**PCTEST ENGINEERING LABORATORY, INC.**
**6660 – B Dobbin Road · Columbia, MD 21045 · USA**
**Telephone 410.290.6652 / Fax 410.290.6654**
**http://www.pctestlab.com (email: randy@pctestlab.com)**

# CERTIFICATE OF COMPLIANCE

## CLASS II PERMISSIVE CHANGE

**MANUFACTURER NAME & ADDRESS:**
SYMBOL TECHNOLOGIES INC.
1 Symbol Plaza
Holtsville, NY 11742-1300
Attn: Mark Luksich, Regulatory Director

**DATE & LOCATION OF TESTING:**
Date(s) of Tests: February 26-27, 2003
Test Report S/N: 15.230226098.H9P
Test Site: PCTEST Lab, Columbia, MD

| | |
|---|---|
| **FCC ID:** | **H9PLA4137** |
| **APPLICANT:** | **SYMBOL TECHNOLOGIES INC.** |

**SUMMARY:**

| | |
|---|---|
| **Trade Name/Model No.:** | **Motorola S24** |
| **Equipment EUT Type:** | **WLAN Compact Flash Card** |
| **Data Transfer Rate(s):** | **1Mbps, 2Mbps, 5.5Mbps, 11Mbps** |
| **Max. Output Power:** | **0.1 W (Conducted)** |
| **Frequency Range:** | **2412 - 2462 MHz** |
| **FCC Classification:** | **FCC Part 15 Spread Spectrum Transceiver (DSS)** |
| **FCC Rule Part(s):** | **Parts 15.247; ANSI C-63.4-2001** |
| **Test Device Serial No.:** | **S/N: 00A0F83D3194** |
| **Permissive Change(s):** | **Added Antenna #SQ2403PV96SMAR / Enclosure** |
| **Original Grant Date:** | **April 17, 2002** |

**This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C-63.4-2001.**

**Grant Conditions: Class II Permissive Change. Output is peak conducted. This device is approved for mobile operating configurations with respect to 2.1091 for satisfying RF exposure compliance requirements. Device is authorized for use with the external vehicular antenna described in this filing. End-users must be provided with antenna installation and transmitter operating conditions for satisfying RF exposure compliance.**

**I authorize and attest to the accuracy of data. All measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.**

*PCTEST certifies that no party to this application has been denied the FCC benefits pursuant to Section 5301 of the Anti-Drug Abuse Act of 1988, 21 U.S.C. 862.*

Alfred Cirwithian
Vice President Engineering

**15.230226098.H9P**

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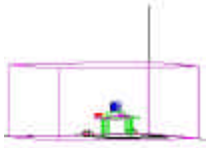
# EXHIBIT A – Attestation Statements



# MEASUREMENT REPORT

## A. General Information

| | |
|---|---|
| APPLICANT | SYMBOL TECHNOLOGIES INC. |
| APPLICANT ADDRESS | 1 Symbol Plaza |
| | Holtsville, NY 11742-1300 |
| TEST SITE | PCTEST ENGINEERING LABORATORY, INC. |
| TEST SITE ADDRESS | 6660-B Dobbin Road, Columbia, MD 21045 USA |
| FCC RULE PART(S) | Parts 15.247; ANSI C-63.4-2001 |
| MODEL NAME | Motorola S24 |
| FCC ID | H9PLA4137 |
| Test Device Serial No.: | S/N:2LKSA01252 ☐ Production ☒ Pre-Production ☐ Engineering |
| FCC CLASSIFICATION | FCC Part 15 Spread Spectrum Transceiver (DSS) |
| DATE(S) OF TEST | February 26-27, 2003 |
| PERMISSIVE CHANGE(S): | Added Antenna #SQ2403PV96SMAR / Enclosure |
| ORIGINAL GRANT DATE: | April 17, 2002 |

## A.1 Test Methodology

**Both conducted and radiated testing were performed according to the procedures in ANSI C63.4-2001. Radiated testing was performed at an antenna to EUT distance of 3 meters.**

## A.2 Test Facility / NVLAP Accreditation

**The conducted and radiated tests were performed at PCTEST Engineering Lab in Columbia, MD 21045, U.S.A.**

- **PCTEST facility is an FCC registered (PCTEST Reg. No. 90864) test facility with the site description report on file has met all the requirements specified in Section 2.948 of the FCC Rules.**
- **PCTEST Lab is an ISO/IEC 17025 accredited laboratory by the U.S. National Institute of Standards and Technology (NIST) under the National Voluntary Laboratory Accreditation Program (NVLAP) in EMC, Telecommunications, and FCC for satisfactory compliance with criteria established in Title 15, Part 285 Code of Federal Regulations. (NVLAP Lab code: 100431-0).**
- **PCTEST Lab is a recognized U.S. Conformity Assessment Body (CAB) in EMC and R&TTE (n.b. 0982) under the U.S.-EU Mutual Recognition Agreement (MRA).**
- **PCTEST TCB is a Telecommunication Certification Body (TCB) accredited to ISO/IEC Guide 65 by the American National Standards Institute (ANSI)**

# 1.0 INTRODUCTION

## 1.1 Evaluation Procedure

The measurement procedure described in the American National Standard for Methods of Measurement of Radio-Noise Emission from Low-Voltage Electrical and Electronic Equipment in the Range of 9kHz to 40GHz (ANSI C63.4-2001) and FCC Public Notice dated July 12, 1995 entitled "Guidance on Measurement for Direct Sequence Spread Spectrum System" were used in the measurement of the **Symbol *WLAN Compact Flash Card FCC ID: H9PLA4137***.

## 1.2 Scope

Measurement & determination of electromagnetic emissions (EMC) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission.

## 1.3 PCTEST Test Location

The map at the right shows the location of the PCTEST LABORATORY, its proximity to the FCC Laboratory, the Columbia vicinity are, the Baltimore-Washington Internt'l (BWI) airport, the city of Baltimore and the Washington, DC area. (see Figure 1.2-1).

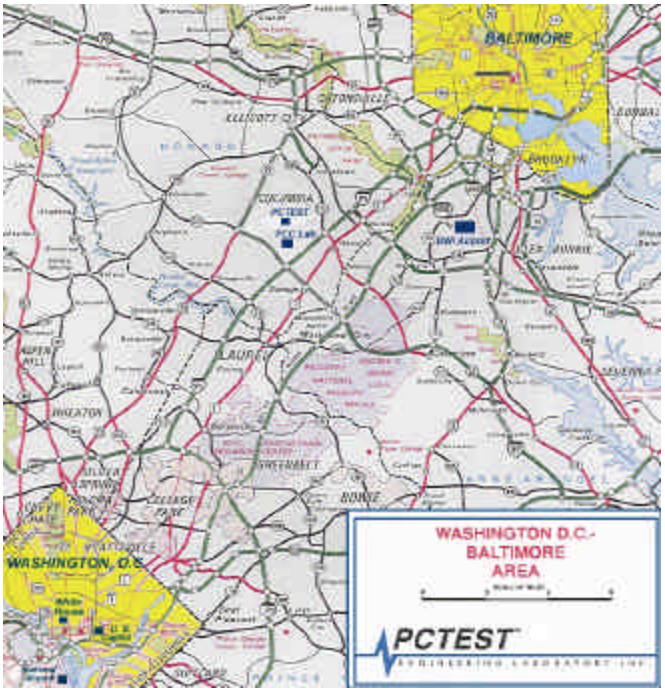



**Figure 1.3-1. Map of the Greater Baltimore and Metropolitan Washington, D.C. area**

These measurement tests were conducted at the PCTEST Engineering Laboratory, Inc. facility in New Concept Business Park, Guilford Industrial Park, Columbia, Maryland. The site address is 6660-B Dobbin Road, Columbia, MD 21045. The test site is one of the highest points in the Columbia area with an elevation of 390 feet above mean sea level. The site coordinates are 39° 11'15" N latitude and 76° 49'38" W longitude. The facility is 1.5 miles North of the FCC laboratory, and the ambient signal and ambient signal strength are approximately equal to those of the FCC laboratory. There are no FM or TV transmitters within 15 miles of the site. The detailed description of the measurement facility was found to be in compliance with the requirements of § 2.948 according to ANSI C63.4 on October 19, 2002.

