



FCC TEST REPORT

**Test report
On Behalf of
Dongguan Yufang Electronics Co., Ltd
For
Wireless remote control
Model No.: YF-YK-002**

FCC ID: 2AZ3V-YF-YK-002

Prepared for : Dongguan Yufang Electronics Co., Ltd
202, Fengyi No.1, fengdeling village, Fenggang town, Dongguan City, China

Prepared By : Shenzhen Tongzhou Testing Co.,Ltd
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Date of Test: 2021/4/7 ~ 2021/4/14

Date of Report: 2021/4/14

Report Number: TZ210302064-E

The test report apply only to the specific sample(s) tested under stated test conditions
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TEST RESULT CERTIFICATION

Applicant's name : Dongguan Yufang Electronics Co., Ltd
Address : 202, Fengyi No.1, fengdeling village, Fenggang town, Dongguan City, China
Manufacture's Name : Dongguan Yufang Electronics Co., Ltd
Address : 202, Fengyi No.1, fengdeling village, Fenggang town, Dongguan City, China
Product description
Trade Mark : N/A
Product name : Wireless remote control
Model and/or type reference : YF-YK-002
Standards : FCC Rules and Regulations Part 15.231
ANSI C63.10:2013

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Date of Test

Date (s) of performance of tests : 2021/4/7 ~ 2021/4/14

Date of Issue: 2021/4/14

Test Result : Pass

Testing Engineer : Anna Hu

(Anna Hu)

Technical Manager : Hugo Chen

(Hugo Chen)

Authorized Signatory : Andy Zhang

(Andy Zhang)

**Revision History**

| Revision | Issue Date | Revisions | Revised By |
|----------|------------|---------------|------------|
| 000 | 2021/4/14 | Initial Issue | Andy Zhang |
| | | | |
| | | | |



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1. GENERAL INFORMATION

1.1. Description of Device (EUT)

| | |
|-------------------|---------------------------|
| EUT | : Wireless remote control |
| Model Number | : YF-YK-002 |
| Model Declaration | : N/A |
| Test Model | : YF-YK-002 |
| Power Supply | : DC 12V by battery |
| Hardware version | : V1.0 |
| Software version | : V1.0 |
| Sample ID | : TZ210302064-1# |

SRD

| | |
|-----------------------|---------------------------------|
| Frequency Range | : 433.92MHz |
| Channel Number | : 1 |
| Modulation Technology | : ASK |
| Antenna Type And Gain | Integral Antenna, 0.0dBi (Max.) |

Note1: Antenna position refer to EUT Photos



1.2. Objective

The primary objective of the manufacturer is compliance with Subpart C of Part 15 of FCC Rules for the radiated and conducted emissions of intentional radiators. Certification of these devices is required as a prerequisite to marketing as defined in Part 2 the FCC Rules.

Certification is a procedure where the manufacturer or a contracted laboratory makes measurements and submits the test data and technical information to the FCC. The FCC issues a grant of equipment authorization upon successful completion of their review of the submitted documents. Once the equipment authorization has been obtained, the label indicating compliance must be attached to all identical units, which are subsequently manufactured.

Maintenance of compliance is the responsibility of the manufacturer. Any modification of the product which may result in increased emissions should be checked to ensure compliance has been maintained (i.e., printed circuit board layout changes, different line filter, different power supply, harnessing or I/O cable changes, etc.).

1.3. Environmental Conditions

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

- Temperature: 15-35°C
- Humidity: 30-60 %
- Atmospheric pressure: 86-106 kPa



1.4. Host System Configuration List and Details

| Manufacturer | Description | Model | Serial Number | Certificate |
|--------------|-------------|-------|---------------|-------------|
| | | | | |

1.5. External I/O Cable

| I/O Port Description | Quantity | Cable |
|----------------------|----------|-------|
| | | |
| | | |
| | | |
| | | |
| | | |

1.6. Description of Test Facility

FCC

Designation Number: CN1275

Test Firm Registration Number: 167722

Shenzhen Tongzhou Testing Co.,Ltd has been listed on the US Federal Communications Commission list of test facilities recognized to perform electromagnetic emissions measurements.

A2LA

Certificate Number: 5463.01

Shenzhen Tongzhou Testing Co.,Ltd has been listed by American Association for Laboratory Accreditation to perform electromagnetic emission measurement.

IC

ISED#: 22033

CAB identifier: CN0099

Shenzhen Tongzhou Testing Co.,Ltd has been listed by Innovation, Science and Economic Development Canada to perform electromagnetic emission measurement.

The 3m-Semi anechoic test site fulfils CISPR 16-1-4 according to ANSI C63.10 and CISPR 16-1-4:2010

1.7. Statement of the Measurement Uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. To CISPR 16 – 4 “Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements” and is documented in the Shenzhen Tongzhou Testing Co.,Ltd's quality system acc. To DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

1.8. Measurement Uncertainty

| Test Item | Frequency Range | Uncertainty | Note |
|------------------------|-----------------|-------------|------|
| Radiation Uncertainty | 9KHz~30MHz | ±3.08dB | (1) |
| | 30MHz~1000MHz | ±4.42dB | (1) |
| | 1GHz~40GHz | ±4.06dB | (1) |
| Conduction Uncertainty | : 150kHz~30MHz | ±2.23dB | (1) |

(1). This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

1.9. Description of Test Modes

The EUT was placed in a RF test mode for testing of the transmitter and in normal mode of operation for testing the digital circuitry or receiver. In both modes the carrier current device within the EUT was operational.

1.10. Antenna System

The directional gains of antenna used for transmitting refer to section 1.1 of this report, and EUT uses an integral antenna which is permanently attached.



2. TEST METHODOLOGY

All measurements contained in this report were conducted with ANSI C63.10-2013, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices.

