

## 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.**

**Control panel**

**Model: WisDom**

**Part numbers:**

**RWSAL0433USA,**

**RWSALV433USA**

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## 1 Applicant information

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

## 2 Equipment under test attributes

**Product name:** Control panel  
**Product type:** Transceiver  
**Model(s):** WisDom  
**Part number:** RWSALV433USA  
**Receipt date** 7/16/2007

## 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:** 18077  
**Location:** Hermon Laboratories Ltd. Harakevet Industrial Zone, Binyamina 30500, Israel  
**Test started:** 7/16/2007  
**Test completed:** 1/27/2008  
**Test specification(s):** FCC Part 15, subpart C, §15.231; subpart B, §§15.107, 15.109;  
RSS-210 Issue 7:2007, Annex 1; RSS-Gen issue 2:2007; ICES-003 issue 4:2004

## 5 Tests summary

Test	Status
<b>Transmitter characteristics</b>	
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	Pass
FCC Part 15, Section 203 / RSS-Gen, Section 7.1.4, Antenna requirements	Pass
<b>Unintentional emissions</b>	
FCC Part 15, Section 107 / RSS-Gen, Section 7.2.2, Conducted emission at AC power port	Pass
FCC Part 15, Section 109 / RSS-Gen, Section 7.1.6/ ICES-003 Section 5.5, Radiated emission	Pass
FCC Part 15, Section 111 / RSS-Gen, Section 6(b), Section 7.2.3.1, Conducted emission at receiver antenna port	Not required

Testing was completed against all relevant requirements of the test standard. The 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
<b>Tested by:</b>	Mr. S. Samokha, test engineer	January 27, 2008	
<b>Reviewed by:</b>	Mrs. M. Cherniavsky, certification engineer	February 3, 2008	
<b>Approved by:</b>	Mr. M. Nikishin, EMC and radio group leader	February 4, 2008	



## 6 EUT description

### 6.1 General information

The EUT is an alarm control panel, which includes a transceiver operating at 433.92 MHz. The EUT is powered from AC mains via 120 VAC / 9 VAC adapter.

According to customer declaration of identity, both RWSALV433USA and RWSAL0433USA control panels are electronically/electrically identical. The only difference is the following: RWSALV433USA main panel is additionally equipped with a voice module. Therefore only the main panel, part number RWSALV433USA was tested.

### 6.2 Ports and lines

Port type	Port description	Connected		Connector type	Qty.	Cable type	Cable length	Indoor / outdoor
		From	To					
Power	9 VAC	EUT	AC/AC adapter	AC jack	1	Unshielded	1.5 m	Indoor
Power	120 VAC	adapter	AC mains	IEC 60320	1	NA	NA	Indoor
Power	9 VAC	EUT	Open circuit	Terminal block	1	Unshielded	1.5 m	Indoor
Ground	Ground	EUT	Not connected	Terminal block	1	NA	NA	NA
Signal	Bell tamper	EUT	Open circuit	Terminal block	2	Unshielded	3.5 m	Indoor
Signal	Bell/LS	EUT	Open circuit	Terminal block	2	Unshielded	3.5 m	Indoor
Signal	RS-485 Bus	EUT	Open circuit	Terminal block	2	Unshielded	3.5 m	Indoor
Power	9-16VDC Aux&Com	EUT	Open circuit	Terminal block	2	Unshielded	3.5 m	Indoor
Signal	UO1 dry contact	EUT	Open circuit	Terminal block	2	Unshielded	3.5 m	Indoor
Signal	UO2 dry contact	EUT	Open circuit	Terminal block	2	Unshielded	3.5 m	Indoor
Signal	UO3	EUT	Open circuit	Terminal block	2	Unshielded	3.5 m	Indoor
Signal	UO4	EUT	Open circuit	Terminal block	2	Unshielded	3.5 m	Indoor
Signal	Z1 Zone (sensor)	EUT	Open circuit	Terminal block	2	Unshielded	3.5 m	Indoor
Telecom	LINE (PSTN)	EUT	Line simulator	RJ 11	1	Unshielded	3 m	Indoor
Signal	Phone	EUT	Open circuit	RJ 11	1	Unshielded	3 m	Indoor
Signal	Phone	EUT	Open circuit	Terminal block	1	Unshielded	3 m	Indoor

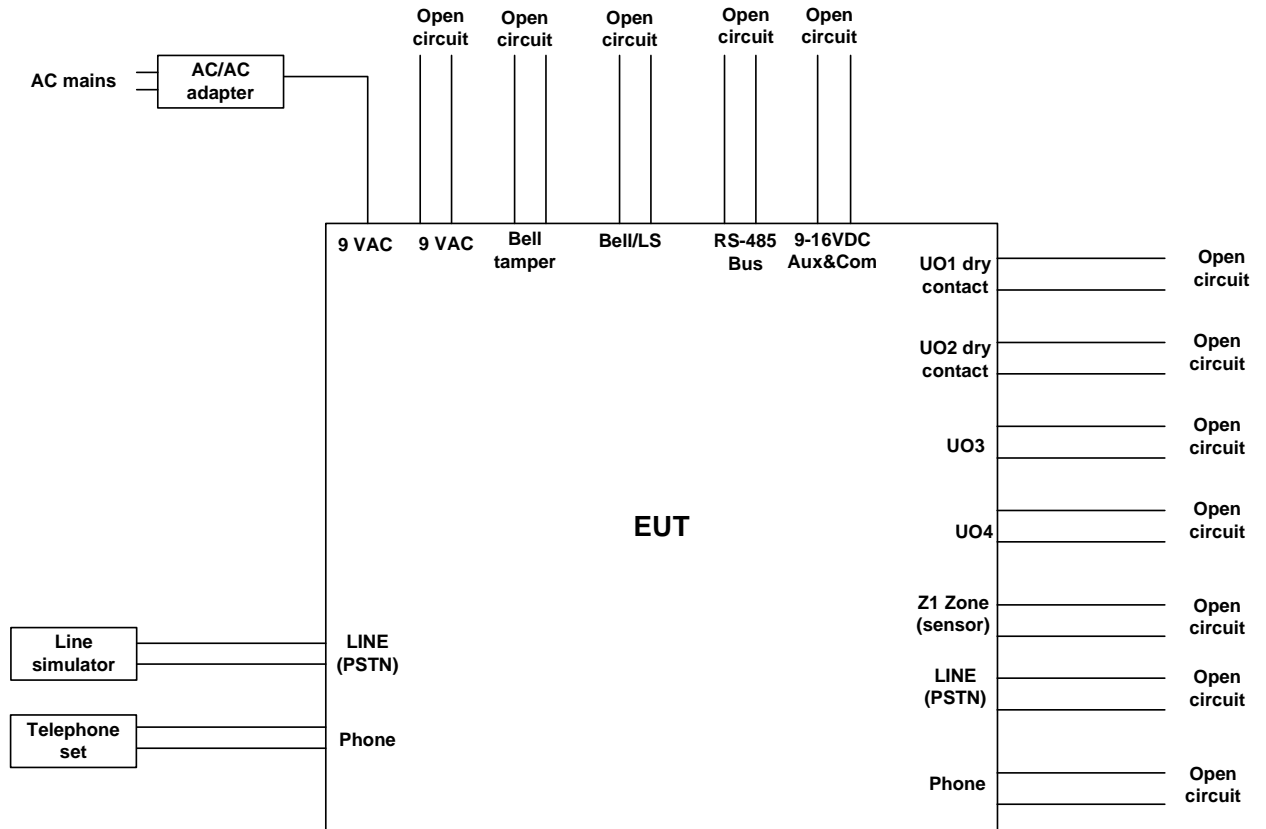
### 6.3 Support and test equipment

Description	Manufacturer	Model number	Serial number
Line simulator	Hermon Labs	LS-01	1856
AC/AC adapter	Ktec	KSAFE1440850T1M2	NA
Telephone set	Typical		

### 6.4 Changes made in EUT

No changes were implemented in the EUT.

## 6.5 Test configuration





## 6.6 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		433.95 MHz				
Maximum rated output power		At transmitter 50 $\Omega$ RF output connector				
		Effective radiated power (for equipment with no RF connector)		-6.11 dBm		
Is transmitter output power variable?		X	No			
			Yes	continuous variable		
				stepped variable with stepsize		dB
				minimum RF power		dBm
		maximum RF power		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		2.4 kbps				
Type of modulation		OOK				
Modulating test signal (baseband)		ID code				
Transmitter power source						
X	Battery	Nominal rated voltage	1.5 VDC x 6	Battery type	Nickel metal hybrid	
	DC	Nominal rated voltage	VDC			
X	AC mains	Nominal rated voltage	120 VAC	Frequency	60 Hz	

<b>Test specification:</b>	<b>FCC Part 15, Section 231(a) / RSS-210, Section A1.1.1, Periodic operation requirements</b>		
<b>Test procedure:</b>	Supplier declaration		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	PASS
<b>Date &amp; Time:</b>	1/27/2008 9:22 AM		
<b>Temperature:</b> 19°C	<b>Air Pressure:</b> 1015 hPa	<b>Relative Humidity:</b> 49 %	<b>Power Supply:</b> 120 V AC
<b>Remarks:</b>			

## 7 Transmitter tests according to 47CFR part 15 subpart C and RSS-210 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.

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 the associated plots.

Figure 7.1.1 Setup for transmitter shut down test



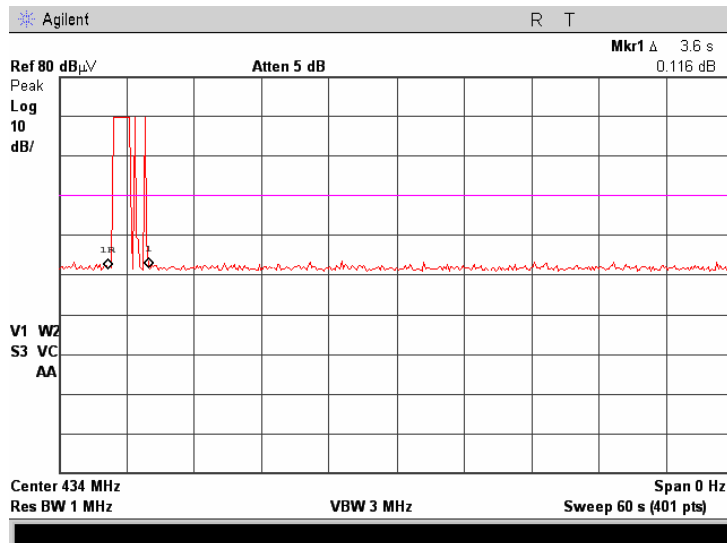


<b>Test specification:</b>	<b>FCC Part 15, Section 231(a) / RSS-210, Section A1.1.1, Periodic operation requirements</b>		
<b>Test procedure:</b>	Supplier declaration		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	<b>PASS</b>
<b>Date &amp; Time:</b>	1/27/2008 9:22 AM		
<b>Temperature:</b> 19°C	<b>Air Pressure:</b> 1015 hPa	<b>Relative Humidity:</b> 49 %	<b>Power Supply:</b> 120 V AC
<b>Remarks:</b>			

Table 7.1.1 Periodic operation requirements

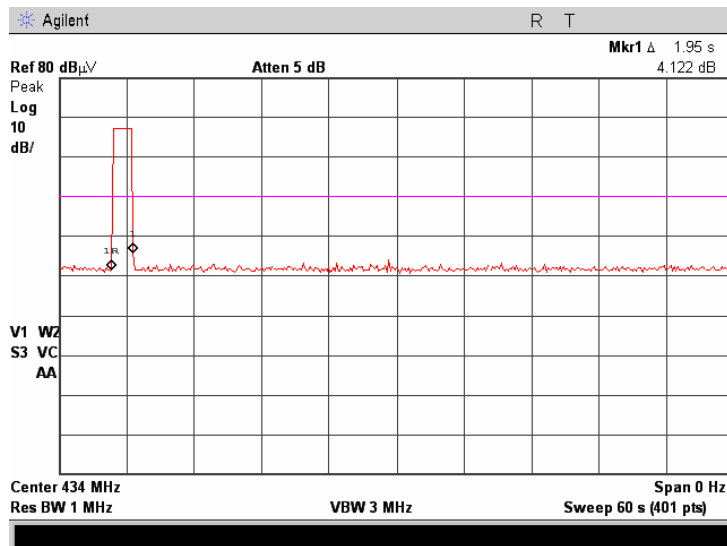
Requirement	Rationale	Verdict
Continuous transmissions are not permitted	Supplier declaration	Comply
A manually operated transmitter shall be deactivated within not more than 5 seconds of switch being released	NA	NA
Transmitter activated automatically shall cease transmission within 5 seconds	Plots 7.1.1 to 7.1.5	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	NA	NA

Plot 7.1.1 Transmitter shut down test result (initialization)

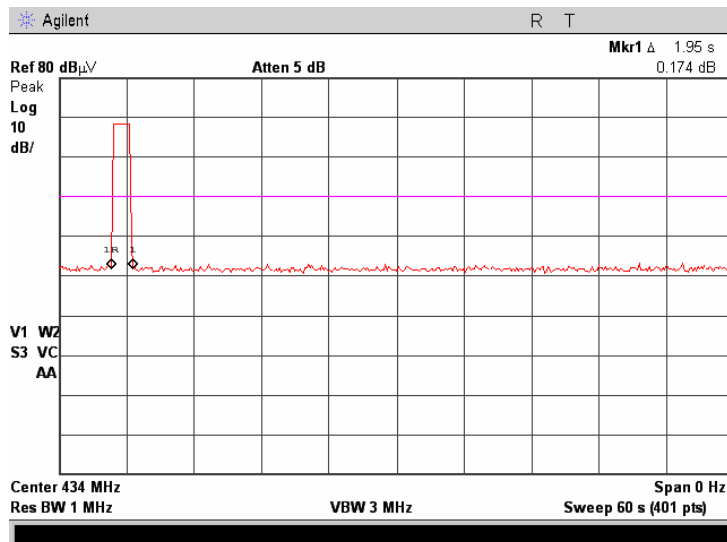


<b>Test specification:</b>	<b>FCC Part 15, Section 231(a) / RSS-210, Section A1.1.1, Periodic operation requirements</b>		
<b>Test procedure:</b>	Supplier declaration		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	<b>PASS</b>
<b>Date &amp; Time:</b>	1/27/2008 9:22 AM		
<b>Temperature:</b> 19°C	<b>Air Pressure:</b> 1015 hPa	<b>Relative Humidity:</b> 49 %	<b>Power Supply:</b> 120 V AC
<b>Remarks:</b>			

**Plot 7.1.2 Transmitter test result (armed panel)**

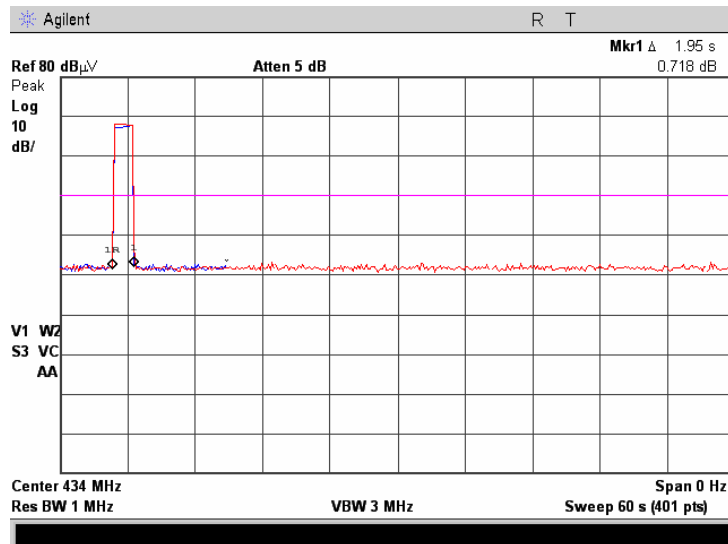


**Plot 7.1.3 Transmitter test result (disarmed panel)**



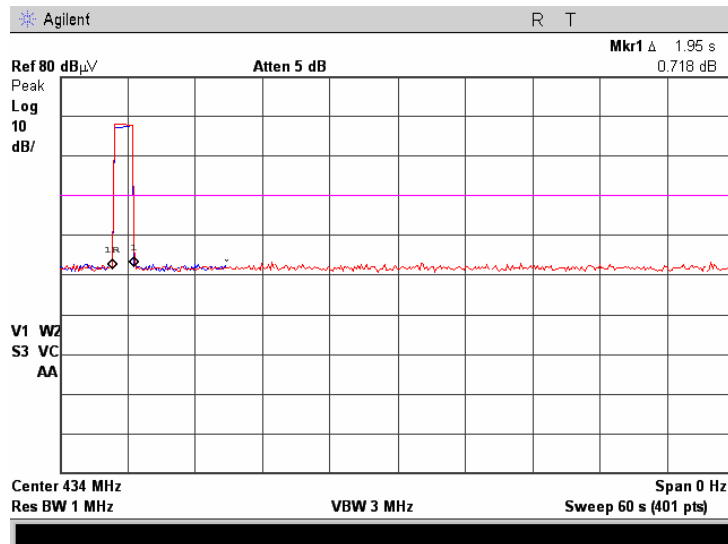
<b>Test specification:</b>	<b>FCC Part 15, Section 231(a) / RSS-210, Section A1.1.1, Periodic operation requirements</b>		
<b>Test procedure:</b>	Supplier declaration		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	<b>PASS</b>
<b>Date &amp; Time:</b>	1/27/2008 9:22 AM		
<b>Temperature:</b> 19°C	<b>Air Pressure:</b> 1015 hPa	<b>Relative Humidity:</b> 49 %	<b>Power Supply:</b> 120 V AC
<b>Remarks:</b>			

