

# TEST REPORT



**CTK Co., Ltd.**  
(Ho-dong), 113, Yejik-ro, Cheoin-gu,  
Yongin-si, Gyeonggi-do, Korea  
Tel: +82-31-339-9970  
Fax: +82-31-624-9501

Report No.:  
CTK-2020-00326  
Page (1) / (17) Pages

## 1. Client

- Name : MOBASE ELECTRONICS CO., LTD.
- Address : 100, Saneop-ro, 156beon-gil, Gwonseon-gu, Suwon-si, Gyeonggi-do, South Korea
- Date of Receipt : 2019-12-10

## 2. Manufacturer

- Name : MOBASE ELECTRONICS CO., LTD.
- Address : 100, Saneop-ro, 156beon-gil, Gwonseon-gu, Suwon-si, Gyeonggi-do, South Korea

## 3. Use of Report : For FCC Certification

## 4. Test Sample / Model : UNIT ASSY-I.B.U / MBECIBUB2004

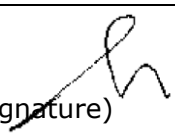
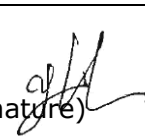
## 5. Date of Test : 2019-12-30 to 2020-01-02

## 6. Test Standard(method) used : FCC 47 CFR part 15 subpart C 15.209

## 7. Testing Environment: Temp.: (23 ± 1) °C, Humidity: (48 ± 5) % R.H.

## 8. Test Results : Compliance

The results shown in this test report refer only to the sample(s) tested unless otherwise stated. This Test Report cannot be reproduced, except in full.

|             |                                                                                                                |                                                                                                                   |
|-------------|----------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------|
| Affirmation | Tested by                                                                                                      | Technical Manager                                                                                                 |
|             | Bong-seok Kim: (Signature)  | Young-taek Lee: (Signature)  |

2020-01-17

Republic of KOREA **CTK Co., Ltd.**



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## REPORT REVISION HISTORY

| Date       | Revision                | Page No |
|------------|-------------------------|---------|
| 2020-01-17 | Issued (CTK-2020-00326) | all     |
|            |                         |         |

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|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|--|
|  <p><b>CTK Co., Ltd.</b><br/>The Power Leader of Global Regulatory Certification</p> | <p><b>CTK Co., Ltd.</b><br/>(Ho-dong), 113, Yejik-ro, Cheoin-gu,<br/>Yongin-si, Gyeonggi-do, Korea<br/>Tel: +82-31-339-9970<br/>Fax: +82-31-624-9501</p> | <p>Report No.:<br/>CTK-2020-00326<br/>Page (4) / (17) Pages</p> |  |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|--|

# 1. General Product Description

## 1.1 Client Information

|                       |                                                                                 |
|-----------------------|---------------------------------------------------------------------------------|
| <b>Company</b>        | MOBASE ELECTRONICS CO., LTD.                                                    |
| <b>Contact Point</b>  | 100, Saneop-ro, 156beon-gil, Gwonseon-gu, Suwon-si, Gyeonggi-do, South Korea    |
| <b>Contact Person</b> | Name : Hee-Tack Ryu<br>E-mail : shadow@mobaseelec.com<br>Tel : +82-31-8090-2611 |

## 1.2 Product Information

|                                  |                           |
|----------------------------------|---------------------------|
| <b>FCC ID</b>                    | NYOMBECIBUB2004           |
| <b>Product Description</b>       | UNIT ASSY-I.B.U           |
| <b>Model name</b>                | MBECIBUB2004              |
| <b>Variant Model name</b>        | -                         |
| <b>Operating Frequency Range</b> | 134.5 kHz                 |
| <b>RF Output Power</b>           | 72.5 dBuV/m @ 3 m         |
| <b>Antenna Type</b>              | PCB antenna(Loop antenna) |
| <b>Power Source</b>              | DC 12 V (Battery)         |

## 1.3 Antenna Information

|                                     |                                                 |
|-------------------------------------|-------------------------------------------------|
| <input checked="" type="checkbox"/> | Integral antenna (antenna permanently attached) |
| <input type="checkbox"/>            | External antenna (dedicated antennas)           |

## 2. Facility and Accreditations

### 2.1 Test Facility

The measurement facility is located at (Ho-dong), 113, Yejik-ro, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea.

### 2.2 Laboratory Accreditations and Listings

| Country | Agency | Registration Number |
|---------|--------|---------------------|
| USA     | FCC    | 805871              |
| CANADA  | ISED   | 8737A-2             |
| KOREA   | NRRA   | KR0025              |

### 2.3 Calibration Details of Equipment Used for Measurement

Test equipment and test accessories are calibrated on regular basis. The maximum time between calibrations is one year or what is recommended by the manufacturer, whichever is less. All test equipment calibrations are traceable to the Korea Research Institute of Standards and Science (KRISS), therefore, all test data recorded in this report is traceable to KRISS.

