

## FCC Test Report

**Report No.:** RF160530E07

**FCC ID:** YLIGHT-RGBTX3

**Test Model:** GT-RGBTX3

**Received Date:** May 30, 2016

**Test Date:** June 17 to 23, 2016

**Issued Date:** July 06, 2016

**Applicant:** H.S. CRAFT MANUFACTURING CO.

**Address:** 9F, NO.35, GUANG FU N. ROAD, TAIPEI, TAIWAN

**Issued By:** Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch  
Hsin Chu Laboratory

**Lab Address:** E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300,  
Taiwan R.O.C.

**Test Location (1):** E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300,  
Taiwan R.O.C.

**Test Location (2):** No. 49, Ln. 206, Wende Rd., Shangshan Tsuen, Chiung Lin Hsiang, Hsin  
Chu Hsien 307, Taiwan R.O.C.



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### Release Control Record

| Issue No.   | Description       | Date Issued   |
|-------------|-------------------|---------------|
| RF160530E07 | Original release. | July 06, 2016 |

## 1 Certificate of Conformity

**Product:** Remote control

**Brand:** GE

**Test Model:** GT-RGBTX3


**Sample Status:** ENGINEERING SAMPLE

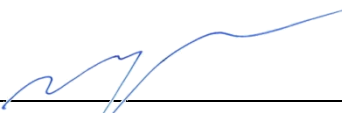
**Applicant:** H.S. CRAFT MANUFACTURING CO.

**Test Date:** June 17 to 23, 2016

**Standards:** 47 CFR FCC Part 15, Subpart C (Section 15.231)  
ANSI C63.10: 2013

The above equipment has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

**Prepared by :**  , **Date:** July 06, 2016  
Claire Kuan / Specialist

**Approved by :**  , **Date:** July 06, 2016  
May Chen / Manager

## 2 Summary of Test Results

| 47 CFR FCC Part 15, Subpart C (SECTION 15.231) |                                |        |  |
|--|--------------------------------|--------|--|
| FCC Clause                                     | Test Item                      | Result | Remarks  |
| 15.207   | AC Power Conducted Emission    | NA     | Without AC power port of the EUT.  |
| 15.209<br>15.231(b)                            | Radiated Emission Test         | PASS   | Meet the requirement of limit.<br>Minimum passing margin is -1.2dB at 433.92MHz. |
| 15.231(c)                                      | Emission Bandwidth Measurement | PASS   | Meet the requirement of limit.   |
| 15.231(a)                                      | De-activation                  | PASS   | Meet the requirement of limit.   |

### 2.1 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

| Measurement                    | Frequency     | Expanded Uncertainty (k=2) ( $\pm$ ) |
|--------------------------------|---------------|--------------------------------------|
| Radiated Emissions up to 1 GHz | 30MHz ~ 1GHz  | 5.31 dB                              |
| Radiated Emissions above 1 GHz | 1GHz ~ 6GHz   | 3.40 dB                              |
|                                | 6GHz ~ 18GHz  | 3.73 dB                              |
|                                | 18GHz ~ 40GHz | 4.11 dB                              |

### 2.2 Modification Record

There were no modifications required for compliance.

### 3 General Information

#### 3.1 General Description of EUT

|                     |                     |
|---------------------|---------------------|
| Product             | Remote control      |
| Brand               | GE                  |
| Test Model          | GT-RGBTX3           |
| Status of EUT       | ENGINEERING SAMPLE  |
| Power Supply Rating | 6Vdc from batteries |
| Modulation Type     | ASK                 |
| Transfer Rate       | 2.4kbps             |
| Operating Frequency | 433.92MHz           |
| Number of Channel   | 1                   |
| Antenna Type        | Refer to Note       |
| Antenna Connector   | Refer to Note       |
| Accessory Device    | Battery (LR44) x 4  |
| Data Cable Supplied | NA                  |

Note:

1. The antenna provided to the EUT, please refer to the following table:

| Antenna Gain (dBi) | Antenna | Connector Type | Frequency range |
|--------------------|---------|----------------|-----------------|
| 0                  | PCB     | NA             | 433.92MHz       |

2. The above EUT information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or user's manual.

#### 3.2 Description of Test Modes

One channel was provided to this EUT:

| Channel | FREQ. (MHz) |
|---------|-------------|
| 1       | 433.92      |

### 3.2.1 Test Mode Applicability and Tested Channel Detail

| EUT CONFIGURE MODE | APPLICABLE TO |         |     |    |    | DESCRIPTION |
|--------------------|---------------|---------|-----|----|----|-------------|
|                    | RE $\geq$ 1G  | RE < 1G | PLC | EB | DT |             |
| -                  | √             | √       | -   | √  | √  | -           |

Where

**RE $\geq$ 1G:** Radiated Emission above 1GHz

**RE<1G:** Radiated Emission below 1GHz

**PLC:** Power Line Conducted Emission

**EB:** 20dB Bandwidth measurement

**DT:** Deactivation Time measurement

**NOTE:** 1. The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on X-plane.

#### Radiated Emission Test (Above 1GHz):

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

| AVAILABLE CHANNEL | TESTED CHANNEL | MODULATION TYPE |
|-------------------|----------------|-----------------|
| 1                 | 1              | ASK             |

#### Radiated Emission Test (Below 1GHz):

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

| AVAILABLE CHANNEL | TESTED CHANNEL | MODULATION TYPE |
|-------------------|----------------|-----------------|
| 1                 | 1              | ASK             |

