

# CFR 47 FCC Part 15.231

## TEST REPORT

Product : **Transmitter**

Trade Name : N/A

Model Number : 09XR2PR

FCC ID : ELVATRJC

Prepared for

### **Nutek Corporation**

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Prepared by

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The test results in the report only to the tested sample.

# Statement of Compliance

**Applicant:** Nutek Corporation

**Manufacturer:** Nutek Corporation

**Product:** Transmitter

**Model No.:** 09XR2PR

**Tested Power Supply:** 6Vdc Battery

**Date of Final Test:** Sep. 03, 2010

**Configuration of Measurements and Standards Used :**

FCC Rules and Regulations Part 15 Subpart C

1. The result of the testing report relate only to the item tested.
2. The testing report shall not be reproduced expect in full, without the written approval of IETC.

Report Issued: 2010/09/10

Project Engineer: *Adam Cheng*  
Adam Cheng

Approved: *Jerry Liu*  
Jerry Liu

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## 1 Summary of Measurement

| <b>Report Clause</b> | <b>Test Parameter</b> | <b>Reference Document<br/>CFR47 Part15</b> | <b>Results</b> |
|----------------------|-----------------------|--|----------------|
| 4                    | Radiated Emission     | §15.231(b), 15.209                         | Pass           |
| 5                    | Emission bandwidth    | §15.231(c)                                 | Pass           |

## 2 General Information

### 2.1 Description of Equipment Under Test

- Product** : Transmitter
- Model Number** : 09XR2PR
- Applicant** : **Nutek Corporation**  
NO.167, Lane 235, Bauchiau Rd., Shindian City, Taipei County  
23145, Taiwan
- Manufacturer** : **Nutek Corporation**  
NO. 167, Lane 235, Bauchiau Rd., Shindian City, Taipei County  
23145, Taiwan
- Power Supply** : 6Vdc Battery
- Operating Frequency** : 433.92MHz
- Channel Number** : 1 channel
- Type of Modulation** : FSK
- Antenna description** : This device uses Spring antenna.  
The antenna is integral to the device, thereby meeting the  
requirement of FCC 15.203.
- Date of Receipt Sample** : Aug. 24, 2010
- Date of Test** : Aug. 24 ~ Sep. 03, 2010
- Additional Description** : 1) The Model Number "09XR2PR" is representative selected in  
the test and included in this report.  
2) For more detail specification about EUT, please refer to the  
user's manual.

## 2.2 Details of tested peripheral equipment

N/A

## 2.3 Test Facility

- Site Description** : ☑OATS 2
- Name of Firm** : Interocean EMC Technology Corp.
- Company web** : <http://www.ietc.com.tw>
- Site 1, 2 Location** : No.5-2, Lin 1, Tin-Fu Tsun, Lin-Kou Hsiang,  
Taipei County, Taiwan, R.O.C.
- Site 3, 4 Location** : No. 12, Ruei-Shu Valley, Ruei-Ping Tsun, Lin-Kou Hsiang,  
Taipei County, Taiwan, R.O.C.
- Site Filing** :
- Federal Communication Commissions – USA  
Registration No.: 96399 (OATS 1 & 2)  
Registration No.: 518958 (OATS 3 & 4)  
Designation No.: TW1020
  - Voluntary Control Council for Interference by Information  
Technology Equipment (VCCI) – Japan  
Member No.: 1349  
Registration No. (Conducted Room): C-1094  
Registration No. (Conducted Room): T-1562  
Registration No. (OATS 1): R-1040  
Registration No. (OATS 2): R-1041
  - Industry Canada (IC)  
OUR FILE: 46405-4437 Submission: 130946  
Registration No. (OATS 1): 4437A-1  
Registration No. (OATS 2): 4437A-2  
Registration No. (OATS 3): 4437A-3  
Registration No. (OATS 4): 4437A-4
- Site Accreditation** :
- Bureau of Standards and Metrology and Inspection (BSMI) –  
Taiwan, R.O.C.  
Accreditation No.:  
SL2-IN-E-0026 for CNS13438 / CISPR22  
SL2-R1-E-0026 for CNS13439 / CISPR13  
SL2-R2-E-0026 for CNS13439 / CISPR13  
SL2-A1-E-0026 for CNS13783-1 / CISPR14-1  
SL2-L1-E-0026 for CNS 14115 / CISPR 15
  - Taiwan Accreditation Foundation (TAF)  
Accrditation No.: 1113
  - TÜV NORD  
Certificate No: TNTW0801R-02

