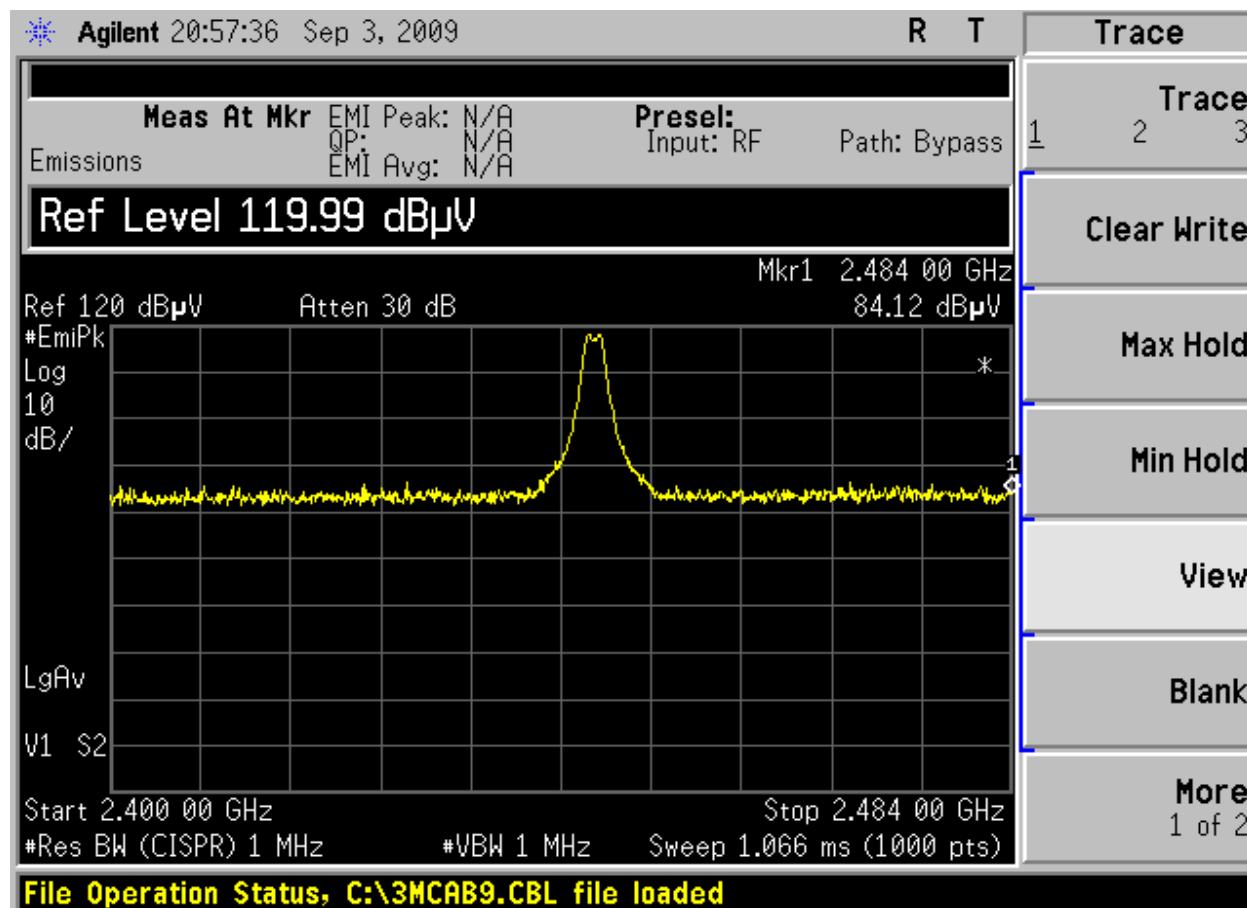


Screen Captures - Radiated Emissions Testing with Bent SMA Antenna (continued)

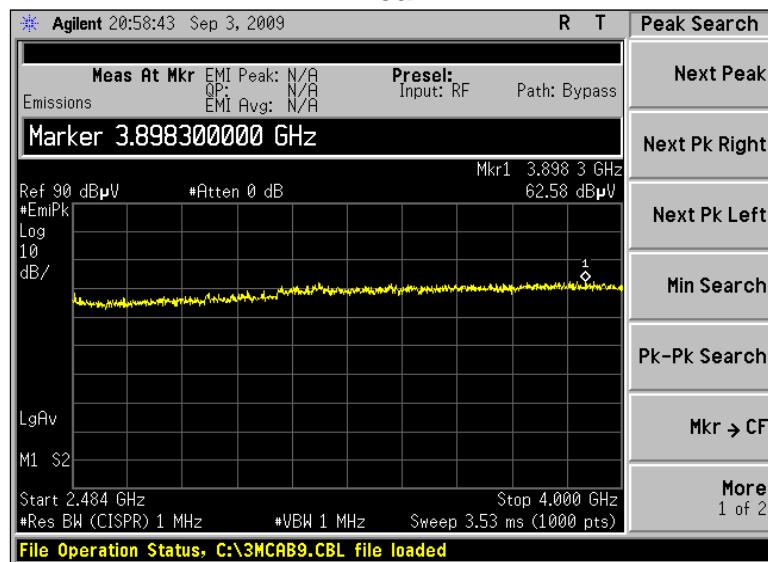
Channel 8, Antenna Vertically Polarized, 2400-2484 MHz, at 3m



| | | |
|---------------------------|--|------------------|
| Prepared For: Niles Audio | EUT: 2.4 GHz module | LS Research, LLC |
| Report #: 309028-2 | Model #: 2.4 GHz RF Transceiver Module | |
| LSR Job #: C-690 | Serial #: see page 6 | Page 54 of 159 |

Screen Captures - Radiated Emissions Testing with Bent SMA Antenna (continued)

Channel 8, Antenna Vertically Polarized, EUT Vertical 2484 MHz – 4000 MHz, at 3 m Peak



Note: because the peak value (of the noise floor) was above the average limit, the video average bandwidth was decreased to demonstrate that the video-averaged signal is below the radiated limit.

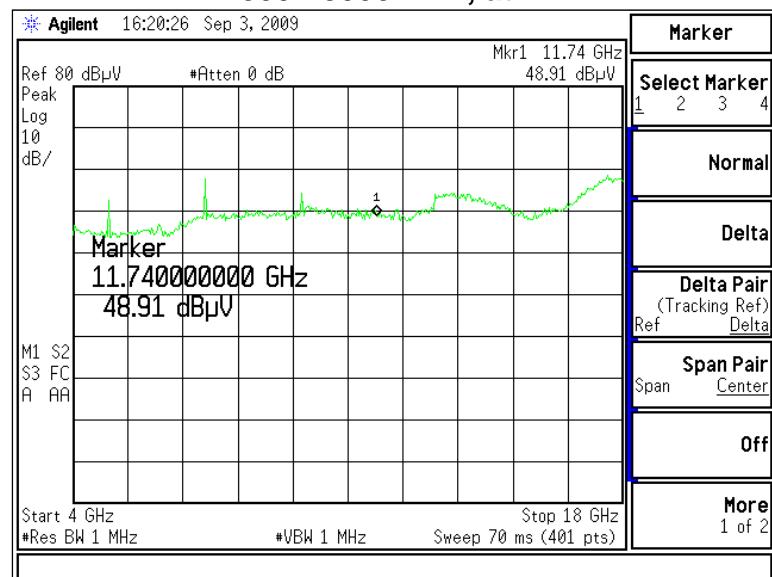
Channel 8, Antenna Vertically Polarized, EUT Vertical 2484 MHz – 4000 MHz, at 3 m Average



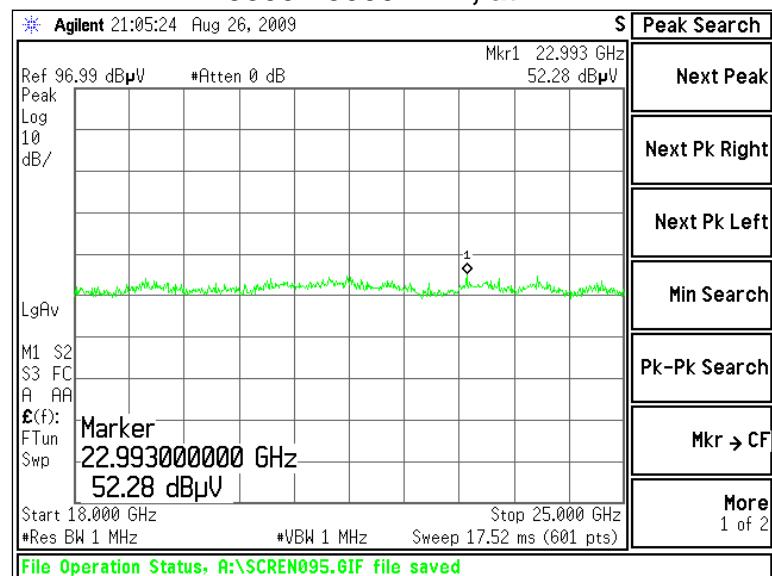
| | | |
|---------------------------|--|------------------|
| Prepared For: Niles Audio | EUT: 2.4 GHz module | LS Research, LLC |
| Report #: 309028-2 | Model #: 2.4 GHz RF Transceiver Module | |
| LSR Job #: C-690 | Serial #: see page 6 | Page 55 of 159 |

Screen Captures - Radiated Emissions Testing with Bent SMA Antenna (continued)

Channel 8, Antenna Horizontally Polarized, EUT Vertical 4000-18000 MHz, at 1m



Channel 14, Antenna Vertically Polarized, EUT Vertical 18000-25000 MHz, at 1 m



| | | |
|---------------------------|--|------------------|
| Prepared For: Niles Audio | EUT: 2.4 GHz module | LS Research, LLC |
| Report #: 309028-2 | Model #: 2.4 GHz RF Transceiver Module | |
| LSR Job #: C-690 | Serial #: see page 6 | Page 56 of 159 |

5.6.3.2 Receive Mode of SMA Bent Antenna

Per the requirements of RSS-210, the EUT was placed in continuous receive mode and the radiated spurious emissions were measured and compared to the limits stated in RSS-Gen Section 4.10.

The test setup, procedure, and equipment utilized were identical to that described in sections 5.1, 5.2, and 5.3 of this document.

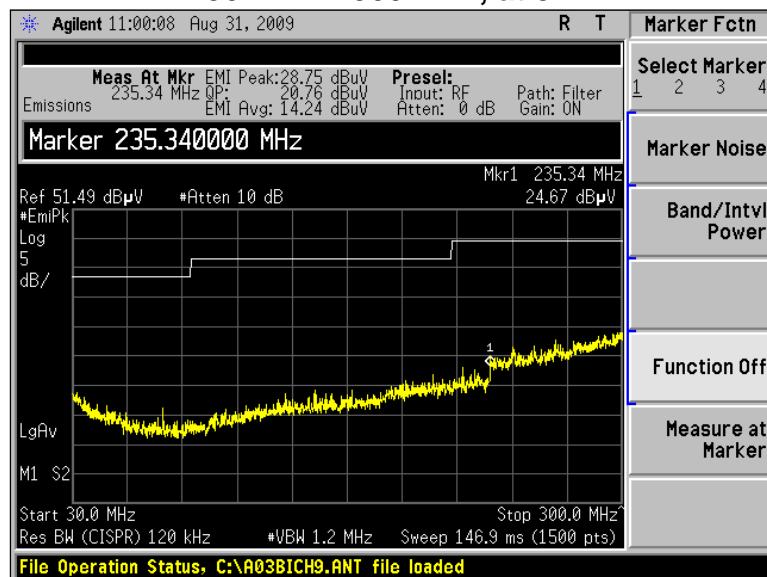
Measurement data and screen captures from the receive tests are presented below:

| Frequency (MHz) | Height (m) | Azimuth (degree) | Peak Reading (dB μ V/m) | Quasi Peak Reading (dB μ V/m) | Quasi Peak Limit (dB μ V/m) | Margin (dB) | Antenna Polarity | EUT orientation |
|-----------------|------------|------------------|-----------------------------|-----------------------------------|---------------------------------|-------------|------------------|-----------------|
| 74.87 | 1.00 | 0 | 26.93 | 19.20 | 40.0 | 20.8 | Vertical | Side |
| 119.34 | 1.00 | 0 | 26.71 | 24.13 | 43.5 | 19.4 | Vertical | Vertical |
| 179.16 | 1.00 | 0 | 24.27 | 20.22 | 43.5 | 23.3 | Horizontal | Flat |
| 209.06 | 1.00 | 0 | 26.72 | 23.38 | 43.5 | 20.1 | Vertical | Flat |
| 235.34 | 1.00 | 0 | 28.75 | 20.76 | 46.0 | 25.2 | Horizontal | Vertical |
| 715.90 | 1.00 | 0 | 32.78 | 27.19 | 46.0 | 18.8 | Horizontal | Flat |
| 938.90 | 1.00 | 0 | 33.37 | 27.84 | 46.0 | 18.2 | Vertical | Flat |
| 976.20 | 1.00 | 0 | 34.89 | 29.15 | 54.0 | 24.9 | Horizontal | Vertical |
| 990.60 | 1.00 | 0 | 35.46 | 29.43 | 54.0 | 24.6 | Vertical | Side |

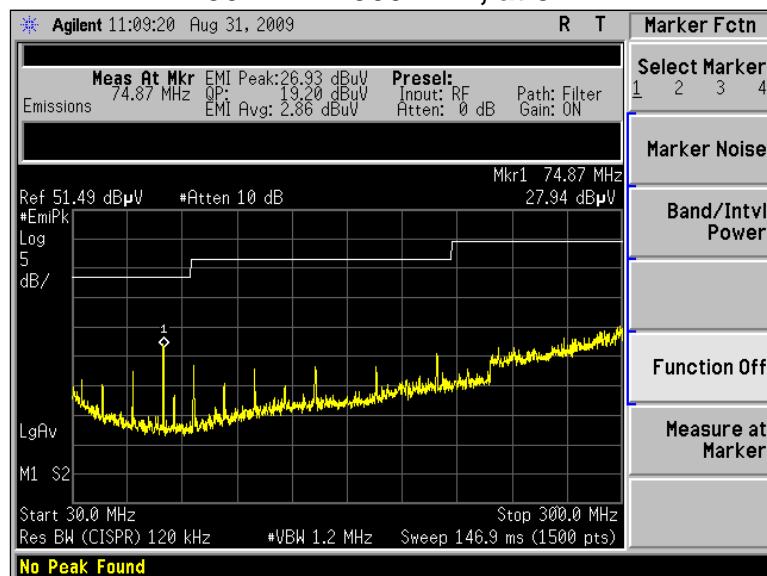
| | | |
|---------------------------|--|------------------|
| Prepared For: Niles Audio | EUT: 2.4 GHz module | LS Research, LLC |
| Report #: 309028-2 | Model #: 2.4 GHz RF Transceiver Module | |
| LSR Job #: C-690 | Serial #: see page 6 | Page 57 of 159 |

Screen Captures - Radiated Emissions Testing – Receive Mode with Bent SMA Antenna

**Channel 8, Antenna Horizontally Polarized, EUT Vertical
30 MHz – 300 MHz, at 3m**



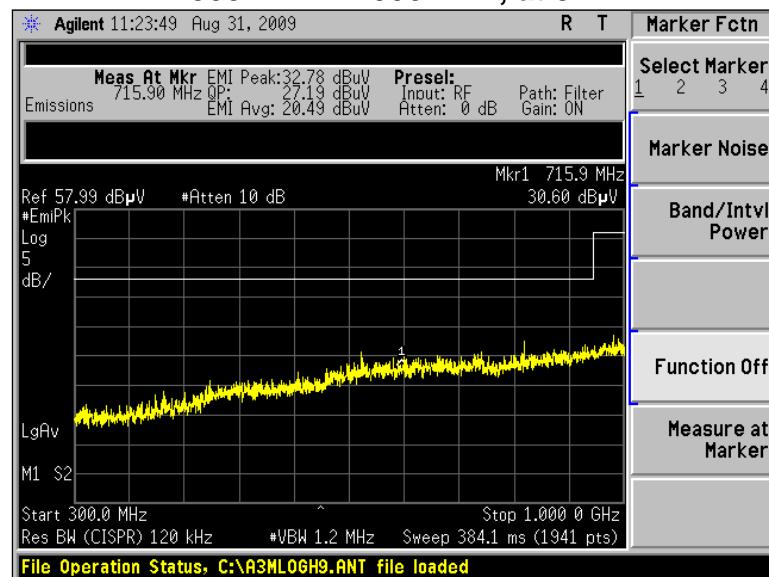
**Channel 8, Antenna Vertically Polarized, EUT on Side
30 MHz – 300 MHz, at 3m**



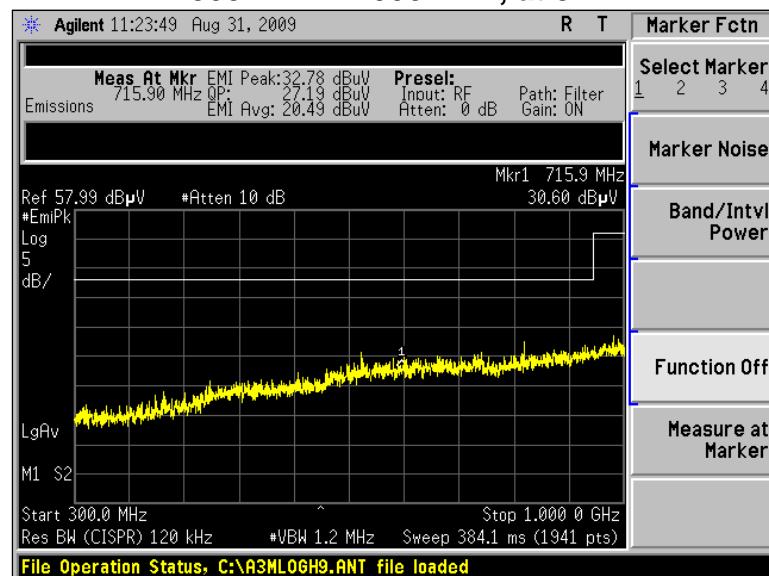
| | | |
|---------------------------|--|------------------|
| Prepared For: Niles Audio | EUT: 2.4 GHz module | LS Research, LLC |
| Report #: 309028-2 | Model #: 2.4 GHz RF Transceiver Module | |
| LSR Job #: C-690 | Serial #: see page 6 | Page 58 of 159 |

Screen Captures - Radiated Emissions Testing – Receive Mode with Bent SMA Antenna (continued)

**Channel 14, Antenna Horizontally Polarized
300 MHz – 1000 MHz, at 3m**



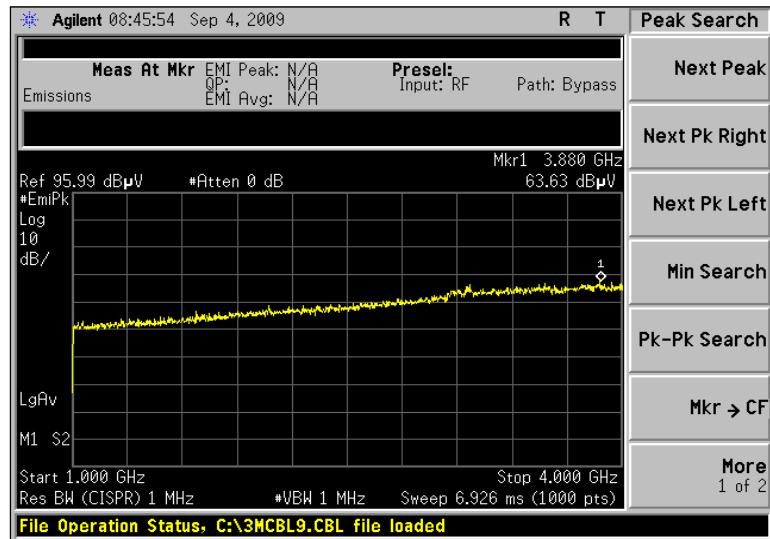
**Channel 14, Antenna Vertically Polarized
300 MHz – 1000 MHz, at 3m**



| | | |
|---------------------------|--|------------------|
| Prepared For: Niles Audio | EUT: 2.4 GHz module | LS Research, LLC |
| Report #: 309028-2 | Model #: 2.4 GHz RF Transceiver Module | |
| LSR Job #: C-690 | Serial #: see page 6 | Page 59 of 159 |

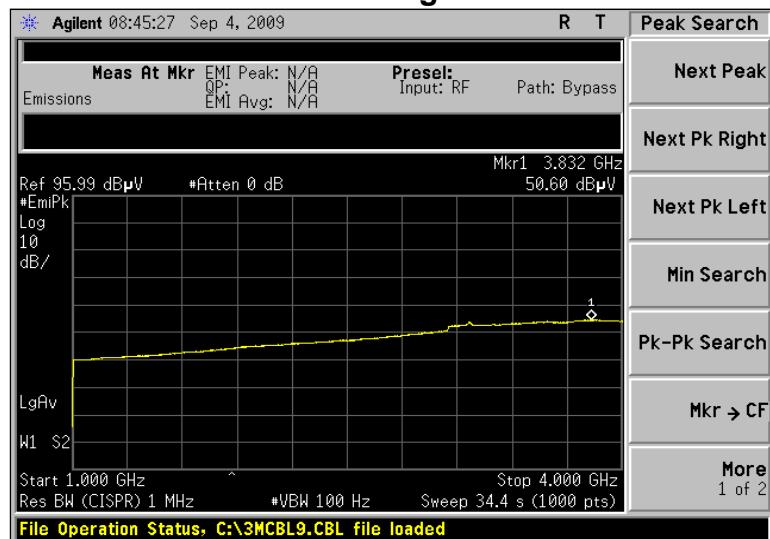
Screen Captures - Radiated Emissions Testing – Receive Mode with Bent SMA Antenna (continued)

Channel 8, Antenna Horizontally Polarized, EUT Vertical 1000 MHz – 4000 MHz, at 3m Peak



Note: because the peak value (of the noise floor) was above the average limit, the video average bandwidth was decreased to demonstrate that the video-averaged signal is below the radiated limit.

