

TEST REPORT

ACCORDING TO: FCC parts 22, 24 and part 15 subpart B

FOR:

Motorola Communications Israel Ltd.
QuadBand GSM module 850/1900 MHz
Model:G24
FCC ID:IHDT56FV1

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1 Applicant information

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E-mail: alfred.firouz@motorola.com
Contact name: Mr. Alfred Firouz

2 Equipment under test attributes

Product name: QuadBand GSM module 850/1900 MHz
Model(s): G24
Serial number: FCN5538DXY600173
Hardware version: P4
Software release: 33D
Receipt date 10/16/2005

3 Manufacturer information

Client name: Motorola Communications Israel Ltd.
Address: 3 Kremenetski street, P.O.B. 25016, 67899 Tel Aviv, Israel
Telephone: +972 3565 8888
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Contact name: Mr. Alfred Firouz




4 Test details

Project ID: 16719
Location: Hermon Laboratories Ltd. P.O.Box 23, Binyamina 30500, Israel
Test started: 10/16/2005
Test completed: 11/06/2005
Test specification(s): FCC 47 CFR parts 22, 24:2004, part 15:2005 subpart B, §§15.107, 15.109

5 Tests summary

| Test | Status |
|---|--------|
| Transmitter characteristics | |
| Sections 22.913, 24.232, RF output power | Pass |
| Sections 24.238(b), 2.1049, Occupied bandwidth | Pass |
| Sections 22.917, 24.238, Spurious emissions at antenna terminal | Pass |
| Sections 22.917, 24.238, Emissions at band edges | Pass |
| Sections 22.917, 24.238, Radiated spurious emissions | Pass |
| Sections 22.355, 24.235, Frequency stability | Pass |
| Unintentional emissions | |
| Section 15.107, Conducted emission at AC power port | Pass |
| Section 15.109, Radiated 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. A. Adelberg, test engineer | November 6, 2005 |  |
| Reviewed by: | Mrs. M. Cherniavsky, certification engineer | November 7, 2005 |  |
| Approved by: | Mr. M. Nikishin, EMC group leader | November 28, 2005 |  |

6 EUT description

6.1 General information

The EUT is a QuadBand GSM module, powered by DC power supply. Throughout the testing the EUT was installed into an evaluation board.

6.2 Support and test equipment

| Description | Manufacturer | Model number | Serial number |
|------------------|--------------|--------------|---------------|
| Evaluation board | Motorola | G24eboard | 8488899V01P1 |

6.3 Operating frequencies

| Source | Frequency, MHz | | |
|-----------------|----------------|-------|--------|
| Digital portion | 26 | NA | NA |
| Cell 850 | 824.2 | 836.4 | 848.8 |
| PCS 1900 | 1850.2 | 1880 | 1909.8 |

6.4 Changes made in the EUT

No changes were implemented.

6.5 Transmitter characteristics

6.5.1 G24, cell 850/PCS 1900 transmitter under the FCC ID:IHDT56FV1, manufactured by Motorola, Inc

| | | | | | | |
|--|---|---|--|------------------------------------|---|------------------------------------|
| Type of equipment | | | | | | |
| Stand-alone (Equipment with or without its own control provisions) | | | | | | |
| Combined equipment (Equipment where the radio part is fully integrated within another type of equipment) | | | | | | |
| X | Plug-in card (Equipment intended for a variety of host systems) | | | | | |
| Intended use | | | Condition of use | | | |
| fixed | | | Always at a distance more than 2 m from all people | | | |
| mobile | | | Always at a distance more than 20 cm from all people | | | |
| X | portable | | May operate at a distance closer than 20 cm to human body | | | |
| Assigned frequency range | | 824 – 849 MHz/1850 – 1910 MHz | | | | |
| Operating frequency range | | 824.2 – 848.8 MHz/1850.2 – 1909.8 MHz | | | | |
| RF channel spacing | | 200 kHz | | | | |
| Maximum rated output power | | At transmitter 50 Ω RF output connector | | 850 – 33.03 dBm 1900 –30.17 dBm | | |
| | | Effective radiated power (for equipment with no RF connector) | | | | |
| Is transmitter output power variable? | | No | | continuous variable | | |
| | | X | Yes | stepped variable with stepsize | | 2 dB |
| | | | | minimum RF power | | 0 dBm |
| | | | | maximum RF power | | 850 – 33.03 dBm 1900 –30.17 dBm |
| Antenna connection | | | | | | |
| unique coupling | MMCX | standard connector | X | integral | X with temporary RF connector without temporary RF connector | |
| Antenna/s technical characteristics | | | | | | |
| Type | Frequency range | | Maximum permissive gain of antenna assembly including cable loss | | | |
| External | 824.0 – 849.0 MHz | | 5.4 dBd (7.55 dBi) | | | |
| | 1850 – 1910 MHz | | 2.8 dBi | | | |
| Transmitter 99% power bandwidth | | 250 kHz | | | | |
| Transmitter aggregate data rate/s | | 270.883 kbps | | | | |
| Transmitter aggregate symbol (baud) rate/s | | 270.883 kbps | | | | |
| Type of modulation | | FSK | | | | |
| Type of multiplexing | | TDMA | | | | |
| Modulating test signal (baseband) | | GSM | | | | |
| Maximum transmitter duty cycle in normal use | | 12.5 % | Tx ON time | 0.55 msec | Period | 4.5 msec |
| Transmitter duty cycle supplied for test | | 12.5 % | Tx ON time | 0.55 msec | Period | 4.5 msec |
| Transmitter power source | | | | | | |
| X | DC | Nominal rated voltage | 3.3 - 4.2 VDC | Battery type | | |
| Common power source for transmitter and receiver | | | X | yes | no | |

| | | | |
|----------------------------|--|--------------------------------|----------------------------|
| Test specification: | Section 22.913, Peak output power | | |
| Test procedure: | FCC part 22, Section 22.913 | | |
| Test mode: | Compliance | Verdict: PASS | |
| Date & Time: | 11/4/2005 3:46:51 PM | | |
| Temperature: 22°C | Air Pressure: 1012 hPa | Relative Humidity: 46 % | Power Supply: 4 VDC |
| Remarks: | | | |

7 Transmitter tests according to 47CFR part 22 requirements

7.1 Peak output power

7.1.1 General

This test was performed to measure the peak output power at RF antenna connector. Specification test limits are given in Table 7.1.1.

Table 7.1.1 Peak output power limits

| Assigned frequency range, MHz | Maximum peak output power | |
|-------------------------------|---------------------------|-------|
| | W | dBm |
| 824 – 849 | 7.0 | 38.45 |

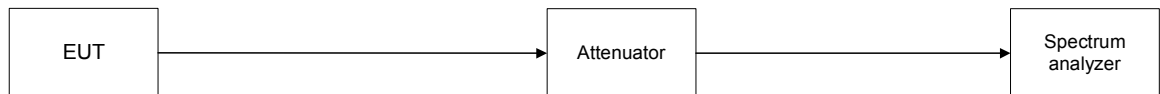
7.1.2 Test procedure

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

7.1.2.2 The EUT was adjusted to produce maximum available to the end user RF output power.

7.1.2.3 The peak output power was measured with spectrum analyzer as provided in Table 7.1.2 and associated plots.

Figure 7.1.1 Peak output power test setup



Photograph 7.1.2 Peak output power test setup



| | | | |
|----------------------------|--|--------------------------------|----------------------------|
| Test specification: | Section 22.913, Peak output power | | |
| Test procedure: | FCC part 22, Section 22.913 | | |
| Test mode: | Compliance | Verdict: PASS | |
| Date & Time: | 11/4/2005 3:46:51 PM | | |
| Temperature: 22°C | Air Pressure: 1012 hPa | Relative Humidity: 46 % | Power Supply: 4 VDC |
| Remarks: | | | |

Table 7.1.2 Peak output power test results

OPERATING FREQUENCY RANGE: 824 - 849 MHz
 DETECTOR USED: Peak
 RESOLUTION BANDWIDTH: 2000 kHz
 VIDEO BANDWIDTH: 3000 kHz
 MODULATION: FSK
 MODULATING SIGNAL: PRBS
 BIT RATE: 270 kbps
 TRANSMITTER OUTPUT POWER SETTINGS: Maximum

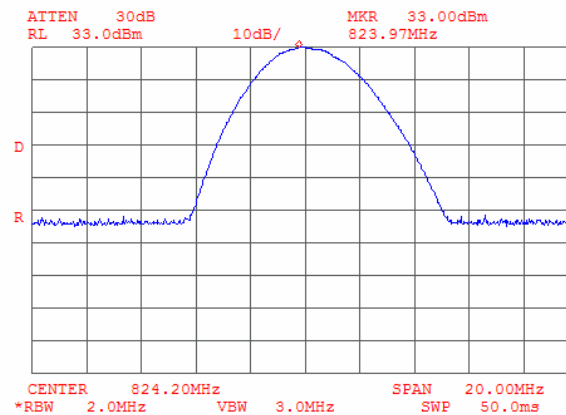
| Carrier frequency, MHz | Spectrum analyzer reading, dBm | External attenuation, dB | Cable loss, dB | RF output power, dBm | Limit, dBm | Margin, dB | Verdict |
|------------------------|--------------------------------|--------------------------|----------------|----------------------|------------|------------|---------|
| 824.4 | 33.00 | Included | Included | 33.00 | 38.45 | -5.45 | Pass |
| 836.4 | 33.03 | Included | Included | 33.03 | 38.45 | -5.42 | Pass |
| 848.8 | 33.03 | Included | Included | 33.03 | 38.45 | -5.42 | Pass |

Reference numbers of test equipment used

| | | | | | | | |
|---------|---------|---------|--|--|--|--|--|
| HL 1424 | HL 2524 | HL 2634 | | | | | |
|---------|---------|---------|--|--|--|--|--|

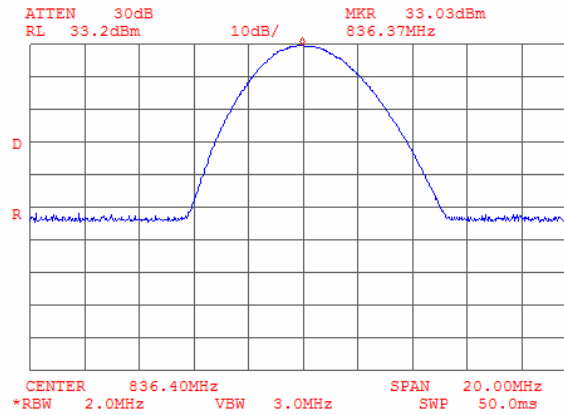
Full description is given in Appendix A.

Plot 7.1.1 Peak output power test results at low frequency

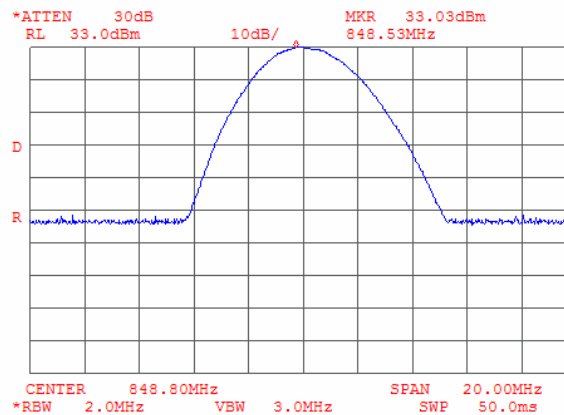


| | | | |
|----------------------------|--|--------------------------------|----------------------------|
| Test specification: | Section 22.913, Peak output power | | |
| Test procedure: | FCC part 22, Section 22.913 | | |
| Test mode: | Compliance | Verdict: PASS | |
| Date & Time: | 11/4/2005 3:46:51 PM | | |
| Temperature: 22°C | Air Pressure: 1012 hPa | Relative Humidity: 46 % | Power Supply: 4 VDC |
| Remarks: | | | |

Plot 7.1.2 Peak output power test results at mid frequency



Plot 7.1.3 Peak output power test results at high frequency



| | | | |
|----------------------------|---|-------------------------------|-----------------------------|
| Test specification: | Section 2.1049, Occupied bandwidth | | |
| Test procedure: | FCC part 2, Section 2.1049 | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date & Time: | 10/20/2005 9:39:03 AM | | |
| Temperature: 23°C | Air Pressure: 1007 hPa | Relative Humidity: 40% | Power Supply: 4 V DC |
| Remarks: | | | |

7.2 Occupied bandwidth test

7.2.1 General

This test was performed to measure transmitter occupied bandwidth. Specification test limits are given in Table 7.2.1.

Table 7.2.1 Occupied bandwidth limits

| Assigned frequency, MHz | Modulation envelope reference points*, dBc |
|-------------------------|--|
| 824 - 849 | 26 |

* - Modulation envelope reference points are provided in terms of attenuation below the unmodulated carrier.

7.2.2 Test procedure

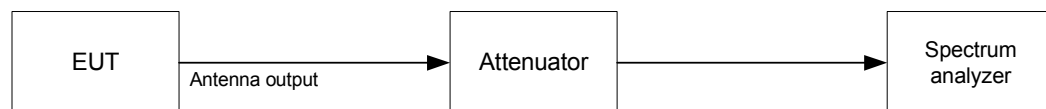
7.2.2.1 The EUT was set up as shown in Figure 7.2.1, energized and its proper operation was checked.

7.2.2.2 The EUT was set to transmit the unmodulated carrier and the reference peak power level was measured.

7.2.2.3 The EUT was set to transmit the normally modulated carrier.

7.2.2.4 The transmitter occupied bandwidth was measured with spectrum analyzer as a frequency delta between the reference points on modulation envelope and the results provided in Table 7.2.2 and the associated plots.

Figure 7.2.1 Occupied bandwidth test setup



Photograph 7.2.2 Occupied bandwidth test setup



| | | | |
|----------------------------|---|-------------------------------|-----------------------------|
| Test specification: | Section 2.1049, Occupied bandwidth | | |
| Test procedure: | FCC part 2, Section 2.1049 | | |
| Test mode: | Compliance | Verdict: PASS | |
| Date & Time: | 10/20/2005 9:39:03 AM | | |
| Temperature: 23°C | Air Pressure: 1007 hPa | Relative Humidity: 40% | Power Supply: 4 V DC |
| Remarks: | | | |

Table 7.2.2 Occupied bandwidth test results

DETECTOR USED: Peak hold
 RESOLUTION BANDWIDTH: 3 kHz
 VIDEO BANDWIDTH: 10 kHz
 MODULATION ENVELOPE REFERENCE POINTS: 26 dBc
 MODULATION: FSK
 MODULATING SIGNAL: PRBS
 BIT RATE: 270 kbps

| Carrier frequency, MHz | Lower reference point, MHz | Upper reference point, MHz | Occupied bandwidth, kHz |
|------------------------|----------------------------|----------------------------|-------------------------|
| 824.2 | 824.065 | 824.347 | 282 |
| 836.4 | 836.262 | 836.540 | 278 |
| 848.8 | 848.660 | 848.943 | 283 |

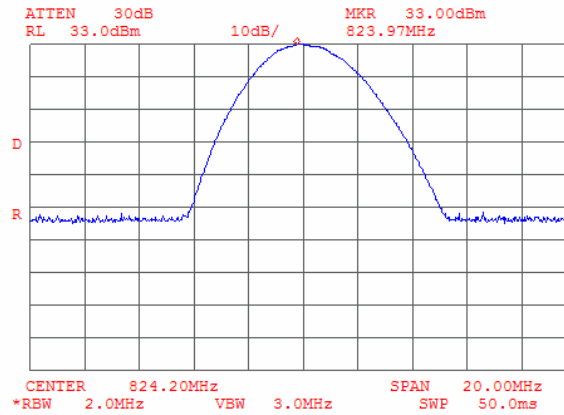
Reference numbers of test equipment used

| | | | | | | |
|---------|---------|---------|--|--|--|--|
| HL 1424 | HL 2399 | HL 2524 | | | | |
|---------|---------|---------|--|--|--|--|

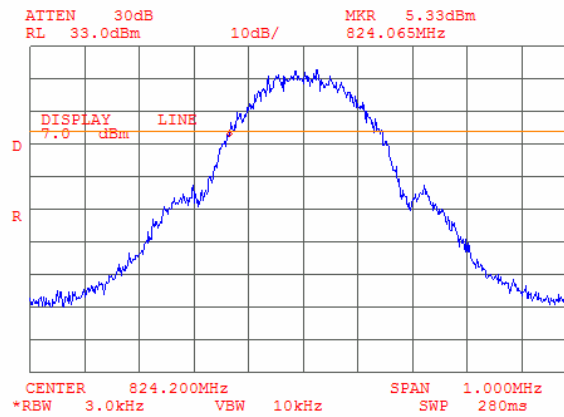
Full description is given in Appendix A.

| | | | |
|----------------------------|---|-------------------------------|-----------------------------|
| Test specification: | Section 2.1049, Occupied bandwidth | | |
| Test procedure: | FCC part 2, Section 2.1049 | | |
| Test mode: | Compliance | Verdict: PASS | |
| Date & Time: | 10/20/2005 9:39:03 AM | | |
| Temperature: 23°C | Air Pressure: 1007 hPa | Relative Humidity: 40% | Power Supply: 4 V DC |
| Remarks: | | | |

Plot 7.2.1 Occupied bandwidth test result at low frequency, reference level

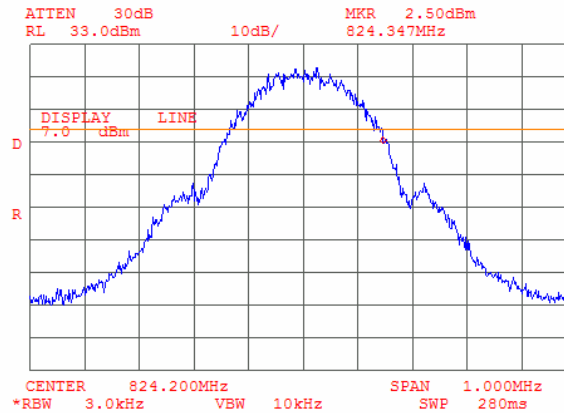


Plot 7.2.2 Occupied bandwidth test result at low frequency, lower reference point

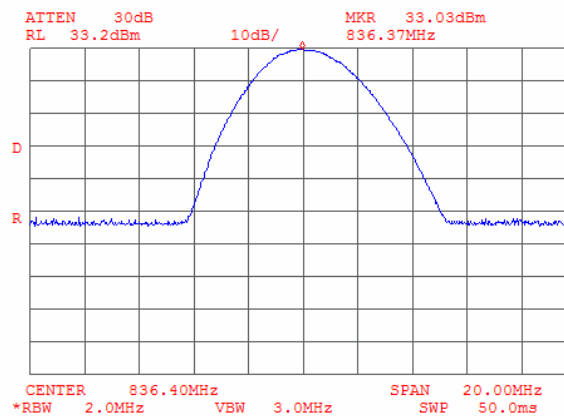


| | | | |
|----------------------------|---|-------------------------------|-----------------------------|
| Test specification: | Section 2.1049, Occupied bandwidth | | |
| Test procedure: | FCC part 2, Section 2.1049 | | |
| Test mode: | Compliance | Verdict: PASS | |
| Date & Time: | 10/20/2005 9:39:03 AM | | |
| Temperature: 23°C | Air Pressure: 1007 hPa | Relative Humidity: 40% | Power Supply: 4 V DC |
| Remarks: | | | |

Plot 7.2.3 Occupied bandwidth test result at low frequency, higher reference point

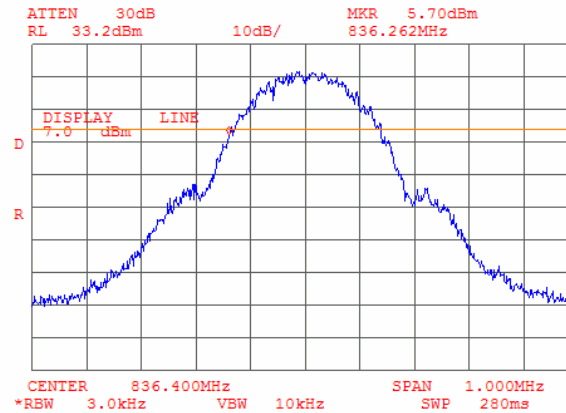


Plot 7.2.4 Occupied bandwidth test result at mid frequency, reference level

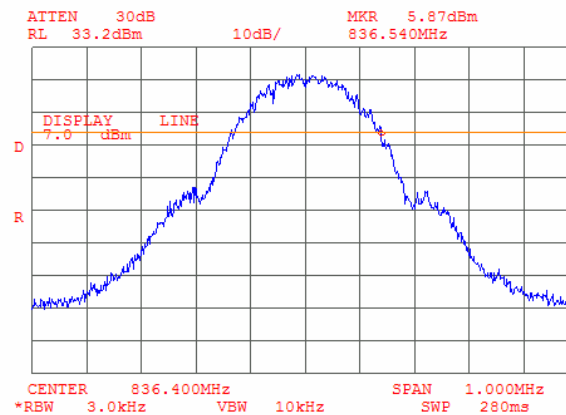


| | | | |
|----------------------------|---|-------------------------------|-----------------------------|
| Test specification: | Section 2.1049, Occupied bandwidth | | |
| Test procedure: | FCC part 2, Section 2.1049 | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date & Time: | 10/20/2005 9:39:03 AM | | |
| Temperature: 23°C | Air Pressure: 1007 hPa | Relative Humidity: 40% | Power Supply: 4 V DC |
| Remarks: | | | |

Plot 7.2.5 Occupied bandwidth test result at mid frequency, lower reference point

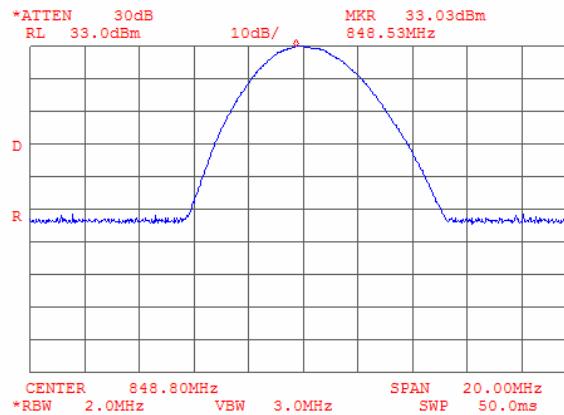


Plot 7.2.6 Occupied bandwidth test result at mid frequency, higher reference point

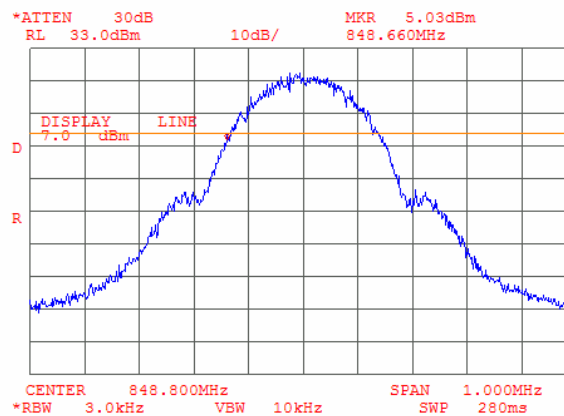


| | | | |
|----------------------------|---|-------------------------------|-----------------------------|
| Test specification: | Section 2.1049, Occupied bandwidth | | |
| Test procedure: | FCC part 2, Section 2.1049 | | |
| Test mode: | Compliance | Verdict: PASS | |
| Date & Time: | 10/20/2005 9:39:03 AM | | |
| Temperature: 23°C | Air Pressure: 1007 hPa | Relative Humidity: 40% | Power Supply: 4 V DC |
| Remarks: | | | |

Plot 7.2.7 Occupied bandwidth test result at high frequency, reference level

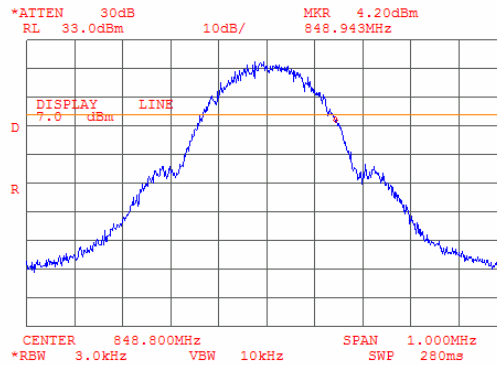


Plot 7.2.8 Occupied bandwidth test result at high frequency, lower reference point

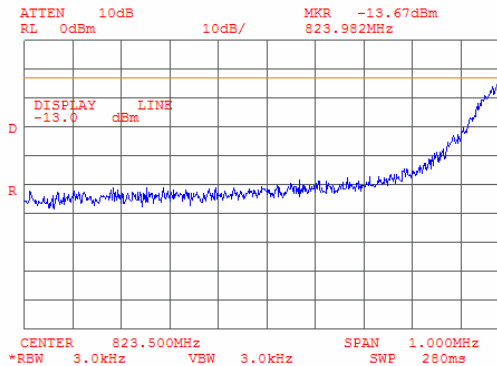


| | | | |
|----------------------------|---|-------------------------------|-----------------------------|
| Test specification: | Section 2.1049, Occupied bandwidth | | |
| Test procedure: | FCC part 2, Section 2.1049 | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date & Time: | 10/20/2005 9:39:03 AM | | |
| Temperature: 23°C | Air Pressure: 1007 hPa | Relative Humidity: 40% | Power Supply: 4 V DC |
| Remarks: | | | |

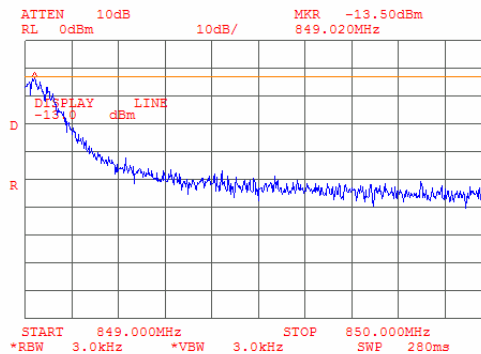
Plot 7.2.9 Occupied bandwidth test result at high frequency, higher reference point



Plot 7.2.10 Bandedge emission measurements in 823 - 824 MHz range at low carrier frequency



Plot 7.2.11 Bandedge emission measurements in 849 - 850 MHz range at high carrier frequency



For bandedge emissions measurement procedure refer to section 7.3

| | | | |
|----------------------------|--|--------------------------------|----------------------------|
| Test specification: | Section 22.917, Spurious emission at antenna terminal | | |
| Test procedure: | FCC part 22, Section 22.917 | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date & Time: | 10/20/2005 4:03:01 PM | | |
| Temperature: 22 °C | Air Pressure: 1012 hPa | Relative Humidity: 46 % | Power Supply: 4 VDC |
| Remarks: | | | |

7.3 Spurious emissions at RF antenna connector test

7.3.1 General

This test was performed to measure spurious emissions at RF antenna connector. Specification test limits are given in Table 7.3.1.

Table 7.3.1 Spurious emission limits

| Frequency, MHz | Attenuation below carrier, dBc | ERP of spurious, dBm |
|------------------------------------|--------------------------------|----------------------|
| 0.009 – 10 th harmonic* | 43+10logP* | -13.0 |

- spurious emission limits do not apply to the in band emission within ± 250 % of the authorized bandwidth from the carrier; investigated in course of emission mask testing

7.3.2 Test procedure

7.3.2.1 The EUT was set up as shown in Figure 7.3.1, energized and its proper operation was checked.

7.3.2.2 The EUT was adjusted to produce maximum available for end user RF output power.

7.3.2.3 The spurious emission was measured with spectrum analyzer as provided in Table 7.3.2 and associated plots.

Figure 7.3.1 Spurious emission test setup



Photograph 7.3.2 Spurious emission test setup



| | | | | |
|----------------------------|--|--------------------------------|----------------------------|-------------|
| Test specification: | Section 22.917, Spurious emission at antenna terminal | | | |
| Test procedure: | FCC part 22, Section 22.917 | | | |
| Test mode: | Compliance | Verdict: | | PASS |
| Date & Time: | 10/20/2005 4:03:01 PM | | | |
| Temperature: 22 °C | Air Pressure: 1012 hPa | Relative Humidity: 46 % | Power Supply: 4 VDC | |
| Remarks: | | | | |

Table 7.3.2 Spurious emission test results

ASSIGNED FREQUENCY RANGE: 824 - 849 MHz
 INVESTIGATED FREQUENCY RANGE: 0.009 – 9000 MHz
 DETECTOR USED: Peak
 VIDEO BANDWIDTH: ≥ Resolution bandwidth
 MODULATION: FSK
 MODULATING SIGNAL: PRBS
 BIT RATE: 270 kbps
 TRANSMITTER OUTPUT POWER SETTINGS: Maximum
 TRANSMITTER OUTPUT POWER: 30.00 dBm at low frequency
 30.03 dBm at mid frequency
 30.03 dBm at high frequency

| Frequency, MHz | SA reading, dBm | Attenuator, dB | Cable loss, dB | RBW, kHz | Spurious emission, dBm | Attenuation below carrier, dBc | Limit, dBc | Margin, dB* | Verdict |
|-------------------------------|-----------------|----------------|----------------|----------|------------------------|--------------------------------|------------|-------------|---------|
| Low carrier frequency | | | | | | | | | |
| 1648.25 | -31.67 | Included | Included | 1000 | -31.67 | 64.67 | 46.00 | 18.67 | Pass |
| 2472.72 | -29.83 | Included | Included | 1000 | -29.83 | 62.83 | 46.00 | 16.83 | Pass |
| 3297.02 | -39.50 | Included | Included | 1000 | -39.50 | 72.50 | 46.00 | 26.50 | Pass |
| 4121.27 | -58.87 | Included | Included | 1000 | -58.87 | 91.87 | 46.00 | 45.87 | Pass |
| 6593.72 | -57.53 | Included | Included | 1000 | -57.53 | 90.53 | 46.00 | 44.53 | Pass |
| 8242.72 | -54.20 | Included | Included | 1000 | -54.20 | 87.20 | 46.00 | 41.20 | Pass |
| Mid carrier frequency | | | | | | | | | |
| 1673.00 | -31.17 | Included | Included | 1000 | -31.17 | 64.20 | 46.03 | 18.17 | Pass |
| 2509.15 | -30.00 | Included | Included | 1000 | -30.00 | 63.03 | 46.03 | 17.00 | Pass |
| 3345.27 | -41.83 | Included | Included | 1000 | -41.83 | 74.86 | 46.03 | 28.83 | Pass |
| 4181.63 | -58.03 | Included | Included | 1000 | -58.03 | 91.06 | 46.03 | 45.03 | Pass |
| 6690.65 | -56.70 | Included | Included | 1000 | -56.70 | 89.73 | 46.03 | 43.70 | Pass |
| 8364.50 | -53.70 | Included | Included | 1000 | -53.70 | 86.73 | 46.03 | 40.70 | Pass |
| High carrier frequency | | | | | | | | | |
| 1697.60 | -31.17 | Included | Included | 1000 | -31.17 | 64.20 | 46.03 | 18.17 | Pass |
| 2546.30 | -31.50 | Included | Included | 1000 | -31.50 | 64.53 | 46.03 | 18.50 | Pass |
| 3394.92 | -48.53 | Included | Included | 1000 | -48.53 | 81.56 | 46.03 | 35.53 | Pass |
| 4244.02 | -57.03 | Included | Included | 1000 | -57.03 | 90.06 | 46.03 | 44.03 | Pass |
| 6790.70 | -55.70 | Included | Included | 1000 | -55.70 | 88.73 | 46.03 | 42.70 | Pass |
| 8487.37 | -55.70 | Included | Included | 1000 | -55.70 | 55.70 | 13.00 | 42.70 | Pass |

*- Margin = Spurious emission – specification limit.

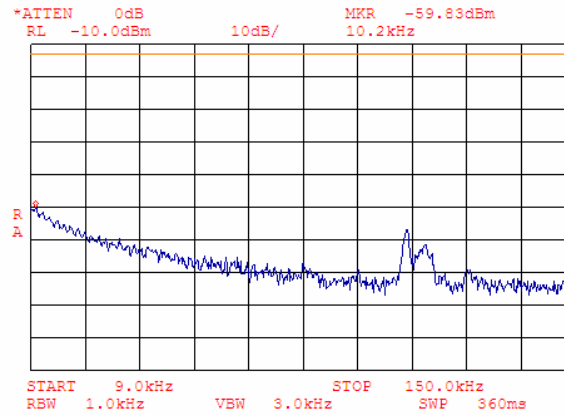
Reference numbers of test equipment used

| | | | | | |
|---------|---------|---------|--|--|--|
| HL 1424 | HL 2399 | HL 2524 | | | |
|---------|---------|---------|--|--|--|

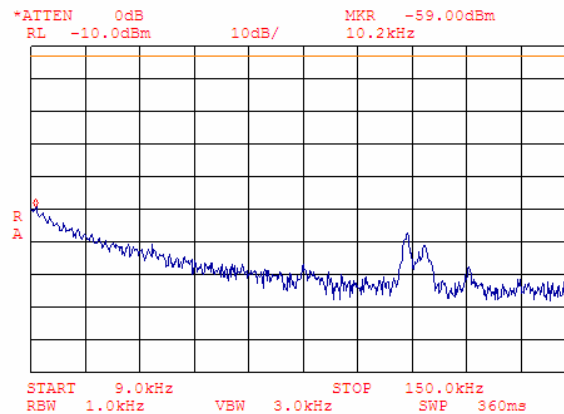
Full description is given in Appendix A.

| | | | |
|----------------------------|--|--------------------------------|----------------------------|
| Test specification: | Section 22.917, Spurious emission at antenna terminal | | |
| Test procedure: | FCC part 22, Section 22.917 | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date & Time: | 10/20/2005 4:03:01 PM | | |
| Temperature: 22 °C | Air Pressure: 1012 hPa | Relative Humidity: 46 % | Power Supply: 4 VDC |
| Remarks: | | | |

Plot 7.3.1 Spurious emission measurements in 9 - 150 kHz range at low carrier frequency

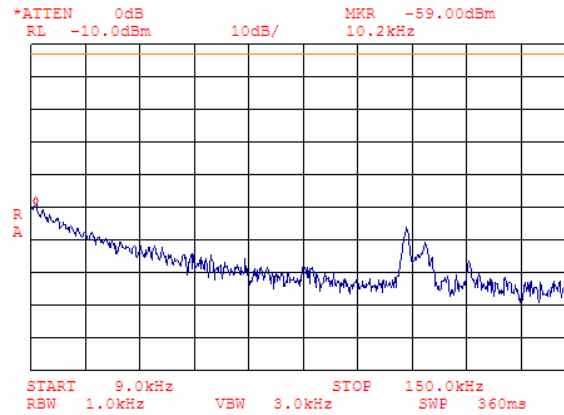


Plot 7.3.2 Spurious emission measurements in 9 - 150 kHz range at mid carrier frequency

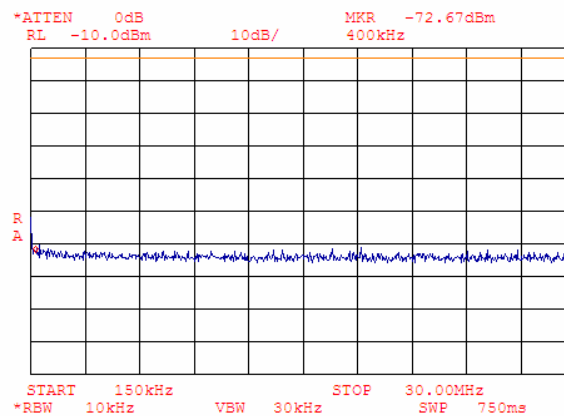


| | | | |
|----------------------------|--|--------------------------------|----------------------------|
| Test specification: | Section 22.917, Spurious emission at antenna terminal | | |
| Test procedure: | FCC part 22, Section 22.917 | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date & Time: | 10/20/2005 4:03:01 PM | | |
| Temperature: 22 °C | Air Pressure: 1012 hPa | Relative Humidity: 46 % | Power Supply: 4 VDC |
| Remarks: | | | |

Plot 7.3.3 Spurious emission measurements in 9 - 150 kHz range at high carrier frequency

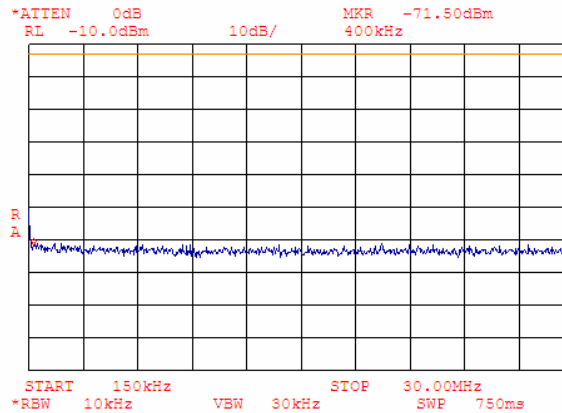


Plot 7.3.4 Spurious emission measurements in 0.15 - 30.0 MHz range at low carrier frequency

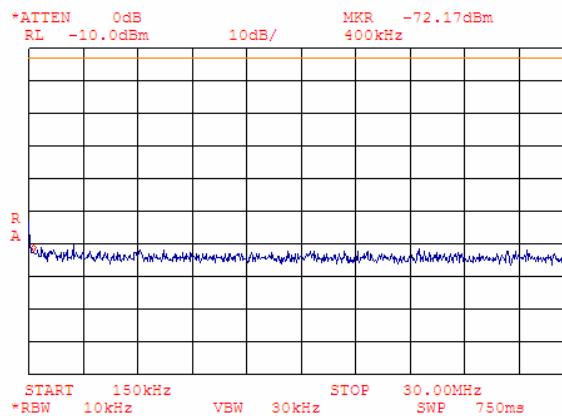


| | | | |
|----------------------------|--|--------------------------------|----------------------------|
| Test specification: | Section 22.917, Spurious emission at antenna terminal | | |
| Test procedure: | FCC part 22, Section 22.917 | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date & Time: | 10/20/2005 4:03:01 PM | | |
| Temperature: 22 °C | Air Pressure: 1012 hPa | Relative Humidity: 46 % | Power Supply: 4 VDC |
| Remarks: | | | |

Plot 7.3.5 Spurious emission measurements in 0.15 - 30.0 MHz range at mid carrier frequency

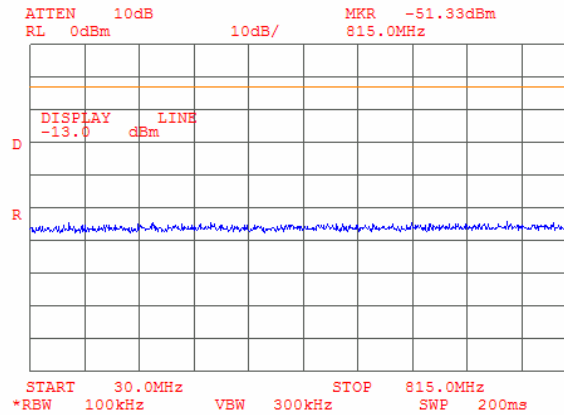


Plot 7.3.6 Spurious emission measurements in 0.15 - 30.0 MHz range at high carrier frequency