#### Emission Bandwidth Measurement:

- ☒ This item includes all test value of each mode, but only includes spectrum plot of worst value of each mode.
- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

| AVAILABLE CHANNEL | TESTED CHANNEL | MODULATION TYPE |
|-------------------|----------------|-----------------|
| 1                 | 1              | ASK             |

### **Deactivation Time Measurement:**

- ☒ This item includes all test value of each mode, but only includes spectrum plot of worst value of each mode.
- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

| AVAILABLE CHANNEL | TESTED CHANNEL | MODULATION TYPE |
|-------------------|----------------|-----------------|
| 1                 | 1              | ASK             |

### **TEST CONDITION:**

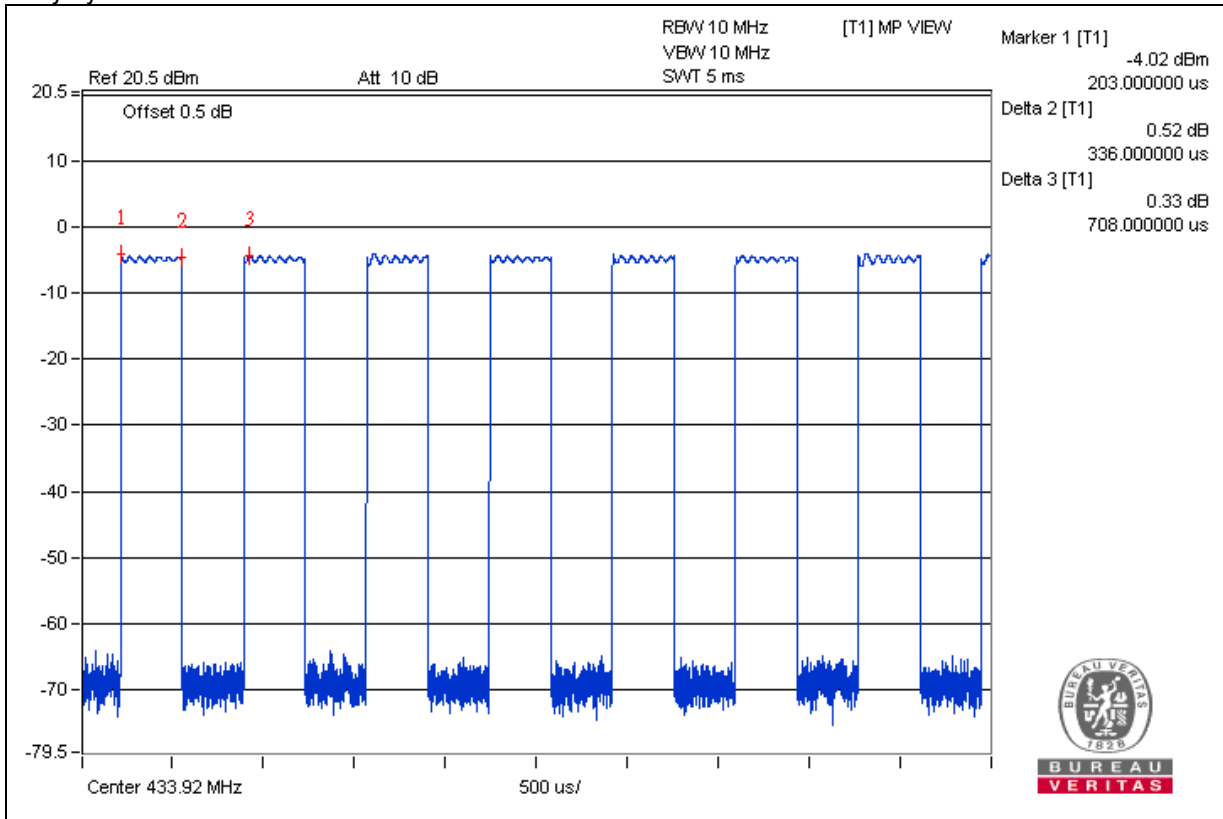
| Applicable To | Environmental Conditions | Input Power | Tested By     |
|---------------|--------------------------|-------------|---------------|
| RE $\geq$ 1G  | 25deg. C, 65%RH          | 6Vdc        | Tim Ho        |
| RE<1G         | 25deg. C, 65%RH          | 6Vdc        | Tim Ho        |
| EB            | 25deg. C, 60%RH          | 6Vdc        | Anderson Chen |
| DT            | 25deg. C, 60%RH          | 6Vdc        | Anderson Chen |



### 3.3 Duty Cycle of Test Signal

Duty cycle of test signal is < 98 %

Duty cycle =  $0.336 \text{ ms} / 0.708 \text{ ms} = 0.475$

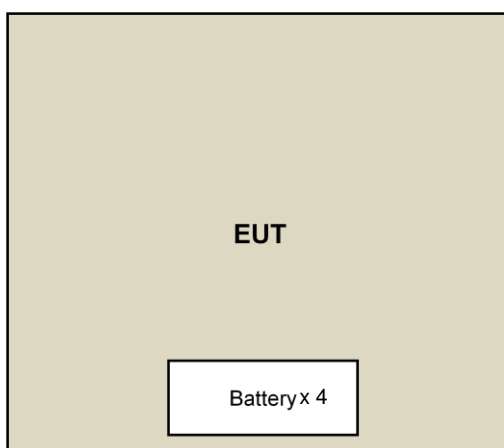


### 3.4 Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

| ID | Product | Brand  | Model No. | Serial No. | FCC ID | Remarks         |
|----|---------|--------|-----------|------------|--------|-----------------|
| A. | Battery | Maxell | LR44      | NA         | NA     | Provided by Lab |

#### 3.4.1 Configuration of System under Test



### 3.5 General Description of Applied Standards

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

**FCC Part 15, Subpart C (15.231)**

ANSI C63.10-2013

All test items have been performed and recorded as per the above standards.

