# Rollease Acmeda Inc

# RF TEST REPORT

**Report Type:**
FCC Part 15.231 & ISED RSS-210 RF report

**Model:**
MT02-0101-067004, MT02-0101-050004

**REPORT NUMBER:**
181102136SHA-001

**ISSUE DATE:**
Apr 11, 2019

**DOCUMENT CONTROL NUMBER:**
TTRF15.231_V1 © 2018 Intertek

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Report no.: 181102136SHA-001

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| | |
|---|---|
| **Applicant:** | Rollease Acmeda Inc<br>750 East Main Street, 7th Floor, Stamford CT 06902 United States |
| **Manufacturer:** | Rollease Acmeda Inc<br>750 East Main Street, 7th Floor, Stamford CT 06902 United States |
| **Manufacturing site:** | NINGBO DOOYA MECHANIC & ELECTRONIC TECHNOLOGY CO., LTD.<br>No.168 Shengguang Road, Luotuo, Zhenhai, Ningbo, ZHEJIANG, China |

| | |
|---|---|
| **FCC ID:** | 2AGGZMT0201014 |
| **IC:** | 21769-MT0201014 |

**SUMMARY:**

| The equipment complies with the requirements according to the following standard(s) or Specification: |
|---|
| **47CFR Part 15 (2017):** Radio Frequency Devices (Subpart C)<br><br>**ANSI C63.10 (2013):** American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices<br><br>**RSS-210 Issue 9 (August 2016):** Licence-exempt Radio Apparatus (All Frequency Bands): Category I Equipment<br><br>**RSS-Gen Issue 5 (April 2018):** General Requirements for Compliance of Radio Apparatus |

| **PREPARED BY:** | **REVIEWED BY:** |
|---|---|
| Teddy yin | Daniel Zhao |
| Project Engineer<br>Teddy Yin | Reviewer<br>Daniel Zhao |

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# Content

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# Revision History

| Report No. | Version | Description | Issued Date |
|---|---|---|---|
| 181102136SHA-001 | Rev. 01 | Initial issue of report | Apr 11, 2019 |
| | | | |
| | | | |

TEST REPORT

# Measurement result summary

| TEST ITEM | FCC REFERANCE | IC REFERANCE | RESULT |
|---|---|---|---|
| Fundamental & spurious emission &Restrict band radiated emission | 15.231(b)<br>15.209(a)<br>15.205 | RSS-210 A.1.2<br>RSS-Gen Issue 5<br>Clause 8.9&8.10 | Pass |
| Power line conducted emission | 15.207 | RSS-Gen Issue 5<br>Clause 8.8 | NA |
| Emission bandwidth | 15.231(c) | RSS-210 Issue 9<br>A1.3<br>RSS-GEN Issue 5<br>6.7 | Pass |
| Deactivating time | 15.231(a)(1) | RSS-210 Issue 9<br>A1.1(a) | Pass |
| Antenna requirement | 15.203 | - | Pass |

Notes: 1: NA =Not Applicable

2: Determination of the test conclusion is based on IEC Guide 115 in consideration of measurement uncertainty.

3: Additions, Deviations and Exclusions from Standards: None.

TEST REPORT

# 1 GENERAL INFORMATION

## 1.1 Description of Equipment Under Test (EUT)

| | |
|---|---|
| Product name: | AUTOMATE PUSH5 REMOTE |
| Type/Model: | MT02-0101-067004, MT02-0101-050004 |
| Description of EUT: | The EUT is a transmitter to control the working condition of the corresponding receiver. Both models are same except for the color of enclosure. |
| Rating: | DC 3V |
| Category of EUT: | Class B |
| EUT type: | ☒ Table top ☐ Floor standing |
| Software Version: | / |
| Hardware Version: | / |
| Sample received date: | Feb 22, 2019 |
| Date of test: | Feb 22~Mar 1, 2019 |

## 1.2 Technical Specification

| | |
|---|---|
| Operation Frequency: | 433.92MHz |
| Type of Modulation: | FSK |
| Product Type: | ☐ Mobile<br>☒ Portable<br>☐ Fix Location |
| Channel Number: | 1 |
| Antenna Designation: | Integral PCB antenna, non-user removable |
| Gain of Antenna: | 0.5dBi max (Declared by manufacture) |

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## 1.3 Description of Test Facility

| | |
|---|---|
| Name: | Intertek Testing Services Shanghai |
| Address: | Building 86, No. 1198 Qinzhou Road(North), Shanghai 200233, P.R. China |
| Telephone: | 86 21 61278200 |
| Telefax: | 86 21 54262353 |

| | |
|---|---|
| The test facility is recognized, certified, or accredited by these organizations: | CNAS Accreditation Lab<br>Registration No. CNAS L0139 |
| | FCC Accredited Lab<br>Designation Number: CN1175 |
| | IC Registration Lab<br>CAB identifier.: CN0051 |
| | VCCI Registration Lab<br>Registration No.: R-14243, G-10845, C-14723, T-12252 |
| | A2LA Accreditation Lab<br>Certificate Number: 3309.02 |

# 2 TEST SPECIFICATIONS

## 2.1 Standards or specification

47CFR Part 15 (2017)
ANSI C63.10 (2013)
RSS-210 Issue 9 (August 2016)
RSS-Gen Issue 5 (April 2018)

## 2.2 Mode of operation during the test

Within this test report, EUT was tested with modulation and tested under its rating voltage and frequency.
The EUT is a handheld device, so three axes (X, Y, Z) were observed while the test receiver worked as "max hold" continuously and the highest reading among the whole test procedure was recorded. Compare with the test results that X axis is the worst case.

