

# FCC Test Report

Report No.: AGC00927190703FE03

**FCC ID** : 2AKARUR10R-1F  
**APPLICATION PURPOSE** : Original Equipment  
**PRODUCT DESIGNATION** : UHF Card Issuer  
**BRAND NAME** : ZK Radio  
**MODEL NAME** : UR10R-1F, UR10R-2F, UD11R-F, UD10R-F  
**APPLICANT** : Guangdong ZK Radio Electronic Tech Co., Ltd  
**DATE OF ISSUE** : Aug. 30, 2019  
**STANDARD(S)** : FCC Part 15.247  
**REPORT VERSION** : V1.0

## Attestation of Global Compliance (Shenzhen) Co., Ltd

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| Report Version | Revise Time | Issued Date   | Valid Version | Notes           |
|----------------|-------------|---------------|---------------|-----------------|
| V1.0           | /           | Aug. 30, 2019 | Valid         | Initial Release |



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**1. VERIFICATION OF CONFORMITY**

|                                 |   |
|---------------------------------|---|
| <b>Applicant</b>                | Guangdong ZK Radio Electronic Tech Co., Ltd                               |
| <b>Address</b>                  | 1004 Room, 3 block B, Tian-an-Yun-Gu, Ban Tian, Longgang, Shenzhen, China |
| <b>Manufacturer</b>             | Guangdong ZK Radio Electronic Tech Co., Ltd                               |
| <b>Address</b>                  | 1004 Room, 3 block B, Tian-an-Yun-Gu, Ban Tian, Longgang, Shenzhen, China |
| <b>Factory</b>                  | Guangdong ZK Radio Electronic Tech Co., Ltd                               |
| <b>Address</b>                  | 1004 Room, 3 block B, Tian-an-Yun-Gu, Ban Tian, Longgang, Shenzhen, China |
| <b>Product Designation</b>      | UHF Card Issuer   |
| <b>Brand Name</b>               | ZK Radio  |
| <b>Test Model</b>               | UR10R-1F  |
| <b>Series Model</b>             | UR10R-2F, UD11R-F, UD10R-F  |
| <b>Difference description</b>   | All the same except for the model name                                    |
| <b>Date of test</b>             | Jul. 31, 2019 to Aug. 29, 2019  |
| <b>Deviation</b>                | None  |
| <b>Condition of Test Sample</b> | Normal  |
| <b>Test Result</b>              | Pass  |
| <b>Report Template</b>          | AGCRT-US-BR/RF  |

We hereby certify that:

The above equipment was tested by Attestation of Global Compliance (Shenzhen) Co., Ltd. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10 (2013) and the energy emitted by the sample EUT tested as described in this report is in compliance with radiated emission limits of FCC Rules Part 15.247.

Prepared By

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Aug. 29, 2019

Reviewed By

*Max Zhang*Max Zhang  
(Reviewer)

Aug. 30, 2019

Approved By

*Forrest Lei*Forrest Lei  
(Authorized Officer)

Aug. 30, 2019

## 2. GENERAL INFORMATION

### 2.1. PRODUCT DESCRIPTION

The EUT is "RFID" designed as a "Communication Device". It is designed by way of utilizing the FHSS technology to achieve the system operation.

A major technical description of EUT is described as following

|                            |                   |
|----------------------------|-------------------|
| <b>Operation Frequency</b> | 920 MHz to 925MHz |
| <b>RF Output Power</b>     | 25.650dBm(Max)    |
| <b>Modulation</b>          | ASK(FHSS)         |
| <b>Number of channels</b>  | 51                |
| <b>Hardware Version</b>    | D300M-UHF-V1.00   |
| <b>Software Version</b>    | D300M-UHF_V1.03   |
| <b>Antenna Designation</b> | Ceramic Antenna   |
| <b>Antenna Gain</b>        | 2dBi              |
| <b>Power Supply</b>        | DC 5V             |

### 2.2. TABLE OF CARRIER FREQUENCIES

| Frequency Band | Channel Number | Frequency |
|----------------|----------------|-----------|
| 902~928MHZ     | 1              | 920.0MHZ  |
|                | 2              | 920.1MHZ  |
|                | :              | :         |
|                | 50             | 924.9MHZ  |
|                | 51             | 925.0 MHZ |

Note: The channel spacing is 0.1MHz.



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### 2.3. RECEIVER INPUT BANDWIDTH

The input bandwidth of the receiver is 100kHz.

### 2.4. EXAMPLE OF A HOPPING SEQUENCE IN DATA MODE

Example of a 51 hopping sequence in data mode:

21,23,33,25,27,31,07,09,13,11,15,02,06,01,03,05,04,08,10,12,14,16,17,18,19,20,  
24,26,27,28,29,30,32,34,35,36,37,38,40,41,42,43,45,44,47,46,48,49,50,51

### 2.5. EQUALLY AVERAGE USE OF FREQUENCIES AND BEHAVIOUR

The system shall hop to channel frequencies that are selected at the system hopping rate from a pseudo randomly ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter.

### 2.6. RELATED SUBMITTAL(S) / GRANT (S)

This submittal(s) (test report) is filing to comply with Section 15.247 of the FCC Part 15, Subpart C Rules.

### 2.7. TEST METHODOLOGY

Both conducted and radiated testing was performed according to the procedures in ANSI C63.10 (2013). Radiated testing was performed at an antenna to EUT distance 3 meters.

### 2.8. SPECIAL ACCESSORIES

Refer to section 5.2.

### 2.9. EQUIPMENT MODIFICATIONS

Not available for this EUT intended for grant.



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### 3. MEASUREMENT UNCERTAINTY

The uncertainty is calculated using the methods suggested in the "Guide to the Expression of Uncertainty in measurement" (GUM) published by CISPR and ANSI.

- Uncertainty of Conducted Emission,  $U_c = \pm 3.2 \text{ dB}$
- Uncertainty of Radiated Emission below 1GHz,  $U_c = \pm 3.9 \text{ dB}$
- Uncertainty of Radiated Emission above 1GHz,  $U_c = \pm 4.8 \text{ dB}$



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**4. DESCRIPTION OF TEST MODES**

| NO. | TEST MODE DESCRIPTION |
|-----|-----------------------|
| 1   | Low channel TX        |
| 2   | Middle channel TX     |
| 3   | High channel TX       |

Note:

1. Only the result of the worst case was recorded in the report, if no other cases.
2. For Radiated Emission, 3axis were chosen for testing for each applicable mode.
3. The test software is the UHF(MI610)\_V1.01 which can set the EUT into the individual test modes.



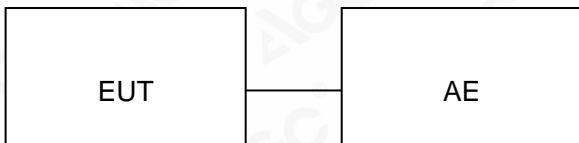
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## 5. SYSTEM TEST CONFIGURATION

### 5.1. CONFIGURATION OF EUT SYSTEM

Configure :



### 5.2. EQUIPMENT USED IN EUT SYSTEM

| Item | Equipment       | Model No. | ID or Specification | Remark          |
|------|-----------------|-----------|---------------------|-----------------|
| 1    | UHF Card Issuer | UR10R-1F  | 2AKARUR10R-1F       | EUT             |
| 2    | PC              | Xiaomi    | Air 13.3            | AE              |
| 3    | Adapter         | Xiao Mi   | ADC6501TM           | AE              |
| 4    | USB Cable       | --        | --                  | Market with EUT |

### 5.3. SUMMARY OF TEST RESULTS

| FCC RULES     | DESCRIPTION OF TEST         | RESULT    |
|---------------|-----------------------------|-----------|
| §15.247       | Peak Output Power           | Compliant |
| §15.247       | 20 dB Bandwidth             | Compliant |
| §15.247       | Spurious Emission           | Compliant |
| 15.247&15.209 | Radiated Emission           | Compliant |
| §15.207       | Conduction Emission         | Compliant |
| §15.247       | Number of Hopping Frequency | Compliant |
| §15.247       | Time of Occupancy           | Compliant |
| §15.247       | Frequency Separation        | Compliant |



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## 6. TEST FACILITY

|  |  |
|--|--|
| <b>Test Site</b>                         | Attestation of Global Compliance (Shenzhen) Co., Ltd   |
| <b>Location</b>                          | 1-2/F, Building 19, Junfeng Industrial Park, Chongqing Road, Heping Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China |
| <b>Designation Number</b>                | CN1259   |
| <b>FCC Test Firm Registration Number</b> | 975832   |
| <b>A2LA Cert. No.</b>                    | 5054.02  |
| <b>Description</b>                       | Attestation of Global Compliance(Shenzhen) Co., Ltd is accredited by A2LA  |

## TEST EQUIPMENT OF CONDUCTED EMISSION TEST

| Equipment     | Manufacturer | Model   | S/N    | Cal. Date     | Cal. Due      |
|---------------|--------------|---------|--------|---------------|---------------|
| TEST RECEIVER | R&S          | ESPI    | 101206 | Jun. 10, 2019 | Jun. 09, 2020 |
| LISN          | R&S          | ESH2-Z5 | 100086 | Aug. 26, 2019 | Aug. 25, 2020 |

## TEST EQUIPMENT OF RADIATED EMISSION TEST

| Equipment                      | Manufacturer   | Model        | S/N        | Cal. Date     | Cal. Due      |
|--------------------------------|----------------|--------------|------------|---------------|---------------|
| TEST RECEIVER                  | R&S            | ESCI         | 10096      | Jun. 12, 2019 | Jun. 11, 2020 |
| EXA Signal Analyzer            | Agilent        | N9010A       | MY53470504 | Dec. 20, 2018 | Dec. 19, 2019 |
| 2.4GHz Fliter                  | EM Electronics | 2400-2500MHz | N/A        | Feb. 27, 2019 | Feb. 26, 2020 |
| Attenuator                     | ZHINAN         | E-002        | N/A        | Aug. 26, 2019 | Aug. 25, 2020 |
| Horn antenna                   | SCHWARZBECK    | BBHA 9170    | #768       | Sep. 21, 2017 | Sep. 20, 2020 |
| Active loop antenna (9K-30MHz) | ZHINAN         | ZN30900C     | 18051      | Jun. 14, 2018 | Jun. 13, 2020 |
| Double-Ridged Waveguide Horn   | ETS LINDGREN   | 3117         | 00034609   | May. 26, 2018 | May. 25, 2020 |
| Broadband Preamplifier         | ETS LINDGREN   | 3117PA       | 00225134   | Oct. 25, 2018 | Oct. 24, 2019 |
| ANTENNA                        | SCHWARZBECK    | VULB9168     | D69250     | Sep. 28, 2017 | Sep. 27, 2019 |

## 7. PEAK OUTPUT POWER

### 7.1. MEASUREMENT PROCEDURE

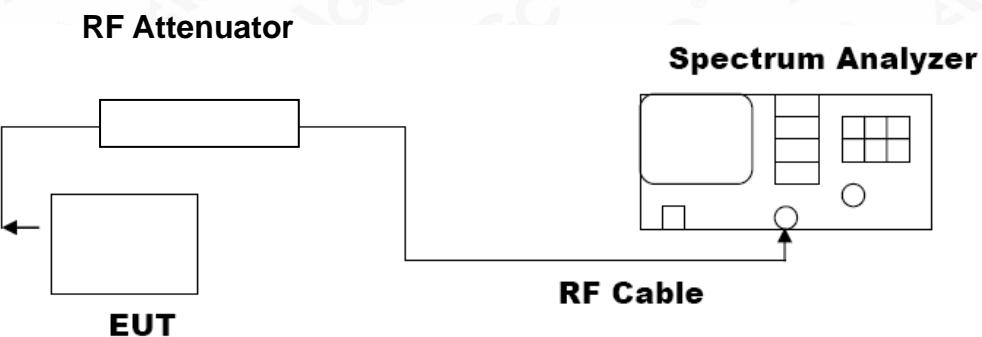
For peak power test:

1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
2. Span: Approximately five times the 20 dB bandwidth, centered on a hopping channel.
3. RBW > 20 dB bandwidth of the emission being measured.
4. VBW  $\geq$  RBW.
5. Sweep: Auto.
6. Detector function: Peak.
7. Trace: Max hold.

Allow trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission. The indicated level is the peak output power, after any corrections for external attenuators and cables.

### 7.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)

#### PEAK POWER TEST SETUP



### 7.3. LIMITS AND MEASUREMENT RESULT

| PEAK OUTPUT POWER MEASUREMENT RESULT<br>FOR ASK MODULATION |                     |                            |              |
|--|---------------------|----------------------------|--------------|
| Frequency<br>(MHz)   | Peak Power<br>(dBm) | Applicable Limits<br>(dBm) | Pass or Fail |
| 920.0  | 25.650              | 30                         | Pass         |
| 922.5  | 25.192              | 30                         | Pass         |
| 925.0  | 24.944              | 30                         | Pass         |

Low Channel



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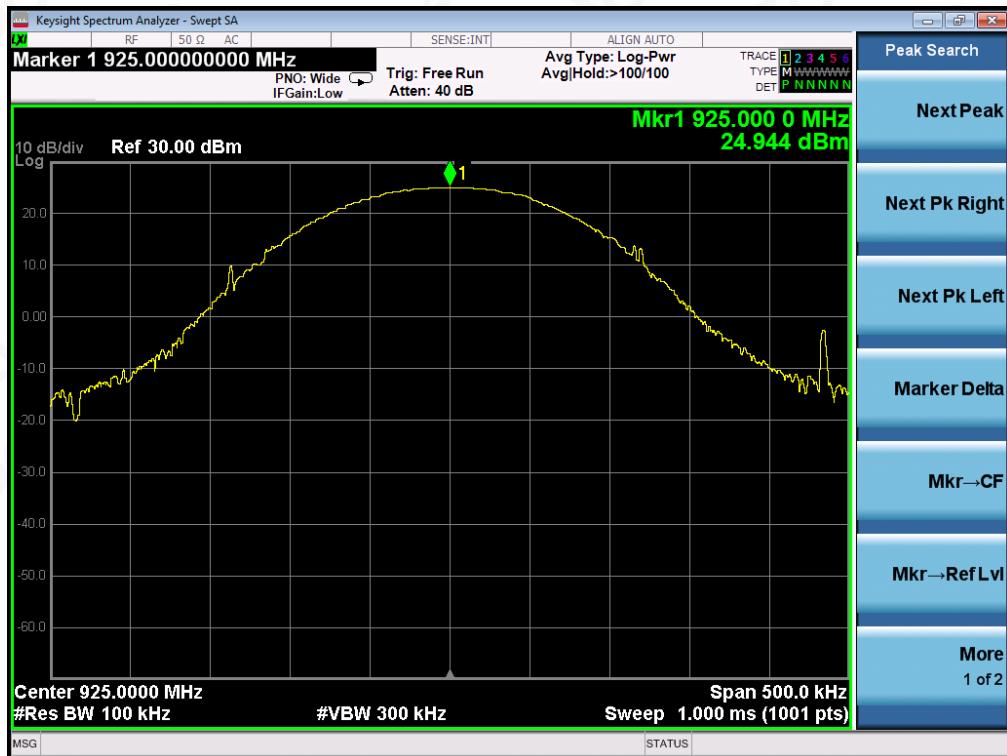
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## Middle Channel



## High Channel



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## 8. 20DB BANDWIDTH

### 8.1. MEASUREMENT PROCEDURE

1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
2. Set the EUT Work on the top, the middle and the bottom operation frequency individually.
3. Set Span = approximately 2 to 5 times the 20 dB bandwidth, centered on a hopping channel  
The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1% to 5% of the OBW and video bandwidth (VBW) shall be approximately three times RBW; Sweep = auto; Detector function = peak
4. Set SPA Trace 1 Max hold, then View.

