

# TEST REPORT

**ACCORDING TO: FCC 47CFR part 15 subpart C § 15.247 (FHSS) and subpart B,  
RSS-210 issue 8 Annex 8**

FOR:

**Visonic Ltd.**

**Remote keypad**

**Models: KP-140 PG2 (915)  
KP-141 PG2 (915)**

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## 1 Applicant information

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**Contact name:** Mr. Arick Elshtein

## 2 Equipment under test attributes

**Product name:** Remote keypad  
**Product type:** Transceiver  
**Model(s):** KP-141 PG2  
**Hardware version:** 90-204024, revision PCB-2  
**Software release:** JS-701195, version 1.0.09  
**Receipt date:** 1/28/2011

## 3 Manufacturer information

**Manufacturer name:** Visonic Ltd.  
**Address:** Habarzel street 24, Tel Aviv 69710, Israel  
**Telephone:** +972 3645 6714  
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**E-Mail:** aelshtein@visonic.com  
**Contact name:** Mr. Arick Elshtein

## 4 Test details

**Project ID:** 21632  
**Location:** Hermon Laboratories Ltd. Harakevet Industrial Zone, Binyamina 30500, Israel  
**Test started:** 1/28/2011  
**Test completed:** 2/16/2011  
**Test specification(s):** FCC 47CFR part 15, subpart C, §15.247 (FHSS); subpart B; RSS-210 issue 8 Annex 8, RSS-Gen issue 3

## 5 Tests summary

| Test                                                                           | Status                                                            |
|--------------------------------------------------------------------------------|-------------------------------------------------------------------|
| <b>Transmitter characteristics</b>                                             |                                                                   |
| FCC Section 15.247(a)1, RSS-210 section A8.1(a), The 20 dB bandwidth           | Pass                                                              |
| FCC Section 15.247(a)1, RSS-210 section A8.1(b), Frequency separation          | Pass                                                              |
| FCC Section 15.247(a)1, RSS-210 section A8.1(c), Number of hopping frequencies | Pass                                                              |
| FCC Section 15.247(a)1, RSS-210 section A8.1(c), Average time of occupancy     | Pass                                                              |
| FCC Section 15.247(b), RSS-210 section A8.4(1), Peak output power              | Pass                                                              |
| FCC Section 15.247(d), RSS-210 section A8.5, Emissions at band edges           | Pass                                                              |
| FCC Section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions       | Pass                                                              |
| FCC Section 15.203, RSS-Gen section 7.1.2, Antenna requirements                | Pass                                                              |
| FCC Section 15.207(a), RSS-Gen section 7.2.2, Conducted emission               | Not required                                                      |
| FCC Section 15.247(i), RSS-Gen, section 5.5, RF exposure                       | Pass, the exhibit to the application of certification is provided |
| <b>Unintentional emissions</b>                                                 |                                                                   |
| Section 15.107, Conducted emission at AC power port                            | Not required                                                      |
| Section 15.109, RSS-Gen section 6.2, Radiated emission                         | Pass                                                              |

Testing was completed against all relevant requirements of the test standard. The results obtained indicate that the product under test complies in full with the requirements tested.  
The test results relate only to the items tested. Pass/ fail decision was based on nominal values.

|                     | Name and Title                               | Date              | Signature                                                                             |
|---------------------|----------------------------------------------|-------------------|---------------------------------------------------------------------------------------|
| <b>Tested by:</b>   | Mrs. E. Pitt, test engineer                  | February 16, 2011 |  |
| <b>Reviewed by:</b> | Mrs. M. Cherniavsky, certification engineer  | March 22, 2011    |  |
| <b>Approved by:</b> | Mr. M. Nikishin, EMC and radio group manager | May 6, 2011       |  |

## 6 EUT description

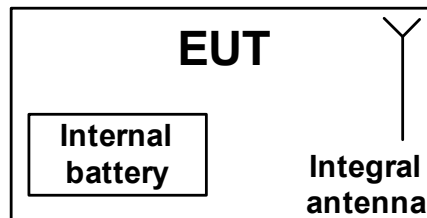
### 6.1 General information

The EUT, KP-140 PG2 and KP-141 PG2, is a 2-way PowerG wireless keypad for the PowerMaster family control panels. The KP-141 PG2 is the same as the KP-140 PG2 but also includes a built-in proximity RFID tag reader. Both keypads enable most common everyday user functions:

- Arm and Disarm the alarm system.
- Initiate Emergency, Fire and Panic alarms.
- Control X-10 devices and PGM output.
- Perform one of the AUX (auxiliary) predefined functions.
- Review system Status.

The KP-141 PG2 model as a full version of the device was tested.

### 6.2 Test configuration



### 6.3 Changes made in the EUT

No changes were implemented in the EUT.

## 6.4 EUT positions during testing

Photograph 6.4.1 EUT in X-axis orthogonal position



Photograph 6.4.2 EUT in Y-axis orthogonal position



Photograph 6.4.3 EUT in Z-axis orthogonal position



Photograph 6.4.4 EUT close view in Y-axis orthogonal position



## 6.5 Transmitter characteristics

|                                                                               |                                                                                                          |                                                           |         |                                   |                                |
|-------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------|-----------------------------------------------------------|---------|-----------------------------------|--------------------------------|
| <b>Type of equipment</b>                                                      |                                                                                                          |                                                           |         |                                   |                                |
| X                                                                             | Stand-alone (Equipment with or without its own control provisions)                                       |                                                           |         |                                   |                                |
|                                                                               | Combined equipment (Equipment where the radio part is fully integrated within another type of equipment) |                                                           |         |                                   |                                |
|                                                                               | Plug-in card (Equipment intended for a variety of host systems)                                          |                                                           |         |                                   |                                |
| <b>Intended use</b>                                                           |                                                                                                          | <b>Condition of use</b>                                   |         |                                   |                                |
|                                                                               | fixed                                                                                                    | Always at a distance more than 2 m from all people        |         |                                   |                                |
|                                                                               | mobile                                                                                                   | Always at a distance more than 20 cm from all people      |         |                                   |                                |
| X                                                                             | portable                                                                                                 | May operate at a distance closer than 20 cm to human body |         |                                   |                                |
| <b>Assigned frequency ranges</b>                                              |                                                                                                          | 902 – 928 MHz                                             |         |                                   |                                |
| <b>Operating frequencies</b>                                                  |                                                                                                          | 912.750 – 919.106 MHz                                     |         |                                   |                                |
| <b>Maximum rated output power</b>                                             |                                                                                                          | At transmitter 50 $\Omega$ RF output connector            |         | dBm                               |                                |
|                                                                               |                                                                                                          | EIRP                                                      |         | 16.5 dBm                          |                                |
|                                                                               |                                                                                                          | Peak output power                                         |         | 24.5 dBm                          |                                |
| <b>Is transmitter output power variable?</b>                                  |                                                                                                          | X                                                         | No      |                                   |                                |
|                                                                               |                                                                                                          |                                                           | Yes     | continuous variable               |                                |
|                                                                               |                                                                                                          |                                                           |         | stepped variable with stepsize    |                                |
|                                                                               |                                                                                                          |                                                           |         | minimum RF power                  | dBm                            |
|                                                                               |                                                                                                          |                                                           |         | maximum RF power                  | dBm                            |
| <b>Antenna connection</b>                                                     |                                                                                                          |                                                           |         |                                   |                                |
| unique coupling                                                               |                                                                                                          | standard connector                                        |         | X                                 | integral                       |
|                                                                               |                                                                                                          |                                                           |         | X                                 | with temporary RF connector    |
|                                                                               |                                                                                                          |                                                           |         | X                                 | without temporary RF connector |
| <b>Antenna/s technical characteristics</b>                                    |                                                                                                          |                                                           |         |                                   |                                |
| Type                                                                          |                                                                                                          | Manufacturer                                              |         | Model number                      |                                |
| Integral                                                                      |                                                                                                          | Visonic                                                   |         | Built-in wire antenna             |                                |
|                                                                               |                                                                                                          |                                                           |         | Gain                              |                                |
|                                                                               |                                                                                                          |                                                           |         | -8 dBi                            |                                |
| <b>Transmitter aggregate data rate/s</b>                                      |                                                                                                          | 50 kbps                                                   |         |                                   |                                |
| <b>Type of modulation</b>                                                     |                                                                                                          | GFSK                                                      |         |                                   |                                |
| <b>Modulating test signal (baseband)</b>                                      |                                                                                                          | PRBS                                                      |         |                                   |                                |
| <b>Maximum transmitter duty cycle in normal use</b>                           |                                                                                                          | 0.1%                                                      |         |                                   |                                |
| <b>Transmitter power source</b>                                               |                                                                                                          |                                                           |         |                                   |                                |
| X                                                                             | Battery                                                                                                  | <b>Nominal rated voltage</b>                              | 3.0 VDC | <b>Battery type</b>               | Lithium                        |
|                                                                               | DC                                                                                                       | <b>Nominal rated voltage</b>                              | VDC     |                                   |                                |
|                                                                               | AC mains                                                                                                 | <b>Nominal rated voltage</b>                              | VAC     | <b>Frequency</b>                  |                                |
| <b>Common power source for transmitter and receiver</b>                       |                                                                                                          |                                                           |         |                                   |                                |
|                                                                               |                                                                                                          |                                                           |         | X                                 | yes                            |
|                                                                               |                                                                                                          |                                                           |         |                                   | no                             |
| <b>Spread spectrum technique used</b>                                         |                                                                                                          | X                                                         |         | Frequency hopping (FHSS)          |                                |
|                                                                               |                                                                                                          |                                                           |         | Digital transmission system (DTS) |                                |
|                                                                               |                                                                                                          |                                                           |         | Hybrid                            |                                |
| <b>Spread spectrum parameters for transmitters tested per FCC 15.247 only</b> |                                                                                                          |                                                           |         |                                   |                                |
| FHSS                                                                          | Total number of hops                                                                                     |                                                           | 50      |                                   |                                |
|                                                                               | Bandwidth per hop                                                                                        |                                                           | 100 kHz |                                   |                                |
|                                                                               | Max. separation of hops                                                                                  |                                                           | 130 kHz |                                   |                                |

|                     |                                                                  |                         |                           |
|---------------------|------------------------------------------------------------------|-------------------------|---------------------------|
| Test specification: | FCC section 15.247(a)1, RSS-210 section A8.1(a), 20 dB bandwidth |                         |                           |
| Test procedure:     | Public notice DA 00-705                                          |                         |                           |
| Test mode:          | Compliance                                                       | Verdict: PASS           |                           |
| Date:               | 2/6/2011                                                         |                         |                           |
| Temperature: 22 °C  | Air Pressure: 1022 hPa                                           | Relative Humidity: 48 % | Power Supply: 3 V battery |
| Remarks:            |                                                                  |                         |                           |

## 7 Transmitter tests according to 47CFR part 15 subpart C and RSS-210 Annex 8 requirements

### 7.1 20 dB bandwidth

#### 7.1.1 General

This test was performed to measure 20 dB bandwidth of the transmitter hopping channel. Specification test limits are given in Table 7.1.1.

Table 7.1.1 The 20 dB bandwidth limits

| Assigned frequency, MHz | Maximum bandwidth, kHz | Modulation envelope reference points*, dBc |
|-------------------------|------------------------|--------------------------------------------|
| 902.0 – 928.0           | 500                    | 20                                         |
| 2400.0 – 2483.5         | NA                     |                                            |
| 5725.0 – 5850.0         | 1000                   |                                            |

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

#### 7.1.2 Test procedure

7.1.2.1 The EUT was set up as shown in Figure 7.1.1, energized and its proper operation was checked.

7.1.2.2 The EUT was set to transmit modulated carrier at maximum data rate.

7.1.2.3 The transmitter bandwidth was measured with spectrum analyzer as frequency delta between reference points on modulation envelope and provided in Table 7.1.2 and the associated plots.

Figure 7.1.1 The 20 dB bandwidth test setup



|                            |                                                                         |                                |                                  |
|----------------------------|-------------------------------------------------------------------------|--------------------------------|----------------------------------|
| <b>Test specification:</b> | <b>FCC section 15.247(a)1, RSS-210 section A8.1(a), 20 dB bandwidth</b> |                                |                                  |
| <b>Test procedure:</b>     | Public notice DA 00-705                                                 |                                |                                  |
| <b>Test mode:</b>          | Compliance                                                              | <b>Verdict:</b> PASS           |                                  |
| <b>Date:</b>               | 2/6/2011                                                                |                                |                                  |
| <b>Temperature:</b> 22 °C  | <b>Air Pressure:</b> 1022 hPa                                           | <b>Relative Humidity:</b> 48 % | <b>Power Supply:</b> 3 V battery |
| <b>Remarks:</b>            |                                                                         |                                |                                  |

**Table 7.1.2 The 20 dB bandwidth test results**

ASSIGNED FREQUENCY BAND: 902 – 928 MHz  
DETECTOR USED: Peak  
SWEEP TIME: Auto  
RESOLUTION BANDWIDTH:  $\geq 1\%$  of the 20 dB bandwidth  
VIDEO BANDWIDTH:  $\geq$  RBW  
MODULATION ENVELOPE REFERENCE POINTS: 20.0 dBc  
MODULATING SIGNAL: PRBS  
FREQUENCY HOPPING: Disabled

| Carrier frequency, MHz | Type of modulation | Data rate, kbps | Symbol rate, Msymbols/s | 20 dB bandwidth, kHz | Limit, kHz | Margin, kHz | Verdict |
|------------------------|--------------------|-----------------|-------------------------|----------------------|------------|-------------|---------|
| <b>Low frequency</b>   |                    |                 |                         |                      |            |             |         |
| 912.750                | GFSK               | 50              | NA                      | 92.0                 | 500.0      | -408.0      | Pass    |
| <b>Mid frequency</b>   |                    |                 |                         |                      |            |             |         |
| 915.863                | GFSK               | 50              | NA                      | 96.5                 | 500.0      | -403.5      | Pass    |
| <b>High frequency</b>  |                    |                 |                         |                      |            |             |         |
| 919.106                | GFSK               | 50              | NA                      | 100.0                | 500.0      | -400.0      | Pass    |

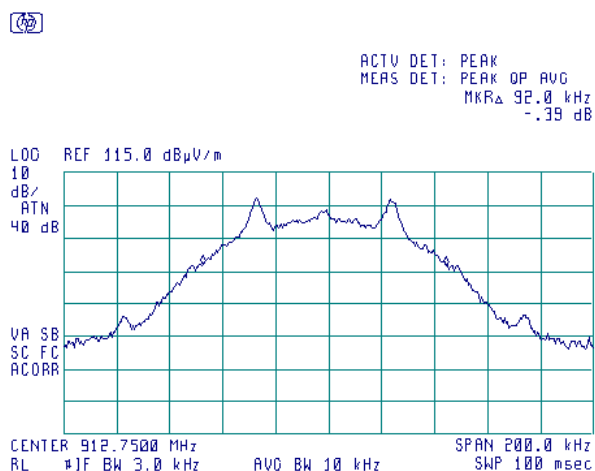
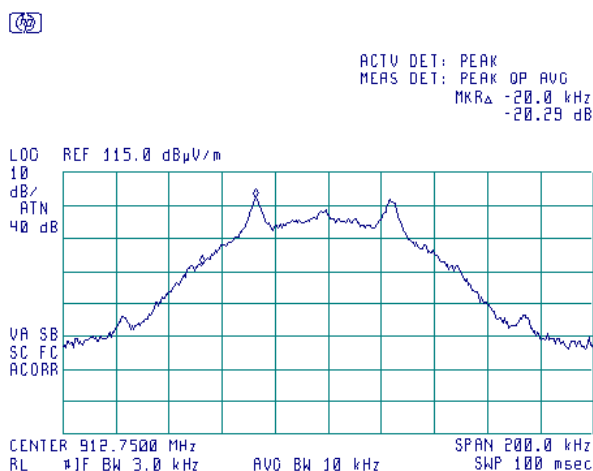
**Reference numbers of test equipment used**

|         |         |         |         |         |         |  |  |
|---------|---------|---------|---------|---------|---------|--|--|
| HL 0034 | HL 0415 | HL 0593 | HL 0594 | HL 0812 | HL 1425 |  |  |
|---------|---------|---------|---------|---------|---------|--|--|

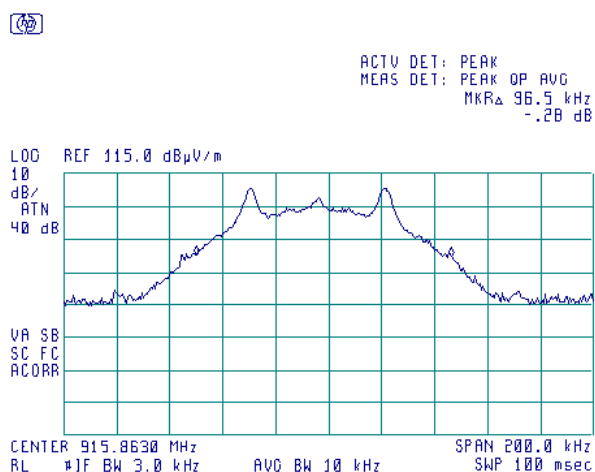
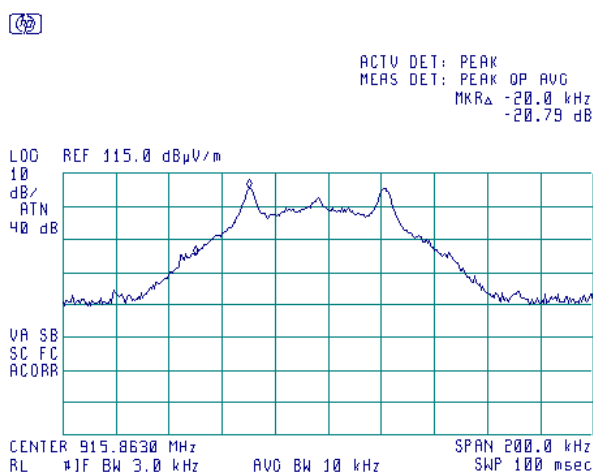
Full description is given in Appendix A.

|                                                                                             |                               |                                |                                  |
|---------------------------------------------------------------------------------------------|-------------------------------|--------------------------------|----------------------------------|
| <b>Test specification:</b> FCC section 15.247(a)1, RSS-210 section A8.1(a), 20 dB bandwidth |                               |                                |                                  |
| <b>Test procedure:</b> Public notice DA 00-705                                              |                               |                                |                                  |
| <b>Test mode:</b> Compliance                                                                |                               | <b>Verdict:</b> PASS           |                                  |
| <b>Date:</b> 2/6/2011                                                                       |                               |                                |                                  |
| <b>Temperature:</b> 22 °C                                                                   | <b>Air Pressure:</b> 1022 hPa | <b>Relative Humidity:</b> 48 % | <b>Power Supply:</b> 3 V battery |
| <b>Remarks:</b>                                                                             |                               |                                |                                  |

Plot 7.1.1 The 20 dB bandwidth test result at low frequency

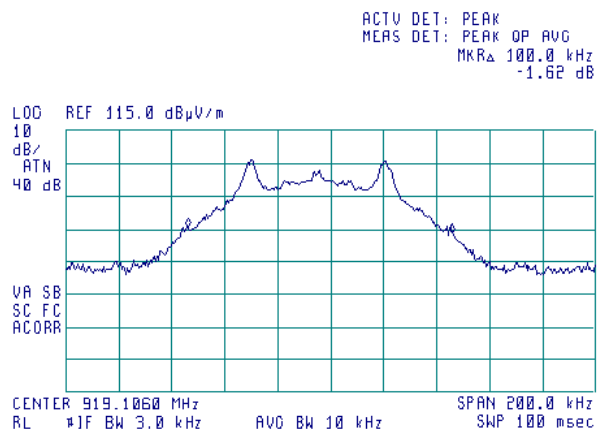
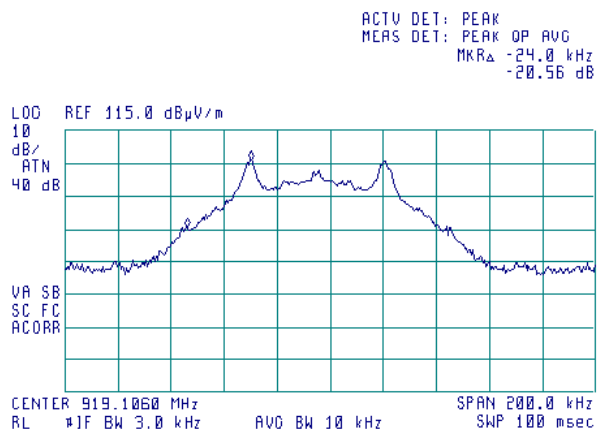


Plot 7.1.2 The 20 dB bandwidth test result at mid frequency



|                            |                               |                                                                         |                                  |
|----------------------------|-------------------------------|-------------------------------------------------------------------------|----------------------------------|
| <b>Test specification:</b> |                               | <b>FCC section 15.247(a)1, RSS-210 section A8.1(a), 20 dB bandwidth</b> |                                  |
| <b>Test procedure:</b>     |                               | Public notice DA 00-705                                                 |                                  |
| <b>Test mode:</b>          |                               | Compliance                                                              | <b>Verdict:</b> PASS             |
| <b>Date:</b>               |                               | 2/6/2011                                                                |                                  |
| <b>Temperature:</b> 22 °C  | <b>Air Pressure:</b> 1022 hPa | <b>Relative Humidity:</b> 48 %                                          | <b>Power Supply:</b> 3 V battery |
| <b>Remarks:</b>            |                               |                                                                         |                                  |

Plot 7.1.3 The 20 dB bandwidth test result at high frequency



|                            |                                                                              |                                |                                  |
|----------------------------|------------------------------------------------------------------------------|--------------------------------|----------------------------------|
| <b>Test specification:</b> | <b>FCC section 15.247(a)1, RSS-210 section A8.1(b), Frequency separation</b> |                                |                                  |
| <b>Test procedure:</b>     | Public notice DA 00-705                                                      |                                |                                  |
| <b>Test mode:</b>          | Compliance                                                                   | <b>Verdict:</b>                | <b>PASS</b>                      |
| <b>Date:</b>               | 2/7/2011                                                                     |                                |                                  |
| <b>Temperature:</b> 24 °C  | <b>Air Pressure:</b> 1014 hPa                                                | <b>Relative Humidity:</b> 47 % | <b>Power Supply:</b> 3 V battery |
| <b>Remarks:</b>            |                                                                              |                                |                                  |

## 7.2 Carrier frequency separation

### 7.2.1 General

This test was performed to measure frequency separation between the peaks of adjacent channels. Specification test limits are given in Table 7.2.1.

**Table 7.2.1 Carrier frequency separation limits**

| Assigned frequency range, MHz | Carrier frequency separation                                           |
|-------------------------------|------------------------------------------------------------------------|
| 902.0 – 928.0                 | 25 kHz or 20 dB bandwidth of the hopping channel, whichever is greater |
| 2400.0 – 2483.5               |                                                                        |
| 5725.0 – 5850.0               |                                                                        |

### 7.2.2 Test procedure

- 7.2.2.1** The EUT was set up as shown in Figure 7.2.1, energized with frequency hopping function enabled and its proper operation was checked.
- 7.2.2.2** The spectrum analyzer span was set to capture the carrier frequency and both of adjacent channels, the lower and the higher. The resolution bandwidth was set wider than 1 % of the frequency span.
- 7.2.2.3** The spectrum analyzer was set in max hold mode and allowed trace to stabilize.
- 7.2.2.4** The frequency separation between the peaks of adjacent channels was measured as provided in Table 7.2.2 and the associated plot.

**Figure 7.2.1 Carrier frequency separation test setup**



|                            |                               |                                                                              |                                  |
|----------------------------|-------------------------------|------------------------------------------------------------------------------|----------------------------------|
| <b>Test specification:</b> |                               | <b>FCC section 15.247(a)1, RSS-210 section A8.1(b), Frequency separation</b> |                                  |
| <b>Test procedure:</b>     |                               | Public notice DA 00-705                                                      |                                  |
| <b>Test mode:</b>          | Compliance                    | <b>Verdict:</b> PASS                                                         |                                  |
| <b>Date:</b>               | 2/7/2011                      |                                                                              |                                  |
| <b>Temperature:</b> 24 °C  | <b>Air Pressure:</b> 1014 hPa | <b>Relative Humidity:</b> 47 %                                               | <b>Power Supply:</b> 3 V battery |
| <b>Remarks:</b>            |                               |                                                                              |                                  |

**Table 7.2.2 Carrier frequency separation test results**

ASSIGNED FREQUENCY BAND: 902-928 MHz  
 MODULATION: GFSK  
 MODULATING SIGNAL: PRBS  
 BIT RATE: 50 kbps  
 DETECTOR USED: Peak  
 RESOLUTION BANDWIDTH:  $\geq 1\%$  of the span  
 VIDEO BANDWIDTH:  $\geq$  RBW  
 FREQUENCY HOPPING: Enabled  
 20 dB BANDWIDTH: 100 kHz

| Carrier frequency separation, kHz | Limit, kHz | Margin* | Verdict |
|-----------------------------------|------------|---------|---------|
| 130                               | 100        | 30      | Pass    |

\* - Margin = Carrier frequency separation – specification limit.

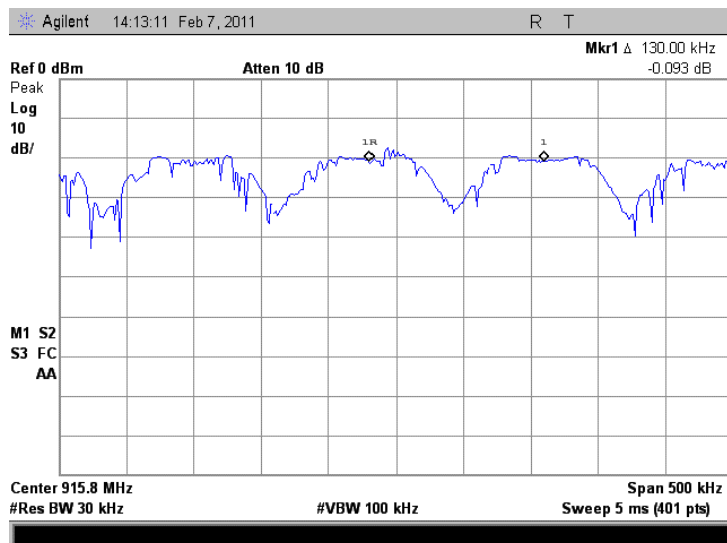
**Reference numbers of test equipment used**

|         |         |         |  |  |  |  |  |
|---------|---------|---------|--|--|--|--|--|
| HL 1984 | HL 2909 | HL 3632 |  |  |  |  |  |
|---------|---------|---------|--|--|--|--|--|

Full description is given in Appendix A.

|                            |                               |                                                                              |                                  |
|----------------------------|-------------------------------|------------------------------------------------------------------------------|----------------------------------|
| <b>Test specification:</b> |                               | <b>FCC section 15.247(a)1, RSS-210 section A8.1(b), Frequency separation</b> |                                  |
| <b>Test procedure:</b>     |                               | Public notice DA 00-705                                                      |                                  |
| <b>Test mode:</b>          |                               | Compliance                                                                   | <b>Verdict:</b> PASS             |
| <b>Date:</b>               |                               | 2/7/2011                                                                     |                                  |
| <b>Temperature:</b> 24 °C  | <b>Air Pressure:</b> 1014 hPa | <b>Relative Humidity:</b> 47 %                                               | <b>Power Supply:</b> 3 V battery |
| <b>Remarks:</b>            |                               |                                                                              |                                  |

Plot 7.2.1 Carrier frequency separation



|                            |                               |                                                                                           |                                  |
|----------------------------|-------------------------------|-------------------------------------------------------------------------------------------|----------------------------------|
| <b>Test specification:</b> |                               | <b>FCC section 15.247(a)1, RSS-210 section A8.1(c),<br/>Number of hopping frequencies</b> |                                  |
| <b>Test procedure:</b>     |                               | Public notice DA 00-705                                                                   |                                  |
| <b>Test mode:</b>          |                               | Compliance                                                                                | <b>Verdict:</b> PASS             |
| <b>Date:</b>               |                               | 2/7/2011                                                                                  |                                  |
| <b>Temperature:</b> 24 °C  | <b>Air Pressure:</b> 1014 hPa | <b>Relative Humidity:</b> 47 %                                                            | <b>Power Supply:</b> 3 V battery |
| <b>Remarks:</b>            |                               |                                                                                           |                                  |

## 7.3 Number of hopping frequencies

### 7.3.1 General

This test was performed to calculate the number of hopping frequencies used by the EUT. Specification test limits are given in Table 7.3.1.

Table 7.3.1 Minimum number of hopping frequencies

| Assigned frequency range, MHz | Number of hopping frequencies                                                                         |
|-------------------------------|-------------------------------------------------------------------------------------------------------|
| 902.0 – 928.0                 | 50 (if the 20 dB bandwidth is less than 250 kHz)<br>25 (if the 20 dB bandwidth is 250 kHz or greater) |
| 2400.0 – 2483.5               | 15                                                                                                    |
| 5725.0 – 5850.0               | 75                                                                                                    |

### 7.3.2 Test procedure

- 7.3.2.1** The EUT was set up as shown in Figure 7.3.1, energized with frequency hopping function enabled and its proper operation was checked.
- 7.3.2.2** Initially the spectrum analyzer span was set equal to frequency band of operation and the resolution bandwidth was set wider than 1 % of the frequency span. If the separate hopping channels were not clearly resolved the frequency band of operation was broken to sections and the resolution bandwidth was set wider than 1 % of the frequency span of each section.
- 7.3.2.3** The spectrum analyzer was set in max hold mode and allowed trace to stabilize.
- 7.3.2.4** The number of frequency hopping channels was calculated as provided in Table 7.3.2 and the associated plots.

Figure 7.3.1 Hopping frequencies test setup



|                            |                               |                                                                                           |                                  |
|----------------------------|-------------------------------|-------------------------------------------------------------------------------------------|----------------------------------|
| <b>Test specification:</b> |                               | <b>FCC section 15.247(a)1, RSS-210 section A8.1(c),<br/>Number of hopping frequencies</b> |                                  |
| <b>Test procedure:</b>     |                               | Public notice DA 00-705                                                                   |                                  |
| <b>Test mode:</b>          |                               | Compliance                                                                                | <b>Verdict:</b> PASS             |
| <b>Date:</b>               |                               | 2/7/2011                                                                                  |                                  |
| <b>Temperature:</b> 24 °C  | <b>Air Pressure:</b> 1014 hPa | <b>Relative Humidity:</b> 47 %                                                            | <b>Power Supply:</b> 3 V battery |
| <b>Remarks:</b>            |                               |                                                                                           |                                  |

**Table 7.3.2 Hopping frequencies test results**

ASSIGNED FREQUENCY BAND: 902-928 MHz  
 MODULATION: GFSK  
 BIT RATE: 50 kbps  
 DETECTOR USED: Peak  
 RESOLUTION BANDWIDTH:  $\geq 1\%$  of the span  
 VIDEO BANDWIDTH:  $\geq$  RBW  
 FREQUENCY HOPPING: Enabled

| Number of hopping frequencies | Minimum number of hopping frequencies | Margin* | Verdict |
|-------------------------------|---------------------------------------|---------|---------|
| 50                            | 50                                    | 0       | Pass    |

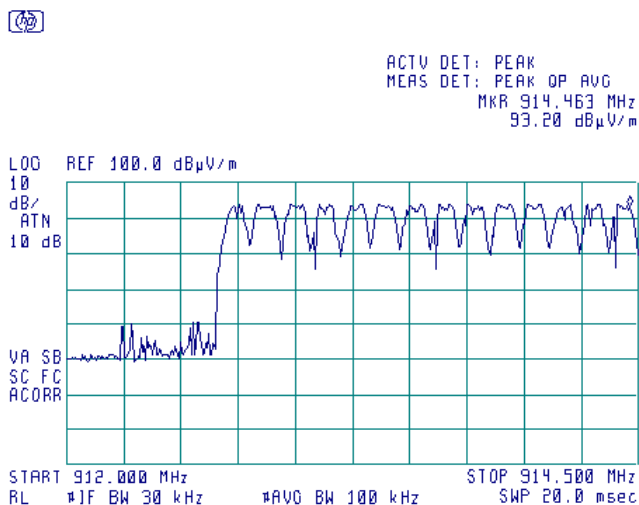
\* - Margin = Number of hopping frequencies – Minimum number of hopping frequencies.