Plot 7.1.4 Transmitter test result (alarm signal)



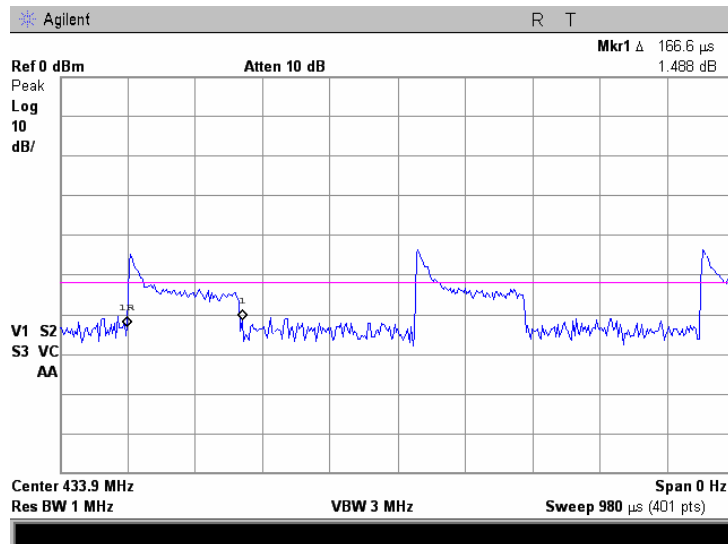
<b>Test specification:</b>	<b>FCC Part 15, Section 231(a) / RSS-210, Section A1.1.1, Periodic operation requirements</b>		
<b>Test procedure:</b>	Supplier declaration		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	<b>PASS</b>
<b>Date &amp; Time:</b>	1/27/2008 9:22 AM		
<b>Temperature:</b> 19°C	<b>Air Pressure:</b> 1015 hPa	<b>Relative Humidity:</b> 49 %	<b>Power Supply:</b> 120 V AC
<b>Remarks:</b>			

Plot 7.1.5 Transmitter test result (tamper signal)

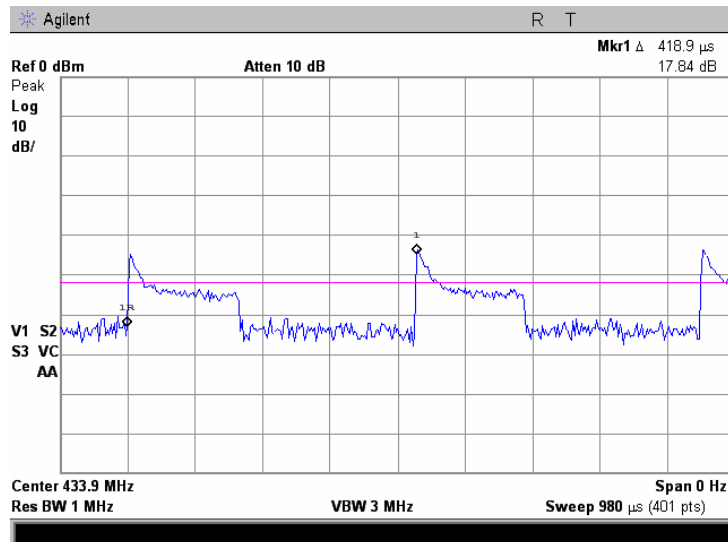


<b>Test specification:</b>	<b>FCC Part 15, Section 231(a) / RSS-210, Section A1.1.1, Periodic operation requirements</b>		
<b>Test procedure:</b>	Supplier declaration		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	<b>PASS</b>
<b>Date &amp; Time:</b>	1/27/2008 9:22 AM		
<b>Temperature:</b> 19°C	<b>Air Pressure:</b> 1015 hPa	<b>Relative Humidity:</b> 49 %	<b>Power Supply:</b> 120 V AC
<b>Remarks:</b>			

Plot 7.1.6 Transmission pulse duration



Plot 7.1.7 Transmission pulse period



<b>Test specification:</b>	<b>FCC Part 15, Section 231(a) / RSS-210, Section A1.1.1, Periodic operation requirements</b>		
<b>Test procedure:</b>	Supplier declaration		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	<b>PASS</b>
<b>Date &amp; Time:</b>	1/27/2008 9:22 AM		
<b>Temperature:</b> 19°C	<b>Air Pressure:</b> 1015 hPa	<b>Relative Humidity:</b> 49 %	<b>Power Supply:</b> 120 V AC
<b>Remarks:</b>			

**Table 7.1.2 Total duration of polling / supervision transmissions**

<b>Duration, ms</b>	<b>Repetition period, ms</b>	<b>Maximum number of transmissions within 1 hour</b>	<b>Total duration within 1 hour, ms</b>
No transmissions			

**Reference numbers of test equipment used**

HL 0337	HL 3001						
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Full description is given in Appendix A.

<b>Test specification:</b>	<b>FCC Part 15, Section 231(b) / RSS-210, Section A1.1.2, Field strength of emissions</b>		
<b>Test procedure:</b>	ANSI C63.4, Section 13.1.4		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	<b>PASS</b>
<b>Date &amp; Time:</b>	8/19/2007 9:09:14 AM		
<b>Temperature:</b> 25°C	<b>Air Pressure:</b> 1007 hPa	<b>Relative Humidity:</b> 36 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

## 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
433.95	100.82	80.82

**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**	80.82	60.82
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.

<b>Test specification:</b>	<b>FCC Part 15, Section 231(b) / RSS-210, Section A1.1.2, Field strength of emissions</b>		
<b>Test procedure:</b>	ANSI C63.4, Section 13.1.4		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	<b>PASS</b>
<b>Date &amp; Time:</b>	8/19/2007 9:09:14 AM		
<b>Temperature:</b> 25°C	<b>Air Pressure:</b> 1007 hPa	<b>Relative Humidity:</b> 36 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

### 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 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.

7.2.2.3 The worst test results (the lowest margins) were recorded in Table 7.2.3, Table 7.2.5 and shown in the associated plots.

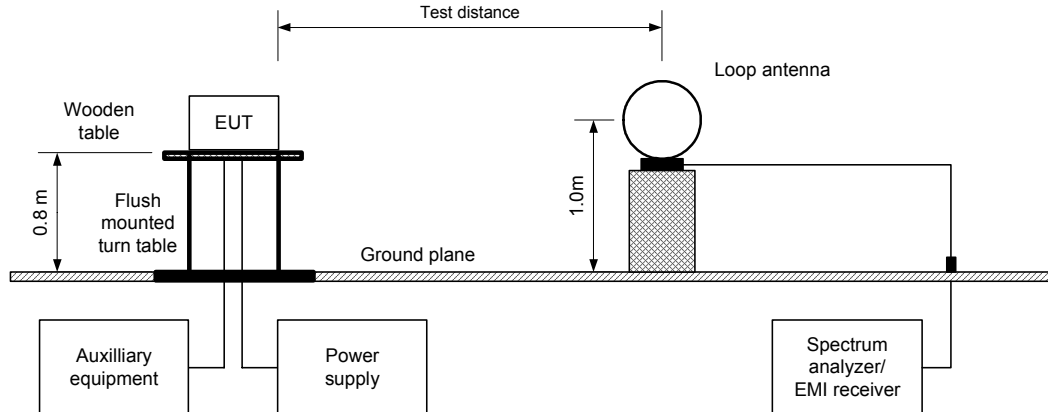
### 7.2.3 Test procedure for spurious emission field strength measurements above 30 MHz

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 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.

7.2.3.3 The worst test results (the lowest margins) were recorded in Table 7.2.3, Table 7.2.5 and shown in the associated plots.

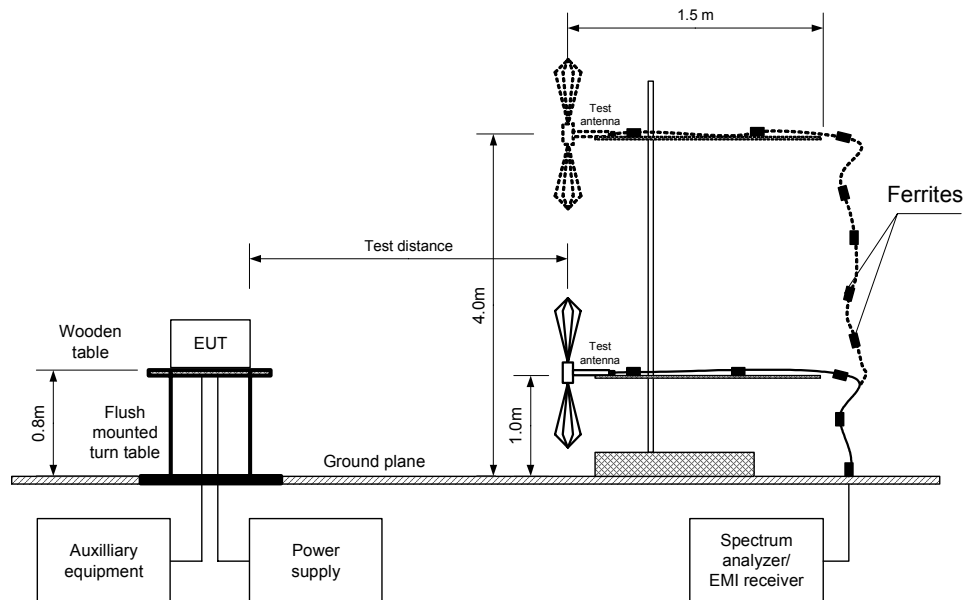
**Figure 7.2.1 Setup for spurious emission field strength measurements below 30 MHz**





<b>Test specification:</b>	<b>FCC Part 15, Section 231(b) / RSS-210, Section A1.1.2, Field strength of emissions</b>		
<b>Test procedure:</b>	ANSI C63.4, Section 13.1.4		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	<b>PASS</b>
<b>Date &amp; Time:</b>	8/19/2007 9:09:14 AM		
<b>Temperature:</b> 25°C	<b>Air Pressure:</b> 1007 hPa	<b>Relative Humidity:</b> 36 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

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



<b>Test specification:</b>	<b>FCC Part 15, Section 231(b) / RSS-210, Section A1.1.2, Field strength of emissions</b>		
<b>Test procedure:</b>	ANSI C63.4, Section 13.1.4		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	<b>PASS</b>
<b>Date &amp; Time:</b>	8/19/2007 9:09:14 AM		
<b>Temperature:</b> 25°C	<b>Air Pressure:</b> 1007 hPa	<b>Relative Humidity:</b> 36 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

**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: Typical (Vertical)  
 MODULATION: FSK  
 MODULATING SIGNAL: ID code  
 BIT RATE: 2.4 kbps  
 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**	
<b>Fundamental emission</b>											
433.948	H	1.97	195	89.12	100.8	-11.68	-8.95	80.17	80.8	-0.63	Pass
<b>Spurious emissions</b>											
1301.63	V	1.24	178	34.24	74	-39.76	-8.95	25.29	54	-28.71	Pass

\*- 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		
0.161	0.415	71.3	3.18	21150	-8.95

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

**Reference numbers of test equipment used**

HL 0521	HL 0589	HL 0604	HL 1004	HL 1947	HL 2259	HL 2432	HL 2780
HL 2871	HL 2909						

Full description is given in Appendix A.

<b>Test specification:</b>	<b>FCC Part 15, Section 231(b) / RSS-210, Section A1.1.2, Field strength of emissions</b>		
<b>Test procedure:</b>	ANSI C63.4, Section 13.1.4		
<b>Test mode:</b>	Compliance	<b>Verdict: PASS</b>	
<b>Date &amp; Time:</b>	8/19/2007 9:09:14 AM		
<b>Temperature:</b> 25°C	<b>Air Pressure:</b> 1007 hPa	<b>Relative Humidity:</b> 36 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

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

TEST DISTANCE: 3 m  
EUT POSITION: Typical (Vertical)  
MODULATION: FSK  
MODULATING SIGNAL: ID code  
BIT RATE: 2.4 kbps  
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*				
136.019000	35.04	32.60	40.50	-7.90	V	1.0	269	Pass
165.353600	36.24	33.19	40.50	-7.31	V	1.0	232	
189.353600	38.06	36.02	40.50	-4.48	V	1.0	56	

\*- Margin = Measured emission - specification limit.

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

**Reference numbers of test equipment used**

HL 0415	HL 0521	HL 0569	HL 0589	HL 0604	HL 0812	HL 1004	HL 1425
HL 1430	HL 1553	HL 1566	HL 2009	HL 2697			

Full description is given in Appendix A.

<b>Test specification:</b>	<b>FCC Part 15, Section 231(b) / RSS-210, Section A1.1.2, Field strength of emissions</b>				
<b>Test procedure:</b>	ANSI C63.4, Section 13.1.4				
<b>Test mode:</b>	Compliance	<b>Verdict:</b>		<b>PASS</b>	
<b>Date &amp; Time:</b>	8/19/2007 9:09:14 AM				
<b>Temperature:</b> 25°C	<b>Air Pressure:</b> 1007 hPa	<b>Relative Humidity:</b> 36 %	<b>Power Supply:</b> 120 VAC		
<b>Remarks:</b>					

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

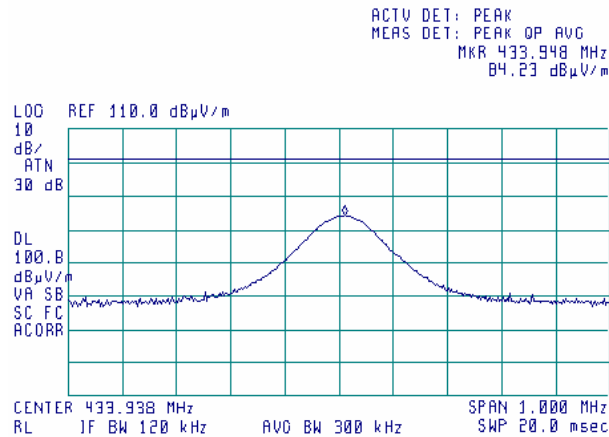
Table 7.2.7 Restricted bands according to RSS-210, Section 2.7

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

<b>Test specification:</b>	<b>FCC Part 15, Section 231(b) / RSS-210, Section A1.1.2, Field strength of emissions</b>		
<b>Test procedure:</b>	ANSI C63.4, Section 13.1.4		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	<b>PASS</b>
<b>Date &amp; Time:</b>	8/19/2007 9:09:14 AM		
<b>Temperature:</b> 25°C	<b>Air Pressure:</b> 1007 hPa	<b>Relative Humidity:</b> 36 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

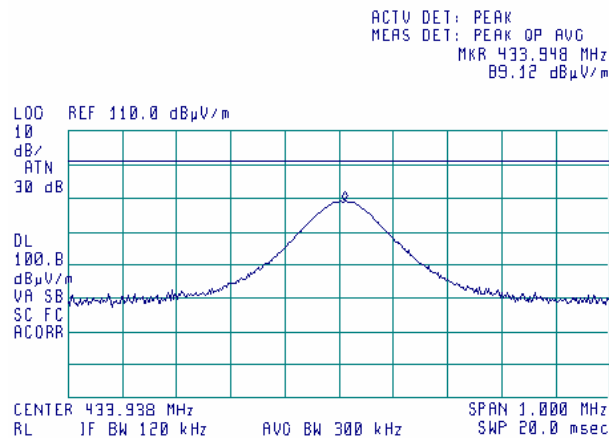
**Plot 7.2.1 Radiated emission measurements at the fundamental frequency**

TEST SITE: OATS  
TEST DISTANCE: 3 m  
ANTENNA POLARIZATION: Vertical  
EUT POSITION: Typical (Vertical)



**Plot 7.2.2 Radiated emission measurements at the fundamental frequency**

TEST SITE: OATS  
TEST DISTANCE: 3 m  
ANTENNA POLARIZATION: Horizontal  
EUT POSITION: Typical (Vertical)

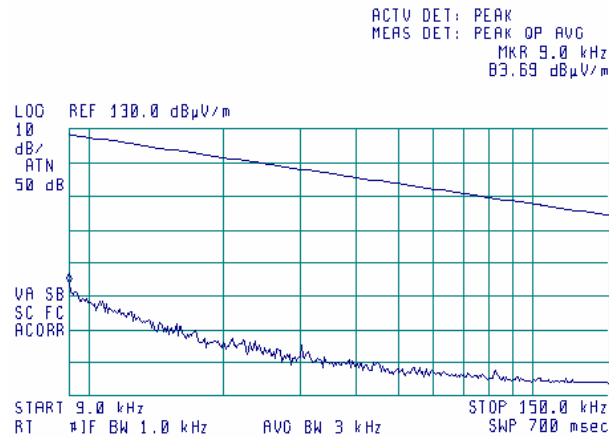


<b>Test specification:</b>	<b>FCC Part 15, Section 231(b) / RSS-210, Section A1.1.2, Field strength of emissions</b>		
<b>Test procedure:</b>	ANSI C63.4, Section 13.1.4		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	<b>PASS</b>
<b>Date &amp; Time:</b>	8/19/2007 9:09:14 AM		
<b>Temperature:</b> 25°C	<b>Air Pressure:</b> 1007 hPa	<b>Relative Humidity:</b> 36 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

