
**COMPLIANCE WORLDWIDE INC.
TEST REPORT 204-07**

In Accordance with the Requirements of
**Federal Communications Commission
CFR 47 Part 95, Subpart H**
Low Power Licensed Radio Communication Devices
Wireless Medical Telemetry Service Transceiver
In the bands 1395-1400 and 1427-1432 MHz

Issued to

**Philips Medical Systems
3000 Minuteman Drive
Andover, MA 01810
978-659-2800**

for

**M2638A 1.4 GHz WMTS ITS Radio Module
with Tri Band Antenna, Part # M8100-66490**

FCC ID: PQC-WMTS-MODULE

Report Issued on June 7, 2007

Tested by



Brian F. Breault

Reviewed by



Larry K. Stillings

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1. Scope

This test report certifies that the Philips M2638A 1.4 GHz WMTS ITS Radio Module with the Tri Band Antenna, Part # M8100-66490, as tested, meets the Federal Communications Commission CFR 47, PART 95 requirement. The scope of this test report is limited to the test sample provided by the client, only in as much as that sample represents other production units. If any significant changes are made to the unit, the changes shall be evaluated and a retest may be required.

2. Product Details

- 2.1 Manufacturer:** Philips Medical Systems
- 2.2 Model Number:** M2638A 1.4 GHz WMTS ITS Radio Module with Tri Band Antenna, Part # M8100-66490
- 2.3 Serial Number:** Not Specified
- 2.4 Description of EUT:** Radio modules for 1.4 GHz telemetry system with alternate dual-band antenna.
Operating Frequencies: 1395.9, 1397.5, 1399.1, 1427.9, 1429.5, 1431.1 MHz.
- 2.5 Power Source:** DC 12 volts – From external power supply.
- 2.6 EMC Modifications:** None

3. Product Configuration

3.1. Operational Characteristics & Software

The M2638A and MDL4851A are ITS (Instrument Telemetry System) radio modules designed to be mounted on the MPXX family of patient monitors (an MP50 is used in this test plan). The M2638A operates in the 1.4 GHz WMTS band and the MDL4851A operates in the 2.4 GHz ISM band. Both modules combine the radio module with the system PCA, which is the interface for data and power from the Patient Monitor to which it connects, is a single housing, M8003-45201. It can be connected to the MPXX series of monitors through a short pigtail “Y” cable. The pigtail cable has a round DIN connector which plugs into the 12V/LAN/Serial port on the MPXX monitor. On the ITS module end, the cable has an RJ45 plug for data and a 5 mm coaxial power connector for the 12 V DC power input. For the Spurious Radiated Emissions testing, the connections to the ITS for power and data are made through the custom cable, Item E in the System Configuration Block Diagram in Section 4.4 due to the MP50 being a Class A device and it is required that the transmitter portion be Class B compliant.

An MP50 Patient Bedside Monitor will be connected to the ITS modules. The MP50 will have an ECG simulator connected to generate the patient physiological data signals.

3. Product Configuration (continued)

3.2. EUT Hardware

| Blk Diag # | Manufactr | Model/Part # / Options | Serial Number | Input Voltage | Frq (Hz) | Description/Function |
|------------|-----------|------------------------|---------------|---------------|----------|-------------------------------|
| 1 | Philips | M2638A | DE505Y0033 | +12 V | DC | 1.4 GHz WMTS ITS Radio Module |
| 2 | Philips | MDL4841A | NSN | +12 V | DC | 2.4 GHz ROW ITS module |
| 17 | Philips | M3002-66493 | NSN | NA | NA | Dual band PCB antenna |
| 18 | Philips | M8100-66490 | NSN | NA | NA | Tri-band antenna |

3.3. EUT Hardware/Software/Firmware Revision Level

| EUT Model# | PCA# | Description | HW | SW | FW |
|------------|-------------|------------------------------|---------|---------|---------|
| MDL4851A | NA | 2.4 GHz ITS ROW radio module | unknown | unknown | A.01.03 |
| MDL4851A | M8090-66491 | Data/Power PCA | unknown | unknown | Unknown |
| M2638A | M4840-63100 | 1.4 GHz WMTS Radio PCA Set | Unknown | Unknown | unknown |

3.4. EUT Cables/Transducers

| Blk Diag Ltr | Manufacturer | Model/Part # | Length (m) | Shield Y/N | Description/Function |
|--------------|--------------|--------------|------------|------------|--|
| NA | OEM-unknown | M8058-61001 | 0.1 | N | 6 conductor ribbon cable-internal |
| C | OEM-unknown | | 0.3 | N | Data/power pigtail cable from Bedside monitor to the radio module |
| E | Philips R&D | N/A | 0.9 | N | Data/power assembly-provided by PMD R&D- custom cable connecting Optical isolator DB9 to the ITS through a "Y" cable with additional leads from the ITS to the +12 V DC supply |

3.5. Support Equipment

| Blk Diag # | Manufctr | Model/Part # Options | Serial Number | Input Voltage | Input Frq. | Description/Function |
|------------|-------------|--|------------------------|---------------|------------|--|
| 3 | HP | 6205C | 2411A-08043 | 104-127 V | 48-440 Hz | Power Supply for ITS Radio Module |
| 4 | Philips | M4852A/ 862232/ NA Ref #453564039961 | US52400262 | 48 V | DC | 2.4 GHz ROW Access Point |
| 5 | Philips | M4843AA/ 862232/ NA Ref #453564036551 | RO71000231 | 48 V | DC | 1.4 GHz WMTS Access Point |
| 6 | Philips | M4844A/ 862114/ NA | US34300035 | 100-240 V | 50-60 Hz | Philips Telemetry II Synchronization box |
| 7 | Power Dsine | M4845A/ 862152/ NA | MO438680955 7276003 | 100-240 V | 50-60 Hz | Power-Over-Ethernet hub |
| 8 | Cisco | 2950 Catalyst | F0C0816X1S4 | 100-240 V | 50-60 Hz | 10/100 Base-T switch |
| 9 | Philips | M3171A/ 862117 | 756005AG- 520D03 | 100-240 V | 50-60 Hz | Access Point Controller |

3. Product Configuration (continued)

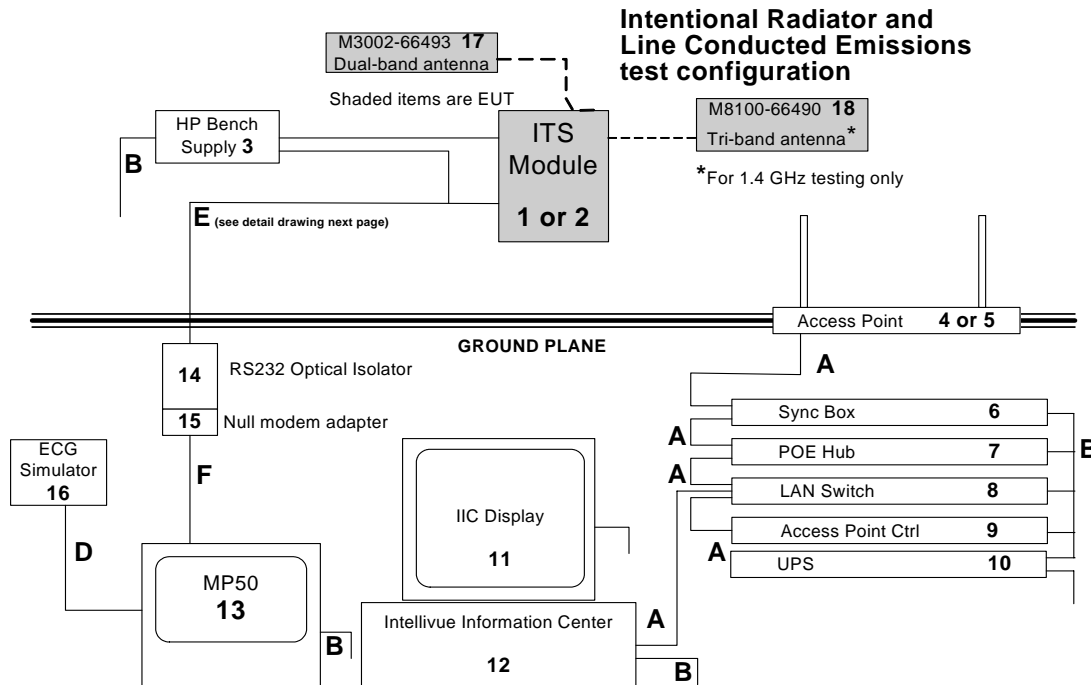
3.5. Support Equipment (continued)

| Blk Diag # | Manufctr | Model/Part # Options | Serial Number | Input Voltage | Input Frq. | Description/Function |
|------------|----------------|----------------------|---------------|---------------|------------|---|
| 10 | TrippLite | SMART500RT1U | | 120 V | 60 Hz | UPS |
| 11 | HP | 109P20/74H | 47517133 | 100-240 V | 50-60 Hz | Display for IntelliVue Information Center |
| 12 | Philips | M3167-60003 | USU32301H2 | 100-240 V | 50-60 Hz | INTELLiVUE Information Center (HP PC) |
| 13 | Philips | MP50 | DE44010453 | 100-240 V | 50-60 Hz | Bedside Patient Monitor |
| 14 | BB electronics | 9POP4 | NA | 15 V | DC | RS 232 optical isolator |
| 15 | NA | NA | NA | NA | NA | Null modem adapter |
| 16 | Bio-Tek | Lionheart 2 | 125006 | 9 V | DC | Multi-parameter patient simulator |