**Reference numbers of test equipment used**

|         |         |         |         |  |  |  |  |
|---------|---------|---------|---------|--|--|--|--|
| HL 2909 | HL 2883 | HL 3386 | HL 1984 |  |  |  |  |
|---------|---------|---------|---------|--|--|--|--|

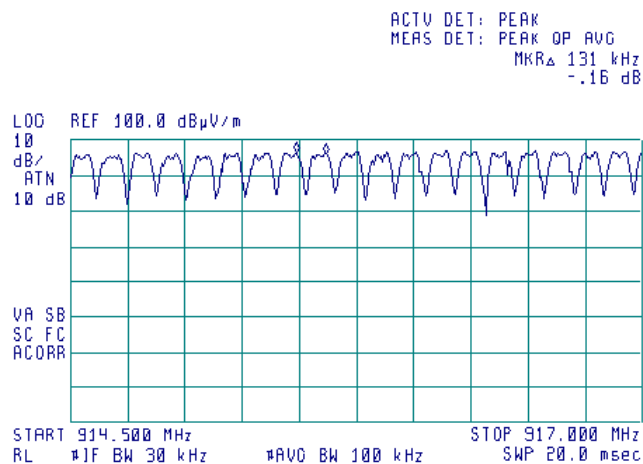
Full description is given in Appendix A.

**Plot 7.3.1 Number of hopping frequencies in the frequency range 912 –914.5 MHz (fourteen)**

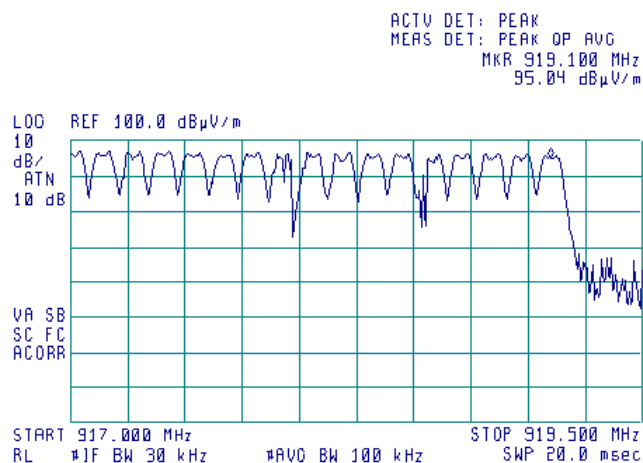


|                     |                                                                                   |                         |                           |
|---------------------|-----------------------------------------------------------------------------------|-------------------------|---------------------------|
| Test specification: | FCC section 15.247(a)1, RSS-210 section A8.1(c),<br>Number of hopping frequencies |                         |                           |
| Test procedure:     | Public notice DA 00-705                                                           |                         |                           |
| Test mode:          | Compliance                                                                        | Verdict: PASS           |                           |
| Date:               | 2/7/2011                                                                          |                         |                           |
| Temperature: 24 °C  | Air Pressure: 1014 hPa                                                            | Relative Humidity: 47 % | Power Supply: 3 V battery |
| Remarks:            |                                                                                   |                         |                           |

Plot 7.3.2 Number of hopping frequencies in the frequency range 914.5 –917.0 MHz (nineteen)



Plot 7.3.3 Number of hopping frequencies in the frequency range 917 –919.5 MHz (seventeen)



|                     |                                                                               |                         |                           |
|---------------------|-------------------------------------------------------------------------------|-------------------------|---------------------------|
| Test specification: | FCC section 15.247(a)1, RSS-210 section A8.1(c),<br>Average time of occupancy |                         |                           |
| Test procedure:     | Public notice DA 00-705                                                       |                         |                           |
| Test mode:          | Compliance                                                                    | Verdict: PASS           |                           |
| Date:               | 2/6/2011                                                                      |                         |                           |
| Temperature: 22 °C  | Air Pressure: 1022 hPa                                                        | Relative Humidity: 48 % | Power Supply: 3 V battery |
| Remarks:            |                                                                               |                         |                           |

## 7.4 Average time of occupancy

### 7.4.1 General

This test was performed to calculate the average time of occupancy (dwell time) on any frequency channel of the EUT. Specification test limits are given in Table 7.4.1.

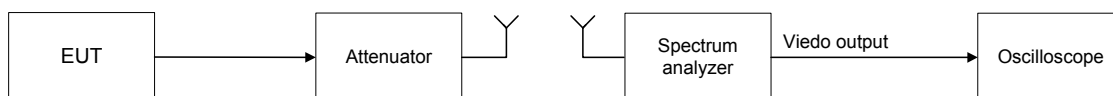
Table 7.4.1 Average time of occupancy limits

| Assigned frequency range, MHz | Maximum average time of occupancy, s | Investigated period, s | Number of hopping frequencies |
|-------------------------------|--------------------------------------|------------------------|-------------------------------|
| 902.0 – 928.0                 | 0.4                                  | 20.0                   | $\geq 50$                     |
| 902.0 – 928.0                 | 0.4                                  | 10.0                   | $< 50$                        |
| 2400.0 – 2483.5               | 0.4                                  | $0.4 \times N$         | $N (\geq 15)$                 |
| 5725.0 – 5850.0               | 0.4                                  | 30.0                   | $\geq 75$                     |

### 7.4.2 Test procedure

- 7.4.2.1 The EUT was set up as shown in Figure 7.4.1, energized with frequency hopping function enabled and its proper operation was checked.
- 7.4.2.2 The spectrum analyzer span was set to zero centered on a hopping channel.
- 7.4.2.3 The single transmission duration and period were measured with oscilloscope.
- 7.4.2.4 The average time of occupancy was calculated as the single transmission time multiplied by the investigated period and divided by the single transmission period.
- 7.4.2.5 The test results provided in Table 7.4.2 and the associated plots.

Figure 7.4.1 Average time of occupancy test setup



|                            |  |                                                                                       |                                |
|----------------------------|--|---------------------------------------------------------------------------------------|--------------------------------|
| <b>Test specification:</b> |  | <b>FCC section 15.247(a)1, RSS-210 section A8.1(c),<br/>Average time of occupancy</b> |                                |
| <b>Test procedure:</b>     |  | Public notice DA 00-705                                                               |                                |
| <b>Test mode:</b>          |  | <b>Verdict:</b>                                                                       |                                |
| <b>Date:</b>               |  | PASS                                                                                  |                                |
| <b>Temperature:</b> 22 °C  |  | <b>Air Pressure:</b> 1022 hPa                                                         | <b>Relative Humidity:</b> 48 % |
| <b>Remarks:</b>            |  | <b>Power Supply:</b> 3 V battery                                                      |                                |

**Table 7.4.2 Average time of occupancy test results**

ASSIGNED FREQUENCY BAND: 902-928 MHz  
 MODULATION: GFSK  
 MODULATING SIGNAL: PRBS  
 DETECTOR USED: Peak  
 RESOLUTION BANDWIDTH: 3 MHz  
 VIDEO BANDWIDTH: 3 MHz  
 NUMBER OF HOPPING FREQUENCIES: 50  
 INVESTIGATED PERIOD: 20 s  
 FREQUENCY HOPPING: Enabled

| Carrier frequency,<br>MHz | Single transmission<br>duration, s | Single transmission<br>period, s | Average time of<br>occupancy*, s | Bit rate,<br>kbps | Limit,<br>s | Margin,<br>s** | Verdict |
|---------------------------|------------------------------------|----------------------------------|----------------------------------|-------------------|-------------|----------------|---------|
| 915.863                   | 4.975                              | 2                                | 0.04975                          | 50                | 0.4         | -0.35          | Pass    |

\* - Average time of occupancy = (Single transmission duration × Investigated period) / Single transmission period.

\*\* - Margin = Average time of occupancy – specification limit.

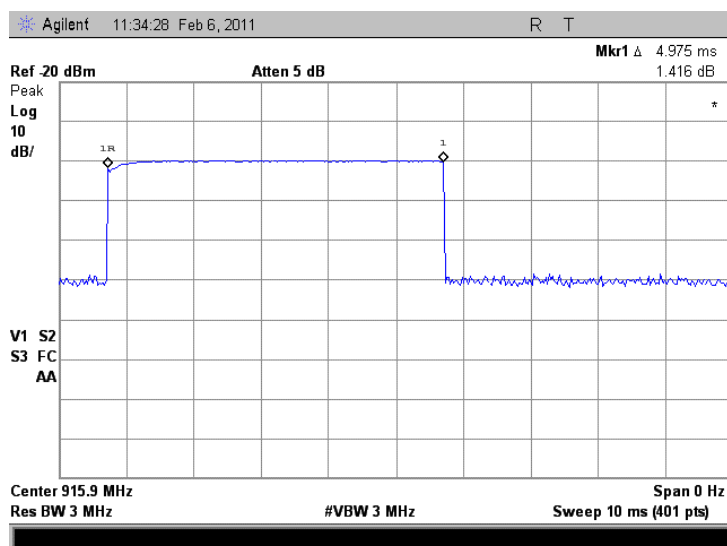
**Reference numbers of test equipment used**

|         |         |         |  |  |  |  |  |
|---------|---------|---------|--|--|--|--|--|
| HL 1984 | HL 3001 | HL 3632 |  |  |  |  |  |
|---------|---------|---------|--|--|--|--|--|

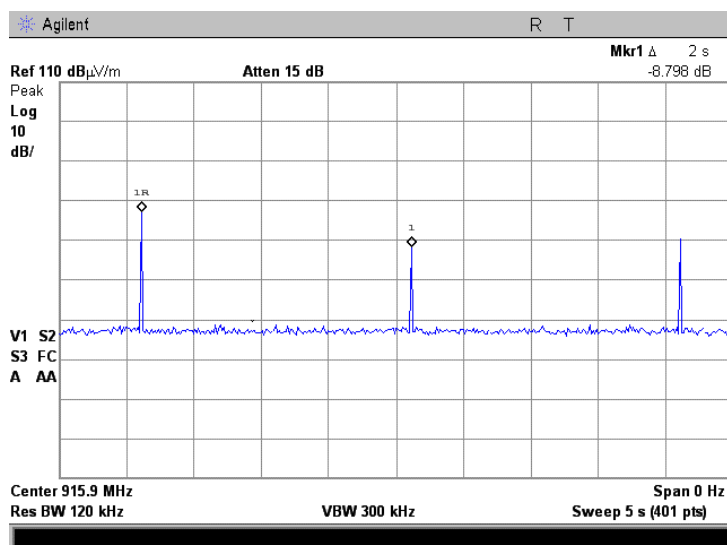
Full description is given in Appendix A.

|                            |                               |                                                                                       |                                  |
|----------------------------|-------------------------------|---------------------------------------------------------------------------------------|----------------------------------|
| <b>Test specification:</b> |                               | <b>FCC section 15.247(a)1, RSS-210 section A8.1(c),<br/>Average time of occupancy</b> |                                  |
| <b>Test procedure:</b>     |                               | Public notice DA 00-705                                                               |                                  |
| <b>Test mode:</b>          |                               | Compliance                                                                            | <b>Verdict:</b> PASS             |
| <b>Date:</b>               |                               | 2/6/2011                                                                              |                                  |
| <b>Temperature:</b> 22 °C  | <b>Air Pressure:</b> 1022 hPa | <b>Relative Humidity:</b> 48 %                                                        | <b>Power Supply:</b> 3 V battery |
| <b>Remarks:</b>            |                               |                                                                                       |                                  |

Plot 7.4.1 Single transmission duration



Plot 7.4.2 Single transmission period



|                            |                                                                          |                                |                                  |
|----------------------------|--------------------------------------------------------------------------|--------------------------------|----------------------------------|
| <b>Test specification:</b> | <b>FCC section 15.247(b), RSS-210 section A8.4(1), Peak output power</b> |                                |                                  |
| <b>Test procedure:</b>     | Public notice DA 00-705                                                  |                                |                                  |
| <b>Test mode:</b>          | Compliance                                                               | <b>Verdict:</b>                | <b>PASS</b>                      |
| <b>Date:</b>               | 2/6/2011                                                                 |                                |                                  |
| <b>Temperature:</b> 22 °C  | <b>Air Pressure:</b> 1022 hPa                                            | <b>Relative Humidity:</b> 48 % | <b>Power Supply:</b> 3 V battery |
| <b>Remarks:</b>            |                                                                          |                                |                                  |

## 7.5 Peak output power

### 7.5.1 General

This test was performed to measure the maximum peak output power radiated by transmitter. Specification test limits are given in Table 7.5.1.

**Table 7.5.1 Peak output power limits**

| Assigned frequency range, MHz | Peak output power*           |                             | Equivalent field strength limit @ 3m, dB(μV/m)* | Maximum antenna gain, dBi |
|-------------------------------|------------------------------|-----------------------------|-------------------------------------------------|---------------------------|
|                               | W                            | dBm                         |                                                 |                           |
| 902.0 – 928.0                 | 1.0                          | 30.0                        | 131.2                                           | 6.0*                      |
| 2400.0 – 2483.5               | 0.125 (<75 hopping channels) | 21.0(<75 hopping channels)  | 122.2 (<75 hopping channels)                    |                           |
|                               | 1.0 (≥75 hopping channels)   | 30.0 (≥75 hopping channels) | 131.2 (≥75 hopping channels)                    |                           |
| 5725.0 – 5850.0               | 1.0                          | 30.0                        | 131.2                                           |                           |

\*- Equivalent field strength limit was calculated from the peak output power as follows:  $E = \sqrt{30 \times P \times G} / r$ , where P is peak output power in Watts, r is antenna to EUT distance in meters and G is transmitter antenna gain in dBi.

\*\* - The limit is provided in terms of conducted RF power at the antenna connector. If transmitting antennas of directional gain greater than 6 dBi are used, the peak output power limit shall be reduced below the stated value as follows:

- by 1 dB for every 3 dB that the directional gain of antenna exceeds 6 dBi for fixed point-to-point transmitters operate in 2400-2483.5 MHz band;
- without any corresponding reduction for fixed point-to-point transmitters operate in 5725-5850 MHz band;
- by the amount in dB that the directional gain of antenna exceeds 6 dBi for the rest of transmitters.

### 7.5.2 Test procedure

**7.5.2.1** The EUT was set up as shown in Figure 7.5.1, energized and its proper operation was checked. The EUT was tested in 3 orthogonal positions.

**7.5.2.2** The EUT was adjusted to produce maximum available to end user RF output power.

**7.5.2.3** The frequency span of spectrum analyzer was set approximately 5 times wider than 20 dB bandwidth of the EUT and the resolution bandwidth was set wider than 20 dB bandwidth of the EUT. To find maximum radiation the turntable was rotated 360° and the measuring antenna height was swept in both vertical and horizontal polarizations.

**7.5.2.4** The maximum field strength of the EUT carrier frequency was measured as provided in Table 7.5.2 and associated plots.

**7.5.2.5** The maximum peak output power was calculated from the field strength of carrier as follows:

$$P = (E \times d)^2 / (30 \times G),$$

where P is the peak output power in W, E is the field strength in V/m, d is the test distance and G is the transmitter numeric antenna gain over an isotropic radiator.

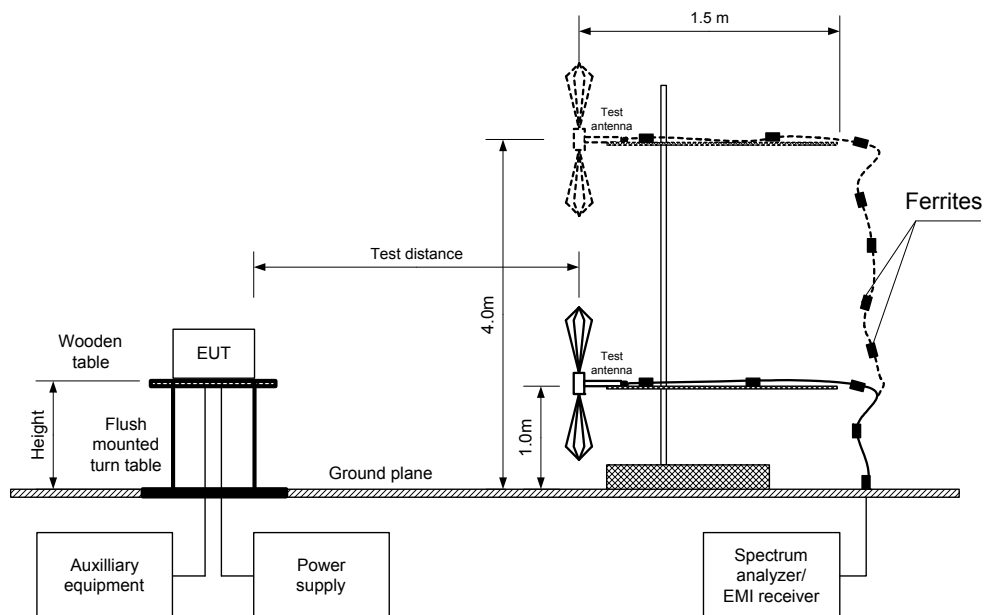
The above equation was converted in logarithmic units for 3 m test distance:

$$\text{Peak output power in dBm} = \text{Field strength in dB}(\mu\text{V/m}) - \text{Transmitter antenna gain in dBi} - 95.2 \text{ dB}$$

**7.5.2.6** The worst test results (the lowest margins) were recorded in Table 7.5.1.

|                            |                               |                                                                          |                                  |
|----------------------------|-------------------------------|--------------------------------------------------------------------------|----------------------------------|
| <b>Test specification:</b> |                               | <b>FCC section 15.247(b), RSS-210 section A8.4(1), Peak output power</b> |                                  |
| <b>Test procedure:</b>     |                               | Public notice DA 00-705                                                  |                                  |
| <b>Test mode:</b>          | Compliance                    | <b>Verdict:</b>                                                          | <b>PASS</b>                      |
| <b>Date:</b>               | 2/6/2011                      |                                                                          |                                  |
| <b>Temperature:</b> 22 °C  | <b>Air Pressure:</b> 1022 hPa | <b>Relative Humidity:</b> 48 %                                           | <b>Power Supply:</b> 3 V battery |
| <b>Remarks:</b>            |                               |                                                                          |                                  |

Figure 7.5.1 Setup for carrier field strength measurements



|                            |                               |                                                                          |                                  |
|----------------------------|-------------------------------|--------------------------------------------------------------------------|----------------------------------|
| <b>Test specification:</b> |                               | <b>FCC section 15.247(b), RSS-210 section A8.4(1), Peak output power</b> |                                  |
| <b>Test procedure:</b>     |                               | Public notice DA 00-705                                                  |                                  |
| <b>Test mode:</b>          | Compliance                    | <b>Verdict:</b>                                                          | <b>PASS</b>                      |
| <b>Date:</b>               | 2/6/2011                      |                                                                          |                                  |
| <b>Temperature:</b> 22 °C  | <b>Air Pressure:</b> 1022 hPa | <b>Relative Humidity:</b> 48 %                                           | <b>Power Supply:</b> 3 V battery |
| <b>Remarks:</b>            |                               |                                                                          |                                  |

Table 7.5.2 Peak output power test results

ASSIGNED FREQUENCY BAND: 902 – 928 MHz  
 TEST DISTANCE: 3 m  
 TEST SITE: OATS  
 EUT HEIGHT: 0.8 m  
 DETECTOR USED: Peak  
 TEST ANTENNA TYPE: Biconilog (30 MHz – 1000 MHz)  
 Double ridged guide (above 1000 MHz)  
 MODULATION: GFSK  
 BIT RATE: 50 kbps  
 TRANSMITTER OUTPUT POWER SETTINGS: Maximum  
 DETECTOR USED: Peak  
 EUT 20 dB BANDWIDTH: 100.0 kHz  
 RESOLUTION BANDWIDTH: 120 kHz  
 VIDEO BANDWIDTH: 300 kHz  
 FREQUENCY HOPPING: Disabled  
 NUMBER OF FREQUENCY HOPPING CHANNELS: 50

| Frequency, MHz | Field strength, dB(μV/m) | Antenna polarization | Antenna height, m | Azimuth, degrees* | EUT antenna gain, dBi | Peak output power, dBm** | Limit, dBm | Margin, dB*** | Verdict |
|----------------|--------------------------|----------------------|-------------------|-------------------|-----------------------|--------------------------|------------|---------------|---------|
| 912.750        | 108.1                    | H                    | 1.00              | 5                 | -8.0                  | 20.8                     | 30.0       | -9.2          | Pass    |
| 915.863        | 111.7                    | H                    | 1.00              | 5                 | -8.0                  | 24.5                     | 30.0       | -5.5          | Pass    |
| 919.106        | 107.0                    | H                    | 1.00              | 5                 | -8.0                  | 19.8                     | 30.0       | -10.3         | Pass    |

Maximum peak output power was obtained in the EUT Y-axis orthogonal position.

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

\*\* - Peak output power was calculated from the field strength of carrier as follows:  $P = (E \times d)^2 / (30 \times G)$ , where P is the peak output power in W, E is the field strength in V/m, d is the test distance in meters and G is the transmitter numeric antenna gain over an isotropic radiator. The above equation was converted in logarithmic units for 3 m test distance: *Peak output power in dBm = Field strength in dB(μV/m) - Transmitter antenna gain in dBi - 95.2 dB*

\*\*\* - Margin = Peak output power – specification limit.

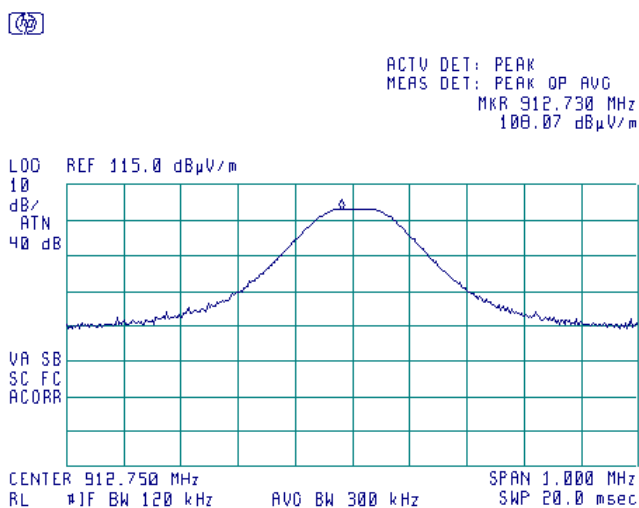
#### Reference numbers of test equipment used

|         |         |         |         |         |         |  |  |
|---------|---------|---------|---------|---------|---------|--|--|
| HL 0034 | HL 0415 | HL 0593 | HL 0594 | HL 0812 | HL 1425 |  |  |
|---------|---------|---------|---------|---------|---------|--|--|

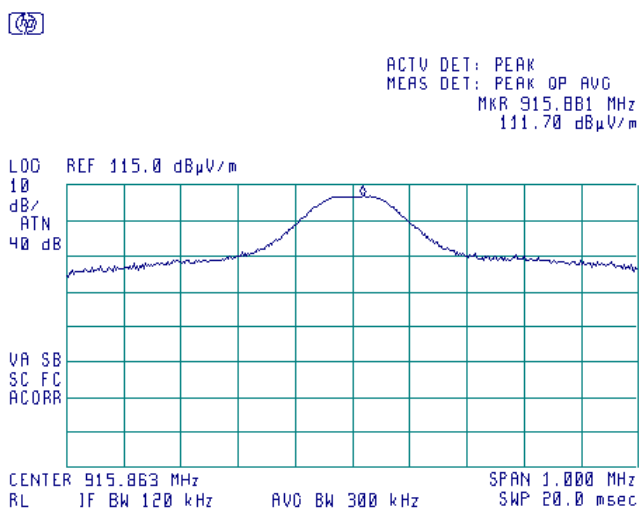
Full description is given in Appendix A.

|                            |                                                                          |                                |                                  |
|----------------------------|--------------------------------------------------------------------------|--------------------------------|----------------------------------|
| <b>Test specification:</b> | <b>FCC section 15.247(b), RSS-210 section A8.4(1), Peak output power</b> |                                |                                  |
| <b>Test procedure:</b>     | Public notice DA 00-705                                                  |                                |                                  |
| <b>Test mode:</b>          | Compliance                                                               | <b>Verdict:</b>                | <b>PASS</b>                      |
| <b>Date:</b>               | 2/6/2011                                                                 |                                |                                  |
| <b>Temperature:</b> 22 °C  | <b>Air Pressure:</b> 1022 hPa                                            | <b>Relative Humidity:</b> 48 % | <b>Power Supply:</b> 3 V battery |
| <b>Remarks:</b>            |                                                                          |                                |                                  |

Plot 7.5.1 Field strength of carrier at low frequency

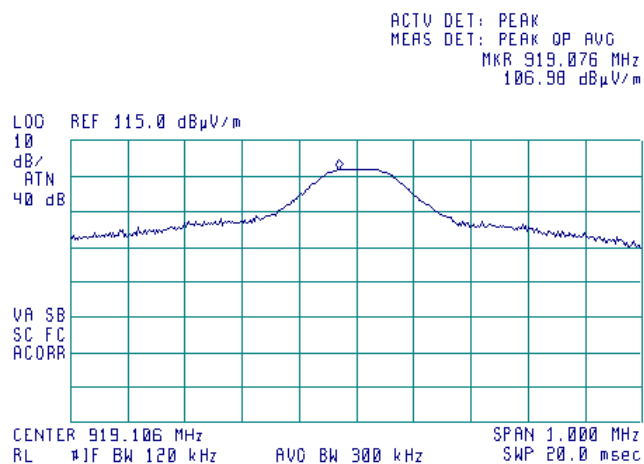


Plot 7.5.2 Field strength of carrier at mid frequency



|                            |                               |                                                                          |                                  |
|----------------------------|-------------------------------|--------------------------------------------------------------------------|----------------------------------|
| <b>Test specification:</b> |                               | <b>FCC section 15.247(b), RSS-210 section A8.4(1), Peak output power</b> |                                  |
| <b>Test procedure:</b>     |                               | Public notice DA 00-705                                                  |                                  |
| <b>Test mode:</b>          |                               | Compliance                                                               | <b>Verdict:</b> PASS             |
| <b>Date:</b>               |                               | 2/6/2011                                                                 |                                  |
| <b>Temperature:</b> 22 °C  | <b>Air Pressure:</b> 1022 hPa | <b>Relative Humidity:</b> 48 %                                           | <b>Power Supply:</b> 3 V battery |
| <b>Remarks:</b>            |                               |                                                                          |                                  |

Plot 7.5.3 Field strength of carrier at high frequency



|                     |                                                                      |                         |                           |
|---------------------|----------------------------------------------------------------------|-------------------------|---------------------------|
| Test specification: | FCC section 15.247(d), RSS-210 section A8.5, Emissions at band edges |                         |                           |
| Test procedure:     | Public notice DA 00-705                                              |                         |                           |
| Test mode:          | Compliance                                                           | Verdict: PASS           |                           |
| Date:               | 2/6/2011                                                             |                         |                           |
| Temperature: 22 °C  | Air Pressure: 1022 hPa                                               | Relative Humidity: 48 % | Power Supply: 3 V battery |
| Remarks:            |                                                                      |                         |                           |

## 7.6 Band edge radiated emissions

### 7.6.1 General

This test was performed to measure emissions, radiated from the EUT at the assigned frequency band edges. Specification test limits are given in Table 7.6.1.

Table 7.6.1 Band edge emission limits

| Assigned frequency, MHz | Attenuation below carrier*, dBc | Field strength at 3 m within restricted bands, dB(μV/m) |         |
|-------------------------|---------------------------------|---------------------------------------------------------|---------|
|                         |                                 | Peak                                                    | Average |
| 902.0 – 928.0           | 20.0                            | 74.0                                                    | 54.0    |
| 2400.0 – 2483.5         |                                 |                                                         |         |
| 5725.0 – 5850.0         |                                 |                                                         |         |

\* - Band edge emission limit is provided in terms of attenuation below the peak of modulated carrier measured with the same resolution bandwidth.

### 7.6.2 Test procedure

- 7.6.2.1 The EUT was set up as shown in Figure 7.6.1, energized normally modulated at the maximum data rate with its hopping function disabled and its proper operation was checked.
- 7.6.2.2 The EUT was adjusted to produce maximum available to end user RF output power at the lowest carrier frequency.
- 7.6.2.3 The spectrum analyzer span was set to capture the carrier frequency and associated modulation products. The resolution bandwidth was set wider than 1 % of the frequency span.
- 7.6.2.4 The spectrum analyzer was set in max hold mode and allowed trace to stabilize. The highest emission level within the authorized band was measured.
- 7.6.2.5 The maximum band edge emission and modulation product outside of the band were measured as provided in Table 7.6.2 and associated plots and referenced to the highest emission level measured within the authorized band.
- 7.6.2.6 The above procedure was repeated with the EUT adjusted to produce maximum RF output power at the highest carrier frequency.
- 7.6.2.7 The above procedure was repeated with the frequency hopping function enabled.

Figure 7.6.1 Band edge emission test setup



|                            |                                                                             |                                |                                  |
|----------------------------|-----------------------------------------------------------------------------|--------------------------------|----------------------------------|
| <b>Test specification:</b> | <b>FCC section 15.247(d), RSS-210 section A8.5, Emissions at band edges</b> |                                |                                  |
| <b>Test procedure:</b>     | Public notice DA 00-705                                                     |                                |                                  |
| <b>Test mode:</b>          | Compliance                                                                  | <b>Verdict:</b>                | <b>PASS</b>                      |
| <b>Date:</b>               | 2/6/2011                                                                    |                                |                                  |
| <b>Temperature:</b> 22 °C  | <b>Air Pressure:</b> 1022 hPa                                               | <b>Relative Humidity:</b> 48 % | <b>Power Supply:</b> 3 V battery |
| <b>Remarks:</b>            |                                                                             |                                |                                  |

**Table 7.6.2 Band edge emission test results**

ASSIGNED FREQUENCY BAND: 902 – 928 MHz  
 DETECTOR USED: Peak  
 MODULATION: GFSK  
 MODULATING SIGNAL: PRBS  
 BIT RATE: 50 kbps  
 TRANSMITTER OUTPUT POWER SETTINGS: Maximum  
 TRANSMITTER OUTPUT POWER: 108.1 dBm at low carrier frequency  
 107.0 dBm at high carrier frequency  
 RESOLUTION BANDWIDTH:  $\geq 1\%$  of the span  
 VIDEO BANDWIDTH:  $\geq$  RBW

| Frequency, MHz             | Band edge emission, dBm | Emission at carrier, dBuV/m | Attenuation below carrier, dBc | Limit, dBc | Margin, dB* | Verdict |
|----------------------------|-------------------------|-----------------------------|--------------------------------|------------|-------------|---------|
| Frequency hopping disabled |                         |                             |                                |            |             |         |
| 902.000                    | 78.7                    | 108.1                       | 29.4                           | 20.0       | 9.4         | Pass    |
| 928.000                    | 80.3                    | 107.0                       | 26.7                           |            | 6.7         |         |
| Frequency hopping enabled  |                         |                             |                                |            |             |         |
| 902.000                    | 54.59                   | 108.1                       | 53.51                          | 20.0       | 33.51       | Pass    |
| 928.000                    | 49.41                   | 107.0                       | 57.59                          |            | 37.59       |         |

\*- Margin = Attenuation below carrier – specification limit.

