Engineering and Testing for EMC and Safety Compliance

# CLASS II PERMISSIVE CHANGE REPORT
## FCC PART 15

| Test Lab: | Applicant: |
|---|---|
| Rhein Tech Laboratories, Inc. Phone: 703-689-0368<br>360 Herndon Parkway Fax: 703-689-2056<br>Suite 1400 Web: www.rheintech.com<br>Herndon, VA 20170 | Ikusi Phone: +34 943 44 88 00<br>Contact: Luis Rodriguez Fax: +34 943 44 88 16<br>Pol. Ind. 27 No 30 (Martutene) E-Mail: rodriguez@ikusi.es<br>20014 San Sebastian SPAIN |

| | | | |
|---|---|---|---|
| **FCC ID** | PVTTR800-US | **TEST REPORT DATE** | May 17, 2006 |
| **PLAT FORM** | N/A | **RTL WORK ORDER NUMBER** | 2006060 |
| **MODEL** | TR800 | **RTL QUOTE NUMBER** | QRTL06-186 |

| | |
|---|---|
| **FCC Classification:** | DXT – Part 15 Low Power Transceiver – RX Verified |
| **FCC Rule Part(s):** | Part 15.249: Operation within the bands 902-928 MHz, 2400-2483.5 MHz, 5725-5850 MHz, and 24.0-24.25 GHz |
| **Digital Interface Information** | Digital Interface was found to be compliant |
| **Receiver Information** | Receiver was found to be compliant |

| Frequency Range (MHz) | Output Power (W) | Frequency Tolerance | Emission Designator |
|---|---|---|---|
| 902.5 - 927.45 | 0.0006 | N/A | 9K30DSR |

I, the undersigned, hereby declare that the equipment tested and referenced in this report conforms to the identified standard(s) as described in this test report. Modifications made to the equipment during testing, in order to achieve compliance with these standards, are listed in the report.

Furthermore, there was no deviation from, additions to, or exclusions from the FCC Part 2, FCC Part 15, and ANSI C63.4

Signature: _____ Date: May 17, 2006

Typed/Printed Name: Desmond A. Fraser Position: President

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# 1 General Information

## 1.1 Scope

FCC Rules Part 15.249: Operation within the bands 902-928 MHz, 2400-2483.5 MHz, 5725-5850 MHz, and 24.0-24.25 GHz.

## 1.2 Modifications

No modifications were made to the unit to achieve the results in this test report.

## 1.3 Test Facility

The open area test site and conducted measurement facility used to collect the radiated data is located at 360 Herndon Parkway, Suite 1400, Herndon, Virginia 20170. This site has been fully described in a report and approved by the Federal Communications Commission to perform AC line conducted and radiated emissions testing (ANSI C63.4 2003).

## 1.4 Related Submittal(s)/Grant(s)

This is a permissive change request to the original limited modular approval certification for IKUSI Model Number: TR800, FCC ID: PVTTR800-US. The change is the addition of two arrangements of an external antenna. The first arrangement is mounted directly to the fixed unit and the second arrangement is mounted to a mounting bracket attached to the fixed unit with a 1.5 m shielded cable. Both arrangements use the same antenna. The IF, LO, and up to the 2$^{nd}$ LO were investigated and tested, and found to be compliant also.

# 2 Test Information

## 2.1 Test Justification

The EUT was tested in all three orthogonal planes in order to determine worst-case emissions. Channel 1 at 902.5 MHz, Channel 36 at 915.025 MHz, and Channel 70 at 927.45 MHz were tested and investigated from 9 kHz to 10 GHz. Data for all three channels are presented in this report. The test results relate only to the item(s) that was tested.

The antenna arrangements transmit, receive, and are connected to the only antenna port available.

## 2.2 Exercising the EUT

The EUT was provided with the firmware programmed into the handheld unit to control the fixed unit and was provided a means for continuous transmission during testing. The carrier was also checked to verify that the information was being transmitted. There were no deviations from the test standard(s) and/or methods.

