

TEST REPORT

ACCORDING TO: FCC CFR 47 PART 15 Subpart C, section 15.231 and subpart B;
RSS-210, Issue 7, Annex 1; ICES-003 Issue 4:2004

FOR:

Risco Ltd.

**Wireless glass-break detector
Model: Wireless VITRON**

Part number:RWT6G043300A

This report is in conformity with ISO/IEC 17025. The "A2LA Accredited" symbol endorsement applies only to the tests and calibrations that are listed in the scope of Hermon Laboratories accreditation. The test results relate only to the items tested.
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1 Applicant information

Client name: Risco Ltd.
Address: 14 Hachoma street, Rishon Le Zion, 75655, Israel
Telephone: +972 3963 7777
Fax: +972 3961 6535
E-mail: EfiG@riscogroup.com
Contact name: Mr. Efi Goren

2 Equipment under test attributes

Product name: Wireless glass-break detector
Product type: Transmitter
Model: Wireless VITRON
Part number: RWT6G043300A
Receipt date 1/30/2008

3 Manufacturer information

Manufacturer name: Risco Ltd.
Address: 14 Hachoma street, Rishon Le Zion, 75655, Israel
Telephone: +972 3963 7777
Fax: +972 3961 6535
E-Mail: EfiG@riscogroup.com
Contact name: Mr. Efi Goren




4 Test details

Project ID: 18514
Location: Hermon Laboratories Ltd. Harakevet Industrial Zone, Binyamina 30500, Israel
Test started: 1/30/2008
Test completed: 2/29/2008
Test specification(s): FCC Part 15, subpart C, §15.231; subpart B
RSS-210 Issue 7:2007, Annex 1; RSS-Gen issue 2:2007; ICES-003 issue 4:2004

5 Tests summary

Test	Status
FCC 15.231(a) and RSS-210 Annex 1 (9/3/2007)	
Transmitter characteristics	
FCC Part 15, Section 231(a) / RSS-210, Section A1.1.1, Periodic operation requirements	Pass
FCC Part 15, Section 231(b) / RSS-210, Section A1.1.2, Field strength of emissions	Pass
FCC Part 15, Section 231(c) / RSS-210, Section A1.1.3, Occupied bandwidth	Pass
FCC Part 15, Section 207 / RSS-Gen, Section 7.2.2, Conducted emission	Not required
FCC Part 15, Section 203 / RSS-Gen, Section 7.1.4, Antenna requirements	Pass
Unintentional emissions	
FCC Part 15, Section 107 / RSS-Gen, Section 7.1.6 / ICES-003, Conducted emission at AC power port	Not required
FCC Part 15, Section 109 / RSS-Gen, Section 7.2.3 / ICES-003, Radiated emission	Pass
FCC Part 15, Section 111 / RSS-210, Section 7.2.3, Conducted emission at receiver antenna port	Not required

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

	Name and Title	Date	Signature
Tested by:	Mr. L. Markel, test engineer	February 29, 2008	
Reviewed by:	Mrs. M. Cherniavsky, certification engineer	March 9, 2008	
Approved by:	Mr. M. Nikishin, EMC and radio group leader	March 10, 2008	

6 EUT description

6.1 General information

The EUT is a wireless glass break detector operating at 433.92 MHz and powered by a 3V non-rechargeable battery.

6.2 Changes made in EUT

No changes were implemented in the EUT.

6.3 EUT test configuration in “X-axis” position



6.4 Transmitter characteristics

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)				
Intended use		Condition of use			
	fixed	Always at a distance more than 2 m from all people			
X	mobile	Always at a distance more than 20 cm from all people			
	portable	May operate at a distance closer than 20 cm to human body			
Operating frequency		433.92 MHz			
Maximum rated output power		At transmitter 50 Ω RF output connector			
		Effective radiated power (for equipment with no RF connector)		-7.5 dBm	
Is transmitter output power variable?		X	No		
			Yes	continuous variable	
				stepped variable with stepsize	dB
				minimum RF power	dBm
				maximum RF power	-7.5 dBm
Antenna connection					
	unique coupling	standard connector	X	integral	
				with temporary RF connector	
				X	without temporary RF connector
Antenna/s technical characteristics					
Type	Manufacturer	Model number		Gain	
Helicoil	Risco Ltd.	NA		NA	
Transmitter aggregate data rate		666 bps			
Type of modulation		ASK			
Modulating test signal (baseband)		ID code			
Transmitter power source					
X	Battery	Nominal rated voltage	3 VDC	Battery type	Lithium
	DC	Nominal rated voltage	VDC		
	AC mains	Nominal rated voltage	VAC	Frequency	

Test specification:	FCC Part 15, Section 231(a) / RSS-210, Section A1.1.1, Periodic operation requirements		
Test procedure:	Supplier declaration		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	2/13/2008 8:48:01 AM		
Temperature: 22°C	Air Pressure: 1019 hPa	Relative Humidity: 36%	Power Supply: 3 V battery
Remarks:			

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

7.1 Periodic operation requirements

7.1.1 General

The EUT was verified for compliance with periodic operation requirements listed below:

- Continuous transmissions such as voice, video and the radio control of toys are not permitted;
- A manually operated transmitter shall employ switch that will automatically deactivate the transmitter within not more than 5 seconds of being released;
- A transmitter activated automatically shall cease transmission within 5 seconds after activation;
- Periodic transmissions, excluding polling or supervision transmissions, at regular predetermined intervals are not permitted;
- Total duration of polling or supervision transmissions, including data, to determine system integrity in security or safety applications shall not exceed 2 seconds per hour.

The rationale for compliance with the above requirements was either test results or supplier declaration. The summary of results is provided in Table 7.1.1.

7.1.2 Test procedure for transmitter shut down test

7.1.2.1 The EUT was set up as shown in Figure 7.1.1.

7.1.2.2 The spectrum analyzer center frequency was adjusted to the EUT carrier, span set to zero and video triggered for transmission.

7.1.2.3 The transmitter was activated either manually or automatically. Once manually operated transmitter was activated, the switch was immediately released.

7.1.2.4 The transmission time was captured and shown in Plot 7.1.1.

7.1.3 Test procedure for measurements of polling / supervision transmission duration

7.1.3.1 The EUT was set up as shown in Figure 7.1.1.

7.1.3.2 The spectrum analyzer center frequency was adjusted to the EUT carrier, span set to zero and video triggered for transmission.

7.1.3.3 The transmission time was captured and shown in.

Figure 7.1.1 Setup for transmitter shut down test

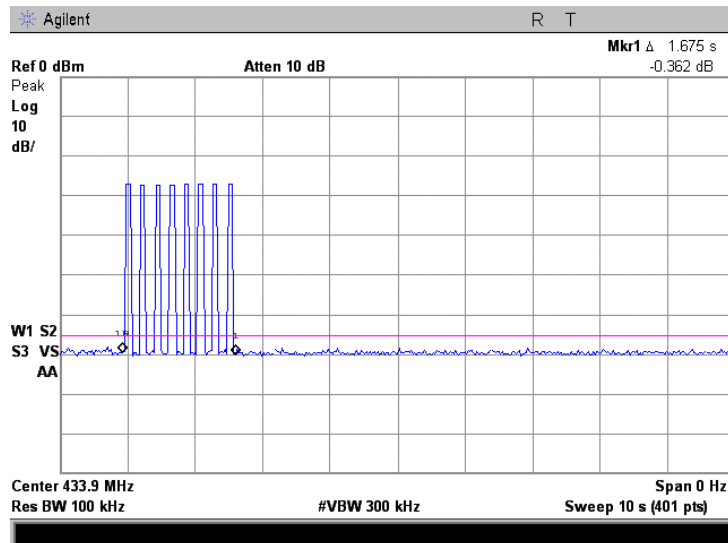


Test specification:	FCC Part 15, Section 231(a) / RSS-210, Section A1.1.1, Periodic operation requirements		
Test procedure:	Supplier declaration		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	2/13/2008 8:48:01 AM		
Temperature: 22°C	Air Pressure: 1019 hPa	Relative Humidity: 36%	Power Supply: 3 V battery
Remarks:			

Table 7.1.1 Periodic operation requirements

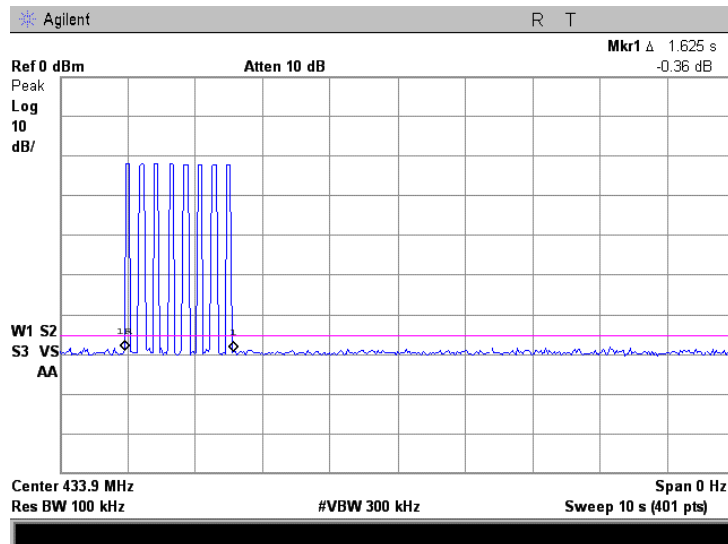
Requirement	Rationale	Verdict
Continuous transmissions are not permitted	Supplier declaration	Comply
A manually operated transmitter shall be deactivated within not more than 5 seconds of switch being released	NA	NA
Transmitter activated automatically shall cease transmission within 5 seconds	Plots 7.1.1 to 7.1.4	Comply
Periodic transmissions at regular predetermined intervals are not permitted	Supplier declaration	Comply
Total duration of polling or supervision transmissions shall not exceed 2 seconds per hour	Plots 7.1.5 to 7.1.8	Comply

Plot 7.1.1 Battery installation test result



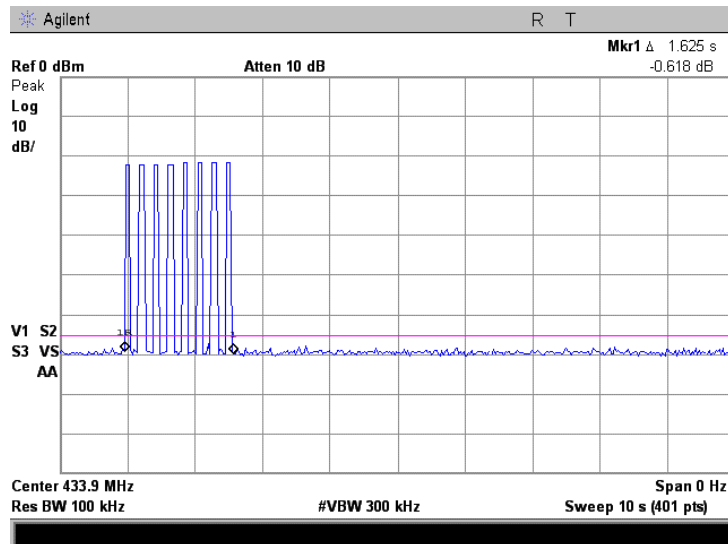
Test specification:	FCC Part 15, Section 231(a) / RSS-210, Section A1.1.1, Periodic operation requirements		
Test procedure:	Supplier declaration		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	2/13/2008 8:48:01 AM		
Temperature: 22°C	Air Pressure: 1019 hPa	Relative Humidity: 36%	Power Supply: 3 V battery
Remarks:			

Plot 7.1.2 Alarm test result

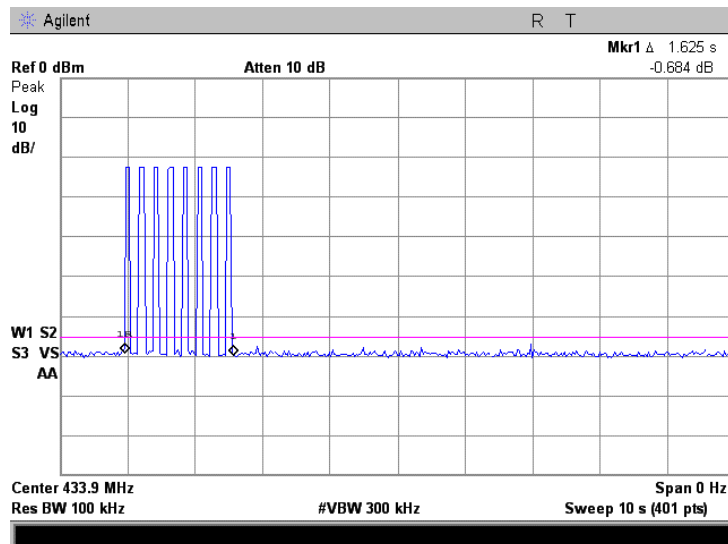


Test specification:	FCC Part 15, Section 231(a) / RSS-210, Section A1.1.1, Periodic operation requirements		
Test procedure:	Supplier declaration		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	2/13/2008 8:48:01 AM		
Temperature: 22°C	Air Pressure: 1019 hPa	Relative Humidity: 36%	Power Supply: 3 V battery
Remarks:			

