



# Test Report

## FCC Part15 Subpart C

Product Name : Ring Bridge  
Model No. : 5B01S8  
HVIN : 5B01S8  
FVIN : 0.7.5-33  
FCC ID : 2AEUPBHARB001

Applicant : Ring, LLC.

Address : 1523 26th St, Santa Monica, CA 90404

Date of Receive the sample : Feb. 02, 2020  
Test Date : Feb. 02, 2020 ~ Sep. 22, 2020  
Issued Date : Sep. 22, 2020  
Report No. : 2080843R-RF-US-P06V01  
Report Version : V1.1

This Report is based on DEKRA report No.: 1922002R-RF-US-P06V02 , the EUT add a 250K/FSK mode.

The test results presented in this report relate only to the object tested.

The measurement result is considered in conformance with the requirement if it is within the prescribed limit, It is not necessary to account the uncertainty associated with the measurement result, unless the specification, standard or customer have special requirements

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## Test Report Certification

Issued Date : Sep. 22, 2020

Report No. : 2080843R-RF-US-P06V01



Product Name : Ring Bridge

Applicant : Ring, LLC.

Address : 1523 26<sup>th</sup> St, Santa Monica, CA 90404

Manufacturer : Ring, LLC.

Address : 1523 26<sup>th</sup> St, Santa Monica, CA 90404

Model No. : 5B01S8

HVIN : 5B01S8

FVIN : 0.7.5-33

FCC ID : 2AEUPBHARB001

EUT Voltage : DC 5V

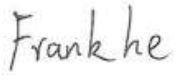
Test Voltage : AC120V/60Hz

Applicable Standard : FCC CFR Title 47 Part 15 Subpart C  
ANSI C63.10: 2013

Test Result : Complied

Performed Location : DEKRA Testing & Certification (Suzhou) Co., Ltd.  
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## History of This Test Report

| REPORT NO.            | VERSION | DESCRIPTION                                                                                                                                                                                                      | ISSUED DATE   |
|-----------------------|---------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|
| 2080843R-RF-US-P06V01 | V1.0    | Initial Issued Report                                                                                                                                                                                            | Apr. 07, 2020 |
| 2080843R-RF-US-P06V01 | V1.1    | <ol style="list-style-type: none"><li>1. Page 46, updated the dwell time test plot.</li><li>2. Page 49, updated the power.</li><li>3. Page 52, updated the Emissions in non-restricted frequency bands</li></ol> | Sep. 22, 2020 |
|                       |         |                                                                                                                                                                                                                  |               |
|                       |         |                                                                                                                                                                                                                  |               |

## 1. General Information

### 1.1. EUT Description

|                                                                         |                                                          |
|-------------------------------------------------------------------------|----------------------------------------------------------|
| Product Name                                                            | Ring Bridge                                              |
| Model No.                                                               | 5B01S8                                                   |
| HVIN                                                                    | 5B01S8                                                   |
| FVIN                                                                    | 0.7.5-33                                                 |
| Working Voltage                                                         | DC 5V                                                    |
| Test Voltage                                                            | 120V/60Hz                                                |
| Modulation & Bandwidth/data rate & Frequency Range & Channel Separation | 902- 928 MHz<br>FSK FHSS 250Kbps: 902.5~927.5MHz, 500KHz |
| Type of Modulation                                                      | FSK                                                      |
| Data Rate                                                               | FSK: 250Kbps                                             |
| Antenna Type                                                            | Reference to Antenna List                                |
| Peak Antenna Gain                                                       | Reference to Antenna List                                |

| FSK FHSS 250Kbps (902.5MHz~927.5MHz) |           |         |           |         |           |         |           |
|--------------------------------------|-----------|---------|-----------|---------|-----------|---------|-----------|
| Channel                              | Frequency | Channel | Frequency | Channel | Frequency | Channel | Frequency |
| 01                                   | 902.5 MHz | 02      | 903.0 MHz | 03      | 903.5 MHz | 04      | 904.0 MHz |
| 05                                   | 904.5 MHz | 06      | 905.0 MHz | 07      | 905.5 MHz | 08      | 906.0 MHz |
| 09                                   | 906.5 MHz | 10      | 907.0 MHz | 11      | 907.5 MHz | 12      | 908.0 MHz |
| 13                                   | 908.5 MHz | 14      | 909.0 MHz | 15      | 909.5 MHz | 16      | 910.0 MHz |
| 17                                   | 910.5 MHz | 18      | 911.0 MHz | 19      | 911.5 MHz | 20      | 912.0 MHz |
| 21                                   | 912.5 MHz | 22      | 913.0 MHz | 23      | 913.5 MHz | 24      | 914.0 MHz |
| 25                                   | 914.5 MHz | 26      | 915.0 MHz | 27      | 915.5 MHz | 28      | 916.0 MHz |
| 29                                   | 916.5 MHz | 30      | 917.0 MHz | 31      | 917.5 MHz | 32      | 918.0 MHz |
| 33                                   | 918.5 MHz | 34      | 919.0 MHz | 35      | 919.5 MHz | 36      | 920.0 MHz |
| 37                                   | 920.5 MHz | 38      | 921.0 MHz | 39      | 921.5 MHz | 40      | 922.0 MHz |
| 41                                   | 922.5 MHz | 42      | 923.0 MHz | 43      | 923.5 MHz | 44      | 924.0 MHz |
| 45                                   | 924.5 MHz | 46      | 925.0 MHz | 47      | 925.5 MHz | 48      | 926.0 MHz |
| 49                                   | 926.5 MHz | 50      | 927.0 MHz | 51      | 927.5 MHz | N/A     | N/A       |



## 1.2. Antenna information

|                      |                                     |           |                                     |                            |                          |           |
|----------------------|-------------------------------------|-----------|-------------------------------------|----------------------------|--------------------------|-----------|
| Model No.            | N/A                                 |           |                                     |                            |                          |           |
| Antenna manufacturer | N/A                                 |           |                                     |                            |                          |           |
| Antenna Delivery     | <input checked="" type="checkbox"/> | 1*TX+1*RX | <input type="checkbox"/>            | 2*TX+2*RX                  | <input type="checkbox"/> | 3*TX+3*RX |
| Antenna technology   | <input checked="" type="checkbox"/> | SISO      |                                     |                            |                          |           |
|                      | <input type="checkbox"/>            | MIMO      | <input type="checkbox"/>            | Basic                      |                          |           |
|                      |                                     |           | <input type="checkbox"/>            | CDD                        |                          |           |
|                      |                                     |           | <input type="checkbox"/>            | Beam-forming               |                          |           |
|                      |                                     |           |                                     |                            |                          |           |
| Antenna Type         | <input type="checkbox"/>            | External  | <input type="checkbox"/>            | Dipole                     |                          |           |
|                      | <input checked="" type="checkbox"/> | Internal  | <input type="checkbox"/>            | PIFA                       |                          |           |
|                      |                                     |           | <input checked="" type="checkbox"/> | PCB                        |                          |           |
|                      |                                     |           | <input type="checkbox"/>            | Ceramic Chip Antenna       |                          |           |
|                      |                                     |           | <input type="checkbox"/>            | Metal plate type F antenna |                          |           |
|                      |                                     |           | <input type="checkbox"/>            | Printed Antenna            |                          |           |
| Antenna Gain         | -1dBi                               |           |                                     |                            |                          |           |

### 1.3. Mode of Operation

DEKRA has verified the construction and function in typical operation. All the test modes were carried out with the EUT in normal operation, which was shown in this test report and defined as:

| Test Mode                                                           |
|---------------------------------------------------------------------|
| Mode 1: Transmit by FSK FHSS with 250Kbps data rate(902.5-927.5MHz) |

Note:

1. For portable device, radiated spurious emission was verified over X, Y, Z Axis, and shown the worst case on this report.
2. Regards to the frequency band operation for systems using FHSS modulation: normal operation (hopping) was selected to test for conducted spurious test.
3. The extreme test condition for voltage and temperature were declared by the manufacturer.
4. The reading values of all the test items contain cable loss.

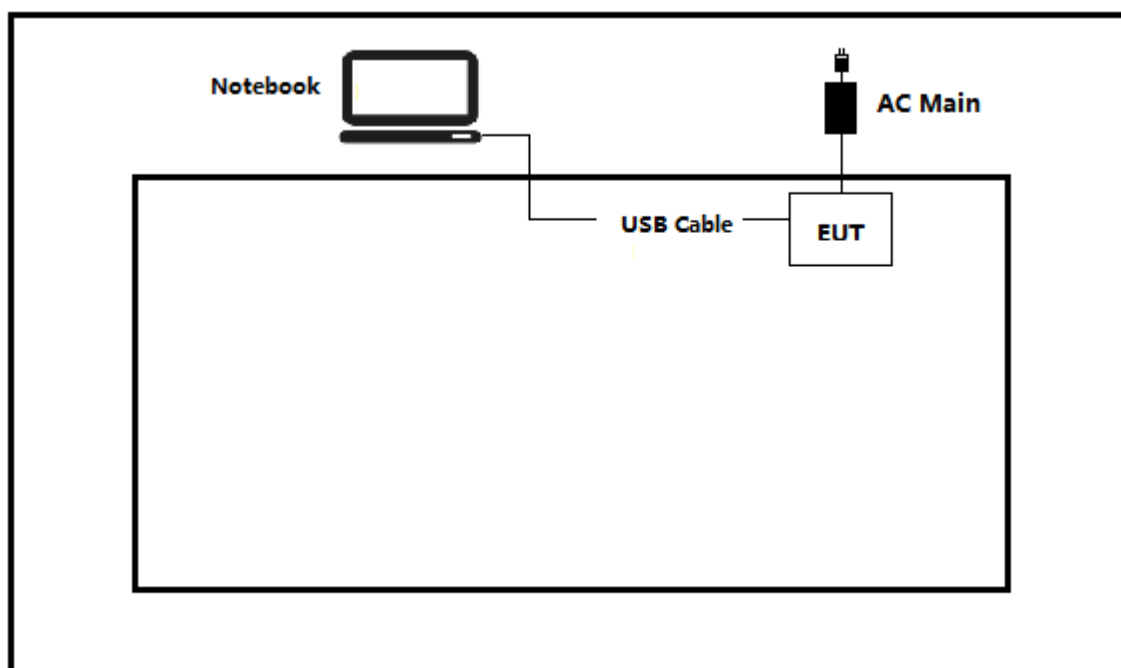
#### 1.4. Tested System Details

The types for all equipment, plus descriptions of all cables used in the tested system (including inserted cards) are:

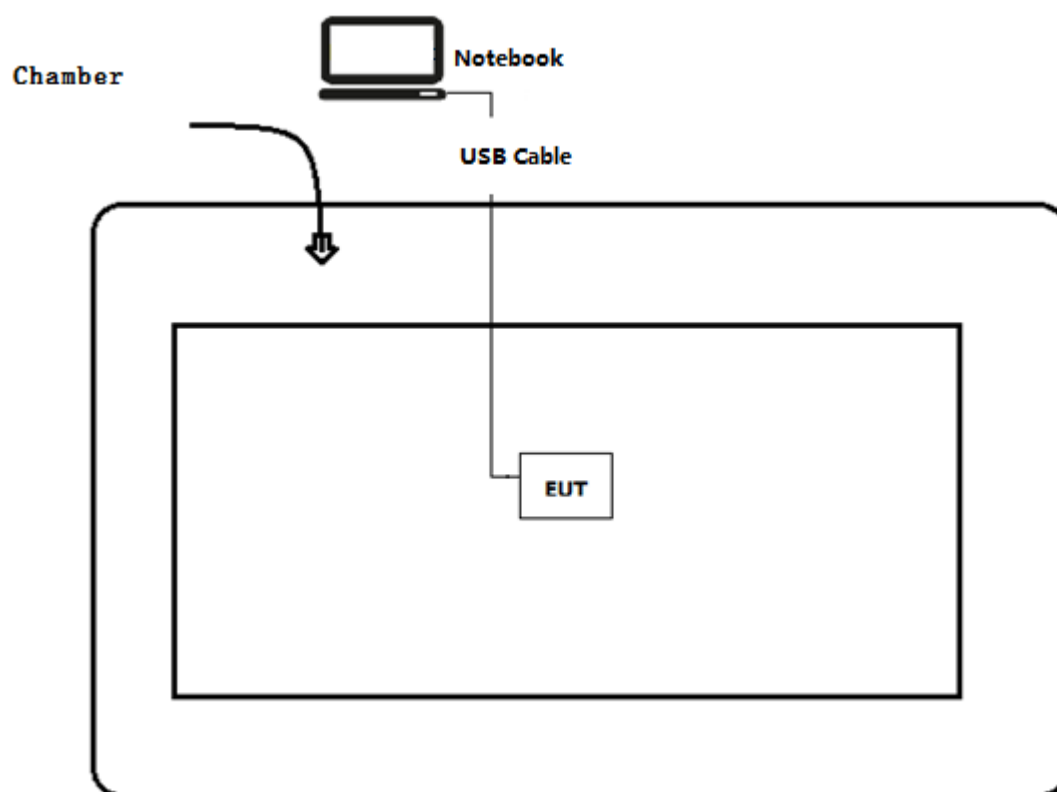
| No. | Product      | Manufacturer | Model No.      | Serial No. | Power Cord       |
|-----|--------------|--------------|----------------|------------|------------------|
| 1   | Notebook     | Lenovo       | Think pad x220 | SUA0600195 | Power by adapter |
| A   | USB Cable    | N/A          | N/A            | N/A        | Shield, 0.75m    |
| B   | Serial Cable | N/A          | N/A            | N/A        | Shield, 0.75m    |
| C   | USB Cable    | N/A          | N/A            | N/A        | Shield, 10m      |
| D   | Serial Cable | N/A          | N/A            | N/A        | Shield, 10m      |

## 1.5. Configuration of Tested System

Test setup Diagram- AC Line Conducted Emission Test



Test setup Diagram- Radiated Emission



## 1.6. EUT Exercise Software

|   |                                                                             |
|---|-----------------------------------------------------------------------------|
| 1 | Setup the EUT and simulators as shown on above.                             |
| 2 | Turn on the power of all equipment.                                         |
| 3 | Run "cmd", and set the test mode and channel, then start continue Transmit. |

## 2. Technical Test

### 2.1. Summary of Test Result

| Performed Test Item                         | Normative References                                            | Test Performed | Deviation |
|---------------------------------------------|-----------------------------------------------------------------|----------------|-----------|
| Conducted Emission                          | FCC CFR Title 47 Part 15 Subpart C Section 15.207               | Yes            | No        |
| Emissions in restricted frequency bands     | FCC CFR Title 47 Part 15 Subpart C Section 15.209               | Yes            | No        |
| 20dB Bandwidth                              | FCC CFR Title 47 Part 15 Subpart C Section 15.247(a)(1)         | Yes            | No        |
| Carrier Frequency Separation                | FCC CFR Title 47 Part 15 Subpart C Section 15.247(a)(1)         | Yes            | No        |
| Number of Hopping Frequencies               | FCC CFR Title 47 Part 15 Subpart C Section 15.247(a)(1)(iii)    | Yes            | No        |
| Time of Occupancy (Dwell Time)              | FCC CFR Title 47 Part 15 Subpart C Section 15.247(a)(1)(iii)    | Yes            | No        |
| Peak Output Power                           | FCC CFR Title 47 Part 15 Subpart C Section 15.247(b)(1)         | Yes            | No        |
| Emissions in non-restricted frequency bands | FCC CFR Title 47 Part 15 Subpart C Section 15.215(c), 15.247(d) | Yes            | No        |
| Radiated Emission Band Edge                 | FCC CFR Title 47 Part 15 Subpart C Section 15.247(d)            | Yes            | No        |
| Antenna Requirement                         | FCC CFR Title 47 Part 15 Subpart C Section 15.203               | Yes            | No        |

## 2.2. Test Environment

| Items                      | Required (IEC 68-1) | Actual   |
|----------------------------|---------------------|----------|
| Temperature (°C)           | 15-35               | 21       |
| Humidity (%RH)             | 25-75               | 50       |
| Barometric pressure (mbar) | 860-1060            | 950-1000 |