## 2.3 Test Result Summary

**Table 2-1: Test Result Summary with FCC Rules and Regulations**

| STANDARD | TEST | PASS/FAIL OR N/A |
|---|---|---|
| FCC 15.249(a) | Radiated Emissions | Pass |

## 2.4 Test System Details

The test sample was received by Rhein Tech Labs on May 15, 2006. The FCC Identifiers for all equipment, plus descriptions of all cables used in the tested system, are:

**Table 2-2: Equipment Under Test (EUT)**

| Part | Manufacturer | Model | Serial Number | FCC ID | Cable Description | RTL Bar Code |
|---|---|---|---|---|---|---|
| Antenna/Bracket/ Cable Assembly | IKUSI | N/A | NA | NA | 1.5 m Shielded I/O | 17226 |
| Battery | IKUSI | BT06K | NA | NA | N/A | 17224 |
| Battery | IKUSI | BT06K | NA | NA | N/A | 17223 |
| Transceiver | IKUSI | TM70/2.21 | 0705157 | NA | 1 m Unshielded AC Power | 17220 |

**Table 2-3: External Components in Test Configuration**

| Part | Manufacturer | Model | Serial Number | FCC ID | Cable Description | RTL Bar Code |
|---|---|---|---|---|---|---|
| Charger For Handheld Batteries | IKUSI | CB60 | NA | NA | NA | 17225 |
| Handheld Transceiver | IKUSI | TM70/2.21 | 0705167 | NA | n/a | 17221 |
| AC Adapter | Ontop | A42004Q | 07C2C | N/A | 1.9 m Unshielded | 17222 |

