

# TEST REPORT

ACCORDING TO: FCC CFR 47 PART 15 subpart C, §15.225 and subpart B class B

FOR:

**Orex Computed Radiography Ltd.  
(A Carestream Health Company)**

**RFID Reader**

**Model: Scan & Go Device**

**FCC ID:ZBE-SCANGODEVICE**

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## 1 Applicant information

**Client name:** Orex Computed Radiography Ltd. (A Carestream Health Company)  
**Address:** P.O.B. 505, Yokneam Star building, Yokneam, 20692, Israel  
**Telephone:** +972 4909 9617  
**Fax:** +972 4959 1262  
**E-mail:** Moshe.Shenhav@carestream.com  
**Contact name:** Mr. Moshe Shenhav

## 2 Equipment under test attributes

**Product name:** RFID reader  
**Product type:** Transceiver  
**Model(s):** Scan & Go Device  
**Serial number:** 007  
**Hardware version:** AS000755 RevAF  
**Software release:** CR95HF\_MMY\_PROJECT.HEX  
**Receipt date** 4/10/2012

## 3 Manufacturer information

**Manufacturer name:** Orex Computed Radiography Ltd. (A Carestream Health Company)  
**Address:** P.O.B. 505, Yokneam Star building, Yokneam, 20692, Israel  
**Telephone:** +972 4909 9617  
**Fax:** +972 4959 1262  
**E-Mail:** Moshe.Shenhav@carestream.com  
**Contact name:** Mr. Moshe Shenhav

## 4 Test details




**Project ID:** 23197  
**Location:** Hermon Laboratories Ltd. Harakevet Industrial Zone, Binyamina 30500, Israel  
**Test started:** 4/10/2012  
**Test completed:** 4/17/2012  
**Test specification(s):** FCC CFR 47 Part 15 subpart C, §15.225 and subpart B class B

## 5 Tests summary

Test	Status
<b>Transmitter characteristics</b>	
Sections 15.225(a) (b) (c), In band radiated emissions	Pass
Sections 15.225(d), Out of band radiated emissions	Pass
Section 15.225(e), Frequency stability	Pass
Section 15.207(a), Conducted emission	Pass
Section 15.215(c), Occupied bandwidth	Pass
Section 15.203, Antenna requirements	Pass
<b>Unintentional emissions</b>	
Section 15.107, Class B, Conducted emission at AC power port	Pass
Section 15.109, Class B, Radiated emission	Pass

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. Alex Chaplik, test engineer	April 17, 2012	
<b>Reviewed by:</b>	Mrs. M. Cherniavsky, certification engineer	May 1, 2012	
<b>Approved by:</b>	Mr. M. Nikishin, EMC and Radio group manager	May 7, 2012	

## 6 EUT description

### 6.1 General information

The EUT, RFID reader, enables to link the imaging plate to a specific exam acquisition (for example, patient) prior to acquisition. This information is retrieved by the scanner and the imaging plate is scanned automatically according to this information. Scanned images are then routed automatically to the correct workstation, associated to the correct exam acquisition and placed in the correct frame in the CS 7600 image Acquisition interface.

### 6.2 Ports and lines

Port type	Port description	Conn. From	Conn. To	Qty.	Cable type	Cable length, m
Signal	USB	PC	EUT	1	Shielded	2

### 6.3 Support and test equipment

Description	Manufacturer	Model number	Serial number
Laptop (for subpart C tests)	Lenovo	G570	CB0787190
AC/DC adapter(for subpart C tests)	Lenovo	ADP-65KHB	127EC5
Laptop (for subpart B tests)	Lenovo	R39030310202	EB1792622
AC/DC adapter (for subpart B tests)	Lenovo	ADP-40NH B	36001650

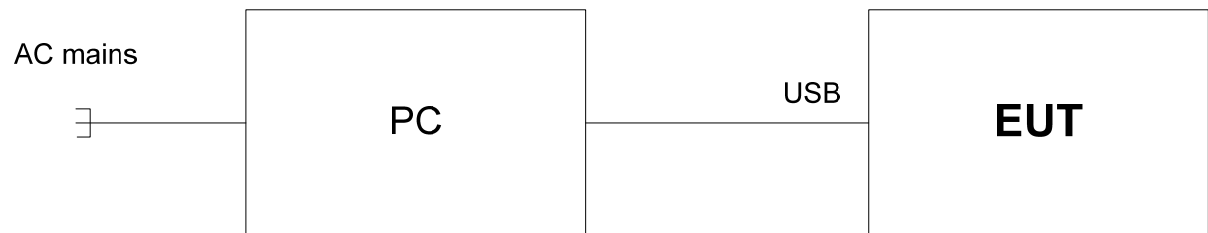
### 6.4 Operating frequencies

Source	Frequency, MHz
Tx	13.56
LO	8

### 6.5 Changes made in EUT

No changes were implemented in the EUT during testing.

## 6.6 Test configuration



## 6.7 Transceiver characteristics

<b>Type of equipment</b>				
<input checked="" type="checkbox"/>	Stand-alone (Equipment with or without its own control provisions)			
<input type="checkbox"/>	Combined equipment (Equipment where the radio part is fully integrated within another type of equipment)			
<input type="checkbox"/>	Plug-in card (Equipment intended for a variety of host systems)			
<b>Assigned frequency ranges</b>		13.553 – 13.567 MHz		
<b>Operating frequencies</b>		13.56 MHz		
<b>Is transmitter output power variable?</b>	<input checked="" type="checkbox"/>	No		
	<input type="checkbox"/>	Yes	continuous variable	
			stepped variable with stepsize	dB
			minimum RF power	dBm
			maximum RF power	dBm
<b>Antenna connection</b>				
unique coupling	standard connector	<input checked="" type="checkbox"/>	integral	<input checked="" type="checkbox"/> with temporary RF connector <input type="checkbox"/> without temporary RF connector
<b>Type of modulation</b>		Communication protocol ISO15693		
<b>Modulating test signal</b>		ID code		
<b>Transmitter power source</b>				
<input checked="" type="checkbox"/>	AC mains	<b>Nominal rated voltage</b>	120 VAC	
<b>Common power source for transmitter and receiver</b>			<input checked="" type="checkbox"/>	yes
			<input type="checkbox"/>	No



Test specification:	Sections 15.225(a) (b) (c), In band radiated emissions		
Test procedure:	ANSI C63.4, Sections 5.3 and 13.1.4		
Test mode:	Compliance	Verdict: PASS	
Date(s):	4/10/2012 - 4/12/2012		
Temperature: 22.9 °C	Air Pressure: 1007 hPa	Relative Humidity: 51 %	Power Supply: 120 VAC
Remarks:			

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

### 7.1 In band radiated emissions

#### 7.1.1 General

This test was performed to measure field strength of fundamental emission and modulation products from the EUT within the assigned band. Specification test limits are given in Table 7.1.1.

Table 7.1.1 Radiated emission limits

Frequency, MHz	Field strength at 30 m distance*		Field strength at 3 m distance*	
	μV/m	dB(μV/m)	μV/m	dB(μV/m)**
13.110 – 13.410	106	40.5	10600	80.5
13.410 – 13.553	334	50.5	33400	90.5
<b>13.553 – 13.567</b>	<b>15848</b>	<b>84.0</b>	<b>1584800</b>	<b>124.0</b>
13.567 – 13.710	334	50.5	33400	90.5
13.710 – 14.010	106	40.5	10600	80.5

\*- The limit is provided in quasi peak values.

\*\* - 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.

#### 7.1.2 Test procedure

7.1.2.1 The EUT was set up as shown in Figure 7.1.1 energized and the performance check was conducted.

7.1.2.2 The specified frequency range was investigated with loop antenna connected to spectrum analyzer/ EMI receiver. To find maximum radiation the turntable was rotated 360°, the measuring antenna was rotated around its vertical axis and the measuring antenna polarization was switched from vertical to horizontal.

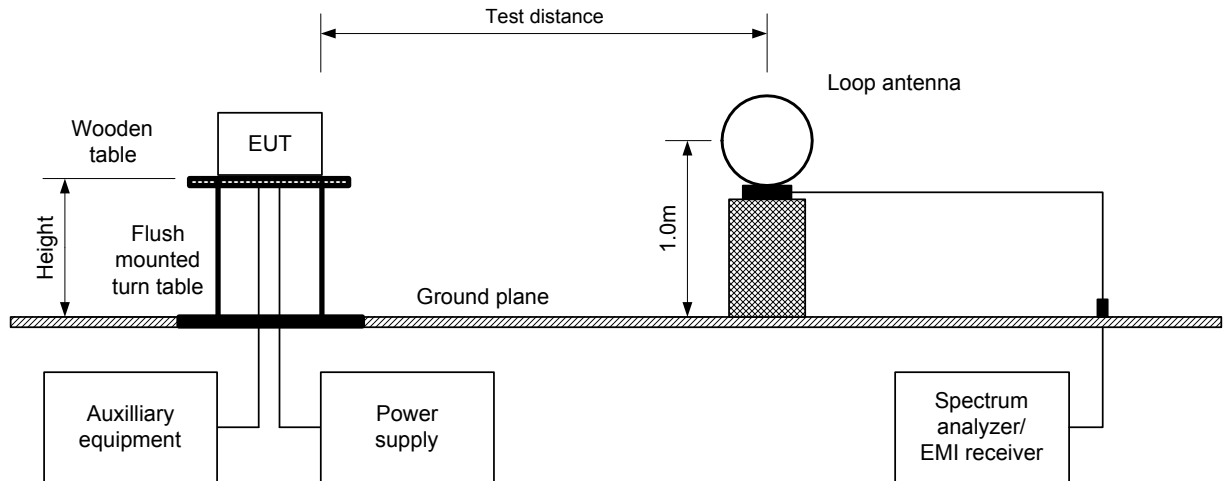
7.1.2.3 The worst test results (the lowest margins) were recorded in Table 7.1.2 and shown in the associated plots.





