



# TEST REPORT

## FCC Part 15C & RSS-GEN (Issue 5)



**Equipment under test** UNIT ASSY-IBU  
**Model name** MBECIBUS2109  
**FCC ID** NYOMBECIBUS2109  
**IC number** 3109A-MBECIBUS219  
**Applicant** MOBASE ELECTRONICS CO., LTD.  
**Manufacturer** MOBASE ELECTRONICS CO., LTD.  
**Date of test(s)** 2022.04.18 ~ 2022.04.28  
**Date of issue** 2022.05.03

**Issued to**

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Test and report completed by :	Report approval by :
	
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**Revision history**

Revision	Date of issue	Test report No.	Description
-	2022.05.03	KES-RF1-22T0038	Initial

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### 1. General information

Applicant MOBASE ELECTRONICS CO., LTD.  
Applicant address 100, Saneop-ro, 156beon-gil, Gwonseon-gu, Suwon-si,  
Gyeonggi-do, South Korea  
Test site KES Co., Ltd.  
Test site address ☐ 3701, 40, Simin-daero 365beon-gil, Dongan-gu, Anyang-si,  
Gyeonggi-do, 14057, Korea  
☒ 473-29, Gayeo-ro, Yeosu-si, Gyeonggi-do, Korea  
Test Facility FCC Accreditation Designation No.: KR0100, Registration No.: 444148  
FCC rule part(s): Part 15C  
IC rule part(s): RSS-GEN (Issue 5)  
FCC ID: NYOMBECIBUS2109  
IC number: 3109A-MBECIBUS219  
Test device serial No. ☒ Production ☐ Pre-production ☐ Engineering

#### 1.1. EUT description

Equipment under test UNIT ASSY-IBU  
Frequency range 0.125 MHz(TX only), 433.92 MHz(RX only)  
Model: MBECIBUS2109  
Modulation technique ASK  
Number of channels 0.125 MHz : 1 ch  
Antenna type Loop antenna  
Power source DC 12 V  
H/W version 1.0  
S/W version 1.0

#### 1.2. Test configuration

The **MOBASE ELECTRONICS CO., LTD. / UNIT ASSY-IBU / MBECIBUS2109 /**  
**FCC ID: NYOMBECIBUS2109** was tested according to the specification of EUT, the EUT must comply with following standards.

FCC Part 15C  
ANSI C63.10-2013

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**1.3. Test frequency**

Ch.	Frequency (MHz)
00	0.125

**1.4. Information about derivative model**

N/A

**1.6. Accessory information**

Equipment	Manufacturer	Model	Serial No.	Power source
-	-	-	-	-

**1.7. Measurement Uncertainty`**

Test Item		Uncertainty
Uncertainty for Conduction emission test		2.46 dB
Uncertainty for Radiation emission test (include Fundamental emission)	Below 1GHz	4.40 dB
	Above 1GHz	5.94 dB
Note. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.		

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**2. Summary of tests**

Section in FCC Part 15	Section in RSS- Gen	Parameter	Test results
15.205, 15.209	RSS-Gen 8.9, 8.10	Radiated spurious emission	Pass
2.1049	RSS-Gen 6.7	20 dB Bandwidth	Pass
15.207	RSS-Gen 8.8	AC conducted emissions	N/A <sup>1)</sup>