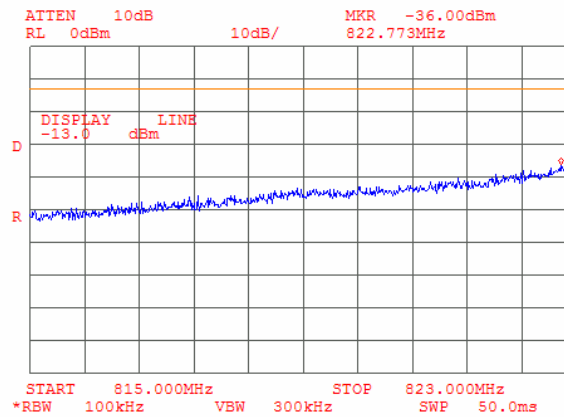


| | | | |
|----------------------------|--|--------------------------------|----------------------------|
| Test specification: | Section 22.917, Spurious emission at antenna terminal | | |
| Test procedure: | FCC part 22, Section 22.917 | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date & Time: | 10/20/2005 4:03:01 PM | | |
| Temperature: 22 °C | Air Pressure: 1012 hPa | Relative Humidity: 46 % | Power Supply: 4 VDC |
| Remarks: | | | |

Plot 7.3.7 Spurious emission measurements in 30.0 - 815 MHz range at low carrier frequency

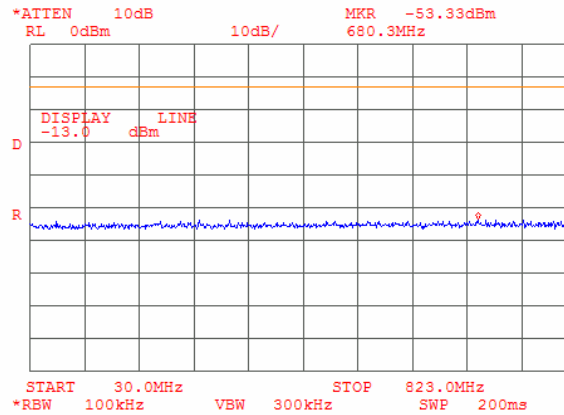


Plot 7.3.8 Spurious emission measurements in 815 - 823 MHz range at low carrier frequency

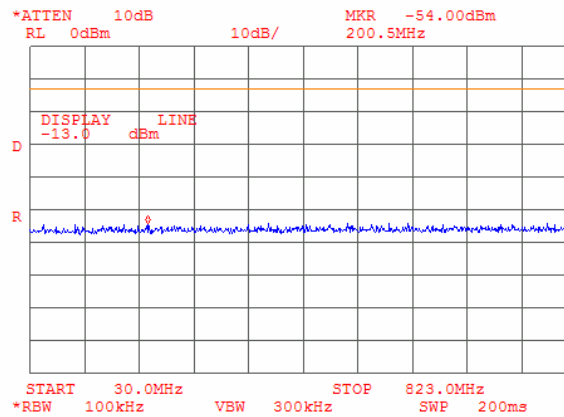


| | | | |
|----------------------------|--|--------------------------------|----------------------------|
| Test specification: | Section 22.917, Spurious emission at antenna terminal | | |
| Test procedure: | FCC part 22, Section 22.917 | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date & Time: | 10/20/2005 4:03:01 PM | | |
| Temperature: 22 °C | Air Pressure: 1012 hPa | Relative Humidity: 46 % | Power Supply: 4 VDC |
| Remarks: | | | |

Plot 7.3.9 Spurious emission measurements in 30.0 - 823 MHz range at mid carrier frequency

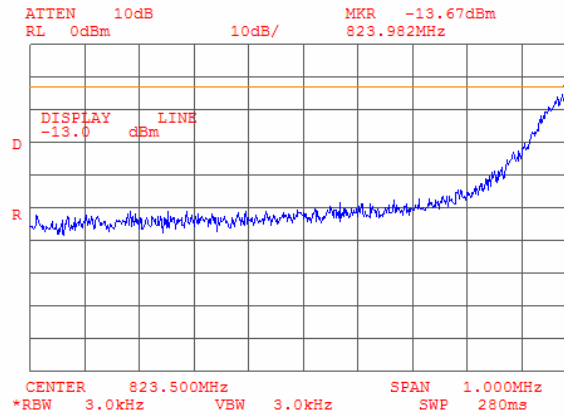


Plot 7.3.10 Spurious emission measurements in 30.0 - 823 MHz range at high carrier frequency

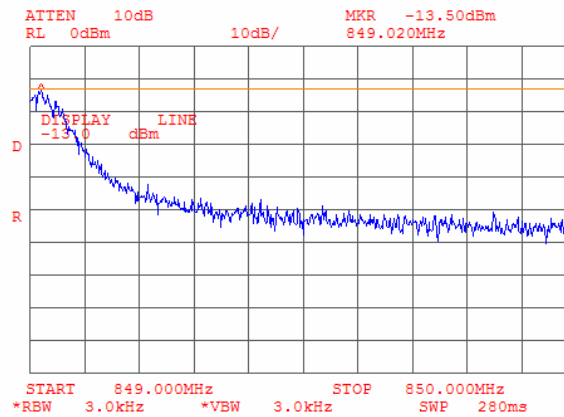


| | | | |
|----------------------------|--|--------------------------------|----------------------------|
| Test specification: | Section 22.917, Spurious emission at antenna terminal | | |
| Test procedure: | FCC part 22, Section 22.917 | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date & Time: | 10/20/2005 4:03:01 PM | | |
| Temperature: 22 °C | Air Pressure: 1012 hPa | Relative Humidity: 46 % | Power Supply: 4 VDC |
| Remarks: | | | |

Plot 7.3.11 Spurious emission measurements in 823 - 824 MHz range at low carrier frequency

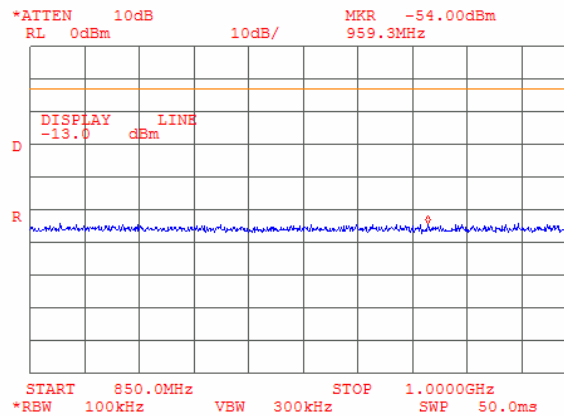


Plot 7.3.12 Spurious emission measurements in 849 - 850 MHz range at high carrier frequency



| | | | |
|----------------------------|--|--------------------------------|----------------------------|
| Test specification: | Section 22.917, Spurious emission at antenna terminal | | |
| Test procedure: | FCC part 22, Section 22.917 | | |
| Test mode: | Compliance | Verdict: PASS | |
| Date & Time: | 10/20/2005 4:03:01 PM | | |
| Temperature: 22 °C | Air Pressure: 1012 hPa | Relative Humidity: 46 % | Power Supply: 4 VDC |
| Remarks: | | | |

Plot 7.3.13 Spurious emission measurements in 850 - 1000 MHz range at low carrier frequency

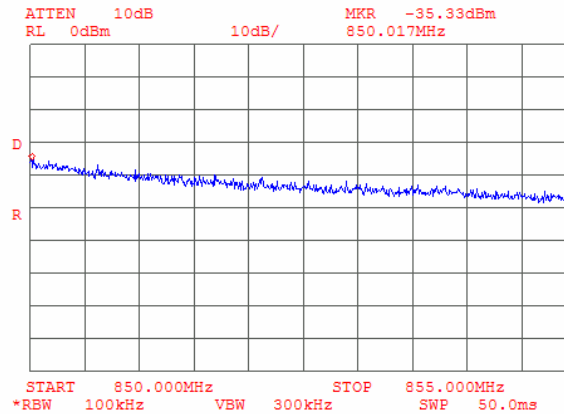


Plot 7.3.14 Spurious emission measurements in 850 - 1000 MHz range at mid carrier frequency



| | | | |
|----------------------------|--|--------------------------------|----------------------------|
| Test specification: | Section 22.917, Spurious emission at antenna terminal | | |
| Test procedure: | FCC part 22, Section 22.917 | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date & Time: | 10/20/2005 4:03:01 PM | | |
| Temperature: 22 °C | Air Pressure: 1012 hPa | Relative Humidity: 46 % | Power Supply: 4 VDC |
| Remarks: | | | |

Plot 7.3.15 Spurious emission measurements in 850 - 855 MHz range at high carrier frequency

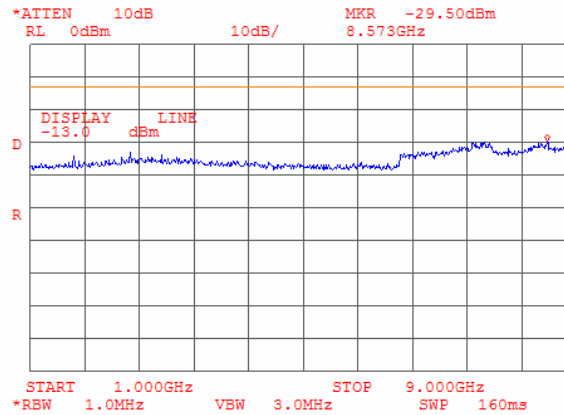


Plot 7.3.16 Spurious emission measurements in 855 - 1000 MHz range at high carrier frequency



| | | | |
|----------------------------|--|--------------------------------|----------------------------|
| Test specification: | Section 22.917, Spurious emission at antenna terminal | | |
| Test procedure: | FCC part 22, Section 22.917 | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date & Time: | 10/20/2005 4:03:01 PM | | |
| Temperature: 22 °C | Air Pressure: 1012 hPa | Relative Humidity: 46 % | Power Supply: 4 VDC |
| Remarks: | | | |

Plot 7.3.17 Spurious emission measurements in 1000 - 9000 MHz range at low carrier frequency



Plot 7.3.18 Spurious emission measurements in 1000 - 9000 MHz range at mid carrier frequency

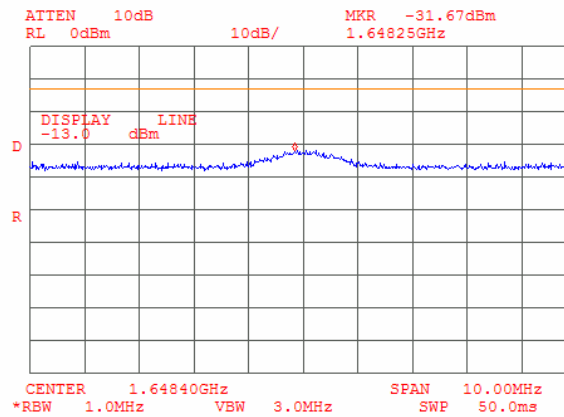


| | | | |
|----------------------------|--|--------------------------------|----------------------------|
| Test specification: | Section 22.917, Spurious emission at antenna terminal | | |
| Test procedure: | FCC part 22, Section 22.917 | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date & Time: | 10/20/2005 4:03:01 PM | | |
| Temperature: 22 °C | Air Pressure: 1012 hPa | Relative Humidity: 46 % | Power Supply: 4 VDC |
| Remarks: | | | |

Plot 7.3.19 Spurious emission measurements in 1000 - 9000 MHz range at high carrier frequency

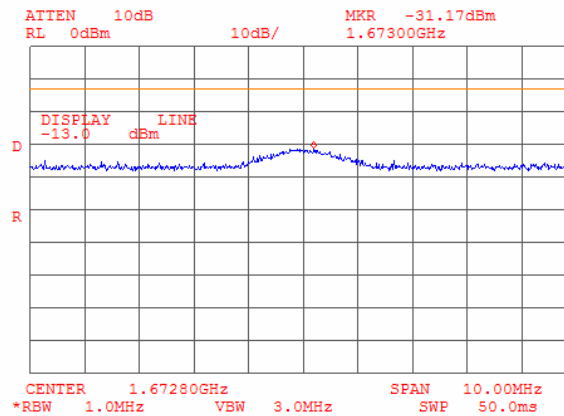


Plot 7.3.20 Conducted spurious emission measurements at the 2nd harmonic of low carrier frequency

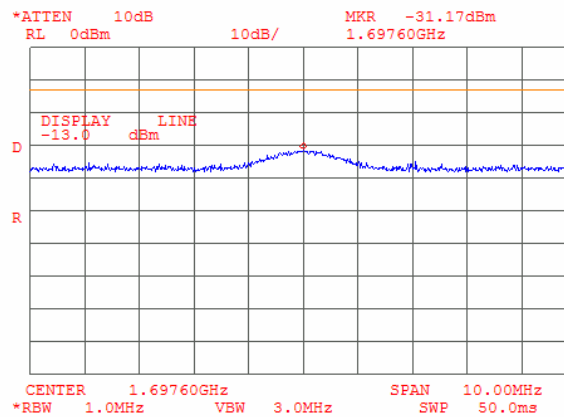


| | | | |
|----------------------------|--|--------------------------------|----------------------------|
| Test specification: | Section 22.917, Spurious emission at antenna terminal | | |
| Test procedure: | FCC part 22, Section 22.917 | | |
| Test mode: | Compliance | Verdict: PASS | |
| Date & Time: | 10/20/2005 4:03:01 PM | | |
| Temperature: 22 °C | Air Pressure: 1012 hPa | Relative Humidity: 46 % | Power Supply: 4 VDC |
| Remarks: | | | |

Plot 7.3.21 Conducted spurious emission measurements at the 2nd harmonic of mid carrier frequency

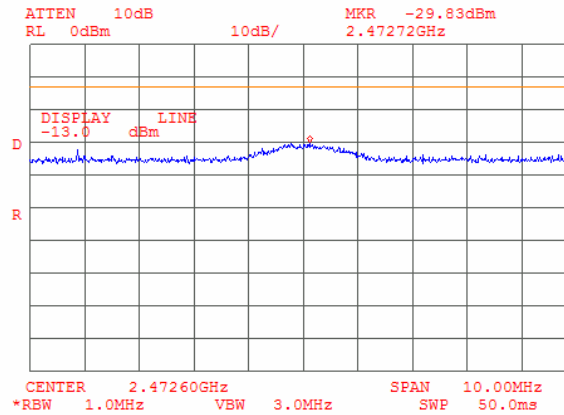


Plot 7.3.22 Conducted spurious emission measurements at the 2nd harmonic of high carrier frequency

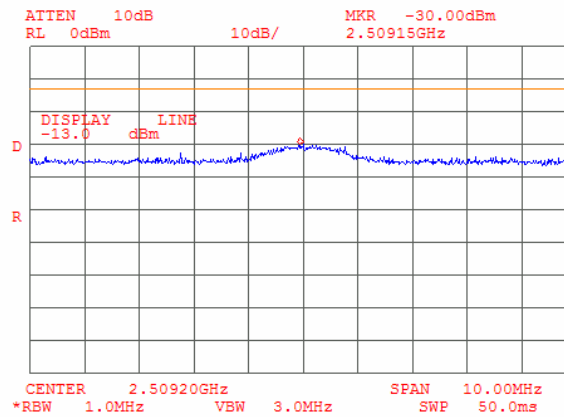


| | | | |
|----------------------------|--|--------------------------------|----------------------------|
| Test specification: | Section 22.917, Spurious emission at antenna terminal | | |
| Test procedure: | FCC part 22, Section 22.917 | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date & Time: | 10/20/2005 4:03:01 PM | | |
| Temperature: 22 °C | Air Pressure: 1012 hPa | Relative Humidity: 46 % | Power Supply: 4 VDC |
| Remarks: | | | |

Plot 7.3.23 Conducted spurious emission measurements at the 3rd harmonic of low carrier frequency

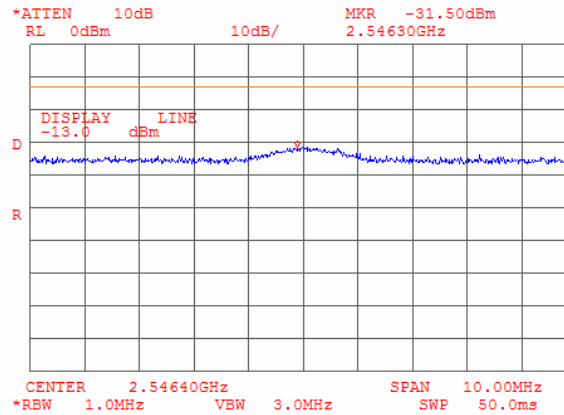


Plot 7.3.24 Conducted spurious emission measurements at the 3rd harmonic of mid carrier frequency

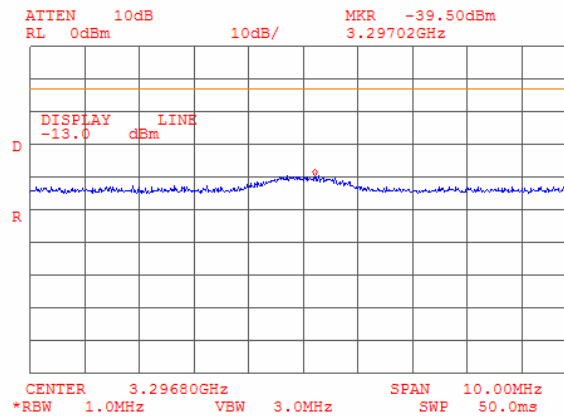


| | | | |
|----------------------------|--|--------------------------------|----------------------------|
| Test specification: | Section 22.917, Spurious emission at antenna terminal | | |
| Test procedure: | FCC part 22, Section 22.917 | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date & Time: | 10/20/2005 4:03:01 PM | | |
| Temperature: 22 °C | Air Pressure: 1012 hPa | Relative Humidity: 46 % | Power Supply: 4 VDC |
| Remarks: | | | |

Plot 7.3.25 Conducted spurious emission measurements at the 3rd harmonic of high carrier frequency

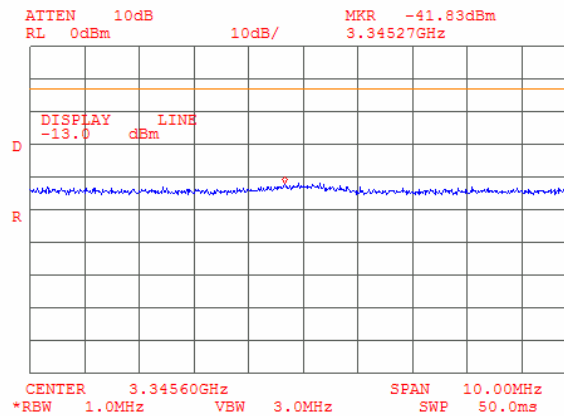


Plot 7.3.26 Conducted spurious emission measurements at the 4th harmonic of low carrier frequency

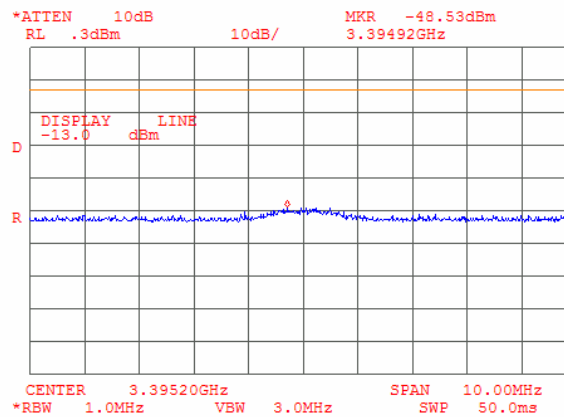


| | | | |
|----------------------------|--|--------------------------------|----------------------------|
| Test specification: | Section 22.917, Spurious emission at antenna terminal | | |
| Test procedure: | FCC part 22, Section 22.917 | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date & Time: | 10/20/2005 4:03:01 PM | | |
| Temperature: 22 °C | Air Pressure: 1012 hPa | Relative Humidity: 46 % | Power Supply: 4 VDC |
| Remarks: | | | |

Plot 7.3.27 Conducted spurious emission measurements at the 4th harmonic of mid carrier frequency

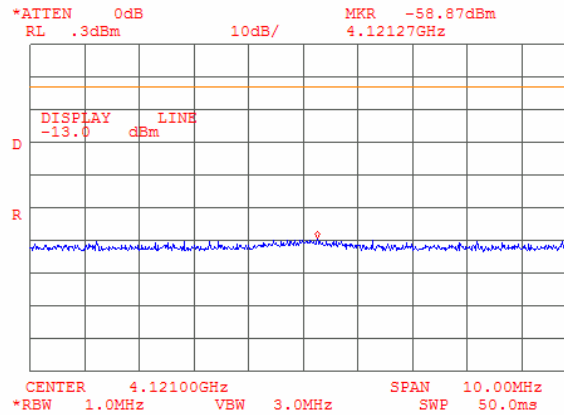


Plot 7.3.28 Conducted spurious emission measurements at the 4th harmonic of high carrier frequency

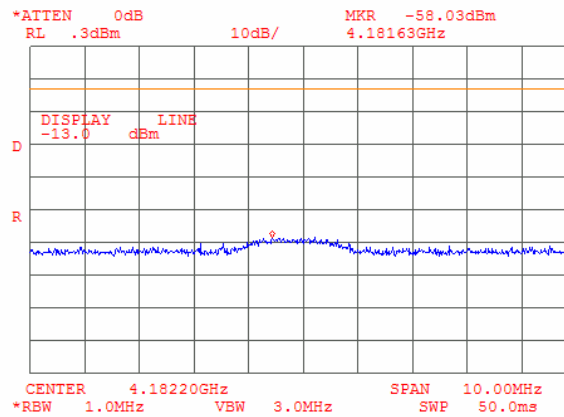


| | | | |
|----------------------------|--|--------------------------------|----------------------------|
| Test specification: | Section 22.917, Spurious emission at antenna terminal | | |
| Test procedure: | FCC part 22, Section 22.917 | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date & Time: | 10/20/2005 4:03:01 PM | | |
| Temperature: 22 °C | Air Pressure: 1012 hPa | Relative Humidity: 46 % | Power Supply: 4 VDC |
| Remarks: | | | |

Plot 7.3.29 Conducted spurious emission measurements at the 5th harmonic of low carrier frequency

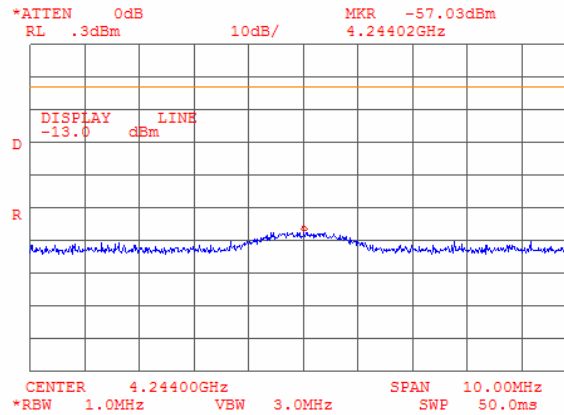


Plot 7.3.30 Conducted spurious emission measurements at the 5th harmonic of mid carrier frequency

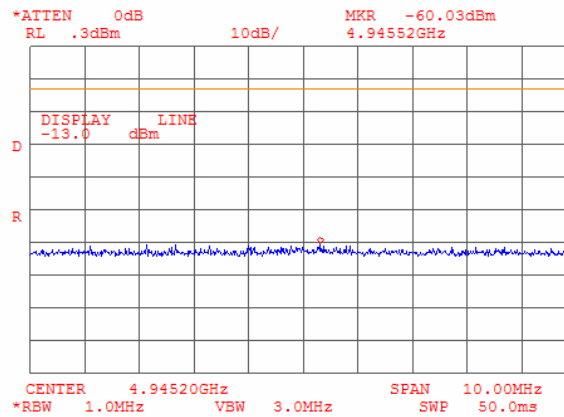


| | | | |
|----------------------------|--|--------------------------------|----------------------------|
| Test specification: | Section 22.917, Spurious emission at antenna terminal | | |
| Test procedure: | FCC part 22, Section 22.917 | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date & Time: | 10/20/2005 4:03:01 PM | | |
| Temperature: 22 °C | Air Pressure: 1012 hPa | Relative Humidity: 46 % | Power Supply: 4 VDC |
| Remarks: | | | |

Plot 7.3.31 Conducted spurious emission measurements at the 5th harmonic of high carrier frequency

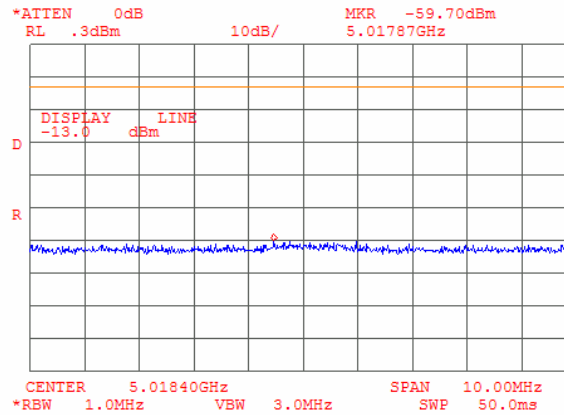


Plot 7.3.32 Conducted spurious emission measurements at the 6th harmonic of low carrier frequency

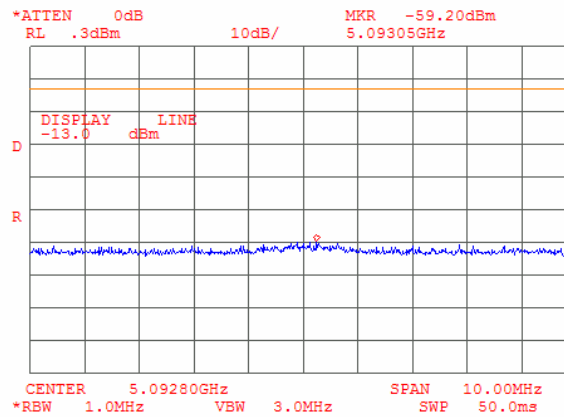


| | | | |
|----------------------------|--|--------------------------------|----------------------------|
| Test specification: | Section 22.917, Spurious emission at antenna terminal | | |
| Test procedure: | FCC part 22, Section 22.917 | | |
| Test mode: | Compliance | Verdict: PASS | |
| Date & Time: | 10/20/2005 4:03:01 PM | | |
| Temperature: 22 °C | Air Pressure: 1012 hPa | Relative Humidity: 46 % | Power Supply: 4 VDC |
| Remarks: | | | |

Plot 7.3.33 Conducted spurious emission measurements at the 6th harmonic of mid carrier frequency

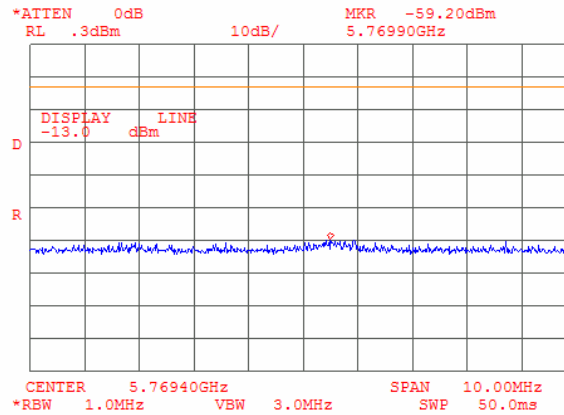


Plot 7.3.34 Conducted spurious emission measurements at the 6th harmonic of high carrier frequency

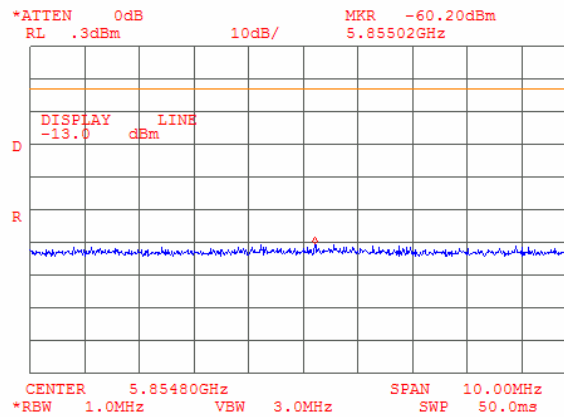


| | | | |
|----------------------------|--|--------------------------------|----------------------------|
| Test specification: | Section 22.917, Spurious emission at antenna terminal | | |
| Test procedure: | FCC part 22, Section 22.917 | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date & Time: | 10/20/2005 4:03:01 PM | | |
| Temperature: 22 °C | Air Pressure: 1012 hPa | Relative Humidity: 46 % | Power Supply: 4 VDC |
| Remarks: | | | |

Plot 7.3.35 Conducted spurious emission measurements at the 7th harmonic of low carrier frequency

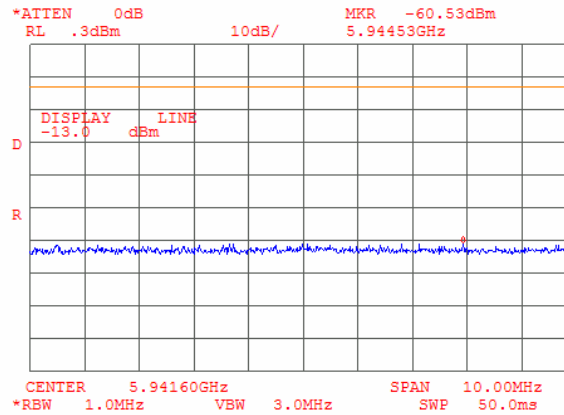


Plot 7.3.36 Conducted spurious emission measurements at the 7th harmonic of mid carrier frequency

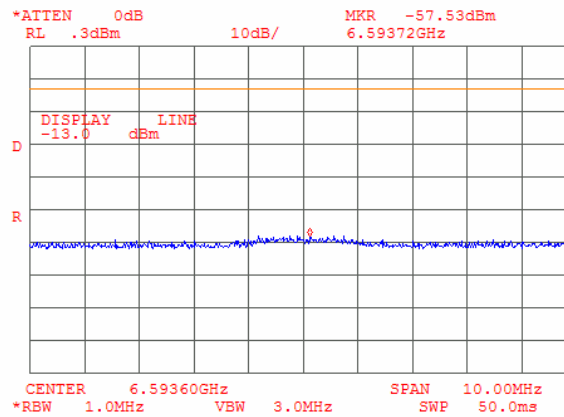


| | | | |
|----------------------------|--|--------------------------------|----------------------------|
| Test specification: | Section 22.917, Spurious emission at antenna terminal | | |
| Test procedure: | FCC part 22, Section 22.917 | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date & Time: | 10/20/2005 4:03:01 PM | | |
| Temperature: 22 °C | Air Pressure: 1012 hPa | Relative Humidity: 46 % | Power Supply: 4 VDC |
| Remarks: | | | |

Plot 7.3.37 Conducted spurious emission measurements at the 7th harmonic of high carrier frequency

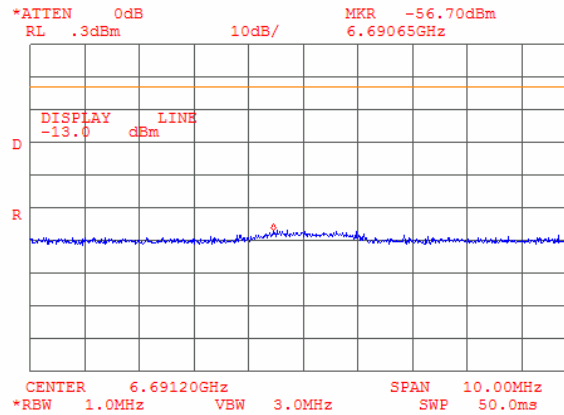


Plot 7.3.38 Conducted spurious emission measurements at the 8th harmonic of low carrier frequency

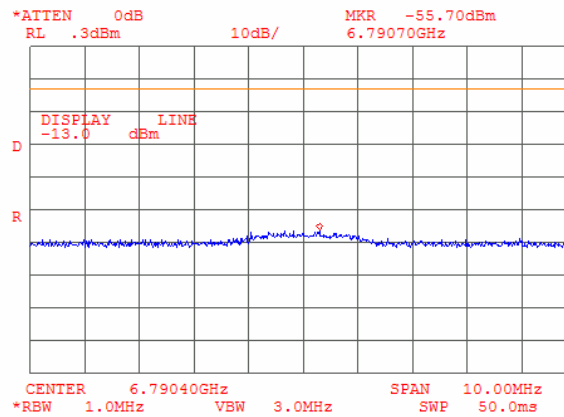


| | | | |
|----------------------------|--|--------------------------------|----------------------------|
| Test specification: | Section 22.917, Spurious emission at antenna terminal | | |
| Test procedure: | FCC part 22, Section 22.917 | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date & Time: | 10/20/2005 4:03:01 PM | | |
| Temperature: 22 °C | Air Pressure: 1012 hPa | Relative Humidity: 46 % | Power Supply: 4 VDC |
| Remarks: | | | |

Plot 7.3.39 Conducted spurious emission measurements at the 8th harmonic of mid carrier frequency

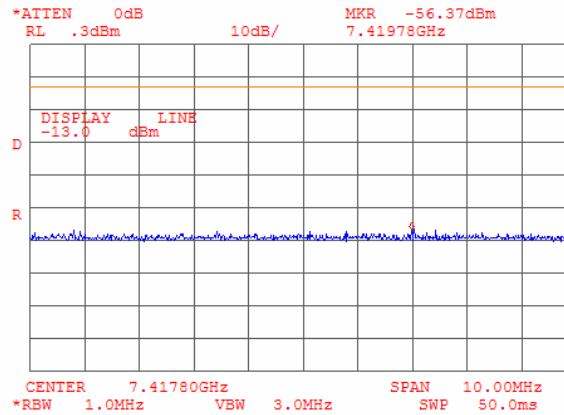


Plot 7.3.40 Conducted spurious emission measurements at the 8th harmonic of high carrier frequency

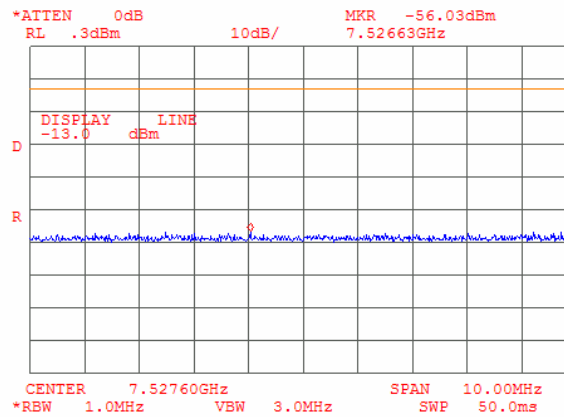


| | | | |
|----------------------------|--|--------------------------------|----------------------------|
| Test specification: | Section 22.917, Spurious emission at antenna terminal | | |
| Test procedure: | FCC part 22, Section 22.917 | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date & Time: | 10/20/2005 4:03:01 PM | | |
| Temperature: 22 °C | Air Pressure: 1012 hPa | Relative Humidity: 46 % | Power Supply: 4 VDC |
| Remarks: | | | |

Plot 7.3.41 Conducted spurious emission measurements at the 9th harmonic of low carrier frequency

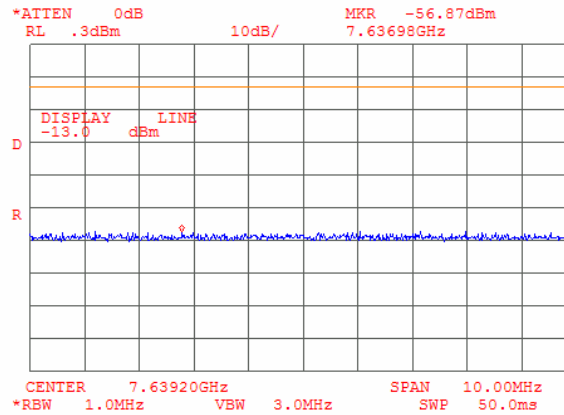


Plot 7.3.42 Conducted spurious emission measurements at the 9th harmonic of mid carrier frequency

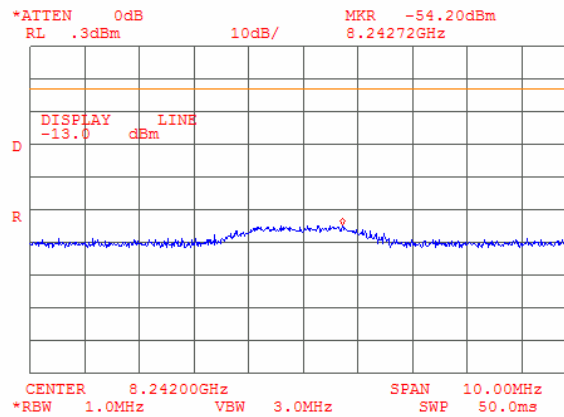


| | | | |
|----------------------------|--|--------------------------------|----------------------------|
| Test specification: | Section 22.917, Spurious emission at antenna terminal | | |
| Test procedure: | FCC part 22, Section 22.917 | | |
| Test mode: | Compliance | Verdict: PASS | |
| Date & Time: | 10/20/2005 4:03:01 PM | | |
| Temperature: 22 °C | Air Pressure: 1012 hPa | Relative Humidity: 46 % | Power Supply: 4 VDC |
| Remarks: | | | |

Plot 7.3.43 Conducted spurious emission measurements at the 9th harmonic of high carrier frequency

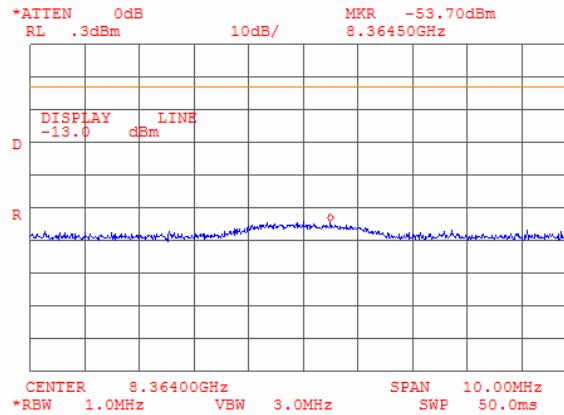


Plot 7.3.44 Conducted spurious emission measurements at the 10th harmonic of low carrier frequency

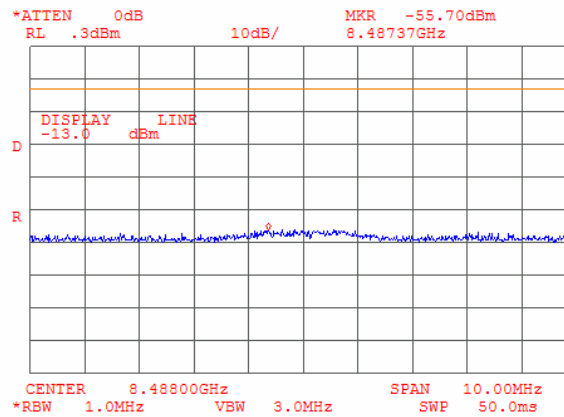


| | | | |
|----------------------------|--|--------------------------------|----------------------------|
| Test specification: | Section 22.917, Spurious emission at antenna terminal | | |
| Test procedure: | FCC part 22, Section 22.917 | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date & Time: | 10/20/2005 4:03:01 PM | | |
| Temperature: 22 °C | Air Pressure: 1012 hPa | Relative Humidity: 46 % | Power Supply: 4 VDC |
| Remarks: | | | |

Plot 7.3.45 Conducted spurious emission measurements at the 10th harmonic of mid carrier frequency



Plot 7.3.46 Conducted spurious emission measurements at the 10th harmonic of high carrier frequency



| | | | |
|----------------------------|--|--------------------------------|----------------------------|
| Test specification: | Section 22.917, Radiated spurious emissions | | |
| Test procedure: | FCC part 22, Section 22.917 | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date & Time: | 10/16/2005 3:30:32 PM | | |
| Temperature: 24 °C | Air Pressure: 1012 hPa | Relative Humidity: 45 % | Power Supply: 4 VDC |
| Remarks: | | | |

7.4 Field strength of spurious emissions

7.4.1 General

This test was performed to measure field strength of spurious emissions from the EUT. Specification test limit is given in Table 7.4.1.