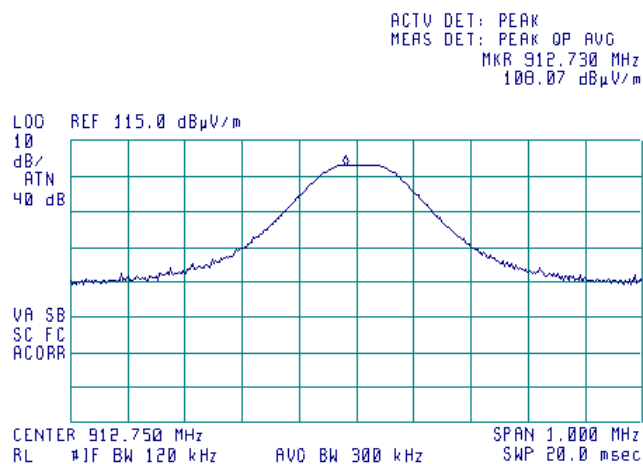
**Reference numbers of test equipment used**

|         |         |         |         |         |         |  |  |
|---------|---------|---------|---------|---------|---------|--|--|
| HL 0034 | HL 0415 | HL 0593 | HL 0594 | HL 0812 | HL 1425 |  |  |
|---------|---------|---------|---------|---------|---------|--|--|

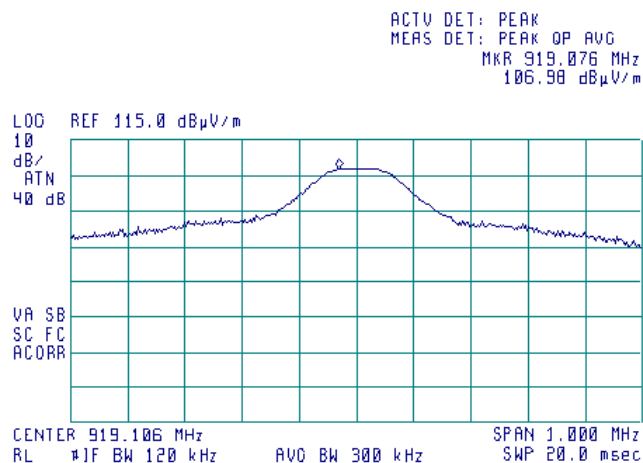
Full description is given in Appendix A.

|                                                                                                 |                               |                                |                                  |
|-------------------------------------------------------------------------------------------------|-------------------------------|--------------------------------|----------------------------------|
| <b>Test specification:</b> FCC section 15.247(d), RSS-210 section A8.5, Emissions at band edges |                               |                                |                                  |
| <b>Test procedure:</b> Public notice DA 00-705                                                  |                               |                                |                                  |
| <b>Test mode:</b> Compliance                                                                    | <b>Verdict:</b> PASS          |                                |                                  |
| <b>Date:</b> 2/6/2011                                                                           |                               |                                |                                  |
| <b>Temperature:</b> 22 °C                                                                       | <b>Air Pressure:</b> 1022 hPa | <b>Relative Humidity:</b> 48 % | <b>Power Supply:</b> 3 V battery |
| <b>Remarks:</b>                                                                                 |                               |                                |                                  |

Plot 7.6.1 The highest emission level within the assigned band at low carrier frequency

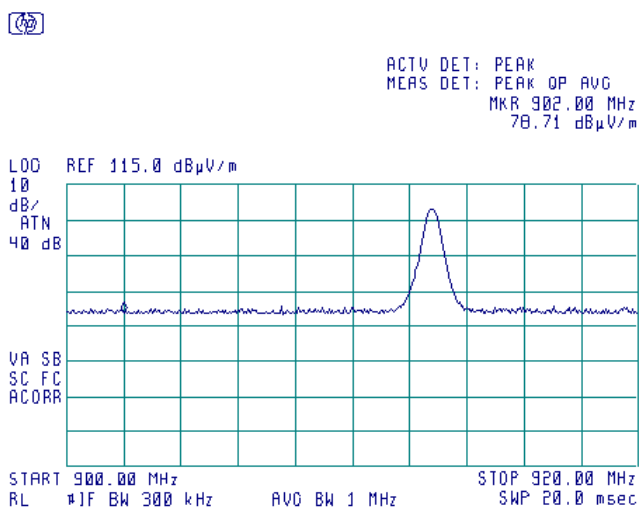


Plot 7.6.2 The highest emission level within the assigned band at high carrier frequency

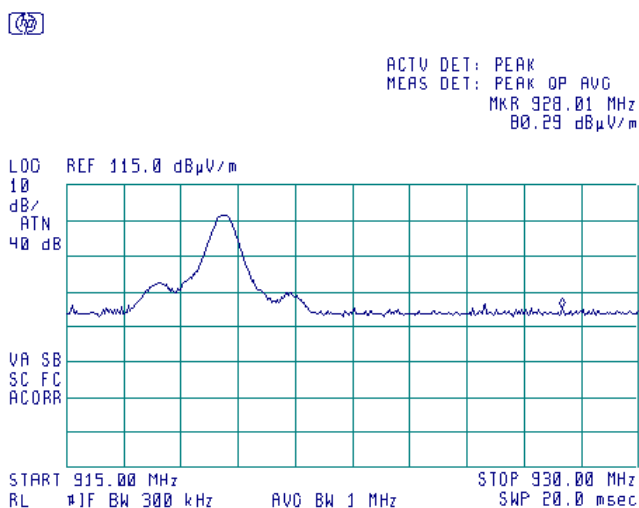


|                                                                                                 |                               |                                |                                  |
|-------------------------------------------------------------------------------------------------|-------------------------------|--------------------------------|----------------------------------|
| <b>Test specification:</b> FCC section 15.247(d), RSS-210 section A8.5, Emissions at band edges |                               |                                |                                  |
| <b>Test procedure:</b> Public notice DA 00-705                                                  |                               |                                |                                  |
| <b>Test mode:</b> Compliance                                                                    |                               | <b>Verdict:</b> PASS           |                                  |
| <b>Date:</b> 2/6/2011                                                                           |                               |                                |                                  |
| <b>Temperature:</b> 22 °C                                                                       | <b>Air Pressure:</b> 1022 hPa | <b>Relative Humidity:</b> 48 % | <b>Power Supply:</b> 3 V battery |
| <b>Remarks:</b>                                                                                 |                               |                                |                                  |

Plot 7.6.3 The highest band edge emission at low carrier frequency with hopping function disabled

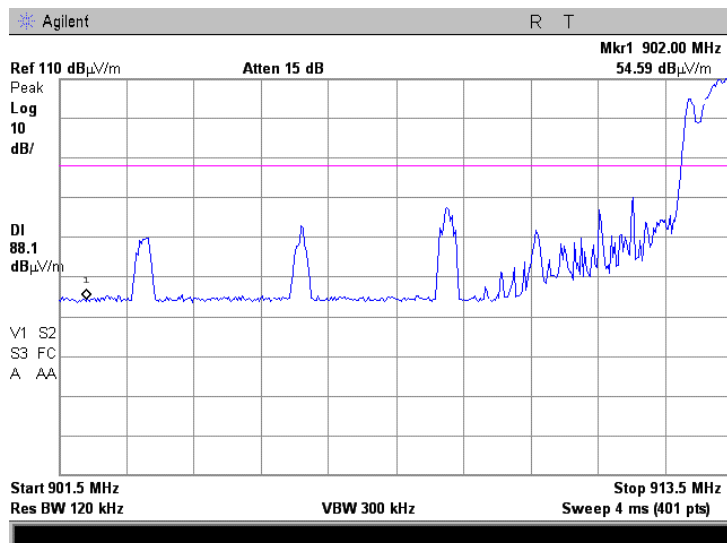


Plot 7.6.4 The highest band edge emission at high carrier frequency with hopping function disabled

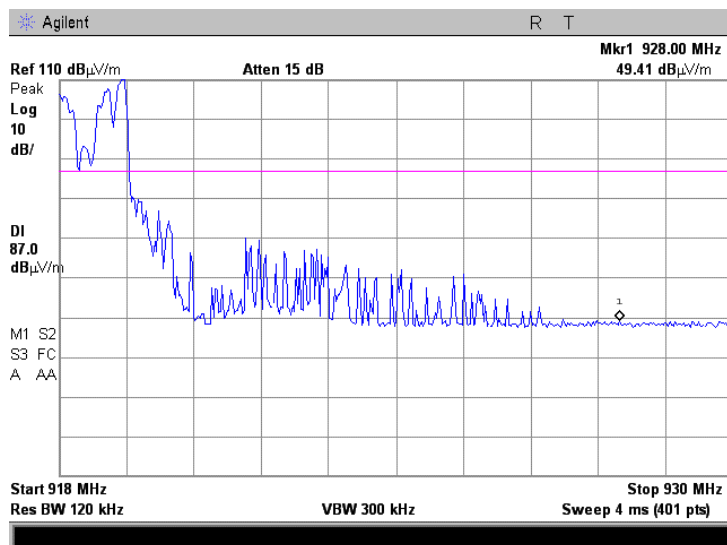


|                     |                                                                      |                         |                           |
|---------------------|----------------------------------------------------------------------|-------------------------|---------------------------|
| Test specification: | FCC section 15.247(d), RSS-210 section A8.5, Emissions at band edges |                         |                           |
| Test procedure:     | Public notice DA 00-705                                              |                         |                           |
| Test mode:          | Compliance                                                           | Verdict: PASS           |                           |
| Date:               | 2/6/2011                                                             |                         |                           |
| Temperature: 22 °C  | Air Pressure: 1022 hPa                                               | Relative Humidity: 48 % | Power Supply: 3 V battery |
| Remarks:            |                                                                      |                         |                           |

Plot 7.6.5 The highest band edge emission at low carrier frequency with hopping function enabled



Plot 7.6.6 The highest band edge emission at high carrier frequency with hopping function enabled



|                            |                                                                                 |                                |                                  |
|----------------------------|---------------------------------------------------------------------------------|--------------------------------|----------------------------------|
| <b>Test specification:</b> | <b>FCC section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions</b> |                                |                                  |
| <b>Test procedure:</b>     | Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4 |                                |                                  |
| <b>Test mode:</b>          | Compliance                                                                      | <b>Verdict:</b>                | <b>PASS</b>                      |
| <b>Date:</b>               | 2/2/2011 - 2/7/2011                                                             |                                |                                  |
| <b>Temperature:</b> 22 °C  | <b>Air Pressure:</b> 1015 hPa                                                   | <b>Relative Humidity:</b> 50 % | <b>Power Supply:</b> 3 V battery |
| <b>Remarks:</b>            |                                                                                 |                                |                                  |

## 7.7 Field strength of spurious emissions

### 7.7.1 General

This test was performed to measure field strength of spurious emissions from the EUT. Specification test limits are given in Table 7.7.1.

Table 7.7.1 Radiated spurious emissions limits

| Frequency, MHz                   | Field strength at 3 m within restricted bands, dB(μV/m)*** |                 |                 | Attenuation of field strength of spurious versus carrier outside restricted bands, dBc*** |
|----------------------------------|------------------------------------------------------------|-----------------|-----------------|-------------------------------------------------------------------------------------------|
|                                  | Peak                                                       | Quasi Peak      | Average         |                                                                                           |
| 0.009 – 0.090                    | 148.5 – 128.5                                              | NA              | 128.5 – 108.5** | 20.0                                                                                      |
| 0.090 – 0.110                    | NA                                                         | 108.5 – 106.8** | NA              |                                                                                           |
| 0.110 – 0.490                    | 126.8 – 113.8                                              | NA              | 106.8 – 93.8**  |                                                                                           |
| 0.490 – 1.705                    | NA                                                         | 73.8 – 63.0**   | NA              |                                                                                           |
| 1.705 – 30.0*                    |                                                            | 69.5            |                 |                                                                                           |
| 30 – 88                          |                                                            | 40.0            |                 |                                                                                           |
| 88 – 216                         |                                                            | 43.5            |                 |                                                                                           |
| 216 – 960                        |                                                            | 46.0            |                 |                                                                                           |
| 960 - 1000                       |                                                            | 54.0            |                 |                                                                                           |
| 1000 – 10 <sup>th</sup> harmonic | 74.0                                                       | NA              | 54.0            |                                                                                           |

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

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

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

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

\*\*\* - The field strength limits applied from the lowest radio frequency generated in the device, without going below 9 kHz up to the tenth harmonic of the highest fundamental frequency.

### 7.7.2 Test procedure for spurious emission field strength measurements in 9 kHz to 30 MHz band

**7.7.2.1** The EUT was set up as shown in Figure 7.7.1, energized and the performance check was conducted.

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

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

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

**7.7.3.1** The EUT was set up as shown in Figure 7.7.2, energized and the performance check was conducted.

**7.7.3.2** The specified frequency range was investigated with antenna connected to spectrum analyzer/ EMI receiver. To find maximum radiation the turntable was rotated 360°, the measuring antenna height was changed from 1 to 4 m, its polarization was switched from vertical to horizontal.

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

|                            |                                                                                 |                                |                                  |
|----------------------------|---------------------------------------------------------------------------------|--------------------------------|----------------------------------|
| <b>Test specification:</b> | <b>FCC section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions</b> |                                |                                  |
| <b>Test procedure:</b>     | Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4 |                                |                                  |
| <b>Test mode:</b>          | Compliance                                                                      | <b>Verdict:</b>                | <b>PASS</b>                      |
| <b>Date:</b>               | 2/2/2011 - 2/7/2011                                                             |                                |                                  |
| <b>Temperature:</b> 22 °C  | <b>Air Pressure:</b> 1015 hPa                                                   | <b>Relative Humidity:</b> 50 % | <b>Power Supply:</b> 3 V battery |
| <b>Remarks:</b>            |                                                                                 |                                |                                  |

Figure 7.7.1 Setup for spurious emission field strength measurements below 30 MHz

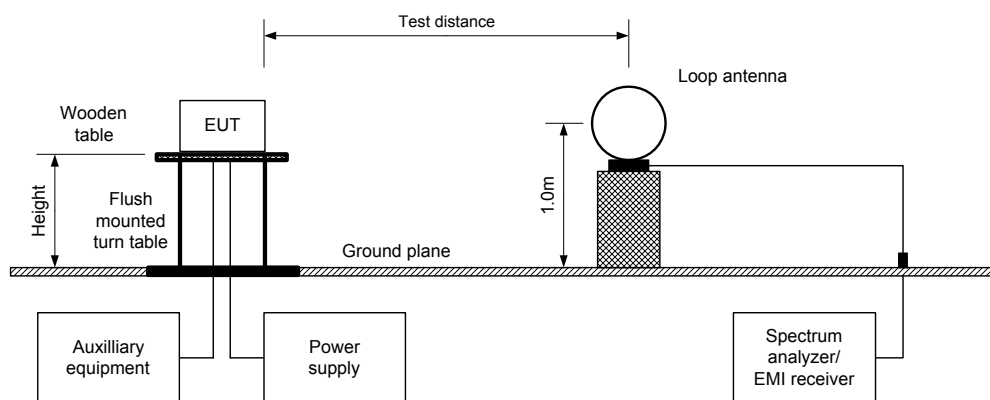
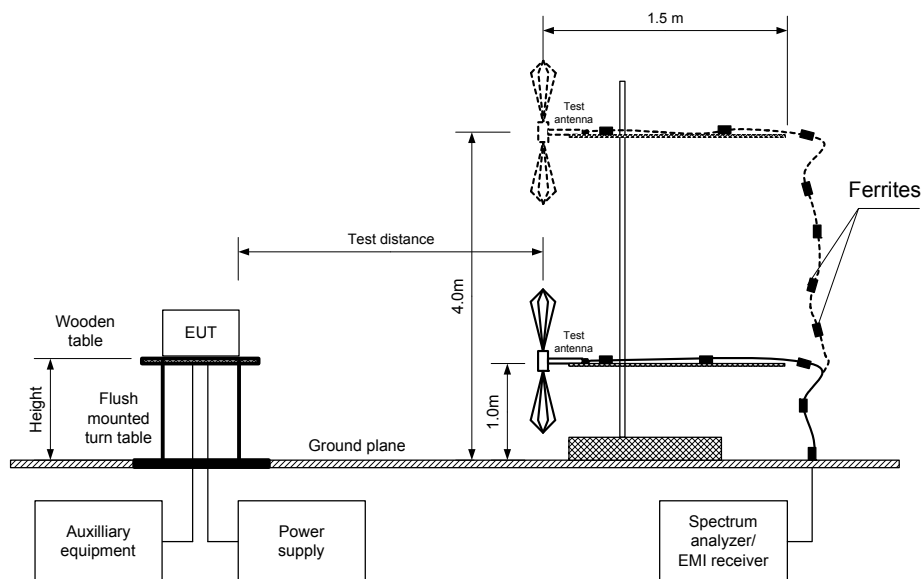


Figure 7.7.2 Setup for spurious emission field strength measurements above 30 MHz



|                     |                                                                                 |                         |                           |  |
|---------------------|---------------------------------------------------------------------------------|-------------------------|---------------------------|--|
| Test specification: | FCC section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions        |                         |                           |  |
| Test procedure:     | Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4 |                         |                           |  |
| Test mode:          | Compliance                                                                      | Verdict: PASS           |                           |  |
| Date:               | 2/2/2011 - 2/7/2011                                                             |                         |                           |  |
| Temperature: 22 °C  | Air Pressure: 1015 hPa                                                          | Relative Humidity: 50 % | Power Supply: 3 V battery |  |
| Remarks:            |                                                                                 |                         |                           |  |

**Table 7.7.2 Field strength of emissions outside restricted bands**

ASSIGNED FREQUENCY BAND: 902-928 MHz  
 INVESTIGATED FREQUENCY RANGE: 0.009 - 9300 MHz  
 TEST DISTANCE: 3 m  
 MODULATION: GFSK  
 MODULATING SIGNAL: PRBS  
 BIT RATE: 50 kbps  
 DUTY CYCLE: 100 %  
 TRANSMITTER OUTPUT POWER SETTINGS: Maximum  
 DETECTOR USED: Peak  
 RESOLUTION BANDWIDTH: 100 kHz  
 VIDEO BANDWIDTH: 300 kHz  
 TEST ANTENNA TYPE: Active loop (9 kHz – 30 MHz)  
 Biconilog (30 MHz – 1000 MHz)  
 Double ridged guide (above 1000 MHz)  
 FREQUENCY HOPPING: Disabled

| Disabled               |                                            |                         |                      |                      |                                           |                                      |               |                 |         |
|------------------------|--------------------------------------------|-------------------------|----------------------|----------------------|-------------------------------------------|--------------------------------------|---------------|-----------------|---------|
| Frequency<br>MHz       | Field strength<br>of spurious,<br>dB(μV/m) | Antenna<br>polarization | Antenna<br>height, m | Azimuth,<br>degrees* | Field strength<br>of carrier,<br>dB(μV/m) | Attenuation<br>below carrier,<br>dBc | Limit,<br>dBc | Margin,<br>dB** | Verdict |
| Low carrier frequency  |                                            |                         |                      |                      |                                           |                                      |               |                 |         |
| 1825.540               | 55.28                                      | H                       | 1.8                  | 170                  | 108.07                                    | 52.79                                | 20.0          | 32.79           | Pass    |
| 5476.635               | 62.68                                      | H                       | 1.2                  | 330                  |                                           | 45.39                                |               | 25.39           |         |
| 6389.405               | 57.37                                      | H                       | 1.1                  | 315                  |                                           | 50.70                                |               | 30.70           |         |
| Mid carrier frequency  |                                            |                         |                      |                      |                                           |                                      |               |                 |         |
| 1831.765               | 62.35                                      | H                       | 2.0                  | 180                  | 111.7                                     | 49.35                                | 20.0          | 29.35           | Pass    |
| 5495.305               | 62.91                                      | V                       | 1.5                  | 95                   |                                           | 48.79                                |               | 28.79           |         |
| 6411.200               | 60.71                                      | V                       | 1.0                  | 90                   |                                           | 50.99                                |               | 30.99           |         |
| High carrier frequency |                                            |                         |                      |                      |                                           |                                      |               |                 |         |
| 1838.250               | 53.92                                      | H                       | 2.3                  | 180                  | 107.00                                    | 53.08                                | 20.0          | 33.08           | Pass    |
| 5514.470               | 62.15                                      | H                       | 1.6                  | 350                  |                                           | 44.85                                |               | 24.85           |         |
| 6433.865               | 53.89                                      | H                       | 1.0                  | 342                  |                                           | 53.11                                |               | 33.11           |         |

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

\*\* - Margin = Attenuation below carrier – specification limit.

|                     |                                                                                 |                         |                           |
|---------------------|---------------------------------------------------------------------------------|-------------------------|---------------------------|
| Test specification: | FCC section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions        |                         |                           |
| Test procedure:     | Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4 |                         |                           |
| Test mode:          | Compliance                                                                      | Verdict: PASS           |                           |
| Date:               | 2/2/2011 - 2/7/2011                                                             |                         |                           |
| Temperature: 22 °C  | Air Pressure: 1015 hPa                                                          | Relative Humidity: 50 % | Power Supply: 3 V battery |
| Remarks:            |                                                                                 |                         |                           |

**Table 7.7.3 Field strength of spurious emissions above 1 GHz within restricted bands**

ASSIGNED FREQUENCY BAND: 902-928 MHz  
 INVESTIGATED FREQUENCY RANGE: 1000 - 9300 MHz  
 TEST DISTANCE: 3 m  
 MODULATION: GFSK  
 MODULATING SIGNAL: PRBS  
 BIT RATE: 50 kbps  
 DUTY CYCLE DURING TEST: 100 %  
 TRANSMITTER OUTPUT POWER SETTINGS: Maximum  
 DETECTOR USED: Peak  
 RESOLUTION BANDWIDTH: 1000 kHz  
 TEST ANTENNA TYPE: Double ridged guide  
 FREQUENCY HOPPING: Disabled

| Frequency,<br>MHz      | Antenna      |              | Azimuth,<br>degrees* | Peak field strength(VBW=3 MHz) |                    |                 | Average field strength(VBW=10 Hz) |                         |                    |                  | Verdict |
|------------------------|--------------|--------------|----------------------|--------------------------------|--------------------|-----------------|-----------------------------------|-------------------------|--------------------|------------------|---------|
|                        | Polarization | Height,<br>m |                      | Measured,<br>dB(μV/m)          | Limit,<br>dB(μV/m) | Margin,<br>dB** | Measured,<br>dB(μV/m)             | Calculated,<br>dB(μV/m) | Limit,<br>dB(μV/m) | Margin,<br>dB*** |         |
| Low carrier frequency  |              |              |                      |                                |                    |                 |                                   |                         |                    |                  |         |
| 2738.277               | V            | 1.3          | 10                   | 53.90                          | 74.00              | -20.10          | 53.12                             | 36.60                   | 54.00              | -17.40           | Pass    |
| 3651.083               | V            | 1.0          | 180                  | 54.01                          | 74.00              | -19.99          | 51.24                             | 34.72                   | 54.00              | -19.28           |         |
| 4579.288               | H            | 1.2          | 163                  | 63.30                          | 74.00              | -10.70          | 62.20                             | 45.68                   | 54.00              | -8.32            |         |
| 7302.003               | V            | 1.1          | 180                  | 52.84                          | 74.00              | -21.16          | 49.86                             | 33.34                   | 54.00              | -20.66           |         |
| 8214.783               | V            | 1.2          | 100                  | 56.39                          | 74.00              | -17.61          | 52.93                             | 36.41                   | 54.00              | -17.59           |         |
| 9127.500               | V            | 1.1          | 95                   | 55.24                          | 74.00              | -18.76          | 51.79                             | 35.27                   | 54.00              | -18.73           |         |
| Mid carrier frequency  |              |              |                      |                                |                    |                 |                                   |                         |                    |                  |         |
| 2747.715               | V            | 1.1          | 0                    | 54.30                          | 74.00              | -19.70          | 53.13                             | 36.61                   | 54.00              | -17.39           | Pass    |
| 3663.433               | V            | 1.0          | 100                  | 59.61                          | 74.00              | -14.39          | 58.29                             | 41.77                   | 54.00              | -12.23           |         |
| 4579.288               | H            | 1.7          | 180                  | 65.90                          | 74.00              | -8.10           | 64.87                             | 48.35                   | 54.00              | -5.65            |         |
| 7326.952               | V            | 1.0          | 90                   | 53.34                          | 74.00              | -20.66          | 47.62                             | 31.10                   | 54.00              | -22.90           |         |
| 8242.695               | V            | 1.2          | 165                  | 59.93                          | 74.00              | -14.07          | 54.77                             | 38.25                   | 54.00              | -15.75           |         |
| 9158.525               | V            | 1.3          | 90                   | 58.87                          | 74.00              | -15.13          | 51.57                             | 35.05                   | 54.00              | -18.95           |         |
| High carrier frequency |              |              |                      |                                |                    |                 |                                   |                         |                    |                  |         |
| 2757.190               | V            | 1.5          | 180                  | 50.39                          | 74.00              | -23.61          | 48.58                             | 32.06                   | 54.00              | -21.94           | Pass    |
| 3676.407               | V            | 1.6          | 180                  | 53.56                          | 74.00              | -20.44          | 48.66                             | 32.14                   | 54.00              | -21.86           |         |
| 4595.713               | H            | 1.3          | 185                  | 62.19                          | 74.00              | -11.81          | 60.57                             | 44.05                   | 54.00              | -9.95            |         |
| 7352.777               | V            | 1.0          | 190                  | 52.11                          | 74.00              | -21.89          | 45.28                             | 28.76                   | 54.00              | -25.24           |         |
| 8271.770               | V            | 1.0          | 180                  | 50.99                          | 74.00              | -23.01          | 42.68                             | 26.16                   | 54.00              | -27.84           |         |
| 9190.825               | V            | 2.1          | 15                   | 50.87                          | 74.00              | -23.13          | 39.48                             | 22.96                   | 54.00              | -31.04           |         |

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

\*\* - Margin = Measured field strength - specification limit.

\*\*\* - Margin = Calculated field strength - specification limit,

where Calculated field strength = Measured field strength + average factor.

**Table 7.7.4 Average factor calculation**

| Transmission pulse |            | Transmission burst |            | Transmission train duration, ms | Average factor, dB |
|--------------------|------------|--------------------|------------|---------------------------------|--------------------|
| Duration, ms       | Period, ms | Duration, ms       | Period, ms |                                 |                    |
| 4.975              | 2000       | NA                 | NA         | NA                              | -16.52             |

\*- Average factor was calculated as follows

for pulse train shorter than 100 ms:

$$\text{Average factor} = 20 \times \log_{10} \left( \frac{\text{Pulse duration}}{\text{Pulse period}} \times \frac{\text{Burst duration}}{\text{Train duration}} \times \text{Number of bursts within pulse train} \right)$$

for pulse train longer than 100 ms:

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

|                     |                                                                                 |                         |                           |  |
|---------------------|---------------------------------------------------------------------------------|-------------------------|---------------------------|--|
| Test specification: | FCC section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions        |                         |                           |  |
| Test procedure:     | Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4 |                         |                           |  |
| Test mode:          | Compliance                                                                      | Verdict: PASS           |                           |  |
| Date:               | 2/2/2011 - 2/7/2011                                                             |                         |                           |  |
| Temperature: 22 °C  | Air Pressure: 1015 hPa                                                          | Relative Humidity: 50 % | Power Supply: 3 V battery |  |
| Remarks:            |                                                                                 |                         |                           |  |

**Table 7.7.5 Field strength of spurious emissions below 1 GHz within restricted bands**

ASSIGNED FREQUENCY BAND: 902-928 MHz  
 INVESTIGATED FREQUENCY RANGE: 0.009 – 1000 MHz  
 TEST DISTANCE: 3 m  
 MODULATION: GFSK  
 MODULATING SIGNAL: PRBS  
 BIT RATE: 50 kbps  
 DUTY CYCLE DURING TEST: 100 %  
 TRANSMITTER OUTPUT POWER SETTINGS: Maximum  
 RESOLUTION BANDWIDTH: 0.2 kHz (9 kHz – 150 kHz)  
 9.0 kHz (150 kHz – 30 MHz)  
 120 kHz (30 MHz – 1000 MHz)  
 VIDEO BANDWIDTH: > Resolution bandwidth  
 TEST ANTENNA TYPE: Active loop (9 kHz – 30 MHz)  
 Biconilog (30 MHz – 1000 MHz)  
 FREQUENCY HOPPING: Disabled

| Frequency             |                         | Quasi-peak                  |                 |            | Antenna polarization | Antenna height, m | Turn-table position**, degrees | Verdict |      |
|-----------------------|-------------------------|-----------------------------|-----------------|------------|----------------------|-------------------|--------------------------------|---------|------|
| Frequency MHz         | Peak emission, dB(μV/m) | Measured emission, dB(μV/m) | Limit, dB(μV/m) | Margin, dB |                      |                   |                                |         |      |
| No signals were found |                         |                             |                 |            |                      |                   |                                |         | Pass |

\*- Margin = Measured emission - specification limit.

