# FCC/ISED

TEST REPORT

ISSUED BY Shenzhen BALUN Technology Co., Ltd.



FOR

**GDA421** 

**ISSUED TO** ONE WORLD TECHNOLOGIES, INC

1428 PEARMAN DAIRY ROAD ANDERSON SOUTH CAROLINA 29625 USA



Prepared by:

Hu Chao

Hu Chao

(Engineer)

Date Jan. 10, 2018

Approved by:

Liao Jianming

(Technical Director)

Date

Report No .:

BL-SZ17C0101-601

**EUT Name:** 

**GDA421** 

Model Name:

**GDA421** 

**Brand Name:** 

RYOBI

Test Standard:

47 CFR Part 15 Subpart C

RSS-Gen (Issue 4, November 2014)

RSS-210 (Issue 9, August 2016)

FCC ID: VMZGDA421

ISED Number:

9880A-GDA421

Test conclusion:

Pass

Test Date:

Dec. 15, 2017 ~ Jan. 10, 2018

Date of Issue:

Jan. 10, 2018

NOTE: This test report of test results only related to testing samples, which can be duplicated completely for the legal use with the approval of the applicant; it shall not be reproduced except in full, without the written approval of Shenzhen BALUN Technology Co., Ltd. BALUN Laboratory. Any objections should be raised within thirty days from the date of issue. To validate the report, please contact us.

Block B, 1st FL, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong, P. R. China 518055 TEL: +86-755-66850100, FAX: +86-755-61824271

Email: info@baluntek.com



### **Revision History**

Revisions

 Version
 Issue Date

 Rev. 01
 Jan. 04, 2018

 Rev. 02
 Jan. 10, 2018

Revise the duty cycle on page 22. retest the RE on 3m and meanwhile

update the Annex 4/5 on page 24/25

## **TABLE OF CONTENTS**

| 1 | AD  | MINISTRATIVE DATA (GENERAL INFORMATION)            | 5  |
|---|-----|--|----|
|   | 1.1 | Identification of the Testing Laboratory           | 5  |
|   | 1.2 | Identification of the Responsible Testing Location | 5  |
|   | 1.3 | Announce   | 5  |
| 2 | PR  | ODUCT INFORMATION                                  | 6  |
|   | 2.1 | Applicant  | 6  |
|   | 2.2 | Manufacturer                                       | 6  |
|   | 2.3 | Factory Information                                | 6  |
|   | 2.4 | General Description for Equipment under Test (EUT) | 6  |
|   | 2.5 | Ancillary Equipment                                | 6  |
|   | 2.6 | Technical Information                              | 7  |
| 3 | SU  | MMARY OF TEST RESULTS                              | 8  |
|   | 3.1 | Test Standards                                     | 8  |
|   | 3.2 | Verdict  | 8  |
| 4 | GE  | NERAL TEST CONFIGURATIONS                          | 9  |
|   | 4.1 | Test Environments                                  | 9  |
|   | 4.2 | Test Equipment List                                | 9  |
|   | 4.3 | Measurement Uncertainty                            | 10 |
|   | 4.4 | Description of Test Setup                          | 11 |
|   | 4.4 | 1 For AC Power Supply Port Test                    | 11 |
|   | 4.4 | .2 For Radiated Test (Below 30 MHz)                | 11 |



|     | 4.4.3 | For Radiated Test (30 MHz-1 GHz)                              | 12 |
|-----|-------|---|----|
|     | 4.4.4 | For Radiated Test (Above 1 GHz)                               | 12 |
| 5   | TEST  | ITEMS   | 13 |
| 5.  | .1 A  | ntenna Requirements   | 13 |
|     | 5.1.1 | Relevant Standards  | 13 |
|     | 5.1.2 | Antenna Anti-Replacement Construction                         | 13 |
|     | 5.1.3 | Antenna Gain  | 13 |
| 5.  | 2 C   | onducted Emission   | 14 |
|     | 5.2.1 | Limit   | 14 |
|     | 5.2.2 | Test Setup  | 14 |
|     | 5.2.3 | Test Procedure  | 14 |
|     | 5.2.4 | Test Result   | 14 |
| 5.  | 3 2   | O dB Bandwidth  | 15 |
|     | 5.3.1 | Limit   | 15 |
|     | 5.3.2 | Test Setup  | 15 |
|     | 5.3.3 | Test Procedure  | 15 |
|     | 5.3.4 | Test Result   | 15 |
| 5.  | 4 F   | ield Strength of Fundamental Emissions and Radiated Emissions | 16 |
|     | 5.4.1 | Limit   | 16 |
|     | 5.4.2 | Test Setup  | 16 |
|     | 5.4.3 | Test Procedure  | 16 |
|     | 5.4.4 | Test Result   | 17 |
| 5.  | 5 T   | ransmitting Time  | 18 |
|     | 5.5.1 | Limit   | 18 |
|     | 5.5.2 | Test Setup  | 18 |
|     | 5.5.3 | Test Procedure  | 18 |
|     | 5.5.4 | Test Result   | 18 |
| ANI | NEX A | TEST RESULT   | 19 |
| Α   | .1 C  | onducted Emission   | 19 |
| Α   | .2 2  | 0 dB Bandwidth  | 20 |
| Α   | .3 D  | uty cycle   | 21 |





