(dB)
AG-amplifier gain=40 dB

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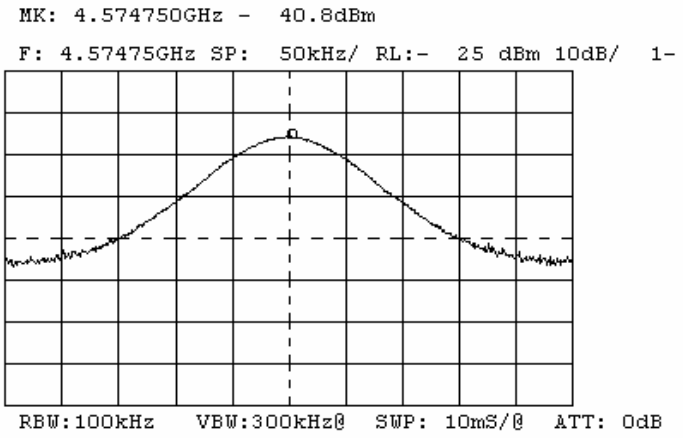
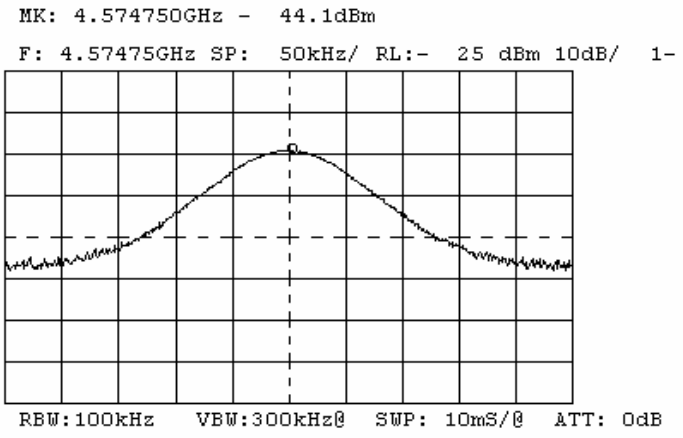
Plot A 17

Radiated spurious emission measurements at the OATS, 5th harmonic, vertical antenna polarization



Plot A 18

Radiated spurious emission measurements at the OATS, 5th harmonic, horizontal antenna polarization



Frequency, MHz	U, dBm	AF, dB	CL, dB	E, dBuV/m	Limit, dBuV/m	Margin, dB
4574.520	-40.8	33.01	4.30	63.5	72.4	-8.9

E(dBuV/m)=UdBm+107(dBuV/dBm)+ AF(dB)+CL(dB)-AG(dB)
AG-amplifier gain=40 dB

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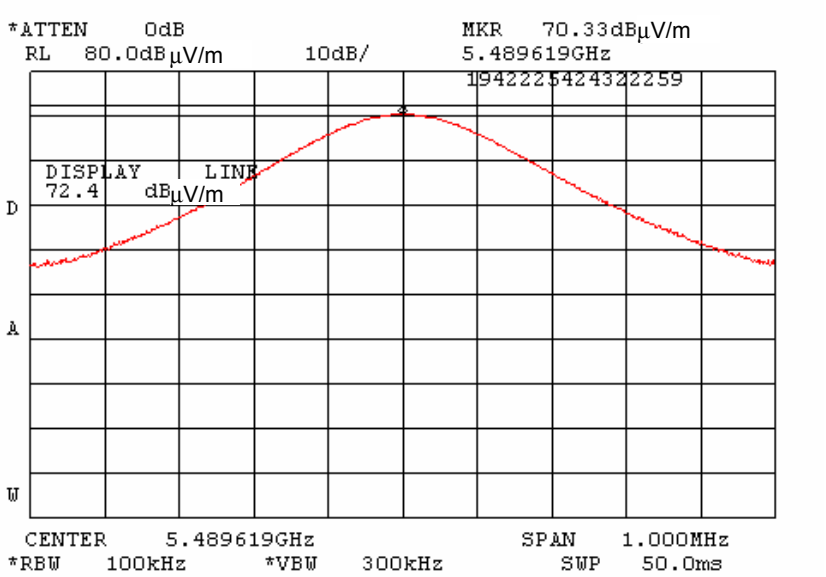
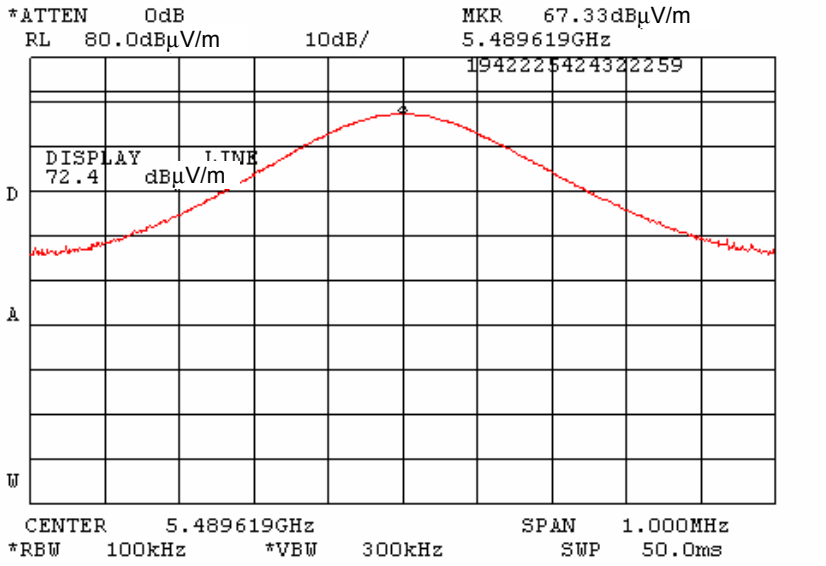
Plot A 19

Radiated spurious emission measurements at the OATS, 6th harmonic, vertical antenna polarization



