

# FCC Radio Test Report

**FCC ID: RNE00515TX**

This report concerns: ☒ Original Grant

**Project No.** : 1905C115  
**Equipment** : Digital Freezer /Refrigerator Thermometer  
**Test Model** : 00515TX  
**Series Model** : N/A  
**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 23, 2019  
**Date of Test** : May 24, 2019 ~ Jun. 27, 2019  
**Issued Date** : Jan. 14, 2020  
**Tested by** : BTL Inc.

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Certificate #5123.02

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The information, data and test plan are provided by manufacturer which may affect the validity of results, so it is manufacturer's responsibility to ensure that the apparatus meets the essential requirements of applied standards and in all the possible configurations as representative of its intended use.

## 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.

Please note that the measurement uncertainty is provided for informational purpose only and are not use in determining the Pass/Fail results.

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**REPORT ISSUED HISTORY**

| Report Version | Description               | Issued Date   |
|----------------|---------------------------|---------------|
| R00            | Original Issue.           | Nov. 29, 2019 |
| R01            | Updated the product name. | Jan. 14, 2020 |

## 1. GENERAL SUMMARY

Equipment : Digital Freezer /Refrigerator Thermometer  
Brand Name : ACURITE  
Test Model : 00515TX  
Series Model : N/A  
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 24, 2019 ~ Jun. 27, 2019  
Test Sample : Engineering Sample No.: DG190523170-2  
Standard(s) : FCC Part15, Subpart C(15.231)  
ANSI C63.10-2013

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-FCCP-1-1905C115) were obtained utilizing the test procedures, test instruments, test sites that has been accredited by the Authority of A2LA according to the ISO/IEC 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 (15.247) |                                     |                                        |          |          |
|--------------------------------|-------------------------------------|----------------------------------------|----------|----------|
| Standard(s) Section            | Test Item                           | Test Result                            | Judgment | Remark   |
| 15.207                         | AC Power Line Conducted Emissions   | APPENDIX A                             | N/A      | NOTE (1) |
| 15.209& 15.231(e)              | Radiated Spurious Emission          | APPENDIX B<br>APPENDIX C<br>APPENDIX D | PASS     | -----    |
| 15.231(c)                      | 20dB Occupied Bandwidth Measurement | APPENDIX E                             | PASS     | -----    |
| 15.231(e)                      | Timing Testing                      | APPENDIX F                             | PASS     | -----    |

Note:

- (1) "N/A" denotes test is not applicable in this test report
- (2) The EUT's maximum operating frequency is 433.92MHz.

## 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 FCC: 357015

BTL's designation number for FCC: CN1240

## 2.2 MEASUREMENT UNCERTAINTY

ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level (based on a coverage factor (k=2))

The BTL measurement uncertainty as below table:

### 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           | Digital Freezer /Refrigerator Thermometer |                         |
| Brand Name          | ACURITE                                   |                         |
| Test Model          | 00515TX                                   |                         |
| Series Model        | N/A                                       |                         |
| Model Difference(s) | N/A                                       |                         |
| Power Source        | Supplied from 2*AA battery                |                         |
| Power Rating        | DC 3V                                     |                         |
| Product Description | Product Type                              | Remote Control Device   |
|                     | Operation Frequency                       | 433.92 MHz              |
|                     | Modulation Type                           | ASK                     |
|                     | Number Of Channel                         | 1CH, please see note 2. |
|                     | Antenna Designation                       | Loop antenna            |
|                     | Field Strength                            | 62.14 dBuV/m (AV Max.)  |

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) EUT uses a 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 Y-plane. Therefore only the test data of this Y-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. | 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. AC POWER LINE CONDUCTED EMISSIONS TEST

### 4.1 Limit

| Frequency of Emission (MHz) | Limit (dBμV) |           |
|-----------------------------|--------------|-----------|
|                             | 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 tighter limit applies at the band edges.
- (2) The limit of " \* " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.
- (3) 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    |

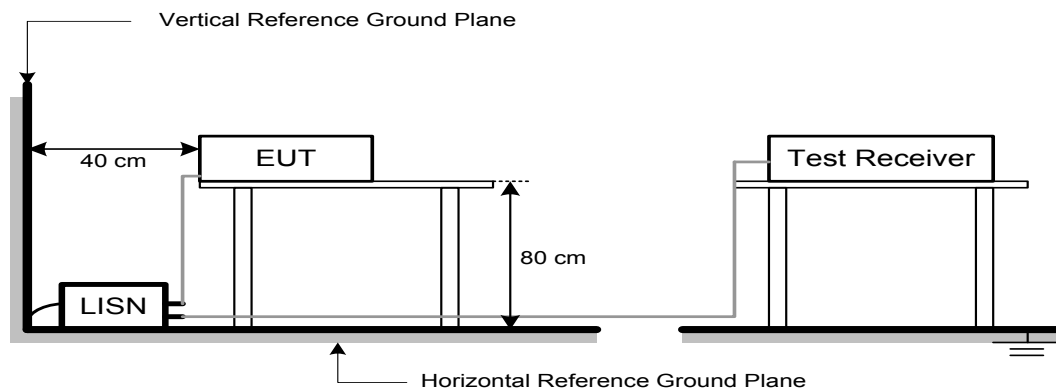
### 4.2 TEST PROCEDURE

- a. The EUT was placed 0.8 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 ground plane 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.

### 4.3 DEVIATION FROM TEST STANDARD

No deviation

#### 4.4 TEST SETUP



#### 4.5 EUT OPERATING CONDITIONS

The EUT was configured for testing in a typical function (as a customer would normally use it), EUT was programmed to be in continuously transmitting data or hopping on mode.

#### 4.6 EUT TEST CONDITIONS

Temperature: N/A      Relative Humidity: N/A      Test Voltage: N/A

#### 4.7 TEST RESULTS

Please refer to the APPENDIX 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 150 kHz to 30 MHz.

## 5. RADIATED EMISSION TEST

### 5.1 FIELD STRENGTH OF FUNDAMENTAL EMISSIONS MEASUREMENT LIMIT

| Frequency Band (MHz) | Fundamental EmissionsLimit( $\mu\text{V/m}$ ) 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 EmissionsLimit(dBuV/m) at 3m |
|-------------------------|------------------------------------------|
| 433.92 MHz              | 72.87 (Average)                          |
| 433.92 MHz              | 92.87 (Peak)                             |

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

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

### 5.3 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( $\mu\text{V/m}$ ) 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 =  $16.6667 \times (\text{operating frequency, MHz}) - 2833.3333$ .

(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 (micorvolts/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 |

