

TEST REPORT



CTK Co., Ltd.
(Ho-dong), 113, Yejik-ro, Cheoin-gu,
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Fax: +82-31-624-9501

Report No.:
CTK-2022-02956
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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 : 2022-09-27

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

4. Test Sample / Model : UNIT ASSY-IBU(BCM) / MBECIBUB2109

5. Date of Test : 2022-10-11 to 2022-10-20


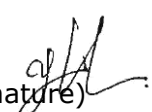
6. Test Standard(method) used : FCC 47 CFR part 15 subpart C 15.209

7. Testing Environment: refer to 11 pages to 16 pages

8. Test Results : Compliance

9. Location of Test : Permanent Testing Lab On Site Testing (Address : 5, Dongbu-ro 221beon-gil, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea)

The results shown in this test report refer only to the sample(s) tested unless otherwise stated. This report cannot be reproduced or copied without the written consent of CTK.

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.

2022-11-16

CTK Co., Ltd.



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REPORT REVISION HISTORY

Date	Revision	Page No
2022-11-16	Issued (CTK-2022-02956)	all

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1. General Product Description

1.1 Client Information

Company	MOBASE ELECTRONICS CO., LTD.
Contact Point	100, Saneop-ro 156beon-gil, Gwonseon-gu, Suwon-si, Gyeonggi-do, Republic of Korea
Contact Person	Name : Hee-Tack Ryu E-mail : shadow@mobaseelec.com Tel : +82-31-8091-2611

1.2 Product Information

FCC ID	NYOMBECIBUB2109
Product Description	UNIT ASSY-IBU(BCM)
Model name	MBECIBUB2109
Variant Model name	-
FVIN	N/A
Operating Frequency	134.2 kHz
RF Output Power	83.5 dBuV/m @ 3m
That may have multiple primary coils	No
Antenna Type	Integral
Power Source	DC 12 V

1.3 Antenna Information

<input checked="" type="checkbox"/>	Integral antenna (antenna permanently attached)
<input type="checkbox"/>	Temporary RF connector provided
<input 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. Accreditations

2.1 Laboratory Accreditations and Listings

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

2.2 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
15.209	RSS-210 7.2 & 7.3	Radiated Emissions	C	4.2
15.207	RSS-Gen 8.8	AC Power line Conducted Emissions	NA(Note 4)	-
<i>Note 1:</i> C=Complies NC=Not Complies NT=Not Tested NA=Not Applicable				
<i>Note 2:</i> The data in this test report are traceable to the national or international standards.				
<i>Note 3:</i> The sample was tested according to the following specification: ANSI C63.10-2013.				
<i>Note 4:</i> The equipment is operated on battery power only				

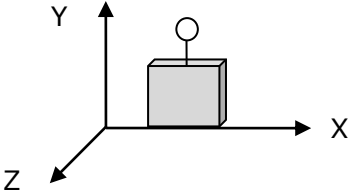
3.2 Mode of operation during the test

It is configured so that the maximum level is transmitted continuously.

Test Frequency

Operating Frequencies
134.2 kHz

The Worst Case Measurement Configuration

Tests Item	Transmitter Radiated Emissions, Emission Bandwidth
Condition	Radiated measurement
User Position	<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.
EUT faces identified relative to view from receiving antenna	

3.3 Peripheral Devices

No.	Device	Manufacturer	Model No.	Serial No.
1	DC Power Supply	Topward Electric Instruments	6303D	711196



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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	3.88 dB(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.