Plot A 20

Radiated spurious emission measurements at the OATS, 6th harmonic, horizontal antenna polarization



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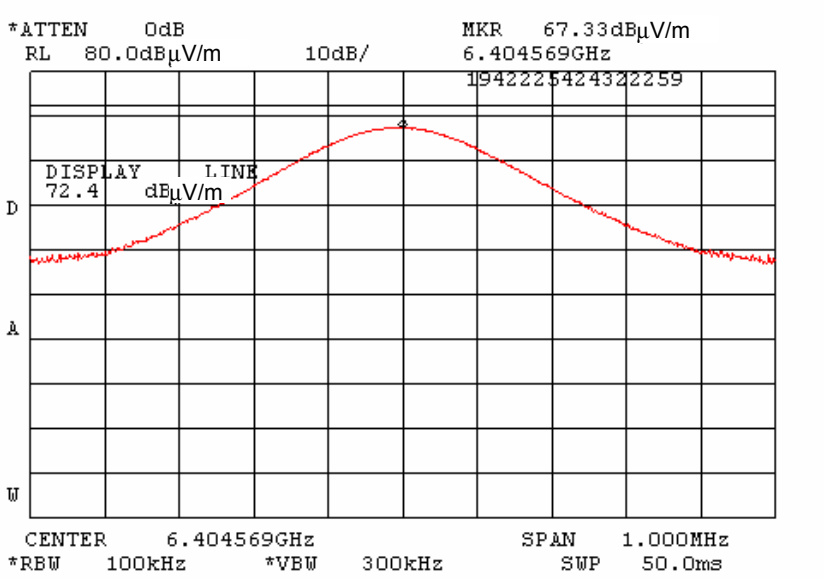
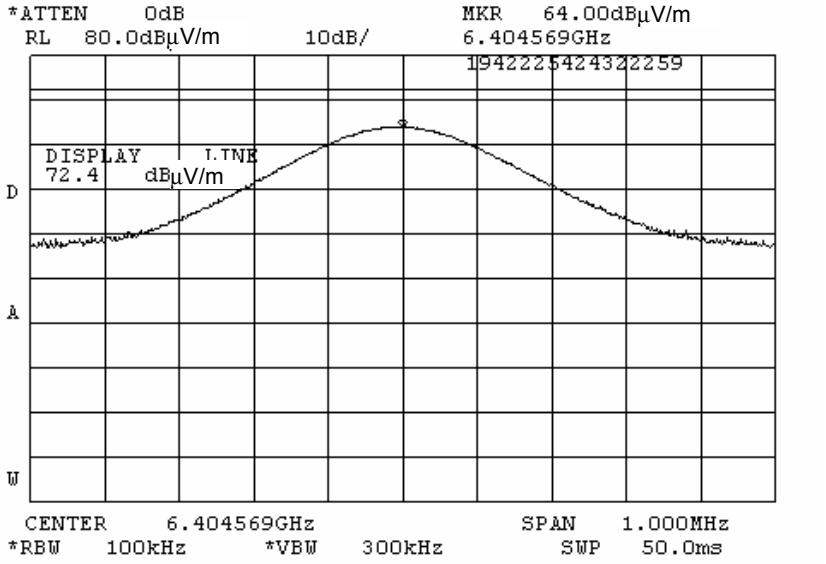
Plot A 21

Radiated spurious emission measurements at the OATS, 7th harmonic, vertical antenna polarization



Plot A 22

Radiated spurious emission measurements at the OATS, 7th harmonic, horizontal antenna polarization



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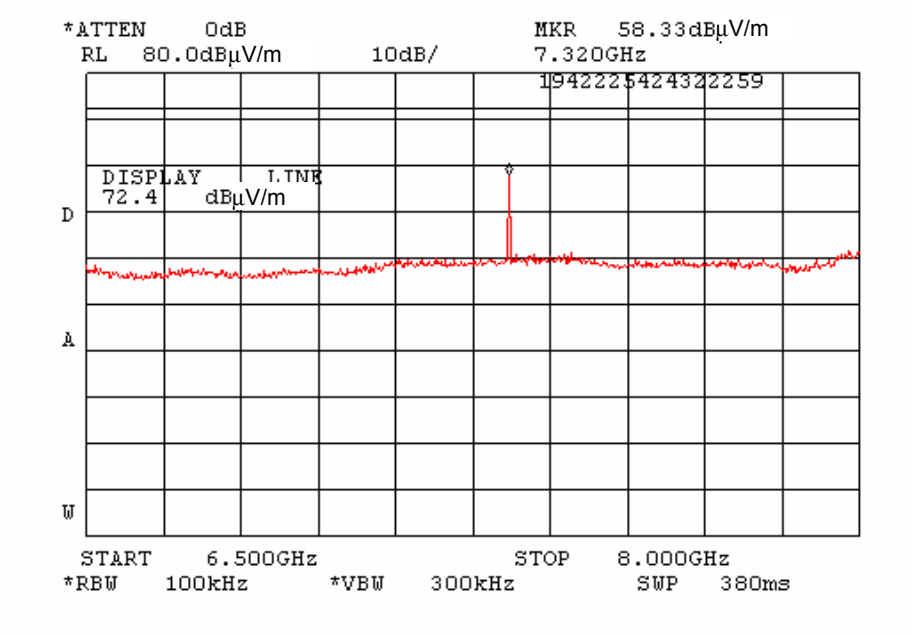
Plot A 23