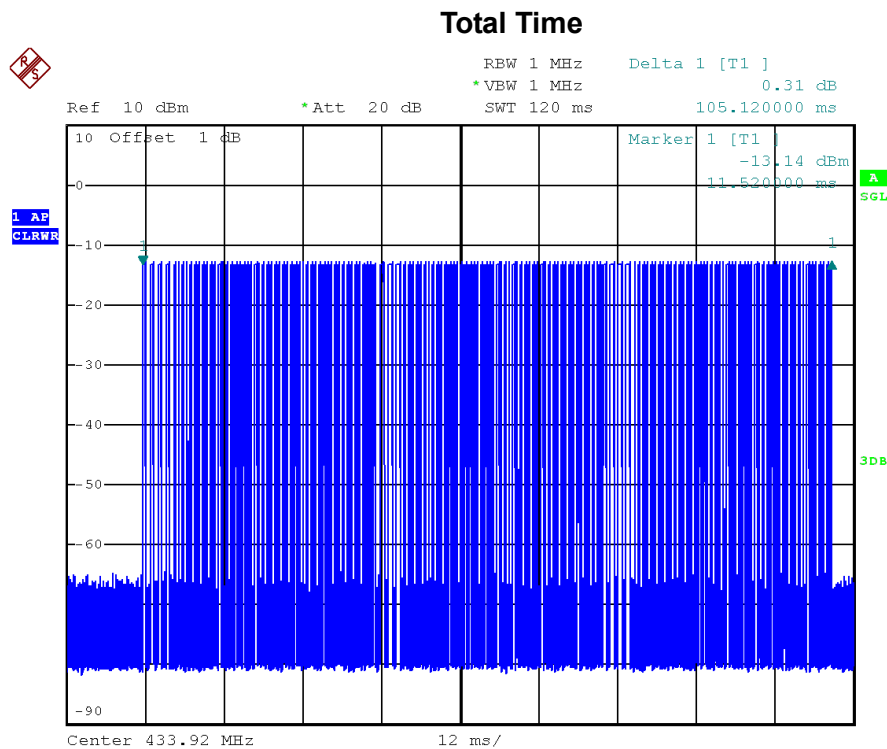
#### 5.4 DWELL TIME OF PERIODIC OPERATION MEASUREMENT

Duty Cycle = ( N1\*L1+N2\*L2+...+Nn-1\*Ln-1+Nn\*Ln)/100 or T

DUTY CYCLE=(0.6\*12+0.2\*96+0.4\*45)/100  
=42.2/100  
=42.2%

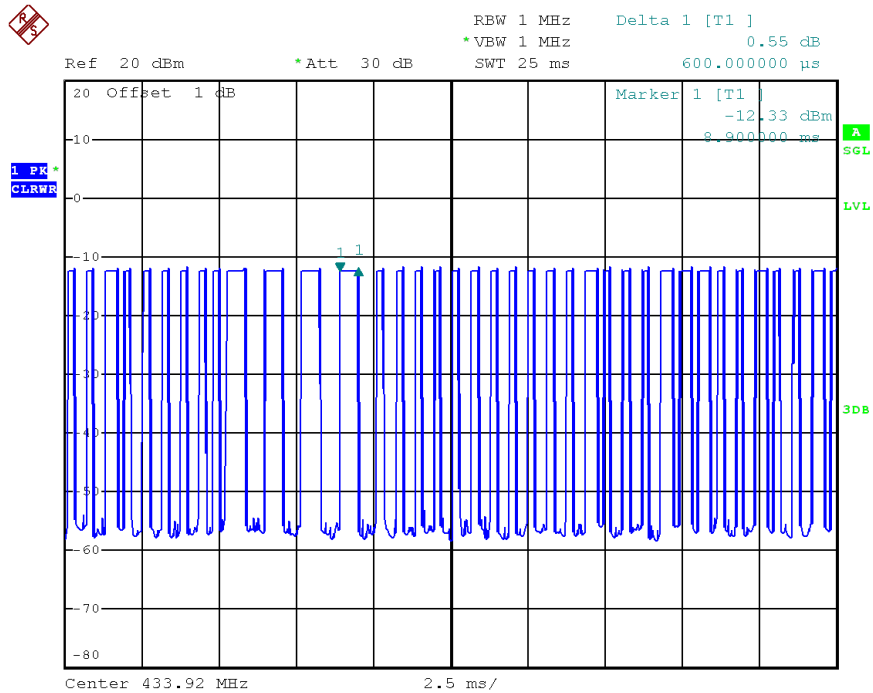
Average Reading =Peak Reading (dBuV/m)+ 20log (Duty cycle)