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

**Table 7.7.6 Restricted bands**

| MHz               | MHz                 | MHz                   | MHz             | MHz           | GHz           |
|-------------------|---------------------|-----------------------|-----------------|---------------|---------------|
| 0.09 - 0.11       | 8.37625 - 8.38675   | 73 - 74.6             | 399.9 - 410     | 2690 - 2900   | 10.6 - 12.7   |
| 0.495 - 0.505     | 8.41425 - 8.41475   | 74.8 - 75.2           | 608 - 614       | 3260 - 3267   | 13.25 - 13.4  |
| 2.1735 - 2.1905   | 12.29 - 12.293      | 108 - 121.94          | 960 - 1240      | 3332 - 3339   | 14.47 - 14.5  |
| 4.125 - 4.128     | 12.51975 - 12.52025 | 123 - 138             | 1300 - 1427     | 3345.8 - 3358 | 15.35 - 16.2  |
| 4.17725 - 4.17775 | 12.57675 - 12.57725 | 149.9 - 150.05        | 1435 - 1626.5   | 3600 - 4400   | 17.7 - 21.4   |
| 4.20725 - 4.20775 | 13.36 - 13.41       | 156.52475 - 156.52525 | 1645.5 - 1646.5 | 4500 - 5150   | 22.01 - 23.12 |
| 6.215 - 6.218     | 16.42 - 16.423      | 156.7 - 156.9         | 1660 - 1710     | 5350 - 5460   | 23.6 - 24     |
| 6.26775 - 6.26825 | 16.69475 - 16.69525 | 162.0125 - 167.17     | 1718.8 - 1722.2 | 7250 - 7750   | 31.2 - 31.8   |
| 6.31175 - 6.31225 | 16.80425 - 16.80475 | 167.72 - 173.2        | 2200 - 2300     | 8025 - 8500   | 36.43 - 36.5  |
| 8.291 - 8.294     | 25.5 - 25.67        | 240 - 285             | 2310 - 2390     | 9000 - 9200   | Above 38.6    |
| 8.362 - 8.366     | 37.5 - 38.25        | 322 - 335.4           | 2483.5 - 2500   | 9300 - 9500   |               |

**Reference numbers of test equipment used**

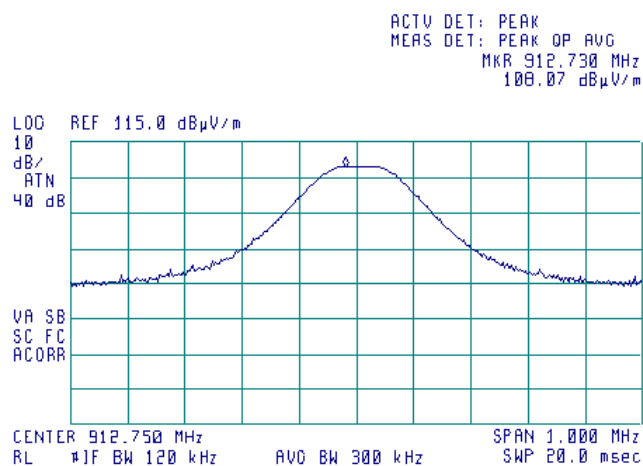
|         |         |         |         |         |         |         |         |
|---------|---------|---------|---------|---------|---------|---------|---------|
| HL 0446 | HL 1984 | HL 2432 | HL 2697 | HL 2780 | HL 2882 | HL 2883 | HL 3334 |
| HL 3343 | HL 3390 | HL 3884 |         |         |         |         |         |

Full description is given in Appendix A.

|                            |                                                                                 |                                |                                  |
|----------------------------|---------------------------------------------------------------------------------|--------------------------------|----------------------------------|
| <b>Test specification:</b> | <b>FCC section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions</b> |                                |                                  |
| <b>Test procedure:</b>     | Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4 |                                |                                  |
| <b>Test mode:</b>          | Compliance                                                                      | <b>Verdict:</b>                | <b>PASS</b>                      |
| <b>Date:</b>               | 2/2/2011 - 2/7/2011                                                             |                                |                                  |
| <b>Temperature:</b> 22 °C  | <b>Air Pressure:</b> 1015 hPa                                                   | <b>Relative Humidity:</b> 50 % | <b>Power Supply:</b> 3 V battery |
| <b>Remarks:</b>            |                                                                                 |                                |                                  |

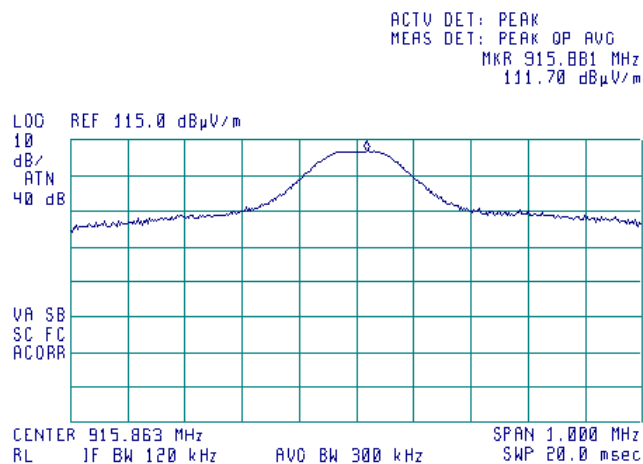
**Plot 7.7.1 Radiated emission measurements at the low carrier frequency**

TEST SITE: OATS  
TEST DISTANCE: 3 m  
ANTENNA POLARIZATION: Vertical & Horizontal



**Plot 7.7.2 Radiated emission measurements at the mid carrier frequency**

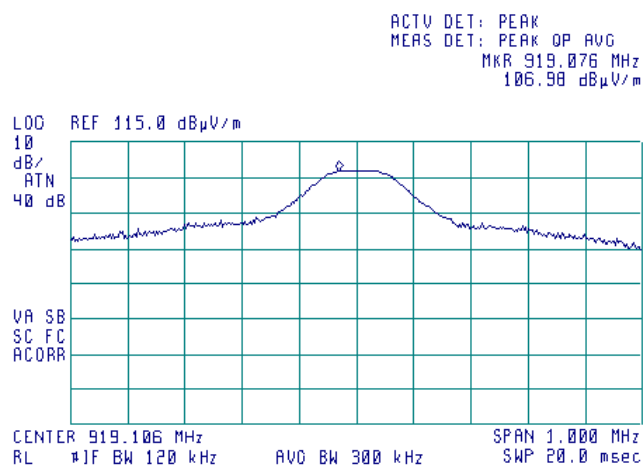
TEST SITE: OATS  
TEST DISTANCE: 3 m  
ANTENNA POLARIZATION: Vertical & Horizontal



|                            |                                                                                 |                                |                                  |
|----------------------------|---------------------------------------------------------------------------------|--------------------------------|----------------------------------|
| <b>Test specification:</b> | <b>FCC section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions</b> |                                |                                  |
| <b>Test procedure:</b>     | Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4 |                                |                                  |
| <b>Test mode:</b>          | Compliance                                                                      | <b>Verdict:</b>                | <b>PASS</b>                      |
| <b>Date:</b>               | 2/2/2011 - 2/7/2011                                                             |                                |                                  |
| <b>Temperature:</b> 22 °C  | <b>Air Pressure:</b> 1015 hPa                                                   | <b>Relative Humidity:</b> 50 % | <b>Power Supply:</b> 3 V battery |
| <b>Remarks:</b>            |                                                                                 |                                |                                  |

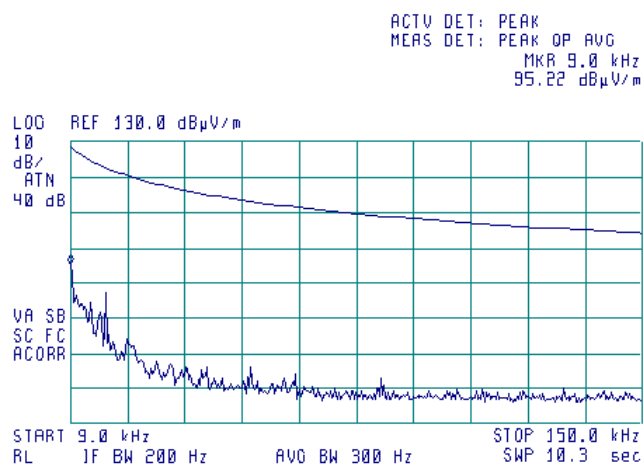
### Plot 7.7.3 Radiated emission measurements at the high carrier frequency

TEST SITE: OATS  
TEST DISTANCE: 3 m  
ANTENNA POLARIZATION: Vertical & Horizontal



### Plot 7.7.4 Radiated emission measurements from 9 to 150 kHz at the low carrier frequency

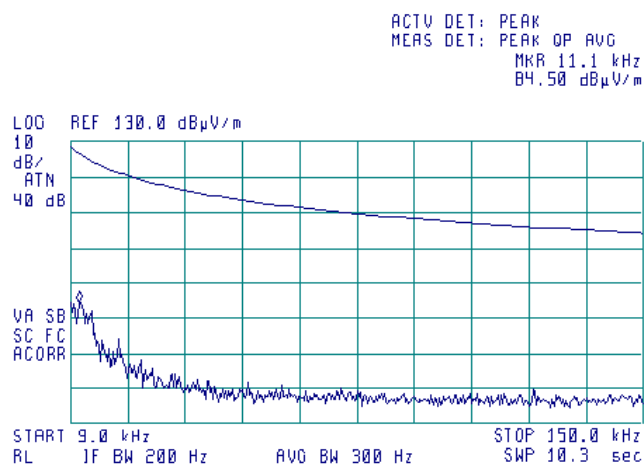
TEST SITE: Anechoic chamber  
TEST DISTANCE: 3 m  
ANTENNA POLARIZATION: Vertical



|                            |                                                                                 |                                |                                  |
|----------------------------|---------------------------------------------------------------------------------|--------------------------------|----------------------------------|
| <b>Test specification:</b> | <b>FCC section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions</b> |                                |                                  |
| <b>Test procedure:</b>     | Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4 |                                |                                  |
| <b>Test mode:</b>          | Compliance                                                                      | <b>Verdict:</b>                | <b>PASS</b>                      |
| <b>Date:</b>               | 2/2/2011 - 2/7/2011                                                             |                                |                                  |
| <b>Temperature:</b> 22 °C  | <b>Air Pressure:</b> 1015 hPa                                                   | <b>Relative Humidity:</b> 50 % | <b>Power Supply:</b> 3 V battery |
| <b>Remarks:</b>            |                                                                                 |                                |                                  |

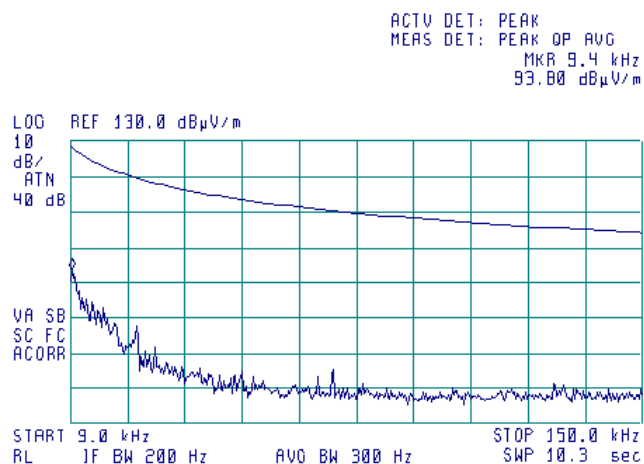
**Plot 7.7.5 Radiated emission measurements from 9 to 150 kHz at the mid carrier frequency**

TEST SITE: Anechoic chamber  
TEST DISTANCE: 3 m  
ANTENNA POLARIZATION: Vertical



**Plot 7.7.6 Radiated emission measurements from 9 to 150 kHz at the high carrier frequency**

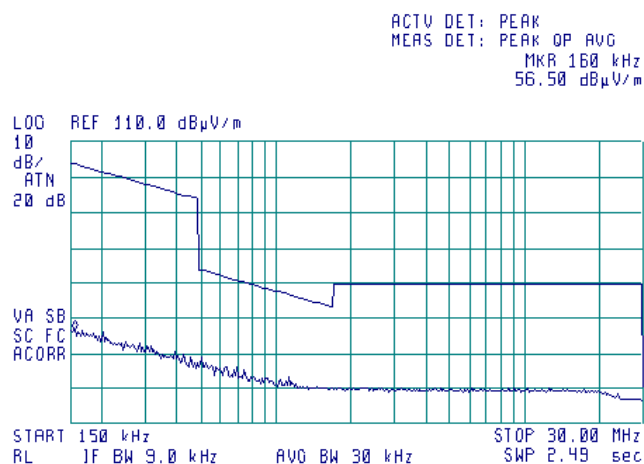
TEST SITE: Anechoic chamber  
TEST DISTANCE: 3 m  
ANTENNA POLARIZATION: Vertical



|                            |                                                                                 |                                |                                  |
|----------------------------|---------------------------------------------------------------------------------|--------------------------------|----------------------------------|
| <b>Test specification:</b> | <b>FCC section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions</b> |                                |                                  |
| <b>Test procedure:</b>     | Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4 |                                |                                  |
| <b>Test mode:</b>          | Compliance                                                                      | <b>Verdict:</b>                | <b>PASS</b>                      |
| <b>Date:</b>               | 2/2/2011 - 2/7/2011                                                             |                                |                                  |
| <b>Temperature:</b> 22 °C  | <b>Air Pressure:</b> 1015 hPa                                                   | <b>Relative Humidity:</b> 50 % | <b>Power Supply:</b> 3 V battery |
| <b>Remarks:</b>            |                                                                                 |                                |                                  |

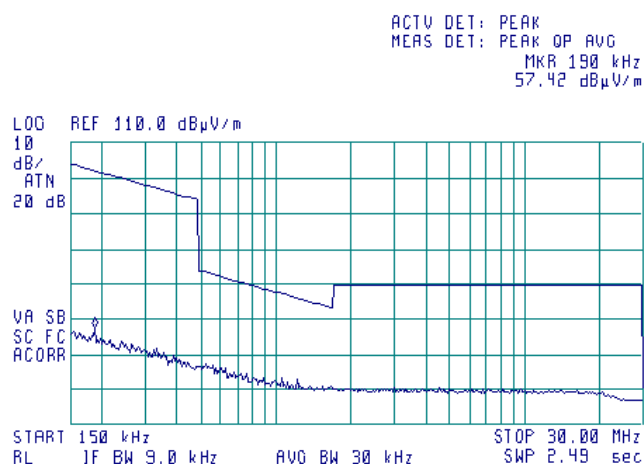
**Plot 7.7.7 Radiated emission measurements from 0.15 to 30 MHz at the low carrier frequency**

TEST SITE: Anechoic chamber  
TEST DISTANCE: 3 m  
ANTENNA POLARIZATION: Vertical



**Plot 7.7.8 Radiated emission measurements from 0.15 to 30 MHz at the mid carrier frequency**

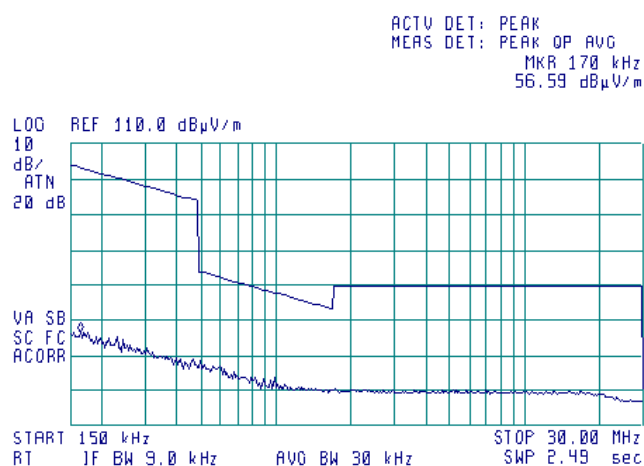
TEST SITE: Anechoic chamber  
TEST DISTANCE: 3 m  
ANTENNA POLARIZATION: Vertical



|                            |                                                                                 |                                |                                  |
|----------------------------|---------------------------------------------------------------------------------|--------------------------------|----------------------------------|
| <b>Test specification:</b> | <b>FCC section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions</b> |                                |                                  |
| <b>Test procedure:</b>     | Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4 |                                |                                  |
| <b>Test mode:</b>          | Compliance                                                                      | <b>Verdict:</b>                | <b>PASS</b>                      |
| <b>Date:</b>               | 2/2/2011 - 2/7/2011                                                             |                                |                                  |
| <b>Temperature:</b> 22 °C  | <b>Air Pressure:</b> 1015 hPa                                                   | <b>Relative Humidity:</b> 50 % | <b>Power Supply:</b> 3 V battery |
| <b>Remarks:</b>            |                                                                                 |                                |                                  |

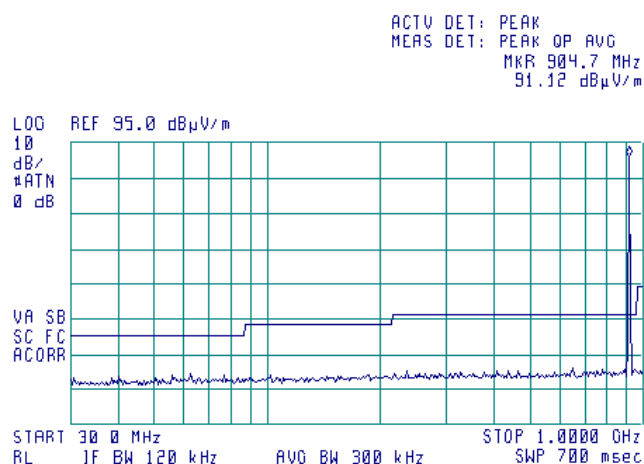
**Plot 7.7.9 Radiated emission measurements from 0.15 to 30 MHz at the high carrier frequency**

TEST SITE: Anechoic chamber  
TEST DISTANCE: 3 m  
ANTENNA POLARIZATION: Vertical



**Plot 7.7.10 Radiated emission measurements from 30 to 1000 MHz at the low carrier frequency**

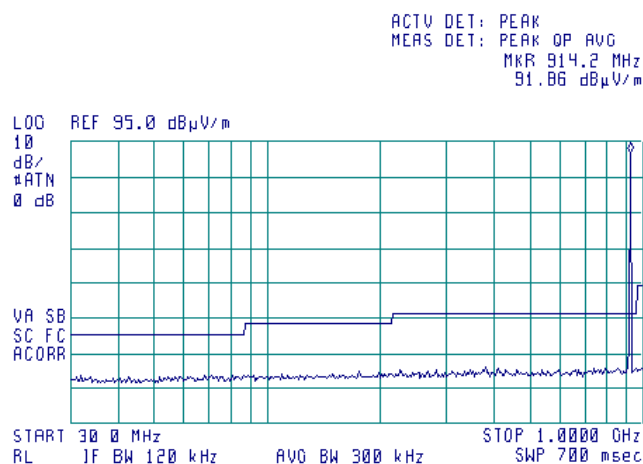
TEST SITE: Anechoic chamber  
TEST DISTANCE: 3 m  
ANTENNA POLARIZATION: Vertical and Horizontal



|                            |                                                                                 |                                |                                  |
|----------------------------|---------------------------------------------------------------------------------|--------------------------------|----------------------------------|
| <b>Test specification:</b> | <b>FCC section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions</b> |                                |                                  |
| <b>Test procedure:</b>     | Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4 |                                |                                  |
| <b>Test mode:</b>          | Compliance                                                                      | <b>Verdict:</b>                | <b>PASS</b>                      |
| <b>Date:</b>               | 2/2/2011 - 2/7/2011                                                             |                                |                                  |
| <b>Temperature:</b> 22 °C  | <b>Air Pressure:</b> 1015 hPa                                                   | <b>Relative Humidity:</b> 50 % | <b>Power Supply:</b> 3 V battery |
| <b>Remarks:</b>            |                                                                                 |                                |                                  |

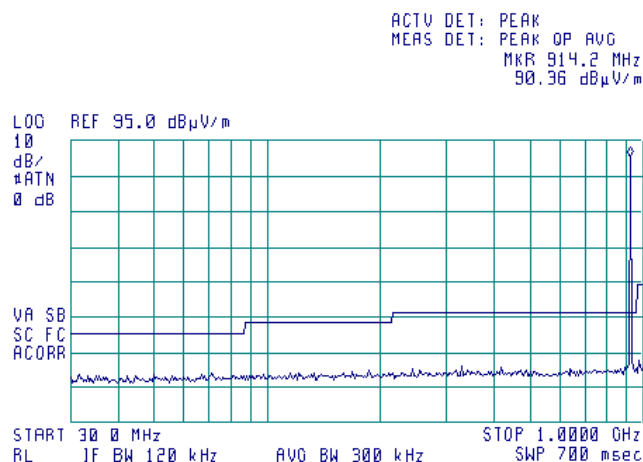
**Plot 7.7.11 Radiated emission measurements from 30 to 1000 MHz at the mid carrier frequency**

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



**Plot 7.7.12 Radiated emission measurements from 30 to 1000 MHz at the high carrier frequency**

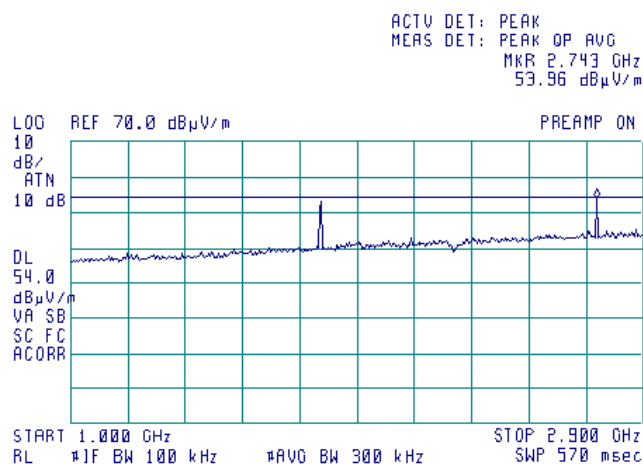
TEST SITE: Anechoic chamber  
TEST DISTANCE: 3 m  
ANTENNA POLARIZATION: Vertical and Horizontal



|                            |                               |                                                                                 |                                  |
|----------------------------|-------------------------------|---------------------------------------------------------------------------------|----------------------------------|
| <b>Test specification:</b> |                               | <b>FCC section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions</b> |                                  |
| <b>Test procedure:</b>     |                               | Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4 |                                  |
| <b>Test mode:</b>          |                               | Compliance                                                                      | <b>Verdict:</b> PASS             |
| <b>Date:</b>               |                               | 2/2/2011 - 2/7/2011                                                             |                                  |
| <b>Temperature:</b> 22 °C  | <b>Air Pressure:</b> 1015 hPa | <b>Relative Humidity:</b> 50 %                                                  | <b>Power Supply:</b> 3 V battery |
| <b>Remarks:</b>            |                               |                                                                                 |                                  |

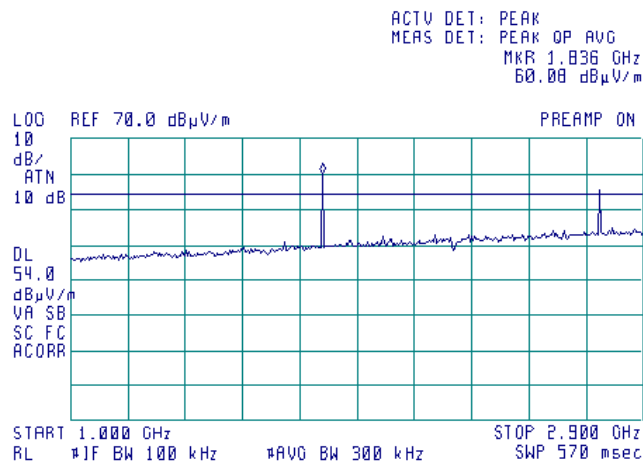
**Plot 7.7.13 Radiated emission measurements from 1000 to 2900 MHz at the low carrier frequency**

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



**Plot 7.7.14 Radiated emission measurements from 1000 to 2900 MHz at the mid carrier frequency**

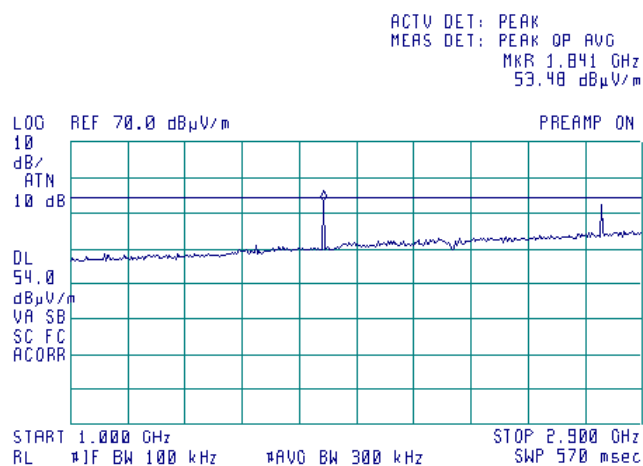
TEST SITE: Anechoic chamber  
TEST DISTANCE: 3 m  
ANTENNA POLARIZATION: Vertical and Horizontal



|                            |                                                                                 |                                |                                  |
|----------------------------|---------------------------------------------------------------------------------|--------------------------------|----------------------------------|
| <b>Test specification:</b> | <b>FCC section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions</b> |                                |                                  |
| <b>Test procedure:</b>     | Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4 |                                |                                  |
| <b>Test mode:</b>          | Compliance                                                                      | <b>Verdict:</b>                | <b>PASS</b>                      |
| <b>Date:</b>               | 2/2/2011 - 2/7/2011                                                             |                                |                                  |
| <b>Temperature:</b> 22 °C  | <b>Air Pressure:</b> 1015 hPa                                                   | <b>Relative Humidity:</b> 50 % | <b>Power Supply:</b> 3 V battery |
| <b>Remarks:</b>            |                                                                                 |                                |                                  |

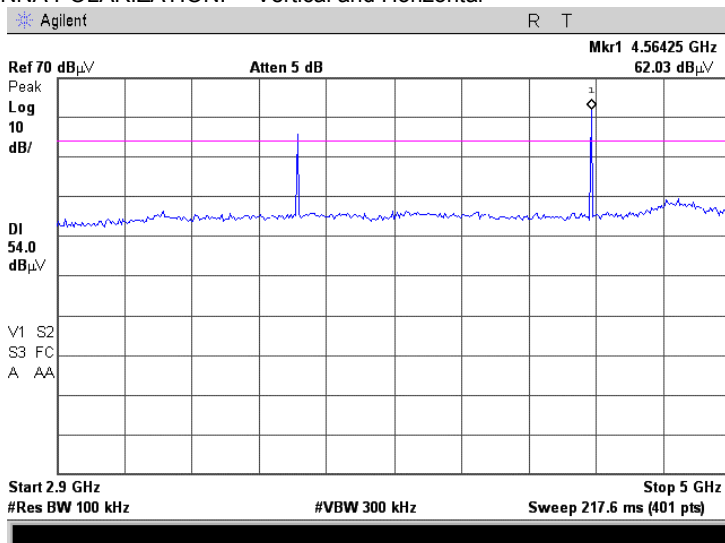
**Plot 7.7.15 Radiated emission measurements from 1000 to 2900 MHz at the high carrier frequency**

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



**Plot 7.7.16 Radiated emission measurements from 2900 to 5000 MHz at the low carrier frequency**

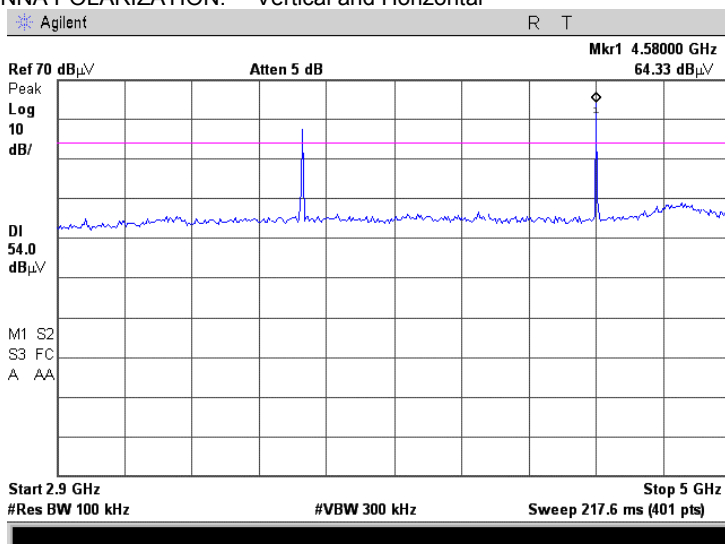
TEST SITE: Anechoic chamber  
TEST DISTANCE: 3 m  
ANTENNA POLARIZATION: Vertical and Horizontal



|                            |                                                                                 |                                |                                  |
|----------------------------|---------------------------------------------------------------------------------|--------------------------------|----------------------------------|
| <b>Test specification:</b> | <b>FCC section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions</b> |                                |                                  |
| <b>Test procedure:</b>     | Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4 |                                |                                  |
| <b>Test mode:</b>          | Compliance                                                                      | <b>Verdict: PASS</b>           |                                  |
| <b>Date:</b>               | 2/2/2011 - 2/7/2011                                                             |                                |                                  |
| <b>Temperature:</b> 22 °C  | <b>Air Pressure:</b> 1015 hPa                                                   | <b>Relative Humidity:</b> 50 % | <b>Power Supply:</b> 3 V battery |
| <b>Remarks:</b>            |                                                                                 |                                |                                  |

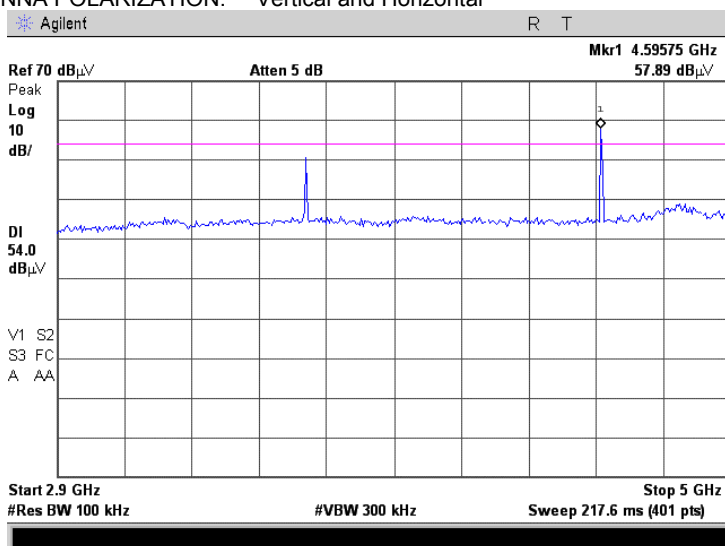
**Plot 7.7.17 Radiated emission measurements from 2900 to 5000 MHz at the mid carrier frequency**

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



**Plot 7.7.18 Radiated emission measurements from 2900 to 5000 MHz at the high carrier frequency**

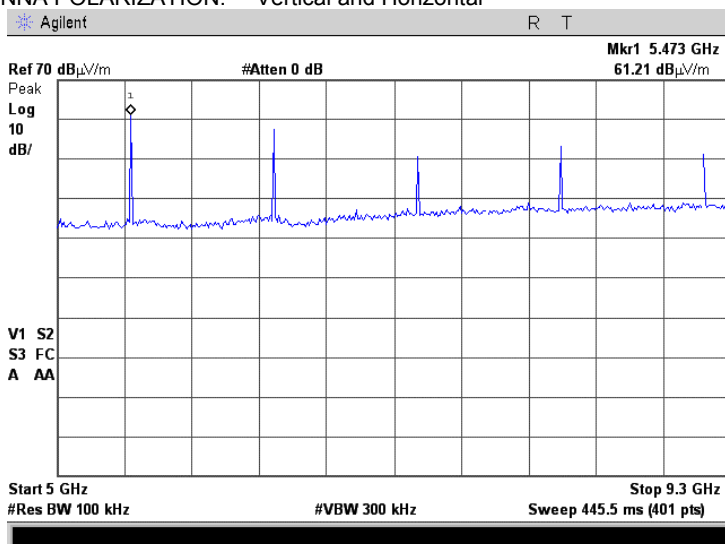
TEST SITE: Anechoic chamber  
TEST DISTANCE: 3 m  
ANTENNA POLARIZATION: Vertical and Horizontal



|                            |                                                                                 |                                |                                  |
|----------------------------|---------------------------------------------------------------------------------|--------------------------------|----------------------------------|
| <b>Test specification:</b> | <b>FCC section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions</b> |                                |                                  |
| <b>Test procedure:</b>     | Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4 |                                |                                  |
| <b>Test mode:</b>          | Compliance                                                                      | <b>Verdict:</b>                | <b>PASS</b>                      |
| <b>Date:</b>               | 2/2/2011 - 2/7/2011                                                             |                                |                                  |
| <b>Temperature:</b> 22 °C  | <b>Air Pressure:</b> 1015 hPa                                                   | <b>Relative Humidity:</b> 50 % | <b>Power Supply:</b> 3 V battery |
| <b>Remarks:</b>            |                                                                                 |                                |                                  |

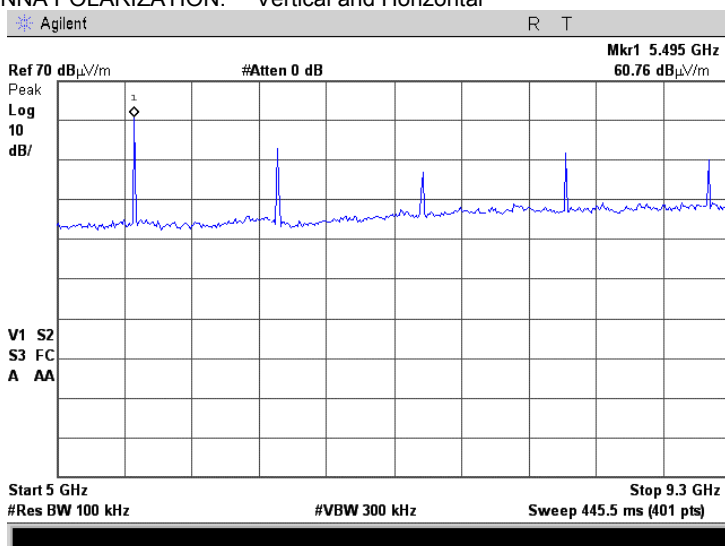
**Plot 7.7.19 Radiated emission measurements from 5000 to 9300 MHz at the low carrier frequency**

TEST SITE: OATS  
TEST DISTANCE: 3 m  
ANTENNA POLARIZATION: Vertical and Horizontal



**Plot 7.7.20 Radiated emission measurements from 5000 to 9300 MHz at the mid carrier frequency**

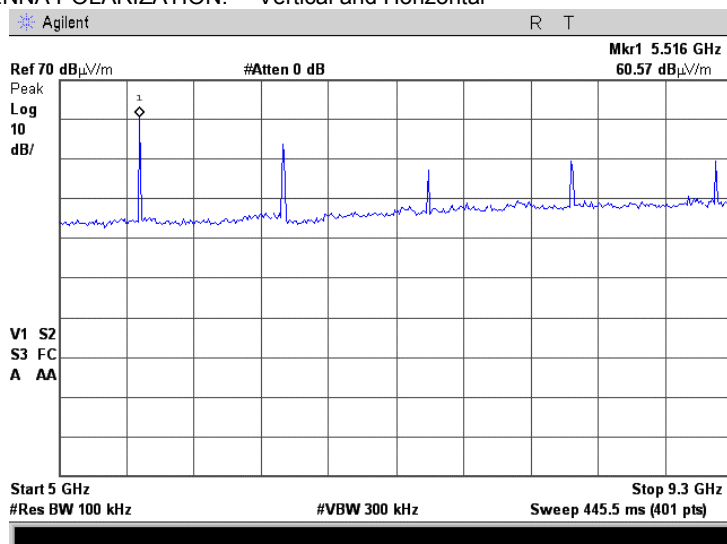
TEST SITE: OATS  
TEST DISTANCE: 3 m  
ANTENNA POLARIZATION: Vertical and Horizontal



|                            |                                                                                 |                                |                                  |
|----------------------------|---------------------------------------------------------------------------------|--------------------------------|----------------------------------|
| <b>Test specification:</b> | <b>FCC section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions</b> |                                |                                  |
| <b>Test procedure:</b>     | Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4 |                                |                                  |
| <b>Test mode:</b>          | Compliance                                                                      | <b>Verdict:</b> <b>PASS</b>    |                                  |
| <b>Date:</b>               | 2/2/2011 - 2/7/2011                                                             |                                |                                  |
| <b>Temperature:</b> 22 °C  | <b>Air Pressure:</b> 1015 hPa                                                   | <b>Relative Humidity:</b> 50 % | <b>Power Supply:</b> 3 V battery |
| <b>Remarks:</b>            |                                                                                 |                                |                                  |

Plot 7.7.21 Radiated emission measurements from 5000 to 9300 MHz at the high carrier frequency