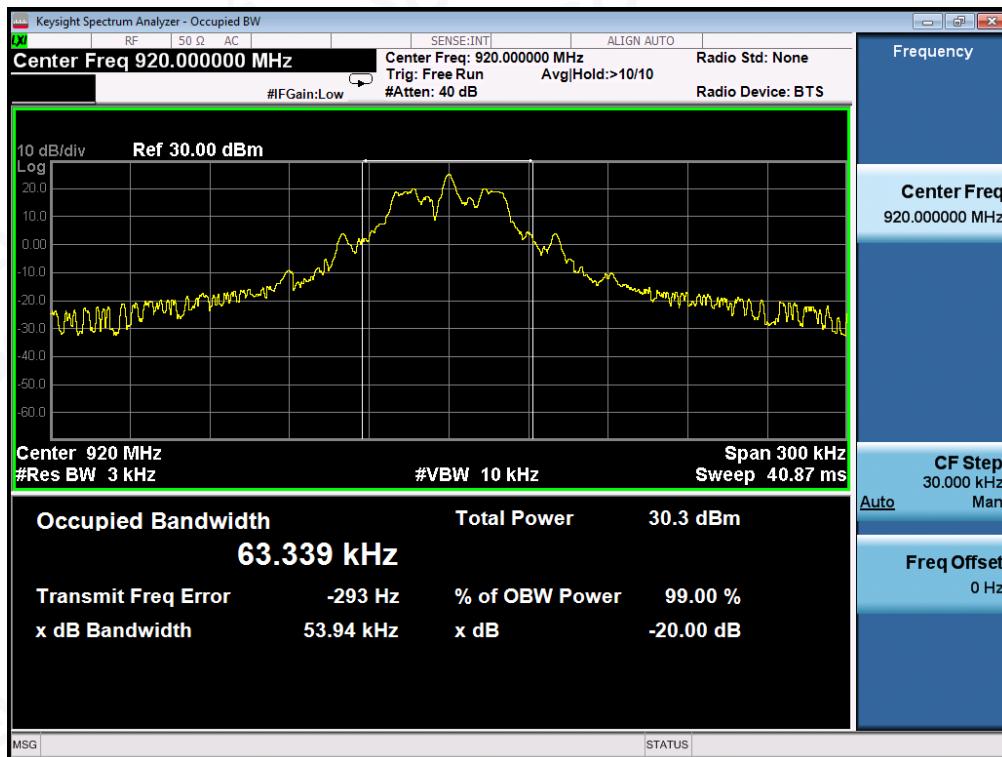
### 8.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)

The same as described in section 7.2.

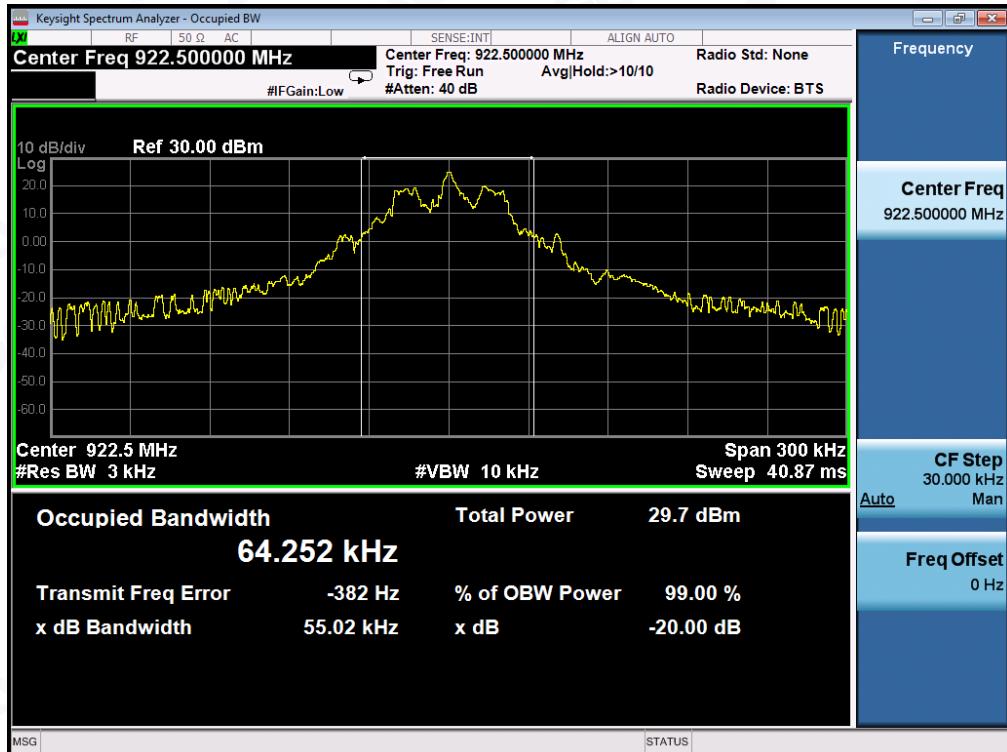
### 8.3. LIMITS AND MEASUREMENT RESULTS

| MEASUREMENT RESULT FOR ASK MOUDULATION |                    |          |      |
|--|--------------------|----------|------|
| Applicable Limits                      | Measurement Result |          |      |
|  | Test Data (kHz)    | Criteria |      |
| N/A                                    | Low Channel        | 53.94    | PASS |
|  | Middle Channel     | 55.02    | PASS |
|  | High Channel       | 54.93    | PASS |

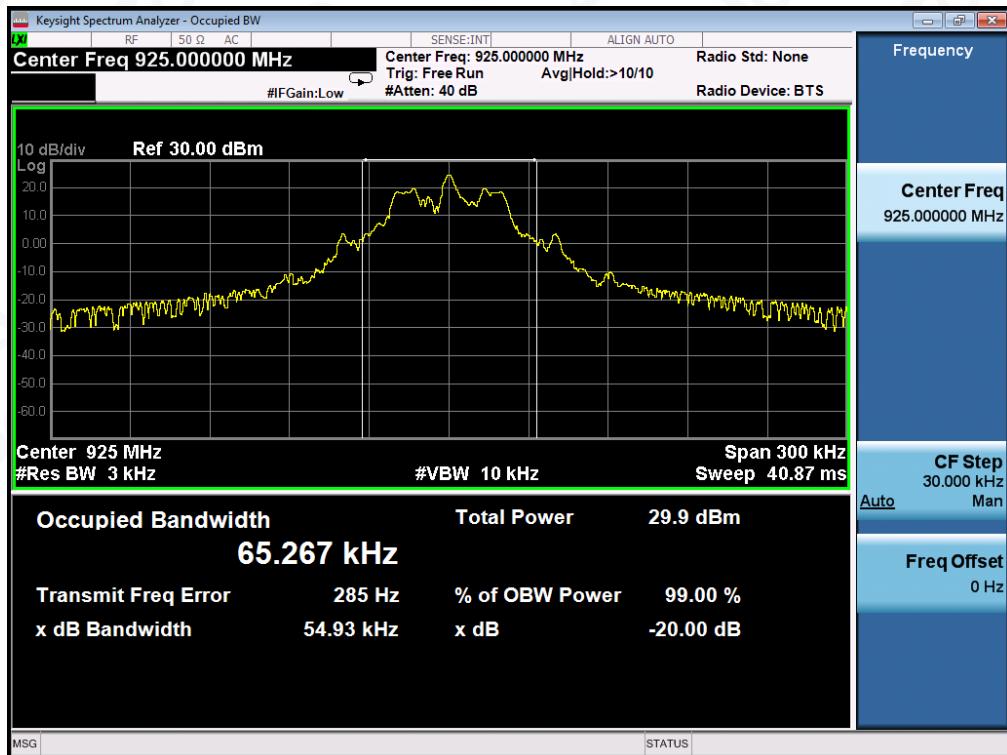
TEST PLOT OF BANDWIDTH FOR LOW CHANNEL



## TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL



## TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL



## 9. CONDUCTED SPURIOUS EMISSION

### 9.1. MEASUREMENT PROCEDURE

1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
2. Set the EUT Work on the top, the Middle and the bottom operation frequency individually.
3. Set the Span = wide enough to capture the peak level of the in-band emission and all spurious emissions from the lowest frequency generated in the EUT up through the 10th harmonic.  
RBW = 100 kHz; VBW= 300 kHz; Sweep = auto; Detector function = peak.
4. Set SPA Trace 1 Max hold, then View.

### 9.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)

The same as described in section 8.2

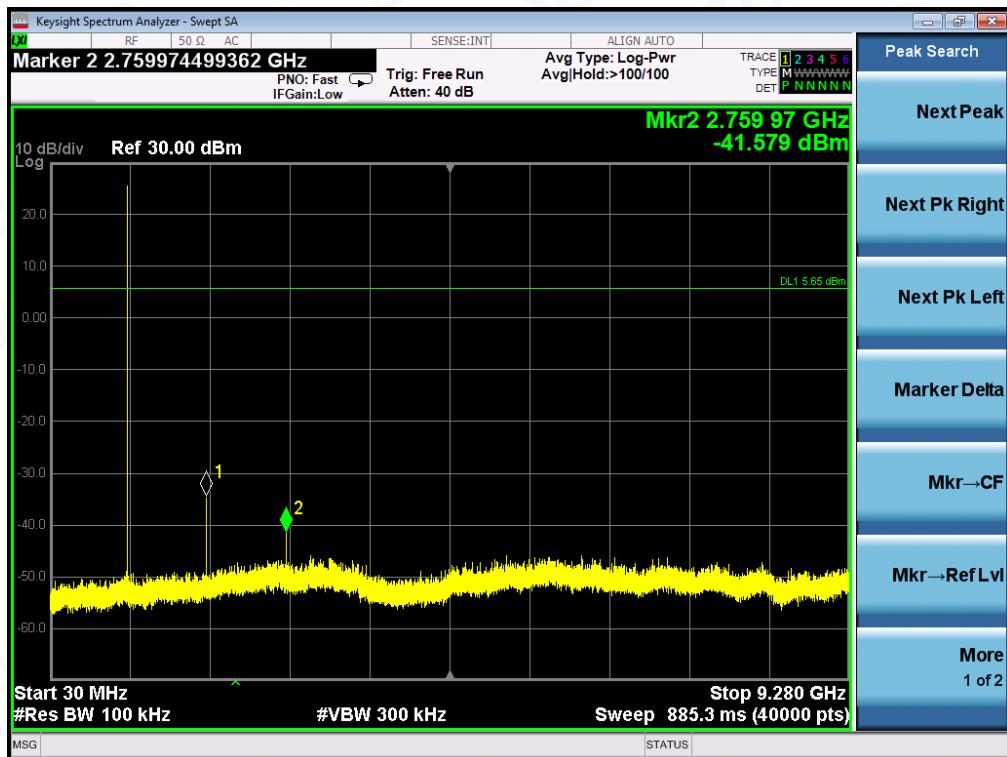
### 9.3. MEASUREMENT EQUIPMENT USED

The same as described in section 6

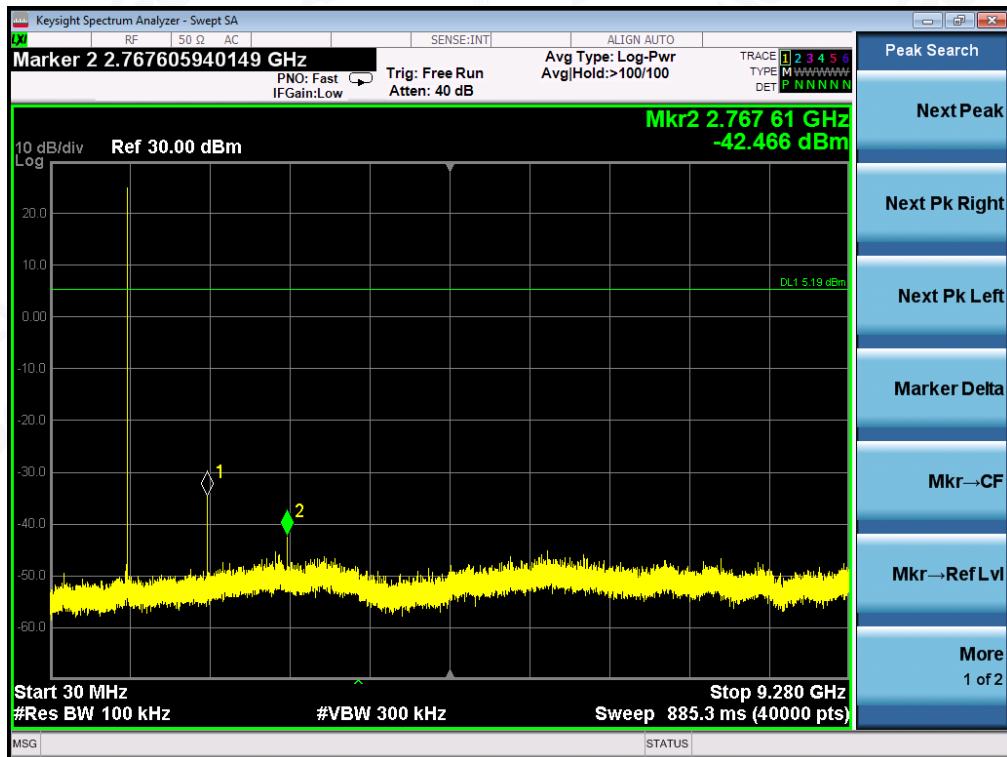
### 9.4. LIMITS AND MEASUREMENT RESULT

| LIMITS AND MEASUREMENT RESULT  |  |          |
|--|--|----------|
| Applicable Limits  | Measurement Result   |          |
|  | Test Data  | Criteria |
| <p>In any 100 KHz Bandwidth Outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produce by the intentional radiator shall be at least 20 dB below that in 100KHz bandwidth within the band that contains the highest level of the desired power.</p> <p>In addition, radiation emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in§15.209(a))</p> | At least -20dBc than the limit Specified on the BOTTOM Channel | PASS     |
|  | At least -20dBc than the limit Specified on the TOP Channel    | PASS     |

### TEST RESULT FOR ENTIRE FREQUENCY RANGE ASK MODULATION IN LOW CHANNEL



### ASK MODULATION IN MIDDLE CHANNEL



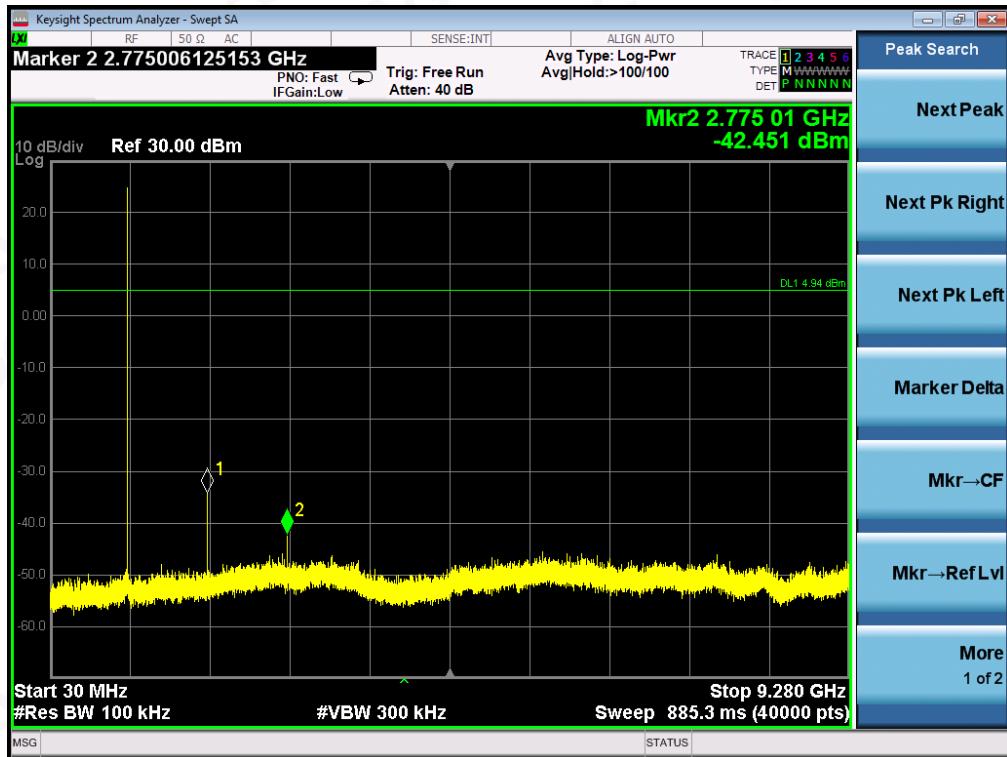
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## ASK MODULATION IN HIGH CHANNEL



Note: The peak emissions without marker on the above plots are fundamental wave and need not to compare with the limit.



