

## TEST REPORT

ACCORDING TO: FCC part 27: 2005, sections 27.53(d)(3), 27.53(e) and  
part 15: 2005 subpart B

FOR:

**Vyyo Ltd.**

**UHF industrial modem with  
Wi-Fi access point**

**Model:V290iA**

**FCC ID:PBJV284-PLUS-A**

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

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## 1 Applicant information

**Client name:** VYYO Ltd.  
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**Contact name:** Mr. Avihai Dahan

## 2 Equipment under test attributes

**Product name:** UHF industrial modem with Wi-Fi access point  
**Operating frequency range:** 776.075 – 776.925 MHz  
**Model:** V290iA, FCC ID:PBJV284-PLUS-A  
**Serial number:** 0067  
**Receipt date:** 4/26/2006

## 3 Manufacturer information

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

## 4 Test details

**Project ID:** 17088  
**Location:** Hermon Laboratories Ltd. P.O.Box 23, Binyamina 30500, Israel  
**Test started:** 5/01/2006  
**Test completed:** 5/23/2006  
**Test specifications:** FCC 47CFR:2005 part 27, §27.53(d)(3), §27.53(e);  
FCC part 15, subpart B



## 5 Tests summary

| Test  | Status |
|---|--------|
| <b>Transmitter characteristics</b>                                  |        |
| Section 27.53(d)(3), Spurious emissions RF antenna connector        | Pass   |
| Section 27.53(d)(3), Radiated spurious emissions                    | Pass   |
| Section 27.53(e), Radiated spurious emissions in 1559-1610 MHz band | Pass   |
| <b>Unintentional emissions</b>                                      |        |
| Section 15.107, Conducted emission at AC power port                 | Pass   |
| Section 15.109, Radiated emission                                   | Pass   |

The test results relate only to the items tested. Pass / fail decision was based on nominal values.

|              | Name and Title                              | Date         | Signature |
|--------------|---|--------------|-----------|
| Tested by:   | Mr. A. Adelberg, test engineer              | May 18, 2006 |           |
| Reviewed by: | Mrs. M. Cherniavsky, certification engineer | May 28, 2006 |           |
| Approved by: | Mr. M. Nikishin, EMC and Radio group leader | May 29, 2006 |           |

## 6 EUT description

### 6.1 General information

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

### 6.2 Ports and lines

| Port type | Port description     | Connected     |               | Connector type | Qty. | Cable type  | Cable length | Indoor / outdoor |
|-----------|----------------------|---------------|---------------|----------------|------|-------------|--------------|------------------|
|           |                      | From          | To            |                |      |             |              |                  |
| Power     | AC mains             | Power adaptor | AC mains      | IEC 60320      | 1    | Unshielded  | 1.5 m        | Indoor           |
| Power     | VDC                  | EUT           | Power adaptor | DC jack        | 1    | Unshielded  | 1.5 m        | Indoor           |
| Signal    | Antenna              | EUT           | Attenuator    | F-type         | 1    | Coax 75 Ohm | 10.0 m       | Outdoor          |
| Signal    | Ethernet             | EUT           | Open circuit  | RJ 45          | 3    | FTP Cat.5   | 1.5 m        | Indoor           |
| Signal    | RS232 (SCADA)        | EUT           | Loop          | D type 9       | 4    | Unshielded  | 2 m          | Outdoor          |
| Signal    | AUX                  | EUT           | Open circuit  | D type 9       | 1    | Unshielded  | 2 m          | Indoor           |
| Signal    | Power Supply Control | EUT           | Open circuit  | D type 9       | 2    | Unshielded  | 2 m          | Indoor           |

### 6.3 Support and test equipment

| Description                       | Manufacturer | Model number  | Serial number       |
|-----------------------------------|--------------|---------------|---------------------|
| Wireless modem termination system | Vyyo         | V3000         | 5036408             |
| Up converter (256 QAM)            | Wavecom      | UC4040D       | 216450              |
| Down converter                    | Vyyo         | XTB VHF       | 1348529             |
| Laptop                            | IBM          | ThinkPad 600x | 5573MWV02/99        |
| Power adaptor for EUT             | DVE          | DSA-0151A     | 3604                |
| Power adaptor for laptop          | IBM          | 02K6654       | 150HN9              |
| Switch 24 ports                   | Super Stack  | 3C16980       | 0602/72NV4990A<br>1 |

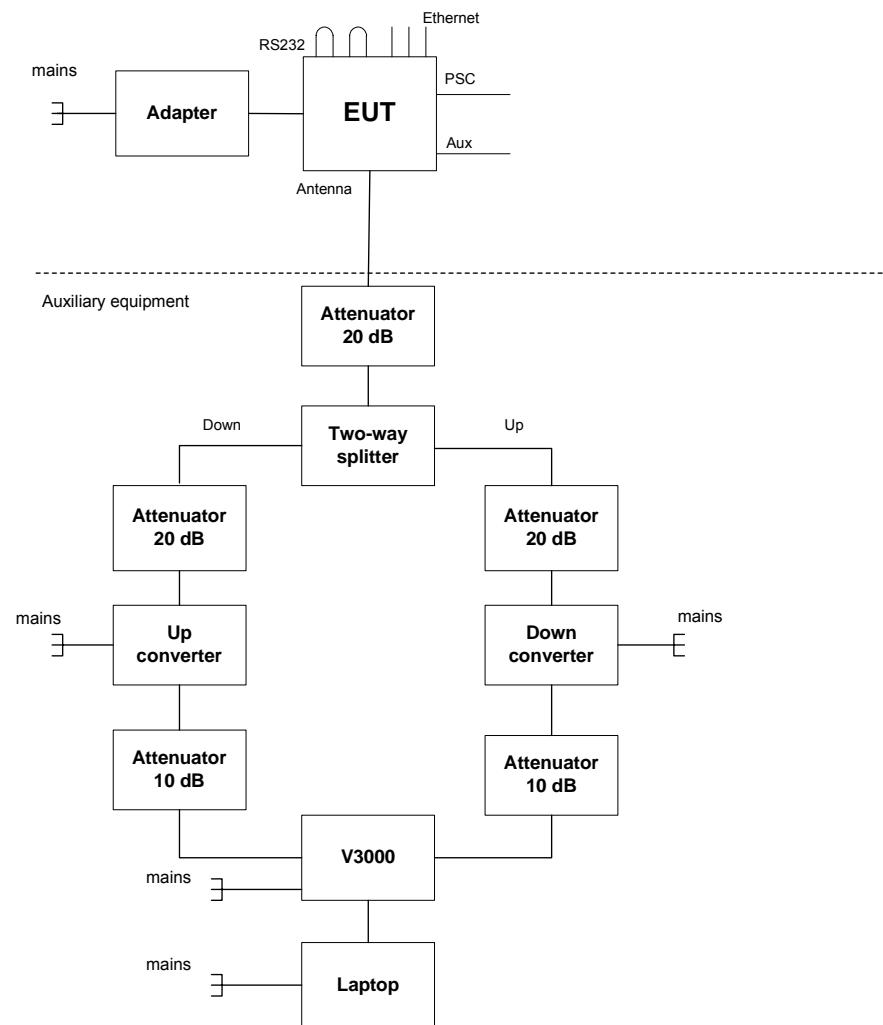
### 6.4 Operating frequencies

| Source      | Frequency, MHz |           |                        |
|-------------|----------------|-----------|------------------------|
| Receiver    | 702.0 (LO)     | 44.0 (IF) | 746.075 – 746.925 (Rx) |
| Transmitter | 10.0 (VCTXO)   | 44.0 (IF) | 776.075 – 776.925 (Tx) |

### 6.5 Changes made in the EUT

No changes were implemented.

## 6.6 Test configuration



## 6.7 Transmitter characteristics

| Type of equipment  |   |   |                                |   |       |          |
|--|---|---|--------------------------------|---|-------|----------|
| Stand-alone (Equipment with or without its own control provisions)   |   |   |                                |   |       |          |
| <input checked="" type="checkbox"/> Combined equipment (Equipment where the radio part is fully integrated within another type of equipment) |   |   |                                |   |       |          |
| Plug-in card (Equipment intended for a variety of host systems)  |   |   |                                |   |       |          |
| Intended use   | Condition of use  |   |                                |   |       |          |
| fixed  | Always at a distance more than 2 m from all people        |   |                                |   |       |          |
| <input checked="" type="checkbox"/> mobile   | Always at a distance more than 20 cm from all people      |   |                                |   |       |          |
| portable   | May operate at a distance closer than 20 cm to human body |   |                                |   |       |          |
| Assigned frequency range   |   | 776.0 – 777.0 MHz   |                                |   |       |          |
| Wi-Fi frequency range  |   | 2412 – 2462 MHz   |                                |   |       |          |
| Operating frequency range  |   | 776.075 – 776.925 MHz   |                                |   |       |          |
| Maximum rated output power   |   | At transmitter 50 Ω RF output connector                       |                                | 28.16 dBm   |       |          |
|  |   | Effective radiated power (for equipment with no RF connector) |                                | NA  |       |          |
| Is transmitter output power variable?  |   | No  |                                |   |       |          |
|  |   | continuous variable   |                                |   |       |          |
|  |   | <input checked="" type="checkbox"/> Yes                       | stepped variable with stepsize | 0.25 dB   |       |          |
|  |   |   | minimum RF power               | -17.0 dBm   |       |          |
|  |   |   | maximum RF power               | +28.16 dBm  |       |          |
| Antenna connection   |   |   |                                |   |       |          |
| unique coupling  | <input checked="" type="checkbox"/>                       | standard F-type connector                                     | integral                       | with temporary RF connector<br>without temporary RF connector |       |          |
| Antenna/s technical characteristics  |   |   |                                |   |       |          |
| Type   | Manufacturer  |   | Model number                   | Gain  |       |          |
| Yagi   | Shenglu   |   | TDJ-700B12G13.5                | 13.5 dBi  |       |          |
| Transmitter 99% power bandwidth  |   | 150 / 200 / 325 / 400kHz                                      |                                |   |       |          |
| Type of multiplexing   |   | TDMA  |                                |   |       |          |
| Modulating test signal (baseband)  |   | PRBS  |                                |   |       |          |
| Maximum transmitter duty cycle in normal use   |   | 50 %  |                                |   |       |          |
| Transmitter duty cycle supplied for test   |   | 100 %   |                                |   |       |          |
| Transmitter power source   |   |   |                                |   |       |          |
| Battery  | Nominal rated voltage                                     | VDC   | Battery type                   |   |       |          |
| DC   | Nominal rated voltage                                     | VDC   |                                |   |       |          |
| <input checked="" type="checkbox"/> AC mains   | Nominal rated voltage                                     | 120 VAC   | Frequency                      | 60 Hz   |       |          |
| Common power source for transmitter and receiver   |   | <input checked="" type="checkbox"/> yes                       | no                             |   |       |          |
| Type of modulation   | Modulation states (constellation)                         |   | RF channel spacing             | Frequency channel   |       |          |
|  |   |   |                                | Low   | Mid   | High     |
| QAM  | 16  |   | 150 kHz                        | 776.075   | 776.5 | 776.925  |
| QPSK   | 4   |   | 150 kHz                        | 776.075   | 776.5 | 776.925  |
| QAM  | 16  |   | 200 kHz                        | 776.1   | 776.5 | 776.9    |
| QPSK   | 4   |   | 200 kHz                        | 776.1   | 776.5 | 776.9    |
| QAM  | 16  |   | 325 kHz                        | 776.1625  | 776.5 | 776.8375 |
| QPSK   | 4   |   | 325 kHz                        | 776.1625  | 776.5 | 776.8375 |
| QAM  | 16  |   | 400 kHz                        | 776.2   | 776.5 | 776.8    |
| QPSK   | 4   |   | 400 kHz                        | 776.2   | 776.5 | 776.8    |

|                            |  |                                |                              |
|----------------------------|--|--------------------------------|------------------------------|
| <b>Test specification:</b> | <b>Section 27.53(d)(3), Spurious emissions at RF antenna connector</b> |                                |                              |
| <b>Test procedure:</b>     | 47 CFR, Sections 2.1047, 2.1051, TIA/EIA-603-A, Section 2.2.13         |                                |                              |
| <b>Test mode:</b>          | Compliance   | <b>Verdict:</b>                | PASS                         |
| <b>Date:</b>               | 5/07/2006  |                                |                              |
| <b>Temperature:</b> 21 °C  | <b>Air Pressure:</b> 1006 hPa  | <b>Relative Humidity:</b> 44 % | <b>Power Supply:</b> 120 VAC |
| <b>Remarks:</b>            |  |                                |                              |

## 7 Transmitter characteristics

### 7.1 Spurious emissions at RF antenna connector test

#### 7.1.1 General

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

**Table 7.1.1 Spurious emission limits**

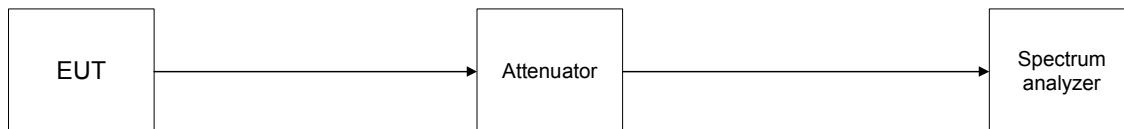
| Frequency, MHz*                   | Attenuation below carrier, dBc | Spurious emissions, dBm |
|-----------------------------------|--------------------------------|-------------------------|
| 0.009 – 10 <sup>th</sup> harmonic | 43+10logP*                     | -13                     |

\* - P is transmitter output power in Watts.

#### 7.1.2 Test procedure

- 7.1.2.1 The EUT was set up as shown in Figure 7.3.1, energized and its proper operation was checked.
- 7.1.2.2 The EUT was adjusted to produce maximum available for end user RF output power.
- 7.1.2.3 The spurious emission was measured with spectrum analyzer as provided in Table 7.3.2 and associated plots.

**Figure 7.1.1 Spurious emission test setup**



|                            |  |                                |                              |
|----------------------------|--|--------------------------------|------------------------------|
| <b>Test specification:</b> | <b>Section 27.53(d)(3), Spurious emissions at RF antenna connector</b> |                                |                              |
| <b>Test procedure:</b>     | 47 CFR, Sections 2.1047, 2.1051, TIA/EIA-603-A, Section 2.2.13         |                                |                              |
| <b>Test mode:</b>          | Compliance   | <b>Verdict:</b>                | PASS                         |
| <b>Date:</b>               | 5/07/2006  |                                |                              |
| <b>Temperature:</b> 21 °C  | <b>Air Pressure:</b> 1006 hPa  | <b>Relative Humidity:</b> 44 % | <b>Power Supply:</b> 120 VAC |
| <b>Remarks:</b>            |  |                                |                              |

**Table 7.1.2 Spurious emission test results**

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

| Frequency, MHz                                  | Bit rate, Mbps | RBW, kHz | Spurious emission, dBm | Limit, dBm | Margin, dB* | Verdict |
|---|----------------|----------|------------------------|------------|-------------|---------|
| <b>Low channel</b>                              |                |          |                        |            |             |         |
| All emissions found more than 20 dB below limit |                |          |                        |            |             | Pass    |
| <b>Mid channel</b>                              |                |          |                        |            |             |         |
| All emissions found more than 20 dB below limit |                |          |                        |            |             | Pass    |
| <b>High channel</b>                             |                |          |                        |            |             | Pass    |
| All emissions found more than 20 dB below limit |                |          |                        |            |             | Pass    |

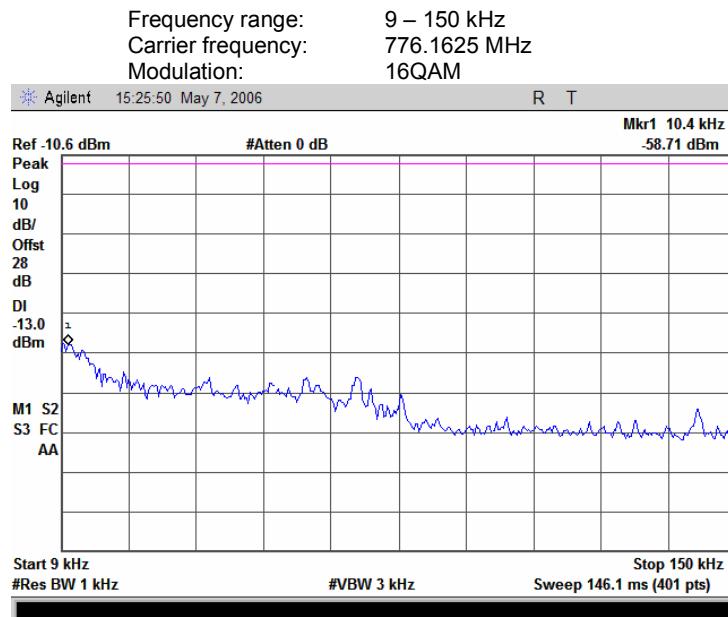
\*- Margin = Spurious emission – specification limit.

**Reference numbers of test equipment used**

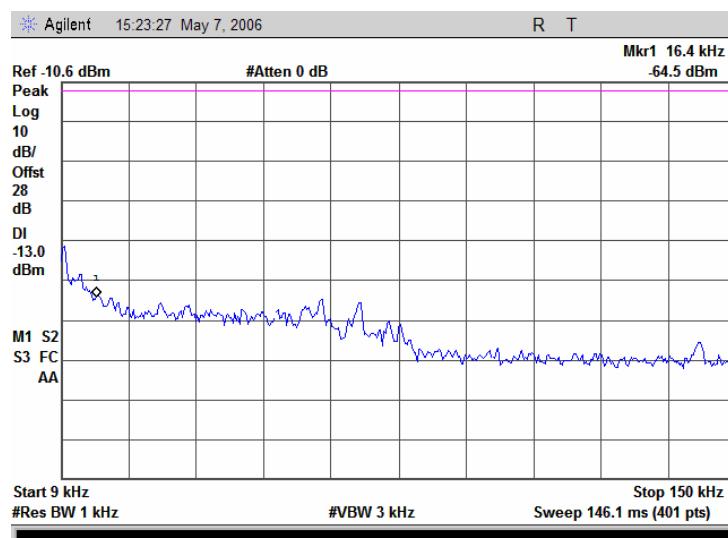
|         |         |         |         |         |  |  |  |
|---------|---------|---------|---------|---------|--|--|--|
| HL 0186 | HL 1474 | HL 1475 | HL 1653 | HL 1942 |  |  |  |
|---------|---------|---------|---------|---------|--|--|--|

Full description is given in Appendix A.

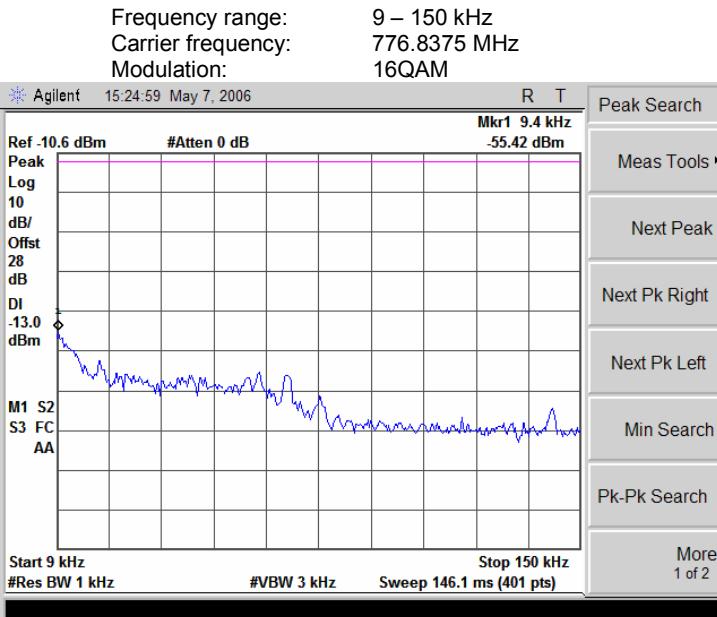
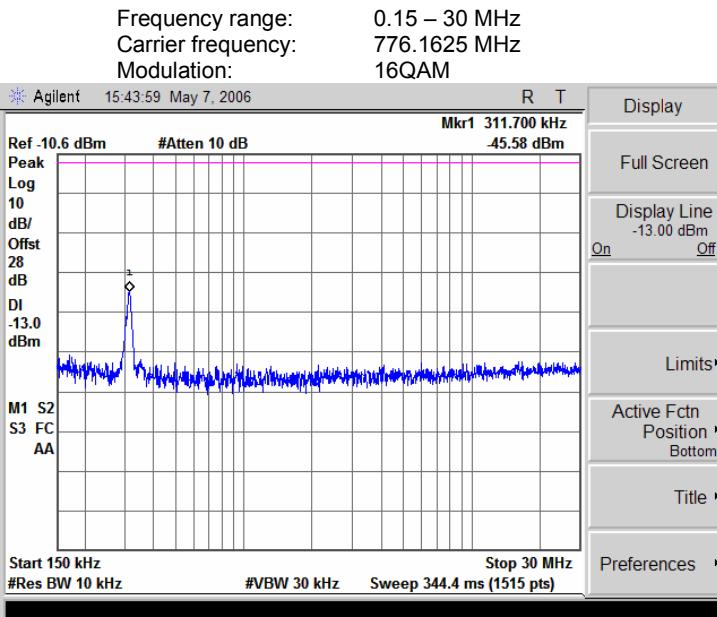
|                            |  |                                |                              |
|----------------------------|--|--------------------------------|------------------------------|
| <b>Test specification:</b> | <b>Section 27.53(d)(3), Spurious emissions at RF antenna connector</b> |                                |                              |
| <b>Test procedure:</b>     | 47 CFR, Sections 2.1047, 2.1051, TIA/EIA-603-A, Section 2.2.13         |                                |                              |
| <b>Test mode:</b>          | Compliance   | <b>Verdict:</b>                | PASS                         |
| <b>Date:</b>               | 5/07/2006  |                                |                              |
| <b>Temperature:</b> 21 °C  | <b>Air Pressure:</b> 1006 hPa  | <b>Relative Humidity:</b> 44 % | <b>Power Supply:</b> 120 VAC |
| <b>Remarks:</b>            |  |                                |                              |

**Plot 7.1.1 Spurious emission measurements at RF antenna connector, low channel**

**Plot 7.1.2 Spurious emission measurements at RF antenna connector, mid channel**

Frequency range: 9 – 150 kHz  
 Carrier frequency: 776.5 MHz  
 Modulation: 16QAM

