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TEST REPORT

ACCORDING TO: FCC 47CFR part 15 subpart C § 15.247 (FHSS),
RSS-210 issue 8 Annex 8, RSS-Gen issue 3 section 6

FOR:
Telematics Wireless Ltd.
Water meter
Model: 3G interpreter LG
FCC ID:NTA3GINTRP1
IC:4732A-INTRP1

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

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1 Applicant information

Client name: Telematics Wireless Ltd.
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Telephone: +972 3557 5767
Fax: +972 3557 5753
E-mail: slavas@tlmw.com
Contact name: Mr. Slava Snitkovsky

2 Equipment under test attributes

Product name: Water meter
Product type: Transceiver
Model(s): 3G interpreter LG
Serial number: 1026
Hardware version: A
Software release: 1.07
Receipt date 6/24/2012

3 Manufacturer information

Manufacturer name: Telematics Wireless Ltd.
Address: 26 Hamelaha street, POB 1911, Holon, 58117, Israel
Telephone: +972 3557 5767
Fax: +972 3557 5753
E-Mail: slavas@tlmw.com
Contact name: Mr. Slava Snitkovsky

4 Test details




Project ID: 23395
Location: Hermon Laboratories Ltd. Harakevet Industrial Zone, Binyamina 30500, Israel
Test started: 6/24/2012
Test completed: 7/08/2012
Test specification(s): FCC 47CFR part 15:2011, subpart C §15.247 (DTS); RSS-210 issue 8 Annex 8
FCC 47CFR part 15:2011 subpart B §15.109; RSS-Gen issue 3 section 6.1

5 Tests summary

| Test | Status |
|--|---|
| Transmitter characteristics | |
| FCC Section 15.247(a)1, RSS-210 section A8.1(a), The 20 dB bandwidth | Pass |
| FCC Section 15.247(a)1, RSS-210 section A8.1(b), Frequency separation | Pass |
| FCC Section 15.247(a)1, RSS-210 section A8.1(c), Number of hopping frequencies | Pass |
| FCC Section 15.247(a)1, RSS-210 section A8.1(c), Average time of occupancy | Pass |
| FCC Section 15.247(b), RSS-210 section A8.4(1), Peak output power | Pass |
| FCC Section 15.247(d), RSS-210 section A8.5, Emissions at band edges | Pass |
| FCC Section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions | Pass |
| FCC Section 15.203, RSS-Gen section 7.1.2, Antenna requirements | Pass |
| FCC Section 15.207(a), RSS-Gen section 7.2.4, Conducted emission | Not required |
| FCC Section 15.247(i), RSS-Gen, section 5.5, RF exposure | Pass, the exhibit to the application of certification is provided |
| Unintentional emissions | |
| Section 15.107, Conducted emission at AC power port | Not required |
| Section 15.109, Radiated emission | Pass |

Testing was completed against all relevant requirements of the test standard. The results obtained indicate that the product under test complies in full with the requirements tested.

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

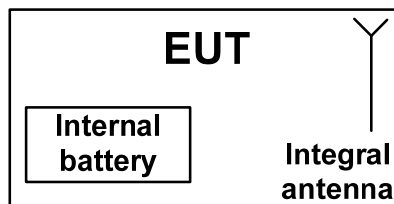
| | Name and Title | Date | Signature |
|---------------------|---|---------------|---|
| Tested by: | Mrs. E. Pitt, test engineer | July 8, 2012 |  |
| Reviewed by: | Mrs. M. Cherniavsky, certification engineer | July 17, 2012 |  |
| Approved by: | Mr. M. Nikishin, EMC and radio group leader | July 26, 2012 |  |

6 EUT description

6.1 General information

The EUT is a 3G interpreter L&G water meter, powered from two 3.6 VDC lithium internal batteries.

6.2 Test configuration



6.3 Changes made in EUT

No changes were implemented in the EUT during the testing.



6.4 Transmitter characteristics

| | | | | | | |
|---|--|--|-------------------------|--|---|-----|
| Type of equipment | | | | | | |
| | Stand-alone (Equipment with or without its own control provisions) | | | | | |
| X | 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 range | | 902 – 928 MHz | | | | |
| Operating frequency range | | 902.3-927.8 MHz (FHSS wide channel) 904 – 927.9 MHz (FHSS narrow channel) | | | | |
| Maximum rated output power | | At transmitter 50 Ω RF output connector | | NA | | |
| | | Peak output power | | 24.08 dBm (FHSS wide channel) 24.00 dBm (FHSS narrow channel) | | |
| Is transmitter output power variable? | | X | No | | | |
| | | | Yes | continuous variable | | |
| | | | Yes | stepped variable with stepsize | | dB |
| | | | Yes | minimum RF power | | dBm |
| | Yes | maximum RF power | | dBm | | |
| Antenna connection | | | | | | |
| unique coupling | | standard connector | | X | integral | |
| | | | | X | with temporary RF connector without temporary RF connector | |
| Antenna/s technical characteristics | | | | | | |
| Type | Manufacturer | Model number | | Gain | | |
| Integral loop | Telematics Wireless Ltd. | NA | | 3 dBi | | |
| Transmitter aggregate data rate/s | | 9.6, 19.2, 38.4, 115.2 kbps | | | | |
| Transmitter aggregate symbol (baud) rate/s | | NA | | | | |
| Modulating test signal (baseband) | | PRBS | | | | |
| Modulation type | | FSK, GFSK | | | | |
| Maximum transmitter duty cycle in normal use | | 1% | | | | |
| Transmitter duty cycle supplied for test (FHSS) | | 1% | | | | |
| Transmitter power source | | | | | | |
| X | Battery | Nominal rated voltage | 3.6 VDC | Battery type | Lithium | |
| | DC | Nominal rated voltage | VDC | | | |
| | AC mains | Nominal rated voltage | VAC | Frequency | | |
| Spread spectrum parameters for transmitters tested per FCC 15.247 only | | | | | | |
| FHSS | Total number of hops | 86 wide channels, 240 narrow channels | | | | |
| | Bandwidth per hop | 198.75 kHz (for 86 channels); 88.5 kHz (for 240 channels) | | | | |
| | Max. separation of hops | 300 kHz (for 86 channels); 99.8 kHz (for 240 channels) | | | | |



| | | | |
|---|-------------------------------|--------------------------------|------------------------------|
| Test specification: Section 15.247(a)1, RSS-210 section A8.1(a), 20 dB bandwidth | | | |
| Test procedure: Public notice DA 00-705 | | | |
| Test mode: Compliance | Verdict: PASS | | |
| Date(s): 6/24/2012 - 7/4/2012 | | | |
| Temperature: 24 °C | Air Pressure: 1007 hPa | Relative Humidity: 45 % | Power Supply: Battery |
| Remarks: | | | |

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

7.1 20 dB bandwidth

7.1.1 General

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

Table 7.1.1 The 20 dB bandwidth limits

| Assigned frequency, MHz | Maximum bandwidth, kHz | Modulation envelope reference points*, dBc |
|-------------------------|------------------------|--|
| 902.0 – 928.0 | 250 | 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 associated plot.

7.1.2.4 The test was repeated for each data rate and each modulation format.

Figure 7.1.1 The 20 dB bandwidth test setup





| | | | | | |
|----------------------------|--|---|--|--------------------------------|--|
| Test specification: | | Section 15.247(a)1, RSS-210 section A8.1(a), 20 dB bandwidth | | | |
| Test procedure: | | Public notice DA 00-705 | | | |
| Test mode: | | Compliance | | Verdict: PASS | |
| Date(s): | | 6/24/2012 - 7/4/2012 | | | |
| Temperature: 24 °C | | Air Pressure: 1007 hPa | | Relative Humidity: 45 % | |
| Remarks: | | Power Supply: Battery | | | |

Table 7.1.2 The 20 dB bandwidth test results

ASSIGNED FREQUENCY BAND: 902 – 928 MHz
 DETECTOR USED: Peak
 SWEEP TIME: Auto
 VIDEO BANDWIDTH: ≥ RBW
 MODULATION ENVELOPE REFERENCE POINTS: 20.0 dBc

| Carrier frequency, MHz | Baud Rate, bps | 20 dB bandwidth, kHz | Limit, kHz | Margin, kHz | Verdict |
|------------------------|----------------|----------------------|------------|-------------|---------|
| 902.3 | 9600 | 25.38 | 250 | -224.63 | Pass |
| | 19200 | 44.75 | 250 | -205.25 | Pass |
| | 38400 | 84.00 | 250 | -166.00 | Pass |
| 915.2 | 9600 | 25.25 | 250 | -224.75 | Pass |
| | 19200 | 45.50 | 250 | -204.50 | Pass |
| | 38400 | 89.50 | 250 | -160.50 | Pass |
| 927.8 | 9600 | 25.63 | 250 | -224.38 | Pass |
| | 19200 | 45.00 | 250 | -205.00 | Pass |
| | 38400 | 87.00 | 250 | -163.00 | Pass |

Table 7.1.3 The 20 dB bandwidth test results

ASSIGNED FREQUENCY BAND: 902 – 928 MHz
 DETECTOR USED: Peak
 SWEEP TIME: Auto
 VIDEO BANDWIDTH: ≥ RBW
 MODULATION ENVELOPE REFERENCE POINTS: 20.0 dBc

| Carrier frequency, MHz | Baud Rate, bps | 20 dB bandwidth, kHz | Limit, kHz | Margin, kHz | Verdict |
|------------------------|----------------|----------------------|------------|-------------|---------|
| 902.3 | 115200 | 193.75 | 250 | -56.25 | Pass |
| 915.2 | 115200 | 192.50 | 250 | -57.50 | Pass |
| 927.8 | 115200 | 198.75 | 250 | -51.25 | Pass |



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| | | | |
|----------------------------|--|---|--|
| Test specification: | | Section 15.247(a)1, RSS-210 section A8.1(a), 20 dB bandwidth | |
| Test procedure: | | Public notice DA 00-705 | |
| Test mode: | | Compliance | |
| Date(s): | | 6/24/2012 - 7/4/2012 | |
| Temperature: 24 °C | | Air Pressure: 1007 hPa | |
| | | Relative Humidity: 45 % | |
| | | Power Supply: Battery | |
| Remarks: | | | |

Table 7.1.4 The 20 dB bandwidth test results

ASSIGNED FREQUENCY BAND: 902 – 928 MHz
 DETECTOR USED: Peak
 SWEEP TIME: Auto
 VIDEO BANDWIDTH: ≥ RBW
 MODULATION ENVELOPE REFERENCE POINTS: 20.0 dBc

| Carrier frequency, MHz | Baud Rate, bps | 20 dB bandwidth, kHz | Limit, kHz | Margin, kHz | Verdict |
|------------------------|----------------|----------------------|------------|-------------|---------|
| 904.0 | 9600 | 25.50 | 250 | -224.50 | Pass |
| | 19200 | 45.00 | 250 | -205.00 | Pass |
| | 38400 | 86.50 | 250 | -163.50 | Pass |
| 915.0 | 9600 | 25.625 | 250 | -224.38 | Pass |
| | 19200 | 45.25 | 250 | -204.75 | Pass |
| | 38400 | 88.00 | 250 | -162.00 | Pass |
| 927.9 | 9600 | 25.50 | 250 | -224.50 | Pass |
| | 19200 | 45.50 | 250 | -204.50 | Pass |
| | 38400 | 88.50 | 250 | -161.50 | Pass |

Reference numbers of test equipment used

| | | | | | | | | |
|---------|---------|---------|---------|--|--|--|--|--|
| HL 1553 | HL 1984 | HL 3001 | HL 3769 | | | | | |
|---------|---------|---------|---------|--|--|--|--|--|

Full description is given in Appendix A.

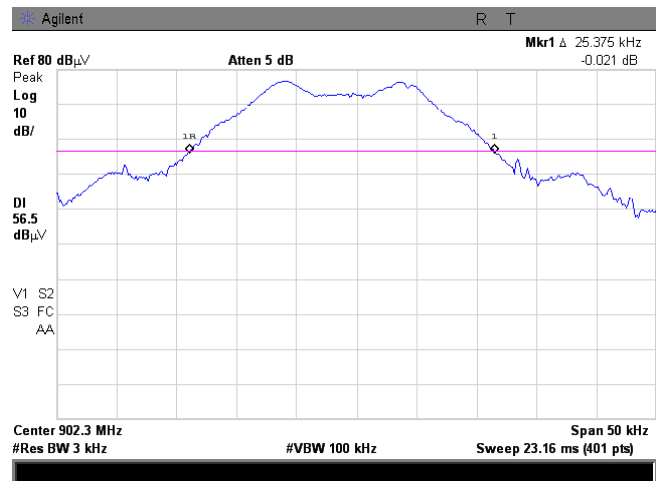
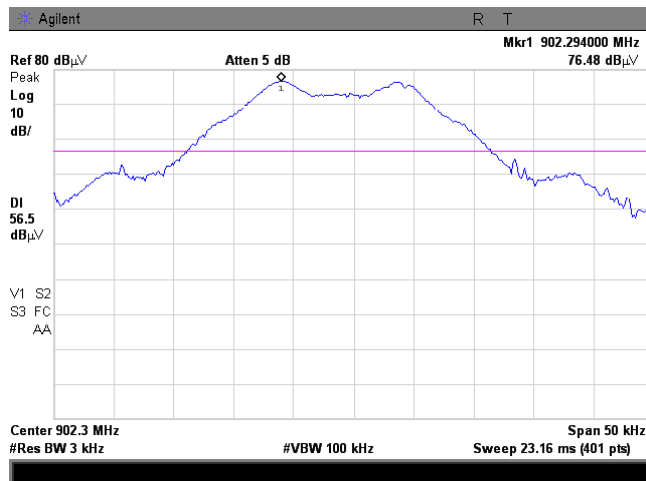


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|---|-------------------------------|--------------------------------|------------------------------|
| Test specification: Section 15.247(a)1, RSS-210 section A8.1(a), 20 dB bandwidth | | | |
| Test procedure: Public notice DA 00-705 | | | |
| Test mode: Compliance | Verdict: PASS | | |
| Date(s): 6/24/2012 - 7/4/2012 | | | |
| Temperature: 24 °C | Air Pressure: 1007 hPa | Relative Humidity: 45 % | Power Supply: Battery |
| Remarks: | | | |

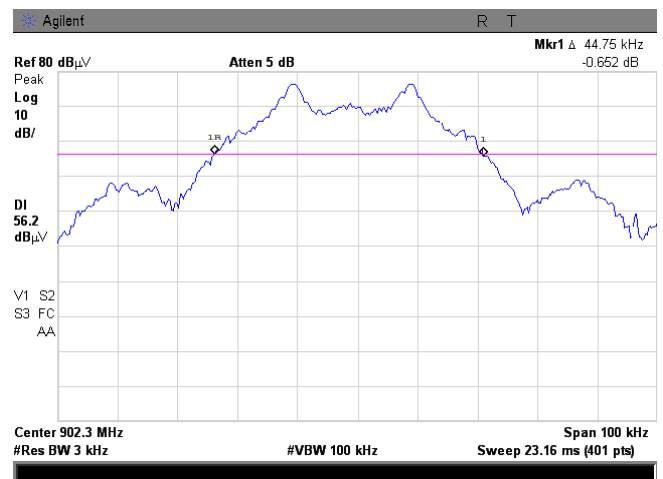
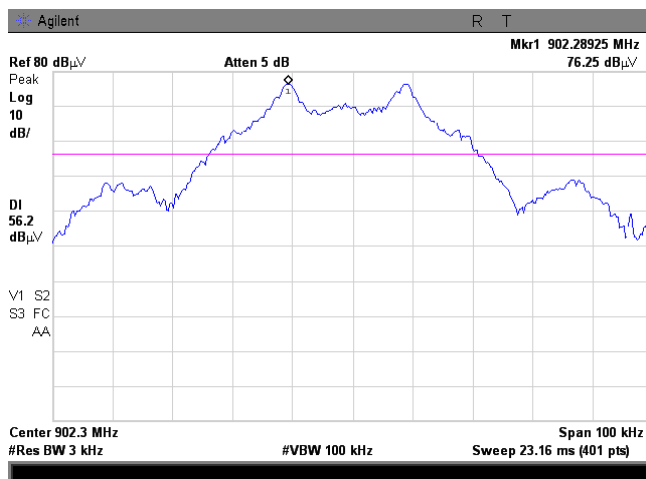
Plot 7.1.1 The 20 dB bandwidth test result at low frequency

CONFIGURATION: FHSS 86 channels
BAUD RATE: 9600 bps



Plot 7.1.2 The 20 dB bandwidth test result at low frequency

CONFIGURATION: FHSS 86 channels
BAUD RATE: 19200 bps



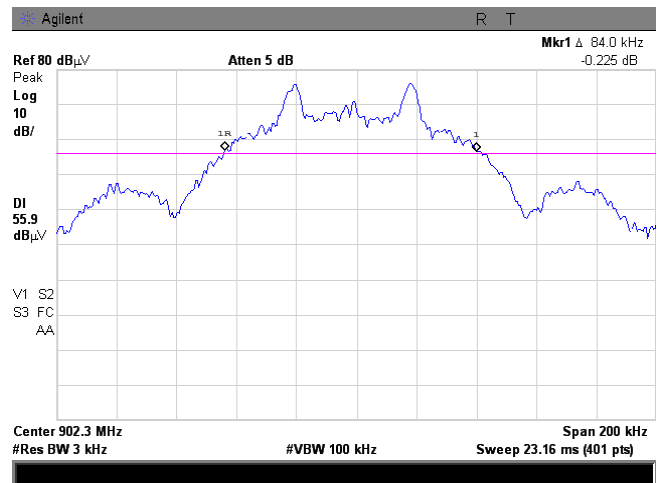
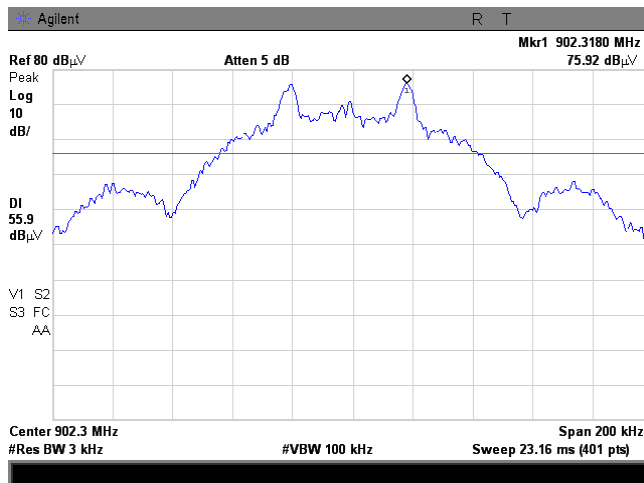


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| | | | |
|---|-------------------------------|--------------------------------|------------------------------|
| Test specification: Section 15.247(a)1, RSS-210 section A8.1(a), 20 dB bandwidth | | | |
| Test procedure: Public notice DA 00-705 | | | |
| Test mode: Compliance | Verdict: PASS | | |
| Date(s): 6/24/2012 - 7/4/2012 | | | |
| Temperature: 24 °C | Air Pressure: 1007 hPa | Relative Humidity: 45 % | Power Supply: Battery |
| Remarks: | | | |

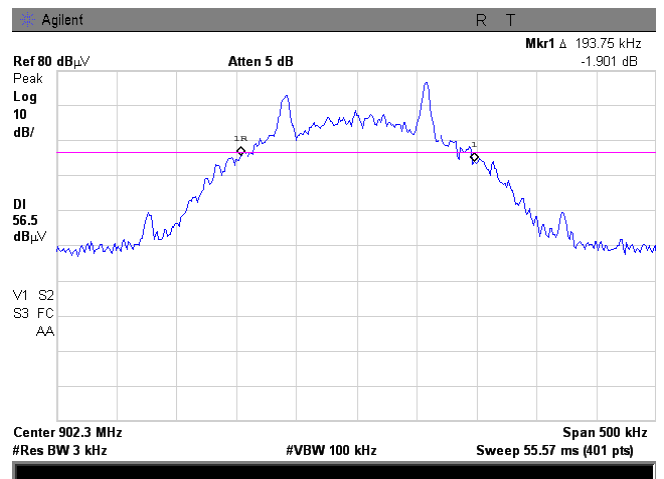
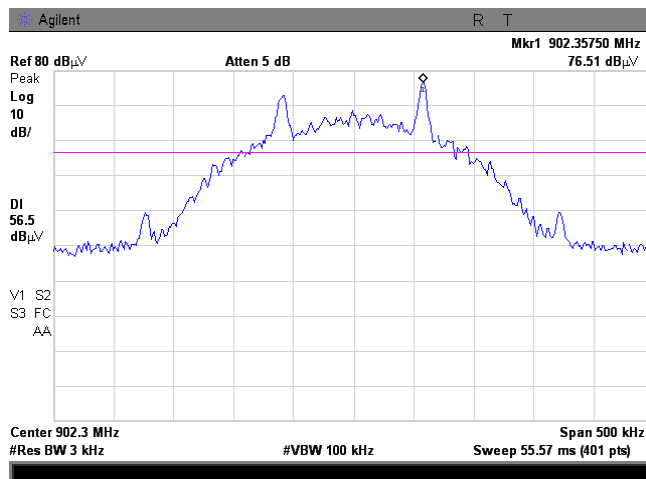
Plot 7.1.3 The 20 dB bandwidth test result at low frequency

CONFIGURATION: FHSS 86 channels
BAUD RATE: 38400 bps



Plot 7.1.4 The 20 dB bandwidth test result at low frequency

CONFIGURATION: FHSS 86 channels
BAUD RATE: 11520 bps



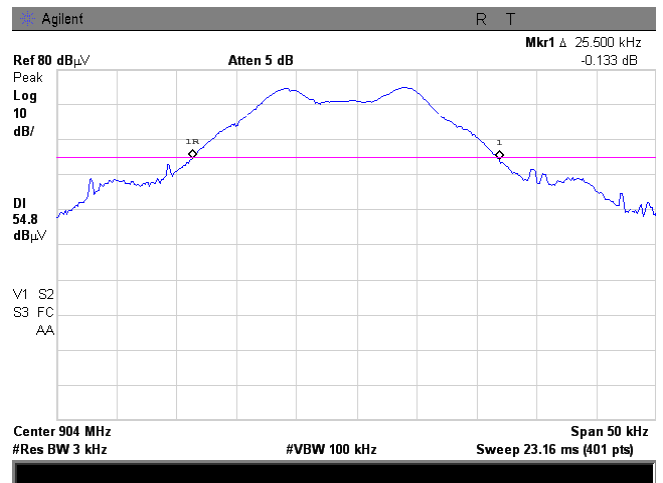
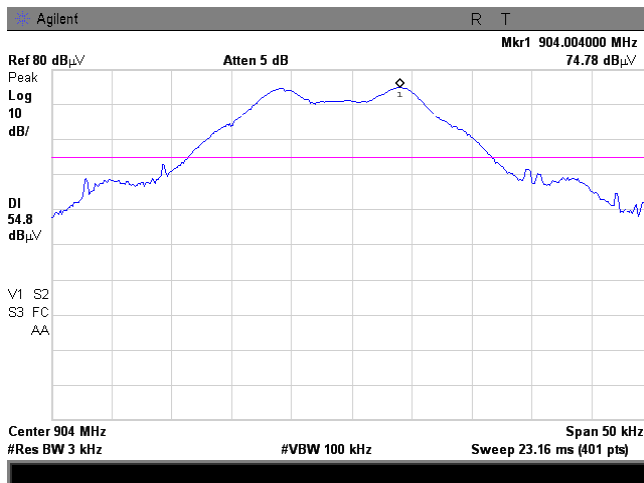


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|---|-------------------------------|--------------------------------|------------------------------|
| Test specification: Section 15.247(a)1, RSS-210 section A8.1(a), 20 dB bandwidth | | | |
| Test procedure: Public notice DA 00-705 | | | |
| Test mode: Compliance | Verdict: PASS | | |
| Date(s): 6/24/2012 - 7/4/2012 | | | |
| Temperature: 24 °C | Air Pressure: 1007 hPa | Relative Humidity: 45 % | Power Supply: Battery |
| Remarks: | | | |

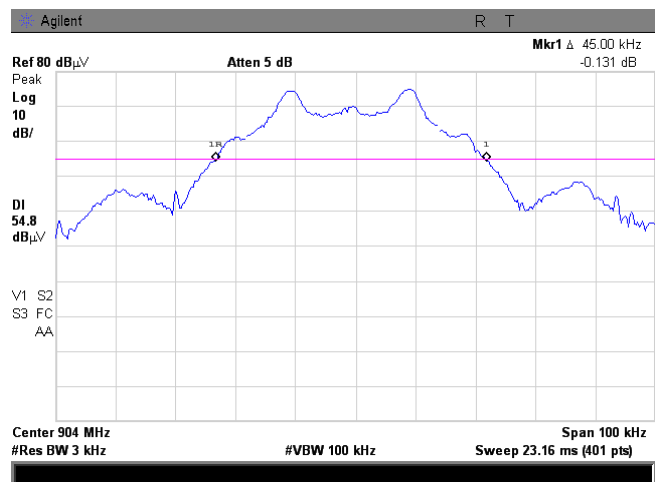
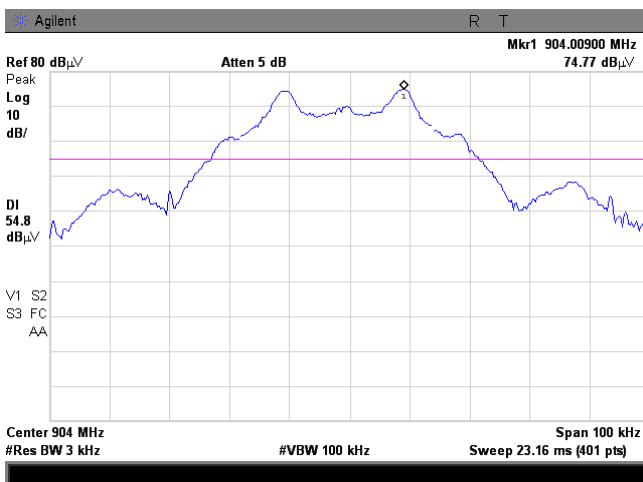
Plot 7.1.5 The 20 dB bandwidth test result at low frequency

CONFIGURATION: FHSS 240 channels
BAUD RATE: 9600 bps



Plot 7.1.6 The 20 dB bandwidth test result at low frequency

CONFIGURATION: FHSS 240 channels
BAUD RATE: 19200 bps



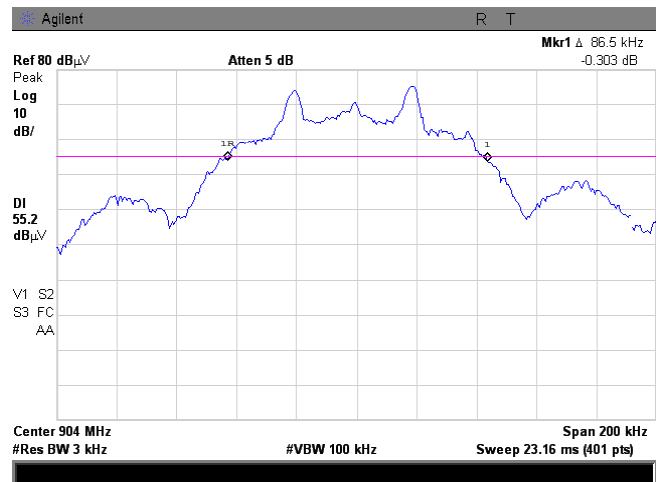
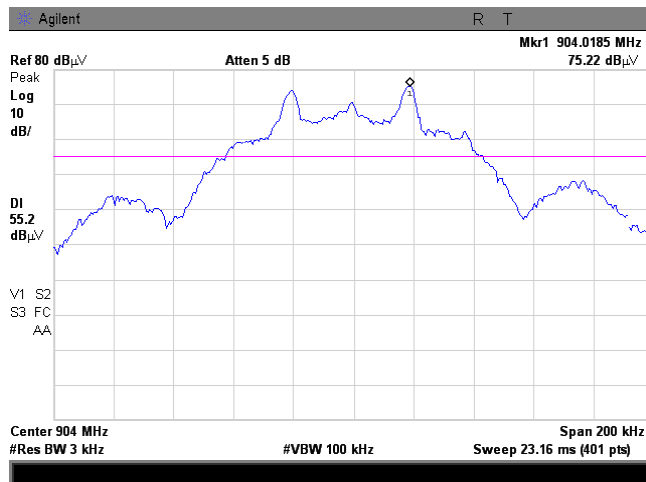


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| | | | |
|---|-------------------------------|--------------------------------|------------------------------|
| Test specification: Section 15.247(a)1, RSS-210 section A8.1(a), 20 dB bandwidth | | | |
| Test procedure: Public notice DA 00-705 | | | |
| Test mode: Compliance | Verdict: PASS | | |
| Date(s): 6/24/2012 - 7/4/2012 | | | |
| Temperature: 24 °C | Air Pressure: 1007 hPa | Relative Humidity: 45 % | Power Supply: Battery |
| Remarks: | | | |

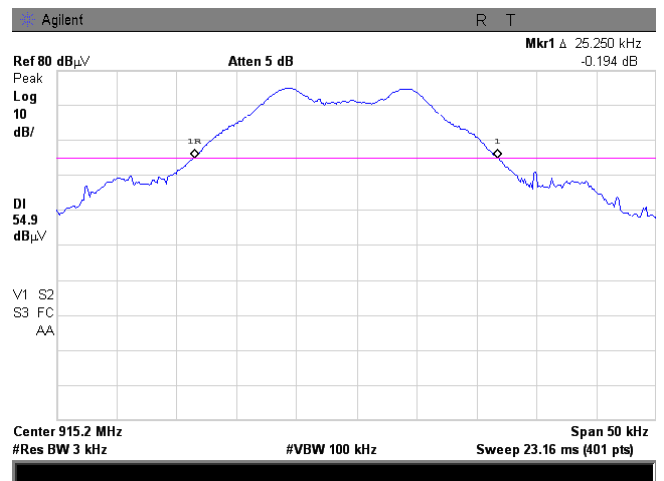
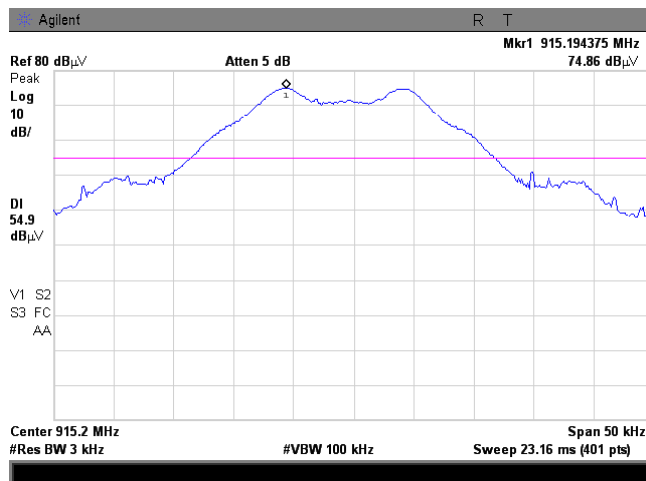
Plot 7.1.7 The 20 dB bandwidth test result at low frequency

CONFIGURATION: FHSS 240 channels
BAUD RATE: 38400 bps



Plot 7.1.8 The 20 dB bandwidth test result at mid frequency

CONFIGURATION: FHSS 86 channels
BAUD RATE: 9600 bps



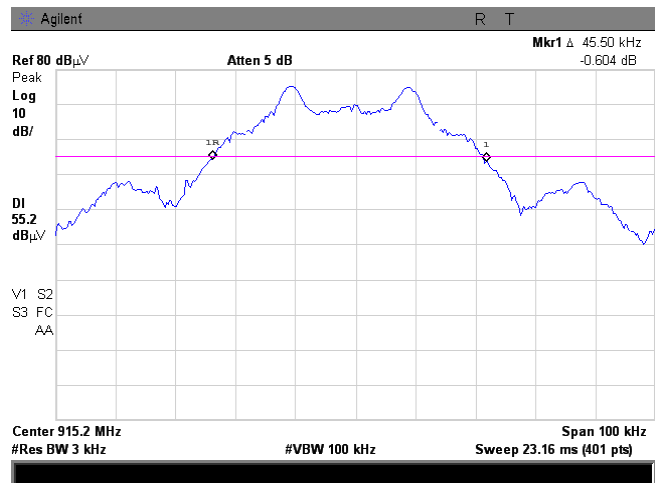
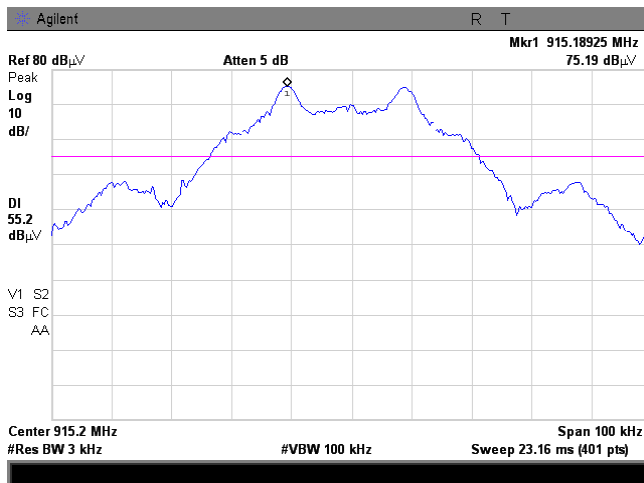


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| | | | |
|---|-------------------------------|--------------------------------|------------------------------|
| Test specification: Section 15.247(a)1, RSS-210 section A8.1(a), 20 dB bandwidth | | | |
| Test procedure: Public notice DA 00-705 | | | |
| Test mode: Compliance | Verdict: PASS | | |
| Date(s): 6/24/2012 - 7/4/2012 | | | |
| Temperature: 24 °C | Air Pressure: 1007 hPa | Relative Humidity: 45 % | Power Supply: Battery |
| Remarks: | | | |

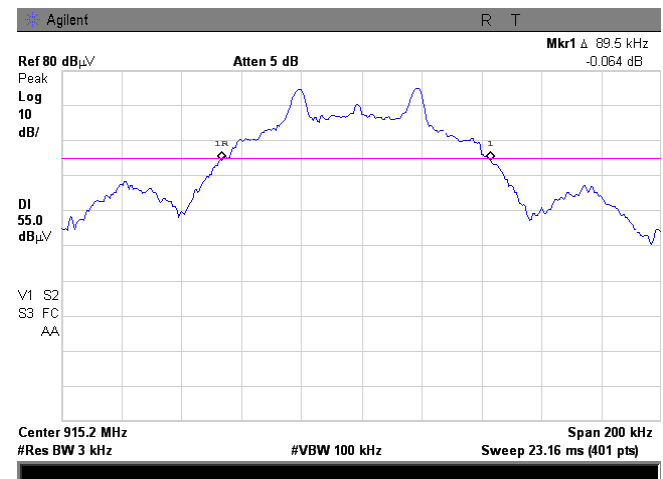
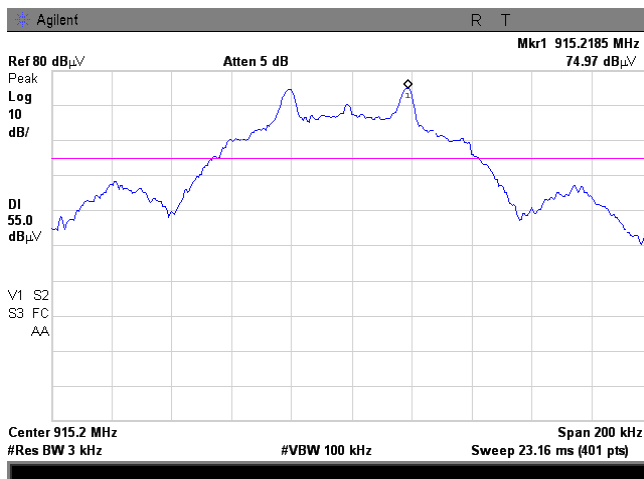
Plot 7.1.9 The 20 dB bandwidth test result at mid frequency

CONFIGURATION: FHSS 86 channels
BAUD RATE: 19200 bps



Plot 7.1.10 The 20 dB bandwidth test result at mid frequency

CONFIGURATION: FHSS 86 channels
BAUD RATE: 38400 bps



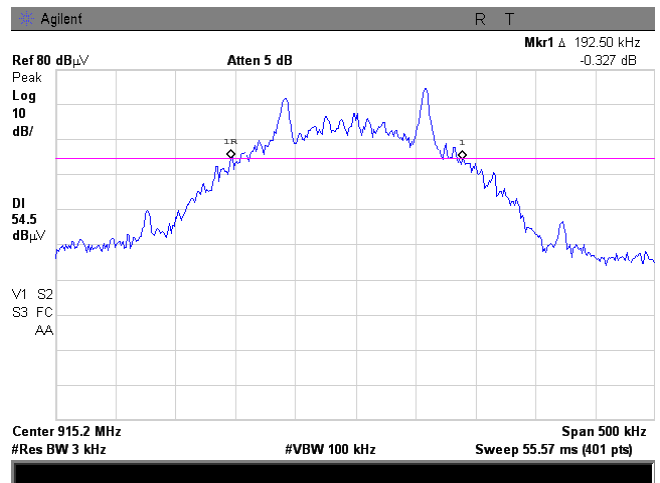
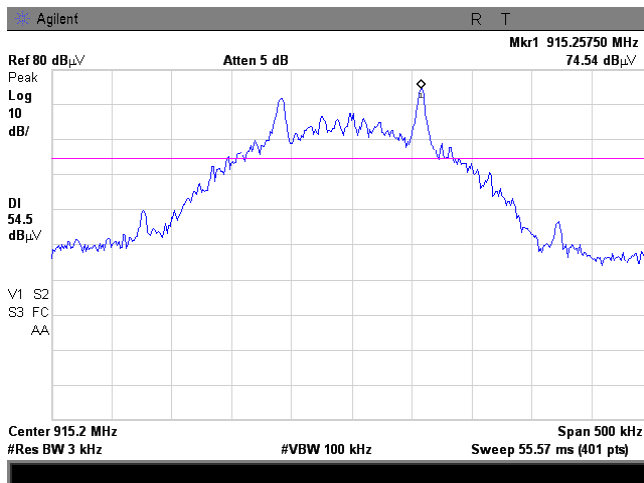


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| | | | |
|---|-------------------------------|--------------------------------|------------------------------|
| Test specification: Section 15.247(a)1, RSS-210 section A8.1(a), 20 dB bandwidth | | | |
| Test procedure: Public notice DA 00-705 | | | |
| Test mode: Compliance | Verdict: PASS | | |
| Date(s): 6/24/2012 - 7/4/2012 | | | |
| Temperature: 24 °C | Air Pressure: 1007 hPa | Relative Humidity: 45 % | Power Supply: Battery |
| Remarks: | | | |

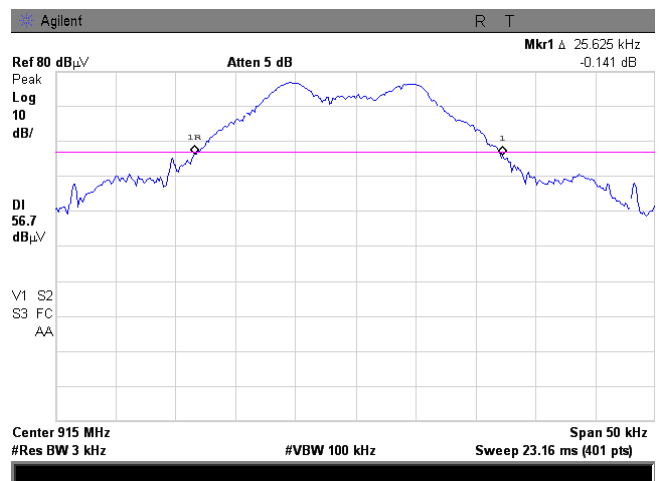
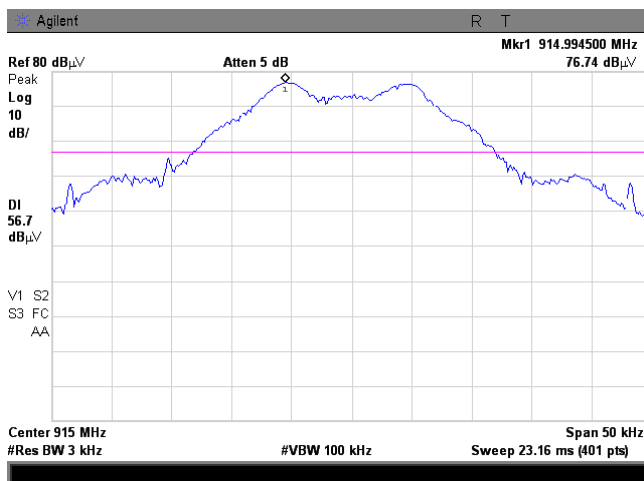
Plot 7.1.11 The 20 dB bandwidth test result at mid frequency

