

**ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT****INTENTIONAL RADIATOR CERTIFICATION TO  
FCC PART 15 SUBPART C REQUIREMENT**

OF

**Applicant:** Ruoeey Lung Enterprise Corp.  
"NO.17, LU-KUNG SOUTH 2 ROAD, CHANG-PIN INDUSTRIAL  
PARK LU-KANG CHANGHUA TAIWAN"

**Product Name:** Remote Controller

**Model No.:** RC-RF11D-1

**Model Difference:** N/A

**Report Number:** T190516W05-RP

**FCC ID** TRURC-RF11D-1

**FCC Rule Part** Part 15.231

**Issue Date:** Jun. 20, 2019

**Date of Test:** Apr. 26, 2019 ~ May 22, 2019

**Date of EUT Received:** Apr. 26, 2019

**Issued by:** Compliance Certification Services Inc. Wugu Lab.  
No.11, Wugong 6th Rd., Wugu Dist., New Taipei City 24891,  
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The test Result was tested by Compliance Certification Services Inc. The test data, data evaluation, test procedures, and equipment configurations shown in this report were given in ANSI C63.10: 2013 and compliance standards.

The test results of this report relate only to the tested sample (EUT) identified in this report. The test Report of full or partial shall not copy. Without written approval of Compliance Certification Services Inc. (Wugu Laboratory).

**Tested By:**

Jerry Lu

Jerry Lu / Engineer

**Approved By:**

Kevin Tsai

Kevin Tsai / Deputy Manager



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## Revision History

| Report Number | Revision | Description                  | Effected Page | Issue Date    | Revised By |
|---------------|----------|------------------------------|---------------|---------------|------------|
| T190516W05-RP | Rev.00   | Initial creation of document | All           | Jun. 20, 2019 | Elle Chang |

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# 1 GENERAL INFORMATION

## 1.1 Product Description

|                   |                             |
|-------------------|-----------------------------|
| Product Name:     | Remote Controller           |
| Model No.:        | RC-RF11D-1                  |
| Model Difference: | N/A                         |
| Hardware Version: | N/A                         |
| Software Version: | N/A                         |
| Power Supply:     | 4.5Vdc from AAA batteries*3 |

|                      |                           |
|----------------------|---------------------------|
| Radio Technology:    | 433 MHz Short Range Radio |
| Operating Frequency  | 433.92MHz                 |
| Transmit Power       | ≤ 71.42 dBuV/m Max.       |
| Modulation Technique | ASK                       |
| Number of Channels   | 1 Channel                 |
| Antenna Type         | PCB Antenna               |

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## 1.2 Test Methodology

FCC Part 15, Subpart C §15.231

ANSI C63.10:2013

Note: All test items have been performed and record as per the above standards.

## 1.3 Test Facility

Compliance Certification Services Inc. Wugu Lab. No.11, Wugong 6th Rd.,  
Wugu Dist., New Taipei City 24891, Taiwan. (R.O.C.)

FCC Designation number: TW1309

## 1.4 Special Accessories

There are no special accessories used while test was conducted.

## 1.5 Equipment Modifications

There was no modification incorporated into the EUT.

## 1.6 Radiated Emission Test Sites For Measurements From 9 kHz To 30 MHz

Radiated emission below 30MHz is measured in a 9m\*9m\*6m semi-anechoic chamber, the measurements correspond to those obtained at an open-field test site.

There is a comparison data of both open-field test site and semi-Anechoic chamber, and the result came out very similar.

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## 2 SYSTEM TEST CONFIGURATION

### 2.1 EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

### 2.2 EUT Exercise

The Transmitter was operated in the normal operating mode. The Tx frequency was fixed which was for the purpose of the measurements.

### 2.3 Test Procedure

#### 2.3.1 Conducted Emissions

The EUT is a placed on a table which is 0.8 m above ground plane. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz. The CISPR Quasi-Peak and Average detector mode is employed according to §15.207. The two LISNs provide 50uH/50 ohm of coupling impedance for the measuring instrument. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.

#### 2.3.2 Radiated Emissions

The EUT is a placed on a turn table. For emissions testing at or below 1 GHz, the table height shall be 0.8 m above the reference ground plane. For emission measurements above 1 GHz, the table height shall be 1.5 m. The turn table shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this transmitter (EUT) was rotated through three orthogonal axes and measurement procedures for electric field radiated emissions above 1 GHz the EUT measurement is to be made "while keeping the antenna in the 'cone of radiation' from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response." is still within the 3dB illumination BW of the measurement antenna.

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## 2.4 Configuration of Tested System

**Fig. 2-1 Configuration of Tested System**

EUT(TX)

**Table 2-1 Equipment Used in Tested System**

| Item | Equipment | Mfr/Brand | Model/<br>Type No. | Series No. | Data Cable | Power<br>Cord |
|------|-----------|-----------|--------------------|------------|------------|---------------|
|      | N/A       |           |                    |            |            |               |

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### 3 SUMMARY OF TEST RESULTS

| FCC Rules     | Description Of Test                | Result    |
|---------------|------------------------------------|-----------|
| §15.207       | AC Power Line Conducted Emission   | N/A       |
| §15.231       | Radiated Emission                  | Compliant |
| §15.231(c)    | 20dB Bandwidth                     | Compliant |
| §15.35 (c)    | Duty Cycle Test (Pulse Modulation) | Compliant |
| §15.231(a)(1) | Release Time Measurement           | Compliant |

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## 4 DESCRIPTION OF TEST MODES

### 4.1 Operated in 433.92 MHz Band

1 channel are provided.

| CH | FREQUENCY  |
|----|------------|
| 38 | 433.925MHZ |

### 4.2 The Worst Test Modes and Channel Details

| RADIATED EMISSION TEST (BELOW 1 GHz) |                   |                |            |                  |              |
|--------------------------------------|-------------------|----------------|------------|------------------|--------------|
| MODE                                 | AVAILABLE CHANNEL | TESTED CHANNEL | MODULATION | DATA RATE (Kbps) | ANTENNA PORT |
| 433 MHz                              | 38                | 38             | ASK        | 1                | MAIN         |
| RADIATED EMISSION TEST (ABOVE 1 GHz) |                   |                |            |                  |              |
| MODE                                 | AVAILABLE CHANNEL | TESTED CHANNEL | MODULATION | DATA RATE (Kbps) | ANTENNA PORT |
| 433 MHz                              | 38                | 38             | ASK        | 1                | MAIN         |

**Note:**

The field strength of radiation emission was measured as EUT stand-up position (H mode) and lie down position (E1, E2 mode) for 433MHz Transmitter for channel Low, Mid and High, the worst case H position was reported.