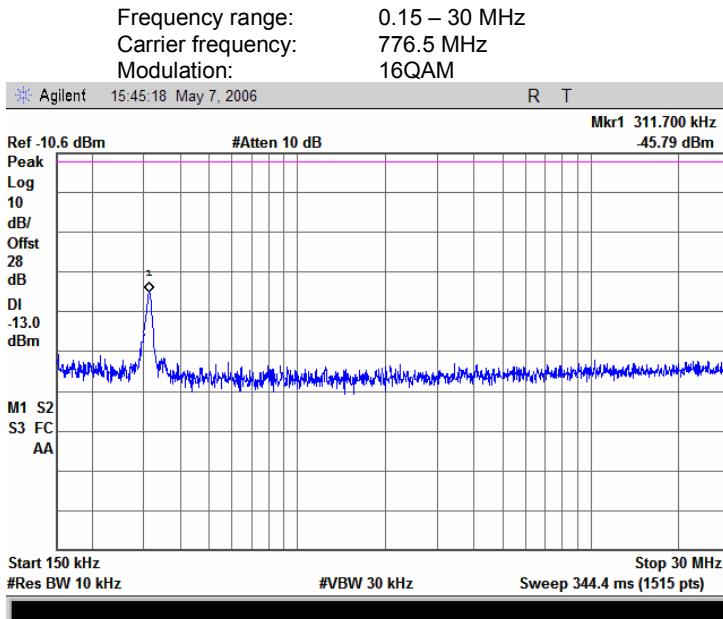


|                            |  |                                |                              |
|----------------------------|--|--------------------------------|------------------------------|
| <b>Test specification:</b> | <b>Section 27.53(d)(3), Spurious emissions at RF antenna connector</b> |                                |                              |
| <b>Test procedure:</b>     | 47 CFR, Sections 2.1047, 2.1051, TIA/EIA-603-A, Section 2.2.13         |                                |                              |
| <b>Test mode:</b>          | Compliance   | <b>Verdict:</b>                | PASS                         |
| <b>Date:</b>               | 5/07/2006  |                                |                              |
| <b>Temperature:</b> 21 °C  | <b>Air Pressure:</b> 1006 hPa  | <b>Relative Humidity:</b> 44 % | <b>Power Supply:</b> 120 VAC |
| <b>Remarks:</b>            |  |                                |                              |

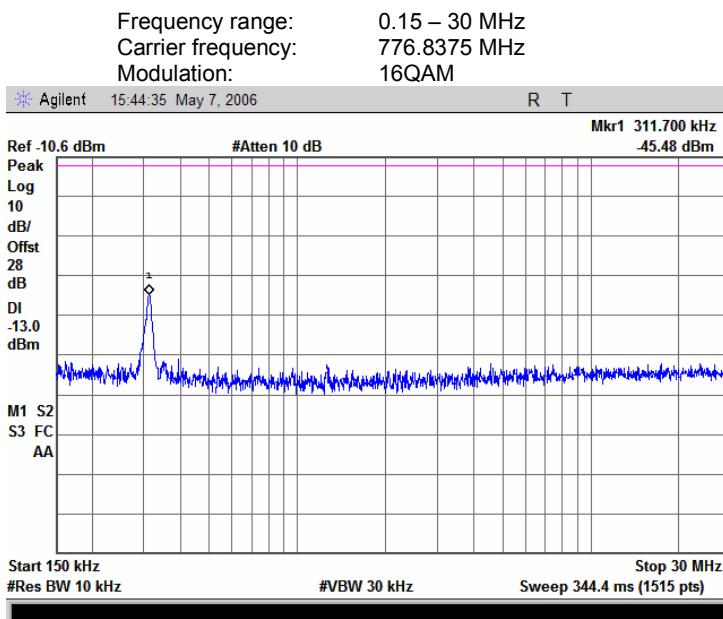
**Plot 7.1.3 Spurious emission measurements at RF antenna connector, high channel**

**Plot 7.1.4 Spurious emission measurements at RF antenna connector, low channel**


|                            |  |                                |                              |
|----------------------------|--|--------------------------------|------------------------------|
| <b>Test specification:</b> | <b>Section 27.53(d)(3), Spurious emissions at RF antenna connector</b> |                                |                              |
| <b>Test procedure:</b>     | 47 CFR, Sections 2.1047, 2.1051, TIA/EIA-603-A, Section 2.2.13         |                                |                              |
| <b>Test mode:</b>          | Compliance   | <b>Verdict:</b>                | PASS                         |
| <b>Date:</b>               | 5/07/2006  |                                |                              |
| <b>Temperature:</b> 21 °C  | <b>Air Pressure:</b> 1006 hPa  | <b>Relative Humidity:</b> 44 % | <b>Power Supply:</b> 120 VAC |
| <b>Remarks:</b>            |  |                                |                              |

Plot 7.1.5 Spurious emission measurements at RF antenna connector, mid channel

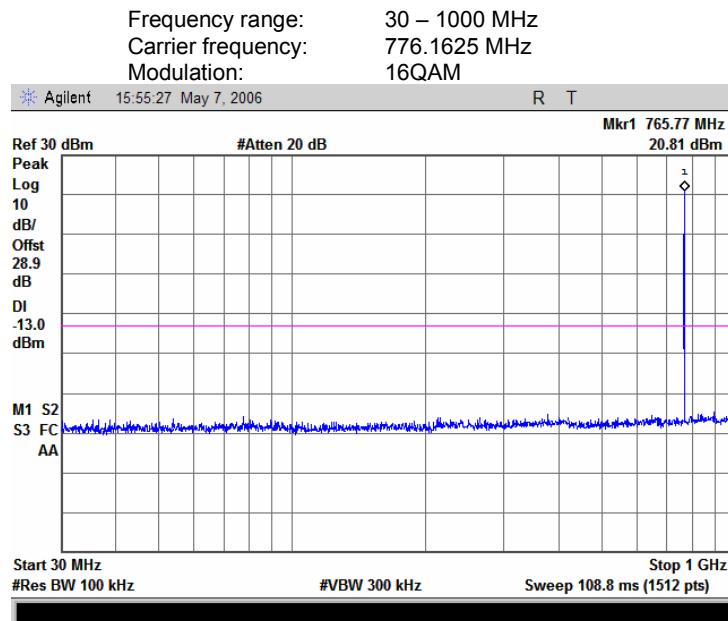


Plot 7.1.6 Spurious emission measurements at RF antenna connector, high channel

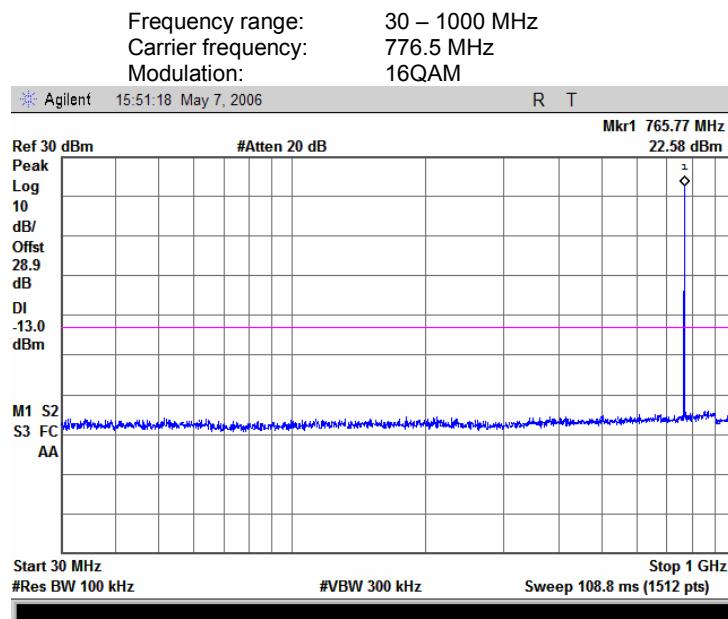


|                            |  |                                |                              |
|----------------------------|--|--------------------------------|------------------------------|
| <b>Test specification:</b> | <b>Section 27.53(d)(3), Spurious emissions at RF antenna connector</b> |                                |                              |
| <b>Test procedure:</b>     | 47 CFR, Sections 2.1047, 2.1051, TIA/EIA-603-A, Section 2.2.13         |                                |                              |
| <b>Test mode:</b>          | Compliance   | <b>Verdict:</b>                | PASS                         |
| <b>Date:</b>               | 5/07/2006  |                                |                              |
| <b>Temperature:</b> 21 °C  | <b>Air Pressure:</b> 1006 hPa  | <b>Relative Humidity:</b> 44 % | <b>Power Supply:</b> 120 VAC |
| <b>Remarks:</b>            |  |                                |                              |

Plot 7.1.7 Spurious emission measurements at RF antenna connector, low channel

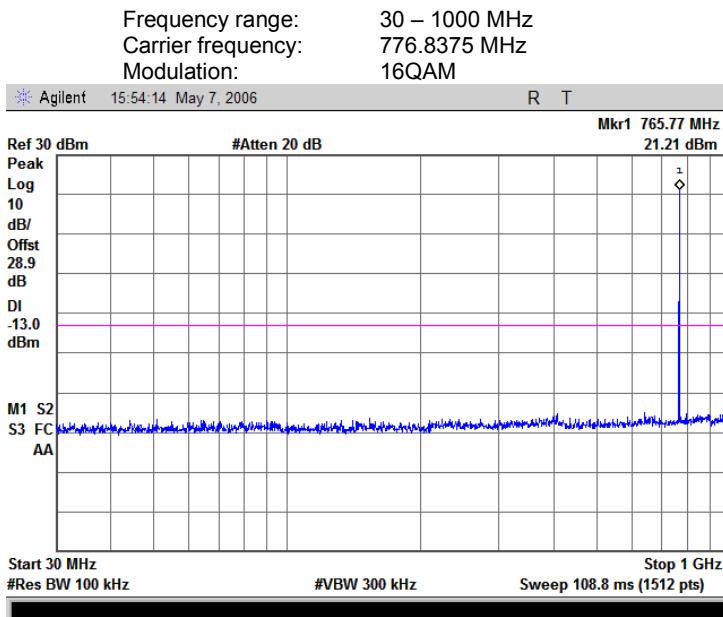


Plot 7.1.8 Spurious emission measurements at RF antenna connector, mid channel

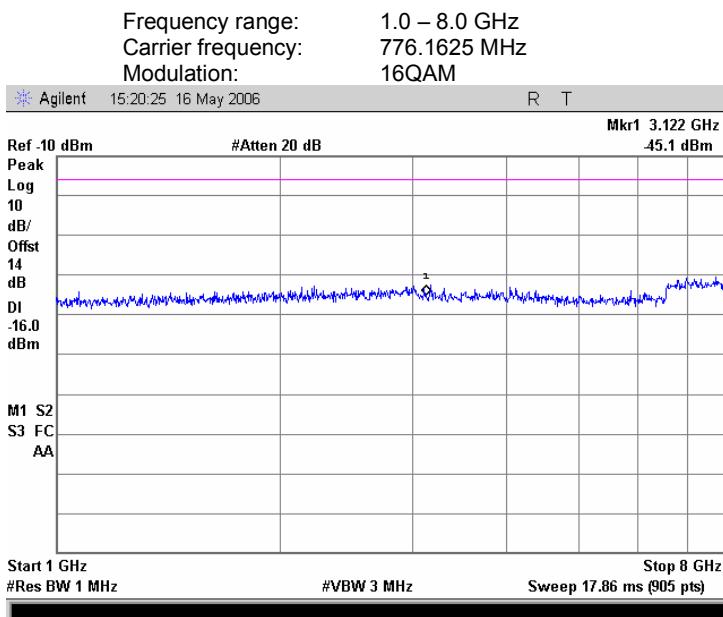


|                            |  |                                |                              |
|----------------------------|--|--------------------------------|------------------------------|
| <b>Test specification:</b> | <b>Section 27.53(d)(3), Spurious emissions at RF antenna connector</b> |                                |                              |
| <b>Test procedure:</b>     | 47 CFR, Sections 2.1047, 2.1051, TIA/EIA-603-A, Section 2.2.13         |                                |                              |
| <b>Test mode:</b>          | Compliance   | <b>Verdict:</b>                | PASS                         |
| <b>Date:</b>               | 5/07/2006  |                                |                              |
| <b>Temperature:</b> 21 °C  | <b>Air Pressure:</b> 1006 hPa  | <b>Relative Humidity:</b> 44 % | <b>Power Supply:</b> 120 VAC |
| <b>Remarks:</b>            |  |                                |                              |

**Plot 7.1.9 Spurious emission measurements at RF antenna connector, high channel**



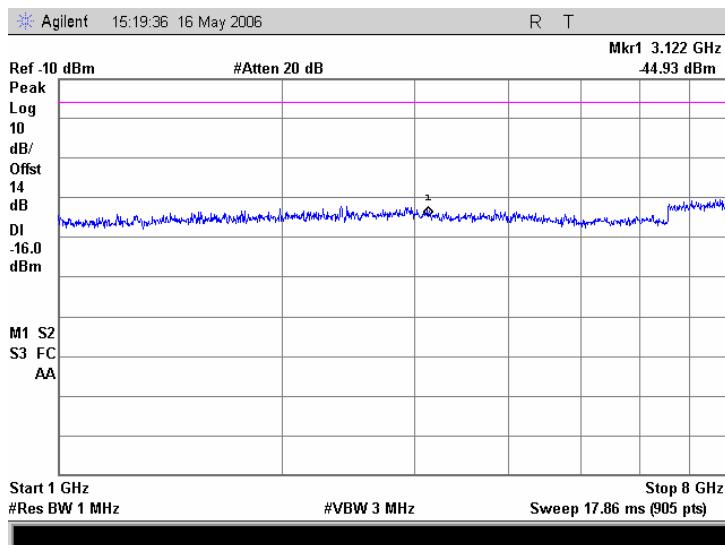
**Plot 7.1.10 Spurious emission measurements at RF antenna connector, low channel**



|                            |  |                                |                              |
|----------------------------|--|--------------------------------|------------------------------|
| <b>Test specification:</b> | <b>Section 27.53(d)(3), Spurious emissions at RF antenna connector</b> |                                |                              |
| <b>Test procedure:</b>     | 47 CFR, Sections 2.1047, 2.1051, TIA/EIA-603-A, Section 2.2.13         |                                |                              |
| <b>Test mode:</b>          | Compliance   | <b>Verdict:</b>                | PASS                         |
| <b>Date:</b>               | 5/07/2006  |                                |                              |
| <b>Temperature:</b> 21 °C  | <b>Air Pressure:</b> 1006 hPa  | <b>Relative Humidity:</b> 44 % | <b>Power Supply:</b> 120 VAC |
| <b>Remarks:</b>            |  |                                |                              |

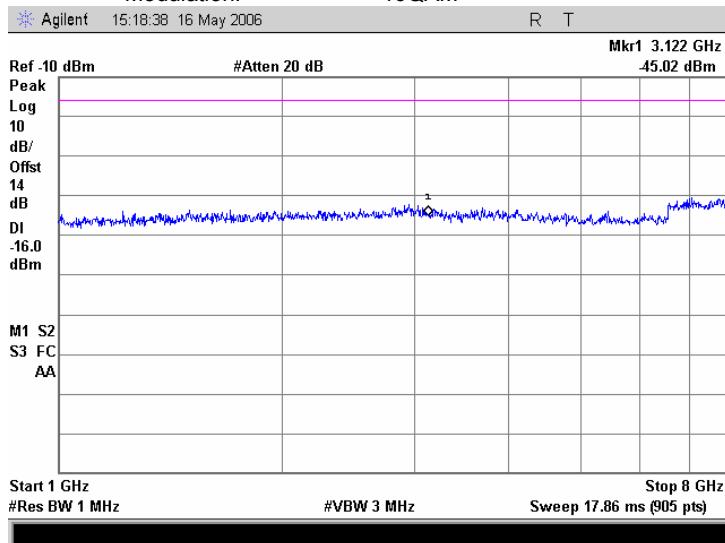
**Plot 7.1.11 Spurious emission measurements at RF antenna connector, mid channel**

Frequency range: 1.0 – 8.0 GHz  
Carrier frequency: 776.5 MHz  
Modulation: 16QAM



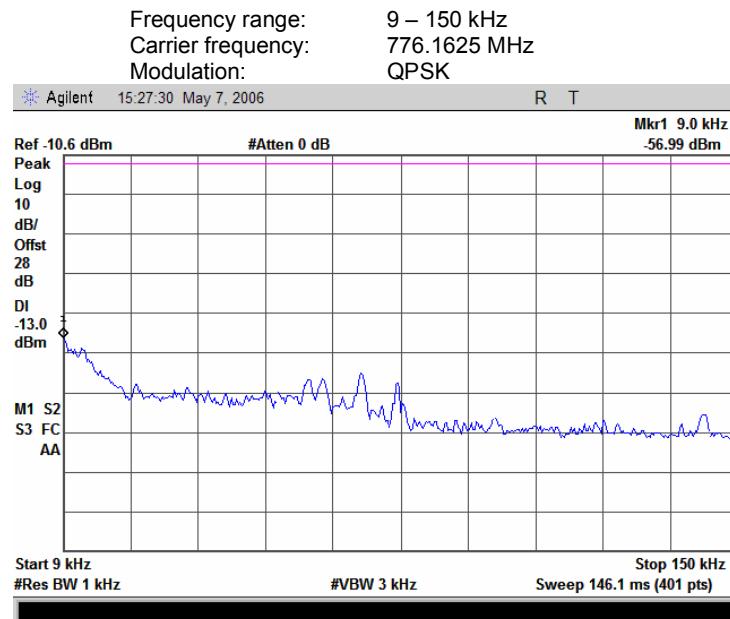
**Plot 7.1.12 Spurious emission measurements at RF antenna connector, high channel**

Frequency range: 1.0 – 8.0 GHz  
Carrier frequency: 776.8375 MHz  
Modulation: 16QAM

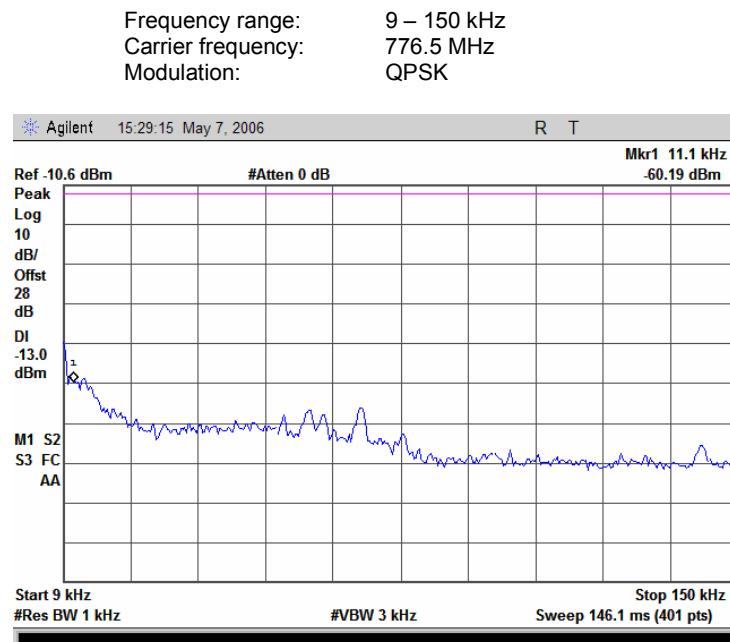


|                            |  |                                |                              |
|----------------------------|--|--------------------------------|------------------------------|
| <b>Test specification:</b> | <b>Section 27.53(d)(3), Spurious emissions at RF antenna connector</b> |                                |                              |
| <b>Test procedure:</b>     | 47 CFR, Sections 2.1047, 2.1051, TIA/EIA-603-A, Section 2.2.13         |                                |                              |
| <b>Test mode:</b>          | Compliance   | <b>Verdict:</b>                | PASS                         |
| <b>Date:</b>               | 5/07/2006  |                                |                              |
| <b>Temperature:</b> 21 °C  | <b>Air Pressure:</b> 1006 hPa  | <b>Relative Humidity:</b> 44 % | <b>Power Supply:</b> 120 VAC |
| <b>Remarks:</b>            |  |                                |                              |

Plot 7.1.13 Spurious emission measurements at RF antenna connector, low channel

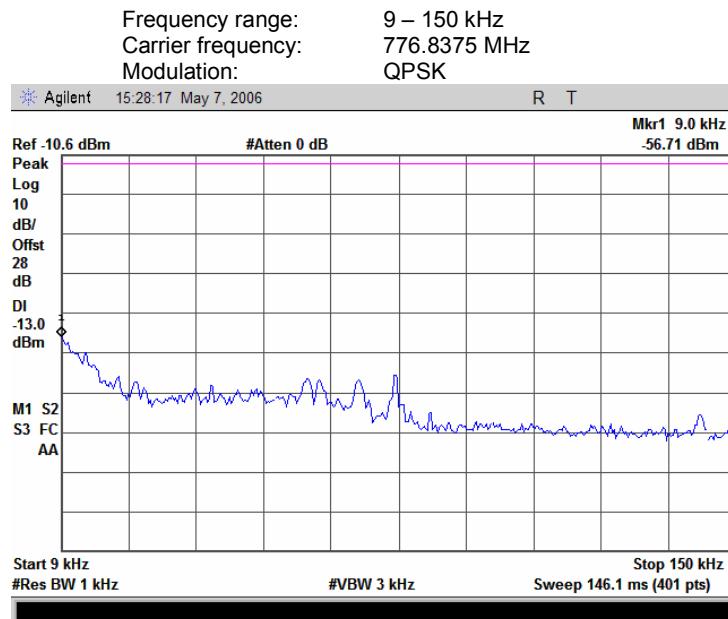


Plot 7.1.14 Spurious emission measurements at RF antenna connector, mid channel

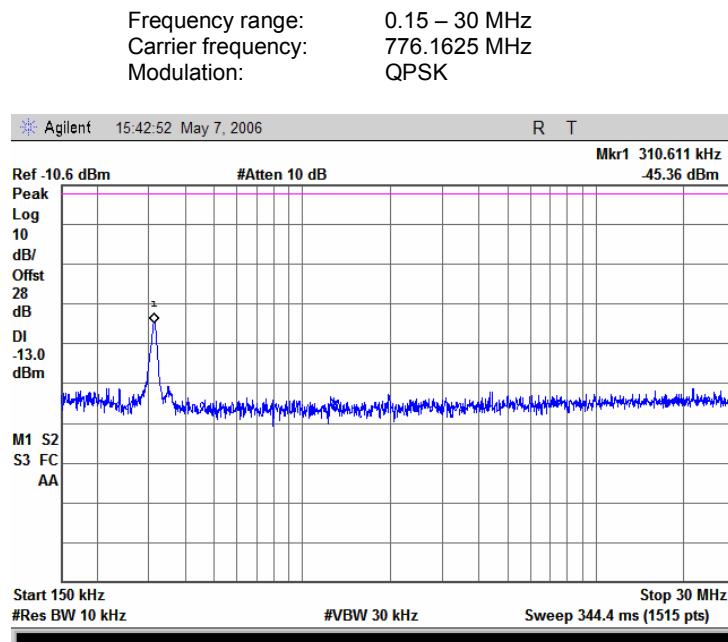


|                            |  |                                |                              |
|----------------------------|--|--------------------------------|------------------------------|
| <b>Test specification:</b> | <b>Section 27.53(d)(3), Spurious emissions at RF antenna connector</b> |                                |                              |
| <b>Test procedure:</b>     | 47 CFR, Sections 2.1047, 2.1051, TIA/EIA-603-A, Section 2.2.13         |                                |                              |
| <b>Test mode:</b>          | Compliance   | <b>Verdict:</b>                | PASS                         |
| <b>Date:</b>               | 5/07/2006  |                                |                              |
| <b>Temperature:</b> 21 °C  | <b>Air Pressure:</b> 1006 hPa  | <b>Relative Humidity:</b> 44 % | <b>Power Supply:</b> 120 VAC |
| <b>Remarks:</b>            |  |                                |                              |