CONFIGURATION: FHSS 86 channels
BAUD RATE: 115200 bps



Plot 7.1.12 The 20 dB bandwidth test result at mid frequency

CONFIGURATION: FHSS 240 channels
BAUD RATE: 9600 bps



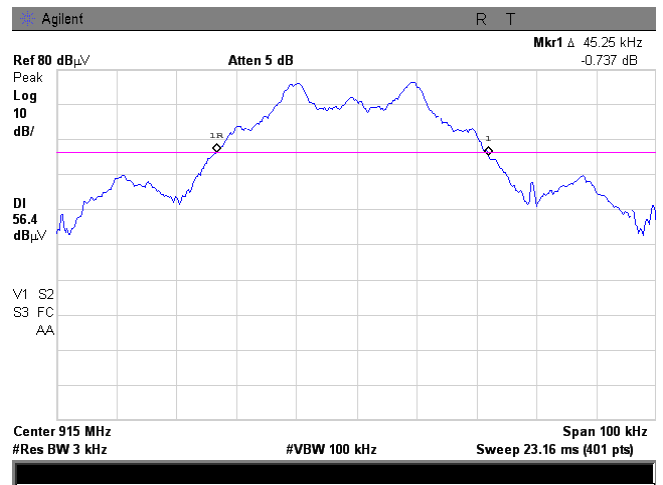
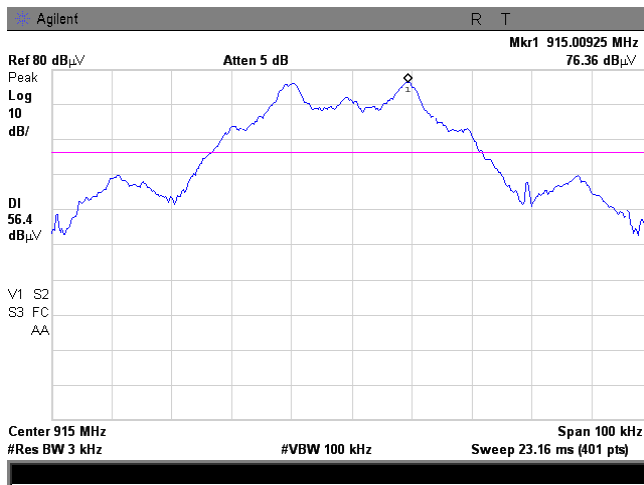


HERMON LABORATORIES

| | | | |
|---|-------------------------------|--------------------------------|------------------------------|
| Test specification: Section 15.247(a)1, RSS-210 section A8.1(a), 20 dB bandwidth | | | |
| Test procedure: Public notice DA 00-705 | | | |
| Test mode: Compliance | Verdict: PASS | | |
| Date(s): 6/24/2012 - 7/4/2012 | | | |
| Temperature: 24 °C | Air Pressure: 1007 hPa | Relative Humidity: 45 % | Power Supply: Battery |
| Remarks: | | | |

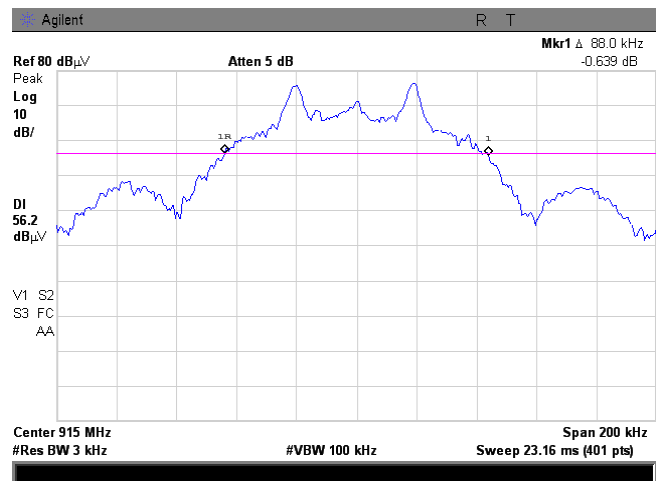
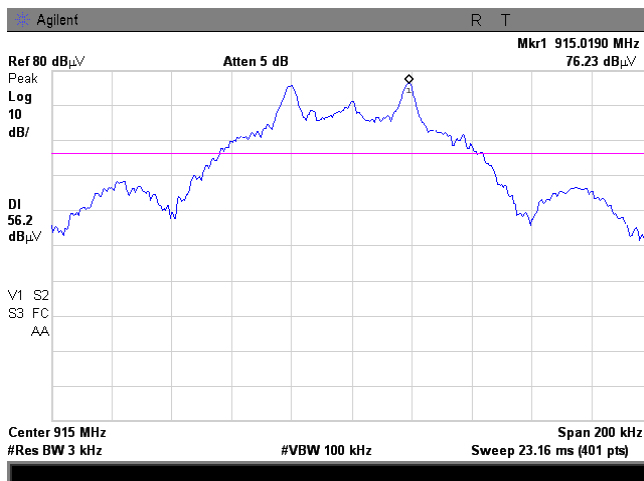
Plot 7.1.13 The 20 dB bandwidth test result at mid frequency

CONFIGURATION: FHSS 240 channels
BAUD RATE: 19200 bps



Plot 7.1.14 The 20 dB bandwidth test result at mid frequency

CONFIGURATION: FHSS 240 channels
BAUD RATE: 38400 bps



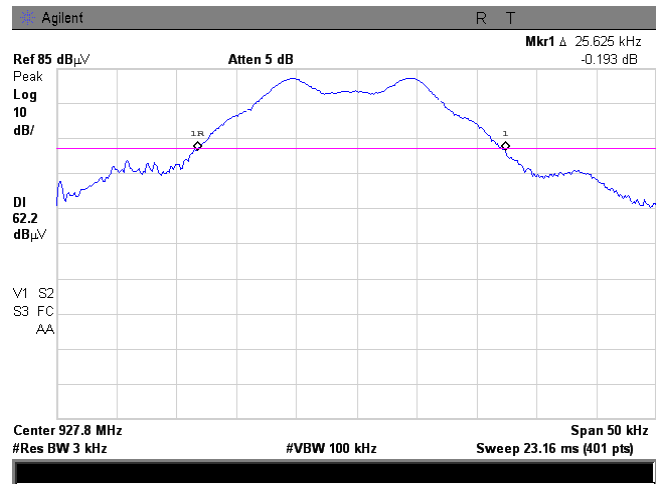
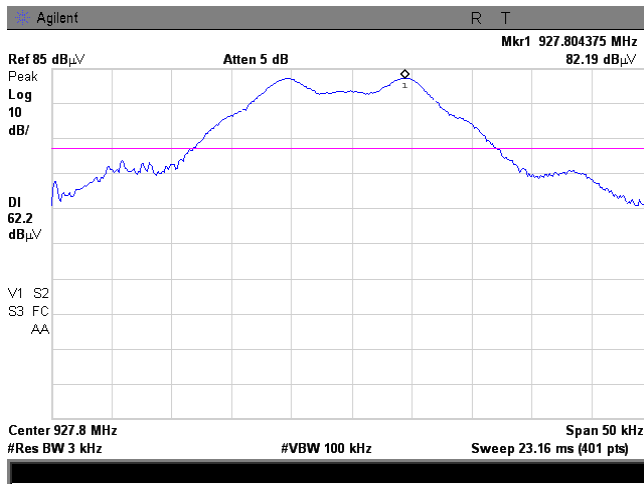


HERMON LABORATORIES

| | | | |
|---|-------------------------------|--------------------------------|------------------------------|
| Test specification: Section 15.247(a)1, RSS-210 section A8.1(a), 20 dB bandwidth | | | |
| Test procedure: Public notice DA 00-705 | | | |
| Test mode: Compliance | Verdict: PASS | | |
| Date(s): 6/24/2012 - 7/4/2012 | | | |
| Temperature: 24 °C | Air Pressure: 1007 hPa | Relative Humidity: 45 % | Power Supply: Battery |
| Remarks: | | | |

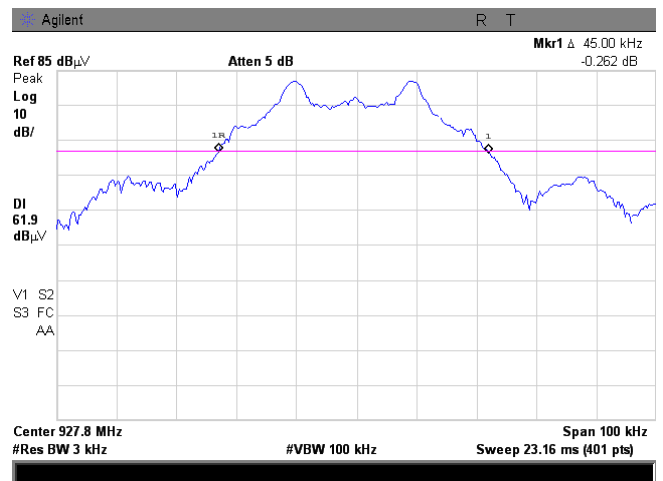
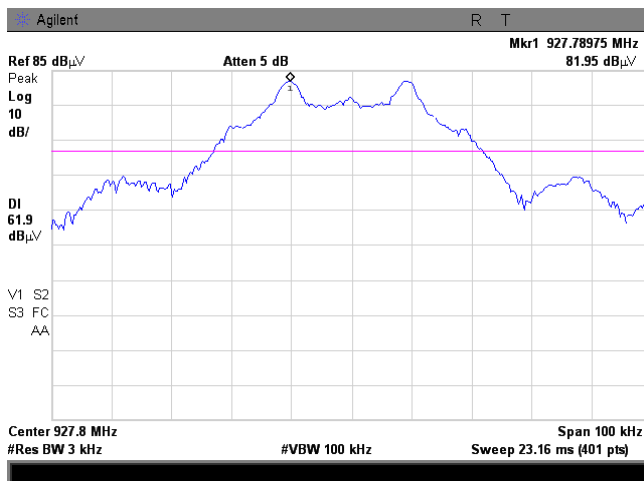
Plot 7.1.15 The 20 dB bandwidth test result at high frequency

CONFIGURATION: FHSS 86 channels
BAUD RATE: 9600 bps



Plot 7.1.16 The 20 dB bandwidth test result at high frequency

CONFIGURATION: FHSS 86 channels
BAUD RATE: 19200 bps



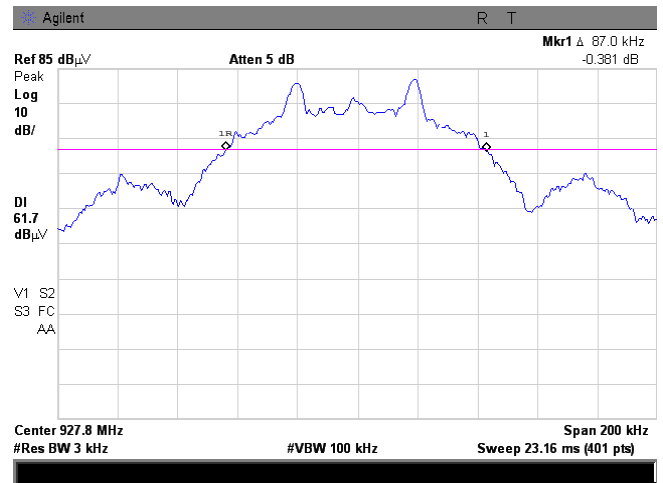
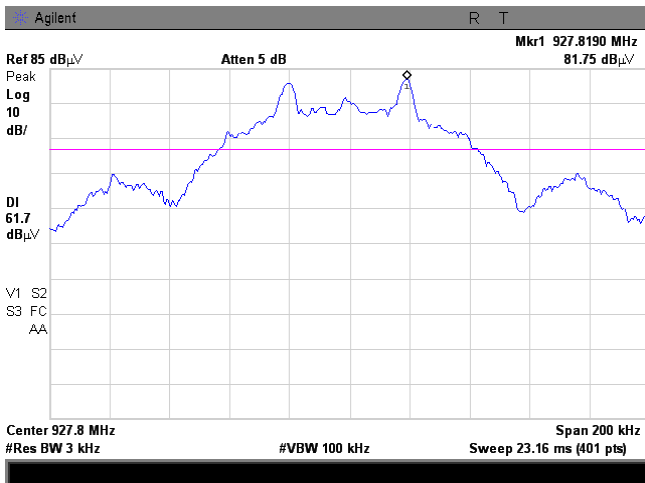


HERMON LABORATORIES

| | | | |
|---|-------------------------------|--------------------------------|------------------------------|
| Test specification: Section 15.247(a)1, RSS-210 section A8.1(a), 20 dB bandwidth | | | |
| Test procedure: Public notice DA 00-705 | | | |
| Test mode: Compliance | Verdict: PASS | | |
| Date(s): 6/24/2012 - 7/4/2012 | | | |
| Temperature: 24 °C | Air Pressure: 1007 hPa | Relative Humidity: 45 % | Power Supply: Battery |
| Remarks: | | | |

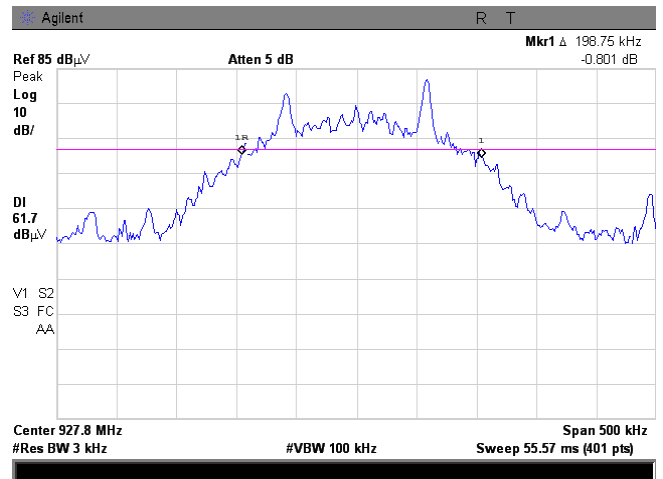
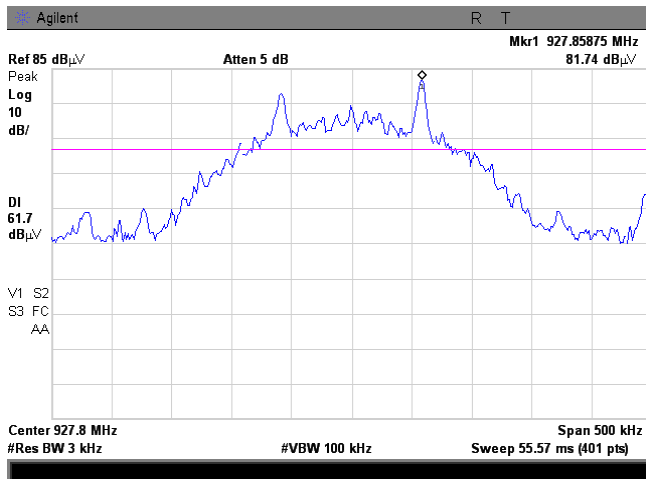
Plot 7.1.17 The 20 dB bandwidth test result at high frequency

CONFIGURATION: FHSS 86 channels
BAUD RATE: 38400 bps



Plot 7.1.18 The 20 dB bandwidth test result at high frequency

CONFIGURATION: FHSS 86 channels
BAUD RATE: 115200 bps



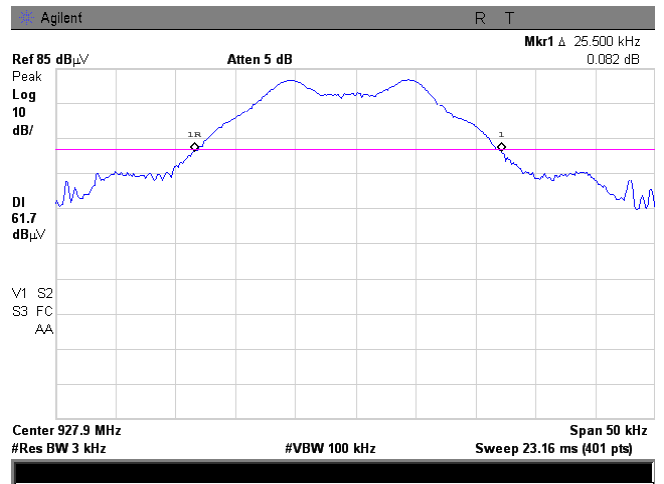
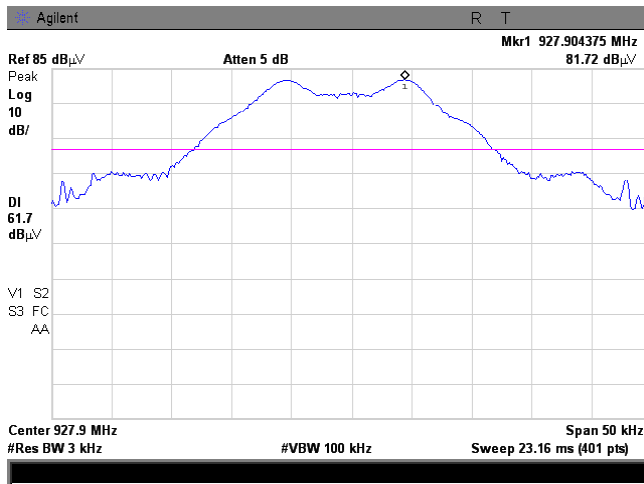


HERMON LABORATORIES

| | | | |
|---|-------------------------------|--------------------------------|------------------------------|
| Test specification: Section 15.247(a)1, RSS-210 section A8.1(a), 20 dB bandwidth | | | |
| Test procedure: Public notice DA 00-705 | | | |
| Test mode: Compliance | Verdict: PASS | | |
| Date(s): 6/24/2012 - 7/4/2012 | | | |
| Temperature: 24 °C | Air Pressure: 1007 hPa | Relative Humidity: 45 % | Power Supply: Battery |
| Remarks: | | | |

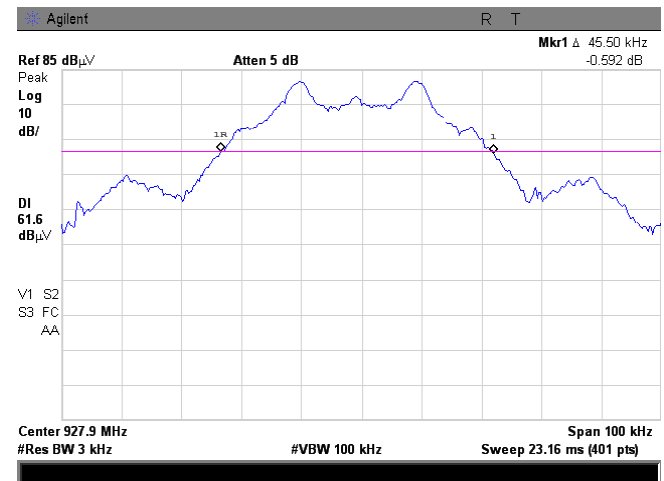
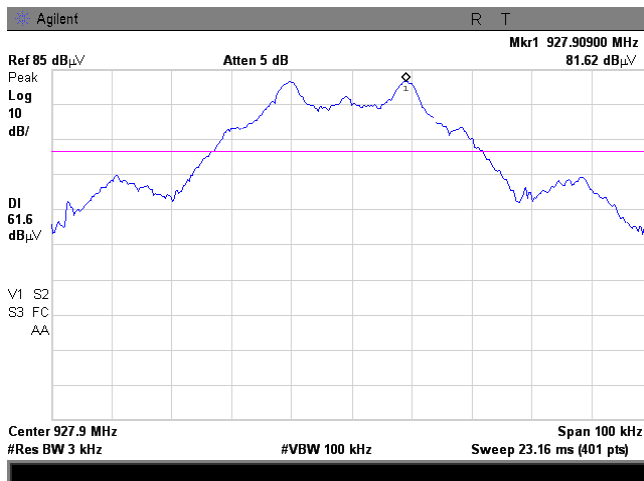
Plot 7.1.19 The 20 dB bandwidth test result at high frequency

CONFIGURATION: FHSS 240 channels
BAUD RATE: 9600 bps



Plot 7.1.20 The 20 dB bandwidth test result at high frequency

CONFIGURATION: FHSS 240 channels
BAUD RATE: 19200 bps



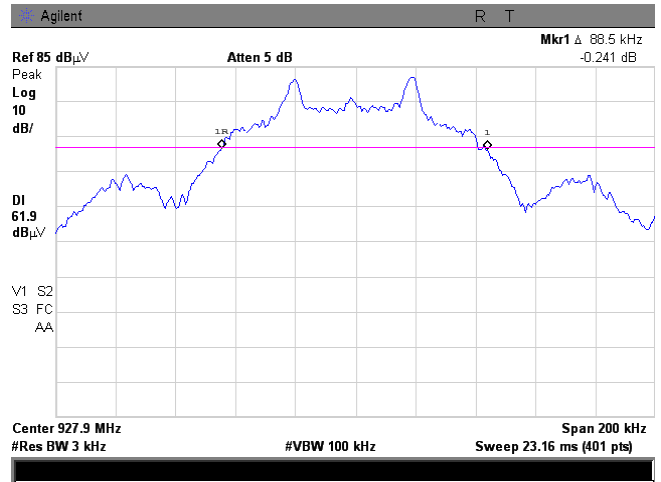
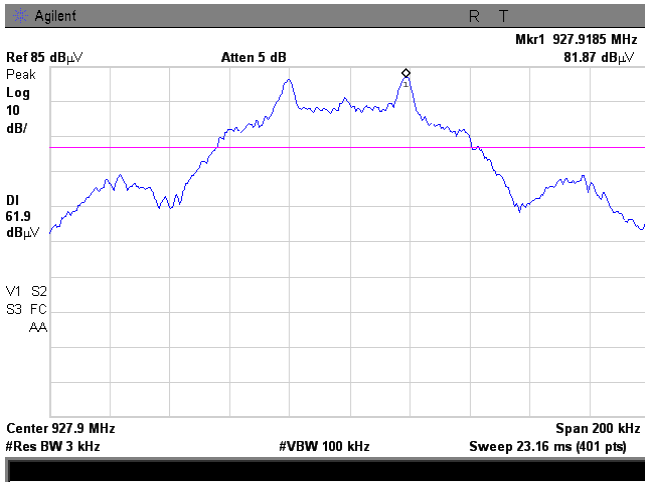


HERMON LABORATORIES

| | | | |
|----------------------------|--|---|--|
| Test specification: | | Section 15.247(a)1, RSS-210 section A8.1(a), 20 dB bandwidth | |
| Test procedure: | | Public notice DA 00-705 | |
| Test mode: | | Compliance | |
| Date(s): | | 6/24/2012 - 7/4/2012 | |
| Temperature: 24 °C | | Air Pressure: 1007 hPa | |
| | | Relative Humidity: 45 % | |
| | | Power Supply: Battery | |
| Remarks: | | | |
| | | Verdict: PASS | |

Plot 7.1.21 The 20 dB bandwidth test result at high frequency

CONFIGURATION: FHSS 240 channels
BAUD RATE: 38400 bps





| | | | |
|----------------------------|--|--------------------------------|------------------------------|
| Test specification: | Section 15.247(a)1, RSS-210 section A8.1(b), Frequency separation | | |
| Test procedure: | Public notice DA 00-705 | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date(s): | 7/4/2012 | | |
| Temperature: 22 °C | Air Pressure: 1004 hPa | Relative Humidity: 48 % | Power Supply: 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





HERMON LABORATORIES

| | | | |
|----------------------------|--|--------------------------------|------------------------------|
| Test specification: | Section 15.247(a)1, RSS-210 section A8.1(b), Frequency separation | | |
| Test procedure: | Public notice DA 00-705 | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date(s): | 7/4/2012 | | |
| Temperature: 22 °C | Air Pressure: 1004 hPa | Relative Humidity: 48 % | Power Supply: Battery |
| Remarks: | | | |

Table 7.2.2 Carrier frequency separation test results

ASSIGNED FREQUENCY: 902-928 MHz
 MODULATION: FSK
 DETECTOR USED: Peak
 FREQUENCY HOPPING: Enabled

MODE: 86 channels
 20 dB BANDWIDTH: 198.75 kHz

| Carrier frequency separation, kHz | Limit, kHz | Margin, kHz* | Verdict |
|-----------------------------------|------------|--------------|---------|
| 300 | 198.75 | 101.25 | Pass |

MODE: 240 channels
 20 dB BANDWIDTH: 88.5 kHz

| Carrier frequency separation, kHz | Limit, kHz | Margin, kHz* | Verdict |
|-----------------------------------|------------|--------------|---------|
| 99.8 | 88.5 | 11.3 | Pass |

* - Margin = Carrier frequency separation – specification limit.

Reference numbers of test equipment used

| | | | | | | | |
|---------|---------|---------|--|--|--|--|--|
| HL 0521 | HL 1984 | HL 4278 | | | | | |
|---------|---------|---------|--|--|--|--|--|

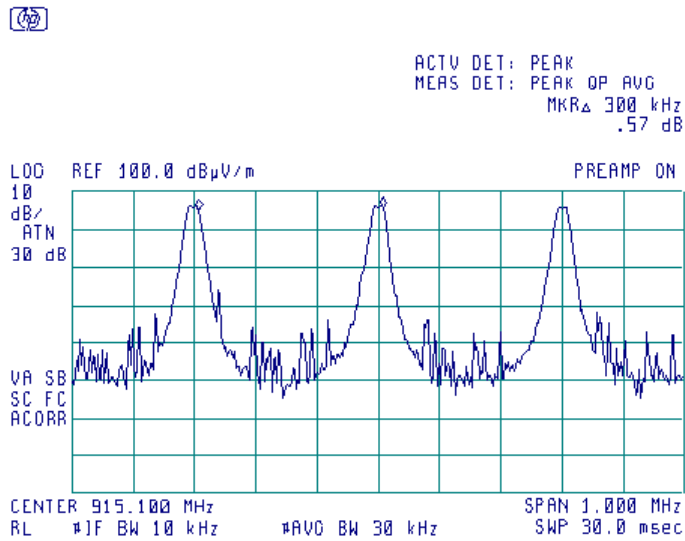
Full description is given in Appendix A.



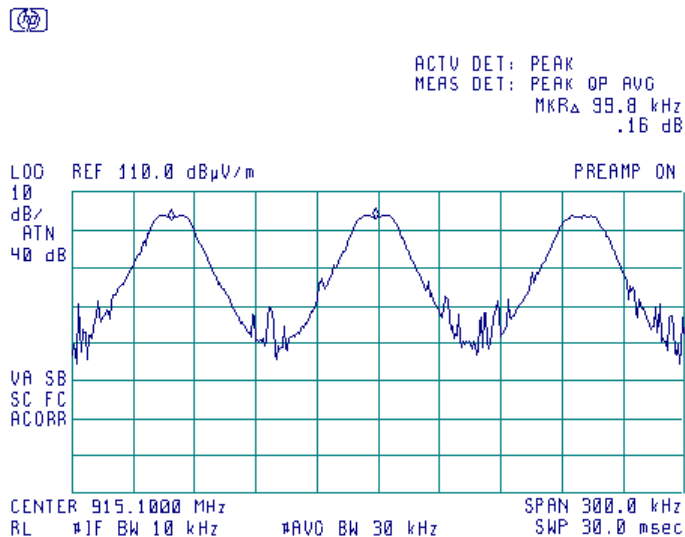
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| | | | |
|----------------------------|--|--|--|
| Test specification: | | Section 15.247(a)1, RSS-210 section A8.1(b), Frequency separation | |
| Test procedure: | | Public notice DA 00-705 | |
| Test mode: | | Compliance | |
| Date(s): | | 7/4/2012 | |
| Temperature: 22 °C | | Air Pressure: 1004 hPa | |
| Remarks: | | Relative Humidity: 48 % | |
| | | Power Supply: Battery | |
| | | Verdict: PASS | |

Plot 7.2.1 Carrier frequency separation, 86 channels mode



Plot 7.2.2 Carrier frequency separation, 240 channels mode





| | | | |
|----------------------------|---|--------------------------------|------------------------------|
| Test specification: | Section 15.247(a)1, RSS-210 section A8.1(c), Number of hopping frequencies | | |
| Test procedure: | Public notice DA 00-705 | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date(s): | 7/4/2012 | | |
| Temperature: 23 °C | Air Pressure: 1004 hPa | Relative Humidity: 43 % | Power Supply: 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 associated plots.

Figure 7.3.1 Hopping frequencies test setup





| | | | |
|----------------------------|---|--------------------------------|------------------------------|
| Test specification: | Section 15.247(a)1, RSS-210 section A8.1(c), Number of hopping frequencies | | |
| Test procedure: | Public notice DA 00-705 | | |
| Test mode: | Compliance | Verdict: PASS | |
| Date(s): | 7/4/2012 | | |
| Temperature: 23 °C | Air Pressure: 1004 hPa | Relative Humidity: 43 % | Power Supply: Battery |
| Remarks: | | | |

Table 7.3.2 Hopping frequencies test results

ASSIGNED FREQUENCY: 902-928 MHz
 MODULATION: FSK
 DETECTOR USED: Peak
 RESOLUTION BANDWIDTH: ≥ 1% of the span
 VIDEO BANDWIDTH: ≥ RBW
 FREQUENCY HOPPING: Enabled

OPERATING MODE: Wide channel

| Number of hopping frequencies | Minimum number of hopping frequencies | Margin* | Verdict |
|-------------------------------|---------------------------------------|---------|---------|
| 86 | 50 | 36 | Pass |

OPERATING MODE: Narrow channel

| Number of hopping frequencies | Minimum number of hopping frequencies | Margin* | Verdict |
|-------------------------------|---------------------------------------|---------|---------|
| 240 | 50 | 190 | Pass |

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

Reference numbers of test equipment used

| | | | | | | | |
|---------|---------|---------|--|--|--|--|--|
| HL 1513 | HL 1984 | HL 3001 | | | | | |
|---------|---------|---------|--|--|--|--|--|

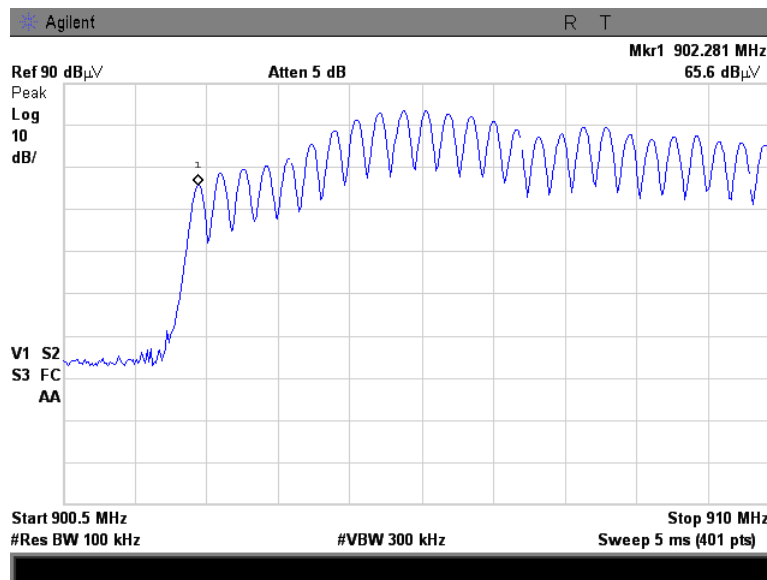
Full description is given in Appendix A.



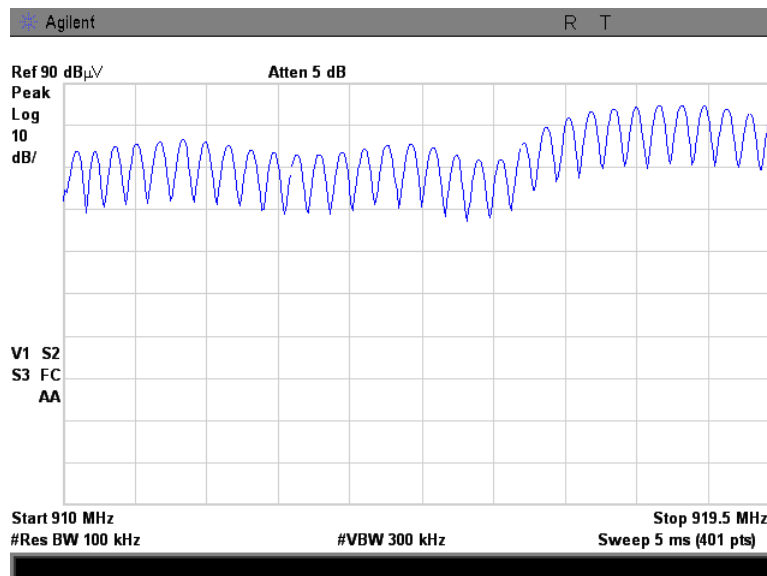
HERMON LABORATORIES

| | | | |
|----------------------------|---|--------------------------------|------------------------------|
| Test specification: | Section 15.247(a)1, RSS-210 section A8.1(c), Number of hopping frequencies | | |
| Test procedure: | Public notice DA 00-705 | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date(s): | 7/4/2012 | | |
| Temperature: 23 °C | Air Pressure: 1004 hPa | Relative Humidity: 43 % | Power Supply: Battery |
| Remarks: | | | |

Plot 7.3.1 Number of hopping frequencies in wide channel mode (26 channels)



Plot 7.3.2 Number of hopping frequencies in wide channel mode (32 channels)

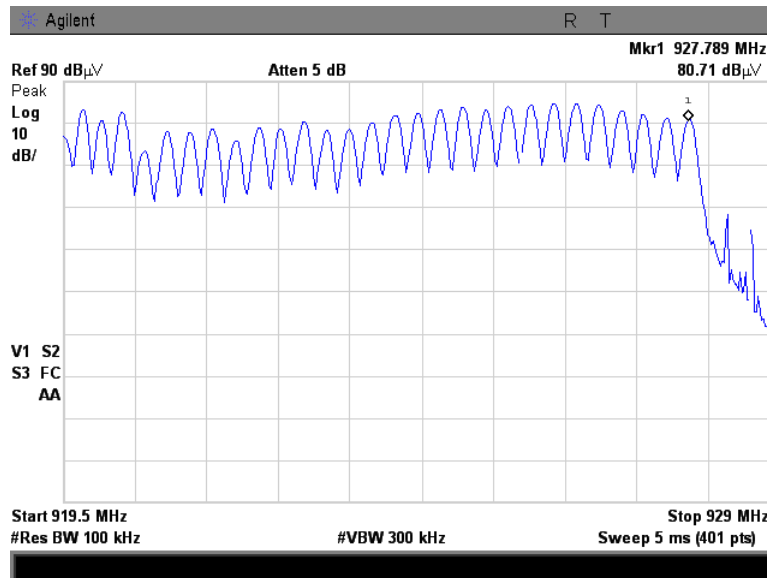




HERMON LABORATORIES

| | | | |
|----------------------------|---|--------------------------------|------------------------------|
| Test specification: | Section 15.247(a)1, RSS-210 section A8.1(c), Number of hopping frequencies | | |
| Test procedure: | Public notice DA 00-705 | | |
| Test mode: | Compliance | Verdict: PASS | |
| Date(s): | 7/4/2012 | | |
| Temperature: 23 °C | Air Pressure: 1004 hPa | Relative Humidity: 43 % | Power Supply: Battery |
| Remarks: | | | |

Plot 7.3.3 Number of hopping frequencies in wide channel mode (28 channels)

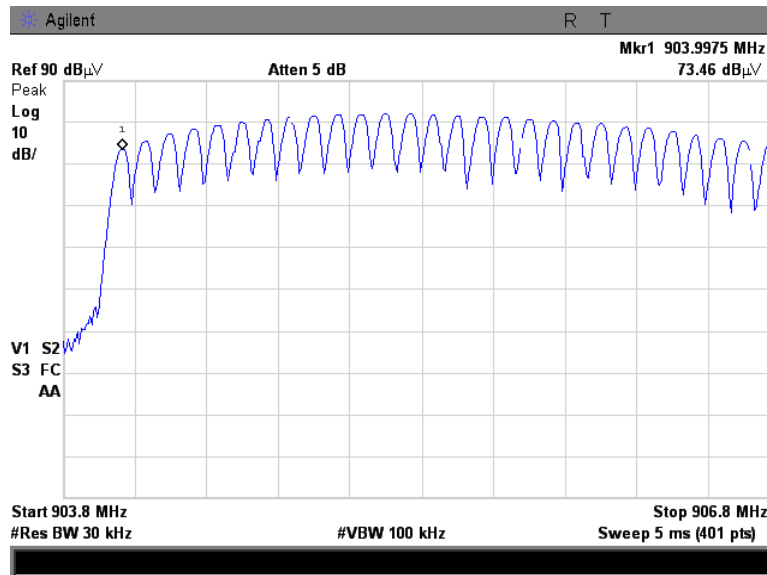




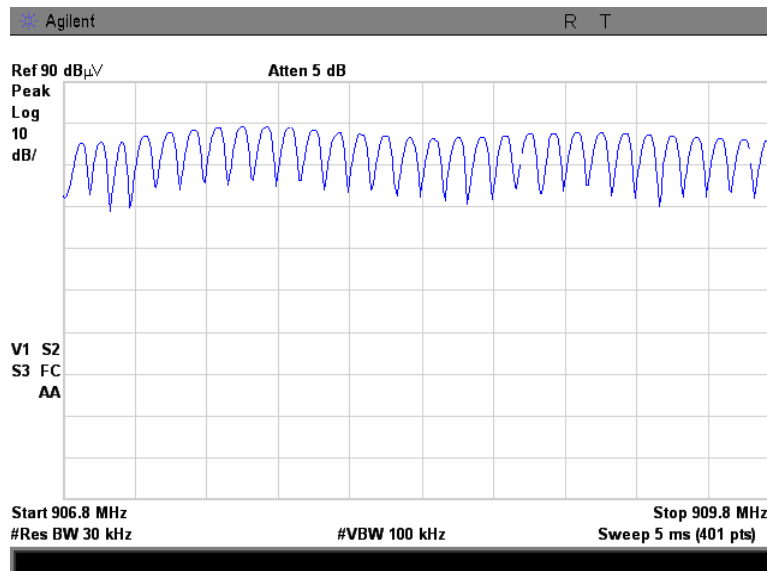
HERMON LABORATORIES

| | | | |
|----------------------------|---|--------------------------------|------------------------------|
| Test specification: | Section 15.247(a)1, RSS-210 section A8.1(c), Number of hopping frequencies | | |
| Test procedure: | Public notice DA 00-705 | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date(s): | 7/4/2012 | | |
| Temperature: 23 °C | Air Pressure: 1004 hPa | Relative Humidity: 43 % | Power Supply: Battery |
| Remarks: | | | |

Plot 7.3.4 Number of hopping frequencies in narrow channel mode (28 channels)



Plot 7.3.5 Number of hopping frequencies in narrow channel mode (30 channels)

