

TEST REPORT

ACCORDING TO: FCC 47CFR part 15 subpart C § 15.247 (FHSS)

FOR:

Visonic Ltd.

**Supervised Wireless PowerG Smoke
Detector, model SMD-426 PG2**

**Supervised Wireless PowerG Heat and
Smoke Detector, model SMD-427 PG2**

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1 Applicant information

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Contact name: Mr. Arick Elshtein

2 Equipment under test attributes

Product name: Supervised wireless PowerG smoke detector
Product type: Transceiver
Model(s): SMD-426 PG2
Serial number: 0-500121
Hardware version: 90-203269 9-101509
Software release: JS-701451
Receipt date: 12/23/2010

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: 21055
Location: Hermon Laboratories Ltd. Harakevet Industrial Zone, Binyamina 30500, Israel
Test started: 12/23/2010
Test completed: 1/03/2011
Test specification(s): FCC 47CFR part 15, subpart C, §15.247 (FHSS)

5 Tests summary

| Test | Status |
|---|---|
| Transmitter characteristics | |
| Section 15.247(a)1, The 20 dB bandwidth | Pass |
| Section 15.247(a)1, Frequency separation | Pass |
| Section 15.247(a)1, Number of hopping frequencies | Pass |
| Section 15.247(a)1, Average time of occupancy | Pass |
| Section 15.247(b), Peak output power | Pass |
| Section 15.247(d), Emissions at band edges | Pass |
| Section 15.247(d), Radiated spurious emissions | Pass |
| Section 15.203, Antenna requirements | Pass |
| Section 15.207(a), Conducted emission | Not required |
| Section 15.247(i), RF exposure | Pass, the exhibit to the application of certification is provided |

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 |
|---------------------|--|-----------------|---|
| Tested by: | Mrs. E. Pitt, test engineer | January 3, 2011 |  |
| Reviewed by: | Mrs. M. Cherniavsky, certification engineer | January 4, 2011 |  |
| Approved by: | Mr. M. Nikishin, EMC and radio group manager | January 5, 2011 |  |

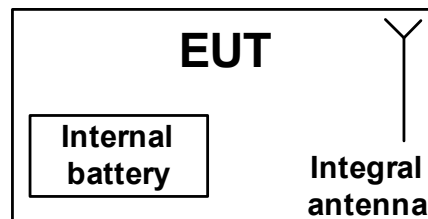
6 EUT description

6.1 General information

The EUT is a heat and smoke automatic fire detector with integral audible signal for open area protection, designed to sense smoke or heat (not flame) and fitted with a PowerG type transceiver. The EUT, model name SMD-426 PG2, is a smoke detector and the EUT, model name SMD-427 PG2, is a heat and smoke detector. They provide early warning of developing fire by sounding an alarm with its built-in alarm horn, and by transmitting a coded alarm signal to a PowerG receiver or to a compatible wireless alarm control panel.

The SMD-426 PG2 and SMD-427 PG2 have the same RF part. Each EUT utilizes an integral antenna and is powered by 3 V lithium battery. The only difference is an additional temperature sensor based on the same PCB in SMD-427 PG2. Therefore only SMD-426 PG2 was tested.

6.2 Test configuration



6.3 Changes made in the EUT

No changes were implemented in the EUT.

6.4 Transmitter characteristics

| | | | | | | |
|---|--|---|-----------------------------------|--------------|--------------------------------|--|
| Type of equipment | | | | | | |
| 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) | | | | | |
| Intended use | | Condition of use | | | | |
| | fixed | Always at a distance more than 2 m from all people | | | | |
| X | mobile | Always at a distance more than 20 cm from all people | | | | |
| | portable | May operate at a distance closer than 20 cm to human body | | | | |
| Assigned frequency ranges | | 902 – 928 MHz | | | | |
| Operating frequencies | | 912.750 – 919.106 MHz | | | | |
| Maximum rated output power | | At transmitter 50 Ω RF output connector | | | dBm | |
| | | Peak output power | | | 18.68 dBm | |
| Is transmitter output power variable? | | X | No | | | |
| | | Yes | continuous variable | | | |
| | | | stepped variable with stepsize | | | |
| | | | minimum RF power | | | |
| | | | maximum RF power | | | |
| Antenna connection | | | | | | |
| unique coupling | | standard connector | | X | integral | |
| | | | | | with temporary RF connector | |
| | | | | X | without temporary RF connector | |
| Antenna/s technical characteristics | | | | | | |
| Type | Manufacturer | | Model number | | Gain | |
| Internal | Vionic | | Wire antenna | | -8 dBi | |
| Transmitter aggregate data rate/s | | 50 kbps | | | | |
| Type of modulation | | GFSK | | | | |
| Modulating test signal (baseband) | | PRBS | | | | |
| Maximum transmitter duty cycle in normal use | | 0.1% | | | | |
| Transmitter power source | | | | | | |
| X | Battery | Nominal rated voltage | 3.0 VDC | Battery type | Lithium | |
| | DC | Nominal rated voltage | VDC | | | |
| | AC mains | Nominal rated voltage | VAC | Frequency | | |
| Common power source for transmitter and receiver | | | X yes no | | | |
| Spread spectrum technique used | | X | Frequency hopping (FHSS) | | | |
| | | | Digital transmission system (DTS) | | | |
| | | | Hybrid | | | |
| Spread spectrum parameters for transmitters tested per FCC 15.247 only | | | | | | |
| FHSS | Total number of hops | | 50 | | | |
| | Bandwidth per hop | | 102 kHz | | | |
| | Max. separation of hops | | 131 kHz | | | |

| | | | |
|----------------------------|-------------------------------|--|---------------------------------|
| Test specification: | | Section 15.247(a)1, 20 dB bandwidth | |
| Test procedure: | | Public notice DA 00-705 | |
| Test mode: | Compliance | Verdict: | PASS |
| Date: | 1/3/2011 | | |
| Temperature: 22 °C | Air Pressure: 1014 hPa | Relative Humidity: 52 % | Power Supply: 3V battery |
| Remarks: | | | |

7 Transmitter tests according to 47CFR part 15 subpart C 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



| | | | |
|----------------------------|-------------------------------|--|---------------------------------|
| Test specification: | | Section 15.247(a)1, 20 dB bandwidth | |
| Test procedure: | | Public notice DA 00-705 | |
| Test mode: | | Compliance | Verdict: PASS |
| Date: | | 1/3/2011 | |
| Temperature: 22 °C | Air Pressure: 1014 hPa | Relative Humidity: 52 % | Power Supply: 3V battery |
| Remarks: | | | |

Table 7.1.2 The 20 dB bandwidth test results

ASSIGNED FREQUENCY RANGE: 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 |
|------------------------|--------------------|-----------------|-------------------------|----------------------|------------|-------------|---------|
| 912.750 | GFSK | 50 | NA | 100.0 | 500 | -400.0 | Pass |
| 915.863 | | | | 101.5 | 500 | -398.5 | Pass |
| 919.106 | | | | 102.0 | 500 | -398.0 | Pass |

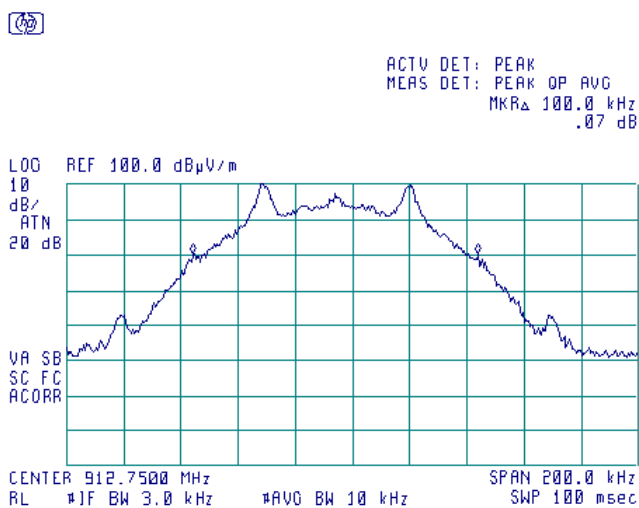
Reference numbers of test equipment used

| | | | | | | | | |
|---------|---------|---------|---------|--|--|--|--|--|
| HL 0521 | HL 0604 | HL 2871 | HL 3622 | | | | | |
|---------|---------|---------|---------|--|--|--|--|--|

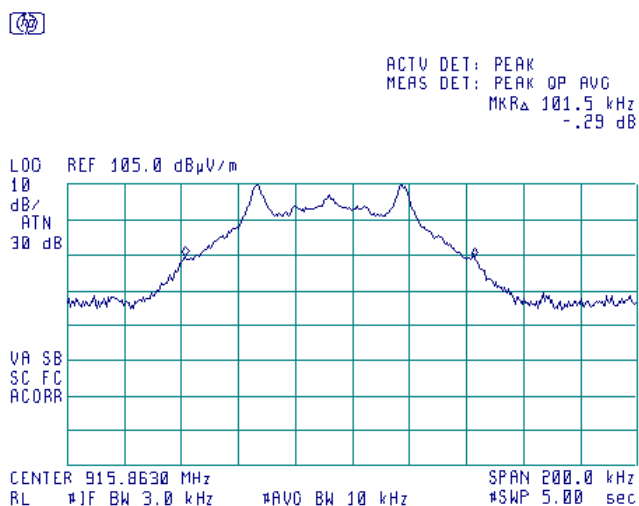
Full description is given in Appendix A.

| | | | |
|----------------------------|-------------------------------|--|---------------------------------|
| Test specification: | | Section 15.247(a)1, 20 dB bandwidth | |
| Test procedure: | | Public notice DA 00-705 | |
| Test mode: | | Compliance | Verdict: PASS |
| Date: | | 1/3/2011 | |
| Temperature: 22 °C | Air Pressure: 1014 hPa | Relative Humidity: 52 % | Power Supply: 3V battery |
| Remarks: | | | |

Plot 7.1.1 The 20 dB bandwidth test result at low frequency

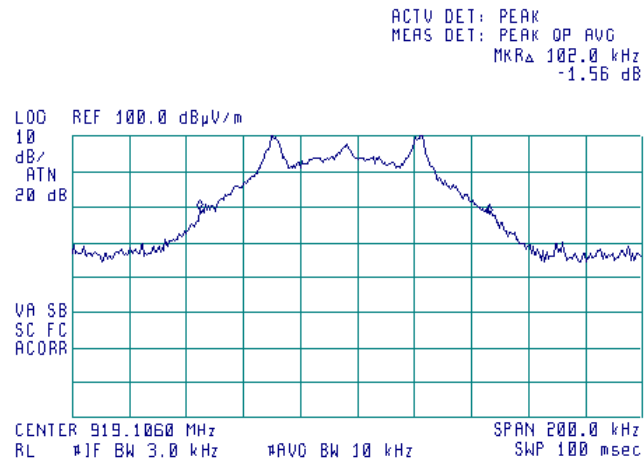


Plot 7.1.2 The 20 dB bandwidth test result at mid frequency



| | | | |
|----------------------------|-------------------------------|--|---------------------------------|
| Test specification: | | Section 15.247(a)1, 20 dB bandwidth | |
| Test procedure: | | Public notice DA 00-705 | |
| Test mode: | | Compliance | Verdict: PASS |
| Date: | | 1/3/2011 | |
| Temperature: 22 °C | Air Pressure: 1014 hPa | Relative Humidity: 52 % | Power Supply: 3V battery |
| Remarks: | | | |

Plot 7.1.3 The 20 dB bandwidth test result at high frequency



| | | | |
|----------------------------|---|--------------------------------|---------------------------------|
| Test specification: | Section 15.247(a)1, Frequency separation | | |
| Test procedure: | Public notice DA 00-705 | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date: | 1/3/2011 | | |
| Temperature: 22 °C | Air Pressure: 1014 hPa | Relative Humidity: 52 % | Power Supply: 3V battery |
| Remarks: | | | |

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 plots.

Figure 7.2.1 Carrier frequency separation test setup



| | | | |
|----------------------------|---|--------------------------------|---------------------------------|
| Test specification: | Section 15.247(a)1, Frequency separation | | |
| Test procedure: | Public notice DA 00-705 | | |
| Test mode: | Compliance | Verdict: PASS | |
| Date: | 1/3/2011 | | |
| Temperature: 22 °C | Air Pressure: 1014 hPa | Relative Humidity: 52 % | Power Supply: 3V battery |
| Remarks: | | | |

Table 7.2.2 Carrier frequency separation test results

ASSIGNED FREQUENCY RANGE: 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
 20 dB BANDWIDTH: 101.3kHz

| Carrier frequency separation, kHz | Limit, kHz | Margin* | Verdict |
|-----------------------------------|------------|---------|---------|
| 131 | 101.3 | 29.7 | Pass |

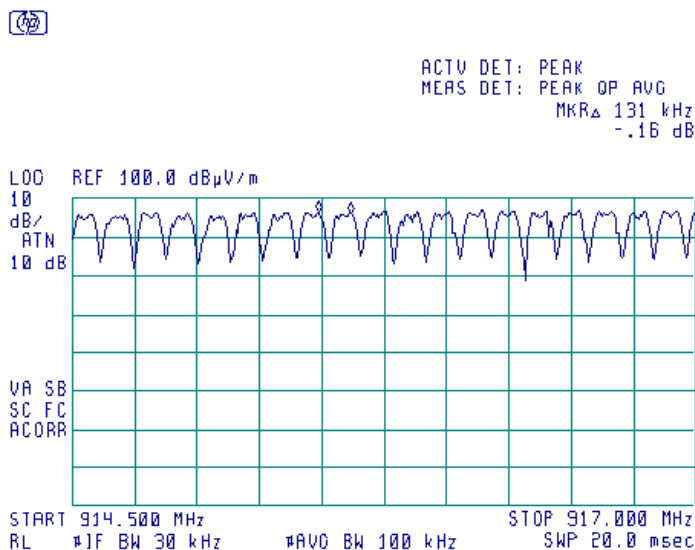
* - Margin = Carrier frequency separation – specification limit.

Reference numbers of test equipment used

| | | | | | | | |
|---------|---------|---------|---------|--|--|--|--|
| HL 1431 | HL 1984 | HL 2883 | HL 3386 | | | | |
|---------|---------|---------|---------|--|--|--|--|

Full description is given in Appendix A.

Plot 7.2.1 Carrier frequency separation



| | | | |
|----------------------------|--|--------------------------------|---------------------------------|
| Test specification: | Section 15.247(a)1, Number of hopping frequencies | | |
| Test procedure: | Public notice DA 00-705 | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date: | 1/3/2011 | | |
| Temperature: 22 °C | Air Pressure: 1014 hPa | Relative Humidity: 52 % | Power Supply: 3V battery |
| Remarks: | | | |

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) 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



| | | | |
|----------------------------|--|--------------------------------|---------------------------------|
| Test specification: | Section 15.247(a)1, Number of hopping frequencies | | |
| Test procedure: | Public notice DA 00-705 | | |
| Test mode: | Compliance | Verdict: PASS | |
| Date: | 1/3/2011 | | |
| Temperature: 22 °C | Air Pressure: 1014 hPa | Relative Humidity: 52 % | Power Supply: 3V battery |
| Remarks: | | | |

Table 7.3.2 Hopping frequencies test results

ASSIGNED FREQUENCY RANGE: 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 |

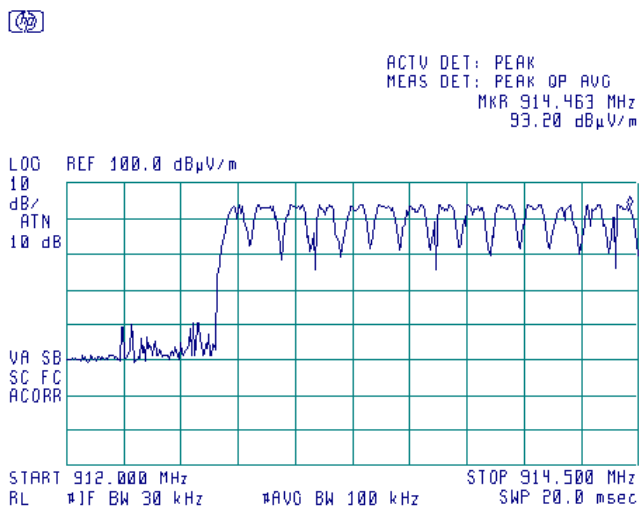
* - Margin = Number of hopping frequencies – Minimum number of hopping frequencies.

Reference numbers of test equipment used

| | | | | | | | |
|---------|---------|---------|---------|--|--|--|--|
| HL 1431 | HL 2883 | HL 3386 | HL 1984 | | | | |
|---------|---------|---------|---------|--|--|--|--|

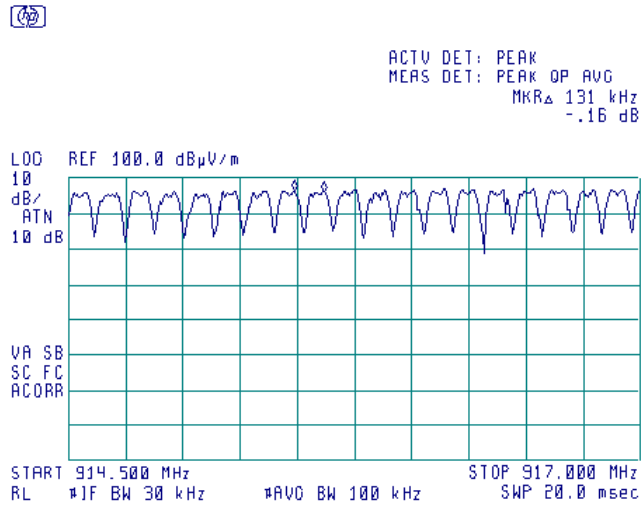
Full description is given in Appendix A.

