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1 Applicant information

Client name: Yoggie Security Systems Ltd.
Address: Block 310, P.O.Box 156, Beth Halevy 42870, Israel
Telephone: +972 9894 4900
Fax: +972 9894 4800
E-mail: ami@yoggie.com
Contact name: Mr. Ami Oz

2 Equipment under test attributes

Product name: Wireless network application card
Product type: Transceiver operating in 2412 – 2472 MHz range (802.11b/g protocol) / 2402 – 2480 MHz range (Core v2.1 + EDR protocol)
Model(s): Constant Connect and Protect
Serial number: 00000001
OEM Part number: 210-SA-00001
Lenovo Part number: 3321-20U
Receipt date 5/14/2009

3 Manufacturer information

Manufacturer name: Yoggie Security Systems Ltd.
Address: Block 310, P.O.Box 156, Beth Halevy 42870, Israel
Telephone: +972 9894 4900
Fax: +972 9894 4800
E-Mail: ami@yoggie.com
Contact name: Mr. Ami Oz

4 Test details

Project ID: 19597
Location: Hermon Laboratories Ltd. Harakevet Industrial Zone, Binyamina 30500, Israel
Test started: 5/14/2009
Test completed: 6/17/2009
Test specification(s): FCC 47CFR part 15, subpart C §15.247 and RSS-210 issue 7, Annex 8 (FHSS)



5 Tests summary

| Test | Status |
|---|--------|
| Transmitter characteristics | |
| FCC Section 15.247(a)1, (g), (h), RSS-210 section A8.1(a), Frequency hopping requirements | Pass |
| FCC Section 15.247(a)1, RSS-210 section A8.1(a), 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(d), Number of hopping frequencies | Pass |
| FCC Section 15.247(a)1, RSS-210 section A8.1(d), Average time of occupancy | Pass |
| FCC Section 15.247(b)(1), RSS-210 section A8.4(2), Peak output power | Pass |
| FCC Section 15.247(i), RSS-Gen, section 5.5, RF exposure | 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 7.1.4, Antenna requirements | Pass |
| FCC Section 15.207(a), RSS-Gen section 7.2.2, Conducted emission | Pass |

Testing was completed against all relevant requirements of the test standard. 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: | Mr. L. Markel, test engineer | June 17, 2009 | |
| Reviewed by: | Mrs. M. Cherniavsky, certification engineer | June 22, 2009 | |
| Approved by: | Mr. M. Nikishin, EMC and radio group manager | June 23, 2009 | |

6 EUT description

6.1 General information

The EUT is a wireless card inserted into a laptop. It supports Wi-Fi and Bluetooth protocols and can transmit in one mode only at a time. No simultaneous transmission is allowed.

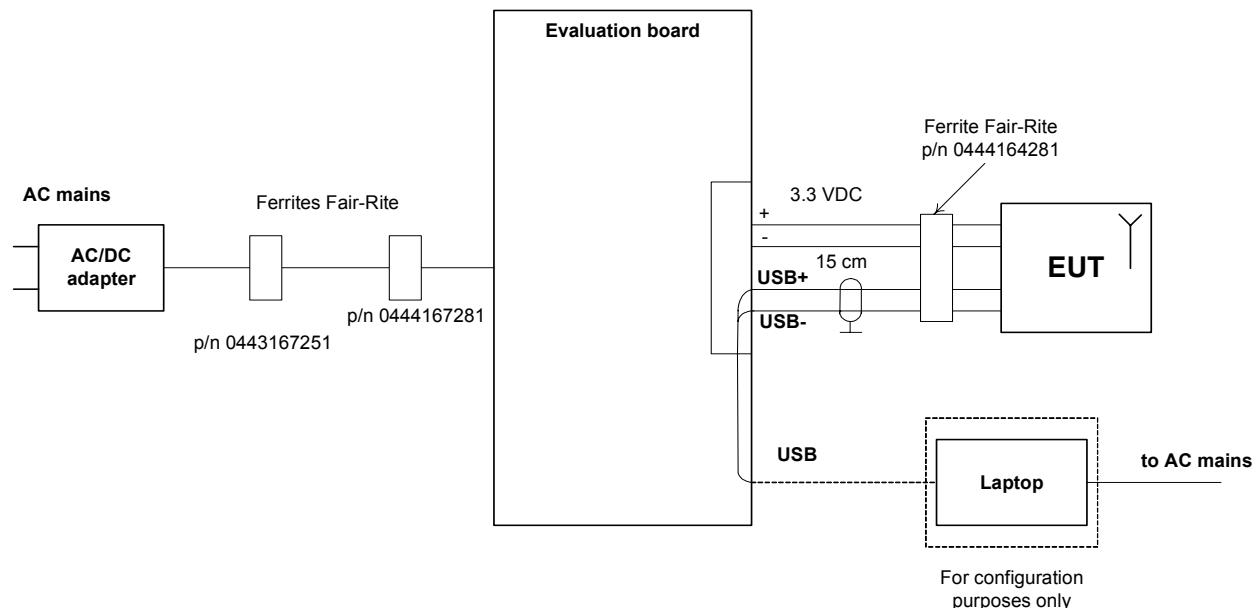
6.2 Ports and lines

| Port type | Port description | Connected from | Connected to | Qty. | Cable type | Cable Length, m |
|-----------|------------------|------------------|------------------|------|--------------------|-----------------|
| Signal | USB | Evaluation board | Laptop | 1 | Shielded | 1.5 |
| Signal | Express card | EUT | Evaluation board | 1 | Shielded | 0.15 |
| Power | DC Power | Evaluation board | EUT | 1 | Unshielded | 0.15 |
| Power | DC Power | AC/DC adaptor | Evaluation board | 1 | Unshielded | 1.5 |
| Power | AC mains | AC/DC adapter | AC mains | 1 | 2-pole wall-outlet | NA |

6.3 Support and test equipment

| Description | Manufacturer | Model number | Serial number |
|------------------|-------------------------|--------------|---------------|
| Evaluation board | Yoggie Security Systems | 2.1 | 000-PB-00301 |
| Laptop | Lenovo | T400 | L3-D754808/10 |

6.4 Test configuration



6.5 EUT configuration during the field strength measurement tests

Figure 6.5.1 The EUT in X-axis orthogonal position

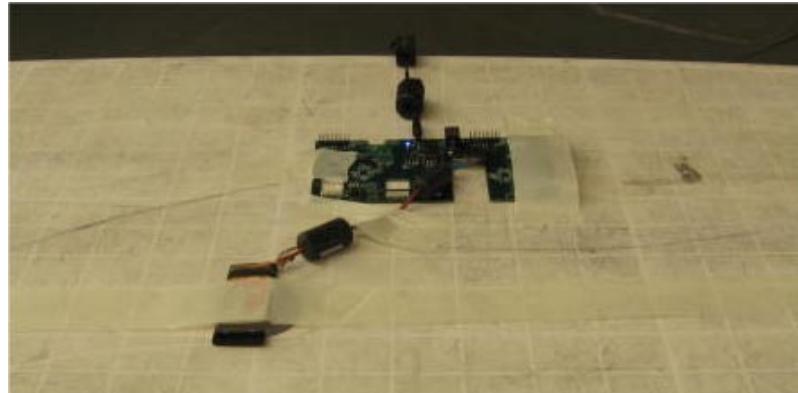


Figure 6.5.2 The EUT in Y-axis orthogonal position

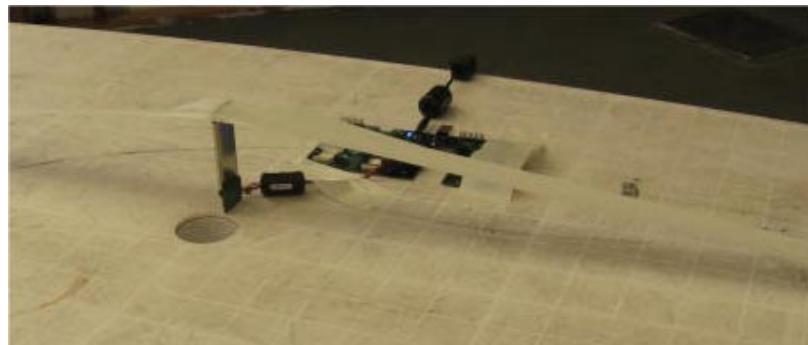
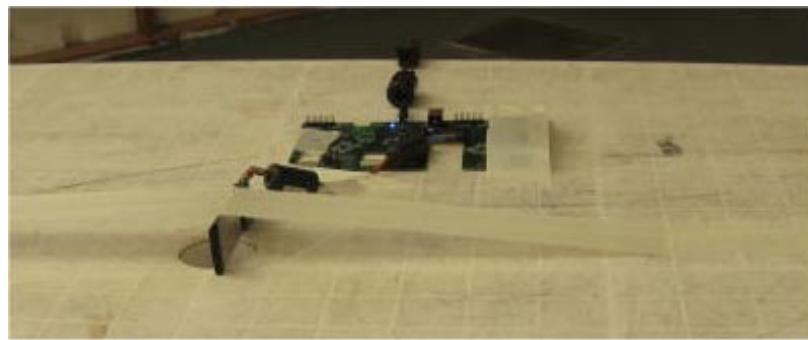


Figure 6.5.3 The EUT in Z-axis orthogonal position



6.6 Transmitter characteristics (Bluetooth)

| | | | |
|---|------------------------------|---|---|
| Type of equipment | | | |
| <input type="checkbox"/> Stand-alone (Equipment with or without its own control provisions) <input type="checkbox"/> Combined equipment (Equipment where the radio part is fully integrated within another type of equipment) <input checked="" type="checkbox"/> Plug-in card (Equipment intended for a variety of host systems) | | | |
| Intended use | | Condition of use | |
| <input type="checkbox"/> fixed <input checked="" type="checkbox"/> mobile <input type="checkbox"/> portable | | Always at a distance more than 2 m from all people Always at a distance more than 20 cm from all people May operate at a distance closer than 20 cm to human body | |
| Assigned frequency range | | 2400 – 2483.5 MHz | |
| Operating frequency range | | 2402 - 2480 MHz | |
| RF channel spacing | | 1, 2 MHz | |
| Maximum peak output power | | At transmitter 50 Ω RF output connector | dBm |
| | | Effective radiated power (for equipment with no RF connector) | -9.55 dBm |
| Is transmitter output power variable? | | X No | |
| | | Yes | continuous variable stepped variable with stepsize |
| Antenna connection | | | |
| unique coupling | standard connector | X integral | with temporary RF connector X without temporary RF connector |
| Antenna/s technical characteristics | | | |
| Type | Manufacturer | Model number | Gain |
| Ceramic Chip Antenna | Pulse Engineering | P/N W3008E | 3 dBi |
| Transmitter 99% power bandwidth | Type of modulation | | Transmitter aggregate data rate/s, MBps |
| 1 MHz | GPSK | | 1 |
| 2 MHz | DQPSK | | 2 |
| 2 MHz | 8DPSK | | 3 |
| Modulation type | FHSS | | |
| Maximum transmitter duty cycle in normal use | 50% | | |
| Maximum transmitter duty cycle for test purposes | 94 % | | |
| Transmitter power source | | | |
| | Nominal rated voltage | | Battery type |
| V | DC (PoE) | Nominal rated voltage | 3.3 VDC |
| | AC mains | Nominal rated voltage | Frequency NA |
| Common power source for transmitter and receiver | | V yes | no |

| | | | |
|----------------------------|--|-------------------------------|------------------------------|
| Test specification: | Section 15.247(a)1,(g),(h) / RSS-210, Section A8.1(a), Frequency hopping requirements | | |
| Test procedure: | Public notice DA 00-705 | | |
| Test mode: | Compliance | Verdict: | |
| Date & Time: | 6/8/2009 4:12:15 PM | PASS | |
| Temperature: 24°C | Air Pressure: 1012 hPa | Relative Humidity: 48% | Power Supply: 3.3 VDC |
| Remarks: | | | |

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

7.1 Frequency hopping requirements

The EUT was verified for compliance with frequency hopping requirements listed below:

- The EUT shall hop to channel frequencies that are selected from a pseudo-randomly ordered list;
- Each hopping frequency shall be used equally on the average;
- The EUT receiver shall have input bandwidth that match the hopping channel bandwidth of the corresponding transmitter and shall shift frequencies in synchronization with the transmitted signals;
- The coordination of frequency hopping systems in any other manner for the express purpose of avoiding the simultaneous occupancy of individual hopping frequencies by multiple transmitters is not permitted.

The rationale for compliance with the above requirements was either test results or supplier declaration. The summary of results is provided in Table 7.1.1.

Table 7.1.1 Frequency hopping requirements

| Requirement | Rationale | Verdict |
|---|---|---------|
| The EUT shall hop to channel frequencies that are selected from a pseudo-randomly ordered list | Supplier declaration (refer to Table 7.1.2) | Comply |
| Each hopping frequency shall be used equally on the average | Supplier declaration | Comply |
| The EUT receiver shall have input bandwidth that match the hopping channel bandwidth of the corresponding transmitter | Supplier declaration | Comply |
| The EUT receiver shall shift frequencies in synchronization with the transmitted signals | Supplier declaration | Comply |
| Each transmitter operates independently and there is no synchronization with other transmitters for purposes other than to avoid simultaneous channel occupancy | Supplier declaration | Comply |

Table 7.1.2 Frequency channel assignment

| Frequency [MHz] | Frequency Assignment |
|-----------------|----------------------|-----------------|----------------------|-----------------|----------------------|-----------------|----------------------|
| 2402.00 | F1 | 2422.00 | F21 | 2442.00 | F41 | 2462.00 | F61 |
| 2403.00 | F2 | 2423.00 | F22 | 2443.00 | F42 | 2463.00 | F62 |
| 2404.00 | F3 | 2424.00 | F23 | 2444.00 | F43 | 2464.00 | F63 |
| 2405.00 | F4 | 2425.00 | F24 | 2445.00 | F44 | 2465.00 | F64 |
| 2406.00 | F5 | 2426.00 | F25 | 2446.00 | F45 | 2466.00 | F65 |
| 2407.00 | F6 | 2427.00 | F26 | 2447.00 | F46 | 2467.00 | F66 |
| 2408.00 | F7 | 2428.00 | F27 | 2448.00 | F47 | 2468.00 | F67 |
| 2409.00 | F8 | 2429.00 | F28 | 2449.00 | F48 | 2469.00 | F68 |
| 2410.00 | F9 | 2430.00 | F29 | 2450.00 | F49 | 2470.00 | F69 |
| 2411.00 | F10 | 2431.00 | F30 | 2451.00 | F50 | 2471.00 | F70 |
| 2412.00 | F11 | 2432.00 | F31 | 2452.00 | F51 | 2472.00 | F71 |
| 2413.00 | F12 | 2433.00 | F32 | 2453.00 | F52 | 2473.00 | F72 |
| 2414.00 | F13 | 2434.00 | F33 | 2454.00 | F53 | 2474.00 | F73 |
| 2415.00 | F14 | 2435.00 | F34 | 2455.00 | F54 | 2475.00 | F74 |
| 2416.00 | F15 | 2436.00 | F35 | 2456.00 | F55 | 2476.00 | F75 |
| 2417.00 | F16 | 2437.00 | F36 | 2457.00 | F56 | 2477.00 | F76 |
| 2418.00 | F17 | 2438.00 | F37 | 2458.00 | F57 | 2478.00 | F77 |
| 2419.00 | F18 | 2439.00 | F38 | 2459.00 | F58 | 2479.00 | F78 |
| 2420.00 | F19 | 2440.00 | F39 | 2460.00 | F59 | 2480.00 | F79 |
| 2421.00 | F20 | 2441.00 | F40 | 2461.00 | F60 | | F80 |

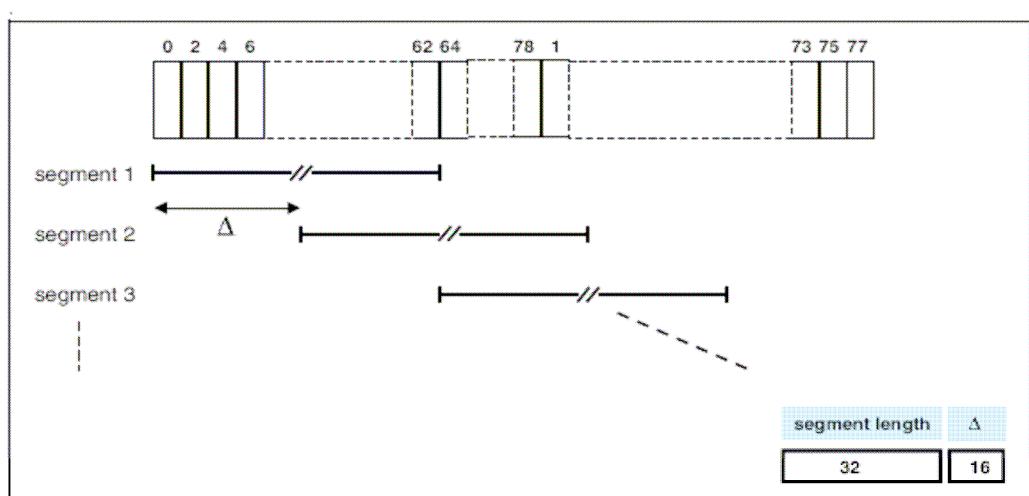


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| | | | |
|----------------------------|--|-------------------------------|------------------------------|
| Test specification: | Section 15.247(a)1,(g),(h) / RSS-210, Section A8.1(a), Frequency hopping requirements | | |
| Test procedure: | Public notice DA 00-705 | | |
| Test mode: | Compliance | Verdict: PASS | |
| Date & Time: | 6/8/2009 4:12:15 PM | | |
| Temperature: 24°C | Air Pressure: 1012 hPa | Relative Humidity: 48% | Power Supply: 3.3 VDC |
| Remarks: | | | |

NOTE: According to BLUETOOTH Specifications the selection scheme chooses a segment of 32 hop frequencies spanning about 64 MHz and visits these hops in pseudo-random order. Next, a different 32-hop segment is chosen, etc. In the page, master page response, slave page response, page scan, inquiry, inquiry response and inquiry scan hopping sequences, the same 32-hop segment is used all the time (the segment is selected by the address; different devices will have different paging segments).
When the basic channel hopping sequence is selected, the output constitutes a pseudo-random sequence that slides through the 79 hops.

Figure 7.1.1 Hop selection scheme





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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 & Time: | 6/17/2009 3:24:52 PM | Relative Humidity: | 42% |
| Temperature: 23°C | Air Pressure: 1009 hPa | Power Supply: | 3.3 VDC |
| Remarks: | | | |

7.2 20 dB bandwidth

7.2.1 General

This test was performed to measure 20 dB bandwidth of the transmitter hopping channel. Specification test limits are given in Table 7.2.1.

Table 7.2.1 The 20 dB bandwidth limits

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

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

7.2.2 Test procedure

- 7.2.2.1 The EUT was set up as shown in Figure 7.2.1, energized and its proper operation was checked.
- 7.2.2.2 The EUT was set to transmit modulated carrier at maximum data rate.
- 7.2.2.3 The transmitter bandwidth was measured with spectrum analyzer as frequency delta between reference points on modulation envelope and provided in Table 7.2.2 and associated plot.
- 7.2.2.4 The test was repeated for each data rate and each modulation format.

Figure 7.2.1 The 20 dB bandwidth test setup





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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 & Time: | 6/17/2009 3:24:52 PM | Relative Humidity: | 42% |
| Temperature: 23°C | Air Pressure: 1009 hPa | Power Supply: | 3.3 VDC |
| Remarks: | | | |

Table 7.2.2 The 20 dB bandwidth test results

ASSIGNED FREQUENCY BAND: 2400.0 – 2483.5 MHz
 DETECTOR USED: Peak
 SWEEP TIME: Auto
 RESOLUTION BANDWIDTH: \geq 1% of the 20 dB bandwidth
 VIDEO BANDWIDTH: \geq RBW
 MODULATION ENVELOPE REFERENCE POINTS: 20.0 dBc
 MODULATING SIGNAL: PRBS
 FREQUENCY HOPPING: Disabled

| Carrier frequency, MHz | Type of modulation | Data rate, Mbps | 20 dB bandwidth, kHz | Limit, kHz | Margin, kHz | Verdict |
|------------------------|--------------------|-----------------|----------------------|------------|-------------|---------|
| Low frequency | | | | | | |
| 2402.00 | GFSK | 1 | 960.0 | NA | NA | Pass |
| 2402.00 | DQPSK | 2 | 1380.0 | NA | NA | Pass |
| 2402.00 | 8DPSK | 3 | 1365.0 | NA | NA | Pass |
| Mid frequency | | | | | | |
| 2437.00 | GFSK | 1 | 975.0 | NA | NA | Pass |
| 2437.00 | DQPSK | 2 | 1380.0 | NA | NA | Pass |
| 2437.00 | 8DPSK | 3 | 1357.5 | NA | NA | Pass |
| High frequency | | | | | | |
| 2480.00 | GFSK | 1 | 967.5 | NA | NA | Pass |
| 2480.00 | DQPSK | 2 | 1372.5 | NA | NA | Pass |
| 2480.00 | 8DPSK | 3 | 1357.0 | NA | NA | Pass |

Reference numbers of test equipment used

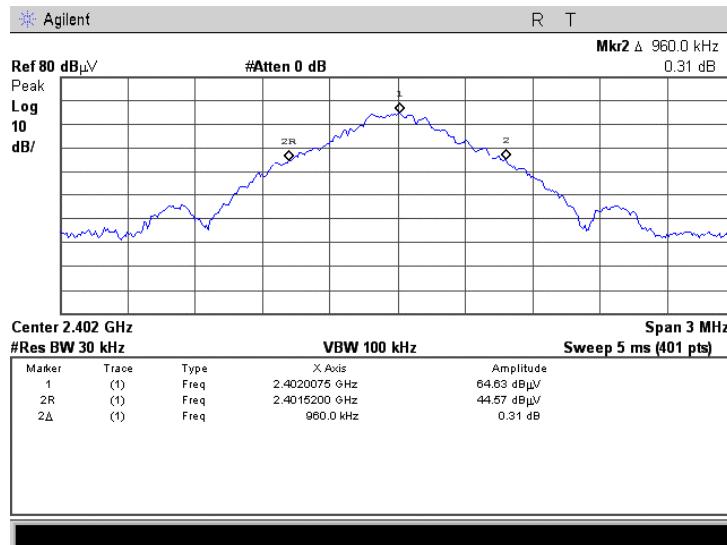
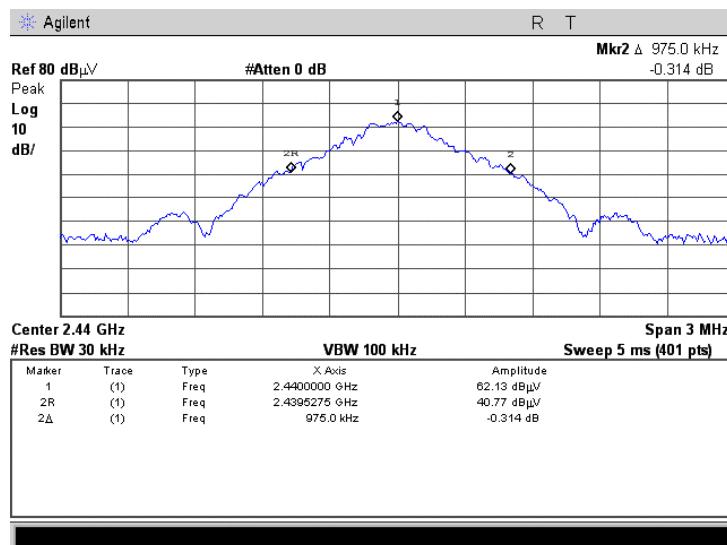
| | | | | | | | |
|---------|---------|---------|--|--|--|--|--|
| HL 1116 | HL 2780 | HL 2911 | | | | | |
|---------|---------|---------|--|--|--|--|--|

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: | |
| Date & Time: | 6/17/2009 3:24:52 PM | PASS | |
| Temperature: 23°C | Air Pressure: 1009 hPa | Relative Humidity: 42% | Power Supply: 3.3 VDC |
| Remarks: | | | |

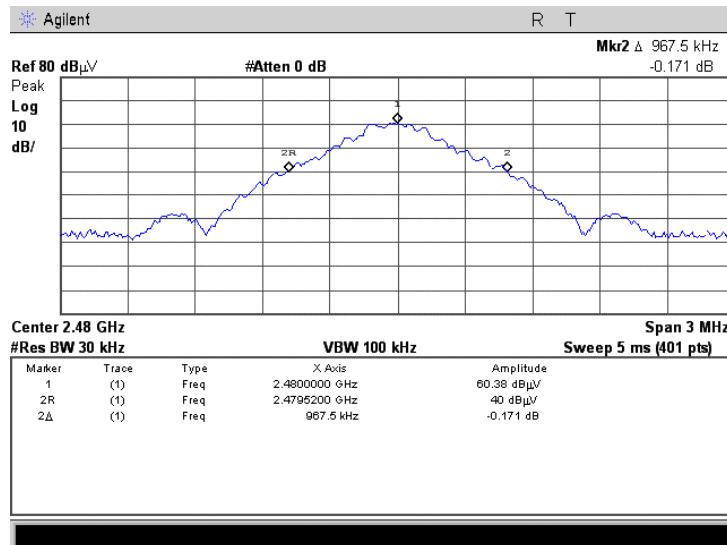
Plot 7.2.1 The 20 dB bandwidth test result at low frequency with GFSK modulation @ 1 Mbps**Plot 7.2.2 The 20 dB bandwidth test result at mid frequency with GFSK modulation @ 1 Mbps**



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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 & Time: | 6/17/2009 3:24:52 PM | | |
| Temperature: 23°C | Air Pressure: 1009 hPa | Relative Humidity: 42% | Power Supply: 3.3 VDC |
| Remarks: | | | |

Plot 7.2.3 The 20 dB bandwidth test result at high frequency with GFSK modulation @ 1 Mbps

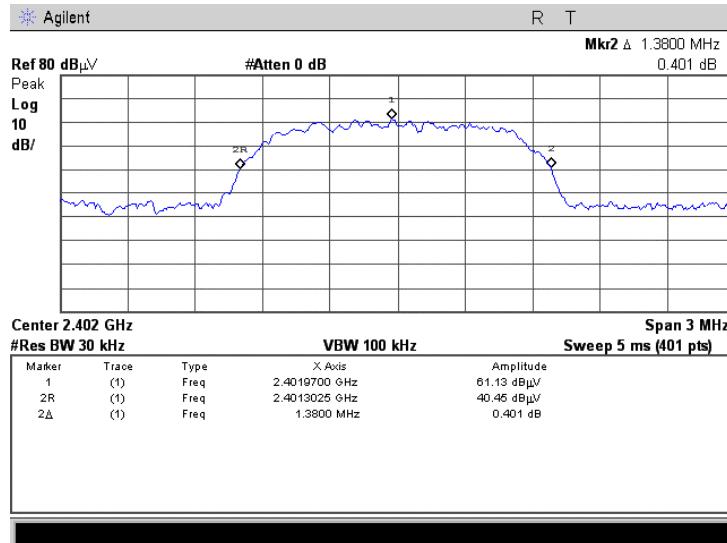




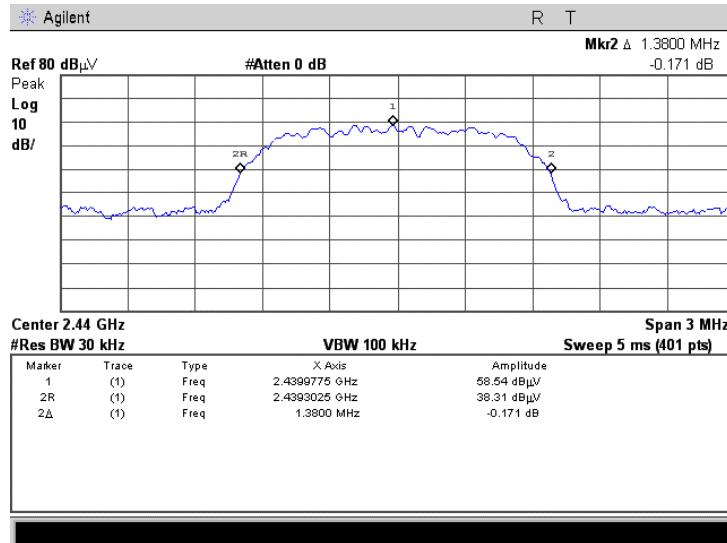
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| | | | |
|----------------------------|--|-------------------------------|------------------------------|
| Test specification: | Section 15.247(a)1/ RSS-210, Section A8.1(a), 20 dB bandwidth | | |
| Test procedure: | Public notice DA 00-705 | | |
| Test mode: | Compliance | Verdict: | |
| Date & Time: | 6/17/2009 3:24:52 PM | PASS | |
| Temperature: 23°C | Air Pressure: 1009 hPa | Relative Humidity: 42% | Power Supply: 3.3 VDC |
| Remarks: | | | |

Plot 7.2.4 The 20 dB bandwidth test result at low frequency with DQPSK modulation @ 2 Mbps

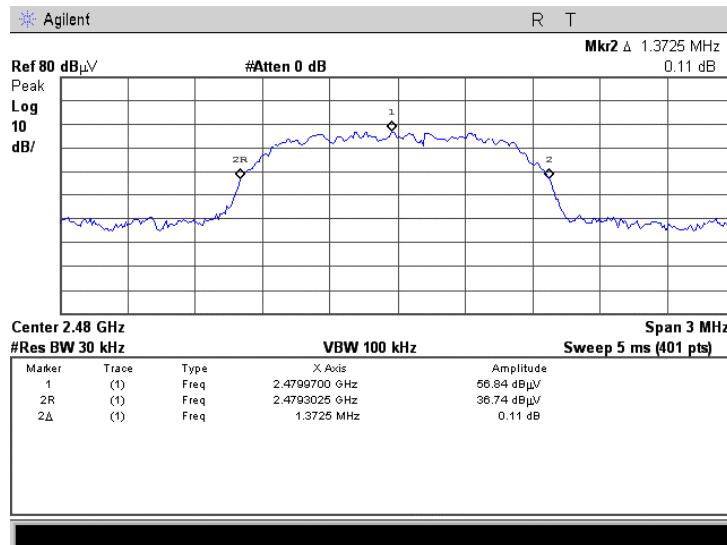


Plot 7.2.5 The 20 dB bandwidth test result at mid frequency with DQPSK modulation @ 2 Mbps



| | | | |
|----------------------------|--|------------------------------|------|
| 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 & Time: | 6/17/2009 3:24:52 PM | Relative Humidity: | 42% |
| Temperature: 23°C | Air Pressure: 1009 hPa | Power Supply: 3.3 VDC | |
| Remarks: | | | |

