

## FCC CERTIFICATION TEST REPORT

### FOR

|                      |   |                                                                                       |
|----------------------|---|---------------------------------------------------------------------------------------|
| Applicant            | : | FOSHAN SANMAK LIGHTING CO.,LTD                                                        |
| Address              | : | Block 3, Chuangfu Industry Zone, Lihe Rd., Nanhai District, Foshan City, 528244 China |
| Equipment under Test | : | TRV SINGLE CHANNEL WIRELESS REMOTE                                                    |
| Model No.            | : | 1292701                                                                               |
| Trade Mark           | : | SANMAK                                                                                |
| FCC ID               | : | 2AVYD1292701                                                                          |
| Manufacturer         | : | FOSHAN SANMAK LIGHTING CO.,LTD                                                        |
| Address              | : | Block 3, Chuangfu Industry Zone, Lihe Rd., Nanhai District, Foshan City, 528244 China |

**Issued By: Dongguan Dongdian Testing Service Co., Ltd.**

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# REPORT

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## TEST REPORT DECLARE

|                             |   |                                                                                          |
|-----------------------------|---|------------------------------------------------------------------------------------------|
| <b>Applicant</b>            | : | FOSHAN SANMAK LIGHTING CO.,LTD                                                           |
| <b>Address</b>              | : | Block 3, Chuangfu Industry Zone, Lihe Rd., Nanhai District,<br>Foshan City, 528244 China |
| <b>Equipment under Test</b> | : | TRV SINGLE CHANNEL WIRELESS REMOTE                                                       |
| <b>Model No.</b>            | : | 1292701                                                                                  |
| <b>Trade mark</b>           | : | SANMAK                                                                                   |
| <b>Manufacturer</b>         | : | FOSHAN SANMAK LIGHTING CO.,LTD                                                           |
| <b>Address</b>              | : | Block 3, Chuangfu Industry Zone, Lihe Rd., Nanhai District,<br>Foshan City, 528244 China |

**Test Standard Used:**

FCC Rules and Regulations Part 15 Subpart C.

**Test procedure used:**

ANSI C63.10:2013

**We Declare:**

The equipment described above is tested by Dongguan Dongdian Testing Service Co., Ltd. and in the configuration tested the equipment complied with the standards specified above. The test results are contained in this test report and Dongguan Dongdian Testing Service Co., Ltd. is assumed of full responsibility for the accuracy and completeness of these tests.

**After test and evaluation, our opinion is that the equipment provided for test compliance with the requirement of the above FCC and IC standards.**

|                         |                   |                      |                               |
|-------------------------|-------------------|----------------------|-------------------------------|
| <b>Report No.:</b>      | DDT-R20031715-1E1 |                      |                               |
| <b>Date of Receipt:</b> | Mar. 17, 2020     | <b>Date of Test:</b> | Mar. 17, 2020 ~ Apr. 10, 2020 |

**Prepared By:**

*Talent Zhang*

**Talent Zhang/Engineer**

**Approved By:**



**Damon Hu/EMC Manager**

Note: This report applies to above tested sample only. This report shall not be reproduced in parts without written approval of Dongguan Dongdian Testing Service Co., Ltd.

## Revision history

| Rev. | Revisions     | Issue Date    | Revised By |
|------|---------------|---------------|------------|
| ---  | Initial issue | Apr. 10, 2020 |            |
|      |               |               |            |

## 1 Summary of test results

| Description of Test Item                         | Standard                                                          | Results |
|--------------------------------------------------|-------------------------------------------------------------------|---------|
| 20dB Bandwidth and 99% Bandwidth                 | FCC Part 15: 15.215<br>ANSI C63.10:2013                           | PASS    |
| Stop Transmitting Time Test                      | FCC Part 15C: 15.231(a)(1)                                        | PASS    |
| Radiated Emission                                | FCC Part 15: 15.209<br>FCC Part 15: 15.231(b)<br>ANSI C63.10:2013 | PASS    |
| Power Line Conducted Emissions                   | FCC Part 15: 15.207<br>ANSI C63.10:2013                           | N/A     |
| Antenna requirement                              | FCC Part 15: 15.203                                               | PASS    |
| Note: N/A is an abbreviation for Not Applicable. |                                                                   |         |

## 2 General test information

### 2.1. Description of EUT

|                          |                                               |
|--------------------------|-----------------------------------------------|
| EUT* Name                | : TRV SINGLE CHANNEL WIRELESS REMOTE          |
| Model Number             | : 1292701                                     |
| EUT function description | : Please reference user manual of this device |
| Power supply             | : DC 6V                                       |
| Operation frequency      | : 433.92MHz                                   |
| Modulation               | : ASK                                         |
| Antenna Type             | : Integrated antenna                          |
| Sample Type              | : Series production                           |

Note 1: EUT is the ab. of equipment under test.

### 2.2. Accessories of EUT

| Description of Accessories | Manufacturer | Model number | Serial No. | Other |
|----------------------------|--------------|--------------|------------|-------|
| N/A                        | N/A          | N/A          | N/A        | N/A   |

### 2.3. Assistant equipment used for test

| Assistant equipment | Manufacturer | Model number | Serial No. | Other |
|---------------------|--------------|--------------|------------|-------|
| N/A                 | N/A          | N/A          | N/A        | N/A   |

### 2.4. Block diagram of EUT configuration for test



| Tested mode, channel, information |         |                 |
|-----------------------------------|---------|-----------------|
| Mode                              | Channel | Frequency (MHz) |
| TX mode                           | /       | 433.92          |

Note : New battery is used during all test

### 2.5. Deviations of test standard

No Deviation.

## 2.6. Test environment conditions

During the measurement the environmental conditions were within the listed ranges:

|                    |           |
|--------------------|-----------|
| Temperature range: | 21-25°C   |
| Humidity range:    | 40-75%    |
| Pressure range:    | 86-106kPa |

## 2.7. Test laboratory

Dongguan Dongdian Testing Service Co., Ltd.

Add: No. 17, Zongbu Road 2, Songshan Lake Sci&Tech, Industry Park, Dongguan City, Guangdong Province, China, 523808

Tel: +86-0769-89201699, <http://www.dgddt.com>, Email: ddt@dgddt.com

CNAS Accreditation No. L6451; A2LA Accreditation No. 3870.01

Designation Number: CN1182; Test Firm Registration Number: 540522

Industry Canada site registration number: 10288A-1

## 2.8. Measurement uncertainty

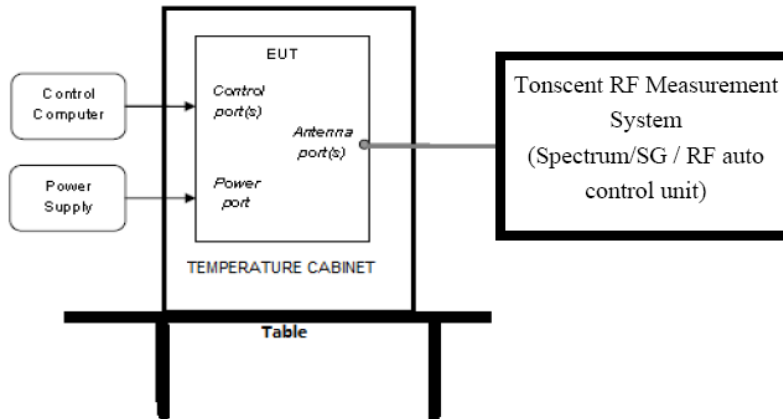
| Test Item                                                                                                                                     | Uncertainty                                                                                 |
|-----------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|
| Bandwidth                                                                                                                                     | 1.1%                                                                                        |
| Peak Output Power(Conducted)(Spectrum analyzer)                                                                                               | 0.86dB (10 MHz ≤ f < 3.6GHz);<br>1.38dB (3.6GHz ≤ f < 8GHz)                                 |
| Peak Output Power(Conducted)(Power Sensor)                                                                                                    | 0.74dB                                                                                      |
| Power Spectral Density                                                                                                                        | 0.74dB (10 MHz ≤ f < 3.6GHz);<br>1.38dB (3.6GHz ≤ f < 8GHz)                                 |
| Frequencies Stability                                                                                                                         | 6.7 × 10 <sup>-8</sup> (Antenna couple method)<br>5.5 × 10 <sup>-8</sup> (Conducted method) |
| Conducted spurious emissions                                                                                                                  | 0.86dB (10 MHz ≤ f < 3.6GHz);<br>1.40dB (3.6GHz ≤ f < 8GHz)<br>1.66dB (8GHz ≤ f < 22GHz)    |
| Uncertainty for radio frequency (RBW<20kHz)                                                                                                   | 3×10 <sup>-8</sup>                                                                          |
| Temperature                                                                                                                                   | 0.4°C                                                                                       |
| Humidity                                                                                                                                      | 2%                                                                                          |
| Uncertainty for Radiation Emission test (30MHz-1GHz)                                                                                          | 4.70 dB (Antenna Polarize: V)<br>4.84 dB (Antenna Polarize: H)                              |
| Uncertainty for Radiation Emission test (1GHz-40GHz)                                                                                          | 4.10dB (1-6GHz)<br>4.40dB (6GHz-18GHz)<br>3.54dB (18GHz-26GHz)<br>4.30dB (26GHz-40GHz)      |
| Uncertainty for Power line conduction emission test                                                                                           | 3.32dB (150kHz-30MHz)                                                                       |
| Note: This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2. |                                                                                             |