**Note :**

1. This product is powered by DC 12 V.

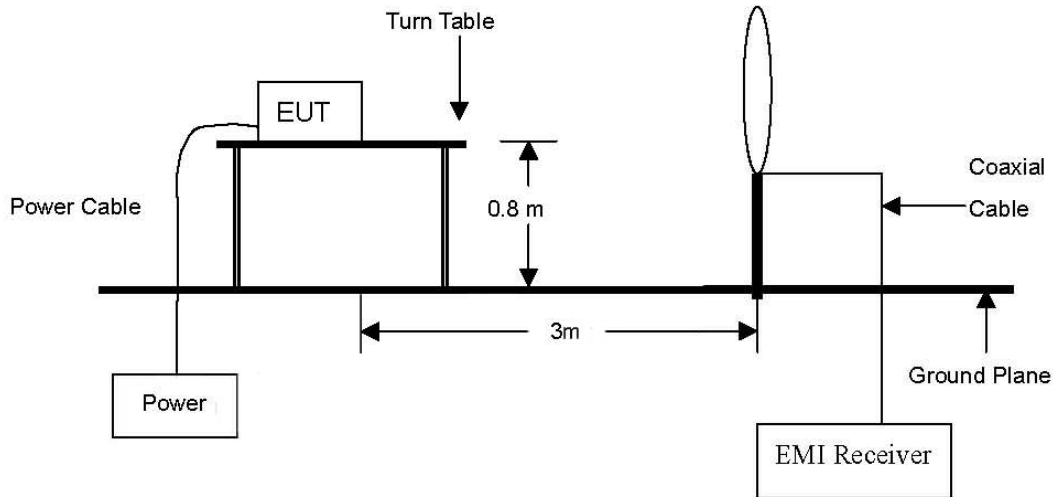
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### 3. Test results

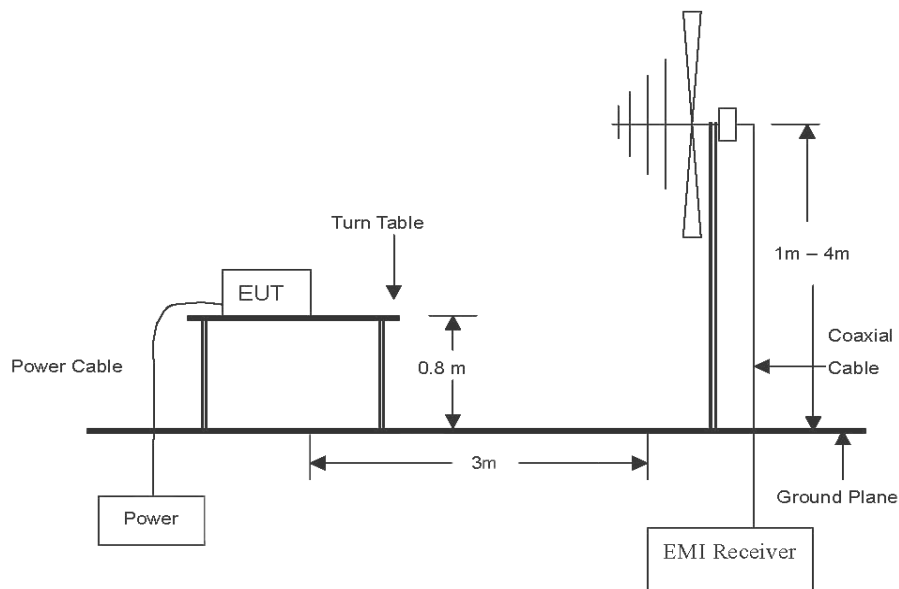
#### 3.1. Radiated spurious emission

##### Test setup

The diagram below shows the test setup that is utilized to make the measurements for emission from 9 kHz to 30 MHz Emissions.



The diagram below shows the test setup that is utilized to make the measurements for emission from 30 MHz to 1 GHz emissions.



**Test procedure**

[9 kHz to 30 MHz]

The EUT was placed on the top of a rotating table 0.8 meter above the ground at a 3 meter anechoic chamber test site. The table was rotated 360 degrees to determine the position of the highest radiation. Then antenna is a loop antenna is fixed at one meter above the ground to determine the maximum value of the field strength. Both parallel and perpendicular and ground parallel of the antenna are set to make the measurement. For each suspected emission, the EUT was arranged to its worst case and then the table was turned from 0 degrees to 360 degrees to find the maximum reading. The test-receiver system was set to Quasi-peak function and specified bandwidth with maximum hold mode.

[30 MHz to 1 GHz]

The height of the measuring antenna was varied between 1 to 4 m and the table was rotated a full revolution in order to obtain maximum values of the electric field intensity.

The measurement was made in both the vertical and horizontal polarization, and the maximum value is presented in the report.