**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: Typical (Vertical)

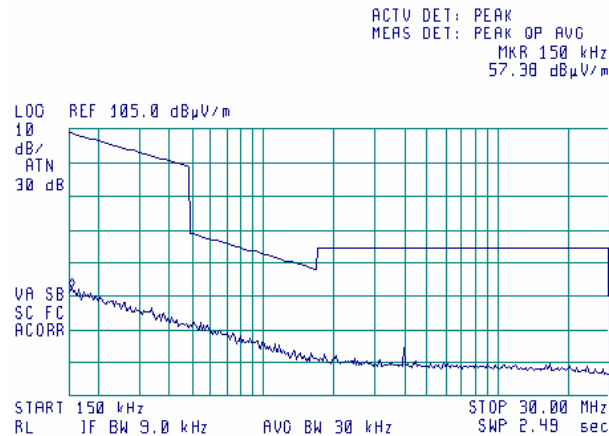
17:23:14 JUL 18, 2007



**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 and Horizontal  
EUT POSITION: Typical (Vertical)

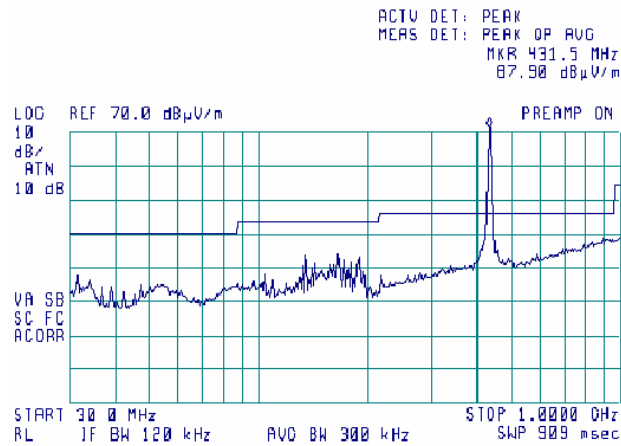
17:27:20 JUL 18, 2007



<b>Test specification:</b>	<b>FCC Part 15, Section 231(b) / RSS-210, Section A1.1.2, Field strength of emissions</b>		
<b>Test procedure:</b>	ANSI C63.4, Section 13.1.4		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	<b>PASS</b>
<b>Date &amp; Time:</b>	8/19/2007 9:09:14 AM		
<b>Temperature:</b> 25°C	<b>Air Pressure:</b> 1007 hPa	<b>Relative Humidity:</b> 36 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

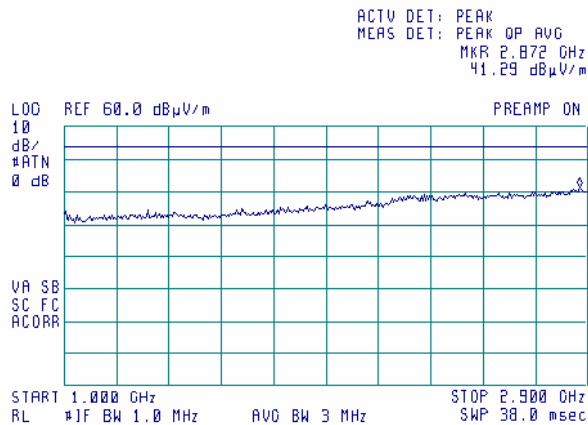
**Plot 7.2.5 Radiated emission measurements from 30 to 1000 MHz**

TEST SITE: Semi-anechoic chamber  
TEST DISTANCE: 3 m  
ANTENNA POLARIZATION: Vertical and Horizontal  
EUT POSITION: Typical (Vertical)



**Plot 7.2.6 Radiated emission measurements from 1.0 to 2.9 GHz**

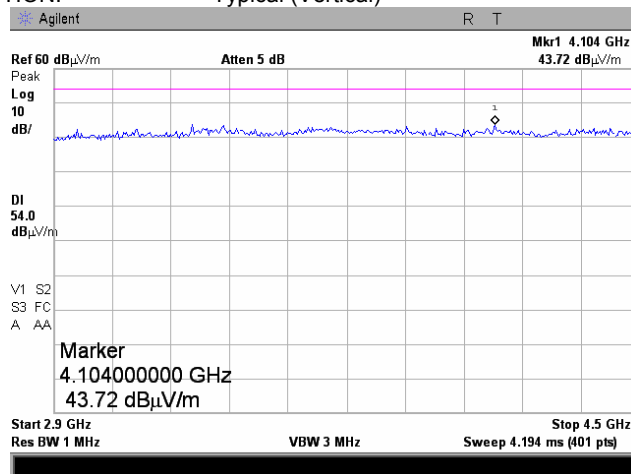
TEST SITE: Semi-anechoic chamber  
TEST DISTANCE: 3 m  
ANTENNA POLARIZATION: Vertical and Horizontal  
EUT POSITION: Typical (Vertical)



<b>Test specification:</b>	<b>FCC Part 15, Section 231(b) / RSS-210, Section A1.1.2, Field strength of emissions</b>		
<b>Test procedure:</b>	ANSI C63.4, Section 13.1.4		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	<b>PASS</b>
<b>Date &amp; Time:</b>	8/19/2007 9:09:14 AM		
<b>Temperature:</b> 25°C	<b>Air Pressure:</b> 1007 hPa	<b>Relative Humidity:</b> 36 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

**Plot 7.2.7 Radiated emission measurements from 2.9 to 4.5 MHz**

TEST SITE: Semi-anechoic chamber  
 TEST DISTANCE: 3 m  
 ANTENNA POLARIZATION: Vertical and Horizontal  
 EUT POSITION: Typical (Vertical)



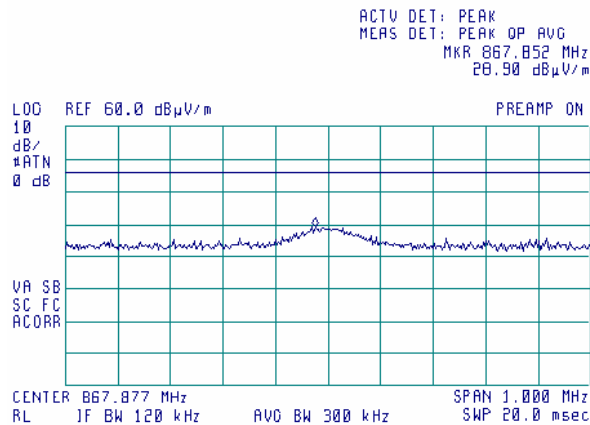


<b>Test specification:</b>	<b>FCC Part 15, Section 231(b) / RSS-210, Section A1.1.2, Field strength of emissions</b>		
<b>Test procedure:</b>	ANSI C63.4, Section 13.1.4		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	<b>PASS</b>
<b>Date &amp; Time:</b>	8/19/2007 9:09:14 AM		
<b>Temperature:</b> 25°C	<b>Air Pressure:</b> 1007 hPa	<b>Relative Humidity:</b> 36 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

**Plot 7.2.8 Radiated emission measurements at the second harmonic frequency**

TEST SITE: Semi-anechoic chamber  
 TEST DISTANCE: 3 m  
 ANTENNA POLARIZATION: Vertical  
 EUT POSITION: Typical (Vertical)

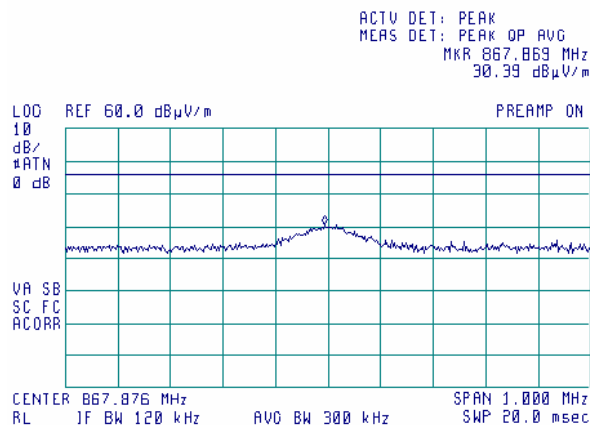
15:04:32 JUL 10, 2007



**Plot 7.2.9 Radiated emission measurements at the second harmonic frequency**

TEST SITE: Semi-anechoic chamber  
 TEST DISTANCE: 3 m  
 ANTENNA POLARIZATION: Horizontal  
 EUT POSITION: Typical (Vertical)

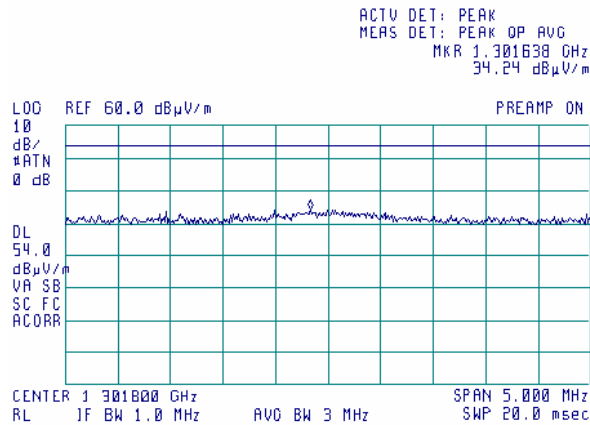
15:13:36 JUL 10, 2007



<b>Test specification:</b>	<b>FCC Part 15, Section 231(b) / RSS-210, Section A1.1.2, Field strength of emissions</b>		
<b>Test procedure:</b>	ANSI C63.4, Section 13.1.4		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	<b>PASS</b>
<b>Date &amp; Time:</b>	8/19/2007 9:09:14 AM		
<b>Temperature:</b> 25°C	<b>Air Pressure:</b> 1007 hPa	<b>Relative Humidity:</b> 36 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

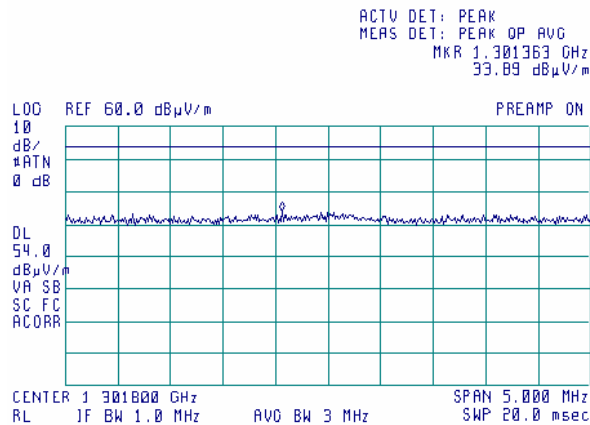
**Plot 7.2.10 Radiated emission measurements at the third harmonic frequency**

TEST SITE: OATS  
TEST DISTANCE: 3 m  
ANTENNA POLARIZATION: Vertical  
EUT POSITION: Typical (Vertical)



**Plot 7.2.11 Radiated emission measurements at the third harmonic frequency**

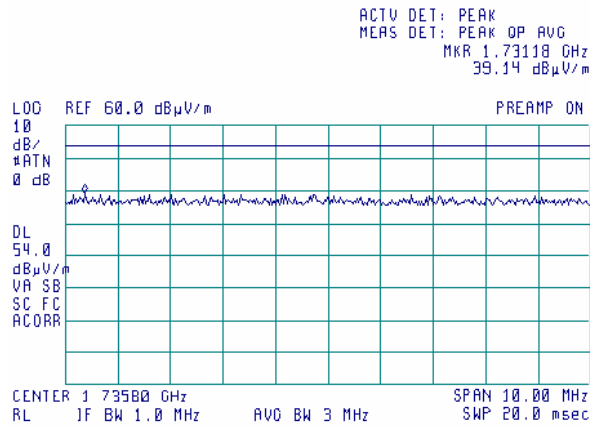
TEST SITE: OATS  
TEST DISTANCE: 3 m  
ANTENNA POLARIZATION: Horizontal  
EUT POSITION: Typical (Vertical)



<b>Test specification:</b>	<b>FCC Part 15, Section 231(b) / RSS-210, Section A1.1.2, Field strength of emissions</b>		
<b>Test procedure:</b>	ANSI C63.4, Section 13.1.4		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	<b>PASS</b>
<b>Date &amp; Time:</b>	8/19/2007 9:09:14 AM		
<b>Temperature:</b> 25°C	<b>Air Pressure:</b> 1007 hPa	<b>Relative Humidity:</b> 36 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

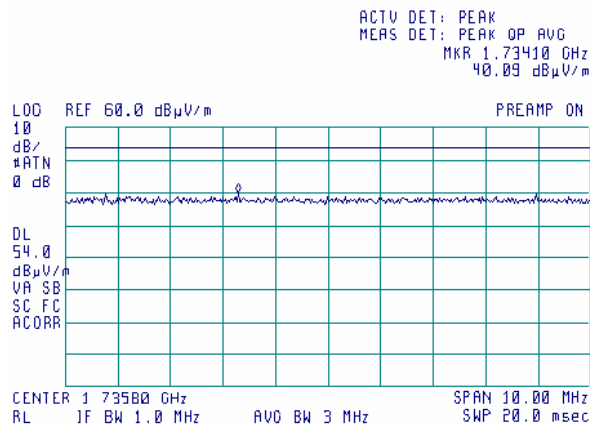
**Plot 7.2.12 Radiated emission measurements at the forth harmonic frequency**

TEST SITE: OATS  
 TEST DISTANCE: 3 m  
 ANTENNA POLARIZATION: Vertical  
 EUT POSITION: Typical (Vertical)



**Plot 7.2.13 Radiated emission measurements at the forth harmonic frequency**

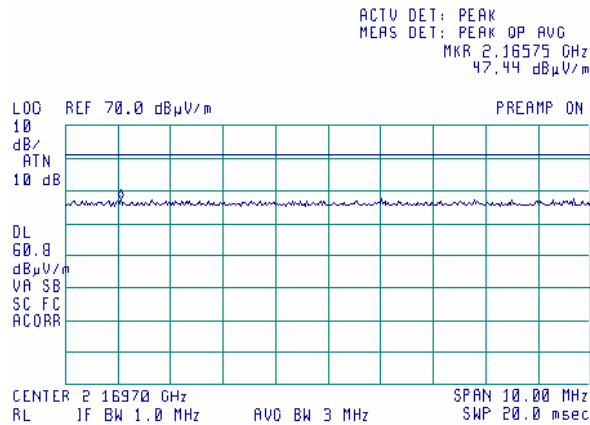
TEST SITE: OATS  
 TEST DISTANCE: 3 m  
 ANTENNA POLARIZATION: Horizontal  
 EUT POSITION: Typical (Vertical)



<b>Test specification:</b>	<b>FCC Part 15, Section 231(b) / RSS-210, Section A1.1.2, Field strength of emissions</b>		
<b>Test procedure:</b>	ANSI C63.4, Section 13.1.4		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	<b>PASS</b>
<b>Date &amp; Time:</b>	8/19/2007 9:09:14 AM		
<b>Temperature:</b> 25°C	<b>Air Pressure:</b> 1007 hPa	<b>Relative Humidity:</b> 36 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

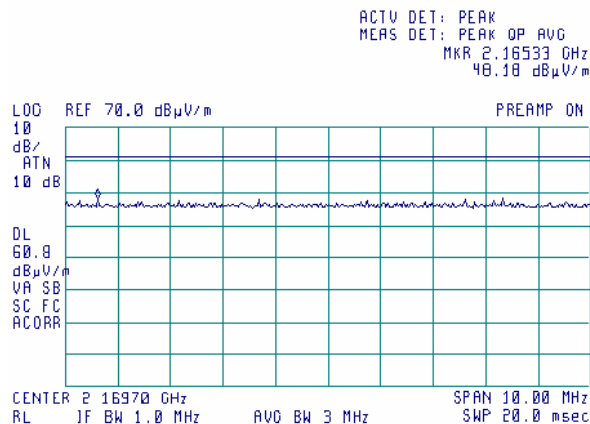
**Plot 7.2.14 Radiated emission measurements at the fifth harmonic frequency**

TEST SITE: OATS  
TEST DISTANCE: 3 m  
ANTENNA POLARIZATION: Vertical  
EUT POSITION: Typical (Vertical)