3.6. Support Equipment Cables/Transducers

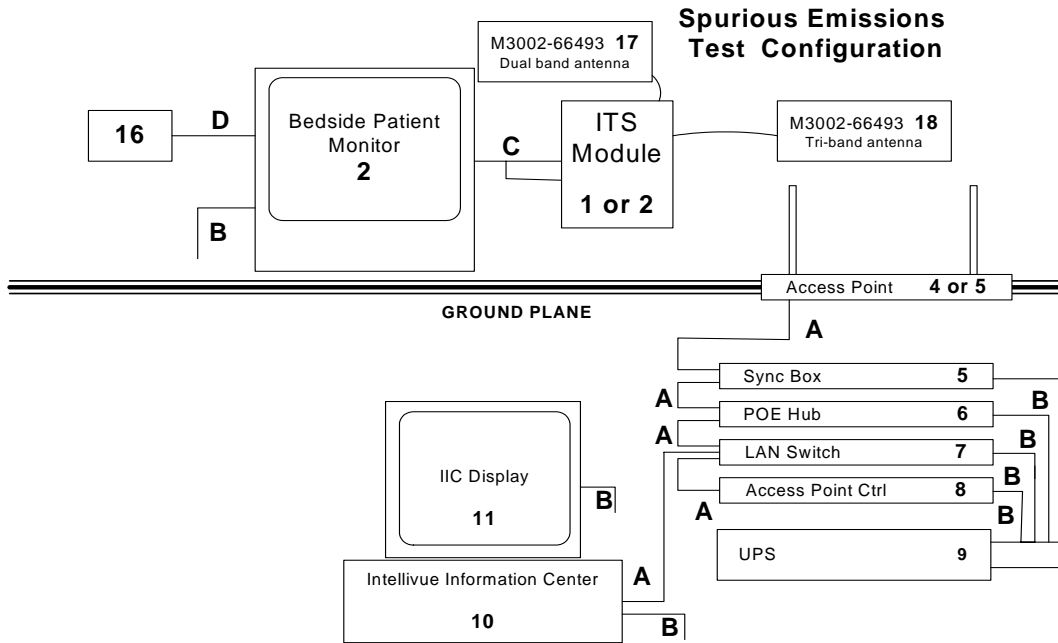
| Blk Diag Ltr | Manufctr | Model/Part # | Length (m) | Shield Y/N | Description/Function |
|--------------|----------|--------------|------------|------------|--------------------------|
| A | N/A | N/A | Various | N | Category 5 UTP LAN cable |
| B | N/A | N/A | 2 | N | AC power cords |
| D | Philips | | 2 | N | ECG lead set |

3.7. Block Diagram 1 – Intentional Radiator and Line Conducted Configuration

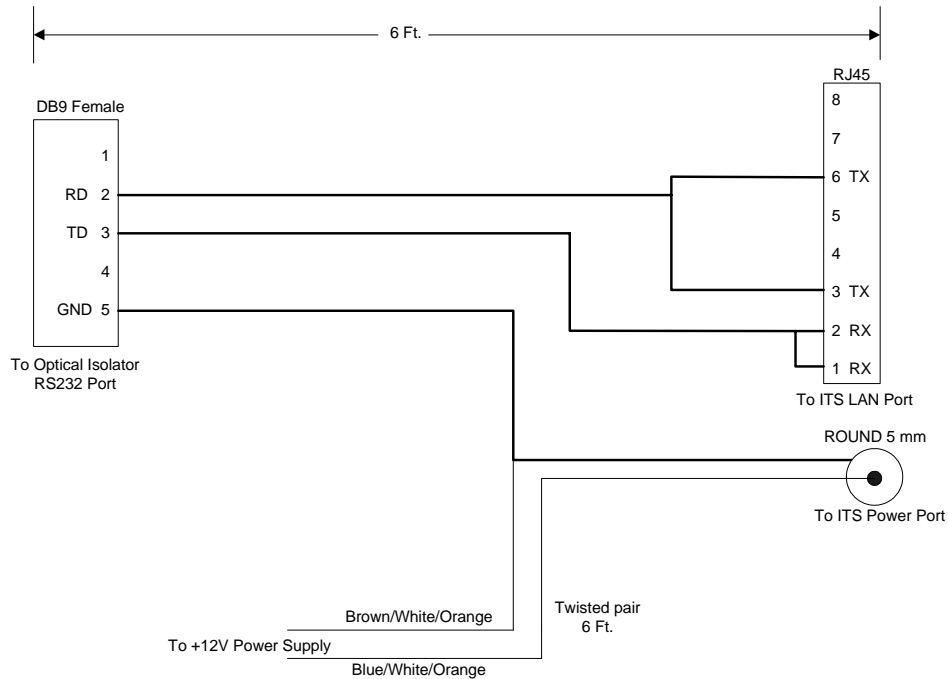


3. Product Configuration (continued)

3.8. Block Diagram 2 – Spurious Emissions Configuration



3.9. Detail drawing for Cable E in Section 3.7 System Configuration Block Diagram



4. Measurements Parameters

4.1. Measurement Equipment Used to Perform Test

| Device | Manufacturer | Model No. | Serial No. | Cal Due |
|-------------------|-----------------|-----------|------------|-----------|
| EMI Receiver | Hewlett Packard | 8546A | 3650A00360 | 3/14/2008 |
| Spectrum Analyzer | Hewlett Packard | 8593E | 3829A03887 | 3/8/2008 |
| Microwave Preamp | Hewlett Packard | 8449B | 3008A01323 | 9/21/2008 |
| Bilog Antenna | Com-Power | AC220 | 25509 | 7/31/2007 |
| Horn Antenna | Electro-Metrics | EM-6961 | 6337 | 8/25/2007 |
| LISN | EMCO | 3825/2 | 9109-1860 | 1/11/2008 |

4.2. Measurement & Equipment Setup

| | |
|--------------------------------------|--|
| Test Date: | May 30, 2007 |
| Test Engineer: | Brian Breault |
| Normal Site Temperature (15 - 35°C): | 22.6 |
| Relative Humidity (20 -75%RH): | 31% |
| Frequency Range: | 30 MHz to 16 GHz |
| Measurement Distance: | 3 Meters |
| EMI Receiver IF Bandwidth: | 120 kHz - 30 MHz to 1 GHz 1 MHz - Above 1 GHz |
| EMI Receiver Avg Bandwidth: | 300 kHz - 30 MHz to 1 GHz 3 MHz - Above 1 GHz |
| Detector Function: | Peak, QP - 30 MHz to 1 GHz Peak, Avg - Above 1 GHz Unless otherwise specified. |

4.3. Test Procedure

All references to CFR 47 PART 95, Subpart H - Wireless Medical Telemetry Service (WMTS) - refer to the 10-1-05 edition.

The test methods used to generate the data in this test report is in accordance with 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

In accordance with ANSI C63.4-2003, section 13.1.4.1, c, the device under test was rotated through three orthogonal axes to determine which attitude produced the highest emission relative to the limit. The attitude that produced the highest emission relative to the limit was used for all radiated emission measurements.

4.4. Measurement Uncertainty

The following uncertainties are expressed for an expansion/coverage factor of K=2.

| | |
|----------------------------------|------------------------|
| RF Frequency | $\pm 1 \times 10^{-8}$ |
| Radiated Emission of Transmitter | ± 4.55 dB |
| Radiated Emission of Receiver | ± 4.55 dB |
| Temperature | $\pm 0.91^{\circ}$ C |
| Humidity | $\pm 5\%$ |

5. Choice of Equipment for Test Suites

5.1 Choice of Model

This test report is based on the test samples supplied by the manufacturer and are reported by the manufacturer to be equivalent to the production units.

5.2 Presentation

This test sample was tested complete with all required ancillary equipment. Refer to Section 3 of this report for product equipment configuration.

