

## PARTIAL TEST REPORT

ACCORDING TO: FCC part 27: 2004  
FCC part 15: 2005 subpart B

FOR:  
**VYYO-XTEND Ltd.**  
**Wireless modem**  
**Model:V284i**

This report is in conformity with ISO/ IEC 17025. The A2LA logo endorsement applies only to the test methods and the standards that are listed in the scope of Hermon Laboratories accreditation. The test results relate only to the items tested. This test report shall not be reproduced in any form except in full with the written approval of Hermon Laboratories Ltd.

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## 1 Applicant information

**Client name:** VYYO - XTEND Ltd.  
**Address:** Airport City, POB 197, Ben Gurion Airport, 70100, Israel  
**Telephone:** +972 3976 9999  
**Fax:** +972 3976 9998  
**E-mail:** hhandler@vyyo.com  
**Contact name:** Mr. Hillel Hendler

## 2 Equipment under test attributes

**Product name:** Wireless modem  
**Operating frequency range:** 776.1 – 776.9 MHz  
**Model:** V284i  
**Serial number:** 1325114  
**Receipt date:** 6/21/2005

## 3 Manufacturer information

**Manufacturer name:** VYYO - XTEND Ltd.  
**Address:** Airport City, POB 197, Ben Gurion Airport, 70100, Israel  
**Telephone:** +972 3976 9999  
**Fax:** +972 3976 9998  
**E-Mail:** hhandler@vyyo.com  
**Contact name:** Mr. Hillel Hendler

## 4 Test details

**Project ID:** 16544  
**Location:** Hermon Laboratories Ltd. P.O.Box 23, Binyamina 30500, Israel  
**Test started:** 6/21/2005  
**Test completed:** 8/15/2004  
**Test specifications:** FCC part 27: 2003  
FCC part 15: 2004 subpart B

## 5 Tests summary

Test	Status
<b>Transmitter characteristics</b>	
Section 27.50c(1)(i), Peak output power at RF antenna connector	Pass
Section 2.1091, RF radiation exposure evaluation	Pass
Section 27.53d, Spurious emissions RF antenna connector	Pass
Section 27.53d, Adjacent channel power	Not tested
Section 27.53d, Radiated spurious emissions	Pass
Section 27.54, Frequency stability	Pass
Section 2.1049, Occupied bandwidth	Pass
<b>Unintentional emissions</b>	
Section 15.107, Conducted emission at AC power port	Pass
Section 15.109, Radiated emission	Pass
Section 15.111, Antenna power conducted measurements for receiver	Pass

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. A. Adelberg, test engineer	August 15, 2005	
<b>Reviewed by:</b>	Mrs. M. Cherniavsky, certification engineer	August 18, 2005	
<b>Approved by:</b>	Mr. M. Nikishin, EMC group leader	August 19, 2005	

## 6 EUT description

### 6.1 General information

The EUT is a broadband wireless data modem used by cable and wireless operators to deliver telephony services (T1/E1) and high-speed data connections to business and residential subscribers. The EUT operates within 776.1 to 776.9 MHz band and is powered from AC mains through a power adaptor.

### 6.2 Ports and lines

Port type	Port description	Connected		Connector type	Qty.	Cable type	Cable length	Indoor / outdoor
		From	To					
Power	AC mains	Power adaptor	AC mains	2 pole	1	NA	NA	Indoor
Power	VDC	EUT	Power adaptor	DC jack	1	Unshielded	1.5 m	Indoor
Signal	Ethernet	EUT	Laptop	RJ 45	1	UTP Cat.5	1.5 m	Indoor
Signal	USB	EUT	Laptop	USB	1	Shielded	1.5 m	Indoor
Signal	Antenna	EUT	Attenuator	F-type	1	Coax 75 Ohm	12.0 m	Outdoor
Power	AC mains	Power adaptor	AC mains	3 pole	1	Unshielded	1.5 m	Indoor
Power	VDC	Laptop	Power adaptor	DC jack	1	Unshielded	1.5 m	Indoor
Signal	Mouse	Laptop	Mouse	USB	1	Shielded	2 m	Indoor
Signal	Parallel	Laptop	Printer	D type 25	1	Shielded	5 m	Indoor
Signal	Keyboard	Laptop	Keyboard	PS2	1	Unshielded	2 m	Indoor

### 6.3 Support and test equipment

Description	Manufacturer	Model number	Serial number
E1/T1 Broadband hub	Vyyo	V3000	NA
External Laptop	IBM	ThinkPad 600x	5573MWV02/99
Power adaptor for external laptop	IBM	02K6654	4062298
Up converter	Wavecom	UC4040D	169532
Signal generator	Rohde&Schwartz	SML01	836817/091
Mouse	Microsoft	Mouse 2.1A	03306271
Printer	Epson	LX-810	44B1127035
Keyboard	Quantum	KWD-840	OC11401283
Power adaptor for EUT	DVE	DSA-0151A	3604
Laptop	IBM	ThinkPad T40	KP-DPM50 04/03
Power adaptor for laptop	IBM	02K6654	150HN9

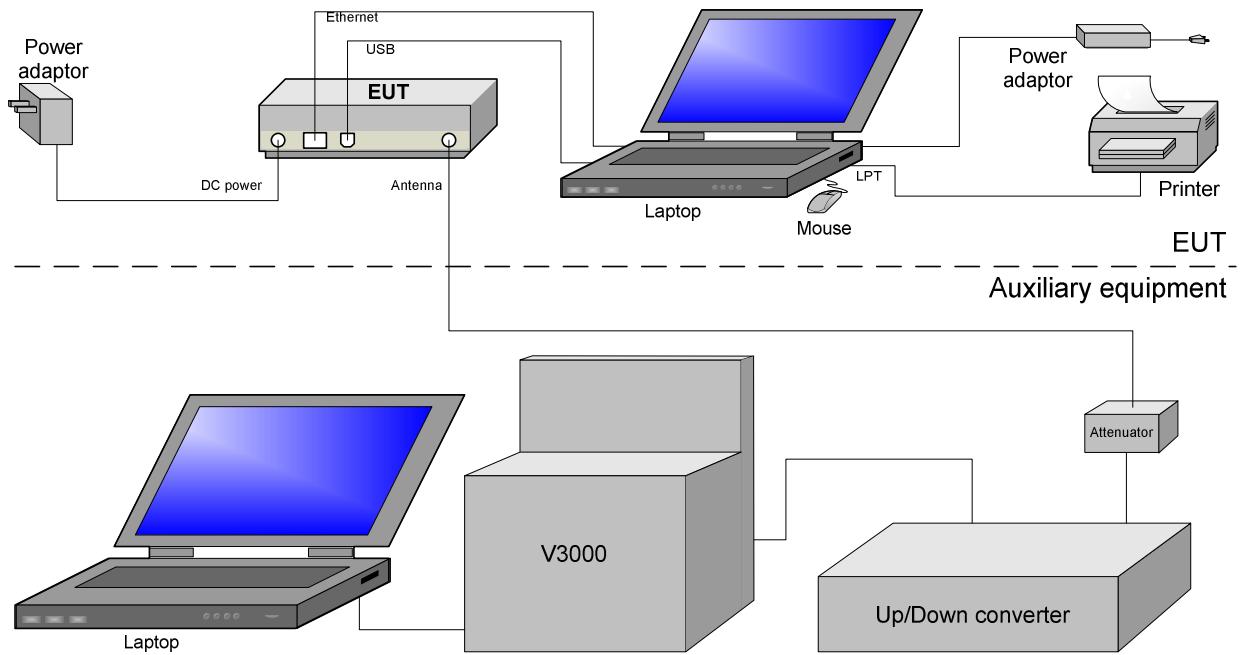
### 6.4 Operating frequencies

Source	Frequency, MHz		
Receiver	702.0 (LO)	44.0 (IF)	746.1 – 746.9 (Rx)
Transmitter	10.0 (VCTXO)	44.0 (IF)	776.1 - 776.9 (Tx)

### 6.5 Changes made in the EUT

No changes were implemented.

## 6.6 Test configuration



## 6.7 Transmitter characteristics

Type of equipment						
<input checked="" type="checkbox"/>	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					
<input checked="" type="checkbox"/> fixed	Always at a distance more than 2 m from all people					
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					
Assigned frequency range	776.0 – 777.0 MHz					
Operating frequency range	776.1 – 776.9 MHz					
Maximum rated output power		At transmitter 50 Ω RF output connector		24.9.0 dBm		
		Effective radiated power (for equipment with no RF connector)		NA dBm		
Is transmitter output power variable?		No				
		continuous variable				
		<input checked="" type="checkbox"/>	stepped variable with stepsize	0.25 dB		
			minimum RF power	-11.0 dBm		
			maximum RF power	+24.89 dBm		
Antenna connection						
unique coupling	<input checked="" type="checkbox"/>	standard F-type connector	integral	with temporary RF connector without temporary RF connector		
Antenna/s technical characteristics						
Type	Manufacturer		Model number	Gain		
Yagi	Shenglu		TDJ-700B12G13.5	13.5 dBi		
Transmitter 99% power bandwidth						
200 / 400 kHz						
Type of multiplexing						
TDMA						
Modulating test signal (baseband)						
PRBS						
Maximum transmitter duty cycle in normal use						
50 %						
Transmitter duty cycle supplied for test						
50 %						
Transmitter power source						
Battery	Nominal rated voltage	VDC	Battery type			
DC	Nominal rated voltage	VDC				
<input checked="" type="checkbox"/> AC mains	Nominal rated voltage	120 VAC	Frequency	60 Hz		
Common power source for transmitter and receiver						
<input checked="" type="checkbox"/> yes						
Emission designator						
Type of modulation	Modulation states (constellation)		RF channel spacing	Frequency channel		
				Low	Mid	High
QAM	16		200 kHz	776.1	776.5	776.9
QPSK	4		200 kHz	776.1	776.5	776.9
QAM	16		400 kHz	776.2	776.5	776.8
QPSK	4		400 kHz	776.2	776.5	776.8

<b>Test specification:</b>	<b>Section 27.50c(1)(i), Peak output power at RF antenna connector</b>		
<b>Test procedure:</b>	47 CFR, Section 2.1046; TIA/EIA-603-A, Section 2.2.1		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	PASS
<b>Date:</b>	06/26/2005		
<b>Temperature:</b> 26 °C	<b>Air Pressure:</b> 1006 hPa	<b>Relative Humidity:</b> 44 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

## 7 Transmitter characteristics

### 7.1 Peak output power test

#### 7.1.1 General

This test was performed to measure the peak output power at RF antenna connector. Specification test limits are given in Table 7.1.1. The test results are provided in Table 7.1.2 and the associated plots.

**Table 7.1.1 Peak output power limits**

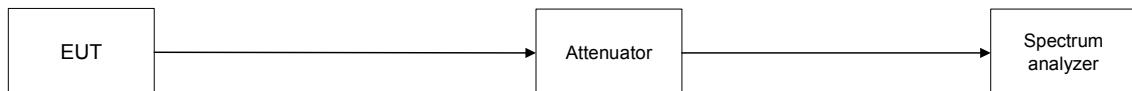
Assigned frequency range, MHz	Maximum peak output power*	
	W	dBm
776.0 – 777.0	1.34	31.3

\* The peak output power limit was calculated by subtracting of antenna gain in dBd from maximum allowed ERP 44.8 dBm (30 W).

#### 7.1.2 Test procedure

- 7.1.2.1 The EUT was set up as shown in Figure 7.1.1, energized and its proper operation was checked.
- 7.1.2.2 The EUT was adjusted to produce maximum available to the end user RF output power.
- 7.1.2.3 The peak output power was measured with spectrum analyzer as provided in Table 7.1.2 and associated plots.

**Figure 7.1.1 Peak output power test setup**



<b>Test specification:</b>	<b>Section 27.50c(1)(i), Peak output power at RF antenna connector</b>		
<b>Test procedure:</b>	47 CFR, Section 2.1046; TIA/EIA-603-A, Section 2.2.1		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	PASS
<b>Date:</b>	06/26/2005		
<b>Temperature:</b> 26 °C	<b>Air Pressure:</b> 1006 hPa	<b>Relative Humidity:</b> 44 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

**Table 7.1.2 Peak output power test results**

ASSIGNED FREQUENCY RANGE: 776.0 – 777.0 MHz  
 DETECTOR USED: Peak  
 RESOLUTION BANDWIDTH: 5000 kHz  
 VIDEO BANDWIDTH: 3000 kHz  
 MODULATION: 16QAM  
 MODULATING SIGNAL: PRBS  
 TRANSMITTER OUTPUT POWER SETTINGS: Maximum

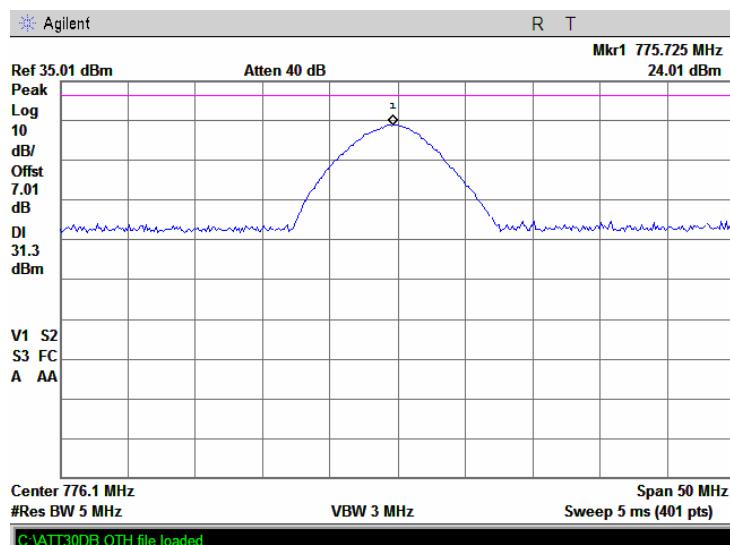
Carrier frequency, MHz	Spectrum analyzer reading, dBm	External attenuation, dB	Cable loss, dB	RF output power, dBm	Limit, dBm	Margin, dB	Verdict
776.1	24.01	Included		24.01	31.3	-7.29	Pass
776.5	24.89	Included		24.89	31.3	-6.41	Pass
776.9	24.69	Included		24.69	31.3	-6.61	Pass

**Reference numbers of test equipment used**

HL 1097	HL 1523	HL 1653	HL 2287				
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Full description is given in Appendix A.

**Plot 7.1.1 Peak output power test results at low frequency**

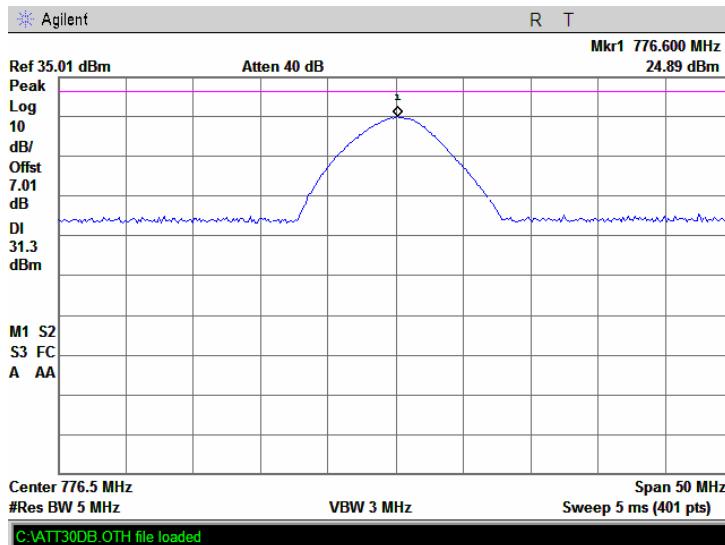




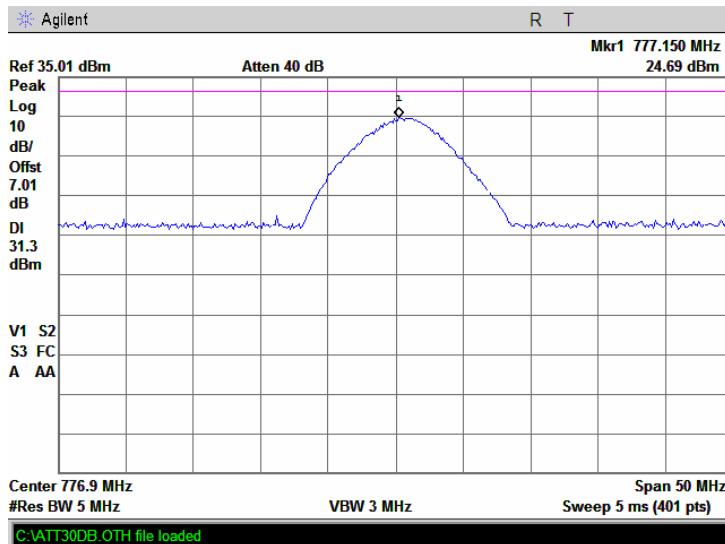
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<b>Test specification:</b>	<b>Section 27.50c(1)(i), Peak output power at RF antenna connector</b>		
<b>Test procedure:</b>	47 CFR, Section 2.1046; TIA/EIA-603-A, Section 2.2.1		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	PASS
<b>Date:</b>	06/26/2005		
<b>Temperature:</b> 26 °C	<b>Air Pressure:</b> 1006 hPa	<b>Relative Humidity:</b> 44 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

**Plot 7.1.2 Peak output power test results at mid frequency**



**Plot 7.1.3 Peak output power test results at high frequency**



<b>Test specification:</b>	<b>Section 2.1091, RF radiation exposure evaluation</b>		
<b>Test procedure:</b>	47 CFR, Section 1.1307(b)		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	PASS
<b>Date:</b>	06/27/2005		
<b>Temperature:</b> 24 °C	<b>Air Pressure:</b> 1010 hPa	<b>Relative Humidity:</b> 46 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

## 7.2 RF exposure

### 7.2.1 General

This test was performed to determine the minimum safe distance between the transmitter antenna and human to avoid public exposure in excess of limits for general population (uncontrolled exposure). Specification test limits are given in Table 7.2.1.

Table 7.2.1 RF exposure limits

Frequency range, MHz	Power density*		Electric field strength**, V/m
	mW/cm <sup>2</sup>	W/m <sup>2</sup>	
776.1	0.52	5.2	44.2
776.9	0.52	5.2	44.2

\* - Power density limit within 300 - 1500 MHz was calculated according to the following equation:  $S = F / 1500$ , where S is power density in mW/cm<sup>2</sup> and F is frequency in MHz

\*\* - Electric field strength limit was calculated from power density as follows:  $E = \sqrt{S \times 120 \times \pi}$ , where E is electric field strength in V/m and S is power density in W/m<sup>2</sup>

### 7.2.2 Test procedure

- 7.2.2.1 The EUT, connected to the antenna providing the maximum directional gain, was set up as shown in .
- 7.2.2.2 The E-field probe was pointed to the EUT antenna zero azimuth at a 3 m distance, the maximum field strength reading was recorded in Table 7.2.2.
- 7.2.2.3 The E-field probe was slowly moved toward the EUT until E-field equivalent to the maximum permitted power density was measured.
- 7.2.2.4 The obtained antenna to probe distance was recorded in Table 7.2.2 as a minimum separation distance.
- 7.2.2.5 The test was repeated at the rest of test distances according to Table 7.2.2.

Table 7.2.2 Maximum permissible exposure (MPE) measurement

Test distance, m	Field strength, V/m	Equivalent power density, mW/cm <sup>2</sup>	Limit, mW/cm <sup>2</sup>	Margin, mW/cm <sup>2</sup>	Verdict
2.0	0.48	0.0000611	0.52	-0.5199389	Pass
1.5	0.98	0.0002548	0.52	-0.5197452	Pass
1.0	1.32	0.0004622	0.52	-0.5195378	Pass
0.5	1.84	0.0008981	0.52	-0.5191019	Pass
0.3	2.12	0.0011922	0.52	-0.5188078	Pass
0.2	2.76	0.0020206	0.52	-0.5179794	Pass
0.1	3.78	0.0037901	0.52	-0.5162099	Pass
0.05	4.26	0.0048138	0.52	-0.5151862	Pass

\* - Equivalent power density was calculated from electric field strength as follows:  $S = 0.1 \times E^2 / (120 \times \pi)$ , where E is electric field strength in V/m and S is power density in mW/cm<sup>2</sup>

### Reference numbers of test equipment used

HL 0613	HL 1629				
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Full description is given in Appendix A.

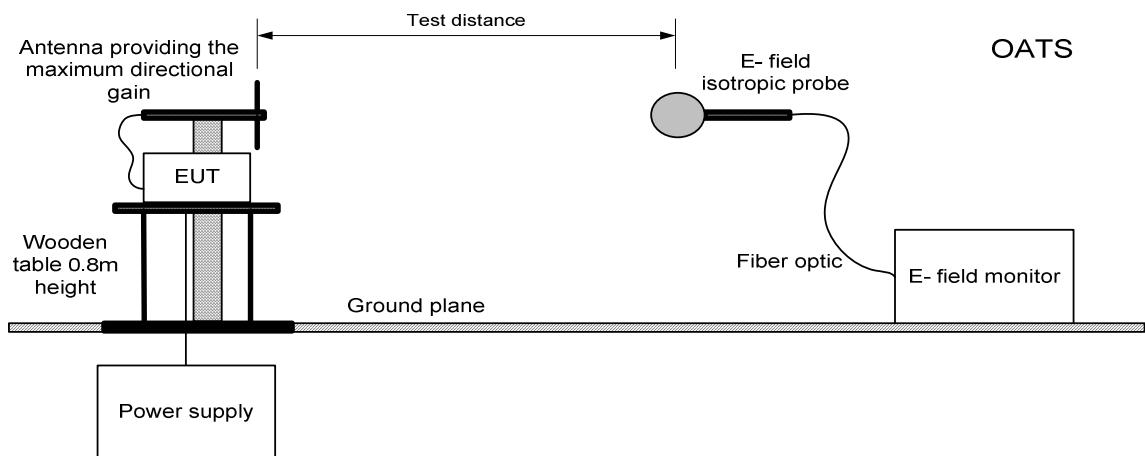


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Date of Issue: August 2005

<b>Test specification:</b>	<b>Section 2.1091, RF radiation exposure evaluation</b>		
<b>Test procedure:</b>	47 CFR, Section 1.1307(b)		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	PASS
<b>Date:</b>	06/27/2005		
<b>Temperature:</b> 24 °C	<b>Air Pressure:</b> 1010 hPa	<b>Relative Humidity:</b> 46 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

**Figure 7.2.1 Maximum permissible exposure (MPE) measurement setup**



<b>Test specification:</b>	<b>Section 27.53d, Spurious emissions at RF antenna connector</b>		
<b>Test procedure:</b>	47 CFR, Sections 2.1047, 2.1051, TIA/EIA-603-A, Section 2.2.13		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	PASS
<b>Date:</b>	6/28/2005		
<b>Temperature:</b> 23 °C	<b>Air Pressure:</b> 1011 hPa	<b>Relative Humidity:</b> 40 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

### 7.3 Spurious emissions at RF antenna connector test

#### 7.3.1 General

This test was performed to measure spurious emissions at RF antenna connector. Specification test limits are given in Table 7.3.1. The test results are provided in Table 7.3.2 and associated plots.