## 2.3 Test software list

| Test Items | Software | Manufacturer | Version |
|---|---|---|---|
| Conducted emission | ESxS-K1 | R&S | V2.1.0 |
| Radiated emission | ES-K1 | R&S | V1.71 |

## 2.4 Test peripherals list

| Item No. | Name | Band and Model | Description |
|---|---|---|---|
| 1 | / | / | / |
| | | | |
| | | | |

## 2.5 Test environment condition:

| Test items | Temperature | Humidity |
|---|---|---|
| Fundamental & spurious emission & Restrict band radiated emission | 25°C | 53% RH |
| Power line conducted emission | / | / |
| Emission bandwidth & Deactivating time | 25°C | 53% RH |

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## 2.6 Instrument list

| Radiated Emission | | | | | |
|---|---|---|---|---|---|
| Used | Equipment | Manufacturer | Type | Internal no. | Due date |
| ☒ | Test Receiver | R&S | ESIB 26 | EC 3045 | 2019-09-12 |
| ☒ | Bilog Antenna | TESEQ | CBL 6112D | EC 4206 | 2019-06-10 |
| ☒ | Pre-amplifier | R&S | AFS42-00101800-25-S-42 | EC5262 | 2019-06-10 |
| ☒ | Horn antenna | R&S | HF 906 | EC 3049 | 2019-11-17 |
| ☒ | Semi-anechoic chamber | Albatross | - | EC 3048 | 2019-07-31 |
| RF test | | | | | |
| Used | Equipment | Manufacturer | Type | Internal no. | Due date |
| ☒ | PXA Signal Analyzer | Keysight | N9030A | EC 5338 | 2019-03-05 |
| Additional instrument | | | | | |
| Used | Equipment | Manufacturer | Type | Internal no. | Due date |
| ☒ | Therom-Hygrograph | ZJ1-2A | S.M.I.F. | EC 3326 | 2019-03-28 |
| ☒ | Therom-Hygrograph | ZJ1-2A | S.M.I.F. | EC 2122 | 2019-03-11 |

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## 2.7 Measurement uncertainty

The measurement uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

| Test item | Measurement uncertainty |
|---|---|
| Maximum peak output power | ± 0.74dB |
| Radiated Emissions in restricted frequency bands below 1GHz | ± 4.90dB |
| Radiated Emissions in restricted frequency bands above 1GHz | ± 5.02dB |
| Emission outside the frequency band | ± 2.89dB |
| Power line conducted emission | ± 3.19dB |

# 3 Fundamental & Spurious Emission & Restrict band radiated emission

**Test result:** **Pass**

## 3.1 Limit

**3.1.1** The emission shall test through the 10th harmonic or to 40GHz, whichever is lower. It must comply with the limits below:

| Fundamental Frequency (MHz) | Fundamental limit (uV/m) | Spurious limit (uV/m) |
|---|---|---|
| ☐ 40.66 – 40.70 | 2250 | 225 |
| ☐ 70 – 130 | 1250 | 125 |
| ☐ 130 - 174 | 1250 to 3750 | 125 to 375 |
| ☐ 174 - 260 | 3750 | 375 |
| ☒ 260 – 470 | 3750 to 12500 | 375 to 1250 |
| ☐ Above 470 | 12500 | 1250 |

The formulas for calculating the maximum permitted fundamental field strengths are as follows: for the band 130-174 MHz, uV/m at 3 meters = 56.81818(Frequency) - 6136.3636; for the band 260-470 MHz, uV/m at 3 meters = 41.6667(Frequency) - 7083.3333. The maximum permitted unwanted emission level is 20 dB below the maximum permitted fundamental level.

For that the EUT use fundamental frequency of 433.92MHz, after calculation, the limit is:

Fundamental limit = 41.6667 * 433.92 - 7083.3333 = 10996.68 uV/m = 80.80dBuV/m
Spurious limit = 81 – 20 = 60.80dBuV/m

////////////////////////////////////////////////////////////////////////////////////////////////////

**3.1.2** The radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) showed as below:

| Frequency (MHz) | Field Strength (dBuV/m) | Measurement Distance (m) |
|---|---|---|
| 30 - 88 | 40.0 | 3 |
| 88 - 216 | 43.5 | 3 |
| 216 - 960 | 46.0 | 3 |
| Above 960 | 54.0 | 3 |

## 3.2 Measurement Procedure

**For Radiated emission below 30MHz:**

a) The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.
b) The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
c) Both X and Y axes of the antenna are set to make the measurement.
d) For each suspected emission, the EUT was arranged to its worst case and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
e) The test-receiver system was set to Quasi-Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

**NOTE:**

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 9kHz at frequency below 30MHz.

**For Radiated emission above 30MHz:**

a) The EUT was placed on the top of a rotating table 0.8 meters (for 30MHz ~ 1GHz) / 1.5 meters (for above 1GHz) above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.

b) The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

c) The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

d) For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

e) The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.

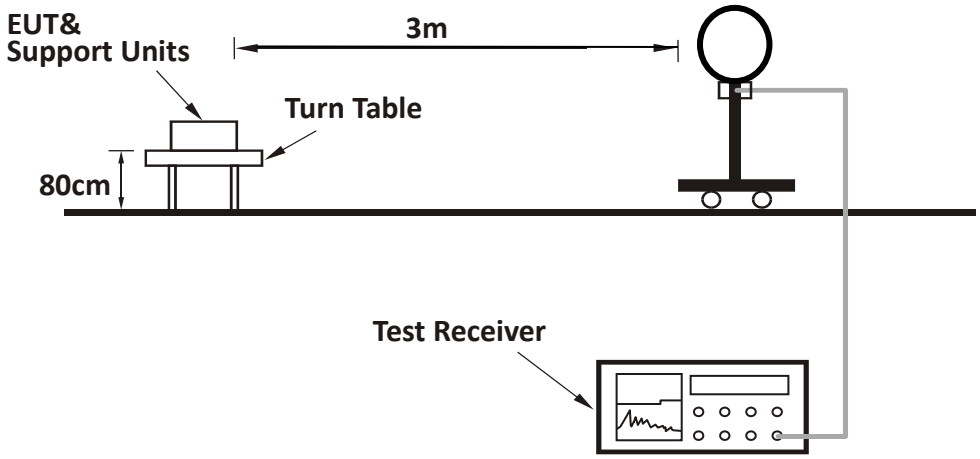
f) The test-receiver system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

**Note:**

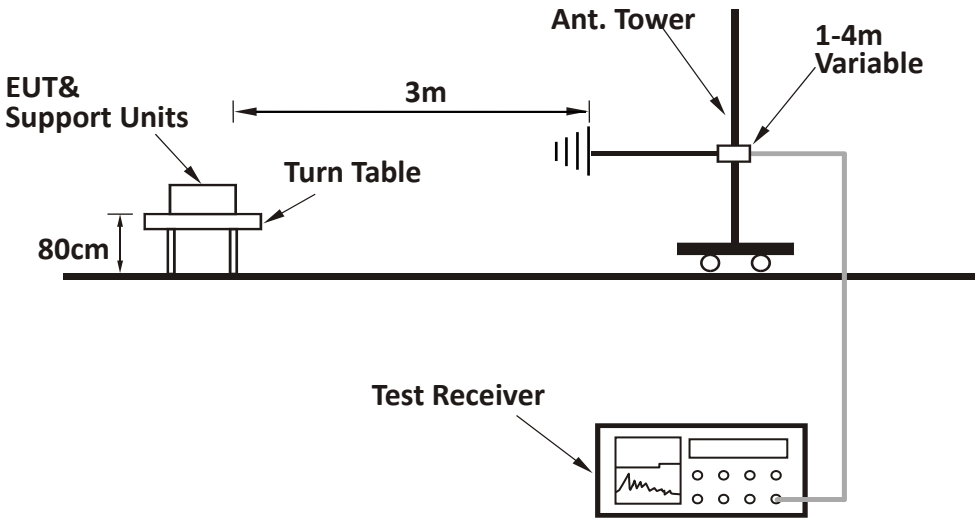
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.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