## 2.5 Configuration of Tested System

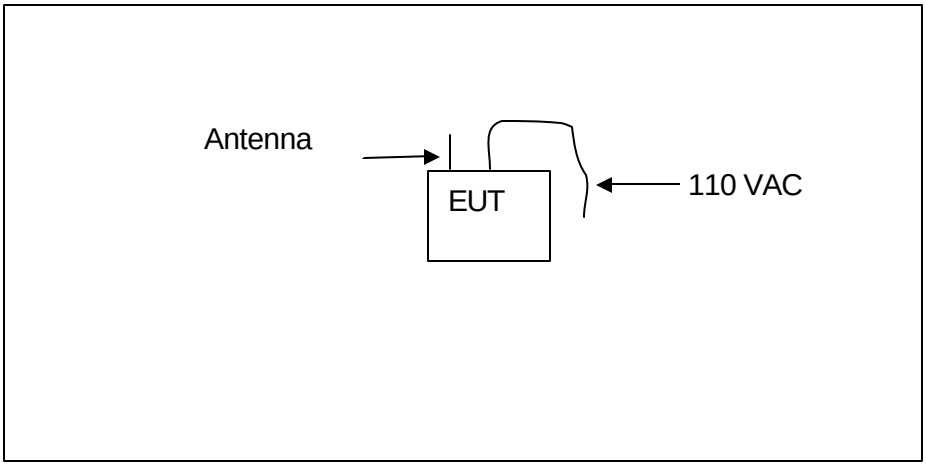
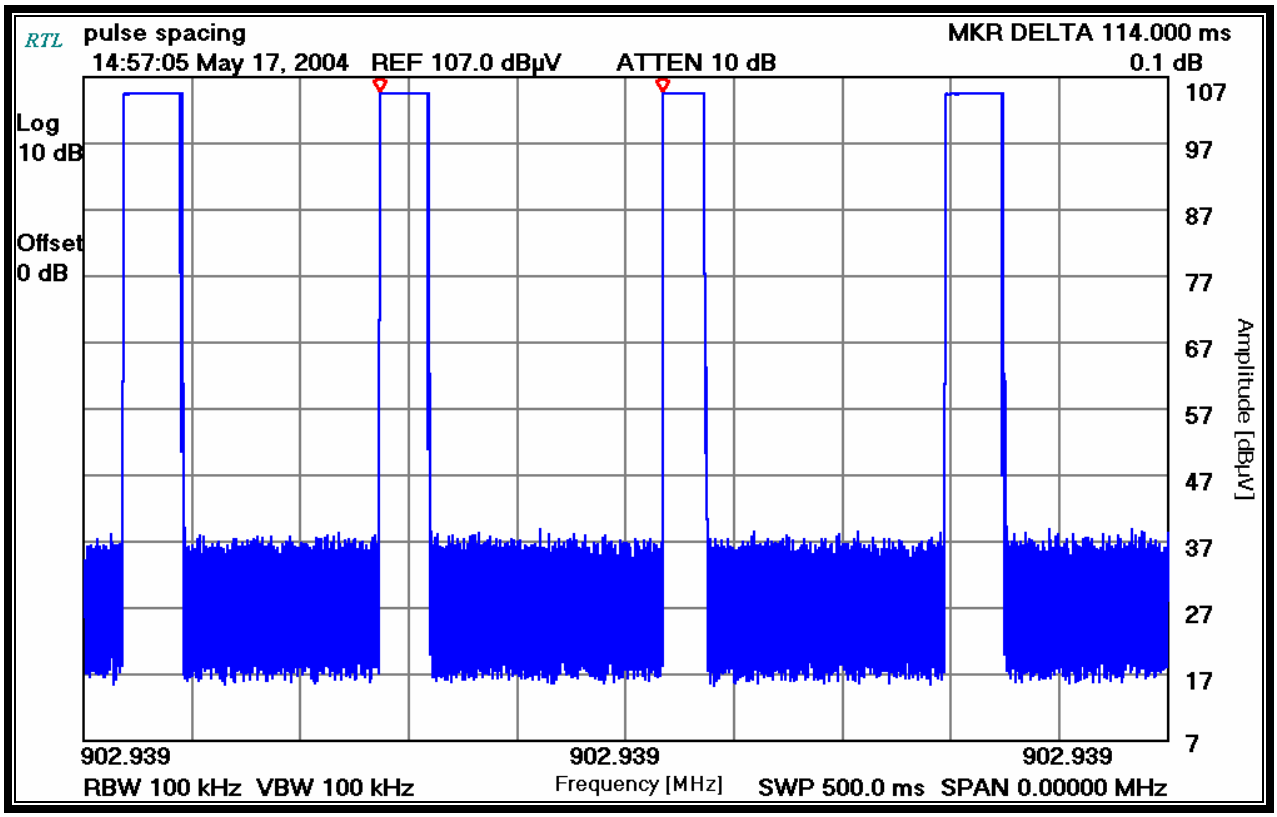