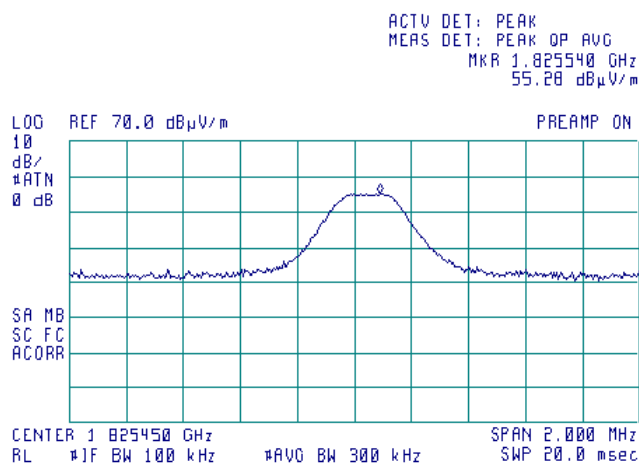
TEST SITE: OATS  
TEST DISTANCE: 3 m  
ANTENNA POLARIZATION: Vertical and Horizontal



|                            |                                                                                 |                                |                                  |
|----------------------------|---------------------------------------------------------------------------------|--------------------------------|----------------------------------|
| <b>Test specification:</b> | <b>FCC section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions</b> |                                |                                  |
| <b>Test procedure:</b>     | Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4 |                                |                                  |
| <b>Test mode:</b>          | Compliance                                                                      | <b>Verdict:</b>                | <b>PASS</b>                      |
| <b>Date:</b>               | 2/2/2011 - 2/7/2011                                                             |                                |                                  |
| <b>Temperature:</b> 22 °C  | <b>Air Pressure:</b> 1015 hPa                                                   | <b>Relative Humidity:</b> 50 % | <b>Power Supply:</b> 3 V battery |
| <b>Remarks:</b>            |                                                                                 |                                |                                  |

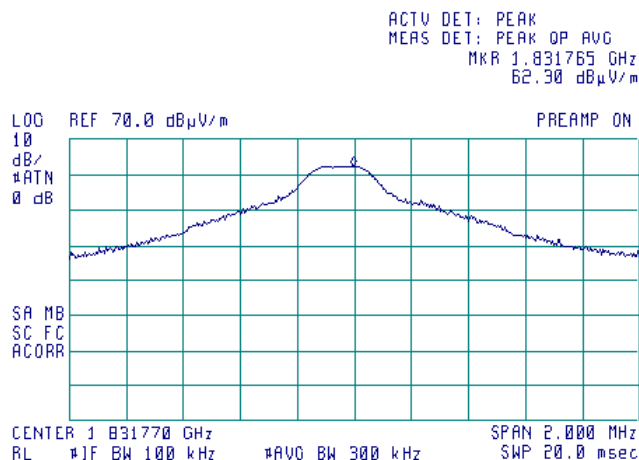
**Plot 7.7.22 Radiated emission measurements at the second harmonic of low carrier frequency**

TEST SITE: Semi anechoic chamber  
TEST DISTANCE: 3 m



**Plot 7.7.23 Radiated emission measurements at the second harmonic of mid carrier frequency**

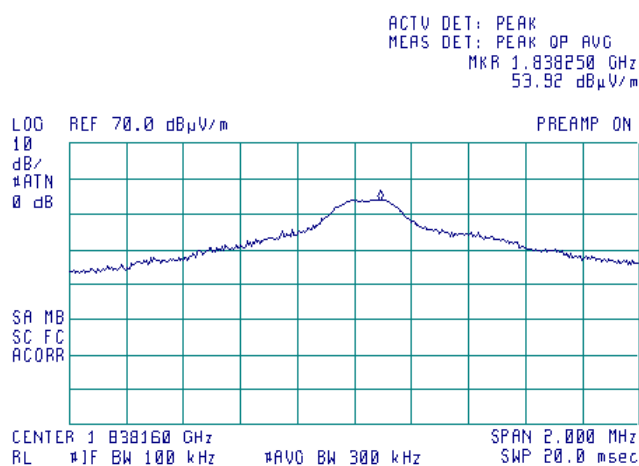
TEST SITE: Semi anechoic chamber  
TEST DISTANCE: 3 m



|                            |                                                                                 |                                |                                  |
|----------------------------|---------------------------------------------------------------------------------|--------------------------------|----------------------------------|
| <b>Test specification:</b> | <b>FCC section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions</b> |                                |                                  |
| <b>Test procedure:</b>     | Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4 |                                |                                  |
| <b>Test mode:</b>          | Compliance                                                                      | <b>Verdict:</b>                | <b>PASS</b>                      |
| <b>Date:</b>               | 2/2/2011 - 2/7/2011                                                             |                                |                                  |
| <b>Temperature:</b> 22 °C  | <b>Air Pressure:</b> 1015 hPa                                                   | <b>Relative Humidity:</b> 50 % | <b>Power Supply:</b> 3 V battery |
| <b>Remarks:</b>            |                                                                                 |                                |                                  |

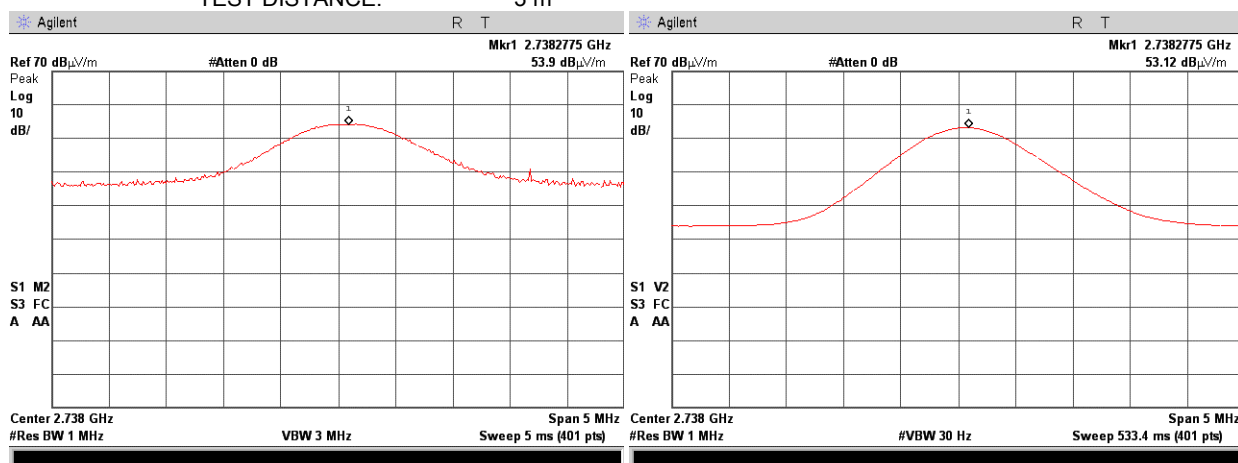
Plot 7.7.24 Radiated emission measurements at the second harmonic of high carrier frequency

TEST SITE: Semi anechoic chamber  
TEST DISTANCE: 3 m



Plot 7.7.25 Radiated emission measurements at the third harmonic of low carrier frequency

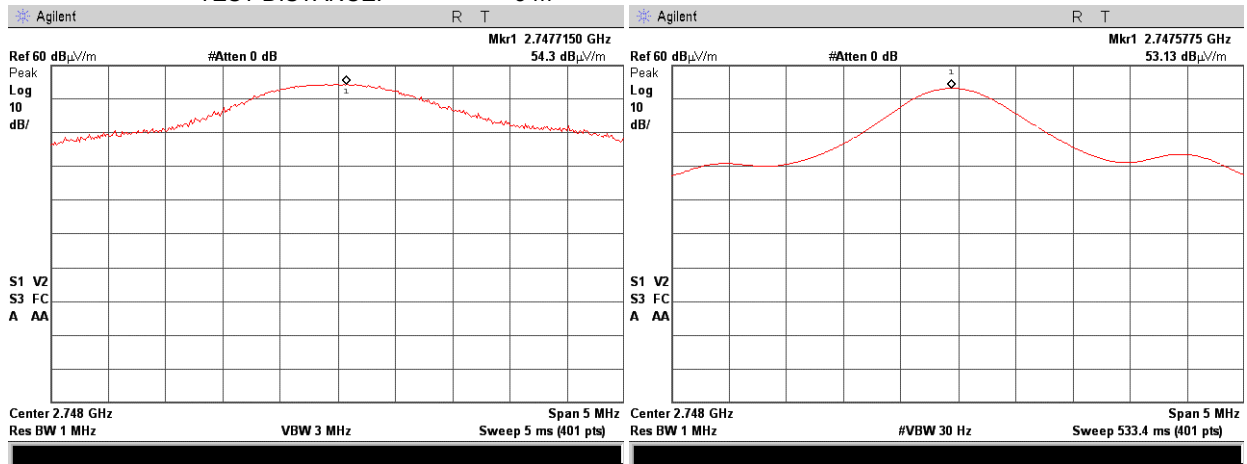
TEST SITE: OATS  
TEST DISTANCE: 3 m



|                            |                                                                                 |                                |                                  |
|----------------------------|---------------------------------------------------------------------------------|--------------------------------|----------------------------------|
| <b>Test specification:</b> | <b>FCC section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions</b> |                                |                                  |
| <b>Test procedure:</b>     | Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4 |                                |                                  |
| <b>Test mode:</b>          | Compliance                                                                      | <b>Verdict: PASS</b>           |                                  |
| <b>Date:</b>               | 2/2/2011 - 2/7/2011                                                             |                                |                                  |
| <b>Temperature:</b> 22 °C  | <b>Air Pressure:</b> 1015 hPa                                                   | <b>Relative Humidity:</b> 50 % | <b>Power Supply:</b> 3 V battery |
| <b>Remarks:</b>            |                                                                                 |                                |                                  |

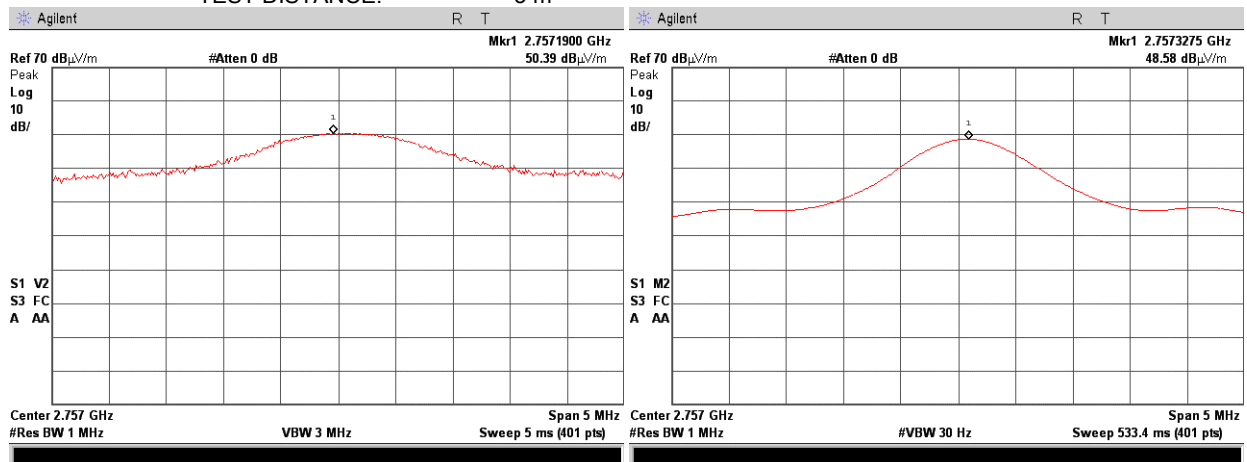
Plot 7.7.26 Radiated emission measurements at the third harmonic of mid carrier frequency

TEST SITE: OATS  
TEST DISTANCE: 3 m



Plot 7.7.27 Radiated emission measurements at the third harmonic of high carrier frequency

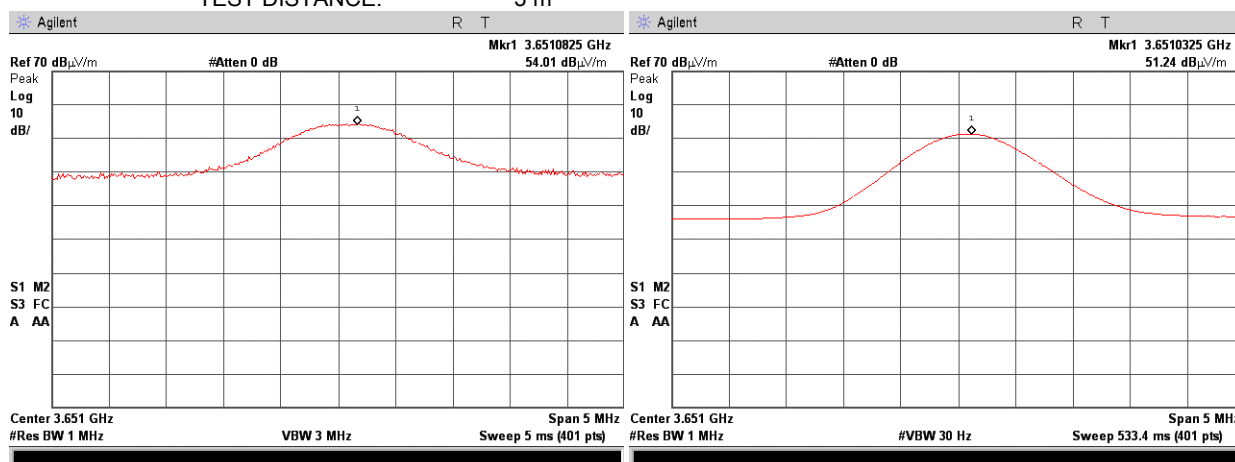
TEST SITE: OATS  
TEST DISTANCE: 3 m



|                                                                                                        |                                  |
|--------------------------------------------------------------------------------------------------------|----------------------------------|
| <b>Test specification:</b> FCC section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions    |                                  |
| <b>Test procedure:</b> Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4 |                                  |
| <b>Test mode:</b> Compliance                                                                           | <b>Verdict:</b> PASS             |
| <b>Date:</b> 2/2/2011 - 2/7/2011                                                                       |                                  |
| <b>Temperature:</b> 22 °C                                                                              | <b>Air Pressure:</b> 1015 hPa    |
| <b>Relative Humidity:</b> 50 %                                                                         | <b>Power Supply:</b> 3 V battery |
| <b>Remarks:</b>                                                                                        |                                  |

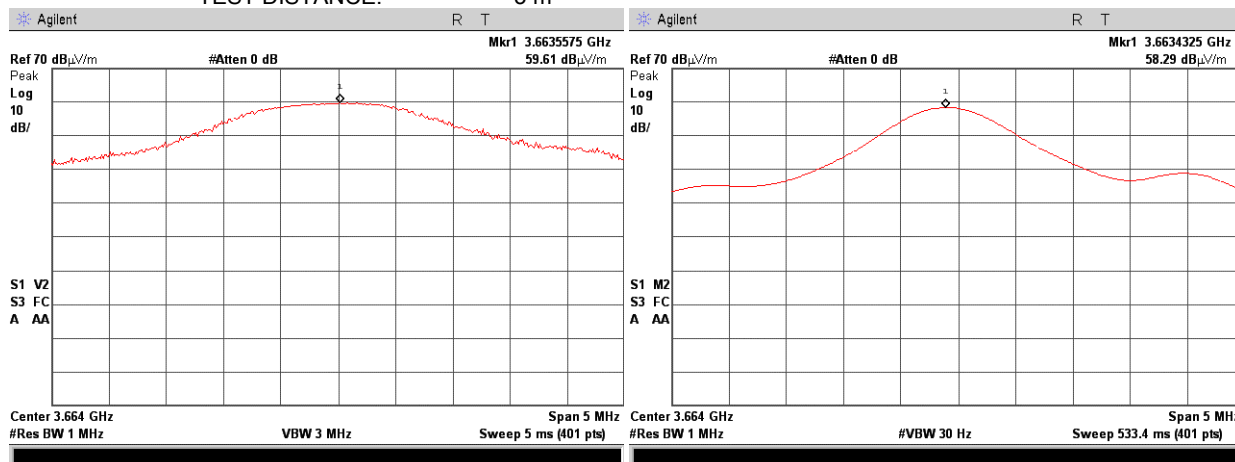
Plot 7.7.28 Radiated emission measurements at the fourth harmonic of low carrier frequency

TEST SITE: OATS  
TEST DISTANCE: 3 m



Plot 7.7.29 Radiated emission measurements at the fourth harmonic of mid carrier frequency

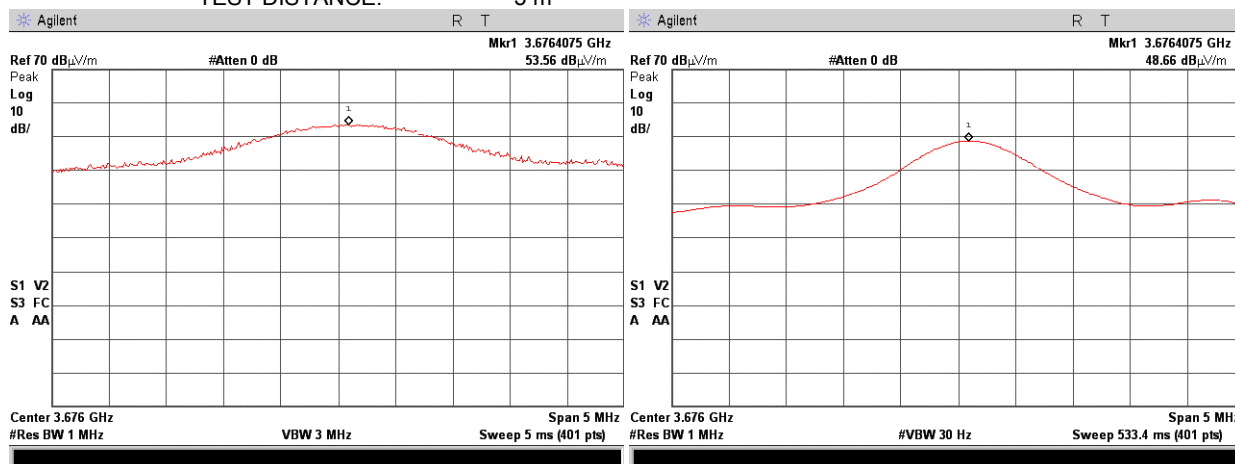
TEST SITE: OATS  
TEST DISTANCE: 3 m



|                            |                                                                                 |                                |                                  |
|----------------------------|---------------------------------------------------------------------------------|--------------------------------|----------------------------------|
| <b>Test specification:</b> | <b>FCC section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions</b> |                                |                                  |
| <b>Test procedure:</b>     | Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4 |                                |                                  |
| <b>Test mode:</b>          | Compliance                                                                      | <b>Verdict: PASS</b>           |                                  |
| <b>Date:</b>               | 2/2/2011 - 2/7/2011                                                             |                                |                                  |
| <b>Temperature:</b> 22 °C  | <b>Air Pressure:</b> 1015 hPa                                                   | <b>Relative Humidity:</b> 50 % | <b>Power Supply:</b> 3 V battery |
| <b>Remarks:</b>            |                                                                                 |                                |                                  |

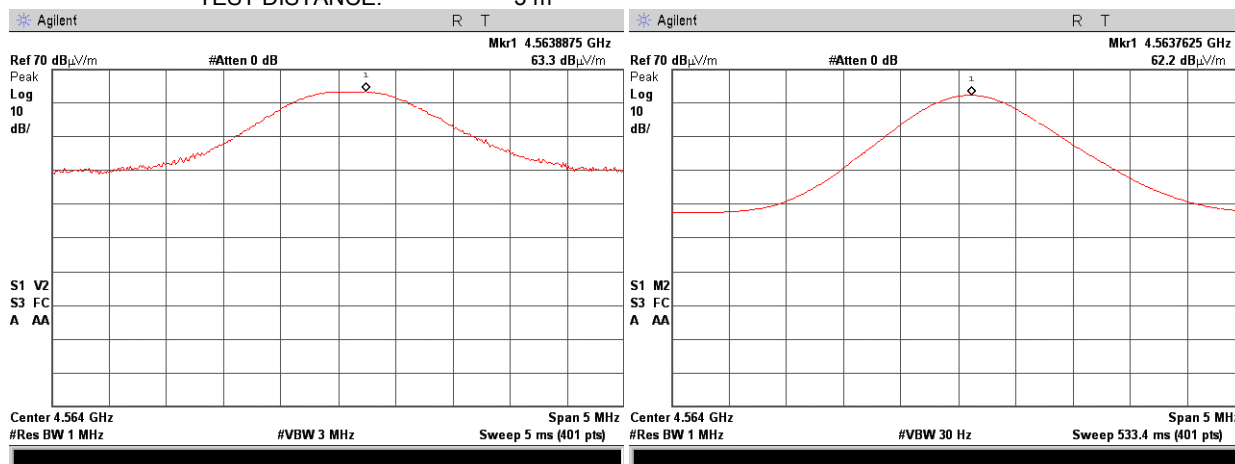
**Plot 7.7.30 Radiated emission measurements at the fourth harmonic of high carrier frequency**

TEST SITE: OATS  
TEST DISTANCE: 3 m



**Plot 7.7.31 Radiated emission measurements at the fifth harmonic of low carrier frequency**

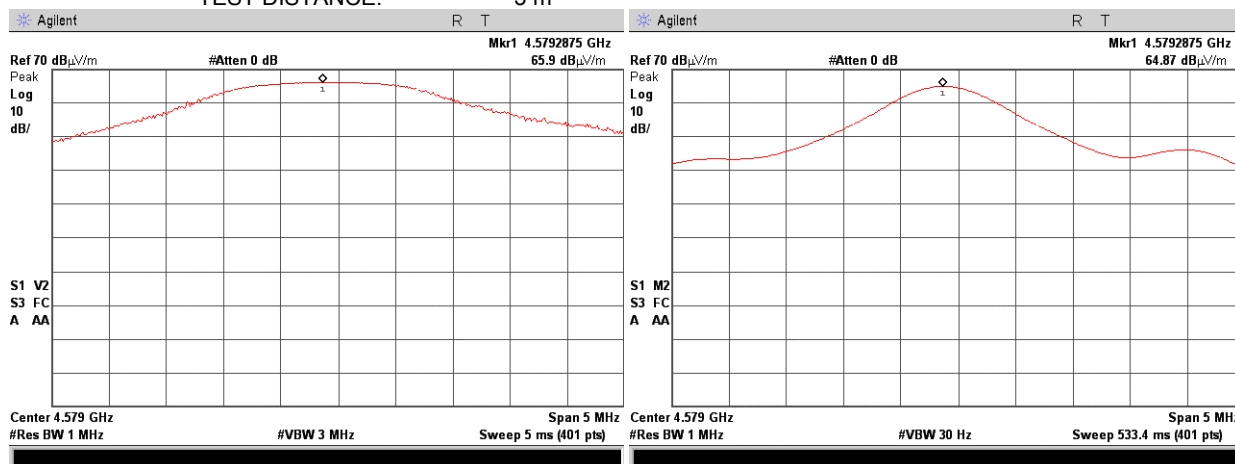
TEST SITE: OATS  
TEST DISTANCE: 3 m



|                            |                                                                                 |                                |                                  |
|----------------------------|---------------------------------------------------------------------------------|--------------------------------|----------------------------------|
| <b>Test specification:</b> | <b>FCC section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions</b> |                                |                                  |
| <b>Test procedure:</b>     | Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4 |                                |                                  |
| <b>Test mode:</b>          | Compliance                                                                      | <b>Verdict: PASS</b>           |                                  |
| <b>Date:</b>               | 2/2/2011 - 2/7/2011                                                             |                                |                                  |
| <b>Temperature:</b> 22 °C  | <b>Air Pressure:</b> 1015 hPa                                                   | <b>Relative Humidity:</b> 50 % | <b>Power Supply:</b> 3 V battery |
| <b>Remarks:</b>            |                                                                                 |                                |                                  |

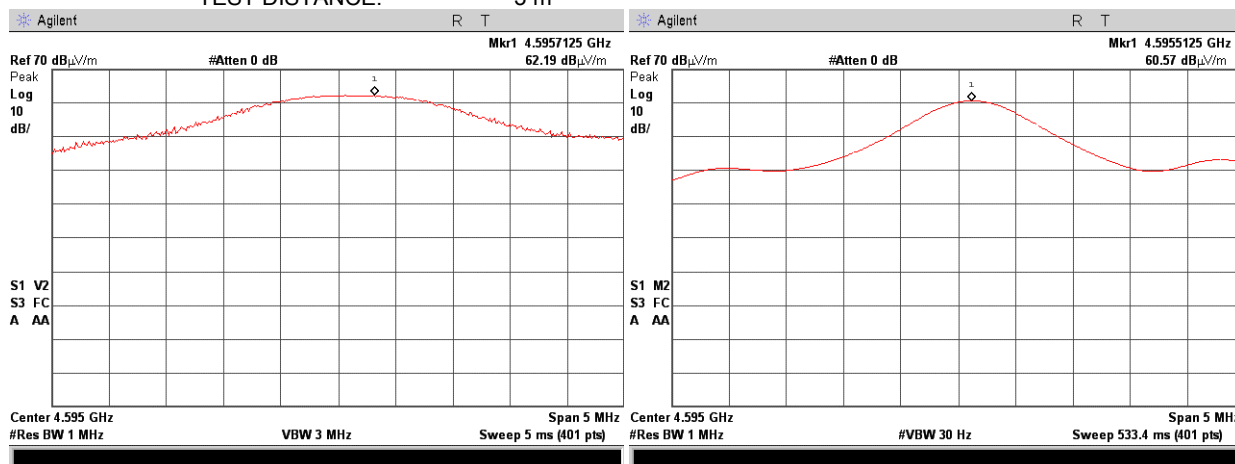
**Plot 7.7.32 Radiated emission measurements at the fifth harmonic of mid carrier frequency**

TEST SITE: OATS  
TEST DISTANCE: 3 m



**Plot 7.7.33 Radiated emission measurements at the fifth harmonic of high carrier frequency**

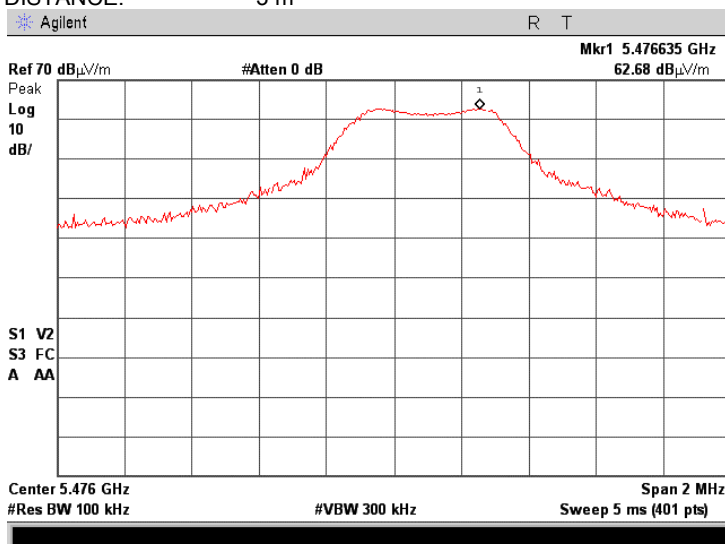
TEST SITE: OATS  
TEST DISTANCE: 3 m



|                            |                                                                                 |                                |                                  |
|----------------------------|---------------------------------------------------------------------------------|--------------------------------|----------------------------------|
| <b>Test specification:</b> | <b>FCC section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions</b> |                                |                                  |
| <b>Test procedure:</b>     | Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4 |                                |                                  |
| <b>Test mode:</b>          | Compliance                                                                      | <b>Verdict:</b>                | <b>PASS</b>                      |
| <b>Date:</b>               | 2/2/2011 - 2/7/2011                                                             |                                |                                  |
| <b>Temperature:</b> 22 °C  | <b>Air Pressure:</b> 1015 hPa                                                   | <b>Relative Humidity:</b> 50 % | <b>Power Supply:</b> 3 V battery |
| <b>Remarks:</b>            |                                                                                 |                                |                                  |

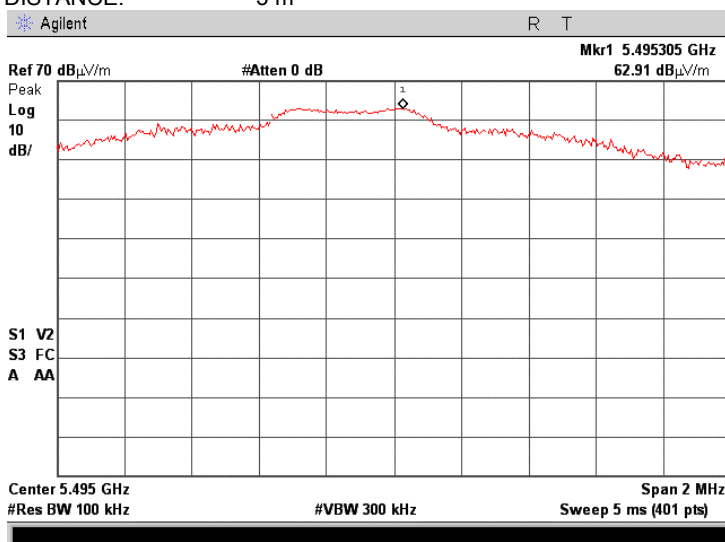
Plot 7.7.34 Radiated emission measurements at the sixth harmonic of low carrier frequency

TEST SITE: OATS  
TEST DISTANCE: 3 m



Plot 7.7.35 Radiated emission measurements at the sixth harmonic of mid carrier frequency

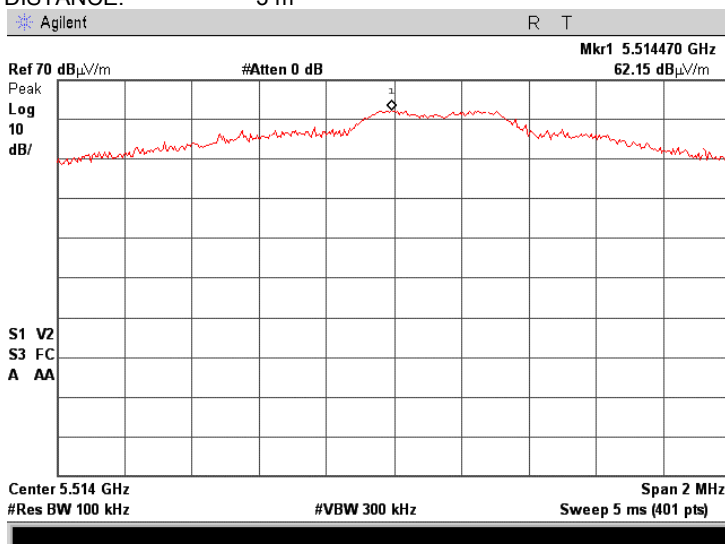
TEST SITE: OATS  
TEST DISTANCE: 3 m



|                            |                                                                                 |                                |                                  |
|----------------------------|---------------------------------------------------------------------------------|--------------------------------|----------------------------------|
| <b>Test specification:</b> | <b>FCC section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions</b> |                                |                                  |
| <b>Test procedure:</b>     | Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4 |                                |                                  |
| <b>Test mode:</b>          | Compliance                                                                      | <b>Verdict:</b>                | <b>PASS</b>                      |
| <b>Date:</b>               | 2/2/2011 - 2/7/2011                                                             |                                |                                  |
| <b>Temperature:</b> 22 °C  | <b>Air Pressure:</b> 1015 hPa                                                   | <b>Relative Humidity:</b> 50 % | <b>Power Supply:</b> 3 V battery |
| <b>Remarks:</b>            |                                                                                 |                                |                                  |