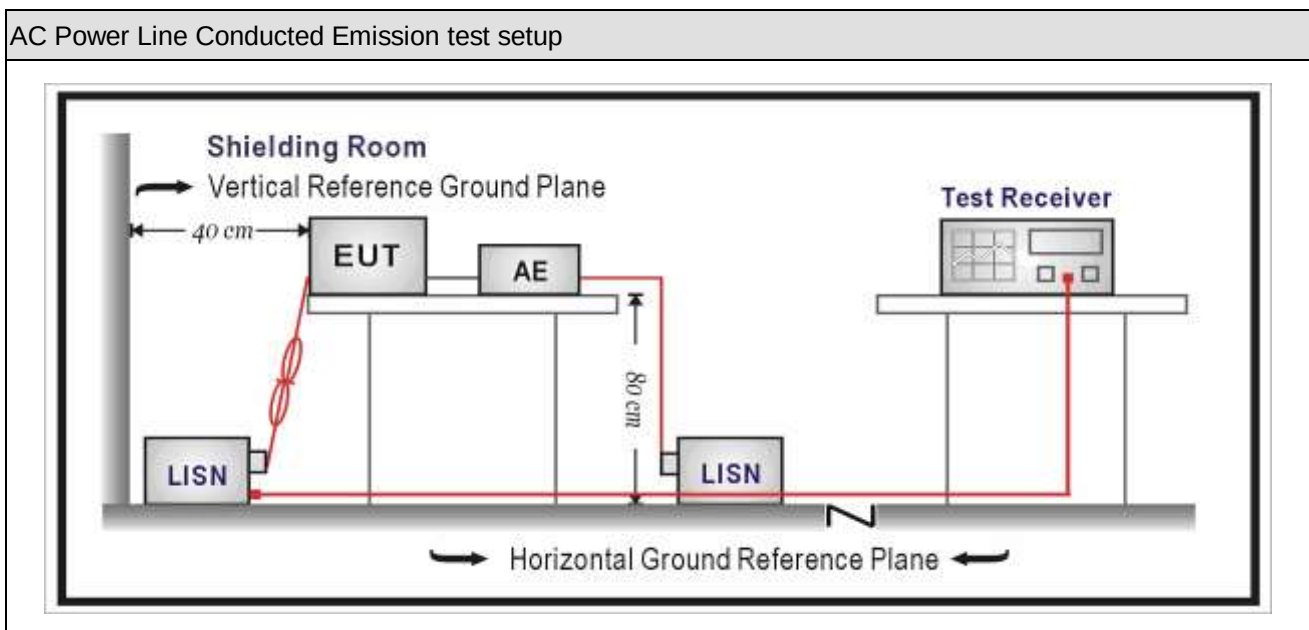
### 3. Conducted Emission

#### 3.1. Test Equipment

| AC Power Line Conducted Emission / TR-1 |              |          |            |            |               |
|-----------------------------------------|--------------|----------|------------|------------|---------------|
| Instrument                              | Manufacturer | Type No. | Serial No. | Cal. Date  | Cal. Due Date |
| EMI Test Receiver                       | R&S          | ESCI     | 100906     | 2019.04.20 | 2020.04.19    |
| Two-Line V-Network                      | R&S          | ENV 216  | 101189     | 2019.10.16 | 2020.10.15    |
| Two-Line V-Network                      | R&S          | ENV 216  | 101044     | 2019.05.25 | 2020.05.24    |
| 50ohm Coaxial Switch                    | Anritsu      | MP59B    | 6200464462 | N/A        | N/A           |
| 50ohm Termination                       | SHX          | TF2      | 07081402   | 2019.09.02 | 2020.09.01    |
| Temperature/Humidity Meter              | Riters       | RTS-8S   | TR1-TH     | 2019.08.21 | 2020.08.20    |

Note: All equipment is calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.

#### 3.2. Test Setup





### 3.3. Limit

| Frequency of Emission<br>(MHz)                                                                             | Conducted Limit         |                      |
|------------------------------------------------------------------------------------------------------------|-------------------------|----------------------|
|                                                                                                            | Quasi-peak (dB $\mu$ V) | Average (dB $\mu$ V) |
| 0.15-0.5                                                                                                   | 66 to 56                | 56 to 46             |
| 0.5-5                                                                                                      | 56                      | 46                   |
| 5-30                                                                                                       | 60                      | 50                   |
| Note 1: The lower limit shall apply at the transition frequencies.                                         |                         |                      |
| Note 2: The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz. |                         |                      |

### 3.4. Test Procedure

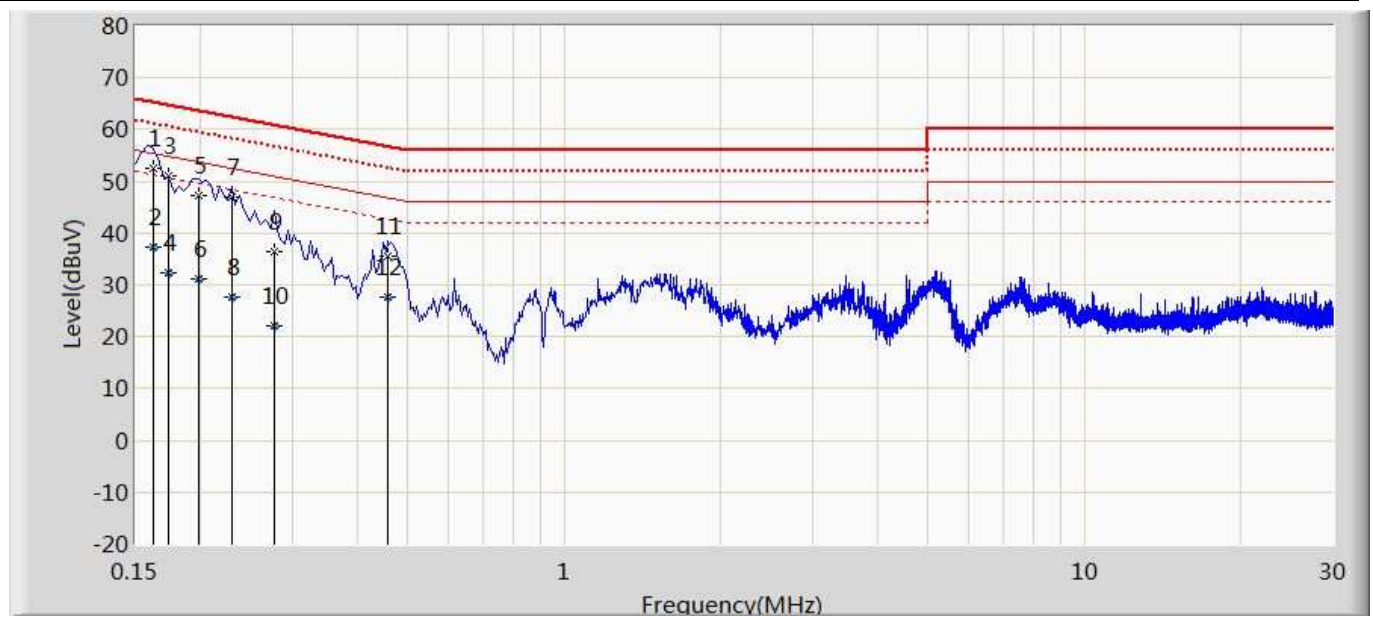
| Test Method                         |                  |         |                                                                                             |
|-------------------------------------|------------------|---------|---------------------------------------------------------------------------------------------|
|                                     | References Rule  | Chapter | Item                                                                                        |
| <input checked="" type="checkbox"/> | ANSI C63.10-2013 | 6.2     | Standard test method for ac power-line conducted emissions from unlicensed wireless devices |

### 3.5. Uncertainty

The measurement uncertainty is defined as  $\pm 2.02$  dB

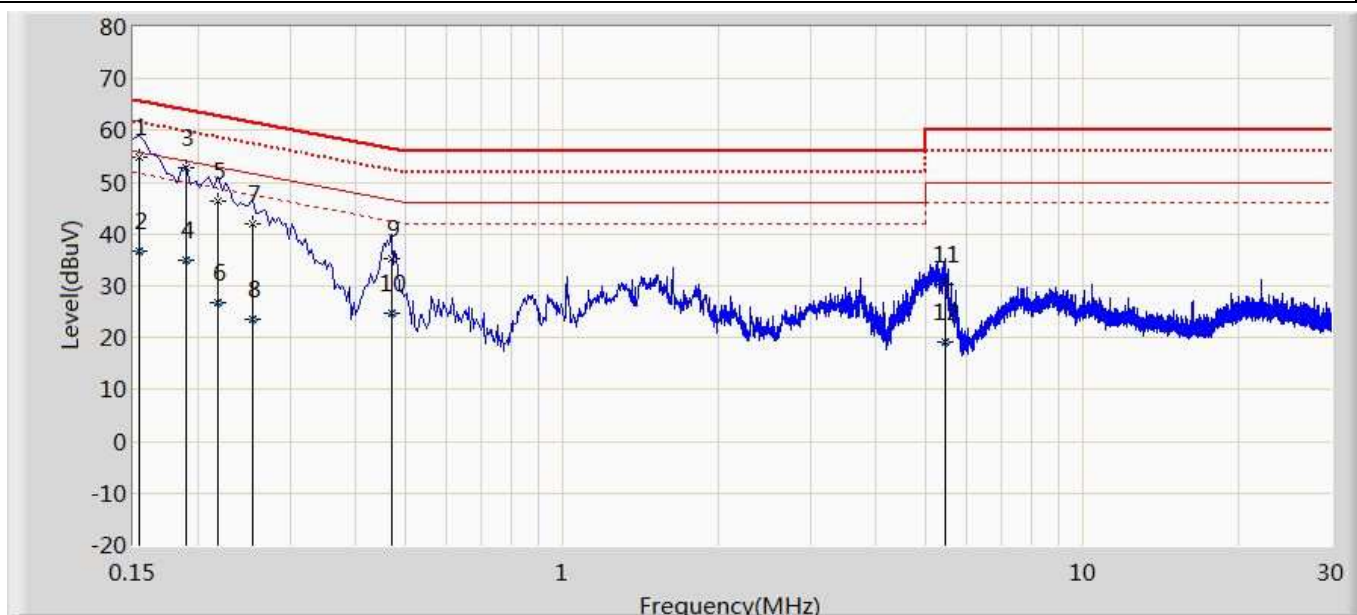
### 3.6. Test Result

|                                   |                     |
|-----------------------------------|---------------------|
| Engineer: YULIU                   |                     |
| Site: TR1                         | Time: 2020/03/24    |
| Limit: FCC_Part15.207_CE_AC Power | Margin: 4           |
| Probe: ENV216_101190(0.009-30MHz) | Polarity: Line      |
| EUT: Ring Bridge                  | Power: AC 120V/60Hz |
| Note: Mode 1                      |                     |



| No | Mark | Frequency (MHz) | Measure Level (dBuV) | Reading Level (dBuV) | Over Limit (dB) | Limit (dBuV) | Factor (dB) | Type |
|----|------|-----------------|----------------------|----------------------|-----------------|--------------|-------------|------|
| 1  | *    | 0.162           | 52.627               | 43.012               | -12.734         | 65.361       | 9.616       | QP   |
| 2  |      | 0.162           | 37.186               | 27.571               | -18.174         | 55.361       | 9.616       | AV   |
| 3  |      | 0.174           | 50.926               | 41.292               | -13.842         | 64.767       | 9.633       | QP   |
| 4  |      | 0.174           | 32.457               | 22.824               | -22.310         | 54.767       | 9.633       | AV   |
| 5  |      | 0.198           | 47.211               | 37.582               | -16.483         | 63.694       | 9.628       | QP   |
| 6  |      | 0.198           | 31.125               | 21.496               | -22.569         | 53.694       | 9.628       | AV   |
| 7  |      | 0.230           | 46.862               | 37.232               | -15.588         | 62.450       | 9.630       | QP   |
| 8  |      | 0.230           | 27.651               | 18.021               | -24.799         | 52.450       | 9.630       | AV   |
| 9  |      | 0.278           | 36.465               | 26.836               | -24.410         | 60.875       | 9.629       | QP   |
| 10 |      | 0.278           | 22.044               | 12.415               | -28.831         | 50.875       | 9.629       | AV   |
| 11 |      | 0.458           | 35.533               | 25.899               | -21.196         | 56.729       | 9.634       | QP   |
| 12 |      | 0.458           | 27.806               | 18.172               | -18.923         | 46.729       | 9.634       | AV   |

|                                   |                     |
|-----------------------------------|---------------------|
| Engineer: YULIU                   |                     |
| Site: TR1                         | Time: 2020/03/24    |
| Limit: FCC_Part15.207_CE_AC Power | Margin: 4           |
| Probe: ENV216_101190(0.009-30MHz) | Polarity: Neutral   |
| EUT: Ring Bridge                  | Power: AC 120V/60Hz |
| Note: Mode 1                      |                     |



| No | Mark | Frequency (MHz) | Measure Level (dBuV) | Reading Level (dBuV) | Over Limit (dB) | Limit (dBuV) | Factor (dB) | Type |
|----|------|-----------------|----------------------|----------------------|-----------------|--------------|-------------|------|
| 1  | *    | 0.154           | 54.995               | 45.373               | -10.786         | 65.781       | 9.622       | QP   |
| 2  |      | 0.154           | 36.655               | 27.033               | -19.127         | 55.781       | 9.622       | AV   |
| 3  |      | 0.190           | 52.714               | 43.088               | -11.322         | 64.037       | 9.626       | QP   |
| 4  |      | 0.190           | 34.925               | 25.298               | -19.112         | 54.037       | 9.626       | AV   |
| 5  |      | 0.218           | 46.391               | 36.763               | -16.504         | 62.895       | 9.628       | QP   |
| 6  |      | 0.218           | 26.847               | 17.218               | -26.048         | 52.895       | 9.628       | AV   |
| 7  |      | 0.254           | 42.099               | 32.470               | -19.526         | 61.625       | 9.629       | QP   |
| 8  |      | 0.254           | 23.691               | 14.062               | -27.934         | 51.625       | 9.629       | AV   |
| 9  |      | 0.470           | 35.277               | 25.646               | -21.237         | 56.514       | 9.632       | QP   |
| 10 |      | 0.470           | 24.741               | 15.109               | -21.773         | 46.514       | 9.632       | AV   |
| 11 |      | 5.434           | 30.335               | 20.525               | -29.665         | 60.000       | 9.810       | QP   |
| 12 |      | 5.434           | 19.131               | 9.321                | -30.869         | 50.000       | 9.810       | AV   |

Note:

1. " \* ", means this data is the worst emission level.