The radiated testing was performed at an antenna-to-EUT distance of 3 meters. All radiated and conducted emissions measurement was performed at Shenzhen Tongzhou Testing Co.,Ltd.

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 that intends to maximize its emission characteristics in a continuous normal application.

2.2. EUT Exercise

The EUT was operated in the normal operating mode. The TX frequency that was fixed which was for the purpose of the measurements.

According to its specifications, the EUT must comply with the requirements of the Section 15.203, 15.205, 15.207, 15.209 and 15.231 under the FCC Rules Part 15 Subpart C.

2.3. General Test Procedures

2.3.1 Conducted Emissions

The EUT is placed on the turntable, which is 0.8 m above ground plane. According to the requirements in Section 6.2.1 of ANSI C63.10-2013 Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using Quasi-peak and average detector modes.

2.3.2 Radiated Emissions

The EUT is placed on a turn table, which is 1.5 m above ground plane. The turntable 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 maximum emissions, exploratory radiated emission measurements were made according to the requirements in Section 6.3 of ANSI C63.10-2013

2.4. Instrument Calibration

All test equipment is regularly checked to ensure that performance is maintained in accordance with the manufacturer's specifications. All antennas are calibrated at regular intervals with respect to tuned half-wave dipoles. An exhibit of this report contains the list of test equipment used and calibration information.

2.5. Test Mode

The EUT has been tested under engineering mode. The field strength of radiation emission was measured in the following position: EUT stand-up position (Y axis), lie-down position (X, Z axis).

The worst case of X axis was reported.



3. SYSTEM TEST CONFIGURATION

3.1. Justification

The system was configured for testing in a continuous transmits condition.

3.2. EUT Exercise Software

N/A

3.3. Special Accessories

N/A

3.4. Block Diagram/Schematics

Please refer to the related document

3.5. Equipment Modifications

Shenzhen Tongzhou Testing Co.,Ltd. has not done any modification on the EUT.

3.6. Test Setup

Please refer to the test setup photo.



4. SUMMARY OF TEST RESULTS

| Rules | Description of test | Sample ID | Result |
|----------------|------------------------|----------------|-----------|
| §15.203 | Antenna Requirement | TZ210302064-1# | Compliant |
| §15.205 | Restricted Band | TZ210302064-1# | Compliant |
| §15.209 | General Requirement | TZ210302064-1# | Compliant |
| §15.231 (b) | Radiated Emissions | TZ210302064-1# | Compliant |
| §15.231 (c) | 20dB Bandwidth Testing | TZ210302064-1# | Compliant |
| §15.231 (a)(1) | Deactivation Testing | TZ210302064-1# | Compliant |
| §15.231 | Duty cycle Factor | TZ210302064-1# | Compliant |

Note: All buttons have been taken into consideration and only worst case reported.

5. TEST ITEMS and RESULTS

5.1. Transmitter Deactivation Time

FCC 15.231 (a)

5.1.1. Limit

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

5.1.2. Test Procedure

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

5.1.3. Test Result

| Frequency (MHz) | Activation Time (s) | Limit: not more than 5 seconds of being released(s) | Conclusion |
|-----------------|---------------------|---|------------|
| 433.92 | 1.412 | 5 | PASS |

Agilent Spectrum Analyzer - Swept SA

Marker 1 Δ -1.41150 s #Avg Type: Log-Pwr 10:20:19 AM Apr 14, 2021

PNO: Fast Trig: Free Run TRACE 1 2 3 4 5 6

IFGain:Low #Atten: 40 dB TYPE VVMM/VMMA DET A N N N N N

ΔMkr1 -1.412 s 0.01 dB

10 dB/div Ref 30.00 dBm Log

20.0
10.0
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0

Center 433.920000 MHz Span 0 Hz

Res BW 8 MHz #VBW 50 MHz* Sweep 4.000 s (8001 pts)