### 3 Test specifications

#### 3.1 Test standard

The EUT was performed according to FCC Part 15 Subpart C Section 15.231 procedure and setup followed by ANSI C63.4, 2003 requirements.

#### 3.2 Operation mode

By preliminary testing and verifying three axis (X, Y and Z) position of EUT transmitted status, it was found that "X axis" position was the worst, then the final test was executed the worst condition and test data were recorded in this report

The EUT was operated in continuous transmission mode during all of the tests.



**X axis mode**



**Y axis mode**



**Z axis mode**



### 3.3 Test Equipment

| Instrument              | Manufacturer | Model           | Serial No.  | Next Cal. Date |
|-------------------------|--------------|-----------------|-------------|----------------|
| Spectrum Analyzer       | R&S          | FSP30           | 100002      | 2010/12/08     |
| Spectrum Analyzer       | R&S          | FSP40           | 100478      | 2011/04/20     |
| Preamplifier            | Agilent      | 8449B           | 3008A01434  | 2011/04/20     |
| Preamplifier            | SCHAFFNER    | CA30100         | 2           | 2010/11/03     |
| Horn Antenna            | Schwarzbeck  | BBHA 9120       | 9120D-583   | 2011/02/09     |
| Wide Bandwidth Sensor   | Anritsu      | MA2491A         | 728133      | 2010/11/13     |
| Power Meter             | Anritsu      | ML2495A         | 736010      | 2010/11/13     |
| Temp & Humidity chamber | GIAN FORCE   | GTH-150-40-2P-U | MAA0305-012 | 2011/05/07     |

Note: The above equipments are within the valid calibration period.

## 4 Radiated emission test

### 4.1 Limits

According to FCC 15.231(b) requirement:

In addition to the provisions of §15.205, the field strength of emissions from intentional radiator operated under this section shall not exceed the following:

#### Fundamental and harmonics emission limits

| Frequency<br>(MHz) | Field Strength of Fundamental        |   | Field Strength of Harmonics          |   |
|--------------------|--------------------------------------|---|--------------------------------------|---|
|                    | ( $\mu\text{V}/\text{m}@3\text{m}$ ) | ( $\text{dB}\mu\text{V}/\text{m}@3\text{m}$ ) | ( $\mu\text{V}/\text{m}@3\text{m}$ ) | ( $\text{dB}\mu\text{V}/\text{m}@3\text{m}$ ) |
| 433.92             | 10996                                | 80.8  | 1099.6                               | 60.8  |

#### General Radiated emission Limit

Spurious Emission tested through until 10<sup>th</sup> harmonic. Radiated emissions, which fall in the restricted bands, as defined in §15.205 (a), comply with the radiated emission limits specified in §15.209 (a).

| Frequency<br>(MHz) | 15.209 Limits                        |   |
|--------------------|--------------------------------------|---|
|                    | ( $\mu\text{V}/\text{m}@3\text{m}$ ) | ( $\text{dB}\mu\text{V}/\text{m}@3\text{m}$ ) |
| 30-88              | 100                                  | 40  |
| 88-216             | 150                                  | 43.5  |
| 216-960            | 200                                  | 46  |
| Above 960          | 500                                  | 54  |

Remark :

1. The table above tighter limit applies at the band edges.
2. The measurement distance in meters, which that between form closest point of EUT to instrument antenna.

## 4.2 Calculation of Average Factor

The output field strengths of specification in accordance with the FCC rules specify measurements with an average detector. During the test, a spectrum analyzer incorporating a peak detector was used. Therefore, a reduction factor can be applied to the resultant peak signal level and compared to the limit for measurement instrumentation incorporating an average detector.