| ANTENNA PORT CONDUCTED TEST |                   |                |            |                  |              |
|-----------------------------|-------------------|----------------|------------|------------------|--------------|
| MODE                        | AVAILABLE CHANNEL | TESTED CHANNEL | MODULATION | DATA RATE (Kbps) | ANTENNA PORT |
| 433 MHz                     | 38                | 38             | ASK        | 1                | MAIN         |

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## 5 MEASUREMENT UNCERTAINTY

| PARAMETER                             | UNCERTAINTY    |
|---------------------------------------|----------------|
| AC Powerline Conducted Emission       | +/- 1.2575 dB  |
| 20dB Bandwidth                        | +/- 147.256 Hz |
| 3M Semi Anechoic Chamber / 30M~200M   | +/- 4.12 dB    |
| 3M Semi Anechoic Chamber / 200M~1000M | +/- 4.68 dB    |
| 3M Semi Anechoic Chamber / 1G~8G      | +/- 5.18 dB    |
| 3M Semi Anechoic Chamber / 8G~18G     | +/- 5.47 dB    |
| 3M Semi Anechoic Chamber / 18G~26G    | +/- 3.81 dB    |

**Note:**

1. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of  $k=2$ .
2. Determination of compliance is based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

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## 6 CONDUCTED EMISSIONS TEST

### 6.1 Standard Applicable

According to §15.207 and frequency within 150 kHz to 30MHz shall not exceed the limit table as below.

| Frequency range<br>MHz | Limits<br>dB(uV) |          |
|------------------------|------------------|----------|
|                        | Quasi-peak       | Average  |
| 0.15 to 0.50           | 66 to 56         | 56 to 46 |
| 0.50 to 5              | 56               | 46       |
| 5 to 30                | 60               | 50       |

Note  
1.The lower limit shall apply at the transition frequencies  
2.The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.

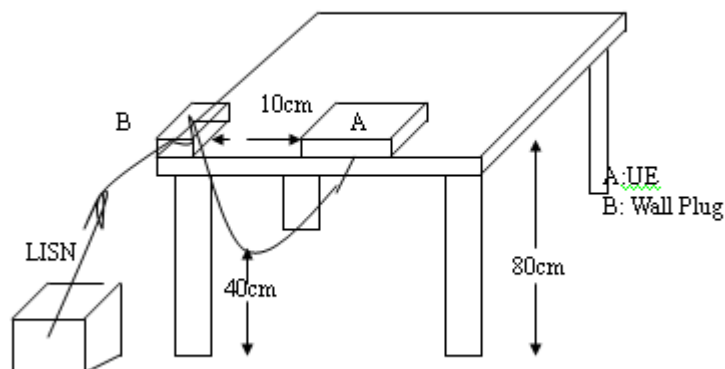
### 6.2 Measurement Equipment Used:

N/A

### 6.3 EUT Setup

1. The conducted emission tests were performed in the test site, using the setup in accordance with the ANSI C63.10:2013.
2. The AC/DC Power adaptor of EUT was plug-in LISN. The EUT was placed flushed with the rear of the table.
3. The LISN was connected with 120Vac/60Hz power source.

### 6.4 Test SET-UP (Block Diagram of Configuration)



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## 6.5 Measurement Procedure

1. The EUT was placed on a table which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. Repeat above procedures until all frequency measured were complete.

## 6.6 Measurement Result

N/A; Powered from AAA battery\*3.

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## 7 RADIATED EMISSION TEST

### 7.1 Standard Applicable

According to 15.231(b), the field strength of emissions from Intentional Radiators operated under this section shall not exceed the following:

| Fundamental Frequency (MHz) | Field Strength of Fundamental |                  | Field Strength of Spurious |               |
|-----------------------------|-------------------------------|------------------|----------------------------|---------------|
|                             | (dBuV/m)                      | (uV/m)           | (dBuV/m)                   | (uV/m)        |
| 40.66 - 40.70               | 67.04                         | 2,250            | 47                         | 225           |
| 70 - 130                    | 61.94                         | 1,250            | 41.9                       | 125           |
| 130 - 174                   | * 61.94 - 71.48               | * 1,250 -3,750   | * 41.9 – 51.48             | * 125 to 375  |
| 174 - 260                   | 71.48                         | 3,750            | 51.48                      | 375           |
| 260 - 470                   | * 71.48 - 81.94               | * 3,750 - 12,500 | * 51.48 - 54               | * 375 to 1250 |
| above 470                   | 81.94                         | 12,500           | 74                         | 1250          |

#### Remark:

1. Emission level in dBuV/m=20 log (uV/m)
2. Measurement was performed at an antenna to the closed point of EUT distance of meters.
3. Only spurious frequency is permitted to locate within the Restricted Bands specified in provision of § 15.205
4. Emission spurious frequency which appearing within the Restricted Bands specified in provision of §15.205, then the general radiated emission limits in § 15.209 apply.
5. For the band 130-174MHz, uV/m at 3meters = 56.81818(F) – 6136.3636; For the band 260-470MHz uV/m at 3meters = 41.6667(F) – 7083.3333; Where F is the frequency in MHz.
6. 433.00 MHz limit = 41.6667 \* 433.00 – 7083.3333= 10958.3478 uV/m = 80.80 dBuV/m  
433.75 MHz limit = 41.6667 \* 433.75 – 7083.3333= 10989.597825 uV/m = 80.82 dBuV/m  
434.525 MHz limit = 41.6667 \* 434.525 – 7083.3333= 11021.88952 uV/m = 80.85 dBuV/m

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## 7.2 Measurement Procedure

1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. The turn table shall rotate 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emissions.
4. When measurement procedures for electric field radiated emissions above 1 GHz the EUT measurement is to be made "while keeping the antenna in the 'cone of radiation' from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response." is still within the 3dB illumination BW of the measurement antenna.
5. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
6. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
7. Repeat above procedures until all frequency of the interest measured were complete.

## 7.3 Auxiliary Procedure (Setting on Spectrum to capture the reading of emission level):

Span = wide enough to fully capture the emission being measured

RBW = 1 MHz for  $f \geq 1$  GHz, 100 kHz for  $f < 1$  GHz

VBW  $\geq$  RBW

Sweep = auto

Detector function = peak

Trace = max hold

Test was measured starting from 9kHz to 10<sup>th</sup> harmonic of the fundamental frequency, and data containing the worst result above 30MHz are shown on the test report.