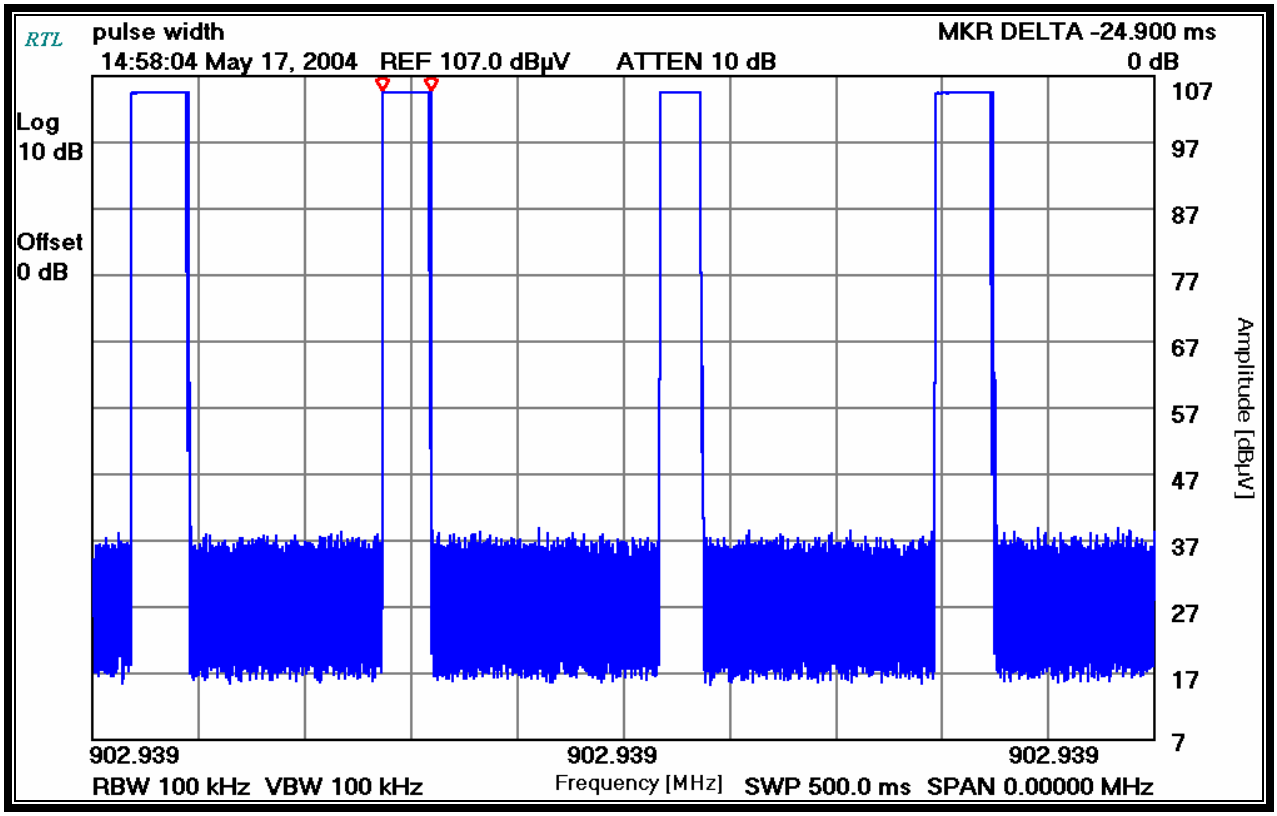

**Figure 2-1: Worst Case Configuration of System Under Test**

## 3 Duty Cycle Calculation

The duty cycle data is taken from the original certification report for use in average calculations.




**Plot 3-1: Pulse Spacing**




**Plot 3-2: Pulse Width**

Duty Cycle Calculation: 20 Log (24.9ms/100ms) = -12.1 dB
24.9% duty cycle used.

# 4 Radiated Emission Limits Radiated Harmonics - §15.249

## 4.1 Radiated Emission Limits Test Procedure

Radiated Emissions of the harmonics were tested at three meters, and meet the requirements of 500 microvolts/meter in average mode, and 20 dB higher in peak mode, per 15.249(e). The EUT was tested in three orthogonal planes to determine worst case emissions which are presented here.