Table 7.4.1 Radiated spurious emissions limits

| Frequency, MHz | Attenuation below carrier, dBc | ERP of spurious, dBm | Equivalent field strength limit @ 3m, dB(μ V/m)** |
|-----------------------------------|--------------------------------|----------------------|--|
| 0.009 – 10 th harmonic | 43+10logP* | -13 | 84.4 |

* - P is transmitter output power in Watts.

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

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

7.4.2.1 The EUT was set up as shown in Figure 7.4.1, energized and the performance check was conducted.

7.4.2.2 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.

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

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

7.4.3.1 The EUT was set up as shown in Figure 7.4.2, energized and the performance check was conducted.

7.4.3.2 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.

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

| | | | |
|----------------------------|--|--------------------------------|----------------------------|
| Test specification: | Section 22.917, Radiated spurious emissions | | |
| Test procedure: | FCC part 22, Section 22.917 | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date & Time: | 10/16/2005 3:30:32 PM | | |
| Temperature: 24 °C | Air Pressure: 1012 hPa | Relative Humidity: 45 % | Power Supply: 4 VDC |
| Remarks: | | | |

Figure 7.4.1 Setup for spurious emission field strength measurements below 30 MHz

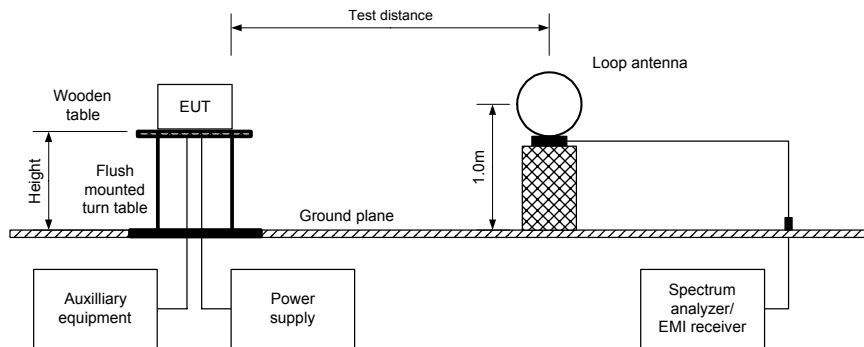
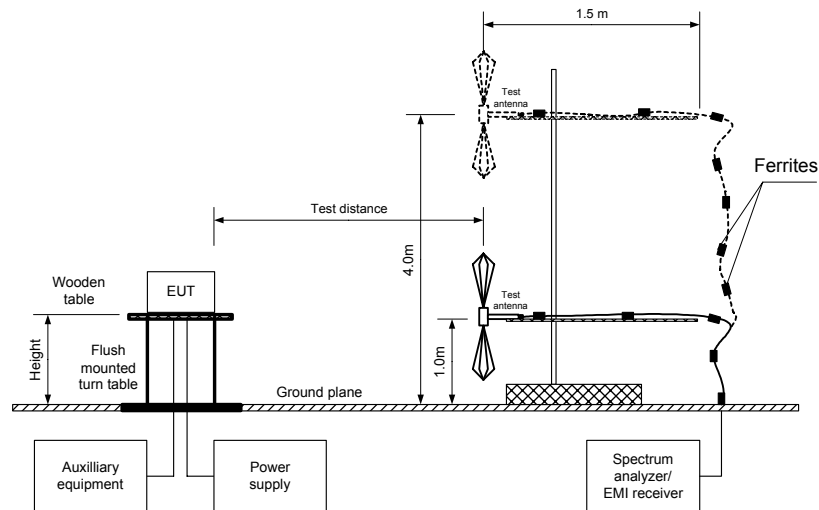


Figure 7.4.2 Setup for spurious emission field strength measurements above 30 MHz



| | | | |
|--|-------------------------------|--------------------------------|----------------------------|
| Test specification: Section 22.917, Radiated spurious emissions | | | |
| Test procedure: FCC part 22, Section 22.917 | | | |
| Test mode: Compliance | | Verdict: PASS | |
| Date & Time: 10/16/2005 3:30:32 PM | | | |
| Temperature: 24 °C | Air Pressure: 1012 hPa | Relative Humidity: 45 % | Power Supply: 4 VDC |
| Remarks: | | | |

Table 7.4.2 Field strength of emissions

ASSIGNED FREQUENCY RANGE: 824 - 850 MHz
 INVESTIGATED FREQUENCY RANGE: 0.009 – 9000 MHz
 TEST DISTANCE: 3 m
 MODULATION: Modulated
 DUTY CYCLE: 100 %
 TRANSMITTER OUTPUT POWER SETTINGS: Maximum
 TRANSMITTER OUTPUT POWER: 33.00 dBm at low carrier frequency
 33.03 dBm at mid carrier frequency
 33.03 dBm at high carrier frequency

DETECTOR USED: Peak
 TEST ANTENNA TYPE: Active loop (9 kHz – 30 MHz)
 Biconilog (30 MHz – 1000 MHz)
 Double ridged guide (above 1000 MHz)

| Frequency, MHz | Field strength of spurious, dB(μV/m) | Limit, dB(μV/m) | Margin, dB | Antenna polarization | Antenna height, m | Azimuth, degrees* |
|----------------------------------|--------------------------------------|-----------------|------------|----------------------|-------------------|-------------------|
| Low carrier frequency | | | | | | |
| 1648.33 | 46.34 | 84.38 | -38.04 | Vertical | 1.0 | 110 |
| 2472.58 | 48.61 | 84.38 | -35.77 | Vertical | 1.0 | 98 |
| Mid carrier frequency | | | | | | |
| 1672.9 | 46.71 | 84.38 | -37.67 | Vertical | 1.1 | 102 |
| 2509.1 | 47.51 | 84.38 | -36.87 | Vertical | 1.0 | 89 |
| High carrier frequency | | | | | | |
| No spurious emissions were found | | | | | | |

*- EUT front panel refers to 0 degrees position of turntable.
 **- Margin = Attenuation below carrier – specification limit.

Table 7.4.3 Substitution method

ASSIGNED FREQUENCY: 824 - 849 MHz
 INVESTIGATED FREQUENCY RANGE: 30 – 9000 MHz
 TEST DISTANCE: 3 m
 RESOLUTION BANDWIDTH: 1 MHz (above 1000 MHz)
 VIDEO BANDWIDTH: > Resolution bandwidth
 TEST ANTENNA TYPE: Double ridged guide (above 1000 MHz)

| Frequency, MHz | Field strength, dB(μV/m) | Antenna polarization | RF generator output, dBm | Ant gain, dBd | Cable loss, dB | ERP, dBm | Atten. below carrier, dBc | Limit, dBc | Margin, dB* | Verdict |
|------------------------------|--------------------------|----------------------|--------------------------|---------------|----------------|----------|---------------------------|------------|-------------|---------|
| Low carrier frequency | | | | | | | | | | |
| 1648.33 | 46.34 | Vertical | -56.52 | 6.8 | 3.4 | -53.12 | -86.12 | -46.0 | -40.12 | Pass |
| 2472.58 | 48.61 | Vertical | -54.21 | 7.4 | 4.2 | -51.01 | -84.01 | -46.0 | -38.01 | Pass |
| Mid carrier frequency | | | | | | | | | | |
| 1672.9 | 46.71 | Vertical | -54.94 | 6.8 | 3.4 | -51.54 | -84.54 | -46.3 | -38.24 | Pass |
| 2509.1 | 47.51 | Vertical | -54.6 | 7.4 | 4.2 | -51.40 | -84.40 | -46.3 | -38.10 | Pass |

*- Margin = Attenuation below carrier - limit.

Reference numbers of test equipment used

| | | | | | | | |
|---------|---------|---------|---------|---------|---------|---------|---------|
| HL 0410 | HL 0446 | HL 0521 | HL 0589 | HL 0592 | HL 0593 | HL 0594 | HL 0604 |
| HL 0768 | HL 1200 | HL 1424 | HL 1942 | HL 1947 | HL 1984 | HL 2009 | HL 2259 |
| HL 2260 | HL 2387 | HL 2399 | | | | | |

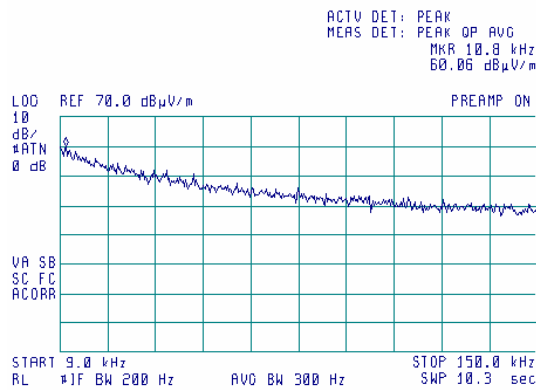
Full description is given in Appendix A.

| | | | |
|--|-------------------------------|--------------------------------|----------------------------|
| Test specification: Section 22.917, Radiated spurious emissions | | | |
| Test procedure: FCC part 22, Section 22.917 | | | |
| Test mode: Compliance | Verdict: PASS | | |
| Date & Time: 10/16/2005 3:30:32 PM | | | |
| Temperature: 24 °C | Air Pressure: 1012 hPa | Relative Humidity: 45 % | Power Supply: 4 VDC |
| Remarks: | | | |

Plot 7.4.1 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

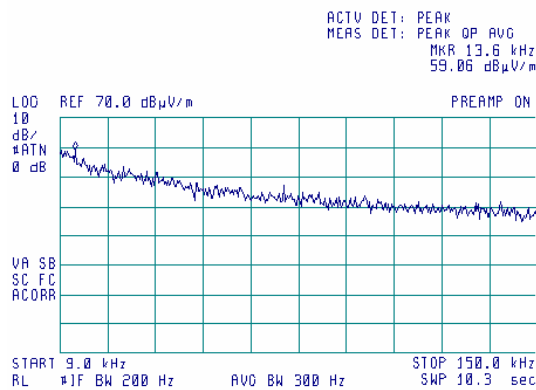
10:04:48 OCT 17, 2005



Plot 7.4.2 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

10:16:26 OCT 17, 2005

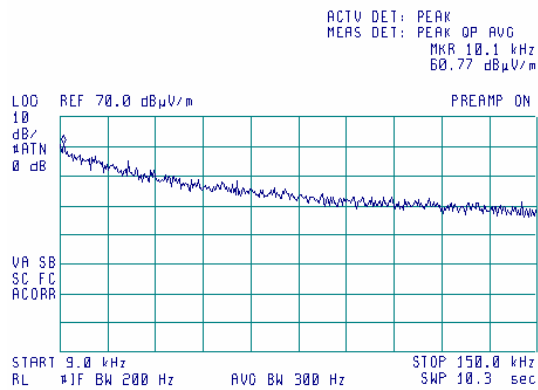


| | | | |
|--|-------------------------------|--------------------------------|----------------------------|
| Test specification: Section 22.917, Radiated spurious emissions | | | |
| Test procedure: FCC part 22, Section 22.917 | | | |
| Test mode: Compliance | Verdict: PASS | | |
| Date & Time: 10/16/2005 3:30:32 PM | | | |
| Temperature: 24 °C | Air Pressure: 1012 hPa | Relative Humidity: 45 % | Power Supply: 4 VDC |
| Remarks: | | | |

Plot 7.4.3 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

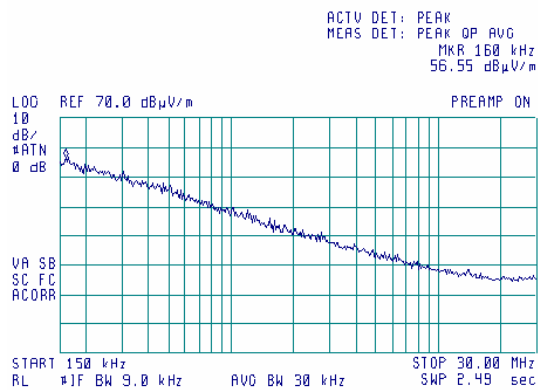
10:19:00 OCT 17, 2005



Plot 7.4.4 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

10:00:17 OCT 17, 2005

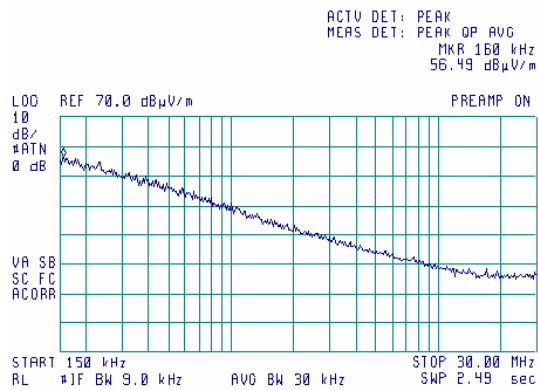


| | | | |
|----------------------------|--|--------------------------------|----------------------------|
| Test specification: | Section 22.917, Radiated spurious emissions | | |
| Test procedure: | FCC part 22, Section 22.917 | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date & Time: | 10/16/2005 3:30:32 PM | | |
| Temperature: 24 °C | Air Pressure: 1012 hPa | Relative Humidity: 45 % | Power Supply: 4 VDC |
| Remarks: | | | |

Plot 7.4.5 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

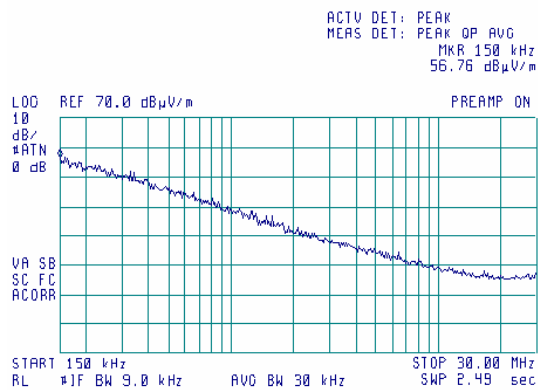
10:13:27 OCT 17, 2005



Plot 7.4.6 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

10:22:05 OCT 17, 2005

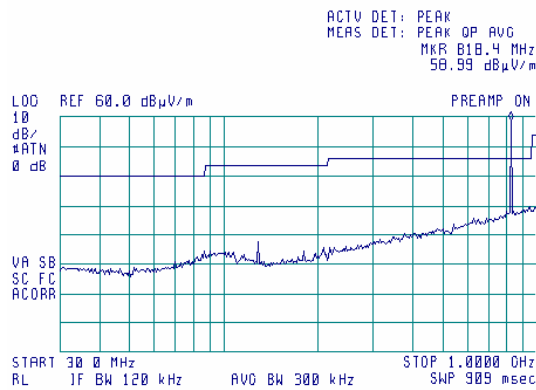


| | | | |
|--|-------------------------------|--------------------------------|----------------------------|
| Test specification: Section 22.917, Radiated spurious emissions | | | |
| Test procedure: FCC part 22, Section 22.917 | | | |
| Test mode: Compliance | Verdict: PASS | | |
| Date & Time: 10/16/2005 3:30:32 PM | | | |
| Temperature: 24 °C | Air Pressure: 1012 hPa | Relative Humidity: 45 % | Power Supply: 4 VDC |
| Remarks: | | | |

Plot 7.4.7 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

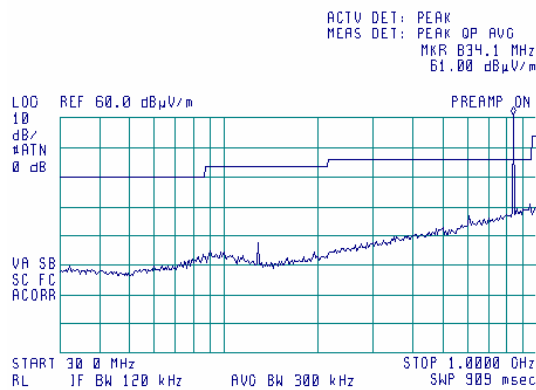
14:29:36 OCT 16, 2005



Plot 7.4.8 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

14:34:45 OCT 16, 2005

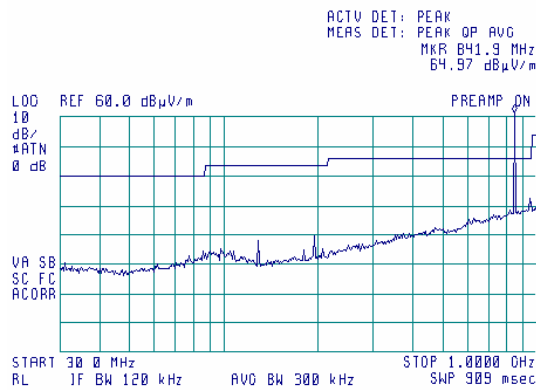


| | | | |
|--|-------------------------------|--------------------------------|----------------------------|
| Test specification: Section 22.917, Radiated spurious emissions | | | |
| Test procedure: FCC part 22, Section 22.917 | | | |
| Test mode: Compliance | Verdict: PASS | | |
| Date & Time: 10/16/2005 3:30:32 PM | | | |
| Temperature: 24 °C | Air Pressure: 1012 hPa | Relative Humidity: 45 % | Power Supply: 4 VDC |
| Remarks: | | | |

Plot 7.4.9 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

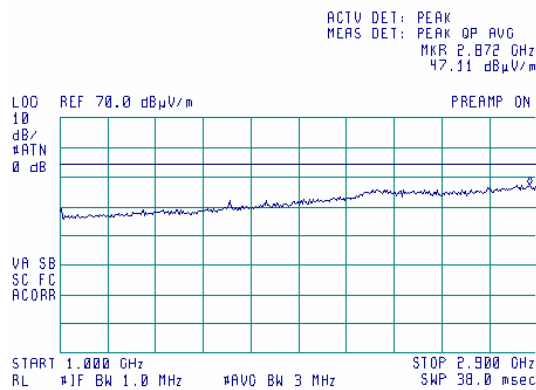
14:41:59 OCT 16, 2005



Plot 7.4.10 Radiated emission measurements from 1000 to 2900 MHz at the low carrier frequency

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

16:31:13 OCT 16, 2005

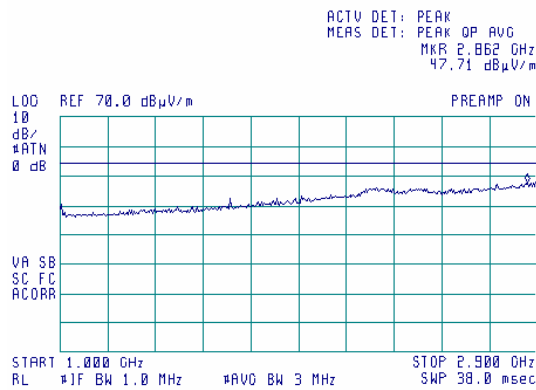


| | | | |
|--|-------------------------------|--------------------------------|----------------------------|
| Test specification: Section 22.917, Radiated spurious emissions | | | |
| Test procedure: FCC part 22, Section 22.917 | | | |
| Test mode: Compliance | Verdict: PASS | | |
| Date & Time: 10/16/2005 3:30:32 PM | | | |
| Temperature: 24 °C | Air Pressure: 1012 hPa | Relative Humidity: 45 % | Power Supply: 4 VDC |
| Remarks: | | | |

Plot 7.4.11 Radiated emission measurements from 1000 to 2900 MHz at the mid carrier frequency

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

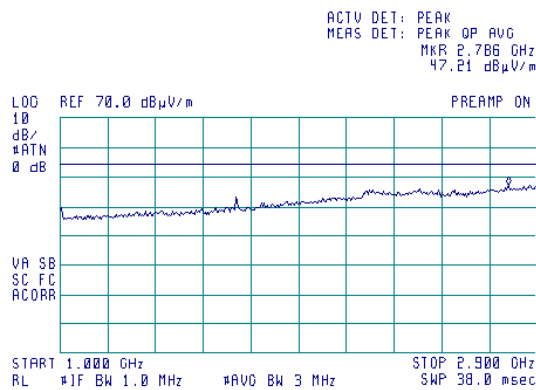
16:21:58 OCT 16, 2005



Plot 7.4.12 Radiated emission measurements from 1000 to 2900 MHz at the high carrier frequency

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

16:34:51 OCT 16, 2005

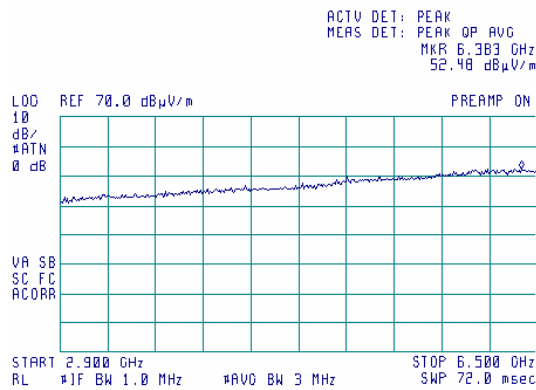


| | | | |
|----------------------------|-------------------------------|--|----------------------------|
| Test specification: | | Section 22.917, Radiated spurious emissions | |
| Test procedure: | | FCC part 22, Section 22.917 | |
| Test mode: | Compliance | Verdict: | PASS |
| Date & Time: | 10/16/2005 3:30:32 PM | | |
| Temperature: 24 °C | Air Pressure: 1012 hPa | Relative Humidity: 45 % | Power Supply: 4 VDC |
| Remarks: | | | |

Plot 7.4.13 Radiated emission measurements from 2900 to 6500 MHz at the low carrier frequency

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

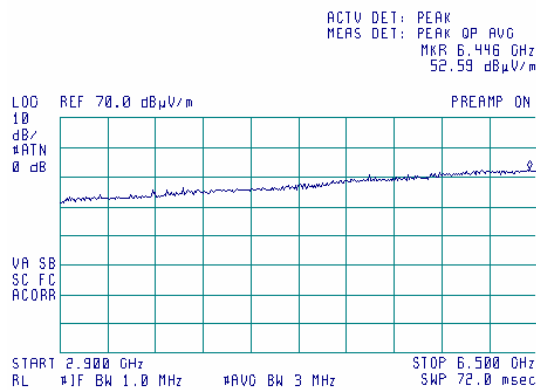
16:14:58 OCT 16, 2005



Plot 7.4.14 Radiated emission measurements from 2900 to 6500 MHz at the mid carrier frequency

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

16:17:33 OCT 16, 2005

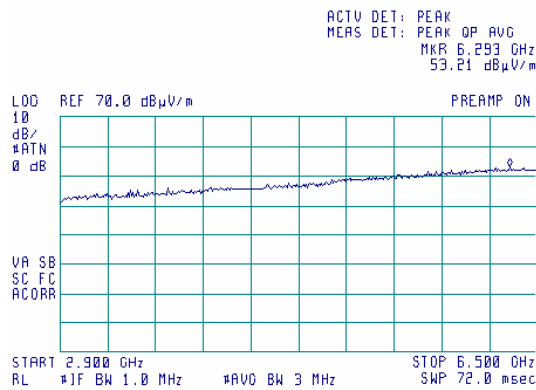


| | | | |
|----------------------------|--|--------------------------------|----------------------------|
| Test specification: | Section 22.917, Radiated spurious emissions | | |
| Test procedure: | FCC part 22, Section 22.917 | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date & Time: | 10/16/2005 3:30:32 PM | | |
| Temperature: 24 °C | Air Pressure: 1012 hPa | Relative Humidity: 45 % | Power Supply: 4 VDC |
| Remarks: | | | |

Plot 7.4.15 Radiated emission measurements from 2900 to 6500 MHz at the high carrier frequency

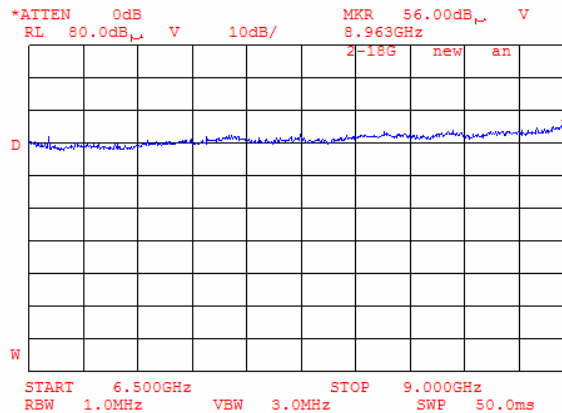
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal

16:36:54 OCT 16, 2005



Plot 7.4.16 Radiated emission measurements from 6.5 to 9 GHz at the low carrier frequency

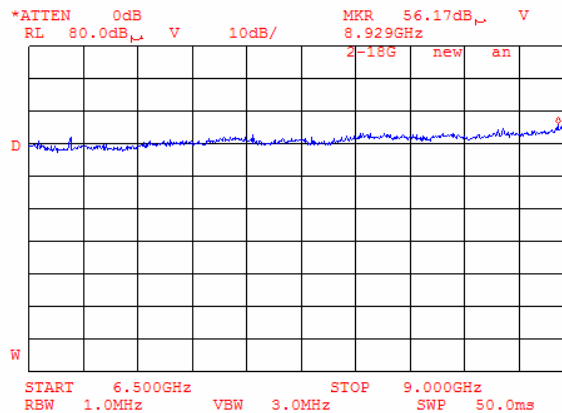
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal



| | | | |
|----------------------------|--|--------------------------------|----------------------------|
| Test specification: | Section 22.917, Radiated spurious emissions | | |
| Test procedure: | FCC part 22, Section 22.917 | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date & Time: | 10/16/2005 3:30:32 PM | | |
| Temperature: 24 °C | Air Pressure: 1012 hPa | Relative Humidity: 45 % | Power Supply: 4 VDC |
| Remarks: | | | |

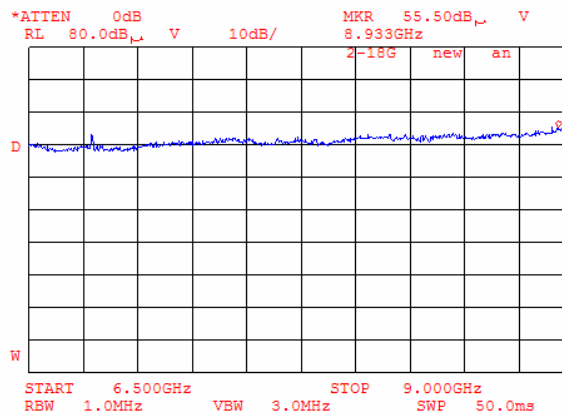
Plot 7.4.17 Radiated emission measurements from 6.5 to 9 GHz at the mid carrier frequency

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



Plot 7.4.18 Radiated emission measurements from 6.5 to 9 GHz at the high carrier frequency

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

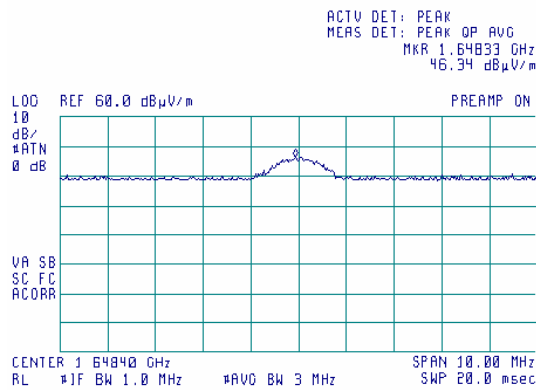


| | | | |
|----------------------------|--|--------------------------------|----------------------------|
| Test specification: | Section 22.917, Radiated spurious emissions | | |
| Test procedure: | FCC part 22, Section 22.917 | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date & Time: | 10/16/2005 3:30:32 PM | | |
| Temperature: 24 °C | Air Pressure: 1012 hPa | Relative Humidity: 45 % | Power Supply: 4 VDC |
| Remarks: | | | |

Plot 7.4.19 Radiated emission measurements at the second harmonic of low carrier frequency

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m

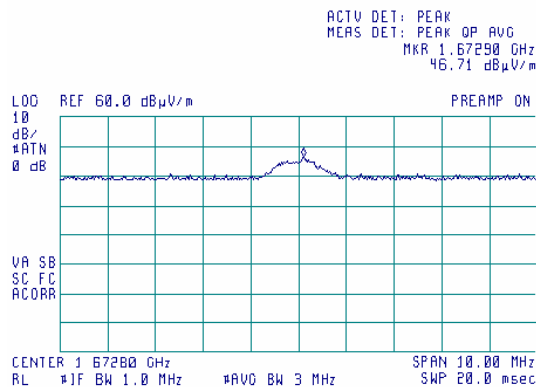
17:34:02 OCT 16, 2005



Plot 7.4.20 Radiated emission measurements at the second harmonic of mid carrier frequency

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m

17:28:09 OCT 16, 2005

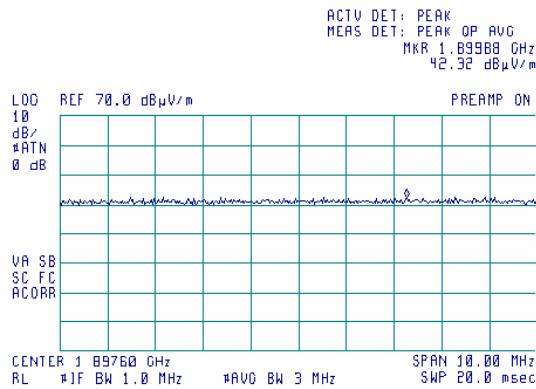


| | | | |
|----------------------------|--|--------------------------------|----------------------------|
| Test specification: | Section 22.917, Radiated spurious emissions | | |
| Test procedure: | FCC part 22, Section 22.917 | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date & Time: | 10/16/2005 3:30:32 PM | | |
| Temperature: 24 °C | Air Pressure: 1012 hPa | Relative Humidity: 45 % | Power Supply: 4 VDC |
| Remarks: | | | |

Plot 7.4.21 Radiated emission measurements at the second harmonic of high carrier frequency

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m

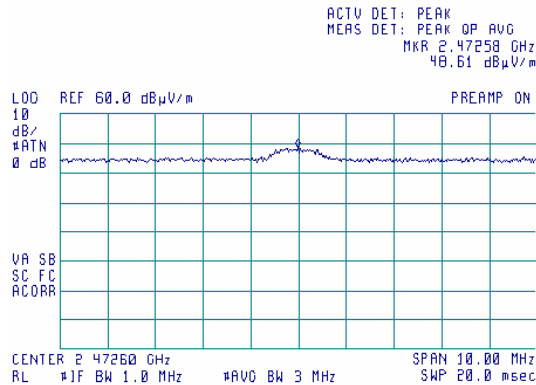
16:46:01 OCT 16, 2005



Plot 7.4.22 Radiated emission measurements at the third harmonic of low carrier frequency

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m

17:35:55 OCT 16, 2005

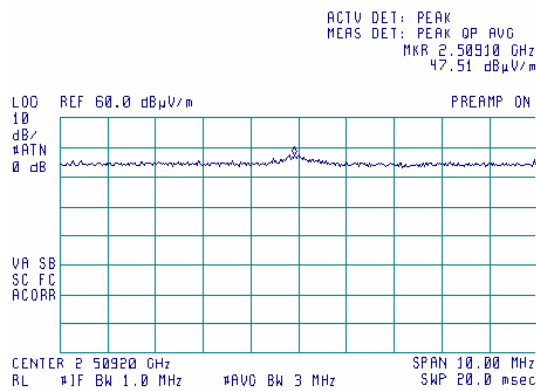


| | | | |
|----------------------------|--|--------------------------------|----------------------------|
| Test specification: | Section 22.917, Radiated spurious emissions | | |
| Test procedure: | FCC part 22, Section 22.917 | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date & Time: | 10/16/2005 3:30:32 PM | | |
| Temperature: 24 °C | Air Pressure: 1012 hPa | Relative Humidity: 45 % | Power Supply: 4 VDC |
| Remarks: | | | |

Plot 7.4.23 Radiated emission measurements at the third harmonic of mid carrier frequency

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m

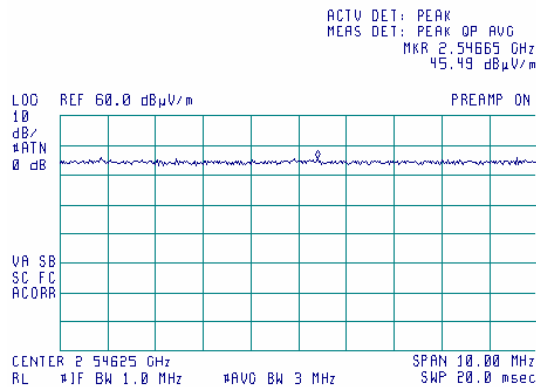
17:23:30 OCT 16, 2005



Plot 7.4.24 Radiated emission measurements at the third harmonic of high carrier frequency

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m

16:51:06 OCT 16, 2005

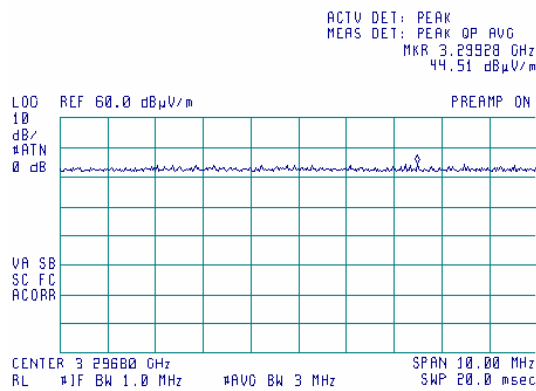


| | | | |
|--|-------------------------------|--------------------------------|----------------------------|
| Test specification: Section 22.917, Radiated spurious emissions | | | |
| Test procedure: FCC part 22, Section 22.917 | | | |
| Test mode: Compliance | Verdict: PASS | | |
| Date & Time: 10/16/2005 3:30:32 PM | | | |
| Temperature: 24 °C | Air Pressure: 1012 hPa | Relative Humidity: 45 % | Power Supply: 4 VDC |
| Remarks: | | | |

Plot 7.4.25 Radiated emission measurements at the fourth harmonic of low carrier frequency

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m

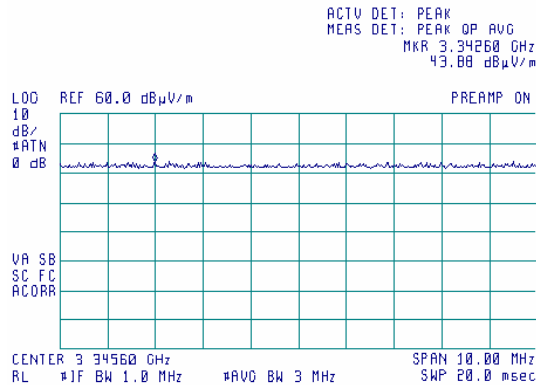
17:39:15 OCT 16, 2005



Plot 7.4.26 Radiated emission measurements at the fourth harmonic of mid carrier frequency

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m

17:10:50 OCT 16, 2005

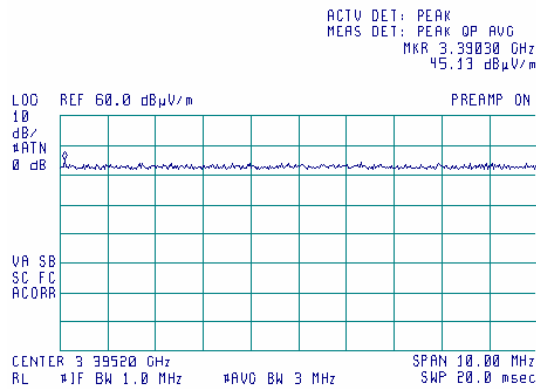


| | | | |
|----------------------------|--|--------------------------------|----------------------------|
| Test specification: | Section 22.917, Radiated spurious emissions | | |
| Test procedure: | FCC part 22, Section 22.917 | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date & Time: | 10/16/2005 3:30:32 PM | | |
| Temperature: 24 °C | Air Pressure: 1012 hPa | Relative Humidity: 45 % | Power Supply: 4 VDC |
| Remarks: | | | |

Plot 7.4.27 Radiated emission measurements at the fourth harmonic of high carrier frequency

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m

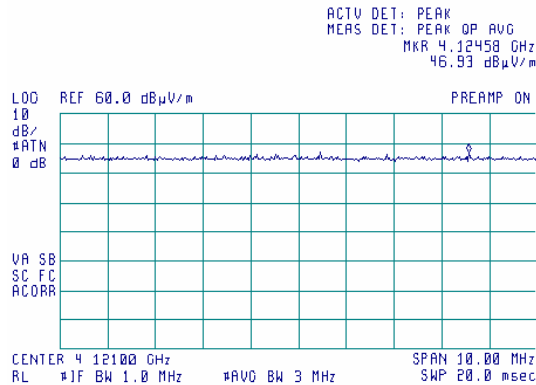
17:02:19 OCT 16, 2005



Plot 7.4.28 Radiated emission measurements at the fifth harmonic of low carrier frequency

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m

17:42:18 OCT 16, 2005

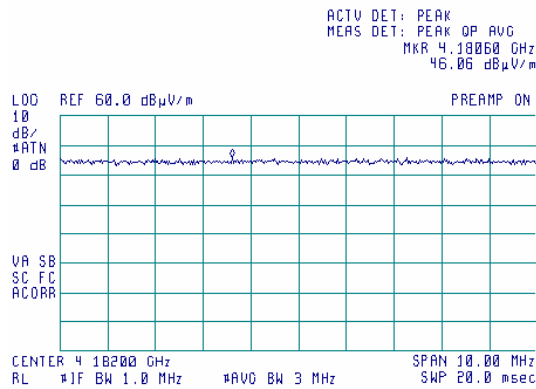


| | | | |
|----------------------------|--|--------------------------------|----------------------------|
| Test specification: | Section 22.917, Radiated spurious emissions | | |
| Test procedure: | FCC part 22, Section 22.917 | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date & Time: | 10/16/2005 3:30:32 PM | | |
| Temperature: 24 °C | Air Pressure: 1012 hPa | Relative Humidity: 45 % | Power Supply: 4 VDC |
| Remarks: | | | |

Plot 7.4.29 Radiated emission measurements at the fifth harmonic of mid carrier frequency

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m

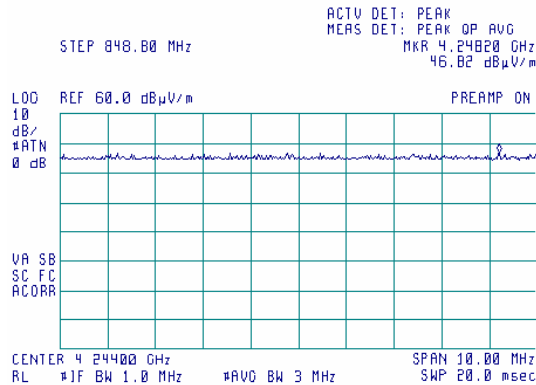
17:17:06 OCT 16, 2005



Plot 7.4.30 Radiated emission measurements at the fifth harmonic of high carrier frequency

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m

17:00:39 OCT 16, 2005



| | | | |
|----------------------------|--|--------------------------------|----------------------------|
| Test specification: | Section 22.355, Frequency stability test | | |
| Test procedure: | FCC part 22, Section 22.355, part 2 section 2.1055 | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date & Time: | 10/26/2005 13:48:01 PM | | |
| Temperature: 24 °C | Air Pressure: 1012 hPa | Relative Humidity: 45 % | Power Supply: 4 VDC |
| Remarks: | | | |

7.5 Frequency stability test

7.5.1 General

This test was performed to measure frequency stability of transmitter RF carrier. Specification test limits are given in Table 7.5.1. The test results are provided in Table 7.5.2.

