

# FCC&IC Radio Test Report

**FCC ID: RNE06053MTX**

**IC: 6608A-06053MTX**

This report concerns (check one): Original Grant Class II Change

**Project No.** : 1605C142  
**Equipment** : Wireless Signal Repeater  
**Model Name** : 06053M  
**Applicant** : Chaney Instrument Co.  
**Address** : Flat 09,19/F.,Metro Centre Phase I,32 Lam Hing  
Street, Kowloon Bay, Kowloon, Hong Kong

**Date of Receipt** : May. 18, 2016  
**Date of Test** : May. 18, 2016 ~ May. 27, 2016  
**Issued Date** : May. 30, 2016  
**Tested by** : BTL Inc.

**Testing Engineer** : Shawn Xiao  
(Shawn Xiao)

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### **Limitation**

For the use of the authority's logo is limited unless the Test Standard(s)/Scope(s)/Item(s) mentioned in this test report is (are) included in the conformity assessment authorities acceptance respective.

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### REPORT ISSUED HISTORY

| Issued No.          | Description     | Issued Date   |
|---------------------|-----------------|---------------|
| BTL-FICP-1-1605C142 | Original Issue. | May. 30, 2016 |

## 1. CERTIFICATION

Equipment : Wireless Signal Repeater  
Trade Name : ACURITE  
Model Name : 06053M  
Applicant : Chaney Instrument Co.  
Manufacturer : Chaney Instrument Co.  
Address : Flat 09,19/F.,Metro Centre Phase I,32 Lam Hing Street, Kowloon Bay,  
Kowloon, Hong Kong  
Factory : Chaney Instrument Co.  
Address : Flat 09,19/F.,Metro Centre Phase I,32 Lam Hing Street, Kowloon Bay,  
Kowloon, Hong Kong  
Date of Test : May. 18, 2016 ~ May. 27, 2016  
Test Sample : Engineering Sample  
Standard(s) : FCC Part15, Subpart C(15.231)/ ANSI C63.10-2013  
Canada RSS-210 Issue 8 Dec. 2010

The above equipment has been tested and found compliance with the requirement of the relative standards by BTL Inc.

The test data, data evaluation, and equipment configuration contained in our test report (Ref No. BTL-FICP-1-1605C142) were obtained utilizing the test procedures, test instruments, test sites that has been accredited by the Authority of TAF according to the ISO-17025 quality assessment standard and technical standard(s).

## 2. SUMMARY OF TEST RESULTS

Test procedures according to the technical standard(s):

| FCC Part15, Subpart C (15.231), Canada RSS-210 Issue 8 |                      |  |          |                 |
|--|----------------------|--|----------|-----------------|
| Standard(s) Section                                    |                      | Test Item                              | Judgment | Remark          |
| RSS-Gen<br>8.8   | 15.207               | Conducted Emission                     | N/A      | <b>NOTE (1)</b> |
| RSS-210<br>A1.1.5                                      | 15.209&<br>15.231(e) | Radiated Spurious Emission             | PASS     |                 |
| RSS-210<br>A1.1.3                                      | 15.231(c)            | 20dB Occupied Bandwidth<br>Measurement | PASS     |                 |
| RSS-210<br>A1.1.5                                      | 15.231(e)            | Timing Testing                         | PASS     |                 |

**NOTE:**

(1) "N/A" denotes test is not applicable to this device.

(2) EUT is used new battery.

## 2.1 TEST FACILITY

The test facilities used to collect the test data in this report is at the location of No.3, Jinshagang 1st Road, Shixia, Dalang Town, Dongguan, Guangdong, China.

BTL's test firm number for FCC319330

BTL's test firm number for IC 4428B-1

## 2.2 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. The BTL measurement uncertainty is less than the CISPR 16-4-2  $U_{\text{CISPR}}$  requirement.

The reported uncertainty of measurement  $y \pm U$ , where expanded uncertainty  $U$  is based on a standard uncertainty multiplied by a coverage factor of  $k=2$ , providing a level of confidence of approximately **95%**.

### A. Radiated Measurement :

| Test Site       | Method | Measurement Frequency Range | Ant.<br>H / V | U,(dB) |
|-----------------|--------|-----------------------------|---------------|--------|
| DG-CB03<br>(3m) | CISPR  | 9KHz ~ 30MHz                | V             | 3.79   |
|                 |        | 9KHz ~ 30MHz                | H             | 3.57   |
|                 |        | 30MHz ~ 200MHz              | V             | 3.82   |
|                 |        | 30MHz ~ 200MHz              | H             | 3.78   |
|                 |        | 200MHz ~ 1,000MHz           | V             | 4.10   |
|                 |        | 200MHz ~ 1,000MHz           | H             | 4.06   |

| Test Site       | Method | Measurement Frequency Range | Ant.<br>H / V | U,(dB) |
|-----------------|--------|-----------------------------|---------------|--------|
| DG-CB03<br>(3m) | CISPR  | 1GHz ~ 18GHz                | V             | 3.12   |
|                 |        | 1GHz ~ 18GHz                | H             | 3.68   |
|                 |        | 18GHz ~ 40GHz               | V             | 4.15   |
|                 |        | 18GHz ~ 40GHz               | H             | 4.14   |

Note: Unless specifically mentioned, the uncertainty of measurement has not been taken into account to declare the compliance or non-compliance to the specification.



### 3. GENERAL INFORMATION

#### 3.1 GENERAL DESCRIPTION OF EUT

|                     |                                  |                                |
|---------------------|----------------------------------|--------------------------------|
| Equipment           | Wireless Signal Repeater         |                                |
| Trade Name          | ACURITE                          |                                |
| Model Name          | 06053M                           |                                |
| Model Difference    | N/A                              |                                |
| Product Description | Product Type                     | Low Power Communication Device |
|                     | Operation Frequency              | 433.92 MHz                     |
|                     | Modulation Type                  | ASK                            |
|                     | Number Of Channel                | 1CH, please see note 2.        |
|                     | Antenna Designation              | Internal antenna               |
|                     | Field Strength                   | 58.27 dBuV/m (AV Max.)         |
| PowerSource         | Supplied from 2 set 3*AA Battery |                                |
| Power Rating        | DC 4.5V                          |                                |

Note:

1. For a more detailed features description, please refer to the manufacturer's specifications or the user's manual.
2. Channel List:

| Channel | Frequency (MHz) |
|---------|-----------------|
| 01      | 433.92          |

### 3.2 DESCRIPTION OF TEST MODES

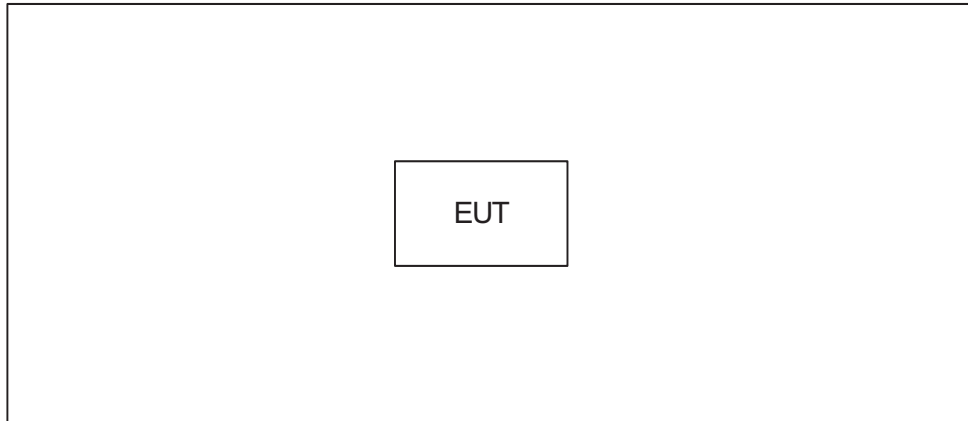
To investigate the maximum EMI emission characteristics generated from EUT, the test system was pre-scanning tested based on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

| Test Mode | Description     |
|-----------|-----------------|
| Mode 1    | TX CH 433.92MHz |

Note:

- (1) The EUT is used new battery.
- (2) The EUT is considered a portable unit, it was pre-tested on the positioned of each 3 axis. The worst case was found positioned on Z-plane. Therefore only the test data of this Z-plane was used for radiated emission measurement test.

### 3.3 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED



### 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.

| Item | Equipment | Mfr/Brand | Model/Type No. | FCC ID | Series No. |
|------|-----------|-----------|----------------|--------|------------|
| -    | -         | -         | -              | -      | -          |

| Item | Shielded Type | Ferrite Core | Length | Note |
|------|---------------|--------------|--------|------|
| -    | -             | -            | -      | -    |

Note:

- (1) For detachable type I/O cable should be specified the length in m in 『Length』 column.

## 4. EMC EMISSION TEST

### 4.1 CONDUCTED EMISSION MEASUREMENT

#### 4.1.1 POWER LINE CONDUCTED EMISSION LIMITS (Frequency Range 150KHz-30MHz)

| Frequency of Emission (MHz) | Conducted Limit (dB $\mu$ V) |           |
|-----------------------------|------------------------------|-----------|
|                             | Quasi-peak                   | Average   |
| 0.15 -0.5                   | 66 to 56*                    | 56 to 46* |
| 0.50 -5.0                   | 56                           | 46        |
| 5.0 -30.0                   | 60                           | 50        |

Note:

- (1) The limit of " \* " decreases with the logarithm of the frequency
- (2) The test result calculated as following:  
 Measurement Value = Reading Level + Correct Factor  
 Correct Factor = Insertion Loss + Cable Loss + Attenuator Factor(if use)  
 Margin Level = Measurement Value - Limit Value

The following table is the setting of the receiver

| Receiver Parameters | Setting  |
|---------------------|----------|
| Attenuation         | 10 dB    |
| Start Frequency     | 0.15 MHz |
| Stop Frequency      | 30 MHz   |
| IF Bandwidth        | 9 kHz    |

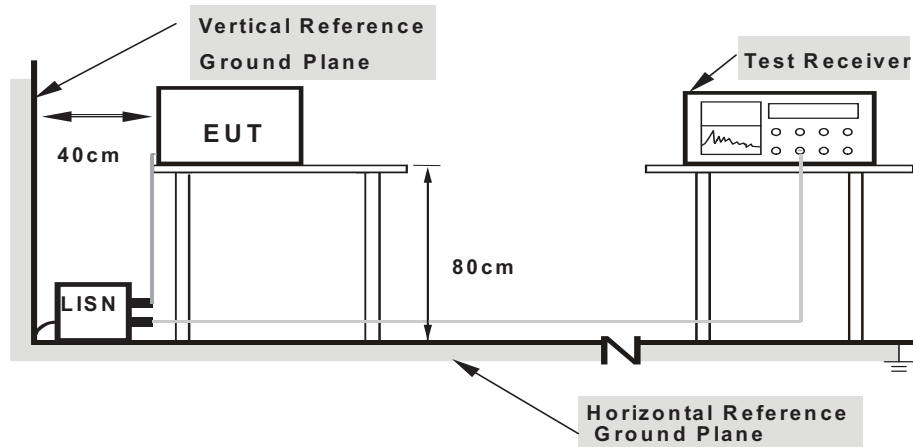
#### 4.1.2 TEST PROCEDURE

- a. The EUT was placed 0.4 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipment powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
- b. Interconnecting cables that hang closer than 40 cm to the groundplane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
- c. I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
- d. LISN at least 80 cm from nearest part of EUT chassis.
- e. For the actual test configuration, please refer to the related Item –EUT Test Photos.