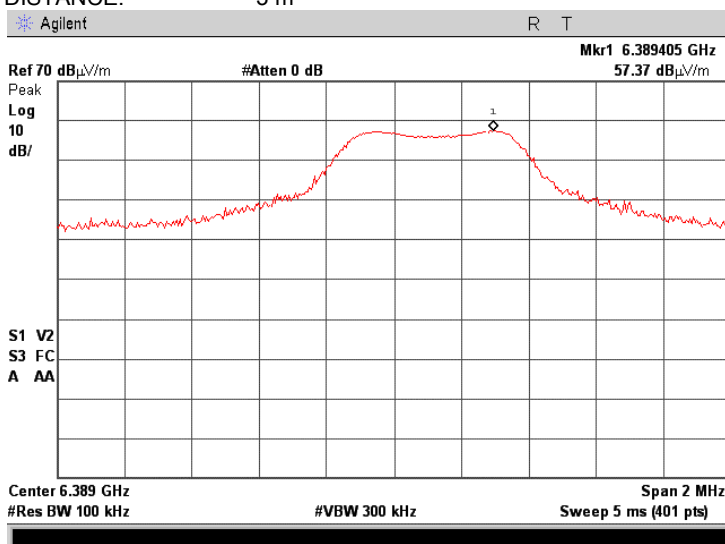
**Plot 7.7.36 Radiated emission measurements at the sixth harmonic of high carrier frequency**

TEST SITE: OATS  
TEST DISTANCE: 3 m



**Plot 7.7.37 Radiated emission measurements at the seventh harmonic of low carrier frequency**

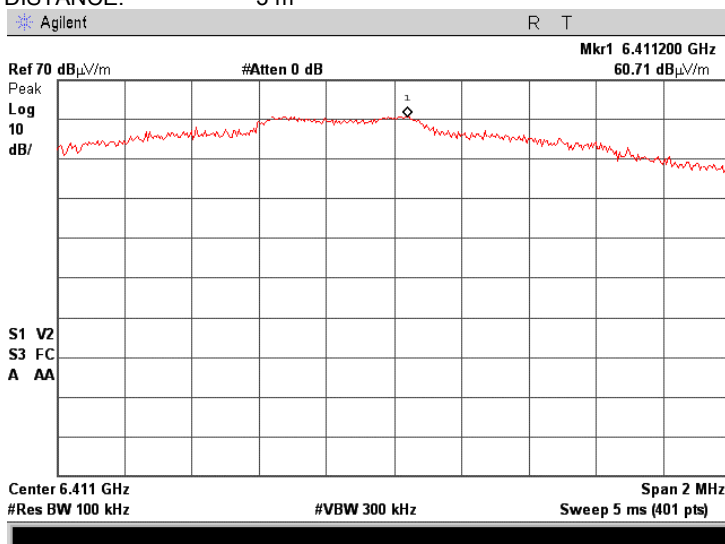
TEST SITE: OATS  
TEST DISTANCE: 3 m



|                            |                                                                                 |                                |                                  |
|----------------------------|---------------------------------------------------------------------------------|--------------------------------|----------------------------------|
| <b>Test specification:</b> | <b>FCC section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions</b> |                                |                                  |
| <b>Test procedure:</b>     | Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4 |                                |                                  |
| <b>Test mode:</b>          | Compliance                                                                      | <b>Verdict:</b>                | <b>PASS</b>                      |
| <b>Date:</b>               | 2/2/2011 - 2/7/2011                                                             |                                |                                  |
| <b>Temperature:</b> 22 °C  | <b>Air Pressure:</b> 1015 hPa                                                   | <b>Relative Humidity:</b> 50 % | <b>Power Supply:</b> 3 V battery |
| <b>Remarks:</b>            |                                                                                 |                                |                                  |

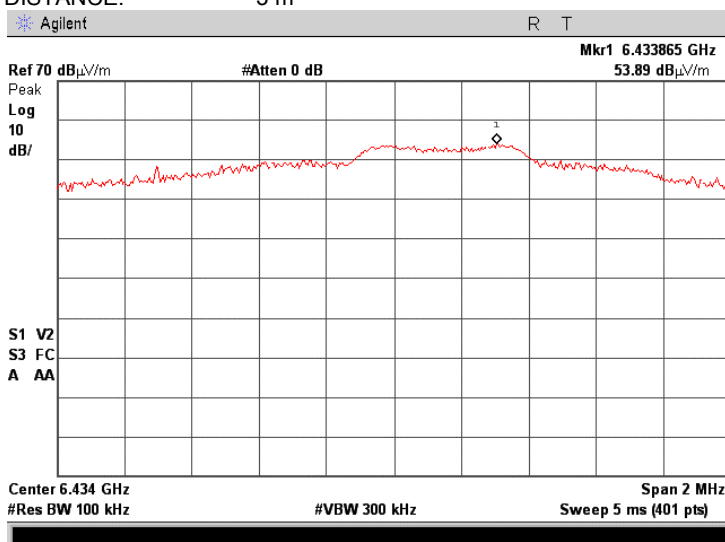
Plot 7.7.38 Radiated emission measurements at the seventh harmonic of mid carrier frequency

TEST SITE: OATS  
TEST DISTANCE: 3 m



Plot 7.7.39 Radiated emission measurements at the seventh harmonic of high carrier frequency

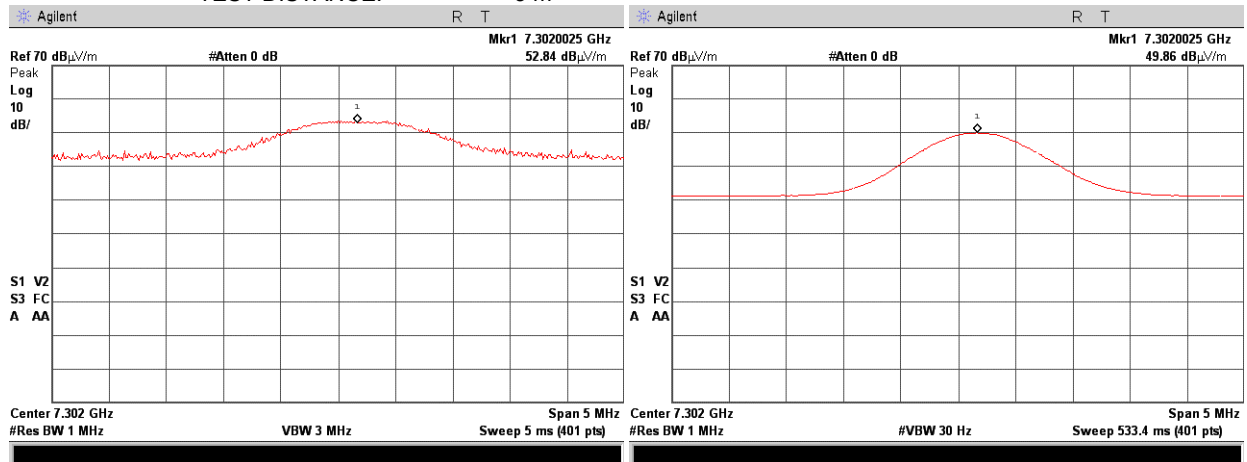
TEST SITE: OATS  
TEST DISTANCE: 3 m



|                            |                                                                                 |                                |                                  |
|----------------------------|---------------------------------------------------------------------------------|--------------------------------|----------------------------------|
| <b>Test specification:</b> | <b>FCC section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions</b> |                                |                                  |
| <b>Test procedure:</b>     | Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4 |                                |                                  |
| <b>Test mode:</b>          | Compliance                                                                      | <b>Verdict: PASS</b>           |                                  |
| <b>Date:</b>               | 2/2/2011 - 2/7/2011                                                             |                                |                                  |
| <b>Temperature:</b> 22 °C  | <b>Air Pressure:</b> 1015 hPa                                                   | <b>Relative Humidity:</b> 50 % | <b>Power Supply:</b> 3 V battery |
| <b>Remarks:</b>            |                                                                                 |                                |                                  |

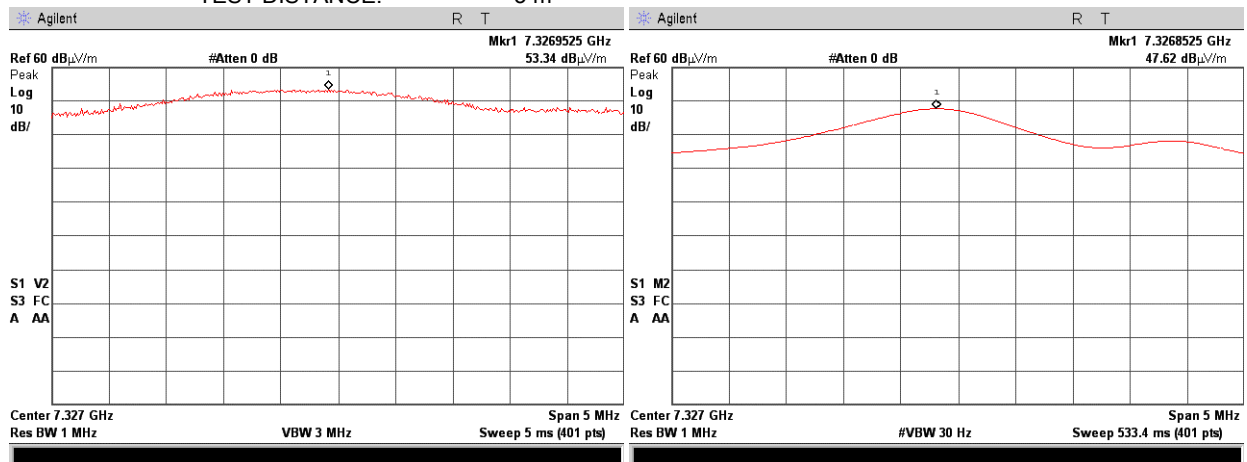
**Plot 7.7.40 Radiated emission measurements at the eighth harmonic of low carrier frequency**

TEST SITE: OATS  
TEST DISTANCE: 3 m



**Plot 7.7.41 Radiated emission measurements at the eighth harmonic of mid carrier frequency**

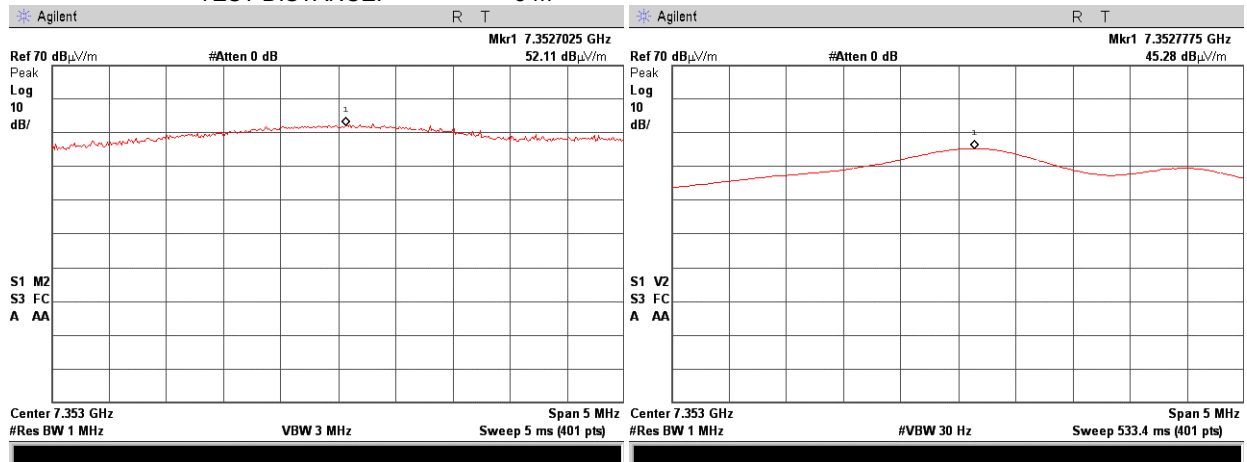
TEST SITE: OATS  
TEST DISTANCE: 3 m



|                            |                               |                                                                                 |                                  |
|----------------------------|-------------------------------|---------------------------------------------------------------------------------|----------------------------------|
| <b>Test specification:</b> |                               | <b>FCC section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions</b> |                                  |
| <b>Test procedure:</b>     |                               | Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4 |                                  |
| <b>Test mode:</b>          | Compliance                    | <b>Verdict:</b> PASS                                                            |                                  |
| <b>Date:</b>               | 2/2/2011 - 2/7/2011           |                                                                                 |                                  |
| <b>Temperature:</b> 22 °C  | <b>Air Pressure:</b> 1015 hPa | <b>Relative Humidity:</b> 50 %                                                  | <b>Power Supply:</b> 3 V battery |
| <b>Remarks:</b>            |                               |                                                                                 |                                  |

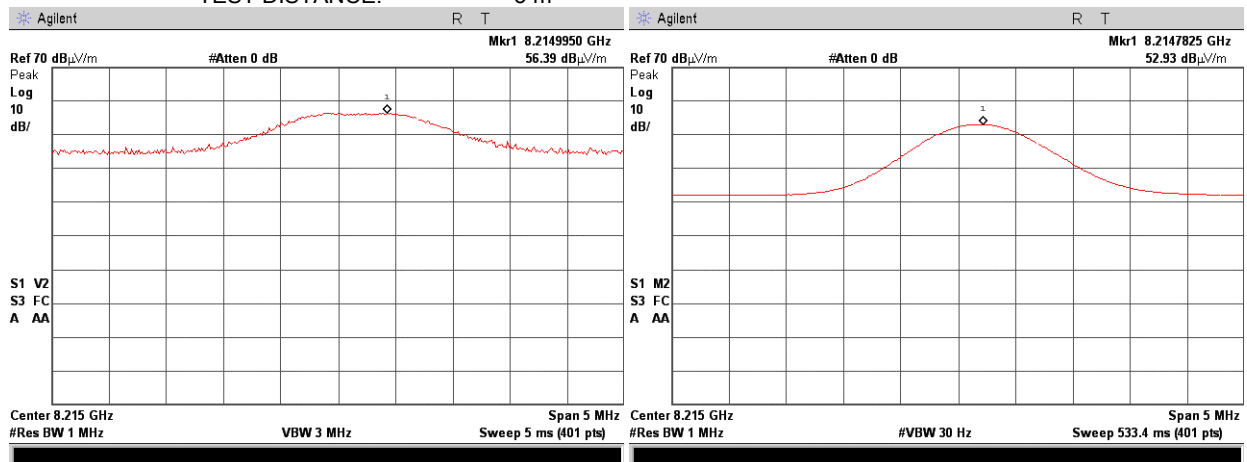
Plot 7.7.42 Radiated emission measurements at the eighth harmonic of high carrier frequency

TEST SITE: OATS  
TEST DISTANCE: 3 m



Plot 7.7.43 Radiated emission measurements at the ninth harmonic of low carrier frequency

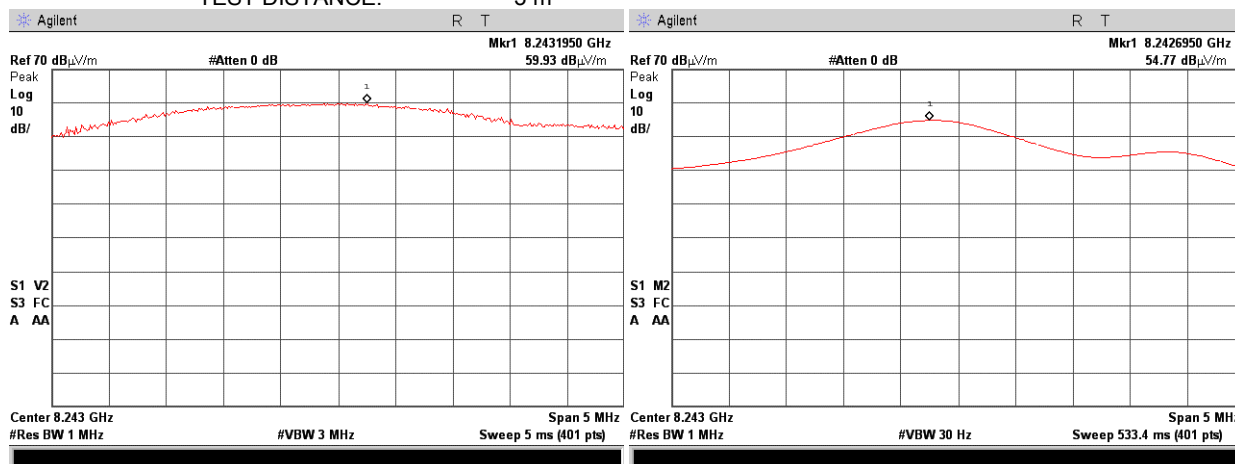
TEST SITE: OATS  
TEST DISTANCE: 3 m



|                            |                                                                                 |                                |                                  |
|----------------------------|---------------------------------------------------------------------------------|--------------------------------|----------------------------------|
| <b>Test specification:</b> | <b>FCC section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions</b> |                                |                                  |
| <b>Test procedure:</b>     | Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4 |                                |                                  |
| <b>Test mode:</b>          | Compliance                                                                      | <b>Verdict: PASS</b>           |                                  |
| <b>Date:</b>               | 2/2/2011 - 2/7/2011                                                             |                                |                                  |
| <b>Temperature:</b> 22 °C  | <b>Air Pressure:</b> 1015 hPa                                                   | <b>Relative Humidity:</b> 50 % | <b>Power Supply:</b> 3 V battery |
| <b>Remarks:</b>            |                                                                                 |                                |                                  |

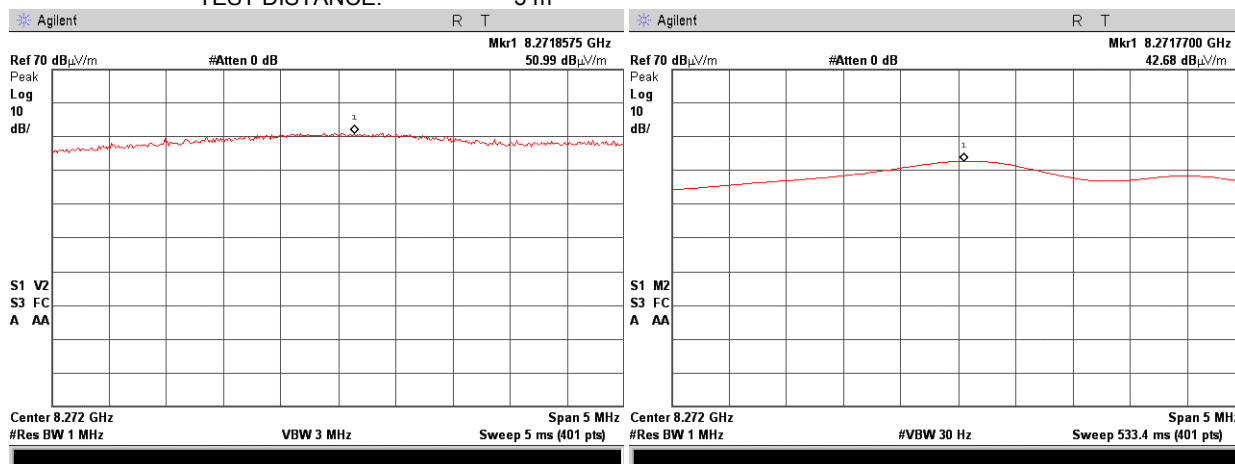
Plot 7.7.44 Radiated emission measurements at the ninth harmonic of mid carrier frequency

TEST SITE: OATS  
TEST DISTANCE: 3 m



Plot 7.7.45 Radiated emission measurements at the ninth harmonic of high carrier frequency

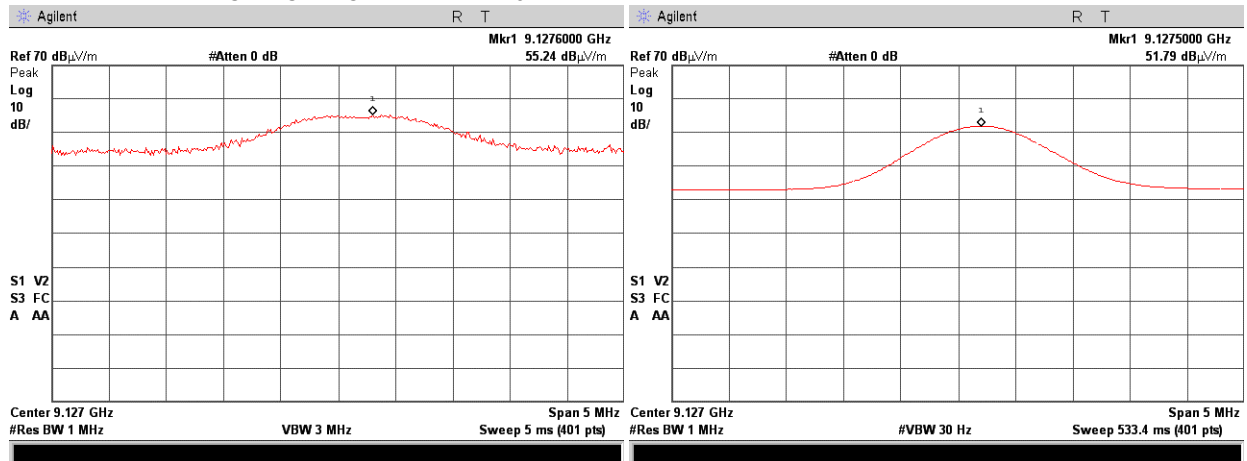
TEST SITE: OATS  
TEST DISTANCE: 3 m



|                            |                               |                                                                                 |                                  |
|----------------------------|-------------------------------|---------------------------------------------------------------------------------|----------------------------------|
| <b>Test specification:</b> |                               | <b>FCC section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions</b> |                                  |
| <b>Test procedure:</b>     |                               | Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4 |                                  |
| <b>Test mode:</b>          | Compliance                    | <b>Verdict:</b> PASS                                                            |                                  |
| <b>Date:</b>               | 2/2/2011 - 2/7/2011           |                                                                                 |                                  |
| <b>Temperature:</b> 22 °C  | <b>Air Pressure:</b> 1015 hPa | <b>Relative Humidity:</b> 50 %                                                  | <b>Power Supply:</b> 3 V battery |
| <b>Remarks:</b>            |                               |                                                                                 |                                  |

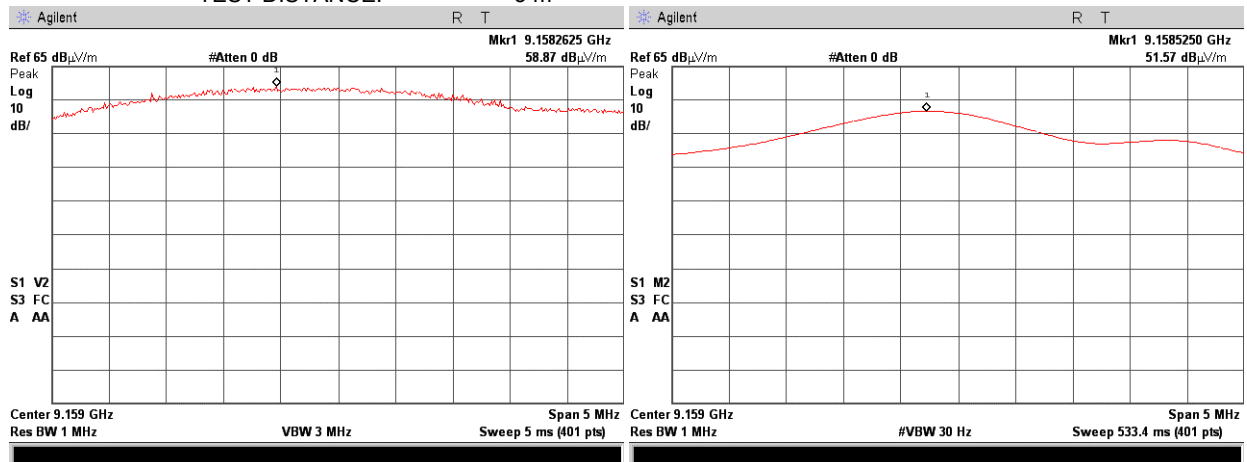
Plot 7.7.46 Radiated emission measurements at the tenth harmonic of low carrier frequency

TEST SITE: OATS  
TEST DISTANCE: 3 m



Plot 7.7.47 Radiated emission measurements at the tenth harmonic of mid carrier frequency

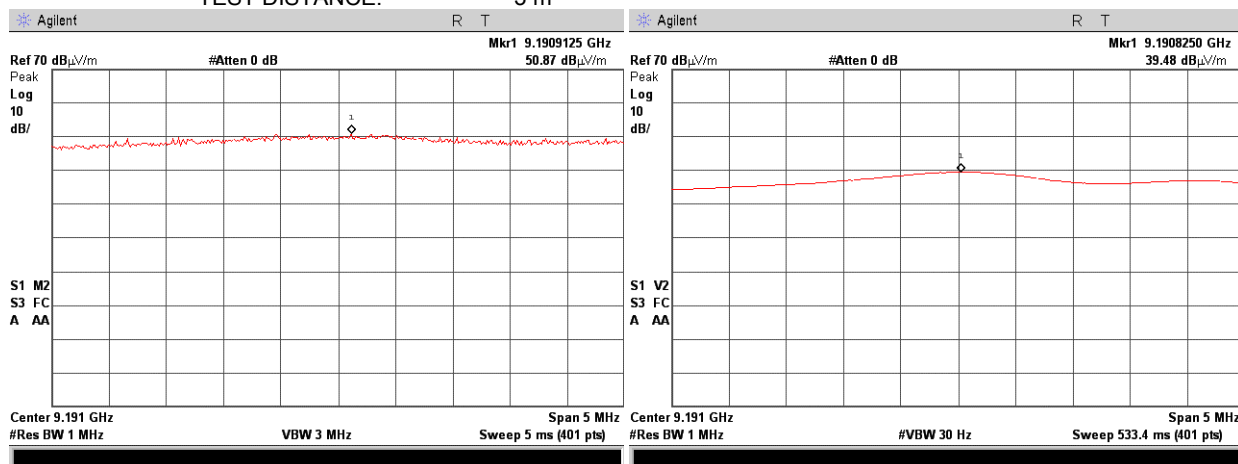
TEST SITE: OATS  
TEST DISTANCE: 3 m



|                     |                                                                                 |                         |                           |
|---------------------|---------------------------------------------------------------------------------|-------------------------|---------------------------|
| Test specification: | FCC section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions        |                         |                           |
| Test procedure:     | Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4 |                         |                           |
| Test mode:          | Compliance                                                                      | Verdict: PASS           |                           |
| Date:               | 2/2/2011 - 2/7/2011                                                             |                         |                           |
| Temperature: 22 °C  | Air Pressure: 1015 hPa                                                          | Relative Humidity: 50 % | Power Supply: 3 V battery |
| Remarks:            |                                                                                 |                         |                           |

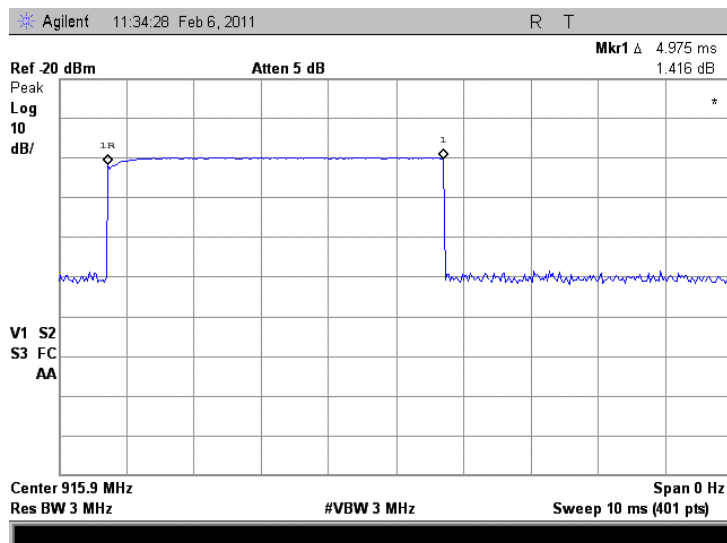
**Plot 7.7.48 Radiated emission measurements at the tenth harmonic of high carrier frequency**

TEST SITE: OATS  
TEST DISTANCE: 3 m

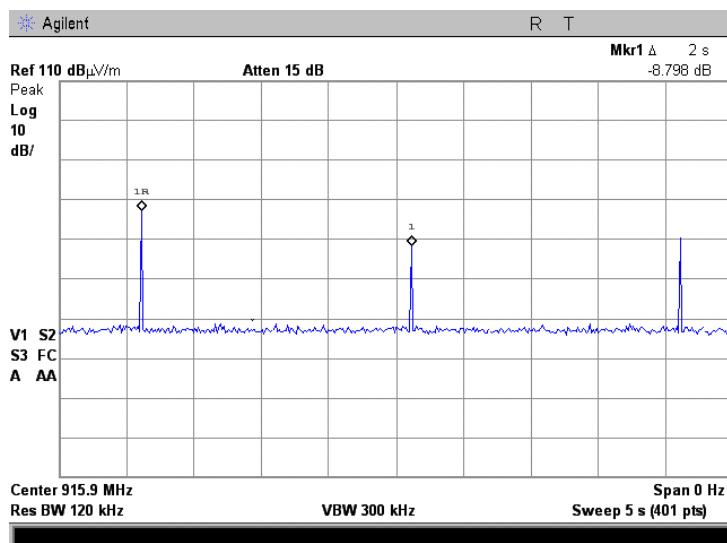


|                            |                                                                                 |                                |                                  |
|----------------------------|---------------------------------------------------------------------------------|--------------------------------|----------------------------------|
| <b>Test specification:</b> | <b>FCC section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions</b> |                                |                                  |
| <b>Test procedure:</b>     | Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4 |                                |                                  |
| <b>Test mode:</b>          | Compliance                                                                      | <b>Verdict:</b>                | <b>PASS</b>                      |
| <b>Date:</b>               | 2/2/2011 - 2/7/2011                                                             |                                |                                  |
| <b>Temperature:</b> 22 °C  | <b>Air Pressure:</b> 1015 hPa                                                   | <b>Relative Humidity:</b> 50 % | <b>Power Supply:</b> 3 V battery |
| <b>Remarks:</b>            |                                                                                 |                                |                                  |

Plot 7.7.49 Transmission pulse duration



Plot 7.7.50 Transmission pulse period



|                            |                                                                        |                                |                                  |
|----------------------------|------------------------------------------------------------------------|--------------------------------|----------------------------------|
| <b>Test specification:</b> | <b>FCC section 15.203, RSS-Gen section 7.1.2, Antenna requirements</b> |                                |                                  |
| <b>Test procedure:</b>     | Public notice DA 00-705                                                |                                |                                  |
| <b>Test mode:</b>          | Compliance                                                             | <b>Verdict:</b>                | <b>PASS</b>                      |
| <b>Date:</b>               | 12/13/2010                                                             |                                |                                  |
| <b>Temperature:</b> 25 °C  | <b>Air Pressure:</b> 1018 hPa                                          | <b>Relative Humidity:</b> 38 % | <b>Power Supply:</b> 3 V battery |
| <b>Remarks:</b>            |                                                                        |                                |                                  |

## 7.8 Antenna requirements

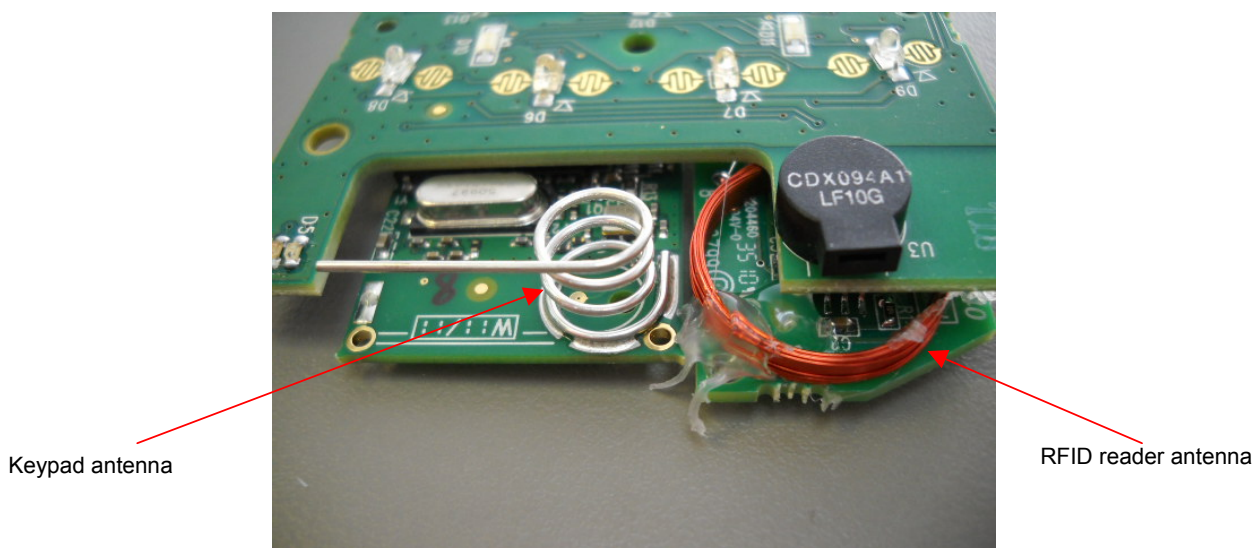
The EUT was verified for compliance with antenna requirements. A transmitter shall be designed to ensure that no antenna other than that furnished by the responsible party will be used with the device. It may be either permanently attached or employs a unique antenna connector for every antenna proposed for use with the EUT. This requirement does not apply to professionally installed transmitters.