# 2.0 PRODUCT INFORMATION

## 2.1 Equipment Description

The Equipment Under Test (EUT) is the **Symbol *WLAN Compact Flash Card FCC ID: H9PLA4137***. The EUT consisted of the following components(s):

**Table 2-1. EUT Equipment Description**

| Manufacturer / Model / Description | Serial Number |
|---|---|
| Symbol Technologies, Inc. / Motorola S24 | 00A0F83D3194 |

## 2.2 Operation Mode

The EUT was installed in the Motorola S24 with a different antenna as described herein.

## 2.3 EMI Suppression Device(s)/Modifications

EMI suppression device(s) added and/or modifications made during testing.

- none

# 3.0 DESCRIPTION OF TEST

## 3.1 Conducted Emissions

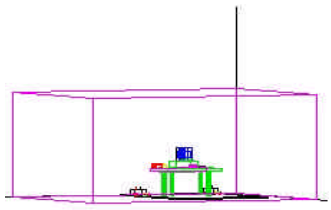


**Figure 3.1-1. Shielded Enclosure Line-Conducted Test Facility**

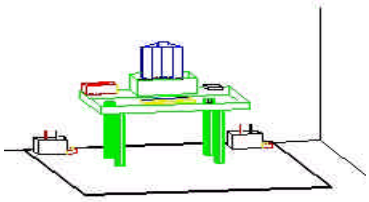


**Figure 3.1-2. Line Conducted Emission Test Set-Up**

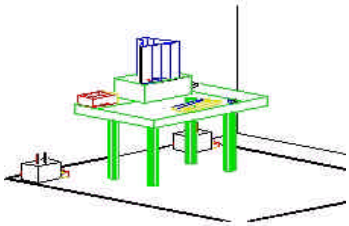


**Figure 3.1-3. Wooden Table & Bonded LISNs**

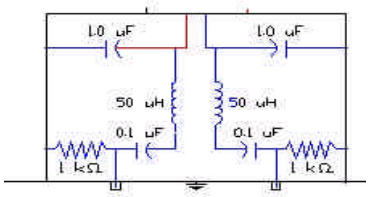



**Figure 3.1-4. LISN Schematic Diagram**

The line-conducted facility is located inside a 16'x20'x10' shielded enclosure. It is manufactured by Ray Proof Series 81 (see Figure 3.1-1). The shielding effectiveness of the shielded room is in accordance with MIL-Std-285 or NSA 65-5. A 1m x 1.5m wooden table 80cm high is placed 40cm away from the vertical wall and 1.5m away from the sidewall of the shielded room (see Figure 3.1-2). Solar Electronics and EMCO Model 3725/2 (10kHz-30MHz) 50Ω/50µH Line-Impedance Stabilization Networks (LISNs) are bonded to the shielded room (See Figure 3.1-3). The EUT is powered from the Solar LISN and the support equipment is powered from the EMCO LISN. Power to the LISNs are filtered by a high-current high-insertion loss Ray Proof power line filters (100dB 14Hz-10GHz). The purpose of the filter is to attenuate ambient signal interference and this filter is also bonded to the shielded enclosure. All electrical cables are shielded by braided tinned copper zipper tubing with an inner diameter of ½". If the EUT is a DC-powered device, power will be derived from the source power supply it normally will be powered from and this supply line(s) will be connected to the Solar LISN. The LISN schematic diagram is shown (See Figure 3.1-4). All interconnecting cables more than 1 meter were shortened by non-inductive bundling (serpentine fashion) to a 1-meter length. Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The RF output of the LISN was connected to the spectrum analyzer to determine the frequency producing the maximum EME from the EUT. The spectrum was scanned from 150kHz to 30Mhz with a 20msec. sweep time. The frequencies producing the maximum level were re-examined using an EMI/Field Intensity Meter and Quasi-Peak adapter. The detector function was set to CISPR quasi-peak and average mode. The bandwidth of the receiver was set to 10kHz. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each EME emission. Each emission was maximized by: switching power lines; varying the mode of operation or resolution; clock or data exchange speed; scrolling H patter to the EUT and/or support equipment, and powering the monitor from the floor mounted outlet box and the computer aux AC outlet, if applicable; whichever determined the worst-case emission. Photographs of the worst-case emission can be seen in Exhibit M. Each EME reported was calibrated using the HP8640B signal generator.

## 3.2 Radiated Emissions

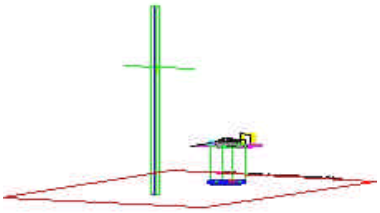


**Figure 3.2-1. Meter Test Site**

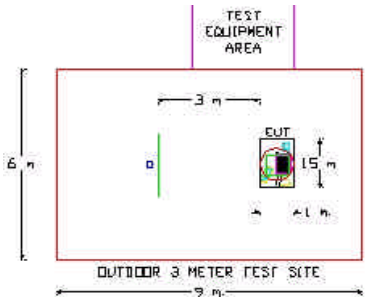



**Figure 3.2-2. Dimensions of Outdoor Test Site**

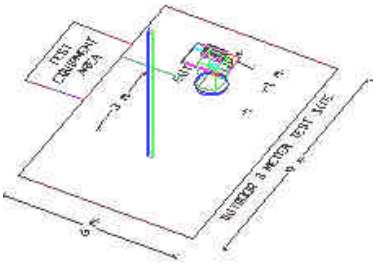


**Figure 3.2-3. Turntable and System Setup**

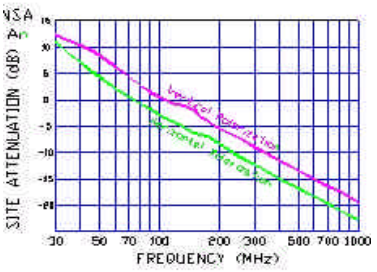



**Figure 3.2-4. Normalized Site Attenuation Curves (H&V)**

Preliminary measurements were made indoors at 1 meter using broadband antennas, broadband amplifier, and spectrum analyzer to determine the frequency producing the maximum EME. Appropriate precaution was taken to ensure that all EME from the EUT were maximized and investigated. The system configuration, clock speed, mode of operation or video resolution, turntable azimuth with respect to the antenna was noted for each frequency found. The spectrum was scanned from 30 to 200 MHz using biconical antenna and from 200 to 1000 MHz using log-spiral antenna. Above 1 GHz, linearly polarized double ridge horn antennas were used.