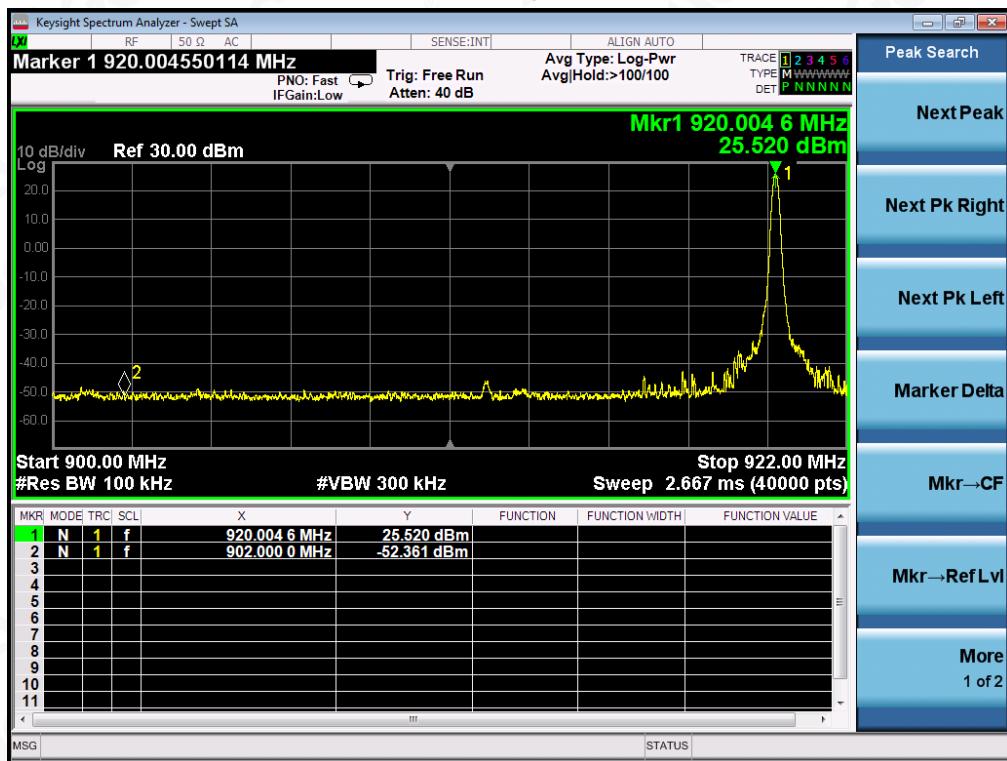
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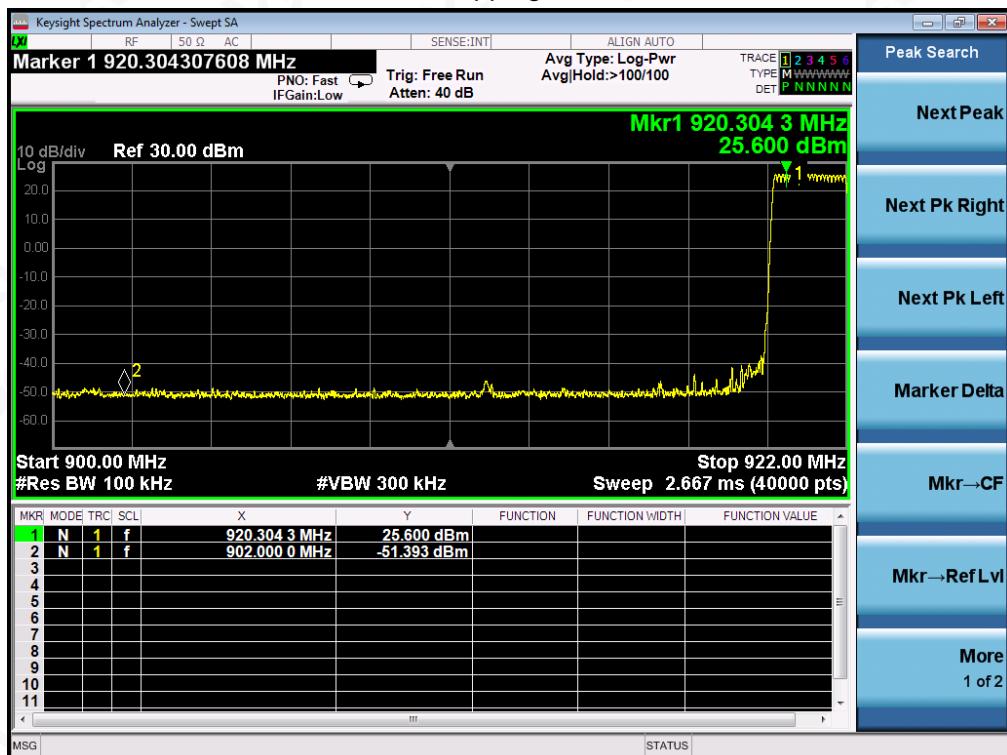
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**TEST RESULT FOR BAND EDGE  
ASK MODULATION IN LOW CHANNEL**  
Hopping off



Hopping on

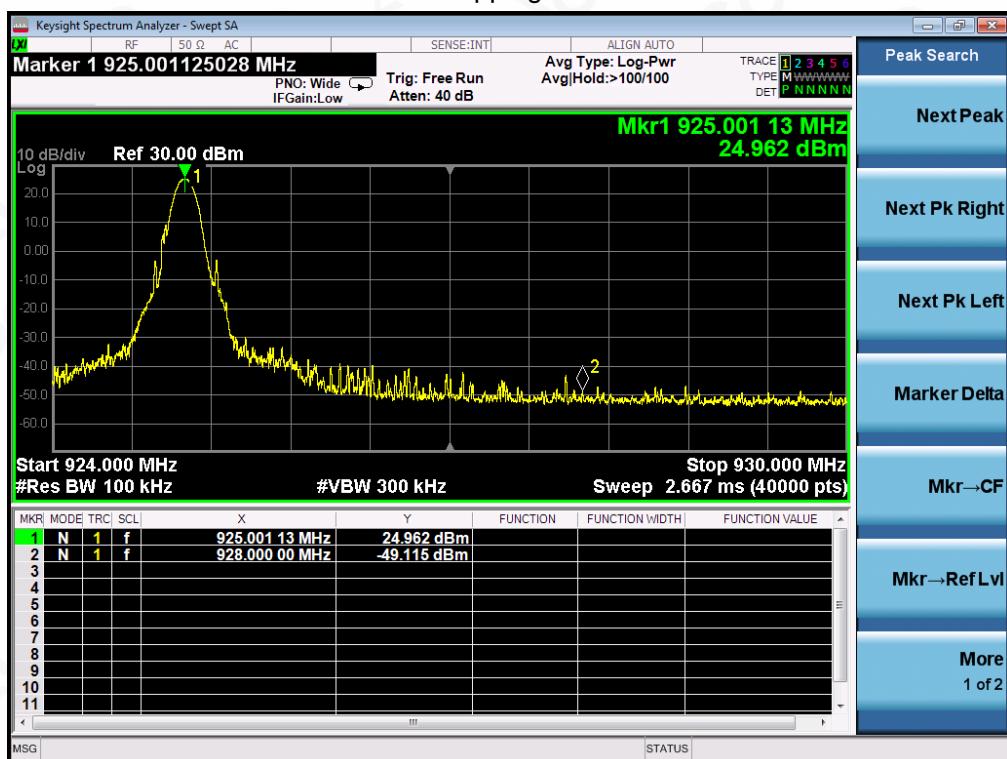


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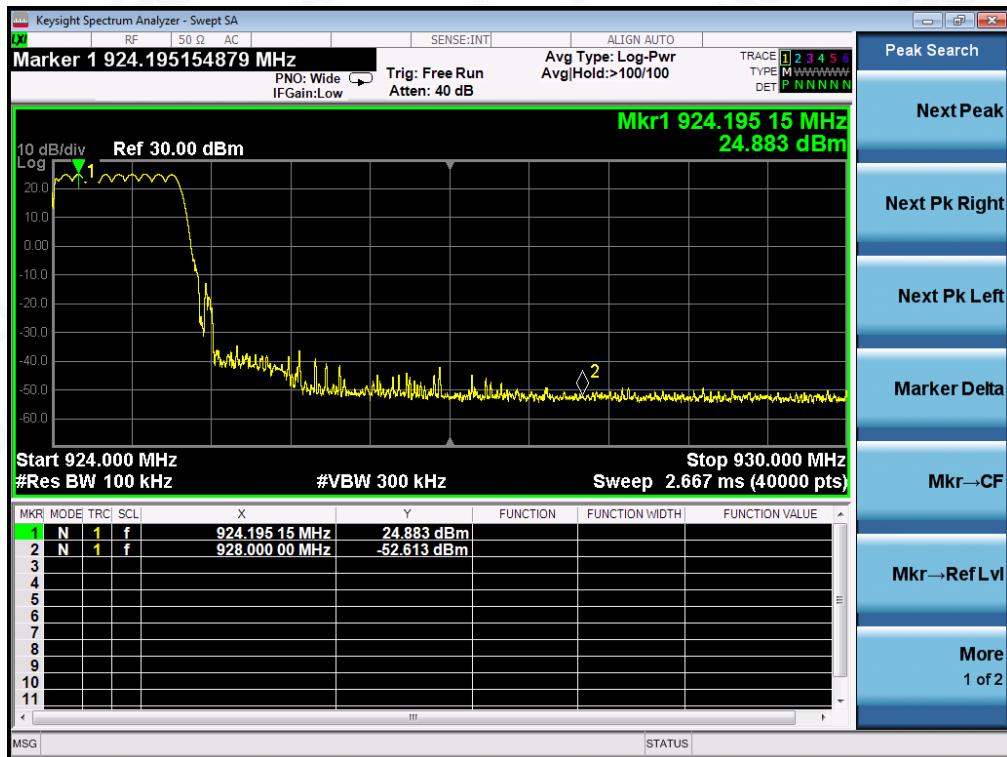
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ASK MODULATION IN HIGH CHANNEL  
 Hopping off


## Hopping on



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## 10. RADIATED EMISSION

### 10.1. MEASUREMENT PROCEDURE

1. The EUT was placed on the top of the turntable 0.8 or 1.5 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
4. For each suspected emissions, the antenna tower was scan (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
5. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
6. For emissions above 1GHz, use 1MHz VBW and RBW for peak reading. Then 1MHz RBW and 10Hz VBW for average reading in spectrum analyzer. Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.
7. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum values.
8. If the emissions level of the EUT in peak mode was 3 dB lower than the average limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method for below 1GHz.
9. For testing above 1GHz, the emissions level of the EUT in peak mode was lower than average limit (that means the emissions level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
10. In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver. High - Low scan is not required in this case.

The following table is the setting of spectrum analyzer and receiver.

| Spectrum Parameter    | Setting   |
|-----------------------|---|
| Start ~Stop Frequency | 9KHz~150KHz/RB 200Hz for QP                               |
| Start ~Stop Frequency | 150KHz~30MHz/RB 9KHz for QP                               |
| Start ~Stop Frequency | 30MHz~1000MHz/RB 120KHz for QP                            |
| Start ~Stop Frequency | 1GHz~26.5GHz<br>1MHz/1MHz for Peak, 1MHz/10Hz for Average |

| Receiver Parameter    | Setting                        |
|-----------------------|--------------------------------|
| Start ~Stop Frequency | 9KHz~150KHz/RB 200Hz for QP    |
| Start ~Stop Frequency | 150KHz~30MHz/RB 9KHz for QP    |
| Start ~Stop Frequency | 30MHz~1000MHz/RB 120KHz for QP |

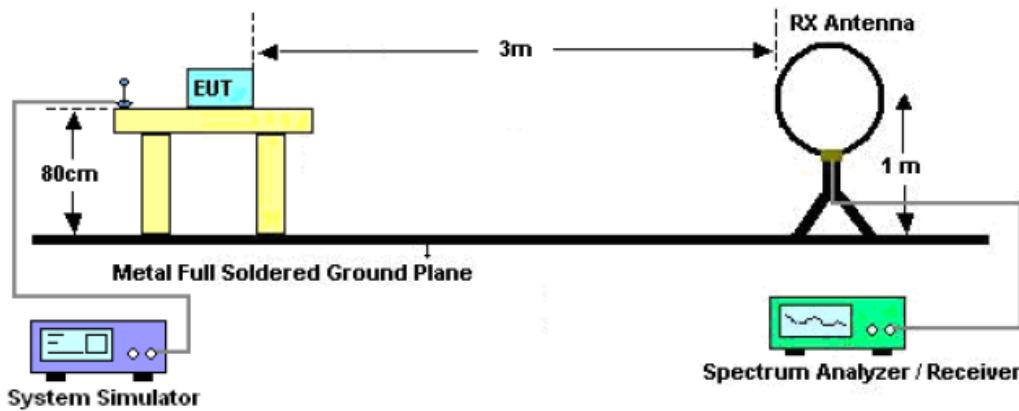


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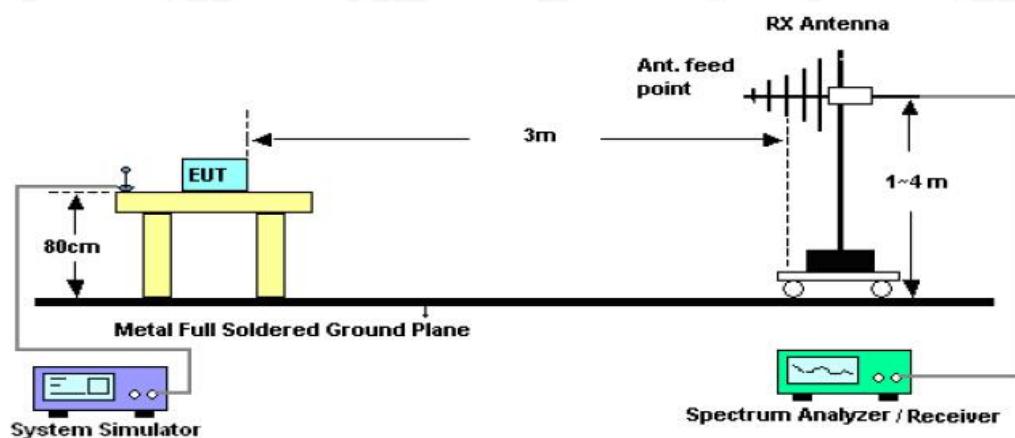
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## 10.2. TEST SETUP

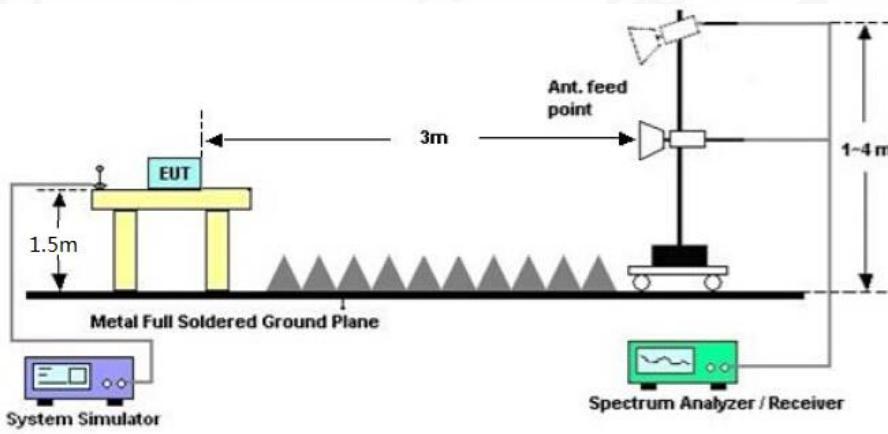
Radiated Emission Test-Setup Frequency Below 30MHz



RADIATED EMISSION TEST SETUP 30MHz-1000MHz



RADIATED EMISSION TEST SETUP ABOVE 1000MHz



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### 10.3. LIMITS AND MEASUREMENT RESULT

15.209(a) Limit in the below table has to be followed

| Frequencies (MHz) | Field Strength (micorvolts/meter) | Measurement Distance (meters) |
|-------------------|-----------------------------------|-------------------------------|
| 0.009~0.490       | 2400/F(KHz)                       | 300                           |
| 0.490~1.705       | 24000/F(KHz)                      | 30                            |
| 1.705~30.0        | 30                                | 30                            |
| 30~88             | 100                               | 3                             |
| 88~216            | 150                               | 3                             |
| 216~960           | 200                               | 3                             |
| Above 960         | 500                               | 3                             |

Note: All modes were tested For restricted band radiated emission,  
the test records reported below are the worst result compared to other modes.