5.3 Choice of Operating Frequencies

The choice of operating frequencies selected for the testing outlined in this report was based on the lowest and highest operating frequencies in each of the two bands utilized by the device under test. The frequencies selected were 1395.8 MHz, 1399.1 MHz, 1427.9 MHz and 1431.1 MHz.

6. Measurement Summary

| Transmitter Test Requirement | FCC Requirement | Test Report Section | Result | Comment |
|--|-----------------|---------------------|-----------|---|
| Product Labeling | 95.1109(b) | N/A | N/A | See exhibits FCC label sample and label location. |
| Emission Type | 95.115(c) | N/A | N/A | Transmits Data and ECG Waveform |
| Frequency Stability | 95.115(e) | N/A | N/A | Data Provided By Philips Medical |
| RF Safety | 95.1125 | N/A | N/A | Statement and Technical Basis |
| Radiated Field Strength of Fundamental | 95.115(a)(2) | 7.1 | Compliant | |
| Radiated Field Strength of Harmonics | 95.115(a)(2) | 7.2 | Compliant | |
| Occupied Bandwidth | 95.1111(a)(2) | 7.3 | Compliant | |
| Band Edge Measurements | 95.1115(b)(2) | 7.4 | Compliant | |
| Spurious Radiated Emissions | 95.115(b) | 7.5 | Compliant | |
| Conducted Emissions | 15.207 | 7.6 | Compliant | |
| Determination of Average Factor | 15.35 (c) | 7.7 | | Meets requirement |

7. Measurement Data

7.1. Radiated Field Strength of Fundamental

Requirement: In the 1395–1400 MHz and 1427–1429.5 MHz bands, the maximum allowable field strength is 740 mV/m (117.4 dB μ V/m), as measured at a distance of 3 meters, using measuring equipment with an averaging detector and a 1 MHz measurement bandwidth.

| Channel | Freq (MHz) | Peak Amp (dB μ V/m) | Avg Amp (dB μ V/m) | Avg Limit (dB μ V/m) | Avg Margin (dB) |
|---------|------------|-------------------------|------------------------|--------------------------|-----------------|
| 1 | 1395.9 | 102.29 | 66.4 | 117.4 | -51.0 |
| 3 | 1399.1 | 102.22 | 66.1 | 117.4 | -51.3 |
| 4 | 1427.9 | 103.26 | 68.3 | 117.4 | -49.1 |
| 6 | 1431.1 | 103.21 | 67.6 | 117.4 | -49.8 |

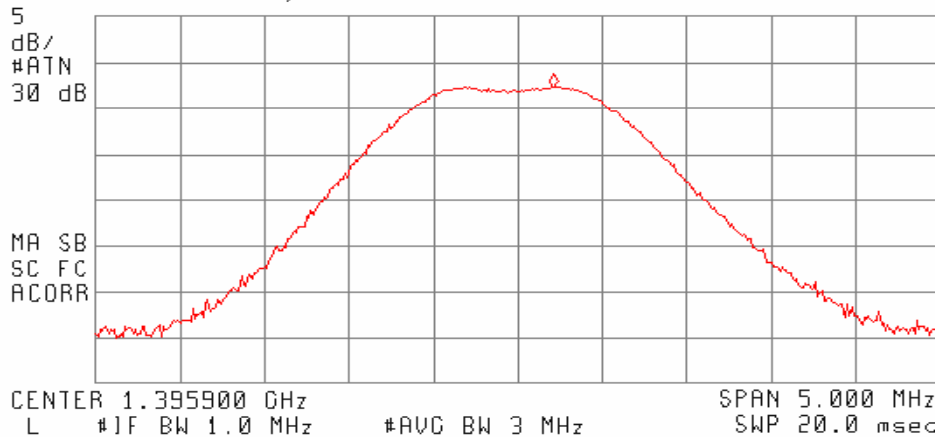
7.1.1. Channel 1



204-07 Field Strength of Fundamental - Chan 1

ACTV DET: PEAK
MEAS DET: PEAK AVG
MKR 1.396113 GHz
102.29 dB μ V

LOG REF 110.0 dB μ V



7. Measurement Data (continued)

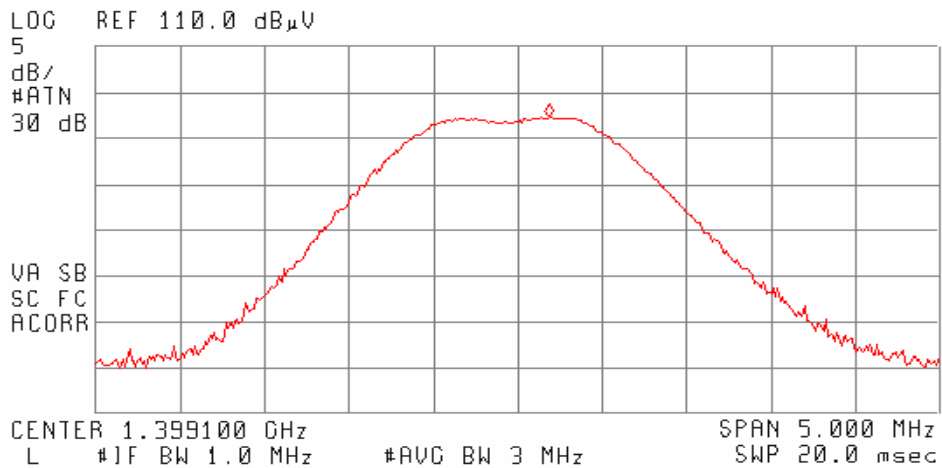
7.1. Radiated Field Strength of Fundamental (continued)

7.1.2. Channel 3



204-07 Field Strength of Fundamental - Chan 3

ACTV DET: PEAK
MEAS DET: PEAK AVG
MKR 1.399288 GHz
102.22 dB μ V

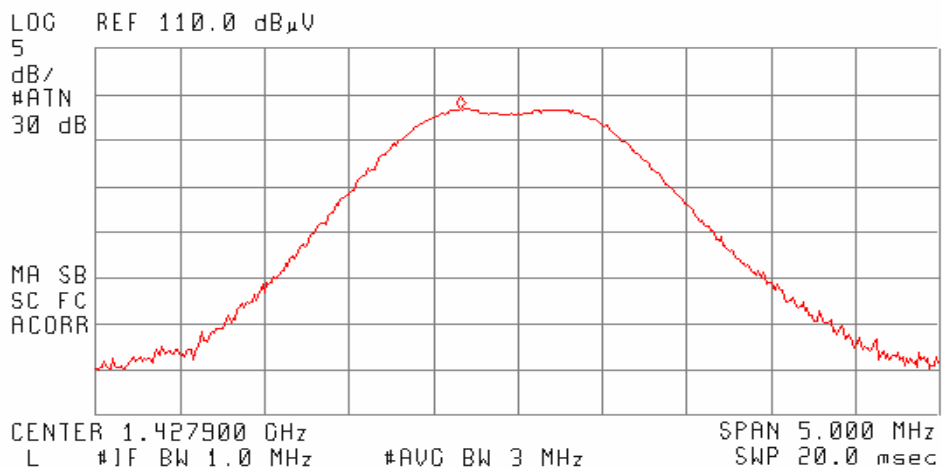


7.1.3. Channel 4



204-07 Field Strength of Fundamental - Chan 4

ACTV DET: PEAK
MEAS DET: PEAK AVG
MKR 1.427563 GHz
103.26 dB μ V



7. Measurement Data (continued)

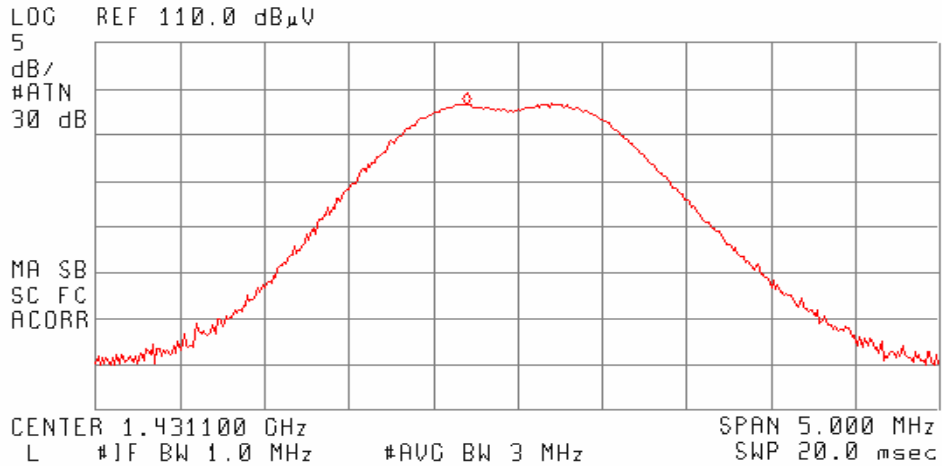
7.1. Radiated Field Strength of Fundamental (continued)

7.1.4. Channel 6



204-07 Field Strength of Fundamental - Chan 6

ACTV DET: PEAK
MEAS DET: PEAK AVG
MKR 1.430800 GHz
103.21 dB μ V



Note: Due to the low duty cycles, the difference between the peak to average measurements of the fundamental frequencies are greater than 20 dB. However, the peak emissions do not exceed the average limit.