Table 7.3.1 Spurious emission limits

Frequency, MHz*	Attenuation below carrier, dBc	Spurious emissions, dBm
0.009 – 10 <sup>th</sup> harmonic	43+10logP*	-13

\* - P is transmitter output power in Watts.

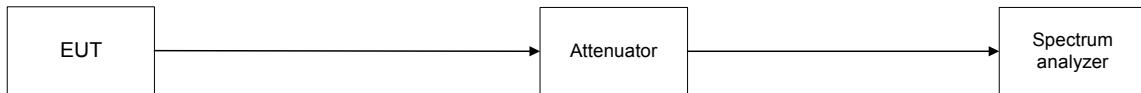
#### 7.3.2 Test procedure

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 adjusted to produce maximum available for end user RF output power.

7.3.2.3 The spurious emission was measured with spectrum analyzer as provided in Table 7.3.2 and associated plots.

Figure 7.3.1 Spurious emission test setup



<b>Test specification:</b>	<b>Section 27.53d, Spurious emissions at RF antenna connector</b>		
<b>Test procedure:</b>	47 CFR, Sections 2.1047, 2.1051, TIA/EIA-603-A, Section 2.2.13		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	PASS
<b>Date:</b>	6/28/2005		
<b>Temperature:</b> 23 °C	<b>Air Pressure:</b> 1011 hPa	<b>Relative Humidity:</b> 40 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

**Table 7.3.2 Spurious emission test results**

ASSIGNED FREQUENCY RANGE: 776.0 – 777.0 MHz  
 INVESTIGATED FREQUENCY RANGE: 0.009 – 8000 MHz  
 DETECTOR USED: Peak  
 VIDEO BANDWIDTH:  $\geq$  Resolution bandwidth  
 MODULATION: 16QAM  
 MODULATING SIGNAL: PRBS  
 TRANSMITTER OUTPUT POWER SETTINGS: Maximum

Frequency, MHz	Bit rate, Mbps	RBW, kHz	Spurious emission, dBm	Limit, dBm	Margin, dB*	Verdict
<b>Low channel</b>						
0.009 - 1000			More than 20 dB below limit			Pass
<b>Mid channel</b>						
0.009 - 1000			More than 20 dB below limit			Pass
<b>High channel</b>						
0.009 - 1000			More than 20 dB below limit			Pass

\*- Margin = Spurious emission – specification limit.

**Reference numbers of test equipment used**

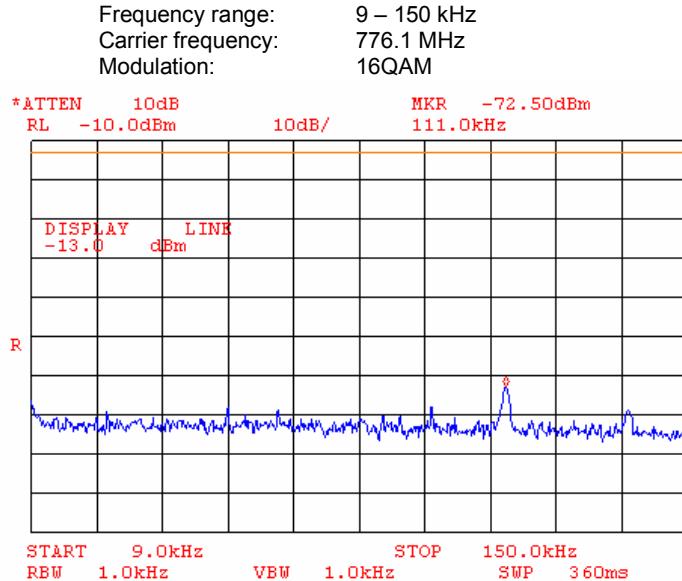
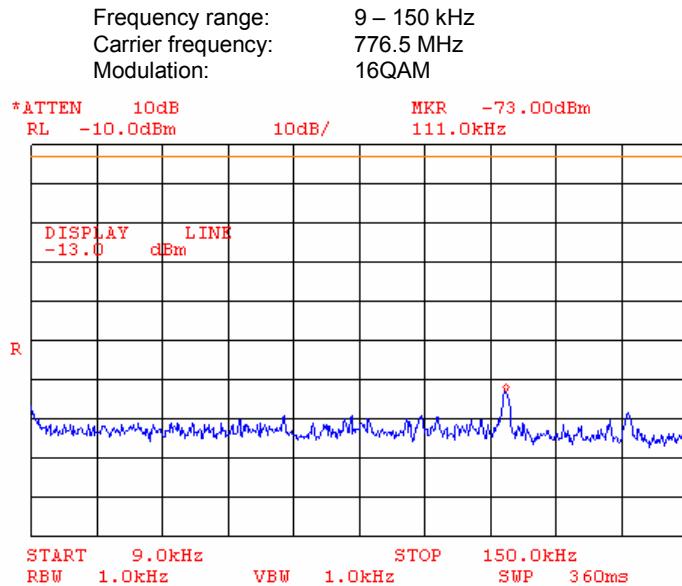
HL 1097	HL 1424	HL 1455	HL 1488	HL 1653	HL 1942	
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Full description is given in Appendix A.



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<b>Test specification:</b>	<b>Section 27.53d, Spurious emissions at RF antenna connector</b>		
<b>Test procedure:</b>	47 CFR, Sections 2.1047, 2.1051, TIA/EIA-603-A, Section 2.2.13		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	PASS
<b>Date:</b>	6/28/2005		
<b>Temperature:</b> 23 °C	<b>Air Pressure:</b> 1011 hPa	<b>Relative Humidity:</b> 40 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

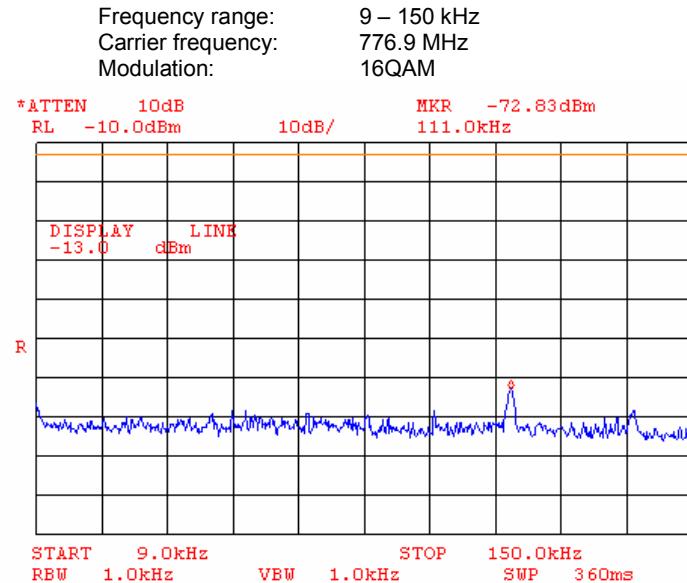
**Plot 7.3.1 Spurious emission measurements at RF antenna connector, low channel****Plot 7.3.2 Spurious emission measurements at RF antenna connector, mid channel**



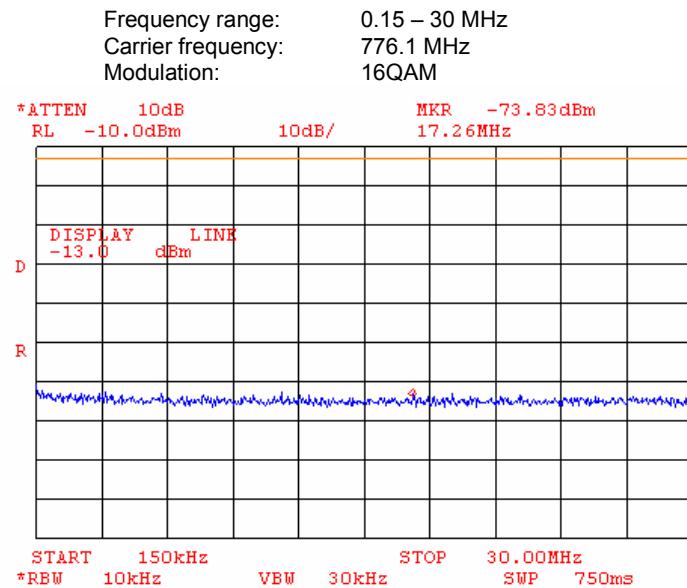
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<b>Test specification:</b>	<b>Section 27.53d, Spurious emissions at RF antenna connector</b>		
<b>Test procedure:</b>	47 CFR, Sections 2.1047, 2.1051, TIA/EIA-603-A, Section 2.2.13		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	PASS
<b>Date:</b>	6/28/2005		
<b>Temperature:</b> 23 °C	<b>Air Pressure:</b> 1011 hPa	<b>Relative Humidity:</b> 40 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

**Plot 7.3.3 Spurious emission measurements at RF antenna connector, high channel**



**Plot 7.3.4 Spurious emission measurements at RF antenna connector, low channel**





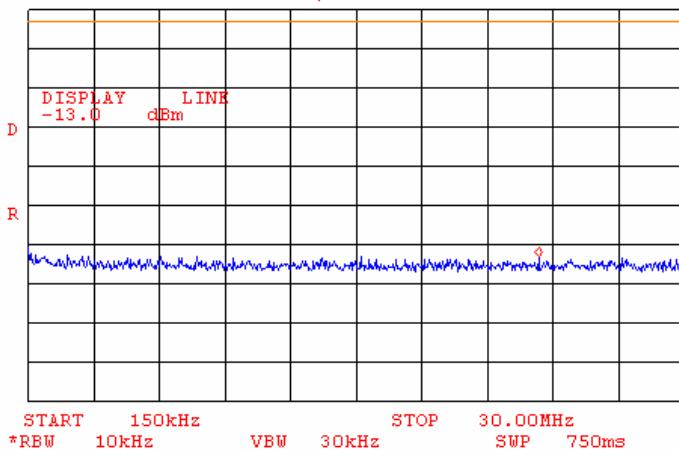
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<b>Test specification:</b>	<b>Section 27.53d, Spurious emissions at RF antenna connector</b>		
<b>Test procedure:</b>	47 CFR, Sections 2.1047, 2.1051, TIA/EIA-603-A, Section 2.2.13		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	PASS
<b>Date:</b>	6/28/2005		
<b>Temperature:</b> 23 °C	<b>Air Pressure:</b> 1011 hPa	<b>Relative Humidity:</b> 40 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

### Plot 7.3.5 Spurious emission measurements at RF antenna connector, mid channel

Frequency range: 0.15 – 30 MHz  
Carrier frequency: 776.5 MHz  
Modulation: 16QAM

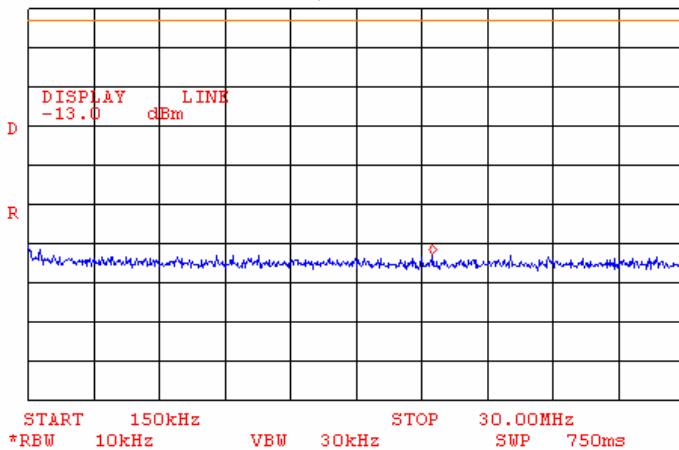
\*ATTEN 10dB MKR -72.83dBm  
RL -10.0dBm 10dB/ 23.38MHz



**Plot 7.3.6 Spurious emission measurements at RF antenna connector, high channel**

Frequency range: 0.15 – 30 MHz  
Carrier frequency: 776.9 MHz  
Modulation: 16QAM

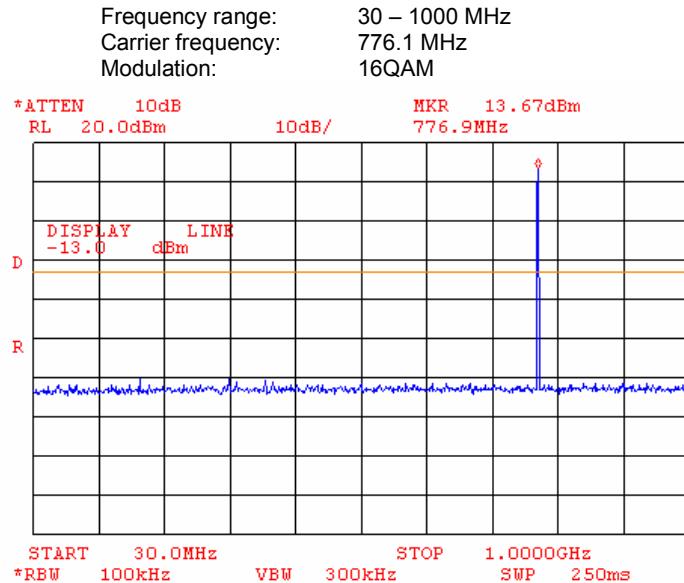
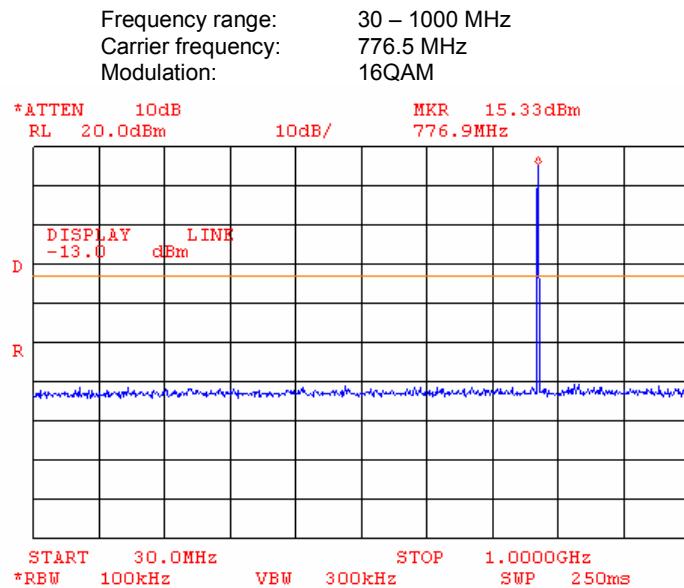
\*ATTEN 10dB MKR -72.50dBm  
RL -10.0dBm 10dB/ 18.56MHz





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<b>Test specification:</b>	<b>Section 27.53d, Spurious emissions at RF antenna connector</b>		
<b>Test procedure:</b>	47 CFR, Sections 2.1047, 2.1051, TIA/EIA-603-A, Section 2.2.13		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	PASS
<b>Date:</b>	6/28/2005		
<b>Temperature:</b> 23 °C	<b>Air Pressure:</b> 1011 hPa	<b>Relative Humidity:</b> 40 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

**Plot 7.3.7 Spurious emission measurements at RF antenna connector, low channel****Plot 7.3.8 Spurious emission measurements at RF antenna connector, mid channel**

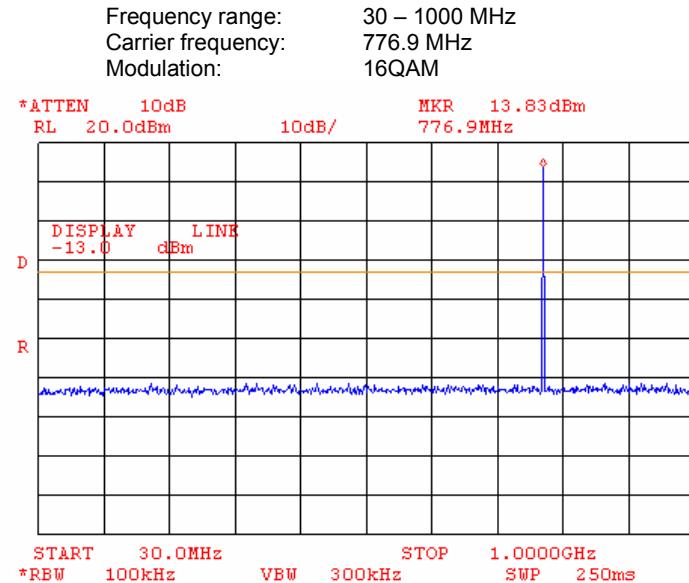


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Date of Issue: August 2005

<b>Test specification:</b>	<b>Section 27.53d, Spurious emissions at RF antenna connector</b>		
<b>Test procedure:</b>	47 CFR, Sections 2.1047, 2.1051, TIA/EIA-603-A, Section 2.2.13		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	PASS
<b>Date:</b>	6/28/2005		
<b>Temperature:</b> 23 °C	<b>Air Pressure:</b> 1011 hPa	<b>Relative Humidity:</b> 40 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

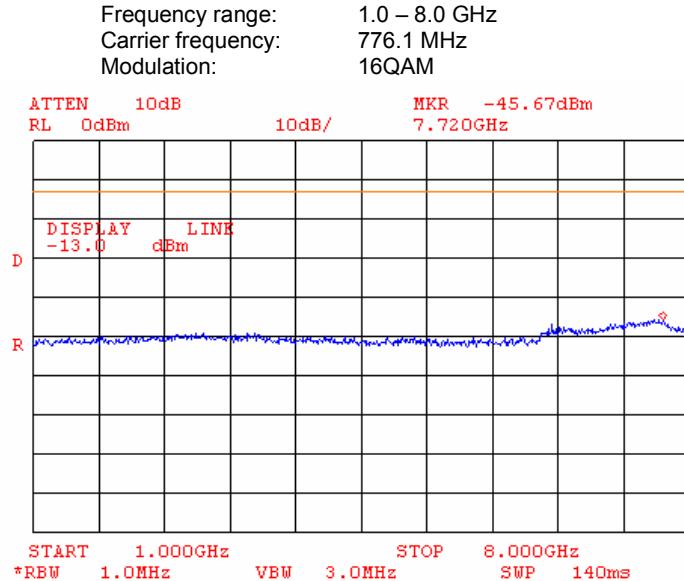
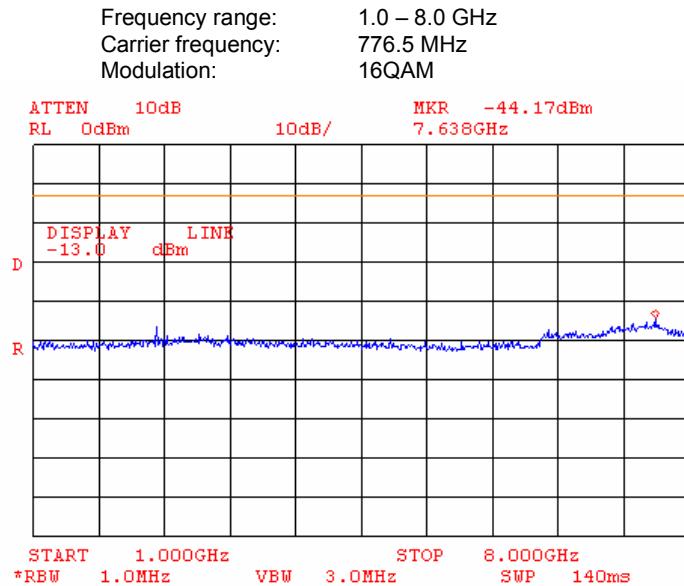
**Plot 7.3.9 Spurious emission measurements at RF antenna connector, high channel**





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<b>Test specification:</b>	<b>Section 27.53d, Spurious emissions at RF antenna connector</b>		
<b>Test procedure:</b>	47 CFR, Sections 2.1047, 2.1051, TIA/EIA-603-A, Section 2.2.13		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	PASS
<b>Date:</b>	6/28/2005		
<b>Temperature:</b> 23 °C	<b>Air Pressure:</b> 1011 hPa	<b>Relative Humidity:</b> 40 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

**Plot 7.3.10 Spurious emission measurements at RF antenna connector, low channel****Plot 7.3.11 Spurious emission measurements at RF antenna connector, mid channel**