### 3. Test Specifications

#### 3.1 Standards

| FCC Part Section(s)                                                                                           | Requirement(s)                    | Status (Note 1) | Report Clause |
|---------------------------------------------------------------------------------------------------------------|-----------------------------------|-----------------|---------------|
| 15.203                                                                                                        | Antenna Requirement               | C               | 1.3           |
| 15.215(c)                                                                                                     | Emission Bandwidth                | C               | 4.1           |
| 15.209                                                                                                        | Radiated Emissions                | C               | 4.2           |
| 15.207                                                                                                        | AC Power line Conducted Emissions | NA(Note 2)      | -             |
| <u>Note 1:</u> C=Complies NC=Not Complies NT=Not Tested NA=Not Applicable                                     |                                   |                 |               |
| <u>Note 2:</u> The equipment is operated on battery power only                                                |                                   |                 |               |
| <u>Note 3:</u> The data in this test report are traceable to the national or international standards.         |                                   |                 |               |
| <u>Note 4:</u> The sample was tested according to the following specification: FCC Part 15, ANSI C63.10-2013. |                                   |                 |               |

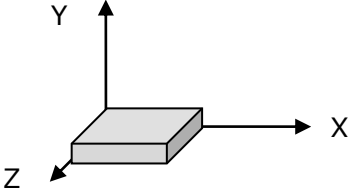
### 3.2 Mode of operation during the test

Wireless charger were performed all charging conditions including variable loading and non-charging operation, the worst mode is full charging loading.

#### Test Frequency

| Operating Frequencies |
|-----------------------|
| 134.5 kHz             |

#### The Worst Case Measurement Configuration

|                                                                     |                                                                                                                         |
|---------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|
| <b>Tests Item</b>                                                   | Transmitter Radiated Emissions, Emission Bandwidth                                                                      |
| <b>Condition</b>                                                    | Radiated measurement                                                                                                    |
| <b>User Position</b>                                                | <input type="checkbox"/> EUT will be placed in fixed position.                                                          |
|                                                                     | <input checked="" type="checkbox"/> EUT will be placed in mobile position and operating multiple positions.             |
|                                                                     | <input type="checkbox"/> EUT will be a hand-held or body-worn battery-powered devices and operating multiple positions. |
| <b>Operating Mode</b>                                               | Continuous Transmission                                                                                                 |
| <b>EUT faces identified relative to view from receiving antenna</b> |                                     |

### 3.3 Peripheral Devices

| No. | Device          | Manufacturer                 | Model No. | Serial No. |
|-----|-----------------|------------------------------|-----------|------------|
| 1   | DC Power Supply | Topward Electric Instruments | 6303D     | 711196     |
| 2   | SSB(Controller) | HYUNDAI                      | -         | -          |

Note : SSB was provided by manufacturer.

### 3.4 Maximum Measurement Uncertainty

The value of the measurement uncertainty for the measurement of each parameter.  
 Coverage factor  $k = 2$ , Confidence levels of 95 %

| Test Item          | Uncertainty |
|--------------------|-------------|
| Radiated emissions | 4.38 dB     |