### 10.4. TEST RESULT

#### RADIATED EMISSION BELOW 30MHZ

No emission found between lowest internal used/generated frequencies to 30MHz.



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**RADIATED EMISSION BELOW 1GHZ**

|                    |                 |                          |                |
|--------------------|-----------------|--------------------------|----------------|
| <b>EUT</b>         | UHF Card Issuer | <b>Model Name</b>        | UR10R-1F       |
| <b>Temperature</b> | 25°C            | <b>Relative Humidity</b> | 55.4%          |
| <b>Pressure</b>    | 960hPa          | <b>Test Voltage</b>      | Normal Voltage |
| <b>Test Mode</b>   | Mode 1          | <b>Antenna</b>           | Horizontal     |



| No. | Mk | Freq.    | Reading            | Factor               | Measurement          | Limit                | Over   | Detector | Antenna Height | Table Degree | Comment |
|-----|----|----------|--------------------|----------------------|----------------------|----------------------|--------|----------|----------------|--------------|---------|
|     |    | MHz      | dB <sub>B</sub> uV | dB <sub>B</sub> uV/m | dB <sub>B</sub> uV/m | dB <sub>B</sub> uV/m | dB     |          | cm             | degree       |         |
| 1   |    | 59.0998  | 5.56               | 18.95                | 24.51                | 40.00                | -15.49 | peak     |                |              |         |
| 2   |    | 261.1831 | 12.13              | 18.41                | 30.54                | 46.00                | -15.46 | peak     |                |              |         |
| 3   |    | 329.0833 | 9.52               | 20.49                | 30.01                | 46.00                | -15.99 | peak     |                |              |         |
| 4   |    | 599.0665 | 4.76               | 26.93                | 31.69                | 46.00                | -14.31 | peak     |                |              |         |
| 5   | *  | 843.1832 | 4.56               | 30.97                | 35.53                | 46.00                | -10.47 | peak     |                |              |         |
| 6   |    | 980.5999 | 2.89               | 32.39                | 35.28                | 54.00                | -18.72 | peak     |                |              |         |

**RESULT: PASS**


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|                    |                 |                          |                |
|--------------------|-----------------|--------------------------|----------------|
| <b>EUT</b>         | UHF Card Issuer | <b>Model Name</b>        | UR10R-1F       |
| <b>Temperature</b> | 25°C            | <b>Relative Humidity</b> | 55.4%          |
| <b>Pressure</b>    | 960hPa          | <b>Test Voltage</b>      | Normal Voltage |
| <b>Test Mode</b>   | Mode 1          | <b>Antenna</b>           | Vertical       |



| No. | Mk | Freq.    | Reading | Factor | Measurement | Limit  | Over   | Detector | Antenna Height | Table Degree | Comment |
|-----|----|----------|---------|--------|-------------|--------|--------|----------|----------------|--------------|---------|
|     |    | MHz      | dBuV    | dBuV/m | dBuV/m      | dBuV/m | dB     |          |                |              |         |
| 1   |    | 59.0998  | 11.49   | 18.95  | 30.44       | 40.00  | -9.56  | peak     |                |              |         |
| 2   | *  | 141.5500 | 15.47   | 19.23  | 34.70       | 43.50  | -8.80  | peak     |                |              |         |
| 3   |    | 215.9165 | 14.75   | 17.00  | 31.75       | 43.50  | -11.75 | peak     |                |              |         |
| 4   |    | 516.6165 | 8.95    | 25.32  | 34.27       | 46.00  | -11.73 | peak     |                |              |         |
| 5   |    | 843.1832 | 5.49    | 30.97  | 36.46       | 46.00  | -9.54  | peak     |                |              |         |
| 6   |    | 932.0999 | 3.17    | 31.98  | 35.15       | 46.00  | -10.85 | peak     |                |              |         |

## RESULT: PASS

### Note:

- Factor=Antenna Factor + Cable loss, Margin=Measurement-Limit.
- The "Factor" value can be calculated automatically by software of measurement system.
- All test modes had been pre-tested. The mode 1 is the worst case and recorded in the report.



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**RADIATED EMISSION ABOVE 1GHZ**

|                    |                 |                          |                |
|--------------------|-----------------|--------------------------|----------------|
| <b>EUT</b>         | UHF Card Issuer | <b>Model Name</b>        | UR10R-1F       |
| <b>Temperature</b> | 25°C            | <b>Relative Humidity</b> | 55.4%          |
| <b>Pressure</b>    | 960hPa          | <b>Test Voltage</b>      | Normal Voltage |
| <b>Test Mode</b>   | Mode 1          | <b>Antenna</b>           | Horizontal     |

| Frequency<br>(MHz) | Meter Reading<br>(dB $\mu$ V) | Factor<br>(dB) | Emission Level<br>(dB $\mu$ V/m) | Limits<br>(dB $\mu$ V/m) | Margin<br>(dB) | Value Type |
|--------------------|-------------------------------|----------------|----------------------------------|--------------------------|----------------|------------|
| 1840.018           | 50.33                         | 0.08           | 50.41                            | 74.00                    | -23.59         | peak       |
| 1840.018           | 47.61                         | 0.08           | 47.69                            | 54.00                    | -6.31          | Avg        |
| 2760.027           | 44.48                         | 2.21           | 46.69                            | 74.00                    | -27.31         | peak       |
| 2760.027           | 40.79                         | 2.21           | 43.00                            | 54.00                    | -11.00         | Avg        |
|                    |                               |                |                                  |                          |                |            |
|                    |                               |                |                                  |                          |                |            |

**Remark:**

Factor = Antenna Factor + Cable Loss – Pre-amplifier.

|                    |                 |                          |                |
|--------------------|-----------------|--------------------------|----------------|
| <b>EUT</b>         | UHF Card Issuer | <b>Model Name</b>        | UR10R-1F       |
| <b>Temperature</b> | 25°C            | <b>Relative Humidity</b> | 55.4%          |
| <b>Pressure</b>    | 960hPa          | <b>Test Voltage</b>      | Normal Voltage |
| <b>Test Mode</b>   | Mode 1          | <b>Antenna</b>           | Vertical       |

| Frequency<br>(MHz) | Meter Reading<br>(dB $\mu$ V) | Factor<br>(dB) | Emission Level<br>(dB $\mu$ V/m) | Limits<br>(dB $\mu$ V/m) | Margin<br>(dB) | Value Type |
|--------------------|-------------------------------|----------------|----------------------------------|--------------------------|----------------|------------|
| 1840.018           | 52.36                         | 0.08           | 52.44                            | 74.00                    | -21.56         | peak       |
| 1840.018           | 46.83                         | 0.08           | 46.91                            | 54.00                    | -7.09          | Avg        |
| 2760.027           | 42.86                         | 2.21           | 45.07                            | 74.00                    | -28.93         | peak       |
| 2760.027           | 38.84                         | 2.21           | 41.05                            | 54.00                    | -12.95         | Avg        |
|                    |                               |                |                                  |                          |                |            |
|                    |                               |                |                                  |                          |                |            |

**Remark:**

Factor = Antenna Factor + Cable Loss – Pre-amplifier.



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|                    |                 |                          |                |
|--------------------|-----------------|--------------------------|----------------|
| <b>EUT</b>         | UHF Card Issuer | <b>Model Name</b>        | UR10R-1F       |
| <b>Temperature</b> | 25°C            | <b>Relative Humidity</b> | 55.4%          |
| <b>Pressure</b>    | 960hPa          | <b>Test Voltage</b>      | Normal Voltage |
| <b>Test Mode</b>   | Mode 2          | <b>Antenna</b>           | Horizontal     |

| Frequency<br>(MHz) | Meter Reading<br>(dB $\mu$ V) | Factor<br>(dB) | Emission Level<br>(dB $\mu$ V/m) | Limits<br>(dB $\mu$ V/m) | Margin<br>(dB) | Value Type |
|--------------------|-------------------------------|----------------|----------------------------------|--------------------------|----------------|------------|
| 1845.018           | 50.33                         | 0.14           | 50.47                            | 74.00                    | -23.53         |            |
| 1845.018           | 47.47                         | 0.14           | 47.61                            | 54.00                    | -6.39          | AVG        |
| 2767.527           | 45.68                         | 2.36           | 48.04                            | 74.00                    | -25.96         | peak       |
| 2767.527           | 42.35                         | 2.36           | 44.71                            | 54.00                    | -9.29          | AVG        |
|                    |                               |                |                                  |                          |                |            |
|                    |                               |                |                                  |                          |                |            |
|                    |                               |                |                                  |                          |                |            |

Remark:

Factor = Antenna Factor + Cable Loss – Pre-amplifier.

|                    |                 |                          |                |
|--------------------|-----------------|--------------------------|----------------|
| <b>EUT</b>         | UHF Card Issuer | <b>Model Name</b>        | UR10R-1F       |
| <b>Temperature</b> | 25°C            | <b>Relative Humidity</b> | 55.4%          |
| <b>Pressure</b>    | 960hPa          | <b>Test Voltage</b>      | Normal Voltage |
| <b>Test Mode</b>   | Mode 2          | <b>Antenna</b>           | Vertical       |

| Frequency<br>(MHz) | Meter Reading<br>(dB $\mu$ V) | Factor<br>(dB) | Emission Level<br>(dB $\mu$ V/m) | Limits<br>(dB $\mu$ V/m) | Margin<br>(dB) | Value Type |
|--------------------|-------------------------------|----------------|----------------------------------|--------------------------|----------------|------------|
| 1845.018           | 52.57                         | 0.14           | 52.71                            | 74.00                    | -21.29         |            |
| 1845.018           | 47.80                         | 0.14           | 47.94                            | 54.00                    | -6.06          | AVG        |
| 2767.527           | 44.30                         | 2.36           | 46.66                            | 74.00                    | -27.34         | peak       |
| 2767.527           | 42.24                         | 2.36           | 44.60                            | 54.00                    | -9.40          | AVG        |
|                    |                               |                |                                  |                          |                |            |
|                    |                               |                |                                  |                          |                |            |
|                    |                               |                |                                  |                          |                |            |

Remark:

Factor = Antenna Factor + Cable Loss – Pre-amplifier.



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|                    |                 |                          |                |
|--------------------|-----------------|--------------------------|----------------|
| <b>EUT</b>         | UHF Card Issuer | <b>Model Name</b>        | UR10R-1F       |
| <b>Temperature</b> | 25°C            | <b>Relative Humidity</b> | 55.4%          |
| <b>Pressure</b>    | 960hPa          | <b>Test Voltage</b>      | Normal Voltage |
| <b>Test Mode</b>   | Mode 3          | <b>Antenna</b>           | Horizontal     |

| Frequency<br>(MHz) | Meter Reading<br>(dB $\mu$ V) | Factor<br>(dB) | Emission Level<br>(dB $\mu$ V/m) | Limits<br>(dB $\mu$ V/m) | Margin<br>(dB) | Value Type |
|--------------------|-------------------------------|----------------|----------------------------------|--------------------------|----------------|------------|
| 1850.018           | 51.49                         | 0.22           | 51.71                            | 74.00                    | -22.29         |            |
| 1850.018           | 48.39                         | 0.22           | 48.61                            | 54.00                    | -5.39          | AVG        |
| 2775.027           | 43.40                         | 2.64           | 46.04                            | 74.00                    | -27.96         | peak       |
| 2775.027           | 42.13                         | 2.64           | 44.77                            | 54.00                    | -9.23          | AVG        |
|                    |                               |                |                                  |                          |                |            |
|                    |                               |                |                                  |                          |                |            |
|                    |                               |                |                                  |                          |                |            |

Remark:

Factor = Antenna Factor + Cable Loss – Pre-amplifier.

|                    |                 |                          |                |
|--------------------|-----------------|--------------------------|----------------|
| <b>EUT</b>         | UHF Card Issuer | <b>Model Name</b>        | UR10R-1F       |
| <b>Temperature</b> | 25°C            | <b>Relative Humidity</b> | 55.4%          |
| <b>Pressure</b>    | 960hPa          | <b>Test Voltage</b>      | Normal Voltage |
| <b>Test Mode</b>   | Mode 3          | <b>Antenna</b>           | Vertical       |

| Frequency<br>(MHz) | Meter Reading<br>(dB $\mu$ V) | Factor<br>(dB) | Emission Level<br>(dB $\mu$ V/m) | Limits<br>(dB $\mu$ V/m) | Margin<br>(dB) | Value Type |
|--------------------|-------------------------------|----------------|----------------------------------|--------------------------|----------------|------------|
| 1850.018           | 51.22                         | 0.22           | 51.44                            | 74.00                    | -22.56         |            |
| 1850.018           | 47.72                         | 0.22           | 47.94                            | 54.00                    | -6.06          | AVG        |
| 2775.027           | 43.86                         | 2.64           | 46.50                            | 74.00                    | -27.50         | peak       |
| 2775.027           | 41.81                         | 2.64           | 44.45                            | 54.00                    | -9.55          | AVG        |
|                    |                               |                |                                  |                          |                |            |
|                    |                               |                |                                  |                          |                |            |
|                    |                               |                |                                  |                          |                |            |

Remark:

Factor = Antenna Factor + Cable Loss – Pre-amplifier.

## RESULT: PASS

### Note:

Other emissions from 1G to 10 GHz are considered as ambient noise. No recording in the test report.

Factor = Antenna Factor + Cable loss - Amplifier gain, Over=Measure-Limit.

The “Factor” value can be calculated automatically by software of measurement system.

All test modes had been pre-tested. The GFSK modulation is the worst case and recorded in the report.



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## 11. NUMBER OF HOPPING FREQUENCY

### 11.1. MEASUREMENT PROCEDURE

The EUT shall have its hopping function enabled. Use the following spectrum analyzer settings:

1. Span: The frequency band of operation. Depending on the number of channels the device supports, it may be necessary to divide the frequency range of operation across multiple spans, to allow the individual channels to be clearly seen.
2. RBW: To identify clearly the individual channels, set the RBW to less than 30% of the channel spacing or the 20 dB bandwidth, whichever is smaller.
3. VBW  $\geq$  RBW. Sweep: Auto. Detector function: Peak. Trace: Max hold.
4. Allow the trace to stabilize.

### 11.2. TEST SETUP (BLOCK DIAGRAM OF CONFIGURATION)

Same as described in section 8.2

### 11.3. MEASUREMENT EQUIPMENT USED

The same as described in section 6

### 11.4. LIMITS AND MEASUREMENT RESULT

| TOTAL NO. OF HOPPING CHANNEL | LIMIT (NO. OF CH) | MEASUREMENT (NO. OF CH) | RESULT |
|------------------------------|-------------------|-------------------------|--------|
|                              | >=50              | 51                      | PASS   |

TEST PLOT FOR NO. OF TOTAL CHANNELS



## 12. TIME OF OCCUPANCY (DWELL TIME)

### 12.1. MEASUREMENT PROCEDURE

The EUT shall have its hopping function enabled. Use the following spectrum analyzer settings:

1. Span: Zero span, centered on a hopping channel.
2. RBW shall be  $\leq$  channel spacing and where possible RBW should be set  $\gg 1 / T$ , where T is the expected dwell time per channel.
3. Sweep: As necessary to capture the entire dwell time per hopping channel; where possible use a video trigger and trigger delay so that the transmitted signal starts a little to the right of the start of the plot. The trigger level might need slight adjustment to prevent triggering when the system hops on an adjacent channel; a second plot might be needed with a longer sweep time to show two successive hops on a channel.
4. Detector function: Peak. Trace: Max hold.
5. Use the marker-delta function to determine the transmit time per hop.
6. Repeat the measurement using a longer sweep time to determine the number of hops over the period specified in the requirements. The sweep time shall be equal to, or less than, the period specified in the requirements. Determine the number of hops over the sweep time and calculate the total number of hops in the period specified in the requirements, using the following equation:

(Number of hops in the period specified in the requirements) = (number of hops on spectrum analyzer)  $\times$  (period specified in the requirements / analyzer sweep time)

7. The average time of occupancy is calculated from the transmit time per hop multiplied by the number of hops in the period specified in the requirements.