The duty cycle is measured in 100 ms or the repetition cycle period, whichever is a shorter time frame. The duty cycle is measured by placing the spectrum analyzer to set zero span at 100kHz resolution bandwidth.

Averaging factor in dB =  $20 \log (\text{duty cycle})$

The duration of one cycle = 131.06ms

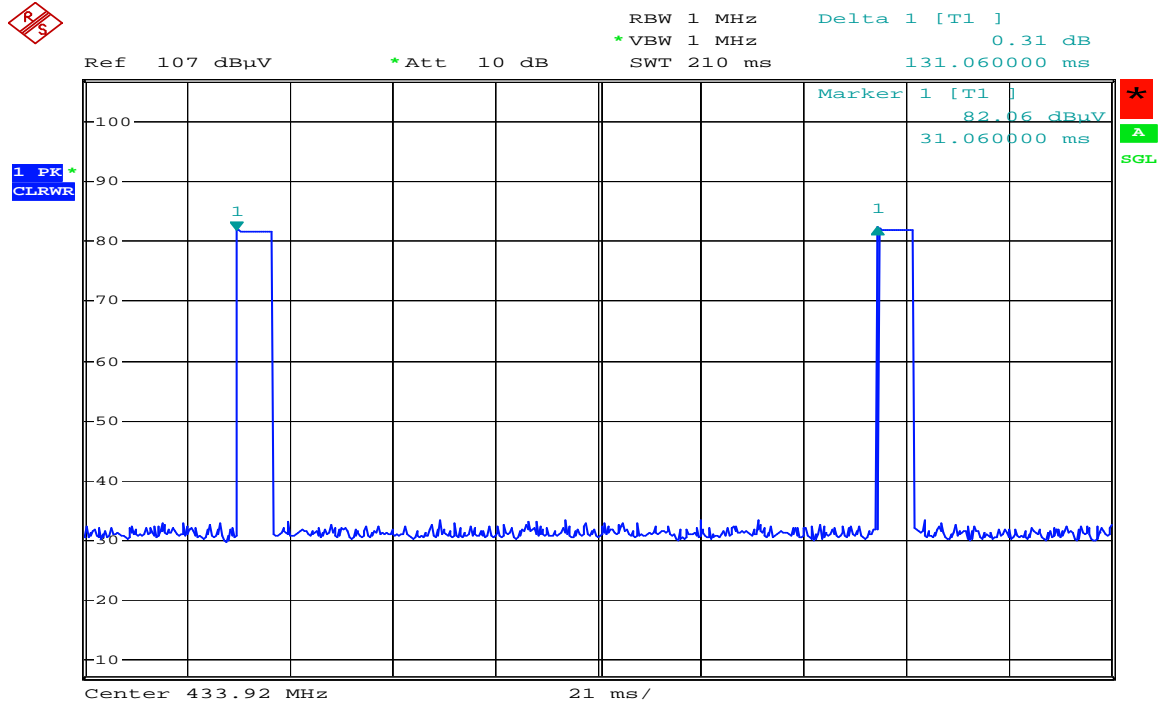
The duty cycle is simply the on-time divided by 100ms