Average Reading = Peak+20\*log (DUTY CYCLE)=Peak-7.49



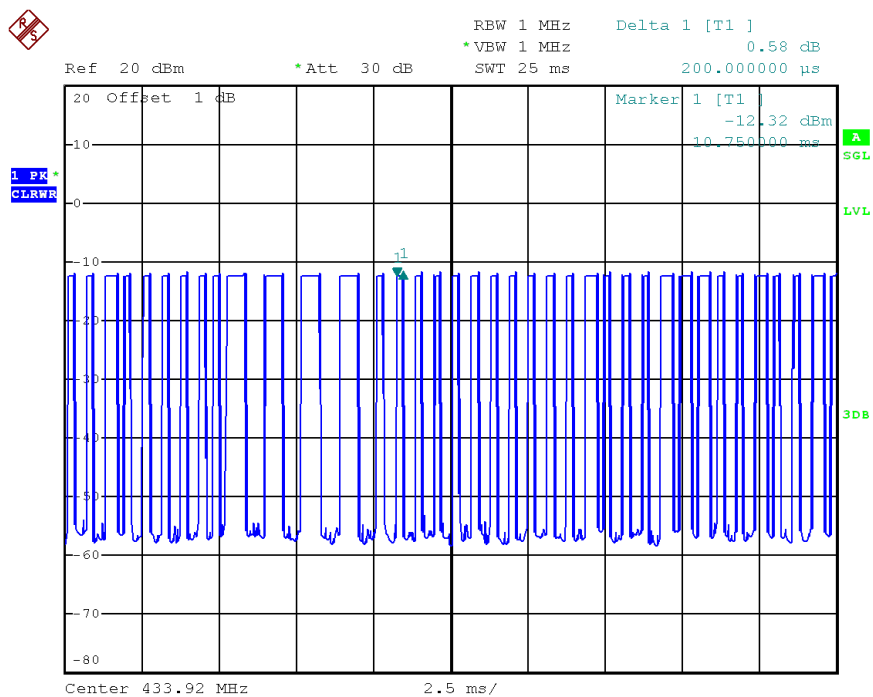
Date: 5.JUN.2019 09:41:26

### On Time: 0.6ms\*12



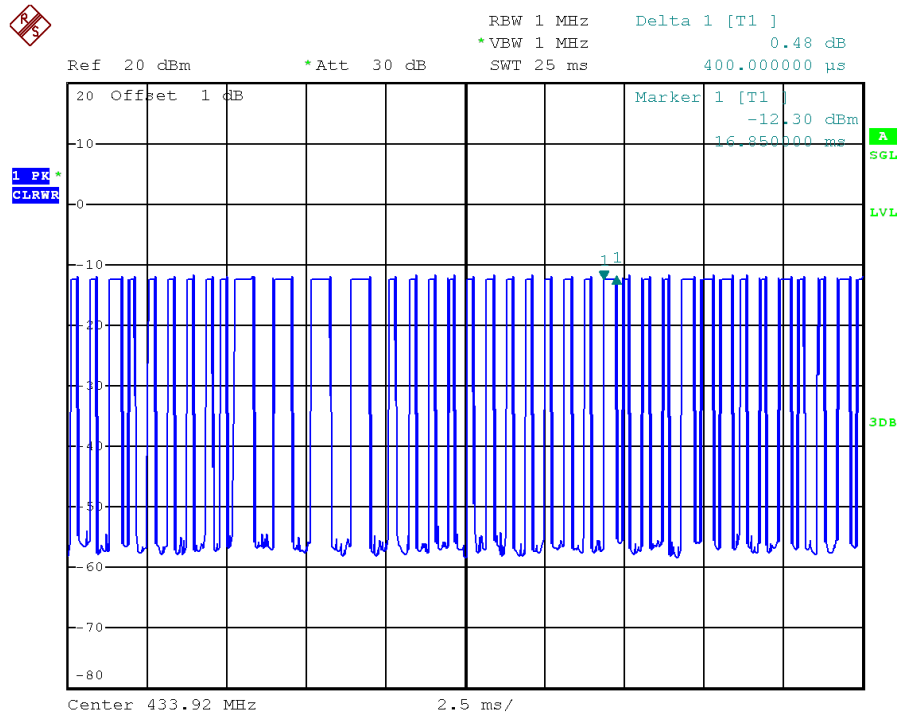
Date: 5.JUN.2019 09:33:21

### On Time: 0.2ms\*96



Date: 5.JUN.2019 09:33:09

**On Time: 0.4ms\*45**



Date: 5.JUN.2019 09:33:38

## 5.5 TEST PROCEDURE

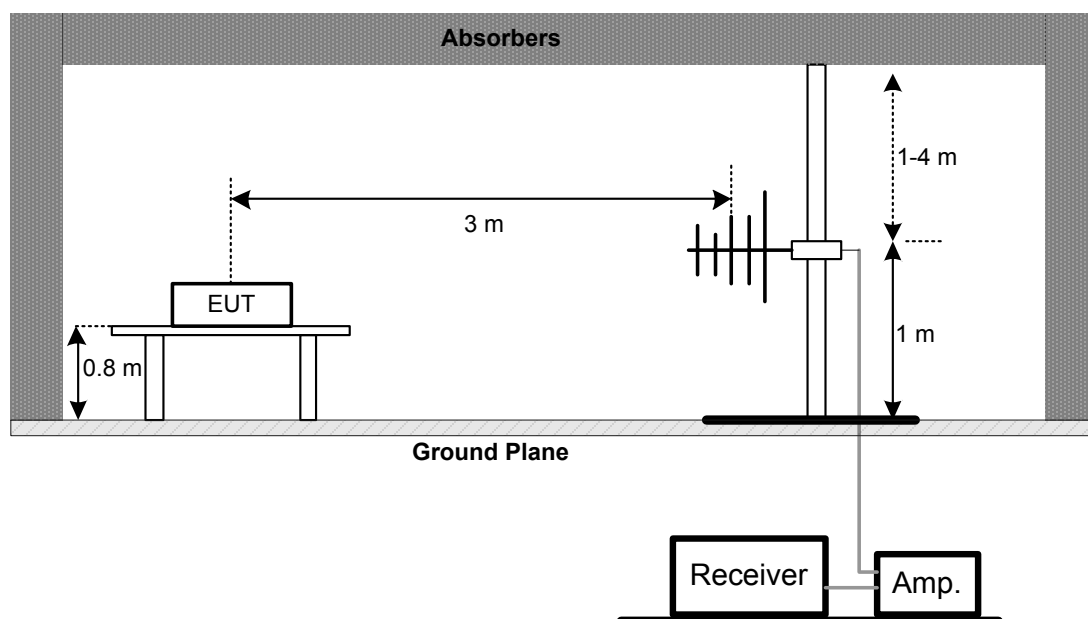
- The measuring distance of 3 m shall be used for measurements. The EUT was placed on the top of a rotating table 0.8 meter above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.(below 1GHz)
- The measuring distance of 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)
- 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.
- For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights find the maximum reading (used Bore sight function).
- The receiver system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1GHz.
- 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.
- 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)
- 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)
- For the actual test configuration, please refer to the related Item –EUT Test Photos.

## 5.6 DEVIATION FROM TEST STANDARD

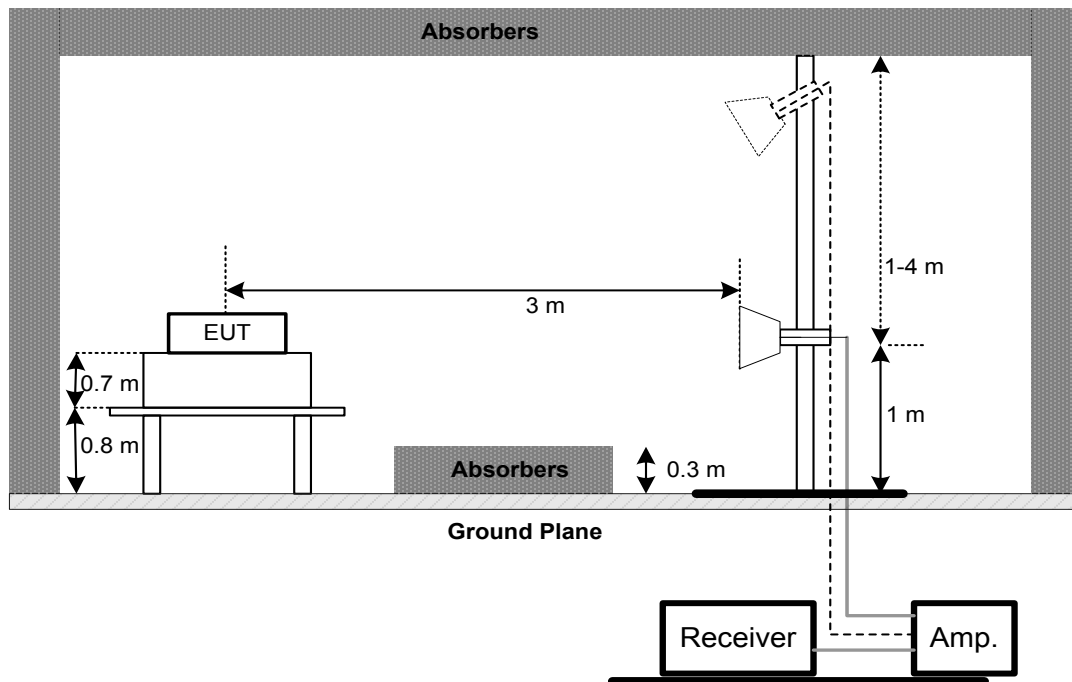
No deviation

## 5.7 TEST SETUP

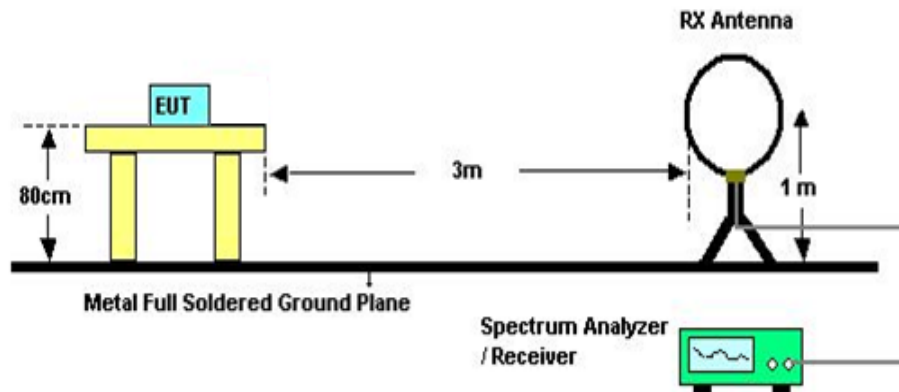
(A) Radiated Emission Test Set-Up Frequency Below 1 GHz



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



(C) For Radiated Emissions Below 30MHz



**5.8 DEVIATION FROM TEST STANDARD**

The EUT tested system was configured as the statements of 4.5 unless otherwise a special operating condition is specified in the follows during the testing.

**5.9 DEVIATION FROM TEST STANDARD**

Temperature: 24° C    Relative Humidity: 68%    Test Voltage: DC 3V

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

Please refer to the Appendix 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..

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

Please refer to the Appendix C.

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

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

Please refer to the Appendix 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.

## 6. 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                      |

### 6.1 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             |

### 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 10 kHz and the video bandwidth of 10 kHz were used.
3. Measured the spectrum width with power higher than 20dB below carrier.

### 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 continuously transmitting mode.

## 6.6 EUT TEST CONDITIONS

Temperature: 24° C    Relative Humidity: 64%    Test Voltage: DC 3V

## 6.7 TESTRESULTS

Please refer to the Appendix E.

## 7. 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.

### 7.1 MEASURING INSTRUMENTS AND SETTING

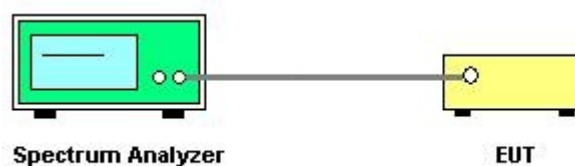
Please refer to section 6 in this report. The following table is the setting of the Spectrum Analyzer.

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

### 7.2 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.

### 7.3 TEST SETUP LAYOUT



### 7.4 TEST DEVIATION

There is no deviation with the original standard.

### 7.5 EUT OPERATION DURING TEST

The EUT was programmed to be in normal mode.

### 7.6 EUT OPERATION DURING TEST

Temperature: 24° C    Relative Humidity: 64%    Test Voltage: DC 3V

### 7.7 TEST RESULTS

Please refer to the Appendix F.

## 8. MEASUREMENT INSTRUMENTS LIST

| Radiated Emissions - 9 kHz to 30 MHz |                      |              |                          |            |                  |
|--------------------------------------|----------------------|--------------|--------------------------|------------|------------------|
| Item                                 | Kind of Equipment    | Manufacturer | Type No.                 | Serial No. | Calibrated until |
| 1                                    | Loop Antenna         | EM           | EM-6876-1                | 230        | Jan. 15, 2020    |
| 2                                    | Cable                | N/A          | RG 213/U                 | C-102      | May 31, 2020     |
| 3                                    | EMI Test Receiver    | R&S          | ESCI                     | 100895     | Mar. 10, 2020    |
| 4                                    | Measurement Software | Farad        | EZ-EMC<br>Ver.NB-03A1-01 | N/A        | N/A              |

| Radiated Emission Measurement - Below 1GHz |                      |              |                             |             |                  |
|--------------------------------------------|----------------------|--------------|-----------------------------|-------------|------------------|
| Item                                       | Kind of Equipment    | Manufacturer | Type No.                    | Serial No.  | Calibrated until |
| 1                                          | Antenna              | Schwarzbeck  | VULB9160                    | 9160-3232   | Mar. 09, 2020    |
| 2                                          | Amplifier            | HP           | 8447D                       | 2944A09673  | Aug. 11, 2019    |
| 3                                          | Receiver             | Agilent      | N9038A                      | MY52130039  | Aug. 11, 2019    |
| 4                                          | Cable                | emci         | LMR-400(30MHz-1 GHz)(8m+5m) | N/A         | May 24, 2020     |
| 5                                          | Controller           | CT           | SC100                       | N/A         | N/A              |
| 6                                          | Controller           | MF           | MF-7802                     | MF780208416 | N/A              |
| 7                                          | Measurement Software | Farad        | EZ-EMC<br>Ver.NB-03A1-01    | N/A         | N/A              |