### 3 Equipment used during test

| Equipment                                                 | Manufacturer | Model No.     | Serial No.     | Last Cal.     | Cal. Interval |
|-----------------------------------------------------------|--------------|---------------|----------------|---------------|---------------|
| <b>RF Connected Test (Tonscend RF Measurement System)</b> |              |               |                |               |               |
| Spectrum analyzer                                         | R&S          | FSU26         | 200071         | Sep. 29, 2019 | 1 Year        |
| Spectrum analyzer                                         | Agilent      | N9020A        | MY49100362     | Sep. 29, 2019 | 1 Year        |
| Wideband Radio Communication tester                       | R&S          | CMW500        | 117491         | Jun. 25, 2019 | 1 Year        |
| Vector Signal Generator                                   | Agilent      | E8267D        | US49060192     | Sep. 29, 2019 | 1 Year        |
| Vector Signal Generator                                   | Agilent      | N5182A        | MY48180737     | Jun. 25, 2019 | 1 Year        |
| Power Sensor                                              | Agilent      | U2021XA       | MY55150010     | Jun. 28, 2019 | 1 Year        |
| Power Sensor                                              | Agilent      | U2021XA       | MY55150011     | Jun. 28, 2019 | 1 Year        |
| DC Power Source                                           | MATRIS       | MPS-3005L-3   | D813058W       | Jun. 25, 2019 | 1 Year        |
| RF Cable                                                  | Micable      | C10-01-01-1   | 100309         | Sep. 29, 2019 | 1 Year        |
| Temp&Humi Programmable                                    | ZHIXIANG     | ZXGDS-150L    | ZX170110-A     | Oct. 21, 2019 | 1 Year        |
| Test Software                                             | JS Tonscend  | JS1120-3      | Ver.2.7        | N/A           | N/A           |
| <b>Radiation 1#chamber</b>                                |              |               |                |               |               |
| EMI Test Receiver                                         | R&S          | ESU8          | 100316         | Sep. 29, 2019 | 1 Year        |
| Spectrum analyzer                                         | Agilent      | E4447A        | MY50180031     | Jun. 25, 2019 | 1 Year        |
| Trilog Broadband Antenna                                  | Schwarzbeck  | VULB9163      | 9163-462       | Nov. 15, 2019 | 1 Year        |
| Active Loop antenna                                       | Schwarzbeck  | FMZB-1519     | 1519-038       | Sep. 29, 2019 | 1 Year        |
| Double Ridged Horn Antenna                                | R&S          | HF907         | 100276         | Nov. 15, 2019 | 1 Year        |
| Broad Band Horn Antenna                                   | Schwarzbeck  | BBHA 9170     | 790            | Sep. 29, 2019 | 1 Year        |
| Pre-amplifier                                             | A.H.         | PAM-0118      | 360            | Sep. 29, 2019 | 1 Year        |
| Pre-amplifier                                             | TERA-MW      | TRLA-0040 G35 | 101303         | Sep. 29, 2019 | 1 Year        |
| RF Cable                                                  | HUBSER       | CP-X2+ CP-X1  | W11.03+ W12.02 | Sep. 29, 2019 | 1 Year        |
| RF Cable                                                  | N/A          | 5m+6m+1m      | 06270619       | Sep. 29, 2019 | 1 Year        |
| MI Cable                                                  | HUBSER       | C10-01-01-1 M | 1091629        | Sep. 29, 2019 | 1 Year        |
| Test software                                             | Audix        | E3            | V 6.11111b     | N/A           | N/A           |
| <b>Power Line Conducted Emissions Test</b>                |              |               |                |               |               |
| EMI Test Receiver                                         | R&S          | ESU8          | 100316         | Sep. 29, 2019 | 1 Year        |
| LISN 1                                                    | R&S          | ENV216        | 101109         | Sep. 29, 2019 | 1 Year        |
| LISN 2                                                    | R&S          | ESH2-Z5       | 100309         | Sep. 29, 2019 | 1 Year        |
| Pulse Limiter                                             | R&S          | ESH3-Z2       | 101242         | Sep. 29, 2019 | 1 Year        |
| CE Cable 1                                                | HUBSER       | N/A           | W10.01         | Sep. 29, 2019 | 1 Year        |
| Test software                                             | Audix        | E3            | V 6.11111b     | N/A           | N/A           |

## 4. On Time and Duty Cycle

### 4.1. Block diagram of test setup



### 4.2. Limits

None: for reporting purposes only.

### 4.3. Test Procedure

Set the Centre frequency of the spectrum analyzer to the transmitting frequency;

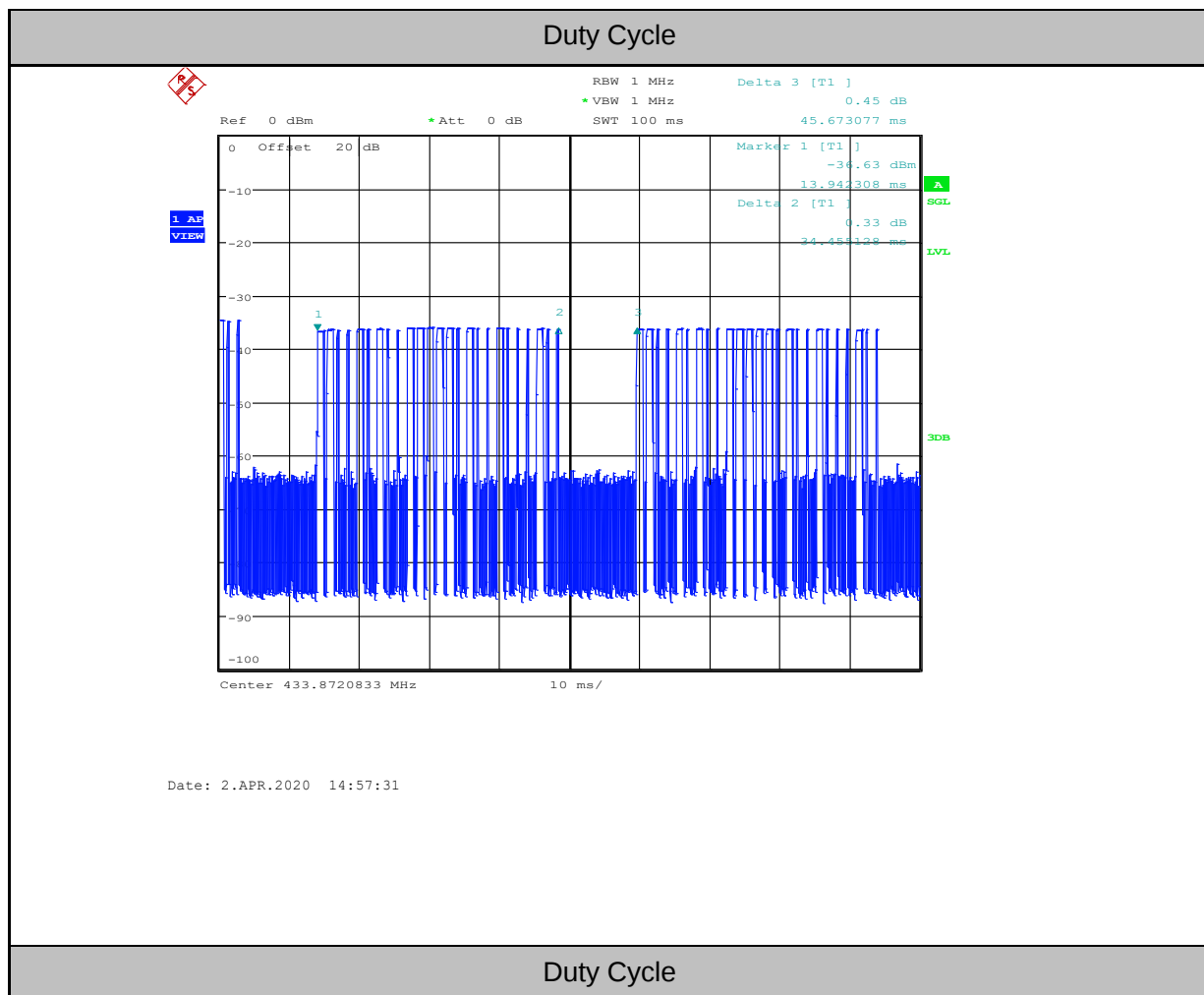
Set the span=0MHz, RBW=1MHz, VBW=1MHz, Sweep time=300ms;