Radiated spurious emission measurements at the OATS from 6.500 GHz to 8.000 GHz



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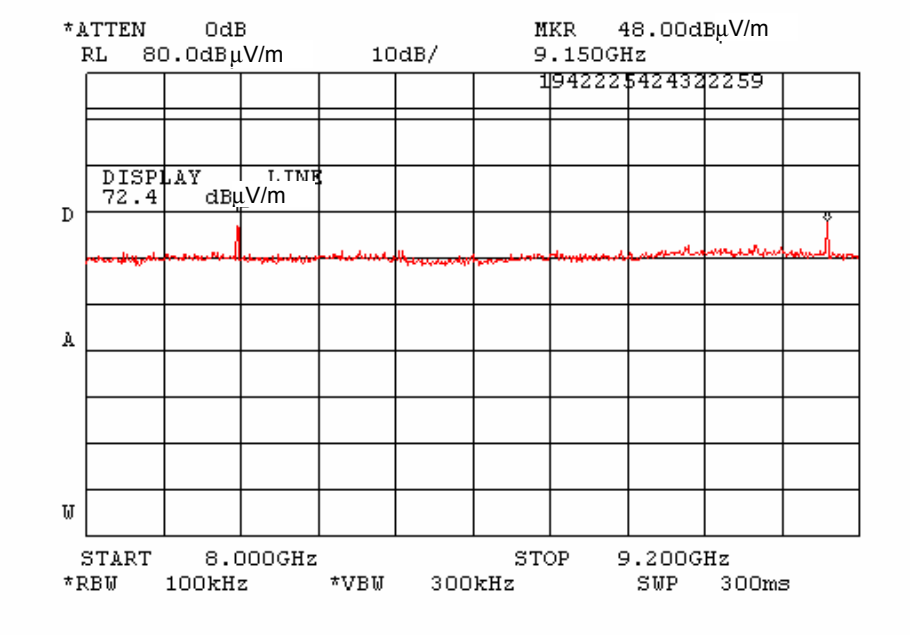
Plot A 24

Radiated spurious emission measurements at the OATS from 8.000 GHz to 9.200 GHz



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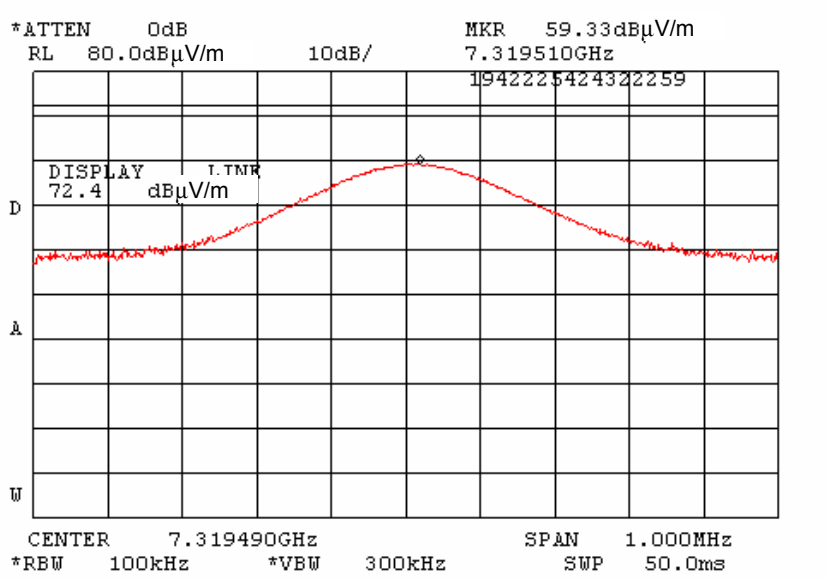
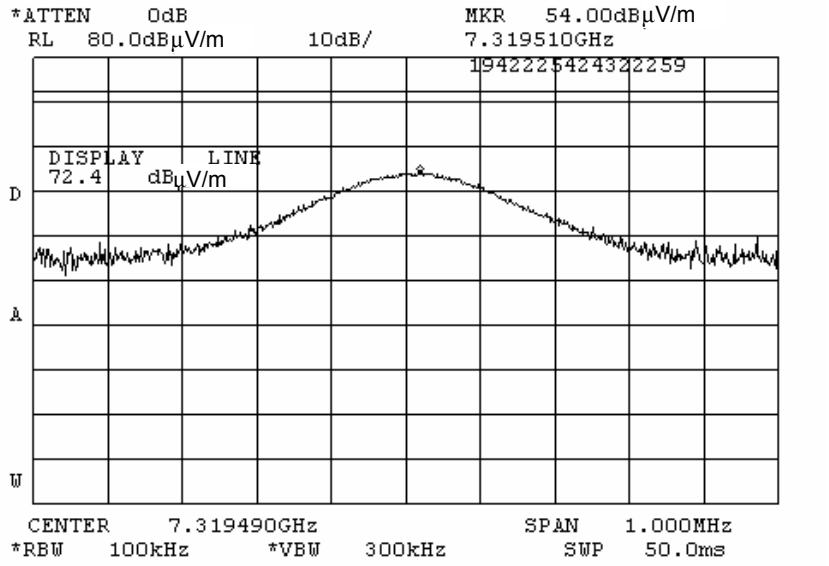
Plot A 25

Radiated spurious emission measurements at the OATS, 8th harmonic, vertical antenna polarization



Plot A 26

Radiated spurious emission measurements at the OATS, 8th harmonic, horizontal antenna polarization