**Note:** The EUT has been verified to comply with the requirements of FCC Part 15, Subpart B, Class B (DoC).  
The test report has been issued separately.

## 4 Test Types and Results

### 4.1 Radiated Emission Measurement

#### 4.1.1 Limits of Radiated Emission Measurement

| Fundamental Frequency (MHz) | Field Strength of Fundamental |               | Field Strength of Spurious |               |
|-----------------------------|-------------------------------|---------------|----------------------------|---------------|
|                             | uV/meter                      | dBuV/meter    | uV/meter                   | dBuV/meter    |
| 40.66 ~ 40.70               | 2250                          | 67.04         | 225                        | 48.04         |
| 70 ~ 130                    | 1250                          | 61.94         | 125                        | 41.94         |
| 130 ~ 174                   | 1250 ~ 3750                   | 61.94 ~ 71.48 | 125 ~ 375                  | 41.94 ~ 51.48 |
| 174 ~ 260                   | 3750                          | 71.48         | 375                        | 51.48         |
| 260 ~ 470                   | 3750 ~ 12500                  | 71.48 ~ 81.94 | 375 ~ 1250                 | 51.48 ~ 61.94 |
| Above 470                   | 12500                         | 81.94         | 1250                       | 61.94         |

**NOTE:**

- Where F is the frequency in MHz, the formula for calculating the maximum permitted fundamental field strengths are as follows: for the band 130-174 MHz,  $\mu\text{V/m}$  at 3 meters =  $56.81818(F) - 6136.3636$ ; for the band 260-470 MHz,  $\mu\text{V/m}$  at 3 meters =  $41.6667(F) - 7083.3333$ . The maximum permitted unwanted emission level is 20 dB below the maximum permitted fundamental level.
- The above field strength limits are specified at a distance of 3meters. The tighter limits apply at the band edges.

Emissions radiated outside of the specified bands, shall be according to the general radiated limits in 15.209 as following:

| Frequencies (MHz) | Field Strength (microvolts/meter) | Measurement Distance (meters) |
|-------------------|-----------------------------------|-------------------------------|
| 0.009 ~ 0.490     | 2400/F(kHz)                       | 300                           |
| 0.490 ~ 1.705     | 24000/F(kHz)                      | 30                            |
| 1.705 ~ 30.0      | 30                                | 30                            |
| 30 ~ 88           | 100                               | 3                             |
| 88 ~ 216          | 150                               | 3                             |
| 216 ~ 960         | 200                               | 3                             |
| Above 960         | 500                               | 3                             |

**NOTE:**

- The lower limit shall apply at the transition frequencies.
- Emission level (dBuV/m) =  $20 \log$  Emission level ( $\mu\text{V/m}$ ).
- For frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.

#### 4.1.2 Test Instruments

| DESCRIPTION & MANUFACTURER                     | MODEL NO.   | SERIAL NO.                    | CALIBRATED DATE | CALIBRATED UNTIL |
|--|---|-------------------------------|-----------------|------------------|
| Test Receiver<br>Agilent                       | N9038A  | MY50010156                    | Aug. 12, 2015   | Aug. 11, 2016    |
| Pre-Amplifier <sup>(*)</sup><br>EMCI           | EMC001340   | 980142                        | Jan. 20, 2016   | Jan. 19, 2018    |
| Loop Antenna <sup>(*)</sup><br>Electro-Metrics | EM-6879   | 264                           | Dec. 16, 2014   | Dec. 15, 2016    |
| RF Cable                                       | NA  | LOOPCAB-001<br>LOOPCAB-002    | Jan. 18, 2016   | Jan. 17, 2017    |
| Pre-Amplifier<br>Mini-Circuits                 | ZFL-1000VH2<br>B  | AMP-ZFL-05                    | May 07, 2016    | May 06, 2017     |
| Trilog Broadband Antenna<br>SCHWARZBECK        | VULB 9168   | 9168-156                      | Jan. 04, 2016   | Jan. 03, 2017    |
| RF Cable                                       | 8D  | 966-3-1<br>966-3-2<br>966-3-3 | Apr. 02, 2016   | Apr. 01, 2017    |
| Horn_Antenna<br>SCHWARZBECK                    | BBHA9120-D  | 9120D-406                     | Jan. 20, 2016   | Jan. 19, 2017    |
| Pre-Amplifier<br>Agilent                       | 8449B   | 3008A02465                    | Apr. 05, 2016   | Apr. 04, 2017    |
| RF Cable                                       | EMC104-SM-<br>SM-2000<br>EMC104-SM-<br>SM-5000<br>EMC104-SM-<br>SM-5000 | 150317<br>150321<br>150322    | Mar. 30, 2016   | Mar. 29, 2017    |
| Spectrum Analyzer<br>Keysight                  | N9030A  | MY54490520                    | July 26, 2015   | July 25, 2016    |
| Pre-Amplifier<br>EMCI                          | EMC184045   | 980143                        | Jan. 15, 2016   | Jan. 14, 2017    |
| Horn_Antenna<br>SCHWARZBECK                    | BBHA 9170   | BBHA9170608                   | Jan. 08, 2016   | Jan. 07, 2017    |
| RF Cable                                       | SUCOFLEX<br>102   | 36432/2<br>36441/2            | Jan. 16, 2016   | Jan. 15, 2017    |
| Software                                       | ADT_Radiated<br>_V8.7.07  | NA                            | NA              | NA               |
| Antenna Tower & Turn Table<br>Max-Full         | MF-7802   | MF780208406                   | NA              | NA               |
| Boresight Antenna Fixture                      | FBA-01  | FBA-SIP01                     | NA              | NA               |

#### Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. \*The calibration interval of the above test instruments is 24 months and the calibrations are traceable to NML/ROC and NIST/USA.
3. The test was performed in 966 Chamber No. 3.
4. The FCC Site Registration No. is 147459
5. The CANADA Site Registration No. is 20331-1
6. Tested Date: June 20 to 21, 2016

#### 4.1.3 Test Procedures

- a. The EUT was placed on the top of a rotating table 0.8 meters (for below 1GHz) / 1.5 meters (for above 1GHz) above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.
- f. The test-receiver system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

**Note:**

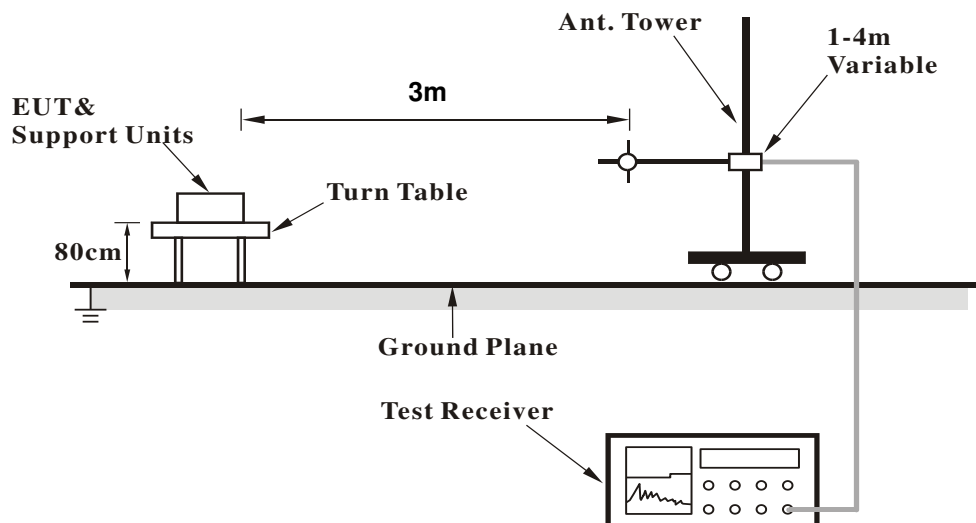
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is  $\geq 1/T$  (Duty cycle  $< 98\%$ ) or 10Hz (Duty cycle  $\geq 98\%$ ) for Average detection (AV) at frequency above 1GHz.
4. All modes of operation were investigated and the worst-case emissions are reported.

#### 4.1.4 Deviation from Test Standard

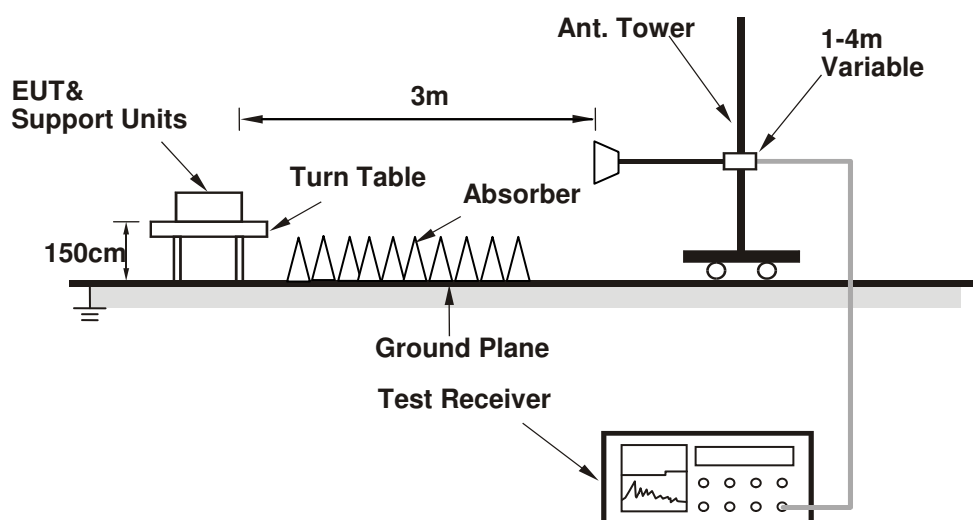
No deviation.

#### 4.1.5 Test Setup

##### <Frequency Range below 1GHz>



##### <Frequency Range above 1GHz>



For the actual test configuration, please refer to the attached file (Test Setup Photo).

#### 4.1.6 EUT Operating Conditions

- a. Placed the EUT on the testing table.
- b. Set the EUT under transmission condition continuously at specific channel frequency.