The rationale for compliance with the above requirements was either visual inspection results or supplier declaration. The summary of results is provided in Table 7.8.1.

**Table 7.8.1 Antenna requirements**

| Requirement                                        | Rationale         | Verdict |
|----------------------------------------------------|-------------------|---------|
| The transmitter antenna is permanently attached    | Visual inspection | Comply  |
| The transmitter employs a unique antenna connector | NA                |         |
| The transmitter requires professional installation | NA                |         |

**Photograph 7.8.1 Antenna assembly**



|                                                                                       |                               |
|---------------------------------------------------------------------------------------|-------------------------------|
| <b>Test specification:</b> FCC section 15.109, RSS-Gen section 6.2, Radiated emission |                               |
| <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> 2/15/2011                                                                |                               |
| <b>Temperature:</b> 22 °C                                                             | <b>Air Pressure:</b> 1009 hPa |
| <b>Relative Humidity:</b> 52 %                                                        |                               |
| <b>Power Supply:</b> 3 V battery                                                      |                               |
| <b>Remarks:</b>                                                                       |                               |

## 8 Unintentional emissions

### 8.1 Radiated emission measurements

#### 8.1.1 General

This test was performed to measure radiated emissions from the EUT enclosure. Specification test limits are given in Table 8.1.1 and Table 8.1.2.

Table 8.1.1 Radiated emission test limits according to FCC Part 15 Section 15.109

| Frequency, MHz | Class B limit, dB(μV/m) |              | Class A limit, dB(μV/m) |              |
|----------------|-------------------------|--------------|-------------------------|--------------|
|                | 10 m distance           | 3 m distance | 10 m distance           | 3 m distance |
| 30 - 88        | 29.5*                   | 40.0         | 39.0                    | 49.5*        |
| 88 - 216       | 33.0*                   | 43.5         | 43.5                    | 54.0*        |
| 216 - 960      | 35.5*                   | 46.0         | 46.4                    | 56.9*        |
| Above 960      | 43.5*                   | 54.0         | 49.5                    | 60.0*        |

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

Table 8.1.2 Radiated emission limits according to RSS-Gen, Section 6.2

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

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

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

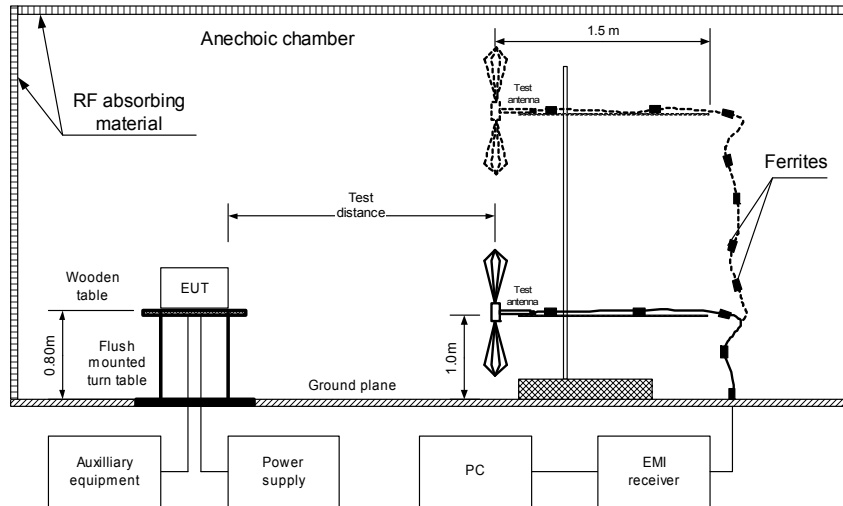
8.1.2.1 The EUT was set up as shown in Figure 8.1.1, energized and the performance check was conducted.

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

8.1.2.3 The worst test results (the lowest margins) were recorded in Table 8.1.3 and shown in the associated plots.

|                            |                               |                                                                   |                                  |
|----------------------------|-------------------------------|-------------------------------------------------------------------|----------------------------------|
| <b>Test specification:</b> |                               | <b>FCC section 15.109, RSS-Gen section 6.2, Radiated emission</b> |                                  |
| <b>Test procedure:</b>     |                               | ANSI C63.4, Sections 11.6 and 12.1.4                              |                                  |
| <b>Test mode:</b>          |                               | Compliance                                                        | <b>Verdict:</b> PASS             |
| <b>Date:</b>               |                               | 2/15/2011                                                         |                                  |
| <b>Temperature:</b> 22 °C  | <b>Air Pressure:</b> 1009 hPa | <b>Relative Humidity:</b> 52 %                                    | <b>Power Supply:</b> 3 V battery |
| <b>Remarks:</b>            |                               |                                                                   |                                  |

Figure 8.1.1 Setup for radiated emission measurements in anechoic chamber, table-top equipment



|                            |                               |                                                                   |                                  |
|----------------------------|-------------------------------|-------------------------------------------------------------------|----------------------------------|
| <b>Test specification:</b> |                               | <b>FCC section 15.109, RSS-Gen section 6.2, Radiated emission</b> |                                  |
| <b>Test procedure:</b>     |                               | ANSI C63.4, Sections 11.6 and 12.1.4                              |                                  |
| <b>Test mode:</b>          | Compliance                    | <b>Verdict:</b>                                                   | <b>PASS</b>                      |
| <b>Date:</b>               | 2/15/2011                     |                                                                   |                                  |
| <b>Temperature:</b> 22 °C  | <b>Air Pressure:</b> 1009 hPa | <b>Relative Humidity:</b> 52 %                                    | <b>Power Supply:</b> 3 V battery |
| <b>Remarks:</b>            |                               |                                                                   |                                  |

Table 8.1.3 Radiated emission test results

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

| RECESSION BANDWIDTH:    |                               |                                   |                    |                | 120 KHz                 |                         |                                      |         |
|-------------------------|-------------------------------|-----------------------------------|--------------------|----------------|-------------------------|-------------------------|--------------------------------------|---------|
| Frequency,<br>MHz       | Peak<br>emission,<br>dB(μV/m) | Quasi-peak                        |                    |                | Antenna<br>polarization | Antenna<br>height,<br>m | Turn-table<br>position**,<br>degrees | Verdict |
|                         |                               | Measured<br>emission,<br>dB(μV/m) | Limit,<br>dB(μV/m) | Margin,<br>dB* |                         |                         |                                      |         |
| No emissions were found |                               |                                   |                    |                |                         |                         |                                      | Pass    |

TEST SITE: SEMI ANECHOIC CHAMBER  
TEST DISTANCE: 3 m  
DETECTORS USED: PEAK / AVERAGE  
FREQUENCY RANGE: 1000 MHz – 5000 MHz  
RESOLUTION BANDWIDTH: 1000 kHz

| Frequency,<br>MHz       | Peak                              |                    |                | Average                           |                    |                | Antenna<br>polarization | Antenna<br>height,<br>m | Turn-table<br>position**,<br>degrees | Verdict |
|-------------------------|-----------------------------------|--------------------|----------------|-----------------------------------|--------------------|----------------|-------------------------|-------------------------|--------------------------------------|---------|
|                         | Measured<br>emission,<br>dB(μV/m) | Limit,<br>dB(μV/m) | Margin,<br>dB* | Measured<br>emission,<br>dB(μV/m) | Limit,<br>dB(μV/m) | Margin,<br>dB* |                         |                         |                                      |         |
| No emissions were found |                                   |                    |                |                                   |                    |                |                         |                         |                                      | Pass    |

\*- Margin = Measured emission - specification limit.

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

**Reference numbers of test equipment used**

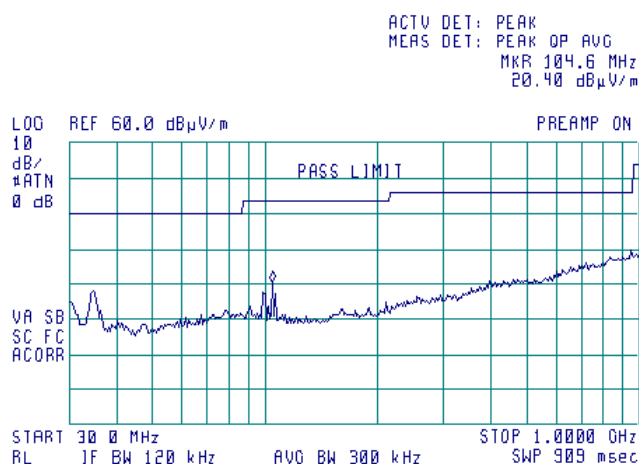
|         |         |         |         |         |         |         |         |
|---------|---------|---------|---------|---------|---------|---------|---------|
| HL 0465 | HL 0521 | HL 0593 | HL 0594 | HL 0604 | HL 1984 | HL 2871 | HL 3622 |
|---------|---------|---------|---------|---------|---------|---------|---------|

Full description is given in Appendix A.

|                            |                               |                                                                   |                                  |
|----------------------------|-------------------------------|-------------------------------------------------------------------|----------------------------------|
| <b>Test specification:</b> |                               | <b>FCC section 15.109, RSS-Gen section 6.2, Radiated emission</b> |                                  |
| <b>Test procedure:</b>     |                               | ANSI C63.4, Sections 11.6 and 12.1.4                              |                                  |
| <b>Test mode:</b>          | Compliance                    | <b>Verdict:</b>                                                   | <b>PASS</b>                      |
| <b>Date:</b>               | 2/15/2011                     |                                                                   |                                  |
| <b>Temperature:</b> 22 °C  | <b>Air Pressure:</b> 1009 hPa | <b>Relative Humidity:</b> 52 %                                    | <b>Power Supply:</b> 3 V battery |
| <b>Remarks:</b>            |                               |                                                                   |                                  |

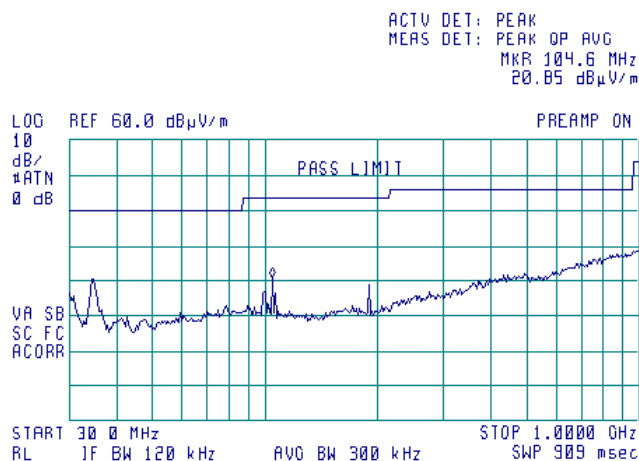
**Plot 8.1.1 Radiated emission measurements in 30 - 1000 MHz range, vertical antenna polarization**

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



**Plot 8.1.2 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

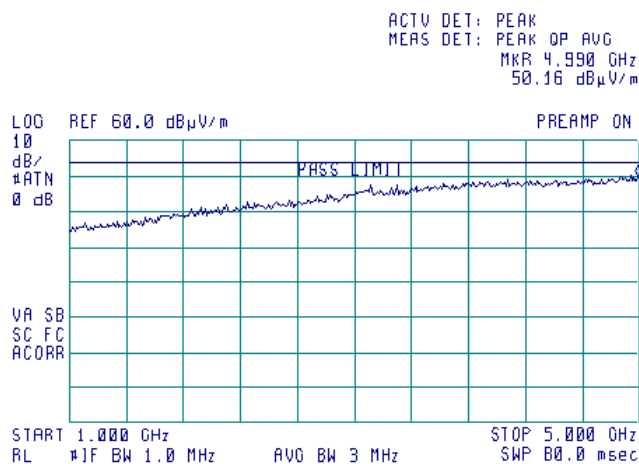


|                            |                               |                                                                   |                                  |
|----------------------------|-------------------------------|-------------------------------------------------------------------|----------------------------------|
| <b>Test specification:</b> |                               | <b>FCC section 15.109, RSS-Gen section 6.2, Radiated emission</b> |                                  |
| <b>Test procedure:</b>     |                               | ANSI C63.4, Sections 11.6 and 12.1.4                              |                                  |
| <b>Test mode:</b>          | Compliance                    | <b>Verdict:</b>                                                   | <b>PASS</b>                      |
| <b>Date:</b>               | 2/15/2011                     |                                                                   |                                  |
| <b>Temperature:</b> 22 °C  | <b>Air Pressure:</b> 1009 hPa | <b>Relative Humidity:</b> 52 %                                    | <b>Power Supply:</b> 3 V battery |
| <b>Remarks:</b>            |                               |                                                                   |                                  |

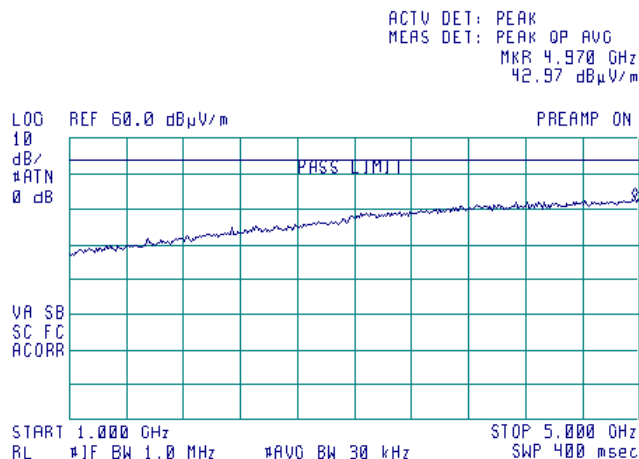
**Plot 8.1.3 Radiated emission measurements above 1000 MHz, vertical antenna polarization**

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

(42)



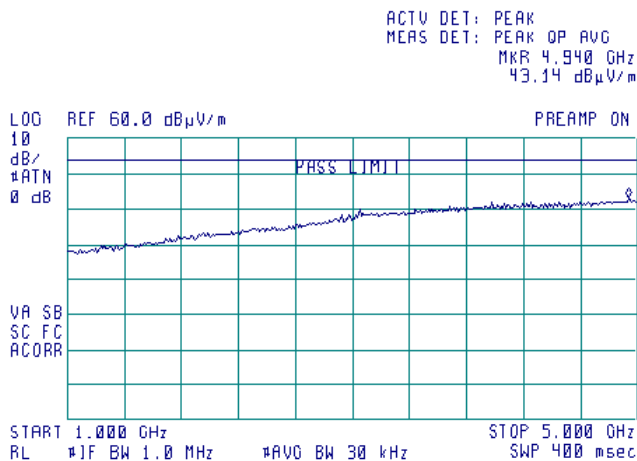
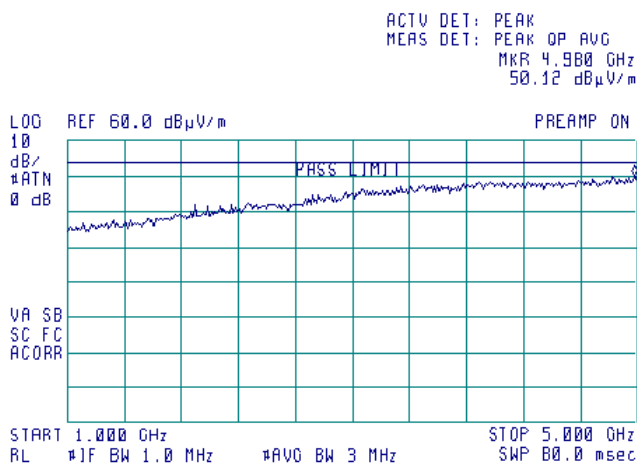
(42)



|                            |                               |                                                                   |                                  |
|----------------------------|-------------------------------|-------------------------------------------------------------------|----------------------------------|
| <b>Test specification:</b> |                               | <b>FCC section 15.109, RSS-Gen section 6.2, Radiated emission</b> |                                  |
| <b>Test procedure:</b>     |                               | ANSI C63.4, Sections 11.6 and 12.1.4                              |                                  |
| <b>Test mode:</b>          | Compliance                    | <b>Verdict:</b>                                                   | <b>PASS</b>                      |
| <b>Date:</b>               | 2/15/2011                     |                                                                   |                                  |
| <b>Temperature:</b> 22 °C  | <b>Air Pressure:</b> 1009 hPa | <b>Relative Humidity:</b> 52 %                                    | <b>Power Supply:</b> 3 V battery |
| <b>Remarks:</b>            |                               |                                                                   |                                  |

**Plot 8.1.4 Radiated emission measurements above 1000 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.  |
|-------|--------------------------------------------------------------------------|-----------------------------------------------------------|------------------|-----------------------------------|-----------|-----------|
| 0034  | Antenna, Log Periodic, 200 - 1000 MHz                                    | Electro-Metrics                                           | LPA 25/30        | 1988                              | 09-Mar-11 | 09-Mar-12 |
| 0415  | Cable, Coax, RF, RG-214                                                  | Hermon Laboratories                                       | CC-3             | 056                               | 01-Dec-10 | 01-Dec-11 |
| 0446  | Antenna, Loop, Active, 10 kHz - 30 MHz                                   | EMCO                                                      | 6502             | 2857                              | 29-Jun-10 | 29-Jun-11 |
| 0465  | Anechoic Chamber<br>9(L) x 6.5(W) x 5.5(H) m                             | Hermon Laboratories                                       | AC - 1           | 023                               | 16-Sep-10 | 16-Sep-11 |
| 0521  | EMI Receiver (Spectrum Analyzer) with<br>RF filter section 9 kHz-6.5 GHz | Hewlett Packard                                           | 8546A            | 3617A<br>00319,<br>3448A002<br>53 | 25-Aug-10 | 25-Aug-11 |
| 0593  | Antenna Mast, 1-4 m Pneumatic                                            | Madgesh                                                   | AM-F1            | 101                               | 04-Feb-11 | 04-Feb-12 |
| 0594  | Turn Table FOR ANECHOIC CHAMBER<br>flush mount d=1.2 m Pneumatic         | Hermon Laboratories                                       | TT-<br>WDC1      | 102                               | 12-Oct-10 | 12-Oct-11 |
| 0604  | Antenna BiconiLog Log-Periodic/T Bow-<br>TIE, 26 - 2000 MHz              | EMCO                                                      | 3141             | 9611-1011                         | 11-Jan-11 | 11-Jan-12 |
| 0812  | Cable Coax, RG-214, 11.5 m, N-type<br>connectors                         | Hermon Laboratories                                       | C214-11          | 148                               | 01-Dec-10 | 01-Dec-11 |
| 1425  | EMI Receiver, 9 kHz - 2.9 GHz, System:<br>HL1426, HL1427                 | Agilent Technologies                                      | 8542E            | 3710A002<br>22,<br>3705A002<br>04 | 24-Aug-10 | 24-Aug-11 |
| 1984  | Antenna, Double-Ridged Waveguide<br>Horn, 1-18 GHz, 300 W                | EMC Test Systems                                          | 3115             | 9911-5964                         | 11-Jun-10 | 11-Jun-11 |
| 2432  | Antenna, Double-Ridged Waveguide Horn<br>1-18 GHz                        | EMC Test Systems                                          | 3115             | 00027177                          | 11-Jun-10 | 11-Jun-11 |
| 2697  | Antenna, 30 MHz - 3.0 GHz                                                | Sunol Sciences.<br>Corp.<br>Pleasanton,<br>California USA | JB3              | A022805                           | 11-Jan-11 | 11-Jan-12 |
| 2780  | EMC analyzer, 100 Hz to 26.5 GHz                                         | Agilent Technologies                                      | E7405A           | MY451024<br>62                    | 07-Jul-10 | 07-Jul-11 |
| 2871  | Microwave Cable Assembly, 18 GHz,<br>6.4 m, SMA - SMA                    | Huber-Suhner                                              | 198-8155-<br>00  | 2871                              | 14-Sep-10 | 14-Sep-11 |
| 2882  | Cable, 18 GHz N-type, M-F, 3 m                                           | Bird Electronic Corp.                                     | TC-<br>MNFN-3.0  | 211539<br>001                     | 03-Oct-10 | 03-Oct-11 |
| 2883  | Cable, 18 GHz N-type, M-F, 3 m                                           | Bird Electronic Corp.                                     | TC-<br>MNFN-3.0  | 211539<br>003                     | 01-Dec-10 | 01-Dec-11 |
| 2909  | Spectrum analyzer, ESA-E, 100 Hz to<br>26.5 GHz                          | Agilent Technologies                                      | E4407B           | MY414447<br>62                    | 07-May-10 | 07-May-11 |
| 3001  | EMC Analyzer, 9 kHz to 3 GHz                                             | Agilent Technologies                                      | E7402A           | US394401<br>80                    | 26-Dec-10 | 26-Dec-11 |
| 3334  | Filter, High Pass, 2.5 GHz                                               | LORCH<br>MICROWAVE                                        | 5HP7-<br>2500-SR | Z22                               | 04-Oct-10 | 04-Oct-11 |
| 3343  | High Pass Filter, 50 Ohm,<br>2650 to 6500 MHz                            | Mini-Circuits                                             | VHF-<br>2700+    | NA                                | 04-Oct-10 | 04-Oct-11 |

| HL No | Description                                                           | Manufacturer         | Model    | Ser. No.   | Last Cal. | Due Cal.  |
|-------|-----------------------------------------------------------------------|----------------------|----------|------------|-----------|-----------|
| 3386  | Microwave Cable Assembly, 26.5 GHz, 1.0 m, N type/N type              | Suhner Sucoflex      | 104EA    | 3386       | 07-Feb-11 | 07-Feb-12 |
| 3390  | Microwave Cable Assembly, 26.5 GHz, 1.0 m, N type/N type              | Suhner Sucoflex      | 104EA    | 3390       | 07-Feb-11 | 07-Feb-12 |
| 3622  | Cable RF, 6.0 m, N type-N type, DC-6.5 GHz                            | Alpha Wire           | RG 214/U | NA         | 27-May-10 | 27-May-11 |
| 3632  | Cable RF, 5.4 m, N type-N type, DC-6.5 GHz                            | Alpha Wire           | RG 214/U | NA         | 27-May-10 | 27-May-11 |
| 3884  | Preamplifier, 0.1 to 18 GHz, Gain 25 dB, N-type(f) in, N-type(m) out. | Agilent Technologies | 87405C   | MY47010418 | 13-Jan-11 | 13-Jan-12 |

## 10 APPENDIX B Measurement uncertainties

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

| Test description                                                                                     | Expanded uncertainty                                                                                                                                                                                                                                                                                         |
|------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Conducted carrier power at RF antenna connector                                                      | Below 12.4 GHz: $\pm 1.7$ dB<br>12.4 GHz to 40 GHz: $\pm 2.3$ dB                                                                                                                                                                                                                                             |
| Conducted emissions at RF antenna connector                                                          | 9 kHz to 2.9 GHz: $\pm 2.6$ dB<br>2.9 GHz to 6.46 GHz: $\pm 3.5$ dB<br>6.46 GHz to 13.2 GHz: $\pm 4.3$ dB<br>13.2 GHz to 22.0 GHz: $\pm 5.0$ dB<br>22.0 GHz to 26.8 GHz: $\pm 5.5$ dB<br>26.8 GHz to 40.0 GHz: $\pm 4.8$ dB                                                                                  |
| Occupied bandwidth                                                                                   | $\pm 8.0$ %                                                                                                                                                                                                                                                                                                  |
| Duty cycle, timing (Tx ON / OFF) and average factor measurements                                     | $\pm 1.0$ %                                                                                                                                                                                                                                                                                                  |
| Radiated emissions at 3 m measuring distance<br>Horizontal polarization<br><br>Vertical polarization | Biconilog antenna: $\pm 5.3$ dB<br>Biconical antenna: $\pm 5.0$ dB<br>Log periodic antenna: $\pm 5.3$ dB<br>Double ridged horn antenna: $\pm 5.3$ dB<br>Biconilog antenna: $\pm 6.0$ dB<br>Biconical antenna: $\pm 5.7$ dB<br>Log periodic antenna: $\pm 6.0$ dB<br>Double ridged horn antenna: $\pm 6.0$ dB |

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

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

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

## 11 APPENDIX C Test laboratory description

Tests were performed at Hermon Laboratories Ltd., which is a fully independent, private, EMC, safety, environmental and telecommunication testing facility.

Hermon Laboratories is listed by the Federal Communications Commission (USA) for all parts of Code of Federal Regulations 47 (CFR 47), Registration Numbers 90624 for OATS and 90623 for the anechoic chamber; by Industry Canada for electromagnetic emissions (file numbers IC 2186A-1 for OATS, IC 2186A-2 for anechoic chamber, IC 2186A-3 for full-anechoic chamber for RE measurements above 1 GHz), certified by VCCI, Japan (the registration numbers are R-808 for OATS, R-1082 for anechoic chamber, G-27 for full-anechoic chamber for RE measurements above 1 GHz, C-845 for conducted emissions site, T-1606 for conducted emissions at telecommunication ports), has a status of a Telefication - Listed Testing Laboratory, Certificate No. L138/00. The laboratory is accredited by American Association for Laboratory Accreditation (USA) according to ISO/IEC 17025 for electromagnetic compatibility, product safety, telecommunications testing and environmental simulation (for exact scope please refer to Certificate No. 839.01). The FCC Designation Number is US1003.

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Person for contact: Mr. Alex Usoskin, CEO.

## 12 APPENDIX D Specification references

|                                |                                                                                                                                                                     |
|--------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| FCC 47CFR part 15: 2010        | Radio Frequency Devices                                                                                                                                             |
| Public notice DA 00- 705: 2000 | Filing and measurement guidelines for frequency hopping spread spectrum systems.                                                                                    |
| ANSI C63.2: 1996               | American National Standard for Instrumentation-Electromagnetic Noise and Field Strength, 10 kHz to 40 GHz-Specifications                                            |
| ANSI C63.4: 2003               | American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz |
| RSS-210 Issue 8: 2010          | Low Power Licence- Exempt Radiocommunication Devices                                                                                                                |
| RSS-Gen Issue 3: 2010          | General Requirements and Information for the Certification of Radiocommunication Equipment                                                                          |

## 13 APPENDIX E Test equipment correction factors

**Antenna factor**  
**Active loop antenna**  
**Model 6502, S/N 2857, HL 0446**

| Frequency,<br>MHz | Magnetic antenna factor,<br>dB | Electric antenna factor,<br>dB |
|-------------------|--------------------------------|--------------------------------|
| 0.009             | -32.8                          | 18.7                           |
| 0.010             | -33.8                          | 17.7                           |
| 0.020             | -38.3                          | 13.2                           |
| 0.050             | -41.1                          | 10.4                           |
| 0.075             | -41.3                          | 10.2                           |
| 0.100             | -41.6                          | 9.9                            |
| 0.150             | -41.7                          | 9.8                            |
| 0.250             | -41.6                          | 9.9                            |
| 0.500             | -41.8                          | 9.8                            |
| 0.750             | -41.9                          | 9.7                            |
| 1.000             | -41.4                          | 10.1                           |
| 2.000             | -41.5                          | 10.0                           |
| 3.000             | -41.4                          | 10.2                           |
| 4.000             | -41.4                          | 10.1                           |
| 5.000             | -41.5                          | 10.1                           |
| 10.000            | -41.9                          | 9.6                            |
| 15.000            | -41.9                          | 9.6                            |
| 20.000            | -42.2                          | 9.3                            |
| 25.000            | -42.8                          | 8.7                            |
| 30.000            | -44.0                          | 7.5                            |

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

**Antenna factor**  
**Log periodic antenna**  
**Electro-Metrics, model LPA-25/30**  
**Ser.No.1988, HL 0034**

| Frequency<br>MHz | Antenna Factor<br>dB(1/m) | Frequency<br>MHz | Antenna Factor<br>dB(1/m) |
|------------------|---------------------------|------------------|---------------------------|
| 200              | 12.6                      | 625              | 20.4                      |
| 225              | 12.2                      | 650              | 20.9                      |
| 250              | 13.4                      | 675              | 22.0                      |
| 275              | 14.3                      | 700              | 22.2                      |
| 300              | 15.2                      | 725              | 22.7                      |
| 325              | 15.7                      | 750              | 22.5                      |
| 350              | 15.9                      | 775              | 22.7                      |
| 375              | 16.4                      | 800              | 22.8                      |
| 400              | 17.0                      | 825              | 23.2                      |
| 425              | 17.4                      | 850              | 23.5                      |
| 450              | 17.9                      | 875              | 23.9                      |
| 475              | 18.6                      | 900              | 24.0                      |
| 500              | 19.1                      | 925              | 24.0                      |
| 525              | 19.3                      | 950              | 24.2                      |
| 550              | 19.6                      | 975              | 24.7                      |
| 575              | 19.8                      | 1000             | 25.1                      |
| 600              | 20.0                      |                  |                           |

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

**Antenna factor**  
**Biconilog antenna EMCO Model 3141**  
**Ser.No.1011, HL 0604**

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

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

**Antenna factor**  
**Double-ridged wave guide horn antenna**  
**Model 3115, S/N 9911-5964, HL1984**

| Frequency,<br>MHz | Antenna factor,<br>dB(1/m) |
|-------------------|----------------------------|
| 1000.0            | 24.7                       |
| 1500.0            | 25.7                       |
| 2000.0            | 27.6                       |
| 2500.0            | 28.9                       |
| 3000.0            | 31.2                       |
| 3500.0            | 32.0                       |
| 4000.0            | 32.5                       |
| 4500.0            | 32.7                       |
| 5000.0            | 33.6                       |
| 5500.0            | 35.1                       |
| 6000.0            | 35.4                       |
| 6500.0            | 34.9                       |
| 7000.0            | 36.1                       |
| 7500.0            | 37.8                       |
| 8000.0            | 38.0                       |
| 8500.0            | 38.1                       |
| 9000.0            | 39.1                       |
| 9500.0            | 38.3                       |
| 10000.0           | 38.6                       |
| 10500.0           | 38.2                       |
| 11000.0           | 38.7                       |
| 11500.0           | 39.5                       |
| 12000.0           | 40.0                       |
| 12500.0           | 40.4                       |
| 13000.0           | 40.5                       |
| 13500.0           | 41.1                       |
| 14000.0           | 41.6                       |
| 14500.0           | 41.7                       |
| 15000.0           | 38.7                       |
| 15500.0           | 38.2                       |
| 16000.0           | 38.8                       |
| 16500.0           | 40.5                       |
| 17000.0           | 42.5                       |
| 17500.0           | 45.9                       |
| 18000.0           | 49.4                       |