## 3.3 Test Configuration

**For Radiated emission below 30MHz:**




**For Radiated emission 30MHz to 1GHz:**



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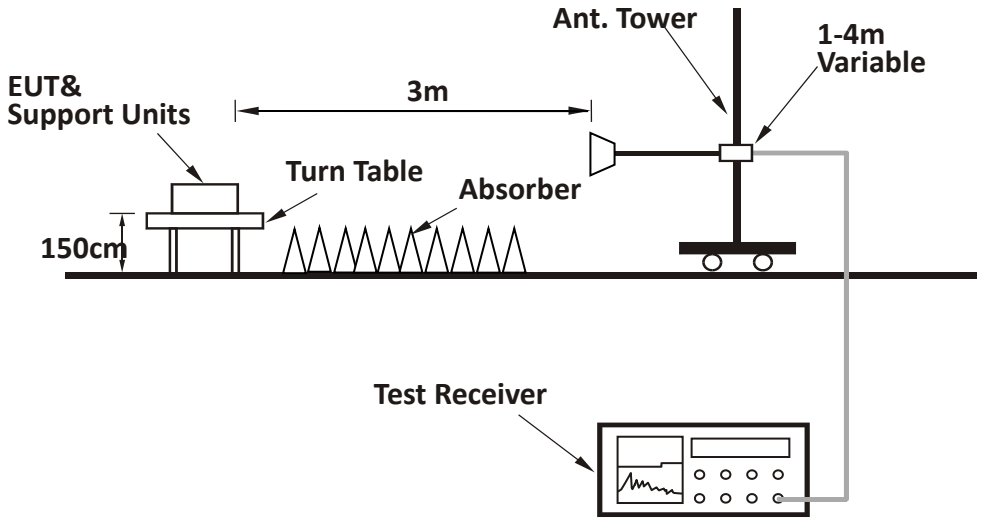
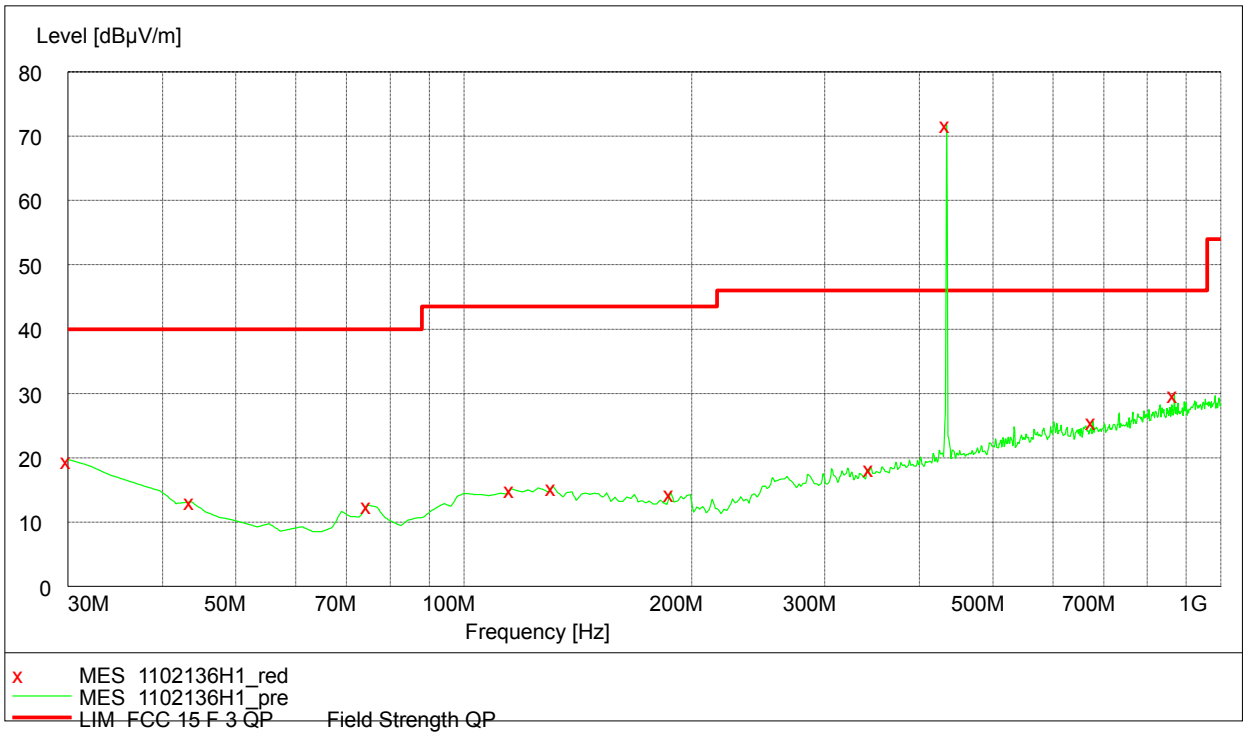
**For Radiated emission above 1GHz:**