#### 4.1.3 DEVIATION FROM TEST STANDARD

No deviation

#### 4.1.4 TEST SETUP



- Note:**
1. Support units were connected to second LISN.
  2. Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes

#### 4.1.5 EUT OPERATING CONDITIONS

The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.

#### 4.1.6 EUT TEST CONDITIONS

Temperature: N/A  
Relative Humidity: N/A

#### 4.1.7 TEST RESULTS

Please refer to the Attachment A.

Remark:

- (1) All readings are QP Mode value unless otherwise stated AVG in column of 'Note'. If the QP Mode Measured value compliance with the QP Limits and lower than AVG Limits, the EUT shall be deemed to meet both QP & AVG Limits and then only QP Mode was measured, but AVG Mode didn't perform. In this case, a "\*" marked in AVG Mode column of Interference Voltage Measured.
- (2) Measuring frequency range from 150KHz to 30MHz.
- (3) "N/A" denotes test is not applicable to this device.

## 4.2 RADIATED EMISSION MEASUREMENT

### 4.2.1 FIELD STRENGTH OF FUNDAMENTAL EMISSIONS MEASUREMENT LIMIT

| Frequency Band (MHz) | Fundamental Emissions Limit (uV/m) at 3m |
|----------------------|--|
| 40.66-40.70          | 1000                                     |
| 70-130               | 500                                      |
| 130-174              | 500-1500(**)                             |
| 174-260              | 1500                                     |
| 260-470              | 1500-5000(**)                            |
| Above 470            | 5000                                     |

\*\*1. Linear interpolations, the formulas for calculating the maximum permitted fundamental field strengths are as follows:

(1) For the band 130 - 174 MHz,  $\mu\text{V/m}$  at 3 meters =  $22.72727 \times (\text{operating frequency, MHz}) - 2454.545$ ;

(2) For the band 260 - 470 MHz,  $\mu\text{V/m}$  at 3 meters =  $16.6667 \times (\text{operating frequency, MHz}) - 2833.3333$ .

So the field strength of emission limits has been calculated in below table.

| Carrier Frequency (MHz) | Fundamental Emissions Limit (dBuV/m) at 3m |
|-------------------------|--|
| 433.92 MHz              | 72.87 (Average)                            |
| 433.92 MHz              | 92.87 (Peak)                               |

### 4.2.2 MEASURING INSTRUMENTS AND SETTING (FIELD STRENGTH OF FUNDAMENTAL EMISSIONS)

| Receiver Parameter | Setting               |
|--------------------|-----------------------|
| Attenuation        | Auto                  |
| Center Frequency   | Fundamental Frequency |
| RBW                | 120 kHz               |
| Detector           | Peak / Average        |

### 4.2.3 RADIATED EMISSIONS MEASUREMENT

Devices complying with 47 CFR FCC part 15 subpart C, section 15.231(e). The field strength of emissions from intentional radiators at 3 meters operated under this Section shall not exceed the following:

| Frequency Band (MHz) | Spurious Emissions Limit(uV/m) at 3m |
|----------------------|--------------------------------------|
| 40.66-40.70          | 100                                  |
| 70-130               | 50                                   |
| 130-174              | 50-150(**)                           |
| 174-260              | 150                                  |
| 260-470              | 150-500(**)                          |
| Above 470            | 500                                  |

\*\*1. Linear interpolations, the formulas for calculating the maximum permitted fundamental field strengths are as follows:

(1) For the band 130 - 174 MHz,  $\mu\text{V/m}$  at 3 meters =  $22.72727 \times (\text{operating frequency, MHz}) - 2454.545$ ;

(2) For the band 260 - 470 MHz,  $\mu\text{V/m}$  at 3 meters =  $16.66667 \times (\text{operating frequency, MHz}) - 2833.3333$ .

(3) The maximum permitted unwanted emissions level is 20 dB below the maximum permitted fundamental level. In addition field strength of any emissions which appear inside of the restriction band shall not exceed the general radiated emissions limits in Section 15.209(a).

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

| Receiver Parameter     | Setting                           |
|------------------------|-----------------------------------|
| Attenuation            | Auto                              |
| Start ~ Stop Frequency | 9kHz~90kHz for PK/AVG detector    |
| Start ~ Stop Frequency | 90kHz~110kHz for QP detector      |
| Start ~ Stop Frequency | 110kHz~490kHz for PK/AVG detector |
| Start ~ Stop Frequency | 490kHz~30MHz for QP detector      |
| Start ~ Stop Frequency | 30MHz~1000MHz for QP detector     |

| Spectrum Parameter                    | Setting                                       |
|---------------------------------------|---|
| Attenuation                           | Auto  |
| Start Frequency                       | 1000 MHz                                      |
| Stop Frequency                        | 10th carrier harmonic                         |
| RB / VB (emission in restricted band) | 1MHz / 1MHz for Peak, AV Mode with Dwell time |

#### 4.2.4 DWELL TIME OF PERIODIC OPERATION MEASUREMENT

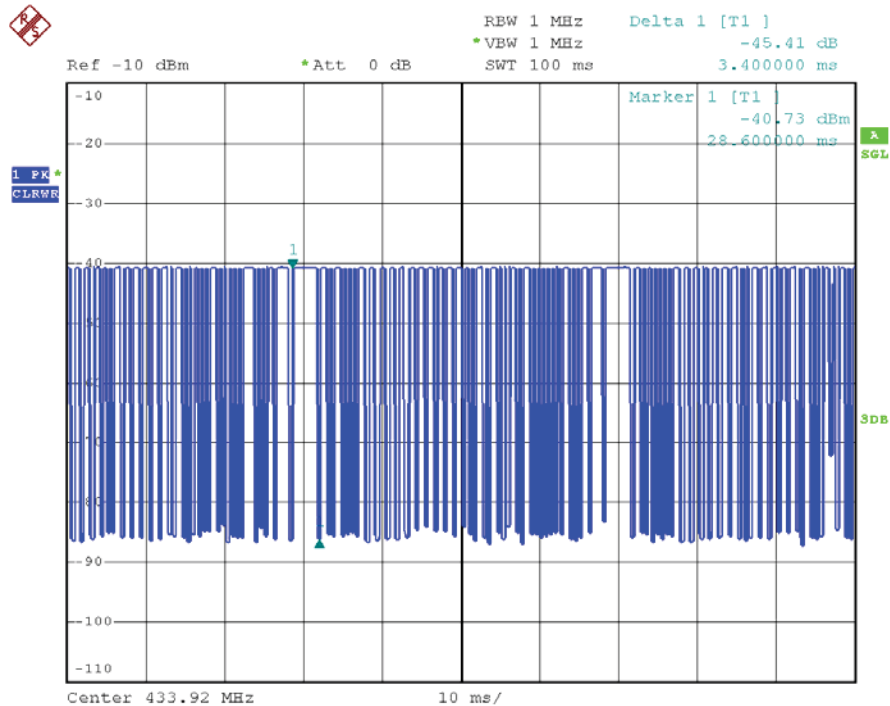
Duty Cycle =  $(N1 \cdot L1 + N2 \cdot L2 + \dots + Nn-1 \cdot Ln-1 + Nn \cdot Ln) / 100$  or T

Duty Cycle =  $(3.4 \cdot 2 + 1.8 \cdot 3 + 1 \cdot 37 + 0.4 \cdot 42 + 0.6 \cdot 4 + 0.8 \cdot 11) / 100 \text{msec} = 77.20\%$

Average Reading = Peak Reading (dBuV/m) +  $20 \log$  (Duty cycle)