Final measurements were made outdoors at 3meter test range using Roberts™ Dipole antennas or horn antenna (see Figure 3.2-1). The test equipment was placed on a wooden and plastic bench situated on a 1.5 x 2 meter area adjacent to the measurement area (see Figure 3.2-2). Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. Each frequency found during pre-scan measurements was re-examined and investigated using EMI/Field Intensity Meter and Quasi-Peak Adapter. The detector function was set to CISPR quasi-peak mode and the bandwidth of the receiver was set to 100kHz or 1 MHz depending on the frequency or type of signal. Above 1GHz the detector function was set to CISPR average mode (RBW = 1MHz, VBW = 10Hz).

The half-wave dipole antenna was tuned to the frequency found during preliminary radiated measurements. The EUT, support equipment and interconnecting cables were re-configured to the set-up producing the maximum emission for the frequency and were placed on top of a 0.8-meter high non-metallic 1 x 1.5 meter table (see Figure 3.2-3). The EUT, support equipment, and interconnecting cables were re-arranged and manipulated to maximize each EME emission. The turntable containing the system was rotated; the antenna height was varied 1 to 4 meters and stopped at the azimuth or height producing the maximum emission. Each emission was maximized by: varying the mode of operation or resolution; clock or data exchange speed; scrolling H pattern to the EUT and/or support equipment, and powering the monitor from the floor mounted outlet box and the computer aux AC outlet, if applicable; and changing the polarity of the antenna, whichever determined the worst-case emission. Photographs of the worst-case emission can be seen in Exhibit E-G. Each EME reported was calibrated using the HP8640B signal generator. The Theoretical Normalized Site Attenuation Curves for both horizontal and vertical polarization are shown in Figure 3.2-4.

# 4.0 ANTENNA REQUIREMENTS

An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the applicant can be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with this requirement.

The antenna uses a **unique coupled (reverse S)** connector.

**Conclusion:**

The **Symbol H9PLA4137** unit complies with the requirement of §15.203.

# 5.0 TEST EQUIPMENT CALIBRATION DATA

Test Equipment Calibration is traceable to the National Institute of Standards and Technology (NIST).

**Table 5-1. Annual Test Equipment Calibration Schedule**

| TYPE | MODEL | CAL. DUE DATE | CAL. INTERVAL | SERIAL No. |
|---|---|---|---|---|
| Microwave Spectrum Analyzer | HP 8566 (100Hz–22GHz) | 12/05/03 | Annual | 3638A08713 |
| Microwave Spectrum Analyzer | HP 8566 (100Hz-22GHz) | 04/17/03 | Annual | 2542A11898 |
| Spectrum Analyzer/Tracking Generator | HP 8591A (9kHz-1.8GHz) | 06/02/03 | Annual | 3144A02458 |
| Spectrum Analyzer | HP 8591A (9kHz-1.8GHz) | 10/15/03 | Annual | 3108A02053 |
| Spectrum Analyzer | HP 8594A (9kHz-2.9GHz) | 11/02/03 | Annual | 3051A00187 |
| Signal Generator | HP 8650B (500Hz-1GHz) | 06/02/03 | Annual | 2232A19558 |
| Signal Generator | HP 8640B (500Hz-1GHz) | 06/02/03 | Annual | 1851A09816 |
| Signal Generator | Rohde & Schwarz (0.1-1GHz) | 09/22/03 | Annual | 894215/012 |
| Ailtech/Eaton Receiver | NM 37/57A-SL (30MHz-1GHz) | 04/12/03 | Annual | 0792-03271 |
| Ailtech/Eaton Receiver | NM 37/57A (30MHz-1GHz) | 03/11/03 | Annual | 0805-03334 |
| Ailtech/Eaton Receiver | NM 17/27A (0.1-32MHz) | 09/17/03 | Annual | 0608-03241 |
| Quasi-Peak Adapter | HP 85650A | 08/09/03 | Annual | 2043A00301 |
| Ailtech/Eaton Adapter | CCA-7 CISPR/ANSI QP Adapter | 03/11/03 | Annual | 0194-04082 |
| RG58 Coax Test Cable | No.167 | | | n/a |
| Harmonic/Flicker Test System | HP 6841A (IEC 555-2/3) | | | 3531A00115 |
| Broadband Amplifier (2) | HP 8447D | | | 1145A00470, 1937A03348 |
| Broadband Amplifier | HP 8447F | | | 2443A03784 |
| Transient Limiter | HP 11947A (9kHz-200MHz) | | | 2820A00300 |
| Horn Antenna (2) | EMCO Model 3115 (1-18GHz) | | | 9704-5182, 9205-3874 |
| Horn Antenna | EMCO Model 3116 (18-40GHz) | | | 9203-2178 |
| Biconical Antenna (3) | Eaton 94455-1 | | | 1295, 1332, 1277 |
| Log-Spiral Antenna (2) | Ailtech/Eaton 93490-1 | | | 0227, 1104 |
| Log-Spiral Antenna | Singer 93490-1 | | | 147 |
| Roberts Dipoles | Compliance Design (1 set) A100 | | | 5118 |
| Ailtech Dipoles | DM-105A (1set) | | | 33448-111 |
| EMCO LISN (3) | 3816/2, 3816/2, 3725/2 | | | 1077, 1079, 2099 |
| 50-ohm Terminator | n/a | | | n/a |
| Microwave Preamp 40dB Gain | HP 83017A (0.5-26.5GHz) | | | 3123A00181 |
| Microwave Cables | MicroCoax (1.0-26.5GHz) | | | n/a |
| Ailtech/Eaton Receiver | NM37/57A-SL | | | 0792-03271 |
| Spectrum Analyzer | HP 8591A | | | 3034A01395 |
| Modulation Analyzer | HP 8901A | | | 2432A03467 |
| NTSC Pattern Generator | Leader 408 | | | 0377433 |
| Noise Figure Meter | HP 8970B, Ailtech 7510 | | | 3106A02189, TE31700 |
| Noise Generator | Ailtech 7010 | | | 1473 |
| Microwave Survey Meter | Holaday Model 1501 (2.45GHz) | | | 80931 |
| Digital Thermometer | Extech Instruments 421305 | | | 426966 |
| Attenuator | HP 8495A (0-70dB) DC-4GHz | | | |
| Bi-Directional Coax Coupler | Narda 3020A (50-1000MHz) | | | |
| Shielded Screen Room | RF Lindgren Model 26-2/2-0 | | | 6710 (PCT270) |
| Shielded Semi-Anechoic Chamber | Ray Proof Model S81 | | | R2437 (PCT278) |
| Environmental Chamber | Associated Systems 1025 | | | PCT285 |
| OATS | n/a | 12/31/2004 | Tri-annual | |

# 6.0 CONCLUSION

The data collected with the changes described herein, show that the **SYMBOL WLAN Compact Flash Card FCC ID: H9PLA4137** continues to comply with Part 15C of the FCC Rules.

# EXHIBIT B – Test Results

## Summary

The intentional radiator has been tested in a simulated typical installation to demonstrate compliance with the relevant FCC performance and procedural standards.

The radio was transmitting at full power on the specified channels and at a data rate(s) specified above. The channels tested are high, middle and low of the allocated bands.