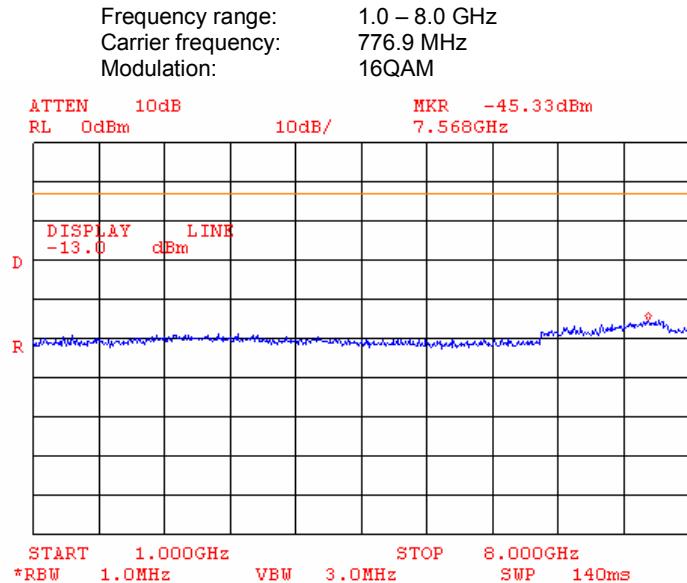


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Report ID: VYYRAD\_FCC.16544\_CR.doc  
Date of Issue: August 2005

<b>Test specification:</b>	<b>Section 27.53d, Spurious emissions at RF antenna connector</b>		
<b>Test procedure:</b>	47 CFR, Sections 2.1047, 2.1051, TIA/EIA-603-A, Section 2.2.13		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	PASS
<b>Date:</b>	6/28/2005		
<b>Temperature:</b> 23 °C	<b>Air Pressure:</b> 1011 hPa	<b>Relative Humidity:</b> 40 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

**Plot 7.3.12 Spurious emission measurements at RF antenna connector, high channel**

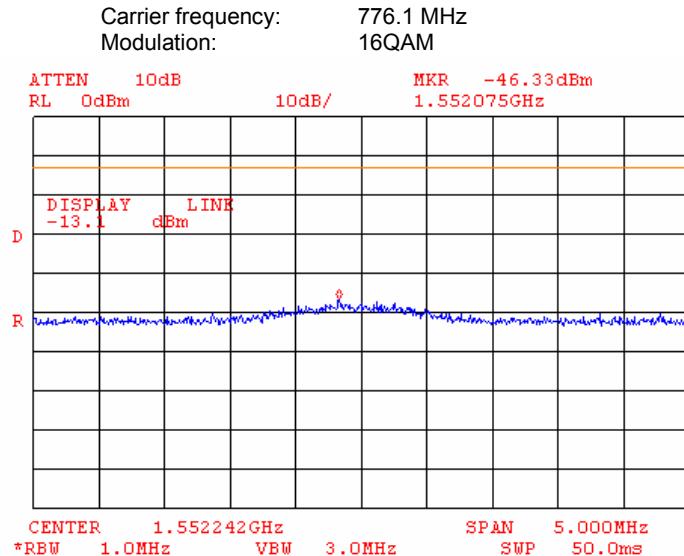
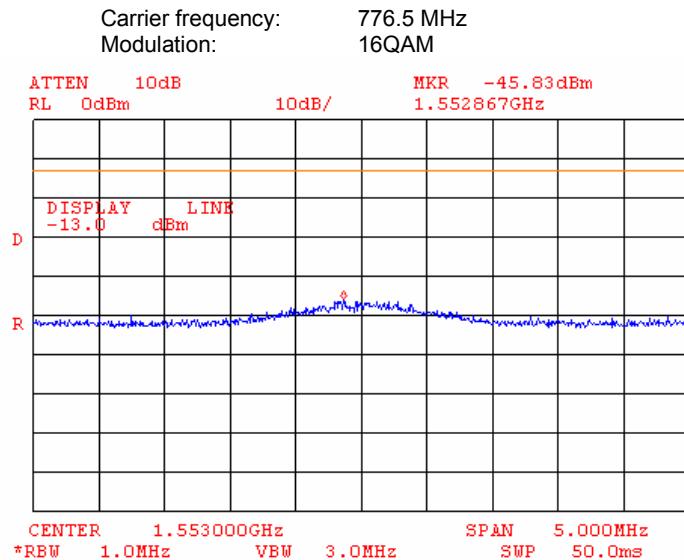




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Report ID: VYYRAD\_FCC.16544\_CR.doc  
Date of Issue: August 2005

<b>Test specification:</b>	<b>Section 27.53d, Spurious emissions at RF antenna connector</b>		
<b>Test procedure:</b>	47 CFR, Sections 2.1047, 2.1051, TIA/EIA-603-A, Section 2.2.13		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	PASS
<b>Date:</b>	6/28/2005		
<b>Temperature:</b> 23 °C	<b>Air Pressure:</b> 1011 hPa	<b>Relative Humidity:</b> 40 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

**Plot 7.3.13 Spurious emission measurements at RF antenna connector, the 2<sup>nd</sup> harmonic of the low channel****Plot 7.3.14 Spurious emission measurements at RF antenna connector, the 2<sup>nd</sup> harmonic of the mid channel**

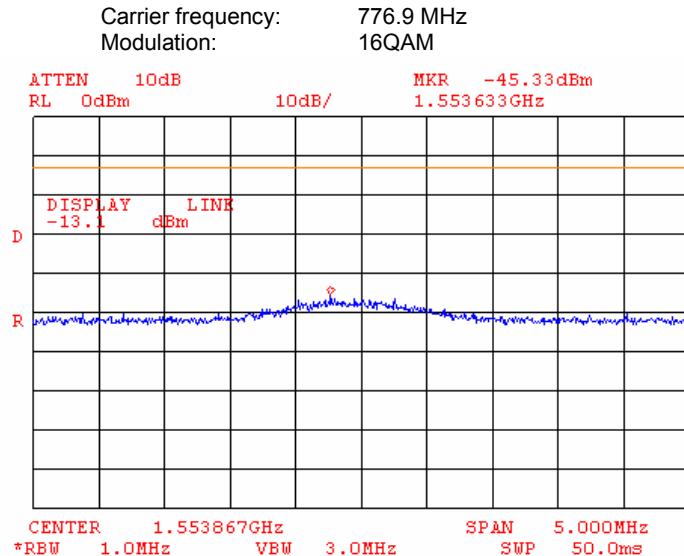


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Report ID: VYYRAD\_FCC.16544\_CR.doc  
Date of Issue: August 2005

<b>Test specification:</b>	<b>Section 27.53d, Spurious emissions at RF antenna connector</b>		
<b>Test procedure:</b>	47 CFR, Sections 2.1047, 2.1051, TIA/EIA-603-A, Section 2.2.13		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	PASS
<b>Date:</b>	6/28/2005		
<b>Temperature:</b> 23 °C	<b>Air Pressure:</b> 1011 hPa	<b>Relative Humidity:</b> 40 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

**Plot 7.3.15 Spurious emission measurements at RF antenna connector, the 2<sup>nd</sup> harmonic of the high channel**



<b>Test specification:</b>	<b>Section 27.53d, Radiated spurious emissions</b>		
<b>Test procedure:</b>	47 CFR, Section 2.1053, TIA/EIA-603-A, Section 2.2.12		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	PASS
<b>Date:</b>	06/22/2005		
<b>Temperature:</b> 24 °C	<b>Air Pressure:</b> 1008 hPa	<b>Relative Humidity:</b> 36 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

## 7.4 Radiated spurious emission measurements

### 7.4.1 General

This test was performed to measure radiated spurious emissions from the EUT enclosure with antenna connector terminated with 50 Ohm dummy load. Specification test limits are given in Table 7.4.1.

Table 7.4.1 Radiated spurious emission test limits

Frequency, MHz*	Attenuation below carrier, dBc	Spurious emissions, dBm	Equivalent field strength limit @ 3m, dB(µV/m)**
0.009 – 10 <sup>th</sup> harmonic	43+10logP*	-13	84.4

\* - P is transmitter output power in Watts.

\*\* - Equivalent field strength limit was calculated from maximum allowed ERP of spurious as follows:  
 $E = \sqrt{30 \times P \times 1.64} / r$ , where P is ERP in Watts, 1.64 is numeric gain of ideal dipole and r is antenna to EUT distance in meters.

### 7.4.2 Test procedure for spurious emission field strength measurements in 9 kHz to 30 MHz range

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

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

7.4.2.3 The test results were recorded in Table 7.4.2 and shown in the associated plots.

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

7.4.3.1 The EUT was set up as shown in Figures 7.4.2, 7.4.3, energized and the EUT performance was checked.

7.4.3.2 The specified frequency range was investigated with antennas connected to spectrum analyzer. To find maximum radiation the turntable was rotated 360° and the measuring antenna height was swept from 1 to 4 m in both, vertical and horizontal, polarizations.

7.4.3.3 The worst test results with respect to the limits were recorded in Table 7.4.2 and shown in the associated plots.

### 7.4.4 Test procedure for substitution ERP measurements of spurious

7.4.4.1 The test equipment was set up as shown in Figure 7.4.4 and energized.

7.4.4.2 RF signal generator was set to the frequency of investigated spurious emission and the RF output level was preliminary adjusted to produce the same field strength as it was measured from the EUT.

7.4.4.3 The test antenna height was swept from 1 to 4 m to find maximum emission from substitution antenna and RF signal generator output was fine adjusted to produce the same field strength as it was measured from the EUT.

7.4.4.4 The above procedure was performed in both, horizontal and vertical, polarizations of the test and substitution antennas.

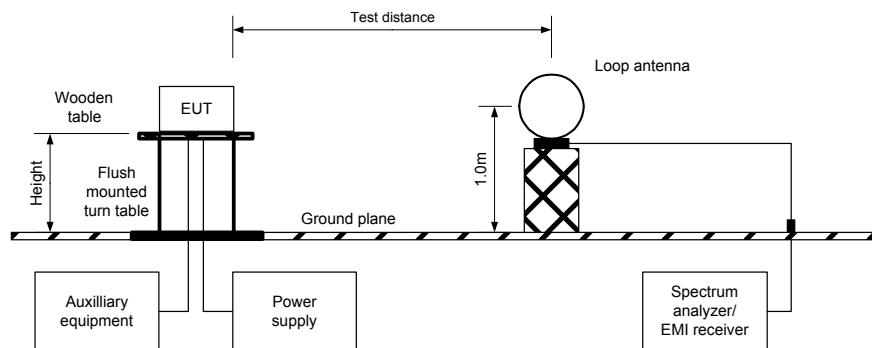
7.4.4.5 The ERP of spurious emissions was calculated as a sum of signal generator output power in dBm, antenna gain in dBd and cable loss in dB.

7.4.4.6 The above procedure was repeated at the rest of investigated frequencies.

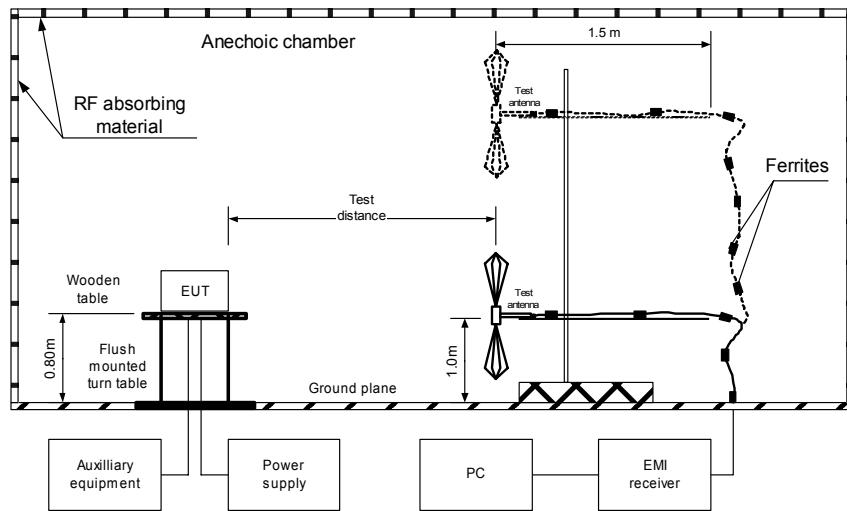
7.4.4.7 The worst test results with respect to the limits were recorded in Table 7.4.3 and shown in the associated plots.

<b>Test specification:</b>	<b>Section 27.53d, Radiated spurious emissions</b>		
<b>Test procedure:</b>	47 CFR, Section 2.1053, TIA/EIA-603-A, Section 2.2.12		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	PASS
<b>Date:</b>	06/22/2005		
<b>Temperature:</b> 24 °C	<b>Air Pressure:</b> 1008 hPa	<b>Relative Humidity:</b> 36 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

**Figure 7.4.1 Setup for spurious emission field strength measurements in 9 kHz to 30 MHz range**



**Figure 7.4.2 Setup for spurious emission field strength measurements in 30 MHz to 6.5 GHz range**



<b>Test specification:</b>	<b>Section 27.53d, Radiated spurious emissions</b>		
<b>Test procedure:</b>	47 CFR, Section 2.1053, TIA/EIA-603-A, Section 2.2.12		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	PASS
<b>Date:</b>	06/22/2005		
<b>Temperature:</b> 24 °C	<b>Air Pressure:</b> 1008 hPa	<b>Relative Humidity:</b> 36 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

Figure 7.4.3 Setup for spurious emission field strength measurements in 1 to 7.5 GHz range

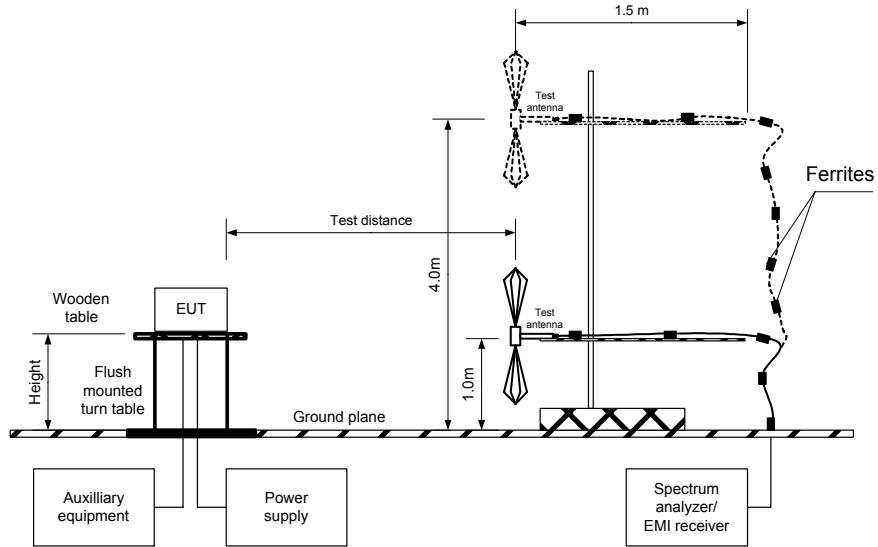
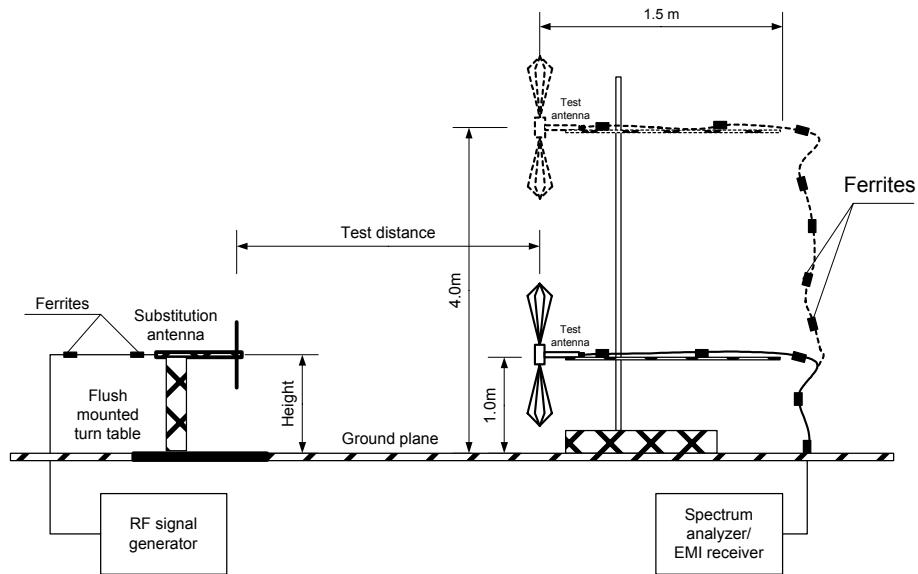


Figure 7.4.4 Setup for substitution ERP measurements of spurious



<b>Test specification:</b>	<b>Section 27.53d, Radiated spurious emissions</b>		
<b>Test procedure:</b>	47 CFR, Section 2.1053, TIA/EIA-603-A, Section 2.2.12		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	PASS
<b>Date:</b>	06/22/2005		
<b>Temperature:</b> 24 °C	<b>Air Pressure:</b> 1008 hPa	<b>Relative Humidity:</b> 36 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

**Table 7.4.2 Spurious emission field strength test results**

ASSIGNED FREQUENCY RANGE: 776.0 – 777.0 MHz  
 TEST DISTANCE: 3 m  
 EUT HEIGHT: 0.8 m  
 INVESTIGATED FREQUENCY RANGE: 0.009 – 8000 MHz  
 DETECTOR USED: Peak  
 VIDEO BANDWIDTH:  $\geq$  Resolution bandwidth  
 TEST ANTENNA TYPE: Active loop (9 kHz – 30 MHz)  
 Biconilog (30 MHz – 1000 MHz)  
 Double ridged guide (above 1000 MHz)  
 MODULATION: 16QAM  
 MODULATING SIGNAL: PRBS  
 TRANSMITTER OUTPUT POWER SETTINGS: Maximum

Frequency, MHz	Antenna polarization	RBW, kHz	Field strength, dB( $\mu$ V/m)	Limit, dB( $\mu$ V/m)	Margin, dB*	Verdict
<b>Low carrier frequency</b>						
214.775000	Vertical	120	30.86	84.4	-53.54	Pass
400.500000	Horizontal	120	35.98	84.4	-48.42	Pass
500.000000	Vertical	120	31.92	84.4	-52.48	Pass
750.000000	Vertical	120	35.96	84.4	-48.44	Pass
800.978750	Vertical	120	38.30	84.4	-46.10	Pass
916.332000	Horizontal	120	29.55	84.4	-54.85	Pass
1551.280000	Vertical	1000	43.82	84.4	-40.58	Pass
<b>Mid carrier frequency</b>						
73.012000	Vertical	120	32.17	84.4	-52.23	Pass
200.125600	Vertical	120	30.52	84.4	-53.88	Pass
398.000000	Vertical	120	38.66	84.4	-45.74	Pass
596.130000	Vertical	120	32.10	84.4	-52.30	Pass
699.410000	Horizontal	120	35.81	84.4	-48.59	Pass
801.200000	Vertical	120	36.39	84.4	-48.01	Pass
1552.725000	Vertical	1000	43.12	84.4	-41.28	Pass
<b>High carrier frequency</b>						
31.240000	Vertical	120	43.39	84.4	-41.01	Pass
87.492500	Vertical	120	41.01	84.4	-43.39	Pass
249.960000	Vertical	120	51.89	84.4	-32.51	Pass
262.462500	Vertical	120	46.04	84.4	-38.36	Pass
437.428000	Horizontal	120	49.34	84.4	-35.06	Pass
612.402500	Vertical	120	44.06	84.4	-40.34	Pass
1554.613000	Vertical	1000	43.24	84.4	-41.16	Pass

\*- Margin = Field strength of spurious – calculated field strength limit.

<b>Test specification:</b>	<b>Section 27.53d, Radiated spurious emissions</b>		
<b>Test procedure:</b>	47 CFR, Section 2.1053, TIA/EIA-603-A, Section 2.2.12		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	PASS
<b>Date:</b>	06/22/2005		
<b>Temperature:</b> 24 °C	<b>Air Pressure:</b> 1008 hPa	<b>Relative Humidity:</b> 36 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

**Table 7.4.3 Substitution ERP of spurious test results**

ASSIGNED FREQUENCY RANGE: 776.0 – 777.0 MHz  
 TEST SITE: OATS  
 TEST DISTANCE: 3 m  
 SUBSTITUTION ANTENNA HEIGHT: 0.8 m  
 DETECTOR USED: Peak  
 VIDEO BANDWIDTH:  $\geq$  Resolution bandwidth  
 SUBSTITUTION ANTENNA TYPE: Double ridged guide

Frequency, MHz	Antenna polarization	RBW, kHz	Field strength, dB( $\mu$ V/m)	RF generator output, dBm	Antenna gain, dBd	Cable loss, dB	ERP result, dBm**	ERP limit, dBm	Margin, dB*	Verdict
<b>Low carrier frequency</b>										
214.77500	Vertical	120	30.86	-61.62	-0.09	1.04	-62.75	-13.00	-49.75	Pass
400.50000	Horizontal	120	35.98	-62.74	-0.32	1.54	-64.60	-13.00	-51.60	Pass
500.00000	Vertical	120	31.92	-60.97	-1.67	1.76	-64.40	-13.00	-51.40	Pass
750.00000	Vertical	120	35.96	-57.58	-0.22	2.27	-60.07	-10.83	-49.24	Pass
800.97875	Vertical	120	38.30	-53.05	-0.89	2.38	-56.31	-10.83	-45.48	Pass
916.33200	Horizontal	120	29.55	-64.32	0.17	2.94	-67.09	-10.83	-56.26	Pass
1551.2800	Vertical	1000	43.82	-57.08	5.07	3.55	-55.56	-10.83	-44.73	Pass
<b>Mid carrier frequency</b>										
73.012000	Vertical	120	32.17	-65.93	-0.97	0.58	-67.48	-10.83	-56.65	Pass
200.12560	Vertical	120	30.52	-61.96	-0.03	0.99	-62.98	-13.00	-49.98	Pass
398.00000	Vertical	120	38.66	-60.06	-0.28	1.54	-61.88	-13.00	-48.88	Pass
596.13000	Vertical	120	32.10	-60.02	-0.42	1.88	-62.32	-10.83	-51.49	Pass
699.41000	Horizontal	120	35.81	-57.73	0.46	2.17	-59.44	-10.83	-48.61	Pass
801.20000	Vertical	120	36.39	-54.96	-0.88	2.38	-58.22	-10.83	-47.39	Pass
1552.7250	Vertical	1000	43.12	-57.78	5.07	3.55	-56.26	-10.83	-45.43	Pass
<b>High carrier frequency</b>										
31.240000	Vertical	120	43.39	-56.18	-0.90	0.36	-57.43	-10.83	-46.60	Pass
87.492500	Vertical	120	41.01	-57.02	-0.85	0.64	-58.51	-10.83	-47.68	Pass
249.96000	Vertical	120	51.89	-40.59	-0.22	1.16	-41.97	-13.00	-28.97	Pass
262.46250	Vertical	120	46.04	-46.44	-0.27	1.21	-47.91	-13.00	-34.91	Pass
437.42800	Horizontal	120	49.34	-49.38	-0.82	1.62	-51.82	-13.00	-38.82	Pass
612.40250	Vertical	120	44.06	-48.06	-0.29	1.92	-50.27	-10.83	-39.44	Pass
1554.6130	Vertical	1000	43.24	-57.66	5.06	3.55	-56.15	-10.83	-45.32	Pass

\*- Margin = Spurious emission – specification limit.