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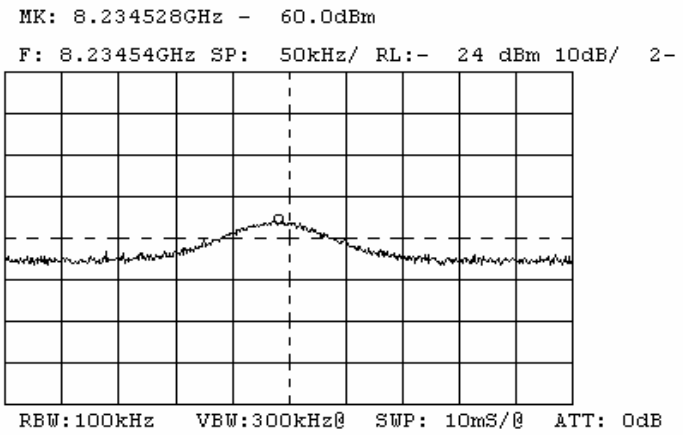
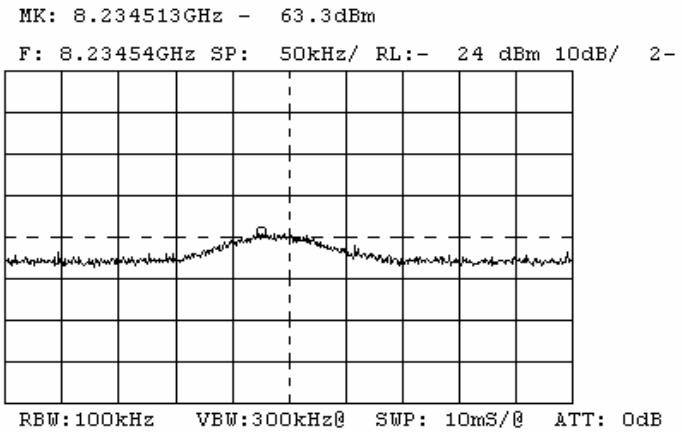
Plot A 27

Radiated spurious emission measurements at the OATS, 9th harmonic, vertical antenna polarization



Plot A 28

Radiated spurious emission measurements at the OATS, 9th harmonic, horizontal antenna polarization



Frequency, MHz	U, dBm	AF, dB	CL, dB	E, dBuV/m	Limit, dBuV/m	Margin, dB
8234.136	-60.0	37.73	5.90	50.6	72.4	-21.8

E(dBuV/m)=UdBm+107(dBuV/dBm)+ AF(dB)+CL(dB)-AG(dB)
AG-amplifier gain=40 dB

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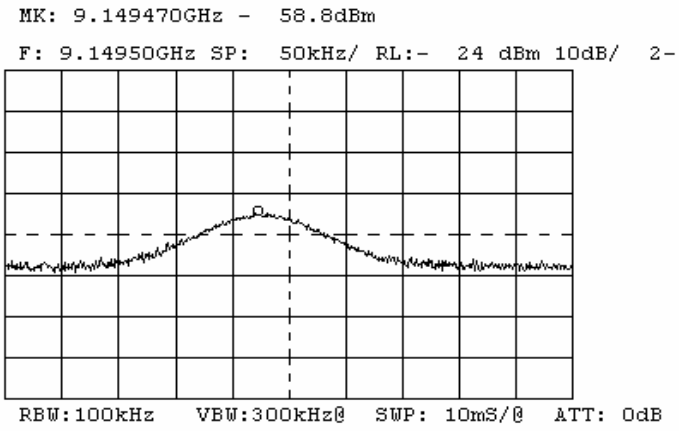
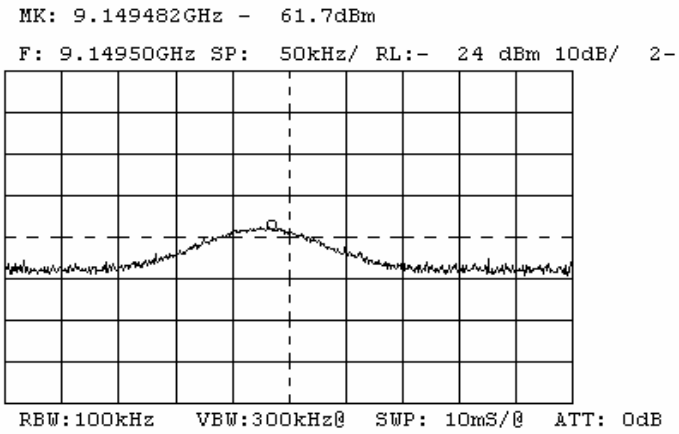
Plot A 29

Radiated spurious emission measurements at the OATS, 10th harmonic, vertical antenna polarization



Plot A 30

Radiated spurious emission measurements at the OATS, 10th harmonic, horizontal antenna polarization



Frequency, MHz	U, dBm	AF, dB	CL, dB	E, dBuV/m	Limit, dBuV/m	Margin, dB
9149.040	-58.8	38.30	6.10	52.6	72.4	-19.8

E(dBuV/m)=UdBm+107(dBuV/dBm)+ AF(dB)+CL(dB)-AG(dB)
AG-amplifier gain=40 dB

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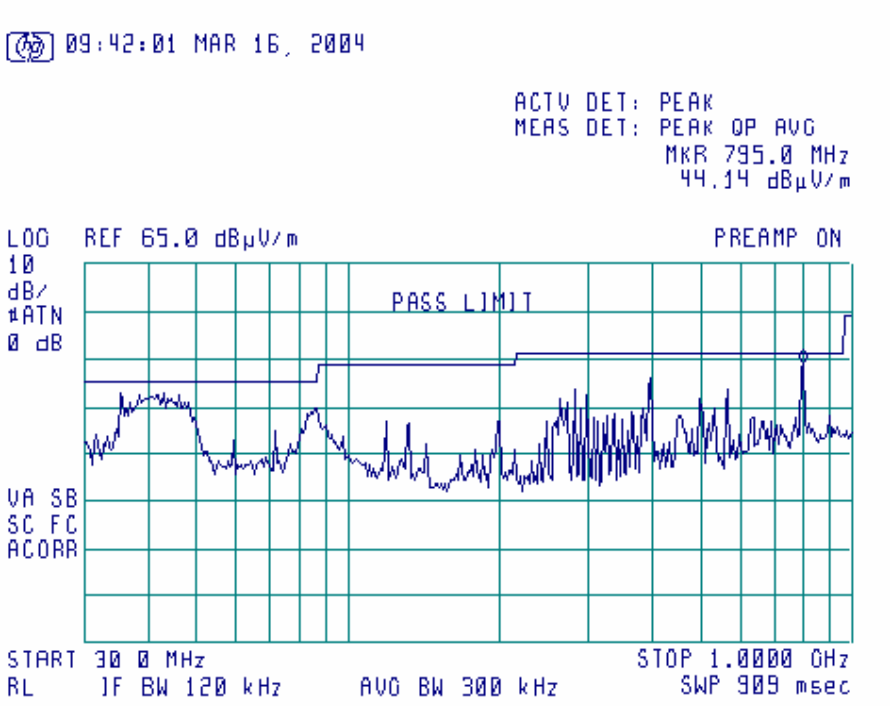
Plot A 31