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

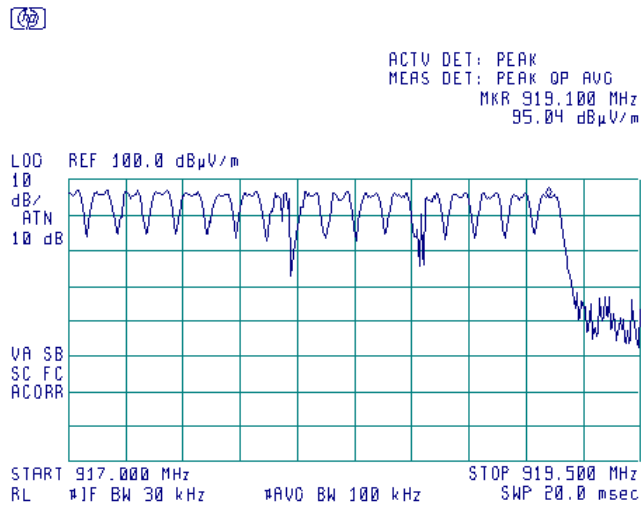


| | | | |
|----------------------------|--|--------------------------------|---------------------------------|
| Test specification: | Section 15.247(a)1, Number of hopping frequencies | | |
| Test procedure: | Public notice DA 00-705 | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date: | 1/3/2011 | | |
| Temperature: 22 °C | Air Pressure: 1014 hPa | Relative Humidity: 52 % | Power Supply: 3V 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: | Section 15.247(a)1, Average time of occupancy | | |
| Test procedure: | Public notice DA 00-705 | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date: | 1/3/2011 | | |
| Temperature: 22 °C | Air Pressure: 1014 hPa | Relative Humidity: 52 % | Power Supply: 3V 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.

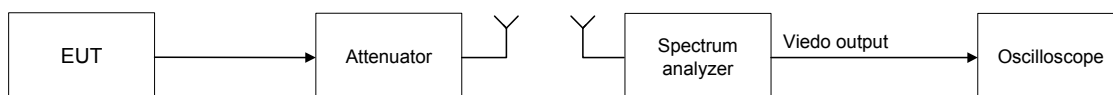
Table 7.4.1 Average time of occupancy limits

| 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 | ≥ 50 |
| 902.0 – 928.0 | 0.4 | 10.0 | < 50 |
| 2400.0 – 2483.5 | 0.4 | 0.4 × N | N (≥ 15) |
| 5725.0 – 5850.0 | 0.4 | 30.0 | ≥ 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 are provided in Table 7.4.2 and the associated plots.

Figure 7.4.1 Average time of occupancy test setup



| | | | |
|----------------------------|-------------------------------|--|---------------------------------|
| Test specification: | | Section 15.247(a)1, Average time of occupancy | |
| Test procedure: | | Public notice DA 00-705 | |
| Test mode: | | Compliance | Verdict: PASS |
| Date: | | 1/3/2011 | |
| Temperature: 22 °C | Air Pressure: 1014 hPa | Relative Humidity: 52 % | Power Supply: 3V battery |
| Remarks: | | | |

Table 7.4.2 Average time of occupancy test results

ASSIGNED FREQUENCY RANGE: 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, MHz | Single transmission duration, ms | Single transmission period, ms | Average time of occupancy*, ms | Bit rate, kbps | Limit, ms | Margin, ms** | Verdict |
|------------------------|----------------------------------|--------------------------------|--------------------------------|----------------|-----------|--------------|---------|
| 915.863 | 4.991 | 2000 | 49.91 | 50 | 400 | -350.09 | Pass |

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

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

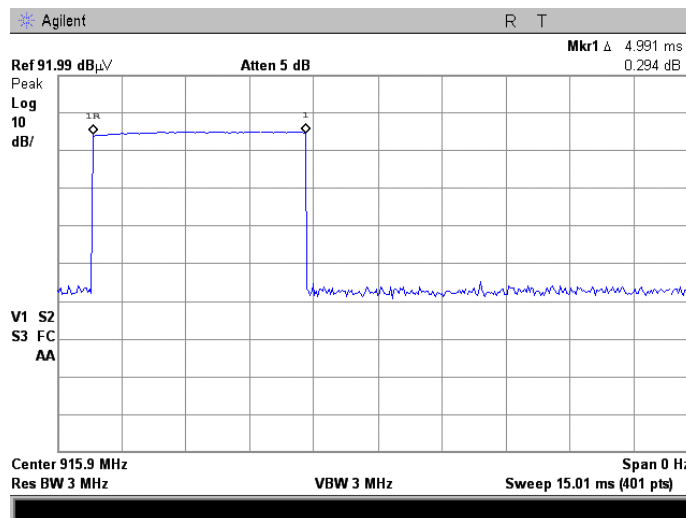
Reference numbers of test equipment used

| | | | | | | | |
|---------|--|--|--|--|--|--|--|
| HL 3001 | | | | | | | |
|---------|--|--|--|--|--|--|--|

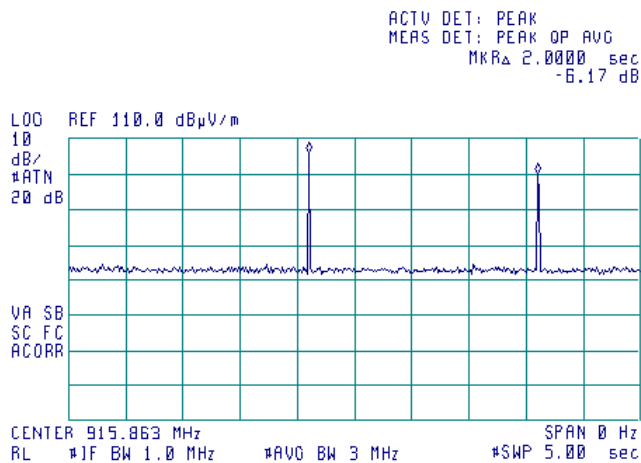
Full description is given in Appendix A.

| | | | |
|----------------------------|-------------------------------|--|---------------------------------|
| Test specification: | | Section 15.247(a)1, Average time of occupancy | |
| Test procedure: | | Public notice DA 00-705 | |
| Test mode: | | Compliance | Verdict: PASS |
| Date: | | 1/3/2011 | |
| Temperature: 22 °C | Air Pressure: 1014 hPa | Relative Humidity: 52 % | Power Supply: 3V battery |
| Remarks: | | | |

Plot 7.4.1 Single transmission duration



Plot 7.4.2 Single transmission period



| | | | |
|----------------------------|---|--------------------------------|---------------------------------|
| Test specification: | Section 15.247(b), Peak output power | | |
| Test procedure: | Public notice DA 00-705 | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date: | 1/3/2011 | | |
| Temperature: 22 °C | Air Pressure: 1014 hPa | Relative Humidity: 52 % | Power Supply: 3V battery |
| Remarks: | | | |

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 | 30 | 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.

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.

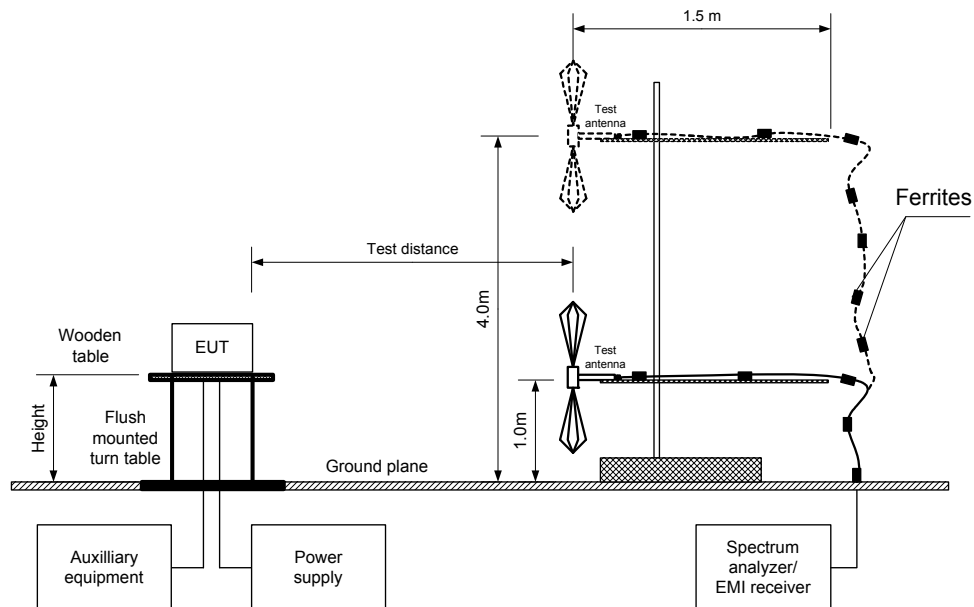
The above equation was converted in logarithmic units for 3 m test distance:

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

7.5.2.6 The worst test results (the lowest margins) were recorded in Table 7.5.2.

| | | | |
|----------------------------|-------------------------------|---|---------------------------------|
| Test specification: | | Section 15.247(b), Peak output power | |
| Test procedure: | | Public notice DA 00-705 | |
| Test mode: | Compliance | Verdict: | PASS |
| Date: | 1/3/2011 | | |
| Temperature: 22 °C | Air Pressure: 1014 hPa | Relative Humidity: 52 % | Power Supply: 3V battery |
| Remarks: | | | |

Figure 7.5.1 Setup for carrier field strength measurements



| | | | |
|----------------------------|---|--------------------------------|---------------------------------|
| Test specification: | Section 15.247(b), Peak output power | | |
| Test procedure: | Public notice DA 00-705 | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date: | 1/3/2011 | | |
| Temperature: 22 °C | Air Pressure: 1014 hPa | Relative Humidity: 52 % | Power Supply: 3V battery |
| Remarks: | | | |

Table 7.5.2 Peak output power test results

ASSIGNED FREQUENCY RANGE: 902-928 MHz
 TEST DISTANCE: 3 m
 TEST SITE: Semi anechoic chamber
 EUT HEIGHT: 0.8 m
 DETECTOR USED: Peak
 TEST ANTENNA TYPE: Biconilog (30 MHz – 1000 MHz)
 Double ridged guide (above 1000 MHz)
 MODULATION: GFSK
 MODULATING SIGNAL: PRBS
 BIT RATE: 50 kbps
 TRANSMITTER OUTPUT POWER SETTINGS: Maximum
 DETECTOR USED: Peak
 EUT 20 dB BANDWIDTH: 102 kHz
 RESOLUTION BANDWIDTH: 120 MHz
 VIDEO BANDWIDTH: 300 MHz
 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 | 101.49 | V | 1.2 | 60 | -8 | 14.29 | 30 | -15.71 | Pass |
| 915.863 | 105.88 | V | 1.2 | 60 | -8 | 18.68 | 30 | -11.32 | Pass |
| 919.106 | 101.92 | V | 1.2 | 60 | -8 | 14.72 | 30 | -15.28 | Pass |

*- 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.

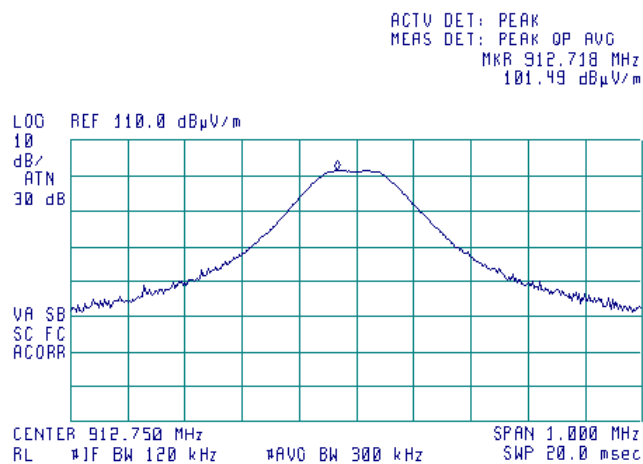
Reference numbers of test equipment used

| | | | | | | | |
|---------|---------|---------|---------|--|--|--|--|
| HL 0521 | HL 0604 | HL 2871 | HL 3622 | | | | |
|---------|---------|---------|---------|--|--|--|--|

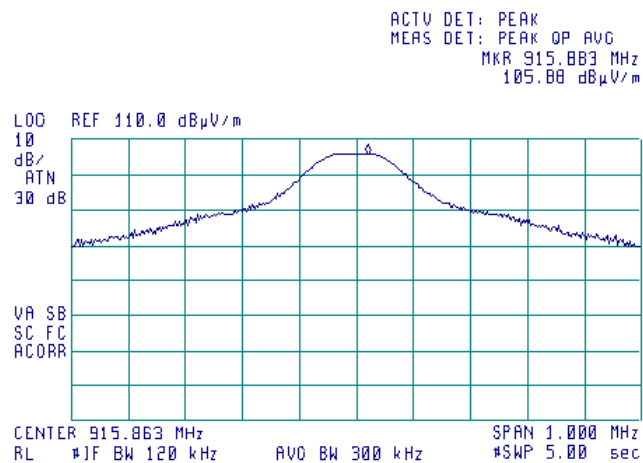
Full description is given in Appendix A.

| | | | |
|----------------------------|---|--------------------------------|---------------------------------|
| Test specification: | Section 15.247(b), Peak output power | | |
| Test procedure: | Public notice DA 00-705 | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date: | 1/3/2011 | | |
| Temperature: 22 °C | Air Pressure: 1014 hPa | Relative Humidity: 52 % | Power Supply: 3V battery |
| Remarks: | | | |

Plot 7.5.1 Field strength of carrier at low frequency

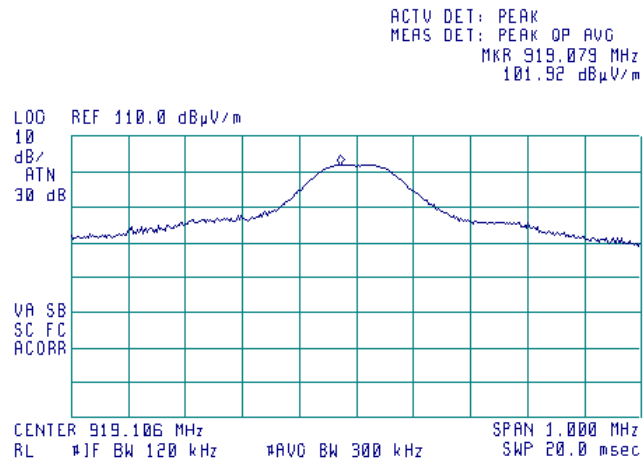


Plot 7.5.2 Field strength of carrier at mid frequency



| | | | |
|----------------------------|-------------------------------|---|---------------------------------|
| Test specification: | | Section 15.247(b), Peak output power | |
| Test procedure: | | Public notice DA 00-705 | |
| Test mode: | | Compliance | Verdict: PASS |
| Date: | | 1/3/2011 | |
| Temperature: 22 °C | Air Pressure: 1014 hPa | Relative Humidity: 52 % | Power Supply: 3V battery |
| Remarks: | | | |

Plot 7.5.3 Field strength of carrier at high frequency



| | | | |
|----------------------------|---|--------------------------------|---------------------------------|
| Test specification: | Section 15.247(d), Emissions at band edges | | |
| Test procedure: | Public notice DA 00-705 | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date: | 1/3/2011 | | |
| Temperature: 22 °C | Air Pressure: 1014 hPa | Relative Humidity: 52 % | Power Supply: 3V 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



| | | | |
|----------------------------|---|--------------------------------|---------------------------------|
| Test specification: | Section 15.247(d), Emissions at band edges | | |
| Test procedure: | Public notice DA 00-705 | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date: | 1/3/2011 | | |
| Temperature: 22 °C | Air Pressure: 1014 hPa | Relative Humidity: 52 % | Power Supply: 3V battery |
| Remarks: | | | |

Table 7.6.2 Band edge emission test results

ASSIGNED FREQUENCY RANGE: 902-928 MHz
 DETECTOR USED: Peak
 MODULATION: GFSK
 MODULATING SIGNAL: PRBS
 BIT RATE: 50 kbps
 TRANSMITTER OUTPUT POWER SETTINGS: Maximum
 RESOLUTION BANDWIDTH: $\geq 1\%$ of the span
 VIDEO BANDWIDTH: \geq RBW

| Frequency, MHz | Band edge emission, dBm | Emission at carrier, dBm | Attenuation below carrier, dBc | Limit, dBc | Margin, dB* | Verdict |
|----------------------------|-------------------------|--------------------------|--------------------------------|------------|-------------|---------|
| Frequency hopping disabled | | | | | | |
| 902 | 48.32 | 101.49 | 53.17 | 20.0 | 33.17 | Pass |
| 928 | 49.66 | 101.92 | 52.26 | | 32.26 | |
| Frequency hopping enabled | | | | | | |
| 902 | 34.22 | 101.49 | 67.27 | 20.0 | 47.27 | Pass |
| 928 | 40.84 | 101.92 | 61.08 | | 41.08 | |

*- Margin = Attenuation below carrier – specification limit.