### 12.2. TEST SETUP (BLOCK DIAGRAM OF CONFIGURATION)

Same as described in section 8.2

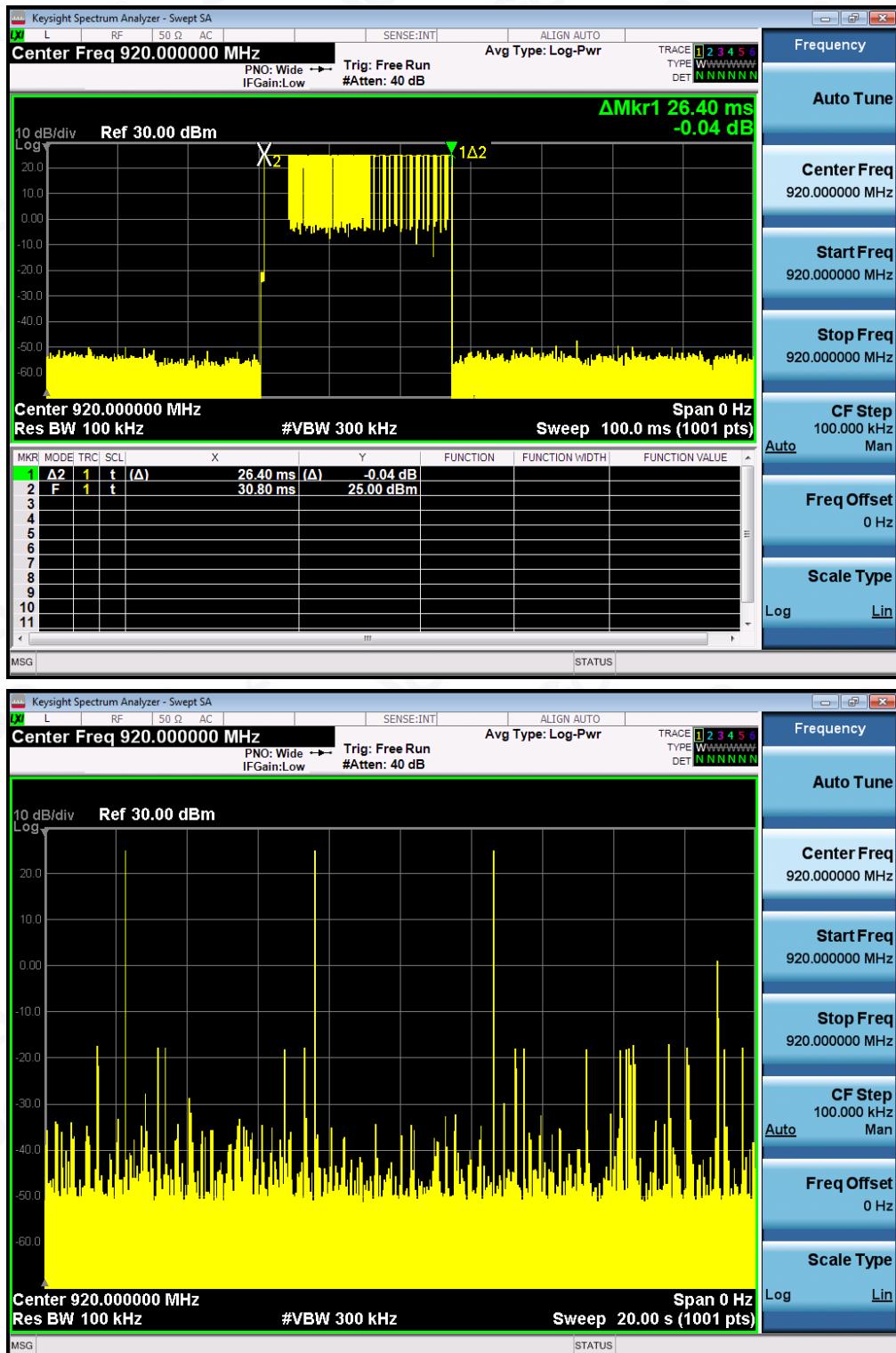
### 12.3. MEASUREMENT EQUIPMENT USED

The same as described in section 6

### 12.4. LIMITS AND MEASUREMENT RESULT

| Channel | Time of Pulse (ms) | Number of hops in the period specified in the requirements | Sweep Time (ms) | Limit (ms) |
|---------|--------------------|--|-----------------|------------|
| Low     | 26.40              | 3  | 79.20           | 400        |
| Middle  | 26.40              | 4  | 105.60          | 400        |
| High    | 26.40              | 3  | 79.20           | 400        |

## TEST PLOT OF LOW CHANNEL



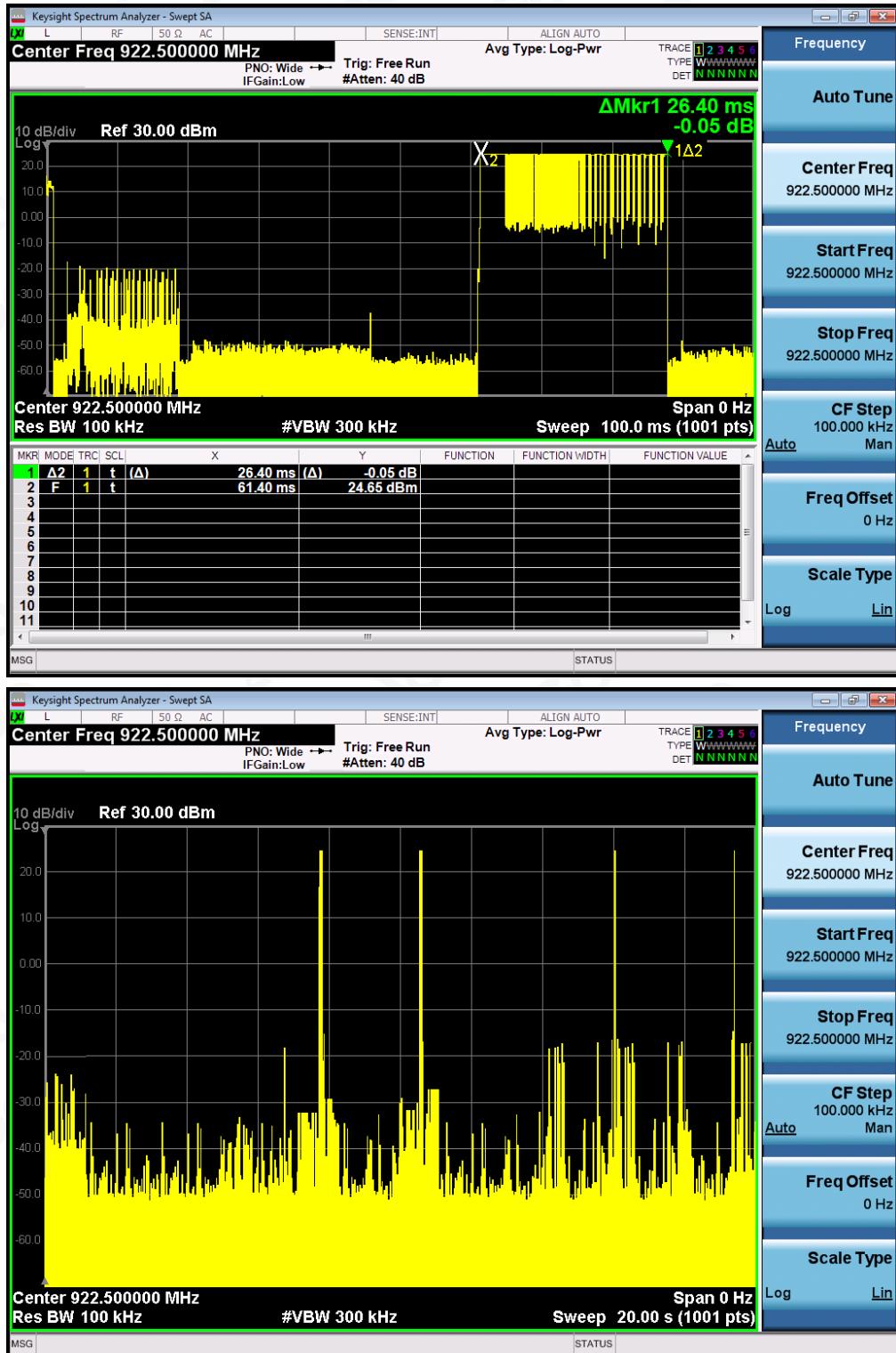
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## TEST PLOT OF MIDDLE CHANNEL



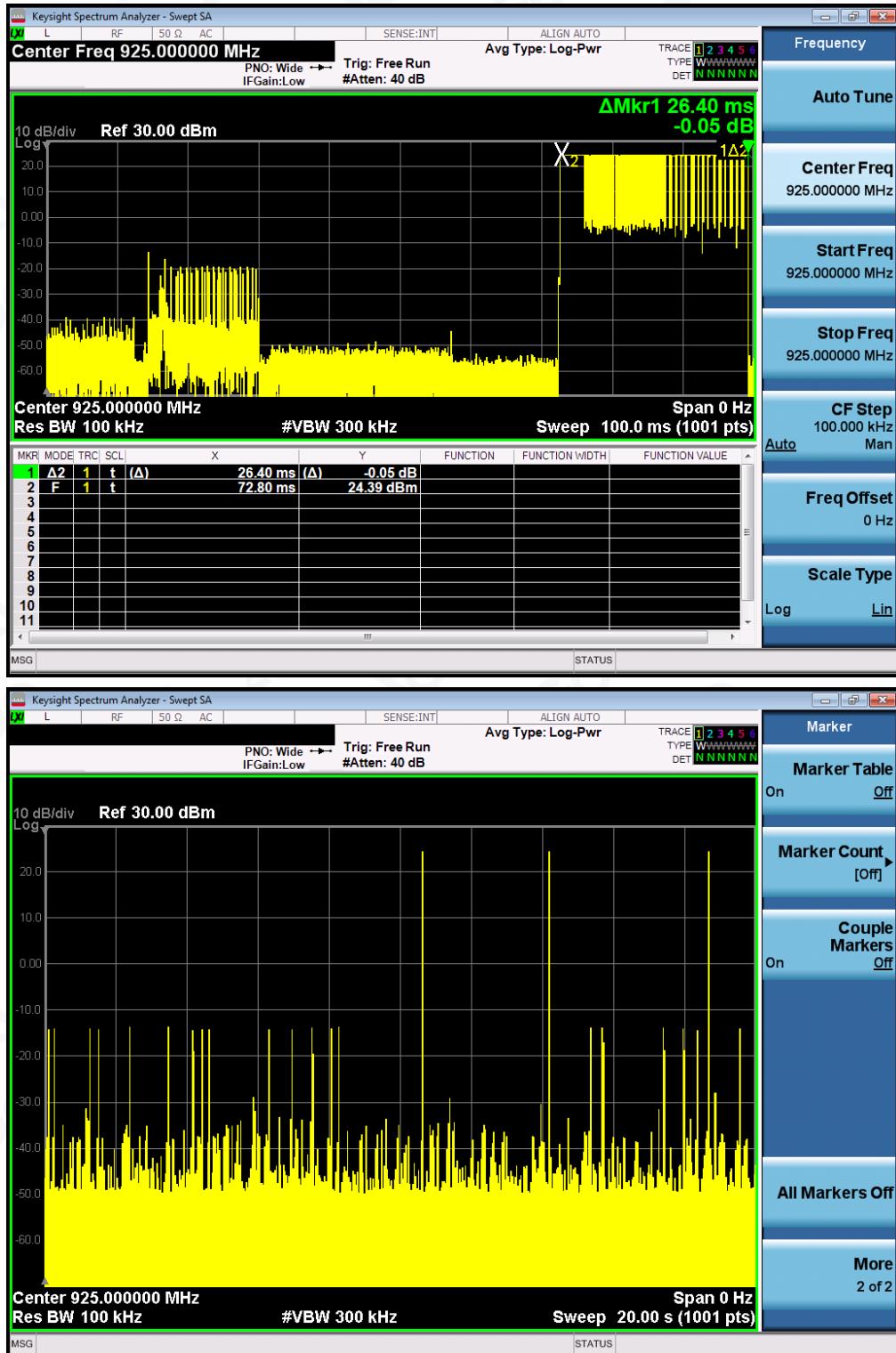
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## TEST PLOT OF HIGH CHANNEL



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## 13. FREQUENCY SEPARATION

### 13.1. MEASUREMENT PROCEDURE

The EUT shall have its hopping function enabled. Use the following spectrum analyzer settings:

1. Span: Wide enough to capture the peaks of two adjacent channels.
2. RBW: Start with the RBW set to approximately 30% of the channel spacing; adjust as necessary to best identify the center of each individual channel.
3. Video (or average) bandwidth (VBW)  $\geq$  RBW.
4. Sweep: Auto. e) Detector function: Peak. f) Trace: Max hold. g) Allow the trace to stabilize.

Use the marker-delta function to determine the separation between the peaks of the adjacent channels.

### 13.2. TEST SETUP (BLOCK DIAGRAM OF CONFIGURATION)

Same as described in section 6.2

### 13.3. MEASUREMENT EQUIPMENT USED

The same as described in section 6.3

### 13.4. LIMITS AND MEASUREMENT RESULT

| CHANNEL   | CHANNEL<br>SEPARATION | LIMIT                         | RESULT |
|-----------|-----------------------|-------------------------------|--------|
|           | KHz                   | KHz                           |        |
| CH01-CH02 | 95                    | $\geq 25$ KHz or 2/3 20 dB BW | Pass   |

TEST PLOT FOR FREQUENCY SEPARATION



## 14. FCC LINE CONDUCTED EMISSION TEST

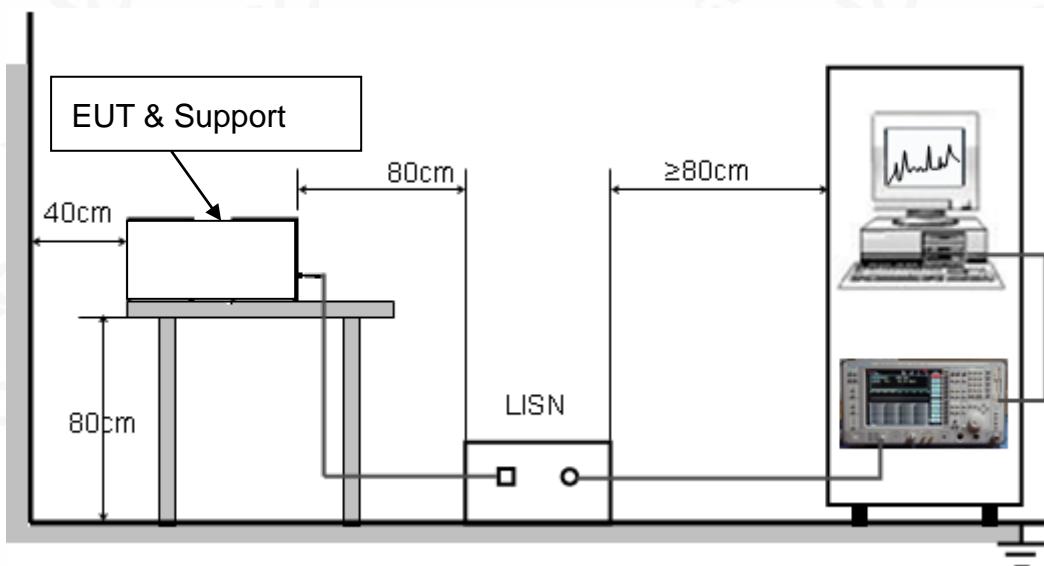
### 14.1. LIMITS OF LINE CONDUCTED EMISSION TEST

| Frequency     | Maximum RF Line Voltage |                |
|---------------|-------------------------|----------------|
|               | Q.P.( dBuV)             | Average( dBuV) |
| 150kHz~500kHz | 66-56                   | 56-46          |
| 500kHz~5MHz   | 56                      | 46             |
| 5MHz~30MHz    | 60                      | 50             |

Note:

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

### 14.2. BLOCK DIAGRAM OF LINE CONDUCTED EMISSION TEST



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#### 14.3. PRELIMINARY PROCEDURE OF LINE CONDUCTED EMISSION TEST

1. The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. When the EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.10 (see Test Facility for the dimensions of the ground plane used). When the EUT is a floor-standing equipment, it is placed on the ground plane which has a 3-12 mm non-conductive covering to insulate the EUT from the ground plane.
2. Support equipment, if needed, was placed as per ANSI C63.10.
3. All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10.
4. All support equipments received AC 120V/60Hz power from a LISN, if any.
5. The EUT received DC charging voltage by PC which received AC 120V/60Hz power by a LISN..
6. The test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
7. Analyzer / Receiver scanned from 150 kHz to 30MHz for emissions in each of the test modes.
8. During the above scans, the emissions were maximized by cable manipulation.
9. The test mode(s) were scanned during the preliminary test.