Average Reading = Peak value +  $20 \log$ (Duty cycle) , AV=PK-2.248

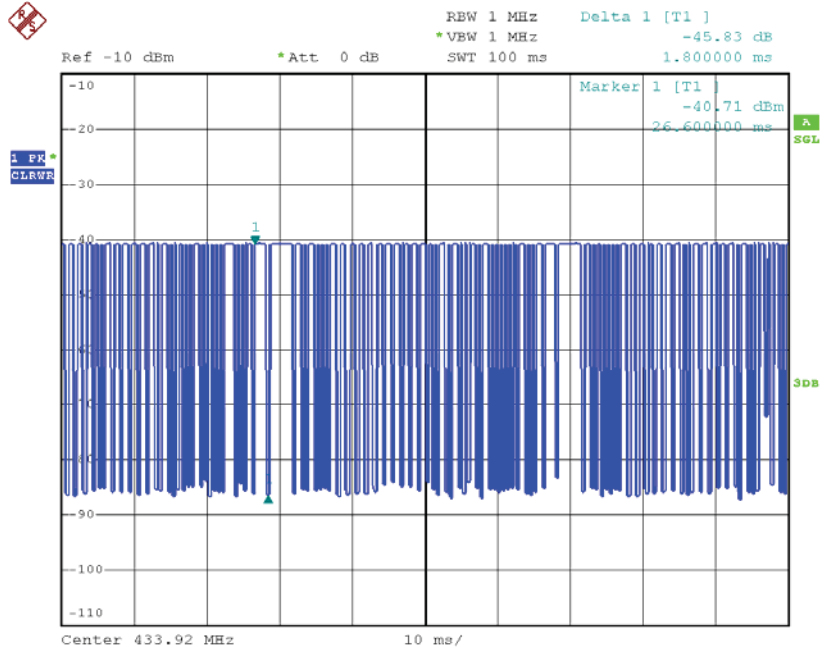
#### On Time 1: 3.4ms\*2



Date: 30.MAY.2016 10:36:35

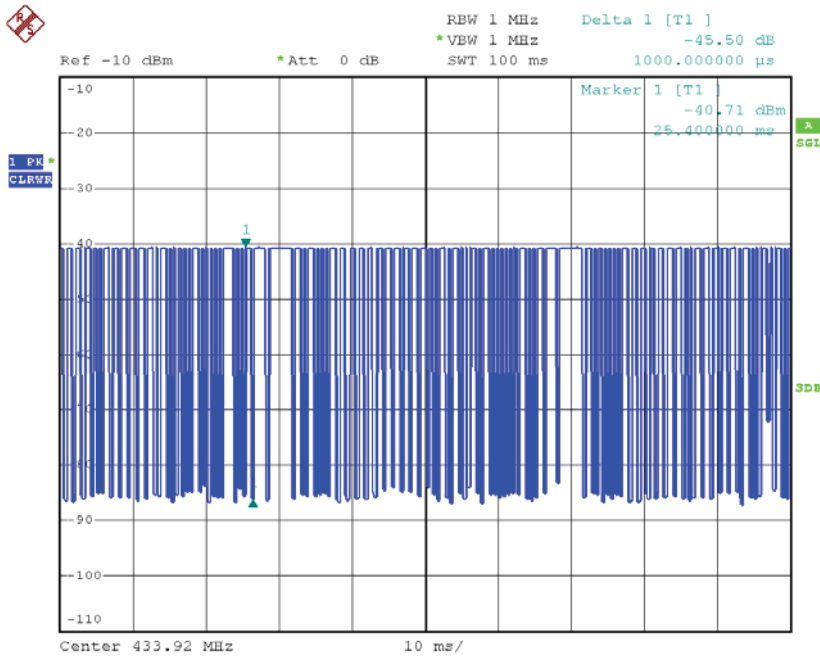


### On Time 2: 1.8ms\*3



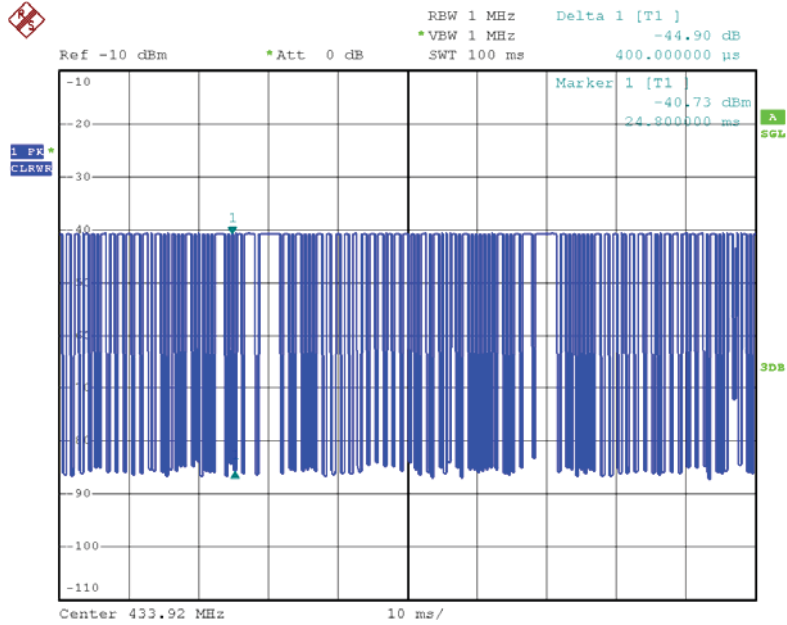
Date: 30.MAY.2016 10:37:08

### On Time 3: 1ms\*37



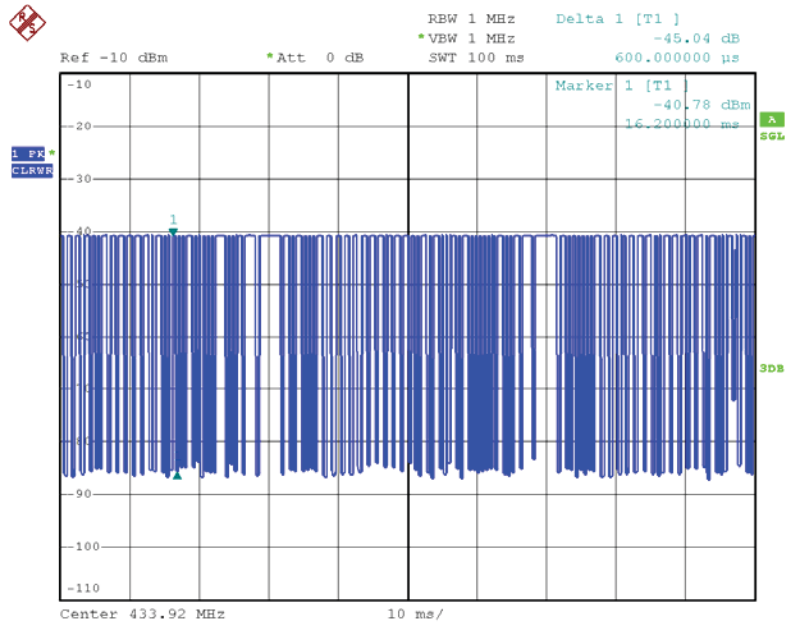
Date: 30.MAY.2016 10:37:35

### On Time 4: 0.4ms\*42



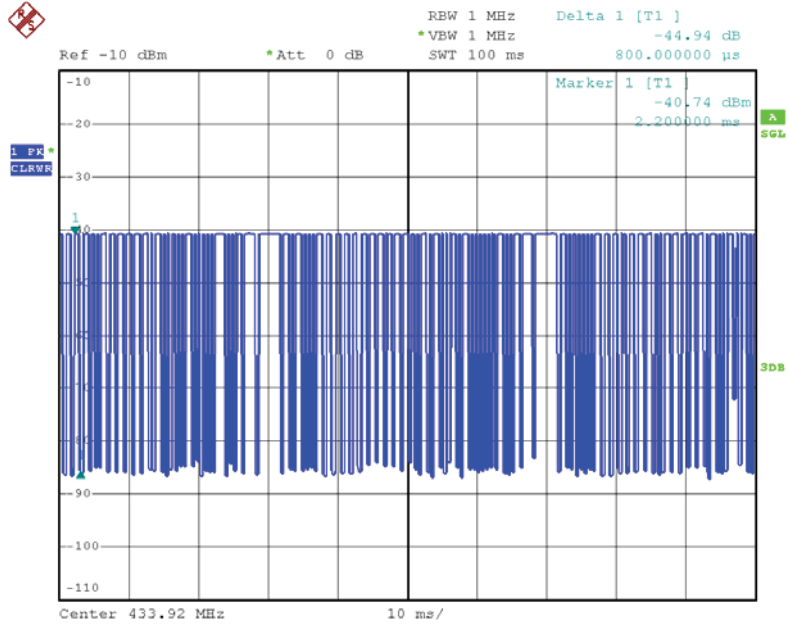
Date: 30.MAY.2016 10:38:11

### On Time 5: 0.6ms\*4



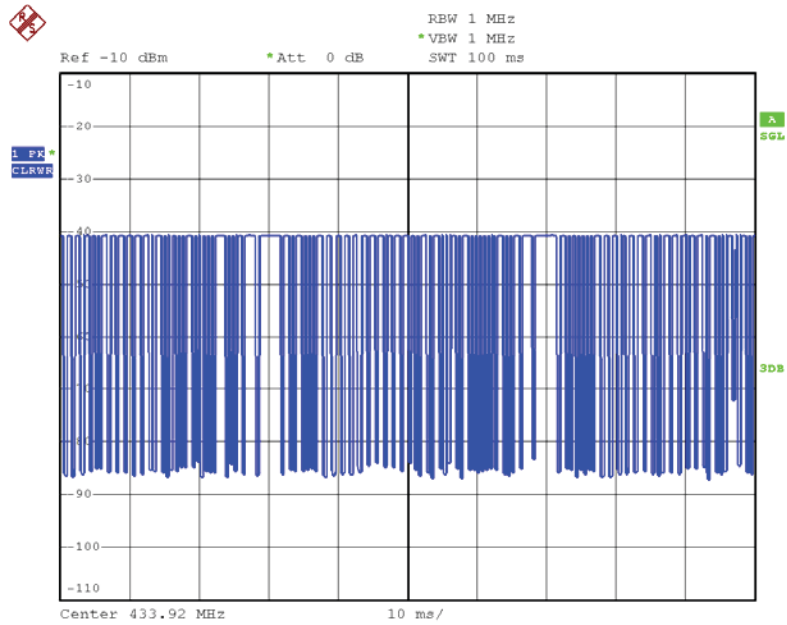
Date: 30.MAY.2016 10:38:44

**On Time 6: 0.8ms\*11**



Date: 30.MAY.2016 10:41:55

**Duty Cycle**



Date: 30.MAY.2016 10:35:32

#### 4.2.5 TEST PROCEDURE

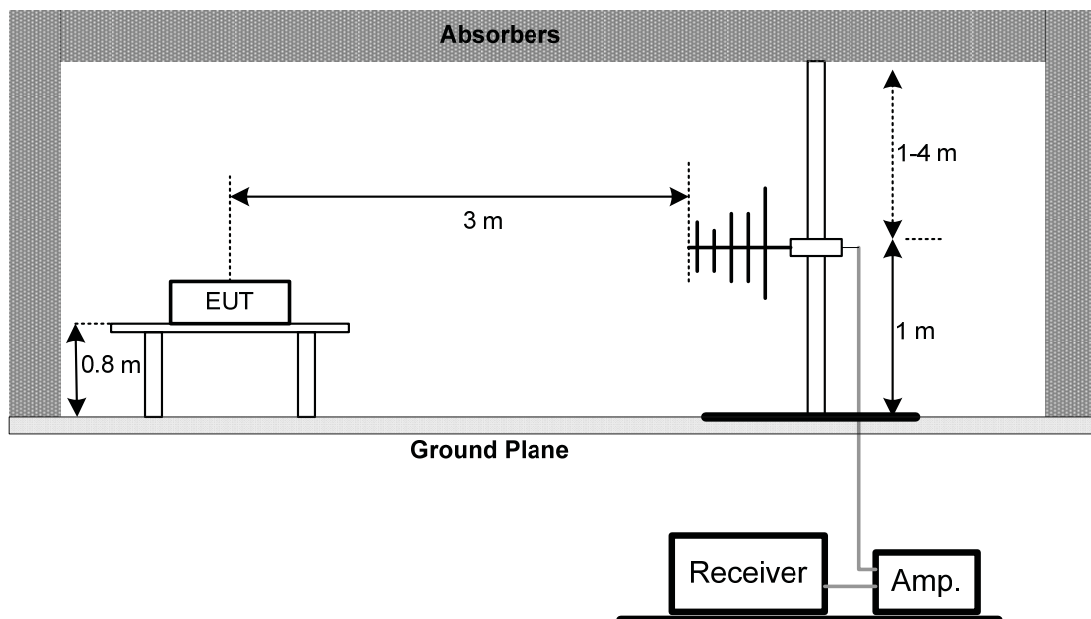
- a. The measuring distance of 3 m shall be used for measurements. The EUT was placed on the top of a rotating table 0.8 meter above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.(below 1GHz)
- b. The measuring distance of 3 m shall be used for measurements. The EUT was placed on the top of a rotating table 1.5 meter above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.(above 1GHz)
- c. The height of the equipment or of the substitution antenna shall be 0.8 m or 1.5 m, the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. The initial step in collecting radiated emission data is a receiver peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
- e. All readings are Peak unless otherwise stated QP in column of Note. Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn't perform. (below 1GHz)
- f. All readings are Peak Mode value unless otherwise stated AVG in column of Note. If the Peak Mode Measured value compliance with the Peak Limits and lower than AVG Limits, the EUT shall be deemed to meet both Peak & AVG Limits and then only Peak Mode was measured, but AVG Mode didn't perform. (above 1GHz)
- g. For the actual test configuration, please refer to the related Item –EUT Test Photos.

#### 4.2.6 DEVIATION FROM TEST STANDARD

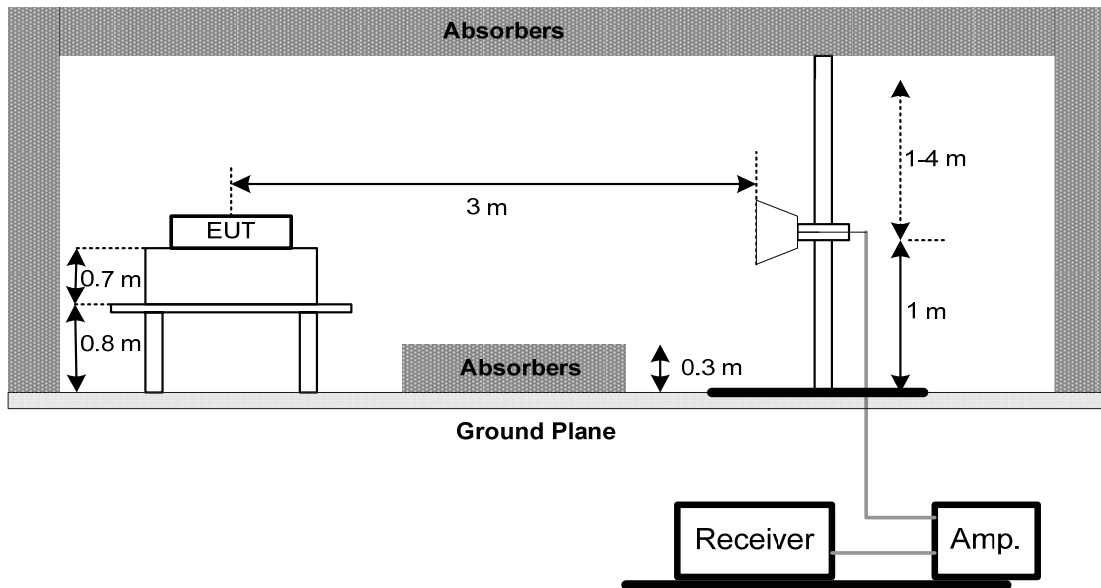
No deviation

#### 4.2.7 TEST SETUP

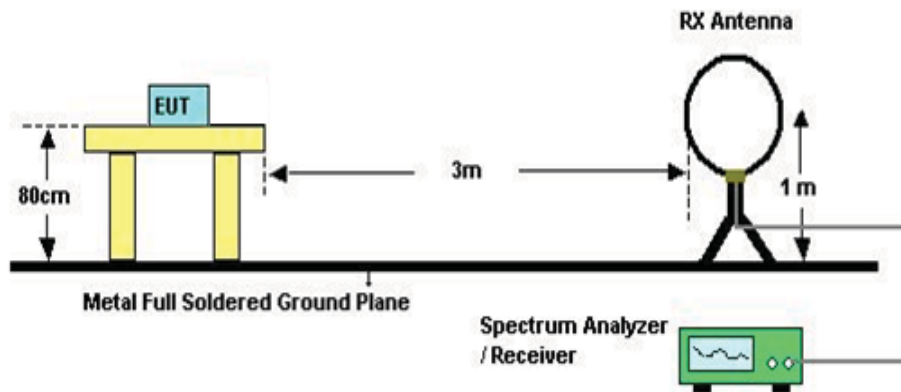
(A) Radiated Emission Test Set-Up Frequency Below 1 GHz



(B) Radiated Emission Test Set-Up Frequency Above 1 GHz



(C) For radiated emissions below 30MHz



**4.2.8 EUT OPERATING CONDITIONS**

The EUT tested system was configured as the statements of 4.1.5 unless otherwise a special operating condition is specified in the follows during the testing.

**4.2.9 EUT TEST CONDITIONS**

- Temperature: 24° C
- Relative Humidity: 52%
- Test Voltage: DC 4.5V

**4.2.10 TEST RESULTS (9kHz to 30MHz)**

Please refer to the Attachment B.

Remark:

- (1) The amplitude of spurious emissions which are attenuated by more than 20 dB below the permissible value has no need to be reported.
- (2) Distance extrapolation factor =  $40 \log(\text{specific distance} / \text{test distance})$  (dB);.
- (3) Limit line = specific limits (dBuV) + distance extrapolation factor..

**4.2.11 TEST RESULTS (30MHz to 1000MHz)**

Please refer to the Attachment C.

**4.2.12 TEST RESULTS (Above 1000 MHz)**

Please refer to the Attachment D.

Remark:

- (1) Radiated emissions measured in frequency range above 1000MHz were made with an instrument using Peak detector mode and AV detector mode of the emission