**Plot 7.2.15 Radiated emission measurements at the fifth harmonic frequency**

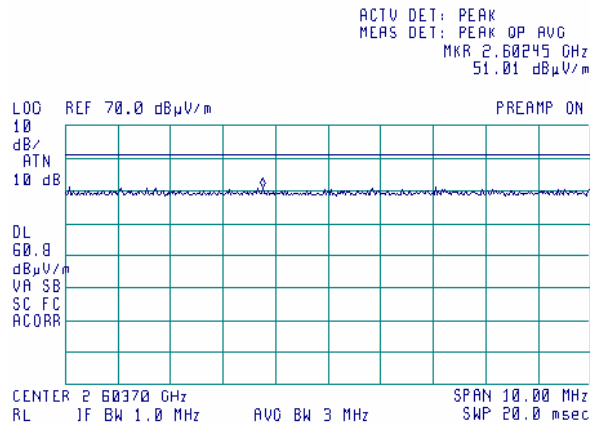
TEST SITE: OATS  
TEST DISTANCE: 3 m  
ANTENNA POLARIZATION: Horizontal  
EUT POSITION: Typical (Vertical)



<b>Test specification:</b>	<b>FCC Part 15, Section 231(b) / RSS-210, Section A1.1.2, Field strength of emissions</b>		
<b>Test procedure:</b>	ANSI C63.4, Section 13.1.4		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	<b>PASS</b>
<b>Date &amp; Time:</b>	8/19/2007 9:09:14 AM		
<b>Temperature:</b> 25°C	<b>Air Pressure:</b> 1007 hPa	<b>Relative Humidity:</b> 36 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

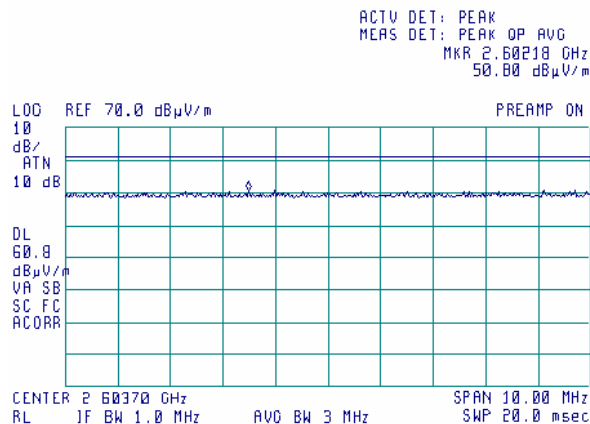
**Plot 7.2.16 Radiated emission measurements at the sixth harmonic frequency**

TEST SITE: OATS  
TEST DISTANCE: 3 m  
ANTENNA POLARIZATION: Vertical  
EUT POSITION: Typical (Vertical)



**Plot 7.2.17 Radiated emission measurements at the sixth harmonic frequency**

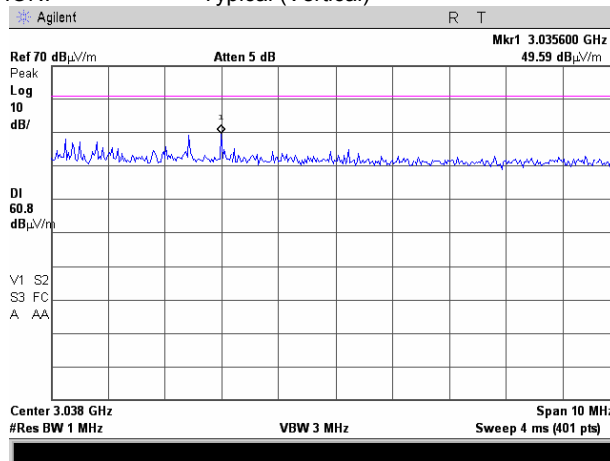
TEST SITE: OATS  
TEST DISTANCE: 3 m  
ANTENNA POLARIZATION: Horizontal  
EUT POSITION: Typical (Vertical)



<b>Test specification:</b>	<b>FCC Part 15, Section 231(b) / RSS-210, Section A1.1.2, Field strength of emissions</b>		
<b>Test procedure:</b>	ANSI C63.4, Section 13.1.4		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	<b>PASS</b>
<b>Date &amp; Time:</b>	8/19/2007 9:09:14 AM		
<b>Temperature:</b> 25°C	<b>Air Pressure:</b> 1007 hPa	<b>Relative Humidity:</b> 36 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

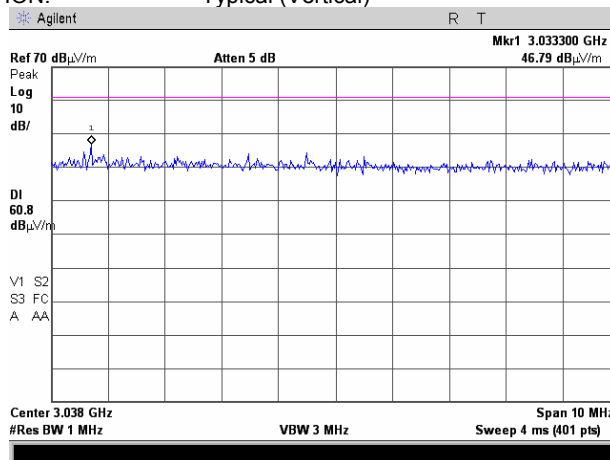
**Plot 7.2.18 Radiated emission measurements at the seventh harmonic frequency**

TEST SITE: OATS  
TEST DISTANCE: 3 m  
ANTENNA POLARIZATION: Vertical  
EUT POSITION: Typical (Vertical)



**Plot 7.2.19 Radiated emission measurements at the seventh harmonic frequency**

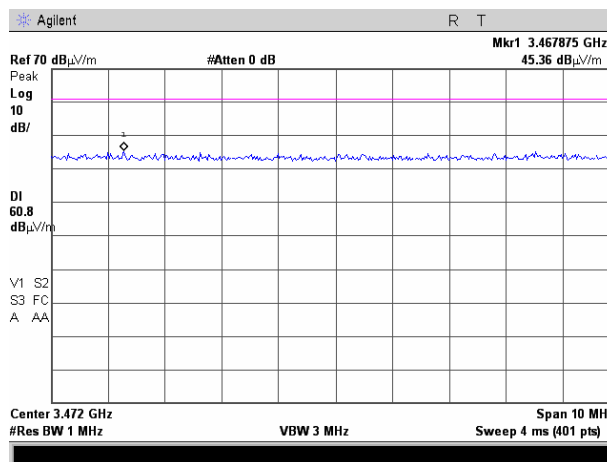
TEST SITE: OATS  
TEST DISTANCE: 3 m  
ANTENNA POLARIZATION: Horizontal  
EUT POSITION: Typical (Vertical)



<b>Test specification:</b>	<b>FCC Part 15, Section 231(b) / RSS-210, Section A1.1.2, Field strength of emissions</b>		
<b>Test procedure:</b>	ANSI C63.4, Section 13.1.4		
<b>Test mode:</b>	Compliance	<b>Verdict: PASS</b>	
<b>Date &amp; Time:</b>	8/19/2007 9:09:14 AM		
<b>Temperature:</b> 25°C	<b>Air Pressure:</b> 1007 hPa	<b>Relative Humidity:</b> 36 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

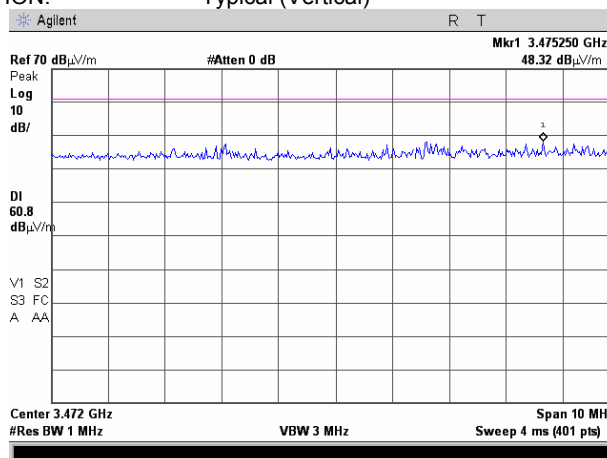
**Plot 7.2.20 Radiated emission measurements at the eighth harmonic frequency**

TEST SITE: OATS  
 TEST DISTANCE: 3 m  
 ANTENNA POLARIZATION: Vertical  
 EUT POSITION: Typical (Vertical)



**Plot 7.2.21 Radiated emission measurements at the eighth harmonic frequency**

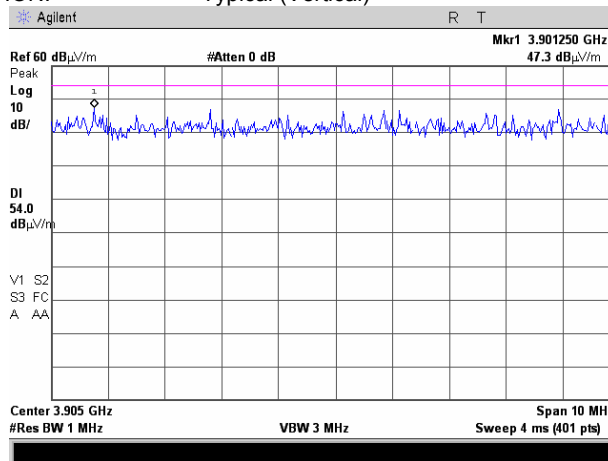
TEST SITE: OATS  
 TEST DISTANCE: 3 m  
 ANTENNA POLARIZATION: Horizontal  
 EUT POSITION: Typical (Vertical)



<b>Test specification:</b>	<b>FCC Part 15, Section 231(b) / RSS-210, Section A1.1.2, Field strength of emissions</b>		
<b>Test procedure:</b>	ANSI C63.4, Section 13.1.4		
<b>Test mode:</b>	Compliance	<b>Verdict: PASS</b>	
<b>Date &amp; Time:</b>	8/19/2007 9:09:14 AM		
<b>Temperature:</b> 25°C	<b>Air Pressure:</b> 1007 hPa	<b>Relative Humidity:</b> 36 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

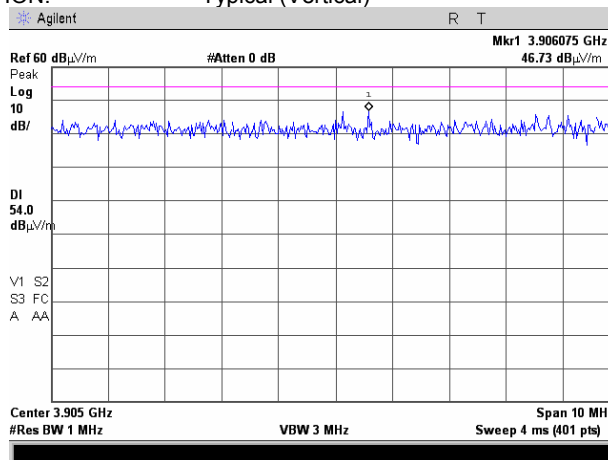
**Plot 7.2.22 Radiated emission measurements at the ninth harmonic frequency**

TEST SITE: OATS  
 TEST DISTANCE: 3 m  
 ANTENNA POLARIZATION: Vertical  
 EUT POSITION: Typical (Vertical)



**Plot 7.2.23 Radiated emission measurements at the ninth harmonic frequency**

TEST SITE: OATS  
 TEST DISTANCE: 3 m  
 ANTENNA POLARIZATION: Horizontal  
 EUT POSITION: Typical (Vertical)

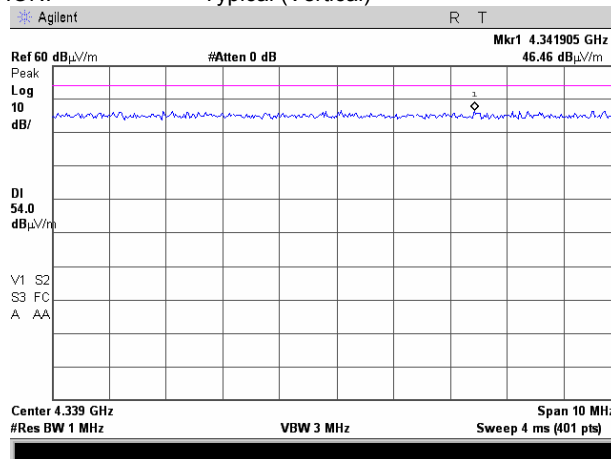




<b>Test specification:</b>	<b>FCC Part 15, Section 231(b) / RSS-210, Section A1.1.2, Field strength of emissions</b>		
<b>Test procedure:</b>	ANSI C63.4, Section 13.1.4		
<b>Test mode:</b>	Compliance	<b>Verdict: PASS</b>	
<b>Date &amp; Time:</b>	8/19/2007 9:09:14 AM		
<b>Temperature:</b> 25°C	<b>Air Pressure:</b> 1007 hPa	<b>Relative Humidity:</b> 36 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

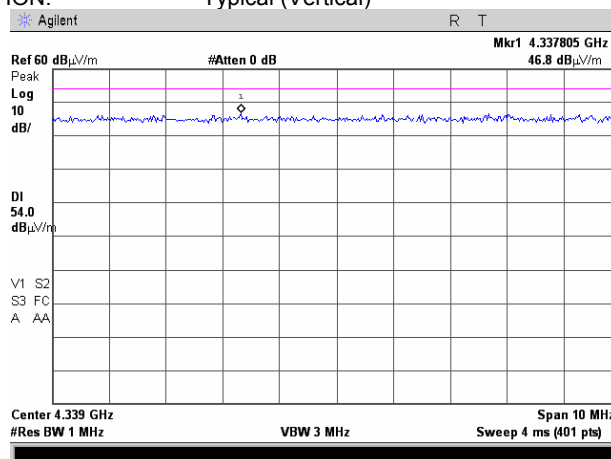
**Plot 7.2.24 Radiated emission measurements at the tenth harmonic frequency**

TEST SITE: OATS  
 TEST DISTANCE: 3 m  
 ANTENNA POLARIZATION: Vertical  
 EUT POSITION: Typical (Vertical)



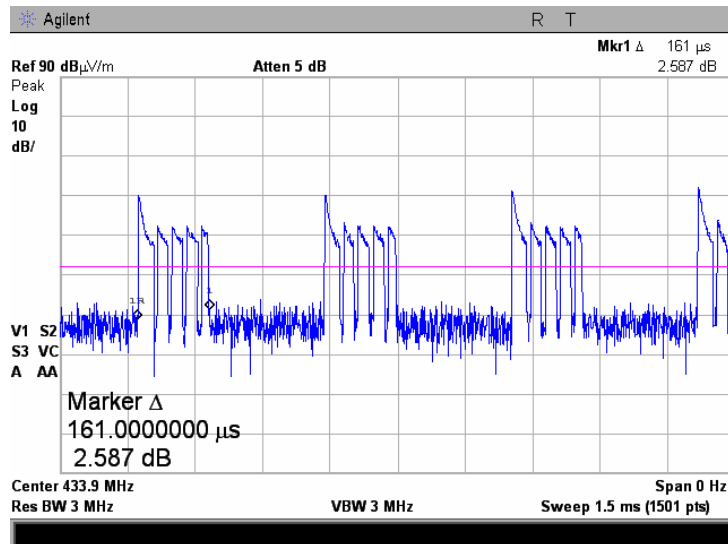
**Plot 7.2.25 Radiated emission measurements at the tenth harmonic frequency**

TEST SITE: OATS  
 TEST DISTANCE: 3 m  
 ANTENNA POLARIZATION: Horizontal  
 EUT POSITION: Typical (Vertical)

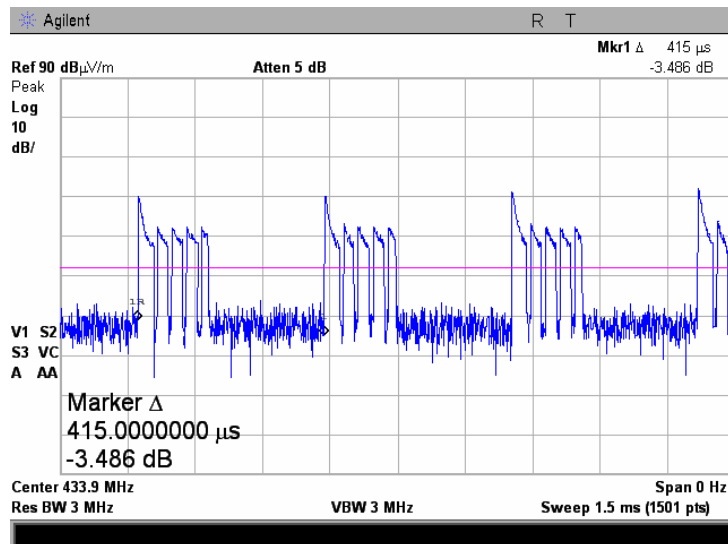


<b>Test specification:</b>	<b>FCC Part 15, Section 231(b) / RSS-210, Section A1.1.2, Field strength of emissions</b>		
<b>Test procedure:</b>	ANSI C63.4, Section 13.1.4		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	<b>PASS</b>
<b>Date &amp; Time:</b>	8/19/2007 9:09:14 AM		
<b>Temperature:</b> 25°C	<b>Air Pressure:</b> 1007 hPa	<b>Relative Humidity:</b> 36 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