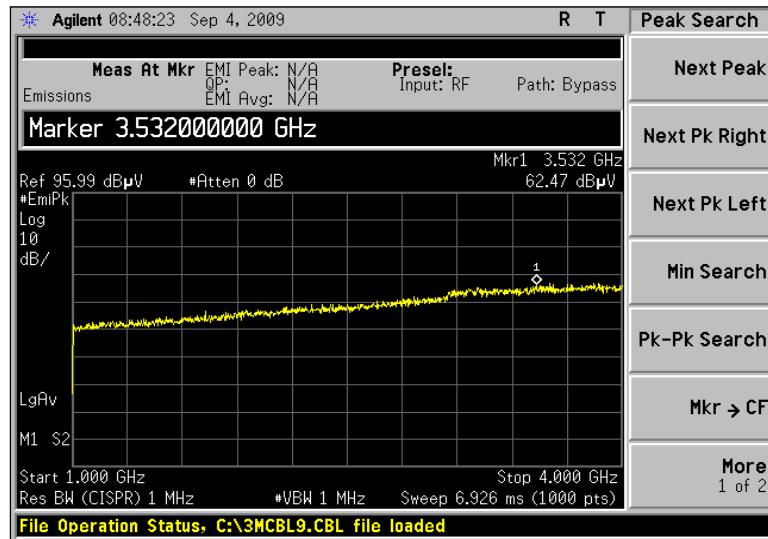
Channel 8, Antenna Horizontally Polarized, EUT Vertical 1000 MHz – 4000 MHz, at 3m Average



| | | |
|---------------------------|--|------------------|
| Prepared For: Niles Audio | EUT: 2.4 GHz module | LS Research, LLC |
| Report #: 309028-2 | Model #: 2.4 GHz RF Transceiver Module | |
| LSR Job #: C-690 | Serial #: see page 6 | Page 60 of 159 |

Screen Captures - Radiated Emissions Testing – Receive Mode with Bent SMA Antenna (continued)

Channel 8, Antenna Vertically Polarized, EUT Vertical 1000 MHz – 4000 MHz, at 3m Peak



Note: because the peak value (of the noise floor) was above the average limit, the video average bandwidth was decreased to demonstrate that the video-averaged signal is below the radiated limit.

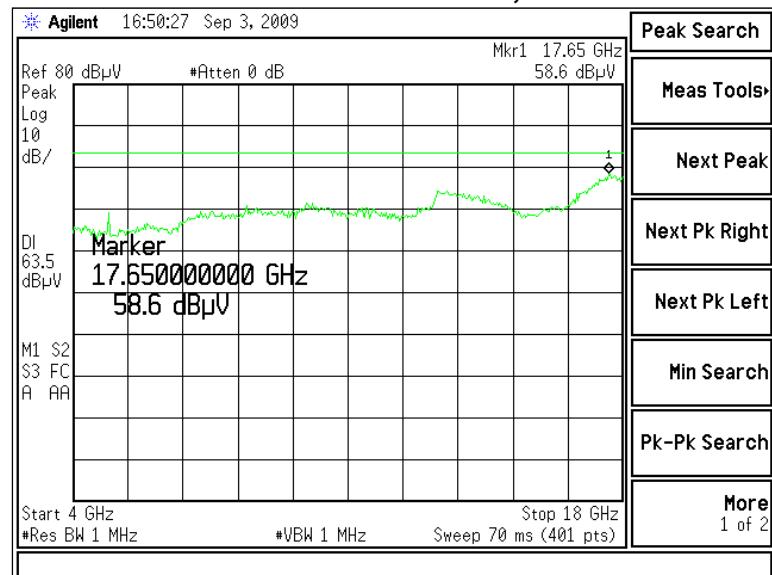
Channel 8, Antenna Vertically Polarized, EUT Vertical 1000 MHz – 4000 MHz, at 3m Average



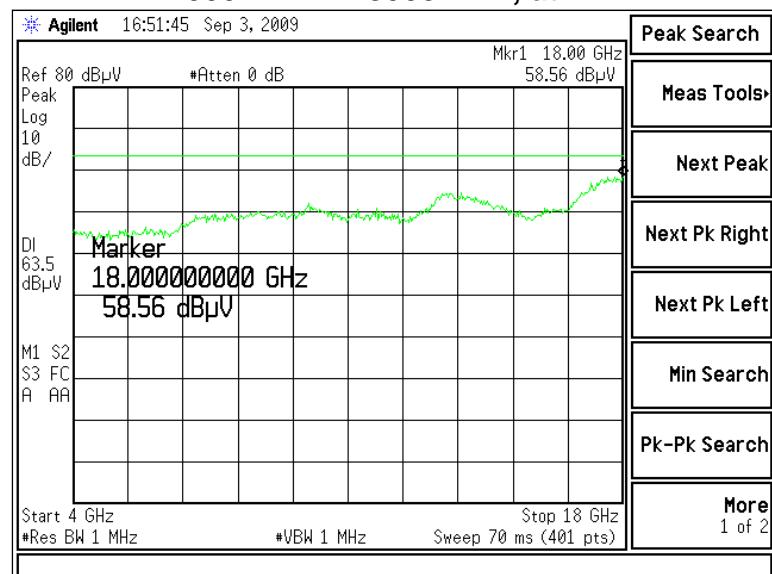
| | | |
|---------------------------|--|------------------|
| Prepared For: Niles Audio | EUT: 2.4 GHz module | LS Research, LLC |
| Report #: 309028-2 | Model #: 2.4 GHz RF Transceiver Module | |
| LSR Job #: C-690 | Serial #: see page 6 | Page 61 of 159 |

Screen Captures - Radiated Emissions Testing – Receive Mode with Bent SMA Antenna (continued)

**Channel 8, Antenna Horizontally Polarized
4000 MHz – 18000 MHz, at 1 m**



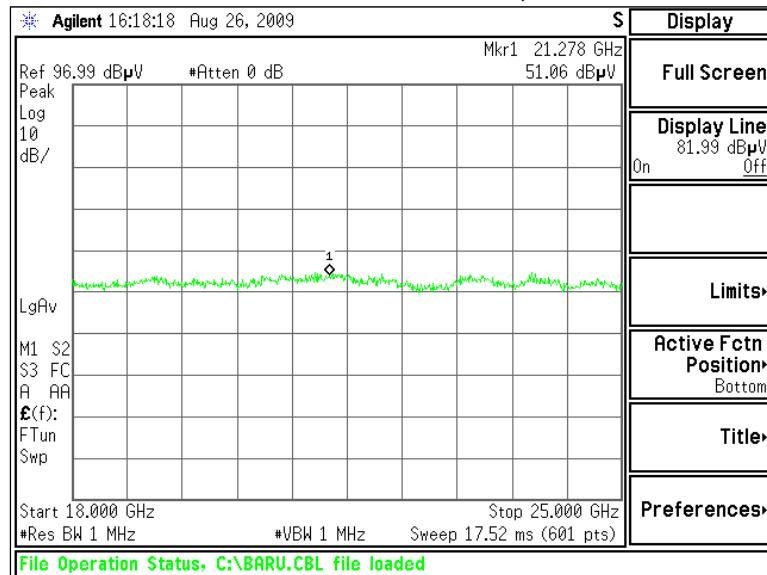
**Channel 8, Antenna Vertically Polarized
4000 MHz – 18000 MHz, at 1 m**



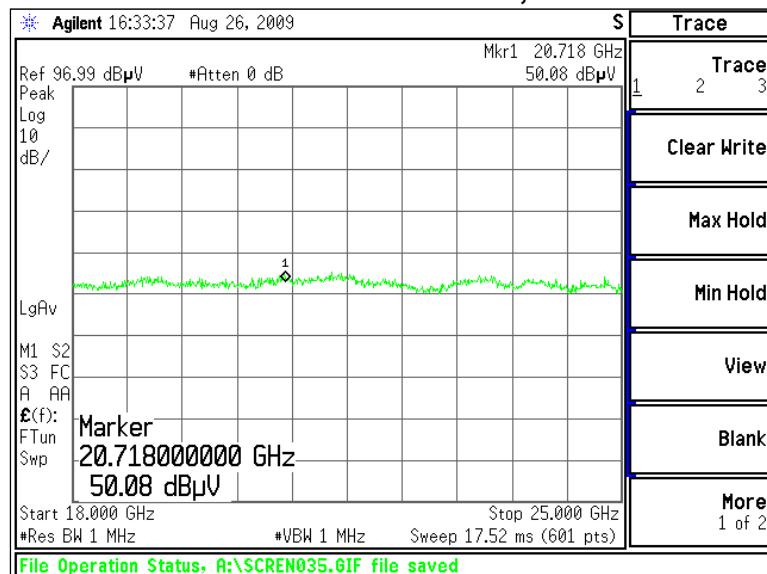
| | | |
|---------------------------|--|------------------|
| Prepared For: Niles Audio | EUT: 2.4 GHz module | LS Research, LLC |
| Report #: 309028-2 | Model #: 2.4 GHz RF Transceiver Module | |
| LSR Job #: C-690 | Serial #: see page 6 | Page 62 of 159 |

Screen Captures - Radiated Emissions Testing – Receive Mode with Bent SMA Antenna (continued)

**Channel 8, Antenna Horizontally Polarized, EUT on Side
18000 MHz – 25000 MHz, at 1 m**



**Channel 8, Antenna Vertically Polarized, EUT on Side
18000 MHz – 25000 MHz, at 1 m**



| | | |
|---------------------------|--|------------------|
| Prepared For: Niles Audio | EUT: 2.4 GHz module | LS Research, LLC |
| Report #: 309028-2 | Model #: 2.4 GHz RF Transceiver Module | |
| LSR Job #: C-690 | Serial #: see page 6 | Page 63 of 159 |

5.6.4 Radiated Emissions on Unit with BNC Antenna

5.6.4.1 Transmit Mode

The following table depicts the level of significant spurious radiated RF emissions found:

| Frequency (MHz) | Height (m) | Azimuth (degree) | Peak Reading (dB μ V/m) | Quasi Peak Reading (dB μ V/m) | Quasi Peak Limit (dB μ V/m) | Margin (dB) | Antenna Polarity | EUT orientation |
|-----------------|------------|------------------|-----------------------------|-----------------------------------|---------------------------------|-------------|------------------|-----------------|
| 50.5 | 1.00 | 0 | 17.33 | 10.51 | 40.0 | 29.5 | Vertical | Side |
| 152.7 | 1.00 | 0 | 20.31 | 13.05 | 43.5 | 30.5 | Horizontal | Side |
| 241.9 | 1.00 | 0 | 26.23 | 20.58 | 46.0 | 25.4 | Horizontal | Vertical |
| 288.9 | 1.00 | 0 | 29.82 | 23.22 | 46.0 | 22.8 | Vertical | Vertical |
| 503.8 | 1.00 | 0 | 28.73 | 22.96 | 46.0 | 23.0 | Vertical | Vertical |
| 660.8 | 1.00 | 0 | 31.21 | 25.82 | 46.0 | 20.2 | Horizontal | Side |
| 756.3 | 1.00 | 0 | 32.5 | 26.67 | 46.0 | 19.3 | Horizontal | Vertical |
| 917.0 | 1.00 | 0 | 32.98 | 27.39 | 46.0 | 18.6 | Vertical | Side |

| | | |
|---------------------------|--|------------------|
| Prepared For: Niles Audio | EUT: 2.4 GHz module | LS Research, LLC |
| Report #: 309028-2 | Model #: 2.4 GHz RF Transceiver Module | |
| LSR Job #: C-690 | Serial #: see page 6 | Page 64 of 159 |

Radiated Emissions Data Chart - Unit with BNC Antenna (continued)

The following table depicts the level of significant radiated RF fundamental and harmonic emissions seen on Channel 0:

| Frequency (MHz) | Height (m) | Azimuth (degree) | Peak Reading (dB μ V/m) | Avg Reading (dB μ V/m) | Avg Limit (dB μ V/m) | Margin (dB) | Antenna Polarity | EUT orientation |
|-----------------|------------|------------------|-----------------------------|----------------------------|--------------------------|-------------|------------------|-----------------|
| 2405 | 1.00 | 8 | 119.3 | 118.0 | 125.0 | 7.0 | Horizontal | Vertical |
| 4810 | 1.07 | 122 | 55.6 | 51.4 | 63.5 | 12.1 | Horizontal | Vertical |
| 7215 | 1.05 | 175 | 62.1 | 51.5 | 106.5 | 55.0 | Vertical | Vertical |
| 9620 | 1.00 | 271 | 59.9 | 49.7 | 106.5 | 56.8 | Horizontal | Vertical |
| 12025 | 1.02 | 220 | 60.8 | 50.4 | 63.5 | 13.1 | Vertical | Flat |
| 14430 | 1.07 | 197 | 53.7 | 42.9 | 106.5 | 63.6 | Vertical | Side |
| 16835 | 1.03 | 119 | 52.4 | 41.9 | 106.5 | 64.7 | Vertical | Vertical |
| 19240 | | | Note 3 | | 63.5 | | | |
| 21645 | | | Note 3 | | 106.5 | | | |
| 24050 | | | Note 3 | | 106.5 | | | |

The following table depicts the level of significant radiated RF fundamental and harmonic emissions seen on Channel 8:

| Frequency (MHz) | Height (m) | Azimuth (degree) | Peak Reading (dB μ V/m) | Avg Reading (dB μ V/m) | Avg Limit (dB μ V/m) | Margin (dB) | Antenna Polarity | EUT orientation |
|-----------------|------------|------------------|-----------------------------|----------------------------|--------------------------|-------------|------------------|-----------------|
| 2445 | 2.34 | 78 | 116.5 | 114.7 | 125.0 | 10.3 | Vertical | Vertical |
| 4890 | 1.13 | 326 | 61.8 | 53.0 | 63.5 | 10.5 | Horizontal | Vertical |
| 7335 | 1.03 | 50 | 67.0 | 56.5 | 63.5 | 7.0 | Horizontal | Vertical |
| 9780 | 1.00 | 78 | 60.7 | 50.6 | 103.2 | 52.5 | Vertical | Flat |
| 12225 | 1.08 | 67 | 55.8 | 46.0 | 63.5 | 17.5 | Vertical | Flat |
| 14670 | 1.03 | 115 | 53.5 | 42.8 | 103.2 | 60.3 | Vertical | Flat |
| 17115 | 1.03 | 8 | 54.4 | 42.8 | 103.2 | 60.3 | Horizontal | Vertical |
| 19560 | | | Note 3 | | 63.5 | | | |
| 22005 | | | Note 3 | | 103.2 | | | |
| 24450 | | | Note 3 | | 103.2 | | | |

The following table depicts the level of significant radiated RF fundamental and harmonic emissions seen on Channel 14:

| Frequency (MHz) | Height (m) | Azimuth (degree) | Peak Reading (dB μ V/m) | Avg Reading (dB μ V/m) | Avg Limit (dB μ V/m) | Margin (dB) | Antenna Polarity | EUT orientation |
|-----------------|------------|------------------|-----------------------------|----------------------------|--------------------------|-------------|------------------|-----------------|
| 2475 | 1.00 | 103 | 116.0 | 115.0 | 125.0 | 10.0 | Horizontal | Flat |
| 4950 | 1.10 | 335 | 62.5 | 54.7 | 63.5 | 8.8 | Horizontal | Side |
| 7425 | 1.10 | 42 | 60.9 | 50.9 | 63.5 | 12.6 | Horizontal | Vertical |
| 9900 | 1.00 | 346 | 62.5 | 52.6 | 103.5 | 50.9 | Horizontal | Vertical |
| 12375 | 1.10 | 62 | 55.8 | 45.3 | 63.5 | 18.2 | Vertical | Vertical |
| 14850 | 1.08 | 118 | 52.0 | 40.7 | 103.5 | 62.8 | Horizontal | Vertical |
| 17325 | 1.03 | 20 | 55.8 | 43.9 | 103.5 | 59.6 | Horizontal | Side |
| 19800 | | | Note 3 | | 63.5 | | | |
| 22275 | | | Note 3 | | 63.5 | | | |
| 24750 | | | Note 3 | | 103.5 | | | |

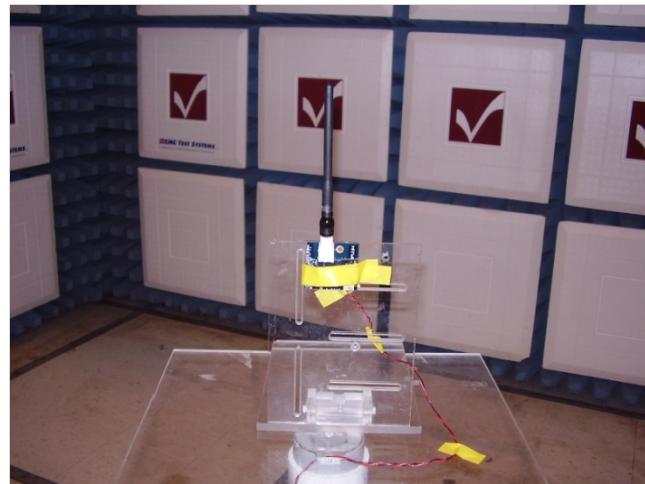
Notes:

- 1) A Quasi-Peak Detector was used in measurements below 1 GHz, and a Peak as well as an Average Detector was used in measurements above 1 GHz. The peak detector was used to ensure the peak emissions did not exceed 20 dB above the limits.
- 2) Measurements above 4 GHz were made at 1 meters of separation from the EUT.
- 3) Measurement at receiver system noise floor.
- 4) For measurements of the fundamental power, because of spectral bandwidth, the receiver was set to RBW=VBW=3 MHz.

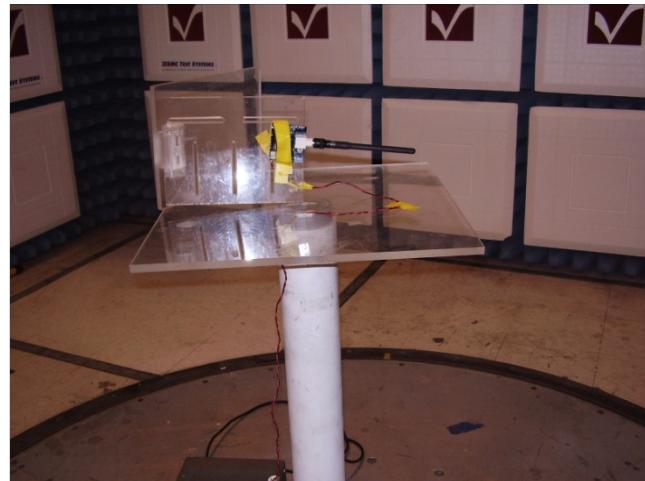
| | | |
|---------------------------|--|------------------|
| Prepared For: Niles Audio | EUT: 2.4 GHz module | LS Research, LLC |
| Report #: 309028-2 | Model #: 2.4 GHz RF Transceiver Module | |
| LSR Job #: C-690 | Serial #: see page 6 | Page 65 of 159 |

Test Setup Photo(s) – Radiated Emissions Test- Unit with BNC Antenna

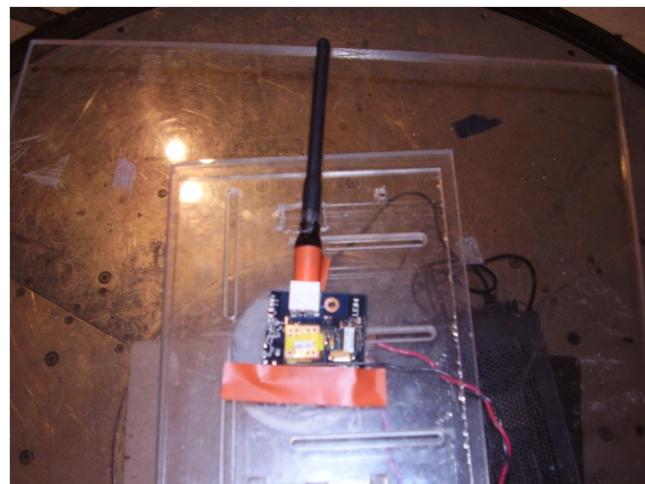
Vertical Orientation



Side Orientation



Flat Orientation



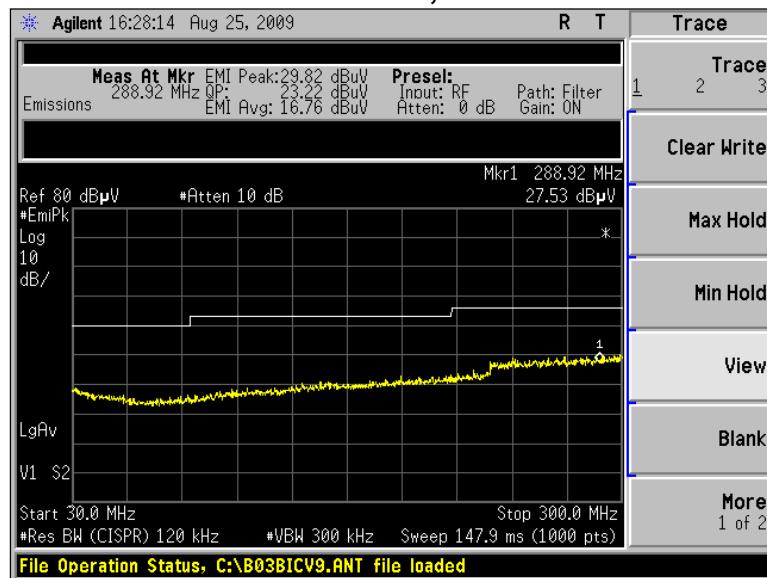
| | | |
|---------------------------|--|------------------|
| Prepared For: Niles Audio | EUT: 2.4 GHz module | LS Research, LLC |
| Report #: 309028-2 | Model #: 2.4 GHz RF Transceiver Module | |
| LSR Job #: C-690 | Serial #: see page 6 | Page 66 of 159 |

Screen Captures - Radiated Emissions Test - Unit with BNC Antenna

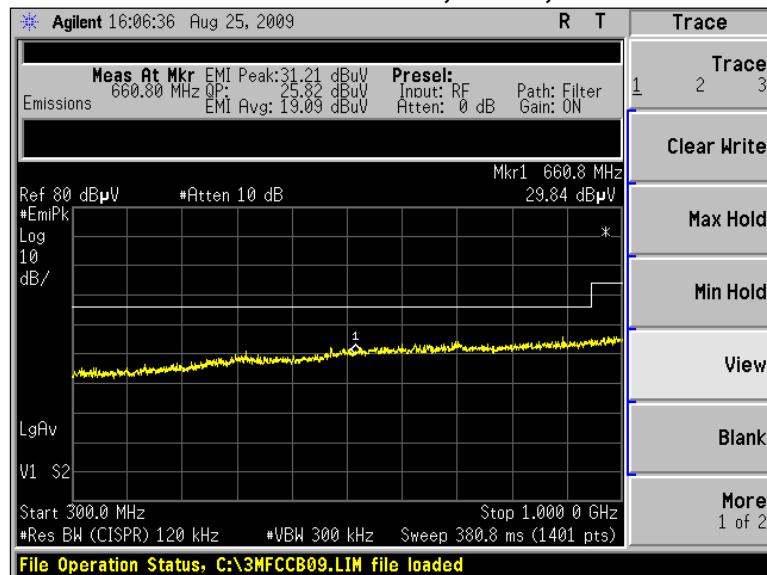
These screen captures represent Peak Emissions. For radiated emission measurements, a Quasi-Peak detector function is utilized when measuring frequencies below 1 GHz, and an Average detector function is utilized when measuring frequencies above 1 GHz.