Duty Cycle =  $(7.58\text{ms} \times 1) = 7.58 \text{ ms} / 100\text{ms}$

Therefore, the averaging factor is found by  $20 \log 0.0758 = -22.41\text{dB}$

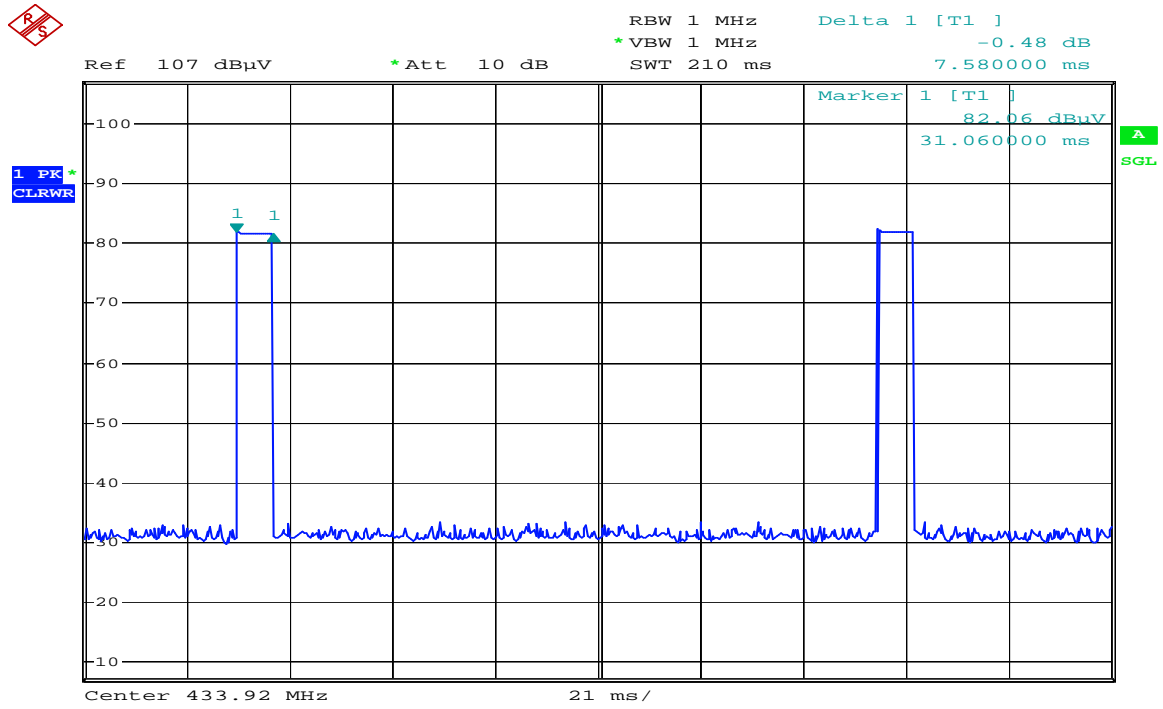
Please see the diagrams below.