| A.4   | Fie | ld Strength of Fundamental Emissions | 24 |
|-------|-----|--------------------------------------|----|
| A.5   | Ra  | diated Emissions                     | 25 |
| A.6   | Tra | nsmitter Time                        | 27 |
| ANNEX | В   | TEST SETUP PHOTOS                    | 28 |
| ANNEX | С   | EUT EXTERNAL PHOTOS                  | 28 |
| ANNFX | D   | EUT INTERNAL PHOTOS                  | 28 |



## 1 ADMINISTRATIVE DATA (GENERAL INFORMATION)

## 1.1 Identification of the Testing Laboratory

|  | Company Name | Shenzhen BALUN Technology Co., Ltd.                                 |
|--|--------------|---|
|  | Address      | Block B, 1st FL, Baisha Science and Technology Park, Shahe Xi Road, |
|  | Address      | Nanshan District, Shenzhen, Guangdong Province, P. R. China         |
|  | Phone Number | +86 755 6685 0100   |

## 1.2 Identification of the Responsible Testing Location

| Test Location                | Shenzhen BALUN Technology Co., Ltd.   |
|------------------------------|---|
| Addis                        | Block B, 1st FL, Baisha Science and Technology Park, Shahe Xi Road,   |
| Address                      | Nanshan District, Shenzhen, Guangdong Province, P. R. China   |
| Accreditation<br>Certificate | The laboratory has been listed by Industry Canada to perform electromagnetic emission measurements. The recognition numbers of test site are 11524A-1.  The laboratory is a testing organization accredited by FCC as a accredited testing laboratory. The designation number is CN1196.  The laboratory is a testing organization accredited by American Association for Laboratory Accreditation(A2LA) according to ISO/IEC 17025. The accreditation certificate is 4344.01.  The laboratory is a testing organization accredited by China National Accreditation Service for Conformity Assessment (CNAS) according to ISO/IEC 17025. The accreditation certificate number is L6791. |
|                              | All measurement facilities used to collect the measurement data are   |
| Description                  | located at Block B, FL 1, Baisha Science and Technology Park, Shahe Xi  |
| Description                  | Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China   |
|                              | 518055  |

#### 1.3 Announce

- (1) The test report reference to the report template version v5.3.
- (2) The test report is invalid if not marked with the signatures of the persons responsible for preparing and approving the test report.
- (3) The test report is invalid if there is any evidence and/or falsification.
- (4) The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein.
- (5) This document may not be altered or revised in any way unless done so by BALUN and all revisions are duly noted in the revisions section.
- (6) Content of the test report, in part or in full, cannot be used for publicity and/or promotional purposes without prior written approval from the laboratory.



## **2 PRODUCT INFORMATION**

## 2.1 Applicant

| Applicant | ONE WORLD TECHNOLOGIES, INC                           |
|-----------|---|
| Addross   | 1428 PEARMAN DAIRY ROAD ANDERSON SOUTH CAROLINA 29625 |
| Address   | USA   |

## 2.2 Manufacturer

| Manufacturer | ET Technology (Wuxi) Co., Ltd.  |
|--------------|---|
| Address      | No.58 Xiqun road, Meicun industrial zone, Wuxi, Jiangsu, China 214112 |

## 2.3 Factory Information

| Manufacturer | N/A |
|--------------|-----|
| Address      | N/A |

## 2.4 General Description for Equipment under Test (EUT)

| EUT Name         | GDA421 |
|------------------|--------|
| Model Name       | GDA421 |
| Hardware Version | N/A    |
| Software Version | N/A    |

## 2.5 Ancillary Equipment

Note: Not applicable.



### 2.6 Technical Information

| Modulation Type     | FSK              |
|---------------------|------------------|
|                     | ☐ Mobile         |
| Product Type        | □ Portable     □ |
|                     | ☐ Fix Location   |
| Operating Frequency | 433.92 MHz.      |
| Antenna Type        | PCB Antenna      |
| Antenna Gain        | 0 dBi            |

All channel was listed on the following table:

| Channel number | Freq. (MHz) |
|----------------|-------------|
| 1              | 433.92      |

Note: The above EUT information in section 2.4 and 2.6 was declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or user's manual.