The signature scans shown here are from worst-case emissions, as measured on channels 0, 8, or 14, with the sense antenna both in vertical and horizontal polarity for worst case presentations.

Channel 0, Antenna Vertically Polarized, EUT Vertical 30-300 MHz, at 3m



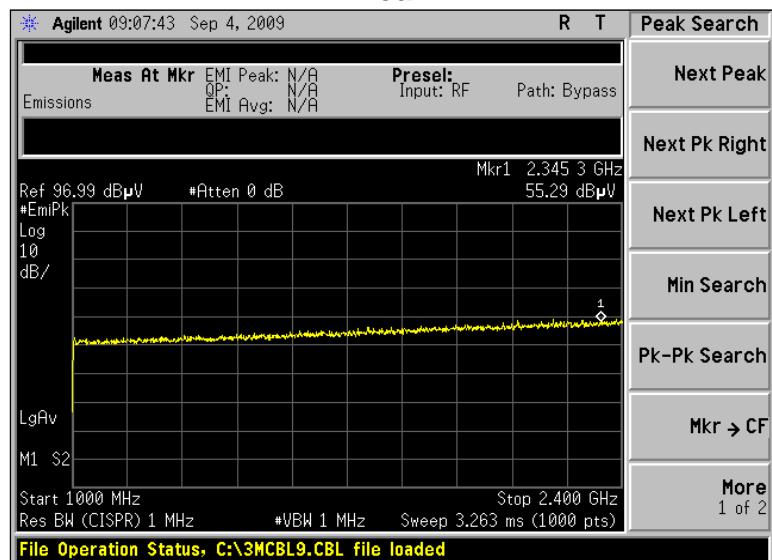
Channel 0, Antenna Horizontally Polarized, EUT on Side 300-1000 MHz, at 3m,



| | | |
|---------------------------|--|------------------|
| Prepared For: Niles Audio | EUT: 2.4 GHz module | LS Research, LLC |
| Report #: 309028-2 | Model #: 2.4 GHz RF Transceiver Module | |
| LSR Job #: C-690 | Serial #: see page 6 | Page 67 of 159 |

Screen Captures - Radiated Emissions Testing - Unit with BNC Antenna (continued)

Channel 8, Antenna Vertically Polarized, EUT Vertical 1000 MHz – 2400 MHz, at 3m Peak



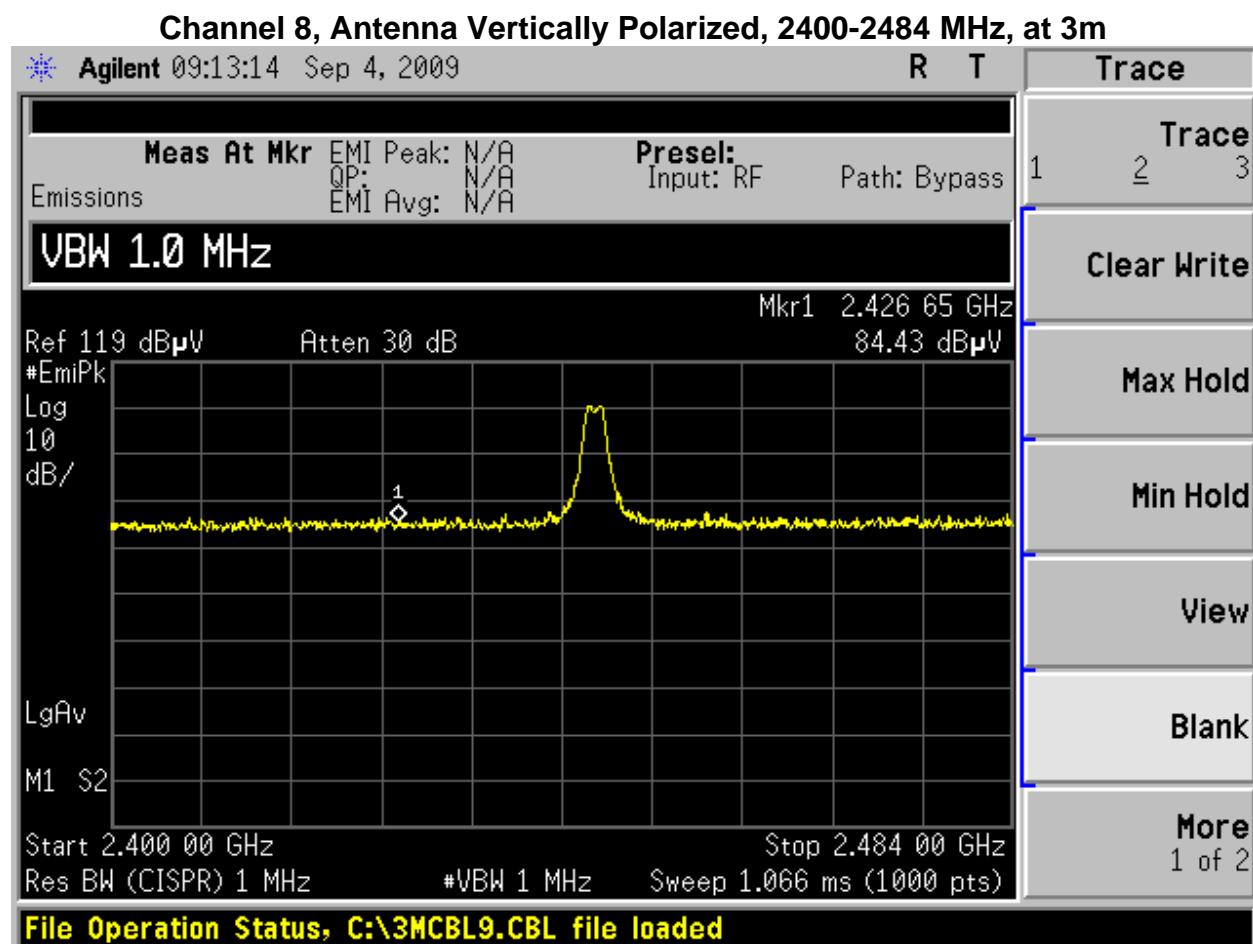
Note: because the peak value (of the noise floor) was above the average limit, the video average bandwidth was decreased to demonstrate that the video-averaged signal is below the radiated limit.

Channel 8, Antenna Vertically Polarized, EUT Vertical 1000 MHz – 2400 MHz, at 3m Average



| | | |
|---------------------------|--|------------------|
| Prepared For: Niles Audio | EUT: 2.4 GHz module | LS Research, LLC |
| Report #: 309028-2 | Model #: 2.4 GHz RF Transceiver Module | |
| LSR Job #: C-690 | Serial #: see page 6 | Page 68 of 159 |

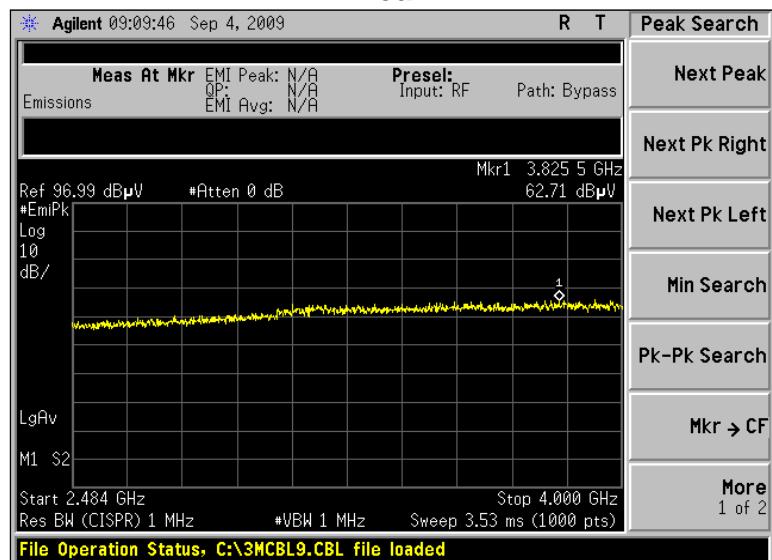
Screen Captures - Radiated Emissions Testing - Unit with BNC Antenna (continued)



| | | |
|---------------------------|--|------------------|
| Prepared For: Niles Audio | EUT: 2.4 GHz module | LS Research, LLC |
| Report #: 309028-2 | Model #: 2.4 GHz RF Transceiver Module | |
| LSR Job #: C-690 | Serial #: see page 6 | Page 69 of 159 |

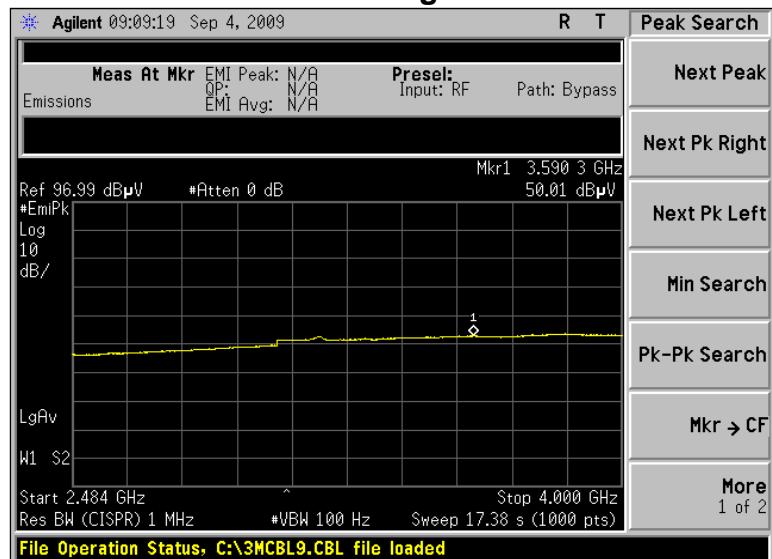
Screen Captures - Radiated Emissions Testing - Unit with BNC Antenna (continued)

Channel 8, Antenna Vertically Polarized, EUT Vertical 2400 MHz-2484 MHz, at 3m Peak



Note: because the peak value (of the noise floor) was above the average limit, the video average bandwidth was decreased to demonstrate that the video-averaged signal is below the radiated limit.

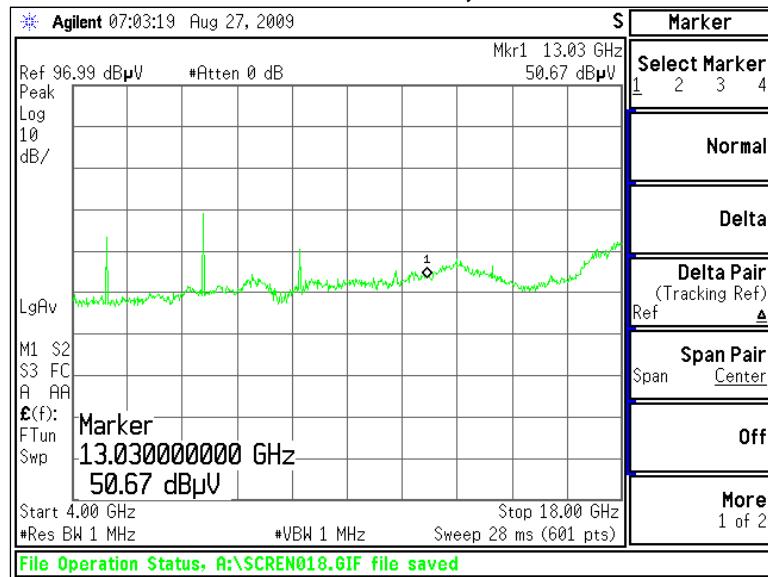
Channel 8, Antenna Vertically Polarized, EUT Vertical 2400 MHz-2484 MHz, at 3m Average



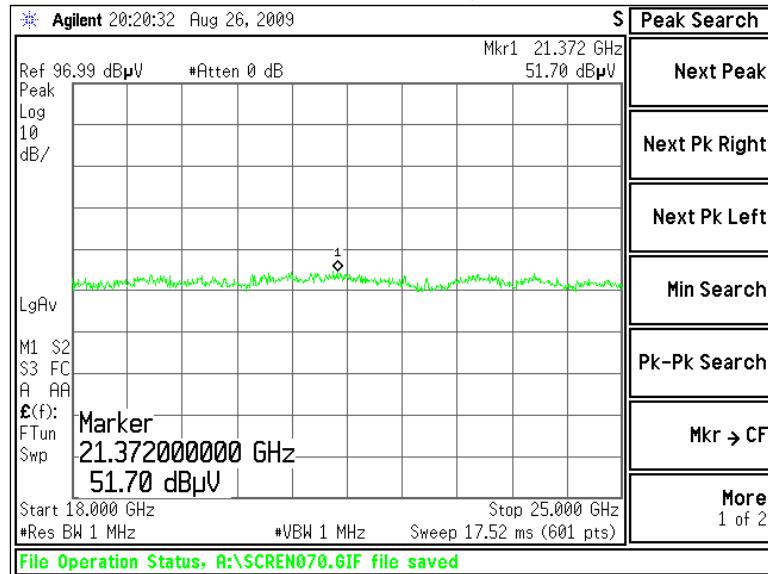
| | | |
|---------------------------|--|------------------|
| Prepared For: Niles Audio | EUT: 2.4 GHz module | LS Research, LLC |
| Report #: 309028-2 | Model #: 2.4 GHz RF Transceiver Module | |
| LSR Job #: C-690 | Serial #: see page 6 | Page 70 of 159 |

Screen Captures - Radiated Emissions Testing - Unit with BNC Antenna (continued)

Channel 8, Antenna Horizontally Polarized, EUT Vertical 4000-18000 MHz, at 1m



Channel 0, Antenna Vertically Polarized, EUT Flat 18000-25000 MHz, at 1 m



| | | |
|---------------------------|--|------------------|
| Prepared For: Niles Audio | EUT: 2.4 GHz module | LS Research, LLC |
| Report #: 309028-2 | Model #: 2.4 GHz RF Transceiver Module | |
| LSR Job #: C-690 | Serial #: see page 6 | Page 71 of 159 |

5.6.4.2 Receive Mode - Unit with BNC Antenna

Per the requirements of RSS-210, the EUT was placed in continuous receive mode and the radiated spurious emissions were measured and compared to the limits stated in RSS-Gen Section 4.10.

The test setup, procedure, and equipment utilized were identical to that described in sections 5.1, 5.2, and 5.3 of this document.

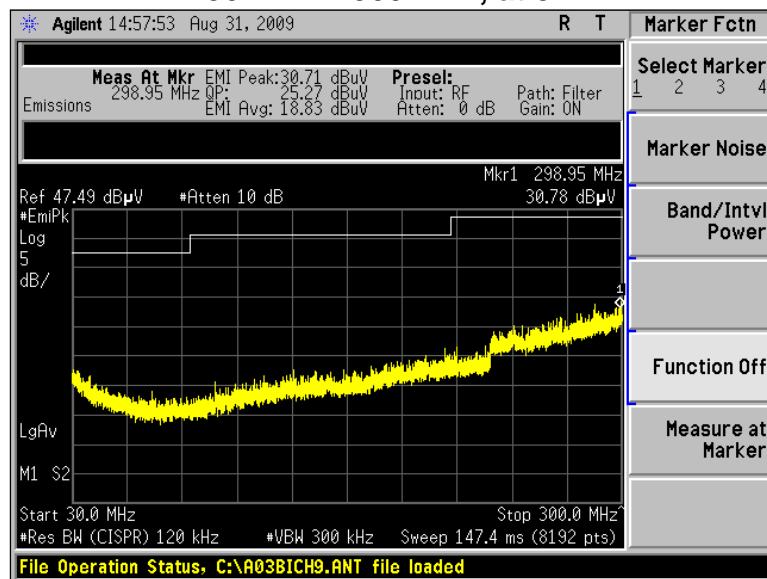
Measurement data and screen captures from the receive tests are presented below:

| Frequency (MHz) | Height (m) | Azimuth (degree) | Peak Reading (dB μ V/m) | Quasi Peak Reading (dB μ V/m) | Quasi Peak Limit (dB μ V/m) | Margin (dB) | Antenna Polarity | EUT orientation |
|-----------------|------------|------------------|-----------------------------|-----------------------------------|---------------------------------|-------------|------------------|-----------------|
| 79.98 | 1.00 | 0 | 21.43 | 18.54 | 40.0 | 21.5 | Vertical | Flat |
| 247.18 | 1.00 | 0 | 28.21 | 21.69 | 46.0 | 24.3 | Vertical | Vertical |
| 288.03 | 1.00 | 0 | 29.32 | 24.07 | 46.0 | 21.9 | Vertical | Side |
| 298.95 | 1.00 | 0 | 30.71 | 25.27 | 46.0 | 20.7 | Horizontal | Vertical |
| 299.30 | 1.00 | 0 | 30.97 | 25.28 | 46.0 | 20.7 | Horizontal | Flat |
| 299.58 | 1.00 | 0 | 30.57 | 24.35 | 46.0 | 21.7 | Horizontal | Side |
| 960.00 | 1.00 | 0 | 33.44 | 28.09 | 54.0 | 25.9 | Vertical | Side |
| 972.31 | 1.00 | 0 | 35.92 | 29.62 | 54.0 | 24.4 | Horizontal | Vertical |
| 980.17 | 1.00 | 0 | 34.86 | 28.72 | 54.0 | 25.3 | Vertical | Flat |
| 985.30 | 1.00 | 0 | 36.26 | 30.07 | 54.0 | 23.9 | Horizontal | Flat |
| 994.02 | 1.00 | 0 | 35.05 | 29.34 | 54.0 | 24.7 | Vertical | Vertical |
| 998.63 | 1.00 | 0 | 36.04 | 30.13 | 54.0 | 23.9 | Horizontal | Side |

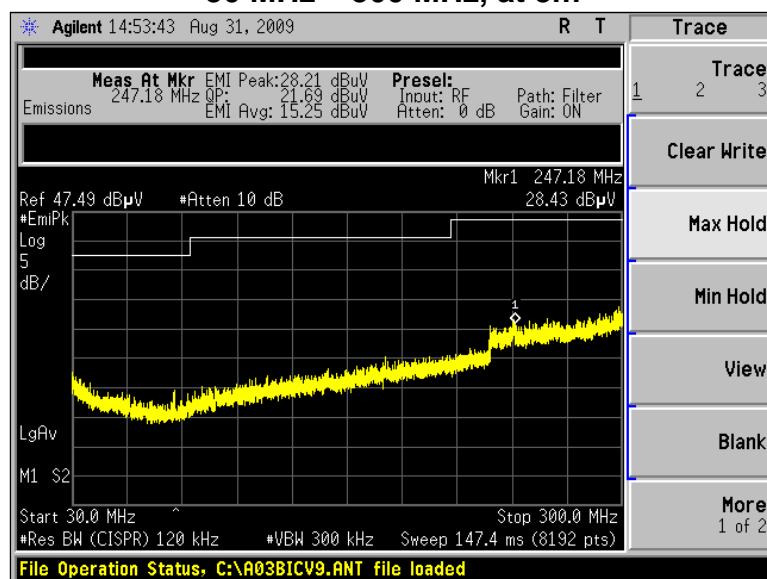
| | | |
|---------------------------|--|------------------|
| Prepared For: Niles Audio | EUT: 2.4 GHz module | LS Research, LLC |
| Report #: 309028-2 | Model #: 2.4 GHz RF Transceiver Module | |
| LSR Job #: C-690 | Serial #: see page 6 | Page 72 of 159 |

Screen Captures - Radiated Emissions Testing – Receive Mode - Unit with BNC Antenna

**Channel 8, Antenna Horizontally Polarized, EUT Vertical
30 MHz – 300 MHz, at 3m**



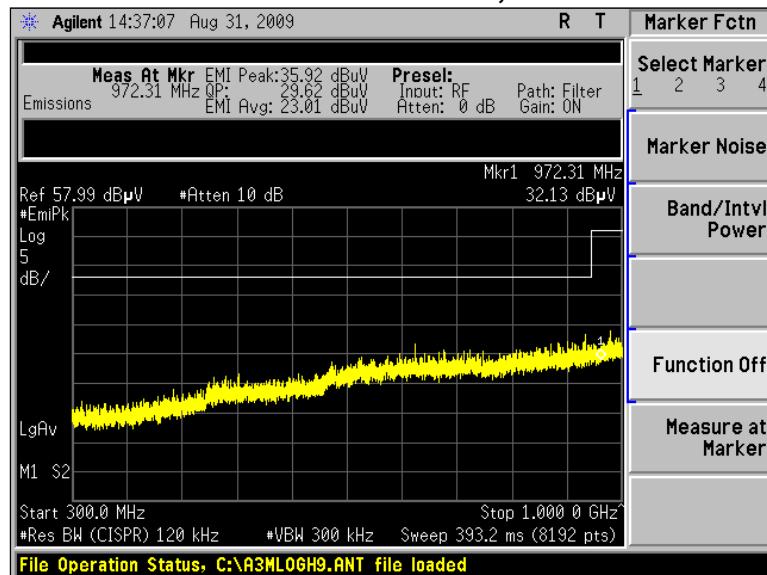
**Channel 8, Antenna Vertically Polarized, EUT on Side
30 MHz – 300 MHz, at 3m**