Radiated emission measurements in the anechoic chamber from 30 MHz to 1000 MHz, test distance 3 m, vertical & horizontal antenna polarization



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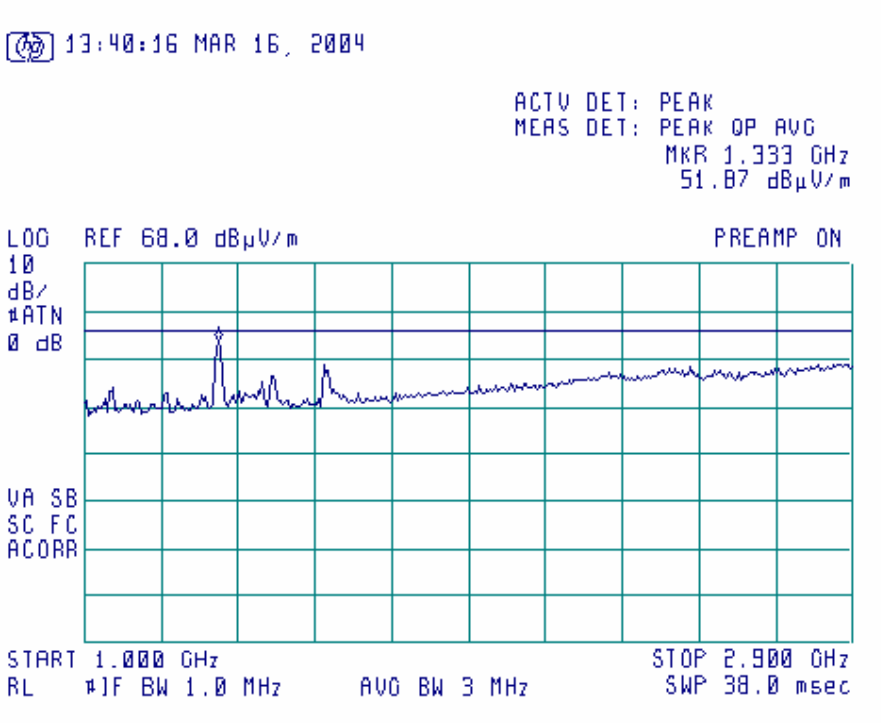
Plot A 32

Radiated emission measurements in the anechoic chamber from 1 GHz to 2.9 GHz, test distance 3 m, vertical & horizontal antenna polarization



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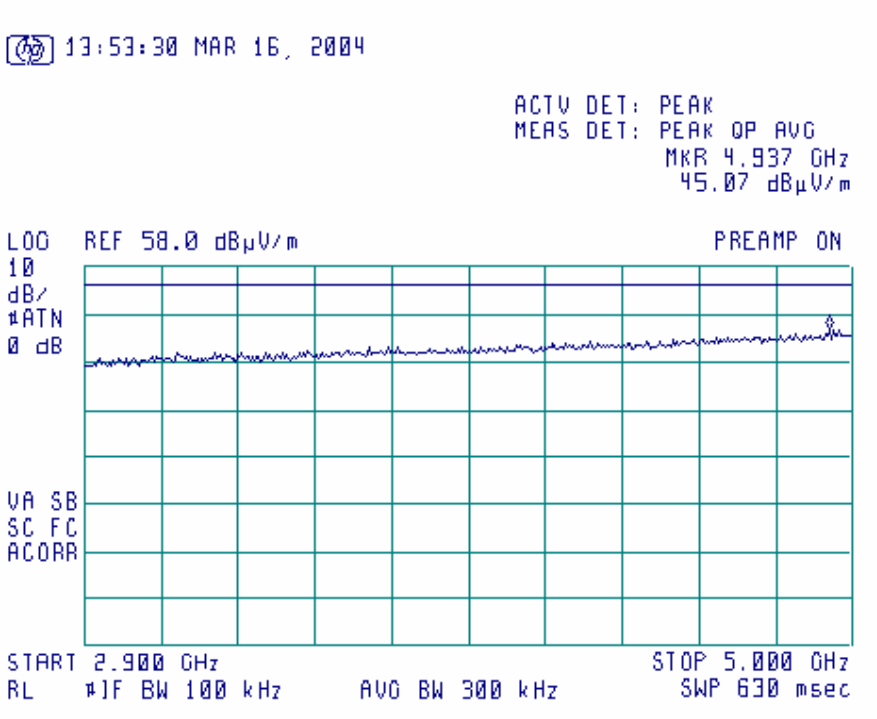
Plot A 33

Radiated emission measurements in the anechoic chamber from 2.9 GHz to 5 GHz, test distance 3 m, vertical & horizontal antenna polarization