# **3 SUMMARY OF TEST RESULTS**

## 3.1 Test Standards

| No. | Identity             | Document Title   |
|-----|----------------------|--|
|     | 47 CFR Part 15,      |  |
| 1   | Subpart C            | Intentional Radiators                                      |
|     | (10-1-16 Edition)    |  |
| 2   | ANSI C63.10-2013     | American National Standard for Testing Unlicensed Wireless |
|     |                      | Devices  |
| 3   | RSS-Gen              | General Requirements for Compliance of Radio Apparatus     |
| ٦   | (Issue 4, Nov. 2014) |  |
|     | RSS-210              |  |
| 4   | (Issue 9, August     | Licence-Exempt Radio Apparatus:Category I Equipments       |
|     | 2016)                |  |
| 5   | ANSI C63.10-2013     | American National Standard of Procedures for Compliance    |
|     |                      | Testing of Unlicensed Wireless Devices                     |

## 3.2 Verdict

| No.      | Description                   | FCC Part No. | Test Result | Verdict   |  |
|----------|-------------------------------|--------------|-------------|-----------|--|
| 1        | Antenna Requirement           | 15.203       |             | Pass Note |  |
| 2        | Conducted Emission            | 15.207       | ANNEX A.1   | N/A       |  |
| 3        | Bandwidth                     | 15.231(c)    | ANNEX A.2   | Pass      |  |
| 4        | Duty Cycle                    | 15.35        | ANNEX A.3   | Pass      |  |
| 5        | Field Strength of Fundamental | 15.231(b)    | ANNEX A.4   | Pass      |  |
| 3        | Emissions                     | 13.231(0)    | ANNLA A.4   |           |  |
| 6        | Radiated Emissions            | 15.209       | ANNEX A.5   | Pass      |  |
|          | Tradiated Emissions           | 15.231(b)    | ANNEX A.5   | F 033     |  |
| 7        | Transmitting Time             | 15.231(a)    | ANNEX A.6   | Pass      |  |
| Note: Pl | ease refer to section 5.1     |              |             |           |  |



## **4 GENERAL TEST CONFIGURATIONS**

## 4.1 Test Environments

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

| Relative Humidity          | 45% - 55%               |                |  |  |
|----------------------------|-------------------------|----------------|--|--|
| Atmospheric Pressure       | 100 kPa -102 kPa        |                |  |  |
| Temperature                | NT (Normal Temperature) | +22°C to +25°C |  |  |
| Working Voltage of the EUT | NV (Normal Voltage)     | 3 V            |  |  |

## 4.2 Test Equipment List

| Description                           | Manufacturer            | Model                 | Serial No.          | Cal. Date  | Cal. Due   |
|---------------------------------------|-------------------------|-----------------------|---------------------|------------|------------|
| Spectrum Analyzer                     | ROHDE&SCHWARZ           | FSV-30                | 103118              | 2017.06.22 | 2018.06.21 |
| Switch Unit with OSP-<br>B157         | ROHDE&SCHWARZ           | OSP120                | 101270              | 2017.06.22 | 2018.06.21 |
| Spectrum Analyzer                     | AGILENT                 | E4440A                | MY45304434          | 2017.09.07 | 2018.09.06 |
| EMI Receiver                          | ROHDE&SCHWARZ           | ESRP                  | 101036              | 2017.06.22 | 2018.06.21 |
| LISN                                  | SCHWARZBECK             | NSLK 8127             | 8127-687            | 2017.06.22 | 2018.06.21 |
| Bluetooth Tester                      | ROHDE&SCHWARZ           | CBT                   | 101005              | 2017.06.22 | 2018.06.21 |
| Power Splitter                        | KMW                     | DCPD-LDC              | 1305003215          |            |            |
| Power Sensor                          | ROHDE&SCHWARZ           | NRP-Z21               | 103971              | 2017.06.22 | 2018.06.21 |
| Attenuator (20 dB)                    | KMW                     | ZA-S1-201             | 110617091           |            |            |
| Attenuator (6 dB)                     | KMW                     | ZA-S1-61              | ZA-S1-61 1305003189 |            |            |
| DC Power Supply                       | ROHDE&SCHWARZ           | HMP2020               | 018141664           | 2017.06.22 | 2018.06.21 |
| Temperature Chamber                   | ANGELANTIONI<br>SCIENCE | NTH64-40A             | 1310                | 2017.06.22 | 2018.06.21 |
| Test Antenna-<br>Rod(9 kHz-30 MHz)    | SCHWARZBECK             | VAMP 9243             | 9243-556            | 2017.06.22 | 2018.06.21 |
| Test Antenna-<br>Bi-Log(30 MHz-3 GHz) | SCHWARZBECK             | VULB 9163             | 9163-624            | 2017.06.22 | 2018.06.21 |
| Test Antenna-<br>Horn(1-18 GHz)       | SCHWARZBECK             | BBHA<br>9120D         | 9120D-1148          | 2017.06.22 | 2018.06.21 |
| Test Antenna-<br>Horn(15-26.5 GHz)    | SCHWARZBECK             | BBHA 9170             | 9170-305            | 2017.06.22 | 2018.06.21 |
| Anechoic Chamber                      | EMC<br>TECHNOLOGY LTD   | 21.1m*11.6<br>m*7.35m | N/A                 | 2016.08.09 | 2018.08.08 |
| Anechoic Chamber                      | RAINFORD                | 9m*6m*6m              | N/A                 | 2017.02.24 | 2019.02.23 |
| Shielded Enclosure                    | ChangNing               | CN-130701             | 130703              |            |            |



## 4.3 Measurement Uncertainty

The following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2.

