

# TEST REPORT



**CTK Co., Ltd.**  
(Ho-dong), 113, Yejik-ro, Cheoin-gu,  
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Report No.:  
CTK-2022-01215  
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## 1. Applicant

- Name : MOBASE ELECTRONICS CO., LTD.
- Address : 100, Saneop-ro 156beon-gil, Gwonseon-gu, Suwon-si, Gyeonggi-do, Republic of Korea
- Date of Receipt : 2022-03-14

## 2. Manufacturer

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

**3. Use of Report :** For FCC Certification, For ISED Certification

**4. Test Sample / Model :** Wireless Charging System / MBECNWPC2207

**5. Date of Test :** 2022-04-12, 2022-04-21

**6. Test Standard(method) used :** FCC 47 CFR part 15 subpart C 15.225  
RSS-Gen Issue 5, RSS-210 Issue 10

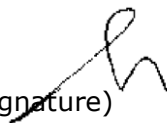

**7. Testing Environment:** Temp.: (24.8 ± 1) °C, Humidity: (47 ± 3) % R.H.

**8. Test Results :** Compliance

**9. Location of Test :**  Permanent Testing Lab     On Site Testing

The results shown in this test report refer only to the sample(s) tested unless otherwise stated.

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

Remark. This report is not related to KOLAS accreditation and relevant regulation.

2022-04-22

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## REPORT REVISION HISTORY

Date	Revision	Page No
2022-04-22	Issued (CTK-2022-01215)	all

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# 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, Republic of Korea
<b>Contact Person</b>	Name : Hee-Tack Ryu E-mail : shadow@mobaseelec.com Tel : +82-31-8091-2611

## 1.2 Product Information

<b>FCC ID</b>	NYOMBECNWPC2207
<b>IC</b>	3109A-MBECNWPC227
<b>Product Description</b>	Wireless Charging System
<b>Model name</b>	MBECNWPC2207
<b>Variant Model name</b>	-
<b>FVIN</b>	N/A
<b>Operating Frequency Range</b>	13.56 MHz
<b>RF Output Power</b>	64.8 dBuV/m @ 3 m
<b>Antenna Type</b>	PCB antenna(Loop antenna)
<b>Power Source</b>	DC 12 V

## 1.3 Antenna Information

<input checked="" type="checkbox"/>	Integral antenna (antenna permanently attached)
<input type="checkbox"/>	Temporary RF connector provided
<input checked="" type="checkbox"/>	No temporary RF connector provided Transmit chains bypass antenna and soldered temporary RF connector provided for connected measurement. In case of conducted measurements the transmitter shall be connected to the measuring equipment via a suitable attenuator and correct for all losses in the RF path.
<input type="checkbox"/>	External antenna (dedicated antennas)



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## 2. Facility and Accreditations

### 2.1 Test Facility

#### [Radiated Emission]

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

#### [Frequency tolerance]

The measurement facility is located at 142, Dongbu-ro, Cheoin-gu, Yongin-si, Gyeonggi-do, Republic of 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.



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### 3. Test Specifications

#### 3.1 Standards

FCC Part Section(s)	RSS Section(s)	Requirement(s)	Status (Note 1)	Report Clause
15.203	RSS-Gen 6.8	Antenna Requirement	C	1.3
15.215(c)	RSS-Gen 6.7	Emission Bandwidth	C	4.1
15.225 (a)(b)(c)(d)	RSS-210 Annex B.6 (a)(b)(c)(d)	Field strength emissions	C	4.2
15.225(e)	RSS-210 Annex B.6	Frequency tolerance	C	4.3
15.207	RSS-Gen 8.8	AC Power line Conducted Emissions	NA(Note 4)	-

Note 1: C=Complies NC=Not Complies NT=Not Tested NA=Not Applicable

Note 2: The data in this test report are traceable to the national or international standards.

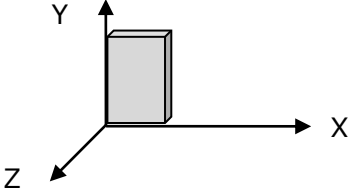
Note 3: The sample was tested according to the following specification: ANSI C63.10-2013.

Note 4: The equipment is operated on battery power only

### 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.

#### The Worst Case Measurement Configuration

<b>Tests Item</b>	Transmitter Radiated Emissions, Emission Bandwidth
<b>Condition</b>	Radiated measurement
<b>User Position</b>	<input checked="" type="checkbox"/> EUT will be placed in fixed position.
	<input 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>	DC Power supply mode
<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	997931



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### 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	3.98 dB(C.L. : Approx. 95%, $k = 2$ )
Frequency tolerance	10 Hz(C.L. : Approx. 95%, $k = 2$ )