\*\* ERP =  $P_{gen} - CL + G_{ant}$ , where

$P_{gen}$  - signal generator output power in dBm

CL - cable loss in dB

$G_{ant}$  - antenna gain in dBd

#### Reference numbers of test equipment used

HL 0446	HL 0465	HL 0521	HL 0589	HL 0604	HL 0661	HL 1004	HL 1200
HL 1424	HL 1942	HL 1947	HL 1984	HL 2009	HL 2400	HL 2432	

Full description is given in Appendix A.

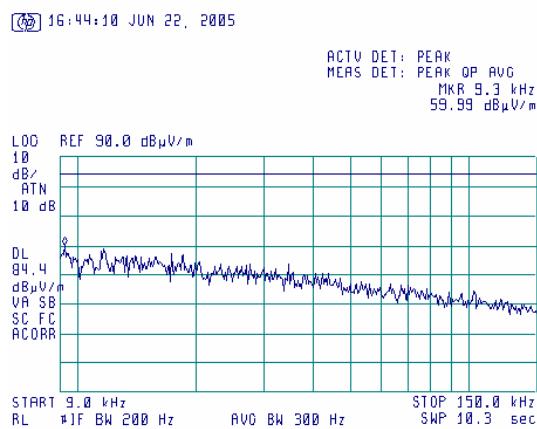


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<b>Test specification:</b>	<b>Section 27.53d, Radiated spurious emissions</b>		
<b>Test procedure:</b>	47 CFR, Section 2.1053, TIA/EIA-603-A, Section 2.2.12		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	PASS
<b>Date:</b>	06/22/2005		
<b>Temperature:</b> 24 °C	<b>Air Pressure:</b> 1008 hPa	<b>Relative Humidity:</b> 36 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

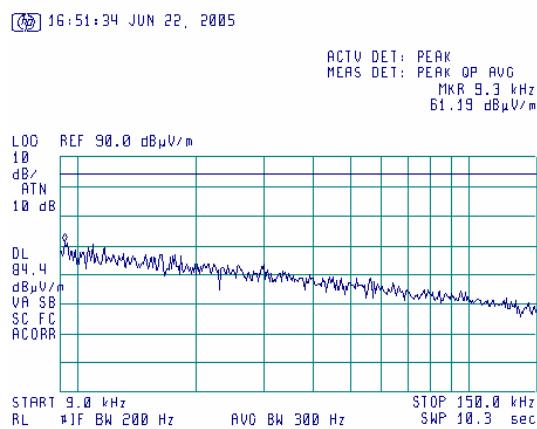
#### Plot 7.4.1 Radiated emission measurements in 9 - 150 kHz range

TEST SITE: Semi anechoic chamber  
 CARRIER FREQUENCY: Low  
 ANTENNA POLARIZATION: Vertical  
 TEST DISTANCE: 3 m



#### Plot 7.4.2 Radiated emission measurements in 9 - 150 kHz range

TEST SITE: Semi anechoic chamber  
 CARRIER FREQUENCY: Mid  
 ANTENNA POLARIZATION: Vertical  
 TEST DISTANCE: 3 m





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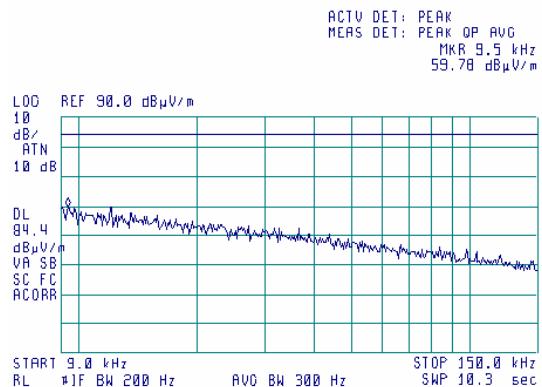
Report ID: VYYRAD\_FCC.16544\_CR.doc  
Date of Issue: August 2005

<b>Test specification:</b>	<b>Section 27.53d, Radiated spurious emissions</b>		
<b>Test procedure:</b>	47 CFR, Section 2.1053, TIA/EIA-603-A, Section 2.2.12		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	PASS
<b>Date:</b>	06/22/2005		
<b>Temperature:</b> 24 °C	<b>Air Pressure:</b> 1008 hPa	<b>Relative Humidity:</b> 36 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

**Plot 7.4.3 Radiated emission measurements in 9 - 150 kHz range**

TEST SITE: Semi anechoic chamber  
CARRIER FREQUENCY: High  
ANTENNA POLARIZATION: Vertical  
TEST DISTANCE: 3 m

⌚ 16:59:17 JUN 22, 2005





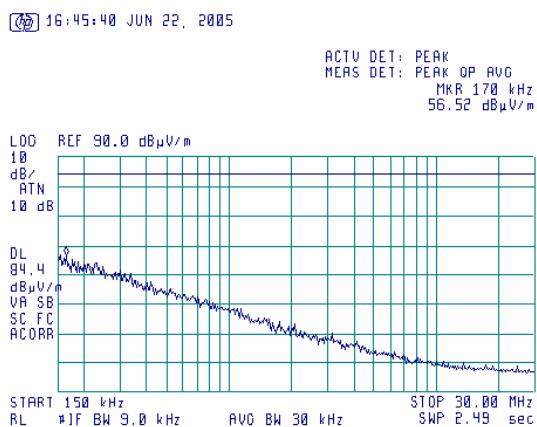
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Date of Issue: August 2005

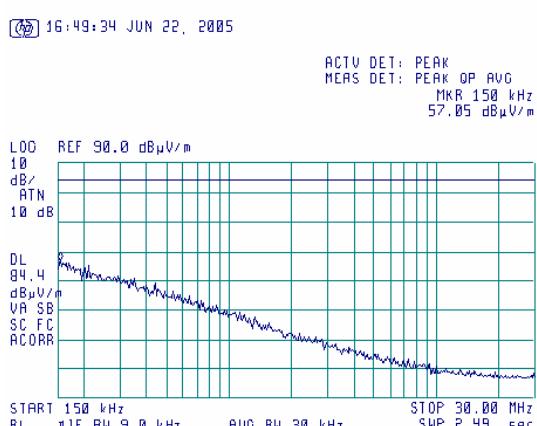
<b>Test specification:</b>	<b>Section 27.53d, Radiated spurious emissions</b>		
<b>Test procedure:</b>	47 CFR, Section 2.1053, TIA/EIA-603-A, Section 2.2.12		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	PASS
<b>Date:</b>	06/22/2005		
<b>Temperature:</b> 24 °C	<b>Air Pressure:</b> 1008 hPa	<b>Relative Humidity:</b> 36 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

**Plot 7.4.4 Radiated emission measurements in 0.15 - 30 MHz range**

TEST SITE: Semi anechoic chamber  
 CARRIER FREQUENCY: Low  
 ANTENNA POLARIZATION: Vertical  
 TEST DISTANCE: 3 m



TEST SITE: Semi anechoic chamber  
 CARRIER FREQUENCY: Mid  
 ANTENNA POLARIZATION: Vertical  
 TEST DISTANCE: 3 m





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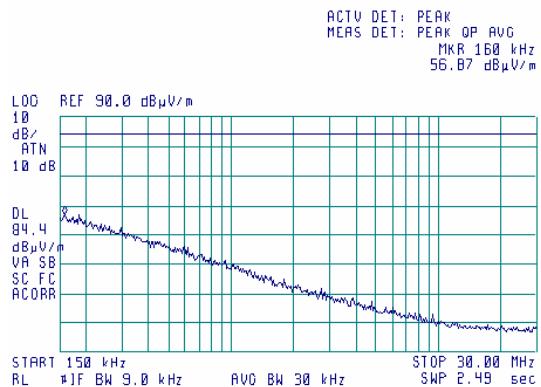
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Date of Issue: August 2005

<b>Test specification:</b>	<b>Section 27.53d, Radiated spurious emissions</b>		
<b>Test procedure:</b>	47 CFR, Section 2.1053, TIA/EIA-603-A, Section 2.2.12		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	PASS
<b>Date:</b>	06/22/2005		
<b>Temperature:</b> 24 °C	<b>Air Pressure:</b> 1008 hPa	<b>Relative Humidity:</b> 36 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

**Plot 7.4.6 Radiated emission measurements in 0.15 - 30 MHz range**

TEST SITE: Semi anechoic chamber  
CARRIER FREQUENCY: High  
ANTENNA POLARIZATION: Vertical  
TEST DISTANCE: 3 m

⌚ 17:09:06 JUN 22, 2005



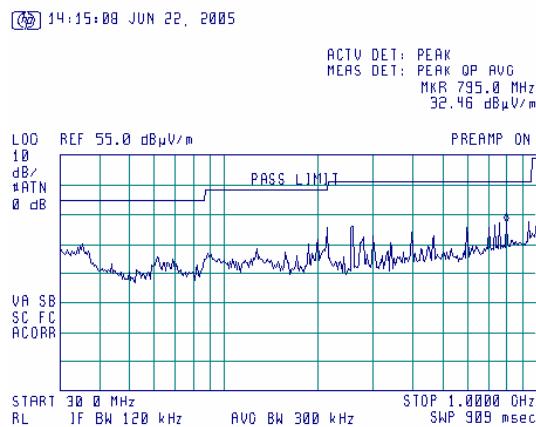


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<b>Test specification:</b>	<b>Section 27.53d, Radiated spurious emissions</b>		
<b>Test procedure:</b>	47 CFR, Section 2.1053, TIA/EIA-603-A, Section 2.2.12		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	PASS
<b>Date:</b>	06/22/2005		
<b>Temperature:</b> 24 °C	<b>Air Pressure:</b> 1008 hPa	<b>Relative Humidity:</b> 36 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

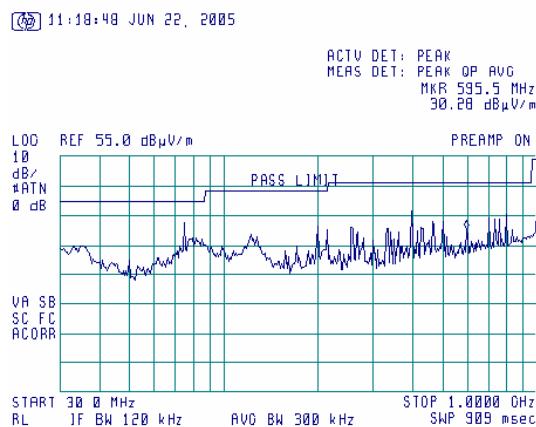
**Plot 7.4.7 Radiated emission measurements in 30 - 1000 MHz range**

TEST SITE: Semi anechoic chamber  
CARRIER FREQUENCY: Low  
ANTENNA POLARIZATION: Vertical and Horizontal  
TEST DISTANCE: 3 m



**Plot 7.4.8 Radiated emission measurements in 30 - 1000 MHz range**

TEST SITE: Semi anechoic chamber  
CARRIER FREQUENCY: Mid  
ANTENNA POLARIZATION: Vertical and Horizontal  
TEST DISTANCE: 3 m

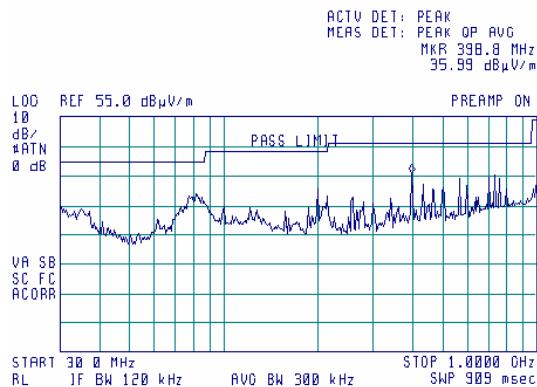


<b>Test specification:</b>	<b>Section 27.53d, Radiated spurious emissions</b>		
<b>Test procedure:</b>	47 CFR, Section 2.1053, TIA/EIA-603-A, Section 2.2.12		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	PASS
<b>Date:</b>	06/22/2005		
<b>Temperature:</b> 24 °C	<b>Air Pressure:</b> 1008 hPa	<b>Relative Humidity:</b> 36 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

**Plot 7.4.9 Radiated emission measurements in 30 - 1000 MHz range**

TEST SITE: Semi anechoic chamber  
 CARRIER FREQUENCY: High  
 ANTENNA POLARIZATION: Vertical and Horizontal  
 TEST DISTANCE: 3 m

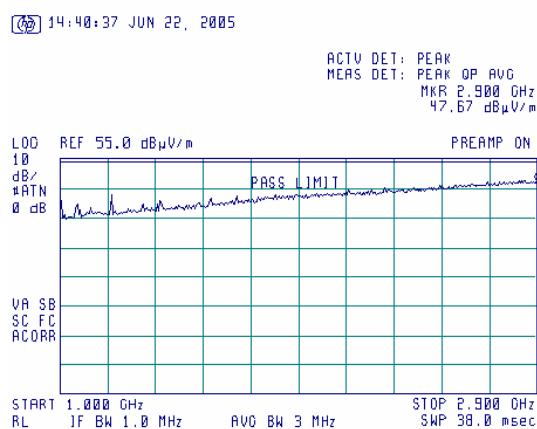
⌚ 14:22:09 JUN 22, 2005



<b>Test specification:</b>	<b>Section 27.53d, Radiated spurious emissions</b>		
<b>Test procedure:</b>	47 CFR, Section 2.1053, TIA/EIA-603-A, Section 2.2.12		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	PASS
<b>Date:</b>	06/22/2005		
<b>Temperature:</b> 24 °C	<b>Air Pressure:</b> 1008 hPa	<b>Relative Humidity:</b> 36 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

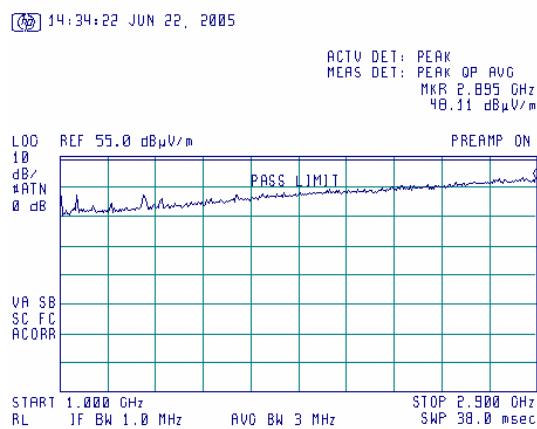
**Plot 7.4.10 Radiated emission measurements in 1 – 2.9 GHz range**

TEST SITE: Semi anechoic chamber  
 CARRIER FREQUENCY: Low  
 ANTENNA POLARIZATION: Vertical and Horizontal  
 TEST DISTANCE: 3 m



**Plot 7.4.11 Radiated emission measurements in 1 – 2.9 GHz range**

TEST SITE: Semi anechoic chamber  
 CARRIER FREQUENCY: Mid  
 ANTENNA POLARIZATION: Vertical and Horizontal  
 TEST DISTANCE: 3 m

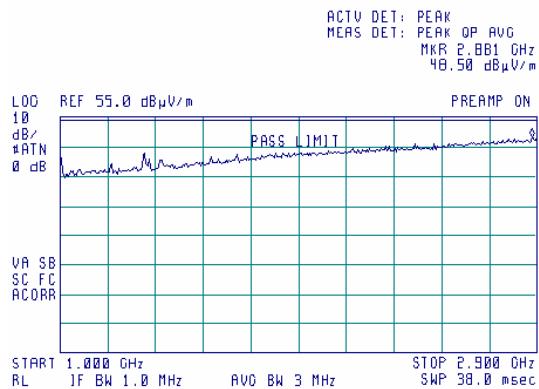


<b>Test specification:</b>	<b>Section 27.53d, Radiated spurious emissions</b>		
<b>Test procedure:</b>	47 CFR, Section 2.1053, TIA/EIA-603-A, Section 2.2.12		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	PASS
<b>Date:</b>	06/22/2005		
<b>Temperature:</b> 24 °C	<b>Air Pressure:</b> 1008 hPa	<b>Relative Humidity:</b> 36 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

**Plot 7.4.12 Radiated emission measurements in 1 – 2.9 GHz range**

TEST SITE: Semi anechoic chamber  
 CARRIER FREQUENCY: High  
 ANTENNA POLARIZATION: Vertical and Horizontal  
 TEST DISTANCE: 3 m

⌚ 14:26:54 JUN 22, 2005





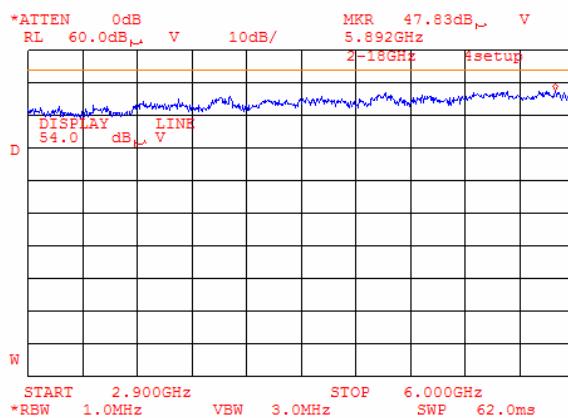
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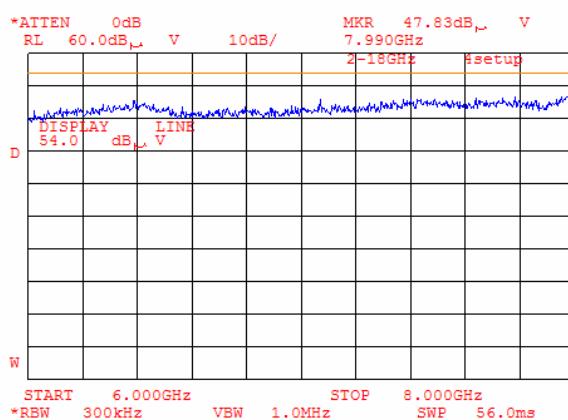
<b>Test specification:</b>	<b>Section 27.53d, Radiated spurious emissions</b>		
<b>Test procedure:</b>	47 CFR, Section 2.1053, TIA/EIA-603-A, Section 2.2.12		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	PASS
<b>Date:</b>	06/22/2005		
<b>Temperature:</b> 24 °C	<b>Air Pressure:</b> 1008 hPa	<b>Relative Humidity:</b> 36 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

**Plot 7.4.13 Radiated emission measurements in 2.9 – 6.0 GHz range**

TEST SITE: Anechoic chamber  
 CARRIER FREQUENCY: Low  
 ANTENNA POLARIZATION: Vertical and Horizontal  
 TEST DISTANCE: 3 m

**Plot 7.4.14 Radiated emission measurements in 6.0 – 8.0 GHz range**

TEST SITE: Anechoic chamber  
 CARRIER FREQUENCY: Low  
 ANTENNA POLARIZATION: Vertical and Horizontal  
 TEST DISTANCE: 3 m





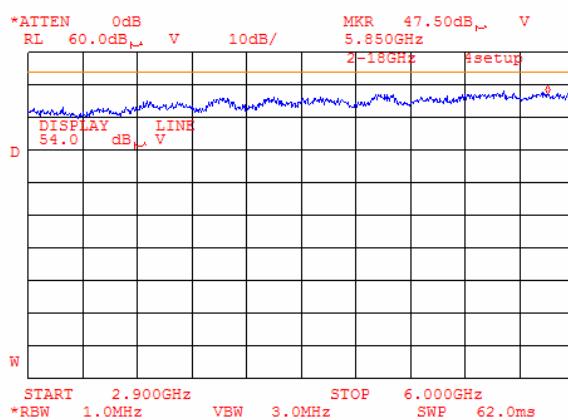
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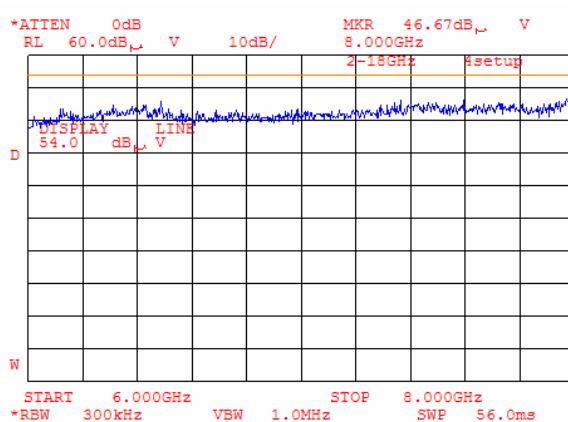
<b>Test specification:</b>	<b>Section 27.53d, Radiated spurious emissions</b>		
<b>Test procedure:</b>	47 CFR, Section 2.1053, TIA/EIA-603-A, Section 2.2.12		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	PASS
<b>Date:</b>	06/22/2005		
<b>Temperature:</b> 24 °C	<b>Air Pressure:</b> 1008 hPa	<b>Relative Humidity:</b> 36 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