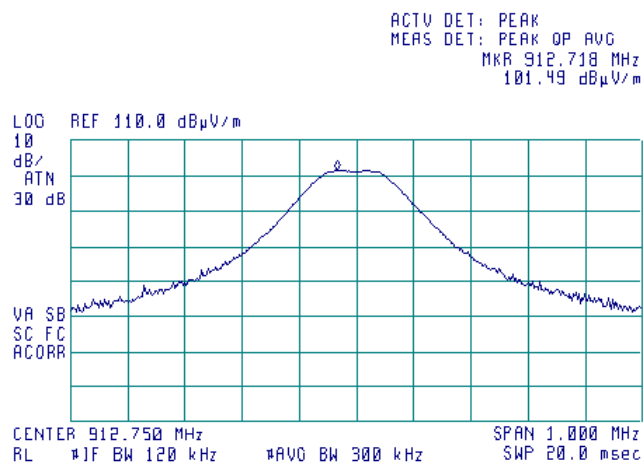
Reference numbers of test equipment used

| | | | | | | | |
|---------|---------|---------|---------|--|--|--|--|
| HL 0521 | HL 0604 | HL 2871 | HL 3622 | | | | |
|---------|---------|---------|---------|--|--|--|--|

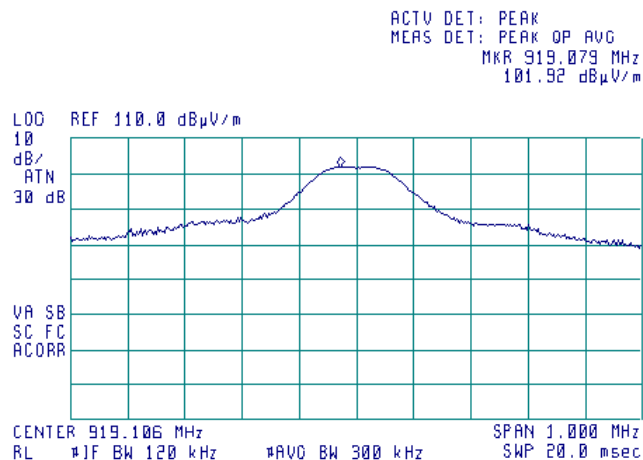
Full description is given in Appendix A.

| | | | |
|----------------------------|---|--------------------------------|---------------------------------|
| Test specification: | Section 15.247(d), Emissions at band edges | | |
| Test procedure: | Public notice DA 00-705 | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date: | 1/3/2011 | | |
| Temperature: 22 °C | Air Pressure: 1014 hPa | Relative Humidity: 52 % | Power Supply: 3V battery |
| Remarks: | | | |

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

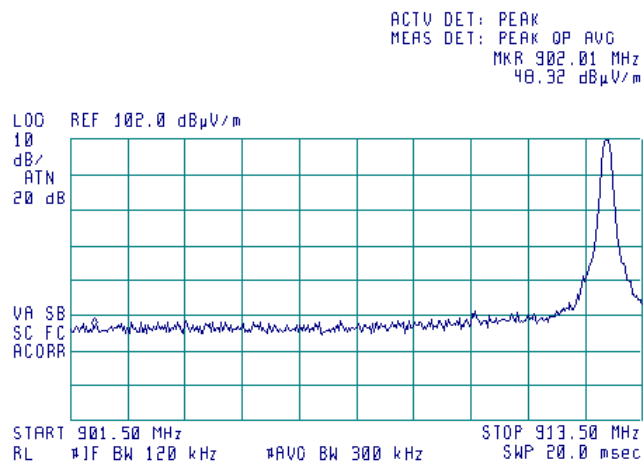


Plot 7.6.2 The highest emission level within the assigned band at high carrier frequency

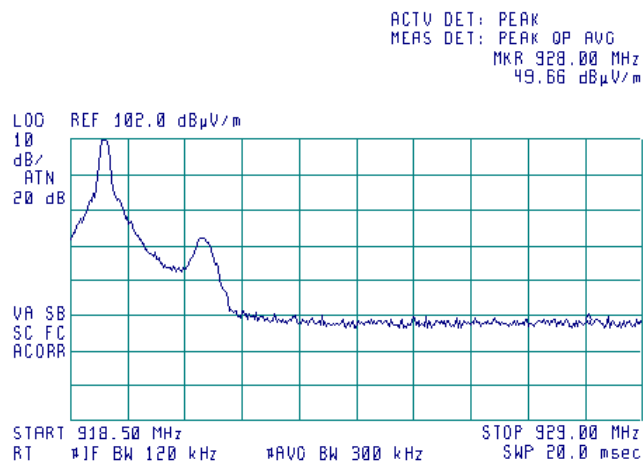


| | | | |
|----------------------------|-------------------------------|---|---------------------------------|
| Test specification: | | Section 15.247(d), Emissions at band edges | |
| Test procedure: | | Public notice DA 00-705 | |
| Test mode: | | Compliance | Verdict: PASS |
| Date: | | 1/3/2011 | |
| Temperature: 22 °C | Air Pressure: 1014 hPa | Relative Humidity: 52 % | Power Supply: 3V battery |
| Remarks: | | | |

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

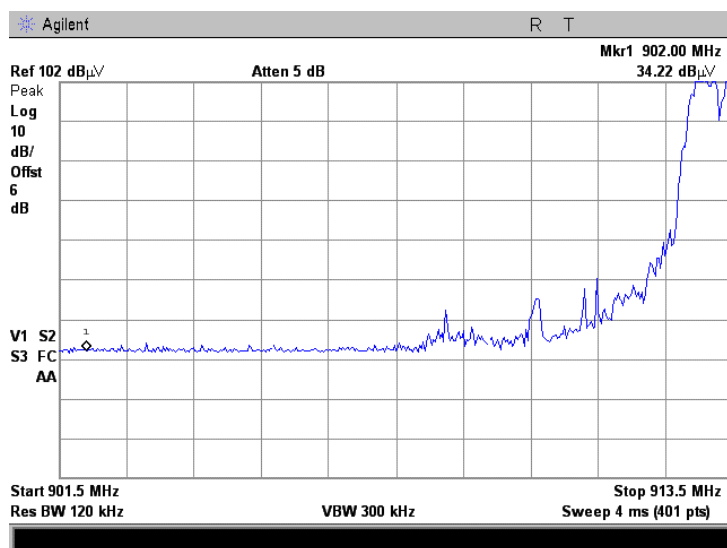


Plot 7.6.4 The highest band edge emission at high carrier frequency with hopping function disabled

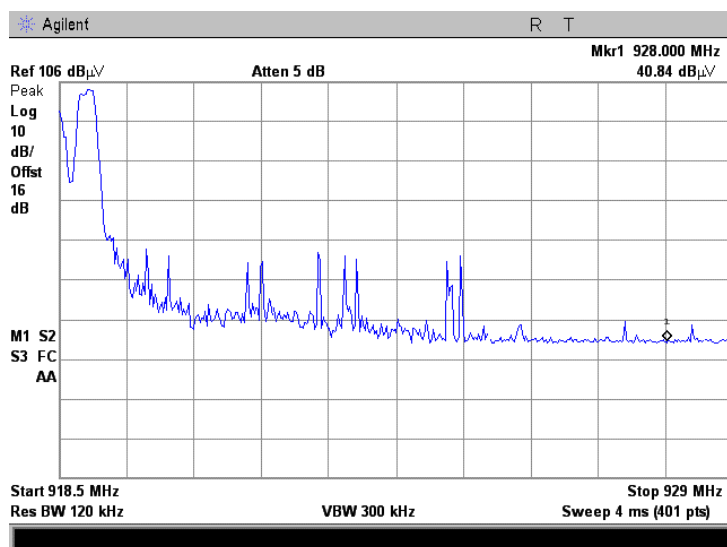


| | | | |
|----------------------------|-------------------------------|---|---------------------------------|
| Test specification: | | Section 15.247(d), Emissions at band edges | |
| Test procedure: | | Public notice DA 00-705 | |
| Test mode: | | Compliance | Verdict: PASS |
| Date: | | 1/3/2011 | |
| Temperature: 22 °C | Air Pressure: 1014 hPa | Relative Humidity: 52 % | Power Supply: 3V 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



| | | | |
|----------------------------|---|--------------------------------|---------------------------------|
| Test specification: | Section 15.247(d), 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: | 1/3/2011 | | |
| Temperature: 22 °C | Air Pressure: 1014 hPa | Relative Humidity: 52 % | Power Supply: 3V battery |
| Remarks: | | | |

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 th harmonic | 74.0 | NA | 54.0 | |

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

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

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

** - 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.

| | | | |
|---------------------|---|-------------------------|--------------------------|
| Test specification: | Section 15.247(d), 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: | 1/3/2011 | | |
| Temperature: 22 °C | Air Pressure: 1014 hPa | Relative Humidity: 52 % | Power Supply: 3V battery |
| Remarks: | | | |

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

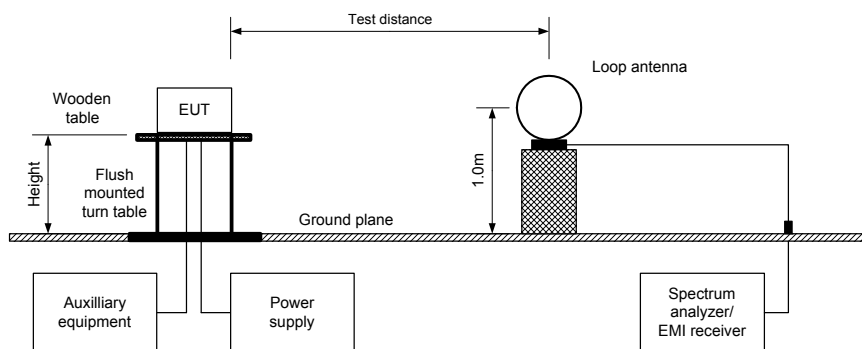
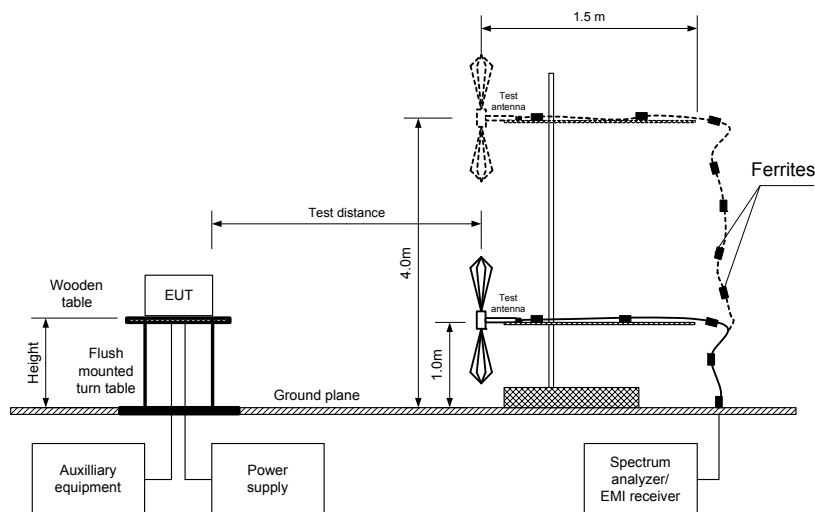


Figure 7.7.2 Setup for spurious emission field strength measurements above 30 MHz



| | | | | |
|---------------------|---|-------------------------|--------------------------|------|
| Test specification: | Section 15.247(d), 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: | 1/3/2011 | | | |
| Temperature: 22 °C | Air Pressure: 1014 hPa | Relative Humidity: 52 % | Power Supply: 3V battery | |
| Remarks: | | | | |

Table 7.7.2 Field strength of emissions outside restricted bands

ASSIGNED FREQUENCY RANGE: 902-928 MHz
 INVESTIGATED FREQUENCY RANGE: 0.009 -9500 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

| Frequency, MHz | Field strength of spurious, dB(μV/m) | Antenna polarization | Antenna height, m | Azimuth, degrees* | Field strength of carrier, dB(μV/m) | Attenuation below carrier, dBc | Limit, dBc | Margin, dB** | Verdict |
|------------------------|--------------------------------------|----------------------|-------------------|-------------------|-------------------------------------|--------------------------------|------------|--------------|---------|
| Low carrier frequency | | | | | | | | | |
| 1825.431 | 58.45 | V | 1.1 | 0 | 101.24 | -42.79 | 20.0 | -22.79 | Pass |
| 5476.616 | 56.61 | V | 1.5 | 120 | | -44.63 | | -24.63 | |
| 6389.395 | 56.07 | V | 1.4 | 150 | | -45.17 | | -25.17 | |
| Mid carrier frequency | | | | | | | | | |
| 1831.709 | 65.99 | V | 1.6 | 90 | 105.74 | -39.75 | 20.0 | -19.75 | Pass |
| 5495.301 | 58.44 | V | 1.5 | 20 | | -47.30 | | -27.30 | |
| 6411.160 | 53.61 | V | 1.4 | 90 | | -52.13 | | -32.13 | |
| High carrier frequency | | | | | | | | | |
| 1838.154 | 58.79 | H | 1.7 | 120 | 101.68 | -42.89 | 20.0 | -22.89 | Pass |
| 5514.463 | 57.81 | V | 1.6 | 140 | | -43.87 | | -23.87 | |
| 6433.875 | 52.29 | V | 1.5 | 180 | | -49.39 | | -29.39 | |

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

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

| | | | |
|----------------------------|---|--------------------------------|---------------------------------|
| Test specification: | Section 15.247(d), 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: | 1/3/2011 | | |
| Temperature: 22 °C | Air Pressure: 1014 hPa | Relative Humidity: 52 % | Power Supply: 3V battery |
| Remarks: | | | |

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

ASSIGNED FREQUENCY RANGE: 902-928 MHz
 INVESTIGATED FREQUENCY RANGE: 1000 -9500 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: 1000 kHz
 TEST ANTENNA TYPE: Double ridged guide
 FREQUENCY HOPPING: Disabled

| Frequency | | | | Disabled | | | Average field strength(VBW=10 Hz) | | | | | Verdict |
|-------------------------|----------------------|-----------|-------------------|--------------------|-----------------|--------------|-----------------------------------|----------------------|-----------------|---------------|------|---------|
| Frequency, MHz | Antenna Polarization | Height, m | Azimuth, degrees* | Measured, dB(μV/m) | Limit, dB(μV/m) | Margin, dB** | Measured, dB(μV/m) | Calculated, dB(μV/m) | Limit, dB(μV/m) | Margin, dB*** | | |
| Low carrier frequency | | | | | | | | | | | | |
| 2738.224 | V | 1.6 | 30 | 55.78 | 74 | -18.22 | 54.21 | 28.21 | 54 | -25.79 | Pass | |
| 3650.974 | V | 1.8 | 30 | 56.55 | 74 | -17.45 | 54.24 | 28.24 | 54 | -25.76 | | |
| 4563.699 | V | 1.7 | 80 | 57.74 | 74 | -16.26 | 54.84 | 28.84 | 54 | -25.16 | | |
| 7301.985 | V | 1.7 | 0 | 50.39 | 74 | -23.61 | 47.80 | 21.80 | 54 | -32.20 | | |
| 8214.710 | V | 1.5 | 0 | 50.17 | 74 | -23.83 | 46.94 | 20.94 | 54 | -33.06 | | |
| 9127.447 | V | 1.5 | 0 | 54.82 | 74 | -19.18 | 51.81 | 25.81 | 54 | -28.19 | | |
| Mid carrier frequency54 | | | | | | | | | | | | |
| 2747.560 | V | 1.6 | 60 | 58.50 | 74 | -15.50 | 57.11 | 31.11 | 54 | -22.89 | Pass | |
| 3663.410 | V | 14 | 210 | 58.93 | 74 | -15.07 | 54.84 | 28.84 | 54 | -25.16 | | |
| 4579.273 | V | 1.5 | 60 | 59.31 | 74 | -14.69 | 56.62 | 30.62 | 54 | -23.38 | | |
| 7326.838 | V | 1.6 | 30 | 51.26 | 74 | -22.74 | 47.04 | 21.04 | 54 | -32.96 | | |
| 8242.688 | V | 1.6 | 20 | 49.11 | 74 | -24.89 | 43.81 | 17.81 | 54 | -36.19 | | |
| 9158.526 | V | 1.4 | 0 | 53.16 | 74 | -20.84 | 48.13 | 22.13 | 54 | -31.87 | | |
| High carrier frequency | | | | | | | | | | | | |
| 2757.305 | H | 1.6 | 80 | 54.27 | 74 | -19.73 | 52.15 | 26.15 | 54 | -27.85 | Pass | |
| 3676.399 | H | 1.7 | 90 | 55.08 | 74 | -18.92 | 51.71 | 25.71 | 54 | -28.29 | | |
| 4595.505 | V | 1.6 | 60 | 59.63 | 74 | -14.37 | 56.90 | 30.90 | 54 | -23.10 | | |
| 7352.806 | V | 1.8 | 30 | 47.48 | 74 | -26.52 | 42.26 | 16.26 | 54 | -37.74 | | |
| 8271.899 | V | 1.7 | 200 | 48.50 | 74 | -25.50 | 41.62 | 15.62 | 54 | -38.38 | | |
| 9190.943 | V | 1.7 | 0 | 48.66 | 74 | -25.34 | 42.04 | 16.04 | 54 | -37.96 | | |