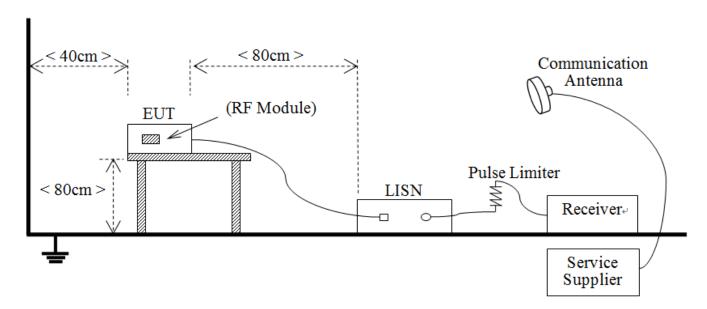
This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

| Measurement                       | Value   |
|-----------------------------------|---------|
| Occupied Channel Bandwidth        | ±4%     |
| RF output power, conducted        | ±1.4 dB |
| Power Spectral Density, conducted | ±2.5 dB |
| Unwanted Emissions, conducted     | ±2.8 dB |
| All emissions, radiated           | ±5.4 dB |
| Temperature                       | ±1°C    |
| Humidity                          | ±4%     |



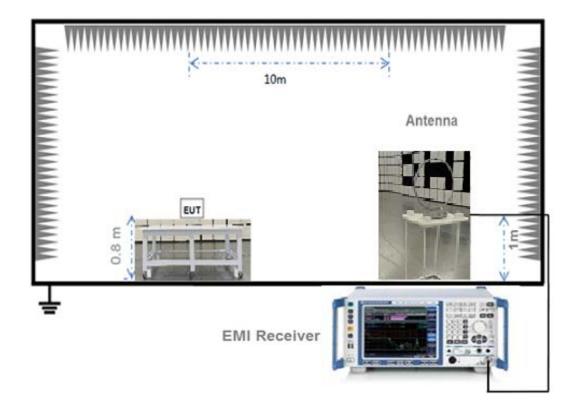
## 4.4 Description of Test Setup

## 4.4.1 For AC Power Supply Port Test



(Diagram 1)

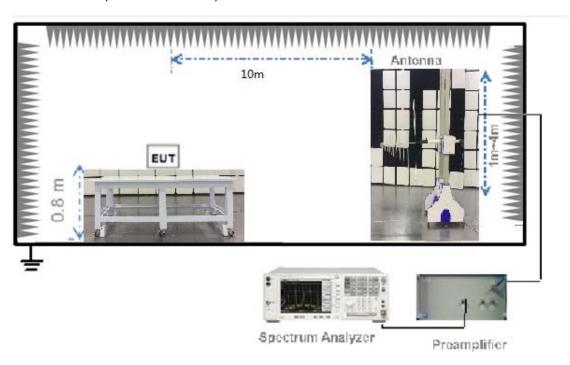
### 4.4.2 For Radiated Test (Below 30 MHz)



(Diagram 2)

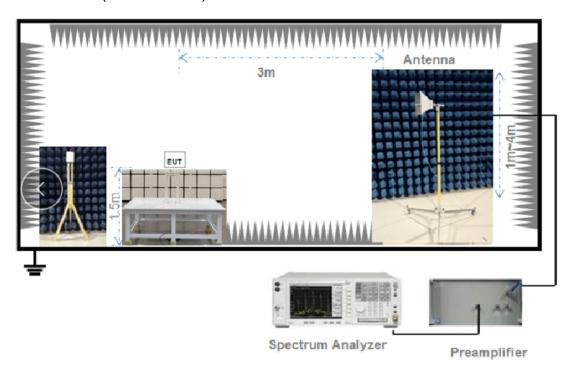


## 4.4.3 For Radiated Test (30 MHz-1 GHz)



(Diagram 3)

## 4.4.4 For Radiated Test (Above 1 GHz)



(Diagram 4)



### 5 TEST ITEMS

### 5.1 Antenna Requirements

#### 5.1.1 Relevant Standards

FCC §15.203 & 15.247(b)

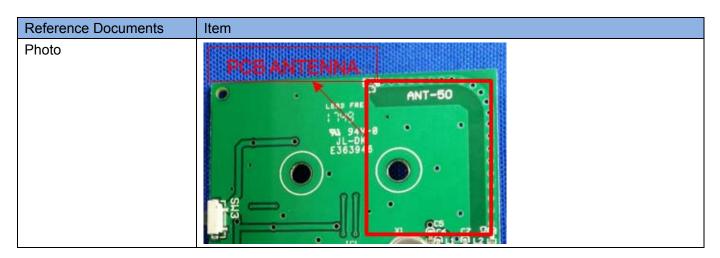
An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of § 15.211, § 15.213, § 15.217, § 15.219, or § 15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with § 15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.