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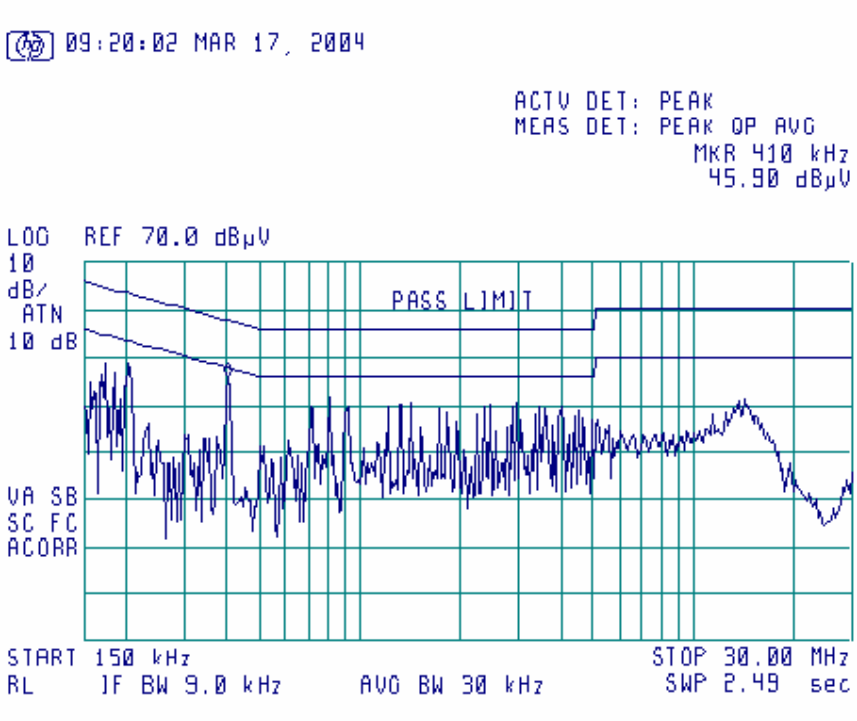
Plot A 34

Conducted emission measurement results at the EUT AC first line



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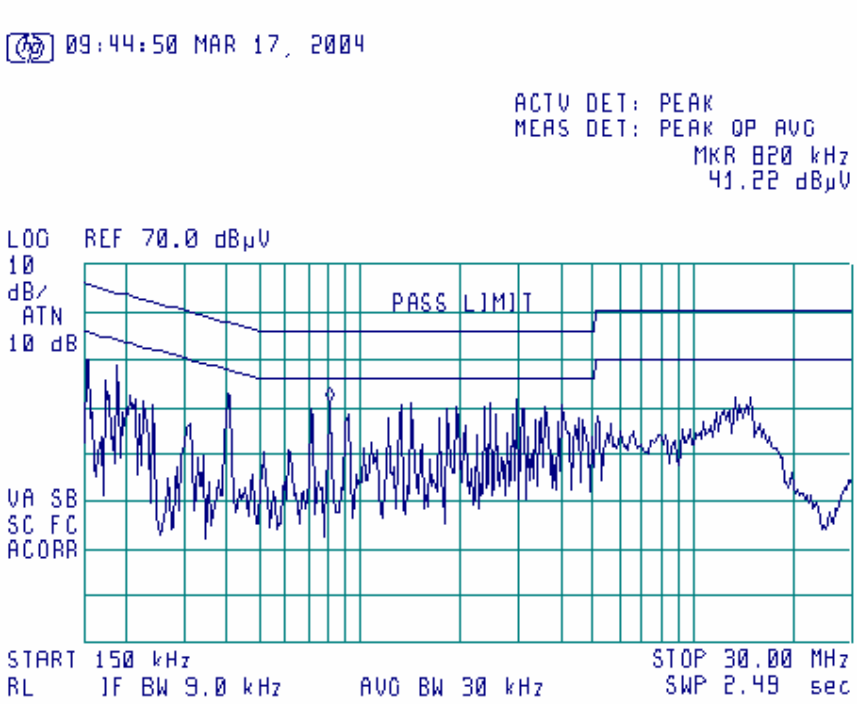
Plot A 35

Conducted emission measurements test results at the EUT AC second line



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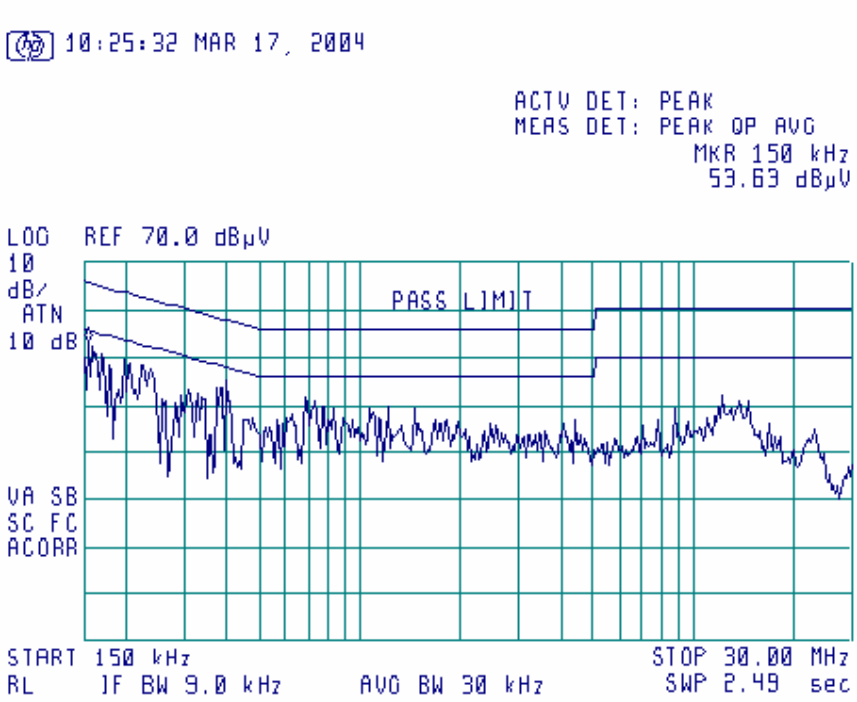
Plot A 36

