PCTEST ENGINEERING LABORATORY, INC.
6660-B Dobbin Road, Columbia, MD 21045 USA
Tel. 410.290.6652 / Fax 410.290.6554
http://www.pctestlab.com

# CERTIFICATE OF COMPLIANCE
## FCC PART 15.247 Certification

**Applicant Name:**
OPTOELECTRONICS CO., LTD.
5-5-3 Tsukagoshi Warabi-Shi
Saitama Pref. 335-0002
Japan

**Date of Testing:**
January 2-4, 2007
**Test Site/Location:**
PCTEST Lab, Columbia, MD, USA
**Test Report Serial No.:**
0612191133

| | |
|---|---|
| **FCC ID:** | **UFOOPL7734** |
| **APPLICANT:** | **OPTOELECTRONICS CO., LTD.** |

| | |
|---|---|
| **Model(s):** | OPL-7734 |
| **EUT Type:** | Wireless Barcode Scanner |
| **Max. RF Output Power:** | 0.748mW (-1.26 dBm) Conducted |
| **Frequency Range:** | 2405 – 2480 MHz |
| **FCC Classification:** | Digital Transmission System (DTS) – (Zigbee – 802.15.4) |
| **FCC Rule Part(s):** | Part 15.247 |
| **Test Device Serial No.:** | N/A |

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-63.4-2003.

I 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.

*Grant Conditions: Listed output power is conducted.*

*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.*

Randy Ortanez
President

ACCREDITED
CERTIFICATE #2041.01

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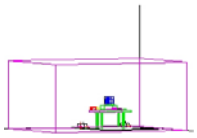


# MEASUREMENT REPORT

## FCC Part 15.247

## A. § 2.1033 General Information

| | |
|---|---|
| **APPLICANT:** | OPTOELECTRONICS CO., LTD. |
| **APPLICANT ADDRESS:** | 5-5-3 Tsukagoshi Warabi-Shi |
| | Saitama Pref. 335-0002, Japan |
| **TEST SITE:** | PCTEST ENGINEERING LABORATORY, INC. |
| **TEST SITE ADDRESS:** | 6660-B Dobbin Road, Columbia, MD 21045 USA |
| **FCC RULE PART(S):** | Part 15.247 |
| **MODEL NAME:** | OPL-7734 |
| **FCC ID:** | UFOOPL7734 |
| **Test Device Serial No.:** | N/A ☐ Production ☒ Pre-Production ☐ Engineering |
| **FCC CLASSIFICATION:** | Digital Transmission System (DTS) |
| **DATE(S) OF TEST:** | January 2-4, 2007 |
| **TEST REPORT S/N:** | 0612191133 |

## A.1 Test Facility / Accreditations

**Measurements were performed at PCTEST Engineering Lab located 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 and has met all the requirements specified in Section 2.948 of the FCC Rules and Industry Canada (IC-2451).
- PCTEST Lab is accredited to ISO 17025 by U.S. National Institute of Standards and Technology (NIST) under the National Voluntary Laboratory Accreditation Program (NVLAP Lab code: 100431-0) in EMC, FCC and Telecommunications.
- PCTEST Lab is accredited to ISO 17025-2005 by the American Association for Laboratory Accreditation (A2LA) in Specific Absorption Rate (SAR) testing, Hearing Aid Compatibility (HAC) testing, CTIA Test Plans, and wireless testing for FCC and Industry Canada Rules.

- 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) in all scopes of FCC Rules and Industry Canada Standards (RSS).
- PCTEST facility is an IC registered (IC-2451) test laboratory with the site description on file at Industry Canada.
- PCTEST is a CTIA Authorized Test Laboratory (CATL) for AMPS, CDMA, and EvDO wireless devices and for Over-the-Air (OTA) Antenna Performance testing for AMPS, CDMA, GSM, GPRS, EGPRS, UMTS (W-CDMA), CDMA 1xEVDO, and CDMA 1xRTT.

# 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 C63.4-2003) and FCC Public Notice dated March 23, 2005 entitled "Measurements of Digital Transmission Systems Operating Under Section 15.247" were used in the measurement of the **Wireless Barcode Scanner FCC ID: UFOOPL7734.**

**Deviation from measurement procedure…….....NONE**

## 1.2 Scope

Measurement and 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 1.3-1).

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 C63.4-2003 on January 27, 2006 and Industry Canada.

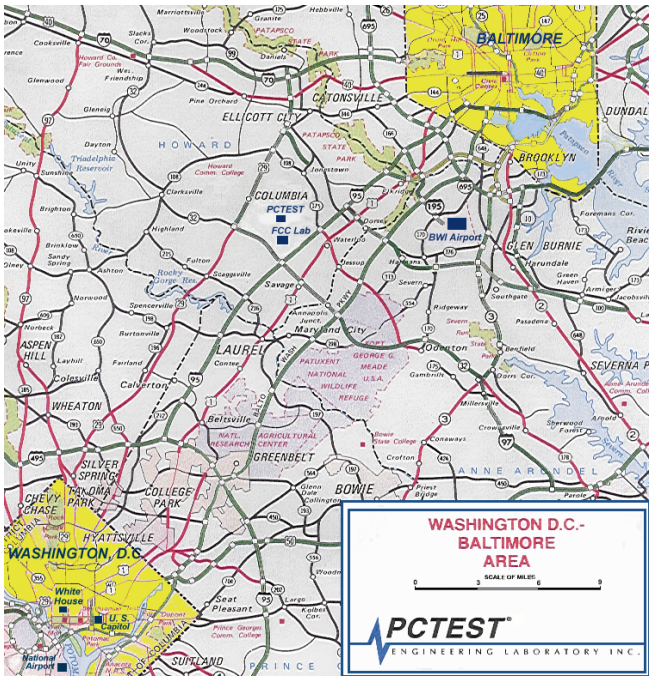



**Figure 1.3-1. Map of the Greater Baltimore and Metropolitan Washington, D.C. area**

# 2.0 PRODUCT INFORMATION

## 2.1 Equipment Description

The Equipment Under Test (EUT) is the Optoelectronics Co., Ltd. Wireless Barcode Scanner **FCC ID: UFOOPL7734**. The unit is powered from an internal rechargeable battery. Recharging occurs when the unit is placed in the cradle (separate certification). The EUT consisted of the following components(s):

| Manufacturer / Description | FCC ID | Serial Number |
|---|---|---|
| Wireless Barcode Scanner (EUT) | UFOOPL7734 | N/A |
| Cradle for Wireless Barcode Scanner | UFOCRD7734 | N/A |

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

The Wireless Barcode Scanner utilizes 802.15.4 ZigBee technology which operates on channels 11 – 26 from 2405 to 2480MHz as shown in the following table.

| Ch. | Frequency (MHz) | Ch. | Frequency (MHz) |
|---|---|---|---|
| 11 | 2405 | 19 | 2445 |
| 12 | 2410 | 20 | 2450 |
| 13 | 2415 | 21 | 2455 |
| 14 | 2420 | 22 | 2460 |
| 15 | 2425 | 23 | 2465 |
| 16 | 2430 | 24 | 2470 |
| 17 | 2435 | 25 | 2475 |
| 18 | 2440 | 26 | 2480 |

**Table 2.1 Frequency/ Channel Operations**

## 2.2 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

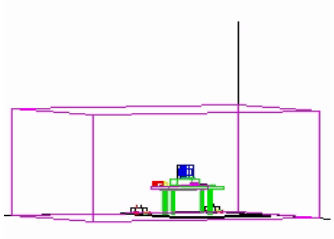


**Figure 3.1-1. Shielded Enclosure Line-Conducted Test Facility**

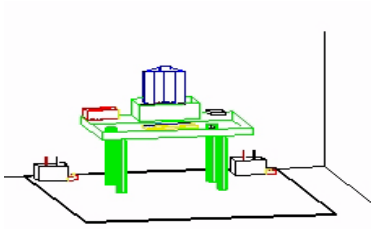


**Figure 3.1-2. Line Conducted Emission Test Set-Up**

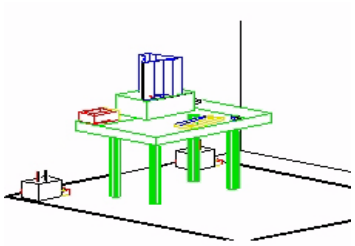


**Figure 3.1-3. Wooden Table & Bonded LISNs**

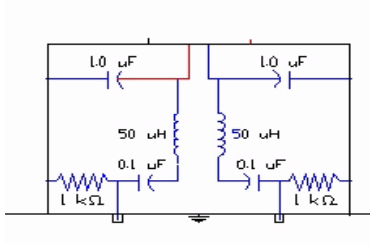



**Figure 3.1-4. LISN Schematic Diagram**

The line-conducted facility is located inside a 16'x20'x10' shielded enclosure, 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 filter (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 to a 1 meter length by non-inductive bundling (serpentine fashion). 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 spectrum analyzer. The detector function was set to CISPR quasi-peak and average mode. The bandwidth of the analyzer 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 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; whichever determined the worst-case emission. Photographs of the worst-case emission can be seen in Exhibit B. Each EME reported was calibrated using the Agilent E8257D (250kHz – 20GHz) PSG Signal Generator.