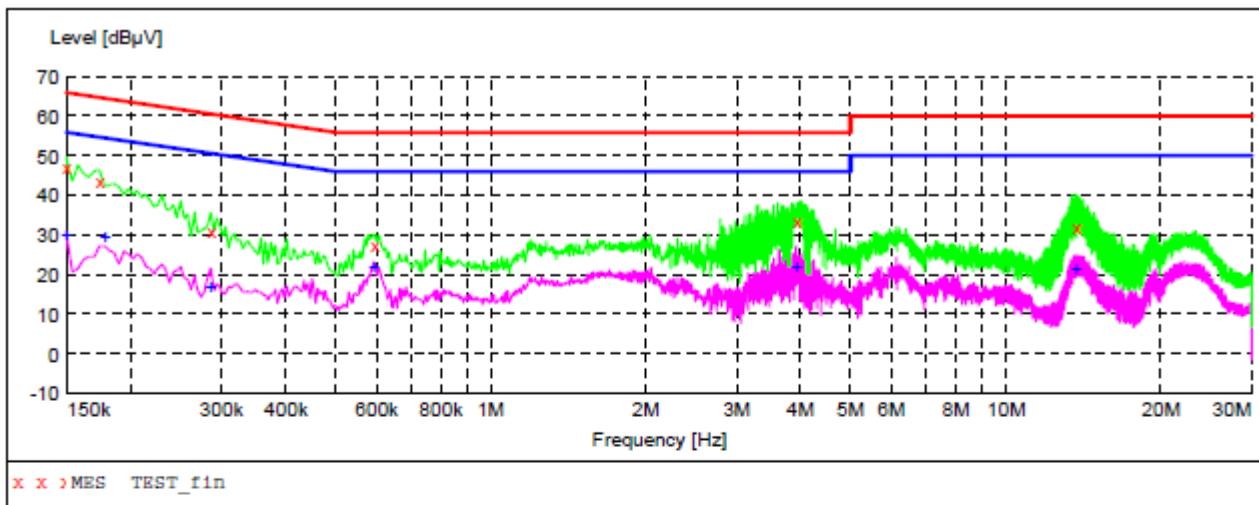
Then, the EUT configuration and cable configuration of the above highest emission level were recorded for reference of final testing.

#### 14.4. FINAL PROCEDURE OF LINE CONDUCTED EMISSION TEST

1. EUT and support equipment was set up on the test bench as per step 2 of the preliminary test.
2. A scan was taken on both power lines, Line 1 and Line 2, recording at least the six highest emissions. Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit. If EUT emission level was less -2dB to the A.V. limit in Peak mode, then the emission signal was re-checked using Q.P and Average detector.
3. The test data of the worst case condition(s) was reported on the Summary Data page.

## 14.5. TEST RESULT OF LINE CONDUCTED EMISSION TEST

### LINE CONDUCTED EMISSION TEST-L



#### MEASUREMENT RESULT: "TEST\_fin"

8/27/2019 10:33AM

| Frequency<br>MHz | Level<br>dB $\mu$ V | Transd<br>dB | Limit<br>dB $\mu$ V | Margin<br>dB | Detector | Line | PE  |
|------------------|---------------------|--------------|---------------------|--------------|----------|------|-----|
| 0.150000         | 47.40               | 10.8         | 66                  | 18.6         | QP       | L1   | FLO |
| 0.174000         | 43.80               | 10.9         | 65                  | 21.0         | QP       | L1   | FLO |
| 0.286000         | 30.90               | 10.9         | 61                  | 29.7         | QP       | L1   | FLO |
| 0.594000         | 27.70               | 10.8         | 56                  | 28.3         | QP       | L1   | FLO |
| 3.918000         | 33.50               | 11.6         | 56                  | 22.5         | QP       | L1   | FLO |
| 13.674000        | 32.00               | 12.1         | 60                  | 28.0         | QP       | L1   | FLO |

#### MEASUREMENT RESULT: "TEST\_fin2"

8/27/2019 10:33AM

| Frequency<br>MHz | Level<br>dB $\mu$ V | Transd<br>dB | Limit<br>dB $\mu$ V | Margin<br>dB | Detector | Line | PE  |
|------------------|---------------------|--------------|---------------------|--------------|----------|------|-----|
| 0.150000         | 30.00               | 10.8         | 56                  | 26.0         | AV       | L1   | FLO |
| 0.178000         | 29.80               | 10.9         | 55                  | 24.8         | AV       | L1   | FLO |
| 0.286000         | 17.00               | 10.9         | 51                  | 33.6         | AV       | L1   | FLO |
| 0.594000         | 21.70               | 10.8         | 46                  | 24.3         | AV       | L1   | FLO |
| 3.918000         | 22.10               | 11.6         | 46                  | 23.9         | AV       | L1   | FLO |
| 13.674000        | 21.30               | 12.1         | 50                  | 28.7         | AV       | L1   | FLO |

**RESULT: PASS**

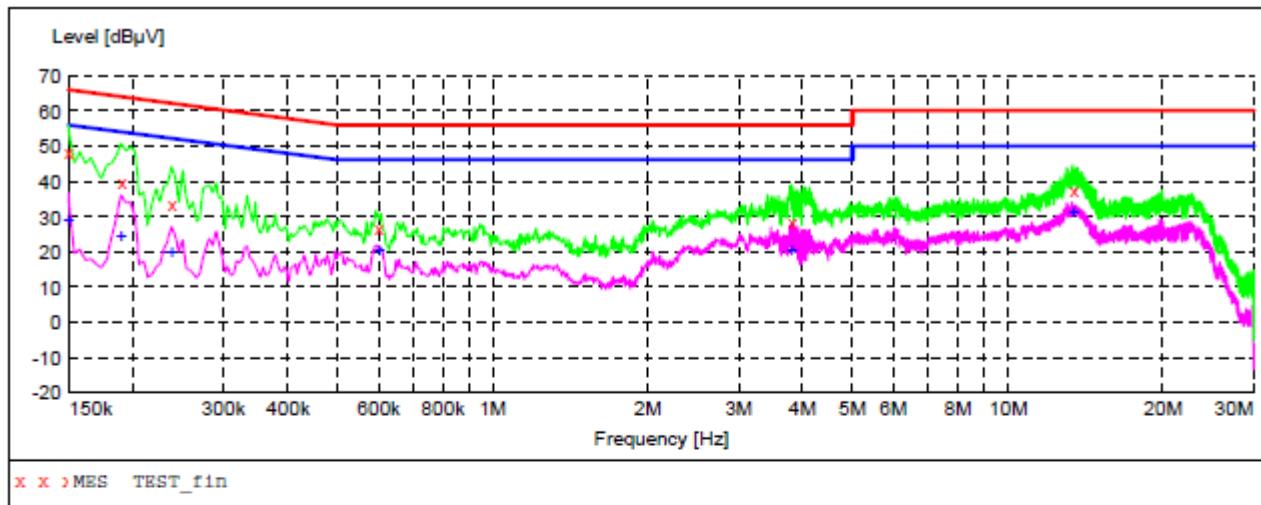

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## LINE CONDUCTED EMISSION TEST-N


**MEASUREMENT RESULT: "TEST\_fin"**

8/27/2019 10:23AM

| Frequency<br>MHz | Level<br>dB $\mu$ V | Transd<br>dB | Limit<br>dB $\mu$ V | Margin<br>dB | Detector | Line | PE  |
|------------------|---------------------|--------------|---------------------|--------------|----------|------|-----|
| 0.150000         | 48.20               | 10.8         | 66                  | 17.8         | QP       | N    | FLO |
| 0.190000         | 39.80               | 10.9         | 64                  | 24.2         | QP       | N    | FLO |
| 0.238000         | 33.90               | 10.9         | 62                  | 28.3         | QP       | N    | FLO |
| 0.598000         | 26.50               | 10.7         | 56                  | 29.5         | QP       | N    | FLO |
| 3.814000         | 28.60               | 11.6         | 56                  | 27.4         | QP       | N    | FLO |
| 13.406000        | 37.40               | 12.1         | 60                  | 22.6         | QP       | N    | FLO |

**MEASUREMENT RESULT: "TEST\_fin2"**

8/27/2019 10:23AM

| Frequency<br>MHz | Level<br>dB $\mu$ V | Transd<br>dB | Limit<br>dB $\mu$ V | Margin<br>dB | Detector | Line | PE  |
|------------------|---------------------|--------------|---------------------|--------------|----------|------|-----|
| 0.150000         | 29.20               | 10.8         | 56                  | 26.8         | AV       | N    | FLO |
| 0.190000         | 24.50               | 10.9         | 54                  | 29.5         | AV       | N    | FLO |
| 0.238000         | 20.20               | 10.9         | 52                  | 32.0         | AV       | N    | FLO |
| 0.602000         | 20.50               | 10.7         | 46                  | 25.5         | AV       | N    | FLO |
| 3.814000         | 20.50               | 11.6         | 46                  | 25.5         | AV       | N    | FLO |
| 13.406000        | 31.10               | 12.1         | 50                  | 18.9         | AV       | N    | FLO |

**RESULT: PASS**

Note: All the test modes had been tested, the mode 1 was the worst case. Only the data of the worst case would be record in this test report.

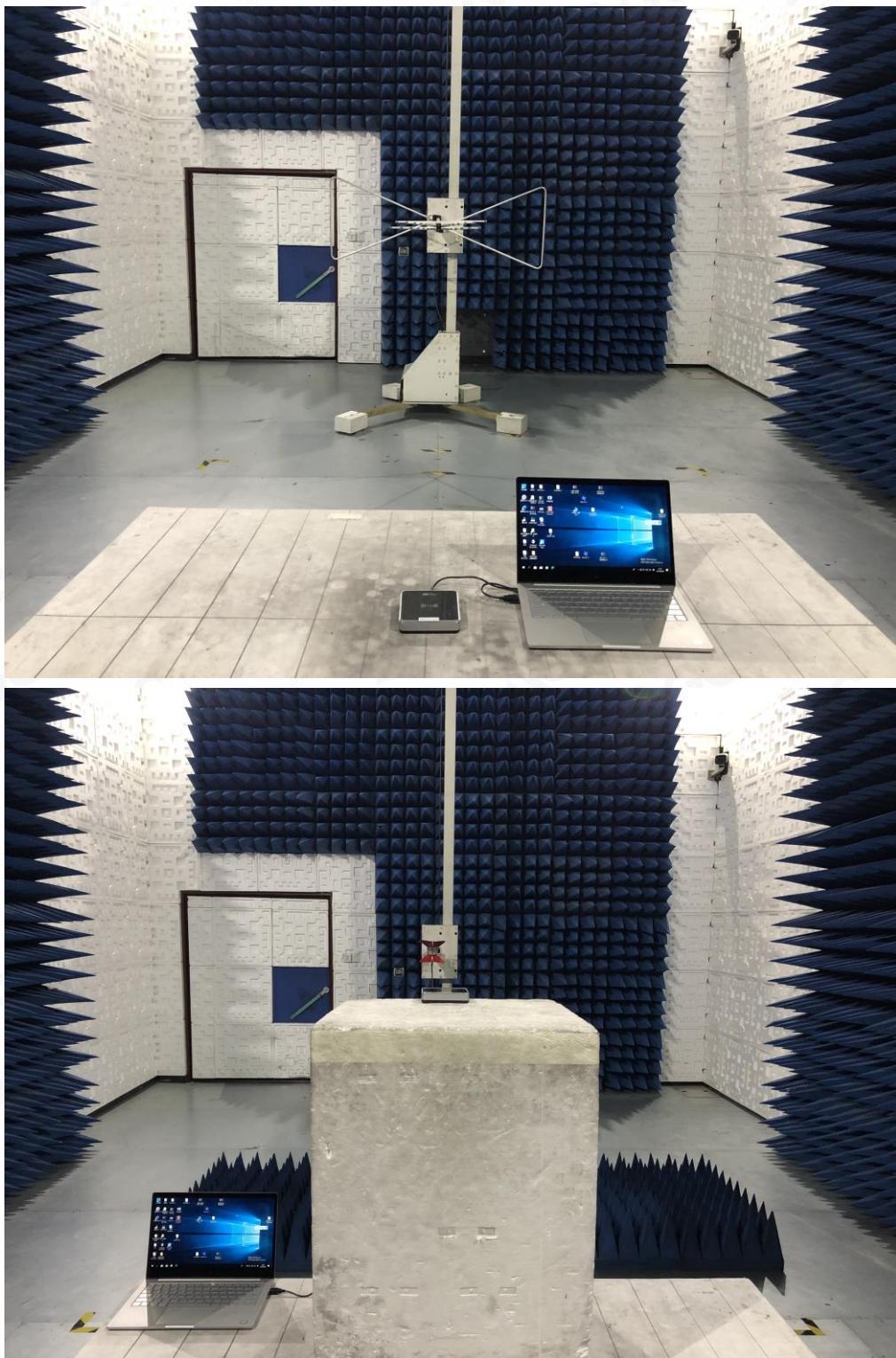


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**APPENDIX A: PHOTOGRAPHS OF TEST SETUP****FCC RADIATED EMISSION TEST SETUP****Attestation of Global Compliance**

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## CONDUCTED EMISSION TEST SETUP