Conducted emission measurements test results at the laptop AC first line



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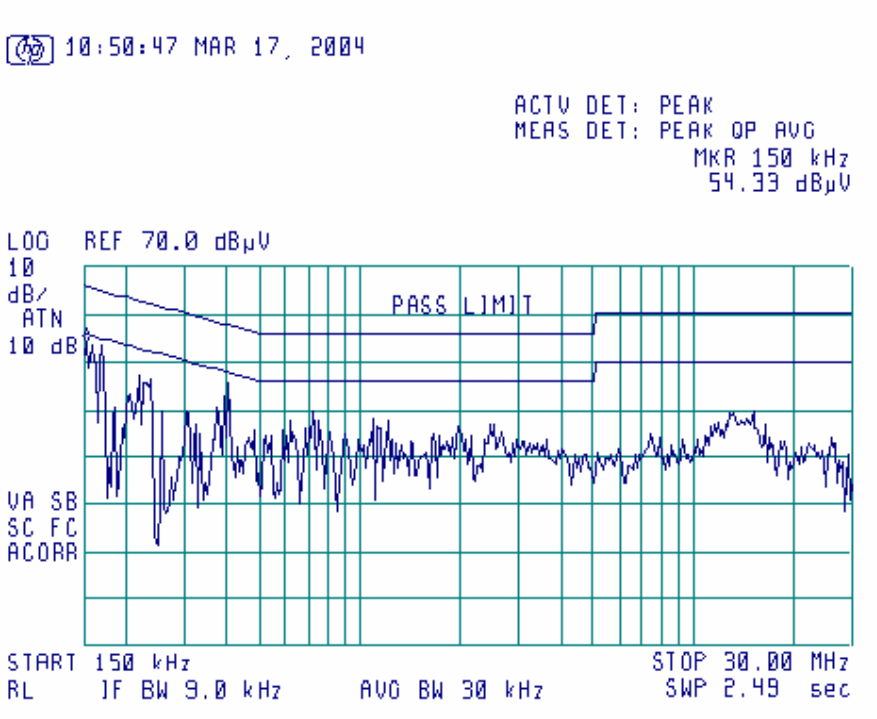
Plot A 37

Conducted emission measurements test results at the laptop AC second line



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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.	
0025	Spectrum analyzer, 10 kHz-23 GHz	Anritsu	MS-710C	5837	10/04
0026	Spectrum analyzer, 100 Hz-2.2 GHz	Anritsu	MS 2601A	3460	9/04
0038	Antenna mast, 1-4 m	Hermon Labs	AM-1	028	2/05 check
0091	Position controller for antenna mast + turntable, OFTS	Hermon Labs	CRL-2	091	4/05 check
0163	LISN FCC/VDE/MIL -STD	Electro-Metrics	ANS-25/2	1314	10/04
0203	Power supply, DC, 0-40 V, 0-3 A	Hewlett Packard	6290A	2203	12/04
0287	Turntable, motorized diameter, 2 m	Hermon Labs	TMD-2	042	11/04 check
0446	Active loop antenna, 10 kHz-30 MHz	Electro-Mechanics	6502	2857	10/04
0447	LISN, 16/2, 300 V RMS	Hermon Labs	LISN 16-1	447	11/04
0465	Anechoic chamber 9 (L) x 6.5 (W) x 5.5 (H) m	Hermon Labs	AC-1	023	10/05 check
0493	Oven temperature	Thermotron	S-1.2 Mini-Max	4016	9/04
0521	Spectrum analyzer with RF filter section (EMI receiver 9 kHz - 6.5 GHz)	Hewlett Packard	8546A	0319	9/04
0547	Amplifier, GaAs FET,RF 6-18 GHz, 2 W, 35 dB,12 V/1.2 A, N.F4.5 dB	Avantek	AMT - 12407 M	400	12/04
0580	DC block adaptor 10 kHz-2.2 GHz	Anritsu	MA8601 A	580	12/04
0589	Cable coaxial, GORE A2POL118.2, 3 m	Hermon Labs	GORE-3	589	11/04
0590	Attenuator 10 dB, 50 Ohm, N-type, 2W	Elisra Electronic Systems	MW2100-N-Type	10	1/05
0592	Position controller	Hermon Labs	L2-SR3000	100	5/04 check
0593	Antenna mast, 1-4 m/ 1-6 m Pneumatic	Hermon Labs	AM-F1	101	2/05 check
0594	Turntable for Anechoic Chamber, flush mounted, d=1.2 m, pneumatic	Hermon Labs	WDC1	102	1/05 check
0604	Antenna biconilog log-periodic/T Bow-Tie, 26 - 2000 MHz	EMCO	3141	9611-1011	1/05
0616	Antenna, double ridge guide, 1 – 18 GHz	Hermon Labs	AH-18	113	3/05
0661	Generator Swept Signal, 10MHz to 40GHz+ 10dBm	Hewlett Packard	83640B	0266	9/04
0672	Shielded room 4.6(L) x 4.2(W) x2.4(H) m	Hermon Labs	SR-3	027	11/04 Check

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HL Serial No.	Description	Manufacturer information			Due Calibr. Month/ year
		Name	Model No.	Serial No.	
1004	Cable, coaxial ANDREW PSWJ4, 6 m	Hermon Labs	ANDREW-6	163	12/04
1365	Cable coaxial, RG-214, 5 m	Hermon Labs	C214-5	1365	4/05
1430	EMI Receiver System, 9 kHz - 2.9 GHz	Agilent Technologies	8542E	3807A00262	9/04
1502	Cable RF, 6 m	Belden	M17/167 MIL-C-17	1502	12/04 check
1510	Cable RF, 8 m	Belden	M17/167 MIL-C-17	1510	12/04
1565	Antenna, dipole, tunable 500 - 1000 MHz	Electro-Metrics	TDS-30-2	334	1/05
1947	Cable 18 GHz, 6.5 m, blue	Rhophase Microwave Ltd	NPS-1803A-6500-NPS	T4974	10/04
1984	Antenna, double ridged waveguide horn, 1-18 GHz, 300W, N-type	EMC Test Systems	3115	9911-5964	3/05
2009	Cable RF, 8 m	Alpha Wire	RG-214	C-56	12/04
2258	Amplifier Low Noise 2-20 GHz	Sophia Wireless	LNA0220-C	0222	11/04
2387	Filter bandpass, 8 – 14 GHz	Hermon Labs	FBP8-14	2387	6/04
2400	Cable 40 GHz, 1.5 m, green	Rhophase Microwave Ltd.	KPS-1503A-1500-KPS	X2946	6/04
2432	Antenna, double-ridged waveguide horn, 1-18 GHz	EMC Test Systems	3115	000271777	7/04

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Appendix C Antenna factors and cable loss

Correction factor
Line impedance stabilization network
Model ANS-25/2
Electro-Metrics

Frequency, kHz	Correction factor, dB
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

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

Frequency, kHz	Correction factor, dB
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 in dB is to be added to meter readings of an interference analyzer or a spectrum analyzer.