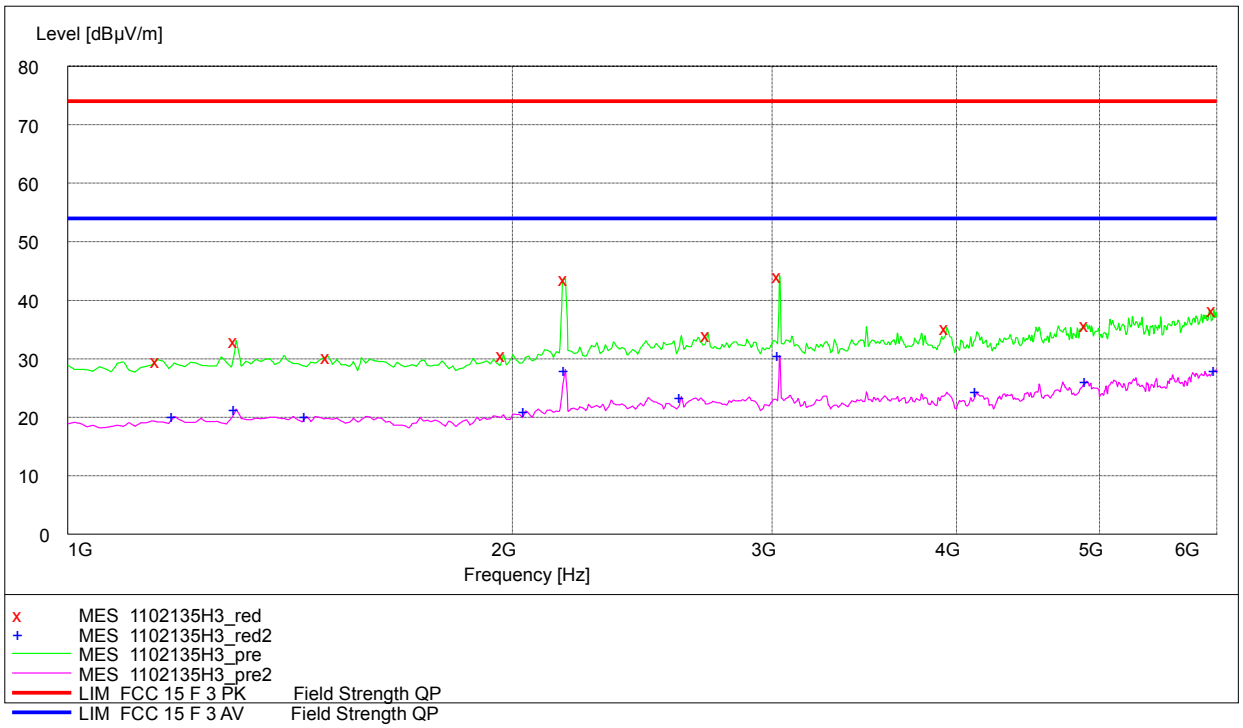


## 3.4 Test Results of Radiated Emissions

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported.
All keys were pre-tested, and the “all”key is the worst case.

Horizontal



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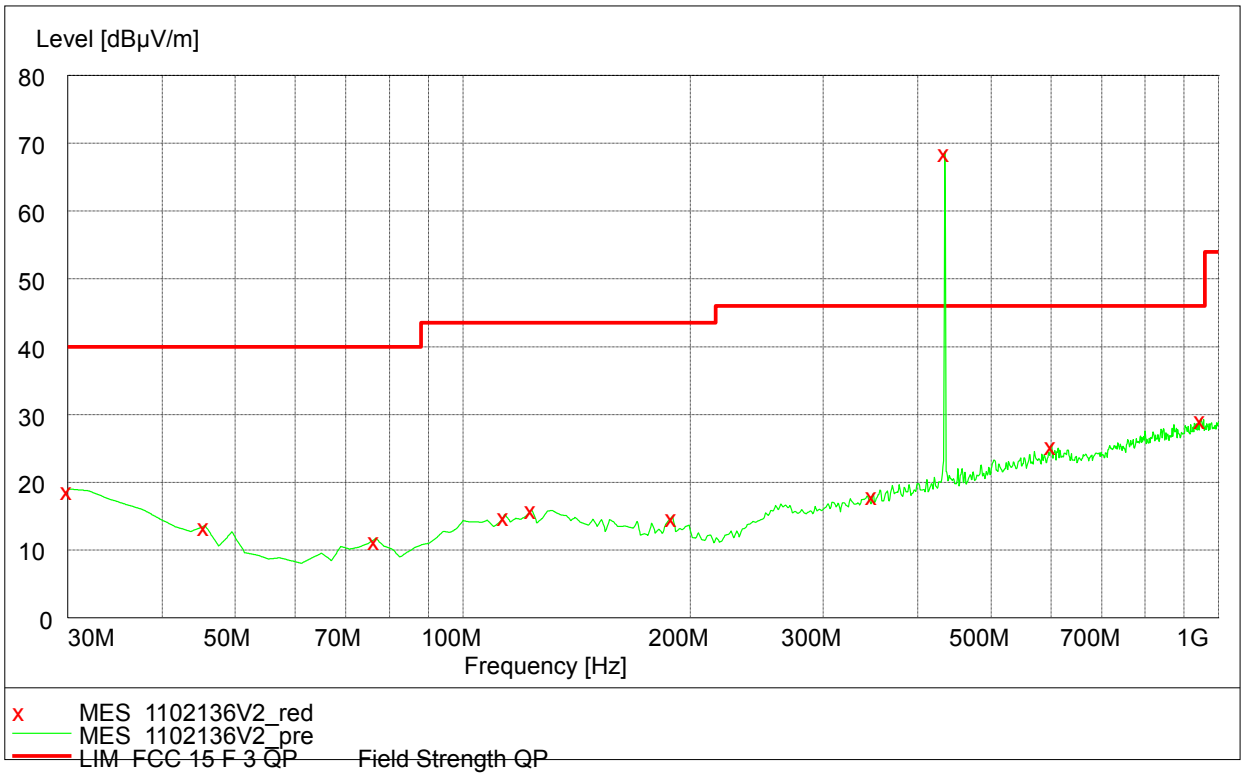
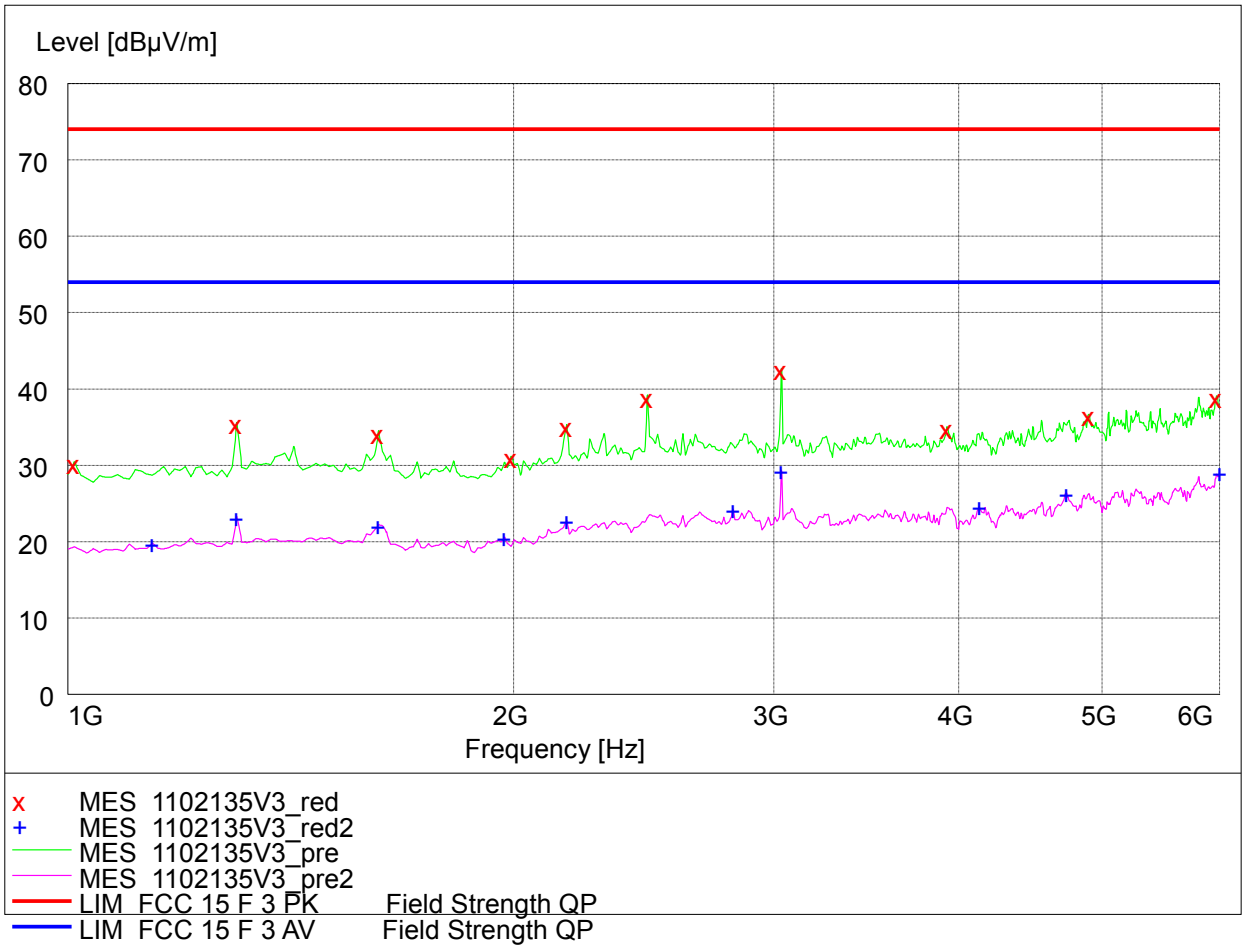
Vertical