With respect to the spurious emissions tabled on the following pages, the peak values do not exceed the average limits by more than 20 dB

7. Measurement Data (continued)

7.2. Radiated Field Strength of Harmonics

7.2.1. Channel 1, 1395.9 MHz

| Frequency (MHz) | Amplitude (dBµV) | | Corr. Fact. (dB) | Amplitude (dBµV/m) | | Avg Limit | Margin (dB) | Ant Pol | Ant Ht | TT Pos | Result |
|------------------------|------------------|-------|------------------|--------------------|-------|-----------|-------------|-------------|--------|--------|--------|
| | Peak | Avg | | Peak | Avg | | | H/V | cm | Deg | |
| 2791.800 ¹ | 65.42 | 45.42 | -3.96 | 61.46 | 41.46 | 54 | -12.54 | H | 100 | 5 | Passed |
| 4187.700 ¹ | 52.70 | 32.70 | 1.45 | 54.15 | 34.15 | 54 | -19.85 | H | 100 | 0 | Passed |
| 5583.600 | 47.38 | 27.38 | 3.80 | 51.18 | 31.18 | 54 | -22.82 | H | 100 | 0 | Passed |
| 6979.500 | 46.12 | 26.12 | 7.72 | 53.84 | 33.84 | 54 | -20.16 | Noise Floor | | Passed | |
| 8375.400 ¹ | 47.29 | 27.29 | 8.40 | 55.69 | 35.69 | 54 | -18.31 | Noise Floor | | Passed | |
| 9771.300 | 48.15 | 28.15 | 8.21 | 56.36 | 36.36 | 54 | -17.64 | Noise Floor | | Passed | |
| 11167.200 ¹ | 46.31 | 26.31 | 11.35 | 57.66 | 37.66 | 54 | -16.34 | Noise Floor | | Passed | |
| 12563.100 ¹ | 45.65 | 25.65 | 16.02 | 61.67 | 41.67 | 54 | -12.33 | Noise Floor | | Passed | |
| 13959.000 | 46.39 | 26.39 | 19.38 | 65.77 | 45.77 | 54 | -8.23 | Noise Floor | | Passed | |

¹ Frequency falls within the Restricted Bands of Operation. See FCC Part 15, Section 15.205 for additional information.

7.2.2. Channel 3, 1399.1 MHz

| Frequency (MHz) | Amplitude (dBµV) | | Corr. Fact. (dB) | Amplitude (dBµV/m) | | Avg Limit | Margin (dB) | Ant Pol | Ant Ht | TT Pos | Result |
|------------------------|------------------|-------|------------------|--------------------|-------|-----------|-------------|-------------|--------|--------|--------|
| | Peak | Avg | | Peak | Avg | | | H/V | cm | Deg | |
| 2798.200 ¹ | 65.74 | 45.74 | -3.99 | 61.75 | 41.75 | 54 | -12.25 | H | 100 | 5 | Passed |
| 4197.300 ¹ | 53.13 | 33.13 | 0.77 | 53.90 | 33.90 | 54 | -20.10 | H | 100 | 0 | Passed |
| 5596.400 | 47.11 | 27.11 | 3.76 | 50.87 | 30.87 | 54 | -23.13 | H | 100 | 0 | Passed |
| 6995.500 | 46.84 | 26.84 | 8.57 | 55.41 | 35.41 | 54 | -18.59 | Noise Floor | | Passed | |
| 8394.600 ¹ | 47.73 | 27.73 | 8.86 | 56.59 | 36.59 | 54 | -17.41 | Noise Floor | | Passed | |
| 9793.700 | 48.12 | 28.12 | 9.49 | 57.61 | 37.61 | 54 | -16.39 | Noise Floor | | Passed | |
| 11192.800 ¹ | 46.37 | 26.37 | 14.16 | 60.53 | 40.53 | 54 | -13.47 | Noise Floor | | Passed | |
| 12591.900 ¹ | 46.51 | 26.51 | 16.08 | 62.59 | 42.59 | 54 | -11.41 | Noise Floor | | Passed | |
| 13991.000 | 46.59 | 26.59 | 19.18 | 65.77 | 45.77 | 54 | -8.23 | Noise Floor | | Passed | |

¹ Frequency falls within the Restricted Bands of Operation. See FCC Part 15, Section 15.205 for additional information.

7. Measurement Data (continued)

7.2. Radiated Field Strength of Harmonics (continued)

7.2.3. Channel 4, 1427.9 MHz

| Frequency (MHz) | Amplitude (dBµV) | | Corr. Fact. (dB) | Amplitude (dBµV/m) | | Avg Limit | Margin (dB) | Ant Pol | Ant Ht | TT Pos | Result |
|------------------------|------------------|-------|------------------|--------------------|-------|-----------|-------------|-------------|--------|--------|--------|
| | Peak | Avg | | Peak | Avg | | | | | | |
| 2855.800 ¹ | 67.66 | 47.66 | -3.87 | 63.79 | 43.79 | 54 | -10.21 | H | 100 | 0 | Passed |
| 4283.700 ¹ | 56.72 | 36.72 | 0.94 | 57.66 | 37.66 | 54 | -16.34 | H | 100 | 0 | Passed |
| 5711.600 | 47.29 | 27.29 | 3.29 | 50.58 | 30.58 | 54 | -23.42 | H | 100 | 0 | Passed |
| 7139.500 | 50.31 | 30.31 | 7.56 | 57.87 | 37.87 | 54 | -16.13 | Noise Floor | | Passed | |
| 8567.400 | 50.47 | 30.47 | 8.49 | 58.96 | 38.96 | 54 | -15.04 | Noise Floor | | Passed | |
| 9995.300 | 51.30 | 31.30 | 10.52 | 61.82 | 41.82 | 54 | -12.18 | Noise Floor | | Passed | |
| 11423.200 ¹ | 47.49 | 27.49 | 14.40 | 61.89 | 41.89 | 54 | -12.11 | Noise Floor | | Passed | |
| 12851.100 | 46.69 | 26.69 | 17.13 | 63.82 | 43.82 | 54 | -10.18 | Noise Floor | | Passed | |
| 14279.000 | 46.27 | 26.27 | 20.53 | 66.80 | 46.80 | 54 | -7.20 | Noise Floor | | Passed | |

¹ Frequency falls within the Restricted Bands of Operation. See FCC Part 15, Section 15.205 for additional information.

7.2.4. Channel 6, 1431.1 MHz

| Frequency (MHz) | Amplitude (dBµV) | | Corr. Fact. (dB) | Amplitude (dBµV/m) | | Avg Limit | Margin (dB) | Ant Pol | Ant Ht | TT Pos | Result |
|------------------------|------------------|-------|------------------|--------------------|-------|-----------|-------------|-------------|--------|--------|--------|
| | Peak | Avg | | Peak | Avg | | | | | | |
| 2862.200 ¹ | 66.96 | 46.96 | -4.00 | 62.96 | 42.96 | 54 | -11.04 | V | 123 | 355 | Passed |
| 4293.300 ¹ | 54.72 | 34.72 | 1.04 | 55.76 | 35.76 | 54 | -18.24 | H | 100 | 0 | Passed |
| 5724.400 | 47.41 | 27.41 | 3.51 | 50.92 | 30.92 | 54 | -23.08 | H | 100 | 0 | Passed |
| 7155.500 | 50.88 | 30.88 | 8.35 | 59.23 | 39.23 | 54 | -14.77 | Noise Floor | | Passed | |
| 8586.600 | 47.25 | 27.25 | 8.52 | 55.77 | 35.77 | 54 | -18.23 | Noise Floor | | Passed | |
| 10017.700 | 46.99 | 26.99 | 10.88 | 57.87 | 37.87 | 54 | -16.13 | Noise Floor | | Passed | |
| 11448.800 ¹ | 47.84 | 27.84 | 14.46 | 62.30 | 42.30 | 54 | -11.70 | Noise Floor | | Passed | |
| 12879.900 | 46.88 | 26.88 | 17.14 | 64.02 | 44.02 | 54 | -9.98 | Noise Floor | | Passed | |
| 14311.000 | 46.10 | 26.10 | 20.67 | 66.77 | 46.77 | 54 | -7.23 | Noise Floor | | Passed | |

¹ Frequency falls within the Restricted Bands of Operation. See FCC Part 15, Section 15.205 for additional information.

