

# TEST REPORT

ACCORDING TO: FCC part 27, part 15 subpart B

FOR:

**Arcadian Networks**

**Broadband wireless data modem**

**Model:V384**

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## 1 Applicant information

**Client name:** Arcadian Networks Inc.  
**Address:** 400 Columbus Avenue, Suite 210E, Valhalla, NY 10595, USA  
**Telephone:** +972 3976 9847  
**Fax:** +972 3976 9998  
**E-mail:** hillel.hendler@arcadiannetworks.com  
**Contact name:** Mr. Hillel Hendler

## 2 Equipment under test attributes

**Product name:** Broadband wireless data modem  
**Operating frequency range:** 787.1625 – 787.8375 MHz  
**Model:** V384  
**Receipt date:** 11/7/2007

## 3 Manufacturer information

**Manufacturer name:** Arcadian Networks Inc.  
**Address:** 400 Columbus Avenue, Suite 210E, Valhalla, NY 10595, USA  
**Telephone:** +972 3976 9847  
**Fax:** +972 3976 9998  
**E-Mail:** Arnon.afgin@arcadiannetworks.com  
**Contact name:** Mr. Arnon Afgin

## 4 Test details




**Project ID:** 18284  
**Location:** Hermon Laboratories Ltd. P.O.Box 23, Binyamina 30500, Israel  
**Test started:** 11/7/2007  
**Test completed:** 12/31/2007  
**Test specifications:** FCC part 27:2007  
FCC part 15: 2007 subpart B

## 5 Tests summary

Test	Status
<b>Transmitter characteristics</b>	
Section 27.50(b)(9), Peak output power at RF antenna connector	Pass
Section 2.1091, 27.52, RF safety	Pass
Section 27.53(c)(2), Spurious emissions RF antenna connector	Pass
Section 27.53(c)(3), Spurious emissions RF antenna connector in 763-775MHz and 793-805 MHz	Pass
Section 27.53(c)(2), Radiated spurious emissions	Pass
Section 27.53(f), Radiated spurious emissions in 1559-1610 MHz band	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.

This test report replaces the previously issued test report identified by Doc ID:ARCRAD\_FCC.18284\_rev.1

	Name and Title	Date	Signature
<b>Tested by:</b>	Mr. S. Samokha, test engineer	December 31, 2007	
<b>Reviewed by:</b>	Mrs. M. Cherniavsky, certification engineer	December 31, 2007	
<b>Approved by:</b>	Mr. M. Nikishin, EMC and Radio group leader	January 14, 2008	

## 6 EUT description

### 6.1 General information

The EUT is a broadband wireless data modem used by cable and wireless operators to deliver data services and high-speed data connections to business and residential subscribers. The EUT operates within 787 to 788 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	IEC 60320	1	Unshielded	1.5 m	Indoor
Power	DC	EUT	Power adaptor	DC jack	1	Unshielded	1.5 m	Indoor
Signal	Ethernet	EUT	Laptop	RJ 45	1	Unshielded	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	IEC 60320	1	Unshielded	1.5 m	Indoor
Power	DC	Laptop	Power adaptor	DC jack	1	Unshielded	1.5 m	Indoor

### 6.3 Support and test equipment

Description	Manufacturer	Model number	Serial number
Wireless modem termination system	Vyvo	V3000	0094417
Up converter	Wavecom	NA	NA
Down converter	Vyvo	V3100	464608122
Combiner (two-way splitter)	RMS	NA	NA
Laptop	IBM	2645-5EG	5573MWW02199
Power adaptor for laptop	IBM	02K6654	3892A299
Switch Hub	Tricom	NA	NA
Power adaptor for EUT	DVE	DSA-0421S-12	005BC16846
Power adaptor for Down converter	Deer Computers	AD1607B	NA

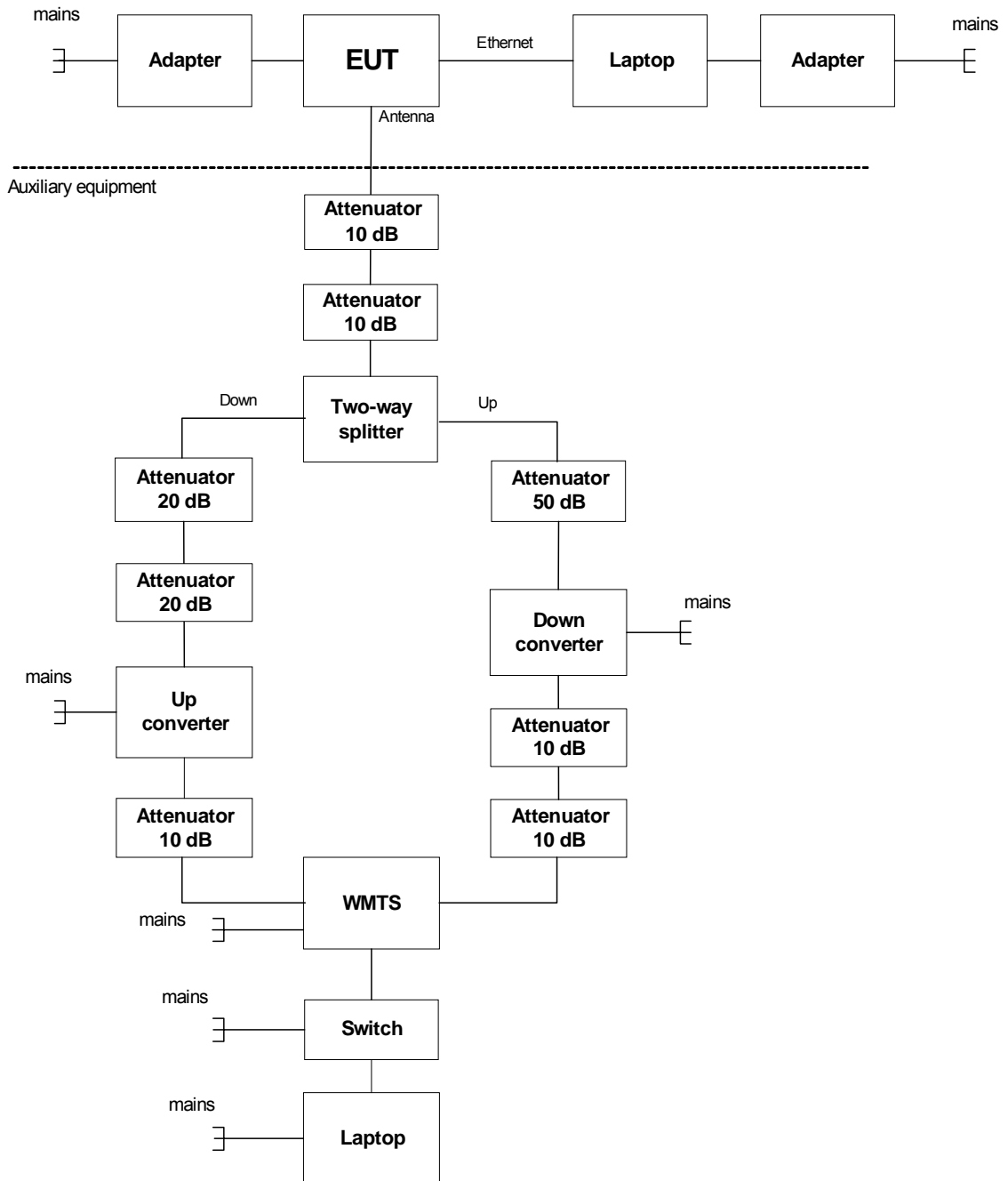
### 6.4 Operating frequencies

Source	Frequency, MHz		
Crystals	10	13	24
EBI bus	50		
Direct conversion	44		
Transmitter	787 - 788		

### 6.5 Changes made in the EUT

No changes were implemented.

## 6.6 Test configuration





### 6.7 Transmitter characteristics

<b>Type of equipment</b>							
<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)						
<b>Intended use</b>			<b>Condition of use</b>				
<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					
<b>Assigned frequency range</b>		787.0 – 788.0 MHz					
<b>Operating frequency range</b>		787.1625 – 787.8375 MHz					
<b>Maximum rated output power</b>		At transmitter 50 Ω RF output connector			29.9 dBm		
		Effective radiated power (for equipment with no RF connector)			NA		
<b>Is transmitter output power variable?</b>		No					
		continuous variable					
		<input checked="" type="checkbox"/>	Yes	0.25 dB	0.25 dB		
				minimum RF power	-23.0 dBm		
			maximum RF power	+29.9 dBm			
<b>Antenna connection</b>							
	unique coupling	<input checked="" type="checkbox"/>	standard F-type connector	integral	with temporary RF connector		
					without temporary RF connector		
<b>Antenna/s technical characteristics</b>							
Type	Manufacturer	Model number		Gain			
Yagi	Skymast	4RF0054-A		11.5 dBd			
<b>Transmitter 99% power bandwidth</b>		325 kHz					
<b>Type of multiplexing</b>		TDMA					
<b>Modulating test signal (baseband)</b>		PRBS					
<b>Maximum transmitter duty cycle in normal use</b>		50 %					
<b>Transmitter duty cycle supplied for test</b>		50 %					
<b>Transmitter power source</b>							
	Battery	<b>Nominal rated voltage</b>	VDC	<b>Battery type</b>			
	DC	<b>Nominal rated voltage</b>	VDC				
<input checked="" type="checkbox"/>	AC mains	<b>Nominal rated voltage</b>	120 VAC	<b>Frequency</b>	60 Hz		
<b>Common power source for transmitter and receiver</b>				<input checked="" type="checkbox"/>	yes	no	
<b>Type of modulation</b>	<b>Modulation states (constellation)</b>	<b>RF channel spacing</b>	<b>Frequency channel</b>				
			<b>Low</b>	<b>Mid</b>	<b>High</b>		
QAM	16	325 kHz	787.1625	787.5	787.8375		
QPSK	4	325 kHz	787.1625	787.5	787.8375		

<b>Test specification:</b>	<b>Section 27.50(b)(9), Peak output power at RF antenna connector</b>		
<b>Test procedure:</b>	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	<b>PASS</b>
<b>Date:</b>	11/08/2007		
<b>Temperature:</b> 24 °C	<b>Air Pressure:</b> 1012 hPa	<b>Relative Humidity:</b> 45 %	<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.

Table 7.1.1 Peak output power limits

Assigned frequency range, MHz	Maximum peak output power*	
	dBm	W
787.0 – 788.0	44.77	30.0

\* The peak output power limit was calculated by subtracting of antenna gain in dBd from maximum allowed ERP 44.77 dBm (30 W):

$$44.77 \text{ dBm} - (13.65 \text{ dBi} - 2.15 \text{ dB}) = 33.27 \text{ dBm}$$

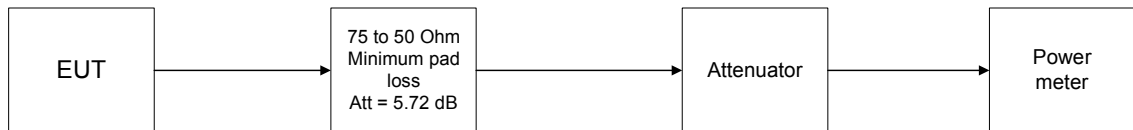
#### 7.1.2 Test procedure for measurements with power meter

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 thermocouple power meter 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 27.50(b)(9), Peak output power at RF antenna connector</b>		
<b>Test procedure:</b>	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	<b>PASS</b>
<b>Date:</b>	11/08/2007		
<b>Temperature:</b> 24 °C	<b>Air Pressure:</b> 1012 hPa	<b>Relative Humidity:</b> 45 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

Table 7.1.2 Conducted output power test results

ASSIGNED FREQUENCY RANGE: 787.0 – 788.0 MHz  
DETECTOR USED: Sample  
RESOLUTION BANDWIDTH: 3 kHz  
VIDEO BANDWIDTH: 10 kHz  
MODULATION: 16QAM/QPSK  
MODULATING SIGNAL: PRBS  
BIT RATE: 1.040 Mbps  
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
<b>16QAM</b>							
787.1625	28.32	Included		28.32	33.27	-4.95	Pass
787.5000	28.60	Included		28.60	33.27	-4.67	Pass
787.8375	28.24	Included		28.24	33.27	-5.03	Pass
<b>QPSK</b>							
787.1625	27.85	Included		27.85	33.27	-5.42	Pass
787.5000	27.80	Included		27.80	33.27	-5.47	Pass
787.8375	28.34	Included		28.34	33.27	-4.93	Pass

ASSIGNED FREQUENCY RANGE: 787.0 – 788.0 MHz  
DETECTOR USED: Peak  
RESOLUTION BANDWIDTH: 3 kHz  
VIDEO BANDWIDTH: 10 kHz  
MODULATION: 16QAM/QPSK  
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
<b>16QAM</b>							
787.1625	29.78	Included		29.78	33.27	-3.49	Pass
787.5000	29.90	Included		29.90	33.27	-3.37	Pass
787.8375	29.42	Included		29.42	33.27	-3.85	Pass
<b>QPSK</b>							
787.1625	29.02	Included		29.02	33.27	-4.25	Pass
787.5000	29.20	Included		29.20	33.27	-4.07	Pass
787.8375	29.65	Included		29.65	33.27	-3.62	Pass

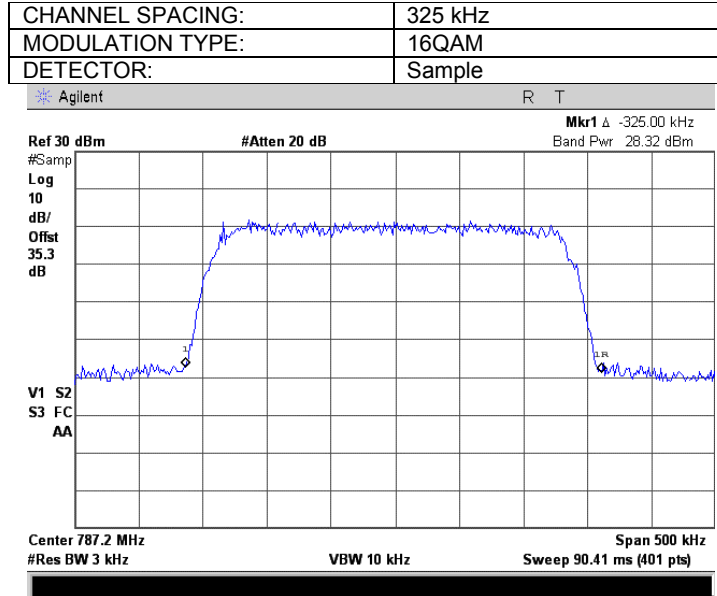
## Reference numbers of test equipment used

HL 2780	HL 3180						
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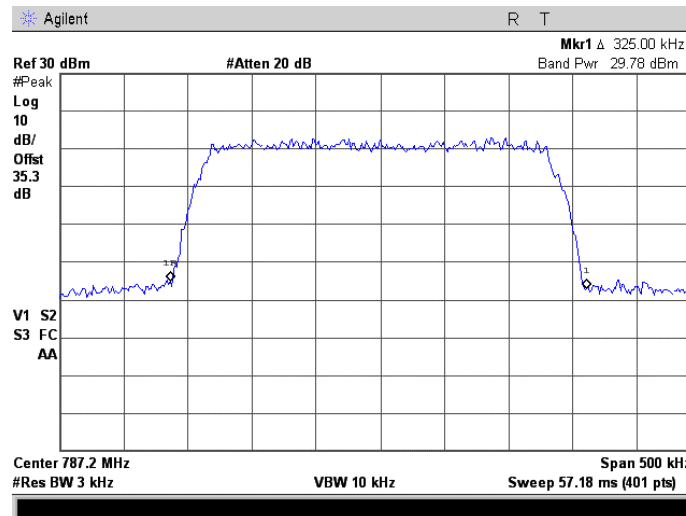
Full description is given in Appendix A.

<b>Test specification:</b>	<b>Section 27.50(b)(9), Peak output power at RF antenna connector</b>		
<b>Test procedure:</b>	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	<b>PASS</b>
<b>Date:</b>	11/08/2007		
<b>Temperature:</b> 24 °C	<b>Air Pressure:</b> 1012 hPa	<b>Relative Humidity:</b> 45 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

Plot 7.1.1 Average output power at low frequency, 16QAM 1.040 Mbps data rate

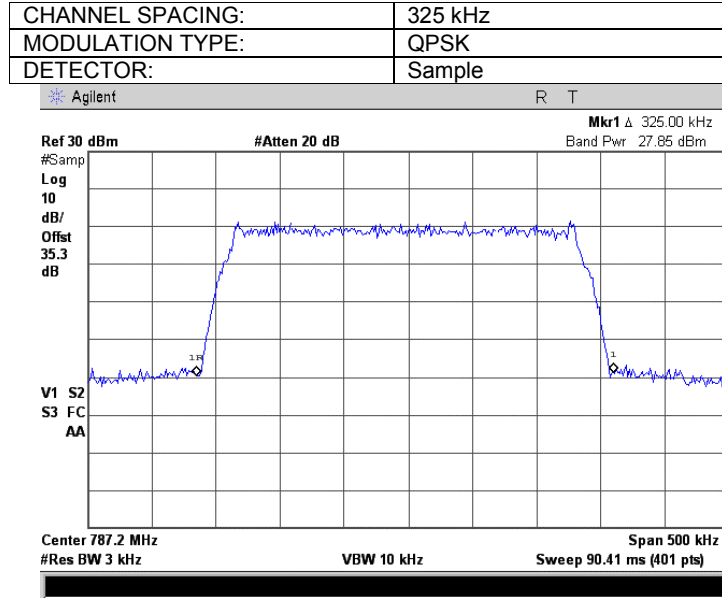


Plot 7.1.2 Peak output power at low frequency, 16QAM 1.040 Mbps data rate

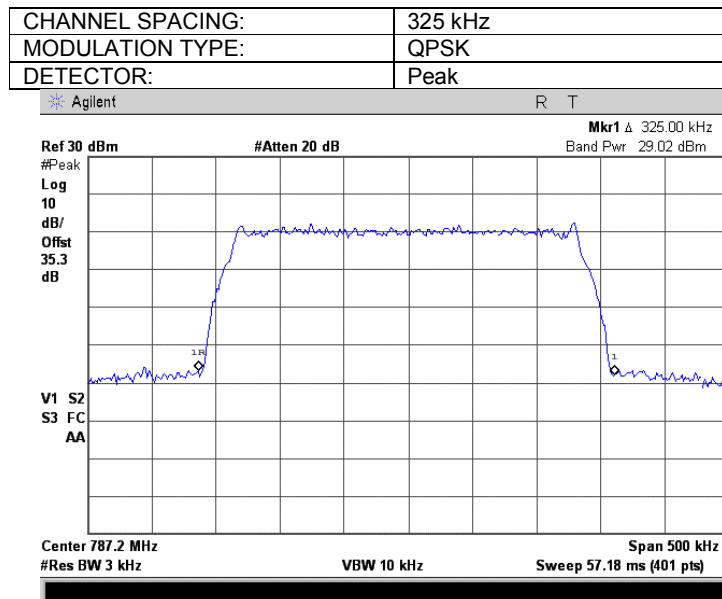


<b>Test specification:</b>	<b>Section 27.50(b)(9), Peak output power at RF antenna connector</b>		
<b>Test procedure:</b>	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	<b>PASS</b>
<b>Date:</b>	11/08/2007		
<b>Temperature:</b> 24 °C	<b>Air Pressure:</b> 1012 hPa	<b>Relative Humidity:</b> 45 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

Plot 7.1.3 Average output power at low frequency, QPSK 0.52 Mbpsdata rate

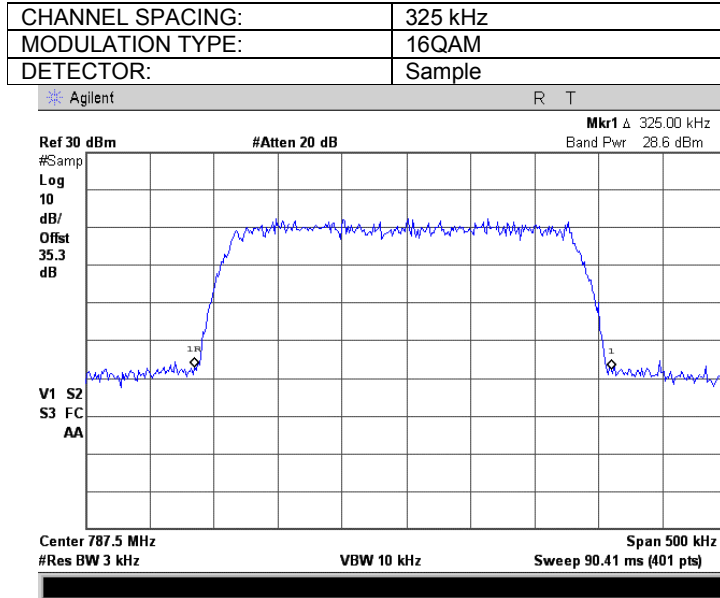


Plot 7.1.4 Peak output power at low frequency, QPSK 0.52 Mbpsdata rate

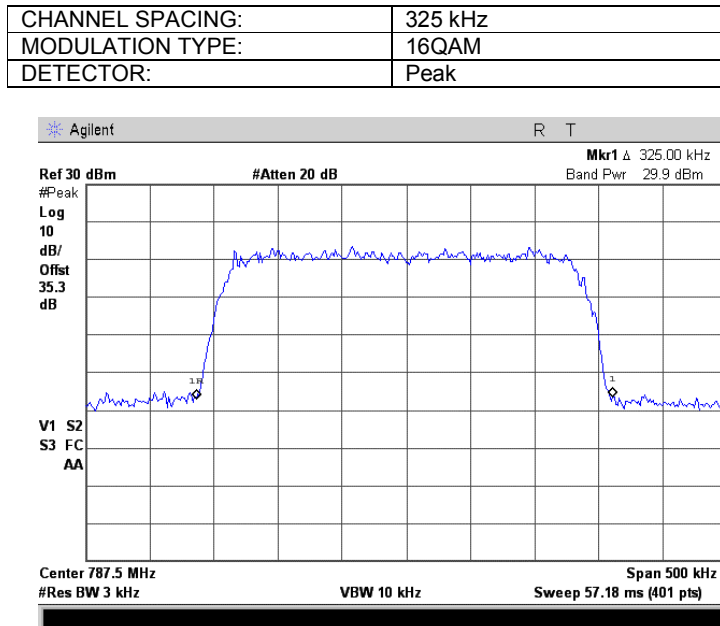


<b>Test specification:</b>	<b>Section 27.50(b)(9), Peak output power at RF antenna connector</b>		
<b>Test procedure:</b>	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	<b>PASS</b>
<b>Date:</b>	11/08/2007		
<b>Temperature:</b> 24 °C	<b>Air Pressure:</b> 1012 hPa	<b>Relative Humidity:</b> 45 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

Plot 7.1.5 Average output power at mid frequency, 16QAM 1.040 Mbps data rate



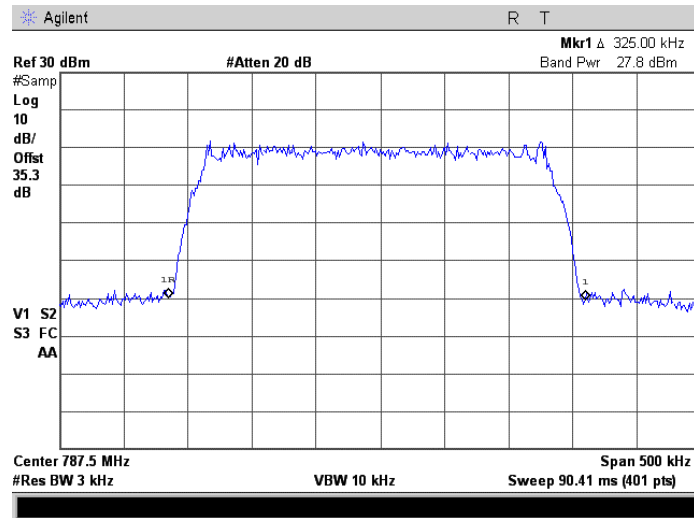
Plot 7.1.6 Peak output power at mid frequency, 16QAM 1.040 Mbps data rate



<b>Test specification:</b>	<b>Section 27.50(b)(9), Peak output power at RF antenna connector</b>		
<b>Test procedure:</b>	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	<b>PASS</b>
<b>Date:</b>	11/08/2007		
<b>Temperature:</b> 24 °C	<b>Air Pressure:</b> 1012 hPa	<b>Relative Humidity:</b> 45 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

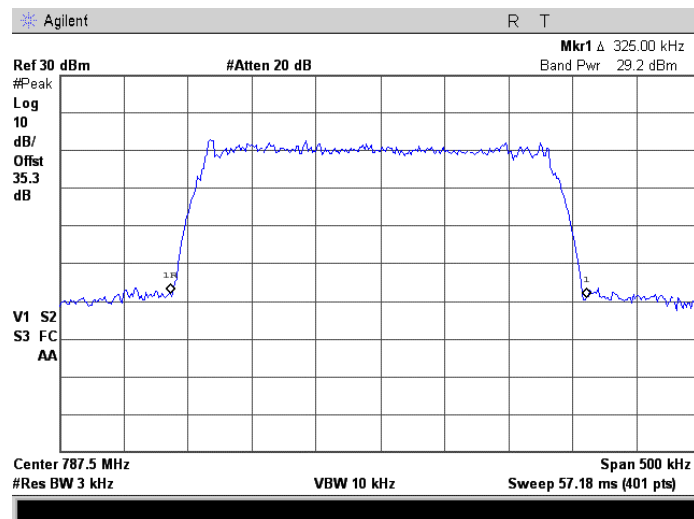
Plot 7.1.7 Average output power at mid frequency, QPSK 0.52 Mbpsdata rate

CHANNEL SPACING:	325 kHz
MODULATION TYPE:	QPSK
DETECTOR:	Sample



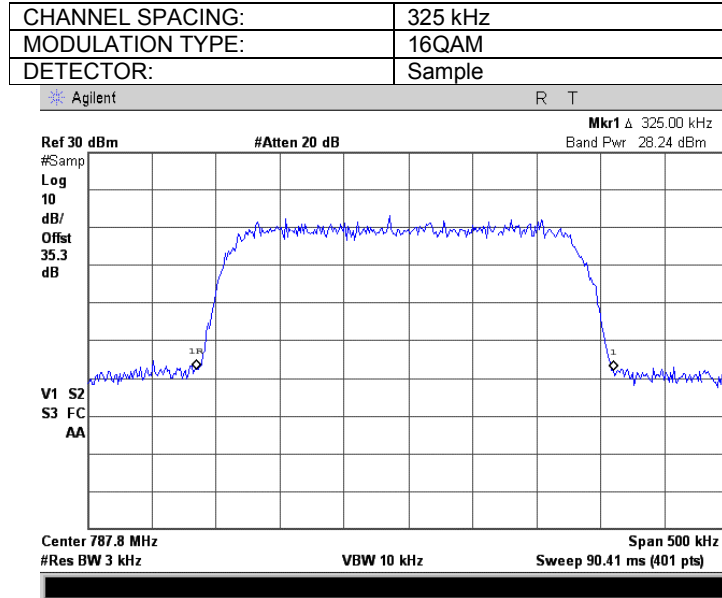
Plot 7.1.8 Peak output power at mid frequency, QPSK 0.52 Mbpsdata rate

CHANNEL SPACING:	325 kHz
MODULATION TYPE:	QPSK
DETECTOR:	Peak

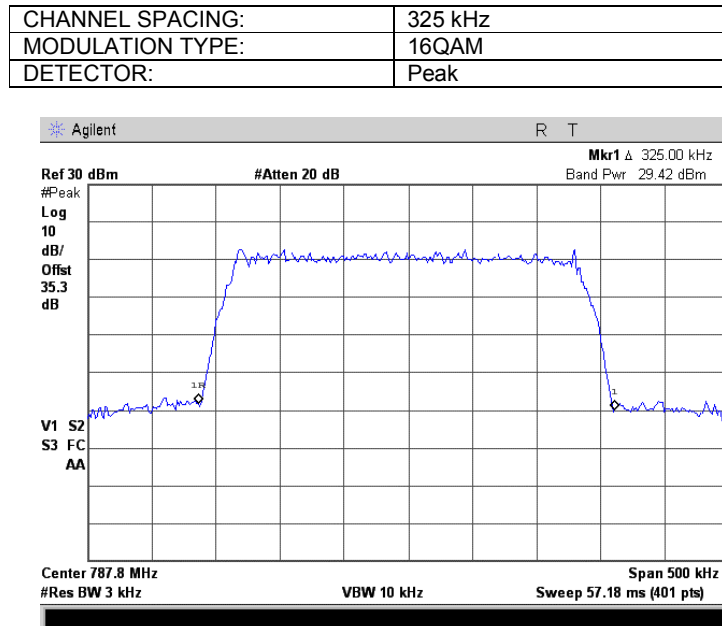


<b>Test specification:</b>	<b>Section 27.50(b)(9), Peak output power at RF antenna connector</b>		
<b>Test procedure:</b>	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	<b>PASS</b>
<b>Date:</b>	11/08/2007		
<b>Temperature:</b> 24 °C	<b>Air Pressure:</b> 1012 hPa	<b>Relative Humidity:</b> 45 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

Plot 7.1.9 Average output power at high frequency, 16QAM 1.040 Mbps data rate

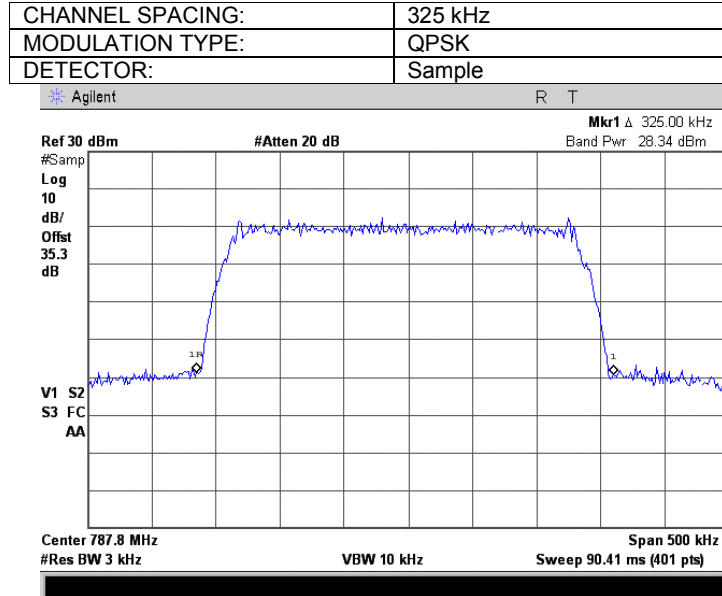


Plot 7.1.10 Peak output power at high frequency, 16QAM 1.040 Mbps data rate

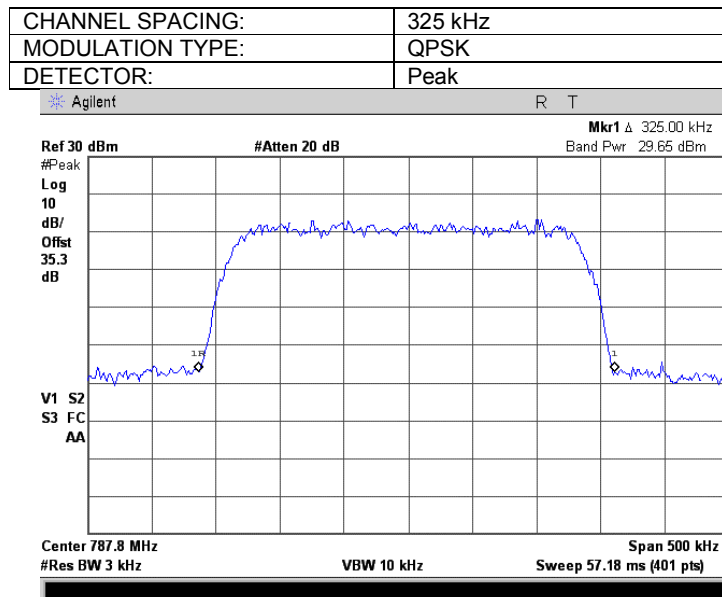


<b>Test specification:</b>	<b>Section 27.50(b)(9), Peak output power at RF antenna connector</b>		
<b>Test procedure:</b>	47 CFR, Section 2.1046; TIA/EIA-603-C, Section 2.2.1		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	<b>PASS</b>
<b>Date:</b>	11/08/2007		
<b>Temperature:</b> 24 °C	<b>Air Pressure:</b> 1012 hPa	<b>Relative Humidity:</b> 45 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

Plot 7.1.11 Average output power at high frequency, QPSK 0.52 Mbps data rate



Plot 7.1.12 Peak output power at high frequency, QPSK 0.52 Mbps data rate





<b>Test specification:</b>	<b>Sections 2.1091, 27.52, RF radiation exposure evaluation</b>		
<b>Test procedure:</b>	47 CFR, Section 1.1307(b)		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	<b>PASS</b>
<b>Date:</b>	11/21/2007		
<b>Temperature:</b> 24 °C	<b>Air Pressure:</b> 1013 hPa	<b>Relative Humidity:</b> 47 %	<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>	
787.17	0.52	5.2	44.2
787.83	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 Figure 7.2.1.
- 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 probe was investigated over a cross-section area equivalent to the antenna size at various test distances to detect the maximum radial from the antenna.
- 7.2.2.5 The obtained antenna to probe distance was recorded in Table 7.2.2 as a minimum separation distance.
- 7.2.2.6 The test was repeated at the rest of test distances according to Table 7.2.2.
- 7.2.2.7 The test was repeated at the high frequency according to Table 7.2.3.