## 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.

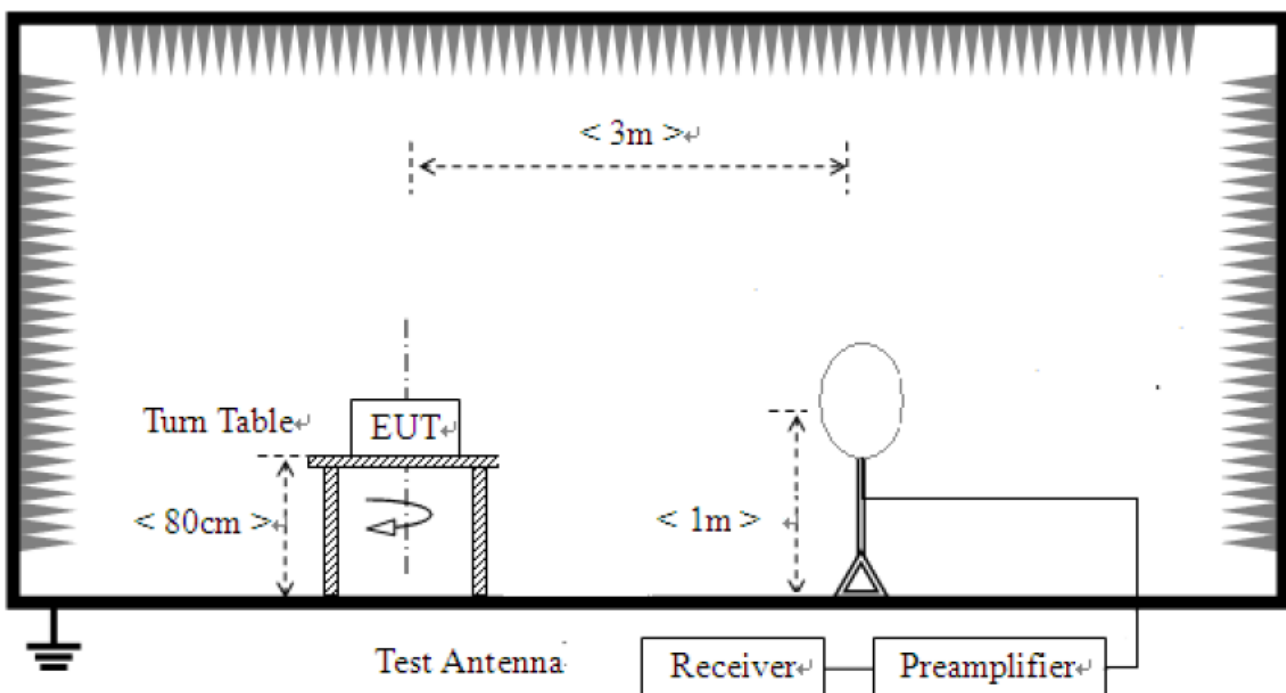
The occupied bandwidth or the "99% emission bandwidth" is defined as the frequency range between two points, one above and the other below the carrier frequency, within which 99% of the total transmitted power of the fundamental transmitted emission is contained. The occupied bandwidth shall be reported for all equipment in addition to the specified bandwidth required in the applicable RSSs.

In some cases, the "x dB bandwidth" is required, which is defined as the frequency range between two points, one at the lowest frequency below and one at the highest frequency above the carrier frequency, at which the maximum power level of the transmitted emission is attenuated x dB below the maximum in-band power level of the modulated signal, where the two points are on the outskirts of the in-band emission.

#### Test Procedures

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

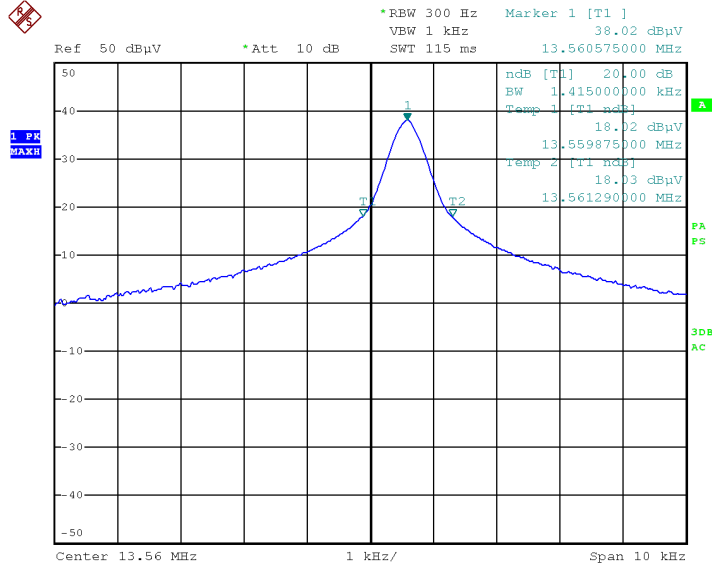
#### Test Setup



### Test results

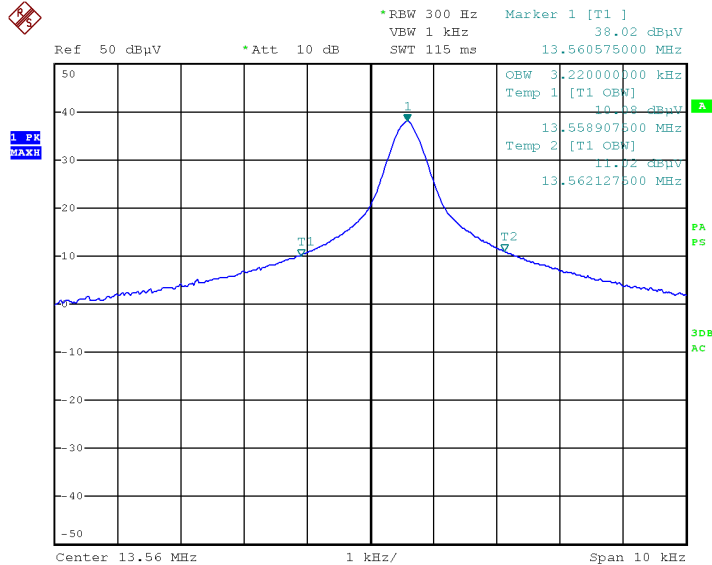
Emission Bandwidth	Result	Limit
20dB Bandwidth	1.415 kHz	N/A
99% Bandwidth	3.220 kHz	N/A