## 4.2 Radiated Emissions Harmonics/Spurious Test Data

**Table 4-1: Radiated Emissions Harmonics/Spurious (Channel 1, 902.5 MHz) - Attached Antenna Configuration**

| Emission Frequency (MHz) | Test Detector | Analyzer Reading (dBuV) | Site Correction Factor (dB/m) | Emission Level (dBuV/m) (Average less 12.1 dB duty cycle correction factor) | Limit (dBuV/m) | Margin (dB) |
|---|---|---|---|---|---|---|
| 1805.0 | Pk | 48.6 | 8.0 | 56.6 | 74.0 | -17.4 |
| 1805.0 | Av | 48.6 | 8.0 | 39.7 | 54.0 | -14.3 |
| 2707.5 | Pk | 56.8 | 9.0 | 65.8 | 74.0 | -8.2 |
| 2707.5 | Av | 56.8 | 9.0 | 48.9 | 54.0 | -5.1 |
| 3610.0 | Pk | 45.0 | 7.2 | 52.2 | 74.0 | -21.8 |
| 3610.0 | Av | 45.0 | 7.2 | 35.3 | 54.0 | -18.7 |
| 4512.5 | Pk | 45.5 | 11.9 | 57.4 | 74.0 | -16.6 |
| 4512.5 | Av | 45.5 | 11.9 | 40.5 | 54.0 | -13.5 |
| 5415.0 | Pk | 42.8 | 11.6 | 54.4 | 74.0 | -19.6 |
| 5415.0 | Av | 42.8 | 11.6 | 37.5 | 54.0 | -16.5 |
| 6317.5 | Pk | 40.3 | 11.2 | 51.5 | 74.0 | -22.5 |
| 6317.5 | Av | 40.3 | 11.2 | 34.6 | 54.0 | -19.4 |
| 7220.0 | Pk | 40.2 | 10.3 | 50.5 | 74.0 | -23.5 |
| 7220.0 | Av | 40.2 | 10.3 | 33.6 | 54.0 | -20.4 |
| 8122.5 | Pk | 39.8 | 9.9 | 49.7 | 74.0 | -24.3 |
| 8122.5 | Av | 39.8 | 9.9 | 32.8 | 54.0 | -21.2 |
| 9025.0 | Pk | 37.2 | 14.0 | 51.2 | 74.0 | -22.8 |
| 9025.0 | Av | 37.2 | 14.0 | 34.3 | 54.0 | -19.7 |

Peak Resolution/Video Bandwidth is 1 MHz

**Table 4-2: Radiated Emissions Harmonics/Spurious (Channel 36, 915.025 MHz) - Attached Antenna Configuration**

| Emission Frequency (MHz) | Test Detector | Analyzer Reading (dBuV) | Site Correction Factor (dB/m) | Emission Level (dBuV/m) (Average less 12.1 dB duty cycle correction factor) | Limit (dBuV/m) | Margin (dB) |
|---|---|---|---|---|---|---|
| 1830.1 | Pk | 47.6 | 9.6 | 57.2 | 74.0 | -16.8 |
| 1830.1 | Av | 47.6 | 9.6 | 40.3 | 54.0 | -13.7 |
| 2745.1 | Pk | 52.2 | 9.3 | 61.5 | 74.0 | -12.5 |
| 2745.1 | Av | 52.2 | 9.3 | 44.6 | 54.0 | -9.4 |
| 3660.1 | Pk | 44.2 | 7.5 | 51.7 | 74.0 | -22.3 |
| 3660.1 | Av | 44.2 | 7.5 | 34.8 | 54.0 | -19.2 |
| 4575.1 | Pk | 45.2 | 11.1 | 56.3 | 74.0 | -17.7 |
| 4575.1 | Av | 45.2 | 11.1 | 39.4 | 54.0 | -14.6 |
| 5490.2 | Pk | 43.8 | 12.2 | 56.0 | 74.0 | -18.0 |
| 5490.2 | Av | 43.8 | 12.2 | 39.1 | 54.0 | -14.9 |
| 6405.2 | Pk | 40.8 | 11.6 | 52.4 | 74.0 | -21.6 |
| 6405.2 | Av | 40.8 | 11.6 | 35.5 | 54.0 | -18.5 |
| 7320.2 | Pk | 39.8 | 10.1 | 49.9 | 74.0 | -24.1 |
| 7320.2 | Av | 39.8 | 10.1 | 33.0 | 54.0 | -21.0 |
| 8235.2 | Pk | 40.0 | 14.9 | 54.9 | 74.0 | -19.1 |
| 8235.2 | Av | 40.0 | 14.9 | 38.0 | 54.0 | -16.0 |
| 9150.3 | Pk | 39.7 | 14.2 | 53.9 | 74.0 | -20.1 |
| 9150.3 | Av | 39.7 | 14.2 | 37.0 | 54.0 | -17.0 |