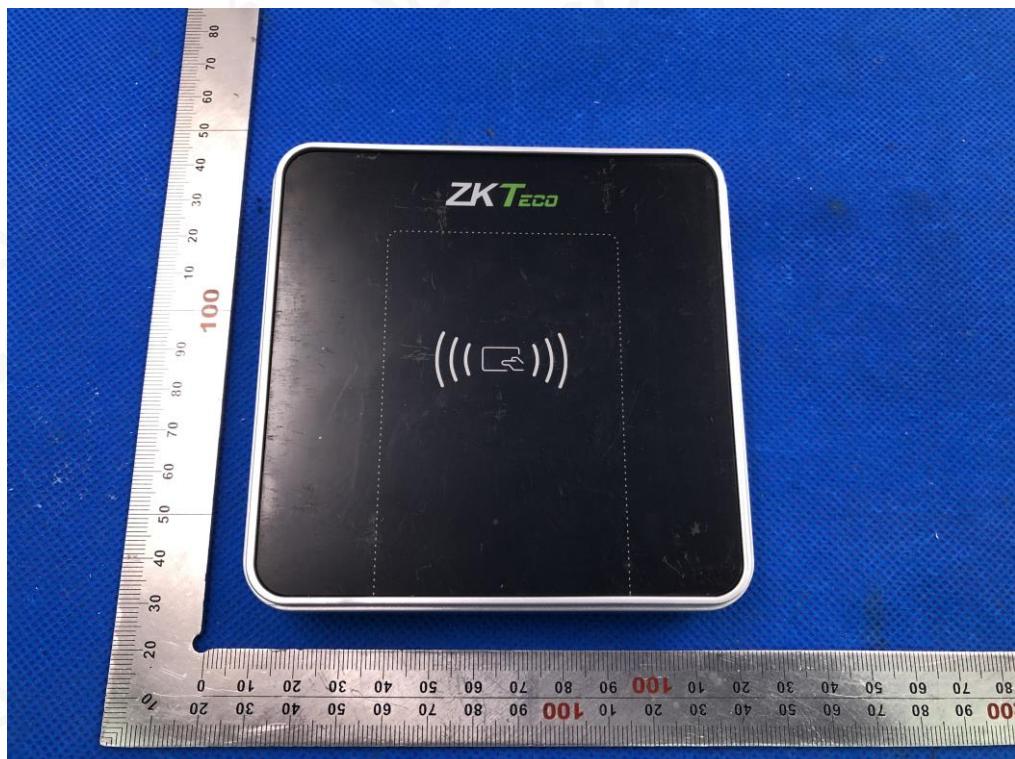


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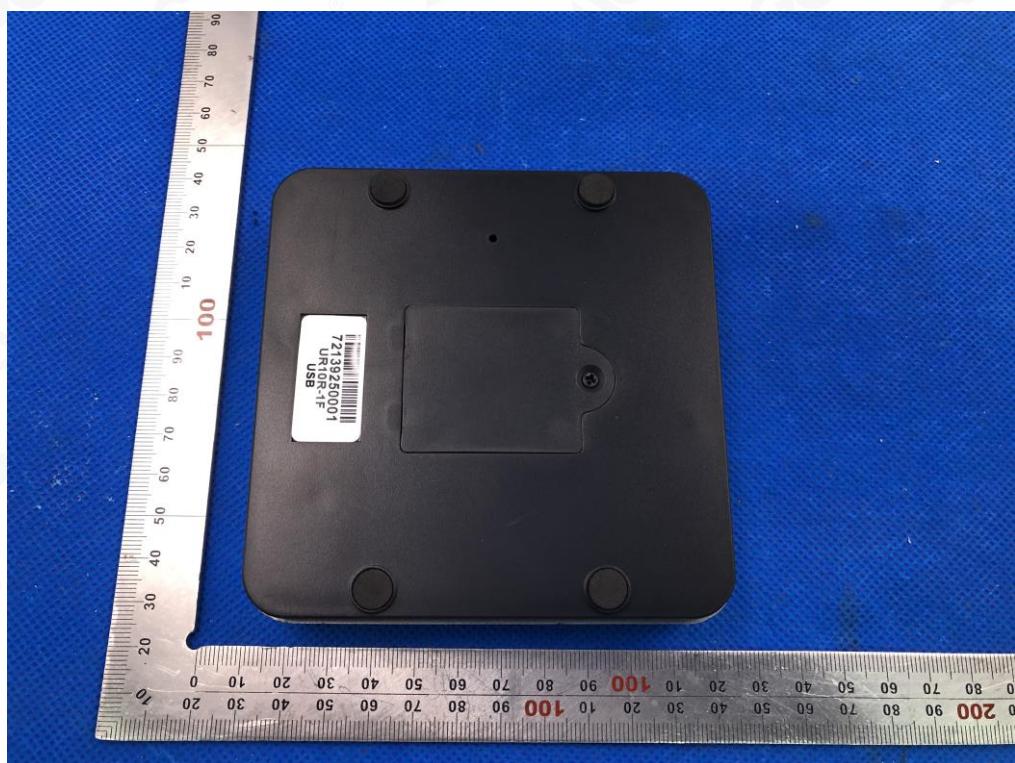
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**APPENDIX B: PHOTOGRAPHS OF EUT**  
**ALL VIEW OF EUT****Attestation of Global Compliance**