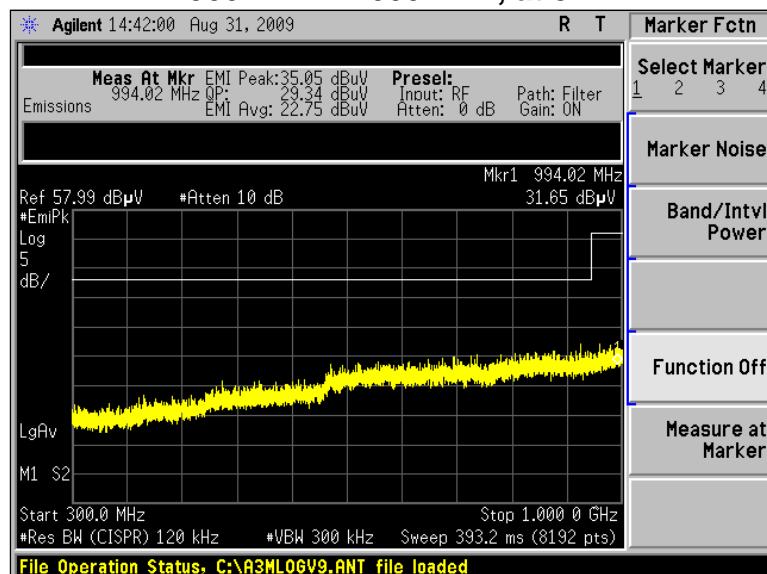
| | | |
|---------------------------|--|------------------|
| Prepared For: Niles Audio | EUT: 2.4 GHz module | LS Research, LLC |
| Report #: 309028-2 | Model #: 2.4 GHz RF Transceiver Module | |
| LSR Job #: C-690 | Serial #: see page 6 | Page 73 of 159 |

Screen Captures - Radiated Emissions Testing – Receive Mode - Unit with BNC Antenna (continued)

**Channel 8, Antenna Horizontally Polarized, EUT Vertical
300 MHz – 1000 MHz, at 3m**



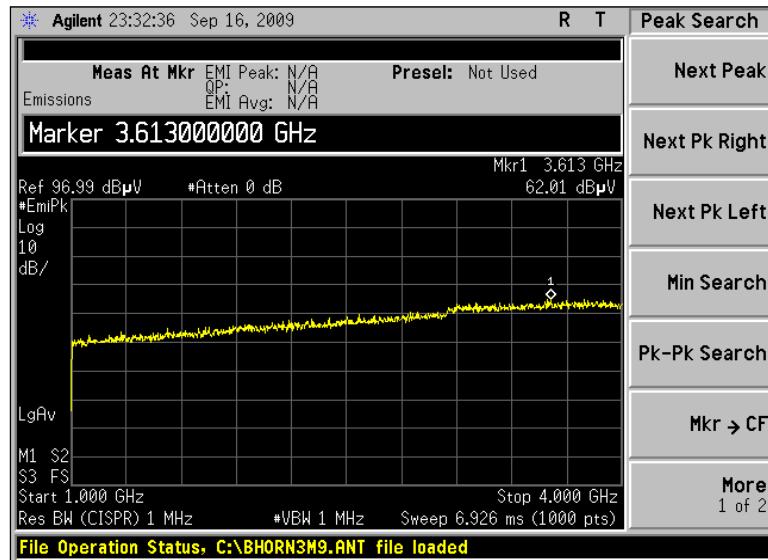
**Channel 8, Antenna Vertically Polarized, EUT Vertical
300 MHz – 1000 MHz, at 3m**



| | | |
|---------------------------|--|------------------|
| Prepared For: Niles Audio | EUT: 2.4 GHz module | LS Research, LLC |
| Report #: 309028-2 | Model #: 2.4 GHz RF Transceiver Module | |
| LSR Job #: C-690 | Serial #: see page 6 | Page 74 of 159 |

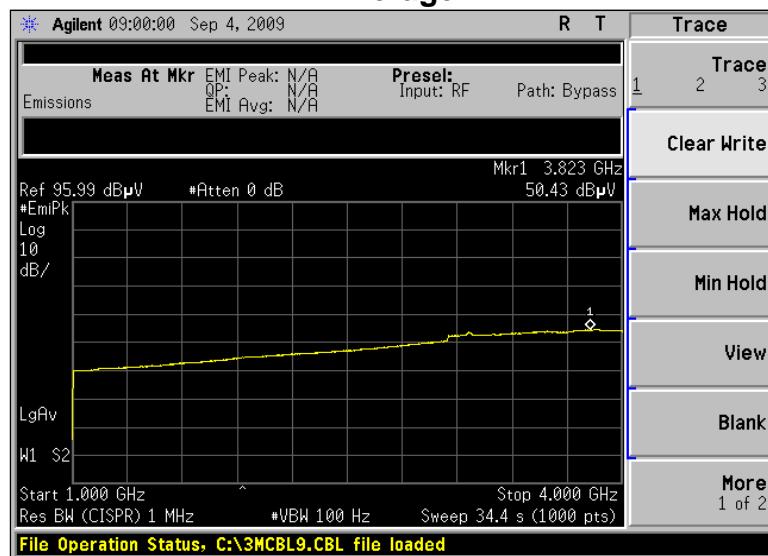
Screen Captures - Radiated Emissions Testing – Receive Mode - Unit with BNC Antenna (continued)

Channel 8, Antenna Horizontally Polarized, EUT Vertical 1000 MHz – 4000 MHz, at 3m Peak



Note: because the peak value (of the noise floor) was above the average limit, the video average bandwidth was decreased to demonstrate that the video-averaged signal is below the radiated limit.

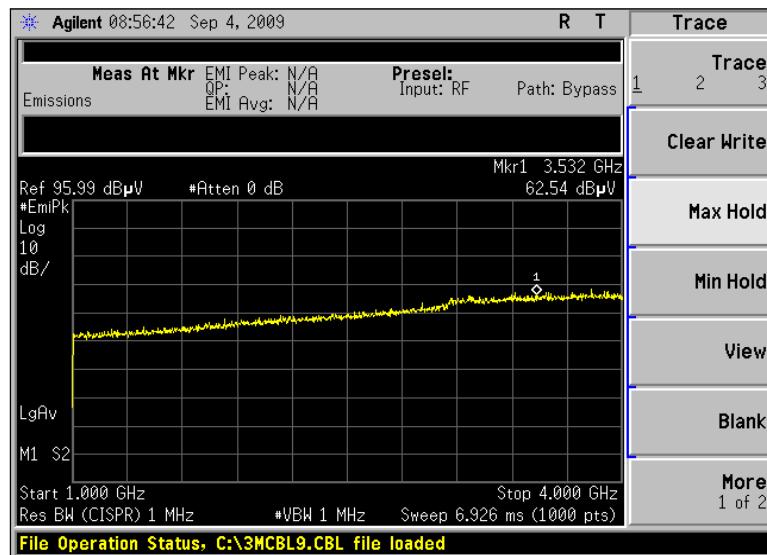
Channel 8, Antenna Horizontally Polarized, EUT Vertical 1000 MHz – 4000 MHz, at 3m Average



| | | |
|---------------------------|--|------------------|
| Prepared For: Niles Audio | EUT: 2.4 GHz module | LS Research, LLC |
| Report #: 309028-2 | Model #: 2.4 GHz RF Transceiver Module | |
| LSR Job #: C-690 | Serial #: see page 6 | Page 75 of 159 |

Screen Captures - Radiated Emissions Testing – Receive Mode - Unit with BNC Antenna (continued)

Channel 8, Antenna Vertically Polarized, EUT Vertical 1000 MHz – 4000 MHz, at 3m Peak



Note: because the peak value (of the noise floor) was above the average limit, the video average bandwidth was decreased to demonstrate that the video-averaged signal is below the radiated limit.

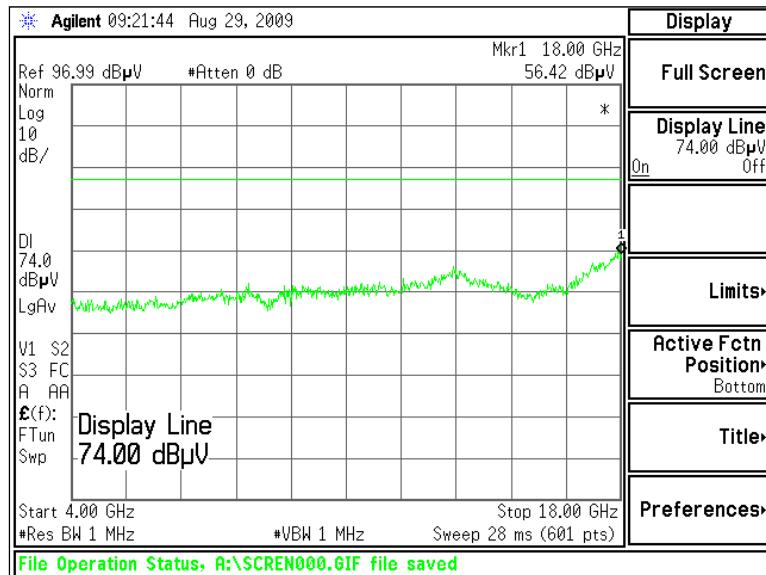
Channel 8, Antenna Vertically Polarized, EUT Vertical 1000 MHz – 4000 MHz, at 3m Average



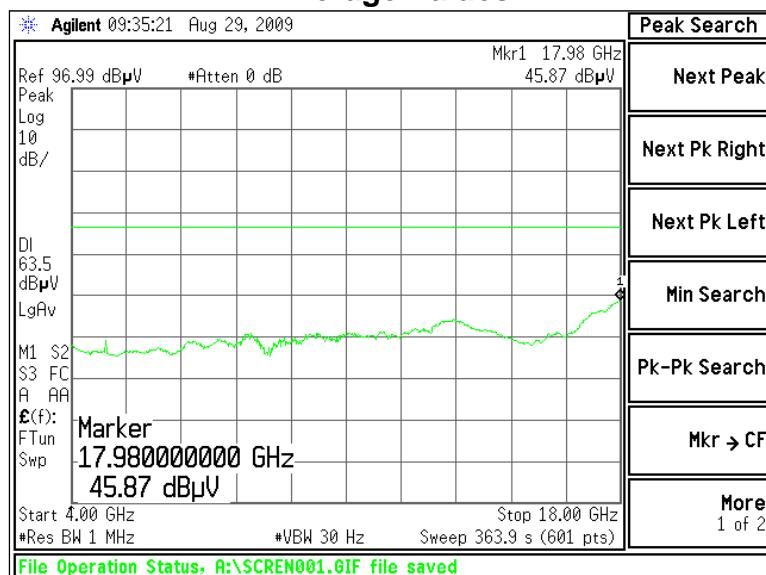
| | | |
|---------------------------|--|------------------|
| Prepared For: Niles Audio | EUT: 2.4 GHz module | LS Research, LLC |
| Report #: 309028-2 | Model #: 2.4 GHz RF Transceiver Module | |
| LSR Job #: C-690 | Serial #: see page 6 | Page 76 of 159 |

Screen Captures - Radiated Emissions Testing – Receive Mode - Unit with BNC Antenna (continued)

**Channel 8, Antenna Horizontally Polarized, EUT Vertical
4000 MHz – 18000 MHz, at 1 m
Peak Values**



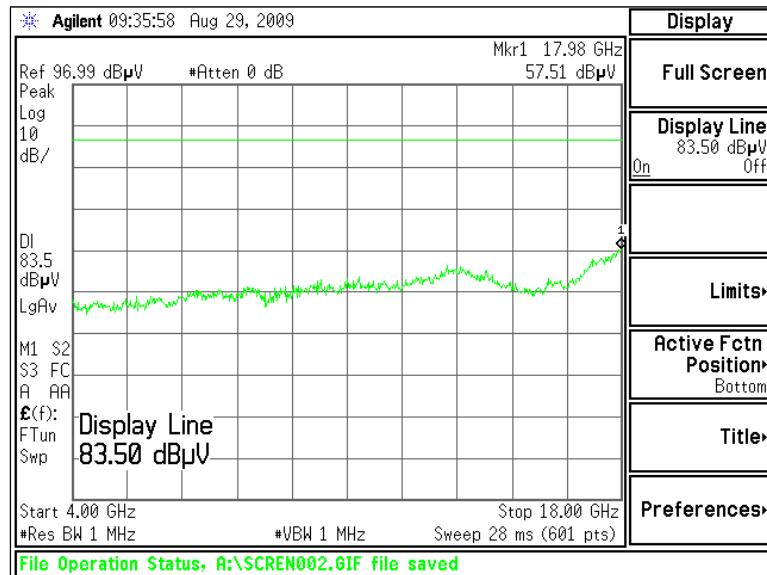
**Channel 8, Antenna Horizontally Polarized, EUT Vertical
4000 MHz – 18000 MHz, at 1 m
Average Values**



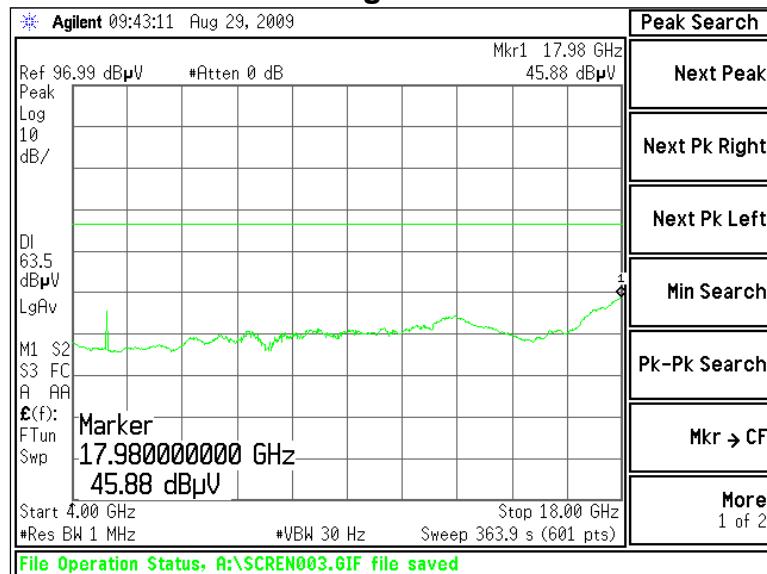
| | | |
|---------------------------|--|------------------|
| Prepared For: Niles Audio | EUT: 2.4 GHz module | LS Research, LLC |
| Report #: 309028-2 | Model #: 2.4 GHz RF Transceiver Module | |
| LSR Job #: C-690 | Serial #: see page 6 | Page 77 of 159 |

Screen Captures - Radiated Emissions Testing – Receive Mode - Unit with BNC Antenna (continued)

**Channel 8, Antenna Vertically Polarized, EUT Vertical
4000 MHz – 18000 MHz, at 1 m
Peak Values**



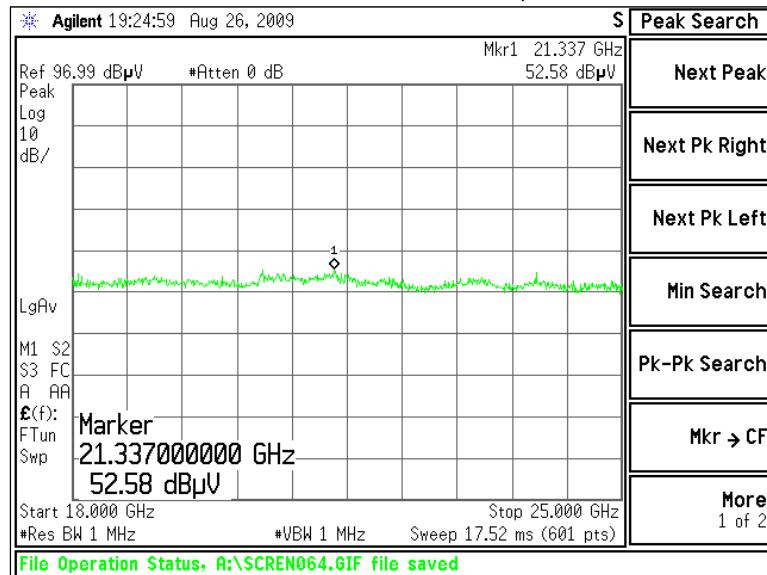
**Channel 8, Antenna Vertically Polarized, EUT Vertical
4000 MHz – 18000 MHz, at 1 m
Average Values**



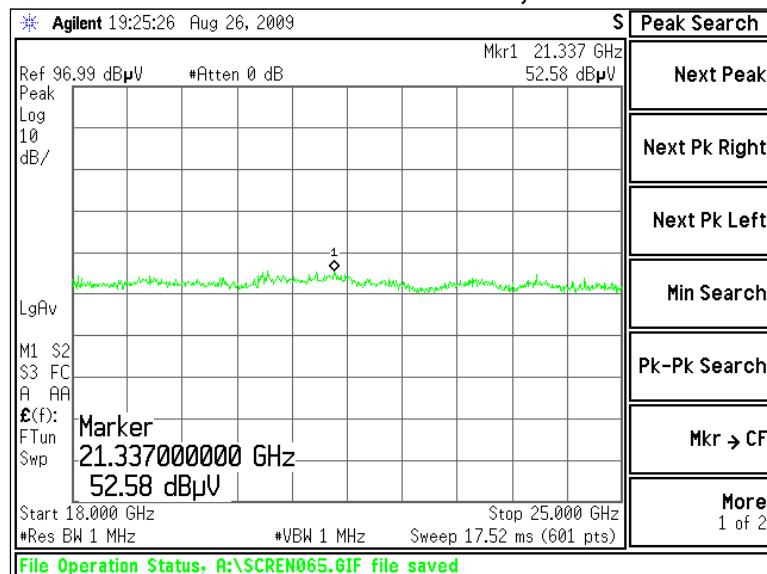
| | | |
|---------------------------|--|------------------|
| Prepared For: Niles Audio | EUT: 2.4 GHz module | LS Research, LLC |
| Report #: 309028-2 | Model #: 2.4 GHz RF Transceiver Module | |
| LSR Job #: C-690 | Serial #: see page 6 | Page 78 of 159 |

Screen Captures - Radiated Emissions Testing – Receive Mode - Unit with BNC Antenna (continued)

**Channel 8, Antenna Horizontally Polarized, EUT Vertical
18000 MHz – 25000 MHz, at 1 m**



**Channel 8, Antenna Vertically Polarized, EUT Vertical
18000 MHz – 25000 MHz, at 1 m**



| | | |
|---------------------------|--|------------------|
| Prepared For: Niles Audio | EUT: 2.4 GHz module | LS Research, LLC |
| Report #: 309028-2 | Model #: 2.4 GHz RF Transceiver Module | |
| LSR Job #: C-690 | Serial #: see page 6 | Page 79 of 159 |

5.6.5 Radiated Emissions on Unit with Wire Antenna

5.6.5.1 Transmit mode on original unit

The Wire Antenna unit was originally tested January 2 – 11, 2006. The data from the original testing is shown below. Verification testing was performed in August and September of 2009 and data is presented in Section 5.6.5.2

The following table depicts the level of significant radiated RF fundamental and harmonic emissions seen on Low Channel:

| Frequency (MHz) | Antenna Polarity | Height (meters) | Azimuth (0° - 360°) | Measured EFI (dB μ V/m) | 15.247 Limit (dB μ V/m) | Margin (dB) |
|-----------------|------------------|-----------------|---------------------|-----------------------------|-----------------------------|-------------|
| 2405 | H | 1.10 | 45 | 117.0 | 125.2 | 8.2 |
| 4810 | V | 1.10 | 0 | 38.7 | 54.0 | 15.3 |
| 7215 | V | 1.00 | 265 | 46.9 | 106.5 | 59.6 |
| 9620 | H | 1.00 | 260 | 46.5 | 106.5 | 60.0 |
| 12025 | H | 1.05 | 215 | 39.9 | 63.5 | 23.6 |
| 14430 | | | | | 63.5 | |
| 16835 | | | | | 106.5 | |
| 19240 | | | | | 74.0 | |
| 21645 | | | | | 117.0 | |
| 24050 | | | | | 117.0 | |

The following table depicts the level of significant radiated RF fundamental and harmonic emissions seen on Mid Channel:

| Frequency (MHz) | Antenna Polarity | Height (meters) | Azimuth (0° - 360°) | Measured EFI (dB μ V/m) | 15.247 Limit (dB μ V/m) | Margin (dB) |
|-----------------|------------------|-----------------|---------------------|-----------------------------|-----------------------------|-------------|
| 2445 | H | 1.10 | 60 | 115.6 | 125.2 | 9.6 |
| 4890 | V | 1.10 | 35 | 39.8 | 54.0 | 14.2 |
| 7335 | V | 1.00 | 265 | 46.6 | 63.5 | 16.9 |
| 9780 | H | 1.00 | 270 | 46.4 | 105.1 | 58.7 |
| 12225 | H | 1.05 | 215 | 39.0 | 63.5 | 24.5 |
| 14670 | | | | | 105.1 | |
| 17115 | | | | | 105.1 | |
| 19560 | | | | | 74.0 | |
| 22005 | | | | | 115.6 | |
| 24450 | | | | | 115.6 | |