Peak Resolution/Video Bandwidth is 1 MHz

**Table 4-3: Radiated Emissions Harmonics/Spurious (Channel 70, 927.45 MHz) - Attached Antenna Configuration**

| Emission Frequency (MHz) | Test Detector | Analyzer Reading (dBuV) | Site Correction Factor (dB/m) | Emission Level (dBuV/m) (Average less 12.1 dB duty cycle correction factor) | Limit (dBuV/m) | Margin (dB) |
|---|---|---|---|---|---|---|
| 1854.9 | Pk | 50.9 | 10.0 | 60.9 | 74.0 | -13.1 |
| 1854.9 | Av | 50.9 | 10.0 | 44.0 | 54.0 | -10.0 |
| 2782.4 | Pk | 54.3 | 8.6 | 62.9 | 74.0 | -11.1 |
| 2782.4 | Av | 54.3 | 8.6 | 46.0 | 54.0 | -8.0 |
| 3709.8 | Pk | 44.3 | 7.9 | 52.2 | 74.0 | -21.8 |
| 3709.8 | Av | 44.3 | 7.9 | 35.3 | 54.0 | -18.7 |
| 4637.3 | Pk | 46.0 | 10.8 | 56.8 | 74.0 | -17.2 |
| 4637.3 | Av | 46.0 | 10.8 | 39.9 | 54.0 | -14.1 |
| 5564.7 | Pk | 42.8 | 11.9 | 54.7 | 74.0 | -19.3 |
| 5564.7 | Av | 42.8 | 11.9 | 37.8 | 54.0 | -16.2 |
| 6492.2 | Pk | 41.2 | 11.1 | 52.3 | 74.0 | -21.7 |
| 6492.2 | Av | 41.2 | 11.1 | 35.4 | 54.0 | -18.6 |
| 7419.6 | Pk | 40.3 | 11.0 | 51.3 | 74.0 | -22.7 |
| 7419.6 | Av | 40.3 | 11.0 | 34.4 | 54.0 | -19.6 |
| 8347.1 | Pk | 39.2 | 15.0 | 54.2 | 74.0 | -19.8 |
| 8347.1 | Av | 39.2 | 15.0 | 37.3 | 54.0 | -16.7 |
| 9274.5 | Pk | 38.2 | 13.7 | 51.9 | 74.0 | -22.1 |
| 9274.5 | Av | 38.2 | 13.7 | 35.0 | 54.0 | -19.0 |

Peak Resolution/Video Bandwidth is 1 MHz

**Table 4-4: Radiated Emissions Harmonics/Spurious (Channel 1, 902.5 MHz) - Unattached Antenna Configuration**

| Emission Frequency (MHz) | Test Detector | Analyzer Reading (dBuV) | Site Correction Factor (dB/m) | Emission Level (dBuV/m) (Average less 12.1 dB duty cycle correction factor) | Limit (dBuV/m) | Margin (dB) |
|---|---|---|---|---|---|---|
| 1805.0 | Pk | 49.3 | 8.0 | 57.3 | 74.0 | -16.7 |
| 1805.0 | Av | 49.3 | 8.0 | 40.4 | 54.0 | -13.6 |
| 2707.5 | Pk | 57.8 | 9.0 | 66.8 | 74.0 | -7.2 |
| 2707.5 | Av | 57.8 | 9.0 | 49.9 | 54.0 | -4.1 |
| 3610.0 | Pk | 46.2 | 7.2 | 53.4 | 74.0 | -20.6 |
| 3610.0 | Av | 46.2 | 7.2 | 36.5 | 54.0 | -17.5 |
| 4512.5 | Pk | 42.8 | 11.9 | 54.7 | 74.0 | -19.3 |
| 4512.5 | Av | 42.8 | 11.9 | 37.8 | 54.0 | -16.2 |
| 5415.0 | Pk | 42.8 | 11.6 | 54.4 | 74.0 | -19.6 |
| 5415.0 | Av | 42.8 | 11.6 | 37.5 | 54.0 | -16.5 |
| 6317.5 | Pk | 40.5 | 11.2 | 51.7 | 74.0 | -22.3 |
| 6317.5 | Av | 40.5 | 11.2 | 34.8 | 54.0 | -19.2 |
| 7220.0 | Pk | 39.7 | 10.3 | 50.0 | 74.0 | -24.0 |
| 7220.0 | Av | 39.7 | 10.3 | 33.1 | 54.0 | -20.9 |
| 8122.5 | Pk | 39.8 | 9.9 | 49.7 | 74.0 | -24.3 |
| 8122.5 | Av | 39.8 | 9.9 | 32.8 | 54.0 | -21.2 |
| 9025.0 | Pk | 37.7 | 14.0 | 51.7 | 74.0 | -22.3 |
| 9025.0 | Av | 37.7 | 14.0 | 34.8 | 54.0 | -19.2 |