#### Emission Bandwidth Plot 20dB Bandwidth



Date: 12.APR.2022 16:22:32

#### Emission Bandwidth Plot 99% Bandwidth



Date: 12.APR.2022 16:22:51

## 4.2 Field strength emissions

### Requirement

- (a) The field strength of any emissions within the band 13.553-13.567 MHz shall not exceed 15,848 microvolts/meter at 30 meters.

Frequency(MHz)	Field Strength uV/m@30m	Field Strength dBuV/m@30m	Field Strength dBuV/m@3m
13.553-13.567	15,848	84.0	124.0

- (b) Within the bands 13.410-13.553 MHz and 13.567-13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter at 30 meters.

Frequency(MHz)	Field Strength uV/m@30m	Field Strength dBuV/m@30m	Field Strength dBuV/m@3m
13.410-13.553	334	50.5	90.5
13.567-13.710	334	50.5	90.5

- (c) Within the bands 13.110-13.410 MHz and 13.710-14.010 MHz the field strength of any emissions shall not exceed 106 microvolts/meter at 30 meters.

Frequency(MHz)	Field Strength uV/m@30m	Field Strength dBuV/m@30m	Field Strength dBuV/m@3m
13.110-13.410	106	40.5	80.5
13.710-14.010	106	40.5	80.5

- (d) The field strength of any emissions appearing outside of the 13.110-14.010 MHz band shall not exceed the general radiated emission limits in §15.209(RSS-GEN).



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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.



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## Test Location

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

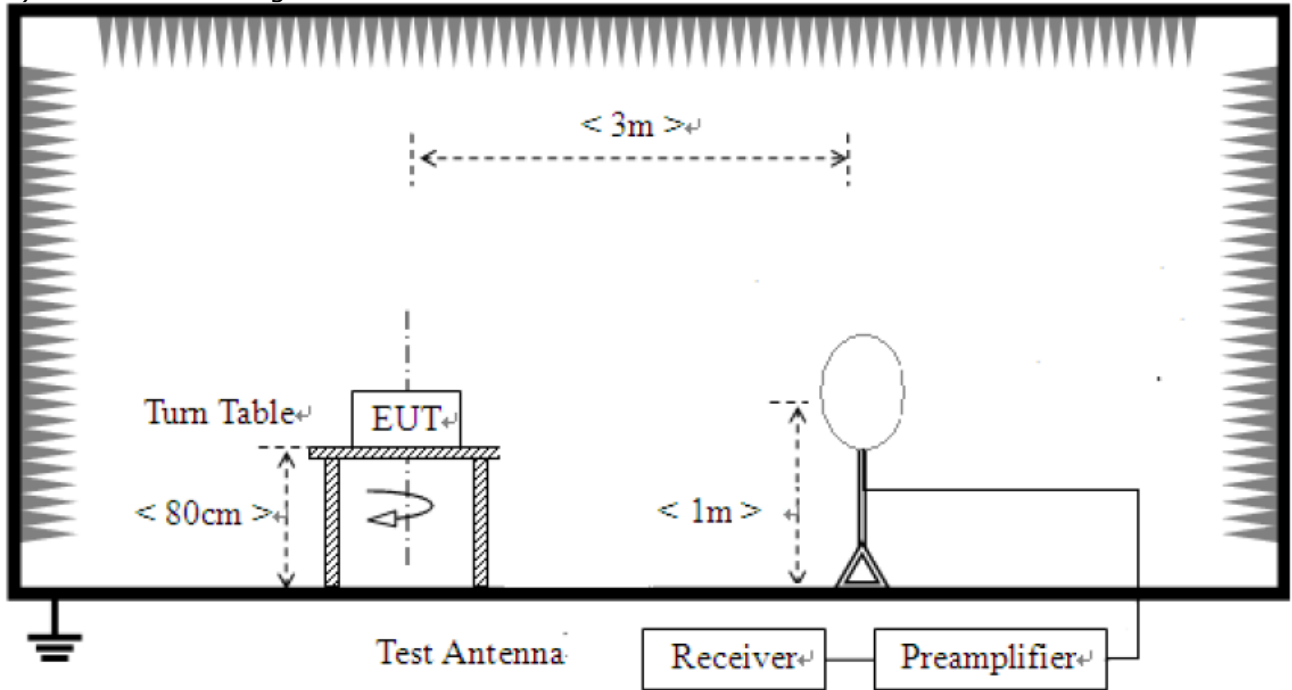
## Test Procedures

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. 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. 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 rage 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.