The following table depicts the level of significant radiated RF fundamental and harmonic emissions seen on High Channel:

| Frequency (MHz) | Antenna Polarity | Height (meters) | Azimuth (0° - 360°) | Measured EFI (dB μ V/m) | 15.247 Limit (dB μ V/m) | Margin (dB) |
|-----------------|------------------|-----------------|---------------------|-----------------------------|-----------------------------|-------------|
| 2475 | H | 1.05 | 40 | 117.6 | 125.2 | 7.6 |
| 4950 | V | 1.20 | 85 | 40.8 | 54.0 | 13.2 |
| 7425 | V | 1.00 | 270 | 46.7 | 63.5 | 16.8 |
| 9900 | H | 1.00 | 270 | 46.2 | 107.1 | 60.9 |
| 12375 | H | 1.05 | 200 | 37.8 | 63.5 | 25.7 |
| 14850 | | | | | 107.1 | |
| 17325 | | | | | 107.1 | |
| 19800 | | | | | 74.0 | |
| 22275 | | | | | 74.0 | |
| 24750 | | | | | 117.6 | |

| | | |
|---------------------------|--|------------------|
| Prepared For: Niles Audio | EUT: 2.4 GHz module | LS Research, LLC |
| Report #: 309028-2 | Model #: 2.4 GHz RF Transceiver Module | |
| LSR Job #: C-690 | Serial #: see page 6 | Page 80 of 159 |

5.6.5.2 Transmit mode on current unit

The following table depicts the level of spurious radiated RF emissions found:

| Frequency (MHz) | Height (m) | Azimuth (degree) | Peak Reading (dB μ V/m) | Quasi Peak Reading (dB μ V/m) | Quasi Peak Limit (dB μ V/m) | Margin (dB) | Antenna Polarity | EUT orientation |
|-----------------|------------|------------------|-----------------------------|-----------------------------------|---------------------------------|-------------|------------------|-----------------|
| 119.7 | 1.00 | 0 | 19.27 | 12.33 | 43.5 | 31.2 | Vertical | Vertical |
| 203.0 | 1.00 | 0 | 22.31 | 15.26 | 43.5 | 28.2 | Horizontal | Vertical |
| 245.1 | 1.00 | 0 | 27.26 | 21.55 | 46.0 | 24.5 | Horizontal | Horizontal |
| 287.0 | 1.00 | 0 | 29.31 | 23.31 | 46.0 | 22.7 | Vertical | Horizontal |
| 681.6 | 1.00 | 0 | 33.02 | 26.63 | 46.0 | 19.4 | Horizontal | Vertical |
| 803.0 | 1.00 | 224 | 38.59 | 34.77 | 46.0 | 11.2 | Horizontal | Horizontal |
| 803.0 | 1.00 | 147 | 37.38 | 33.95 | 46.0 | 12.1 | Horizontal | Horizontal |
| 805.0 | 1.00 | 212 | 42.69 | 40.3 | 46.0 | 5.7 | Horizontal | Horizontal |
| 923.0 | 1.00 | 0 | 33.35 | 27.55 | 46.0 | 18.5 | Vertical | Vertical |

| | | |
|---------------------------|--|------------------|
| Prepared For: Niles Audio | EUT: 2.4 GHz module | LS Research, LLC |
| Report #: 309028-2 | Model #: 2.4 GHz RF Transceiver Module | |
| LSR Job #: C-690 | Serial #: see page 6 | Page 81 of 159 |

Radiated Emissions Data Chart on Unit with Wire Antenna (continued)

The following table depicts the level of significant radiated RF fundamental and harmonic emissions seen on Channel 0:

| Frequency (MHz) | Height (m) | Azimuth (degree) | Peak Reading (dB μ V/m) | Avg Reading (dB μ V/m) | Avg Limit (dB μ V/m) | Margin (dB) | Antenna Polarity | EUT orientation |
|-----------------|------------|------------------|-----------------------------|----------------------------|--------------------------|-------------|------------------|-----------------|
| 2405 | 1.17 | 247 | 117.0 | 116.0 | 125.0 | 9.1 | Vertical | Side |
| 4810 | 1.00 | 156 | 56.8 | 51.4 | 63.5 | 12.1 | Horizontal | Vertical |
| 7215 | 1.03 | 329 | 67.3 | 56.2 | 104.5 | 48.3 | Horizontal | Vertical |
| 9620 | 1.03 | 328 | 61.6 | 51.5 | 104.5 | 52.9 | Horizontal | Vertical |
| 12025 | 1.04 | 199 | 59.3 | 49.1 | 63.5 | 14.4 | Vertical | Side |
| 14430 | 1.03 | 132 | 56.3 | 46.6 | 104.5 | 57.9 | Horizontal | Side |
| 16835 | 1.06 | 4 | 51.8 | 41.6 | 104.5 | 62.9 | Horizontal | Side |
| 19240 | | | Note 3 | | 63.5 | | | |
| 21645 | | | Note 3 | | 104.5 | | | |
| 24050 | | | Note 3 | | 104.5 | | | |

The following table depicts the level of significant radiated RF fundamental and harmonic emissions seen on Channel 8:

| Frequency (MHz) | Height (m) | Azimuth (degree) | Peak Reading (dB μ V/m) | Avg Reading (dB μ V/m) | Avg Limit (dB μ V/m) | Margin (dB) | Antenna Polarity | EUT orientation |
|-----------------|------------|------------------|-----------------------------|----------------------------|--------------------------|-------------|------------------|-----------------|
| 2445 | 1.11 | 208 | 114.6 | 113.1 | 125.0 | 12.0 | Horizontal | Side |
| 4890 | 1.26 | 193 | 67.2 | 58.1 | 63.5 | 5.4 | Horizontal | Flat |
| 7335 | 1.10 | 26 | 70.2 | 59.0 | 63.5 | 4.5 | Vertical | Flat |
| 9780 | 1.11 | 102 | 58.3 | 52.8 | 101.6 | 48.8 | Horizontal | Flat |
| 12225 | 1.06 | 281 | 58.5 | 48.0 | 63.5 | 15.5 | Horizontal | Vertical |
| 14670 | 1.14 | 282 | 52.8 | 41.4 | 101.6 | 60.1 | Vertical | Flat |
| 17115 | | | Note 3 | | 101.6 | | | |
| 19560 | | | Note 3 | | 63.5 | | | |
| 22005 | | | Note 3 | | 101.6 | | | |
| 24450 | | | Note 3 | | 101.6 | | | |

The following table depicts the level of significant radiated RF fundamental and harmonic emissions seen on Channel 14:

| Frequency (MHz) | Height (m) | Azimuth (degree) | Peak Reading (dB μ V/m) | Avg Reading (dB μ V/m) | Avg Limit (dB μ V/m) | Margin (dB) | Antenna Polarity | EUT orientation |
|-----------------|------------|------------------|-----------------------------|----------------------------|--------------------------|-------------|------------------|-----------------|
| 2475 | 1.18 | 296 | 116.0 | 114.4 | 125.0 | 10.6 | Horizontal | Vertical |
| 4950 | 1.03 | 90 | 52.2 | 47.8 | 63.5 | 15.7 | Horizontal | Vertical |
| 7425 | 1.00 | 295 | 60.2 | 48.2 | 63.5 | 15.3 | Horizontal | Vertical |
| 9900 | 1.05 | 317 | 52.9 | 41.5 | 102.9 | 61.4 | Horizontal | Vertical |
| 12375 | 1.05 | 226 | 54.8 | 42.5 | 63.5 | 21.0 | Vertical | Vertical |
| 14850 | 1.03 | 10 | 51.1 | 40.0 | 102.9 | 62.9 | Vertical | Side |
| 17325 | 1.03 | 7 | 56.0 | 43.8 | 102.9 | 59.1 | Horizontal | Vertical |
| 19800 | | | Note 3 | | 63.5 | | | |
| 22275 | | | Note 3 | | 63.5 | | | |
| 24750 | | | Note 3 | | 102.9 | | | |

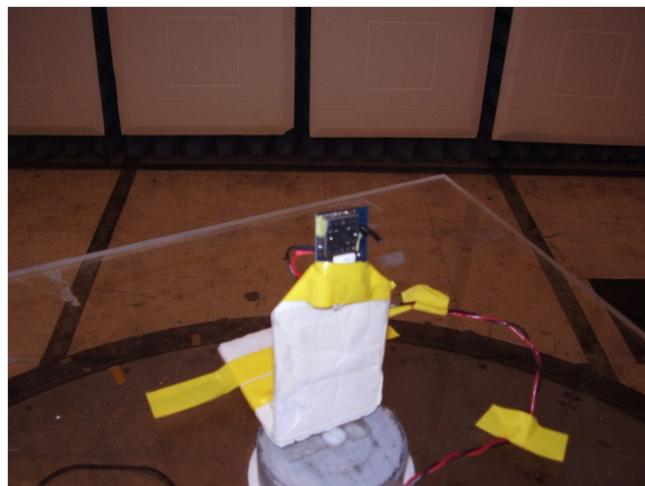
Notes:

- 1) A Quasi-Peak Detector was used in measurements below 1 GHz, and a Peak as well as an Average Detector was used in measurements above 1 GHz. The peak detector was used to ensure the peak emissions did not exceed 20 dB above the limits.
- 2) Measurements above 4 GHz were made at 1 meters of separation from the EUT.
- 3) Measurement at receiver system noise floor.
- 4) For measurements of the fundamental power, because of spectral bandwidth, the receiver was set to RBW=VBW=3 MHz.

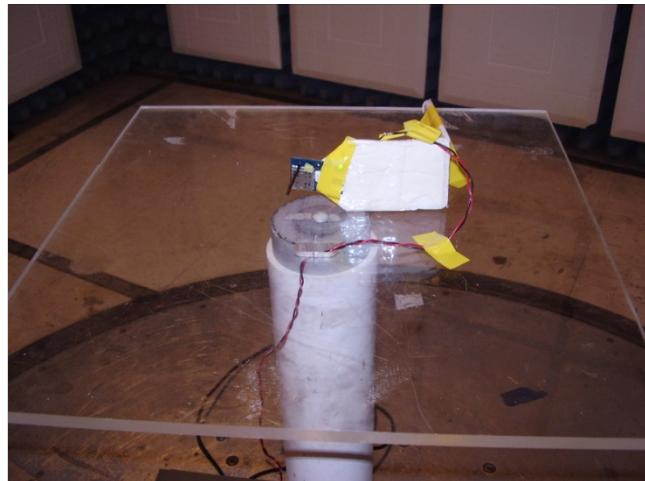
| | | |
|---------------------------|--|------------------|
| Prepared For: Niles Audio | EUT: 2.4 GHz module | LS Research, LLC |
| Report #: 309028-2 | Model #: 2.4 GHz RF Transceiver Module | |
| LSR Job #: C-690 | Serial #: see page 6 | Page 82 of 159 |

Test Setup Photo(s) –Radiated Emissions Test: Unit with Wire Antenna

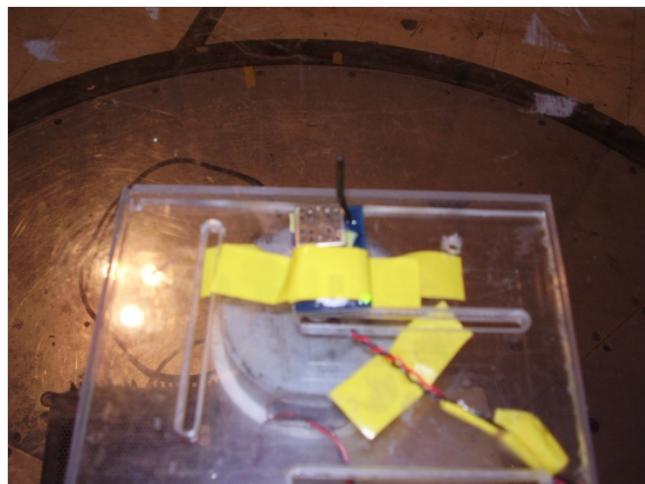
Vertical Orientation



Side Orientation



Flat Orientation



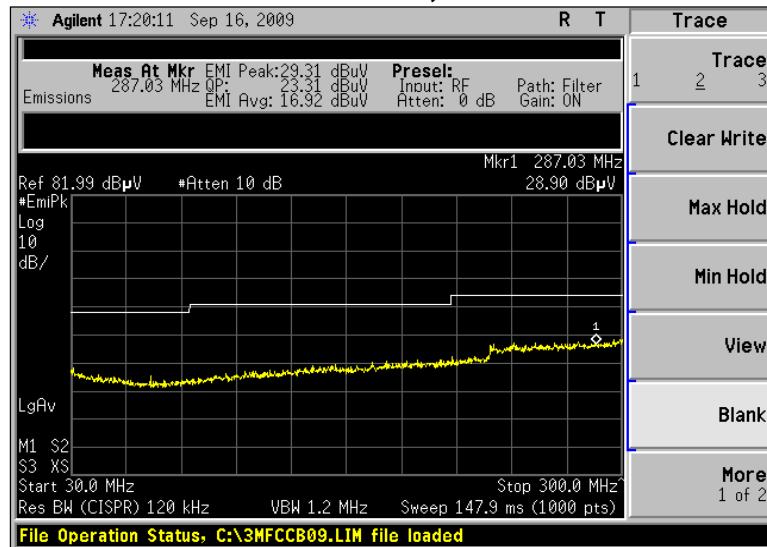
| | | |
|---------------------------|--|------------------|
| Prepared For: Niles Audio | EUT: 2.4 GHz module | LS Research, LLC |
| Report #: 309028-2 | Model #: 2.4 GHz RF Transceiver Module | |
| LSR Job #: C-690 | Serial #: see page 6 | Page 83 of 159 |

Screen Captures - Radiated Emissions Test on Unit with Wire Antenna

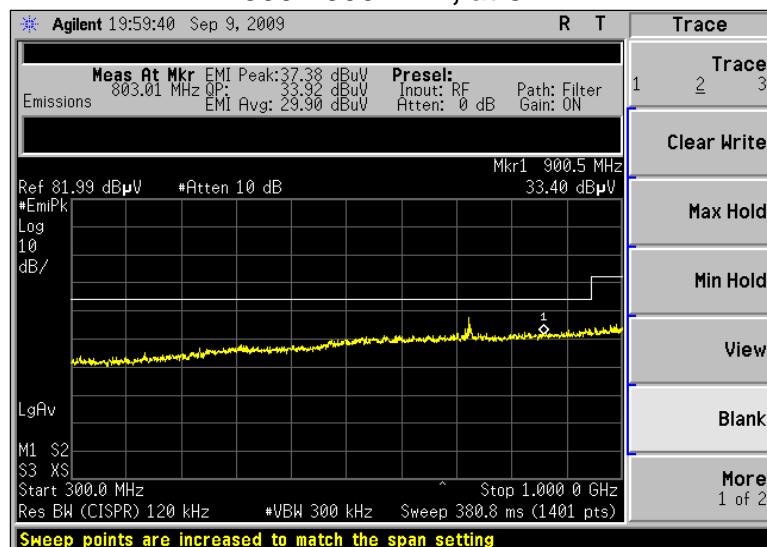
These screen captures represent Peak Emissions. For radiated emission measurements, a Quasi-Peak detector function is utilized when measuring frequencies below 1 GHz, and an Average detector function is utilized when measuring frequencies above 1 GHz.

The signature scans shown here are from worst-case emissions, as measured on channels 0, 8, or 14, with the sense antenna both in vertical and horizontal polarity for worst case presentations.

Channel 0, Antenna Vertically Polarized, EUT Horizontal 30-300 MHz, at 3m



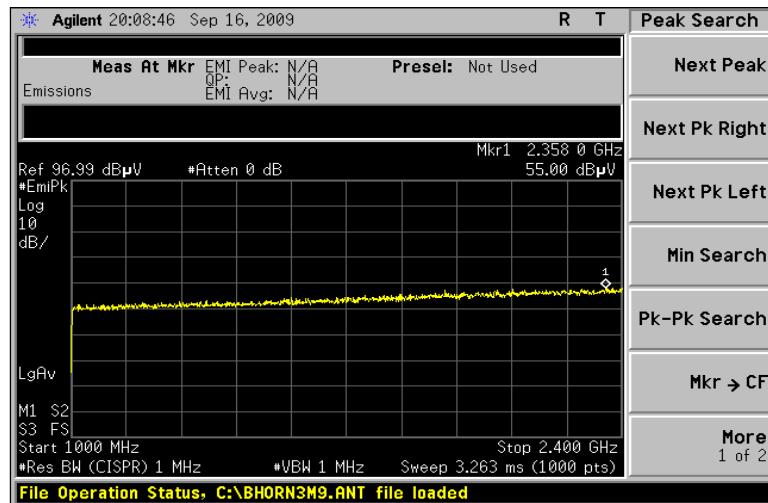
Channel 0 Antenna Horizontally Polarized, EUT Horizontal 300-1000 MHz, at 3m



| | | |
|---------------------------|--|------------------|
| Prepared For: Niles Audio | EUT: 2.4 GHz module | LS Research, LLC |
| Report #: 309028-2 | Model #: 2.4 GHz RF Transceiver Module | |
| LSR Job #: C-690 | Serial #: see page 6 | Page 84 of 159 |

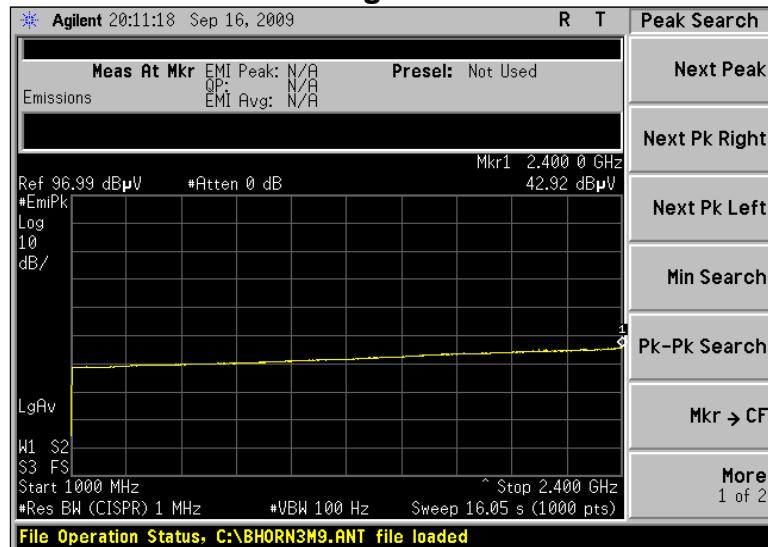
**Screen Captures - Radiated Emissions Testing on Unit with Wire Antenna
(continued)**

**Channel 8, Antenna Horizontally Polarized, EUT on Side
1000-2400 MHz, at 3m
Peak Values**



Note: because the peak value (of the noise floor) was above the average limit, the video average bandwidth was decreased to demonstrate that the video-averaged signal is below the radiated limit.

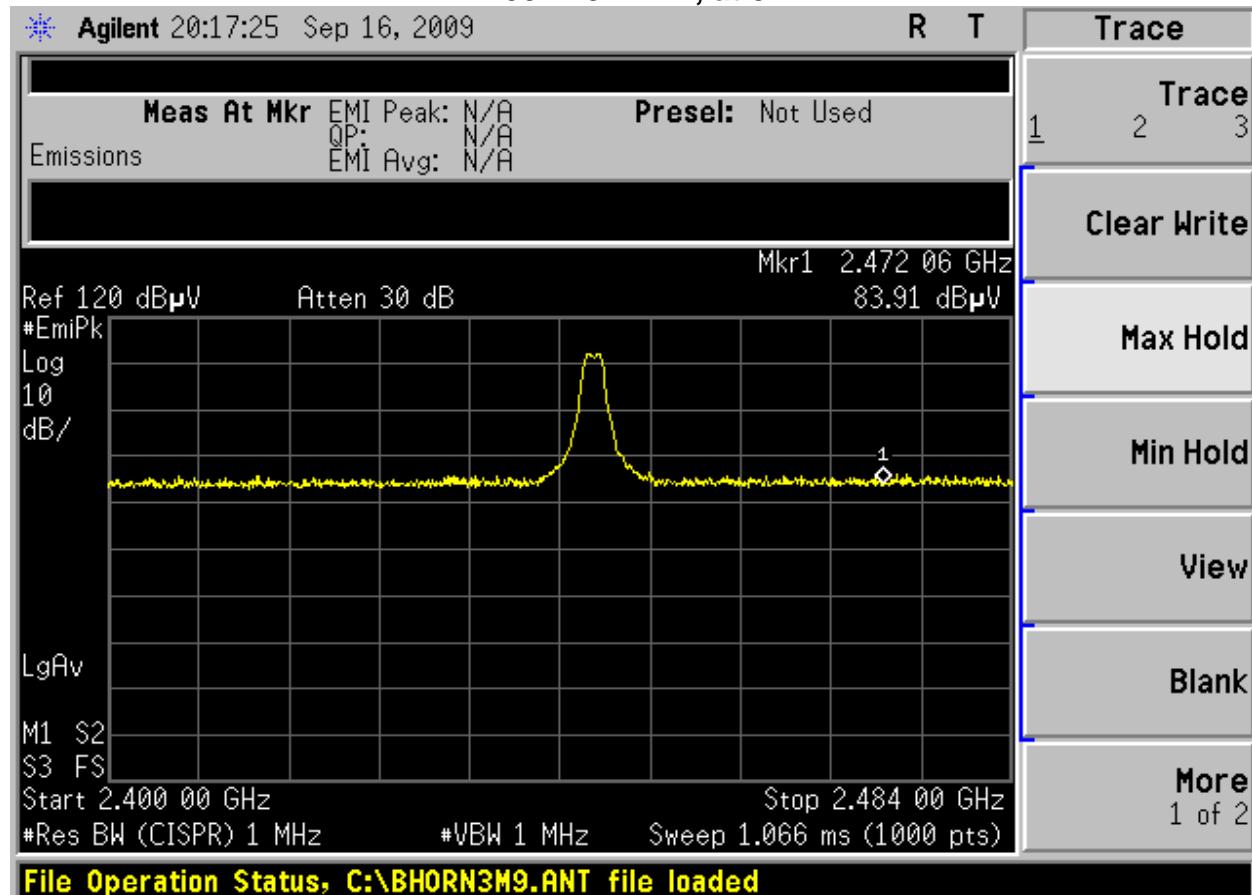
**Channel 8, Antenna Horizontally Polarized, EUT on Side
1000-2400 MHz, at 3m
Average Values**



| | | |
|---------------------------|--|------------------|
| Prepared For: Niles Audio | EUT: 2.4 GHz module | LS Research, LLC |
| Report #: 309028-2 | Model #: 2.4 GHz RF Transceiver Module | |
| LSR Job #: C-690 | Serial #: see page 6 | Page 85 of 159 |