2. Measurement Level = Reading Level + Factor(Probe+Cable-Amp).

## 4. Emissions in restricted frequency bands

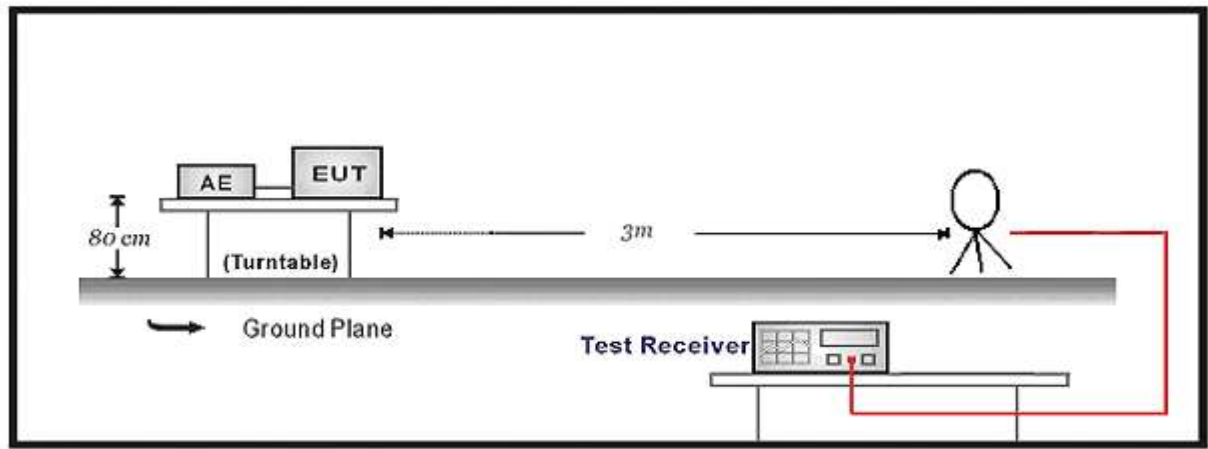
### 4.1. Test Equipment

| Radiated Emission(Below 1GHz) / AC-2                                                                                                     |              |              |            |            |               |
|------------------------------------------------------------------------------------------------------------------------------------------|--------------|--------------|------------|------------|---------------|
| Instrument                                                                                                                               | Manufacturer | Type No.     | Serial No. | Cal. Date  | Cal. Due Date |
| EMI Test Receiver                                                                                                                        | R&S          | ESCI         | 100573     | 2019.12.28 | 2020.12.27    |
| Loop Antenna                                                                                                                             | R&S          | HFH2-Z2      | 833799/003 | 2020.02.17 | 2021.02.16    |
| Bilog Antenna                                                                                                                            | Teseq GmbH   | CBL6112D     | 27611      | 2019.09.23 | 2020.09.22    |
| Coaxial Cable                                                                                                                            | Huber+Suhner | SUCOFLEX 106 | AC2-C      | 2019.04.13 | 2020.04.12    |
| Temperature/Humidity Meter                                                                                                               | Riters       | RTS-8S       | AC2-TH     | 2019.09.02 | 2020.09.01    |
| Note: All equipment is calibrated with traceable calibrations. Each calibration is traceable to the national or international standards. |              |              |            |            |               |

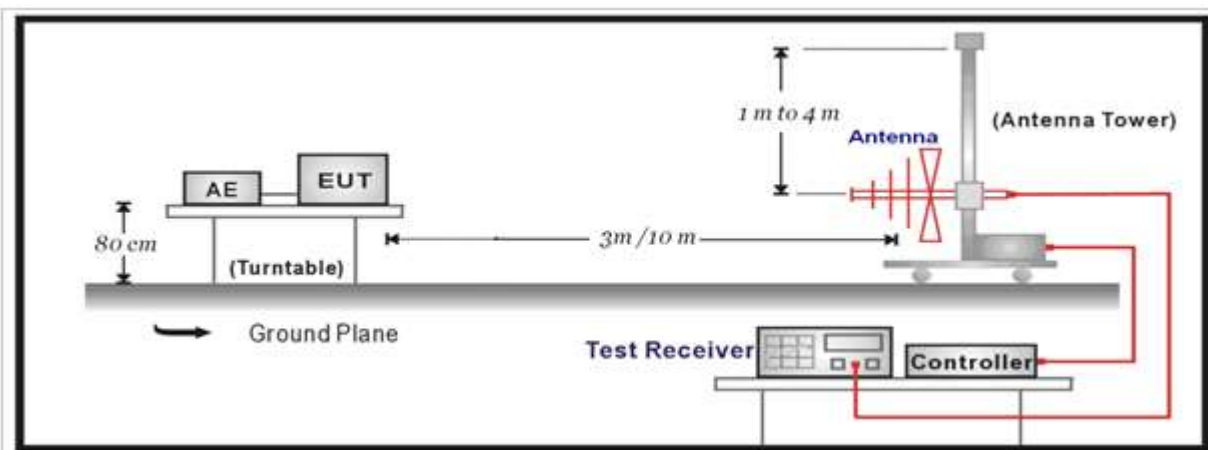
| Radiated Emission(Above 1GHz) / AC-5                                                                                                     |              |              |             |            |               |
|------------------------------------------------------------------------------------------------------------------------------------------|--------------|--------------|-------------|------------|---------------|
| Instrument                                                                                                                               | Manufacturer | Type No.     | Serial No.  | Cal. Date  | Cal. Due Date |
| Spectrum Analyzer                                                                                                                        | Agilent      | N9038A       | MY51210196  | 2019.05.25 | 2020.05.24    |
| Preamplifier                                                                                                                             | BXT          | NA2651D      | LNA17040209 | 2019.04.13 | 2020.04.12    |
| Preamplifier                                                                                                                             | EMCI         | EMC184045SE  | 980263      | 2019.06.13 | 2020.06.12    |
| DRG Horn                                                                                                                                 | ETS-Lindgren | 3117         | 00167055    | 2019.05.25 | 2020.05.24    |
| Broad-Band Horn Antenna                                                                                                                  | Schwarzbeck  | BBHA9170     | 294         | 2020.03.23 | 2021.03.22    |
| Coaxial Cable                                                                                                                            | Huber+Suhner | SUCOFLEX 106 | AC5-C2      | 2019.04.13 | 2020.04.12    |
| Temperature/Humidity Meter                                                                                                               | Riters       | RTS-8S       | AC5-TH      | 2019.09.02 | 2020.09.01    |
| Note: All equipment is calibrated with traceable calibrations. Each calibration is traceable to the national or international standards. |              |              |             |            |               |

## 4.2. Test Setup

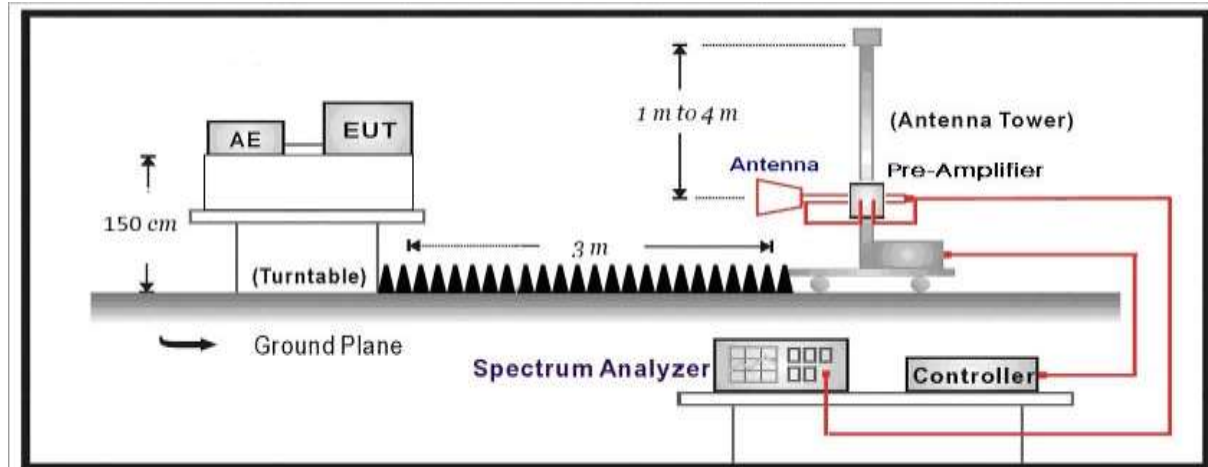
Below 30MHz Test Setup:



30MHz-1GHz Test Setup:



Above 1GHz Test Setup:



### 4.3. Limit

| Restricted Bands of operation |                       |                 |                 |
|-------------------------------|-----------------------|-----------------|-----------------|
| Frequency (MHz)               | Frequency (MHz)       | Frequency (MHz) | Frequency (GHz) |
| 0.090 – 0.110                 | 16.42 – 16.423        | 399.9 – 410     | 4.5 – 5.15      |
| 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 – 156.52525 | 2483.5 – 2500   | 17.7 – 21.4     |
| 8.37625 – 8.38675             | 156.7 – 156.9         | 2690 – 2900     | 22.01 – 23.12   |
| 8.81425 – 8.81475             | 162.0125 – 167.17     | 3260 – 3267     | 23.6 – 24.0     |
| 12.29 – 12.293                | 167.72 – 173.2        | 3332 – 3339     | 31.2 – 31.8     |
| 12.51975 – 12.52025           | 240 – 285             | 3345.8 – 3358   | 36.43 – 36.5    |
| 12.57675 – 12.57725           | 322 – 335.4           | 3600 – 4400     |                 |
| 13.36 – 13.41                 |                       |                 |                 |

| Restricted Band Emissions Limit |                                    |                                             |                          |
|---------------------------------|------------------------------------|---------------------------------------------|--------------------------|
| Frequency (MHz)                 | Field strength ( $\mu\text{V/m}$ ) | Field strength ( $\text{dB}\mu\text{V/m}$ ) | Measurement distance (m) |
| 0.009 - 0.49                    | 2400/F(kHz)                        | 48.5 – 13.8                                 | 300 <sub>(Note 1)</sub>  |
| 0.49 - 1.705                    | 24000/F(kHz)                       | 33.8 - 23                                   | 30 <sub>(Note 1)</sub>   |
| 1.705 - 30                      | 30                                 | 29.5                                        | 30 <sub>(Note 1)</sub>   |
| 30 - 88                         | 100                                | 40                                          | 3 <sub>(Note 2)</sub>    |
| 88 - 216                        | 150                                | 43.5                                        | 3 <sub>(Note 2)</sub>    |
| 216 - 960                       | 200                                | 46                                          | 3 <sub>(Note 2)</sub>    |
| Above 960                       | 500                                | 54                                          | 3 <sub>(Note 2)</sub>    |

Note 1: At frequencies below 30 MHz, measurements may be performed at a distance closer than that specified in the regulations; however, an attempt should be made to avoid making measurements in the near field. Pending the development of an appropriate measurement procedure for measurements performed below 30 MHz, when performing measurements at a closer distance than specified, the results shall be extrapolated to the specified distance by either making measurements at a minimum of two distances on at least one radial to determine the proper extrapolation factor or by using the square of an inverse linear distance extrapolation factor (40 dB/decade).

Note 2: At frequencies at or above 30 MHz, measurements may be performed at a distance other than what is specified provided: measurements are not made in the near field except where it can be shown that near field measurements are appropriate due to the characteristics of the device; and it can be demonstrated that the signal levels needed to be measured at the distance employed can be detected by the measurement equipment. Measurements shall not be performed at a distance greater than 30 meters unless it can be further demonstrated that measurements at a distance of 30 meters or less are impractical. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse linear-distance for field strength measurements; inverse-linear-distance-squared for power density measurements).

#### 4.4. Test Procedure

| Test Method                         |                 |         |                                                                                                  |
|-------------------------------------|-----------------|---------|--------------------------------------------------------------------------------------------------|
|                                     | References Rule | Chapter | Description                                                                                      |
| <input checked="" type="checkbox"/> | ANSI C63.10     | 6.4     | Radiated emissions from unlicensed wireless devices below 30 MHz                                 |
| <input checked="" type="checkbox"/> | ANSI C63.10     | 6.5     | Radiated emissions from unlicensed wireless devices in the frequency range of 30 MHz to 1000 MHz |
| <input checked="" type="checkbox"/> | ANSI C63.10     | 6.6     | Radiated emissions from unlicensed wireless devices above 1 GHz                                  |

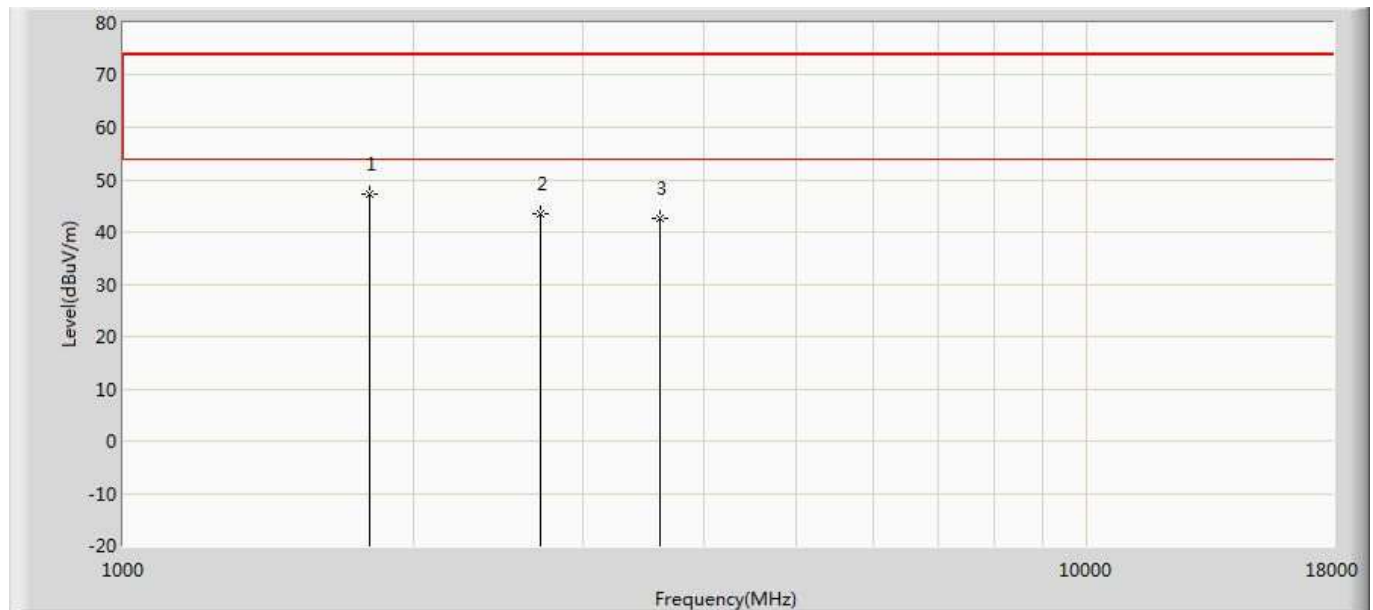
#### 4.5. Uncertainty

The measurement uncertainty above 1G is defined as  $\pm 3.9$  dB  
below 1G is defined as  $\pm 3.8$  dB



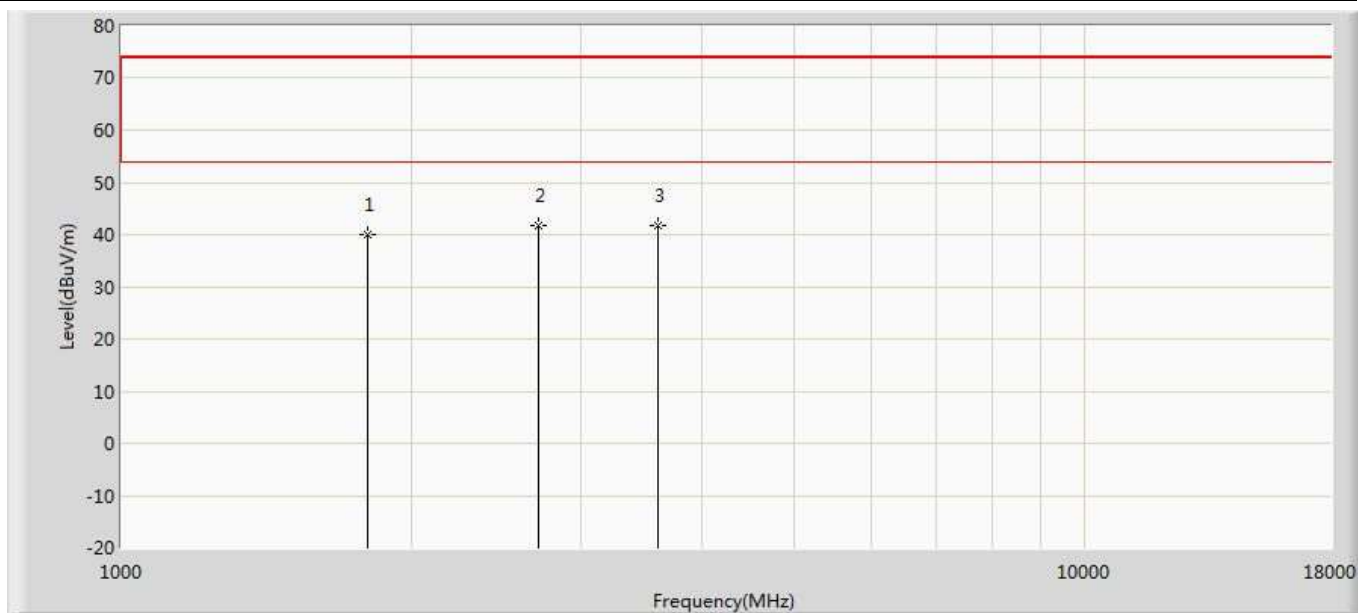
#### 4.6. Test Result

|                                    |                     |
|------------------------------------|---------------------|
| Engineer: YULIU                    |                     |
| Site: AC5                          | Time: 2020/03/26    |
| Limit: FCC_Part15.209_RE(3m)       | Margin: 0           |
| Probe: Horn_3117_00167055(1-18GHz) | Polarity: Vertical  |
| EUT: Ring Bridge                   | Power: AC 120V/60Hz |
| Note: Mode8:Transmit at 902.5MHz   |                     |