<b>Test specification:</b>	<b>Sections 2.1091, 27.52, RF radiation exposure evaluation</b>		
<b>Test procedure:</b>	47 CFR, Section 1.1307(b)		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	<b>PASS</b>
<b>Date:</b>	11/21/2007		
<b>Temperature:</b> 24 °C	<b>Air Pressure:</b> 1013 hPa	<b>Relative Humidity:</b> 47 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

Table 7.2.2 Maximum permissible exposure (MPE) measurement at low frequency

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
3.0	9.4	0.023450	0.52	-0.49655	Pass
2.0	11.7	0.036330	0.52	-0.48367	Pass
1.5	15.2	0.061316	0.52	-0.45868	Pass
1.0	24.3	0.156712	0.52	-0.36329	Pass
0.5	27.2	0.196348	0.52	-0.32365	Pass
0.2	33.1	0.290767	0.52	-0.22923	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>

Table 7.2.3 Maximum permissible exposure (MPE) measurement at high frequency

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
3.0	10.1	0.027073	0.52	-0.49293	Pass
2.0	13.6	0.049087	0.52	-0.47091	Pass
1.5	17.8	0.084087	0.52	-0.43591	Pass
1.0	24.3	0.156712	0.52	-0.36329	Pass
0.5	28.3	0.212550	0.52	-0.30745	Pass
0.2	34.1	0.308601	0.52	-0.21140	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

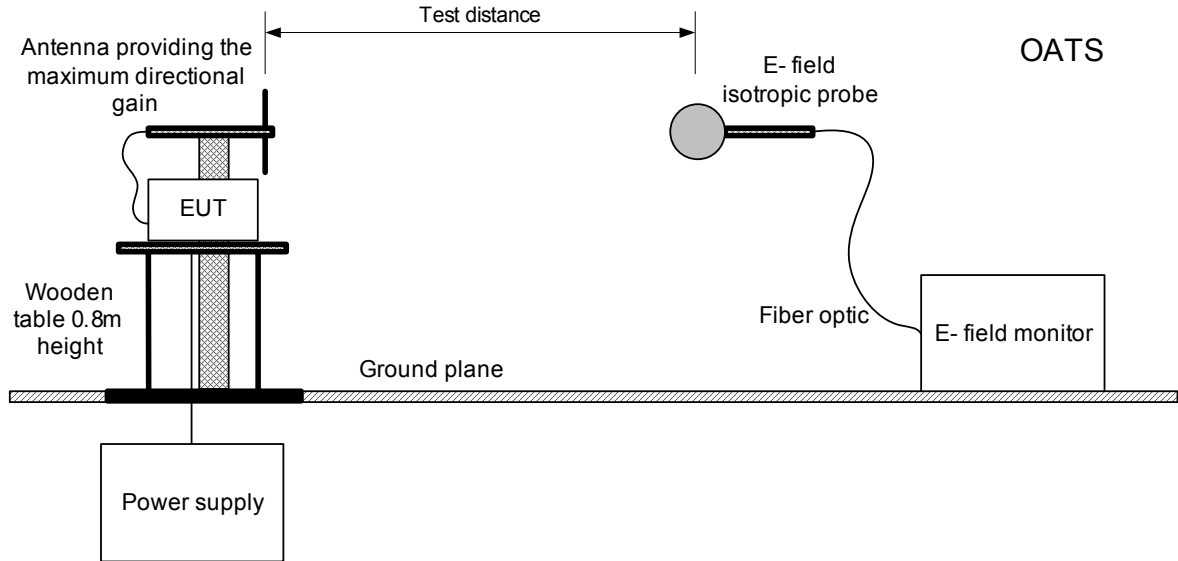
HL 0174	HL 0613						
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Full description is given in Appendix A.



<b>Test specification:</b>	<b>Sections 2.1091, 27.52, RF radiation exposure evaluation</b>		
<b>Test procedure:</b>	47 CFR, Section 1.1307(b)		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	<b>PASS</b>
<b>Date:</b>	11/21/2007		
<b>Temperature:</b> 24 °C	<b>Air Pressure:</b> 1013 hPa	<b>Relative Humidity:</b> 47 %	<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 27.53(c)(2), Spurious emissions at RF antenna connector</b>		
<b>Test procedure:</b>	47 CFR, Sections 2.1047, 2.1051, TIA/EIA-603-C, Section 2.2.13		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	<b>PASS</b>
<b>Date:</b>	11/07/2007		
<b>Temperature:</b> 24 °C	<b>Air Pressure:</b> 1013 hPa	<b>Relative Humidity:</b> 45 %	<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.

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 27.53(c)(2), Spurious emissions at RF antenna connector</b>		
<b>Test procedure:</b>	47 CFR, Sections 2.1047, 2.1051, TIA/EIA-603-C, Section 2.2.13		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	<b>PASS</b>
<b>Date:</b>	11/07/2007		
<b>Temperature:</b> 24 °C	<b>Air Pressure:</b> 1013 hPa	<b>Relative Humidity:</b> 45 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

Table 7.3.2 Spurious emission test results

ASSIGNED FREQUENCY RANGE: 787.0 – 788.0 MHz  
 INVESTIGATED FREQUENCY RANGE: 0.009 – 8000 MHz  
 DETECTOR USED: Peak  
 VIDEO BANDWIDTH: ≥ Resolution bandwidth  
 TRANSMITTER OUTPUT POWER SETTINGS: Maximum  
 MODULATING SIGNAL: PRBS

MODULATION: QPSK

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 the specified limit					Pass
1575.325	0.52	1000	-38.87	-13.00	-25.87	Pass
2359.230	0.52	1000	-39.51	-13.00	-26.51	Pass
<b>High channel</b>						
0.009 - 1000	More than 20 dB below the specified limit					Pass
1575.7125	0.52	1000	-39.06	-13.00	-26.06	Pass
2365.5725	0.52	1000	-38.55	-13.00	-25.55	Pass

\*- Margin = Spurious emission – specification limit.

MODULATION: 16QAM

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 the specified limit					Pass
1574.4625	1.040	1000	-39.18	-13.00	-26.18	Pass
2360.130	1.040	1000	-38.81	-13.00	-25.81	Pass
<b>High channel</b>						
0.009 - 1000	More than 20 dB below the specified limit					Pass
1575.8875	1.040	1000	-39.62	-13.00	-36.62	Pass
2365.7725	1.040	1000	-39.11	-13.00	-26.11	Pass

**Reference numbers of test equipment used**

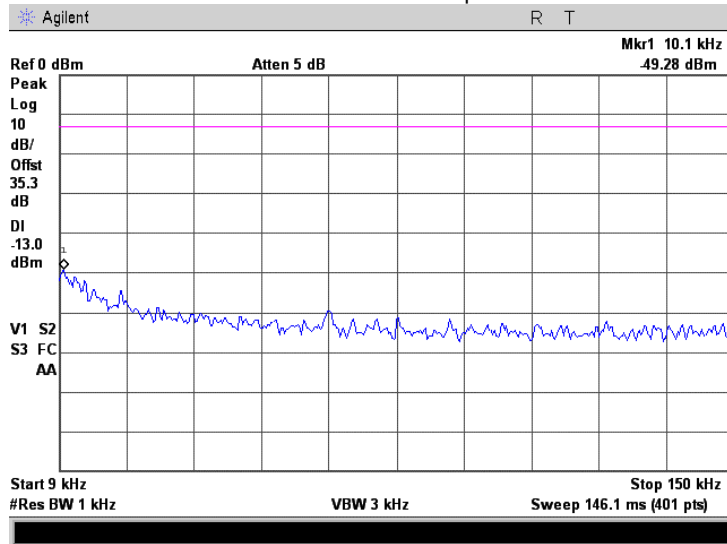
HL 2399	HL 2524	HL 2780				
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Full description is given in Appendix A.

<b>Test specification:</b>	<b>Section 27.53(c)(2), Spurious emissions at RF antenna connector</b>		
<b>Test procedure:</b>	47 CFR, Sections 2.1047, 2.1051, TIA/EIA-603-C, Section 2.2.13		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	<b>PASS</b>
<b>Date:</b>	11/07/2007		
<b>Temperature:</b> 24 °C	<b>Air Pressure:</b> 1013 hPa	<b>Relative Humidity:</b> 45 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

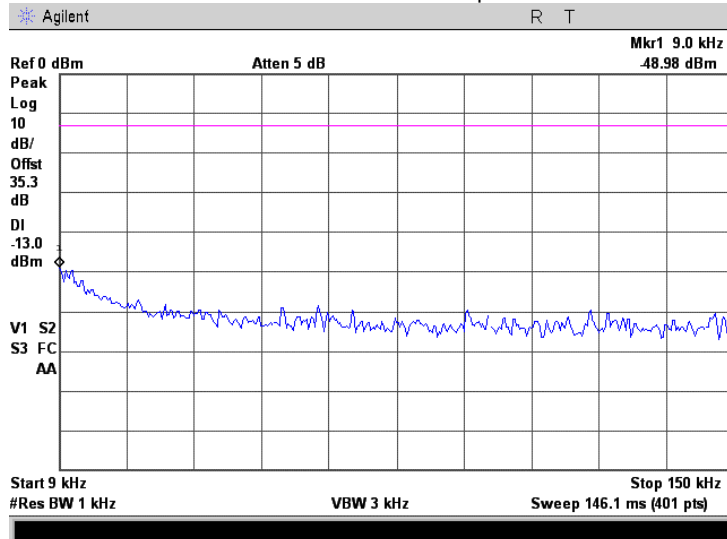
Plot 7.3.1 Spurious emission measurements at RF antenna connector, low channel

Frequency range: 9 – 150 kHz  
Modulation: QPSK  
Data rate: 0.52 Mbps



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

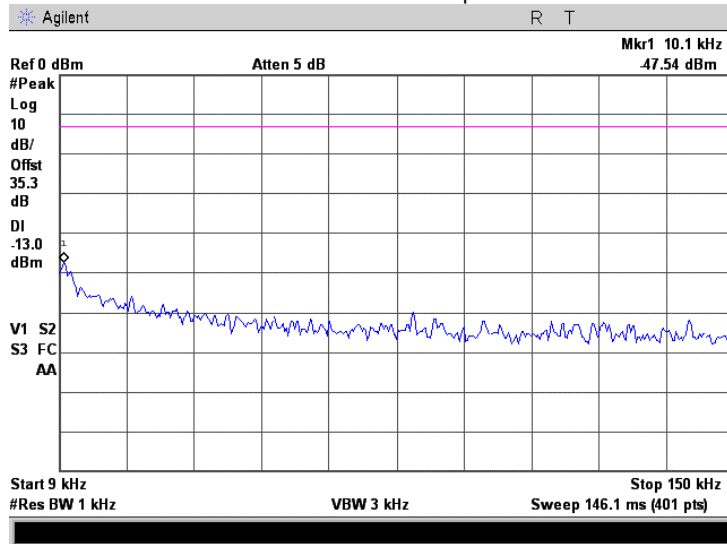
Frequency range: 9 – 150 kHz  
Modulation: 16QAM  
Data rate: 1.040 Mbps



<b>Test specification:</b>	<b>Section 27.53(c)(2), Spurious emissions at RF antenna connector</b>		
<b>Test procedure:</b>	47 CFR, Sections 2.1047, 2.1051, TIA/EIA-603-C, Section 2.2.13		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	<b>PASS</b>
<b>Date:</b>	11/07/2007		
<b>Temperature:</b> 24 °C	<b>Air Pressure:</b> 1013 hPa	<b>Relative Humidity:</b> 45 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

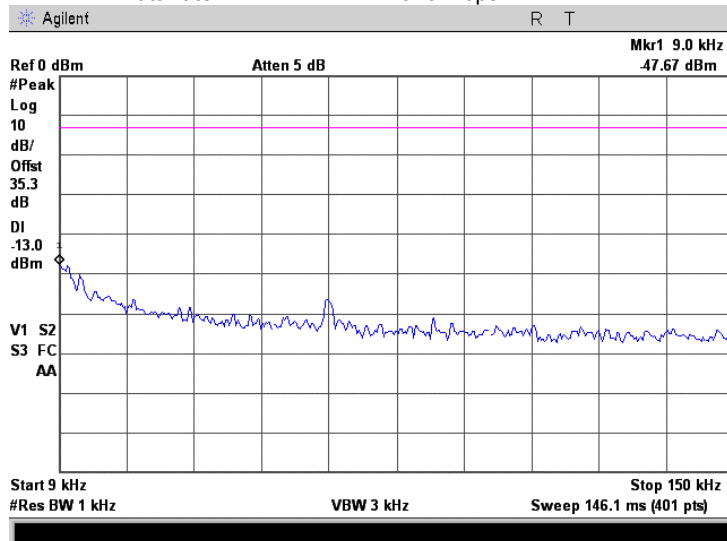
**Plot 7.3.3 Spurious emission measurements at RF antenna connector, high channel**

Frequency range: 9 – 150 kHz  
Modulation: QPSK  
Data rate: 0.52 Mbps



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

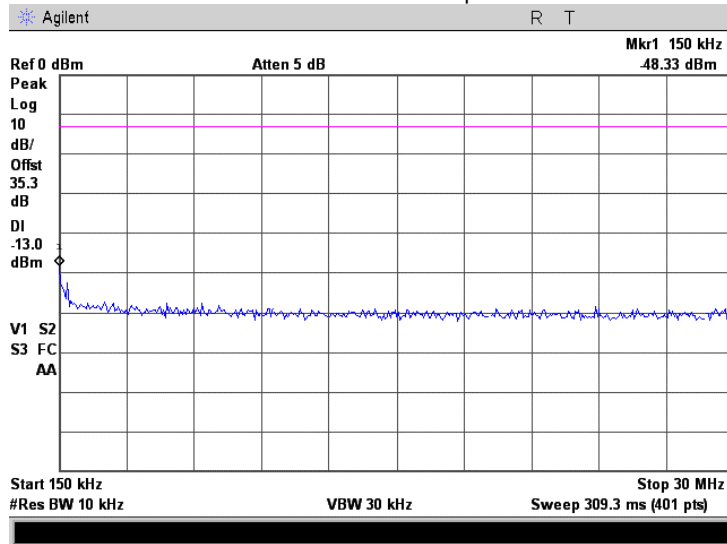
Frequency range: 9 – 150 kHz  
Modulation: 16QAM  
Data rate: 1.040 Mbps



<b>Test specification:</b>	<b>Section 27.53(c)(2), Spurious emissions at RF antenna connector</b>		
<b>Test procedure:</b>	47 CFR, Sections 2.1047, 2.1051, TIA/EIA-603-C, Section 2.2.13		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	<b>PASS</b>
<b>Date:</b>	11/07/2007		
<b>Temperature:</b> 24 °C	<b>Air Pressure:</b> 1013 hPa	<b>Relative Humidity:</b> 45 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

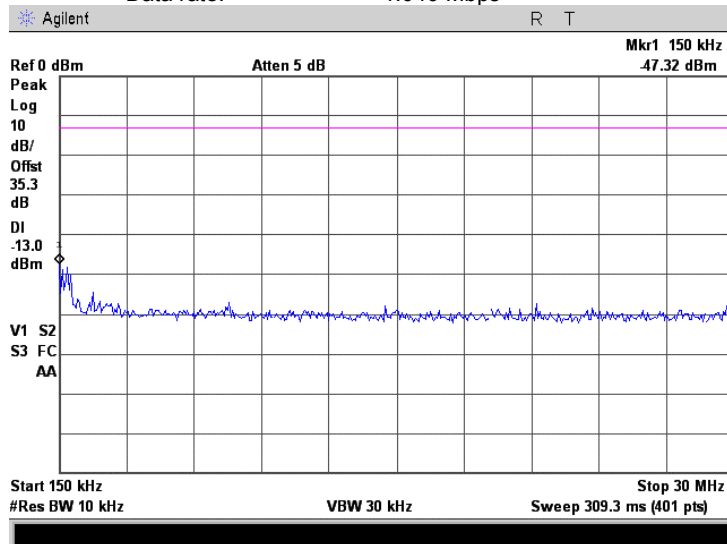
Plot 7.3.5 Spurious emission measurements at RF antenna connector, low channel

Frequency range: 150 kHz – 30 MHz  
Modulation: QPSK  
Data rate: 0.52 Mbps



Plot 7.3.6 Spurious emission measurements at RF antenna connector, low channel

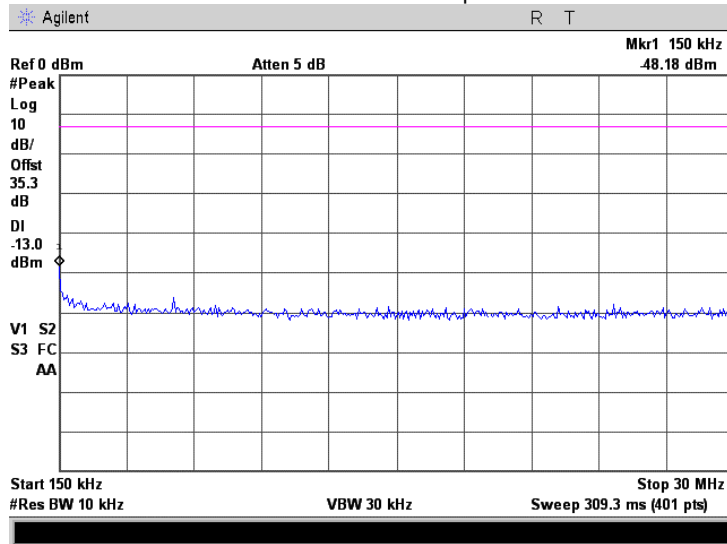
Frequency range: 150 kHz – 30 MHz  
Modulation: 16QAM  
Data rate: 1.040 Mbps



<b>Test specification:</b>	<b>Section 27.53(c)(2), Spurious emissions at RF antenna connector</b>		
<b>Test procedure:</b>	47 CFR, Sections 2.1047, 2.1051, TIA/EIA-603-C, Section 2.2.13		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	<b>PASS</b>
<b>Date:</b>	11/07/2007		
<b>Temperature:</b> 24 °C	<b>Air Pressure:</b> 1013 hPa	<b>Relative Humidity:</b> 45 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

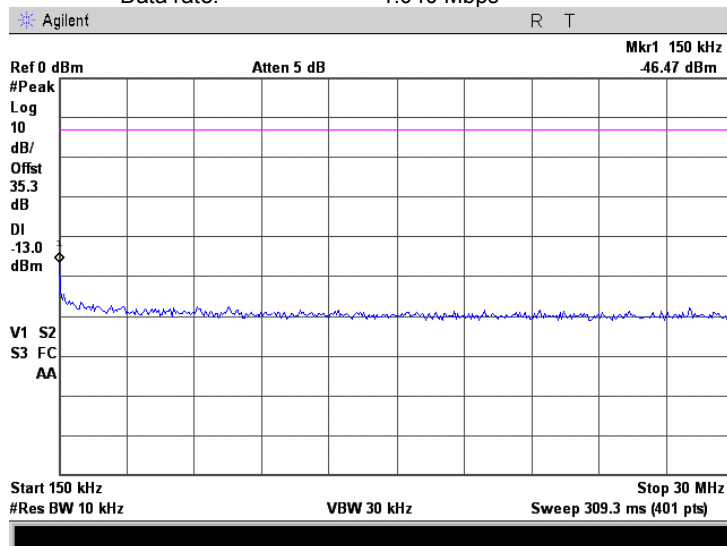
**Plot 7.3.7 Spurious emission measurements at RF antenna connector, high channel**

Frequency range: 150 kHz – 30 MHz  
Modulation: QPSK  
Data rate: 0.52 Mbps



**Plot 7.3.8 Spurious emission measurements at RF antenna connector, high channel**

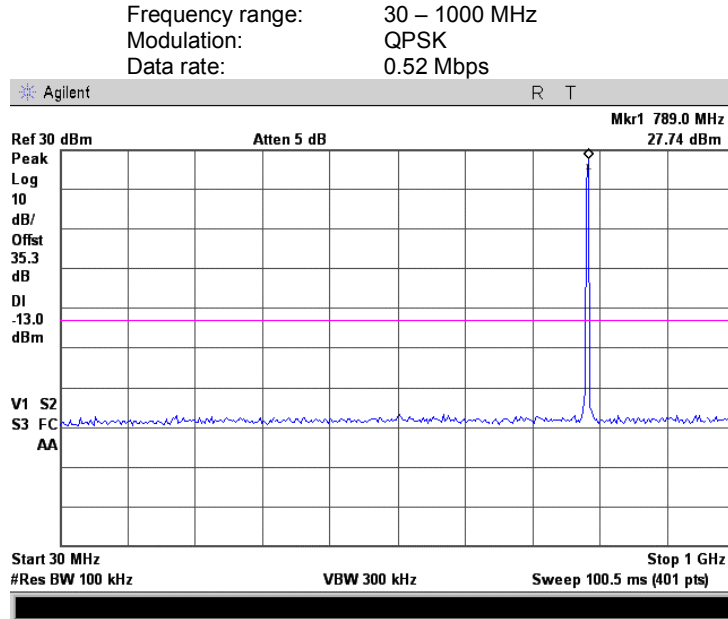
Frequency range: 150 kHz – 30 MHz  
Modulation: 16QAM  
Data rate: 1.040 Mbps



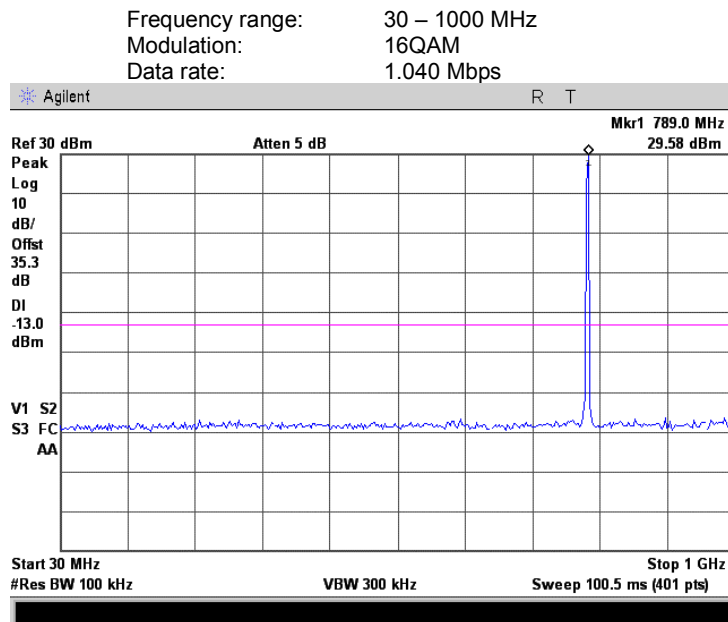


<b>Test specification:</b>	<b>Section 27.53(c)(2), Spurious emissions at RF antenna connector</b>		
<b>Test procedure:</b>	47 CFR, Sections 2.1047, 2.1051, TIA/EIA-603-C, Section 2.2.13		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	<b>PASS</b>
<b>Date:</b>	11/07/2007		
<b>Temperature:</b> 24 °C	<b>Air Pressure:</b> 1013 hPa	<b>Relative Humidity:</b> 45 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

Plot 7.3.9 Spurious emission measurements at RF antenna connector, low channel

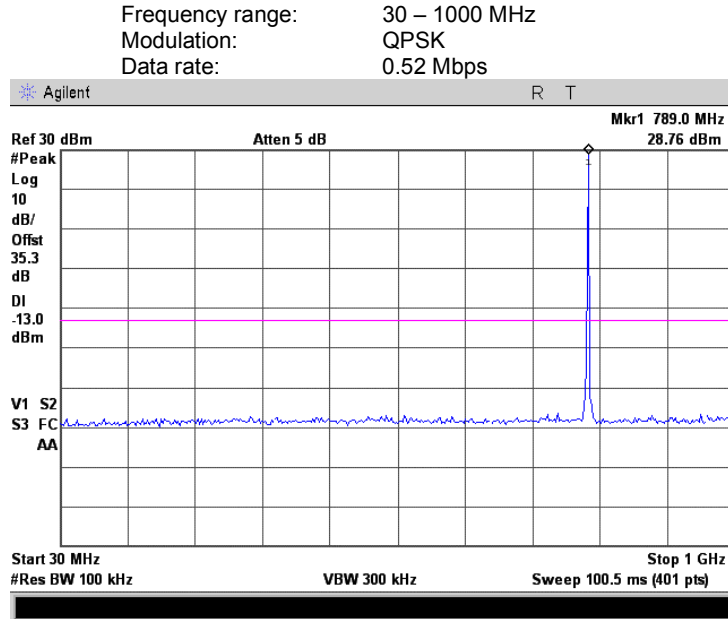


Plot 7.3.10 Spurious emission measurements at RF antenna connector, low channel

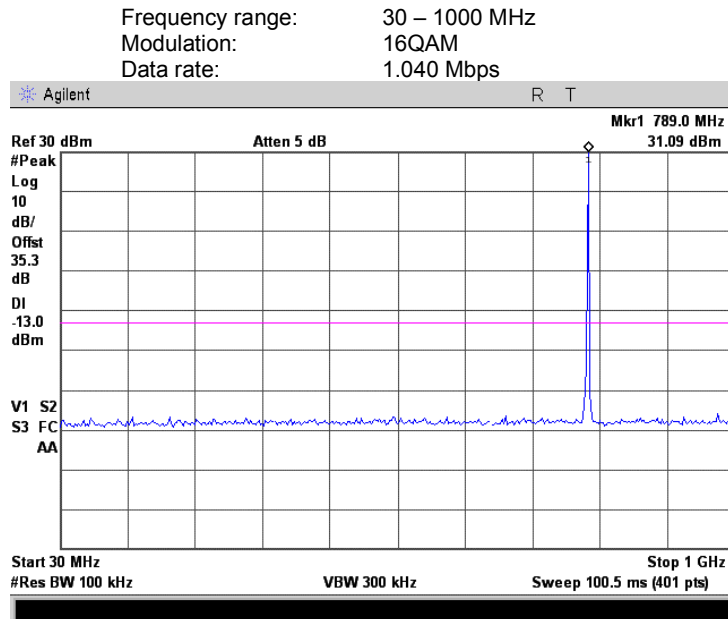


<b>Test specification:</b>	<b>Section 27.53(c)(2), Spurious emissions at RF antenna connector</b>		
<b>Test procedure:</b>	47 CFR, Sections 2.1047, 2.1051, TIA/EIA-603-C, Section 2.2.13		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	<b>PASS</b>
<b>Date:</b>	11/07/2007		
<b>Temperature:</b> 24 °C	<b>Air Pressure:</b> 1013 hPa	<b>Relative Humidity:</b> 45 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

Plot 7.3.11 Spurious emission measurements at RF antenna connector, high channel

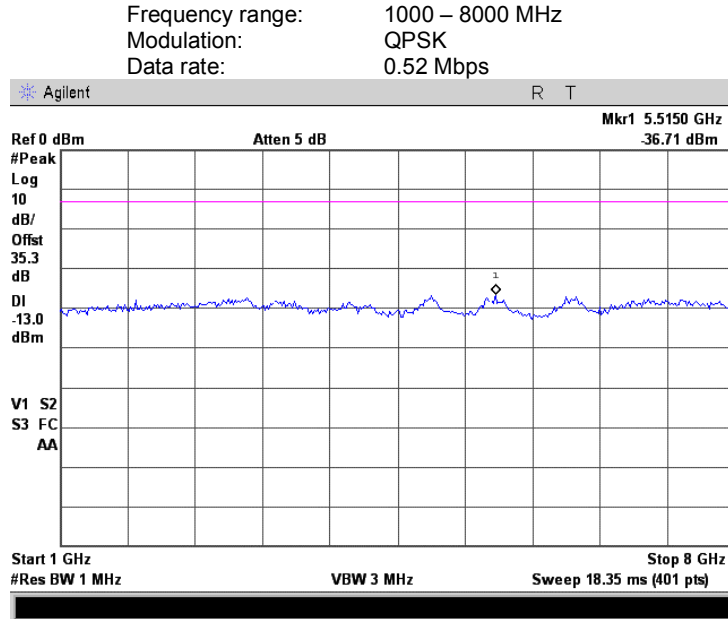


Plot 7.3.12 Spurious emission measurements at RF antenna connector, high channel

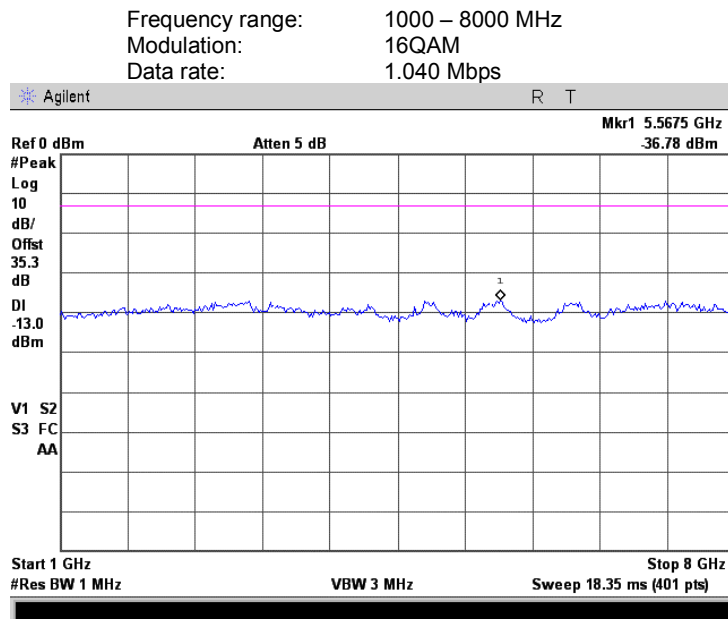


<b>Test specification:</b>	<b>Section 27.53(c)(2), Spurious emissions at RF antenna connector</b>		
<b>Test procedure:</b>	47 CFR, Sections 2.1047, 2.1051, TIA/EIA-603-C, Section 2.2.13		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	<b>PASS</b>
<b>Date:</b>	11/07/2007		
<b>Temperature:</b> 24 °C	<b>Air Pressure:</b> 1013 hPa	<b>Relative Humidity:</b> 45 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