*- 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 | | |
| 4.991 | 2000 | NA | NA | NA | -26 |

*- 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: | Section 15.247(d), 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: | 1/3/2011 | | |
| Temperature: 22 °C | Air Pressure: 1014 hPa | Relative Humidity: 52 % | Power Supply: 3V battery |
| Remarks: | | | |

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

ASSIGNED FREQUENCY RANGE: 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: 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)
 Biconical (30 MHz – 200 MHz)
 Log periodic (200 MHz – 1000 MHz)
 Biconilog (30 MHz – 1000 MHz)
 FREQUENCY HOPPING: Disabled

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

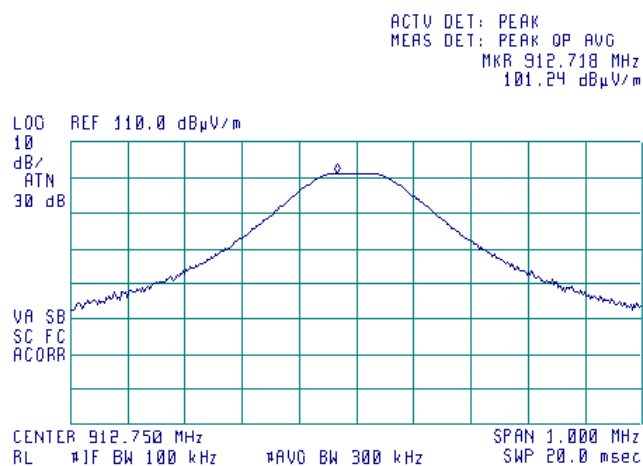
| | | | | | | | |
|---------|---------|---------|---------|---------|---------|---------|---------|
| HL 0446 | HL 0604 | HL 1984 | HL 2780 | HL 2883 | HL 3123 | HL 3346 | HL 3534 |
|---------|---------|---------|---------|---------|---------|---------|---------|

Full description is given in Appendix A.

| | | | |
|----------------------------|---|--------------------------------|---------------------------------|
| Test specification: | Section 15.247(d), 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: | 1/3/2011 | | |
| Temperature: 22 °C | Air Pressure: 1014 hPa | Relative Humidity: 52 % | Power Supply: 3V battery |
| Remarks: | | | |

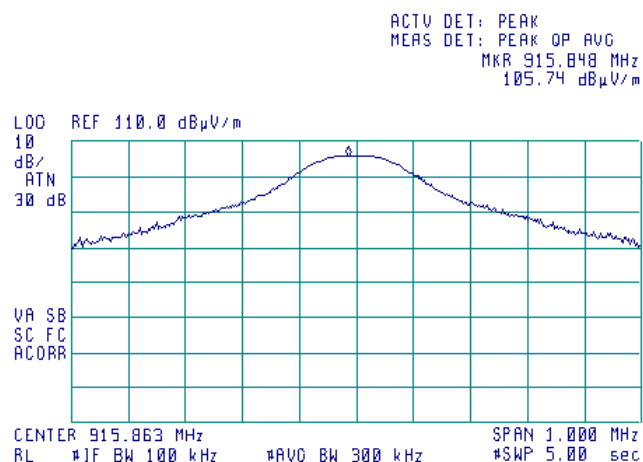
Plot 7.7.1 Radiated emission measurements at the low carrier frequency

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical & Horizontal



Plot 7.7.2 Radiated emission measurements at the mid carrier frequency

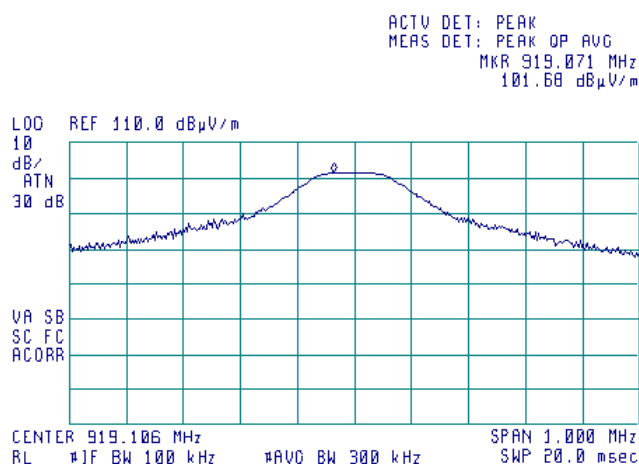
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical & Horizontal



| | | | |
|----------------------------|---|--------------------------------|---------------------------------|
| Test specification: | Section 15.247(d), 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: | 1/3/2011 | | |
| Temperature: 22 °C | Air Pressure: 1014 hPa | Relative Humidity: 52 % | Power Supply: 3V battery |
| Remarks: | | | |

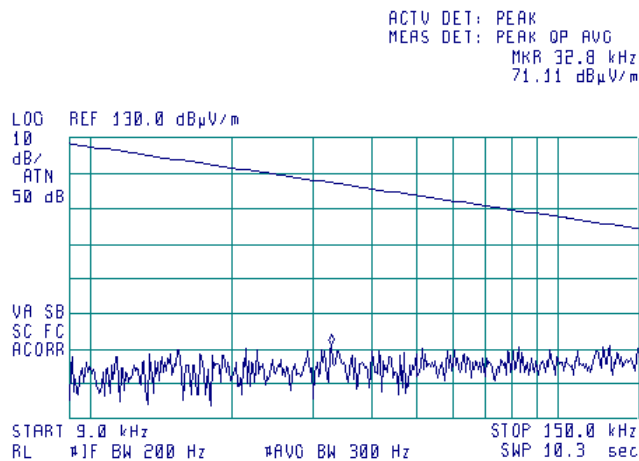
Plot 7.7.3 Radiated emission measurements at the high carrier frequency

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical & Horizontal



Plot 7.7.4 Radiated emission measurements from 9 to 150 kHz at the low, mid and high carrier frequency

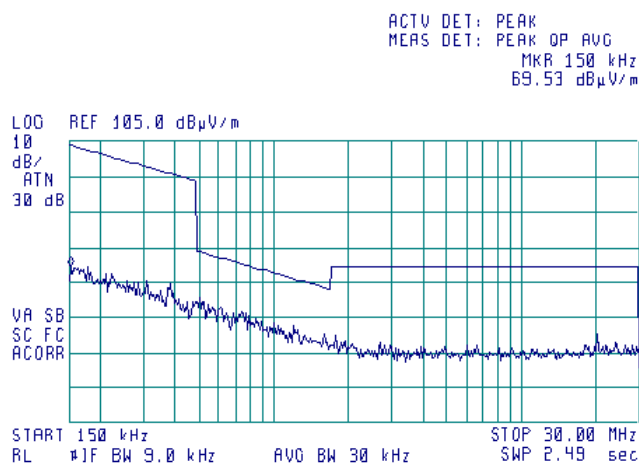
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical



| | | | |
|----------------------------|---|--------------------------------|---------------------------------|
| Test specification: | Section 15.247(d), 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: | 1/3/2011 | | |
| Temperature: 22 °C | Air Pressure: 1014 hPa | Relative Humidity: 52 % | Power Supply: 3V battery |
| Remarks: | | | |

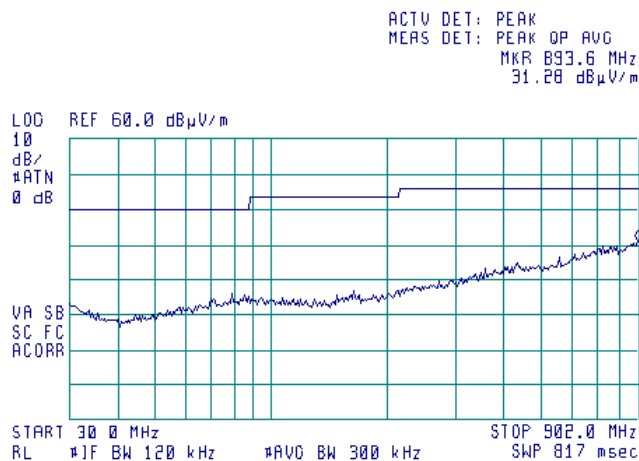
Plot 7.7.5 Radiated emission measurements from 0.15 to 30 MHz at the low, mid and high carrier frequency

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



Plot 7.7.6 Radiated emission measurements from 30 to 902 MHz at the low carrier frequency

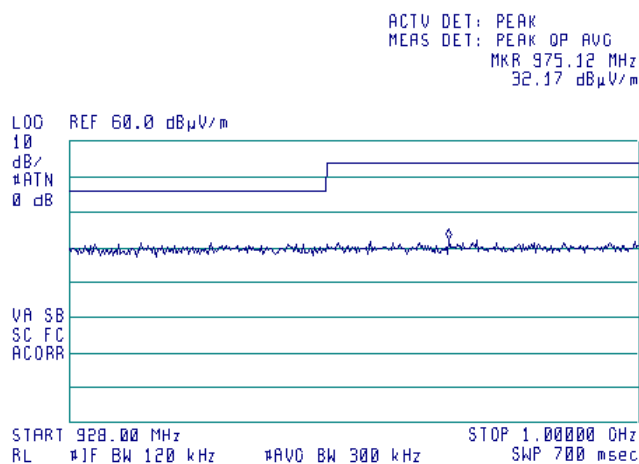
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal



| | | | |
|----------------------------|---|--------------------------------|---------------------------------|
| Test specification: | Section 15.247(d), 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: | 1/3/2011 | | |
| Temperature: 22 °C | Air Pressure: 1014 hPa | Relative Humidity: 52 % | Power Supply: 3V battery |
| Remarks: | | | |

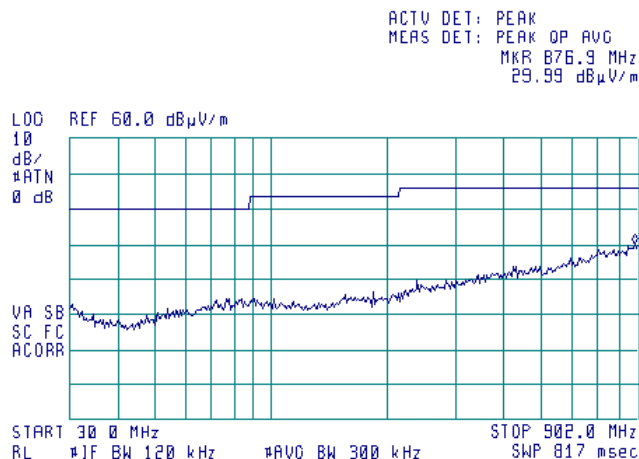
Plot 7.7.7 Radiated emission measurements from 928 to 1000 MHz at the low carrier frequency

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



Plot 7.7.8 Radiated emission measurements from 30 to 902 MHz at the mid carrier frequency

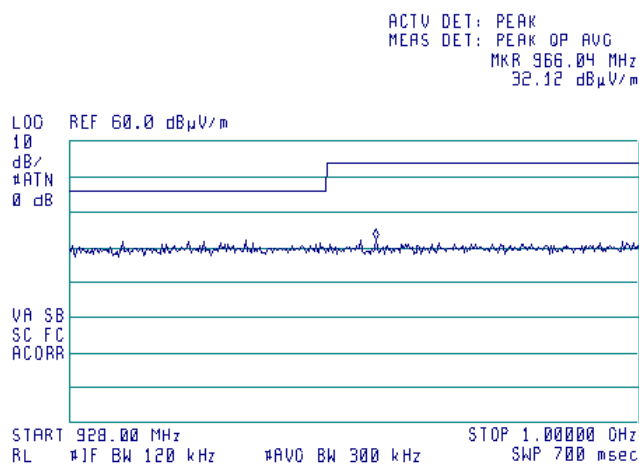
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal



| | | | |
|----------------------------|---|--------------------------------|---------------------------------|
| Test specification: | Section 15.247(d), 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: | 1/3/2011 | | |
| Temperature: 22 °C | Air Pressure: 1014 hPa | Relative Humidity: 52 % | Power Supply: 3V battery |
| Remarks: | | | |

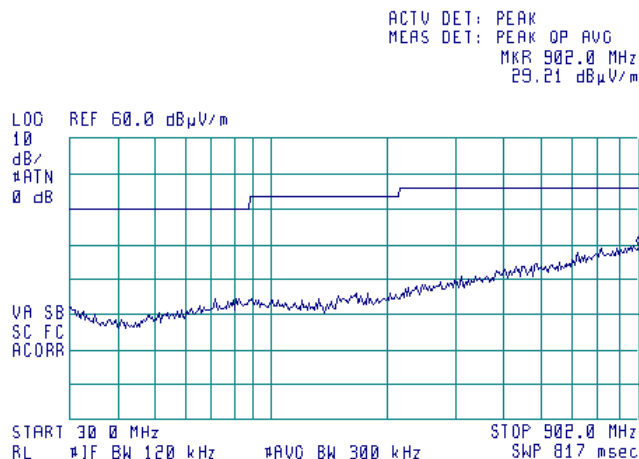
Plot 7.7.9 Radiated emission measurements from 928 to 1000 MHz at the mid carrier frequency

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



Plot 7.7.10 Radiated emission measurements from 30 to 902 MHz at the high carrier frequency

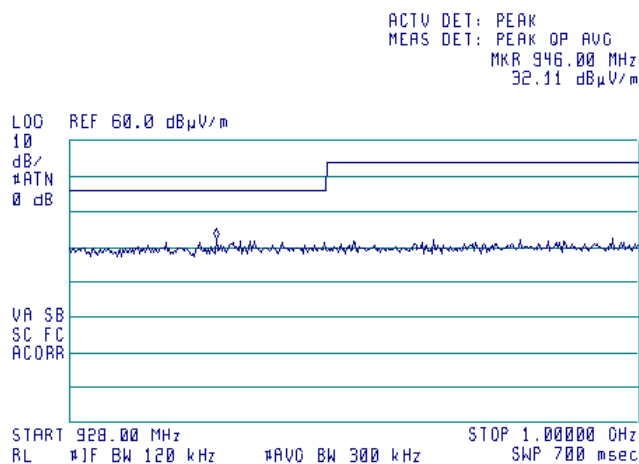
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal



| | | | |
|----------------------------|---|--------------------------------|---------------------------------|
| Test specification: | Section 15.247(d), 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: | 1/3/2011 | | |
| Temperature: 22 °C | Air Pressure: 1014 hPa | Relative Humidity: 52 % | Power Supply: 3V battery |
| Remarks: | | | |

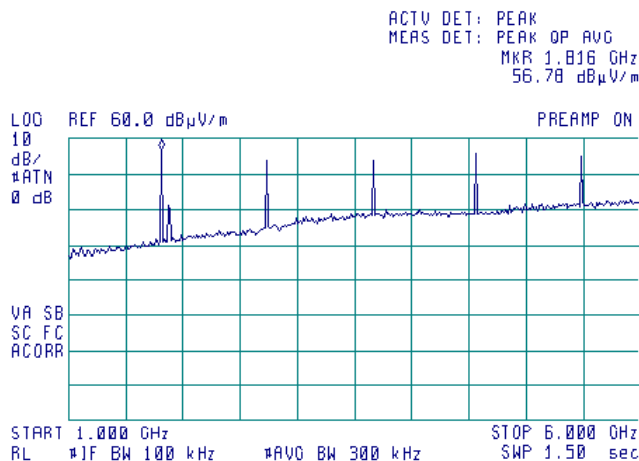
Plot 7.7.11 Radiated emission measurements from 928 to 1000 MHz at the high carrier frequency

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



Plot 7.7.12 Radiated emission measurements from 1000 to 6000 MHz at the low carrier frequency

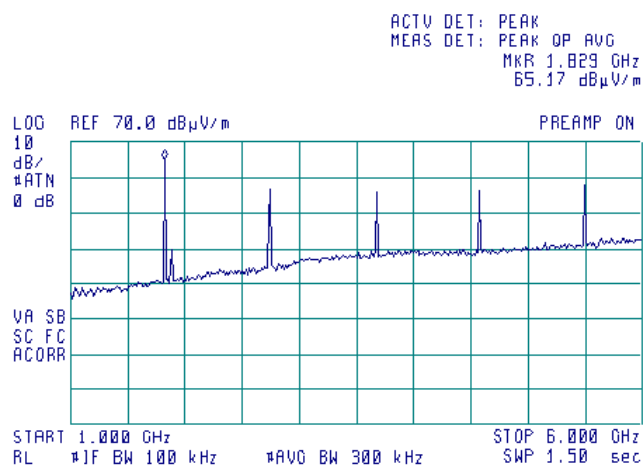
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal



| | | | |
|----------------------------|---|--------------------------------|---------------------------------|
| Test specification: | Section 15.247(d), 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: | 1/3/2011 | | |
| Temperature: 22 °C | Air Pressure: 1014 hPa | Relative Humidity: 52 % | Power Supply: 3V battery |
| Remarks: | | | |