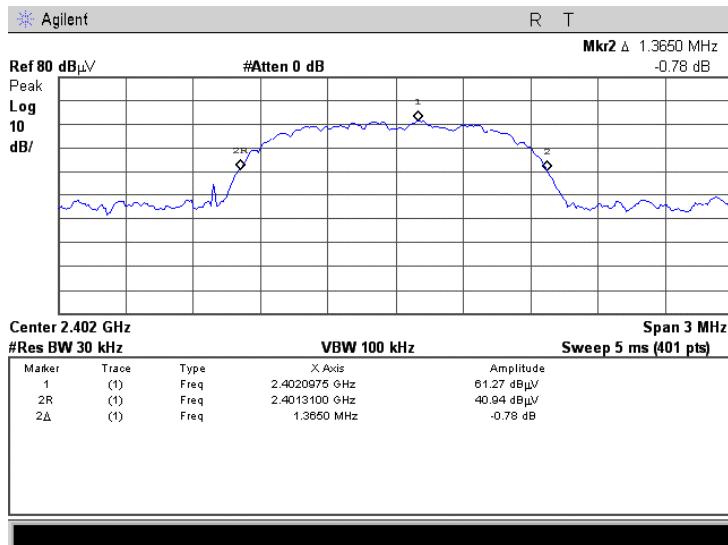
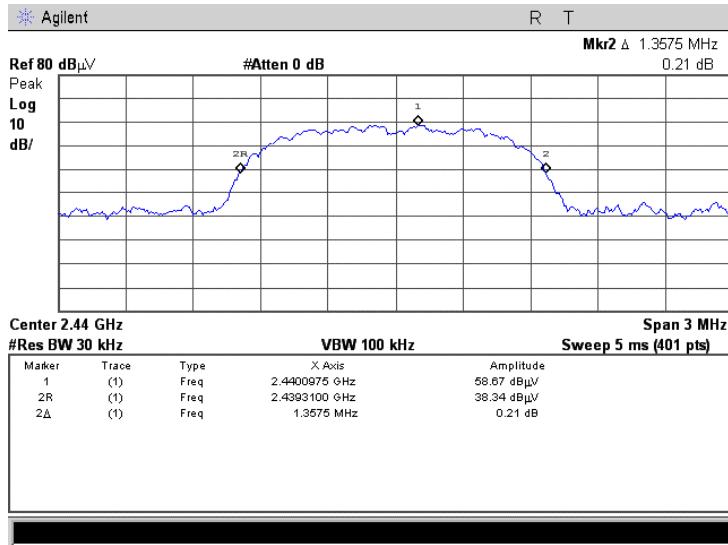
Plot 7.2.6 The 20 dB bandwidth test result at high frequency with DQPSK modulation @ 2 Mbps





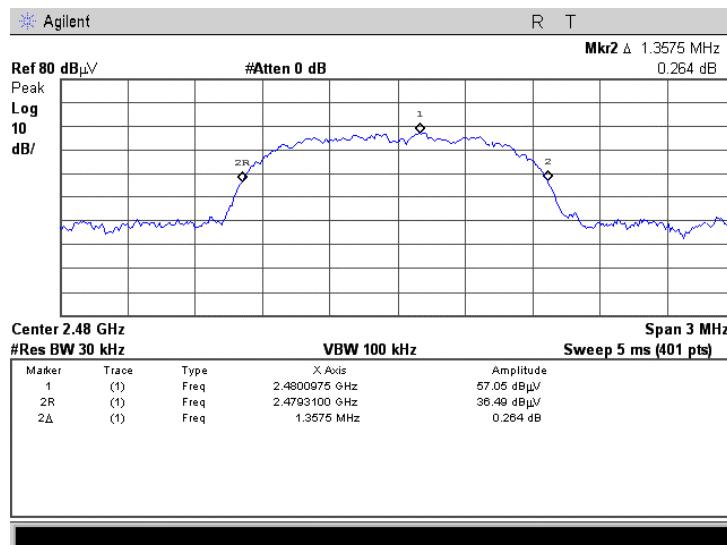
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| | | | |
|----------------------------|--|-------------------------------|------------------------------|
| Test specification: | Section 15.247(a)1/ RSS-210, Section A8.1(a), 20 dB bandwidth | | |
| Test procedure: | Public notice DA 00-705 | | |
| Test mode: | Compliance | Verdict: | |
| Date & Time: | 6/17/2009 3:24:52 PM | PASS | |
| Temperature: 23°C | Air Pressure: 1009 hPa | Relative Humidity: 42% | Power Supply: 3.3 VDC |
| Remarks: | | | |

Plot 7.2.7 The 20 dB bandwidth test result at low frequency with 8DPSK modulation @ 3 Mbps**Plot 7.2.8 The 20 dB bandwidth test result at mid frequency with 8DPSK modulation @ 3 Mbps**

| | | | |
|----------------------------|--|-------------------------------|------------------------------|
| 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: | |
| Date & Time: | 6/17/2009 3:24:52 PM | PASS | |
| Temperature: 23°C | Air Pressure: 1009 hPa | Relative Humidity: 42% | Power Supply: 3.3 VDC |
| Remarks: | | | |

Plot 7.2.9 The 20 dB bandwidth test result at high frequency with 8DPSK modulation @ 3 Mbps





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 & Time: | 6/8/2009 4:44:17 PM | | |
| Temperature: 24°C | Air Pressure: 1012 hPa | Relative Humidity: 48% | Power Supply: 3.3 VDC |
| Remarks: | | | |

7.3 Carrier frequency separation

7.3.1 General

This test was performed to measure frequency separation between the peaks of adjacent channels. Specification test limits are given in Table 7.3.1.

Table 7.3.1 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, |
| 2400.0 – 2483.5 | whichever is greater |
| 5725.0 – 5850.0 | |

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 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.
- 7.3.2.3 The spectrum analyzer was set in max hold mode and allowed trace to stabilize.
- 7.3.2.4 The frequency separation between the peaks of adjacent channels was measured as provided in Table 7.3.2 and associated plots.

Figure 7.3.1 Carrier frequency separation test setup





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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 | Verdict: PASS | |
| Date & Time: | 6/8/2009 4:44:17 PM | Relative Humidity: 48% | Power Supply: 3.3 VDC |
| Temperature: 24°C | Air Pressure: 1012 hPa | | |
| Remarks: | | | |

Table 7.3.2 Carrier frequency separation test results

ASSIGNED FREQUENCY: 2400.0 – 2483.5 MHz
 MODULATION: GFSK, DQPSK, 8DPSK
 MODULATING SIGNAL: PRBS
 BIT RATE: 1/2/3 Mbps
 DETECTOR USED: Peak
 RESOLUTION BANDWIDTH: $\geq 1\%$ of the span
 VIDEO BANDWIDTH: \geq RBW
 FREQUENCY HOPPING: Disabled*
 20 dB BANDWIDTH: 975.0 kHz for GFSK
 1380.0 kHz for DQPSK
 1365.0 kHz for 8DQPSK

| Carrier frequency separation, kHz | Limit, kHz | Margin** | Verdict |
|-----------------------------------|------------|----------|---------|
| GFSK 1 Mbps | | | |
| 1995.0 | 975.0 | -1020.0 | Pass |
| DQPSK 2 Mbps | | | |
| 2017.5 | 1380.0 | -637.5 | Pass |
| 8DPSK 3 Mbps | | | |
| 2002.5 | 1365.0 | -637.5 | Pass |

*NOTE: Each channel was set manually.

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

Reference numbers of test equipment used

| | | | | | | |
|---------|---------|---------|--|--|--|--|
| HL 1116 | HL 2780 | HL 2869 | | | | |
|---------|---------|---------|--|--|--|--|

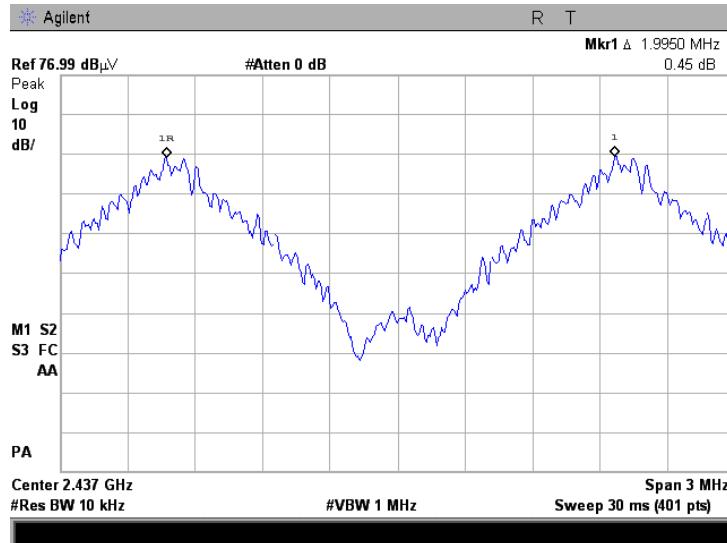
Full description is given in Appendix A.



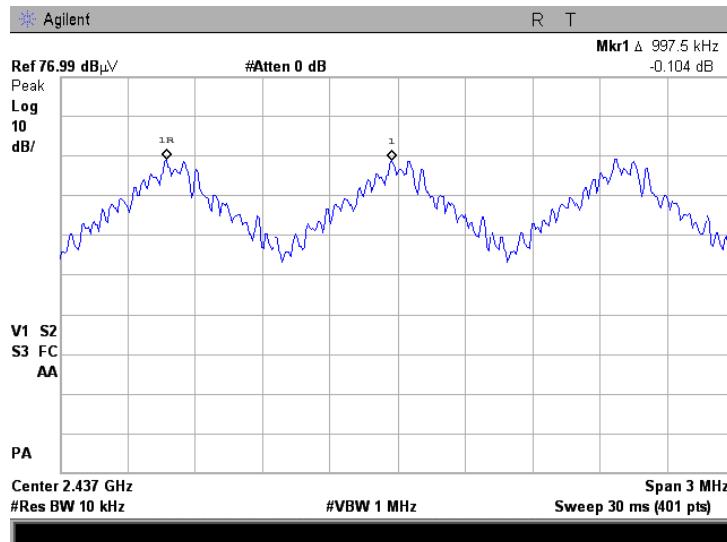
HERMON LABORATORIES

| | | | |
|----------------------------|---|-------------------------------|------------------------------|
| 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: | |
| Date & Time: | 6/8/2009 4:44:17 PM | PASS | |
| Temperature: 24°C | Air Pressure: 1012 hPa | Relative Humidity: 48% | Power Supply: 3.3 VDC |
| Remarks: | | | |

Plot 7.3.1 Carrier frequency separation, frequency hopping disabled, GFSK two even channels at hopping sequence



Plot 7.3.2 Carrier frequency separation, frequency hopping disabled, GFSK modulation

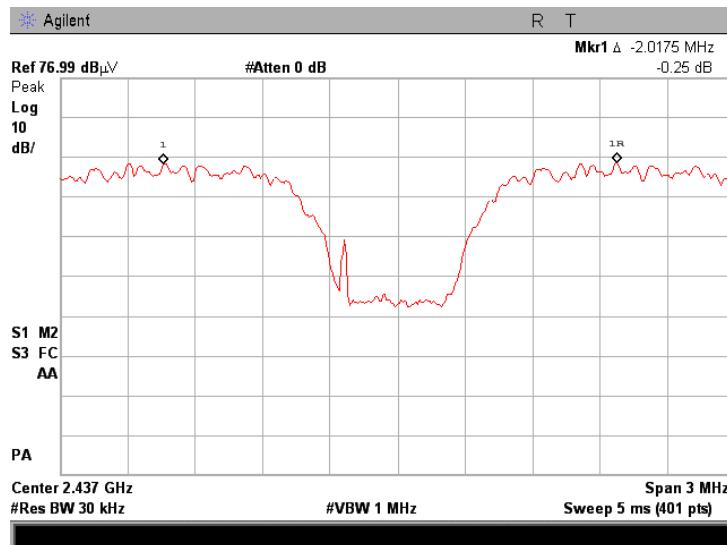




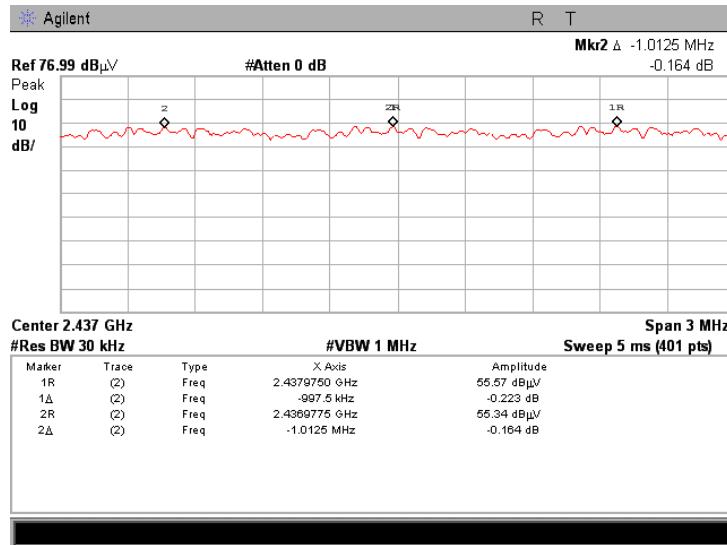
HERMON LABORATORIES

| | | | |
|----------------------------|---|-------------------------------|------------------------------|
| 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: | |
| Date & Time: | 6/8/2009 4:44:17 PM | PASS | |
| Temperature: 24°C | Air Pressure: 1012 hPa | Relative Humidity: 48% | Power Supply: 3.3 VDC |
| Remarks: | | | |

Plot 7.3.3 Carrier frequency separation, frequency hopping disabled, DQPSK two even channels at hopping sequence



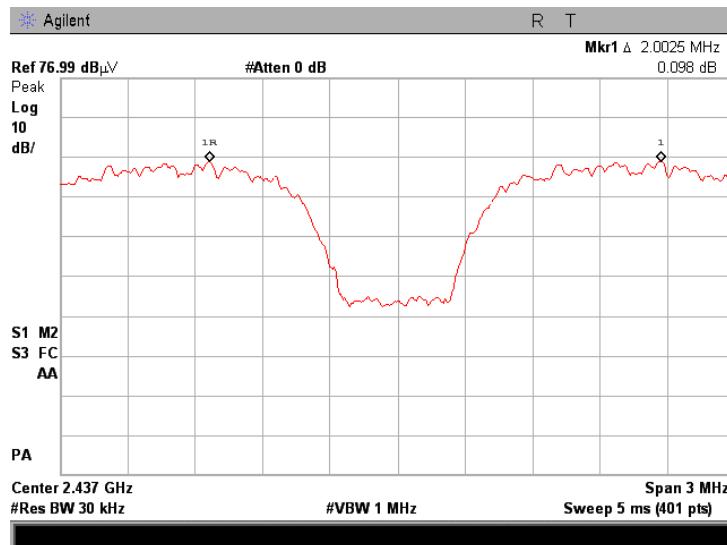
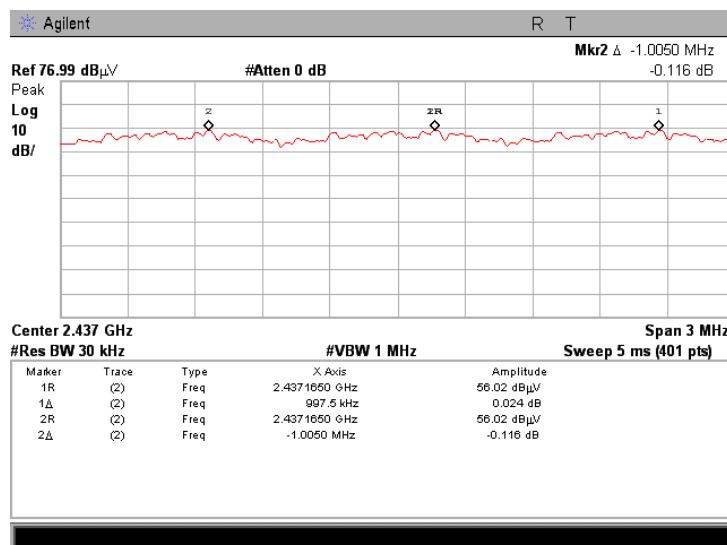
Plot 7.3.4 Carrier frequency separation, frequency hopping disabled, DQPSK modulation





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: | |
| Date & Time: | 6/8/2009 4:44:17 PM | PASS | |
| Temperature: 24°C | Air Pressure: 1012 hPa | Relative Humidity: 48% | Power Supply: 3.3 VDC |
| Remarks: | | | |

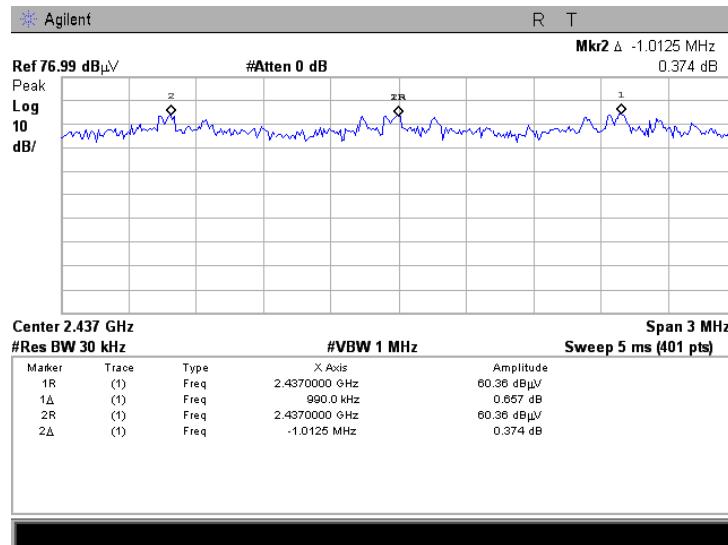
Plot 7.3.5 Carrier frequency separation, frequency hopping disabled, 8DPSK two even channels at hopping sequence**Plot 7.3.6 Carrier frequency separation, frequency hopping disabled, 8DQPSK modulation**



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 & Time: | 6/8/2009 4:44:17 PM | | |
| Temperature: 24°C | Air Pressure: 1012 hPa | Relative Humidity: 48% | Power Supply: 3.3 VDC |
| Remarks: | | | |

Plot 7.3.7 Carrier frequency separation, frequency hopping disabled



| | | | |
|----------------------------|---|-------------------------------|--|
| Test specification: | Section 15.247(a)1/ RSS-210, Section A8.1(d), Number of hopping frequencies | | |
| Test procedure: | Public notice DA 00-705 | | |
| Test mode: | Compliance | Verdict: PASS | |
| Date & Time: | 6/8/2009 4:44:30 PM | Air Pressure: 1012 hPa | Relative Humidity: 48% Power Supply: 3.3 VDC |
| Remarks: | | | |

7.4 Number of hopping frequencies

7.4.1 General

This test was performed to calculate the number of hopping frequencies used by the EUT. Specification test limits are given in Table 7.4.1.

Table 7.4.1 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 |

7.4.2 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 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.
- 7.4.2.3 The spectrum analyzer was set in max hold mode and allowed trace to stabilize.
- 7.4.2.4 The number of frequency hopping channels was calculated as provided in Table 7.4.2 and associated plots.

Figure 7.4.1 Hopping frequencies test setup





| | | | |
|----------------------------|--|-------------------------------|------------------------------|
| Test specification: | Section 15.247(a)1/ RSS-210, Section A8.1(d), Number of hopping frequencies | | |
| Test procedure: | Public notice DA 00-705 | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date & Time: | 6/8/2009 4:44:30 PM | | |
| Temperature: 24°C | Air Pressure: 1012 hPa | Relative Humidity: 48% | Power Supply: 3.3 VDC |
| Remarks: | | | |

Table 7.4.2 Hopping frequencies test results

ASSIGNED FREQUENCY: 2400.0 – 2483.5 MHz
MODULATION: GFSK
MODULATING SIGNAL: PRBS
BIT RATE: 1 / 2 / 3 Mbps
DETECTOR USED: Peak
RESOLUTION BANDWIDTH: $\geq 1\%$ of the span
VIDEO BANDWIDTH: \geq RBW
FREQUENCY HOPPING: Disabled

| Number of hopping frequencies | Minimum number of hopping frequencies | Margin* | Verdict |
|-------------------------------|---------------------------------------|---------|---------|
| 79 | 15 | -64 | Pass |

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

Reference numbers of test equipment used

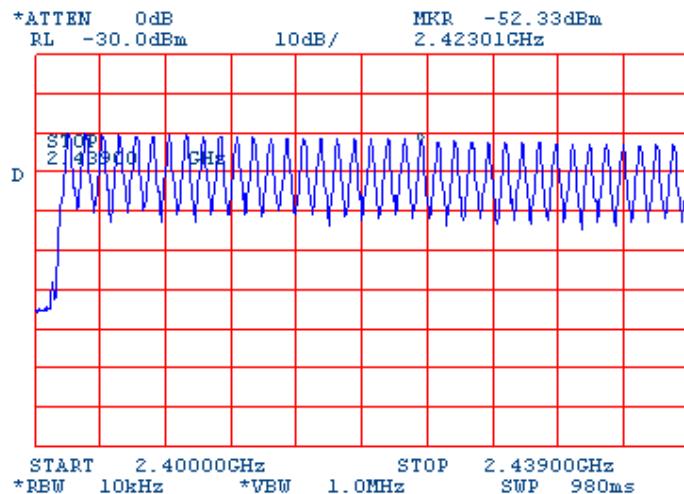
| | | | | | | |
|---------|---------|---------|--|--|--|--|
| HL 1116 | HL 1424 | HL 2869 | | | | |
|---------|---------|---------|--|--|--|--|

Full description is given in Appendix A.

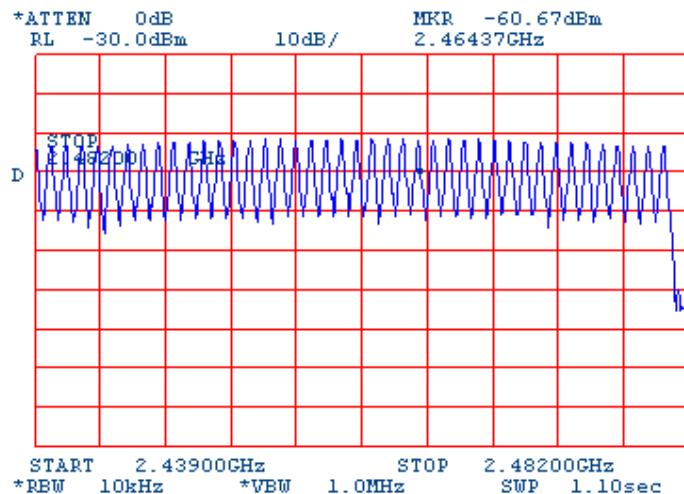


| | | | |
|----------------------------|---|-------------------------------|------------------------------|
| Test specification: | Section 15.247(a)1/ RSS-210, Section A8.1(d), Number of hopping frequencies | | |
| Test procedure: | Public notice DA 00-705 | | |
| Test mode: | Compliance | Verdict: PASS | |
| Date & Time: | 6/8/2009 4:44:30 PM | | |
| Temperature: 24°C | Air Pressure: 1012 hPa | Relative Humidity: 48% | Power Supply: 3.3 VDC |
| Remarks: | | | |

Plot 7.4.1 Number of hopping frequencies, hopping disabled, GFSK modulation @ 1 Mbps



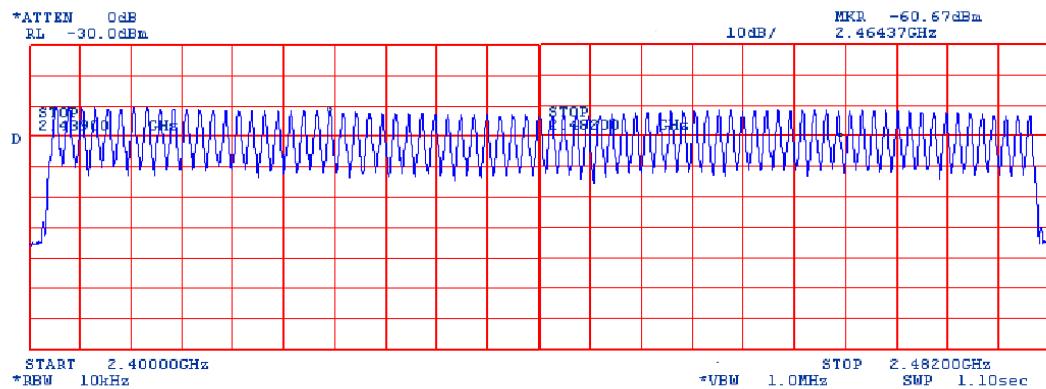
Plot 7.4.2 Number of hopping frequencies, hopping disabled, GFSK modulation @ 1 Mbps





| | | | |
|----------------------------|---|-------------------------------|------------------------------|
| Test specification: | Section 15.247(a)1/ RSS-210, Section A8.1(d), Number of hopping frequencies | | |
| Test procedure: | Public notice DA 00-705 | | |
| Test mode: | Compliance | Verdict: PASS | |
| Date & Time: | 6/8/2009 4:44:30 PM | | |
| Temperature: 24°C | Air Pressure: 1012 hPa | Relative Humidity: 48% | Power Supply: 3.3 VDC |
| Remarks: | | | |

Plot 7.4.3 Number of hopping frequencies, hopping disabled, GFSK modulation @ 1 Mbps



| | | | |
|----------------------------|---|-------------------------------|------------------------------|
| Test specification: | Section 15.247(a)1/RSS-210, Section A8.1(d), Average time of occupancy | | |
| Test procedure: | Public notice DA 00-705 | | |
| Test mode: | Compliance | Verdict: | |
| Date & Time: | 6/17/2009 3:28:27 PM | PASS | |
| Temperature: 23°C | Air Pressure: 1009 hPa | Relative Humidity: 42% | Power Supply: 3.3 VDC |
| Remarks: | | | |

7.5 Average time of occupancy

7.5.1 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 7.5.1.

Table 7.5.1 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 | 79 |
| 5725.0 – 5850.0 | 0.4 | 30.0 | ≥ 75 |

7.5.2 Test procedure

- 7.5.2.1 The EUT was set up as shown in Figure 7.5.1, energized with frequency hopping function enabled and its proper operation was checked.
- 7.5.2.2 The spectrum analyzer span was set to zero centered on a hopping channel.
- 7.5.2.3 The single transmission duration and period were measured with oscilloscope.
- 7.5.2.4 The average time of occupancy was calculated as the single transmission time multiplied by the investigated period and divided by the single transmission period.
- 7.5.2.5 The test was repeated at each data rate and modulation type as provided in Table 7.5.2 and associated plots.

Figure 7.5.1 Average time of occupancy test setup



| | | | |
|----------------------------|---|-------------------------------|------------------------------|
| Test specification: | Section 15.247(a)1/RSS-210, Section A8.1(d), Average time of occupancy | | |
| Test procedure: | Public notice DA 00-705 | | |
| Test mode: | Compliance | Verdict: | |
| Date & Time: | 6/17/2009 3:28:27 PM | PASS | |
| Temperature: 23°C | Air Pressure: 1009 hPa | Relative Humidity: 42% | Power Supply: 3.3 VDC |
| Remarks: | | | |

Table 7.5.2 Average time of occupancy test results

ASSIGNED FREQUENCY:

2400.00 – 2483.5 MHz

MODULATION:

GFSK / DQPSK / 8DPSK

MODULATING SIGNAL:

PRBS

DETECTOR USED:

Peak

RESOLUTION BANDWIDTH:

10 kHz

VIDEO BANDWIDTH:

300 kHz

NUMBER OF HOPPING FREQUENCIES:

79

INVESTIGATED PERIOD:

31.6 s

FREQUENCY HOPPING:

Enabled

| Carrier frequency MHz | Single transmission duration, ms | Single transmission period, ms | Average time of occupancy*, ms | Bit rate Mbps | Symbol rate Msymbol/s | Limit, ms | Margin ms** | Verdict |
|-----------------------|----------------------------------|--------------------------------|--------------------------------|---------------|-----------------------|-----------|-------------|---------|
| 2437.0 | 0.726 | 2.526 | 115.0 | Up to 3 Mbps | NA | 400.0 | -285.0 | Pass |

* - Average time of occupancy = (Single transmission duration × Investigated period) / (Single transmission period × number of hopping channels) = (0.726*31600)/(2.526*79) = 115.0 ms

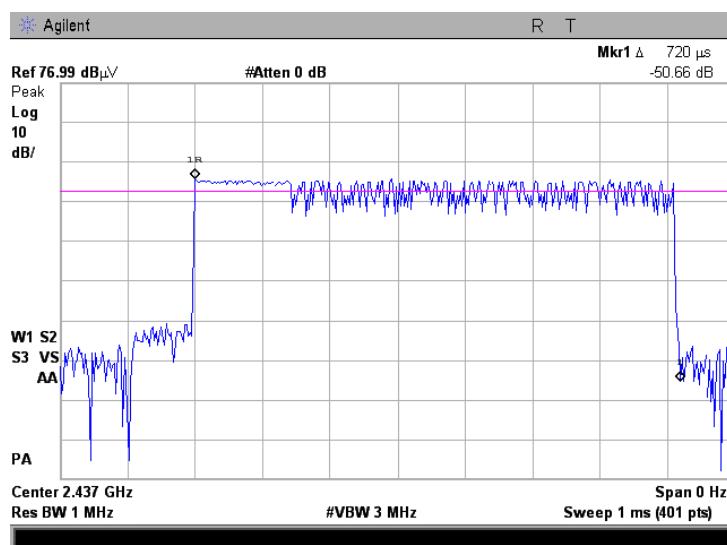
** - Margin = Average time of occupancy – specification limit.

Reference numbers of test equipment used

| | | | | | | | |
|---------|---------|---------|---------|--|--|--|--|
| HL 2780 | HL 1116 | HL 2869 | HL 1562 | | | | |
|---------|---------|---------|---------|--|--|--|--|

Full description is given in Appendix A.