Plot 7.3.13 Spurious emission measurements at RF antenna connector, low channel

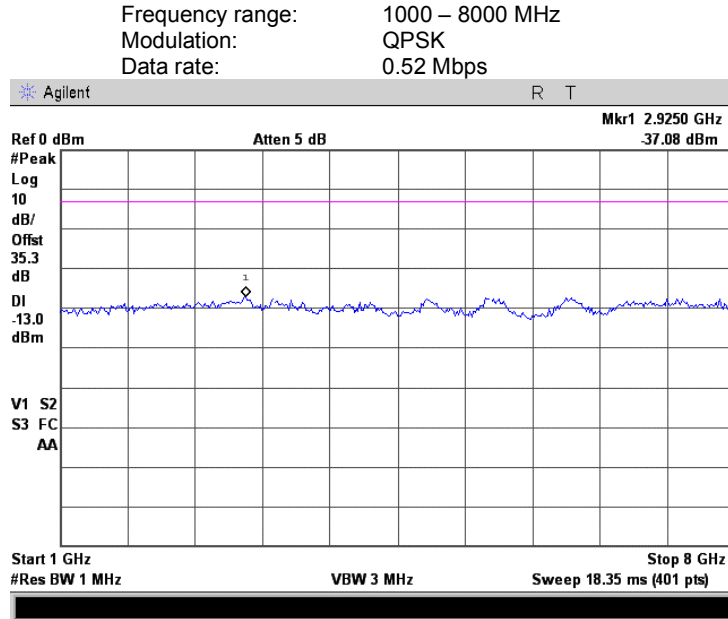


Plot 7.3.14 Spurious emission measurements at RF antenna connector, low channel

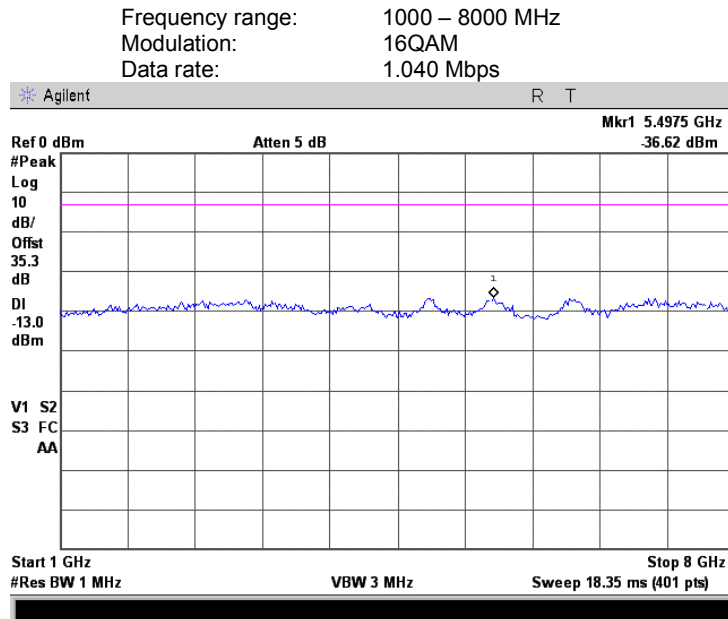


<b>Test specification:</b>	<b>Section 27.53(c)(2), Spurious emissions at RF antenna connector</b>		
<b>Test procedure:</b>	47 CFR, Sections 2.1047, 2.1051, TIA/EIA-603-C, Section 2.2.13		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	<b>PASS</b>
<b>Date:</b>	11/07/2007		
<b>Temperature:</b> 24 °C	<b>Air Pressure:</b> 1013 hPa	<b>Relative Humidity:</b> 45 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

Plot 7.3.15 Spurious emission measurements at RF antenna connector, high channel



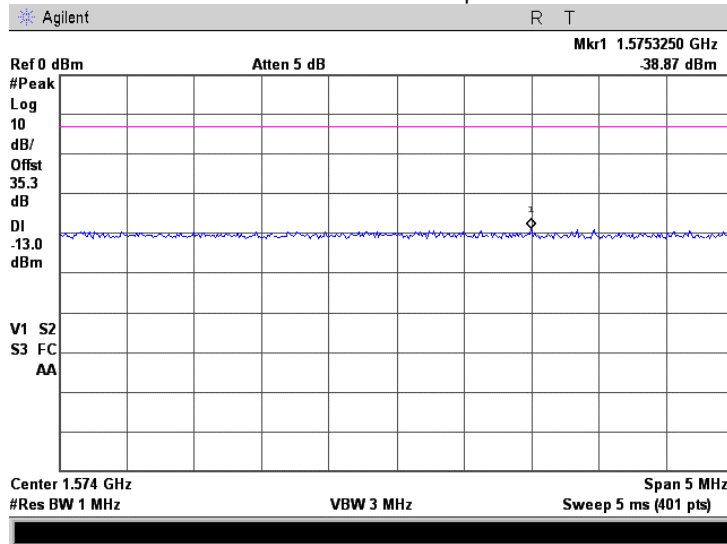
Plot 7.3.16 Spurious emission measurements at RF antenna connector, high channel



<b>Test specification:</b>	<b>Section 27.53(c)(2), Spurious emissions at RF antenna connector</b>		
<b>Test procedure:</b>	47 CFR, Sections 2.1047, 2.1051, TIA/EIA-603-C, Section 2.2.13		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	<b>PASS</b>
<b>Date:</b>	11/07/2007		
<b>Temperature:</b> 24 °C	<b>Air Pressure:</b> 1013 hPa	<b>Relative Humidity:</b> 45 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

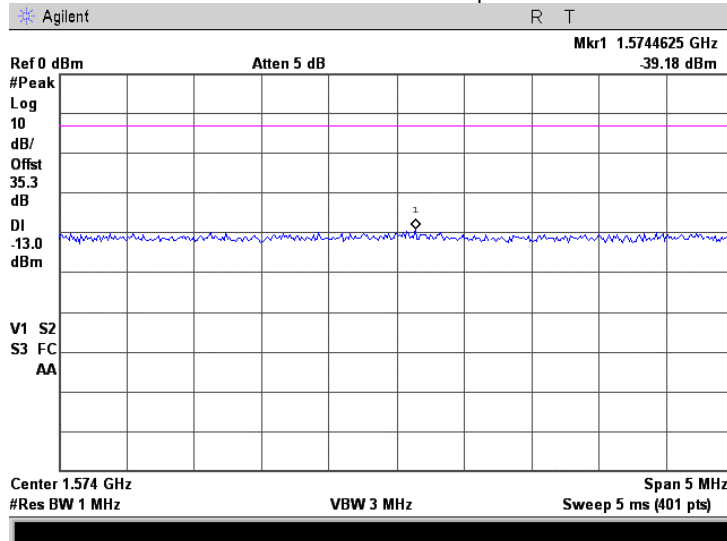
Plot 7.3.17 Spurious emission measurements at RF antenna connector, the 2<sup>nd</sup> harmonic of the low channel

Carrier frequency: 787.1625 MHz  
Modulation: QPSK  
Data rate: 0.52 Mbps



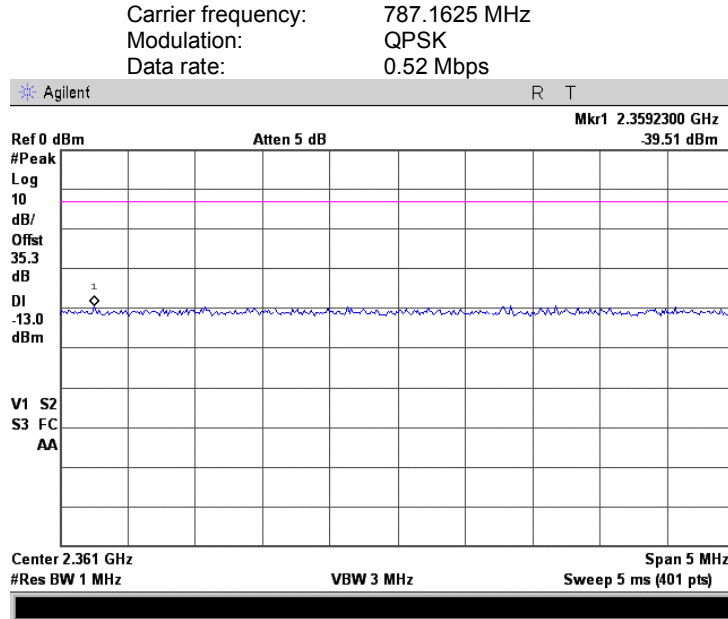
Plot 7.3.18 Spurious emission measurements at RF antenna connector, the 2<sup>nd</sup> harmonic of the low channel

Carrier frequency: 787.1625 MHz  
Modulation: 16QAM  
Data rate: 1.040 Mbps

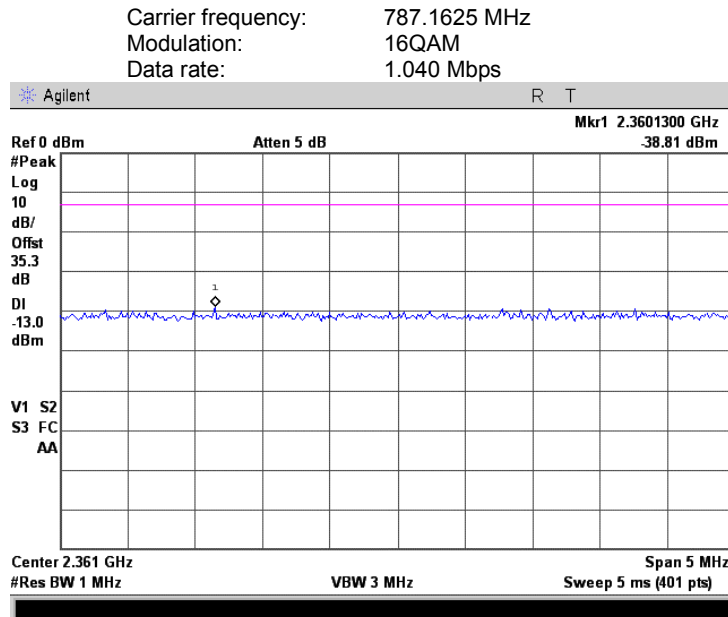


<b>Test specification:</b>	<b>Section 27.53(c)(2), Spurious emissions at RF antenna connector</b>		
<b>Test procedure:</b>	47 CFR, Sections 2.1047, 2.1051, TIA/EIA-603-C, Section 2.2.13		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	<b>PASS</b>
<b>Date:</b>	11/07/2007		
<b>Temperature:</b> 24 °C	<b>Air Pressure:</b> 1013 hPa	<b>Relative Humidity:</b> 45 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

Plot 7.3.19 Spurious emission measurements at RF antenna connector, the 3<sup>rd</sup> harmonic of the low channel

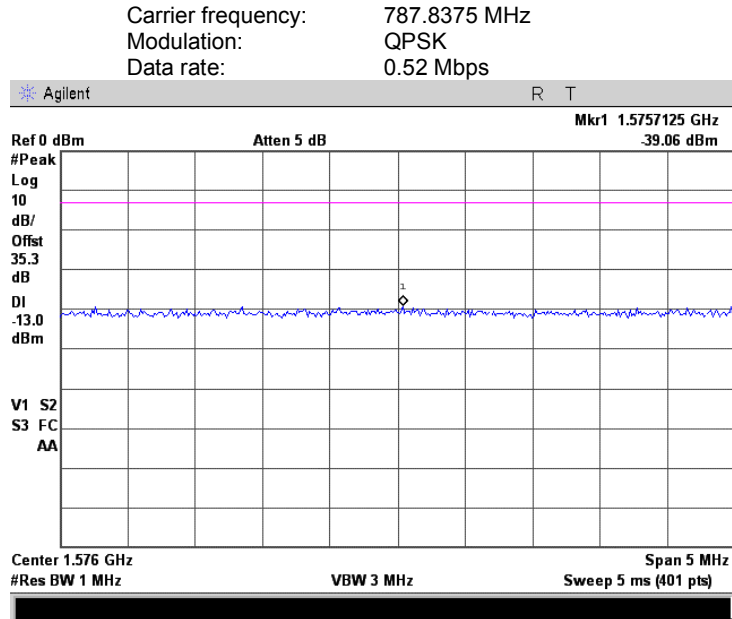


Plot 7.3.20 Spurious emission measurements at RF antenna connector, the 3<sup>rd</sup> harmonic of the low channel

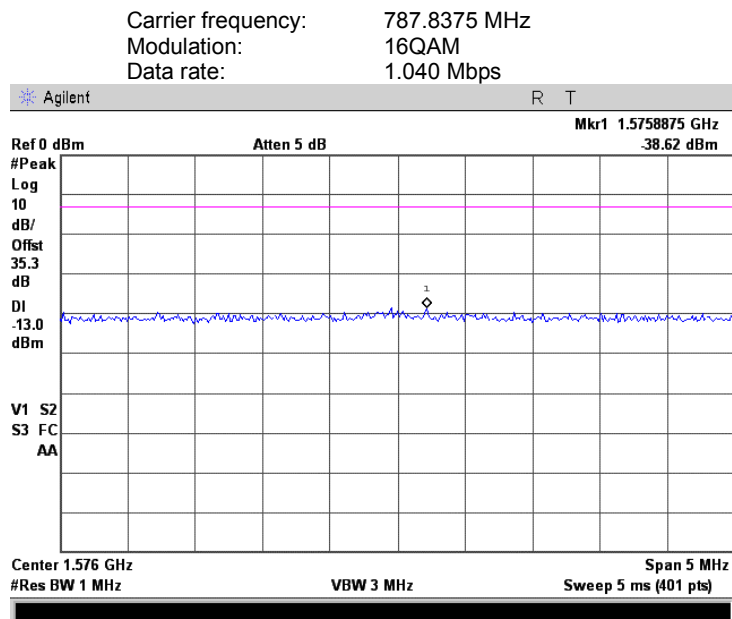


<b>Test specification:</b>	<b>Section 27.53(c)(2), Spurious emissions at RF antenna connector</b>		
<b>Test procedure:</b>	47 CFR, Sections 2.1047, 2.1051, TIA/EIA-603-C, Section 2.2.13		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	<b>PASS</b>
<b>Date:</b>	11/07/2007		
<b>Temperature:</b> 24 °C	<b>Air Pressure:</b> 1013 hPa	<b>Relative Humidity:</b> 45 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

Plot 7.3.21 Spurious emission measurements at RF antenna connector, the 2<sup>nd</sup> harmonic of the high channel



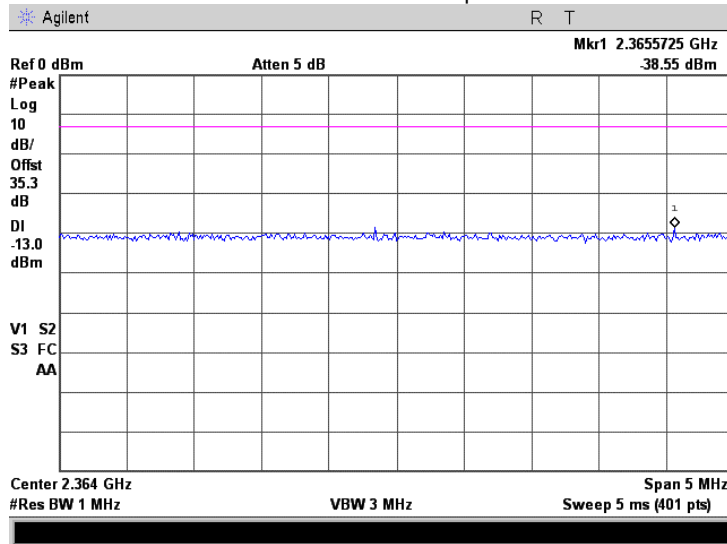
Plot 7.3.22 Spurious emission measurements at RF antenna connector, the 2<sup>nd</sup> harmonic of the high channel



<b>Test specification:</b>	<b>Section 27.53(c)(2), Spurious emissions at RF antenna connector</b>		
<b>Test procedure:</b>	47 CFR, Sections 2.1047, 2.1051, TIA/EIA-603-C, Section 2.2.13		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	<b>PASS</b>
<b>Date:</b>	11/07/2007		
<b>Temperature:</b> 24 °C	<b>Air Pressure:</b> 1013 hPa	<b>Relative Humidity:</b> 45 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

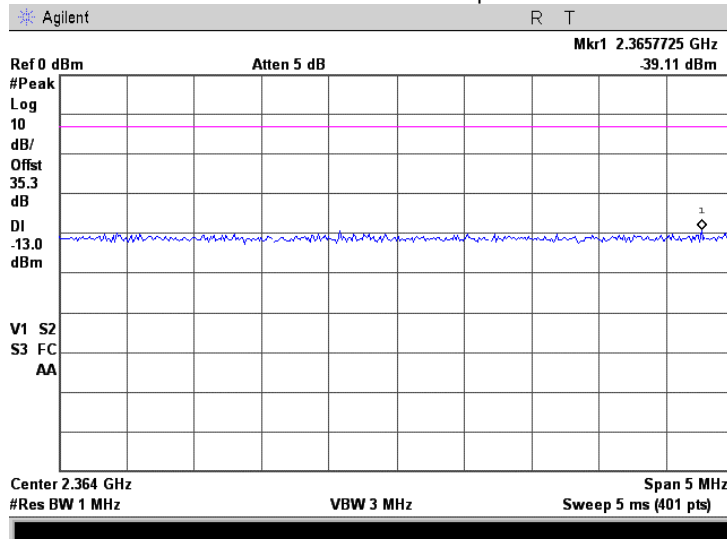
Plot 7.3.23 Spurious emission measurements at RF antenna connector, the 3<sup>rd</sup> harmonic of the high channel

Carrier frequency: 787.8375 MHz  
Modulation: QPSK  
Data rate: 0.52 Mbps



Plot 7.3.24 Spurious emission measurements at RF antenna connector, the 3<sup>rd</sup> harmonic of the high channel

Carrier frequency: 787.8375 MHz  
Modulation: 16QAM  
Data rate: 1.040 Mbps

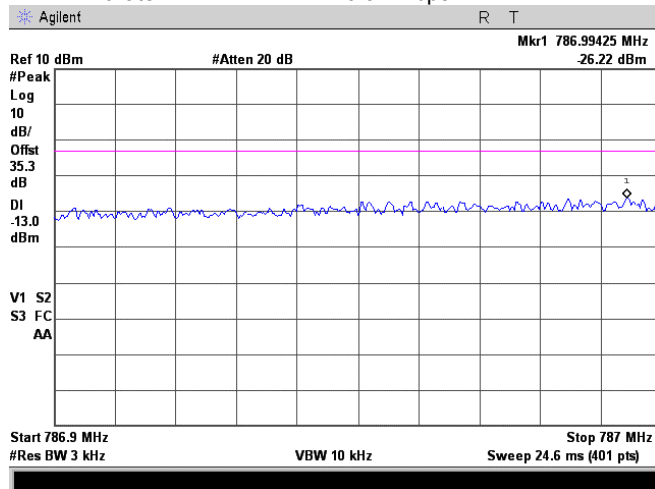




<b>Test specification:</b>	<b>Section 27.53(c)(2), Spurious emissions at RF antenna connector</b>		
<b>Test procedure:</b>	47 CFR, Sections 2.1047, 2.1051, TIA/EIA-603-C, Section 2.2.13		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	<b>PASS</b>
<b>Date:</b>	11/07/2007		
<b>Temperature:</b> 24 °C	<b>Air Pressure:</b> 1013 hPa	<b>Relative Humidity:</b> 45 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

**Plot 7.3.25 Spurious emissions at RF antenna connector, low channel band edge measurements**

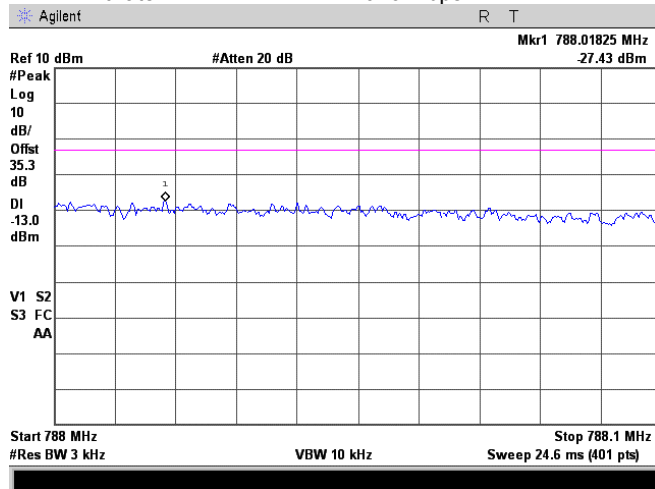
Frequency: 787.1625 MHz  
Band edge: 786.9 – 787.0 MHz  
Modulation: QPSK  
Bit rate: 0.52 Mbps



Test result = SA reading + Correction factor = -26.22 dBm + 10 dB = -16.22 dBm  
Correction factor = log (30kHz/3kHz) = 10 dB

**Plot 7.3.26 Spurious emissions at RF antenna connector, high channel band edge measurements**

Frequency: 787.8375 MHz  
Band edge: 788.0 – 788.1 MHz  
Modulation: QPSK  
Bit rate: 1.040 Mbps

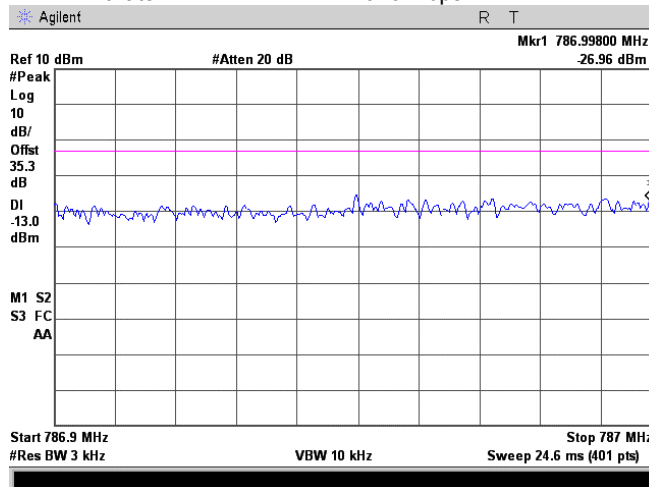


Test result = SA reading + Correction factor = -27.43 dBm + 10 dB = -17.43 dBm  
Correction factor = log (30kHz/3kHz) = 10 dB

<b>Test specification:</b>	<b>Section 27.53(c)(2), Spurious emissions at RF antenna connector</b>		
<b>Test procedure:</b>	47 CFR, Sections 2.1047, 2.1051, TIA/EIA-603-C, Section 2.2.13		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	<b>PASS</b>
<b>Date:</b>	11/07/2007		
<b>Temperature:</b> 24 °C	<b>Air Pressure:</b> 1013 hPa	<b>Relative Humidity:</b> 45 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

**Plot 7.3.27 Spurious emissions at RF antenna connector, low channel band edge measurements**

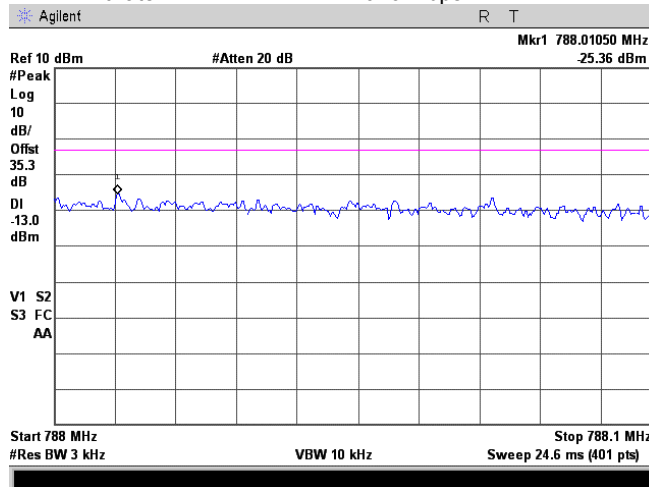
Frequency: 787.1625 MHz  
Band edge: 786.0 – 787.0 MHz  
Modulation: 16QAM  
Bit rate: 1.040 Mbps



Test result = SA reading + Correction factor = -26.96 dBm + 10 dB = -16.96 dBm  
Correction factor = log (30kHz/3kHz) = 10dB

**Plot 7.3.28 Spurious emissions at RF antenna connector, high channel band edge measurements**

Frequency: 787.8375 MHz  
Band edge: 788.0 – 789.0 MHz  
Modulation: 16QAM  
Bit rate: 1.040 Mbps



Test result = SA reading + Correction factor = -25.36 dBm + 10 dB = -15.36 dBm  
Correction factor = log (30kHz/3kHz) = 10 dB

<b>Test specification:</b>	<b>Section 27.53(c)(3), Spurious emissions at RF antenna connector in 763-775 MHz and 793 – 805 MHz</b>		
<b>Test procedure:</b>	47 CFR, Sections 2.1047, 2.1051, TIA/EIA-603-C, Section 2.2.13		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	<b>PASS</b>
<b>Date:</b>	12/31/2007		
<b>Temperature:</b> 22 °C	<b>Air Pressure:</b> 1017 hPa	<b>Relative Humidity:</b> 42 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

## 7.4 Spurious emissions at RF antenna connector test in 763-775 MHz and 793 – 805 MHz

### 7.4.1 General

This test was performed to measure spurious emissions at RF antenna connector. Specification test limits are given in Table 7.4.1.

Table 7.4.1 Spurious emission limits

Frequency, MHz*	Attenuation below carrier, dBc	Spurious emissions, dBm
763 – 775 MHz	76+10logP*	-46
793 – 805 MHz	76+10logP*	-46

\* - P is transmitter output power in Watts.

### 7.4.2 Test procedure

7.4.2.1 The EUT was set up as shown in Figure 7.4.1, energized and its proper operation was checked.

7.4.2.2 The EUT was adjusted to produce maximum available for end user RF output power.

7.4.2.3 The spurious emission was measured with spectrum analyzer as provided in Table 7.4.2 and associated plots.

Figure 7.4.1 Occupied bandwidth test setup





<b>Test specification:</b>	<b>Section 27.53(c)(3), Spurious emissions at RF antenna connector in 763-775 MHz and 793 – 805 MHz</b>		
<b>Test procedure:</b>	47 CFR, Sections 2.1047, 2.1051, TIA/EIA-603-C, Section 2.2.13		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	<b>PASS</b>
<b>Date:</b>	12/31/2007		
<b>Temperature:</b> 22 °C	<b>Air Pressure:</b> 1017 hPa	<b>Relative Humidity:</b> 42 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

Table 7.4.2 Spurious emission test results

ASSIGNED FREQUENCY RANGE: 787.0 – 788.0 MHz  
 INVESTIGATED FREQUENCY RANGE: 763 – 775 MHz, 793 – 805 MHz  
 DETECTOR USED: Peak  
 VIDEO BANDWIDTH: ≥ Resolution bandwidth  
 MODULATING SIGNAL: PRBS  
 BIT RATE: 0.52 Mbps  
 TRANSMITTER OUTPUT POWER SETTINGS: Maximum

MODULATION: QPSK

requency, MHz	Bit rate, Mbps	RBW, kHz	Spurious emission, dBm	Limit, dBm	Margin, dB*	Verdict
<b>Low channel</b>						
763 – 775	0.52	10	-56.54	-46.00	-10.54	Pass
793 - 805	0.52	10	-48.15	-46.00	-2.15	Pass
<b>Mid channel</b>						
763 – 775	0.52	10	-54.28	-46.00	-8.28	Pass
793 - 805	0.52	10	-48.42	-46.00	-2.42	Pass
<b>High channel</b>						
763 – 775	0.52	10	-57.46	-46.00	-11.46	Pass
793 - 805	0.52	10	-48.52	-46.00	-2.52	Pass

MODULATION: 16QAM

Frequency, MHz	Bit rate, Mbps	RBW, kHz	Spurious emission, dBm	Limit, dBm	Margin, dB*	Verdict
<b>Low channel</b>						
763 – 775	1.040	10	-56.22	-46.00	-10.22	Pass
793 - 805	1.040	10	-49.92	-46.00	-3.92	Pass
<b>Mid channel</b>						
763 – 775	1.040	10	-57.21	-46.00	-11.21	Pass
793 - 805	1.040	10	-49.05	-46.00	-3.05	Pass
<b>High channel</b>						
763 – 775	1.040	10	-58.77	-46.00	-12.77	Pass
793 - 805	1.040	10	-49.14	-46.00	-3.14	Pass

\*- Margin = Spurious emission – specification limit.

## Reference numbers of test equipment used

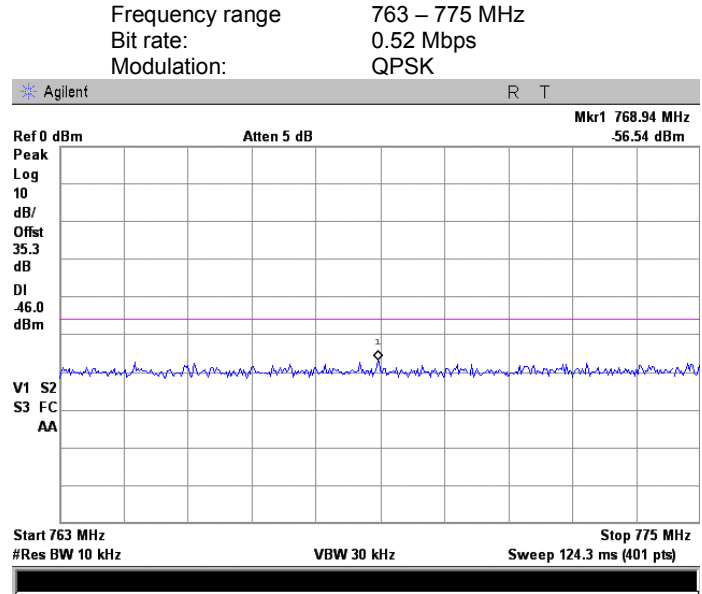
HL 2011	HL 2867	HL 2869	HL 2909	HL 3175	HL 3180		
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Full description is given in Appendix A.