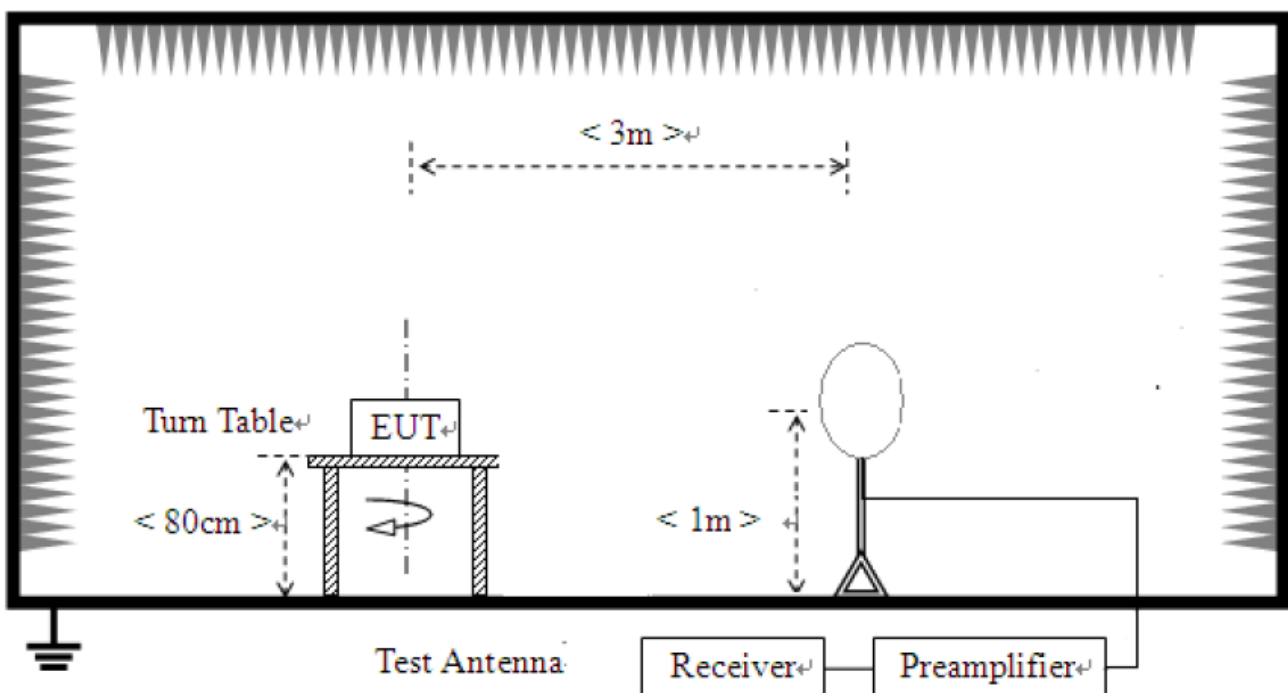
The occupied bandwidth or the "99% emission bandwidth" is defined as the frequency range between two points, one above and the other below the carrier frequency, within which 99% of the total transmitted power of the fundamental transmitted emission is contained. The occupied bandwidth shall be reported 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).