Final system data was gathered in a mode that tended to maximize emissions by varying the orientation of the EUT, orientation of power and I/O cabling, antenna search height, and antenna polarization.

| | |
|---|---|
| Test Date(s): | February 26-27, 2003 |
| Test Engineer: | Al Cirwithian |
| Method/System: | Direct Sequence Spread Spectrum (DSSS) |
| Data Transfer Rate(s): | 1Mbps, 2Mbps, 5.5Mbps, 11Mbps |

**Table A-1. Summary of Test Results**

| FCC Part Section(s) | RSS 210 Section | Test Description | Test Limit | Result |
|---|---|---|---|---|
| TRANSMITTER MODE (TX) | | | | |
| 15.247(a)(2) | | 6dB Bandwidth | > 500kHz | Pass * |
| 15.247(b) | 6.22(o)(b) | Transmitter Output Power | < 1 Watt | Pass |
| 15.237(d) | 6.2.2(o)(b) | Transmitter Power Spectral Density | < 8dBm / 3kHz | Pass * |
| 15.247(c) | 5.9.1<br>6.2.2(o) (e1) | Occupied BandEdge<br>Out-of-Band Emissions<br>(BandEdge at 20dB below) | Radiated <20dBc. Emissions in restricted bands must meet the radiated limits detailed in 15.207 | Pass * |
| 15.205<br>15.209 | 6.2.1<br>6.3 | General Field Strength Limits (Restricted Bands and Radiated Emission Limits) | < FCC 15.209 limits or<br>< RSS-210 table 3 limits<br>Emissions in restricted bands must meet the radiated limits detailed in 15.207 | Pass |
| 15.207 | 6.6 | AC Conducted Emissions<br>150kHz – 30MHz | Class B = 250µV | Pass |
| RECEIVER MODE (RX) | | | | |
| 15.207 | 7.4 | AC Conducted Emissions<br>150kHz – 30MHz | Class B = 250µV | Pass |
| 15.209 | 7.3 | General Field Strength Limits (Restricted Bands and Radiated Emissions Limits) | < FCC 15.209 limits or<br>< RSS-210 table 3 limits | Pass |

* NOTE: These tests were not performed. Same as original report.

# EXHIBIT B – Test Results (Cont.)

## Output Power Measurement

§15.247(b)

A transmitter antenna terminal of EUT is connected to the input of a RF power sensor. Measurement is made while the EUT is operating in transmission mode at the appropriate frequencies.

Minimum Standard – The transmitter peak output power shall not exceed 1 watt.

Data Transfer Rate: 11Mbps

**Table A-3. Radiated Output Power Measurements**

| Frequency (MHz) | Channel No. | Test Results | | |
|---|---|---|---|---|
| | | Power Output (dBm) | Power Output (W) | Pass/Fail |
| 2412 | 1 | 21.07 | 0.128 | Pass |
| 2437 | 6 | 21.27 | 0.134 | Pass |
| 2462 | 11 | 21.07 | 0.128 | Pass |

Actual data is taken with a peak power meter.
Max. Peak Power + Attenuation = dBm ⇒ Watts.

Equivalent Isotropic Radiated Power Measurements by Substitution Method according to ANSI/TIA/EIA-603-A-2001, Aug. 15, 2001:

The EUT was placed on a wooden turn table 3-meters from the receive antenna. The receive antenna height and turntable rotation was adjusted for the highest reading on the receive spectrum analyzer. A Horn antenna was substituted in place of the EUT. This Horn antenna was driven by a signal generator and the level of the signal generator was adjusted to obtain the same receive spectrum analyzer reading. The conducted power at the terminals of the Horn antenna is measured. The difference between the gain of the horn and an isotropic antenna is taken into consideration and the EIRP is recorded.

# EXHIBIT B – Test Results (Cont.)

## Radiated Harmonic Measurements

§15.205 & §15.209

Data Transfer Rate: 1 Mbps

Distance of Measurements: 3 Meters

Channel: 01

**Table A-5. Radiated Harmonic Measurements**

| Frequency (MHz) | Level (dBm) | AFCL (dB) | POL (H/V) | F/S (mV/m) | F/S (dBmV/m) | Margin (dB) |
|---|---|---|---|---|---|---|
| 4824 | -103.7 | 40.4 | V | 152.93 | 43.7 | - 10.3 |
| 7236 | -108.6 | 47.4 | V | 195.43 | 45.8 | - 8.2 |
| 9648 | -122.8 | 50.3 | V | 53.09 | 34.5 | - 19.5 |
| 12060 | -135.0 | 53.7 | V | 19.28 | 25.7 | - 28.3 |

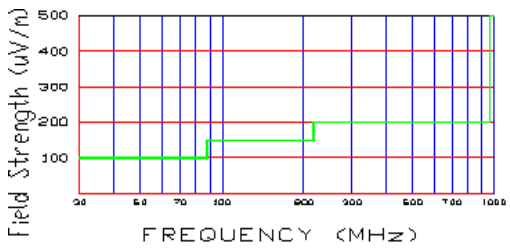



**Figure A-5. Restricted band harmonic & spurious limits.**

NOTES:

1. All harmonics in the restricted bands specified in §15.205 are below the limit shown in Table G-1. (Note: * = Restricted Band measured frequency)

2. All harmonics/spurs are at least 20 dB below the highest emission in the authorized band using RBW = 100kHz

3. Average Measurements > 1GHz using RBW = 1 MHz VBW = 10 Hz

4. The peak emissions above 1 GHz are not more than 20 dB above the average limit.

5. The antenna is manipulated through typical positions, polarity and length during the tests.

6. The EUT is supplied with nominal AC voltage or/and a new/fully-recharged battery.

7. The spectrum is measured from 9kHz to the 10th harmonic and the worst-case emissions are reported.

8. < - 135 are below the analyzer floor level.

9. The radiated limits are shown on Figure A-1. Above 1 GHz, the limit is 500 µV/m (54dBµ/m).

# EXHIBIT B – Test Results (Cont.)

## Radiated Harmonic Measurements (Cont.)

§15.205 & §15.209

Data Transfer Rate: 1 Mbps

Distance of Measurements: 3 Meters

Channel: 06

**Table A-6. Radiated Harmonic Measurements**

| Frequency (MHz) | Level (dBm) | AFCL (dB) | POL (H/V) | F/S (mV/m) | F/S (dBmV/m) | Margin (dB) |
|---|---|---|---|---|---|---|
| 4874 | -103.4 | 40.5 | V | 160.33 | 44.1 | - 9.9 |
| 7311 | -109.0 | 48.0 | V | 199.53 | 46.0 | - 8.0 |
| 9748 | -122.2 | 50.3 | V | 56.89 | 35.1 | - 18.9 |
| 12185 | -135.0 | 53.7 | V | 19.28 | 25.7 | - 28.3 |

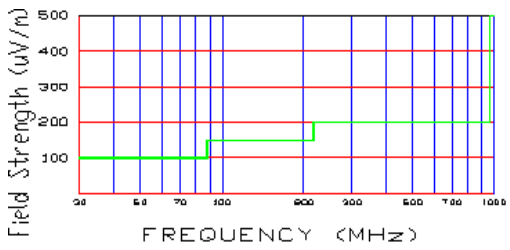



**Figure A-6. Restricted band harmonic & spurious limits.**

NOTES:

1. All harmonics in the restricted bands specified in §15.205 are below the limit shown in Table G-1. (Note: * = Restricted Band measured frequency)

2. All harmonics/spurs are at least 20 dB below the highest emission in the authorized band using RBW = 100kHz

3. Average Measurements > 1GHz using RBW = 1 MHz VBW = 10 Hz

4. The peak emissions above 1 GHz are not more than 20 dB above the average limit.

5. The antenna is manipulated through typical positions, polarity and length during the tests.

6. The EUT is supplied with nominal AC voltage or/and a new/fully-recharged battery.

7. The spectrum is measured from 9kHz to the 10th harmonic and the worst-case emissions are reported.

8. < - 135 are below the analyzer floor level.