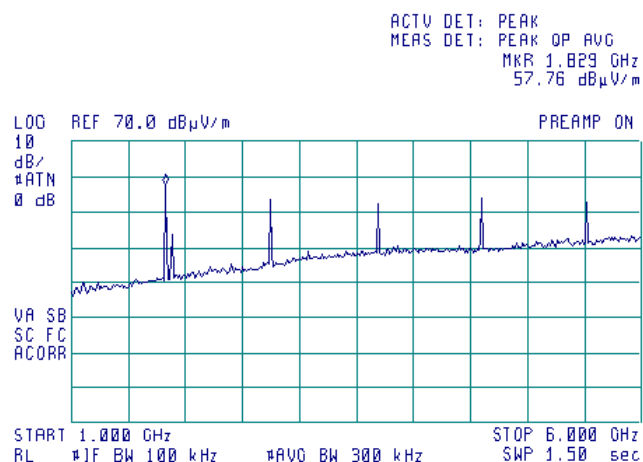
Plot 7.7.13 Radiated emission measurements from 1000 to 6000 MHz at the mid carrier frequency

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



Plot 7.7.14 Radiated emission measurements from 1000 to 6000 MHz at the high carrier frequency

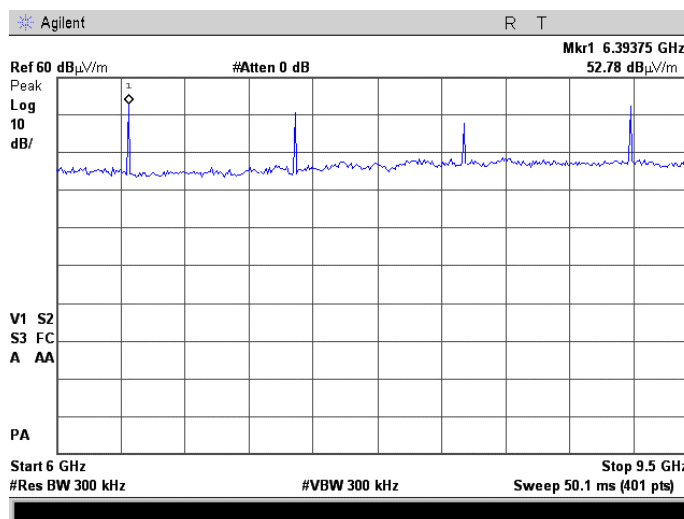
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal



| | | | |
|----------------------------|---|--------------------------------|---------------------------------|
| Test specification: | Section 15.247(d), 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: | 1/3/2011 | | |
| Temperature: 22 °C | Air Pressure: 1014 hPa | Relative Humidity: 52 % | Power Supply: 3V battery |
| Remarks: | | | |

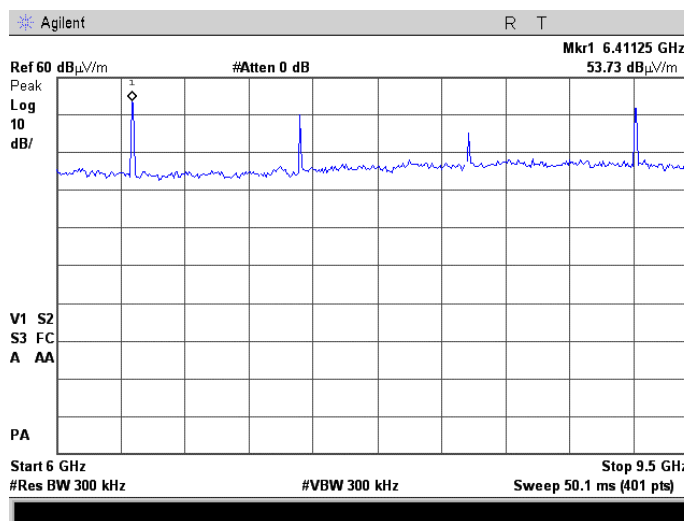
Plot 7.7.15 Radiated emission measurements from 6000 to 9500 MHz at the low carrier frequency

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



Plot 7.7.16 Radiated emission measurements from 6000 to 9500 MHz at the mid carrier frequency

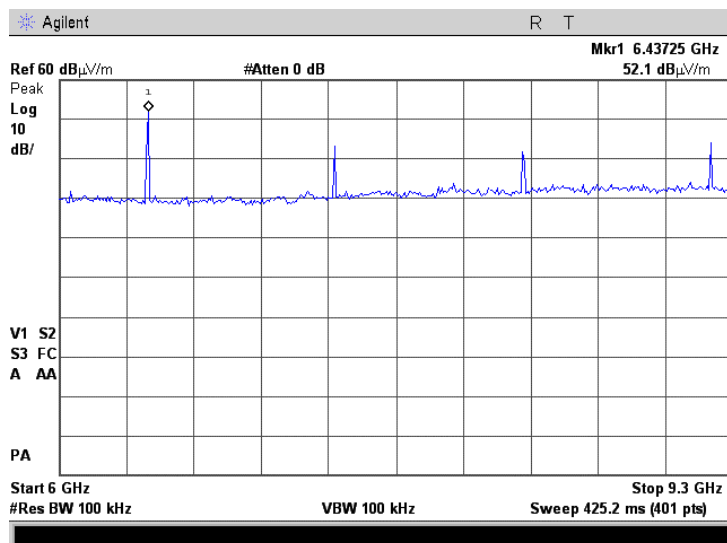
TEST SITE: OATS
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal



| | | | |
|----------------------------|-------------------------------|---|---------------------------------|
| Test specification: | | Section 15.247(d), 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: | | 1/3/2011 | |
| Temperature: 22 °C | Air Pressure: 1014 hPa | Relative Humidity: 52 % | Power Supply: 3V battery |
| Remarks: | | | |

Plot 7.7.17 Radiated emission measurements from 6000 to 9500 MHz at the high carrier frequency

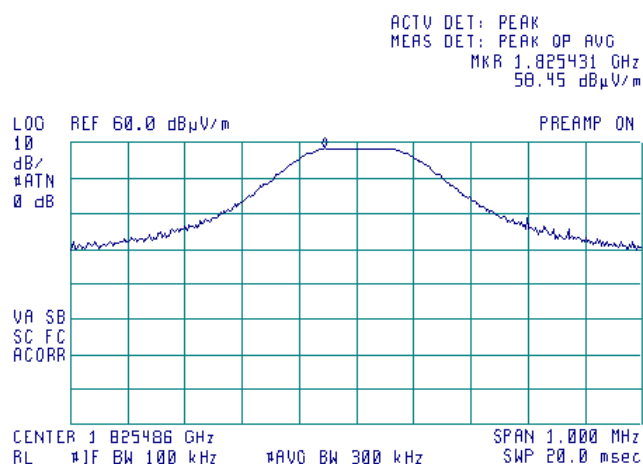
TEST SITE: OATS
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal



| | | | |
|----------------------------|---|--------------------------------|---------------------------------|
| Test specification: | Section 15.247(d), 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: | 1/3/2011 | | |
| Temperature: 22 °C | Air Pressure: 1014 hPa | Relative Humidity: 52 % | Power Supply: 3V battery |
| Remarks: | | | |

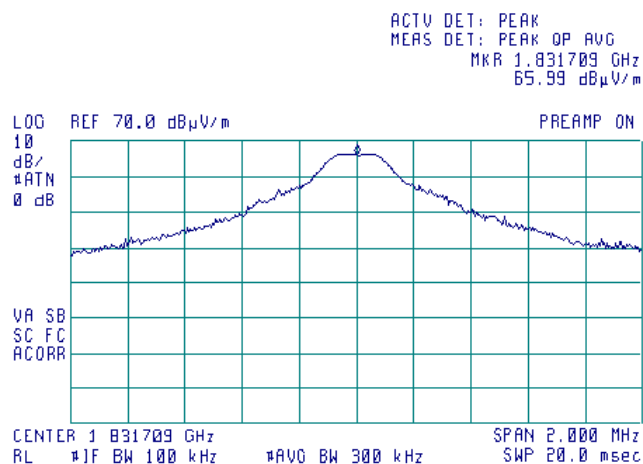
Plot 7.7.18 Radiated emission measurements at the second harmonic of low carrier frequency

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m



Plot 7.7.19 Radiated emission measurements at the second harmonic of mid carrier frequency

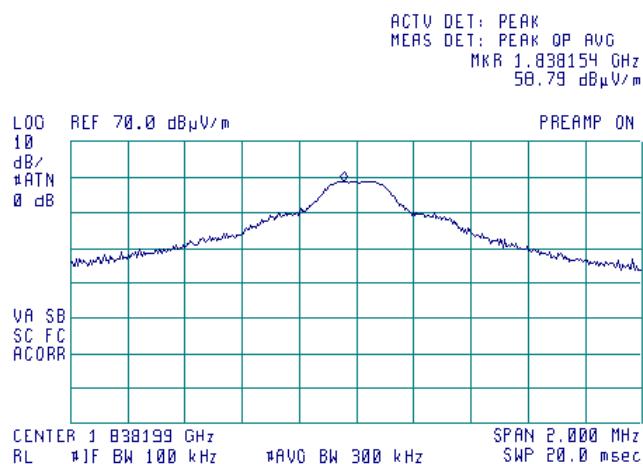
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m



| | | | |
|----------------------------|-------------------------------|---|---------------------------------|
| Test specification: | | Section 15.247(d), 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: | | 1/3/2011 | |
| Temperature: 22 °C | Air Pressure: 1014 hPa | Relative Humidity: 52 % | Power Supply: 3V battery |
| Remarks: | | | |

Plot 7.7.20 Radiated emission measurements at the second harmonic of high carrier frequency

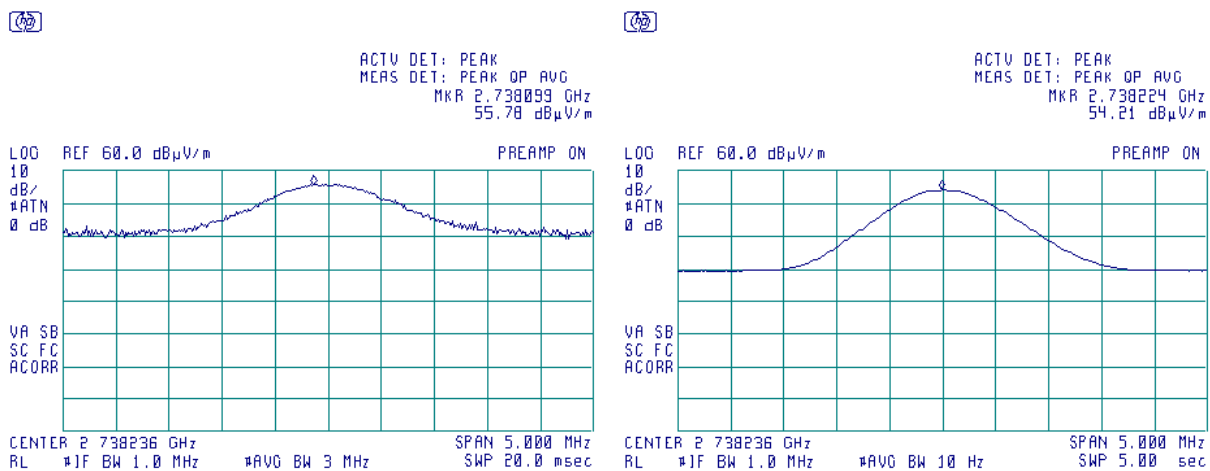
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m



| | | | |
|----------------------------|-------------------------------|---|---------------------------------|
| Test specification: | | Section 15.247(d), 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: | | 1/3/2011 | |
| Temperature: 22 °C | Air Pressure: 1014 hPa | Relative Humidity: 52 % | Power Supply: 3V battery |
| Remarks: | | | |

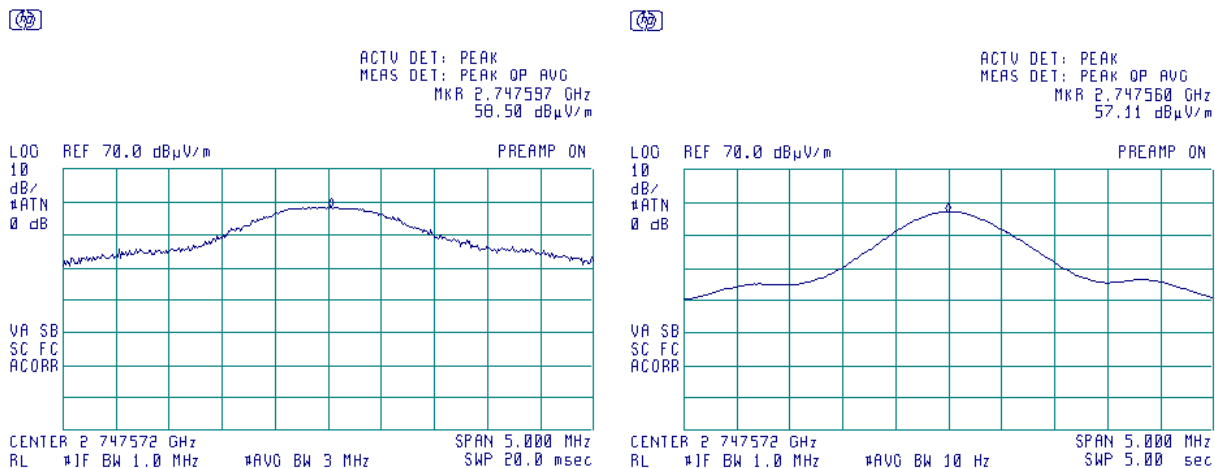
Plot 7.7.21 Radiated emission measurements at the third harmonic of low carrier frequency

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m



Plot 7.7.22 Radiated emission measurements at the third harmonic of mid carrier frequency

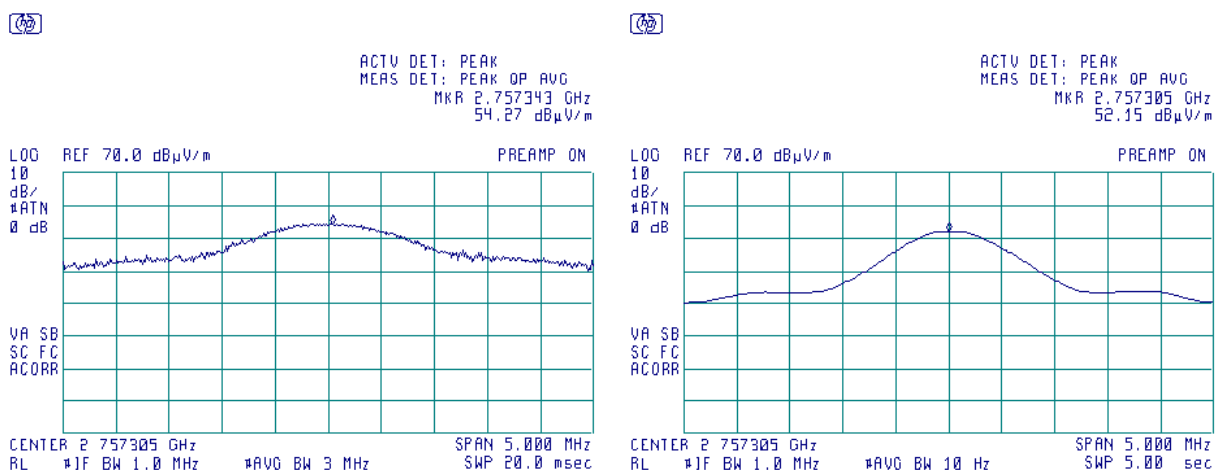
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m



| | | | |
|----------------------------|---|--------------------------------|---------------------------------|
| Test specification: | Section 15.247(d), 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: | 1/3/2011 | | |
| Temperature: 22 °C | Air Pressure: 1014 hPa | Relative Humidity: 52 % | Power Supply: 3V battery |
| Remarks: | | | |

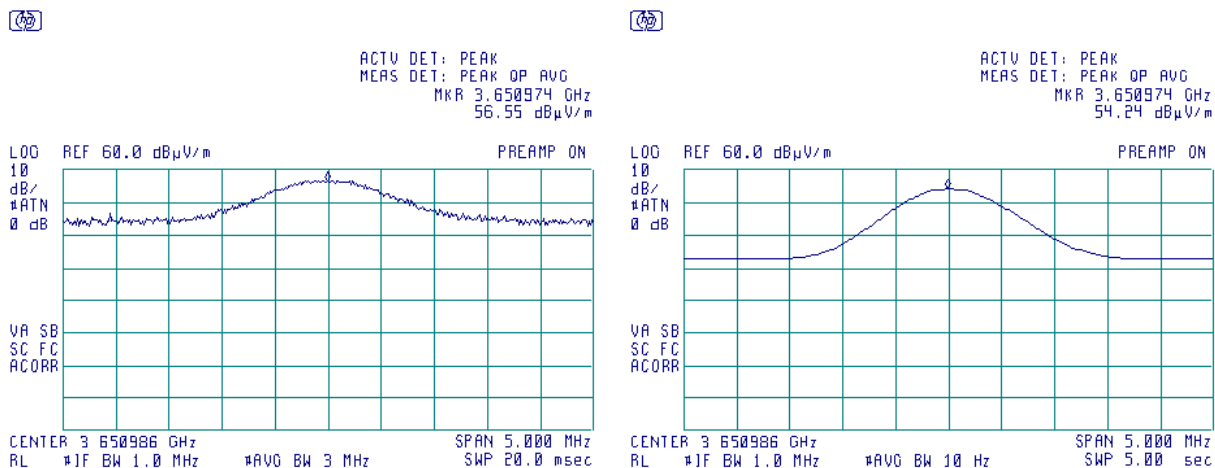
Plot 7.7.23 Radiated emission measurements at the third harmonic of high carrier frequency