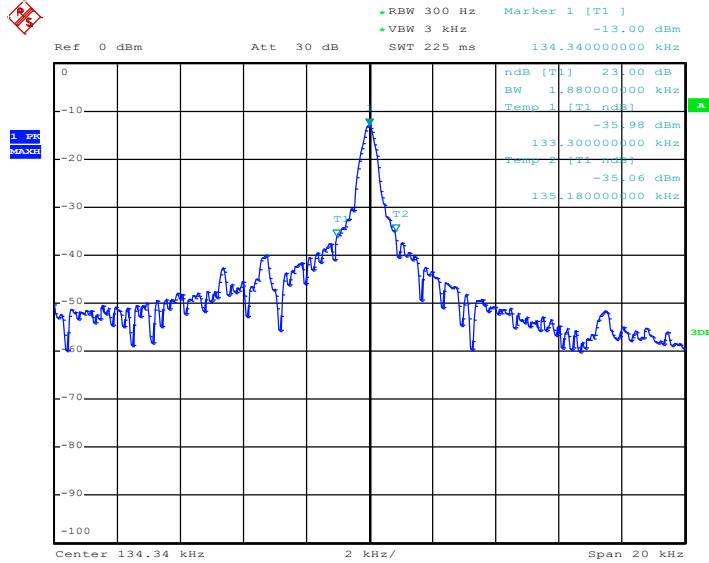
Test Setup



Test results

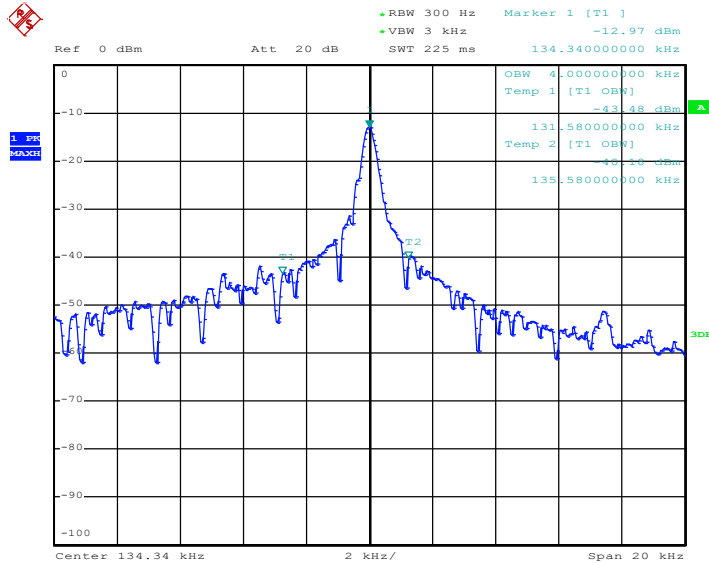
Emission Bandwidth	Result	Limit
23 dB Bandwidth	1.88 kHz	N/A
99 % Bandwidth	4.0 kHz	N/A

Emission Bandwidth Plot 23dB Bandwidth



Date: 20.OCT.2022 18:06:56

Emission Bandwidth Plot 99% Bandwidth



Date: 20.OCT.2022 17:58:01

4.2 Radiated emissions

FCC 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.

ISED Requirement

RSS-Gen includes the general field strength limits of unwanted emissions, where applicable, for transmitters and receivers operating in accordance with the provisions specified in this standard.

Unless otherwise indicated, unwanted emissions of transmitters and receivers are permitted to fall within the restricted frequency bands listed in RSS-Gen and the TV bands 54-72 MHz, 76-88 MHz, 174-216 MHz and 470-602 MHz; however, fundamental emissions are prohibited in these bands, except where equipment operation is permitted in the applicable RSS.

Transmitters whose wanted and unwanted emissions fall within the general field strength limits specified in RSS-Gen may operate licence-exempt in any of the frequency bands, other than the restricted frequency bands listed in RSS-Gen and the TV bands 54-72 MHz, 76-88 MHz, 174-216 MHz and 470-602 MHz, and shall be certified under RSS-210. Under no circumstances shall the level of any unwanted emissions exceed the level of the fundamental emissions.