Plot 7.1.15 Spurious emission measurements at RF antenna connector, high channel

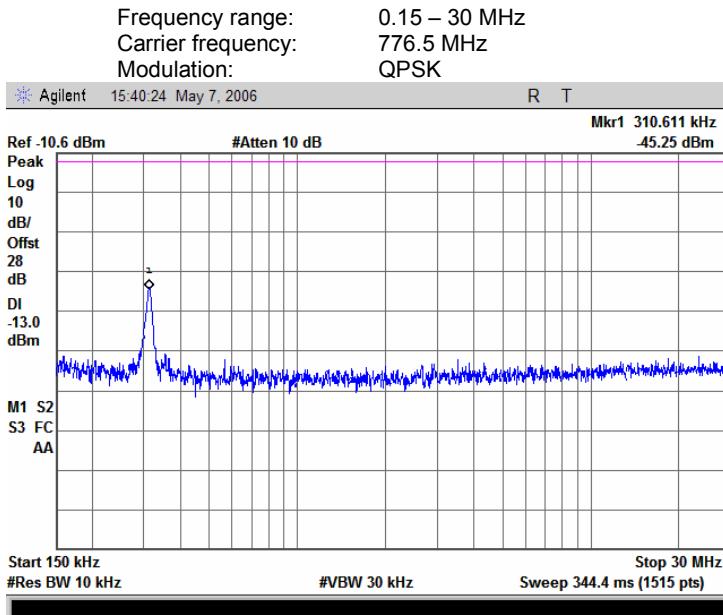


Plot 7.1.16 Spurious emission measurements at RF antenna connector, low channel

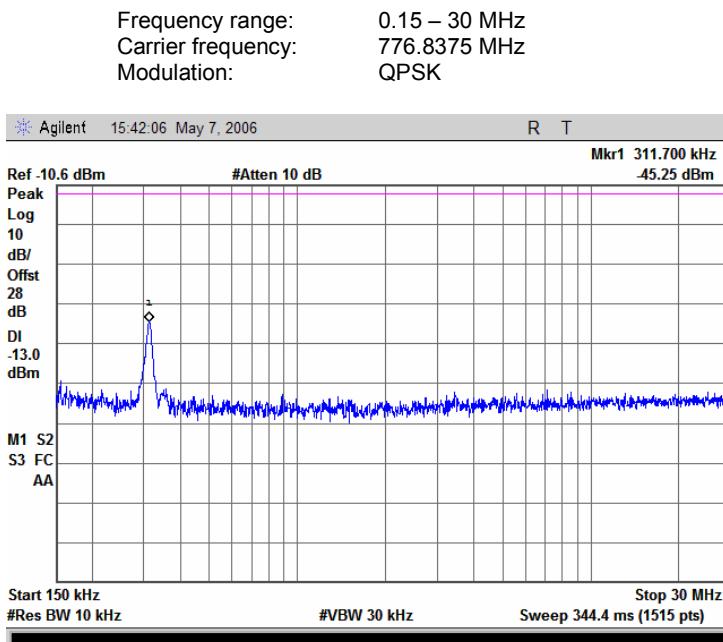


|                            |  |                                |                              |
|----------------------------|--|--------------------------------|------------------------------|
| <b>Test specification:</b> | <b>Section 27.53(d)(3), Spurious emissions at RF antenna connector</b> |                                |                              |
| <b>Test procedure:</b>     | 47 CFR, Sections 2.1047, 2.1051, TIA/EIA-603-A, Section 2.2.13         |                                |                              |
| <b>Test mode:</b>          | Compliance   | <b>Verdict:</b>                | PASS                         |
| <b>Date:</b>               | 5/07/2006  |                                |                              |
| <b>Temperature:</b> 21 °C  | <b>Air Pressure:</b> 1006 hPa  | <b>Relative Humidity:</b> 44 % | <b>Power Supply:</b> 120 VAC |
| <b>Remarks:</b>            |  |                                |                              |

Plot 7.1.17 Spurious emission measurements at RF antenna connector, mid channel

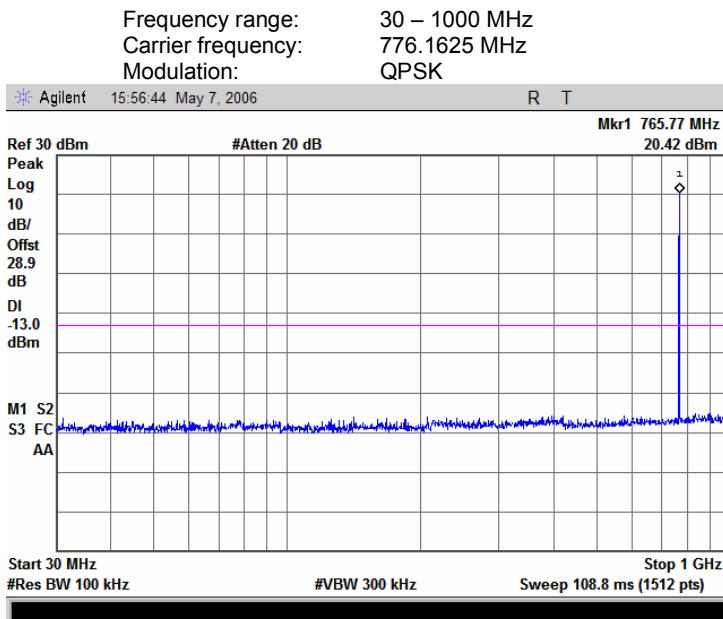


Plot 7.1.18 Spurious emission measurements at RF antenna connector, high channel

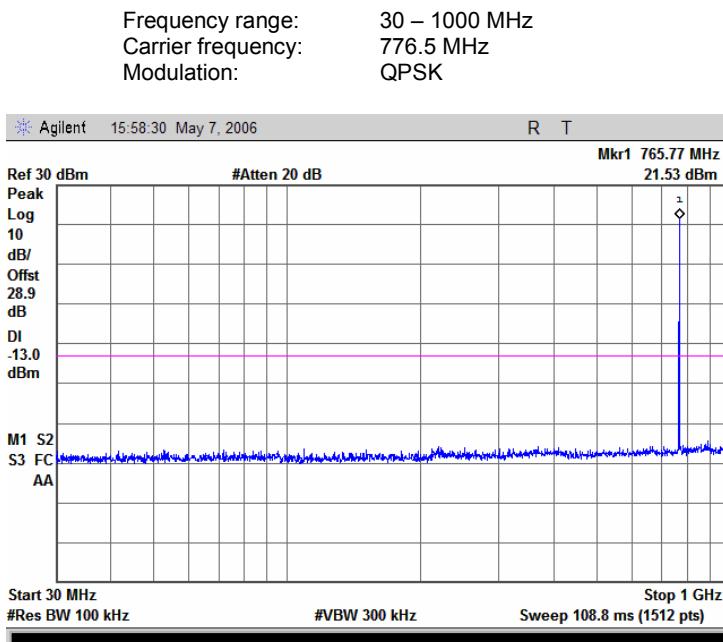


|                            |  |                                |                              |
|----------------------------|--|--------------------------------|------------------------------|
| <b>Test specification:</b> | <b>Section 27.53(d)(3), Spurious emissions at RF antenna connector</b> |                                |                              |
| <b>Test procedure:</b>     | 47 CFR, Sections 2.1047, 2.1051, TIA/EIA-603-A, Section 2.2.13         |                                |                              |
| <b>Test mode:</b>          | Compliance   | <b>Verdict:</b>                | PASS                         |
| <b>Date:</b>               | 5/07/2006  |                                |                              |
| <b>Temperature:</b> 21 °C  | <b>Air Pressure:</b> 1006 hPa  | <b>Relative Humidity:</b> 44 % | <b>Power Supply:</b> 120 VAC |
| <b>Remarks:</b>            |  |                                |                              |

Plot 7.1.19 Spurious emission measurements at RF antenna connector, low channel



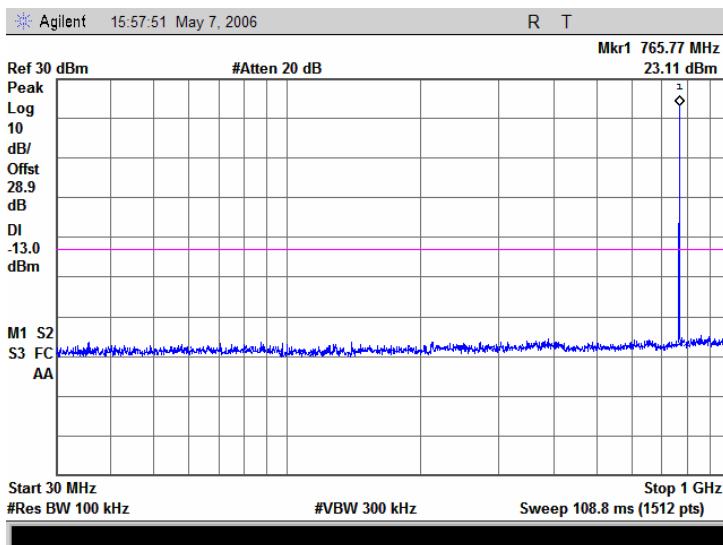
Plot 7.1.20 Spurious emission measurements at RF antenna connector, mid channel



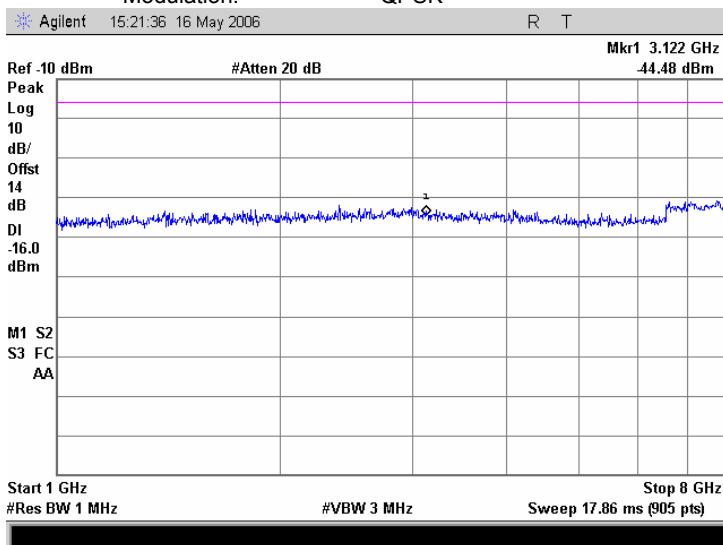
|                            |  |                                |                              |
|----------------------------|--|--------------------------------|------------------------------|
| <b>Test specification:</b> | <b>Section 27.53(d)(3), Spurious emissions at RF antenna connector</b> |                                |                              |
| <b>Test procedure:</b>     | 47 CFR, Sections 2.1047, 2.1051, TIA/EIA-603-A, Section 2.2.13         |                                |                              |
| <b>Test mode:</b>          | Compliance   | <b>Verdict:</b>                | PASS                         |
| <b>Date:</b>               | 5/07/2006  |                                |                              |
| <b>Temperature:</b> 21 °C  | <b>Air Pressure:</b> 1006 hPa  | <b>Relative Humidity:</b> 44 % | <b>Power Supply:</b> 120 VAC |
| <b>Remarks:</b>            |  |                                |                              |

**Plot 7.1.21 Spurious emission measurements at RF antenna connector, high channel**

Frequency range: 30 – 1000 MHz  
 Carrier frequency: 776.8375 MHz  
 Modulation: QPSK


**Plot 7.1.22 Spurious emission measurements at RF antenna connector, low channel**

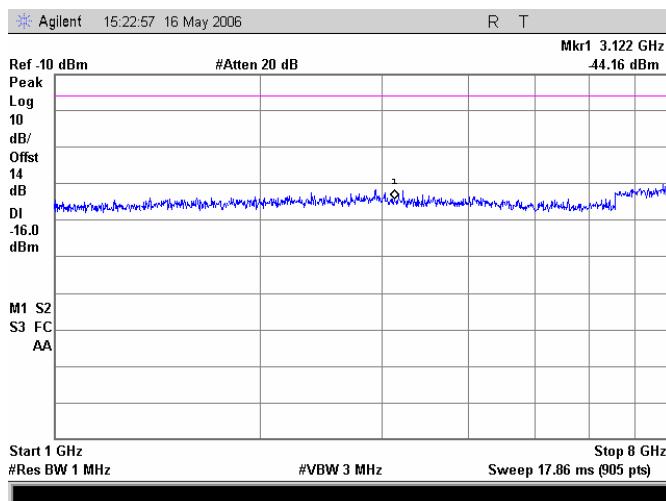
Frequency range: 1.0 – 8.0 GHz  
 Carrier frequency: 776.1625 MHz  
 Modulation: QPSK



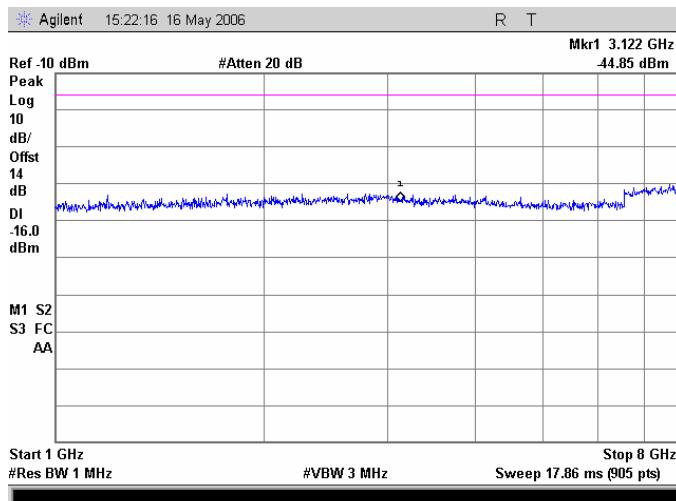
|                            |  |                                |                              |
|----------------------------|--|--------------------------------|------------------------------|
| <b>Test specification:</b> | <b>Section 27.53(d)(3), Spurious emissions at RF antenna connector</b> |                                |                              |
| <b>Test procedure:</b>     | 47 CFR, Sections 2.1047, 2.1051, TIA/EIA-603-A, Section 2.2.13         |                                |                              |
| <b>Test mode:</b>          | Compliance   | <b>Verdict:</b>                | PASS                         |
| <b>Date:</b>               | 5/07/2006  |                                |                              |
| <b>Temperature:</b> 21 °C  | <b>Air Pressure:</b> 1006 hPa  | <b>Relative Humidity:</b> 44 % | <b>Power Supply:</b> 120 VAC |
| <b>Remarks:</b>            |  |                                |                              |

**Plot 7.1.23 Spurious emission measurements at RF antenna connector, mid channel**

Frequency range: 1.0 – 8.0 GHz  
 Carrier frequency: 776.5 MHz  
 Modulation: QPSK


**Plot 7.1.24 Spurious emission measurements at RF antenna connector, high channel**

Frequency range: 1.0 – 8.0 GHz  
 Carrier frequency: 776.8375 MHz  
 Modulation: QPSK



|                            |   |                              |      |
|----------------------------|---|------------------------------|------|
| <b>Test specification:</b> | <b>Section 27.53(d)(3), Radiated spurious emissions</b> |                              |      |
| <b>Test procedure:</b>     | 47 CFR, Section 2.1053                                  |                              |      |
| <b>Test mode:</b>          | Compliance  | <b>Verdict:</b>              | PASS |
| <b>Date:</b>               | 5/09/2006   | <b>Relative Humidity:</b>    | 48 % |
| <b>Temperature:</b> 21 °C  | <b>Air Pressure:</b> 1008 hPa                           | <b>Power Supply:</b> 120 VAC |      |
| <b>Remarks:</b>            |   |                              |      |

## 7.2 Radiated spurious emission measurements

### 7.2.1 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 7.2.1.

Table 7.2.1 Radiated spurious emission test limits

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

\* - P is transmitter output power in Watts.

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

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

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

7.2.2.2 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.

7.2.2.3 The test results were recorded in Table 7.2.2 and shown in the associated plots.

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

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

7.2.3.2 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.

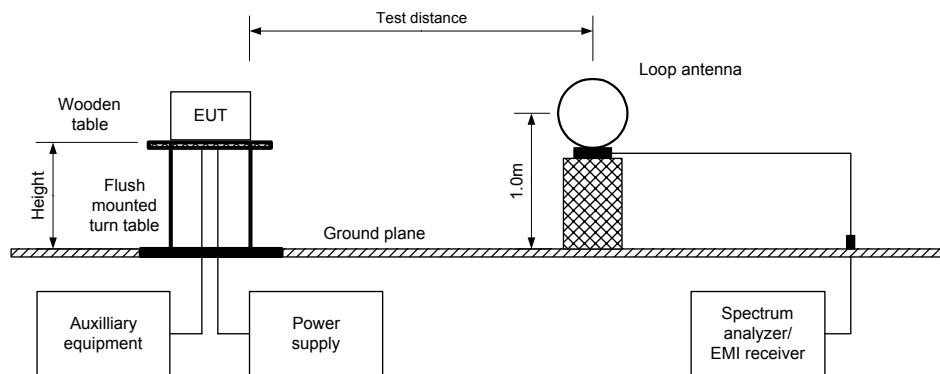
7.2.3.3 The worst test results with respect to the limits were recorded in Table 7.2.2 and shown in the associated plots.

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

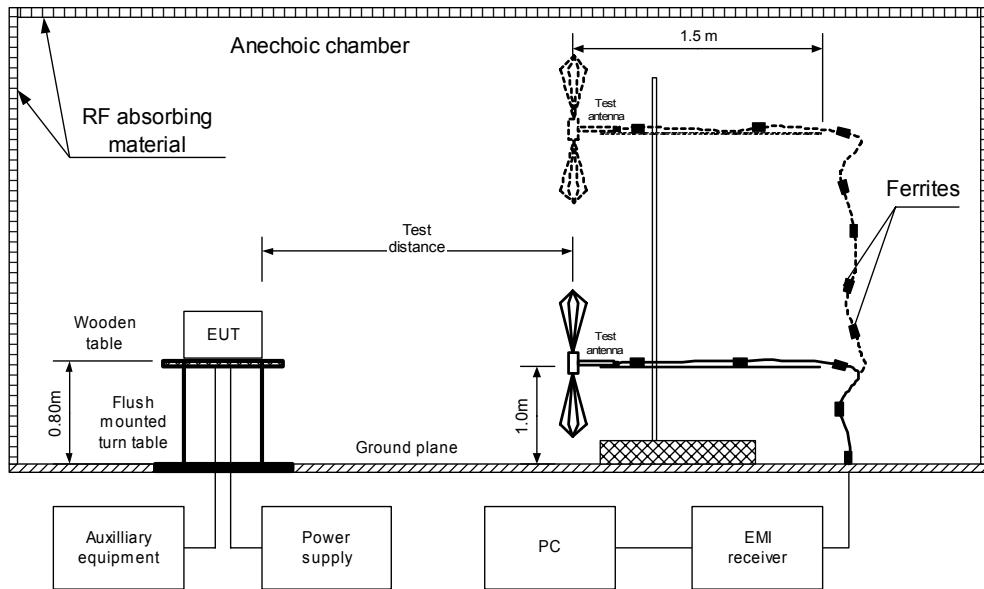
7.2.3.5 The worst test results with respect to the limits were recorded in Table 7.2.2 and shown in the associated plots.

|                            |   |                                |                              |
|----------------------------|---|--------------------------------|------------------------------|
| <b>Test specification:</b> | <b>Section 27.53(d)(3), Radiated spurious emissions</b> |                                |                              |
| <b>Test procedure:</b>     | 47 CFR, Section 2.1053                                  |                                |                              |
| <b>Test mode:</b>          | Compliance  | <b>Verdict:</b>                | PASS                         |
| <b>Date:</b>               | 5/09/2006   |                                |                              |
| <b>Temperature:</b> 21 °C  | <b>Air Pressure:</b> 1008 hPa                           | <b>Relative Humidity:</b> 48 % | <b>Power Supply:</b> 120 VAC |
| <b>Remarks:</b>            |   |                                |                              |

**Figure 7.2.1 Setup for spurious emission field strength measurements in 9 kHz to 30 MHz range**

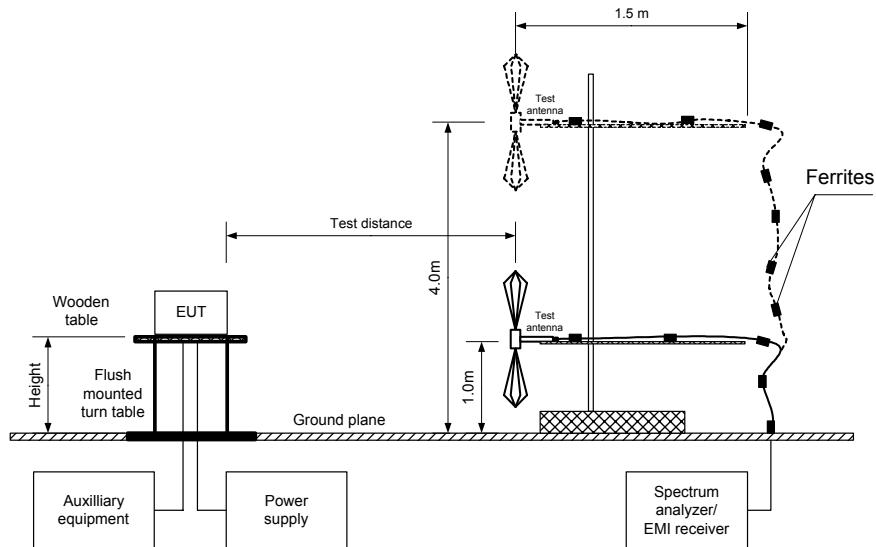


**Figure 7.2.2 Setup for spurious emission field strength measurements above 30 MHz**



|                            |   |                                |                              |
|----------------------------|---|--------------------------------|------------------------------|
| <b>Test specification:</b> | <b>Section 27.53(d)(3), Radiated spurious emissions</b> |                                |                              |
| <b>Test procedure:</b>     | 47 CFR, Section 2.1053                                  |                                |                              |
| <b>Test mode:</b>          | Compliance  | <b>Verdict:</b>                | PASS                         |
| <b>Date:</b>               | 5/09/2006   |                                |                              |
| <b>Temperature:</b> 21 °C  | <b>Air Pressure:</b> 1008 hPa                           | <b>Relative Humidity:</b> 48 % | <b>Power Supply:</b> 120 VAC |
| <b>Remarks:</b>            |   |                                |                              |

**Figure 7.2.3 Setup for spurious emission field strength measurements in 1 to 8 GHz range**



**Photograph 7.2.1 Setup for spurious emission field strength measurements in 1 to 8 GHz range**



|                            |   |                                |                              |
|----------------------------|---|--------------------------------|------------------------------|
| <b>Test specification:</b> | <b>Section 27.53(d)(3), Radiated spurious emissions</b> |                                |                              |
| <b>Test procedure:</b>     | 47 CFR, Section 2.1053                                  |                                |                              |
| <b>Test mode:</b>          | Compliance  | <b>Verdict:</b>                | PASS                         |
| <b>Date:</b>               | 5/09/2006   |                                |                              |
| <b>Temperature:</b> 21 °C  | <b>Air Pressure:</b> 1008 hPa                           | <b>Relative Humidity:</b> 48 % | <b>Power Supply:</b> 120 VAC |
| <b>Remarks:</b>            |   |                                |                              |