# Duty Cycle



Comment: Duty cycle  
Date: 25.AUG.2010 13:10:05

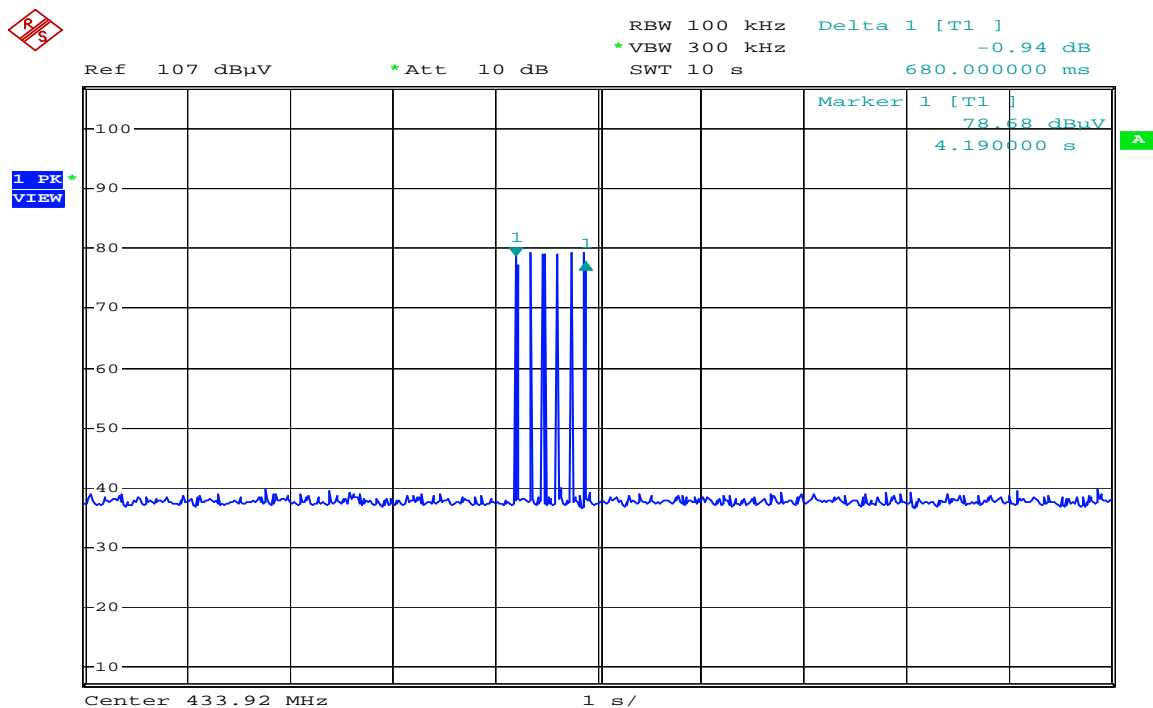
### Time Slot



Comment: Time slot  
Date: 25.AUG.2010 13:08:05

### Time Slot

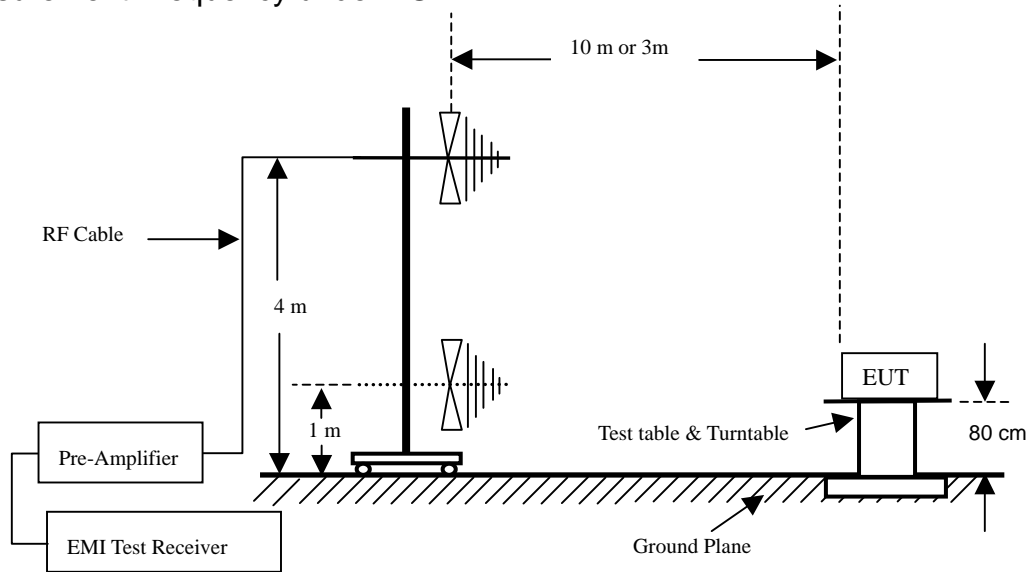
The EUT was complied with the requirement of FCC 15.231 (a)(1), which employed a switch that will automatically deactivate the transmitter within less than 5 seconds of being released.