**Plot 7.4.15 Radiated emission measurements in 2.9 – 6.0 GHz range**

TEST SITE: Anechoic chamber  
 CARRIER FREQUENCY: Mid  
 ANTENNA POLARIZATION: Vertical and Horizontal  
 TEST DISTANCE: 3 m

**Plot 7.4.16 Radiated emission measurements in 6.0 – 8.0 GHz range**

TEST SITE: Anechoic chamber  
 CARRIER FREQUENCY: Mid  
 ANTENNA POLARIZATION: Vertical and Horizontal  
 TEST DISTANCE: 3 m





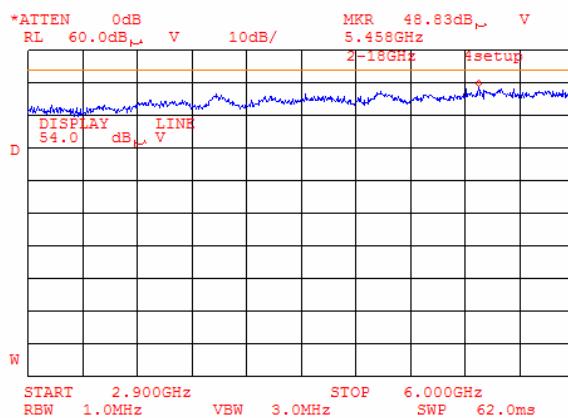
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Date of Issue: August 2005

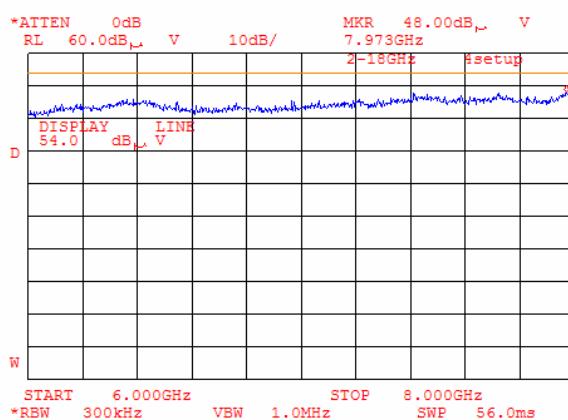
<b>Test specification:</b>	<b>Section 27.53d, Radiated spurious emissions</b>		
<b>Test procedure:</b>	47 CFR, Section 2.1053, TIA/EIA-603-A, Section 2.2.12		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	PASS
<b>Date:</b>	06/22/2005		
<b>Temperature:</b> 24 °C	<b>Air Pressure:</b> 1008 hPa	<b>Relative Humidity:</b> 36 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

**Plot 7.4.17 Radiated emission measurements in 2.9 – 6.0 GHz range**

TEST SITE: Anechoic chamber  
 CARRIER FREQUENCY: High  
 ANTENNA POLARIZATION: Vertical and Horizontal  
 TEST DISTANCE: 3 m

**Plot 7.4.18 Radiated emission measurements in 6.0 – 8.0 GHz range**

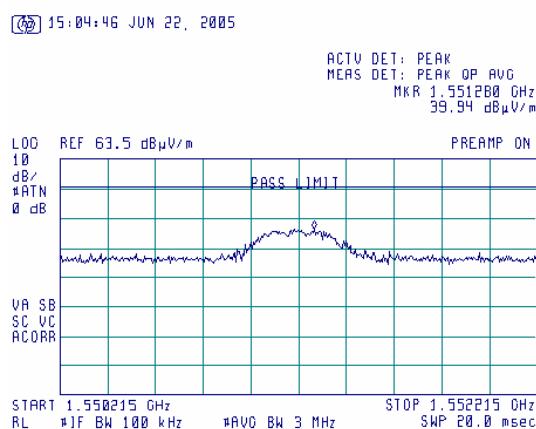
TEST SITE: Anechoic chamber  
 CARRIER FREQUENCY: High  
 ANTENNA POLARIZATION: Vertical and Horizontal  
 TEST DISTANCE: 3 m



<b>Test specification:</b>	<b>Section 27.53d, Radiated spurious emissions</b>		
<b>Test procedure:</b>	47 CFR, Section 2.1053, TIA/EIA-603-A, Section 2.2.12		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	PASS
<b>Date:</b>	06/22/2005		
<b>Temperature:</b> 24 °C	<b>Air Pressure:</b> 1008 hPa	<b>Relative Humidity:</b> 36 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

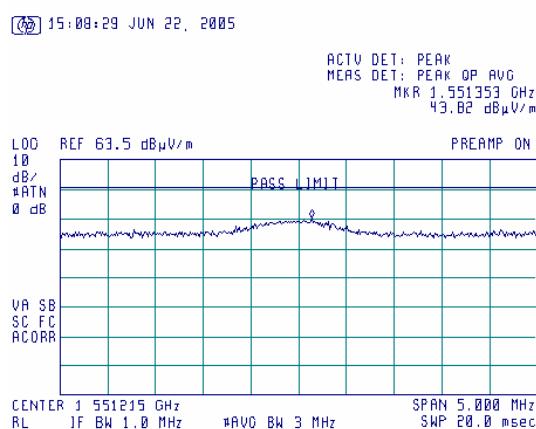
**Plot 7.4.19 Radiated emission measurements at the 2<sup>nd</sup> harmonic of low channel**

TEST SITE: Semi anechoic chamber  
 CARRIER FREQUENCY: 776.1 MHz  
 ANTENNA POLARIZATION: Vertical and Horizontal  
 TEST DISTANCE: 3 m



**Plot 7.4.20 Radiated emission measurements at the 2<sup>nd</sup> harmonic of low channel**

TEST SITE: Semi anechoic chamber  
 CARRIER FREQUENCY: 776.1 MHz  
 ANTENNA POLARIZATION: Vertical and Horizontal  
 TEST DISTANCE: 3 m



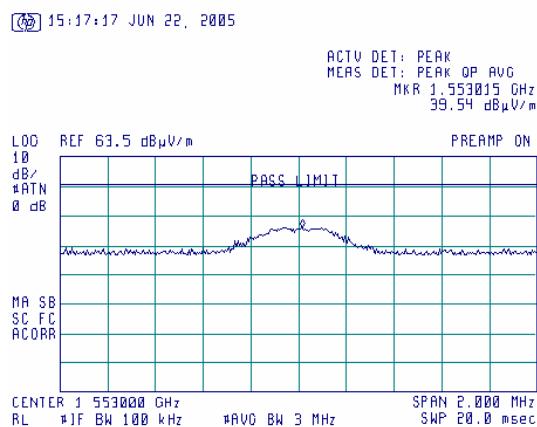


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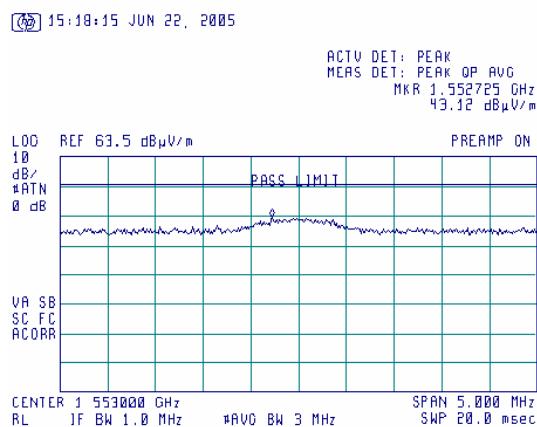
<b>Test specification:</b>	<b>Section 27.53d, Radiated spurious emissions</b>		
<b>Test procedure:</b>	47 CFR, Section 2.1053, TIA/EIA-603-A, Section 2.2.12		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	PASS
<b>Date:</b>	06/22/2005		
<b>Temperature:</b> 24 °C	<b>Air Pressure:</b> 1008 hPa	<b>Relative Humidity:</b> 36 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

**Plot 7.4.21 Radiated emission measurements at the 2<sup>nd</sup> harmonic of mid channel**

TEST SITE: Semi anechoic chamber  
 CARRIER FREQUENCY: 776.5 MHz  
 ANTENNA POLARIZATION: Vertical and Horizontal  
 TEST DISTANCE: 3 m

**Plot 7.4.22 Radiated emission measurements at the 2<sup>nd</sup> harmonic of mid channel**

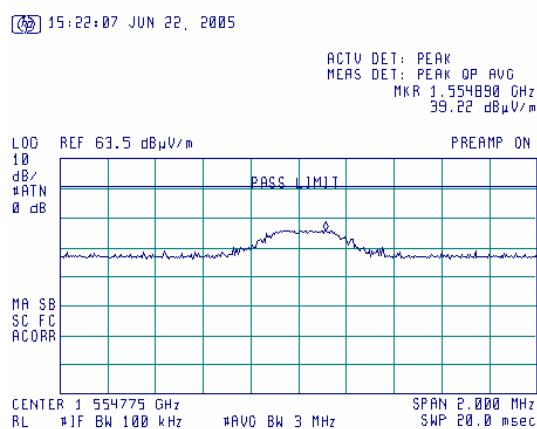
TEST SITE: Semi anechoic chamber  
 CARRIER FREQUENCY: 776.5 MHz  
 ANTENNA POLARIZATION: Vertical and Horizontal  
 TEST DISTANCE: 3 m



<b>Test specification:</b>	<b>Section 27.53d, Radiated spurious emissions</b>		
<b>Test procedure:</b>	47 CFR, Section 2.1053, TIA/EIA-603-A, Section 2.2.12		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	PASS
<b>Date:</b>	06/22/2005		
<b>Temperature:</b> 24 °C	<b>Air Pressure:</b> 1008 hPa	<b>Relative Humidity:</b> 36 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

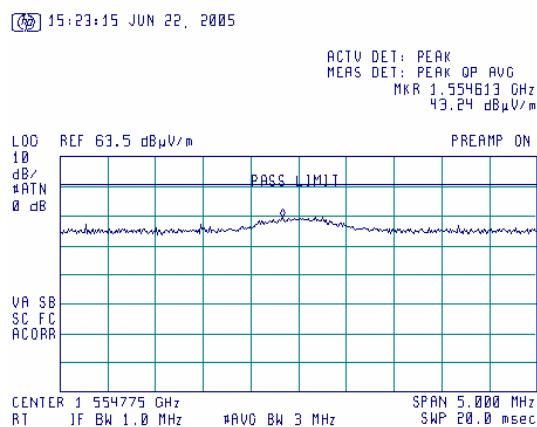
**Plot 7.4.23 Radiated emission measurements at the 2<sup>nd</sup> harmonic of high channel**

TEST SITE: Semi anechoic chamber  
 CARRIER FREQUENCY: 776.9 MHz  
 ANTENNA POLARIZATION: Vertical and Horizontal  
 TEST DISTANCE: 3 m



**Plot 7.4.24 Radiated emission measurements at the 2<sup>nd</sup> harmonic of high channel**

TEST SITE: Semi anechoic chamber  
 CARRIER FREQUENCY: 776.9 MHz  
 ANTENNA POLARIZATION: Vertical and Horizontal  
 TEST DISTANCE: 3 m



<b>Test specification:</b>	<b>Section 27.54, Frequency stability</b>		
<b>Test procedure:</b>	47 CFR, Section 2.1055, TIA/EIA-603-A, Section 2.2.2		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	PASS
<b>Date:</b>	06/26/2005		
<b>Temperature:</b> 24 °C	<b>Air Pressure:</b> 1010 hPa	<b>Relative Humidity:</b> 42 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

## 7.5 Frequency stability test

### 7.5.1 General

This test was performed to measure frequency stability of transmitter RF carrier. Specification test limits are given in Table 7.5.1. The test results are provided in Tables 7.5.2, 7.5.3 and shown in the associated plots.

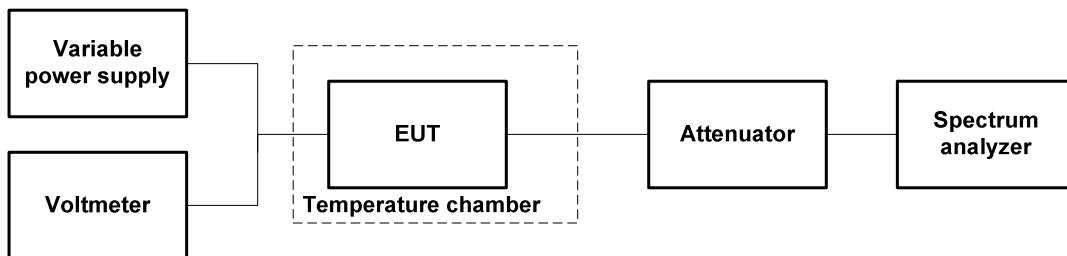
Table 7.5.1 Frequency stability limits

Assigned frequency, MHz	Maximum allowed frequency displacement
710.0 – 716.0	26 dBc points including frequency tolerance shall remain within the assigned band

### 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 EUT power was turned off. Temperature within test chamber was set to +30°C and a period of time sufficient to stabilize all of the oscillator circuit components was allowed.
- 7.5.2.3 The EUT was powered on and carrier frequency was measured at start up moment and then every minute until frequency had been stabilized or 10 minutes elapsed whichever reached the last. The EUT was powered off.
- 7.5.2.4 The above procedure was repeated at 0°C and at the lowest test temperature.
- 7.5.2.5 The EUT was powered on and carrier frequency was measured at start up moment and at the end of stabilization period at the rest of test temperatures and voltages. The EUT was powered off.
- 7.5.2.6 Frequency displacement was calculated as provided in Tables 7.5.2 and 7.5.3.

Figure 7.5.1 Frequency stability test setup



<b>Test specification:</b>	<b>Section 27.54, Frequency stability</b>		
<b>Test procedure:</b>	47 CFR, Section 2.1055, TIA/EIA-603-A, Section 2.2.2		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	PASS
<b>Date:</b>	06/26/2005		
<b>Temperature:</b> 24 °C	<b>Air Pressure:</b> 1010 hPa	<b>Relative Humidity:</b> 42 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

Table 7.5.2 Frequency stability test results

ASSIGNED FREQUENCY RANGE: 776.0–777.0 MHz  
 NOMINAL POWER VOLTAGE: 120 VAC (102 VAC - 138 VAC)  
 TEMPERATURE STABILIZATION PERIOD: 20 min  
 POWER DURING TEMPERATURE TRANSITION: Off  
 RESOLUTION BANDWIDTH: 100 Hz  
 VIDEO BANDWIDTH: 100 Hz  
 FREQUENCY SPAN: 10.0 kHz  
 SPECTRUM ANALYZER MODE: Counter  
 MODULATION: Unmodulated

T, °C	Voltage, V	Frequency, MHz							Max frequency drift, Hz	
		Start up	1 <sup>st</sup> min	2 <sup>nd</sup> min	3 <sup>rd</sup> min	4 <sup>th</sup> min	5 <sup>th</sup> min	10 <sup>th</sup> min	Positive	Negative
<b>Low frequency 776.1 MHz</b>										
-30	nominal	776.099342	776.099355	776.099356	776.099336	776.099356	776.099354	776.099359	802	0
-20	nominal	776.099502	NA	NA	NA	NA	NA	776.099572	1015	0
-10	nominal	776.099718	NA	NA	NA	NA	NA	776.099891	1334	0
0	nominal	776.099877	776.099850	776.099841	776.099829	776.099821	776.099816	776.099790	1320	0
10	nominal	776.099402	NA	NA	NA	NA	NA	776.099214	845	0
20	15%	776.098689	NA	NA	NA	NA	NA	776.098487	132	-70
20	nominal	776.098700	NA	NA	NA	NA	NA	776.098557*	143	NA
20	-15%	776.098506	NA	NA	NA	NA	NA	776.098490	0	-67
30	nominal	776.099469	776.099115	776.098873	776.098651	776.098541	776.098467	776.098455	912	-102
40	nominal	776.098856	NA	NA	NA	NA	NA	776.098926	369	0
50	nominal	776.099041	NA	NA	NA	NA	NA	776.099118	561	0
<b>High frequency 776.9 MHz</b>										
-30	nominal	776.899366	776.899363	776.899364	776.899364	776.899365	776.899365	776.899365	804	0
-20	nominal	776.899387	NA	NA	NA	NA	NA	776.899541	979	0
-10	nominal	776.899859	NA	NA	NA	NA	NA	776.899913	1351	0
0	nominal	776.899800	776.899898	776.899902	776.899896	776.899886	776.899876	776.899834	1340	0
10	nominal	776.899837	NA	NA	NA	NA	NA	776.899373	1275	0
20	15%	776.898578	NA	NA	NA	NA	NA	776.898367	16	-195
20	nominal	776.898550	NA	NA	NA	NA	NA	776.898562*	NA	-12
20	-15%	776.899812	NA	NA	NA	NA	NA	776.898696	1250	0
30	nominal	776.898454	776.898467	776.898489	776.898506	776.898518	776.898529	776.898577	15	-108
40	nominal	776.898406	NA	NA	NA	NA	NA	776.898847	285	-156
50	nominal	776.898799	NA	NA	NA	NA	NA	776.899077	515	0

\* - Reference frequency

<b>Test specification:</b>	<b>Section 27.54, Frequency stability</b>		
<b>Test procedure:</b>	47 CFR, Section 2.1055, TIA/EIA-603-A, Section 2.2.2		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	PASS
<b>Date:</b>	06/26/2005		
<b>Temperature:</b> 24 °C	<b>Air Pressure:</b> 1010 hPa	<b>Relative Humidity:</b> 42 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

Table 7.5.3 Transmitter operating range including frequency drift

Assigned frequency band, MHz	Measured 26 dBc point, MHz	Frequency drift, Hz		26 dBc point including frequency tolerance, MHz	Verdict
		Positive	Negative		
776.0 – 777.0	776.00500 – 776.99500	1351	195	776.004805 – 776.996351	Pass

**Reference numbers of test equipment used**

HL 0278	HL 0493	HL 1097	HL 1204	HL 1653		
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Full description is given in Appendix A.

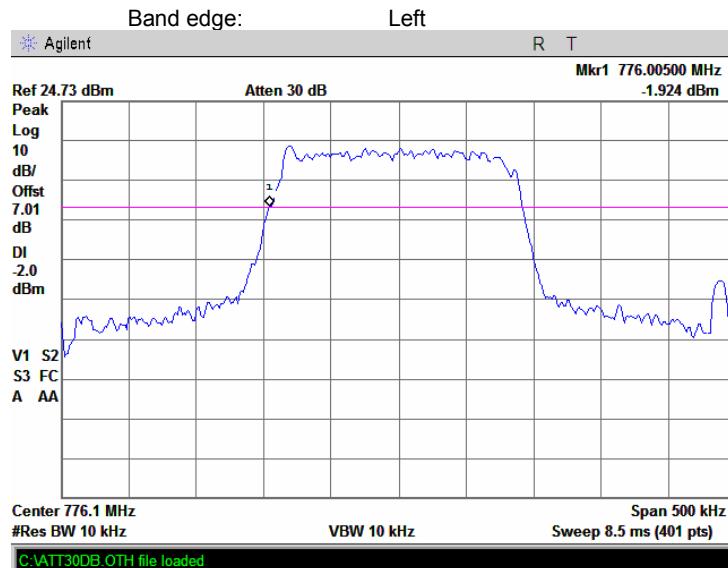


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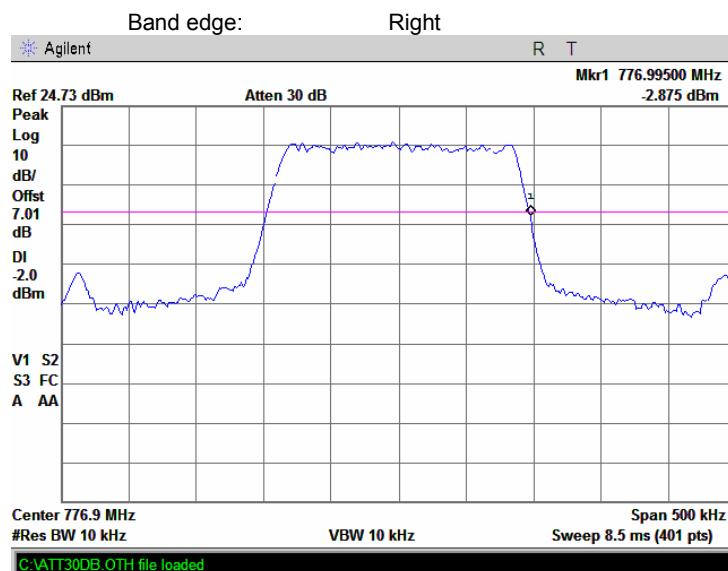
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<b>Test specification:</b>	<b>Section 27.54, Frequency stability</b>		
<b>Test procedure:</b>	47 CFR, Section 2.1055, TIA/EIA-603-A, Section 2.2.2		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	PASS
<b>Date:</b>	06/26/2005		
<b>Temperature:</b> 24 °C	<b>Air Pressure:</b> 1010 hPa	<b>Relative Humidity:</b> 42 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

**Plot 7.5.1 Band edge emission at low frequency**



**Plot 7.5.2 Band edge emission at high frequency**



<b>Test specification:</b>	<b>Section 2.1049, Occupied bandwidth</b>		
<b>Test procedure:</b>	47 CFR, Section 2.1049		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	PASS
<b>Date:</b>	06/27/2005		
<b>Temperature:</b> 24 °C	<b>Air Pressure:</b> 1010 hPa	<b>Relative Humidity:</b> 46 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

## 7.6 Occupied bandwidth test

### 7.6.1 General

This test was performed to measure transmitter occupied bandwidth. Specification test limits are given in Table 7.6.1.

Table 7.6.1 Occupied bandwidth limits

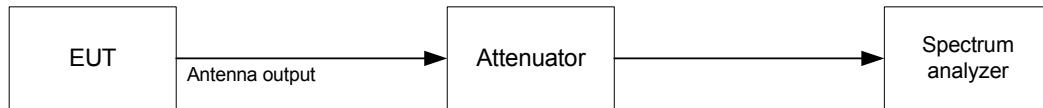
Assigned frequency, MHz	Modulation envelope reference points*, dBc
776.0 – 777.0	26

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

### 7.6.2 Test procedure

- 7.6.2.1 The EUT was set up as shown in Figure 7.6.1, energized and its proper operation was checked.
- 7.6.2.2 The EUT was set to transmit unmodulated carrier and reference peak power level was measured.
- 7.6.2.3 The EUT was set to transmit modulated carrier.
- 7.6.2.4 The transmitter occupied bandwidth was measured with spectrum analyzer as frequency delta between reference points on modulation envelope and provided in Table 7.6.2 and associated plots.