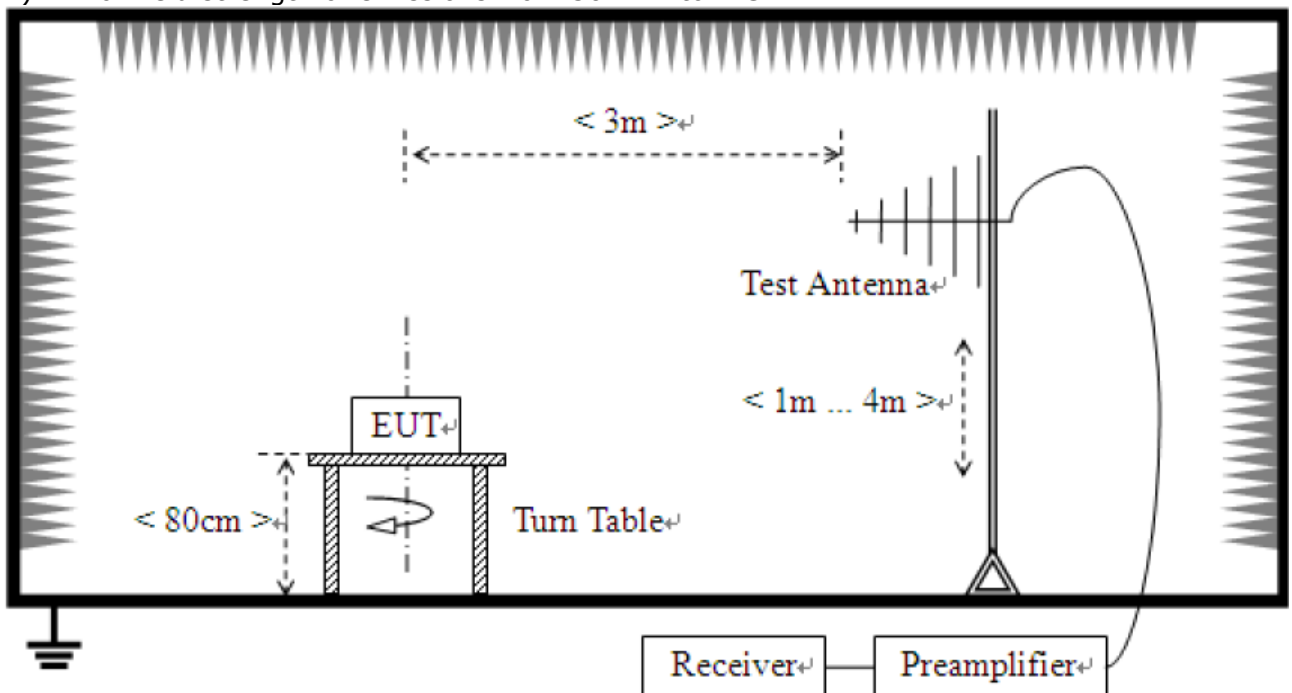
Measuring instrument Settings	
Frequency Range	9 kHz – 1 000 MHz
RBW	200 Hz (9 kHz – 150 kHz) 9 kHz (150 kHz – 30 MHz) 120 kHz (30 MHz – 1 000 MHz)
VBW	≥ RBW
Sweep time	auto couple
Detector function	CISPR quasi-peak(below 1 000 MHz)