9. The radiated limits are shown on Figure A-2. Above 1 GHz, the limit is 500 µV/m (54dBµ/m).

# EXHIBIT B – Test Results (Cont.)

## Radiated Harmonic Measurements (Cont.)

§15.205 & §15.209

Data Transfer Rate: 1 Mbps

Distance of Measurements: 3 Meters

Channel: 11

**Table A-7. Radiated Harmonic Measurements**

| Frequency (MHz) | Level (dBm) | AFCL (dB) | POL (H/V) | F/S (mV/m) | F/S (dBmV/m) | Margin (dB) |
|---|---|---|---|---|---|---|
| 4924 | -103.6 | 40.7 | V | 160.33 | 44.1 | - 9.9 |
| 7386 | -107.6 | 48.2 | V | 239.88 | 47.6 | - 6.4 |
| 9848 | -121.5 | 50.4 | V | 62.37 | 35.9 | - 18.1 |
| 12310 | -135.0 | 53.8 | V | 19.50 | 25.8 | - 28.2 |

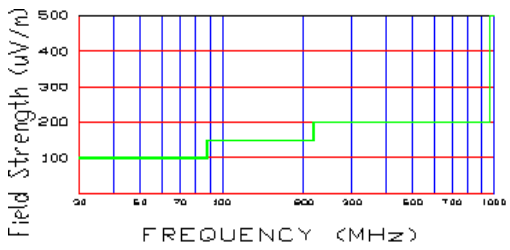



**Figure A-7. Restricted band harmonic & spurious limits.**

NOTES:

1. All harmonics in the restricted bands specified in §15.205 are below the limit shown in Table G-1. (Note: * = Restricted Band measured frequency)

2. All harmonics/spurs are at least 20 dB below the highest emission in the authorized band using RBW = 100kHz

3. Average Measurements > 1GHz using RBW = 1 MHz VBW = 10 Hz

4. The peak emissions above 1 GHz are not more than 20 dB above the average limit.

5. The antenna is manipulated through typical positions, polarity and length during the tests.

6. The EUT is supplied with nominal AC voltage or/and a new/fully-recharged battery.

7. The spectrum is measured from 9kHz to the 10th harmonic and the worst-case emissions are reported.

8. < - 135 are below the analyzer floor level.

9. The radiated limits are shown on Figure A-3. Above 1 GHz, the limit is 500 µV/m (54dBµ/m).

# EXHIBIT B – Test Results (Cont.)

## Radiated Harmonic Measurements (Cont.)

§15.205 & §15.209

Data Transfer Rate: 2 Mbps

Distance of Measurements: 3 Meters

Channel: 01

**Table A-8. Radiated Harmonic Measurements**

| Frequency (MHz) | Level (dBm) | AFCL (dB) | POL (H/V) | F/S (mV/m) | F/S (dBmV/m) | Margin (dB) |
|---|---|---|---|---|---|---|
| 4824 | -103.5 | 40.4 | V | 156.50 | 43.9 | - 10.1 |
| 7236 | -108.5 | 47.4 | V | 197.70 | 45.9 | - 8.1 |
| 9648 | -122.2 | 50.3 | V | 56.89 | 35.1 | - 18.9 |
| 12060 | -135.0 | 53.7 | V | 19.28 | 25.7 | - 28.3 |

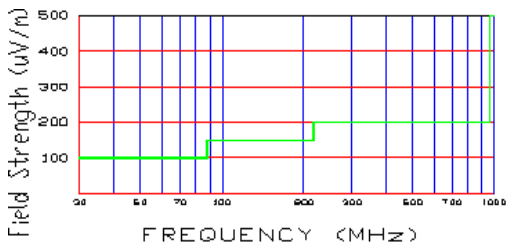



**Figure A-8. Restricted band harmonic & spurious limits.**

NOTES:

1. All harmonics in the restricted bands specified in §15.205 are below the limit shown in Table G-1. (Note: * = Restricted Band measured frequency)

2. All harmonics/spurs are at least 20 dB below the highest emission in the authorized band using RBW = 100kHz

3. Average Measurements > 1GHz using RBW = 1 MHz VBW = 10 Hz

4. The peak emissions above 1 GHz are not more than 20 dB above the average limit.

5. The antenna is manipulated through typical positions, polarity and length during the tests.

6. The EUT is supplied with nominal AC voltage or/and a new/fully-recharged battery.

7. The spectrum is measured from 9kHz to the 10th harmonic and the worst-case emissions are reported.

8. < - 135 are below the analyzer floor level.

9. The radiated limits are shown on Figure A-4. Above 1 GHz, the limit is 500 µV/m (54dBµ/m).

# EXHIBIT B – Test Results (Cont.)

## Radiated Harmonic Measurements (Cont.)

§15.247(b) / §15.205 & §15.209

Data Transfer Rate: 2 Mbps

Distance of Measurements: 3 Meters

Channel: 06

**Table A-9. Radiated Harmonic Measurements**

| Frequency (MHz) | Level (dBm) | AFCL (dB) | POL (H/V) | F/S (mV/m) | F/S (dBmV/m) | Margin (dB) |
|---|---|---|---|---|---|---|
| 4874 | -103.2 | 40.5 | V | 164.06 | 44.3 | - 9.7 |
| 7311 | -109.4 | 48.0 | V | 190.55 | 45.6 | - 8.4 |
| 9748 | -122.6 | 50.3 | V | 54.33 | 34.7 | - 19.3 |
| 12185 | -135 | 53.7 | V | 19.28 | 25.7 | - 28.3 |

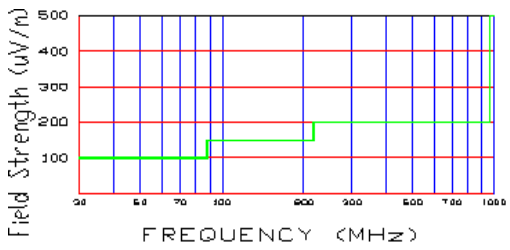



**Figure A-9. Restricted band harmonic & spurious limits.**

NOTES:

1. All harmonics in the restricted bands specified in §15.205 are below the limit shown in Table G-1. (Note: * = Restricted Band measured frequency)

2. All harmonics/spurs are at least 20 dB below the highest emission in the authorized band using RBW = 100kHz

3. Average Measurements > 1GHz using RBW = 1 MHz VBW = 10 Hz

4. The peak emissions above 1 GHz are not more than 20 dB above the average limit.

5. The antenna is manipulated through typical positions, polarity and length during the tests.

6. The EUT is supplied with nominal AC voltage or/and a new/fully-recharged battery.

7. The spectrum is measured from 9kHz to the 10th harmonic and the worst-case emissions are reported.

8. < - 135 are below the analyzer floor level.