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Test Location

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

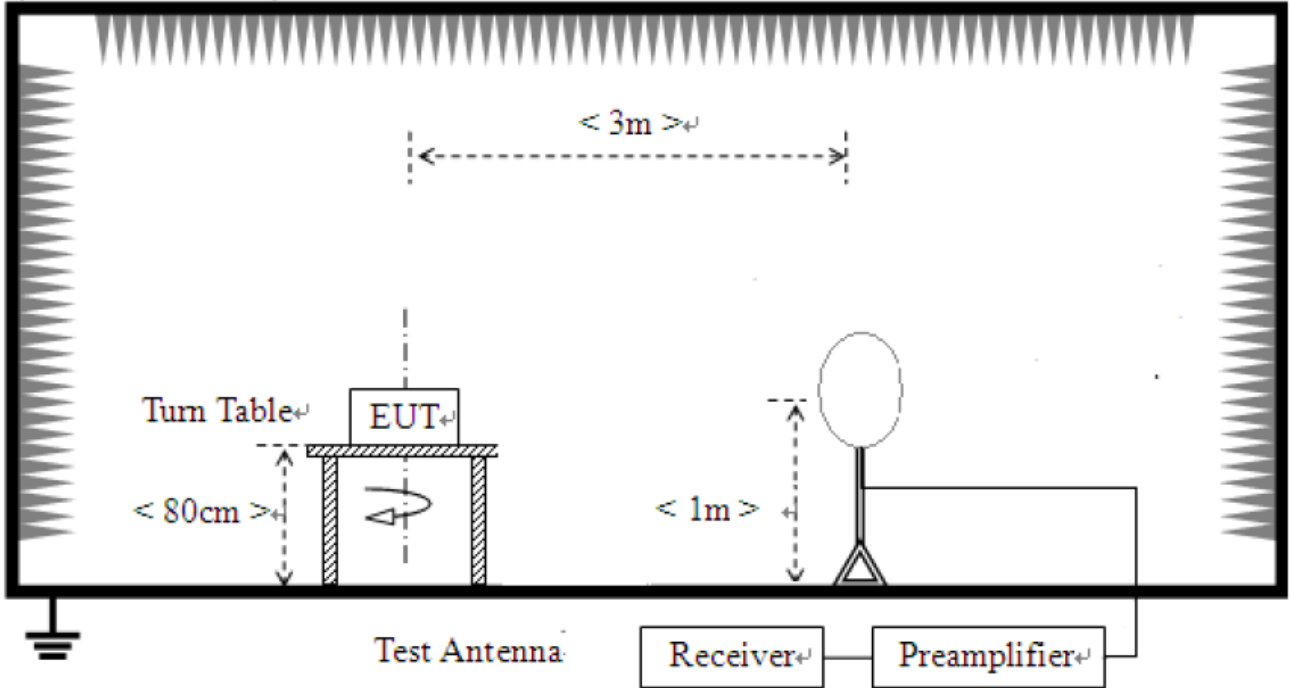
Test Procedures

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.

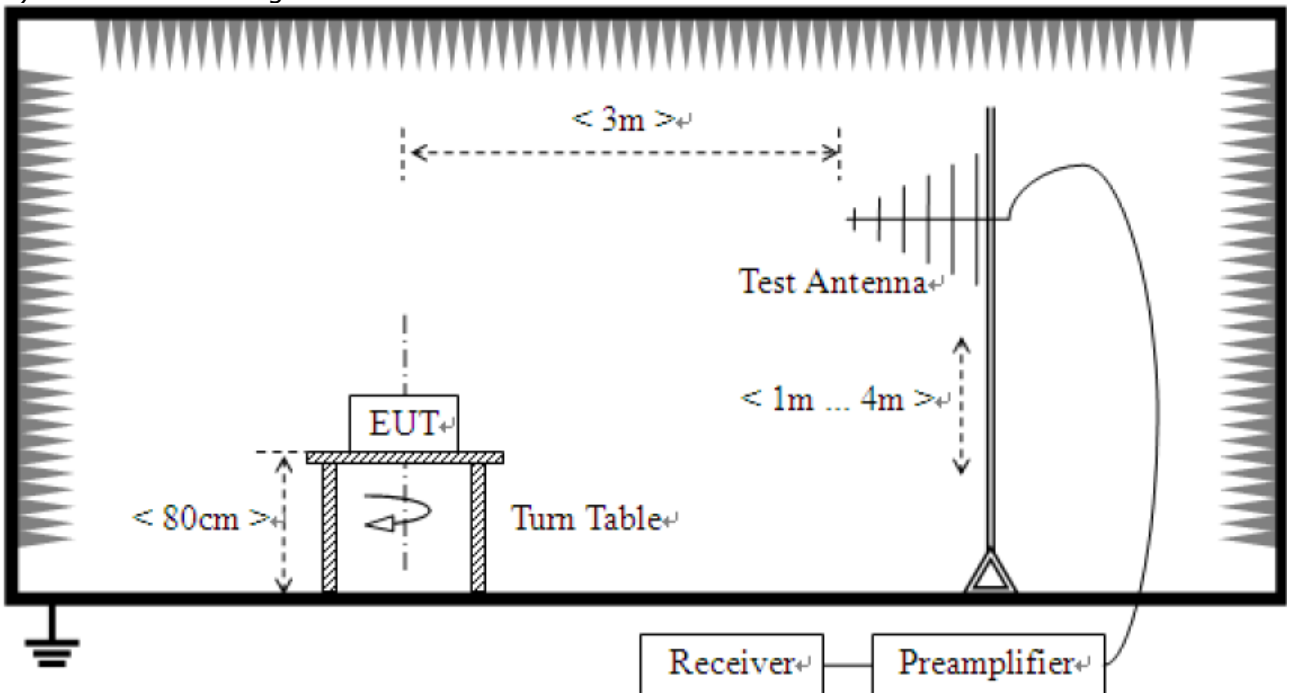
Measuring instrument Settings	
Frequency Range	9 kHz – 1 000 MHz
RBW	200 Hz (9 kHz – 150 kHz) 9 kHz (150 kHz – 30 MHz) 120 kHz (30 MHz – 1 000 MHz)
VBW	≥ RBW
Sweep time	auto couple
Detector function	CISPR quasi-peak(below 1 000 MHz)