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**Test data:**

| Polarization | Frequency (MHz) | Corrected Reading (dBμV/m) | Correct Factor (dB/m) | Limits (dBμV/m) | Margin (dB) | Detector |
|---|---|---|---|---|---|---|
| H | **433.92** | 71.8 | 18.3 | Fundamental | / | PK |
| | 867.81 | 30.0 | 23.2 | 46.0 | 16.0 | PK |
| | 1296.59 | 33.1 | -12.0 | 74.0 | 40.9 | PK |
| | 2172.34 | 43.8 | -8.4 | 74.0 | 30.2 | PK |
| | 3034.07 | 44.3 | -6.2 | 74.0 | 29.7 | PK |
| | 4897.80 | 35.9 | -1.7 | 74.0 | 38.1 | PK |
| V | 30.00 | 19.0 | 18.6 | 40.0 | 21.0 | PK |
| | **433.92** | 68.8 | 18.3 | Fundamental | / | PK |
| | 867.81 | 28.7 | 23.2 | 46.0 | 17.3 | PK |
| | 1296.59 | 35.6 | -12.0 | 74.0 | 38.4 | PK |
| | 2172.34 | 35.3 | -8.4 | 74.0 | 38.7 | PK |
| | 3034.07 | 42.7 | -6.2 | 74.0 | 31.3 | PK |
| | 4897.80 | 36.7 | -1.7 | 74.0 | 37.3 | PK |

Remark: 1. Correct Factor = Antenna Factor + Cable Loss (+ Amplifier, for higher than 1GHz), the value was added to Original Receiver Reading by the software automatically.

2. Corrected Reading = Original Receiver Reading + Correct Factor
3. Margin = Limit - Corrected Reading
4. If the PK Corrected Reading is lower than AV limit, the AV test can be elided.

Example: Assuming Antenna Factor = 30.20dB/m, Cable Loss = 2.00dB,
Gain of Preamplifier = 32.00dB, Original Receiver Reading = 10.00dBuV,
Limit = 40.00dBuV/m.
Then Correct Factor = 30.20 + 2.00 – 32.00 = 0.20dB/m;
Corrected Reading = 10dBuV + 0.20dB/m = 10.20dBuV/m;
Margin = 40.00dBuV/m - 10.20dBuV/m = 29.80dB.

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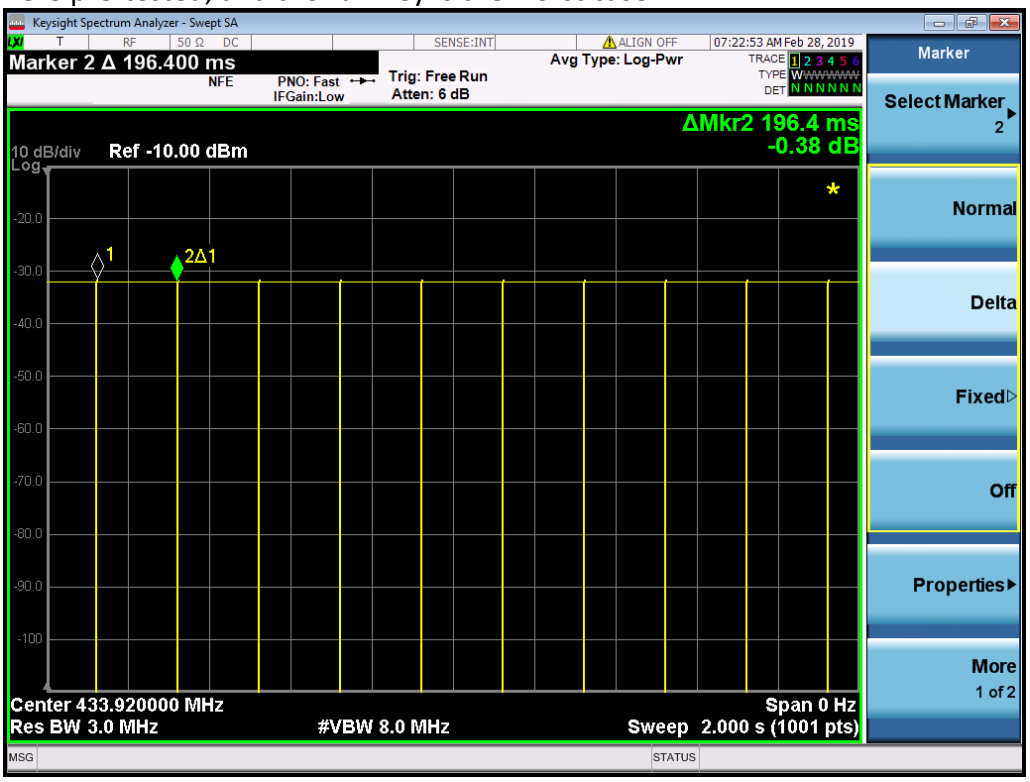
## Duty Cycle:

The test data with maximum duty cycle was listed below.

Because the pulse train is periodic with a period exceeding 100ms, and the maximum “on time” is over 100ms.

The Duty cycle= 1

All keys were pre-tested, and the “all”key is the worst case.



Calculating the AV value according to the duty cycle

| Antenna | Frequency (MHz) | PK Reading (dBuV/m) | Correct Factor (dB) | AV Reading (dBuV/m) | Limit (dBuV/m) | Margin (dB) |
|---|---|---|---|---|---|---|
| H | **433.92** | 71.8 | 0 | 71.8 | 80.8 | 9.0 |
| H | 867.81 | 30.0 | | 30.0 | 60.8 | 30.8 |
| H | 1296.59 | 33.1 | | 33.1 | 60.8 | 27.7 |
| H | 2172.34 | 43.8 | | 43.8 | 60.8 | 17.0 |
| H | 3034.07 | 44.3 | | 44.3 | 60.8 | 16.5 |
| H | 4897.80 | 35.9 | | 35.9 | 60.8 | 24.9 |
| V | **433.92** | 68.8 | | 68.8 | 80.8 | 12.0 |
| V | 867.81 | 28.7 | | 28.7 | 60.8 | 32.1 |
| V | 1296.59 | 35.6 | | 35.6 | 60.8 | 25.2 |
| V | 2172.34 | 35.3 | | 35.3 | 60.8 | 25.5 |
| V | 3034.07 | 42.7 | | 42.7 | 60.8 | 18.1 |
| V | 4897.80 | 36.7 | | 36.7 | 60.8 | 24.1 |

Remark:
1. Correct Factor = 20lg (duty cycle) = 20lg (1) = 0;
2. AV Reading = PK Reading + Correct Factor;
3. Margin = limit - AV Reading.

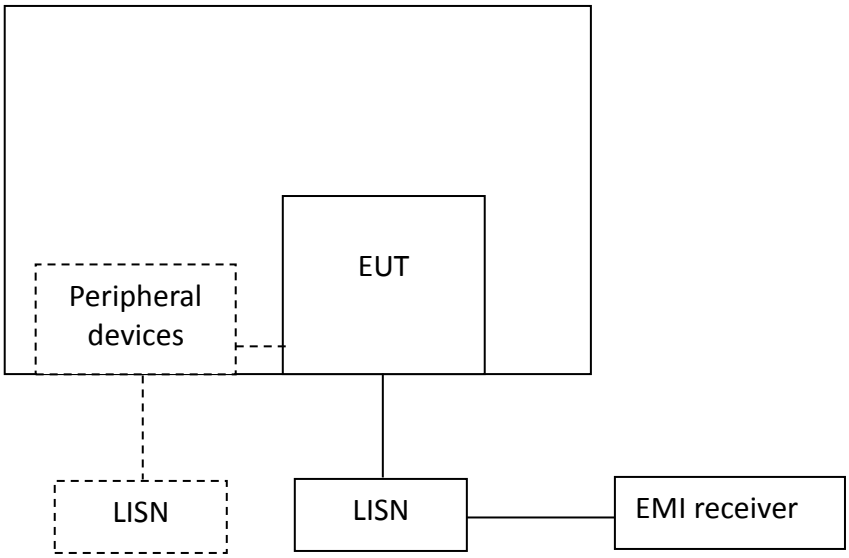
# 4 Power line conducted emission

**Test result:** **NA**

## 4.1 Limit

| Frequency of Emission (MHz) | Conducted Limit (dBuV) | |
|---|---|---|
| | QP | AV |
| 0.15-0.5 | 66 to 56* | 56 to 46 * |
| 0.5-5 | 56 | 46 |
| 5-30 | 60 | 50 |
| * Decreases with the logarithm of the frequency. | | |

## 4.2 Test Configuration



## 4.3 Measurement Procedure

Measured levels of ac power-line conducted emission shall be the emission voltages from the voltage probe, where permitted, or across the 50 Ω LISN port (to which the EUT is connected), where permitted, terminated into a 50 Ω measuring instrument. All emission voltage and current measurements shall be made on each current-carrying conductor at the plug end of the EUT power cord by the use of mating plugs and receptacles on the LISN, if used. Equipment shall be tested with power cords that are normally supplied or recommended by the manufacturer and that have electrical and shielding characteristics that are the same as those cords normally supplied or recommended by the manufacturer. For those measurements using a LISN, the 50 Ω measuring port is terminated by a measuring instrument having 50 Ω input impedance. All other ports are terminated in 50 Ω loads.

Tabletop devices shall be placed on a platform of nominal size 1 m by 1.5 m, raised 80 cm above the reference ground plane. The vertical conducting plane or wall of an RF-shielded (screened) room shall be located 40 cm to the rear of the EUT. Floor-standing devices shall be placed either directly on the reference ground-plane or on insulating material as described in ANSI C63.4. All other surfaces of tabletop or floor-standing EUTs shall be at least 80 cm from any other grounded conducting surface, including the case or cases of one or more LISNs.

The bandwidth of the test receiver is set at 9 kHz.

## 4.4 Test Results of Power line conducted emission

**Test Curve:**

L Line

**Test Data:**

| Frequency (MHz) | Quasi-peak | | | Average | | |
|---|---|---|---|---|---|---|
| | level dB(μV) | Limit dB(μV) | Margin (dB) | level dB(μV) | limit dB(μV) | Margin (dB) |
| 0.17 | | 65.0 | | | 55.3 | |
| 0.22 | | 62.7 | | | 51.9 | |
| 0.39 | | 57.9 | | | 46.0 | |
| 4.29 | | 56.0 | | | 46.0 | |
| 10.45 | | 60.0 | | | 50.0 | |
| 19.40 | | 60.0 | | | 50.0 | |

Note: *means margin is more than 10dB.