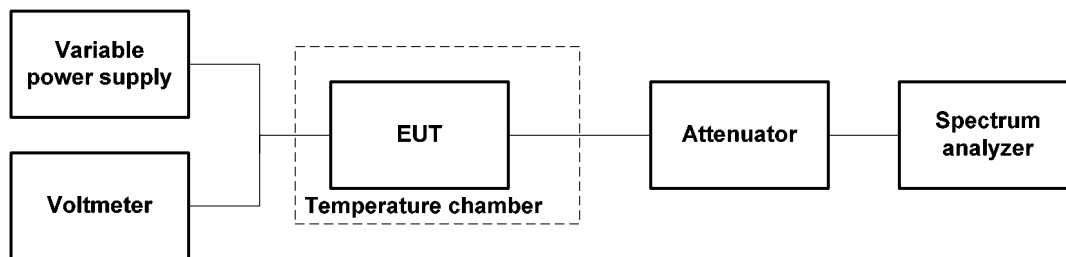
Table 7.5.1 Frequency stability limits

| Assigned frequency, MHz | Limit, ppm | Limits, Hz |
|-------------------------|------------|------------|
| 824.2 | 2.5 | 2060 |
| 836.4 | | 2090 |
| 848.8 | | 2120 |

7.5.2 Test procedure

- 7.5.2.1 The EUT was set up as shown in Figure 8.5.1, energized and its proper operation was checked.
- 7.5.2.2 The EUT power was turned off. Temperature within test chamber was set to +30°C and a period of time sufficient to stabilize all of the oscillator circuit components was allowed.
- 7.5.2.3 The EUT was powered on and carrier frequency was measured at start up moment and then every minute until frequency had been stabilized or 10 minutes elapsed whichever reached the last. The EUT was powered off.
- 7.5.2.4 The above procedure was repeated at 0°C and at the lowest test temperature.
- 7.5.2.5 The EUT was powered on and carrier frequency was measured at start up moment and at the end of stabilization period at the rest of test temperatures and voltages. The EUT was powered off.
- 7.5.2.6 Frequency displacement was calculated and compared with the limit as provided in Table 7.5.2

Figure 7.5.1 Frequency stability test setup



| | | | |
|----------------------------|--|--------------------------------|----------------------------|
| Test specification: | Section 22.355, Frequency stability test | | |
| Test procedure: | FCC part 22, Section 22.355, part 2 section 2.1055 | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date & Time: | 10/26/2005 13:48:01 PM | | |
| Temperature: 24 °C | Air Pressure: 1012 hPa | Relative Humidity: 45 % | Power Supply: 4 VDC |
| Remarks: | | | |

Photograph 7.5.1 Frequency stability test setup



| | | | | | |
|----------------------------|-------------------------------|--|----------------------------|-------------|--|
| Test specification: | | Section 22.355, Frequency stability test | | | |
| Test procedure: | | FCC part 22, Section 22.355, part 2 section 2.1055 | | | |
| Test mode: | Compliance | Verdict: | | PASS | |
| Date & Time: | 10/26/2005 13:48:01 PM | | | | |
| Temperature: 24 °C | Air Pressure: 1012 hPa | Relative Humidity: 45 % | Power Supply: 4 VDC | | |
| Remarks: | | | | | |

Table 7.5.2 Frequency stability test results

OPERATING FREQUENCY: 824.2 – 848.8 MHz
 NOMINAL POWER VOLTAGE: 4 Vdc
 TEMPERATURE STABILIZATION PERIOD: 20 min
 POWER DURING TEMPERATURE TRANSITION: Off
 SPECTRUM ANALYZER MODE: Counter
 RESOLUTION BANDWIDTH: 100 kHz
 VIDEO BANDWIDTH: 100 kHz
 MODULATION: FSK

| T, °C | Voltage, V | Frequency, MHz | | | | | | | Max frequency drift, Hz | |
|--|------------|----------------|---------------------|---------------------|---------------------|---------------------|---------------------|----------------------|-------------------------|----------|
| | | Start up | 1 st min | 2 nd min | 3 rd min | 4 th min | 5 th min | 10 th min | Positive | Negative |
| Low carrier frequency, limit 2060 Hz | | | | | | | | | | |
| -30 | nominal | 824.200625 | 824.200850 | 824.200850 | 824.198750 | 824.198750 | 824.200000 | 824.200000 | 0 | -1250 |
| -20 | nominal | 824.201000 | NA | NA | NA | NA | NA | 824.201000 | 0 | -500 |
| -10 | nominal | 824.199200 | NA | NA | NA | NA | NA | 824.200000 | 0 | -800 |
| 0 | nominal | 824.199375 | 824.200000 | 824.200625 | 824.200625 | 824.201250 | 824.200000 | 824.201250 | 1250 | 0 |
| 10 | nominal | 824.199375 | NA | NA | NA | NA | NA | 824.200400 | 0 | -625 |
| 20 | +15% | 824.201250 | NA | NA | NA | NA | NA | 824.201250 | 0 | -250 |
| 20 | nominal | 824.201250 | NA | NA | NA | NA | NA | 824.201500* | 250 | 0 |
| 20 | -15% | 824.199375 | NA | NA | NA | NA | NA | 824.200400 | 0 | -1025 |
| 30 | nominal | 824.200850 | NA | NA | NA | NA | NA | 824.200000 | 850 | 0 |
| 40 | nominal | 824.201000 | NA | NA | NA | NA | NA | 824.200000 | 1000 | 0 |
| 50 | nominal | 824.199600 | 824.199200 | 824.200850 | 824.200000 | 824.200000 | 824.198750 | 824.200000 | 0 | -1250 |
| Mid carrier frequency, , limit 2090 Hz | | | | | | | | | | |
| -30 | nominal | 836.402000 | 836.402000 | 836.401700 | 836.401700 | 836.402000 | 836.402000 | 836.400450 | 0 | -1550 |
| -20 | nominal | 836.400000 | NA | NA | NA | NA | NA | 836.399375 | 0 | -675 |
| -10 | nominal | 836.400000 | NA | NA | NA | NA | NA | 836.400450 | 0 | -450 |
| 0 | nominal | 836.402000 | 836.402000 | 836.402000 | 836.402000 | 836.401700 | 836.402000 | 836.402000 | 0 | -300 |
| 10 | nominal | 836.402000 | NA | NA | NA | NA | NA | 836.401250 | 750 | 0 |
| 20 | +15% | 836.400000 | NA | NA | NA | NA | NA | 836.400000 | 0 | 0 |
| 20 | nominal | 836.400000 | NA | NA | NA | NA | NA | 836.399750* | 0 | -250 |
| 20 | -15% | 836.400000 | NA | NA | NA | NA | NA | 836.400000 | 0 | 0 |
| 30 | nominal | 836.400450 | NA | NA | NA | NA | NA | 836.401250 | 0 | -800 |
| 40 | nominal | 836.400000 | NA | NA | NA | NA | NA | 836.400000 | 0 | 0 |
| 50 | nominal | 836.402000 | 836.400800 | 836.401700 | 836.400800 | 836.400850 | 836.400000 | 836.400400 | 1300 | 0 |
| High carrier frequency, , limit 2120 Hz | | | | | | | | | | |
| -30 | nominal | 848.800000 | 848.800450 | 848.800450 | 848.800000 | 848.800450 | 848.800450 | 848.800000 | 0 | -450 |
| -20 | nominal | 848.800000 | NA | NA | NA | NA | NA | 848.801250 | 1200 | 0 |
| -10 | nominal | 848.801250 | NA | NA | NA | NA | NA | 848.800400 | 0 | -850 |
| 0 | nominal | 848.800800 | 848.801250 | 848.800800 | 848.800450 | 848.800450 | 848.800450 | 848.800400 | 850 | 0 |
| 10 | nominal | 848.801250 | NA | NA | NA | NA | NA | 848.800850 | 400 | 0 |
| 20 | +15% | 848.800400 | NA | NA | NA | NA | NA | 848.800350 | 50 | 0 |
| 20 | nominal | 848.800000 | NA | NA | NA | NA | NA | 848.800000* | 0 | 0 |
| 20 | -15% | 848.801250 | NA | NA | NA | NA | NA | 848.800400 | 850 | 0 |
| 30 | nominal | 848.800400 | NA | NA | NA | NA | NA | 848.800350 | 50 | 0 |
| 40 | nominal | 848.800000 | NA | NA | NA | NA | NA | 848.800625 | 0 | -620 |
| 50 | nominal | 848.800450 | 848.800450 | 848.800450 | 848.800000 | 848.800450 | 848.801650 | 848.800450 | 1200 | 0 |

* - Reference frequency

Reference numbers of test equipment used

| | | | | | | | |
|---------|---------|---------|---------|---------|--|--|--|
| HL 0278 | HL 0493 | HL 1097 | HL 1204 | HL 1653 | | | |
|---------|---------|---------|---------|---------|--|--|--|

Full description is given in Appendix A.

| | | | |
|----------------------------|--|--------------------------------|----------------------------|
| Test specification: | Section 24.232, Peak output power | | |
| Test procedure: | FCC part 24, Section 24.232 | | |
| Test mode: | Compliance | Verdict: PASS | |
| Date & Time: | 11/4/2005 3:46:51 PM | | |
| Temperature: 22°C | Air Pressure: 1012 hPa | Relative Humidity: 46 % | Power Supply: 4 VDC |
| Remarks: | | | |

8 Transmitter tests according to 47CFR part 24 requirements

8.1 Peak output power

8.1.1 General

This test was performed to measure the peak output power at RF antenna connector. Specification test limits are given in Table 8.1.1.

Table 8.1.1 Peak output power limits

| Assigned frequency range, MHz | Maximum peak output power | |
|-------------------------------|---------------------------|------|
| | W | dBm |
| 1850 - 1910 | 2.0 | 33.0 |

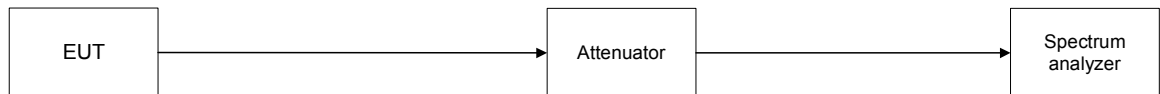
8.1.2 Test procedure

8.1.2.1 The EUT was set up as shown in Figure 8.1.1, energized and its proper operation was checked.

8.1.2.2 The EUT was adjusted to produce maximum available to the end user RF output power.

8.1.2.3 The peak output power was measured with spectrum analyzer as provided in Table 8.1.2 and associated plots.

Figure 8.1.1 Peak output power test setup



| | | | |
|----------------------------|--|--------------------------------|----------------------------|
| Test specification: | Section 24.232, Peak output power | | |
| Test procedure: | FCC part 24, Section 24.232 | | |
| Test mode: | Compliance | Verdict: PASS | |
| Date & Time: | 11/4/2005 3:46:51 PM | | |
| Temperature: 22°C | Air Pressure: 1012 hPa | Relative Humidity: 46 % | Power Supply: 4 VDC |
| Remarks: | | | |

Table 8.1.2 Peak output power test results

OPERATING FREQUENCY RANGE: 1850 - 1910 MHz
 DETECTOR USED: Peak
 RESOLUTION BANDWIDTH: 2000 kHz
 VIDEO BANDWIDTH: 3000 kHz
 MODULATION: FSK
 MODULATING SIGNAL: PRBS
 BIT RATE: 270 kbps
 TRANSMITTER OUTPUT POWER SETTINGS: Maximum

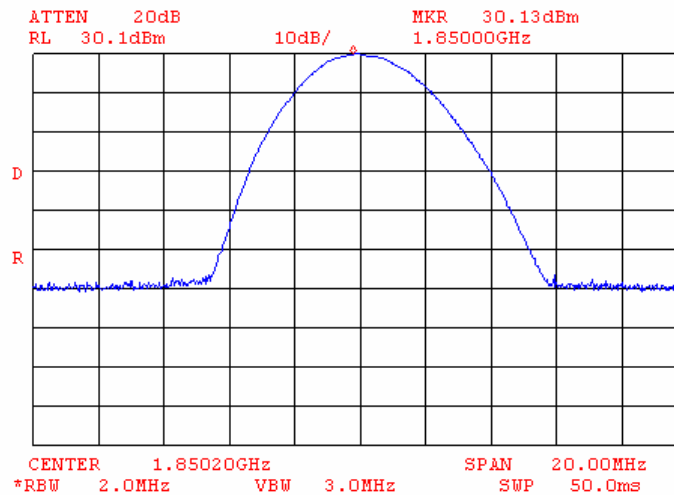
| Carrier frequency, MHz | Spectrum analyzer reading, dBm | External attenuation, dB | Cable loss, dB | RF output power, dBm | Limit, dBm | Margin, dB | Verdict |
|------------------------|--------------------------------|--------------------------|----------------|----------------------|------------|------------|---------|
| 1850.2 | 30.13 | Included | Included | 30.13 | 33.00 | -2.87 | Pass |
| 1880.0 | 30.17 | Included | Included | 30.17 | 33.00 | -2.83 | Pass |
| 1909.8 | 30.00 | Included | Included | 30.00 | 33.00 | -3.00 | Pass |

Reference numbers of test equipment used

| | | | | | | | |
|---------|---------|---------|--|--|--|--|--|
| HL 1424 | HL 2524 | HL 2634 | | | | | |
|---------|---------|---------|--|--|--|--|--|

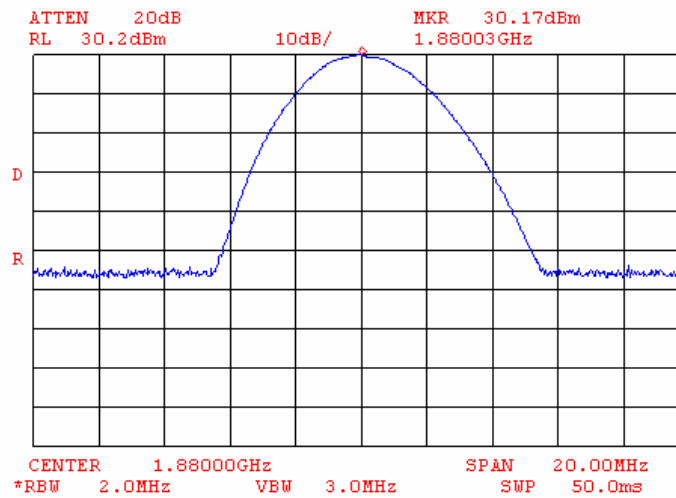
Full description is given in Appendix A.

Plot 8.1.1 Peak output power test results at low frequency

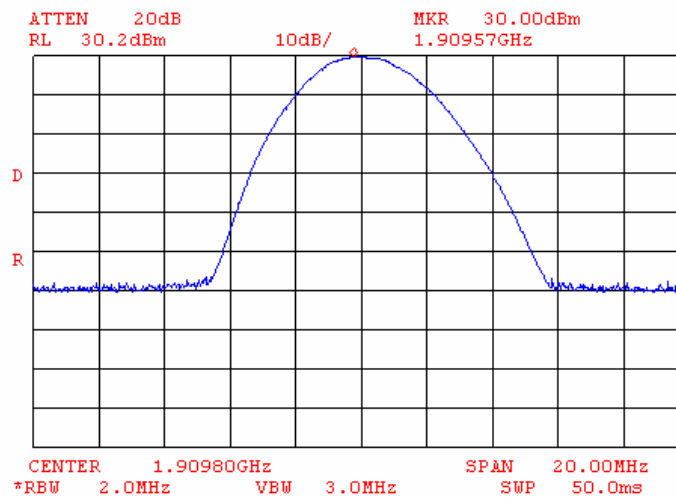


| | | | |
|----------------------------|--|--------------------------------|----------------------------|
| Test specification: | Section 24.232, Peak output power | | |
| Test procedure: | FCC part 24, Section 24.232 | | |
| Test mode: | Compliance | Verdict: PASS | |
| Date & Time: | 11/4/2005 3:46:51 PM | | |
| Temperature: 22°C | Air Pressure: 1012 hPa | Relative Humidity: 46 % | Power Supply: 4 VDC |
| Remarks: | | | |

Plot 8.1.2 Peak output power test results at mid frequency



Plot 8.1.3 Peak output power test results at high frequency



| | | | |
|----------------------------|-------------------------------|--|-----------------------------|
| Test specification: | | Section 24.238(b), Occupied bandwidth | |
| Test procedure: | | FCC part 24, Section 24.238 | |
| Test mode: | Compliance | Verdict: | PASS |
| Date & Time: | 10/20/2005 9:39:03 AM | | |
| Temperature: 23°C | Air Pressure: 1007 hPa | Relative Humidity: 40% | Power Supply: 4 V DC |
| Remarks: | | | |

8.2 Occupied bandwidth test

8.2.1 General

This test was performed to measure transmitter occupied bandwidth. Specification test limits are given in Table 8.2.1

Table 8.2.1 Occupied bandwidth limits

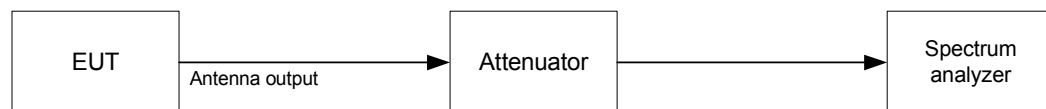
| Assigned frequency, MHz | Modulation envelope reference points*, dBc |
|-------------------------|--|
| 1850 – 1910 | 26 |

* - Modulation envelope reference points are provided in terms of attenuation below the unmodulated carrier.

8.2.2 Test procedure

- 8.2.2.1 The EUT was set up as shown in Figure 8.2.1, energized and its proper operation was checked.
- 8.2.2.2 The EUT was set to transmit the unmodulated carrier and the reference peak power level was measured.
- 8.2.2.3 The EUT was set to transmit the normally modulated carrier.
- 8.2.2.4 The transmitter occupied bandwidth was measured with spectrum analyzer as a frequency delta between the reference points on modulation envelope and the results provided in Table 8.2.2 and the associated plots.

Figure 8.2.1 Occupied bandwidth test setup



| | | | |
|----------------------------|--|-------------------------------|-----------------------------|
| Test specification: | Section 24.238(b), Occupied bandwidth | | |
| Test procedure: | FCC part 24, Section 24.238 | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date & Time: | 10/20/2005 9:39:03 AM | | |
| Temperature: 23°C | Air Pressure: 1007 hPa | Relative Humidity: 40% | Power Supply: 4 V DC |
| Remarks: | | | |

Table 8.2.2 Occupied bandwidth test results

DETECTOR USED: Peak hold
 RESOLUTION BANDWIDTH: 3 kHz
 VIDEO BANDWIDTH: 10 kHz
 MODULATION ENVELOPE REFERENCE POINTS: 26 dBc
 MODULATION: FSK
 MODULATING SIGNAL: PRBS
 BIT RATE: 270 kbps

| Carrier frequency, MHz | Lower reference point, MHz | Upper reference point, MHz | Occupied bandwidth, kHz |
|------------------------|----------------------------|----------------------------|-------------------------|
| 1850.2 | 1850.062 | 1850.338 | 276 |
| 1880.0 | 1879.863 | 1880.140 | 277 |
| 1909.8 | 1909.660 | 1909.933 | 273 |

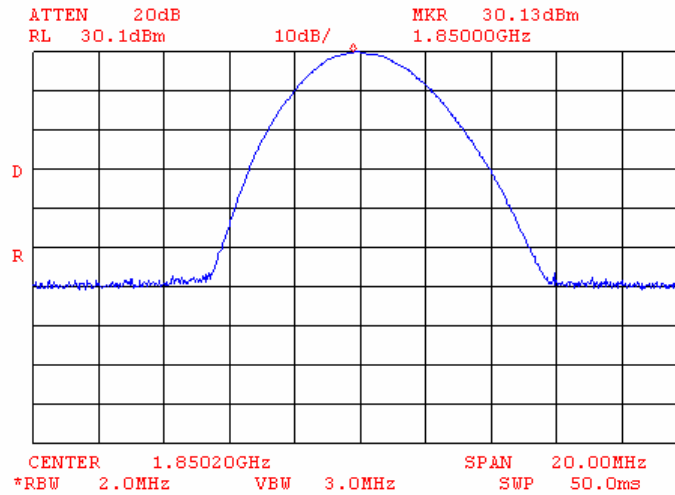
Reference numbers of test equipment used

| | | | | | | |
|---------|---------|---------|--|--|--|--|
| HL 1424 | HL 2399 | HL 2524 | | | | |
|---------|---------|---------|--|--|--|--|

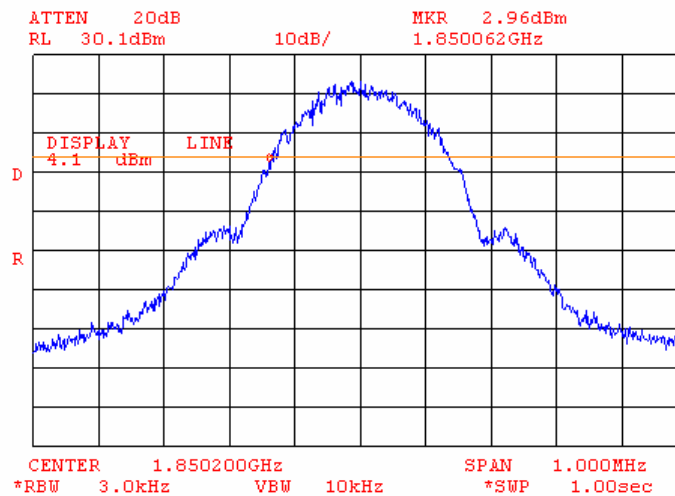
Full description is given in Appendix A.

| | | | |
|----------------------------|--|-------------------------------|-----------------------------|
| Test specification: | Section 24.238(b), Occupied bandwidth | | |
| Test procedure: | FCC part 24, Section 24.238 | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date & Time: | 10/20/2005 9:39:03 AM | | |
| Temperature: 23°C | Air Pressure: 1007 hPa | Relative Humidity: 40% | Power Supply: 4 V DC |
| Remarks: | | | |

Plot 8.2.1 Occupied bandwidth test result at low frequency, reference level

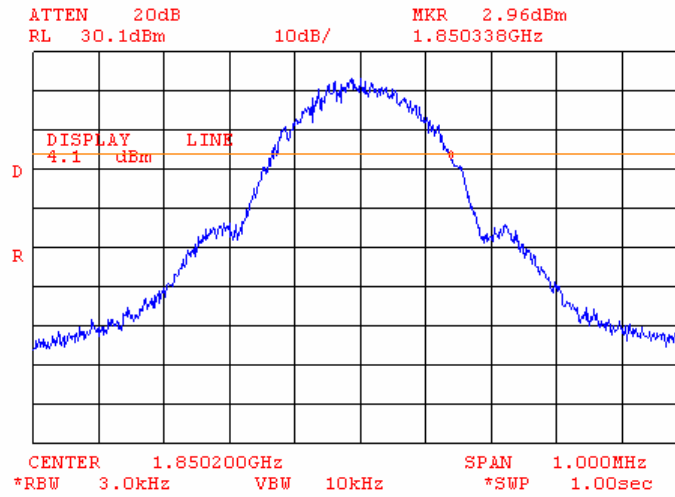


Plot 8.2.2 Occupied bandwidth test result at low frequency, lower reference point

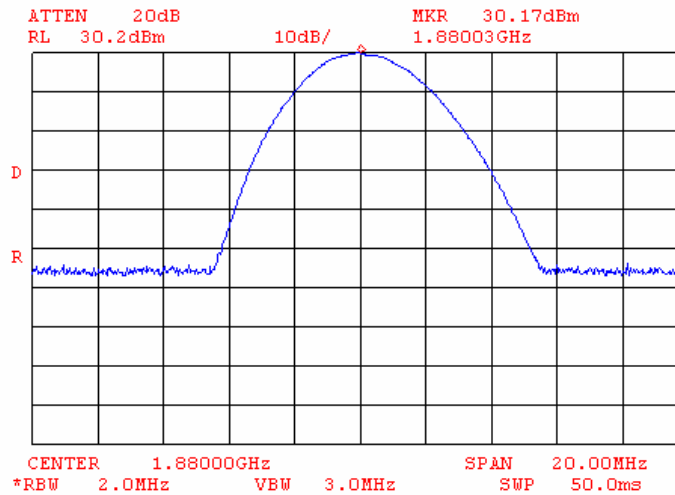


| | | | |
|----------------------------|--|-------------------------------|-----------------------------|
| Test specification: | Section 24.238(b), Occupied bandwidth | | |
| Test procedure: | FCC part 24, Section 24.238 | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date & Time: | 10/20/2005 9:39:03 AM | | |
| Temperature: 23°C | Air Pressure: 1007 hPa | Relative Humidity: 40% | Power Supply: 4 V DC |
| Remarks: | | | |

Plot 8.2.3 Occupied bandwidth test result at low frequency, higher reference point

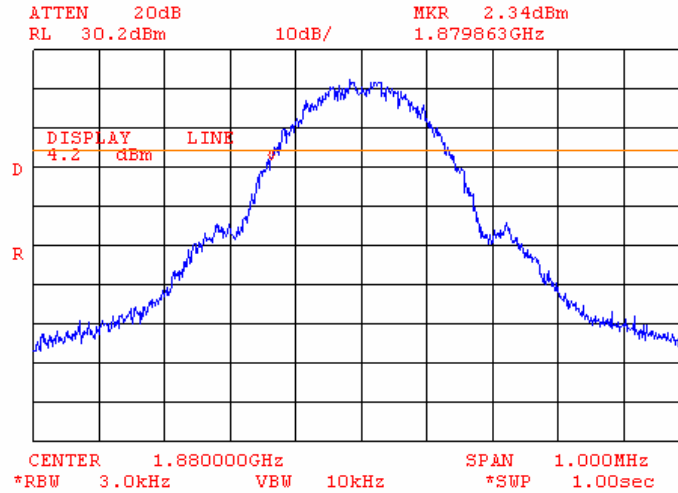


Plot 8.2.4 Occupied bandwidth test result at mid frequency, reference level

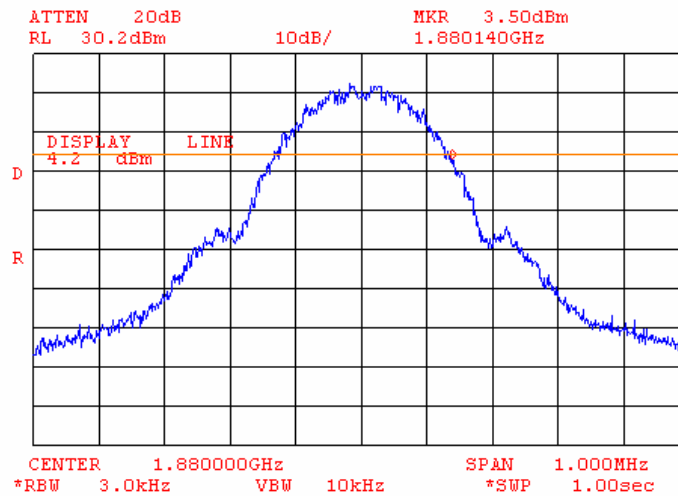


| | | | |
|----------------------------|--|-------------------------------|-----------------------------|
| Test specification: | Section 24.238(b), Occupied bandwidth | | |
| Test procedure: | FCC part 24, Section 24.238 | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date & Time: | 10/20/2005 9:39:03 AM | | |
| Temperature: 23°C | Air Pressure: 1007 hPa | Relative Humidity: 40% | Power Supply: 4 V DC |
| Remarks: | | | |

Plot 8.2.5 Occupied bandwidth test result at mid frequency, lower reference point

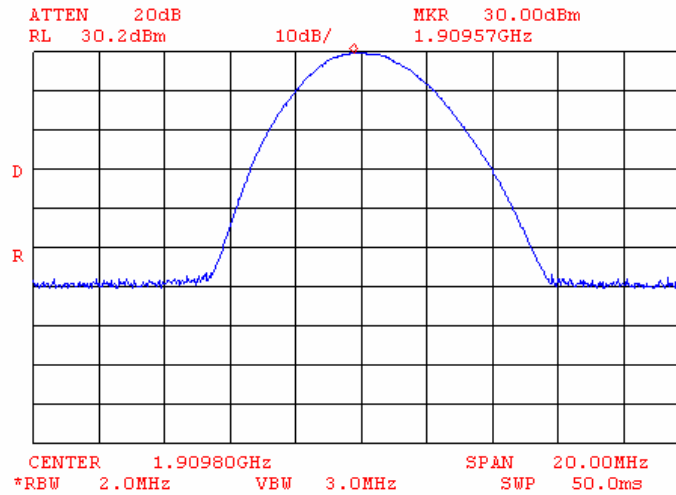


Plot 8.2.6 Occupied bandwidth test result at mid frequency, higher reference point

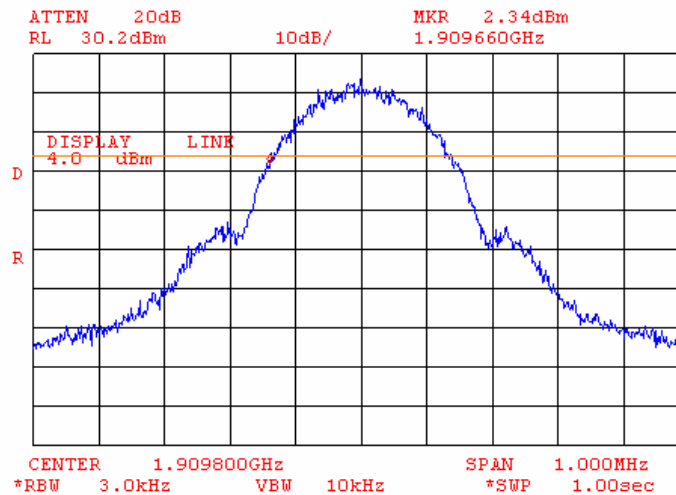


| | | | |
|----------------------------|--|-------------------------------|-----------------------------|
| Test specification: | Section 24.238(b), Occupied bandwidth | | |
| Test procedure: | FCC part 24, Section 24.238 | | |
| Test mode: | Compliance | Verdict: PASS | |
| Date & Time: | 10/20/2005 9:39:03 AM | | |
| Temperature: 23°C | Air Pressure: 1007 hPa | Relative Humidity: 40% | Power Supply: 4 V DC |
| Remarks: | | | |

Plot 8.2.7 Occupied bandwidth test result at high frequency, reference level

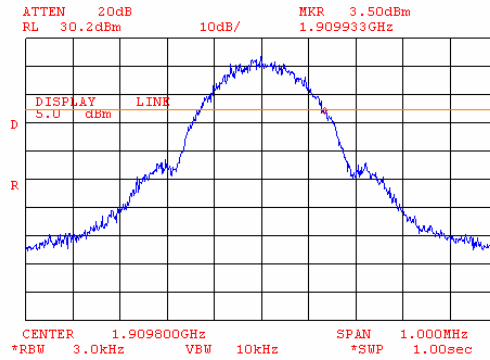


Plot 8.2.8 Occupied bandwidth test result at high frequency, lower reference point

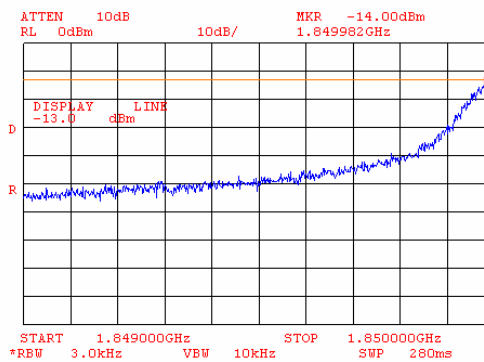


| | | | |
|----------------------------|--|-------------------------------|-----------------------------|
| Test specification: | Section 24.238(b), Occupied bandwidth | | |
| Test procedure: | FCC part 24, Section 24.238 | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date & Time: | 10/20/2005 9:39:03 AM | | |
| Temperature: 23°C | Air Pressure: 1007 hPa | Relative Humidity: 40% | Power Supply: 4 V DC |
| Remarks: | | | |

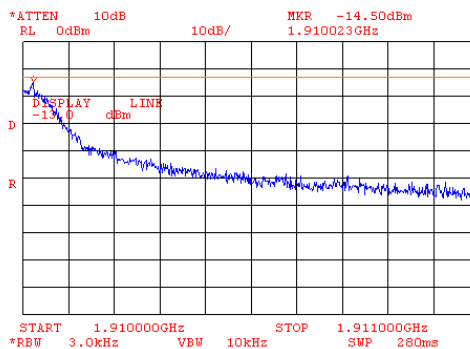
Plot 8.2.9 Occupied bandwidth test result at high frequency, higher reference point



Plot 8.2.10 Bandedge emission measurements in 1849 - 1850 MHz range at low carrier frequency



Plot 8.2.11 Bandedge emission measurements in 1910 - 1911 MHz range at high carrier frequency



For bandedge emissions measurement procedure refer to section 8.3.

| | | | |
|----------------------------|--|--------------------------------|----------------------------|
| Test specification: | Section 24.238, Spurious emission at antenna terminal | | |
| Test procedure: | FCC part 24, Section 24.238 | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date & Time: | 10/20/2005 4:03:01 PM | | |
| Temperature: 22 °C | Air Pressure: 1012 hPa | Relative Humidity: 46 % | Power Supply: 4 VDC |
| Remarks: | | | |

8.3 Spurious emissions at RF antenna connector test

8.3.1 General

This test was performed to measure spurious emissions at RF antenna connector. Specification test limits are given in Table 8.3.1.

Table 8.3.1 Spurious emission limits

| Frequency, MHz | Attenuation below carrier, dBc | ERP of spurious, dBm |
|------------------------------------|--------------------------------|----------------------|
| 0.009 – 10 th harmonic* | 43+10logP* | -13.0 |

8.3.2 Test procedure

8.3.2.1 The EUT was set up as shown in Figure 8.3.1, energized and its proper operation was checked.

8.3.2.2 The EUT was adjusted to produce maximum available for end user RF output power.

8.3.2.3 The spurious emission was measured with spectrum analyzer as provided in Table 8.3.2 and associated plots.

Figure 8.3.1 Spurious emission test setup



| | | | | |
|----------------------------|--|--------------------------------|----------------------------|-------------|
| Test specification: | Section 24.238, Spurious emission at antenna terminal | | | |
| Test procedure: | FCC part 24, Section 24.238 | | | |
| Test mode: | Compliance | Verdict: | | PASS |
| Date & Time: | 10/20/2005 4:03:01 PM | | | |
| Temperature: 22 °C | Air Pressure: 1012 hPa | Relative Humidity: 46 % | Power Supply: 4 VDC | |
| Remarks: | | | | |

Table 8.3.2 Spurious emission test results

ASSIGNED FREQUENCY RANGE: 1850 - 1910 MHz
 INVESTIGATED FREQUENCY RANGE: 0.009 – 20000 MHz
 DETECTOR USED: Peak
 VIDEO BANDWIDTH: ≥ Resolution bandwidth
 MODULATION: FSK
 MODULATING SIGNAL: PRBS
 BIT RATE: 270 kbps
 TRANSMITTER OUTPUT POWER SETTINGS: Maximum
 TRANSMITTER OUTPUT POWER: 30.13 dBm at low frequency
 30.17 dBm at mid frequency
 30.00 dBm at high frequency

| Frequency, MHz | SA reading, dBm | Attenuator, dB | Cable loss, dB | RBW, kHz | Spurious emission, dBm | Attenuation below carrier, dBc | Limit, dBc | Margin, dB* | Verdict |
|-------------------------------|-----------------|----------------|----------------|----------|------------------------|--------------------------------|------------|-------------|---------|
| Low carrier frequency | | | | | | | | | |
| 3700.32 | -43.33 | Included | Included | 1000 | -43.33 | 73.46 | 43.13 | 30.33 | Pass |
| 5550.45 | -47.00 | Included | Included | 1000 | -47.00 | 77.13 | 43.13 | 34.00 | Pass |
| 7400.70 | -43.50 | Included | Included | 1000 | -43.50 | 73.63 | 43.13 | 30.50 | Pass |
| 9250.87 | -40.67 | Included | Included | 1000 | -40.67 | 70.80 | 43.13 | 27.67 | Pass |
| 11100.77 | -31.17 | Included | Included | 1000 | -31.17 | 61.30 | 43.13 | 18.17 | Pass |
| 14800.73 | -39.17 | Included | Included | 1000 | -39.17 | 69.30 | 43.13 | 26.17 | Pass |
| Mid carrier frequency | | | | | | | | | |
| 3760.07 | -43.83 | Included | Included | 1000 | -43.83 | 74.00 | 43.17 | 30.83 | Pass |
| 5639.53 | -48.67 | Included | Included | 1000 | -48.67 | 78.84 | 43.17 | 35.67 | Pass |
| 7519.75 | -44.00 | Included | Included | 1000 | -44.00 | 74.17 | 43.17 | 31.00 | Pass |
| 9399.60 | -39.33 | Included | Included | 1000 | -39.33 | 69.50 | 43.17 | 26.33 | Pass |
| 11279.60 | -29.83 | Included | Included | 1000 | -29.83 | 60.00 | 43.17 | 16.83 | Pass |
| 15039.65 | -37.00 | Included | Included | 1000 | -37.00 | 67.17 | 43.17 | 24.00 | Pass |
| High carrier frequency | | | | | | | | | |
| 3819.25 | -44.67 | Included | Included | 1000 | -44.67 | 74.67 | 43.00 | 31.67 | Pass |
| 5729.40 | -38.17 | Included | Included | 1000 | -38.17 | 68.17 | 43.00 | 25.17 | Pass |
| 7638.85 | -44.17 | Included | Included | 1000 | -44.17 | 74.17 | 43.00 | 31.17 | Pass |
| 9549.07 | -40.67 | Included | Included | 1000 | -40.67 | 70.67 | 43.00 | 27.67 | Pass |
| 11458.35 | -33.50 | Included | Included | 1000 | -33.50 | 63.50 | 43.00 | 20.50 | Pass |
| 15278.92 | -37.33 | Included | Included | 1000 | -37.33 | 37.33 | 13.00 | 24.33 | Pass |

*- Margin = Spurious emission – specification limit.