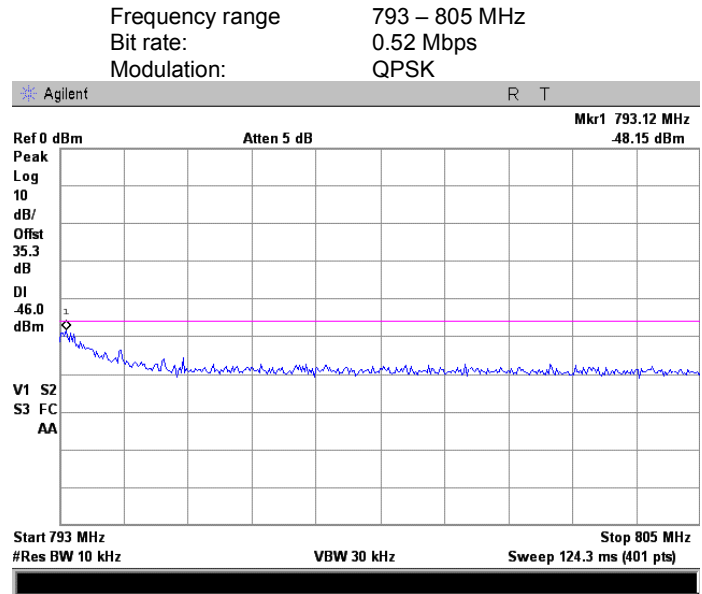


<b>Test specification:</b>	<b>Section 27.53(c)(3), Spurious emissions at RF antenna connector in 763-775 MHz and 793 – 805 MHz</b>		
<b>Test procedure:</b>	47 CFR, Sections 2.1047, 2.1051, TIA/EIA-603-C, Section 2.2.13		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	<b>PASS</b>
<b>Date:</b>	12/31/2007		
<b>Temperature:</b> 22 °C	<b>Air Pressure:</b> 1017 hPa	<b>Relative Humidity:</b> 42 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

Plot 7.4.1 Spurious emission measurements at RF antenna connector at low frequency

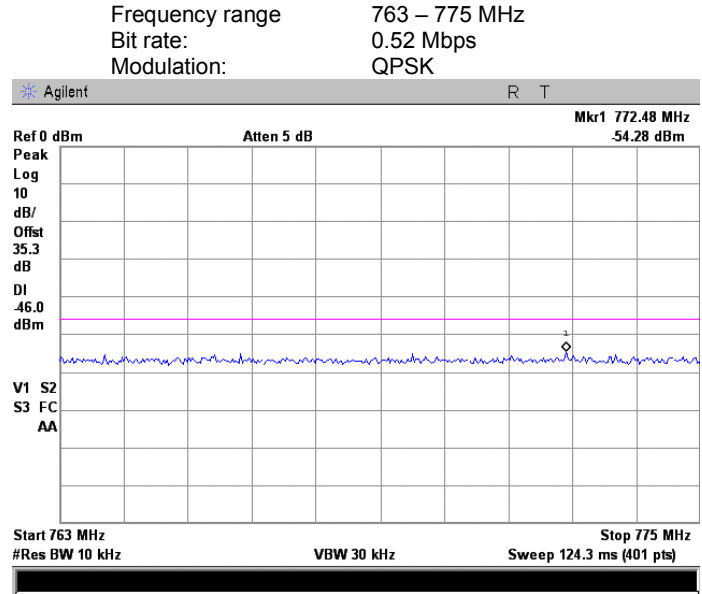


Plot 7.4.2 Spurious emission measurements at RF antenna connector at low frequency

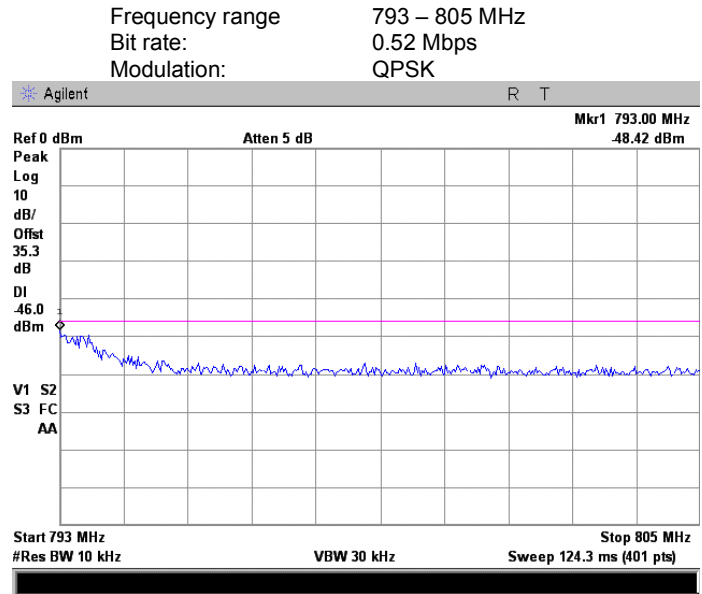


<b>Test specification:</b>	<b>Section 27.53(c)(3), Spurious emissions at RF antenna connector in 763-775 MHz and 793 – 805 MHz</b>		
<b>Test procedure:</b>	47 CFR, Sections 2.1047, 2.1051, TIA/EIA-603-C, Section 2.2.13		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	<b>PASS</b>
<b>Date:</b>	12/31/2007		
<b>Temperature:</b> 22 °C	<b>Air Pressure:</b> 1017 hPa	<b>Relative Humidity:</b> 42 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

**Plot 7.4.3 Spurious emission measurements at RF antenna connector at mid frequency**

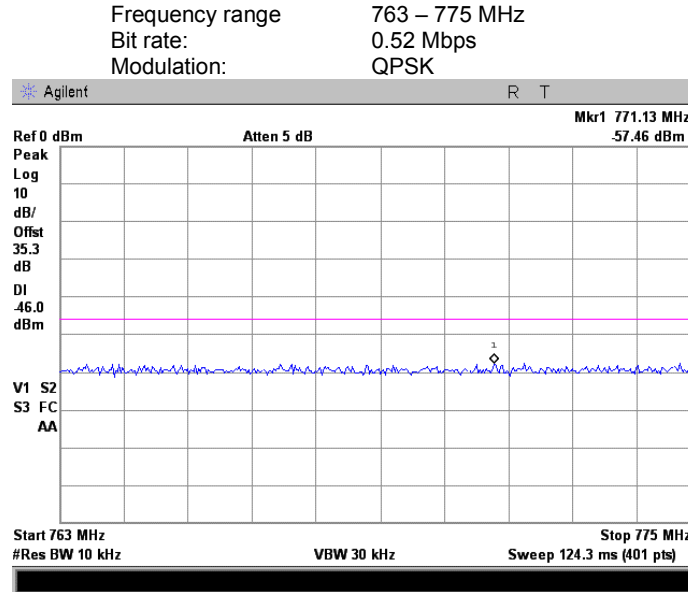


**Plot 7.4.4 Spurious emission measurements at RF antenna connector at mid frequency**

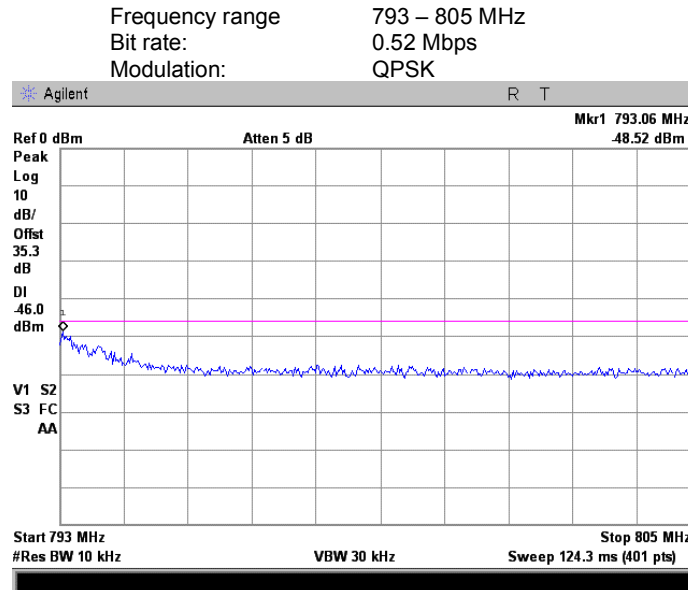


<b>Test specification:</b>	<b>Section 27.53(c)(3), Spurious emissions at RF antenna connector in 763-775 MHz and 793 – 805 MHz</b>		
<b>Test procedure:</b>	47 CFR, Sections 2.1047, 2.1051, TIA/EIA-603-C, Section 2.2.13		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	<b>PASS</b>
<b>Date:</b>	12/31/2007		
<b>Temperature:</b> 22 °C	<b>Air Pressure:</b> 1017 hPa	<b>Relative Humidity:</b> 42 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

Plot 7.4.5 Spurious emission measurements at RF antenna connector at high frequency

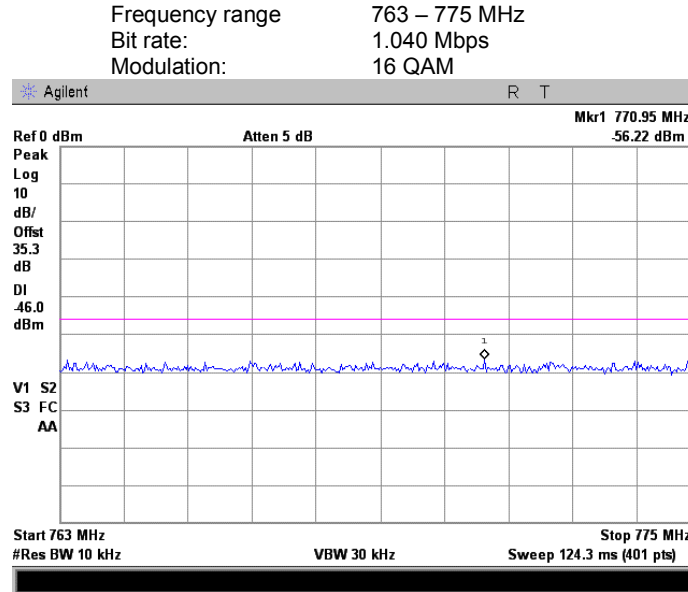


Plot 7.4.6 Spurious emission measurements at RF antenna connector at high frequency

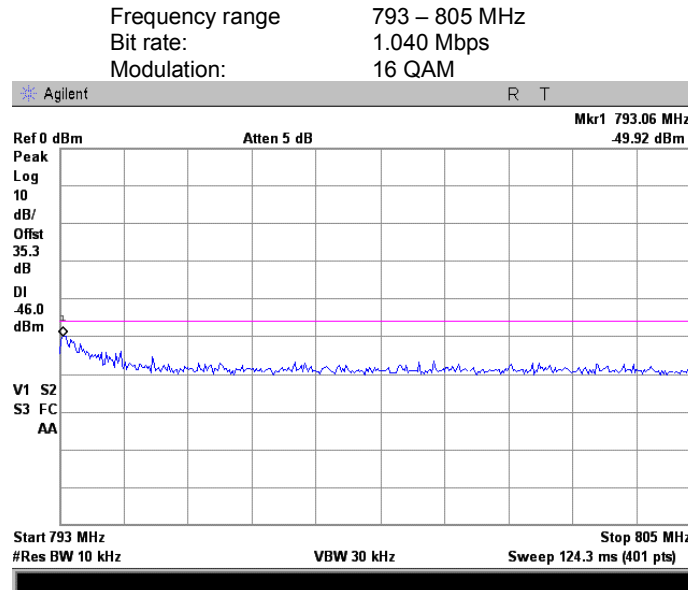


<b>Test specification:</b>	<b>Section 27.53(c)(3), Spurious emissions at RF antenna connector in 763-775 MHz and 793 – 805 MHz</b>		
<b>Test procedure:</b>	47 CFR, Sections 2.1047, 2.1051, TIA/EIA-603-C, Section 2.2.13		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	<b>PASS</b>
<b>Date:</b>	12/31/2007		
<b>Temperature:</b> 22 °C	<b>Air Pressure:</b> 1017 hPa	<b>Relative Humidity:</b> 42 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

Plot 7.4.7 Spurious emission measurements at RF antenna connector at low frequency



Plot 7.4.8 Spurious emission measurements at RF antenna connector at low frequency

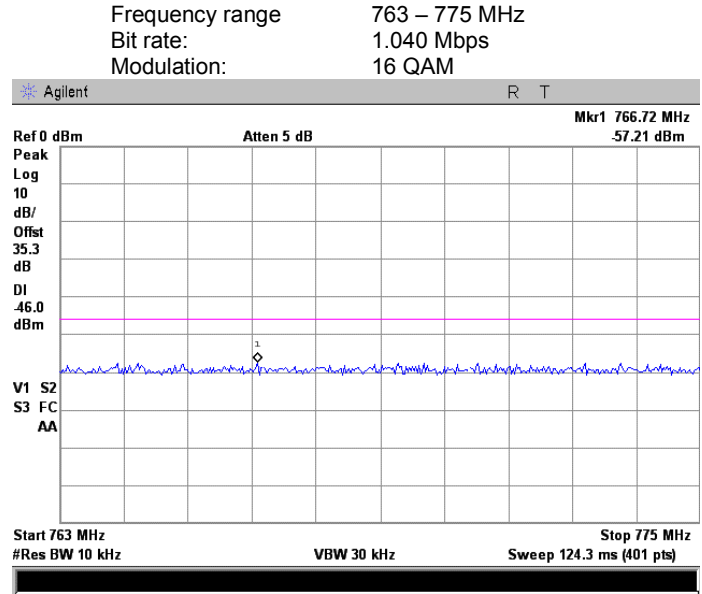




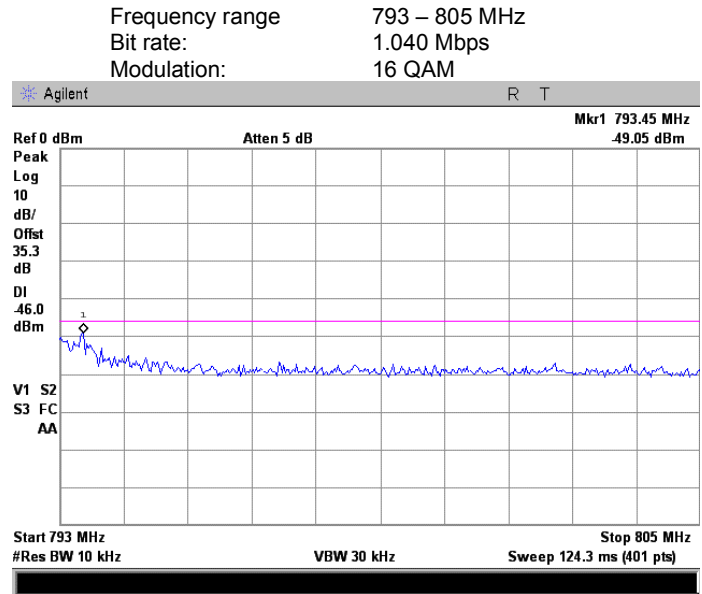


<b>Test specification:</b>	<b>Section 27.53(c)(3), Spurious emissions at RF antenna connector in 763-775 MHz and 793 – 805 MHz</b>		
<b>Test procedure:</b>	47 CFR, Sections 2.1047, 2.1051, TIA/EIA-603-C, Section 2.2.13		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	<b>PASS</b>
<b>Date:</b>	12/31/2007		
<b>Temperature:</b> 22 °C	<b>Air Pressure:</b> 1017 hPa	<b>Relative Humidity:</b> 42 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

Plot 7.4.9 Spurious emission measurements at RF antenna connector at mid frequency

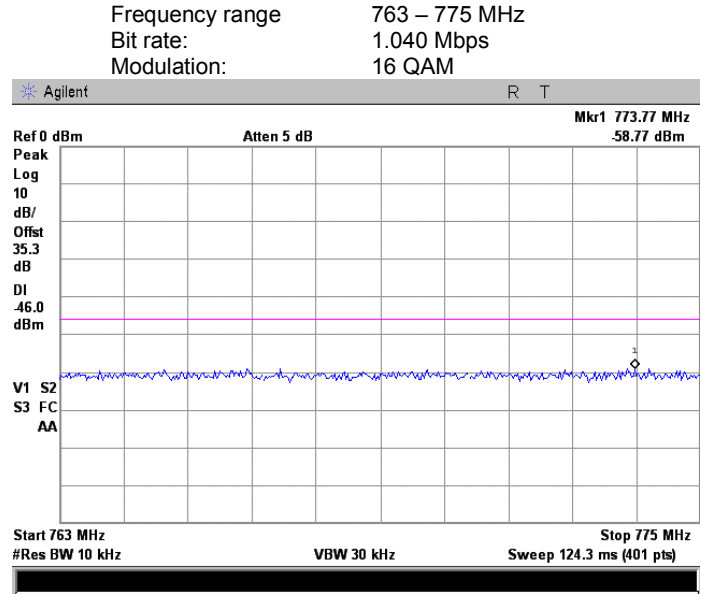


Plot 7.4.10 Spurious emission measurements at RF antenna connector at mid frequency

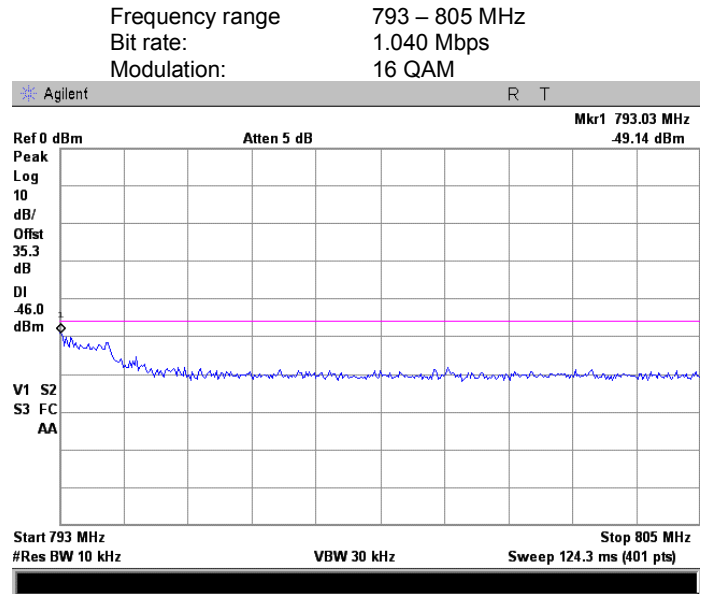


<b>Test specification:</b>	<b>Section 27.53(c)(3), Spurious emissions at RF antenna connector in 763-775 MHz and 793 – 805 MHz</b>		
<b>Test procedure:</b>	47 CFR, Sections 2.1047, 2.1051, TIA/EIA-603-C, Section 2.2.13		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	<b>PASS</b>
<b>Date:</b>	12/31/2007		
<b>Temperature:</b> 22 °C	<b>Air Pressure:</b> 1017 hPa	<b>Relative Humidity:</b> 42 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

Plot 7.4.11 Spurious emission measurements at RF antenna connector at high frequency



Plot 7.4.12 Spurious emission measurements at RF antenna connector at high frequency





<b>Test specification:</b>	<b>Section 27.53(c)(2), Radiated spurious emissions</b>		
<b>Test procedure:</b>	47 CFR, Section 2.1053, TIA/EIA-603-C, Section 2.2.12		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	<b>PASS</b>
<b>Date:</b>	11/11/2007		
<b>Temperature:</b> 24 °C	<b>Air Pressure:</b> 1008 hPa	<b>Relative Humidity:</b> 45 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

## 7.5 Radiated spurious emission measurements

### 7.5.1 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 7.5.1.

**Table 7.5.1 Radiated spurious emission test limits**

Frequency, MHz*	Attenuation below carrier dBc	Spurious emissions, dBm	Equivalent field strength limit @ 3m, dB( $\mu$ V/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.

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

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

**7.5.2.2** 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.

**7.5.2.3** The test results were recorded in Table 7.5.2 and shown in the associated plots.

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

**7.5.3.1** The EUT was set up as shown in Figures 7.5.2, energized and the EUT performance was checked.

**7.5.3.2** 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.

**7.5.3.3** The worst test results with respect to the limits were recorded in Table 7.5.2 and shown in the associated plots.

<b>Test specification:</b>	<b>Section 27.53(c)(2), Radiated spurious emissions</b>		
<b>Test procedure:</b>	47 CFR, Section 2.1053, TIA/EIA-603-C, Section 2.2.12		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	<b>PASS</b>
<b>Date:</b>	11/11/2007		
<b>Temperature:</b> 24 °C	<b>Air Pressure:</b> 1008 hPa	<b>Relative Humidity:</b> 45 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

Figure 7.5.1 Setup for spurious emission field strength measurements in 9 kHz to 30 MHz range

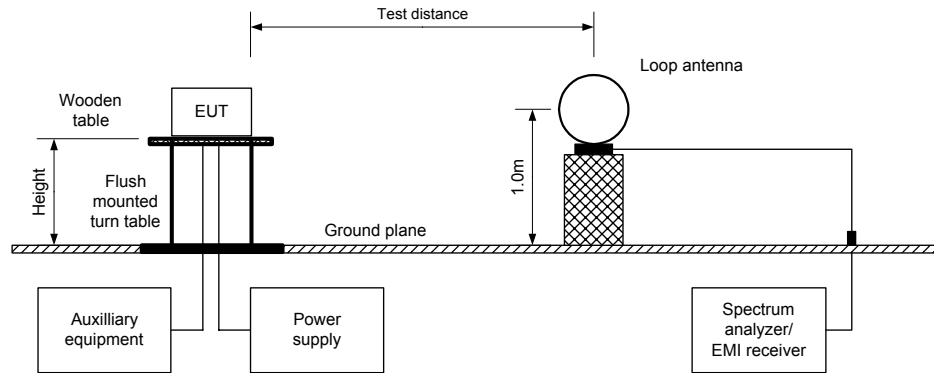
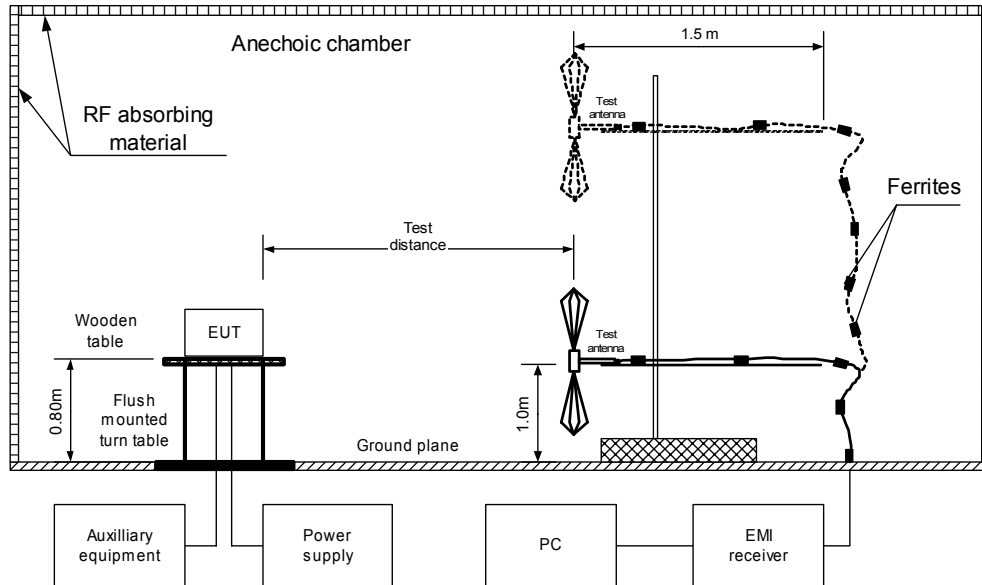


Figure 7.5.2 Setup for spurious emission field strength measurements above 30 MHz





<b>Test specification:</b>	<b>Section 27.53(c)(2), Radiated spurious emissions</b>		
<b>Test procedure:</b>	47 CFR, Section 2.1053, TIA/EIA-603-C, Section 2.2.12		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	<b>PASS</b>
<b>Date:</b>	11/11/2007		
<b>Temperature:</b> 24 °C	<b>Air Pressure:</b> 1008 hPa	<b>Relative Humidity:</b> 45 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

**Table 7.5.2 Spurious emission field strength test results**

ASSIGNED FREQUENCY RANGE: 787.0 – 788.0 MHz  
TEST DISTANCE: 3 m  
EUT HEIGHT: 0.8 m  
INVESTIGATED FREQUENCY RANGE: 0.009 – 8000 MHz  
DETECTOR USED: Peak  
VIDEO BANDWIDTH: ≥ 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(μV/m)	Limit, dB(μV/m)	Margin, dB*	Verdict
All found emissions were more than 20 dB below the limit						Pass

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

**Reference numbers of test equipment used**

HL 0446	HL 0521	HL 0589	HL 0604	HL 1004	HL 1947	HL 2432	HL 2780
HL 2871							

Full description is given in Appendix A.



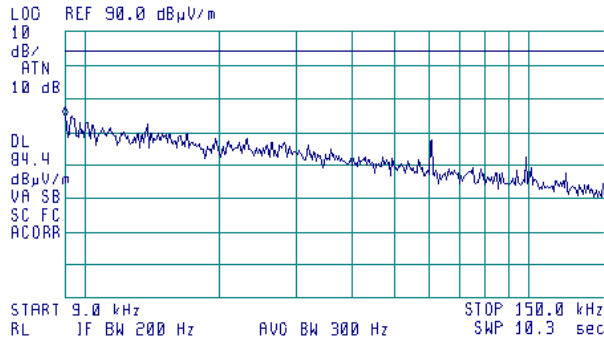
<b>Test specification:</b>	<b>Section 27.53(c)(2), Radiated spurious emissions</b>		
<b>Test procedure:</b>	47 CFR, Section 2.1053, TIA/EIA-603-C, Section 2.2.12		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	<b>PASS</b>
<b>Date:</b>	11/11/2007		
<b>Temperature:</b> 24 °C	<b>Air Pressure:</b> 1008 hPa	<b>Relative Humidity:</b> 45 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

**Plot 7.5.1 Radiated emission measurements in 9 - 150 kHz range**

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

17:12:26 NOV 11, 2007

ACTV DET: PEAK  
 MEAS DET: PEAK OP AVG  
 MKR 9.0 kHz  
 64.69 dBµV/m

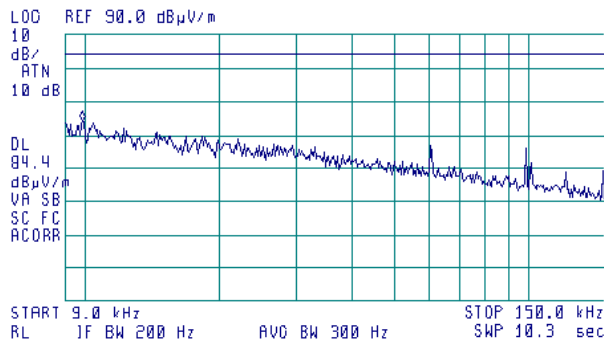


**Plot 7.5.2 Radiated emission measurements in 9 - 150 kHz range**

TEST SITE: Semi anechoic chamber  
 CARRIER FREQUENCY: Low  
 ANTENNA POLARIZATION: Vertical  
 TEST DISTANCE: 3 m  
 MODULATION: 16QAM

17:17:38 NOV 11, 2007

ACTV DET: PEAK  
 MEAS DET: PEAK OP AVG  
 MKR 9.9 kHz  
 64.25 dBµV/m



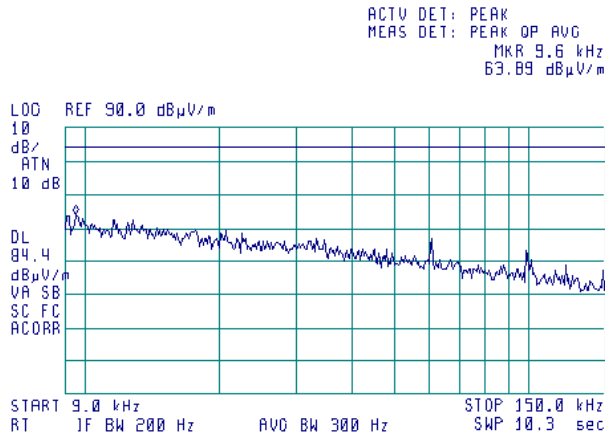


<b>Test specification:</b>	<b>Section 27.53(c)(2), Radiated spurious emissions</b>		
<b>Test procedure:</b>	47 CFR, Section 2.1053, TIA/EIA-603-C, Section 2.2.12		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	<b>PASS</b>
<b>Date:</b>	11/11/2007		
<b>Temperature:</b> 24 °C	<b>Air Pressure:</b> 1008 hPa	<b>Relative Humidity:</b> 45 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

**Plot 7.5.3 Radiated emission measurements in 9 - 150 kHz range**

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

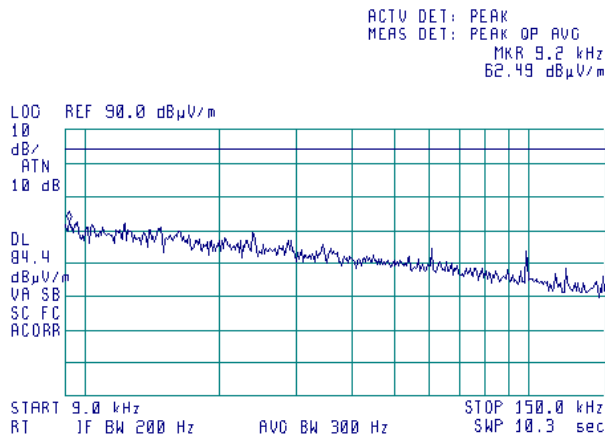
17:35:57 NOV 11, 2007



**Plot 7.5.4 Radiated emission measurements in 9 - 150 kHz range**

TEST SITE: Semi anechoic chamber  
 CARRIER FREQUENCY: Mid  
 ANTENNA POLARIZATION: Vertical  
 TEST DISTANCE: 3 m  
 MODULATION: 16QAM

17:22:33 NOV 11, 2007



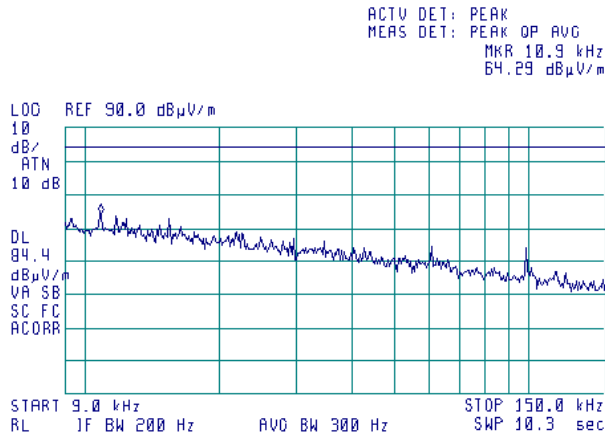


<b>Test specification:</b>	<b>Section 27.53(c)(2), Radiated spurious emissions</b>		
<b>Test procedure:</b>	47 CFR, Section 2.1053, TIA/EIA-603-C, Section 2.2.12		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	<b>PASS</b>
<b>Date:</b>	11/11/2007		
<b>Temperature:</b> 24 °C	<b>Air Pressure:</b> 1008 hPa	<b>Relative Humidity:</b> 45 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