7. Measurement Data (continued)

7.3. Occupied Bandwidth

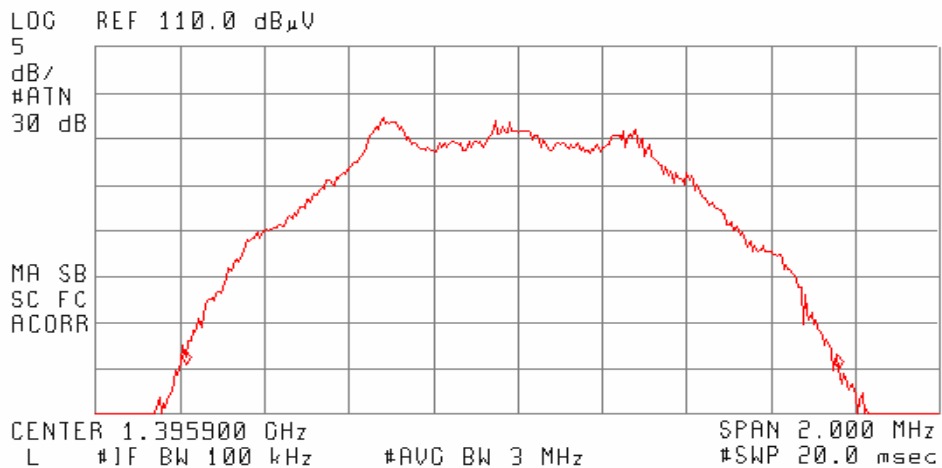
| Channel | Freq (MHz) | Occupied Bandwidth (MHz) | Channel | Freq (MHz) | Occupied Bandwidth (MHz) |
|---------|------------|--------------------------|---------|------------|--------------------------|
| 1 | 1395.9 | 1.545 | 4 | 1427.9 | 1.545 |
| 3 | 1399.1 | 1.535 | 6 | 1431.1 | 1.555 |

7.3.1. Channel 1, 1395.9 MHz



204-07 Occupied Bandwidth - Chan 1

ACTV DET: PEAK
MEAS DET: PEAK AVG
MKRΔ 1.545 MHz
-.51 dB



7. Measurement Data (continued)

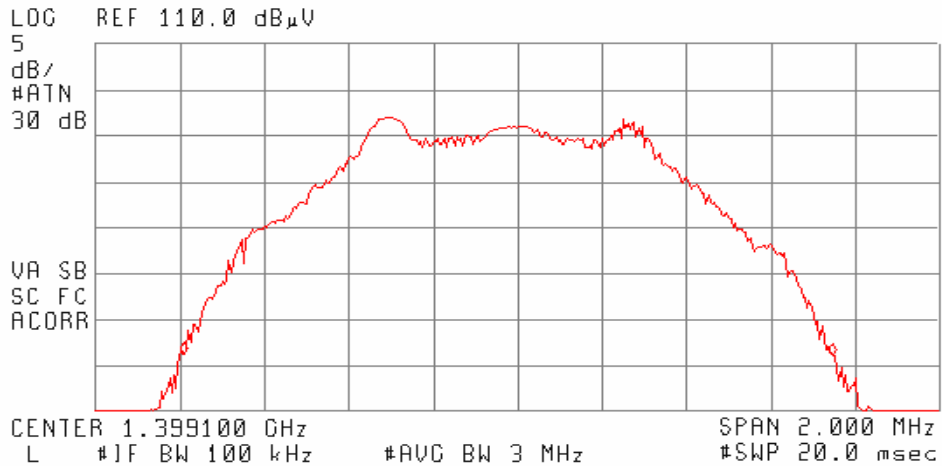
7.3. Occupied Bandwidth (continued)

7.3.2. Channel 3, 1399.1 MHz



204-07 Occupied Bandwidth - Chan 3

ACTV DET: PEAK
MEAS DET: PEAK AVG
MKR Δ 1.535 MHz
-.13 dB

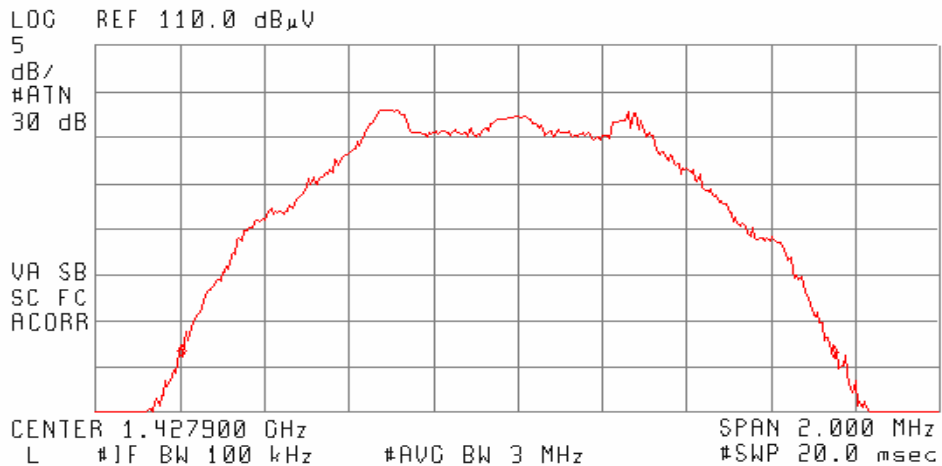


7.3.3. Channel 4, 1427.9 MHz



204-07 Occupied Bandwidth - Chan 4

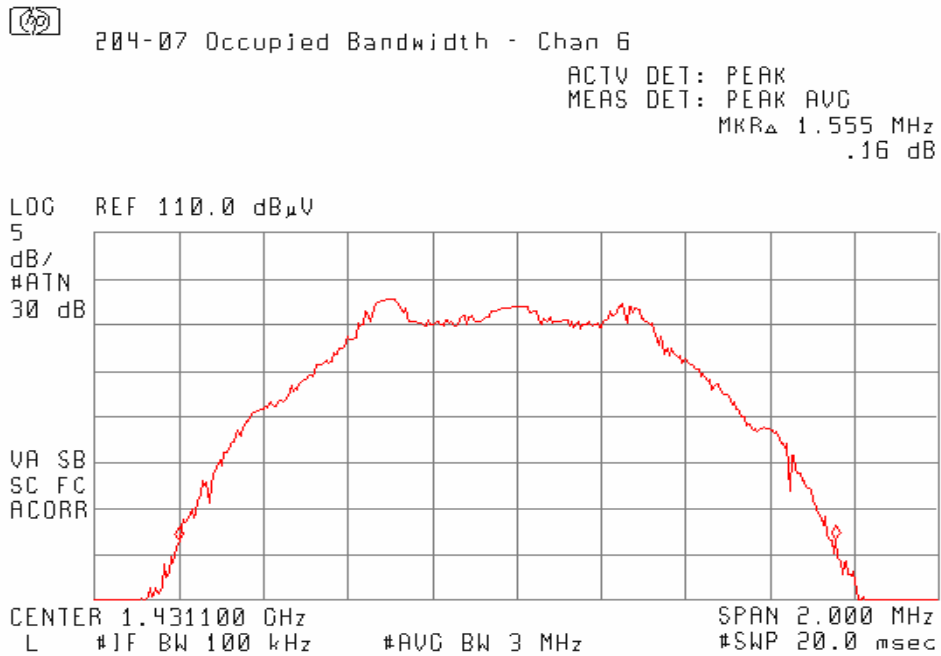
ACTV DET: PEAK
MEAS DET: PEAK AVG
MKR Δ 1.545 MHz
-.20 dB



7. Measurement Data (continued)

7.3. Occupied Bandwidth (continued)

7.3.4. Channel 6, 1431.1 MHz



7.4. Band Edge

Requirement: The band edge measurements were made in accordance with FCC Publication Number 913591: Measurement of Radiated Emissions at the Edge of the Band for a Part 15 RF Device.

| Channel | Signal Peak | | | Band Edge | | |
|---------|-------------|-------------------|------------------|------------|------------------|------------------|
| | Freq (MHz) | Peak Amp (dBµV/m) | Avg Amp (dBµV/m) | Freq (MHz) | Delta Value (dB) | Avg Amp (dBµV/m) |
| 1 | 1395.9 | 102.29 | 66.4 | 1395 | -38.01 | 28.39 |
| 3 | 1399.1 | 102.22 | 66.1 | 1400 | -36.45 | 29.65 |
| 4 | 1427.9 | 103.26 | 68.3 | 1427 | -40.19 | 28.11 |
| 6 | 1431.1 | 103.21 | 67.6 | 1432 | -37.78 | 29.82 |