## 4. Technical Characteristic Test

### 4.1 Emission Bandwidth

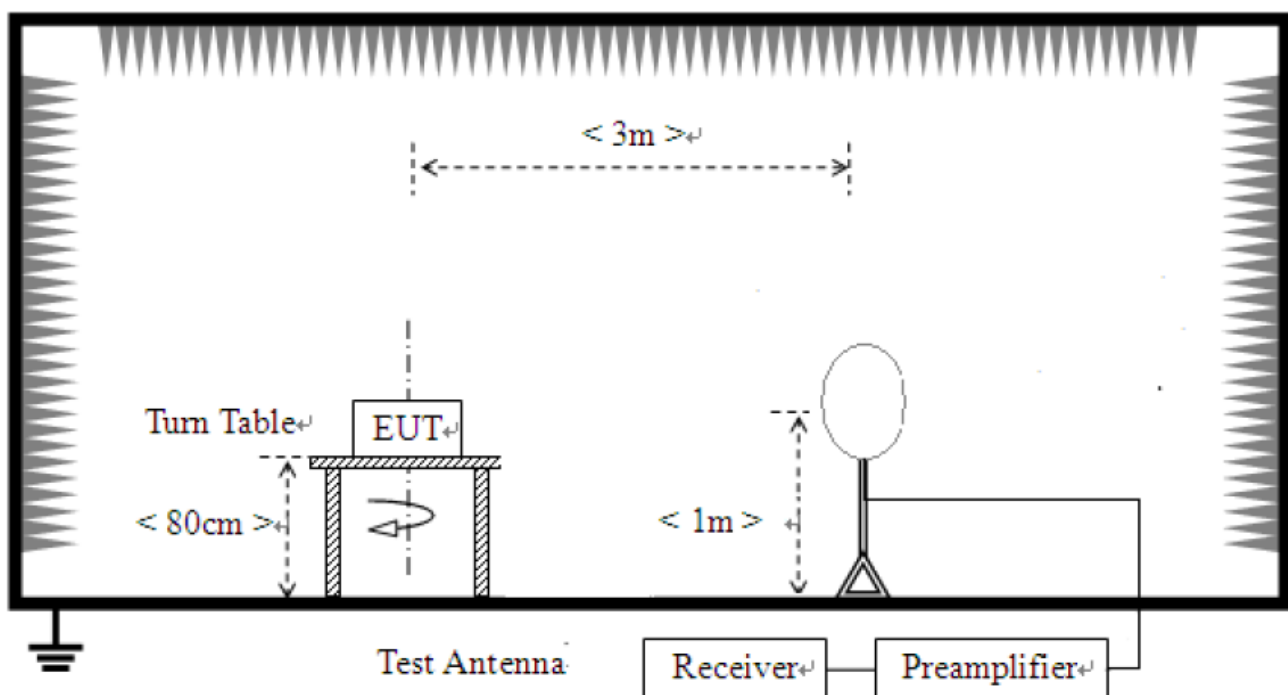
#### Requirement

Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§15.217 through 15.257 and in subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.

#### Test Procedures

For the emission bandwidth refer ANSI C63.10-2013, clause 6.9(Occupied bandwidth).

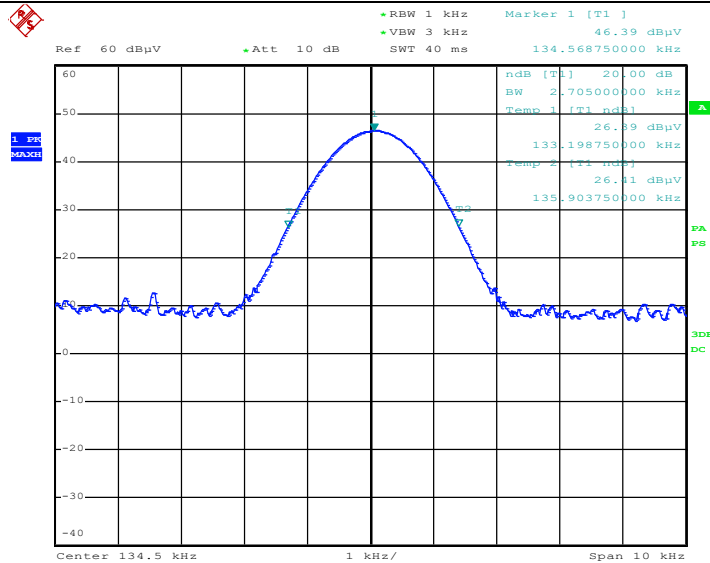
#### Test Setup



## Test results

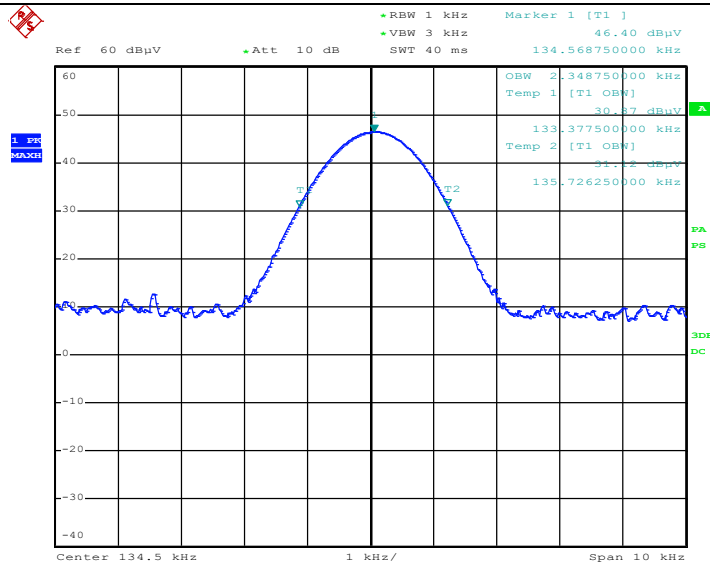
| Emission Bandwidth | Result    | Limit |
|--------------------|-----------|-------|
| 20dB Bandwidth     | 2.705 kHz | N/A   |
| 99% Bandwidth      | 2.349 kHz | N/A   |

### Emission Bandwidth Plot 20dB Bandwidth



Date: 30.DEC.2019 19:27:25

### Emission Bandwidth Plot 99% Bandwidth



Date: 30.DEC.2019 19:27:49

## 4.2 Radiated emissions

### Requirement

FCC Part 15 § 15.209 (a) Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table :

| Frequency(MHz) | Field Strength uV/m | Field Strength dBuV/m | Measurement Distance (meters) |
|----------------|---------------------|-----------------------|-------------------------------|
| 0.009-0.490    | 2400/F(kHz)         | 48.5 – 13.8           | 300                           |
| 0.490-1.705    | 24000/F(kHz)        | 33.8 – 23             | 30                            |
| 1.705-30       | 30                  | 29.5                  | 30                            |
| 30-88          | 100**               | 40                    | 3                             |
| 88-216         | 150**               | 43.5                  | 3                             |
| 216-960        | 200**               | 46                    | 3                             |
| Above 960      | 500                 | 54                    | 3                             |

\*\* Except as provided in 15.209(g).fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72MHz, 76-88MHz, 174-216MHz, 470-806MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g.15.231 and 15.241.