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

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

Antenna factor in dB(1/m) is to be added to receiver meter reading in dB(μV) to convert it into 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 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
Model 3115, S/N 9911-5964, HL1984

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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Antenna factor
Double-ridged guide horn antenna
Model 3115, serial number: 00027177, HL2432

Frequency, MHz	Antenna factor. dB(1/m)
1000.0	24.7
1500.0	25.7
2000.0	27.8
2500.0	28.9
3000.0	30.7
3500.0	31.8
4000.0	33.0
4500.0	32.8
5000.0	34.2
5500.0	34.9
6000.0	35.2
6500.0	35.4
7000.0	36.3
7500.0	37.3
8000.0	37.5
8500.0	38.0
9000.0	38.3
9500.0	38.3
10000.0	38.7
10500.0	38.7
11000.0	38.9
11500.0	39.5
12000.0	39.5
12500.0	39.4
13000.0	40.5
13500.0	40.8
14000.0	41.5
14500.0	41.3
15000.0	40.2
15500.0	38.7
16000.0	38.5
16500.0	39.8
17000.0	41.9
17500.0	45.8
18000.0	49.1

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).

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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
Cable coaxial, RG-214, 5m, model: C214-5, HL 1365

No.	Frequency, MHz	Measured, dB	Measured uncertainty dB
1	1000	0.41	±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 loss
Cable coaxial, 6 m, model: M17/167 MIL-C-17, HL 1502

Frequency, MHz	Cable loss, dB
0.1	0.02
1	0.07
3	0.15
5	0.17
10	0.26
30	0.43
50	0.57
80	0.72
100	0.81
300	1.48
500	2.00
800	2.70
1000	3.09

Cable loss
Cable M17/167 MIL-C-17, HL 1510

No.	Frequency, MHz	Cable loss, dB
1	0.1	0.05
2	1	0.09
3	3	0.16
4	5	0.18
5	10	0.27
6	30	0.44
7	50	0.58
8	80	0.69
9	100	0.82
10	300	1.48
11	500	2.01
12	800	2.65
13	1000	3.12

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Cable loss
Cable 18 GHz, 6.5 m, blue, model: NPS-1803A-6500-NPS, S/N T4974, HL 1947

Frequency, GHz	Cable loss, dB
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	Cable loss, dB
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 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 coaxial, 40GHz, 1.5 m, green, Rhophase Microwave Limited, model: KPS-1503A-1500-KPS, HL 2400

Frequency, GHz	Cable loss, dB	Frequency, GHz	Cable loss, dB	Frequency, GHz	Cable loss, dB
0.03	0.06	6.5	1.46	15.50	2.34
0.05	0.08	6.7	1.49	16.00	2.34
0.1	0.15	6.9	1.50	16.50	2.40
0.2	0.23	7.1	1.51	17.00	2.46
0.3	0.29	7.3	1.55	17.50	2.54
0.5	0.37	7.5	1.56	18.00	2.61
0.7	0.46	7.7	1.58	18.50	2.59
0.9	0.53	7.9	1.60	19.00	2.59
1.1	0.58	8.1	1.61	19.50	2.67
1.3	0.65	8.3	1.68	20.00	2.62
1.5	0.66	8.5	1.68	20.50	2.73
1.7	0.72	8.7	1.75	21.00	2.71
1.9	0.76	8.9	1.74	21.50	2.78
2.1	0.79	9.1	1.81	22.00	2.83
2.3	0.85	9.3	1.79	22.50	2.81
2.5	0.90	9.5	1.86	23.50	2.91
2.7	0.91	9.7	1.85	24.00	2.97
2.9	0.97	9.9	1.87	24.50	2.98
3.1	0.97	10.1	1.88	25.00	2.97
3.3	1.03	10.30	1.82	25.50	3.03
3.5	1.06	10.50	1.92	26.00	3.04
3.7	1.10	10.70	1.86	26.50	3.11
3.9	1.13	10.90	1.96	27.00	2.97
4.1	1.16	11.10	1.90	28.00	3.15
4.3	1.18	11.30	1.99	29.00	3.07
4.5	1.21	11.50	1.95	30.00	3.13
4.7	1.23	11.70	2.00	31.00	3.13
4.9	1.26	11.90	2.01	32.00	3.18
5.1	1.28	12.10	1.99	33.00	3.31
5.3	1.31	12.40	2.06	34.00	3.32
5.5	1.32	13.00	2.11	35.00	3.37
5.7	1.36	13.50	2.17	36.00	3.36
5.9	1.37	14.00	2.36	37.00	3.46
6.1	1.38	14.50	2.32	39.00	3.49
6.3	1.44	15.00	2.30	40.00	3.52

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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, 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) and approved by Israel Ministry of environmental protection, radiation hazards department (Permit number 1158).

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Abbreviations and acronyms

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

ASK	amplitude shift keying
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
EUT	equipment under test
GHz	gigahertz
H	height
Hz	hertz
kHz	kilohertz
kV	kilovolt
L	length
LNA	low noise amplifier
LMS	location and monitoring service
LO	local oscillator
m	meter
MHz	megahertz
NA	not applicable
QP	quasi-peak
RF	radio frequency
Rx	receiver
rms	root mean square
s	second
Tx	transmitter
V	volt
W	width

Specification references

47CFR part 90: 2002	Private land mobile radio services
ANSI C63.2:96	American National Standard for Instrumentation-Electromagnetic Noise and Field Strength, 10 kHz to 40 GHz-Specifications.
ANSI C63.4:2001	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.