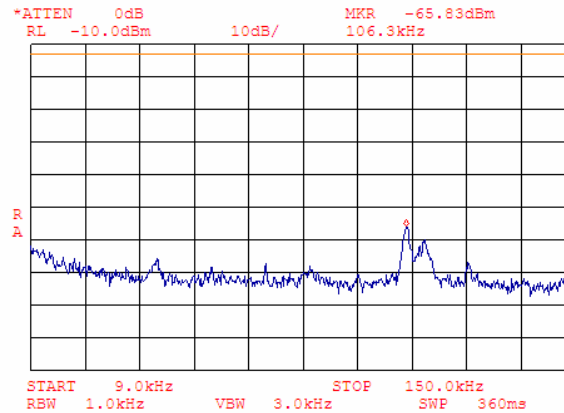
Reference numbers of test equipment used

| | | | | | |
|---------|---------|---------|--|--|--|
| HL 1424 | HL 2254 | HL 2524 | | | |
|---------|---------|---------|--|--|--|

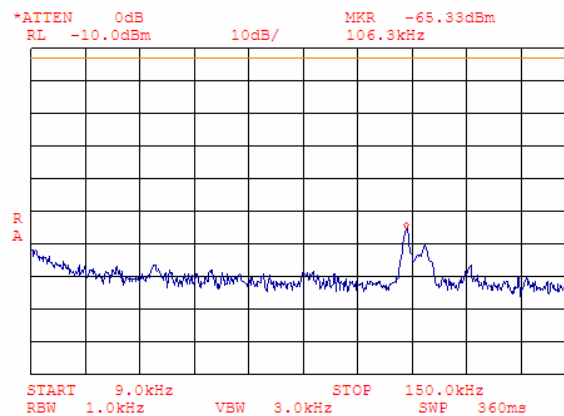
Full description is given in Appendix A.

| | | | |
|----------------------------|--|--------------------------------|----------------------------|
| Test specification: | Section 24.238, Spurious emission at antenna terminal | | |
| Test procedure: | FCC part 24, Section 24.238 | | |
| Test mode: | Compliance | Verdict: PASS | |
| Date & Time: | 10/20/2005 4:03:01 PM | | |
| Temperature: 22 °C | Air Pressure: 1012 hPa | Relative Humidity: 46 % | Power Supply: 4 VDC |
| Remarks: | | | |

Plot 8.3.1 Spurious emission measurements in 9 - 150 kHz range at low carrier frequency

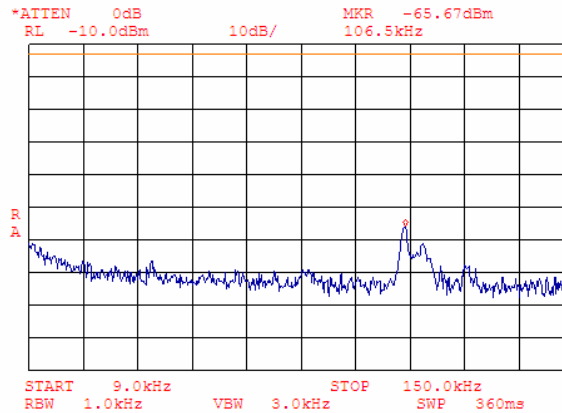


Plot 8.3.2 Spurious emission measurements in 9 - 150 kHz range at mid carrier frequency

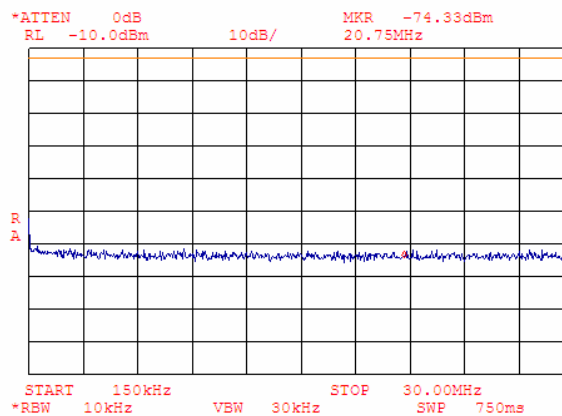


| | | | |
|----------------------------|--|--------------------------------|----------------------------|
| Test specification: | Section 24.238, Spurious emission at antenna terminal | | |
| Test procedure: | FCC part 24, Section 24.238 | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date & Time: | 10/20/2005 4:03:01 PM | | |
| Temperature: 22 °C | Air Pressure: 1012 hPa | Relative Humidity: 46 % | Power Supply: 4 VDC |
| Remarks: | | | |

Plot 8.3.3 Spurious emission measurements in 9 - 150 kHz range at high carrier frequency

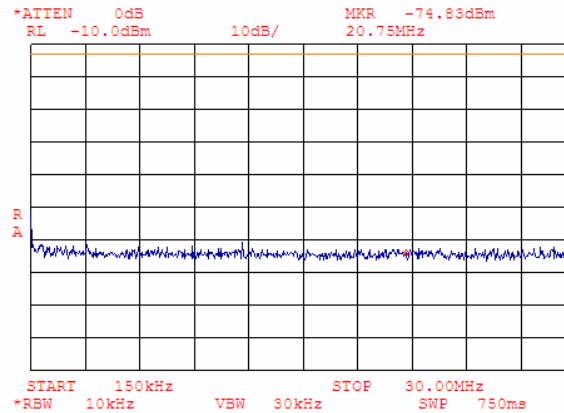


Plot 8.3.4 Spurious emission measurements in 0.15 - 30.0 MHz range at low carrier frequency

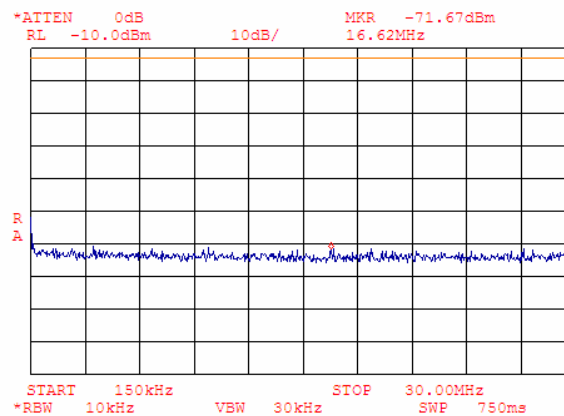


| | | | |
|----------------------------|--|--------------------------------|----------------------------|
| Test specification: | Section 24.238, Spurious emission at antenna terminal | | |
| Test procedure: | FCC part 24, Section 24.238 | | |
| Test mode: | Compliance | Verdict: PASS | |
| Date & Time: | 10/20/2005 4:03:01 PM | | |
| Temperature: 22 °C | Air Pressure: 1012 hPa | Relative Humidity: 46 % | Power Supply: 4 VDC |
| Remarks: | | | |

Plot 8.3.5 Spurious emission measurements in 0.15 - 30.0 MHz range at mid carrier frequency

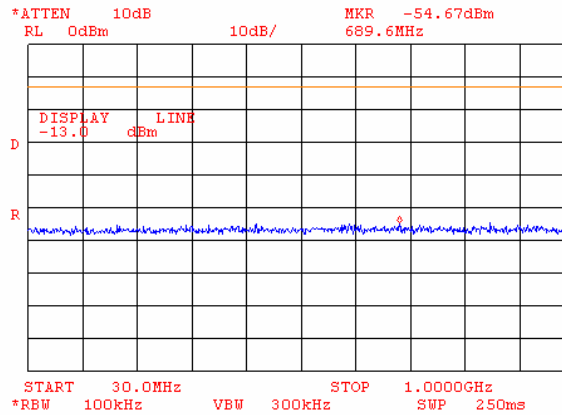


Plot 8.3.6 Spurious emission measurements in 0.15 - 30.0 MHz range at high carrier frequency

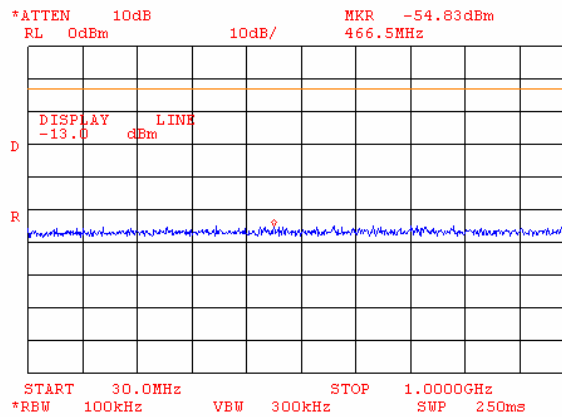


| | | | |
|----------------------------|--|--------------------------------|----------------------------|
| Test specification: | Section 24.238, Spurious emission at antenna terminal | | |
| Test procedure: | FCC part 24, Section 24.238 | | |
| Test mode: | Compliance | Verdict: PASS | |
| Date & Time: | 10/20/2005 4:03:01 PM | | |
| Temperature: 22 °C | Air Pressure: 1012 hPa | Relative Humidity: 46 % | Power Supply: 4 VDC |
| Remarks: | | | |

Plot 8.3.7 Spurious emission measurements in 30.0 - 1000 MHz range at low carrier frequency

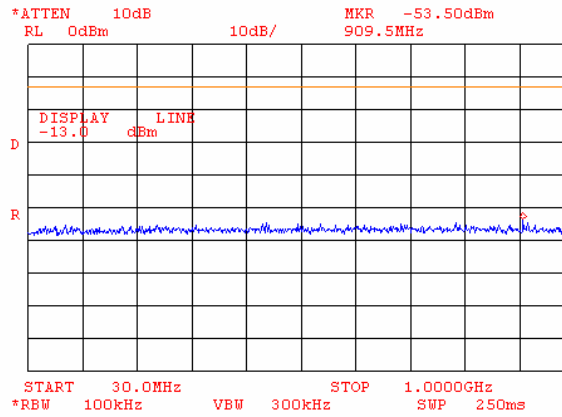


Plot 8.3.8 Spurious emission measurements in 30.0 - 1000 MHz range at mid carrier frequency

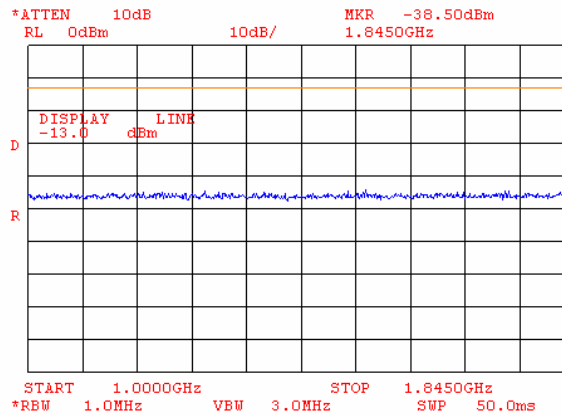


| | | | |
|----------------------------|--|--------------------------------|----------------------------|
| Test specification: | Section 24.238, Spurious emission at antenna terminal | | |
| Test procedure: | FCC part 24, Section 24.238 | | |
| Test mode: | Compliance | Verdict: PASS | |
| Date & Time: | 10/20/2005 4:03:01 PM | | |
| Temperature: 22 °C | Air Pressure: 1012 hPa | Relative Humidity: 46 % | Power Supply: 4 VDC |
| Remarks: | | | |

Plot 8.3.9 Spurious emission measurements in 30.0 - 1000 MHz range at high carrier frequency

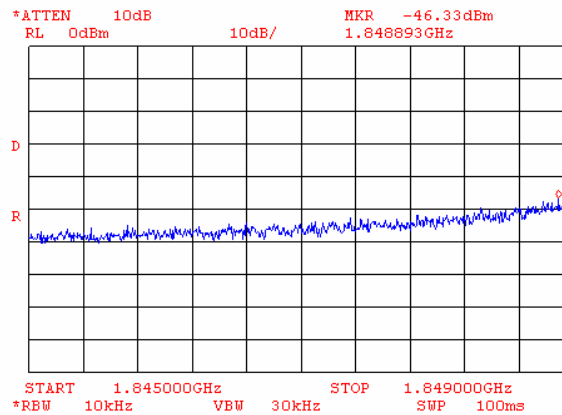


Plot 8.3.10 Spurious emission measurements in 1000 - 1845 MHz range at low carrier frequency



| | | | |
|----------------------------|--|--------------------------------|----------------------------|
| Test specification: | Section 24.238, Spurious emission at antenna terminal | | |
| Test procedure: | FCC part 24, Section 24.238 | | |
| Test mode: | Compliance | Verdict: PASS | |
| Date & Time: | 10/20/2005 4:03:01 PM | | |
| Temperature: 22 °C | Air Pressure: 1012 hPa | Relative Humidity: 46 % | Power Supply: 4 VDC |
| Remarks: | | | |

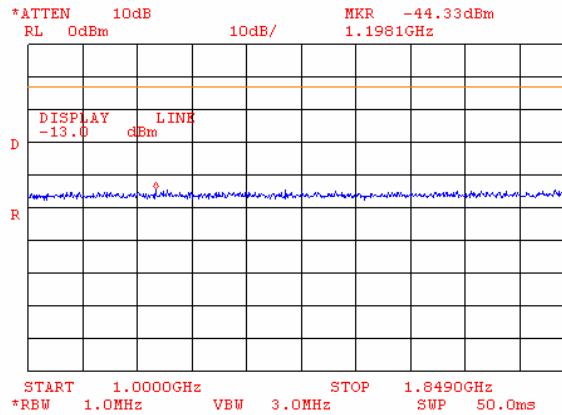
Plot 8.3.11 Spurious emission measurements in 1845 - 1849 MHz range at low carrier frequency



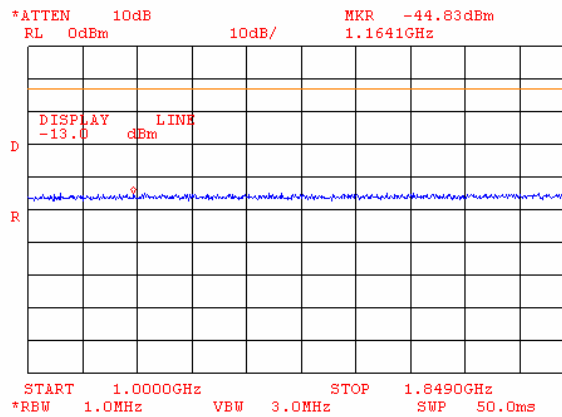
Note: $P_{Signal} = P_{SA\ reading} + 10\log(1\text{MHz}/\text{RBW}) = -46.33 + 10\log(100) = -46.33 + 20 = -26.33\ \text{dBm}$
Limit = -13 dBm

| | | | |
|----------------------------|--|--------------------------------|----------------------------|
| Test specification: | Section 24.238, Spurious emission at antenna terminal | | |
| Test procedure: | FCC part 24, Section 24.238 | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date & Time: | 10/20/2005 4:03:01 PM | | |
| Temperature: 22 °C | Air Pressure: 1012 hPa | Relative Humidity: 46 % | Power Supply: 4 VDC |
| Remarks: | | | |

Plot 8.3.12 Spurious emission measurements in 1000 - 1849 MHz range at mid carrier frequency

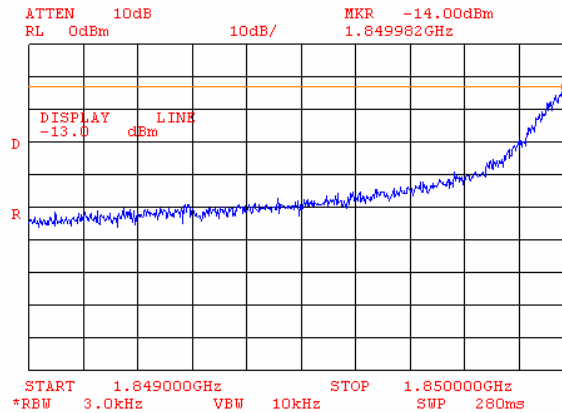


Plot 8.3.13 Spurious emission measurements in 1000 - 1849 MHz range at high carrier frequency

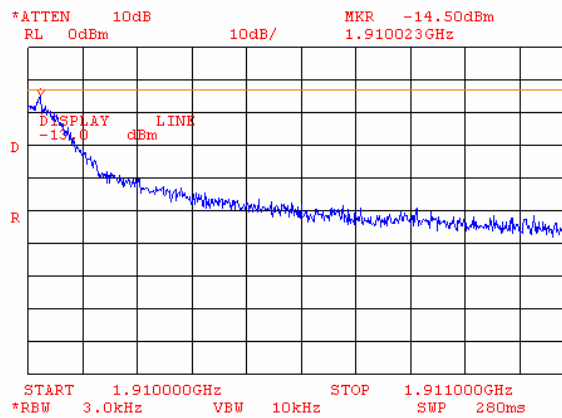


| | | | |
|----------------------------|--|--------------------------------|----------------------------|
| Test specification: | Section 24.238, Spurious emission at antenna terminal | | |
| Test procedure: | FCC part 24, Section 24.238 | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date & Time: | 10/20/2005 4:03:01 PM | | |
| Temperature: 22 °C | Air Pressure: 1012 hPa | Relative Humidity: 46 % | Power Supply: 4 VDC |
| Remarks: | | | |

Plot 8.3.14 Spurious emission measurements in 1849 - 1850 MHz range at low carrier frequency

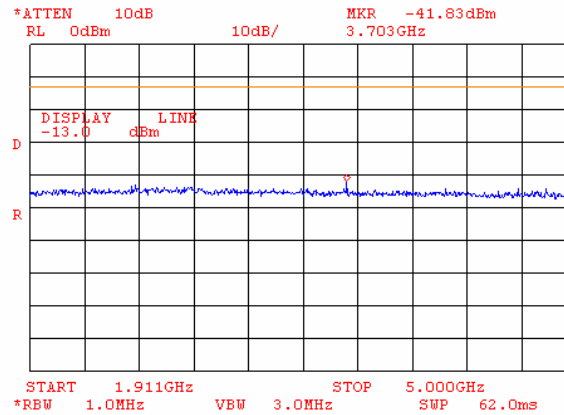


Plot 8.3.15 Spurious emission measurements in 1910 - 1911 MHz range at high carrier frequency

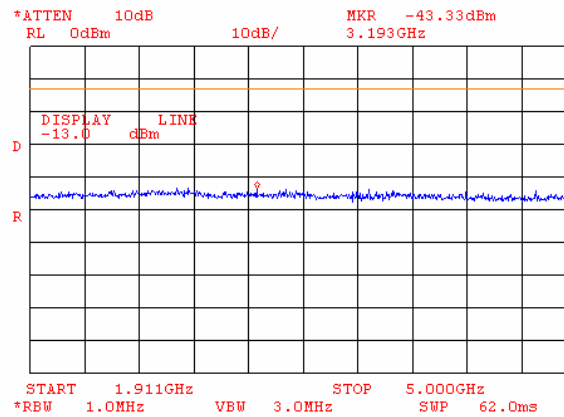


| | | | |
|----------------------------|--|--------------------------------|----------------------------|
| Test specification: | Section 24.238, Spurious emission at antenna terminal | | |
| Test procedure: | FCC part 24, Section 24.238 | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date & Time: | 10/20/2005 4:03:01 PM | | |
| Temperature: 22 °C | Air Pressure: 1012 hPa | Relative Humidity: 46 % | Power Supply: 4 VDC |
| Remarks: | | | |

Plot 8.3.16 Spurious emission measurements in 1911 - 5000 MHz range at low carrier frequency

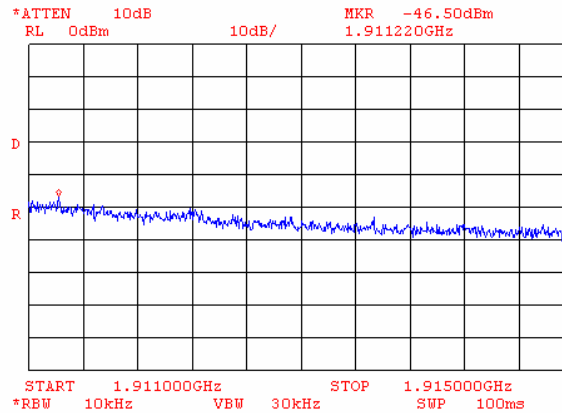


Plot 8.3.17 Spurious emission measurements in 1911 - 5000 MHz range at mid carrier frequency



| | | | |
|----------------------------|--|--------------------------------|----------------------------|
| Test specification: | Section 24.238, Spurious emission at antenna terminal | | |
| Test procedure: | FCC part 24, Section 24.238 | | |
| Test mode: | Compliance | Verdict: PASS | |
| Date & Time: | 10/20/2005 4:03:01 PM | | |
| Temperature: 22 °C | Air Pressure: 1012 hPa | Relative Humidity: 46 % | Power Supply: 4 VDC |
| Remarks: | | | |

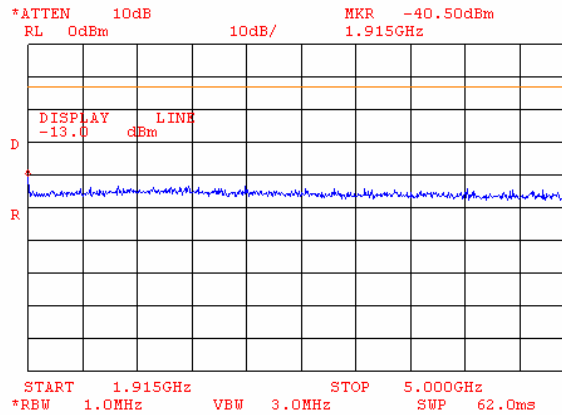
Plot 8.3.18 Spurious emission measurements in 1911 - 1915 MHz range at high carrier frequency



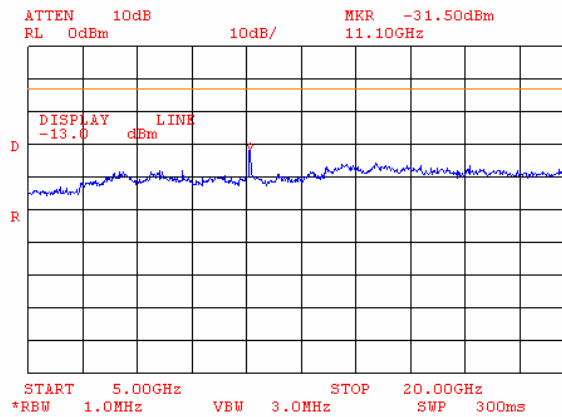
Note: $P_{Signal} = P_{SA\ reading} + 10\log(1\text{MHz}/\text{RBW}) = -46.50 + 10\log(100) = -46.50 + 20 = -26.50\ \text{dBm}$
Limit = -13 dBm

| | | | |
|----------------------------|--|--------------------------------|----------------------------|
| Test specification: | Section 24.238, Spurious emission at antenna terminal | | |
| Test procedure: | FCC part 24, Section 24.238 | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date & Time: | 10/20/2005 4:03:01 PM | | |
| Temperature: 22 °C | Air Pressure: 1012 hPa | Relative Humidity: 46 % | Power Supply: 4 VDC |
| Remarks: | | | |

Plot 8.3.19 Spurious emission measurements in 1915 - 5000 MHz range at high carrier frequency

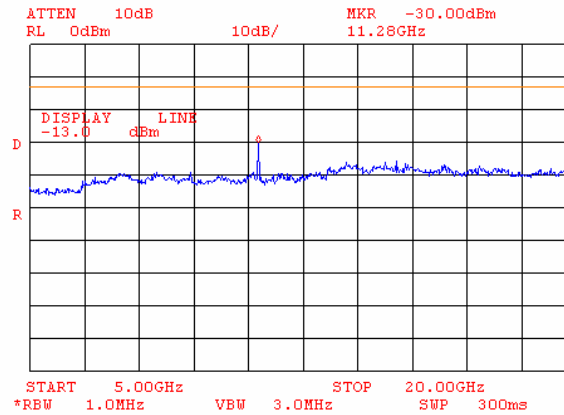


Plot 8.3.20 Spurious emission measurements in 5000 - 20000 MHz range at low carrier frequency

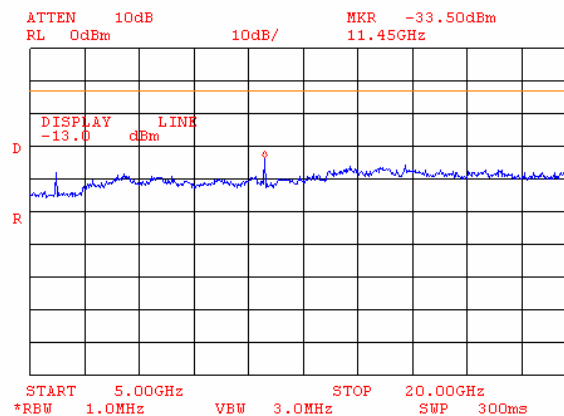


| | | | |
|----------------------------|--|--------------------------------|----------------------------|
| Test specification: | Section 24.238, Spurious emission at antenna terminal | | |
| Test procedure: | FCC part 24, Section 24.238 | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date & Time: | 10/20/2005 4:03:01 PM | | |
| Temperature: 22 °C | Air Pressure: 1012 hPa | Relative Humidity: 46 % | Power Supply: 4 VDC |
| Remarks: | | | |

Plot 8.3.21 Spurious emission measurements in 5000 - 20000 MHz range at mid carrier frequency

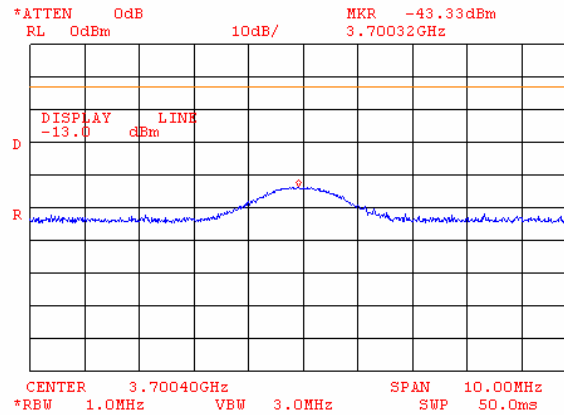


Plot 8.3.22 Spurious emission measurements in 5000 - 20000 MHz range at high carrier frequency

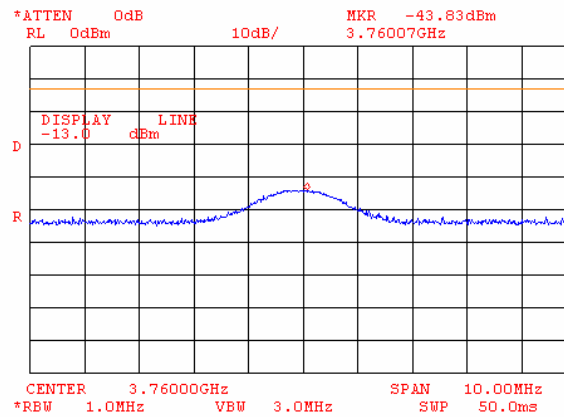


| | | | |
|----------------------------|--|--------------------------------|----------------------------|
| Test specification: | Section 24.238, Spurious emission at antenna terminal | | |
| Test procedure: | FCC part 24, Section 24.238 | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date & Time: | 10/20/2005 4:03:01 PM | | |
| Temperature: 22 °C | Air Pressure: 1012 hPa | Relative Humidity: 46 % | Power Supply: 4 VDC |
| Remarks: | | | |

Plot 8.3.23 Conducted spurious emission measurements at the 2nd harmonic of low carrier frequency

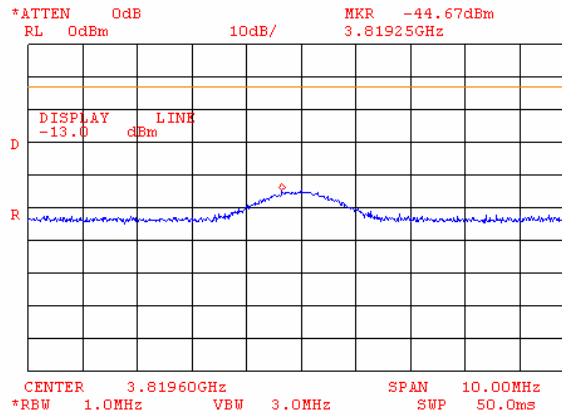


Plot 8.3.24 Conducted spurious emission measurements at the 2nd harmonic of mid carrier frequency

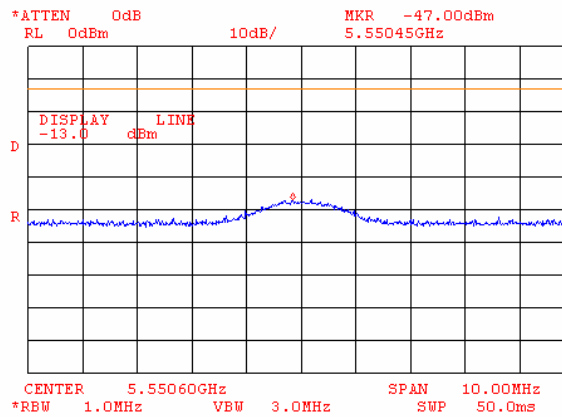


| | | | |
|----------------------------|--|--------------------------------|----------------------------|
| Test specification: | Section 24.238, Spurious emission at antenna terminal | | |
| Test procedure: | FCC part 24, Section 24.238 | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date & Time: | 10/20/2005 4:03:01 PM | | |
| Temperature: 22 °C | Air Pressure: 1012 hPa | Relative Humidity: 46 % | Power Supply: 4 VDC |
| Remarks: | | | |

Plot 8.3.25 Conducted spurious emission measurements at the 2nd harmonic of high carrier frequency

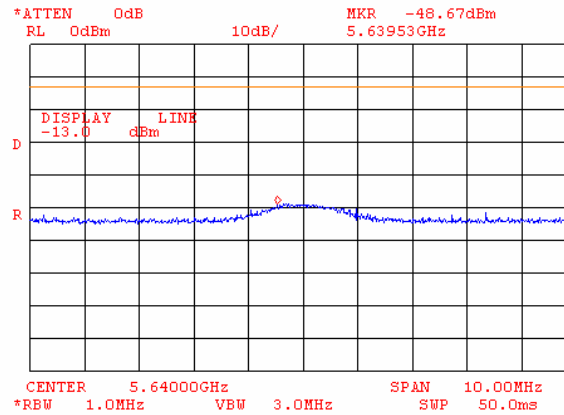


Plot 8.3.26 Conducted spurious emission measurements at the 3rd harmonic of low carrier frequency

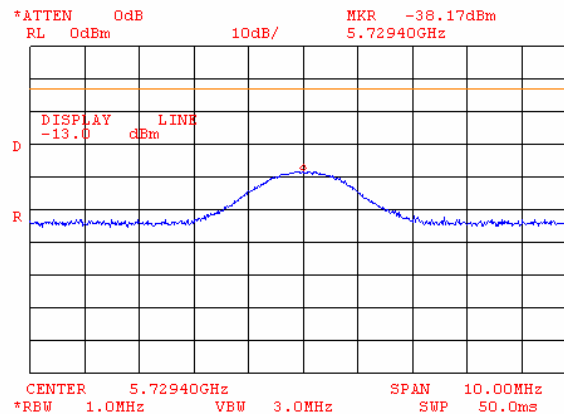


| | | | |
|----------------------------|--|--------------------------------|----------------------------|
| Test specification: | Section 24.238, Spurious emission at antenna terminal | | |
| Test procedure: | FCC part 24, Section 24.238 | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date & Time: | 10/20/2005 4:03:01 PM | | |
| Temperature: 22 °C | Air Pressure: 1012 hPa | Relative Humidity: 46 % | Power Supply: 4 VDC |
| Remarks: | | | |

Plot 8.3.27 Conducted spurious emission measurements at the 3rd harmonic of mid carrier frequency

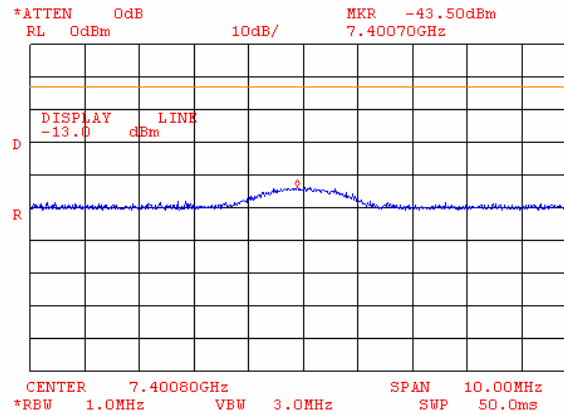


Plot 8.3.28 Conducted spurious emission measurements at the 3rd harmonic of high carrier frequency

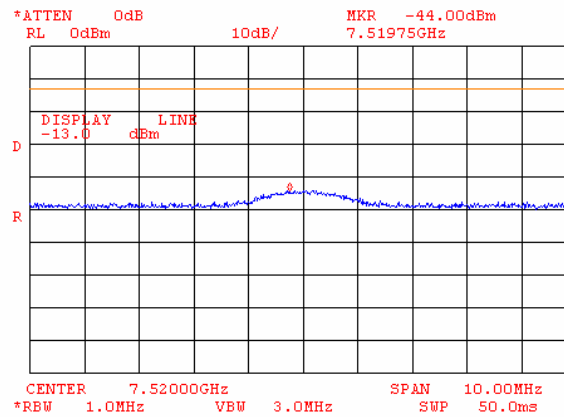


| | | | |
|----------------------------|--|--------------------------------|----------------------------|
| Test specification: | Section 24.238, Spurious emission at antenna terminal | | |
| Test procedure: | FCC part 24, Section 24.238 | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date & Time: | 10/20/2005 4:03:01 PM | | |
| Temperature: 22 °C | Air Pressure: 1012 hPa | Relative Humidity: 46 % | Power Supply: 4 VDC |
| Remarks: | | | |

Plot 8.3.29 Conducted spurious emission measurements at the 4th harmonic of low carrier frequency

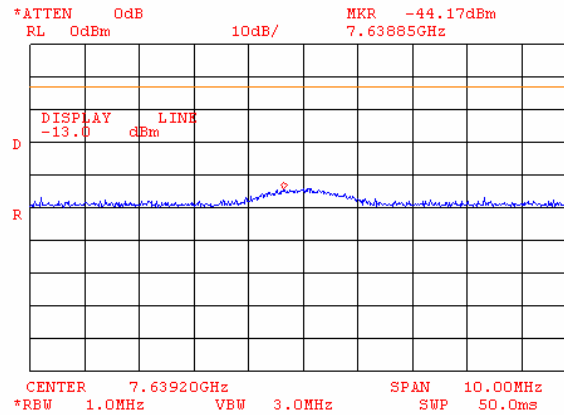


Plot 8.3.30 Conducted spurious emission measurements at the 4th harmonic of mid carrier frequency

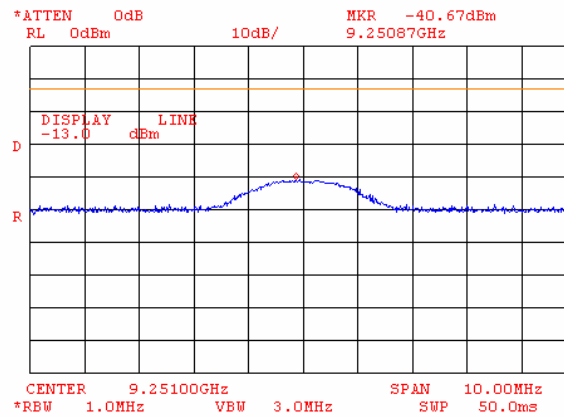


| | | | |
|----------------------------|--|--------------------------------|----------------------------|
| Test specification: | Section 24.238, Spurious emission at antenna terminal | | |
| Test procedure: | FCC part 24, Section 24.238 | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date & Time: | 10/20/2005 4:03:01 PM | | |
| Temperature: 22 °C | Air Pressure: 1012 hPa | Relative Humidity: 46 % | Power Supply: 4 VDC |
| Remarks: | | | |

Plot 8.3.31 Conducted spurious emission measurements at the 4th harmonic of high carrier frequency

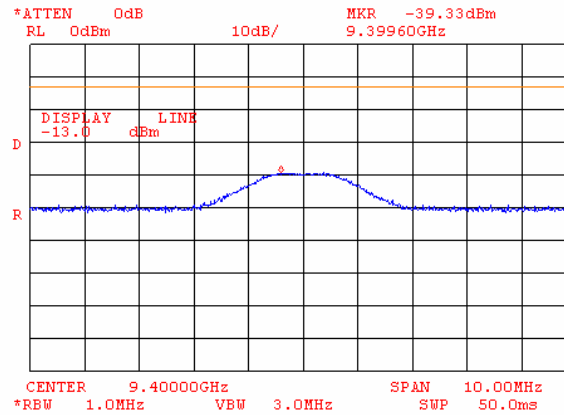


Plot 8.3.32 Conducted spurious emission measurements at the 5th harmonic of low carrier frequency

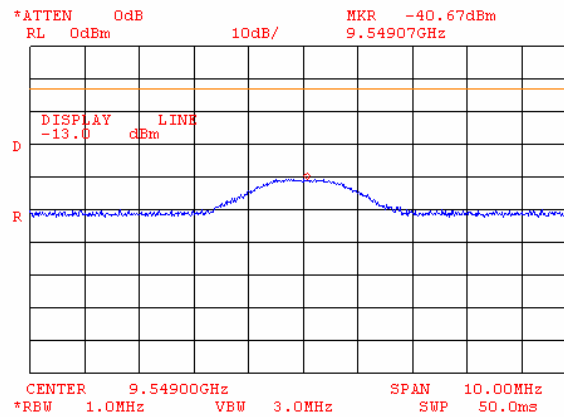


| | | | |
|----------------------------|--|--------------------------------|----------------------------|
| Test specification: | Section 24.238, Spurious emission at antenna terminal | | |
| Test procedure: | FCC part 24, Section 24.238 | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date & Time: | 10/20/2005 4:03:01 PM | | |
| Temperature: 22 °C | Air Pressure: 1012 hPa | Relative Humidity: 46 % | Power Supply: 4 VDC |
| Remarks: | | | |

Plot 8.3.33 Conducted spurious emission measurements at the 5th harmonic of mid carrier frequency

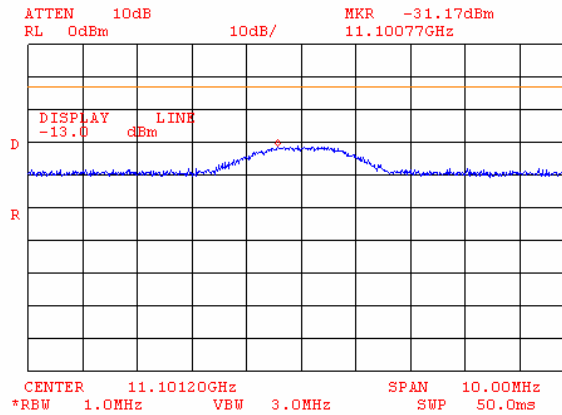


Plot 8.3.34 Conducted spurious emission measurements at the 5th harmonic of high carrier frequency