Note : The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.

## Test Location

☒ 10 m SAC (test distance : ☐ 10 m, ☒ 3 m)

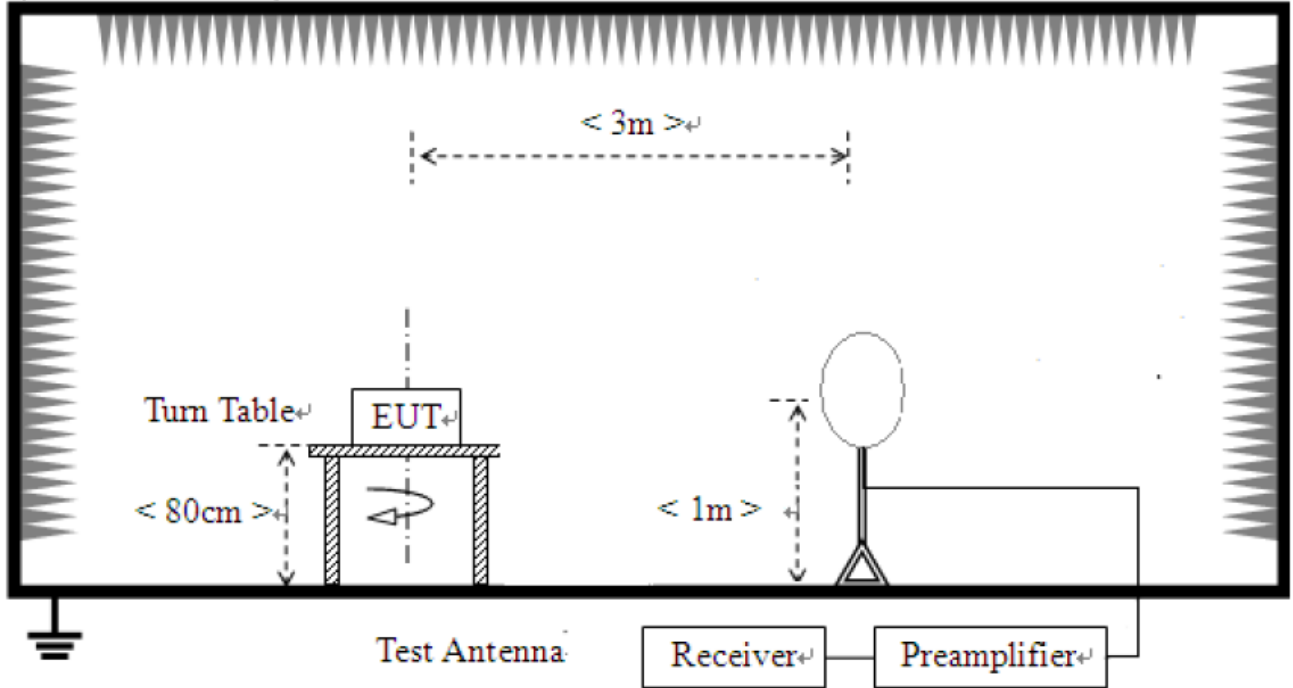
## Test Procedures

| Test Method                         |                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|-------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <input checked="" type="checkbox"/> | Refer as ANSI C63.10-2013, clause 6.4(Radiated emissions from unlicensed wireless devices below 30 MHz).                                                                                                                                                                                                                                                                                                                                      |
| <input checked="" type="checkbox"/> | Radiated emission tests shall be performed in the frequency range of 9 kHz to 30 MHz, using a calibrated loop antenna.<br>When perpendicular to the ground plane, the lowest height of the magnetic antenna shall be 1 m above the ground and shall be positioned at the specified distance from the EUT.<br>During the measurement the Loop Test Antenna rotates about its vertical axis for maximum response at each azimuth about the EUT. |
| <input checked="" type="checkbox"/> | The results shall be by using the square of an inverse linear distance extrapolation factor(40 dB/decade).                                                                                                                                                                                                                                                                                                                                    |
| <input checked="" type="checkbox"/> | Refer as ANSI C63.10-2013, clause 6.5(Radiated emissions from unlicensed wireless devices in the frequency range of 30 MHz to 1000 MHz).                                                                                                                                                                                                                                                                                                      |
| <input checked="" type="checkbox"/> | In the frequency range above 30 MHz, Bi-Log Test Antenna(30 MHz to 1 GHz) is used. Test Antenna height is carried from 1m to 4m above the ground to determine the maximum value of the field strength. The emissions levels at both horizontal and vertical polarizations should be tested.                                                                                                                                                   |
| <input checked="" type="checkbox"/> | Emissions more than 20 dB below the limit do not need to be reported.                                                                                                                                                                                                                                                                                                                                                                         |