**Screen Captures - Radiated Emissions Testing on Unit with Wire Antenna
(continued)**

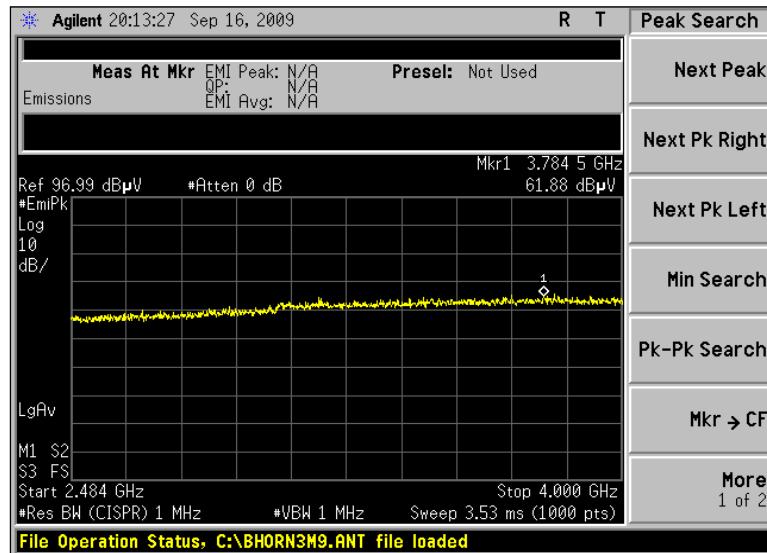
**Channel 8, Antenna Horizontally Polarized, EUT on Side
2400-2484 MHz, at 3m**



| | | |
|---------------------------|--|------------------|
| Prepared For: Niles Audio | EUT: 2.4 GHz module | LS Research, LLC |
| Report #: 309028-2 | Model #: 2.4 GHz RF Transceiver Module | |
| LSR Job #: C-690 | Serial #: see page 6 | Page 86 of 159 |

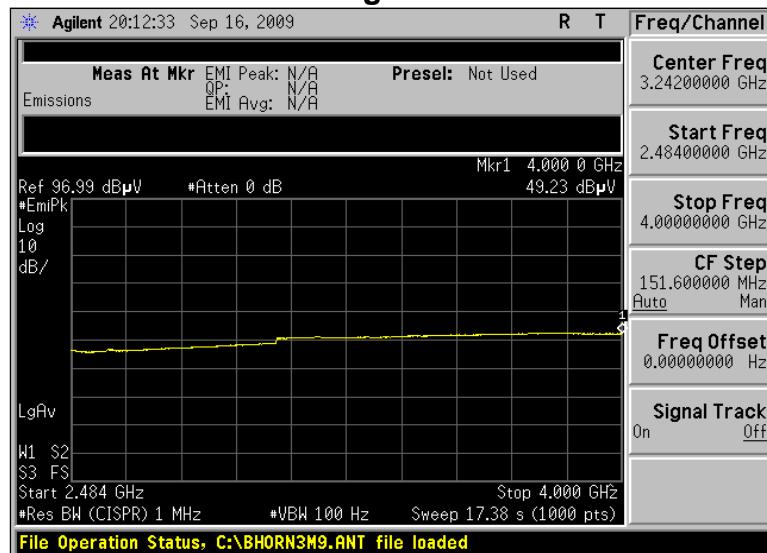
**Screen Captures - Radiated Emissions Testing on Unit with Wire Antenna
(continued)**

**Channel 8, Antenna Horizontally Polarized, EUT on Side
2484.0-4000 MHz, at 3m
Peak Values**



Note: because the peak value (of the noise floor) was above the average limit, the video average bandwidth was decreased to demonstrate that the video-averaged signal is below the radiated limit.

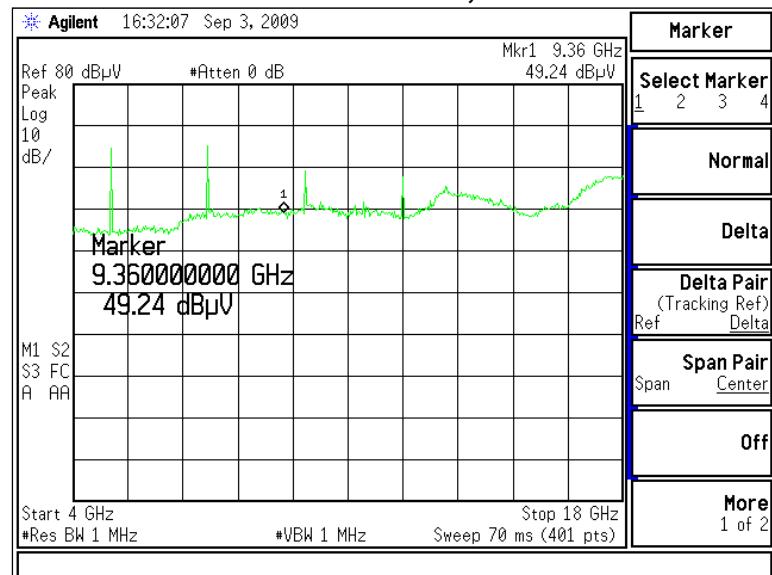
**Channel 8, Antenna Horizontally Polarized, EUT on Side
2484.0-4000 MHz, at 3m
Average Values**



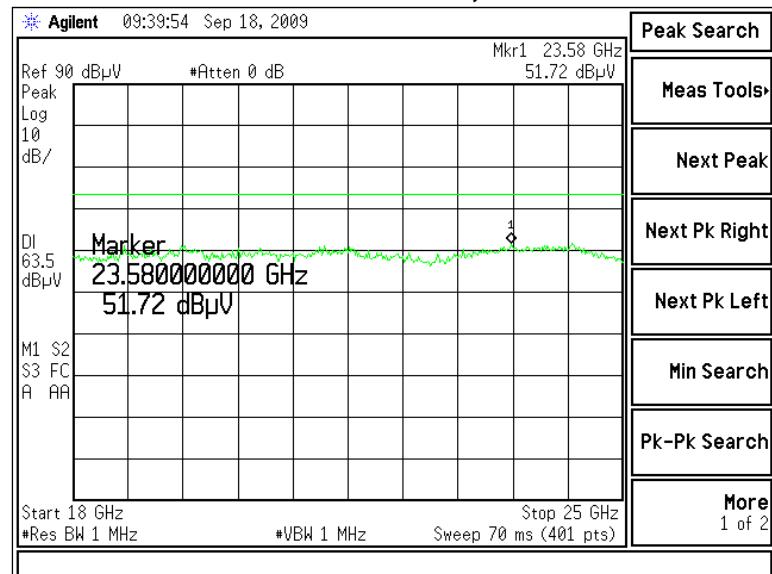
| | | |
|---------------------------|--|------------------|
| Prepared For: Niles Audio | EUT: 2.4 GHz module | LS Research, LLC |
| Report #: 309028-2 | Model #: 2.4 GHz RF Transceiver Module | |
| LSR Job #: C-690 | Serial #: see page 6 | Page 87 of 159 |

**Screen Captures - Radiated Emissions Testing on Unit with Wire Antenna
(continued)**

**Channel 14, Antenna Horizontally Polarized, EUT on Side
4000-18000 MHz, at 1m**



**Channel 8, Antenna Horizontally Polarized, EUT on Side
18000-25000 MHz, at 1 m**



| | | |
|---------------------------|--|------------------|
| Prepared For: Niles Audio | EUT: 2.4 GHz module | LS Research, LLC |
| Report #: 309028-2 | Model #: 2.4 GHz RF Transceiver Module | |
| LSR Job #: C-690 | Serial #: see page 6 | Page 88 of 159 |

5.6.5.3 Receive Mode on Unit with Wire Antenna

Per the requirements of RSS-210, the EUT was placed in continuous receive mode and the radiated spurious emissions were measured and compared to the limits stated in RSS-Gen Section 4.10.

The test setup, procedure, and equipment utilized were identical to that described in sections 5.1, 5.2, and 5.3 of this document.

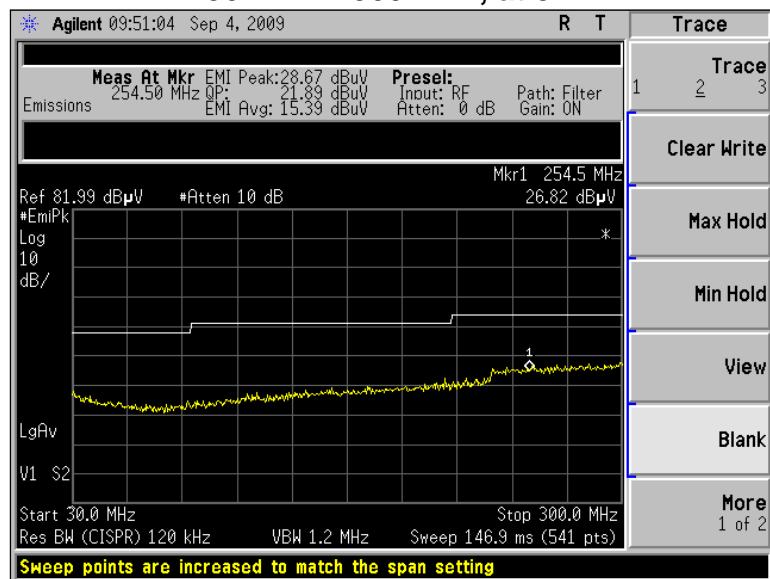
Measurement data and screen captures from the receive tests are presented below:

| Frequency (MHz) | Height (m) | Azimuth (degree) | Peak Reading (dB μ V/m) | Quasi Peak Reading (dB μ V/m) | Quasi Peak Limit (dB μ V/m) | Margin (dB) | Antenna Polarity | EUT orientation |
|-----------------|------------|------------------|-----------------------------|-----------------------------------|---------------------------------|-------------|------------------|-----------------|
| 173.5 | 1.00 | 0 | 20.8 | 13.9 | 43.5 | 29.6 | Vertical | Vertical |
| 208.5 | 1.00 | 0 | 21.8 | 15.7 | 43.5 | 27.8 | Vertical | Side |
| 254.5 | 1.00 | 0 | 28.7 | 21.9 | 46.0 | 24.1 | Horizontal | Vertical |
| 293.5 | 1.00 | 0 | 28.6 | 23.2 | 46.0 | 22.8 | Horizontal | Side |
| 626.3 | 1.00 | 0 | 31.6 | 25.0 | 46.0 | 21.0 | Horizontal | Vertical |
| 740.3 | 1.00 | 0 | 31.8 | 25.8 | 46.0 | 20.2 | Horizontal | Side |
| 871.0 | 1.00 | 0 | 32.9 | 27.3 | 46.0 | 18.7 | Vertical | Side |
| 919.0 | 1.00 | 0 | 33.7 | 27.4 | 46.0 | 18.6 | Vertical | Vertical |

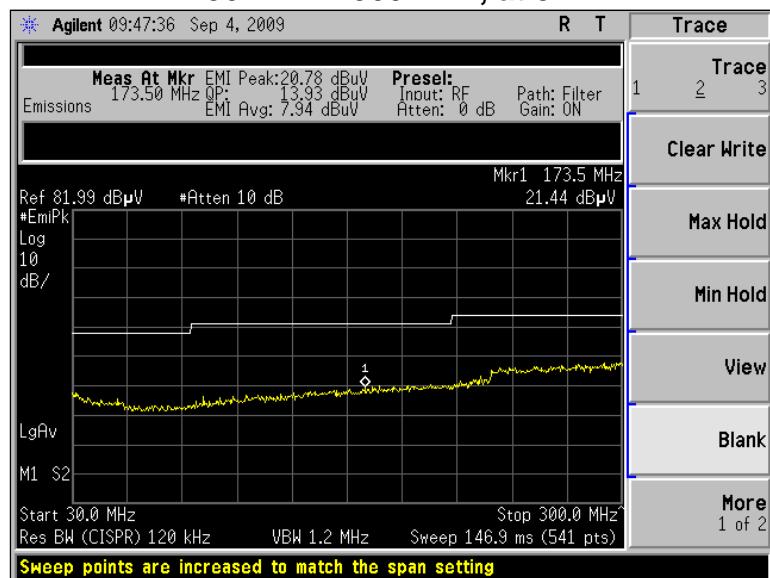
| | | |
|---------------------------|--|------------------|
| Prepared For: Niles Audio | EUT: 2.4 GHz module | LS Research, LLC |
| Report #: 309028-2 | Model #: 2.4 GHz RF Transceiver Module | |
| LSR Job #: C-690 | Serial #: see page 6 | Page 89 of 159 |

Screen Captures - Radiated Emissions Testing – Receive Mode on Unit with Wire Antenna

**Channel 8, Antenna Horizontally Polarized, EUT Vertical
30 MHz – 300 MHz, at 3m**



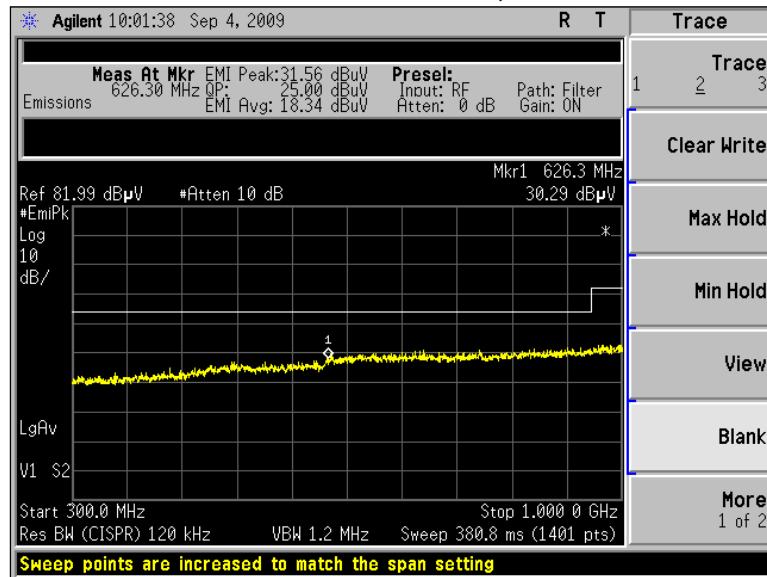
**Channel 8, Antenna Vertically Polarized, EUT on Side
30 MHz – 300 MHz, at 3m**



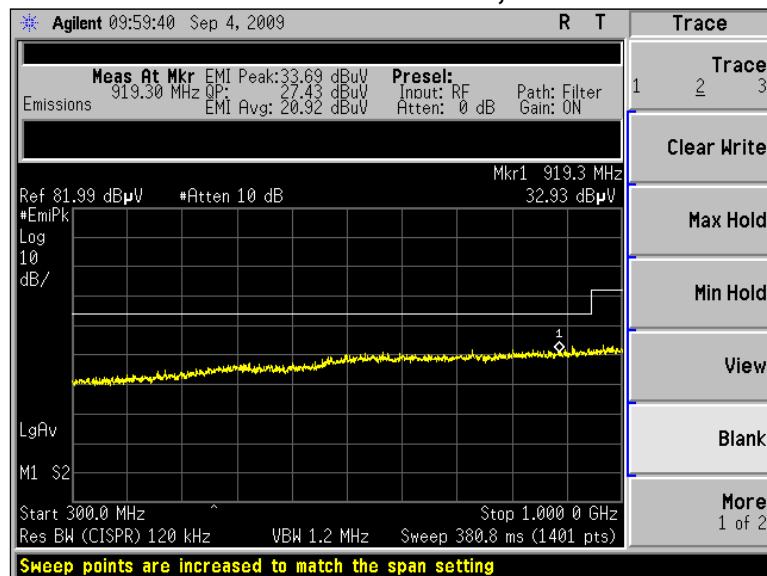
| | | |
|---------------------------|--|------------------|
| Prepared For: Niles Audio | EUT: 2.4 GHz module | LS Research, LLC |
| Report #: 309028-2 | Model #: 2.4 GHz RF Transceiver Module | |
| LSR Job #: C-690 | Serial #: see page 6 | Page 90 of 159 |

Screen Captures - Radiated Emissions Testing – Receive Mode on Unit with Wire Antenna (continued)

Channel 8, Antenna Horizontally Polarized, EUT on Side 300 MHz – 1000 MHz, at 3m



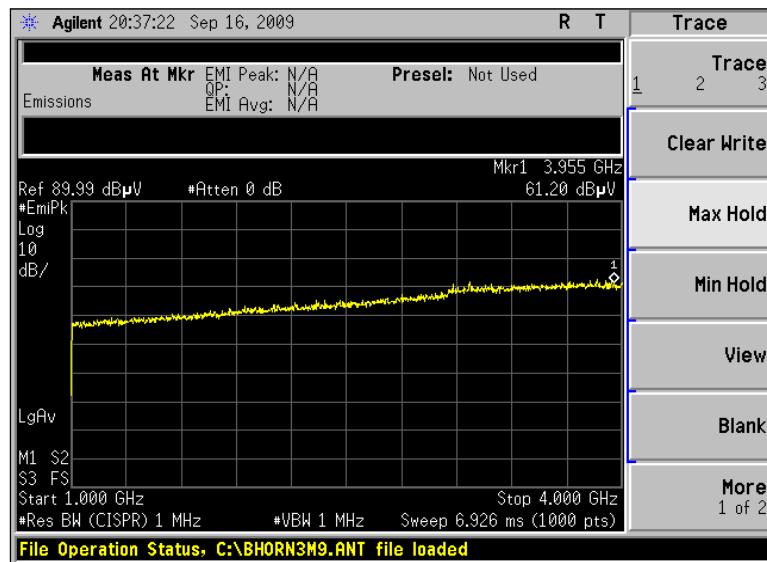
Channel 8, Antenna Vertically Polarized, EUT on Side 300 MHz – 1000 MHz, at 3m



| | | |
|---------------------------|--|------------------|
| Prepared For: Niles Audio | EUT: 2.4 GHz module | LS Research, LLC |
| Report #: 309028-2 | Model #: 2.4 GHz RF Transceiver Module | |
| LSR Job #: C-690 | Serial #: see page 6 | Page 91 of 159 |

Screen Captures - Radiated Emissions Testing – Receive Mode on Unit with Wire Antenna (continued)

Channel 8, Antenna Horizontally Polarized, EUT Vertical 1000 MHz – 4000 MHz, at 3m Peak Values



Note: because the peak value (of the noise floor) was above the average limit, the video average bandwidth was decreased to demonstrate that the video-averaged signal is below the radiated limit.

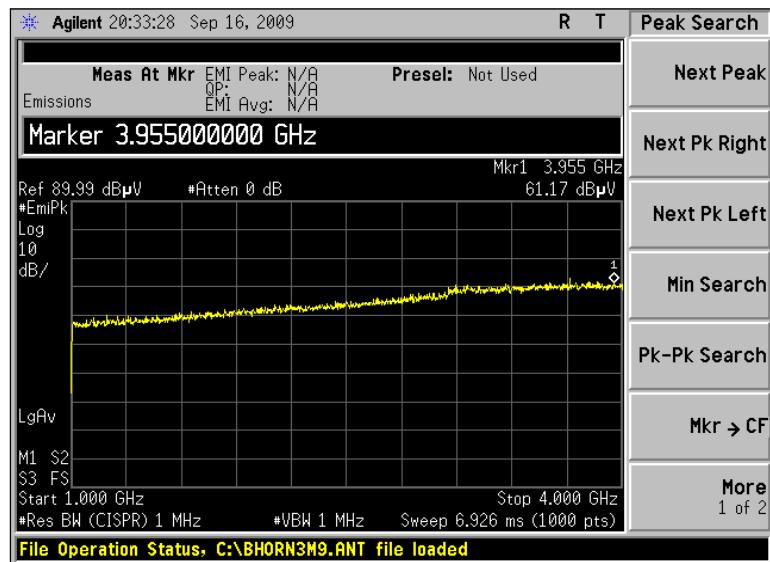
Channel 8, Antenna Horizontally Polarized, EUT Vertical 1000 MHz – 4000 MHz, at 3m Average Values



| | | |
|---------------------------|--|------------------|
| Prepared For: Niles Audio | EUT: 2.4 GHz module | LS Research, LLC |
| Report #: 309028-2 | Model #: 2.4 GHz RF Transceiver Module | |
| LSR Job #: C-690 | Serial #: see page 6 | Page 92 of 159 |

Screen Captures - Radiated Emissions Testing – Receive Mode on Unit with Wire Antenna (continued)

Channel 8, Antenna Vertically Polarized, EUT Vertical 1000 MHz – 4000 MHz, at 3m Peak Values



Note: because the peak value (of the noise floor) was above the average limit, the video average bandwidth was decreased to demonstrate that the video-averaged signal is below the radiated limit.