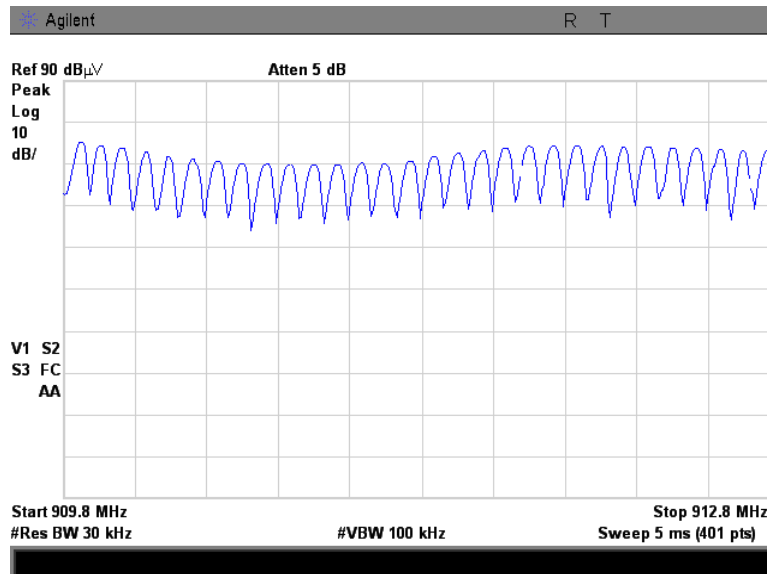




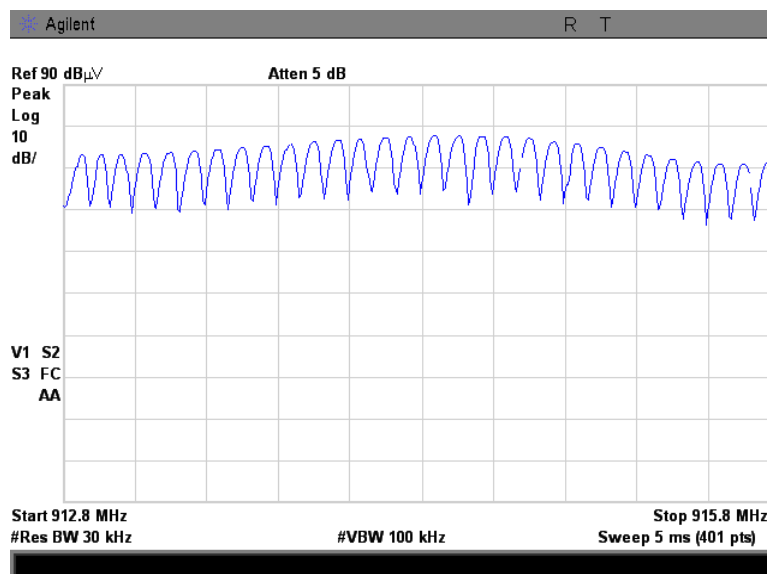
HERMON LABORATORIES

| | | | |
|----------------------------|---|--------------------------------|------------------------------|
| Test specification: | Section 15.247(a)1, RSS-210 section A8.1(c), Number of hopping frequencies | | |
| Test procedure: | Public notice DA 00-705 | | |
| Test mode: | Compliance | Verdict: PASS | |
| Date(s): | 7/4/2012 | | |
| Temperature: 23 °C | Air Pressure: 1004 hPa | Relative Humidity: 43 % | Power Supply: Battery |
| Remarks: | | | |

Plot 7.3.6 Number of hopping frequencies in narrow channel mode (30 channels)



Plot 7.3.7 Number of hopping frequencies in narrow channel mode (30 channels)

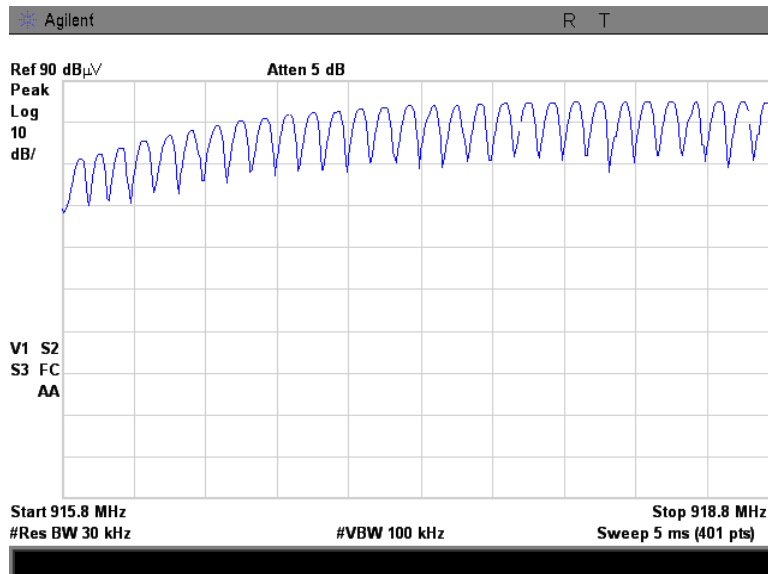




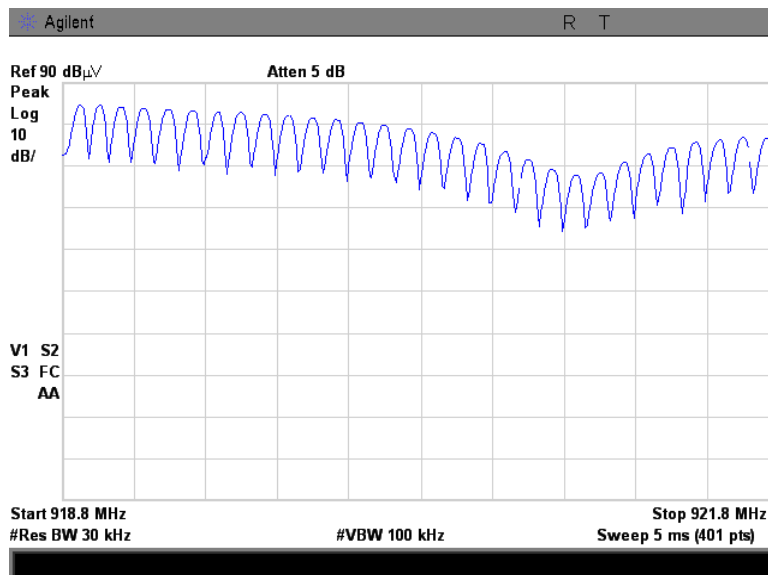
HERMON LABORATORIES

| | | | |
|----------------------------|---|--------------------------------|------------------------------|
| Test specification: | Section 15.247(a)1, RSS-210 section A8.1(c), Number of hopping frequencies | | |
| Test procedure: | Public notice DA 00-705 | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date(s): | 7/4/2012 | | |
| Temperature: 23 °C | Air Pressure: 1004 hPa | Relative Humidity: 43 % | Power Supply: Battery |
| Remarks: | | | |

Plot 7.3.8 Number of hopping frequencies in narrow channel mode (30 channels)



Plot 7.3.9 Number of hopping frequencies in narrow channel mode (30 channels)

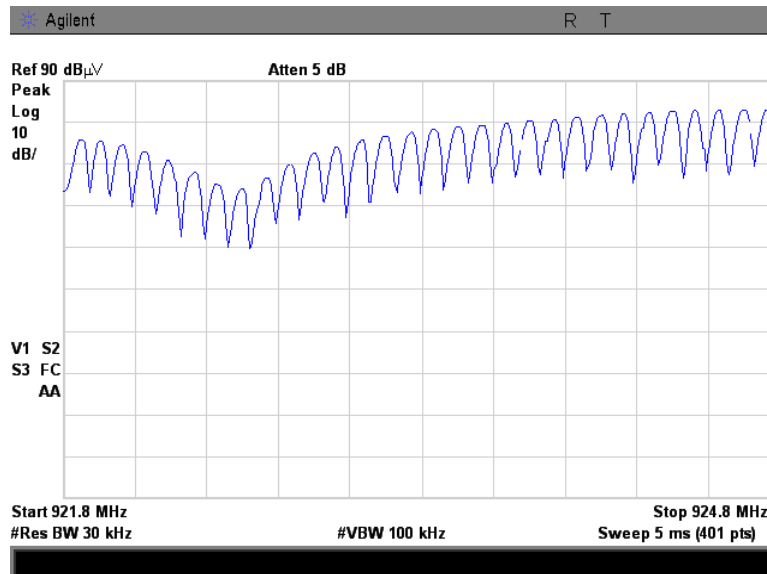




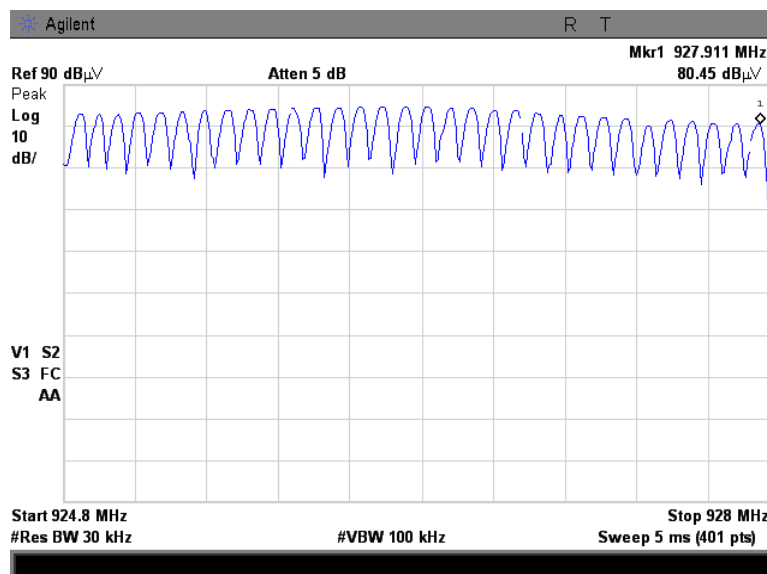
HERMON LABORATORIES

| | | | |
|----------------------------|---|--------------------------------|------------------------------|
| Test specification: | Section 15.247(a)1, RSS-210 section A8.1(c), Number of hopping frequencies | | |
| Test procedure: | Public notice DA 00-705 | | |
| Test mode: | Compliance | Verdict: PASS | |
| Date(s): | 7/4/2012 | | |
| Temperature: 23 °C | Air Pressure: 1004 hPa | Relative Humidity: 43 % | Power Supply: Battery |
| Remarks: | | | |

Plot 7.3.10 Number of hopping frequencies in narrow channel mode (30 channels)



Plot 7.3.11 Number of hopping frequencies in narrow channel mode (32 channels)





| | | | |
|----------------------------|--|---|--|
| Test specification: | | Section 15.247(a)1, RSS-210 section A8.1(c), Average time of occupancy | |
| Test procedure: | | Public notice DA 00-705 | |
| Test mode: | | Compliance | |
| Date(s): | | 7/4/2012 | |
| Temperature: 22 °C | | Air Pressure: 1004 hPa | |
| Remarks: | | Verdict: PASS | |
| | | Relative Humidity: 48 % | |
| | | Power Supply: Battery | |

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.

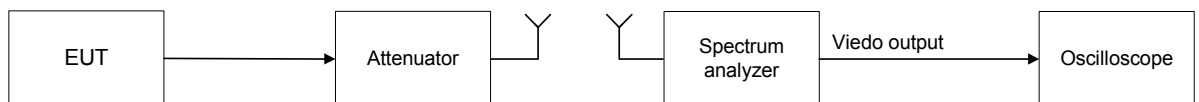
7.4.2.2 The spectrum analyzer span was set to zero centered on a hopping channel.

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 was repeated at each data rate and modulation type as 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, RSS-210 section A8.1(c), Average time of occupancy | |
| Test procedure: | | Public notice DA 00-705 | |
| Test mode: | | Compliance | |
| Date(s): | | 7/4/2012 | |
| Temperature: 22 °C | | Air Pressure: 1004 hPa | |
| | | Relative Humidity: 48 % | |
| | | Power Supply: Battery | |
| Remarks: | | | |

Table 7.4.2 Average time of occupancy test results

ASSIGNED FREQUENCY: 902-928 MHz
 MODULATION: FSK
 DETECTOR USED: Peak
 FREQUENCY HOPPING: Enabled

NUMBER OF HOPPING FREQUENCIES: 86

| Carrier frequency, MHz | Single transmission duration, ms | Single transmission period, s | Average time of occupancy*, s | Bit rate, bps | Limit, s | Margin, s** | Verdict |
|------------------------|----------------------------------|-------------------------------|-------------------------------|---------------|----------|-------------|---------|
| 915 | 6.1 | 1 | 0.122 | 115200 | 0.4 | -0.278 | Pass |

NUMBER OF HOPPING FREQUENCIES: 240

| Carrier frequency, MHz | Single transmission duration, ms | Single transmission period, s | Average time of occupancy*, s | Bit rate, bps | Limit, s | Margin, s** | Verdict |
|------------------------|----------------------------------|-------------------------------|-------------------------------|---------------|----------|-------------|---------|
| 915 | 6.1 | 2 | 0.061 | 38400 | 0.4 | -0.389 | Pass |

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

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

Reference numbers of test equipment used

| | | | | | | | |
|---------|---------|---------|--|--|--|--|--|
| HL 1513 | HL 1984 | HL 3001 | | | | | |
|---------|---------|---------|--|--|--|--|--|

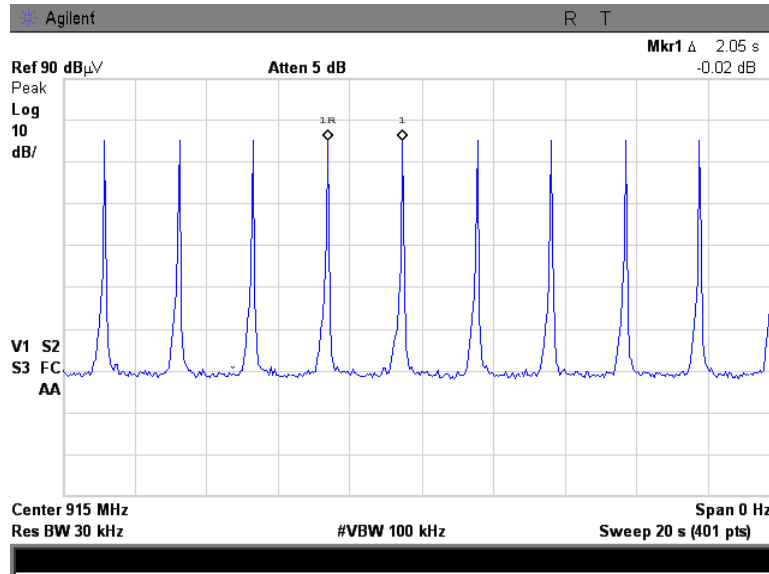
Full description is given in Appendix A.



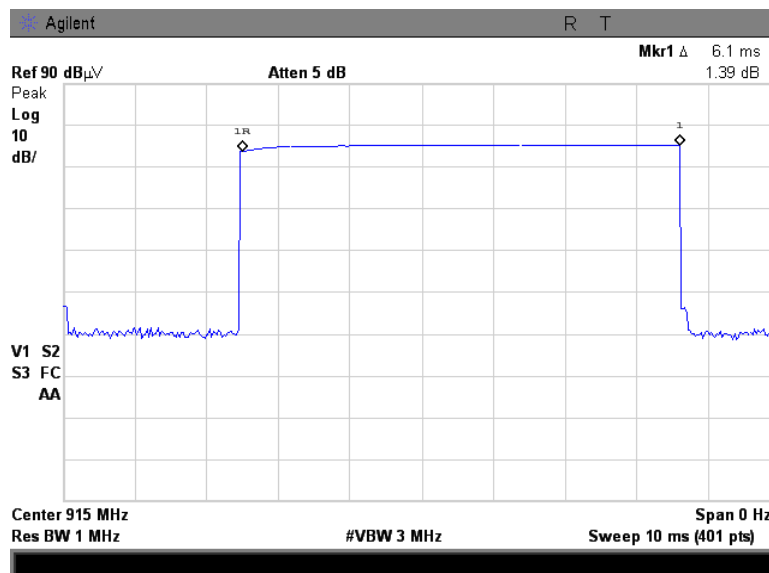
HERMON LABORATORIES

| | | | |
|--------------------------------|--|---|--|
| Test specification: | | Section 15.247(a)1, RSS-210 section A8.1(c), Average time of occupancy | |
| Test procedure: | | Public notice DA 00-705 | |
| Test mode: | | Compliance | |
| Date(s): | | 7/4/2012 | |
| Temperature: 22 °C | | Air Pressure: 1004 hPa | |
| Relative Humidity: 48 % | | Power Supply: Battery | |
| Remarks: | | | |
| | | Verdict: PASS | |

Plot 7.4.1 Single transmission period in narrow channel mode (240 channels)



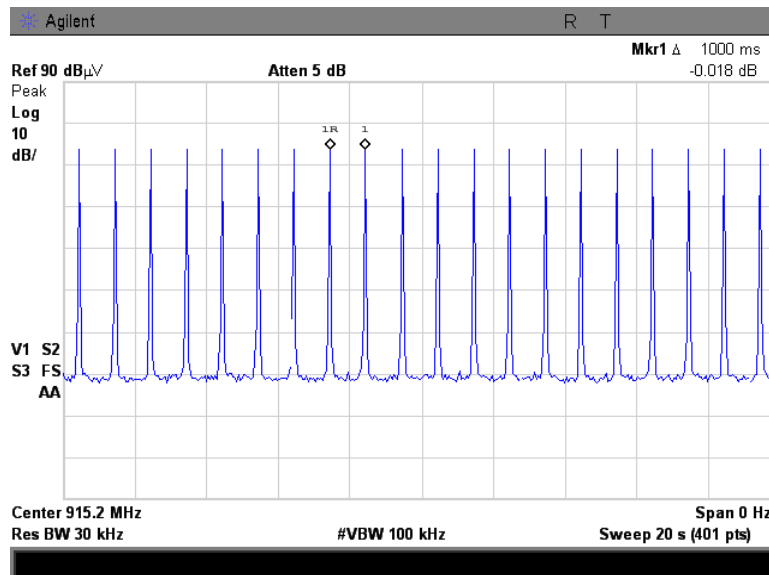
Plot 7.4.2 Single transmission duration in narrow channel mode (240 channels)



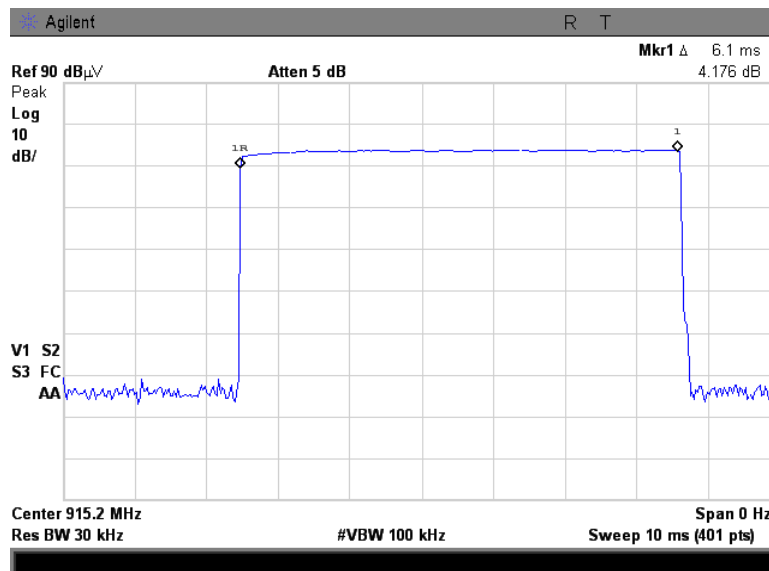


| | | | |
|--------------------------------|--|---|--|
| Test specification: | | Section 15.247(a)1, RSS-210 section A8.1(c), Average time of occupancy | |
| Test procedure: | | Public notice DA 00-705 | |
| Test mode: | | Compliance | |
| Date(s): | | 7/4/2012 | |
| Temperature: 22 °C | | Air Pressure: 1004 hPa | |
| Relative Humidity: 48 % | | Power Supply: Battery | |
| Remarks: | | | |
| | | Verdict: PASS | |

Plot 7.4.3 Single transmission period in wide channel mode (86 channels)



Plot 7.4.4 Single transmission duration in wide channel mode (86 channels)





| | | | |
|----------------------------|--|--|--|
| Test specification: | | Section 15.247(b), RSS-210 section A8.4(1), Peak output power | |
| Test procedure: | | Public notice DA 00-705 | |
| Test mode: | | Compliance | |
| Date(s): | | 6/24/2012 - 6/24/2012 | |
| Temperature: 22 °C | | Air Pressure: 1007 hPa | |
| | | Relative Humidity: 45 % | |
| | | Power Supply: 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 | 1.0 | 30.0 | 125.2 | 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 the 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:

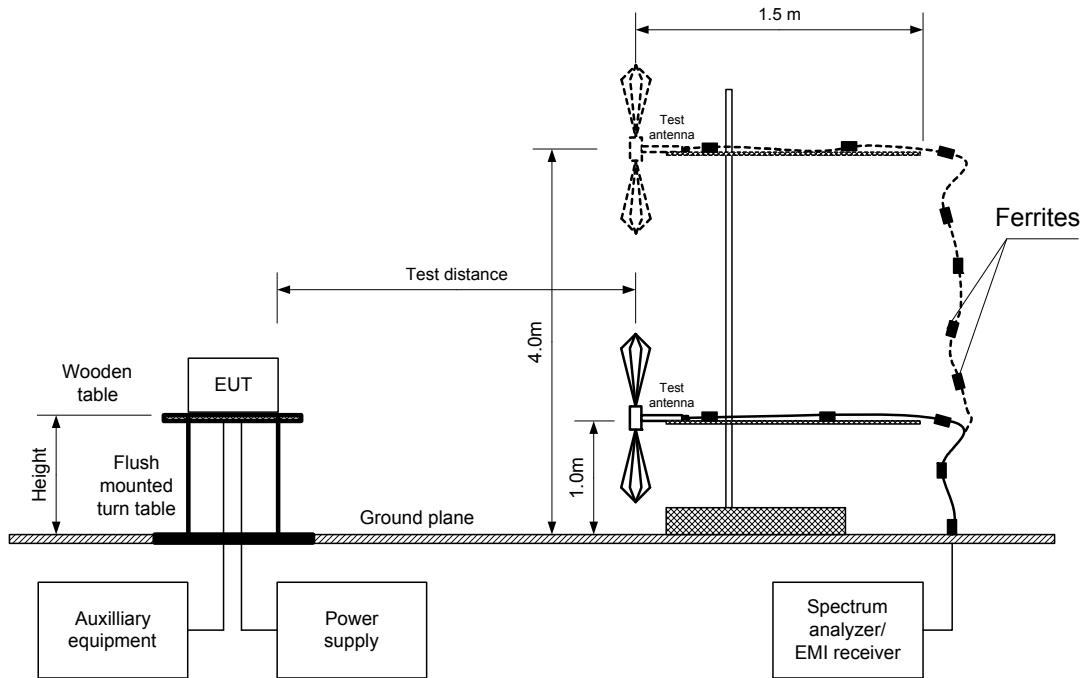
$$\text{Peak output power in dBm} = \text{Field strength in dB}(\mu\text{V/m}) - \text{Transmitter antenna gain in dBi} - 95.2 \text{ dB}$$

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



| | | | |
|----------------------------|--|--------------------------------|------------------------------|
| Test specification: | Section 15.247(b), RSS-210 section A8.4(1), Peak output power | | |
| Test procedure: | Public notice DA 00-705 | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date(s): | 6/24/2012 - 6/24/2012 | | |
| Temperature: 22 °C | Air Pressure: 1007 hPa | Relative Humidity: 45 % | Power Supply: Battery |
| Remarks: | | | |

Figure 7.5.1 Setup for carrier field strength measurements





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| | | | |
|----------------------------|--|--|--|
| Test specification: | | Section 15.247(b), RSS-210 section A8.4(1), Peak output power | |
| Test procedure: | | Public notice DA 00-705 | |
| Test mode: | | Compliance | |
| Date(s): | | 6/24/2012 - 6/24/2012 | |
| Temperature: 22 °C | | Air Pressure: 1007 hPa | |
| | | Relative Humidity: 45 % | |
| | | Power Supply: Battery | |
| Remarks: | | | |

Table 7.5.2 Peak output power test results

ASSIGNED FREQUENCY: 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)
 MODULATION: FSK (for 9.6; 19.2.2; 38.4 kbps)
 GFSK (for 115.2 kbps)
 TRANSMITTER OUTPUT POWER SETTINGS: Maximum
 DETECTOR USED: Peak
 RESOLUTION BANDWIDTH: 1 MHz
 VIDEO BANDWIDTH: 3 MHz
 FREQUENCY HOPPING: Disabled

FHSS CONFIGURATION: 86 channels

| 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 |
|----------------------------|--------------------------|----------------------|-------------------|-------------------|-----------------------|--------------------------|------------|---------------|---------|
| Bit rate 9600 bps | | | | | | | | | |
| 902.3 | 122.21 | Vert | 1.0 | 305 | 3 | 24.01 | 30.0 | -5.99 | Pass |
| 915.2 | 121.74 | Vert | 1.0 | 302 | 3 | 23.54 | 30.0 | -6.46 | Pass |
| 927.8 | 120.83 | Vert | 1.0 | 304 | 3 | 22.63 | 30.0 | -7.37 | Pass |
| Bit rate 19200 bps | | | | | | | | | |
| 902.3 | 122.25 | Vert | 1.0 | 305 | 3 | 24.05 | 30.0 | -5.95 | Pass |
| 915.2 | 121.74 | Vert | 1.0 | 302 | 3 | 23.54 | 30.0 | -6.46 | Pass |
| 927.8 | 120.90 | Vert | 1.0 | 304 | 3 | 22.70 | 30.0 | -7.30 | Pass |
| Bit rate 38400 bps | | | | | | | | | |
| 902.3 | 122.25 | Vert | 1.0 | 305 | 3 | 24.05 | 30.0 | -5.95 | Pass |
| 914.9 | 121.86 | Vert | 1.0 | 302 | 3 | 23.66 | 30.0 | -6.34 | Pass |
| 927.8 | 120.93 | Vert | 1.0 | 304 | 3 | 22.73 | 30.0 | -7.27 | Pass |
| Bit rate 115200 bps | | | | | | | | | |
| 902.3 | 122.28 | Vert | 1.0 | 305 | 3 | 24.08 | 30.0 | -5.92 | Pass |
| 915.2 | 121.77 | Vert | 1.0 | 302 | 3 | 23.57 | 30.0 | -6.43 | Pass |
| 927.8 | 120.91 | Vert | 1.0 | 304 | 3 | 22.71 | 30.0 | -7.29 | Pass |



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| | | | | | |
|----------------------------|--|--|--|--------------------------------|--|
| Test specification: | | Section 15.247(b), RSS-210 section A8.4(1), Peak output power | | | |
| Test procedure: | | Public notice DA 00-705 | | | |
| Test mode: | | Compliance | | Verdict: PASS | |
| Date(s): | | 6/24/2012 - 6/24/2012 | | | |
| Temperature: 22 °C | | Air Pressure: 1007 hPa | | Relative Humidity: 45 % | |
| Remarks: | | Power Supply: Battery | | | |

Table 7.5.2 Peak output power test results (continued)

FHSS CONFIGURATION: 240 channels

| 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 |
|---------------------------|--------------------------|----------------------|-------------------|-------------------|-----------------------|--------------------------|------------|---------------|---------|
| Bit rate 9600 bps | | | | | | | | | |
| 904.0 | 122.09 | Vert | 1.0 | 308 | 3 | 23.89 | 30.0 | -6.11 | Pass |
| 915.0 | 121.69 | Vert | 1.0 | 304 | 3 | 23.49 | 30.0 | -6.51 | Pass |
| 927.9 | 120.87 | Vert | 1.0 | 301 | 3 | 22.67 | 30.0 | -7.33 | Pass |
| Bit rate 19200 bps | | | | | | | | | |
| 904.0 | 122.20 | Vert | 1.0 | 308 | 3 | 24.00 | 30.0 | -6.00 | Pass |
| 915.0 | 121.60 | Vert | 1.0 | 304 | 3 | 23.40 | 30.0 | -6.60 | Pass |
| 927.9 | 120.93 | Vert | 1.0 | 301 | 3 | 22.73 | 30.0 | -7.27 | Pass |
| Bit rate 38400 bps | | | | | | | | | |
| 904.0 | 122.16 | Vert | 1.0 | 308 | 3 | 23.96 | 30.0 | -6.04 | Pass |
| 915.0 | 121.70 | Vert | 1.0 | 304 | 3 | 23.50 | 30.0 | -6.50 | Pass |
| 927.9 | 120.86 | Vert | 1.0 | 301 | 3 | 22.66 | 30.0 | -7.34 | 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 4280 | | | | |
|---------|---------|---------|---------|--|--|--|--|

Full description is given in Appendix A.

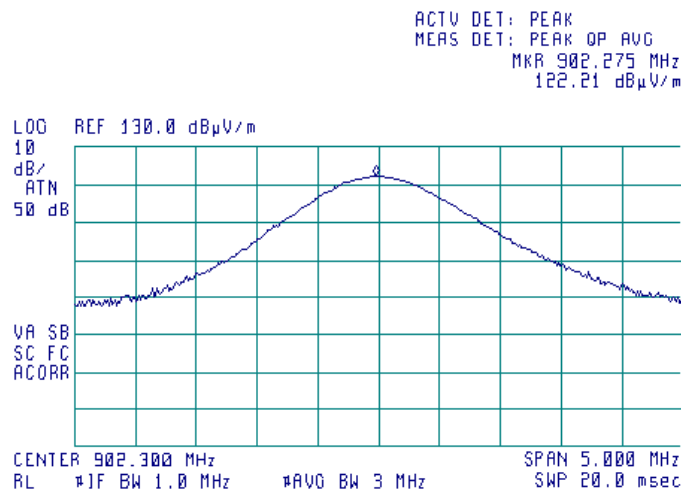


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| | | | |
|--|-------------------------------|--------------------------------|------------------------------|
| Test specification: Section 15.247(b), RSS-210 section A8.4(1), Peak output power | | | |
| Test procedure: Public notice DA 00-705 | | | |
| Test mode: Compliance | Verdict: PASS | | |
| Date(s): 6/24/2012 - 6/24/2012 | | | |
| Temperature: 22 °C | Air Pressure: 1007 hPa | Relative Humidity: 45 % | Power Supply: Battery |
| Remarks: | | | |

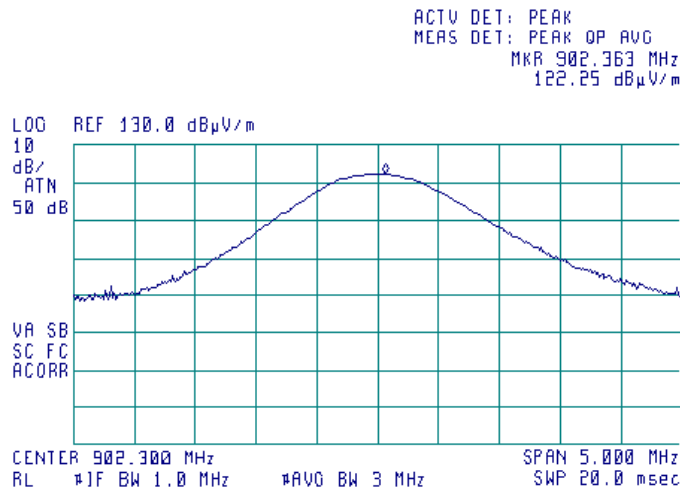
Plot 7.5.1 Field strength of carrier at low frequency

CONFIGURATION: FHSS 86 Channels
BIT RATE: 9600 bps
ANTENNA POLARIZATION: Vertical and Horizontal



Plot 7.5.2 Field strength of carrier at low frequency

CONFIGURATION: FHSS 86 Channels
BIT RATE: 19200 bps
ANTENNA POLARIZATION: Vertical and Horizontal



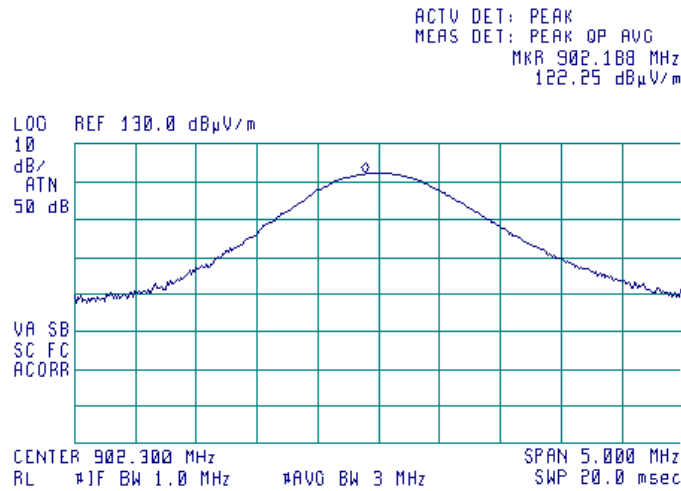


HERMON LABORATORIES

| | | | |
|----------------------------|--|--|--|
| Test specification: | | Section 15.247(b), RSS-210 section A8.4(1), Peak output power | |
| Test procedure: | | Public notice DA 00-705 | |
| Test mode: | | Compliance | |
| Date(s): | | 6/24/2012 - 6/24/2012 | |
| Temperature: 22 °C | | Air Pressure: 1007 hPa | |
| Remarks: | | Relative Humidity: 45 % | |
| | | Power Supply: Battery | |
| | | Verdict: PASS | |

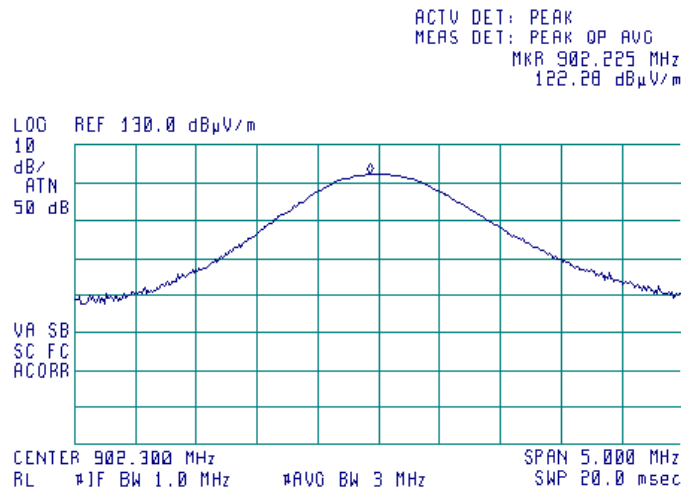
Plot 7.5.3 Field strength of carrier at low frequency

CONFIGURATION: FHSS 86 Channels
BIT RATE: 38400 bps
ANTENNA POLARIZATION: Vertical and Horizontal



Plot 7.5.4 Field strength of carrier at low frequency

CONFIGURATION: FHSS 86 Channels
BIT RATE: 115200 bps
ANTENNA POLARIZATION: Vertical and Horizontal



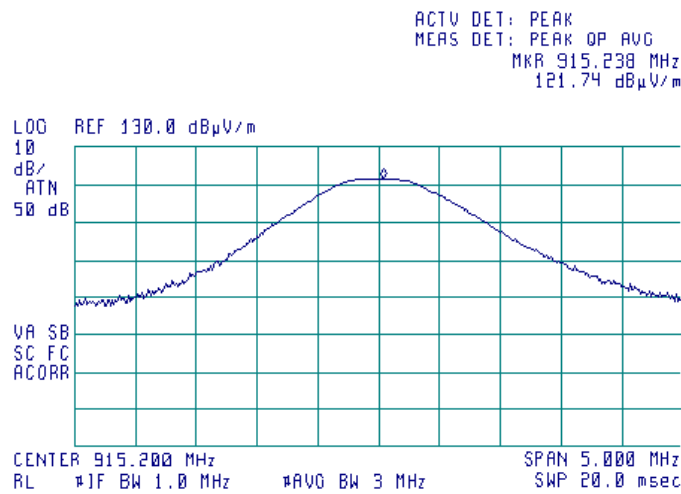


HERMON LABORATORIES

| | | | |
|--|-------------------------------|--------------------------------|------------------------------|
| Test specification: Section 15.247(b), RSS-210 section A8.4(1), Peak output power | | | |
| Test procedure: Public notice DA 00-705 | | | |
| Test mode: Compliance | Verdict: PASS | | |
| Date(s): 6/24/2012 - 6/24/2012 | | | |
| Temperature: 22 °C | Air Pressure: 1007 hPa | Relative Humidity: 45 % | Power Supply: Battery |
| Remarks: | | | |

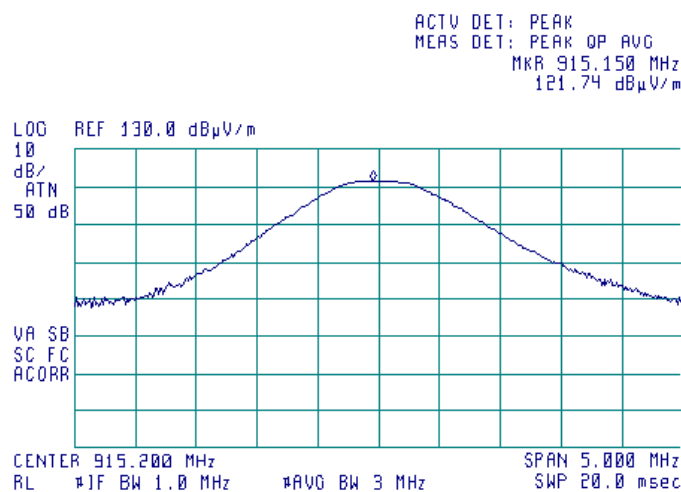
Plot 7.5.5 Field strength of carrier at mid frequency

CONFIGURATION: FHSS 86 Channels
BIT RATE: 9600 bps
ANTENNA POLARIZATION: Vertical and Horizontal



Plot 7.5.6 Field strength of carrier at mid frequency

CONFIGURATION: FHSS 86 Channels
BIT RATE: 19200 bps
ANTENNA POLARIZATION: Vertical and Horizontal



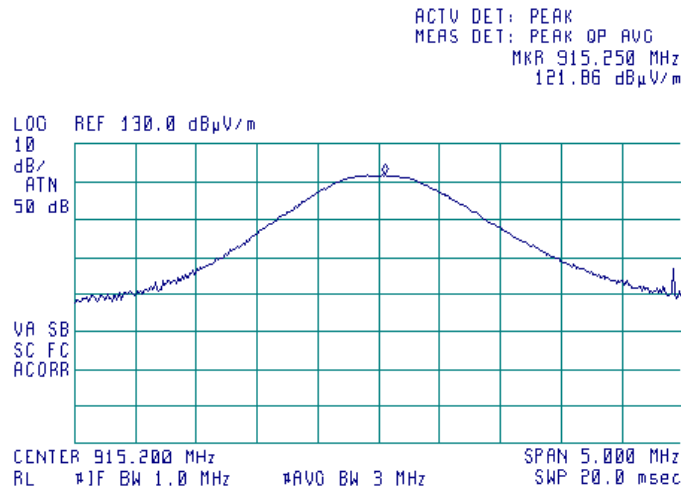


HERMON LABORATORIES

| | | | |
|--------------------------------|--|--|--|
| Test specification: | | Section 15.247(b), RSS-210 section A8.4(1), Peak output power | |
| Test procedure: | | Public notice DA 00-705 | |
| Test mode: | | Compliance | |
| Date(s): | | 6/24/2012 - 6/24/2012 | |
| Temperature: 22 °C | | Air Pressure: 1007 hPa | |
| Relative Humidity: 45 % | | Power Supply: Battery | |
| Remarks: | | | |

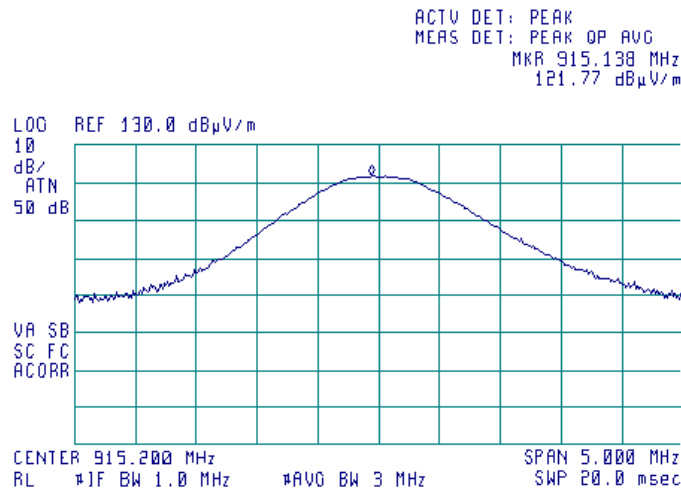
Plot 7.5.7 Field strength of carrier at mid frequency