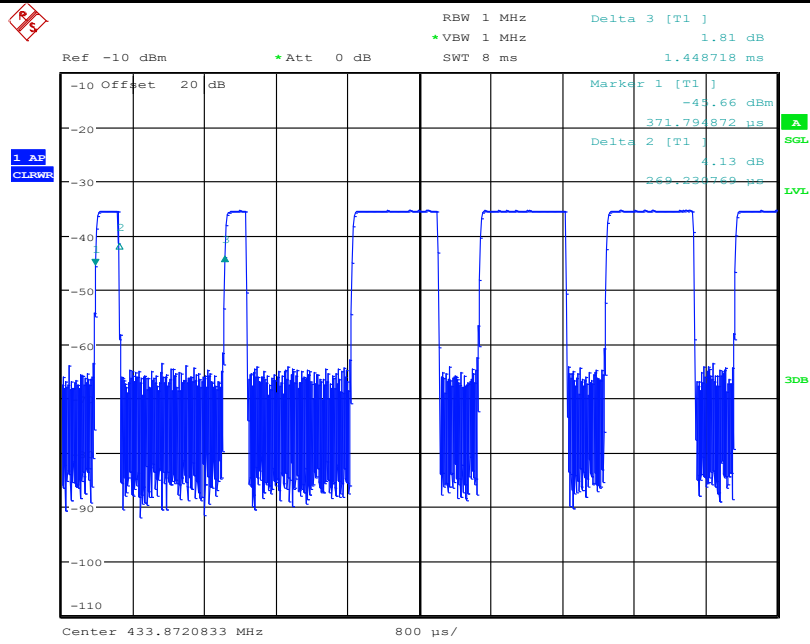
Trace mode = Single hold.

### 4.4. Test Result

| Test Channel                                                                                                                                                                                                                                                                                                                                                                                                                                    | Duty Cycle | 10log(1/x) Factor[dB] |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|-----------------------|
| 433.92                                                                                                                                                                                                                                                                                                                                                                                                                                          | 0.33263    | -9.56                 |
| Note 1: The transmitter duty cycle was measured using a spectrum analyser in the time domain and calculated by below Equation:<br>$\delta(\text{dB}) = 20\log(\Delta) = 20\log(0.33263) = -9.56 \text{ dB}$<br>$\delta$ is the duty cycle correction factor (dB)<br>$\Delta$ is the duty cycle (dimensionless)<br>Note 2: In cases where the pulse train exceeds 0.1 s, the measured field strength shall be determined during a 0.1 s interval |            |                       |