**Photograph 7.2.2 Setup for spurious emission field strength measurements in the anechoic chamber**



**Photograph 7.2.3 Setup for spurious emission field strength measurements in 1 to 8 GHz range at OATS**



|                            |   |                                |                              |
|----------------------------|---|--------------------------------|------------------------------|
| <b>Test specification:</b> | <b>Section 27.53(d)(3), Radiated spurious emissions</b> |                                |                              |
| <b>Test procedure:</b>     | 47 CFR, Section 2.1053                                  |                                |                              |
| <b>Test mode:</b>          | Compliance  | <b>Verdict:</b>                | PASS                         |
| <b>Date:</b>               | 5/09/2006   |                                |                              |
| <b>Temperature:</b> 21 °C  | <b>Air Pressure:</b> 1008 hPa                           | <b>Relative Humidity:</b> 48 % | <b>Power Supply:</b> 120 VAC |
| <b>Remarks:</b>            |   |                                |                              |

**Table 7.2.2 Spurious emission field strength test results**

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

| Frequency, MHz   | Antenna polarization | RBW, kHz | Field strength, dB( $\mu$ V/m) | Limit, dB( $\mu$ V/m) | Margin, dB* | Verdict |
|--|----------------------|----------|--------------------------------|-----------------------|-------------|---------|
| 0.311265   | -                    | 150      | 69.4                           | 84.4                  | -15         | Pass    |
| All other 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**

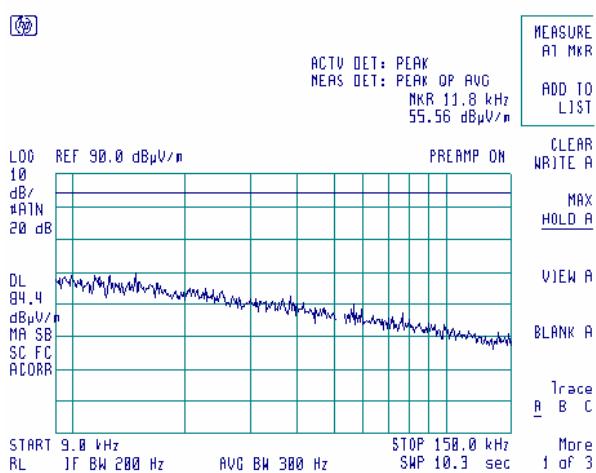
|         |         |         |         |         |         |         |         |
|---------|---------|---------|---------|---------|---------|---------|---------|
| HL 0446 | HL 0465 | HL 0521 | HL 0589 | HL 0604 | HL 1004 | HL 1200 | HL 1424 |
| HL 1942 | HL 1947 | HL 1984 | HL 2009 | HL 2258 | HL 2780 |         |         |

Full description is given in Appendix A.

|                            |   |                                |                              |
|----------------------------|---|--------------------------------|------------------------------|
| <b>Test specification:</b> | <b>Section 27.53(d)(3), Radiated spurious emissions</b> |                                |                              |
| <b>Test procedure:</b>     | 47 CFR, Section 2.1053                                  |                                |                              |
| <b>Test mode:</b>          | Compliance  | <b>Verdict:</b>                | PASS                         |
| <b>Date:</b>               | 5/09/2006   |                                |                              |
| <b>Temperature:</b> 21 °C  | <b>Air Pressure:</b> 1008 hPa                           | <b>Relative Humidity:</b> 48 % | <b>Power Supply:</b> 120 VAC |
| <b>Remarks:</b>            |   |                                |                              |

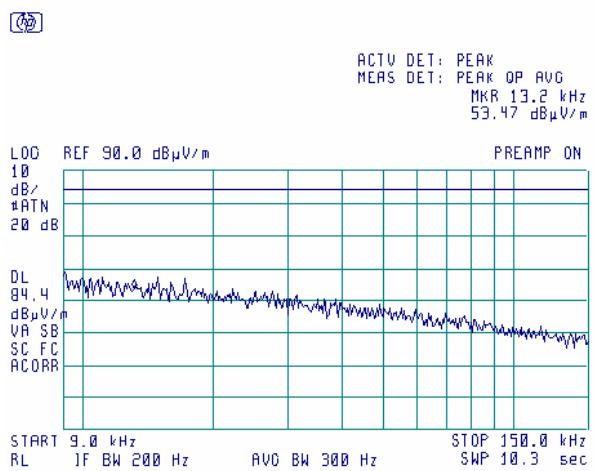
**Plot 7.2.1 Radiated emission measurements in 9 - 150 kHz range**

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



**Plot 7.2.2 Radiated emission measurements in 9 - 150 kHz range**

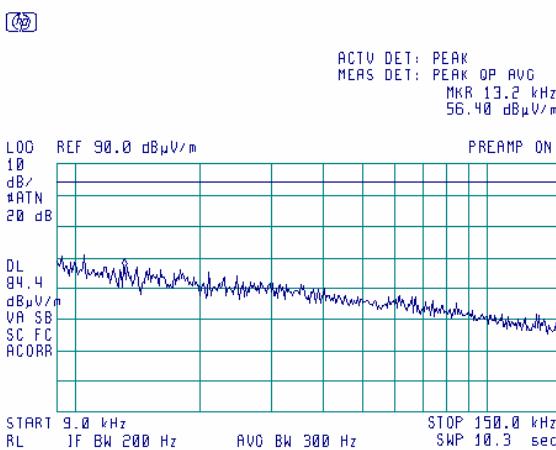
TEST SITE: Semi anechoic chamber  
 CARRIER FREQUENCY: Low  
 ANTENNA POLARIZATION: Vertical  
 TEST DISTANCE: 3 m  
 MODULATION: 16QAM



|                            |   |                                |                              |
|----------------------------|---|--------------------------------|------------------------------|
| <b>Test specification:</b> | <b>Section 27.53(d)(3), Radiated spurious emissions</b> |                                |                              |
| <b>Test procedure:</b>     | 47 CFR, Section 2.1053                                  |                                |                              |
| <b>Test mode:</b>          | Compliance  | <b>Verdict:</b>                | PASS                         |
| <b>Date:</b>               | 5/09/2006   |                                |                              |
| <b>Temperature:</b> 21 °C  | <b>Air Pressure:</b> 1008 hPa                           | <b>Relative Humidity:</b> 48 % | <b>Power Supply:</b> 120 VAC |
| <b>Remarks:</b>            |   |                                |                              |

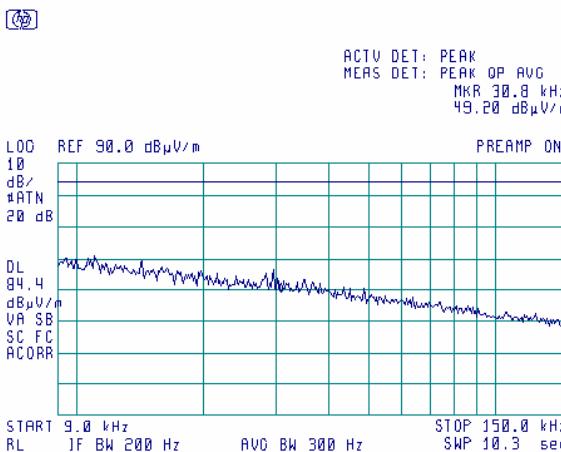
**Plot 7.2.3 Radiated emission measurements in 9 - 150 kHz range**

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



**Plot 7.2.4 Radiated emission measurements in 9 - 150 kHz range**

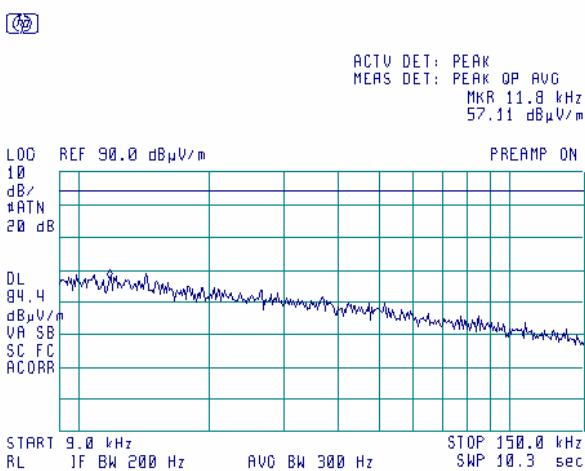
TEST SITE: Semi anechoic chamber  
 CARRIER FREQUENCY: Mid  
 ANTENNA POLARIZATION: Vertical  
 TEST DISTANCE: 3 m  
 MODULATION: 16QAM



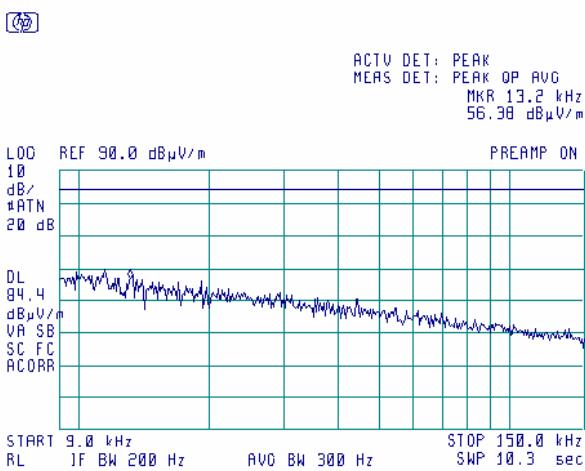
|                            |   |                                |                              |
|----------------------------|---|--------------------------------|------------------------------|
| <b>Test specification:</b> | <b>Section 27.53(d)(3), Radiated spurious emissions</b> |                                |                              |
| <b>Test procedure:</b>     | 47 CFR, Section 2.1053                                  |                                |                              |
| <b>Test mode:</b>          | Compliance  | <b>Verdict:</b>                | PASS                         |
| <b>Date:</b>               | 5/09/2006   |                                |                              |
| <b>Temperature:</b> 21 °C  | <b>Air Pressure:</b> 1008 hPa                           | <b>Relative Humidity:</b> 48 % | <b>Power Supply:</b> 120 VAC |
| <b>Remarks:</b>            |   |                                |                              |

**Plot 7.2.5 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


**Plot 7.2.6 Radiated emission measurements in 9 - 150 kHz range**

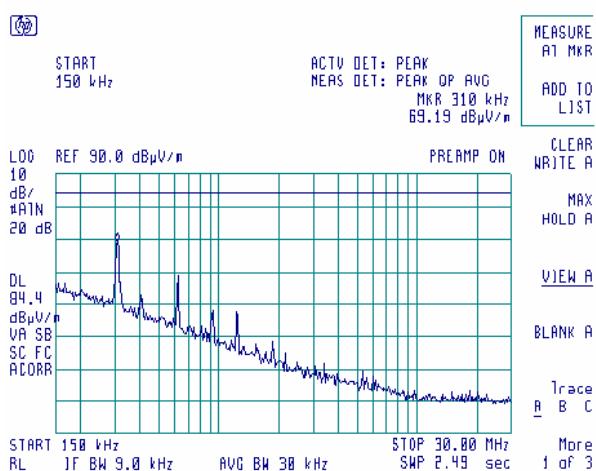
TEST SITE: Semi anechoic chamber  
 CARRIER FREQUENCY: High  
 ANTENNA POLARIZATION: Vertical  
 TEST DISTANCE: 3 m  
 MODULATION: 16QAM



|                            |   |                                |                              |
|----------------------------|---|--------------------------------|------------------------------|
| <b>Test specification:</b> | <b>Section 27.53(d)(3), Radiated spurious emissions</b> |                                |                              |
| <b>Test procedure:</b>     | 47 CFR, Section 2.1053                                  |                                |                              |
| <b>Test mode:</b>          | Compliance  | <b>Verdict:</b>                | PASS                         |
| <b>Date:</b>               | 5/09/2006   |                                |                              |
| <b>Temperature:</b> 21 °C  | <b>Air Pressure:</b> 1008 hPa                           | <b>Relative Humidity:</b> 48 % | <b>Power Supply:</b> 120 VAC |
| <b>Remarks:</b>            |   |                                |                              |

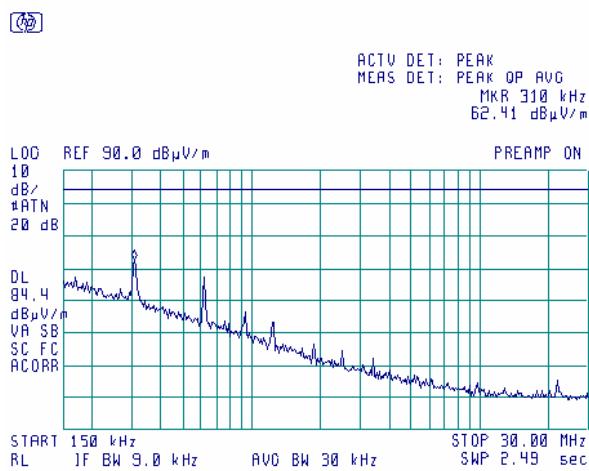
Plot 7.2.7 Radiated emission measurements in 0.15 - 30 MHz range

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



Plot 7.2.8 Radiated emission measurements in 0.15 - 30 MHz range

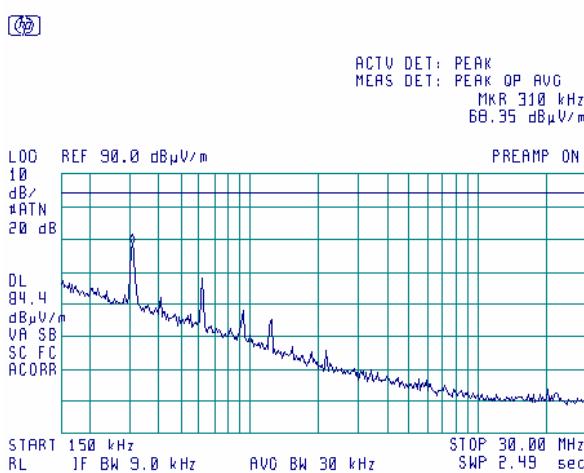
TEST SITE: Semi anechoic chamber  
 CARRIER FREQUENCY: Low  
 ANTENNA POLARIZATION: Vertical  
 TEST DISTANCE: 3 m  
 MODULATION: 16QAM



|                            |   |                                |                              |
|----------------------------|---|--------------------------------|------------------------------|
| <b>Test specification:</b> | <b>Section 27.53(d)(3), Radiated spurious emissions</b> |                                |                              |
| <b>Test procedure:</b>     | 47 CFR, Section 2.1053                                  |                                |                              |
| <b>Test mode:</b>          | Compliance  | <b>Verdict:</b>                | PASS                         |
| <b>Date:</b>               | 5/09/2006   |                                |                              |
| <b>Temperature:</b> 21 °C  | <b>Air Pressure:</b> 1008 hPa                           | <b>Relative Humidity:</b> 48 % | <b>Power Supply:</b> 120 VAC |
| <b>Remarks:</b>            |   |                                |                              |

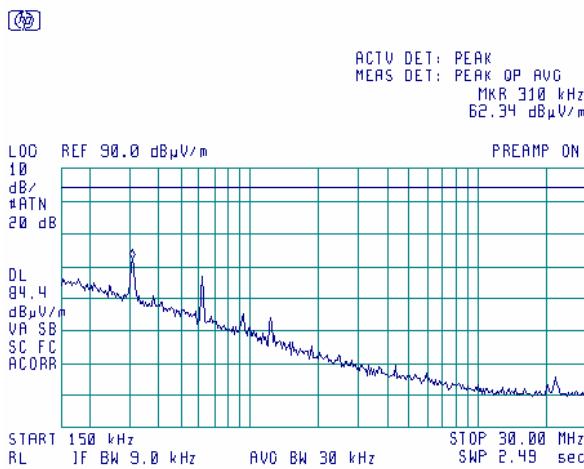
Plot 7.2.9 Radiated emission measurements in 0.15 - 30 MHz range

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



Plot 7.2.10 Radiated emission measurements in 0.15 - 30 MHz range

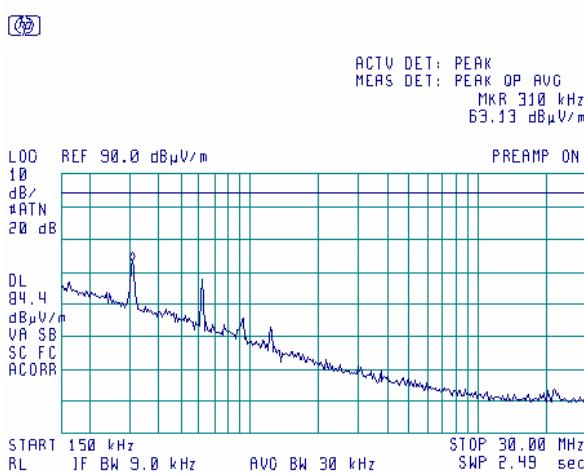
TEST SITE: Semi anechoic chamber  
 CARRIER FREQUENCY: Mid  
 ANTENNA POLARIZATION: Vertical  
 TEST DISTANCE: 3 m  
 MODULATION: 16QAM



|                            |   |                                |                              |
|----------------------------|---|--------------------------------|------------------------------|
| <b>Test specification:</b> | <b>Section 27.53(d)(3), Radiated spurious emissions</b> |                                |                              |
| <b>Test procedure:</b>     | 47 CFR, Section 2.1053                                  |                                |                              |
| <b>Test mode:</b>          | Compliance  | <b>Verdict:</b>                | PASS                         |
| <b>Date:</b>               | 5/09/2006   |                                |                              |
| <b>Temperature:</b> 21 °C  | <b>Air Pressure:</b> 1008 hPa                           | <b>Relative Humidity:</b> 48 % | <b>Power Supply:</b> 120 VAC |
| <b>Remarks:</b>            |   |                                |                              |

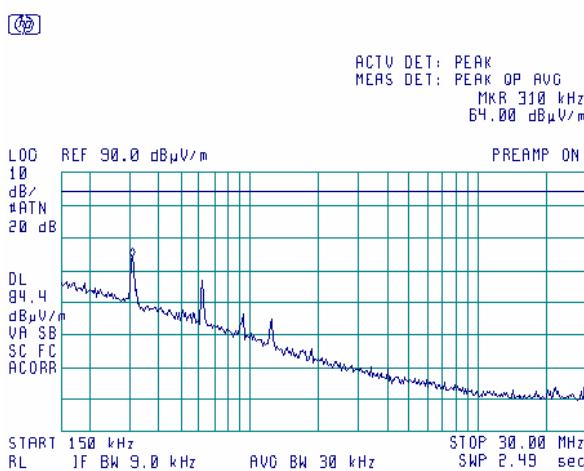
Plot 7.2.11 Radiated emission measurements in 0.15 - 30 MHz range

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



Plot 7.2.12 Radiated emission measurements in 0.15 - 30 MHz range

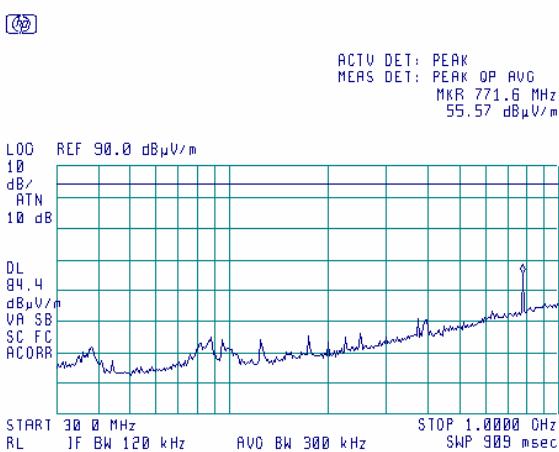
TEST SITE: Semi anechoic chamber  
 CARRIER FREQUENCY: High  
 ANTENNA POLARIZATION: Vertical  
 TEST DISTANCE: 3 m  
 MODULATION: 16QAM



|                            |   |                                |                              |
|----------------------------|---|--------------------------------|------------------------------|
| <b>Test specification:</b> | <b>Section 27.53(d)(3), Radiated spurious emissions</b> |                                |                              |
| <b>Test procedure:</b>     | 47 CFR, Section 2.1053                                  |                                |                              |
| <b>Test mode:</b>          | Compliance  | <b>Verdict:</b>                | PASS                         |
| <b>Date:</b>               | 5/09/2006   |                                |                              |
| <b>Temperature:</b> 21 °C  | <b>Air Pressure:</b> 1008 hPa                           | <b>Relative Humidity:</b> 48 % | <b>Power Supply:</b> 120 VAC |
| <b>Remarks:</b>            |   |                                |                              |

**Plot 7.2.13 Radiated emission measurements in 30 - 1000 MHz range**

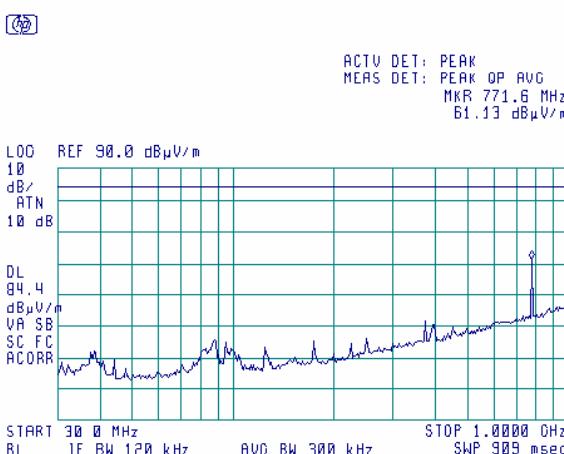
TEST SITE: Semi anechoic chamber  
 CARRIER FREQUENCY: Low  
 ANTENNA POLARIZATION: Vertical and Horizontal  
 TEST DISTANCE: 3 m  
 MODULATION: QPSK



Note: 776.075 MHz – intentional radiation of RF module

**Plot 7.2.14 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

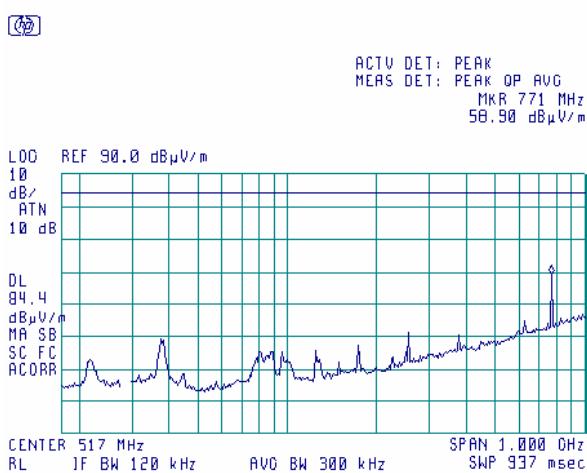


Note: 776.075 MHz – intentional radiation of RF module

|                            |   |                                |                              |
|----------------------------|---|--------------------------------|------------------------------|
| <b>Test specification:</b> | <b>Section 27.53(d)(3), Radiated spurious emissions</b> |                                |                              |
| <b>Test procedure:</b>     | 47 CFR, Section 2.1053                                  |                                |                              |
| <b>Test mode:</b>          | Compliance  | <b>Verdict:</b>                | PASS                         |
| <b>Date:</b>               | 5/09/2006   |                                |                              |
| <b>Temperature:</b> 21 °C  | <b>Air Pressure:</b> 1008 hPa                           | <b>Relative Humidity:</b> 48 % | <b>Power Supply:</b> 120 VAC |
| <b>Remarks:</b>            |   |                                |                              |