CONFIGURATION: FHSS 86 Channels
BIT RATE: 38400 bps
ANTENNA POLARIZATION: Vertical and Horizontal



Plot 7.5.8 Field strength of carrier at mid frequency

CONFIGURATION: FHSS 86 Channels
BIT RATE: 115200 bps
ANTENNA POLARIZATION: Vertical and Horizontal



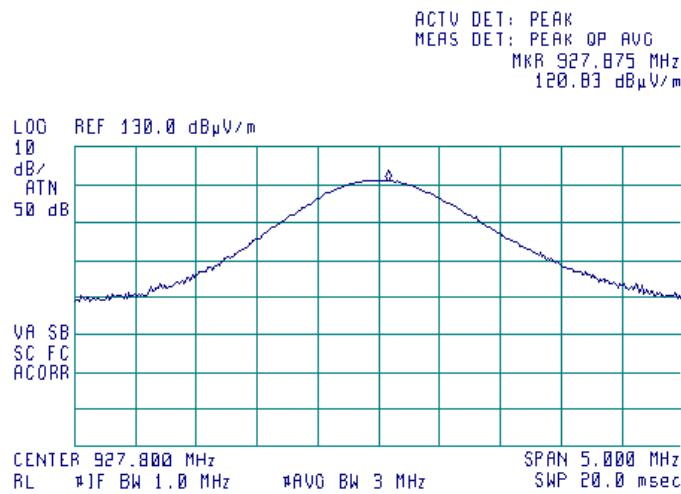


HERMON LABORATORIES

| | | | |
|----------------------------|--|--|--|
| Test specification: | | Section 15.247(b), RSS-210 section A8.4(1), Peak output power | |
| Test procedure: | | Public notice DA 00-705 | |
| Test mode: | | Compliance | |
| Date(s): | | 6/24/2012 - 6/24/2012 | |
| Temperature: 22 °C | | Air Pressure: 1007 hPa | |
| Remarks: | | Verdict: PASS | |
| | | Relative Humidity: 45 % | |
| | | Power Supply: Battery | |

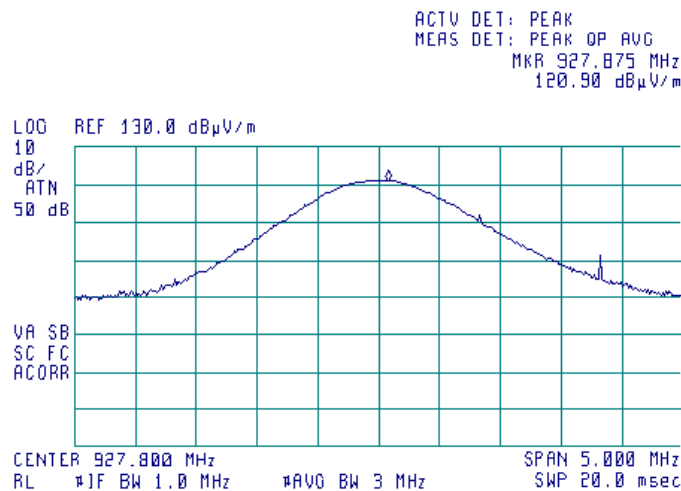
Plot 7.5.9 Field strength of carrier at high frequency

CONFIGURATION: FHSS 86 Channels
BIT RATE: 9600 bps
ANTENNA POLARIZATION: Vertical and Horizontal



Plot 7.5.10 Field strength of carrier at high frequency

CONFIGURATION: FHSS 86 Channels
BIT RATE: 19200 bps
ANTENNA POLARIZATION: Vertical and Horizontal



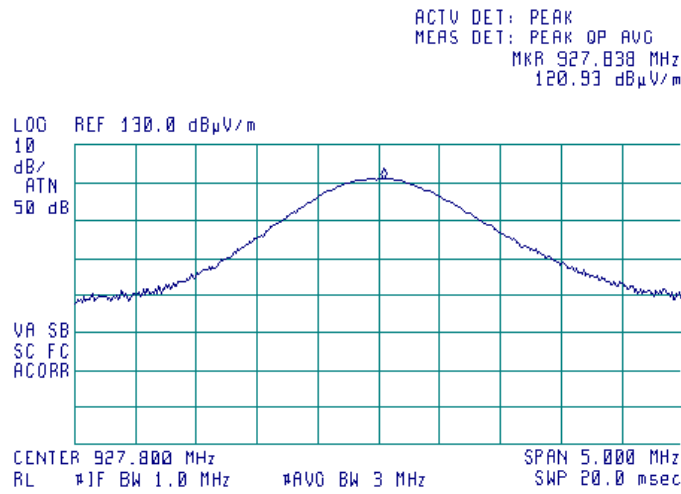


HERMON LABORATORIES

| | | | |
|--------------------------------|--|--|--|
| Test specification: | | Section 15.247(b), RSS-210 section A8.4(1), Peak output power | |
| Test procedure: | | Public notice DA 00-705 | |
| Test mode: | | Compliance | |
| Date(s): | | 6/24/2012 - 6/24/2012 | |
| Temperature: 22 °C | | Air Pressure: 1007 hPa | |
| Relative Humidity: 45 % | | Power Supply: Battery | |
| Remarks: | | | |

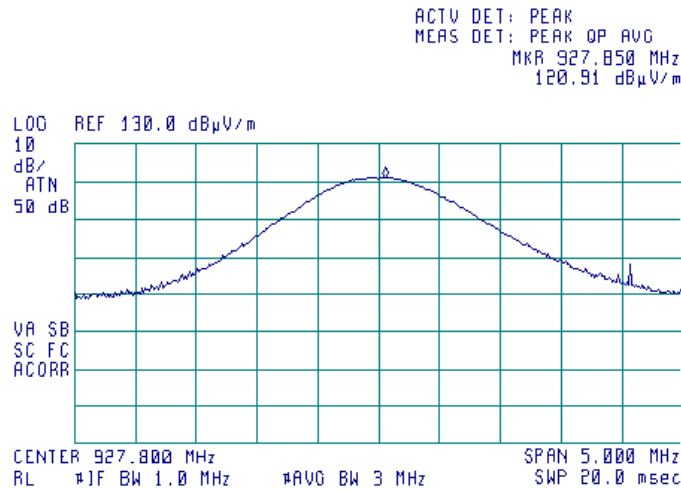
Plot 7.5.11 Field strength of carrier at high frequency

CONFIGURATION: FHSS 86 Channels
BIT RATE: 38400 bps
ANTENNA POLARIZATION: Vertical and Horizontal



Plot 7.5.12 Field strength of carrier at high frequency

CONFIGURATION: FHSS 86 Channels
BIT RATE: 115200 bps
ANTENNA POLARIZATION: Vertical and Horizontal



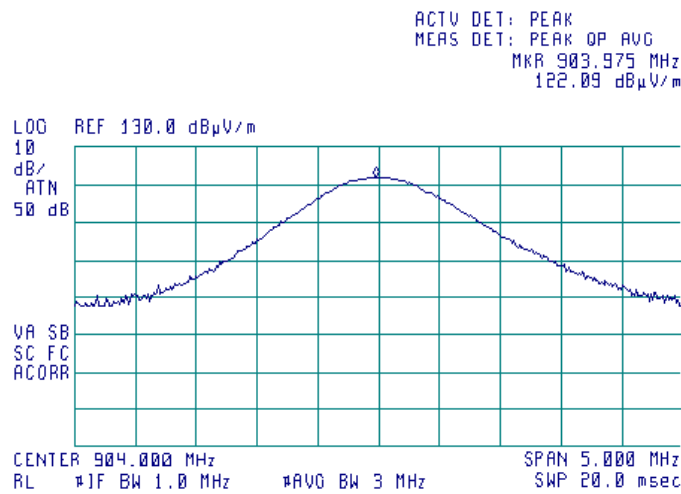


HERMON LABORATORIES

| | | | |
|----------------------------|--|--|--|
| Test specification: | | Section 15.247(b), RSS-210 section A8.4(1), Peak output power | |
| Test procedure: | | Public notice DA 00-705 | |
| Test mode: | | Compliance | |
| Date(s): | | 6/24/2012 - 6/24/2012 | |
| Temperature: 22 °C | | Air Pressure: 1007 hPa | |
| Remarks: | | Verdict: PASS | |
| | | Relative Humidity: 45 % | |
| | | Power Supply: Battery | |

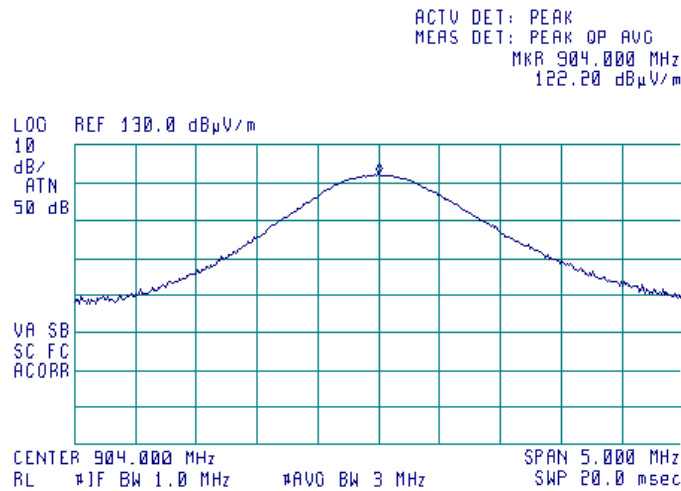
Plot 7.5.13 Field strength of carrier at low frequency

CONFIGURATION: FHSS 240 Channels
BIT RATE: 9600 bps
ANTENNA POLARIZATION: Vertical & Horizontal



Plot 7.5.14 Field strength of carrier at low frequency

CONFIGURATION: FHSS 240 Channels
BIT RATE: 19200 bps
ANTENNA POLARIZATION: Vertical and Horizontal



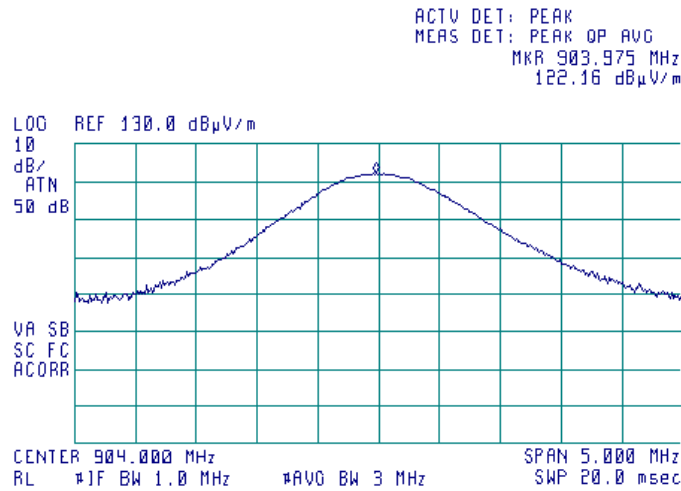


HERMON LABORATORIES

| | | | |
|--------------------------------|--|--|--|
| Test specification: | | Section 15.247(b), RSS-210 section A8.4(1), Peak output power | |
| Test procedure: | | Public notice DA 00-705 | |
| Test mode: | | Compliance | |
| Date(s): | | 6/24/2012 - 6/24/2012 | |
| Temperature: 22 °C | | Air Pressure: 1007 hPa | |
| Relative Humidity: 45 % | | Power Supply: Battery | |
| Remarks: | | | |

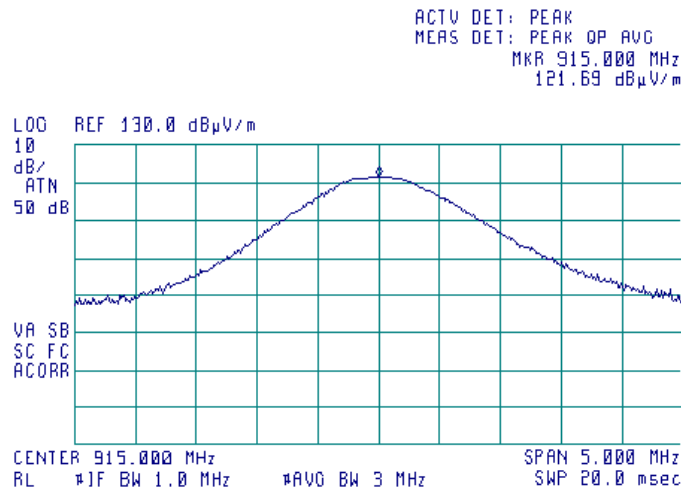
Plot 7.5.15 Field strength of carrier at low frequency

CONFIGURATION: FHSS 240 Channels
BIT RATE: 38400 bps
ANTENNA POLARIZATION: Vertical and Horizontal



Plot 7.5.16 Field strength of carrier at mid frequency

CONFIGURATION: FHSS 240 Channels
BIT RATE: 9600 bps
ANTENNA POLARIZATION: Vertical and Horizontal



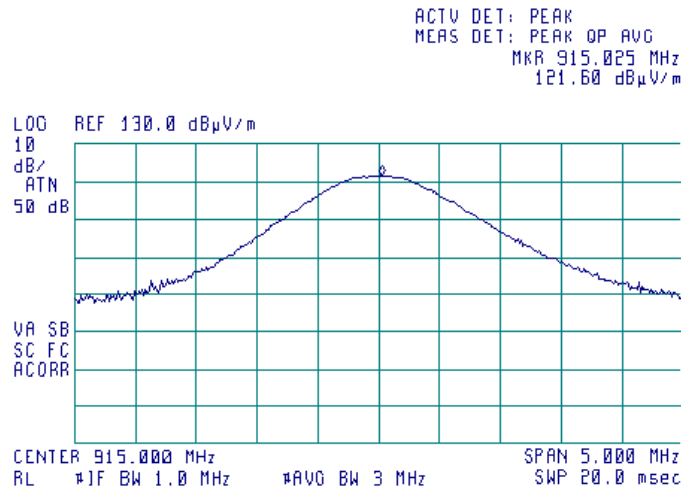


HERMON LABORATORIES

| | | | |
|----------------------------|--|--|--|
| Test specification: | | Section 15.247(b), RSS-210 section A8.4(1), Peak output power | |
| Test procedure: | | Public notice DA 00-705 | |
| Test mode: | | Compliance | |
| Date(s): | | 6/24/2012 - 6/24/2012 | |
| Temperature: 22 °C | | Air Pressure: 1007 hPa | |
| Remarks: | | Verdict: PASS | |
| | | Relative Humidity: 45 % | |
| | | Power Supply: Battery | |

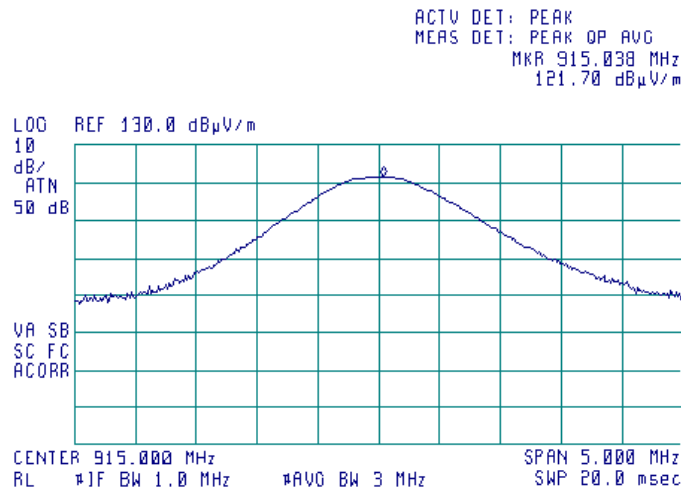
Plot 7.5.17 Field strength of carrier at mid frequency

CONFIGURATION: FHSS 240 Channels
BIT RATE: 19200 bps
ANTENNA POLARIZATION: Vertical and Horizontal



Plot 7.5.18 Field strength of carrier at mid frequency

CONFIGURATION: FHSS 240 Channels
BIT RATE: 38400 bps
ANTENNA POLARIZATION: Vertical and Horizontal



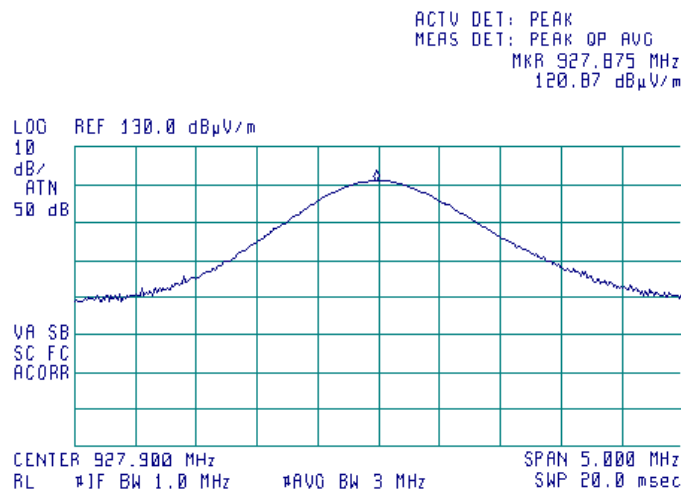


HERMON LABORATORIES

| | | | |
|----------------------------|--|--|--|
| Test specification: | | Section 15.247(b), RSS-210 section A8.4(1), Peak output power | |
| Test procedure: | | Public notice DA 00-705 | |
| Test mode: | | Compliance | |
| Date(s): | | 6/24/2012 - 6/24/2012 | |
| Temperature: 22 °C | | Air Pressure: 1007 hPa | |
| Remarks: | | Relative Humidity: 45 % | |
| | | Power Supply: Battery | |
| | | Verdict: PASS | |

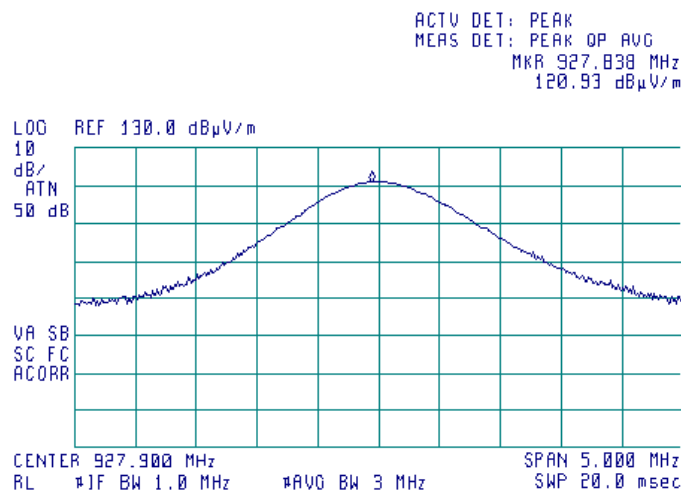
Plot 7.5.19 Field strength of carrier at high frequency

CONFIGURATION: FHSS 240 Channels
BIT RATE: 9600 bps
ANTENNA POLARIZATION: Vertical and Horizontal



Plot 7.5.20 Field strength of carrier at high frequency

CONFIGURATION: FHSS 240 Channels
BIT RATE: 19200 bps
ANTENNA POLARIZATION: Vertical and Horizontal





HERMON LABORATORIES

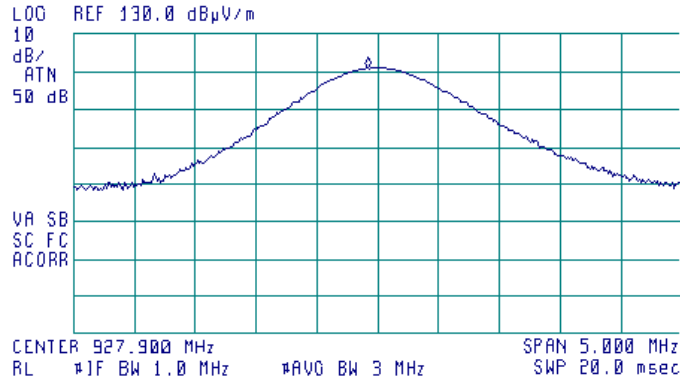
| | | | |
|--------------------------------|--|--|--|
| Test specification: | | Section 15.247(b), RSS-210 section A8.4(1), Peak output power | |
| Test procedure: | | Public notice DA 00-705 | |
| Test mode: | | Compliance | |
| Date(s): | | 6/24/2012 - 6/24/2012 | |
| Temperature: 22 °C | | Air Pressure: 1007 hPa | |
| Relative Humidity: 45 % | | Power Supply: Battery | |
| Remarks: | | | |

Plot 7.5.21 Field strength of carrier at high frequency

CONFIGURATION: FHSS 240 Channels
BIT RATE: 38400 bps
ANTENNA POLARIZATION: Vertical and Horizontal



ACTV DET: PEAK
MEAS DET: PEAK OP AVG
MKR 927.013 MHz
120.86 dBµV/m





| | |
|---|-------------------------------|
| Test specification: Section 15.247(d), RSS-210 section A8.5, Emissions at band edges | |
| Test procedure: Public notice DA 00-705 | |
| Test mode: Compliance | Verdict: PASS |
| Date(s): 7/5/2012 | |
| Temperature: 24 °C | Air Pressure: 1005 hPa |
| Relative Humidity: 50 % | |
| Power Supply: 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. 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.
- 7.6.2.3 The spectrum analyzer was set in max hold mode and allowed trace to stabilize. The highest emission level within the authorized band was measured.
- 7.6.2.4 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.
- 7.6.2.5 The above procedure was repeated with the EUT adjusted to produce maximum RF output power at the highest carrier frequency.
- 7.6.2.6 The above procedure was repeated with the frequency hopping function enabled.

Figure 7.6.1 Band edge emission test setup





HERMON LABORATORIES

| | |
|---|-------------------------------|
| Test specification: Section 15.247(d), RSS-210 section A8.5, Emissions at band edges | |
| Test procedure: Public notice DA 00-705 | |
| Test mode: Compliance | Verdict: PASS |
| Date(s): 7/5/2012 | |
| Temperature: 24 °C | Air Pressure: 1005 hPa |
| Relative Humidity: 50 % | |
| Power Supply: Battery | |
| Remarks: | |

Table 7.6.2 Band edge emission test results

ASSIGNED FREQUENCY RANGE: 902 – 928 MHz
 DETECTOR USED: Peak
 MODULATION: FSK
 MODULATING SIGNAL: PRBS
 TRANSMITTER OUTPUT POWER SETTINGS: Maximum
 RESOLUTION BANDWIDTH: ≥ 1% of the span
 VIDEO BANDWIDTH: ≥ RBW

OPERATIONAL MODE: FHSS 86 channels

| Frequency, MHz | Bit rate, kbps | Band edge emission, dBm | Emission at carrier, dBm | Attenuation below carrier, dBc | Limit, dBc | Margin, dB* | Verdict |
|-----------------------------------|----------------|-------------------------|--------------------------|--------------------------------|------------|-------------|---------|
| Frequency hopping disabled | | | | | | | |
| 902.000 | 9600 | 62.33 | 92.12 | 29.79 | 20.0 | 9.79 | Pass |
| 928.000 | 9600 | 49.66 | 90.95 | 41.29 | | 21.29 | |
| 902.000 | 19200 | 60.94 | 92.05 | 31.11 | | 11.11 | |
| 928.000 | 19200 | 53.14 | 90.99 | 37.85 | | 17.85 | |
| 902.000 | 38400 | 60.90 | 91.87 | 30.97 | | 10.97 | |
| 928.000 | 38400 | 55.72 | 90.94 | 35.22 | | 15.22 | |
| 902.000 | 115200 | 64.71 | 91.81 | 27.10 | | 7.10 | |
| 928.000 | 115200 | 55.67 | 91.14 | 35.47 | | 15.47 | |
| Frequency hopping enabled | | | | | | | |
| 902.000 | 9600 | 59.43 | 89.29 | 29.86 | 20.0 | 9.86 | Pass |
| 928.000 | 9600 | 47.77 | 89.59 | 41.82 | | 21.82 | |
| 902.000 | 19200 | 57.15 | 89.30 | 32.15 | | 12.15 | |
| 928.000 | 19200 | 50.09 | 89.18 | 39.09 | | 19.09 | |
| 902.000 | 38400 | 58.76 | 89.50 | 30.74 | | 10.74 | |
| 928.000 | 38400 | 49.63 | 88.99 | 39.36 | | 19.36 | |
| 902.000 | 115200 | 58.47 | 89.42 | 30.95 | | 10.95 | |
| 928.000 | 115200 | 53.31 | 91.10 | 37.79 | | 17.79 | |

OPERATIONAL MODE: FHSS 240 channels

| Frequency, MHz | Bit rate, bps | Band edge emission, dBm | Emission at carrier, dBm | Attenuation below carrier, dBc | Limit, dBc | Margin, dB* | Verdict |
|-----------------------------------|---------------|-------------------------|--------------------------|--------------------------------|------------|-------------|---------|
| Frequency hopping disabled | | | | | | | |
| 902.000 | 9600 | 31.83 | 90.63 | 58.80 | 20.0 | 38.80 | Pass |
| 928.000 | 9600 | 54.03 | 90.80 | 36.77 | | 16.77 | |
| 902.000 | 19200 | 33.26 | 90.80 | 57.54 | | 37.54 | |
| 928.000 | 19200 | 59.90 | 90.79 | 30.89 | | 10.89 | |
| 902.000 | 38400 | 35.29 | 90.67 | 55.38 | | 35.38 | |
| 928.000 | 38400 | 61.60 | 90.70 | 29.10 | | 9.10 | |
| Frequency hopping enabled | | | | | | | |
| 902.000 | 9600 | 32.69 | 89.37 | 56.68 | 20.0 | 36.68 | Pass |
| 928.000 | 9600 | 53.82 | 88.05 | 34.23 | | 14.23 | |
| 902.000 | 19200 | 33.12 | 89.06 | 55.94 | | 35.94 | |
| 928.000 | 19200 | 54.56 | 88.10 | 33.54 | | 13.54 | |
| 902.000 | 38400 | 34.06 | 88.91 | 54.85 | | 34.85 | |
| 928.000 | 38400 | 53.35 | 87.94 | 34.59 | | 14.59 | |

*- Margin = Attenuation below carrier – specification limit.

Reference numbers of test equipment used

| | | | | | | |
|---------|---------|---------|---------|--|--|--|
| HL 1984 | HL 2883 | HL 2780 | HL 3901 | | | |
|---------|---------|---------|---------|--|--|--|

Full description is given in Appendix A.

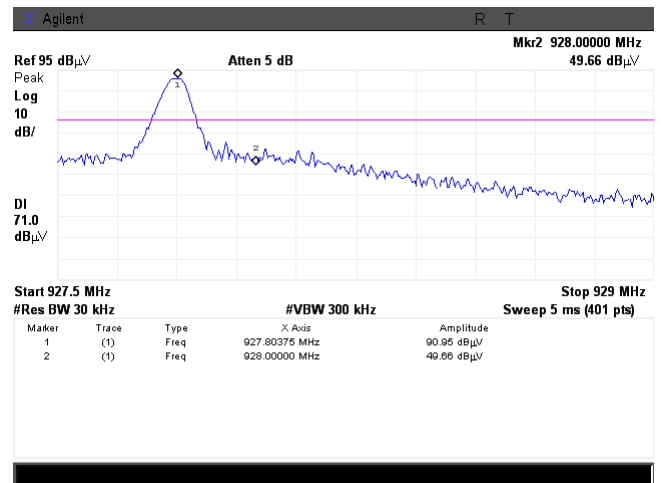
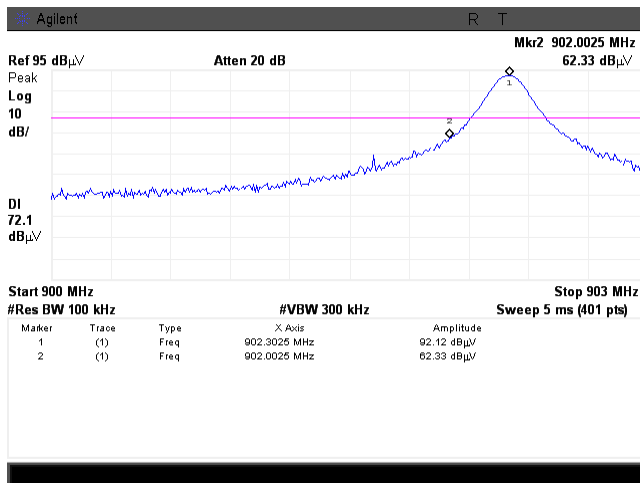


HERMON LABORATORIES

| | |
|---|--------------------------------|
| Test specification: Section 15.247(d), RSS-210 section A8.5, Emissions at band edges | |
| Test procedure: Public notice DA 00-705 | |
| Test mode: Compliance | Verdict: PASS |
| Date(s): 7/5/2012 | |
| Temperature: 24 °C | Air Pressure: 1005 hPa |
| | Relative Humidity: 50 % |
| | Power Supply: Battery |
| Remarks: | |

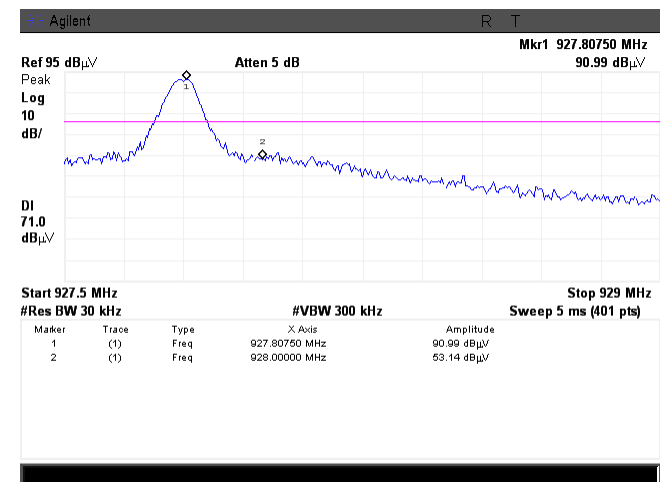
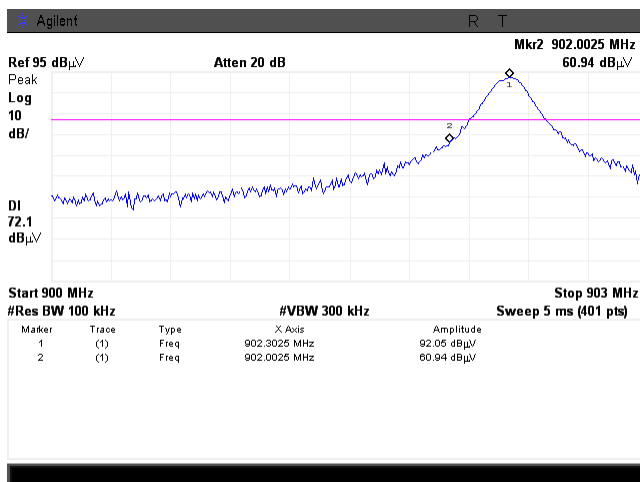
Plot 7.6.1 The band edge emission at wide channel configuration with hopping function disabled

BIT RATE: 9600 bps



Plot 7.6.2 The band edge emission at wide channel configuration with hopping function disabled

BIT RATE: 19200 bps



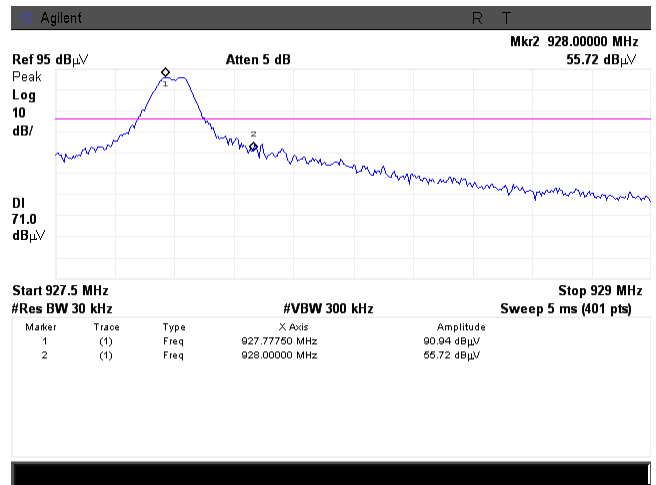
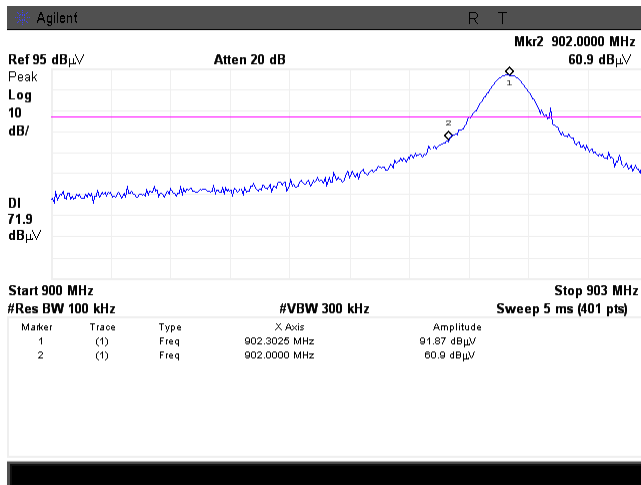


HERMON LABORATORIES

| | | | |
|---|-------------------------------|--------------------------------|------------------------------|
| Test specification: Section 15.247(d), RSS-210 section A8.5, Emissions at band edges | | | |
| Test procedure: Public notice DA 00-705 | | | |
| Test mode: Compliance | Verdict: PASS | | |
| Date(s): 7/5/2012 | | | |
| Temperature: 24 °C | Air Pressure: 1005 hPa | Relative Humidity: 50 % | Power Supply: Battery |
| Remarks: | | | |

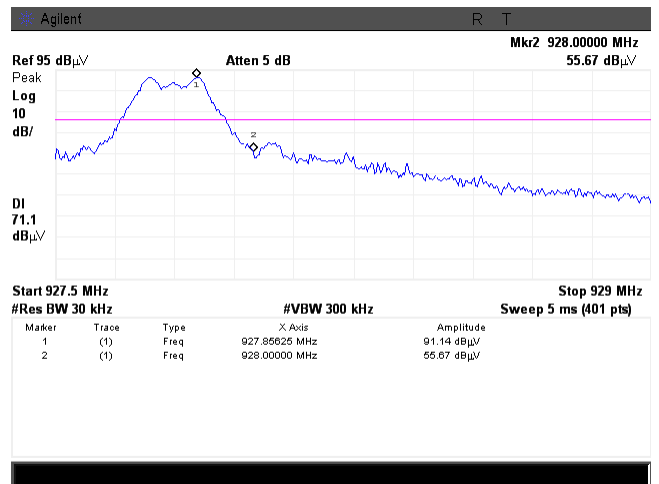
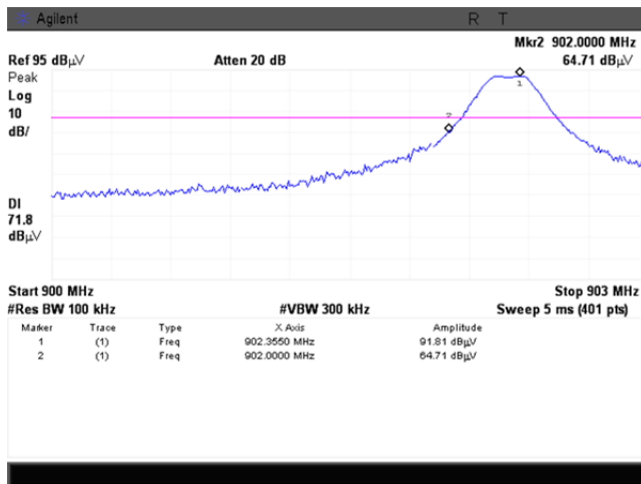
Plot 7.6.3 The band edge emission at wide channel configuration with hopping function disabled

BIT RATE: 38400 bps



Plot 7.6.4 The band edge emission at wide channel configuration with hopping function disabled

BIT RATE: 115200 bps



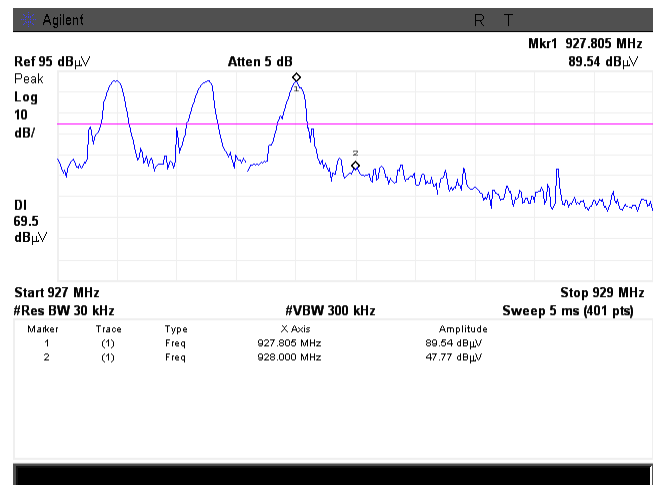
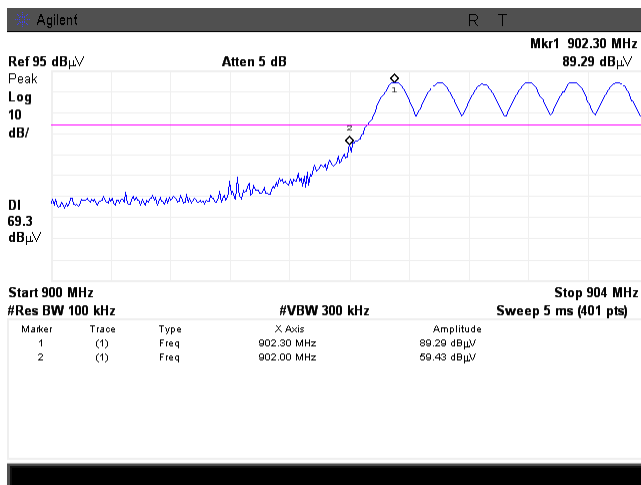


HERMON LABORATORIES

| | | | |
|---|-------------------------------|--------------------------------|------------------------------|
| Test specification: Section 15.247(d), RSS-210 section A8.5, Emissions at band edges | | | |
| Test procedure: Public notice DA 00-705 | | | |
| Test mode: Compliance | Verdict: PASS | | |
| Date(s): 7/5/2012 | | | |
| Temperature: 24 °C | Air Pressure: 1005 hPa | Relative Humidity: 50 % | Power Supply: Battery |
| Remarks: | | | |

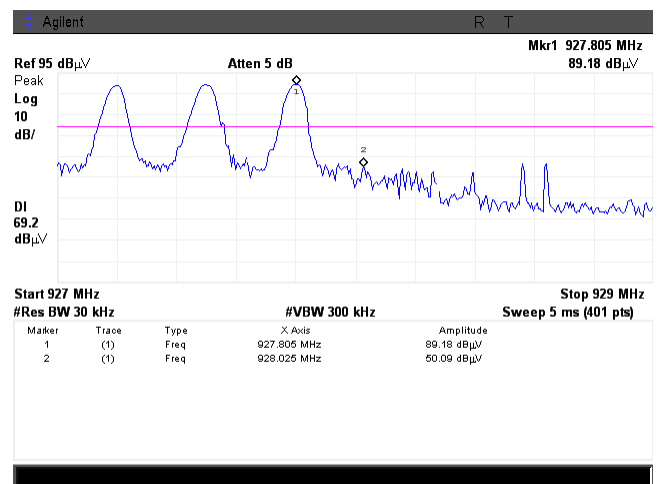
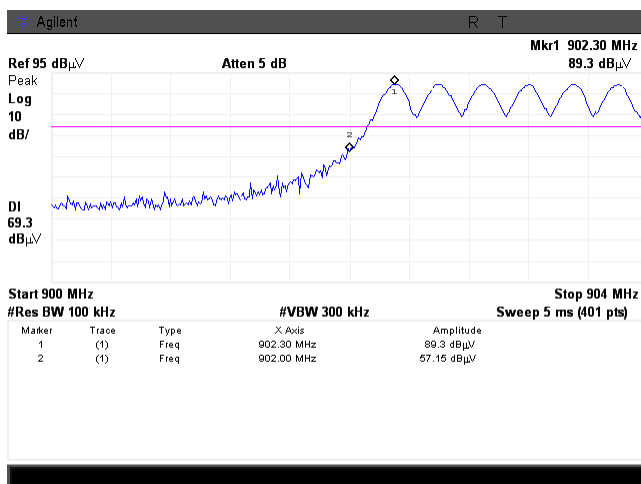
Plot 7.6.5 The band edge emission at wide channel configuration with hopping function enabled