## 3.2 Radiated Emissions

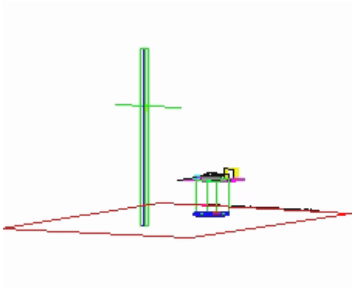


**Figure 3.2-1. 3-Meter Test Site**

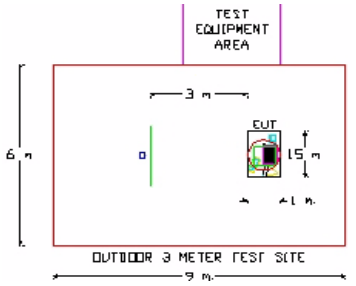



**Figure 3.2-2. Dimensions of Outdoor Test Site**

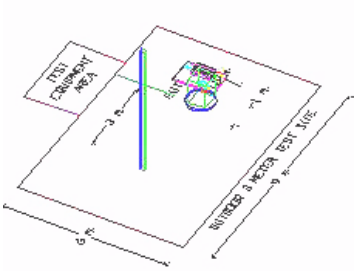


**Figure 3.2-3. Turntable and System Setup**

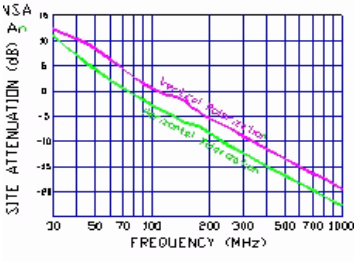



**Figure 3.2-4. Normalized Site Attenuation Curves (H&V)**

Preliminary measurements were made indoors at 1-meter using broadband antennas, broadband amplifiers, and spectrum analyzers 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, and turntable azimuth with respect to the antenna was noted for each frequency found. The spectrum was scanned from 30 to 200 MHz using a bi-conical antenna and from 200 to 1000 MHz using a log-spiral antenna. Above 1 GHz, linearly polarized double ridge horn antennas were used.

Final measurements were made outdoors at 3-meter test range using Roberts™ Dipole antennas or horn antennas (*see Figure 3.2-1*). The test equipment was placed on a wooden and plastic bench situated on a 1.5m x 2m 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. The detector function was set to CISPR quasi-peak mode and the bandwidth of the spectrum analyzer was set to 100kHz for frequencies below 1GHz or 1MHz for frequencies above 1GHz. Above 1GHz the detector function was set to 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 and the height of the receive antenna was varied 1 to 4 meters and stopped at the azimuth and 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 B. Each EME reported was calibrated using the Agilent E8257D (250kHz – 20GHz) PSG 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

**Excerpt from §15.203 of the FCC Rules/Regulations:**
"An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party 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 the provisions of this section."

- The antenna(s) of the Wireless Barcode Scanner are **permanently attached.**
- There are no provisions for connection to an external antenna..

**Conclusion:**

The **Wireless Barcode Scanner FCC ID: UFOOPL7734** 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).

| Manufacturer | Model / Equipment | Calibration Date | Cal Inerval | Calibration Due | Serial No. |
|---|---|---|---|---|---|
| Agilent | E4404B/E4407B ESA Spectrum Analyzer | 04/20/06 | Annual | 04/20/07 | US39210313 |
| Agilent | N4010A Wireless Connectivity Test Set | 06/11/06 | Annual | 06/11/07 | GB46170464 |
| EMCO | Model 3115 (1-18GHz) Horn Antenna | 08/24/06 | Biennial | 08/23/08 | 9203-2178 |
| EMCO | Model 3115 (1-18GHz) Horn Antenna | 08/25/06 | Biennial | 08/24/08 | 9704-5182 |
| Gigatronics | 8657A Universal Power Meter | 04/07/06 | Annual | 04/07/07 | 8650319 |
| Gigatronics | 80701A (0.05-18GHz) Power Sensor | 04/11/06 | Annual | 04/11/07 | 1833460 |
| Rohde & Schwarz | NRVS Power Meter | 06/01/05 | Biennial | 06/01/07 | 835360/079 |
| Rohde & Schwarz | NRV-Z53 Power Sensor | 06/01/05 | Biennial | 06/01/07 | 846076/007 |
| Agilent | HP 8566B (100Hz–22GHz) | 12/21/06 | Annual | 12/21/07 | 3638A08713 |
| Agilent | HP 8591A (9kHz-1.8GHz) | 09/20/06 | Annual | 09/20/07 | 3144A02458 |
| Agilent | E4448A (3Hz-50GHz) | 09/22/06 | Annual | 09/22/07 | US42510244 |
| Agilent | E8257D (250kHz-20GHz) Signal Generator | 02/11/06 | Annual | 02/11/07 | MY45470194 |
| Agilent | E8257D (250kHz-20GHz) Signal Generator | 03/30/06 | Annual | 03/30/07 | MY44320964 |
| Gigatronics | 8651A (50MHz-18GHz) | 07/28/06 | Annual | 07/28/07 | 1834052 |
| Gigatronics | 80701A (0.05-18GHz) Power Sensor | 08/04/06 | Annual | 08/04/07 | 1835299 |
| Ailtech/Eaton | NM 37/57A (30MHz-1GHz) | 06/07/06 | Annual | 06/07/07 | 0805-03334 |
| Agilent | HP 85650A Quasi-Peak Adapter | 12/21/06 | Annual | 12/21/07 | 2043A00301 |
| Agilent | HP 8449B (1-26.5GHz) Pre-Amplifier | 12/12/06 | Annual | 12/12/07 | 3008A00985 |
| Agilent | HP 11713A Attenuation/Switch Driver | 12/12/06 | Annual | 12/12/07 | N/A |
| Agilent | HP 85685A (20Hz-2GHz) Preselector | 12/12/06 | Annual | 12/12/07 | N/A |
| Agilent | HP 8566B Opt. 462 Impulse Bandwidth | 12/12/06 | Annual | 12/12/07 | 3701A22204 |
| EMCO | 3115 (1-18GHz) Horn Antenna | 04/04/05 | Biennial | 04/04/07 | 9205-3874 |
| Compliance Design | A100 Roberts Dipoles | 08/31/05 | Biennial | 08/31/07 | 5118 |
| EMCO | Dipole Pair | 09/21/06 | Biennial | 09/20/08 | 23951 |
| SOLAR | 8012-50 LISN (2) | 11/18/05 | Biennial | 11/18/07 | 0313233, 0310234 |
| - | No.165 (30MHz - 1000MHz) RG58 Coax Cable | N/A | | N/A | N/A |
| - | No.166 (1000-26500MHz) Microwave RF Cable | N/A | | N/A | N/A |
| - | No.167 (100kHz - 100MHz) RG58 Coax Cable | N/A | | N/A | N/A |

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

# 6.0 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. The device is a ZigBee device and operates with only one fixed data rate as shown in the following table.