Figure 7.6.1 Occupied bandwidth test setup



<b>Test specification:</b>	<b>Section 2.1049, Occupied bandwidth</b>		
<b>Test procedure:</b>	47 CFR, Section 2.1049		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	PASS
<b>Date:</b>	06/27/2005		
<b>Temperature:</b> 24 °C	<b>Air Pressure:</b> 1010 hPa	<b>Relative Humidity:</b> 46 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

**Table 7.6.2 Occupied bandwidth test results**

DETECTOR USED: Peak hold  
 RESOLUTION BANDWIDTH: 30 kHz  
 VIDEO BANDWIDTH: 100 kHz  
 MODULATION ENVELOPE REFERENCE POINTS: 26 dBc  
 MODULATING SIGNAL: PRBS

Carrier frequency, MHz	Occupied bandwidth, kHz
<b>Modulation: QPSK</b>	
776.1	255
776.5	248
776.9	247
<b>Modulation: 16QAM</b>	
776.1	260
776.5	250
776.9	253

**Reference numbers of test equipment used**

HL 1424	HL 1650	HL 2414	HL 2524			
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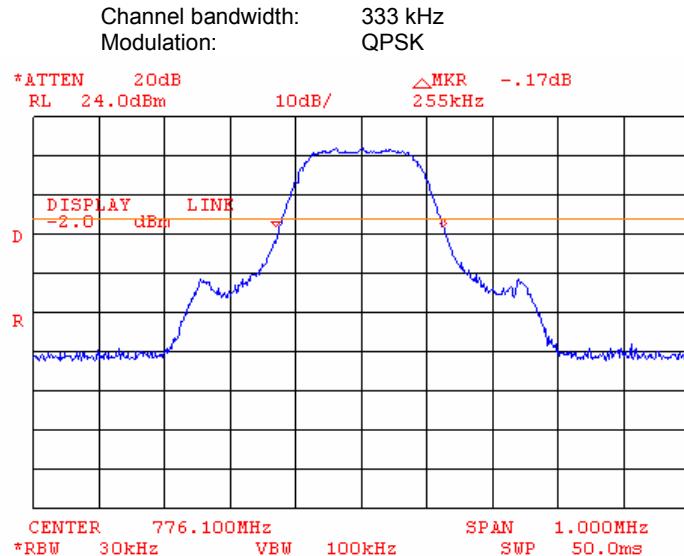
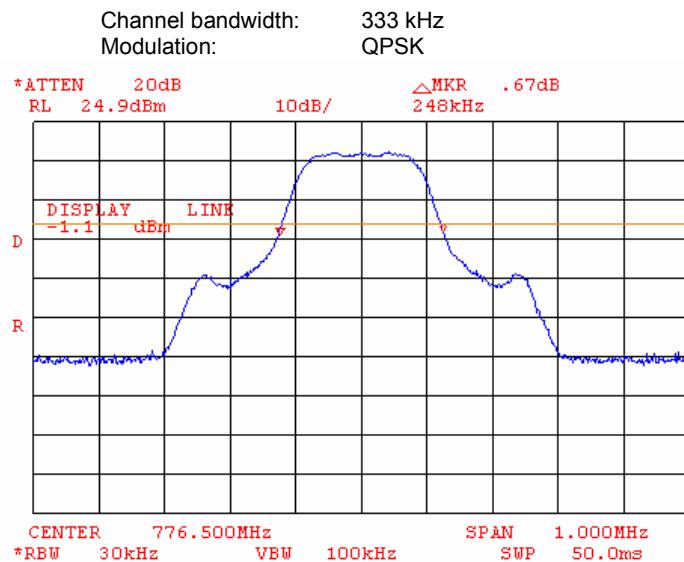
Full description is given in Appendix A.



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<b>Test specification:</b>	<b>Section 2.1049, Occupied bandwidth</b>		
<b>Test procedure:</b>	47 CFR, Section 2.1049		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	PASS
<b>Date:</b>	06/27/2005		
<b>Temperature:</b> 24 °C	<b>Air Pressure:</b> 1010 hPa	<b>Relative Humidity:</b> 46 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

**Plot 7.6.1 Occupied bandwidth test results at low frequency****Plot 7.6.2 Occupied bandwidth test results at mid frequency**

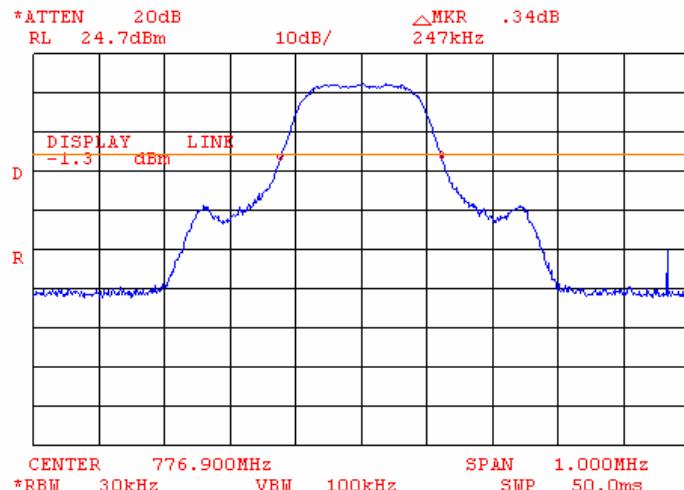


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<b>Test specification:</b>	<b>Section 2.1049, Occupied bandwidth</b>		
<b>Test procedure:</b>	47 CFR, Section 2.1049		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	PASS
<b>Date:</b>	06/27/2005		
<b>Temperature:</b> 24 °C	<b>Air Pressure:</b> 1010 hPa	<b>Relative Humidity:</b> 46 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

### Plot 7.6.3 Occupied bandwidth test results at high frequency

Channel bandwidth: 333 kHz  
Modulation: QPSK

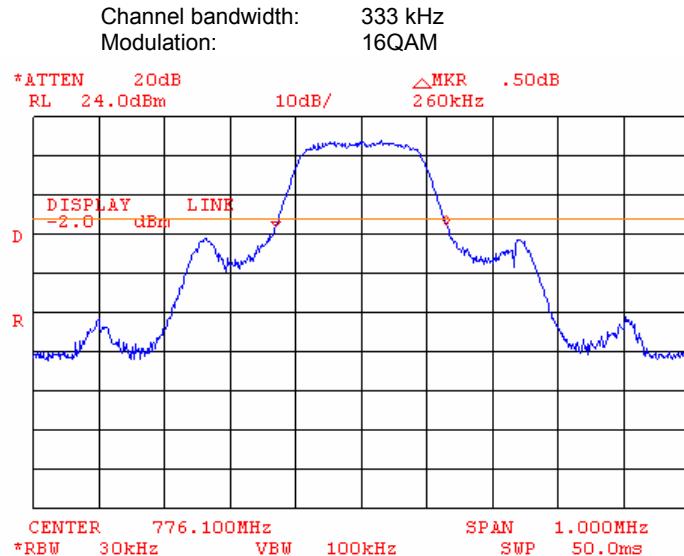
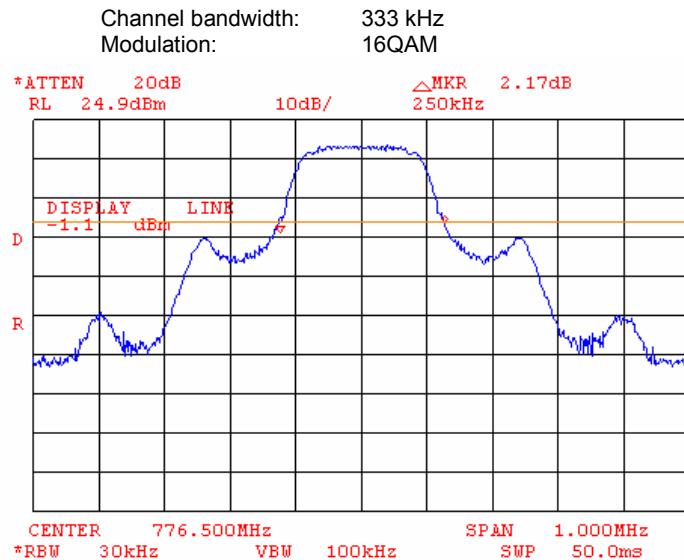




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<b>Test specification:</b>	<b>Section 2.1049, Occupied bandwidth</b>		
<b>Test procedure:</b>	47 CFR, Section 2.1049		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	PASS
<b>Date:</b>	06/27/2005		
<b>Temperature:</b> 24 °C	<b>Air Pressure:</b> 1010 hPa	<b>Relative Humidity:</b> 46 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

**Plot 7.6.4 Occupied bandwidth test results at low frequency****Plot 7.6.5 Occupied bandwidth test results at mid frequency**

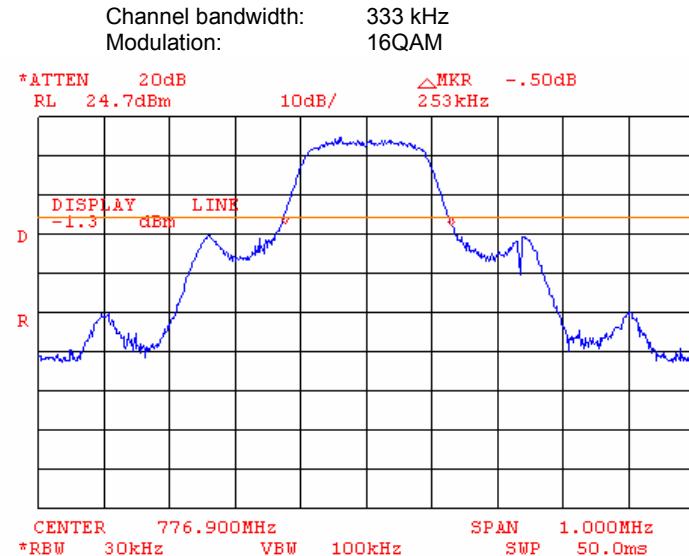


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Report ID: VYYRAD\_FCC.16544\_CR.doc  
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<b>Test specification:</b>	<b>Section 2.1049, Occupied bandwidth</b>		
<b>Test procedure:</b>	47 CFR, Section 2.1049		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	PASS
<b>Date:</b>	06/27/2005		
<b>Temperature:</b> 24 °C	<b>Air Pressure:</b> 1010 hPa	<b>Relative Humidity:</b> 46 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

**Plot 7.6.6 Occupied bandwidth test results at high frequency**



<b>Test specification:</b>	<b>Section 15.107, Conducted emission at AC power port, Class B</b>		
<b>Test procedure:</b>	ANSI C63.4, Sections 11.5 and 12.1.3		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	<b>PASS</b>
<b>Date:</b>	06/28/2005		
<b>Temperature:</b> 25 °C	<b>Air Pressure:</b> 1010 hPa	<b>Relative Humidity:</b> 43 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

## 8 Emissions 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. The specification test limits are given in Table 8.1.1. The worst test results with respect to the limits were recorded in Table 8.1.2 and shown in the associated plots.

**Table 8.1.1 Limits for conducted emissions**

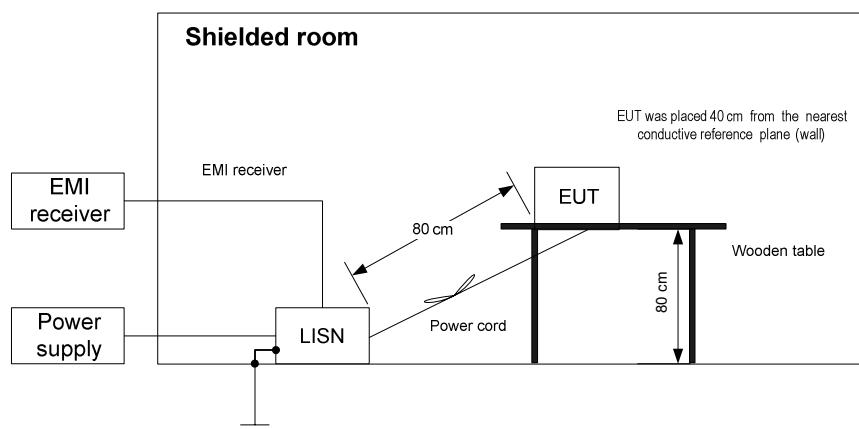
Frequency, MHz	Class B limit, dB( $\mu$ V)	
	QP	AVRG
0.15 - 0.5	66 - 56*	56 - 46*
0.5 - 5.0	56	46
5.0 - 30	60	50

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

### 8.1.2 Test procedure

- 8.1.2.1 The EUT was set up as shown in Figure 8.1.1, energized and the EUT performance was checked.
- 8.1.2.2 The measurements were performed at the EUT power terminals with the LISN, connected to the EMI receiver in the frequency range referred to in Table 8.1.2. The 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.

**Figure 8.1.1 Setup for conducted emission measurements at the mains power port, table-top EUT**



<b>Test specification:</b>	<b>Section 15.107, Conducted emission at AC power port, Class B</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:</b>	06/28/2005		
<b>Temperature:</b> 25 °C	<b>Air Pressure:</b> 1010 hPa	<b>Relative Humidity:</b> 43 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

**Table 8.1.2 Conducted emission test results**

LINE: AC mains  
 EUT OPERATING MODE: Receive / Standby  
 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*		
0.176165	49.03	47.50	64.72	-17.22	39.21	54.72	-15.51	L1	Pass
0.503043	43.56	41.77	56.00	-14.23	25.47	46.00	-20.53		
0.616824	44.55	43.61	56.00	-12.39	34.51	46.00	-11.49		
1.329846	43.81	40.84	56.00	-15.16	23.97	46.00	-22.03		
2.647810	44.81	42.42	56.00	-13.58	26.30	46.00	-19.70		
20.480178	52.93	51.45	60.00	-8.55	49.10	50.00	-0.90		
0.176435	48.88	46.99	64.71	-17.72	39.03	54.71	-15.68		
0.352985	44.18	43.35	58.95	-15.60	37.37	48.95	-11.58		
0.623475	43.33	42.63	56.00	-13.37	30.88	46.00	-15.12		
1.040424	43.90	42.19	56.00	-13.81	26.95	46.00	-19.05		
1.313686	44.20	42.69	56.00	-13.31	26.96	46.00	-19.04		
20.479665	43.89	42.50	60.00	-17.50	40.11	50.00	-9.89		

\*- Margin = Measured emission - specification limit.

**Reference numbers of test equipment used**

HL 0163	HL 0447	HL 1430	HL 1502	HL 1510		
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Full description is given in Appendix A.



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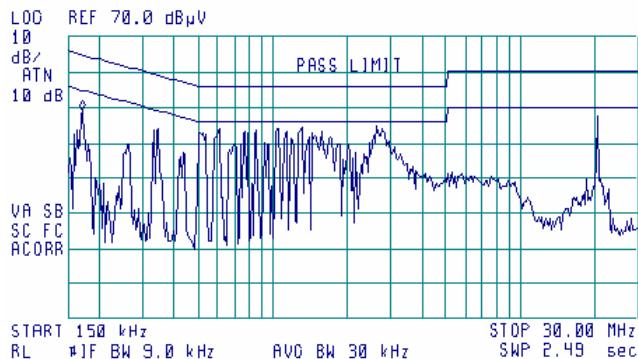
<b>Test specification:</b>	<b>Section 15.107, Conducted emission at AC power port, Class B</b>		
<b>Test procedure:</b>	ANSI C63.4, Sections 11.5 and 12.1.3		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	PASS
<b>Date:</b>	06/28/2005		
<b>Temperature:</b> 25 °C	<b>Air Pressure:</b> 1010 hPa	<b>Relative Humidity:</b> 43 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

### Plot 8.1.1 Conducted emission measurements

LINE: L1  
EUT OPERATING MODE: Receive / Standby  
LIMIT: QUASI-PEAK, AVERAGE  
DETECTOR: PEAK

 10:43:26 JUN 28, 2005

ACTV DET: PEAK  
MEAS DET: PEAK OP AVG  
MKR 170 kHz  
49.05 dB $\mu$ V

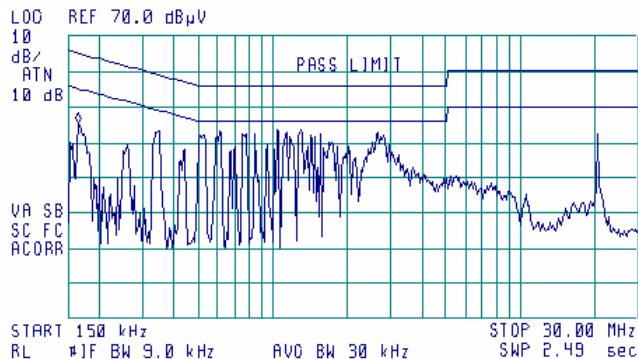


### Plot 8.1.2 Conducted emission measurements

LINE: L2  
EUT OPERATING MODE: Receive / Standby  
LIMIT: QUASI-PEAK, AVERAGE  
DETECTOR: PEAK

10:55:22 JUN 28, 2005

ACTV DET: PEAK  
MEAS DET: PEAK OP AVG  
MKR 170 kHz  
45.40 dB $\mu$ V



<b>Test specification:</b>	<b>Section 15.109, Radiated emission, Class B</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:</b>	6/28/2005		
<b>Temperature:</b> 25 °C	<b>Air Pressure:</b> 1010 hPa	<b>Relative Humidity:</b> 42 %	<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. The 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)	
	10 m distance	3 m distance
30 - 88	29.5*	40.0
88 - 216	33.0*	43.5
216 - 960	35.5*	46.0
Above 960	43.5*	54.0

\* The limit for test distance other than specified was calculated using the inverse linear distance extrapolation factor as follows:  $Lim_{S2} = Lim_{S1} + 20 \log (S_1/S_2)$ , where  $S_1$  and  $S_2$  – standard defined and test distance respectively in meters.

### 8.2.2 Test procedure

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

8.2.2.2 The measurements were performed in the anechoic chamber at 3 m test distance. The specified frequency range was investigated with the antenna connected to the EMI receiver. To find the highest emission the turntable was rotated 360° and the measuring antenna height was swept from 1 to 4 m in both, vertical and horizontal polarizations. The EUT cables position was varied to maximize emission.

8.2.2.3 The worst test results with respect to the limits were recorded in Table 8.2.2 and shown in the associated plots.

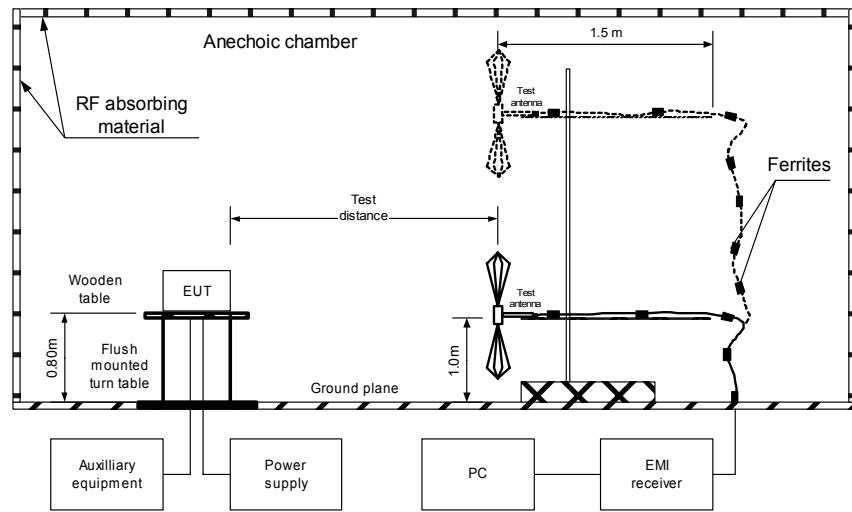


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<b>Test specification:</b>	<b>Section 15.109, Radiated emission, Class B</b>		
<b>Test procedure:</b>	ANSI C63.4, Sections 11.6 and 12.1.4		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	PASS
<b>Date:</b>	6/28/2005		
<b>Temperature:</b> 25 °C	<b>Air Pressure:</b> 1010 hPa	<b>Relative Humidity:</b> 42 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

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



<b>Test specification:</b>	<b>Section 15.109, Radiated emission, Class B</b>			
<b>Test procedure:</b>	ANSI C63.4, Sections 11.6 and 12.1.4			
<b>Test mode:</b>	Compliance			<b>Verdict:</b>
<b>Date:</b>	6/28/2005			<b>PASS</b>
<b>Temperature:</b> 25 °C	<b>Air Pressure:</b> 1010 hPa	<b>Relative Humidity:</b> 42 %		<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>				

Table 8.2.2 Radiated emission test results

EUT SET UP: TABLE-TOP  
 EUT OPERATING MODE: Receive / Standby  
 TEST SITE: SEMI 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*				
214.766000	34.21	24.53	30.00	-5.47	Vertical	2.0	68	Pass
400.504389	32.43	30.47	37.00	-6.53	Vertical	1.0	80	
599.250000	29.50	23.62	37.00	-13.38	Vertical	1.0	347	
699.675000	31.48	27.15	37.00	-9.85	Vertical	1.0	354	
750.000000	36.37	33.13	37.00	-3.87	Vertical	1.1	51	
800.987500	33.83	29.44	37.00	-7.56	Vertical	1.7	46	

DETECTORS USED: PEAK / AVERAGE  
 FREQUENCY RANGE: 1000 MHz – 5000 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*				
1202.000	41.10	33.60	54.00	-20.40	Vertical	1.2	62	Pass

\*- Margin = Measured emission - specification limit.