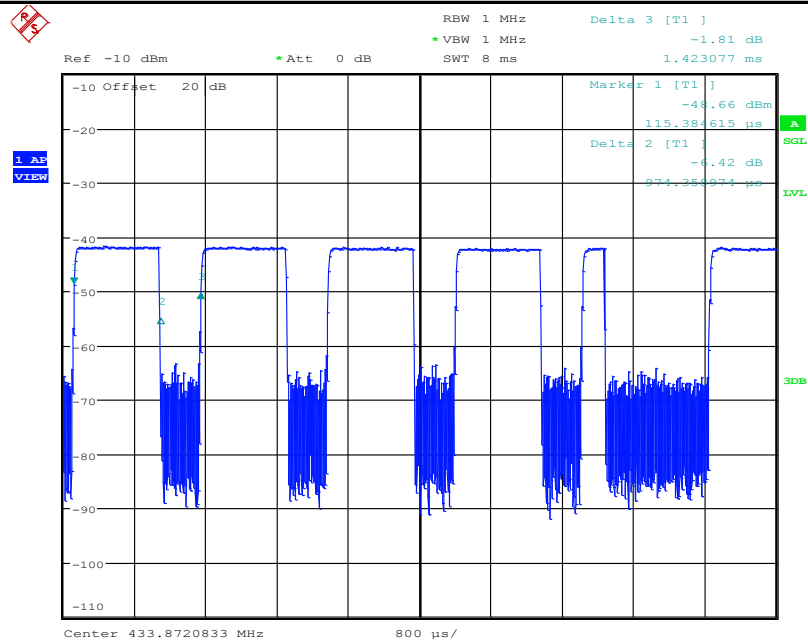
#### 4.5. Original test data





Date: 2.APR.2020 15:03:42

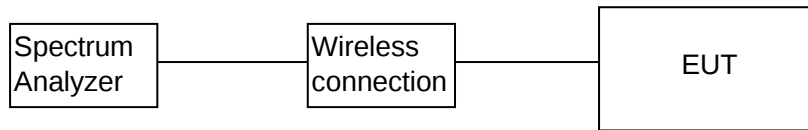
## Duty Cycle



Date: 2.APR.2020 15:30:47

## 5. 20dB Bandwidth and 99% Bandwidth

### 5.1. Block diagram of test setup



### 5.2. Limits

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

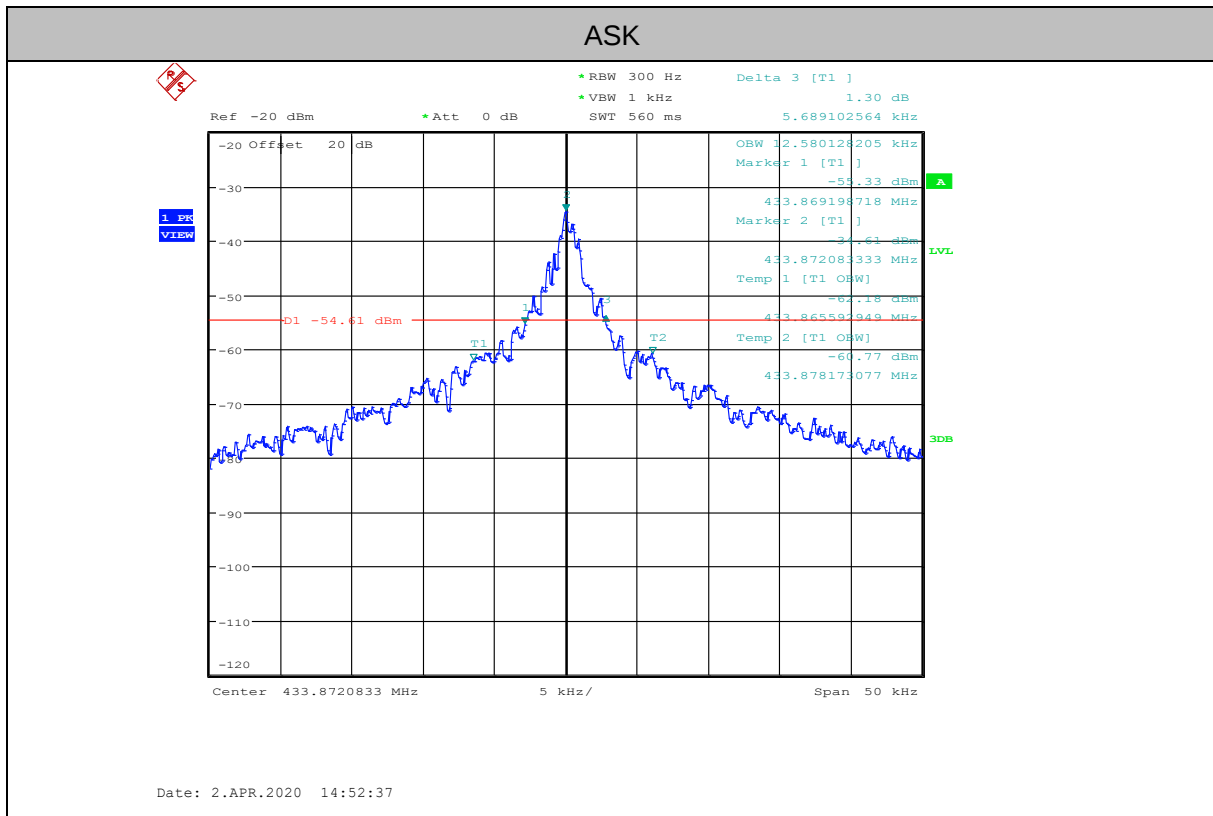
### 5.3. Test Procedure

- (1) Connect EUT's antenna output to spectrum analyzer by RF cable.
- (2) The bandwidth of the fundamental frequency was measured by spectrum analyzer with 300Hz RBW and 1kHz VBW. The 20dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 20dB.

### 5.4. Test Result

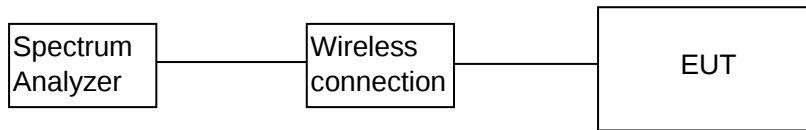
| Frequency (MHz) | 20 dB Bandwidth (kHz) | 99% Bandwidth (kHz) | Limit (MHz): No wider than 0.25% of the center frequency | Conclusion |
|-----------------|-----------------------|---------------------|----------------------------------------------------------|------------|
| ASK             | 5.689                 | 12.58               | $433.92 \times 0.25\% = 1.0848\text{MHz}$                | PASS       |

## 5.5. Original test data



## 6 Stop transmitting time test

### 6.1. Block diagram of test setup



### 6.2. Limits

15.231(a), manually operated transmissions: employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.

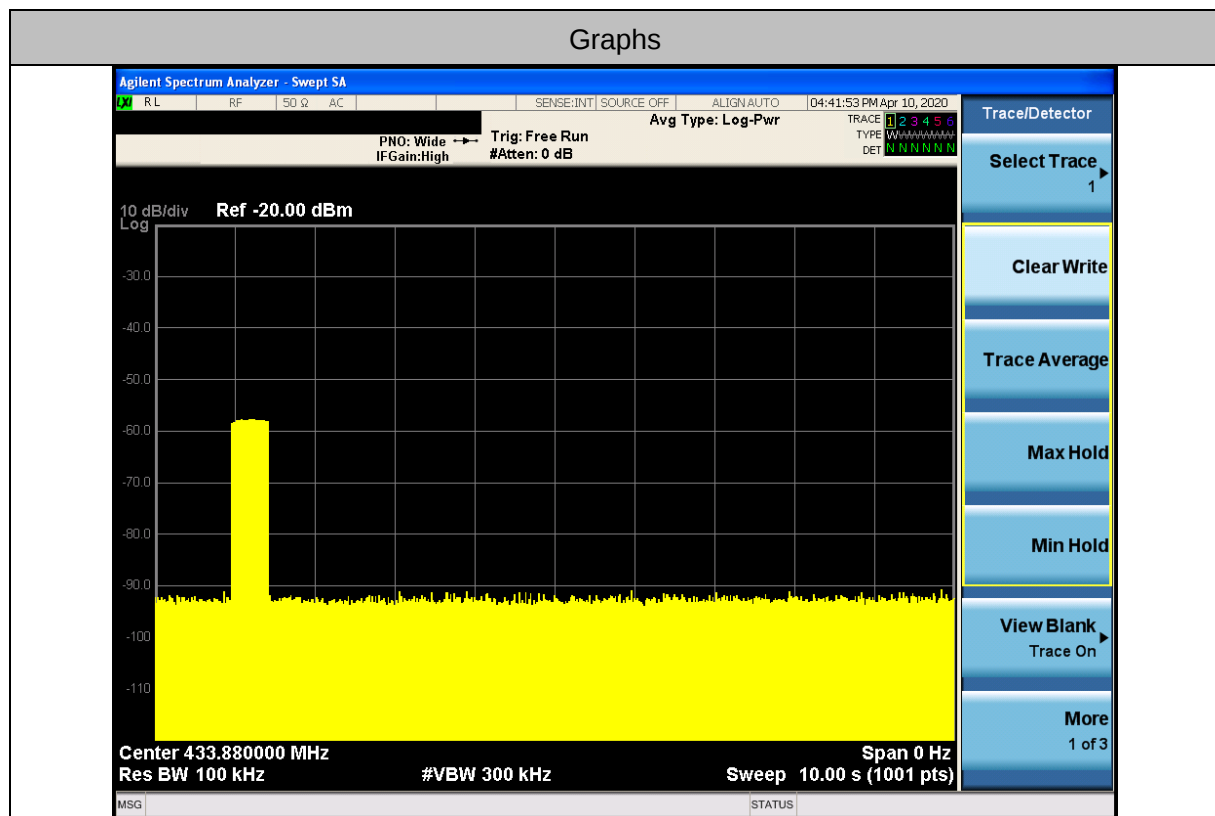
### 6.3. Test Procedure

- (1) The EUT's RF signal was coupled to spectrum analyzer by antenna connected to spectrum analyzer.
- (2) Set the spectrum to zero span mode, and centered of EUT frequency.
- (3) Measure the stop transmitting time after release EUT button.

### 6.4. Test Result

| Frequency (MHz) | Limit | Result |
|-----------------|-------|--------|
| 433.92          | ≤5s   | Pass   |