Method/System: Digital Transmission System (DTS)

Data Rate(s) Tested: 250kbps (ZigBee)

| FCC Part Section(s) | RSS 210 Section | Test Description | Test Limit | Test Condition | Test Result |
|---|---|---|---|---|---|
| **TRANSMITTER MODE (TX)** | | | | | |
| 15.247(a)(2) | RSS-210 [A8.2 (1)] | 6dB Bandwidth | > 500kHz | Conducted | PASS |
| 15.247(b)(3) | RSS-210 [A8.4 (4)] | Transmitter Output Power | < 1 Watt | | PASS |
| 15.247(e) | RSS-210 [A8.2 (2)] | Transmitter Power Spectral Density | < 8dBm / 3kHz Band | | PASS |
| 15.247(d) | RSS-210 [A8.5] | Occupied Band Width<br>Out-of-Band Emissions (Band Width at 20dB below) | Radiated <20dBc. Emissions in restricted bands must meet the radiated limits detailed in 15.209 | Radiated (30MHz-1GHz) (1-25 GHz) | PASS |
| 15.205<br>15.209 | RSS-210 [A8.5] | 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 15.209 | | PASS |
| 15.207 | RSS-Gen [7.2.2 ] | AC Conducted Emissions 150kHz – 30MHz | < FCC 15.207 limits or<br>< RSS-Gen table 2 limits | Line Conducted | N/A |
| **RECEIVER MODE (RX)** | | | | | |
| 15.107 | RSS-Gen [7.2.2 ] | AC Conducted Emissions 150kHz – 30MHz | < FCC 15.207 limits or<br>< RSS-Gen table 2 limits | Line Conducted | PASS |
| 15.109 | RSS-Gen [7.2.3.2] | General Field Strength Limits (Restricted Bands and Radiated Emissions Limits) | < FCC 15.209 limits or<br>< RSS-210 table 3 limits | Radiated (30MHz-1GHz) (1-25 GHz) | PASS |
| **RF EXPOSURE (SAR or MPE)** | | | | | |
| 2.1093/2.1091 | RSS-102 | SAR Test or MPE | 1.6 W/kg (SAR)<br>1 mW/cm² (MPE) | 3 Channels | N/A |

**Table 6-1. Summary of Test Results**

## 6.1 6dB Bandwidth Measurement – DTS (802.15.4)

**§15.247(a)(2); RSS-210(A8.2 (1))**

The bandwidth at 6dB down from the highest in-band spectral density is measured with a spectrum analyzer connected to the receive antenna while the EUT is operating in transmission mode at the appropriate frequencies. ***The minimum permissible 6dB bandwidth is 500 kHz.***

| Frequency [MHz] | Channel No. | Measured Bandwidth [MHz] | Minimum Bandwidth [MHz] | Pass / Fail |
|---|---|---|---|---|
| 2405 | 11 | 1.625 | 0.500 | Pass |
| 2440 | 18 | 1.65 | 0.500 | Pass |
| 2480 | 26 | 1.617 | 0.500 | Pass |

**Table 6-2. Conducted Bandwidth Measurements, 802.15.4 (ZigBee)**

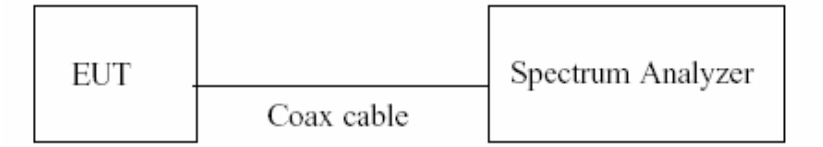
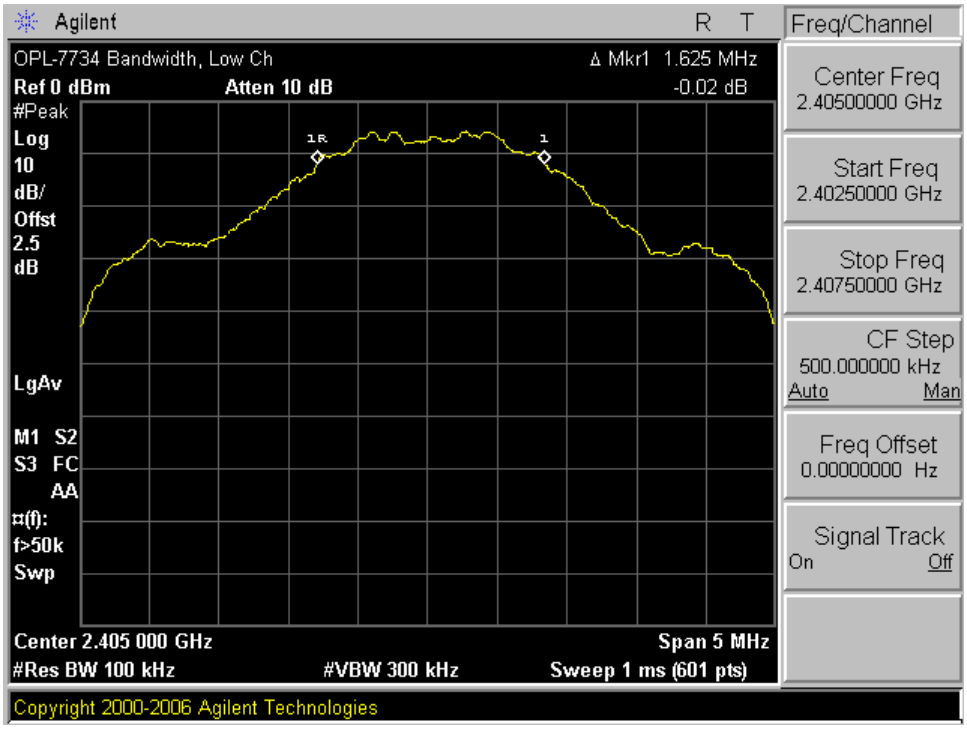
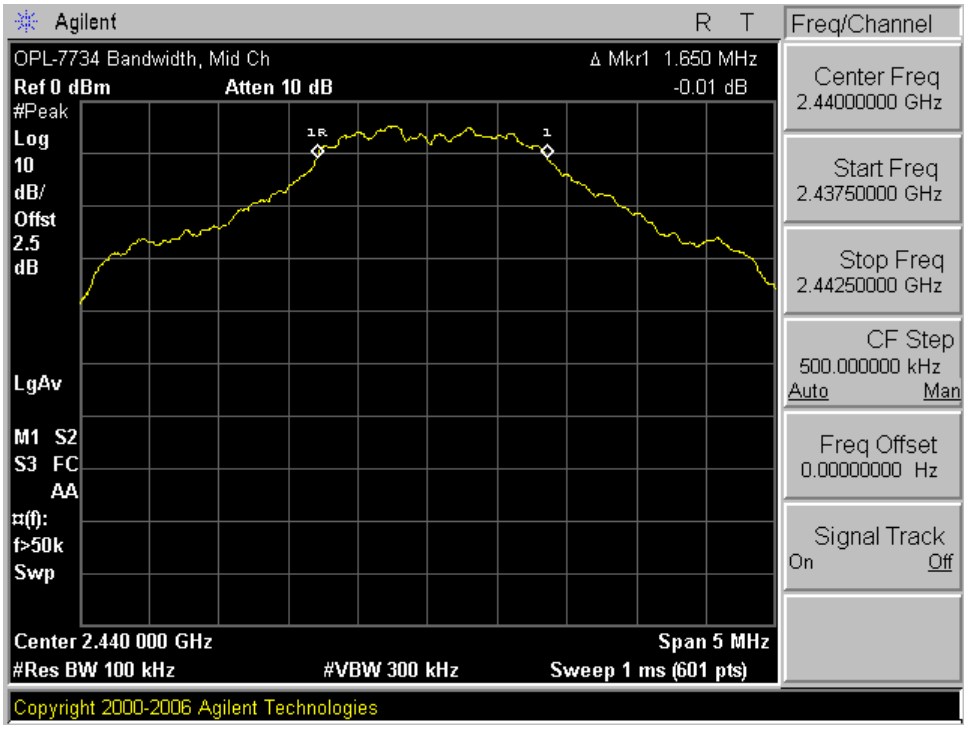