**Test Curve:**

N Line

**Test Data:**

| Frequency (MHz) | Quasi-peak | | | Average | | |
|---|---|---|---|---|---|---|
| | level dB(μV) | Limit dB(μV) | Margin (dB) | level dB(μV) | limit dB(μV) | Margin (dB) |
| 0.17 | | 65.0 | | | 55.3 | |
| 0.22 | | 62.7 | | | 51.9 | |
| 0.39 | | 57.9 | | | 46.0 | |
| 4.29 | | 56.0 | | | 46.0 | |
| 10.45 | | 60.0 | | | 50.0 | |
| 19.40 | | 60.0 | | | 50.0 | |

Note: *means margin is more than 10dB.

*Remark: 1. Correct Factor = LISN Factor + Cable Loss, the value was added to Original Receiver Reading by the software automatically.*

*2. Corrected Reading = Original Receiver Reading + Correct Factor*

*3. Margin = Limit - Corrected Reading*

*4. If the PK Corrected Reading is lower than AV limit, the AV test can be elided.*

# 5 Emission Bandwidth

**Test result:** **Pass**

## 5.1 Limit

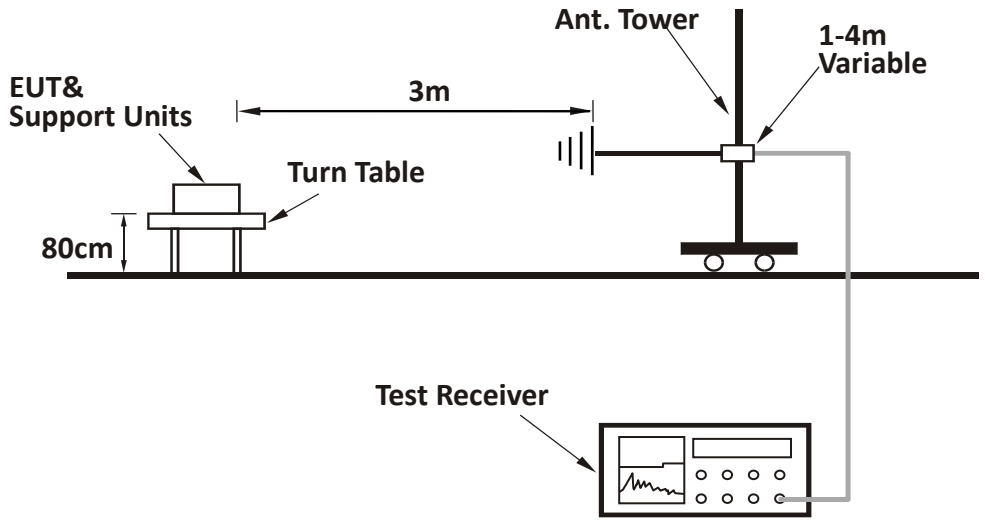
The bandwidth of the emission shall be no wider than 0.25 % of the center frequency for devices operating above 70MHz and below 900MHz. For devices operating above 900 MHz, the 99% bandwidth shall be less or equal to 0.5% of the center frequency.

The limit for the EUT = 0.25% * 433.92 MHz = 1085 kHz

## 5.2 Measurement Procedure

The EUT and simulators were placed on a 0.8m high wooden turntable above the horizontal metal ground plane. The turn table rotated 360 degrees to determine the position of the maximum emission level. The EUT was set 3 meters away from the receiving antenna which was mounted on an antenna mast. The antenna moved up and down between from 1meter to 4 meters to find out the maximum emission level.
The central frequency of test receiver was set near the operating frequency of EUT.
The test was conducted using the Spectrum Analyzer with the resolutions bandwidth set at 3kHz, the video bandwidth set at 10kHz.

## 5.3 Test Configuration



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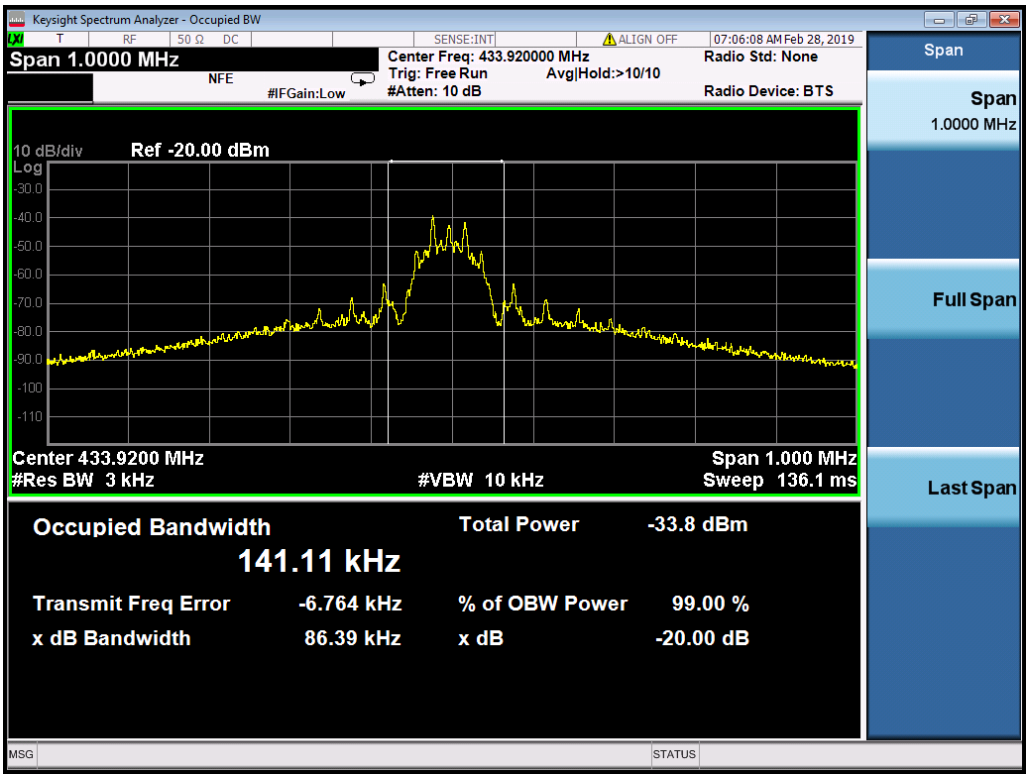
## 5.4 The results