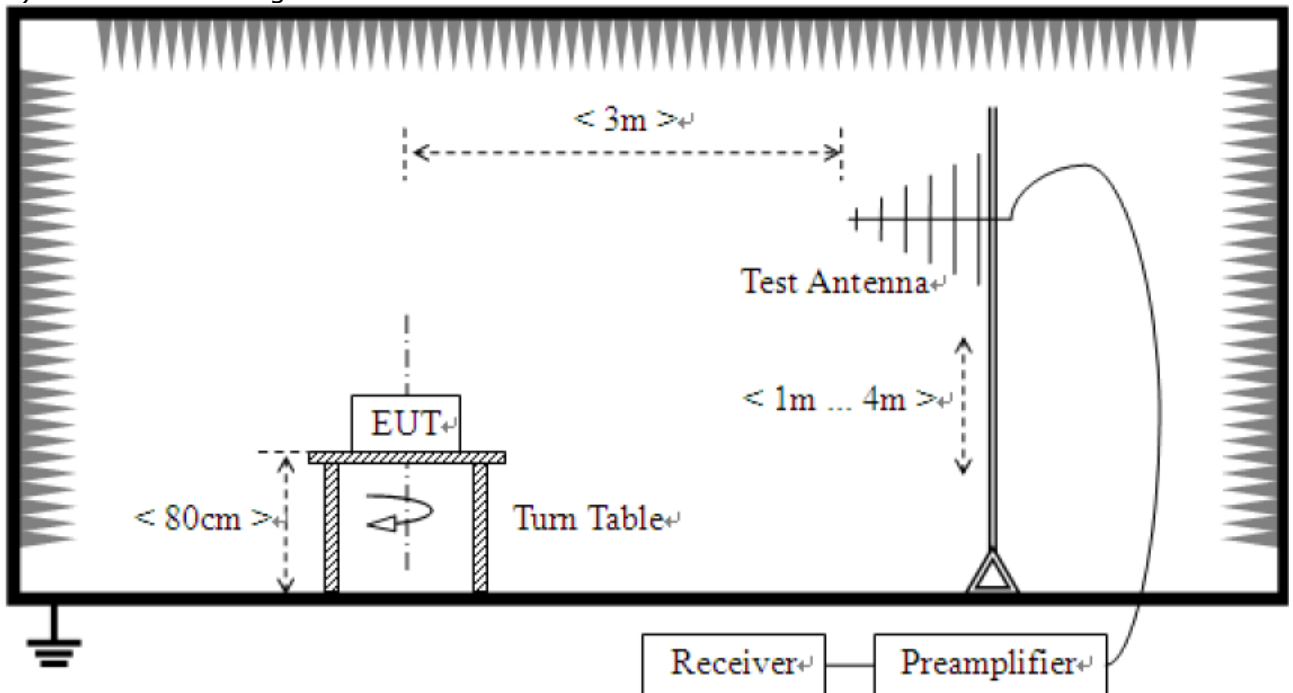
| Measuring instrument Settings |                                                                                      |
|-------------------------------|--------------------------------------------------------------------------------------|
| Frequency Range               | 9 kHz – 1 000 MHz                                                                    |
| RBW                           | 200 Hz (9 kHz – 150 kHz)<br>9 kHz (150 kHz – 30 MHz)<br>120 kHz (30 MHz – 1 000 MHz) |
| VBW                           | ≥ RBW                                                                                |
| Sweep time                    | auto couple                                                                          |
| Detector function             | CISPR quasi-peak(below 1 000 MHz)                                                    |