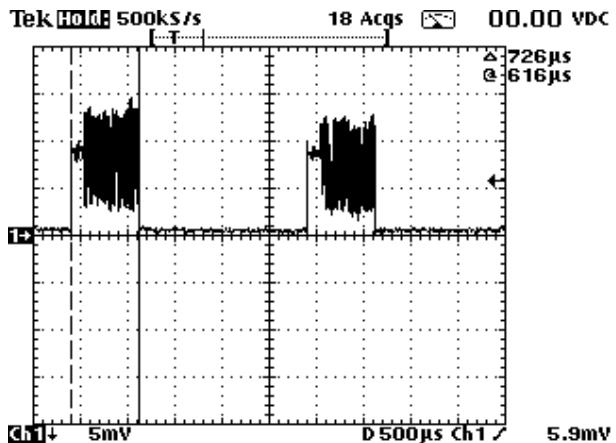
Plot 7.5.1 Single transmission duration



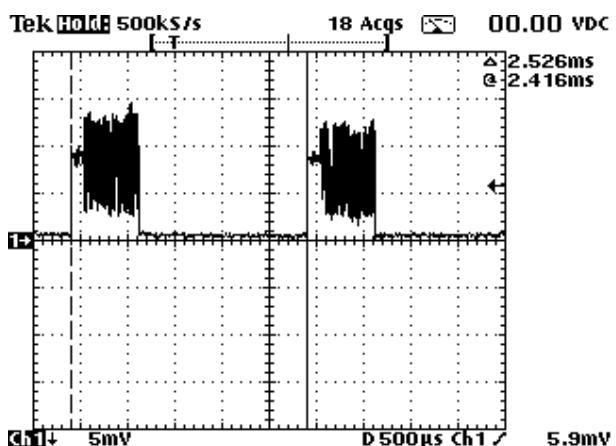


| | | | |
|----------------------------|---|-------------------------------|------------------------------|
| Test specification: | Section 15.247(a)1/RSS-210, Section A8.1(d), Average time of occupancy | | |
| Test procedure: | Public notice DA 00-705 | | |
| Test mode: | Compliance | Verdict: | |
| Date & Time: | 6/17/2009 3:28:27 PM | PASS | |
| Temperature: 23°C | Air Pressure: 1009 hPa | Relative Humidity: 42% | Power Supply: 3.3 VDC |
| Remarks: | | | |

Plot 7.5.2 Single transmission duration



Plot 7.5.3 Single transmission period



| | | | |
|----------------------------|---|-------------------------------|------------------------------|
| Test specification: | Section 15.247(b)/ RSS-210, Section A8.4(2), Peak output power | | |
| Test procedure: | Public notice DA 00-705 | | |
| Test mode: | Compliance | Verdict: | |
| Date & Time: | 6/17/2009 3:31:43 PM | PASS | |
| Temperature: 23°C | Air Pressure: 1009 hPa | Relative Humidity: 42% | Power Supply: 3.3 VDC |
| Remarks: | | | |

7.6 Peak output power

7.6.1 General

This test was performed to measure the maximum peak output power radiated by transmitter. Specification test limits are given in Table 7.6.1.

Table 7.6.1 Peak output power limits

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

7.6.2 Test procedure

- 7.6.2.1 The EUT was set up as shown in Figure 7.6.1, energized and its proper operation was checked.
- 7.6.2.2 The EUT was adjusted to produce maximum available to end user RF output power.
- 7.6.2.3 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.
- 7.6.2.4 The EUT was investigated in 3 orthogonal positions to determine the highest emission. The maximum field strength of the EUT carrier frequency was measured as provided in Table 7.6.2 and associated plots.
- 7.6.2.5 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:

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

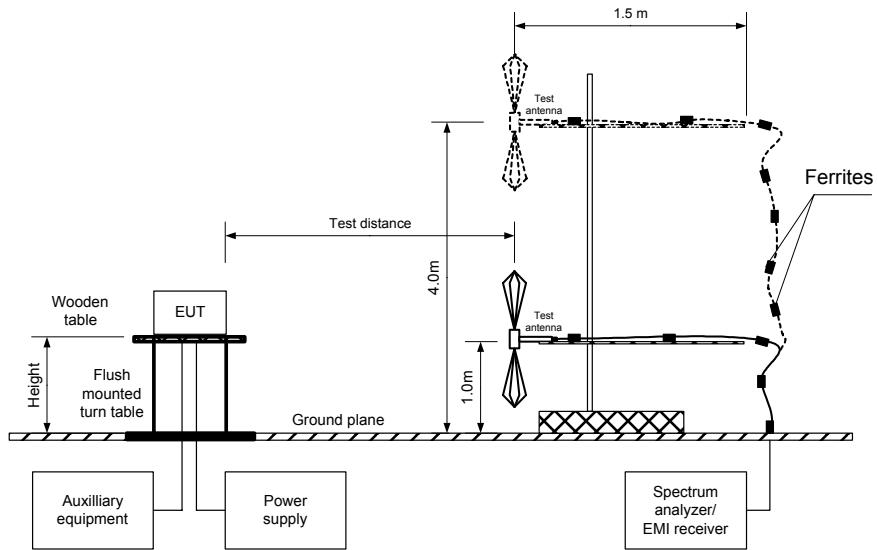
- 7.6.2.6 The worst test results (the lowest margins) were recorded in Table 7.6.2.



HERMON LABORATORIES

| | | | |
|----------------------------|---|-------------------------------|------------------------------|
| Test specification: | Section 15.247(b)/ RSS-210, Section A8.4(2), Peak output power | | |
| Test procedure: | Public notice DA 00-705 | | |
| Test mode: | Compliance | Verdict: PASS | |
| Date & Time: | 6/17/2009 3:31:43 PM | | |
| Temperature: 23°C | Air Pressure: 1009 hPa | Relative Humidity: 42% | Power Supply: 3.3 VDC |
| Remarks: | | | |

Figure 7.6.1 Setup for carrier field strength measurements





| | | | |
|----------------------------|---|-------------------------------|------------------------------|
| Test specification: | Section 15.247(b)/ RSS-210, Section A8.4(2), Peak output power | | |
| Test procedure: | Public notice DA 00-705 | | |
| Test mode: | Compliance | Verdict: | |
| Date & Time: | 6/17/2009 3:31:43 PM | PASS | |
| Temperature: 23°C | Air Pressure: 1009 hPa | Relative Humidity: 42% | Power Supply: 3.3 VDC |
| Remarks: | | | |

Table 7.6.2 Peak output power test results

| | |
|---------------------------------------|--------------------------------------|
| ASSIGNED FREQUENCY: | 2400.00 – 2483.5 MHz |
| TEST DISTANCE: | 3 m |
| TEST SITE: | OATS |
| EUT HEIGHT: | 0.8 m |
| DETECTOR USED: | Peak |
| TEST ANTENNA TYPE: | Double ridged guide (above 1000 MHz) |
| MODULATING SIGNAL: | PRBS |
| TRANSMITTER OUTPUT POWER SETTINGS: | Maximum |
| DETECTOR USED: | Peak |
| RESOLUTION BANDWIDTH: | 1 MHz |
| VIDEO BANDWIDTH: | 3 MHz |
| FREQUENCY HOPPING: | Disabled |
| NUMBER OF FREQUENCY HOPPING CHANNELS: | 79 |
| MODULATION: | GFSK |
| BIT RATE: | 1 Mbps |
| 20 dB EMISSION BANDWIDTH: | 0.975 MHz |

| Frequency, MHz | Field strength, dB(μ V/m)* | Antenna polarization | Antenna height, m | Azimuth, degrees** | EUT antenna gain, dBi | Peak output power, dBm*** | Limit, dBm | Margin dB**** | Verdict |
|----------------|---------------------------------|----------------------|-------------------|--------------------|-----------------------|---------------------------|------------|---------------|---------|
| 2402.00 | 86.00 | H | 1.1 | 000 | 3 | -12.23 | 30.0 | -42.23 | Pass |
| 2437.00 | 83.50 | H | 1.1 | 010 | 3 | -14.73 | 30.0 | -44.73 | Pass |
| 2480.00 | 81.67 | H | 1.1 | 000 | 3 | -16.56 | 30.0 | -46.56 | Pass |

| | |
|---------------------------|-----------|
| MODULATION: | 8DPSK |
| BIT RATE: | 3 Mbps |
| 20 dB EMISSION BANDWIDTH: | 1.365 MHz |

| Frequency, MHz | Field strength, dB(μ V/m)* | Antenna polarization | Antenna height, m | Azimuth, degrees** | EUT antenna gain, dBi | Peak output power, dBm*** | Limit, dBm | Margin dB**** | Verdict |
|----------------|---------------------------------|----------------------|-------------------|--------------------|-----------------------|---------------------------|------------|---------------|---------|
| 2402.00 | 87.33 | H | 1.0 | 000 | 3 | -9.55 | 30.0 | -39.55 | Pass |
| 2437.00 | 86.33 | H | 1.1 | 000 | 3 | -10.55 | 30.0 | -40.55 | Pass |
| 2480.00 | 83.00 | H | 1.1 | 000 | 3 | -13.88 | 30.0 | -43.88 | Pass |

NOTE: The EUT was investigated in 3 orthogonal positions to determine the highest emission and the maximum was found in X-axis position with received antenna in horizontal polarization.

* - Field strength, dB(μ V/m) = Measured value, dB(μ V) + Antenna Factor (dB μ V/m) + Cable Loss (dB) = Measured value, dB(μ V) + 30.5 dB

**- 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 (dBm) = Field strength in dB(μ V/m) - Transmitter antenna gain (dBi) – 95.2 dB+RBW correction factor****

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

*****-RBW correction factor – is a correction factor to extrapolate the results obtained with 1 MHz RBW (due to instrument limitation) to 20 dBc EBW.

RBW correction factor = 0 dB for GFSK and for 8DPSK: $10\log(1.365/1.0) = 1.35$ dB.

Reference numbers of test equipment used

| | | | | | | | |
|---------|---------|---------|--|--|--|--|--|
| HL 1424 | HL 1984 | HL 3122 | | | | | |
|---------|---------|---------|--|--|--|--|--|

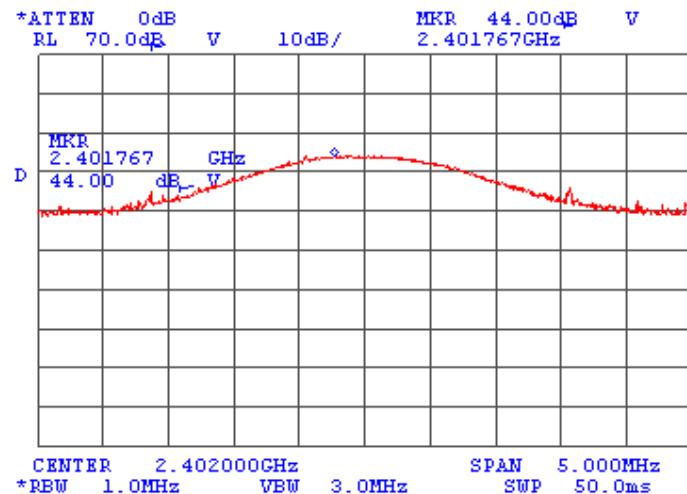
Full description is given in Appendix A.



| | | | |
|----------------------------|---|-------------------------------|------------------------------|
| Test specification: | Section 15.247(b)/ RSS-210, Section A8.4(2), Peak output power | | |
| Test procedure: | Public notice DA 00-705 | | |
| Test mode: | Compliance | Verdict: | |
| Date & Time: | 6/17/2009 3:31:43 PM | PASS | |
| Temperature: 23°C | Air Pressure: 1009 hPa | Relative Humidity: 42% | Power Supply: 3.3 VDC |
| Remarks: | | | |

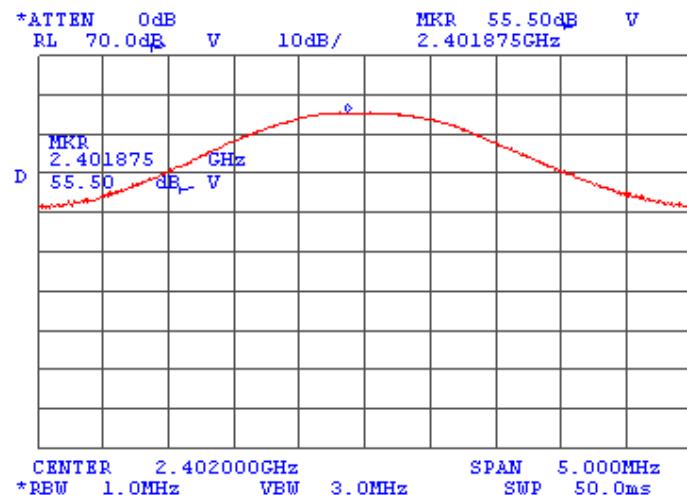
Plot 7.6.1 Field strength of carrier at low frequency, GFSK modulation @1 Mbps

EUT POSITION: X-axis
ANTENNA POLARIZATION: Vertical



Plot 7.6.2 Field strength of carrier at low frequency, GFSK modulation @1 Mbps

EUT POSITION: X-axis
ANTENNA POLARIZATION: Horizontal

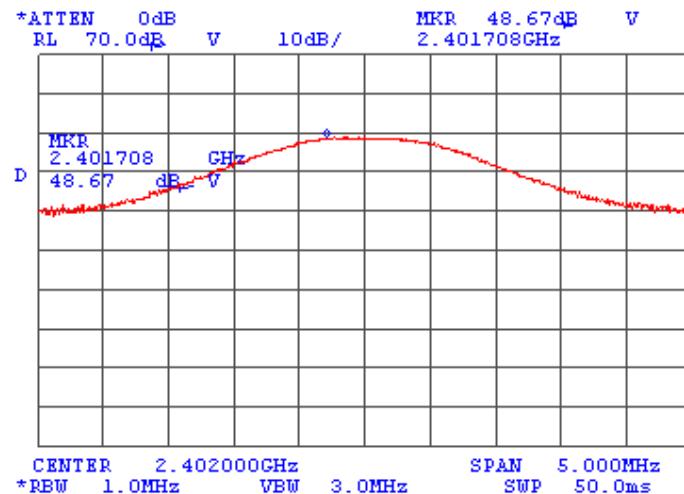




| | | | |
|----------------------------|---|-------------------------------|------------------------------|
| Test specification: | Section 15.247(b)/ RSS-210, Section A8.4(2), Peak output power | | |
| Test procedure: | Public notice DA 00-705 | | |
| Test mode: | Compliance | Verdict: | |
| Date & Time: | 6/17/2009 3:31:43 PM | PASS | |
| Temperature: 23°C | Air Pressure: 1009 hPa | Relative Humidity: 42% | Power Supply: 3.3 VDC |
| Remarks: | | | |

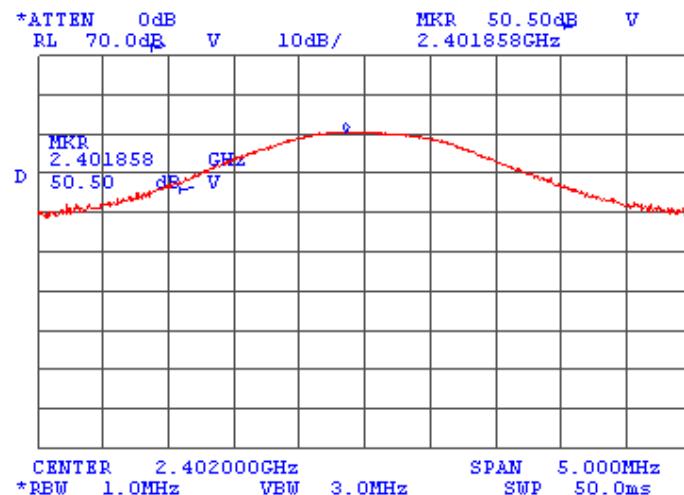
Plot 7.6.3 Field strength of carrier at low frequency, GFSK modulation @1 Mbps

EUT POSITION: Y-axis
ANTENNA POLARIZATION: Vertical



Plot 7.6.4 Field strength of carrier at low frequency, GFSK modulation @1 Mbps

EUT POSITION: Y-axis
ANTENNA POLARIZATION: Horizontal

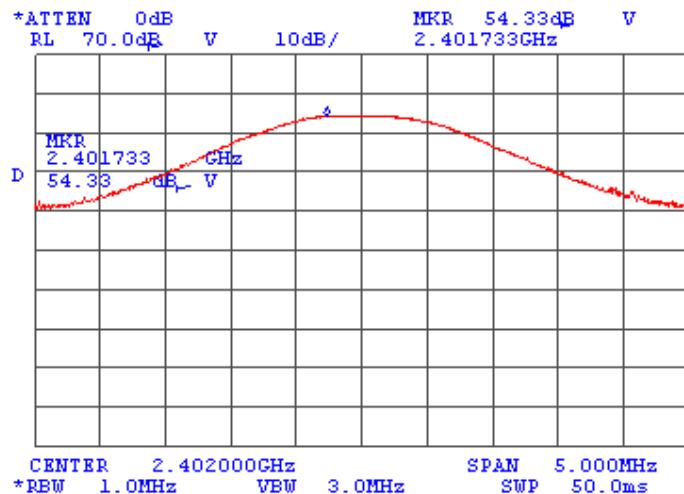




| | | | |
|----------------------------|---|-------------------------------|------------------------------|
| Test specification: | Section 15.247(b)/ RSS-210, Section A8.4(2), Peak output power | | |
| Test procedure: | Public notice DA 00-705 | | |
| Test mode: | Compliance | Verdict: | |
| Date & Time: | 6/17/2009 3:31:43 PM | PASS | |
| Temperature: 23°C | Air Pressure: 1009 hPa | Relative Humidity: 42% | Power Supply: 3.3 VDC |
| Remarks: | | | |

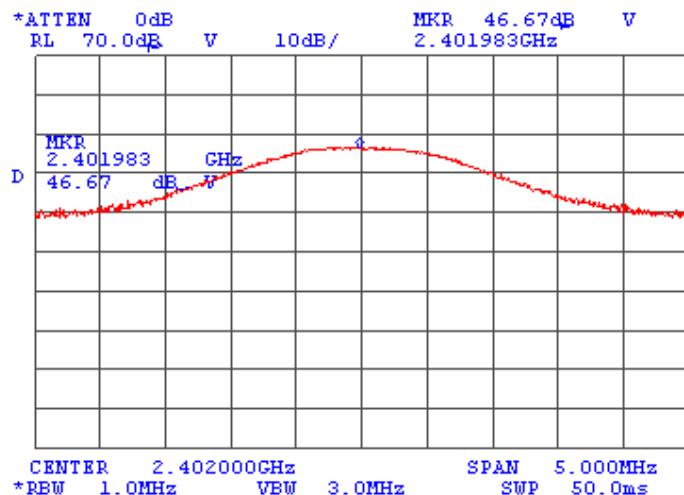
Plot 7.6.5 Field strength of carrier at low frequency, GFSK modulation @1 Mbps

EUT POSITION: Z-axis
ANTENNA POLARIZATION: Vertical



Plot 7.6.6 Field strength of carrier at low frequency, GFSK modulation @1 Mbps

EUT POSITION: Z-axis
ANTENNA POLARIZATION: Horizontal

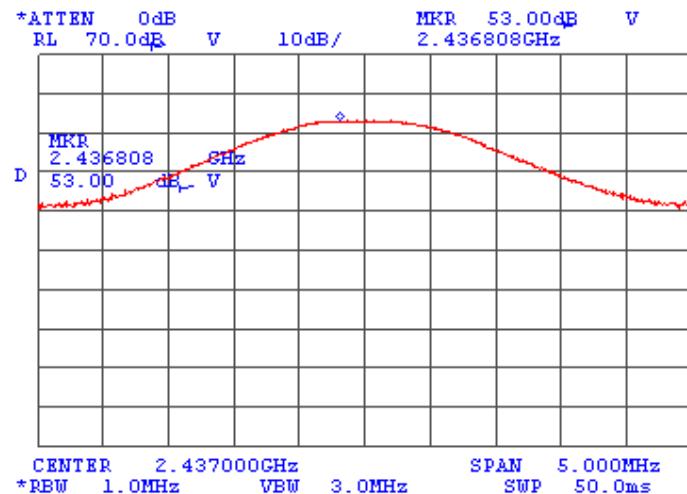




| | | | |
|----------------------------|---|-------------------------------|------------------------------|
| Test specification: | Section 15.247(b)/ RSS-210, Section A8.4(2), Peak output power | | |
| Test procedure: | Public notice DA 00-705 | | |
| Test mode: | Compliance | Verdict: | |
| Date & Time: | 6/17/2009 3:31:43 PM | PASS | |
| Temperature: 23°C | Air Pressure: 1009 hPa | Relative Humidity: 42% | Power Supply: 3.3 VDC |
| Remarks: | | | |

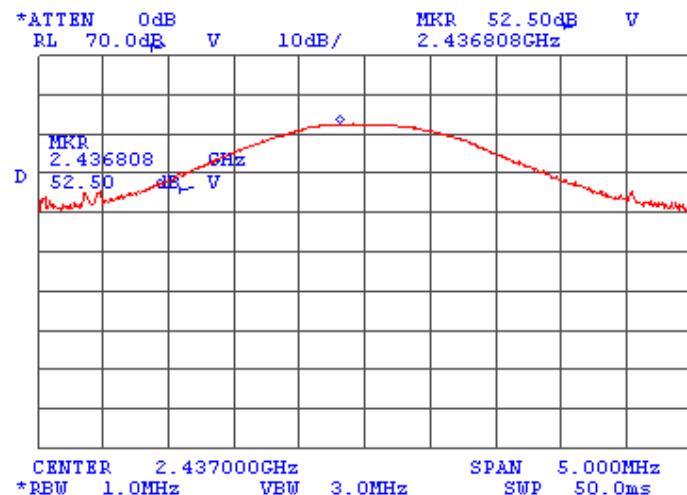
Plot 7.6.7 Field strength of carrier at mid frequency, GFSK modulation @1 Mbps

EUT POSITION: X-axis
ANTENNA POLARIZATION: Horizontal



Plot 7.6.8 Field strength of carrier at mid frequency, GFSK modulation @1 Mbps

EUT POSITION: X-axis
ANTENNA POLARIZATION: Vertical



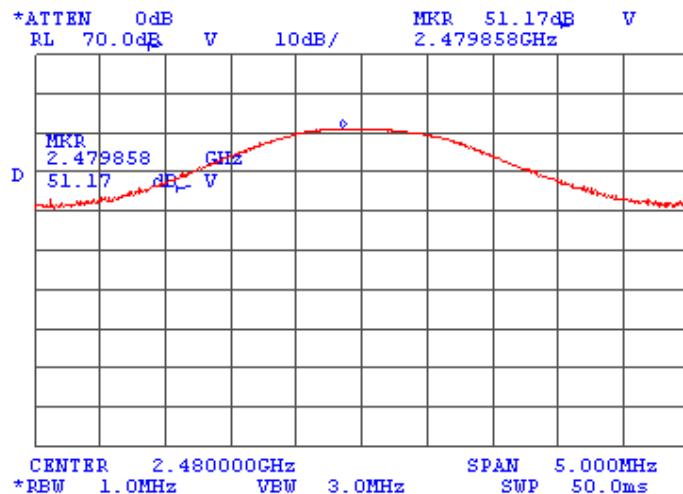


HERMON LABORATORIES

| | | | |
|----------------------------|---|-------------------------------|------------------------------|
| Test specification: | Section 15.247(b)/ RSS-210, Section A8.4(2), Peak output power | | |
| Test procedure: | Public notice DA 00-705 | | |
| Test mode: | Compliance | Verdict: | |
| Date & Time: | 6/17/2009 3:31:43 PM | PASS | |
| Temperature: 23°C | Air Pressure: 1009 hPa | Relative Humidity: 42% | Power Supply: 3.3 VDC |
| Remarks: | | | |

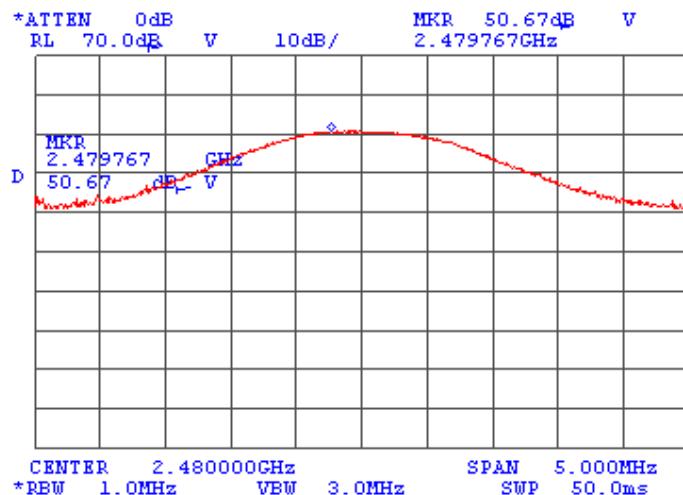
Plot 7.6.9 Field strength of carrier at high frequency, GFSK modulation @1 Mbps

EUT POSITION: X-axis
ANTENNA POLARIZATION: Horizontal



Plot 7.6.10 Field strength of carrier at high frequency, GFSK modulation @1 Mbps

EUT POSITION: Z-axis
ANTENNA POLARIZATION: Vertical

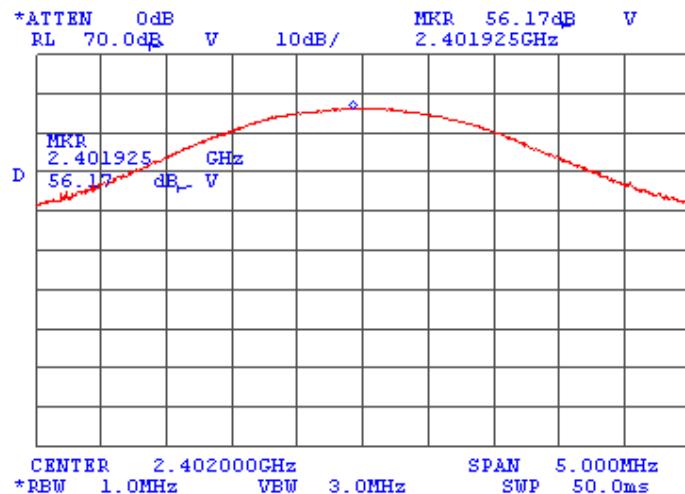




| | | | |
|----------------------------|---|-------------------------------|------------------------------|
| Test specification: | Section 15.247(b)/ RSS-210, Section A8.4(2), Peak output power | | |
| Test procedure: | Public notice DA 00-705 | | |
| Test mode: | Compliance | Verdict: | |
| Date & Time: | 6/17/2009 3:31:43 PM | PASS | |
| Temperature: 23°C | Air Pressure: 1009 hPa | Relative Humidity: 42% | Power Supply: 3.3 VDC |
| Remarks: | | | |

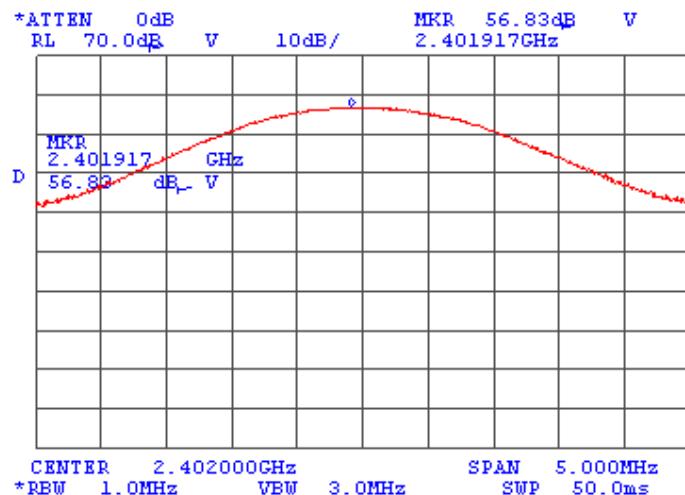
Plot 7.6.11 Field strength of carrier at low frequency, 8DPSK modulation @1 Mbps

EUT POSITION: Z-axis
ANTENNA POLARIZATION: Vertical



Plot 7.6.12 Field strength of carrier at low frequency, 8DPSK modulation @1 Mbps

EUT POSITION: X-axis
ANTENNA POLARIZATION: Horizontal



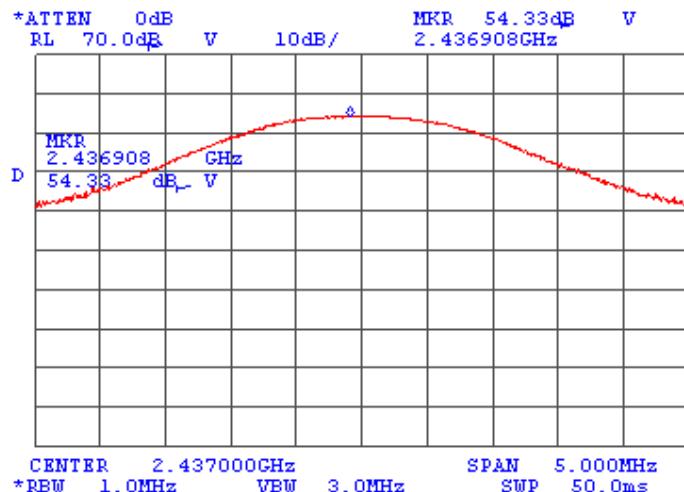


HERMON LABORATORIES

| | | | |
|----------------------------|---|-------------------------------|------------------------------|
| Test specification: | Section 15.247(b)/ RSS-210, Section A8.4(2), Peak output power | | |
| Test procedure: | Public notice DA 00-705 | | |
| Test mode: | Compliance | Verdict: | |
| Date & Time: | 6/17/2009 3:31:43 PM | PASS | |
| Temperature: 23°C | Air Pressure: 1009 hPa | Relative Humidity: 42% | Power Supply: 3.3 VDC |
| Remarks: | | | |

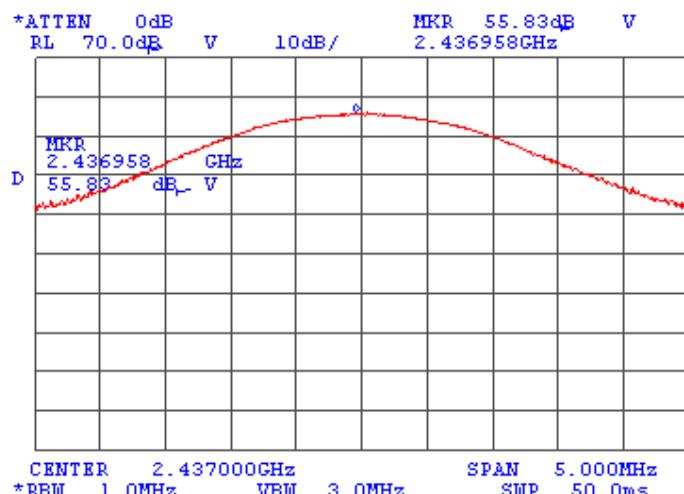
Plot 7.6.13 Field strength of carrier at mid frequency, 8DPSK modulation @1 Mbps

EUT POSITION: Z-axis
ANTENNA POLARIZATION: Vertical



Plot 7.6.14 Field strength of carrier at mid frequency, 8DPSK modulation @1 Mbps

EUT POSITION: X-axis
ANTENNA POLARIZATION: Horizontal



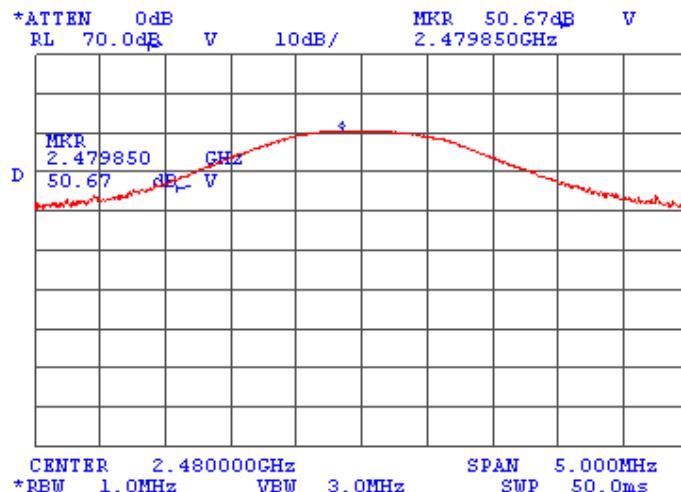


HERMON LABORATORIES

| | | | |
|----------------------------|---|-------------------------------|------------------------------|
| Test specification: | Section 15.247(b)/ RSS-210, Section A8.4(2), Peak output power | | |
| Test procedure: | Public notice DA 00-705 | | |
| Test mode: | Compliance | Verdict: | |
| Date & Time: | 6/17/2009 3:31:43 PM | PASS | |
| Temperature: 23°C | Air Pressure: 1009 hPa | Relative Humidity: 42% | Power Supply: 3.3 VDC |
| Remarks: | | | |

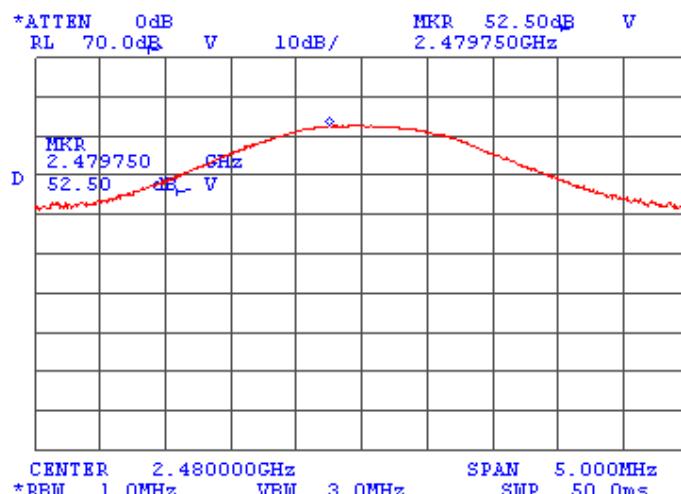
Plot 7.6.15 Field strength of carrier at high frequency, 8DPSK modulation @1 Mbps

EUT POSITION: Z-axis
ANTENNA POLARIZATION: Vertical



Plot 7.6.16 Field strength of carrier at high frequency, 8DPSK modulation @1 Mbps

EUT POSITION: X-axis
ANTENNA POLARIZATION: Horizontal



| | | | |
|----------------------------|---|-------------------------------|------------------------------|
| 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: | |
| Date & Time: | 6/17/2009 3:45:01 PM | PASS | |
| Temperature: 23°C | Air Pressure: 1009 hPa | Relative Humidity: 42% | Power Supply: 3.3 VDC |
| Remarks: | | | |

7.7 Band edge radiated emissions

7.7.1 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 7.7.1.