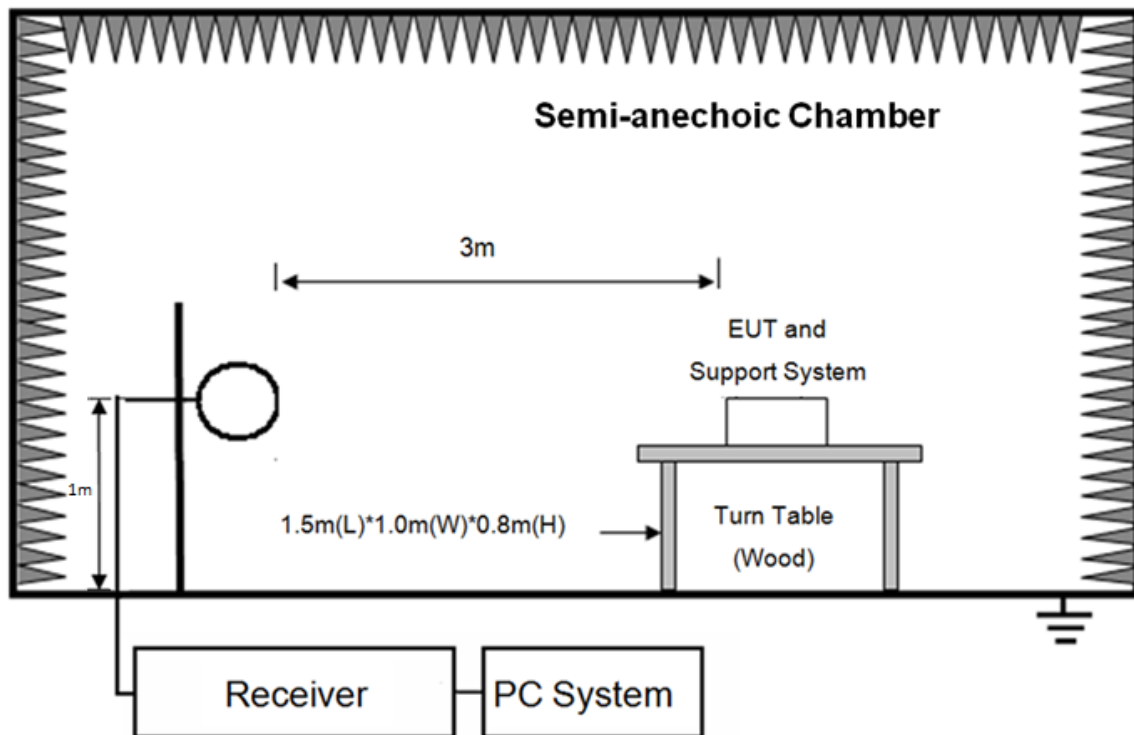
### 6.5. Original test data



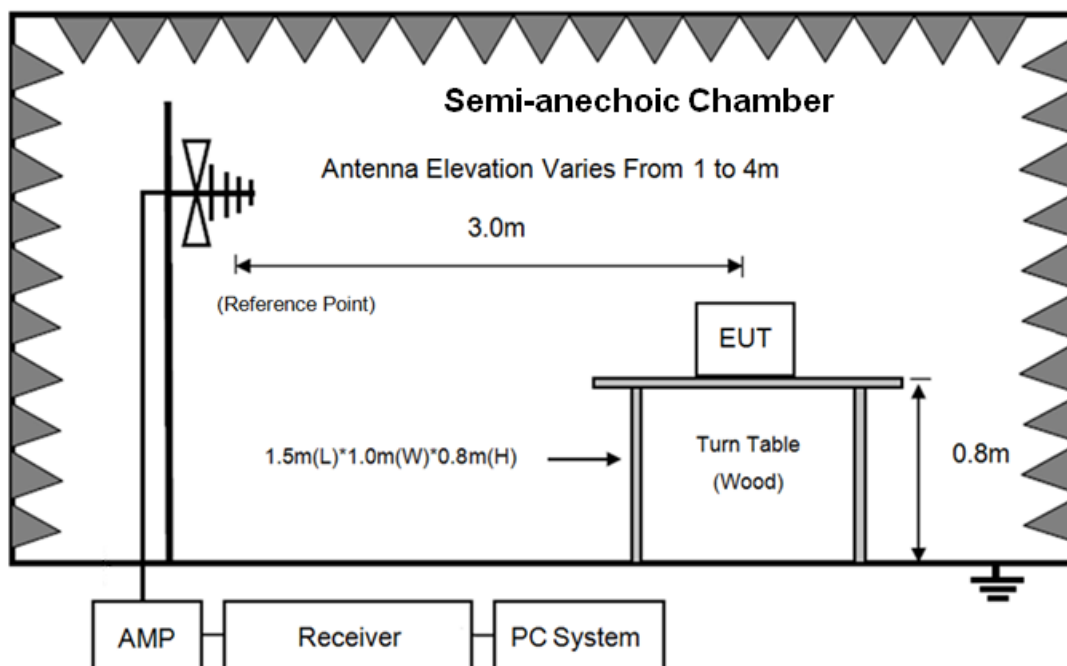
## 7 Radiated emission

### 7.1. Block diagram of test setup

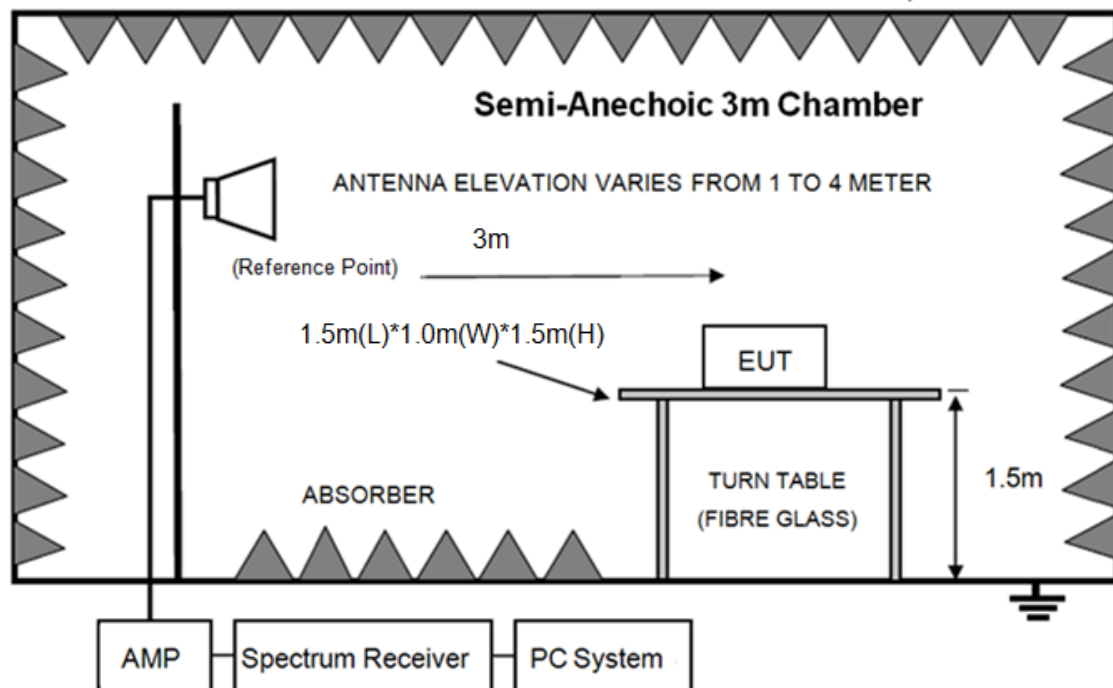
In 3m Anechoic Chamber Test Setup Diagram for 9kHz-30MHz



In 3m Anechoic Chamber Test Setup Diagram for below 1GHz



In 3m Anechoic Chamber Test Setup Diagram for frequency above 1GHz



Note: For harmonic emissions test a appropriate high pass filter was inserted in the input port of AMP.

## 7.2. Limit

(1) FCC 15.205 Restricted frequency band

| MHz               | MHz                 | MHz           | GHz              |
|-------------------|---------------------|---------------|------------------|
| 0.090-0.110       | 16.42-16.423        | 399.9-410     | 4.5-5.15         |
| 10.495-0.505      | 16.69475-16.69525   | 608-614       | 5.35-5.46        |
| 2.1735-2.1905     | 16.80425-16.80475   | 960-1240      | 7.25-7.75        |
| 4.125-4.128       | 25.5-25.67          | 1300-1427     | 8.025-8.5        |
| 4.1772&4.17775    | 37.5-38.25          | 1435-1626.5   | 9.0-9.2          |
| 4.2072&4.20775    | 73-74.6             | 1645.5-1646.5 | 9.3-9.5          |
| 6.215-6.218       | 74.8-75.2           | 1660-1710     | 10.6-12.7        |
| 6.26775-6.26825   | 108-121.94          | 1718.8-1722.2 | 13.25-13.4       |
| 6.31175-6.31225   | 123-138             | 2200-2300     | 14.47-14.5       |
| 8.291-8.294       | 149.9-150.05        | 2310-2390     | 15.35-16.2       |
| 8.362-8.366       | 156.52475-156.52525 | 2483.5-2500   | 17.7-21.4        |
| 8.37625-8.38675   | 156.7-156.9         | 2690-2900     | 22.01-23.12      |
| 8.41425-8.41475   | 162.0125-167.17     | 3260-3267     | 23.6-24.G        |
| 12.29-12.293      | 167.72-173.2        | 3332-3339     | 31.2-31.8        |
| 12.51975-12.52025 | 240-285             | 3345.8-3358   | 36.43-36.5       |
| 12.57675-12.57725 | 322-335.4           | 3600-4400     | ( <sup>2</sup> ) |
| 13.36-13.41       |                     |               |                  |