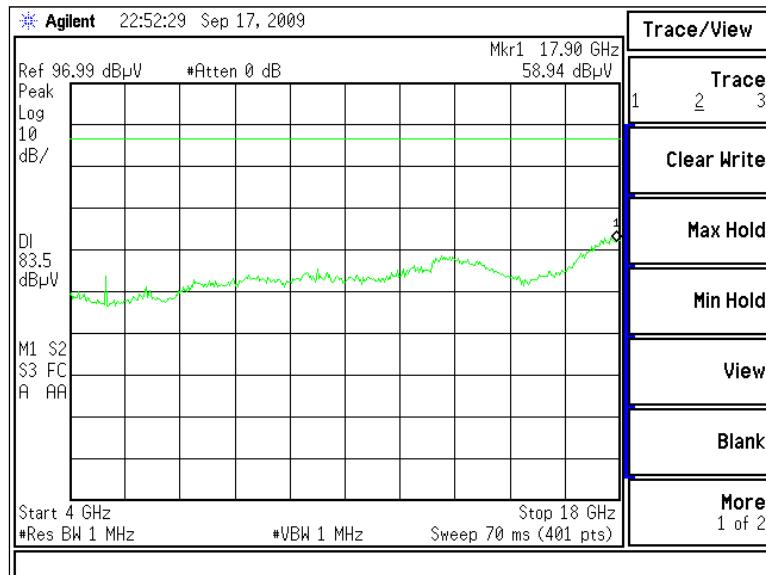
Channel 8, Antenna Vertically Polarized, EUT Vertical 1000 MHz – 4000 MHz, at 3m Average Values



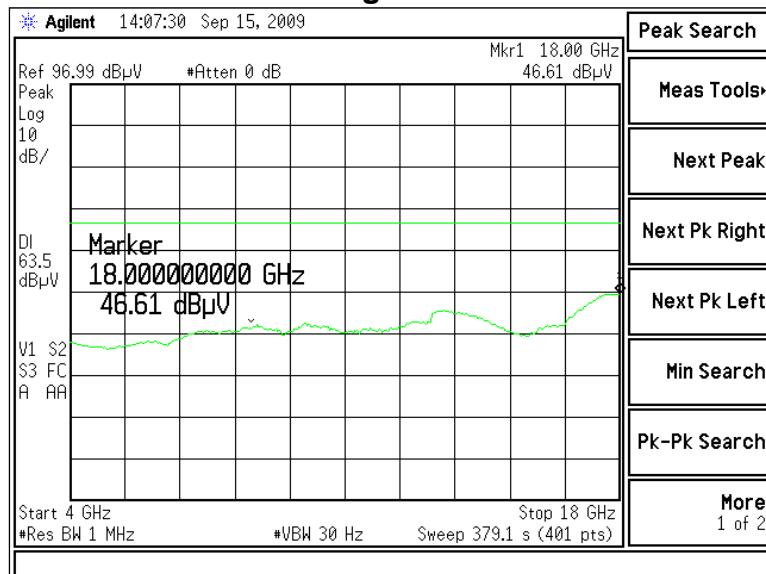
| | | |
|---------------------------|--|------------------|
| Prepared For: Niles Audio | EUT: 2.4 GHz module | LS Research, LLC |
| Report #: 309028-2 | Model #: 2.4 GHz RF Transceiver Module | |
| LSR Job #: C-690 | Serial #: see page 6 | Page 93 of 159 |

Screen Captures - Radiated Emissions Testing – Receive Mode on Unit with Wire Antenna (continued)

**Channel 8, Antenna Horizontally Polarized, EUT Vertical
4000 MHz – 18000 MHz, at 1 m
Peak Values**



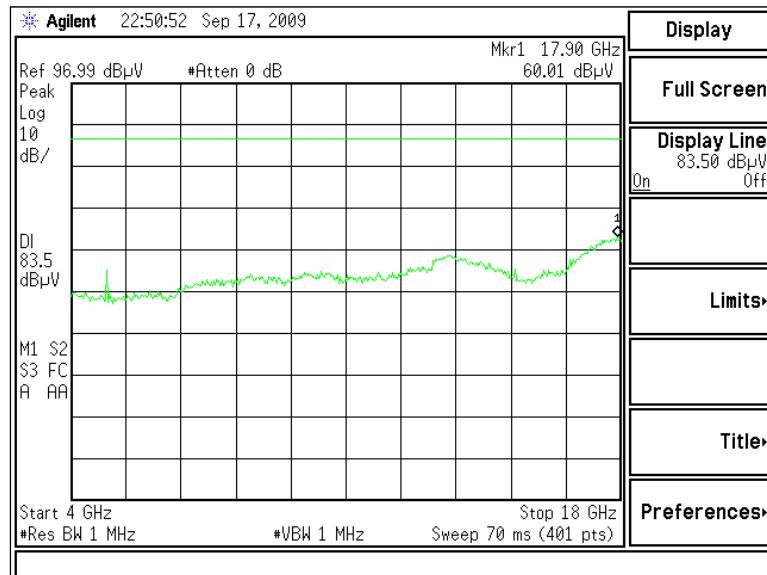
**Channel 8, Antenna Horizontally Polarized, EUT Vertical
4000 MHz – 18000 MHz, at 1 m
Average Values**



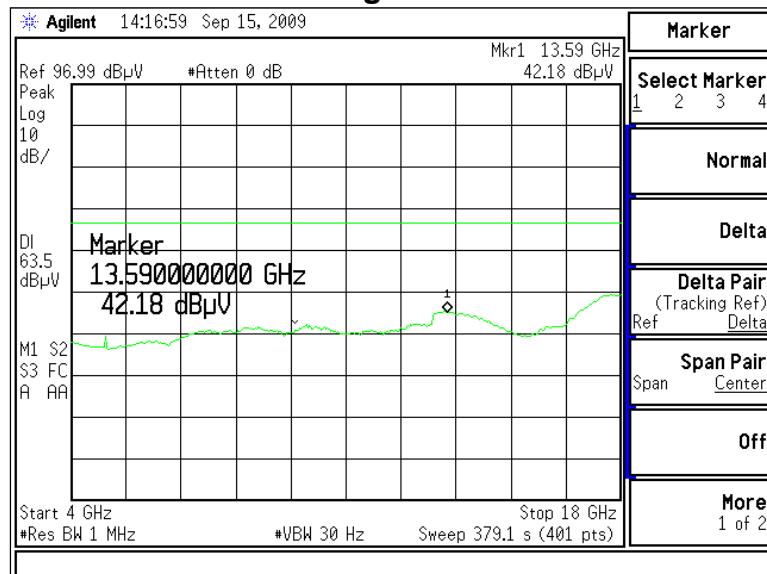
| | | |
|---------------------------|--|------------------|
| Prepared For: Niles Audio | EUT: 2.4 GHz module | LS Research, LLC |
| Report #: 309028-2 | Model #: 2.4 GHz RF Transceiver Module | |
| LSR Job #: C-690 | Serial #: see page 6 | Page 94 of 159 |

Screen Captures - Radiated Emissions Testing – Receive Mode on Unit with Wire Antenna (continued)

**Channel 8, Antenna Vertically Polarized, EUT Vertical
4000 MHz – 18000 MHz, at 1 m
Peak Values**



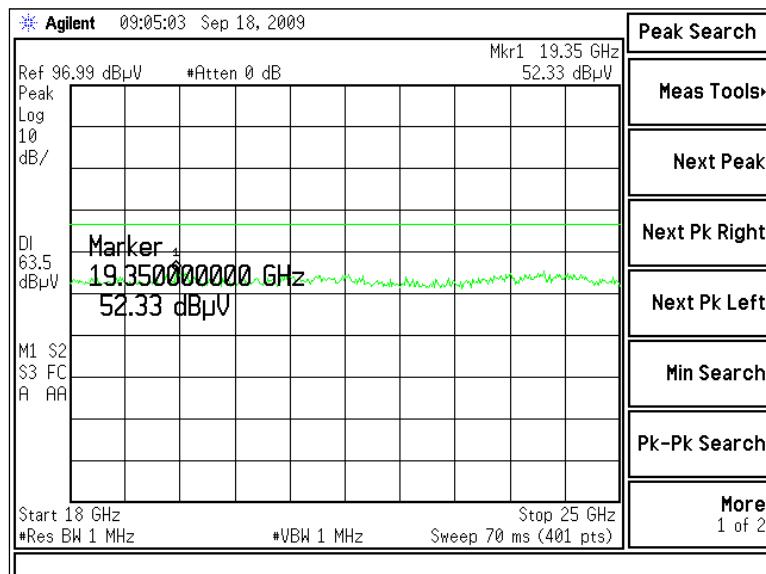
**Channel 8, Antenna Vertically Polarized, EUT Vertical
4000 MHz – 18000 MHz, at 1 m
Average Values**



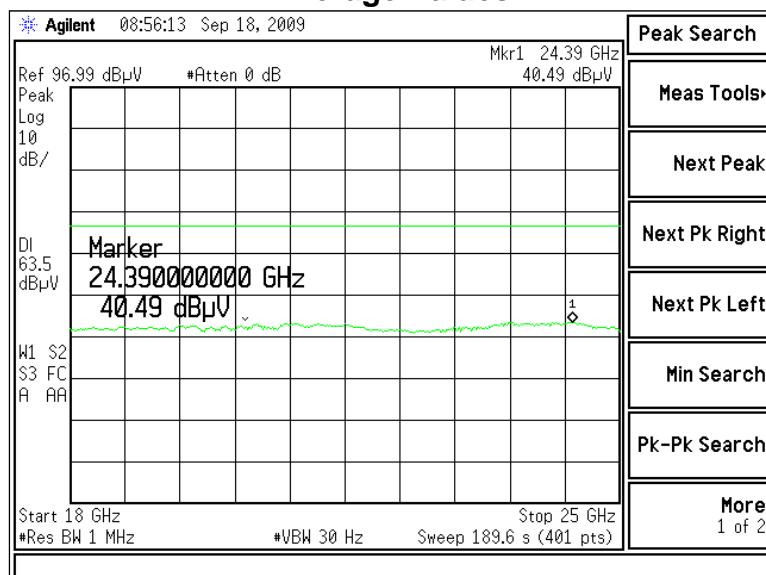
| | | |
|---------------------------|--|------------------|
| Prepared For: Niles Audio | EUT: 2.4 GHz module | LS Research, LLC |
| Report #: 309028-2 | Model #: 2.4 GHz RF Transceiver Module | |
| LSR Job #: C-690 | Serial #: see page 6 | Page 95 of 159 |

Screen Captures - Radiated Emissions Testing – Receive Mode on Unit with Wire Antenna (continued)

**Channel 8, Antenna Horizontally Polarized, EUT on Side
18000 MHz – 25000 MHz, at 1 m
Peak Values**



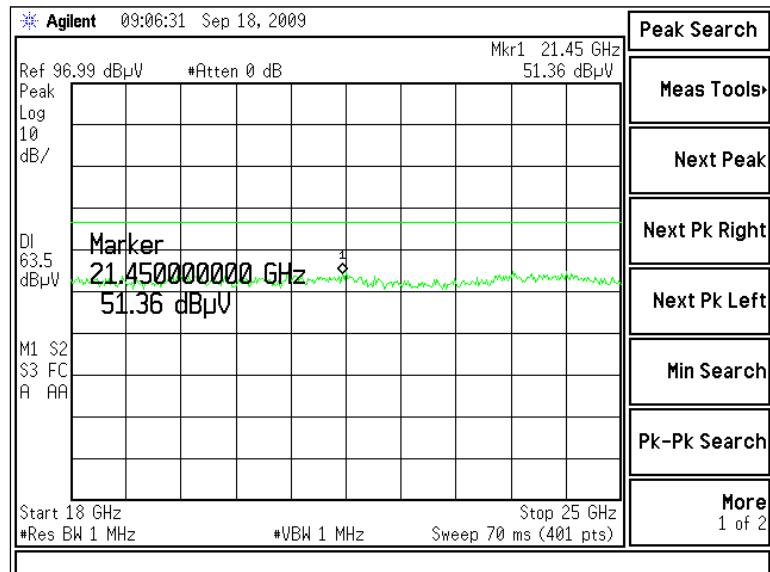
**Channel 8, Antenna Horizontally Polarized, EUT on Side
18000 MHz – 25000 MHz, at 1 m
Average Values**



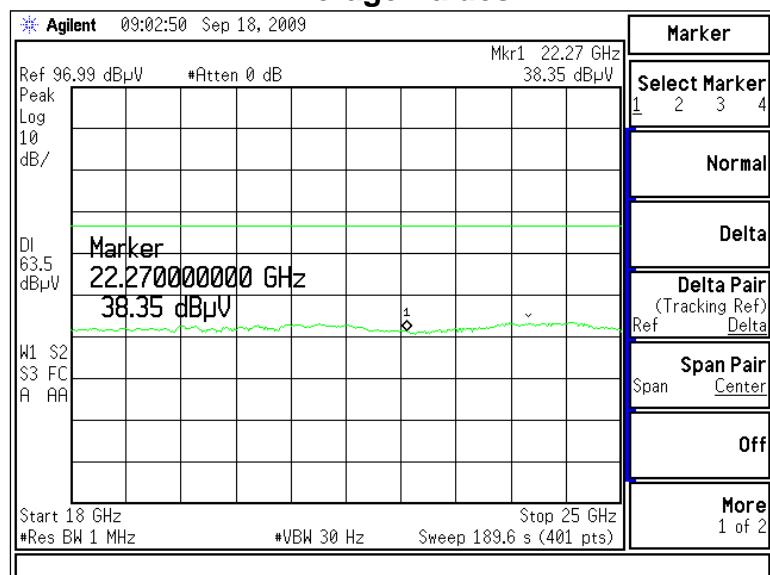
| | | |
|---------------------------|--|------------------|
| Prepared For: Niles Audio | EUT: 2.4 GHz module | LS Research, LLC |
| Report #: 309028-2 | Model #: 2.4 GHz RF Transceiver Module | |
| LSR Job #: C-690 | Serial #: see page 6 | Page 96 of 159 |

Screen Captures - Radiated Emissions Testing – Receive Mode on Unit with Wire Antenna (continued)

**Channel 8, Antenna Vertically Polarized, EUT on Side
18000 MHz – 25000 MHz, at 1 m
Peak Values**



**Channel 8, Antenna Vertically Polarized, EUT on Side
18000 MHz – 25000 MHz, at 1 m
Average Values**



| | | |
|---------------------------|--|------------------|
| Prepared For: Niles Audio | EUT: 2.4 GHz module | LS Research, LLC |
| Report #: 309028-2 | Model #: 2.4 GHz RF Transceiver Module | |
| LSR Job #: C-690 | Serial #: see page 6 | Page 97 of 159 |

5.6.6 Radiated Emissions on Unit with Heat Shrink Dipole Antenna

5.6.6.1 Transmit Mode

The following table depicts the level of spurious radiated RF emissions found:

| Frequency (MHz) | Height (m) | Azimuth (degree) | Peak Reading (dB μ V/m) | Quasi Peak Reading (dB μ V/m) | Quasi Peak Limit (dB μ V/m) | Margin (dB) | Antenna Polarity | EUT orientation |
|-----------------|------------|------------------|-----------------------------|-----------------------------------|---------------------------------|-------------|------------------|-----------------|
| 199.7 | 1.00 | 0 | 21.72 | 15.4 | 43.5 | 28.1 | Vertical | Flat |
| 222.7 | 1.00 | 0 | 23.99 | 16.73 | 46.0 | 29.3 | Vertical | Side |
| 253.6 | 1.00 | 0 | 27.31 | 21.07 | 46.0 | 24.9 | Horizontal | Flat |
| 256.6 | 1.00 | 0 | 28.73 | 22.62 | 46.0 | 23.4 | Horizontal | Side |
| 545.6 | 1.00 | 0 | 28.25 | 22.25 | 46.0 | 23.8 | Vertical | Vertical |
| 675.0 | 1.00 | 0 | 31.85 | 26.13 | 46.0 | 19.9 | Horizontal | Vertical |
| 704.0 | 1.00 | 0 | 31.53 | 21.75 | 46.0 | 24.3 | Vertical | Flat |
| 810.6 | 1.00 | 0 | 32.23 | 26.5 | 46.0 | 19.5 | Horizontal | Flat |
| 905.1 | 1.00 | 0 | 33.63 | 27.98 | 46.0 | 18.0 | Horizontal | Vertical |
| 960.0 | 1.00 | 0 | 34.04 | 28.13 | 54.0 | 25.9 | Vertical | Vertical |

| | | |
|---------------------------|--|------------------|
| Prepared For: Niles Audio | EUT: 2.4 GHz module | LS Research, LLC |
| Report #: 309028-2 | Model #: 2.4 GHz RF Transceiver Module | |
| LSR Job #: C-690 | Serial #: see page 6 | Page 98 of 159 |

Radiated Emissions Data Chart on Unit with Heat Shrink Dipole Antenna (continued)

The following table depicts the level of significant radiated RF fundamental and harmonic emissions seen on Channel 0:

| Frequency (MHz) | Height (m) | Azimuth (degree) | Peak Reading (dB μ V/m) | Avg Reading (dB μ V/m) | Avg Limit (dB μ V/m) | Margin (dB) | Antenna Polarity | EUT orientation |
|-----------------|------------|------------------|-----------------------------|----------------------------|--------------------------|-------------|------------------|-----------------|
| 2405 | 1.00 | 259 | 115.9 | 114.8 | 125.0 | 10.2 | Vertical | Vertical |
| 4810 | 1.12 | 174 | 55.4 | 52.3 | 63.5 | 11.2 | Vertical | Side |
| 7215 | 1.11 | 172 | 71.1 | 60.3 | 103.3 | 43.0 | Horizontal | Vertical |
| 9620 | 1.00 | 259 | 68.0 | 55.3 | 103.3 | 47.9 | Horizontal | Side |
| 12025 | 1.00 | 304 | 62.4 | 52.1 | 63.5 | 11.4 | Horizontal | Vertical |
| 14430 | 1.02 | 81 | 57.0 | 46.3 | 103.3 | 57.0 | Horizontal | Vertical |
| 16835 | 1.12 | 147 | 53.4 | 42.0 | 103.3 | 61.3 | Horizontal | Vertical |
| 19240 | | | Note 3 | | 63.5 | | | |
| 21645 | | | Note 3 | | 103.3 | | | |
| 24050 | | | Note 3 | | 103.3 | | | |

The following table depicts the level of significant radiated RF fundamental and harmonic emissions seen on Channel 8:

| Frequency (MHz) | Height (m) | Azimuth (degree) | Peak Reading (dB μ V/m) | Avg Reading (dB μ V/m) | Avg Limit (dB μ V/m) | Margin (dB) | Antenna Polarity | EUT orientation |
|-----------------|------------|------------------|-----------------------------|----------------------------|--------------------------|-------------|------------------|-----------------|
| 2445 | 1.15 | 268 | 115.2 | 113.7 | 125.0 | 11.3 | Vertical | Vertical |
| 4890 | 1.15 | 166 | 53.6 | 46.0 | 63.5 | 17.5 | Vertical | Vertical |
| 7335 | 1.00 | 165 | 65.5 | 54.8 | 63.5 | 8.7 | Horizontal | Vertical |
| 9780 | 1.05 | 224 | 58.9 | 48.7 | 102.2 | 53.5 | Horizontal | Vertical |
| 12225 | 1.07 | 270 | 64.5 | 54.4 | 63.5 | 9.1 | Horizontal | Side |
| 14670 | 1.10 | 121 | 53.7 | 42.5 | 102.2 | 59.7 | Horizontal | Vertical |
| 17115 | | | Note 3 | | 102.2 | 102.2 | Horizontal | Vertical |
| 19560 | | | Note 3 | | 63.5 | | | |
| 22005 | | | Note 3 | | 102.2 | | | |
| 24450 | | | Note 3 | | 102.2 | | | |

The following table depicts the level of significant radiated RF fundamental and harmonic emissions seen on Channel 14:

| Frequency (MHz) | Height (m) | Azimuth (degree) | Peak Reading (dB μ V/m) | Avg Reading (dB μ V/m) | Avg Limit (dB μ V/m) | Margin (dB) | Antenna Polarity | EUT orientation |
|-----------------|------------|------------------|-----------------------------|----------------------------|--------------------------|-------------|------------------|-----------------|
| 2475 | 1.15 | 268 | 113.4 | 112.2 | 125.0 | 12.8 | Vertical | Vertical |
| 4950 | 1.06 | 174 | 57.4 | 50.9 | 63.5 | 12.6 | Vertical | Vertical |
| 7425 | 1.10 | 159 | 63.7 | 53.2 | 63.5 | 10.3 | Horizontal | Vertical |
| 9900 | 1.00 | 297 | 59.6 | 49.6 | 100.7 | 51.0 | Vertical | Vertical |
| 12375 | 1.04 | 72 | 60.0 | 50.1 | 63.5 | 13.4 | Horizontal | Vertical |
| 14850 | 1.00 | 222 | 53.9 | 42.5 | 100.7 | 58.2 | Horizontal | Side |
| 17325 | 1.11 | 334 | 56.5 | 44.6 | 100.7 | 56.0 | Horizontal | Flat |
| 19800 | | | Note 3 | | 63.5 | | | |
| 22275 | | | Note 3 | | 63.5 | | | |
| 24750 | | | Note 3 | | 100.7 | | | |

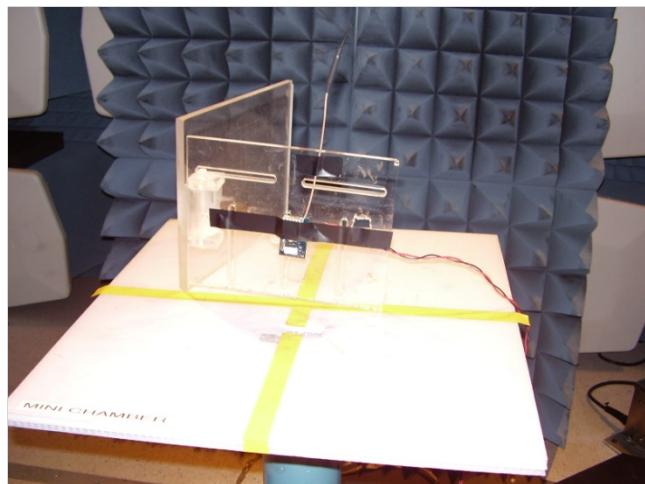
Notes:

- 1) A Quasi-Peak Detector was used in measurements below 1 GHz, and a Peak as well as an Average Detector was used in measurements above 1 GHz. The peak detector was used to ensure the peak emissions did not exceed 20 dB above the limits.
- 2) Measurements above 4 GHz were made at 1 meters of separation from the EUT.
- 3) Measurement at receiver system noise floor.
- 4) For measurements of the fundamental power, because of spectral bandwidth, the receiver was set to RBW=VBW=3 MHz.