9. The radiated limits are shown on Figure A-5. Above 1 GHz, the limit is 500 µV/m (54dBµ/m).

# EXHIBIT B – Test Results (Cont.)

## Radiated Harmonic Measurements (Cont.)

§15.247(b) / §15.205 & §15.209

Data Transfer Rate: 2 Mbps

Distance of Measurements: 3 Meters

Channel: 11

**Table A-10. Radiated Harmonic Measurements**

| Frequency (MHz) | Level (dBm) | AFCL (dB) | POL (H/V) | F/S (mV/m) | F/S (dBmV/m) | Margin (dB) |
|---|---|---|---|---|---|---|
| 4924 | -103.5 | 40.7 | V | 162.18 | 44.2 | - 9.8 |
| 7386 | -107.3 | 48.2 | V | 248.31 | 47.9 | - 6.1 |
| 9848 | -121.2 | 50.4 | V | 64.57 | 36.2 | - 17.8 |
| 12310 | -135.0 | 53.8 | V | 19.50 | 25.8 | - 28.2 |

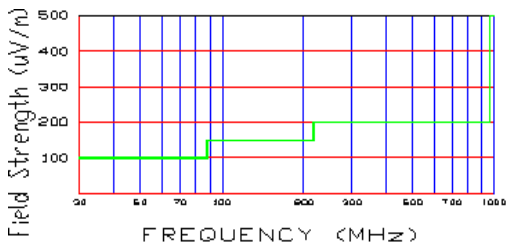



**Figure A-10. Restricted band harmonic & spurious limits.**

NOTES:

1. All harmonics in the restricted bands specified in §15.205 are below the limit shown in Table G-1. (Note: * = Restricted Band measured frequency)

2. All harmonics/spurs are at least 20 dB below the highest emission in the authorized band using RBW = 100kHz

3. Average Measurements > 1GHz using RBW = 1 MHz VBW = 10 Hz

4. The peak emissions above 1 GHz are not more than 20 dB above the average limit.

5. The antenna is manipulated through typical positions, polarity and length during the tests.

6. The EUT is supplied with nominal AC voltage or/and a new/fully-recharged battery.

7. The spectrum is measured from 9kHz to the 10th harmonic and the worst-case emissions are reported.

8. < - 135 are below the analyzer floor level.

9. The radiated limits are shown on Figure A-6. Above 1 GHz, the limit is 500 µV/m (54dBµ/m).

# EXHIBIT B – Test Results (Cont.)

## Radiated Harmonic Measurements (Cont.)

§15.247(b) / §15.205 & §15.209

Data Transfer Rate: 5.5 Mbps

Distance of Measurements: 3 Meters

Channel: 01

**Table A-11. Radiated Harmonic Measurements**

| Frequency (MHz) | Level (dBm) | AFCL (dB) | POL (H/V) | F/S (mV/m) | F/S (dBmV/m) | Margin (dB) |
|---|---|---|---|---|---|---|
| 4824 | -103.0 | 40.4 | V | 165.77 | 44.4 | - 9.6 |
| 7236 | -108.2 | 47.4 | V | 204.64 | 46.2 | - 7.8 |
| 9648 | -122.0 | 50.3 | V | 58.21 | 35.3 | - 18.7 |
| 12060 | -135.0 | 53.7 | V | 19.28 | 25.7 | - 28.3 |

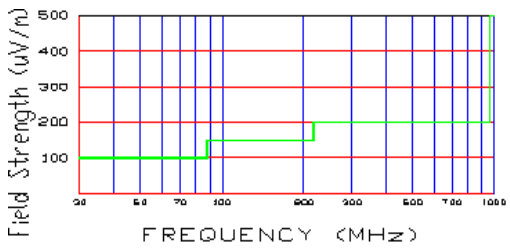



**Figure A-11. Restricted band harmonic & spurious limits.**

NOTES:

1. All harmonics in the restricted bands specified in §15.205 are below the limit shown in Table G-1. (Note: * = Restricted Band measured frequency)

2. All harmonics/spurs are at least 20 dB below the highest emission in the authorized band using RBW = 100kHz

3. Average Measurements > 1GHz using RBW = 1 MHz VBW = 10 Hz

4. The peak emissions above 1 GHz are not more than 20 dB above the average limit.

5. The antenna is manipulated through typical positions, polarity and length during the tests.

6. The EUT is supplied with nominal AC voltage or/and a new/fully-recharged battery.

7. The spectrum is measured from 9kHz to the 10th harmonic and the worst-case emissions are reported.

8. < - 135 are below the analyzer floor level.

9. The radiated limits are shown on Figure A-7. Above 1 GHz, the limit is 500 µV/m (54dBµ/m).

# EXHIBIT B – Test Results (Cont.)

## Radiated Harmonic Measurements (Cont.)

§15.247(b) / §15.205 & §15.209

Data Transfer Rate: 5.5 Mbps

Distance of Measurements: 3 Meters

Channel: 06

**Table A-12. Radiated Harmonic Measurements**

| Frequency (MHz) | Level (dBm) | AFCL (dB) | POL (H/V) | F/S (mV/m) | F/S (dBmV/m) | Margin (dB) |
|---|---|---|---|---|---|---|
| 4874 | -102.8 | 40.5 | V | 171.79 | 44.7 | - 9.3 |
| 7311 | -109.2 | 48.0 | V | 194.98 | 45.8 | - 8.2 |
| 9748 | -122.5 | 50.3 | V | 54.95 | 34.8 | - 19.2 |
| 12185 | -135.0 | 53.7 | V | 19.28 | 25.7 | - 28.3 |

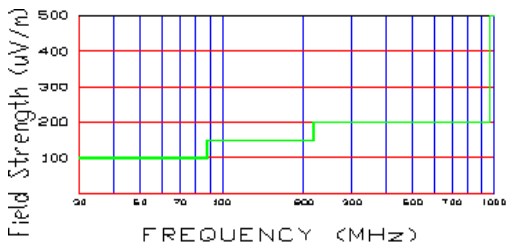



**Figure A-12. Restricted band harmonic & spurious limits.**

NOTES:

1. All harmonics in the restricted bands specified in §15.205 are below the limit shown in Table G-1. (Note: * = Restricted Band measured frequency)

2. All harmonics/spurs are at least 20 dB below the highest emission in the authorized band using RBW = 100kHz

3. Average Measurements > 1GHz using RBW = 1 MHz VBW = 10 Hz

4. The peak emissions above 1 GHz are not more than 20 dB above the average limit.

5. The antenna is manipulated through typical positions, polarity and length during the tests.

6. The EUT is supplied with nominal AC voltage or/and a new/fully-recharged battery.

7. The spectrum is measured from 9kHz to the 10th harmonic and the worst-case emissions are reported.

8. < - 135 are below the analyzer floor level.