Plot 7.2.26 Transmission pulse duration

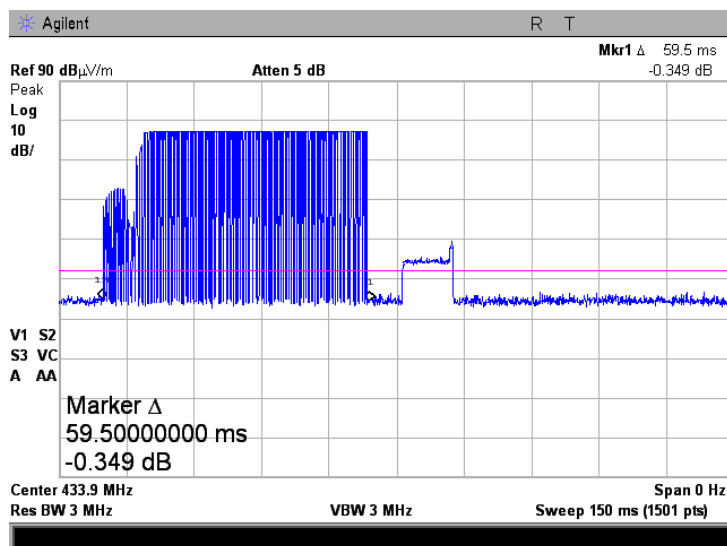


Plot 7.2.27 Transmission pulse period

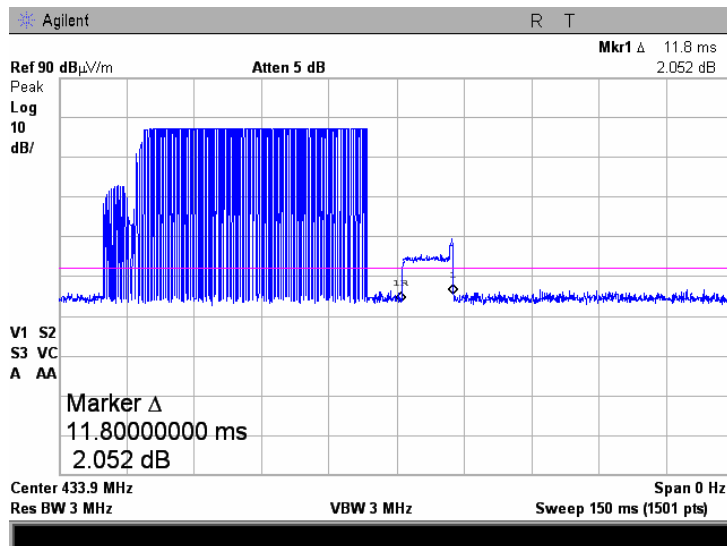


<b>Test specification:</b>	<b>FCC Part 15, Section 231(b) / RSS-210, Section A1.1.2, Field strength of emissions</b>		
<b>Test procedure:</b>	ANSI C63.4, Section 13.1.4		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	<b>PASS</b>
<b>Date &amp; Time:</b>	8/19/2007 9:09:14 AM		
<b>Temperature:</b> 25°C	<b>Air Pressure:</b> 1007 hPa	<b>Relative Humidity:</b> 36 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

Plot 7.2.28 Transmission burst duration

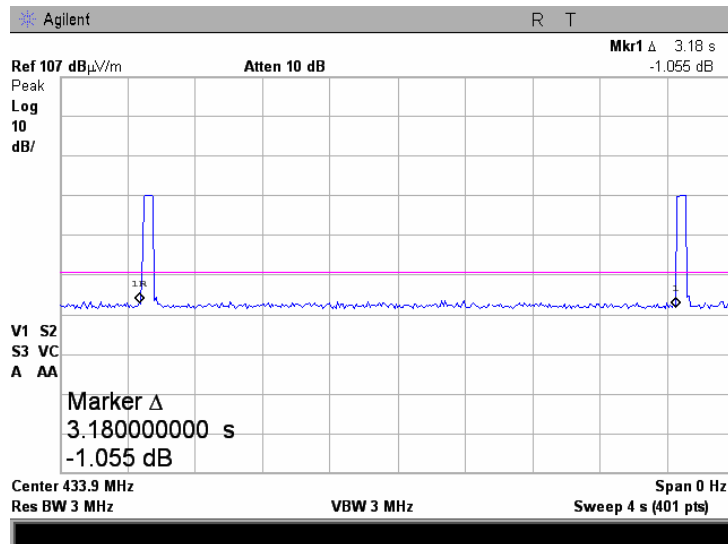


Plot 7.2.29 Second pulse transmission duration

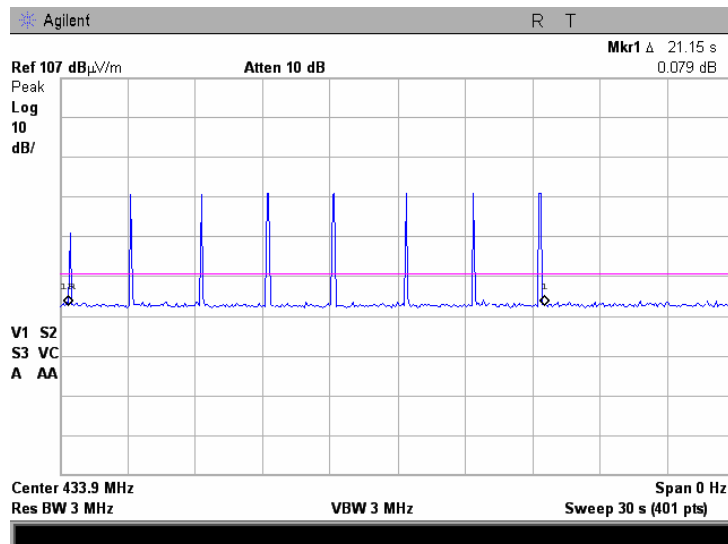


<b>Test specification:</b>	<b>FCC Part 15, Section 231(b) / RSS-210, Section A1.1.2, Field strength of emissions</b>		
<b>Test procedure:</b>	ANSI C63.4, Section 13.1.4		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	<b>PASS</b>
<b>Date &amp; Time:</b>	8/19/2007 9:09:14 AM		
<b>Temperature:</b> 25°C	<b>Air Pressure:</b> 1007 hPa	<b>Relative Humidity:</b> 36 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

Plot 7.2.30 Transmission burst period



Plot 7.2.31 Transmission train duration



<b>Test specification:</b> FCC Part 15, Section 231(c) / Section A1.1.3, Occupied bandwidth			
<b>Test procedure:</b> ANSI C63.4, Section 13.1.7			
<b>Test mode:</b> Compliance	<b>Verdict:</b> PASS		
<b>Date &amp; Time:</b> 8/23/2007 7:48:02 AM			
<b>Temperature:</b> 25 °C	<b>Air Pressure:</b> 1006 hPa	<b>Relative Humidity:</b> 38 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

### 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.

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



<b>Test specification:</b>		<b>FCC Part 15, Section 231(c) / Section A1.1.3, Occupied bandwidth</b>			
<b>Test procedure:</b>		ANSI C63.4, Section 13.1.7			
<b>Test mode:</b>	Compliance	<b>Verdict:</b>		<b>PASS</b>	
<b>Date &amp; Time:</b>	8/23/2007 7:48:02 AM				
<b>Temperature:</b> 25 °C	<b>Air Pressure:</b> 1006 hPa	<b>Relative Humidity:</b> 38 %	<b>Power Supply:</b> 120 VAC		
<b>Remarks:</b>					

**Table 7.3.2 Occupied bandwidth test results**

DETECTOR USED: Peak hold  
 RESOLUTION BANDWIDTH: 10 kHz  
 VIDEO BANDWIDTH: 30 kHz  
 MODULATION ENVELOPE REFERENCE POINTS: 20 dBc  
 MODULATION: FSK  
 MODULATING SIGNAL: ID code  
 BIT RATE: 2.4 kbps

Carrier frequency, MHz	Occupied bandwidth, kHz	Limit		Margin, kHz	Verdict
		% of the carrier frequency	kHz		
433.92	62.5	0.25	1082.5	-1020.0	Pass

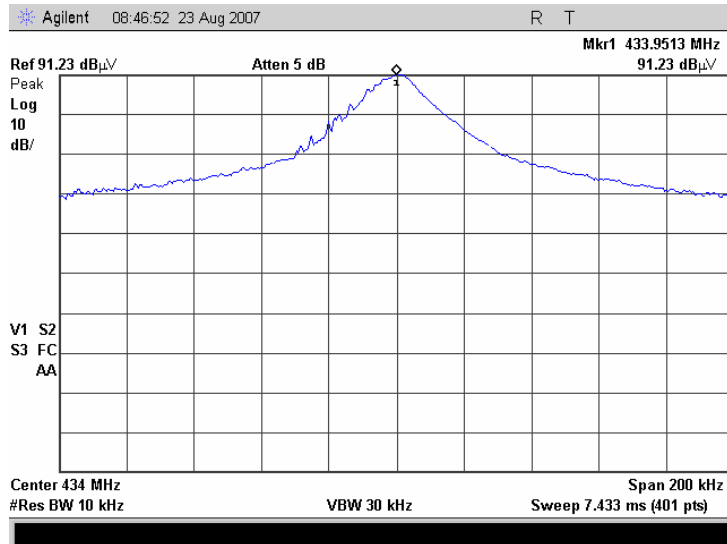
**Reference numbers of test equipment used**

HL 0337	HL 2780							
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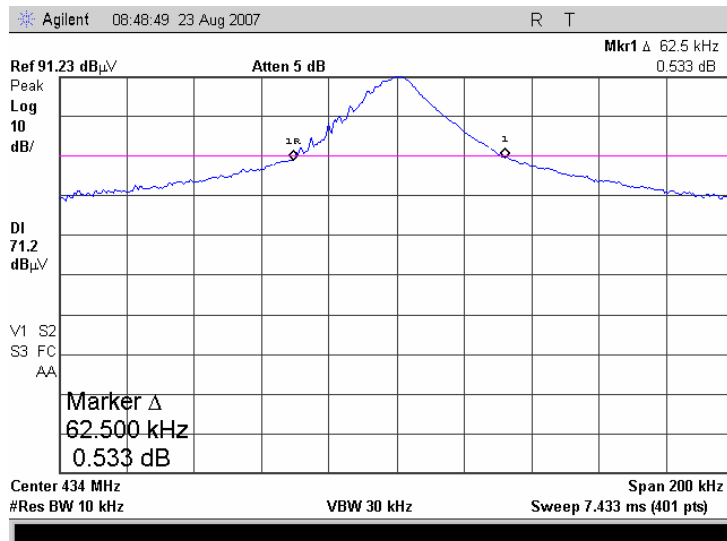
Full description is given in Appendix A.

<b>Test specification:</b> FCC Part 15, Section 231(c) / Section A1.1.3, Occupied bandwidth			
<b>Test procedure:</b> ANSI C63.4, Section 13.1.7			
<b>Test mode:</b> Compliance	<b>Verdict:</b> PASS		
<b>Date &amp; Time:</b> 8/23/2007 7:48:02 AM			
<b>Temperature:</b> 25 °C	<b>Air Pressure:</b> 1006 hPa	<b>Relative Humidity:</b> 38 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

Plot 7.3.1 Occupied bandwidth test result



Plot 7.3.2 Occupied bandwidth test result



<b>Test specification:</b> FCC Part 15, Section 207 / RSS-Gen, Section 7.2.2, Conducted emission			
<b>Test procedure:</b> ANSI C63.4, Section 13.1.3			
<b>Test mode:</b> Compliance	<b>Verdict:</b> PASS		
<b>Date &amp; Time:</b> 8/15/2007 12:15:33 PM			
<b>Temperature:</b> 27°C	<b>Air Pressure:</b> 1010 hPa	<b>Relative Humidity:</b> 42 %	<b>Power Supply:</b> 120 V AC
<b>Remarks:</b>			

## 7.4 Conducted emissions

### 7.4.1 General

This test was performed to measure common mode conducted emissions at the power port. Specification test limits are given in Table 7.4.1.

**Table 7.4.1 Limits for conducted emissions according to FCC Part 15, Section 207 / RSS-Gen, Section 7.2.2**

Frequency, MHz	Class B limit, dB( $\mu$ V)	
	QP	AVRG
0.15 - 0.5	66 - 56*	56 - 46*
0.5 - 5.0	56	46
5.0 - 30	60	50

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

### 7.4.2 Test procedure

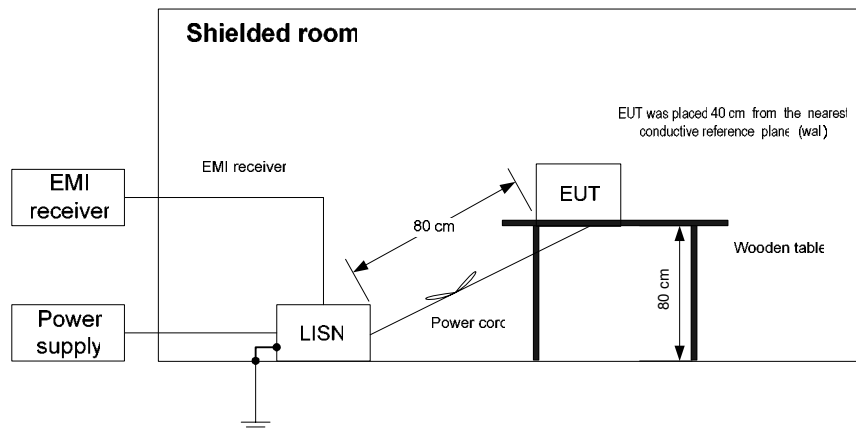
7.4.2.1 The EUT was set up as shown in Figure 7.4.1, energized and the performance check was conducted.

7.4.2.2 The measurements were performed at power terminals with the LISN, connected to a spectrum analyzer while unused coaxial connector of the LISN was terminated with 50 Ohm.

7.4.2.3 The position of the device cables was varied to determine maximum emission level.

7.4.2.4 The worst test results (the lowest margins) were recorded in Table 7.4.2 and shown in the associated plots.

**Figure 7.4.1 Setup for conducted emission measurements, table-top equipment**





<b>Test specification:</b> FCC Part 15, Section 207 / RSS-Gen, Section 7.2.2, Conducted emission			
<b>Test procedure:</b> ANSI C63.4, Section 13.1.3			
<b>Test mode:</b> Compliance	<b>Verdict:</b> PASS		
<b>Date &amp; Time:</b> 8/15/2007 12:15:33 PM			
<b>Temperature:</b> 27°C	<b>Air Pressure:</b> 1010 hPa	<b>Relative Humidity:</b> 42 %	<b>Power Supply:</b> 120 V AC
<b>Remarks:</b>			

Table 7.4.2 Conducted emission test results according to FCC Part 15, Section 207 / RSS-Gen, Section 7.2.2

LINE: AC mains  
EUT OPERATING MODE: Transmit  
EUT SET UP: TABLE-TOP  
TEST SITE: SHIELDED ROOM  
FREQUENCY RANGE: 150 kHz - 30 MHz  
RESOLUTION BANDWIDTH: 9 kHz

Frequency, MHz	Peak emission, dB(μV)	Quasi-peak			Average			Line ID	Verdict
		Measured emission, dB(μV)	Limit, dB(μV)	Margin, dB*	Measured emission, dB(μV)	Limit, dB(μV)	Margin, dB*		
0.153569	37.35	28.04	65.83	-37.79	8.21	55.83	-47.62	L1	Pass
0.164729	36.01	27.08	65.28	-38.20	9.97	55.28	-45.31		
0.183778	39.82	36.90	64.35	-27.45	26.89	54.35	-27.46		
0.606431	34.81	33.70	56.00	-22.30	26.45	46.00	-19.55		
0.768466	44.59	43.53	56.00	-12.47	36.28	46.00	-9.72		
19.164564	35.66	31.83	60.00	-28.17	25.73	50.00	-24.27		
0.181917	39.44	36.33	64.44	-28.11	25.51	54.44	-28.93	L2	Pass
0.607183	38.23	36.30	56.00	-19.70	28.28	46.00	-17.72		
0.769271	47.82	46.51	56.00	-9.49	38.75	46.00	-7.25		
0.930603	39.99	38.59	56.00	-17.41	30.70	46.00	-15.30		
1.091121	43.65	40.52	56.00	-15.48	32.32	46.00	-13.68		
19.089331	35.33	29.74	60.00	-30.26	23.59	50.00	-26.41		

\*- Margin = Measured emission - specification limit.

Reference numbers of test equipment used

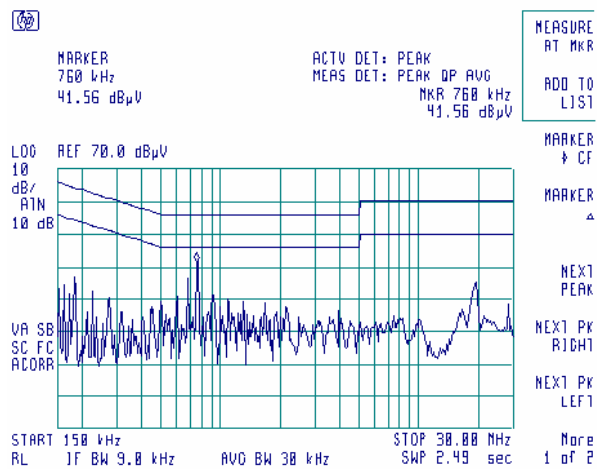
HL 0466	HL 0787	HL 1502	HL 1503	HL 1430	HL 2888		
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Full description is given in Appendix A.