MSG STATUS

Marker

Select Marker 1 ▶

Normal

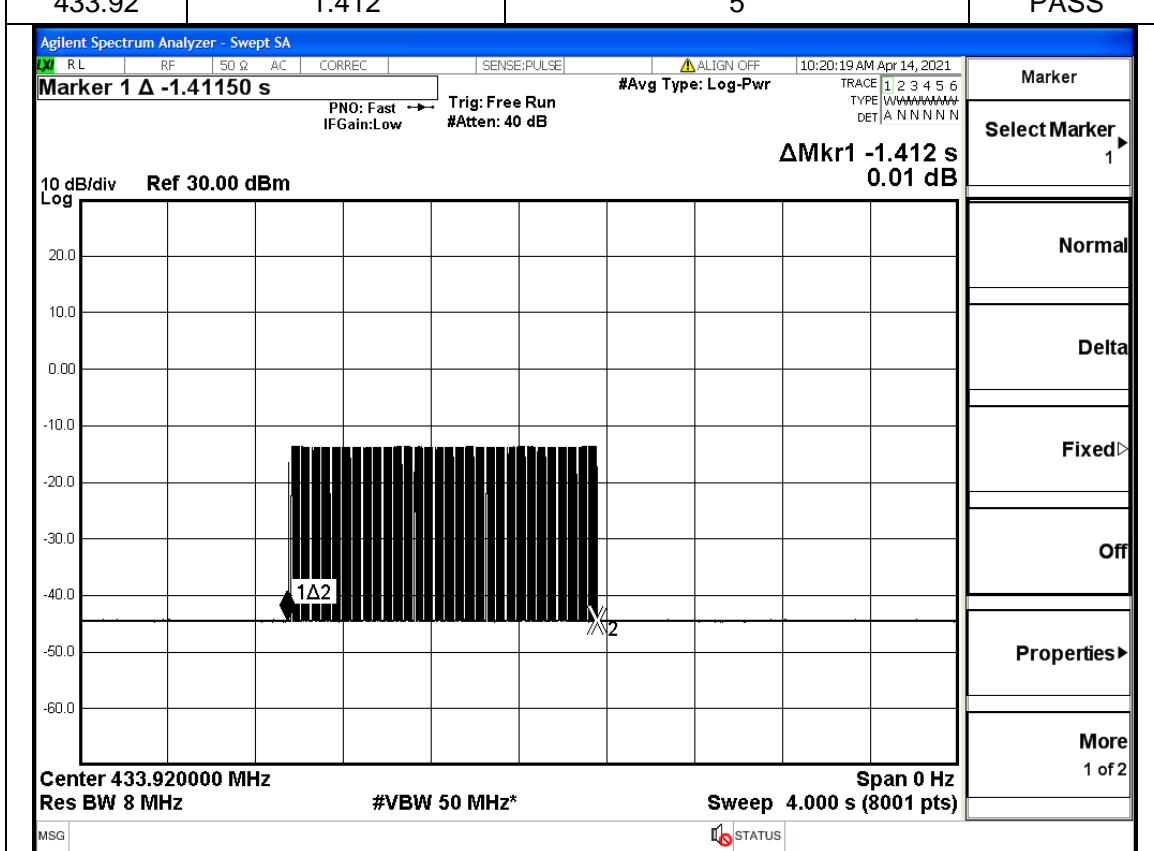
Delta

Fixed ▶

Off

Properties ▶

More 1 of 2



5.2. Transmitter Field Strength of Emissions

5.2.1. Limit

FCC §15.231 (b)

In addition to the provisions of § 15.205, the field strength of emissions from Intentional radiators operated under this section shall not exceed the following:

| Fundamental frequency (MHz) | Field Strength of Fundamental (microvolt/meter) | Field Strength of spurious emissions (microvolt/meter) |
|-----------------------------|---|--|
| 40.66-40.70 | 2,250 | 225 |
| 70-130 | 1,250 | 125 |
| 130-174 | 1,250 to 3,370 | 125 to 375 |
| 174-260 | 3,750 | 375 |
| 260-470 | 3,750 to 12,500 | 375 to 1,250 |
| Above 470 | 12,500 | 1,250 |

[Where F is the frequency in MHz, the formulas for calculating the maximum permitted fundamental field strengths are as follows: for the band 130-174 MHz, $\mu\text{V/m}$ at 3 meters = $56.81818(F) - 6136.3636$; for the band 260-470 MHz, $\mu\text{V/m}$ at 3 meters = $41.6667(F) - 7083.3333$. The maximum permitted unwanted emission level is 20 dB below the maximum permitted fundamental level.]

§15.205 (a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

| MHz | MHz | MHz | GHz |
|----------------------------|---------------------|-----------------|------------------|
| 0.090 - 0.110 | 16.42 - 16.423 | 399.9 - 410 | 4.5 - 5.15 |
| ¹ 0.495 - 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 |
| 4.17725 - 4.17775 | 37.5 - 38.25 | 1435 - 1626.5 | 9.0 - 9.2 |
| 4.20725 - 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 - | 2483.5 - 2500 | 17.7 - 21.4 |
| 8.37625 - 8.38675 | 156.52525 | 2655 - 2900 | 22.01 - 23.12 |
| 8.41425 - 8.41475 | 156.7 - 156.9 | 3260 - 3267 | 23.6 - 24.0 |
| 12.29 - 12.293 | 162.0125 - 167.17 | 3332 - 3339 | 31.2 - 31.8 |
| 12.51975 - 12.52025 | 167.72 - 173.2 | 3345.8 - 3358 | 36.43 - 36.5 |
| 12.57675 - 12.57725 | 240 - 285 | 3600 - 4400 | (²) |
| 13.36 - 13.41 | 322 - 335.4 | | |

1 Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

2 Above 38.6

§15.205 (b) Except as provided in paragraphs (d) and (e), the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi peak detector. Above 1000 MHz, compliance with the emission



limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

§15.209 (a) Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

| Frequency (MHz) | Field strength (microvolts/meter) | Measurement distance (meters) |
|-----------------|-----------------------------------|-------------------------------|
| 0.009–0.490 | 2400/F(kHz) | 300 |
| 0.490–1.705 | 24000/F(kHz) | 30 |
| 1.705–30.0 | 30 | 30 |
| 30–88 | 100** | 3 |
| 88–216 | 150** | 3 |
| 216–960 | 200** | 3 |
| Above 960 | 500 | 3 |

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54 72 MHz, 76 88 MHz, 174 216 MHz or 470 806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

§15.209 (b) In the emission table above, the tighter limit applies at the band edges.

5.2.2. Measuring Instruments and Setting

Please refer to section 6 of equipments list in this report. The following table is the setting of spectrum analyzer and receiver.

| Spectrum Parameter | Setting |
|---|--|
| Attenuation | Auto |
| Start Frequency | 1000 MHz |
| Stop Frequency | 10th carrier harmonic |
| RB / VB (Emission in restricted band) | 1MHz / 1MHz for Peak, 1 MHz / 10Hz for Average |
| RB / VB (Emission in non-restricted band) | 1MHz / 1MHz for Peak, 1 MHz / 10Hz for Average |

| Spectrum Parameter | Setting |
|------------------------|----------------------------------|
| Attenuation | Auto |
| Start ~ Stop Frequency | 9kHz~150kHz / RB 200Hz for QP |
| Start ~ Stop Frequency | 150kHz~30MHz / RB 9kHz for QP |
| Start ~ Stop Frequency | 30MHz~1000MHz / RB 120kHz for QP |

5.2.3. Test Procedures

1) Sequence of testing 9 kHz to 30 MHz

Setup:

- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.
- If the EUT is a tabletop system, a rotatable table with 0.8 m height is used.
- If the EUT is a floor standing device, it is placed on the ground.
- Auxiliary equipment and cables were positioned to simulate normal operation conditions.
- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.
- The measurement distance is 3 meter.
- The EUT was set into operation.