<b>Test specification:</b>		<b>Sections 15.225(a) (b) (c), In band radiated emissions</b>	
<b>Test procedure:</b>		ANSI C63.4, Sections 5.3 and 13.1.4	
<b>Test mode:</b>		Compliance	<b>Verdict:</b> PASS
<b>Date(s):</b>		4/10/2012 - 4/12/2012	
<b>Temperature:</b> 22.9 °C	<b>Air Pressure:</b> 1007 hPa	<b>Relative Humidity:</b> 51 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

Figure 7.1.1 Setup for in band radiated emission measurements





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<b>Test specification:</b>		<b>Sections 15.225(a) (b) (c), In band radiated emissions</b>	
<b>Test procedure:</b>		ANSI C63.4, Sections 5.3 and 13.1.4	
<b>Test mode:</b>		Compliance	<b>Verdict:</b> PASS
<b>Date(s):</b>		4/10/2012 - 4/12/2012	
<b>Temperature:</b> 22.9 °C	<b>Air Pressure:</b> 1007 hPa	<b>Relative Humidity:</b> 51 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

Table 7.1.2 In band radiated emission test results

TEST DISTANCE: 3 m  
 EUT POSITION: 3 orthogonal (X / Y / Z)  
 MODULATION: Communication protocol ISO15693  
 MODULATING SIGNAL: ID code  
 TRANSMITTER OUTPUT POWER SETTINGS: Maximum  
 INVESTIGATED FREQUENCY RANGE: 13.110 – 14.010 MHz  
 RESOLUTION BANDWIDTH: 9.0 kHz  
 VIDEO BANDWIDTH: 30.0 kHz

Carrier frequency, MHz		Quasi-peak			Antenna polarization	Azimuth**, degrees	Verdict
Peak emission, dB(μV/m)	Measured emission, dB(μV/m)	Limit, dB(μV/m)	Margin, dB*				
Unom							
13.56	64.5	64.5	124.0	-59.5	Vertical	100	Pass

The recorded result was obtained in the EUT Y-axis orthogonal position.

\*- Margin = Measured emission – specification limit.

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

#### Reference numbers of test equipment used

HL 0446	HL 0521	HL 2871	HL 3617				
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Full description is given in Appendix A.

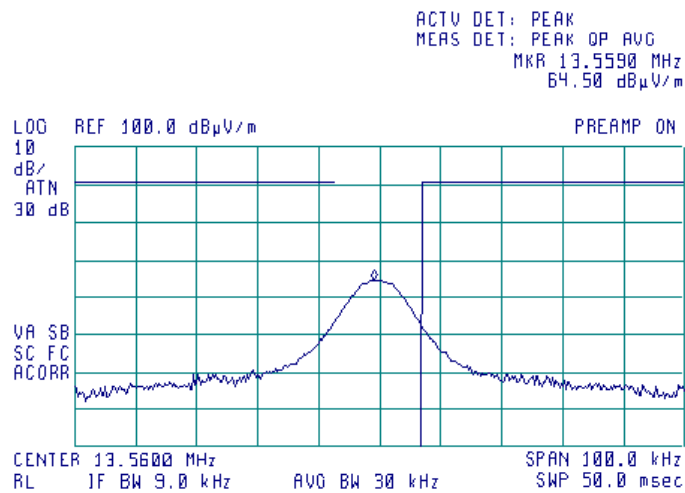


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<b>Test specification:</b>		<b>Sections 15.225(a) (b) (c), In band radiated emissions</b>	
<b>Test procedure:</b>		ANSI C63.4, Sections 5.3 and 13.1.4	
<b>Test mode:</b>		Compliance	<b>Verdict:</b> PASS
<b>Date(s):</b>		4/10/2012 - 4/12/2012	
<b>Temperature:</b> 22.9 °C	<b>Air Pressure:</b> 1007 hPa	<b>Relative Humidity:</b> 51 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

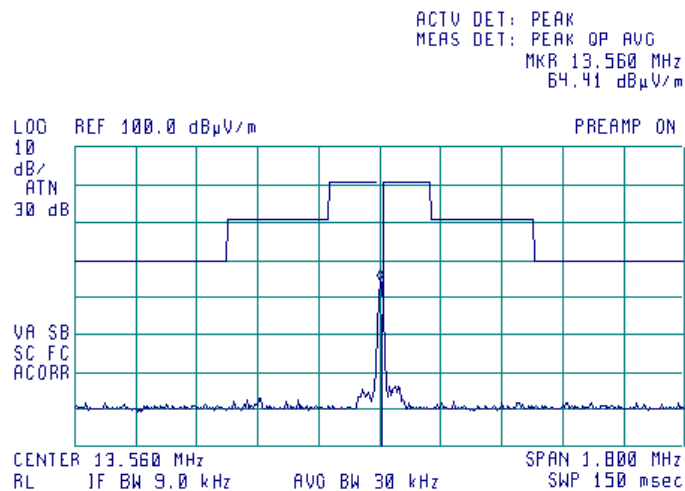
#### Plot 7.1.1 Fundamental emission test result

TEST SITE: Semi anechoic chamber  
TEST DISTANCE: 3 m  
DETECTOR: Peak hold  
EUT POSITION: Y (as worst from 3 orthogonal positions)  
INPUT VOLTAGE: Unom



#### Plot 7.1.2 In band radiated emission test results

TEST SITE: Semi anechoic chamber  
TEST DISTANCE: 3 m  
DETECTOR: Peak hold





<b>Test specification:</b>		<b>Sections 15.225(d), Out of band radiated emissions</b>	
<b>Test procedure:</b>		ANSI C63.4, Sections 5.3 and 13.1.4	
<b>Test mode:</b>		Compliance	<b>Verdict:</b> PASS
<b>Date(s):</b>		4/10/2012 - 4/15/2012	
<b>Temperature:</b> 22.9 °C	<b>Air Pressure:</b> 1007 hPa	<b>Relative Humidity:</b> 51 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

## 7.2 Out of band radiated emissions

### 7.2.1 General

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

Table 7.2.1 Radiated emission limits

Frequency, MHz	Field strength at 3 m within restricted bands, dB(μV/m)***		
	Peak	Quasi Peak	Average
0.009 – 0.090	148.5 – 128.5	NA	128.5 – 108.5**
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	

\*- 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.

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

$$\text{Lim}_{S2} = \text{Lim}_{S1} + 40 \log (S_1/S_2),$$

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

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

### 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 loop antenna connected to spectrum analyzer/ EMI receiver. To find maximum radiation the turntable was rotated 360°, the measuring antenna was rotated around its vertical axis and the measuring antenna polarization was switched from vertical to horizontal.

7.2.2.3 The worst test results (the lowest margins) were recorded in Table 7.2.2 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 7.2.2 and shown in the associated plots.

<b>Test specification:</b>		<b>Sections 15.225(d), Out of band radiated emissions</b>	
<b>Test procedure:</b>		ANSI C63.4, Sections 5.3 and 13.1.4	
<b>Test mode:</b>		Compliance	<b>Verdict:</b> PASS
<b>Date(s):</b>		4/10/2012 - 4/15/2012	
<b>Temperature:</b> 22.9 °C	<b>Air Pressure:</b> 1007 hPa	<b>Relative Humidity:</b> 51 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

Figure 7.2.1 Radiated emissions below 30 MHz test set up

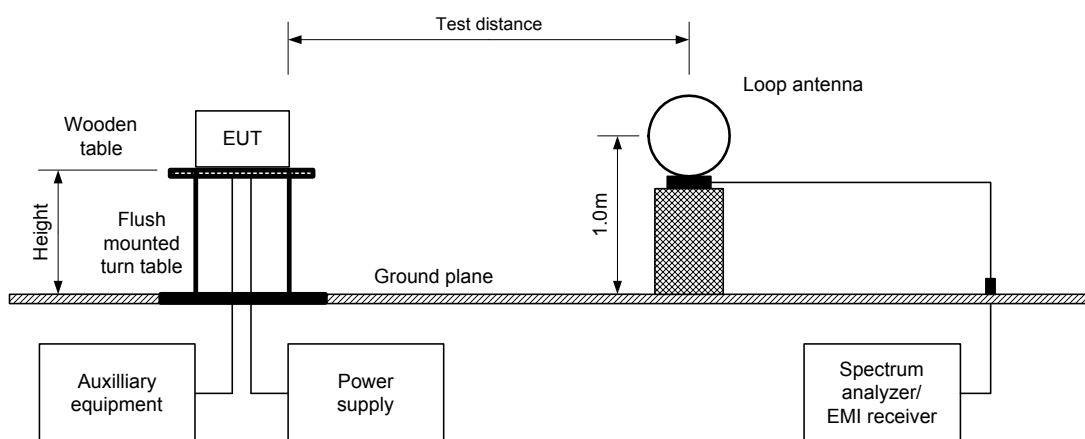
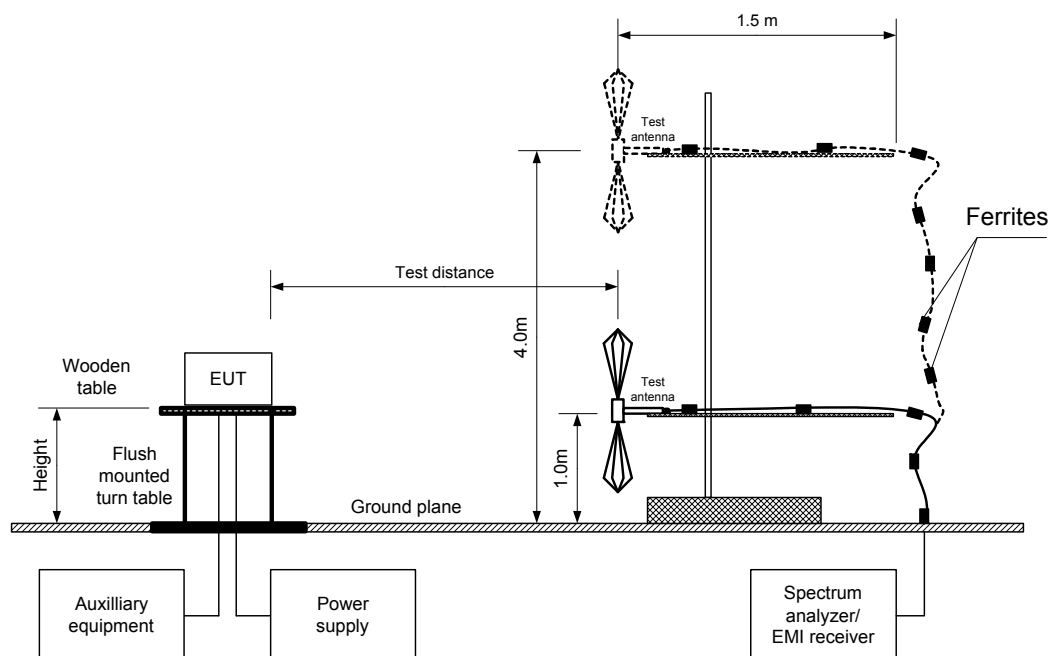


Figure 7.2.2 Radiated emissions above 30 MHz test set up





<b>Test specification:</b>		<b>Sections 15.225(d), Out of band radiated emissions</b>	
<b>Test procedure:</b>		ANSI C63.4, Sections 5.3 and 13.1.4	
<b>Test mode:</b>		Compliance	<b>Verdict:</b> PASS
<b>Date(s):</b>		4/10/2012 - 4/15/2012	
<b>Temperature:</b> 22.9 °C	<b>Air Pressure:</b> 1007 hPa	<b>Relative Humidity:</b> 51 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

Table 7.2.2 Out of band radiated emissions test results

TEST DISTANCE: 3 m  
 EUT POSITION: Y-axis  
 MODULATION: Communication protocol ISO15693  
 MODULATING SIGNAL: ID code  
 TRANSMITTER OUTPUT POWER SETTINGS: Maximum  
 INVESTIGATED FREQUENCY RANGE: 0.009 – 1000 MHz  
 RESOLUTION BANDWIDTH: 0.2 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*				
30.491	43.37	33.9	40.0	-6.1	Vertical	1.3	90	Pass
40.2	37.9	29.6	40.0	-10.4	Vertical	1.2	160	
53.6	37.2	31.4	40.0	-8.6	Vertical	1.4	230	
72.24	38.6	34.1	40.0	-5.9	Vertical	1.3	200	
103.175	40.5	29.8	43.5	-13.7	Horizontal	1.3	30	
143.4	42.5	31.6	43.5	-11.9	Horizontal	1.3	330	

\*- Margin = Measured emission – specification limit.