Plot 7.1.3 Tamper alarm (open cover) test result

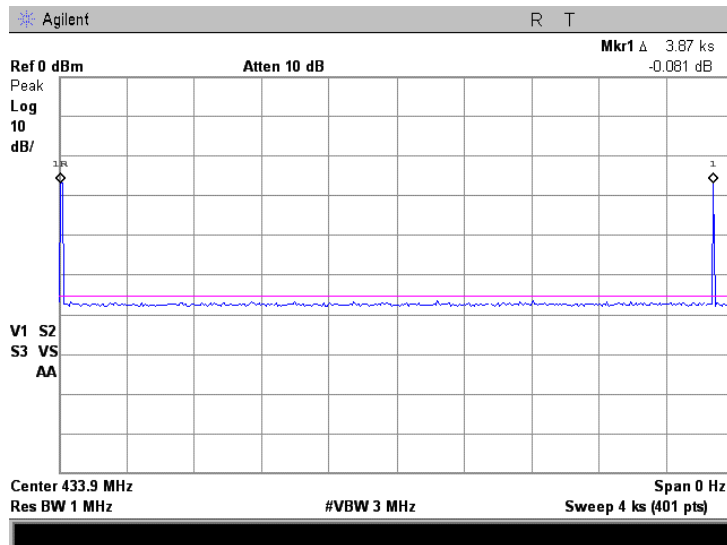


Plot 7.1.4 Tamper alarm (close cover) test result

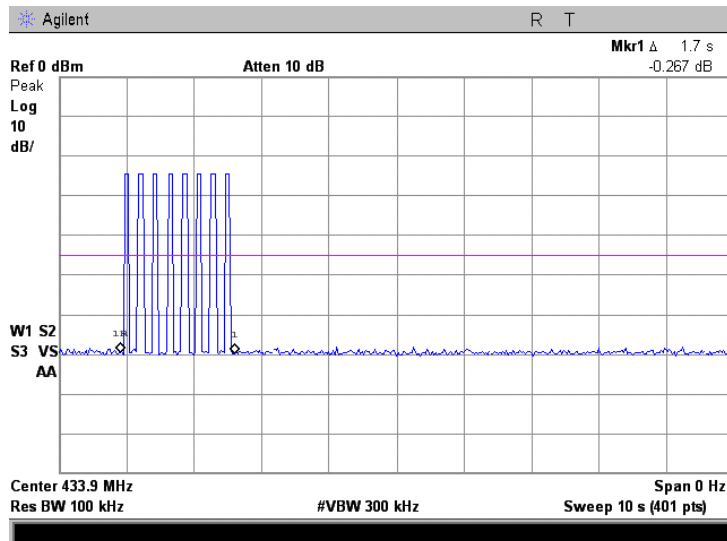


Test specification:	FCC Part 15, Section 231(a) / RSS-210, Section A1.1.1, Periodic operation requirements		
Test procedure:	Supplier declaration		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	2/13/2008 8:48:01 AM		
Temperature: 22°C	Air Pressure: 1019 hPa	Relative Humidity: 36%	Power Supply: 3 V battery
Remarks:			

Plot 7.1.5 Polling / supervision transmission within 1 hour

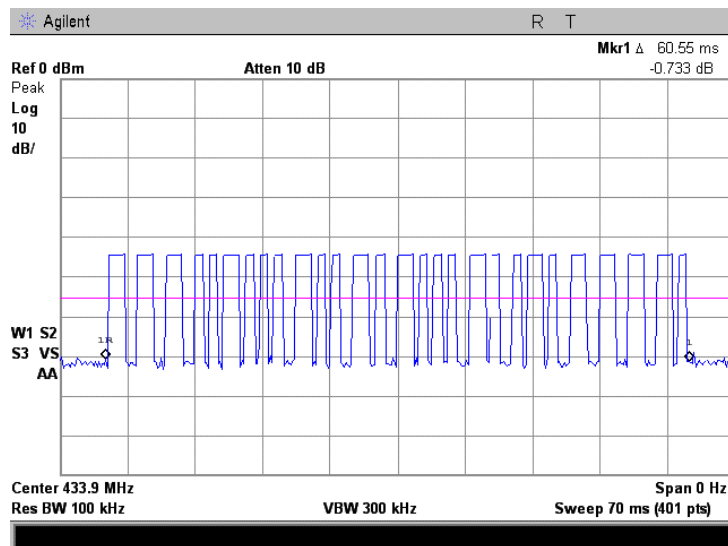


Plot 7.1.6 Polling / supervision transmission duration

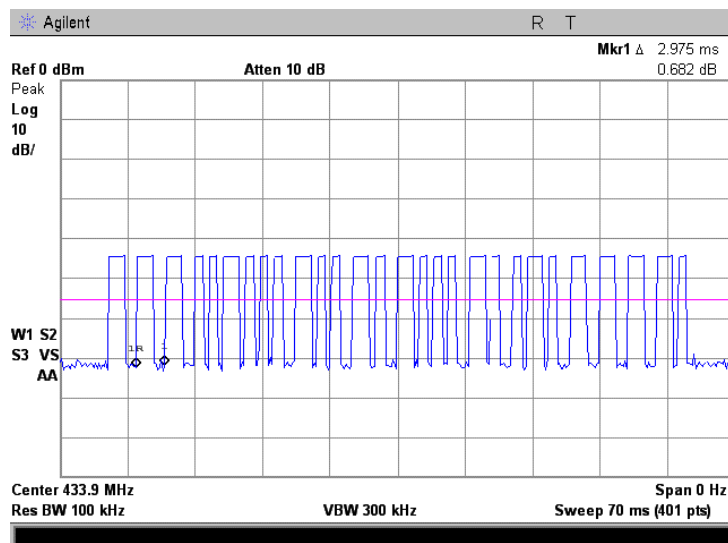


Test specification:	FCC Part 15, Section 231(a) / RSS-210, Section A1.1.1, Periodic operation requirements		
Test procedure:	Supplier declaration		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	2/13/2008 8:48:01 AM		
Temperature: 22°C	Air Pressure: 1019 hPa	Relative Humidity: 36%	Power Supply: 3 V battery
Remarks:			

Plot 7.1.7 Polling / supervision burst duration

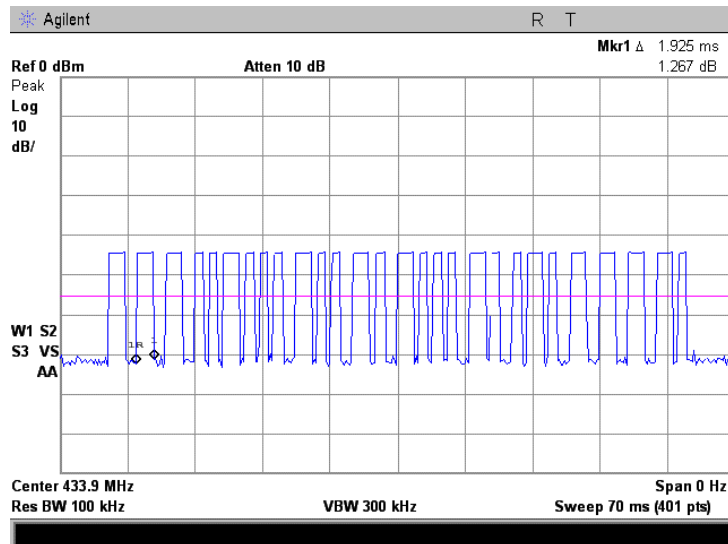


Plot 7.1.8 Polling / supervision pulse period



Test specification:	FCC Part 15, Section 231(a) / RSS-210, Section A1.1.1, Periodic operation requirements		
Test procedure:	Supplier declaration		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	2/13/2008 8:48:01 AM		
Temperature: 22°C	Air Pressure: 1019 hPa	Relative Humidity: 36%	Power Supply: 3 V battery
Remarks:			

Plot 7.1.9 Polling / supervision pulse duration



Test specification:	FCC Part 15, Section 231(a) / RSS-210, Section A1.1.1, Periodic operation requirements		
Test procedure:	Supplier declaration		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	2/13/2008 8:48:01 AM		
Temperature: 22°C	Air Pressure: 1019 hPa	Relative Humidity: 36%	Power Supply: 3 V battery
Remarks:			

Table 7.1.2 Total duration of polling / supervision transmissions

Duration, ms	Repetition period, ms	Maximum duration of transmissions within 1 hour (ms)	Total duration within 1 hour, ms
313.44	3870000	2000	313.44

Supervision Duration = {(Burst length / Pulse period) x Pulse duration} x number of bursts within transmission =
 ={(60.55 / 2.975) x 1.925} x 8 = 313.44 ms

Reference numbers of test equipment used

HL 1481	HL 2909	HL 3323				
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Full description is given in Appendix A.

Test specification:	FCC Part 15, Section 231(b) / RSS-210, Section A1.1.2, Field strength of emissions		
Test procedure:	ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	2/28/2008 5:09:06 PM		
Temperature: 22°C	Air Pressure: 1015 hPa	Relative Humidity: 38%	Power Supply: 3 V battery
Remarks:			

7.2 Field strength of emissions

7.2.1 General

This test was performed to measure field strength of fundamental and spurious emissions from the EUT. Specification test limits are given in Table 7.2.1 and Table 7.2.2.

Table 7.2.1 Radiated fundamental emission limits

Fundamental frequency, MHz	Field strength at 3 m, dB(μV/m)	
	Peak	Average
433.92	100.8	80.8

Table 7.2.2 Radiated spurious emissions limits

Frequency, MHz	Field strength at 3 m, dB(μV/m)				
	Within restricted bands			Outside restricted bands	
	Peak	Quasi Peak	Average	Peak	Average
0.009 – 0.090	148.5 – 128.5	NA	128.5 – 108.5**	80.8	60.8
0.090 – 0.110	NA	108.5 – 106.8**	NA		
0.110 – 0.490	126.8 – 113.8	NA	106.8 – 93.8**		
0.490 – 1.705	NA	73.8 – 63.0**	NA		
1.705 – 30.0*		69.5			
30 – 88		40.0			
88 – 216		43.5			
216 – 960		46.0			
960 - 1000		54.0			
Above 1000	74.0	NA	54.0		

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

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

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

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

Note 1: The fundamental emission limit in dB(μV/m) was calculated as follows:

$$\text{Lim}_{AVR} = 20 \times \log(56.81818 \times F - 6136.3636) - \text{within } 130 - 174 \text{ MHz band};$$

$$\text{Lim}_{AVR} = 20 \times \log(41.6667 \times F - 7083.3333) - \text{within } 260 - 470 \text{ MHz band},$$

where F is the carrier frequency in MHz.

The limit for spurious emissions was 20 dB lower than fundamental emission limit.

The above limits provided in terms of average values, peak limit was 20 dB above the average limit.

Note 2: The above field strength limits applied from the lowest radio frequency generated in the device, without going below 9 kHz up to the tenth harmonic of the highest fundamental frequency.

Test specification:	FCC Part 15, Section 231(b) / RSS-210, Section A1.1.2, Field strength of emissions		
Test procedure:	ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	2/28/2008 5:09:06 PM		
Temperature: 22°C	Air Pressure: 1015 hPa	Relative Humidity: 38%	Power Supply: 3 V battery
Remarks:			

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

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

7.2.2.2 The measurements were performed in three EUT orthogonal positions.

7.2.2.3 The specified frequency range was investigated with antenna connected to spectrum analyzer/ EMI receiver. To find maximum radiation the turntable was rotated 360° and the measuring antenna was rotated around its vertical axis.

7.2.2.4 The worst test results (the lowest margins) found in the EUT "X-axis" orthogonal position were recorded in Table 7.2.3, Table 7.2.5 and shown in the associated plots.

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

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

7.2.3.2 The measurements were performed in three EUT orthogonal positions.

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

7.2.3.4 The worst test results (the lowest margins) found in the EUT "X-axis" orthogonal position were recorded in Table 7.2.3, Table 7.2.5 and shown in the associated plots.