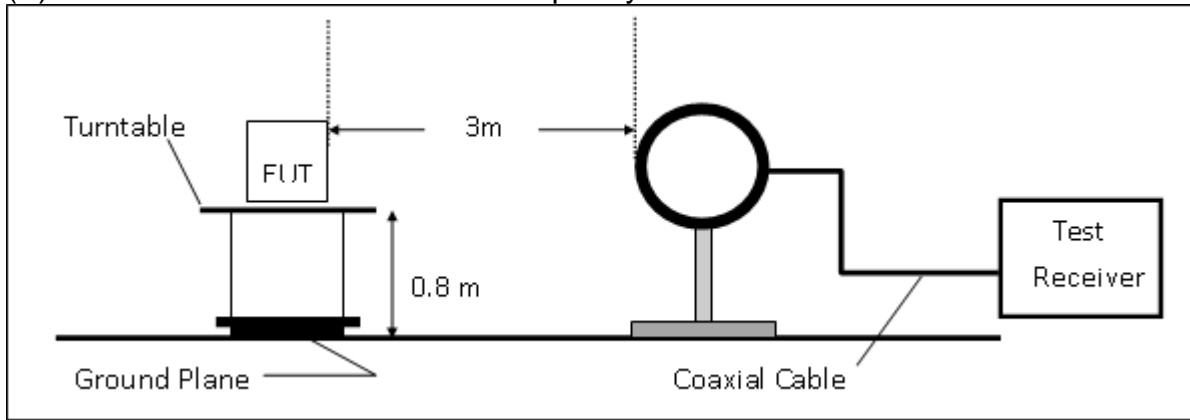
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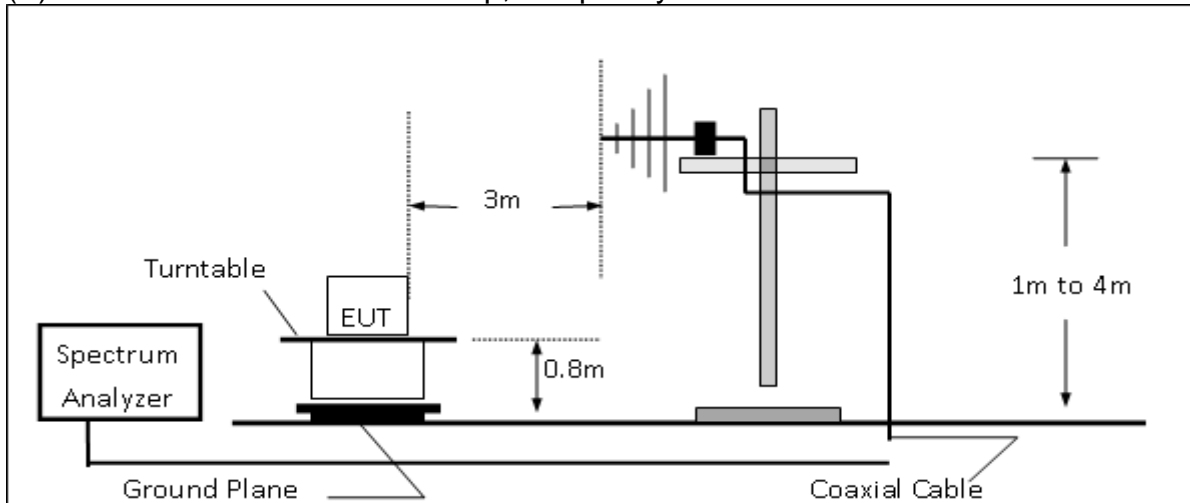
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### 7.4 Test SET-UP (Block Diagram of Configuration).

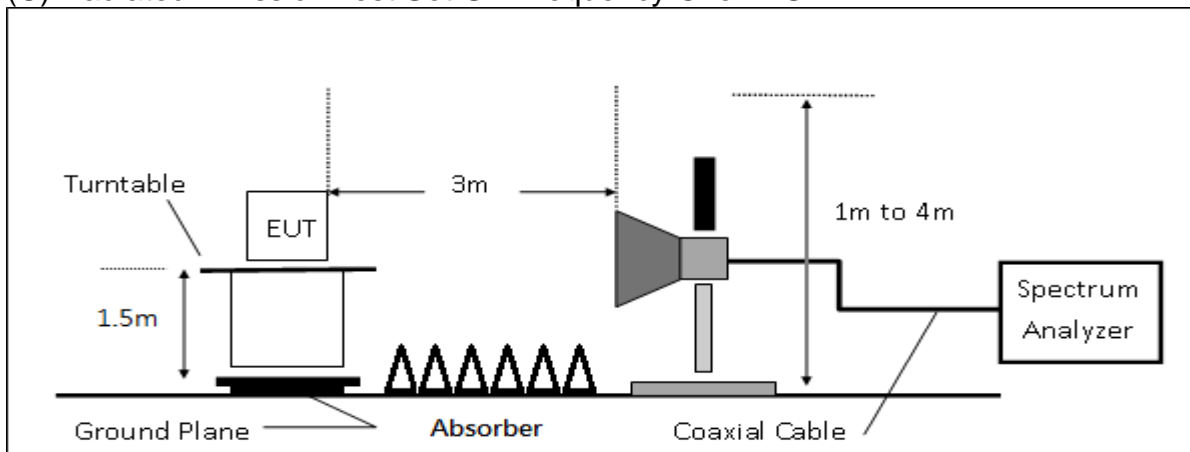
(A) Radiated Emission Test Set-UP Frequency Below 30MHz.



(B) Radiated Emission Test Set-UP, Frequency form 30MHz to 1000MHz



(C) Radiated Emission Test Set-UP Frequency Over 1 GHz



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## 7.5 Measurement Equipment Used:

| 966A Chamber                     |                   |                 |               |            |            |
|----------------------------------|-------------------|-----------------|---------------|------------|------------|
| EQUIPMENT TYPE                   | MFR               | MODEL NUMBER    | SERIAL NUMBER | LAST CAL.  | CAL DUE.   |
| Band Reject Filters              | MICRO TRONICS     | BRM 50702       | 120           | 02/26/2019 | 02/25/2020 |
| Bilog Antenna                    | Sunol Sciences    | JB3             | A030105       | 07/13/2018 | 07/12/2019 |
| Cable                            | HUBER SUHNER      | SUCOFLEX 104PEA | 25157         | 02/26/2019 | 02/25/2020 |
| Cable                            | HUBER SUHNER      | SUCOFLEX 104PEA | 20995         | 02/26/2019 | 02/25/2020 |
| Digital Thermo-Hygro Meter       | WISEWIND          | 1206            | D07           | 01/30/2019 | 01/29/2020 |
| double Ridged Guide Horn Antenna | ETC               | MCTD 1209       | DRH13M02003   | 08/20/2018 | 08/19/2019 |
| Loop Antenna                     | COM-POWER         | AL-130          | 121051        | 03/22/2019 | 03/21/2020 |
| Pre-Amplifier                    | EMEC              | EM330           | 060609        | 02/26/2019 | 02/25/2020 |
| Pre-Amplifier                    | HP                | 8449B           | 3008A00965    | 02/26/2019 | 02/25/2020 |
| PSA Series Spectrum Analyzer     | Agilent           | E4446A          | MY46180323    | 05/31/2018 | 05/30/2019 |
| Antenna Tower                    | CCS               | CC-A-1F         | N/A           | N.C.R      | N.C.R      |
| Controller                       | CCS               | CC-C-1F         | N/A           | N.C.R      | N.C.R      |
| Turn Table                       | CCS               | CC-T-1F         | N/A           | N.C.R      | N.C.R      |
| Software                         | e3 V6.11-20180413 |                 |               |            |            |

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## 7.6 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor (if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CL - AG$$

|       |                        |  |
|-------|------------------------|--|
| Where | FS = Field Strength    | CL = Cable Attenuation Factor (Cable Loss) |
|       | RA = Reading Amplitude | AG = Amplifier Gain                        |
|       | AF = Antenna Factor    |  |

### Remark:

The limit of the emission level is expressed in dBuV/m, which converts  $20 \cdot \log(uV/m)$

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre\_Amplifier Gain(dB)

## 7.7 Test Results of Radiated Spurious Emissions form 9 KHz to 30 MHz

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit per 15.31(o) was not reported.