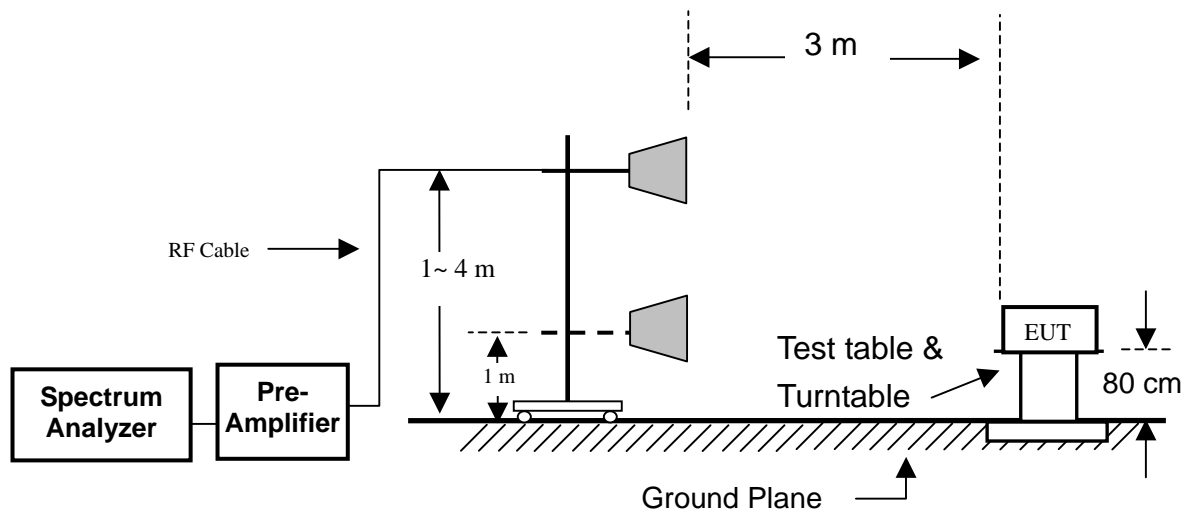
Comment: Deactivation  
Date: 24.AUG.2010 16:25:43

### 4.3 Configuration of Measurement

#### Measurement Frequency under 1GHz



#### Measurement Frequency above 1GHz



### 4.4 Test Procedure

Radiated emission measurements frequency range were performed from 30MHz to 5GHz. Spectrum Analyzer Resolution Bandwidth set to 100kHz or greater for frequencies from 30MHz to 1GHz, and set 1MHz Resolution Bandwidth for frequencies above 1GHz.

The EUT is place on non-conductive turntable for the test. If peripheral devices apply to the EUT, the peripheral devices will be connected to EUT and whole system. During the emission test, the signal is maximized through rotation and all cables were present worst-case emissions. The height of antenna and polarization is constantly changed for exploring maximum signal reading. The height of antenna can be up form reference ground to 4 meter and down to 1 meter.

### 4.5 Test Result

**PASS.**

The final test emission data is shown as following tables.

### Radiated Emission below 1GHz

| Frequency (MHz) | Antenna Polarization | Reading (dB $\mu$ V) | Preamp (dB) | Correction Factor (dB/m) | Corrected Level (dB $\mu$ V/m) | Limits (dB $\mu$ V/m) | Margin (dB) | Det. Mode |
|-----------------|----------------------|----------------------|-------------|--------------------------|--------------------------------|-----------------------|-------------|-----------|
| 75.420          | H                    | 54.80                | 33.29       | 6.82                     | 28.33                          | 40.00                 | -11.67      | QP        |
| 124.670         | H                    | 52.60                | 33.05       | 14.39                    | 33.94                          | 46.00                 | -12.06      | QP        |
| 269.700         | H                    | 46.90                | 33.50       | 21.07                    | 34.47                          | 46.00                 | -11.53      | QP        |
| 483.790         | H                    | 47.60                | 33.86       | 21.24                    | 34.98                          | 46.00                 | -11.02      | QP        |
| 648.000         | H                    | 47.20                | 33.58       | 24.13                    | 37.75                          | 46.00                 | -8.25       | QP        |
| 826.700         | H                    | 43.10                | 33.70       | 26.63                    | 36.03                          | 46.00                 | -9.97       | QP        |
| 83.220          | V                    | 52.41                | 33.14       | 8.73                     | 28.00                          | 40.00                 | -12.00      | QP        |
| 135.760         | V                    | 47.80                | 33.10       | 15.85                    | 30.55                          | 43.50                 | -12.95      | QP        |
| 227.400         | V                    | 49.30                | 33.37       | 19.85                    | 35.78                          | 46.00                 | -10.22      | QP        |
| 377.980         | V                    | 49.10                | 33.78       | 18.92                    | 34.24                          | 46.00                 | -11.76      | QP        |
| 573.690         | V                    | 48.50                | 33.94       | 22.94                    | 37.50                          | 46.00                 | -8.50       | QP        |
| 648.330         | V                    | 48.06                | 33.58       | 23.92                    | 38.40                          | 46.00                 | -7.60       | QP        |