BIT RATE: 9600 bps



Plot 7.6.6 The band edge emission at wide channel configuration with hopping function enabled

BIT RATE: 19200 bps



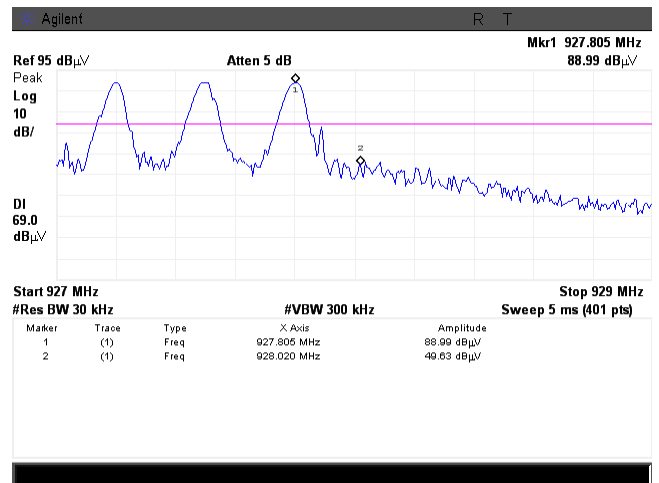
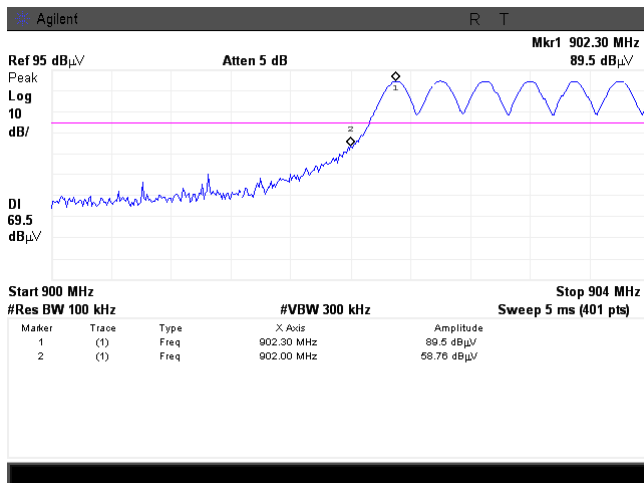


HERMON LABORATORIES

| | | | |
|---|-------------------------------|--------------------------------|------------------------------|
| Test specification: Section 15.247(d), RSS-210 section A8.5, Emissions at band edges | | | |
| Test procedure: Public notice DA 00-705 | | | |
| Test mode: Compliance | Verdict: PASS | | |
| Date(s): 7/5/2012 | | | |
| Temperature: 24 °C | Air Pressure: 1005 hPa | Relative Humidity: 50 % | Power Supply: Battery |
| Remarks: | | | |

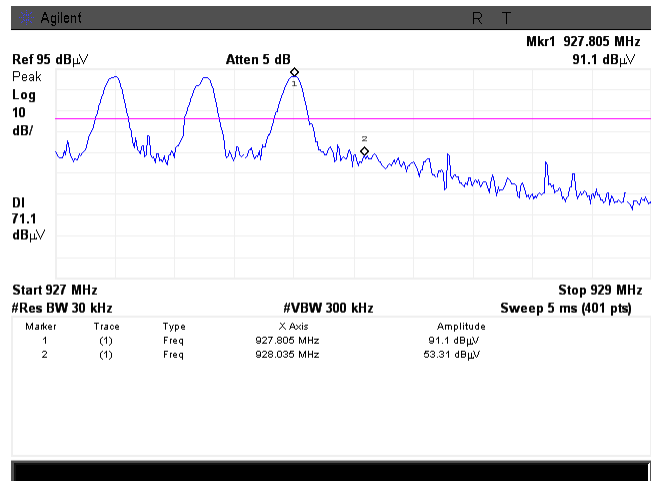
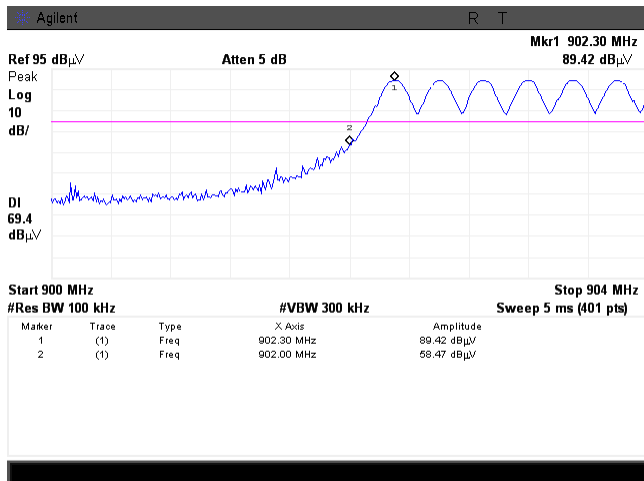
Plot 7.6.7 The band edge emission at wide channel configuration with hopping function enabled

BIT RATE: 38400 bps



Plot 7.6.8 The band edge emission at wide channel configuration with hopping function enabled

BIT RATE: 115200 bps



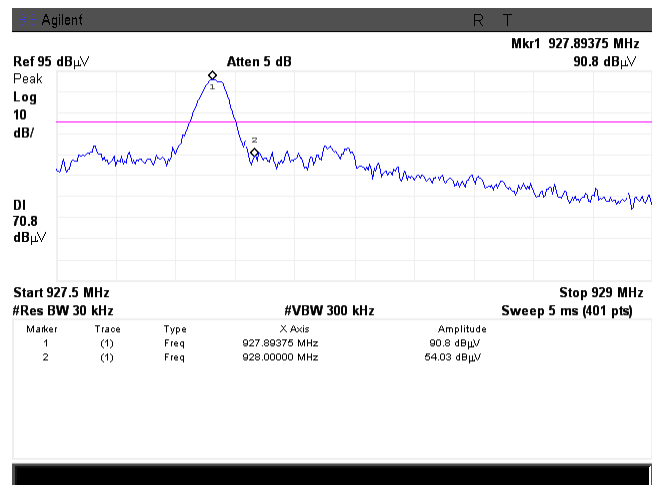
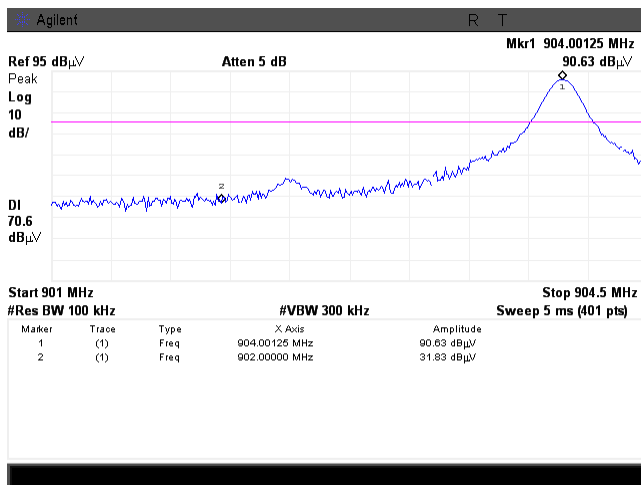


HERMON LABORATORIES

| | |
|---|--------------------------------|
| Test specification: Section 15.247(d), RSS-210 section A8.5, Emissions at band edges | |
| Test procedure: Public notice DA 00-705 | |
| Test mode: Compliance | Verdict: PASS |
| Date(s): 7/5/2012 | |
| Temperature: 24 °C | Air Pressure: 1005 hPa |
| | Relative Humidity: 50 % |
| | Power Supply: Battery |
| Remarks: | |

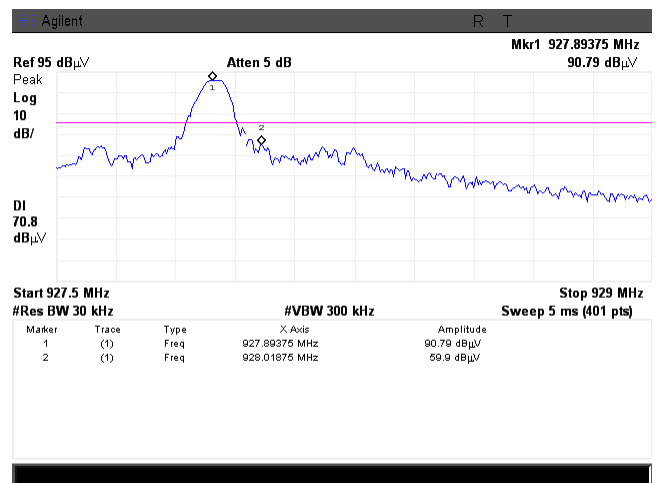
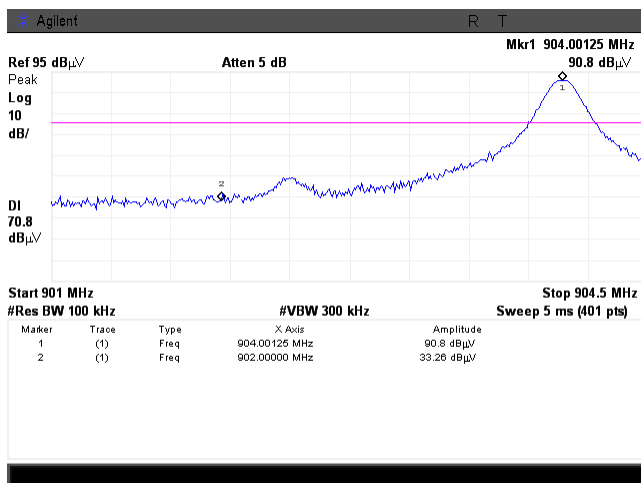
Plot 7.6.9 The band edge emission at narrow channel configuration with hopping function disabled

BIT RATE: 9600 bps



Plot 7.6.10 The band edge emission at narrow channel configuration with hopping function disabled

BIT RATE: 19200 bps



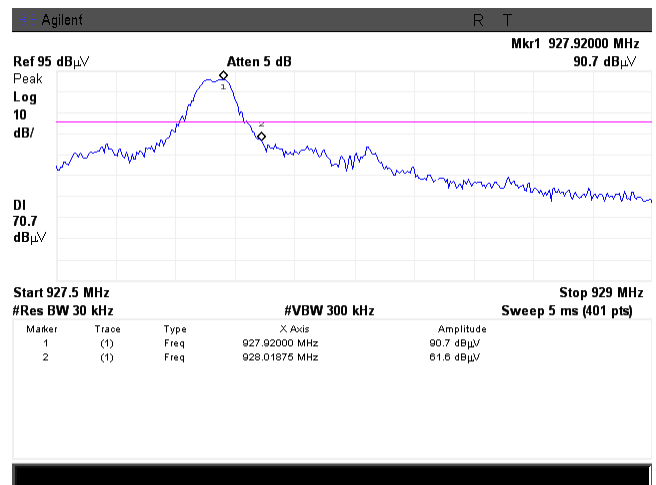
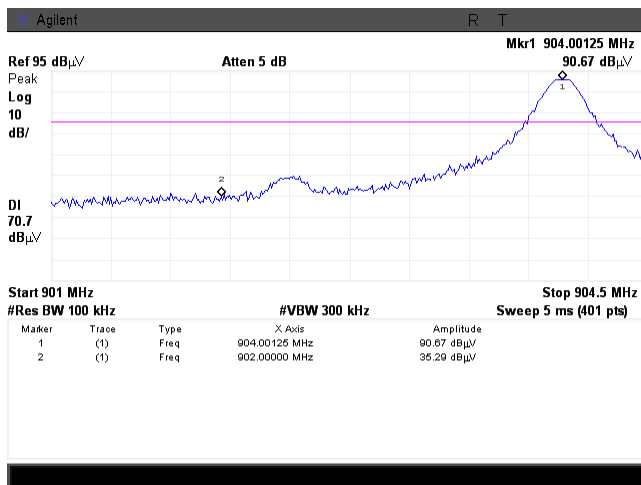


HERMON LABORATORIES

| | | | |
|---|-------------------------------|--------------------------------|------------------------------|
| Test specification: Section 15.247(d), RSS-210 section A8.5, Emissions at band edges | | | |
| Test procedure: Public notice DA 00-705 | | | |
| Test mode: Compliance | Verdict: PASS | | |
| Date(s): 7/5/2012 | | | |
| Temperature: 24 °C | Air Pressure: 1005 hPa | Relative Humidity: 50 % | Power Supply: Battery |
| Remarks: | | | |

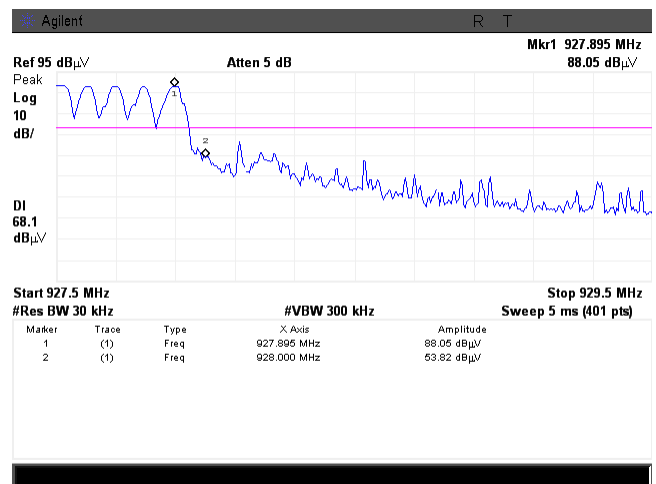
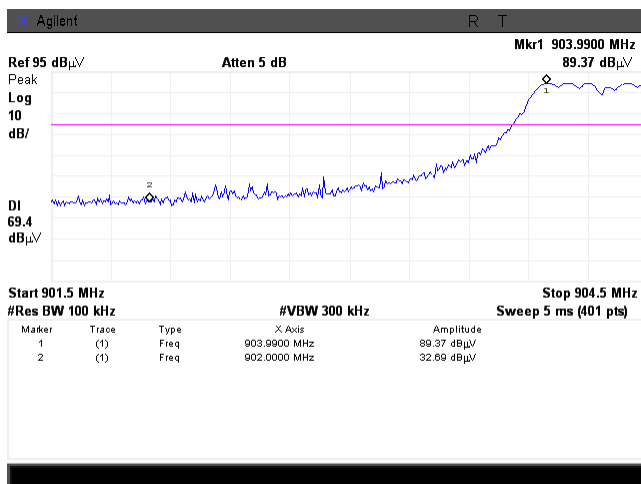
Plot 7.6.11 The band edge emission at narrow channel configuration with hopping function disabled

BIT RATE: 38400 bps



Plot 7.6.12 The band edge emission at narrow channel configuration with hopping function enabled

BIT RATE: 9600 bps



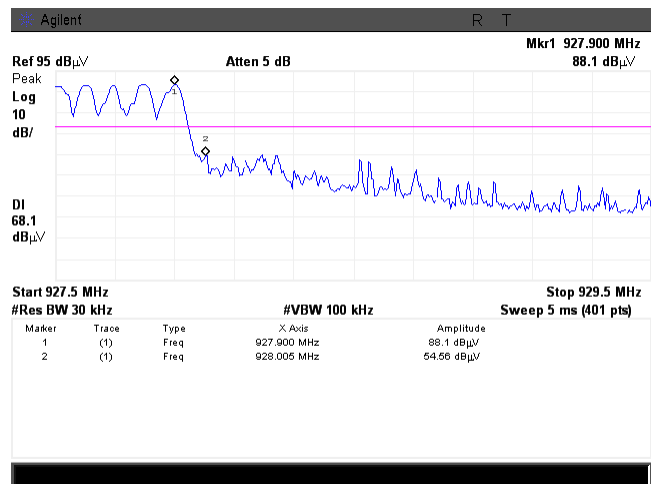
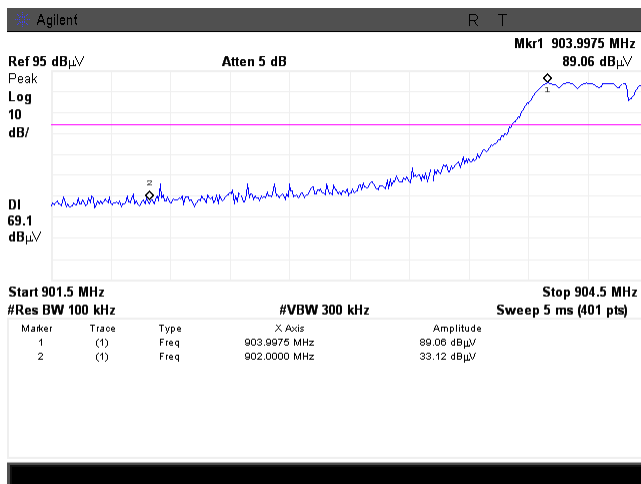


HERMON LABORATORIES

| | |
|---|-------------------------------|
| Test specification: Section 15.247(d), RSS-210 section A8.5, Emissions at band edges | |
| Test procedure: Public notice DA 00-705 | |
| Test mode: Compliance | Verdict: PASS |
| Date(s): 7/5/2012 | |
| Temperature: 24 °C | Air Pressure: 1005 hPa |
| Remarks: | |

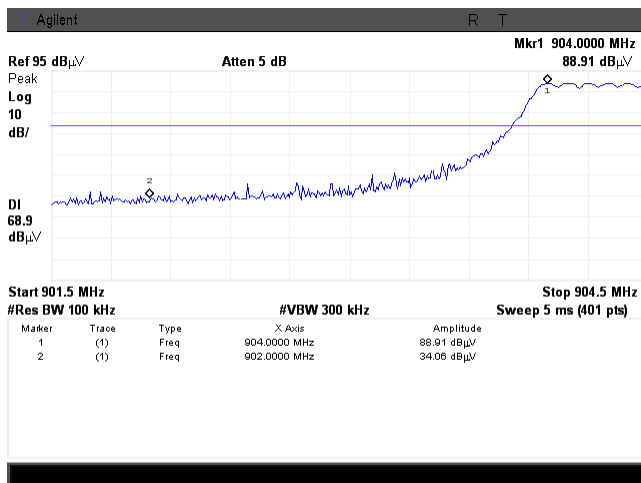
Plot 7.6.13 The band edge emission at narrow channel configuration with hopping function enabled

BIT RATE: 19200 bps



Plot 7.6.14 The band edge emission at narrow channel configuration with hopping function enabled

BIT RATE: 38400 bps





| | | | |
|----------------------------|--|---|--|
| Test specification: | | Section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions | |
| Test procedure: | | Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4 | |
| Test mode: | | Compliance | |
| Date(s): | | 6/24/2012 - 7/4/2012 | |
| Temperature: 23 °C | | Air Pressure: 1007 hPa | |
| Remarks: | | Verdict: PASS | |
| | | Relative Humidity: 45 % | |
| | | Power Supply: Battery | |

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(□V/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), RSS-210 section A8.5, Radiated spurious emissions | | |
| Test procedure: | Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4 | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date(s): | 6/24/2012 - 7/4/2012 | | |
| Temperature: 23 °C | Air Pressure: 1007 hPa | Relative Humidity: 45 % | Power Supply: Battery |
| Remarks: | | | |

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

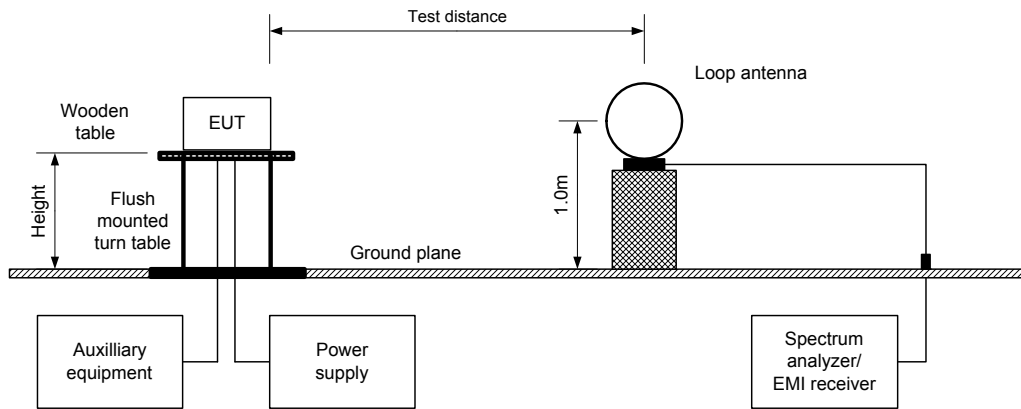
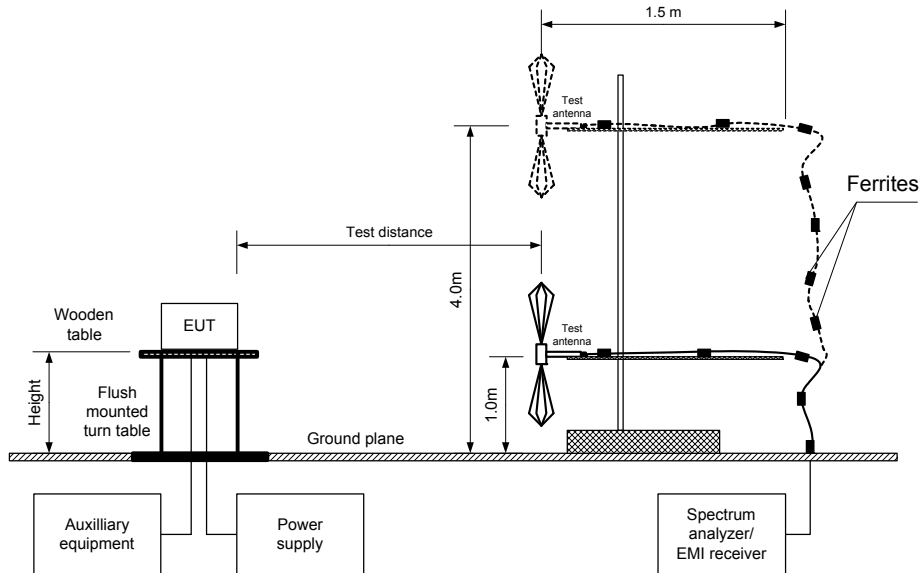


Figure 7.7.2 Setup for spurious emission field strength measurements above 30 MHz





| | | | |
|--|-------------------------------|--------------------------------|------------------------------|
| Test specification: Section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions | | | |
| Test procedure: Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4 | | | |
| Test mode: Compliance | | Verdict: PASS | |
| Date(s): 6/24/2012 - 7/4/2012 | | | |
| Temperature: 23 °C | Air Pressure: 1007 hPa | Relative Humidity: 45 % | Power Supply: Battery |
| Remarks: | | | |

Table 7.7.2 Field strength of emissions outside restricted bands

ASSIGNED FREQUENCY: 902 - 928 MHz
 INVESTIGATED FREQUENCY RANGE: 0.009 - 9300 MHz
 TEST DISTANCE: 3 m
 MODULATION: GFSK
 MODULATING SIGNAL: PRBS
 BIT RATE: 115200 bps
 DUTY CYCLE: 1%
 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)
 Disabled

FREQUENCY HOPPING:

| 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 | | | | | | | | | |
| 1804.6 | 72.26 | Horizontal | 1.6 | 277 | 122.22 | 49.96 | 20.0 | 29.96 | Pass |
| 6316.1 | 61.15 | Vertical | 1.4 | 288 | | 61.07 | | 41.07 | |
| 7218.85 | 64.92 | Vertical | 1.1 | 250 | | 57.30 | | 37.30 | |
| Mid carrier frequency | | | | | | | | | |
| 1830.4 | 71.69 | Horizontal | 1.6 | 260 | 121.70 | 50.01 | 20.0 | 30.01 | Pass |
| 5491.2 | 66.89 | Vertical | 1.2 | 83 | | 54.81 | | 34.81 | |
| 6406.4 | 62.85 | Vertical | 1.0 | 20 | | 58.85 | | 38.85 | |
| High carrier frequency | | | | | | | | | |
| 1855.6 | 71.66 | Horizontal | 1.6 | 270 | 120.86 | 49.20 | 20.0 | 29.20 | Pass |
| 5566.8 | 66.06 | Vertical | 1.3 | 0 | | 54.80 | | 34.80 | |
| 6494.6 | 60.65 | Vertical | 1.4 | 30 | | 60.21 | | 40.21 | |
| 9278.0 | 54.58 | Vertical | 1.0 | 280 | | 66.28 | | 46.28 | |

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

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



| | | | | | |
|------------------------------|--|---|--|--------------------------------|--|
| Test specification: | | Section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions | | | |
| Test procedure: | | Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4 | | | |
| Test mode: | | Compliance | | Verdict: PASS | |
| Date(s): | | 6/24/2012 - 7/4/2012 | | | |
| Temperature: 23 °C | | Air Pressure: 1007 hPa | | Relative Humidity: 45 % | |
| Power Supply: Battery | | Remarks: | | | |

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

ASSIGNED FREQUENCY: 902 – 928 MHz
 INVESTIGATED FREQUENCY RANGE: 1000 - 9300 MHz
 TEST DISTANCE: 3 m
 MODULATION: GFSK
 MODULATING SIGNAL: PRBS
 BIT RATE: 115200 bps
 TRANSMITTER OUTPUT POWER SETTINGS: Maximum
 DETECTOR USED: Peak
 RESOLUTION BANDWIDTH: 1000 kHz
 TEST ANTENNA TYPE: Double ridged guide
 FREQUENCY HOPPING: Disabled

| Frequency, MHz | Antenna | | Azimuth, degrees* | Peak field strength(VBW=3 MHz) | | | Average field strength(VBW=1 kHz) | | | | Verdict |
|-------------------------------|--------------|-----------|-------------------|--------------------------------|-----------------|--------------|-----------------------------------|----------------------|-----------------|---------------|---------|
| | Polarization | Height, m | | Measured, dB(µV/m) | Limit, dB(□V/m) | Margin, dB** | Measured, dB(µV/m) | Calculated, dB(µV/m) | Limit, dB(µV/m) | Margin, dB*** | |
| Low carrier frequency | | | | | | | | | | | |
| 2707.0 | Vertical | 1.2 | 0 | 67.86 | 74.0 | -6.14 | 65.97 | 41.67 | 54.0 | -12.33 | Pass |
| 3609.2 | Vertical | 1.7 | 90 | 68.91 | 74.0 | -5.09 | 68.56 | 44.26 | 54.0 | -9.74 | |
| 4511.5 | Horizontal | 1.8 | 30 | 70.00 | 74.0 | -4.00 | 69.66 | 45.36 | 54.0 | -8.64 | |
| 5413.8 | Vertical | 1.3 | 82 | 62.55 | 74.0 | -11.45 | 61.34 | 37.04 | 54.0 | -16.96 | |
| 8121.2 | Vertical | 1.3 | 307 | 61.55 | 74.0 | -12.45 | 55.96 | 31.66 | 54.0 | -22.34 | |
| 9023.0 | Vertical | 1.0 | 280 | 66.34 | 74.0 | -7.66 | 64.04 | 39.74 | 54.0 | -14.26 | |
| Mid carrier frequency | | | | | | | | | | | |
| 2745.60 | Vertical | 1.4 | 0 | 65.59 | 74.0 | -8.41 | 65.97 | 41.67 | 54.0 | -12.33 | Pass |
| 3660.8.0 | Vertical | 1.6 | 70 | 67.56 | 74.0 | -6.44 | 68.56 | 44.26 | 54.0 | -9.74 | |
| 4576.00 | Vertical | 1.8 | 30 | 69.16 | 74.0 | -4.84 | 69.66 | 45.36 | 54.0 | -8.64 | |
| 7319.36 | Vertical | 1.1 | 247 | 67.22 | 74.0 | -6.78 | 61.34 | 37.04 | 54.0 | -16.96 | |
| 8234.15 | Vertical | 1.3 | 307 | 61.56 | 74.0 | -12.44 | 55.96 | 31.66 | 54.0 | -22.34 | |
| 9152.00 | Vertical | 1.0 | 280 | 64.47 | 74.0 | -9.53 | 64.04 | 39.74 | 54.0 | -14.26 | |
| High carrier frequency | | | | | | | | | | | |
| 2783.40 | Vertical | 1.5 | 0 | 72.50 | 74.0 | -1.50 | 71.35 | 47.05 | 54.0 | -6.95 | Pass |
| 3711.20 | Vertical | 1.2 | 74 | 66.11 | 74.0 | -7.89 | 65.47 | 41.17 | 54.0 | -12.83 | |
| 4639.00 | Horizontal | 1.8 | 30 | 66.88 | 74.0 | -7.12 | 65.97 | 41.67 | 54.0 | -12.33 | |
| 7421.91 | Vertical | 1.1 | 223 | 66.68 | 74.0 | -7.32 | 66.21 | 41.91 | 54.0 | -12.09 | |
| 8350.02 | Vertical | 1.2 | 300 | 59.08 | 74.0 | -14.92 | 50.70 | 26.40 | 54.0 | -27.60 | |

*- 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 | | |
| 6.1 | 1000 | NA | NA | NA | -24.3 |

*- Average factor was calculated as follows

for pulse train shorter than 100 ms:

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

for pulse train longer than 100 ms:

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



| | | | |
|----------------------------|---|--------------------------------|------------------------------|
| Test specification: | Section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions | | |
| Test procedure: | Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4 | | |
| Test mode: | Compliance | Verdict: PASS | |
| Date(s): | 6/24/2012 - 7/4/2012 | | |
| Temperature: 23 °C | Air Pressure: 1007 hPa | Relative Humidity: 45 % | Power Supply: Battery |
| Remarks: | | | |

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

ASSIGNED FREQUENCY: 902 – 928 MHz
 INVESTIGATED FREQUENCY RANGE: 0.009 – 1000 MHz
 TEST DISTANCE: 3 m
 MODULATION: GFSK
 MODULATING SIGNAL: PRBS
 BIT RATE: 115200 bps
 TRANSMITTER OUTPUT POWER SETTINGS: Maximum
 RESOLUTION BANDWIDTH: 0.2 kHz (9 kHz – 150 kHz)
 9.0 kHz (150 kHz – 30 MHz)
 120 kHz (30 MHz – 1000 MHz)
 VIDEO BANDWIDTH: > Resolution bandwidth
 TEST ANTENNA TYPE: Active loop (9 kHz – 30 MHz)
 Biconilog (30 MHz – 1000 MHz)
 FREQUENCY HOPPING: Disabled

| Frequency, MHz | Peak emission, dB(µV/m) | Quasi-peak | | | Antenna polarization | Antenna height, m | Turn-table position**, degrees | Verdict |
|-------------------------------|-------------------------|-----------------------------|-----------------|-------------|----------------------|-------------------|--------------------------------|---------|
| | | Measured emission, dB(µV/m) | Limit, dB(µV/m) | Margin, dB* | | | | |
| Low carrier frequency | | | | | | | | |
| 634.0 | 44.0 | 33.4 | 46.0 | -12.6 | Vert | 1.0 | 9 | Pass |
| 960.1 | 47.8 | 38.9 | 54.0 | -7.9 | Vert | 1.0 | 0 | Pass |
| Mid carrier frequency | | | | | | | | |
| 633.2 | 44.0 | 35.6 | 46.0 | -10.4 | Vert | 1.0 | 9 | Pass |
| 962.2 | 51.2 | 39.9 | 54.0 | -14.1 | Vert | 1.0 | 0 | Pass |
| High carrier frequency | | | | | | | | |
| 629.0 | 45.4 | 37.5 | 46.0 | -8.5 | Vert | 1.0 | 9 | Pass |
| 962.2 | 52.4 | 40.2 | 54.0 | -13.8 | Vert | 1.0 | 0 | Pass |

*- Margin = Measured emission - specification limit.
 **- EUT front panel refer to 0 degrees position of turntable.



HERMON LABORATORIES

| | | | |
|----------------------------|-------------------------------|---|------------------------------|
| Test specification: | | Section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions | |
| Test procedure: | | Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4 | |
| Test mode: | | Verdict: PASS | |
| Compliance | | | |
| Date(s): | | 6/24/2012 - 7/4/2012 | |
| Temperature: 23 °C | Air Pressure: 1007 hPa | Relative Humidity: 45 % | Power Supply: Battery |
| Remarks: | | | |

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 | |

Harmonic distribution:

| Harmonic # | Low carrier, MHz | Mid carrier, MHz | High carrier, MHz |
|------------|------------------|------------------|-------------------|
| 1 | 902.3000 | 915.2000 | 927.8000 |
| 2 | 1,804.6000 | 1,830.4000 | 1,855.6000 |
| 3 | 2,706.9000 | 2,745.6000 | 2,783.4000 |
| 4 | 3,609.2000 | 3,660.8000 | 3,711.2000 |
| 5 | 4,511.5000 | 4,576.0000 | 4,639.0000 |
| 6 | 5,413.8000 | 5,491.2000 | 5,566.8000 |
| 7 | 6,316.1000 | 6,406.4000 | 6,494.6000 |
| 8 | 7,218.4000 | 7,321.6000 | 7,422.4000 |
| 9 | 8,120.7000 | 8,236.8000 | 8,350.2000 |
| 10 | 9,023.0000 | 9,152.0000 | 9,278.0000 |

Legend:

| |
|----------------------------------|
| Outside restricted band harmonic |
| Within restricted band harmonic |

Reference numbers of test equipment used

| | | | | | | | |
|---------|---------|---------|---------|---------|---------|---------|---------|
| HL 0521 | HL 0446 | HL 0604 | HL 2871 | HL 4280 | HL 3354 | HL 2909 | HL 1984 |
| HL 3901 | HL 3341 | HL 3531 | HL 3342 | HL 2909 | HL 3533 | | |

Full description is given in Appendix A.

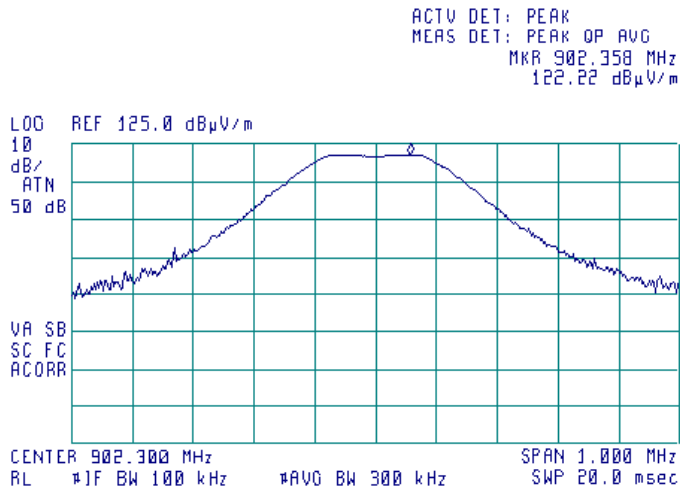


HERMON LABORATORIES

| | | | |
|----------------------------|--|---|--|
| Test specification: | | Section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions | |
| Test procedure: | | Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4 | |
| Test mode: | | Compliance | |
| Date(s): | | 6/24/2012 - 7/4/2012 | |
| Temperature: 23 °C | | Air Pressure: 1007 hPa | |
| Remarks: | | Verdict: PASS | |
| | | Relative Humidity: 45 % | |
| | | Power Supply: Battery | |

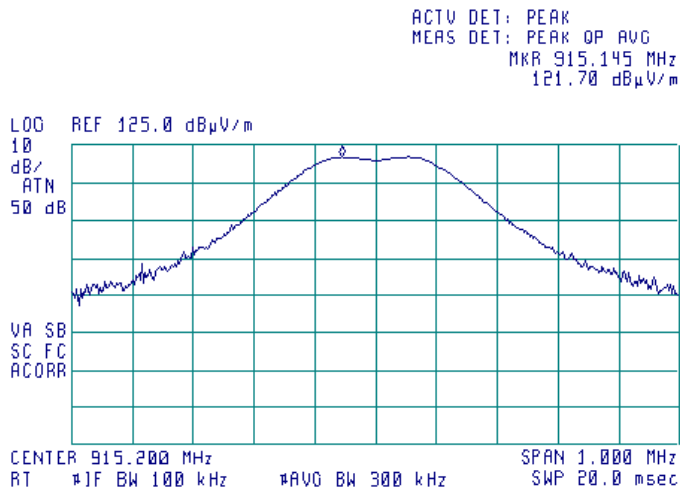
Plot 7.7.1 Radiated emission measurements at the low carrier frequency

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





HERMON LABORATORIES

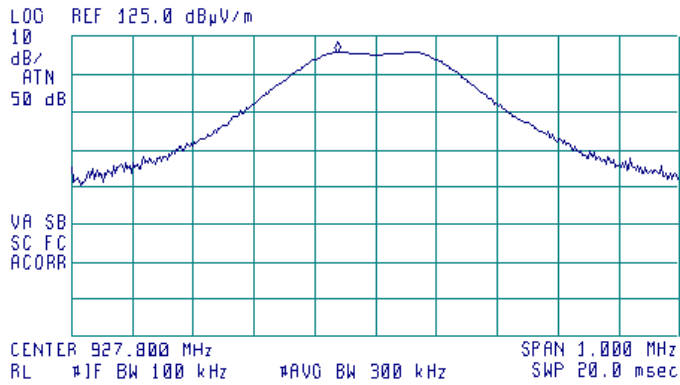
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|----------------------------|-------------------------------|---|------------------------------|
| Test specification: | | Section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions | |
| Test procedure: | | Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4 | |
| Test mode: | | Verdict: | |
| Compliance | | PASS | |
| Date(s): | | 6/24/2012 - 7/4/2012 | |
| Temperature: 23 °C | Air Pressure: 1007 hPa | Relative Humidity: 45 % | Power Supply: 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 and horizontal



ACTV DET: PEAK
 MEAS DET: PEAK OP AVG
 MKR 927.738 MHz
 120.86 dBµV/m



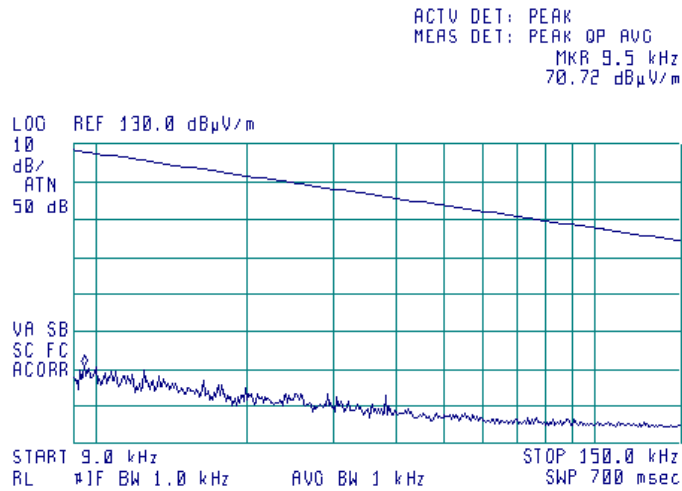


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| | | | |
|----------------------------|---|--------------------------------|------------------------------|
| Test specification: | Section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions | | |
| Test procedure: | Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4 | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date(s): | 6/24/2012 - 7/4/2012 | | |
| Temperature: 23 °C | Air Pressure: 1007 hPa | Relative Humidity: 45 % | Power Supply: Battery |
| Remarks: | | | |

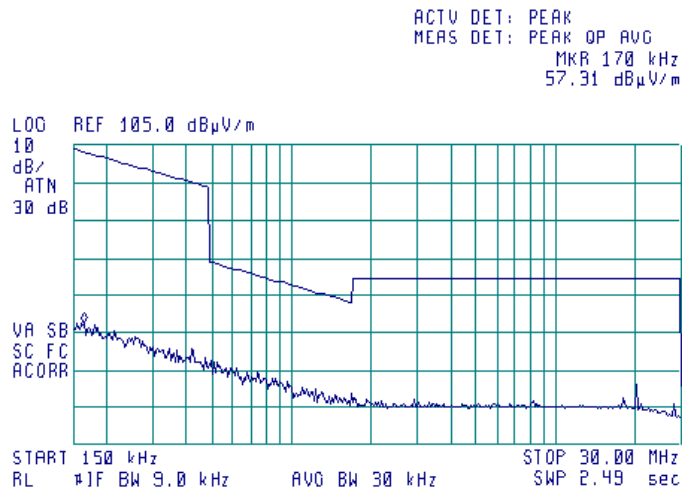
Plot 7.7.4 Radiated emission measurements from 9 to 150 kHz at the low, mid and high carrier frequency