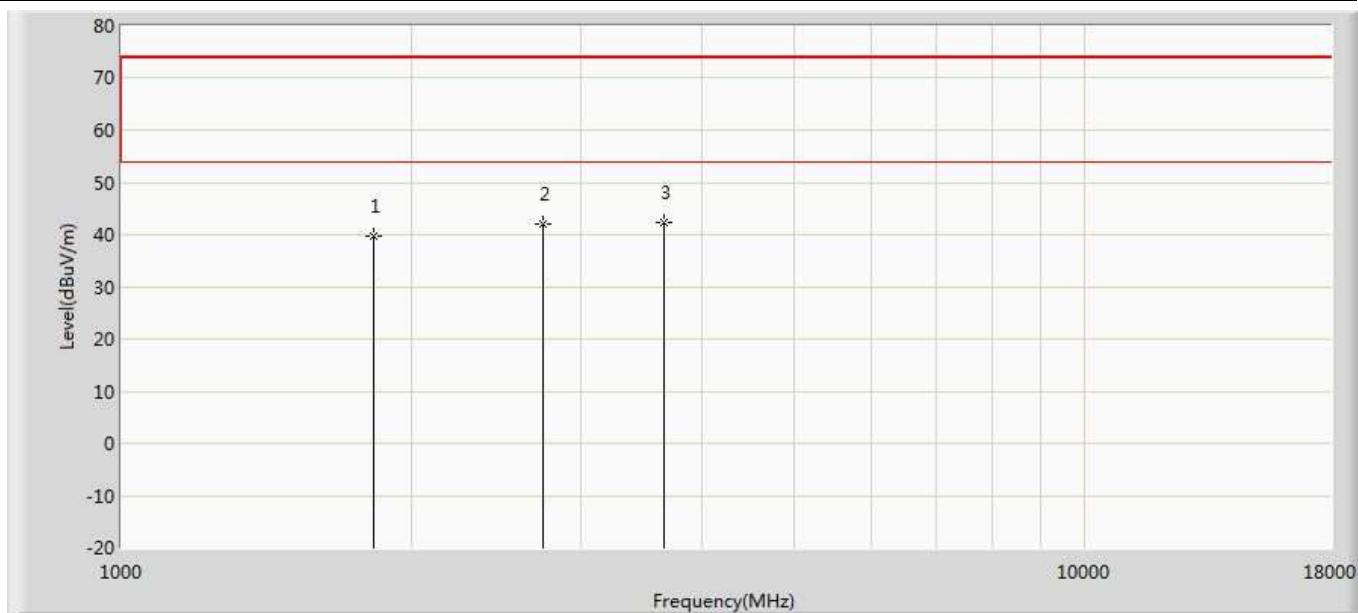
| No | Mark | Frequency (MHz) | Measure Level (dBuV/m) | Reading Level (dBuV) | Over Limit (dB) | Limit (dBuV/m) | Factor (dB) | Type |
|----|------|-----------------|------------------------|----------------------|-----------------|----------------|-------------|------|
| 1  | *    | 1805.000        | 47.379                 | 47.687               | -26.621         | 74.000         | -0.308      | PK   |
| 2  |      | 2707.500        | 43.386                 | 41.559               | -30.614         | 74.000         | 1.827       | PK   |
| 3  |      | 3610.000        | 42.573                 | 38.777               | -31.427         | 74.000         | 3.796       | PK   |

|                                    |                      |
|------------------------------------|----------------------|
| Engineer: YULIU                    |                      |
| Site: AC5                          | Time: 2020/03/26     |
| Limit: FCC_Part15.209_RE(3m)       | Margin: 0            |
| Probe: Horn_3117_00167055(1-18GHz) | Polarity: Horizontal |
| EUT: Ring Bridge                   | Power: AC 120V/60Hz  |
| Note: Mode 8: Transmit at 902.5MHz |                      |



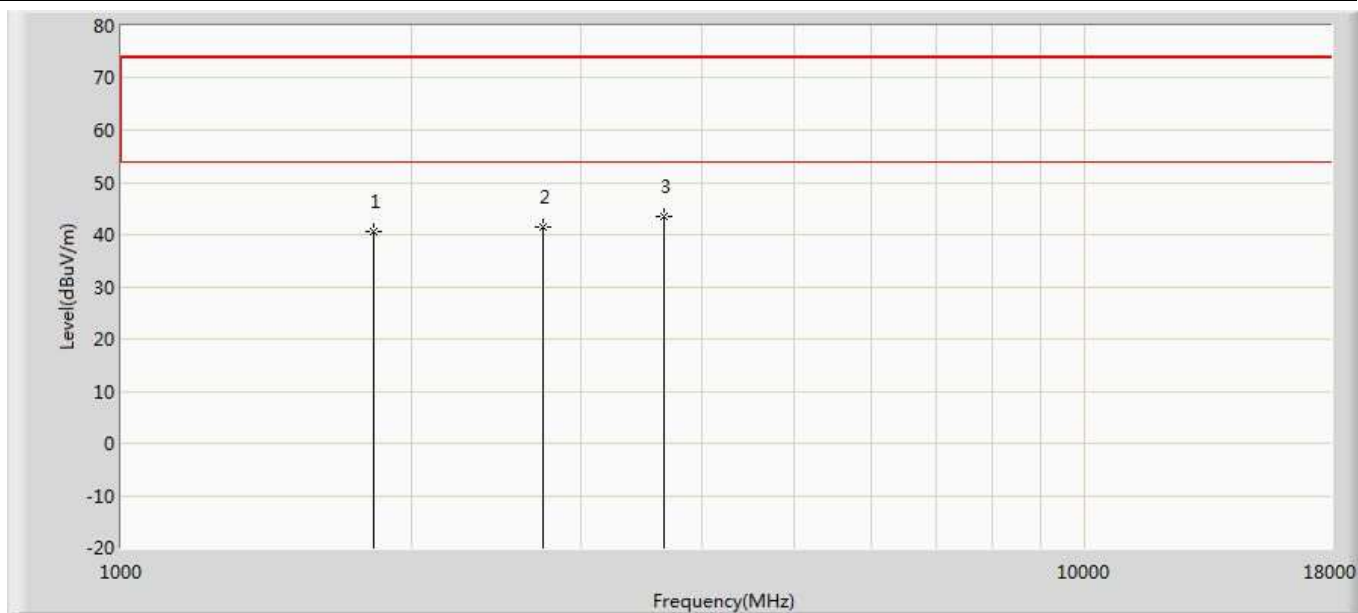
| No | Mark | Frequency (MHz) | Measure Level (dBuV/m) | Reading Level (dBuV) | Over Limit (dB) | Limit (dBuV/m) | Factor (dB) | Type |
|----|------|-----------------|------------------------|----------------------|-----------------|----------------|-------------|------|
| 1  |      | 1805.000        | 39.859                 | 40.167               | -34.141         | 74.000         | -0.308      | PK   |
| 2  |      | 2707.500        | 41.843                 | 40.016               | -32.157         | 74.000         | 1.827       | PK   |
| 3  | *    | 3610.000        | 41.871                 | 38.075               | -32.129         | 74.000         | 3.796       | PK   |

|                                    |                     |
|------------------------------------|---------------------|
| Engineer: YULIU                    |                     |
| Site: AC5                          | Time: 2020/03/26    |
| Limit: FCC_Part15.209_RE(3m)       | Margin: 0           |
| Probe: Horn_3117_00167055(1-18GHz) | Polarity: Vertical  |
| EUT: Ring Bridge                   | Power: AC 120V/60Hz |
| Note: Mode 8: Transmit at 915MHz   |                     |



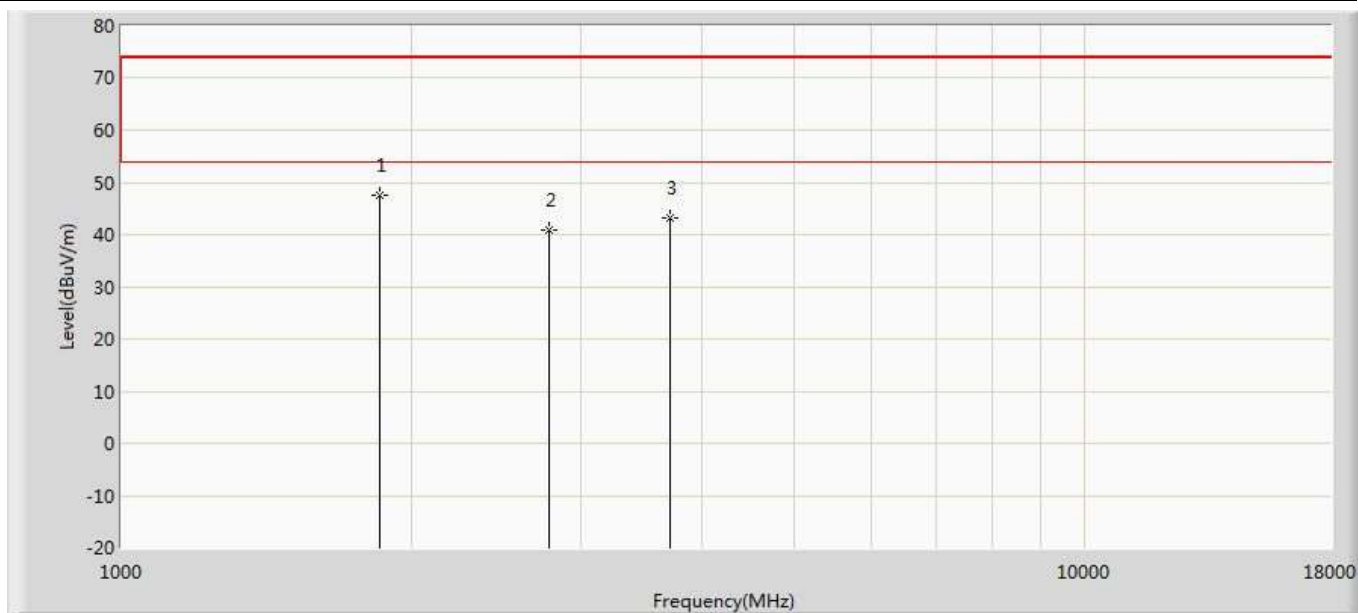
| No | Mark | Frequency (MHz) | Measure Level (dBuV/m) | Reading Level (dBuV) | Over Limit (dB) | Limit (dBuV/m) | Factor (dB) | Type |
|----|------|-----------------|------------------------|----------------------|-----------------|----------------|-------------|------|
| 1  |      | 1830.000        | 39.805                 | 39.682               | -34.195         | 74.000         | 0.124       | PK   |
| 2  |      | 2745.000        | 41.933                 | 39.989               | -32.067         | 74.000         | 1.944       | PK   |
| 3  | *    | 3660.000        | 42.203                 | 38.313               | -31.797         | 74.000         | 3.890       | PK   |

|                                    |                      |
|------------------------------------|----------------------|
| Engineer: YULIU                    |                      |
| Site: AC5                          | Time: 2020/03/26     |
| Limit: FCC_Part15.209_RE(3m)       | Margin: 0            |
| Probe: Horn_3117_00167055(1-18GHz) | Polarity: Horizontal |
| EUT: Ring Bridge                   | Power: AC 120V/60Hz  |
| Note: Mode 8: Transmit at 915MHz   |                      |



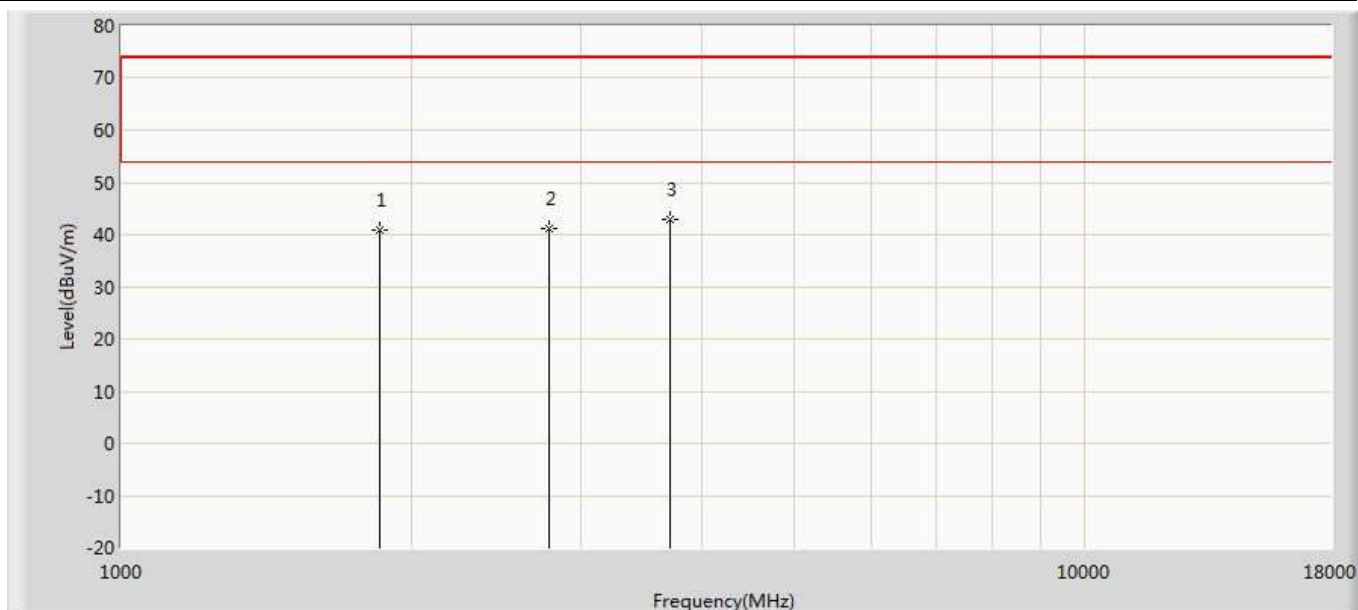
| No | Mark | Frequency (MHz) | Measure Level (dBuV/m) | Reading Level (dBuV) | Over Limit (dB) | Limit (dBuV/m) | Factor (dB) | Type |
|----|------|-----------------|------------------------|----------------------|-----------------|----------------|-------------|------|
| 1  |      | 1830.000        | 40.460                 | 40.337               | -33.540         | 74.000         | 0.124       | PK   |
| 2  |      | 2745.000        | 41.572                 | 39.628               | -32.428         | 74.000         | 1.944       | PK   |
| 3  | *    | 3660.000        | 43.504                 | 39.614               | -30.496         | 74.000         | 3.890       | PK   |

|                                    |                     |
|------------------------------------|---------------------|
| Engineer: YULIU                    |                     |
| Site: AC5                          | Time: 2020/03/26    |
| Limit: FCC_Part15.209_RE(3m)       | Margin: 0           |
| Probe: Horn_3117_00167055(1-18GHz) | Polarity: Vertical  |
| EUT: Ring Bridge                   | Power: AC 120V/60Hz |
| Note: Mode 8: Transmit at 927.5MHz |                     |



| No | Mark | Frequency (MHz) | Measure Level (dBuV/m) | Reading Level (dBuV) | Over Limit (dB) | Limit (dBuV/m) | Factor (dB) | Type |
|----|------|-----------------|------------------------|----------------------|-----------------|----------------|-------------|------|
| 1  | *    | 1855.000        | 47.417                 | 47.179               | -26.583         | 74.000         | 0.237       | PK   |
| 2  |      | 2782.500        | 40.877                 | 38.911               | -33.123         | 74.000         | 1.966       | PK   |
| 3  |      | 3710.000        | 43.129                 | 38.950               | -30.871         | 74.000         | 4.179       | PK   |

|                                    |                      |
|------------------------------------|----------------------|
| Engineer: YULIU                    |                      |
| Site: AC5                          | Time: 2020/03/26     |
| Limit: FCC_Part15.209_RE(3m)       | Margin: 0            |
| Probe: Horn_3117_00167055(1-18GHz) | Polarity: Horizontal |
| EUT: Ring Bridge                   | Power: AC 120V/60Hz  |
| Note: Mode 8: Transmit at 927.5MHz |                      |