- (2) A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.
- (3) EUT Orthogonal Axis:  
"X" - denotes Laid on Table; "Y" - denotes Vertical Stand; "Z" - denotes Side Stand
- (4) During the measurements above 1 GHz it is taken care of that the EUT is always within the 3 dB cone of radiation BW of the used antenna

## 5. 20dB SPECTRUM BANDWIDTH MEASUREMENT

Limit

The bandwidth of the emissions shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. So the emission bandwidth limits have been calculated in below table.

| Fundamental Frequency | 20dB Bandwidth Limits (MHz) |
|-----------------------|-----------------------------|
| 433.92 MHz            | 1.0848                      |

### 5.1 MEASURING INSTRUMENTS AND SETTING

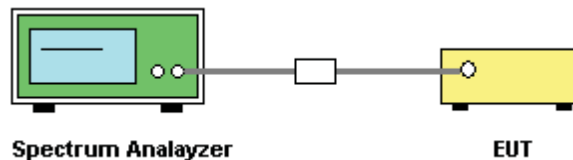
Please refer to section 5 in this report. The following table is the setting of the Spectrum Analyzer.

| Spectrum Parameters | Setting          |
|---------------------|------------------|
| Attenuation         | Auto             |
| Span Frequency      | > 20dB Bandwidth |
| RB                  | 10 kHz           |
| VB                  | 10 kHz           |
| Detector            | Peak             |
| Trace               | Max Hold         |
| Sweep Time          | Auto             |

### 5.2 TEST PROCEDURES

1. The transmitter output (antenna port) was connected to the spectrum analyser in peak hold mode.
2. The resolution bandwidth of 10 kHz and the video bandwidth of 10 kHz were used.
3. Measured the spectrum width with power higher than 20dB below carrier.

### 5.3 TEST SETUP LAYOUT



### 5.4 TEST DEVIATION

There is no deviation with the original standard.

**5.5 EUT OPERATION DURING TEST**

The EUT was programmed to be in continuously transmitting mode.

**5.6 EUT TEST CONDITIONS**

Temperature: 23° C  
Relative Humidity: 55%  
Test Voltage: DC 4.5V

**5.7 TEST RESULTS**

Please refer to the Attachment E.

.



## 6. TIMING TESTING

### Limit

In addition, devices operated under the provisions of this paragraph shall be provided with a means for automatically limiting operation so that the duration of each transmission shall not be greater than one second and the silent period between transmissions shall be at least 30 times the duration of the transmission but in no case less than 10 seconds.

### 6.1 MEASURING INSTRUMENTS AND SETTING

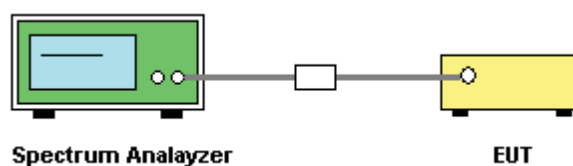
Please refer to section 6 in this report. The following table is the setting of the Spectrum Analyzer.

| Spectrum Parameters | Setting     |
|---------------------|-------------|
| Attenuation         | Auto        |
| Span Frequency      | Zero Span   |
| RB                  | 1MHz        |
| VB                  | 1MHz        |
| Detector            | Peak        |
| Trace               | Max Hold    |
| Sweep Time          | 100 seconds |

### 6.2 TEST PROCEDURES

1. The transmitter output (antenna port) was connected to the spectrum analyser in peak hold mode.
2. The resolution bandwidth of 1MHz and the video bandwidth of 1MHz were used.

### 6.3 TEST SETUP LAYOUT



### 6.4 TEST DEVIATION

There is no deviation with the original standard.

### 6.5 EUT OPERATION DURING TEST

The EUT was programmed to be in normal mode.

### 6.6 EUT TEST CONDITIONS

Temperature: 23° C  
 Relative Humidity: 55%  
 Test Voltage: DC 4.5V

### 6.7 TEST RESULTS

Please refer to the Attachment F.