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 of fundamental frequency

Test Date

2022-10-11

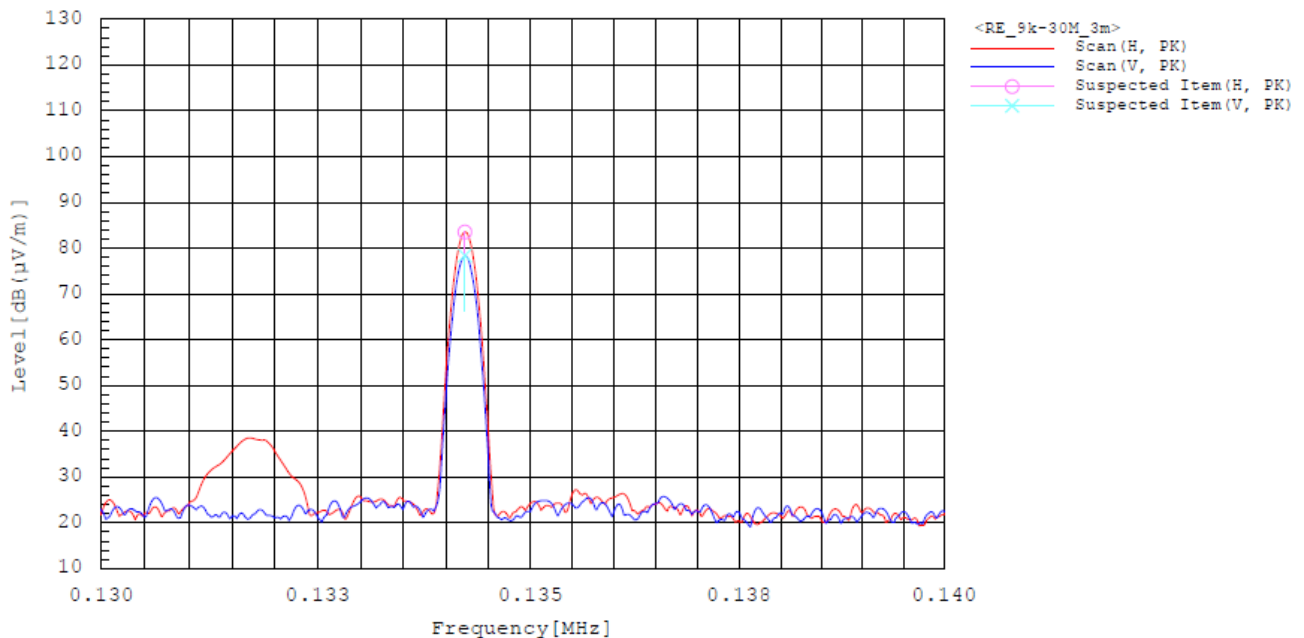
Testing Environment

Temperature: (23 ± 1) °C

Relative Humidity: (45 ± 3) % R.H.