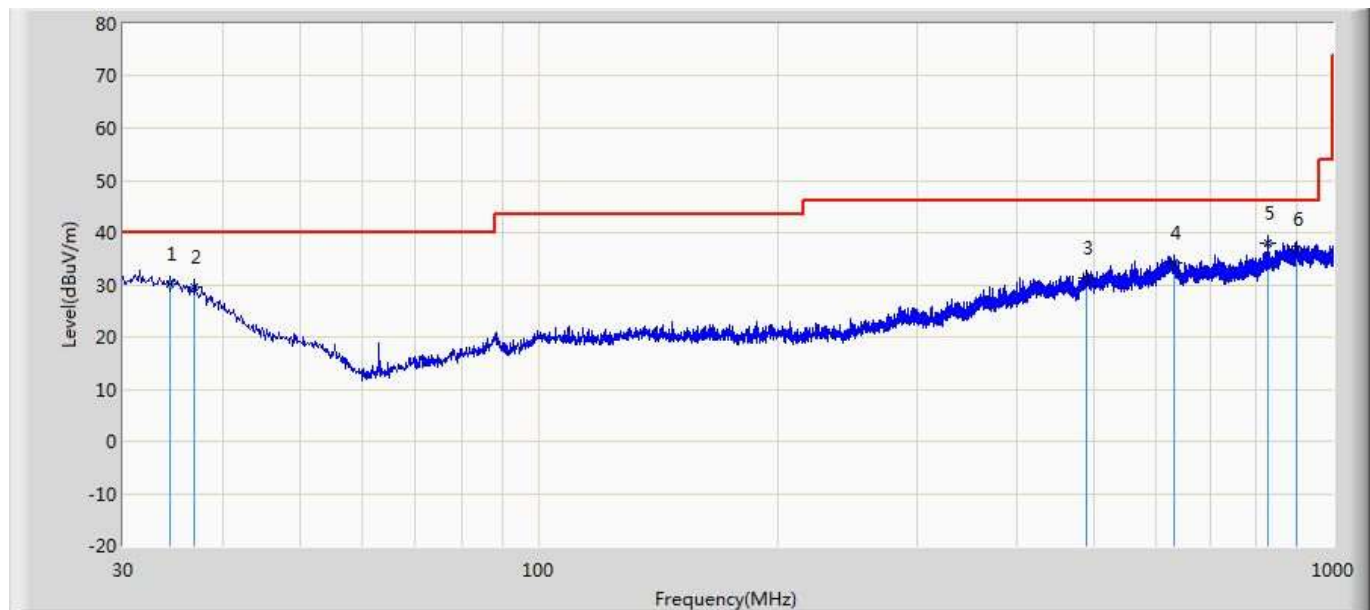
| No | Mark | Frequency (MHz) | Measure Level (dBuV/m) | Reading Level (dBuV) | Over Limit (dB) | Limit (dBuV/m) | Factor (dB) | Type |
|----|------|-----------------|------------------------|----------------------|-----------------|----------------|-------------|------|
| 1  |      | 1855.000        | 40.988                 | 40.750               | -33.012         | 74.000         | 0.237       | PK   |
| 2  |      | 2782.500        | 41.237                 | 39.271               | -32.763         | 74.000         | 1.966       | PK   |
| 3  | *    | 3710.000        | 42.776                 | 38.597               | -31.224         | 74.000         | 4.179       | PK   |

## Note:

1. Measured Level = Reading Level + Factor.
2. The test frequency range, 9kHz~30MHz, the worst case are at least 20dB below the limits, therefore no data appear in the report.
3. This limit applies for using average detector, if the test result on peak is lower than average limit, then average measurement needn't be performed.
4. As the radiated emission was performed, so conducted emission was not tested.

### The worst case of Radiated Emission below 1GHz:

|                              |                      |
|------------------------------|----------------------|
| Engineer: YULIU              |                      |
| Site: AC2                    | Time: 2020/03/25     |
| Limit: FCC_Part15.209_RE(3m) | Margin: 0            |
| Probe: AC2_3M(30-1000M)      | Polarity: Horizontal |
| EUT: Ring Bridge             | Power: AC 120V/60Hz  |
| Note: Mode 1                 |                      |

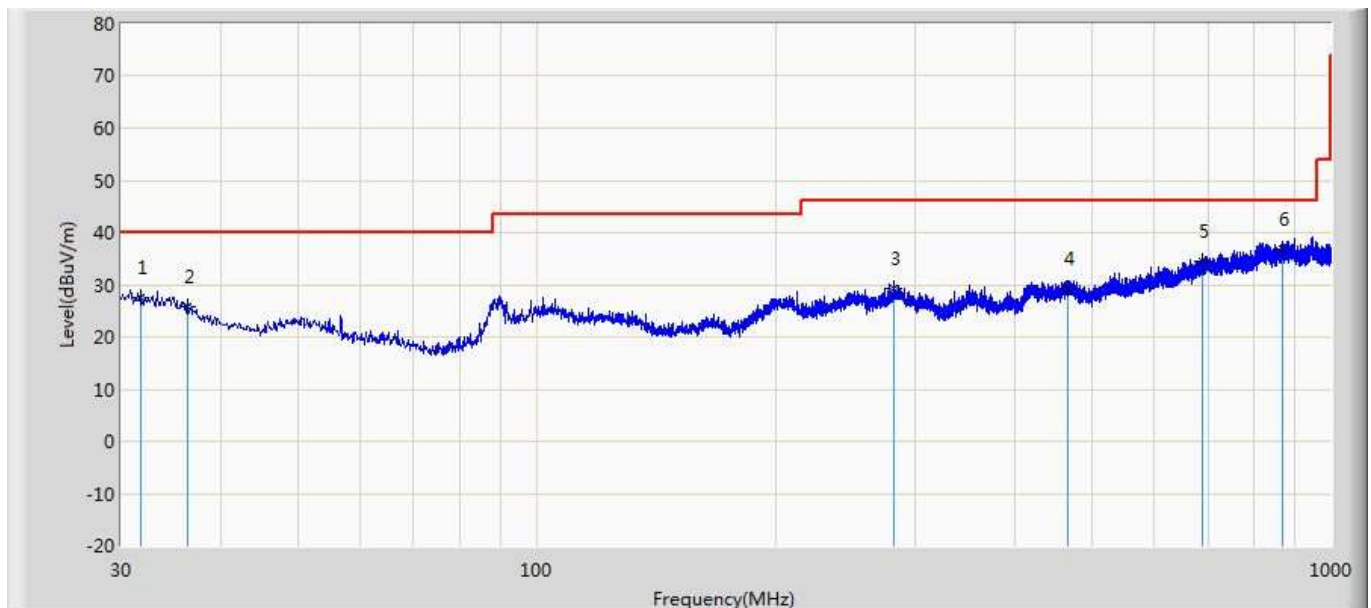


| No | Mark | Frequency (MHz) | Measure Level (dBuV/m) | Reading Level (dBuV) | Over Limit (dB) | Limit (dBuV/m) | Factor (dB) | Ant Pos (cm) | Table Pos (deg) | Type |
|----|------|-----------------|------------------------|----------------------|-----------------|----------------|-------------|--------------|-----------------|------|
| 1  |      | 34.365          | 30.148                 | 3.122                | -9.852          | 40.000         | 27.025      | 165          | 350             | QP   |
| 2  |      | 36.911          | 29.686                 | 4.495                | -10.314         | 40.000         | 25.191      | 150          | 320             | QP   |
| 3  |      | 489.538         | 31.301                 | 3.027                | -14.699         | 46.000         | 28.275      | 120          | 250             | QP   |
| 4  |      | 630.430         | 34.301                 | 4.117                | -11.699         | 46.000         | 30.184      | 110          | 235             | QP   |
| 5  | *    | 827.097         | 38.028                 | 6.349                | -7.972          | 46.000         | 31.678      | 100          | 180             | QP   |
| 6  |      | 901.545         | 36.715                 | 3.554                | -9.285          | 46.000         | 33.161      | 135          | 117             | QP   |

#### Note:

1. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
2. " \* ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Factor(Probe+Cable-Amp).

|                              |                     |
|------------------------------|---------------------|
| Engineer: YULIU              |                     |
| Site: AC2                    | Time: 2020/03/25    |
| Limit: FCC_Part15.209_RE(3m) | Margin: 0           |
| Probe: AC2_3M(30-1000M)      | Polarity: Vertical  |
| EUT: Ring Bridge             | Power: AC 120V/60Hz |
| Note: Mode 1                 |                     |



| No | Mark | Frequency (MHz) | Measure Level (dBuV/m) | Reading Level (dBuV) | Over Limit (dB) | Limit (dBuV/m) | Factor (dB) | Ant Pos (cm) | Table Pos (deg) | Type |
|----|------|-----------------|------------------------|----------------------|-----------------|----------------|-------------|--------------|-----------------|------|
| 1  |      | 31.698          | 27.559                 | 4.119                | -12.441         | 40.000         | 23.440      | 120          | 188             | QP   |
| 2  |      | 36.305          | 25.890                 | 4.234                | -14.110         | 40.000         | 21.656      | 100          | 355             | QP   |
| 3  |      | 282.321         | 29.344                 | 4.297                | -16.656         | 46.000         | 25.047      | 150          | 245             | QP   |
| 4  |      | 466.015         | 29.378                 | 2.558                | -16.622         | 46.000         | 26.820      | 120          | 114             | QP   |
| 5  |      | 690.206         | 34.409                 | 4.314                | -11.591         | 46.000         | 30.095      | 140          | 246             | QP   |
| 6  | *    | 867.838         | 36.917                 | 3.951                | -9.083          | 46.000         | 32.966      | 180          | 360             | QP   |

**Note:**

1. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
2. " \* ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Factor(Probe+Cable-Amp).

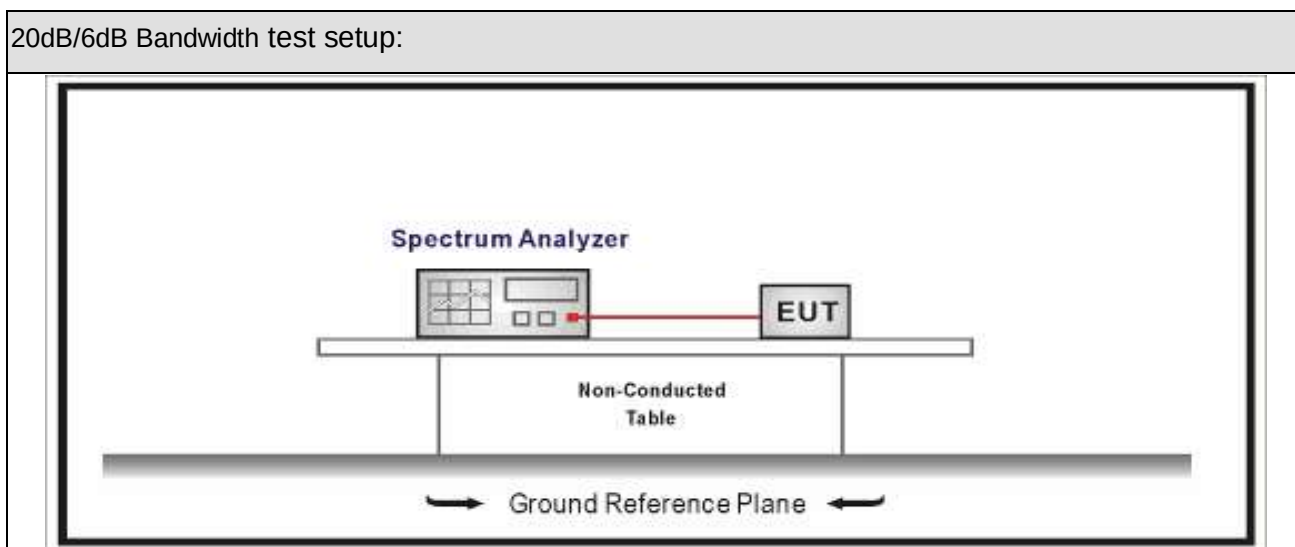


## 5. 20dB Bandwidth

### 5.1 Test Equipment

| 20dB/6dB Bandwidth / TR-8                                                                                                                |              |          |            |            |               |
|------------------------------------------------------------------------------------------------------------------------------------------|--------------|----------|------------|------------|---------------|
| Instrument                                                                                                                               | Manufacturer | Type No. | Serial No. | Cal. Date  | Cal. Due Date |
| Spectrum Analyzer                                                                                                                        | Agilent      | N9010A   | MY48030494 | 2019.09.28 | 2020.09.27    |
| MXA Signal Analyzer                                                                                                                      | Keysight     | N9020B   | MY59050482 | 2019.12.13 | 2020.12.12    |
| Temperature/Humidity Meter                                                                                                               | Zhichen      | ZC1-2    | TR8-TH     | 2019.09.02 | 2020.09.01    |
| Note: All equipment is calibrated with traceable calibrations. Each calibration is traceable to the national or international standards. |              |          |            |            |               |

### 5.2 Test Setup



### 5.3 Limit

| 20dB/6dB Bandwidth                  |                                                                                                                                                                             |
|-------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <input type="checkbox"/>            | For frequency hopping systems operating in 2400-2483.5 MHz band, within frequency range.                                                                                    |
| <input checked="" type="checkbox"/> | For frequency hopping systems operating in 902-928 MHz band, the maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz.                                         |
| <input checked="" type="checkbox"/> | Systems using digital modulation techniques may operate in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz. |
| <input type="checkbox"/>            | For frequency hopping systems operating in 5725-5850 MHz band, the maximum 20 dB bandwidth of the hopping channel is 1 MHz.                                                 |

## 5.4 Test Procedure

| Test Method                         |                  |         |                          |
|-------------------------------------|------------------|---------|--------------------------|
|                                     | References Rule  | Chapter | Item                     |
| <input checked="" type="checkbox"/> | ANSI C63.10-2013 | 6.9     | Occupied bandwidth tests |
| <input checked="" type="checkbox"/> | ANSI C63.10-2013 | 11.8    | DTS bandwidth            |