**Plot 7.5.5 Radiated emission measurements in 9 - 150 kHz range**

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

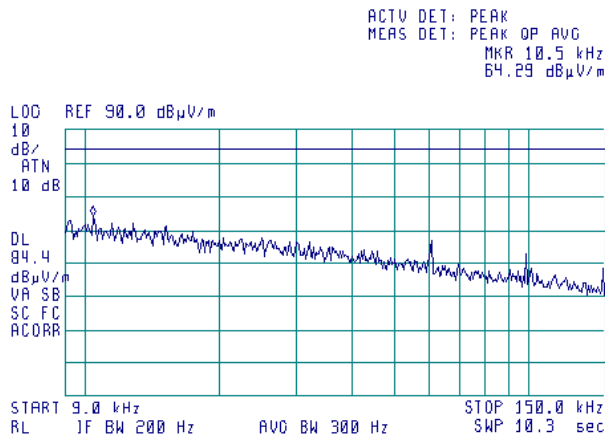
17:39:00 NOV 11, 2007



**Plot 7.5.6 Radiated emission measurements in 9 - 150 kHz range**

TEST SITE: Semi anechoic chamber  
 CARRIER FREQUENCY: High  
 ANTENNA POLARIZATION: Vertical  
 TEST DISTANCE: 3 m  
 MODULATION: 16QAM

17:46:46 NOV 11, 2007







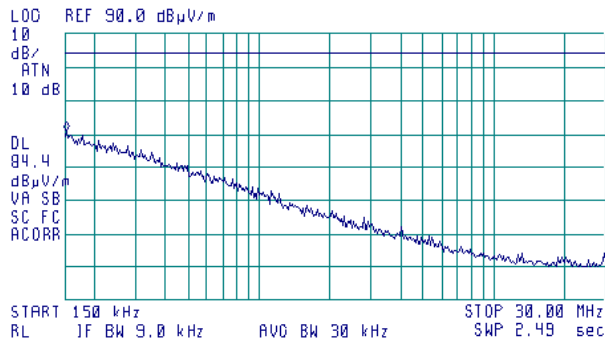
<b>Test specification:</b>	<b>Section 27.53(c)(2), Radiated spurious emissions</b>		
<b>Test procedure:</b>	47 CFR, Section 2.1053, TIA/EIA-603-C, Section 2.2.12		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	<b>PASS</b>
<b>Date:</b>	11/11/2007		
<b>Temperature:</b> 24 °C	<b>Air Pressure:</b> 1008 hPa	<b>Relative Humidity:</b> 45 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

**Plot 7.5.7 Radiated emission measurements in 0.15 - 30 MHz range**

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

17:09:44 NOV 11, 2007

ACTV DET: PEAK  
 MEAS DET: PEAK OP AVG  
 MKR 150 kHz  
 60.59 dBµV/m

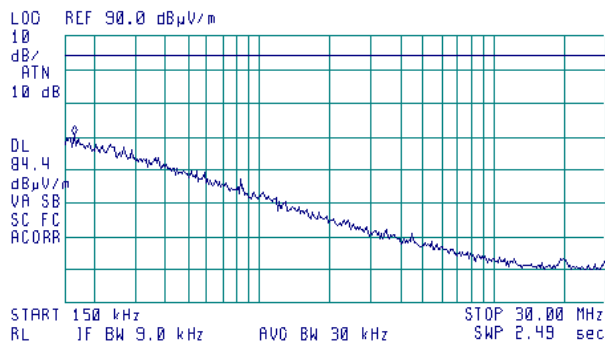


**Plot 7.5.8 Radiated emission measurements in 0.15 - 30 MHz range**

TEST SITE: Semi anechoic chamber  
 CARRIER FREQUENCY: Low  
 ANTENNA POLARIZATION: Vertical  
 TEST DISTANCE: 3 m  
 MODULATION: 16QAM

17:05:52 NOV 11, 2007

ACTV DET: PEAK  
 MEAS DET: PEAK OP AVG  
 MKR 170 kHz  
 60.39 dBµV/m





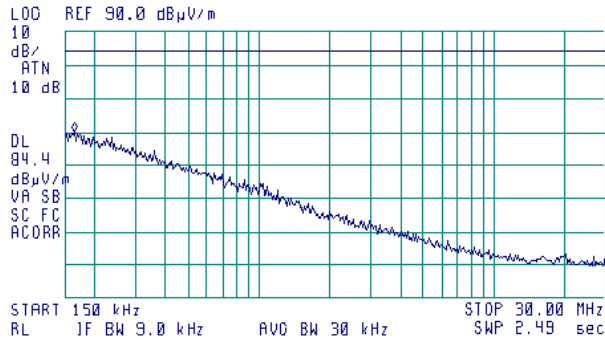
<b>Test specification:</b>	<b>Section 27.53(c)(2), Radiated spurious emissions</b>		
<b>Test procedure:</b>	47 CFR, Section 2.1053, TIA/EIA-603-C, Section 2.2.12		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	<b>PASS</b>
<b>Date:</b>	11/11/2007		
<b>Temperature:</b> 24 °C	<b>Air Pressure:</b> 1008 hPa	<b>Relative Humidity:</b> 45 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

**Plot 7.5.9 Radiated emission measurements in 0.15 - 30 MHz range**

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

17:33:11 NOV 11, 2007

ACTV DET: PEAK  
 MEAS DET: PEAK OP AVG  
 MKR 170 kHz  
 60.16 dBµV/m

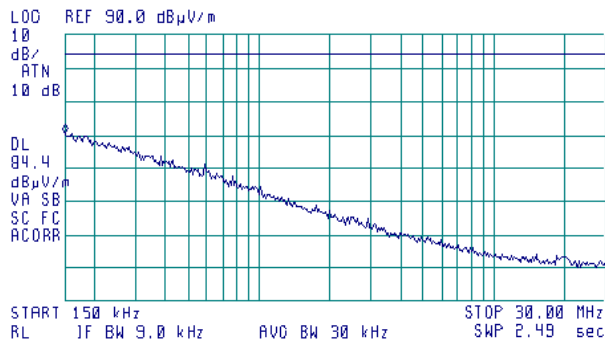


**Plot 7.5.10 Radiated emission measurements in 0.15 - 30 MHz range**

TEST SITE: Semi anechoic chamber  
 CARRIER FREQUENCY: Mid  
 ANTENNA POLARIZATION: Vertical  
 TEST DISTANCE: 3 m  
 MODULATION: 16QAM

17:28:04 NOV 11, 2007

ACTV DET: PEAK  
 MEAS DET: PEAK OP AVG  
 MKR 150 kHz  
 60.48 dBµV/m





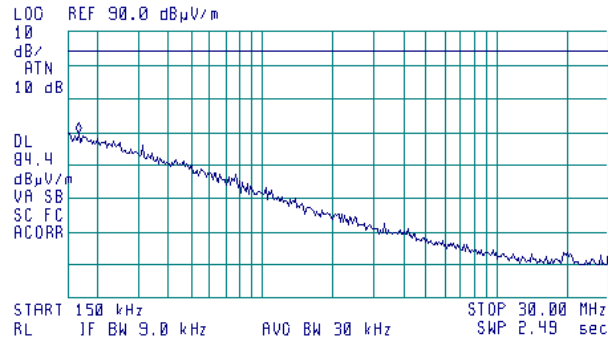
<b>Test specification:</b>	<b>Section 27.53(c)(2), Radiated spurious emissions</b>		
<b>Test procedure:</b>	47 CFR, Section 2.1053, TIA/EIA-603-C, Section 2.2.12		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	<b>PASS</b>
<b>Date:</b>	11/11/2007		
<b>Temperature:</b> 24 °C	<b>Air Pressure:</b> 1008 hPa	<b>Relative Humidity:</b> 45 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

**Plot 7.5.11 Radiated emission measurements in 0.15 - 30 MHz range**

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

17:41:03 NOV 11, 2007

ACTV DET: PEAK  
 MEAS DET: PEAK OP AVG  
 MKR 170 kHz  
 59.74 dBµV/m

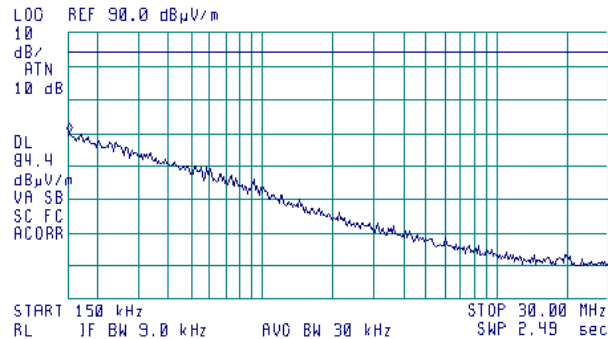


**Plot 7.5.12 Radiated emission measurements in 0.15 - 30 MHz range**

TEST SITE: Semi anechoic chamber  
 CARRIER FREQUENCY: High  
 ANTENNA POLARIZATION: Vertical  
 TEST DISTANCE: 3 m  
 MODULATION: 16QAM

17:44:14 NOV 11, 2007

ACTV DET: PEAK  
 MEAS DET: PEAK OP AVG  
 MKR 150 kHz  
 60.02 dBµV/m



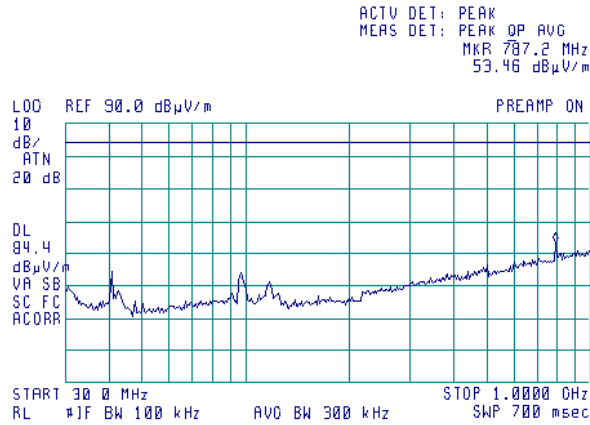


<b>Test specification:</b>	<b>Section 27.53(c)(2), Radiated spurious emissions</b>		
<b>Test procedure:</b>	47 CFR, Section 2.1053, TIA/EIA-603-C, Section 2.2.12		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	<b>PASS</b>
<b>Date:</b>	11/11/2007		
<b>Temperature:</b> 24 °C	<b>Air Pressure:</b> 1008 hPa	<b>Relative Humidity:</b> 45 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

Plot 7.5.13 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  
 MODULATION: QPSK

13:10:05 NOV 11, 2007

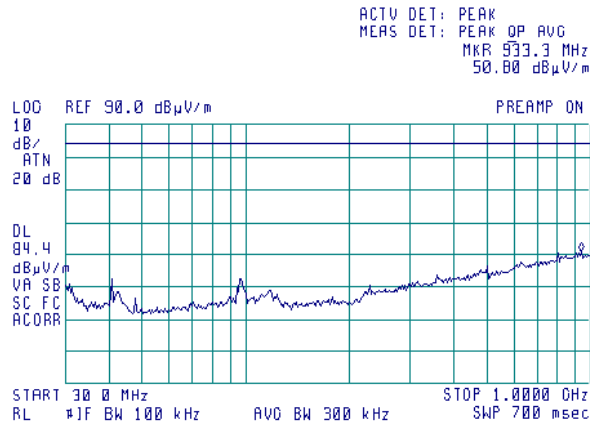


Note: 787.1625 MHz – intentional radiation of RF module

Plot 7.5.14 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  
 MODULATION: 16QAM

13:05:33 NOV 11, 2007



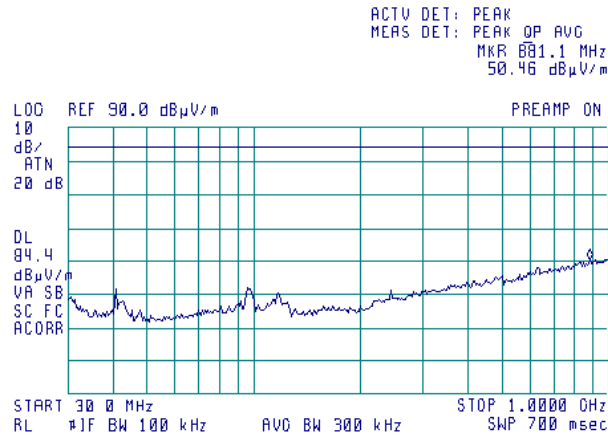


<b>Test specification:</b>	<b>Section 27.53(c)(2), Radiated spurious emissions</b>		
<b>Test procedure:</b>	47 CFR, Section 2.1053, TIA/EIA-603-C, Section 2.2.12		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	<b>PASS</b>
<b>Date:</b>	11/11/2007		
<b>Temperature:</b> 24 °C	<b>Air Pressure:</b> 1008 hPa	<b>Relative Humidity:</b> 45 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

**Plot 7.5.15 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  
 MODULATION: QPSK

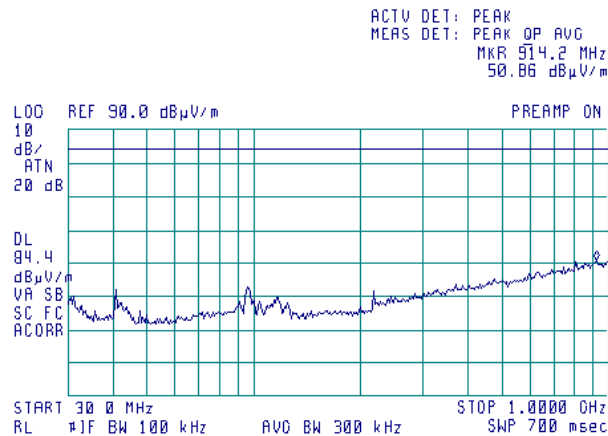
12:39:03 NOV 11, 2007



**Plot 7.5.16 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  
 MODULATION: 16QAM

12:47:40 NOV 11, 2007



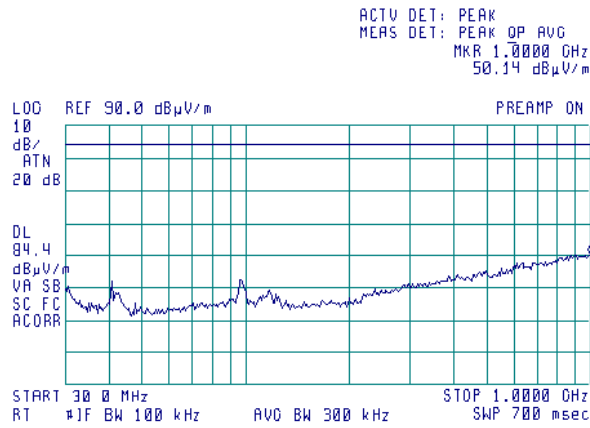


<b>Test specification:</b>	<b>Section 27.53(c)(2), Radiated spurious emissions</b>		
<b>Test procedure:</b>	47 CFR, Section 2.1053, TIA/EIA-603-C, Section 2.2.12		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	<b>PASS</b>
<b>Date:</b>	11/11/2007		
<b>Temperature:</b> 24 °C	<b>Air Pressure:</b> 1008 hPa	<b>Relative Humidity:</b> 45 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

**Plot 7.5.17 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  
 MODULATION: QPSK

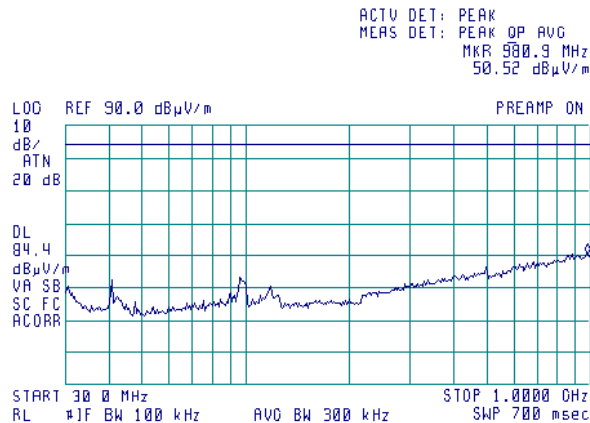
12:52:06 NOV 11, 2007



**Plot 7.5.18 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  
 MODULATION: 16QAM

12:57:00 NOV 11, 2007



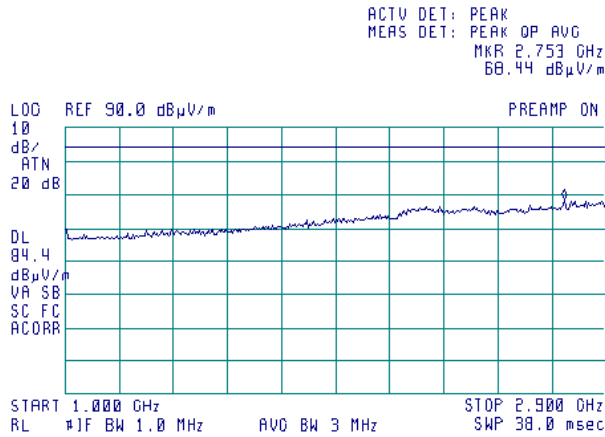


<b>Test specification:</b>	<b>Section 27.53(c)(2), Radiated spurious emissions</b>		
<b>Test procedure:</b>	47 CFR, Section 2.1053, TIA/EIA-603-C, Section 2.2.12		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	<b>PASS</b>
<b>Date:</b>	11/11/2007		
<b>Temperature:</b> 24 °C	<b>Air Pressure:</b> 1008 hPa	<b>Relative Humidity:</b> 45 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

**Plot 7.5.19 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  
 MODULATION: QPSK

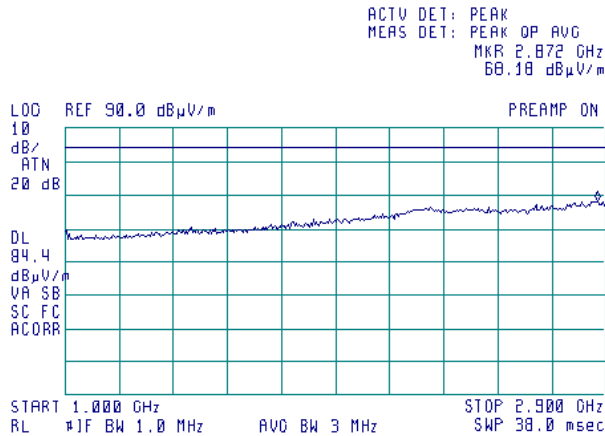
13:23:14 NOV 11, 2007



**Plot 7.5.20 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  
 MODULATION: 16QAM

13:29:27 NOV 11, 2007



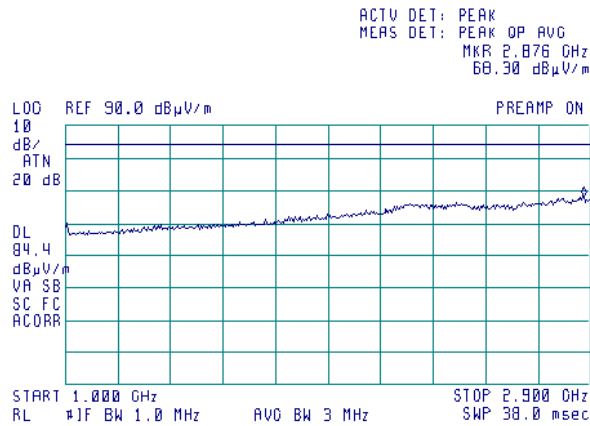


<b>Test specification:</b>	<b>Section 27.53(c)(2), Radiated spurious emissions</b>		
<b>Test procedure:</b>	47 CFR, Section 2.1053, TIA/EIA-603-C, Section 2.2.12		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	<b>PASS</b>
<b>Date:</b>	11/11/2007		
<b>Temperature:</b> 24 °C	<b>Air Pressure:</b> 1008 hPa	<b>Relative Humidity:</b> 45 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

**Plot 7.5.21 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  
 MODULATION: QPSK

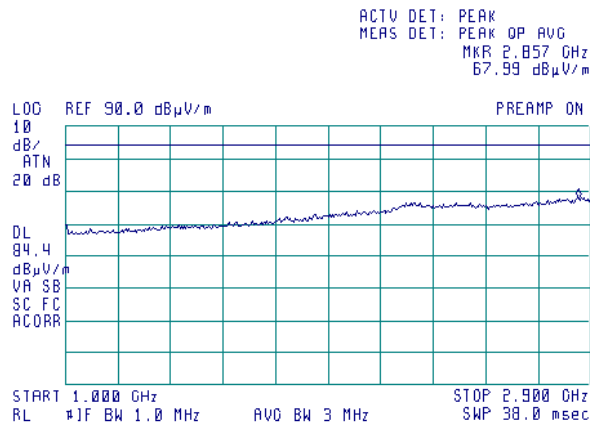
14:13:15 NOV 11, 2007



**Plot 7.5.22 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  
 MODULATION: 16QAM

14:09:04 NOV 11, 2007





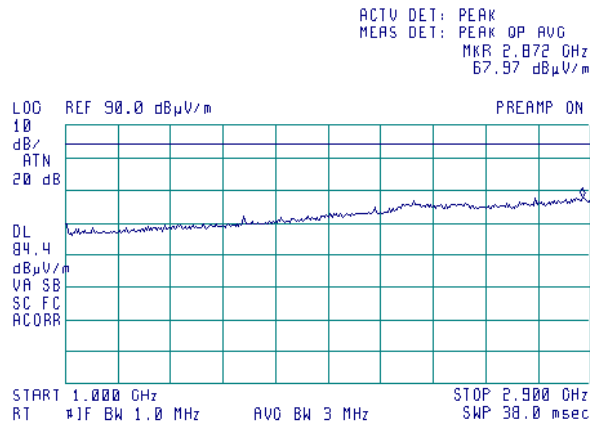


<b>Test specification:</b>	<b>Section 27.53(c)(2), Radiated spurious emissions</b>		
<b>Test procedure:</b>	47 CFR, Section 2.1053, TIA/EIA-603-C, Section 2.2.12		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	<b>PASS</b>
<b>Date:</b>	11/11/2007		
<b>Temperature:</b> 24 °C	<b>Air Pressure:</b> 1008 hPa	<b>Relative Humidity:</b> 45 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

**Plot 7.5.23 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  
 MODULATION: QPSK

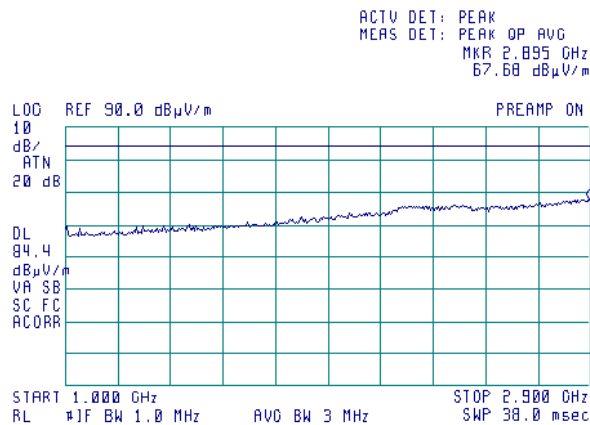
14:17:20 NOV 11, 2007



**Plot 7.5.24 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  
 MODULATION: 16QAM

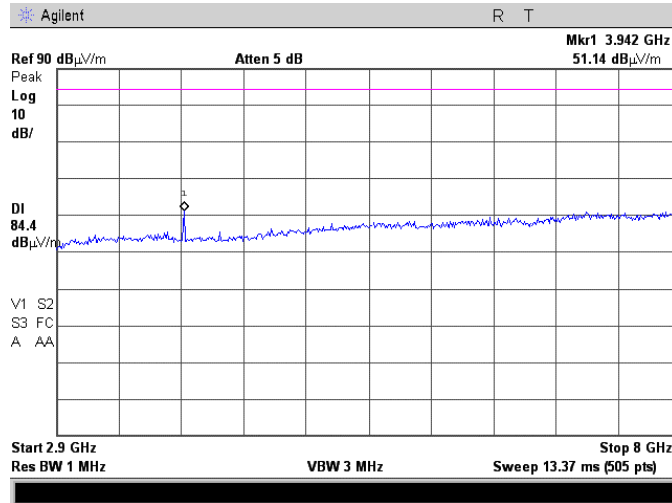
14:21:21 NOV 11, 2007



<b>Test specification:</b>	<b>Section 27.53(c)(2), Radiated spurious emissions</b>		
<b>Test procedure:</b>	47 CFR, Section 2.1053, TIA/EIA-603-C, Section 2.2.12		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	<b>PASS</b>
<b>Date:</b>	11/11/2007		
<b>Temperature:</b> 24 °C	<b>Air Pressure:</b> 1008 hPa	<b>Relative Humidity:</b> 45 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

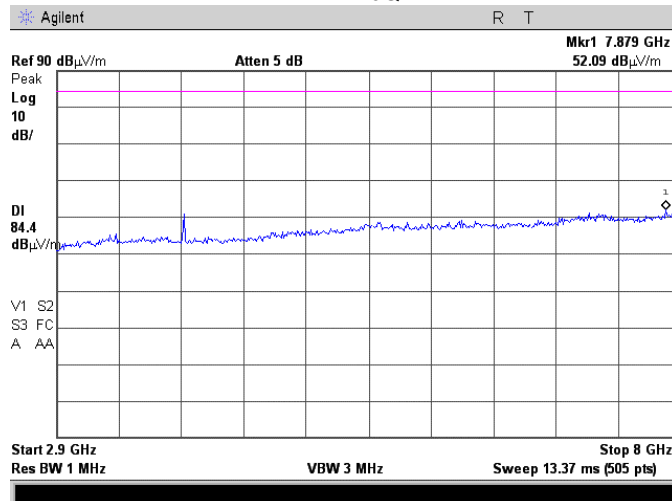
**Plot 7.5.25 Radiated emission measurements in 2.9 – 8.0 GHz range**

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



**Plot 7.5.26 Radiated emission measurements in 2.9 – 8.0 GHz range**

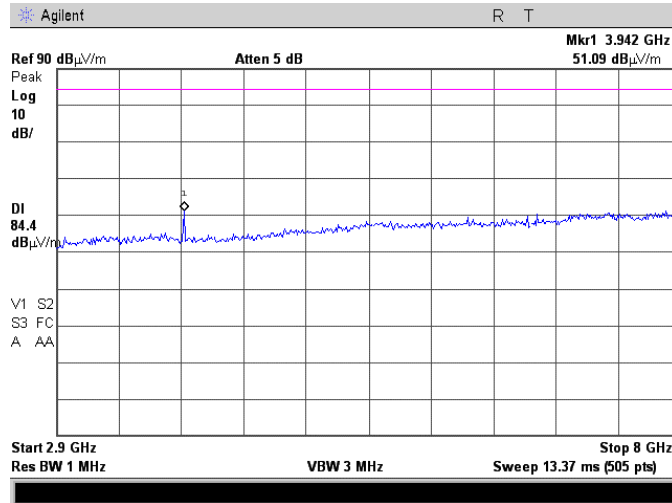
TEST SITE: Anechoic chamber  
 CARRIER FREQUENCY: Low  
 ANTENNA POLARIZATION: Vertical and Horizontal  
 TEST DISTANCE: 3 m  
 MODULATION: 16QAM



<b>Test specification:</b>	<b>Section 27.53(c)(2), Radiated spurious emissions</b>		
<b>Test procedure:</b>	47 CFR, Section 2.1053, TIA/EIA-603-C, Section 2.2.12		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	<b>PASS</b>
<b>Date:</b>	11/11/2007		
<b>Temperature:</b> 24 °C	<b>Air Pressure:</b> 1008 hPa	<b>Relative Humidity:</b> 45 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

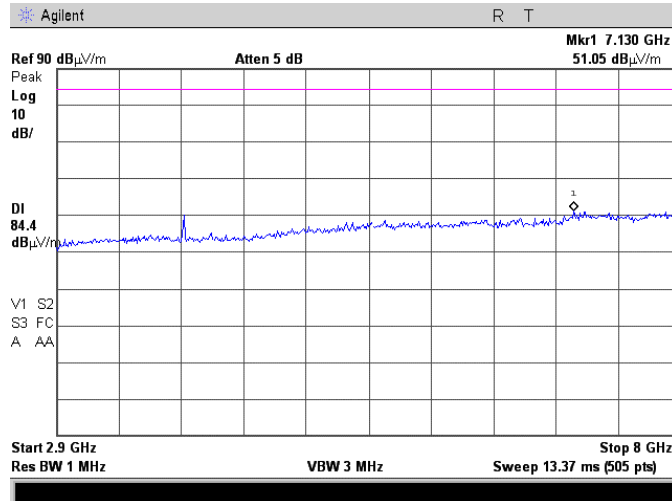
**Plot 7.5.27 Radiated emission measurements in 2.9 – 8.0 GHz range**

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



**Plot 7.5.28 Radiated emission measurements in 2.9 – 8.0 GHz range**

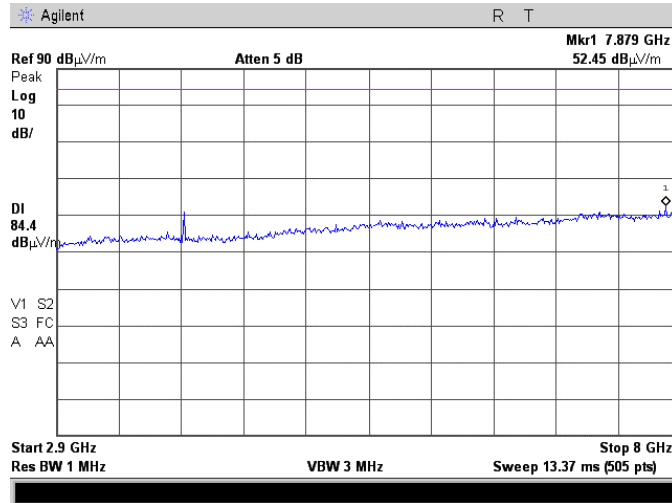
TEST SITE: Anechoic chamber  
 CARRIER FREQUENCY: Mid  
 ANTENNA POLARIZATION: Vertical and Horizontal  
 TEST DISTANCE: 3 m  
 MODULATION: 16QAM



<b>Test specification:</b>	<b>Section 27.53(c)(2), Radiated spurious emissions</b>		
<b>Test procedure:</b>	47 CFR, Section 2.1053, TIA/EIA-603-C, Section 2.2.12		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	<b>PASS</b>
<b>Date:</b>	11/11/2007		
<b>Temperature:</b> 24 °C	<b>Air Pressure:</b> 1008 hPa	<b>Relative Humidity:</b> 45 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

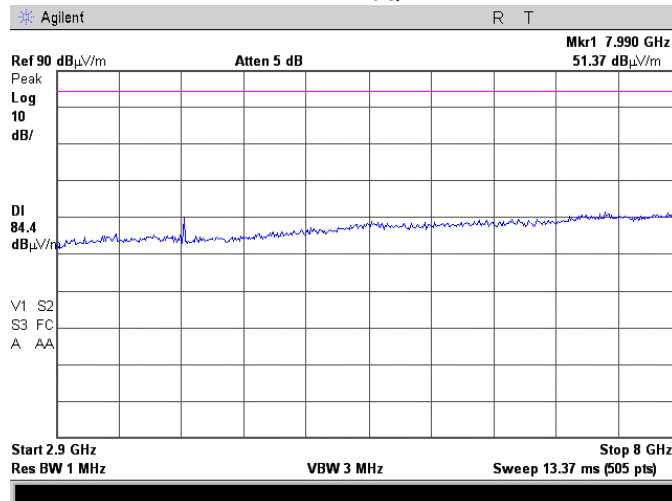
**Plot 7.5.29 Radiated emission measurements in 2.9 – 8.0 GHz range**

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



**Plot 7.5.30 Radiated emission measurements in 2.9 – 8.0 GHz range**

TEST SITE: Anechoic chamber  
 CARRIER FREQUENCY: High  
 ANTENNA POLARIZATION: Vertical and Horizontal  
 TEST DISTANCE: 3 m  
 MODULATION: 16QAM





<b>Test specification:</b>	<b>Section 27.53(f), Radiated emissions in the 1559-1610 MHz band</b>		
<b>Test procedure:</b>	ANSI C63.4, Sections 11.5 and 12.1.3; TIA/EIA-603-C, Section 2.2.12		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	<b>PASS</b>
<b>Date:</b>	11/11/2007		
<b>Temperature:</b> 24 °C	<b>Air Pressure:</b> 1008 hPa	<b>Relative Humidity:</b> 45 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

## 7.6 Radiated spurious emission measurements in 1559-1610 MHz band

### 7.6.1 General

This test was performed to measure radiated spurious emissions from the EUT enclosure with antenna. Specification test limits are given in Table 7.6.1.