9. The radiated limits are shown on Figure A-8. Above 1 GHz, the limit is 500 µV/m (54dBµ/m).

# EXHIBIT B – Test Results (Cont.)

## Radiated Harmonic Measurements (Cont.)

§15.247(b) / §15.205 & §15.209

Data Transfer Rate: 5.5 Mbps

Distance of Measurements: 3 Meters

Channel: 11

**Table A-13. Radiated Harmonic Measurements**

| Frequency (MHz) | Level (dBm) | AFCL (dB) | POL (H/V) | F/S (mV/m) | F/S (dBmV/m) | Margin (dB) |
|---|---|---|---|---|---|---|
| 4924 | -103.3 | 40.7 | V | 165.96 | 44.4 | - 9.6 |
| 7386 | -107.0 | 48.2 | V | 257.04 | 48.2 | - 5.8 |
| 9848 | -121.7 | 50.4 | V | 60.95 | 35.7 | - 18.3 |
| 12310 | -135.0 | 53.8 | V | 19.50 | 25.8 | - 28.2 |

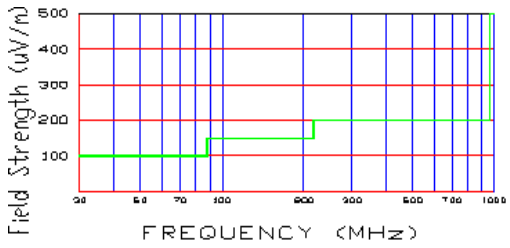



**Figure A-13. Restricted band harmonic & spurious limits.**

NOTES:

1. All harmonics in the restricted bands specified in §15.205 are below the limit shown in Table G-1. (Note: * = Restricted Band measured frequency)

2. All harmonics/spurs are at least 20 dB below the highest emission in the authorized band using RBW = 100kHz

3. Average Measurements > 1GHz using RBW = 1 MHz VBW = 10 Hz

4. The peak emissions above 1 GHz are not more than 20 dB above the average limit.

5. The antenna is manipulated through typical positions, polarity and length during the tests.

6. The EUT is supplied with nominal AC voltage or/and a new/fully-recharged battery.

7. The spectrum is measured from 9kHz to the 10th harmonic and the worst-case emissions are reported.

8. < - 135 are below the analyzer floor level.

9. The radiated limits are shown on Figure A-9. Above 1 GHz, the limit is 500 µV/m (54dBµ/m).

# EXHIBIT B – Test Results (Cont.)

## Radiated Harmonic Measurements (Cont.)

§15.247(b) / §15.205 & §15.209

Data Transfer Rate: 11 Mbps

Distance of Measurements: 3 Meters

Channel: 01

**Table A-14. Radiated Harmonic Measurements**

| Frequency (MHz) | Level (dBm) | AFCL (dB) | POL (H/V) | F/S (mV/m) | F/S (dBmV/m) | Margin (dB) |
|---|---|---|---|---|---|---|
| 4824 | -102.8 | 40.4 | V | 169.63 | 44.6 | - 9.4 |
| 7236 | -108.0 | 47.4 | V | 209.41 | 46.4 | - 7.6 |
| 9648 | -121.5 | 50.3 | V | 61.66 | 35.8 | - 18.2 |
| 12060 | -135.0 | 53.7 | V | 19.28 | 25.7 | - 28.3 |

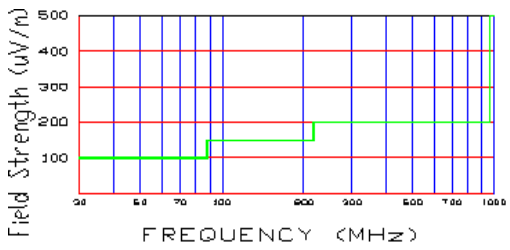



**Figure A-14. Restricted band harmonic & spurious limits.**

NOTES:

1. All harmonics in the restricted bands specified in §15.205 are below the limit shown in Table G-1. (Note: * = Restricted Band measured frequency)

2. All harmonics/spurs are at least 20 dB below the highest emission in the authorized band using RBW = 100kHz

3. Average Measurements > 1GHz using RBW = 1 MHz VBW = 10 Hz

4. The peak emissions above 1 GHz are not more than 20 dB above the average limit.

5. The antenna is manipulated through typical positions, polarity and length during the tests.

6. The EUT is supplied with nominal AC voltage or/and a new/fully-recharged battery.

7. The spectrum is measured from 9kHz to the 10th harmonic and the worst-case emissions are reported.

8. < - 135 are below the analyzer floor level.

9. The radiated limits are shown on Figure A-10. Above 1 GHz, the limit is 500 µV/m (54dBµ/m).

# EXHIBIT B – Test Results (Cont.)

## Radiated Harmonic Measurements (Cont.)

§15.247(b) / §15.205 & §15.209

Data Transfer Rate: 11 Mbps

Distance of Measurements: 3 Meters

Channel: 06

**Table A-15. Radiated Harmonic Measurements**

| Frequency (MHz) | Level (dBm) | AFCL (dB) | POL (H/V) | F/S (mV/m) | F/S (dBmV/m) | Margin (dB) |
|---|---|---|---|---|---|---|
| 4874 | -102.4 | 40.5 | V | 179.89 | 45.1 | - 8.9 |
| 7311 | -109.0 | 48.0 | V | 199.53 | 46.0 | - 8.0 |
| 9748 | -122.3 | 50.3 | V | 56.23 | 35.0 | - 19.0 |
| 12185 | -135.0 | 53.7 | V | 19.28 | 25.7 | - 28.3 |

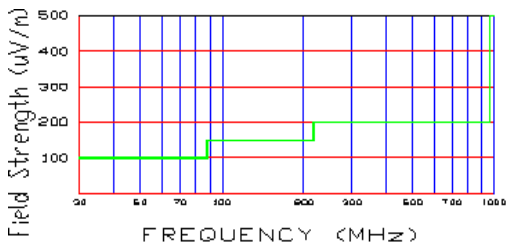



**Figure A-15. Restricted band harmonic & spurious limits.**

NOTES:

1. All harmonics in the restricted bands specified in §15.205 are below the limit shown in Table G-1. (Note: * = Restricted Band measured frequency)

2. All harmonics/spurs are at least 20 dB below the highest emission in the authorized band using RBW = 100kHz

3. Average Measurements > 1GHz using RBW = 1 MHz VBW = 10 Hz

4. The peak emissions above 1 GHz are not more than 20 dB above the average limit.

5. The antenna is manipulated through typical positions, polarity and length during the tests.

6. The EUT is supplied with nominal AC voltage or/and a new/fully-recharged battery.

7. The spectrum is measured from 9kHz to the 10th harmonic and the worst-case emissions are reported.

8. < - 135 are below the analyzer floor level.

9. The radiated limits are shown on Figure A-11. Above 1 GHz, the limit is 500 μV/m (54dBμ/m).

# EXHIBIT B – Test Results (Cont.)

## Radiated Harmonic Measurements (Cont.)

§15.247(b) / §15.205 & §15.209

Data Transfer Rate: 11 Mbps

Distance of Measurements: 3 Meters

Channel: 11

**Table A-16. Radiated Harmonic Measurements**

| Frequency (MHz) | Level (dBm) | AFCL (dB) | POL (H/V) | F/S (mV/m) | F/S (dBmV/m) | Margin (dB) |
|---|---|---|---|---|---|---|
| 4924 | -103.2 | 40.7 | V | 167.88 | 44.5 | - 9.5 |
| 7386 | -107.1 | 48.2 | V | 254.10 | 48.1 | - 5.9 |
| 9848 | -121.5 | 50.4 | V | 62.37 | 35.9 | - 18.1 |
| 12310 | -135.0 | 53.8 | V | 19.50 | 25.8 | - 28.2 |

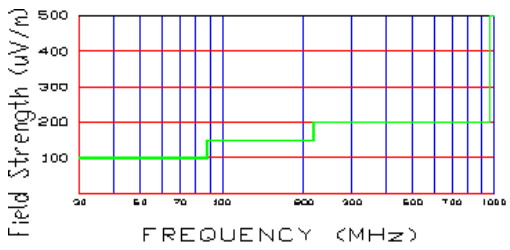



**Figure A-16. Restricted band harmonic & spurious limits.**

NOTES:

1. All harmonics in the restricted bands specified in §15.205 are below the limit shown in Table G-1. (Note: * = Restricted Band measured frequency)

2. All harmonics/spurs are at least 20 dB below the highest emission in the authorized band using RBW = 100kHz

3. Average Measurements > 1GHz using RBW = 1 MHz VBW = 10 Hz

4. The peak emissions above 1 GHz are not more than 20 dB above the average limit.

5. The antenna is manipulated through typical positions, polarity and length during the tests.

6. The EUT is supplied with nominal AC voltage or/and a new/fully-recharged battery.

7. The spectrum is measured from 9kHz to the 10th harmonic and the worst-case emissions are reported.

8. < - 135 are below the analyzer floor level.