## 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

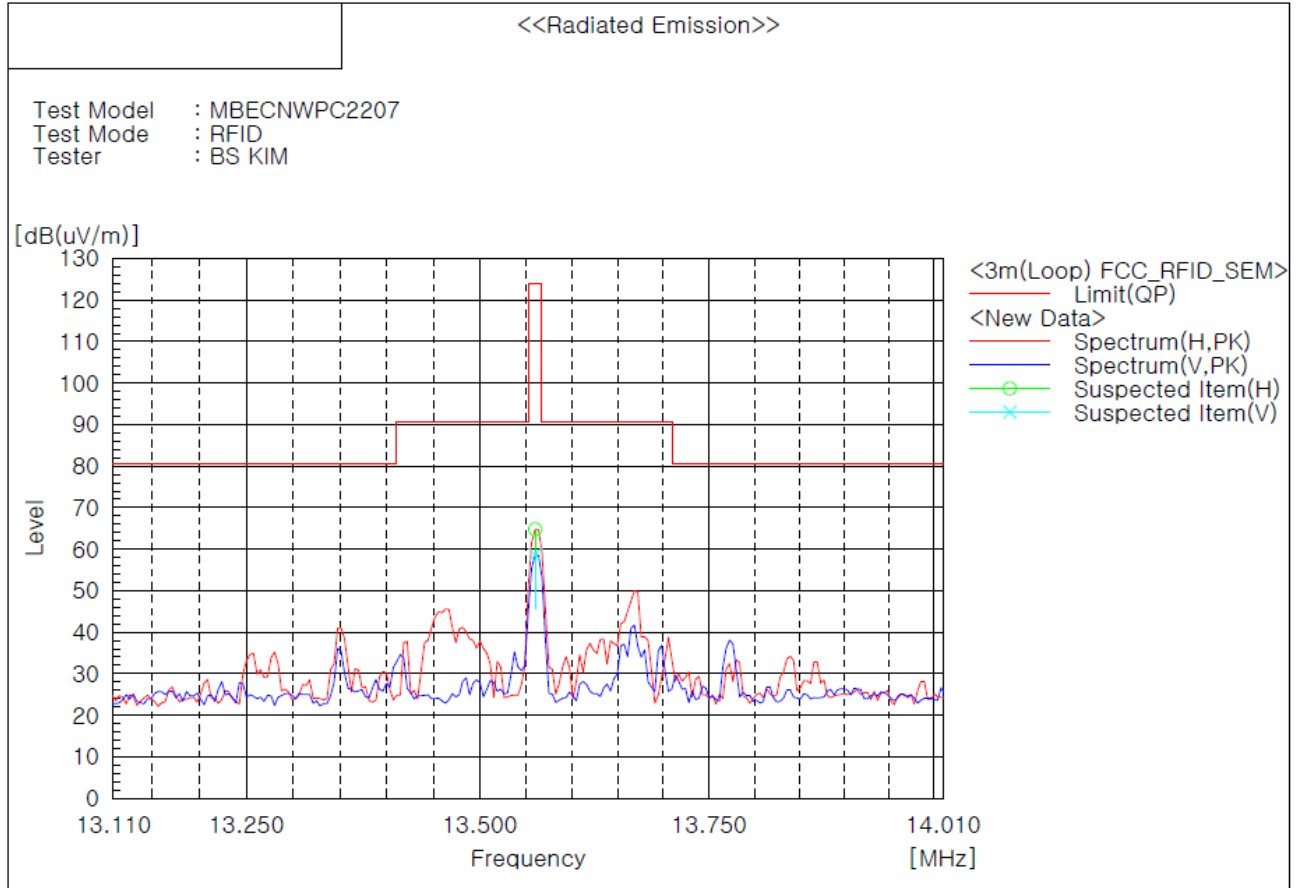


## Test results

### 1) Radiated emissions within the band 13.110-14.010 MHz

The requirements are:

Complies



#### Spectrum Selection

No.	Frequency [MHz]	(P)	Reading [dB(uV)]	c.f [dB(1/m)]	Result PK [dB(uV/m)]	Limit QP [dB(uV/m)]	Margin QP [dB]	Height [cm]	Angle [deg]
1	13.560	H	38.6	26.2	64.8	124.0	59.2	101.0	200.0
2	13.560	V	32.4	26.2	58.6	124.0	65.4	100.0	113.0

#### Remark :

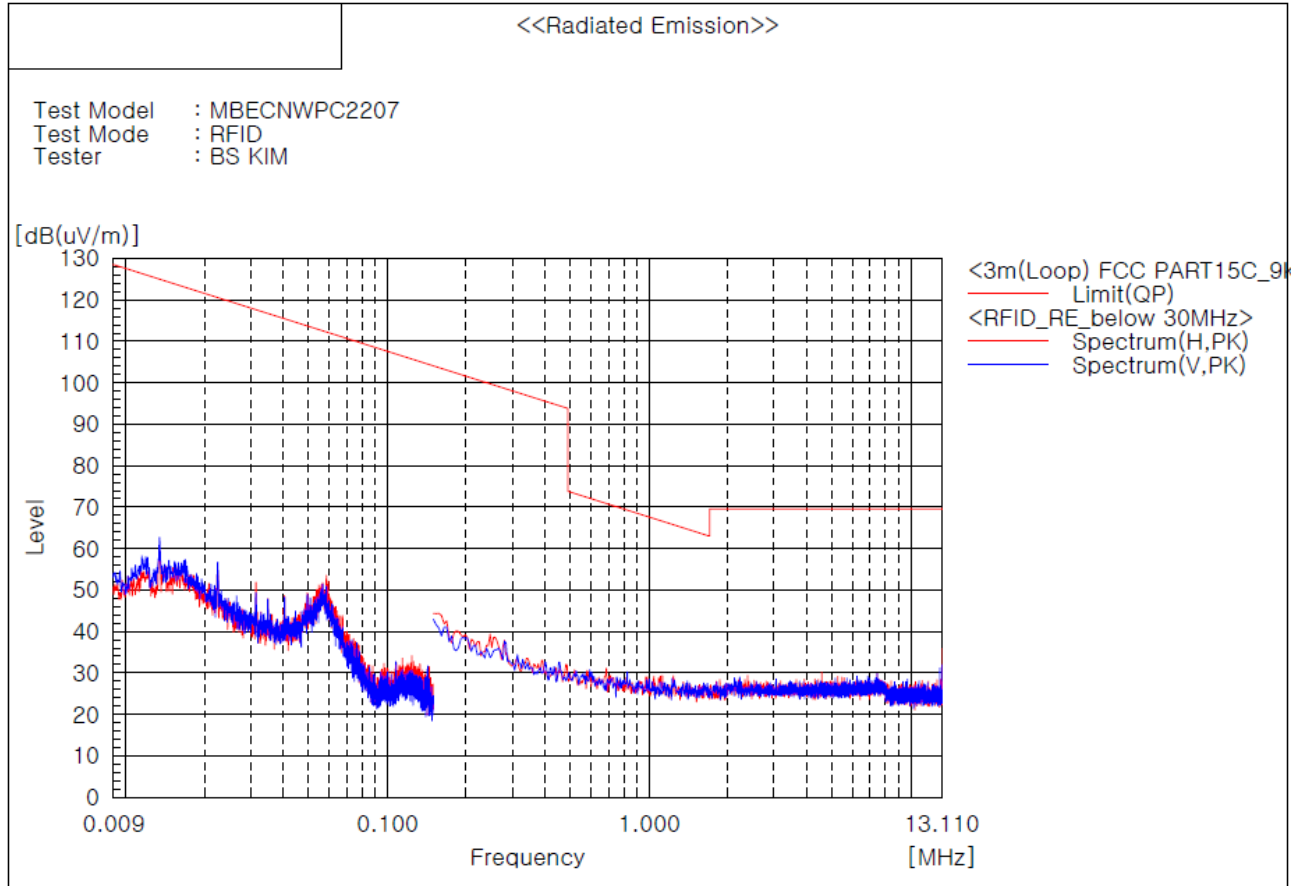
1. Result = Reading + c.f(correction factor)
2. Correction factor = Antenna factor + Cable loss + 6 dB attenuator
3. The test result in peak detector is less than quasi-peak limit.