Premeasurement:

- The turntable rotates from 0° to 315° using 45° steps.
- The antenna height is 0.8 meter.
- At each turntable position the analyzer sweeps with peak detection to find the maximum of all emissions

Final measurement:

- Identified emissions during the premeasurement the software maximizes by rotating the turntable position (0° to 360°) and by rotating the elevation axes (0° to 360°).
- The final measurement will be done in the position (turntable and elevation) causing the highest emissions with QPK detector.
- The final levels, frequency, measuring time, bandwidth, turntable position, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the premeasurement and the limit will be stored.

2) Sequence of testing 30 MHz to 1 GHz

Setup:

- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.
- If the EUT is a tabletop system, a table with 0.8 m height is used, which is placed on the ground plane.
- If the EUT is a floor standing device, it is placed on the ground plane with insulation between both.
- Auxiliary equipment and cables were positioned to simulate normal operation conditions
- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.
- The measurement distance is 3 meter.
- The EUT was set into operation.

Premeasurement:

- The turntable rotates from 0° to 315° using 45° steps.
- The antenna is polarized vertical and horizontal.
- The antenna height changes from 1 to 3 meter.
- At each turntable position, antenna polarization and height the analyzer sweeps three times in peak to find the maximum of all emissions.

Final measurement:

- The final measurement will be performed with minimum the six highest peaks.
- According to the maximum antenna and turntable positions of premeasurement the software maximize the peaks by changing turntable position ($\pm 45^\circ$) and antenna movement between 1 and 4 meter.
- The final measurement will be done with QP detector with an EMI receiver.
- The final levels, frequency, measuring time, bandwidth, antenna height, antenna polarization, turntable angle, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the premeasurement with marked maximum final measurements and the limit will be stored.

3) Sequence of testing 1 GHz to 18 GHz

Setup:

- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.
- If the EUT is a tabletop system, a rotatable table with 1.5 m height is used.
- If the EUT is a floor standing device, it is placed on the ground plane with insulation between both.
- Auxiliary equipment and cables were positioned to simulate normal operation conditions
- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.
- The measurement distance is 3 meter.
- The EUT was set into operation.

Premeasurement:

- The turntable rotates from 0° to 315° using 45° steps.
- The antenna is polarized vertical and horizontal.
- The antenna height scan range is 1 meter to 2.5 meter.
- At each turntable position and antenna polarization the analyzer sweeps with peak detection to find the maximum of all emissions.

Final measurement:

- The final measurement will be performed with minimum the six highest peaks.
- According to the maximum antenna and turntable positions of premeasurement the software maximize the peaks by changing turntable position ($\pm 45^\circ$) and antenna movement between 1 and 4 meter. This procedure is repeated for both antenna polarizations.
- The final measurement will be done in the position (turntable, EUT-table and antenna polarization) causing the highest emissions with Peak and Average detector.
- The final levels, frequency, measuring time, bandwidth, turntable position, EUT-table position, antenna polarization, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the premeasurement with marked maximum final measurements and the limit will be stored.

5.2.4. EUT Operation during Test

The EUT was programmed to be in Normal transmitting mode.

5.2.5. Results of Radiated Emissions (9 kHz ~30MHz)

| | | | |
|---------------|---------|----------------|------------------|
| Temperature | 25°C | Humidity | 60% |
| Test Engineer | Anna Hu | Configurations | Normal Operating |

| Freq. (MHz) | Level (dBuV) | Over Limit (dB) | Over Limit (dBuV) | Remark |
|----------------|-----------------|--------------------|----------------------|----------|
| - | - | - | - | See Note |

Note:

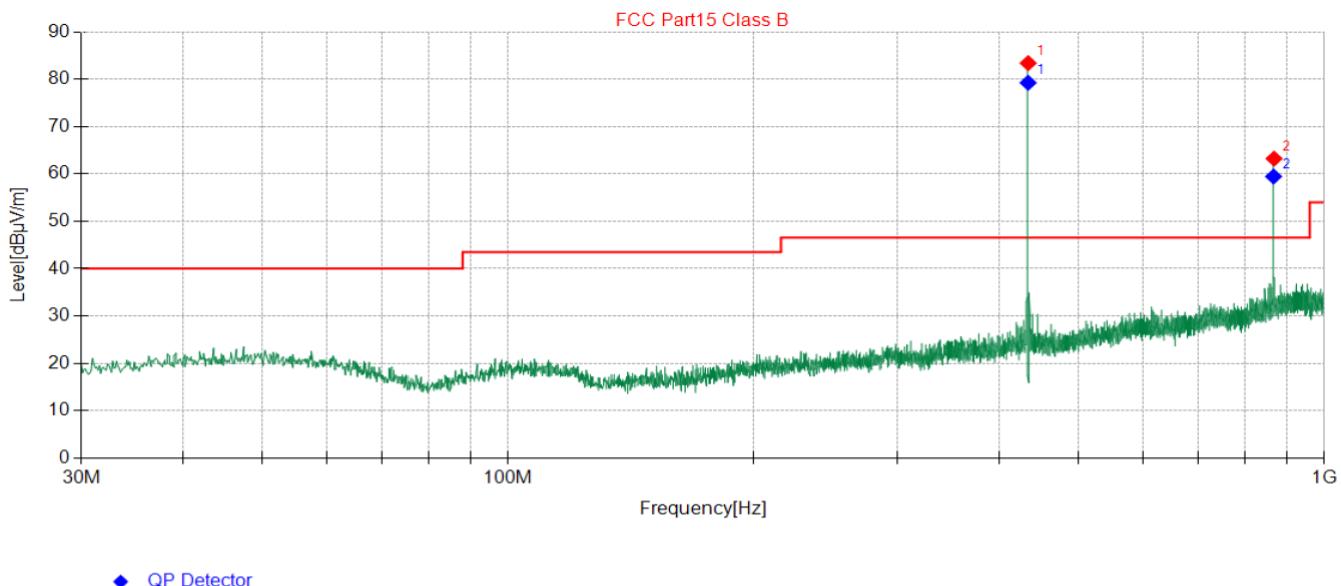
The amplitude of spurious emissions which are attenuated by more than 20 dB below the permissible value has no need to be reported.