Test specification:	FCC Part 15, Section 231(b) / RSS-210, Section A1.1.2, Field strength of emissions		
Test procedure:	ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	2/28/2008 5:09:06 PM		
Temperature: 22°C	Air Pressure: 1015 hPa	Relative Humidity: 38%	Power Supply: 3 V battery
Remarks:			

Figure 7.2.1 Setup for spurious emission field strength measurements below 30 MHz

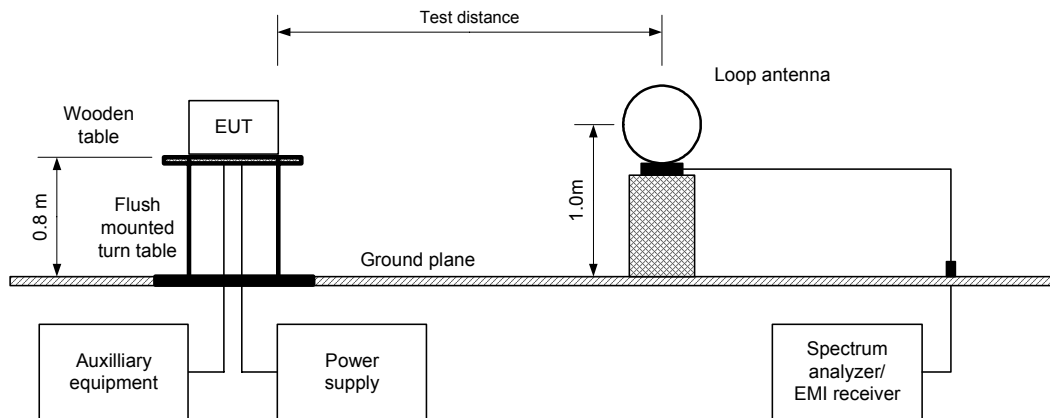
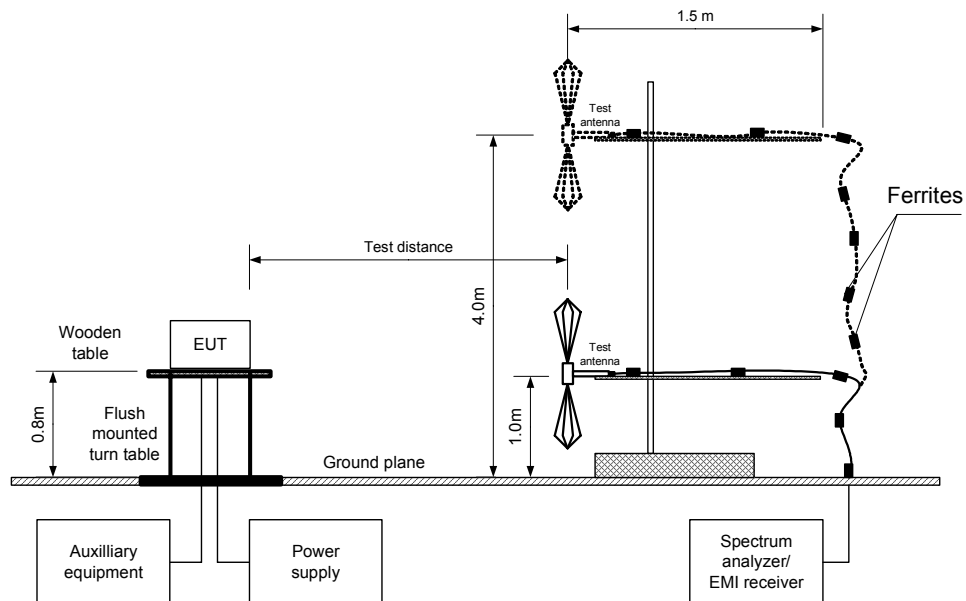


Figure 7.2.2 Setup for spurious emission field strength measurements above 30 MHz



Test specification:	FCC Part 15, Section 231(b) / RSS-210, Section A1.1.2, Field strength of emissions		
Test procedure:	ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	2/28/2008 5:09:06 PM		
Temperature: 22°C	Air Pressure: 1015 hPa	Relative Humidity: 38%	Power Supply: 3 V battery
Remarks:			

Table 7.2.3 Field strength of fundamental emission, spurious emissions outside restricted bands and within restricted bands at frequencies above 1 GHz

TEST DISTANCE: 3 m
EUT POSITION: 3 orthogonal (X / Y / Z)
MODULATION: ASK
MODULATING SIGNAL: ID code
BIT RATE: 666 bps
TRANSMITTER OUTPUT POWER SETTINGS: Maximum
INVESTIGATED FREQUENCY RANGE: 0.009 - 4500 MHz
DETECTOR USED: Peak
RESOLUTION BANDWIDTH: 1 kHz (9 kHz – 150 kHz)
9.0 kHz (150 kHz – 30 MHz)
120 kHz (30 MHz – 1000 MHz)
1.0 MHz (above 1000 MHz)
VIDEO BANDWIDTH: ≥ Resolution bandwidth
TEST ANTENNA TYPE: Active loop (9 kHz – 30 MHz)
Biconilog (30 MHz – 1000 MHz)
Double ridged guide (above 1000 MHz)

F, MHz	Antenna		Azimuth, degrees*	Peak field strength			Avr factor, dB	Average field strength			Verdict
	Pol.	Height, m		Measured, dB(μV/m)	Limit, dB(μV/m)	Margin, dB**		Measured, dB(μV/m)	Limit, dB(μV/m)	Margin, dB**	
Fundamental emission											
433.92	V	1.10	69	87.67	100.8	-13.13	-8.03	79.64	80.8	-1.16	Pass
Spurious emissions											
867.842	V	1.20	0	35.82	80.8	-44.98	-8.03	27.8	60.8	-33.01	Pass
955.779	H	1.30	240	35.90	80.8	-44.90	-8.03	27.9	60.8	-32.93	

The recorded test results were obtained throughout measurements in the EUT “X-axis” position

- *- EUT front panel refers to 0 degrees position of turntable.
- ** - Margin = dB below (negative if above) specification limit.

Table 7.2.4 Average factor calculation

Transmission pulse		Transmission burst		Transmission train duration, ms	Average factor, dB
Duration, ms	Period, ms	Duration, ms	Period, ms		
2	3	59.52	214.88	1587.5	-8.03

*- Average factor was calculated as follows

for pulse train shorter than 100 ms:
$$\text{Average factor} = 20 \times \log_{10} \left(\frac{\text{Pulse duration}}{\text{Pulse period}} \times \frac{\text{Burst duration}}{\text{Train duration}} \times \text{Number of bursts within pulse train} \right)$$

for pulse train longer than 100 ms:
$$\text{Average factor} = 20 \times \log_{10} \left(\frac{\text{Pulse duration}}{\text{Pulse period}} \times \frac{\text{Burst duration}}{100 \text{ ms}} \times \text{Number of bursts within 100 ms} \right)$$

Pulse duration = 2 ms, pulse period = 3 ms
Burst duration = 59.52 ms, burst period = 214.88 ms
Average Factor = $20 \times \log(2/3 * 59.52 / 100) * 1 = -8.03 \text{ dB}$

Reference numbers of test equipment used

HL 0415	HL 0446	HL 0521	HL 0589	HL 0604	HL 1430	HL 1947	HL 2432
HL 2871							

Full description is given in Appendix A.

Test specification:	FCC Part 15, Section 231(b) / RSS-210, Section A1.1.2, Field strength of emissions		
Test procedure:	ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	2/28/2008 5:09:06 PM		
Temperature: 22°C	Air Pressure: 1015 hPa	Relative Humidity: 38%	Power Supply: 3 V battery
Remarks:			

Table 7.2.5 Field strength of emissions below 1 GHz within restricted bands

TEST DISTANCE: 3 m
 EUT POSITION: 3 orthogonal (X / Y / Z)
 MODULATION: ASK
 MODULATING SIGNAL: ID code
 BIT RATE: 666 bps
 TRANSMITTER OUTPUT POWER SETTINGS: Maximum
 INVESTIGATED FREQUENCY RANGE: 0.009 – 1000 MHz
 DETECTOR USED: Peak
 RESOLUTION BANDWIDTH: 1 kHz (9 kHz – 150 kHz)
 9.0 kHz (150 kHz – 30 MHz)
 120 kHz (30 MHz – 1000 MHz)
 VIDEO BANDWIDTH: ≥ Resolution bandwidth
 TEST ANTENNA TYPE: Active loop (9 kHz – 30 MHz)
 Biconilog (30 MHz – 1000 MHz)

Frequency, MHz	Peak emission, dB(μV/m)	Quasi-peak			Antenna polarization	Antenna height, m	Turn-table position**, degrees	Verdict
		Measured emission, dB(μV/m)	Limit, dB(μV/m)	Margin, dB*				
No emissions were found								Pass

*- Margin = Measured emission - specification limit.

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

Reference numbers of test equipment used

HL 0415	HL 0446	HL 0521	HL 0589	HL 0604	HL 1430	HL 1947	HL 2432
HL 2871							

Full description is given in Appendix A.

Test specification:	FCC Part 15, Section 231(b) / RSS-210, Section A1.1.2, Field strength of emissions			
Test procedure:	ANSI C63.4, Section 13.1.4			
Test mode:	Compliance	Verdict:		PASS
Date & Time:	2/28/2008 5:09:06 PM			
Temperature: 22°C	Air Pressure: 1015 hPa	Relative Humidity: 38%	Power Supply: 3 V battery	
Remarks:				

Table 7.2.6 Restricted bands according to FCC 15, Section 205

MHz	MHz	MHz	MHz	MHz	GHz
0.09 - 0.11	8.37625 - 8.38675	73 - 74.6	399.9 - 410	2690 - 2900	10.6 - 12.7
0.495 - 0.505	8.41425 - 8.41475	74.8 - 75.2	608 - 614	3260 - 3267	13.25 - 13.4
2.1735 - 2.1905	12.290 - 12.293	108 - 121.94	960 - 1240	3332 - 3339	14.47 - 14.5
4.125 - 4.128	12.51975 - 12.52025	123 - 138	1300 - 1427	3345.8 - 3358	15.35 - 16.2
4.17725 - 4.17775	12.57675 - 12.57725	149.9 - 150.05	1435 - 1626.5	3600 - 4400	17.7 - 21.4
4.20725 - 4.20775	13.36 - 13.41	156.52475 - 156.52525	1645.5 - 1646.5	4500 - 5150	22.01 - 23.12
6.215 - 6.218	16.420 - 16.423	156.7 - 156.9	1660 - 1710	5350 - 5460	23.6 - 24
6.26775 - 6.26825	16.69475 - 16.69525	162.0125 - 167.17	1718.8 - 1722.2	7250 - 7750	31.2 - 31.8
6.31175 - 6.31225	16.80425 - 16.80475	167.72 - 173.2	2200 - 2300	8025 - 8500	36.43 - 36.5
8.291 - 8.294	25.5 - 25.67	240 - 285	2310 - 2390	9000 - 9200	
8.362 - 8.366	37.5 - 38.25	322 - 335.4	2483.5 - 2500	9300 - 9500	Above 38.6

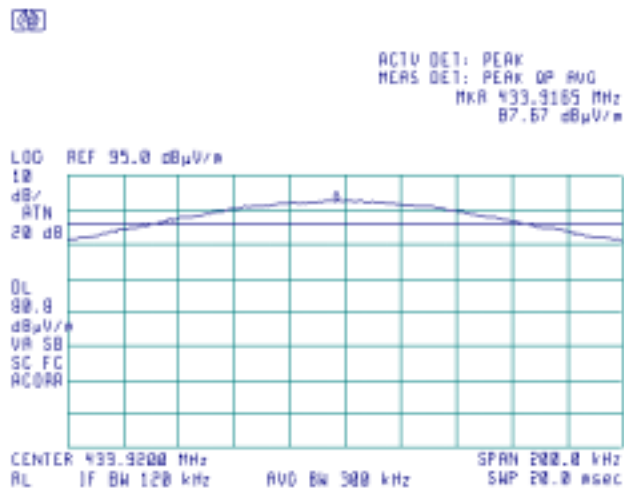
Table 7.2.7 Restricted bands according to RSS-210, Section 2.7

MHz	MHz	MHz	MHz	MHz	GHz
0.09 - 0.11	8.291 - 8.294	16.80425 - 16.80475	399.9 - 410	3260 - 3267	10.6 - 12.7
2.1735 - 2.190	8.362 - 8.366	25.5 - 25.67	608 - 614	3332 - 3339	13.25 - 13.4
3.020 - 3.026	8.37625 - 8.38675	37.5 - 38.25	960 - 1427	3345.8 - 3358	14.47 - 14.5
4.125 - 4.128	8.41425 - 8.41475	73 - 74.6	1435 - 1626.5	3500 - 4400	15.35 - 16.2
4.17725 - 4.17775	12.290 - 12.293	74.8 - 75.2	1645.5 - 1646.5	4500 - 5150	17.7 - 21.4
4.20725 - 4.20775	12.51975 - 12.52025	108 - 138	1660 - 1710	5350 - 5460	22.01 - 23.12
5.677 - 5.683	12.57675 - 12.57725	156.52475 - 156.52525	1718.8 - 1722.2	7250 - 7750	23.6 - 24.0
6.215 - 6.218	13.36 - 13.41	156.7 - 156.9	2200 - 2300	8025 - 8500	31.2 - 31.8
6.26775 - 6.26825	16.42 - 16.423	240 - 285	2310 - 2390	9000 - 9200	36.43 - 36.5
6.31175 - 6.31225	16.69475 - 16.69525	322 - 335.4	2655 - 2900	9300 - 9500	Above 38.6