## Test Setup

- 1) For field strength of emissions from 9 kHz to 30 MHz



- 2) For field strength of emissions from 30 MHz to 1 GHz

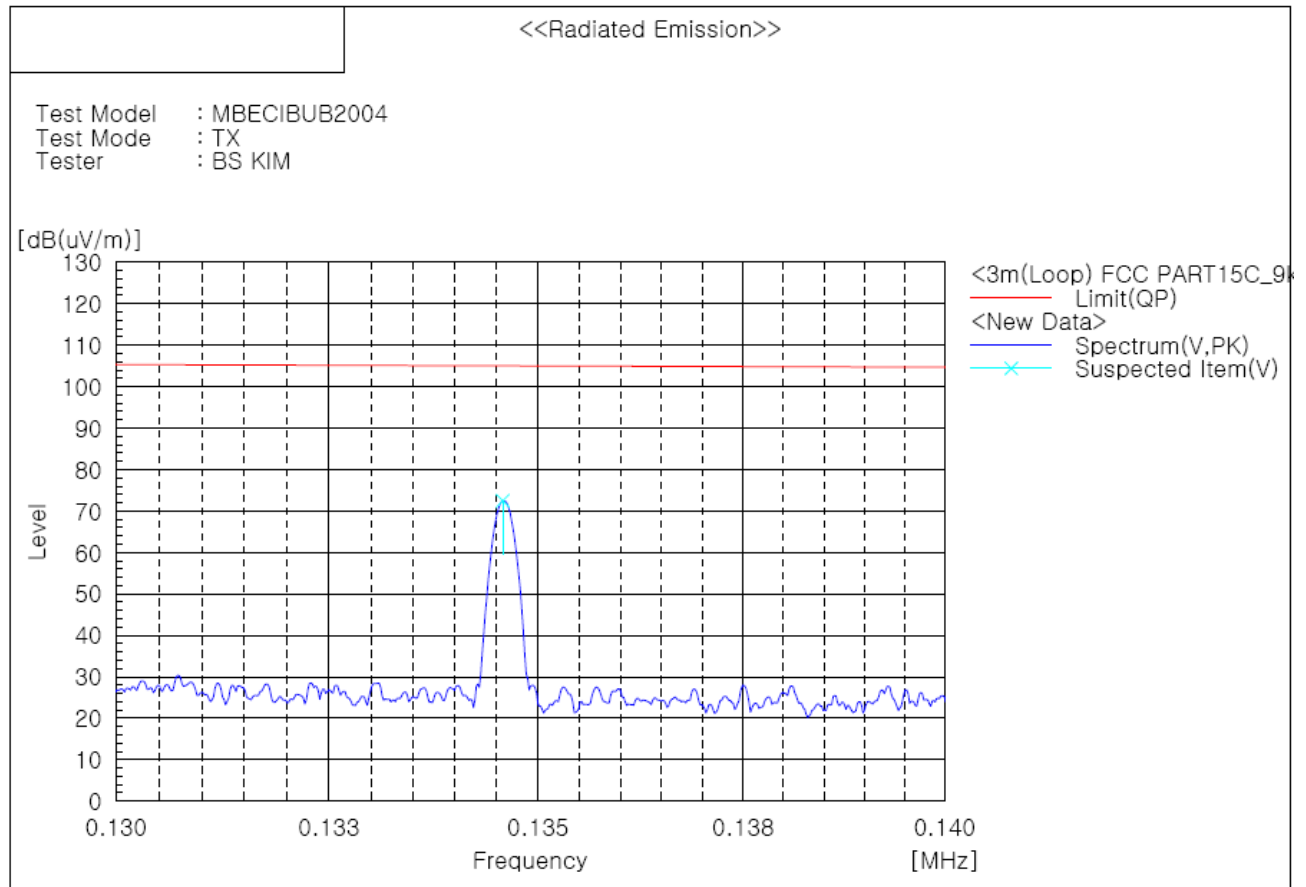


## Test results

### 1) Radiated emissions of fundamental frequency

The requirements are:

☒ Complies



| Frequency [MHz] | Reading [dBuV] | c.f [dB/m] | Result [dBuV/m] | Limit [dBuA/m] | Margin[dB] | Remark |
|-----------------|----------------|------------|-----------------|----------------|------------|--------|
| 0.134 5         | 47.3           | 25.2       | 72.5            | 105.0          | 32.5       |        |