| Radiated Emission Measurement - Above 1GHz |                                     |                |                          |               |                  |
|--------------------------------------------|-------------------------------------|----------------|--------------------------|---------------|------------------|
| Item                                       | Kind of Equipment                   | Manufacturer   | Type No.                 | Serial No.    | Calibrated until |
| 1                                          | Double Ridged Guide Antenna         | ETS            | 3115                     | 75789         | Mar. 09, 2020    |
| 2                                          | Broad-Band Horn Antenna             | Schwarzbeck    | BBHA 9170                | 9170319       | Jun. 30, 2019    |
| 3                                          | Amplifier                           | Agilent        | 8449B                    | 3008A02333    | Mar. 10, 2020    |
| 4                                          | Microwave Preamplifier With Adaptor | EMC INSTRUMENT | EMC2654045               | 980039 & HA01 | Mar. 10, 2020    |
| 5                                          | Receiver                            | Agilent        | N9038A                   | MY52130039    | Aug. 11, 2019    |
| 6                                          | Controller                          | CT             | SC100                    | N/A           | N/A              |
| 7                                          | Controller                          | MF             | MF-7802                  | MF780208416   | N/A              |
| 8                                          | Cable                               | mitron         | B10-01-01-12M            | 18072744      | Jul. 30, 2019    |
| 9                                          | Measurement 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          | FSP40    | 100185     | Aug. 11, 2019    |
| 2                                   | Attenuator        | WOKEN        | 6SM3502  | VAS1214NL  | Feb. 12, 2020    |

| Timing Testing |                   |              |          |            |                  |
|----------------|-------------------|--------------|----------|------------|------------------|
| Item           | Kind of Equipment | Manufacturer | Type No. | Serial No. | Calibrated until |
| 1              | Spectrum Analyzer | R&S          | FSP40    | 100185     | Aug. 11, 2019    |
| 2              | Attenuator        | WOKEN        | 6SM3502  | VAS1214NL  | Feb. 12, 2020    |

Remark: "N/A" denotes no model name, serial no. or calibration specified.  
All calibration period of equipment list is one year.

## 9. EUT TEST PHOTO

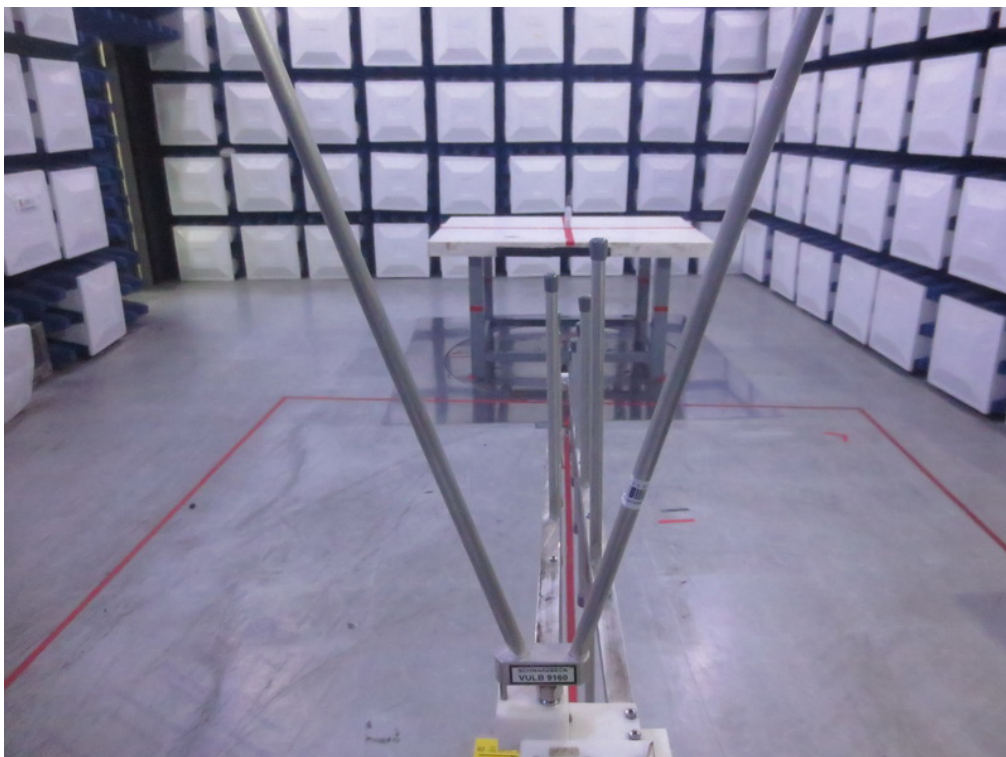
### Radiated Measurement Photos

9KHz to 30MHz



## Radiated Measurement Photos

30MHz to 1000MHz



## Radiated Measurement Photos

Above 1000MHz



## APPENDIX A - AC POWER LINE CONDUCTED EMISSIONS

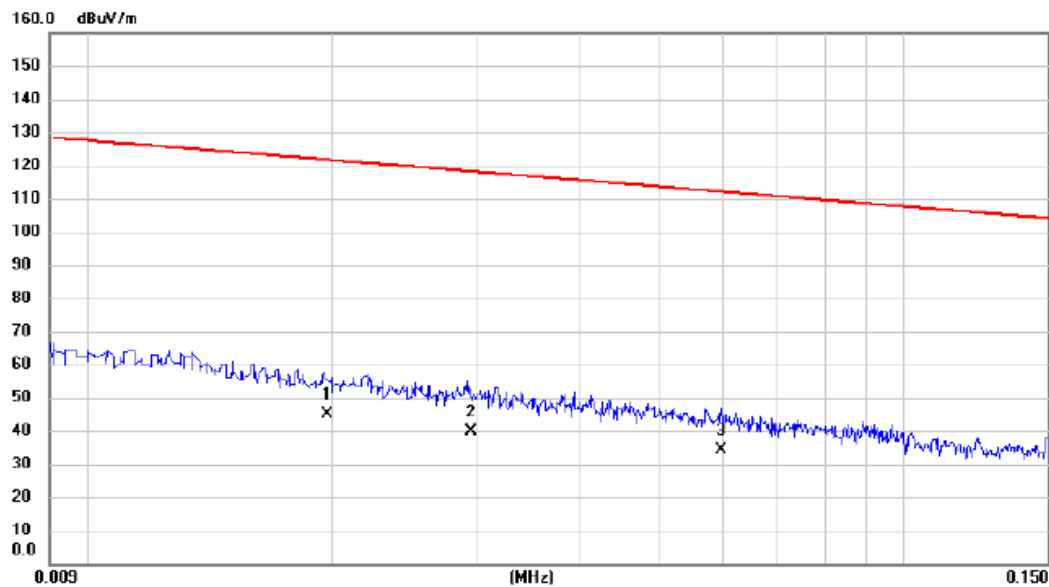
**Test Mode: N/A**

Note: "N/A" denotes test is not applicable to this device.