7. Measurement Data (continued)

7.5. Spurious Radiated Emissions

7.5.1. Regulatory Limit: FCC Part 15, Class B, Quasi-Peak

| Frequency Range (MHz) | Distance (Meters) | Limit (dBµV/m) |
|-----------------------|-------------------|----------------|
| 30 to 88 | 3 | 40.0 |
| 88 to 216 | 3 | 43.5 |
| 216 to 960 | 3 | 46.0 |
| 960 to 1000 | 3 | 54.0 |

7.5.2. Measurement & Equipment Setup

| | |
|-----------------------------|----------------------|
| Test Date: | 06/04/2007 |
| Test Engineer: | Brian Breault |
| Site Temperature (°C): | 20.9 |
| Relative Humidity (%RH): | 31 |
| Frequency Range: | 30 MHz to 1 GHz |
| Measurement Distance: | 3 Meters |
| EMI Receiver IF Bandwidth: | 120 kHz |
| EMI Receiver Avg Bandwidth: | 300 kHz |
| Detector Functions: | Peak and Quasi-Peak. |
| Antenna Height: | 1 to 4 meters |

7.5.3. Test Procedure

Test measurements were made in accordance with ANSI C63.4-2003, Standard Methods of Measurement of Radio Noise Emissions from Low-Voltage Electrical and Electronics Equipment in the Range of 9 kHz to 40 GHz.

7.5.4. Notice: Radiated Emissions > 1 GHz

There were no measurable emissions above 1 GHz other than the transmit frequencies.

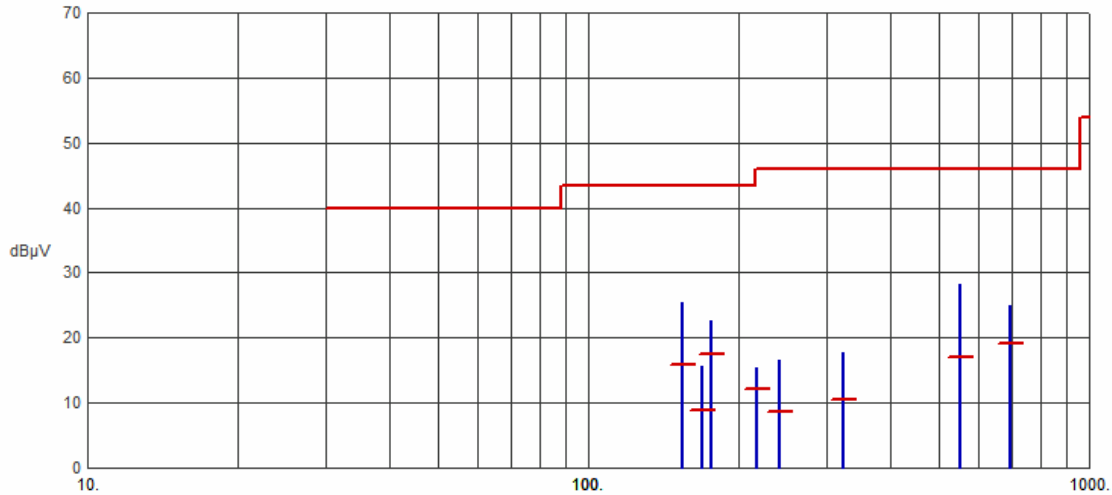
7. Measurement Data (continued)

7.5. Spurious Radiated Emissions (continued)

7.5.5. Horizontal Polarity

Test No.: 204-07, Radiated Emissions - Horizontal Polarity

FCC, Class B



| Frequency (MHz) | Pk Amp (dBµV/m) | QP Amp (dBµV/m) | QP Limit (dBµV/m) | Margin (dB) | Ant Ht (cm) | Table (Deg) | Comments |
|-----------------|-----------------|-----------------|-------------------|-------------|-------------|-------------|----------|
| 153.8927 | 25.41 | 15.87 | 43.50 | -27.63 | N/A | N/A | |
| 168.3222 | 15.66 | 8.79 | 43.50 | -34.71 | N/A | N/A | |
| 176.1746 | 22.60 | 17.57 | 43.50 | -25.93 | N/A | N/A | |
| 217.6970 | 15.31 | 12.11 | 46.00 | -33.89 | N/A | N/A | |
| 240.9660 | 16.46 | 8.62 | 46.00 | -37.38 | N/A | N/A | |
| 322.0187 | 17.76 | 10.42 | 46.00 | -35.58 | N/A | N/A | |
| 552.1321 | 28.21 | 17.02 | 46.00 | -28.98 | N/A | N/A | |
| 698.0580 | 25.03 | 19.24 | 46.00 | -26.76 | N/A | N/A | |

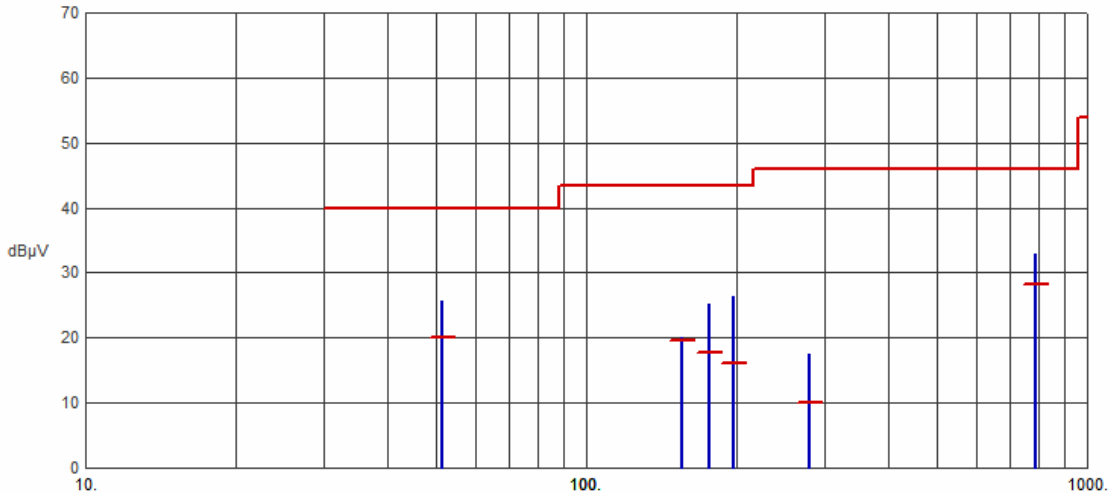
7. Measurement Data (continued)

7.5. Spurious Radiated Emissions (continued)

7.5.6. Vertical Polarity

Test No.: 204-07, Radiated Emissions - Vertical Polarity

FCC, Class B



| Frequency (MHz) | Pk Amp (dBµV/m) | QP Amp (dBµV/m) | QP Limit (dBµV/m) | Margin (dB) | Ant Ht (cm) | Table (Deg) | Comments |
|-----------------|-----------------|-----------------|-------------------|-------------|-------------|-------------|----------|
| 51.6307 | 25.64 | 19.98 | 40.00 | -20.02 | N/A | N/A | |
| 155.4948 | 19.99 | 19.67 | 43.50 | -23.83 | N/A | N/A | |
| 176.2408 | 25.14 | 17.68 | 43.50 | -25.82 | N/A | N/A | |
| 196.9920 | 26.48 | 16.03 | 43.50 | -27.47 | N/A | N/A | |
| 277.9923 | 17.57 | 9.96 | 46.00 | -36.04 | N/A | N/A | |
| 786.4520 | 32.99 | 28.30 | 46.00 | -17.70 | N/A | N/A | |

7. Measurement Data (continued)

7.6. Conducted Emissions

7.6.1. Regulatory Limit: EN55022, Class B

| Frequency Range (MHz) | Limits (dBµV) | |
|-----------------------|-----------------------|-----------------------|
| | Quasi-Peak | Average |
| 0.15 to 0.50 | 66 to 56 ¹ | 56 to 46 ¹ |
| 0.50 to 5.0 | 56 | 46 |
| 0.50 to 30 | 60 | 50 |

¹ The limit decreases linearly with the logarithm of the frequency.