## 5.5 Uncertainty

The measurement uncertainty is defined as  $\pm 1$  kHz

## 5.6 Test Result

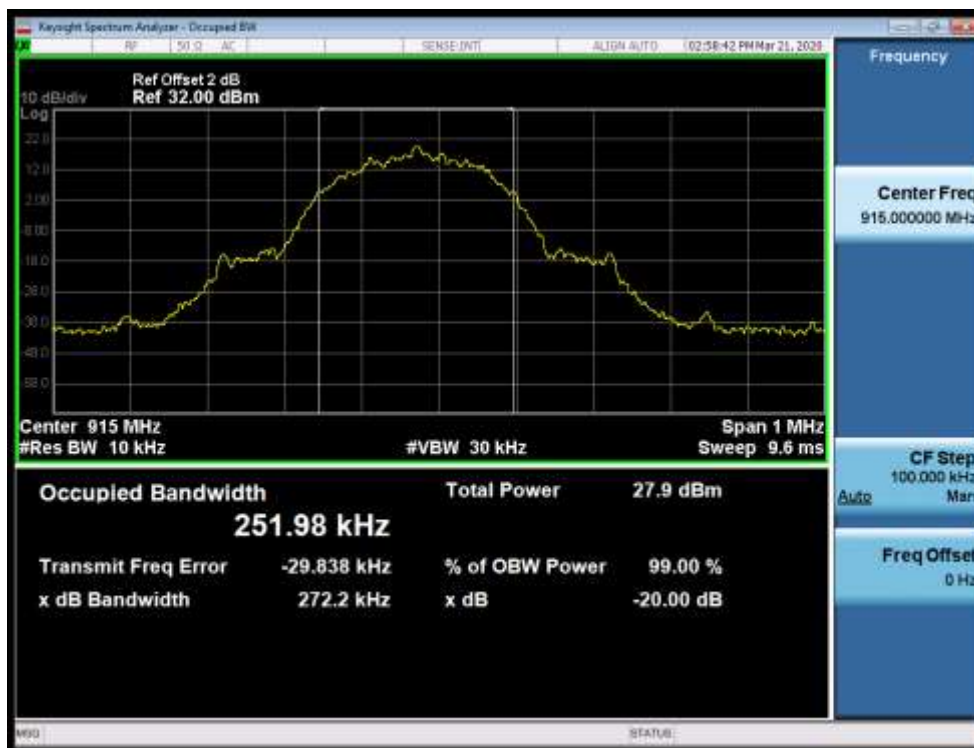
|              |               |           |                |
|--------------|---------------|-----------|----------------|
| Product Name | : Ring Bridge | Power     | : AC 120V/60Hz |
| Test Mode    | : Mode 1      | Test Site | : TR-8         |
| Test Date    | : 2020.03.21  |           |                |

| Channel No. | Frequency<br>(MHz) | 20dB Bandwidth<br>(kHz) | 99% Bandwidth<br>(kHz) |
|-------------|--------------------|-------------------------|------------------------|
| 01          | 902.5              | 268.6                   | 251.49                 |
| 26          | 915                | 272.2                   | 251.98                 |
| 51          | 927.5              | 266.7                   | 252.64                 |

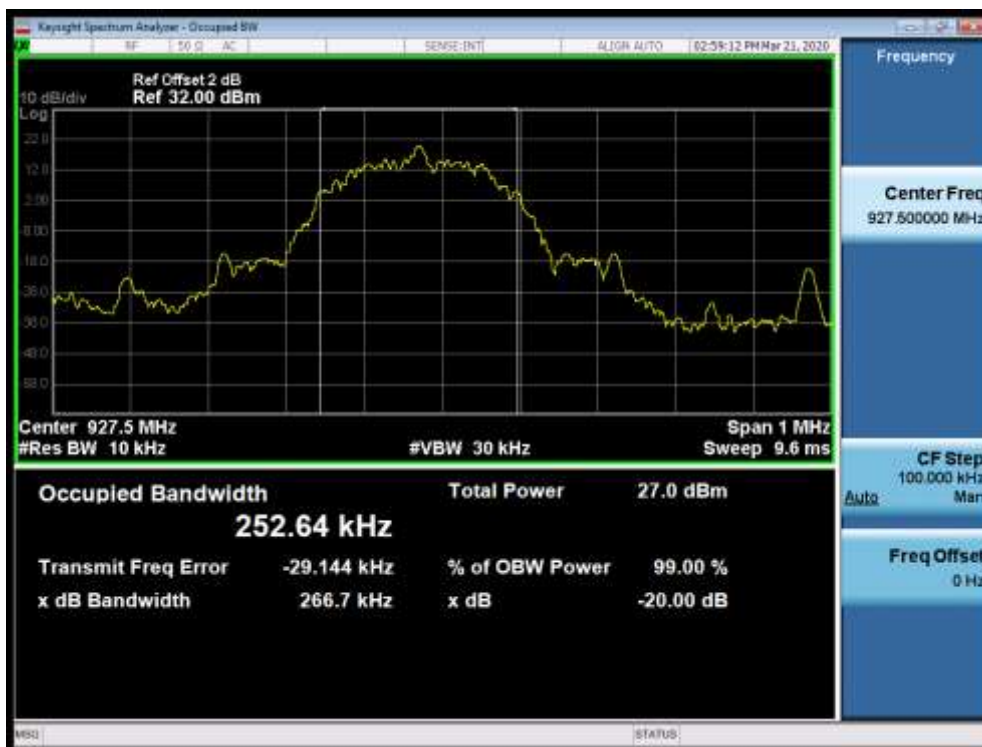
Channel 01 (902.5MHz)



## Channel 26 (915MHz)



## Channel 51 (927.5MHz)



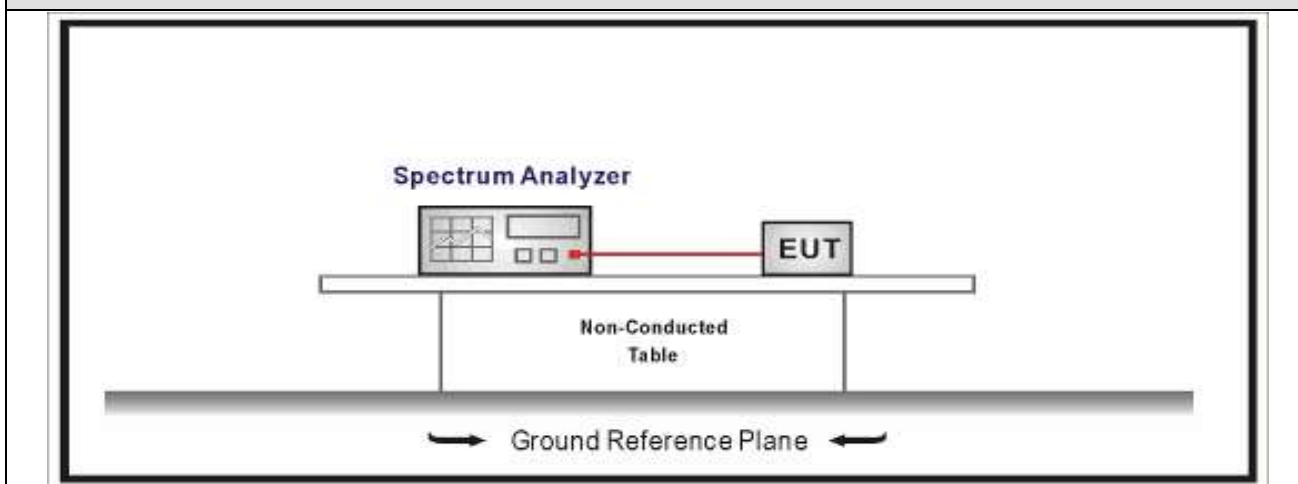
## 6. Carrier Frequency Separation

### 6.1. Test Equipment

| Carrier Frequency Separation / TR-8                                                                                                      |              |          |            |            |               |
|------------------------------------------------------------------------------------------------------------------------------------------|--------------|----------|------------|------------|---------------|
| Instrument                                                                                                                               | Manufacturer | Type No. | Serial No. | Cal. Date  | Cal. Due Date |
| Spectrum Analyzer                                                                                                                        | Agilent      | N9010A   | MY48030494 | 2019.09.28 | 2020.09.27    |
| MXA Signal Analyzer                                                                                                                      | Keysight     | N9020B   | MY59050482 | 2019.12.13 | 2020.12.12    |
| Temperature/Humidity Meter                                                                                                               | Zhichen      | ZC1-2    | TR8-TH     | 2019.09.02 | 2020.09.01    |
| Note: All equipment is calibrated with traceable calibrations. Each calibration is traceable to the national or international standards. |              |          |            |            |               |

### 6.2. Test Setup

Carrier Frequency Separation test setup:



### 6.3. Limit

| Carrier Frequency Separation        |                                                                                                                                                                                                                                                                                                                   |
|-------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <input checked="" type="checkbox"/> | Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.                                                                                                                                    |
| <input type="checkbox"/>            | Frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel.                                                                                                            |
| <input type="checkbox"/>            | The 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period;                                                                         |
| <input type="checkbox"/>            | The 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period. The maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz. |
| <input type="checkbox"/>            | Frequency hopping systems operating in the 5725-5850 MHz band shall use at least 75 hopping frequencies. The maximum 20 dB bandwidth of the hopping channel is 1 MHz.                                                                                                                                             |

### 6.4. Test Procedure

| Test Method                         |                 |         |                              |
|-------------------------------------|-----------------|---------|------------------------------|
|                                     | References Rule | Chapter | Description                  |
| <input checked="" type="checkbox"/> | ANSI C63.10     | 7.8.2   | Carrier frequency separation |

### 6.5. Uncertainty

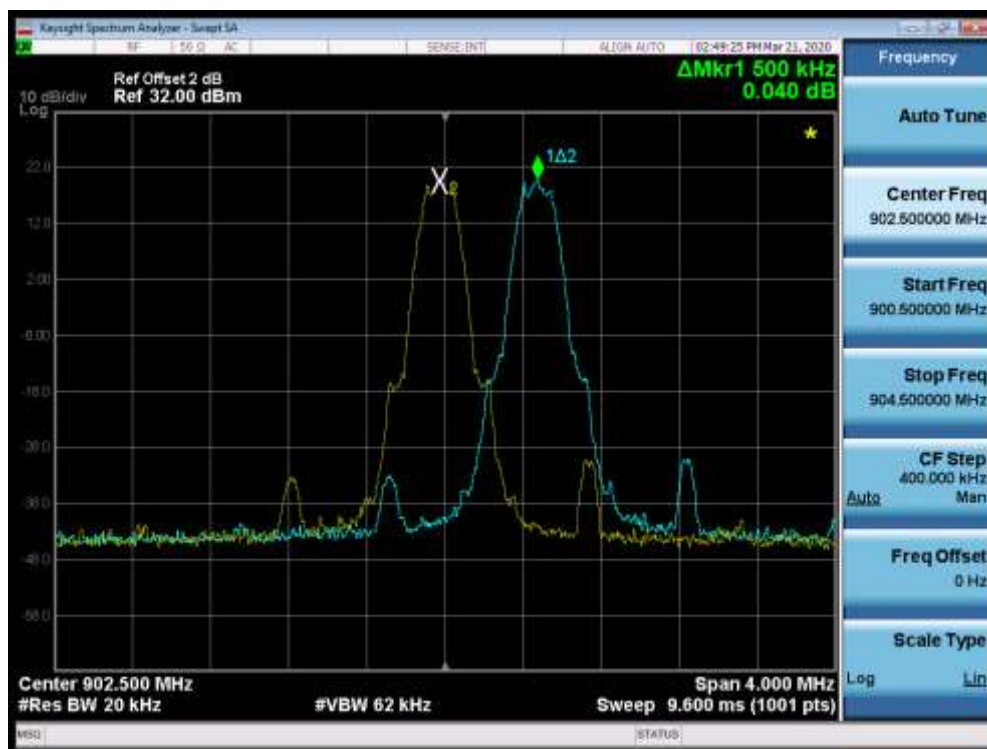
The measurement uncertainty is defined as  $\pm 1$  kHz

## 6.6. Test Result

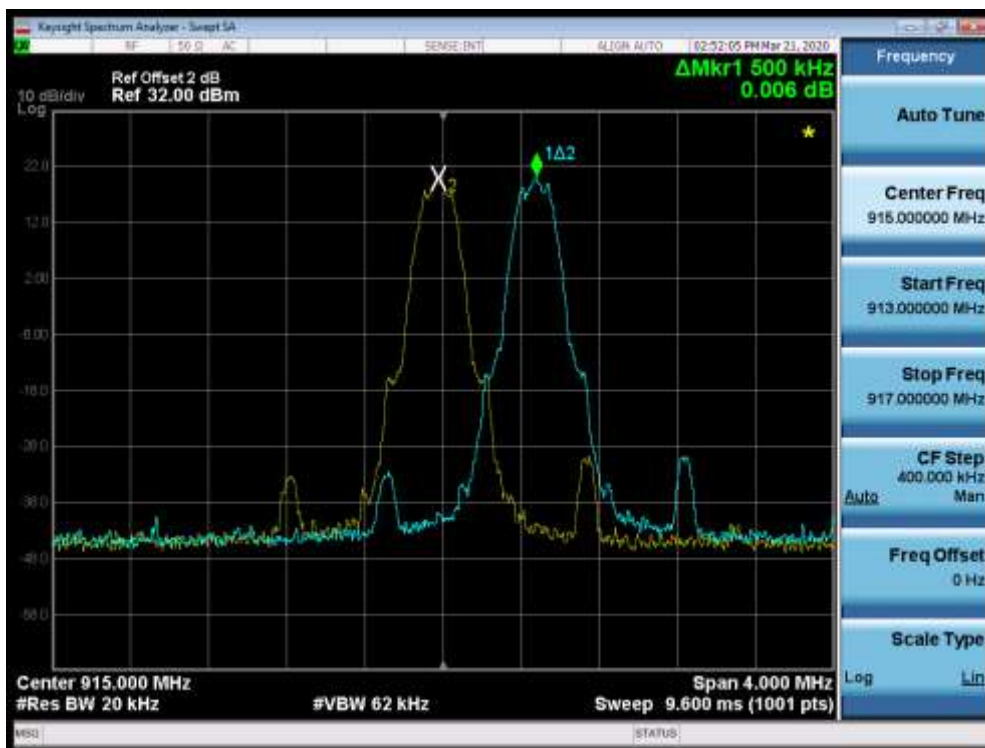
|              |               |           |                |
|--------------|---------------|-----------|----------------|
| Product Name | : Ring Bridge | Power     | : AC 120V/60Hz |
| Test Mode    | : Mode 1      | Test Site | : TR-8         |
| Test Date    | : 2020.03.21  |           |                |

| Channel No. | Frequency (MHz) | Carrier Frequency Separation (kHz) | Limit (kHz) | Result |
|-------------|-----------------|------------------------------------|-------------|--------|
| 01          | 902.5           | 500                                | 268.6       | Pass   |
| 26          | 915.0           | 500                                | 272.2       | Pass   |
| 51          | 927.5           | 500                                | 266.7       | Pass   |

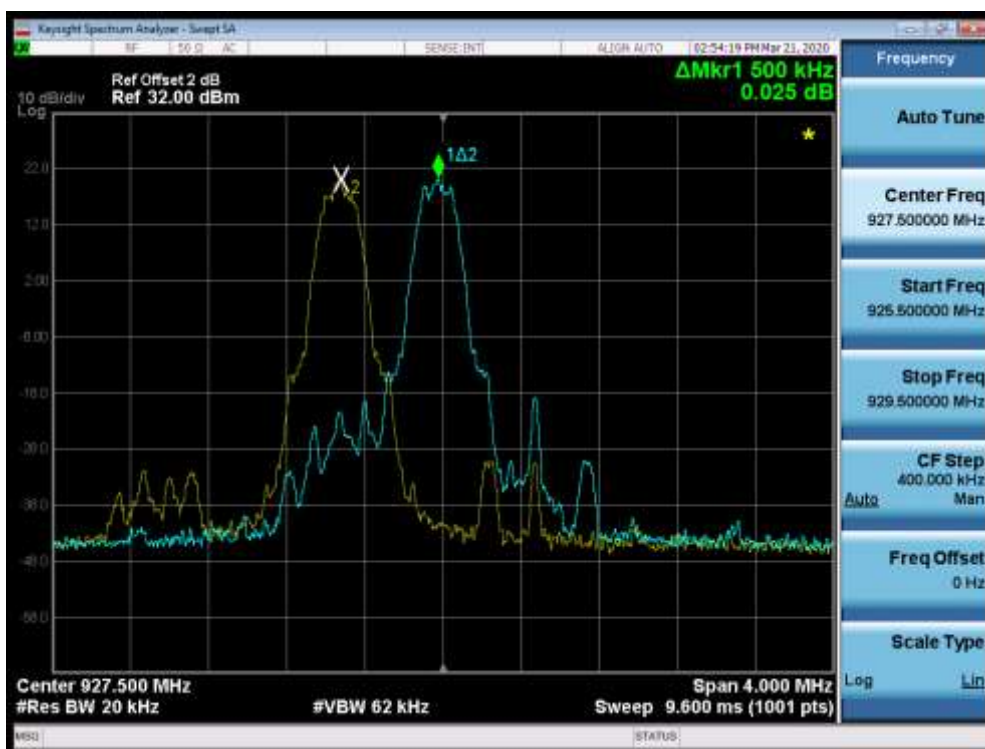
Channel 01 (902.5MHz)