## 7.8 Measurement Result:

Note: Refer to next page spectrum analyzer data chart and tabular data sheets.

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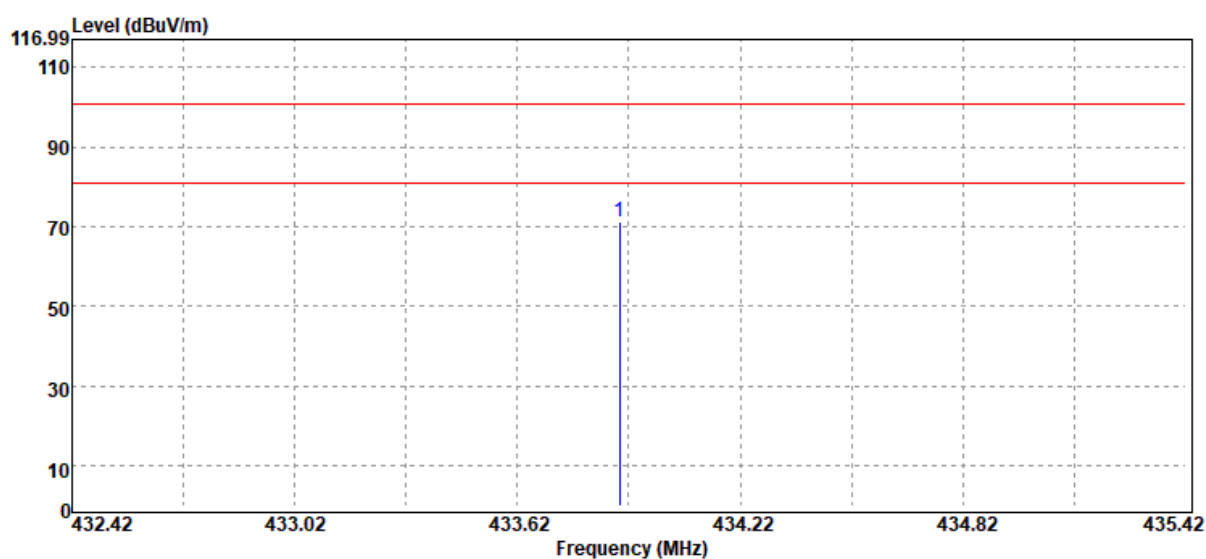
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## 7.9 Measurement Result

### 7.9.1 Radiated emission Main

|                       |              |                          |             |
|-----------------------|--------------|--------------------------|-------------|
| Project Number        | :T190516W05  | Test Date                | :2019-05-21 |
| Operation Band        | :433 MHz     | Temp./Humi.              | :20/52      |
| Fundamental Frequency | :433.92 MHz  | Engineer                 | :Jerry      |
| Operation Mode        | :Main CH MID | Measurement Antenna Pol. | :VERTICAL   |
| EUT Pol.              | :H Plan      |                          |             |



| Freq.<br>MHz | Detector<br>Mode<br>PK/QP/AV | Spectrum<br>Reading Level<br>dBuV | Factor<br>dB | Actual<br>FS<br>dBuV/m | Limit<br>@3m<br>dBuV/m | Margin<br>dB |
|--------------|------------------------------|-----------------------------------|--------------|------------------------|------------------------|--------------|
| 433.90       | Peak                         | 75.65                             | -4.23        | 71.42                  | 100.83                 | -29.41       |
| 433.90       | Average                      | -                                 | -12.29       | 59.13                  | 80.83                  | -21.70       |

Note: Average Actual = Peak Actual + Average Factor (-12.29)

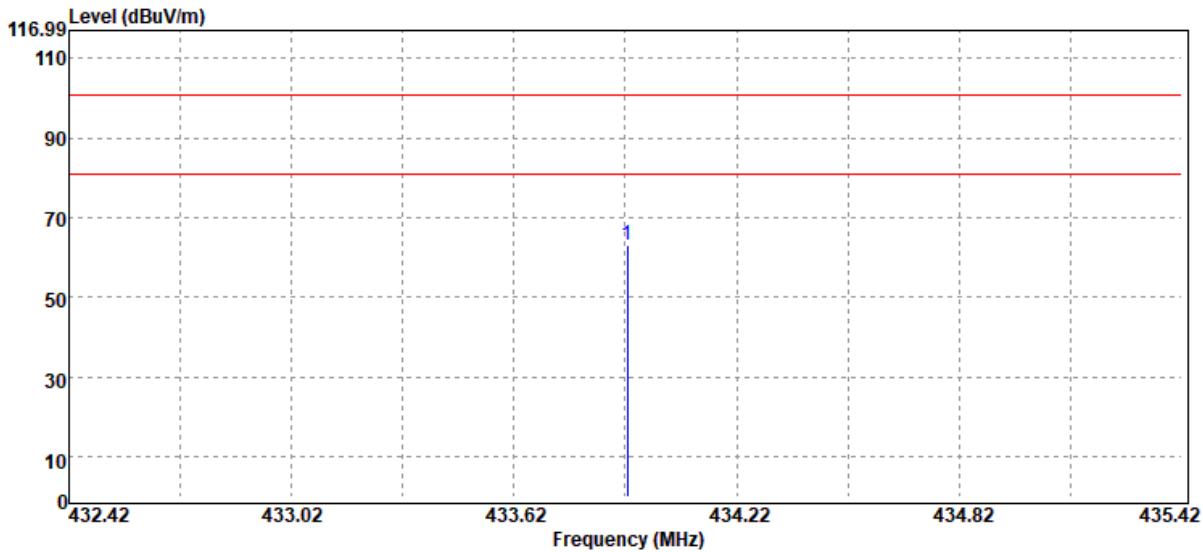
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Project Number : T190516W05  
 Operation Band : 433 MHz  
 Fundamental Frequency : 433.92 MHz  
 Operation Mode : Main CH MID  
 EUT Pol. : H Plan