Peak Resolution/Video Bandwidth is 1 MHz

**Table 4-5: Radiated Emissions Harmonics/Spurious (Channel 36, 915.025 MHz) - Unattached Antenna Configuration**

| Emission Frequency (MHz) | Test Detector | Analyzer Reading (dBuV) | Site Correction Factor (dB/m) | Emission Level (dBuV/m) (Average less 12.1 dB duty cycle correction factor) | Limit (dBuV/m) | Margin (dB) |
|---|---|---|---|---|---|---|
| 1830.1 | Pk | 51.2 | 8.4 | 59.6 | 74.0 | -14.4 |
| 1830.1 | Av | 51.2 | 8.4 | 42.7 | 54.0 | -11.3 |
| 2745.1 | Pk | 52.0 | 9.3 | 61.3 | 74.0 | -12.7 |
| 2745.1 | Av | 52.0 | 9.3 | 44.4 | 54.0 | -9.6 |
| 3660.1 | Pk | 43.5 | 7.5 | 51.0 | 74.0 | -23.0 |
| 3660.1 | Av | 43.5 | 7.5 | 34.1 | 54.0 | -19.9 |
| 4575.1 | Pk | 45.3 | 11.1 | 56.4 | 74.0 | -17.6 |
| 4575.1 | Av | 45.3 | 11.1 | 39.5 | 54.0 | -14.5 |
| 5490.2 | Pk | 43.2 | 12.2 | 55.4 | 74.0 | -18.6 |
| 5490.2 | Av | 43.2 | 12.2 | 38.5 | 54.0 | -15.5 |
| 6405.2 | Pk | 42.2 | 11.6 | 53.8 | 74.0 | -20.2 |
| 6405.2 | Av | 42.2 | 11.6 | 36.9 | 54.0 | -17.1 |
| 7320.2 | Pk | 41.2 | 10.1 | 51.3 | 74.0 | -22.7 |
| 7320.2 | Av | 41.2 | 10.1 | 34.4 | 54.0 | -19.6 |
| 8235.2 | Pk | 41.0 | 14.9 | 55.9 | 74.0 | -18.1 |
| 8235.2 | Av | 41.0 | 14.9 | 39.0 | 54.0 | -15.0 |
| 9150.3 | Pk | 38.2 | 14.2 | 52.4 | 74.0 | -21.6 |
| 9150.3 | Av | 38.2 | 14.2 | 35.5 | 54.0 | -18.5 |

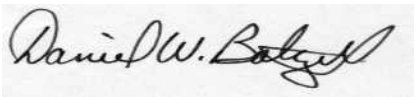
Peak Resolution/Video Bandwidth is 1 MHz