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

## Reference numbers of test equipment used

HL 0446	HL 0521	HL 0604	HL 2871	HL 3617			
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Full description is given in Appendix A.

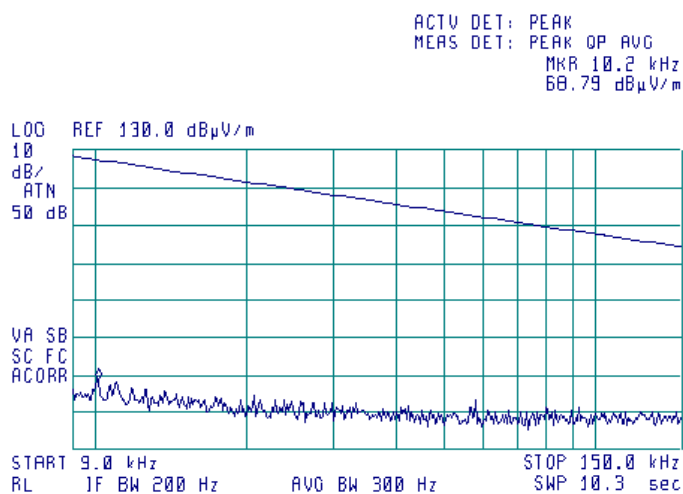


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<b>Test specification:</b>		<b>Sections 15.225(d), Out of band radiated emissions</b>	
<b>Test procedure:</b>		ANSI C63.4, Sections 5.3 and 13.1.4	
<b>Test mode:</b>		Compliance	<b>Verdict:</b> PASS
<b>Date(s):</b>		4/10/2012 - 4/15/2012	
<b>Temperature:</b> 22.9 °C	<b>Air Pressure:</b> 1007 hPa	<b>Relative Humidity:</b> 51 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

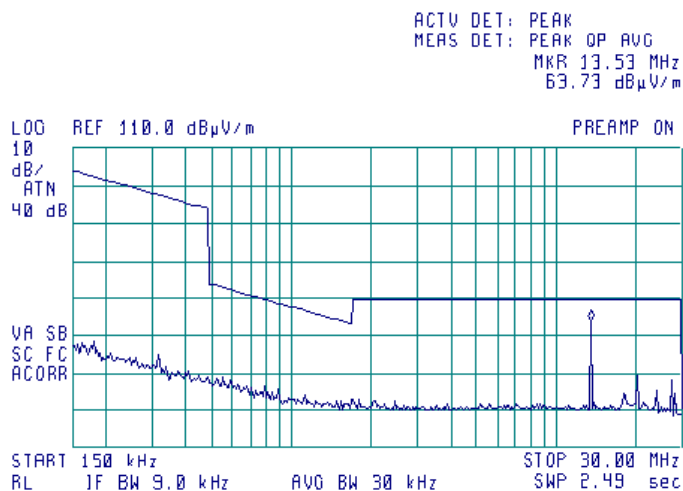
**Plot 7.2.1 Radiated emission measurements from 9 to 150 kHz**

TEST SITE: Semi anechoic chamber  
TEST DISTANCE: 3 m  
ANTENNA POLARIZATION: Vertical  
DETECTOR: Peak hold



**Plot 7.2.2 Radiated emission measurements from 0.15 to 30 MHz**

TEST SITE: Semi anechoic chamber  
TEST DISTANCE: 3 m  
ANTENNA POLARIZATION: Vertical  
DETECTOR: Peak hold



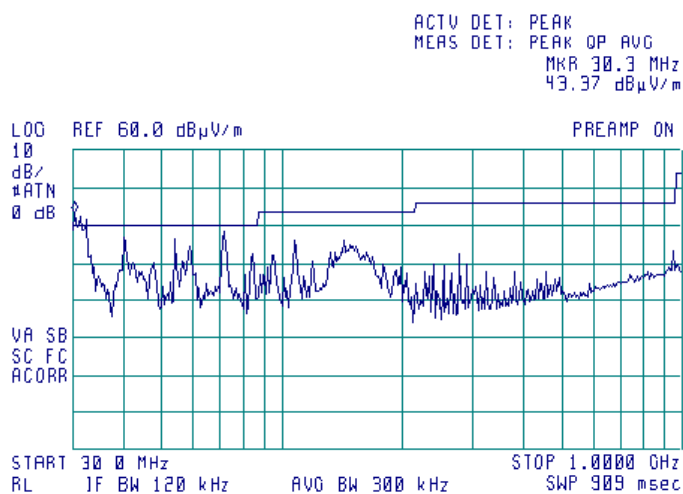


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Test specification:		Sections 15.225(d), Out of band radiated emissions	
Test procedure:		ANSI C63.4, Sections 5.3 and 13.1.4	
Test mode:	Compliance	Verdict: PASS	
Date(s):	4/10/2012 - 4/15/2012		
Temperature: 22.9 °C	Air Pressure: 1007 hPa	Relative Humidity: 51 %	Power Supply: 120 VAC
Remarks:			

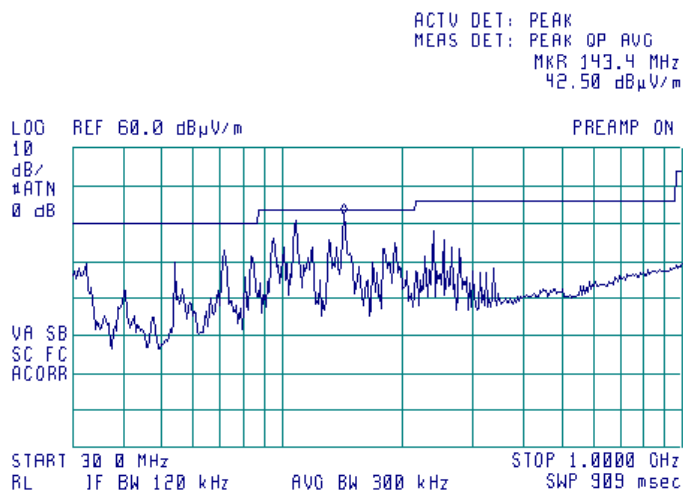
Plot 7.2.3 Radiated emission measurements from 30 to 1000 MHz

TEST SITE: Semi anechoic chamber  
TEST DISTANCE: 3 m  
ANTENNA POLARIZATION: Vertical  
DETECTOR: Peak hold



Plot 7.2.4 Radiated emission measurements from 30 to 1000 MHz

TEST SITE: Semi anechoic chamber  
TEST DISTANCE: 3 m  
ANTENNA POLARIZATION: Horizontal  
DETECTOR: Peak hold





<b>Test specification:</b>		<b>Section 15.225(e), Frequency stability</b>	
<b>Test procedure:</b>		ANSI C63.4, Section 13.1.6	
<b>Test mode:</b>		Compliance	<b>Verdict:</b> PASS
<b>Date(s):</b>		4/15/2012	
<b>Temperature:</b> 23 °C	<b>Air Pressure:</b> 1005 hPa	<b>Relative Humidity:</b> 43 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

## 7.3 Frequency stability test

### 7.3.1 General

This test was performed to measure frequency stability of transmitter RF carrier. Specification test limits are given in Table 7.3.1.

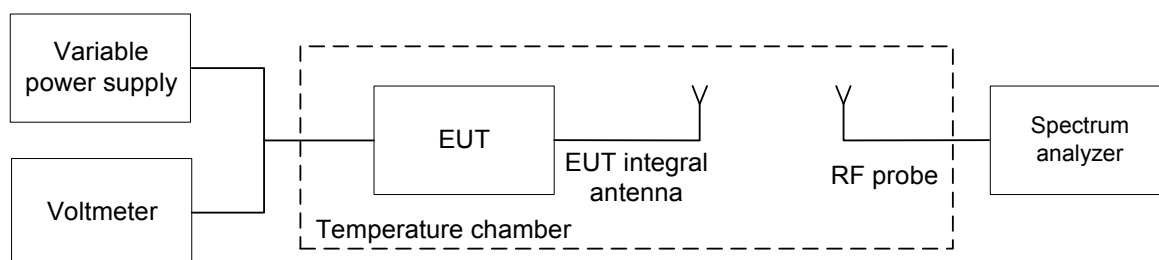
Table 7.3.1 Frequency stability limits

Assigned frequency, MHz	Maximum allowed frequency displacement	
	%	Hz
13.560	± 0.01 %	1356

### 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 power was turned off. Temperature within test chamber was set to the required one and a period of time sufficient to stabilize all of the oscillator circuit components was allowed.
- 7.3.2.3 The EUT was powered on and carrier frequency was measured at start up moment and then after 2, 5 and 10 minutes. The EUT was powered off.
- 7.3.2.4 The above procedure was repeated at the rest of the test temperatures and voltages as provided in Table 7.3.2.
- 7.3.2.5 Frequency displacement was calculated and compared with the limit as provided in Table 7.3.2.