Test specification:	FCC Part 15, Section 231(b) / RSS-210, Section A1.1.2, Field strength of emissions		
Test procedure:	ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	2/28/2008 5:09:06 PM		
Temperature: 22°C	Air Pressure: 1015 hPa	Relative Humidity: 38%	Power Supply: 3 V battery
Remarks:			

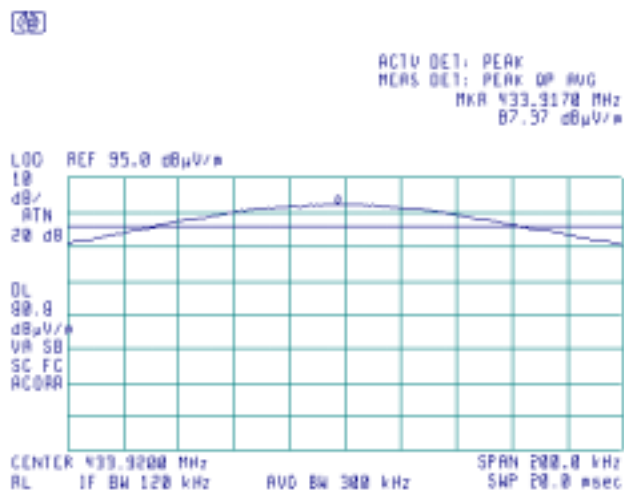
Plot 7.2.1 Radiated emission measurements at the fundamental frequency

TEST SITE: OATS
 TEST DISTANCE: 3 m
 ANTENNA POLARIZATION: Vertical
 EUT POSITION: 3 orthogonal (X/ Y/ Z)



Plot 7.2.2 Radiated emission measurements at the fundamental frequency

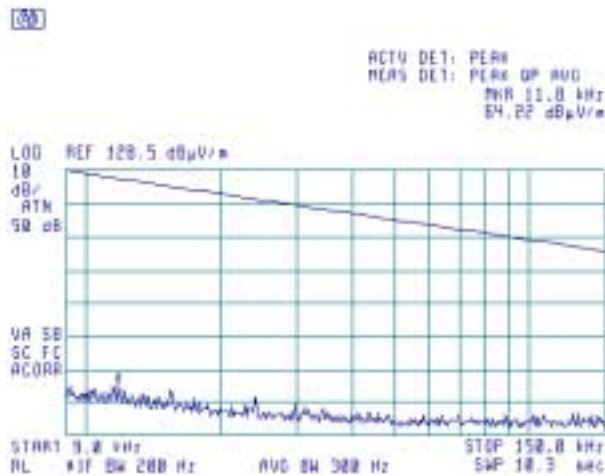
TEST SITE: OATS
 TEST DISTANCE: 3 m
 ANTENNA POLARIZATION: Horizontal
 EUT POSITION: 3 orthogonal (X/ Y/ Z)



Test specification:	FCC Part 15, Section 231(b) / RSS-210, Section A1.1.2, Field strength of emissions		
Test procedure:	ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	2/28/2008 5:09:06 PM		
Temperature: 22°C	Air Pressure: 1015 hPa	Relative Humidity: 38%	Power Supply: 3 V battery
Remarks:			

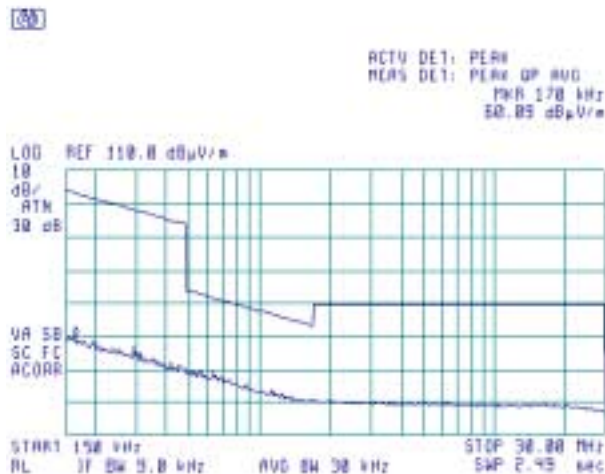
Plot 7.2.3 Radiated emission measurements from 9 to 150 kHz

TEST SITE: Semi anechoic chamber
 TEST DISTANCE: 3 m
 ANTENNA POLARIZATION: Vertical
 EUT POSITION: 3 orthogonal (X/ Y/ Z)



Plot 7.2.4 Radiated emission measurements from 0.15 to 30 MHz

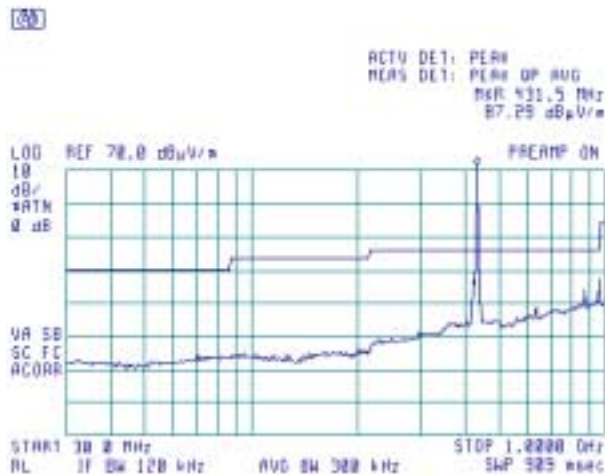
TEST SITE: Semi anechoic chamber
 TEST DISTANCE: 3 m
 ANTENNA POLARIZATION: Vertical
 EUT POSITION: 3 orthogonal (X/ Y/ Z)



Test specification:	FCC Part 15, Section 231(b) / RSS-210, Section A1.1.2, Field strength of emissions		
Test procedure:	ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	2/28/2008 5:09:06 PM		
Temperature: 22°C	Air Pressure: 1015 hPa	Relative Humidity: 38%	Power Supply: 3 V battery
Remarks:			

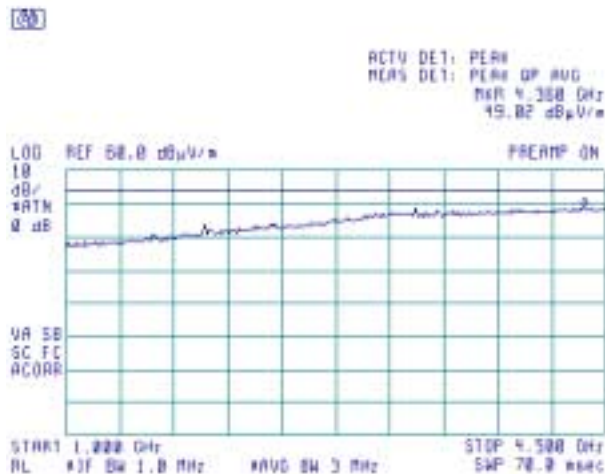
Plot 7.2.5 Radiated emission measurements from 30 to 1000 MHz

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal
EUT POSITION: 3 orthogonal (X/ Y/ Z)



Plot 7.2.6 Radiated emission measurements from 1000 to 4000 MHz

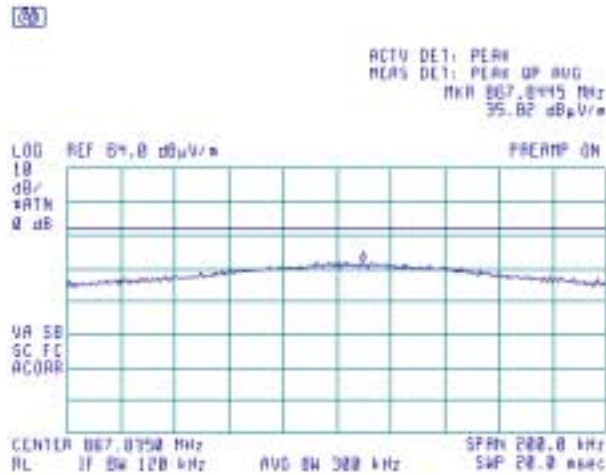
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal
EUT POSITION: 3 orthogonal (X/ Y/ Z)



Test specification:	FCC Part 15, Section 231(b) / RSS-210, Section A1.1.2, Field strength of emissions		
Test procedure:	ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	2/28/2008 5:09:06 PM		
Temperature: 22°C	Air Pressure: 1015 hPa	Relative Humidity: 38%	Power Supply: 3 V battery
Remarks:			

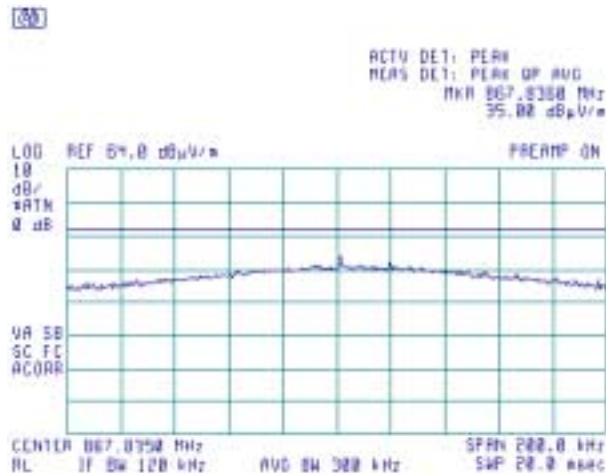
Plot 7.2.7 Radiated emission measurements at the second harmonic frequency

TEST SITE: Semi anechoic chamber
 TEST DISTANCE: 3 m
 ANTENNA POLARIZATION: Vertical
 EUT POSITION: 3 orthogonal (X/ Y/ Z)



Plot 7.2.8 Radiated emission measurements at the second harmonic frequency

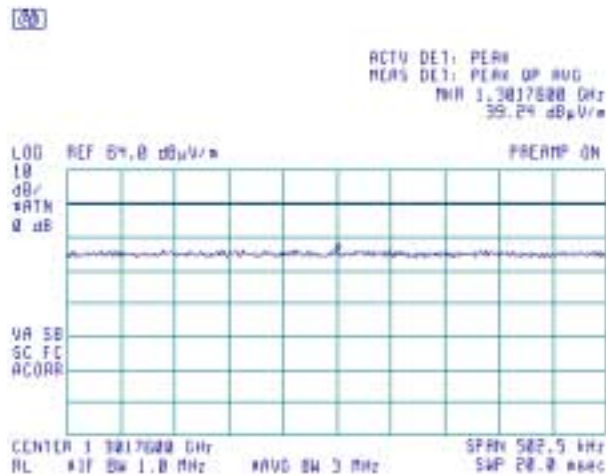
TEST SITE: Semi anechoic chamber
 TEST DISTANCE: 3 m
 ANTENNA POLARIZATION: Horizontal
 EUT POSITION: 3 orthogonal (X/ Y/ Z)



Test specification:	FCC Part 15, Section 231(b) / RSS-210, Section A1.1.2, Field strength of emissions		
Test procedure:	ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	2/28/2008 5:09:06 PM		
Temperature: 22°C	Air Pressure: 1015 hPa	Relative Humidity: 38%	Power Supply: 3 V battery
Remarks:			

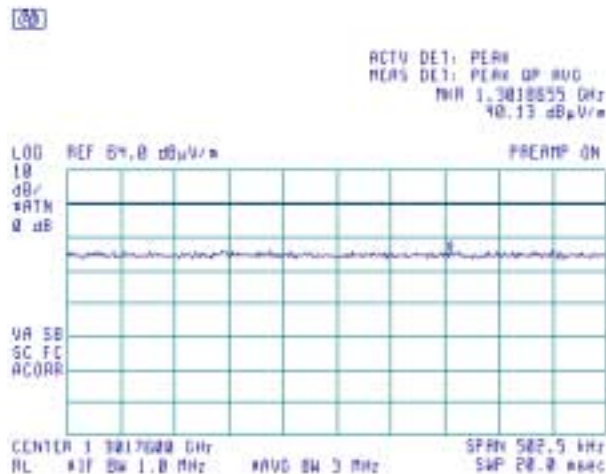
Plot 7.2.9 Radiated emission measurements at the third harmonic frequency

TEST SITE: Semi anechoic chamber
 TEST DISTANCE: 3 m
 ANTENNA POLARIZATION: Vertical
 EUT POSITION: 3 orthogonal (X/ Y/ Z)