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m



Plot 7.7.24 Radiated emission measurements at the fourth harmonic of low carrier frequency

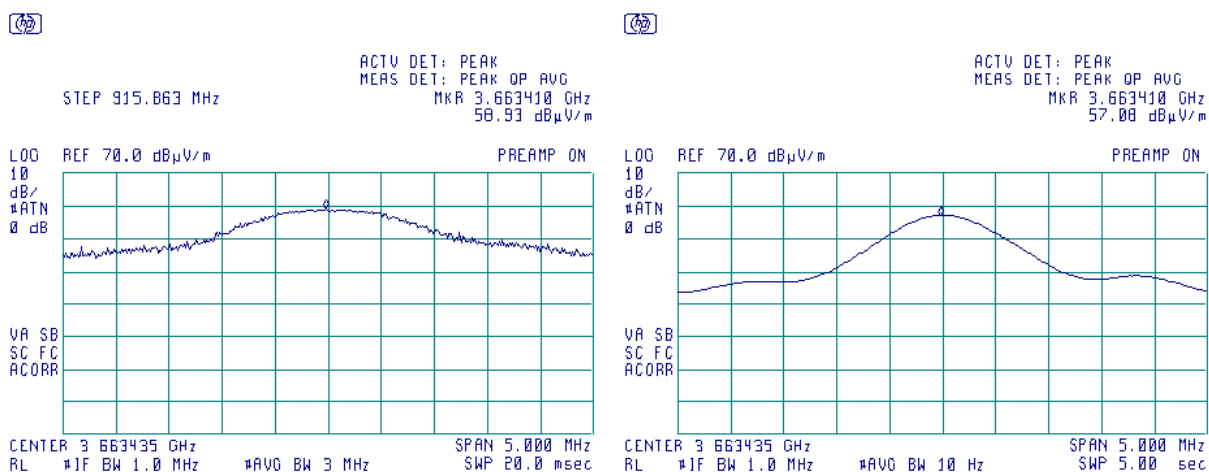
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m



| | | | |
|----------------------------|---|--------------------------------|---------------------------------|
| Test specification: | Section 15.247(d), 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: | 1/3/2011 | | |
| Temperature: 22 °C | Air Pressure: 1014 hPa | Relative Humidity: 52 % | Power Supply: 3V battery |
| Remarks: | | | |

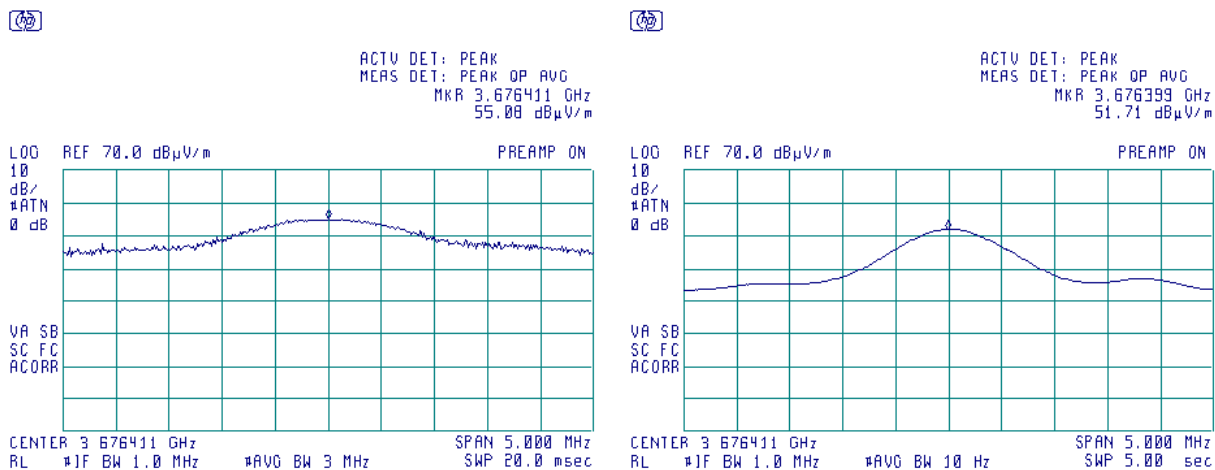
Plot 7.7.25 Radiated emission measurements at the fourth harmonic of mid carrier frequency

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m



Plot 7.7.26 Radiated emission measurements at the fourth harmonic of high carrier frequency

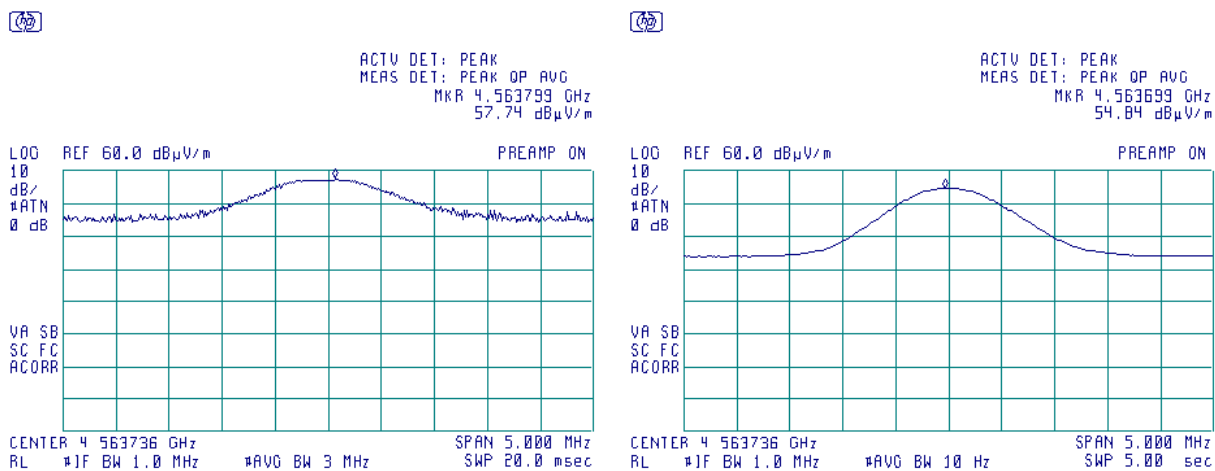
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m



| | | | |
|----------------------------|-------------------------------|---|---------------------------------|
| Test specification: | | Section 15.247(d), 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: | | 1/3/2011 | |
| Temperature: 22 °C | Air Pressure: 1014 hPa | Relative Humidity: 52 % | Power Supply: 3V battery |
| Remarks: | | | |

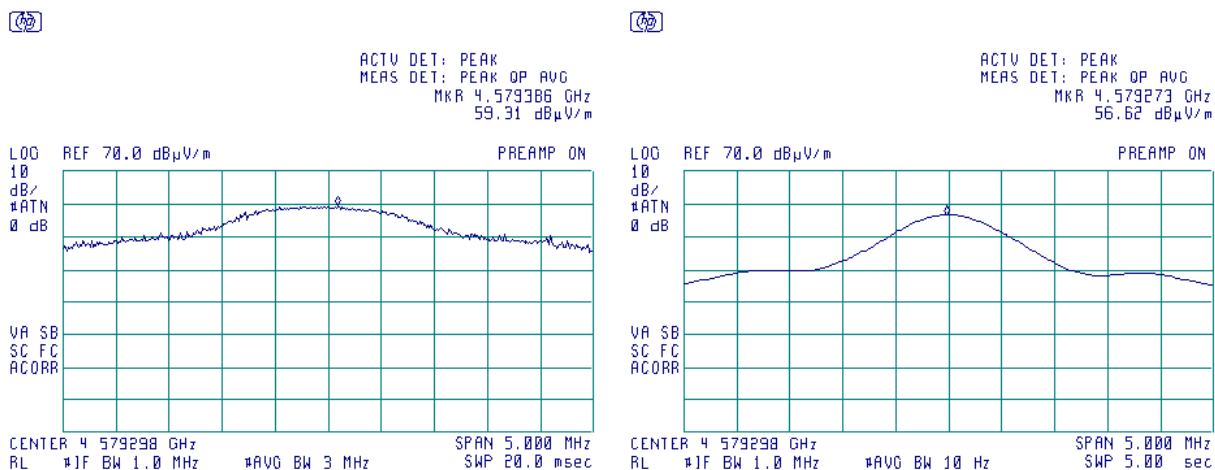
Plot 7.7.27 Radiated emission measurements at the fifth harmonic of low carrier frequency

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m



Plot 7.7.28 Radiated emission measurements at the fifth harmonic of mid carrier frequency

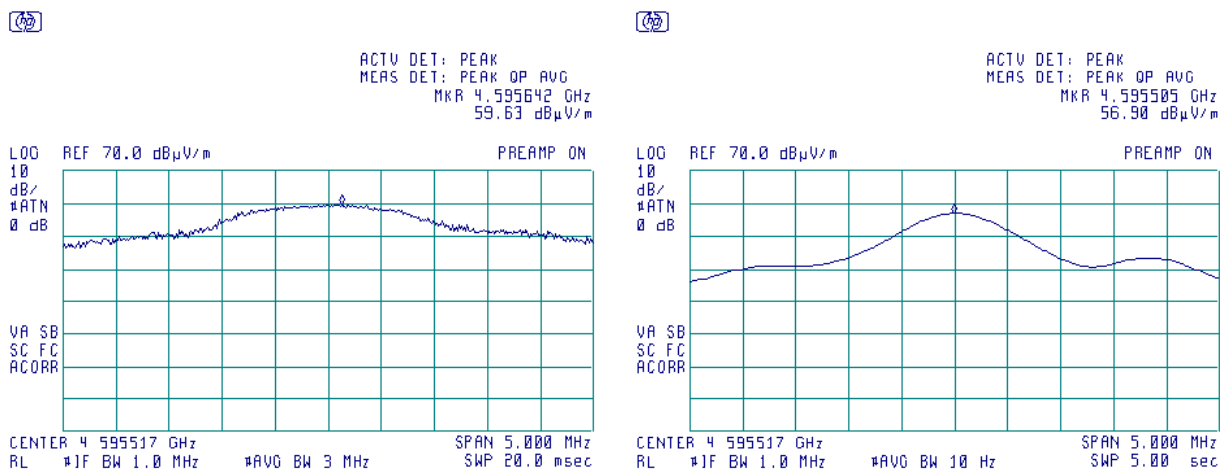
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m



| | | | |
|----------------------------|---|--------------------------------|---------------------------------|
| Test specification: | Section 15.247(d), 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: | 1/3/2011 | | |
| Temperature: 22 °C | Air Pressure: 1014 hPa | Relative Humidity: 52 % | Power Supply: 3V battery |
| Remarks: | | | |

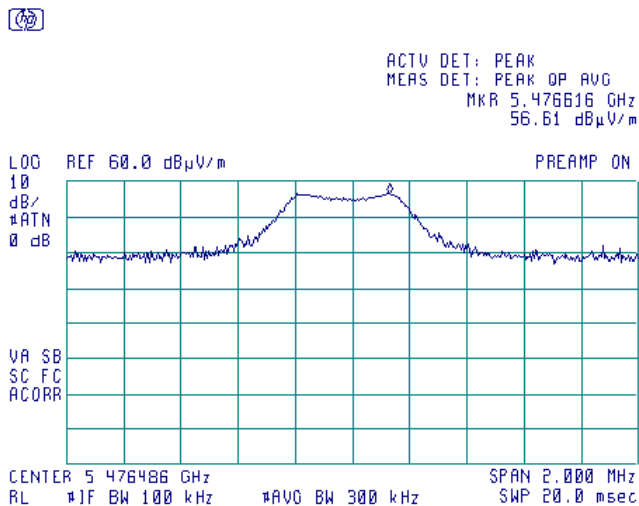
Plot 7.7.29 Radiated emission measurements at the fifth harmonic of high carrier frequency

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m



Plot 7.7.30 Radiated emission measurements at the sixth harmonic of low carrier frequency

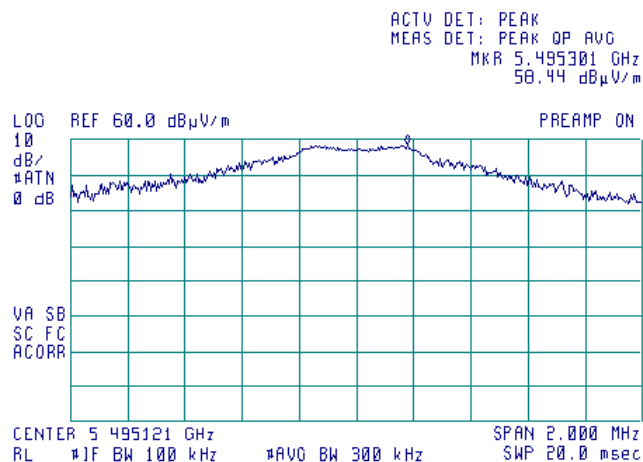
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m



| | | | |
|----------------------------|-------------------------------|---|---------------------------------|
| Test specification: | | Section 15.247(d), 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: | | 1/3/2011 | |
| Temperature: 22 °C | Air Pressure: 1014 hPa | Relative Humidity: 52 % | Power Supply: 3V battery |
| Remarks: | | | |

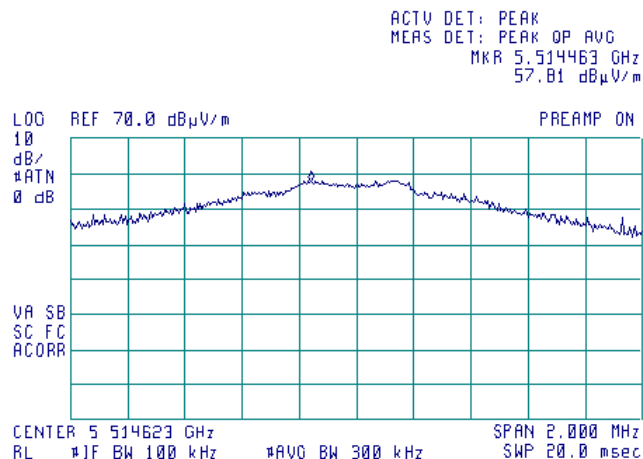
Plot 7.7.31 Radiated emission measurements at the sixth harmonic of mid carrier frequency

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m



Plot 7.7.32 Radiated emission measurements at the sixth harmonic of high carrier frequency

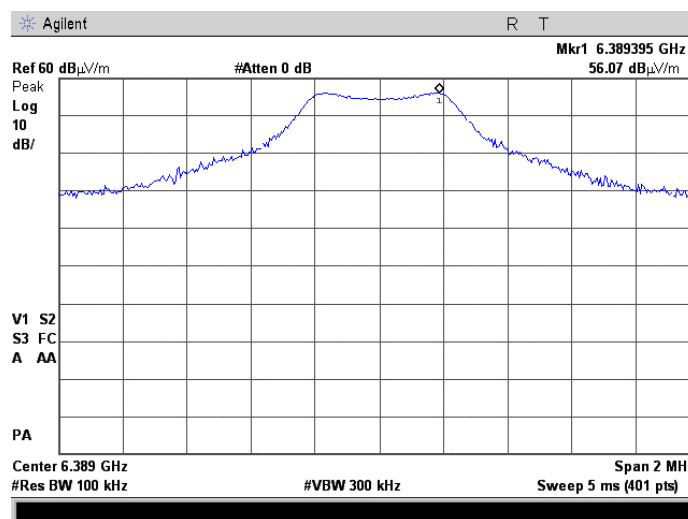
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m



| | | | |
|----------------------------|---|--------------------------------|---------------------------------|
| Test specification: | Section 15.247(d), 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: | 1/3/2011 | | |
| Temperature: 22 °C | Air Pressure: 1014 hPa | Relative Humidity: 52 % | Power Supply: 3V battery |
| Remarks: | | | |

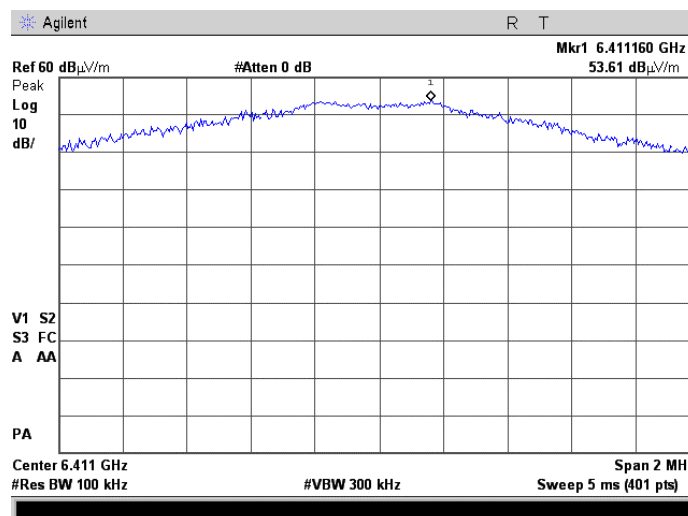
Plot 7.7.33 Radiated emission measurements at the seventh harmonic of low carrier frequency