Figure 7.3.1 Frequency stability test setup





<b>Test specification:</b>		<b>Section 15.225(e), Frequency stability</b>	
<b>Test procedure:</b>		ANSI C63.4, Section 13.1.6	
<b>Test mode:</b>		<b>Verdict:</b> PASS	
<b>Date(s):</b>			
4/15/2012			
<b>Temperature:</b> 23 °C	<b>Air Pressure:</b> 1005 hPa	<b>Relative Humidity:</b> 43 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

Table 7.3.2 Frequency stability test results

OPERATING FREQUENCY: 13.560 MHz  
 NOMINAL POWER VOLTAGE: 120 VAC  
 TEMPERATURE STABILIZATION PERIOD: 20 min  
 POWER DURING TEMPERATURE TRANSITION: Off  
 SPECTRUM ANALYZER MODE: Counter  
 RESOLUTION BANDWIDTH: 30 Hz  
 VIDEO BANDWIDTH: 30 Hz  
 MODULATION: Unmodulated

Temperature, °C	Voltage, V	Frequency, MHz				Max frequency drift, Hz		Limit, Hz	Margin, Hz	Verdict
		Start up	2 <sup>nd</sup> min	5 <sup>th</sup> min	10 <sup>th</sup> min	Positive	Negative			
-20	nominal	13.559747	13.559744	13.559740	13.559740	-27	0	1356	-1329	Pass
20	nominal +15%	13.559767	13.559767	13.559767	13.559767	0	0		-1356	
20	nominal	13.559767	13.559767	13.559767	13.559767*	NA	NA		NA	
20	nominal -15%	13.559767	13.559767	13.559767	13.559767	0	0		-1356	
50	nominal	13.559767	13.559764	13.559760	13.559760	-7	0		-1349	

\* - Reference frequency

## Reference numbers of test equipment used

HL 0493	HL 0495	HL 1424	HL 3310				
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Full description is given in Appendix A.



<b>Test specification:</b>		<b>Section 15.207(a), Conducted emission</b>	
<b>Test procedure:</b>		ANSI C63.4, Section 13.1.3	
<b>Test mode:</b>		Compliance	<b>Verdict:</b> PASS
<b>Date(s):</b>		4/17/2012	
<b>Temperature:</b> 22.5 °C	<b>Air Pressure:</b> 1014 hPa	<b>Relative Humidity:</b> 46 %	<b>Power Supply:</b> 120 VAC
<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**

Frequency, MHz	Class B limit, dB(μV)	
	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.

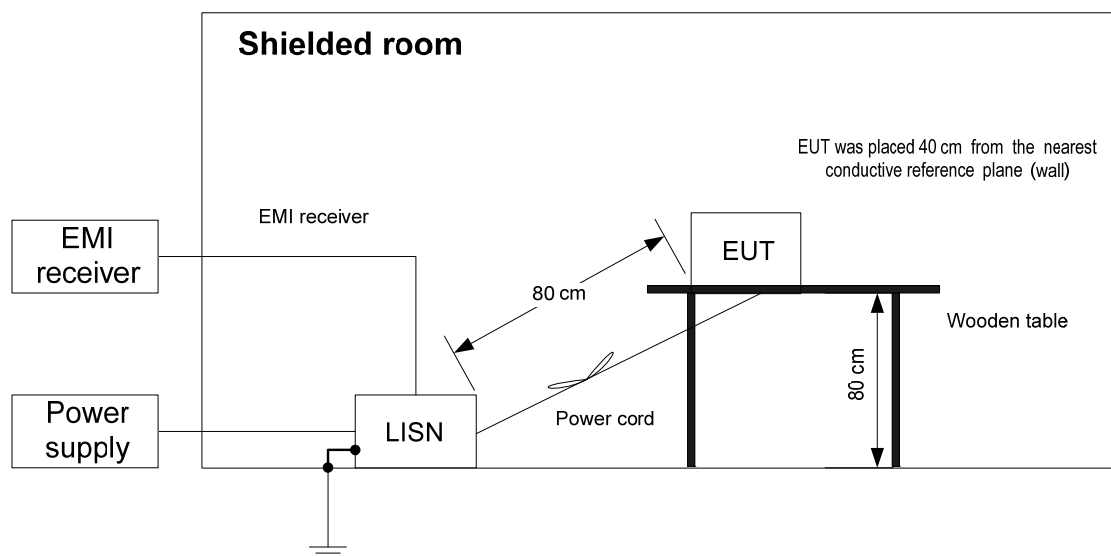
**7.4.2.2** The measurements were performed at power terminals with the LISN, connected to a spectrum analyzer in the frequency range referred to in Table 7.4.2. Unused coaxial connector of the LISN was terminated with 50 Ohm. Quasi-peak and average detectors were used throughout the testing.

**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.

<b>Test specification:</b>		<b>Section 15.207(a), Conducted emission</b>	
<b>Test procedure:</b>		ANSI C63.4, Section 13.1.3	
<b>Test mode:</b>		Compliance	<b>Verdict:</b> PASS
<b>Date(s):</b>		4/17/2012	
<b>Temperature:</b> 22.5 °C	<b>Air Pressure:</b> 1014 hPa	<b>Relative Humidity:</b> 46 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

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





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<b>Test specification:</b>		<b>Section 15.207(a), Conducted emission</b>	
<b>Test procedure:</b>		ANSI C63.4, Section 13.1.3	
<b>Test mode:</b>		Compliance	<b>Verdict:</b> PASS
<b>Date(s):</b>		4/17/2012	
<b>Temperature:</b> 22.5 °C	<b>Air Pressure:</b> 1014 hPa	<b>Relative Humidity:</b> 46 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

Table 7.4.2 Conducted emission test results

LINE: AC mains  
 EUT OPERATING MODE: Transmit  
 EUT SET UP: TABLE-TOP  
 TEST SITE: SHIELDED ROOM  
 DETECTORS USED: PEAK / QUASI-PEAK / AVERAGE  
 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*		
0.153500	46.47	38.99	65.83	-26.84	10.98	55.83	-44.85	L1	Pass
0.176250	46.78	41.62	64.72	-23.10	27.95	54.72	-26.77		
0.351148	34.82	30.83	59.00	-28.17	17.26	49.00	-31.74		
0.616055	31.53	27.66	56.00	-28.34	23.31	46.00	-22.69		
13.559953	36.52	34.44	60.00	-25.56	33.78	50.00	-16.22		
27.120643	42.34	40.97	60.00	-19.03	40.42	50.00	-9.58		
0.153000	47.31	38.73	65.85	-27.12	10.12	55.85	-45.73	L2	Pass
0.175135	46.87	42.19	64.77	-22.58	28.02	54.77	-26.75		
1.752800	29.68	25.40	56.00	-30.60	17.32	46.00	-28.68		
2.100000	26.28	19.94	56.00	-36.06	10.89	46.00	-35.11		
13.561850	35.32	32.33	60.00	-27.67	30.13	50.00	-19.87		
27.119690	42.09	40.44	60.00	-19.56	39.91	50.00	-10.09		

\*- Margin = Measured emission – specification limit.

Reference numbers of test equipment used

HL 0163	HL 0787	HL 1425	HL 1513	HL 3612			
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Full description is given in Appendix A.



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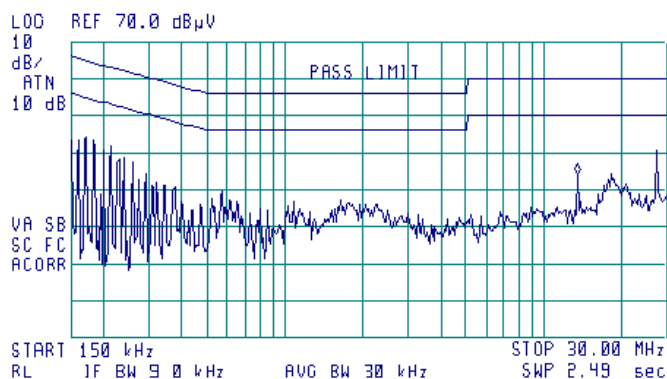
Test specification:		Section 15.207(a), Conducted emission	
Test procedure:		ANSI C63.4, Section 13.1.3	
Test mode:		Verdict: PASS	
Date(s): 4/17/2012			
Temperature: 22.5 °C	Air Pressure: 1014 hPa	Relative Humidity: 46 %	Power Supply: 120 VAC
Remarks:			

Plot 7.4.1 Conducted emission measurements

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



ACTV DET: PEAK  
MEAS DET: PEAK QP AVG  
MKR 13.53 MHz  
33.99 dBμV

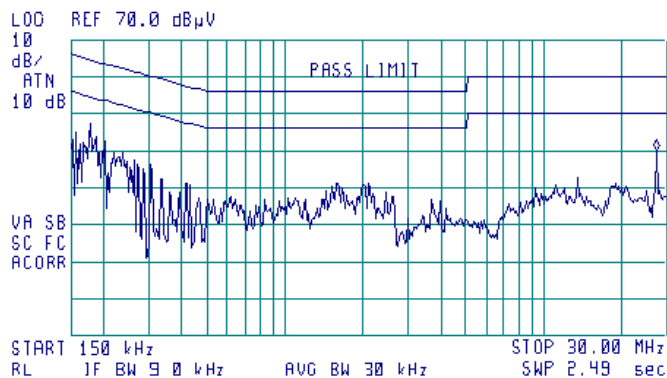


Plot 7.4.2 Conducted emission measurements

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



ACTV DET: PEAK  
MEAS DET: PEAK QP AVG  
MKR 27.05 MHz  
40.05 dBμV



<b>Test specification:</b>		<b>Section 15.215(c), Occupied bandwidth</b>	
<b>Test procedure:</b>		ANSI C63.4, Section 13.1.7	
<b>Test mode:</b>		Compliance	<b>Verdict:</b> PASS
<b>Date(s):</b>		4/15/2012	
<b>Temperature:</b> 23 °C	<b>Air Pressure:</b> 105 hPa	<b>Relative Humidity:</b> 43 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

## 7.5 Occupied bandwidth test

### 7.5.1 General

This test was performed to verify that the 20 dB bandwidth of the emissions was contained within the standard specified frequency band according to FCC §15.215 requirements. Specification test limits are given in Table 7.5.1.

**Table 7.5.1 Occupied bandwidth limits**

Assigned frequency, MHz	Modulation envelope reference points*, dBc
13.110 – 13.410	20.0
13.410 – 13.553	
13.553 – 13.567	
13.567 – 13.710	
13.710 – 14.010	

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

### 7.5.2 Test procedure

**7.5.2.1** The EUT was set up as shown in Figure 7.5.1, energized and its proper operation was checked.

**7.5.2.2** The spectrum analyzer sweep time and bandwidth were set to capture all major modulation sidebands of emission and sweep time was set sufficiently slow to ensure peak measurements. Spectrum analyzer was set in peak hold mode and time sufficient for trace stabilization was allowed.

**7.5.2.3** The peak of emission was measured. The transmitter occupied bandwidth was measured with spectrum analyzer as frequency delta between reference points on modulation envelope and provided in Table 7.5.2 and associated plot.

**7.5.2.4** Modulation bandwidth was calculated by adding of the negative frequency drift to the lower measured frequency and the positive frequency drift to the higher measured frequency. The obtained modulation bandwidth was verified to be within the allowed frequency range.