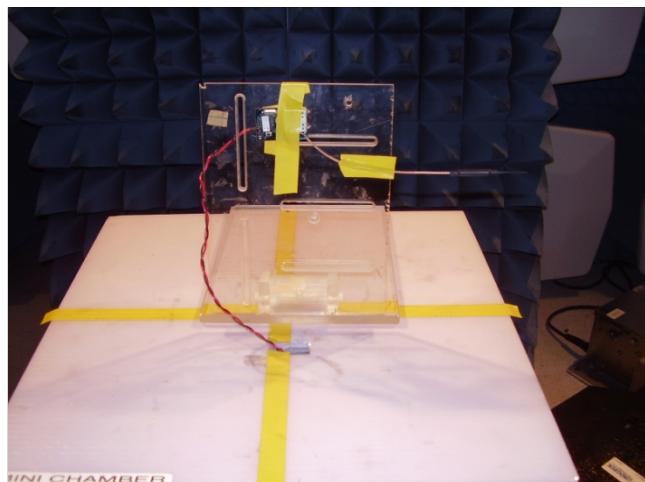
| | | |
|---------------------------|--|------------------|
| Prepared For: Niles Audio | EUT: 2.4 GHz module | LS Research, LLC |
| Report #: 309028-2 | Model #: 2.4 GHz RF Transceiver Module | |
| LSR Job #: C-690 | Serial #: see page 6 | Page 99 of 159 |

Test Setup Photo(s) –Radiated Emissions Test: Unit with Heat Shrink Dipole Antenna

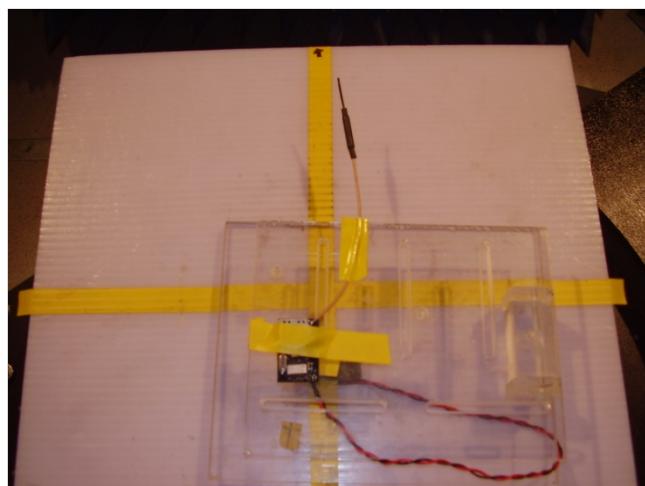
Vertical Orientation



Side Orientation



Flat Orientation



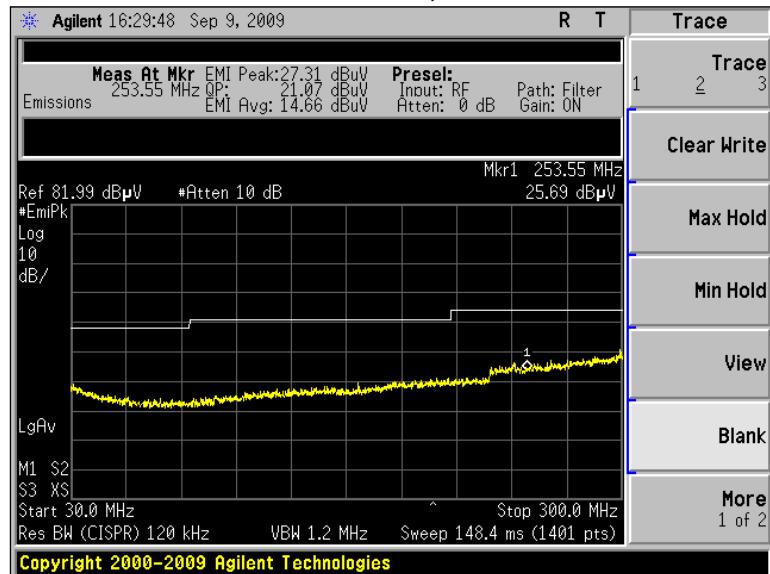
| | | |
|---------------------------|--|------------------------|
| Prepared For: Niles Audio | EUT: 2.4 GHz module | LS Research, LLC |
| Report #: 309028-2 | Model #: 2.4 GHz RF Transceiver Module | |
| LSR Job #: C-690 | Serial #: see page 6 | Page 100 of 159 |

Screen Captures - Radiated Emissions Testing on Unit with Heat Shrink Dipole Antenna

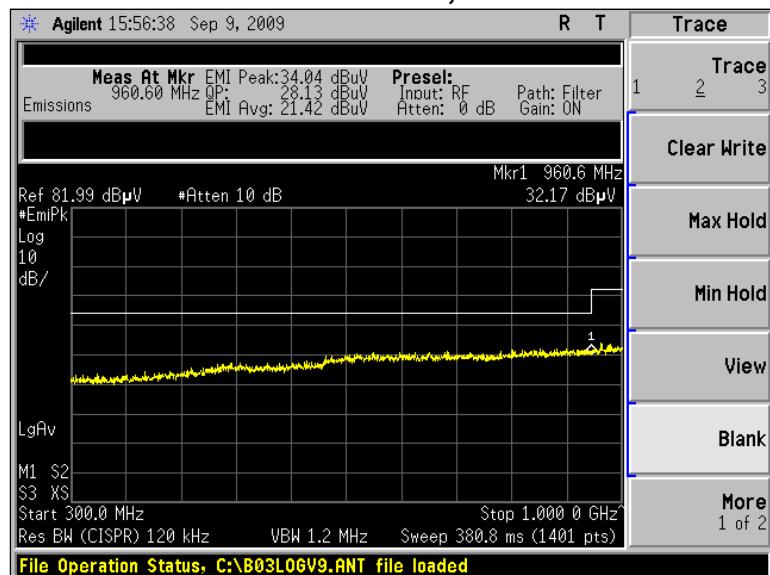
These screen captures represent Peak Emissions. For radiated emission measurements, a Quasi-Peak detector function is utilized when measuring frequencies below 1 GHz, and an Average detector function is utilized when measuring frequencies above 1 GHz.

The signature scans shown here are from worst-case emissions, as measured on channels 0, 8, or 14, with the sense antenna both in vertical and horizontal polarity for worst case presentations.

Channel 0, Antenna Horizontally Polarized, EUT Flat 30-300 MHz, at 3m



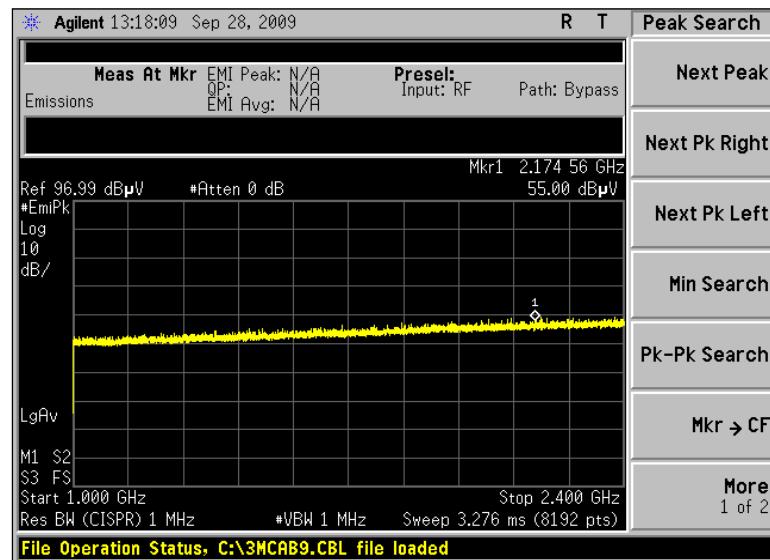
Channel 0, Antenna Vertically Polarized, EUT Vertical 300-1000 MHz, at 3m



| | | |
|---------------------------|--|------------------|
| Prepared For: Niles Audio | EUT: 2.4 GHz module | LS Research, LLC |
| Report #: 309028-2 | Model #: 2.4 GHz RF Transceiver Module | |
| LSR Job #: C-690 | Serial #: see page 6 | Page 101 of 159 |

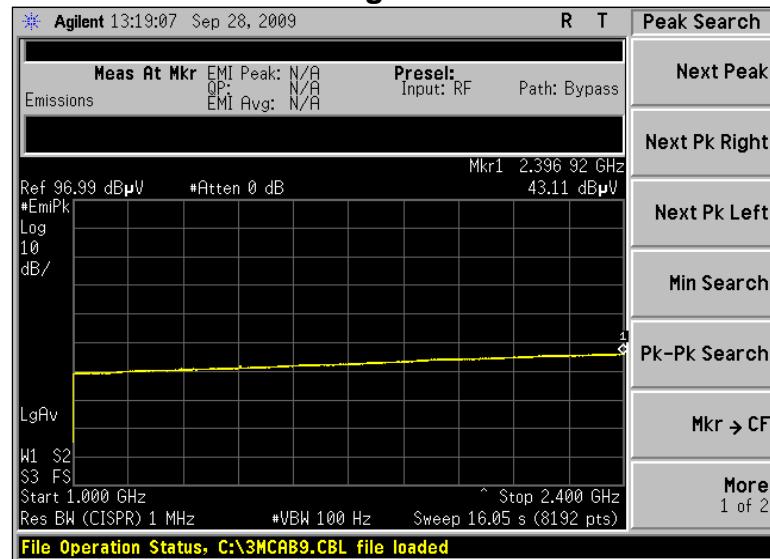
Screen Captures - Radiated Emissions Testing on Unit with Heat Shrink Dipole Antenna (continued)

Channel 14, Antenna Vertically Polarized, EU Vertical 1000-2400 MHz, at 3m Peak Values



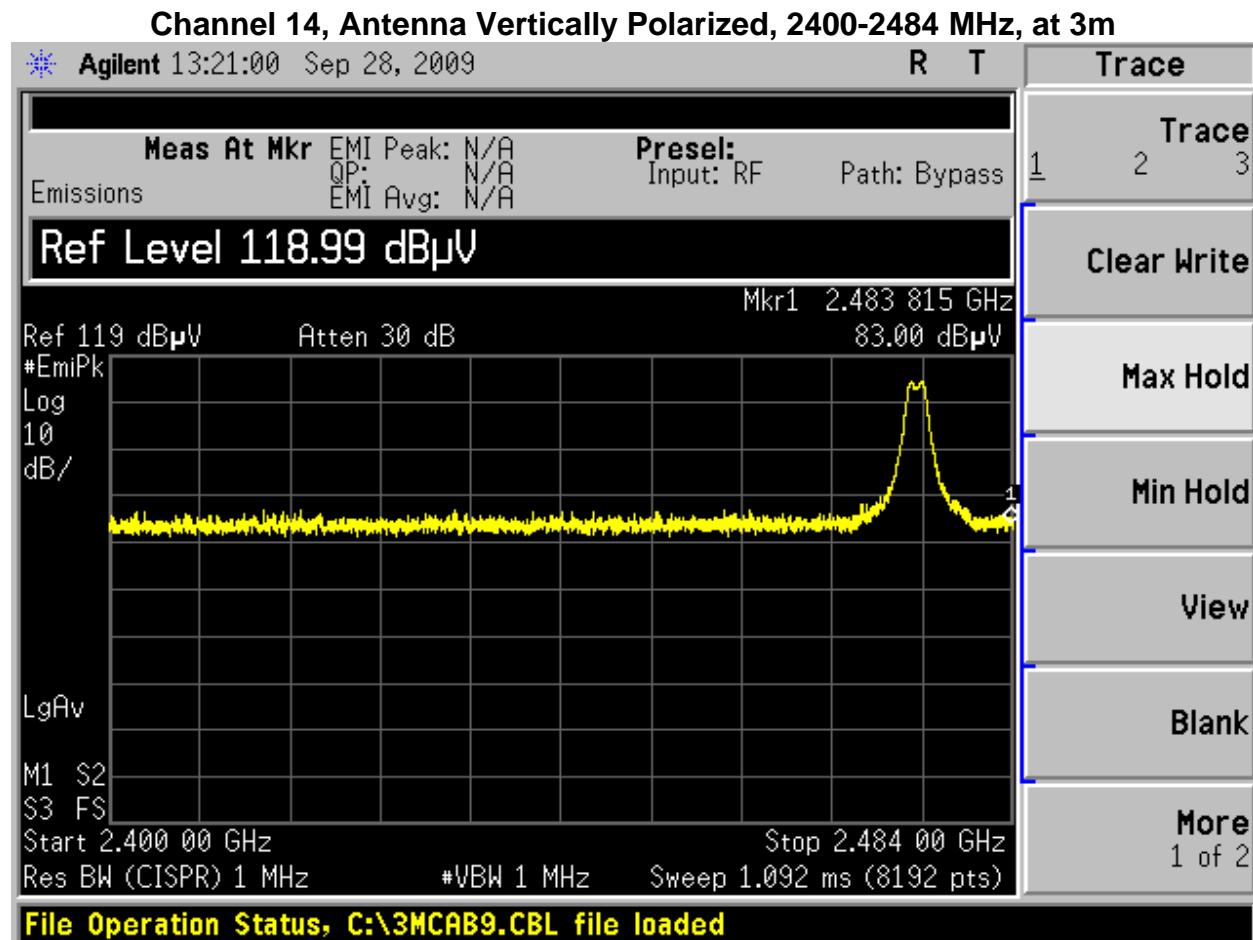
Note: because the peak value (of the noise floor) was above the average limit, the video average bandwidth was decreased to demonstrate that the video-averaged signal is below the radiated limit.

Channel 14, Antenna Vertically Polarized, EU Vertical 1000-2400 MHz, at 3m Average Values



| | | |
|---------------------------|--|------------------|
| Prepared For: Niles Audio | EUT: 2.4 GHz module | LS Research, LLC |
| Report #: 309028-2 | Model #: 2.4 GHz RF Transceiver Module | |
| LSR Job #: C-690 | Serial #: see page 6 | Page 102 of 159 |

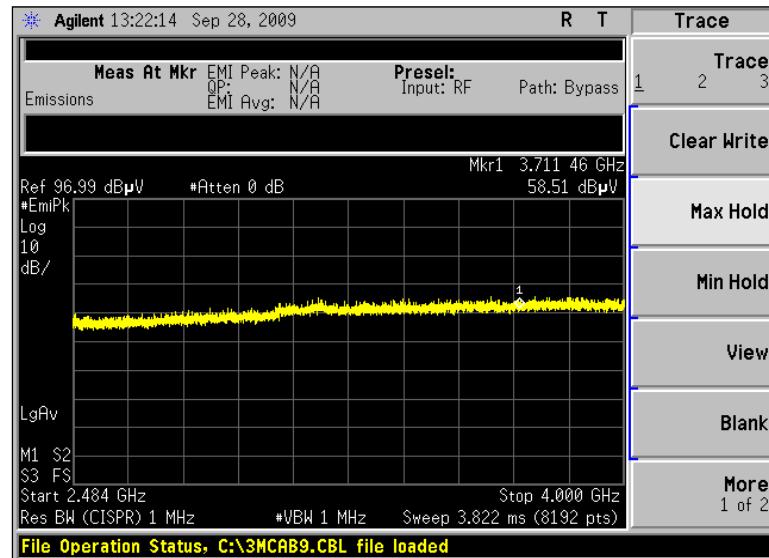
Screen Captures - Radiated Emissions Testing on Unit with Heat Shrink Dipole Antenna (continued)



| | | |
|---------------------------|--|------------------|
| Prepared For: Niles Audio | EUT: 2.4 GHz module | LS Research, LLC |
| Report #: 309028-2 | Model #: 2.4 GHz RF Transceiver Module | |
| LSR Job #: C-690 | Serial #: see page 6 | Page 103 of 159 |

Screen Captures - Radiated Emissions Testing on Unit with Heat Shrink Dipole Antenna (continued)

Channel 14, Antenna Vertically Polarized, EUT Vertical 2484.0-4000 MHz, at 3m Peak Values



Note: because the peak value (of the noise floor) was above the average limit, the video average bandwidth was decreased to demonstrate that the video-averaged signal is below the radiated limit.

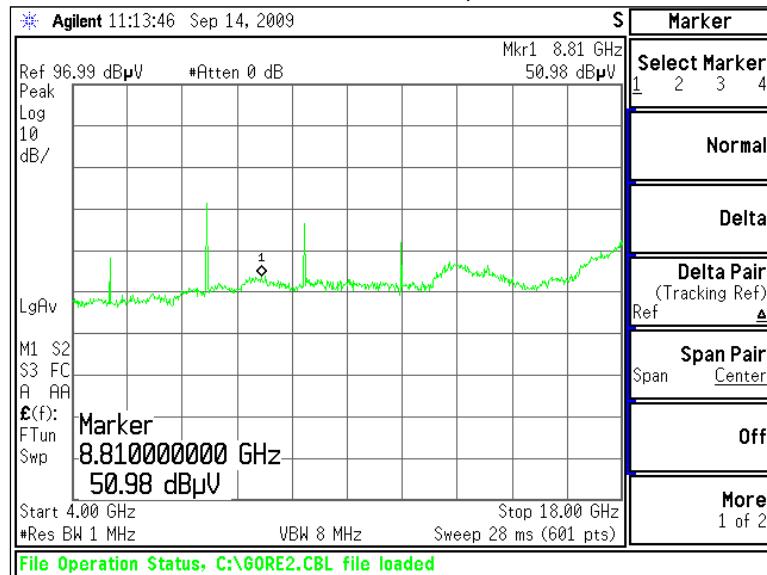
Channel 14, Antenna Vertically Polarized, EUT Vertical 2484.0-4000 MHz, at 3m Average Values



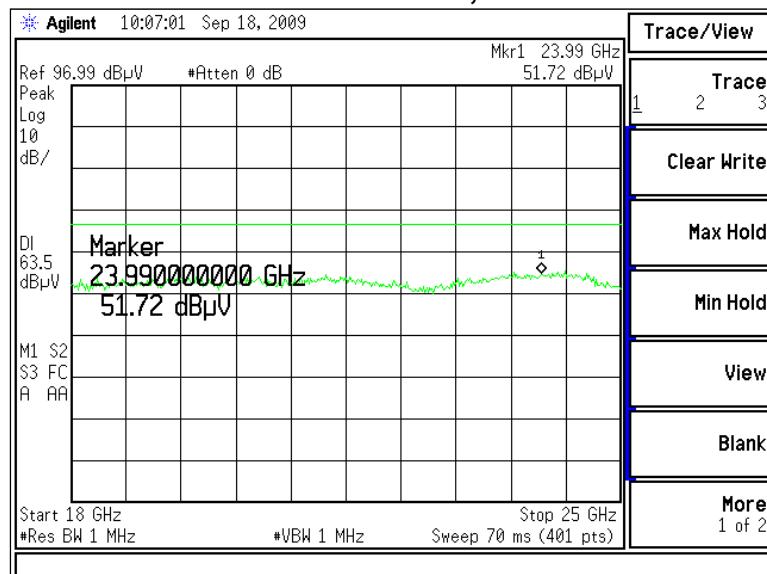
| | | |
|---------------------------|--|------------------|
| Prepared For: Niles Audio | EUT: 2.4 GHz module | LS Research, LLC |
| Report #: 309028-2 | Model #: 2.4 GHz RF Transceiver Module | |
| LSR Job #: C-690 | Serial #: see page 6 | Page 104 of 159 |

Screen Captures - Radiated Emissions Testing on Unit with Heat Shrink Dipole Antenna (continued)

**Channel 0, Antenna Vertically Polarized, EUT Vertical
4000-18000 MHz, at 1m**



**Channel 8, Antenna Vertically Polarized, EUT Vertical
18000-25000 MHz, at 1 m**



| | | |
|---------------------------|--|------------------|
| Prepared For: Niles Audio | EUT: 2.4 GHz module | LS Research, LLC |
| Report #: 309028-2 | Model #: 2.4 GHz RF Transceiver Module | |
| LSR Job #: C-690 | Serial #: see page 6 | Page 105 of 159 |

5.6.6.2 Receive Mode on Unit with Heat Shrink Dipole Antenna

Per the requirements of RSS-210, the EUT was placed in continuous receive mode and the radiated spurious emissions were measured and compared to the limits stated in RSS-Gen Section 4.10.

The test setup, procedure, and equipment utilized were identical to that described in sections 5.1, 5.2, and 5.3 of this document.

Measurement data and screen captures from the receive tests are presented below:

| Frequency (MHz) | Height (m) | Azimuth (degree) | Peak Reading (dB μ V/m) | Quasi Peak Reading (dB μ V/m) | Quasi Peak Limit (dB μ V/m) | Margin (dB) | Antenna Polarity | EUT orientation |
|-----------------|------------|------------------|-----------------------------|-----------------------------------|---------------------------------|-------------|------------------|-----------------|
| 84.59 | 1.00 | 91 | 17.1 | 9.2 | 40.0 | 30.8 | Vertical | Flat |
| 109.5 | 1.00 | 0 | 17.0 | 10.9 | 43.5 | 32.6 | Horizontal | Flat |
| 114.59 | 1.00 | 0 | 18.6 | 12.0 | 43.5 | 31.5 | Vertical | Side |
| 161.08 | 1.00 | 0 | 19.9 | 12.8 | 43.5 | 30.7 | Horizontal | Side |
| 251.35 | 1.00 | 0 | 27.3 | 21.0 | 46.0 | 25.1 | Horizontal | Vertical |
| 279.73 | 1.00 | 0 | 29.1 | 23.3 | 46.0 | 22.7 | Vertical | Vertical |
| 335.8 | 1.00 | 177 | 24.1 | 18.1 | 46.0 | 27.9 | Vertical | Vertical |
| 627.8 | 1.00 | 0 | 30.96 | 25.45 | 46.0 | 20.6 | Horizontal | Vertical |
| 752.3 | 1.00 | 0 | 31.7 | 26.2 | 46.0 | 19.8 | Vertical | Side |
| 985.5 | 1.00 | 0 | 36.26 | 29.85 | 54.0 | 24.2 | Horizontal | Side |

| | | |
|---------------------------|--|------------------|
| Prepared For: Niles Audio | EUT: 2.4 GHz module | LS Research, LLC |
| Report #: 309028-2 | Model #: 2.4 GHz RF Transceiver Module | |
| LSR Job #: C-690 | Serial #: see page 6 | Page 106 of 159 |