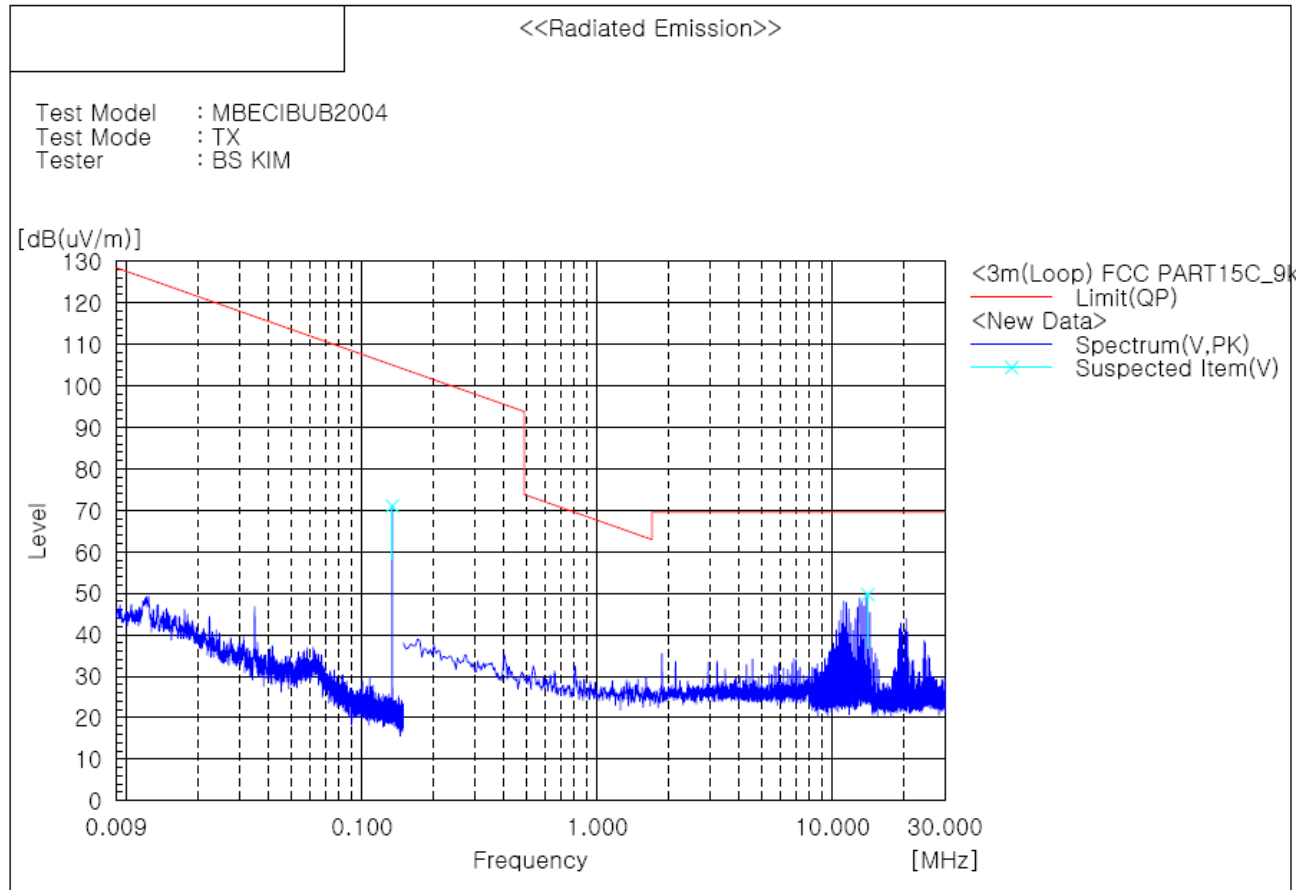
#### Remark :

1. Result = Reading + c.f(correction factor)
2. Correction factor = Antenna factor + Cable loss + 6 dB attenuator
3. Limit :  $20\log(2400/134.5) + 40\log(300/3) = 105.7 \text{ dBuV/m}$
4. Test result is peak values.

## 2) Radiated emissions in the frequency range of 9 kHz to 30 MHz

The requirements are:

☒ Complies



| No. | Frequency [MHz] | Reading [dBuV] | c.f [dB/m] | Result [dBuV/m] | Limit [dBuA/m] | Margin[dB] | Remark |
|-----|-----------------|----------------|------------|-----------------|----------------|------------|--------|
| 1   | 0.135           | 45.9           | 25.2       | 71.1            | -              | -          |        |
| 2   | 14.131          | 23.5           | 26.2       | 49.7            | 69.5           | 19.8       |        |