## 7. MEASUREMENT INSTRUMENTS LIST AND SETTING

| Radiated Emission Measurement |                         |              |   |            |                  |
|-------------------------------|-------------------------|--------------|---|------------|------------------|
| Item                          | Kind of Equipment       | Manufacturer | Type No.                                  | Serial No. | Calibrated until |
| 1                             | Antenna                 | Schwarbeck   | VULB9160                                  | 9160-3232  | Mar. 27, 2017    |
| 2                             | Amplifier               | HP           | 8447D                                     | 2944A09673 | Nov. 09, 2016    |
| 3                             | Receiver                | AGILENT      | N9038A                                    | MY52130039 | Oct. 11, 2016    |
| 4                             | Test Cable              | emci         | LMR-400(30MH<br>z-1GHz)                   | C-01       | Jun. 28, 2016    |
| 5                             | Antenna                 | ETS          | 3115                                      | 00075789   | Mar. 27, 2017    |
| 6                             | Amplifier               | Agilent      | 8449B                                     | 3008A02274 | Nov. 01, 2016    |
| 7                             | Receiver                | AGILENT      | N9038A                                    | MY52130039 | Oct. 11, 2016    |
| 8                             | Test Cable              | emci         | EMC104-SM-S<br>M-10000(1GHz<br>- 26.5GHz) | C-68       | Jun. 28, 2016    |
| 9                             | Controller              | CT           | SC100                                     | N/A        | N/A              |
| 10                            | Active Loop<br>Antenna  | R&S          | HFH2-Z2                                   | 830749/020 | Sep. 07, 2016    |
| 11                            | Measurement<br>Software | Farad        | EZ-EMC<br>Ver.NB-03A1-01                  | N/A        | N/A              |

| 20dB Spectrum Bandwidth Measurement |                   |              |          |            |                  |
|-------------------------------------|-------------------|--------------|----------|------------|------------------|
| Item                                | Kind of Equipment | Manufacturer | Type No. | Serial No. | Calibrated until |
| 1                                   | Spectrum Analyzer | R&S          | FSP 40   | 100185     | Oct. 11, 2016    |
| 2                                   | Attenuator        | WOKEN        | 6SM3502  | VAS1214NL  | Mar. 09, 2017    |
| 3                                   | Test Cable        | N/A          | RG316    | Cable4-001 | Jul. 15, 2016    |

| Timing Testing |                   |              |          |            |                  |
|----------------|-------------------|--------------|----------|------------|------------------|
| Item           | Kind of Equipment | Manufacturer | Type No. | Serial No. | Calibrated until |
| 1              | Spectrum Analyzer | R&S          | FSP 40   | 100185     | Oct. 11, 2016    |
| 2              | Attenuator        | WOKEN        | 6SM3502  | VAS1214NL  | Mar. 09, 2017    |
| 3              | Test Cable        | N/A          | RG316    | Cable4-001 | Jul. 15, 2016    |

Remark: "N/A" denotes no model name, serial no. or calibration specified.

All calibration period of equipment list is one year.

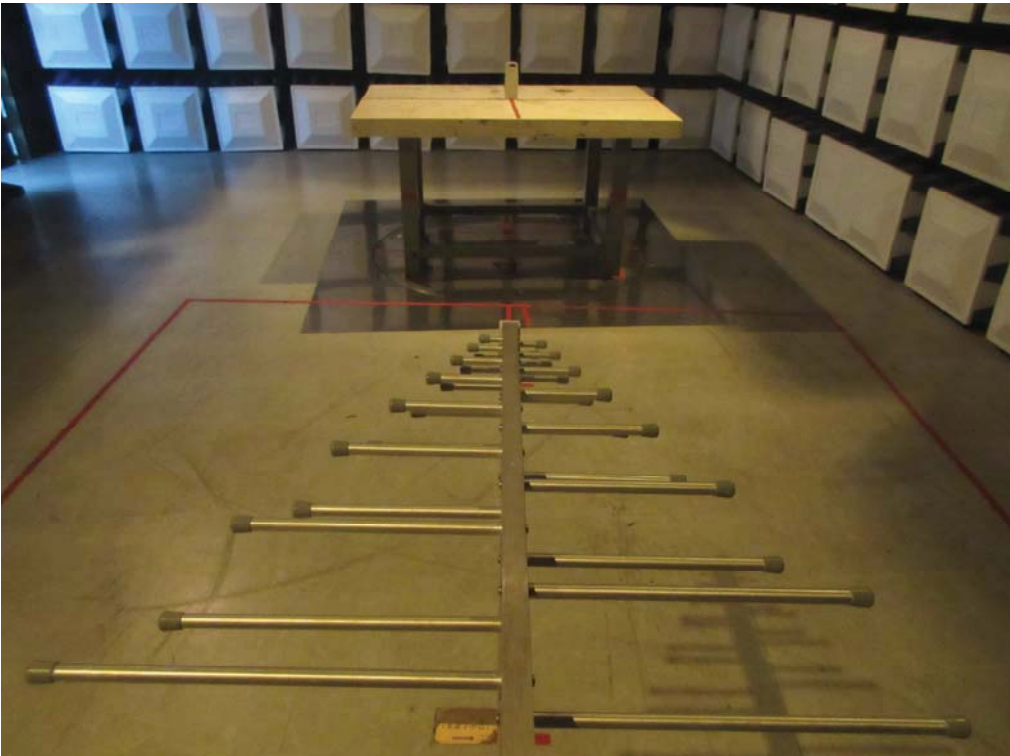
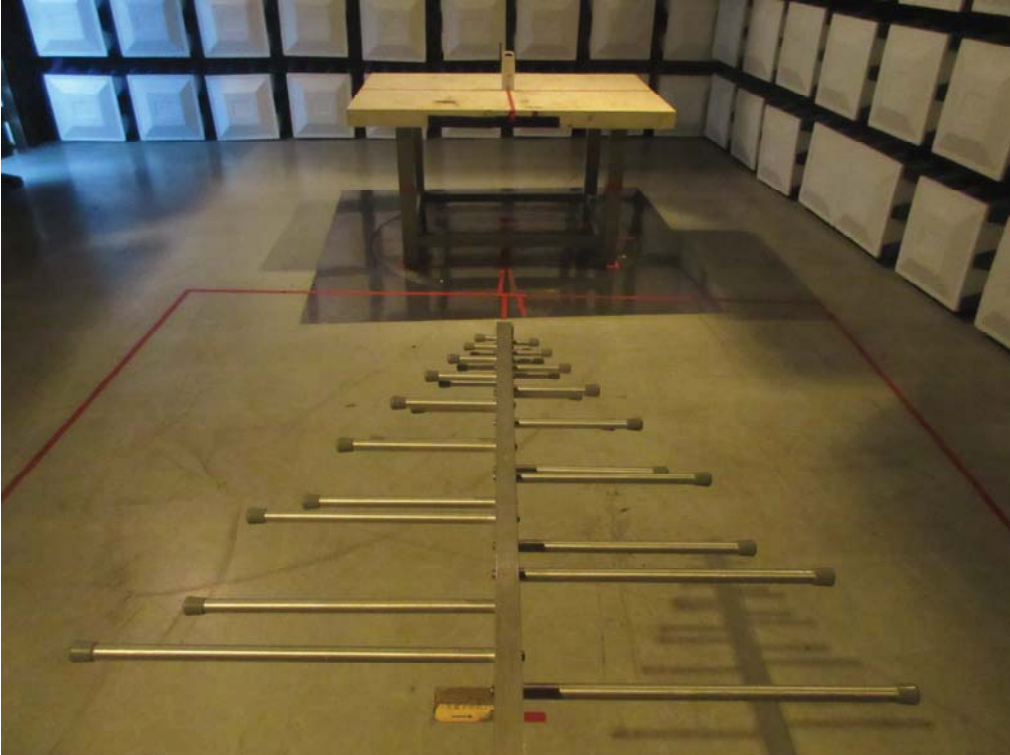
8. EUT TEST PHOTO

Radiated Measurement Photos  
9KHz to 30MHz



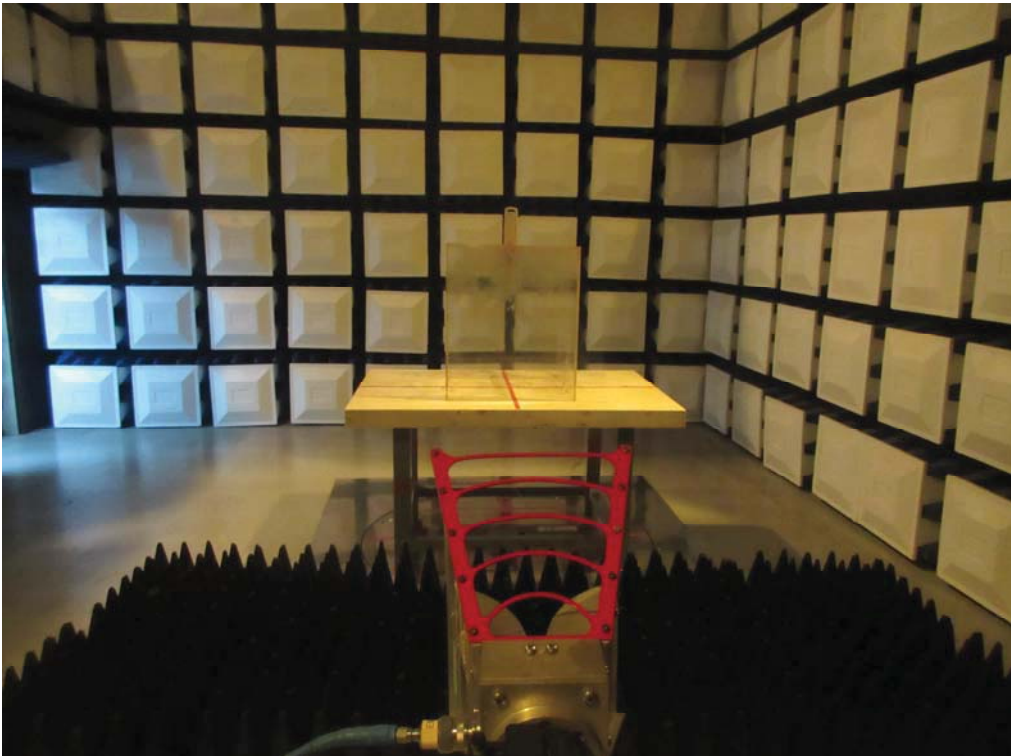
**Radiated Measurement Photos**

**30MHz to 1000MHz**



**Radiated Measurement Photos**

**Above 1000MHz**



## ATTACHMENT A - CONDUCTED EMISSION

**Test Mode: N/A**

Note: "N/A" denotes test is not applicable to this device.  
EUT is used new battery.