**Note:**

1. According to exploratory test no any obvious emission were detected from 9 kHz to 30 MHz. Although these tests were performed other than open area test site, adequate comparison measurements were confirmed against 30 m open area test site. Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the ones of tests made in an open field based on KDB 414788.
2. Measurement distance : 3 m.
3. Field strength = Level + Correction factor +  $F_d$
4.  $F_d = 40\log(D_m / D_s)$   
Where:  
 $F_d$  = Distance factor in dB  
 $D_m$  = Measurement distance in meters  
 $D_s$  = Specification distance in meters  
For 300m:  $40\log(300/3) = 80$  dB for frequency band 0.009 MHz to 0.490 MHz  
For 30m:  $40\log(30/3) = 40$  dB for frequency band 0.490 MHz to 30 MHz
5. No significant emissions were found in the 90 - 110kHz restricted band.

### Limit

According to 15.209(a), for an intentional radiator devices, the general required of field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values :

Frequency (MHz)	Distance (Meters)	Radiated ( $\mu\text{V}/\text{m}$ )
0.009 ~ 0.490	300	2400 / F(kHz)
0.490 ~ 1.705	30	24000 / F(kHz)
1.705 ~ 30.0	30	30
30 ~ 88	3	100**
88 ~ 216	3	150**
216 ~ 960	3	200**
Above 960	3	500

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

According to RSS-Gen, Except when the requirements applicable to a given device state otherwise, emissions from licence-exempt transmitters shall comply with the field strength limits :

Frequency (MHz)	Distance (Meters)	Radiated ( $\mu\text{V}/\text{m}$ )
0.009 ~ 0.490	300	2 400 / F(kHz)
0.490 ~ 1.705	30	24 000 / F(kHz)
1.705 ~ 30.0	30	30
30 ~ 88	3	100
88 ~ 216	3	150
216 ~ 960	3	200
Above 960*	3	500

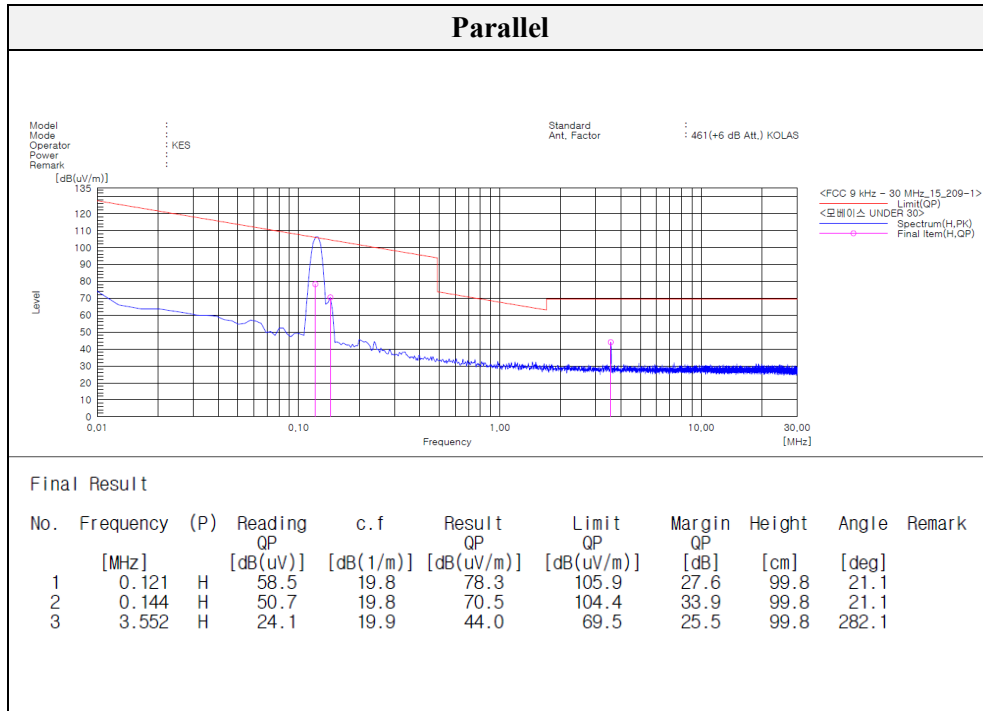
\* Unless otherwise specified, for all frequencies greater than 1 GHz, the radiated emission limits for licence-exempt radio apparatus stated in applicable RSSs (including RSS-Gen) are based on measurements using a linear average detector function having a minimum resolution bandwidth of 1 MHz. If an average limit is specified for the EUT, then the peak emission shall also be measured with instrumentation properly adjusted for such factors as pulse desensitization to ensure the peak emission is less than 20 dB above the average limit.