Table 7.6.1 Radiated spurious emission test limits

Frequency, MHz	Type of signal	EIRP of spurious emissions, dBW/MHz	Spurious emissions, dBm	Equivalent field strength limit @ 3m, dB( $\mu$ V/m)
1559 - 1610	Wideband	-70	-40	55.23
	Discrete or less than 700 Hz BW	-80	-50	45.23

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

7.6.2.1 The EUT was set up as shown in Figure 7.6.1, energized and the EUT performance was checked.

7.6.2.2 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.

7.6.2.3 The worst test results with respect to the limits were recorded in Table 7.6.2 and shown in the associated plots.

### 7.6.3 Test procedure for substitution EIRP measurements of spurious

7.6.3.1 The test equipment was set up as shown in Figure 7.6.2 and energized.

7.6.3.2 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.

7.6.3.3 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.

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

7.6.3.5 The EIRP of spurious emissions was calculated as a sum of signal generator output power in dBm and antenna gain in dBi reduced by cable loss in dB.

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

7.6.3.7 The worst test results (the lowest margins) were recorded in Table 7.6.3 and shown in the associated plots.

<b>Test specification:</b>	<b>Section 27.53(f), Radiated emissions in the 1559-1610 MHz band</b>		
<b>Test procedure:</b>	ANSI C63.4, Sections 11.5 and 12.1.3; TIA/EIA-603-C, Section 2.2.12		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	<b>PASS</b>
<b>Date:</b>	11/11/2007		
<b>Temperature:</b> 24 °C	<b>Air Pressure:</b> 1008 hPa	<b>Relative Humidity:</b> 45 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

Figure 7.6.1 Setup for spurious emission field strength measurements

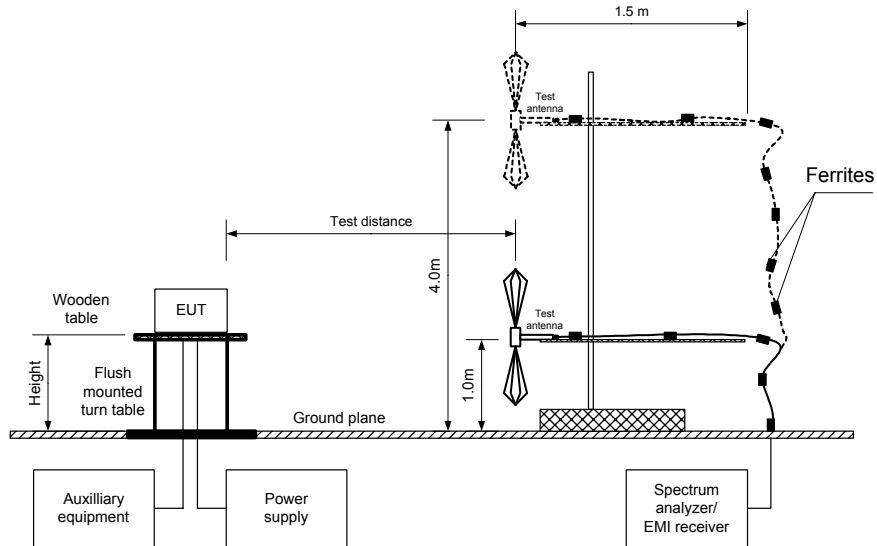
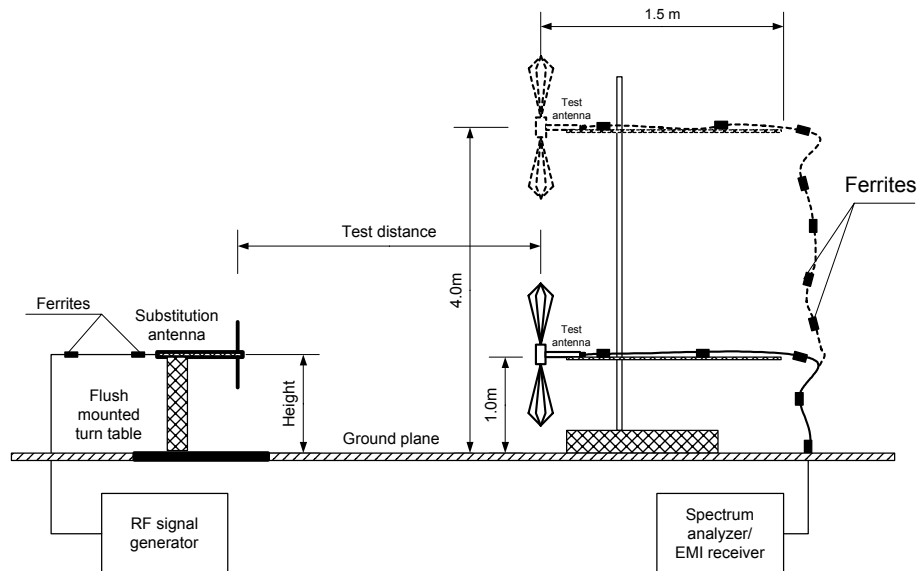


Figure 7.6.2 Setup for substitution ERP measurements of spurious





<b>Test specification:</b>	<b>Section 27.53(f), Radiated emissions in the 1559-1610 MHz band</b>		
<b>Test procedure:</b>	ANSI C63.4, Sections 11.5 and 12.1.3; TIA/EIA-603-C, Section 2.2.12		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	<b>PASS</b>
<b>Date:</b>	11/11/2007		
<b>Temperature:</b> 24 °C	<b>Air Pressure:</b> 1008 hPa	<b>Relative Humidity:</b> 45 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

**Table 7.6.2 Spurious emission field strength test**

ASSIGNED FREQUENCY RANGE: 787.0 – 788.0 MHz  
TEST SITE: OATS  
TEST DISTANCE: 3 m  
EUT HEIGHT: 0.8 m  
INVESTIGATED FREQUENCY RANGE: 1559 – 1610 MHz  
DETECTOR USED: Peak  
VIDEO BANDWIDTH: ≥ Resolution bandwidth  
TEST ANTENNA TYPE: Double ridged guide  
MODULATION: QPSK and 16QAM  
MODULATING SIGNAL: PRBS  
TRANSMITTER OUTPUT POWER SETTINGS: Maximum

Frequency, MHz	Antenna polarization	RBW, kHz	Field strength, dB(μV/m)	Limit, dB(μV/m)	Margin, dB*	Verdict
Low frequency						
1574.43	Vertical	1000	49.78	55.23	-5.45	Pass
Mid frequency						
1574.81	Vertical	1000	52.39	55.23	-2.84	Pass
High frequency						
1575.58	Vertical	1000	51.79	55.23	-3.44	Pass

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

**Table 7.6.3 Substitution EIRP of spurious test results**

ASSIGNED FREQUENCY RANGE: 787.0 – 788.0 MHz  
TEST SITE: OATS  
TEST DISTANCE: 3 m  
SUBSTITUTION ANTENNA HEIGHT: 0.8 m  
DETECTOR USED: Peak  
VIDEO BANDWIDTH: > Resolution bandwidth  
SUBSTITUTION ANTENNA TYPE: Tunable dipole (30 MHz – 1000 MHz)  
Double ridged guide (above 1000 MHz)

Frequency MHz	Field strength dB(μV/m)	RBW, kHz	Antenna polarization	RF generator output, dBm	Ant gain dBi	Cable loss, dB	EIRP, dBm	Spurious emissions, dBm	Margin dB*	Verdict
Low carrier frequency										
1574.43	49.78	1000	Vertical	-52.85	8.34	1.32	-45.83	-40.00	-5.83	Pass
Mid carrier frequency										
1574.43	52.39	1000	Vertical	-50.39	8.34	1.32	-43.37	-40.00	-3.37	Pass
High carrier frequency										
1575.58	51.79	1000	Vertical	-51.09	8.35	1.32	-44.06	-40.00	-4.06	Pass

\*- Margin = Calculated EIRP – spurious emissions limit

**Reference numbers of test equipment used**

HL 0661	HL 1365	HL 1430	HL 1947	HL 1984	HL 2432	HL 2871	
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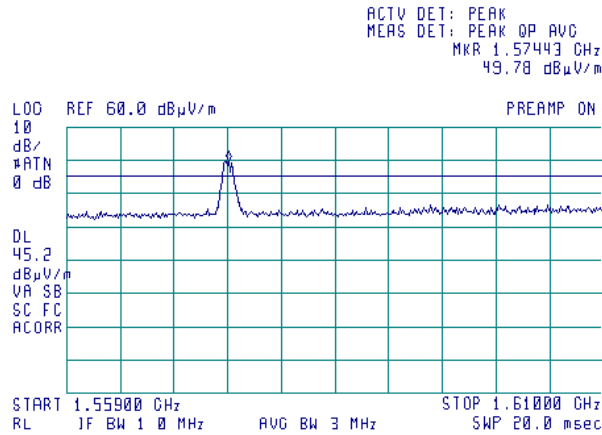
Full description is given in Appendix A.



<b>Test specification:</b>	<b>Section 27.53(f), Radiated emissions in the 1559-1610 MHz band</b>		
<b>Test procedure:</b>	ANSI C63.4, Sections 11.5 and 12.1.3; TIA/EIA-603-C, Section 2.2.12		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	<b>PASS</b>
<b>Date:</b>	11/11/2007		
<b>Temperature:</b> 24 °C	<b>Air Pressure:</b> 1008 hPa	<b>Relative Humidity:</b> 45 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

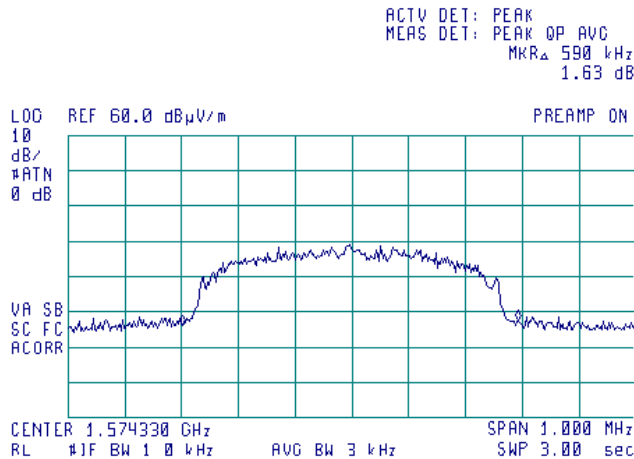
Plot 7.6.1 Radiated emission measurements in 1559 - 1610 MHz range

TEST SITE: OATS  
 CARRIER FREQUENCY: Low  
 ANTENNA POLARIZATION: Vertical and Horizontal  
 TEST DISTANCE: 3 m  
 MODULATION: QPSK



Plot 7.6.2 Signal bandwidth measurements

TEST SITE: OATS  
 CARRIER FREQUENCY: Low  
 MODULATION: QPSK



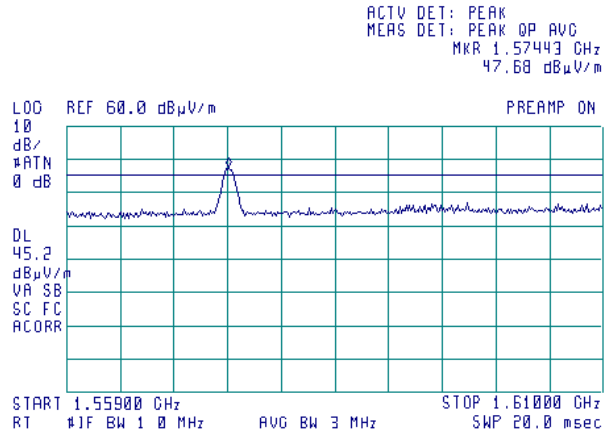




<b>Test specification:</b>	<b>Section 27.53(f), Radiated emissions in the 1559-1610 MHz band</b>		
<b>Test procedure:</b>	ANSI C63.4, Sections 11.5 and 12.1.3; TIA/EIA-603-C, Section 2.2.12		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	<b>PASS</b>
<b>Date:</b>	11/11/2007		
<b>Temperature:</b> 24 °C	<b>Air Pressure:</b> 1008 hPa	<b>Relative Humidity:</b> 45 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

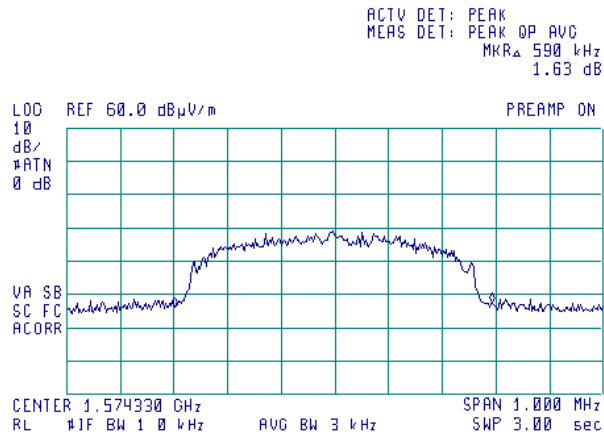
**Plot 7.6.3 Radiated emission measurements in 1559 - 1610 MHz range**

TEST SITE: OATS  
 CARRIER FREQUENCY: Low  
 ANTENNA POLARIZATION: Vertical and Horizontal  
 TEST DISTANCE: 3 m  
 MODULATION: 16QAM



**Plot 7.6.4 Signal bandwidth measurements**

TEST SITE: OATS  
 CARRIER FREQUENCY: Low  
 MODULATION: 16QAM

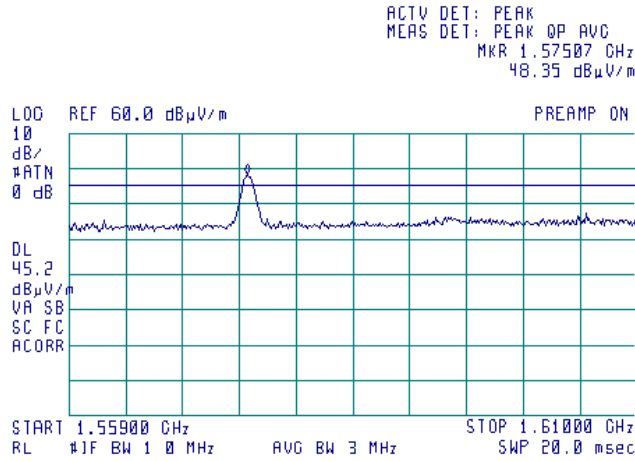




<b>Test specification:</b>	<b>Section 27.53(f), Radiated emissions in the 1559-1610 MHz band</b>		
<b>Test procedure:</b>	ANSI C63.4, Sections 11.5 and 12.1.3; TIA/EIA-603-C, Section 2.2.12		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	<b>PASS</b>
<b>Date:</b>	11/11/2007		
<b>Temperature:</b> 24 °C	<b>Air Pressure:</b> 1008 hPa	<b>Relative Humidity:</b> 45 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

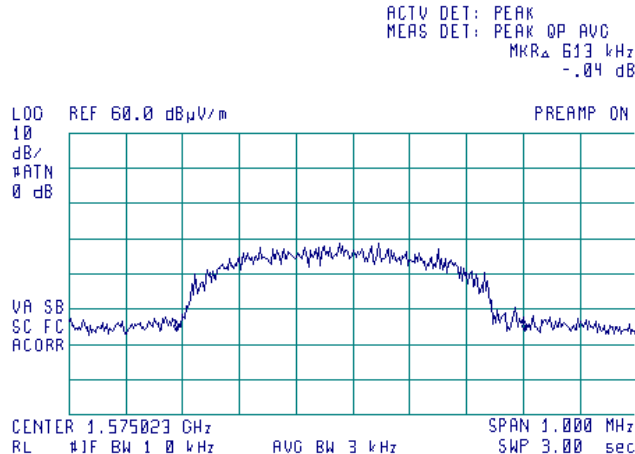
**Plot 7.6.5 Radiated emission measurements in 1559 - 1610 MHz range**

TEST SITE: OATS  
 CARRIER FREQUENCY: Mid  
 ANTENNA POLARIZATION: Vertical and Horizontal  
 TEST DISTANCE: 3 m  
 MODULATION: QPSK



**Plot 7.6.6 Signal bandwidth measurements**

TEST SITE: OATS  
 CARRIER FREQUENCY: Mid  
 MODULATION: QPSK

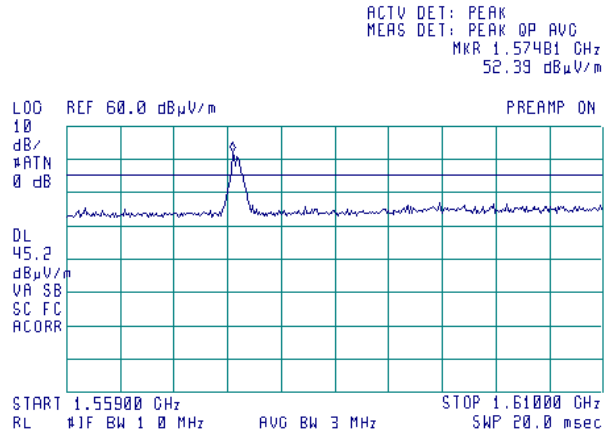




<b>Test specification:</b>	<b>Section 27.53(f), Radiated emissions in the 1559-1610 MHz band</b>		
<b>Test procedure:</b>	ANSI C63.4, Sections 11.5 and 12.1.3; TIA/EIA-603-C, Section 2.2.12		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	<b>PASS</b>
<b>Date:</b>	11/11/2007		
<b>Temperature:</b> 24 °C	<b>Air Pressure:</b> 1008 hPa	<b>Relative Humidity:</b> 45 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

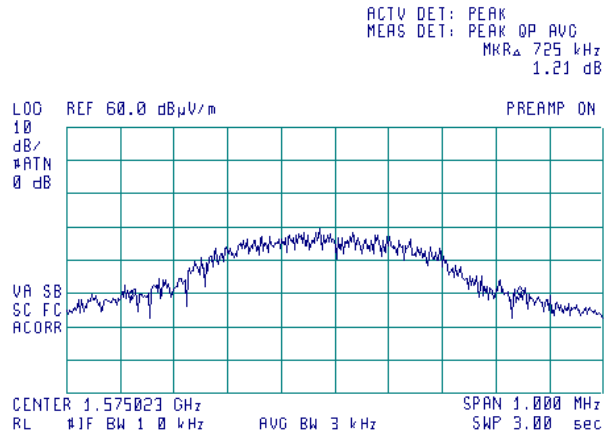
**Plot 7.6.7 Radiated emission measurements in 1559 - 1610 MHz range**

TEST SITE: OATS  
 CARRIER FREQUENCY: Mid  
 ANTENNA POLARIZATION: Vertical and Horizontal  
 TEST DISTANCE: 3 m  
 MODULATION: 16QAM



**Plot 7.6.8 Signal bandwidth measurements**

TEST SITE: OATS  
 CARRIER FREQUENCY: Mid  
 MODULATION: 16QAM

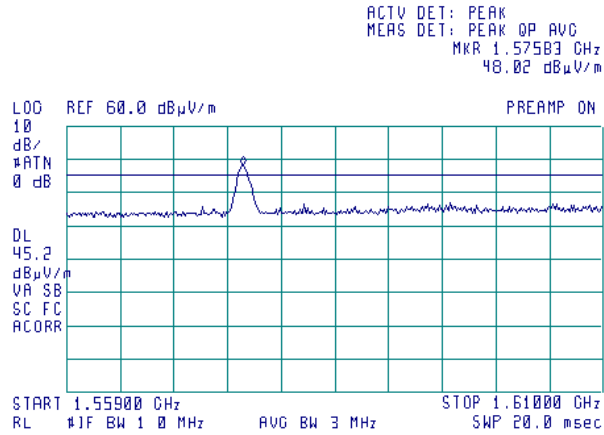




<b>Test specification:</b>	<b>Section 27.53(f), Radiated emissions in the 1559-1610 MHz band</b>		
<b>Test procedure:</b>	ANSI C63.4, Sections 11.5 and 12.1.3; TIA/EIA-603-C, Section 2.2.12		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	<b>PASS</b>
<b>Date:</b>	11/11/2007		
<b>Temperature:</b> 24 °C	<b>Air Pressure:</b> 1008 hPa	<b>Relative Humidity:</b> 45 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

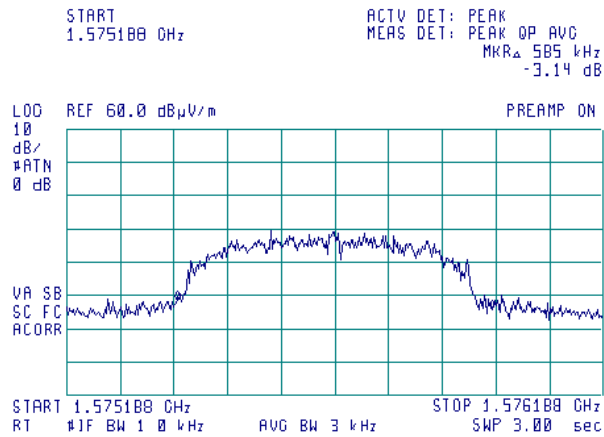
Plot 7.6.9 Radiated emission measurements in 1559 - 1610 MHz range

TEST SITE: OATS  
 CARRIER FREQUENCY: High  
 ANTENNA POLARIZATION: Vertical and Horizontal  
 TEST DISTANCE: 3 m  
 MODULATION: QPSK



Plot 7.6.10 Signal bandwidth measurements

TEST SITE: OATS  
 CARRIER FREQUENCY: High  
 MODULATION: QPSK

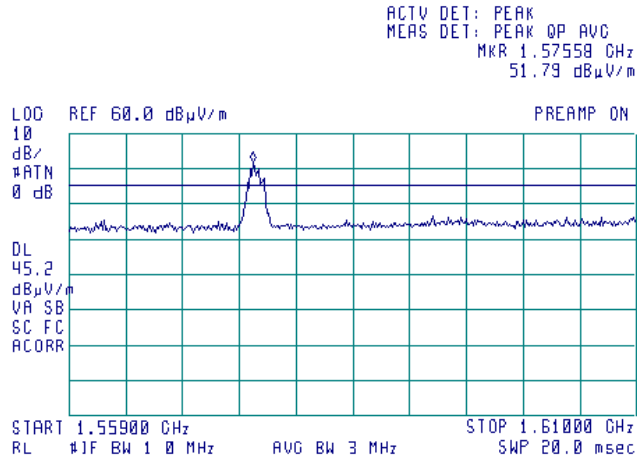




<b>Test specification:</b>	<b>Section 27.53(f), Radiated emissions in the 1559-1610 MHz band</b>		
<b>Test procedure:</b>	ANSI C63.4, Sections 11.5 and 12.1.3; TIA/EIA-603-C, Section 2.2.12		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	<b>PASS</b>
<b>Date:</b>	11/11/2007		
<b>Temperature:</b> 24 °C	<b>Air Pressure:</b> 1008 hPa	<b>Relative Humidity:</b> 45 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

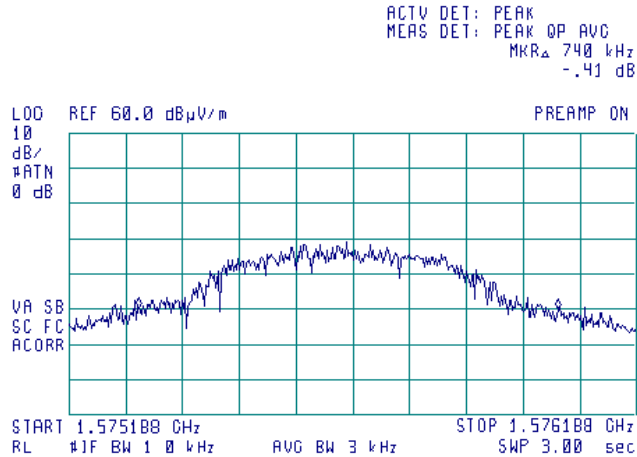
**Plot 7.6.11 Radiated emission measurements in 1559 - 1610 MHz range**

TEST SITE: OATS  
 CARRIER FREQUENCY: High  
 ANTENNA POLARIZATION: Vertical and Horizontal  
 TEST DISTANCE: 3 m  
 MODULATION: 16QAM



**Plot 7.6.12 Signal bandwidth measurements**

TEST SITE: OATS  
 CARRIER FREQUENCY: High  
 MODULATION: 16QAM



<b>Test specification:</b>	<b>Section 27.54, Frequency stability</b>		
<b>Test procedure:</b>	47 CFR, Section 2.1055, TIA/EIA-603-C, Section 2.2.2		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	<b>PASS</b>
<b>Date:</b>	11/08/2007		
<b>Temperature:</b> 24 °C	<b>Air Pressure:</b> 1012 hPa	<b>Relative Humidity:</b> 45 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

## 7.7 Frequency stability test

### 7.7.1 General

This test was performed to measure frequency stability of transmitter RF carrier. Specification test limits are given in Table 7.7.1. The test results are provided in Tables 7.7.2, 7.7.3 and shown in the associated plots.

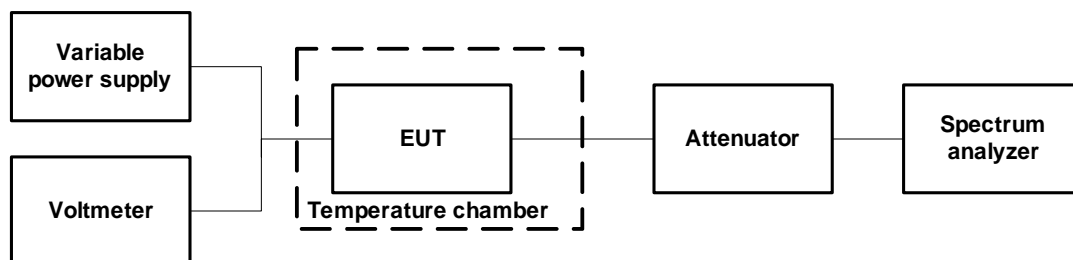
**Table 7.7.1 Frequency stability limits**

Assigned frequency, MHz	Maximum allowed frequency displacement
787.0 – 788.0	26 dBc points including frequency tolerance shall remain within the assigned band

### 7.7.2 Test procedure

- 7.7.2.1 The EUT was set up as shown in Figure 7.7.1, energized and its proper operation was checked.
- 7.7.2.2 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.
- 7.7.2.3 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.
- 7.7.2.4 The above procedure was repeated at 0°C and at the lowest test temperature.
- 7.7.2.5 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.
- 7.7.2.6 Frequency displacement was calculated as provided in Table 7.7.2 and Table 7.7.3.

**Figure 7.7.1 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-C, Section 2.2.2		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	<b>PASS</b>
<b>Date:</b>	11/08/2007		
<b>Temperature:</b> 24 °C	<b>Air Pressure:</b> 1012 hPa	<b>Relative Humidity:</b> 45 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

Table 7.7.2 Frequency stability test results

ASSIGNED FREQUENCY RANGE: 787.0 – 788.0 MHz  
 NOMINAL POWER VOLTAGE: 120 VAC (102 VAC - 138 VAC)  
 TEMPERATURE STABILIZATION PERIOD: 20 min  
 POWER DURING TEMPERATURE TRANSITION: Off  
 RESOLUTION BANDWIDTH: 300 Hz  
 VIDEO BANDWIDTH: 300 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, 787.01500 MHz</b>										
-30	nominal	787.162442	787.162432	787.162425	787.162422	787.162422	787.16242	787.162428	0	0
-20	nominal	787.161190	NA	NA	NA	NA	NA	787.161187	0	0
-10	nominal	787.162163	NA	NA	NA	NA	NA	787.162000	35	-128
0	nominal	787.162238	787.162322	787.162336	787.162337	787.162337	787.162339	787.162322	211	0
10	nominal	787.162344	NA	NA	NA	NA	NA	787.162338	216	0
20	15%	787.162110	NA	NA	NA	NA	NA	787.162123	0	-18
20	nominal	787.162124	NA	NA	NA	NA	NA	787.162128	0	-4
20	-15%	787.162101	NA	NA	NA	NA	NA	787.162122	0	-27
30	nominal	787.162081	787.162064	787.162048	787.162035	787.162024	787.162017	787.161992	0	-136
40	nominal	787.161968	NA	NA	NA	NA	NA	787.162058	0	-160
50	nominal	787.162421	NA	NA	NA	NA	NA	787.162798	670	0
<b>High frequency, 787.98375 MHz</b>										
-30	nominal	787.837729	787.837769	787.837742	787.837673	787.837607	787.837549	787.837443	0	0
-20	nominal	787.837225	NA	NA	NA	NA	NA	787.837317	0	0
-10	nominal	787.837177	NA	NA	NA	NA	NA	787.837164	46	0
0	nominal	787.837331	787.837349	787.837352	787.837354	787.837352	787.837345	787.837000	223	-131
10	nominal	787.837337	NA	NA	NA	NA	NA	787.837353	222	0
20	15%	787.837104	NA	NA	NA	NA	NA	787.837132	1	-27
20	nominal	787.837150	NA	NA	NA	NA	NA	787.837131	19	0
20	-15%	787.837107	NA	NA	NA	NA	NA	787.837125	0	-24
30	nominal	787.837246	787.837197	787.837148	787.837118	787.837139	787.837135	787.837058	115	-73
40	nominal	787.837114	NA	NA	NA	NA	NA	787.836962	0	-169
50	nominal	787.836960	NA	NA	NA	NA	NA	787.837541	410	-171

\* - 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-C, Section 2.2.2		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	<b>PASS</b>
<b>Date:</b>	11/08/2007		
<b>Temperature:</b> 24 °C	<b>Air Pressure:</b> 1012 hPa	<b>Relative Humidity:</b> 45 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

Table 7.7.3 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
		Negative	Positive		
<b>Low frequency QPSK, channel bandwidth 325 kHz</b>					
787.0 – 788.0	787.01500– 787.30625	160	670	787.014840 - 787.306920	Pass
<b>Low frequency 16QAM, channel bandwidth 325 kHz</b>					
787.0 – 788.0	787.01500 – 787.30625	160	670	787.014840 - 787.306920	Pass
<b>High frequency QPSK, channel bandwidth 325 kHz</b>					
787.0 – 788.0	787.69000– 787.98375	171	410	787.689829 - 787.984160	Pass
<b>High frequency 16QAM, channel bandwidth 325 kHz</b>					
787.0 – 788.0	787.69125 – 787.98000	171	410	787.691079 - 787.980410	Pass

## Reference numbers of test equipment used

HL 0493	HL 2780	HL 3180					
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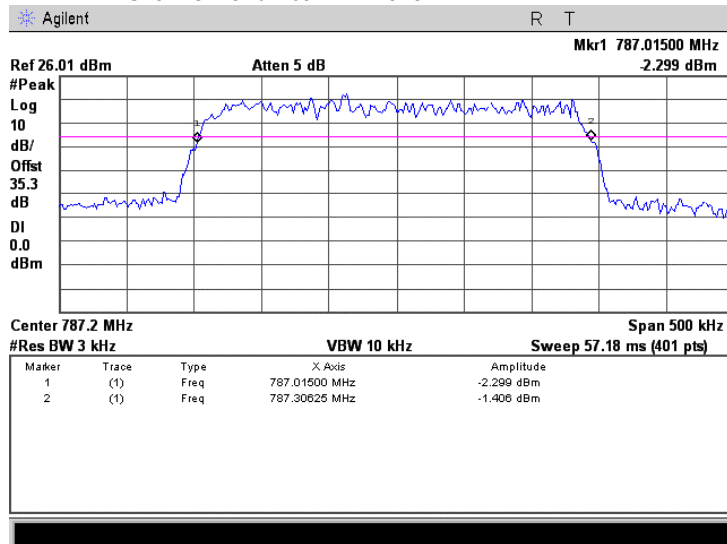
Full description is given in Appendix A.