## 2) Field strength of any emissions appearing outside of the 13.110-14.010 MHz

**Frequency range : 9 kHz – 13.110 MHz**

The requirements are:

Complies



### Remark :

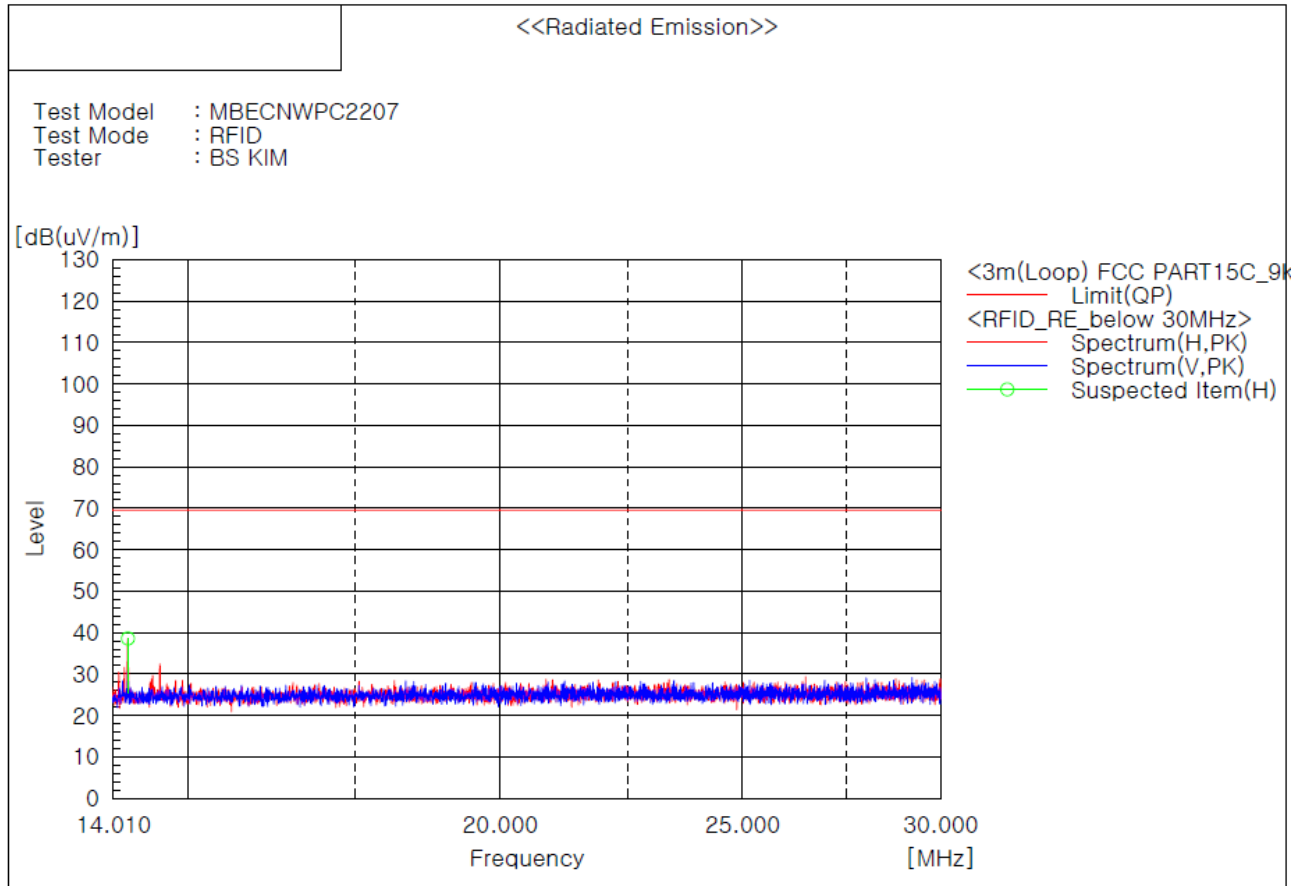
1. Result = Reading + c.f(correction factor)
2. Correction factor = Antenna factor + Cable loss + 6 dB attenuator
3. Emissions more than 20 dB below the limit do not need to be reported.