If directional gain of transmitting antennas is greater than 6 dBi, the power shall be reduced by the same level in dB comparing to gain minus 6 dBi. For the fixed point-to-point operation, the power shall be reduced by one dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi. 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 FCC rule.

### 5.1.2 Antenna Anti-Replacement Construction

The Antenna Anti-Replacement as following method:

| Protected Method        | Description                            |
|-------------------------|--|
| The antenna is embedded | An embedded-in antenna design is used. |
| in the product.         |  |



#### 5.1.3 Antenna Gain

The antenna peak gain of EUT is less than 6 dBi. Therefore, it is not necessary to reduce maximum peak output power limit.



#### 5.2 Conducted Emission

#### 5.2.1 Limit

FCC §15.207

For an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a  $50\mu\text{H}/50\Omega$  line impedance stabilization network (LISN).

| Frequency range | Conducted I | Limit (dBµV) |
|-----------------|-------------|--------------|
| (MHz)           | Quai-peak   | Average      |
| 0.15 - 0.50     | 66 to 56    | 56 to 46     |
| 0.50 - 5        | 56          | 46           |
| 0.50 - 30       | 60          | 50           |

#### 5.2.2 Test Setup

See section 4.4.1 for test setup description for the AC power supply port. The photo of test setup please refer to ANNEX B.

#### 5.2.3 Test Procedure

The maximum conducted interference is searched using Peak (PK), if the emission levels more than the AV and QP limits, and that have narrow margins from the AV and QP limits will be re-measured with AV and QP detectors. Tests for both L phase and N phase lines of the power mains connected to the EUT are performed. Refer to recorded points and plots below.

Devices subject to Part 15 must be tested for all available U.S. voltages and frequencies (such as a nominal 120 VAC, 50/60 Hz and 240 VAC, 50/60 Hz) for which the device is capable of operation. A device rated for 50/60 Hz operation need not be tested at both frequencies provided the radiated and line conducted emissions are the same at both frequencies.

#### 5.2.4 Test Result

Please refer to ANNEX A.1.



#### 5.3 20 dB Bandwidth

#### 5.3.1 Limit

FCC §15.231

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.

### 5.3.2 Test Setup

See section 4.4.3 for test setup description for the antenna port. The photo of test setup please refer to ANNEX B.

#### 5.3.3 Test Procedure

Use the following spectrum analyzer settings:

Span = approximately 2 to 3 times the 20 dB bandwidth

RBW = 100 kHz

VBW ≥ 300 kHz

Sweep = auto

Detector function = peak

Trace = max hold

#### 5.3.4 Test Result

Please refer to ANNEX A.2.



### 5.4 Field Strength of Fundamental Emissions and Radiated Emissions

#### 5.4.1 Limit

#### FCC §15.231 & §15.209

According to FCC section 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               | Field strength of fundamental | Field strength of spurious   |  |  |  |  |  |
|-------------------------------------|-------------------------------|------------------------------|--|--|--|--|--|
| (MHz)                               | (microvolts/meter)            | emissions (microvolts/meter) |  |  |  |  |  |
| 40.66-40.70                         | 2250                          | 225                          |  |  |  |  |  |
| 70-130                              | 1250                          | 125                          |  |  |  |  |  |
| 130-174                             | <sup>1</sup> 1250 to 3750     | 125 to 375                   |  |  |  |  |  |
| 174-260                             | 3750                          | 375                          |  |  |  |  |  |
| 260-470                             | <sup>1</sup> 3750 to 12500    | 375 to 1250                  |  |  |  |  |  |
| Above 470                           | 12500                         | 1250                         |  |  |  |  |  |
| <sup>1</sup> Linear interpolations. |                               |                              |  |  |  |  |  |

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 (μV/m) |
|-----------------|-----------------------|
| 0.009 - 0.490   | 2400/F(kHz)           |
| 0.490 - 1.705   | 24000/F(kHz)          |
| 1.705 - 30.0    | 30                    |
| 30 - 88         | 100                   |
| 88 - 216        | 150                   |
| 216 - 960       | 200                   |
| Above 960       | 500                   |

#### Note:

- 1. For Above 1000 MHz, the emission limit in this paragraph is based on measurement instrumentation employing an average detector, measurement using instrumentation with a peak detector function, corresponding to 20 dB above the maximum permitted average limit.
- For above 1000 MHz, limit field strength of harmonics: 54dBuV/m@3m (AV) and 74dBuV/m@3m (PK).

#### 5.4.2 Test Setup

See section 4.4.2 to 4.4.4 for test setup description for the antenna port. The photo of test setup please refer to ANNEX B.

#### 5.4.3 Test Procedure

The measurement frequency range is from 30 MHz to the 10th harmonic of the fundamental frequency. The Turn Table is actuated to turn from 0° to 360°, and both horizontal and vertical polarizations of the Test Antenna are used to find the maximum radiated power. Mid channels on all channel bandwidth verified. Only the worst RB size/offset presented. The power of the EUT transmitting frequency should be ignored.