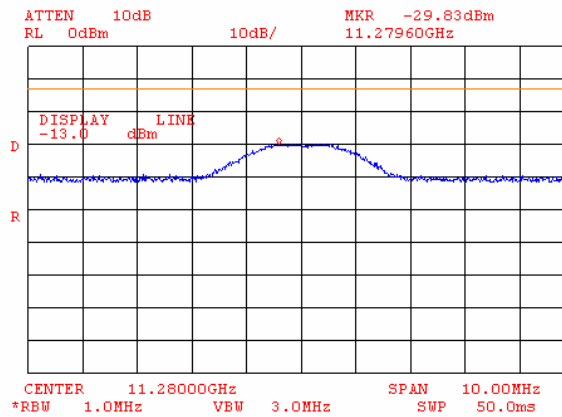


| | | | |
|----------------------------|--|--------------------------------|----------------------------|
| Test specification: | Section 24.238, Spurious emission at antenna terminal | | |
| Test procedure: | FCC part 24, Section 24.238 | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date & Time: | 10/20/2005 4:03:01 PM | | |
| Temperature: 22 °C | Air Pressure: 1012 hPa | Relative Humidity: 46 % | Power Supply: 4 VDC |
| Remarks: | | | |

Plot 8.3.35 Conducted spurious emission measurements at the 6th harmonic of low carrier frequency

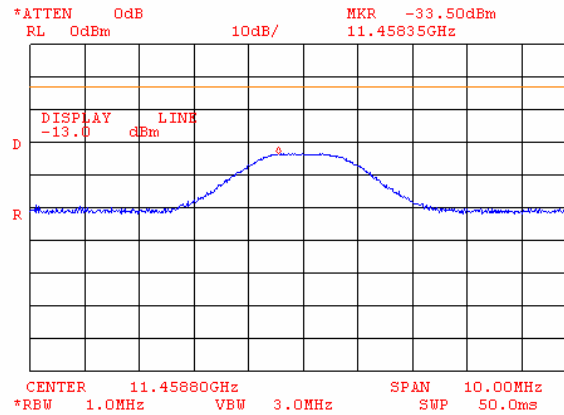


Plot 8.3.36 Conducted spurious emission measurements at the 6th harmonic of mid carrier frequency

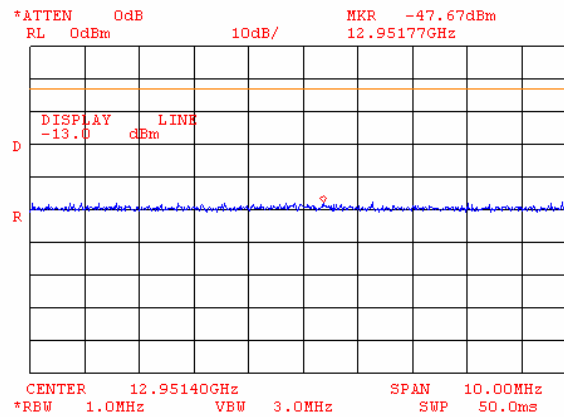


| | | | |
|----------------------------|--|--------------------------------|----------------------------|
| Test specification: | Section 24.238, Spurious emission at antenna terminal | | |
| Test procedure: | FCC part 24, Section 24.238 | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date & Time: | 10/20/2005 4:03:01 PM | | |
| Temperature: 22 °C | Air Pressure: 1012 hPa | Relative Humidity: 46 % | Power Supply: 4 VDC |
| Remarks: | | | |

Plot 8.3.37 Conducted spurious emission measurements at the 6th harmonic of high carrier frequency

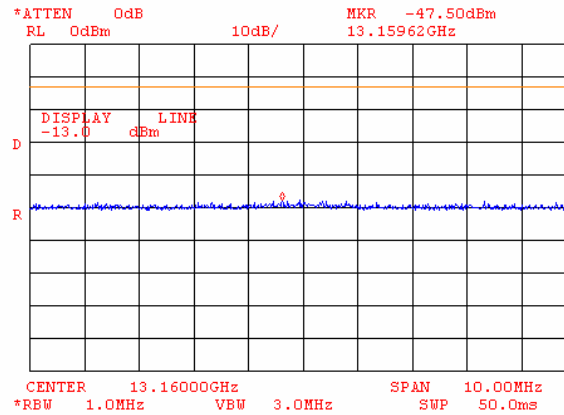


Plot 8.3.38 Conducted spurious emission measurements at the 7th harmonic of low carrier frequency

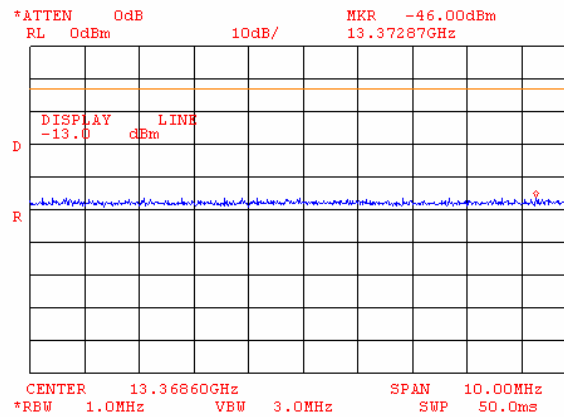


| | | | |
|----------------------------|--|--------------------------------|----------------------------|
| Test specification: | Section 24.238, Spurious emission at antenna terminal | | |
| Test procedure: | FCC part 24, Section 24.238 | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date & Time: | 10/20/2005 4:03:01 PM | | |
| Temperature: 22 °C | Air Pressure: 1012 hPa | Relative Humidity: 46 % | Power Supply: 4 VDC |
| Remarks: | | | |

Plot 8.3.39 Conducted spurious emission measurements at the 7th harmonic of mid carrier frequency

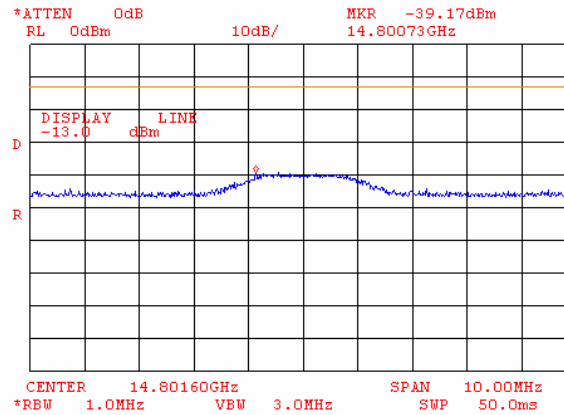


Plot 8.3.40 Conducted spurious emission measurements at the 7th harmonic of high carrier frequency

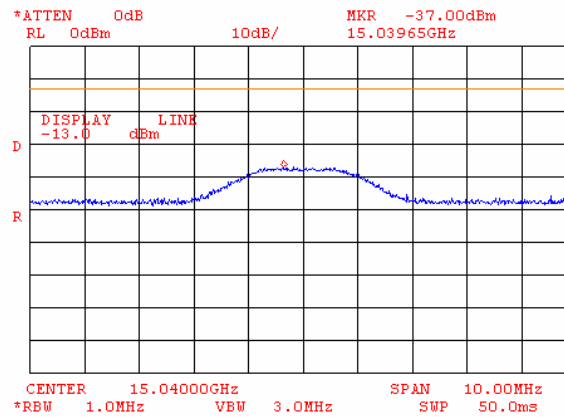


| | | | |
|----------------------------|--|--------------------------------|----------------------------|
| Test specification: | Section 24.238, Spurious emission at antenna terminal | | |
| Test procedure: | FCC part 24, Section 24.238 | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date & Time: | 10/20/2005 4:03:01 PM | | |
| Temperature: 22 °C | Air Pressure: 1012 hPa | Relative Humidity: 46 % | Power Supply: 4 VDC |
| Remarks: | | | |

Plot 8.3.41 Conducted spurious emission measurements at the 8th harmonic of low carrier frequency

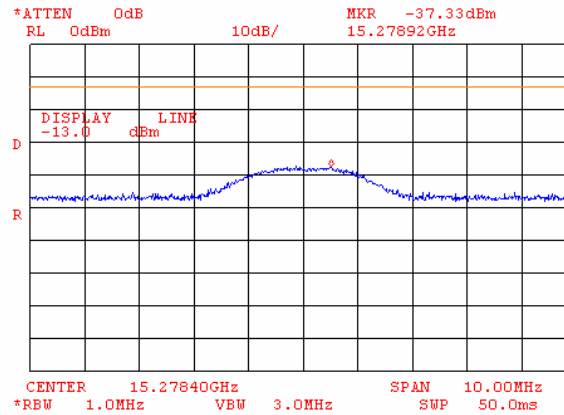


Plot 8.3.42 Conducted spurious emission measurements at the 8th harmonic of mid carrier frequency

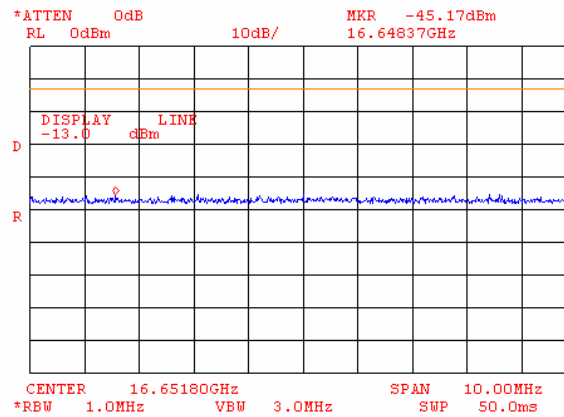


| | | | |
|----------------------------|--|--------------------------------|----------------------------|
| Test specification: | Section 24.238, Spurious emission at antenna terminal | | |
| Test procedure: | FCC part 24, Section 24.238 | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date & Time: | 10/20/2005 4:03:01 PM | | |
| Temperature: 22 °C | Air Pressure: 1012 hPa | Relative Humidity: 46 % | Power Supply: 4 VDC |
| Remarks: | | | |

Plot 8.3.43 Conducted spurious emission measurements at the 8th harmonic of high carrier frequency

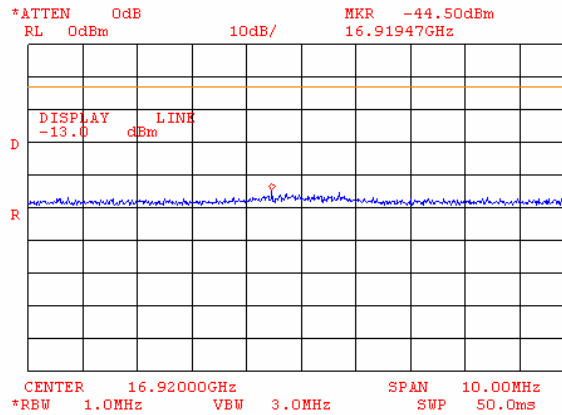


Plot 8.3.44 Conducted spurious emission measurements at the 9th harmonic of low carrier frequency

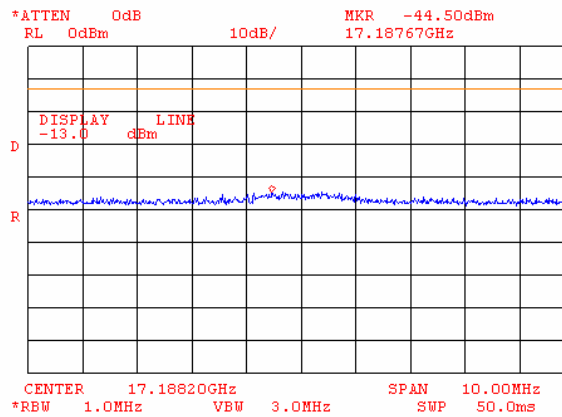


| | | | |
|----------------------------|--|--------------------------------|----------------------------|
| Test specification: | Section 24.238, Spurious emission at antenna terminal | | |
| Test procedure: | FCC part 24, Section 24.238 | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date & Time: | 10/20/2005 4:03:01 PM | | |
| Temperature: 22 °C | Air Pressure: 1012 hPa | Relative Humidity: 46 % | Power Supply: 4 VDC |
| Remarks: | | | |

Plot 8.3.45 Conducted spurious emission measurements at the 9th harmonic of mid carrier frequency

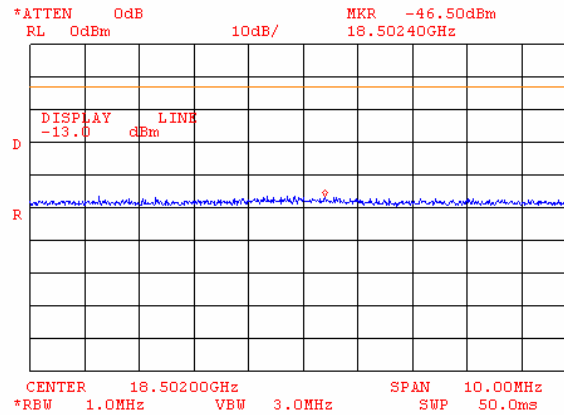


Plot 8.3.46 Conducted spurious emission measurements at the 9th harmonic of high carrier frequency

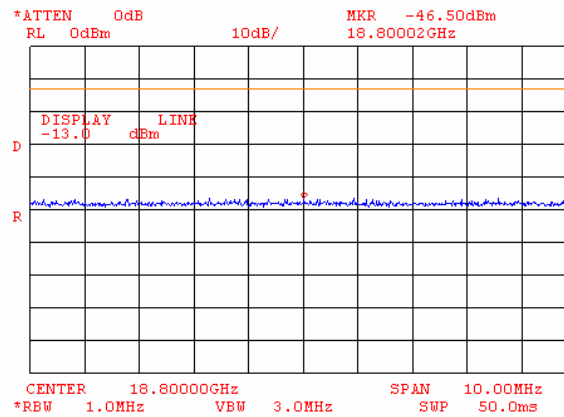


| | | | |
|----------------------------|--|--------------------------------|----------------------------|
| Test specification: | Section 24.238, Spurious emission at antenna terminal | | |
| Test procedure: | FCC part 24, Section 24.238 | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date & Time: | 10/20/2005 4:03:01 PM | | |
| Temperature: 22 °C | Air Pressure: 1012 hPa | Relative Humidity: 46 % | Power Supply: 4 VDC |
| Remarks: | | | |

Plot 8.3.47 Conducted spurious emission measurements at the 10th harmonic of low carrier frequency

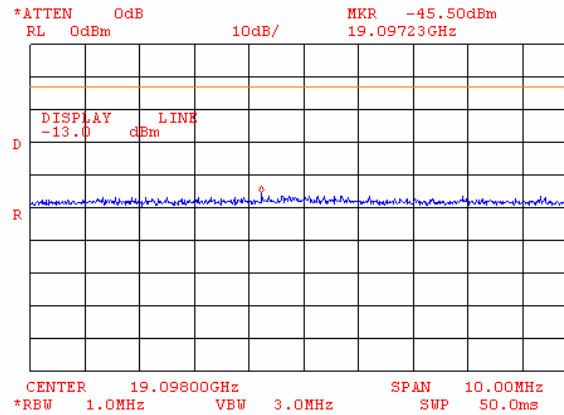


Plot 8.3.48 Conducted spurious emission measurements at the 10th harmonic of mid carrier frequency



| | | | |
|----------------------------|--|--------------------------------|----------------------------|
| Test specification: | Section 24.238, Spurious emission at antenna terminal | | |
| Test procedure: | FCC part 24, Section 24.238 | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date & Time: | 10/20/2005 4:03:01 PM | | |
| Temperature: 22 °C | Air Pressure: 1012 hPa | Relative Humidity: 46 % | Power Supply: 4 VDC |
| Remarks: | | | |

Plot 8.3.49 Conducted spurious emission measurements at the 10th harmonic of high carrier frequency



| | | | |
|----------------------------|--|--------------------------------|----------------------------|
| Test specification: | Section 24.238, Radiated spurious emissions | | |
| Test procedure: | Public notice DA 00-705 | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date & Time: | 10/16/2005 3:30:32 PM | | |
| Temperature: 24 °C | Air Pressure: 1012 hPa | Relative Humidity: 45 % | Power Supply: 4 VDC |
| Remarks: | | | |

8.4 Field strength of spurious emissions

8.4.1 General

This test was performed to measure field strength of spurious emissions from the EUT. Specification test limit is given in Table 8.4.1.

Table 8.4.1 Radiated spurious emissions limits

| Frequency, MHz | Attenuation below carrier, dBc | ERP of spurious, dBm | Equivalent field strength limit @ 3m, dB(μ V/m)** |
|-----------------------------------|--------------------------------|----------------------|--|
| 0.009 – 10 th harmonic | 43+10logP* | -13 | 84.4 |

* - P is transmitter output power in Watts.

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

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

8.4.2.1 The EUT was set up as shown in Figure 8.4.1, energized and the performance check was conducted.

8.4.2.2 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.

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

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

8.4.3.1 The EUT was set up as shown in Figure 8.4.2, energized and the performance check was conducted.

8.4.3.2 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.

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

| | | | |
|----------------------------|--|--------------------------------|----------------------------|
| Test specification: | Section 24.238, Radiated spurious emissions | | |
| Test procedure: | Public notice DA 00-705 | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date & Time: | 10/16/2005 3:30:32 PM | | |
| Temperature: 24 °C | Air Pressure: 1012 hPa | Relative Humidity: 45 % | Power Supply: 4 VDC |
| Remarks: | | | |

Figure 8.4.1 Setup for spurious emission field strength measurements below 30 MHz

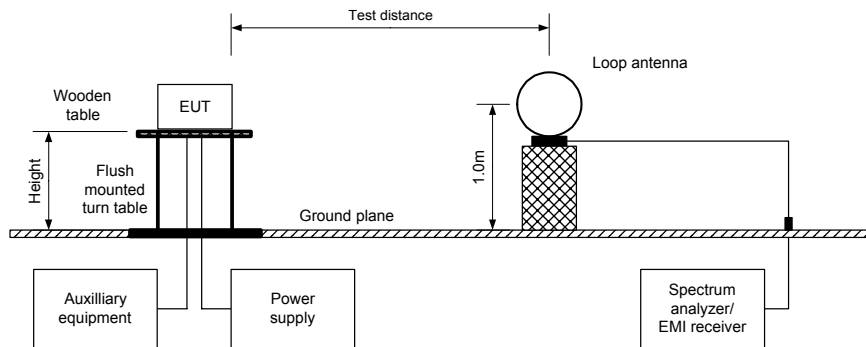
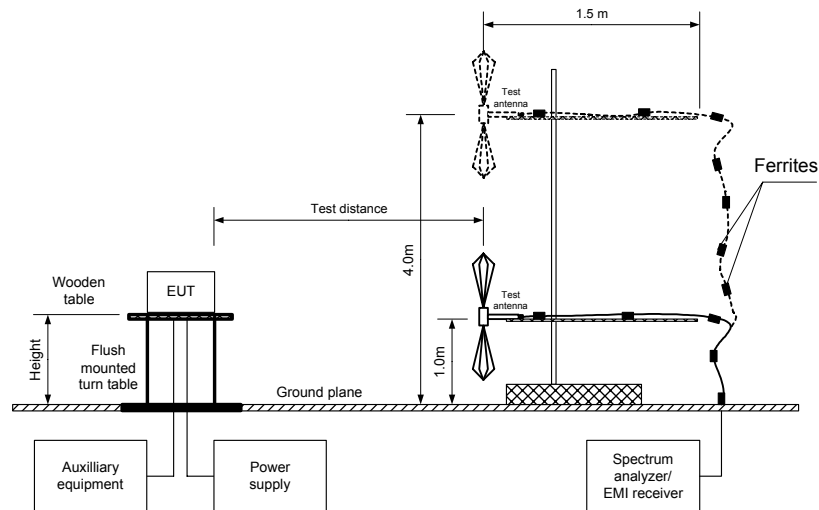


Figure 8.4.2 Setup for spurious emission field strength measurements above 30 MHz



| | | | |
|----------------------------|-------------------------------|--|----------------------------|
| Test specification: | | Section 24.238, Radiated spurious emissions | |
| Test procedure: | | Public notice DA 00-705 | |
| Test mode: | Compliance | Verdict: | PASS |
| Date & Time: | 10/16/2005 3:30:32 PM | | |
| Temperature: 24 °C | Air Pressure: 1012 hPa | Relative Humidity: 45 % | Power Supply: 4 VDC |
| Remarks: | | | |

Table 8.4.2 Field strength of emissions

ASSIGNED FREQUENCY RANGE: 1850 - 1910 MHz
 INVESTIGATED FREQUENCY RANGE: 0.009 – 20000 MHz
 TEST DISTANCE: 3 m
 MODULATION: Unmodulated
 DUTY CYCLE: 100 %
 TRANSMITTER OUTPUT POWER SETTINGS: Maximum
 TRANSMITTER OUTPUT POWER: 30.13 dBm at low carrier frequency
 30.17 dBm at mid carrier frequency
 30.00 dBm at high carrier frequency
 DETECTOR USED: Peak
 TEST ANTENNA TYPE: Active loop (9 kHz – 30 MHz)
 Biconilog (30 MHz – 1000 MHz)
 Double ridged guide (1000 MHz – 18000 MHz)
 Standard gain horn (above 18 GHz)

| Frequency, MHz | Field strength of spurious, dB(μV/m) | Limit, dB(μV/m) | Margin, dB | Antenna polarization | Antenna height, m | Azimuth, degrees* |
|----------------------------------|--------------------------------------|-----------------|------------|----------------------|-------------------|-------------------|
| No spurious emissions were found | | | | | | |

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

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

Reference numbers of test equipment used

| | | | | | | | |
|---------|---------|---------|---------|---------|---------|---------|---------|
| HL 0410 | HL 0446 | HL 0521 | HL 0589 | HL 0592 | HL 0593 | HL 0594 | HL 0604 |
| HL 0768 | HL 1200 | HL 1424 | HL 1942 | HL 1947 | HL 1984 | HL 2009 | HL 2259 |
| HL 2260 | HL 2387 | HL 2399 | | | | | |

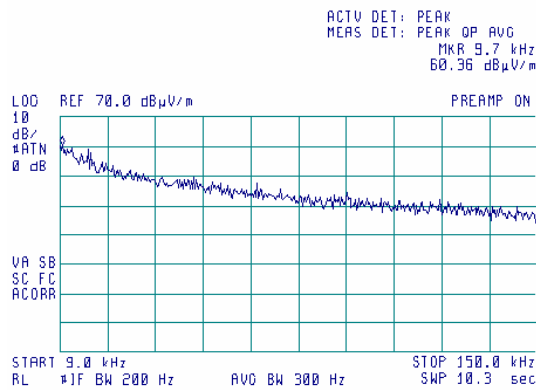
Full description is given in Appendix A.

| | | | |
|----------------------------|-------------------------------|--|----------------------------|
| Test specification: | | Section 24.238, Radiated spurious emissions | |
| Test procedure: | | Public notice DA 00-705 | |
| Test mode: | Compliance | Verdict: | PASS |
| Date & Time: | 10/16/2005 3:30:32 PM | | |
| Temperature: 24 °C | Air Pressure: 1012 hPa | Relative Humidity: 45 % | Power Supply: 4 VDC |
| Remarks: | | | |

Plot 8.4.1 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

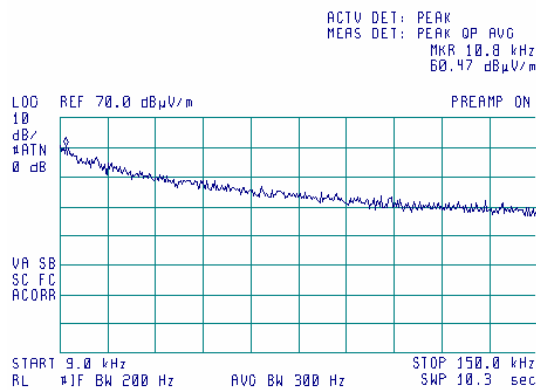
10:36:23 OCT 17, 2005



Plot 8.4.2 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

10:44:44 OCT 17, 2005

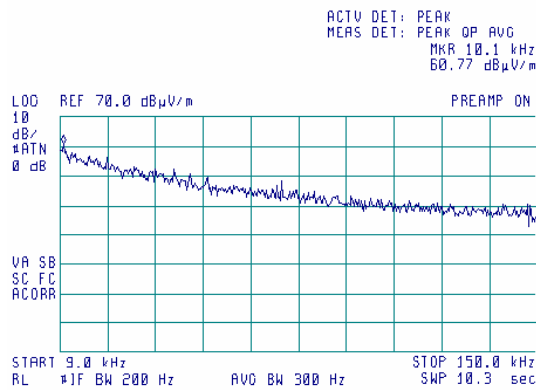


| | | | |
|----------------------------|--|--------------------------------|----------------------------|
| Test specification: | Section 24.238, Radiated spurious emissions | | |
| Test procedure: | Public notice DA 00-705 | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date & Time: | 10/16/2005 3:30:32 PM | | |
| Temperature: 24 °C | Air Pressure: 1012 hPa | Relative Humidity: 45 % | Power Supply: 4 VDC |
| Remarks: | | | |

Plot 8.4.3 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

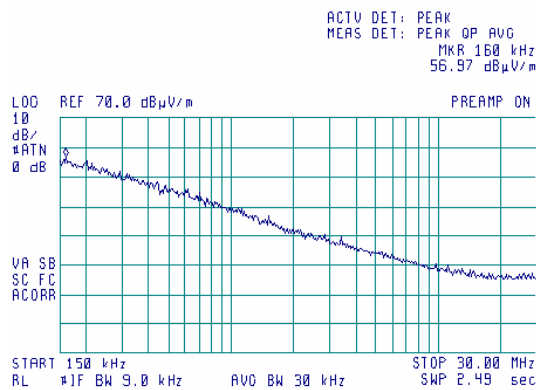
10:58:51 OCT 17, 2005



Plot 8.4.4 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

10:27:09 OCT 17, 2005

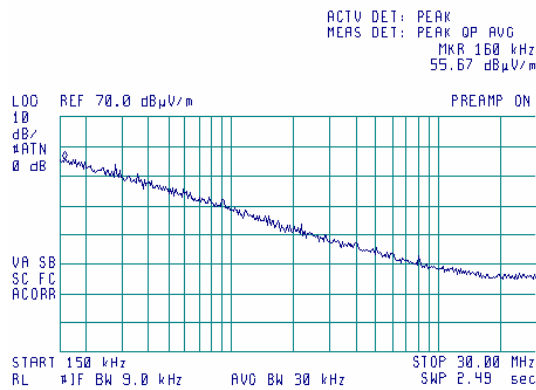


| | | | |
|----------------------------|--|--------------------------------|----------------------------|
| Test specification: | Section 24.238, Radiated spurious emissions | | |
| Test procedure: | Public notice DA 00-705 | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date & Time: | 10/16/2005 3:30:32 PM | | |
| Temperature: 24 °C | Air Pressure: 1012 hPa | Relative Humidity: 45 % | Power Supply: 4 VDC |
| Remarks: | | | |

Plot 8.4.5 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

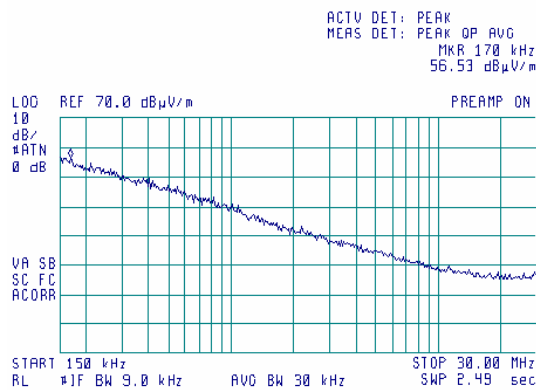
10:51:04 OCT 17, 2005



Plot 8.4.6 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

10:55:55 OCT 17, 2005

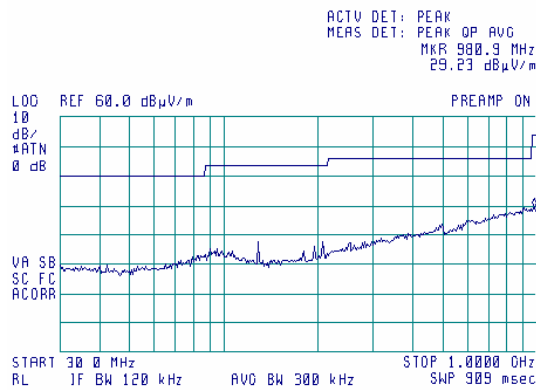


| | | | |
|--|-------------------------------|--------------------------------|----------------------------|
| Test specification: Section 24.238, Radiated spurious emissions | | | |
| Test procedure: Public notice DA 00-705 | | | |
| Test mode: Compliance | Verdict: PASS | | |
| Date & Time: 10/16/2005 3:30:32 PM | | | |
| Temperature: 24 °C | Air Pressure: 1012 hPa | Relative Humidity: 45 % | Power Supply: 4 VDC |
| Remarks: | | | |

Plot 8.4.7 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

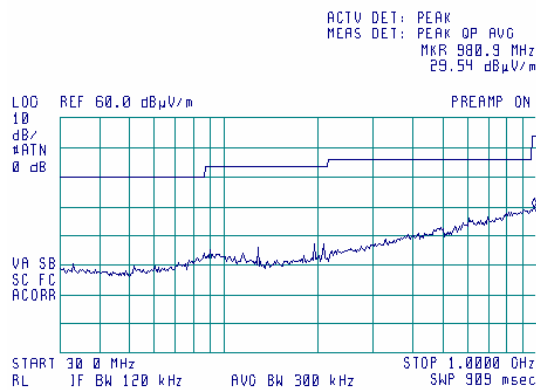
14:46:00 OCT 16, 2005



Plot 8.4.8 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

14:50:24 OCT 16, 2005

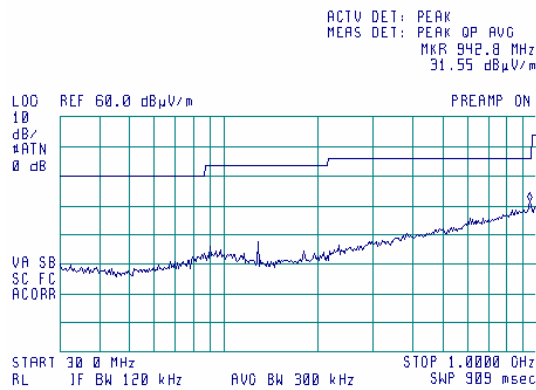


| | | | |
|--|-------------------------------|--------------------------------|----------------------------|
| Test specification: Section 24.238, Radiated spurious emissions | | | |
| Test procedure: Public notice DA 00-705 | | | |
| Test mode: Compliance | Verdict: PASS | | |
| Date & Time: 10/16/2005 3:30:32 PM | | | |
| Temperature: 24 °C | Air Pressure: 1012 hPa | Relative Humidity: 45 % | Power Supply: 4 VDC |
| Remarks: | | | |

Plot 8.4.9 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

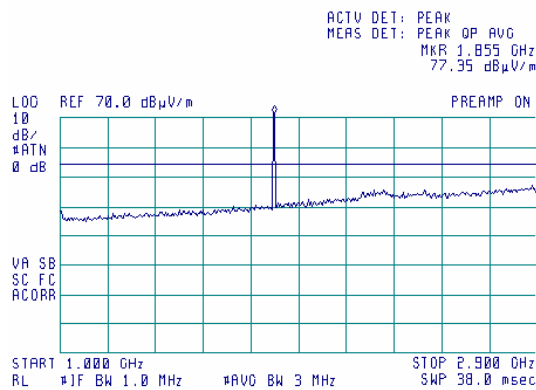
14:53:30 OCT 16, 2005



Plot 8.4.10 Radiated emission measurements from 1000 to 2900 MHz at the low carrier frequency

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

15:36:34 OCT 16, 2005

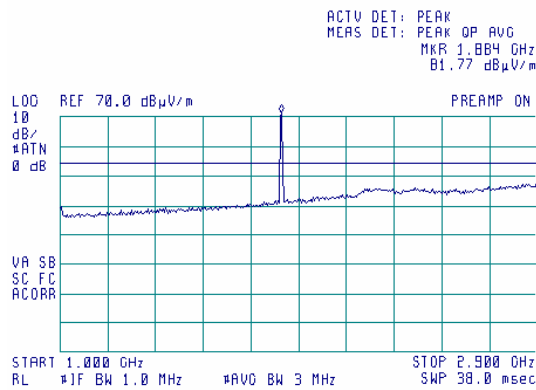


| | | | |
|--|-------------------------------|--------------------------------|----------------------------|
| Test specification: Section 24.238, Radiated spurious emissions | | | |
| Test procedure: Public notice DA 00-705 | | | |
| Test mode: Compliance | Verdict: PASS | | |
| Date & Time: 10/16/2005 3:30:32 PM | | | |
| Temperature: 24 °C | Air Pressure: 1012 hPa | Relative Humidity: 45 % | Power Supply: 4 VDC |
| Remarks: | | | |

Plot 8.4.11 Radiated emission measurements from 1000 to 2900 MHz at the mid carrier frequency

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

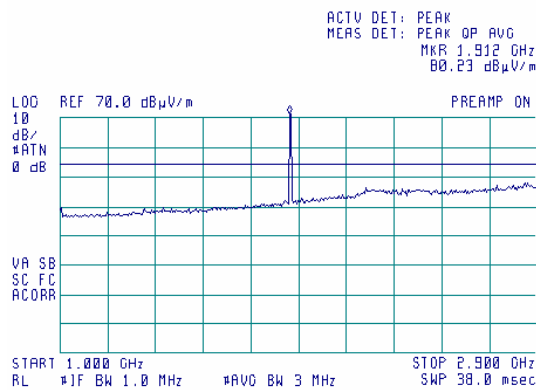
15:18:04 OCT 16, 2005



Plot 8.4.12 Radiated emission measurements from 1000 to 2900 MHz at the high carrier frequency

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

15:13:47 OCT 16, 2005

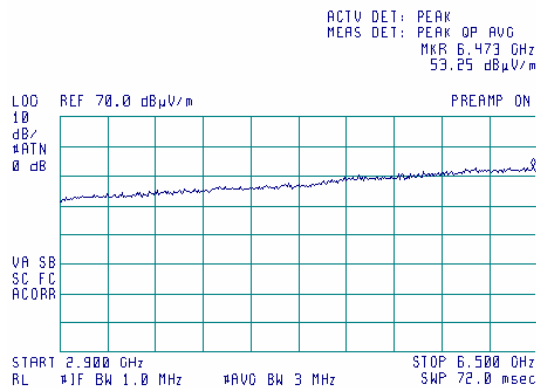


| | | | |
|----------------------------|-------------------------------|--|----------------------------|
| Test specification: | | Section 24.238, Radiated spurious emissions | |
| Test procedure: | | Public notice DA 00-705 | |
| Test mode: | Compliance | Verdict: | PASS |
| Date & Time: | 10/16/2005 3:30:32 PM | | |
| Temperature: 24 °C | Air Pressure: 1012 hPa | Relative Humidity: 45 % | Power Supply: 4 VDC |
| Remarks: | | | |

Plot 8.4.13 Radiated emission measurements from 2900 to 6500 MHz at the low carrier frequency

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

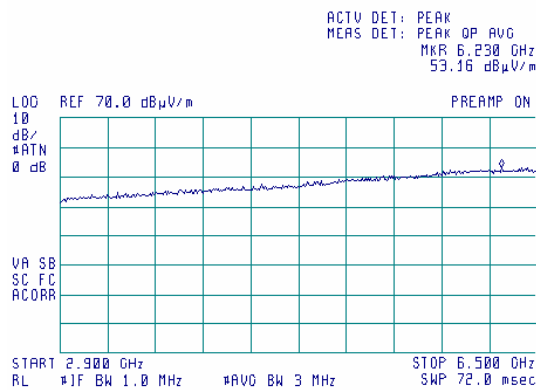
15:31:47 OCT 16, 2005



Plot 8.4.14 Radiated emission measurements from 2900 to 6500 MHz at the mid carrier frequency

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

15:22:51 OCT 16, 2005

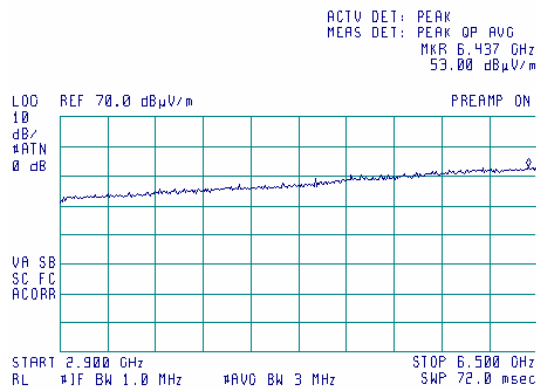


| | | | |
|--|-------------------------------|--------------------------------|----------------------------|
| Test specification: Section 24.238, Radiated spurious emissions | | | |
| Test procedure: Public notice DA 00-705 | | | |
| Test mode: Compliance | Verdict: PASS | | |
| Date & Time: 10/16/2005 3:30:32 PM | | | |
| Temperature: 24 °C | Air Pressure: 1012 hPa | Relative Humidity: 45 % | Power Supply: 4 VDC |
| Remarks: | | | |

Plot 8.4.15 Radiated emission measurements from 2900 to 6500 MHz at the high carrier frequency

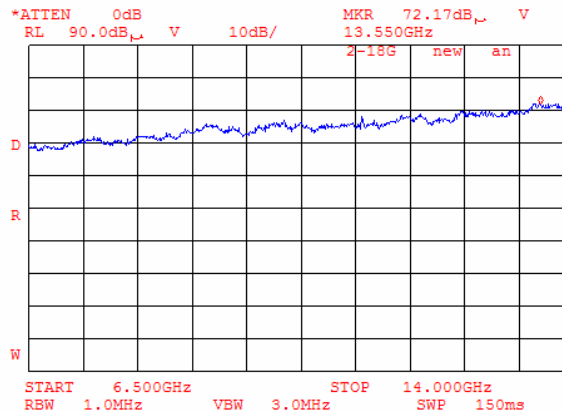
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal

15:27:09 OCT 16, 2005



Plot 8.4.16 Radiated emission measurements from 6.5 to 14 GHz at the low carrier frequency

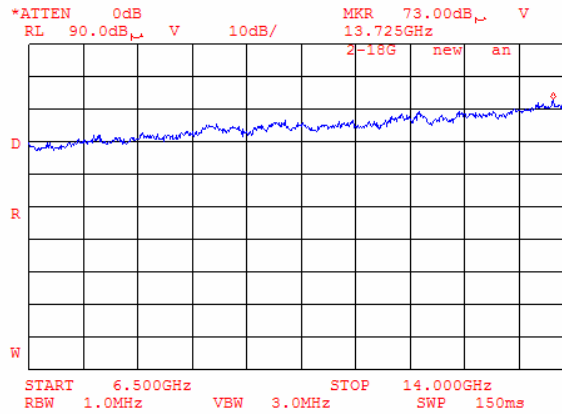
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal



| | | | |
|----------------------------|--|--------------------------------|----------------------------|
| Test specification: | Section 24.238, Radiated spurious emissions | | |
| Test procedure: | Public notice DA 00-705 | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date & Time: | 10/16/2005 3:30:32 PM | | |
| Temperature: 24 °C | Air Pressure: 1012 hPa | Relative Humidity: 45 % | Power Supply: 4 VDC |
| Remarks: | | | |