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

#### Reference numbers of test equipment used

HL 0784	HL 0816	HL 1365	HL 1425	HL 1430	HL 1552	HL 1553	HL 1566
HL 1567	HL 1941	HL 1947	HL 1984	HL 1984	HL 2697		

Full description is given in Appendix A.

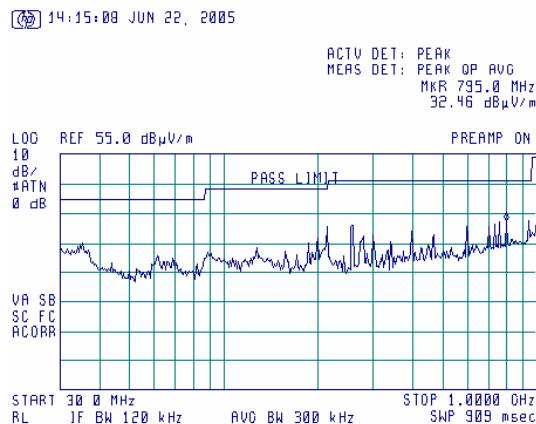


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<b>Test specification:</b>	<b>Section 15.109, Radiated emission, Class B</b>		
<b>Test procedure:</b>	ANSI C63.4, Sections 11.6 and 12.1.4		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	PASS
<b>Date:</b>	6/28/2005		
<b>Temperature:</b> 25 °C	<b>Air Pressure:</b> 1010 hPa	<b>Relative Humidity:</b> 42 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

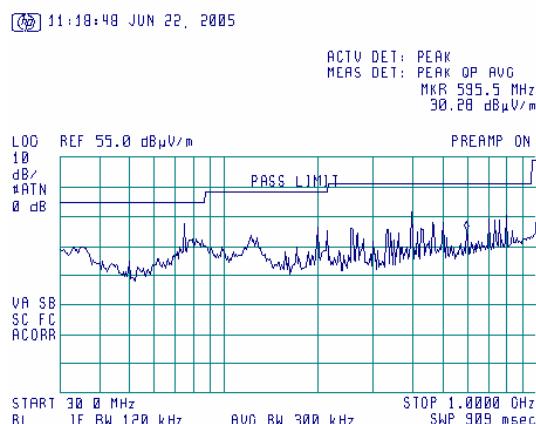
**Plot 8.2.1 Radiated emission measurements in 30- 1000 MHz range at low frequency channel, horizontal and vertical antenna polarization**

TEST SITE: Semi anechoic chamber  
TEST DISTANCE: 3 m  
EUT OPERATING MODE: Receive / Standby



**Plot 8.2.2 Radiated emission measurements in 30- 1000 MHz range at mid frequency channel, horizontal and vertical antenna polarization**

TEST SITE: Semi anechoic chamber  
TEST DISTANCE: 3 m  
EUT OPERATING MODE: Receive / Standby



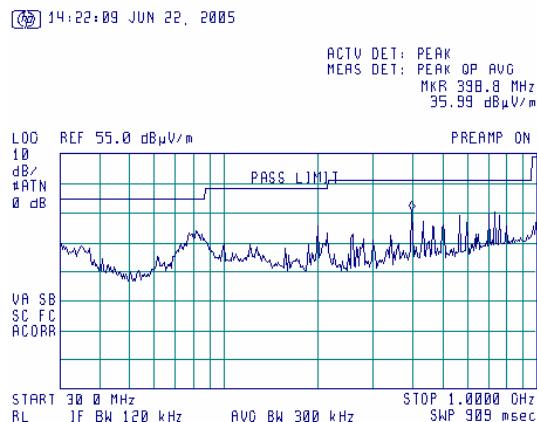


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<b>Test specification:</b>	<b>Section 15.109, Radiated emission, Class B</b>		
<b>Test procedure:</b>	ANSI C63.4, Sections 11.6 and 12.1.4		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	PASS
<b>Date:</b>	6/28/2005		
<b>Temperature:</b> 25 °C	<b>Air Pressure:</b> 1010 hPa	<b>Relative Humidity:</b> 42 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

**Plot 8.2.3 Radiated emission measurements in 30- 1000 MHz range at high frequency channel, horizontal and vertical antenna polarization**

TEST SITE: Semi anechoic chamber  
TEST DISTANCE: 3 m  
EUT OPERATING MODE: Receive / Standby



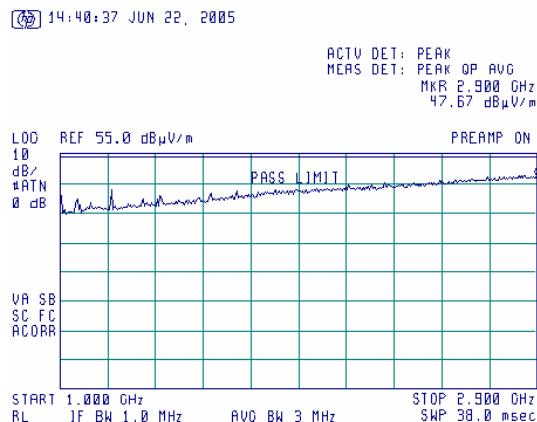


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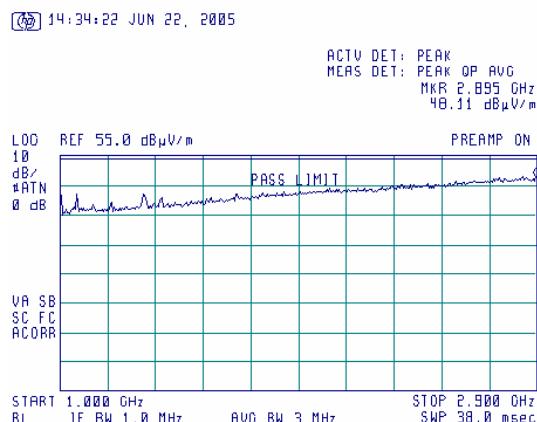
<b>Test specification:</b>	<b>Section 15.109, Radiated emission, Class B</b>		
<b>Test procedure:</b>	ANSI C63.4, Sections 11.6 and 12.1.4		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	PASS
<b>Date:</b>	6/28/2005		
<b>Temperature:</b> 25 °C	<b>Air Pressure:</b> 1010 hPa	<b>Relative Humidity:</b> 42 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

**Plot 8.2.4 Radiated emission measurements in 1.0 – 2.9 GHz range at low frequency channel, horizontal and vertical antenna polarization**

TEST SITE: Semi anechoic chamber  
 TEST DISTANCE: 3 m  
 EUT OPERATING MODE: Receive / Standby

**Plot 8.2.5 Radiated emission measurements in 1.0 – 2.9 GHz range at mid frequency channel, horizontal and vertical antenna polarization**

TEST SITE: Semi anechoic chamber  
 TEST DISTANCE: 3 m  
 EUT OPERATING MODE: Receive / Standby





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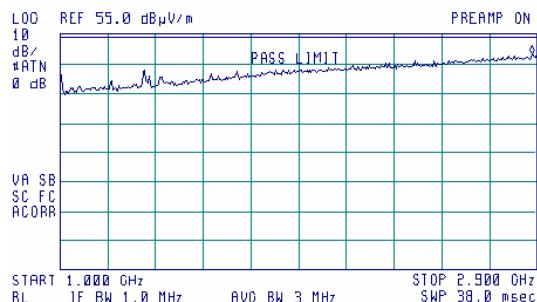
<b>Test specification:</b>	<b>Section 15.109, Radiated emission, Class B</b>		
<b>Test procedure:</b>	ANSI C63.4, Sections 11.6 and 12.1.4		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	PASS
<b>Date:</b>	6/28/2005		
<b>Temperature:</b> 25 °C	<b>Air Pressure:</b> 1010 hPa	<b>Relative Humidity:</b> 42 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

**Plot 8.2.6 Radiated emission measurements in 1.0 – 2.9 GHz range at high frequency channel, horizontal and vertical antenna polarization**

TEST SITE: Semi anechoic chamber  
TEST DISTANCE: 3 m  
EUT OPERATING MODE: Receive / Standby

⌚ 14:26:54 JUN 22, 2005

ACTV DET: PEAK  
MEAS DET: PEAK OP AVG  
MKR 2.881 GHz  
48.50 dB $\mu$ V/m





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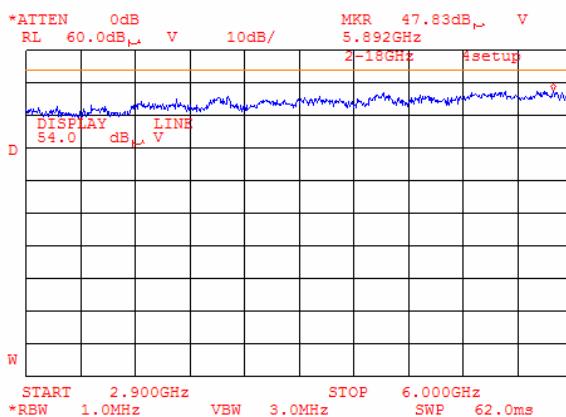
<b>Test specification:</b>	<b>Section 15.109, Radiated emission, Class B</b>		
<b>Test procedure:</b>	ANSI C63.4, Sections 11.6 and 12.1.4		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	PASS
<b>Date:</b>	6/28/2005		
<b>Temperature:</b> 25 °C	<b>Air Pressure:</b> 1010 hPa	<b>Relative Humidity:</b> 42 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

**Plot 8.2.7 Radiated emission measurements in 2.9 – 6.0GHz range at low frequency channel, horizontal and vertical antenna polarization**

TEST SITE: Semi anechoic chamber

TEST DISTANCE: 3 m

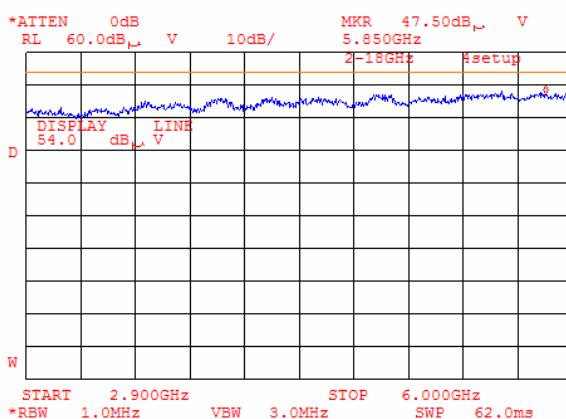
EUT OPERATING MODE: Receive / Standby

**Plot 8.2.8 Radiated emission measurements in 2.9 – 6.0GHz range at mid frequency channel, horizontal and vertical antenna polarization**

TEST SITE: Semi anechoic chamber

TEST DISTANCE: 3 m

EUT OPERATING MODE: Receive / Standby





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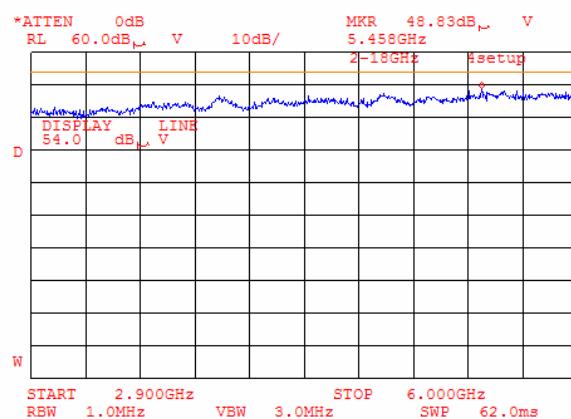
<b>Test specification:</b>	<b>Section 15.109, Radiated emission, Class B</b>		
<b>Test procedure:</b>	ANSI C63.4, Sections 11.6 and 12.1.4		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	PASS
<b>Date:</b>	6/28/2005		
<b>Temperature:</b> 25 °C	<b>Air Pressure:</b> 1010 hPa	<b>Relative Humidity:</b> 42 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

**Plot 8.2.9 Radiated emission measurements in 2.9 – 6.0GHz range at high frequency channel, horizontal and vertical antenna polarization**

TEST SITE: Semi anechoic chamber

TEST DISTANCE: 3 m

EUT OPERATING MODE: Receive / Standby



<b>Test specification:</b>	<b>Section 15.111, Conducted emission at receiver antenna port</b>		
<b>Test procedure:</b>	ANSI C63.4, Section 12.1.5		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	PASS
<b>Date:</b>	11/25/2004	<b>Relative Humidity:</b>	36 %
<b>Temperature:</b> 29 °C	<b>Air Pressure:</b> 1012 hPa	<b>Power Supply:</b> 120 VAC	
<b>Remarks:</b>			

### 8.3 Antenna power conducted measurements for receiver

#### 8.3.1 General

This test was performed to measure spurious emissions at RF antenna connector of receiver operated within 30 to 960 MHz band which was tested for compliance with radiated emission limits with the antenna port connected to resistive termination. The specification test limits are given in Table 8.3.1.

**Table 8.3.1 Spurious emission limits**

<b>Frequency, MHz</b>	<b>EUT type</b>	<b>Power of spurious</b>	
		<b>nW</b>	<b>dBm</b>
30 MHz – 2 <sup>nd</sup> harmonic*	Superheterodyne receiver	2.0	-57.0

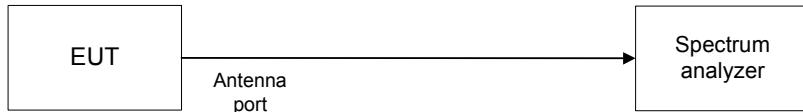
\* - harmonic of the local oscillator frequency.

#### 8.3.2 Test procedure

8.3.2.1 The EUT was set up as shown in Figure 8.3.1, energized and its proper operation was checked.

8.3.2.2 The spurious emission was measured with spectrum analyzer as provided in Table 8.3.2 and associated plots.

**Figure 8.3.1 Spurious emission test setup**



<b>Test specification:</b>	<b>Section 15.111, Conducted emission at receiver antenna port</b>		
<b>Test procedure:</b>	ANSI C63.4, Section 12.1.5		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	PASS
<b>Date:</b>	11/25/2004	<b>Relative Humidity:</b>	36 %
<b>Temperature:</b> 29 °C	<b>Air Pressure:</b> 1012 hPa	<b>Power Supply:</b> 120 VAC	
<b>Remarks:</b>			

**Table 8.3.2 Spurious emission test results**

INVESTIGATED FREQUENCY RANGE: 30 – 1500 MHz  
 RECEIVER TYPE: Superheterodyne  
 EUT OPERATING MODE: Receive  
 DETECTOR USED: Peak  
 RESOLUTION BANDWIDTH: 120 kHz  
 VIDEO BANDWIDTH: 300 kHz

Frequency, MHz	Spurious emission, dBm	Limit, dBm	Margin, dB	Verdict
<b>Low channel: 746.1 MHz</b>				
792.59	-86.09	-57.0	-29.09	Pass
1167.93	-75.25		-18.25	Pass
<b>Mid channel: 746.5 MHz</b>				
792.60	-83.91	-57.0	-26.91	Pass
1127.38	-74.03		-17.03	Pass
<b>High channel: 746.9 MHz</b>				
792.59	-85.92	-57.0	-28.92	Pass
1151.58	-74.99		-17.99	Pass

**Reference numbers of test equipment used**

HL 1653	HL 2458					
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Full description is given in Appendix A.

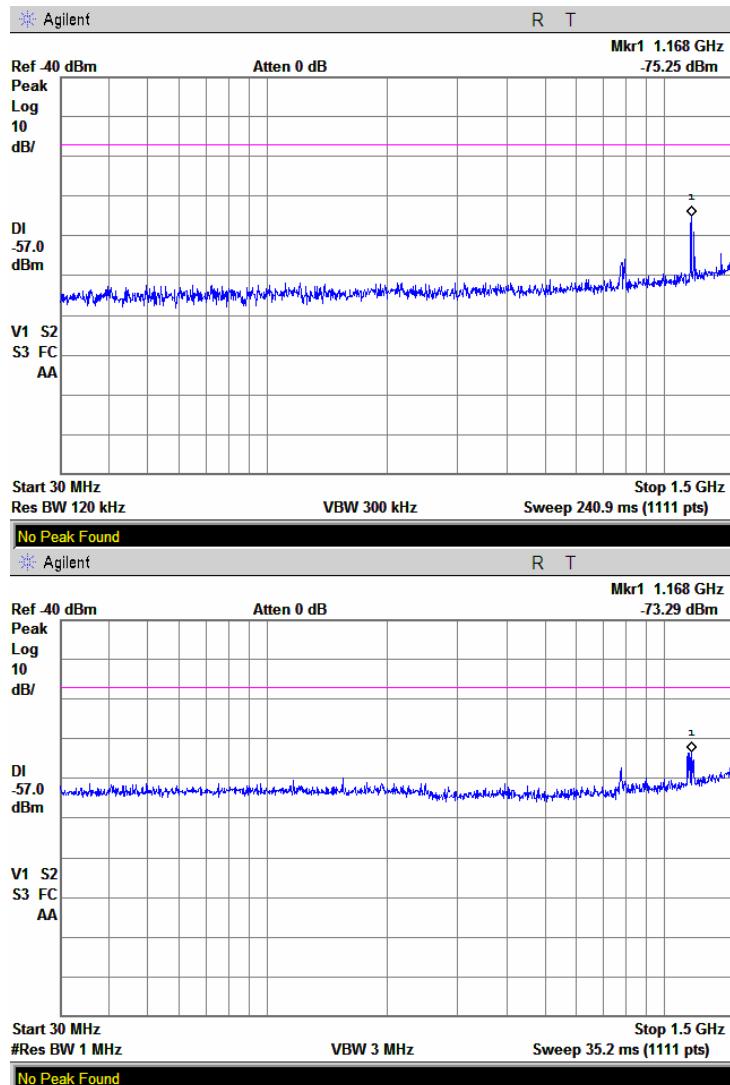


HERMON LABORATORIES

Report ID: VYYRAD\_FCC.16544\_CR.doc  
Date of Issue: August 2005

<b>Test specification:</b>	<b>Section 15.111, Conducted emission at receiver antenna port</b>		
<b>Test procedure:</b>	ANSI C63.4, Section 12.1.5		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	PASS
<b>Date:</b>	11/25/2004		
<b>Temperature:</b> 29 °C	<b>Air Pressure:</b> 1012 hPa	<b>Relative Humidity:</b> 36 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

**Plot 8.3.1 Spurious emission measurements at low channel**



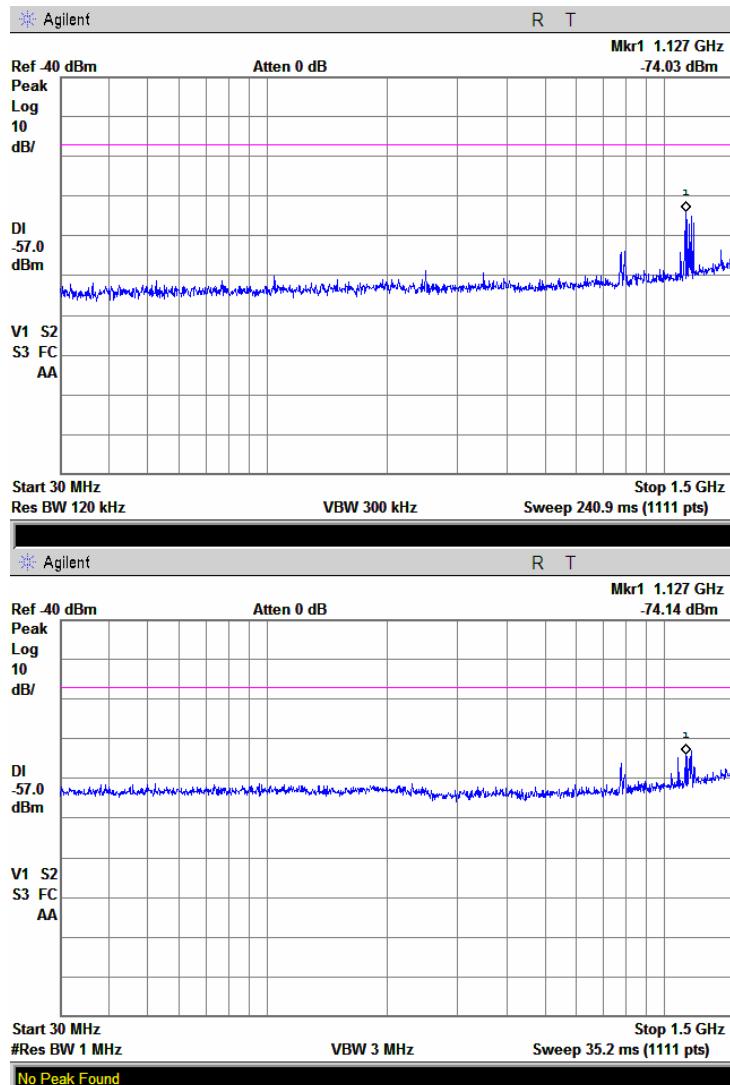


HERMON LABORATORIES

Report ID: VYYRAD\_FCC.16544\_CR.doc  
Date of Issue: August 2005

<b>Test specification:</b>	<b>Section 15.111, Conducted emission at receiver antenna port</b>		
<b>Test procedure:</b>	ANSI C63.4, Section 12.1.5		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	PASS
<b>Date:</b>	11/25/2004		
<b>Temperature:</b> 29 °C	<b>Air Pressure:</b> 1012 hPa	<b>Relative Humidity:</b> 36 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