Table 7.7.1 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 | | | |
| 2400.0 – 2483.5 | 20.0 | 74.0 | 54.0 |
| 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.

7.7.2 Test procedure

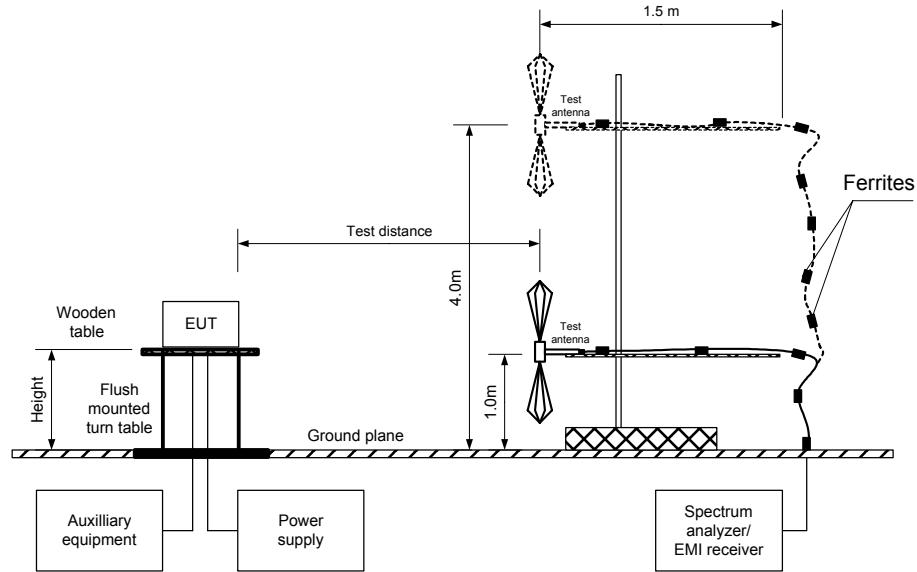
- 7.7.2.1 The EUT was set up as shown in Figure 7.7.1, energized normally modulated at the maximum data rate with its hopping function disabled and its proper operation was checked.
- 7.7.2.2 The EUT was adjusted to produce maximum available to end user RF output power at the lowest carrier frequency.
- 7.7.2.3 The spectrum analyzer span was set to capture the carrier frequency and associated modulation products. The resolution bandwidth was set wider than 1 % of the frequency span.
- 7.7.2.4 The spectrum analyzer was set in max hold mode and allowed trace to stabilize. The highest emission level within the authorized band was measured.
- 7.7.2.5 The maximum band edge emission and modulation product outside of the band were measured as provided in Table 7.7.2 and associated plots and referenced to the highest emission level measured within the authorized band.
- 7.7.2.6 The above procedure was repeated with the EUT adjusted to produce maximum RF output power at the highest carrier frequency.
- 7.7.2.7 The above procedure was repeated with the frequency hopping function enabled.



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: | |
| Date & Time: | 6/17/2009 3:45:01 PM | PASS | |
| Temperature: 23°C | Air Pressure: 1009 hPa | Relative Humidity: 42% | Power Supply: 3.3 VDC |
| Remarks: | | | |

Figure 7.7.1 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: | |
| Date & Time: | 6/17/2009 3:45:01 PM | PASS | |
| Temperature: 23°C | Air Pressure: 1009 hPa | Relative Humidity: 42% | Power Supply: 3.3 VDC |
| Remarks: | | | |

Table 7.7.2 Band edge emission test results

ASSIGNED FREQUENCY RANGE: 2400.0 – 2483.5 MHz
 DETECTOR USED: Peak
 MODULATION: GFSK / 8DPSK
 MODULATING SIGNAL: PRBS
 BIT RATE: 1/ 2 / 3 Mbps
 TRANSMITTER OUTPUT POWER SETTINGS: Maximum
 RESOLUTION BANDWIDTH: $\geq 1\%$ of the span
 VIDEO BANDWIDTH: \geq RBW

| Frequency, MHz | Band edge emission, dB μ V/m | Emission at carrier, dB μ V/m | Attenuation below carrier, dBc | Limit, dBc | Margin, dB* | Verdict |
|--|----------------------------------|-----------------------------------|--------------------------------|------------|-------------|---------|
| Frequency hopping disabled | | | | | | |
| 2397.100 (GFSK) | 48.17 | 84.2 (Plot 7.7.13) | -36.03 | 20.0 | -17.83 | Pass |
| 2397.280 (8DPSK) | 41.84 | 84.2 (Plot 7.7.13) | -42.36 | 20.0 | -15.49 | Pass |
| Frequency hopping enabled | | | | | | |
| Highest bandedge emission meets 20 dBc limit at 2401.310 MHz (Plot 7.7.13) | | | | | | Pass |

*- Margin = Attenuation below carrier – specification limit.



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: | |
| Date & Time: | 6/17/2009 3:45:01 PM | PASS | |
| Temperature: 23°C | Air Pressure: 1009 hPa | Relative Humidity: 42% | Power Supply: 3.3 VDC |
| Remarks: | | | |

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

ASSIGNED FREQUENCY: 2400.0 – 2483.5 MHz

TEST DISTANCE: 3 m

MODULATION: GFSK / 8DPSK

MODULATING SIGNAL: PRBS

BIT RATE: 1 / 3 Mbps

DUTY CYCLE: 100 %

TRANSMITTER OUTPUT POWER SETTINGS: Maximum

DETECTOR USED: Peak

RESOLUTION BANDWIDTH: 1000 kHz

TEST ANTENNA TYPE: Double ridged guide

FREQUENCY HOPPING: Disabled

| Frequency MHz | Antenna | | Azimuth degrees | Peak field strength(VBW=3 MHz) | | | Average field strength(VBW=10 Hz) | | | Verdict | | |
|-------------------------------|--------------|-------------|--------------------|--------------------------------|--------------------|-----------------|-----------------------------------|------------------------|--------------------|---------|--|--|
| | Polarization | Height m | | Measured dB(µV/m) | Limit, dB(µV/m) | Margin, dB** | Measured dB(µV/m) | Calculated dB(µV/m) | Limit, dB(µV/m) | | | |
| Frequency hopping disabled | | | | | | | | | | | | |
| Low carrier frequency | | | | | | | | | | | | |
| 2377.400 | V (z-axis) | 1.2 | 010 | 48.17 | 74.0 | -25.83 | 34.26 | 34.26 | 54.0 | -19.74 | | |
| 8DPSK 3 Mbps | | | | | | | | | | | | |
| 2389.800 | V (z-axis) | 1.2 | 010 | 48.06 | 74.0 | -25.94 | 34.54 | 34.54 | 54.0 | -19.46 | | |
| High carrier frequency | | | | | | | | | | | | |
| 2499.790 | V (z-axis) | 1.2 | 010 | 48.75 | 74.0 | -25.25 | 35.12 | 35.12 | 54.0 | -18.88 | | |
| 8DPSK 3 Mbps | | | | | | | | | | | | |
| 2491.540 | V (z-axis) | 1.2 | 010 | 48.35 | 74.0 | -25.65 | 35.09 | 35.09 | 54.0 | -18.91 | | |
| Frequency hopping enabled | | | | | | | | | | | | |
| Low carrier frequency | | | | | | | | | | | | |
| 2358.200 | V (z-axis) | 1.2 | 010 | 48.42 | 74.0 | -25.58 | 34.37 | 34.37 | 54.0 | -19.63 | | |
| High carrier frequency | | | | | | | | | | | | |
| 2497.740 | V (z-axis) | 1.2 | 010 | 49.92 | 74.0 | -24.08 | 35.24 | 35.24 | 54.0 | -18.76 | | |
| Pass | | | | | | | | | | | | |

*- 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.

Reference numbers of test equipment used

| | | | | | | |
|---------|---------|---------|---------|--|--|--|
| HL 0521 | HL 1984 | HL 3123 | HL 3616 | | | |
|---------|---------|---------|---------|--|--|--|

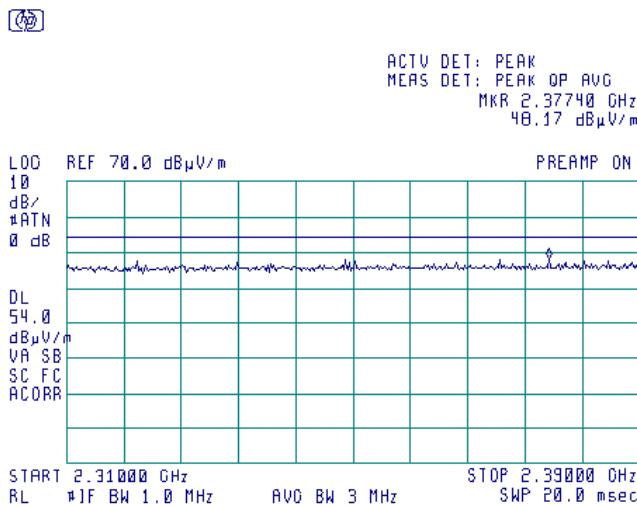
Full description is given in Appendix A.



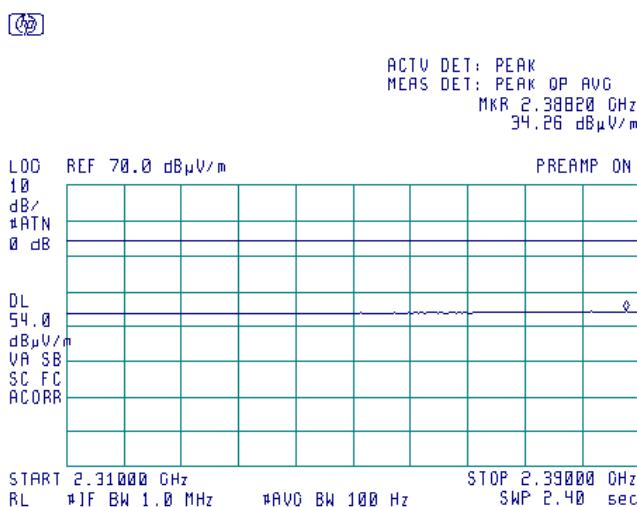
HERMON LABORATORIES

| | | | |
|----------------------------|---|-------------------------------|------------------------------|
| 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: | |
| Date & Time: | 6/17/2009 3:45:01 PM | PASS | |
| Temperature: 23°C | Air Pressure: 1009 hPa | Relative Humidity: 42% | Power Supply: 3.3 VDC |
| Remarks: | | | |

Plot 7.7.1 The highest band edge emission at low carrier frequency with hopping function disabled, 2310.0 – 2390.0 MHz range, peak detector



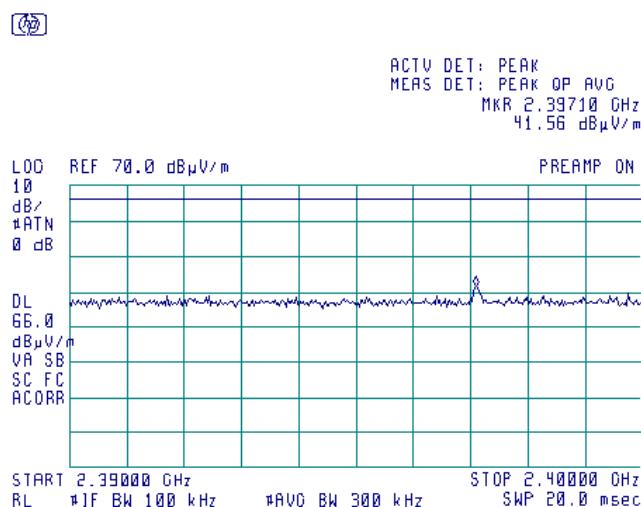
Plot 7.7.2 The highest band edge emission at low carrier frequency with hopping function disabled, 2310.0 – 2390.0 MHz range, VBW = 100 Hz





| | | | |
|----------------------------|---|-------------------------------|------------------------------|
| 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 & Time: | 6/17/2009 3:45:01 PM | Relative Humidity: 42% | Power Supply: 3.3 VDC |
| Temperature: 23°C | Air Pressure: 1009 hPa | | |
| Remarks: | | | |

**Plot 7.7.3 The highest band edge emission at low carrier frequency with hopping function disabled,
2390.0 – 2400.0 MHz range**

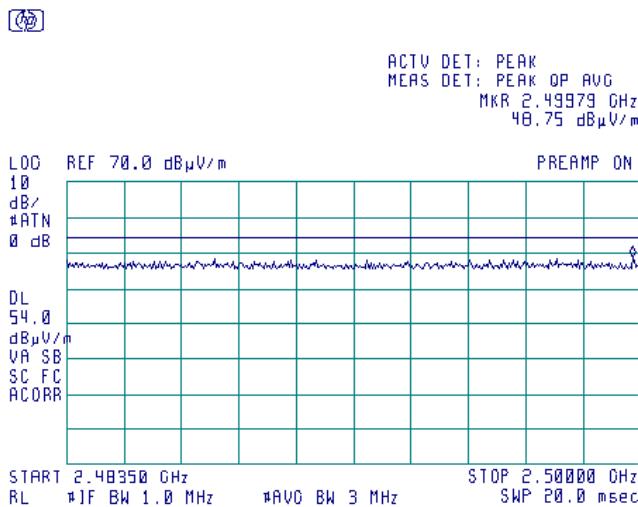




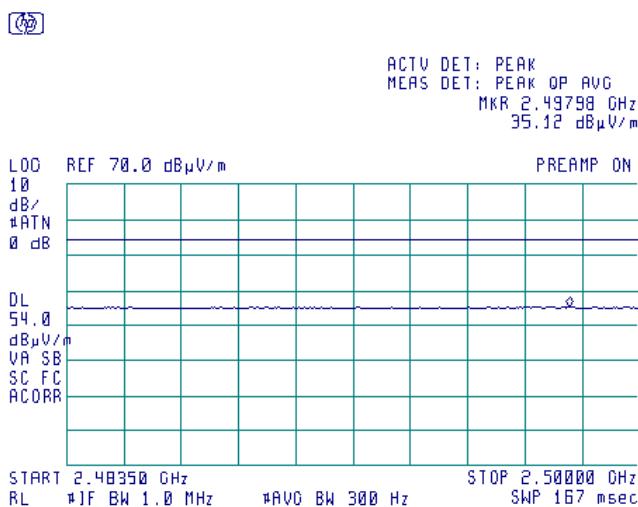
HERMON LABORATORIES

| | | | |
|----------------------------|---|-------------------------------|------------------------------|
| 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: | |
| Date & Time: | 6/17/2009 3:45:01 PM | PASS | |
| Temperature: 23°C | Air Pressure: 1009 hPa | Relative Humidity: 42% | Power Supply: 3.3 VDC |
| Remarks: | | | |

Plot 7.7.4 The highest band edge emission at high carrier frequency with hopping function disabled, 2483.5 – 2500.0 MHz range, peak detector



Plot 7.7.5 The highest band edge emission at high carrier frequency with hopping function disabled, 2483.5 – 2500.0 MHz range, VBW = 100 Hz

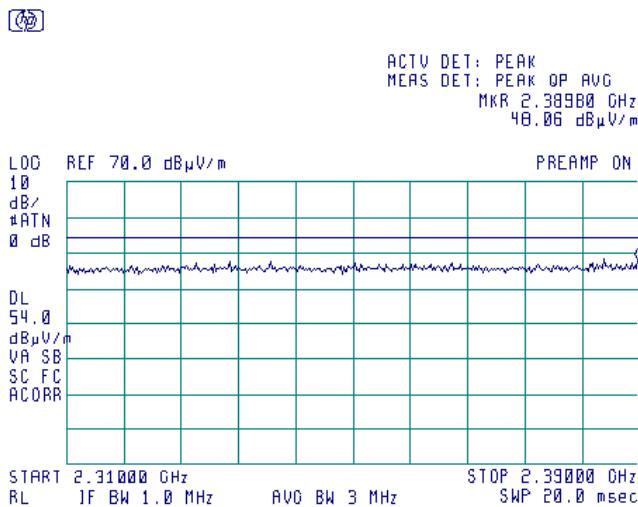




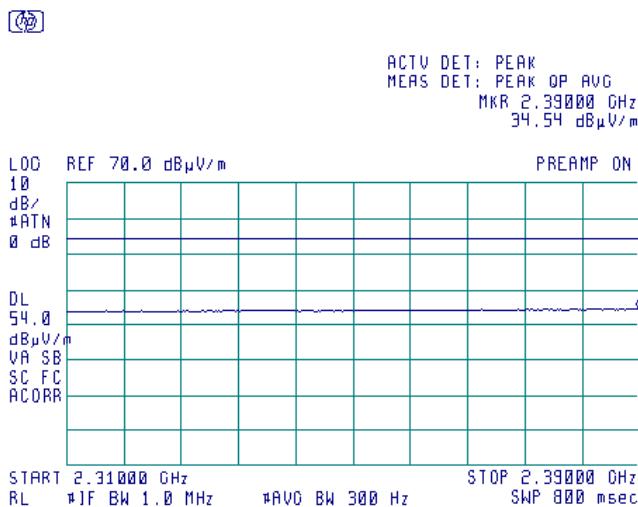
HERMON LABORATORIES

| | | | |
|----------------------------|---|-------------------------------|------------------------------|
| 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: | |
| Date & Time: | 6/17/2009 3:45:01 PM | PASS | |
| Temperature: 23°C | Air Pressure: 1009 hPa | Relative Humidity: 42% | Power Supply: 3.3 VDC |
| Remarks: | | | |

Plot 7.7.6 The highest band edge emission at low carrier frequency with hopping function disabled, 2310.0 – 2390.0 MHz range, peak detector



Plot 7.7.7 The highest band edge emission at low carrier frequency with hopping function disabled, 2310.0 – 2390.0 MHz range, VBW = 100 Hz

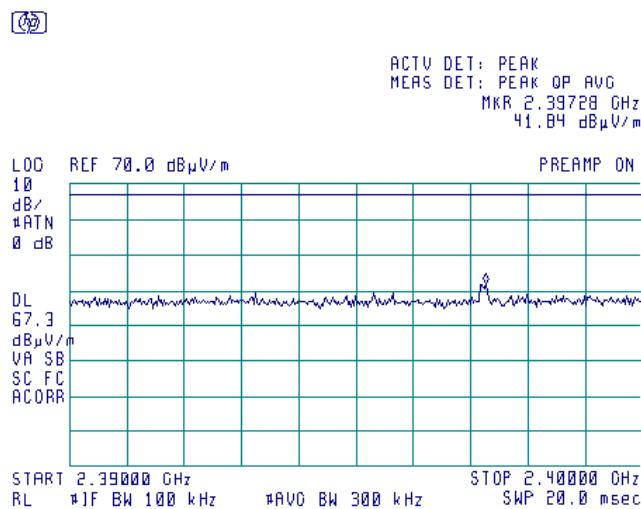




HERMON LABORATORIES

| | | | |
|----------------------------|---|-------------------------------|------------------------------|
| 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 & Time: | 6/17/2009 3:45:01 PM | | |
| Temperature: 23°C | Air Pressure: 1009 hPa | Relative Humidity: 42% | Power Supply: 3.3 VDC |
| Remarks: | | | |

**Plot 7.7.8 The highest band edge emission at low carrier frequency with hopping function disabled,
2390.0 – 2400.0 MHz range**

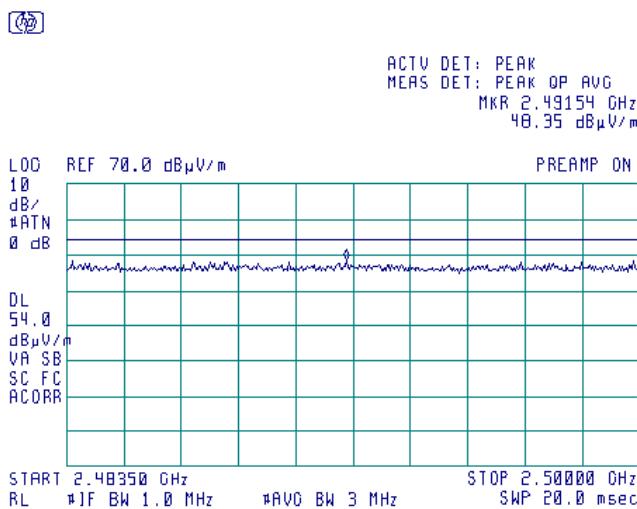




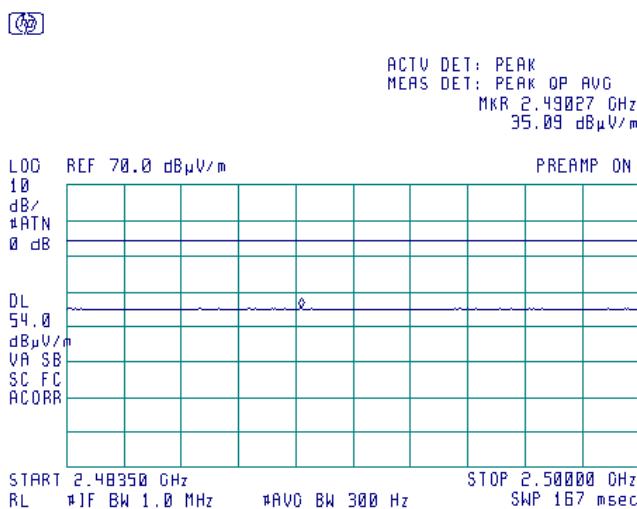
HERMON LABORATORIES

| | | | |
|----------------------------|---|-------------------------------|------------------------------|
| 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: | |
| Date & Time: | 6/17/2009 3:45:01 PM | PASS | |
| Temperature: 23°C | Air Pressure: 1009 hPa | Relative Humidity: 42% | Power Supply: 3.3 VDC |
| Remarks: | | | |

Plot 7.7.9 The highest band edge emission at high carrier frequency with hopping function disabled, 2483.5 – 2500.0 MHz range, peak detector



Plot 7.7.10 The highest band edge emission at high carrier frequency with hopping function disabled, 2483.5 – 2500.0 MHz range, VBW = 100 Hz

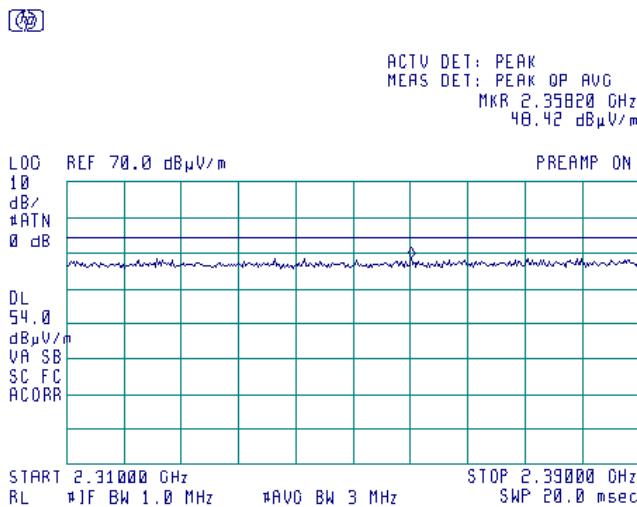




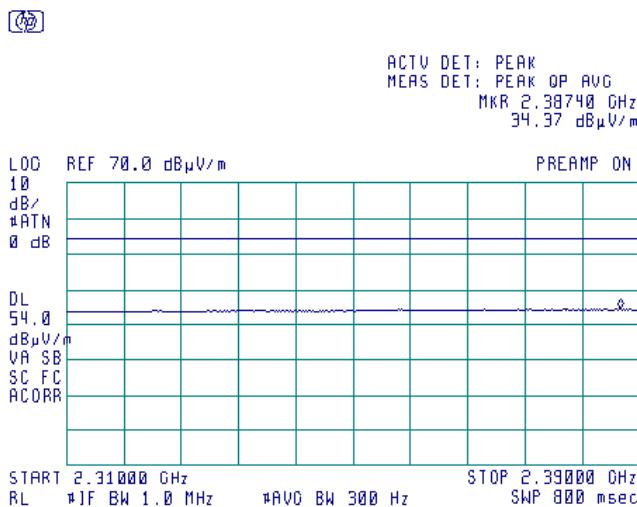
HERMON LABORATORIES

| | | | |
|----------------------------|---|-------------------------------|------------------------------|
| 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: | |
| Date & Time: | 6/17/2009 3:45:01 PM | PASS | |
| Temperature: 23°C | Air Pressure: 1009 hPa | Relative Humidity: 42% | Power Supply: 3.3 VDC |
| Remarks: | | | |

Plot 7.7.11 The highest band edge emission at low carrier frequency with hopping function enabled, 2310.0 – 2390.0 MHz range, peak detector



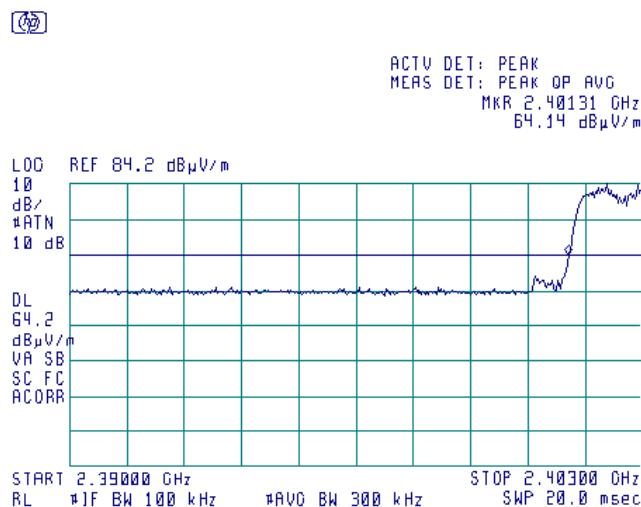
Plot 7.7.12 The highest band edge emission at low carrier frequency with hopping function enabled, 2310.0 – 2390.0 MHz range, VBW = 100 Hz





| | | | |
|----------------------------|---|-------------------------------|------------------------------|
| 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 & Time: | 6/17/2009 3:45:01 PM | Relative Humidity: 42% | Power Supply: 3.3 VDC |
| Temperature: 23°C | Air Pressure: 1009 hPa | | |
| Remarks: | | | |

Plot 7.7.13 The highest band edge emission at low carrier frequency with hopping function enabled,
2390.0 – 2400.0 MHz range

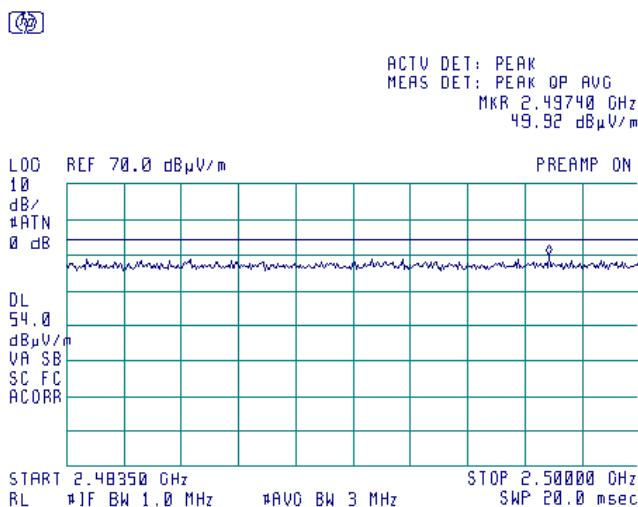




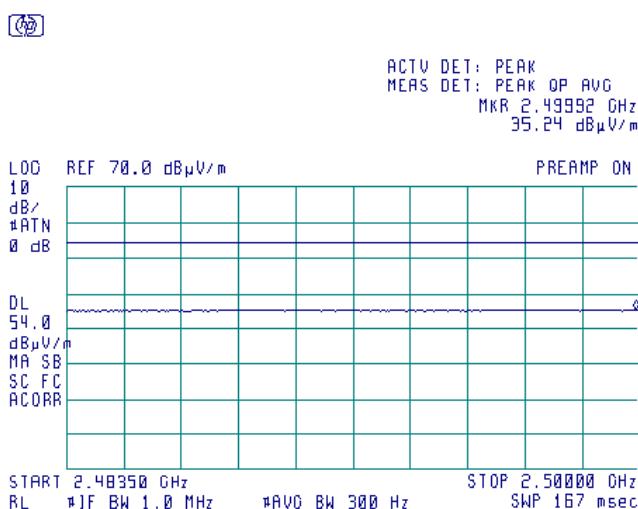
HERMON LABORATORIES

| | | | |
|----------------------------|---|-------------------------------|------------------------------|
| 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: | |
| Date & Time: | 6/17/2009 3:45:01 PM | PASS | |
| Temperature: 23°C | Air Pressure: 1009 hPa | Relative Humidity: 42% | Power Supply: 3.3 VDC |
| Remarks: | | | |

Plot 7.7.14 The highest band edge emission at high carrier frequency with hopping function enabled, 2483.5 – 2500.0 MHz range, peak detector



Plot 7.7.15 The highest band edge emission at high carrier frequency with hopping function enabled, 2483.5 – 2500.0 MHz range, VBW = 100 Hz





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 & Time: | 6/4/2009 9:02:58 AM | | |
| Temperature: 22°C | Air Pressure: 1015 hPa | Relative Humidity: 52% | Power Supply: 3.3 VDC |
| Remarks: | | | |

7.8 Field strength of spurious emissions

7.8.1 General

This test was performed to measure field strength of spurious emissions from the EUT. Specification test limits are given in Table 7.8.1.