## APPENDIX B - RADIATED EMISSION - 9 KHz to 30 MHz

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

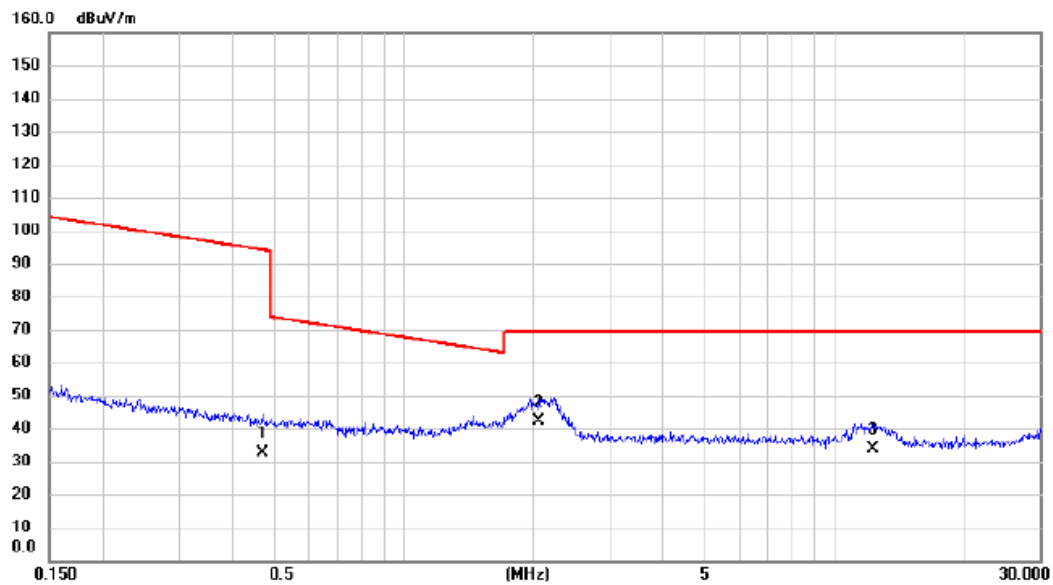
Ant 0°



| 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   | *   | 0.0197       | 31.20                    | 13.91                   | 45.11                      | 121.72          | -76.61       | AVG      |         |
| 2   |     | 0.0295       | 25.80                    | 13.85                   | 39.65                      | 118.21          | -78.56       | AVG      |         |
| 3   |     | 0.0597       | 20.40                    | 13.77                   | 34.17                      | 112.09          | -77.92       | AVG      |         |

Test Mode: TX CH 433.92MHz

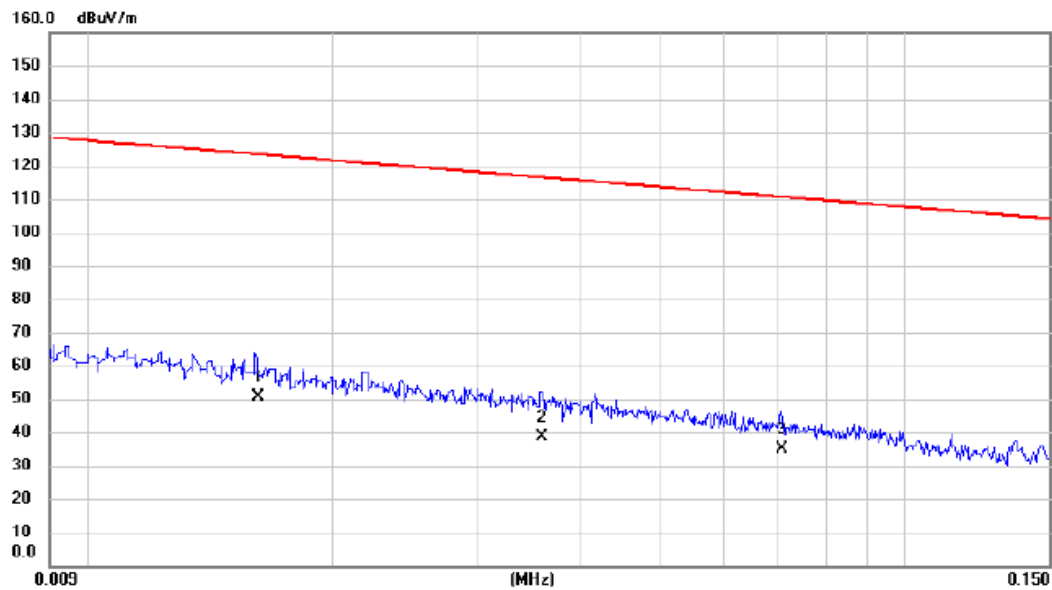
Ant 0°



| No. Mk. | Freq.   | Reading Level | Correct Factor | Measure-ment | Limit  | Margin | Detector | Comment |
|---------|---------|---------------|----------------|--------------|--------|--------|----------|---------|
|         | MHz     | dBuV          | dB             | dBuV/m       | dBuV/m | dB     |          |         |
| 1       | 0.4686  | 19.60         | 13.14          | 32.74        | 94.19  | -61.45 | AVG      |         |
| 2 *     | 2.0550  | 30.50         | 11.79          | 42.29        | 69.54  | -27.25 | QP       |         |
| 3       | 12.3182 | 22.20         | 11.60          | 33.80        | 69.54  | -35.74 | QP       |         |

Test Mode: TX CH 433.92MHz

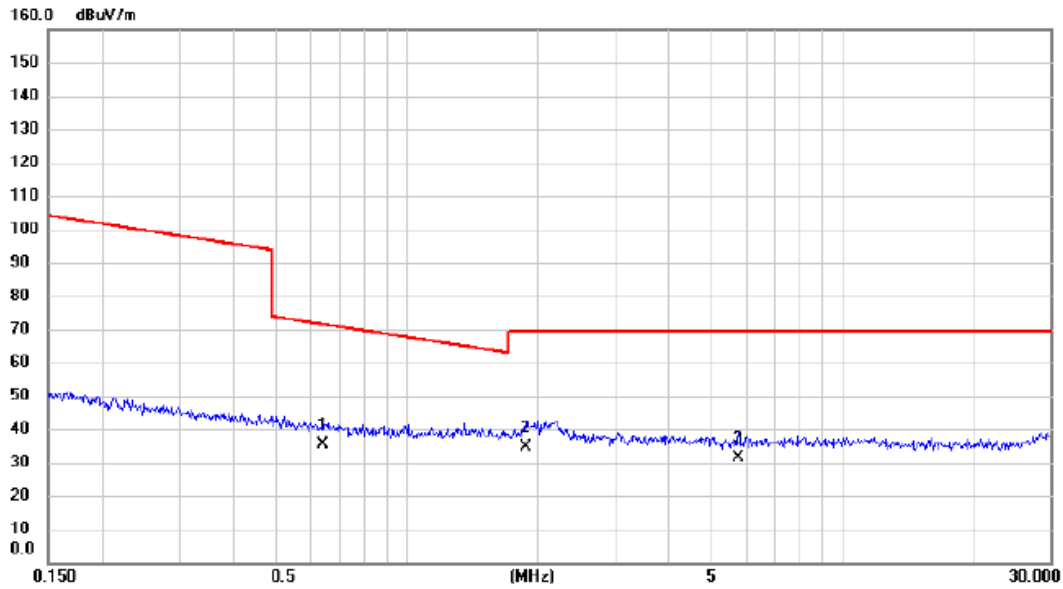
Ant 90°



| 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   | *   | 0.0162       | 35.60                    | 14.96                   | 50.56                      | 123.41          | -72.85       | AVG      |         |
| 2   |     | 0.0360       | 24.90                    | 13.88                   | 38.78                      | 116.48          | -77.70       | AVG      |         |
| 3   |     | 0.0706       | 21.50                    | 13.60                   | 35.10                      | 110.63          | -75.53       | AVG      |         |

Test Mode: TX CH 433.92MHz

Ant 90°



| No. | Mk. | Freq.  | Reading Level | Correct Factor | Measurement | Limit  | Margin |          |         |
|-----|-----|--------|---------------|----------------|-------------|--------|--------|----------|---------|
|     |     | MHz    | dBuV          | dB             | dBuV/m      | dBuV/m | dB     | Detector | Comment |
| 1   |     | 0.6406 | 22.60         | 12.79          | 35.39       | 71.47  | -36.08 | QP       |         |
| 2   | *   | 1.8780 | 22.70         | 11.90          | 34.60       | 69.54  | -34.94 | QP       |         |
| 3   |     | 5.7743 | 20.30         | 10.98          | 31.28       | 69.54  | -38.26 | QP       |         |