**Note:** Transmitting devices are not permitted in restricted frequency bands unless stated otherwise in the specific RSS.

**Test results (Below 30 MHz)**

Mode: -

Distance of measurement: 3 meter



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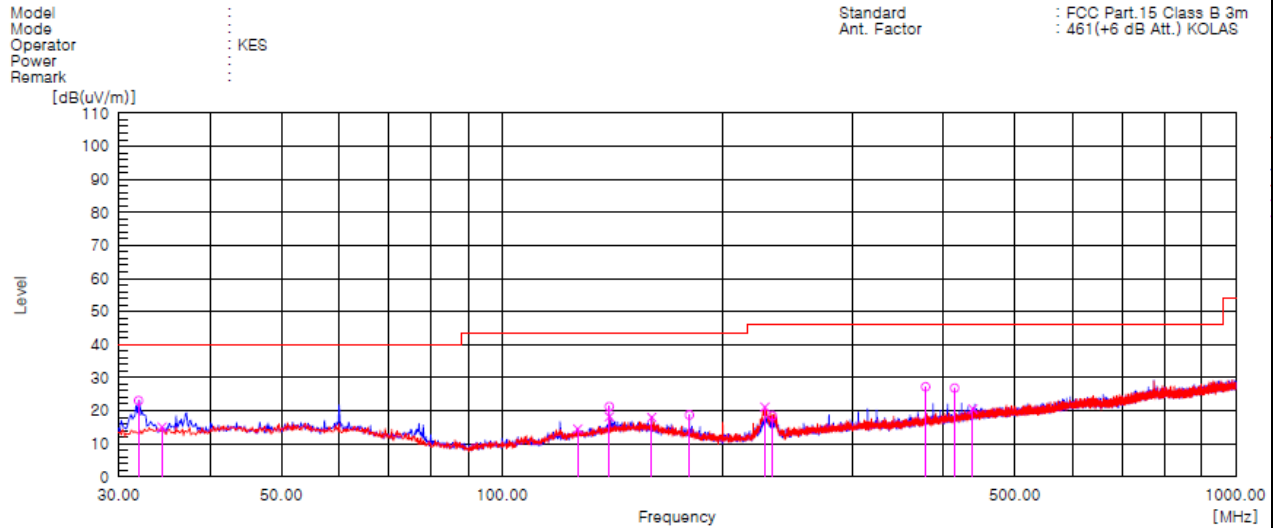
## Test results (Below 1 000 MHz)

Mode:

-

Distance of measurement: 3 meter

### Horizontal // Vertical



### Final Result

No.	Frequency [MHz]	(P)	Reading QP [dB(uV)]	c.f [dB(1/m)]	Result QP [dB(uV/m)]	Limit QP [dB(uV/m)]	Margin QP [dB]	Height [cm]	Angle [deg]	Remark
1	31.940	H	37.1	-14.1	23.0	40.0	17.0	124.0	272.6	
2	34.365	V	29.2	-14.1	15.1	40.0	24.9	107.0	82.3	
3	126.758	V	29.2	-14.7	14.5	43.5	29.0	139.0	267.8	
4	139.974	H	34.4	-13.2	21.2	43.5	22.3	107.0	198.8	
5	139.974	V	31.4	-13.2	18.2	43.5	25.3	373.0	30.8	
6	159.980	V	30.9	-12.9	18.0	43.5	25.5	153.0	283.7	
7	179.986	H	33.3	-14.6	18.7	43.5	24.8	100.0	31.0	
8	228.244	V	36.0	-14.9	21.1	46.0	24.9	152.0	254.2	
9	233.579	H	33.1	-14.7	18.4	46.0	27.6	101.0	4.0	
10	377.988	H	37.5	-10.3	27.2	46.0	18.8	101.0	139.8	
11	413.999	H	36.0	-9.2	26.8	46.0	19.2	124.0	139.8	
12	438.249	V	29.0	-8.5	20.5	46.0	25.5	109.0	114.7	