Distance extrapolation factor = $40 \log (\text{specific distance} / \text{test distance})$ (dB);

Limit line = specific limits (dBuV) + distance extrapolation factor.

5.2.6. Results of Radiated Emissions (30MHz~1GHz)

| | | | |
|---------------|---------|----------------|------------------|
| Temperature | 25°C | Humidity | 60% |
| Test Engineer | Anna Hu | Configurations | Normal Operating |



Suspected Data List

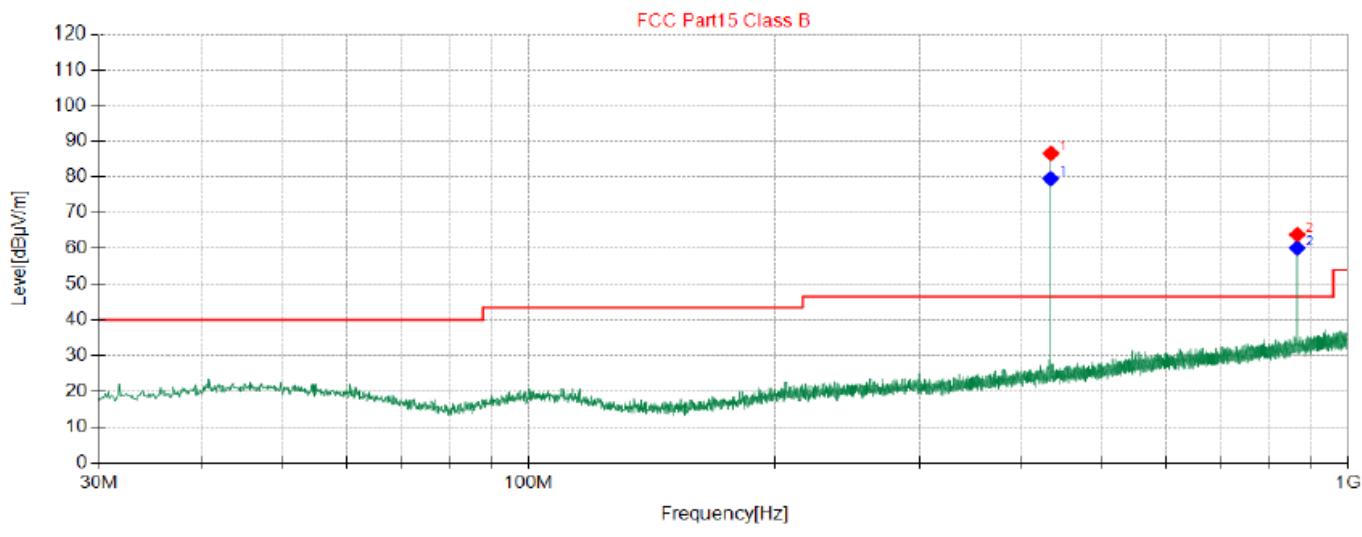
| NO. | Freq. [MHz] | Level [dB μ V/m] | Limit [dB μ V/m] | Margin [dB] | Height [cm] | Angle [°] | Polarity |
|-----|-------------|----------------------|----------------------|-------------|-------------|-----------|----------|
| 1 | 433.88 | 83.41 | 46.50 | -36.91 | 100 | 15 | Vertical |
| 2 | 868.08 | 63.23 | 46.50 | -16.73 | 100 | 20 | Vertical |

Final Data List

| NO. | Freq. [MHz] | QP Value [dB μ V/m] | QP Limit [dB μ V/m] | QP Margin [dB] | Height [cm] | Angle [°] | Polarity |
|-----|-------------|-------------------------|-------------------------|----------------|-------------|-----------|----------|
| 1 | 433.851 | 79.25 | 46.50 | -32.75 | 100 | 15 | Vertical |
| 2 | 867.012 | 59.45 | 46.50 | -12.95 | 100 | 20 | Vertical |

Average Value

| Frequency (MHz) | Level (dB μ V/m) | Duty cycle factor | Average value (dB μ V/m) | Limit (dB μ V/m) | Margin (dB) | Polarization |
|-----------------|----------------------|-------------------|------------------------------|----------------------|-------------|--------------|
| 433.88 | 83.41 | -8.4 | 75.01 | 80.82 | 5.81 | Vertical |
| 867.59 | 63.23 | -8.4 | 54.83 | 60.82 | 5.99 | Vertical |



Suspected Data List

| NO. | Freq. [MHz] | Level [dB μ V/m] | Limit [dB μ V/m] | Margin [dB] | Height [cm] | Angle [°] | Polarity |
|-----|-------------|----------------------|----------------------|-------------|-------------|-----------|------------|
| 1 | 433.88 | 86.63 | 46.50 | -40.13 | 100 | 320 | Horizontal |
| 2 | 867.59 | 63.90 | 46.50 | -17.40 | 100 | 315 | Horizontal |