TEST SITE: OATS
TEST DISTANCE: 3 m



Plot 7.7.34 Radiated emission measurements at the seventh harmonic of mid carrier frequency

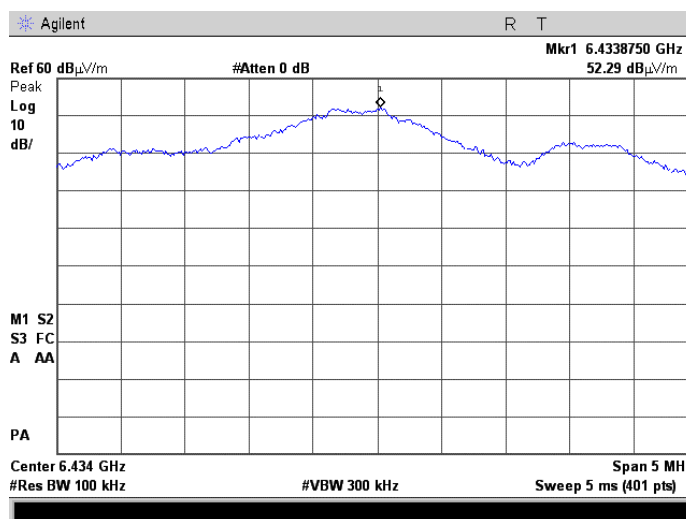
TEST SITE: OATS
TEST DISTANCE: 3 m



| | | | |
|----------------------------|---|--------------------------------|---------------------------------|
| Test specification: | Section 15.247(d), 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: | 1/3/2011 | | |
| Temperature: 22 °C | Air Pressure: 1014 hPa | Relative Humidity: 52 % | Power Supply: 3V battery |
| Remarks: | | | |

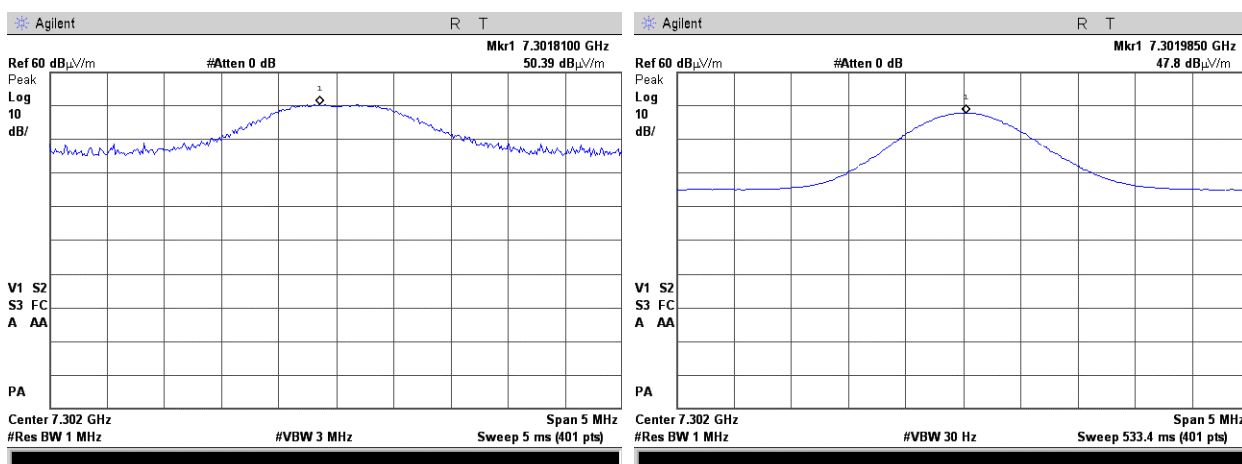
Plot 7.7.35 Radiated emission measurements at the seventh harmonic of high carrier frequency

TEST SITE: OATS
TEST DISTANCE: 3 m



Plot 7.7.36 Radiated emission measurements at the eighth harmonic of low carrier frequency

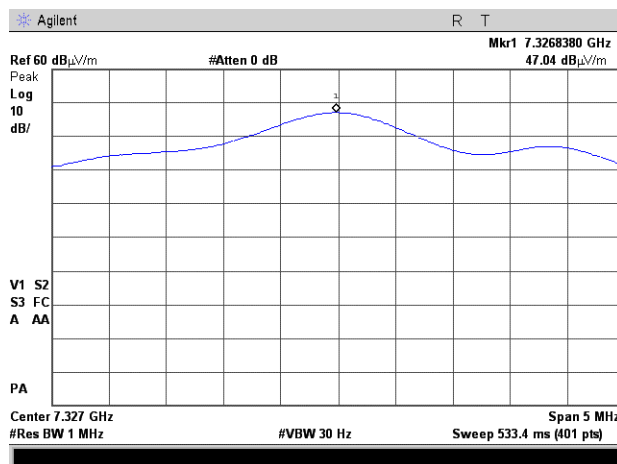
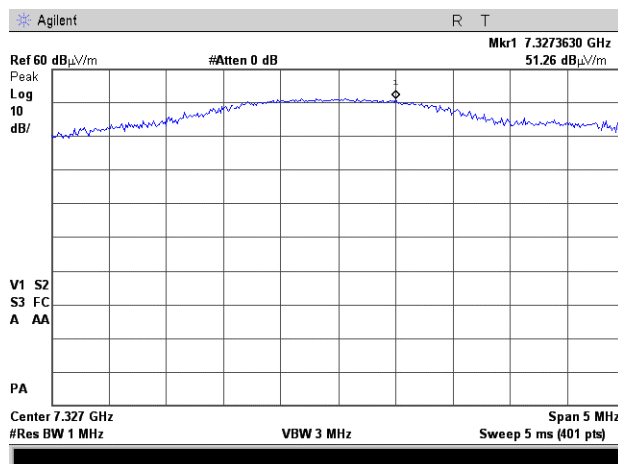
TEST SITE: OATS
TEST DISTANCE: 3 m



| | | | |
|----------------------------|-------------------------------|---|---------------------------------|
| Test specification: | | Section 15.247(d), 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: | | 1/3/2011 | |
| Temperature: 22 °C | Air Pressure: 1014 hPa | Relative Humidity: 52 % | Power Supply: 3V battery |
| Remarks: | | | |

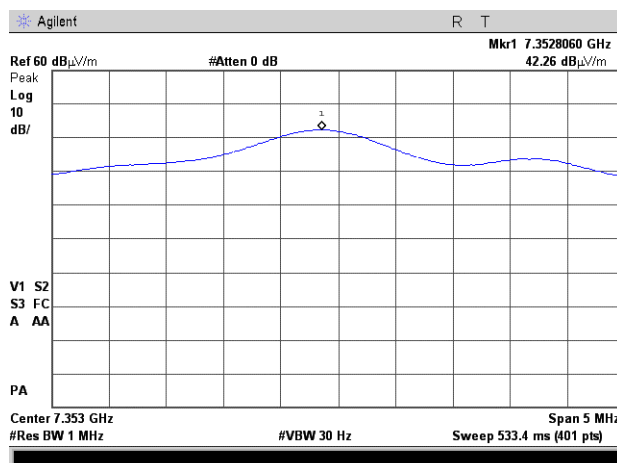
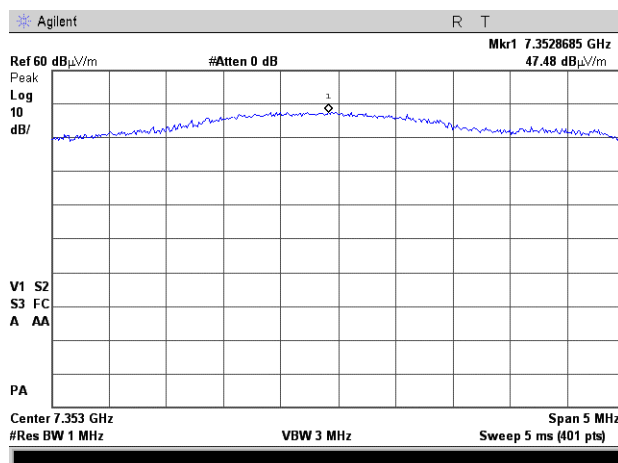
Plot 7.7.37 Radiated emission measurements at the eighth harmonic of mid carrier frequency

TEST SITE: OATS
TEST DISTANCE: 3 m



Plot 7.7.38 Radiated emission measurements at the eighth harmonic of high carrier frequency

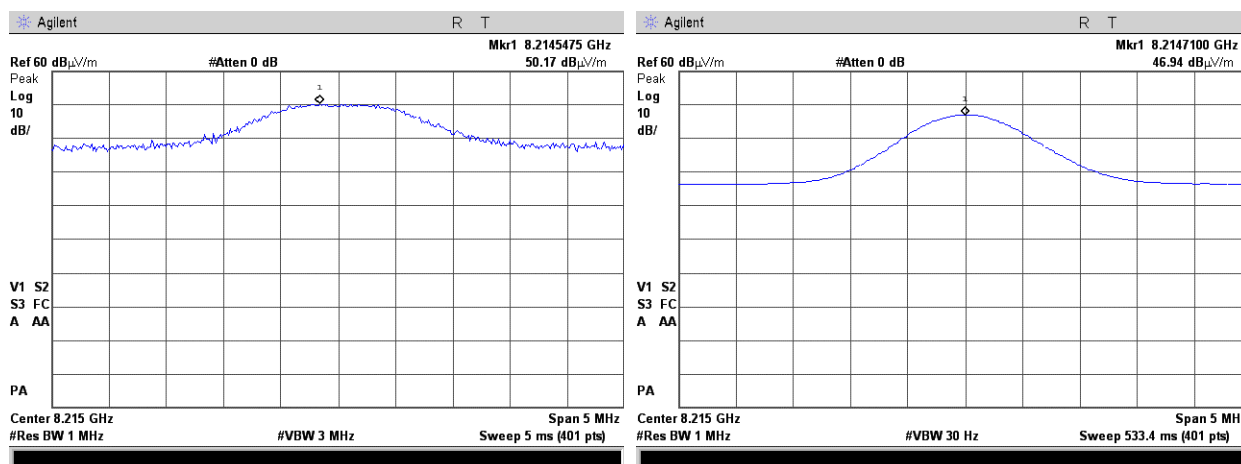
TEST SITE: OATS
TEST DISTANCE: 3 m



| | | | |
|----------------------------|---|--------------------------------|---------------------------------|
| Test specification: | Section 15.247(d), 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: | 1/3/2011 | | |
| Temperature: 22 °C | Air Pressure: 1014 hPa | Relative Humidity: 52 % | Power Supply: 3V battery |
| Remarks: | | | |

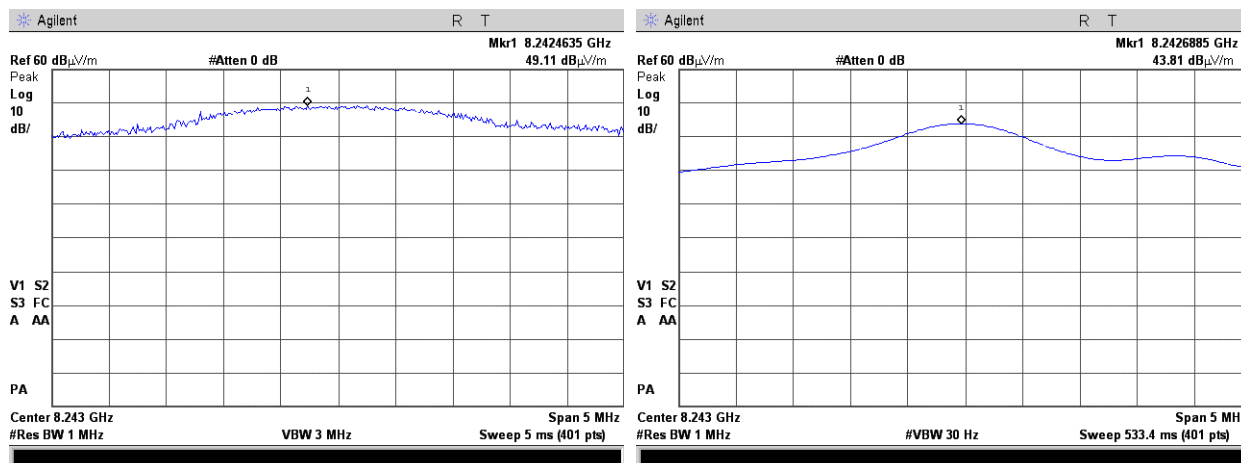
Plot 7.7.39 Radiated emission measurements at the ninth harmonic of low carrier frequency

TEST SITE: OATS
TEST DISTANCE: 3 m



Plot 7.7.40 Radiated emission measurements at the ninth harmonic of mid carrier frequency

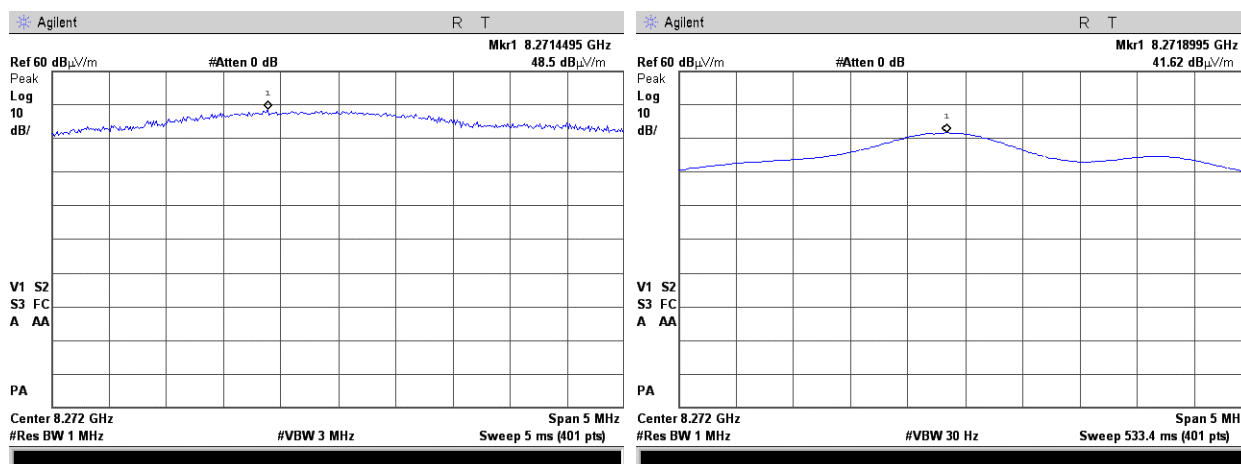
TEST SITE: OATS
TEST DISTANCE: 3 m



| | | | |
|----------------------------|---|--------------------------------|---------------------------------|
| Test specification: | Section 15.247(d), 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: | 1/3/2011 | | |
| Temperature: 22 °C | Air Pressure: 1014 hPa | Relative Humidity: 52 % | Power Supply: 3V battery |
| Remarks: | | | |

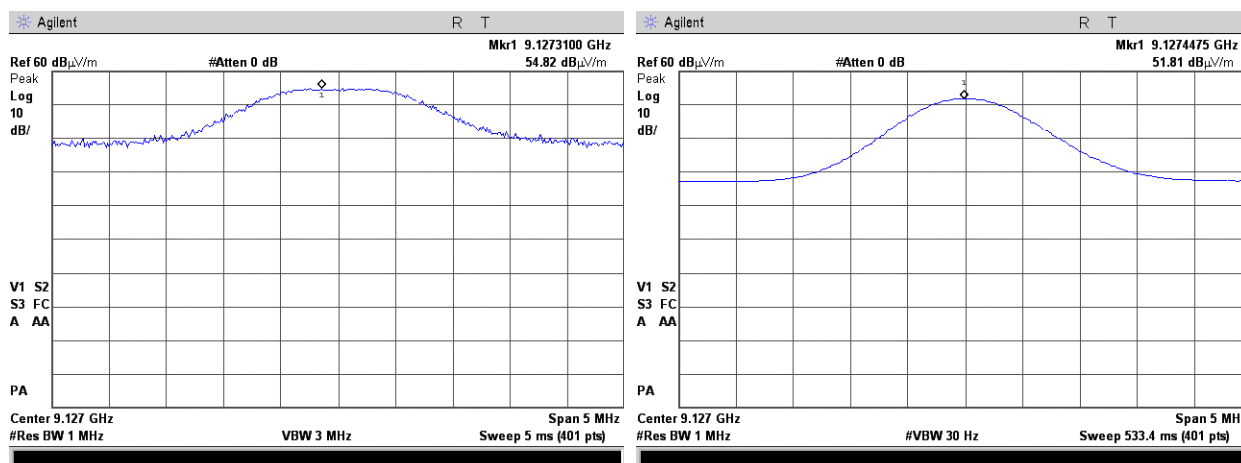
Plot 7.7.41 Radiated emission measurements at the ninth harmonic of high carrier frequency