All Spurious Emission tests were performed in X, Y, Z axis direction. And only the worst axis test condition was



recorded in this test report.

Use the following spectrum analyzer settings:

Span = wide enough to fully capture the emission being measured

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

VBW ≥ RBW

Sweep = auto

Detector function = peak

Trace = max hold

5.4.4 Test Result

Please refer to ANNEX A.4 & A.5.



## 5.5 Transmitting Time

#### 5.5.1 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.

### 5.5.2 Test Setup

See section 4.4.3 for test setup description for the antenna port. The photo of test setup please refer to ANNEX B.

#### 5.5.3 Test Procedure

The EUT transmitter was activated, the spectrum analyzer single sweep was triggered while a command on the EUT was activated and plots were captured

#### 5.5.4 Test Result

Please refer to ANNEX A.6.



## ANNEX A TEST RESULT

## **A.1 Conducted Emission**

Note: Not applicable.



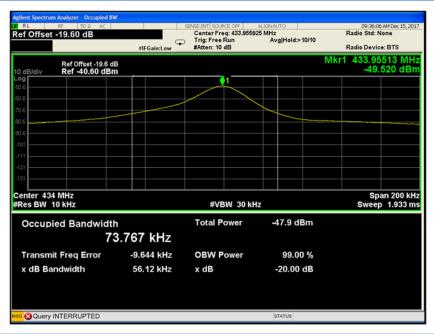
#### A.2 Bandwidth

#### Test Data

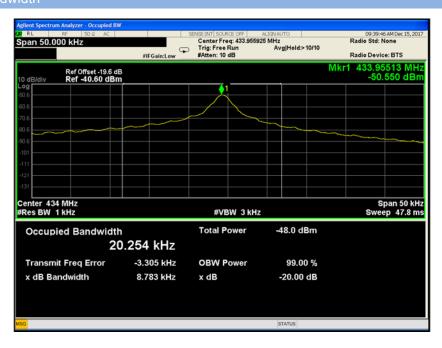
| Frequency<br>(MHz) | 99% OBW (KHz) | 20 dB Bandwidth<br>(kHz) | 20 dB Bandwidth Limit (kHz) | Verdict |
|--------------------|---------------|--------------------------|-----------------------------|---------|
| 433.92             | 20.25         | 56.12                    | 433955*0.25%=1084.88<br>75  | Pass    |

#### Test plots

#### 20 dB Bandwidth



#### 99% Randwidth



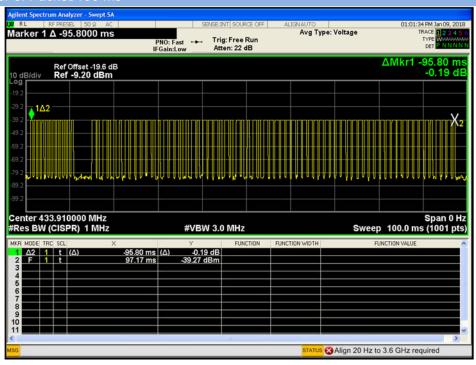


## A.3 Duty cycle

### Test Data and Plot

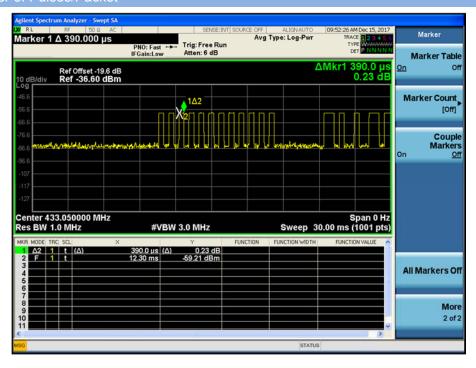
| Data Transmissions           | Number of pulses           |    |
|------------------------------|----------------------------|----|
| The number of pulses Group   | 1                          |    |
| Long pulse duration          | 0.810 ms                   | 43 |
| Short pulse duration         | 0.390 ms                   | 35 |
| Total transmissions duration | 0.810 *43+0.390*35=52.08ms |    |
| On time within 100 msec      | 1*52.08=52.08ms            |    |
| Duty cycle correction factor | 10*log(52.08/100)=-2.83dB  |    |