Final Data List

| NO. | Freq. [MHz] | QP Value [dB μ V/m] | QP Limit [dB μ V/m] | QP Margin [dB] | Height [cm] | Angle [°] | Polarity |
|-----|-------------|-------------------------|-------------------------|----------------|-------------|-----------|----------|
| 1 | 433.426 | 79.56 | 46.50 | -33.06 | 100 | 334 | Horizont |
| 2 | 867.178 | 60.12 | 46.50 | -13.62 | 100 | 320 | Horizont |

Average Value

| Frequency (MHz) | Level (dB μ V/m) | Duty cycle factor | Average value (dB μ V/m) | Limit (dB μ V/m) | Margin (dB) | Polarization |
|-----------------|----------------------|-------------------|------------------------------|----------------------|-------------|--------------|
| 433.88 | 86.63 | -8.4 | 78.23 | 80.82 | 2.59 | Horizontal |
| 867.59 | 63.9 | -8.4 | 55.5 | 60.82 | 5.32 | Horizontal |



5.2.7. Results of Radiated Emissions (Above1GHz)

| | | | |
|---------------|---------|----------------|------------------|
| Temperature | 25°C | Humidity | 60% |
| Test Engineer | Anna Hu | Configurations | Normal Operating |

| Peak Value | | | | |
|-----------------|----------------|----------------|-------------|--------------|
| Frequency (MHz) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Polarization |
| 1301.42 | 53.24 | 74 | 20.76 | Horizontal |
| 1735.25 | 51.34 | 74 | 22.66 | Horizontal |
| 1301.47 | 51.42 | 74 | 22.58 | Vertical |
| 1735.13 | 48.9 | 74 | 25.1 | Vertical |

| Average Value | | | | | | |
|-----------------|----------------|-------------------|------------------------|----------------|-------------|--------------|
| Frequency (MHz) | Level (dBuV/m) | Duty cycle factor | Average value (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Polarization |
| 1301.42 | 53.24 | -8.40 | 44.84 | 54 | 5.17 | Horizontal |
| 1735.25 | 51.34 | -8.40 | 42.94 | 54 | 7.07 | Horizontal |
| 1301.47 | 51.42 | -8.40 | 43.02 | 54 | 6.99 | Vertical |
| 1735.13 | 48.90 | -8.40 | 40.5 | 54 | 9.51 | Vertical |

1. Measuring frequencies from 9k~10th harmonic (ex. 5GHz), No emission found between lowest internal used/generated frequency to 30MHz.
2. Radiated emissions measured in frequency range from 9k~10th harmonic (ex. 5GHz) were made with an instrument using Peak detector mode.
3. Data of measurement within this frequency range shown “---” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

5.3. 20dB Bandwidth Emissions

FCC 15.231 (c)

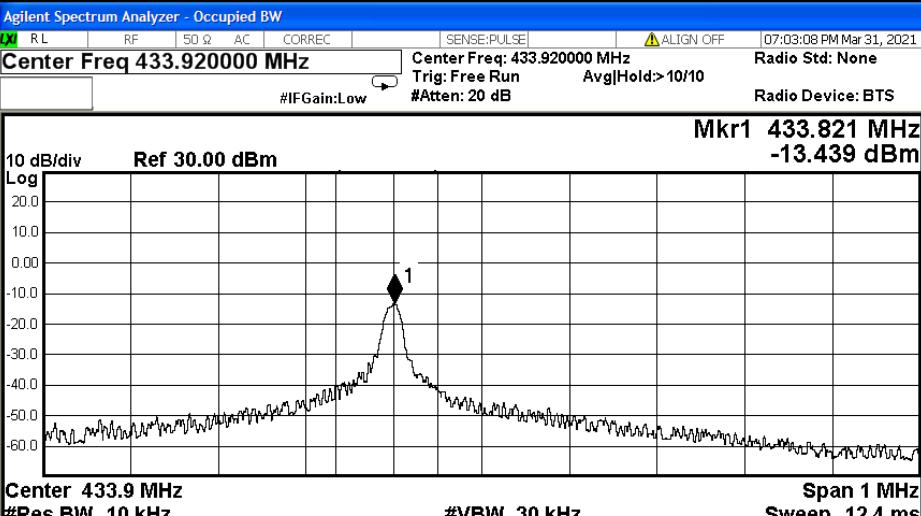
5.3.1. Limit

The bandwidth of the emission shall be no wider than 0.25% of the centre frequency for devices operating above 70 MHz and below 900 MHz. Bandwidth is determined at the points 20 dB down from the modulated carrier.

5.3.2. Test Procedure

With the EUT's antenna attached, the EUT's 20dB Bandwidth power was received by the test antenna which was connected to the spectrum analyzer with the START and STOP frequencies set to the EUT's operation band.

5.3.3. Test Data

| Center Frequency of operation (MHz) | Maximum allowed bandwidth (kHz) | Measured 20dB bandwidth (kHz) | Result |
|---|--|-------------------------------|--------|
| 433.92 | 1084.80 | 50.60 | PASS |
| Maximum allowed bandwidth: | <input checked="" type="checkbox"/> 0.25% of the centre operating frequency <input type="checkbox"/> 0.5% of the centre operating frequency | | |
| RBW: | <input checked="" type="checkbox"/> 10kHz <input type="checkbox"/> 100kHz <input type="checkbox"/> other kHz | | |
| VBW: | <input checked="" type="checkbox"/> 30kHz <input type="checkbox"/> 300kHz <input type="checkbox"/> other kHz | | |
|  Agilent Spectrum Analyzer - Occupied BW Center Freq 433.920000 MHz Center Freq: 433.920000 MHz Radio Std: None Trig: Free Run Avg Hold:>10/10 #Atten: 20 dB Radio Device: BTS 10 dB/div Ref 30.00 dBm Mkr1 433.821 MHz -13.439 dBm Log 10.00 0.00 -10.00 -20.00 -30.00 -40.00 -50.00 -60.00 Center 433.9 MHz Span 1 MHz #Res BW 10 kHz Sweep 12.4 ms Occupied Bandwidth 114.08 kHz Transmit Freq Error -107.08 kHz OBW Power 99.00 % x dB Bandwidth 50.60 kHz x dB -20.00 dB MSG STATUS | | | |

5.4. Duty cycle

5.4.1. Limit

No dedicated limit specified in the Rules.