## (2) FCC 15.209 Limit.

| FREQUENCY<br>MHz | DISTANCE<br>Meters | FIELD STRENGTHS LIMIT                                                                             |                                   |
|------------------|--------------------|---------------------------------------------------------------------------------------------------|-----------------------------------|
|                  |                    | $\mu\text{V/m}$                                                                                   | $\text{dB}(\mu\text{V})/\text{m}$ |
| 0.009 ~ 0.490    | 300                | $2400/F(\text{kHz})$                                                                              | $67.6-20\log(F)$                  |
| 0.490 ~ 1.705    | 30                 | $24000/F(\text{kHz})$                                                                             | $87.6-20\log(F)$                  |
| 1.705 ~ 30.0     | 30                 | 30                                                                                                | 29.54                             |
| 30 ~ 88          | 3                  | 100                                                                                               | 40.0                              |
| 88 ~ 216         | 3                  | 150                                                                                               | 43.5                              |
| 216 ~ 960        | 3                  | 200                                                                                               | 46.0                              |
| 960 ~ 1000       | 3                  | 500                                                                                               | 54.0                              |
| Above 1000       | 3                  | 74.0 $\text{dB}(\mu\text{V})/\text{m}$ (Peak)<br>54.0 $\text{dB}(\mu\text{V})/\text{m}$ (Average) |                                   |

## (3) FCC 15.231 section (b) limit

| Fundamental Frequency<br>(MHz) | Field Strength of Fundamental             |
|--------------------------------|-------------------------------------------|
| 433.92                         | AV:80.83dBuV/m @3m<br>PK:100.83dBuV/m @3m |

Note: (1) The emission limits shown in the above table are based on measurements employing a CISPR QP detector except for the frequency bands 9-90kHz, 110-490kHz and above 1000MHz. Radiated emissions limits in these three bands are based on measurements employing an average detector.

(2) At frequencies below 30MHz, measurement may be performed at a distance closer than that specified, and the limit at closer measurement distance can be extrapolated by below formula:

$$\text{Limit}_{3\text{m}}(\text{dBuV/m}) = \text{Limit}_{300\text{m}}(\text{dBuV/m}) + 40\log(300\text{m}/3\text{m}) = \text{Limit}_{300\text{m}}(\text{dBuV/m}) + 80$$

$$\text{Limit}_{3\text{m}}(\text{dBuV/m}) = \text{Limit}_{30\text{m}}(\text{dBuV/m}) + 40\log(30\text{m}/3\text{m}) = \text{Limit}_{30\text{m}}(\text{dBuV/m}) + 40$$

## (3) Limit for this EUT

All the emissions appearing within 15.205 restricted frequency bands shall not exceed the limits shown in 15.209, all the other emissions include fundamental emission shall not exceed FCC 15.231 section (b) limit of comply with FCC 15.209 limit which permit higher emission level.

### 7.3. Test Procedure

(1) EUT was placed on a non-metallic table, 80 cm above the ground plane inside a semi-anechoic chamber for below 1G and 150 cm above the ground plane inside a semi-anechoic chamber for above 1G.

(2) Test antenna was located 3m from the EUT on an adjustable mast, and the antenna used as below table.

| Test frequency range | Test antenna used        | Test antenna distance |
|----------------------|--------------------------|-----------------------|
| 9kHz-30MHz           | Active Loop antenna      | 3m                    |
| 30MHz-1GHz           | Trilog Broadband Antenna | 3m                    |

|             |                                        |    |
|-------------|----------------------------------------|----|
| 1GHz-18GHz  | Double Ridged Horn Antenna(1GHz-18GHz) | 3m |
| 18GHz-40GHz | Horn Antenna(18GHz-40GHz)              | 1m |

a

According ANSI C63.10:2013 clause 6.4.4.2 and 6.5.3, for measurements below 30 MHz, the loop antenna was positioned with its plane vertical from the EUT and rotated about its vertical axis for maximum response at each azimuth position around the EUT. And the loop antenna also be positioned with its plane horizontal at the specified distance from the EUT. The center of the loop is 1 m above the ground for measurement above 30MHz, the Trilog Broadband Antenna or Horn Antenna was located 3m from EUT, Measurements were made with the antenna positioned in both the horizontal and vertical planes of Polarization, and the measurement antenna was varied from 1 m to 4 m. in height above the reference ground plane to obtain the maximum signal strength.

(3) Below pre-scan procedure was first performed in order to find prominent frequency spectrum radiated emissions from 9kHz to 5GHz (tenth harmonic of fundamental frequency):

(a) Scanning the peak frequency spectrum with the antenna specified in step (3), and the EUT was rotated 360 degree, the antenna height was varied from 1m to 4m(Except loop antenna, it's fixed 1m above ground.)

(b) Change work frequency or channel of device if practicable.

(c) Change modulation type of device if practicable.

(d) Change power supply range from 85% to 115% of the rated supply voltage

(e) Rotated EUT though three orthogonal axes to determine the attitude of EUT arrangement produces highest emissions.

(4) For final emissions measurements at each frequency of interest, the EUT was rotated and the antenna height was varied between 1m and 4m in order to maximize the emission. Measurements in both horizontal and vertical polarities were made and the data was recorded. In order to find the maximum emission, the relative positions of equipments and all of the interface cables were changed according to ANSI C63.10 2013 on Radiated Emission test.

(5) The emissions from 9kHz to 1GHz were measured based on CISPR QP detector except for the frequency bands 9-90kHz, 110-490kHz, for emissions from 9kHz-90kHz,110kHz-490kHz and above 1GHz were measured based on average detector, for emissions above 1GHz, peak emissions also be measured and need comply with Peak limit.

(6) The emissions from 9kHz to 1GHz, QP or average values were measured with EMI receiver with below RBW.

| Frequency band | RBW    |
|----------------|--------|
| 9kHz-150kHz    | 200Hz  |
| 150kHz-30MHz   | 9kHz   |
| 30MHz-1GHz     | 100kHz |

(7) For emissions above 1GHz, both Peak and Average level were measured with Spectrum Analyzer, and the RBW is set at 1MHz, VBW is set at 3MHz for Peak measure; RMS detector RBW 1MHz VBW 3MHz for Average measure(according ANSI C63.10:2013 clause 4.2.3.2.3 procedure for average measure).

(8) X axis, Y axis, Z axis are tested, and worse setup X axis is reported.

#### **7.4. Test result**

**PASS. (See below detailed test result)**

Note1: According exploratory test no any obvious emission were detected from 9kHz to 30MHz.

Note2: For emissions above 1GHz. If peak results comply with AV limit, AV Result is deemed to comply with AV limit.