**Figure 7.5.1 Occupied bandwidth test setup**





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<b>Test specification:</b>		<b>Section 15.215(c), Occupied bandwidth</b>	
<b>Test procedure:</b>		ANSI C63.4, Section 13.1.7	
<b>Test mode:</b>		Compliance	<b>Verdict:</b> PASS
<b>Date(s):</b>		4/15/2012	
<b>Temperature:</b> 23 °C	<b>Air Pressure:</b> 105 hPa	<b>Relative Humidity:</b> 43 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

Table 7.5.2 Occupied bandwidth test results

ASSIGNED FREQUENCY BAND 13.11 – 14.01 MHz  
 DETECTOR USED: Peak hold  
 RESOLUTION BANDWIDTH: 3 kHz  
 VIDEO BANDWIDTH: 3 kHz  
 MODULATION ENVELOPE REFERENCE POINTS: 20 dBc

Band edge	Cross point frequency, MHz	Frequency drift, Hz		Modulation band edge, MHz	Assigned band edge, MHz	Verdict
		Negative	Positive			
Low	13.5544	27	NA	13.554373	13.553	Pass
High	13.5658	NA	0	13.565800	13.567	Pass

## Reference numbers of test equipment used

HL 1424								
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Full description is given in Appendix A.



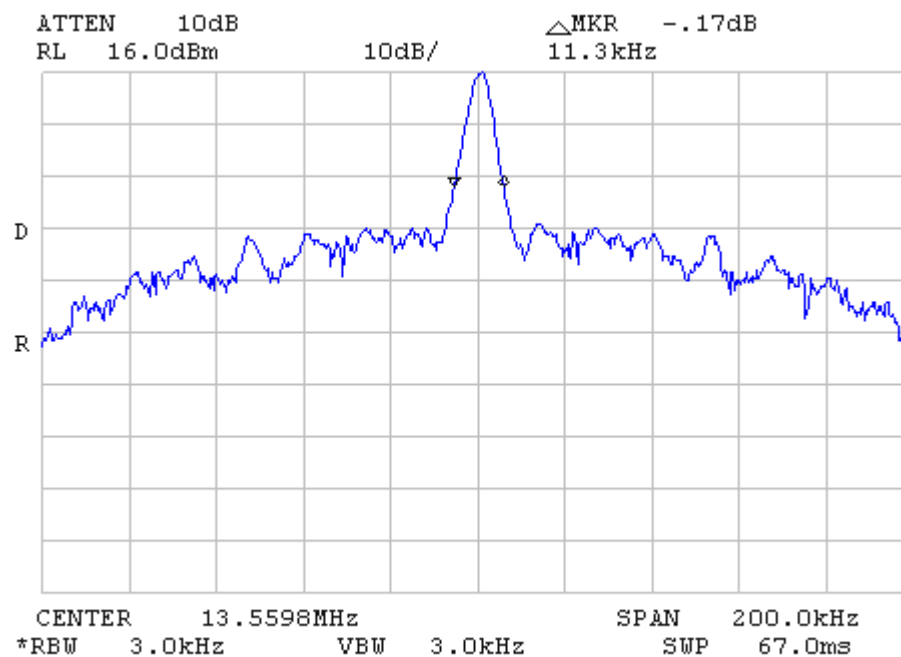


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Test specification:		Section 15.215(c), Occupied bandwidth	
Test procedure:		ANSI C63.4, Section 13.1.7	
Test mode:		Compliance	Verdict: PASS
Date(s):		4/15/2012	
Temperature: 23 °C	Air Pressure: 105 hPa	Relative Humidity: 43 %	Power Supply: 120 VAC
Remarks:			

Plot 7.5.1 Occupied bandwidth test result



<b>Test specification:</b>		<b>Section 15.203, Antenna requirement</b>	
<b>Test procedure:</b>		ANSI C63.4, Section 13.1.7	
<b>Test mode:</b>		Compliance	<b>Verdict:</b> PASS
<b>Date(s):</b>		4/15/2012	
<b>Temperature:</b> 23 °C	<b>Air Pressure:</b> 1005 hPa	<b>Relative Humidity:</b> 43 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

## 7.6 Antenna requirements

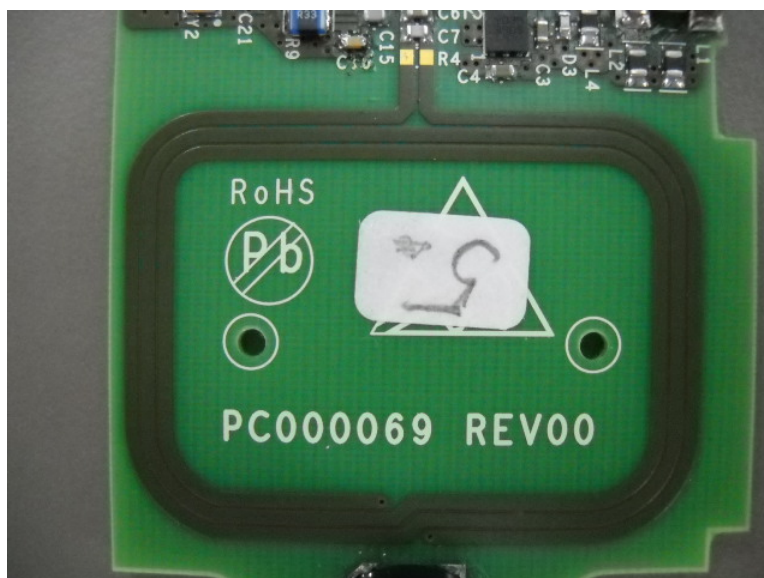
The EUT was verified for compliance with antenna requirements. A transmitter shall be designed to ensure that no antenna other than that furnished by the responsible party will be used with the device. It may be either permanently attached or employs a unique antenna connector for every antenna proposed 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 7.6.1.

**Table 7.6.1 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 7.6.1 Antenna assembly**





<b>Test specification:</b>		<b>Section 15.107, Conducted emission at AC power port</b>	
<b>Test procedure:</b>		ANSI C63.4, Sections 11.5 and 12.1.3	
<b>Test mode:</b>		Compliance	<b>Verdict:</b> PASS
<b>Date(s):</b>		4/17/2012	
<b>Temperature:</b> 22.5 °C	<b>Air Pressure:</b> 1014 hPa	<b>Relative Humidity:</b> 46 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

## 8 Emission tests according to 47CFR part 15 subpart B 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 are given in Table 8.1.1.

Table 8.1.1 Limits for conducted emissions

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 and associated photographs, energized and the performance check was conducted.

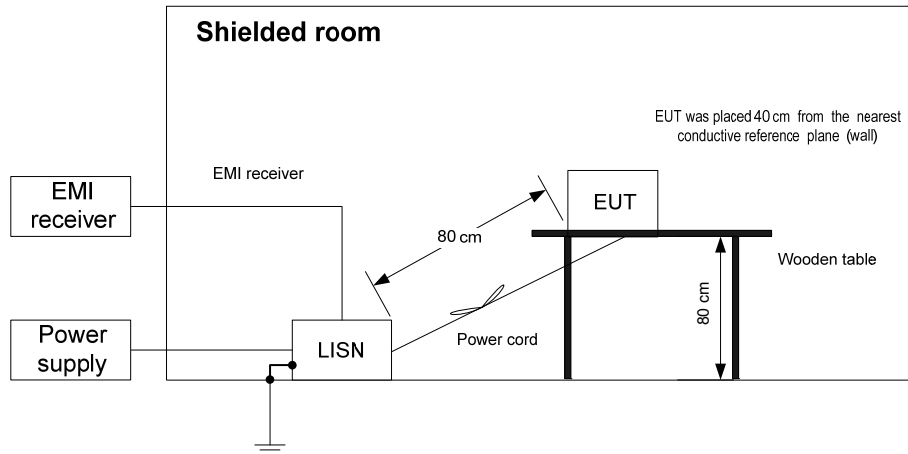
8.1.2.2 The measurements were performed at power terminals with the LISN, connected to a spectrum analyzer in the frequency range referred to in Table 8.1.2. Unused coaxial connector of the LISN was terminated with 50 Ohm. Quasi-peak and average detectors were used throughout the testing.

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>Section 15.107, Conducted emission at AC power port</b>	
<b>Test procedure:</b>		ANSI C63.4, Sections 11.5 and 12.1.3	
<b>Test mode:</b>		Compliance	<b>Verdict:</b> PASS
<b>Date(s):</b>		4/17/2012	
<b>Temperature:</b> 22.5 °C	<b>Air Pressure:</b> 1014 hPa	<b>Relative Humidity:</b> 46 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

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



Photograph 8.1.1 Setup for conducted emission measurements





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<b>Test specification:</b>		<b>Section 15.107, Conducted emission at AC power port</b>	
<b>Test procedure:</b>		ANSI C63.4, Sections 11.5 and 12.1.3	
<b>Test mode:</b>		Compliance	<b>Verdict:</b> PASS
<b>Date(s):</b>		4/17/2012	
<b>Temperature:</b> 22.5 °C	<b>Air Pressure:</b> 1014 hPa	<b>Relative Humidity:</b> 46 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

Photograph 8.1.2 Setup for conducted emission measurements





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<b>Test specification:</b>		<b>Section 15.107, Conducted emission at AC power port</b>	
<b>Test procedure:</b>		ANSI C63.4, Sections 11.5 and 12.1.3	
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	PASS
<b>Date(s):</b>	4/17/2012		
<b>Temperature:</b> 22.5 °C	<b>Air Pressure:</b> 1014 hPa	<b>Relative Humidity:</b> 46 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

**Table 8.1.2 Conducted emission test results**

LINE: AC mains  
 LIMIT: Class B  
 EUT OPERATING MODE: Stand-by  
 EUT SET UP: TABLE-TOP  
 TEST SITE: SHIELDED ROOM  
 DETECTORS USED: PEAK / QUASI-PEAK / AVERAGE  
 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*		
0.182565	45.28	36.89	64.41	-27.52	18.66	54.41	-35.75	L1	PASS
0.549855	37.81	34.38	56.00	-21.62	24.33	46.00	-21.67		
0.597554	36.78	34.64	56.00	-21.36	25.81	46.00	-20.19		
10.070403	42.16	36.97	60.00	-23.03	30.00	50.00	-20.00		
13.131830	40.80	36.33	60.00	-23.67	29.68	50.00	-20.32		
19.878789	33.46	29.79	60.00	-30.21	23.34	50.00	-26.66	L2	PASS
0.156922	43.95	40.76	65.66	-24.90	28.69	55.66	-26.97		
0.549904	37.04	34.52	56.00	-21.48	24.64	46.00	-21.36		
8.691618	36.28	31.45	60.00	-28.55	22.63	50.00	-27.37		
10.044851	41.72	37.09	60.00	-22.91	29.26	50.00	-20.74		
13.131830	40.80	36.33	60.00	-23.67	29.68	50.00	-20.32		
19.878789	33.46	29.79	60.00	-30.21	23.34	50.00	-26.66		

\*- Margin = Measured emission – specification limit.