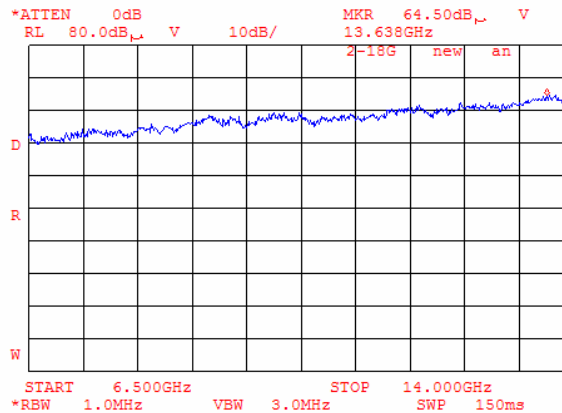
Plot 8.4.17 Radiated emission measurements from 6.5 to 14 GHz at the mid carrier frequency

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



Plot 8.4.18 Radiated emission measurements from 6.5 to 14 GHz at the high carrier frequency

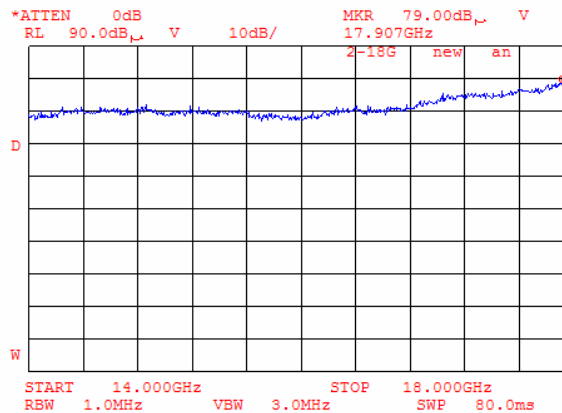
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal



| | | | |
|----------------------------|--|--------------------------------|----------------------------|
| Test specification: | Section 24.238, Radiated spurious emissions | | |
| Test procedure: | Public notice DA 00-705 | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date & Time: | 10/16/2005 3:30:32 PM | | |
| Temperature: 24 °C | Air Pressure: 1012 hPa | Relative Humidity: 45 % | Power Supply: 4 VDC |
| Remarks: | | | |

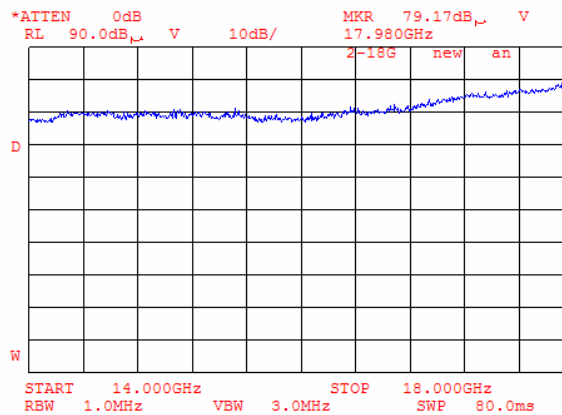
Plot 8.4.19 Radiated emission measurements from 14 to 18 GHz at the low carrier frequency

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



Plot 8.4.20 Radiated emission measurements from 14 to 18 GHz at the mid carrier frequency

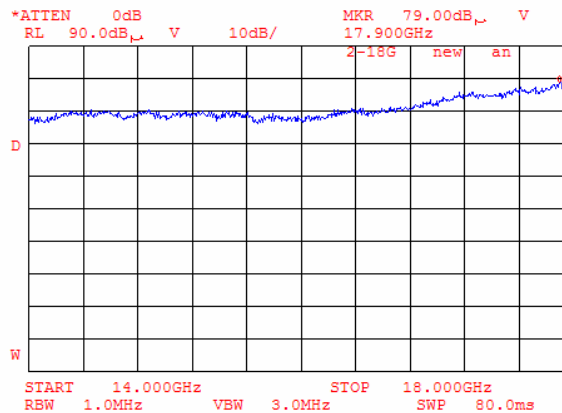
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal



| | | | |
|----------------------------|--|--------------------------------|----------------------------|
| Test specification: | Section 24.238, Radiated spurious emissions | | |
| Test procedure: | Public notice DA 00-705 | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date & Time: | 10/16/2005 3:30:32 PM | | |
| Temperature: 24 °C | Air Pressure: 1012 hPa | Relative Humidity: 45 % | Power Supply: 4 VDC |
| Remarks: | | | |

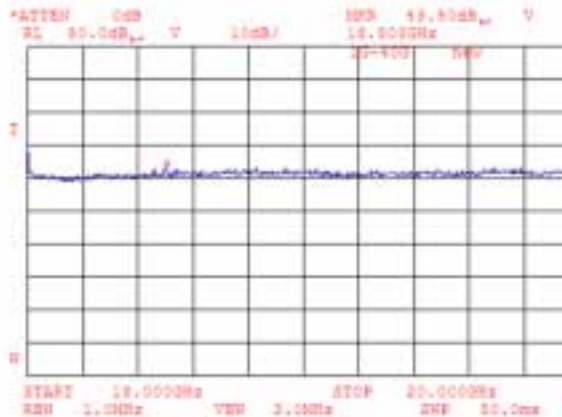
Plot 8.4.21 Radiated emission measurements from 14 to 18 GHz at the high carrier frequency

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



Plot 8.4.22 Radiated emission measurements from 18 to 20 GHz at the low carrier frequency

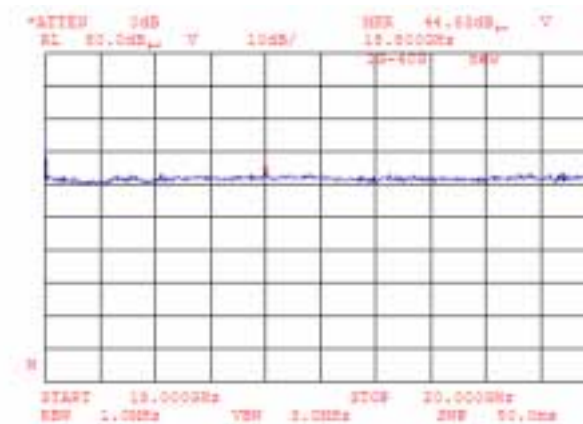
TEST SITE: OATS
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal



| | | | |
|----------------------------|-------------------------------|--|----------------------------|
| Test specification: | | Section 24.238, Radiated spurious emissions | |
| Test procedure: | | Public notice DA 00-705 | |
| Test mode: | Compliance | Verdict: | PASS |
| Date & Time: | 10/16/2005 3:30:32 PM | | |
| Temperature: 24 °C | Air Pressure: 1012 hPa | Relative Humidity: 45 % | Power Supply: 4 VDC |
| Remarks: | | | |

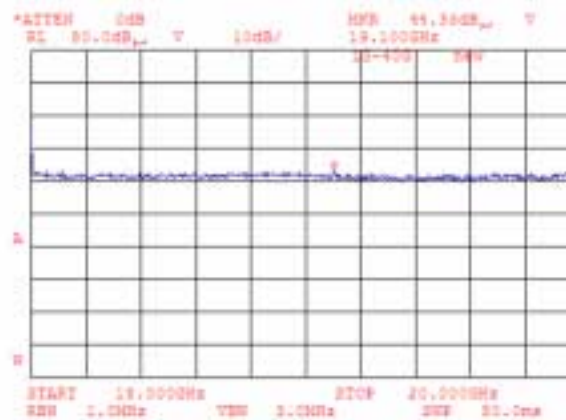
Plot 8.4.23 Radiated emission measurements from 18 to 20 GHz at the mid carrier frequency

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



Plot 8.4.24 Radiated emission measurements from 18 to 20 GHz at the high carrier frequency

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

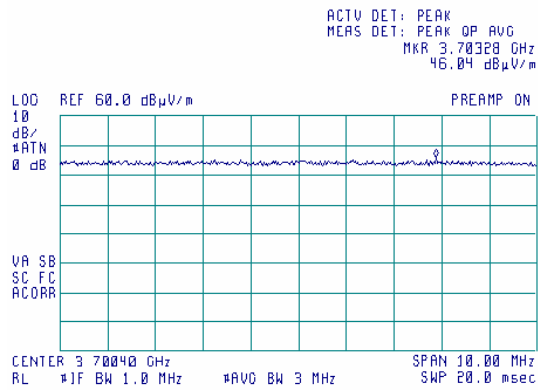


| | | | |
|----------------------------|--|--------------------------------|----------------------------|
| Test specification: | Section 24.238, Radiated spurious emissions | | |
| Test procedure: | Public notice DA 00-705 | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date & Time: | 10/16/2005 3:30:32 PM | | |
| Temperature: 24 °C | Air Pressure: 1012 hPa | Relative Humidity: 45 % | Power Supply: 4 VDC |
| Remarks: | | | |

Plot 8.4.25 Radiated emission measurements at the second harmonic of low carrier frequency

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m

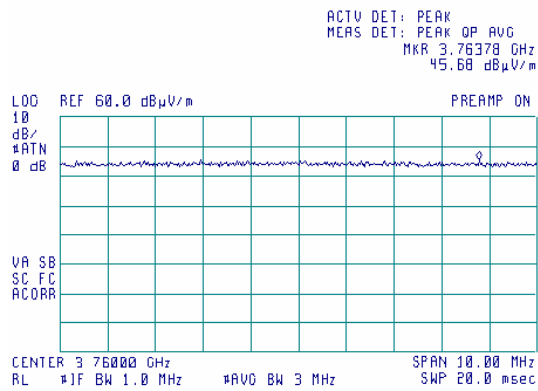
17:57:33 OCT 16, 2005



Plot 8.4.26 Radiated emission measurements at the second harmonic of mid carrier frequency

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m

18:21:51 OCT 16, 2005

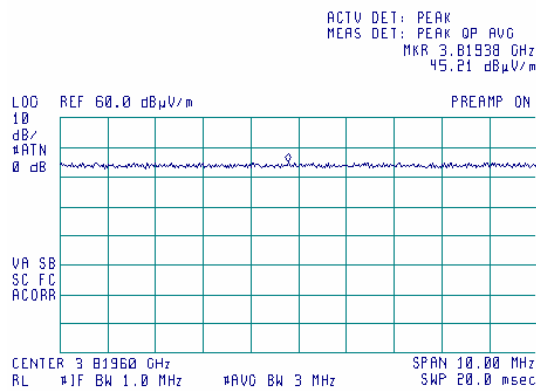


| | | | |
|----------------------------|--|--------------------------------|----------------------------|
| Test specification: | Section 24.238, Radiated spurious emissions | | |
| Test procedure: | Public notice DA 00-705 | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date & Time: | 10/16/2005 3:30:32 PM | | |
| Temperature: 24 °C | Air Pressure: 1012 hPa | Relative Humidity: 45 % | Power Supply: 4 VDC |
| Remarks: | | | |

Plot 8.4.27 Radiated emission measurements at the second harmonic of high carrier frequency

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m

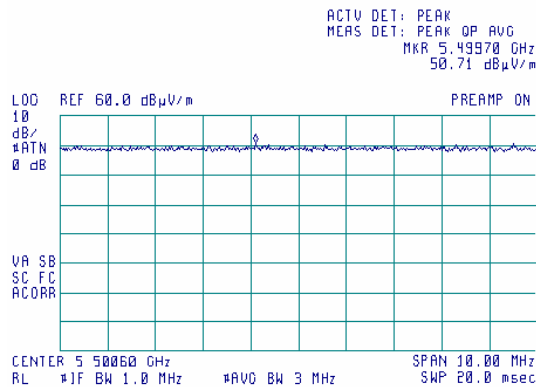
18:31:38 OCT 16, 2005



Plot 8.4.28 Radiated emission measurements at the third harmonic of low carrier frequency

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m

18:00:59 OCT 16, 2005

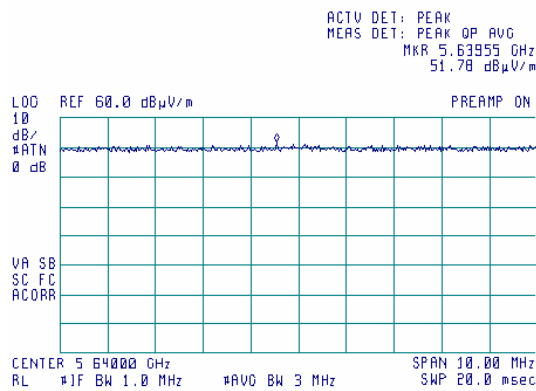


| | | | |
|----------------------------|--|--------------------------------|----------------------------|
| Test specification: | Section 24.238, Radiated spurious emissions | | |
| Test procedure: | Public notice DA 00-705 | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date & Time: | 10/16/2005 3:30:32 PM | | |
| Temperature: 24 °C | Air Pressure: 1012 hPa | Relative Humidity: 45 % | Power Supply: 4 VDC |
| Remarks: | | | |

Plot 8.4.29 Radiated emission measurements at the third harmonic of mid carrier frequency

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m

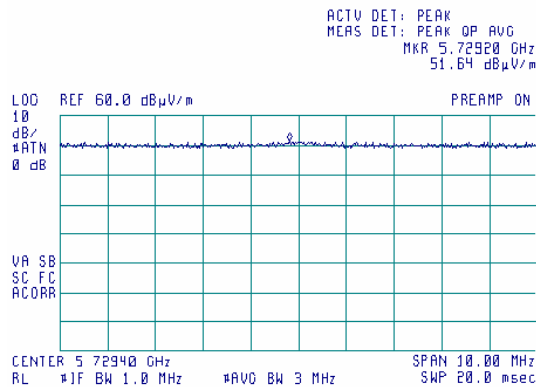
18:24:59 OCT 16, 2005



Plot 8.4.30 Radiated emission measurements at the third harmonic of high carrier frequency

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m

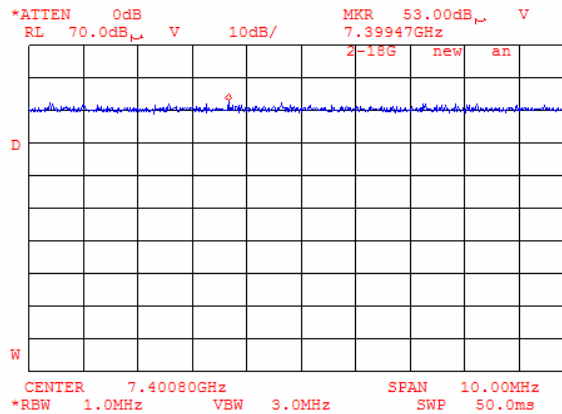
18:28:58 OCT 16, 2005



| | | | |
|----------------------------|--|--------------------------------|----------------------------|
| Test specification: | Section 24.238, Radiated spurious emissions | | |
| Test procedure: | Public notice DA 00-705 | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date & Time: | 10/16/2005 3:30:32 PM | | |
| Temperature: 24 °C | Air Pressure: 1012 hPa | Relative Humidity: 45 % | Power Supply: 4 VDC |
| Remarks: | | | |

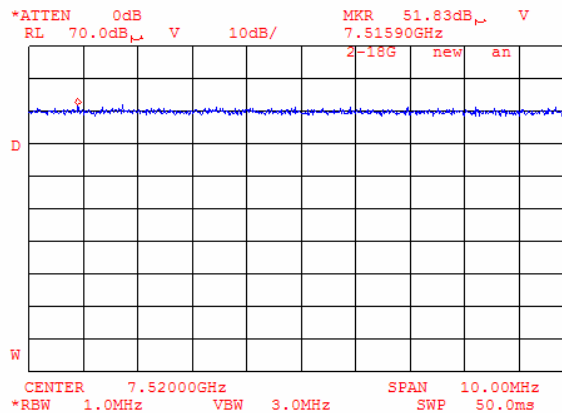
Plot 8.4.31 Radiated emission measurements at the fourth harmonic of low carrier frequency

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m



Plot 8.4.32 Radiated emission measurements at the fourth harmonic of mid carrier frequency

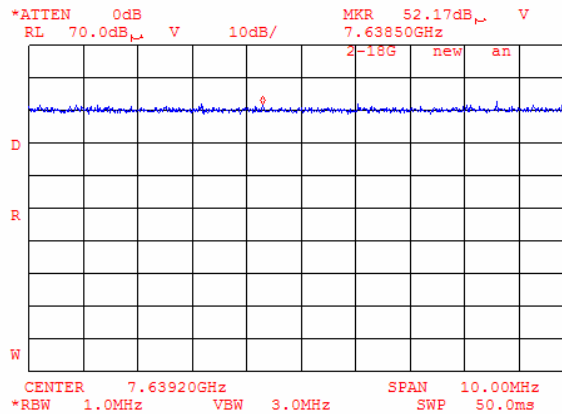
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m



| | | | |
|----------------------------|-------------------------------|--|----------------------------|
| Test specification: | | Section 24.238, Radiated spurious emissions | |
| Test procedure: | | Public notice DA 00-705 | |
| Test mode: | Compliance | Verdict: | PASS |
| Date & Time: | 10/16/2005 3:30:32 PM | | |
| Temperature: 24 °C | Air Pressure: 1012 hPa | Relative Humidity: 45 % | Power Supply: 4 VDC |
| Remarks: | | | |

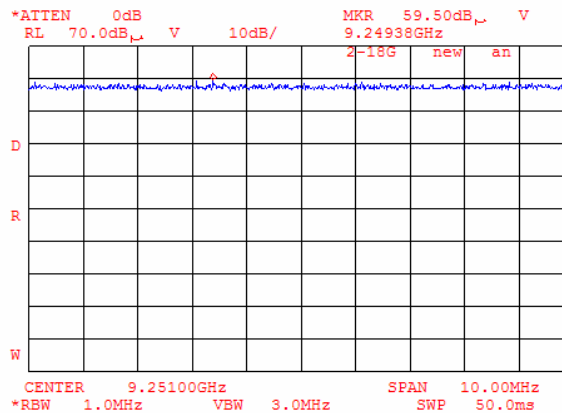
Plot 8.4.33 Radiated emission measurements at the fourth harmonic of high carrier frequency

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m



Plot 8.4.34 Radiated emission measurements at the fifth harmonic of low carrier frequency

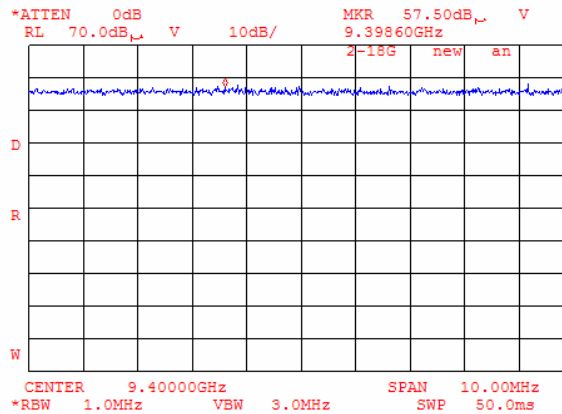
TEST SITE: OATS
TEST DISTANCE: 3 m



| | | | |
|----------------------------|-------------------------------|--|----------------------------|
| Test specification: | | Section 24.238, Radiated spurious emissions | |
| Test procedure: | | Public notice DA 00-705 | |
| Test mode: | Compliance | Verdict: | PASS |
| Date & Time: | 10/16/2005 3:30:32 PM | | |
| Temperature: 24 °C | Air Pressure: 1012 hPa | Relative Humidity: 45 % | Power Supply: 4 VDC |
| Remarks: | | | |

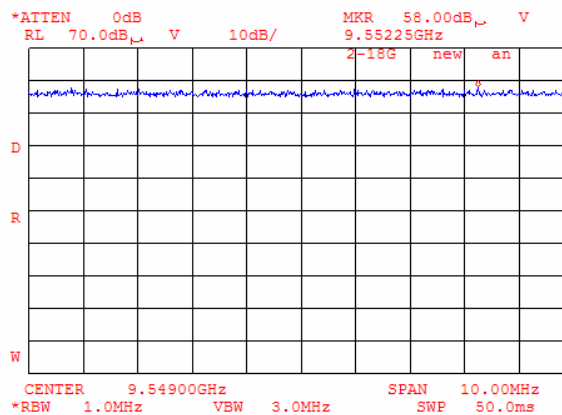
Plot 8.4.35 Radiated emission measurements at the fifth harmonic of mid carrier frequency

TEST SITE: OATS
TEST DISTANCE: 3 m



Plot 8.4.36 Radiated emission measurements at the fifth harmonic of high carrier frequency

TEST SITE: OATS
TEST DISTANCE: 3 m



| | | | |
|----------------------------|--|--------------------------------|----------------------------|
| Test specification: | Section 24.235, Frequency stability test | | |
| Test procedure: | FCC part 24, Section 24.235, part 2 section 2.1055 | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date & Time: | 10/23/2005 13:48:01 PM | | |
| Temperature: 24 °C | Air Pressure: 1012 hPa | Relative Humidity: 45 % | Power Supply: 4 VDC |
| Remarks: | | | |

8.5 Frequency stability test

8.5.1 General

This test was performed to measure frequency stability of transmitter RF carrier. Specification test limits are given in Table 8.5.1.

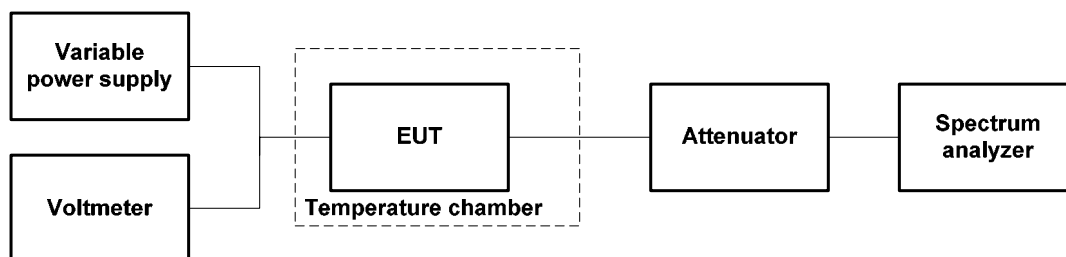
Table 8.5.1 Frequency stability limits

| Assigned frequency, MHz | Limits |
|-------------------------|--|
| 1850.2 | 26 dBc points including frequency tolerance shall remain within the authorized frequency block |
| 1880.0 | |
| 1909.8 | |

8.5.2 Test procedure

- 8.5.2.1 The EUT was set up as shown in Figure 8.5.1, energized and its proper operation was checked.
- 8.5.2.2 The EUT power was turned off. Temperature within test chamber was set to +30°C and a period of time sufficient to stabilize all of the oscillator circuit components was allowed.
- 8.5.2.3 The EUT was powered on and carrier frequency was measured at start up moment and then every minute until frequency had been stabilized or 10 minutes elapsed whichever reached the last. The EUT was powered off.
- 8.5.2.4 The above procedure was repeated at 0°C and at the lowest test temperature.
- 8.5.2.5 The EUT was powered on and carrier frequency was measured at start up moment and at the end of stabilization period at the rest of test temperatures and voltages. The EUT was powered off.
- 8.5.2.6 Frequency displacement was calculated and compared with the limit as provided in Table 8.5.2

Figure 8.5.1 Frequency stability test setup



| | | | | | |
|----------------------------|--|--|--|--------------------------------|--|
| Test specification: | | Section 24.235, Frequency stability test | | | |
| Test procedure: | | FCC part 24, Section 24.235, part 2 section 2.1055 | | | |
| Test mode: | | Compliance | | Verdict: PASS | |
| Date & Time: | | 10/23/2005 13:48:01 PM | | | |
| Temperature: 24 °C | | Air Pressure: 1012 hPa | | Relative Humidity: 45 % | |
| Power Supply: 4 VDC | | | | | |
| Remarks: | | | | | |

Table 8.5.2 Frequency stability test results

OPERATING FREQUENCY: 1850.2 – 1909.8 MHz
 NOMINAL POWER VOLTAGE: 4 Vdc
 TEMPERATURE STABILIZATION PERIOD: 20 min
 POWER DURING TEMPERATURE TRANSITION: Off
 SPECTRUM ANALYZER MODE: Counter
 RESOLUTION BANDWIDTH: 100 kHz
 VIDEO BANDWIDTH: 100 kHz
 MODULATION: FSK

| T, °C | Voltage, V | Frequency, MHz | | | | | | | Max frequency drift, Hz | |
|-------------------------------|------------|----------------|---------------------|---------------------|---------------------|---------------------|---------------------|----------------------|-------------------------|----------|
| | | Start up | 1 st min | 2 nd min | 3 rd min | 4 th min | 5 th min | 10 th min | Positive | Negative |
| Low carrier frequency | | | | | | | | | | |
| -30 | nominal | 1850.200400 | 1850.200400 | 1850.200450 | 1850.200450 | 1850.200400 | 1850.198750 | 1850.200450 | 450 | -1250 |
| -20 | nominal | 1850.200400 | NA | NA | NA | NA | NA | 1850.200000 | 400 | 0 |
| -10 | nominal | 1850.198750 | NA | NA | NA | NA | NA | 1850.200400 | 400 | -1250 |
| 0 | nominal | 1850.198750 | 1850.200000 | 1850.200000 | 1850.200400 | 1850.200450 | 1850.200000 | 1850.200400 | 450 | -1250 |
| 10 | nominal | 1850.198750 | NA | NA | NA | NA | NA | 1850.200000 | 0 | -1250 |
| 20 | +15% | 1850.198750 | NA | NA | NA | NA | NA | 1850.200400 | 400 | -1250 |
| 20 | nominal | 1850.200400 | NA | NA | NA | NA | NA | 1850.200540* | 540 | 0 |
| 20 | -15% | 1850.199375 | NA | NA | NA | NA | NA | 1850.200000 | 0 | -625 |
| 30 | nominal | 1850.200850 | NA | NA | NA | NA | NA | 1850.200000 | 850 | 0 |
| 40 | nominal | 1850.199375 | NA | NA | NA | NA | NA | 1850.200000 | 0 | -625 |
| 50 | nominal | 1850.200450 | 1850.200400 | 1850.200400 | 1850.200400 | 1850.200000 | 1850.200450 | 1850.200450 | 450 | 0 |
| Mid carrier frequency | | | | | | | | | | |
| -30 | nominal | 1880.005000 | 1880.005000 | 1,880.004600 | 1,880.004600 | 1880.005000 | 1880.005400 | 1,880.004600 | 0 | -850 |
| -20 | nominal | 1880.003350 | NA | NA | NA | NA | NA | 1880.003350 | 0 | -2100 |
| -10 | nominal | 1880.005000 | NA | NA | NA | NA | NA | 1,880.004600 | 0 | -850 |
| 0 | nominal | 1880.005450 | 1880.005400 | 1,880.004600 | 1880.005000 | 1880.005450 | 1880.005000 | 1880.005400 | 0 | -850 |
| 10 | nominal | 1880.005000 | NA | NA | NA | NA | NA | 1880.006650 | 1200 | -450 |
| 20 | +15% | 1880.003350 | NA | NA | NA | NA | NA | 1880.005450 | 0 | -2100 |
| 20 | nominal | 1880.005450 | NA | NA | NA | NA | NA | 1880.005000* | 0 | -450 |
| 20 | -15% | 1880.005000 | NA | NA | NA | NA | NA | 1,880.004600 | 0 | -850 |
| 30 | nominal | 1880.003350 | NA | NA | NA | NA | NA | 1880.005450 | 0 | -2100 |
| 40 | nominal | 1880.002500 | NA | NA | NA | NA | NA | 1880.001875 | 0 | -3575 |
| 50 | nominal | 1880.005450 | 1880.005450 | 1880.005000 | 1880.005450 | 1880.005450 | 1880.005400 | 1880.005000 | 0 | -450 |
| High carrier frequency | | | | | | | | | | |
| -30 | nominal | 1909.800850 | 1909.801200 | 1909.800850 | 1909.800850 | 1909.800000 | 1909.800850 | 1909.801200 | 0 | -2544 |
| -20 | nominal | 1909.801250 | NA | NA | NA | NA | NA | 1909.800800 | 1970 | 0 |
| -10 | nominal | 1909.800850 | NA | NA | NA | NA | NA | 1909.800250 | 1837 | 0 |
| 0 | nominal | 1909.800850 | 1909.800850 | 1909.800800 | 1909.800850 | 1909.800000 | 1909.800000 | 1909.800250 | 7293 | 0 |
| 10 | nominal | 1909.801200 | NA | NA | NA | NA | NA | 1909.800250 | 0 | -3127 |
| 20 | +15% | 1909.800000 | NA | NA | NA | NA | NA | 1909.800250 | 0 | -11427 |
| 20 | nominal | 1909.800850 | NA | NA | NA | NA | NA | 1909.800250* | 0 | -10975 |
| 20 | -15% | 1909.799375 | NA | NA | NA | NA | NA | 1909.799375 | 0 | -10872 |
| 30 | nominal | 1909.799375 | NA | NA | NA | NA | NA | 1909.799375 | 0 | -10872 |
| 40 | nominal | 1909.800000 | NA | NA | NA | NA | NA | 1909.800250 | 0 | -11427 |
| 50 | nominal | 1909.800000 | 1909.801250 | 1909.800000 | 1909.800800 | 1909.800850 | 1909.800000 | 1909.800000 | 0 | -10905 |

* - Reference frequency

| | | | |
|----------------------------|-------------------------------|--|----------------------------|
| Test specification: | | Section 24.235, Frequency stability test | |
| Test procedure: | | FCC part 24, Section 24.235, part 2 section 2.1055 | |
| Test mode: | Compliance | Verdict: | PASS |
| Date & Time: | 10/23/2005 13:48:01 PM | | |
| Temperature: 24 °C | Air Pressure: 1012 hPa | Relative Humidity: 45 % | Power Supply: 4 VDC |
| Remarks: | | | |

Table 8.5.3 Transmitter operating range including frequency drift

| Carrier frequency, MHz | Lower reference point, MHz | Upper reference point, MHz | Maximum negative drift, Hz | Maximum positive drift, Hz | Frequency tolerance, MHz | Limit, MHz | Margin, kHz | Verdict |
|------------------------|----------------------------|----------------------------|----------------------------|----------------------------|--------------------------|------------|-------------|---------|
| 1850.2 | 1850.062 | 1850.338 | 1250 | 1650 | 1850.06075 | 1850 | 60.75 | Pass |
| 1880.0 | 1879.863 | 1880.140 | 3575 | 1200 | NA | NA | NA | NA |
| 1909.8 | 1909.660 | 1909.933 | 0 | 1925 | 1909.93493 | 1910 | -65.075 | Pass |

Reference numbers of test equipment used

| | | | | | | | |
|---------|---------|---------|---------|---------|--|--|--|
| HL 0278 | HL 0493 | HL 1097 | HL 1204 | HL 1653 | | | |
|---------|---------|---------|---------|---------|--|--|--|

Full description is given in Appendix A.

| | | | |
|----------------------------|-------------------------------|--|-------------------------------|
| Test specification: | | Section 15.107 Conducted emission | |
| Test procedure: | | ANSI C63.4, Section 13.1.3; Sections 11.5 and 12.1.3 | |
| Test mode: | Compliance | Verdict: | PASS |
| Date & Time: | 11/4/2005 4:03:01 PM | | |
| Temperature: 24 °C | Air Pressure: 1011 hPa | Relative Humidity: 44 % | Power Supply: 120 V AC |
| Remarks: | | | |

9 Unintentional radiation tests according to 47CFR part 15 subpart B requirements

9.1 Conducted emissions

9.1.1 General

This test was performed to measure common mode conducted emissions at the power port. Specification test limits are given in Table 9.1.1. The worst test results (the lowest margins) were recorded in Table 9.1.2 and shown in the associated plots.

Table 9.1.1 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.

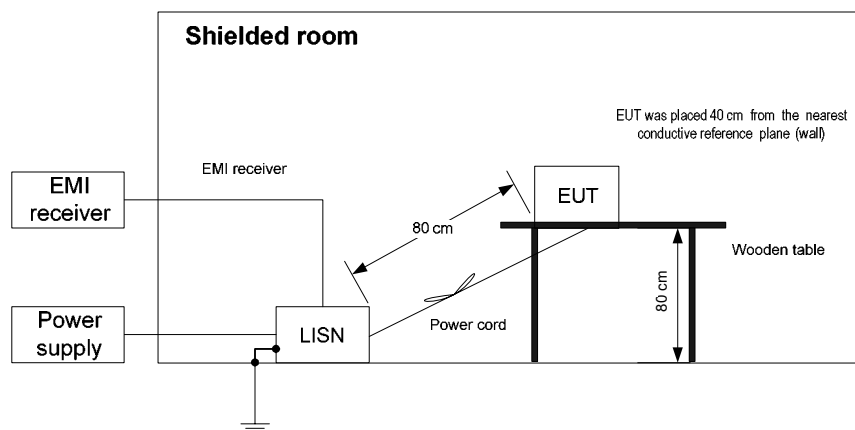
9.1.2 Test procedure

9.1.2.1 The EUT was set up as shown in Figure 9.1.1, energized and the performance check was conducted.

9.1.2.2 The measurements were performed at power terminals with the LISN, connected to a spectrum analyzer in the frequency range referred to in Table 9.1.2. Unused coaxial connector of the LISN was terminated with 50 Ohm. Quasi-peak and average detectors were used throughout the testing.

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

Figure 9.1.1 Setup for conducted emission measurements, table-top equipment



| | | | |
|----------------------------|--|--------------------------------|-------------------------------|
| Test specification: | Section 15.107 Conducted emission | | |
| Test procedure: | ANSI C63.4, Section 13.1.3; Sections 11.5 and 12.1.3 | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date & Time: | 11/4/2005 4:03:01 PM | | |
| Temperature: 24 °C | Air Pressure: 1011 hPa | Relative Humidity: 44 % | Power Supply: 120 V AC |
| Remarks: | | | |

Photograph 9.1.1 Setup for conducted emission measurements



| | | | |
|----------------------------|-------------------------------|--|-------------------------------|
| Test specification: | | Section 15.107 Conducted emission | |
| Test procedure: | | ANSI C63.4, Section 13.1.3; Sections 11.5 and 12.1.3 | |
| Test mode: | Compliance | Verdict: PASS | |
| Date & Time: | 11/4/2005 4:03:01 PM | | |
| Temperature: 24 °C | Air Pressure: 1011 hPa | Relative Humidity: 44 % | Power Supply: 120 V AC |
| Remarks: | | | |

Table 9.1.2 Conducted emission test results

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

| 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* | | |
| 0.171209 | 23.29 | 15.19 | 64.97 | -49.78 | 2.49 | 54.97 | -52.48 | L1 | Pass |
| 0.207759 | 25.68 | 23.25 | 63.36 | -40.11 | 16.04 | 53.36 | -37.32 | | |
| 14.489674 | 32.51 | 27.95 | 60.00 | -32.05 | 20.99 | 50.00 | -29.01 | | |
| 0.169099 | 24.19 | 17.69 | 65.07 | -47.38 | 14.02 | 55.07 | -41.05 | L2 | Pass |
| 0.207852 | 26.89 | 24.22 | 63.35 | -39.13 | 17.59 | 53.35 | -35.76 | | |
| 13.990632 | 31.23 | 27.61 | 60.00 | -32.39 | 20.77 | 50.00 | -29.23 | | |

*- Margin = Measured emission - specification limit.

Reference numbers of test equipment used

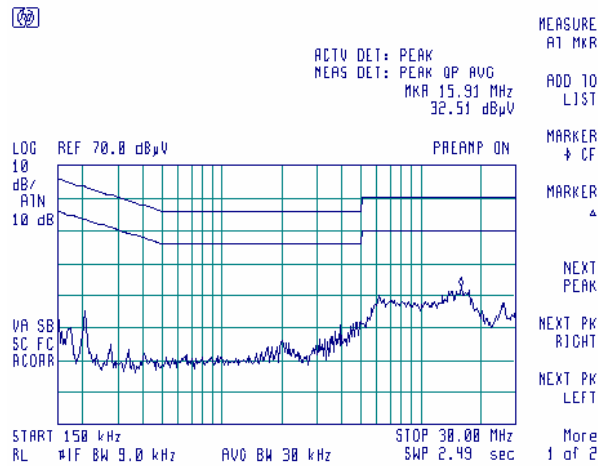
| | | | | | | | |
|---------|---------|---------|---------|---------|---------|---------|--|
| HL 0447 | HL 0580 | HL 1094 | HL 1430 | HL 1503 | HL 1512 | HL 2634 | |
|---------|---------|---------|---------|---------|---------|---------|--|

Full description is given in Appendix A.

| | | | |
|---|-------------------------------|--------------------------------|-------------------------------|
| Test specification: Section 15.107 Conducted emission | | | |
| Test procedure: ANSI C63.4, Section 13.1.3; Sections 11.5 and 12.1.3 | | | |
| Test mode: Compliance | Verdict: PASS | | |
| Date & Time: 11/4/2005 4:03:01 PM | | | |
| Temperature: 24 °C | Air Pressure: 1011 hPa | Relative Humidity: 44 % | Power Supply: 120 V AC |
| Remarks: | | | |

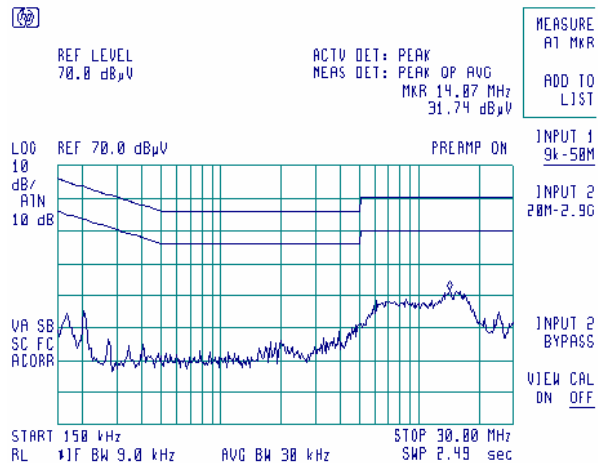
Plot 9.1.1 Conducted emission measurements

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



Plot 9.1.2 Conducted emission measurements

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



| | | | |
|--|-------------------------------|--------------------------------|----------------------------|
| Test specification: Section 15.109, Radiated emission | | | |
| Test procedure: ANSI C63.4, Sections 11.6 and 12.1.4 | | | |
| Test mode: Compliance | | Verdict: PASS | |
| Date & Time: 10/16/2005 3:24:17 PM | | | |
| Temperature: 21 °C | Air Pressure: 1012 hPa | Relative Humidity: 39 % | Power Supply: 4 VDC |
| Remarks: | | | |

9.2 Radiated emissions

9.2.1 General

This test was performed to measure radiated emissions from the EUT enclosure. Specification test limits are given in Table 9.2.1.

Table 9.2.1 Radiated emission test limits

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

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

9.2.2 Test procedure for measurements in semi-anechoic chamber

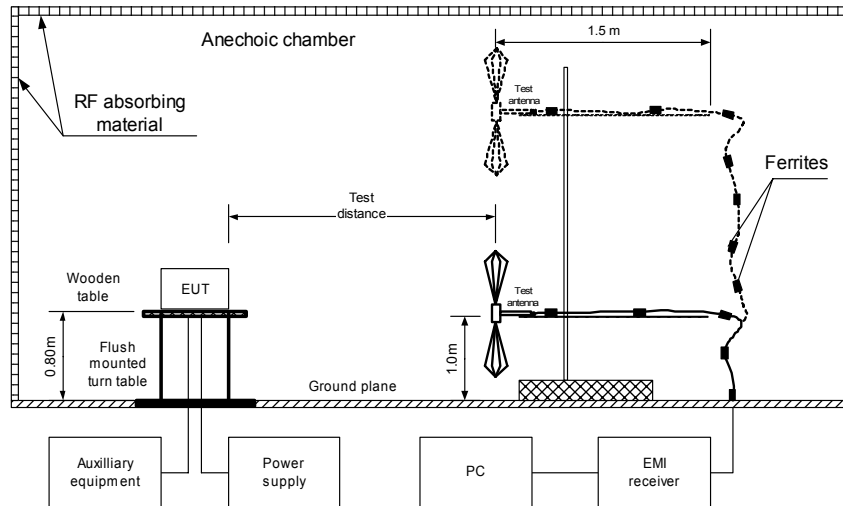
9.2.2.1 The EUT was set up as shown in Figure 9.2.1 and associated photograph/s, energized and the performance check was conducted.