Plot 7.2.10 Radiated emission measurements at the third harmonic frequency

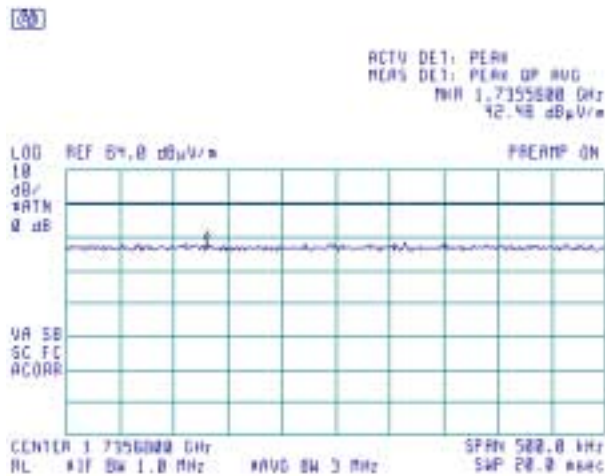
TEST SITE: Semi anechoic chamber
 TEST DISTANCE: 3 m
 ANTENNA POLARIZATION: Horizontal
 EUT POSITION: 3 orthogonal (X/ Y/ Z)



Test specification:	FCC Part 15, Section 231(b) / RSS-210, Section A1.1.2, Field strength of emissions		
Test procedure:	ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	2/28/2008 5:09:06 PM		
Temperature: 22°C	Air Pressure: 1015 hPa	Relative Humidity: 38%	Power Supply: 3 V battery
Remarks:			

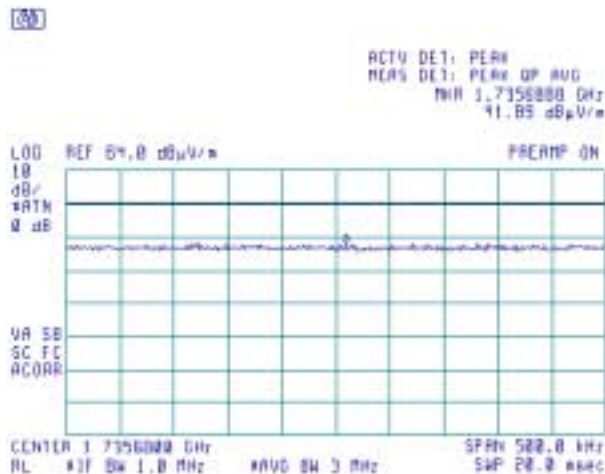
Plot 7.2.11 Radiated emission measurements at the fourth harmonic frequency

TEST SITE: Semi anechoic chamber
 TEST DISTANCE: 3 m
 ANTENNA POLARIZATION: Vertical
 EUT POSITION: 3 orthogonal (X/ Y/ Z)



Plot 7.2.12 Radiated emission measurements at the fourth harmonic frequency

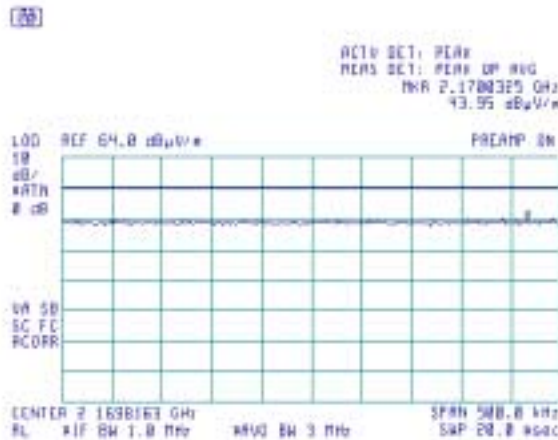
TEST SITE: Semi anechoic chamber
 TEST DISTANCE: 3 m
 ANTENNA POLARIZATION: Horizontal
 EUT POSITION: 3 orthogonal (X/ Y/ Z)



Test specification:	FCC Part 15, Section 231(b) / RSS-210, Section A1.1.2, Field strength of emissions		
Test procedure:	ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	2/28/2008 5:09:06 PM		
Temperature: 22°C	Air Pressure: 1015 hPa	Relative Humidity: 38%	Power Supply: 3 V battery
Remarks:			

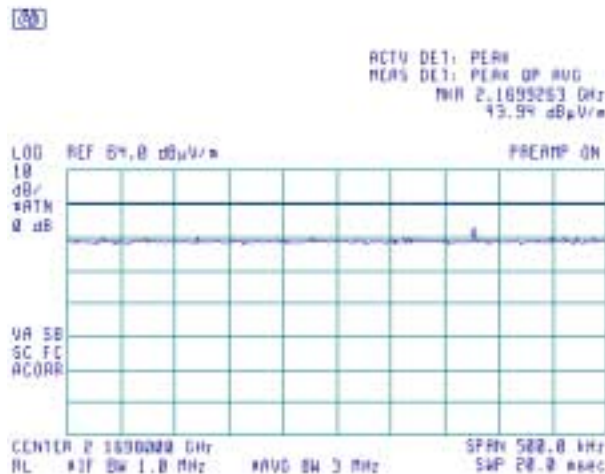
Plot 7.2.13 Radiated emission measurements at the fifth harmonic frequency

TEST SITE: Semi anechoic chamber
 TEST DISTANCE: 3 m
 ANTENNA POLARIZATION: Vertical
 EUT POSITION: 3 orthogonal (X/ Y/ Z)



Plot 7.2.14 Radiated emission measurements at the fifth harmonic frequency

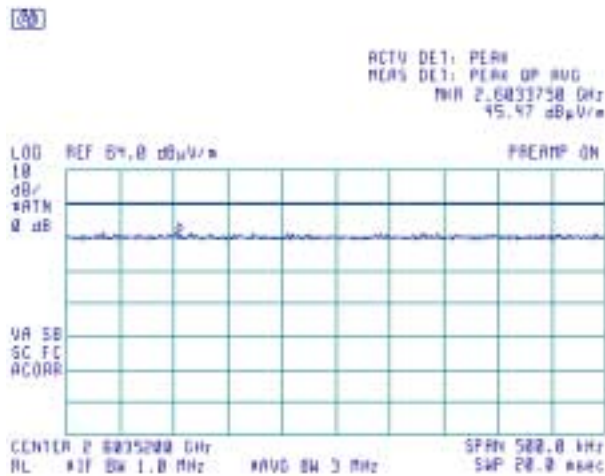
TEST SITE: Semi anechoic chamber
 TEST DISTANCE: 3 m
 ANTENNA POLARIZATION: Horizontal
 EUT POSITION: 3 orthogonal (X/ Y/ Z)



Test specification:	FCC Part 15, Section 231(b) / RSS-210, Section A1.1.2, Field strength of emissions		
Test procedure:	ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	2/28/2008 5:09:06 PM		
Temperature: 22°C	Air Pressure: 1015 hPa	Relative Humidity: 38%	Power Supply: 3 V battery
Remarks:			

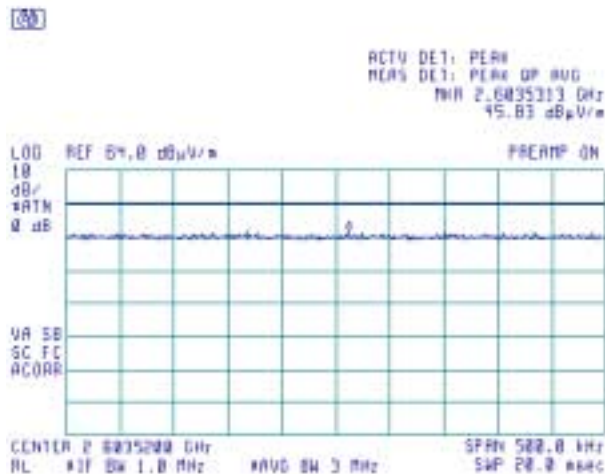
Plot 7.2.15 Radiated emission measurements at the sixth harmonic frequency

TEST SITE: Semi anechoic chamber
 TEST DISTANCE: 3 m
 ANTENNA POLARIZATION: Vertical
 EUT POSITION: 3 orthogonal (X/ Y/ Z)



Plot 7.2.16 Radiated emission measurements at the sixth harmonic frequency

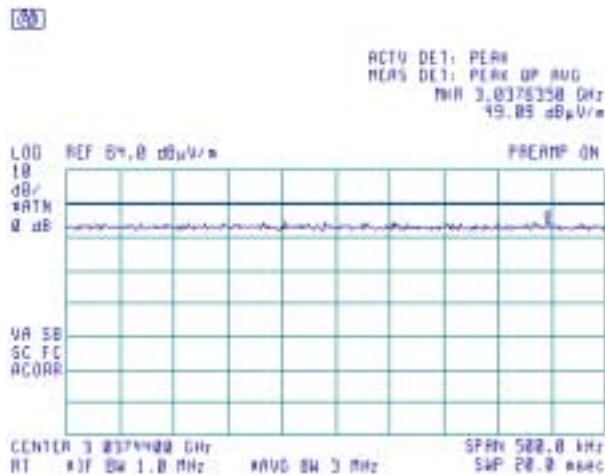
TEST SITE: Semi anechoic chamber
 TEST DISTANCE: 3 m
 ANTENNA POLARIZATION: Horizontal
 EUT POSITION: 3 orthogonal (X/ Y/ Z)



Test specification:	FCC Part 15, Section 231(b) / RSS-210, Section A1.1.2, Field strength of emissions		
Test procedure:	ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	2/28/2008 5:09:06 PM		
Temperature: 22°C	Air Pressure: 1015 hPa	Relative Humidity: 38%	Power Supply: 3 V battery
Remarks:			

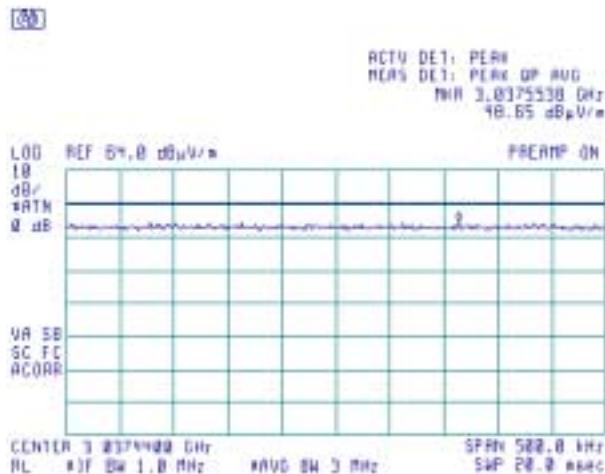
Plot 7.2.17 Radiated emission measurements at the seventh harmonic frequency

TEST SITE: Semi anechoic chamber
 TEST DISTANCE: 3 m
 ANTENNA POLARIZATION: Vertical
 EUT POSITION: 3 orthogonal (X/ Y/ Z)



Plot 7.2.18 Radiated emission measurements at the seventh harmonic frequency

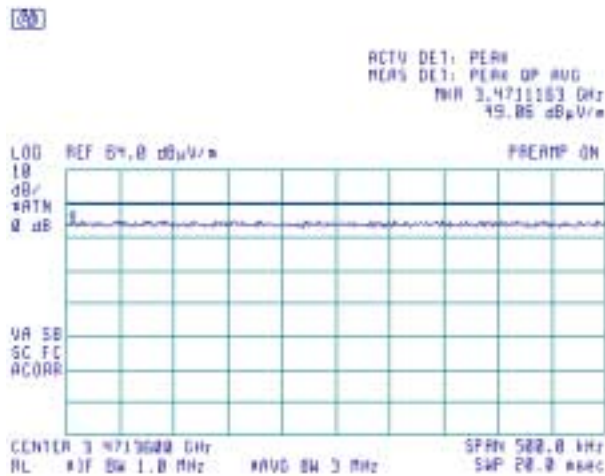
TEST SITE: Semi anechoic chamber
 TEST DISTANCE: 3 m
 ANTENNA POLARIZATION: Horizontal
 EUT POSITION: 3 orthogonal (X/ Y/ Z)



Test specification:	FCC Part 15, Section 231(b) / RSS-210, Section A1.1.2, Field strength of emissions		
Test procedure:	ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	2/28/2008 5:09:06 PM		
Temperature: 22°C	Air Pressure: 1015 hPa	Relative Humidity: 38%	Power Supply: 3 V battery
Remarks:			