<b>Test specification:</b>	<b>Section 27.54, Frequency stability</b>		
<b>Test procedure:</b>	47 CFR, Section 2.1055, TIA/EIA-603-C, Section 2.2.2		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	<b>PASS</b>
<b>Date:</b>	11/08/2007		
<b>Temperature:</b> 24 °C	<b>Air Pressure:</b> 1012 hPa	<b>Relative Humidity:</b> 45 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

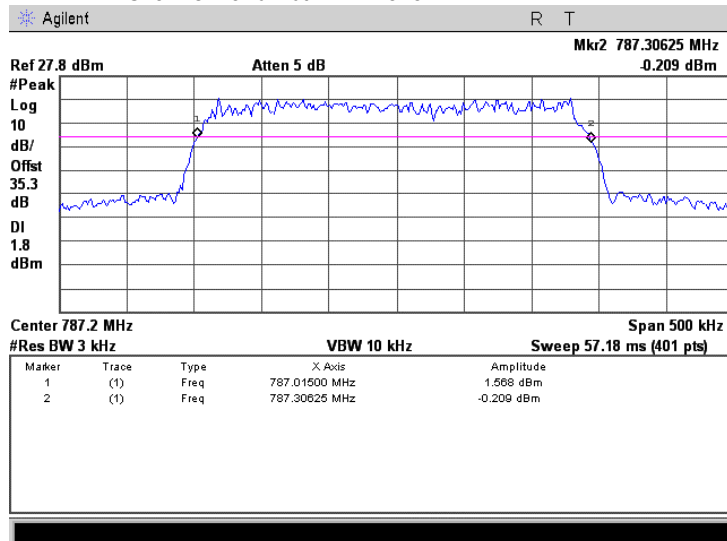
**Plot 7.7.1 Band edge emission at low frequency, QPSK**

Band edge: Left  
Channel Bandwidth: 325 kHz



**Plot 7.7.2 Band edge emission at low frequency, 16QAM**

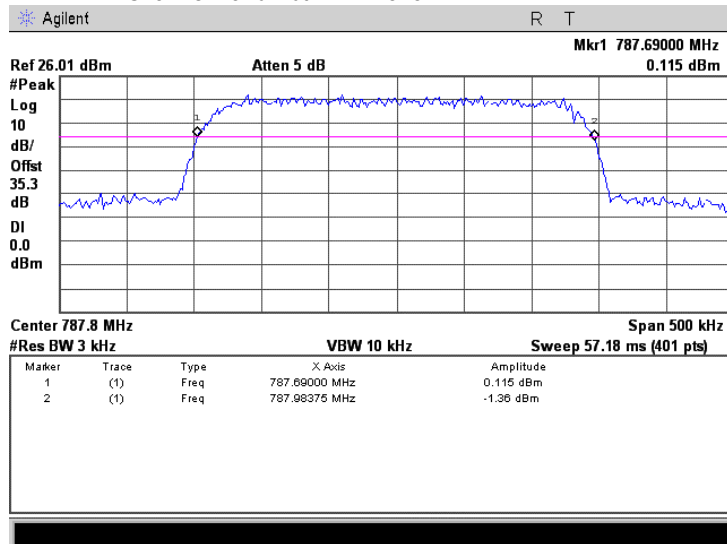
Band edge: Left  
Channel Bandwidth: 325 kHz



<b>Test specification:</b>	<b>Section 27.54, Frequency stability</b>		
<b>Test procedure:</b>	47 CFR, Section 2.1055, TIA/EIA-603-C, Section 2.2.2		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	<b>PASS</b>
<b>Date:</b>	11/08/2007		
<b>Temperature:</b> 24 °C	<b>Air Pressure:</b> 1012 hPa	<b>Relative Humidity:</b> 45 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

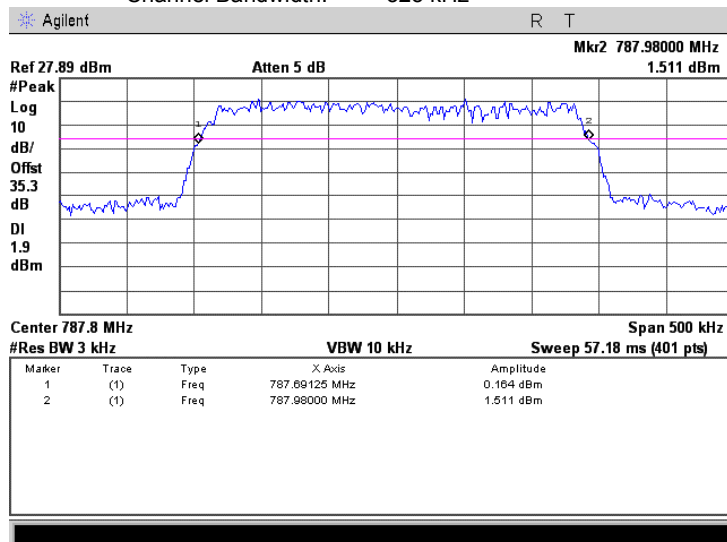
**Plot 7.7.3 Band edge emission at high frequency, QPSK**

Band edge: Right  
Channel Bandwidth: 325 kHz



**Plot 7.7.4 Band edge emission at high frequency, 16QAM**

Band edge: Right  
Channel Bandwidth: 325 kHz



<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>	<b>PASS</b>
<b>Date:</b>	11/08/2007		
<b>Temperature:</b> 24 °C	<b>Air Pressure:</b> 1012 hPa	<b>Relative Humidity:</b> 45 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

## 7.8 Occupied bandwidth test

### 7.8.1 General

This test was performed to measure transmitter occupied bandwidth. Specification test limits are given in Table 7.8.1.

**Table 7.8.1 Occupied bandwidth limits**

Assigned frequency, MHz	Modulation envelope reference points*, dBc
787.0 – 788.0	26

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

### 7.8.2 Test procedure

- 7.8.2.1 The EUT was set up as shown in Figure 7.8.1, energized and its proper operation was checked.
- 7.8.2.2 The EUT was set to transmit unmodulated carrier and reference peak power level was measured.
- 7.8.2.3 The EUT was set to transmit modulated carrier.
- 7.8.2.4 The transmitter occupied bandwidth was measured with spectrum analyzer as frequency delta between reference points on modulation envelope and provided in Table 7.8.2 and associated plots.

**Figure 7.8.1 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>	<b>PASS</b>
<b>Date:</b>	11/08/2007		
<b>Temperature:</b> 24 °C	<b>Air Pressure:</b> 1012 hPa	<b>Relative Humidity:</b> 45 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

**Table 7.8.2 Occupied bandwidth test results**

DETECTOR USED: Peak hold  
 RESOLUTION BANDWIDTH: 3 kHz  
 VIDEO BANDWIDTH: 10 kHz  
 MODULATION ENVELOPE REFERENCE POINTS: 26 dBc  
 MODULATING SIGNAL: PRBS

Carrier frequency, MHz	Occupied bandwidth, kHz
<b>Bit rate: 0.52 Mbps/Modulation: QPSK</b>	
787.1625	280.00
787.5000	285.00
787.8375	283.75
<b>Bit rate: 1.040 Mbps/ Modulation: 16QAM</b>	
787.1625	280.00
787.5000	276.25
787.8375	278.75

**Reference numbers of test equipment used**

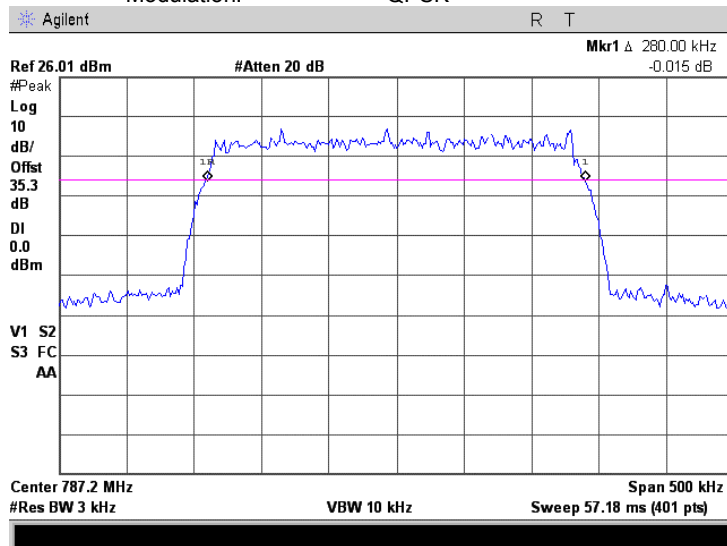
HL 2780	HL 3180						
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Full description is given in Appendix A.

<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>	<b>PASS</b>
<b>Date:</b>	11/08/2007		
<b>Temperature: 24 °C</b>	<b>Air Pressure: 1012 hPa</b>	<b>Relative Humidity: 45 %</b>	<b>Power Supply: 120 VAC</b>
<b>Remarks:</b>			

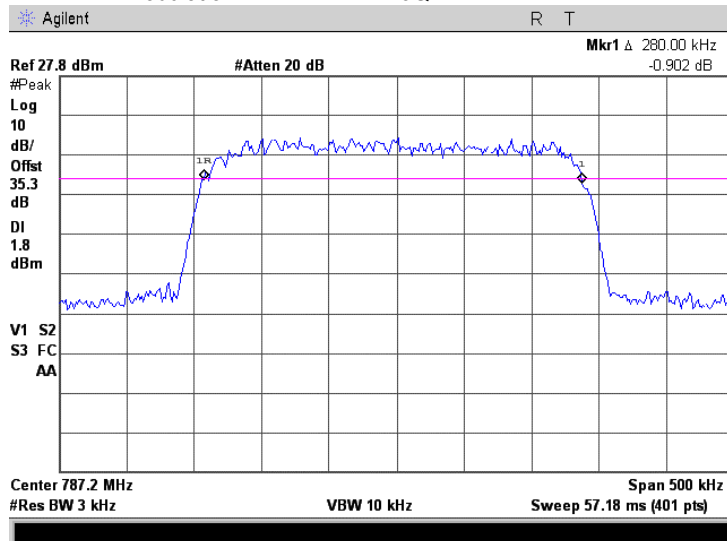
**Plot 7.8.1 Occupied bandwidth test results at low frequency**

Bit rate: 0.52 Mbps  
Modulation: QPSK



**Plot 7.8.2 Occupied bandwidth test results at low frequency**

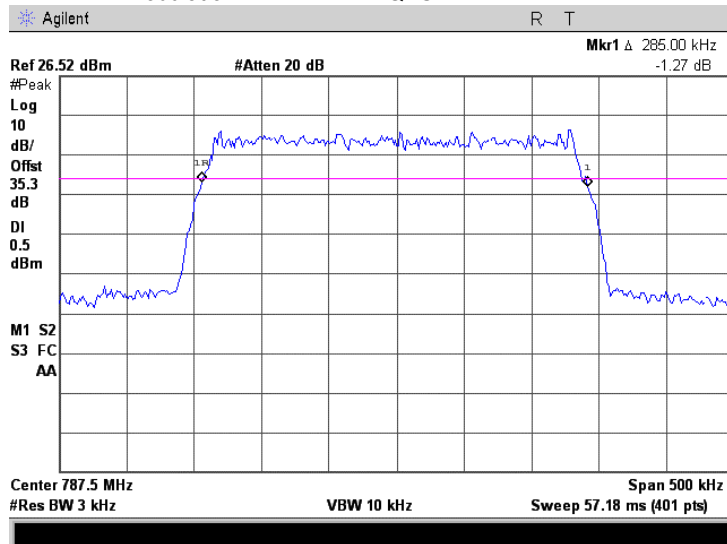
Bit rate: 1.040 Mbps  
Modulation: 16QAM



<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>	<b>PASS</b>
<b>Date:</b>	11/08/2007		
<b>Temperature:</b> 24 °C	<b>Air Pressure:</b> 1012 hPa	<b>Relative Humidity:</b> 45 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

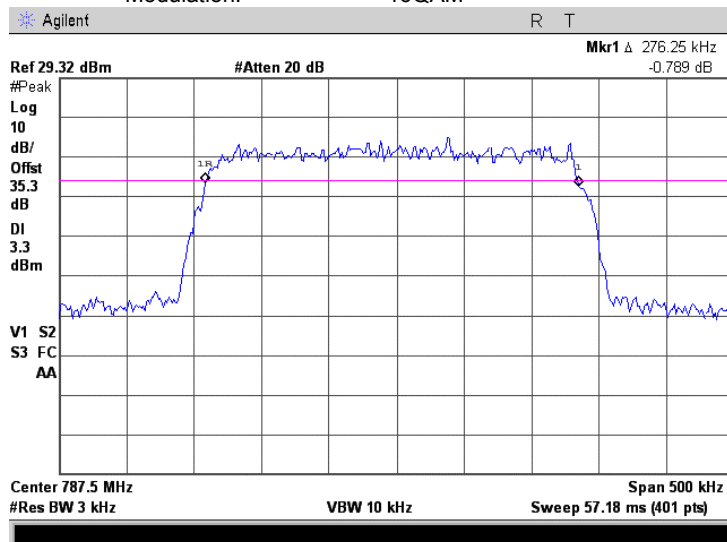
**Plot 7.8.3 Occupied bandwidth test results at mid frequency**

Bit rate: 0.52 Mbps  
Modulation: QPSK



**Plot 7.8.4 Occupied bandwidth test results at mid frequency**

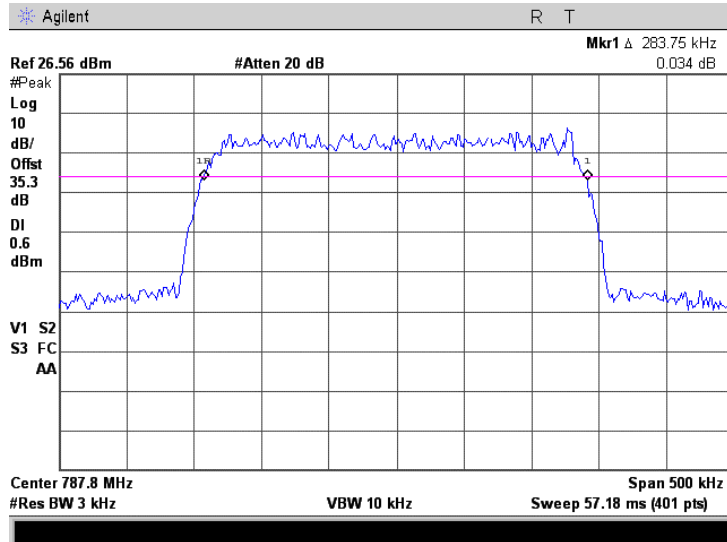
Bit rate: 1.040 Mbps  
Modulation: 16QAM



<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>	<b>PASS</b>
<b>Date:</b>	11/08/2007		
<b>Temperature: 24 °C</b>	<b>Air Pressure: 1012 hPa</b>	<b>Relative Humidity: 45 %</b>	<b>Power Supply: 120 VAC</b>
<b>Remarks:</b>			

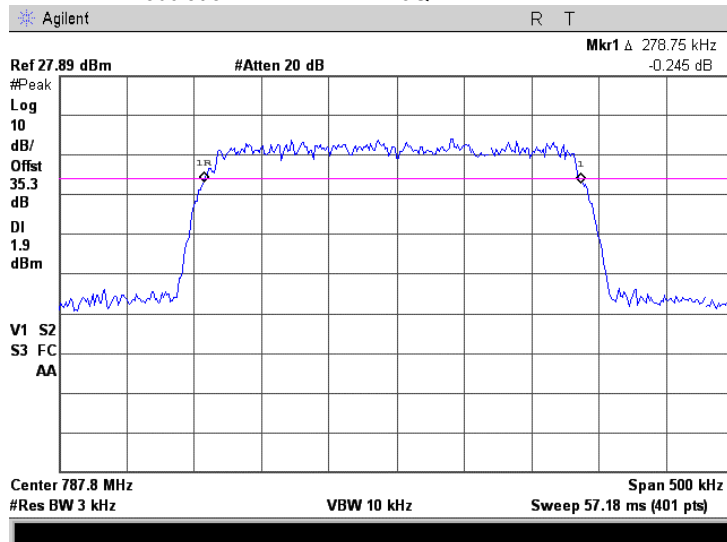
**Plot 7.8.5 Occupied bandwidth test results at high frequency**

Bit rate: 0.52 Mbps  
Modulation: QPSK



**Plot 7.8.6 Occupied bandwidth test results at high frequency**

Bit rate: 1.040 Mbps  
Modulation: 16QAM



<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>	11/25/2007		
<b>Temperature:</b> 24 °C	<b>Air Pressure:</b> 1013 hPa	<b>Relative Humidity:</b> 46 %	<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.

**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.

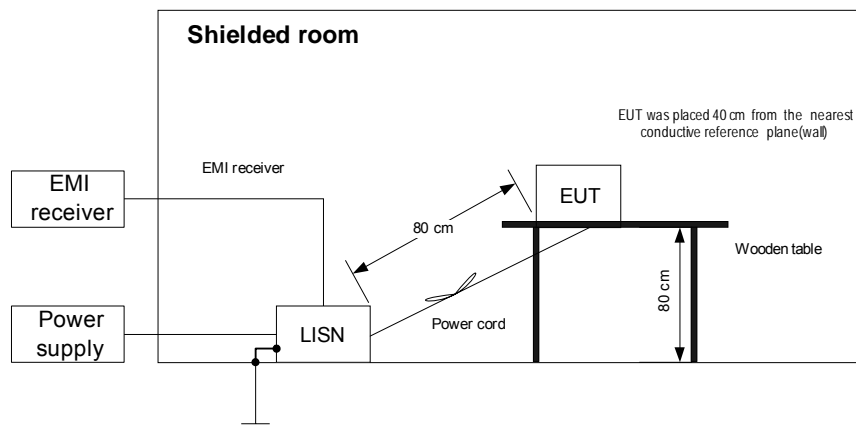
#### 8.1.2 Test procedure

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, Table 8.1.3. 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. The worst test results with respect to the limits were recorded in Table 8.1.2, Table 8.1.3 and shown in the associated plots.

**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>	<b>PASS</b>
<b>Date:</b>	11/25/2007		
<b>Temperature:</b> 24 °C	<b>Air Pressure:</b> 1013 hPa	<b>Relative Humidity:</b> 46 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

**Table 8.1.2 Conducted emission test results**

LINE: AC mains  
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*		
<b>Standby / Receive, modem AC lines</b>									
0.196898	33.01	26.34	63.77	-37.43	15.94	53.77	-37.83	L1	Pass
1.050582	42.41	40.56	56.00	-15.44	23.97	46.00	-22.03		
1.052413	42.02	40.62	56.00	-15.38	23.77	46.00	-22.23		
1.192345	43.26	39.01	56.00	-16.99	37.17	46.00	-8.83		
1.192529	42.91	39.09	56.00	-16.91	37.45	46.00	-8.55		
1.294109	38.01	36.49	56.00	-19.51	35.69	46.00	-10.31		
0.166200	33.53	29.32	65.21	-35.89	10.40	55.21	-44.81	L2	Pass
0.894861	35.10	31.63	56.00	-24.37	26.54	46.00	-19.46		
1.048391	43.03	39.90	56.00	-16.10	23.74	46.00	-22.26		
1.192663	43.29	39.27	56.00	-16.73	37.46	46.00	-8.54		
1.293954	37.61	36.05	56.00	-19.95	35.30	46.00	-10.70		
1.338722	32.32	31.14	56.00	-24.86	30.21	46.00	-15.79		

\*- Margin = Measured emission - specification limit.

**Reference numbers of test equipment used**

HL 0447	HL 0787	HL 1430	HL 1502	HL 1510	HL 2924		
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Full description is given in Appendix A.



<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>	11/25/2007		
<b>Temperature:</b> 24 °C	<b>Air Pressure:</b> 1013 hPa	<b>Relative Humidity:</b> 46 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

Table 8.1.3 Conducted emission test results

LINE: AC mains  
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*		
<b>Transmit, modem AC lines</b>									
0.201495	39.44	37.82	63.60	-25.78	34.49	53.60	-19.11	L1	Pass
0.403795	45.40	44.10	57.80	-13.70	41.49	47.80	-6.31		
0.497341	47.60	46.07	56.05	-9.98	44.94	46.05	-1.11		
1.056579	46.08	43.57	56.00	-12.43	24.83	46.00	-21.17		
1.150790	43.81	41.43	56.00	-14.57	27.81	46.00	-18.19		
1.961237	46.31	42.91	56.00	-13.09	23.34	46.00	-22.66	L2	Pass
0.200175	41.60	38.09	63.65	-25.56	35.33	53.65	-18.32		
0.401529	45.22	43.80	57.84	-14.04	39.94	47.84	-7.90		
0.497033	47.26	46.09	56.06	-9.97	44.93	46.06	-1.13		
1.058930	46.84	42.40	56.00	-13.60	21.90	46.00	-24.10		
1.163086	45.20	41.08	56.00	-14.92	25.93	46.00	-20.07	L2	Pass
1.967723	41.71	40.92	56.00	-15.08	21.39	46.00	-24.61		
<b>Transmit, laptop AC lines</b>									
0.156425	55.17	35.96	65.69	-29.73	-59.99	55.69	-115.68	L1	Pass
0.222525	47.86	29.84	62.79	-32.95	19.95	52.79	-32.84		
0.521349	39.68	32.93	56.00	-23.07	16.67	46.00	-29.33		
0.655118	41.08	37.74	56.00	-18.26	20.05	46.00	-25.95		
0.779456	37.37	29.26	56.00	-26.74	11.29	46.00	-34.71		
0.885878	38.33	32.46	56.00	-23.54	14.43	46.00	-31.57	L2	Pass
0.157880	54.54	37.16	65.62	-28.46	-59.99	55.62	-115.61		
0.201399	50.13	32.34	63.60	-31.26	10.30	53.60	-43.30		
0.521349	39.68	32.93	56.00	-23.07	16.67	46.00	-29.33		
0.657498	32.01	38.95	56.00	-17.05	24.42	46.00	-21.58		
0.658112	42.54	38.97	56.00	-17.03	24.62	46.00	-21.38	L2	Pass
0.869712	35.93	29.33	56.00	-26.67	14.21	46.00	-31.79		

\*- Margin = Measured emission - specification limit.

## Reference numbers of test equipment used

HL 0447	HL 0787	HL 1430	HL 1502	HL 1510	HL 2924		
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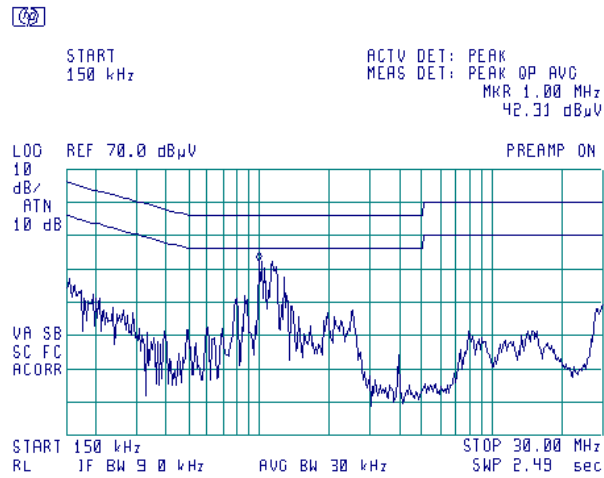
Full description is given in Appendix A.



<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>	11/25/2007		
<b>Temperature:</b> 24 °C	<b>Air Pressure:</b> 1013 hPa	<b>Relative Humidity:</b> 46 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

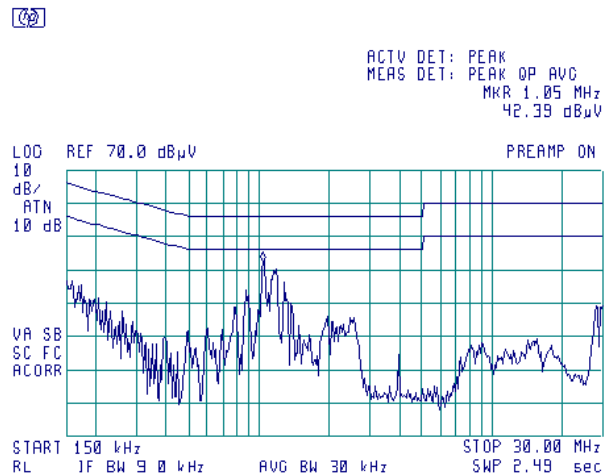
**Plot 8.1.1 Conducted emission measurements on the modem AC lines**

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



**Plot 8.1.2 Conducted emission measurements on the modem AC lines**

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

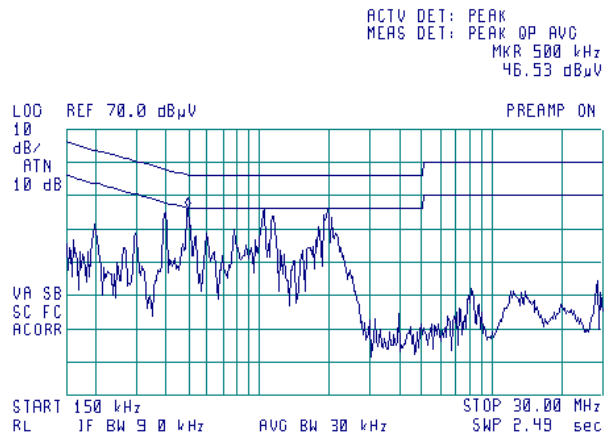




<b>Test specification:</b>	<b>Section 15.107, Conducted emission at AC power port, Class B</b>		
<b>Test procedure:</b>	ANSI C63.4, Sections 11.5 and 12.1.3		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	<b>PASS</b>
<b>Date:</b>	11/25/2007		
<b>Temperature:</b> 24 °C	<b>Air Pressure:</b> 1013 hPa	<b>Relative Humidity:</b> 46 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

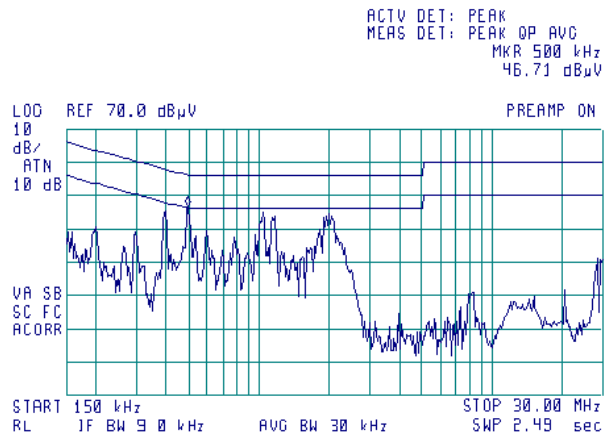
**Plot 8.1.3 Conducted emission measurements on the modem AC lines**

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



**Plot 8.1.4 Conducted emission measurements on the modem AC lines**

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

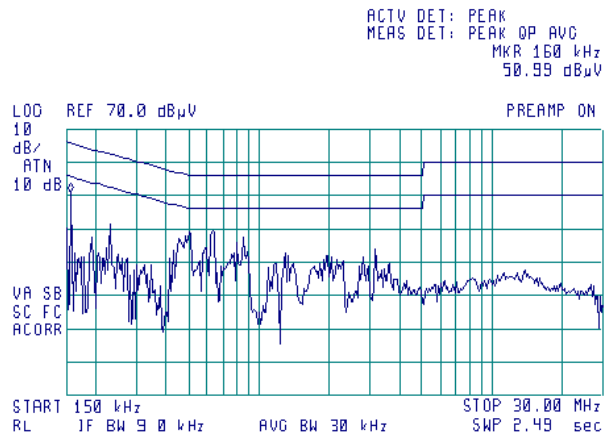




<b>Test specification:</b>	<b>Section 15.107, Conducted emission at AC power port, Class B</b>		
<b>Test procedure:</b>	ANSI C63.4, Sections 11.5 and 12.1.3		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	<b>PASS</b>
<b>Date:</b>	11/25/2007		
<b>Temperature:</b> 24 °C	<b>Air Pressure:</b> 1013 hPa	<b>Relative Humidity:</b> 46 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

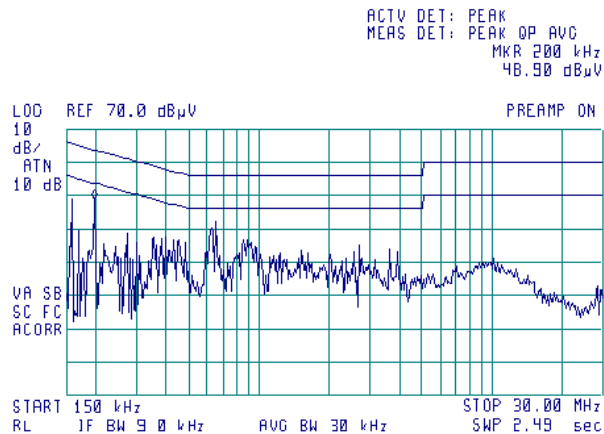
**Plot 8.1.5 Conducted emission measurements on the laptop AC lines**

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



**Plot 8.1.6 Conducted emission measurements on the laptop AC lines**

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



<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>PASS</b>
<b>Date:</b>	11/11/2007		
<b>Temperature:</b> 24 °C	<b>Air Pressure:</b> 1008 hPa	<b>Relative Humidity:</b> 45 %	<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.