## Channel 26 (915.0MHz)



## Channel 51 (927.5MHz)



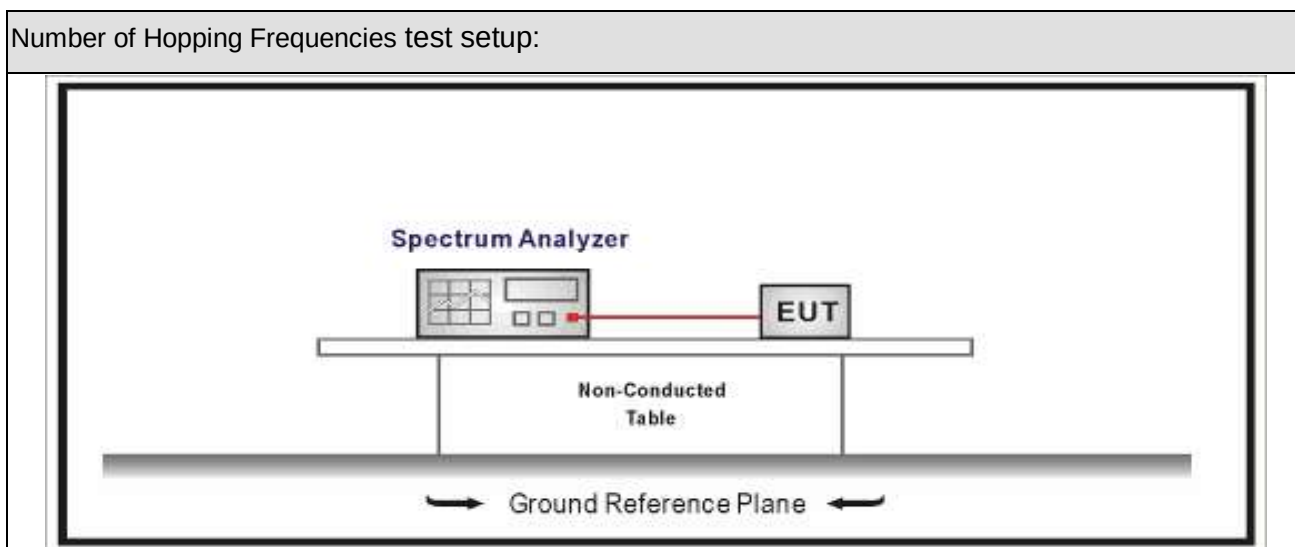


## 7. Number of Hopping Frequencies

### 7.1. Test Equipment

| Number of Hopping Frequencies / TR-8                                                                                                     |              |          |            |            |               |
|------------------------------------------------------------------------------------------------------------------------------------------|--------------|----------|------------|------------|---------------|
| Instrument                                                                                                                               | Manufacturer | Type No. | Serial No. | Cal. Date  | Cal. Due Date |
| Spectrum Analyzer                                                                                                                        | Agilent      | N9010A   | MY48030494 | 2019.09.28 | 2020.09.27    |
| MXA Signal Analyzer                                                                                                                      | Keysight     | N9020B   | MY59050482 | 2019.12.13 | 2020.12.12    |
| Temperature/Humidity Meter                                                                                                               | Zhichen      | ZC1-2    | TR8-TH     | 2019.09.02 | 2020.09.01    |
| Note: All equipment is calibrated with traceable calibrations. Each calibration is traceable to the national or international standards. |              |          |            |            |               |

### 7.2. Test Setup



### 7.3. Limit

| Carrier Frequency Separation        |                                                                                                                                                                               |
|-------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <input type="checkbox"/>            | For frequency hopping systems operating in the 2400-2483.5 MHz band shall use at least 15 hopping frequencies.                                                                |
| <input checked="" type="checkbox"/> | For frequency hopping systems operating in 902-928 MHz band, if the 20 dB bandwidth of the hopping channel is less than 250 kHz, shall use at least 50 hopping frequencies.   |
| <input checked="" type="checkbox"/> | For frequency hopping systems operating in 902-928 MHz band, if the 20 dB bandwidth of the hopping channel is higher than 250 kHz, shall use at least 25 hopping frequencies. |
| <input type="checkbox"/>            | For frequency hopping systems operating in the 5725-5850 MHz band shall use at least 75 hopping frequencies.                                                                  |

## 7.4. Test Procedure

| Test Method                         |                 |         |                               |
|-------------------------------------|-----------------|---------|-------------------------------|
|                                     | References Rule | Chapter | Description                   |
| <input checked="" type="checkbox"/> | ANSI C63.10     | 7.8.3   | Number of Hopping Frequencies |

## 7.5. Uncertainty

The measurement uncertainty is defined as  $\pm 1$  kHz

## 7.6. Test Result

|              |               |           |                |
|--------------|---------------|-----------|----------------|
| Product Name | : Ring Bridge | Power     | : AC 120V/60Hz |
| Test Mode    | : Mode 1      | Test Site | : TR-8         |
| Test Date    | : 2020.03.23  |           |                |

| Frequency Band (MHz) | Number of Hopping Frequencies | Limit | Result |
|----------------------|-------------------------------|-------|--------|
| 902.5-927.5          | 51                            | >25   | Pass   |

### 902.5 - 927.5MHz

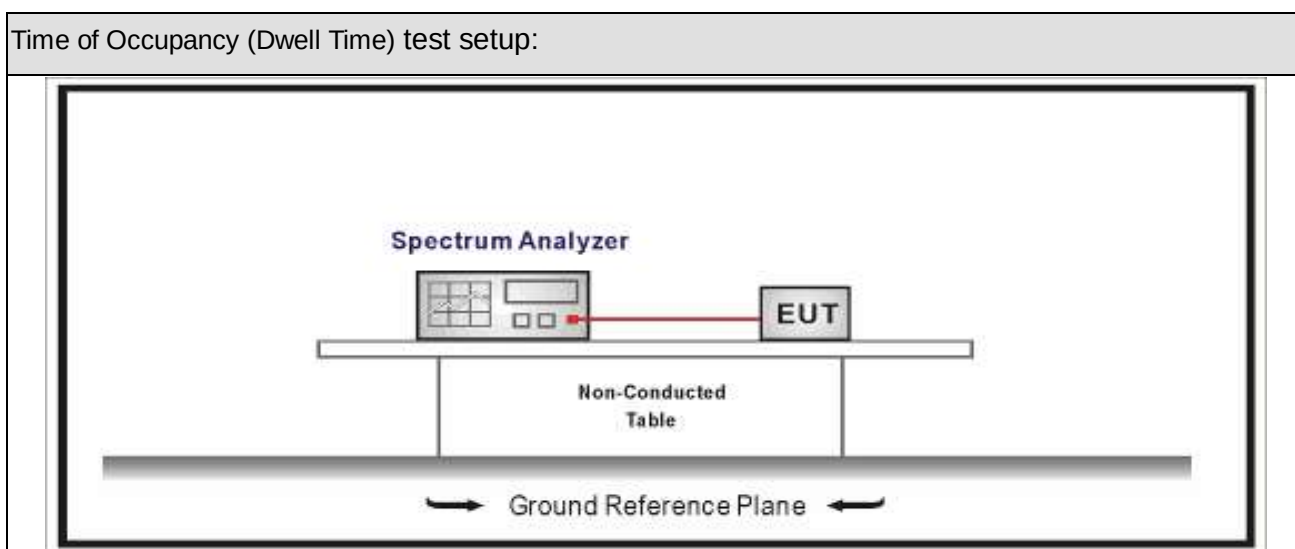


## 8. Time of Occupancy (Dwell Time)

### 8.1. Test Equipment

| Time of Occupancy (Dwell Time) / TR-8                                                                                                    |              |          |            |            |               |
|------------------------------------------------------------------------------------------------------------------------------------------|--------------|----------|------------|------------|---------------|
| Instrument                                                                                                                               | Manufacturer | Type No. | Serial No. | Cal. Date  | Cal. Due Date |
| Spectrum Analyzer                                                                                                                        | Agilent      | N9010A   | MY48030494 | 2019.09.28 | 2020.09.27    |
| MXA Signal Analyzer                                                                                                                      | Keysight     | N9020B   | MY59050482 | 2019.12.13 | 2020.12.12    |
| Temperature/Humidity Meter                                                                                                               | Zhichen      | ZC1-2    | TR8-TH     | 2020.09.02 | 2021.09.01    |
| Note: All equipment is calibrated with traceable calibrations. Each calibration is traceable to the national or international standards. |              |          |            |            |               |

### 8.2. Test Setup



### 8.3. Limit

| Time of Occupancy (Dwell Time)      |                                                                                                                                                                                                                                                                                                              |
|-------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <input type="checkbox"/>            | Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.                                               |
| <input checked="" type="checkbox"/> | For frequency hopping systems operating in the 902-928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period |
| <input type="checkbox"/>            | For frequency hopping systems operating in the 902-928 MHz band: if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4                                  |

|                          |                                                                                                                                                                                                                                                                                       |
|--------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                          | seconds within a 10 second period.                                                                                                                                                                                                                                                    |
| <input type="checkbox"/> | Frequency hopping systems operating in the 5725-5850 MHz band shall use at least 75 hopping frequencies. The maximum 20 dB bandwidth of the hopping channel is 1 MHz. The average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 30 second period. |

#### 8.4. Test Procedure

| Test Method                         |                 |         |                                |
|-------------------------------------|-----------------|---------|--------------------------------|
|                                     | References Rule | Chapter | Description                    |
| <input checked="" type="checkbox"/> | ANSI C63.10     | 7.8.4   | Time of Occupancy (Dwell Time) |

#### 8.5. Uncertainty

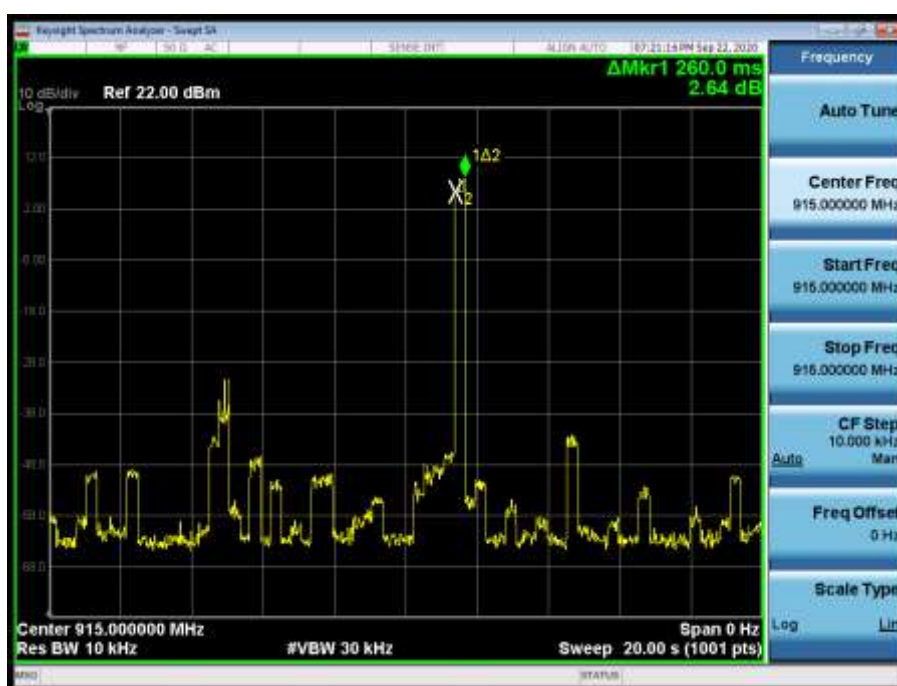
The measurement uncertainty is defined as  $\pm 0.1$  us

## 8.6. Test Result

|              |               |           |                |
|--------------|---------------|-----------|----------------|
| Product Name | : Ring Bridge | Power     | : AC 120V/60Hz |
| Test Mode    | : Mode 1      | Test Site | : TR-8         |
| Test Date    | : 2020.09.22  |           |                |

| Channel No. | Frequency (MHz) | Time of Occupancy (ms) | Limit (ms) | Result |
|-------------|-----------------|------------------------|------------|--------|
| 01          | 915             | 260                    | < 400      | Pass   |

Channel 01 (902.5MHz)

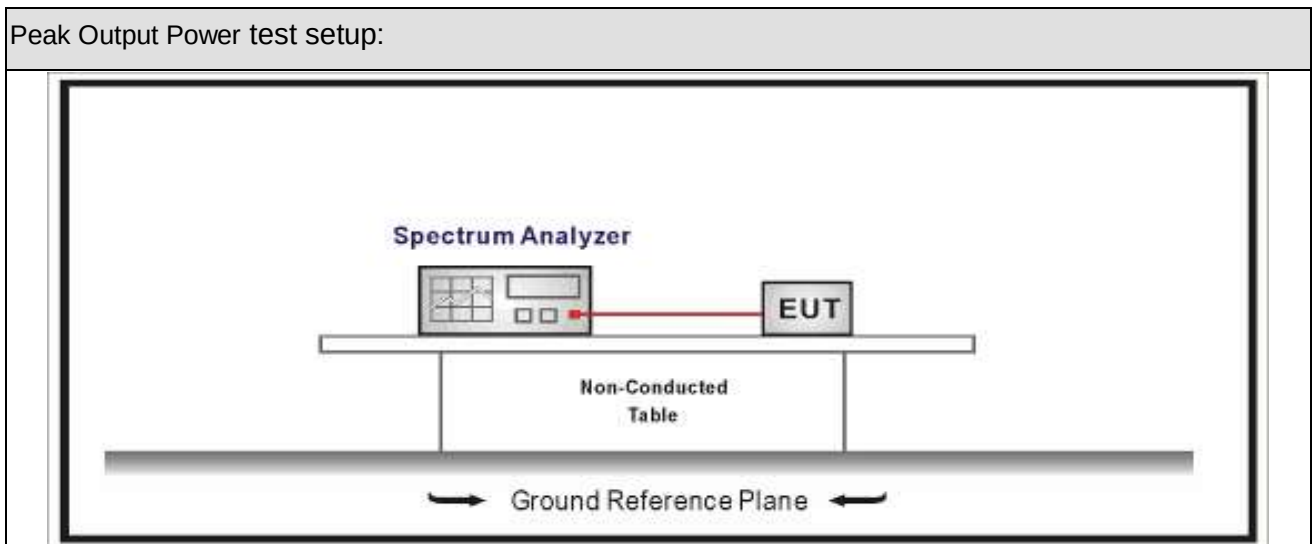


## 9. Peak Output Power

### 9.1. Test Equipment

| Peak Output Power / TR-8                                                                                                                 |              |          |            |            |               |
|------------------------------------------------------------------------------------------------------------------------------------------|--------------|----------|------------|------------|---------------|
| Instrument                                                                                                                               | Manufacturer | Type No. | Serial No. | Cal. Date  | Cal. Due Date |
| Spectrum Analyzer                                                                                                                        | Agilent      | N9010A   | MY48030494 | 2019.09.28 | 2020.09.27    |
| MXA Signal Analyzer                                                                                                                      | Keysight     | N9020B   | MY59050482 | 2019.12.13 | 2020.12.12    |
| Temperature/Humidity Meter                                                                                                               | Zhichen      | ZC1-2    | TR8-TH     | 2020.09.02 | 2021.09.01    |
| Note: All equipment is calibrated with traceable calibrations. Each calibration is traceable to the national or international standards. |              |          |            |            |               |

### 9.2. Test Setup



### 9.3. Limit

| Peak Output Power                   |                                                                                                                                                                                                                                                                                                        |
|-------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <input type="checkbox"/>            | Frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.                         |
| <input type="checkbox"/>            | Frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW. |
| <input checked="" type="checkbox"/> | For frequency hopping systems operating in the 902-928 MHz band: 1 watt for systems employing at least 50 hopping channels; and, 0.25 watts for systems employing less than 50 hopping channels, but at least 25 hopping channels                                                                      |
| <input checked="" type="checkbox"/> | For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt.                                                                                                                                                                                             |