**Frequency range : 14.010 MHz – 30 MHz**

The requirements are:

Complies



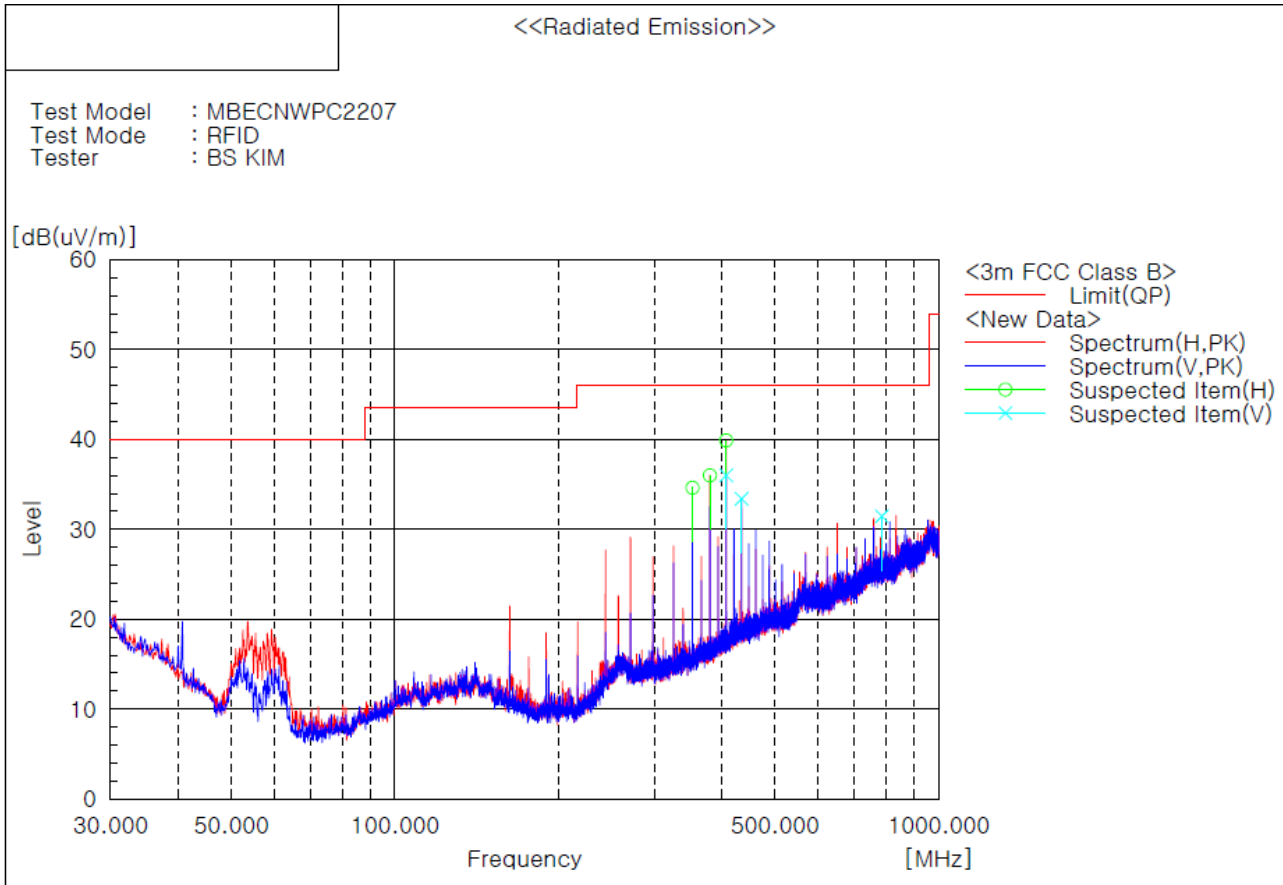
**Remark :**

1. Result = Reading + c.f(correction factor)
2. Correction factor = Antenna factor + Cable loss + 6 dB attenuator
3. Emissions more than 20 dB below the limit do not need to be reported.

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

The requirements are:

Complies



#### Spectrum Selection

No.	Frequency [MHz]	(P)	Reading [dB(uV)]	c.f [dB(1/m)]	Result PK [dB(uV/m)]	Limit QP [dB(uV/m)]	Margin QP [dB]	Height [cm]	Angle [deg]
1	352.646	H	41.7	-7.1	34.6	46.0	11.4	101.0	332.0
2	379.685	H	42.3	-6.3	36.0	46.0	10.0	101.0	338.0
3	406.845	H	44.9	-5.0	39.9	46.0	6.1	207.0	175.0
4	406.845	V	41.0	-5.0	36.0	46.0	10.0	101.0	168.0
5	434.005	V	37.3	-3.9	33.4	46.0	12.6	101.0	174.0
6	786.600	V	28.0	3.5	31.5	46.0	14.5	192.0	143.0

#### Remark :

1. Result = Reading + c.f(Correction factor)
2. Correction factor = Antenna factor + Cable loss + 6 dB attenuator - Amp Gain