All keys were pre-tested, and the “all”key is the worst case.

| Frequency (MHz) | 20dB Bandwidth (kHz) | 99% Bandwidth (kHz) |
|---|---|---|
| 433.92 | 86.39 | 141.11 |
| **Limit** | 1085 | 1085 |
| **Result** | **Complied** | **Complied** |



# 6 Deactivating time

**Test result:** **Pass**

## 6.1 Test limit

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

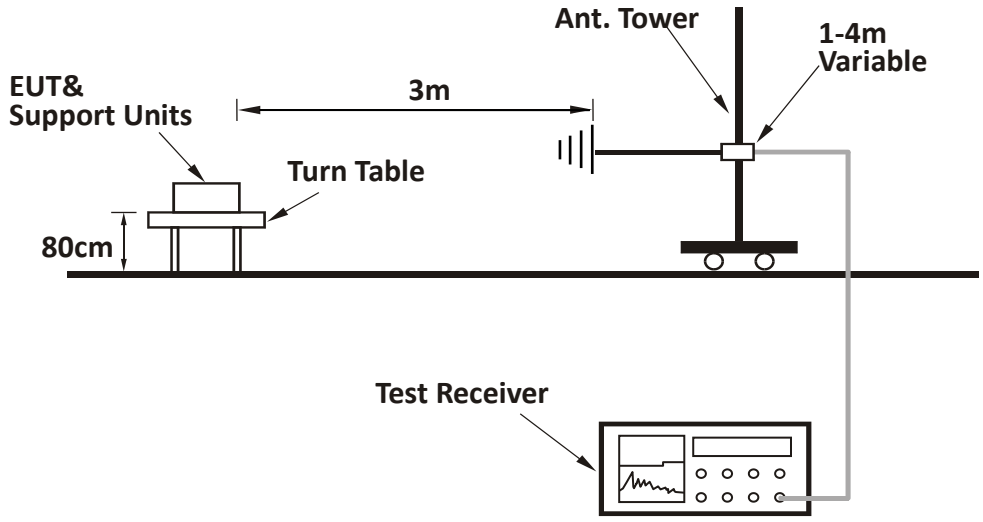
☒ (2) A transmitter activated automatically shall cease transmission within 5 seconds after activation.

☐ (3) Periodic transmissions at regular predetermined intervals are not permitted. However, polling or supervision transmissions, including data, to determine system integrity of transmitters used in security or safety applications are allowed if the total duration of transmissions does not exceed more than two seconds per hour for each transmitter. There is no limit on the number of individual transmissions, provided the total transmission time does not exceed two seconds per hour.

☐ (4) Intentional radiators which are employed for radio control purposes during emergencies involving fire, security, and safety of life, when activated to signal an alarm, may operate during the pendency of the alarm condition.

☐ (5) Transmission of set-up information for security systems may exceed the transmission duration limits in (1) and (2) above, provided such transmission are under the control of a professional installer and do not exceed ten seconds after a manually operated switch is released or a transmitter is activated automatically. Such set-up information may include data.

## 6.2 Test Configuration

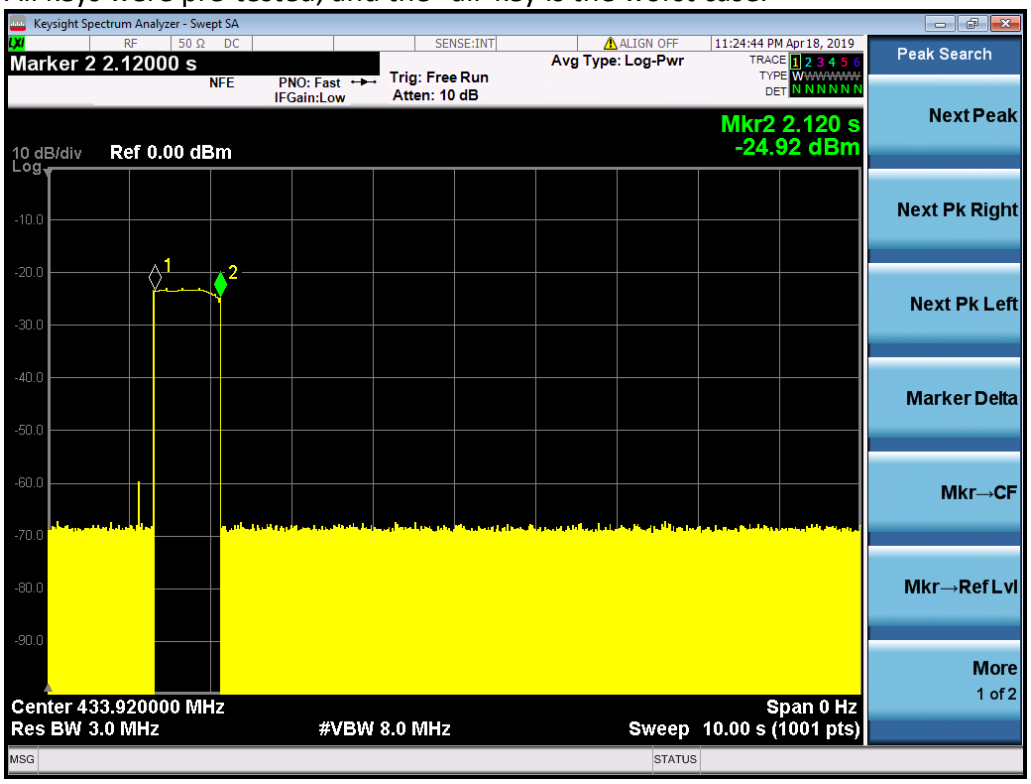


## 6.3 Test procedure and test setup

The measurement was applied in a semi-anechoic chamber.
The central frequency of test receiver was set as the operating frequency of EUT and the Span was set as 0.
The EUT was switched once. The test receiver recorded the whole time from the triggered moment to the time of stopping radiating. For manual switching, to avoid uncertainty, the operating above would be repeated five times and the worst data is recorded.

## 6.4 Test protocol

Whole time from the triggered moment to the time of stopping radiating: 854ms.
As a result, the EUT complies with the limit of 5s' deactivating time.
All keys were pre-tested, and the "all"key is the worst case.



# 7 Antenna requirement

**Requirement:**
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.

**Result:**
EUT uses permanently PCB antenna to the intentional radiator, so it can comply with the provisions of this section.

********** END **********