<b>Test specification:</b> FCC Part 15, Section 207 / RSS-Gen, Section 7.2.2, Conducted emission			
<b>Test procedure:</b> ANSI C63.4, Section 13.1.3			
<b>Test mode:</b> Compliance	<b>Verdict:</b> PASS		
<b>Date &amp; Time:</b> 8/15/2007 12:15:33 PM			
<b>Temperature:</b> 27°C	<b>Air Pressure:</b> 1010 hPa	<b>Relative Humidity:</b> 42 %	<b>Power Supply:</b> 120 V AC
<b>Remarks:</b>			

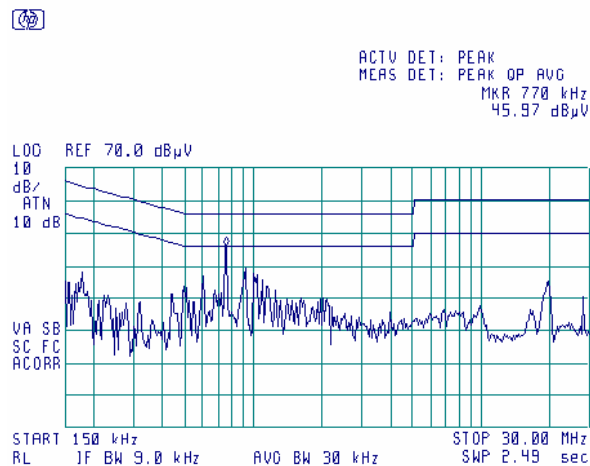
Plot 7.4.1 Conducted emission measurements according to FCC Part 15, Section 207 / RSS-Gen, Section 7.2.2

LINE: L1  
EUT OPERATING MODE: Transmit  
LIMIT: QUASI-PEAK, AVERAGE  
DETECTOR: PEAK



Plot 7.4.2 Conducted emission measurements according to FCC Part 15, Section 207 / RSS-Gen, Section 7.2.2

LINE: L2  
EUT OPERATING MODE: Transmit  
LIMIT: QUASI-PEAK, AVERAGE  
DETECTOR: PEAK



<b>Test specification:</b>	<b>FCC Part 15, Section 203 / RSS-Gen, Section 7.1.4, Antenna requirements</b>		
<b>Test procedure:</b>	Visual inspection / supplier declaration		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	<b>PASS</b>
<b>Date &amp; Time:</b>	8/20/2007 9:02:51 AM		
<b>Temperature:</b> 25 °C	<b>Air Pressure:</b> 1007 hPa	<b>Relative Humidity:</b> 36 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

## 7.5 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 7.5.1.

**Table 7.5.1 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 7.5.1 Antenna assembly**



<b>Test specification:</b>	<b>FCC Part 15, Section 107 / RSS-Gen, Section 7.1.6 / ICES-003, Conducted emission at AC power port</b>		
<b>Test procedure:</b>	ANSI C63.4, Sections 11.5 and 12.1.3 / CISPR 22		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	<b>PASS</b>
<b>Date &amp; Time:</b>	8/16/2007 2:06:42 PM		
<b>Temperature:</b> 25°C	<b>Air Pressure:</b> 1007 hPa	<b>Relative Humidity:</b> 42 %	<b>Power Supply:</b> 120 V AC
<b>Remarks:</b>			

## 8 Unintentional emission tests according to 47CFR part 15 subpart B and ICES-003 requirements

### 8.1 Conducted emissions

#### 8.1.1 General

This test was performed to measure common mode conducted emissions at the mains power port. Specification test limits according to FCC Part 15, Section 107 and ICES-003 are given in Table 8.1.1.

**Table 8.1.1 Limits for conducted emissions according to FCC Part 15, Section 107 and ICES-003, Section 5**

Frequency, MHz	Class B limit, dB( $\mu$ V)		Class A limit, dB( $\mu$ V)	
	QP	AVRG	QP	AVRG
0.15 - 0.5	66 - 56*	56 - 46*	79	66
0.5 - 5.0	56	46	73	60
5.0 - 30	60	50	73	60

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

#### 8.1.2 Test procedure

**8.1.2.1** The EUT was set up as shown in Figure 8.1.1, energized and the performance check was conducted.

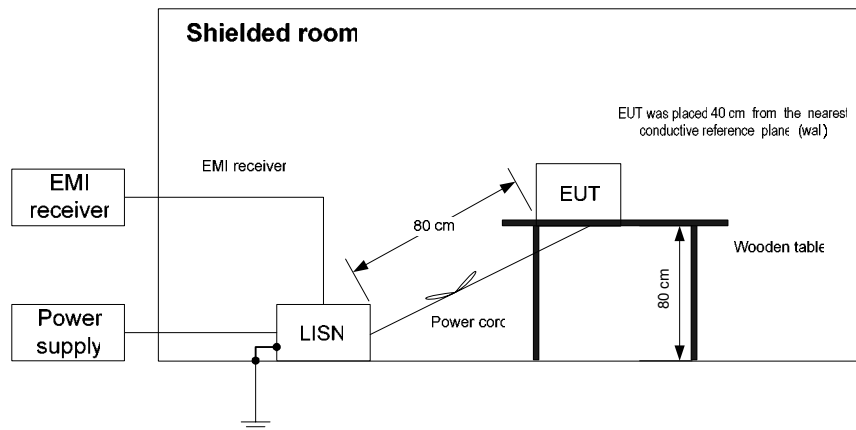
**8.1.2.2** The measurements were performed at power terminals with the LISN, connected to a spectrum analyzer while unused coaxial connector of the LISN was terminated with 50 Ohm.

**8.1.2.3** The position of the device cables was varied to determine maximum emission level.

**8.1.2.4** The worst test results (the lowest margins) were recorded in Table 8.1.2 and shown in the associated plots.

<b>Test specification:</b>	<b>FCC Part 15, Section 107 / RSS-Gen, Section 7.1.6 / ICES-003, Conducted emission at AC power port</b>		
<b>Test procedure:</b>	ANSI C63.4, Sections 11.5 and 12.1.3 / CISPR 22		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	<b>PASS</b>
<b>Date &amp; Time:</b>	8/16/2007 2:06:42 PM		
<b>Temperature:</b> 25°C	<b>Air Pressure:</b> 1007 hPa	<b>Relative Humidity:</b> 42 %	<b>Power Supply:</b> 120 V AC
<b>Remarks:</b>			

Figure 8.1.1 Setup for conducted emission measurements, table-top equipment



<b>Test specification:</b>	<b>FCC Part 15, Section 107 / RSS-Gen, Section 7.1.6 / ICES-003, Conducted emission at AC power port</b>		
<b>Test procedure:</b>	ANSI C63.4, Sections 11.5 and 12.1.3 / CISPR 22		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	<b>PASS</b>
<b>Date &amp; Time:</b>	8/16/2007 2:06:42 PM		
<b>Temperature:</b> 25°C	<b>Air Pressure:</b> 1007 hPa	<b>Relative Humidity:</b> 42 %	<b>Power Supply:</b> 120 V AC
<b>Remarks:</b>			

**Table 8.1.2 Conducted emission test results according to FCC Part 15, Section 107 and ICES-003, Section 5**

LINE: AC mains  
 EUT OPERATING MODE: Stand-by  
 EUT SET UP: TABLE-TOP  
 TEST SITE: SHIELDED ROOM  
 FREQUENCY RANGE: 150 kHz - 30 MHz  
 RESOLUTION BANDWIDTH: 9 kHz

Frequency, MHz	Peak emission, dB(μV)	Quasi-peak			Average			Line ID	Verdict
		Measured emission, dB(μV)	Limit, dB(μV)	Margin, dB*	Measured emission, dB(μV)	Limit, dB(μV)	Margin, dB*		
0.177930	37.83	33.20	64.64	-31.44	22.18	54.64	-32.46	L1	Pass
0.180527	38.48	36.58	64.51	-27.93	26.50	54.51	-28.01		
0.225933	33.64	31.23	62.66	-31.43	19.69	52.66	-32.97		
0.268675	30.63	26.45	61.22	-34.77	20.40	51.22	-30.82		
2.188700	31.76	27.99	56.00	-28.01	16.55	46.00	-29.45		
19.437345	36.51	32.34	60.00	-27.66	26.51	50.00	-23.49		
0.181458	37.71	36.50	64.47	-27.97	26.48	54.47	-27.99	L2	Pass
0.227690	33.53	31.49	62.59	-31.10	22.12	52.59	-30.47		
0.500316	34.72	33.30	56.00	-22.70	27.50	46.00	-18.50		
1.019185	28.68	25.48	56.00	-30.52	11.30	46.00	-34.70		
2.136741	31.37	27.66	56.00	-28.34	18.95	46.00	-27.05		
19.396783	36.25	31.94	60.00	-28.06	26.09	50.00	-23.91		

\*- Margin = Measured emission - specification limit.

**Reference numbers of test equipment used**

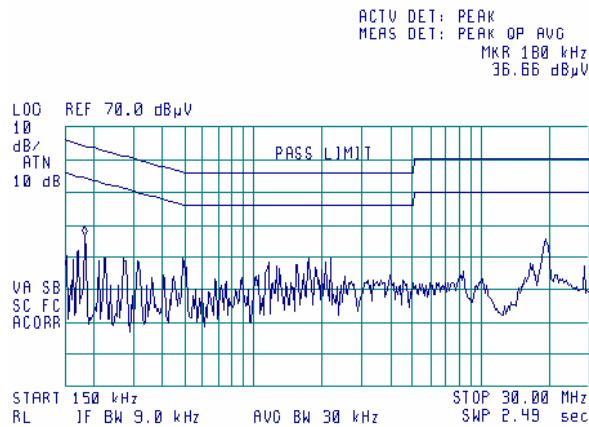
HL 0466	HL 0787	HL1430	HL 1502	HL1503	HL 2888		
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Full description is given in Appendix A.

<b>Test specification:</b>	<b>FCC Part 15, Section 107 / RSS-Gen, Section 7.1.6 / ICES-003, Conducted emission at AC power port</b>		
<b>Test procedure:</b>	ANSI C63.4, Sections 11.5 and 12.1.3 / CISPR 22		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	<b>PASS</b>
<b>Date &amp; Time:</b>	8/16/2007 2:06:42 PM		
<b>Temperature:</b> 25°C	<b>Air Pressure:</b> 1007 hPa	<b>Relative Humidity:</b> 42 %	<b>Power Supply:</b> 120 V AC
<b>Remarks:</b>			

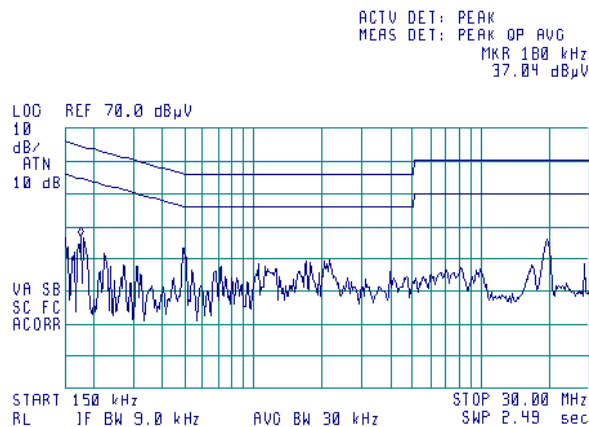
Plot 8.1.1 Conducted emission measurements according to FCC Part 15, Section 107 and ICES-003, Section 5

LINE: L1  
LIMIT: Class B  
EUT OPERATING MODE: Stand-by  
LIMIT: QUASI-PEAK, AVERAGE  
DETECTOR: PEAK



Plot 8.1.2 Conducted emission measurements according to FCC Part 15, Section 107 and ICES-003, Section 5

LINE: L2  
LIMIT: Class B  
EUT OPERATING MODE: Stand-by  
LIMIT: QUASI-PEAK, AVERAGE  
DETECTOR: PEAK



<b>Test specification:</b> FCC Part 15, Section 109 / RSS-Gen, Section 6/ICES-003, Radiated emission			
<b>Test procedure:</b> ANSI C63.4, Sections 11.6 and 12.1.4 / CISPR 22			
<b>Test mode:</b> Compliance	<b>Verdict:</b> PASS		
<b>Date &amp; Time:</b> 7/31/2007 7:14:56 AM			
<b>Temperature:</b> 26°C	<b>Air Pressure:</b> 1007 hPa	<b>Relative Humidity:</b> 47 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

## 8.2 Radiated emission measurements

### 8.2.1 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 8.2.1, according to ICES-003, Section 5 in Table 8.2.2, and according to RSS-Gen, Section 7.2.3.2 in Table 8.2.3.

**Table 8.2.1 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 <sup>th</sup> harmonic**	43.5*	54.0	49.5	60.0*

**Table 8.2.2 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.

**Table 8.2.3 Radiated emission limits according to RSS-Gen, Section 7.2.3.2**

Frequency, MHz	Field strength limit at 3 m test distance, dB(μV/m)
30 - 88	40.0
88 - 216	43.5
216 - 960	46.0
960 - 3 <sup>rd</sup> harmonic**	54.0

\*\* - harmonic of the highest frequency the EUT generates, uses, operates or tunes to.

### 8.2.2 Test procedure for measurements in semi-anechoic chamber

**8.2.2.1** The EUT was set up as shown in Figure 8.2.1, energized and the performance check was conducted.

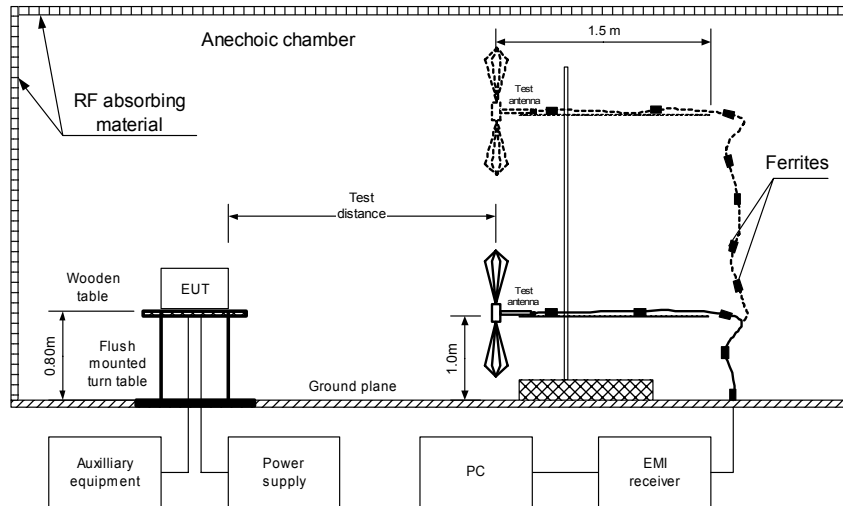
**8.2.2.2** The specified frequency range was investigated with biconilog antenna connected to EMI receiver. To find maximum radiation the turntable was rotated 360°, the measuring antenna height was changed from 1 to 4 m, its polarization was switched from vertical to horizontal and the EUT cables position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

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



<b>Test specification:</b> FCC Part 15, Section 109 / RSS-Gen, Section 6/ICES-003, Radiated emission			
<b>Test procedure:</b> ANSI C63.4, Sections 11.6 and 12.1.4 / CISPR 22			
<b>Test mode:</b> Compliance	<b>Verdict:</b> PASS		
<b>Date &amp; Time:</b> 7/31/2007 7:14:56 AM			
<b>Temperature:</b> 26°C	<b>Air Pressure:</b> 1007 hPa	<b>Relative Humidity:</b> 47 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

Figure 8.2.1 Setup for radiated emission measurements in anechoic chamber, table-top equipment



<b>Test specification:</b> FCC Part 15, Section 109 / RSS-Gen, Section 6/ICES-003, Radiated emission	
<b>Test procedure:</b> ANSI C63.4, Sections 11.6 and 12.1.4 / CISPR 22	
<b>Test mode:</b> Compliance	<b>Verdict:</b> PASS
<b>Date &amp; Time:</b> 7/31/2007 7:14:56 AM	
<b>Temperature:</b> 26°C	<b>Air Pressure:</b> 1007 hPa
<b>Relative Humidity:</b> 47 %	
<b>Power Supply:</b> 120 VAC	
<b>Remarks:</b>	

Table 8.2.4 Radiated emission test results according to FCC Part 15 Section 109 and RSS-Gen Section 7.2.3.2

EUT SET UP: TABLE-TOP  
LIMIT: Class B  
EUT OPERATING MODE: Stand-by  
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*				
42.683500	33.95	30.93	40.00	-9.07	V	1.0	98	Pass
50.017100	31.65	29.95	40.00	-10.05	V	1.2	173	
133.357300	33.06	29.86	43.50	-13.64	V	1.0	41	
173.347700	33.42	30.62	43.50	-12.88	V	1.0	33	
181.360600	37.61	34.38	43.50	-9.12	V	1.0	146	
189.362300	39.05	36.03	43.50	-7.47	V	1.0	13	
194.684800	36.62	34.20	43.50	-9.30	V	1.0	25	
272.032800	34.24	30.51	46.00	-15.49	H	1.0	129	

TEST SITE: SEMI ANECHOIC CHAMBER  
TEST DISTANCE: 3 m  
FREQUENCY RANGE: 1000 MHz – 2200 MHz  
RESOLUTION BANDWIDTH: 1000 kHz

Frequency, MHz	Peak emission, dB(μV/m)	Average			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

<b>Test specification:</b> FCC Part 15, Section 109 / RSS-Gen, Section 6/ICES-003, Radiated emission	
<b>Test procedure:</b> ANSI C63.4, Sections 11.6 and 12.1.4 / CISPR 22	
<b>Test mode:</b> Compliance	<b>Verdict:</b> PASS
<b>Date &amp; Time:</b> 7/31/2007 7:14:56 AM	
<b>Temperature:</b> 26°C	<b>Air Pressure:</b> 1007 hPa
<b>Relative Humidity:</b> 47 %	
<b>Power Supply:</b> 120 VAC	
<b>Remarks:</b>	

Table 8.2.5 Radiated emission test results according to ICES-003, Section 5

EUT SET UP: TABLE-TOP  
LIMIT: Class B  
EUT OPERATING MODE: Stand-by  
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*				
42.683500	33.95	30.93	40.50	-9.57	V	1.0	98	Pass
50.017100	31.65	29.95	40.50	-10.55	V	1.2	173	
133.357300	33.06	29.86	40.50	-10.64	V	1.0	41	
173.347700	33.42	30.62	40.50	-9.88	V	1.0	33	
181.360600	37.61	34.38	40.50	-6.12	V	1.0	146	
189.362300	39.05	36.03	40.50	-4.47	V	1.0	13	
194.684800	36.62	34.20	40.50	-6.30	V	1.0	25	
272.032800	34.24	30.51	47.50	-16.99	H	1.0	129	

\*- Margin = Measured emission - specification limit.