The requirements are:

Complies



Frequency [MHz]	Reading [dBuV]	c.f [dB/m]	Result [dBuV/m]	Limit [dBuV/m]	Margin[dB]	Remark
0.134	58.5	25.0	83.5	105.0	21.5	

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

Test Date

2022-10-11

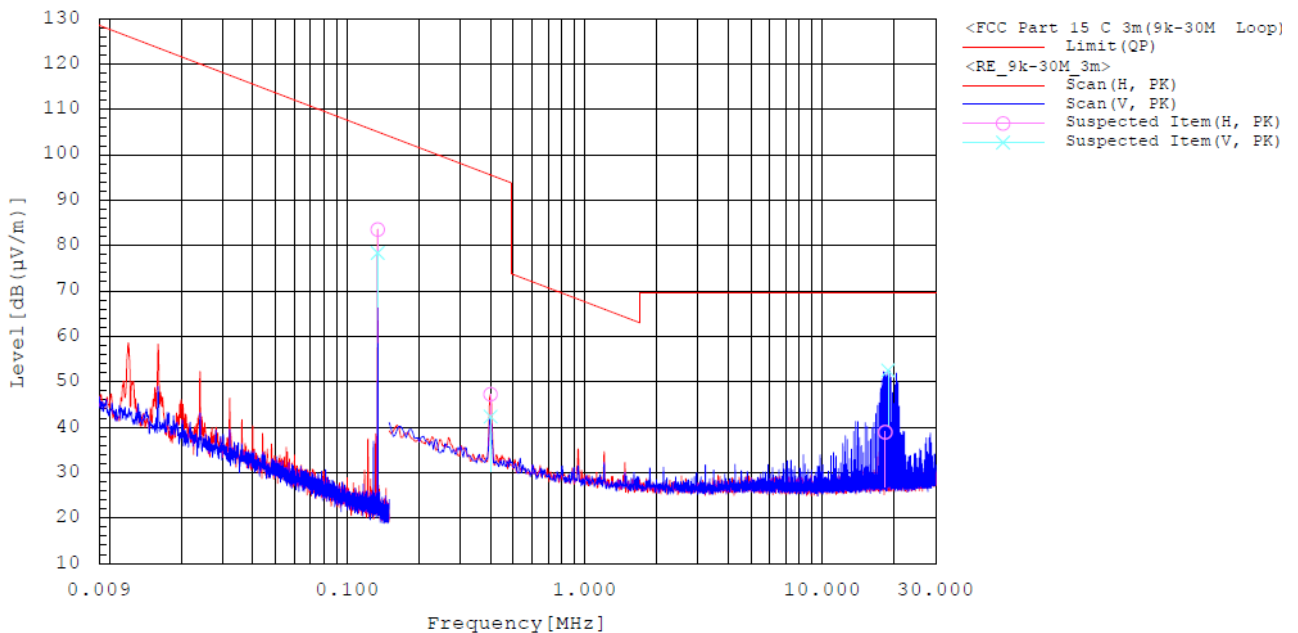
Testing Environment

Temperature: (23 ± 1) °C

Relative Humidity: (45 ± 3) % R.H.

The requirements are:

Complies



No.	Frequency [MHz]	Reading [dBuV]	c.f [dB/m]	Result [dBuV/m]	Limit [dBuV/m]	Margin[dB]	Remark
1	0.134	58.5	25.0	83.5	105.0	21.5	Fundamental frequency
2	0.401	22.0	25.2	47.2	95.5	48.3	
3	18.929	25.8	26.7	52.5	69.5	17.0	

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.