Test Date : 2019-05-21  
 Temp./Humi. : 20/52  
 Engineer : Jerry  
 Measurement Antenna Pol. : HORIZONTAL



| Freq.<br>MHz | Detector<br>Mode<br>PK/QP/AV | Spectrum<br>Reading Level<br>dB $\mu$ V | Factor<br>dB | Actual<br>FS<br>dB $\mu$ V/m | Limit<br>@3m<br>dB $\mu$ V/m | Margin<br>dB |
|--------------|------------------------------|---|--------------|------------------------------|------------------------------|--------------|
| 433.93       | Peak                         | 67.48                                   | -4.23        | 63.25                        | 100.83                       | -37.58       |
| 433.93       | Average                      | -                                       | -12.29       | 50.96                        | 80.83                        | -29.87       |

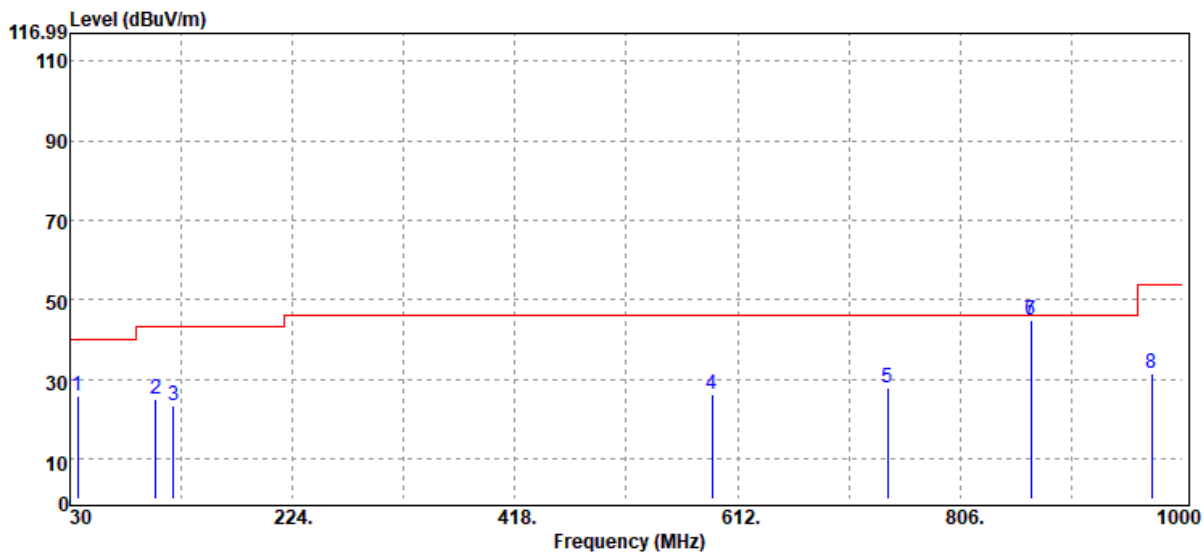
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## 7.9.2 Radiated Spurious Emission

Project Number : T190516W05  
 Operation Band : 433 MHz  
 Fundamental Frequency : 433.92 MHz  
 Operation Mode : Tx CH MID  
 EUT Pol. : H Plan

Test Date : 2019-05-22  
 Temp./Humi. : 20/52  
 Engineer : Jerry  
 Measurement Antenna Pol. : VERTICAL



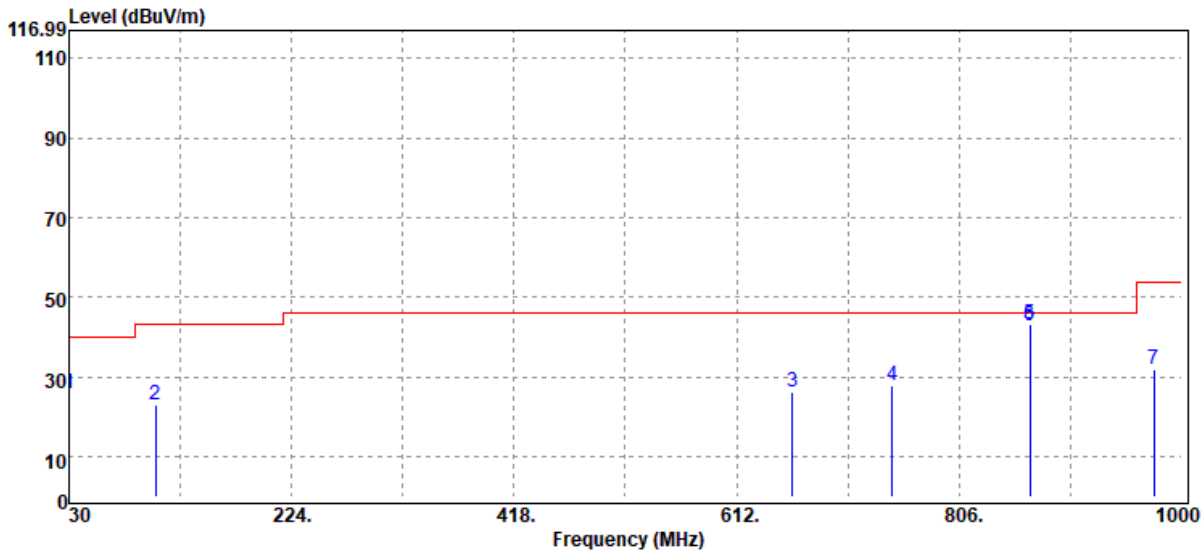
| Freq.<br>MHz | Detector<br>Mode<br>PK/QP/AV | Spectrum<br>Reading Level<br>dB $\mu$ V | Factor<br>dB | Actual<br>FS<br>dB $\mu$ V/m | Limit<br>@3m<br>dB $\mu$ V/m | Margin<br>dB |
|--------------|------------------------------|---|--------------|------------------------------|------------------------------|--------------|
| 36.79        | Peak                         | 33.10                                   | -7.08        | 26.02                        | 40.00                        | -13.98       |
| 104.69       | Peak                         | 36.18                                   | -11.18       | 25.00                        | 43.50                        | -18.50       |
| 120.21       | Peak                         | 32.51                                   | -8.88        | 23.63                        | 43.50                        | -19.87       |
| 589.69       | Peak                         | 27.84                                   | -1.73        | 26.11                        | 46.00                        | -19.89       |
| 742.95       | Peak                         | 26.15                                   | 1.80         | 27.95                        | 46.00                        | -18.05       |
| 867.84       | Peak                         | 42.06                                   | 2.92         | 44.98                        | 46.00                        | -1.02        |
| 867.84       | QP                           | 41.82                                   | 2.92         | 44.74                        | 46.00                        | -1.26        |
| 972.84       | Peak                         | 26.00                                   | 5.56         | 31.56                        | 54.00                        | -22.44       |