Table 7.8.1 Radiated spurious emissions limits

| Frequency, MHz | Field strength at 3 m within restricted bands, dB(µV/m)*** | | | Attenuation of field strength of spurious versus carrier outside restricted bands, dBc*** |
|----------------------------------|--|-----------------|-----------------|---|
| | Peak | Quasi Peak | Average | |
| 0.009 – 0.090 | 148.5 – 128.5 | NA | 128.5 – 108.5** | 20.0 |
| 0.090 – 0.110 | NA | 108.5 – 106.8** | NA | |
| 0.110 – 0.490 | 126.8 – 113.8 | NA | 106.8 – 93.8** | |
| 0.490 – 1.705 | | 73.8 – 63.0** | | |
| 1.705 – 30.0* | | 69.5 | | |
| 30 – 88 | NA | 40.0 | NA | |
| 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:

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

where S₁ and S₂ – 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.

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

7.8.2.1 The EUT was set up as shown in Figure 7.8.1, energized and the performance check was conducted.

7.8.2.2 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.

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

7.8.3 Test procedure for spurious emission field strength measurements above 30 MHz

7.8.3.1 The EUT was set up as shown in Figure 7.8.2, energized and the performance check was conducted.

7.8.3.2 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.

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



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 & Time: | 6/4/2009 9:02:58 AM | | |
| Temperature: 22°C | Air Pressure: 1015 hPa | Relative Humidity: 52% | Power Supply: 3.3 VDC |
| Remarks: | | | |

Figure 7.8.1 Setup for spurious emission field strength measurements below 30 MHz

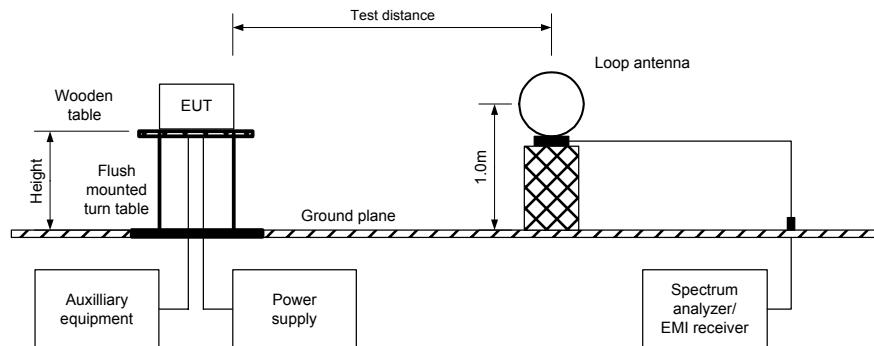
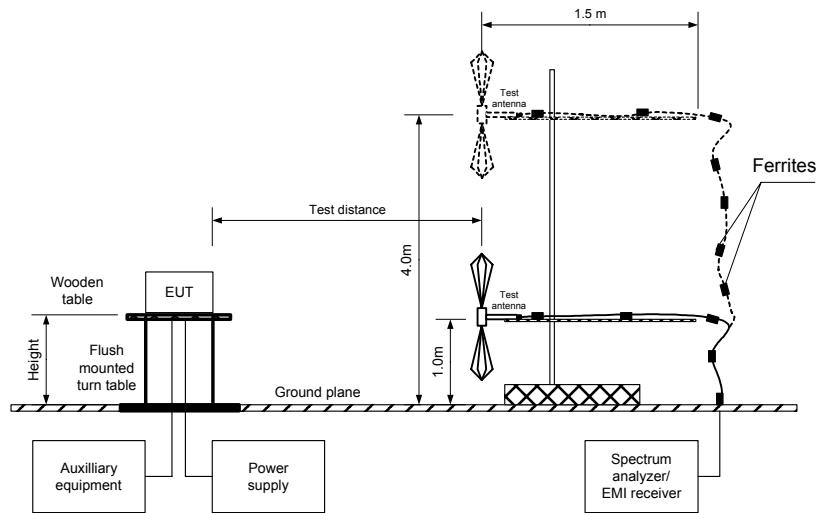


Figure 7.8.2 Setup for spurious emission field strength measurements above 30 MHz





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 & Time: | 6/4/2009 9:02:58 AM | Relative Humidity: 52% | Power Supply: 3.3 VDC |
| Temperature: 22°C | Air Pressure: 1015 hPa | | |
| Remarks: | | | |

Table 7.8.2 Field strength of emissions outside restricted bands

| | |
|------------------------------------|--|
| ASSIGNED FREQUENCY: | 2400.0 – 2483.5 MHz |
| INVESTIGATED FREQUENCY RANGE: | 0.009 - 25000 MHz |
| TEST DISTANCE: | 3 m |
| MODULATION: | GFSK |
| MODULATING SIGNAL: | PRBS |
| BIT RATE: | 3 Mbps |
| DUTY CYCLE: | 100 % |
| TRANSMITTER OUTPUT POWER SETTINGS: | Maximum |
| TRANSMITTER OUTPUT POWER: | -12.23 dBm at low carrier frequency -14.73 dBm at mid carrier frequency -16.56 dBm at high carrier frequency |
| DETECTOR USED: | Peak |
| RESOLUTION BANDWIDTH: | 100 kHz |
| VIDEO BANDWIDTH: | 300 kHz |
| TEST ANTENNA TYPE: | Active loop (9 kHz – 30 MHz) Biconilog (30 MHz – 1000 MHz) Double ridged guide (above 1000 MHz) |
| FREQUENCY HOPPING: | Disabled |

| Frequency MHz | Field strength of spurious, dB(μ V/m) | Antenna polarization | Antenna height, m | Azimuth, degrees* | Field strength of carrier, dB(μ V/m) | Attenuation below carrier, dBc | Limit, dBc | Margin, dB** | Verdict |
|--|--|-------------------------|----------------------|----------------------|---|--------------------------------------|---------------|-----------------|---------|
| All emissions were found at least 20 dB below the spurious limit | | | | | | | | | |

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

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



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: | |
| Date & Time: | 6/4/2009 9:02:58 AM | PASS | |
| Temperature: 22°C | Air Pressure: 1015 hPa | Relative Humidity: 52% | Power Supply: 3.3 VDC |
| Remarks: | | | |

Table 7.8.3 Field strength of spurious emissions above 1 GHz within restricted bands

ASSIGNED FREQUENCY: 2400.0 – 2483.5 MHz
 INVESTIGATED FREQUENCY RANGE: 1000 - 25000 MHz
 TEST DISTANCE: 3 m
 MODULATION: GFSK
 MODULATING SIGNAL: PRBS
 BIT RATE: 3 Mbps
 DUTY CYCLE: 100 %
 TRANSMITTER OUTPUT POWER SETTINGS: Maximum
 TRANSMITTER OUTPUT POWER: -12.23 dBm at low carrier frequency
 -14.73 dBm at mid carrier frequency
 -16.56 dBm at high carrier frequency
 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=10 Hz) | | | Verdict |
|-------------------------------|--------------|-------------|--------------------|--------------------------------|--------------------|-----------------|-----------------------------------|--------------------|-----------------|---------|
| | Polarization | Height m | | Measured dB(µV/m) | Limit, IB(µV/m) | Margin, dB** | Measured, dB(µV/m) | Limit, dB(µV/m) | Margin, dB** | |
| Low carrier frequency | | | | | | | | | | |
| 4804.000 | H | 1.0 | 020 | 48.88 | 74.00 | -25.12 | 44.79 | 54.0 | -9.21 | Pass |
| Mid carrier frequency | | | | | | | | | | |
| 4874.000 | H | 1.0 | 020 | 48.18 | 74.00 | -25.82 | 45.60 | 54.0 | -8.40 | Pass |
| High carrier frequency | | | | | | | | | | |
| 4960.000 | V | 1.1 | 170 | 46.81 | 74.00 | -27.19 | 42.11 | 54.0 | -11.89 | Pass |

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

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



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 & Time: | 6/4/2009 9:02:58 AM | | |
| Temperature: 22°C | Air Pressure: 1015 hPa | Relative Humidity: 52% | Power Supply: 3.3 VDC |
| Remarks: | | | |

Table 7.8.4 Field strength of spurious emissions below 1 GHz within restricted bands

| ASSIGNED FREQUENCY: | 2400.0 – 2483.5 MHz | | | | | | | |
|------------------------------------|--|-----------------------------|-----------------|-------------------------|----------------------|-------------------|--------------------------------|---------|
| INVESTIGATED FREQUENCY RANGE: | 0.009 – 1000 MHz | | | | | | | |
| TEST DISTANCE: | 3 m | | | | | | | |
| MODULATION: | GFSK | | | | | | | |
| MODULATING SIGNAL: | PRBS | | | | | | | |
| BIT RATE: | 3 Mbps | | | | | | | |
| DUTY CYCLE: | 100 % | | | | | | | |
| TRANSMITTER OUTPUT POWER SETTINGS: | Maximum | | | | | | | |
| TRANSMITTER OUTPUT POWER: | -12.23 dBm at low carrier frequency -14.73 dBm at mid carrier frequency -16.56 dBm at high carrier frequency | | | | | | | |
| RESOLUTION BANDWIDTH: | 1 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 |
| High carrier frequency | | Measured emission, dB(µV/m) | Limit, dB(µV/m) | Margin, dB [†] | | | | |
| 399.999 | 29.8 | 25.10 | 46.00 | -20.9 | H | 1.2 | 060 | Pass |

[†]- Margin = Measured emission - specification limit.^{**}- EUT front panel refer to 0 degrees position of turntable.

NOTE: The spurious emissions sweeps were performed with EUT configured to 3 Mbps 8DPSK modulation assuming maximum output power, however spurious emissions measurements were performed with EUT configured to 1 Mbps GFSK modulation, since it was found as the worst case.

Table 7.8.5 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 | |
| 8.362 - 8.366 | 37.5 - 38.25 | 322 - 335.4 | 2483.5 - 2500 | 9300 - 9500 | Above 38.6 |

Reference numbers of test equipment used

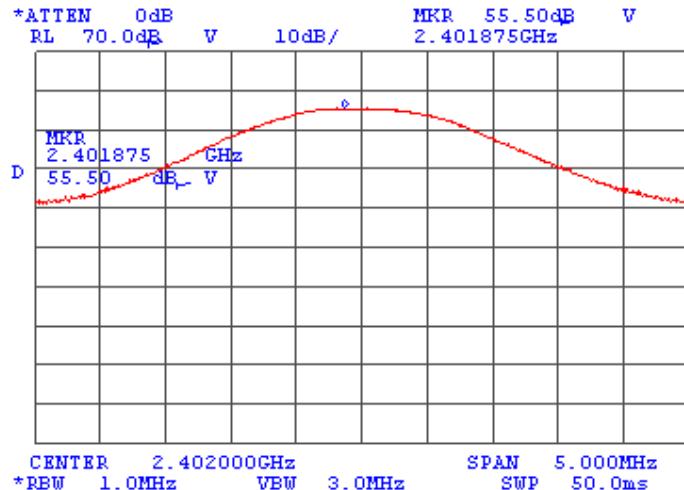
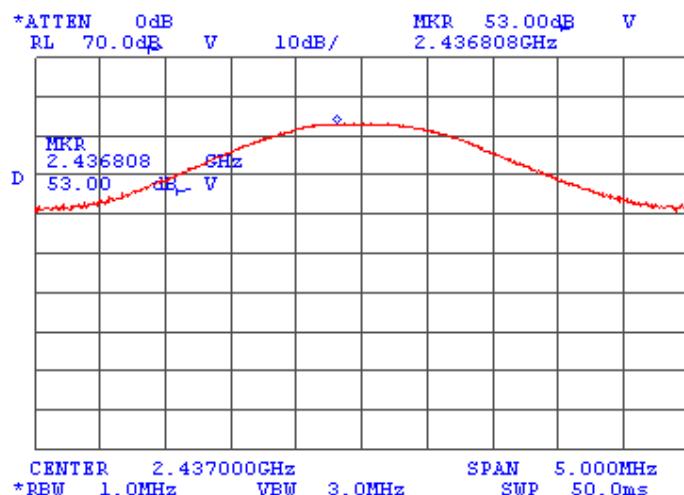
| | | | | | | | |
|---------|---------|---------|---------|---------|---------|---------|---------|
| HL 0446 | HL 0521 | HL 0604 | HL 0768 | HL 1984 | HL 2254 | HL 2780 | HL 2882 |
| HL 3121 | HL 3532 | HL 3534 | HL 3535 | HL 3616 | | | |

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 | Verdict: | |
| Date & Time: | 6/4/2009 9:02:58 AM | PASS | |
| Temperature: 22°C | Air Pressure: 1015 hPa | Relative Humidity: 52% | Power Supply: 3.3 VDC |
| Remarks: | | | |

Plot 7.8.1 Radiated emission measurements at the low carrier frequencyTEST SITE: OATS
TEST DISTANCE: 3 m**Plot 7.8.2 Radiated emission measurements at the mid carrier frequency**TEST SITE: OATS
TEST DISTANCE: 3 m

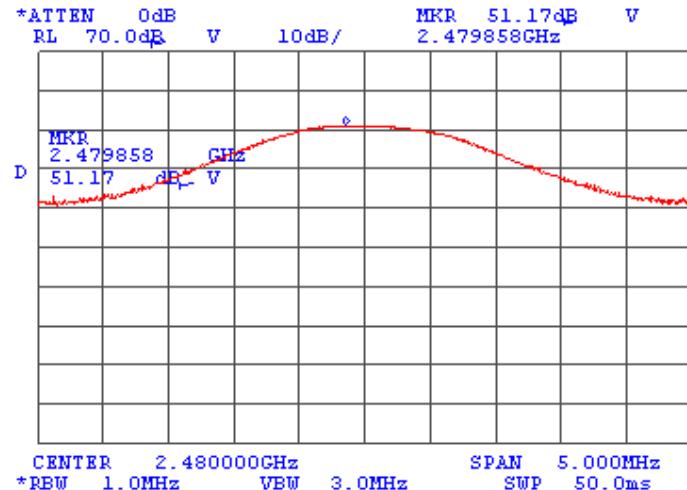


HERMON LABORATORIES

| | | | |
|----------------------------|---|-------------------------------|------------------------------|
| 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 & Time: | 6/4/2009 9:02:58 AM | | |
| Temperature: 22°C | Air Pressure: 1015 hPa | Relative Humidity: 52% | Power Supply: 3.3 VDC |
| Remarks: | | | |

Plot 7.8.3 Radiated emission measurements at the high carrier frequency

TEST SITE: OATS
TEST DISTANCE: 3 m



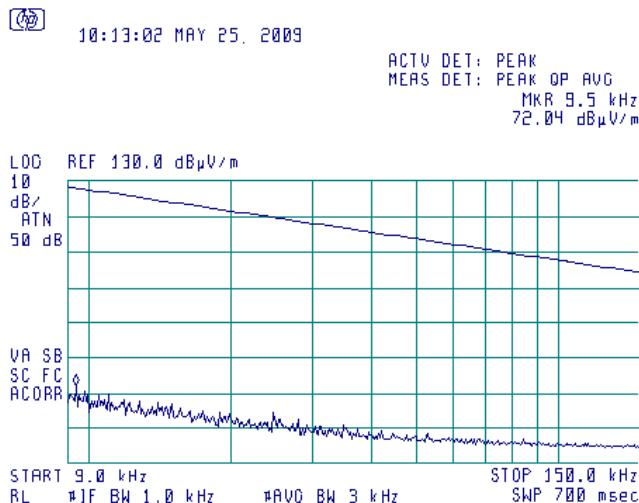


HERMON LABORATORIES

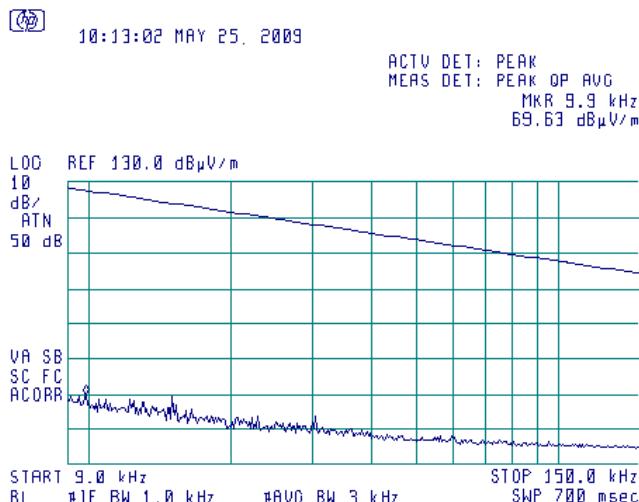
| | | | |
|----------------------------|---|-------------------------------|------------------------------|
| Test specification: | Section 15.247(d) / RSS-210, Section A8.5, Radiated spurious emissions | | |
| Test procedure: | Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4 | | |
| Test mode: | Compliance | Verdict: | |
| Date & Time: | 6/4/2009 9:02:58 AM | PASS | |
| Temperature: 22°C | Air Pressure: 1015 hPa | Relative Humidity: 52% | Power Supply: 3.3 VDC |
| Remarks: | | | |

Plot 7.8.4 Radiated emission measurements from 9 to 150 kHz at the low carrier frequency

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

**Plot 7.8.5 Radiated emission measurements from 9 to 150 kHz at the mid carrier frequency**

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



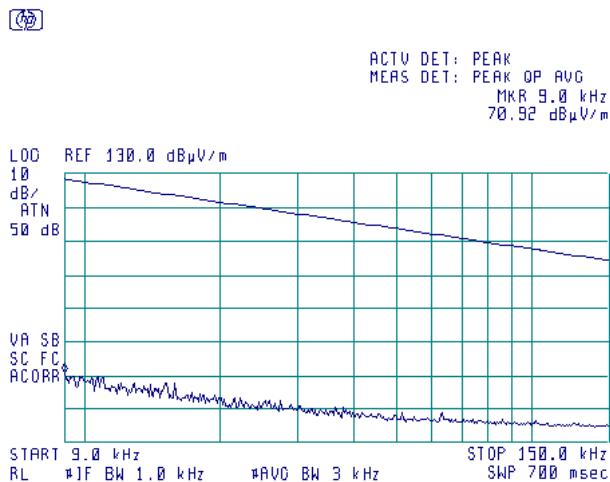


HERMON LABORATORIES

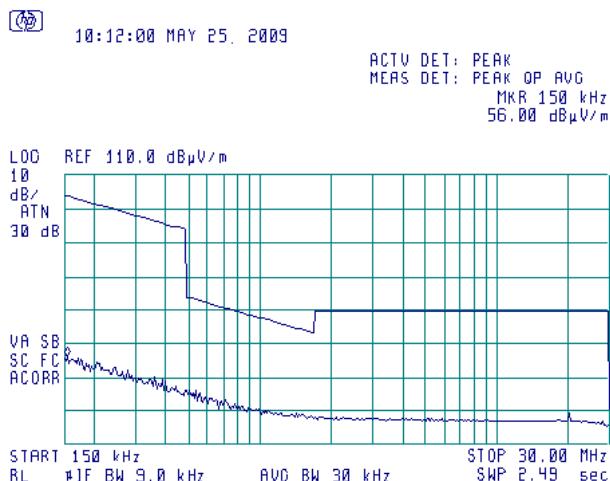
| | | | |
|----------------------------|---|-------------------------------|------------------------------|
| Test specification: | Section 15.247(d) / RSS-210, Section A8.5, Radiated spurious emissions | | |
| Test procedure: | Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4 | | |
| Test mode: | Compliance | Verdict: | |
| Date & Time: | 6/4/2009 9:02:58 AM | PASS | |
| Temperature: 22°C | Air Pressure: 1015 hPa | Relative Humidity: 52% | Power Supply: 3.3 VDC |
| Remarks: | | | |

Plot 7.8.6 Radiated emission measurements from 9 to 150 kHz at the high carrier frequency

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

**Plot 7.8.7 Radiated emission measurements from 0.15 to 30 MHz at the low carrier frequency**

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



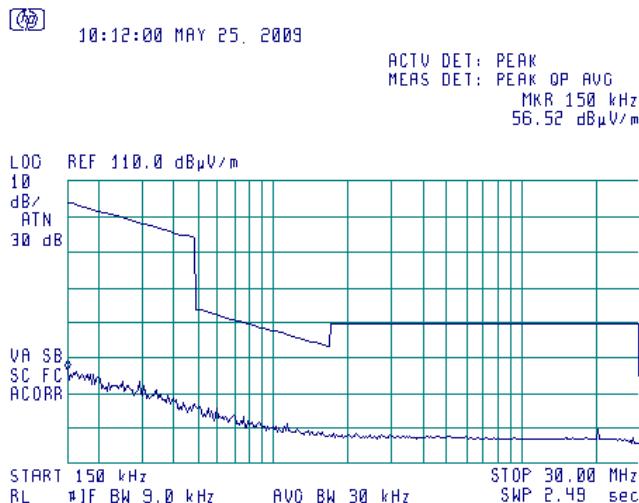


HERMON LABORATORIES

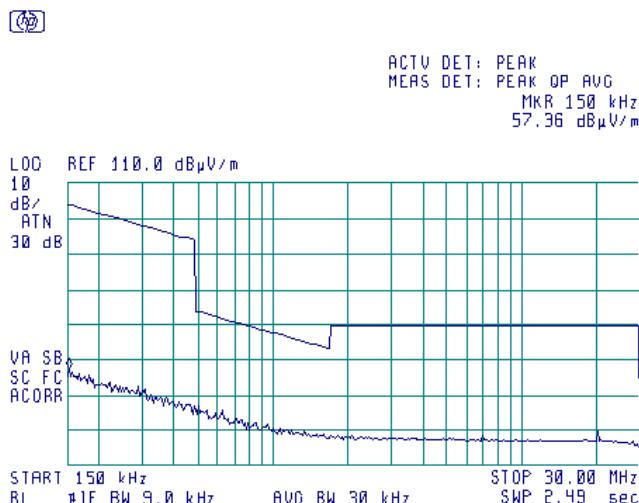
| | | | |
|----------------------------|---|-------------------------------|------------------------------|
| Test specification: | Section 15.247(d) / RSS-210, Section A8.5, Radiated spurious emissions | | |
| Test procedure: | Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4 | | |
| Test mode: | Compliance | Verdict: | |
| Date & Time: | 6/4/2009 9:02:58 AM | PASS | |
| Temperature: 22°C | Air Pressure: 1015 hPa | Relative Humidity: 52% | Power Supply: 3.3 VDC |
| Remarks: | | | |

Plot 7.8.8 Radiated emission measurements from 0.15 to 30 MHz at the mid carrier frequency

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

**Plot 7.8.9 Radiated emission measurements from 0.15 to 30 MHz at the high carrier frequency**

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



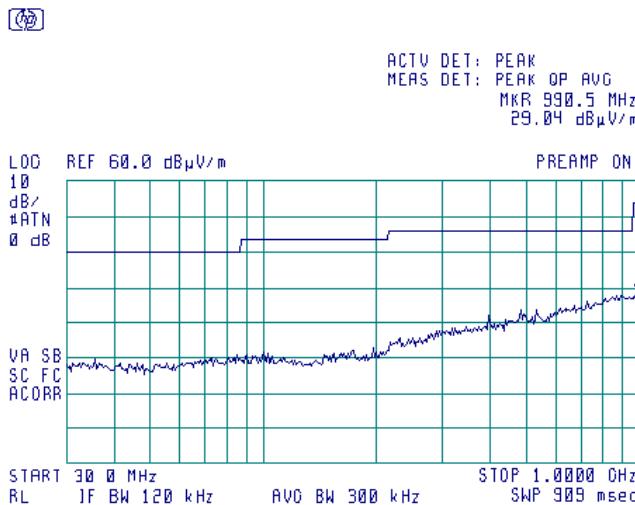


HERMON LABORATORIES

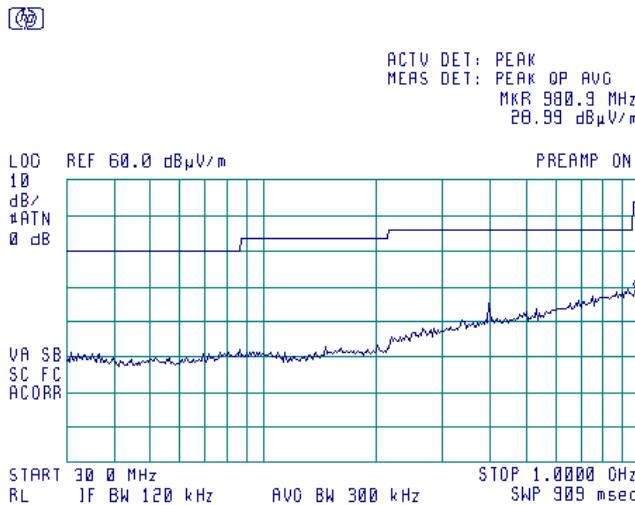
| | | | |
|----------------------------|---|-------------------------------|------------------------------|
| Test specification: | Section 15.247(d) / RSS-210, Section A8.5, Radiated spurious emissions | | |
| Test procedure: | Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4 | | |
| Test mode: | Compliance | | |
| Date & Time: | 6/4/2009 9:02:58 AM | | |
| Temperature: 22°C | Air Pressure: 1015 hPa | Relative Humidity: 52% | Power Supply: 3.3 VDC |
| Remarks: | | | |

Plot 7.8.10 Radiated emission measurements from 30 to 1000 MHz at the low carrier frequency

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

**Plot 7.8.11 Radiated emission measurements from 30 to 1000 MHz at the mid carrier frequency**

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



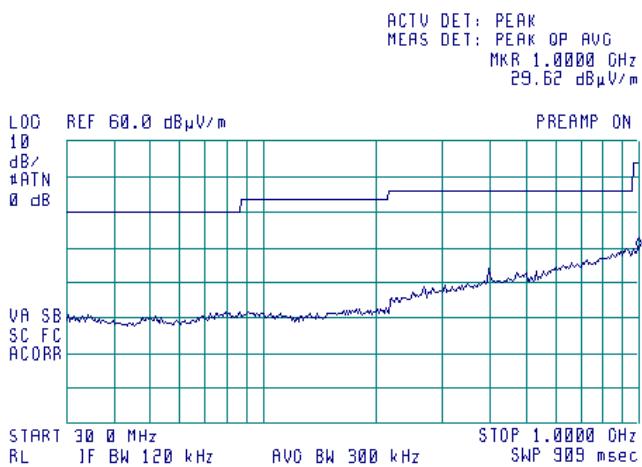


HERMON LABORATORIES

| | | | |
|----------------------------|---|-------------------------------|------------------------------|
| 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 | | |
| Date & Time: | 6/4/2009 9:02:58 AM | | |
| Temperature: 22°C | Air Pressure: 1015 hPa | Relative Humidity: 52% | Power Supply: 3.3 VDC |
| Remarks: | | | |

Plot 7.8.12 Radiated emission measurements from 30 to 1000 MHz at the high carrier frequency

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



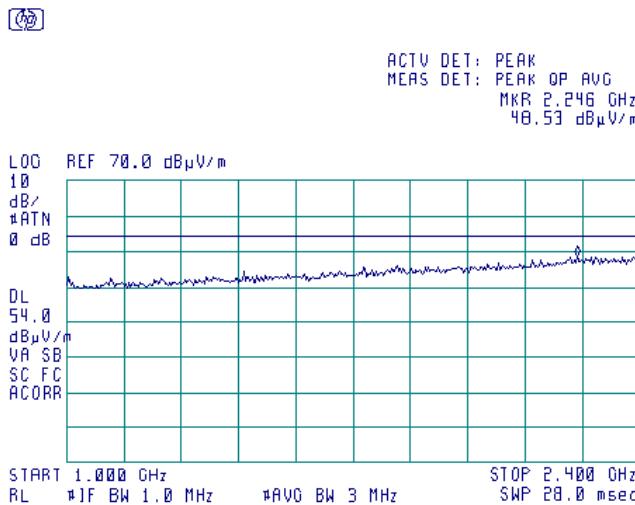


HERMON LABORATORIES

| | | | |
|----------------------------|---|-------------------------------|------------------------------|
| 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: | |
| Date & Time: | 6/4/2009 9:02:58 AM | PASS | |
| Temperature: 22°C | Air Pressure: 1015 hPa | Relative Humidity: 52% | Power Supply: 3.3 VDC |
| Remarks: | | | |

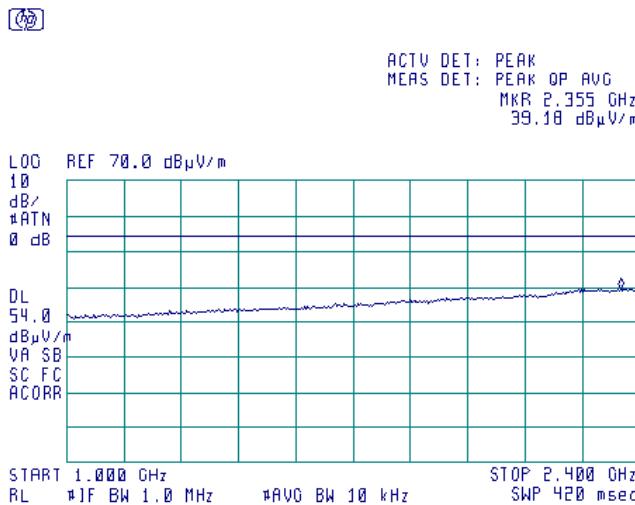
Plot 7.8.13 Radiated emission measurements from 1000 to 2400 MHz at the low carrier frequency

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



Plot 7.8.14 Radiated emission measurements from 1000 to 2400 MHz at the low carrier frequency