#### Number of Packet/100 ms

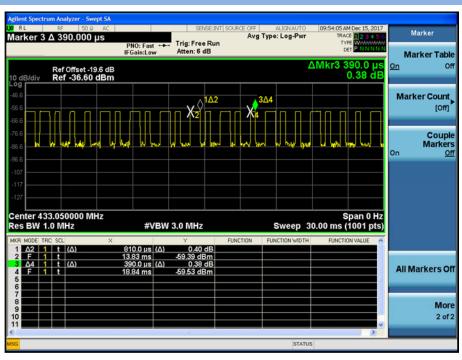




#### Number of Pulses/Packet

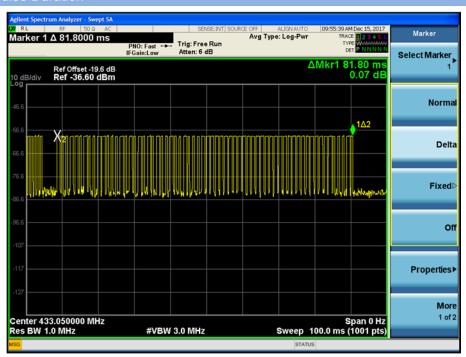


#### Long Pulse Duration



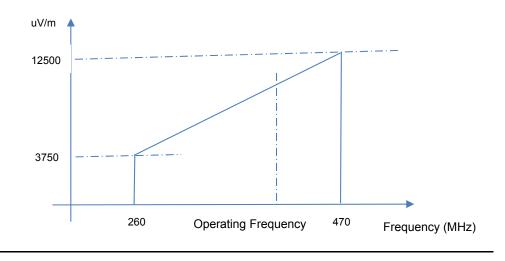


### Short Pulse Duration





## A.4 Field Strength of Fundamental Emissions



The Field Strength of Fundamental Emissions (Operating Frequency) is:  $3750 \text{ uV/m} = 20 \log (3750) \text{ dBuV/m} = 71.48 \text{ dBuV/m}$   $12500 \text{ uV/m} = 20 \log (12500) \text{ dBuV/m} = 81.94 \text{ dBuV/m}$ 

### Test Data

| Field Strength of Fundamental Emissions and Field strength of spurious emissions Value |                               |          |                       |                |            |  |  |  |
|--|-------------------------------|----------|-----------------------|----------------|------------|--|--|--|
| Operating Frequency<br>(MHz)   | Field<br>Strength<br>(dBuV/m) | Detector | Limit @3m<br>(dBuV/m) | Margin<br>(dB) | Antenna    |  |  |  |
|  | 62.39                         | PEAK     | 100.8                 | 38.41          | Vertical   |  |  |  |
| 434.005  | 67.20                         | PEAK     | 100.8                 | 33.60          | Horizontal |  |  |  |
| 434.003  | 59.56                         | AVERAGE  | 80.8                  | 21.24          | Vertical   |  |  |  |
|  | 64.37                         | AVERAGE  | 80.8                  | 16.43          | Horizontal |  |  |  |
|  | 39.26                         | PEAK     | 80.8                  | 41.54          | Vertical   |  |  |  |
| 867.838  | 43.76                         | PEAK     | 80.8                  | 37.04          | Horizontal |  |  |  |
| 007.000  | 36.43                         | AVERAGE  | 60.8                  | 24.37          | Vertical   |  |  |  |
|  | 40.93                         | AVERAGE  | 60.8                  | 19.87          | Horizontal |  |  |  |



## A.5 Radiated Emissions

Note <sup>1</sup>: The low frequency, which started from 9 kHz to 30 MHz, was pre-scanned and the result which was 20 dB lower than the limit line per 15.31(o) was not reported.

Note <sup>2</sup>: The verdict please refer to the A.3 field strength of fundamental emissions and field strength of spurious emissions value.

### Test Data (30 MHz ~ 10th Harmonic)

| 30 MHz to 1 GHz, ANT V |           |          |        |          |        |          |        |        |          |            |
|------------------------|-----------|----------|--------|----------|--------|----------|--------|--------|----------|------------|
| No.                    | Frequency | Results  | Factor | Limit    | Margin | Detector | Table  | Height | ANT      | Verdict    |
|                        | (MHz)     | (dBuV/m) | (dB)   | (dBuV/m) | (dB)   |          | (0)    | (cm)   |          |            |
| 1                      | 38.487    | 23.10    | -24.02 | 40.0     | 16.90  | Peak     | 209.00 | 100    | Vertical | Pass       |
| 2                      | 62.737    | 16.37    | -24.03 | 40.0     | 23.63  | Peak     | 0.00   | 100    | Vertical | Pass       |
| 3                      | 114.632   | 12.98    | -24.19 | 43.5     | 30.52  | Peak     | 2.00   | 100    | Vertical | Pass       |
| 4                      | 212.117   | 12.99    | -23.09 | 43.5     | 30.51  | Peak     | 3.00   | 100    | Vertical | Pass       |
| 5                      | 434.005   | 62.39    | -16.32 | 46.0     | -16.39 | Peak     | 4.00   | 100    | Vertical | N/A Note 2 |
| 6                      | 867.838   | 39.26    | -7.63  | 46.0     | 6.74   | Peak     | 1.00   | 100    | Vertical | N/A Note 2 |