## 4.3 Frequency Stability

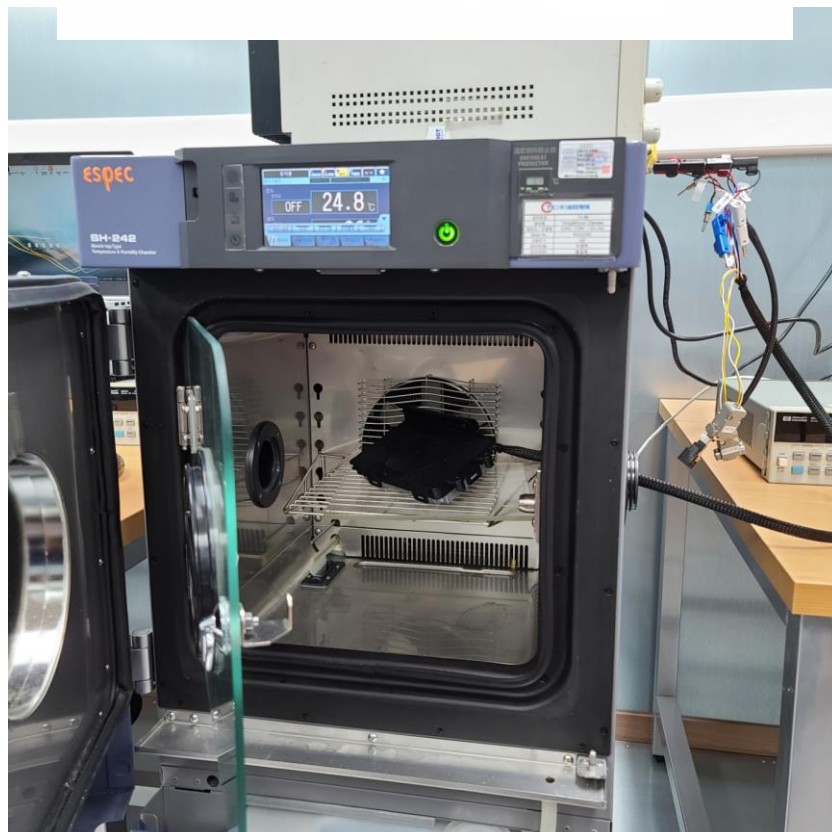
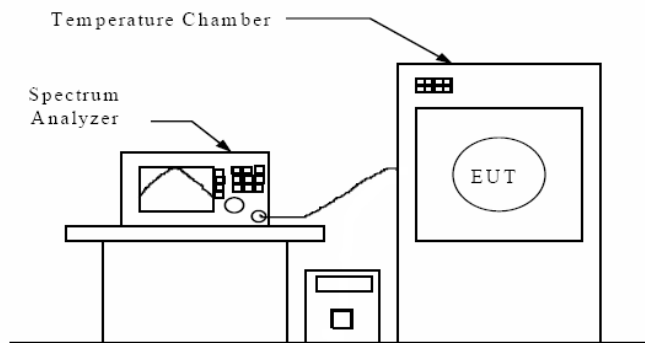
### Requirement

The frequency tolerance of the carrier signal shall be maintained within  $\pm 0.01\%$  of the operating frequency over a temperature variation of  $-20$  degrees to  $+50$  degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C.

### Test Procedures

For the emission bandwidth refer ANSI C63.10-2013, clause 6.8(Frequency stability tests).

### Test Setup





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## Test Results

The requirements are:

Complies

Condition	Measurement Frequency (MHz)				Frequency Stability (ppm)			
	Startup	2 min	5 min	10 min	Start-up	2 min	5 min	10 min
Temp. 50℃	13.560460	13.560415	13.560390	13.560370	-18.80	-22.12	-23.97	-25.44
Temp. 40℃	13.560520	13.560470	13.560455	13.560440	-14.38	-18.07	-19.17	-20.28
Temp. 30℃	13.560610	13.560555	13.560525	13.560525	-7.74	-11.80	-14.01	-14.01
Temp. 20℃	13.560715	13.560665	13.560630	13.560615	0	-3.69	-6.27	-7.37
Temp. 10℃	13.560770	13.560720	13.560705	13.560695	4.06	0.37	-0.74	-1.47
Temp. 0℃	13.560815	13.560795	13.560775	13.560765	7.37	5.90	4.42	3.69
Temp. -10℃	13.560845	13.560830	13.560820	13.560815	9.59	8.48	7.74	7.37
Temp. -20℃	13.560845	13.560845	13.560845	13.560845	9.59	9.59	9.59	9.59
Voltage 85%	13.560600	13.560605	13.560610	13.560610	-8.48	-8.11	-7.74	-7.74
Voltage 115%	13.560645	13.560610	13.560605	13.560600	-5.16	-7.74	-8.11	-8.48
Limit(ppm)	-				100			



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## APPENDIX A – Test Equipment Used For Tests

N o.	Name of Equipment	Manufacturer	Model No.	Serial No.	Date of Calibration	Due Date
1	EMI Test Receiver	Rohde & Schwarz	ESCI7	100814	2021-10-20	2022-10-20
2	Active Loop Antenna	SCHWARZBECK	FMZB 1513	1513-126	2020-05-20	2022-05-20
3	Active Loop Antenna	SCHWARZBECK	FMZB 1513	1513-125	2020-04-16	2022-04-16
					2022-04-15	2024-04-15
4	Bilog Antenna	TESEQ	CBL6111D	58490	2021-03-03	2023-03-03
5	AMPLIFIER	SONOMA	310	291721	2022-01-21	2023-01-21
6	6dB Attenuator	BIRD	5W 6dB	1744	2021-11-18	2022-11-18
7	ATTENUATOR	PASTERNAK	PE7047-6	NONE	2022-02-22	2023-02-22
8	Signal Analyzer	Agilent	N9020A	MY46471102	2022-01-13	2023-01-13

	Cable	Manufacturer	Model No.	Serial No.	Check Date
1	RF Cable (1 GHz below Radiated)	HUBER+SUHNER	SUCOFLEX 104	MY27558/4	2022-04-12
2	RF Cable (1 GHz below Radiated)	CANARE	10m 1G below-1	N/A	2022-04-12
3	RF Cable (1 GHz below Radiated)	CANARE	10m 1G below-2	N/A	2022-04-12
4	3m Loop Cable (1 GHz below Radiated)	CANARE	3m loop	N/A	2022-04-12



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