5.4.2. Test Procedure

5.4.2.1. Place the EUT on the table and set it in transmitting mode.

5.4.2.2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.

5.4.2.3. Set centre frequency of spectrum analyzer=operating frequency.

5.4.2.4. Set the spectrum analyzer as RBW=100 kHz, VBW=100 KHz, Span=0Hz, Adjust Sweep time.

5.4.2.5. Repeat above procedures until all frequency measured was complete.

5.4.3. Test Data

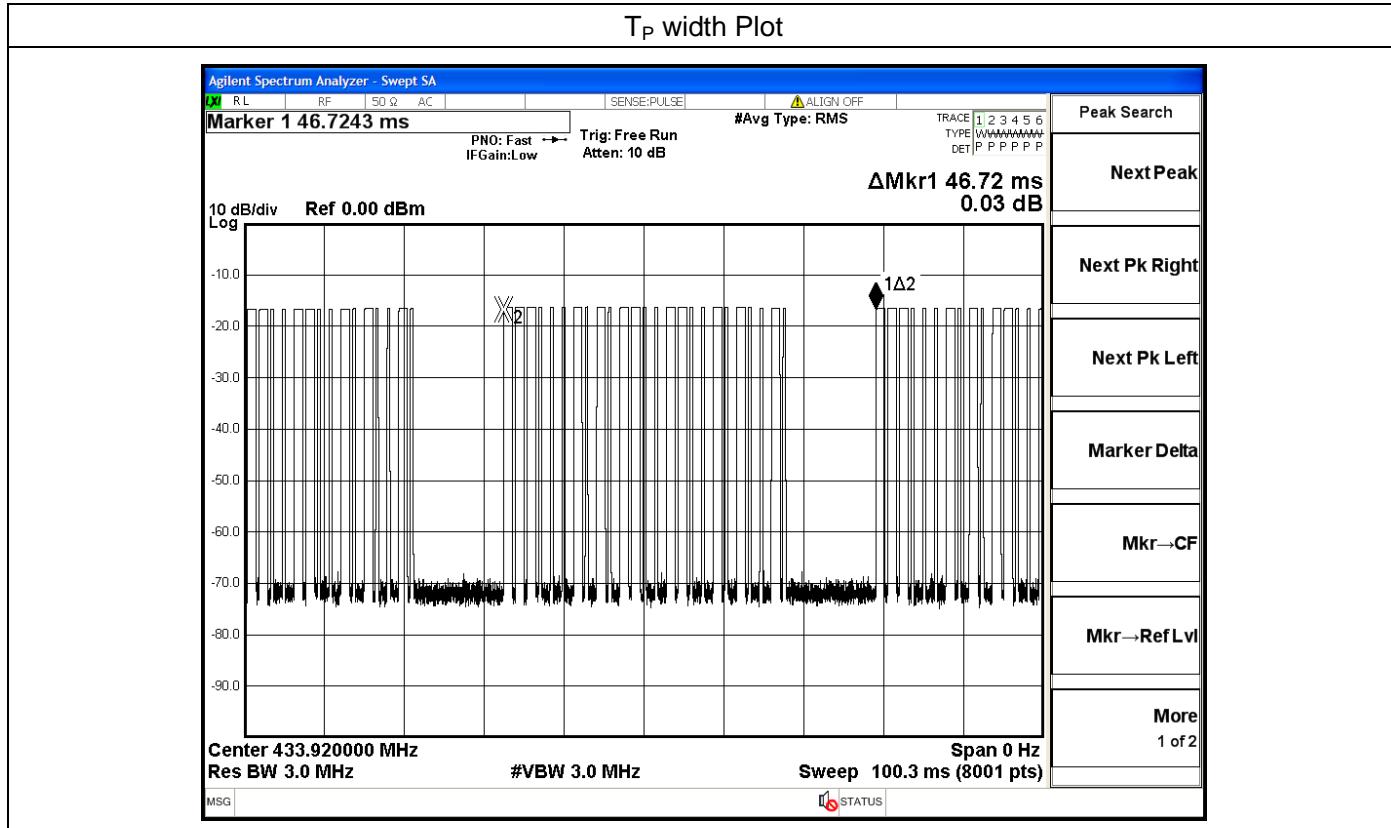
$$T_{on} = 0.3595*13 + 1.09*12 = 17.7535(\text{ms})$$