**Reference numbers of test equipment used**

HL 1425	HL 1513	HL 2888	HL 3612				
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Full description is given in Appendix A.



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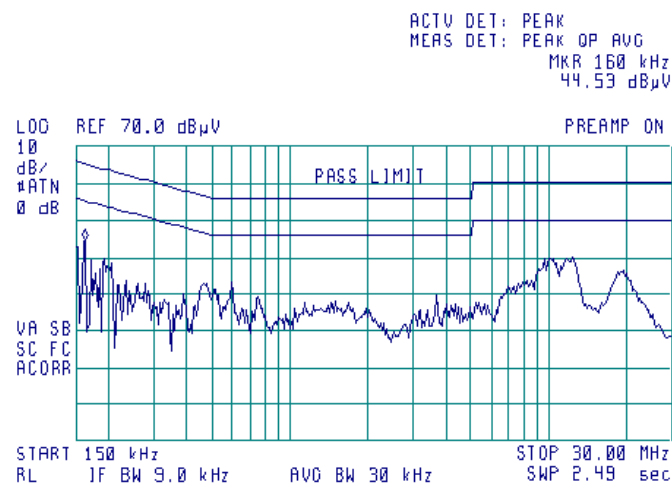
Report ID: ORERAD\_FCC.23197.docx

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<b>Test specification:</b>		<b>Section 15.107, Conducted emission at AC power port</b>	
<b>Test procedure:</b>		ANSI C63.4, Sections 11.5 and 12.1.3	
<b>Test mode:</b>		Compliance	<b>Verdict:</b> PASS
<b>Date(s):</b>		4/17/2012	
<b>Temperature:</b> 22.5 °C	<b>Air Pressure:</b> 1014 hPa	<b>Relative Humidity:</b> 46 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

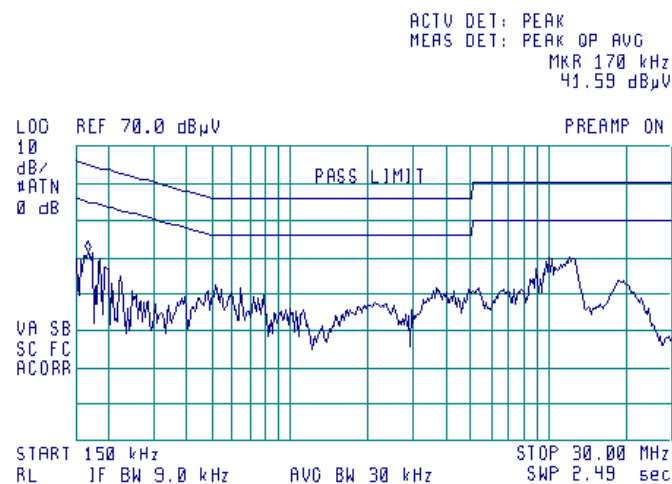
**Plot 8.1.1 Conducted emission measurements**

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



**Plot 8.1.2 Conducted emission measurements**

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





<b>Test specification:</b>		<b>Section 15.109, Radiated emission</b>	
<b>Test procedure:</b>		ANSI C63.4, Sections 11.6 and 12.1.4	
<b>Test mode:</b>		Compliance	<b>Verdict:</b> PASS
<b>Date(s):</b>		4/17/2012	
<b>Temperature:</b> 24.6 °C	<b>Air Pressure:</b> 1011 hPa	<b>Relative Humidity:</b> 43 %	<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 are given in Table 8.2.1.

Table 8.2.1 Radiated emission test limits

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*
Above 960	43.5*	54.0	49.5	60.0*

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

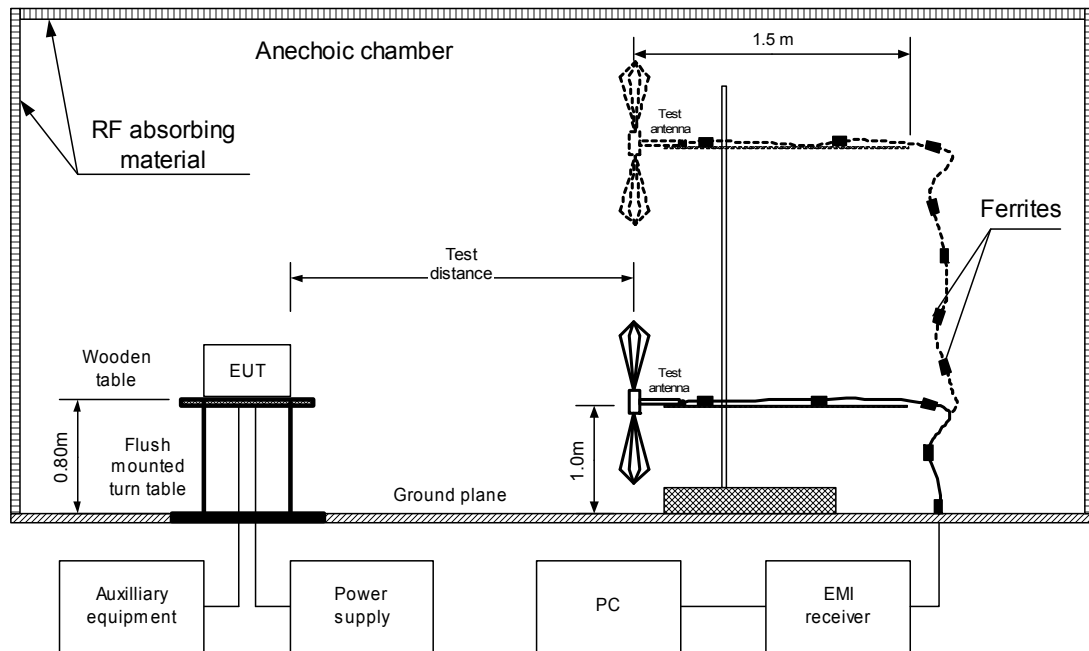
### 8.2.2 Test procedure for measurements at OATS

- 8.2.2.1** The EUT was set up as shown in Figure 8.2.1 and associated photograph/s, energized and the performance check was conducted.
- 8.2.2.2** Preliminary measurements were performed in the anechoic chamber at 3 m test distance. The specified frequency range was investigated with biconical and log periodic antennas connected to EMI receiver. To find maximum radiation the turntable was rotated 360°, the measuring antenna height was changed, its polarization was switched from vertical to horizontal and the EUT cables position was varied.
- 8.2.2.3** The EUT was set up as shown in Figure 8.2.2, energized and the performance check was conducted.
- 8.2.2.4** Final measurements were performed at the open area test site at 3 m test distance. The EUT wires and cables were arranged to produce maximum emission as it was found during preliminary measurements. The frequencies yield the worst test results (the lowest margins) during preliminary testing were 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 and its polarization was changed from vertical to horizontal. At frequencies where high ambient noise was encountered, the final measurements were taken in the anechoic chamber.
- 8.2.2.5** The worst test results (the lowest margins) were recorded in Table 8.2.2 and shown in the associated plots.

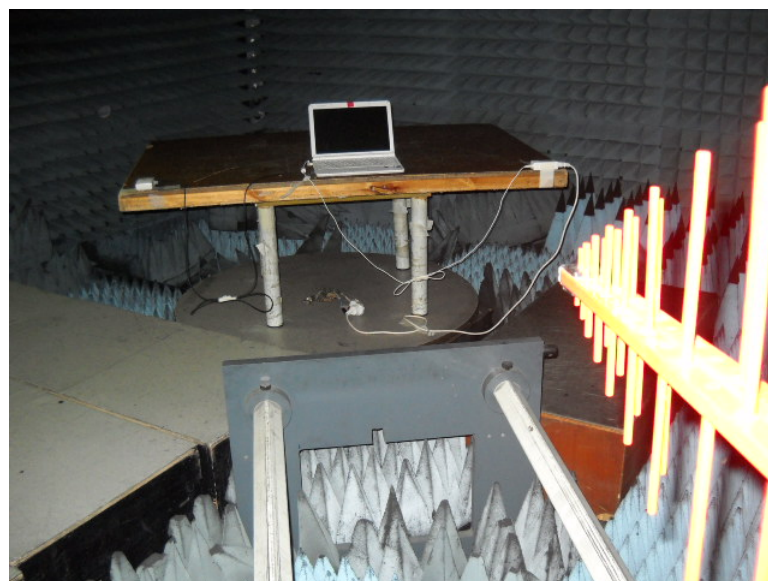


<b>Test specification:</b>		<b>Section 15.109, Radiated emission</b>	
<b>Test procedure:</b>		ANSI C63.4, Sections 11.6 and 12.1.4	
<b>Test mode:</b>		Compliance	<b>Verdict:</b> PASS
<b>Date(s):</b>		4/17/2012	
<b>Temperature:</b> 24.6 °C	<b>Air Pressure:</b> 1011 hPa	<b>Relative Humidity:</b> 43 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

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

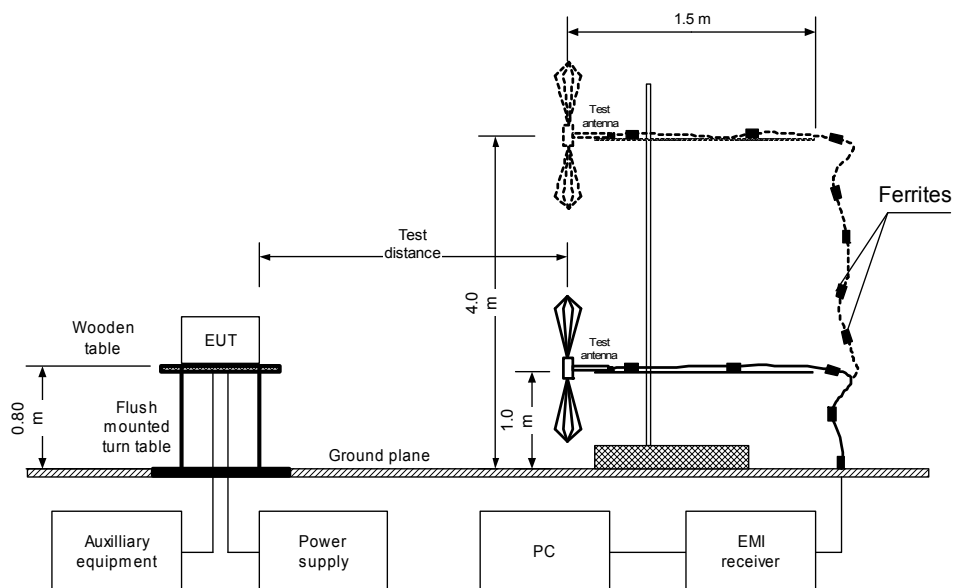


**Photograph 8.2.1 Setup for preliminary radiated emission measurements**



<b>Test specification:</b>		<b>Section 15.109, Radiated emission</b>	
<b>Test procedure:</b>		ANSI C63.4, Sections 11.6 and 12.1.4	
<b>Test mode:</b>		Compliance	<b>Verdict:</b> PASS
<b>Date(s):</b>		4/17/2012	
<b>Temperature:</b> 24.6 °C	<b>Air Pressure:</b> 1011 hPa	<b>Relative Humidity:</b> 43 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