## Radiated Emission test (below 1GHz)

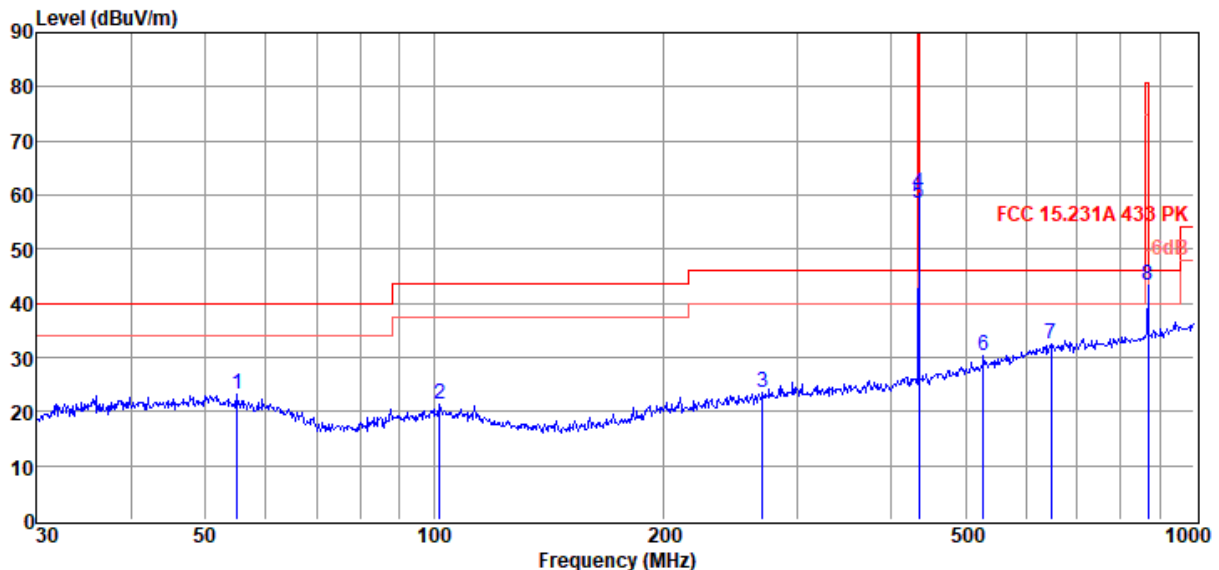
## TR-4-E-009 Radiated Emission Test Result

**Test Site** : DDT 3m Chamber 1#  
**Test Date** : 2020-04-02  
**EUT** : TRV SINGLE CHANNEL WIRELESS  
**Power Supply** : Battery  
**Condition** : Temp:24.5°C,Humi:55%,Press:100.1kPa  
**Memo** : ASK

**Tested By** : Jacky  
**Model Number** : 1292701  
**Test Mode** : Tx mode  
**Antenna/Distance** : 2019 VULB 9163 1#/3m/VERTICAL

D:\2020 RE 1# Report data\Q20031715-1E 1292701\FCC  
 BELOW1G.EM6

Data: 16



| Item<br>(Mark) | Freq.<br>(MHz) | Read<br>Level<br>(dBμV) | Antenna<br>Factor<br>(dB/m) | Cable<br>Loss<br>dB | Result<br>Level<br>(dBμV/m) | Limit<br>Line<br>(dBμV/m) | Over<br>Limit<br>(dB) | Detector | Polarization |
|----------------|----------------|-------------------------|-----------------------------|---------------------|-----------------------------|---------------------------|-----------------------|----------|--------------|
| 1              | 55.03          | 5.70                    | 13.57                       | 4.04                | 23.31                       | 40.00                     | -16.69                | Peak     | VERTICAL     |
| 2              | 101.64         | 5.22                    | 11.80                       | 4.42                | 21.44                       | 43.50                     | -22.06                | Peak     | VERTICAL     |
| 3              | 270.38         | 4.86                    | 13.41                       | 5.39                | 23.66                       | 46.00                     | -22.34                | Peak     | VERTICAL     |
| 4              | 434.07         | 38.29                   | 16.00                       | 6.10                | 60.39                       | /                         | /                     | Peak     | VERTICAL     |
| 6              | 528.25         | 5.95                    | 17.80                       | 6.46                | 30.21                       | 46.00                     | -15.79                | Peak     | VERTICAL     |
| 7              | 647.39         | 6.10                    | 19.55                       | 6.91                | 32.56                       | 46.00                     | -13.44                | Peak     | VERTICAL     |
| 8              | 869.13         | 14.18                   | 21.47                       | 7.59                | 43.24                       | 80.83                     | -37.59                | Peak     | VERTICAL     |

Note: 1. Result Level = Read Level + Antenna Factor + Cable loss.

2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.

3. Test setup: RBW: 100 kHz, VBW: 300 kHz, Sweep time: auto.

# TR-4-E-009 Radiated Emission Test Result

**Test Site** : DDT 3m Chamber 1#

D:\2020 RE 1# Report data\Q20031715-1E 1292701\FCC  
BELOW1G.EM6

**Test Date** : 2020-04-02

**Tested By** : Jacky

**EUT** : TRV SINGLE CHANNEL WIRELESS  
REMOTE

**Model Number** : 1292701

**Power Supply** : Battery

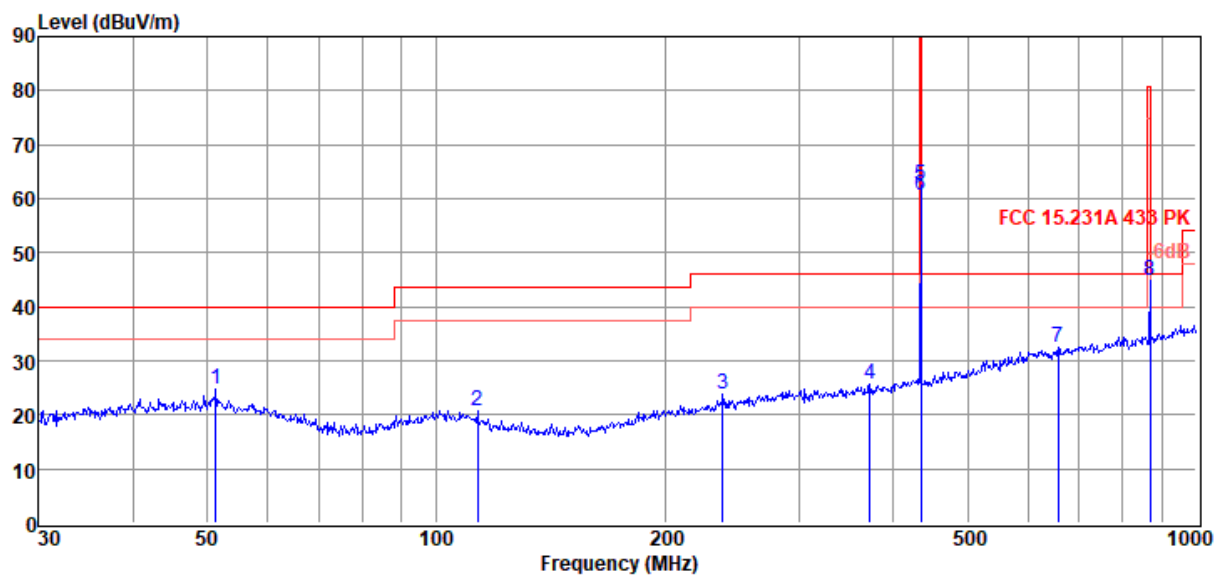
**Test Mode** : Tx mode

**Condition** : Temp:24.5°C,Humi:55%,Press:100.1kPa

**Antenna/Distance** : 2019 VULB 9163 1#/3m/HORIZONTAL

**Memo** : ASK

Data: 17



| Item<br>(Mark) | Freq.<br>(MHz) | Read<br>Level<br>(dBμV) | Antenna<br>Factor<br>(dB/m) | Cable<br>Loss<br>dB | Result<br>Level<br>(dBμV/m) | Limit<br>Line<br>(dBμV/m) | Over<br>Limit<br>(dB) | Detector | Polarization |
|----------------|----------------|-------------------------|-----------------------------|---------------------|-----------------------------|---------------------------|-----------------------|----------|--------------|
| 1              | 51.30          | 6.69                    | 14.03                       | 4.00                | 24.72                       | 40.00                     | -15.28                | Peak     | HORIZONTAL   |
| 2              | 113.32         | 5.45                    | 10.79                       | 4.51                | 20.75                       | 43.50                     | -22.75                | Peak     | HORIZONTAL   |
| 3              | 238.31         | 5.90                    | 12.57                       | 5.23                | 23.70                       | 46.00                     | -22.30                | Peak     | HORIZONTAL   |
| 4              | 372.00         | 4.67                    | 15.00                       | 5.85                | 25.52                       | 46.00                     | -20.48                | Peak     | HORIZONTAL   |
| 5              | 434.07         | 40.51                   | 16.00                       | 6.10                | 62.61                       | /                         | /                     | Peak     | HORIZONTAL   |
| 7              | 658.84         | 5.80                    | 19.62                       | 6.94                | 32.36                       | 46.00                     | -13.64                | Peak     | HORIZONTAL   |
| 8              | 869.13         | 15.70                   | 21.47                       | 7.59                | 44.76                       | 80.83                     | -36.07                | Peak     | HORIZONTAL   |

Note: 1. Result Level = Read Level + Antenna Factor + Cable loss.