Plot 7.2.15 Radiated emission measurements in 30 - 1000 MHz range

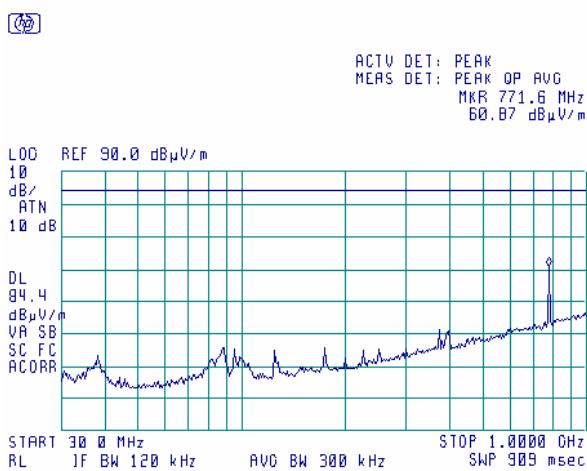
TEST SITE: Semi anechoic chamber  
 CARRIER FREQUENCY: Mid  
 ANTENNA POLARIZATION: Vertical and Horizontal  
 TEST DISTANCE: 3 m  
 MODULATION: QPSK



Note: 776.5 MHz – intentional radiation of RF module

Plot 7.2.16 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

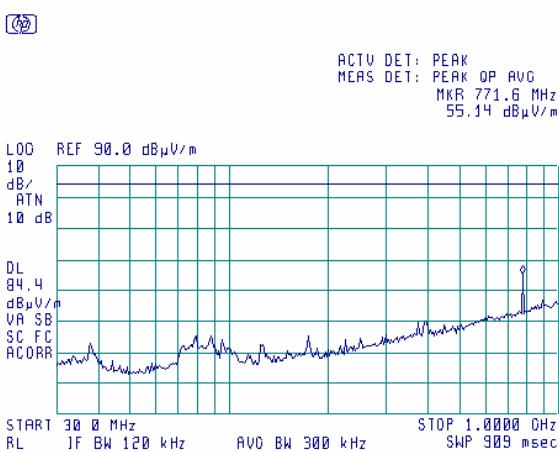


Note: 776.5 MHz – intentional radiation of RF module

|                            |   |                                |                              |
|----------------------------|---|--------------------------------|------------------------------|
| <b>Test specification:</b> | <b>Section 27.53(d)(3), Radiated spurious emissions</b> |                                |                              |
| <b>Test procedure:</b>     | 47 CFR, Section 2.1053                                  |                                |                              |
| <b>Test mode:</b>          | Compliance  | <b>Verdict:</b>                | PASS                         |
| <b>Date:</b>               | 5/09/2006   |                                |                              |
| <b>Temperature:</b> 21 °C  | <b>Air Pressure:</b> 1008 hPa                           | <b>Relative Humidity:</b> 48 % | <b>Power Supply:</b> 120 VAC |
| <b>Remarks:</b>            |   |                                |                              |

**Plot 7.2.17 Radiated emission measurements in 30 - 1000 MHz range**

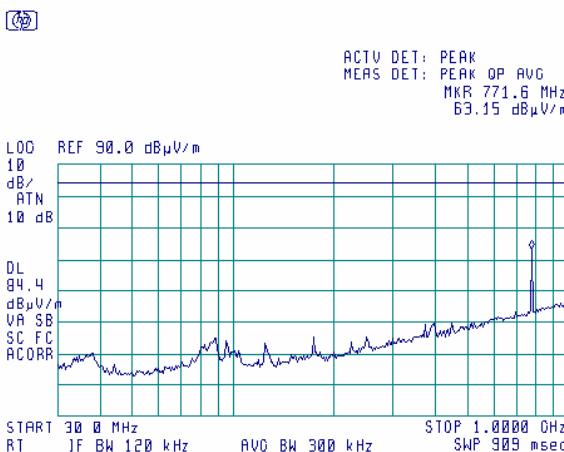
TEST SITE: Semi anechoic chamber  
 CARRIER FREQUENCY: High  
 ANTENNA POLARIZATION: Vertical and Horizontal  
 TEST DISTANCE: 3 m  
 MODULATION: QPSK



Note: 776.925 MHz – intentional radiation of RF module

**Plot 7.2.18 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

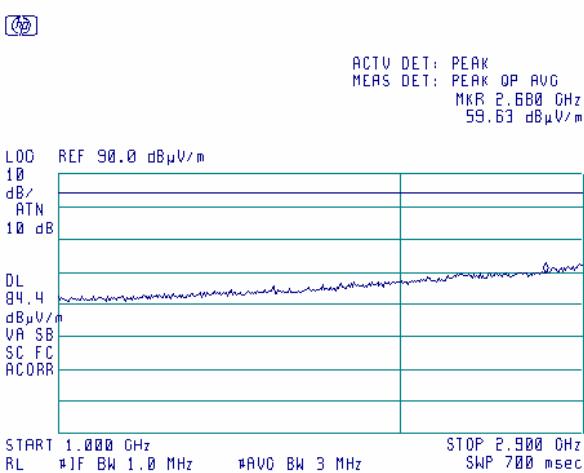


Note: 776.925 MHz – intentional radiation of RF module

|                            |   |                                |                              |
|----------------------------|---|--------------------------------|------------------------------|
| <b>Test specification:</b> | <b>Section 27.53(d)(3), Radiated spurious emissions</b> |                                |                              |
| <b>Test procedure:</b>     | 47 CFR, Section 2.1053                                  |                                |                              |
| <b>Test mode:</b>          | Compliance  | <b>Verdict:</b>                | PASS                         |
| <b>Date:</b>               | 5/09/2006   |                                |                              |
| <b>Temperature:</b> 21 °C  | <b>Air Pressure:</b> 1008 hPa                           | <b>Relative Humidity:</b> 48 % | <b>Power Supply:</b> 120 VAC |
| <b>Remarks:</b>            |   |                                |                              |

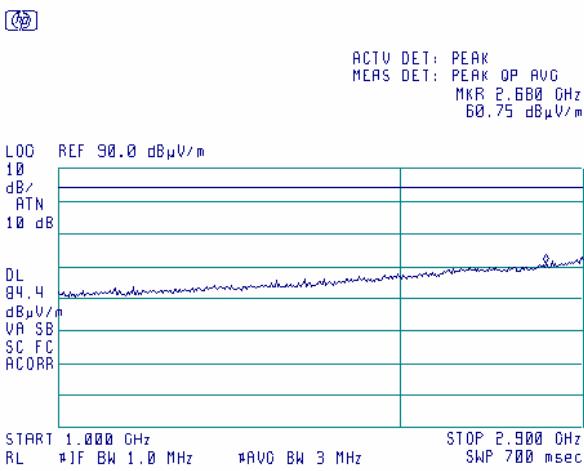
Plot 7.2.19 Radiated emission measurements in 1 – 2.9 GHz range

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



Plot 7.2.20 Radiated emission measurements in 1 – 2.9 GHz range

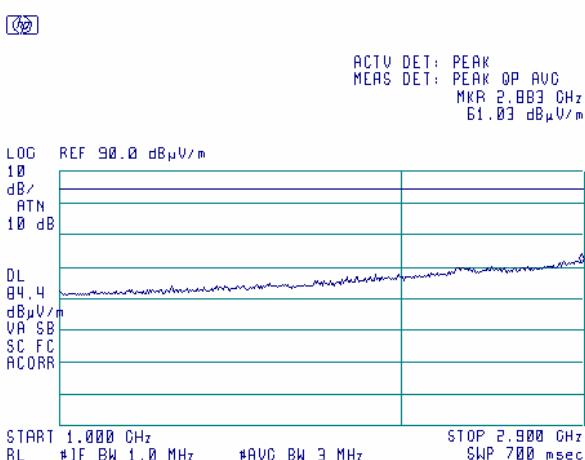
TEST SITE: Semi anechoic chamber  
 CARRIER FREQUENCY: Low  
 ANTENNA POLARIZATION: Vertical and Horizontal  
 TEST DISTANCE: 3 m  
 MODULATION: 16QAM



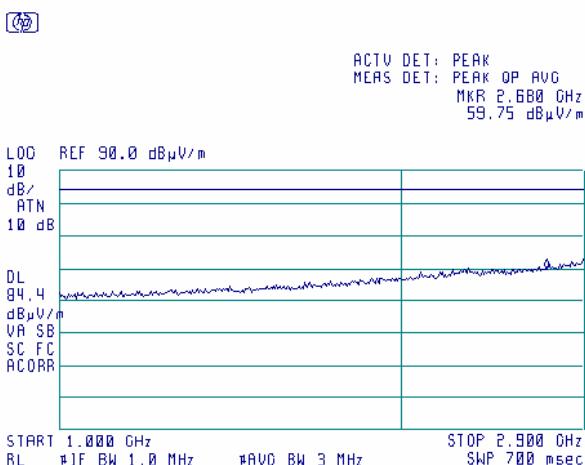
|                            |   |                                |                              |
|----------------------------|---|--------------------------------|------------------------------|
| <b>Test specification:</b> | <b>Section 27.53(d)(3), Radiated spurious emissions</b> |                                |                              |
| <b>Test procedure:</b>     | 47 CFR, Section 2.1053                                  |                                |                              |
| <b>Test mode:</b>          | Compliance  | <b>Verdict:</b>                | PASS                         |
| <b>Date:</b>               | 5/09/2006   |                                |                              |
| <b>Temperature:</b> 21 °C  | <b>Air Pressure:</b> 1008 hPa                           | <b>Relative Humidity:</b> 48 % | <b>Power Supply:</b> 120 VAC |
| <b>Remarks:</b>            |   |                                |                              |

**Plot 7.2.21 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


**Plot 7.2.22 Radiated emission measurements in 1 – 2.9 GHz range**

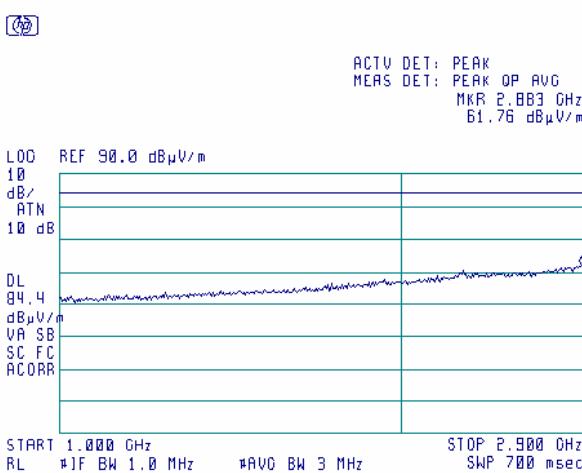
TEST SITE: Semi anechoic chamber  
 CARRIER FREQUENCY: Mid  
 ANTENNA POLARIZATION: Vertical and Horizontal  
 TEST DISTANCE: 3 m  
 MODULATION: 16QAM



|                            |   |                                |                              |
|----------------------------|---|--------------------------------|------------------------------|
| <b>Test specification:</b> | <b>Section 27.53(d)(3), Radiated spurious emissions</b> |                                |                              |
| <b>Test procedure:</b>     | 47 CFR, Section 2.1053                                  |                                |                              |
| <b>Test mode:</b>          | Compliance  | <b>Verdict:</b>                | PASS                         |
| <b>Date:</b>               | 5/09/2006   |                                |                              |
| <b>Temperature:</b> 21 °C  | <b>Air Pressure:</b> 1008 hPa                           | <b>Relative Humidity:</b> 48 % | <b>Power Supply:</b> 120 VAC |
| <b>Remarks:</b>            |   |                                |                              |

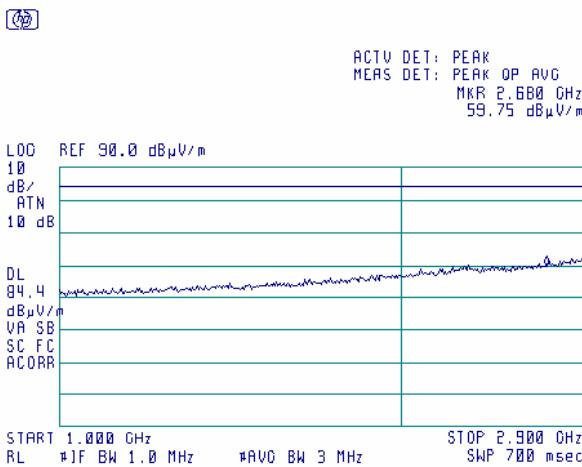
**Plot 7.2.23 Radiated emission measurements in 1 – 2.9 GHz range**

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



**Plot 7.2.24 Radiated emission measurements in 1 – 2.9 GHz range**

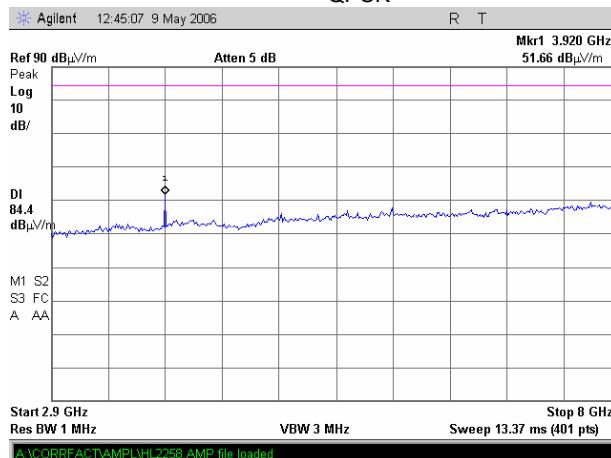
TEST SITE: Semi anechoic chamber  
 CARRIER FREQUENCY: High  
 ANTENNA POLARIZATION: Vertical and Horizontal  
 TEST DISTANCE: 3 m  
 MODULATION: 16QAM



|                            |   |                                |                              |
|----------------------------|---|--------------------------------|------------------------------|
| <b>Test specification:</b> | <b>Section 27.53(d)(3), Radiated spurious emissions</b> |                                |                              |
| <b>Test procedure:</b>     | 47 CFR, Section 2.1053                                  |                                |                              |
| <b>Test mode:</b>          | Compliance  | <b>Verdict:</b>                | PASS                         |
| <b>Date:</b>               | 5/09/2006   |                                |                              |
| <b>Temperature:</b> 21 °C  | <b>Air Pressure:</b> 1008 hPa                           | <b>Relative Humidity:</b> 48 % | <b>Power Supply:</b> 120 VAC |
| <b>Remarks:</b>            |   |                                |                              |

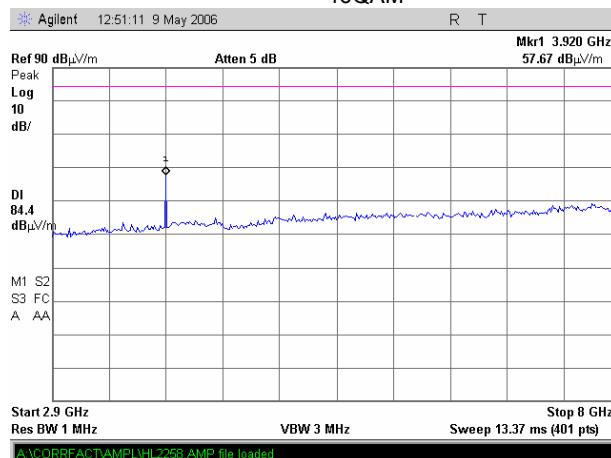
**Plot 7.2.25 Radiated emission measurements in 2.9 – 8.0 GHz range**

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



**Plot 7.2.26 Radiated emission measurements in 2.9 – 8.0 GHz range**

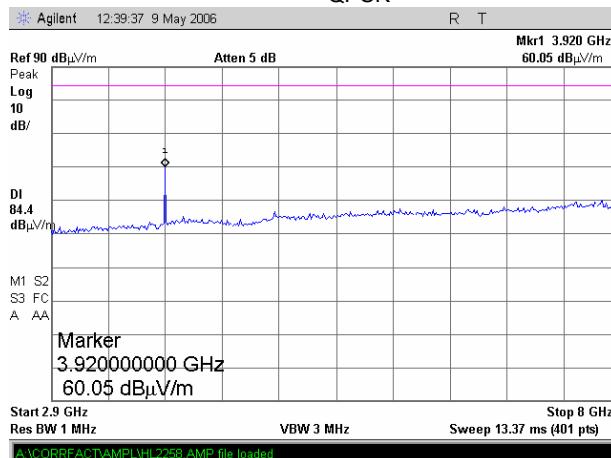
TEST SITE: Anechoic chamber  
 CARRIER FREQUENCY: Low  
 ANTENNA POLARIZATION: Vertical and Horizontal  
 TEST DISTANCE: 3 m  
 MODULATION: 16QAM



|                            |   |                                |                              |
|----------------------------|---|--------------------------------|------------------------------|
| <b>Test specification:</b> | <b>Section 27.53(d)(3), Radiated spurious emissions</b> |                                |                              |
| <b>Test procedure:</b>     | 47 CFR, Section 2.1053                                  |                                |                              |
| <b>Test mode:</b>          | Compliance  | <b>Verdict:</b>                | PASS                         |
| <b>Date:</b>               | 5/09/2006   |                                |                              |
| <b>Temperature:</b> 21 °C  | <b>Air Pressure:</b> 1008 hPa                           | <b>Relative Humidity:</b> 48 % | <b>Power Supply:</b> 120 VAC |
| <b>Remarks:</b>            |   |                                |                              |

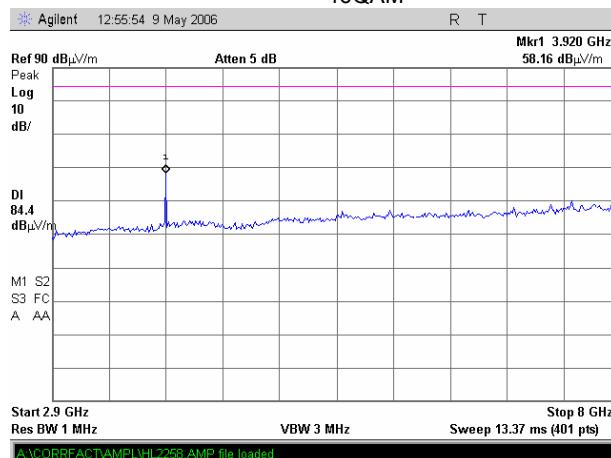
Plot 7.2.27 Radiated emission measurements in 2.9 – 8.0 GHz range

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



Plot 7.2.28 Radiated emission measurements in 2.9 – 8.0 GHz range

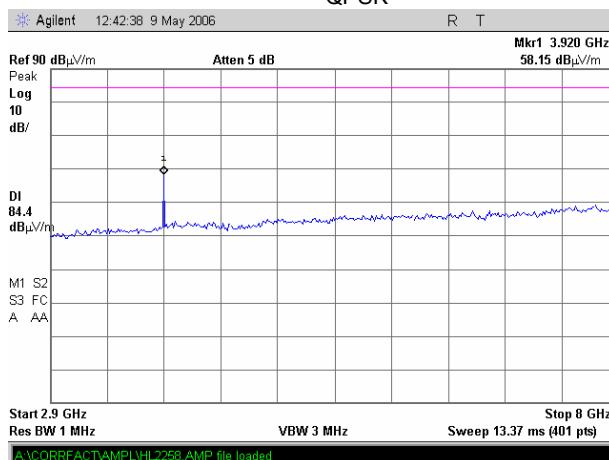
TEST SITE: Anechoic chamber  
 CARRIER FREQUENCY: Mid  
 ANTENNA POLARIZATION: Vertical and Horizontal  
 TEST DISTANCE: 3 m  
 MODULATION: 16QAM



|                            |   |                                |                              |
|----------------------------|---|--------------------------------|------------------------------|
| <b>Test specification:</b> | <b>Section 27.53(d)(3), Radiated spurious emissions</b> |                                |                              |
| <b>Test procedure:</b>     | 47 CFR, Section 2.1053                                  |                                |                              |
| <b>Test mode:</b>          | Compliance  | <b>Verdict:</b>                | PASS                         |
| <b>Date:</b>               | 5/09/2006   |                                |                              |
| <b>Temperature:</b> 21 °C  | <b>Air Pressure:</b> 1008 hPa                           | <b>Relative Humidity:</b> 48 % | <b>Power Supply:</b> 120 VAC |
| <b>Remarks:</b>            |   |                                |                              |

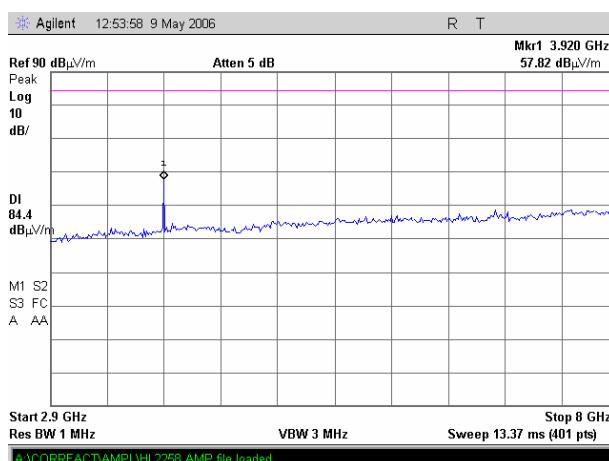
Plot 7.2.29 Radiated emission measurements in 2.9 – 8.0 GHz range

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



Plot 7.2.30 Radiated emission measurements in 2.9 – 8.0 GHz range

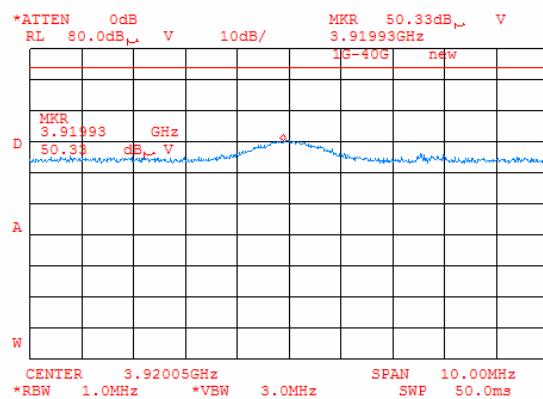
TEST SITE: Anechoic chamber  
 CARRIER FREQUENCY: High  
 ANTENNA POLARIZATION: Vertical and Horizontal  
 TEST DISTANCE: 3 m  
 MODULATION: 16QAM



|                            |   |                                |                              |
|----------------------------|---|--------------------------------|------------------------------|
| <b>Test specification:</b> | <b>Section 27.53(d)(3), Radiated spurious emissions</b> |                                |                              |
| <b>Test procedure:</b>     | 47 CFR, Section 2.1053                                  |                                |                              |
| <b>Test mode:</b>          | Compliance  | <b>Verdict:</b>                | PASS                         |
| <b>Date:</b>               | 5/09/2006   |                                |                              |
| <b>Temperature:</b> 21 °C  | <b>Air Pressure:</b> 1008 hPa                           | <b>Relative Humidity:</b> 48 % | <b>Power Supply:</b> 120 VAC |
| <b>Remarks:</b>            |   |                                |                              |

**Plot 7.2.31 Radiated emission measurements 3.9GHz frequency**

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



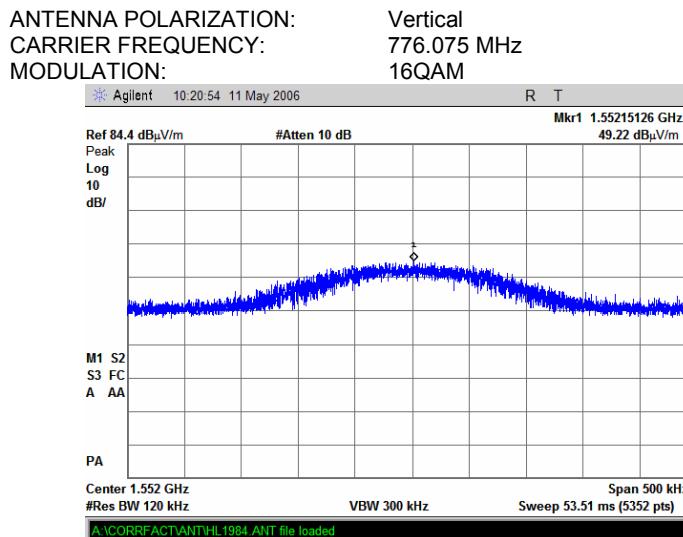
Note: The measurement was taken after the change was implemented

Change: Connector tightening

Note: The emission was more than 20dB below the limit (margin ~34db). There for substitution method was not preformed.