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

9.2.2.3 The worst test results (the lowest margins) were recorded in Table 9.2.2 and shown in the associated plots.

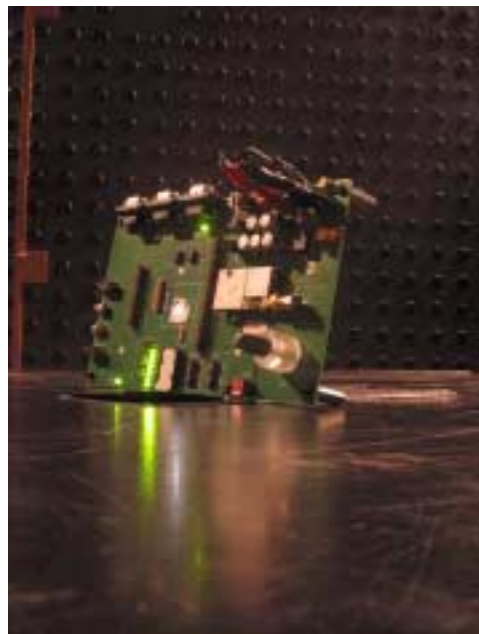
| | | | |
|--|-------------------------------|--------------------------------|----------------------------|
| Test specification: Section 15.109, Radiated emission | | | |
| Test procedure: ANSI C63.4, Sections 11.6 and 12.1.4 | | | |
| Test mode: Compliance | | Verdict: PASS | |
| Date & Time: 10/16/2005 3:24:17 PM | | | |
| Temperature: 21 °C | Air Pressure: 1012 hPa | Relative Humidity: 39 % | Power Supply: 4 VDC |
| Remarks: | | | |

Figure 9.2.1 Setup for radiated emission measurements in anechoic chamber, table-top equipment



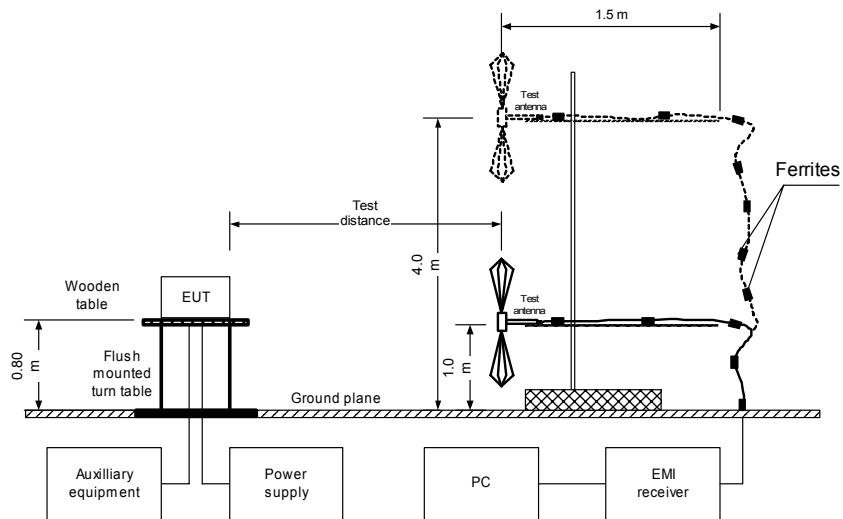
| | | | |
|----------------------------|--|--------------------------------|----------------------------|
| Test specification: | Section 15.109, Radiated emission | | |
| Test procedure: | ANSI C63.4, Sections 11.6 and 12.1.4 | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date & Time: | 10/16/2005 3:24:17 PM | | |
| Temperature: 21 °C | Air Pressure: 1012 hPa | Relative Humidity: 39 % | Power Supply: 4 VDC |
| Remarks: | | | |

Photograph 9.2.1 Setup for radiated emission measurements, below 1 GHz



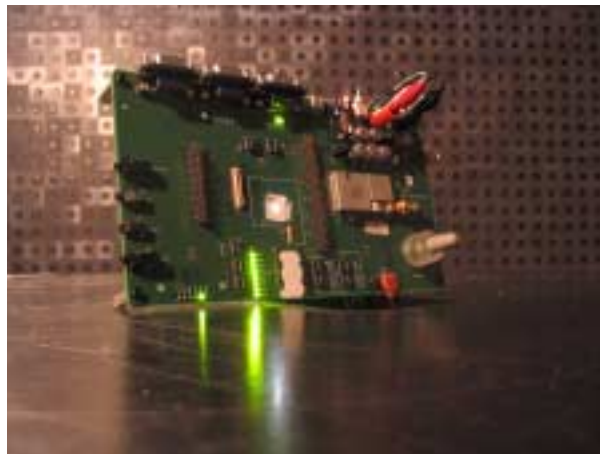
| | | | |
|----------------------------|--|--------------------------------|----------------------------|
| Test specification: | Section 15.109, Radiated emission | | |
| Test procedure: | ANSI C63.4, Sections 11.6 and 12.1.4 | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date & Time: | 10/16/2005 3:24:17 PM | | |
| Temperature: 21 °C | Air Pressure: 1012 hPa | Relative Humidity: 39 % | Power Supply: 4 VDC |
| Remarks: | | | |

Figure 9.2.2 Setup for radiated emission measurements, table-top equipment



| | | | |
|----------------------------|--|--------------------------------|----------------------------|
| Test specification: | Section 15.109, Radiated emission | | |
| Test procedure: | ANSI C63.4, Sections 11.6 and 12.1.4 | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date & Time: | 10/16/2005 3:24:17 PM | | |
| Temperature: 21 °C | Air Pressure: 1012 hPa | Relative Humidity: 39 % | Power Supply: 4 VDC |
| Remarks: | | | |

Photograph 9.2.2 Setup for radiated emission measurements, above 1 GHz



| | | | |
|--|-------------------------------|--------------------------------|----------------------------|
| Test specification: Section 15.109, Radiated emission | | | |
| Test procedure: ANSI C63.4, Sections 11.6 and 12.1.4 | | | |
| Test mode: Compliance | Verdict: PASS | | |
| Date & Time: 10/16/2005 3:24:17 PM | | | |
| Temperature: 21 °C | Air Pressure: 1012 hPa | Relative Humidity: 39 % | Power Supply: 4 VDC |
| Remarks: | | | |

Table 9.2.2 Radiated emission test results

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

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

TEST SITE: SEMI ANECHOIC CHAMBER
TEST DISTANCE: 3 m
DETECTORS USED: PEAK / AVERAGE
FREQUENCY RANGE: 1000 MHz – 10000 MHz
RESOLUTION BANDWIDTH: 1000 kHz

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

*- Margin = Measured emission - specification limit.

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

Reference numbers of test equipment used

| | | | | | | | |
|---------|---------|---------|---------|---------|---------|---------|---------|
| HL 0410 | HL 0521 | HL 0589 | HL 0592 | HL 0593 | HL 0594 | HL 0604 | HL 1200 |
| HL 1424 | HL 1942 | HL 1947 | HL 1984 | HL 2009 | HL 2259 | | |

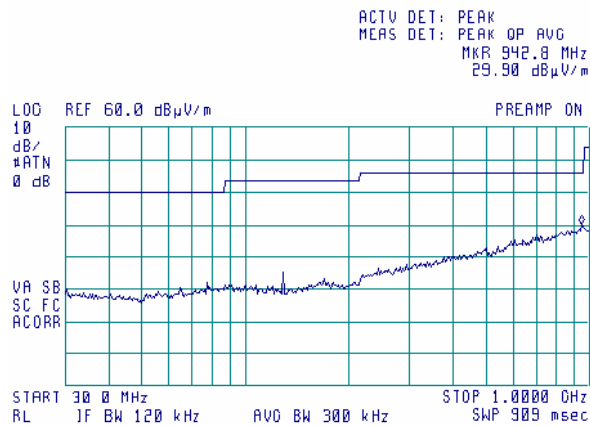
Full description is given in Appendix A.

| | | | |
|--|-------------------------------|--------------------------------|----------------------------|
| Test specification: Section 15.109, Radiated emission | | | |
| Test procedure: ANSI C63.4, Sections 11.6 and 12.1.4 | | | |
| Test mode: Compliance | Verdict: PASS | | |
| Date & Time: 10/16/2005 3:24:17 PM | | | |
| Temperature: 21 °C | Air Pressure: 1012 hPa | Relative Humidity: 39 % | Power Supply: 4 VDC |
| Remarks: | | | |

Plot 9.2.1 Radiated emission measurements in 30- 1000 MHz range, vertical antenna polarization

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

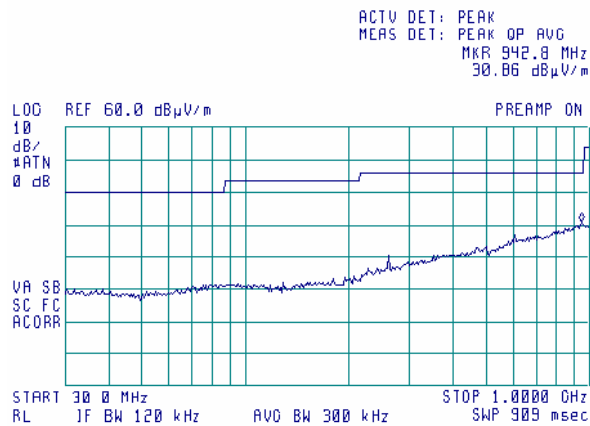
13:32:38 OCT 16, 2005



Plot 9.2.2 Radiated emission measurements in 30- 1000 MHz range, horizontal antenna polarization

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

13:30:20 OCT 16, 2005

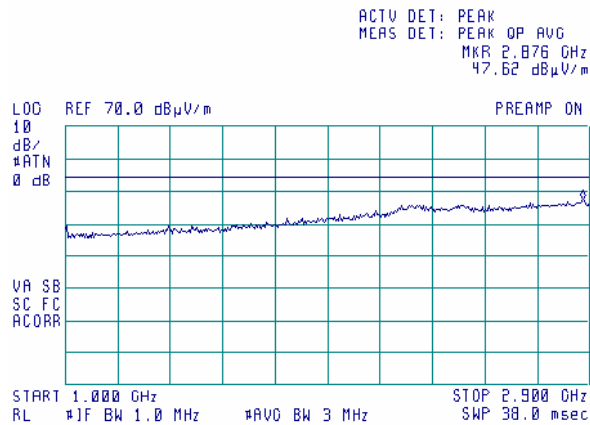


| | | | |
|----------------------------|-------------------------------|--|----------------------------|
| Test specification: | | Section 15.109, Radiated emission | |
| Test procedure: | | ANSI C63.4, Sections 11.6 and 12.1.4 | |
| Test mode: | Compliance | Verdict: | PASS |
| Date & Time: | 10/16/2005 3:24:17 PM | | |
| Temperature: 21 °C | Air Pressure: 1012 hPa | Relative Humidity: 39 % | Power Supply: 4 VDC |
| Remarks: | | | |

Plot 9.2.3 Radiated emission measurements in 1000- 2900 MHz range, vertical antenna polarization

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

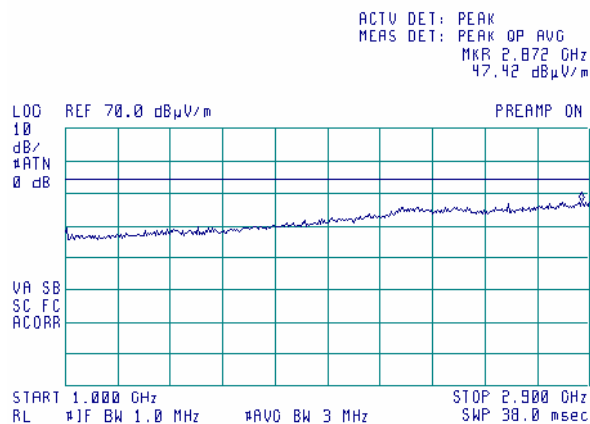
15:55:25 OCT 16, 2005



Plot 9.2.4 Radiated emission measurements in 1000- 2900 MHz range, horizontal antenna polarization

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

15:52:25 OCT 16, 2005

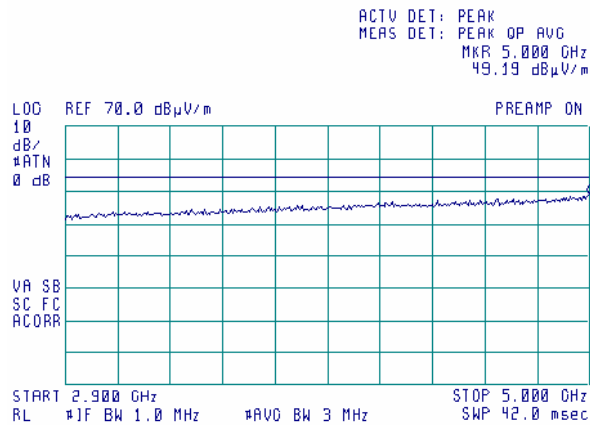


| | | | |
|----------------------------|-------------------------------|--|----------------------------|
| Test specification: | | Section 15.109, Radiated emission | |
| Test procedure: | | ANSI C63.4, Sections 11.6 and 12.1.4 | |
| Test mode: | Compliance | Verdict: | PASS |
| Date & Time: | 10/16/2005 3:24:17 PM | | |
| Temperature: 21 °C | Air Pressure: 1012 hPa | Relative Humidity: 39 % | Power Supply: 4 VDC |
| Remarks: | | | |

Plot 9.2.5 Radiated emission measurements in 2900 - 5000 MHz range, vertical antenna polarization

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

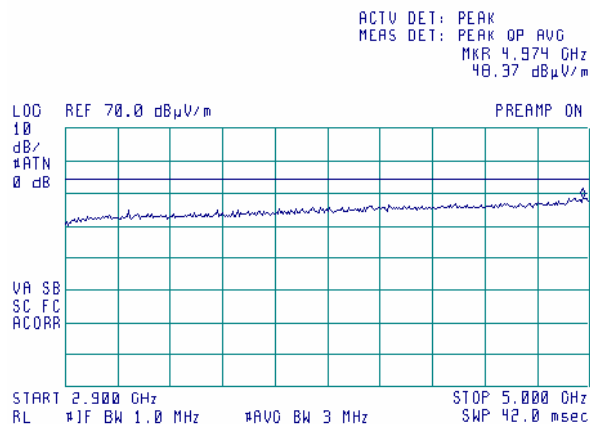
15:59:39 OCT 16, 2005



Plot 9.2.6 Radiated emission measurements in 2900 - 5000 MHz range, horizontal antenna polarization

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

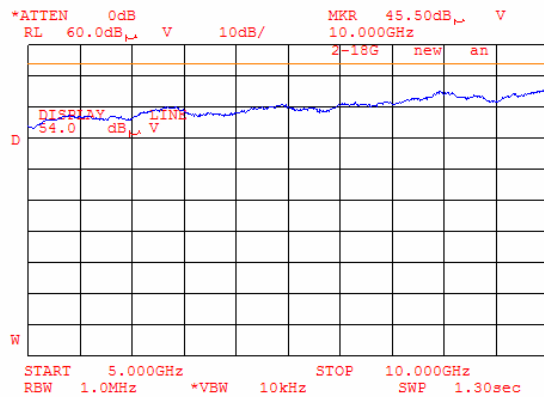
16:01:55 OCT 16, 2005



| | | | |
|----------------------------|-------------------------------|--|----------------------------|
| Test specification: | | Section 15.109, Radiated emission | |
| Test procedure: | | ANSI C63.4, Sections 11.6 and 12.1.4 | |
| Test mode: | Compliance | Verdict: | PASS |
| Date & Time: | 10/16/2005 3:24:17 PM | | |
| Temperature: 21 °C | Air Pressure: 1012 hPa | Relative Humidity: 39 % | Power Supply: 4 VDC |
| Remarks: | | | |

Plot 9.2.7 Radiated emission measurements in 5000 - 10000 MHz range, vertical and horizontal antenna polarization

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



10 APPENDIX A Test equipment and ancillaries used for tests

| HL No | Description | Manufacturer | Model | Ser. No. | Last Cal. | Due Cal. |
|-------|---|----------------------------|---------------------------------|-----------------------------------|-----------|-----------|
| 0278 | Thermometer, -200 - +760C | Fluke | 51K/J | 5045468 | 28-Apr-05 | 28-Apr-06 |
| 0410 | Cable, Coax, Microwave, DC-18 GHz, N-N, 1 m | Gore | PFP01P0 1039.4 | 9338767 | 17-Oct-04 | 17-Oct-05 |
| 0446 | Antenna, Loop active, 10kHz-30MHz | EMCO | 6502 | 2857 | 28-Jun-05 | 28-Jun-06 |
| 0447 | LISN, 16/2, 300V RMS | HL | LISN 16 - 1 | 066 | 03-Nov-05 | 03-Nov-06 |
| 0493 | Oven temperature -45...175 deg C | Thermotron | S-1.2 Mini-Max | 14016 | 23-Sep-05 | 23-Sep-06 |
| 0521 | EMI Receiver (Spectrum Analyzer) with RF filter section 9 kHz-6.5 GHz | Hewlett Packard | 8546A | 3617A 00319, 3448A002 53 | 26-Sep-05 | 26-Sep-06 |
| 0580 | DC block adaptor 10 kHz - 2.2 GHz | Anritsu | MA8601 A | 580 | 22-Dec-04 | 22-Dec-05 |
| 0589 | Cable Coaxial, GORE A2P01POL118, 2.3 m | HL | GORE-3 | 176 | 02-Dec-04 | 02-Dec-05 |
| 0592 | Position Controller | HL | L2- SR3000 (HL CRL- 3) | 100 | 18-May-05 | 18-May-06 |
| 0593 | Antenna Mast, 1-4 m Pneumatic | Madgesh | AM-F1 | 101 | 03-Feb-05 | 03-Feb-06 |
| 0594 | Turn Table FOR ANECHOIC CHAMBER flush mount d=1.2 m Pneumatic | HL | TT-WDC1 | 102 | 27-Jan-05 | 27-Jan-06 |
| 0604 | Antenna BiconiLog Log-Periodic/T Bow-TIE 26 - 2000 MHz | EMCO | 3141 | 9611-1011 | 27-Jan-05 | 27-Jan-06 |
| 0768 | Antenna Standard Gain Horn, 18-26.5 GHz, WR-42, K-band, Gain - 25 dB | Quinstar Technology | QWH- 4200-BA | 110 | 10-Jan-05 | 10-Jan-06 |
| 1094 | Attenuator, 50 Ohm, 2 W, DC to 1500 MHz, 10 dB | Mini-Circuits | NAT-10 | 1094 | 15-Jan-05 | 15-Jan-06 |
| 1097 | Attenuator, 50 Ohm, 5 W, DC to 8 GHz, 20 dB | Midwest Microwave | 0793-20- NN-07 | 1097 | 15-Jan-05 | 15-Jan-06 |
| 1200 | Quadruplexer 1-12 GHz (1-2 GHz; 2-4GHz;4-8 GHz; 8-12GHz) | Elettronica S.p.A. - Roma | UE 84 | D/00240 | 10-Feb-05 | 10-Feb-06 |
| 1204 | One phase Voltage regulator, 2kVA, 0-250V | HL | TDGC-2 | 99 | 04-Jun-05 | 04-Jun-06 |
| 1424 | Spectrum Analyzer, 30 Hz- 40 GHz | Agilent Technologies (HP) | 8564EC | 3946A002 19 | 04-Jun-05 | 04-Jun-06 |
| 1430 | EMI Receiver, 9 kHz - 2.9 GHz, System: HL1431, HL1432 | Agilent Technologies (HP) | 8542E | 3807A002 62,3705A0 0217 | 04-Jun-05 | 04-Jun-06 |
| 1503 | Cable RF, 6 m | Belden | M17/167 MIL-C-17 | 1503 | 11-Sep-05 | 11-Sep-06 |
| 1512 | Cable RF, 8 m | Belden | M17/167 MIL-C-17 | 1512 | 11-Sep-05 | 11-Sep-06 |
| 1653 | Analyzer EMC 9 kHz - 1.5 GHz | Agilent Technologies (HP) | E7401A | US394402 81 | 11-Sep-05 | 11-Sep-06 |
| 1942 | Cable 18GHz, 4 m, blue | Rhophase Microwave Limited | SPS- 1803A- 4000-NPS | T4658 | 11-Sep-05 | 11-Sep-06 |
| 1947 | Cable 18GHz, 6.5 m, blue | Rhophase Microwave Limited | NPS- 1803A- 6500-NPS | T4974 | 11-Sep-05 | 11-Sep-06 |
| 1984 | Antenna, Double-Ridged Waveguide Horn, 1-18 GHz, 300 W, N-type | EMC Test Systems | 3115 | 9911-5964 | 11-Sep-05 | 11-Sep-06 |

| HL No | Description | Manufacturer | Model | Ser. No. | Last Cal. | Due Cal. |
|-------|------------------------------------|----------------------------|--------------------|----------|-----------|-----------|
| 2009 | Cable RF, 8 m | Alpha Wire | RG-214 | C-56 | 11-Sep-05 | 11-Sep-06 |
| 2254 | Cable 40GHz, 0.8 m, blue | Rhophase Microwave Limited | KPS-1503A-800-KPS | W4907 | 11-Sep-05 | 11-Sep-06 |
| 2259 | Amplifier Low Noise 2-20 GHz | Sophia Wireless | LNA0220-C | 0223 | 11-Sep-05 | 11-Sep-06 |
| 2260 | Amplifier Low Noise 14-33 GHz | Sophia Wireless | LNA28-B | 0233 | 11-Sep-05 | 11-Sep-06 |
| 2387 | Filter Bandpass, 8-14 GHz | HL | FBP8-14 | 2387 | 11-Sep-05 | 11-Sep-06 |
| 2399 | Cable 40GHz, 1.5 m, blue | Rhophase Microwave Limited | KPS-1503A-1500-KPS | X2945 | 11-Sep-05 | 11-Sep-06 |
| 2524 | Attenuator, 10 dB, DC-18 GHz | Midwest Microwave | 263-10 | 2524 | 11-Sep-05 | 11-Sep-06 |
| 2634 | Power Supply, 0-36.0 VDC, 0-12.0 A | Nemic-Lambda | UP36-12 | 2634 | 29-Aug-05 | 29-Aug-06 |

11 APPENDIX B Measurement uncertainties

Expanded uncertainty at 95% confidence in Hermon Labs EMC measurements

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

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

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

12 APPENDIX C Test facility description

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

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website: www.hermonlabs.com

Person for contact: Mr. Alex Usoskin, CEO.

13 APPENDIX D Specification references

| | |
|---------------------|--|
| 47CFR part 22:2004 | Public Mobile Services |
| 47CFR part 24: 2004 | Personal Communications Services |
| 47CFR part 15:2004 | Radio Frequency Devices |
| ANSI C63.2: 1996 | American National Standard for Instrumentation-Electromagnetic Noise and Field Strength, 10 kHz to 40 GHz-Specifications. |
| ANSI C63.4: 2003 | American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz. |

14 APPENDIX E Abbreviations and acronyms

| | |
|----------|---|
| A | ampere |
| AC | alternating current |
| A/m | ampere per meter |
| AM | amplitude modulation |
| AVRG | average (detector) |
| cm | centimeter |
| dB | decibel |
| dBm | decibel referred to one milliwatt |
| dB(μV) | decibel referred to one microvolt |
| dB(μV/m) | decibel referred to one microvolt per meter |
| dB(μA) | decibel referred to one microampere |
| dBΩ | decibel referred to one Ohm |
| DC | direct current |
| DTS | digital transmission system |
| EIRP | equivalent isotropically radiated power |
| ERP | effective radiated power |
| EUT | equipment under test |
| F | frequency |
| FHSS | frequency hopping spread spectrum |
| GHz | gigahertz |
| GND | ground |
| H | height |
| HL | Hermon laboratories |
| Hz | hertz |
| ITE | information technology equipment |
| k | kilo |
| kHz | kilohertz |
| LISN | line impedance stabilization network |
| LO | local oscillator |
| m | meter |
| MHz | megahertz |
| min | minute |
| mm | millimeter |
| ms | millisecond |
| μs | microsecond |
| NA | not applicable |
| NT | not tested |
| OATS | open area test site |
| Ω | Ohm |
| PCB | printed circuit board |
| PM | pulse modulation |
| PS | power supply |
| ppm | part per million (10 ⁻⁶) |
| QP | quasi-peak |
| RE | radiated emission |
| RF | radio frequency |
| rms | root mean square |
| Rx | receive |
| s | second |
| T | temperature |
| Tx | transmit |
| V | volt |
| VA | volt-ampere |

15 APPENDIX F Test equipment correction factors

**Correction factor
Line impedance stabilization network
Model LISN 16 - 1
Hermon Laboratories**

| 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.

Antenna factor

Biconilog antenna EMCO, model 3141, serial number 1011, HL 0604

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

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

Antenna factor
Double-ridged wave guide horn antenna
EMC Test Systems, model 3115, serial no: 9911-5964, HL 1984

| Frequency, MHz | Antenna gain, dBi | Antenna factor. dB(1/m) |
|----------------|-------------------|-------------------------|
| 1000.0 | 5.8 | 24.5 |
| 1500.0 | 9.0 | 24.8 |
| 2000.0 | 8.6 | 27.7 |
| 2500.0 | 9.5 | 28.7 |
| 3000.0 | 8.9 | 30.8 |
| 3500.0 | 8.2 | 32.9 |
| 4000.0 | 9.6 | 32.7 |
| 4500.0 | 11.2 | 32.1 |
| 5000.0 | 10.6 | 33.6 |
| 5500.0 | 9.8 | 35.3 |
| 6000.0 | 10.1 | 35.7 |
| 6500.0 | 10.7 | 35.8 |
| 7000.0 | 10.9 | 36.2 |
| 7500.0 | 10.5 | 37.2 |
| 8000.0 | 11.1 | 37.2 |
| 8500.0 | 10.8 | 38.1 |
| 9000.0 | 10.7 | 38.6 |
| 9500.0 | 11.5 | 38.3 |
| 10000.0 | 11.8 | 38.4 |
| 10500.0 | 12.3 | 38.3 |
| 11000.0 | 12.3 | 38.8 |
| 11500.0 | 11.5 | 39.9 |
| 12000.0 | 12.2 | 39.6 |
| 12500.0 | 12.6 | 39.5 |
| 13000.0 | 12.0 | 40.5 |
| 13500.0 | 11.7 | 41.1 |
| 14000.0 | 11.7 | 41.5 |
| 14500.0 | 12.7 | 40.8 |
| 15000.0 | 14.2 | 39.5 |
| 15500.0 | 16.0 | 38.1 |
| 16000.0 | 16.2 | 38.1 |
| 16500.0 | 14.5 | 40.1 |
| 17000.0 | 12.2 | 42.6 |
| 17500.0 | 9.7 | 45.4 |
| 18000.0 | 6.6 | 48.7 |

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

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

| Frequency, MHz | Magnetic Antenna Factor, dB(S/m) | Electric Antenna Factor, dB(1/m) |
|----------------|----------------------------------|----------------------------------|
| 0.009 | -32.8 | 18.7 |
| 0.010 | -33.8 | 17.7 |
| 0.020 | -38.3 | 13.2 |
| 0.050 | -41.1 | 10.4 |
| 0.075 | -41.3 | 10.2 |
| 0.100 | -41.6 | 9.9 |
| 0.150 | -41.7 | 9.8 |
| 0.250 | -41.6 | 9.9 |
| 0.500 | -41.8 | 9.7 |
| 0.750 | -41.9 | 9.6 |
| 1.000 | -41.4 | 10.1 |
| 2.000 | -41.5 | 10.0 |
| 3.000 | -41.4 | 10.1 |
| 4.000 | -41.4 | 10.1 |
| 5.000 | -41.5 | 10.0 |
| 10.000 | -41.9 | 9.6 |
| 15.000 | -41.9 | 9.6 |
| 20.000 | -42.2 | 9.3 |
| 25.000 | -42.8 | 8.7 |
| 30.000 | -44.0 | 7.5 |

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

Antenna factor
Standard gain horn antenna
Quinstar Technology
Model QWH
HL 0768, 0769, 0770, 0771, 0772

| 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(μ V) to convert it into field intensity in dB(μ V/m).

Cable loss
Cable GORE, HL 0410

| No. | Frequency, GHz | Cable loss, dB |
|-----|----------------|----------------|
| 1 | 0.5 | 0.16 |
| 2 | 1 | 0.28 |
| 3 | 2 | 0.38 |
| 4 | 4 | 0.55 |
| 5 | 6 | 0.85 |
| 6 | 8 | 0.90 |
| 7 | 10 | 1.07 |
| 8 | 12 | 1.11 |
| 9 | 14 | 1.29 |
| 10 | 16 | 1.41 |
| 11 | 18 | 1.73 |

Cable loss
Cable Coaxial, GORE A2P01POL118, 2.3 m, model:GORE-3, HL 0589
+ Cable Coaxial, ANDREW PSWJ4, 6m, model: ANDREW-6, HL 1004

| No. | Frequency, MHz | Cable loss, dB | Tolerance (Specification), dB | Measurement uncertainty, dB |
|-----|----------------|----------------|-------------------------------|-----------------------------|
| 1 | 30 | 0.33 | ≤ 6.5 | ±0.12 |
| 2 | 50 | 0.40 | | |
| 3 | 100 | 0.57 | | |
| 4 | 300 | 0.97 | | |
| 5 | 500 | 1.25 | | |
| 6 | 800 | 1.59 | | |
| 7 | 1000 | 1.81 | | |
| 8 | 1200 | 1.97 | | |
| 9 | 1400 | 2.15 | | |
| 10 | 1600 | 2.28 | | |
| 11 | 1800 | 2.43 | | |
| 12 | 2000 | 2.61 | | |
| 13 | 2200 | 2.75 | | |
| 14 | 2400 | 2.89 | | |
| 15 | 2600 | 2.97 | | |
| 16 | 2800 | 3.21 | ≤ 6.5 | ±0.12 |
| 17 | 3000 | 3.32 | | |
| 18 | 3300 | 3.47 | | |
| 19 | 3600 | 3.62 | | |
| 20 | 3900 | 3.84 | | |
| 21 | 4200 | 3.92 | | |
| 22 | 4500 | 4.07 | | |
| 23 | 4800 | 4.36 | | |
| 24 | 5100 | 4.62 | | |
| 25 | 5400 | 4.78 | | |
| 26 | 5700 | 5.16 | | |
| 27 | 6000 | 5.67 | | |
| 28 | 6500 | 5.99 | | |

Cable loss
Cable 18 GHz, 4 m, blue, model: SPS-1803A-4000-NPS, S/N T4658, HL 1942

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

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

Cable loss
Cable 18 GHz, 6.5 m, blue, model: NPS-1803A-6500-NPS, S/N T4974, HL 1947

| Frequency, GHz | Cable loss, dB |
|----------------|----------------|
| 0.03 | 0.30 |
| 0.05 | 0.38 |
| 0.10 | 0.53 |
| 0.20 | 0.74 |
| 0.30 | 0.91 |
| 0.40 | 1.05 |
| 0.50 | 1.18 |
| 0.60 | 1.29 |
| 0.70 | 1.40 |
| 0.80 | 1.50 |
| 0.90 | 1.59 |
| 1.00 | 1.68 |
| 1.10 | 1.77 |
| 1.20 | 1.86 |
| 1.30 | 1.94 |
| 1.40 | 2.01 |
| 1.50 | 2.08 |
| 1.60 | 2.16 |
| 1.70 | 2.22 |
| 1.80 | 2.29 |
| 1.90 | 2.36 |
| 2.00 | 2.42 |
| 2.10 | 2.48 |
| 2.20 | 2.54 |
| 2.30 | 2.60 |
| 2.40 | 2.66 |
| 2.50 | 2.71 |
| 2.60 | 2.77 |
| 2.70 | 2.83 |
| 2.80 | 2.89 |
| 2.90 | 2.95 |
| 3.10 | 3.06 |
| 3.30 | 3.17 |
| 3.50 | 3.28 |
| 3.70 | 3.39 |
| 3.90 | 3.51 |
| 4.10 | 3.62 |
| 4.30 | 3.76 |
| 4.50 | 3.87 |
| 4.70 | 4.01 |
| 4.90 | 4.10 |
| 5.10 | 4.21 |
| 5.30 | 4.31 |
| 5.50 | 4.43 |
| 5.70 | 4.56 |
| 5.90 | 4.71 |

| Frequency, GHz | Cable loss, dB |
|----------------|----------------|
| 6.10 | 4.87 |
| 6.30 | 4.95 |
| 6.50 | 4.94 |
| 6.70 | 4.88 |
| 6.90 | 4.87 |
| 7.10 | 4.83 |
| 7.30 | 4.85 |
| 7.50 | 4.86 |
| 7.70 | 4.91 |
| 7.90 | 4.96 |
| 8.10 | 5.03 |
| 8.30 | 5.08 |
| 8.50 | 5.13 |
| 8.70 | 5.21 |
| 8.90 | 5.22 |
| 9.10 | 5.34 |
| 9.30 | 5.35 |
| 9.50 | 5.52 |
| 9.70 | 5.51 |
| 9.90 | 5.66 |
| 10.10 | 5.70 |
| 10.30 | 5.78 |
| 10.50 | 5.79 |
| 10.70 | 5.82 |
| 10.90 | 5.86 |
| 11.10 | 5.94 |
| 11.30 | 6.06 |
| 11.50 | 6.21 |
| 11.70 | 6.44 |
| 11.90 | 6.61 |
| 12.10 | 6.76 |
| 12.40 | 6.68 |
| 13.00 | 6.66 |
| 13.50 | 6.81 |
| 14.00 | 6.90 |
| 14.50 | 6.90 |
| 15.00 | 6.97 |
| 15.50 | 7.17 |
| 16.00 | 7.28 |
| 16.50 | 7.27 |
| 17.00 | 7.38 |
| 17.50 | 7.68 |
| 18.00 | 7.92 |

Cable loss
RF cable 8 m, model RG-214, HL 2009

| No. | Frequency, MHz | Cable loss, dB | Tolerance (Specification), dB | Measurement uncertainty, dB |
|-----|----------------|----------------|-------------------------------|-----------------------------|
| 1 | 1 | 0.10 | NA | ±0.12 |
| 2 | 10 | 0.14 | | |
| 3 | 30 | 0.25 | | |
| 4 | 50 | 0.34 | | |
| 5 | 100 | 0.53 | | |
| 6 | 300 | 0.99 | | |
| 7 | 500 | 1.31 | | |
| 8 | 800 | 1.73 | | |
| 9 | 1000 | 1.98 | | |
| 10 | 1100 | 2.11 | | |
| 11 | 1200 | 2.21 | | |
| 12 | 1300 | 2.35 | | |
| 13 | 1400 | 2.46 | | |
| 14 | 1500 | 2.55 | | |
| 15 | 1600 | 2.68 | | |
| 16 | 1700 | 2.78 | | |
| 17 | 1800 | 2.88 | | |
| 18 | 1900 | 2.98 | | |
| 19 | 2000 | 3.09 | | |

Cable loss
Cable 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, 40GHz, 1.5 m, Blue, Rhophase Microwave Limited, model: KPS-1503A-1500-KPS, HL 2399

| Frequency, GHz | Cable loss, dB | Frequency, GHz | Cable loss, dB | Frequency, GHz | Cable loss, dB |
|----------------|----------------|----------------|----------------|----------------|----------------|
| 0.03 | 0.07 | 6.5 | 1.57 | 15.50 | 2.50 |
| 0.05 | 0.10 | 6.7 | 1.60 | 16.00 | 2.51 |
| 0.1 | 0.16 | 6.9 | 1.55 | 16.50 | 2.58 |
| 0.2 | 0.26 | 7.1 | 1.65 | 17.00 | 2.65 |
| 0.3 | 0.33 | 7.3 | 1.65 | 17.50 | 2.73 |
| 0.5 | 0.38 | 7.5 | 1.70 | 18.00 | 2.74 |
| 0.7 | 0.41 | 7.7 | 1.71 | 18.50 | 2.67 |
| 0.9 | 0.58 | 7.9 | 1.73 | 19.00 | 2.67 |
| 1.1 | 0.64 | 8.1 | 1.79 | 19.50 | 2.74 |
| 1.3 | 0.70 | 8.3 | 1.81 | 20.00 | 2.69 |
| 1.5 | 0.75 | 8.5 | 1.84 | 20.50 | 2.80 |
| 1.7 | 0.79 | 8.7 | 1.85 | 21.00 | 2.82 |
| 1.9 | 0.83 | 8.9 | 1.90 | 21.50 | 2.87 |
| 2.1 | 0.88 | 9.1 | 1.95 | 22.00 | 2.87 |
| 2.3 | 0.93 | 9.3 | 1.93 | 22.50 | 2.92 |
| 2.5 | 0.97 | 9.5 | 1.98 | 23.50 | 3.04 |
| 2.7 | 1.01 | 9.7 | 1.96 | 24.00 | 3.05 |
| 2.9 | 1.04 | 9.9 | 2.03 | 24.50 | 3.03 |
| 3.1 | 1.08 | 10.1 | 1.99 | 25.00 | 3.11 |
| 3.3 | 1.14 | 10.30 | 2.02 | 25.50 | 3.10 |
| 3.5 | 1.17 | 10.50 | 2.02 | 26.00 | 3.17 |
| 3.7 | 1.21 | 10.70 | 2.02 | 26.50 | 3.11 |
| 3.9 | 1.24 | 10.90 | 2.08 | 27.00 | 3.16 |
| 4.1 | 1.26 | 11.10 | 2.02 | 28.00 | 3.19 |
| 4.3 | 1.26 | 11.30 | 2.09 | 29.00 | 3.19 |
| 4.5 | 1.29 | 11.50 | 2.05 | 30.00 | 3.30 |
| 4.7 | 1.34 | 11.70 | 2.11 | 31.00 | 3.31 |
| 4.9 | 1.34 | 11.90 | 2.11 | 32.00 | 3.35 |
| 5.1 | 1.40 | 12.10 | 2.12 | 33.00 | 3.46 |
| 5.3 | 1.43 | 12.40 | 2.17 | 34.00 | 3.45 |
| 5.5 | 1.45 | 13.00 | 2.29 | 35.00 | 3.49 |
| 5.7 | 1.47 | 13.50 | 2.31 | 36.00 | 3.54 |
| 5.9 | 1.40 | 14.00 | 2.43 | 37.00 | 3.62 |
| 6.1 | 1.53 | 14.50 | 2.43 | 39.00 | 3.69 |
| 6.3 | 1.55 | 15.00 | 2.46 | 40.00 | 3.75 |