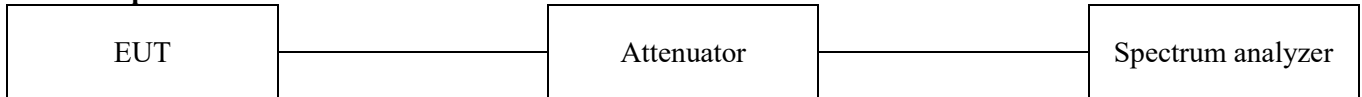
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### 3.2. 20 dB Bandwidth

#### Test setup



#### Test procedures

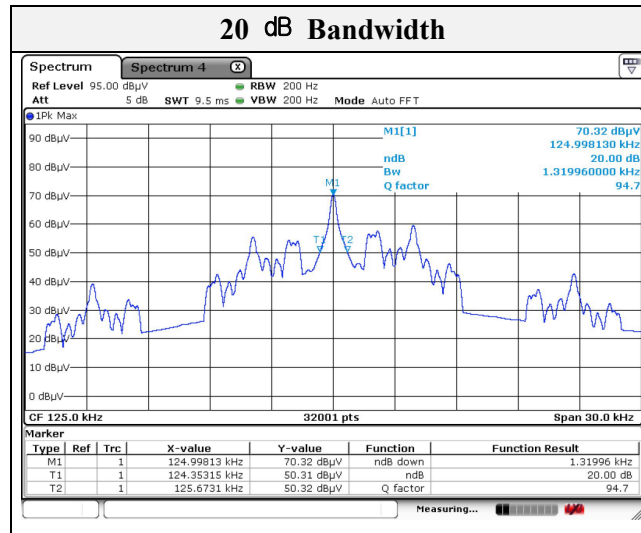
The transmitter output is connected to a spectrum analyzer. The RBW is set to  $\geq 1\%$  of the emission bandwidth. The VBW is set to  $\geq \text{RBW}$ . The sweep time is coupled.

#### Limit

None; for reporting purposes only.

## Test results

Frequency(MHz)	Measured bandwidth(kHz)
0.125	1.320



## Note.

Because the measured signal is CW/CW-like, adjusting the RBW per C63.10 would not be practical since measured bandwidth will always follow the RBW and the result will be approximately twice the RBW.

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**Appendix A. Measurement equipment**

Equipment	Manufacturer	Model	Serial No.	Calibration interval	Calibration due.
Spectrum Analyzer	R&S	FSV40	101725	1 year	2022.06.18
Spectrum analyzer	R&S	FSV3044	101272	1 year	2023.03.14
SIGNAL GENERATOR	KEYSIGHT	N5182B	MY59100115	1 year	2023.04.27
SIGNAL GENERATOR	Anritsu	68369B	002118	1 year	2022.05.17
Loop Antenna	Schwarzbeck	FMZB1513	225	2 years	2023.01.18
TRILOG-BROADBAND ANTENNA	VULB9163	Schwarzbeck	714	2 years	2024.04.19
Attenuator	Huber&Shuner	6806.17.A	-	1 year	2024.04.19
Amplifier	SONOMA INSTRUMENT	310N	401123	1 year	2022.06.07
EMI Test Receiver	R&S	ESU26	100552	1 year	2023.03.31
DC POWER SUPPLY	SORENSEN	DCS40-75E	1408A02745	1 year	2023.01.14

**Peripheral device**

Device	Manufacturer	Model No.	S/N	Note
-	-	-	-	-

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