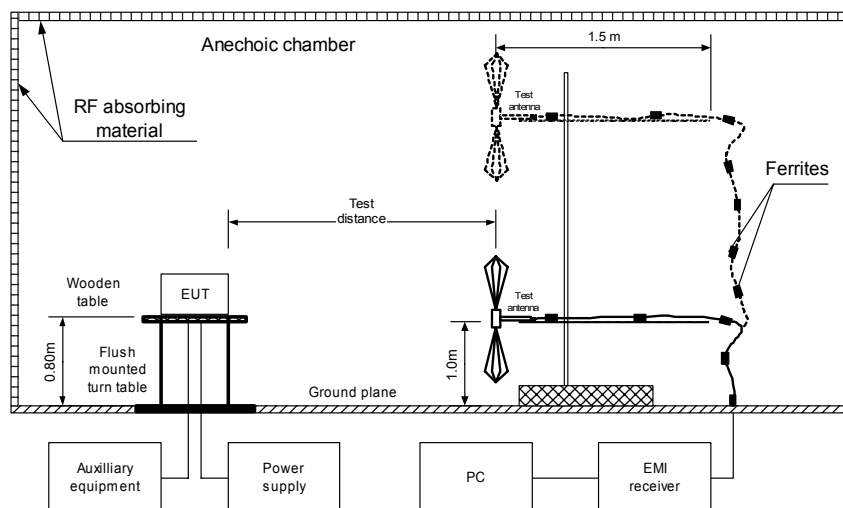
### 8.2.2 Test procedure

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.

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>PASS</b>
<b>Date:</b>	11/11/2007		
<b>Temperature:</b> 24 °C	<b>Air Pressure:</b> 1008 hPa	<b>Relative Humidity:</b> 45 %	<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*				
30.8170	42.9	33.1	40.0	-6.9	V	1.1	305	Pass
42.9575	39.6	33.3	40.0	-6.7	V	1.0	189	
98.33440	39.0	35.3	43.5	-7.8	V	1.0	153	
400.9017	38.1	35.0	46.0	-11.0	V	1.05	151	
696.1095	38.0	30.2	46.0	-15.8	V	1.0	215	
896.2704	40.9	35.5	46.0	-8.5	H	1.1	150	

TEST SITE: SEMI ANECHOIC CHAMBER  
TEST DISTANCE: 3 m  
DETECTORS USED: PEAK / AVERAGE  
FREQUENCY RANGE: 1000 MHz – 4000 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*				
1095.260	48.10	40.4	54.00	-13.96	H	1.2	135	Pass
2711.300	52.40	46.1	54.00	-7.90	H	1.3	38	
3940.088	56.90	51.9	54.00	-2.10	H	1.0	26	

\*- Margin = Measured emission - specification limit.

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

## Reference numbers of test equipment used

HL 0521	HL 0589	HL 0604	HL 1004	HL 1947	HL 2009	HL 2259	HL 2432
HL 2780	HL 2871						

Full description is given in Appendix A.

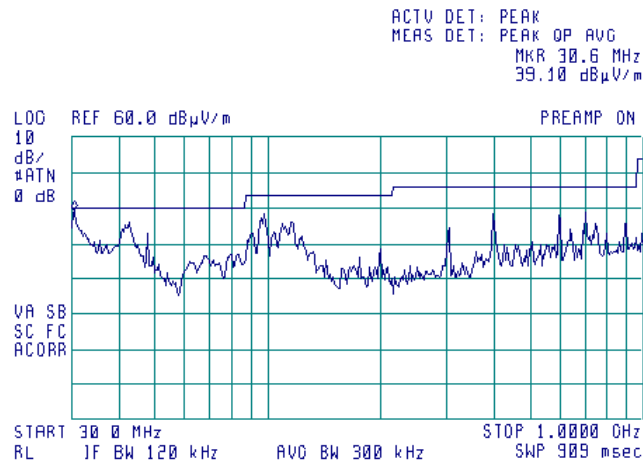


<b>Test specification:</b>	<b>Section 15.109, Radiated emission, Class B</b>		
<b>Test procedure:</b>	ANSI C63.4, Sections 11.6 and 12.1.4		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	<b>PASS</b>
<b>Date:</b>	11/11/2007		
<b>Temperature:</b> 24 °C	<b>Air Pressure:</b> 1008 hPa	<b>Relative Humidity:</b> 45 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

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

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

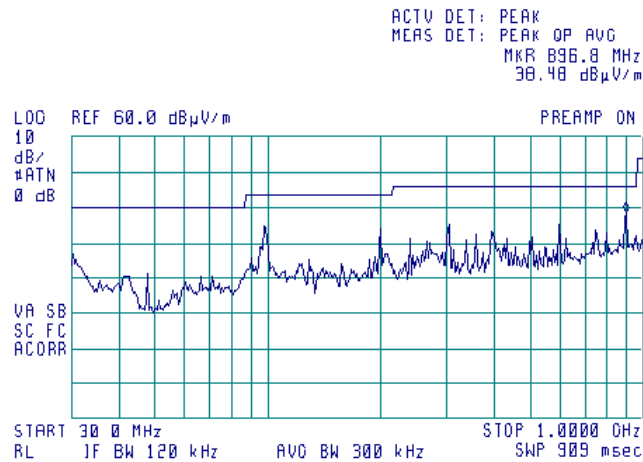
18:02:36 NOV 11, 2007



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

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

18:06:27 NOV 11, 2007





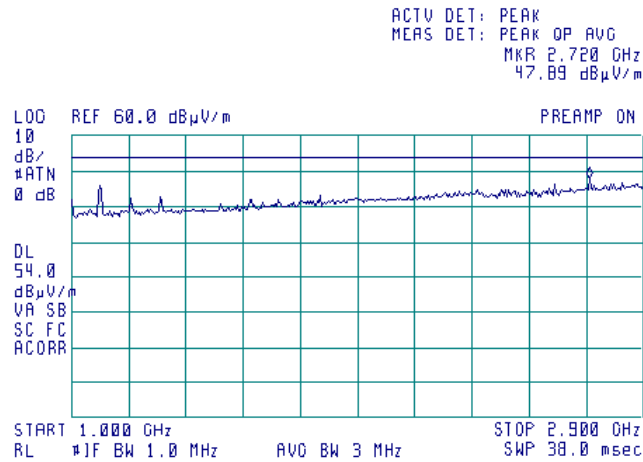


<b>Test specification:</b>	<b>Section 15.109, Radiated emission, Class B</b>		
<b>Test procedure:</b>	ANSI C63.4, Sections 11.6 and 12.1.4		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	<b>PASS</b>
<b>Date:</b>	11/11/2007		
<b>Temperature:</b> 24 °C	<b>Air Pressure:</b> 1008 hPa	<b>Relative Humidity:</b> 45 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

**Plot 8.2.3 Radiated emission measurements in 1.0 – 2.9 GHz range, vertical antenna polarization**

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

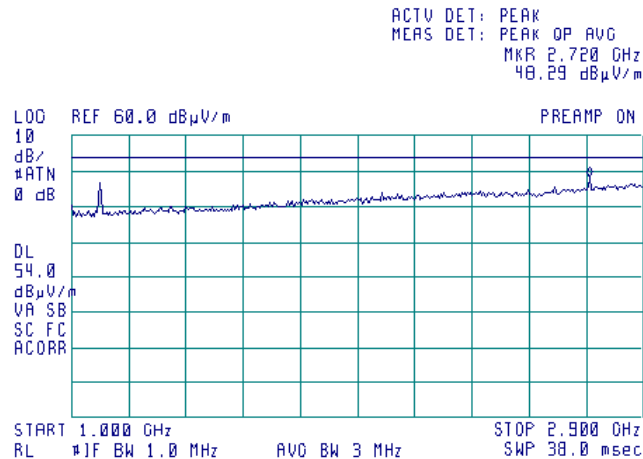
16:09:35 NOV 11, 2007



**Plot 8.2.4 Radiated emission measurements in 1.0 – 2.9 GHz range, horizontal antenna polarization**

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

16:03:29 NOV 11, 2007

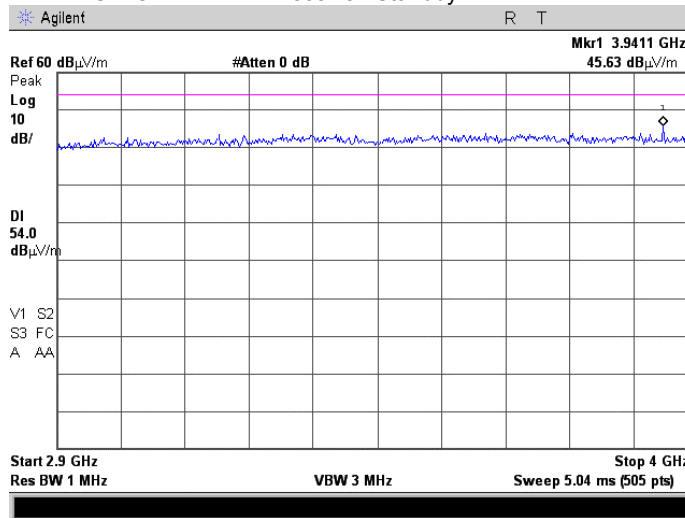




<b>Test specification:</b>	<b>Section 15.109, Radiated emission, Class B</b>		
<b>Test procedure:</b>	ANSI C63.4, Sections 11.6 and 12.1.4		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	<b>PASS</b>
<b>Date:</b>	11/11/2007		
<b>Temperature:</b> 24 °C	<b>Air Pressure:</b> 1008 hPa	<b>Relative Humidity:</b> 45 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

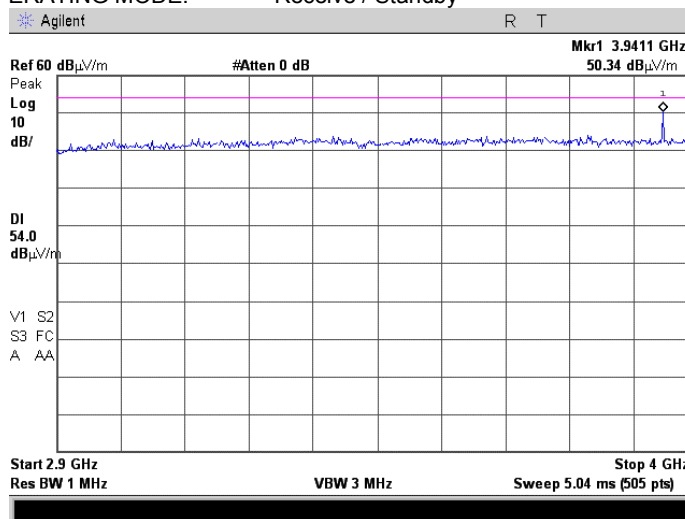
**Plot 8.2.5 Radiated emission measurements in 2.9 – 4.0 GHz range, vertical antenna polarization**

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



**Plot 8.2.6 Radiated emission measurements in 2.9 – 4.0GHz range, horizontal 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>	<b>PASS</b>
<b>Date:</b>	11/27/2007		
<b>Temperature:</b> 23 °C	<b>Air Pressure:</b> 1013 hPa	<b>Relative Humidity:</b> 48 %	<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

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

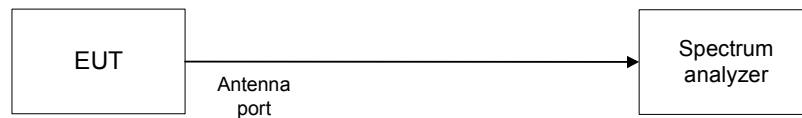
\* - harmonic of the local oscillator frequency.

#### 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>	<b>PASS</b>
<b>Date:</b>	11/27/2007		
<b>Temperature:</b> 23 °C	<b>Air Pressure:</b> 1013 hPa	<b>Relative Humidity:</b> 48 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

**Table 8.3.2 Spurious emission test results**

INVESTIGATED FREQUENCY RANGE: 30 – 2000 MHz  
 RECEIVER TYPE: Superheterodyne  
 EUT OPERATING MODE: Receive  
 DETECTOR USED: Peak  
 RESOLUTION BANDWIDTH: 1000 kHz  
 VIDEO BANDWIDTH: 3000 kHz

Frequency, MHz	Spurious emission, dBm	Limit, dBm	Margin, dB	Verdict
30 - 2000	No emissions were found	-57.0	NA	Pass

**Reference numbers of test equipment used**

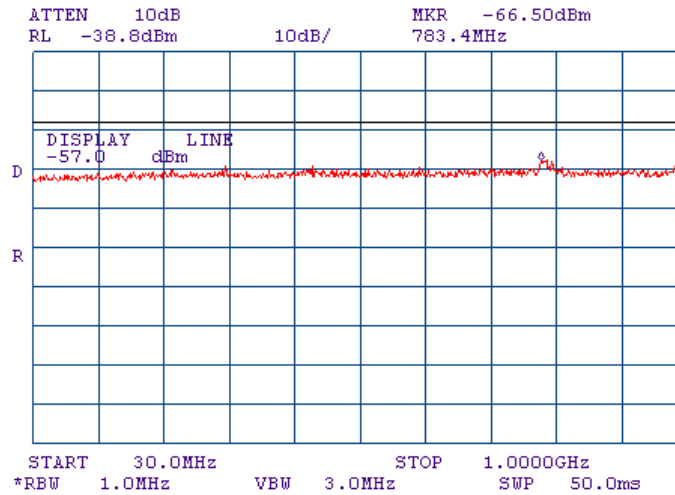
HL 1424	HL 2869					
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Full description is given in Appendix A.

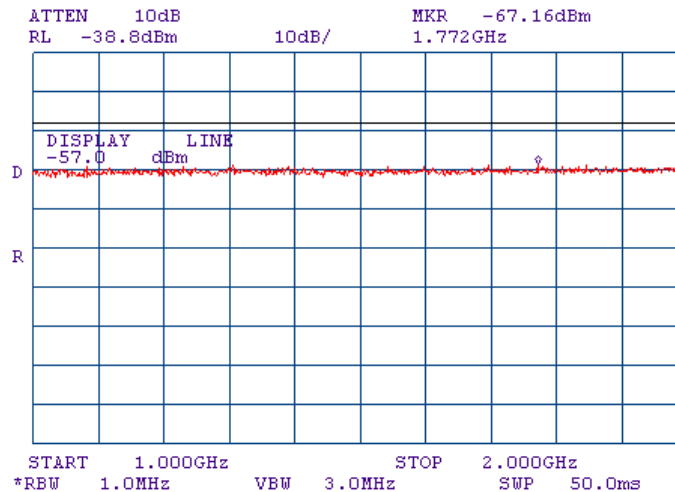


<b>Test specification:</b>	<b>Section 15.111, Conducted emission at receiver antenna port</b>		
<b>Test procedure:</b>	ANSI C63.4, Section 12.1.5		
<b>Test mode:</b>	Compliance	<b>Verdict:</b>	<b>PASS</b>
<b>Date:</b>	11/27/2007		
<b>Temperature:</b> 23 °C	<b>Air Pressure:</b> 1013 hPa	<b>Relative Humidity:</b> 48 %	<b>Power Supply:</b> 120 VAC
<b>Remarks:</b>			

**Plot 8.3.1 Spurious emission measurements in 30 to 1000 MHz range**



**Plot 8.3.2 Spurious emission measurements in 1000 to 2000 MHz range**



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

HL No	Description	Manufacturer	Model	Ser. No.	Last Cal.	Due Cal.
0174	Monitor, Field, 10kHz-1GHz, 1-300 V/m, w/fiberoptic	Amplifier Research	FM1000	60525	07-Dec-07	07-Dec-08
0446	Antenna, Loop, Active, 10 kHz - 30 MHz	EMCO	6502	2857	28-Jun-07	28-Jun-08
0447	LISN, 16/2, 300V RMS, 50 Ohm/50 uH + 5 Ohm, STD CISPR 16-1	HL	LISN 16 - 1	066	03-Nov-07	03-Nov-08
0493	Temperature Chamber -45...175 deg C	Thermotron	S-1.2 Mini-Max	14016	08-Mar-07	08-Mar-08
0521	EMI Receiver (Spectrum Analyzer) with RF filter section 9 kHz-6.5 GHz	Hewlett Packard Co	8546A	3617A 00319, 3448A002 53	28-Aug-07	28-Aug-08
0589	Cable Coaxial, GORE A2P01POL118, 2.3 m	HL	GORE-3	176	02-Dec-07	02-Dec-08
0604	Antenna BiconiLog Log-Periodic/T Bow-TIE, 26 - 2000 MHz	EMCO	3141	9611-1011	10-Jan-07	10-Jan-08
0613	Sensor Electric Field 10 kHz-1.0 GHz, 1-300 V/m (probe), w/charger	Amplifier Research	FP2000	18677	07-Dec-07	07-Dec-08
0661	Generator Swept Signal, 10 MHz to 40 GHz, + 10 dBm	HP	83640B	3614A002 66	23-Sep-07	23-Sep-08
0787	Transient Limiter 9 kHz-200 MHz	Hewlett Packard Co	11947A	3107A018 77	21-Nov-07	21-Nov-08
1004	Cable Coaxial , ANDREW PSWJ4 , 6m	HL	ANDREW -6	163	02-Dec-07	02-Dec-08
1365	Cable Coaxial, S-FLC 12-50, 5 m	HL	C214-5	1365	01-Jan-08	01-Jan-09
1424	Spectrum Analyzer, 30 Hz- 40 GHz	Agilent Technologies	8564EC	3946A002 19	28-Aug-07	28-Aug-08
1430	EMI Receiver, 9 kHz - 2.9 GHz, System: HL1431, HL1432	Agilent Technologies	8542E	3807A002 62,3705A0 0217	31-Aug-07	31-Aug-08
1502	Cable RF, 6 m, BNC/BNC	Belden	M17/167 MIL-C-17	1502	16-Nov-07	16-Nov-08
1510	Cable RF, 8 m, BNC/BNC	Belden	M17/167 MIL-C-17	1510	01-Jan-08	01-Jan-09
1947	Cable 18GHz, 6.5 m, blue	Rhophase Microwave Limited	NPS-1803A-6500-NPS	T4974	05-Oct-07	05-Oct-08
1984	Antenna, Double-Ridged Waveguide Horn, 1-18 GHz, 300 W	EMC Test Systems	3115	9911-5964	03-Mar-07	03-Mar-08
2009	Cable RF, 8 m	Alpha Wire	RG-214	C-56	01-Jan-08	01-Jan-09
2011	Power Divider, 0.5-18.0 GHz, 80 W	Omni Spectra	2090-6204-00	2011	05-Dec-07	05-Dec-08
2259	Amplifier Low Noise 2-20 GHz	Sophia Wireless	LNA0220-C	0223	05-Nov-07	05-Nov-08
2399	Cable 40GHz, 1.5 m, blue	Rhophase Microwave Limited	KPS-1503A-1500-KPS	X2945	01-Jan-08	01-Jan-09
2432	Antenna, Double-Ridged Waveguide Horn 1-18 GHz	EMC Test Systems	3115	00027177	03-Mar-07	03-Mar-08
2524	Attenuator, 10 dB, DC-18 GHz	Midwest Microwave	263-10	2524	03-Jan-08	03-Jan-09
2780	EMC analyzer, 100 Hz to 26.5 GHz	Agilent Technologies	E7405A	MY451024 6	11-Jun-07	11-Jun-08
2867	Cable, 18 GHz, 0.9 m, SMA - SMA, Right Angle	Gore	NA	91P72076	11-Feb-07	11-Feb-08



HL No	Description	Manufacturer	Model	Ser. No.	Last Cal.	Due Cal.
2869	Cable, 18 GHz, 1.2 m, SMA - SMA, Right Angle	Gore	NA	91P72073	11-Feb-07	11-Feb-08
2871	Microwave Cable Assembly, 18 GHz, 6.4 m, SMA - SMA	Huber-Suhner	198-8155-00	2871	11-Feb-07	11-Feb-08
2909	Spectrum analyzer, ESA-E, 100 Hz to 26.5 GHz	Agilent Technologies	E4407B	MY41444762	07-May-07	07-May-08
2924	Line Impedance Stabilization Network (LISN), 50Ohm/50 $\mu$ H+50hm, 25 A, 2 lines,STD: MIL-461E,CISPR 16-1	Electro-Metrics	FCC VDE 25-2	1178	17-Jun-07	17-Jun-08
3175	Attenuator, N-type, 10 dB, DC to 18 GHz, 5 W	Mini-Circuits	BW-N10W5+	0708	07-May-07	07-May-08
3180	Attenuator, N-type, 20 dB, DC to 18 GHz, 5 W	Mini-Circuits	BW-N20W5+	0651	07-May-07	07-May-08

## 10 APPENDIX B Measurement uncertainties

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

Test description	Expanded uncertainty
<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
Vertical polarization	Biconilog antenna: ± 6.0 dB Biconical antenna: ± 5.7 dB Log periodic antenna: ± 6.0 dB Double ridged horn antenna: ± 6.0 dB

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

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

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



## 11 APPENDIX C Test 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).

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

Person for contact: Mr. Alex Usoskin, CEO.

## 12 APPENDIX D Specification references

47CFR part 27: 2007	Miscellaneous wireless communications services
47CFR part 1: 2006	Practice and procedure
47CFR part 2: 2006	Frequency allocations and radio treaty matters; general rules and regulations
47CFR part 15 subpart B: 2006	Radio Frequency Devices
ANSI C63.2: 1996	American National Standard for Instrumentation-Electromagnetic Noise and Field Strength, 10 kHz to 40 GHz-Specifications.
ANSI C63.4: 2003	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz.
ANSI/TIA/EIA-603-C:2004	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards

**13 APPENDIX E Test equipment correction factors**

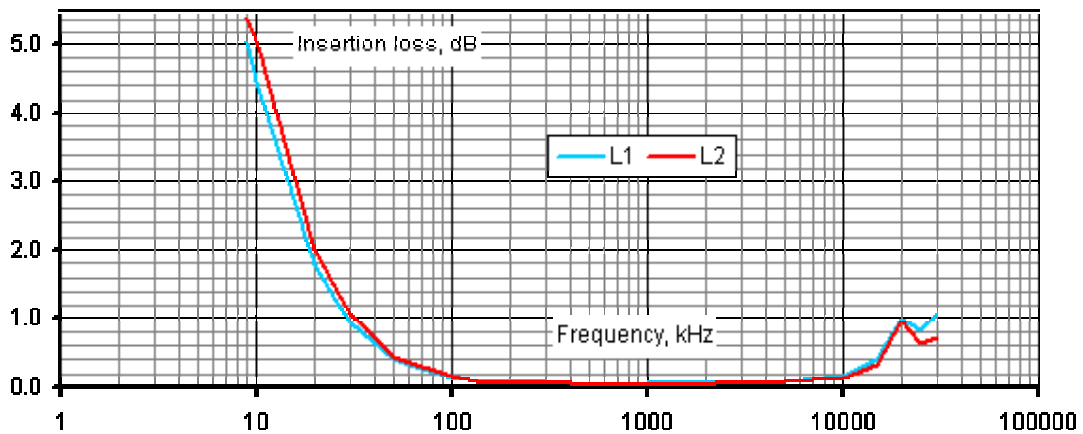
**Correction factor  
Line impedance stabilization network  
Model LISN 16 – 1, Hermon Laboratories, HL 0447**

<b>Frequency, MHz</b>	<b>Correction factor, dB</b>
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 FCC VDE 25-2, Electro-Metrics, HL 2924**

Frequency, kHz	Insertion loss, dB		Measurement Uncertainty, dB
	L1	L2	
9	5.03	5.43	0.6
10	4.47	5.07	
20	1.77	2.00	
30	0.93	1.07	
50	0.41	0.45	
100	0.14	0.16	
150	0.09	0.06	
200	0.07	0.07	
300	0.07	0.05	
400	0.05	0.05	
500	0.02	0.03	
1000	0.05	0.02	
5000	0.07	0.08	
10000	0.17	0.15	
15000	0.42	0.32	
20000	0.99	0.97	
25000	0.83	0.63	
30000	1.07	0.71	





**Antenna Factor**  
**Active Loop Antenna**  
**EMC Test Systems, model 6502, serial number 2857, HL 0446**

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, HL 0604**

Frequency, MHz	Antenna factor, dB(1/m)	Frequency, MHz	Antenna factor, dB(1/m)	Frequency, MHz	Antenna factor, dB(1/m)
26	7.8	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, HL 1984**

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 guide horn antenna  
Model 3115, serial number: 00027177, HL 2432**

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

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



**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		±0.17



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

No.	Frequency, MHz	Measured, dB	Measured uncertainty dB
1	1000	0.41	±0.12
2	1200	0.44	
3	1400	0.48	
4	1600	0.52	
5	1800	0.55	
6	2000	0.58	
7	2200	0.61	
8	2400	0.64	±0.17
9	2600	0.67	
10	2800	0.7	
11	3000	0.73	
12	3300	0.79	
13	3600	0.84	
14	3900	0.94	
15	4200	1.22	



**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 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	±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 coaxial, 40GHz, 1.5 m, Blue, Rhophase Microwave Limited, model: KPS-1503A-1500-KPS, HL 2399

Frequency, GHz	Cable loss, dB	Frequency, GHz	Cable loss, dB	Frequency, GHz	Cable loss, dB
0.03	0.07	6.5	1.57	15.50	2.50
0.05	0.10	6.7	1.60	16.00	2.51
0.1	0.16	6.9	1.55	16.50	2.58
0.2	0.26	7.1	1.65	17.00	2.65
0.3	0.33	7.3	1.65	17.50	2.73
0.5	0.38	7.5	1.70	18.00	2.74
0.7	0.41	7.7	1.71	18.50	2.67
0.9	0.58	7.9	1.73	19.00	2.67
1.1	0.64	8.1	1.79	19.50	2.74
1.3	0.70	8.3	1.81	20.00	2.69
1.5	0.75	8.5	1.84	20.50	2.80
1.7	0.79	8.7	1.85	21.00	2.82
1.9	0.83	8.9	1.90	21.50	2.87
2.1	0.88	9.1	1.95	22.00	2.87
2.3	0.93	9.3	1.93	22.50	2.92
2.5	0.97	9.5	1.98	23.50	3.04
2.7	1.01	9.7	1.96	24.00	3.05
2.9	1.04	9.9	2.03	24.50	3.03
3.1	1.08	10.1	1.99	25.00	3.11
3.3	1.14	10.30	2.02	25.50	3.10
3.5	1.17	10.50	2.02	26.00	3.17
3.7	1.21	10.70	2.02	26.50	3.11
3.9	1.24	10.90	2.08	27.00	3.16
4.1	1.26	11.10	2.02	28.00	3.19
4.3	1.26	11.30	2.09	29.00	3.19
4.5	1.29	11.50	2.05	30.00	3.30
4.7	1.34	11.70	2.11	31.00	3.31
4.9	1.34	11.90	2.11	32.00	3.35
5.1	1.40	12.10	2.12	33.00	3.46
5.3	1.43	12.40	2.17	34.00	3.45
5.5	1.45	13.00	2.29	35.00	3.49
5.7	1.47	13.50	2.31	36.00	3.54
5.9	1.40	14.00	2.43	37.00	3.62
6.1	1.53	14.50	2.43	39.00	3.69
6.3	1.55	15.00	2.46	40.00	3.75



**Cable loss**  
**Cable coaxial, Gore, 18 GHz, 0.9 m, SMA - SMA, model Right Angle, S/N 91P72076**  
**HL 2867**

Frequency, GHz	Cable loss, dB	Frequency, GHz	Cable loss, dB	Frequency, GHz	Cable loss, dB
10	0.06	5750	0.68	12000	1.06
30	0.04	6000	0.69	12250	1.07
100	0.07	6250	0.70	12500	1.09
250	0.14	6500	0.73	12750	1.09
500	0.19	6750	0.74	13000	1.15
750	0.22	7000	0.78	13250	1.17
1000	0.26	7250	0.77	13500	1.16
1250	0.27	7500	0.79	13750	1.17
1500	0.31	7750	0.81	14000	1.14
1750	0.35	8000	0.86	14250	1.13
2000	0.38	8250	0.86	14500	1.06
2250	0.41	8500	0.87	14750	1.12
2500	0.43	8750	0.87	15000	1.16
2750	0.46	9000	0.88	15250	1.11
3000	0.48	9250	0.89	15500	1.06
3250	0.51	9500	0.90	15750	1.12
3500	0.53	9750	0.94	16000	1.20
3750	0.55	10000	1.00	16250	1.25
4000	0.56	10250	1.01	16500	1.24
4250	0.58	10500	1.02	16750	1.34
4500	0.60	10750	1.01	17000	1.35
4750	0.62	11000	1.01	17250	1.35
5000	0.64	11250	1.01	17500	1.36
5250	0.67	11500	1.01	17750	1.40
5500	0.68	11750	1.05	18000	1.51

**Cable loss**  
Cable coaxial, Gore, 18 GHz, 1.1 m, SMA - SMA, model Right Angle, S/N 91P72071  
HL 2869

Frequency, GHz	Cable loss, dB	Frequency, GHz	Cable loss, dB	Frequency, GHz	Cable loss, dB
10	0.06	5750	0.87	12000	1.30
30	0.06	6000	0.87	12250	1.33
100	0.10	6250	0.89	12500	1.35
250	0.18	6500	0.92	12750	1.36
500	0.25	6750	0.94	13000	1.38
750	0.27	7000	0.98	13250	1.41
1000	0.34	7250	0.99	13500	1.39
1250	0.35	7500	1.02	13750	1.41
1500	0.42	7750	1.03	14000	1.42
1750	0.44	8000	1.04	14250	1.46
2000	0.49	8250	1.04	14500	1.39
2250	0.52	8500	1.08	14750	1.46
2500	0.55	8750	1.08	15000	1.40
2750	0.59	9000	1.12	15250	1.47
3000	0.61	9250	1.12	15500	1.36
3250	0.64	9500	1.15	15750	1.49
3500	0.67	9750	1.14	16000	1.51
3750	0.69	10000	1.19	16250	1.60
4000	0.70	10250	1.20	16500	1.56
4250	0.74	10500	1.23	16750	1.66
4500	0.76	10750	1.24	17000	1.71
4750	0.77	11000	1.24	17250	1.78
5000	0.79	11250	1.25	17500	1.75
5250	0.82	11500	1.28	17750	1.77
5500	0.84	11750	1.29	18000	1.86

## 14 APPENDIX F Abbreviations and acronyms

A	ampere
AC	alternating current
A/m	ampere per meter
AM	amplitude modulation
AVRG	average (detector)
cm	centimeter
dB	decibel
dBm	decibel referred to one milliwatt
dB( $\mu$ V)	decibel referred to one microvolt
dB( $\mu$ V/m)	decibel referred to one microvolt per meter
dB( $\mu$ A)	decibel referred to one microampere
DC	direct current
EIRP	equivalent isotropically radiated power
ERP	effective radiated power
EUT	equipment under test
F	frequency
GHz	gigahertz
GND	ground
H	height
HL	Hermon laboratories
Hz	hertz
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
$\mu$ s	microsecond
NA	not applicable
OATS	open area test site
$\Omega$	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