Remark : Corrected Level = Reading – Preamp + Correction Factor  
 Correction Factor = Antenna Factor + Cable Loss



### Fundamental and harmonics emissions

| Freq.<br>(MHz) | Antenna<br>Polarization | Reading<br>(dBμV) | Preamp<br>(dB) | Correction<br>Factor<br>(dB/m) | Average<br>Factor<br>(dB) | Corrected<br>Level<br>(dBμV/m) | Limits<br>(dBμV/m) | Margin<br>(dB) | Det.<br>Mode |
|----------------|-------------------------|-------------------|----------------|--------------------------------|---------------------------|--------------------------------|--------------------|----------------|--------------|
| 433.92         | H                       | 64.98             | 0.00           | 18.59                          | --                        | 83.57                          | 100.8              | -17.23         | PK           |
| 433.92         | H                       | 64.98             | 0.00           | 18.59                          | -22.41                    | 61.16                          | 80.8               | -19.64         | AV           |
| 867.84         | H                       | 53.86             | 33.78          | 26.57                          | --                        | 46.65                          | 60.8               | -14.15         | PK           |
| 1301.76        | H                       | 34.95             | 25.98          | 27.97                          | --                        | 36.94                          | 54.0               | -17.06         | PK           |
| 1735.68        | H                       | 40.96             | 26.15          | 28.72                          | --                        | 43.53                          | 60.8               | -17.27         | PK           |
| 2169.60        | H                       | 37.57             | 26.23          | 30.59                          | --                        | 41.93                          | 60.8               | -18.87         | PK           |
| 2603.52        | H                       | 40.13             | 26.25          | 32.12                          | --                        | 46.00                          | 60.8               | -14.80         | PK           |
| 3037.44        | H                       | 44.09             | 26.20          | 33.04                          | --                        | 50.93                          | 60.8               | -9.87          | PK           |
| 3471.36        | H                       | 40.43             | 26.32          | 33.83                          | --                        | 47.94                          | 60.8               | -12.86         | PK           |
| *3905.28       | H                       | 41.16             | 26.21          | 34.92                          | --                        | 49.87                          | 54.0               | -4.13          | PK           |
| *4339.2        | H                       | 40.37             | 26.12          | 35.90                          | --                        | 50.15                          | 54.0               | -3.85          | PK           |
| 433.92         | V                       | 70.50             | 0.00           | 19.33                          | --                        | 89.83                          | 100.8              | -10.97         | PK           |
| 433.92         | V                       | 70.50             | 0.00           | 19.33                          | -22.41                    | 67.42                          | 80.8               | -13.38         | AV           |
| 867.84         | V                       | 54.52             | 33.78          | 26.77                          | --                        | 47.51                          | 60.8               | -13.29         | PK           |
| 1301.76        | V                       | 37.72             | 25.98          | 27.98                          | --                        | 39.72                          | 54.0               | -14.28         | PK           |
| 1735.68        | V                       | 45.18             | 26.15          | 28.72                          | --                        | 47.75                          | 60.8               | -13.05         | PK           |
| 2169.96        | V                       | 38.33             | 26.23          | 30.59                          | --                        | 42.69                          | 60.8               | -18.11         | PK           |
| 2603.52        | V                       | 41.36             | 26.25          | 32.13                          | --                        | 47.24                          | 60.8               | -13.56         | PK           |
| 3037.44        | V                       | 48.04             | 26.20          | 33.04                          | --                        | 54.88                          | 60.8               | -5.92          | PK           |
| 3471.36        | V                       | 45.78             | 26.32          | 33.83                          | --                        | 53.29                          | 60.8               | -7.51          | PK           |
| *3905.28       | V                       | 40.24             | 26.21          | 34.92                          | --                        | 48.95                          | 54.0               | -5.05          | PK           |
| *4339.2        | V                       | 38.93             | 26.12          | 35.90                          | --                        | 48.71                          | 54.0               | -5.29          | PK           |