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Project Number : T190516W05  
 Operation Band : 433 MHz  
 Fundamental Frequency : 433.92 MHz  
 Operation Mode : Tx CH MID  
 EUT Pol. : H Plan

Test Date : 2019-05-21  
 Temp./Humi. : 20/52  
 Engineer : Jerry  
 Measurement Antenna Pol. : HORIZONTAL



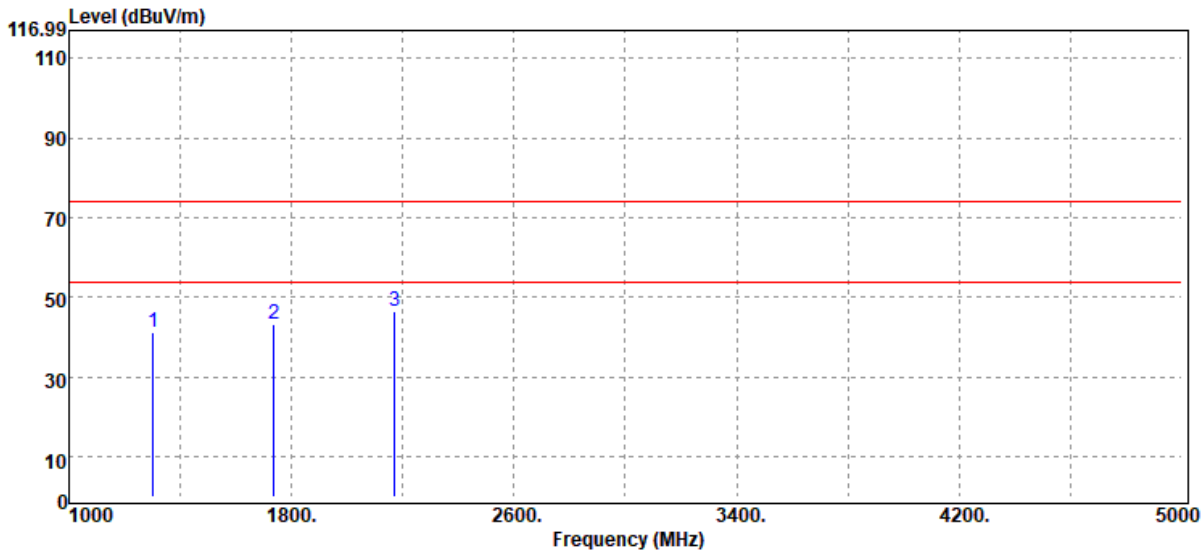
| Freq.<br>MHz | Detector<br>Mode<br>PK/QP/AV | Spectrum<br>Reading Level<br>dB $\mu$ V | Factor<br>dB | Actual<br>FS<br>dB $\mu$ V/m | Limit<br>@3m<br>dB $\mu$ V/m | Margin<br>dB |
|--------------|------------------------------|---|--------------|------------------------------|------------------------------|--------------|
| 30.00        | Peak                         | 27.39                                   | -1.51        | 25.88                        | 40.00                        | -14.12       |
| 105.66       | Peak                         | 34.07                                   | -11.02       | 23.05                        | 43.50                        | -20.45       |
| 660.50       | Peak                         | 26.53                                   | -0.23        | 26.30                        | 46.00                        | -19.70       |
| 747.80       | Peak                         | 25.93                                   | 1.93         | 27.86                        | 46.00                        | -18.14       |
| 867.84       | Peak                         | 40.22                                   | 2.92         | 43.14                        | 46.00                        | -2.86        |
| 867.84       | QP                           | 39.92                                   | 2.92         | 42.84                        | 46.00                        | -3.16        |
| 975.75       | Peak                         | 26.48                                   | 5.54         | 32.02                        | 54.00                        | -21.98       |

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Project Number : T190516W05  
 Operation Band :433 MHz  
 Fundamental Frequency :433.92 MHz  
 Operation Mode :Tx CH MID  
 EUT Pol. :H Plan

Test Date :2019-05-21  
 Temp./Humi. :20/52  
 Engineer :Jerry  
 Measurement Antenna Pol. :VERTICAL



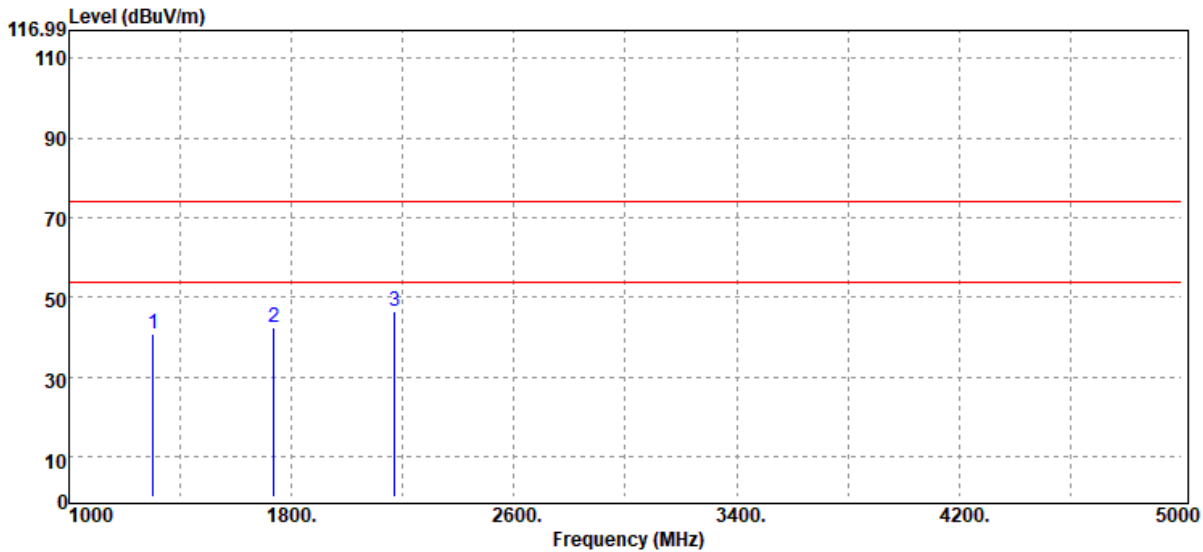
| Freq.<br>MHz | Detector<br>Mode<br>PK/QP/AV | Spectrum<br>Reading Level<br>dB $\mu$ V | Factor<br>dB | Actual<br>FS<br>dB $\mu$ V/m | Limit<br>@3m<br>dB $\mu$ V/m | Margin<br>dB |
|--------------|------------------------------|---|--------------|------------------------------|------------------------------|--------------|
| 1301.76      | Peak                         | 49.54                                   | -8.11        | 41.43                        | 74.00                        | -32.57       |
| 1301.76      | Average                      | -                                       | -12.29       | 29.14                        | 54.00                        | -24.86       |
| 1735.68      | Peak                         | 49.82                                   | -6.52        | 43.30                        | 74.00                        | -30.70       |
| 1735.68      | Average                      | -                                       | -12.29       | 31.01                        | 54.00                        | -22.99       |
| 2169.60      | Peak                         | 49.59                                   | -2.89        | 46.70                        | 74.00                        | -27.30       |
| 2169.60      | Average                      | -                                       | -12.29       | 34.41                        | 54.00                        | -19.59       |