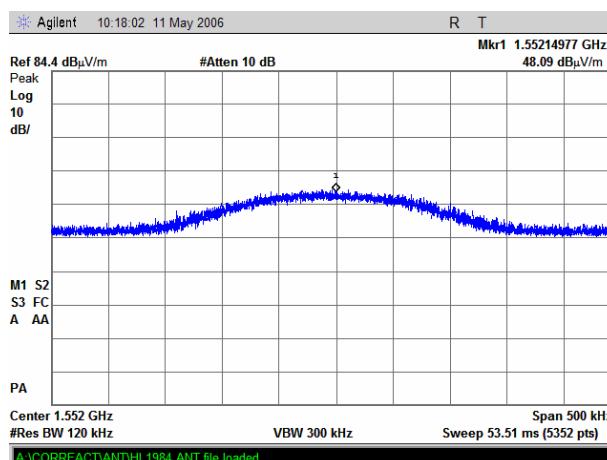
|                            |   |                                |                              |
|----------------------------|---|--------------------------------|------------------------------|
| <b>Test specification:</b> | <b>Section 27.53(d)(3), Radiated spurious emissions</b> |                                |                              |
| <b>Test procedure:</b>     | 47 CFR, Section 2.1053                                  |                                |                              |
| <b>Test mode:</b>          | Compliance  | <b>Verdict:</b>                | PASS                         |
| <b>Date:</b>               | 5/09/2006   |                                |                              |
| <b>Temperature:</b> 21 °C  | <b>Air Pressure:</b> 1008 hPa                           | <b>Relative Humidity:</b> 48 % | <b>Power Supply:</b> 120 VAC |
| <b>Remarks:</b>            |   |                                |                              |

**Plot 7.2.32 Spurious emission measurements, the 2nd harmonic of the low channel**



**Plot 7.2.33 Spurious emission measurements, the 2<sup>nd</sup> harmonic of the low channel**

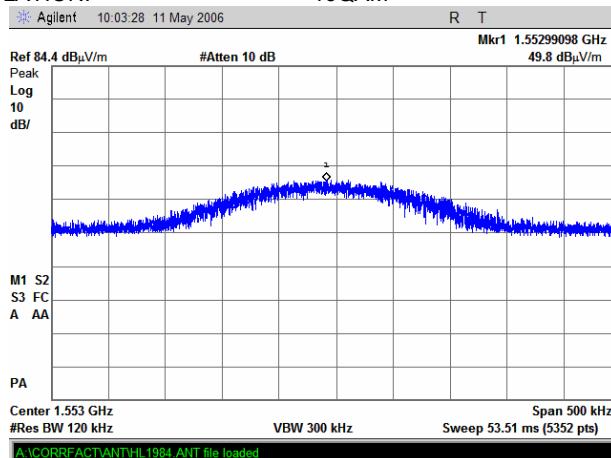
ANTENNA POLARIZATION: Horizontal  
CARRIER FREQUENCY: 776.075 MHz  
MODULATION: 16QAM



|                            |   |                                |                              |
|----------------------------|---|--------------------------------|------------------------------|
| <b>Test specification:</b> | <b>Section 27.53(d)(3), Radiated spurious emissions</b> |                                |                              |
| <b>Test procedure:</b>     | 47 CFR, Section 2.1053                                  |                                |                              |
| <b>Test mode:</b>          | Compliance  | <b>Verdict:</b>                | PASS                         |
| <b>Date:</b>               | 5/09/2006   |                                |                              |
| <b>Temperature:</b> 21 °C  | <b>Air Pressure:</b> 1008 hPa                           | <b>Relative Humidity:</b> 48 % | <b>Power Supply:</b> 120 VAC |
| <b>Remarks:</b>            |   |                                |                              |

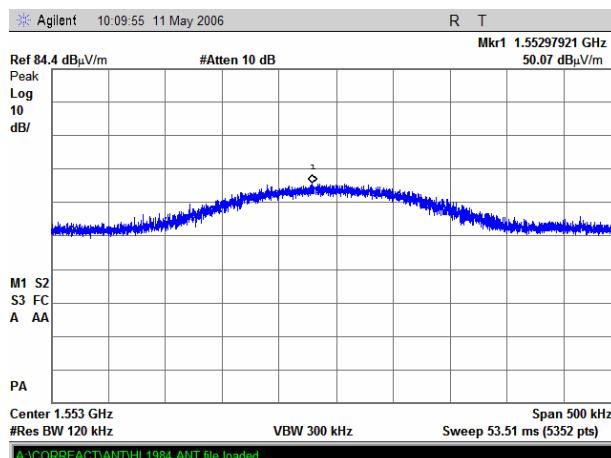
**Plot 7.2.34 Spurious emission measurements, the 2<sup>nd</sup> harmonic of the mid channel**

ANTENNA POLARIZATION: Vertical  
CARRIER FREQUENCY: 776.5 MHz  
MODULATION: 16QAM



**Plot 7.2.35 Spurious emission measurements, the 2<sup>nd</sup> harmonic of the mid channel**

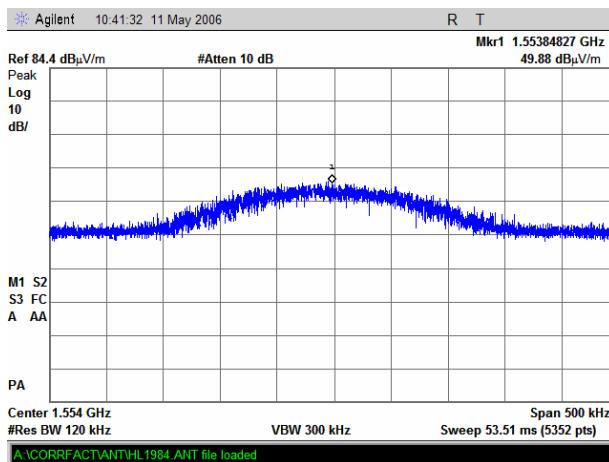
ANTENNA POLARIZATION: Horizontal  
CARRIER FREQUENCY: 776.5 MHz  
MODULATION: 16QAM



|                            |   |                                |                              |
|----------------------------|---|--------------------------------|------------------------------|
| <b>Test specification:</b> | <b>Section 27.53(d)(3), Radiated spurious emissions</b> |                                |                              |
| <b>Test procedure:</b>     | 47 CFR, Section 2.1053                                  |                                |                              |
| <b>Test mode:</b>          | Compliance  | <b>Verdict:</b>                | PASS                         |
| <b>Date:</b>               | 5/09/2006   |                                |                              |
| <b>Temperature:</b> 21 °C  | <b>Air Pressure:</b> 1008 hPa                           | <b>Relative Humidity:</b> 48 % | <b>Power Supply:</b> 120 VAC |
| <b>Remarks:</b>            |   |                                |                              |

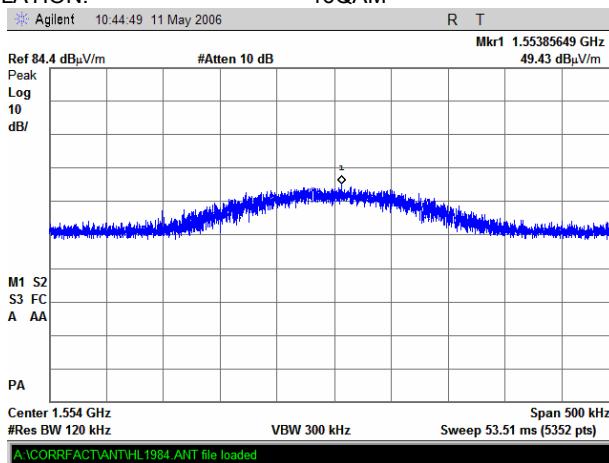
**Plot 7.2.36 Spurious emission measurements, the 2<sup>nd</sup> harmonic of the high channel**

ANTENNA POLARIZATION: Vertical  
CARRIER FREQUENCY: 776.925 MHz  
MODULATION: 16QAM



**Plot 7.2.37 Spurious emission measurements, the 2<sup>nd</sup> harmonic of the high channel**

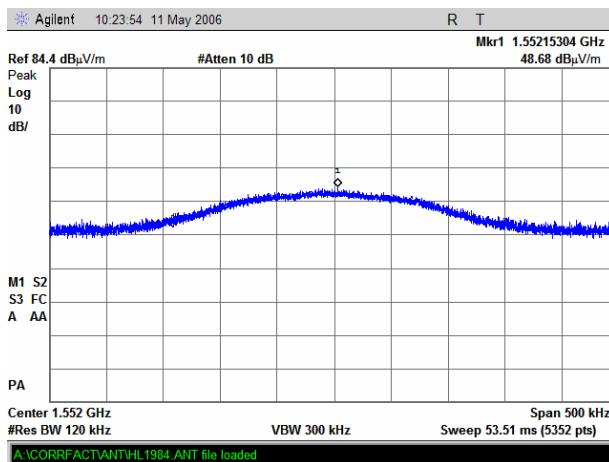
ANTENNA POLARIZATION: Horizontal  
CARRIER FREQUENCY: 776.925 MHz  
MODULATION: 16QAM



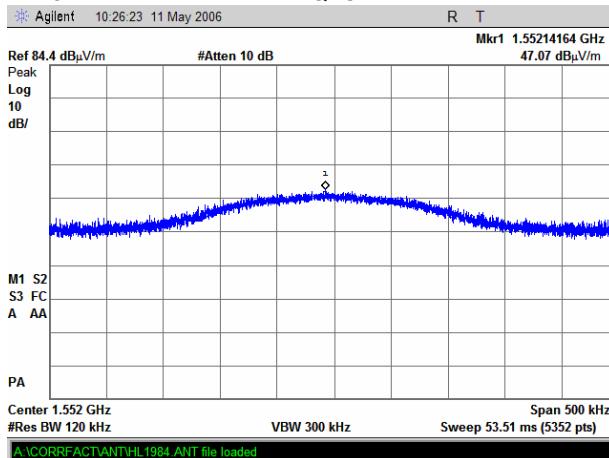
|                            |   |                                |                              |
|----------------------------|---|--------------------------------|------------------------------|
| <b>Test specification:</b> | <b>Section 27.53(d)(3), Radiated spurious emissions</b> |                                |                              |
| <b>Test procedure:</b>     | 47 CFR, Section 2.1053                                  |                                |                              |
| <b>Test mode:</b>          | Compliance  | <b>Verdict:</b>                | PASS                         |
| <b>Date:</b>               | 5/09/2006   |                                |                              |
| <b>Temperature:</b> 21 °C  | <b>Air Pressure:</b> 1008 hPa                           | <b>Relative Humidity:</b> 48 % | <b>Power Supply:</b> 120 VAC |
| <b>Remarks:</b>            |   |                                |                              |

Plot 7.2.38 Spurious emission measurements, the 2nd harmonic of the low channel

ANTENNA POLARIZATION: Vertical  
 CARRIER FREQUENCY: 776.075 MHz  
 MODULATION: QPSK


 Plot 7.2.39 Spurious emission measurements, the 2<sup>nd</sup> harmonic of the low channel

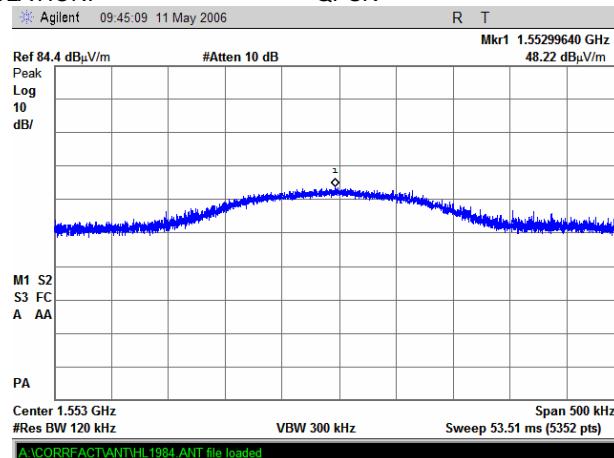
ANTENNA POLARIZATION: Horizontal  
 CARRIER FREQUENCY: 776.075 MHz  
 MODULATION: QPSK



|                            |   |                                |                              |
|----------------------------|---|--------------------------------|------------------------------|
| <b>Test specification:</b> | <b>Section 27.53(d)(3), Radiated spurious emissions</b> |                                |                              |
| <b>Test procedure:</b>     | 47 CFR, Section 2.1053                                  |                                |                              |
| <b>Test mode:</b>          | Compliance  | <b>Verdict:</b>                | PASS                         |
| <b>Date:</b>               | 5/09/2006   |                                |                              |
| <b>Temperature:</b> 21 °C  | <b>Air Pressure:</b> 1008 hPa                           | <b>Relative Humidity:</b> 48 % | <b>Power Supply:</b> 120 VAC |
| <b>Remarks:</b>            |   |                                |                              |

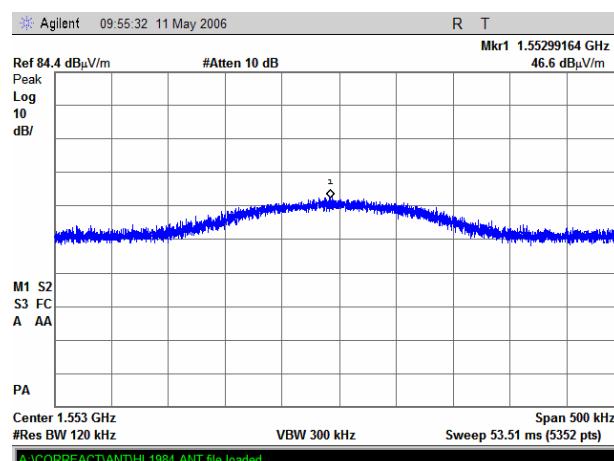
**Plot 7.2.40 Spurious emission measurements, the 2<sup>nd</sup> harmonic of the mid channel**

ANTENNA POLARIZATION: Vertical  
CARRIER FREQUENCY: 776.5 MHz  
MODULATION: QPSK



**Plot 7.2.41 Spurious emission measurements, the 2<sup>nd</sup> harmonic of the mid channel**

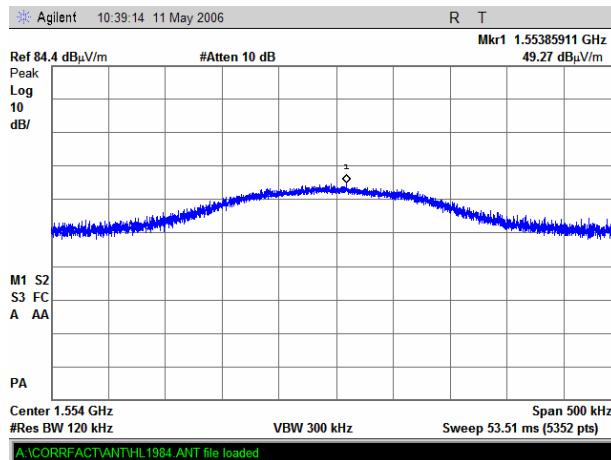
ANTENNA POLARIZATION: Horizontal  
CARRIER FREQUENCY: 776.5 MHz  
MODULATION: QPSK



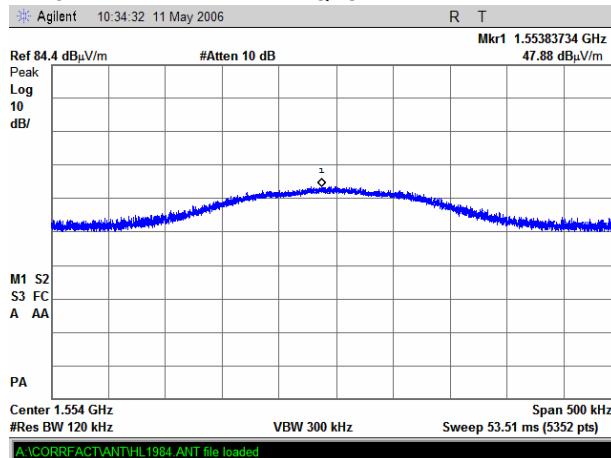
|                            |   |                                |                              |
|----------------------------|---|--------------------------------|------------------------------|
| <b>Test specification:</b> | <b>Section 27.53(d)(3), Radiated spurious emissions</b> |                                |                              |
| <b>Test procedure:</b>     | 47 CFR, Section 2.1053                                  |                                |                              |
| <b>Test mode:</b>          | Compliance  | <b>Verdict:</b>                | PASS                         |
| <b>Date:</b>               | 5/09/2006   |                                |                              |
| <b>Temperature:</b> 21 °C  | <b>Air Pressure:</b> 1008 hPa                           | <b>Relative Humidity:</b> 48 % | <b>Power Supply:</b> 120 VAC |
| <b>Remarks:</b>            |   |                                |                              |

 Plot 7.2.42 Spurious emission measurements, the 2<sup>nd</sup> harmonic of the high channel

ANTENNA POLARIZATION: Vertical  
 CARRIER FREQUENCY: 776. 925 MHz  
 MODULATION: QPSK


 Plot 7.2.43 Spurious emission measurements, the 2<sup>nd</sup> harmonic of the high channel

ANTENNA POLARIZATION: Horizontal  
 CARRIER FREQUENCY: 776. 925 MHz  
 MODULATION: QPSK



|                            |   |                              |      |
|----------------------------|---|------------------------------|------|
| <b>Test specification:</b> | <b>Section 27.53(e), Radiated emissions in the 1559-1610 MHz band</b> |                              |      |
| <b>Test procedure:</b>     | ANSI C63.4, Sections 11.5 and 12.1.3                                  |                              |      |
| <b>Test mode:</b>          | Compliance  | <b>Verdict:</b>              | PASS |
| <b>Date:</b>               | 5/09/2006   | <b>Relative Humidity:</b>    | 48 % |
| <b>Temperature:</b> 21 °C  | <b>Air Pressure:</b> 1008 hPa   | <b>Power Supply:</b> 120 VAC |      |
| <b>Remarks:</b>            |   |                              |      |

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

#### 7.3.1 General

This test was performed to measure radiated spurious emissions from the EUT enclosure with antenna. Specification test limits are given in Table 7.3.1.

Table 7.3.1 Radiated spurious emission test limits

| Frequency, MHz | EIRP of spurious emissions, dBW/MHz | Spurious emissions, dBm | Equivalent field strength limit @ 3m, dB(µV/m) |
|----------------|-------------------------------------|-------------------------|--|
| 1559 - 1610    | -80                                 | -50                     | 45.23  |

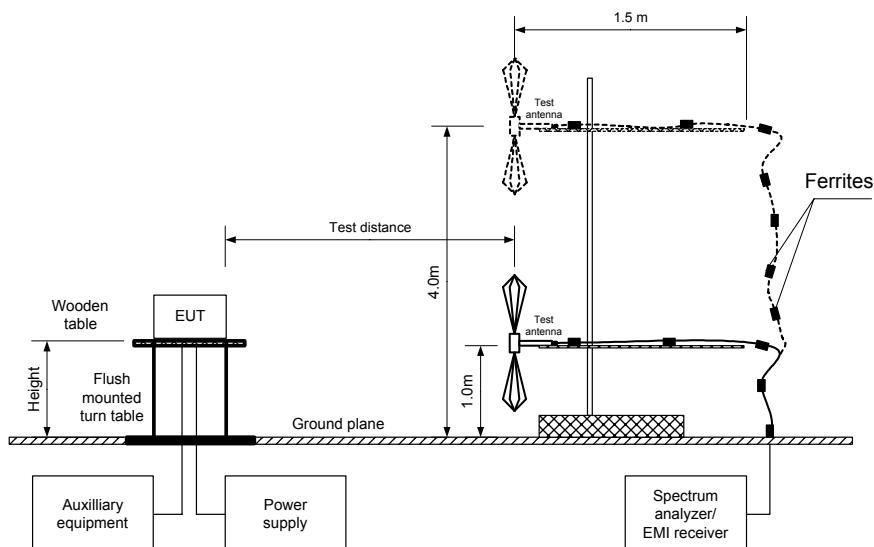
#### 7.3.2 Test procedure for spurious emission field strength measurements above 30 MHz

7.3.2.1 The EUT was set up as shown in Figure 7.3.1, energized and the EUT performance was checked.

7.3.2.2 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.

7.3.2.3 The worst test results with respect to the limits were recorded in Table 7.3.2 and shown in the associated plots.