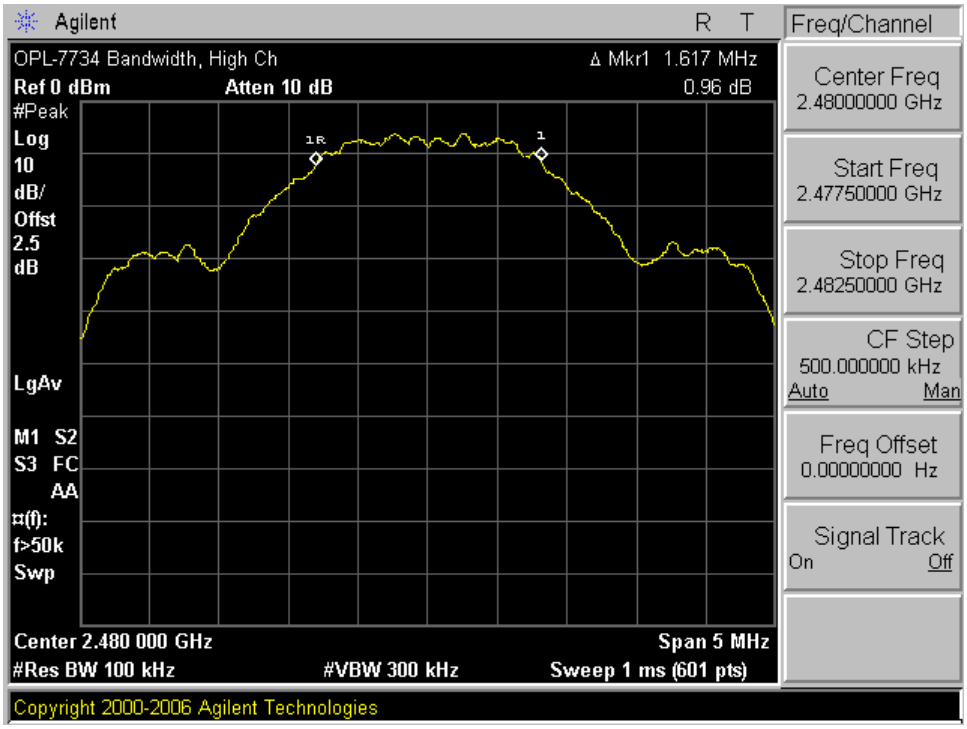

**Figure 6-1. Test Instrument & Measurement Setup**




**Plot 6-1. 6dB Bandwidth Plot (802.15.4 – Ch. 11)**




**Plot 6-2. 6dB Bandwidth Plot (802.15.4 – Ch. 18)**




**Plot 6-3. 6dB Bandwidth Plot (802.15.4 – Ch. 26)**

## 6.2 Output Power Measurement – 802.15.4

**§15.247(b)(3); RSS-210(A8.4 (4))**

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. ***The maximum permissible conducted output power is 1 Watt.***

| Frequency [MHz] | Channel No. | FCC Limit (dBm) | Conducted Peak Power | |
|---|---|---|---|---|
| | | | [dBm] | [mW] |
| 2405 | 11 | 30 | -1.26 | 0.748 |
| 2440 | 18 | 30 | -1.92 | 0.643 |
| 2480 | 26 | 30 | -2.39 | 0.577 |

**Table 6-3. Output Power Measurements**

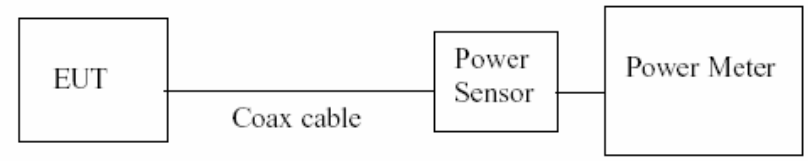



**Figure 6-2. Test Instrument & Measurement Setup**

## 6.3 Power Spectral Density (802.15.4)

**§15.247(e); RSS-210(A8.2 (2))**

The peak power density is measured with a spectrum analyzer connected to the antenna terminal while the EUT is operating in transmission mode at the appropriate frequencies. ***The maximum permissible power spectral density is 8 dBm in any 3 kHz band.***

| Frequency [MHz] | Channel No. | Measured Power Spectral Density [dBm] | Maximum Permissible Power Density [dBm / 3kHz] | Margin [dB] |
|---|---|---|---|---|
| 2405 | 11 | -16.840 | 8.0 | -24.8 |
| 2440 | 18 | -15.690 | 8.0 | -23.7 |
| 2480 | 26 | -16.720 | 8.0 | -24.7 |

**Table 6-5. Conducted Power Density Measurements**

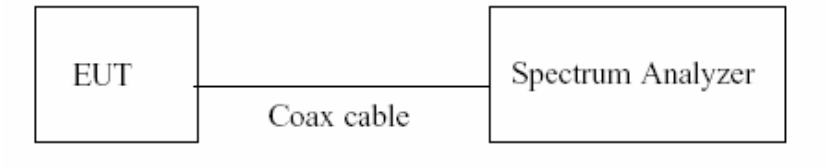
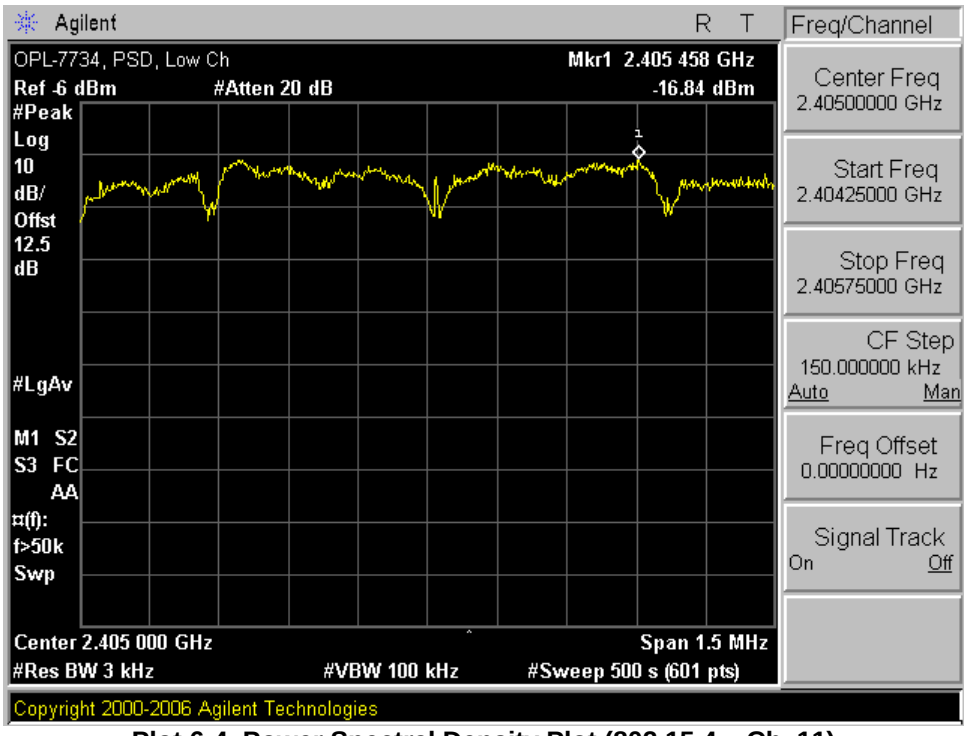
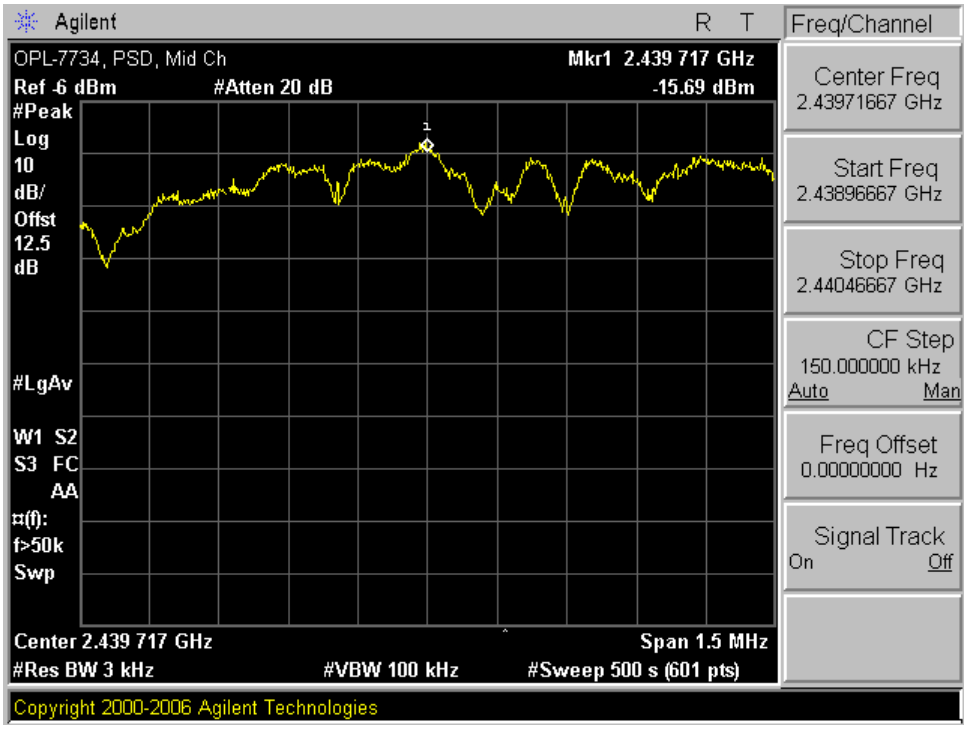