## **ATTACHMENT B - RADIATED EMISSION (9KHz to 30MHz)**

|            |                 |
|------------|-----------------|
| Test Mode: | TX CH 433.92MHz |
|------------|-----------------|

| Freq.<br>(MHz) | Ant.<br>0°/90° | Reading(RA)<br>(dBuV) | Corr.Factor(CF)<br>(dB) | Measured(FS)<br>(dBuV/m) | Limits<br>(dBuV/m) | Margin<br>(dB) | Note |
|----------------|----------------|-----------------------|-------------------------|--------------------------|--------------------|----------------|------|
| 0.0094         | 0°             | 13.19                 | 24.97                   | 38.16                    | 128.14             | -89.98         | AVG  |
| 0.0094         | 0°             | 14.68                 | 24.97                   | 39.65                    | 148.14             | -108.49        | PEAK |
| 0.0238         | 0°             | 6.61                  | 24.06                   | 30.67                    | 120.07             | -89.40         | AVG  |
| 0.0238         | 0°             | 8.65                  | 24.06                   | 32.71                    | 140.07             | -107.36        | PEAK |
| 0.0382         | 0°             | 3.23                  | 23.15                   | 26.38                    | 115.96             | -89.58         | AVG  |
| 0.0382         | 0°             | 5.22                  | 23.15                   | 28.37                    | 135.96             | -107.60        | PEAK |
| 0.0513         | 0°             | 1.18                  | 22.37                   | 23.55                    | 113.40             | -89.85         | AVG  |
| 0.0513         | 0°             | 2.24                  | 22.37                   | 24.61                    | 133.40             | -108.79        | PEAK |
| 0.5880         | 0°             | 19.50                 | 20.08                   | 39.58                    | 72.22              | -32.64         | QP   |
| 1.9679         | 0°             | 23.30                 | 19.50                   | 42.80                    | 69.54              | -26.74         | QP   |

| Freq.<br>(MHz) | Ant.<br>0°/90° | Reading(RA)<br>(dBuV) | Corr.Factor(CF)<br>(dB) | Measured(FS)<br>(dBuV/m) | Limits<br>(dBuV/m) | Margin<br>(dB) | Note |
|----------------|----------------|-----------------------|-------------------------|--------------------------|--------------------|----------------|------|
| 0.0147         | 90°            | 13.14                 | 24.30                   | 37.44                    | 124.26             | -86.82         | AVG  |
| 0.0147         | 90°            | 14.56                 | 24.30                   | 38.86                    | 144.26             | -105.40        | PEAK |
| 0.0270         | 90°            | 7.49                  | 23.86                   | 31.35                    | 118.98             | -87.63         | AVG  |
| 0.0270         | 90°            | 8.80                  | 23.86                   | 32.66                    | 138.98             | -106.32        | PEAK |
| 0.0431         | 90°            | 5.21                  | 22.84                   | 28.05                    | 114.91             | -86.87         | AVG  |
| 0.0431         | 90°            | 6.48                  | 22.84                   | 29.32                    | 134.91             | -105.60        | PEAK |
| 0.0525         | 90°            | 1.38                  | 22.35                   | 23.73                    | 113.20             | -89.47         | AVG  |
| 0.0525         | 90°            | 2.71                  | 22.35                   | 25.06                    | 133.20             | -108.14        | PEAK |
| 0.6730         | 90°            | 22.21                 | 20.35                   | 42.56                    | 71.04              | -28.48         | QP   |
| 2.0242         | 90°            | 24.37                 | 19.49                   | 43.86                    | 69.54              | -25.68         | QP   |



**ATTACHMENT C - RADIATED EMISSION (30MHz to 1000MHz)**

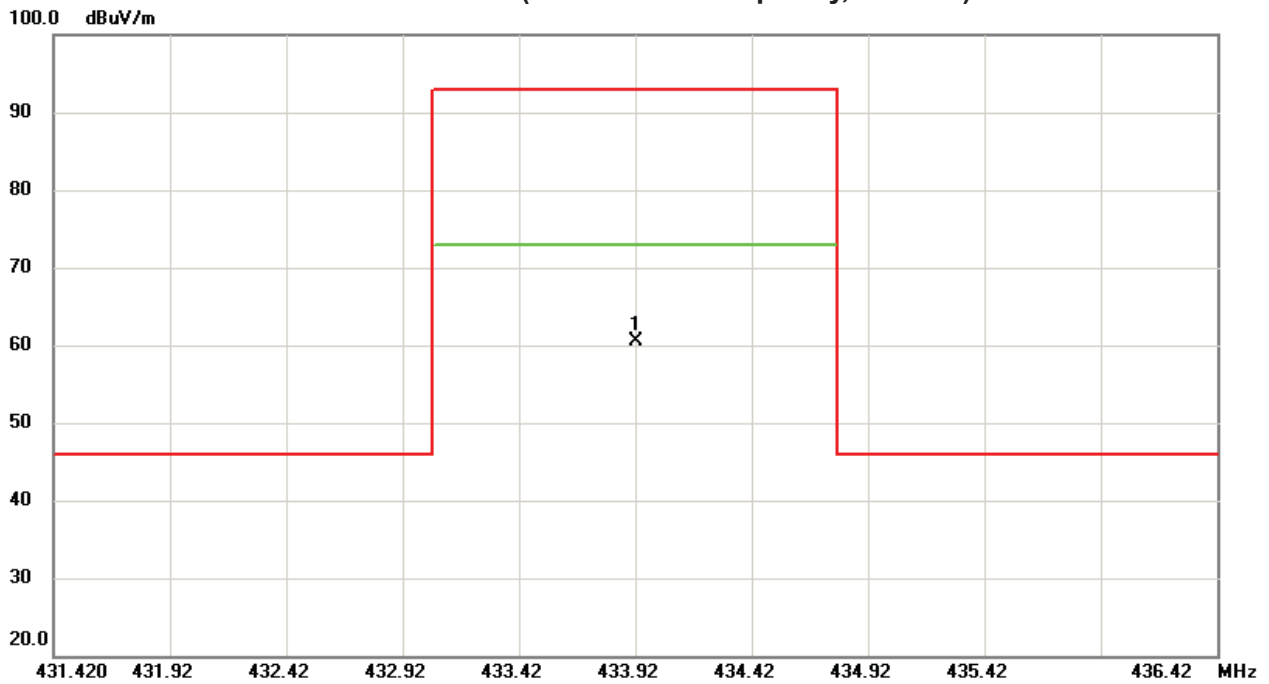
|  |                 |
|--|-----------------|
| Test Mode :  | TX CH 433.92MHz |
| <b>About the duty cycle correction factor calculated, please refer to the page 16~20</b> |                 |

| Freq.<br>(MHz) | Ant.Pol.<br>H/V | Reading        |              | Ant./CF<br>CF(dB) | Act.             |                | Limit            |                | Note       |
|----------------|-----------------|----------------|--------------|-------------------|------------------|----------------|------------------|----------------|------------|
|                |                 | Peak<br>(dBuV) | AV<br>(dBuV) |                   | Peak<br>(dBuV/m) | AV<br>(dBuV/m) | Peak<br>(dBuV/m) | AV<br>(dBuV/m) |            |
| <b>433.92</b>  | <b>V</b>        | <b>69.00</b>   |              | <b>-8.48</b>      | <b>60.52</b>     | <b>58.27</b>   | <b>92.87</b>     | <b>72.87</b>   | <b>Z/F</b> |
| 868.08         | V               | 31.75          |              | -0.90             | 30.85            | 28.60          | 72.87            | 52.87          | Z/H        |

Remark:

- (1) The average value of fundamental frequency is:  
Average = Peak value + 20log(Duty cycle), Final AV=PK-2.248

**Orthogonal Axis: Z**  
**TX 433.92 MHz (Fundamental frequency, Vertical)**



| No. | Mk. | Freq.<br>MHz | Reading<br>Level<br>dBuV | Correct<br>Factor<br>dB | Measure-<br>ment<br>dBuV/m | Limit<br>dBuV/m | Margin<br>dB | Detector | Comment |
|-----|-----|--------------|--------------------------|-------------------------|----------------------------|-----------------|--------------|----------|---------|
| 1   |     | 61.0400      | 27.02                    | -13.97                  | 13.05                      | 40.00           | -26.95       | peak     |         |
| 2   |     | 209.4500     | 30.66                    | -14.75                  | 15.91                      | 43.50           | -27.59       | peak     |         |
| 3   |     | 232.7300     | 27.85                    | -13.65                  | 14.20                      | 46.00           | -31.80       | peak     |         |
| 4   |     | 557.6800     | 27.40                    | -5.67                   | 21.73                      | 46.00           | -24.27       | peak     |         |
| 5   |     | 760.4100     | 27.88                    | -2.47                   | 25.41                      | 46.00           | -20.59       | peak     |         |
| 6   | *   | 868.0800     | 31.75                    | -0.90                   | 30.85                      | 46.00           | -15.15       | peak     |         |