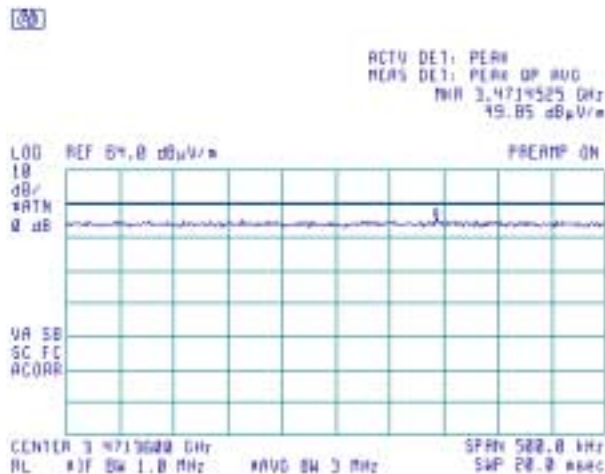
Plot 7.2.19 Radiated emission measurements at the eighth harmonic frequency

TEST SITE: Semi anechoic chamber
 TEST DISTANCE: 3 m
 ANTENNA POLARIZATION: Vertical
 EUT POSITION: 3 orthogonal (X/ Y/ Z)



Plot 7.2.20 Radiated emission measurements at the eighth harmonic frequency

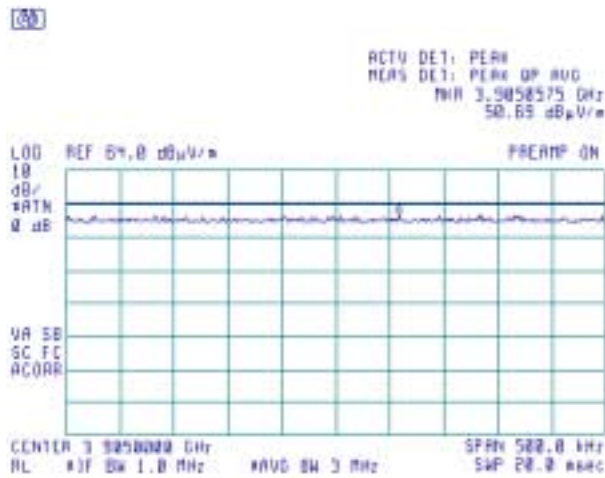
TEST SITE: Semi anechoic chamber
 TEST DISTANCE: 3 m
 ANTENNA POLARIZATION: Horizontal
 EUT POSITION: 3 orthogonal (X/ Y/ Z)



Test specification:	FCC Part 15, Section 231(b) / RSS-210, Section A1.1.2, Field strength of emissions		
Test procedure:	ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	2/28/2008 5:09:06 PM		
Temperature: 22°C	Air Pressure: 1015 hPa	Relative Humidity: 38%	Power Supply: 3 V battery
Remarks:			

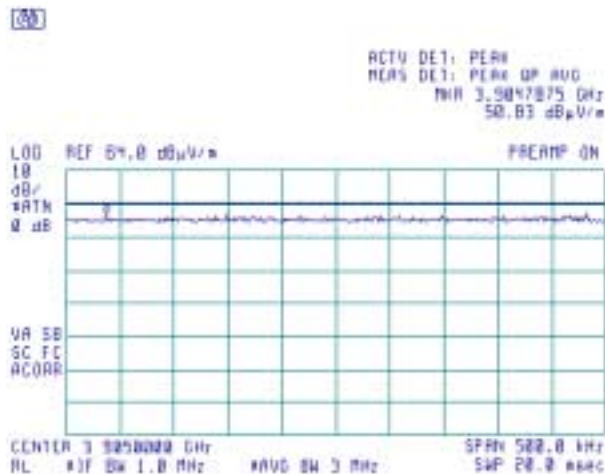
Plot 7.2.21 Radiated emission measurements at the ninth harmonic frequency

TEST SITE: Semi anechoic chamber
 TEST DISTANCE: 3 m
 ANTENNA POLARIZATION: Vertical
 EUT POSITION: 3 orthogonal (X/ Y/ Z)



Plot 7.2.22 Radiated emission measurements at the ninth harmonic frequency

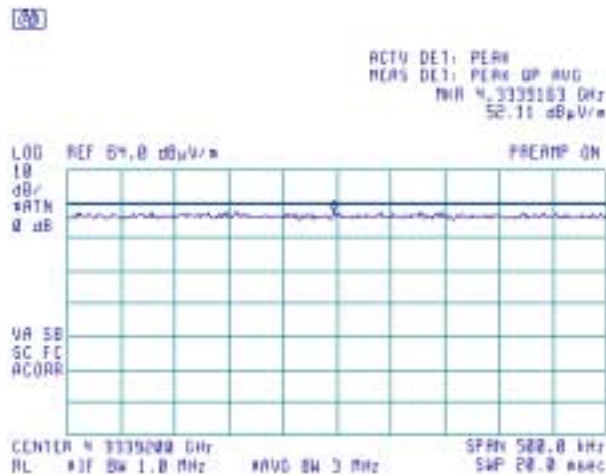
TEST SITE: Semi anechoic chamber
 TEST DISTANCE: 3 m
 ANTENNA POLARIZATION: Horizontal
 EUT POSITION: 3 orthogonal (X/ Y/ Z)



Test specification:	FCC Part 15, Section 231(b) / RSS-210, Section A1.1.2, Field strength of emissions		
Test procedure:	ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	2/28/2008 5:09:06 PM		
Temperature: 22°C	Air Pressure: 1015 hPa	Relative Humidity: 38%	Power Supply: 3 V battery
Remarks:			

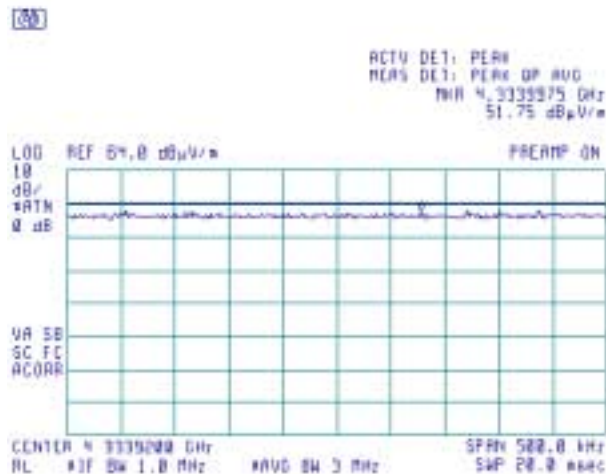
Plot 7.2.23 Radiated emission measurements at the tenth harmonic frequency

TEST SITE: Semi anechoic chamber
 TEST DISTANCE: 3 m
 ANTENNA POLARIZATION: Vertical
 EUT POSITION: 3 orthogonal (X/ Y/ Z)



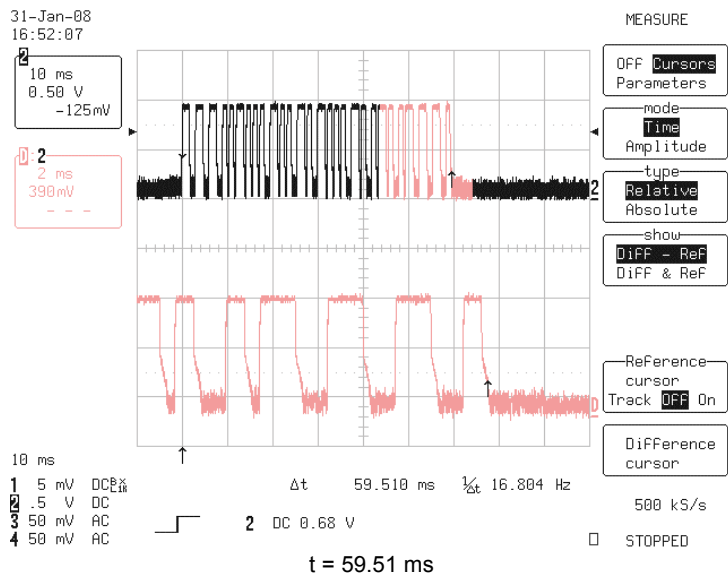
Plot 7.2.24 Radiated emission measurements at the tenth harmonic frequency

TEST SITE: Semi anechoic chamber
 TEST DISTANCE: 3 m
 ANTENNA POLARIZATION: Horizontal
 EUT POSITION: 3 orthogonal (X/ Y/ Z)

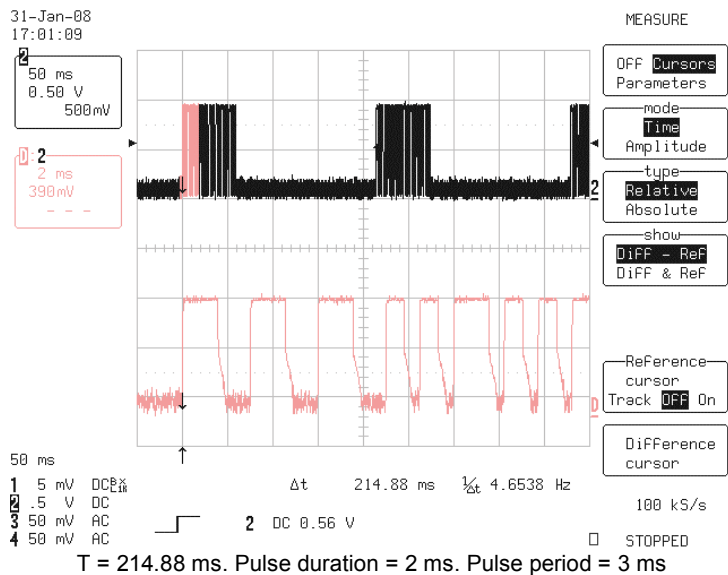


Test specification:	FCC Part 15, Section 231(b) / RSS-210, Section A1.1.2, Field strength of emissions		
Test procedure:	ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	2/28/2008 5:09:06 PM		
Temperature: 22°C	Air Pressure: 1015 hPa	Relative Humidity: 38%	Power Supply: 3 V battery
Remarks:			

Plot 7.2.25 Transmission burst duration

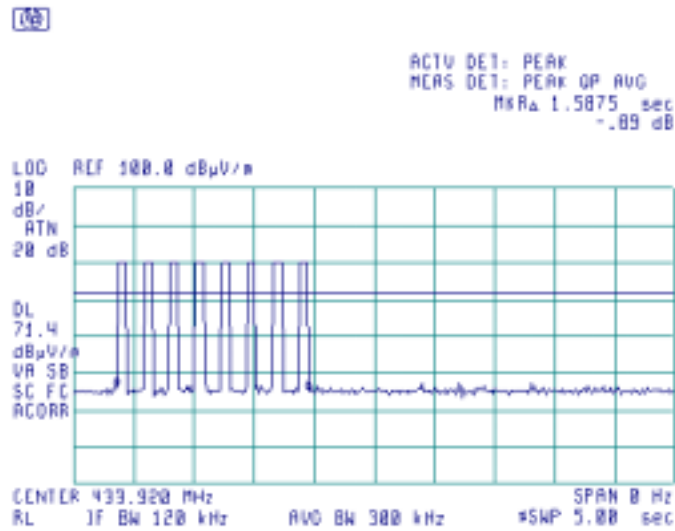


Plot 7.2.26 Transmission burst period

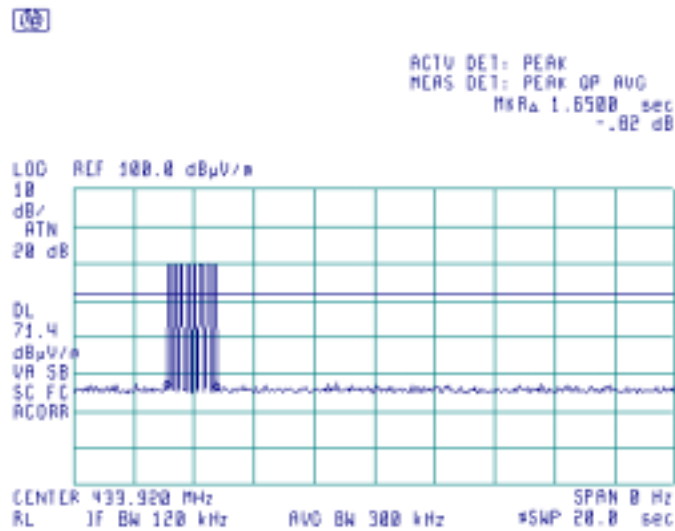


Test specification:	FCC Part 15, Section 231(b) / RSS-210, Section A1.1.2, Field strength of emissions		
Test procedure:	ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	2/28/2008 5:09:06 PM		
Temperature: 22°C	Air Pressure: 1015 hPa	Relative Humidity: 38%	Power Supply: 3 V battery
Remarks:			

Plot 7.2.27 Transmission train duration



Plot 7.2.28 Transmission train duration



Test specification:		FCC Part 15, Section 231(c) / RSS-210, Section A1.1.3, Occupied bandwidth	
Test procedure:		ANSI C63.4, Section 13.1.7	
Test mode:	Compliance	Verdict:	PASS
Date & Time:	2/5/2008 8:52:59 AM		
Temperature: 24°C	Air Pressure: 1022 hPa	Relative Humidity: 33%	Power Supply: 3 V battery
Remarks:			

7.3 Occupied bandwidth test

7.3.1 General

This test was performed to measure transmitter occupied bandwidth. Specification test limits are given in Table 7.3.1. The test results are provided in Table 7.3.2 and associated plots.