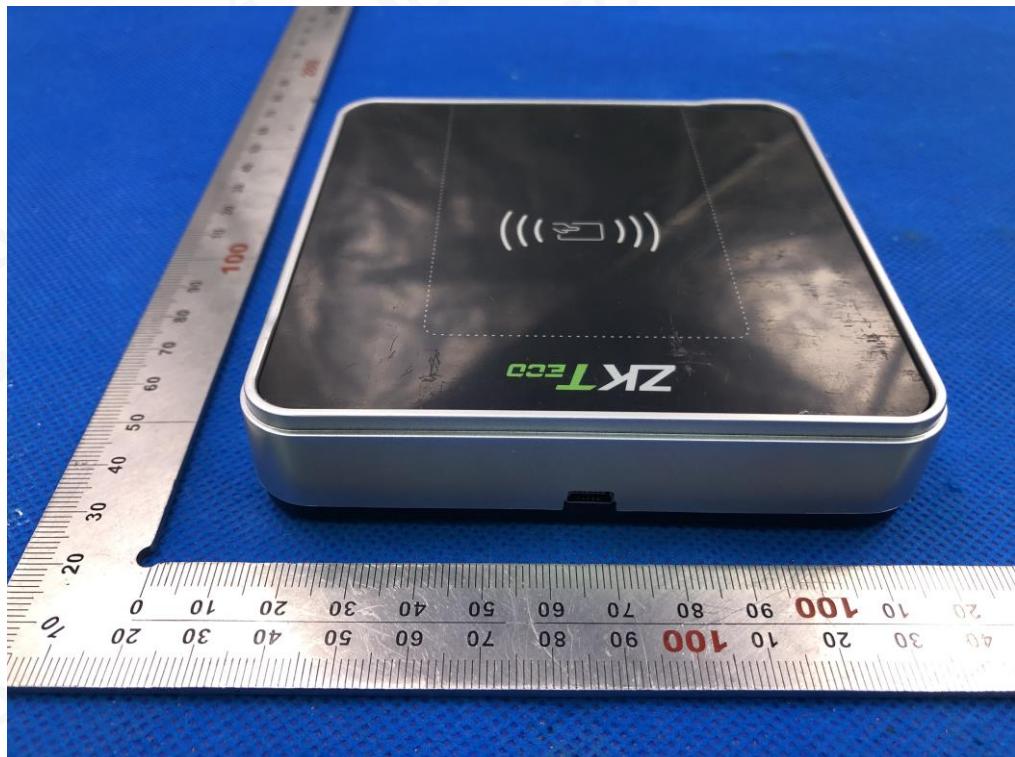
## TOP VIEW OF EUT



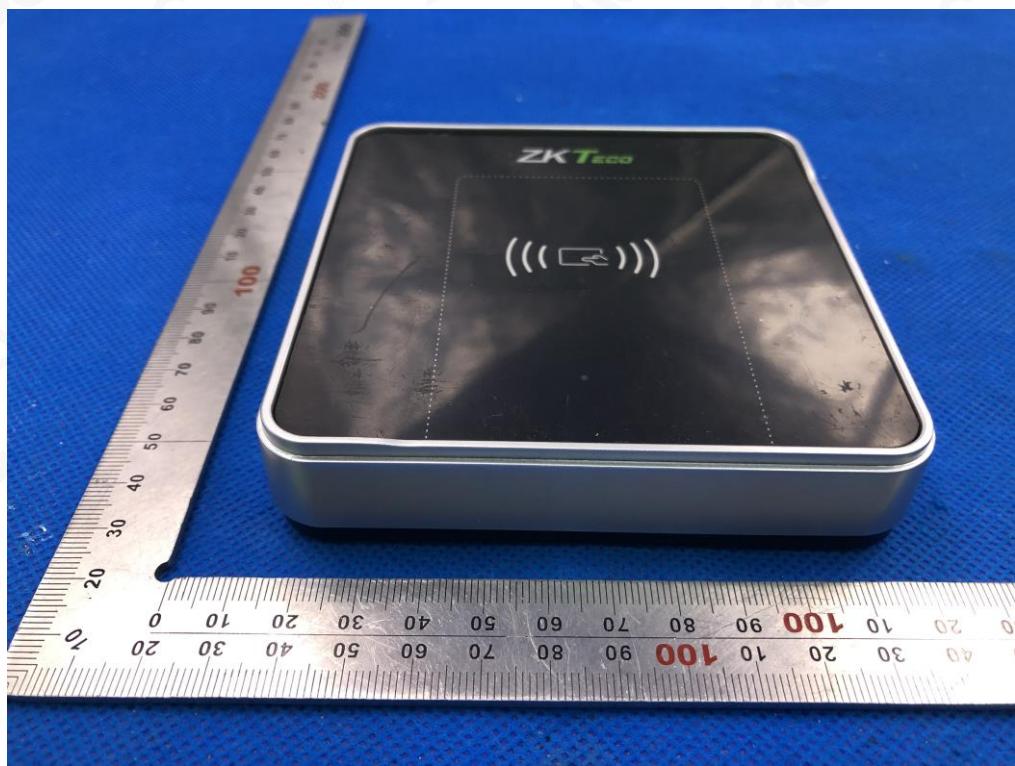
## BOTTOM VIEW OF EUT



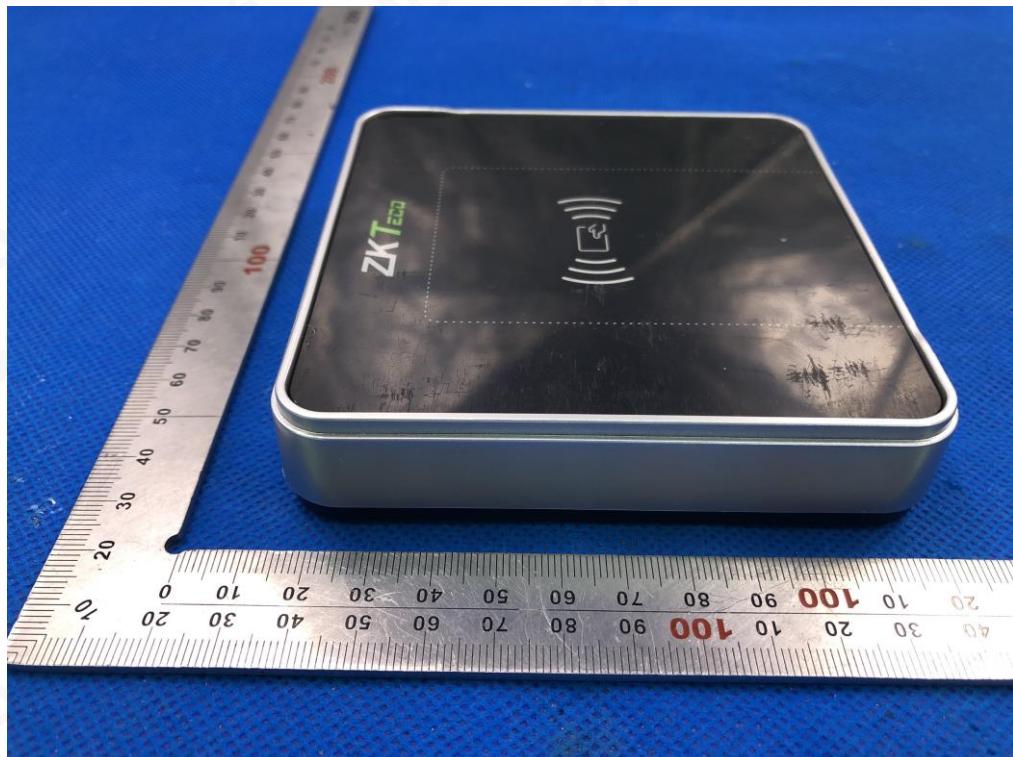
FRONT VIEW OF EUT



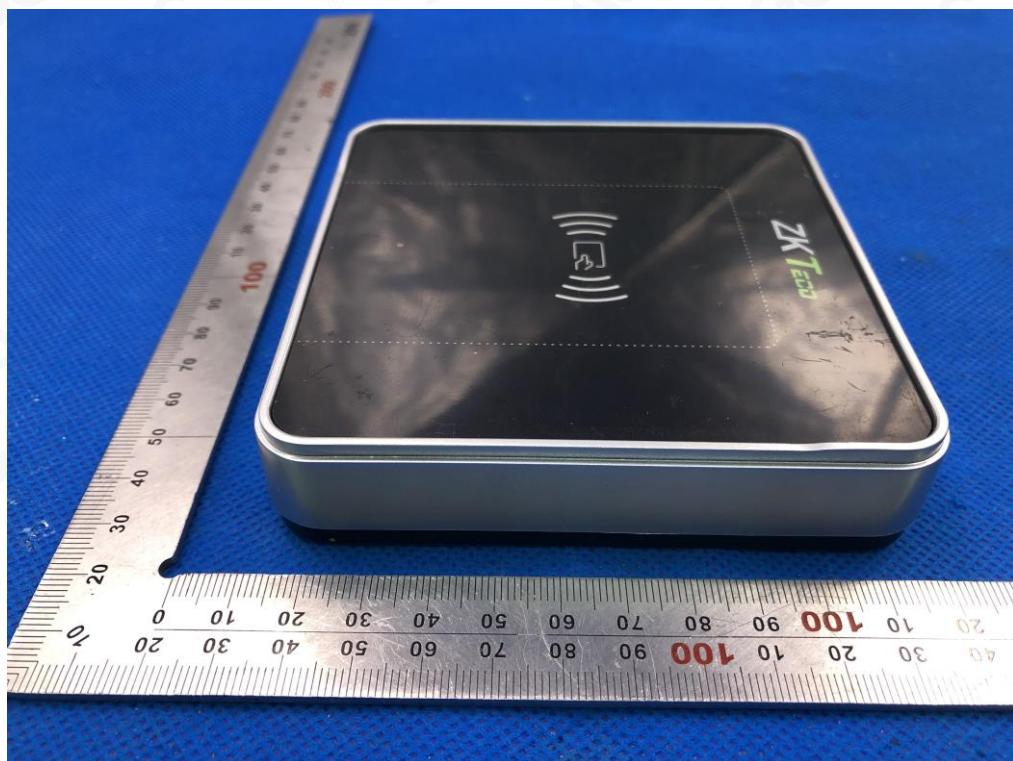
BACK VIEW OF EUT



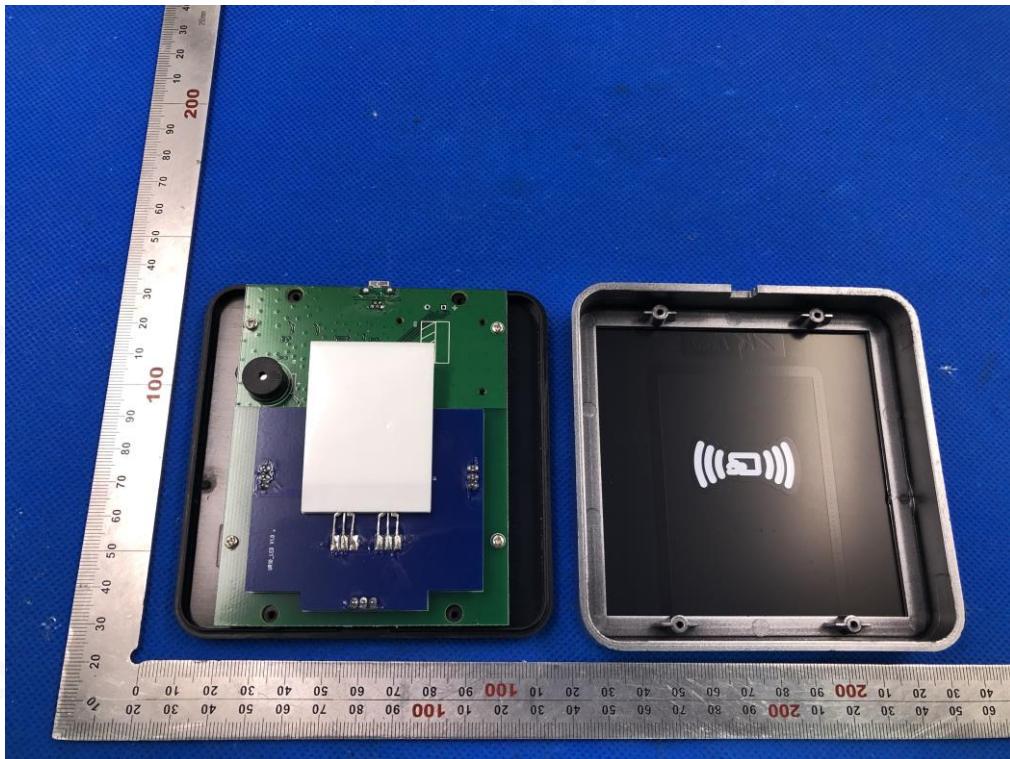
## LEFT VIEW OF EUT



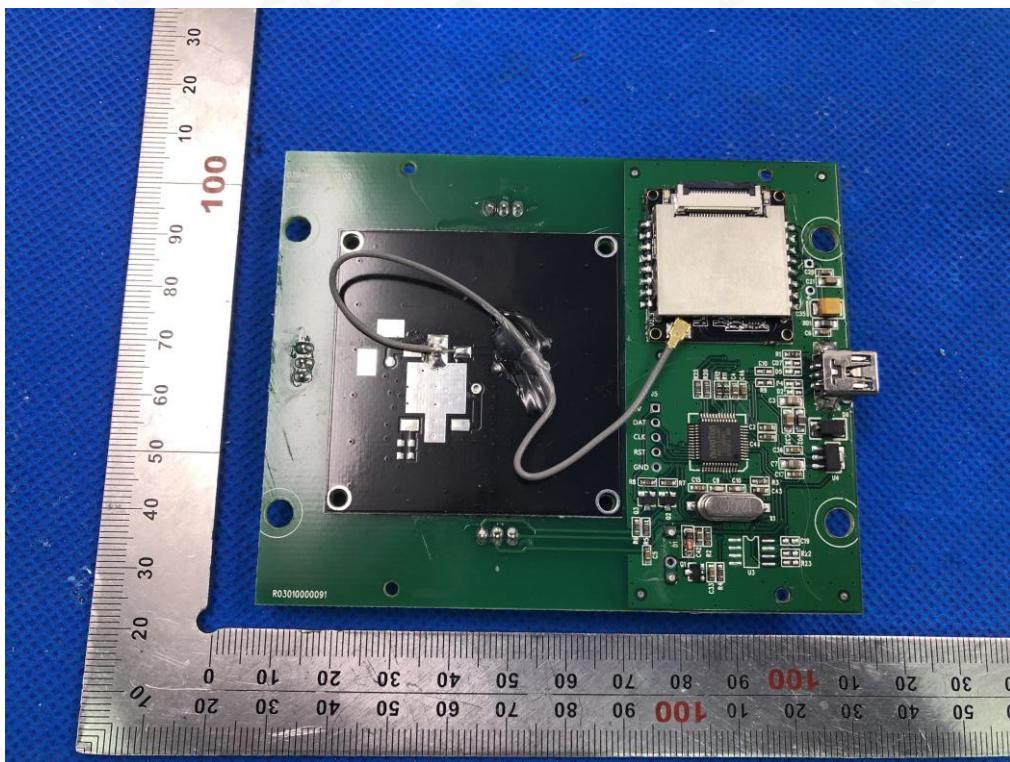
## RIGHT VIEW OF EUT



## OPEN VIEW – 1 OF EUT



## INTERNAL VIEW-1 OF EUT



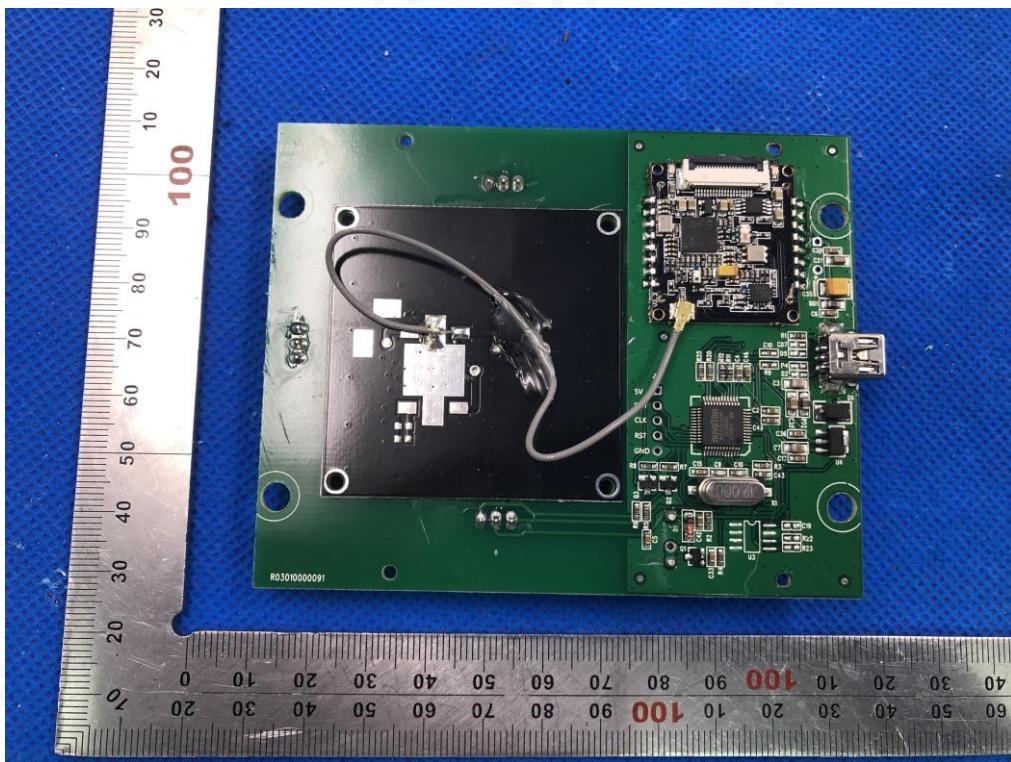
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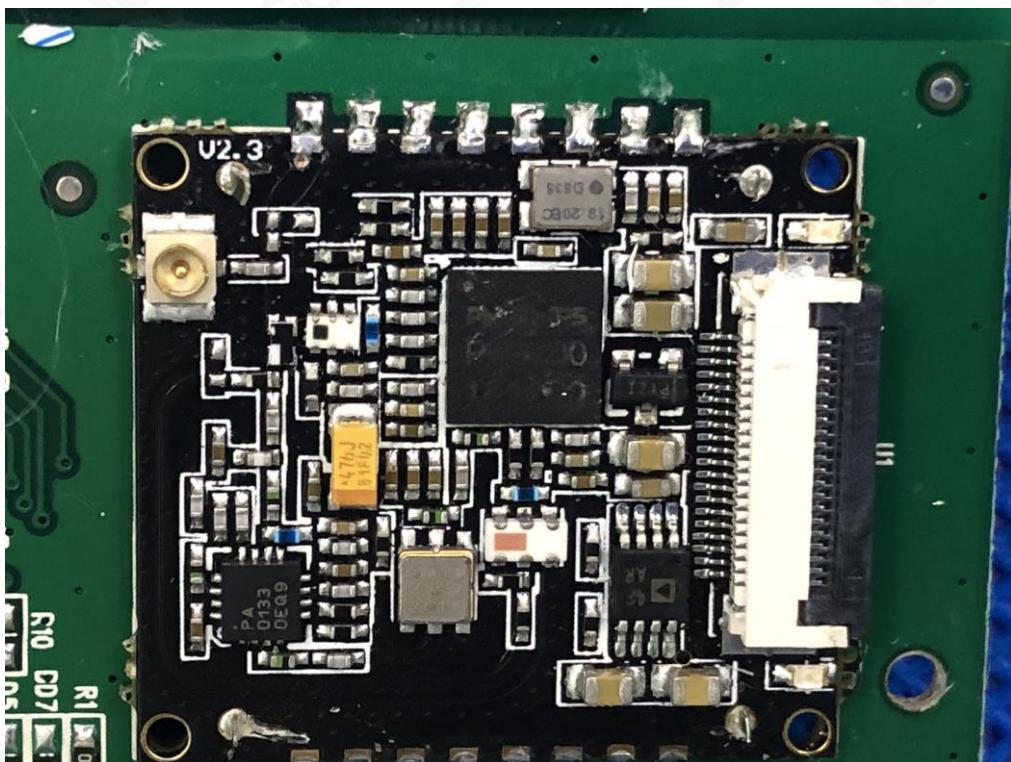
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## INTERNAL VIEW-2 OF EUT



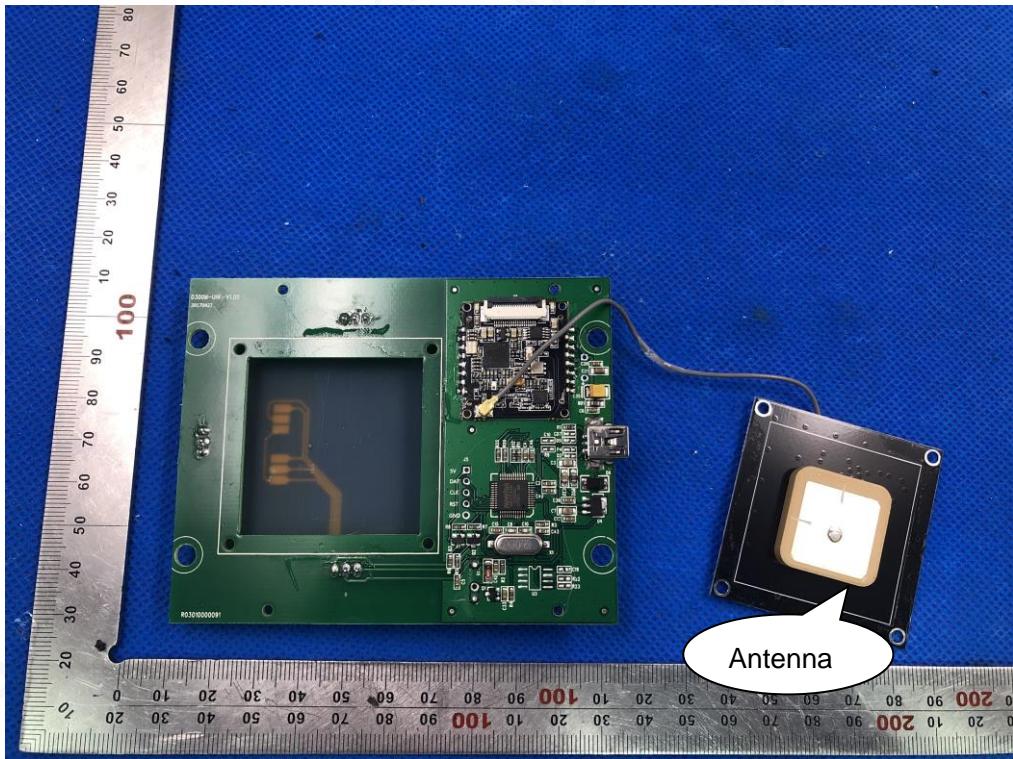
## INTERNAL VIEW-3 OF EUT



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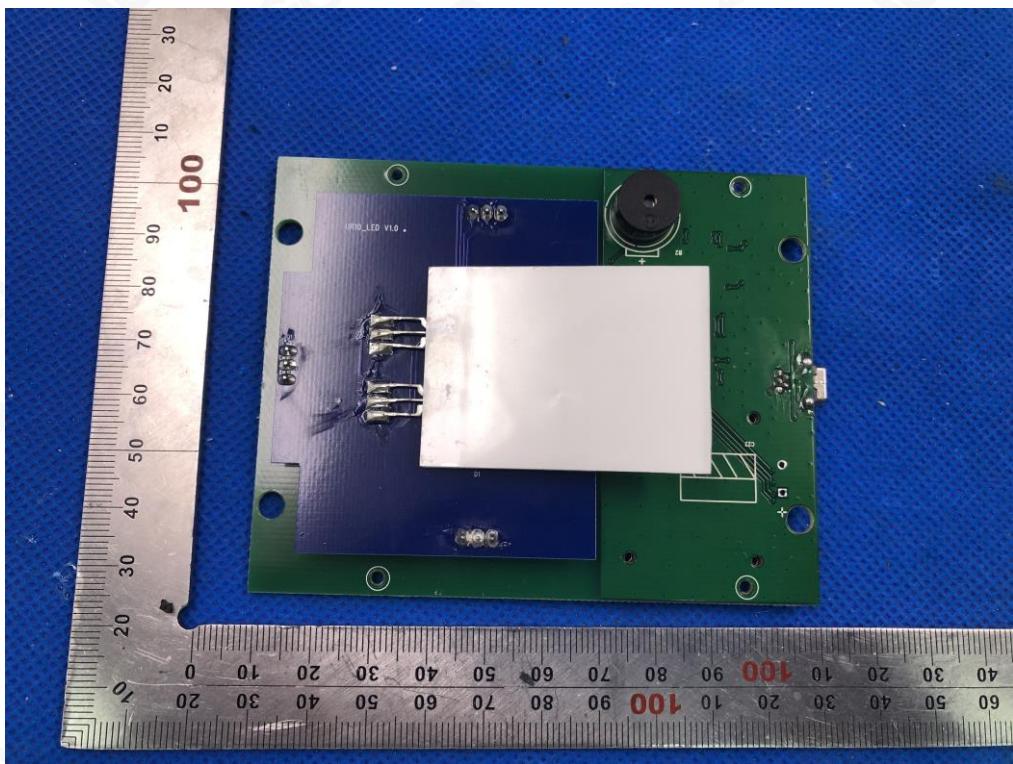
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## INTERNAL VIEW-4 OF EUT



Antenna

## INTERNAL VIEW-5 OF EUT



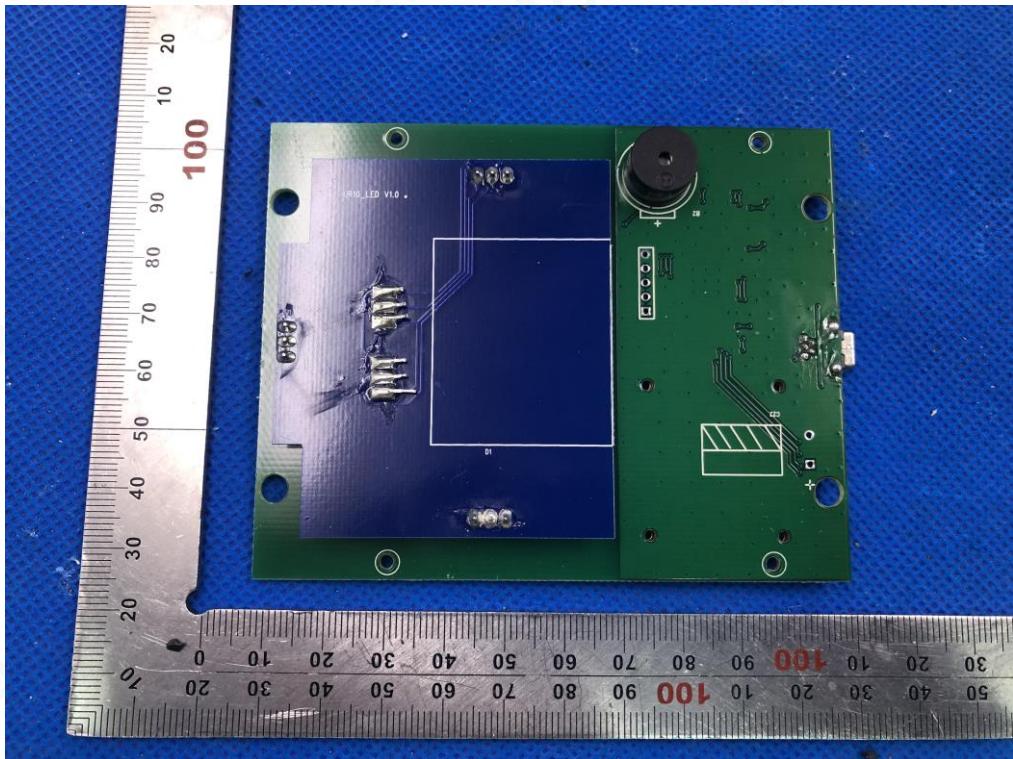
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## INTERNAL VIEW-6 OF EUT

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