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Project Number : T190516W05  
 Operation Band : 433 MHz  
 Fundamental Frequency : 433.92 MHz  
 Operation Mode : Tx CH MID  
 EUT Pol. : H Plan

Test Date : 2019-05-21  
 Temp./Humi. : 20/52  
 Engineer : Jerry  
 Measurement Antenna Pol. : HORIZONTAL



| Freq.<br>MHz | Detector<br>Mode<br>PK/QP/AV | Spectrum<br>Reading Level<br>dBμV | Factor<br>dB | Actual<br>FS<br>dBμV/m | Limit<br>@3m<br>dBμV/m | Margin<br>dB |
|--------------|------------------------------|-----------------------------------|--------------|------------------------|------------------------|--------------|
| 1301.76      | Peak                         | 49.10                             | -8.11        | 40.99                  | 74.00                  | -33.01       |
| 1301.76      | Average                      | -                                 | -12.29       | 28.70                  | 54.00                  | -25.30       |
| 1735.68      | Peak                         | 48.88                             | -6.52        | 42.36                  | 74.00                  | -31.64       |
| 1735.68      | Average                      | -                                 | -12.29       | 30.07                  | 54.00                  | -23.93       |
| 2169.60      | Peak                         | 49.31                             | -2.89        | 46.42                  | 74.00                  | -27.58       |
| 2169.60      | Average                      | -                                 | -12.29       | 34.13                  | 54.00                  | -19.87       |

Note: Average Actual = Peak Actual + Average Factor (-12.29)

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## 8 20 DB OCCUPIED BANDWIDTH

### 8.1 Applicable Standard

According to 15.231 (c) The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier.

### 8.2 Measurement Procedure

1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. Set EUT as normal operation
3. Set SPA Center Frequency = fundamental frequency, RBW, VBW= 10KHz, Span =100KHz.
4. Set SPA -20dB Occupied bandwidth.

### 8.3 Test SET-UP (Block Diagram of Configuration)



### 8.4 Measurement Equipment Used:

| SGS Conducted Emission Test Site No.A |              |        |               |                  |                 |
|---------------------------------------|--------------|--------|---------------|------------------|-----------------|
| Name of Equipment                     | Manufacturer | Model  | Serial Number | Calibration Date | Calibration Due |
| DC Block                              | PASTERNAK    | PE8210 | RF256         | 02/26/2019       | 02/25/2020      |
| Spectrum Analyzer                     | Agilent      | N9010A | MY53400256    | 11/21/2018       | 11/20/2019      |

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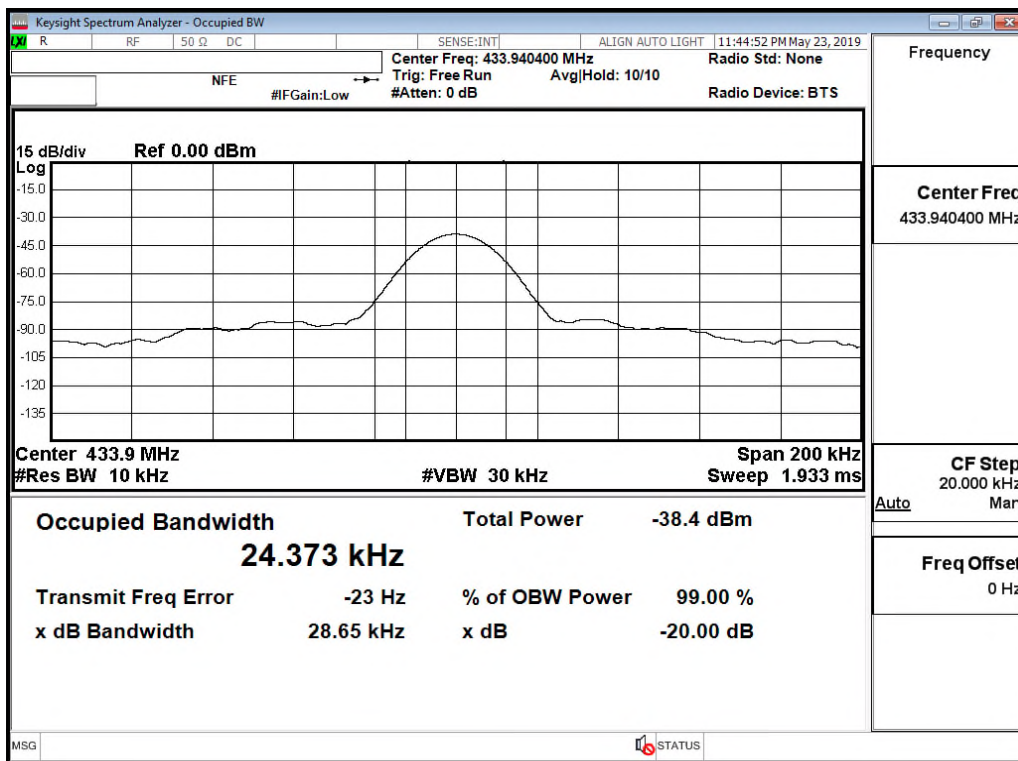
### 8.5 Measurement Results

The center frequency  $f_c$  is **433.92MHz**, according to the Rules, section 15.231(C), the Bandwidth of Center Frequency at -20dB should be calculated as following:

$$433.92 \times 0.0025 = 1.0848 \text{ (MHz)}$$

| CH                        | 20dB Bandwidth (kHz) |
|---------------------------|----------------------|
| Mid                       | 28.65                |
| <b>Limit = 1084.8 kHz</b> |                      |

### 20dB Band Width Test Data (CH Mid)



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## 9 DUTY CYCLE MEASUREMENT

### 9.1 Applicable Standard

According to 15. 35(c) Unless otherwise specified, e.g., §§15.255(b), and 15.256(l)(5), when the radiated emission limits are expressed in terms of the average value of the emission, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum value. The exact method of calculating the average field strength shall be submitted with any application for certification or shall be retained in the measurement data file for equipment subject to Supplier's Declaration of Conformity.

### 9.2 Measurement Procedure

1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. Set ETU normal operating mode.
3. Set SPA Center Frequency = fundamental frequency, RBW, VBW= 100kHz, Span =0 Hz. Adjacent sweep.
4. Set SPA View. Mark delta.

### 9.3 Test SET-UP (Block Diagram of Configuration)

Same as 8.3 Radiated Emission Measurement.