9. The radiated limits are shown on Figure A-12. Above 1 GHz, the limit is 500 µV/m (54dBµ/m).

# EXHIBIT B – Test Results (Cont.)

## Radiated Spurious Measurements

§15.205 / §15.209

Data Transfer Rate: 11 Mbps

Distance of Measurements: 3 Meters

**Table A-17. Radiated Measurements at 3-meters**

| FREQ (MHz) | Level (dBm) | AFCL (dB) | POL (H/V) | Height (m) | Azimuth (° angle) | F/S (uV/M) | Margin (dB) |
|---|---|---|---|---|---|---|---|
| 119.9 | -81.7 | 11.5 | V | 2.3 | 90 | 69.2 | -6.7 |
| 140.0 | -82.5 | 13.0 | H | 2.2 | 180 | 75.0 | -6.0 |
| 240.0 | -85.5 | 18.3 | V | 1.8 | 70 | 97.8 | -6.2 |
| 260.0 | -87.5 | 19.2 | V | 1.8 | 90 | 86.1 | -7.3 |
| 320.0 | -86.5 | 21.3 | V | 1.3 | 210 | 123.1 | -4.2 |
| 419.9 | -90.0 | 24.2 | V | 1.1 | 180 | 114.9 | -4.8 |

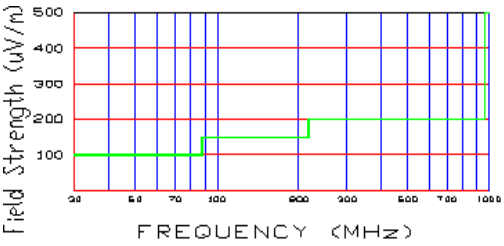



**Figure A-17. Limits at 3 meters**

NOTES:

1. All emissions were investigated and the worst-case emissions are reported.

2. For hand-held devices, the EUT is rotated through three orthogonal axes to determine which configuration produces the maximum emissions.

3. The EUT is supplied with the minimal AC voltage or/and a new/fully re-charged battery.

4. The EUT was tested up to the 10th harmonic (2.5GHz) and no significant emission was found.

5. The radiated limits are shown on Figure A-13. Above 1 GHz the limit is 500µV/m.

# EXHIBIT B – Test Results (Cont.)

## Radiated Restricted Band Measurements

§15.205 / §15.209

Special attention is made for the EUT's harmonic and spurious radiated emission in the restricted bands of operations. The EUT was tested from 9kHz and up to the tenth harmonic of the fundamental frequency of the transmitter using CISPR quasi peak detector below 1GHZ. Above 1 GHz, average measurement was used, using RBW 1MHz – VBW 10Hz and linearly polarized horn antennas. All harmonics/spurs are at least 20dB below the highest emission in the authorized band using RBW = 100kHz. In addition, peak measurements were taken to ensure that the peak levels are not more than 20dB above the average limit. All out of band emissions, other than those created by the spreading sequence, data sequence, and the carrier modulation must not exceed the limits show in Table G-1 per Section 15.209.

**Table A-18. Restricted Band Limits**

| Frequency | F/S (μV/m) | Measured Distance (Meters) |
|---|---|---|
| 0.009 – 0.490 MHz | 2400/F (kHz) | 300 |
| 0.490 – 1.705 MHz | 24000/F (kHz) | 30 |
| 1.705 – 30.00 MHz | 30 | 30 |
| 30.00 – 88.00 MHz | 100 | 3 |
| 88.00 – 216.0 MHz | 150 | 3 |
| 216.0 – 960.0 MHz | 200 | 3 |
| Above 960.0 MHz | 500 | 3 |

### TEST MEASUREMENT EQUIPMENT

| | |
|---|---|
| HP 8562A | Spectrum Analyzer 50GHz |
| HP 8566B | Spectrum Analyzer 100Hz – 22GHz |
| HP 83017A | Microwave Analyzer 40dB Gain (0.5 – 26.5GHz) |
| HP 3784A | Digital Transmission Analyzer |
| EMCO 3115 | Horn Antenna (1 – 18GHz) |
| HP 8495A | 20dB Attenuator (DC-40GHz) 0 –70dB |
| HP 8493B | 10dB Attenuator |
| MicroCoax Cables | Low Loss Microwave Cables (1 – 26.5GHz) |
| CDI Dipoles | Dipole Antennas (30 – 1000MHz) |
| EMCO 3116 | Horn Antenna (18 – 40GHz) |

## EXHIBIT B – Test Results (Cont.)

## Radiated Restricted Band Measurements (Cont.)

§15.205 /§15.209

| | |
|---|---|
| Data Transfer Rate: | 11 Mbps |
| Operating Frequency: | 2483.5 MHz |
| Distance of Measurements: | 3 Meters |

**Table A-19. Radiated Restricted Band Measurements at 3-meters**

| Frequency (MHz) | Level (dBm) | AFCL (dB) | POL (H/V) | F/S (mV/m) | F/S (dBmV/m) | Margin (dB) |
|---|---|---|---|---|---|---|
| 2483.9 | -99.5 | 33.0 | V | 105.93 | 40.5 | -13.5 |
| 2484.0 | -100.6 | 33.0 | V | 93.33 | 39.4 | -14.6 |
| 2484.9 | -106.3 | 33.1 | V | 48.98 | 33.8 | -20.2 |
| 2485.2 | -114.3 | 33.1 | V | 19.50 | 25.8 | -28.2 |
| 2490.7 | -113.5 | 33.2 | V | 21.63 | 26.7 | -27.3 |
| 2492.1 | -112.9 | 33.2 | V | 23.17 | 27.3 | -26.7 |

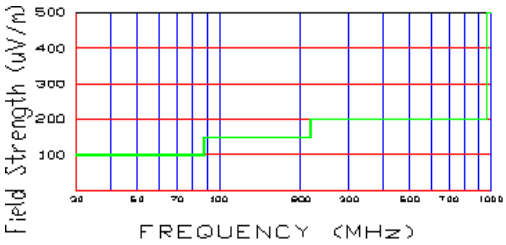



**Figure A-18. Limits at 3 meters**

NOTES:

1. The antenna is manipulated through typical positions, polarity and length during the testing.

2. The EUT is supplied with the minimal AC voltage or/and a new/fully re-charged battery.

3. The spectrum is measured from 9kHz up to the 10th harmonic and the worst-case emissions are reported.

4. The radiated limits are shown on Figure A-14. Above 1 GHz the limit is 500µV/m.

5. < -135dBm is below the analyzer measurement floor level.

# EXHIBIT C – Test Setup Photographs

# EXHIBIT D – EUT External/Internal Photographs

# EXHIBIT E – MPE Report

# EXHIBIT F – User's Manual

# EXHIBIT G – Original Grant Copy