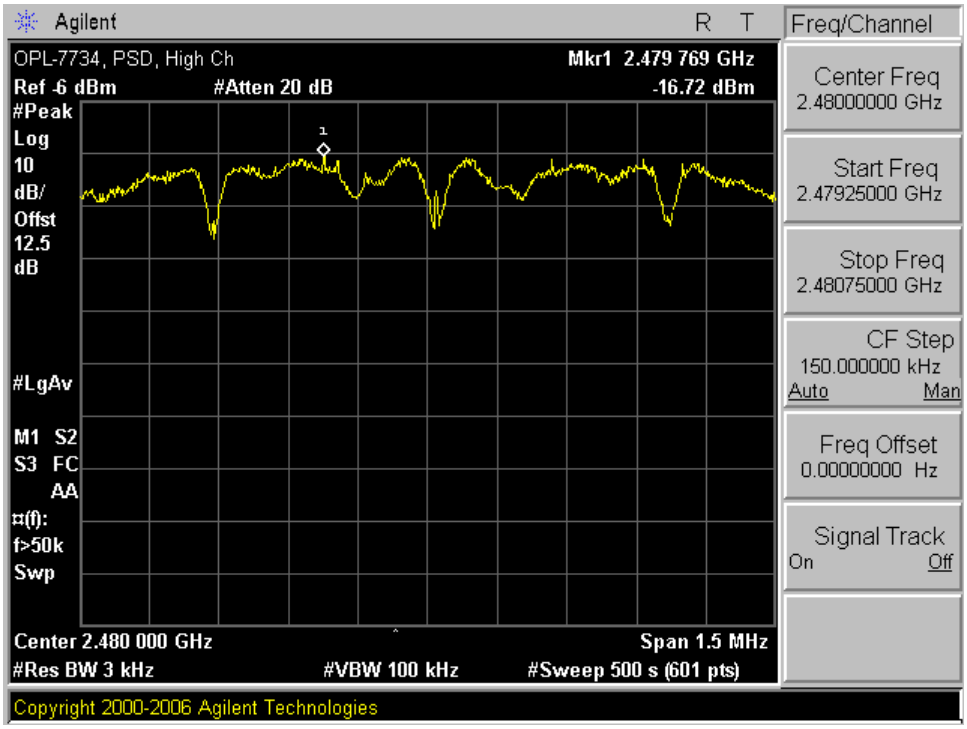

**Figure 6-4. Test Instrument & Measurement Setup**




**Plot 6-4. Power Spectral Density Plot (802.15.4 – Ch. 11)**



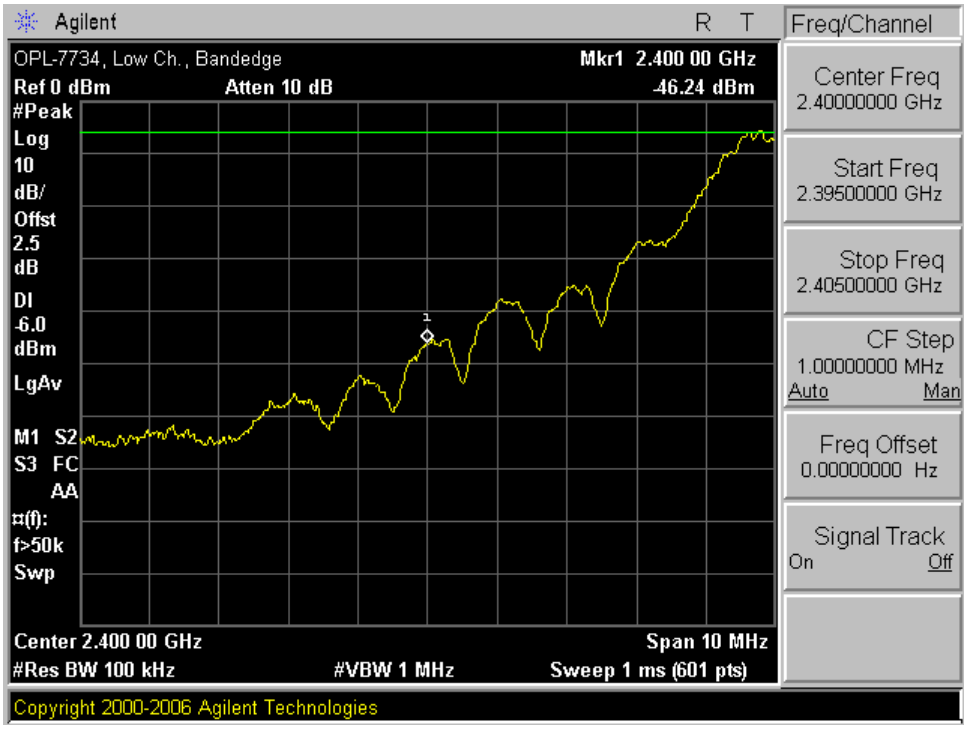

**Plot 6-5. Power Spectral Density Plot (802.15.4 – Ch. 11)**



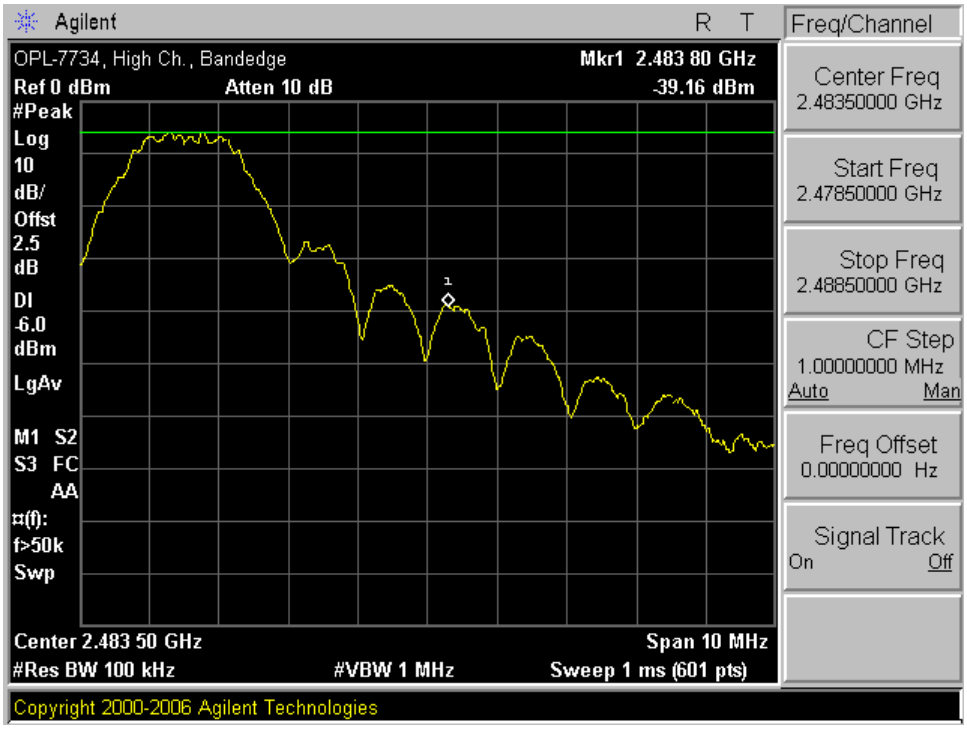

**Plot 6-6. Power Spectral Density Plot (802.15.4 – Ch. 26)**

## 6.4 Out of Band Emissions (Band Edge)

**§15.247(d); RSS-210(A8.5)**

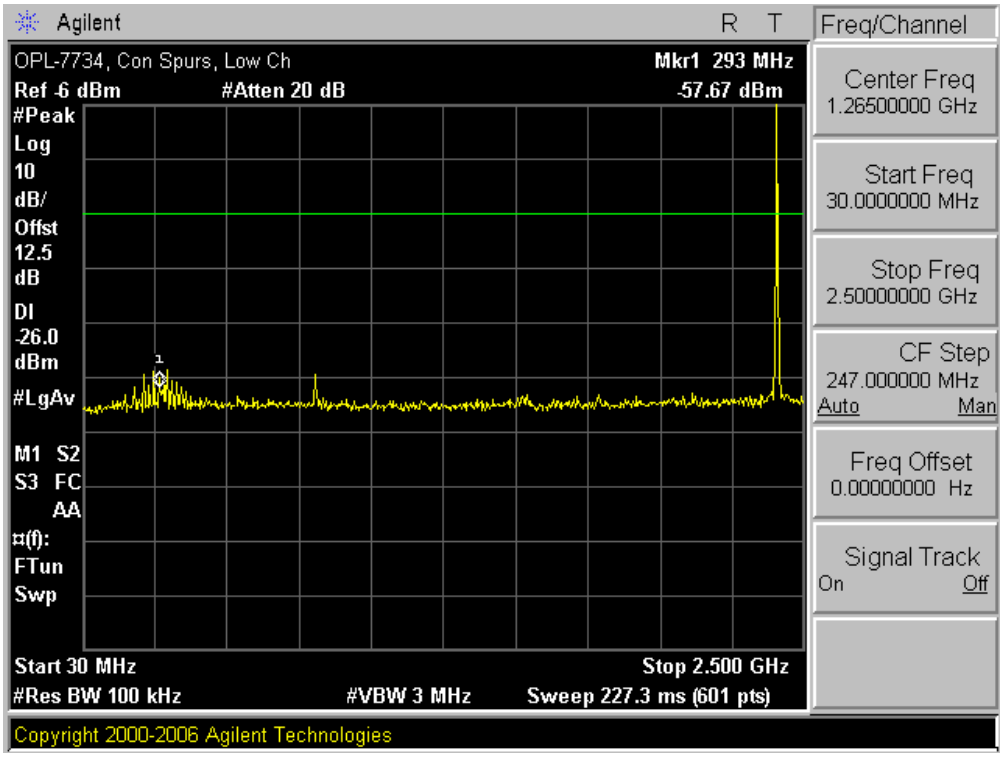



**Plot 6-7. Band Edge Plot (802.15.4 – Ch. 11)**

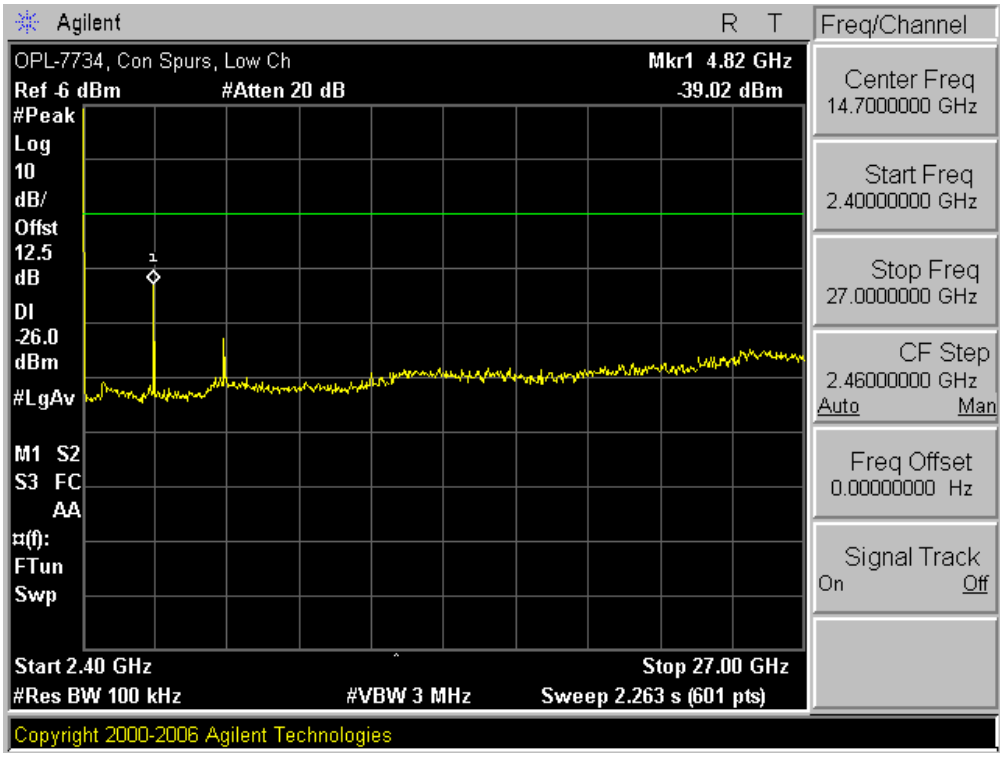



**Plot 6-8. Band Edge Plot (802.15.4 – Ch. 26)**

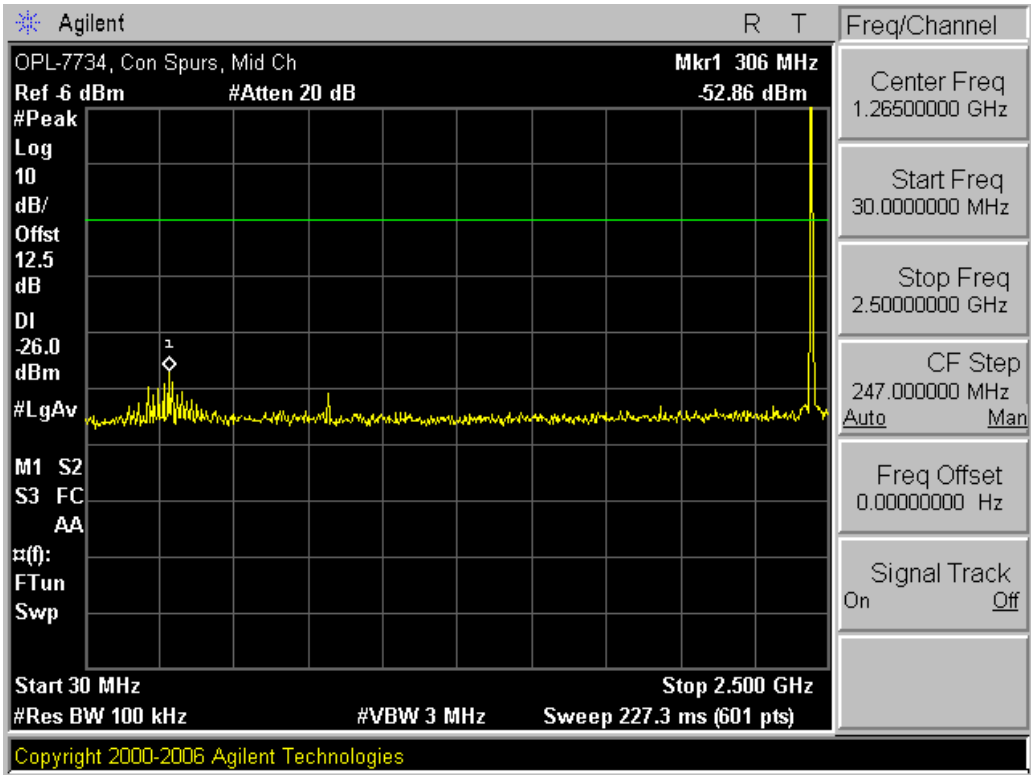
## 6.5 Conducted Spurious Emissions



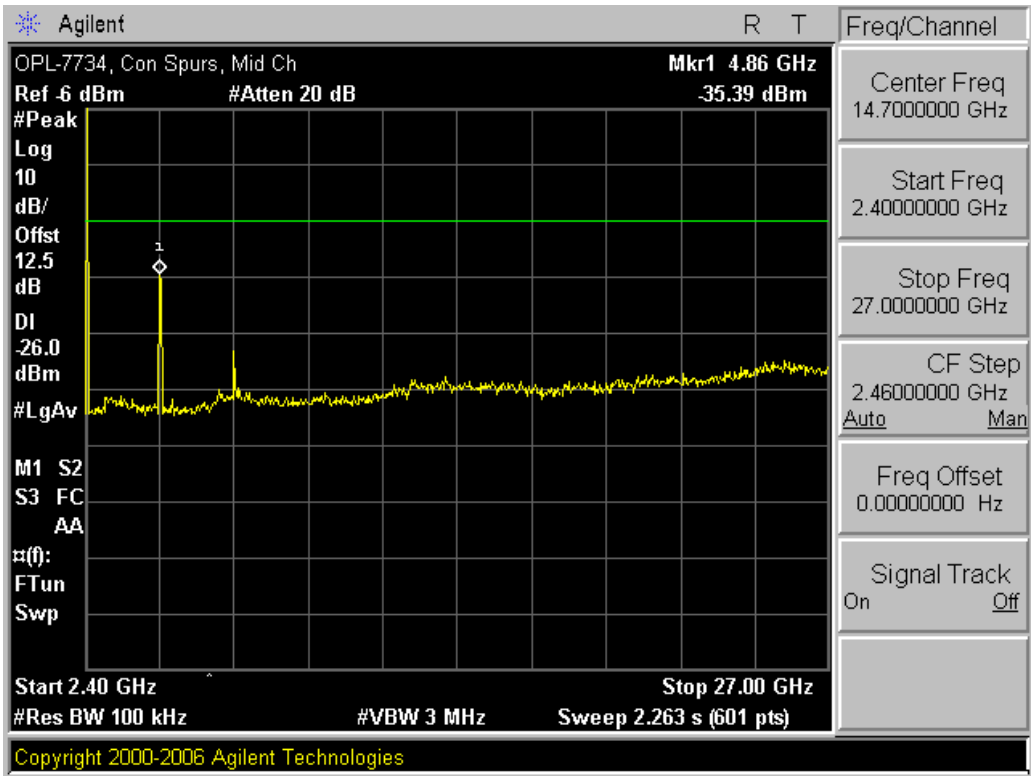

**Plot 6-9. Conducted Spurious Plot (802.15.4 – Ch. 11)**



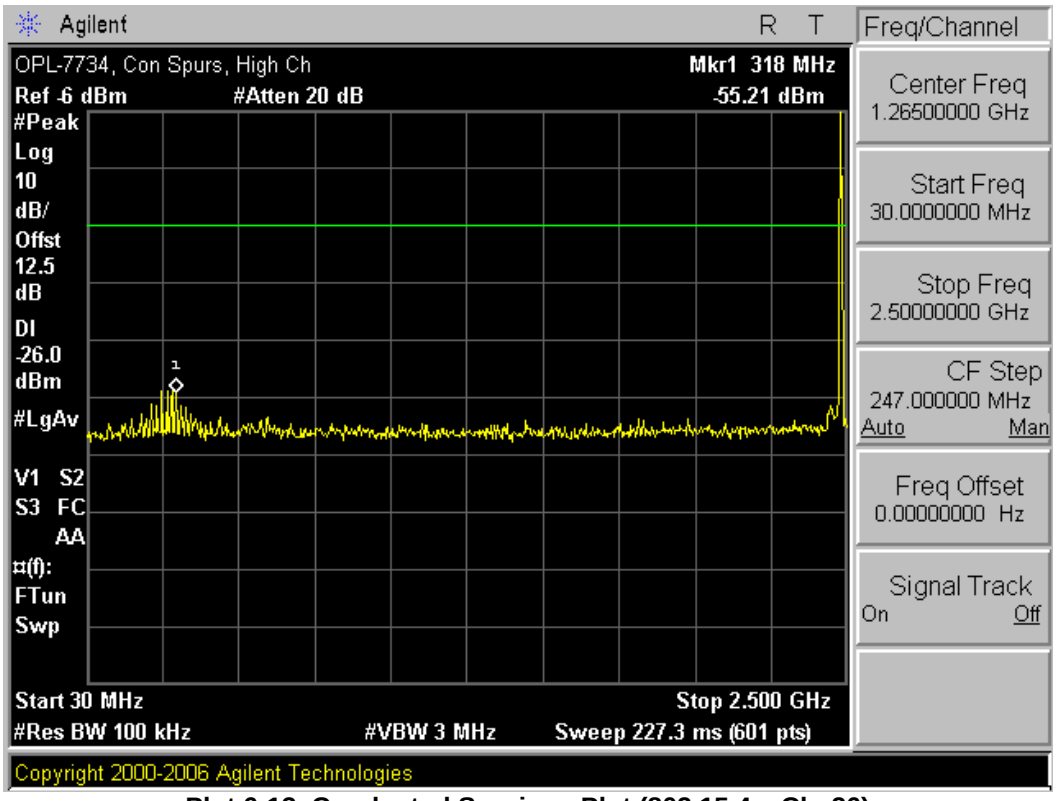

**Plot 6-10. Conducted Spurious Plot (802.15.4 – Ch. 11)**



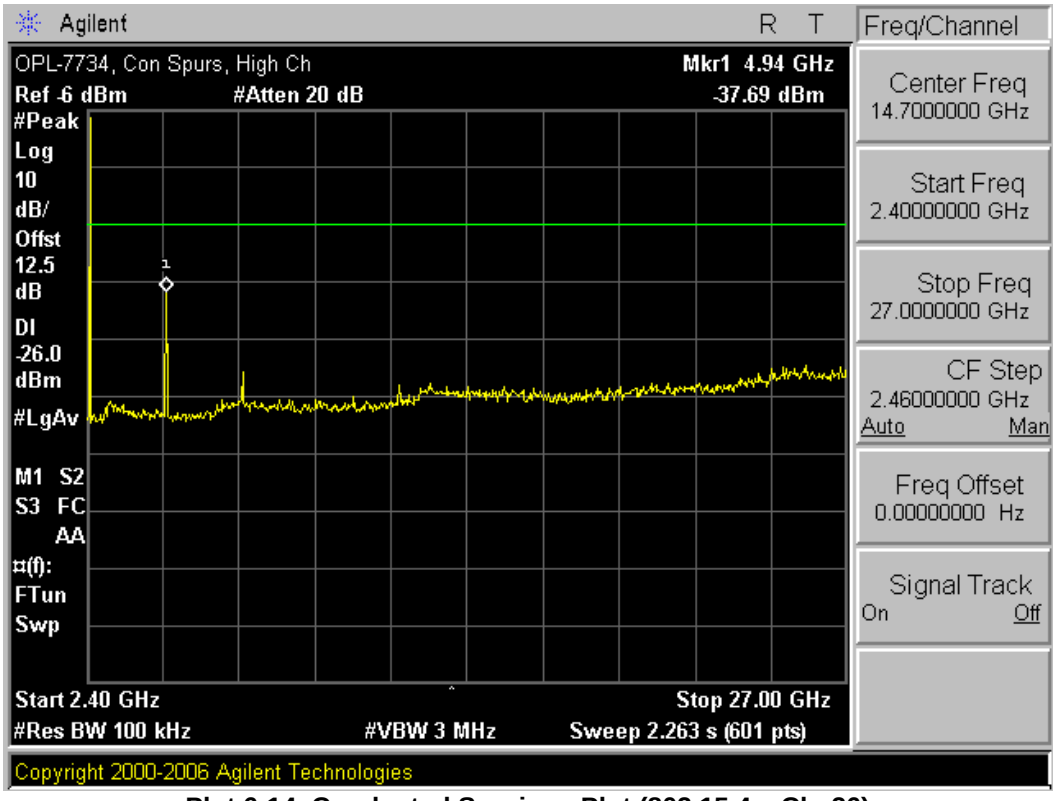

**Plot 6-11. Conducted Spurious Plot (802.15.4 – Ch. 18)**




**Plot 6-12. Conducted Spurious Plot (802.15.4 – Ch. 18)**




**Plot 6-13. Conducted Spurious Plot (802.15.4 – Ch. 26)**




**Plot 6-14. Conducted Spurious Plot (802.15.4 – Ch. 26)**

## 6.6 Radiated Measurements

**§15.247(d) / §15.205 & §15.209; RSS-210(A8.5)**

The EUT was tested from 9kHz to the tenth harmonic of the fundamental frequency of the transmitter. Below 1GHZ a CISPR quasi peak detector was used. Above 1 GHz average measurements were taken, using RBW= 1MHz, VBW= 10Hz, and linearly polarized horn antennas. In addition, peak measurements (RBW= 1MHz, VBW= 1MHz) were taken to ensure that the peak levels are not more than 20dB above the average limit. No harmonics/spurs peak emissions are more than 20dB above the average limit. Special attention is taken for the EUT's harmonic and spurious radiated emissions in the restricted bands of operations, as defined in Section 15.205.