Table 7.3.1 Occupied bandwidth limits

Assigned frequency, MHz	Modulation envelope reference points*, dBc	Maximum allowed bandwidth, % of the carrier frequency
70 - 900	20.0	0.25
Above 900		0.50

*- Modulation envelope reference points provided in terms of attenuation below modulated carrier.

7.3.2 Test procedure

7.3.2.1 The EUT was set up as shown in Figure 7.3.1, energized and its proper operation was checked.

7.3.2.2 The EUT was set to transmit modulated carrier.

7.3.2.3 The transmitter occupied bandwidth was measured with spectrum analyzer as frequency delta between reference points on modulation envelope and provided in Table 7.3.2 and associated plot.

Figure 7.3.1 Occupied bandwidth test setup



Test specification:	FCC Part 15, Section 231(c) / RSS-210, Section A1.1.3, Occupied bandwidth		
Test procedure:	ANSI C63.4, Section 13.1.7		
Test mode:	Compliance	Verdict: PASS	
Date & Time:	2/5/2008 8:52:59 AM		
Temperature: 24°C	Air Pressure: 1022 hPa	Relative Humidity: 33%	Power Supply: 3 V battery
Remarks:			

Table 7.3.2 Occupied bandwidth test results

DETECTOR USED: Peak hold
 RESOLUTION BANDWIDTH: 100 kHz
 VIDEO BANDWIDTH: 300 kHz
 MODULATION ENVELOPE REFERENCE POINTS: 20 dBc
 MODULATION: ASK
 MODULATING SIGNAL: ID code
 BIT RATE: 666 bps

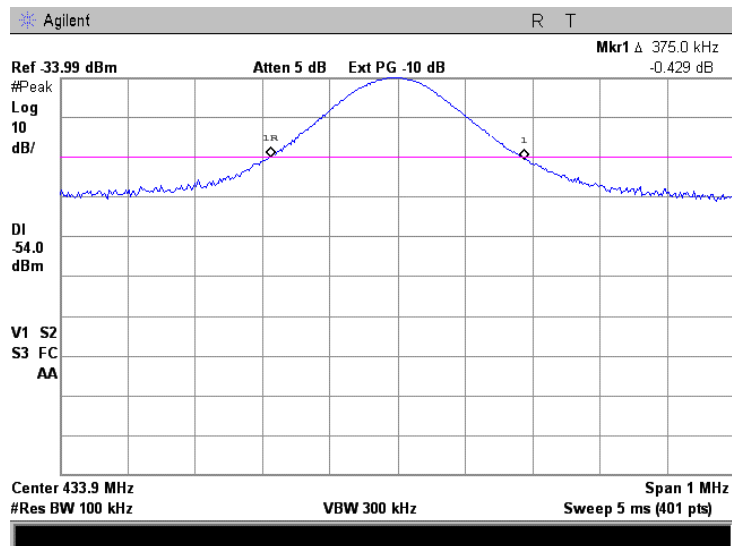
Carrier frequency, MHz	Occupied bandwidth, kHz	Limit		Margin, kHz	Verdict
		% of the carrier frequency	kHz		
433.92	375.0	0.25	1084.8	-709.8	Pass

Reference numbers of test equipment used

HL 1481	HL 2909	HL 3183					
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Full description is given in Appendix A.

Plot 7.3.1 Occupied bandwidth test result



Test specification:	FCC Part 15, Section 203 / RSS-Gen, Section 7.1.4, Antenna requirements		
Test procedure:	Visual inspection / supplier declaration		
Test mode:	Compliance	Verdict:	PASS
Date & Time:	2/4/2008 7:03:14 PM		
Temperature: 24°C	Air Pressure: 1022 hPa	Relative Humidity: 33%	Power Supply: 3 V battery
Remarks:			

7.4 Antenna requirements

The EUT was verified for compliance with antenna requirements. A transmitter shall be designed to ensure that no antenna other than that furnished by the responsible party will be used with the device. It may be either permanently attached or employs a unique antenna connector for every antenna proposed for use with the EUT. This requirement does not apply to professionally installed transmitters.

The rationale for compliance with the above requirements was either visual inspection results or supplier declaration. The summary of results is provided in Table 7.4.1.

Table 7.4.1 Antenna requirements

Requirement	Rationale	Verdict
The transmitter antenna is permanently attached	Visual inspection	Comply
The transmitter employs a unique antenna connector	NA	
The transmitter requires professional installation	NA	

Photograph 7.4.1 Antenna assembly



Test specification: FCC Part 15, Section 109 / ICES-003, Radiated emission	
Test procedure: ANSI C63.4, Sections 11.6 and 12.1.4 / CISPR 22	
Test mode: Compliance	Verdict: PASS
Date & Time: 2/3/2008 7:17:35 PM	
Temperature: 22°C	Air Pressure: 1025 hPa
Remarks:	

7.5 Radiated emission measurements

7.5.1 General

This test was performed to measure radiated emissions from the EUT enclosure. Specification test limits according to FCC Part 15, Section 109 are given in Table 7.5.1, according to ICES-003, Section 5 in Table 7.5.2.

Table 7.5.1 Radiated emission limits according to FCC Part 15, Section 109

Frequency, MHz	Class B limit, dB(μV/m)		Class A limit, dB(μV/m)	
	10 m distance	3 m distance	10 m distance	3 m distance
30 - 88	29.5*	40.0	39.0	49.5*
88 - 216	33.0*	43.5	43.5	54.0*
216 - 960	35.5*	46.0	46.4	56.9*
960 - 5 th harmonic**	43.5*	54.0	49.5	60.0*

Table 7.5.2 Radiated emission limits according to ICES-003, Section 5

Frequency, MHz	Class B limit, dB(μV/m)		Class A limit, dB(μV/m)	
	10 m distance	3 m distance	10 m distance	3 m distance
30 - 230	30	40.5*	40	50.5*
230 - 1000	37	47.5*	47	57.5*

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

7.5.2 Test procedure for measurements in semi-anechoic chamber

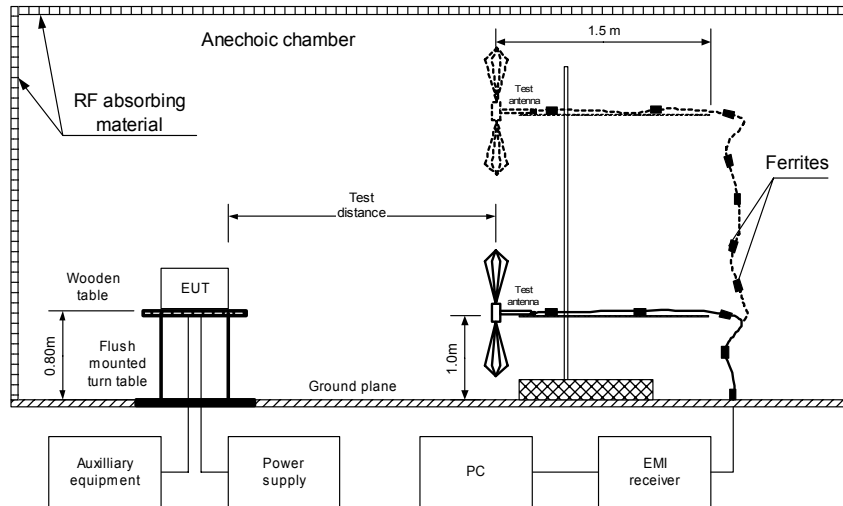
7.5.2.1 The EUT was set up as shown in Figure 7.5.1, energized and the performance check was conducted.

7.5.2.2 The specified frequency range was investigated with biconilog antenna connected to EMI receiver. To find maximum radiation the turntable was rotated 360°, the measuring antenna height was changed from 1 to 4 m, its polarization was switched from vertical to horizontal and the EUT cables position was varied.

7.5.2.3 The worst test results (the lowest margins) were provided in the associated tables and plots.

Test specification: FCC Part 15, Section 109 / ICES-003, Radiated emission			
Test procedure: ANSI C63.4, Sections 11.6 and 12.1.4 / CISPR 22			
Test mode: Compliance	Verdict: PASS		
Date & Time: 2/3/2008 7:17:35 PM			
Temperature: 22°C	Air Pressure: 1025 hPa	Relative Humidity: 43%	Power Supply: 3 V battery
Remarks:			

Figure 7.5.1 Setup for radiated emission measurements in anechoic chamber, table-top equipment



Test specification: FCC Part 15, Section 109 / ICES-003, Radiated emission			
Test procedure: ANSI C63.4, Sections 11.6 and 12.1.4 / CISPR 22			
Test mode: Compliance	Verdict: PASS		
Date & Time: 2/3/2008 7:17:35 PM			
Temperature: 22°C	Air Pressure: 1025 hPa	Relative Humidity: 43%	Power Supply: 3 V battery
Remarks:			

Table 7.5.3 Radiated emission test results according to FCC Part 15, Section 109

EUT SET UP: TABLE-TOP
LIMIT: Class B
EUT OPERATING MODE: Stand-by and Receive
TEST SITE: SEMI ANECHOIC CHAMBER
TEST DISTANCE: 3 m
FREQUENCY RANGE: 30 MHz – 1000 MHz
RESOLUTION BANDWIDTH: 120 kHz

Frequency, MHz	Peak emission, dB(μV/m)	Quasi-peak			Antenna polarization	Antenna height, m	Turn-table position**, degrees	Verdict
		Measured emission, dB(μV/m)	Limit, dB(μV/m)	Margin, dB*				
No spurious were found								Pass

TEST SITE: SEMI ANECHOIC CHAMBER
TEST DISTANCE: 3 m
FREQUENCY RANGE: 1000 MHz – 2000 MHz
RESOLUTION BANDWIDTH: 1000 kHz

Frequency, MHz	Peak emission, dB(μV/m)	Quasi-peak			Antenna polarization	Antenna height, m	Turn-table position**, degrees	Verdict
		Measured emission, dB(μV/m)	Limit, dB(μV/m)	Margin, dB*				
No spurious were found								Pass

Test specification:		FCC Part 15, Section 109 / ICES-003, Radiated emission	
Test procedure:		ANSI C63.4, Sections 11.6 and 12.1.4 / CISPR 22	
Test mode:	Compliance	Verdict:	PASS
Date & Time:	2/3/2008 7:17:35 PM		
Temperature: 22°C	Air Pressure: 1025 hPa	Relative Humidity: 43%	Power Supply: 3 V battery
Remarks:			

Table 7.5.4 Radiated emission test results according to ICES-003, Section 5

EUT SET UP: TABLE-TOP
 EUT OPERATING MODE: Receive
 TEST SITE: SEMI ANECHOIC CHAMBER
 TEST DISTANCE: 3 m
 FREQUENCY RANGE: 30 MHz – 1000 MHz
 RESOLUTION BANDWIDTH: 120 kHz

Frequency, MHz	Peak emission, dB(μV/m)	Quasi-peak			Antenna polarization	Antenna height, m	Turn-table position**, degrees	Verdict
		Measured emission, dB(μV/m)	Limit, dB(μV/m)	Margin, dB*				
No spurious were found								Pass

TEST SITE: SEMI ANECHOIC CHAMBER
 TEST DISTANCE: 3 m
 FREQUENCY RANGE: 1000 MHz – 2000 MHz
 RESOLUTION BANDWIDTH: 1000 kHz

Frequency, MHz	Peak emission, dB(μV/m)	Quasi-peak			Antenna polarization	Antenna height, m	Turn-table position**, degrees	Verdict
		Measured emission, dB(μV/m)	Limit, dB(μV/m)	Margin, dB*				
No spurious were found								Pass

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

Reference numbers of test equipment used

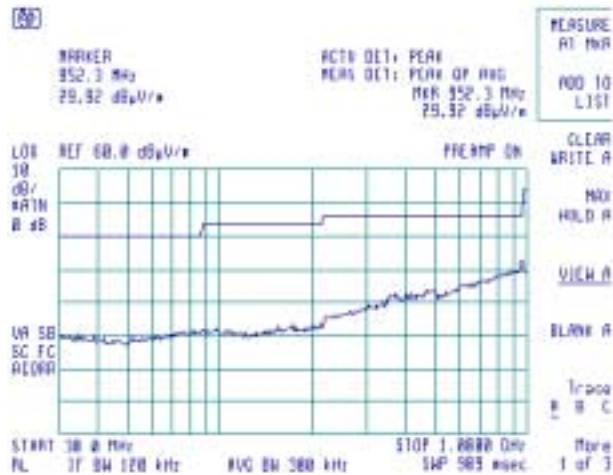
HL 0521	HL 0604	HL 1947	HL 2432	HL 2871			
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Full description is given in Appendix A.