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



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

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



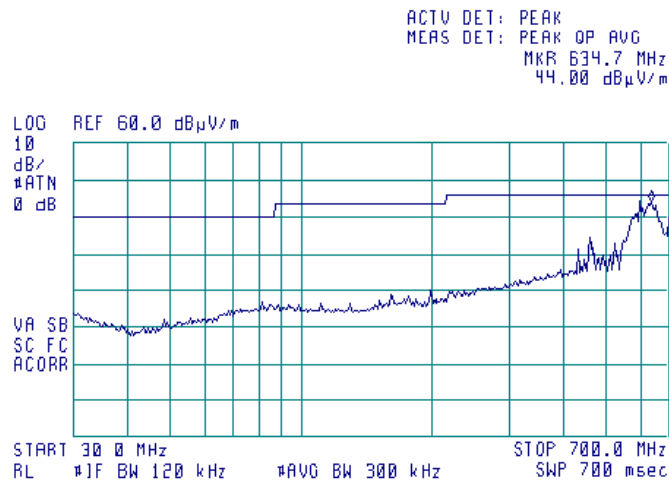


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| | | | |
|----------------------------|-------------------------------|---|------------------------------|
| Test specification: | | Section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions | |
| Test procedure: | | Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4 | |
| Test mode: | | Verdict: PASS | |
| Date(s): | | 6/24/2012 - 7/4/2012 | |
| Temperature: 23 °C | Air Pressure: 1007 hPa | Relative Humidity: 45 % | Power Supply: Battery |
| Remarks: | | | |

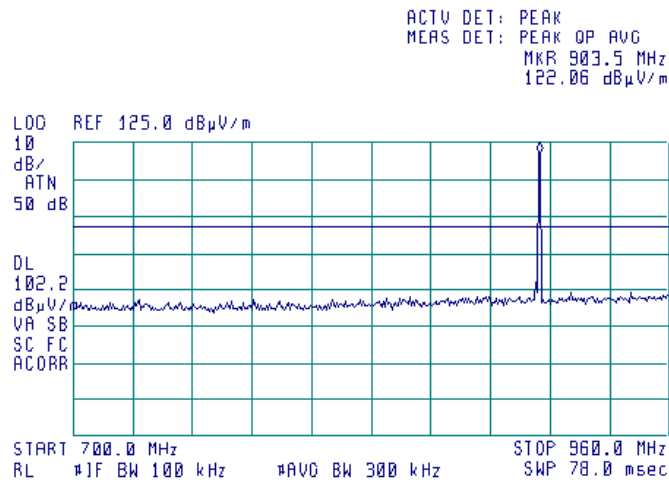
Plot 7.7.6 Radiated emission measurements from 30 to 700 MHz at the low carrier frequency

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



Plot 7.7.7 Radiated emission measurements from 700 to 960 MHz at the low carrier frequency

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



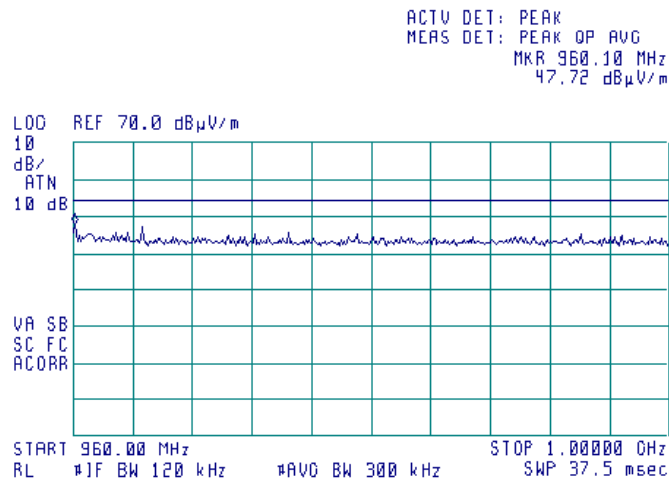


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| | | | |
|----------------------------|---|--------------------------------|------------------------------|
| Test specification: | Section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions | | |
| Test procedure: | Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4 | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date(s): | 6/24/2012 - 7/4/2012 | | |
| Temperature: 23 °C | Air Pressure: 1007 hPa | Relative Humidity: 45 % | Power Supply: Battery |
| Remarks: | | | |

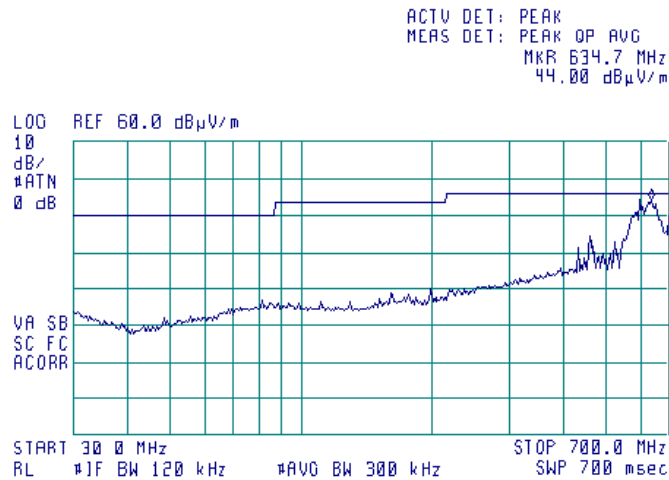
Plot 7.7.8 Radiated emission measurements from 960 to 1000 MHz at the low carrier frequency

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



Plot 7.7.9 Radiated emission measurements from 30 to 700 MHz at the mid carrier frequency

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



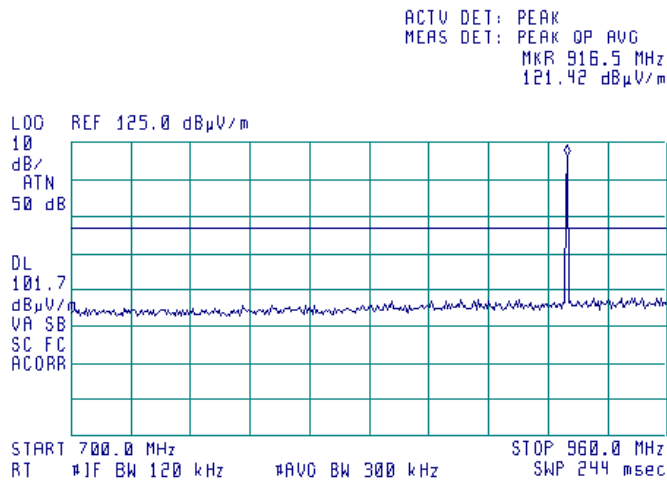


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| | | | |
|----------------------------|---|--------------------------------|------------------------------|
| Test specification: | Section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions | | |
| Test procedure: | Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4 | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date(s): | 6/24/2012 - 7/4/2012 | | |
| Temperature: 23 °C | Air Pressure: 1007 hPa | Relative Humidity: 45 % | Power Supply: Battery |
| Remarks: | | | |

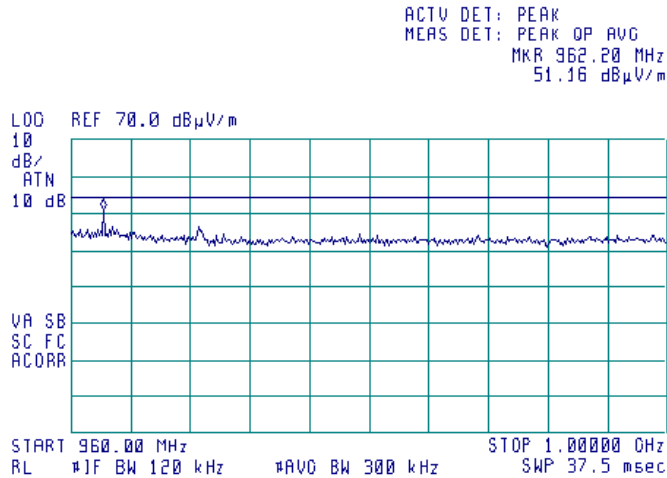
Plot 7.7.10 Radiated emission measurements from 700 to 960 MHz at the mid carrier frequency

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



Plot 7.7.11 Radiated emission measurements from 960 to 1000 MHz at the mid carrier frequency

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



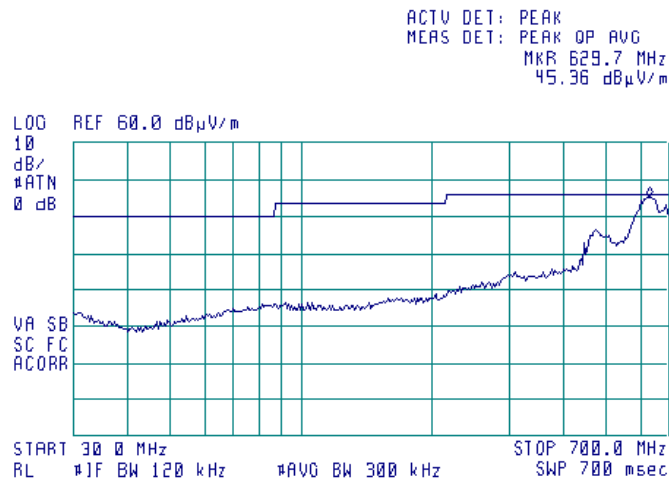


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| | | | |
|----------------------------|-------------------------------|---|------------------------------|
| Test specification: | | Section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions | |
| Test procedure: | | Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4 | |
| Test mode: | | Verdict: | |
| Compliance | | PASS | |
| Date(s): | | 6/24/2012 - 7/4/2012 | |
| Temperature: 23 °C | Air Pressure: 1007 hPa | Relative Humidity: 45 % | Power Supply: Battery |
| Remarks: | | | |

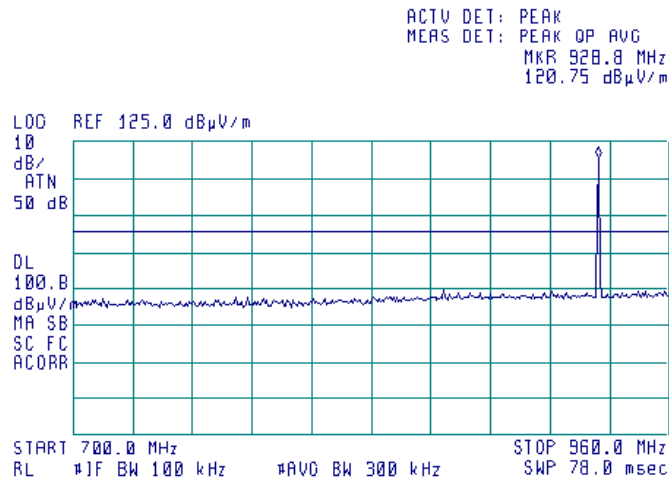
Plot 7.7.12 Radiated emission measurements from 30 to 700 MHz at the high carrier frequency

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



Plot 7.7.13 Radiated emission measurements from 700 to 960 MHz at the high carrier frequency

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





HERMON LABORATORIES

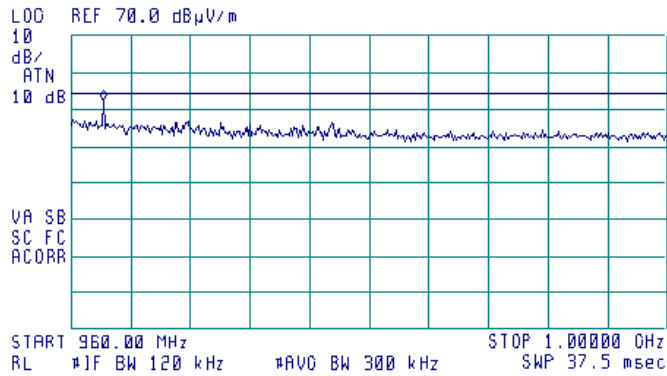
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|----------------------------|---|--------------------------------|------------------------------|
| Test specification: | Section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions | | |
| Test procedure: | Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4 | | |
| Test mode: | Compliance | Verdict: PASS | |
| Date(s): | 6/24/2012 - 7/4/2012 | | |
| Temperature: 23 °C | Air Pressure: 1007 hPa | Relative Humidity: 45 % | Power Supply: Battery |
| Remarks: | | | |

Plot 7.7.14 Radiated emission measurements from 960 to 1000 MHz at the high carrier frequency

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



ACTV DET: PEAK
MEAS DET: PEAK DP AVG
MKR 962.20 MHz
52.42 dBµV/m



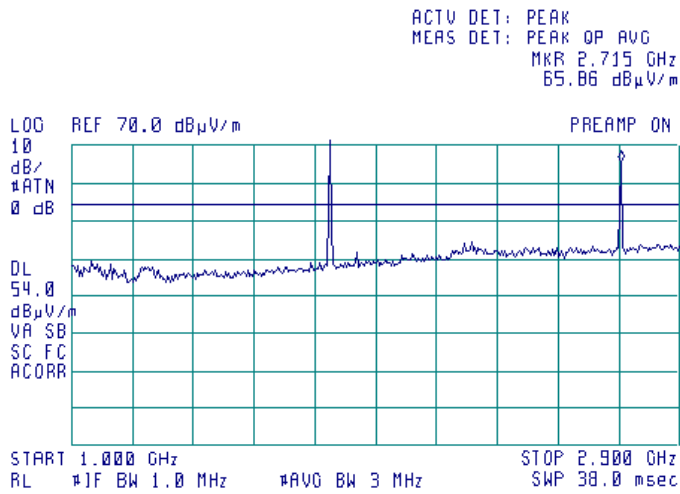


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| | | | |
|----------------------------|-------------------------------|---|------------------------------|
| Test specification: | | Section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions | |
| Test procedure: | | Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4 | |
| Test mode: | | Verdict: PASS | |
| Date(s): | | 6/24/2012 - 7/4/2012 | |
| Temperature: 23 °C | Air Pressure: 1007 hPa | Relative Humidity: 45 % | Power Supply: Battery |
| Remarks: | | | |

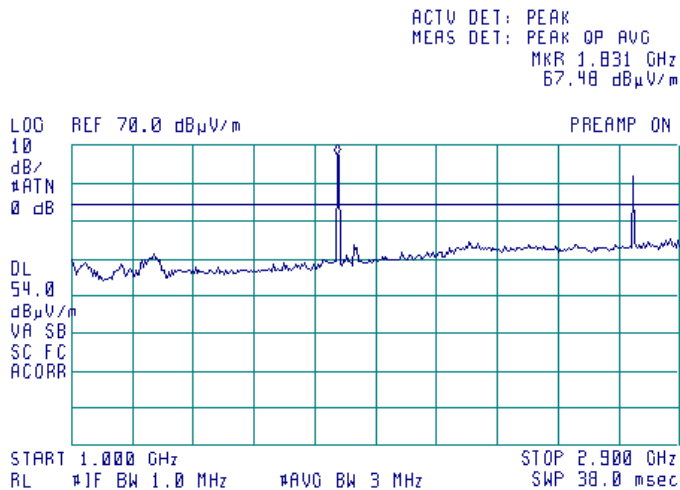
Plot 7.7.15 Radiated emission measurements from 1000 to 2900 MHz at the low carrier frequency

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



Plot 7.7.16 Radiated emission measurements from 1000 to 2900 MHz at the mid carrier frequency

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



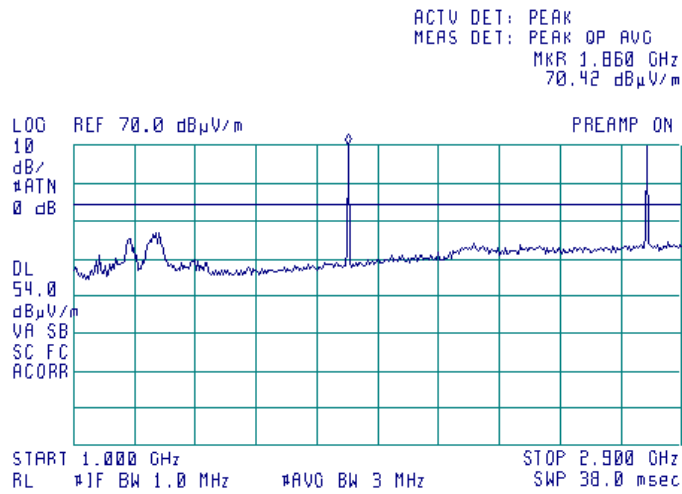


HERMON LABORATORIES

| | | | |
|----------------------------|--|---|--|
| Test specification: | | Section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions | |
| Test procedure: | | Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4 | |
| Test mode: | | Compliance | |
| Date(s): | | 6/24/2012 - 7/4/2012 | |
| Temperature: 23 °C | | Air Pressure: 1007 hPa | |
| Remarks: | | Verdict: PASS | |
| | | Relative Humidity: 45 % | |
| | | Power Supply: Battery | |

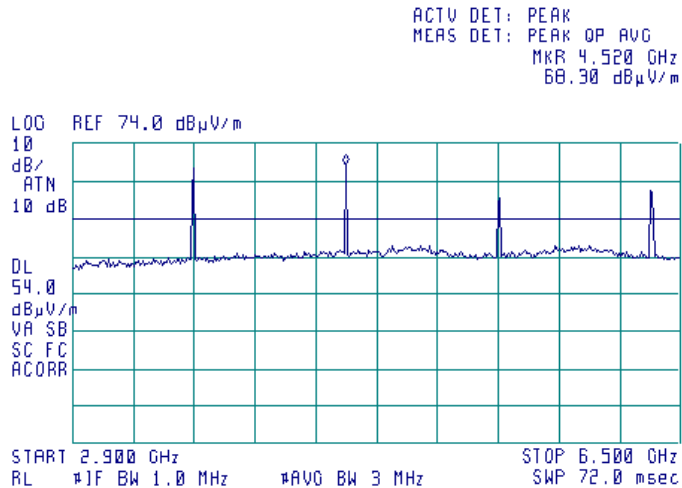
Plot 7.7.17 Radiated emission measurements from 1000 to 2900 MHz at the high carrier frequency

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



Plot 7.7.18 Radiated emission measurements from 2900 to 6500 MHz at the low carrier frequency

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



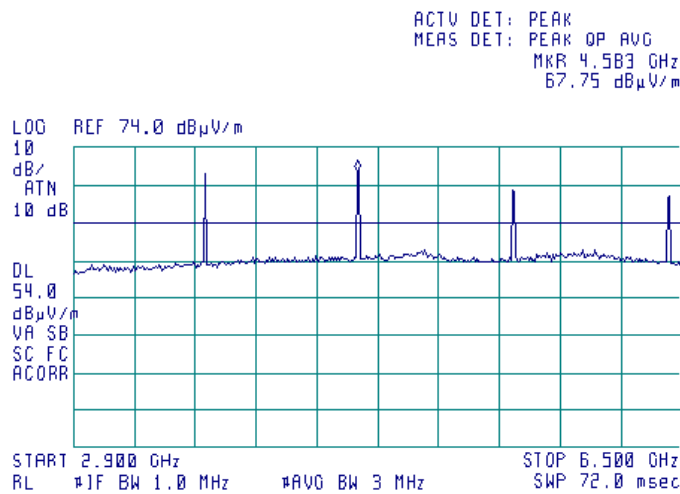


HERMON LABORATORIES

| | | | |
|----------------------------|--|---|--|
| Test specification: | | Section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions | |
| Test procedure: | | Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4 | |
| Test mode: | | Compliance | |
| Date(s): | | 6/24/2012 - 7/4/2012 | |
| Temperature: 23 °C | | Air Pressure: 1007 hPa | |
| Remarks: | | Verdict: PASS | |
| | | Relative Humidity: 45 % | |
| | | Power Supply: Battery | |

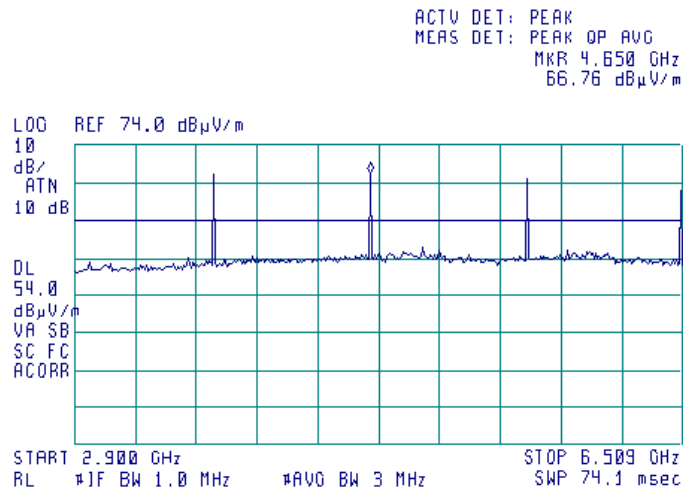
Plot 7.7.19 Radiated emission measurements from 2900 to 6500 MHz at the mid carrier frequency

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



Plot 7.7.20 Radiated emission measurements from 2.9 to 6500 MHz at the high carrier frequency

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





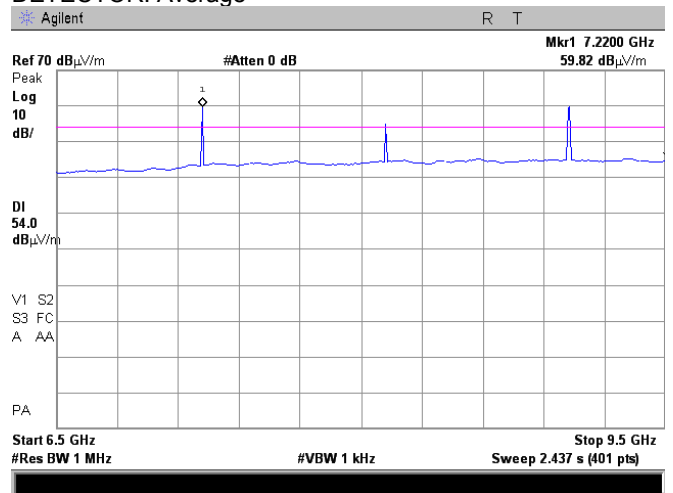
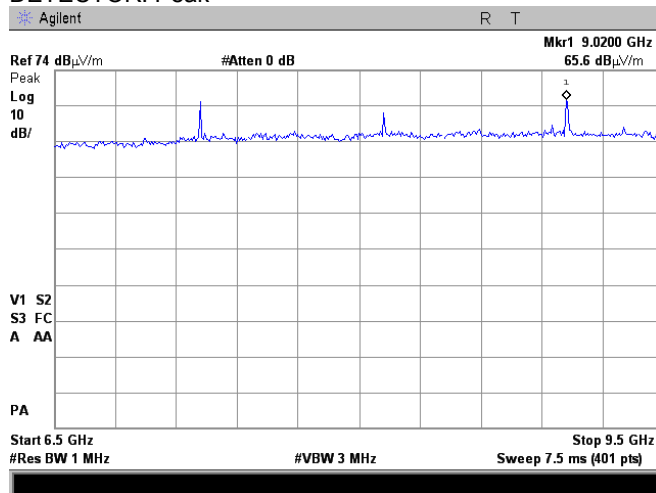
HERMON LABORATORIES

| | | | |
|----------------------------|---|--------------------------------|------------------------------|
| Test specification: | Section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions | | |
| Test procedure: | Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4 | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date(s): | 6/24/2012 - 7/4/2012 | | |
| Temperature: 23 °C | Air Pressure: 1007 hPa | Relative Humidity: 45 % | Power Supply: Battery |
| Remarks: | | | |

Plot 7.7.21 Radiated emission measurements from 6500 to 9300 MHz at the low carrier frequency

TEST SITE:
TEST DISTANCE:
ANTENNA POLARIZATION:
DETECTOR: Peak

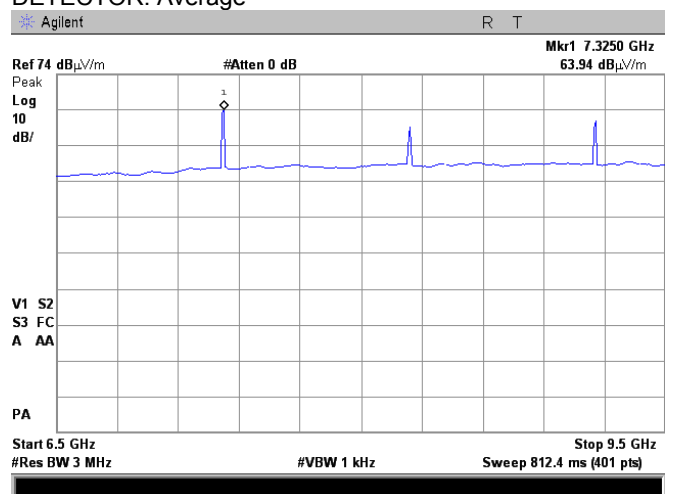
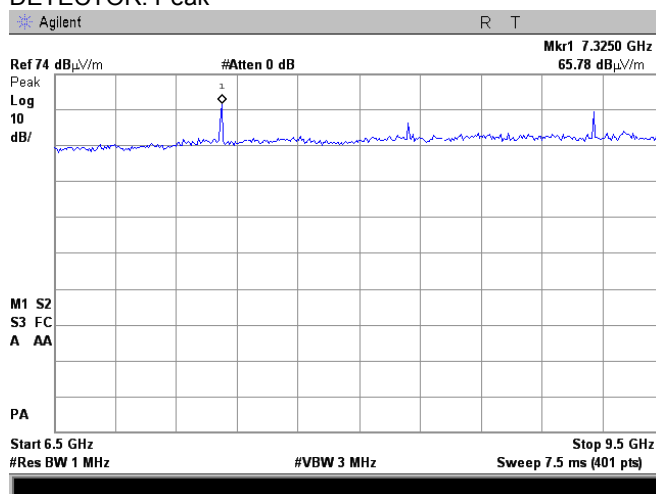
Semi anechoic chamber
3 m
Vertical and Horizontal
DETECTOR: Average



Plot 7.7.22 Radiated emission measurements from 6500 to 9300 MHz at the mid carrier frequency

TEST SITE:
TEST DISTANCE:
ANTENNA POLARIZATION:
DETECTOR: Peak

Semi anechoic chamber
3 m
Vertical and Horizontal
DETECTOR: Average





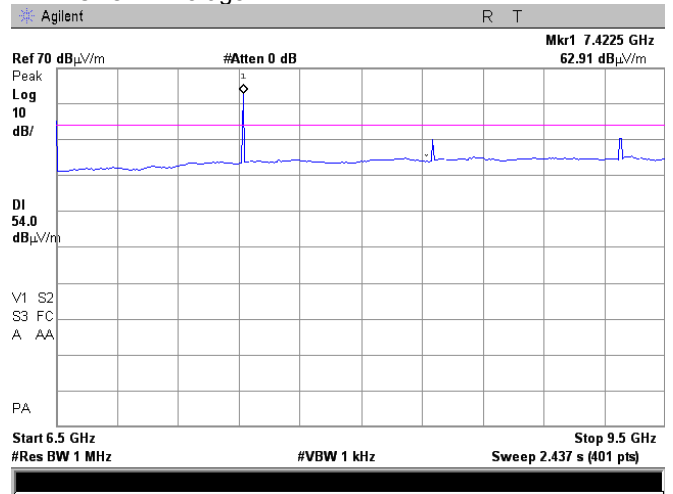
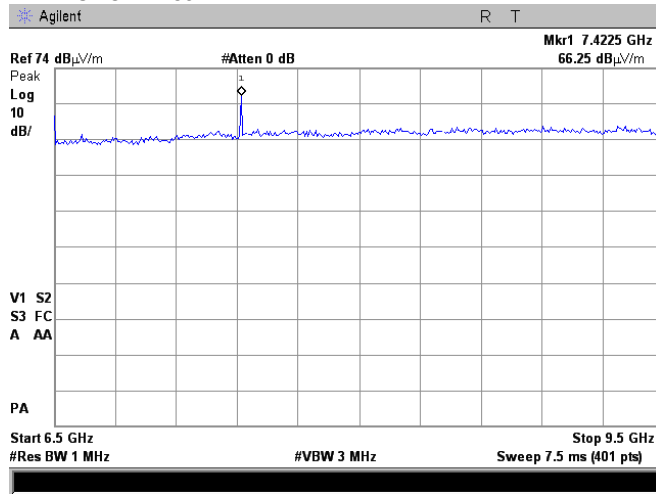
HERMON LABORATORIES

| | | | |
|----------------------------|-------------------------------|---|------------------------------|
| Test specification: | | Section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions | |
| Test procedure: | | Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4 | |
| Test mode: | | Verdict: PASS | |
| Date(s): | | 6/24/2012 - 7/4/2012 | |
| Temperature: 23 °C | Air Pressure: 1007 hPa | Relative Humidity: 45 % | Power Supply: Battery |
| Remarks: | | | |

Plot 7.7.23 Radiated emission measurements from 6500 to 9300 MHz at the high carrier frequency

TEST SITE:
TEST DISTANCE:
ANTENNA POLARIZATION:
DETECTOR: Peak

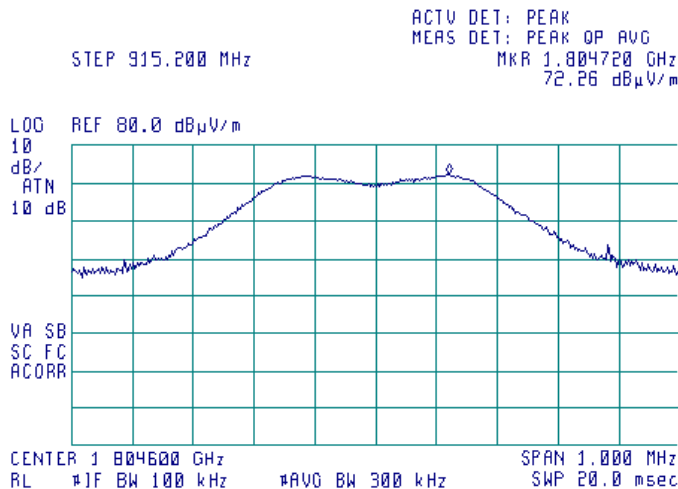
Semi anechoic chamber
3 m
Vertical and Horizontal
DETECTOR: Average



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

TEST SITE:
TEST DISTANCE:
ANTENNA POLARIZATION

Semi anechoic chamber
3 m
Vertical & Horizontal



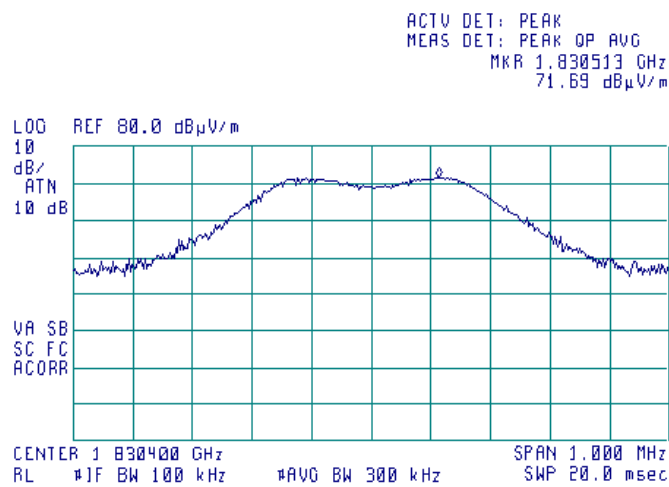


HERMON LABORATORIES

| | | | |
|----------------------------|---|--------------------------------|------------------------------|
| Test specification: | Section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions | | |
| Test procedure: | Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4 | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date(s): | 6/24/2012 - 7/4/2012 | | |
| Temperature: 23 °C | Air Pressure: 1007 hPa | Relative Humidity: 45 % | Power Supply: Battery |
| Remarks: | | | |

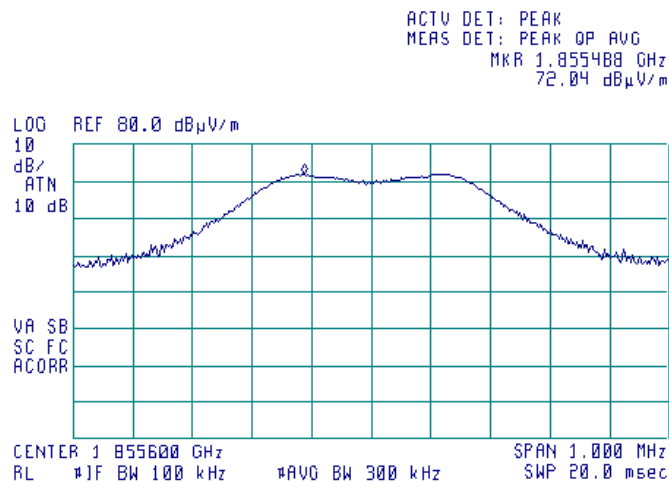
Plot 7.7.25 Radiated emission measurements at the second harmonic of mid carrier frequency

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



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

TEST SITE: Semi anechoic chamber
 TEST DISTANCE: 3 m
 ANTENNA POLARIZATION: Vertical1 & Horizontal





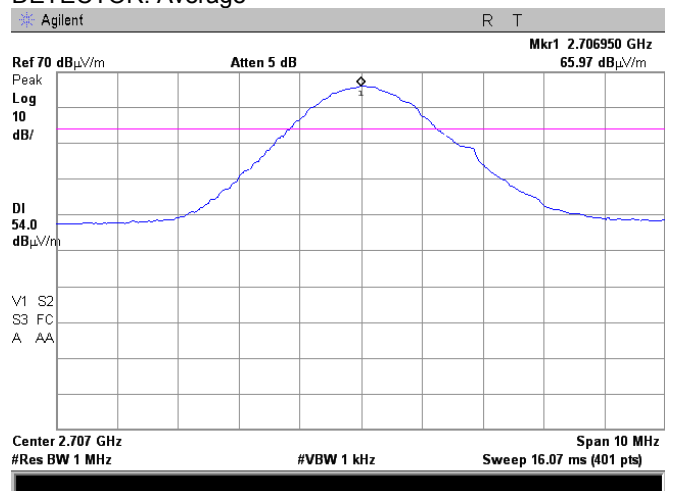
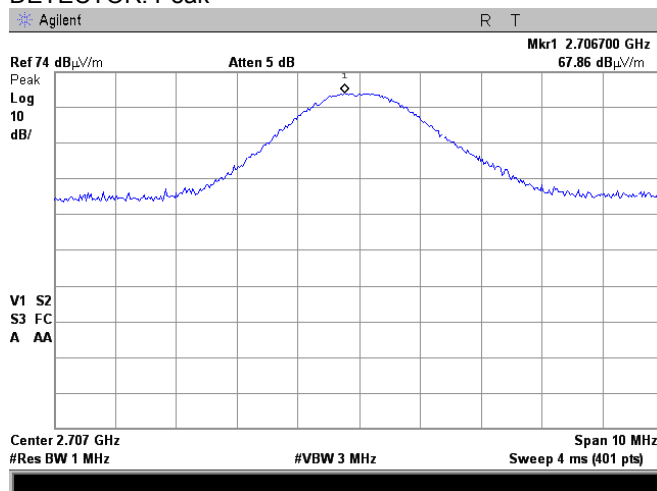
HERMON LABORATORIES

| | |
|--|-------------------------------|
| Test specification: Section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions | |
| Test procedure: Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4 | |
| Test mode: Compliance | Verdict: PASS |
| Date(s): 6/24/2012 - 7/4/2012 | |
| Temperature: 23 °C | Air Pressure: 1007 hPa |
| Relative Humidity: 45 % | Power Supply: Battery |
| Remarks: | |

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

TEST SITE:
TEST DISTANCE:
ANTENNA POLARIZATION:
DETECTOR: Peak

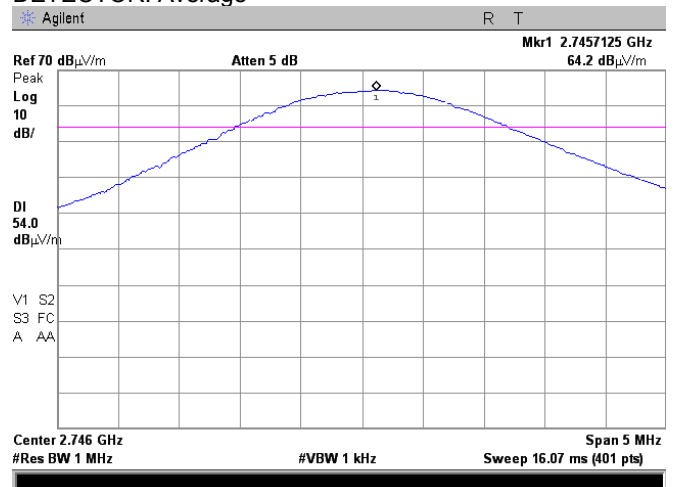
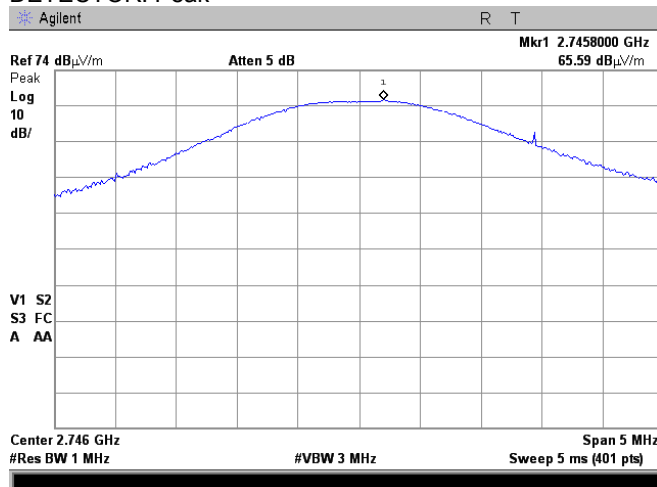
OATS
3 m
Vertical &Horizontal
DETECTOR: Average



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

TEST SITE:
TEST DISTANCE:
ANTENNA POLARIZATION:
DETECTOR: Peak

OATS
3 m
Vertical &Horizontal
DETECTOR: Average





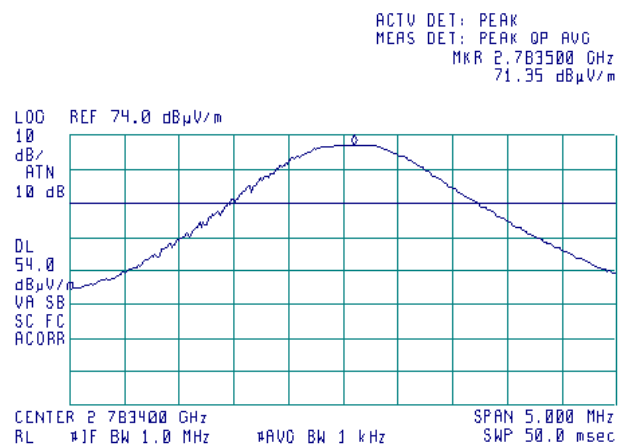
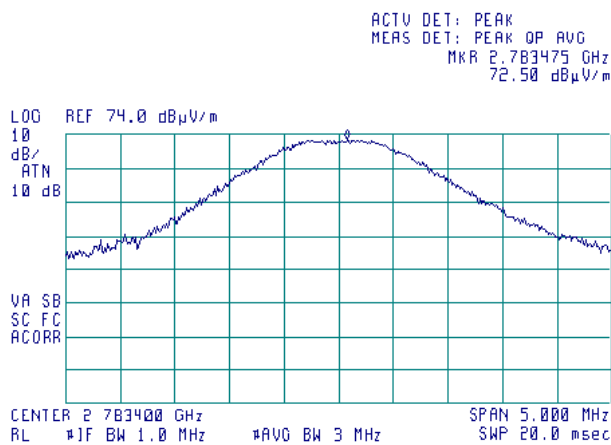
HERMON LABORATORIES

| | | | |
|--|-------------------------------|--------------------------------|------------------------------|
| Test specification: Section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions | | | |
| Test procedure: Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4 | | | |
| Test mode: Compliance | Verdict: PASS | | |
| Date(s): 6/24/2012 - 7/4/2012 | | | |
| Temperature: 23 °C | Air Pressure: 1007 hPa | Relative Humidity: 45 % | Power Supply: Battery |
| Remarks: | | | |