| 30 MHz to 1 GHz, ANT H |           |          |             |          |        |          |        |        |            |            |  |
|------------------------|-----------|----------|-------------|----------|--------|----------|--------|--------|------------|------------|--|
| No.                    | Frequency | Results  | Factor (dB) | Limit    | Margin | Detector | Table  | Height | ANT        | Verdict    |  |
|                        | (MHz)     | (dBuV/m) |             | (dBuV/m) | (dB)   |          | (o)    | (cm)   |            |            |  |
| 1                      | 48.430    | 12.75    | -22.41      | 40.0     | 27.25  | Peak     | 0.00   | 100    | Horizontal | Pass       |  |
| 2                      | 108.327   | 14.09    | -23.44      | 43.5     | 29.41  | Peak     | 10.00  | 100    | Horizontal | Pass       |  |
| 3                      | 193.930   | 12.88    | -23.38      | 43.5     | 30.62  | Peak     | 206.00 | 100    | Horizontal | Pass       |  |
| 4                      | 288.020   | 18.06    | -20.70      | 46.0     | 27.94  | Peak     | 67.00  | 100    | Horizontal | Pass       |  |
| 5                      | 434.005   | 67.20    | -16.32      | 46.0     | -21.20 | Peak     | 0.00   | 100    | Horizontal | N/A Note 2 |  |
| 6                      | 867.838   | 43.76    | -7.63       | 46.0     | 2.24   | Peak     | 67.00  | 100    | Horizontal | N/A Note 2 |  |



#### 1 GHz to 6 GHz, ANT V Frequency Results Factor Limit Margin Detector Table Height ANT Verdict No. (dBuV/m) (MHz) (dB) (dBuV/m) (dB) (cm) (0) 74.0 29.94 1 1301.500 44.06 -11.02 Peak 60.00 100 Vertical Pass 2 1736.000 50.15 -10.67 74.0 23.85 Peak 343.00 100 Vertical Pass 3 2170.000 52.52 -6.95 74.0 21.48 Peak 316.00 Vertical 100 Pass 24.82 Peak Pass 4 2881.500 49.18 -2.80 74.0 60.00 100 Vertical 5 4121.250 45.59 -4.60 74.0 28.41 Peak 61.00 100 Vertical Pass 6 5153.250 -1.31 74.0 25.10 48.90 Peak 10.00 100 Vertical Pass

| 1 GHz to 6 GHz, ANT H |           |          |             |          |        |          |        |        |            |         |  |
|-----------------------|-----------|----------|-------------|----------|--------|----------|--------|--------|------------|---------|--|
| No.                   | Frequency | Results  | Factor (dB) | Limit    | Margin | Detector | Table  | Height | ANT        | Verdict |  |
|                       | (MHz)     | (dBuV/m) |             | (dBuV/m) | (dB)   |          | (0)    | (cm)   |            |         |  |
| 1                     | 1302.000  | 49.43    | -11.01      | 74.0     | 24.57  | Peak     | 290.00 | 100    | Horizontal | Pass    |  |
| 2**                   | 1736.000  | 46.47    | -10.67      | 54.0     | 7.53   | AV       | 290.00 | 100    | Horizontal | Pass    |  |
| 2                     | 1736.000  | 56.89    | -10.67      | 74.0     | 17.11  | Peak     | 290.00 | 100    | Horizontal | Pass    |  |
| 3**                   | 2170.000  | 41.07    | -6.95       | 54.0     | 12.93  | AV       | 290.00 | 100    | Horizontal | Pass    |  |
| 3                     | 2170.000  | 56.35    | -6.95       | 74.0     | 17.65  | Peak     | 16.00  | 100    | Horizontal | Pass    |  |
| 4                     | 2603.500  | 48.82    | -3.79       | 74.0     | 25.18  | Peak     | 343.00 | 100    | Horizontal | Pass    |  |
| 5                     | 3706.500  | 44.66    | -4.28       | 74.0     | 29.34  | Peak     | 203.00 | 100    | Horizontal | Pass    |  |
| 6                     | 4704.000  | 47.45    | -2.99       | 74.0     | 26.55  | Peak     | 17.00  | 100    | Horizontal | Pass    |  |

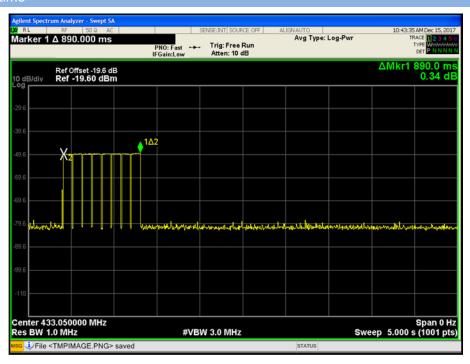


## A.6 Transmitter Time

### Test Data and Plot

The active time is less than 1 seconds

Active time





## ANNEX B TEST SETUP PHOTOS

Please refer the document "BL-SZ17C0101-AR.PDF".

## ANNEX C EUT EXTERNAL PHOTOS

Please refer the document "BL-SZ17C0101-AW.PDF".

### ANNEX D EUT INTERNAL PHOTOS

Please refer the document "BL-SZ17C0101-AI.PDF".

--END OF REPORT--