## APPENDIX C - RADIATED EMISSION - 30MHz to 1000MHz

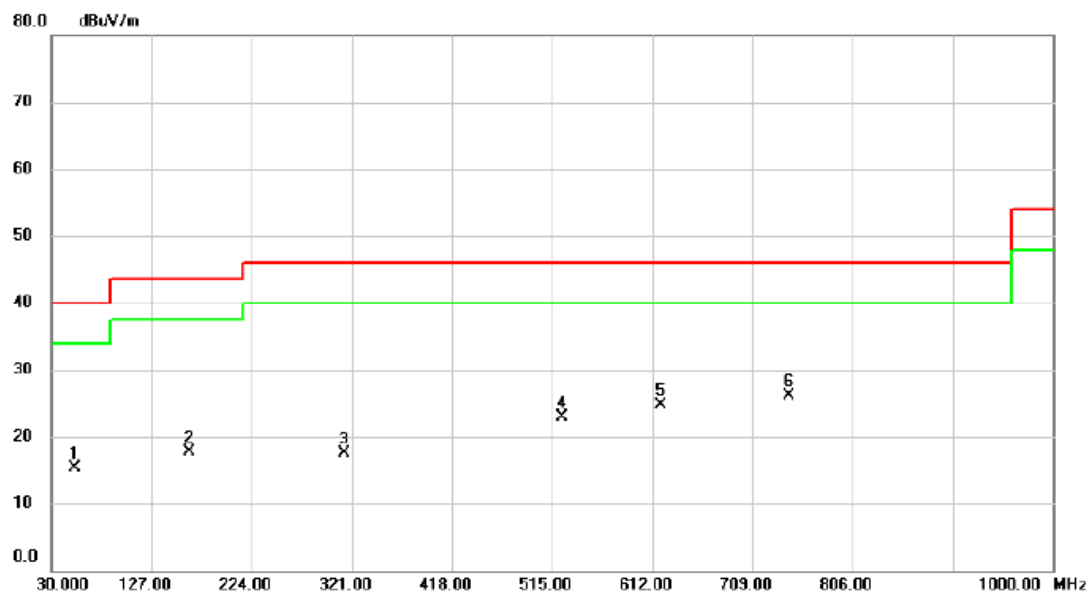
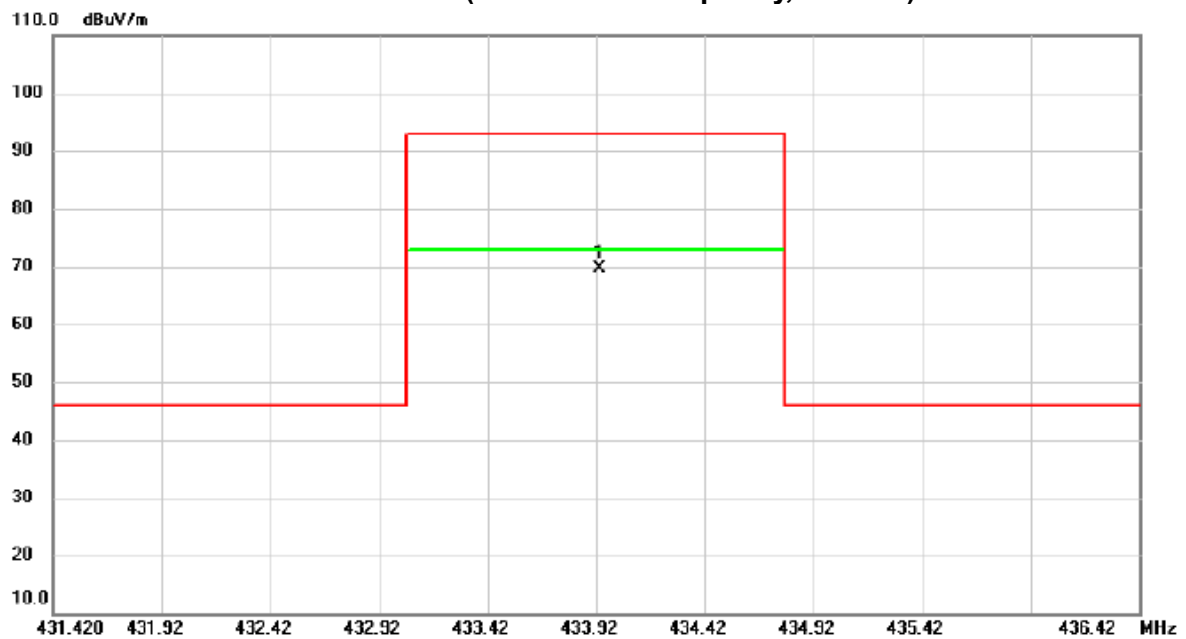
|                                                                                          |                 |
|------------------------------------------------------------------------------------------|-----------------|
| Test Mode :                                                                              | TX CH 433.92MHz |
| <b>About the duty cycle correction factor calculated, please refer to the page 16~18</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) |      |
| 433.935        | V               | 78.23          |              | -8.60             | 69.63            | 62.14          | 92.87            | 72.87          | Z/F  |
| 744.890        | V               | 29.79          |              | -3.70             | 26.09            | 18.60          | 46.00            | 26.00          | Z/H  |

Remark:

- (1) The average value of fundamental frequency is:  
Average = Peak value + 20log(Duty cycle), Final AV=PK -7.49

Orthogonal Axis: Y  
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   |     | 52.795       | 29.27                    | -13.98                  | 15.29                      | 40.00           | -24.71       | peak     |         |
| 2   |     | 163.375      | 29.24                    | -11.55                  | 17.69                      | 43.50           | -25.81       | peak     |         |
| 3   |     | 313.725      | 28.73                    | -11.32                  | 17.41                      | 46.00           | -28.59       | peak     |         |
| 4   |     | 525.185      | 30.44                    | -7.51                   | 22.93                      | 46.00           | -23.07       | peak     |         |
| 5   |     | 619.760      | 29.98                    | -5.37                   | 24.61                      | 46.00           | -21.39       | peak     |         |
| 6   | *   | 744.890      | 29.79                    | -3.70                   | 26.09                      | 46.00           | -19.91       | peak     |         |

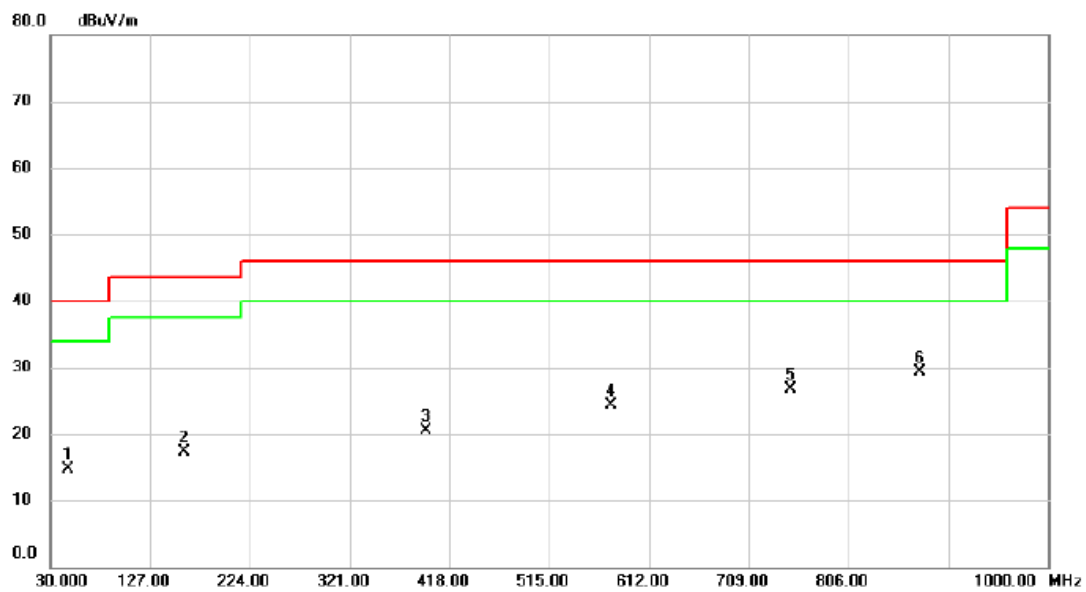
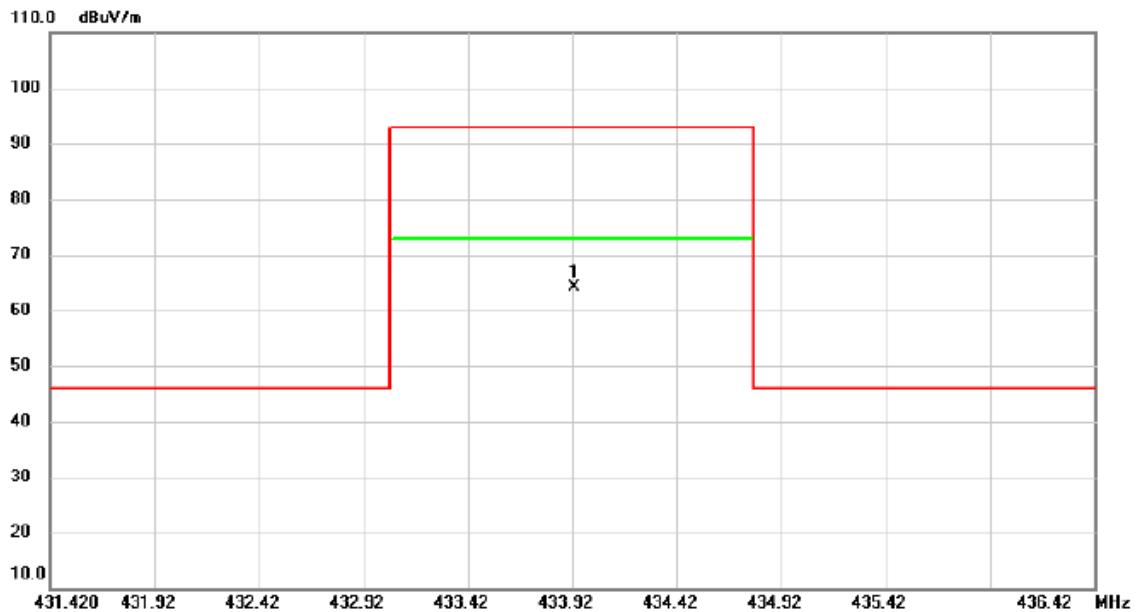
|                                                                                          |                 |
|------------------------------------------------------------------------------------------|-----------------|
| Test Mode :                                                                              | TX CH 433.92MHz |
| <b>About the duty cycle correction factor calculated, please refer to the page 16~18</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) |      |
| 433.928        | H               | 72.69          |              | -8.59             | 64.10            | 56.61          | 72.87            | 52.87          | Z/F  |
| 874.870        | H               | 31.42          |              | -2.11             | 29.31            | 21.82          | 46.00            | 26.00          | Z/H  |