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

TEST SITE:
TEST DISTANCE:
ANTENNA POLARIZATION:
DETECTOR: Peak

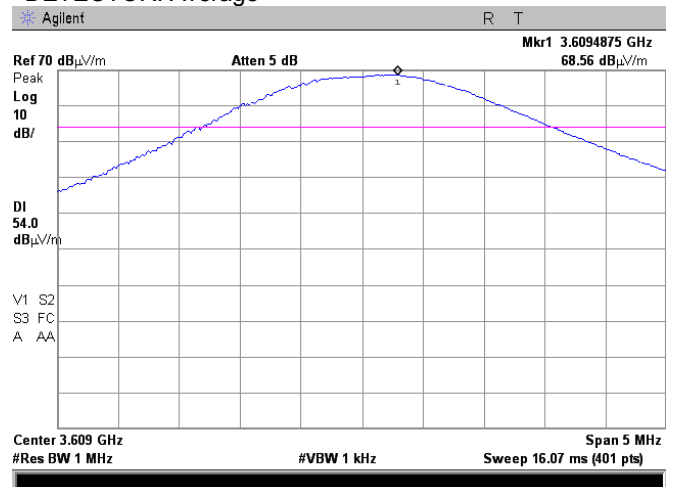
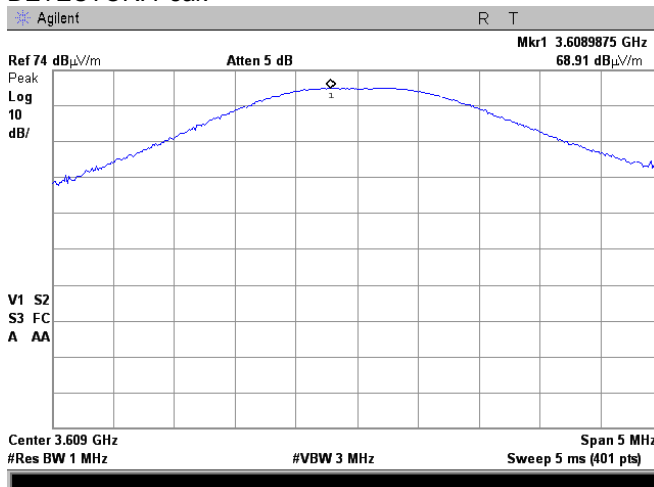
Semi anechoic chamber
3 m
Vertical &Horizontal
DETECTOR: Average



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

TEST SITE:
TEST DISTANCE:
ANTENNA POLARIZATION:
DETECTOR: Peak

OATS
3 m
Vertical &Horizontal
DETECTOR: Average





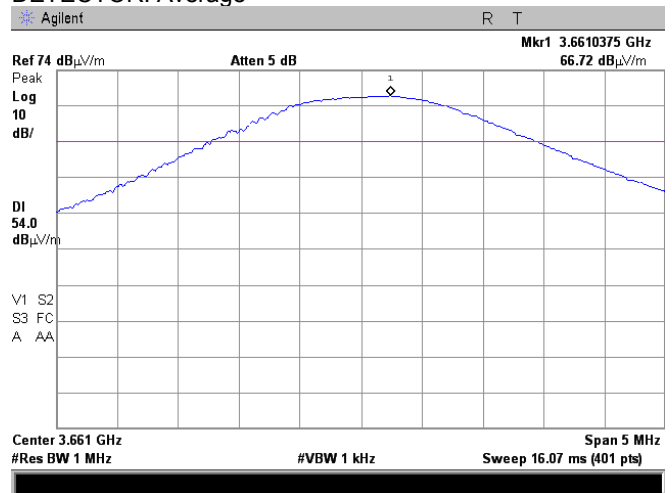
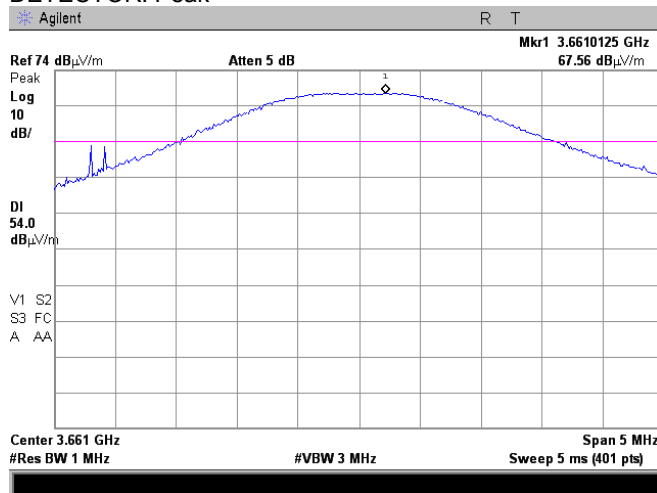
HERMON LABORATORIES

| | | | |
|--|-------------------------------|--------------------------------|------------------------------|
| Test specification: Section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions | | | |
| Test procedure: Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4 | | | |
| Test mode: Compliance | Verdict: PASS | | |
| Date(s): 6/24/2012 - 7/4/2012 | | | |
| Temperature: 23 °C | Air Pressure: 1007 hPa | Relative Humidity: 45 % | Power Supply: Battery |
| Remarks: | | | |

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

TEST SITE:
TEST DISTANCE:
ANTENNA POLARIZATION:
DETECTOR: Peak

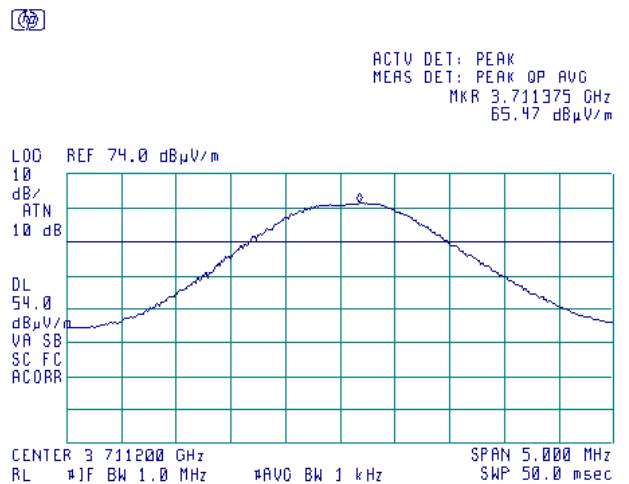
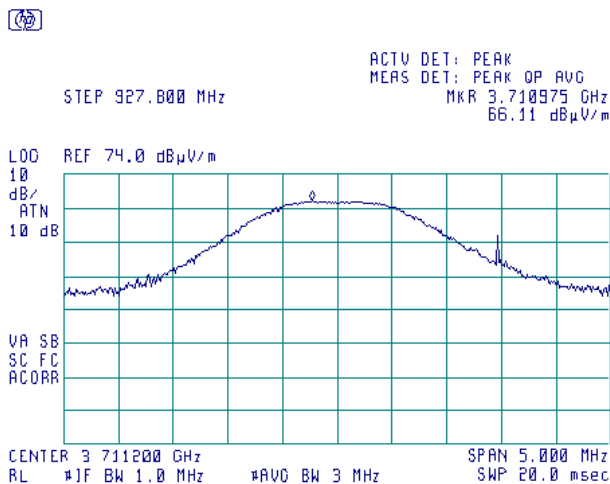
OATS
3 m
Vertical &Horizontal
DETECTOR: Average



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

TEST SITE:
TEST DISTANCE:
ANTENNA POLARIZATION:
DETECTOR: Peak

Semi Anechoic chamber
3 m
Vertical &Horizontal
DETECTOR: Average





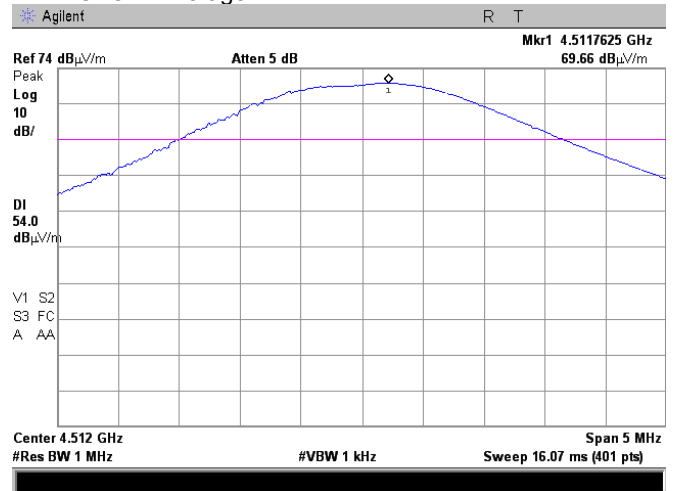
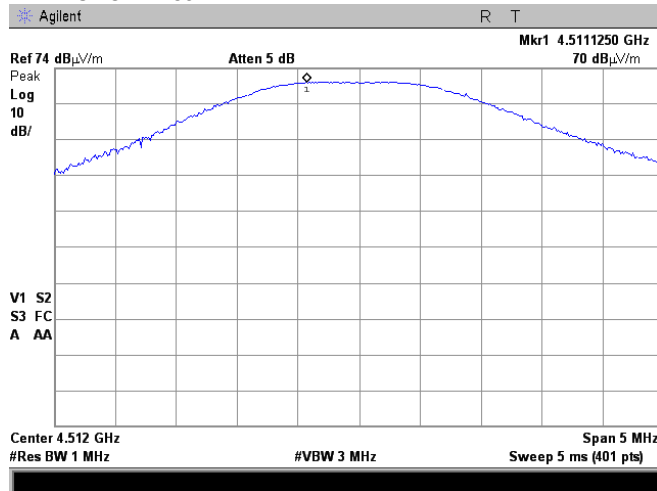
HERMON LABORATORIES

| | |
|--|-------------------------------|
| Test specification: Section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions | |
| Test procedure: Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4 | |
| Test mode: Compliance | Verdict: PASS |
| Date(s): 6/24/2012 - 7/4/2012 | |
| Temperature: 23 °C | Air Pressure: 1007 hPa |
| Relative Humidity: 45 % | Power Supply: Battery |
| Remarks: | |

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

TEST SITE:
TEST DISTANCE:
ANTENNA POLARIZATION:
DETECTOR: Peak

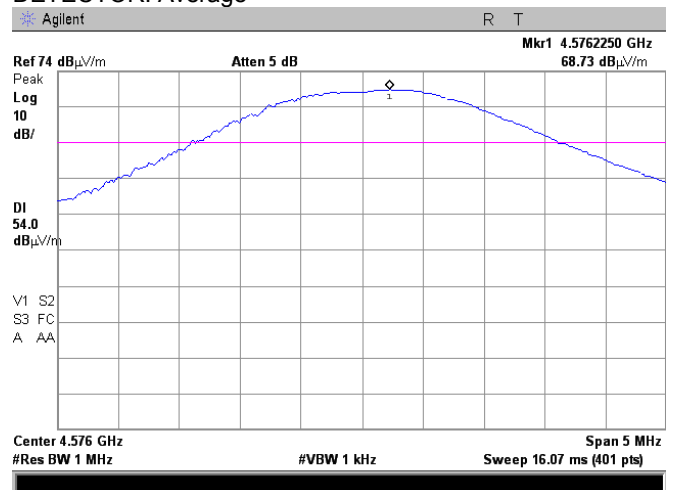
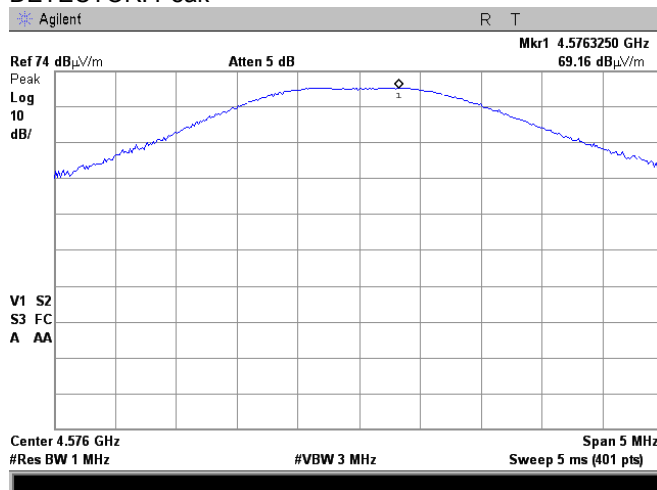
OATS
3 m
Vertical &Horizontal
DETECTOR: Average



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

TEST SITE:
TEST DISTANCE:
ANTENNA POLARIZATION:
DETECTOR: Peak

OATS
3 m
Vertical &Horizontal
DETECTOR: Average





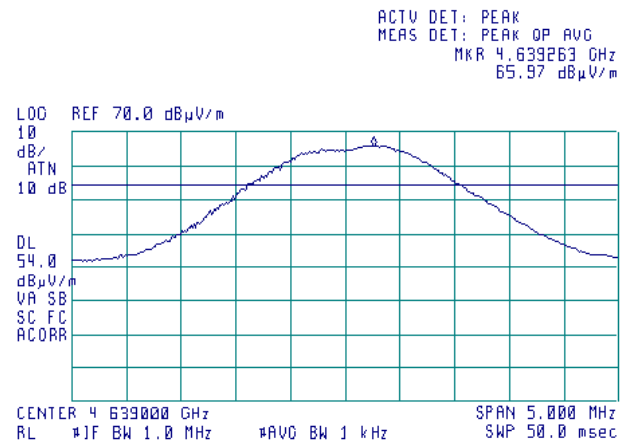
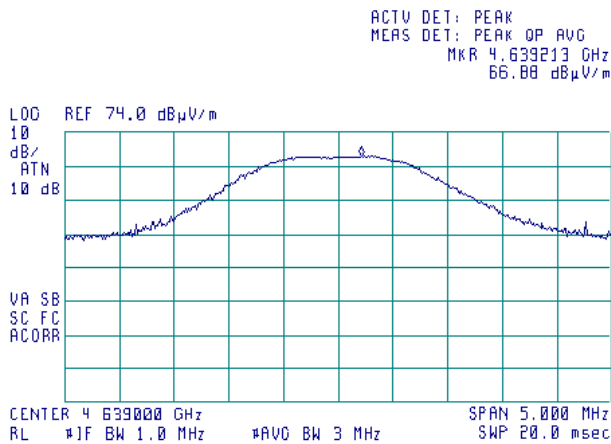
HERMON LABORATORIES

| | | | |
|--|-------------------------------|--------------------------------|------------------------------|
| Test specification: Section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions | | | |
| Test procedure: Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4 | | | |
| Test mode: Compliance | Verdict: PASS | | |
| Date(s): 6/24/2012 - 7/4/2012 | | | |
| Temperature: 23 °C | Air Pressure: 1007 hPa | Relative Humidity: 45 % | Power Supply: Battery |
| Remarks: | | | |

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

TEST SITE:
TEST DISTANCE:
ANTENNA POLARIZATION:
DETECTOR: Peak

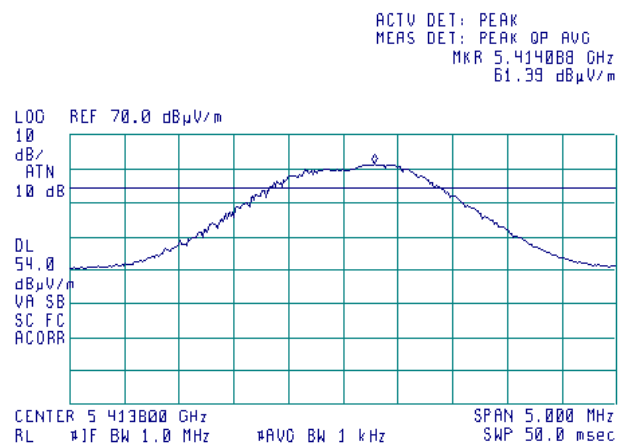
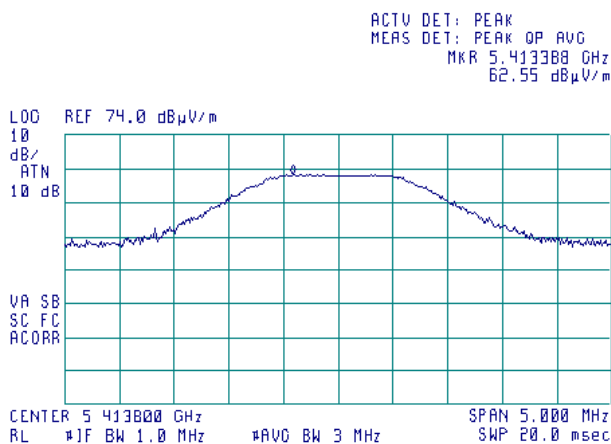
OATS
3 m
Vertical & Horizontal
DETECTOR: Average



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

TEST SITE:
TEST DISTANCE:
ANTENNA POLARIZATION:
DETECTOR: Peak

OATS
3 m
Vertical
DETECTOR: Average



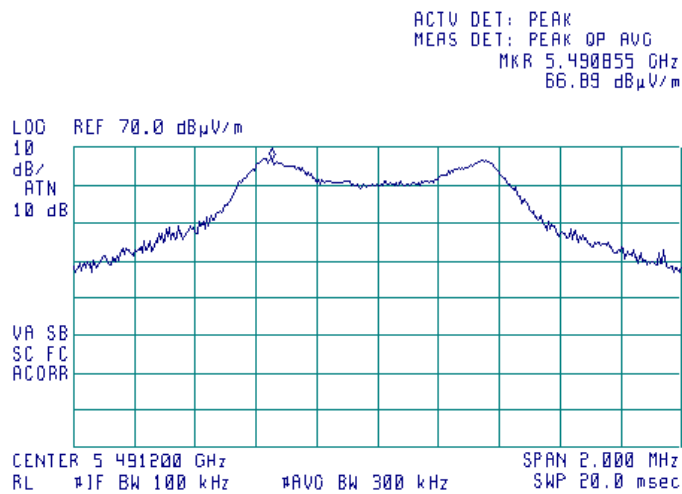


HERMON LABORATORIES

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|----------------------------|-------------------------------|---|------------------------------|
| Test specification: | | Section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions | |
| Test procedure: | | Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4 | |
| Test mode: | | Verdict: PASS | |
| Date(s): | | 6/24/2012 - 7/4/2012 | |
| Temperature: 23 °C | Air Pressure: 1007 hPa | Relative Humidity: 45 % | Power Supply: Battery |
| Remarks: | | | |

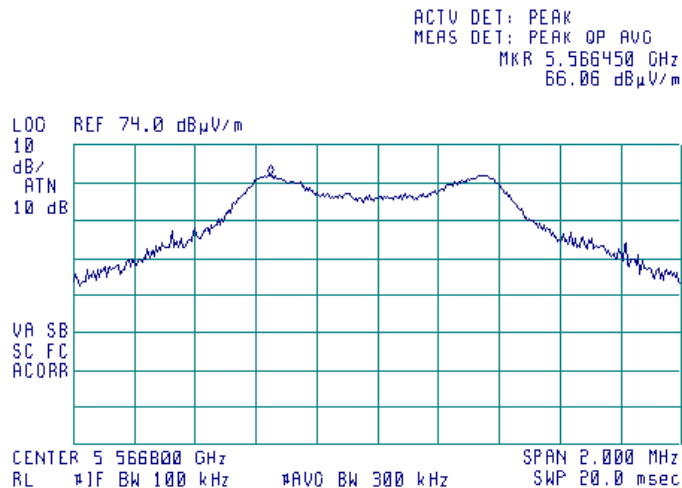
Plot 7.7.37 Radiated emission measurements at the sixth harmonic of mid carrier frequency

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



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

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



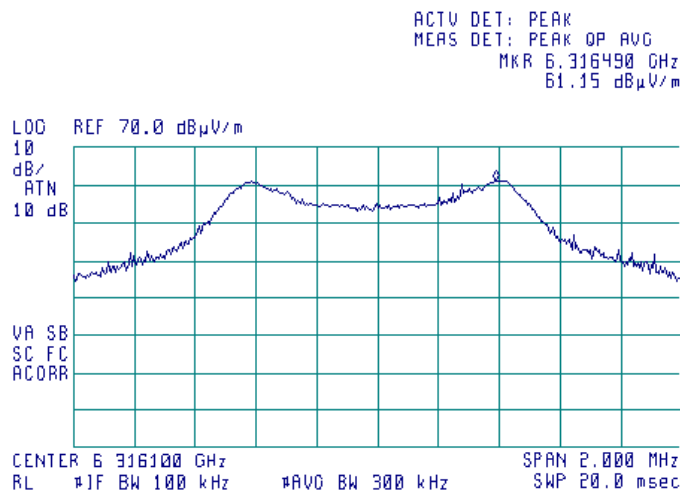


HERMON LABORATORIES

| | | | |
|----------------------------|-------------------------------|---|------------------------------|
| Test specification: | | Section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions | |
| Test procedure: | | Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4 | |
| Test mode: | | Verdict: PASS | |
| Date(s): | | 6/24/2012 - 7/4/2012 | |
| Temperature: 23 °C | Air Pressure: 1007 hPa | Relative Humidity: 45 % | Power Supply: Battery |
| Remarks: | | | |

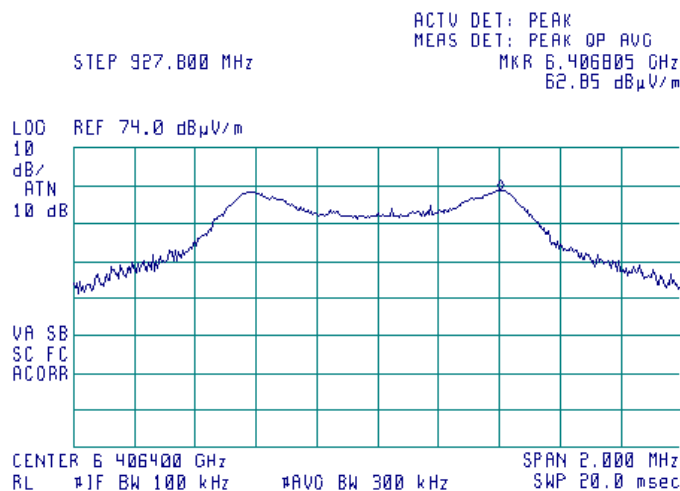
Plot 7.7.39 Radiated emission measurements at the seventh harmonic of low carrier frequency

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



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

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



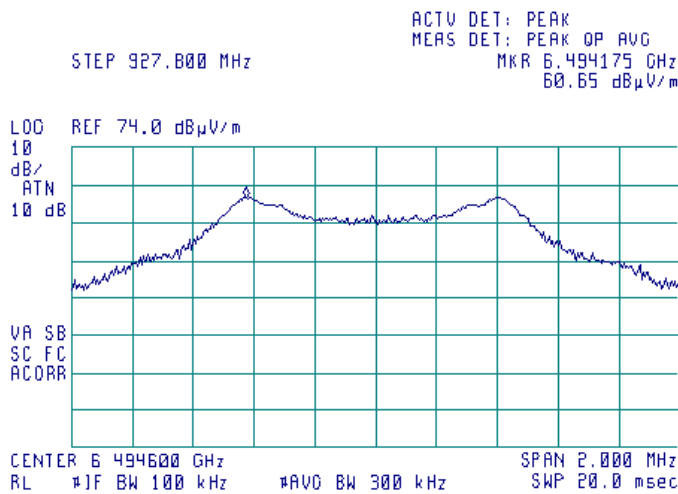


HERMON LABORATORIES

| | | | |
|----------------------------|-------------------------------|---|------------------------------|
| Test specification: | | Section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions | |
| Test procedure: | | Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4 | |
| Test mode: | | Verdict: PASS | |
| Date(s): | | 6/24/2012 - 7/4/2012 | |
| Temperature: 23 °C | Air Pressure: 1007 hPa | Relative Humidity: 45 % | Power Supply: Battery |
| Remarks: | | | |

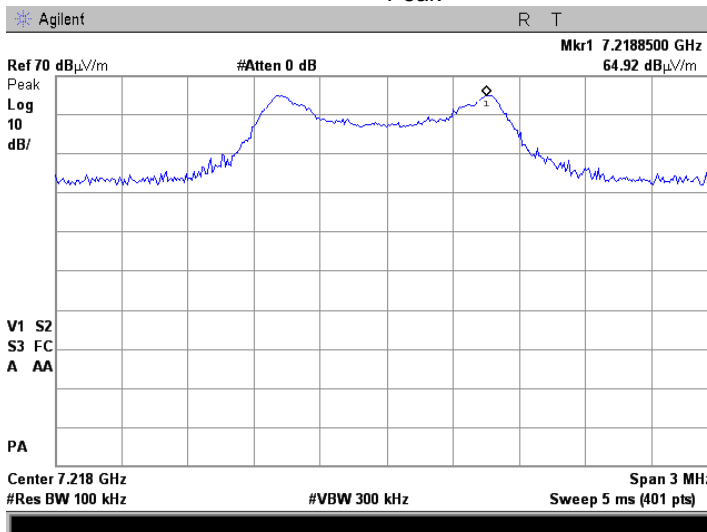
Plot 7.7.41 Radiated emission measurements at the seventh harmonic of high carrier frequency

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



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

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





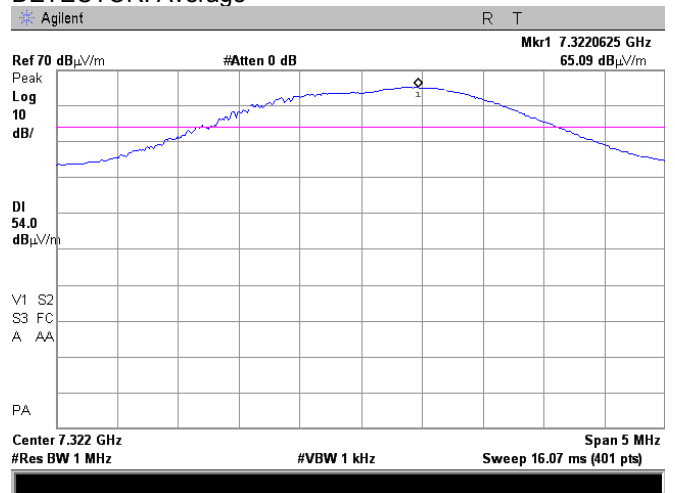
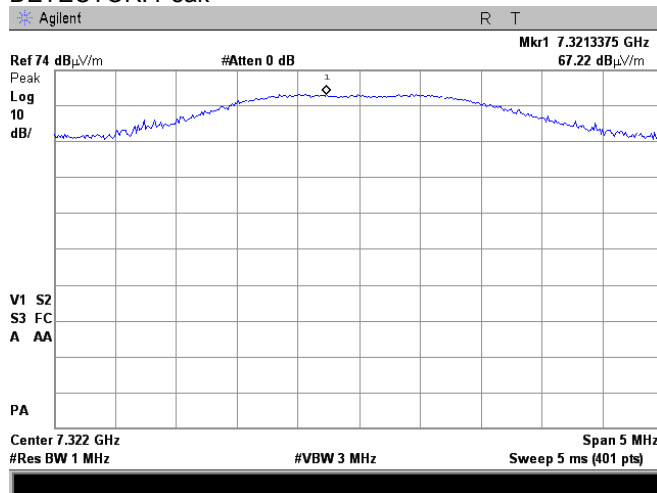
HERMON LABORATORIES

| | | | |
|--|-------------------------------|--------------------------------|------------------------------|
| Test specification: Section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions | | | |
| Test procedure: Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4 | | | |
| Test mode: Compliance | Verdict: PASS | | |
| Date(s): 6/24/2012 - 7/4/2012 | | | |
| Temperature: 23 °C | Air Pressure: 1007 hPa | Relative Humidity: 45 % | Power Supply: Battery |
| Remarks: | | | |

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

TEST SITE:
TEST DISTANCE:
ANTENNA POLARIZATION:
DETECTOR: Peak

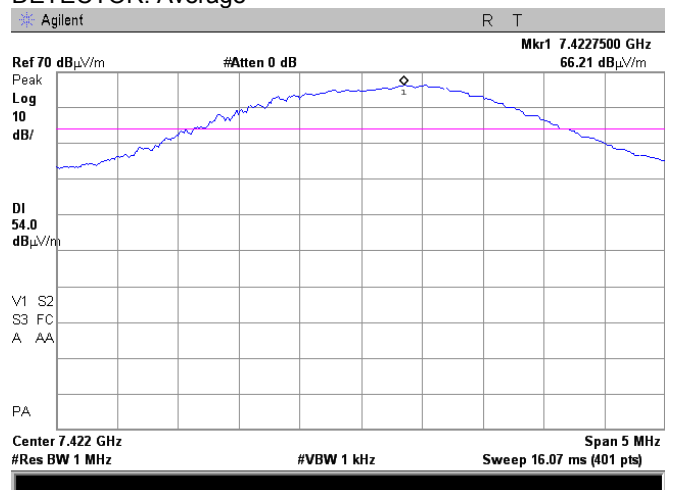
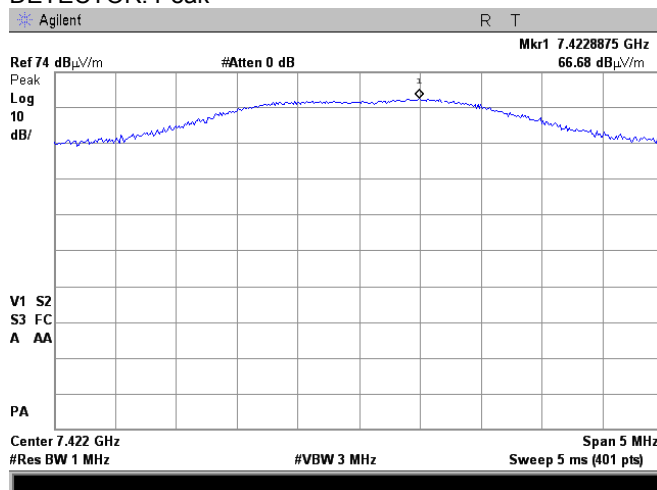
Semi Anechoic chamber
3 m
Vertical and Horizontal
DETECTOR: Average



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

TEST SITE:
TEST DISTANCE:
ANTENNA POLARIZATION:
DETECTOR: Peak

Semi Anechoic chamber
3 m
Vertical and Horizontal
DETECTOR: Average





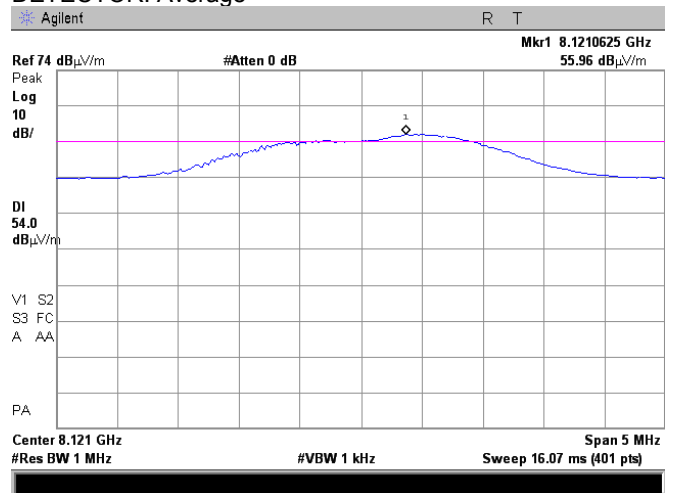
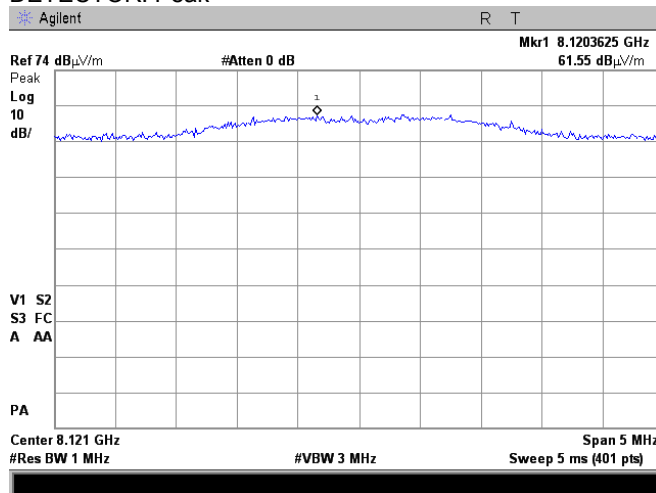
HERMON LABORATORIES

| | |
|--|-------------------------------|
| Test specification: Section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions | |
| Test procedure: Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4 | |
| Test mode: Compliance | Verdict: PASS |
| Date(s): 6/24/2012 - 7/4/2012 | |
| Temperature: 23 °C | Air Pressure: 1007 hPa |
| Relative Humidity: 45 % | Power Supply: Battery |
| Remarks: | |

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

TEST SITE:
TEST DISTANCE:
ANTENNA POLARIZATION:
DETECTOR: Peak

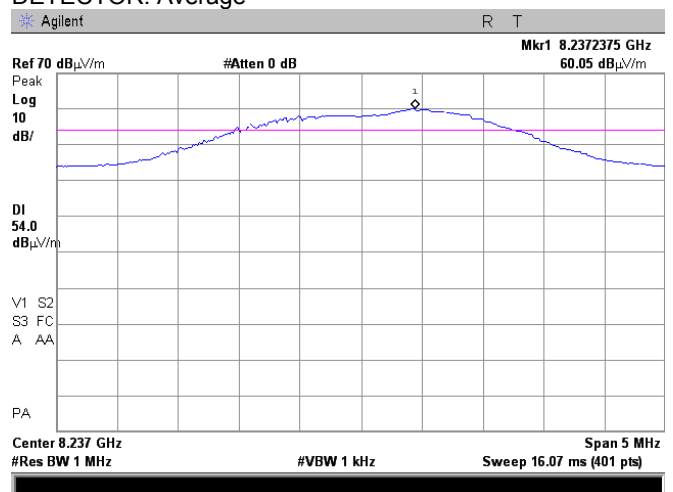
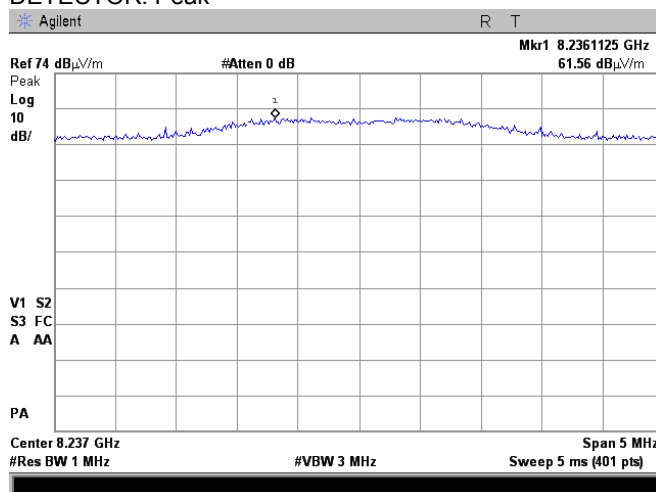
Semi Anechoic chamber
3 m
Vertical and Horizontal
DETECTOR: Average



Plot 7.7.46 Radiated emission measurements at the ninth harmonic of mid carrier frequency

TEST SITE:
TEST DISTANCE:
ANTENNA POLARIZATION:
DETECTOR: Peak

Semi Anechoic chamber
3 m
Vertical and Horizontal
DETECTOR: Average





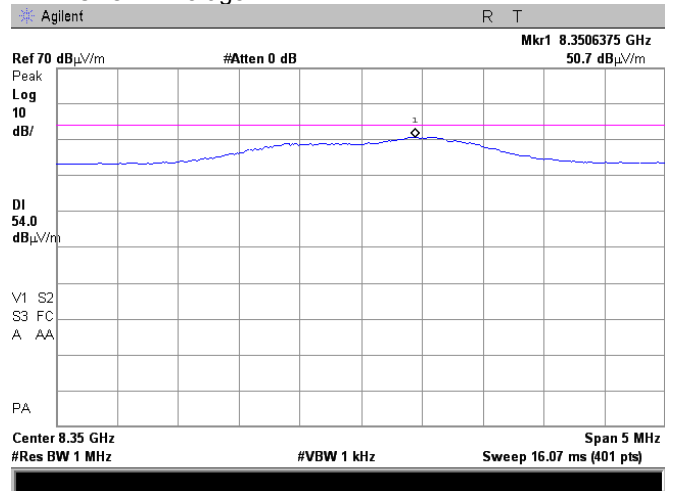
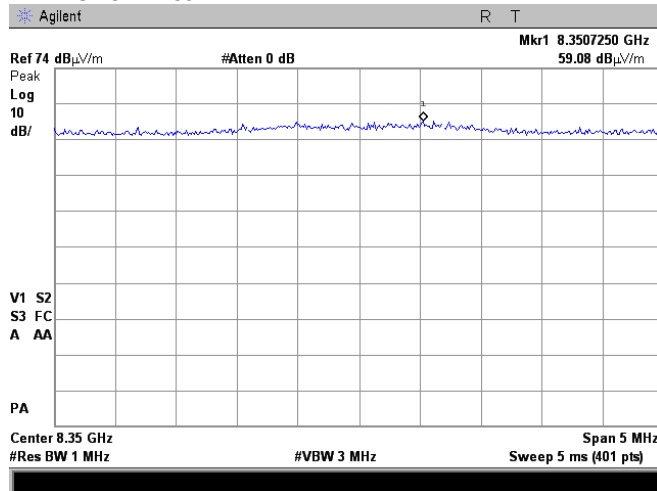
HERMON LABORATORIES

| | |
|--|-------------------------------|
| Test specification: Section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions | |
| Test procedure: Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4 | |
| Test mode: Compliance | Verdict: PASS |
| Date(s): 6/24/2012 - 7/4/2012 | |
| Temperature: 23 °C | Air Pressure: 1007 hPa |
| Relative Humidity: 45 % | Power Supply: Battery |
| Remarks: | |

Plot 7.7.47 Radiated emission measurements at the ninth harmonic of high carrier frequency

TEST SITE:
TEST DISTANCE:
ANTENNA POLARIZATION:
DETECTOR: Peak

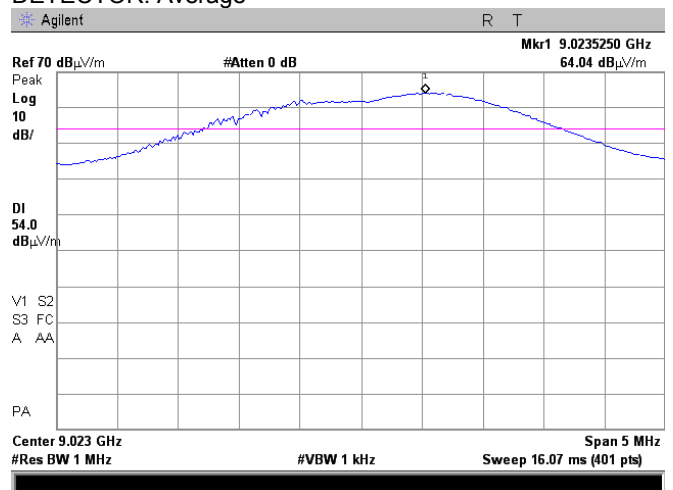
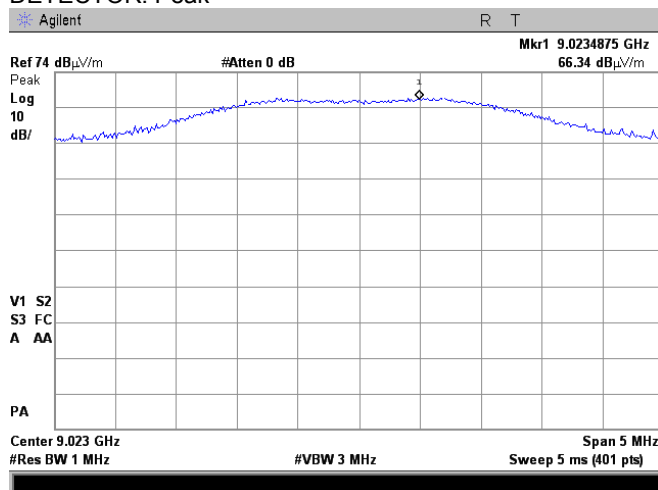
Semi Anechoic chamber
3 m
Vertical and Horizontal
DETECTOR: Average