Figure 7.3.1 Setup for spurious emission field strength measurements



|                            |   |                                |                              |
|----------------------------|---|--------------------------------|------------------------------|
| <b>Test specification:</b> | <b>Section 27.53(e), Radiated emissions in the 1559-1610 MHz band</b> |                                |                              |
| <b>Test procedure:</b>     | ANSI C63.4, Sections 11.5 and 12.1.3                                  |                                |                              |
| <b>Test mode:</b>          | Compliance  | <b>Verdict:</b>                | PASS                         |
| <b>Date:</b>               | 5/09/2006   |                                |                              |
| <b>Temperature:</b> 21 °C  | <b>Air Pressure:</b> 1008 hPa   | <b>Relative Humidity:</b> 48 % | <b>Power Supply:</b> 120 VAC |
| <b>Remarks:</b>            |   |                                |                              |

**Table 7.3.2 Spurious emission field strength test results**

ASSIGNED FREQUENCY RANGE: 776.0 – 777.0 MHz  
 TEST SITE: OATS  
 TEST DISTANCE: 3 m  
 EUT HEIGHT: 0.8 m  
 INVESTIGATED FREQUENCY RANGE: 1559 – 1610 MHz  
 DETECTOR USED: Peak  
 VIDEO BANDWIDTH:  $\geq$  Resolution bandwidth  
 TEST ANTENNA TYPE: Double ridged guide  
 MODULATION: QPSK and 16QAM  
 MODULATING SIGNAL: PRBS  
 TRANSMITTER OUTPUT POWER SETTINGS: Maximum

| Frequency,<br>MHz       | Antenna<br>polarization | RBW,<br>kHz | Field strength,<br>dB( $\mu$ V/m) | Limit,<br>dB( $\mu$ V/m) | Margin,<br>dB* | Verdict |
|-------------------------|-------------------------|-------------|-----------------------------------|--------------------------|----------------|---------|
| No emissions were found |                         |             |                                   |                          |                |         |

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

**Reference numbers of test equipment used**

|         |         |         |         |  |  |  |
|---------|---------|---------|---------|--|--|--|
| HL 1365 | HL 1430 | HL 1947 | HL 1984 |  |  |  |
|---------|---------|---------|---------|--|--|--|

Full description is given in Appendix A.

|                            |   |                                |                              |
|----------------------------|---|--------------------------------|------------------------------|
| <b>Test specification:</b> | <b>Section 27.53(e), Radiated emissions in the 1559-1610 MHz band</b> |                                |                              |
| <b>Test procedure:</b>     | ANSI C63.4, Sections 11.5 and 12.1.3                                  |                                |                              |
| <b>Test mode:</b>          | Compliance  | <b>Verdict:</b>                | PASS                         |
| <b>Date:</b>               | 5/09/2006   |                                |                              |
| <b>Temperature:</b> 21 °C  | <b>Air Pressure:</b> 1008 hPa   | <b>Relative Humidity:</b> 48 % | <b>Power Supply:</b> 120 VAC |
| <b>Remarks:</b>            |   |                                |                              |

**Plot 7.3.1 Radiated emission measurements in 1559 - 1610 MHz range**

TEST SITE:

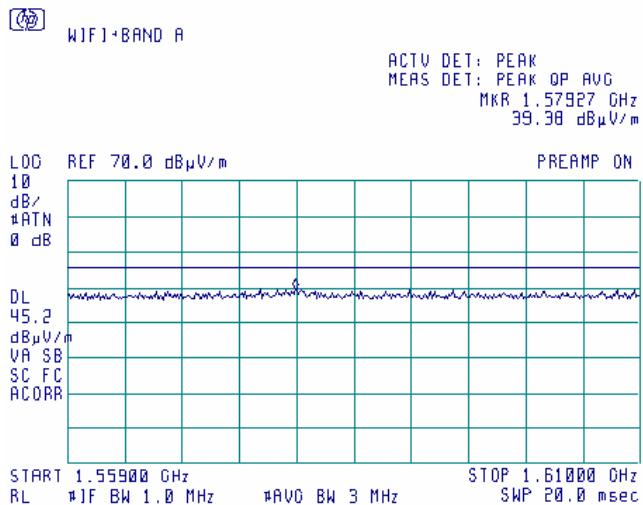
OATS

ANTENNA POLARIZATION:

Vertical and Horizontal

TEST DISTANCE:

3 m



|                            |   |                                |                              |
|----------------------------|---|--------------------------------|------------------------------|
| <b>Test specification:</b> | <b>Section 15.107, Conducted emission at AC power port, Class B</b> |                                |                              |
| <b>Test procedure:</b>     | ANSI C63.4, Sections 11.5 and 12.1.3                                |                                |                              |
| <b>Test mode:</b>          | Compliance  | <b>Verdict:</b>                | PASS                         |
| <b>Date:</b>               | 5/18/2006   |                                |                              |
| <b>Temperature:</b> 22 °C  | <b>Air Pressure:</b> 1010 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. The worst test results with respect to the limits were recorded in Table 8.1.2 and shown in the associated plots.

**Table 8.1.1 Limits for conducted emissions**

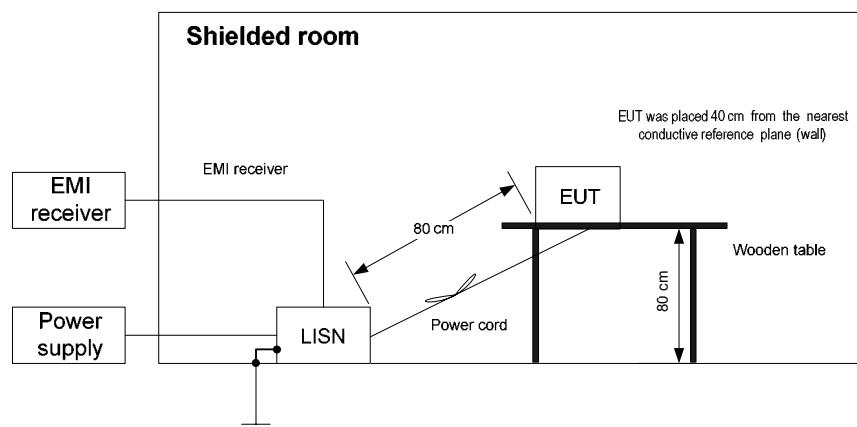
| Frequency,<br>MHz | Class B limit,<br>dB(µV) |          |
|-------------------|--------------------------|----------|
|                   | QP                       | AVRG     |
| 0.15 - 0.5        | 66 - 56*                 | 56 - 46* |
| 0.5 - 5.0         | 56                       | 46       |
| 5.0 - 30          | 60                       | 50       |

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

### 8.1.2 Test procedure

- 8.1.2.1 The EUT was set up as shown in Figure 8.1.1, energized and the EUT performance was checked.
- 8.1.2.2 The measurements were performed at the EUT power terminals with the LISN, connected to the EMI receiver in the frequency range referred to in Table 8.1.2. The unused coaxial connector of the LISN was terminated with 50 Ohm.
- 8.1.2.3 The position of the device cables was varied to determine maximum emission level.

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



|                            |   |                              |      |
|----------------------------|---|------------------------------|------|
| <b>Test specification:</b> | <b>Section 15.107, Conducted emission at AC power port, Class B</b> |                              |      |
| <b>Test procedure:</b>     | ANSI C63.4, Sections 11.5 and 12.1.3                                |                              |      |
| <b>Test mode:</b>          | Compliance  | <b>Verdict:</b>              | PASS |
| <b>Date:</b>               | 5/18/2006   | <b>Relative Humidity:</b>    | 46 % |
| <b>Temperature:</b> 22 °C  | <b>Air Pressure:</b> 1010 hPa                                       | <b>Power Supply:</b> 120 VAC |      |
| <b>Remarks:</b>            |   |                              |      |

**Photograph 8.1.1** Setup for conducted emission measurements at the mains power port



**Photograph 8.1.2** Setup for conducted emission measurements at the mains power port



|                            |   |                                |                              |
|----------------------------|---|--------------------------------|------------------------------|
| <b>Test specification:</b> | <b>Section 15.107, Conducted emission at AC power port, Class B</b> |                                |                              |
| <b>Test procedure:</b>     | ANSI C63.4, Sections 11.5 and 12.1.3                                |                                |                              |
| <b>Test mode:</b>          | Compliance  | <b>Verdict:</b>                | PASS                         |
| <b>Date:</b>               | 5/18/2006   |                                |                              |
| <b>Temperature:</b> 22 °C  | <b>Air Pressure:</b> 1010 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* |         |         |
| 0.215310       | 45.86                 | 44.49                     | 63.07         | -18.58      | 42.10                     | 53.07         | -10.97      | L1      | Pass    |
| 0.357367       | 36.27                 | 34.23                     | 58.85         | -24.62      | 30.53                     | 48.85         | -18.32      |         |         |
| 1.241604       | 53.34                 | 51.59                     | 56.00         | -4.41       | 44.61                     | 46.00         | -1.39       |         |         |
| 1.305241       | 53.80                 | 50.46                     | 56.00         | -5.54       | 42.17                     | 46.00         | -3.83       |         |         |
| 3.091471       | 41.54                 | 38.47                     | 56.00         | -17.53      | 29.29                     | 46.00         | -16.71      |         |         |
| 4.999335       | 35.56                 | 34.56                     | 56.00         | -21.44      | 34.31                     | 46.00         | -11.69      |         |         |
| 0.214012       | 46.43                 | 45.36                     | 63.11         | -17.75      | 43.35                     | 53.11         | -9.76       | L2      | Pass    |
| 0.285033       | 38.16                 | 35.69                     | 60.73         | -25.04      | 29.34                     | 50.73         | -21.39      |         |         |
| 1.241733       | 47.69                 | 45.79                     | 56.00         | -10.21      | 38.34                     | 46.00         | -7.66       |         |         |
| 1.369154       | 50.32                 | 47.38                     | 56.00         | -8.62       | 39.77                     | 46.00         | -6.23       |         |         |
| 3.088707       | 39.08                 | 36.53                     | 56.00         | -19.47      | 27.26                     | 46.00         | -18.74      |         |         |
| 5.173173       | 40.53                 | 31.81                     | 60.00         | -28.19      | 10.18                     | 50.00         | -39.82      |         |         |

\*- Margin = Measured emission - specification limit.

## Reference numbers of test equipment used

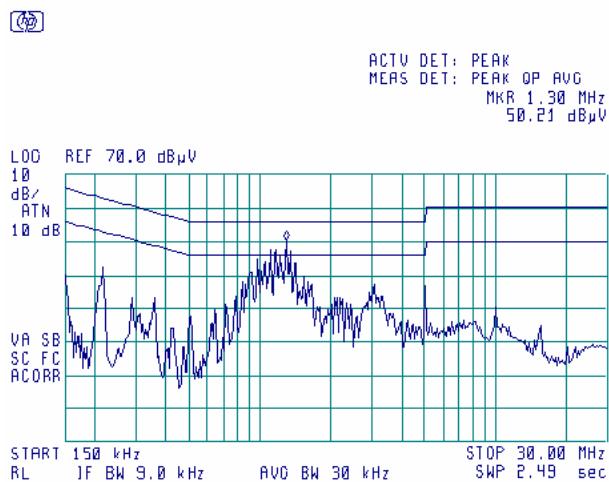
|         |         |         |         |         |         |  |
|---------|---------|---------|---------|---------|---------|--|
| HL 0163 | HL 0184 | HL 0787 | HL 1206 | HL 1430 | HL 1510 |  |
|---------|---------|---------|---------|---------|---------|--|

Full description is given in Appendix A.

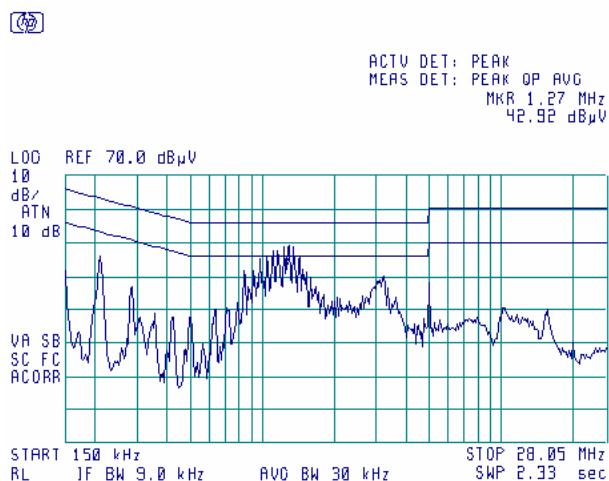
|                            |   |                                |                              |
|----------------------------|---|--------------------------------|------------------------------|
| <b>Test specification:</b> | <b>Section 15.107, Conducted emission at AC power port, Class B</b> |                                |                              |
| <b>Test procedure:</b>     | ANSI C63.4, Sections 11.5 and 12.1.3                                |                                |                              |
| <b>Test mode:</b>          | Compliance  | <b>Verdict:</b>                | PASS                         |
| <b>Date:</b>               | 5/18/2006   |                                |                              |
| <b>Temperature:</b> 22 °C  | <b>Air Pressure:</b> 1010 hPa                                       | <b>Relative Humidity:</b> 46 % | <b>Power Supply:</b> 120 VAC |
| <b>Remarks:</b>            |   |                                |                              |

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

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


**Plot 8.1.2 Conducted emission measurements on 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>                | PASS                         |
| <b>Date:</b>               | 5/04/2006   |                                |                              |
| <b>Temperature:</b> 21 °C  | <b>Air Pressure:</b> 1008hPa                      | <b>Relative Humidity:</b> 42 % | <b>Power Supply:</b> 120 VAC |
| <b>Remarks:</b>            |   |                                |                              |

## 8.2 Radiated emission measurements

### 8.2.1 General

This test was performed to measure radiated emissions from the EUT enclosure. The specification test limits are given in Table 8.2.1.

Table 8.2.1 Radiated emission test limits

| Frequency,<br>MHz | Class B limit,<br>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

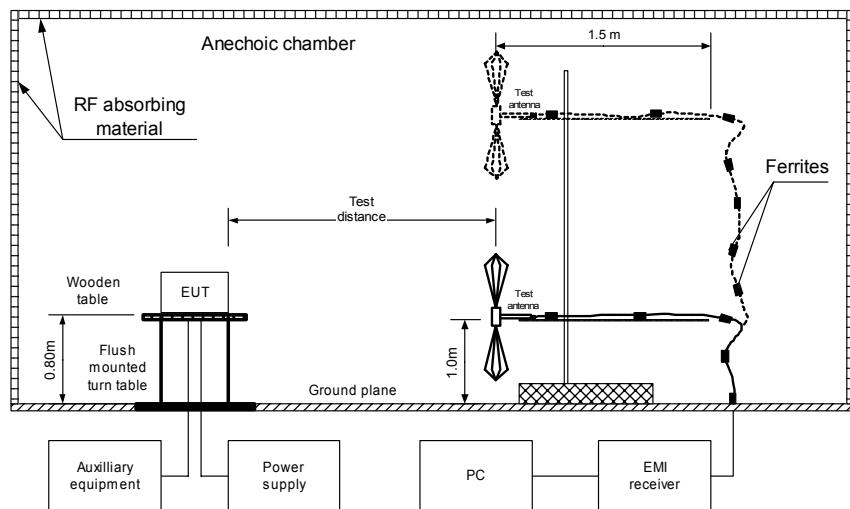
8.2.2.1 The EUT was set up as shown in Figure 8.2.1, energized and the EUT performance was checked.

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.

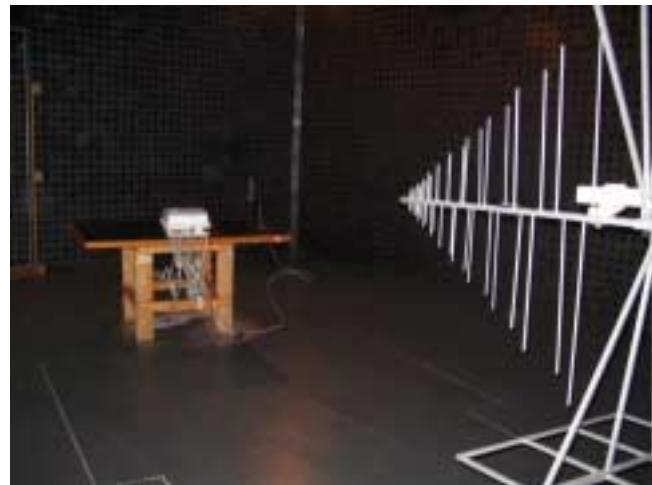
|                            |   |                                |                              |
|----------------------------|---|--------------------------------|------------------------------|
| <b>Test specification:</b> | <b>Section 15.109, Radiated emission, Class B</b> |                                |                              |
| <b>Test procedure:</b>     | ANSI C63.4, Sections 11.6 and 12.1.4              |                                |                              |
| <b>Test mode:</b>          | Compliance  | <b>Verdict:</b>                | PASS                         |
| <b>Date:</b>               | 5/04/2006   |                                |                              |
| <b>Temperature:</b> 21 °C  | <b>Air Pressure:</b> 1008hPa                      | <b>Relative Humidity:</b> 42 % | <b>Power Supply:</b> 120 VAC |
| <b>Remarks:</b>            |   |                                |                              |

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



|                            |   |                                |                              |
|----------------------------|---|--------------------------------|------------------------------|
| <b>Test specification:</b> | <b>Section 15.109, Radiated emission, Class B</b> |                                |                              |
| <b>Test procedure:</b>     | ANSI C63.4, Sections 11.6 and 12.1.4              |                                |                              |
| <b>Test mode:</b>          | Compliance  | <b>Verdict:</b>                | PASS                         |
| <b>Date:</b>               | 5/04/2006   |                                |                              |
| <b>Temperature:</b> 21 °C  | <b>Air Pressure:</b> 1008hPa                      | <b>Relative Humidity:</b> 42 % | <b>Power Supply:</b> 120 VAC |
| <b>Remarks:</b>            |   |                                |                              |

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



**Photograph 8.2.2 Setup for final radiated emission measurements, EUT cabling**



|                            |   |                                |                              |      |
|----------------------------|---|--------------------------------|------------------------------|------|
| <b>Test specification:</b> | <b>Section 15.109, Radiated emission, Class B</b> |                                |                              |      |
| <b>Test procedure:</b>     | ANSI C63.4, Sections 11.6 and 12.1.4              |                                |                              |      |
| <b>Test mode:</b>          | Compliance  |                                | <b>Verdict:</b>              | PASS |
| <b>Date:</b>               | 5/04/2006   |                                |                              |      |
| <b>Temperature:</b> 21 °C  | <b>Air Pressure:</b> 1008hPa                      | <b>Relative Humidity:</b> 42 % | <b>Power Supply:</b> 120 VAC |      |
| <b>Remarks:</b>            |   |                                |                              |      |

Table 8.2.2 Radiated emission test results

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

| Frequency, MHz | Peak emission, dB(µV/m) | Measured emission, dB(µV/m) | Quasi-peak      |             | Antenna polarization | Antenna height, m | Turn-table position**, degrees | Verdict |
|----------------|-------------------------|-----------------------------|-----------------|-------------|----------------------|-------------------|--------------------------------|---------|
|                |                         |                             | Limit, dB(µV/m) | Margin, dB* |                      |                   |                                |         |
| 37.550000      | 37.87                   | 37.60                       | 40.00           | -2.40       | V                    | 1.0               | 349                            | Pass    |
| 81.770000      | 36.26                   | 35.30                       | 40.00           | -4.70       | V                    | 1.0               | 236                            |         |
| 250.000000     | 40.94                   | 39.92                       | 46.00           | -6.08       | H                    | 1.2               | 20                             |         |
| 425.004000     | 42.15                   | 41.00                       | 46.00           | -5.00       | H                    | 1.0               | 100                            |         |
| 874.975000     | 44.42                   | 43.18                       | 46.00           | -2.82       | V                    | 1.2               | 335                            |         |
| 900.010000     | 41.75                   | 40.16                       | 46.00           | -5.84       | V                    | 1.0               | 180                            |         |

DETECTORS USED: PEAK / AVERAGE  
 FREQUENCY RANGE: 1000 MHz – 5000 MHz  
 RESOLUTION BANDWIDTH: 1000 kHz

| Frequency, MHz | Peak emission, dB(µV/m) | Average                     |                 |             | Antenna polarization | Antenna height, m | Turn-table position**, degrees | Verdict |
|----------------|-------------------------|-----------------------------|-----------------|-------------|----------------------|-------------------|--------------------------------|---------|
|                |                         | Measured emission, dB(µV/m) | Limit, dB(µV/m) | Margin, dB* |                      |                   |                                |         |
| 1133.000000    | 49.77                   | 30.09                       | 54.00           | -23.91      | Vertical             | 1.0               | 130                            | Pass    |
| 1200.000000    | 44.58                   | 28.21                       | 54.00           | -25.79      | Horizontal           | 1.0               | 221                            | Pass    |

\*- Margin = Measured emission - specification limit.

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

#### Reference numbers of test equipment used

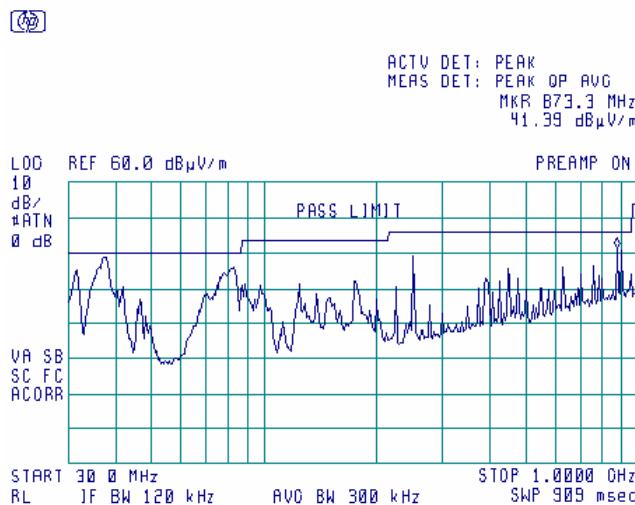
|         |         |         |         |         |         |         |         |
|---------|---------|---------|---------|---------|---------|---------|---------|
| HL 0521 | HL 0589 | HL 0592 | HL 0593 | HL 0594 | HL 0604 | HL 1116 | HL 1947 |
| HL 2009 |         |         |         |         |         |         |         |

Full description is given in Appendix A.