Remark:

- (1) The average value of fundamental frequency is:  
Average = Peak value + 20log(Duty cycle), Final AV=PK-7.49

Orthogonal Axis: Y  
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   |     | 46.975       | 28.99                    | -14.30                  | 14.69                      | 40.00           | -25.31       | peak     |         |
| 2   |     | 159.495      | 28.38                    | -11.13                  | 17.25                      | 43.50           | -26.25       | peak     |         |
| 3   |     | 395.690      | 30.05                    | -9.64                   | 20.41                      | 46.00           | -25.59       | peak     |         |
| 4   |     | 575.140      | 30.93                    | -6.53                   | 24.40                      | 46.00           | -21.60       | peak     |         |
| 5   |     | 750.225      | 30.44                    | -3.67                   | 26.77                      | 46.00           | -19.23       | peak     |         |
| 6   | *   | 874.870      | 31.42                    | -2.11                   | 29.31                      | 46.00           | -16.69       | peak     |         |

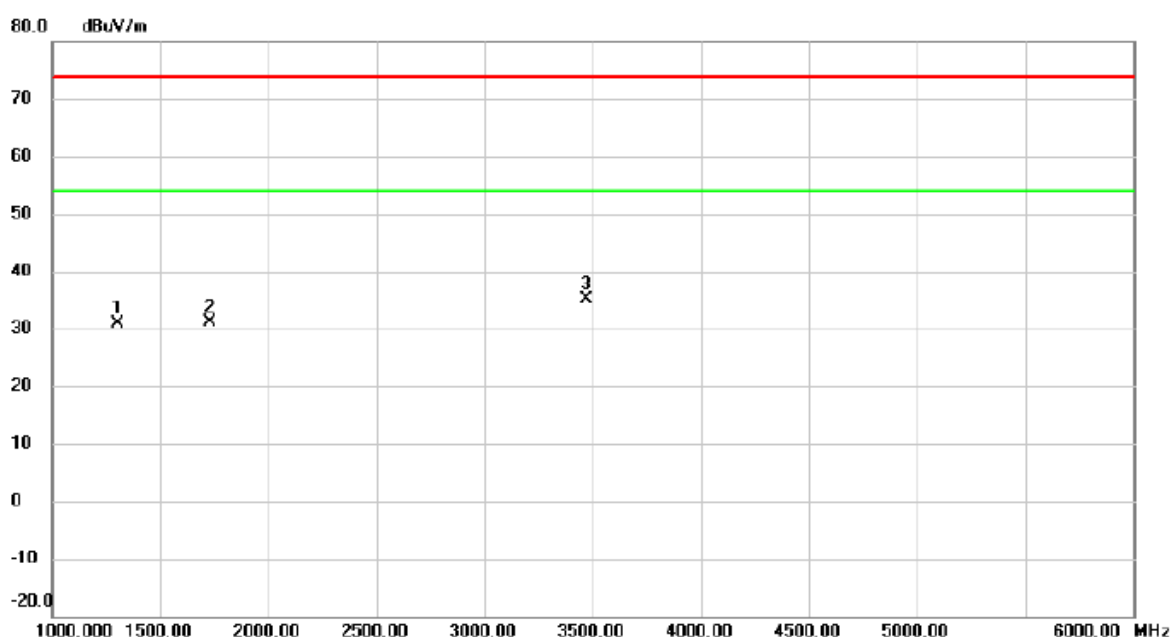
## APPENDIX D - RADIATED EMISSION - ABOVE 1000MHz

|                                                                                          |                 |
|------------------------------------------------------------------------------------------|-----------------|
| Test Mode :                                                                              | TX CH 433.92MHz |
| <b>About the duty cycle correction factor calculated, please refer to the page 16~18</b> |                 |

| Freq.<br>(MHz) | Ant.Pol.<br>H/V | Reading |        | Ant./CF<br>CF(dB) | Act.     |          | Limit    |          | Margin   |          | Note |
|----------------|-----------------|---------|--------|-------------------|----------|----------|----------|----------|----------|----------|------|
|                |                 | Peak    | AV     |                   | Peak     | AV       | Peak     | AV       | Peak     | AV       |      |
|                |                 | (dBuV)  | (dBuV) |                   | (dBuV/m) | (dBuV/m) | (dBuV/m) | (dBuV/m) | (dBuV/m) | (dBuV/m) |      |
| 1300.00        | V               | 37.95   |        | -7.10             | 30.85    |          | 74.00    |          | -43.15   |          | Z/E  |
| 1732.00        | V               | 35.92   |        | -4.68             | 31.24    |          | 74.00    |          | -42.76   |          | Z/E  |
| 3470.00        | V               | 34.22   |        | 0.97              | 35.19    |          | 74.00    |          | -38.81   |          | Z/E  |

Remark:

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

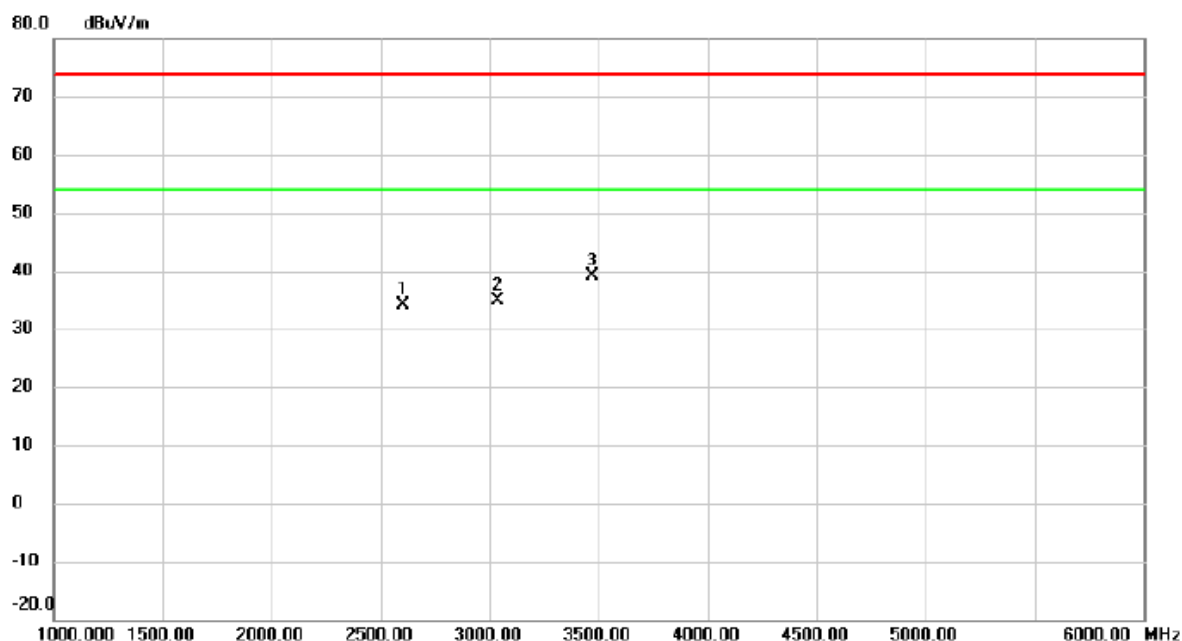


|                                                                                          |                 |
|------------------------------------------------------------------------------------------|-----------------|
| Test Mode :                                                                              | TX CH 433.92MHz |
| <b>About the duty cycle correction factor calculated, please refer to the page 16~18</b> |                 |