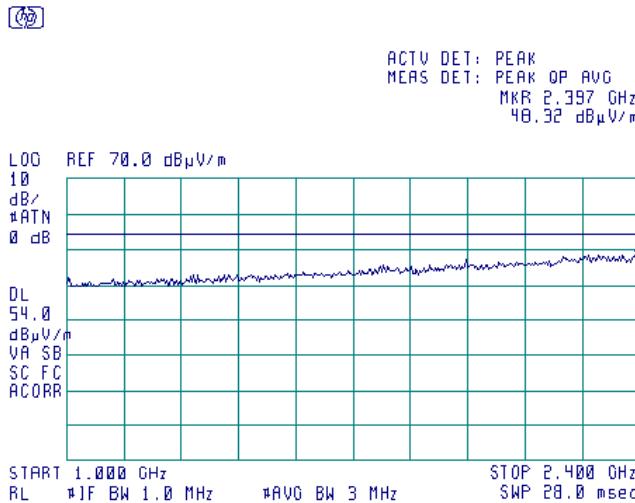
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal
DETECTOR: VBW = 10 kHz



| | | | |
|----------------------------|---|-------------------------------|------------------------------|
| 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: | |
| Date & Time: | 6/4/2009 9:02:58 AM | PASS | |
| Temperature: 22°C | Air Pressure: 1015 hPa | Relative Humidity: 52% | Power Supply: 3.3 VDC |
| Remarks: | | | |

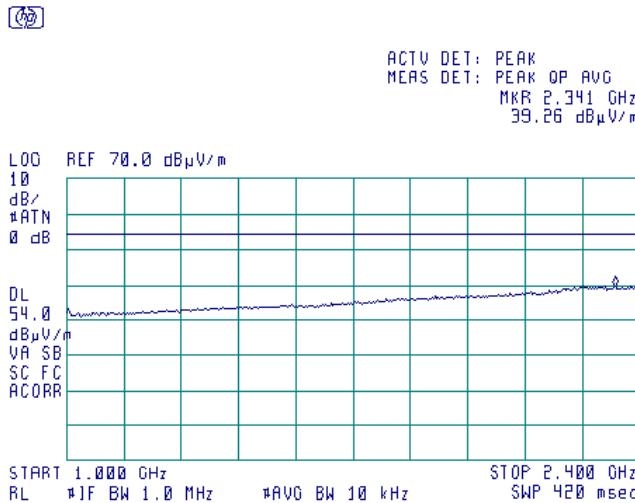
Plot 7.8.15 Radiated emission measurements from 1000 to 2400 MHz at the mid carrier frequency

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



Plot 7.8.16 Radiated emission measurements from 1000 to 2400 MHz at the mid carrier frequency

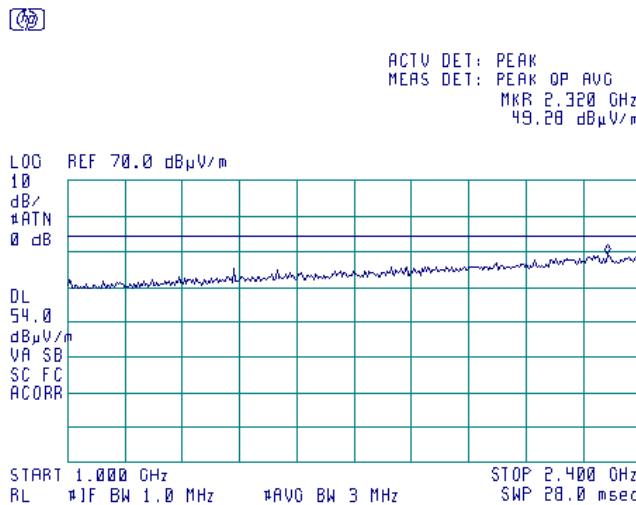
TEST SITE: Semi anechoic chamber
 TEST DISTANCE: 3 m
 ANTENNA POLARIZATION: Vertical and Horizontal
 DETECTOR: VBW = 10 kHz



| | | | |
|----------------------------|---|-------------------------------|------------------------------|
| 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 & Time: | 6/4/2009 9:02:58 AM | | |
| Temperature: 22°C | Air Pressure: 1015 hPa | Relative Humidity: 52% | Power Supply: 3.3 VDC |
| Remarks: | | | |

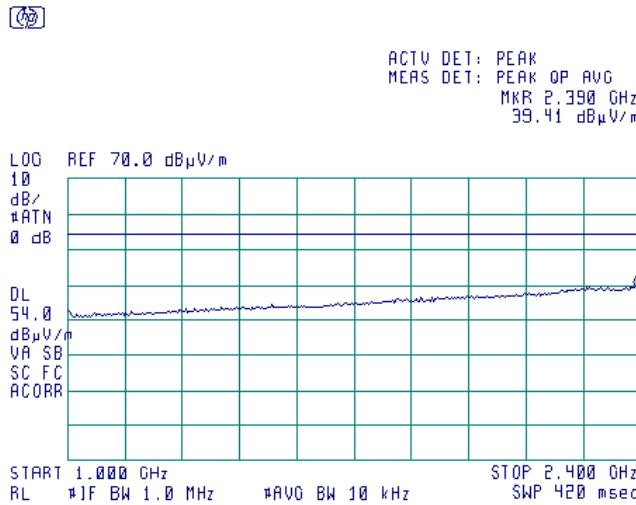
Plot 7.8.17 Radiated emission measurements from 1000 to 2400 MHz at the high carrier frequency

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



Plot 7.8.18 Radiated emission measurements from 1000 to 2400 MHz at the high carrier frequency

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal
DETECTOR: VBW = 10 kHz



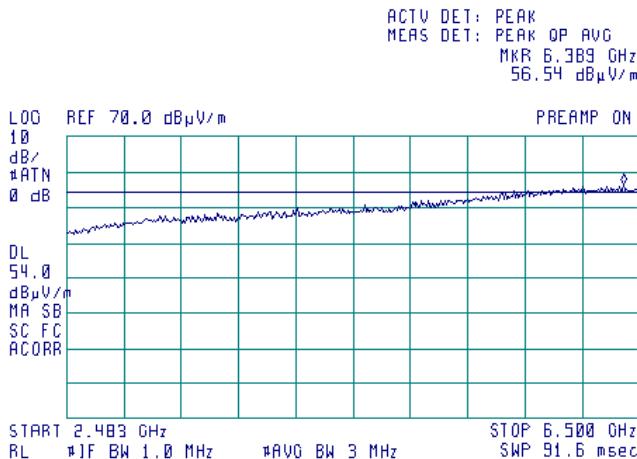


HERMON LABORATORIES

| | | | |
|----------------------------|---|-------------------------------|------------------------------|
| 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 & Time: | 6/4/2009 9:02:58 AM | | |
| Temperature: 22°C | Air Pressure: 1015 hPa | Relative Humidity: 52% | Power Supply: 3.3 VDC |
| Remarks: | | | |

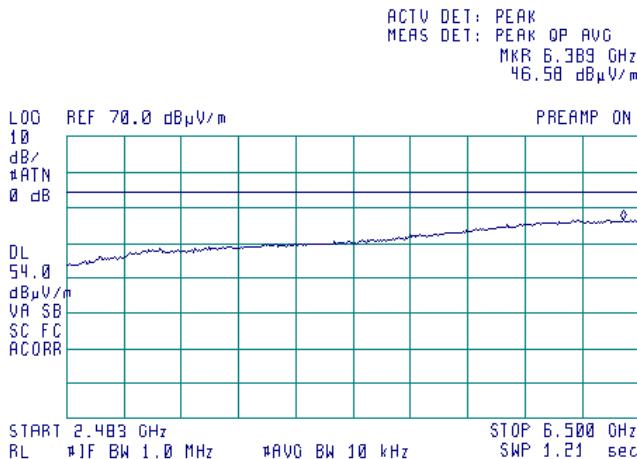
Plot 7.8.19 Radiated emission measurements from 2483.5 to 6500 MHz at the low carrier frequency

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



Plot 7.8.20 Radiated emission measurements from 2483.5 to 6500 MHz at the low carrier frequency

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal
DETECTOR: VBW = 10 kHz

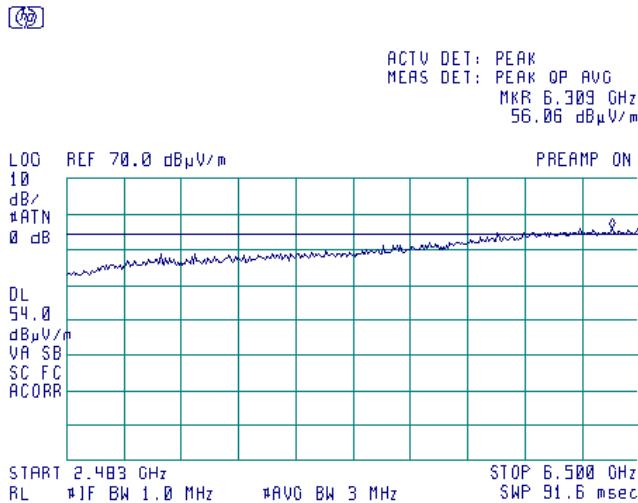




| | | | |
|----------------------------|---|-------------------------------|------------------------------|
| Test specification: | Section 15.247(d) / RSS-210, Section A8.5, Radiated spurious emissions | | |
| Test procedure: | Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4 | | |
| Test mode: | Compliance | | |
| Date & Time: | 6/4/2009 9:02:58 AM | | |
| Temperature: 22°C | Air Pressure: 1015 hPa | Relative Humidity: 52% | Power Supply: 3.3 VDC |
| Remarks: | | | |

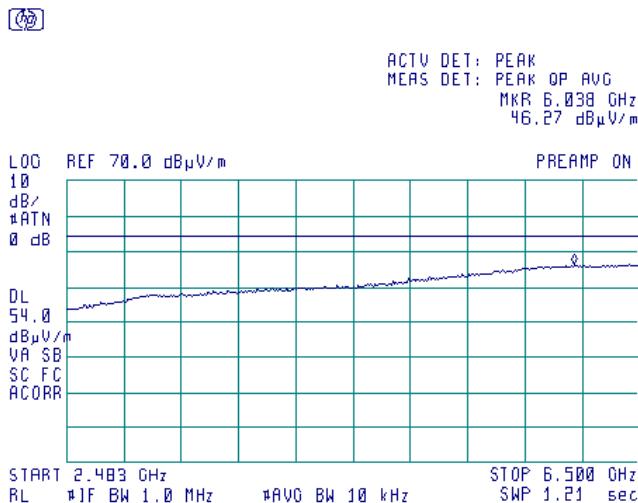
Plot 7.8.21 Radiated emission measurements from 2483.5 to 6500 MHz at the mid carrier frequency

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



Plot 7.8.22 Radiated emission measurements from 2483.5 to 6500 MHz at the mid carrier frequency

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal
DETECTOR: VBW = 10 kHz



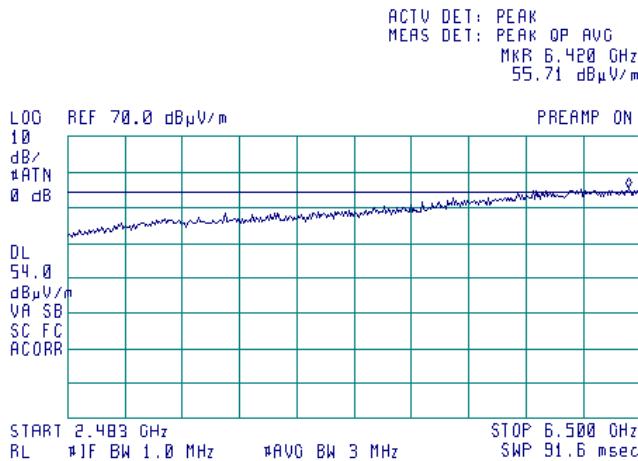


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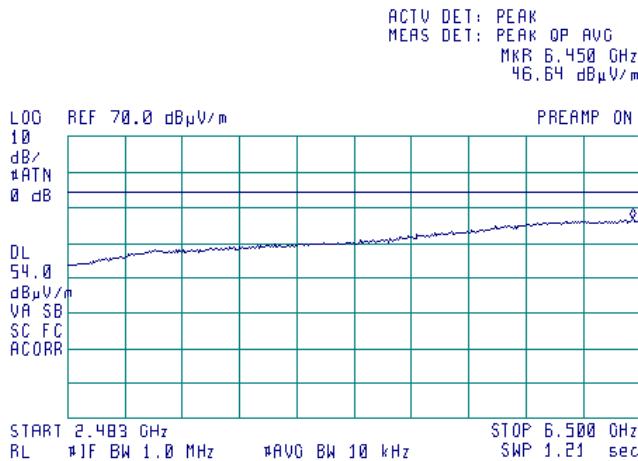
| | | | |
|----------------------------|---|-------------------------------|------------------------------|
| Test specification: | Section 15.247(d) / RSS-210, Section A8.5, Radiated spurious emissions | | |
| Test procedure: | Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4 | | |
| Test mode: | Compliance | Verdict: | |
| Date & Time: | 6/4/2009 9:02:58 AM | PASS | |
| Temperature: 22°C | Air Pressure: 1015 hPa | Relative Humidity: 52% | Power Supply: 3.3 VDC |
| Remarks: | | | |

Plot 7.8.23 Radiated emission measurements from 2500 to 6500 MHz at the high carrier frequency

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

**Plot 7.8.24 Radiated emission measurements from 2500 to 6500 MHz at the high carrier frequency**

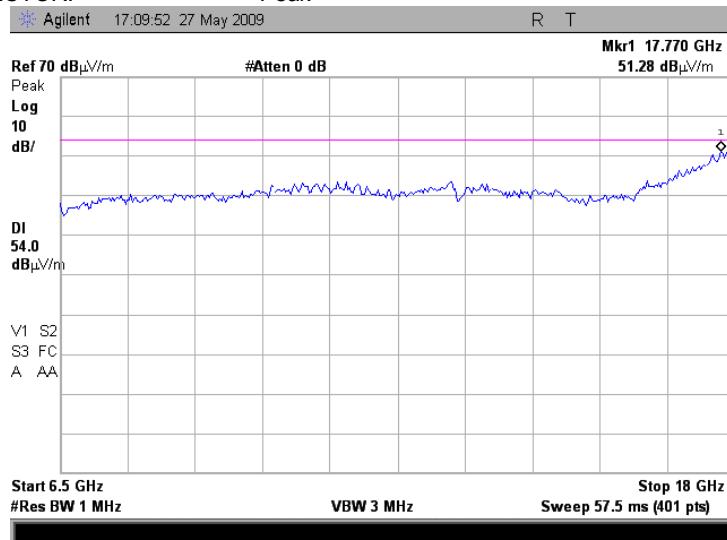
TEST SITE: Semi anechoic chamber
 TEST DISTANCE: 3 m
 ANTENNA POLARIZATION: Vertical and Horizontal
 DETECTOR: VBW = 10 kHz



| | | | |
|----------------------------|---|-------------------------------|------------------------------|
| 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: | |
| Date & Time: | 6/4/2009 9:02:58 AM | PASS | |
| Temperature: 22°C | Air Pressure: 1015 hPa | Relative Humidity: 52% | Power Supply: 3.3 VDC |
| Remarks: | | | |

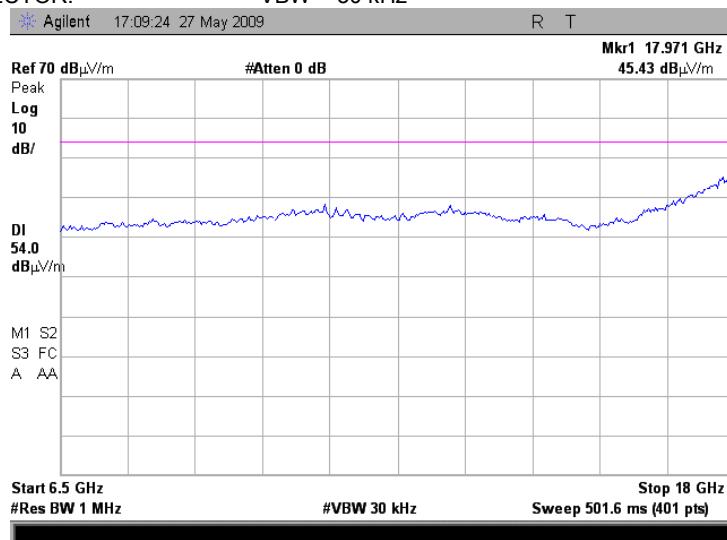
Plot 7.8.25 Radiated emission measurements from 6500 to 18000 MHz at the low carrier frequency

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



Plot 7.8.26 Radiated emission measurements from 6500 to 18000 MHz at the low carrier frequency

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal
DETECTOR: VBW = 30 kHz



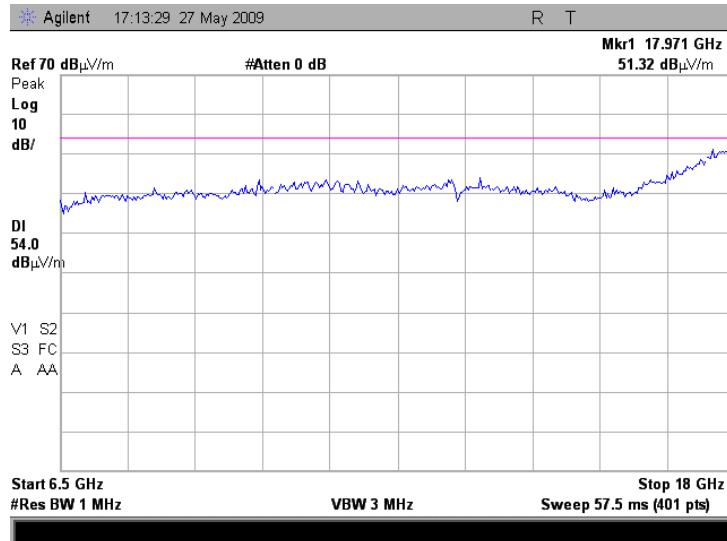


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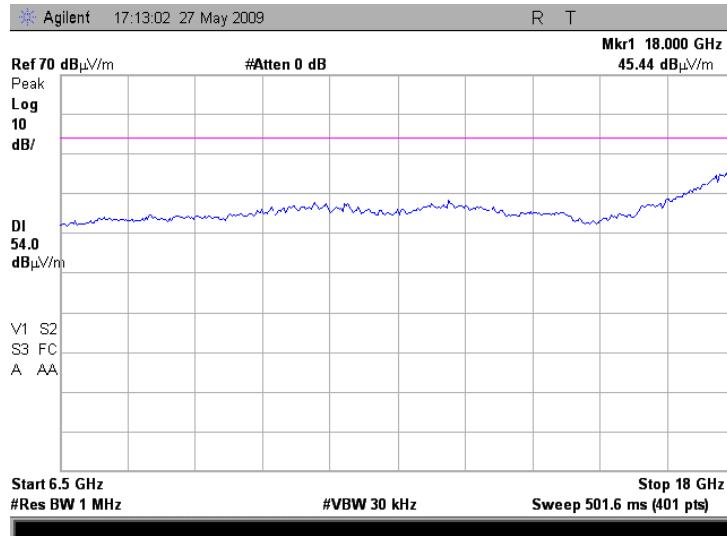
| | | | |
|----------------------------|---|-------------------------------|------------------------------|
| Test specification: | Section 15.247(d) / RSS-210, Section A8.5, Radiated spurious emissions | | |
| Test procedure: | Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4 | | |
| Test mode: | Compliance | Verdict: | |
| Date & Time: | 6/4/2009 9:02:58 AM | PASS | |
| Temperature: 22°C | Air Pressure: 1015 hPa | Relative Humidity: 52% | Power Supply: 3.3 VDC |
| Remarks: | | | |

Plot 7.8.27 Radiated emission measurements from 6500 to 18000 MHz at the mid carrier frequency

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

**Plot 7.8.28 Radiated emission measurements from 6500 to 18000 MHz at the mid carrier frequency**

TEST SITE: Semi anechoic chamber
 TEST DISTANCE: 3 m
 ANTENNA POLARIZATION: Vertical and Horizontal
 DETECTOR: VBW = 30 kHz



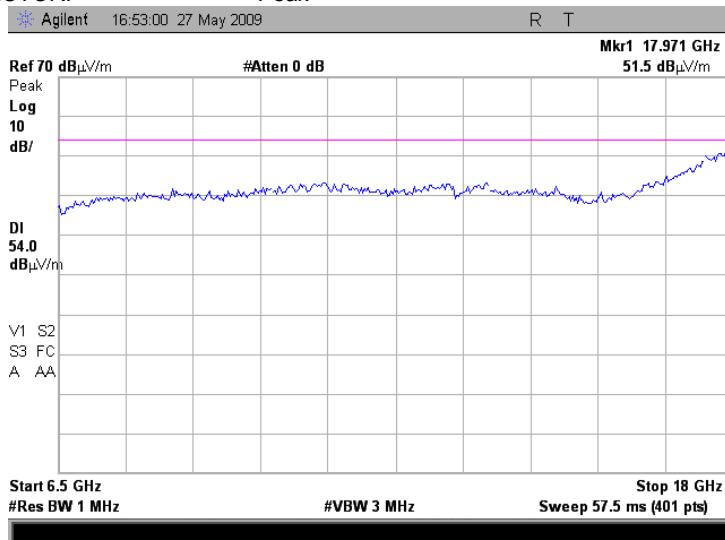


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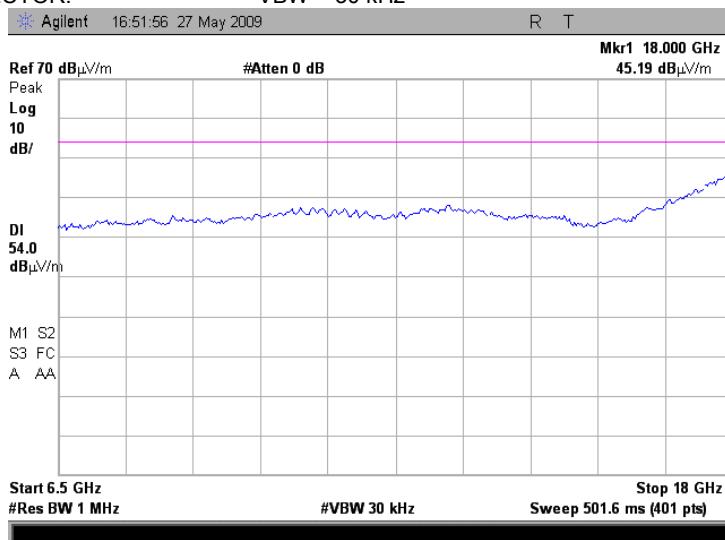
| | | | |
|----------------------------|---|-------------------------------|------------------------------|
| Test specification: | Section 15.247(d) / RSS-210, Section A8.5, Radiated spurious emissions | | |
| Test procedure: | Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4 | | |
| Test mode: | Compliance | Verdict: | |
| Date & Time: | 6/4/2009 9:02:58 AM | PASS | |
| Temperature: 22°C | Air Pressure: 1015 hPa | Relative Humidity: 52% | Power Supply: 3.3 VDC |
| Remarks: | | | |

Plot 7.8.29 Radiated emission measurements from 6500 to 18000 MHz at the high carrier frequency

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

**Plot 7.8.30 Radiated emission measurements from 6500 to 18000 MHz at the high carrier frequency**

TEST SITE: Semi anechoic chamber
 TEST DISTANCE: 3 m
 ANTENNA POLARIZATION: Vertical and Horizontal
 DETECTOR: VBW = 30 kHz



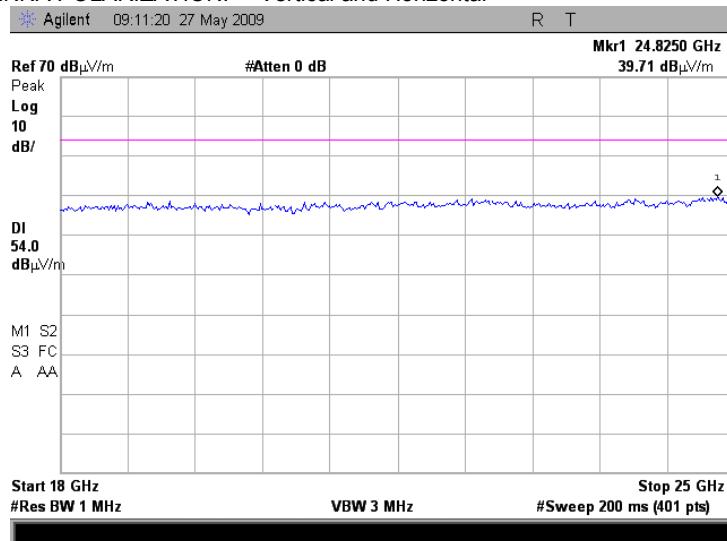


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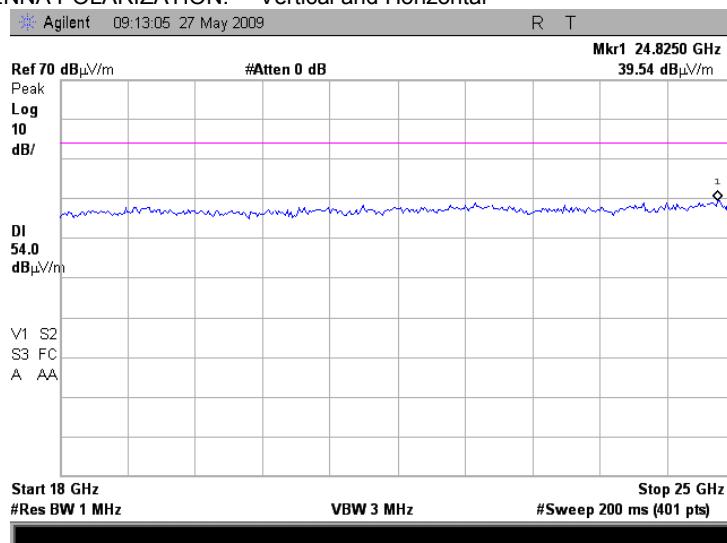
| | | | |
|----------------------------|---|-------------------------------|------------------------------|
| Test specification: | Section 15.247(d) / RSS-210, Section A8.5, Radiated spurious emissions | | |
| Test procedure: | Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4 | | |
| Test mode: | Compliance | Verdict: PASS | |
| Date & Time: | 6/4/2009 9:02:58 AM | | |
| Temperature: 22°C | Air Pressure: 1015 hPa | Relative Humidity: 52% | Power Supply: 3.3 VDC |
| Remarks: | | | |

Plot 7.8.31 Radiated emission measurements from 18000 to 25000 MHz at the low carrier frequency

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

**Plot 7.8.32 Radiated emission measurements from 18000 to 25000 MHz at the mid carrier frequency**

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





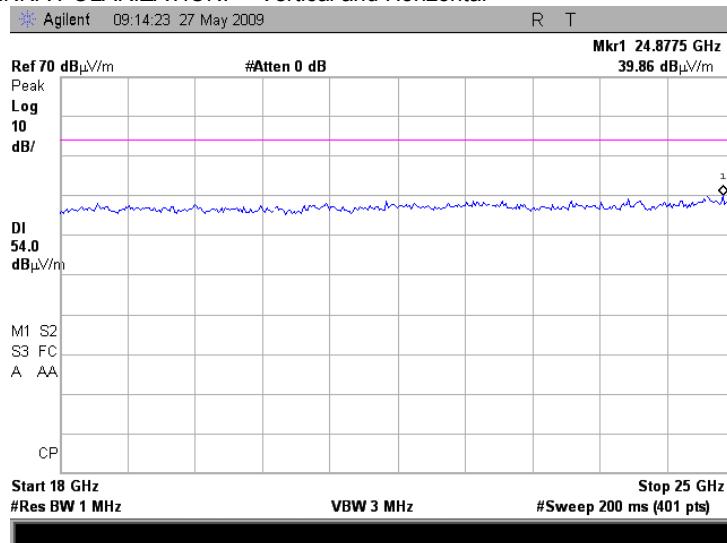
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Report ID: YOGRAD_FCC.19597_FHSS.doc
Date of Issue: 6/18/2009

| | | | |
|----------------------------|---|-------------------------------|------------------------------|
| 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 & Time: | 6/4/2009 9:02:58 AM | | |
| Temperature: 22°C | Air Pressure: 1015 hPa | Relative Humidity: 52% | Power Supply: 3.3 VDC |
| Remarks: | | | |

Plot 7.8.33 Radiated emission measurements from 18000 to 25000 MHz at the high carrier frequency

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



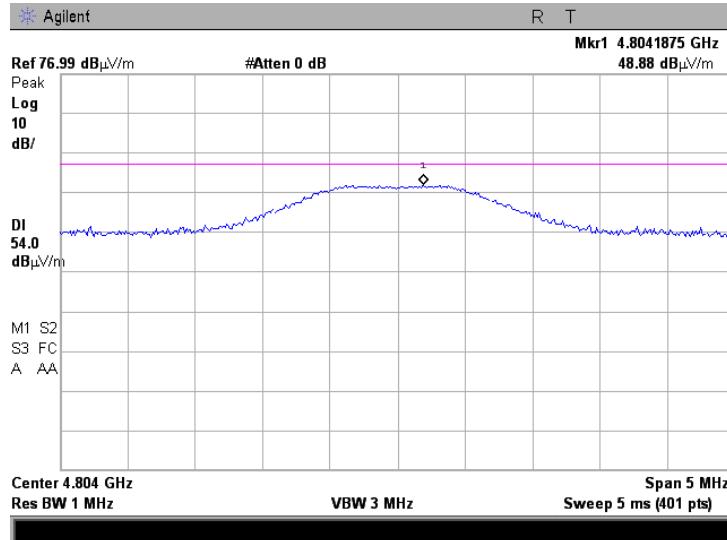


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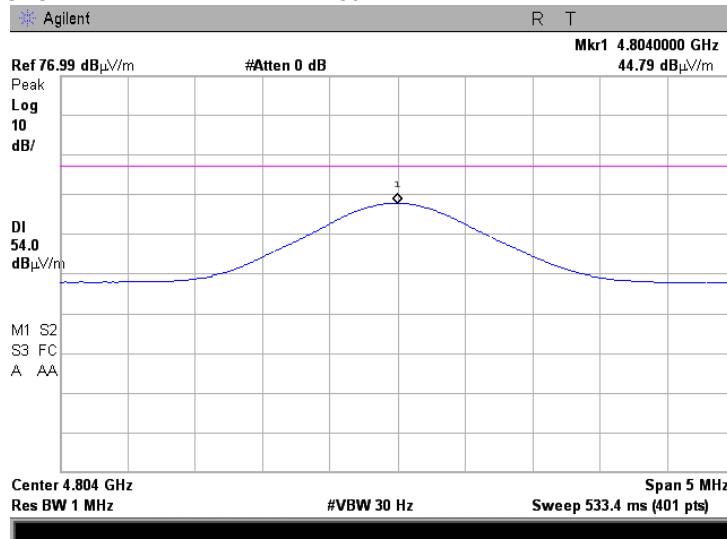
| | | | |
|----------------------------|---|-------------------------------|------------------------------|
| Test specification: | Section 15.247(d) / RSS-210, Section A8.5, Radiated spurious emissions | | |
| Test procedure: | Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4 | | |
| Test mode: | Compliance | Verdict: | |
| Date & Time: | 6/4/2009 9:02:58 AM | PASS | |
| Temperature: 22°C | Air Pressure: 1015 hPa | Relative Humidity: 52% | Power Supply: 3.3 VDC |
| Remarks: | | | |