Figure 8.2.2 Setup for radiated emission measurements at OATS, table-top equipment



<b>Test specification:</b>		<b>Section 15.109, Radiated emission</b>	
<b>Test procedure:</b>		ANSI C63.4, Sections 11.6 and 12.1.4	
<b>Test mode:</b>		Compliance	<b>Verdict:</b> PASS
<b>Date(s):</b>		4/17/2012	
<b>Temperature:</b> 24.6 °C	<b>Air Pressure:</b> 1011 hPa	<b>Relative Humidity:</b> 43 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

Photograph 8.2.2 Setup for final radiated emission measurements, general view



Photograph 8.2.3 Setup for final radiated emission measurements, EUT cabling





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<b>Test specification:</b>		<b>Section 15.109, Radiated emission</b>	
<b>Test procedure:</b>		ANSI C63.4, Sections 11.6 and 12.1.4	
<b>Test mode:</b>		Compliance	<b>Verdict:</b> PASS
<b>Date(s):</b>		4/17/2012	
<b>Temperature:</b> 24.6 °C	<b>Air Pressure:</b> 1011 hPa	<b>Relative Humidity:</b> 43 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

Table 8.2.2 Radiated emission test results

EUT SET UP: TABLE-TOP  
LIMIT: Class B  
EUT OPERATING MODE: Stand-by  
TEST SITE: ANECHOIC CHAMBER  
TEST DISTANCE: 3 m  
DETECTORS USED: PEAK / QUASI-PEAK  
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*				
43.99	32.24	25.26	40	-14.74	Horizontal	1.2	360	Pass
52.02	36.97	34.92	40	-5.08	Horizontal	1.2	338	

EUT SET UP: TABLE-TOP  
LIMIT: Class B  
EUT OPERATING MODE: Stand-by  
TEST SITE: OATS  
TEST DISTANCE: 3 m  
DETECTORS USED: PEAK / QUASI-PEAK  
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*				
120.0	36.89	29.87	43.5	-13.63	Vertical	1.2	33	Pass
180.774	38.90	36.30	43.5	-7.20	Horizontal	1.2	150	
156.0	33.39	28.86	43.5	-14.64	Vertical	1.2	360	
228.0	42.09	36.51	46.0	-9.49	Vertical	1.2	25	

\*- Margin = Measured emission – specification limit.

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

Reference numbers of test equipment used

HL 0415	HL 0569	HL 0812	HL 1425	HL 2697	HL 2780	HL 2883	HL 3390
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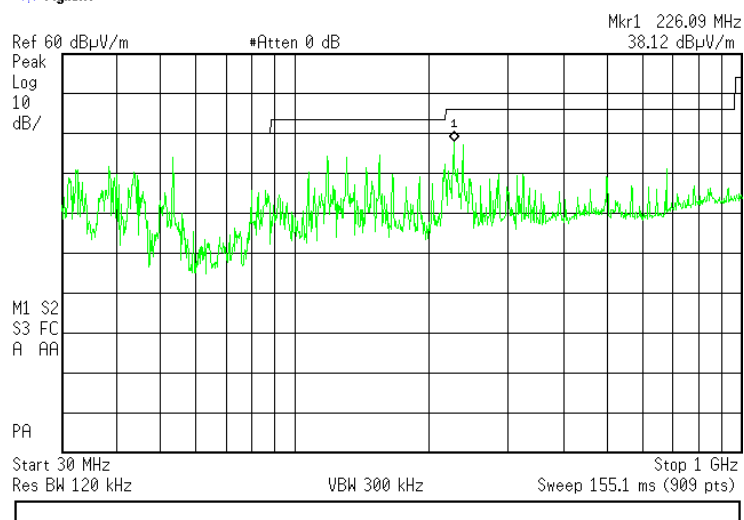
Full description is given in Appendix A.

<b>Test specification:</b>		<b>Section 15.109, Radiated emission</b>	
<b>Test procedure:</b>		ANSI C63.4, Sections 11.6 and 12.1.4	
<b>Test mode:</b>		Compliance	<b>Verdict:</b> PASS
<b>Date(s):</b>		4/17/2012	
<b>Temperature:</b> 24.6 °C	<b>Air Pressure:</b> 1011 hPa	<b>Relative Humidity:</b> 43 %	<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: Class B  
TEST DISTANCE: 3 m  
EUT OPERATING MODE: Stand-by

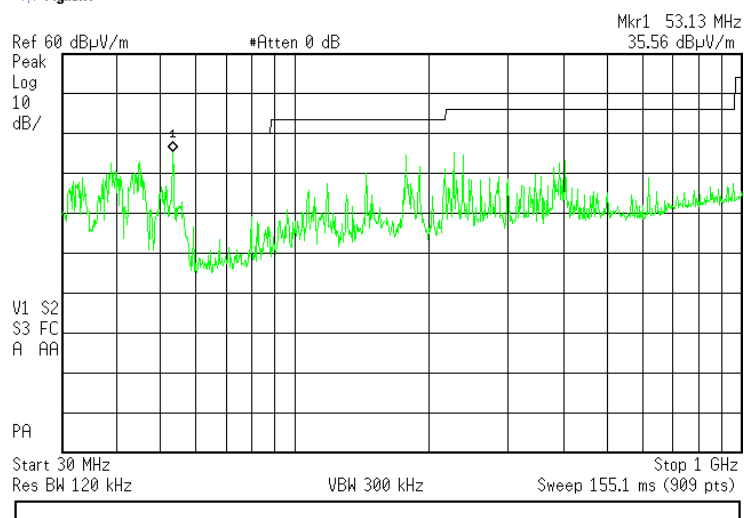
Agilent



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

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

Agilent



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

HL No	Description	Manufacturer	Model	Ser. No.	Last Cal./ Check	Due Cal./ Check
0163	LISN FCC/VDE/50 Ohm/50 uH + 5 Ohm, MIL-STD-461E, CISPR 16-1	Electro-Metrics	ANS 25/2	1314	29-Jun-11	29-Jun-12
0415	Cable, Coax, RF, RG-214, 12.3 m	Hermon Laboratories	CC-3	056	01-Dec-11	01-Dec-12
0446	Antenna, Loop, Active, 10 kHz - 30 MHz	EMCO	6502	2857	03-Jul-11	03-Jul-12
0493	Temperature Chamber -45...175 deg C	Thermotron	S-1.2 Mini-Max	14016	16-May-11	16-May-12
0495	Autotransformer 0-255V, 10A	Variac	EMPL01	495	02-Jun-11	02-Jun-12
0521	EMI Receiver (Spectrum Analyzer) with RF filter section 9 kHz-6.5 GHz	Hewlett Packard	8546A	3617A 00319, 3448A002 53	29-Aug-11	29-Sep-12
0569	Antenna, Log Periodic, 200 - 1000 MHz	Electro-Metrics	LPA 25/30	1953	04-Jul-11	04-Jul-12
0604	Antenna BiconiLog Log-Periodic/T Bow-TIE, 26 - 2000 MHz	EMCO	3141	9611-1011	11-Jan-11	11-Jan-13
0787	Transient Limiter 9 kHz-200 MHz	Hewlett Packard	11947A	3107A018 77	18-Oct-11	18-Oct-12
0812	Cable Coax, RG-214, 11.5 m, N-type connectors	Hermon Laboratories	C214-11	148	01-Dec-11	01-Dec-12
1424	Spectrum Analyzer, 30 Hz- 40 GHz	Agilent Technologies	8564EC	3946A002 19	25-Sep-11	25-Sep-12
1425	EMI Receiver, 9 kHz - 2.9 GHz, System: HL1426, HL1427	Agilent Technologies	8542E	3710A002 22, 3705A002 04	24-Aug-11	24-Aug-12
1513	Cable RF, 8 m, BNC/BNC	Belden	M17/167 MIL-C-17	1513	01-Sep-11	01-Sep-12
2697	Antenna, 30 MHz - 3.0 GHz	Sunol Sciences. Corp. Pleasanton, California USA	JB3	A022805	11-Jan-11	11-Jan-13
2780	EMC analyzer, 100 Hz to 26.5 GHz	Agilent Technologies	E7405A	MY451024 62	07-Jul-11	07-Jul-12
2871	Microwave Cable Assembly, 18 GHz, 6.4 m, SMA - SMA	Huber-Suhner	198-8155- 00	2871	15-Jan-12	15-Jan-13
2883	Cable, 18 GHz N-type, M-F, 3 m	Bird Electronic Corp.	TC-MNFN-3.0	211539 003	04-Dec-11	04-Dec-12
3310	Multimeter	Fluke	115C	94321810	10-Jul-11	10-Jul-12
3390	Microwave Cable Assembly, 26.5 GHz, 1.0 m, N type/N type	Suhner Sucoflex	104EA	3390	07-Feb-12	07-Feb-13
3612	Cable RF, 17.5 m, N type-N type	Teldor	RG-214/U	NA	01-Dec-11	01-Dec-12
3617	Cable RF, 6.5 m, N type-N type, DC-6.5 GHz	Suhner Switzerland	RG 214/U	NA	19-May-11	19-May-12

## 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

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), Registration Numbers 90624 for OATS and 90623 for the anechoic chamber; by Industry Canada for electromagnetic emissions (file numbers IC 2186A-1 for OATS, IC 2186A-2 for anechoic chamber, IC 2186A-3 for full-anechoic chamber for RE measurements above 1 GHz), certified by VCCI, Japan (the registration numbers are R-808 for OATS, R-1082 for anechoic chamber, G-27 for full-anechoic chamber for RE measurements above 1 GHz, C-845 for conducted emissions site, T-1606 for conducted emissions at telecommunication ports), has a status of a Telefication - Listed Testing Laboratory, Certificate No. L138/00. 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). The FCC Designation Number is US1003.

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Person for contact: Mr. Alex Usoskin, CEO.

## 12 APPENDIX D Specification references

47CFR part 15: 2011	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.



## 13 APPENDIX E Test equipment correction factors

**Correction factor**  
**Line impedance stabilization network**  
**Model ANS-25/2, Electro-Metrics, HL 0163**

Frequency, kHz	Correction factor, dB
10	4.9
15	2.86
20	1.83
25	1.25
30	0.91
35	0.69
40	0.53
50	0.35
60	0.25
70	0.18
80	0.14
90	0.11
100	0.09
125	0.06
150	0.04

The correction factor in dB is to be added to meter readings of an interference analyzer or a spectrum analyzer.