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

Test Date

2022-10-14

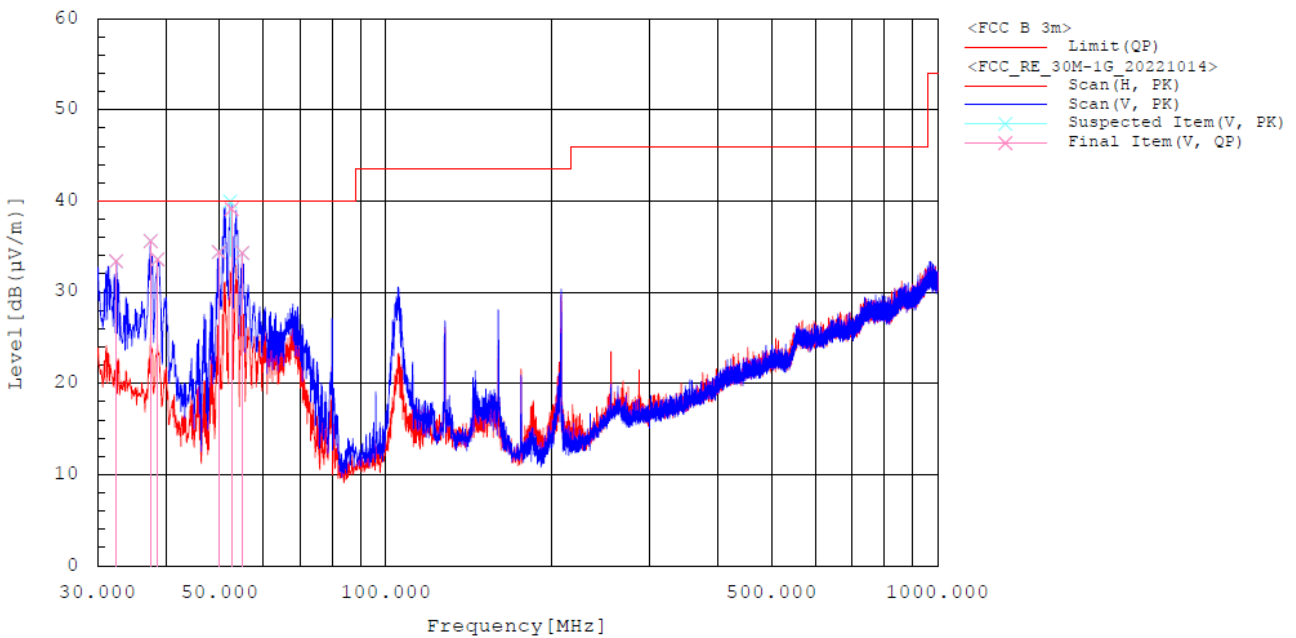
Testing Environment

Temperature: (21 ± 1) °C

Relative Humidity: (51 ± 3) % R.H.

The requirements are:

Complies



No.	Frequency [MHz]	Pol.	Reading [dBuV]	c.f [dB/m]	Result [dBuV/m]	Limit [dBuV/m]	Margin[dB]	Remark
1	32.425	V	41.0	-7.6	33.4	40.0	6.6	
2	37.469	V	45.9	-10.3	35.6	40.0	4.4	
3	38.536	V	44.4	-10.8	33.6	40.0	6.4	
4	49.788	V	51.1	-16.7	34.4	40.0	5.6	
5	52.528	V	57.3	-18.2	39.1	40.0	0.9	
6	54.929	V	53.4	-19.1	34.3	40.0	5.7	

Remark :

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



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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	R&S	ESR7	101088	2022-03-23	2023-03-23
2	Active Loop Antenna	SCHWARZBECK	FMZB 1513	1513-125	2022-04-15	2024-04-15
3	BILOG ANTENNA	TESEQ	CBL6111D	60654	2021-09-03	2023-09-03
4	AMPLIFIER	SONOMA INSTRUMENT	310N	411011	2022-08-10	2023-08-10
5	6dB Attenuator	PASTERNAK	PE7AP006-06	L20210504000023	2022-08-10	2023-08-10
6	Spectrum Analyzer	R&S	FSP	100401	2022-01-05	2023-01-05

No.	Cable	Manufacturer	Model No.	Serial No.	Check Date
1	RF Cable (1 GHz below Radiated)	HUBER+SUHNER	SUCOFLEX 104	MY27558/4	2022-09-21
2	RF Cable (1 GHz below Radiated)	CANARE	L-5D2W	N/A	2022-09-21

-END-