Plot 7.8.34 Radiated emission measurements at the second harmonic of low carrier frequency

TEST SITE: OATS
TEST DISTANCE: 3 m
DETECTOR: Peak

**Plot 7.8.35 Radiated emission measurements at the second harmonic of low carrier frequency**

TEST SITE: OATS
TEST DISTANCE: 3 m
DETECTOR: VBW = 30 Hz



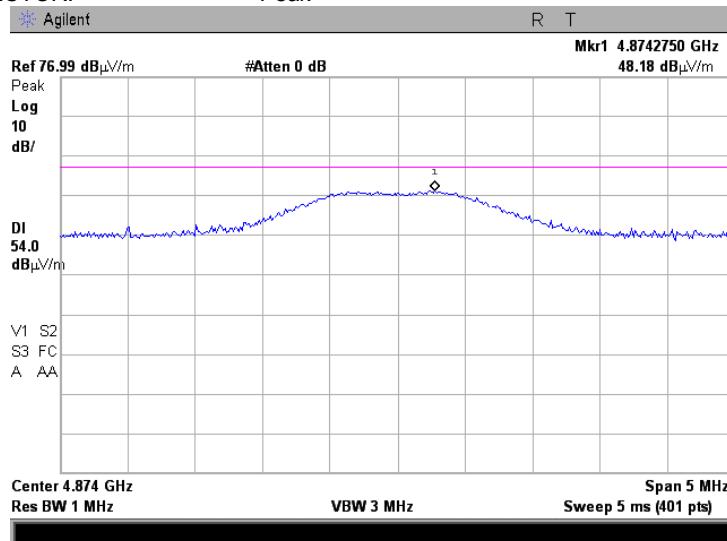


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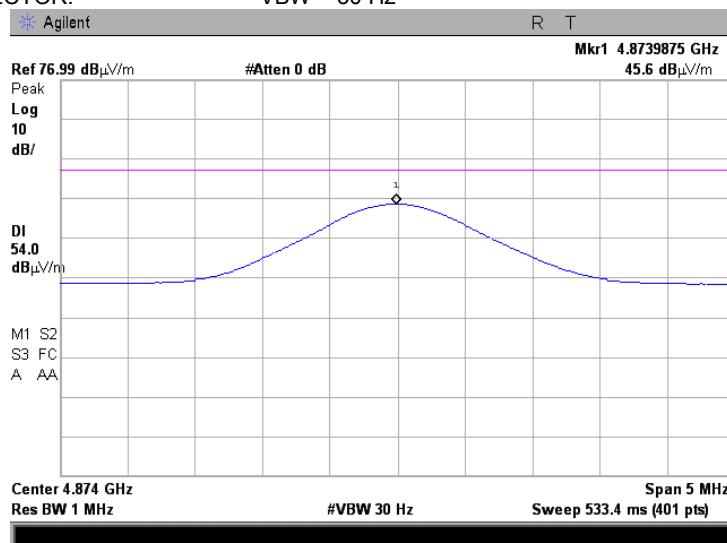
| | | | |
|----------------------------|---|-------------------------------|------------------------------|
| Test specification: | Section 15.247(d) / RSS-210, Section A8.5, Radiated spurious emissions | | |
| Test procedure: | Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4 | | |
| Test mode: | Compliance | Verdict: | |
| Date & Time: | 6/4/2009 9:02:58 AM | PASS | |
| Temperature: 22°C | Air Pressure: 1015 hPa | Relative Humidity: 52% | Power Supply: 3.3 VDC |
| Remarks: | | | |

Plot 7.8.36 Radiated emission measurements at the second harmonic of mid carrier frequency

TEST SITE: OATS
TEST DISTANCE: 3 m
DETECTOR: Peak

**Plot 7.8.37 Radiated emission measurements at the second harmonic of mid carrier frequency**

TEST SITE: OATS
TEST DISTANCE: 3 m
DETECTOR: VBW = 30 Hz



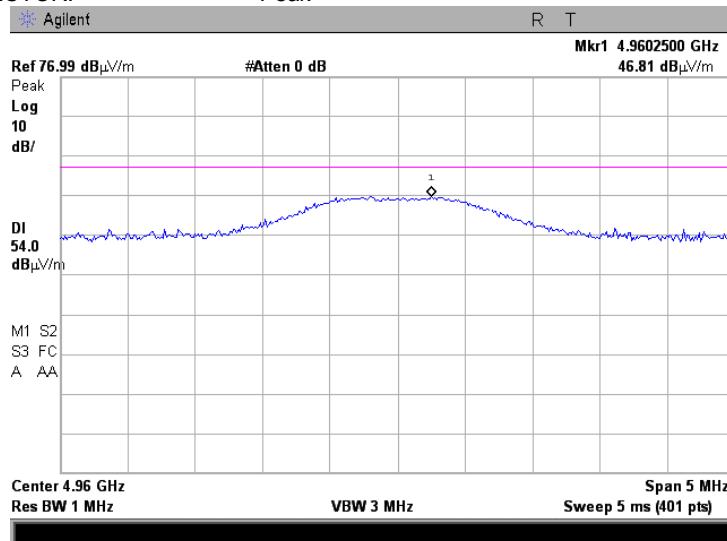


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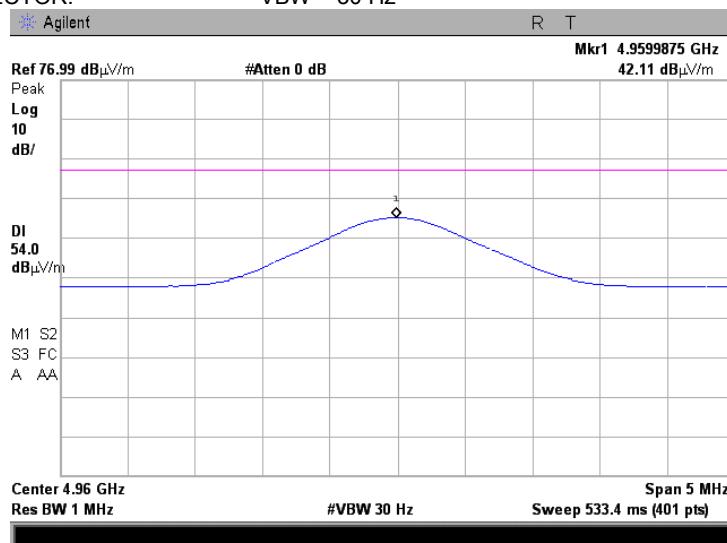
| | | | |
|----------------------------|---|-------------------------------|------------------------------|
| Test specification: | Section 15.247(d) / RSS-210, Section A8.5, Radiated spurious emissions | | |
| Test procedure: | Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4 | | |
| Test mode: | Compliance | Verdict: | |
| Date & Time: | 6/4/2009 9:02:58 AM | PASS | |
| Temperature: 22°C | Air Pressure: 1015 hPa | Relative Humidity: 52% | Power Supply: 3.3 VDC |
| Remarks: | | | |

Plot 7.8.38 Radiated emission measurements at the second harmonic of high carrier frequency

TEST SITE: OATS
TEST DISTANCE: 3 m
DETECTOR: Peak

**Plot 7.8.39 Radiated emission measurements at the second harmonic of high carrier frequency**

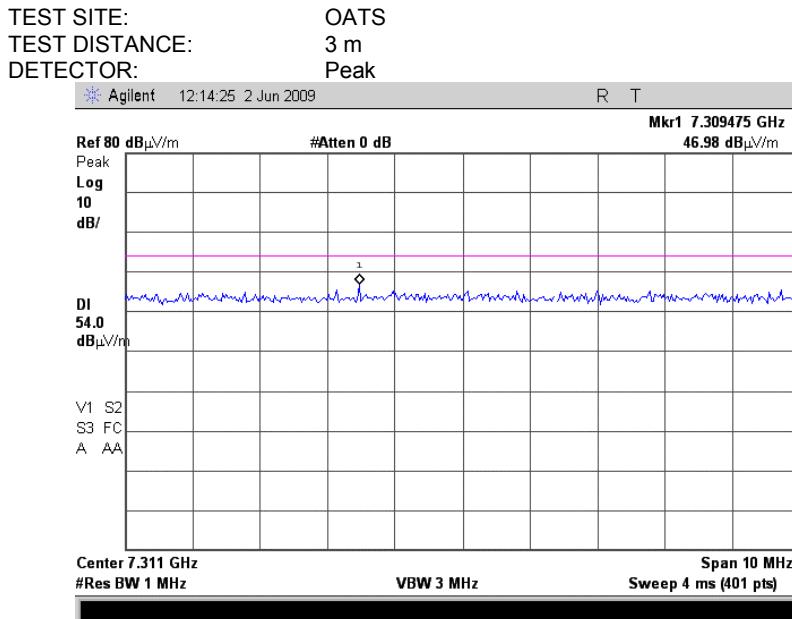
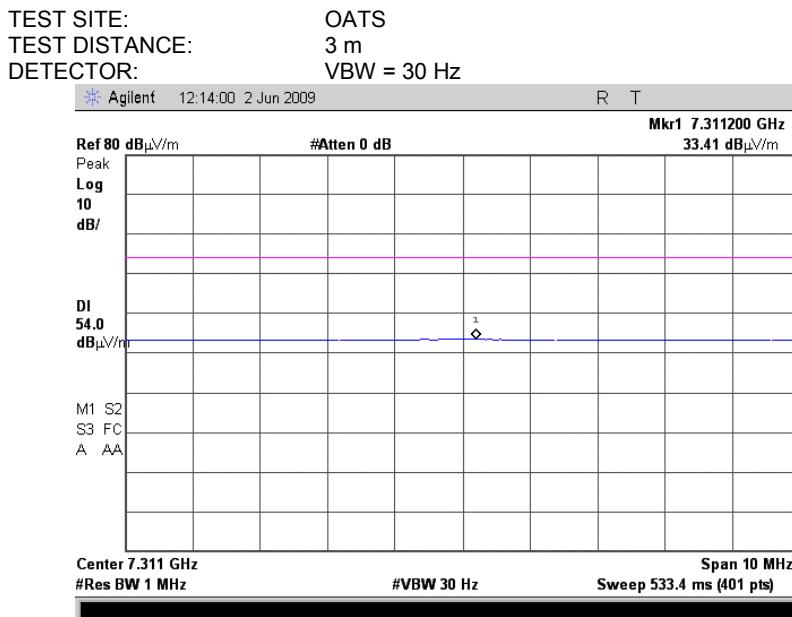
TEST SITE: OATS
TEST DISTANCE: 3 m
DETECTOR: VBW = 30 Hz





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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: | |
| Date & Time: | 6/4/2009 9:02:58 AM | PASS | |
| Temperature: 22°C | Air Pressure: 1015 hPa | Relative Humidity: 52% | Power Supply: 3.3 VDC |
| Remarks: | | | |

Plot 7.8.40 Radiated emission measurements at the third harmonic of mid carrier frequency**Plot 7.8.41 Radiated emission measurements at the third harmonic of mid carrier frequency**

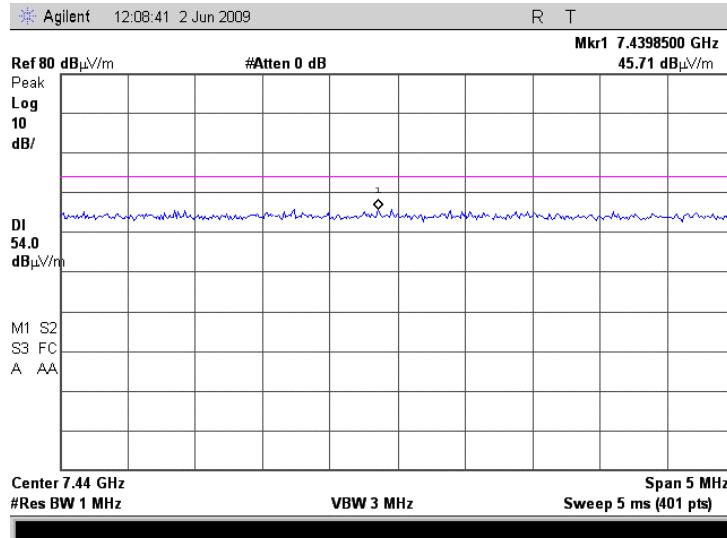


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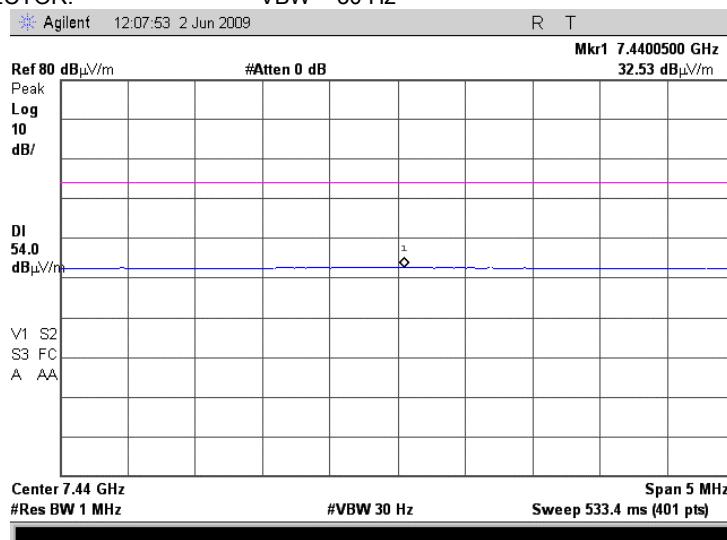
| | | | |
|----------------------------|---|-------------------------------|------------------------------|
| Test specification: | Section 15.247(d) / RSS-210, Section A8.5, Radiated spurious emissions | | |
| Test procedure: | Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4 | | |
| Test mode: | Compliance | Verdict: | |
| Date & Time: | 6/4/2009 9:02:58 AM | PASS | |
| Temperature: 22°C | Air Pressure: 1015 hPa | Relative Humidity: 52% | Power Supply: 3.3 VDC |
| Remarks: | | | |

Plot 7.8.42 Radiated emission measurements at the third harmonic of high carrier frequency

TEST SITE: OATS
TEST DISTANCE: 3 m
DETECTOR: Peak

**Plot 7.8.43 Radiated emission measurements at the third harmonic of high carrier frequency**

TEST SITE: OATS
TEST DISTANCE: 3 m
DETECTOR: VBW = 30 Hz

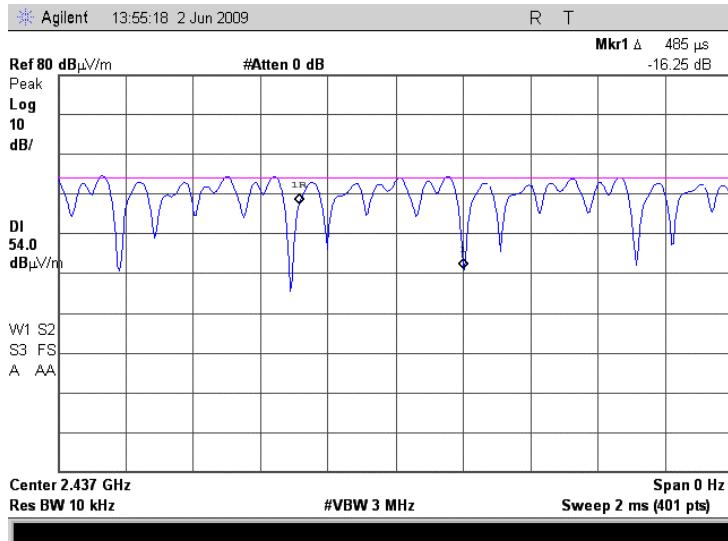




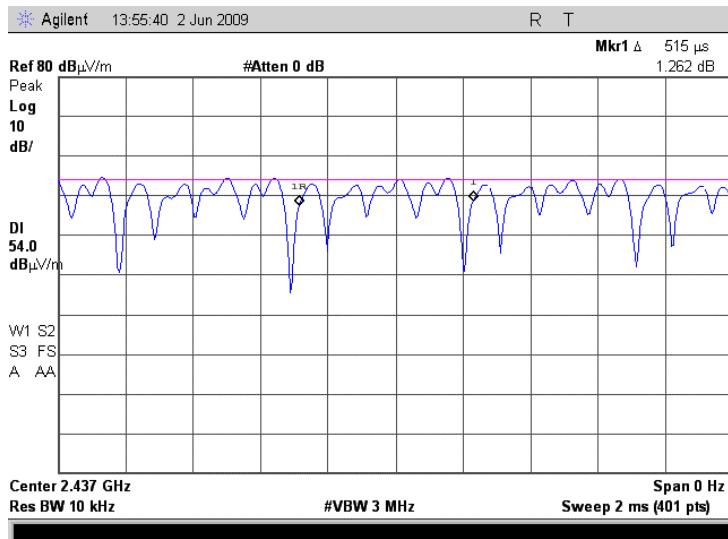
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| | | | |
|----------------------------|---|-------------------------------|------------------------------|
| Test specification: | Section 15.247(d) / RSS-210, Section A8.5, Radiated spurious emissions | | |
| Test procedure: | Public notice DA 00-705/ 47 CFR, Section 15.247(c) / ANSI C63.4, Section 13.1.4 | | |
| Test mode: | Compliance | Verdict: PASS | |
| Date & Time: | 6/4/2009 9:02:58 AM | | |
| Temperature: 22°C | Air Pressure: 1015 hPa | Relative Humidity: 52% | Power Supply: 3.3 VDC |
| Remarks: | | | |

Plot 7.8.44 Transmission pulse duration



Plot 7.8.45 Transmission pulse period





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| | | | |
|----------------------------|---|---------------------------|---------|
| Test specification: | Section 15.203/ RSS-Gen, section 7.1.4, Antenna requirements | | |
| Test procedure: | Public notice DA 00-705 | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date & Time: | 6/17/2009 3:20:22 PM | Relative Humidity: | 42% |
| Temperature: 23°C | Air Pressure: 1009 hPa | Power Supply: | 3.3 VDC |
| Remarks: | | | |

7.9 Antenna requirements

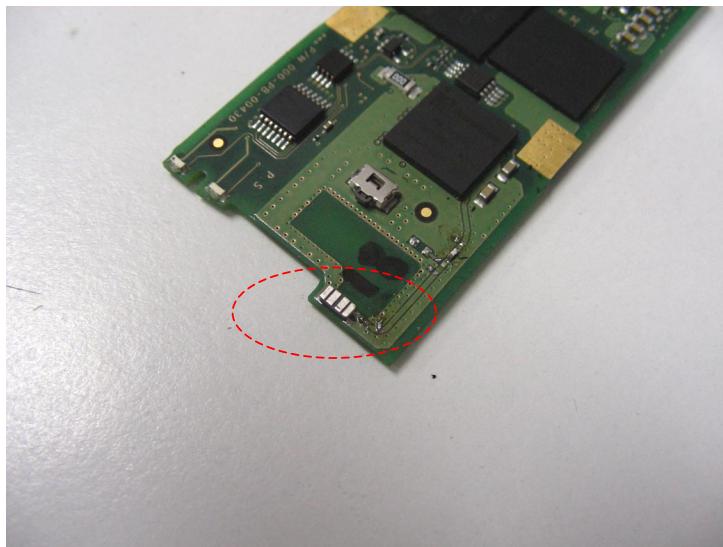
The EUT was verified for compliance with antenna requirements. A transmitter shall be designed to ensure that no antenna other than that furnished by the responsible party will be used with the device. It may be either permanently attached or employs a unique antenna connector for every antenna proposed 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 7.9.1.

Table 7.9.1 Antenna requirements

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

Photograph 7.9.1 Antenna assembly





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| | | | |
|----------------------------|--|-------------------------------|------------------------------|
| Test specification: | FCC section 15.207(a) / RSS-Gen, Section 7.2.2, Conducted emission | | |
| Test procedure: | ANSI C63.4, Section 13.1.3 | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date & Time: | 6/17/2009 3:20:22 PM | | |
| Temperature: 23°C | Air Pressure: 1009 hPa | Relative Humidity: 42% | Power Supply: 3.3 VDC |
| Remarks: | | | |

7.10 Conducted emissions

7.10.1 General

This test was performed to measure common mode conducted emissions at the power port. Specification test limits are given in Table 7.10.1.

Table 7.10.1 Limits for conducted emissions

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

* The limit decreases linearly with the logarithm of frequency.

7.10.2 Test procedure

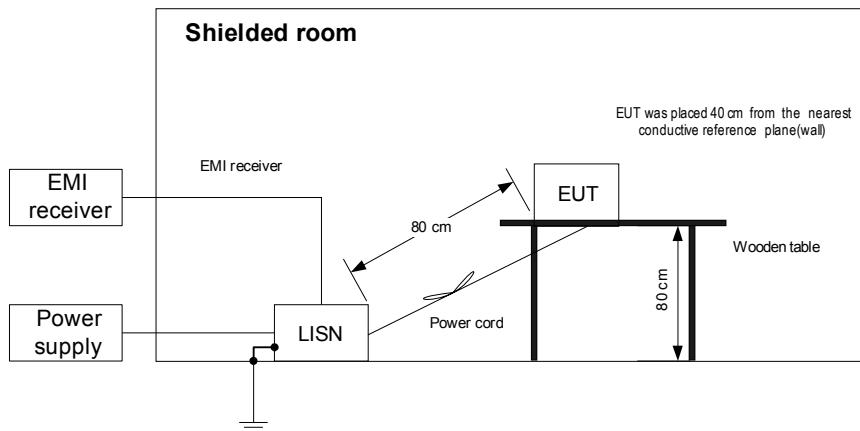
7.10.2.1 The EUT was set up as shown in Figure 7.10.1, energized and the performance check was conducted.

7.10.2.2 The measurements were performed at power terminals with the LISN, connected to a spectrum analyzer in the frequency range referred to in Table 7.10.2. Unused coaxial connector of the LISN was terminated with 50 Ohm. Quasi-peak and average detectors were used throughout the testing.

7.10.2.3 The position of the device cables was varied to determine maximum emission level.

7.10.2.4 The worst test results (the lowest margins) were recorded in Table 7.10.2 and shown in the associated plots.

Figure 7.10.1 Setup for conducted emission measurements, table-top equipment





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| | | | |
|----------------------------|---|-------------------------------|------------------------------|
| Test specification: | FCC section 15.207(a) / RSS-Gen, Section 7.2.2, Conducted emission | | |
| Test procedure: | ANSI C63.4, Section 13.1.3 | | |
| Test mode: | Compliance | Verdict: | |
| Date & Time: | 6/17/2009 3:20:22 PM | PASS | |
| Temperature: 23°C | Air Pressure: 1009 hPa | Relative Humidity: 42% | Power Supply: 3.3 VDC |
| Remarks: | | | |

Table 7.10.2 Conducted emission test results

LINE: AC mains
 EUT OPERATING MODE: Transmit
 EUT SET UP: TABLE-TOP
 TEST SITE: SHIELDED ROOM
 DETECTORS USED: PEAK / QUASI-PEAK / AVERAGE
 FREQUENCY RANGE: 150 kHz - 30 MHz
 RESOLUTION BANDWIDTH: 9 kHz

| Frequency, MHz | Peak emission, dB(µV) | Quasi-peak | | | Average | | | Line ID | Verdict |
|----------------|-----------------------|---------------------------|---------------|-------------|---------------------------|---------------|-------------|---------|---------|
| | | Measured emission, dB(µV) | Limit, dB(µV) | Margin, dB* | Measured emission, dB(µV) | Limit, dB(µV) | Margin, dB* | | |
| 0.192450 | 51.75 | 46.93 | 63.94 | -17.01 | 28.86 | 53.94 | -25.08 | L1 | Pass |
| 0.200300 | 50.48 | 47.54 | 63.64 | -16.10 | 33.01 | 53.64 | -20.63 | | |
| 0.209225 | 49.59 | 45.01 | 63.30 | -18.29 | 23.79 | 53.30 | -29.51 | | |
| 0.189000 | 50.60 | 45.62 | 64.10 | -18.48 | 22.76 | 54.10 | -31.34 | | |
| 0.195600 | 49.75 | 47.16 | 63.82 | -16.66 | 29.28 | 53.82 | -24.54 | L2 | Pass |
| 0.208825 | 48.46 | 43.84 | 63.31 | -19.47 | 23.79 | 53.31 | -29.52 | | |

*- Margin = Measured emission - specification limit.

Reference numbers of test equipment used

| | | | | | | |
|---------|---------|---------|---------|---------|---------|--|
| HL 0447 | HL 0580 | HL 1503 | HL 2924 | HL 3170 | HL 3612 | |
|---------|---------|---------|---------|---------|---------|--|

Full description is given in Appendix A.

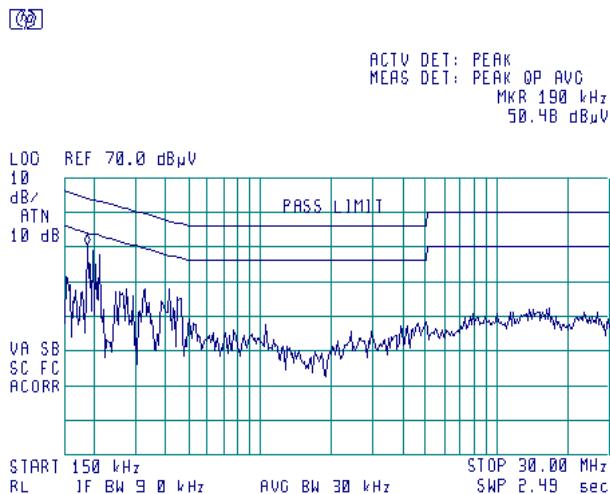


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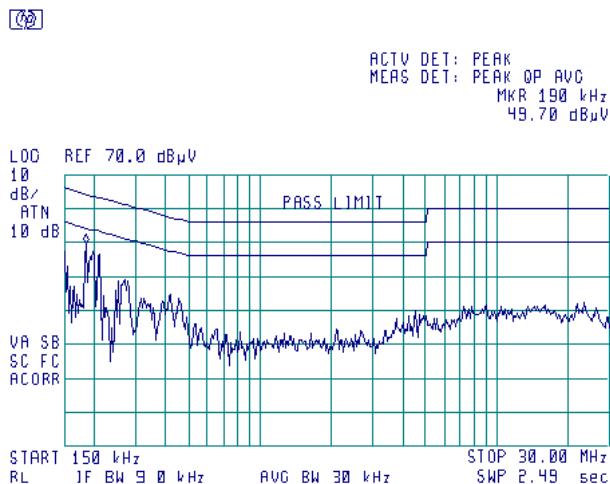
| | | | |
|----------------------------|---|-------------------------------|------------------------------|
| Test specification: | FCC section 15.207(a) / RSS-Gen, Section 7.2.2, Conducted emission | | |
| Test procedure: | ANSI C63.4, Section 13.1.3 | | |
| Test mode: | Compliance | Verdict: | |
| Date & Time: | 6/17/2009 3:20:22 PM | PASS | |
| Temperature: 23°C | Air Pressure: 1009 hPa | Relative Humidity: 42% | Power Supply: 3.3 VDC |
| Remarks: | | | |

Plot 7.10.1 Conducted emission measurements

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

**Plot 7.10.2 Conducted emission measurements**

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



8 APPENDIX A Test equipment and ancillaries used for tests

| HL No | Description | Manufacturer | Model | Ser. No. | Last Cal. | Due Cal. |
|-------|---|----------------------------|-------------------|--------------------------|-----------|-----------|
| 0446 | Antenna, Loop, Active, 10 kHz - 30 MHz | EMCO | 6502 | 2857 | 29-Jun-08 | 29-Jun-09 |
| 0447 | LISN, 16/2, 300V RMS, 50 Ohm/50 uH + 5 Ohm, STD CISPR 16-1 | Hermon Laboratories | LISN 16 - 1 | 066 | 04-Nov-08 | 04-Nov-09 |
| 0521 | EMI Receiver (Spectrum Analyzer) with RF filter section 9 kHz-6.5 GHz | Hewlett Packard Co | 8546A | 3617A 00319, 3448A002 53 | 29-Aug-08 | 29-Aug-09 |
| 0580 | DC block adaptor 10 kHz - 2.2 GHz | Anritsu | MA8601 A | 580 | 23-Nov-08 | 23-Nov-09 |
| 0604 | Antenna BiconiLog Log-Periodic/T Bow-TIE, 26 - 2000 MHz | EMCO | 3141 | 9611-1011 | 11-Jan-09 | 11-Jan-10 |
| 0768 | Antenna Standard Gain Horn, 18-26.5 GHz, WR-42, 25 dB gain | Quinstar Technology | QWH-4200-BA | 110 | 23-Dec-08 | 23-Dec-11 |
| 1116 | Antenna, Double-Ridged Waveguide Horn, 1-18 GHz | Hermon Laboratories | A1-18 | 186 | 23-Jan-09 | 23-Jan-10 |
| 1424 | Spectrum Analyzer, 30 Hz- 40 GHz | Agilent Technologies | 8564EC | 3946A002 19 | 28-Aug-08 | 28-Aug-09 |
| 1503 | Cable RF, 6 m, BNC/BNC | Belden | M17/167 MIL-C-17 | 1503 | 01-Jan-09 | 01-Jan-10 |
| 1562 | Oscilloscope 100 MHz, DMM | Tektronix | THS720A | B039444 | 21-Sep-08 | 21-Sep-09 |
| 1984 | Antenna, Double-Ridged Waveguide Horn, 1-18 GHz, 300 W | EMC Test Systems | 3115 | 9911-5964 | 23-Jan-09 | 23-Jan-10 |
| 2254 | Cable 40 GHz, 0.8 m, blue | Rhophase Microwave Limited | KPS-1503A-800-KPS | W4907 | 11-Jun-09 | 11-Jun-10 |
| 2780 | EMC analyzer, 100 Hz to 26.5 GHz | Agilent Technologies | E7405A | MY451024 6 | 12-Jun-08 | 12-Jun-10 |
| 2869 | Cable, 18 GHz, 1.2 m, SMA - SMA, Right Angle | Gore | NA | 91P72073 | 04-Feb-09 | 04-Feb-10 |
| 2882 | Cable, 18 GHz N-type, M-F, 3 m | Bird | TC-MNFM-3.0 | 211539 001 | 04-Feb-09 | 04-Feb-10 |
| 2911 | Cable 18 GHz, 1.5 m, SMA-SMA | Gore | NA | 89386 | 05-Oct-08 | 05-Oct-09 |
| 2924 | Line Impedance Stabilization Network (LISN), 50Ohm/50 uH+50Ohm, 25 A, 2 lines, STD: MIL-461E,CISPR 16-1 | Electro-Metrics | FCC VDE 25-2 | 1178 | 16-Jun-09 | 16-Jun-10 |
| 3121 | Microwave Cable Assembly, 18 GHz, 6.4 m, SMA - SMA | Huber-Suhner | 198-9155-00 | 3121 | 07-Dec-08 | 07-Dec-09 |
| 3122 | Microwave Cable Assembly, 18 GHz, 6.4 m, SMA - SMA | Huber-Suhner | 198-9155-00 | 3122 | 07-Dec-08 | 07-Dec-09 |
| 3123 | Microwave Cable Assembly, 18 GHz, 6.4 m, SMA - SMA | Huber-Suhner | 198-9155-00 | 3123 | 01-Jan-09 | 01-Jan-10 |
| 3170 | Attenuator, N-type, 10 dB, DC to 6 GHz, 1 W | Mini-Circuits | UNAT-10+ | NA | 01-Jan-09 | 01-Jan-10 |
| 3532 | Amplifier, low noise, 2 to 8 GHz | Quinstar Technology | QLJ-02084040 -J0 | 111590020 01 | 23-Nov-08 | 23-Nov-09 |
| 3534 | Amplifier, low noise, 6 to 18 GHz | Quinstar Technology | QLJ-06184040 -J0 | 111590010 02 | 07-Dec-08 | 07-Dec-09 |
| 3535 | Amplifier, low noise, 18 to 40 GHz | Quinstar Technology | QLJ-18404537 -J0 | 111590030 01 | 07-Dec-08 | 07-Dec-09 |
| 3612 | Cable RF, 17.5 m, N type-N type | Teldor | RG-214/U | NA | 17-Nov-08 | 17-Nov-09 |
| 3616 | Cable RF, 6.5 m, N type-N type, DC-6.5 GHz | Suhner Switzerland | Rg 214/U | NA | 07-Dec-08 | 07-Dec-09 |

9 APPENDIX B Measurement uncertainties

Expanded uncertainty at 95% confidence in Hermon Labs EMC measurements

| Test description | Expanded uncertainty |
|---|---|
| Conducted carrier power at RF antenna connector | Below 12.4 GHz: ± 1.7 dB 12.4 GHz to 40 GHz: ± 2.3 dB |
| Conducted emissions at RF antenna connector | 9 kHz to 2.9 GHz: ± 2.6 dB 2.9 GHz to 6.46 GHz: ± 3.5 dB 6.46 GHz to 13.2 GHz: ± 4.3 dB 13.2 GHz to 22.0 GHz: ± 5.0 dB 22.0 GHz to 26.8 GHz: ± 5.5 dB 26.8 GHz to 40.0 GHz: ± 4.8 dB |
| Occupied bandwidth | ± 8.0 % |
| Duty cycle, timing (Tx ON / OFF) and average factor measurements | ± 1.0 % |
| Conducted emissions with LISN | 9 kHz to 150 kHz: ± 3.9 dB 150 kHz to 30 MHz: ± 3.8 dB |
| Radiated emissions at 3 m measuring distance Horizontal polarization | Biconilog antenna: ± 5.3 dB Biconical antenna: ± 5.0 dB Log periodic antenna: ± 5.3 dB Double ridged horn antenna: ± 5.3 dB |
| Vertical polarization | Biconilog antenna: ± 6.0 dB Biconical antenna: ± 5.7 dB Log periodic antenna: ± 6.0 dB Double ridged horn antenna: ± 6.0 dB |

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

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

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

10 APPENDIX C Test laboratory description

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

Hermon Laboratories is listed by the Federal Communications Commission (USA) for all parts of Code of Federal Regulations 47 (CFR 47), Registration Numbers 90624 for OATS and 90623 for the anechoic chamber; by Industry Canada for electromagnetic emissions (file numbers IC 2186A-1 for OATS and IC 2186A-2 for anechoic chamber), certified by VCCI, Japan (the registration numbers are R-808 for OATS, R-1082 for anechoic chamber, C-845 for conducted emissions site), has a status of a Telefication - Listed Testing Laboratory, Certificate No. L138/00; assessed by TNO Certification EP&S (Netherlands) for a number of EMC, telecommunications, environmental, safety standards, and by AMTAC (UK) for safety of medical devices. The laboratory is accredited by American Association for Laboratory Accreditation (USA) according to ISO/IEC 17025 for electromagnetic compatibility, product safety, telecommunications testing and environmental simulation (for exact scope please refer to Certificate No. 839.01).