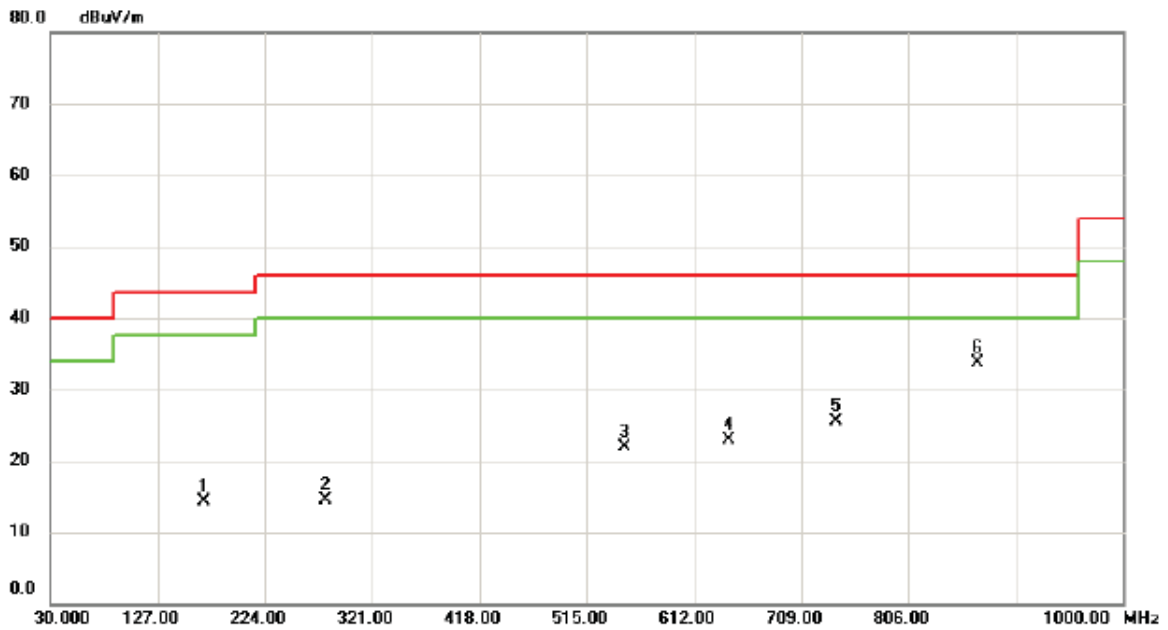
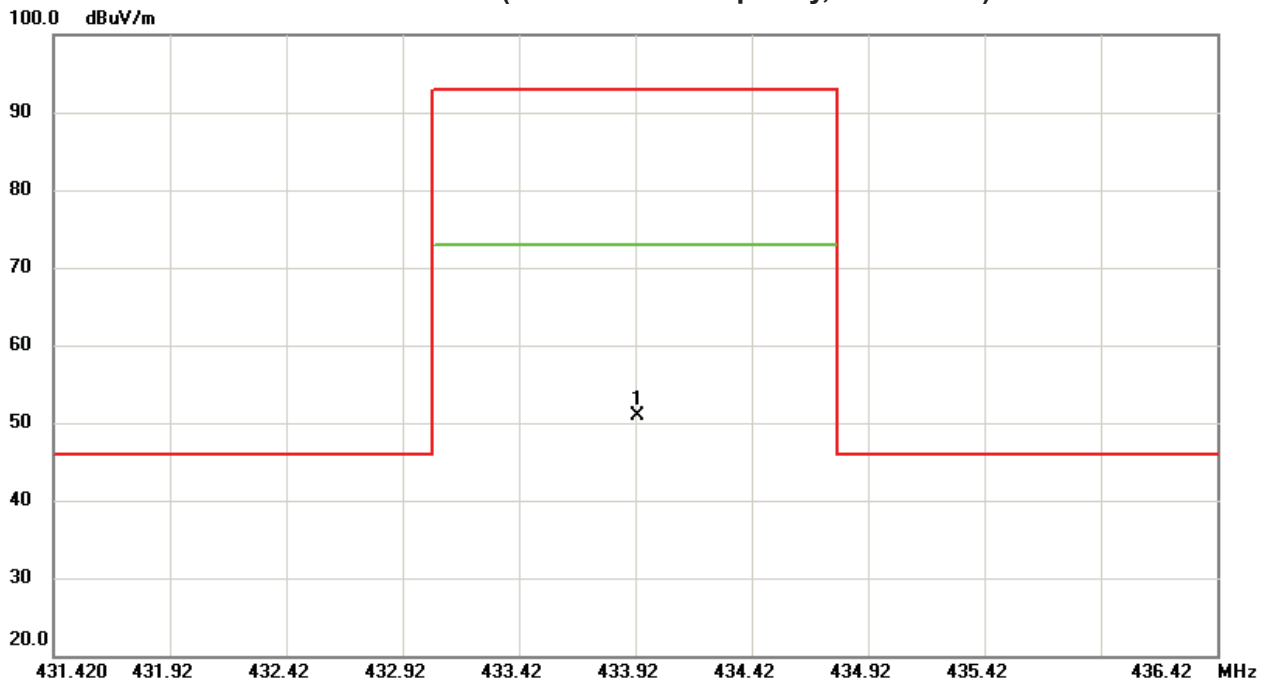
|  |                 |
|--|-----------------|
| Test Mode :  | TX CH 433.92MHz |
| <b>About the duty cycle correction factor calculated, please refer to the page 16~20</b> |                 |

| Freq.<br>(MHz) | Ant.Pol.<br>H/V | Reading        |              | Ant./CF<br>CF(dB) | Act.             |                | Limit            |                | Note       |
|----------------|-----------------|----------------|--------------|-------------------|------------------|----------------|------------------|----------------|------------|
|                |                 | Peak<br>(dBuV) | AV<br>(dBuV) |                   | Peak<br>(dBuV/m) | AV<br>(dBuV/m) | Peak<br>(dBuV/m) | AV<br>(dBuV/m) |            |
| <b>433.92</b>  | <b>H</b>        | <b>59.40</b>   |              | <b>-8.48</b>      | <b>50.92</b>     | <b>48.67</b>   | <b>92.87</b>     | <b>72.87</b>   | <b>Z/F</b> |
| 868.08         | H               | 34.60          |              | -0.90             | 33.70            | 31.45          | 72.87            | 52.87          | Z/H        |

Remark:

- (1) The average value of fundamental frequency is:  
Average = Peak value + 20log(Duty cycle), Final AV= PK-2.248

**Orthogonal Axis: Z**  
**TX 433.92 MHz (Fundamental frequency, Horizontal)**



| No. | Mk. | Freq.<br>MHz | Reading<br>Level<br>dBuV | Correct<br>Factor<br>dB | Measure-<br>ment<br>dBuV/m | Limit<br>dBuV/m | Margin<br>dB | Detector | Comment |
|-----|-----|--------------|--------------------------|-------------------------|----------------------------|-----------------|--------------|----------|---------|
| 1   |     | 168.7100     | 26.54                    | -12.29                  | 14.25                      | 43.50           | -29.25       | peak     |         |
| 2   |     | 279.2900     | 26.80                    | -12.39                  | 14.41                      | 46.00           | -31.59       | peak     |         |
| 3   |     | 548.9500     | 27.26                    | -5.37                   | 21.89                      | 46.00           | -24.11       | peak     |         |
| 4   |     | 644.0100     | 28.27                    | -5.38                   | 22.89                      | 46.00           | -23.11       | peak     |         |
| 5   |     | 741.0100     | 28.50                    | -2.93                   | 25.57                      | 46.00           | -20.43       | peak     |         |
| 6   | *   | 868.0800     | 34.60                    | -0.90                   | 33.70                      | 46.00           | -12.30       | peak     |         |

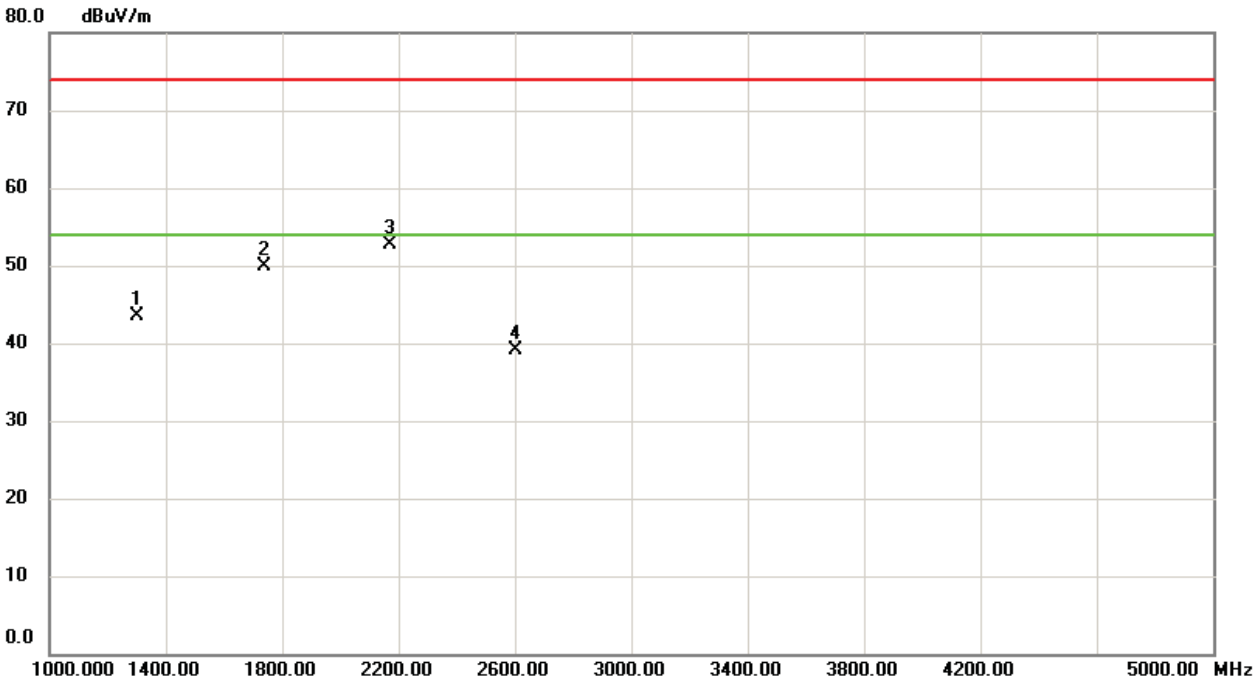
**ATTACHMENT D - RADIATED EMISSION (ABOVE 1000MHz)**

Test Mode : TX CH 433.92MHz  
**About the duty cycle correction factor calculated, please refer to the page 16~20**

| Freq.<br>(MHz) | Ant.Pol.<br>H/V | Reading        |              | Ant./CF<br>CF(dB) | Act.             |                | Limit            |                | Margin           |                | Note |
|----------------|-----------------|----------------|--------------|-------------------|------------------|----------------|------------------|----------------|------------------|----------------|------|
|                |                 | Peak<br>(dBuV) | AV<br>(dBuV) |                   | Peak<br>(dBuV/m) | AV<br>(dBuV/m) | Peak<br>(dBuV/m) | AV<br>(dBuV/m) | Peak<br>(dBuV/m) | AV<br>(dBuV/m) |      |
| 1300.00        | V               | 50.89          |              | -7.40             | 43.49            |                | 74.00            | 54.00          | -30.51           |                | Z/E  |
| 1736.00        | V               | 55.00          |              | -5.07             | 49.93            |                | 74.00            | 54.00          | -24.07           |                | Z/E  |
| 2168.00        | V               | 55.16          |              | -2.43             | 52.73            |                | 74.00            | 54.00          | -21.27           |                | Z/E  |
| 2600.00        | V               | 39.84          |              | -0.74             | 39.10            |                | 74.00            | 54.00          | -34.90           |                | Z/E  |

Remark:

(1) Peak value is much lower than the limit, so AV value isn't shown on this test item.