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

Antenna factor in dB(1/m) is to be added to receiver meter reading in dB( $\mu$ V) to convert it into field strength 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	6.8	4.82	1825	28.7	6.8	4.75	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	0.52	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	4.86
60	7.5	-2.1	0.62	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	8.5	-2.0	0.63	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	0.6	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	8.2	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	4.55	1330	25.6	7.0	4.98	1925	28.6	7.3	5.29	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	5.17	1945	28.5	7.5	5.59	2540	31.2	7.1	5.09
165	12.5	2.0	1.59	760	21.0	6.8	4.83	1355	25.8	7.0	5.06	1950	28.6	7.4	5.48	2545	31.0	7.3	5.43
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	4.98	1965	28.7	7.4	5.75	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	28.5	7.2	5.29	2565	30.8	7.6	5.70
190	11.6	4.2	2.61	785	21.3	6.8	4.77	1380	26.0	7.0	5.06	1975	28.9	7.2	5.22	2570	31.1	7.3	5.37
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	3.59	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	3.45	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	5.06	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	3.54	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	6.9	4.86	1445	26.3	1	5.11	2040	29.3	7.1	5.13	2635	31.8	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	13.2	5.8	3.75	865	22.1	6.9	4.82	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	13.7	5.6	3.61	880	22.1	7.0	5.05	1475	26.4	7.1	5.17	2070	29.4	7.1	5.01	2665	32.0	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	5.8	3.88	910	22.3	7.0	5.05	1505	26.5	7.2	5.27	2100	29.8	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	5.30	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	5.37	2110	29.9	6.8	4.78	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	5.36	2125	29.9	6.9	4.89	2720	32.4	6.5	4.47
345	14.9	6.1	4.06	940	22.8	6.9	4.89	1535	26.6	7.4	5.44	2130	29.9	6.9	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	15.8	5.8	3.78	955	23.0	6.8	4.81	1550	26.6	7.5	5.63	2145	29.8	6.9	4.92	2740	31.8	7.1	5.40
365	15.5	5.9	3.89	960	23.1	6.8	4.77	1555	26.7	7.3	5.59	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	5.18	2155	29.8	7.1	5.10	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	5.08
380	15.7	6.1	4.05	975	23.3	6.6	4.62	1570	26.9	7.2	5.30	2165	29.9	7.0	5.00	2760	32.0	7.0	4.96
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	23.5	6.6	4.52	1580	27.0	7.1	5.17	2175	29.8	7.2	5.20	2770	32.3	6.8	4.73

**Cable loss**  
**Cable coax, RG-214, 12.3 m, s/n 056, HL 0415**

No.	Frequency, MHz	Cable loss, dB	Measured uncertainty, dB
1	10	0.23	±0.12
2	30	0.44	±0.12
3	50	0.60	±0.12
4	100	0.89	±0.12
5	150	1.11	±0.13
6	200	1.30	±0.13
7	250	1.45	±0.13
8	300	1.61	±0.13
9	400	1.94	±0.13
10	500	2.18	±0.13
11	600	2.45	±0.14
12	700	2.67	±0.14
13	800	2.94	±0.14
14	900	3.16	±0.14
15	1000	3.38	±0.14

**Cable loss**  
**Cable Coaxial, RG-214, 11.5 m, s/n 148, HL 0812**

No.	Frequency, MHz	Cable loss, dB	Measured uncertainty, dB
1	10	0.23	±0.12
2	30	0.44	±0.12
3	50	0.60	±0.12
4	100	0.90	±0.12
5	150	1.13	±0.13
6	200	1.34	±0.13
7	250	1.51	±0.13
8	300	1.68	±0.13
9	400	2.01	±0.13
10	500	2.28	±0.13
11	600	2.56	±0.14
12	700	2.80	±0.14
13	800	3.07	±0.14
14	900	3.33	±0.14
15	1000	3.53	±0.14

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

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

**Cable loss**  
**Cable coaxial, Bird, 18 GHz, N-type, M-F, model TC-MNFN-3.0, S/N 211539 003**  
**HL 2883**

Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB
10	0.06	5750	1.70	12000	2.46
30	0.12	6000	1.75	12250	2.48
100	0.21	6250	1.80	12500	2.52
250	0.34	6500	1.81	12750	2.50
500	0.47	6750	1.86	13000	2.54
750	0.59	7000	1.86	13250	2.48
1000	0.67	7250	1.92	13500	2.63
1250	0.76	7500	1.96	13750	2.65
1500	0.84	7750	1.98	14000	2.72
1750	0.92	8000	2.02	14250	2.67
2000	0.98	8250	2.03	14500	2.70
2250	1.05	8500	2.05	14750	2.72
2500	1.12	8750	2.11	15000	2.79
2750	1.17	9000	2.17	15250	2.80
3000	1.22	9250	2.17	15500	2.83
3250	1.27	9500	2.20	15750	2.75
3500	1.33	9750	2.19	16000	2.82
3750	1.38	10000	2.22	16250	2.85
4000	1.42	10250	2.25	16500	2.90
4250	1.46	10500	2.30	16750	2.89
4500	1.51	10750	2.28	17000	2.88
4750	1.54	11000	2.32	17250	2.85
5000	1.59	11250	2.34	17500	2.96
5250	1.62	11500	2.39	17750	3.04
5500	1.65	11750	2.42	18000	3.04



**Cable loss**  
**Cable coaxial, Microwave Cable Assembly, 104EA, 18 GHz, 1.0 m**  
**Suhner Sucoflex, HL 3390**

Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB
10	0.03	4800	0.55	9800	0.89	14900	1.07
30	0.04	4900	0.56	9900	0.89	15000	1.07
50	0.05	5000	0.57	10000	0.86	15100	1.08
100	0.07	5100	0.58	10100	0.86	15200	1.07
200	0.10	5200	0.58	10200	0.88	15300	1.09
300	0.12	5300	0.59	10300	0.92	15400	1.10
400	0.14	5400	0.59	10400	0.94	15500	1.10
500	0.16	5500	0.60	10500	0.96	15600	1.12
600	0.17	5600	0.61	10600	0.93	15700	1.15
700	0.18	5700	0.61	10700	0.89	15800	1.15
800	0.20	5800	0.63	10800	0.89	15900	1.17
900	0.21	5900	0.63	10900	0.88	16000	1.14
1000	0.23	6000	0.64	11000	0.92	16100	1.14
1100	0.24	6100	0.64	11100	0.91	16200	1.15
1200	0.25	6200	0.64	11200	0.89	16300	1.14
1300	0.27	6300	0.65	11300	0.88	16400	1.13
1400	0.28	6400	0.65	11400	0.88	16500	1.13
1500	0.28	6500	0.66	11500	0.90	16600	1.13
1600	0.30	6600	0.67	11600	0.94	16700	1.14
1700	0.31	6700	0.67	11700	0.96	16800	1.14
1800	0.32	6800	0.67	11800	0.92	16900	1.14
1900	0.33	6900	0.68	11900	0.92	17000	1.14
2000	0.34	7000	0.67	12000	0.91	17100	1.15
2100	0.35	7100	0.68	12100	0.92	17200	1.14
2200	0.35	7200	0.69	12200	0.95	17300	1.15
2300	0.36	7300	0.69	12300	0.98	17400	1.15
2400	0.37	7400	0.68	12400	0.96	17500	1.16
2500	0.39	7500	0.69	12500	0.99	17600	1.16
2600	0.40	7600	0.70	12600	0.96	17700	1.16
2700	0.41	7700	0.71	12700	0.93	17800	1.19
2800	0.42	7800	0.72	12800	0.94	17900	1.21
2900	0.42	7900	0.72	12900	0.98	18000	1.25
3000	0.43	8000	0.72	13000	0.99		
3100	0.44	8100	0.73	13100	0.99		
3200	0.45	8200	0.74	13200	0.99		
3300	0.46	8300	0.75	13300	0.99		
3400	0.46	8400	0.74	13400	1.00		
3500	0.47	8500	0.73	13500	1.02		
3600	0.47	8600	0.73	13600	1.05		
3700	0.47	8700	0.75	13700	1.03		
3800	0.49	8800	0.77	13800	1.02		
3900	0.49	8900	0.77	13900	1.03		
4000	0.50	9000	0.77	14000	1.03		
4100	0.51	9100	0.77	14100	1.05		
4200	0.52	9200	0.78	14200	1.05		
4300	0.52	9300	0.80	14300	1.04		
4400	0.53	9400	0.82	14400	1.03		
4500	0.53	9500	0.82	14600	1.06		
4600	0.54	9600	0.83	14700	1.07		
4700	0.56	9700	0.89	14800	1.08		

**Cable loss**  
**Cable coaxial, RG-214/U, N type-N type, 17 m**  
**Teldor, HL 3612**

Frequency, MHz	Cable loss, dB
0.1	0.05
0.5	0.07
1	0.10
3	0.22
5	0.29
10	0.39
30	0.68
50	0.90
100	1.27
150	1.58
200	1.80
250	2.12
300	2.36
350	2.60
400	2.82
450	2.99
500	3.23
550	3.40
600	3.56
650	3.71
700	3.90
750	4.04
800	4.23
850	4.39
900	4.55
950	4.65
1000	4.79

**Cable loss**  
**Cable coaxial, RG-214/U, N type-N type, 6.5 m**  
**Suhner Switzerland, HL 3617**

Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB
10	0.13	2200	2.97	4500	5.10
50	0.33	2300	3.06	4600	5.20
100	0.48	2400	3.16	4700	5.34
200	0.71	2500	3.23	4800	5.36
300	0.89	2600	3.34	4900	5.48
400	1.04	2700	3.42	5000	5.52
500	1.19	2800	3.52	5100	5.61
600	1.32	2900	3.61	5200	5.72
700	1.44	3000	3.69	5300	5.81
800	1.56	3100	3.80	5400	5.93
900	1.68	3200	3.86	5500	6.08
1000	1.80	3300	3.98	5600	6.12
1100	1.90	3400	4.07	5700	6.25
1200	2.00	3500	4.14	5800	6.31
1300	2.11	3600	4.27	5900	6.41
1400	2.21	3700	4.36	6000	6.51
1500	2.30	3800	4.47	6100	6.62
1600	2.40	3900	4.62	6200	6.73
1700	2.49	4000	4.63	6300	6.86
1800	2.61	4100	4.76	6400	6.94
1900	2.69	4200	4.83	6500	7.06
2000	2.79	4300	4.89		
2100	2.88	4400	5.04		

## 14 APPENDIX F Abbreviations and acronyms

A	ampere
AC	alternating current
A/m	ampere per meter
AM	amplitude modulation
AVRG	average (detector)
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
PM	pulse modulation
PS	power supply
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
WB	wideband

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