| Frequency | Field Strength [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 |

**Table 6-6. Radiated Limits**

## Radiated Measurements (Cont.)

**§15.247(d) / §15.205 & §15.209; RSS-210(A8.5)**

Mode: 802.15.4

Transfer Rate: 250 kbps

Distance of Measurements: 3 Meters

Operating Frequency: 2405MHz

Channel: 11 (Low)

| | Frequency [MHz] | Level [dBm] | AFCL [dB] | Pol. [H/V] | Field Strength [dBµV/m] | Field Strength [µV/m] | Margin [dB] |
|---|---|---|---|---|---|---|---|
| * | 4810.00 | -102.11 | 38.8 | H | 43.70 | 153.11 | -10.30 |
| | 7215.00 | -108.78 | 42.4 | H | 40.63 | 107.52 | -27.87 |
| | 9620.00 | -135.00 | 45.2 | H | 17.20 | 7.24 | -51.30 |
| * | 12025.00 | -135.00 | 46.6 | H | 18.63 | 8.54 | -35.37 |

**Table 6-7. Radiated Measurements @ 3 meters**

**NOTES:**

1. All harmonics in the restricted bands specified in §15.205 are below the limit shown in Table 6-4.
(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 = 1MHz VBW = 10Hz

4. The peak emissions above 1GHz are not more than 20dB 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 and/or a new/fully-recharged battery.

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

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

9. Above 1GHz, the limit is 500 µV/m (54dBµ/m) at 3 meters radiated.

## Radiated Measurements (Cont.)

**§15.247(d) / §15.205 & §15.209; RSS-210(A8.5)**

Mode: 802.15.4

Transfer Rate: 250 kbps

Distance of Measurements: 3 Meters

Operating Frequency: 2440MHz

Channel: 18 (Mid)

| | Frequency [MHz] | Level [dBm] | AFCL [dB] | Pol. [H/V] | Field Strength [dBµV/m] | Field Strength [µV/m] | Margin [dB] |
|---|---|---|---|---|---|---|---|
| * | 4880.00 | -101.36 | 38.95 | H | 44.59 | 169.63 | -9.41 |
| * | 7320.00 | -107.68 | 42.67 | H | 41.99 | 125.75 | -12.01 |
| | 9760.00 | -135.00 | 45.36 | H | 17.36 | 7.38 | -50.71 |
| * | 12200.00 | -135.00 | 46.68 | H | 18.68 | 8.59 | -35.32 |