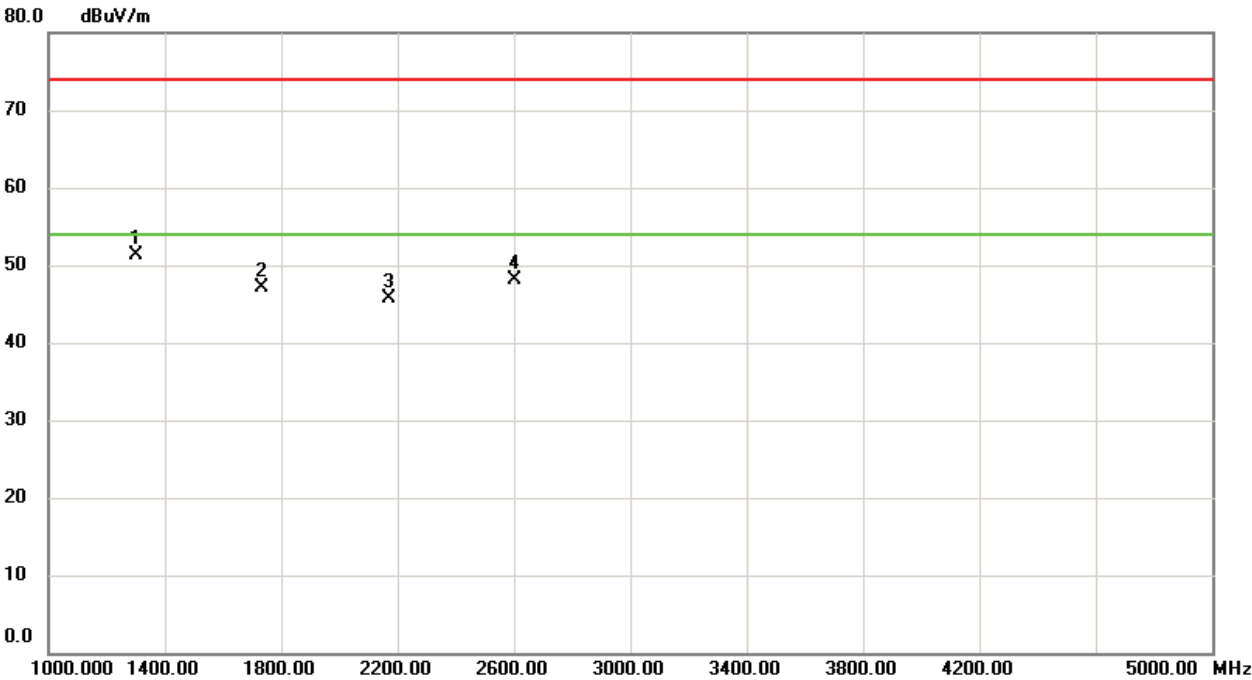


Test Mode : TX CH 433.92MHz  
**About the duty cycle correction factor calculated, please refer to the page 16~20**

| Freq.<br>(MHz) | Ant.Pol.<br>HV | Reading        |              | Ant./CF<br>CF(dB) | Act.             |                | Limit            |                | Margin           |                | Note |
|----------------|----------------|----------------|--------------|-------------------|------------------|----------------|------------------|----------------|------------------|----------------|------|
|                |                | Peak<br>(dBuV) | AV<br>(dBuV) |                   | Peak<br>(dBuV/m) | AV<br>(dBuV/m) | Peak<br>(dBuV/m) | AV<br>(dBuV/m) | Peak<br>(dBuV/m) | AV<br>(dBuV/m) |      |
| 1300.00        | H              | 58.72          |              | -7.40             | 51.32            |                | 74.00            | 54.00          | -22.68           |                | Z/E  |
| 1732.00        | H              | 52.25          |              | -5.09             | 47.16            |                | 74.00            | 54.00          | -26.84           |                | Z/E  |
| 2168.00        | H              | 48.13          |              | -2.43             | 45.70            |                | 74.00            | 54.00          | -28.30           |                | Z/E  |
| 2600.00        | H              | 48.94          |              | -0.74             | 48.20            |                | 74.00            | 54.00          | -25.80           |                | Z/E  |

Remark:

(1) Peak value is much lower than the limit, so AV value isn't shown on this test item.

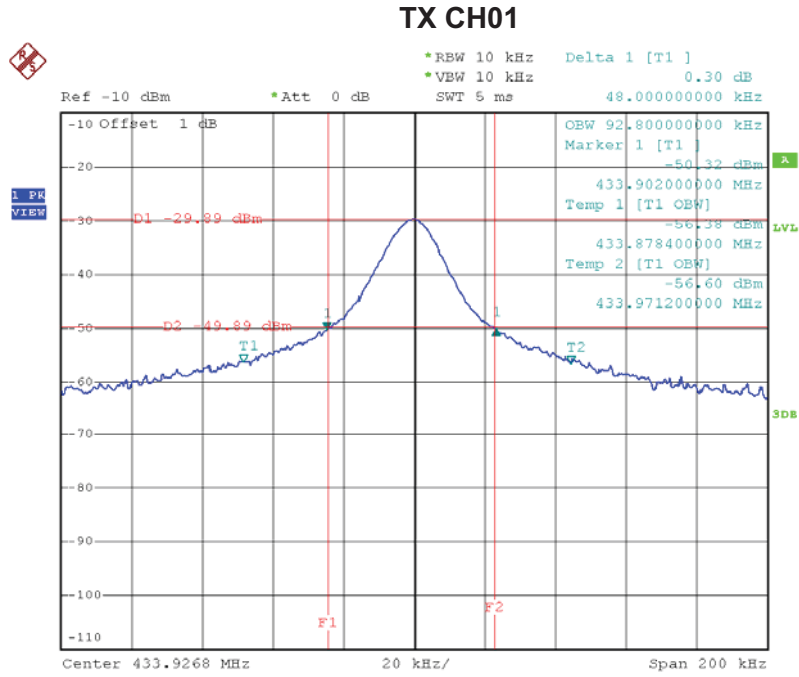




## ATTACHMENT E - 20dB SPECTRUM BANDWIDTH

Test Mode: TX CH 433.92MHz

| Frequency (MHz) | 20dB Bandwidth (kHz) | 99% Occupied BW(kHz) | 20 dB BW Limits (MHz) |
|-----------------|----------------------|----------------------|-----------------------|
| 433.92          | 48.00                | 92.80                | 1.0848                |



Date: 25.MAY.2016 15:02:51

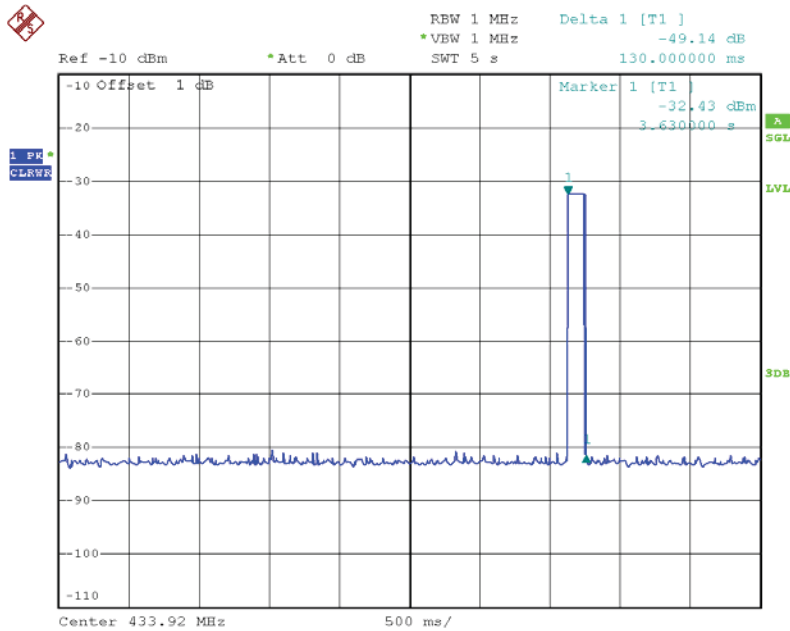
## ATTACHMENT F - TIMING TESTING

Test Mode: TX CH 433.92MHz

|                     |              |               |
|---------------------|--------------|---------------|
| Operation Condition | ON Time (s)  | Limit (s)     |
|                     | 0.13         | <1            |
| Operation Condition | OFF Time (s) | Limit (s)     |
|                     | 16.33        | >10           |
| Operation Condition | ON*30 (s)    | Silent period |
|                     | 3.9          | 16.55         |

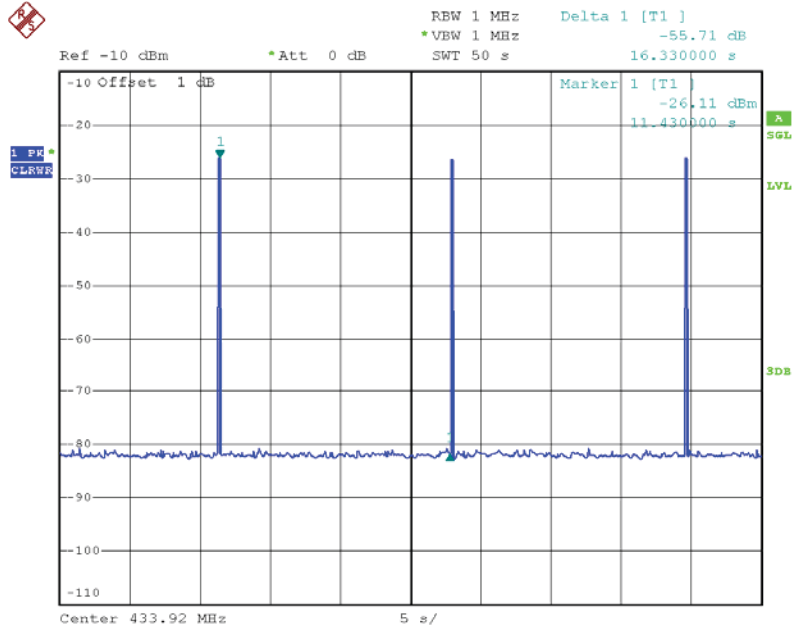
| Test Channel                          | Frequency (MHz) | Silent period (s) | Silent period limit (s) | Result |
|---------------------------------------|-----------------|-------------------|-------------------------|--------|
| CH01                                  | 433.92          | 16.33             | > 10                    | PASS   |
| Silent period = 16.33 >30* 0.13 = 3.9 |                 |                   |                         |        |

### On Time



Date: 29.MAY.2016 16:34:40

### Off Time



Date: 29.MAY.2016 16:37:21