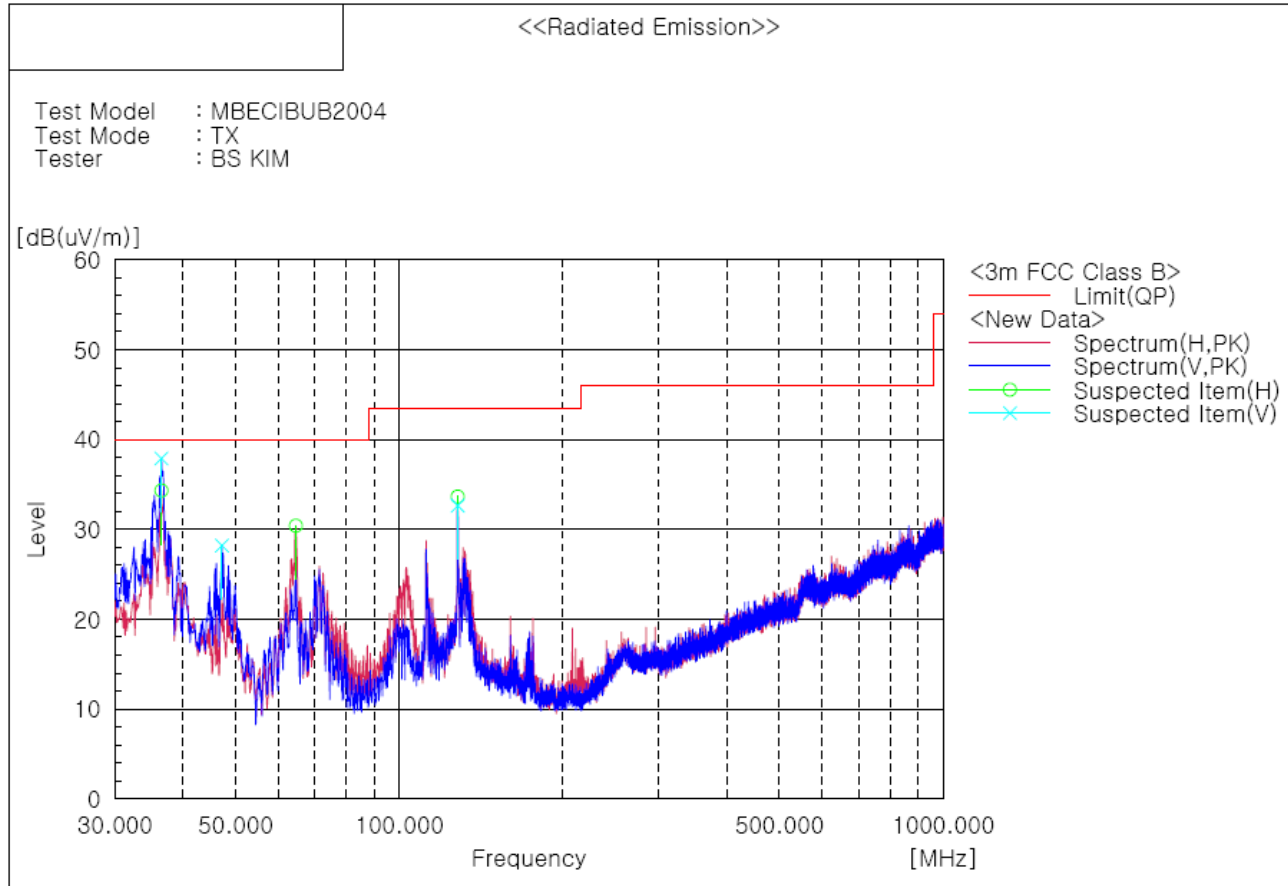
### Remark :

1. Result = Reading + c.f(correction factor)
2. Correction factor = Antenna factor + Cable loss + 6 dB attenuator
3. Test result is peak values.
4. No.1 is the fundamental frequency.

### 3) Radiated emissions in the frequency range of 30 MHz to 1 000 MHz

The requirements are:

☒ Complies



#### Spectrum Selection

| No. | Frequency [MHz] | (P) | Reading [dB(μV)] | c.f [dB(1/m)] | Result PK [dB(μV/m)] | Limit QP [dB(μV/m)] | Margin QP [dB] | Height [cm] | Angle [deg] |
|-----|-----------------|-----|------------------|---------------|----------------------|---------------------|----------------|-------------|-------------|
| 1   | 36.548          | V   | 47.6             | -9.7          | 37.9                 | 40.0                | 2.1            | 101.0       | 82.0        |
| 2   | 36.548          | H   | 44.0             | -9.7          | 34.3                 | 40.0                | 5.7            | 209.0       | 320.0       |
| 3   | 128.091         | H   | 45.1             | -11.4         | 33.7                 | 43.5                | 9.8            | 209.0       | 122.0       |
| 4   | 64.556          | H   | 48.4             | -18.0         | 30.4                 | 40.0                | 9.6            | 305.0       | 345.0       |
| 5   | 128.091         | V   | 44.0             | -11.4         | 32.6                 | 43.5                | 10.9           | 101.0       | 15.0        |
| 6   | 47.218          | V   | 42.5             | -14.3         | 28.2                 | 40.0                | 11.8           | 101.0       | 323.0       |

#### Remark :

1. Result = Reading + c.f(Correction factor)
2. Correction factor = Antenna factor + Cable loss + 6 dB attenuator - Amp Gain
3. The test result in peak detector is less than quasi-peak limit.

## APPENDIX A – Test Equipment Used For Tests

| No. | Name of Equipment   | Manufacturer                 | Model No. | Serial No.    | Date of Calibration | Due Date   |
|-----|---------------------|------------------------------|-----------|---------------|---------------------|------------|
| 1   | EMI Test Receiver   | Rohde & Schwarz              | ESCI7     | 100814        | 2019-10-22          | 2020-10-22 |
| 2   | Active Loop Antenna | SCHWARZBECK                  | FMZB 1513 | 1513-126      | 2018-05-27          | 2020-05-27 |
| 3   | Bilog Antenna       | Schaffner                    | CBL6111C  | 2551          | 2018-05-10          | 2020-05-10 |
| 4   | AMPLIFIER           | SONOMA                       | 310       | 291721        | 2019-01-28          | 2020-01-28 |
| 5   | 6dB Attenuator      | R&S                          | DNF       | 272.4110.50-2 | 2019-10-25          | 2020-10-25 |
| 6   | DC Power supply     | Topward Electric Instruments | 6303D     | 711196        | 2019-01-21          | 2020-01-21 |