**Table 6-8. Radiated Measurements @ 3 meters**

**NOTES:**

1. All harmonics in the restricted bands specified in §15.205 are below the limit shown in Table 6-4.
(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 = 1MHz VBW = 10Hz

4. The peak emissions above 1GHz are not more than 20dB 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 and/or a new/fully-recharged battery.

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

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

9. Above 1GHz, the limit is 500 µV/m (54dBµ/m) at 3 meters radiated.

## Radiated Measurements (Cont.)

**§15.247(d) / §15.205 & §15.209; RSS-210(A8.5)**

Mode: 802.15.4

Transfer Rate: 250 kbps

Distance of Measurements: 3 Meters

Operating Frequency: 2480MHz

Channel: 26 (High)

| | Frequency [MHz] | Level [dBm] | AFCL [dB] | Pol. [H/V] | Field Strength [dBµV/m] | Field Strength [µV/m] | Margin [dB] |
|---|---|---|---|---|---|---|---|
| * | 4960.00 | -97.15 | 39.19 | H | 49.04 | 283.14 | -4.96 |
| * | 7440.00 | -105.73 | 43.01 | H | 44.28 | 163.68 | -9.72 |
| | 9920.00 | -135.00 | 45.67 | H | 17.67 | 7.65 | -50.76 |
| * | 12400.00 | -135.00 | 46.61 | H | 18.61 | 8.52 | -35.39 |

**Table 6-9. Radiated Measurements @ 3 meters**

**NOTES:**

1. All harmonics in the restricted bands specified in §15.205 are below the limit shown in Table 6-4.
(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 = 1MHz VBW = 10Hz

4. The peak emissions above 1GHz are not more than 20dB 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 and/or a new/fully-recharged battery.

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

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

9. Above 1GHz, the limit is 500 µV/m (54dBµ/m) at 3 meters radiated.

## 6.7 Radiated Restricted Band Measurements

**§15.205 / §15.209; RSS-210(A8.5)**

- Special attention is paid to the EUT's harmonic and spurious radiated emission in the restricted bands of operations.

Mode: 802.15.4

Transfer Rate: 250 kbps