#### 4.1.7 Test Results

##### ABOVE 1GHz DATA :

|                        |              |                          |              |
|------------------------|--------------|--------------------------|--------------|
| <b>CHANNEL</b>         | TX Channel 1 | <b>DETECTOR FUNCTION</b> | Peak (PK)    |
| <b>FREQUENCY RANGE</b> | 1GHz ~ 25GHz |                          | Average (AV) |

| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M |             |                         |                |             |                    |                      |                  |                          |
|---|-------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|--------------------------|
| NO.   | FREQ. (MHz) | EMISSION LEVEL (dBuV/m) | LIMIT (dBuV/m) | MARGIN (dB) | ANTENNA HEIGHT (m) | TABLE ANGLE (Degree) | RAW VALUE (dBuV) | CORRECTION FACTOR (dB/m) |
| 1   | 1301.76     | 53.3 PK                 | 74.0           | -20.7       | 2.16 H             | 320                  | 60.4             | -7.1                     |
| 2   | 1301.76     | 46.8 AV                 | 54.0           | -7.2        | 2.16 H             | 320                  | 53.9             | -7.1                     |
| 3   | 1735.68     | 51.0 PK                 | 80.8           | -29.8       | 1.41 H             | 327                  | 57.4             | -6.4                     |
| 4   | 1735.68     | 44.5 AV                 | 60.8           | -16.3       | 1.41 H             | 327                  | 50.9             | -6.4                     |
| 5   | 2169.60     | 50.4 PK                 | 80.8           | -30.4       | 1.32 H             | 232                  | 55.5             | -5.1                     |
| 6   | 2169.60     | 43.9 AV                 | 60.8           | -16.9       | 1.32 H             | 232                  | 49.0             | -5.1                     |
| 7   | 2603.52     | 50.3 PK                 | 80.8           | -30.5       | 1.42 H             | 135                  | 53.8             | -3.5                     |
| 8   | 2603.52     | 43.8 AV                 | 60.8           | -17.0       | 1.42 H             | 135                  | 47.3             | -3.5                     |
| 9   | 3037.44     | 54.5 PK                 | 80.8           | -26.3       | 1.47 H             | 350                  | 56.9             | -2.4                     |
| 10  | 3037.44     | 48.0 AV                 | 60.8           | -12.8       | 1.47 H             | 350                  | 50.4             | -2.4                     |
| 11  | 3471.36     | 51.8 PK                 | 80.8           | -29.0       | 1.19 H             | 343                  | 53.4             | -1.6                     |
| 12  | 3471.36     | 45.3 AV                 | 60.8           | -15.5       | 1.19 H             | 343                  | 46.9             | -1.6                     |
| 13  | 3905.28     | 49.9 PK                 | 74.0           | -24.1       | 1.19 H             | 95                   | 50.2             | -0.3                     |
| 14  | 3905.28     | 43.4 AV                 | 54.0           | -10.6       | 1.19 H             | 95                   | 43.7             | -0.3                     |
| 15  | 4339.20     | 50.5 PK                 | 74.0           | -23.5       | 1.19 H             | 76                   | 49.3             | 1.2                      |
| 16  | 4339.20     | 44.0 AV                 | 54.0           | -10.0       | 1.19 H             | 76                   | 42.8             | 1.2                      |

#### REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. The average value of fundamental frequency is: Average = Peak value + 20 log(Duty cycle) Where the duty factor is calculated from following formula:  

$$20 \log (\text{Duty cycle}) = 20 \log (0.335 \text{ ms} / 0.708 \text{ ms}) = -6.5 \text{ dB}$$

|                        |              |                              |              |
|------------------------|--------------|------------------------------|--------------|
| <b>CHANNEL</b>         | TX Channel 1 | <b>DETECTOR<br/>FUNCTION</b> | Peak (PK)    |
| <b>FREQUENCY RANGE</b> | 1GHz ~ 25GHz |                              | Average (AV) |

| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M |                |                               |                   |                |                          |                            |                        |                                |
|---|----------------|-------------------------------|-------------------|----------------|--------------------------|----------------------------|------------------------|--------------------------------|
| NO.   | FREQ.<br>(MHz) | EMISSION<br>LEVEL<br>(dBuV/m) | LIMIT<br>(dBuV/m) | MARGIN<br>(dB) | ANTENNA<br>HEIGHT<br>(m) | TABLE<br>ANGLE<br>(Degree) | RAW<br>VALUE<br>(dBuV) | CORRECTION<br>FACTOR<br>(dB/m) |
| 1   | 1301.76        | 46.5 PK                       | 74.0              | -27.5          | 1.00 V                   | 295                        | 53.6                   | -7.1                           |
| 2   | 1301.76        | 40.0 AV                       | 54.0              | -14.0          | 1.00 V                   | 295                        | 47.1                   | -7.1                           |
| 3   | 1735.68        | 46.4 PK                       | 80.8              | -34.4          | 1.00 V                   | 200                        | 52.8                   | -6.4                           |
| 4   | 1735.68        | 39.9 AV                       | 60.8              | -20.9          | 1.00 V                   | 200                        | 46.3                   | -6.4                           |
| 5   | 2169.60        | 47.5 PK                       | 80.8              | -33.3          | 1.02 V                   | 169                        | 52.6                   | -5.1                           |
| 6   | 2169.60        | 41.0 AV                       | 60.8              | -19.8          | 1.02 V                   | 169                        | 46.1                   | -5.1                           |
| 7   | 2603.52        | 49.1 PK                       | 80.8              | -31.7          | 1.40 V                   | 279                        | 52.6                   | -3.5                           |
| 8   | 2603.52        | 42.6 AV                       | 60.8              | -18.2          | 1.40 V                   | 279                        | 46.1                   | -3.5                           |
| 9   | 3037.44        | 49.1 PK                       | 80.8              | -31.7          | 1.40 V                   | 65                         | 51.5                   | -2.4                           |
| 10  | 3037.44        | 42.6 AV                       | 60.8              | -18.2          | 1.40 V                   | 65                         | 45.0                   | -2.4                           |
| 11  | 3471.36        | 49.4 PK                       | 80.8              | -31.4          | 1.32 V                   | 298                        | 51.0                   | -1.6                           |
| 12  | 3471.36        | 42.9 AV                       | 60.8              | -17.9          | 1.32 V                   | 298                        | 44.5                   | -1.6                           |
| 13  | 3905.28        | 50.1 PK                       | 74.0              | -23.9          | 1.32 V                   | 80                         | 50.4                   | -0.3                           |
| 14  | 3905.28        | 43.6 AV                       | 54.0              | -10.4          | 1.32 V                   | 80                         | 43.9                   | -0.3                           |
| 15  | 4339.20        | 51.2 PK                       | 74.0              | -22.8          | 1.02 V                   | 349                        | 50.0                   | 1.2                            |
| 16  | 4339.20        | 44.7 AV                       | 54.0              | -9.3           | 1.02 V                   | 349                        | 43.5                   | 1.2                            |

**REMARKS:**

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. The average value of fundamental frequency is: Average = Peak value + 20 log(Duty cycle) Where the duty factor is calculated from following formula:  

$$20 \log (\text{Duty cycle}) = 20 \log (0.335 \text{ ms} / 0.708 \text{ ms}) = -6.5 \text{ dB}$$

# BELOW 1GHz DATA

|                 |              |                      |                 |
|-----------------|--------------|----------------------|-----------------|
| CHANNEL         | TX Channel 1 | DETECTOR<br>FUNCTION | Quasi-Peak (QP) |
| FREQUENCY RANGE | Below 1GHz   |                      |                 |

| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M |                |                               |                   |                |                          |                            |                        |                                |
|---|----------------|-------------------------------|-------------------|----------------|--------------------------|----------------------------|------------------------|--------------------------------|
| NO.   | FREQ.<br>(MHz) | EMISSION<br>LEVEL<br>(dBuV/m) | LIMIT<br>(dBuV/m) | MARGIN<br>(dB) | ANTENNA<br>HEIGHT<br>(m) | TABLE<br>ANGLE<br>(Degree) | RAW<br>VALUE<br>(dBuV) | CORRECTION<br>FACTOR<br>(dB/m) |
| 1   | 80.44          | 25.8 QP                       | 60.8              | -35.0          | 2.25 H                   | 283                        | 38.6                   | -12.8                          |
| 2   | 216.24         | 35.7 QP                       | 60.8              | -25.1          | 2.25 H                   | 283                        | 47.0                   | -11.3                          |
| 3   | 324.88         | 23.5 QP                       | 46.0              | -22.5          | 2.25 H                   | 283                        | 30.1                   | -6.6                           |
| 4   | *433.92        | 79.6 QP                       | 80.8              | -1.2           | 2.26 H                   | 204                        | 83.3                   | -3.7                           |
| 5   | 650.80         | 38.6 QP                       | 60.8              | -22.2          | 2.25 H                   | 283                        | 37.9                   | 0.7                            |
| 6   | 868.08         | 32.5 QP                       | 60.8              | -28.3          | 2.25 H                   | 283                        | 28.7                   | 3.8                            |
| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M   |                |                               |                   |                |                          |                            |                        |                                |
| NO.   | FREQ.<br>(MHz) | EMISSION<br>LEVEL<br>(dBuV/m) | LIMIT<br>(dBuV/m) | MARGIN<br>(dB) | ANTENNA<br>HEIGHT<br>(m) | TABLE<br>ANGLE<br>(Degree) | RAW<br>VALUE<br>(dBuV) | CORRECTION<br>FACTOR<br>(dB/m) |
| 1   | 99.84          | 34.4 QP                       | 60.8              | -26.4          | 2.25 V                   | 283                        | 47.4                   | -13.0                          |
| 2   | 158.04         | 32.0 QP                       | 60.8              | -28.8          | 2.25 V                   | 283                        | 40.3                   | -8.3                           |
| 3   | 171.62         | 26.7 QP                       | 43.5              | -16.8          | 2.25 V                   | 283                        | 35.6                   | -8.9                           |
| 4   | *433.92        | 70.6 QP                       | 80.8              | -10.2          | 2.40 V                   | 282                        | 74.3                   | -3.7                           |
| 5   | 615.88         | 33.9 QP                       | 60.8              | -26.9          | 2.25 V                   | 283                        | 33.7                   | 0.2                            |
| 6   | 672.14         | 31.0 QP                       | 60.8              | -29.8          | 2.25 V                   | 283                        | 30.2                   | 0.8                            |

## REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " \* ": Fundamental frequency.

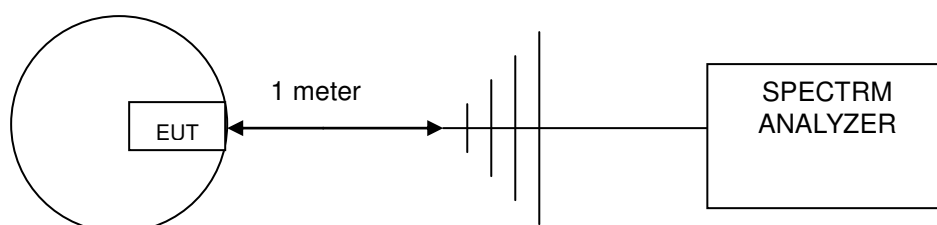
## 4.2 20dB Bandwidth Measurement

### 4.2.1 Limits of 20Bandwidth Measurement

The bandwidth of the emission shall be no wider than 0.25% of the center frequency for device operating above 70 MHz and below 900 MHz.

| Fundamental Frequency (MHz) | Limit of Emission Bandwidth (kHz) |
|-----------------------------|-----------------------------------|
| 433.92                      | 1084.8                            |

### 4.2.2 Test Setup



### 4.2.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

### 4.2.4 Test Procedure

- The EUT was placed on the turn table.
- The signal was coupled to the spectrum analyzer through an antenna.
- Set the resolution bandwidth to 10 kHz and video bandwidth to 30 kHz then select Peak function to scan the channel frequency.
- The emission bandwidth was measured and recorded.

### 4.2.5 Deviation fromTest Standard

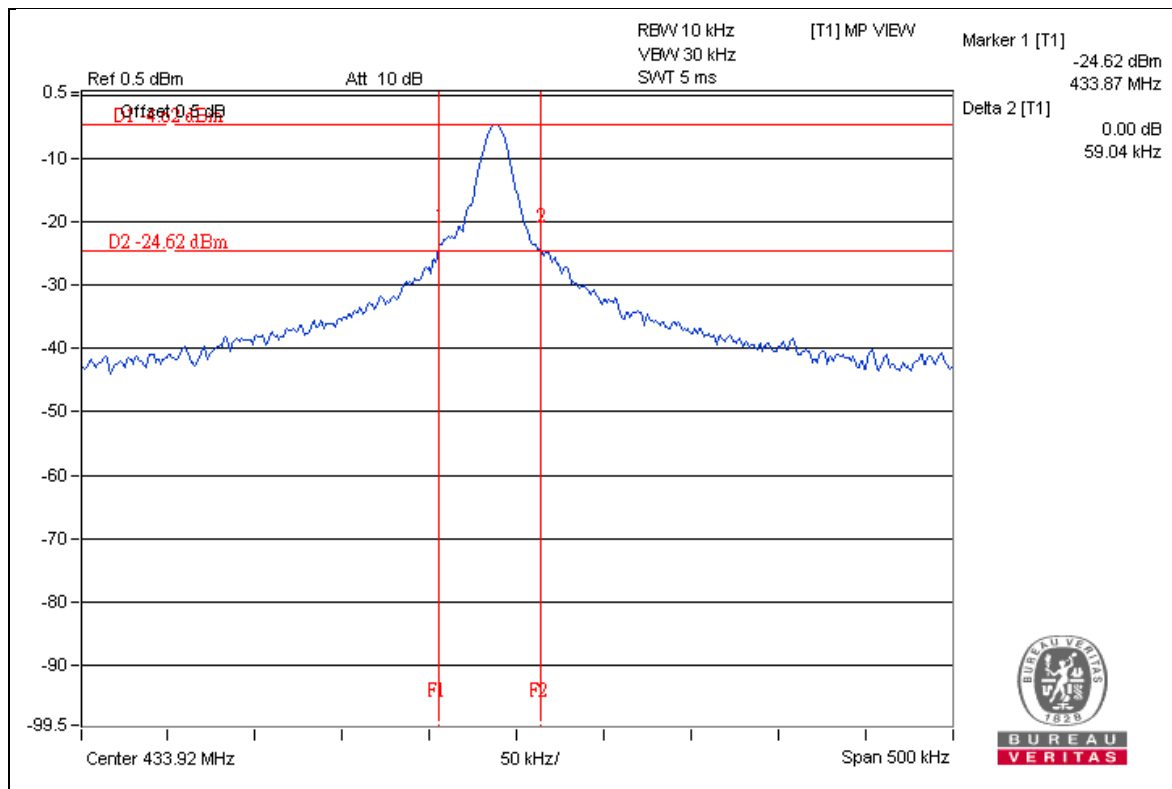
No deviation.

### 4.2.6 EUT Operating Conditions

The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

#### 4.2.7 Test Result

| Channel | Frequency (MHz) | 20dB Bandwidth (kHz) | Maximum Limit (kHz) | Pass / Fail |
|---------|-----------------|----------------------|---------------------|-------------|
| 1       | 433.92          | 59.04                | 1084.8              | Pass        |

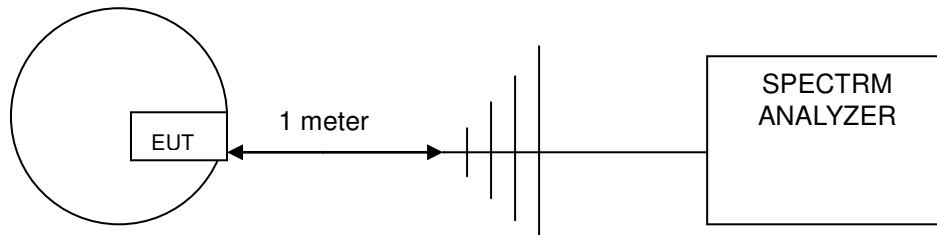


### 4.3 Deactivation Time Measurement

#### 4.3.1 Limits of Deactivation Time Measurement

A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.