7.6.2. Measurement & Equipment Setup

| | |
|-----------------------------|-----------------------------|
| Test Date: | 05/07/2007 |
| Test Engineer: | Robert J. McCall |
| Site Temperature (°C): | 24.3 |
| Relative Humidity (%RH): | 20 |
| Frequency Range: | 0.15 MHz to 30 MHz |
| EMI Receiver IF Bandwidth: | 9 kHz |
| EMI Receiver Avg Bandwidth: | 30 kHz |
| Detector Functions: | Peak, Quasi-Peak. & Average |

7.6.3. Test Procedure

Test measurements were made in accordance with CISPR 22, Section 9: Method of measurement of conducted disturbance at mains terminals and telecommunication ports and ANSI C63.4-2003, Standard Methods of Measurement of Radio Noise Emissions from Low-Voltage Electrical and Electronics Equipment in the Range of 9 kHz to 40 GHz.

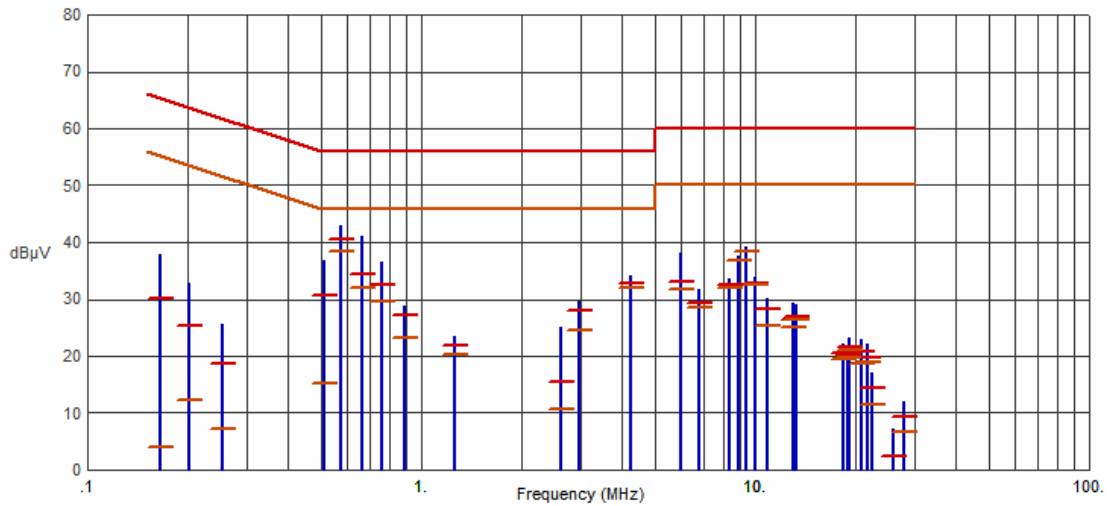
7. Measurement Data (continued)

7.6. Conducted Emissions (continued)

7.6.4. 120 Volts AC – Phase (Power Supply to WMTS ITS Radio Module)

Test No.: 204-07, 120 Volts, 60 Hz Phase

FCC, Class B



| Frequency (MHz) | Pk Amp (dBµV) | QP Amp (dBµV) | QP Limit (dBµV) | QP Margin (dB) | Avg Amp (dBµV) | Avg Limit (dBµV) | Avg Margin (dB) | Comments |
|-----------------|---------------|---------------|-----------------|----------------|----------------|------------------|-----------------|----------|
| .1657 | 37.92 | 30.12 | 65.17 | -35.05 | 4.08 | 55.17 | -51.09 | |
| .2016 | 32.77 | 25.28 | 63.54 | -38.26 | 12.23 | 53.54 | -41.31 | |
| .2526 | 25.72 | 18.80 | 61.67 | -42.87 | 7.21 | 51.67 | -44.46 | |
| .5092 | 36.89 | 30.54 | 56.00 | -25.46 | 15.32 | 46.00 | -30.68 | |
| .5737 | 42.87 | 40.48 | 56.00 | -15.52 | 38.35 | 46.00 | -7.65 | |
| .6665 | 41.03 | 34.43 | 56.00 | -21.57 | 31.95 | 46.00 | -14.05 | |
| .7579 | 36.64 | 32.41 | 56.00 | -23.59 | 29.49 | 46.00 | -16.51 | |
| .8956 | 28.74 | 27.18 | 56.00 | -28.82 | 23.28 | 46.00 | -22.72 | |
| 1.2626 | 23.56 | 21.96 | 56.00 | -34.04 | 20.38 | 46.00 | -25.62 | |
| 2.6146 | 25.13 | 15.52 | 56.00 | -40.48 | 10.60 | 46.00 | -35.40 | |
| 2.9823 | 29.72 | 27.89 | 56.00 | -28.11 | 24.45 | 46.00 | -21.55 | |
| 4.2301 | 34.25 | 32.70 | 56.00 | -23.30 | 31.87 | 46.00 | -14.13 | |
| 5.9598 | 38.17 | 32.98 | 60.00 | -27.02 | 31.86 | 50.00 | -18.14 | |
| 6.8234 | 31.72 | 29.23 | 60.00 | -30.77 | 28.63 | 50.00 | -21.37 | |
| 8.3619 | 33.64 | 32.42 | 60.00 | -27.58 | 31.87 | 50.00 | -18.13 | |
| 8.9397 | 37.65 | 36.87 | 60.00 | -23.13 | 36.82 | 50.00 | -13.18 | |
| 9.4189 | 39.15 | 38.50 | 60.00 | -21.50 | 38.29 | 50.00 | -11.71 | |
| 9.9977 | 33.79 | 32.91 | 60.00 | -27.09 | 32.51 | 50.00 | -17.49 | |
| 10.8613 | 30.16 | 28.20 | 60.00 | -31.80 | 25.38 | 50.00 | -24.62 | |
| 12.9755 | 29.44 | 26.51 | 60.00 | -33.49 | 25.12 | 50.00 | -24.88 | |
| 13.2643 | 29.16 | 26.99 | 60.00 | -33.01 | 26.35 | 50.00 | -23.65 | |
| 18.2629 | 22.26 | 20.54 | 60.00 | -39.46 | 19.55 | 50.00 | -30.45 | |
| 18.8395 | 21.71 | 20.26 | 60.00 | -39.74 | 19.61 | 50.00 | -30.39 | |
| 19.2248 | 23.22 | 21.68 | 60.00 | -38.32 | 21.06 | 50.00 | -28.94 | |
| 20.8578 | 22.86 | 20.68 | 60.00 | -39.32 | 18.79 | 50.00 | -31.21 | |
| 21.7231 | 22.14 | 19.86 | 60.00 | -40.14 | 18.85 | 50.00 | -31.15 | |
| 22.3981 | 17.19 | 14.52 | 60.00 | -45.48 | 11.52 | 50.00 | -38.48 | |
| 26.0438 | 7.32 | 2.43 | 60.00 | -57.57 | -3.15 | 50.00 | -53.15 | |
| 28.0017 | 12.05 | 9.26 | 60.00 | -50.74 | 6.59 | 50.00 | -43.41 | |

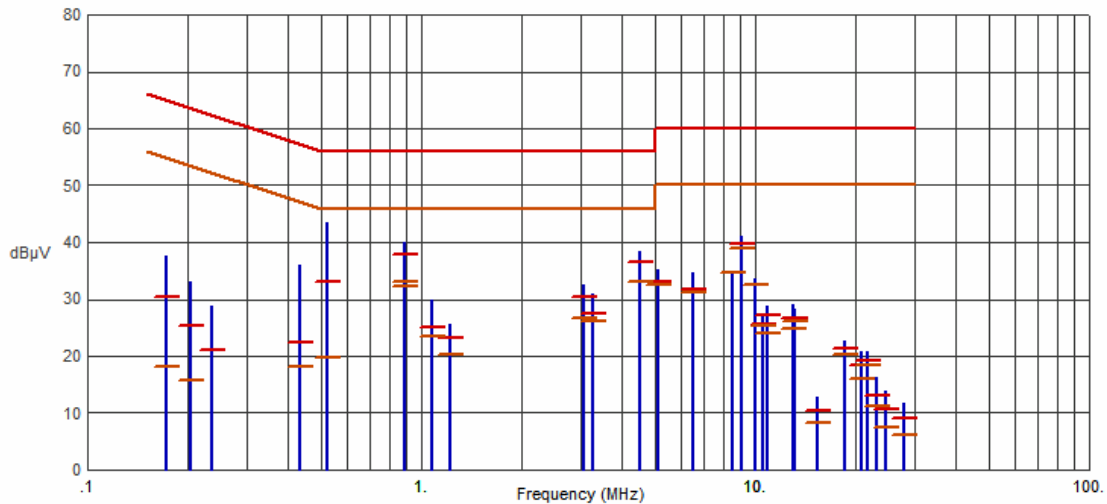
7. Measurement Data (continued)

7.6. Conducted Emissions (continued)

7.6.5. 120 Volts AC - Neutral (Power Supply to WMTS ITS Radio Module)