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

Reference numbers of test equipment used

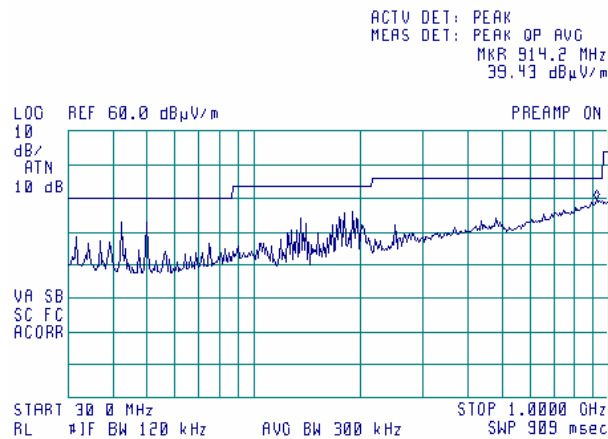
HL 0465	HL 0521	HL 0589	HL 0592	HL 0593	HL 0594	HL 0604	HL 1004
HL 1430	HL 1947	HL 2432					

Full description is given in Appendix A.

<b>Test specification:</b> FCC Part 15, Section 109 / RSS-Gen, Section 6/ICES-003, Radiated emission			
<b>Test procedure:</b> ANSI C63.4, Sections 11.6 and 12.1.4 / CISPR 22			
<b>Test mode:</b> Compliance	<b>Verdict:</b> PASS		
<b>Date &amp; Time:</b> 7/31/2007 7:14:56 AM			
<b>Temperature:</b> 26°C	<b>Air Pressure:</b> 1007 hPa	<b>Relative Humidity:</b> 47 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

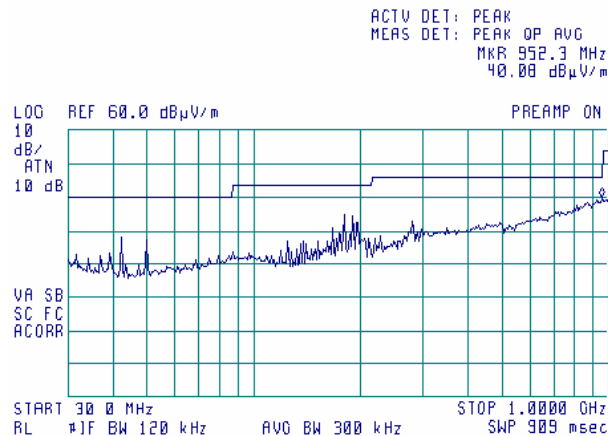
**Plot 8.2.1 Radiated emission measurements in 30 - 1000 MHz range, vertical antenna polarization**

TEST SITE: Anechoic chamber  
LIMIT: FCC part 15 §15.109 Class B and RSS-Gen section 6  
TEST DISTANCE: 3 m  
EUT OPERATING MODE: Stand-by



**Plot 8.2.2 Radiated emission measurements in 30 - 1000 MHz range, horizontal antenna polarization**

TEST SITE: Anechoic chamber  
LIMIT: FCC part 15 §15.109 Class B and RSS-Gen section 6  
TEST DISTANCE: 3 m  
EUT OPERATING MODE: Stand-by

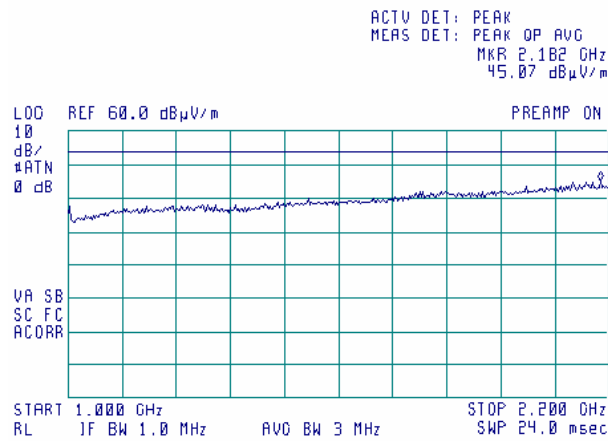


<b>Test specification:</b> FCC Part 15, Section 109 / RSS-Gen, Section 6/ICES-003, Radiated emission			
<b>Test procedure:</b> ANSI C63.4, Sections 11.6 and 12.1.4 / CISPR 22			
<b>Test mode:</b> Compliance	<b>Verdict:</b> PASS		
<b>Date &amp; Time:</b> 7/31/2007 7:14:56 AM			
<b>Temperature:</b> 26°C	<b>Air Pressure:</b> 1007 hPa	<b>Relative Humidity:</b> 47 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

**Plot 8.2.3 Radiated emission measurements above 1000 MHz, vertical antenna polarization**

TEST SITE: Anechoic chamber  
LIMIT: FCC part 15 §15.109 Class B and RSS-Gen section 6  
TEST DISTANCE: 3 m  
EUT OPERATING MODE: Stand-by

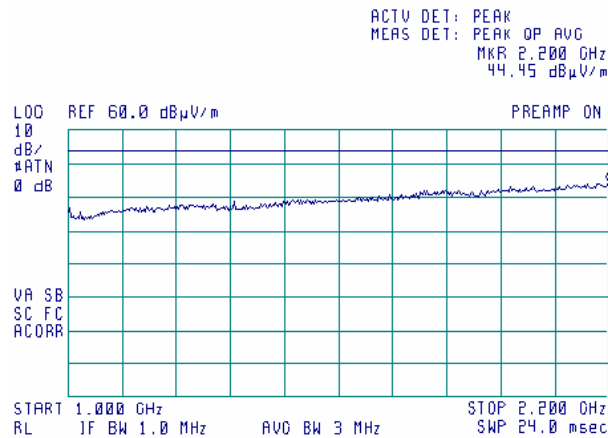
15:43:58 JUL 18, 2007



**Plot 8.2.4 Radiated emission measurements above 1000 MHz, horizontal antenna polarization**

TEST SITE: Anechoic chamber  
LIMIT: FCC part 15 §15.109 Class B and RSS-Gen section 6  
TEST DISTANCE: 3 m  
EUT OPERATING MODE: Stand-by

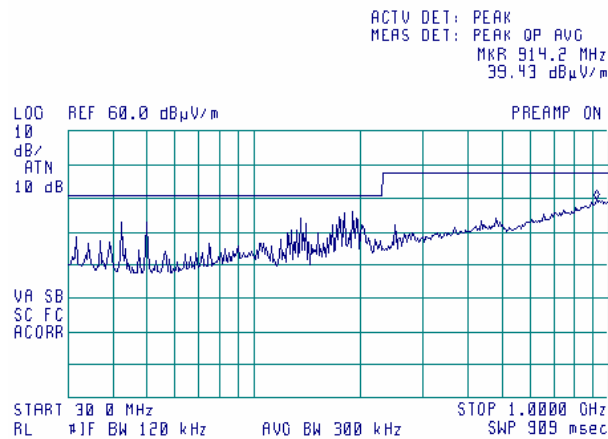
15:47:25 JUL 18, 2007



<b>Test specification:</b> FCC Part 15, Section 109 / RSS-Gen, Section 6/ICES-003, Radiated emission			
<b>Test procedure:</b> ANSI C63.4, Sections 11.6 and 12.1.4 / CISPR 22			
<b>Test mode:</b> Compliance	<b>Verdict:</b> PASS		
<b>Date &amp; Time:</b> 7/31/2007 7:14:56 AM			
<b>Temperature:</b> 26°C	<b>Air Pressure:</b> 1007 hPa	<b>Relative Humidity:</b> 47 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

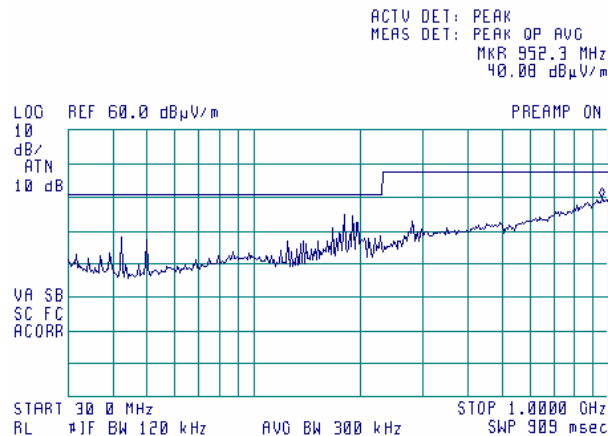
**Plot 8.2.5 Radiated emission measurements in 30 - 1000 MHz range, vertical antenna polarization**

TEST SITE: Anechoic chamber  
LIMIT: ICES-003 Class B  
TEST DISTANCE: 3 m  
EUT OPERATING MODE: Stand-by



**Plot 8.2.6 Radiated emission measurements in 30 - 1000 MHz range, horizontal antenna polarization**

TEST SITE: Anechoic chamber  
LIMIT: ICES-003 Class B  
TEST DISTANCE: 3 m  
EUT OPERATING MODE: Stand-by



## 9 APPENDIX A Test equipment and ancillaries used for tests

HL No	Description	Manufacturer	Model	Ser. No.	Last Cal.	Due Cal.
0337	Probe Set, Hand held, 5 probes	Electro-Metrics	EHFP-30	238	08-Jun-07	08-Jun-08
0415	Cable, Coax, RF, RG-214	HL	CC-3	056	02-Dec-07	02-Dec-08
0446	Antenna, Loop active, 10kHz-30MHz	EMCO	6502	2857	28-Jun-07	28-Jun-08
0465	Anechoic Chamber 9(L) x 6.5(W) x 5.5(H) m	HL	AC - 1	023	23-Aug-05	23-Aug-08
0466	Shielded Room 3(L) x 3(W) x 2,4(H) m	HL	SR - 1	024	11-Nov-07	11-Nov-08
0521	EMI Receiver (Spectrum Analyzer) with RF filter section 9 kHz-6.5 GHz	Hewlett Packard	8546A	3617A 00319, 3448A002 53	28-Aug-07	28-Aug-08
0569	Antenna, Log Periodic, 200 - 1000 MHz	Electro-Metrics	LPA 25/30	1953	10-Jan-08	10-Jan-09
0589	Cable Coaxial, GORE A2P01POL118, 2.3 m	HL	GORE-3	176	02-Dec-07	02-Dec-08
0592	Position Controller	HL	L2- SR3000 (HL CRL- 3)	100	18-May-07	18-May-08
0593	Antenna Mast, 1-4 m Pneumatic	Madgesh	AM-F1	101	02-Feb-08	02-Feb-09
0594	Turn Table FOR ANECHOIC CHAMBER flush mount d=1.2 m Pneumatic	HL	TT- WDC1	102	26-Jan-08	26-Jan-09
0604	Antenna BiconiLog Log-Periodic/T Bow- TIE, 26 - 2000 MHz	EMCO	3141	9611-1011	10-Jan-08	10-Jan-09
0787	Transient Limiter 9 kHz-200 MHz	Hewlett Packard	11947A	3107A018 77	21-Nov-06	21-Nov-07
0812	Cable Coax, RG-214, 11.5 m, N-type connectors	HL	C214-11	148	02-Dec-07	02-Dec-08
1004	Cable Coaxial, ANDREW PSWJ4, 6m	HL	ANDREW -6	163	02-Dec-07	02-Dec-08
1425	EMI Receiver, 9 kHz - 2.9 GHz, System: HL1426, HL1427	Agilent Technologies	8542E	3710A002 22, 3705A002 04	31-Aug-07	31-Aug-08
1430	EMI Receiver, 9 kHz - 2.9 GHz, System: HL1431, HL1432	Agilent Technologies	8542E	3807A002 62,3705A0 0217	31-Aug-07	31-Aug-08
1502	Cable RF, 6 m, BNC/BNC	Belden	M17/167 MIL-C-17	1502	27-Nov-07	27-Nov-08
1503	Cable RF, 6 m, BNC/BNC	Belden	M17/167 MIL-C-17	1503	11-Sep-07	11-Sep-08
1553	Cable RF, 3.5 m	Alpha Wire	RG-214	1553	22-May-07	22-May-08
1566	Cable RF, 2 m	Huber-Suhner	Sucoflex 104PE	13094/4PE	02-Dec-07	02-Dec-08
1947	Cable 18GHz, 6.5 m, blue	Rhophase Microwave Limited	NPS- 1803A- 6500-NPS	T4974	17-Oct-07	17-Oct-08
2009	Cable RF, 8 m	Alpha Wire	RG-214	C-56	20-May-07	20-May-08
2259	Amplifier Low Noise 2-20 GHz	Sophia Wireless	LNA0220- C	0223	05-Nov-07	05-Nov-08
2432	Antenna, Double-Ridged Waveguide Horn 1-18 GHz	EMC Test Systems	3115	00027177	03-Mar-07	03-Mar-08
2697	Antenna, 30 MHz - 3.0 GHz	Sunol Sciences. Corp. Pleasanton, California USA	JB3	A022805	10-Jan-08	10-Jan-09

HL No	Description	Manufacturer	Model	Ser. No.	Last Cal.	Due Cal.
2780	EMC analyzer, 100 Hz to 26.5 GHz	Agilent Technologies	E7405A	MY4510246	11-Jun-07	11-Jun-08
2871	Microwave Cable Assembly, 18 GHz, 6.4 m, SMA - SMA	Huber-Suhner	198-8155-00	2871	11-Feb-07	11-Feb-08
2888	LISN Two-line V-Network 50 Ohm / 50 uH + 5 Ohm, 16A, MIL STD 461E, CISPR 16-1	Rolf Heine	NNB-2/16Z	02/10018	29-Mar-07	29-Mar-08
2909	Spectrum analyzer, ESA-E, 100 Hz to 26.5 GHz	Agilent Technologies	E4407B	MY41444762	07-May-07	07-May-08



## 10 APPENDIX B Measurement uncertainties

### Expanded uncertainty at 95% confidence in Hermon Labs EMC measurements

Test description	Expanded uncertainty
Conducted emissions with LISN	9 kHz to 150 kHz: $\pm 3.9$ dB 150 kHz to 30 MHz: $\pm 3.8$ dB
Radiated emissions at 10 m measuring distance Horizontal polarization  Vertical polarization	Biconilog antenna: $\pm 5.0$ dB Biconical antenna: $\pm 5.0$ dB Log periodic antenna: $\pm 5.1$ dB Double ridged horn antenna: $\pm 5.3$ dB Biconilog antenna: $\pm 5.5$ dB Biconical antenna: $\pm 5.5$ dB Log periodic antenna: $\pm 5.6$ dB Double ridged horn antenna: $\pm 5.8$ dB
Radiated emissions at 3 m measuring distance Horizontal polarization  Vertical polarization	Biconilog antenna: $\pm 5.3$ dB Biconical antenna: $\pm 5.0$ dB Log periodic antenna: $\pm 5.3$ dB Double ridged horn antenna: $\pm 5.3$ dB Biconilog antenna: $\pm 6.0$ dB Biconical antenna: $\pm 5.7$ dB Log periodic antenna: $\pm 6.0$ dB Double ridged horn antenna: $\pm 6.0$ dB
Conducted emissions at RF antenna connector	9 kHz to 2.9 GHz: $\pm 2.6$ dB 2.9 GHz to 6.46 GHz: $\pm 3.5$ dB 6.46 GHz to 13.2 GHz: $\pm 4.3$ dB 13.2 GHz to 22.0 GHz: $\pm 5.0$ dB 22.0 GHz to 26.8 GHz: $\pm 5.5$ dB 26.8 GHz to 40.0 GHz: $\pm 4.8$ dB
Duty cycle, timing (Tx ON / OFF) and average factor measurements	$\pm 1.0$ %
Occupied bandwidth	$\pm 8.0$ %

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.