**Table 4-6: Radiated Emissions Harmonics/Spurious (Channel 70, 927.45 MHz) - Unattached Antenna Configuration**

| Emission Frequency (MHz) | Test Detector | Analyzer Reading (dBuV) | Site Correction Factor (dB/m) | Emission Level (dBuV/m) (Average less 12.1 dB duty cycle correction factor) | Limit (dBuV/m) | Margin (dB) |
|---|---|---|---|---|---|---|
| 1854.9 | Pk | 50.4 | 8.8 | 59.2 | 74.0 | -14.8 |
| 1854.9 | Av | 50.4 | 8.8 | 42.3 | 54.0 | -11.7 |
| 2782.4 | Pk | 55.8 | 8.6 | 64.4 | 74.0 | -9.6 |
| 2782.4 | Av | 55.8 | 8.6 | 47.5 | 54.0 | -6.5 |
| 3709.8 | Pk | 43.3 | 7.9 | 51.2 | 74.0 | -22.8 |
| 3709.8 | Av | 43.3 | 7.9 | 34.3 | 54.0 | -19.7 |
| 4637.3 | Pk | 45.7 | 10.8 | 56.5 | 74.0 | -17.5 |
| 4637.3 | Av | 45.7 | 10.8 | 39.6 | 54.0 | -14.4 |
| 5564.7 | Pk | 42.7 | 11.9 | 54.6 | 74.0 | -19.4 |
| 5564.7 | Av | 42.7 | 11.9 | 37.7 | 54.0 | -16.3 |
| 6492.2 | Pk | 41.0 | 11.1 | 52.1 | 74.0 | -21.9 |
| 6492.2 | Av | 41.0 | 11.1 | 35.2 | 54.0 | -18.8 |
| 7419.6 | Pk | 39.3 | 11.0 | 50.3 | 74.0 | -23.7 |
| 7419.6 | Av | 39.3 | 11.0 | 33.4 | 54.0 | -20.6 |
| 8347.1 | Pk | 39.2 | 15.0 | 54.2 | 74.0 | -19.8 |
| 8347.1 | Av | 39.2 | 15.0 | 37.3 | 54.0 | -16.7 |
| 9274.5 | Pk | 38.2 | 13.7 | 51.9 | 74.0 | -22.1 |
| 9274.5 | Av | 38.2 | 13.7 | 35.0 | 54.0 | -19.0 |

Peak Resolution/Video Bandwidth is 1 MHz

**TEST PERSONNEL:**



| Daniel Baltzell | | May 16, 2006 |
|---|---|---|
| Test Engineer | Signature | Date Of Test |

## 4.3 Test Equipment Used for Testing

**Table 4-7: Radiated Spurious Emissions Test Equipment**

| RTL Asset | Manufacturer | Model | Part Type | Serial Number | Calibration Date |
|---|---|---|---|---|---|
| 900931 | Hewlett Packard | 8566B | Spectrum Analyzer (100 Hz - 22 GHz) | 3138A07771 | 8/3/06 |
| 900930 | Hewlett Packard | 85662A | Spectrum Analyzer Display Section | 3144A20839 | 8/3/06 |
| 901053 | Schaffner &Chase | CBL6112B | Bilog antenna (20 MHz - 2 GHz) | 2648 | 11/1/06 |
| 900905 | Rhein Tech Laboratories, Inc. | PR-1040 | Pre Amplifier 40dB (10 MHz – 2 GHz) | 1006 | 3/15/07 |
| 901020 | Hewlett Packard | 8564E | Portable Spectrum Analyzer (9 kHz - 40 GHz) | 3943A01719 | 9/14/06 |
| 901365 | MITEQ | JS4-00102600-41-5P | Amplifier, 15 V, 0.1-26 GHz, 28dB gain, power 5dB | 1094152 | 3/24/07 |
| 900772 | EMCO | 3161-02 | Horn Antenna (2 - 4 GHz) | 9804-1044 | 5/20/07 |
| 900323 | EMCO | 3160-07 | Horn Antenna (8.2 - 12.4 GHz) | 9605-1054 | 5/20/07 |
| 900321 | EMCO | 3161-03 | Horn Antenna (4.0 - 8.2 GHz) | 9508-1020 | 5/20/07 |
| 901425 | Insulated Wire, Inc. | KPS-1503-2400-KPS | RF cable, 20' | NA | 12/12/06 |
| 901424 | Insulated Wire Inc. | KPS-1503-360-KPS | RF cable 36" | NA | 12/12/06 |

# 5 Conclusion

The data in this Class II report shows that the 2 antenna arrangements for Ikusi Model: TR800; FCC ID: PVTTR800-US, comply with all the requirements of Parts 2 and 15 of the FCC Rules.