Test No.: 204-07, 120 Volts, 60 Hz Neutral

FCC, Class B



| Frequency (MHz) | Pk Amp (dBµV) | QP Amp (dBµV) | QP Limit (dBµV) | QP Margin (dB) | Avg Amp (dBµV) | Avg Limit (dBµV) | Avg Margin (dB) | Comments |
|-----------------|---------------|---------------|-----------------|----------------|----------------|------------------|-----------------|----------|
| .1729 | 37.67 | 30.36 | 64.82 | -34.46 | 18.11 | 54.82 | -36.71 | |
| .2035 | 33.01 | 25.32 | 63.47 | -38.15 | 15.77 | 53.47 | -37.70 | |
| .2349 | 28.72 | 20.94 | 62.27 | -41.33 | -0.34 | 52.27 | -52.61 | |
| .4321 | 35.95 | 22.42 | 57.21 | -34.79 | 18.16 | 47.21 | -29.05 | |
| .5239 | 43.46 | 32.94 | 56.00 | -23.06 | 19.82 | 46.00 | -26.18 | |
| .8953 | 40.13 | 37.96 | 56.00 | -18.04 | 32.94 | 46.00 | -13.06 | |
| .8957 | 39.76 | 37.85 | 56.00 | -18.15 | 32.18 | 46.00 | -13.82 | |
| 1.0788 | 29.91 | 25.19 | 56.00 | -30.81 | 23.49 | 46.00 | -22.51 | |
| 1.2151 | 25.62 | 23.28 | 56.00 | -32.72 | 20.28 | 46.00 | -25.72 | |
| 3.0766 | 32.47 | 30.41 | 56.00 | -25.59 | 26.64 | 46.00 | -19.36 | |
| 3.2580 | 30.84 | 27.44 | 56.00 | -28.56 | 26.13 | 46.00 | -19.87 | |
| 4.5200 | 38.44 | 36.41 | 56.00 | -19.59 | 32.97 | 46.00 | -13.03 | |
| 5.0956 | 35.19 | 33.17 | 60.00 | -26.83 | 32.42 | 50.00 | -17.58 | |
| 6.5363 | 34.69 | 31.71 | 60.00 | -28.29 | 31.15 | 50.00 | -18.85 | |
| 8.5544 | 34.98 | 34.72 | 60.00 | -25.28 | 34.54 | 50.00 | -15.46 | |
| 9.1327 | 41.16 | 39.79 | 60.00 | -20.21 | 38.98 | 50.00 | -11.02 | |
| 9.9974 | 33.59 | 32.49 | 60.00 | -27.51 | 32.43 | 50.00 | -17.57 | |
| 10.5745 | 27.13 | 25.69 | 60.00 | -34.31 | 25.45 | 50.00 | -24.55 | |
| 10.8613 | 28.85 | 27.15 | 60.00 | -32.85 | 24.07 | 50.00 | -25.93 | |
| 12.9769 | 29.14 | 26.67 | 60.00 | -33.33 | 24.78 | 50.00 | -25.22 | |
| 13.1680 | 28.18 | 26.78 | 60.00 | -33.22 | 26.23 | 50.00 | -23.77 | |
| 15.2833 | 12.86 | 10.36 | 60.00 | -49.64 | 8.22 | 50.00 | -41.78 | |
| 18.5535 | 22.72 | 21.28 | 60.00 | -38.72 | 20.17 | 50.00 | -29.83 | |
| 20.8601 | 20.69 | 18.47 | 60.00 | -41.53 | 15.90 | 50.00 | -34.10 | |
| 21.7225 | 20.91 | 19.30 | 60.00 | -40.70 | 18.35 | 50.00 | -31.65 | |
| 23.1651 | 16.39 | 13.06 | 60.00 | -46.94 | 11.20 | 50.00 | -38.80 | |
| 24.6072 | 14.00 | 10.67 | 60.00 | -49.33 | 7.47 | 50.00 | -42.53 | |
| 28.0008 | 11.82 | 8.98 | 60.00 | -51.02 | 6.15 | 50.00 | -43.85 | |

7. Measurement Data (continued)

7.7. Determination of Average Factor

7.7.1. 1.3959 GHz

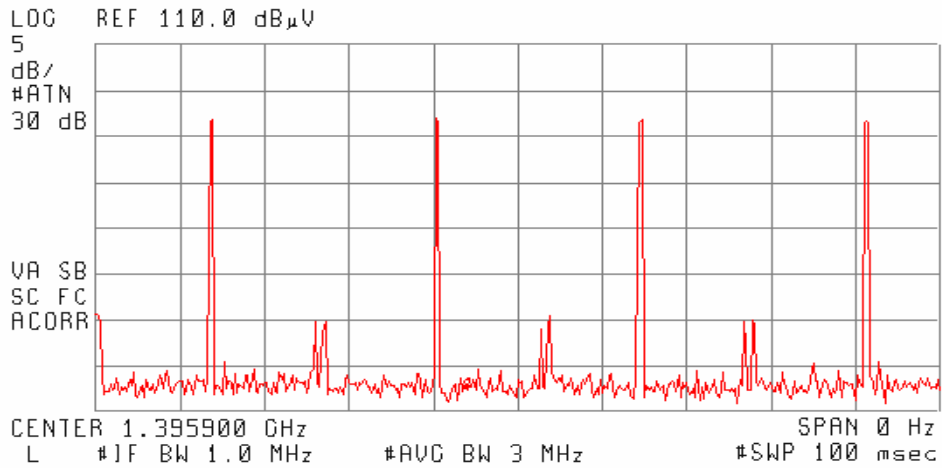
Maximum Duration of 1 cycle: 100 ms
 Number of pulses per period: 4
 Single pulse width: 0.450 ms
 Total On-Time in 1 cycle: 1.80 ms
 On-Time divided by cycle: 1.80 ms / 100 ms = 0.018
 Average Factor: 20 x log (0.018) = -34.89 dB
 FCC and IC maximum allowed average factor is -20dB.

7.7.1.1. Number of pulses in 100 mSec



204-07 Number of Pulses per Period - Chan 1

ACTV DET: PEAK
 MEAS DET: PEAK AVG
 MKR 44.000 msec
 72.37 dBμV



7. Measurement Data (continued)

7.7. Determination of Average Factor (continued)

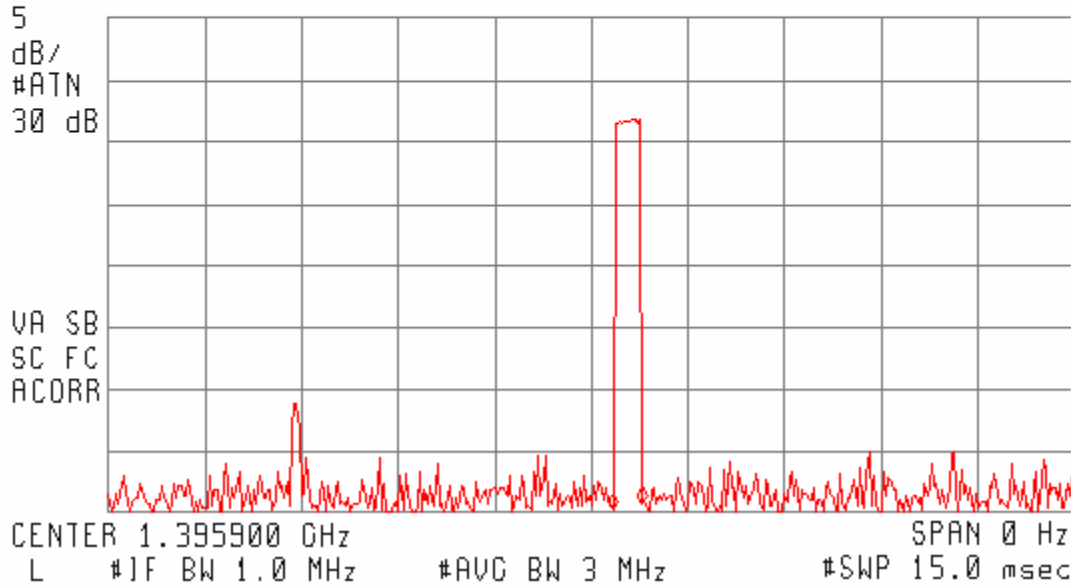
7.7.1.2. Pulse Width



204-07 Single Pulse Width - Chan 1

ACTV DET: PEAK
MEAS DET: PEAK AVG
MKRΔ 450.00 μsec
.40 dB

LOG REF 110.0 dBμV



Note: The DUT Channel 1 measurement data is documented in this report. However, channels 3, 4 and 6 were measured and yielded similar results.