**Plot 8.3.2 Spurious emission measurements at mid channel**

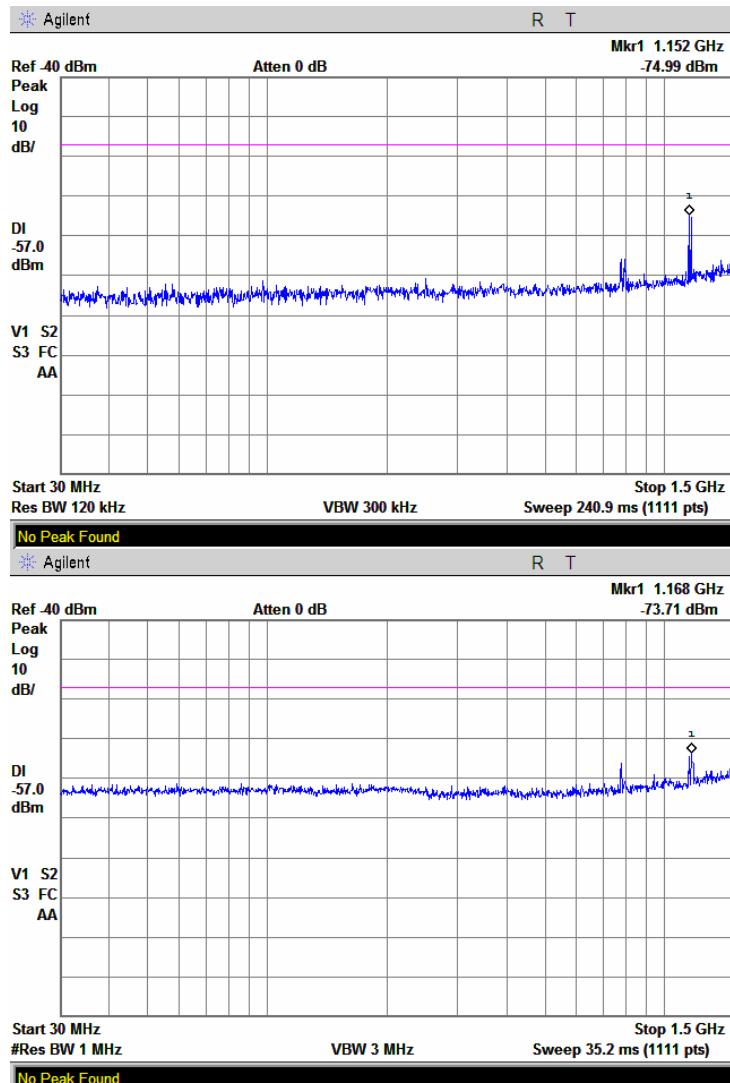




HERMON LABORATORIES

<b>Test specification:</b>	<b>Section 15.111, Conducted emission at receiver antenna port</b>		
<b>Test procedure:</b>	ANSI C63.4, Section 12.1.5		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	PASS
<b>Date:</b>	11/25/2004		
<b>Temperature:</b> 29 °C	<b>Air Pressure:</b> 1012 hPa	<b>Relative Humidity:</b> 36 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

**Plot 8.3.3 Spurious emission measurements at high channel**



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

HL No.	Description	Manufacturer information			Due Calibr. Month/Year
		Name	Model No.	Serial No.	
0163	LISN FCC/VDE/MIL-STD	Electro-Metrics	ANS 25/2	1314	01-Oct-05
0278	Thermometer, -200 - +760C	Fluke	51K/J	5045468	28-Apr-06
0446	Antenna, Loop active, 10kHz-30MHz	EMCO	6502	2857	28-Jun-06
0447	LISN, 16/2, 300V RMS	HL	LISN 16 - 1	066	03-Nov-05
0465	Anechoic Chamber 9(L) x 6,5(W) x 5,5(H) m	HL	AC - 1	023	10-Oct-05
0493	Oven temperature -45...175 deg C	Thermotron	S-1.2 Mini-Max	14016	23-Sep-05
0521	EMI Receiver (Spectrum Analyzer) with RF filter section 9 kHz-2.9 GHz	Hewlett Packard	8546A	3617A00319, 3448A00253	26-Sep-05
0589	Cable Coaxial, GORE A2P01POL118, 2.3 m	HL	GORE-3	176	2-Dec-05
0593	Antenna Mast, 1-4 m Pneumatic	Madgesh	AM-F1	101	03-Feb-06
0594	Turn Table for anechoic chamber flush mount d=1.2 m Pneumatic	HL	TT-WDC1	102	27-Jan-06
0604	Antenna BiconiLog Log-Periodic/T Bow-TIE 26 - 2000 MHz	EMCO	3141	9611-1011	10-Jan-06
0613	Sensor Electric Field 10 kHz-1.0 GHz, 1-300 V/m (probe), w/charger	Amplifier Research	FP2000	18677	08-Dec-05
0661	Generator Swept Signal, 10 MHz to 40 GHz, + 10 dBm	Hewlett Packard	83640B	3614A00266	14-Sep-05
1004	Cable Coaxial , ANDREW PSWJ4 , 6m	HL	ANDREW-6	163	02-Dec-05
1097	Attenuator, 50 Ohm, 5 W, DC to 8 GHz, 20 dB	Midwest Microwave	0793-20-NN-07	1097	15-Jan-06
1200	Quadruplexer 1-12 GHz (1-2 GHz; 2-4GHz;4-8 GHz; 8-12GHz)	Elettronica S.p.A. - Roma	UE 84	D/00240	10-Feb-06
1204	One phase Voltage regulator, 2kVA, 0-250V	HL	TDGC-2	99	04-Jun-06
1424	Spectrum Analyzer, 30 Hz- 40 GHz	Agilent Technologies (HP)	8564EC	3946A00219	30-Aug-06
1430	EMI Receiver, 9 kHz - 2.9 GHz, System: HL1431, HL1432	Agilent Technologies (HP)	8542E	3807A00262, 3705A00217	01-Sep-05
1455	Cable, 1 m	Harbour Industries	MIL 17/60-RG142	1455	23-Sep-05
1476	Cable, 1 m	Harbour Industries	MIL 17/60-RG142	1476	23-Sep-05
1488	Power Divider 0.5 - 18 GHz	Omni Spectra	2090-6204-00	1488	05-Dec-05
1502	Cable RF, 6 m	Belden	M17/167 MIL-C-17	1502	02-Dec-05
1510	Cable RF, 8 m	Belden	M17/167 MIL-C-17	1510	02-Dec-05

HL No.	Description	Manufacturer information			Due Calibr. Month/Year
		Name	Model No.	Serial No.	
1629	Isotropic Field Monitor	Amplifier Research	FM2000	23308	13-Feb-06
1651	Attenuators Set (2, 3, 5, 20 dB), DC-18 GHz	M/A-COM	2082	1651	03-Jan-06
1653	Analyzer EMC 9 kHz - 1.5 GHz	Agilent Technologies (HP)	E7401A	US39440281	06-Feb-06
1942	Cable 18GHz, 4 m, blue	Rhophase Microwave Limited	SPS-1803A- 4000-NPS	T4658	17-Oct-05
1947	Cable 18GHz, 6.5 m, blue	Rhophase Microwave Limited	NPS-1803A- 6500-NPS	T4974	17-Oct-05
1984	Antenna, Double-Ridged Waveguide Horn, 1-18 GHz, 300 W, N-type	EMC Test Systems	3115	9911-5964	22-Mar-06
2009	Cable RF, 8 m	Alpha Wire	RG-214	C-56	02-Dec-05
2400	Cable 40GHz, 1.5 m, green	Rhophase Microwave Limited	KPS-1503A- 1500-KPS	X2946	24-Jun-06
2432	Antenna, Double-Ridged Waveguide Horn 1-18 GHz	EMC Test Systems	3115	00027177	02-Jul-06

## 10 APPENDIX B Measurement uncertainties

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

Test description	Expanded uncertainty
<b>Transmitter tests</b>	
Carrier power conducted at antenna connector	± 1.7 dB
Carrier power radiated (substitution method)	± 4.5 dB
Occupied bandwidth	±8%
Conducted emissions at RF antenna connector	9 kHz to 2.9 GHz: ± 2.6 dB 2.9 GHz to 6.46 GHz: ± 3.5 dB 6.46 GHz to 13.2 GHz: ± 4.3 dB 13.2 GHz to 22.0 GHz: ± 5.0 dB 22.0 GHz to 26.8 GHz: ± 5.5 dB 26.8 GHz to 40.0 GHz: ± 4.8 dB
Spurious emissions radiated 30 MHz – 40 GHz (substitution method)	± 4.5 dB
Frequency stability	± 168 Hz (0.56 ppm)
<b>Unintentional radiator tests</b>	
Conducted emissions with LISN	9 kHz to 150 kHz: ± 3.9 dB 150 kHz to 30 MHz: ± 3.8 dB
Radiated emissions at 3 m measuring distance Horizontal polarization	Biconilog antenna: ± 5.3 dB Biconical antenna: ± 5.0 dB Log periodic antenna: ± 5.3 dB Double ridged horn antenna: ± 5.3 dB Biconilog antenna: ± 6.0 dB Biconical antenna: ± 5.7 dB Log periodic antenna: ± 6.0 dB Double ridged horn antenna: ± 6.0 dB
Vertical polarization	

The test equipment has been calibrated according to its recommended procedures and is within the manufacturer's published limit of error. The standards and instruments used in the calibration system conform to the present requirements of ISO/IEC 17025 (or alternately ANSI/NCSL Z540-1).  
The laboratory calibrates its measurement standards by a third party (traceable to NIST, USA) on a regular basis according to equipment manufacturer requirements. The Hermon Labs EMC measurements uncertainty is given in the table above.

## 11 APPENDIX C Test facility description

Tests were performed at Hermon Laboratories Ltd., which is a fully independent, private, EMC, safety, environmental and telecommunication testing facility. Hermon Laboratories is listed by the Federal Communications Commission (USA) for all parts of Code of Federal Regulations 47 (CFR 47) and by Industry Canada for electromagnetic emissions (file numbers IC 2186-1 for OATS and IC 2186-2 for anechoic chamber), certified by VCCI, Japan (the registration numbers are R-808 for OATS, R-1082 for anechoic chamber, C-845 for conducted emissions site), assessed by TNO Certification EP&S (Netherlands) for a number of EMC, telecommunications, environmental, safety standards, and by AMTAC (UK) for safety of medical devices. The laboratory is accredited by American Association for Laboratory Accreditation (USA) according to ISO/IEC 17025 for electromagnetic compatibility, product safety, telecommunications testing and environmental simulation (for exact scope please refer to Certificate No. 839.01).

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Person for contact: Mr. Alex Usoskin, CEO.

## 12 APPENDIX D Specification references

47CFR part 27: 2004	Miscellaneous wireless communications services
47CFR part 1: 2004	Practice and procedure
47CFR part 2: 2004	Frequency allocations and radio treaty matters; general rules and regulations
47CFR part 15 subpart B: 2005	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.
ANSI/TIA/EIA-603-A:2001	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards

## 13 APPENDIX E 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(µV)	decibel referred to one microvolt
dB(µV/m)	decibel referred to one microvolt per meter
dB(µA)	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
ITE	information technology equipment
k	kilo
kHz	kilohertz
LISN	line impedance stabilization network
LO	local oscillator
m	meter
MHz	megahertz
min	minute
mm	millimeter
ms	millisecond
µs	microsecond
NA	not applicable
OATS	open area test site
Ω	Ohm
QP	quasi-peak
PCB	printed circuit board
PM	pulse modulation
PS	power supply
RE	radiated emission
RF	radio frequency
rms	root mean square
Rx	receive
s	second
T	temperature
Tx	transmit
V	volt

## 14 APPENDIX F Test equipment correction factors

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

Frequency, MHz	Correction factor, dB
0.01	5.0
0.02	2.2
0.03	1.1
0.04	0.7
0.05	0.5
0.1	0.2
0.2	0.1
0.4	0.1
0.6	0.1
0.8	0.1
1	0.1
2	0.1
3	0.1
4	0.1
6	0.2
10	0.3
12	0.4
16	0.5
18	0.6
20	0.7
25	0.9
28	1.2
30	1.3

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

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

Frequency, MHz	Correction factor, dB
0.01	4.7
0.02	2.1
0.03	1.1
0.04	0.7
0.05	0.5
0.1	0.2
0.2	0.1
0.4	0.1
0.6	0.1
0.8	0.1
1	0.1
2	0.1
3	0.1
4	0.1
6	0.1
10	0.1
12	0.1
16	0.1
18	0.1
20	0.1
25	0.1
28	0.1
30	0.1

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**  
**EMC Test Systems, model 6502, serial number 2857**

Frequency, MHz	Magnetic Antenna Factor, dB(S/m)	Electric Antenna Factor, dB(1/m)
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	9.7
0.750	-41.9	9.6
1.000	-41.4	10.1
2.000	-41.5	10.0
3.000	-41.4	10.1
4.000	-41.4	10.1
5.000	-41.5	10.0
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(S/m) is to be added to receiver meter reading in dB( $\mu$ V) to convert it into field intensity in dB( $\mu$ A/m).  
 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, serial number 1011**

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

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 wave guide horn antenna**  
**EMC Test Systems, model 3115, serial no: 9911-5964**

Frequency, MHz	Antenna gain, dBi	Antenna factor. dB(1/m)
1000.0	5.8	24.5
1500.0	9.0	24.8
2000.0	8.6	27.7
2500.0	9.5	28.7
3000.0	8.9	30.8
3500.0	8.2	32.9
4000.0	9.6	32.7
4500.0	11.2	32.1
5000.0	10.6	33.6
5500.0	9.8	35.3
6000.0	10.1	35.7
6500.0	10.7	35.8
7000.0	10.9	36.2
7500.0	10.5	37.2
8000.0	11.1	37.2
8500.0	10.8	38.1
9000.0	10.7	38.6
9500.0	11.5	38.3
10000.0	11.8	38.4
10500.0	12.3	38.3
11000.0	12.3	38.8
11500.0	11.5	39.9
12000.0	12.2	39.6
12500.0	12.6	39.5
13000.0	12.0	40.5
13500.0	11.7	41.1
14000.0	11.7	41.5
14500.0	12.7	40.8
15000.0	14.2	39.5
15500.0	16.0	38.1
16000.0	16.2	38.1
16500.0	14.5	40.1
17000.0	12.2	42.6
17500.0	9.7	45.4
18000.0	6.6	48.7

Antenna factor 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 wave guide horn antenna**  
**EMC Test Systems, model 3115, serial no: 00027177**

Frequency, MHz	Antenna gain, dBi	Antenna factor. dB(1/m)
1000.0	5.5	24.7
1500.0	8.0	25.7
2000.0	8.4	27.8
2500.0	9.3	28.9
3000.0	9.0	30.7
3500.0	9.3	31.8
4000.0	9.3	33.0
4500.0	10.4	32.8
5000.0	10.0	34.2
5500.0	10.1	34.9
6000.0	10.6	35.2
6500.0	11.0	35.4
7000.0	10.8	36.3
7500.0	10.4	37.3
8000.0	10.8	37.5
8500.0	10.8	38.0
9000.0	11.0	38.3
9500.0	11.5	38.3
10000.0	11.5	38.7
10500.0	11.9	38.7
11000.0	12.2	38.9
11500.0	11.9	39.5
12000.0	12.3	39.5
12500.0	12.7	39.4
13000.0	12.0	40.5
13500.0	12.0	40.8
14000.0	11.6	41.5
14500.0	12.2	41.3
15000.0	13.6	40.2
15500.0	15.3	38.7
16000.0	15.8	38.5
16500.0	14.8	39.8
17000.0	12.9	41.9
17500.0	9.2	45.8
18000.0	6.2	49.1

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

**Cable loss**

Cable coaxial, GORE A2P01POL118, 2.3 m, model GORE-3, serial number 176, HL 0589  
 + Cable coaxial, ANDREW PSWJ4, 6 m, model: ANDREW-6, serial number 163, 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		
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 18 GHz, 4 m, blue, model SPS-1803A-4000-NPS, serial number T4658, HL 1942

Frequency, GHz	Cable loss, dB
0.03	0.21
0.05	0.26
0.10	0.36
0.20	0.50
0.30	0.61
0.40	0.70
0.50	0.78
0.60	0.85
0.70	0.93
0.80	0.99
0.90	1.04
1.00	1.10
1.10	1.16
1.20	1.22
1.30	1.26
1.40	1.31
1.50	1.35
1.60	1.41
1.70	1.45
1.80	1.49
1.90	1.53
2.00	1.57
2.10	1.61
2.20	1.65
2.30	1.69
2.40	1.72
2.50	1.76
2.60	1.79
2.70	1.83
2.80	1.87
2.90	1.90
3.10	1.97
3.30	2.04
3.50	2.11
3.70	2.18
3.90	2.24
4.10	2.31
4.30	2.38
4.50	2.43
4.70	2.53
4.90	2.53
5.10	2.63
5.30	2.65
5.50	2.72
5.70	2.76
5.90	2.79

Frequency, GHz	Cable loss, dB
6.10	2.88
6.30	2.90
6.50	2.97
6.70	3.02
6.90	3.04
7.10	3.07
7.30	3.12
7.50	3.13
7.70	3.19
7.90	3.24
8.10	3.30
8.30	3.36
8.50	3.45
8.70	3.41
8.90	3.45
9.10	3.42
9.30	3.55
9.50	3.48
9.70	3.58
9.90	3.61
10.10	3.66
10.30	3.68
10.50	3.70
10.70	3.70
10.90	3.75
11.10	3.78
11.30	3.86
11.50	3.98
11.70	4.10
11.90	4.12
12.10	4.09
12.40	4.13
13.00	4.23
13.50	4.35
14.00	4.40
14.50	4.44
15.00	4.57
15.50	4.66
16.00	4.64
16.50	4.66
17.00	4.75
17.50	4.85
18.00	4.93

**Cable loss**  
**Cable 18 GHz, 6.5 m, blue, model NPS-1803A-6500-NPS, serial number T4974, HL 1947**

Frequency, GHz	Insertion 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	Insertion 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, serial number C-56, HL 2009**

No.	Frequency, MHz	Cable loss, dB	Tolerance (Specification), dB	Measurement uncertainty, dB
1	1	0.10	NA	$\pm 0.12$
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		

**Cable loss**  
**Cable 40 GHz, 1.5 m, green; model KPS-1503A-1500-KPS, serial number X2946 (HL 2400)**

Frequency, GHz	Insertion loss, dB
0.03	0.06
0.05	0.08
0.1	0.15
0.2	0.23
0.3	0.29
0.5	0.37
0.7	0.46
0.9	0.53
1.1	0.58
1.3	0.65
1.5	0.66
1.7	0.72
1.9	0.76
2.1	0.79
2.3	0.85
2.5	0.90
2.7	0.91
2.9	0.97
3.1	0.97
3.3	1.03
3.5	1.06
3.7	1.10
3.9	1.13
4.1	1.16
4.3	1.18
4.5	1.21
4.7	1.23
4.9	1.26
5.1	1.28
5.3	1.31
5.5	1.32
5.7	1.36
5.9	1.37
6.1	1.38
6.3	1.44
6.5	1.46
6.7	1.49
6.9	1.50
7.1	1.51
7.3	1.55
7.5	1.56
7.7	1.58
7.9	1.60
8.1	1.61
8.3	1.68
8.5	1.68
8.7	1.75
8.9	1.74
9.1	1.81
9.3	1.79
9.5	1.86
9.7	1.85
9.9	1.87
10.1	1.88

Frequency, GHz	Insertion loss, dB
10.30	1.82
10.50	1.92
10.70	1.86
10.90	1.96
11.10	1.90
11.30	1.99
11.50	1.95
11.70	2.00
11.90	2.01
12.10	1.99
12.40	2.06
13.00	2.11
13.50	2.17
14.00	2.36
14.50	2.32
15.00	2.30
15.50	2.34
16.00	2.34
16.50	2.40
17.00	2.46
17.50	2.54
18.00	2.61
18.50	2.59
19.00	2.59
19.50	2.67
20.00	2.62
20.50	2.73
21.00	2.71
21.50	2.78
22.00	2.83
22.50	2.81
23.00	2.91
23.50	2.97
24.00	2.98
24.50	2.97
25.00	3.03
25.50	3.04
26.00	3.11
26.50	2.97
27.00	3.15
28.00	3.07
29.00	3.13
30.00	3.13
31.00	3.18
32.00	3.31
33.00	3.32
34.00	3.37
35.00	3.36
36.00	3.46
37.00	3.49
38.00	3.52
39.00	3.62
40.00	3.77

**Cable loss**  
**Cable coaxial, 6 m, model: M17/167 MIL-C-17, HL 1502**

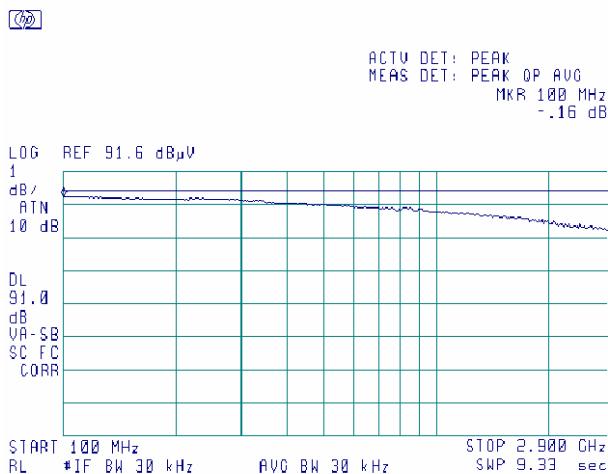
Frequency, MHz	Cable loss, dB
0.1	0.02
1	0.07
3	0.15
5	0.17
10	0.26
30	0.43
50	0.57
80	0.72
100	0.81
300	1.48
500	2.00
800	2.70
1000	3.09

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

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

**Cable RF, 1m, model: MIL 17/60-RG142, serial number 1455 (HL 1455)**  
Calibration data (100 – 2900 MHz)

No.	Parameter	SET	Measured	Deviation	Tolerance (Specification)	Meas. Uncert.
1	Insertion Loss	100 MHz – 2.9 GHz	See attached plot		≤ 2.0 dB	±0.52 dB



**Cable RF, 1m, model: MIL 17/60-RG142, serial number 1476 (HL 1476)**  
Calibration data (100 – 2900 MHz)

No.	Parameter	SET	Measured	Deviation	Tolerance (Specification)	Meas. Uncert.
1	Insertion Loss	100 MHz – 2.9 GHz	See attached plot		≤ 2.0 dB	±0.52 dB