#### 4.3.2 Test Setup



#### 4.3.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

#### 4.3.4 Test Procedures

- The EUT was placed on the turning table.
- The signal was coupled to the spectrum analyzer through an antenna.
- Set the resolution bandwidth to 100kHz and video bandwidth to 300kHz. The spectrum analyser was turned to the centre frequency of the transmitter's and the analyser's marker function was used to determine the duration of transmission.
- The transmission duration was measured and recorded.

#### 4.3.5 Deviation from Test Standard

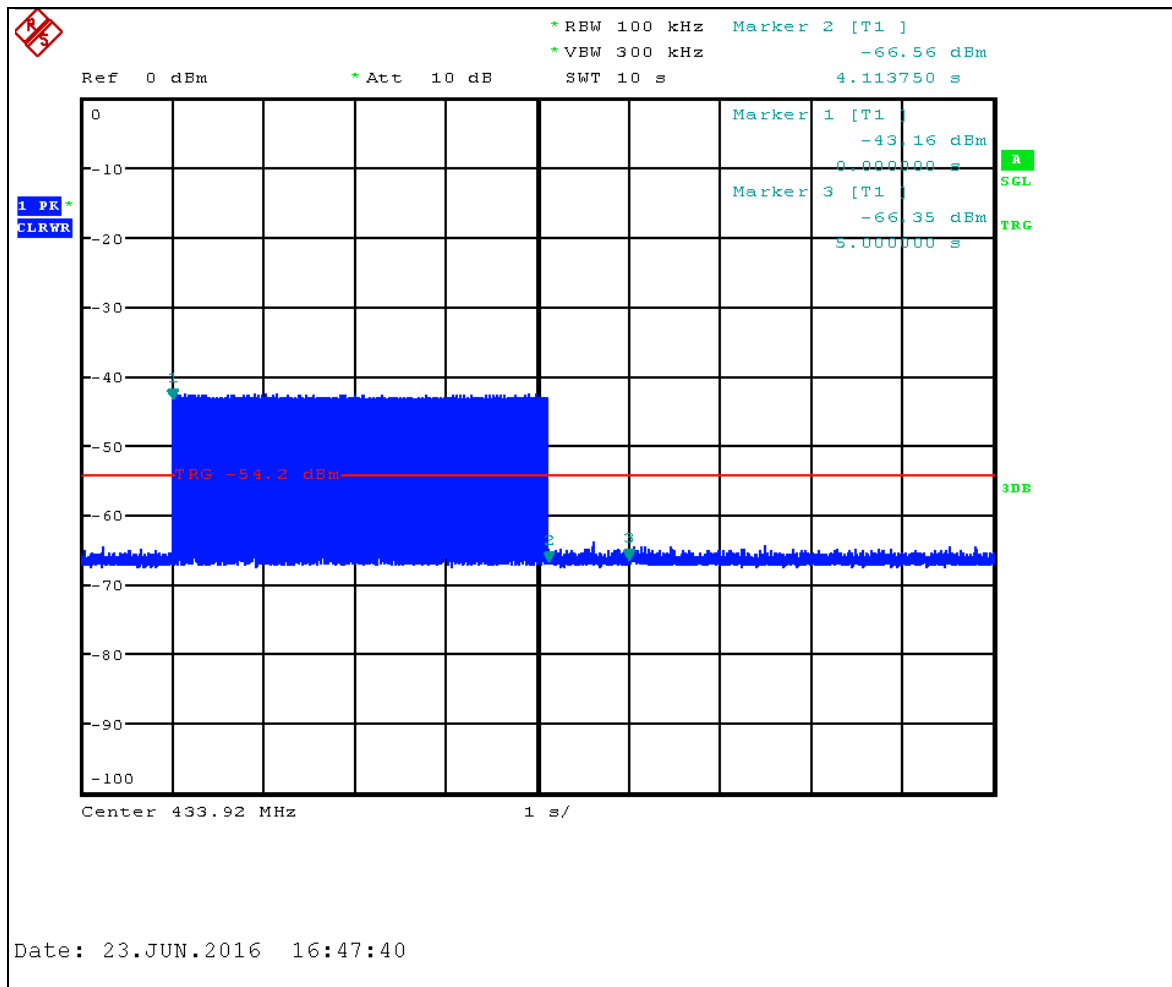
No deviation.

#### 4.3.6 EUT Operating Conditions

Same as Item 4.2.6.

#### 4.3.7 Test Results

| Channel | Frequency (MHz) | Transmission Time (Sec) | Maximum Limit (Sec) | Pass/Fail |
|---------|-----------------|-------------------------|---------------------|-----------|
| 1       | 433.92          | 4.113750                | 5                   | Pass      |



## 5 Pictures of Test Arrangements

Please refer to the attached file (Test Setup Photo).



## Appendix – Information on the Testing Laboratories

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are accredited and approved according to ISO/IEC 17025.

If you have any comments, please feel free to contact us at the following:

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The address and road map of all our labs can be found in our web site also.

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