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

**Antenna factor**  
**Double-ridged guide horn antenna**  
**Model 3115, serial number: 00027177, HL 2432**

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

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

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

| Frequency, MHz | ACF, dB | Gain, dBi | Num gain | Frequency, MHz | ACF, dB | Gain, dBi | Num gain | Frequency, MHz | ACF, dB | Gain, dBi | Num gain | Frequency, MHz | ACF, dB | Gain, dBi | Num gain | Frequency, MHz | ACF, dB | Gain, dBi | Num gain |
|----------------|---------|-----------|----------|----------------|---------|-----------|----------|----------------|---------|-----------|----------|----------------|---------|-----------|----------|----------------|---------|-----------|----------|
| 30             | 22.2    | -22.5     | 0.01     | 620            | 19.7    | 6.3       | 4.27     | 1215           | 24.9    | 7.0       | 5.05     | 1810           | 28.3    | 7.1       | 5.08     | 2405           | 30.9    | 6.9       | 4.93     |
| 35             | 18.5    | -17.4     | 0.02     | 625            | 19.7    | 6.5       | 4.42     | 1220           | 24.9    | 7.0       | 4.99     | 1815           | 28.5    | 6.9       | 4.91     | 2410           | 30.9    | 6.9       | 4.89     |
| 40             | 14.7    | -12.5     | 0.06     | 630            | 19.6    | 6.6       | 4.57     | 1225           | 25.1    | 6.9       | 4.91     | 1820           | 28.6    | 6.8       | 4.74     | 2415           | 31.0    | 6.9       | 4.85     |
| 45             | 11.3    | -8.1      | 0.16     | 635            | 19.7    | 6.5       | 4.48     | 1230           | 25.2    | 6.8       | 4.82     | 1825           | 28.7    | 6.8       | 4.75     | 2420           | 31.0    | 6.8       | 4.82     |
| 45             | 11.3    | -8.1      | 0.16     | 640            | 19.9    | 6.4       | 4.40     | 1235           | 25.1    | 7.0       | 4.96     | 1830           | 28.7    | 6.8       | 4.76     | 2425           | 31.1    | 6.8       | 4.81     |
| 50             | 8.9     | -4.7      | 0.34     | 645            | 19.9    | 6.5       | 4.45     | 1240           | 25.0    | 7.1       | 5.09     | 1835           | 28.7    | 6.7       | 4.72     | 2430           | 31.0    | 6.9       | 4.87     |
| 55             | 7.9     | -2.8      | 0.52     | 650            | 19.9    | 6.5       | 4.51     | 1245           | 25.0    | 7.1       | 5.12     | 1840           | 28.8    | 6.7       | 4.69     | 2435           | 31.0    | 6.9       | 4.88     |
| 60             | 7.8     | -2.1      | 0.62     | 655            | 19.9    | 6.5       | 4.60     | 1250           | 25.0    | 7.1       | 5.15     | 1845           | 28.6    | 6.9       | 4.90     | 2440           | 31.2    | 6.8       | 4.74     |
| 65             | 8.5     | -2.0      | 0.63     | 660            | 19.9    | 6.7       | 4.69     | 1255           | 25.0    | 7.2       | 5.25     | 1850           | 28.4    | 7.1       | 5.12     | 2445           | 31.1    | 6.9       | 4.91     |
| 70             | 9.0     | -1.9      | 0.64     | 665            | 19.9    | 6.7       | 4.70     | 1260           | 24.9    | 7.3       | 5.36     | 1855           | 28.5    | 7.0       | 5.07     | 2450           | 31.0    | 7.0       | 4.96     |
| 75             | 6.8     | -1.1      | 0.78     | 670            | 20.0    | 6.7       | 4.71     | 1265           | 25.0    | 7.3       | 5.31     | 1860           | 28.6    | 7.0       | 5.01     | 2455           | 31.0    | 7.0       | 5.01     |
| 80             | 8.4     | -0.2      | 0.97     | 675            | 20.1    | 6.7       | 4.71     | 1270           | 25.1    | 7.2       | 5.26     | 1865           | 28.5    | 7.1       | 5.17     | 2460           | 30.9    | 7.2       | 5.19     |
| 85             | 8.0     | 0.8       | 1.20     | 680            | 20.1    | 6.7       | 4.71     | 1275           | 25.3    | 7.0       | 5.05     | 1870           | 28.4    | 7.3       | 5.33     | 2465           | 31.1    | 6.9       | 4.95     |
| 90             | 8.2     | 1.1       | 1.29     | 685            | 20.1    | 6.8       | 4.79     | 1280           | 25.5    | 6.8       | 4.84     | 1875           | 28.4    | 7.2       | 5.28     | 2470           | 31.3    | 6.8       | 4.76     |
| 95             | 9.2     | 0.5       | 1.13     | 690            | 20.1    | 6.9       | 4.88     | 1285           | 25.4    | 7.0       | 4.97     | 1880           | 28.5    | 7.2       | 5.22     | 2475           | 31.4    | 6.7       | 4.69     |
| 100            | 10.6    | -0.4      | 0.92     | 695            | 20.2    | 6.8       | 4.82     | 1290           | 25.3    | 7.1       | 5.10     | 1885           | 28.5    | 7.2       | 5.22     | 2480           | 31.3    | 6.8       | 4.79     |
| 110            | 12.6    | -1.6      | 0.70     | 705            | 20.4    | 6.8       | 4.75     | 1300           | 25.2    | 7.3       | 5.33     | 1895           | 28.6    | 7.2       | 5.24     | 2490           | 31.1    | 7.0       | 4.99     |
| 120            | 13.9    | -2.1      | 0.82     | 715            | 20.5    | 6.8       | 4.80     | 1310           | 25.5    | 7.1       | 5.09     | 1905           | 28.5    | 7.3       | 5.36     | 2500           | 30.9    | 7.2       | 5.27     |
| 125            | 14.2    | -2.0      | 0.83     | 720            | 20.5    | 6.9       | 4.85     | 1315           | 25.4    | 7.2       | 5.23     | 1910           | 28.5    | 7.4       | 5.45     | 2505           | 31.1    | 7.1       | 5.15     |
| 130            | 14.2    | -1.7      | 0.68     | 725            | 20.6    | 6.8       | 4.81     | 1320           | 25.3    | 7.3       | 5.36     | 1915           | 28.5    | 7.3       | 5.38     | 2510           | 31.0    | 7.2       | 5.22     |
| 140            | 13.4    | -0.3      | 0.94     | 735            | 20.9    | 6.7       | 4.65     | 1330           | 25.6    | 7.0       | 5.06     | 1925           | 28.6    | 7.3       | 5.35     | 2520           | 31.2    | 7.0       | 5.05     |
| 150            | 12.9    | 0.8       | 1.21     | 745            | 21.0    | 6.6       | 4.59     | 1340           | 25.7    | 7.1       | 5.09     | 1935           | 28.5    | 7.4       | 5.54     | 2530           | 31.0    | 7.3       | 5.37     |
| 160            | 11.6    | 1.6       | 1.44     | 755            | 21.3    | 6.7       | 4.74     | 1350           | 25.8    | 7.2       | 5.17     | 1945           | 28.5    | 7.5       | 5.68     | 2540           | 31.2    | 7.1       | 5.09     |
| 165            | 12.5    | 2.0       | 1.59     | 760            | 21.0    | 6.8       | 4.83     | 1355           | 25.8    | 7.0       | 5.06     | 1950           | 28.6    | 7.4       | 5.58     | 2545           | 31.0    | 7.3       | 5.43     |
| 170            | 12.2    | 2.6       | 1.83     | 765            | 21.1    | 6.8       | 4.73     | 1360           | 25.9    | 6.9       | 4.95     | 1955           | 28.6    | 7.5       | 5.57     | 2550           | 31.0    | 7.3       | 5.39     |
| 175            | 11.8    | 3.3       | 2.13     | 770            | 21.3    | 6.7       | 4.64     | 1365           | 26.0    | 6.9       | 4.95     | 1960           | 28.6    | 7.5       | 5.65     | 2555           | 31.1    | 7.2       | 5.30     |
| 180            | 11.6    | 3.7       | 2.36     | 775            | 21.3    | 6.7       | 4.68     | 1370           | 26.0    | 7.0       | 4.96     | 1965           | 28.7    | 7.4       | 5.47     | 2560           | 31.0    | 7.4       | 5.47     |
| 185            | 11.5    | 4.0       | 2.54     | 780            | 21.3    | 6.7       | 4.72     | 1375           | 26.0    | 7.0       | 5.01     | 1970           | 28.7    | 7.3       | 5.29     | 2565           | 30.8    | 7.6       | 5.70     |
| 190            | 11.6    | 4.2       | 2.61     | 785            | 21.3    | 6.8       | 4.77     | 1380           | 26.0    | 7.0       | 5.06     | 1975           | 28.9    | 7.2       | 5.22     | 2570           | 31.1    | 7.3       | 5.37     |
| 200            | 13.1    | 3.2       | 2.07     | 795            | 21.4    | 6.8       | 4.79     | 1390           | 26.1    | 6.9       | 4.92     | 1985           | 29.1    | 7.1       | 5.11     | 2580           | 31.6    | 6.9       | 4.87     |
| 205            | 12.0    | 4.4       | 2.76     | 800            | 21.5    | 6.8       | 4.77     | 1395           | 26.2    | 6.9       | 4.94     | 1990           | 29.1    | 7.0       | 5.06     | 2585           | 31.6    | 6.8       | 4.79     |
| 210            | 11.0    | 5.6       | 3.66     | 805            | 21.6    | 6.7       | 4.71     | 1400           | 26.2    | 7.0       | 4.96     | 1995           | 29.1    | 7.1       | 5.09     | 2590           | 31.6    | 6.9       | 4.88     |
| 215            | 11.3    | 5.6       | 3.59     | 810            | 21.7    | 6.7       | 4.65     | 1405           | 26.1    | 7.0       | 5.02     | 2000           | 29.1    | 7.1       | 5.11     | 2595           | 31.5    | 7.0       | 4.87     |
| 220            | 11.6    | 5.5       | 3.52     | 815            | 21.7    | 6.7       | 4.72     | 1410           | 26.1    | 7.1       | 5.08     | 2005           | 29.1    | 7.1       | 5.16     | 2600           | 31.6    | 6.9       | 4.86     |
| 225            | 11.7    | 5.5       | 3.55     | 820            | 21.7    | 6.8       | 4.80     | 1415           | 26.2    | 7.0       | 5.02     | 2010           | 29.1    | 7.1       | 5.15     | 2605           | 31.3    | 7.2       | 5.30     |
| 230            | 11.9    | 5.5       | 3.57     | 825            | 21.7    | 6.8       | 4.82     | 1420           | 26.3    | 7.0       | 4.96     | 2015           | 29.2    | 7.1       | 5.13     | 2610           | 31.4    | 7.1       | 5.15     |
| 235            | 12.1    | 5.5       | 3.56     | 830            | 21.7    | 6.9       | 4.85     | 1425           | 26.2    | 7.1       | 5.10     | 2020           | 29.2    | 7.1       | 5.18     | 2615           | 31.7    | 6.9       | 4.88     |
| 240            | 12.3    | 5.5       | 3.54     | 835            | 21.8    | 6.8       | 4.82     | 1430           | 26.1    | 7.2       | 5.25     | 2025           | 29.3    | 7.1       | 5.08     | 2620           | 31.6    | 7.0       | 4.97     |
| 245            | 12.3    | 5.7       | 3.71     | 840            | 21.9    | 6.8       | 4.80     | 1435           | 26.1    | 7.2       | 5.24     | 2030           | 29.3    | 7.0       | 5.05     | 2625           | 31.4    | 7.1       | 5.17     |
| 250            | 12.3    | 5.9       | 3.88     | 845            | 21.9    | 6.8       | 4.83     | 1440           | 26.2    | 7.2       | 5.24     | 2035           | 29.3    | 7.1       | 5.07     | 2630           | 31.6    | 7.0       | 5.00     |
| 255            | 12.3    | 5.9       | 3.85     | 850            | 21.9    | 6.9       | 4.86     | 1445           | 26.3    | 7.1       | 5.11     | 2040           | 29.3    | 7.1       | 5.13     | 2635           | 31.8    | 6.8       | 4.82     |
| 260            | 12.7    | 5.8       | 3.83     | 855            | 22.0    | 6.8       | 4.80     | 1450           | 26.5    | 7.0       | 4.98     | 2045           | 29.2    | 7.2       | 5.23     | 2640           | 31.7    | 7.0       | 4.98     |
| 265            | 13.2    | 5.5       | 3.54     | 860            | 22.1    | 6.8       | 4.74     | 1455           | 26.4    | 7.1       | 5.07     | 2050           | 29.2    | 7.2       | 5.27     | 2645           | 31.7    | 6.9       | 4.93     |
| 270            | 13.7    | 5.2       | 3.27     | 865            | 22.0    | 6.9       | 4.92     | 1460           | 26.4    | 7.1       | 5.17     | 2055           | 29.3    | 7.2       | 5.21     | 2650           | 31.8    | 6.9       | 4.85     |
| 275            | 13.7    | 5.3       | 3.39     | 870            | 21.9    | 7.1       | 5.11     | 1465           | 26.4    | 7.2       | 5.19     | 2060           | 29.5    | 7.0       | 5.02     | 2655           | 31.8    | 6.9       | 4.85     |
| 280            | 13.7    | 5.4       | 3.50     | 875            | 22.0    | 7.1       | 5.08     | 1470           | 26.4    | 7.2       | 5.22     | 2065           | 29.4    | 7.1       | 5.03     | 2660           | 31.7    | 7.0       | 5.02     |
| 285            | 13.7    | 5.6       | 3.61     | 880            | 22.1    | 7.0       | 5.05     | 1475           | 26.5    | 7.1       | 5.17     | 2070           | 29.4    | 7.1       | 5.10     | 2665           | 32.0    | 6.7       | 4.71     |
| 290            | 13.7    | 5.7       | 3.72     | 885            | 22.1    | 7.0       | 5.06     | 1480           | 26.5    | 7.1       | 5.12     | 2075           | 29.5    | 7.0       | 5.01     | 2670           | 32.0    | 6.7       | 4.67     |
| 295            | 13.8    | 5.8       | 3.77     | 890            | 22.1    | 7.0       | 5.06     | 1485           | 26.5    | 7.1       | 5.14     | 2080           | 29.8    | 6.8       | 4.76     | 2675           | 31.9    | 6.8       | 4.81     |
| 300            | 13.9    | 5.8       | 3.81     | 895            | 22.2    | 7.1       | 5.09     | 1490           | 26.5    | 7.1       | 5.17     | 2085           | 29.7    | 6.9       | 4.89     | 2680           | 31.7    | 7.0       | 5.04     |
| 305            | 14.0    | 5.9       | 3.85     | 900            | 22.2    | 7.1       | 5.12     | 1495           | 26.5    | 7.2       | 5.24     | 2090           | 29.7    | 6.9       | 4.86     | 2685           | 31.9    | 6.8       | 4.83     |
| 310            | 14.1    | 5.9       | 3.88     | 905            | 22.3    | 7.1       | 5.09     | 1500           | 26.5    | 7.2       | 5.31     | 2095           | 29.8    | 6.8       | 4.78     | 2690           | 32.1    | 6.7       | 4.72     |
| 315            | 14.3    | 5.9       | 3.89     | 910            | 22.3    | 7.0       | 5.05     | 1505           | 26.5    | 7.2       | 5.27     | 2100           | 29.9    | 6.8       | 4.75     | 2695           | 32.1    | 6.7       | 4.71     |
| 320            | 14.4    | 5.9       | 3.90     | 915            | 22.4    | 7.0       | 4.99     | 1510           | 26.6    | 7.2       | 5.23     | 2105           | 29.8    | 6.8       | 4.81     | 2700           | 32.0    | 6.8       | 4.81     |
| 325            | 14.5    | 5.9       | 3.92     | 920            | 22.6    | 6.9       | 4.92     | 1515           | 26.6    | 7.2       | 5.20     | 2110           | 29.9    | 6.8       | 4.78     | 2705           | 32.0    | 6.8       | 4.80     |
| 330            | 14.6    | 5.9       | 3.93     | 925            | 22.7    | 6.9       | 4.85     | 1520           | 26.5    | 7.3       | 5.38     | 2115           | 29.9    | 6.8       | 4.76     | 2710           | 32.1    | 6.8       | 4.79     |
| 335            | 14.7    | 6.0       | 4.02     | 930            | 22.8    | 6.8       | 4.77     | 1525           | 26.6    | 7.3       | 5.37     | 2120           | 29.9    | 6.8       | 4.84     | 2715           | 32.1    | 6.7       | 4.71     |
| 340            | 14.7    | 6.2       | 4.12     | 935            | 22.8    | 6.8       | 4.83     | 1530           | 26.6    | 7.3       | 5.36     | 2125           | 29.9    | 6.9       | 4.89     | 2720           | 32.4    | 6.5       | 4.47     |
| 345            | 14.9    | 6.1       | 4.06     | 940            | 22.8    | 6.9       | 4.89     | 1535           | 26.6    | 7.4       | 5.44     | 2130           | 29.9    | 6.9       | 4.90     | 2725           | 32.2    | 6.7       | 4.63     |
| 350            | 15.1    | 6.0       | 3.99     | 945            | 22.8    | 6.9       | 4.87     | 1540           | 26.5    | 7.4       | 5.53     | 2135           | 29.8    | 6.9       | 4.94     | 2730           | 31.9    | 7.0       | 5.05     |
| 355            | 15.3    | 5.9       | 3.88     | 950            | 22.9    | 6.9       | 4.85     | 1545           | 26.5    | 7.5       | 5.58     | 2140           | 29.8    | 7.1       | 5.08     | 2735           | 31.6    | 7.4       | 5.44     |
| 360            | 15.6    | 5.8       | 3.78     | 955            | 23.0    | 6.8       | 4.81     | 1550           | 26.5    | 7.5       | 5.63     | 2145           | 29.9    | 6.9       | 4.92     | 2740           | 31.6    | 7.1       | 5.46     |
| 365            | 15.5    | 5.9       | 3.89     | 960            | 23.1    | 6.8       | 4.77     | 1555           | 26.7    | 7.3       | 5.39     | 2150           | 29.9    | 7.0       | 4.98     | 2745           | 31.9    | 7.0       | 5.06     |
| 370            | 15.5    | 6.0       | 4.01     | 965            | 23.1    | 6.7       | 4.73     | 1560           | 26.9    | 7.1       | 5.16     | 2155           | 29.8    | 7.1       | 5.10     | 2750           | 32.0    | 6.9       | 4.94     |
| 375            | 15.6    | 6.1       | 4.03     | 970            | 23.2    | 6.7       | 4.69     | 1565           | 26.9    | 7.2       | 5.23     | 2160           | 29.8    | 7.1       | 5.09     | 2755           | 32.0    | 7.0       | 4.98     |
| 380            | 15.7    | 6.1       | 4.05     | 975            | 23.3    | 6.6       | 4.62     | 1570           | 26.9    | 7.2       | 5.30     | 2165           | 29.9    | 7.0       | 5.00     | 2760           | 32.0    | 7.0       | 5.06     |
| 385            | 15.7    | 6.2       | 4.15     | 980            | 23.5    | 6.6       | 4.54     | 1575           | 27.0    | 7.2       | 5.23     | 2170           | 29.9    | 7.1       | 5.07     | 2765           | 32.2    | 6.8       | 4.80     |
| 390            | 15.7    | 6.3       | 4.25     | 985            | 23.5    | 6.6       | 4.52     | 1580           |         |           |          |                |         |           |          |                |         |           |          |

**Cable loss**  
**Cable Coaxial, RG-58/RG-214, s/n 056, HL 0415**  
**+ Cable Coaxial, RG-214, 11.5m, s/n 148, HL 0812**

| No. | Frequency,<br>MHz | Cable loss,<br>dB | Measured uncertainty,<br>dB |
|-----|-------------------|-------------------|-----------------------------|
| 1   | 20                | 0.73              | ±0.12                       |
| 2   | 30                | 0.91              |                             |
| 3   | 50                | 1.2               |                             |
| 4   | 80                | 1.56              |                             |
| 5   | 100               | 1.76              |                             |
| 6   | 200               | 2.59              |                             |
| 7   | 300               | 3.26              |                             |
| 8   | 400               | 3.93              |                             |
| 9   | 500               | 4.42              |                             |
| 10  | 600               | 4.92              |                             |
| 11  | 700               | 5.36              |                             |
| 12  | 800               | 5.88              |                             |
| 13  | 900               | 6.41              |                             |
| 14  | 1000              | 6.71              |                             |
| 15  | 1500              | 8.63              |                             |
| 16  | 2000              | 10.39             |                             |

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

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

**Cable loss**  
**Cable coaxial, Bird, 18 GHz, N-type, M-F, model TC-MNFN-3.0, S/N 211539 001**  
**HL 2882**

| Frequency,<br>MHz | Cable loss,<br>dB | Frequency,<br>MHz | Cable loss,<br>dB | Frequency,<br>MHz | Cable loss,<br>dB |
|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| 10                | 0.08              | 5750              | 1.78              | 12000             | 2.57              |
| 30                | 0.12              | 6000              | 1.84              | 12250             | 2.62              |
| 100               | 0.22              | 6250              | 1.87              | 12500             | 2.66              |
| 250               | 0.35              | 6500              | 1.92              | 12750             | 2.68              |
| 500               | 0.49              | 6750              | 1.96              | 13000             | 2.67              |
| 750               | 0.60              | 7000              | 2.01              | 13250             | 2.75              |
| 1000              | 0.68              | 7250              | 2.08              | 13500             | 2.77              |
| 1250              | 0.78              | 7500              | 2.12              | 13750             | 2.90              |
| 1500              | 0.85              | 7750              | 2.19              | 14000             | 3.00              |
| 1750              | 0.92              | 8000              | 2.22              | 14250             | 3.12              |
| 2000              | 0.98              | 8250              | 2.28              | 14500             | 2.98              |
| 2250              | 1.06              | 8500              | 2.29              | 14750             | 3.03              |
| 2500              | 1.11              | 8750              | 2.27              | 15000             | 2.99              |
| 2750              | 1.19              | 9000              | 2.28              | 15250             | 2.99              |
| 3000              | 1.25              | 9250              | 2.26              | 15500             | 2.98              |
| 3250              | 1.30              | 9500              | 2.29              | 15750             | 2.98              |
| 3500              | 1.34              | 9750              | 2.33              | 16000             | 2.99              |
| 3750              | 1.40              | 10000             | 2.34              | 16250             | 3.05              |
| 4000              | 1.45              | 10250             | 2.41              | 16500             | 3.11              |
| 4250              | 1.51              | 10500             | 2.46              | 16750             | 3.18              |
| 4500              | 1.54              | 10750             | 2.48              | 17000             | 3.23              |
| 4750              | 1.59              | 11000             | 2.48              | 17250             | 3.21              |
| 5000              | 1.63              | 11250             | 2.52              | 17500             | 3.22              |
| 5250              | 1.68              | 11500             | 2.53              | 17750             | 3.22              |
| 5500              | 1.72              | 11750             | 2.56              | 18000             | 3.25              |

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

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

**Cable loss**  
**Cable coaxial, Microwave Cable Assembly, 104EA, 18 GHz, 1.0 m**  
**Suhner Sucoflex, HL 3386**

| Frequency,<br>MHz | Cable loss,<br>dB | Frequency,<br>MHz | Cable loss,<br>dB | Frequency,<br>MHz | Cable loss,<br>dB |
|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| 10                | 0.05              | 5750              | 1.01              | 12000             | 1.29              |
| 30                | 0.07              | 6000              | 1.02              | 12250             | 1.33              |
| 100               | 0.12              | 6250              | 1.02              | 12500             | 1.36              |
| 250               | 0.18              | 6500              | 0.95              | 12750             | 1.35              |
| 500               | 0.26              | 6750              | 0.96              | 13000             | 1.36              |
| 750               | 0.32              | 7000              | 1.01              | 13250             | 1.39              |
| 1000              | 0.35              | 7250              | 1.04              | 13500             | 1.37              |
| 1250              | 0.41              | 7500              | 1.09              | 13750             | 1.43              |
| 1500              | 0.45              | 7750              | 1.12              | 14000             | 1.46              |
| 1750              | 0.50              | 8000              | 1.13              | 14250             | 1.39              |
| 2000              | 0.54              | 8250              | 1.15              | 14500             | 1.36              |
| 2250              | 0.57              | 8500              | 1.15              | 14750             | 1.47              |
| 2500              | 0.61              | 8750              | 1.15              | 15000             | 1.47              |
| 2750              | 0.64              | 9000              | 1.16              | 15250             | 1.41              |
| 3000              | 0.67              | 9250              | 1.14              | 15500             | 1.52              |
| 3250              | 0.70              | 9500              | 1.14              | 15750             | 1.54              |
| 3500              | 0.71              | 9750              | 1.19              | 16000             | 1.49              |
| 3750              | 0.74              | 10000             | 1.20              | 16250             | 1.48              |
| 4000              | 0.77              | 10250             | 1.22              | 16500             | 1.52              |
| 4250              | 0.80              | 10500             | 1.23              | 16750             | 1.56              |
| 4500              | 0.84              | 10750             | 1.22              | 17000             | 1.57              |
| 4750              | 0.85              | 11000             | 1.21              | 17250             | 1.53              |
| 5000              | 0.84              | 11250             | 1.24              | 17500             | 1.55              |
| 5250              | 0.85              | 11500             | 1.26              | 17750             | 1.55              |
| 5500              | 0.92              | 11750             | 1.28              | 18000             | 1.54              |

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

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

**Cable loss**  
**Cable coaxial, RG-214/U, N type-N type, 6 m**  
**Alpha Wire, HL 3622**

| Frequency,<br>MHz | Cable loss,<br>dB | Frequency,<br>MHz | Cable loss,<br>dB | Frequency,<br>MHz | Cable loss,<br>dB |
|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| 10                | 0.13              | 2100              | 2.95              | 4400              | 4.99              |
| 30                | 0.24              | 2200              | 2.99              | 4500              | 5.00              |
| 50                | 0.32              | 2300              | 3.11              | 4600              | 5.17              |
| 100               | 0.47              | 2400              | 3.16              | 4700              | 5.18              |
| 200               | 0.70              | 2500              | 3.31              | 4800              | 5.33              |
| 300               | 0.88              | 2600              | 3.36              | 4900              | 5.34              |
| 400               | 1.05              | 2700              | 3.46              | 5000              | 5.50              |
| 500               | 1.21              | 2800              | 3.52              | 5100              | 5.56              |
| 600               | 1.36              | 2900              | 3.65              | 5200              | 5.76              |
| 700               | 1.49              | 3000              | 3.70              | 5300              | 5.76              |
| 800               | 1.63              | 3100              | 3.82              | 5400              | 5.85              |
| 900               | 1.72              | 3200              | 3.88              | 5500              | 5.88              |
| 1000              | 1.84              | 3300              | 3.99              | 5600              | 5.96              |
| 1100              | 1.96              | 3400              | 4.08              | 5700              | 6.02              |
| 1200              | 2.06              | 3500              | 4.19              | 5800              | 6.06              |
| 1300              | 2.15              | 3600              | 4.28              | 5900              | 6.14              |
| 1400              | 2.28              | 3700              | 4.42              | 6000              | 6.17              |
| 1500              | 2.35              | 3800              | 4.40              | 6100              | 6.28              |
| 1600              | 2.43              | 3900              | 4.51              | 6200              | 6.36              |
| 1700              | 2.57              | 4000              | 4.62              | 6300              | 6.47              |
| 1800              | 2.62              | 4100              | 4.70              | 6400              | 6.51              |
| 1900              | 2.75              | 4200              | 4.78              | 6500              | 6.65              |
| 2000              | 2.80              | 4300              | 4.83              |                   |                   |

**Cable loss**  
**Cable coaxial, RG-214/U, N type-N type, 5.4 m**  
**Alpha Wire, HL 3632**

| Frequency,<br>MHz | Cable loss,<br>dB | Frequency,<br>MHz | Cable loss,<br>dB | Frequency,<br>MHz | Cable loss,<br>dB | Frequency,<br>MHz | Cable loss,<br>dB |
|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| 10                | 0.06              | 1750              | 2.12              | 3550              | 3.45              | 5350              | 4.75              |
| 30                | 0.17              | 1800              | 2.15              | 3600              | 3.48              | 5400              | 4.76              |
| 50                | 0.24              | 1850              | 2.16              | 3650              | 3.53              | 5450              | 4.80              |
| 100               | 0.35              | 1900              | 2.23              | 3700              | 3.57              | 5500              | 4.82              |
| 150               | 0.45              | 1950              | 2.25              | 3750              | 3.60              | 5550              | 4.88              |
| 200               | 0.54              | 2000              | 2.34              | 3800              | 3.64              | 5600              | 4.90              |
| 250               | 0.64              | 2050              | 2.36              | 3850              | 3.67              | 5650              | 4.94              |
| 300               | 0.69              | 2100              | 2.41              | 3900              | 3.73              | 5700              | 4.98              |
| 350               | 0.76              | 2150              | 2.46              | 3950              | 3.81              | 5750              | 5.01              |
| 400               | 0.83              | 2200              | 2.51              | 4000              | 3.81              | 5800              | 5.07              |
| 450               | 0.90              | 2250              | 2.52              | 4050              | 3.81              | 5850              | 5.13              |
| 500               | 0.95              | 2300              | 2.56              | 4100              | 3.90              | 5900              | 5.15              |
| 550               | 1.02              | 2350              | 2.57              | 4150              | 3.88              | 5950              | 5.20              |
| 600               | 1.07              | 2400              | 2.61              | 4200              | 3.92              | 6000              | 5.26              |
| 650               | 1.14              | 2450              | 2.68              | 4250              | 3.99              | 6050              | 5.28              |
| 700               | 1.18              | 2500              | 2.68              | 4300              | 4.01              | 6100              | 5.30              |
| 750               | 1.24              | 2550              | 2.72              | 4350              | 4.04              | 6150              | 5.37              |
| 800               | 1.31              | 2600              | 2.75              | 4400              | 4.05              | 6200              | 5.39              |
| 850               | 1.33              | 2650              | 2.79              | 4450              | 4.09              | 6250              | 5.45              |
| 900               | 1.38              | 2700              | 2.83              | 4500              | 4.18              | 6300              | 5.48              |
| 950               | 1.41              | 2750              | 2.89              | 4550              | 4.18              | 6350              | 5.52              |
| 1000              | 1.51              | 2800              | 2.91              | 4600              | 4.19              | 6400              | 5.56              |
| 1050              | 1.52              | 2850              | 2.96              | 4650              | 4.22              | 6450              | 5.61              |
| 1100              | 1.55              | 2900              | 2.97              | 4700              | 4.29              | 6500              | 5.62              |
| 1150              | 1.62              | 2950              | 3.00              | 4750              | 4.30              |                   |                   |
| 1200              | 1.66              | 3000              | 3.04              | 4800              | 4.32              |                   |                   |
| 1250              | 1.68              | 3050              | 3.08              | 4850              | 4.37              |                   |                   |
| 1300              | 1.76              | 3100              | 3.12              | 4900              | 4.39              |                   |                   |
| 1350              | 1.78              | 3150              | 3.18              | 4950              | 4.47              |                   |                   |
| 1400              | 1.80              | 3200              | 3.20              | 5000              | 4.51              |                   |                   |
| 1450              | 1.86              | 3250              | 3.24              | 5050              | 4.50              |                   |                   |
| 1500              | 1.92              | 3300              | 3.27              | 5100              | 4.53              |                   |                   |
| 1550              | 1.95              | 3350              | 3.32              | 5150              | 4.59              |                   |                   |
| 1600              | 1.97              | 3400              | 3.35              | 5200              | 4.63              |                   |                   |
| 1650              | 2.04              | 3450              | 3.41              | 5250              | 4.64              |                   |                   |
| 1700              | 2.07              | 3500              | 3.42              | 5300              | 4.66              |                   |                   |

## 14 APPENDIX F Abbreviations and acronyms

|                |                                             |
|----------------|---------------------------------------------|
| A              | ampere                                      |
| AC             | alternating current                         |
| A/m            | ampere per meter                            |
| AM             | amplitude modulation                        |
| AVRG           | average (detector)                          |
| cm             | centimeter                                  |
| dB             | decibel                                     |
| dBm            | decibel referred to one milliwatt           |
| dB( $\mu$ V)   | decibel referred to one microvolt           |
| dB( $\mu$ V/m) | decibel referred to one microvolt per meter |
| dB( $\mu$ A)   | decibel referred to one microampere         |
| DC             | direct current                              |
| EIRP           | equivalent isotropically radiated power     |
| ERP            | effective radiated power                    |
| EUT            | equipment under test                        |
| F              | frequency                                   |
| GHz            | gigahertz                                   |
| GND            | ground                                      |
| H              | height                                      |
| HL             | Hermon laboratories                         |
| Hz             | hertz                                       |
| k              | kilo                                        |
| kHz            | kilohertz                                   |
| LO             | local oscillator                            |
| m              | meter                                       |
| MHz            | megahertz                                   |
| min            | minute                                      |
| mm             | millimeter                                  |
| ms             | millisecond                                 |
| $\mu$ s        | microsecond                                 |
| NA             | not applicable                              |
| NB             | narrow band                                 |
| OATS           | open area test site                         |
| $\Omega$       | Ohm                                         |
| PM             | pulse modulation                            |
| PS             | power supply                                |
| ppm            | part per million ( $10^{-6}$ )              |
| QP             | quasi-peak                                  |
| RE             | radiated emission                           |
| RF             | radio frequency                             |
| rms            | root mean square                            |
| Rx             | receive                                     |
| s              | second                                      |
| T              | temperature                                 |
| Tx             | transmit                                    |
| V              | volt                                        |
| WB             | wideband                                    |

END OF DOCUMENT