### 9.4 Measurement Equipment Used:

Same as 8.3 Radiated Emission Measurement.

### 9.5 Measurement Results:

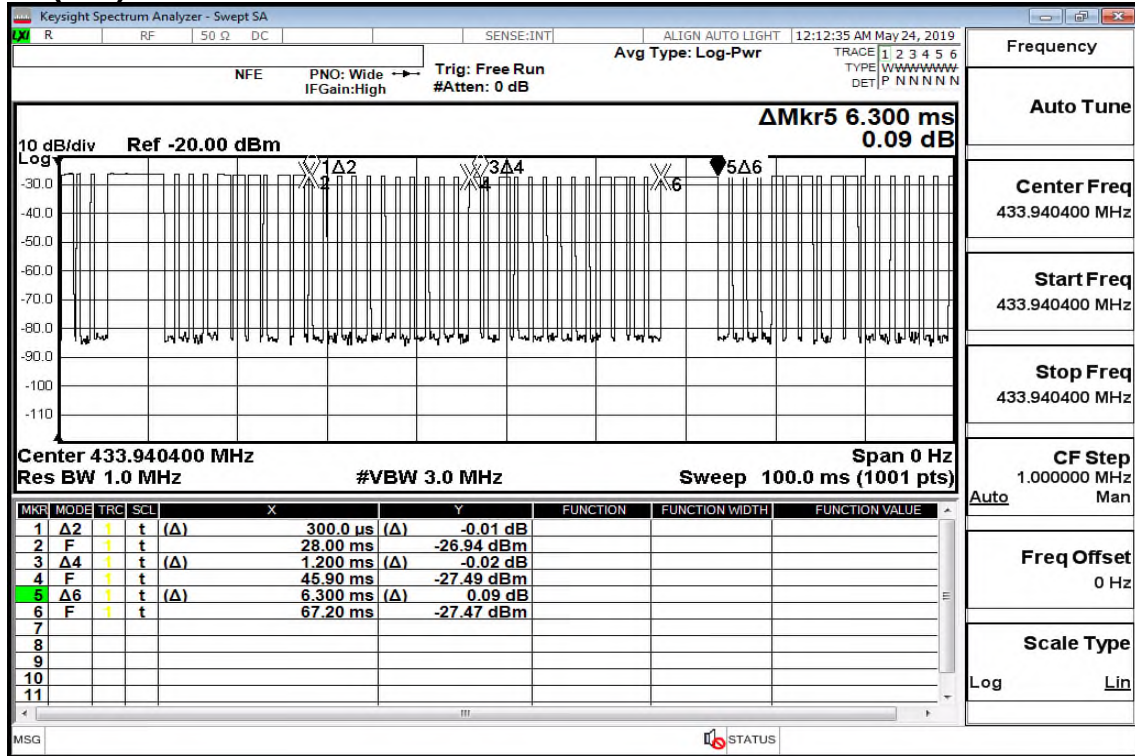
| Ton (ms) | TP=Ton+Toff (ms) | Avg correction(dB)<br>= 20log(Ton/TP) |
|----------|------------------|---------------------------------------|
| 24.3     | 100              | -12.29                                |

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Ton =24.3(ms)



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## 10 RELEASE TIME MEASUREMENT:

15.231 (a) (1) A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.

### 10.1 Measurement Procedure

1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. Set SPA Center Frequency = fundamental frequency, RBW=100KHz, VBW=100KHz, Span =0Hz. Sweep Time= 5s.
3. Set EUT as normal operation and press Transmitter bottom for 2 s approximately,
4. Set SPA Max hold. Delta Mark.

### 10.2 Test SET-UP (Block Diagram of Configuration)

Same as 8.3 Radiated Emission Measurement.

### 10.3 Measurement Equipment Used:

Same as 8.3 Radiated Emission Measurement.

### 10.4 Measurement Results

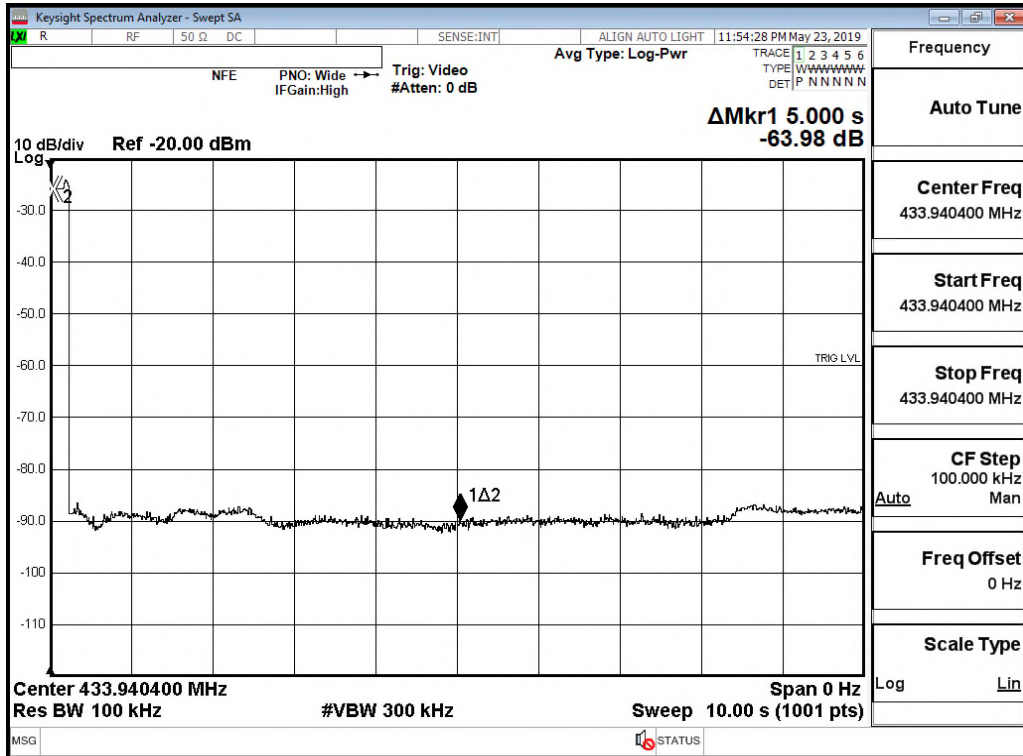
The release time is less than 5 s.  
Refer to attached data chart.

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### FLEX 4ES/4EX



Note: X = release time

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## 11 ANTENNA REQUIREMENT

### 11.1 Standard Applicable:

For intentional device, according to §15.203, an intentional radiator shall be designed to ensure that no antenna other than furnished by the responsible party shall be used with the device.

### 11.2 Antenna Connected Construction:

The antenna is designed as permanently attached and no consideration of replacement. Please see EUT photo for details.

*~ End of Report ~*

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