Distance of Measurements: 3 Meters

Operating Frequency: 2480MHz

Channel: 26 (High)

| Frequency [MHz] | Level [dBm] | AFCL [dB] | Pol. [H/V] | Field Strength [dBµV/m] | Field Strength [µV/m] | Margin [dB] |
|---|---|---|---|---|---|---|
| 2483.50 | -93.53 | 30.81 | H | 44.28 | 163.68 | -9.70 |
| 2483.90 | -92.43 | 30.82 | H | 45.39 | 185.99 | -8.59 |
| 2484.70 | -97.63 | 30.83 | H | 40.20 | 102.33 | -13.78 |
| 2487.60 | -101.43 | 30.83 | H | 36.40 | 66.07 | -17.58 |
| 2490.40 | -102.53 | 30.85 | H | 35.32 | 58.34 | -18.66 |
| 2492.40 | -102.83 | 30.86 | H | 35.03 | 56.43 | -18.95 |

**Table 6-10. Radiated Restricted Band Measurements 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 9 kHz up to the 10th harmonic and the worst-case emissions are reported.

4. Above 1 GHz the limit is 500µV/m.

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

6. The data in the table are Average Measurements > 1GHz using RBW = 1 MHz VBW = 10 Hz

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

# 7.0 CONCLUSION

The data collected relate only the item(s) tested and show that the **Wireless Barcode Scanner** **FCC ID: UFOOPL7734** complies with Part 15C of the FCC Rules.

# EXHIBIT A – LABELING REQUIREMENTS

Per 15.19; Docket 95-19

The sample label shown below shall be permanently affixed at a conspicuous location on the device; instruction manual or pamphlet supplied to the user and be readily visible to the purchaser at the time of purchase. However, when the device is so small wherein placement of the label with specified statement is not practical, only the trade name, and FCC ID, must be displayed on the device per Section 15.19(b)(2).

# EXHIBIT B – TEST SETUP PHOTOGRAPHS

The Line-Conducted and Radiated Test Pictures show the worst-case configuration and cable placement with a minimum margin to the specifications.

# EXHIBIT C – EUT INTERNAL PHOTOGRAPHS

# EXHIBIT D – EUT EXTERNAL PHOTOGRAPHS

# EXHIBIT E – USER'S MANUAL