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

TEST SITE:
TEST DISTANCE:
ANTENNA POLARIZATION:
DETECTOR: Peak

Semi Anechoic chamber
3 m
Vertical and Horizontal
DETECTOR: Average





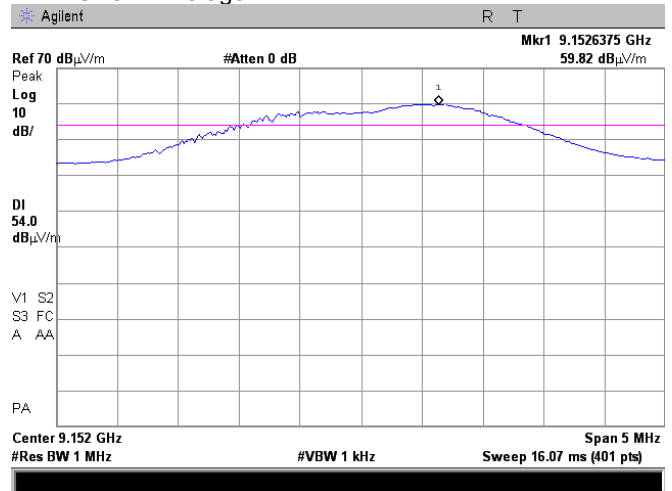
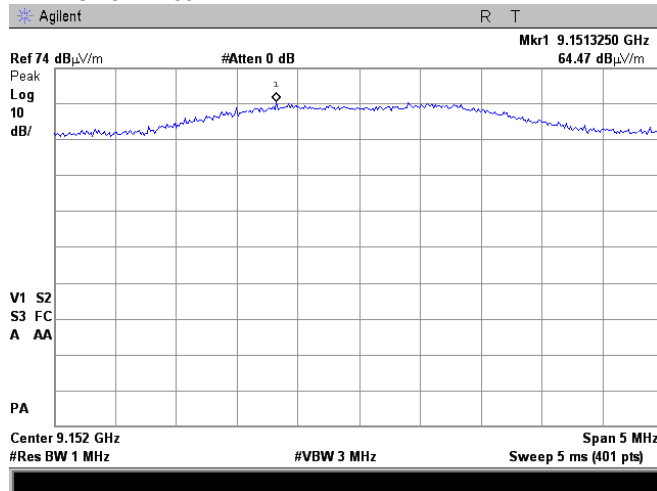
HERMON LABORATORIES

| | | | |
|----------------------------|-------------------------------|---|------------------------------|
| Test specification: | | Section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions | |
| Test procedure: | | Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4 | |
| Test mode: | | Verdict: PASS | |
| Date(s): | | 6/24/2012 - 7/4/2012 | |
| Temperature: 23 °C | Air Pressure: 1007 hPa | Relative Humidity: 45 % | Power Supply: Battery |
| Remarks: | | | |

Plot 7.7.49 Radiated emission measurements at the tenth harmonic of mid carrier frequency

TEST SITE:
TEST DISTANCE:
ANTENNA POLARIZATION:
DETECTOR: Peak

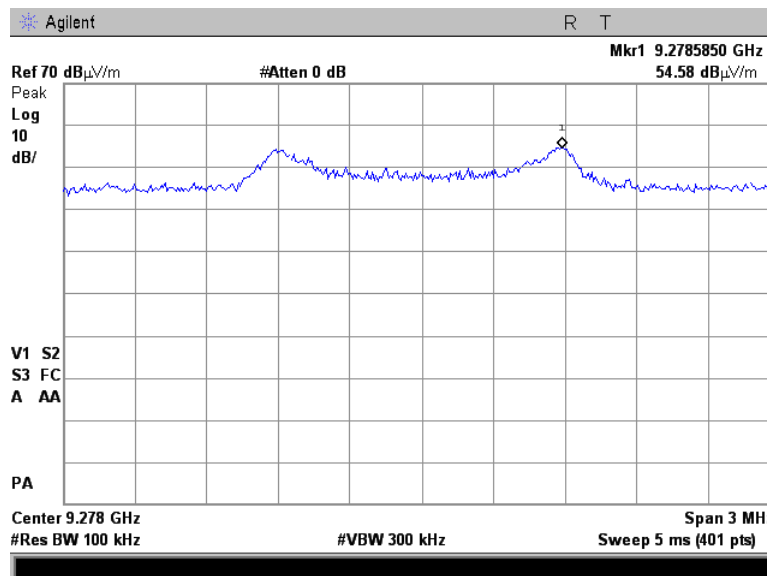
Semi Anechoic chamber
3 m
Vertical
DETECTOR: Average



Plot 7.7.50 Radiated emission measurements at the tenth harmonic of high carrier frequency

TEST SITE:
TEST DISTANCE:
ANTENNA POLARIZATION:
DETECTOR: Peak

Semi Anechoic chamber
3 m
Vertical
DETECTOR: Average

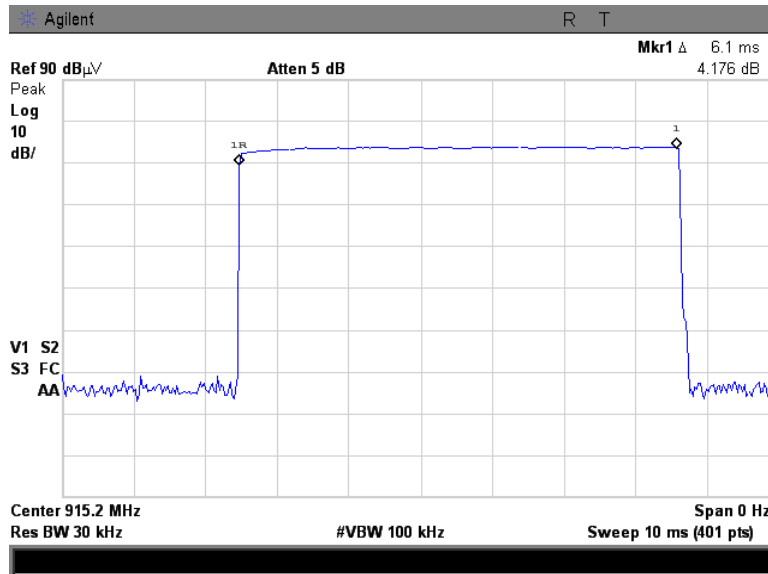




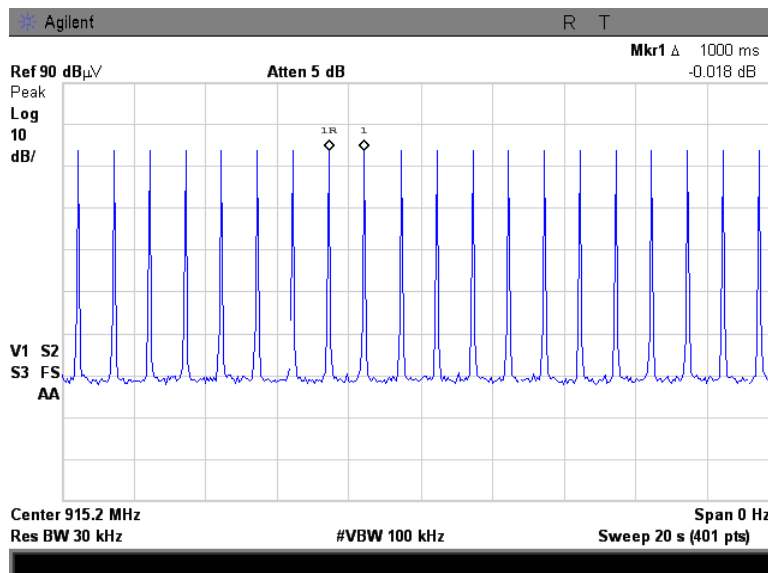
HERMON LABORATORIES

| | | | |
|----------------------------|---|--------------------------------|------------------------------|
| Test specification: | Section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions | | |
| Test procedure: | Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4 | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date(s): | 6/24/2012 - 7/4/2012 | | |
| Temperature: 23 °C | Air Pressure: 1007 hPa | Relative Humidity: 45 % | Power Supply: Battery |
| Remarks: | | | |

Plot 7.7.51 Transmission pulse duration, FHSS



Plot 7.7.52 Transmission pulse period, FHSS





| | | | |
|----------------------------|---|--------------------------------|------------------------------|
| Test specification: | Section 15.247(d), RSS-210 section A8.5, Radiated spurious emissions | | |
| Test procedure: | Public notice DA 00-705 | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date(s): | 7/4/2012 | | |
| Temperature: 22 °C | Air Pressure: 1004 hPa | Relative Humidity: 48 % | Power Supply: 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 | |



| | | | |
|----------------------------|--|---|--|
| Test specification: | | FCC section 15.109, RSS-Gen section 6.1, Radiated emission | |
| Test procedure: | | ANSI C63.4, Sections 11.6 and 12.1.4 | |
| Test mode: | | Compliance | |
| Date(s): | | 7/2/2012 - 7/5/2012 | |
| Temperature: 26 °C | | Air Pressure: 1004 hPa | |
| Remarks: | | Verdict: PASS | |
| | | Relative Humidity: 51 % | |
| | | Power Supply: Battery | |

8 Unintentional emissions tests according to 47CFR part 15 subpart B and RSS-Gen requirements

8.1 Radiated emission measurements

8.1.1 General

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

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

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

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

Table 8.1.2 Radiated emission limits according to RSS-Gen, Section 6.1

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

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

8.1.2 Test procedure for measurements in semi-anechoic chamber

8.1.2.1 The EUT was set up as shown in **Error! Reference source not found.**, energized and the performance check was conducted.

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

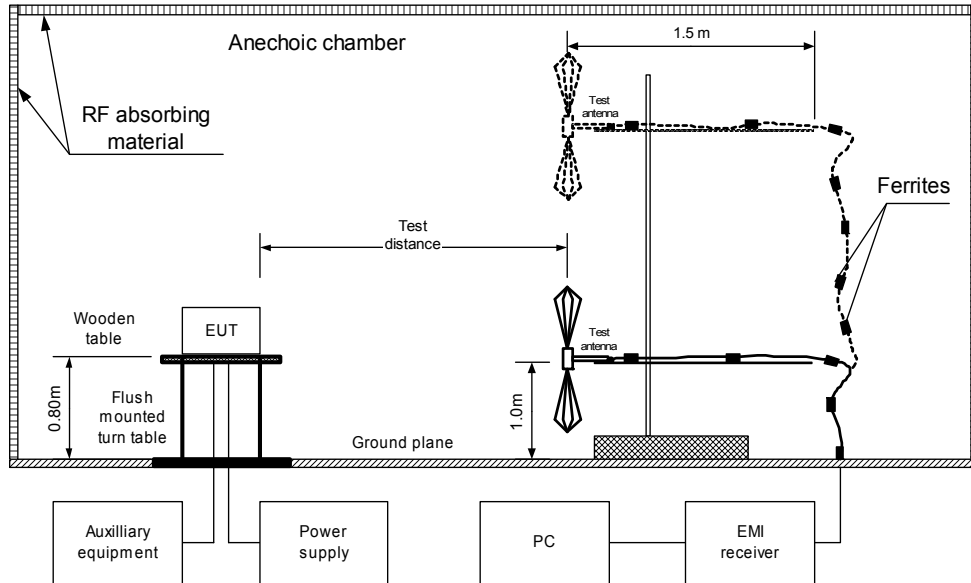
8.1.2.3 The worst test results (the lowest margins) were recorded in Table 8.1.3 and shown in the associated plots.



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| | | | |
|----------------------------|---|--------------------------------|------------------------------|
| Test specification: | FCC section 15.109, RSS-Gen section 6.1, Radiated emission | | |
| Test procedure: | ANSI C63.4, Sections 11.6 and 12.1.4 | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date(s): | 7/2/2012 - 7/5/2012 | | |
| Temperature: 26 °C | Air Pressure: 1004 hPa | Relative Humidity: 51 % | Power Supply: Battery |
| Remarks: | | | |

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



Photograph 8.1.1 Setup for radiated emission measurements, general view





HERMON LABORATORIES

| | | | |
|----------------------------|---|--------------------------------|------------------------------|
| Test specification: | FCC section 15.109, RSS-Gen section 6.1, Radiated emission | | |
| Test procedure: | ANSI C63.4, Sections 11.6 and 12.1.4 | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date(s): | 7/2/2012 - 7/5/2012 | | |
| Temperature: 26 °C | Air Pressure: 1004 hPa | Relative Humidity: 51 % | Power Supply: Battery |
| Remarks: | | | |

Table 8.1.3 Radiated emission test results

EUT SET UP: TABLE-TOP
 LIMIT: Class B
 EUT OPERATING MODE: Receive / Stand-by
 TEST SITE: SEMI ANECHOIC CHAMBER
 TEST DISTANCE: 3 m

DETECTORS USED: PEAK / QUASI-PEAK
 FREQUENCY RANGE: 30 MHz – 1000 MHz
 RESOLUTION BANDWIDTH: 120 kHz

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

DETECTORS USED: PEAK / AVERAGE
 FREQUENCY RANGE: 1000 MHz – 2900 MHz
 RESOLUTION BANDWIDTH: 1000 kHz

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

*- Margin = Measured emission - specification limit.
 **- EUT front panel refer to 0 degrees position of turntable.

Reference numbers of test equipment used

| | | | | | | | |
|--------|--------|---------|---------|---------|--|--|--|
| HL 521 | HL 604 | HL 1984 | HL 2871 | HL 4278 | | | |
|--------|--------|---------|---------|---------|--|--|--|

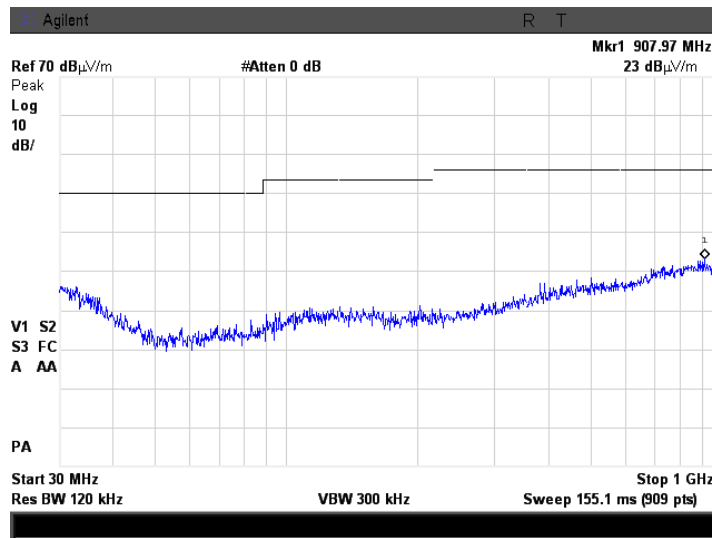
Full description is given in Appendix A.



| | | | |
|----------------------------|--|---|--|
| Test specification: | | FCC section 15.109, RSS-Gen section 6.1, Radiated emission | |
| Test procedure: | | ANSI C63.4, Sections 11.6 and 12.1.4 | |
| Test mode: | | Compliance | |
| Date(s): | | 7/2/2012 - 7/5/2012 | |
| Temperature: 26 °C | | Air Pressure: 1004 hPa | |
| Remarks: | | Verdict: PASS | |
| | | Relative Humidity: 51 % | |
| | | Power Supply: Battery | |

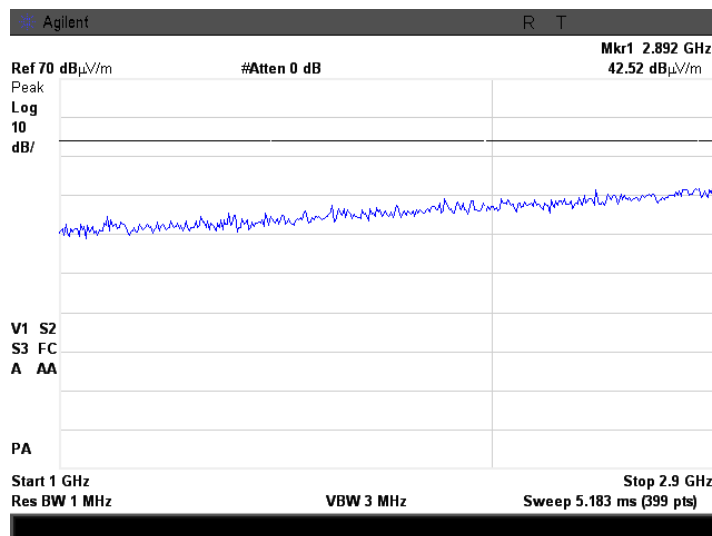
Plot 8.1.1 Radiated emission measurements in 30 - 1000 MHz range, vertical & horizontal antenna polarization

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



Plot 8.1.2 Radiated emission measurements above 1000 MHz, vertical & horizontal antenna polarization

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





9 APPENDIX A Test equipment and ancillaries used for tests

| HL No | Description | Manufacturer | Model | Ser. No. | Last Cal./Check | Due Cal./Check |
|-------|---|-----------------------|---------------------|-----------------------------------|-----------------|----------------|
| 0446 | Antenna, Loop, Active, 10 kHz - 30 MHz | EMCO | 6502 | 2857 | 03-Jul-12 | 03-Jul-13 |
| 0521 | EMI Receiver (Spectrum Analyzer) with RF filter section 9 kHz-6.5 GHz | Hewlett Packard | 8546A | 3617A 00319, 3448A002 53 | 29-Aug-11 | 29-Sep-12 |
| 0604 | Antenna BiconiLog Log-Periodic/T Bow-TIE, 26 - 2000 MHz | EMCO | 3141 | 9611-1011 | 20-May-12 | 20-May-14 |
| 1513 | Cable RF, 8 m, BNC/BNC | Belden | M17/167 MIL-C-17 | 1513 | 01-Sep-11 | 01-Sep-12 |
| 1553 | Cable RF, 3.5 m, N/N-type | Alpha Wire | RG-214 | 1553 | 01-Sep-11 | 01-Sep-12 |
| 1984 | Antenna, Double-Ridged Waveguide Horn, 1-18 GHz, 300 W | EMC Test Systems | 3115 | 9911-5964 | 25-Nov-11 | 25-Nov-12 |
| 2780 | EMC analyzer, 100 Hz to 26.5 GHz | Agilent Technologies | E7405A | MY451024 62 | 09-Jul-12 | 09-Jul-13 |
| 2871 | Microwave Cable Assembly, 18 GHz, 6.4 m, SMA - SMA | Huber-Suhner | 198-8155-00 | 2871 | 15-Jan-12 | 15-Jan-13 |
| 2883 | Cable, 18 GHz N-type, M-F, 3 m | Bird Electronic Corp. | TC-MNFN-3.0 | 211539 003 | 04-Dec-11 | 04-Dec-12 |
| 2909 | Spectrum analyzer, ESA-E, 100 Hz to 26.5 GHz | Agilent Technologies | E4407B | MY414447 62 | 08-May-12 | 08-May-13 |
| 3001 | EMC Analyzer, 9 kHz to 3 GHz | Agilent Technologies | E7402A | US394401 80 | 29-Dec-11 | 29-Dec-12 |
| 3341 | High Pass Filter, 50 Ohm, 1400 to 5000 MHz | Mini-Circuits | VHF-1300+ | NA | 02-Oct-11 | 02-Oct-12 |
| 3342 | High Pass Filter, 50 Ohm, 2000 to 5200 MHz | Mini-Circuits | VHF-1910+ | NA | 02-Oct-11 | 02-Oct-12 |
| 3354 | Low Pass Filter, 50 Ohm, DC to 575 MHz. | Mini-Circuits | VLF-575+ | NA | 02-Oct-11 | 02-Oct-12 |
| 3531 | Amplifier, low noise, 2 to 8 GHz | Quinstar Technology | QLJ-02084040-J0 | 111590020 02 | 25-Dec-11 | 25-Dec-12 |
| 3533 | Amplifier, low noise, 6 to 18 GHz | Quinstar Technology | QLJ-06184040-J0 | 111590010 01 | 25-Dec-11 | 25-Dec-12 |
| 3769 | Attenuator, N-type, 20 dB, DC to 18 GHz, 5 W | Mini-Circuits | BW-N20W5+ | NA | 22-Aug-11 | 22-Aug-12 |
| 3901 | Microwave Cable Assembly, 40.0 GHz, 3.5 m, SMA/SMA | Huber-Suhner | SUCOFLEX 102A | 1225/2A | 08-Feb-12 | 08-Feb-13 |
| 4278 | Test Cable , DC-18 GHz, 4.6 m, N/M - N/M | Mini-Circuits | APC-15FT-NMNM+ | 0755A | 23-Nov-11 | 23-Nov-12 |
| 4280 | Test Cable , DC-18 GHz, 4.6 m, N/M - N/M | Mini-Circuits | APC-15FT-NMNM+ | 0763A | 01-Jan-12 | 01-Jan-13 |



10 APPENDIX B Measurement uncertainties

Expanded uncertainty at 95% confidence in Hermon Labs EMC measurements

| Test description | Expanded uncertainty |
|--|--|
| Conducted carrier power at RF antenna connector | Below 12.4 GHz: ± 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 % |
| Conducted emissions with LISN | 9 kHz to 150 kHz: ± 3.9 dB 150 kHz to 30 MHz: ± 3.8 dB |
| Radiated emissions at 3 m measuring distance Horizontal polarization 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.

11 APPENDIX C Test laboratory description

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

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

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Person for contact: Mr. Alex Usoskin, CEO.

12 APPENDIX D Specification references

| | |
|--------------------------------|--|
| FCC 47CFR part 15: 2011 | Radio Frequency Devices. |
| Public notice DA 00- 705: 2000 | Filing and measurement guidelines for frequency hopping spread spectrum systems. |
| ANSI C63.2: 1996 | American National Standard for Instrumentation-Electromagnetic Noise and Field Strength, 10 kHz to 40 GHz-Specifications. |
| ANSI C63.4: 2003 | American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz. |
| RSS-210 Issue 8: 2010 | Low Power Licence- Exempt Radiocommunication Devices |
| RSS-Gen Issue 3: 2010 | General Requirements and Information for the Certification of Radiocommunication Equipment |



13 APPENDIX E Test equipment correction factors

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

| Frequency, 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) |
|----------------|-------------------------|
| 26 | 7.8 |
| 28 | 7.8 |
| 30 | 7.8 |
| 40 | 7.2 |
| 60 | 7.1 |
| 70 | 8.5 |
| 80 | 9.4 |
| 90 | 9.8 |
| 100 | 9.7 |
| 110 | 9.3 |
| 120 | 8.8 |
| 130 | 8.7 |
| 140 | 9.2 |
| 150 | 9.8 |
| 160 | 10.2 |
| 170 | 10.4 |
| 180 | 10.4 |
| 190 | 10.3 |
| 200 | 10.6 |
| 220 | 11.6 |
| 240 | 12.4 |
| 260 | 12.8 |
| 280 | 13.7 |
| 300 | 14.7 |
| 320 | 15.2 |
| 340 | 15.4 |
| 360 | 16.1 |
| 380 | 16.4 |
| 400 | 16.6 |
| 420 | 16.7 |
| 440 | 17.0 |
| 460 | 17.7 |
| 480 | 18.1 |
| 500 | 18.5 |
| 520 | 19.1 |
| 540 | 19.5 |
| 560 | 19.8 |
| 580 | 20.6 |
| 600 | 21.3 |
| 620 | 21.5 |
| 640 | 21.2 |
| 660 | 21.4 |
| 680 | 21.9 |
| 700 | 22.2 |
| 720 | 22.2 |
| 740 | 22.1 |
| 760 | 22.3 |
| 780 | 22.6 |
| 800 | 22.7 |
| 820 | 22.9 |
| 840 | 23.1 |
| 860 | 23.4 |
| 880 | 23.8 |
| 900 | 24.1 |
| 920 | 24.1 |

| Frequency, MHz | Antenna Factor, dB(1/m) |
|----------------|-------------------------|
| 940 | 24.0 |
| 960 | 24.1 |
| 980 | 24.5 |
| 1000 | 24.9 |
| 1020 | 25.0 |
| 1040 | 25.2 |
| 1060 | 25.4 |
| 1080 | 25.6 |
| 1100 | 25.7 |
| 1120 | 26.0 |
| 1140 | 26.4 |
| 1160 | 27.0 |
| 1180 | 27.0 |
| 1200 | 26.7 |
| 1220 | 26.5 |
| 1240 | 26.5 |
| 1260 | 26.5 |
| 1280 | 26.6 |
| 1300 | 27.0 |
| 1320 | 27.8 |
| 1340 | 28.3 |
| 1360 | 28.2 |
| 1380 | 27.9 |
| 1400 | 27.9 |
| 1420 | 27.9 |
| 1440 | 27.8 |
| 1460 | 27.8 |
| 1480 | 28.0 |
| 1500 | 28.5 |
| 1520 | 28.9 |
| 1540 | 29.6 |
| 1560 | 29.8 |
| 1580 | 29.6 |
| 1600 | 29.5 |
| 1620 | 29.3 |
| 1640 | 29.2 |
| 1660 | 29.4 |
| 1680 | 29.6 |
| 1700 | 29.8 |
| 1720 | 30.3 |
| 1740 | 30.8 |
| 1760 | 31.1 |
| 1780 | 31.0 |
| 1800 | 30.9 |
| 1820 | 30.7 |
| 1840 | 30.6 |
| 1860 | 30.6 |
| 1880 | 30.6 |
| 1900 | 30.6 |
| 1920 | 30.7 |
| 1940 | 30.9 |
| 1960 | 31.2 |
| 1980 | 31.6 |
| 2000 | 32.0 |

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



Cable loss
RF cable 3.5 m, Alpha Wire, model RG-214, S/N 149, HL 1553

| No. | Frequency, MHz | Cable loss, dB | Measurement uncertainty, dB |
|-----|----------------|----------------|-----------------------------|
| 1 | 1 | 0.01 | ±0.05 |
| 2 | 10 | 0.07 | |
| 3 | 30 | 0.12 | |
| 4 | 50 | 0.22 | |
| 5 | 100 | 0.26 | |
| 6 | 200 | 0.40 | |
| 7 | 300 | 0.52 | |
| 8 | 400 | 0.60 | |
| 9 | 500 | 0.70 | |
| 10 | 600 | 0.77 | |
| 11 | 700 | 0.84 | |
| 12 | 800 | 1.00 | |
| 13 | 900 | 1.00 | |
| 14 | 1000 | 1.05 | |
| 15 | 2000 | 1.70 | |



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, Huber-Suhner, 40 GHz, 3.5 m, SMA-SMA, S/N 1225/2A
HL 3901

| Frequency, MHz | Cable loss, dB | Frequency, MHz | Cable loss, dB | Frequency, MHz | Cable loss, dB |
|----------------|----------------|----------------|----------------|----------------|----------------|
| 10 | 0.09 | 9500 | 4.29 | 21000 | 6.67 |
| 100 | 0.41 | 10000 | 4.40 | 22000 | 6.92 |
| 500 | 0.93 | 10500 | 4.52 | 23000 | 7.00 |
| 1000 | 1.33 | 11000 | 4.64 | 24000 | 7.18 |
| 1500 | 1.63 | 11500 | 4.76 | 25000 | 7.29 |
| 2000 | 1.90 | 12000 | 4.87 | 26000 | 7.55 |
| 2500 | 2.12 | 12500 | 4.99 | 27000 | 7.70 |
| 3000 | 2.33 | 13000 | 5.11 | 28000 | 7.88 |
| 3500 | 2.50 | 13500 | 5.20 | 29000 | 8.02 |
| 4000 | 2.67 | 14000 | 5.31 | 30000 | 8.15 |
| 4500 | 2.82 | 14500 | 5.42 | 31000 | 8.35 |
| 5000 | 2.99 | 15000 | 5.51 | 32000 | 8.40 |
| 5500 | 3.16 | 15500 | 5.58 | 33000 | 8.62 |
| 6000 | 3.32 | 16000 | 5.68 | 34000 | 8.73 |
| 6500 | 3.51 | 16500 | 5.78 | 35000 | 8.78 |
| 7000 | 3.65 | 17000 | 5.91 | 36000 | 8.94 |
| 7500 | 3.79 | 17500 | 5.99 | 37000 | 9.21 |
| 8000 | 3.92 | 18000 | 6.07 | 38000 | 9.37 |
| 8500 | 4.04 | 19000 | 6.36 | 39000 | 9.45 |
| 9000 | 4.18 | 20000 | 6.49 | 40000 | 9.52 |



Cable loss
Test cable, Mini-Circuits, S/N 0755A, 18 GHz, 4.6 m, N/M - N/M
APC-15FT-NMNM+, HL 4278

| Frequency, MHz | Cable loss, dB | Frequency, MHz | Cable loss, dB | Frequency, MHz | Cable loss, dB | Frequency, MHz | Cable loss, dB |
|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| 10 | 0.24 | 5000 | 4.25 | 10200 | 6.52 | 15400 | 8.40 |
| 30 | 0.26 | 5100 | 4.29 | 10300 | 6.57 | 15500 | 8.42 |
| 50 | 0.34 | 5200 | 4.32 | 10400 | 6.59 | 15600 | 8.46 |
| 100 | 0.50 | 5300 | 4.38 | 10500 | 6.61 | 15700 | 8.50 |
| 200 | 0.72 | 5400 | 4.41 | 10600 | 6.64 | 15800 | 8.52 |
| 300 | 0.90 | 5500 | 4.46 | 10700 | 6.64 | 15900 | 8.56 |
| 400 | 1.06 | 5600 | 4.51 | 10800 | 6.65 | 16000 | 8.61 |
| 500 | 1.20 | 5700 | 4.56 | 10900 | 6.68 | 16100 | 8.64 |
| 600 | 1.32 | 5800 | 4.59 | 11000 | 6.68 | 16200 | 8.66 |
| 700 | 1.44 | 5900 | 4.64 | 11100 | 6.69 | 16300 | 8.70 |
| 800 | 1.54 | 6000 | 4.69 | 11200 | 6.70 | 16400 | 8.73 |
| 900 | 1.64 | 6100 | 4.72 | 11300 | 6.74 | 16500 | 8.74 |
| 1000 | 1.74 | 6200 | 4.77 | 11400 | 6.78 | 16600 | 8.75 |
| 1100 | 1.83 | 6300 | 4.80 | 11500 | 6.81 | 16700 | 8.78 |
| 1200 | 1.92 | 6400 | 4.83 | 11600 | 6.84 | 16800 | 8.79 |
| 1300 | 2.01 | 6500 | 4.89 | 11700 | 6.87 | 16900 | 8.81 |
| 1400 | 2.09 | 6600 | 4.90 | 11800 | 6.92 | 17000 | 8.85 |
| 1500 | 2.18 | 6700 | 4.95 | 11900 | 6.98 | 17100 | 8.90 |
| 1600 | 2.25 | 6800 | 5.01 | 12000 | 7.02 | 17200 | 8.95 |
| 1700 | 2.33 | 6900 | 4.99 | 12100 | 7.08 | 17300 | 8.99 |
| 1800 | 2.39 | 7000 | 5.04 | 12200 | 7.15 | 17400 | 9.03 |
| 1900 | 2.47 | 7100 | 5.11 | 12300 | 7.20 | 17500 | 9.07 |
| 2000 | 2.53 | 7200 | 5.14 | 12400 | 7.26 | 17600 | 9.11 |
| 2100 | 2.60 | 7300 | 5.21 | 12500 | 7.31 | 17700 | 9.15 |
| 2200 | 2.67 | 7400 | 5.29 | 12600 | 7.36 | 17800 | 9.19 |
| 2300 | 2.73 | 7500 | 5.33 | 12700 | 7.41 | 17900 | 9.24 |
| 2400 | 2.80 | 7600 | 5.38 | 12800 | 7.46 | 18000 | 9.28 |
| 2500 | 2.87 | 7700 | 5.46 | 12900 | 7.51 | | |
| 2600 | 2.93 | 7800 | 5.52 | 13000 | 7.55 | | |
| 2700 | 3.00 | 7900 | 5.58 | 13100 | 7.59 | | |
| 2800 | 3.06 | 8000 | 5.64 | 13200 | 7.65 | | |
| 2900 | 3.12 | 8100 | 5.69 | 13300 | 7.69 | | |
| 3000 | 3.18 | 8200 | 5.75 | 13400 | 7.72 | | |
| 3100 | 3.24 | 8300 | 5.80 | 13500 | 7.78 | | |
| 3200 | 3.30 | 8400 | 5.84 | 13600 | 7.82 | | |
| 3300 | 3.35 | 8500 | 5.90 | 13700 | 7.86 | | |
| 3400 | 3.42 | 8600 | 5.97 | 13800 | 7.91 | | |
| 3500 | 3.46 | 8700 | 5.99 | 13900 | 7.96 | | |
| 3600 | 3.52 | 8800 | 6.04 | 14000 | 8.01 | | |
| 3700 | 3.57 | 8900 | 6.10 | 14100 | 8.06 | | |
| 3800 | 3.61 | 9000 | 6.13 | 14200 | 8.10 | | |
| 3900 | 3.67 | 9100 | 6.17 | 14300 | 8.13 | | |
| 4000 | 3.71 | 9200 | 6.23 | 14400 | 8.16 | | |
| 4100 | 3.77 | 9300 | 6.27 | 14500 | 8.19 | | |
| 4200 | 3.83 | 9400 | 6.30 | 14600 | 8.21 | | |
| 4300 | 3.89 | 9500 | 6.35 | 14700 | 8.23 | | |
| 4400 | 3.94 | 9600 | 6.37 | 14800 | 8.26 | | |
| 4500 | 4.00 | 9700 | 6.40 | 14900 | 8.28 | | |
| 4600 | 4.05 | 9800 | 6.44 | 15000 | 8.30 | | |
| 4700 | 4.10 | 9900 | 6.45 | 15100 | 8.33 | | |
| 4800 | 4.16 | 10000 | 6.47 | 15200 | 8.35 | | |
| 4900 | 4.19 | 10100 | 6.50 | 15300 | 8.37 | | |



Cable loss
Test cable, Mini-Circuits, S/N 0763A, 18 GHz, 4.6 m, N/M - N/M
APC-15FT-NMNM+, HL 4280

| Frequency, MHz | Cable loss, dB | Frequency, MHz | Cable loss, dB | Frequency, MHz | Cable loss, dB | Frequency, MHz | Cable loss, dB |
|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| 10 | 0.21 | 5000 | 4.27 | 10200 | 6.50 | 15400 | 8.49 |
| 30 | 0.26 | 5100 | 4.32 | 10300 | 6.55 | 15500 | 8.50 |
| 50 | 0.34 | 5200 | 4.35 | 10400 | 6.59 | 15600 | 8.55 |
| 100 | 0.51 | 5300 | 4.41 | 10500 | 6.62 | 15700 | 8.58 |
| 200 | 0.63 | 5400 | 4.43 | 10600 | 6.65 | 15800 | 8.61 |
| 300 | 0.73 | 5500 | 4.49 | 10700 | 6.66 | 15900 | 8.64 |
| 400 | 0.91 | 5600 | 4.54 | 10800 | 6.68 | 16000 | 8.68 |
| 500 | 1.07 | 5700 | 4.58 | 10900 | 6.70 | 16100 | 8.72 |
| 600 | 1.21 | 5800 | 4.63 | 11000 | 6.71 | 16200 | 8.73 |
| 700 | 1.33 | 5900 | 4.67 | 11100 | 6.72 | 16300 | 8.75 |
| 800 | 1.45 | 6000 | 4.73 | 11200 | 6.74 | 16400 | 8.77 |
| 900 | 1.55 | 6100 | 4.76 | 11300 | 6.77 | 16500 | 8.80 |
| 1000 | 1.65 | 6200 | 4.81 | 11400 | 6.81 | 16600 | 8.80 |
| 1100 | 1.75 | 6300 | 4.86 | 11500 | 6.84 | 16700 | 8.82 |
| 1200 | 1.85 | 6400 | 4.89 | 11600 | 6.87 | 16800 | 8.83 |
| 1300 | 1.94 | 6500 | 4.94 | 11700 | 6.89 | 16900 | 8.87 |
| 1400 | 2.03 | 6600 | 4.95 | 11800 | 6.94 | 17000 | 8.92 |
| 1500 | 2.11 | 6700 | 4.99 | 11900 | 7.00 | 17100 | 8.96 |
| 1600 | 2.19 | 6800 | 5.04 | 12000 | 7.05 | 17200 | 9.01 |
| 1700 | 2.27 | 6900 | 5.04 | 12100 | 7.10 | 17300 | 9.07 |
| 1800 | 2.34 | 7000 | 5.09 | 12200 | 7.17 | 17400 | 9.09 |
| 1900 | 2.42 | 7100 | 5.15 | 12300 | 7.23 | 17500 | 9.14 |
| 2000 | 2.49 | 7200 | 5.19 | 12400 | 7.29 | 17600 | 9.17 |
| 2100 | 2.56 | 7300 | 5.25 | 12500 | 7.34 | 17700 | 9.21 |
| 2200 | 2.63 | 7400 | 5.33 | 12600 | 7.38 | 17800 | 9.24 |
| 2300 | 2.69 | 7500 | 5.39 | 12700 | 7.44 | 17900 | 9.28 |
| 2400 | 2.76 | 7600 | 5.42 | 12800 | 7.48 | 18000 | 9.31 |
| 2500 | 2.83 | 7700 | 5.51 | 12900 | 7.55 | | |
| 2600 | 2.89 | 7800 | 5.58 | 13000 | 7.58 | | |
| 2700 | 2.95 | 7900 | 5.62 | 13100 | 7.63 | | |
| 2800 | 3.02 | 8000 | 5.68 | 13200 | 7.67 | | |
| 2900 | 3.08 | 8100 | 5.73 | 13300 | 7.72 | | |
| 3000 | 3.15 | 8200 | 5.78 | 13400 | 7.76 | | |
| 3100 | 3.21 | 8300 | 5.83 | 13500 | 7.81 | | |
| 3200 | 3.27 | 8400 | 5.87 | 13600 | 7.85 | | |
| 3300 | 3.33 | 8500 | 5.92 | 13700 | 7.88 | | |
| 3400 | 3.38 | 8600 | 5.96 | 13800 | 7.93 | | |
| 3500 | 3.44 | 8700 | 6.00 | 13900 | 7.97 | | |
| 3600 | 3.49 | 8800 | 6.04 | 14000 | 8.01 | | |
| 3700 | 3.55 | 8900 | 6.10 | 14100 | 8.05 | | |
| 3800 | 3.60 | 9000 | 6.13 | 14200 | 8.09 | | |
| 3900 | 3.65 | 9100 | 6.17 | 14300 | 8.12 | | |
| 4000 | 3.71 | 9200 | 6.22 | 14400 | 8.15 | | |
| 4100 | 3.75 | 9300 | 6.25 | 14500 | 8.19 | | |
| 4200 | 3.81 | 9400 | 6.28 | 14600 | 8.22 | | |
| 4300 | 3.86 | 9500 | 6.32 | 14700 | 8.26 | | |
| 4400 | 3.93 | 9600 | 6.36 | 14800 | 8.29 | | |
| 4500 | 3.98 | 9700 | 6.37 | 14900 | 8.32 | | |
| 4600 | 4.03 | 9800 | 6.41 | 15000 | 8.36 | | |
| 4700 | 4.08 | 9900 | 6.42 | 15100 | 8.40 | | |
| 4800 | 4.13 | 10000 | 6.45 | 15200 | 8.43 | | |
| 4900 | 4.18 | 10100 | 6.48 | 15300 | 8.44 | | |



14 APPENDIX F Abbreviations and acronyms

| | |
|----------------|---|
| A | ampere |
| AC | alternating current |
| A/m | ampere per meter |
| AM | amplitude modulation |
| AVRG | average (detector) |
| cm | centimeter |
| dB | decibel |
| dBm | decibel referred to one milliwatt |
| dB(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