Remark :

1. Corrected Level = Reading – Preamp + Correction Factor
2. Correction Factor = Antenna Factor + Cable Loss
3. “ \* ” Mark indicated Background Noise Level

## **5 Emission bandwidth**

### **5.1 Limits**

According to FCC 15.231(c) requirement:

The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating between 70 MHz to 900 MHz. Those devices operating above 900 MHz, the emission spurious shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier.

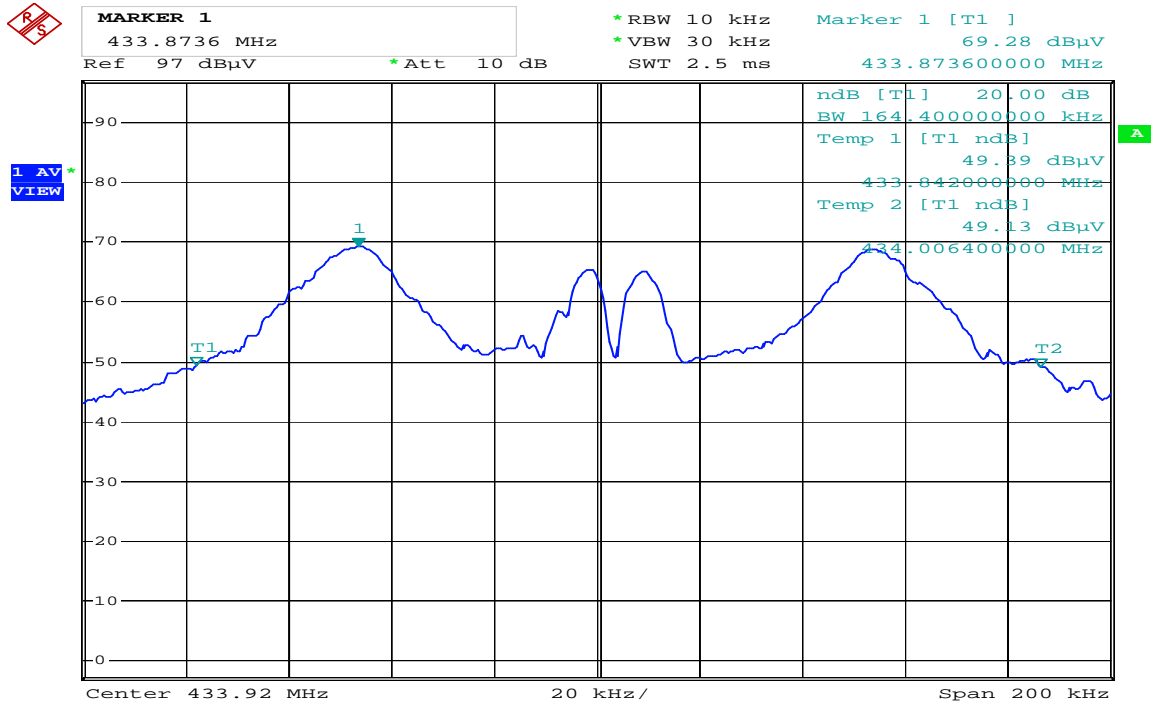
B.W (20dBc) Limit = 0.25% \* f(MHz) = 0.25% \* 433.92MHz = 1084.8kHz

### **5.2 Test Result**

**PASS.**

The final test data is shown as following.

| Channel Frequency (MHz) | Measured 20dB Bandwidth (kHz) | Limit (kHz) | Result |
|-------------------------|-------------------------------|-------------|--------|
| 433.92                  | 164.4                         | 1084.8      | PASS   |



Comment: 20dB Bandwidth  
 Date: 3.SEP.2010 15:17:21