| Freq.<br>(MHz) | Ant.Pol.<br>H/V | Reading |        | Ant./CF<br>CF(dB) | Act.     |          | Limit    |          | Margin   |          | Note |
|----------------|-----------------|---------|--------|-------------------|----------|----------|----------|----------|----------|----------|------|
|                |                 | Peak    | AV     |                   | Peak     | AV       | Peak     | AV       | Peak     | AV       |      |
|                |                 | (dBuV)  | (dBuV) |                   | (dBuV/m) | (dBuV/m) | (dBuV/m) | (dBuV/m) | (dBuV/m) | (dBuV/m) |      |
| 2600.00        | H               | 37.13   |        | -3.06             | 34.07    |          | 74.00    |          | -39.93   |          | Z/E  |
| 3035.00        | H               | 35.73   |        | -0.80             | 34.93    |          | 74.00    |          | -39.07   |          | Z/E  |
| 3470.00        | H               | 38.28   |        | 0.97              | 39.25    |          | 74.00    |          | -34.75   |          | Z/E  |

Remark:

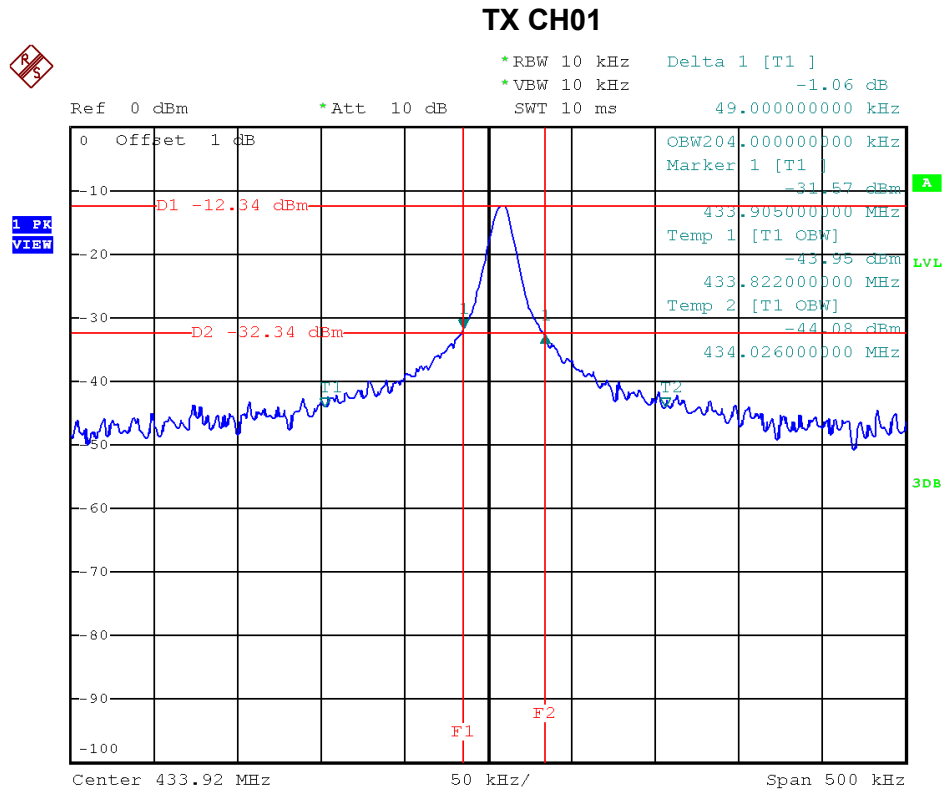
(1) Peak value is much lower than the limit, so AV value isn't shown on this test item.



## APPENDIX E - 20dB SPECTRUM BANDWIDTH

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

| Frequency<br>(MHz) | 20dB Bandwidth<br>(MHz) | 99% Occupied BW<br>(MHz) | 20 dB BW Limits<br>(MHz) |
|--------------------|-------------------------|--------------------------|--------------------------|
| 433.92             | 0.0490                  | 0.2040                   | 1.0848                   |

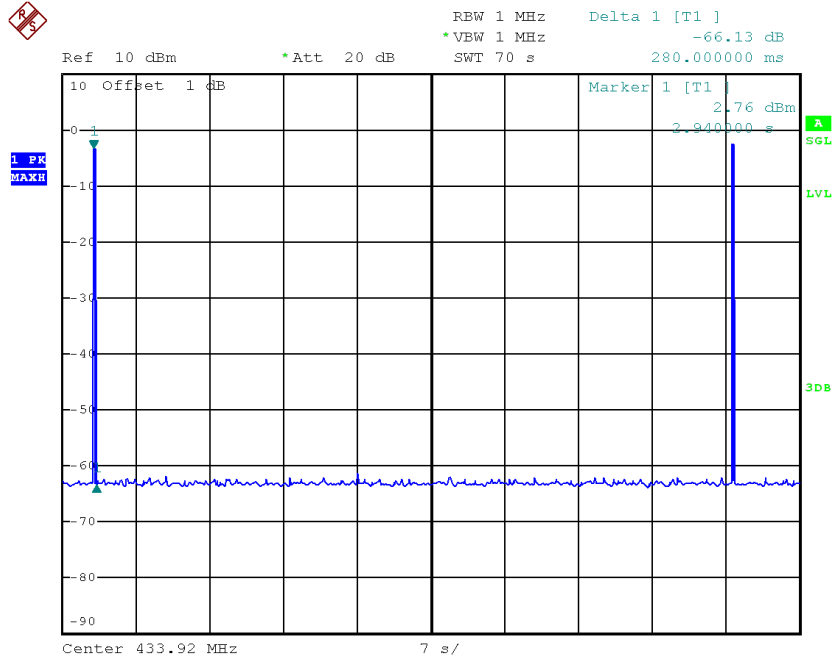


Date: 5.JUN.2019 09:39:03

## APPENDIX F - TIMING TESTING

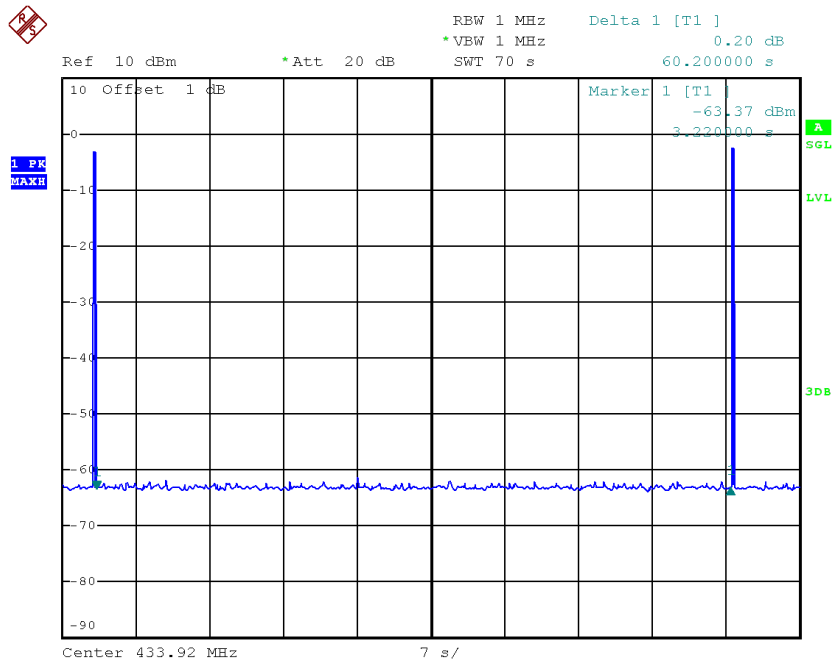
Test Mode: TX CH 433.92MHz

## On Time



Date: 3.JUN.2019 10:24:32

## Off Time



Date: 3.JUN.2019 10:26:09

End of Test Report