2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.

3. Test setup: RBW: 100 kHz, VBW: 300 kHz, Sweep time: auto.

**Field Strength Of The Fundamental Signal**

| Frequency (MHz) | PK Level (dBuV/m) | PK Limit Line (dBuV/m) | Over Limit (dB) | Polarization |
|-----------------|-------------------|------------------------|-----------------|--------------|
| 433.92          | 62.61             | 100.83                 | -38.22          | Horizontal   |
| 433.92          | 60.39             | 100.83                 | -40.44          | Vertical     |

| Frequency (MHz) | AV Level (dBuV/m) | AV Limit Line (dBuV/m) | Over Limit (dB) | Polarization |
|-----------------|-------------------|------------------------|-----------------|--------------|
| 433.92          | 53.05             | 80.83                  | -27.78          | Horizontal   |
| 433.92          | 50.83             | 80.83                  | -30.00          | Vertical     |

Note: AV Level= PK Level+ Duty factor

**Radiated Emission test (above 1GHz)**

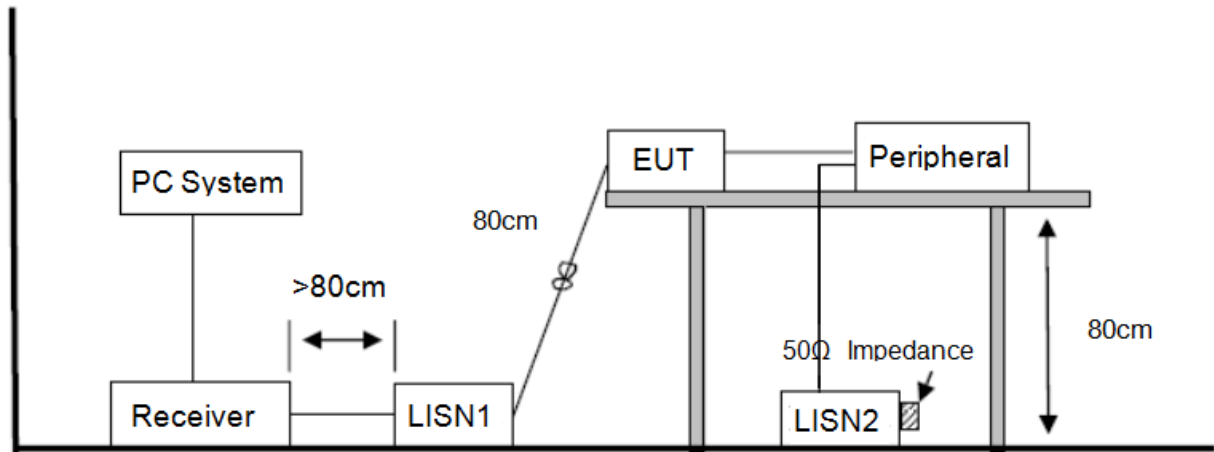
| Freq.<br>(MHz) | Read<br>level<br>(dBuV) | Antenna<br>Factor<br>(dB/m) | PRM<br>Factor<br>(dB) | Cable<br>Loss<br>(dB) | Result<br>Level<br>(dBuV/m) | Limit<br>(dBuV/m<br>) | Margin<br>(dB) | Detector<br>type | Polarization |
|----------------|-------------------------|-----------------------------|-----------------------|-----------------------|-----------------------------|-----------------------|----------------|------------------|--------------|
| Tx mode        |                         |                             |                       |                       |                             |                       |                |                  |              |
| 3754.00        | 46.18                   | 33.02                       | 43.73                 | 5.99                  | 41.46                       | 74.00                 | -32.54         | Peak             | HORIZONTAL   |
| 4774.00        | 48.57                   | 34.06                       | 43.49                 | 6.78                  | 45.92                       | 74.00                 | -28.08         | Peak             | HORIZONTAL   |
| 5794.00        | 45.03                   | 35.04                       | 43.16                 | 7.47                  | 44.38                       | 74.00                 | -29.62         | Peak             | HORIZONTAL   |
| 7256.00        | 44.91                   | 36.11                       | 42.90                 | 8.42                  | 46.54                       | 74.00                 | -27.46         | Peak             | HORIZONTAL   |
| 7936.00        | 45.33                   | 36.56                       | 42.81                 | 8.95                  | 48.03                       | 74.00                 | -25.97         | Peak             | HORIZONTAL   |
| 9415.00        | 44.70                   | 37.35                       | 42.51                 | 9.50                  | 49.04                       | 74.00                 | -24.96         | Peak             | HORIZONTAL   |
| 3431.00        | 46.67                   | 32.42                       | 43.62                 | 5.55                  | 41.02                       | 74.00                 | -32.98         | Peak             | VERTICAL     |
| 5386.00        | 45.76                   | 34.73                       | 43.29                 | 7.19                  | 44.39                       | 74.00                 | -29.61         | Peak             | VERTICAL     |
| 6474.00        | 46.65                   | 35.58                       | 43.02                 | 7.90                  | 47.11                       | 74.00                 | -26.89         | Peak             | VERTICAL     |
| 7494.00        | 45.92                   | 36.30                       | 42.87                 | 8.61                  | 47.96                       | 74.00                 | -26.04         | Peak             | VERTICAL     |
| 8820.00        | 43.86                   | 37.06                       | 42.63                 | 9.17                  | 47.46                       | 74.00                 | -26.54         | Peak             | VERTICAL     |
| 9585.00        | 44.99                   | 37.47                       | 42.48                 | 9.62                  | 49.60                       | 74.00                 | -24.40         | Peak             | VERTICAL     |
| Result: Pass   |                         |                             |                       |                       |                             |                       |                |                  |              |

Note: 1. Result Level = Read Level + Antenna Factor + Cable loss - PRM Factor.

2: For emissions above 1GHz. If peak results comply with AV limit, AV Result is deemed to comply with AV limit.

## 8 Power Line Conducted Emission

### 8.1. Block diagram of test setup



### 8.2. Power Line Conducted Emission Limits

| Frequency       | Quasi-Peak Level<br>dB(μV) | Average Level<br>dB(μV) |
|-----------------|----------------------------|-------------------------|
| 150kHz ~ 500kHz | 66 ~ 56*                   | 56 ~ 46*                |
| 500kHz ~ 5MHz   | 56                         | 46                      |
| 5MHz ~ 30MHz    | 60                         | 50                      |

Note 1: \* Decreasing linearly with logarithm of frequency.

Note 2: The lower limit shall apply at the transition frequencies.

### 8.3. Test Procedure

The EUT and Support equipment, if needed, were put placed on a non-metallic table, 80cm above the ground plane.

Configuration EUT to simulate typical usage as described in clause 2.4 and test equipment as described in clause 10.2 of this report.

All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10.

All support equipment power received from a second LISN.

Emissions were measured on each current carrying line of the EUT using an EMI Test Receiver connected to the LISN powering the EUT.

The Receiver scanned from 150 kHz to 30MHz for emissions in each of the test modes.

During the above scans, the emissions were maximized by cable manipulation.

The test mode(s) described in clause 2.4 were scanned during the preliminary test.

After the preliminary scan, we found the test mode producing the highest emission level.

The EUT configuration and worse cable configuration of the above highest emission levels were recorded for reference of the final test.

EUT and support equipment were set up on the test bench as per the configuration with highest emission level in the preliminary test.

A scan was taken on both power lines, Neutral and Line, recording at least the six highest emissions.

Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit.

The test data of the worst-case condition(s) was recorded.

The bandwidth of test receiver is set at 9 kHz.

#### **8.4. Test Result**

Not Applicable

Conducted limits are not required for devices which only employ battery power for operation according to 15.207(C)

## **9 Antenna Requirements**

For intentional device, according to FCC 47 CFR Section 15.203, An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

**END OF REPORT**