## 11 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).

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Telephone: +972 4628 8001  
Fax: +972 4628 8277  
e-mail: mail@hermonlabs.com  
website: www.hermonlabs.com

Person for contact: Mr. Alex Usoskin, CEO.

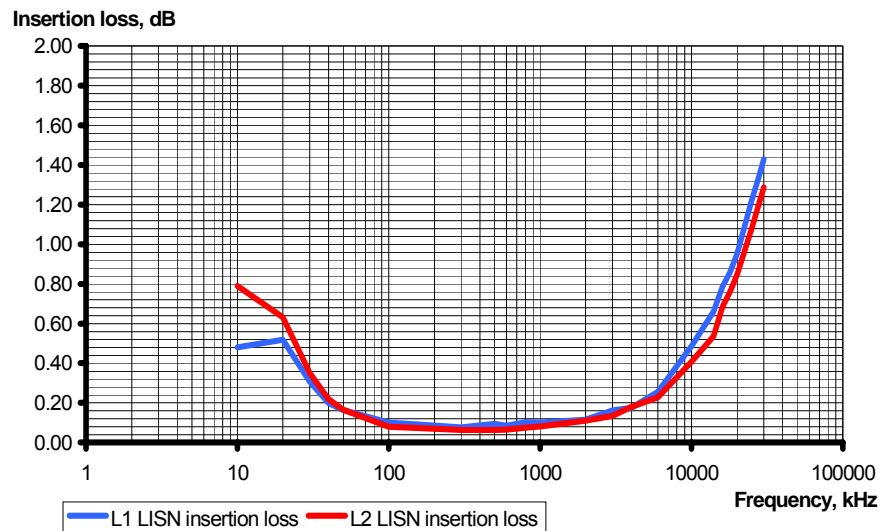
## 12 APPENDIX D Specification references

47CFR part 15: 2006	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

### 13 APPENDIX E Test equipment correction factors

**Correction factor**  
**Line impedance stabilization network**  
**Model NNB-2/16Z, Rolf Heine, HL 2888**

Frequency, kHz	Insertion loss, dB		Measurement Uncertainty, dB
	L1	N	
10	0.48	0.79	±0.6
20	0.52	0.63	
30	0.31	0.35	
40	0.20	0.22	
50	0.16	0.17	
100	0.10	0.08	
300	0.08	0.06	
500	0.10	0.06	
600	0.09	0.07	
800	0.10	0.07	
1000	0.10	0.08	
2000	0.12	0.11	
3000	0.16	0.14	
4000	0.17	0.18	
6000	0.26	0.23	
10000	0.49	0.41	
14000	0.66	0.54	
16000	0.79	0.69	
18000	0.86	0.76	
20000	0.96	0.85	
25000	1.22	1.08	
28000	1.35	1.21	
30000	1.43	1.29	



**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( $\mu$ V) to convert it into field intensity in dB( $\mu$ V/m).

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

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

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

Antenna calibration  
Sunol Sciences Inc., model JB3, serial number A022805, HL 2697

Frequency, MHz	ACF, dB	Gain, dBi	Num gain	Frequency, MHz	ACF, dB	Gain, dBi	Num gain	Frequency, MHz	ACF, dB	Gain, dBi	Num gain	Frequency, MHz	ACF, dB	Gain, dBi	Num gain	Frequency, MHz	ACF, dB	Gain, dBi	Num gain
30	22.2	-22.5	0.01	620	19.7	6.3	4.27	1215	24.9	7.0	5.05	1810	28.3	7.1	5.08	2405	30.9	6.9	4.93
35	18.5	-17.4	0.02	625	19.7	6.5	4.42	1220	24.9	7.0	4.99	1815	28.5	6.9	4.91	2410	30.9	6.9	4.89
40	14.7	-12.5	0.06	630	19.6	6.6	4.57	1225	25.1	6.9	4.91	1820	28.6	6.8	4.74	2415	31.0	6.9	4.85
45	11.3	-8.1	0.16	635	19.7	6.5	4.48	1230	25.2	7.0	4.92	1825	28.7	6.8	4.76	2420	31.0	6.8	4.82
45	11.3	-8.1	0.16	640	19.9	6.4	4.40	1235	25.1	7.0	4.96	1830	28.7	6.8	4.76	2425	31.1	6.8	4.81
50	8.9	-4.7	0.34	645	19.9	6.5	4.45	1240	25.0	7.1	5.09	1835	28.7	6.7	4.72	2430	31.0	6.9	4.87
55	7.9	-2.8	0.62	650	19.9	6.5	4.51	1245	25.0	7.1	5.12	1840	28.8	6.7	4.69	2435	31.0	6.9	4.88
60	7.8	-2.1	0.82	655	19.9	6.6	4.60	1250	25.0	7.1	5.15	1845	28.6	6.9	4.90	2440	31.2	6.8	4.74
65	2.0	8.5	2.0	660	19.9	6.7	4.69	1255	25.0	7.2	5.25	1850	28.4	7.1	5.12	2445	31.1	6.9	4.91
70	9.0	-1.9	0.64	665	19.9	6.7	4.70	1260	24.9	7.3	5.36	1855	28.5	7.0	5.07	2450	31.0	7.0	4.96
75	8.8	-1.1	0.78	670	20.0	6.7	4.71	1265	25.0	7.3	5.31	1860	28.6	7.0	5.01	2455	31.0	7.0	5.01
80	8.4	-0.2	0.97	675	20.1	6.7	4.71	1270	25.1	7.2	5.26	1865	28.5	7.1	5.17	2460	30.9	7.2	5.19
85	8.0	0.8	1.20	680	20.1	6.7	4.71	1275	25.3	7.0	5.05	1870	28.4	7.3	5.33	2465	31.1	6.9	4.95
90	9.2	1.1	1.29	685	20.1	6.8	4.79	1280	25.5	6.8	4.94	1875	28.4	7.2	5.28	2470	31.3	6.8	4.76
95	9.2	0.5	1.13	690	20.1	6.9	4.88	1285	25.4	7.0	4.97	1880	28.5	7.2	5.22	2475	31.4	6.7	4.69
100	10.6	-0.4	0.92	695	20.2	6.8	4.82	1290	25.3	7.1	5.10	1885	28.5	7.2	5.22	2480	31.3	6.8	4.79
110	12.6	-1.6	0.70	705	20.4	6.8	4.75	1300	25.2	7.3	5.33	1895	28.6	7.2	5.24	2490	31.1	7.0	4.99
120	13.9	-2.1	0.62	715	20.5	6.8	4.80	1310	25.5	7.1	5.09	1905	28.5	7.3	5.36	2500	30.9	7.2	5.27
125	14.2	-2.0	0.63	720	20.5	6.9	4.85	1315	25.4	7.2	5.23	1910	28.5	7.4	5.45	2505	31.1	7.1	5.15
130	14.2	-1.7	0.68	725	20.6	6.8	4.81	1320	25.3	7.3	5.36	1915	28.5	7.3	5.38	2510	31.0	7.2	5.22
140	13.4	-0.3	0.94	735	20.9	6.7	4.65	1330	25.6	7.0	5.06	1925	28.6	7.3	5.35	2520	31.2	7.0	5.05
150	12.9	0.8	1.21	745	21.0	6.6	4.59	1340	25.7	7.1	5.09	1935	28.5	7.4	5.54	2530	31.0	7.3	5.37
160	12.7	1.6	1.44	755	21.0	6.8	4.74	1350	25.7	7.1	5.09	1945	28.5	7.5	5.59	2540	31.2	7.1	5.08
165	2.0	2.0	1.59	760	21.0	6.8	4.83	1355	25.8	7.2	5.06	1950	28.5	7.4	5.48	2545	31.0	7.3	4.43
170	12.2	2.6	1.83	765	21.1	6.8	4.73	1360	25.9	6.9	4.95	1955	28.6	7.5	5.57	2550	31.0	7.3	5.39
175	11.8	3.3	2.13	770	21.3	6.7	4.64	1365	26.0	6.9	4.95	1960	28.6	7.5	5.65	2555	31.1	7.2	5.30
180	11.6	3.7	2.36	775	21.3	6.7	4.68	1370	26.0	7.0	4.96	1965	28.7	7.4	5.47	2560	31.0	7.4	5.47
185	11.5	4.0	2.54	780	21.3	6.7	4.72	1375	26.0	7.0	5.01	1970	28.9	7.2	5.29	2565	30.8	7.6	5.70
190	11.2	4.2	2.81	785	21.2	6.7	4.77	1380	26.1	7.2	5.27	1975	28.9	7.2	5.22	2570	31.0	7.3	5.32
200	13.1	3.2	2.07	795	21.4	6.8	4.79	1390	26.1	6.9	4.92	1985	29.1	7.1	5.11	2580	31.6	6.9	4.87
205	12.0	4.4	2.76	800	21.5	6.8	4.77	1395	26.2	6.9	4.94	1990	29.1	7.0	5.06	2585	31.6	6.8	4.79
210	11.0	5.6	3.66	805	21.6	6.7	4.71	1400	26.2	7.0	4.96	1995	29.1	7.1	5.09	2590	31.6	6.9	4.88
215	11.3	5.6	3.69	810	21.7	6.7	4.65	1405	26.1	7.0	5.02	2000	29.1	7.1	5.11	2595	31.5	7.0	4.97
220	11.6	5.5	3.52	815	21.7	6.7	4.72	1410	26.1	7.1	5.09	2005	29.1	7.1	5.16	2600	31.6	6.9	4.86
225	11.7	5.5	3.55	820	21.7	6.8	4.80	1415	26.2	7.0	5.02	2010	29.1	7.1	5.15	2605	31.3	7.2	5.30
230	11.9	5.5	3.57	825	21.7	6.8	4.82	1420	26.3	7.0	4.96	2015	29.2	7.1	5.13	2610	31.4	7.1	5.15
235	12.1	5.5	3.56	830	21.7	6.9	4.85	1425	26.2	7.1	5.10	2020	29.2	7.1	5.18	2615	31.7	6.9	4.88
240	12.3	5.5	3.64	835	21.8	6.8	4.82	1430	26.1	7.2	5.25	2025	29.3	7.1	5.08	2620	31.6	7.0	4.97
245	12.3	5.7	3.71	840	21.9	6.8	4.80	1435	26.1	7.2	5.24	2030	29.3	7.0	5.05	2625	31.4	7.1	5.17
250	12.3	5.9	3.88	845	21.9	6.8	4.83	1440	26.2	7.2	5.24	2035	29.3	7.1	5.07	2630	31.6	7.0	5.00
255	12.5	5.9	3.85	850	21.9	6.8	4.86	1445	26.3	7.1	5.11	2040	29.3	7.1	5.13	2635	31.6	6.8	4.82
260	12.7	5.8	3.83	855	22.0	6.8	4.80	1450	26.5	7.0	4.98	2045	29.2	7.2	5.23	2640	31.7	7.0	4.98
265	13.2	5.5	3.54	860	22.1	6.8	4.74	1455	26.4	7.1	5.07	2050	29.2	7.2	5.27	2645	31.7	6.9	4.93
270	13.7	5.2	3.27	865	22.0	6.9	4.92	1460	26.4	7.1	5.17	2055	29.3	7.2	5.21	2650	31.8	6.9	4.85
275	13.7	5.3	3.39	870	21.9	7.1	5.11	1465	26.4	7.2	5.19	2060	29.5	7.0	5.02	2655	31.8	6.9	4.85
280	13.7	5.4	3.50	875	22.0	7.1	5.08	1470	26.4	7.2	5.22	2065	29.4	7.1	5.08	2660	31.7	7.0	5.02
285	13.6	5.6	3.71	880	22.0	7.0	5.05	1475	26.4	7.1	5.11	2070	29.4	7.1	5.10	2665	31.7	6.7	4.71
290	13.7	5.7	3.72	885	22.1	7.0	5.06	1480	26.5	7.1	5.12	2075	29.5	7.0	5.01	2670	32.0	6.7	4.67
295	13.8	5.8	3.77	890	22.1	7.0	5.06	1485	26.5	7.1	5.14	2080	29.8	6.8	4.76	2675	31.9	6.8	4.81
300	13.9	5.8	3.81	895	22.2	7.1	5.09	1490	26.5	7.1	5.17	2085	29.7	6.9	4.89	2680	31.7	7.0	5.04
305	14.0	5.9	3.85	900	22.2	7.1	5.12	1495	26.5	7.2	5.24	2090	29.7	6.9	4.86	2685	31.9	6.8	4.83
310	14.1	5.9	3.88	905	22.3	7.1	5.09	1500	26.5	7.2	5.31	2095	29.8	6.8	4.78	2690	32.1	6.7	4.72
315	14.3	5.9	3.89	910	22.3	7.0	5.05	1505	26.5	7.2	5.27	2100	29.9	6.8	4.75	2695	32.1	6.7	4.71
320	14.4	5.9	3.90	915	22.4	7.0	4.99	1510	26.6	7.2	5.23	2105	29.8	6.8	4.81	2700	32.0	6.8	4.81
325	14.5	5.9	3.92	920	22.6	6.9	4.92	1515	26.6	7.2	5.20	2110	29.9	6.8	4.76	2705	32.0	6.8	4.80
330	14.6	5.9	3.93	925	22.7	6.9	4.85	1520	26.5	7.3	5.38	2115	29.9	6.8	4.76	2710	32.1	6.8	4.79
335	14.7	6.0	4.02	930	22.8	6.8	4.77	1525	26.6	7.3	5.37	2120	29.9	6.8	4.84	2715	32.1	6.7	4.71
340	14.7	6.2	4.12	935	22.8	6.8	4.83	1530	26.6	7.3	5.38	2125	29.9	6.9	4.89	2720	32.4	6.5	4.47
345	14.8	6.1	4.06	940	22.9	6.9	4.89	1535	26.6	7.4	5.44	2130	29.9	6.8	4.90	2725	32.2	6.7	4.63
350	15.1	6.0	3.99	945	22.8	6.9	4.87	1540	26.5	7.4	5.53	2135	29.8	6.9	4.94	2730	31.9	7.0	5.05
355	15.3	5.9	3.88	950	22.9	6.9	4.85	1545	26.5	7.5	5.58	2140	29.8	7.1	5.08	2735	31.6	7.4	5.44
360	15.6	5.8	3.78	955	23.0	6.8	4.81	1550	26.5	7.5	5.63	2145	29.9	6.9	4.92	2740	31.6	7.1	5.46
365	15.5	5.9	3.89	960	23.1	6.8	4.77	1555	26.7	7.3	5.39	2150	29.9	7.0	4.98	2745	31.9	7.0	5.06
370	15.5	6.0	4.01	965	23.1	6.7	4.73	1560	26.9	7.1	5.16	2155	29.8	7.1	5.05	2750	32.0	6.9	4.94
375	15.6	6.1	4.03	970	23.2	6.7	4.69	1565	26.9	7.2	5.23	2160	29.8	7.1	5.09	2755	32.0	7.0	4.98
380	15.7	6.1	4.05	975	23.2	6.8	4.82	1570	26.9	7.2	5.30	2165	29.9	7.0	5.00	2760	32.0	7.0	5.06
385	15.7	6.2	4.15	980	23.5	6.6	4.54	1575	27.0	7.2	5.23	2170	29.9	7.1	5.07	2765	32.2	6.8	4.80
390	15.7	6.3	4.25	985	23.														

**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 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 coaxial, 6 m, model: M17/167 MIL-C-17, HL 1503**

Frequency, MHz	Cable loss, dB
0.15	0.043
1	0.077
3	0.139
5	0.169
10	0.248
30	0.430
50	0.561
75	0.697
100	0.822
300	1.446
500	1.901
800	2.663
1000	2.829
1500	3.569
2000	4.179

**Cable loss**  
**RF cable 3.5 m, Alpha Wire, model RG-214, S/N 149, HL 1553**

No.	Frequency, MHz	Cable loss, dB	Measurement uncertainty, dB
1	1	0.01	±0.05
2	10	0.07	
3	30	0.12	
4	50	0.22	
5	100	0.26	
6	200	0.40	
7	300	0.52	
8	400	0.60	
9	500	0.70	
10	600	0.77	
11	700	0.84	
12	800	1.00	
13	900	1.00	
14	1000	1.05	
15	2000	1.70	

**Cable loss**  
Cable RF, 2m, model: Sucoflex 104PE, S/N 13094/4PE, HL 1566

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

**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**  
**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		

## 14 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( $\mu$ V)	decibel referred to one microvolt
dB( $\mu$ V/m)	decibel referred to one microvolt per meter
dB( $\mu$ 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
$\mu$ s	microsecond
NA	not applicable
NB	narrow band
OATS	open area test site
$\Omega$	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