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website: www.hermonlabs.com

Person for contact: Mr. Alex Usoskin, CEO.

11 APPENDIX D Specification references

| | |
|--------------------------------|--|
| FCC 47CFR part 15: 2008 | 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 7: 2007 | Low Power Licence- Exempt Radiocommunication Devices |
| RSS-Gen Issue 2: 2007 | General Requirements and Information for the Certification of Radiocommunication Equipment |

12 APPENDIX E Test equipment correction factors

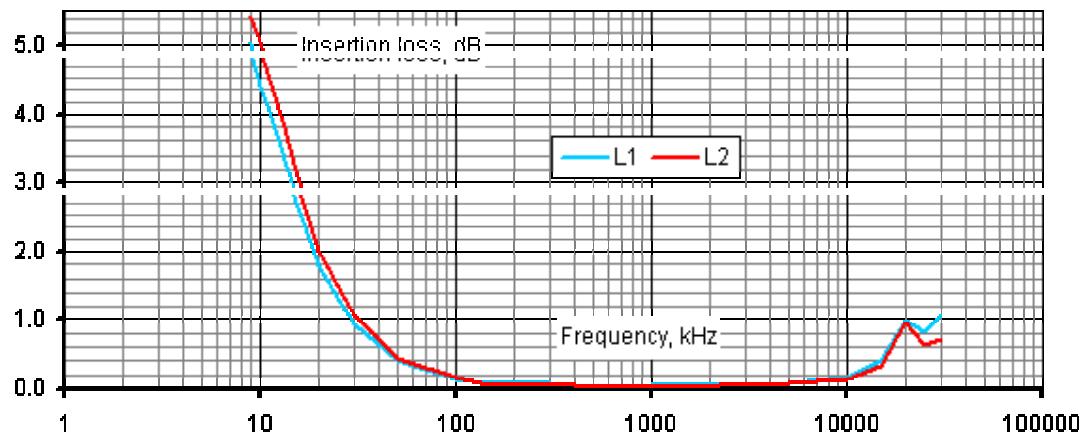
Correction factor
Line impedance stabilization network
Model LISN 16 - 1
Hermon Laboratories, HL 0447

| Frequency, kHz | Correction factor, dB |
|----------------|-----------------------|
| 10 | 4.9 |
| 15 | 2.86 |
| 20 | 1.83 |
| 25 | 1.25 |
| 30 | 0.91 |
| 35 | 0.69 |
| 40 | 0.53 |
| 50 | 0.35 |
| 60 | 0.25 |
| 70 | 0.18 |
| 80 | 0.14 |
| 90 | 0.11 |
| 100 | 0.09 |
| 125 | 0.06 |
| 150 | 0.04 |

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

Correction factor
Line impedance stabilization network
Model FCC VDE 25-2, Electro-Metrics, HL 2924

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



Antenna factor
Active loop antenna
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(µV) to convert it into field intensity in dB(µV/m).

Antenna factor
Standard gain horn antenna
Quinstar Technology
Model QWH
Ser.No.110, HL 0768

| Frequency min, GHz | Frequency max, GHz | Antenna factor, dB(1/m) |
|-----------------------|-----------------------|----------------------------|
| 18.000 | 26.500 | 32.01 |
| 26.500 | 40.000 | 35.48 |
| 40.000 | 60.000 | 39.03 |
| 60.000 | 90.000 | 42.55 |
| 90.000 | 140.000 | 46.23 |
| 140.000 | 220.000 | 50.11 |

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

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

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

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

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

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



Cable loss
Cable coaxial, 6 m, model: M17/167 MIL-C-17, HL 1503

| Frequency, MHz | Cable loss, dB |
|-------------------|-------------------|
| 0.15 | 0.043 |
| 1 | 0.077 |
| 3 | 0.139 |
| 5 | 0.169 |
| 10 | 0.248 |
| 30 | 0.430 |
| 50 | 0.561 |
| 75 | 0.697 |
| 100 | 0.822 |
| 300 | 1.446 |
| 500 | 1.901 |
| 800 | 2.663 |
| 1000 | 2.829 |
| 1500 | 3.569 |
| 2000 | 4.179 |

Cable loss
Cable 40 GHz, 0.8 m, blue, model: KPS-1503A-800-KPS, S/N W4907, HL 2254

| Frequency, GHz | Cable loss, dB | Frequency, GHz | Cable loss, dB | Frequency, GHz | Cable loss, dB |
|----------------|----------------|----------------|----------------|----------------|----------------|
| 0.03 | 0.04 | 5.10 | 0.80 | 15.00 | 1.49 |
| 0.05 | 0.07 | 5.30 | 0.83 | 15.50 | 1.49 |
| 0.10 | 0.09 | 5.50 | 0.83 | 16.00 | 1.46 |
| 0.20 | 0.15 | 5.70 | 0.84 | 16.50 | 1.47 |
| 0.30 | 0.19 | 5.90 | 0.87 | 17.00 | 1.50 |
| 0.40 | 0.25 | 6.10 | 0.86 | 17.50 | 1.57 |
| 0.50 | 0.29 | 6.30 | 0.89 | 18.00 | 1.63 |
| 0.60 | 0.33 | 6.50 | 0.90 | 18.50 | 1.57 |
| 0.70 | 0.37 | 6.70 | 0.89 | 19.00 | 1.63 |
| 0.80 | 0.41 | 6.90 | 0.93 | 19.50 | 1.65 |
| 0.90 | 0.44 | 7.10 | 0.92 | 20.00 | 1.64 |
| 1.00 | 0.45 | 7.30 | 0.95 | 20.50 | 1.75 |
| 1.10 | 0.48 | 7.50 | 0.96 | 21.00 | 1.72 |
| 1.20 | 0.51 | 7.70 | 0.97 | 21.50 | 1.78 |
| 1.30 | 0.53 | 7.90 | 1.01 | 22.00 | 1.76 |
| 1.40 | 0.54 | 8.10 | 1.00 | 22.50 | 1.72 |
| 1.50 | 0.57 | 8.30 | 1.05 | 23.00 | 1.83 |
| 1.60 | 0.59 | 8.50 | 1.04 | 23.50 | 1.80 |
| 1.70 | 0.04 | 8.70 | 1.07 | 24.00 | 1.90 |
| 1.80 | 0.07 | 8.90 | 1.11 | 24.50 | 1.81 |
| 1.90 | 0.09 | 9.10 | 1.09 | 25.00 | 1.98 |
| 2.00 | 0.15 | 9.30 | 1.14 | 25.50 | 1.91 |
| 2.10 | 0.19 | 9.50 | 1.12 | 26.00 | 2.02 |
| 2.20 | 0.25 | 9.70 | 1.15 | 26.50 | 1.92 |
| 2.30 | 0.29 | 9.90 | 1.16 | 27.00 | 1.97 |
| 2.40 | 0.33 | 10.10 | 1.16 | 28.00 | 2.02 |
| 2.50 | 0.37 | 10.30 | 1.19 | 29.00 | 1.95 |
| 2.60 | 0.41 | 10.50 | 1.14 | 30.00 | 1.94 |
| 2.70 | 0.44 | 10.70 | 1.19 | 31.00 | 2.11 |
| 2.80 | 0.45 | 10.90 | 1.17 | 32.00 | 2.17 |
| 2.90 | 0.48 | 11.10 | 1.13 | 33.00 | 2.27 |
| 3.10 | 0.61 | 11.30 | 1.20 | 34.00 | 2.27 |
| 3.30 | 0.64 | 11.50 | 1.13 | 35.00 | 2.29 |
| 3.50 | 0.65 | 11.70 | 1.20 | 36.00 | 2.35 |
| 3.70 | 0.68 | 11.90 | 1.18 | 37.00 | 2.37 |
| 3.90 | 0.69 | 12.10 | 1.14 | 38.00 | 2.40 |
| 4.10 | 0.71 | 12.40 | 1.19 | 39.00 | 2.57 |
| 4.30 | 0.73 | 13.00 | 1.34 | 40.00 | 2.36 |
| 4.50 | 0.75 | 13.50 | 1.33 | | |
| 4.70 | 0.77 | 14.00 | 1.48 | | |
| 4.90 | 0.79 | 14.50 | 1.45 | | |



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

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

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

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

Cable loss
Cable coaxial, Gore, 18 GHz, 1.5 m, SMA-SMA, S/N 89386
HL 2911

| Frequency, MHz | Cable loss, dB | Frequency, MHz | Cable loss, dB | Frequency, MHz | Cable loss, dB |
|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| 10 | 0.06 | 5750 | 1.32 | 12000 | 2.04 |
| 30 | 0.09 | 6000 | 1.34 | 12250 | 2.04 |
| 100 | 0.16 | 6250 | 1.41 | 12500 | 2.07 |
| 250 | 0.27 | 6500 | 1.43 | 12750 | 1.96 |
| 500 | 0.38 | 6750 | 1.46 | 13000 | 1.97 |
| 750 | 0.49 | 7000 | 1.49 | 13250 | 2.01 |
| 1000 | 0.55 | 7250 | 1.52 | 13500 | 2.04 |
| 1250 | 0.62 | 7500 | 1.56 | 13750 | 2.12 |
| 1500 | 0.68 | 7750 | 1.66 | 14000 | 2.16 |
| 1750 | 0.74 | 8000 | 1.69 | 14250 | 2.16 |
| 2000 | 0.78 | 8250 | 1.78 | 14500 | 2.28 |
| 2250 | 0.83 | 8500 | 1.73 | 14750 | 2.26 |
| 2500 | 0.88 | 8750 | 1.71 | 15000 | 2.22 |
| 2750 | 0.97 | 9000 | 1.72 | 15250 | 2.34 |
| 3000 | 1.00 | 9250 | 1.74 | 15500 | 2.41 |
| 3250 | 1.03 | 9500 | 1.76 | 15750 | 2.45 |
| 3500 | 1.05 | 9750 | 1.80 | 16000 | 2.57 |
| 3750 | 1.09 | 10000 | 1.89 | 16250 | 2.54 |
| 4000 | 1.14 | 10250 | 1.94 | 16500 | 2.55 |
| 4250 | 1.17 | 10500 | 1.99 | 16750 | 2.52 |
| 4500 | 1.21 | 10750 | 1.92 | 17000 | 2.42 |
| 4750 | 1.22 | 11000 | 1.96 | 17250 | 2.49 |
| 5000 | 1.24 | 11250 | 1.97 | 17500 | 2.62 |
| 5250 | 1.28 | 11500 | 2.02 | 17750 | 2.70 |
| 5500 | 1.30 | 11750 | 2.07 | 18000 | 2.76 |



Cable loss
Microwave Cable Assembly, 18 GHz, 6.4 m, SMA – SMA, Huber-Suhner, model 198-9155-00
HL 3121

| Frequency, MHz | Cable loss, dB |
|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| 10 | 0.08 | 3600 | 2.10 | 7400 | 3.08 | 11200 | 3.85 | 15100 | 4.58 |
| 30 | 0.18 | 3700 | 2.14 | 7500 | 3.11 | 11300 | 3.85 | 15200 | 4.60 |
| 50 | 0.26 | 3800 | 2.18 | 7600 | 3.14 | 11400 | 3.86 | 15300 | 4.63 |
| 100 | 0.34 | 3900 | 2.19 | 7700 | 3.16 | 11500 | 3.86 | 15400 | 4.65 |
| 200 | 0.47 | 4000 | 2.25 | 7800 | 3.18 | 11600 | 3.87 | 15500 | 4.71 |
| 300 | 0.59 | 4100 | 2.25 | 7900 | 3.20 | 11700 | 3.85 | 15600 | 4.70 |
| 400 | 0.66 | 4200 | 2.28 | 8000 | 3.22 | 11800 | 3.96 | 15700 | 4.69 |
| 500 | 0.75 | 4300 | 2.35 | 8100 | 3.26 | 11900 | 3.92 | 15800 | 4.71 |
| 600 | 0.83 | 4400 | 2.35 | 8200 | 3.27 | 12000 | 3.92 | 15900 | 4.74 |
| 700 | 0.90 | 4500 | 2.38 | 8300 | 3.29 | 12100 | 3.94 | 16000 | 4.69 |
| 800 | 0.96 | 4600 | 2.43 | 8400 | 3.30 | 12200 | 3.94 | 16100 | 4.72 |
| 900 | 1.02 | 4700 | 2.43 | 8500 | 3.31 | 12300 | 3.99 | 16200 | 4.71 |
| 1000 | 1.07 | 4800 | 2.45 | 8600 | 3.33 | 12400 | 4.02 | 16300 | 4.74 |
| 1100 | 1.12 | 4900 | 2.48 | 8700 | 3.35 | 12500 | 4.10 | 16400 | 4.74 |
| 1200 | 1.15 | 5000 | 2.55 | 8800 | 3.36 | 12600 | 4.09 | 16500 | 4.75 |
| 1300 | 1.22 | 5100 | 2.54 | 8900 | 3.38 | 12700 | 4.15 | 16600 | 4.78 |
| 1400 | 1.28 | 5200 | 2.56 | 9000 | 3.40 | 12800 | 4.15 | 16700 | 4.86 |
| 1500 | 1.29 | 5300 | 2.58 | 9100 | 3.41 | 12900 | 4.08 | 16800 | 4.84 |
| 1600 | 1.36 | 5400 | 2.61 | 9200 | 3.45 | 13000 | 4.21 | 16900 | 4.83 |
| 1700 | 1.40 | 5500 | 2.64 | 9300 | 3.48 | 13100 | 4.19 | 17000 | 4.86 |
| 1800 | 1.45 | 5600 | 2.69 | 9400 | 3.52 | 13200 | 4.29 | 17100 | 4.83 |
| 1900 | 1.51 | 5700 | 2.67 | 9500 | 3.54 | 13300 | 4.24 | 17200 | 4.90 |
| 2000 | 1.50 | 5800 | 2.71 | 9600 | 3.59 | 13400 | 4.26 | 17300 | 4.91 |
| 2100 | 1.56 | 5900 | 2.73 | 9700 | 3.59 | 13500 | 4.26 | 17400 | 4.94 |
| 2200 | 1.59 | 6000 | 2.75 | 9800 | 3.62 | 13600 | 4.29 | 17500 | 4.93 |
| 2300 | 1.63 | 6100 | 2.81 | 9900 | 3.70 | 13700 | 4.35 | 17600 | 4.93 |
| 2400 | 1.73 | 6200 | 2.80 | 10000 | 3.70 | 13800 | 4.31 | 17700 | 5.00 |
| 2500 | 1.73 | 6300 | 2.82 | 10100 | 3.72 | 13900 | 4.29 | 17800 | 5.01 |
| 2600 | 1.78 | 6400 | 2.85 | 10200 | 3.73 | 14000 | 4.32 | 17900 | 5.00 |
| 2700 | 1.84 | 6500 | 2.87 | 10300 | 3.75 | 14100 | 4.33 | 18000 | 5.00 |
| 2800 | 1.84 | 6600 | 2.90 | 10400 | 3.76 | 14200 | 4.34 | | |
| 2900 | 1.91 | 6700 | 2.91 | 10500 | 3.77 | 14300 | 4.36 | | |
| 3000 | 1.91 | 6800 | 2.94 | 10600 | 3.79 | 14400 | 4.38 | | |
| 3100 | 1.97 | 6900 | 2.96 | 10700 | 3.80 | 14600 | 4.42 | | |
| 3200 | 1.98 | 7000 | 2.98 | 10800 | 3.81 | 14700 | 4.42 | | |
| 3300 | 2.04 | 7100 | 3.01 | 10900 | 3.81 | 14800 | 4.55 | | |
| 3400 | 2.04 | 7200 | 3.02 | 11000 | 3.83 | 14900 | 4.55 | | |
| 3500 | 2.10 | 7300 | 3.04 | 11100 | 3.84 | 15000 | 4.55 | | |



Cable loss
Microwave Cable Assembly, 18 GHz, 6.4 m, SMA – SMA, Huber-Suhner, model 198-9155-00
HL 3122

| Frequency, MHz | Cable loss, dB |
|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| 10 | 0.11 | 3600 | 2.08 | 7400 | 3.07 | 11200 | 3.92 | 15100 | 4.61 |
| 30 | 0.17 | 3700 | 2.12 | 7500 | 3.09 | 11300 | 3.95 | 15200 | 4.58 |
| 50 | 0.23 | 3800 | 2.15 | 7600 | 3.14 | 11400 | 3.93 | 15300 | 4.62 |
| 100 | 0.32 | 3900 | 2.18 | 7700 | 3.15 | 11500 | 3.93 | 15400 | 4.62 |
| 200 | 0.47 | 4000 | 2.21 | 7800 | 3.19 | 11600 | 3.94 | 15500 | 4.65 |
| 300 | 0.58 | 4100 | 2.24 | 7900 | 3.22 | 11700 | 3.97 | 15600 | 4.66 |
| 400 | 0.66 | 4200 | 2.27 | 8000 | 3.20 | 11800 | 3.98 | 15700 | 4.66 |
| 500 | 0.74 | 4300 | 2.31 | 8100 | 3.21 | 11900 | 4.08 | 15800 | 4.72 |
| 600 | 0.81 | 4400 | 2.31 | 8200 | 3.24 | 12000 | 4.03 | 15900 | 4.78 |
| 700 | 0.88 | 4500 | 2.36 | 8300 | 3.27 | 12100 | 4.06 | 16000 | 4.89 |
| 800 | 0.95 | 4600 | 2.37 | 8400 | 3.32 | 12200 | 4.05 | 16100 | 4.95 |
| 900 | 1.00 | 4700 | 2.40 | 8500 | 3.35 | 12300 | 4.16 | 16200 | 4.92 |
| 1000 | 1.06 | 4800 | 2.43 | 8600 | 3.35 | 12400 | 4.18 | 16300 | 4.95 |
| 1100 | 1.11 | 4900 | 2.45 | 8700 | 3.33 | 12500 | 4.20 | 16400 | 5.02 |
| 1200 | 1.16 | 5000 | 2.50 | 8800 | 3.37 | 12600 | 4.22 | 16500 | 5.04 |
| 1300 | 1.21 | 5100 | 2.51 | 8900 | 3.39 | 12700 | 4.23 | 16600 | 5.06 |
| 1400 | 1.26 | 5200 | 2.55 | 9000 | 3.45 | 12800 | 4.28 | 16700 | 5.17 |
| 1500 | 1.31 | 5300 | 2.56 | 9100 | 3.46 | 12900 | 4.26 | 16800 | 5.16 |
| 1600 | 1.35 | 5400 | 2.59 | 9200 | 3.47 | 13000 | 4.28 | 16900 | 5.19 |
| 1700 | 1.39 | 5500 | 2.62 | 9300 | 3.46 | 13100 | 4.28 | 17000 | 5.23 |
| 1800 | 1.44 | 5600 | 2.65 | 9400 | 3.50 | 13200 | 4.28 | 17100 | 5.30 |
| 1900 | 1.47 | 5700 | 2.67 | 9500 | 3.50 | 13300 | 4.29 | 17200 | 5.26 |
| 2000 | 1.52 | 5800 | 2.71 | 9600 | 3.53 | 13400 | 4.34 | 17300 | 5.30 |
| 2100 | 1.55 | 5900 | 2.72 | 9700 | 3.52 | 13500 | 4.31 | 17400 | 5.30 |
| 2200 | 1.60 | 6000 | 2.73 | 9800 | 3.54 | 13600 | 4.35 | 17500 | 5.36 |
| 2300 | 1.63 | 6100 | 2.76 | 9900 | 3.56 | 13700 | 4.36 | 17600 | 5.40 |
| 2400 | 1.67 | 6200 | 2.78 | 10000 | 3.57 | 13800 | 4.37 | 17700 | 5.47 |
| 2500 | 1.70 | 6300 | 2.81 | 10100 | 3.60 | 13900 | 4.41 | 17800 | 5.56 |
| 2600 | 1.74 | 6400 | 2.85 | 10200 | 3.69 | 14000 | 4.42 | 17900 | 5.45 |
| 2700 | 1.78 | 6500 | 2.87 | 10300 | 3.69 | 14100 | 4.45 | 18000 | 5.47 |
| 2800 | 1.83 | 6600 | 2.87 | 10400 | 3.67 | 14200 | 4.49 | | |
| 2900 | 1.85 | 6700 | 2.90 | 10500 | 3.70 | 14300 | 4.55 | | |
| 3000 | 1.89 | 6800 | 2.91 | 10600 | 3.70 | 14400 | 4.62 | | |
| 3100 | 1.92 | 6900 | 2.96 | 10700 | 3.76 | 14600 | 4.54 | | |
| 3200 | 1.96 | 7000 | 2.99 | 10800 | 3.88 | 14700 | 4.58 | | |
| 3300 | 1.99 | 7100 | 3.01 | 10900 | 3.88 | 14800 | 4.57 | | |
| 3400 | 2.03 | 7200 | 3.04 | 11000 | 3.85 | 14900 | 4.65 | | |
| 3500 | 2.06 | 7300 | 3.08 | 11100 | 3.85 | 15000 | 4.64 | | |



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

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

Cable loss
Cable coaxial, RG-214/U, N type-N type, 17 m
Teldor, HL 3612

| Frequency, GHz | Cable loss, dB |
|----------------|----------------|
| 0.1 | 0.05 |
| 0.5 | 0.07 |
| 1 | 0.10 |
| 3 | 0.22 |
| 5 | 0.29 |
| 10 | 0.39 |
| 30 | 0.68 |
| 50 | 0.90 |
| 100 | 1.27 |
| 150 | 1.58 |
| 200 | 1.80 |
| 250 | 2.12 |
| 300 | 2.36 |
| 350 | 2.60 |
| 400 | 2.82 |
| 450 | 2.99 |
| 500 | 3.23 |
| 550 | 3.40 |
| 600 | 3.56 |
| 650 | 3.71 |
| 700 | 3.90 |
| 750 | 4.04 |
| 800 | 4.23 |
| 850 | 4.39 |
| 900 | 4.55 |
| 950 | 4.65 |
| 1000 | 4.79 |

Cable loss
Cable coaxial, RG-214/U, N type-N type, 6.5 m
Suhner Switzerland, HL 3616

| Frequency, MHz | Cable loss, dB |
|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| 10 | 0.13 | 1750 | 2.66 | 3550 | 4.44 | 5350 | 6.08 |
| 30 | 0.25 | 1800 | 2.72 | 3600 | 4.46 | 5400 | 6.12 |
| 50 | 0.32 | 1850 | 2.78 | 3650 | 4.59 | 5450 | 6.17 |
| 100 | 0.48 | 1900 | 2.81 | 3700 | 4.60 | 5500 | 6.25 |
| 150 | 0.60 | 1950 | 2.86 | 3750 | 4.72 | 5550 | 6.31 |
| 200 | 0.71 | 2000 | 2.94 | 3800 | 4.72 | 5600 | 6.35 |
| 250 | 0.81 | 2050 | 2.97 | 3850 | 4.86 | 5650 | 6.41 |
| 300 | 0.91 | 2100 | 3.01 | 3900 | 4.85 | 5700 | 6.50 |
| 350 | 1.00 | 2150 | 3.06 | 3950 | 4.99 | 5750 | 6.52 |
| 400 | 1.07 | 2200 | 3.11 | 4000 | 4.90 | 5800 | 6.57 |
| 450 | 1.14 | 2250 | 3.16 | 4050 | 5.04 | 5850 | 6.61 |
| 500 | 1.23 | 2300 | 3.21 | 4100 | 5.01 | 5900 | 6.71 |
| 550 | 1.30 | 2350 | 3.26 | 4150 | 5.10 | 5950 | 6.70 |
| 600 | 1.37 | 2400 | 3.31 | 4200 | 5.08 | 6000 | 6.75 |
| 650 | 1.44 | 2450 | 3.35 | 4250 | 5.18 | 6050 | 6.74 |
| 700 | 1.50 | 2500 | 3.39 | 4300 | 5.14 | 6100 | 6.84 |
| 750 | 1.58 | 2550 | 3.46 | 4350 | 5.22 | 6150 | 6.87 |
| 800 | 1.64 | 2600 | 3.48 | 4400 | 5.21 | 6200 | 6.93 |
| 850 | 1.69 | 2650 | 3.55 | 4450 | 5.29 | 6250 | 6.96 |
| 900 | 1.77 | 2700 | 3.59 | 4500 | 5.31 | 6300 | 7.02 |
| 950 | 1.79 | 2750 | 3.66 | 4550 | 5.39 | 6350 | 7.04 |
| 1000 | 1.87 | 2800 | 3.68 | 4600 | 5.41 | 6400 | 7.10 |
| 1050 | 1.92 | 2850 | 3.75 | 4650 | 5.49 | 6450 | 7.11 |
| 1100 | 1.98 | 2900 | 3.79 | 4700 | 5.52 | 6500 | 7.19 |
| 1150 | 2.05 | 2950 | 3.86 | 4750 | 5.60 | | |
| 1200 | 2.09 | 3000 | 3.89 | 4800 | 5.64 | | |
| 1250 | 2.15 | 3050 | 3.94 | 4850 | 5.73 | | |
| 1300 | 2.21 | 3100 | 3.98 | 4900 | 5.70 | | |
| 1350 | 2.27 | 3150 | 4.03 | 4950 | 5.73 | | |
| 1400 | 2.33 | 3200 | 4.06 | 5000 | 5.75 | | |
| 1450 | 2.38 | 3250 | 4.12 | 5050 | 5.83 | | |
| 1500 | 2.44 | 3300 | 4.14 | 5100 | 5.82 | | |
| 1550 | 2.48 | 3350 | 4.22 | 5150 | 5.91 | | |
| 1600 | 2.52 | 3400 | 4.24 | 5200 | 5.92 | | |
| 1650 | 2.56 | 3450 | 4.31 | 5250 | 5.98 | | |
| 1700 | 2.62 | 3500 | 4.35 | 5300 | 6.01 | | |

13 APPENDIX F Abbreviations and acronyms

| | |
|----------------|---|
| A | ampere |
| AC | alternating current |
| A/m | ampere per meter |
| AM | amplitude modulation |
| AVRG | average (detector) |
| BB | broad band |
| 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 |
| dB Ω | decibel referred to one Ohm |
| 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 |
| LISN | line impedance stabilization network |
| 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 |
| QP | quasi-peak |
| RE | radiated emission |
| RF | radio frequency |
| rms | root mean square |
| Rx | receive |
| s | second |
| T | temperature |
| Tx | transmit |
| V | volt |
| VA | volt-ampere |
| WB | wideband |

END OF DOCUMENT