Test specification: FCC Part 15, Section 109 / ICES-003, Radiated emission			
Test procedure: ANSI C63.4, Sections 11.6 and 12.1.4 / CISPR 22			
Test mode: Compliance	Verdict: PASS		
Date & Time: 2/3/2008 7:17:35 PM			
Temperature: 22°C	Air Pressure: 1025 hPa	Relative Humidity: 43%	Power Supply: 3 V battery
Remarks:			

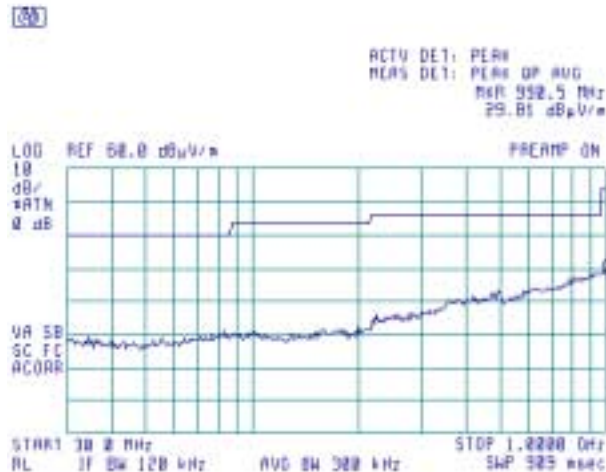
Plot 7.5.1 Radiated emission measurements in 30 - 1000 MHz range, vertical antenna polarization

TEST SITE: Semi anechoic chamber
LIMIT: Class B
TEST DISTANCE: 3 m
EUT OPERATING MODE: Receive / Stand-by



Plot 7.5.2 Radiated emission measurements in 30 - 1000 MHz range, horizontal antenna polarization

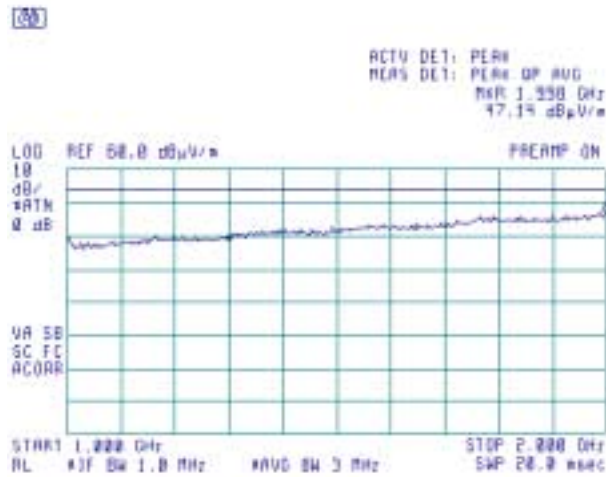
TEST SITE: Semi anechoic chamber
LIMIT: Class B
TEST DISTANCE: 3 m
EUT OPERATING MODE: Receive / Stand-by



Test specification: FCC Part 15, Section 109 / ICES-003, Radiated emission			
Test procedure: ANSI C63.4, Sections 11.6 and 12.1.4 / CISPR 22			
Test mode: Compliance	Verdict: PASS		
Date & Time: 2/3/2008 7:17:35 PM			
Temperature: 22°C	Air Pressure: 1025 hPa	Relative Humidity: 43%	Power Supply: 3 V battery
Remarks:			

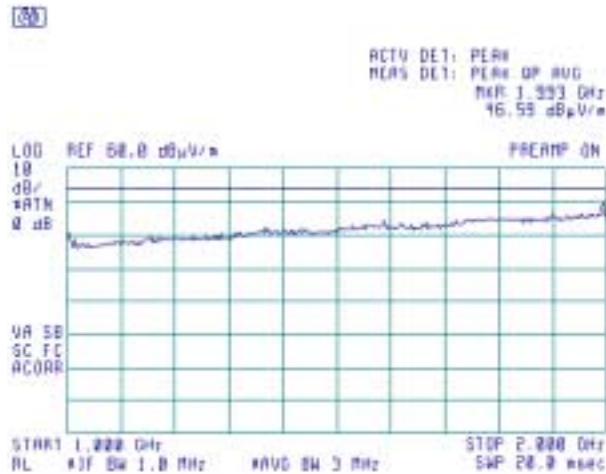
Plot 7.5.3 Radiated emission measurements above 1000 MHz, vertical antenna polarization

TEST SITE: Semi anechoic chamber
LIMIT: Class B
TEST DISTANCE: 3 m
EUT OPERATING MODE: Receive / Stand-by



Plot 7.5.4 Radiated emission measurements above 1000 MHz, horizontal antenna polarization

TEST SITE: Semi anechoic chamber
LIMIT: Class B
TEST DISTANCE: 3 m
EUT OPERATING MODE: Receive / Stand-by



8 APPENDIX A Test equipment and ancillaries used for tests

HL No	Description	Manufacturer	Model	Ser. No.	Last Cal.	Due Cal.
0415	Cable, Coax, RF, RG-214	HL	CC-3	056	02-Dec-07	02-Dec-08
0446	Antenna, Loop, Active, 10 kHz - 30 MHz	EMCO	6502	2857	28-Jun-07	28-Jun-08
0521	EMI Receiver (Spectrum Analyzer) with RF filter section 9 kHz-6.5 GHz	Hewlett Packard Co	8546A	3617A 00319, 3448A002 53	28-Aug-07	28-Aug-08
0589	Cable Coaxial, GORE A2P01POL118, 2.3 m, 6.5 GHz	HL	GORE-3	176	02-Dec-07	02-Dec-08
0604	Antenna BiconiLog Log-Periodic/T Bow-TIE, 26 - 2000 MHz	EMCO	3141	9611-1011	10-Jan-08	10-Jan-09
1430	EMI Receiver, 9 kHz - 2.9 GHz, System: HL1431, HL1432	Agilent Technologies	8542E	3807A002 62,3705A0 0217	31-Aug-07	31-Aug-08
1481	Cable, 1 m	Harbour Industries	MIL 17/60- RG142	1481	11-Sep-07	11-Sep-08
1947	Cable 18GHz, 6.5 m, blue	Rhophase Microwave Limited	NPS- 1803A- 6500-NPS	T4974	05-Oct-07	05-Oct-08
2432	Antenna, Double-Ridged Waveguide Horn 1-18 GHz	EMC Test Systems	3115	00027177	03-Mar-08	03-Mar-09
2871	Microwave Cable Assembly, 18 GHz, 6.4 m, SMA - SMA	Huber-Suhner	198-8155- 00	2871	11-Feb-08	11-Feb-09
2909	Spectrum analyzer, ESA-E, 100 Hz to 26.5 GHz	Agilent Technologies	E4407B	MY414447 62	07-May-07	07-May-08
3183	Attenuator, N-type, 10 dB, DC to 6 GHz, 1 W	Mini-Circuits	UNAT-10+	15542	07-May-07	07-May-08
3323	UHF TEM CELL, 100 MHz to 3000 MHz	TESCOM CO., LTD	TC-5060B	506039018 8	27-Aug-07	27-Aug-08

9 APPENDIX B Measurement uncertainties

Expanded uncertainty at 95% confidence in Hermon Labs EMC measurements

Test description	Expanded uncertainty
Radiated emissions at 10 m measuring distance Horizontal polarization Vertical polarization	Biconilog antenna: ± 5.0 dB Biconical antenna: ± 5.0 dB Log periodic antenna: ± 5.1 dB Double ridged horn antenna: ± 5.3 dB Biconilog antenna: ± 5.5 dB Biconical antenna: ± 5.5 dB Log periodic antenna: ± 5.6 dB Double ridged horn antenna: ± 5.8 dB
Radiated emissions at 3 m measuring distance Horizontal polarization Vertical polarization	Biconilog antenna: ± 5.3 dB Biconical antenna: ± 5.0 dB Log periodic antenna: ± 5.3 dB Double ridged horn antenna: ± 5.3 dB Biconilog antenna: ± 6.0 dB Biconical antenna: ± 5.7 dB Log periodic antenna: ± 6.0 dB Double ridged horn antenna: ± 6.0 dB
Conducted emissions at RF antenna connector	9 kHz to 2.9 GHz: ± 2.6 dB 2.9 GHz to 6.46 GHz: ± 3.5 dB 6.46 GHz to 13.2 GHz: ± 4.3 dB 13.2 GHz to 22.0 GHz: ± 5.0 dB 22.0 GHz to 26.8 GHz: ± 5.5 dB 26.8 GHz to 40.0 GHz: ± 4.8 dB
Duty cycle, timing (Tx ON / OFF) and average factor measurements	± 1.0 %
Occupied bandwidth	± 8.0 %

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

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

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

10 APPENDIX C Test laboratory description

Tests were performed at Hermon Laboratories Ltd., which is a fully independent, private, EMC, safety, environmental and telecommunication testing facility. Hermon Laboratories is listed by the Federal Communications Commission (USA) for all parts of Code of Federal Regulations 47 (CFR 47) 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).

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

Person for contact: Mr. Alex Usoskin, CEO.

11 APPENDIX D Specification references

47CFR part 15: 2007	Radio Frequency Devices.
ANSI C63.2: 1996	American National Standard for Instrumentation-Electromagnetic Noise and Field Strength, 10 kHz to 40 GHz-Specifications.
ANSI C63.4: 2003	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz.
RSS-210 Issue 7: 2007	Low Power Licence- Exempt Radiocommunication Devices
RSS-Gen Issue 2, September 2007	General Requirements and Information for the certification of Radiocommunication Equipment
ICES-003 Issue 4: 2004	Digital Apparatus
CAN/CSA-CEI/IEC CISPR 22: 2002	Information Technology Equipment- Radio Disturbance Characteristics- Limits and Methods of measurement

12 APPENDIX E Test equipment correction factors

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

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

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

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

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

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

**Antenna factor
Double-ridged guide horn antenna
Model 3115, serial number: 00027177, HL 2432**

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(μ V) to convert it into field intensity in dB(μ V/m).

Cable loss
Cable Coaxial, RG-58/RG-214, s/n 056, HL 0415
+ Cable Coaxial, RG-214, 11.5m, s/n 148, HL 0812

No.	Frequency, MHz	Cable loss, dB	Measured uncertainty, dB
1	20	0.73	±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	

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		
22	4500	4.07		±0.17
23	4800	4.36		
24	5100	4.62		
25	5400	4.78		
26	5700	5.16		
27	6000	5.67		
28	6500	5.99		

Cable loss
Cable MIL 17/60-RG142, HL 1481

Frequency, GHz	Cable loss, dB
2	1
2.2	1.1
2.4	1.1
2.6	1.2
2.8	1.2
3	1.2
3.2	1.3
3.4	1.3
3.6	1.5
3.8	1.5
4	1.6
4.2	1.7
4.4	1.8
4.6	1.9
4.8	2
5	2
5.2	2
5.4	2.1
5.6	2.1
5.8	2.2
6	2.2
6.2	2.2
6.4	2.3
6.6	2.3
6.8	2.3
7	2.4
7.2	2.4
7.4	2.5
7.6	2.5
7.8	2.6
8	2.7
8.2	2.8
8.4	3.1
8.6	3.3
8.8	3.5
9	4

Cable loss
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

Cable loss
Cable coaxial, Huber-Suhner, 18 GHz, 6.4 m, SMA - SMA, model 198-8155-00,
HL 2871

Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB
10	0.12	5750	2.34	12000	3.55
30	0.14	6000	2.39	12250	3.61
100	0.27	6250	2.46	12500	3.67
250	0.45	6500	2.52	12750	3.74
500	0.63	6750	2.58	13000	3.79
750	0.76	7000	2.64	13250	3.82
1000	0.89	7250	2.68	13500	3.83
1250	1.01	7500	2.73	13750	3.83
1500	1.12	7750	2.78	14000	3.88
1750	1.23	8000	2.83	14250	3.93
2000	1.32	8250	2.88	14500	3.96
2250	1.41	8500	2.94	14750	4.01
2500	1.49	8750	2.97	15000	4.00
2750	1.58	9000	3.02	15250	4.01
3000	1.66	9250	3.07	15500	4.00
3250	1.73	9500	3.13	15750	4.13
3500	1.80	9750	3.18	16000	4.22
3750	1.87	10000	3.21	16250	4.29
4000	1.93	10250	3.26	16500	4.29
4250	2.01	10500	3.30	16750	4.32
4500	2.06	10750	3.36	17000	4.37
4750	2.12	11000	3.39	17250	4.45
5000	2.17	11250	3.44	17500	4.49
5250	2.24	11500	3.48	17750	4.53
5500	2.29	11750	3.52	18000	4.55

13 APPENDIX F Abbreviations and acronyms

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