TEST SITE: OATS
TEST DISTANCE: 3 m



Plot 7.7.42 Radiated emission measurements at the tenth harmonic of low carrier frequency

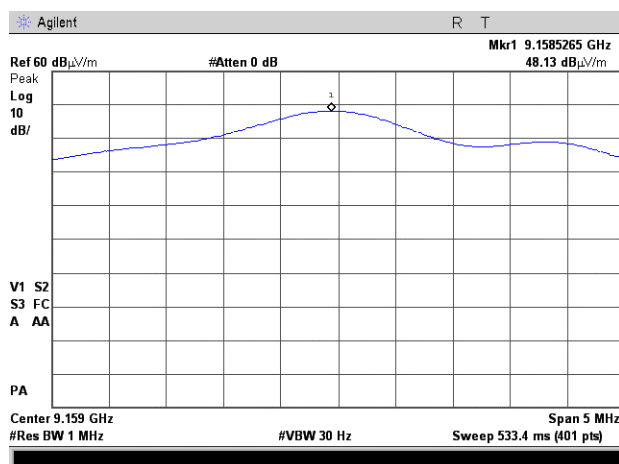
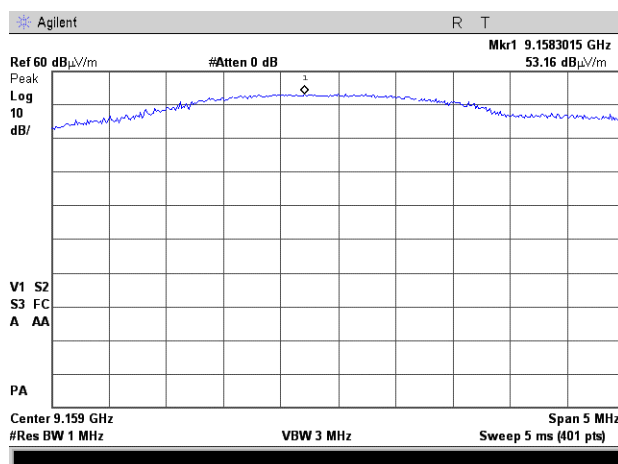
TEST SITE: OATS
TEST DISTANCE: 3 m



| | | | |
|----------------------------|---|--------------------------------|---------------------------------|
| Test specification: | Section 15.247(d), 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: | 1/3/2011 | | |
| Temperature: 22 °C | Air Pressure: 1014 hPa | Relative Humidity: 52 % | Power Supply: 3V battery |
| Remarks: | | | |

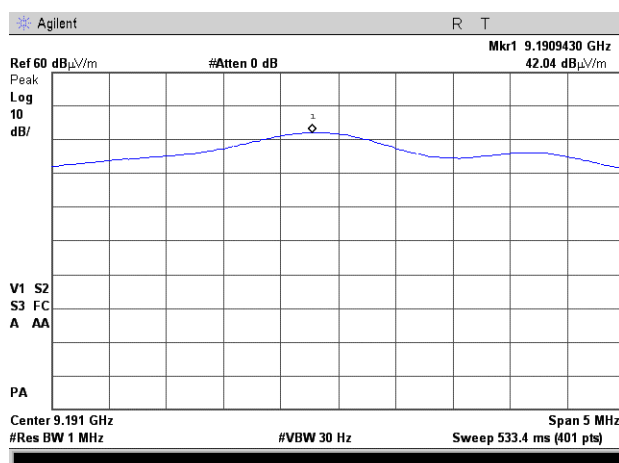
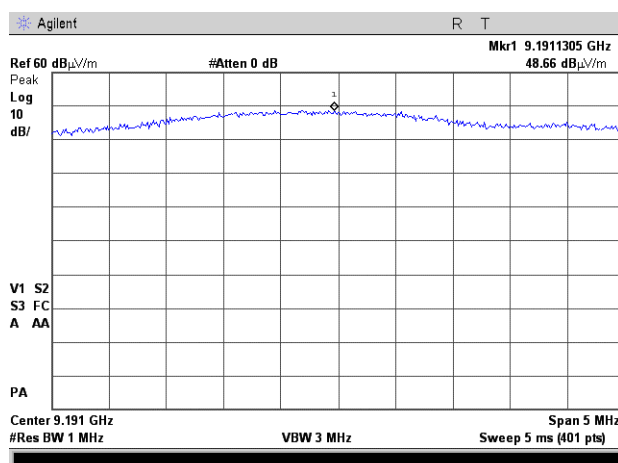
Plot 7.7.43 Radiated emission measurements at the tenth harmonic of mid carrier frequency

TEST SITE: OATS
TEST DISTANCE: 3 m



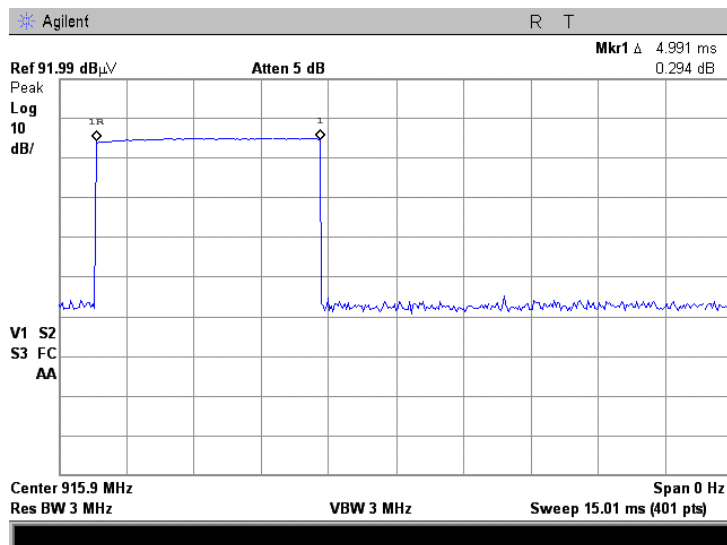
Plot 7.7.44 Radiated emission measurements at the tenth harmonic of high carrier frequency

TEST SITE: OATS
TEST DISTANCE: 3 m

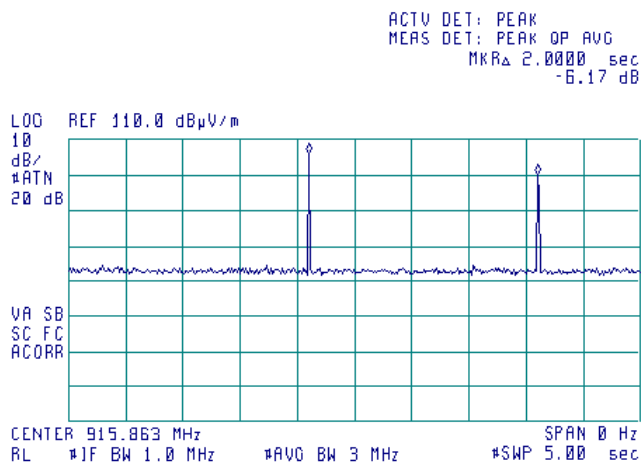


| | | | |
|----------------------------|---|--------------------------------|---------------------------------|
| Test specification: | Section 15.247(d), Radiated spurious emissions | | |
| Test procedure: | Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4 | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date: | 1/3/2011 | | |
| Temperature: 22 °C | Air Pressure: 1014 hPa | Relative Humidity: 52 % | Power Supply: 3V battery |
| Remarks: | | | |

Plot 7.7.45 Transmission pulse duration



Plot 7.7.46 Transmission pulse period



| | | | |
|-----------------------------|-------------------------------|---|---------------------------------|
| Test specification: | | Section 15.203, Antenna requirements | |
| Test procedure: | | Public notice DA 00-705 | |
| Test mode: | | Compliance | Verdict: PASS |
| Date: | | 12/28/2010 | |
| Temperature: 23.6 °C | Air Pressure: 1015 hPa | Relative Humidity: 32 % | Power Supply: 3V battery |
| Remarks: | | | |

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 | |

8 APPENDIX A Test equipment and ancillaries used for tests

| HL No | Description | Manufacturer | Model | Ser. No. | Last Cal./ Check | Due Cal./ Check |
|-------|---|-----------------------|-----------------|-----------------------------------|------------------|-----------------|
| 0446 | Antenna, Loop, Active, 10 kHz - 30 MHz | EMCO | 6502 | 2857 | 29-Jun-10 | 29-Jun-11 |
| 0521 | EMI Receiver (Spectrum Analyzer) with RF filter section 9 kHz-6.5 GHz | Hewlett Packard | 8546A | 3617A 00319, 3448A002 53 | 25-Aug-10 | 25-Aug-11 |
| 0604 | Antenna BiconiLog Log-Periodic/T Bow-TIE, 26 - 2000 MHz | EMCO | 3141 | 9611-1011 | 11-Jan-10 | 11-Jan-11 |
| 1431 | Receiver RF Section, 9 kHz-2.9 GHz, part of HL1430 system | Agilent Technologies | 85422E | 308070026 2 | 25-Nov-10 | 25-Nov-11 |
| 1984 | Antenna, Double-Ridged Waveguide Horn, 1-18 GHz, 300 W | EMC Test Systems | 3115 | 9911-5964 | 11-Jun-10 | 11-Jun-11 |
| 2780 | EMC analyzer, 100 Hz to 26.5 GHz | Agilent Technologies | E7405A | MY451024 62 | 07-Jul-10 | 07-Jul-11 |
| 2871 | Microwave Cable Assembly, 18 GHz, 6.4 m, SMA - SMA | Huber-Suhner | 198-8155-00 | 2871 | 14-Sep-10 | 14-Sep-11 |
| 2883 | Cable, 18 GHz N-type, M-F, 3 m | Bird Electronic Corp. | TC-MNFN-3.0 | 211539 003 | 01-Dec-10 | 01-Dec-11 |
| 3123 | Microwave Cable Assembly, 18 GHz, 5.0 m, SMA - SMA | Huber-Suhner | 198-9155-00 | 3123 | 03-Oct-10 | 03-Oct-11 |
| 3346 | High Pass Filter, 50 Ohm, 5000 to 11000 MHz | Mini-Circuits | VHF-4600+ | NA | 04-Oct-10 | 04-Oct-11 |
| 3386 | Microwave Cable Assembly, 26.5 GHz, 1.0 m, N type/N type | Suhner Sucoflex | 104EA | 3386 | 25-Feb-10 | 25-Feb-11 |
| 3534 | Amplifier, low noise, 6 to 18 GHz | Quinstar Technology | QLJ-06184040-J0 | 111590010 02 | 06-Dec-10 | 06-Dec-11 |
| 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 |

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

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.

10 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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website: www.hermonlabs.com

Person for contact: Mr. Alex Usoskin, CEO.

11 APPENDIX D Specification references

| | |
|--------------------------------|---|
| FCC 47CFR part 15: 2009 | 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 |

12 APPENDIX E Test equipment correction factors

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

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

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

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

| Frequency, MHz | Antenna factor, 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(μ V) to convert it into field intensity in dB(μ V/m).

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

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

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

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

Cable loss
Microwave Cable Assembly, 18 GHz, 6.4 m, SMA – SMA, Huber-Suhner, model 198-9155-00
HL 3123

| Frequency, MHz | Cable loss, dB | Frequency, MHz | Cable loss, dB | Frequency, MHz | Cable loss, dB | Frequency, MHz | Cable loss, dB | Frequency, MHz | Cable loss, dB |
|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| 10 | 0.11 | 3600 | 1.97 | 7400 | 3.12 | 11200 | 3.90 | 15100 | 4.74 |
| 30 | 0.17 | 3700 | 1.97 | 7500 | 3.13 | 11300 | 3.93 | 15200 | 4.70 |
| 50 | 0.25 | 3800 | 2.03 | 7600 | 3.16 | 11400 | 3.88 | 15300 | 4.73 |
| 100 | 0.32 | 3900 | 2.04 | 7700 | 3.18 | 11500 | 3.87 | 15400 | 4.78 |
| 200 | 0.46 | 4000 | 2.10 | 7800 | 3.20 | 11600 | 3.90 | 15500 | 4.75 |
| 300 | 0.58 | 4100 | 1.97 | 7900 | 3.23 | 11700 | 3.86 | 15600 | 4.76 |
| 400 | 0.65 | 4200 | 1.97 | 8000 | 3.25 | 11800 | 3.88 | 15700 | 4.75 |
| 500 | 0.74 | 4300 | 2.03 | 8100 | 3.26 | 11900 | 3.86 | 15800 | 4.78 |
| 600 | 0.82 | 4400 | 2.04 | 8200 | 3.28 | 12000 | 3.89 | 15900 | 4.79 |
| 700 | 0.89 | 4500 | 2.10 | 8300 | 3.31 | 12100 | 3.94 | 16000 | 4.73 |
| 800 | 0.95 | 4600 | 1.97 | 8400 | 3.31 | 12200 | 3.92 | 16100 | 4.78 |
| 900 | 1.01 | 4700 | 1.97 | 8500 | 3.32 | 12300 | 3.96 | 16200 | 4.84 |
| 1000 | 1.07 | 4800 | 2.03 | 8600 | 3.34 | 12400 | 4.01 | 16300 | 4.90 |
| 1100 | 1.11 | 4900 | 2.04 | 8700 | 3.35 | 12500 | 4.07 | 16400 | 4.87 |
| 1200 | 1.17 | 5000 | 2.10 | 8800 | 3.37 | 12600 | 4.08 | 16500 | 4.90 |
| 1300 | 1.22 | 5100 | 2.53 | 8900 | 3.39 | 12700 | 4.17 | 16600 | 4.98 |
| 1400 | 1.27 | 5200 | 2.55 | 9000 | 3.42 | 12800 | 4.26 | 16700 | 5.05 |
| 1500 | 1.29 | 5300 | 2.60 | 9100 | 3.43 | 12900 | 4.16 | 16800 | 5.04 |
| 1600 | 1.35 | 5400 | 2.61 | 9200 | 3.51 | 13000 | 4.21 | 16900 | 5.02 |
| 1700 | 1.40 | 5500 | 2.64 | 9300 | 3.52 | 13100 | 4.24 | 17000 | 5.09 |
| 1800 | 1.44 | 5600 | 2.70 | 9400 | 3.54 | 13200 | 4.27 | 17100 | 5.07 |
| 1900 | 1.51 | 5700 | 2.67 | 9500 | 3.63 | 13300 | 4.31 | 17200 | 5.10 |
| 2000 | 1.49 | 5800 | 2.71 | 9600 | 3.61 | 13400 | 4.33 | 17300 | 5.13 |
| 2100 | 1.55 | 5900 | 2.74 | 9700 | 3.71 | 13500 | 4.25 | 17400 | 5.23 |
| 2200 | 1.58 | 6000 | 2.80 | 9800 | 3.66 | 13600 | 4.27 | 17500 | 5.21 |
| 2300 | 1.62 | 6100 | 2.79 | 9900 | 3.77 | 13700 | 4.33 | 17600 | 5.22 |
| 2400 | 1.72 | 6200 | 2.81 | 10000 | 3.75 | 13800 | 4.33 | 17700 | 5.36 |
| 2500 | 1.76 | 6300 | 2.83 | 10100 | 3.77 | 13900 | 4.31 | 17800 | 5.35 |
| 2600 | 1.78 | 6400 | 2.86 | 10200 | 3.80 | 14000 | 4.30 | 17900 | 5.45 |
| 2700 | 1.80 | 6500 | 2.88 | 10300 | 3.79 | 14100 | 4.30 | 18000 | 5.43 |
| 2800 | 1.86 | 6600 | 2.90 | 10400 | 3.87 | 14200 | 4.31 | | |
| 2900 | 1.90 | 6700 | 2.92 | 10500 | 3.83 | 14300 | 4.37 | | |
| 3000 | 1.90 | 6800 | 2.98 | 10600 | 3.88 | 14400 | 4.35 | | |
| 3100 | 1.97 | 6900 | 2.98 | 10700 | 3.86 | 14600 | 4.53 | | |
| 3200 | 1.97 | 7000 | 3.00 | 10800 | 3.87 | 14700 | 4.50 | | |
| 3300 | 2.03 | 7100 | 3.02 | 10900 | 3.90 | 14800 | 4.62 | | |
| 3400 | 2.04 | 7200 | 3.04 | 11000 | 3.84 | 14900 | 4.65 | | |
| 3500 | 2.10 | 7300 | 3.06 | 11100 | 3.88 | 15000 | 4.79 | | |

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

| Frequency, MHz | Cable loss, dB | Frequency, MHz | Cable loss, dB | Frequency, MHz | Cable loss, 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, RG-214/U, N type-N type, 6 m
Alpha Wire, HL 3622

| Frequency, MHz | Cable loss, dB | Frequency, MHz | Cable loss, dB | Frequency, MHz | Cable loss, 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 | | |

13 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(μ V) | decibel referred to one microvolt |
| dB(μ V/m) | decibel referred to one microvolt per meter |
| dB(μ 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 |
| μ s | microsecond |
| NA | not applicable |
| NB | narrow band |
| OATS | open area test site |
| Ω | 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