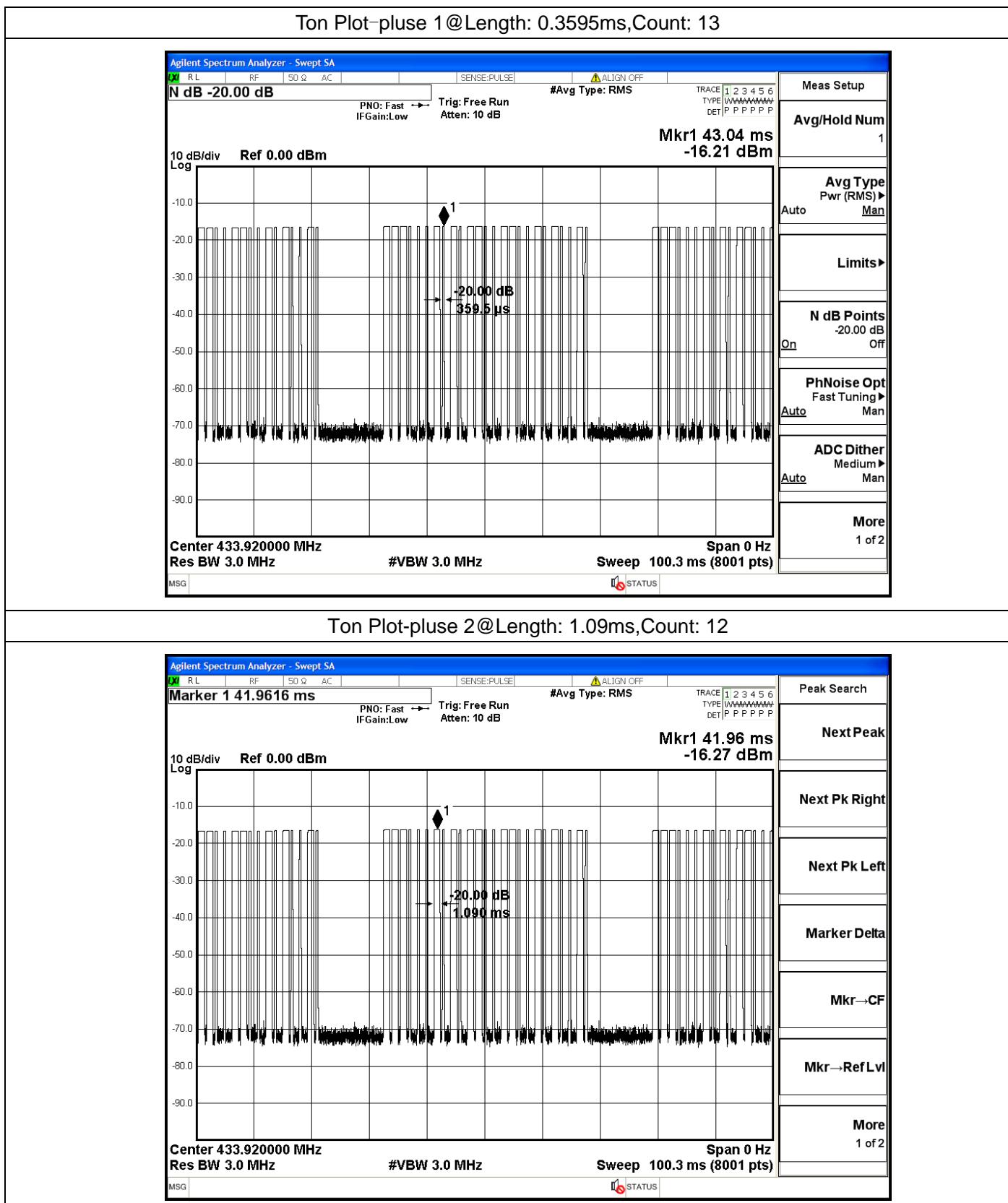
$$T_p = 46.72 \text{ (ms)}$$

$$\text{Duty cycle} = T_{on} / T_p * 100\% = 17.7535 / 46.72 * 100\% = 38.0\%$$

$$\text{DC Correction Factor} = 20 \log (T_{on}/T_p) = 20 \log (0.38) = -8.40 \text{ dB}$$

Note: The signal bandwidth was measured and less than 100 kHz RBW, so PDCF factor is not required to correct the fundamental signal peak result.







5.5. Antenna Requirement

FCC 15.203

5.5.1. Standard Applicable

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.

This EUT uses an external antenna, and maximum antenna gain is 0dBi;

5.5.2. Result

Compliant.



6. LIST OF MEASURING EQUIPMENTS

| Item | Test Equipment | Manufacturer | Model No. | Serial No. | Calibration Date | Calibration Due Date |
|------|----------------------|--------------------|------------------|--------------|------------------|----------------------|
| 1 | MXA Signal Analyzer | Keysight | N9020A | MY52091623 | 2021/1/4 | 2022/1/3 |
| 2 | Power Sensor | Agilent | U2021XA | MY5365004 | 2021/1/4 | 2022/1/3 |
| 3 | Power Meter | Agilent | U2531A | TW53323507 | 2021/1/4 | 2022/1/3 |
| 4 | Wideband Antenna | schwarzbeck | VULB 9163 | 958 | 2019/11/16 | 2022/11/15 |
| 5 | Horn Antenna | schwarzbeck | 9120D-114 1 | 1574 | 2019/11/16 | 2022/11/15 |
| 6 | EMI Test Receiver | R&S | ESCI | 100849/003 | 2021/1/4 | 2022/1/3 |
| 7 | Controller | MF | MF7802 | N/A | N/A | N/A |
| 8 | Amplifier | schwarzbeck | BBV 9743 | 209 | 2021/1/4 | 2022/1/3 |
| 9 | Amplifier | Tonscend | TSAMP-05 18SE | -- | 2021/1/4 | 2022/1/3 |
| 10 | RF Cable(below 1GHz) | HUBER+SUHN ER | RG214 | N/A | 2021/1/4 | 2022/1/3 |
| 11 | RF Cable(above 1GHz) | HUBER+SUHN ER | RG214 | N/A | 2021/1/4 | 2022/1/3 |
| 12 | EMI Test Software | ROHDE & SCHWARZ | ESK1 | V1.71 | N/A | N/A |
| 12 | RE test software | Tonscend | JS32-RE | V2.0.2.0 | N/A | N/A |
| 14 | Test Software | Tonscend | JS1120-2 | V2.5.77.0418 | N/A | N/A |



7. TEST SETUP Photographs of EUT

Please refer to separated files for Test Setup Photos of the EUT.

8. Exterior Photographs of the EUT

Please refer to separated files for External Photos of the EUT.

9. INTERIOR Photographs of the EUT

Please refer to separated files for Internal Photos of the EUT.

-----THE END OF REPORT-----