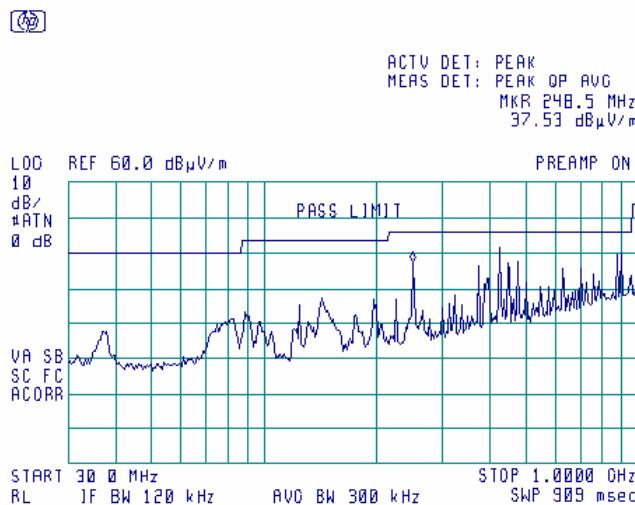
|                            |   |                                |                              |
|----------------------------|---|--------------------------------|------------------------------|
| <b>Test specification:</b> | <b>Section 15.109, Radiated emission, Class B</b> |                                |                              |
| <b>Test procedure:</b>     | ANSI C63.4, Sections 11.6 and 12.1.4              |                                |                              |
| <b>Test mode:</b>          | Compliance  | <b>Verdict:</b>                | PASS                         |
| <b>Date:</b>               | 5/04/2006   |                                |                              |
| <b>Temperature:</b> 21 °C  | <b>Air Pressure:</b> 1008hPa                      | <b>Relative Humidity:</b> 42 % | <b>Power Supply:</b> 120 VAC |
| <b>Remarks:</b>            |   |                                |                              |

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

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


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

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



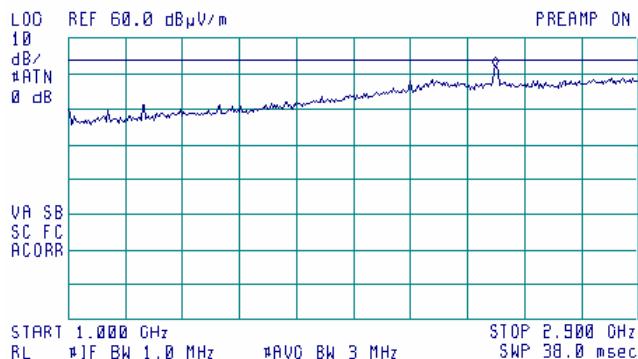
|                            |   |                                |                              |
|----------------------------|---|--------------------------------|------------------------------|
| <b>Test specification:</b> | <b>Section 15.109, Radiated emission, Class B</b> |                                |                              |
| <b>Test procedure:</b>     | ANSI C63.4, Sections 11.6 and 12.1.4              |                                |                              |
| <b>Test mode:</b>          | Compliance  | <b>Verdict:</b>                | PASS                         |
| <b>Date:</b>               | 5/04/2006   |                                |                              |
| <b>Temperature:</b> 21 °C  | <b>Air Pressure:</b> 1008hPa                      | <b>Relative Humidity:</b> 42 % | <b>Power Supply:</b> 120 VAC |
| <b>Remarks:</b>            |   |                                |                              |

**Plot 8.2.3 Radiated emission measurements in 1000 - 2900 MHz, vertical antenna polarization**

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



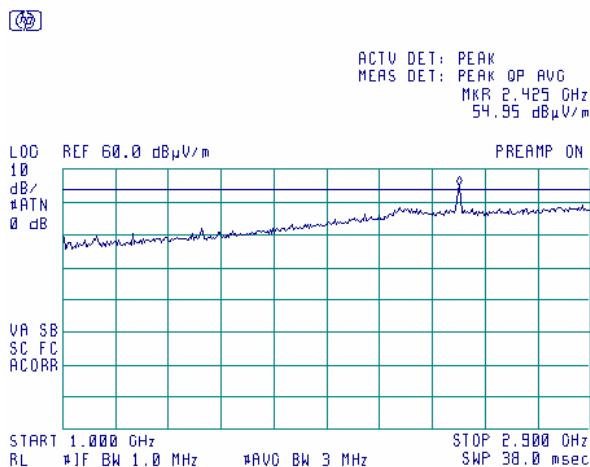
ACTV DET: PEAK  
 MEAS DET: PEAK QP AVG  
 MKR 2.420 GHz  
 52.09 dB $\mu$ V/m



|                            |   |                                |                              |
|----------------------------|---|--------------------------------|------------------------------|
| <b>Test specification:</b> | <b>Section 15.109, Radiated emission, Class B</b> |                                |                              |
| <b>Test procedure:</b>     | ANSI C63.4, Sections 11.6 and 12.1.4              |                                |                              |
| <b>Test mode:</b>          | Compliance  | <b>Verdict:</b>                | PASS                         |
| <b>Date:</b>               | 5/04/2006   |                                |                              |
| <b>Temperature:</b> 21 °C  | <b>Air Pressure:</b> 1008hPa                      | <b>Relative Humidity:</b> 42 % | <b>Power Supply:</b> 120 VAC |
| <b>Remarks:</b>            |   |                                |                              |

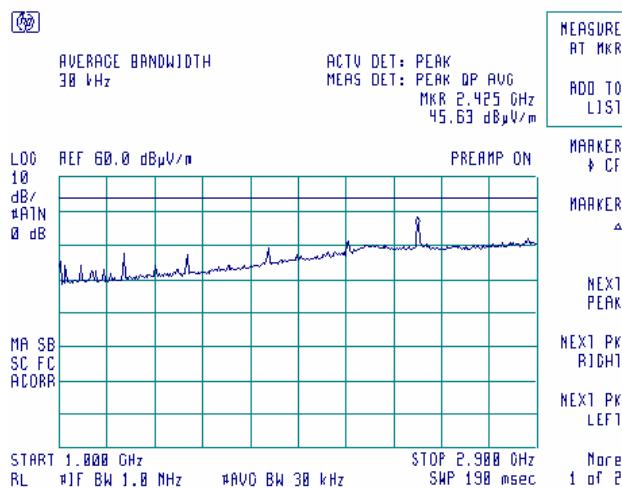
Plot 8.2.4 Radiated emission measurements in 1000 - 2900 MHz, horizontal antenna polarization

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



Plot 8.2.5 Radiated emission measurements in 1000 - 2900 MHz, horizontal antenna polarization

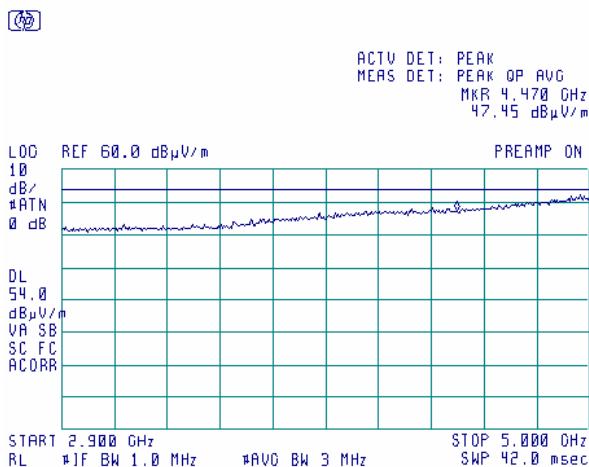
TEST SITE: Semi anechoic chamber  
 LIMIT: Class B  
 TEST DISTANCE: 3 m  
 EUT OPERATING MODE: Receive / Stand-by



|                            |   |                                |                              |
|----------------------------|---|--------------------------------|------------------------------|
| <b>Test specification:</b> | <b>Section 15.109, Radiated emission, Class B</b> |                                |                              |
| <b>Test procedure:</b>     | ANSI C63.4, Sections 11.6 and 12.1.4              |                                |                              |
| <b>Test mode:</b>          | Compliance  | <b>Verdict:</b>                | PASS                         |
| <b>Date:</b>               | 5/04/2006   |                                |                              |
| <b>Temperature:</b> 21 °C  | <b>Air Pressure:</b> 1008hPa                      | <b>Relative Humidity:</b> 42 % | <b>Power Supply:</b> 120 VAC |
| <b>Remarks:</b>            |   |                                |                              |

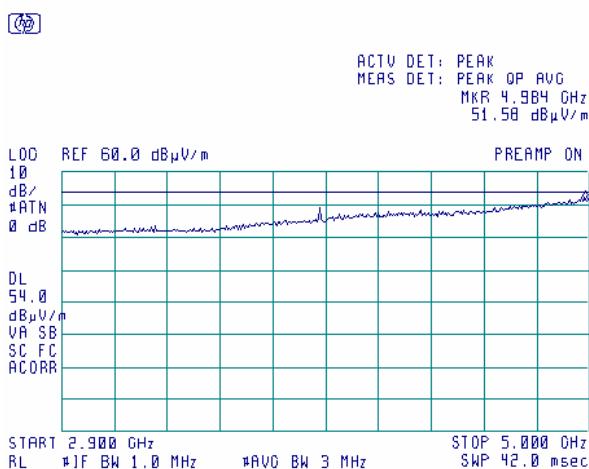
Plot 8.2.6 Radiated emission measurements in 2900 - 5000 MHz, vertical antenna polarization

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



Plot 8.2.7 Radiated emission measurements in 2900 - 5000 MHz, horizontal antenna polarization

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



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

| HL No | Description  | Manufacturer              | Model                | Ser. No.                 | Last Cal. | Due Cal.  |
|-------|--|---------------------------|----------------------|--------------------------|-----------|-----------|
| 0163  | LISN FCC/VDE/MIL-STD   | Electro-Metrics           | ANS 25/2             | 1314                     | 01-Oct-05 | 01-Oct-06 |
| 0174  | Monitor, Field, 10kHz-1GHz, 1-300 V/m, w/fiberoptic                    | Amplifier Research        | FM1000               | 60525                    | 13-Feb-06 | 13-Feb-07 |
| 0184  | Patch Panel, 0-110 dB, 300 Hz - 3 kHz                                  | Hewlett Packard           | 353A                 | 0247A109 29              | 01-Jan-06 | 01-Jan-07 |
| 0186  | Power Divider, 50 Ohm, 0.5 W, 0 - 1 GHz                                | Hewlett Packard           | 11549A               | NA                       | 07-May-06 | 07-May-07 |
| 0446  | Antenna, Loop active, 10kHz-30MHz                                      | EMCO                      | 6502                 | 2857                     | 28-Jun-05 | 28-Jun-06 |
| 0465  | Anechoic Chamber 9(L) x 6.5(W) x 5.5(H) m                              | HL                        | AC - 1               | 023                      | 11-Nov-05 | 11-Nov-06 |
| 0521  | EMI Receiver (Spectrum Analyzer) with RF filter section 9 kHz-6.5 GHz  | Hewlett Packard           | 8546A                | 3617A 00319, 3448A002 53 | 26-Sep-05 | 26-Sep-06 |
| 0574  | Humidity Chamber, temperature range: -70 to +177 deg C, RH: 10 to 98%. | Tenney Engineering        | Tenney 14            | 19                       | 19-Feb-06 | 19-Feb-07 |
| 0589  | Cable Coaxial, GORE A2P01POL118, 2.3 m                                 | HL                        | GORE-3               | 176                      | 02-Dec-05 | 02-Dec-06 |
| 0592  | Position Controller  | HL                        | L2-SR3000 (HL CRL-3) | 100                      | 18-May-06 | 18-May-07 |
| 0593  | Antenna Mast, 1-4 m Pneumatic  | Madgesh                   | AM-F1                | 101                      | 02-Feb-06 | 02-Feb-07 |
| 0594  | Turn Table FOR ANECHOIC CHAMBER flush mount d=1.2 m Pneumatic          | HL                        | TT-WDC1              | 102                      | 26-Jan-06 | 26-Jan-07 |
| 0604  | Antenna BiconiLog Log-Periodic/T Bow-TIE 26 - 2000 MHz                 | EMCO                      | 3141                 | 9611-1011                | 10-Jan-06 | 10-Jan-07 |
| 0787  | Transient Limiter  | Hewlett Packard           | 11947A               | 3107A018 77              | 21-Nov-05 | 21-Nov-06 |
| 0808  | Analyzer Spectrum 100 Hz to 2.2 GHz                                    | Anritsu                   | MS2601B              | M178731                  | 27-Mar-06 | 27-Mar-07 |
| 1004  | Cable Coaxial , ANDREW PSWJ4 , 6m                                      | HL                        | ANDREW -6            | 163                      | 04-Dec-05 | 04-Dec-06 |
| 1116  | Antenna, Horn, 1-18 GHz  | HL                        | A1-18                | 186                      | 03-Mar-06 | 03-Mar-07 |
| 1200  | Quadruplexer 1-12 GHz (1-2 GHz; 2-4GHz;4-8 GHz; 8-12GHz)               | Elettronica S.p.A. - Roma | UE 84                | D/00240                  | 10-Feb-05 | 10-Feb-07 |
| 1206  | One phase voltage regulator, 2kVA, 0-250V                              | HL                        | TDGC-2               | 142                      | 04-Jun-05 | 04-Jun-06 |
| 1365  | Cable Coaxial, S-FLC 12-50, 5 m  | HL                        | C214-5               | 1365                     | 02-Dec-05 | 02-Dec-06 |
| 1424  | Spectrum Analyzer, 30 Hz- 40 GHz                                       | Agilent Technologies      | 8564EC               | 3946A002 19              | 30-Aug-05 | 30-Aug-06 |
| 1430  | EMI Receiver, 9 kHz - 2.9 GHz, System: HL1431, HL1432                  | Agilent Technologies      | 8542E                | 3807A002 62,3705A0 0217  | 01-Sep-05 | 01-Sep-06 |
| 1474  | Cable, 1 m   | Harbour Industries        | MIL 17/60-RG142      | 1474                     | 11-Sep-05 | 11-Sep-06 |
| 1475  | Cable, 1 m   | Harbour Industries        | MIL 17/60-RG142      | 1475                     | 11-Sep-05 | 11-Sep-06 |
| 1510  | Cable RF, 8 m  | Belden                    | M17/167 MIL-C-17     | 1510                     | 02-Dec-05 | 02-Dec-06 |
| 1620  | Attenuator, 50 Ohm, 2W, DC to 8 GHz, 10 dB                             | Midwest Microwave         | 0217-10-NNN-02       | 1620                     | 15-Jan-06 | 15-Jan-07 |

| HL No | Description  | Manufacturer               | Model              | Ser. No.    | Last Cal. | Due Cal.  |
|-------|--|----------------------------|--------------------|-------------|-----------|-----------|
| 1653  | Analyzer EMC 9 kHz - 1.5 GHz                                   | Agilent Technologies       | E7401A             | US394402 81 | 06-Feb-06 | 06-Feb-07 |
| 1942  | Cable 18GHz, 4 m, blue   | Rhophase Microwave Limited | SPS-1803A-4000-NPS | T4658       | 17-Oct-05 | 17-Oct-06 |
| 1947  | Cable 18GHz, 6.5 m, blue                                       | Rhophase Microwave Limited | NPS-1803A-6500-NPS | T4974       | 17-Oct-05 | 17-Oct-06 |
| 1984  | Antenna, Double-Ridged Waveguide Horn, 1-18 GHz, 300 W, N-type | EMC Test Systems           | 3115               | 9911-5964   | 03-Mar-06 | 03-Mar-07 |
| 2009  | Cable RF, 8 m  | Alpha Wire                 | RG-214             | C-56        | 02-Dec-05 | 02-Dec-06 |
| 2078  | Isotropic Field Probe 80 MHz - 40 GHz                          | Amplifier Research         | FP2080             | 302541      | 08-Dec-05 | 08-Dec-06 |
| 2258  | Amplifier Low Noise 2-20 GHz                                   | Sophia Wireless            | LNA0220-C          | 0222        | 05-Nov-05 | 05-Nov-06 |
| 2358  | Power Supply, 2 X 0-36VDC / 5A, 5VDC / 5A                      | Horizon Electronics        | DHR3655 D          | 767469      | 07-Apr-06 | 07-Apr-07 |
| 2780  | EMS analyzer, 100 Hz to 26.5 GHz                               | Agilent Technologies       | E7405A             | MY451024 6  | 11-Jun-05 | 11-Jun-06 |
| 2875  | Power meter RF   | Boonton Electronics Corp.  | 42220A             | 341703AC    | 28-Feb-06 | 28-Feb-07 |
| 2909  | Spectrum analyzer, ESA-E, 100 Hz to 26.5 GHz                   | Agilent Technologies       | E4407B             | MY414447 62 | 10-Apr-06 | 10-Apr-07 |

## 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<br>2.9 GHz to 6.46 GHz: ± 3.5 dB<br>6.46 GHz to 13.2 GHz: ± 4.3 dB<br>13.2 GHz to 22.0 GHz: ± 5.0 dB<br>22.0 GHz to 26.8 GHz: ± 5.5 dB<br>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<br>150 kHz to 30 MHz: ± 3.8 dB   |
| Radiated emissions at 3 m measuring distance<br>Horizontal polarization | Biconilog antenna: ± 5.3 dB<br>Biconical antenna: ± 5.0 dB<br>Log periodic antenna: ± 5.3 dB<br>Double ridged horn antenna: ± 5.3 dB  |
| Vertical polarization   | Biconilog antenna: ± 6.0 dB<br>Biconical antenna: ± 5.7 dB<br>Log periodic antenna: ± 6.0 dB<br>Double ridged horn antenna: ± 6.0 dB  |

The test equipment has been calibrated according to its recommended procedures and is within the manufacturer's published limit of error. The standards and instruments used in the calibration system conform to the present requirements of ISO/IEC 17025 (or alternately ANSI/NCSL Z540-1).

The laboratory calibrates its measurement standards by a third party (traceable to NIST, USA) on a regular basis according to equipment manufacturer requirements. The Hermon Labs EMC measurements uncertainty is given in the table above.

## 11 APPENDIX C Test facility description

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

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e-mail: mail@hermonlabs.com  
website: www.hermonlabs.com

Person for contact: Mr. Alex Usoskin, CEO.

## 12 APPENDIX D Specification references

|                               |  |
|-------------------------------|--|
| 47CFR part 27: 2005           | Miscellaneous wireless communications services   |
| 47CFR part 1: 2005            | Practice and procedure   |
| 47CFR part 2: 2005            | Frequency allocations and radio treaty matters; general rules and regulations  |
| 47CFR part 15 subpart B: 2005 | Radio Frequency Devices  |
| ANSI C63.2: 1996              | American National Standard for Instrumentation-Electromagnetic Noise and Field Strength, 10 kHz to 40 GHz-Specifications.  |
| ANSI C63.4: 2003              | American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz. |
| ANSI/TIA/EIA-603-A:2001       | Land Mobile FM or PM Communications Equipment Measurement and Performance Standards  |

## 13 APPENDIX E Abbreviations and acronyms

|          |   |
|----------|---|
| A        | ampere                                      |
| AC       | alternating current                         |
| A/m      | ampere per meter                            |
| AM       | amplitude modulation                        |
| AVRG     | average (detector)                          |
| cm       | centimeter                                  |
| dB       | decibel                                     |
| dBm      | decibel referred to one milliwatt           |
| dB(µV)   | decibel referred to one microvolt           |
| dB(µV/m) | decibel referred to one microvolt per meter |
| dB(µA)   | decibel referred to one microampere         |
| DC       | direct current                              |
| EIRP     | equivalent isotropically radiated power     |
| ERP      | effective radiated power                    |
| EUT      | equipment under test                        |
| F        | frequency                                   |
| GHz      | gigahertz                                   |
| GND      | ground                                      |
| H        | height                                      |
| HL       | Hermon laboratories                         |
| Hz       | hertz                                       |
| ITE      | information technology equipment            |
| k        | kilo  |
| kHz      | kilohertz                                   |
| LISN     | line impedance stabilization network        |
| LO       | local oscillator                            |
| m        | meter                                       |
| MHz      | megahertz                                   |
| min      | minute                                      |
| mm       | millimeter                                  |
| ms       | millisecond                                 |
| µs       | microsecond                                 |
| NA       | not applicable                              |
| OATS     | open area test site                         |
| Ω        | Ohm   |
| QP       | quasi-peak                                  |
| PCB      | printed circuit board                       |
| PM       | pulse modulation                            |
| PS       | power supply                                |
| RE       | radiated emission                           |
| RF       | radio frequency                             |
| rms      | root mean square                            |
| Rx       | receive                                     |
| s        | second                                      |
| T        | temperature                                 |
| Tx       | transmit                                    |
| V        | volt  |

## 14 APPENDIX F Test equipment correction factors

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

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

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

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

| Frequency,<br>MHz | Magnetic Antenna Factor,<br>dB(S/m) | Electric Antenna Factor,<br>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 guide antenna**  
**Hermon Laboratories, model A1-18, S/N 186, HL 1116**

| Frequency,<br>MHz | Antenna factor.<br>dB(1/m) |
|-------------------|----------------------------|
| 1000.0            | 24.6                       |
| 1500.0            | 26.4                       |
| 2000.0            | 29.7                       |
| 2500.0            | 31.1                       |
| 3000.0            | 31.5                       |
| 3500.0            | 32.7                       |
| 4000.0            | 36.1                       |
| 4500.0            | 36.1                       |
| 5000.0            | 39.9                       |
| 5500.0            | 40.5                       |
| 6000.0            | 40.4                       |
| 6500.0            | 41.0                       |
| 7000.0            | 41.2                       |
| 7500.0            | 41.2                       |
| 8000.0            | 44.3                       |
| 8500.0            | 40.7                       |
| 9000.0            | 39.3                       |
| 9500.0            | 41.3                       |
| 10000.0           | 42.8                       |
| 10500.0           | 43.8                       |
| 11000.0           | 47.0                       |
| 11500.0           | 46.3                       |
| 12000.0           | 43.4                       |
| 12500.0           | 41.8                       |
| 13000.0           | 41.9                       |
| 13500.0           | 44.5                       |
| 14000.0           | 44.8                       |
| 14500.0           | 44.9                       |
| 15000.0           | 44.4                       |
| 15500.0           | 43.4                       |
| 16000.0           | 42.6                       |
| 16500.0           | 43.6                       |
| 17000.0           | 42.3                       |
| 17500.0           | 45.9                       |
| 18000.0           | 45.3                       |

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,<br>MHz | Antenna gain,<br>dBi | Antenna factor.<br>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).

**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,<br>MHz | Cable loss,<br>dB | Tolerance<br>(Specification),<br>dB | Measurement<br>uncertainty,<br>dB |
|-----|-------------------|-------------------|-------------------------------------|-----------------------------------|
| 1   | 30                | 0.33              | ≤ 6.5                               | ±0.12                             |
| 2   | 50                | 0.40              |                                     |                                   |
| 3   | 100               | 0.57              |                                     |                                   |
| 4   | 300               | 0.97              |                                     |                                   |
| 5   | 500               | 1.25              |                                     |                                   |
| 6   | 800               | 1.59              |                                     |                                   |
| 7   | 1000              | 1.81              |                                     |                                   |
| 8   | 1200              | 1.97              |                                     |                                   |
| 9   | 1400              | 2.15              |                                     |                                   |
| 10  | 1600              | 2.28              |                                     |                                   |
| 11  | 1800              | 2.43              |                                     |                                   |
| 12  | 2000              | 2.61              |                                     |                                   |
| 13  | 2200              | 2.75              |                                     |                                   |
| 14  | 2400              | 2.89              |                                     |                                   |
| 15  | 2600              | 2.97              |                                     |                                   |
| 16  | 2800              | 3.21              | ≤ 6.5                               | ±0.12                             |
| 17  | 3000              | 3.32              |                                     |                                   |
| 18  | 3300              | 3.47              |                                     |                                   |
| 19  | 3600              | 3.62              |                                     |                                   |
| 20  | 3900              | 3.84              |                                     |                                   |
| 21  | 4200              | 3.92              |                                     |                                   |
| 22  | 4500              | 4.07              |                                     |                                   |
| 23  | 4800              | 4.36              |                                     |                                   |
| 24  | 5100              | 4.62              |                                     |                                   |
| 25  | 5400              | 4.78              |                                     |                                   |
| 26  | 5700              | 5.16              |                                     |                                   |
| 27  | 6000              | 5.67              |                                     |                                   |
| 28  | 6500              | 5.99              |                                     |                                   |

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

| No. | Frequency,<br>MHz | Measured,<br>dB | Measured uncertainty<br>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 18 GHz, 4 m, blue, model SPS-1803A-4000-NPS, serial number T4658, HL 1942

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

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

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

| Frequency,<br>GHz | Insertion loss,<br>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,<br>GHz | Insertion loss,<br>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,<br>MHz | Cable loss,<br>dB | Tolerance (Specification),<br>dB | Measurement uncertainty,<br>dB |
|-----|-------------------|-------------------|----------------------------------|--------------------------------|
| 1   | 1                 | 0.10              | NA                               | $\pm 0.12$                     |
| 2   | 10                | 0.14              |                                  |                                |
| 3   | 30                | 0.25              |                                  |                                |
| 4   | 50                | 0.34              |                                  |                                |
| 5   | 100               | 0.53              |                                  |                                |
| 6   | 300               | 0.99              |                                  |                                |
| 7   | 500               | 1.31              |                                  |                                |
| 8   | 800               | 1.73              |                                  |                                |
| 9   | 1000              | 1.98              |                                  |                                |
| 10  | 1100              | 2.11              |                                  |                                |
| 11  | 1200              | 2.21              |                                  |                                |
| 12  | 1300              | 2.35              |                                  |                                |
| 13  | 1400              | 2.46              |                                  |                                |
| 14  | 1500              | 2.55              |                                  |                                |
| 15  | 1600              | 2.68              |                                  |                                |
| 16  | 1700              | 2.78              |                                  |                                |
| 17  | 1800              | 2.88              |                                  |                                |
| 18  | 1900              | 2.98              |                                  |                                |
| 19  | 2000              | 3.09              |                                  |                                |

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

| No. | Frequency,<br>MHz | Cable loss,<br>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              |