### 9.4. Test Procedure

| Test Method                         |                 |         |                                                                                  |
|-------------------------------------|-----------------|---------|----------------------------------------------------------------------------------|
|                                     | References Rule | Chapter | Description                                                                      |
| <input checked="" type="checkbox"/> | ANSI C63.10     | 7.8.5   | Output power test procedure for frequency-hopping spread-spectrum (FHSS) devices |
| <input checked="" type="checkbox"/> | ANSI C63.10     | 11.9    | Fundamental emission output power                                                |

### 9.5. Uncertainty

The measurement uncertainty is defined as  $\pm 1.0$  dB



## 9.6. Test Result

|              |   |             |           |   |              |
|--------------|---|-------------|-----------|---|--------------|
| Product Name | : | Ring Bridge | Power     | : | AC 120V/60Hz |
| Test Mode    | : | Mode 1      | Test Site | : | TR8          |
| Test Date    | : | 2020.09.22  |           |   |              |

| Channel | Test Frequency<br>(MHz) | Measurement Power Output<br>AV<br>(dBm) | Limit<br>(dBm) | Result |
|---------|-------------------------|-----------------------------------------|----------------|--------|
| 01      | 902.5                   | 17.86                                   | 30             | Pass   |
| 26      | 915.0                   | 17.89                                   | 30             | Pass   |
| 51      | 927.5                   | 17.92                                   | 30             | Pass   |

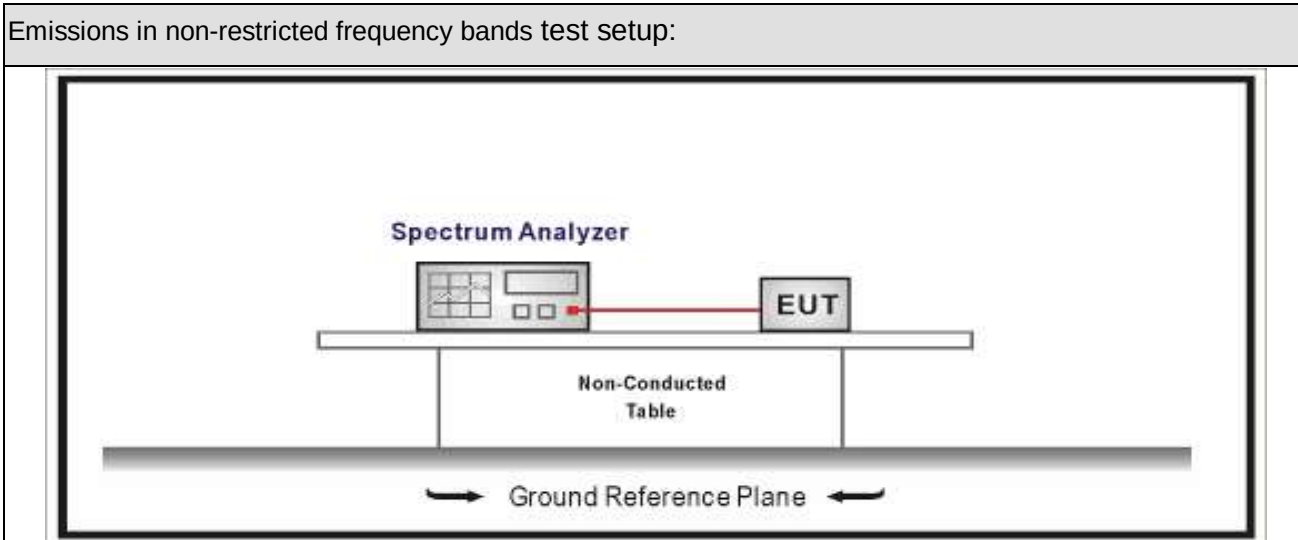
| Channel | Test Frequency<br>(MHz) | E.I.R.P<br>(dBm) | E.I.R.P Limit<br>(dBm) | Result |
|---------|-------------------------|------------------|------------------------|--------|
| 01      | 902.5                   | 16.86            | 30                     | Pass   |
| 26      | 915.0                   | 16.89            | 30                     | Pass   |
| 51      | 927.5                   | 16.92            | 30                     | Pass   |

## 10. Emissions in non-restricted frequency bands

### 10.1. Test Equipment

| Emissions in non-restricted frequency bands / TR-8                                                                                       |              |          |            |            |               |
|------------------------------------------------------------------------------------------------------------------------------------------|--------------|----------|------------|------------|---------------|
| Instrument                                                                                                                               | Manufacturer | Type No. | Serial No. | Cal. Date  | Cal. Due Date |
| Spectrum Analyzer                                                                                                                        | Agilent      | N9010A   | MY48030494 | 2019.09.28 | 2020.09.27    |
| MXA Signal Analyzer                                                                                                                      | Keysight     | N9020B   | MY59050482 | 2019.12.13 | 2020.12.12    |
| Temperature/Humidity Meter                                                                                                               | Zhichen      | ZC1-2    | TR8-TH     | 2020.09.02 | 2021.09.01    |
| Note: All equipment is calibrated with traceable calibrations. Each calibration is traceable to the national or international standards. |              |          |            |            |               |

### 10.2. Test Setup



### 10.3. Limit

| Un-Restricted Band Emissions Limit                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |            |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|
| RF Output power (Detection methods)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Limit(dB)  |
| RF Output power(Average detector)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 30c(Note1) |
| RF Output power(PK detector)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 20c(Note2) |
| <p>Note 1: If maximum conducted (average) output power was used to demonstrate compliance as described in 9.2, then the peak power in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 30 dB relative to the maximum in-band peak PSD level in 100 kHz (i.e., 30 dBc).</p> <p>Note 2: If the maximum peak conducted output power procedure was used, then the peak output power measured in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum in-band peak PSD level in 100 kHz (i.e., 20 dBc).</p> |            |

### 10.4. Test Procedure

| Test Method                         |                 |         |                                                |
|-------------------------------------|-----------------|---------|------------------------------------------------|
|                                     | References Rule | Chapter | Description                                    |
| <input checked="" type="checkbox"/> | ANSI C63.10     | 7.8.6   | Band-edge Compliance of RF Conducted Emissions |
| <input checked="" type="checkbox"/> | ANSI C63.10     | 11.11   | Emissions in nonrestricted frequency bands     |

### 10.5. Uncertainty

The measurement uncertainty is defined as  $\pm 1.0$  dB

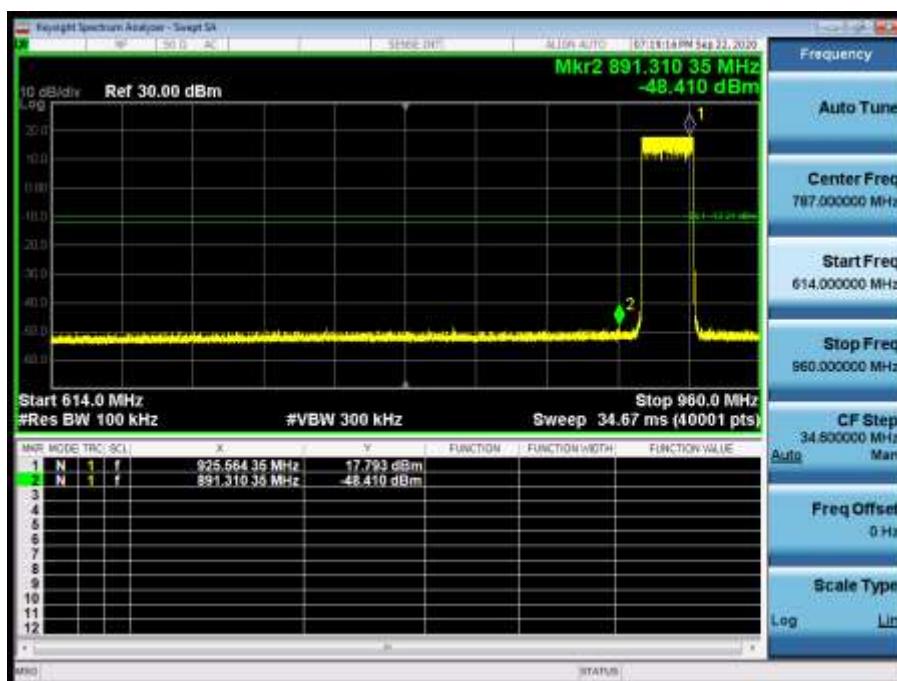
## 10.6. Test Result

|              |               |           |                |
|--------------|---------------|-----------|----------------|
| Product Name | : Ring Bridge | Power     | : AC 120V/60Hz |
| Test Mode    | : Mode 1      | Test Site | : TR-8         |
| Test Date    | : 2020.09.22  |           |                |

| Mode | Channel | Test Frequency (MHz) | In-Band PSD[a] (dBm/100kHz) | Out-Band PSD[b] (dBm/100kHz) | [a]-[b] (dB) | Limit (dB) | Result |
|------|---------|----------------------|-----------------------------|------------------------------|--------------|------------|--------|
| 1    | 01      | 902.5                | 17.644                      | -49.748                      | 67.392       | >30        | Pass   |
| 1    | 51      | 927.5                | 17.774                      | -49.946                      | 67.72        | >30        | Pass   |
| 1    | 01~51   | 902.5-927.5          | 17.793                      | -48.410                      | 66.203       | >30        | Pass   |

Note1: The worst case of Emissions in non-restricted frequency bands as below:

Mode 8 CH01



## 11. Radiated Emission Band Edge

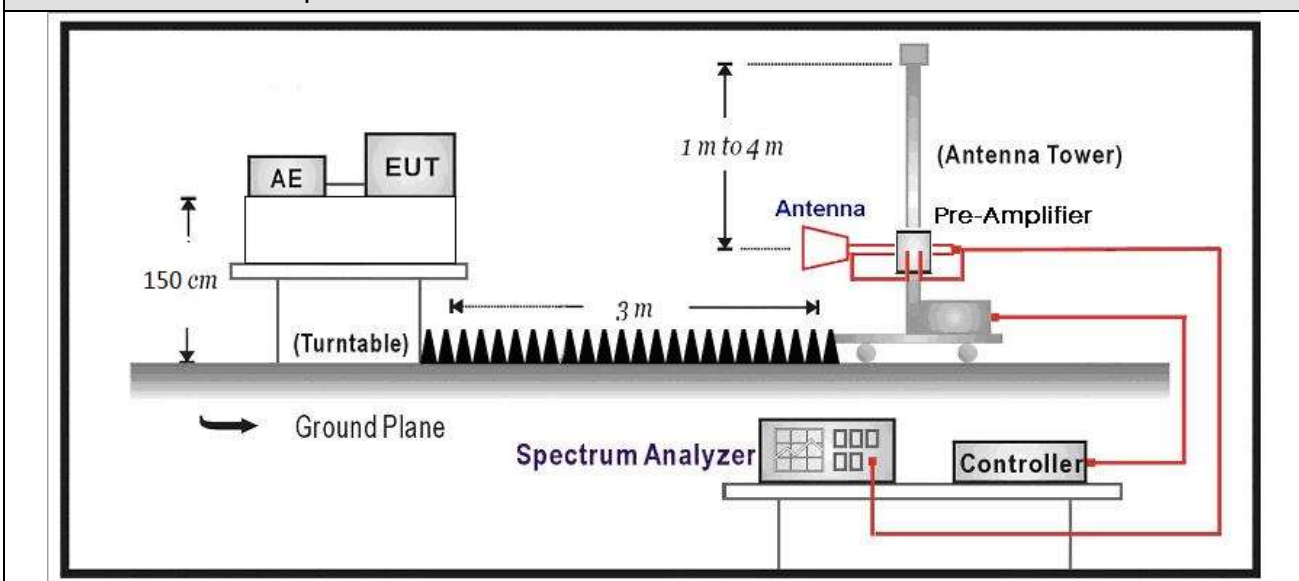
### 11.1. Test Equipment

| Radiated Emission Band Edge / AC-5 |              |                 |             |            |               |
|------------------------------------|--------------|-----------------|-------------|------------|---------------|
| Instrument                         | Manufacturer | Type No.        | Serial No.  | Cal. Date  | Cal. Due Date |
| Spectrum Analyzer                  | Agilent      | N9038A          | MY51210196  | 2019.05.25 | 2020.05.24    |
| Preamplifier                       | BXT          | NA2651D         | LNA17040209 | 2019.04.13 | 2020.04.12    |
| Preamplifier                       | EMCI         | EMC184045S<br>E | 980263      | 2019.06.13 | 2020.06.12    |
| DRG Horn                           | ETS-Lindgren | 3117            | 00167055    | 2019.05.25 | 2020.05.24    |
| Broad-Band Horn<br>Antenna         | Schwarzbeck  | BBHA9170        | 294         | 2020.03.23 | 2021.03.22    |
| Coaxial Cable                      | Huber+Suhner | SUCOFLEX<br>106 | AC5-C2      | 2019.04.13 | 2020.04.12    |
| Temperature/Humidity<br>Meter      | Riters       | RTS-8S          | AC5-TH      | 2019.09.02 | 2020.09.01    |

Note: All equipment is calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.

### 11.2. Test Setup

Above 1GHz Test Setup:



### 11.3. Limit

| Band edge Limit       |          |                      |           |              |
|-----------------------|----------|----------------------|-----------|--------------|
| Frequency bands (MHz) | Detector | Limit (dB $\mu$ V/m) | RBW (KHz) | Distance (m) |
| 608-614               | PK       | 74                   | 100       | 3            |
| 960-1240              | AV       | 54                   | 300       | 3            |

Note: The field strength of emissions appearing within these frequency bands shall not exceed the limits.

### 11.4. Test Procedure

| Test Method                         |                 |         |                                                                                                  |
|-------------------------------------|-----------------|---------|--------------------------------------------------------------------------------------------------|
|                                     | References Rule | Chapter | Description                                                                                      |
| <input checked="" type="checkbox"/> | ANSI C63.10     | 6.10    | Band-edge testing                                                                                |
| <input checked="" type="checkbox"/> | ANSI C63.10     | 6.10.5  | Restricted-band band-edge measurements                                                           |
| <input type="checkbox"/>            | ANSI C63.10     | 6.10.6  | Marker-delta method                                                                              |
| <input type="checkbox"/>            | ANSI C63.10     | 6.4     | Radiated emissions from unlicensed wireless devices below 30 MHz                                 |
| <input type="checkbox"/>            | ANSI C63.10     | 6.5     | Radiated emissions from unlicensed wireless devices in the frequency range of 30 MHz to 1000 MHz |
| <input checked="" type="checkbox"/> | ANSI C63.10     | 6.6     | Radiated emissions from unlicensed wireless devices above 1 GHz                                  |
| <input checked="" type="checkbox"/> | ANSI C63.10     | 7.8.6   | Band-edge measurements for RF conducted emissions                                                |

### 11.5. Uncertainty

The measurement uncertainty above 1G is defined as  $\pm 3.9$  dB

below 1G is defined as  $\pm 3.8$  dB

### **11.6. Test Result**

No restricted band in the range  $\pm 2$  channel bandwidths of the Band-edges of the specified emission band! (608 MHz – 614 MHz and 960 MHz – 1240 MHz).

## 12. Antenna Requirement

### 13.1. Limit

| Antenna Requirement Limit                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |  |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| <p>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.</p> |  |

### 13.2. Antenna Connector Construction

| Antenna Connector Construction                                                             |                                                                  |
|--------------------------------------------------------------------------------------------|------------------------------------------------------------------|
| <input checked="" type="checkbox"/>                                                        | The use of a permanently attached antenna                        |
| <input type="checkbox"/>                                                                   | The antenna use of a unique coupling to the intentional radiator |
| <input type="checkbox"/>                                                                   | The use of a nonstandard antenna jack or electrical connector    |
| Please refer to the attached document "Internal Photograph" to show the antenna connector. |                                                                  |

\_\_\_\_\_ The End \_\_\_\_\_