ETSI EN 303 413 V1.2.1 (2021-04)

TEST REPORT

For

Xiamen Milesight IoT Co., Ltd.

Building C09, Software Park Phase III, Xiamen 361024, Fujian, China

Tested Model: UG67-L04EU-868M
Multiple Models: UG67-L00E-868M, UG67-868M,UG67-L04EU-868M-H32, UG67-L00E-868M-H32, UG67-868M-H32, UG67-868M-H512,UG67-L04EU-868M-H512, UG67-L00E-868M-H512,UG67-868M-H8, UG67-L04EU-868M-H8,UG67-L00E-868M-H8

Report Type: Amended Report	**Product Type:** LoRaWAN Gateway
Report Number:	XMDN220516-20735E-22CA1
Report Date:	2022-06-10
Reviewed By:	Rocky Xiao RF Engineer
Test Laboratory:	Bay Area Compliance Laboratories Corp. (Dongguan) No.12, Pulong East 1st Road, Tangxia Town, Dongguan, Guangdong, China Tel: +86-769-86858888 Fax: +86-769-86858891 www.baclcorp.com.cn

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DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	RXM210219050-22C	Original Report	2021-09-17
1	XMDN220516-20735E-22CA1	Amended Report	2022-06-10

Note: This is the first amended report application which was based on the original report. The differences between them as following:

1. Changed the applicant's address to **Building C09, Software Park Phase III, Xiamen 361024, Fujian, China;**

2. Added EUT models: **UG67-868M-H512, UG67-L04EU-868M-H512, UG67-L00E-868M-H512, UG67-868M-H8, UG67-L04EU-868M-H8, UG67-L00E-868M-H8;**

3. Changed the trade name to Milesight;

4. Change the **silk screen** on the EUT appearance.

The change between the previous equipment and the current equipment is stated and guaranteed by the applicant. The difference between them will not affect the test results, we will keep the test results, test photos, but updated the related EUT photos.

Declarations

BACL is not responsible for the authenticity of any test data provided by the applicant. Data included from the applicant that may affect test results are marked with a triangle symbol "△". Customer model name, addresses, names, trademarks etc. are not considered data.

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

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EXHIBIT A – EUT PHOTOGRAPHS

For photos in this section, please refer to report No.: XMDN220516-20735E-02A1 EXHIBIT A.

DECLARATION LETTER

Xiamen Milesight IoT Co., Ltd.
Add:Building C09, Software Park Phase III, Xiamen 361024, Fujian, China
Tel: 0592-5023060
Fax: 0592-5023065
Emal: tongzl@ursalink.com

DECLARATION OF SIMILARITY

Date: 2022-5-9

To whom it may concern

We, Xiamen Milesight IoT Co., Ltd., hereby declare that the product: LoRaWAN Gateway, model:UG67-L00E-868M,UG67-868M ,UG67-L04EU-868M-H32,UG67-L00E-868M-H32, UG67-868M-H32,UG67-868M-H512,UG67-L04EU-868M-H512,UG67-L00E-868M-H512, UG67-868M-H8,UG67-L04EU-868M-H8,UG67-L00E-868M-H8 is electrically identical with the model: UG67-L04EU-868M which was tested by BACL with the same electromagnetic emissions and electromagnetic compatibility characteristics.
A description of the differences between the tested model and those that are declared similar are as follows:
The models have same software.
All the above models share one PCB board. The only difference between models is that some function devices paste or not paste. The below table show differences:
√: paste --: not paste

	LTE module	WiFi	GPS	POE	LoRa	External antenna	Other differences
UG67-L04EU-868M	√ (EC25-EUX)	√	√	√	√ (868)	√	model names
UG67-L00E-868M	√ (EC25-EUX)	√	√	√	√ (868)	√	
UG67-868M	--	√	√	√	√ (868)	√	
UG67-L04EU-868M-H32	√ (EC25-EUX)	√	--	√	√ (868)	√	model names
UG67-L00E-868M-H32	√ (EC25-EUX)	√	--	√	√ (868)	√	
UG67-868M-H32	--	√	--	√	√ (868)	√	
UG67-868M-H512	--	√	--	√	√ (868)	√	
UG67-L04EU-868M-H512	√ (EC25-EUX)	√	--	√	√ (868)	√	model names
UG67-L00E-868M-H512	√ (EC25-EUX)	√	--	√	√ (868)	√	
UG67-868M-H8	--	√	--	√	√ (868)	√	
UG67-L04EU-868M-H8	√ (EC25-EUX)	√	--	√	√ (868)	√	model names

UG67-L00E-868M-H8	√ (EC25-EUX)	√	--	√	√ (868)	√	

Please contact me should there be need for any additional clarification or information.
Best Regards,
Signature: Zhenlong Tong

Printed Name: Zhenlong Tong
Title: Manager

BELOW IS THE ORIGINAL REPORT

ETSI EN 303 413 V1.2.1 (2021-04)

TEST REPORT

For

Xiamen Milesight IoT Co., Ltd.

4/F,NO. 63-2 Wanghai Road, 2nd Software Park,Xiamen ,China

Tested Model: UG67-L04EU-868M
Multiple Models: UG67-L00E-868M, UG67-868M, UG67-L04EU-868M-H32, UG67-L00E-868M-H32, UG67-868M-H32

Report Type: Original Report	**Product Type:** LoRaWAN Gateway
Report Number:	RXM210219050-22C
Report Date:	2021-09-17
Reviewed By:	Rocky Xiao RF Engineer
Test Laboratory:	Bay Area Compliance Laboratories Corp. (Dongguan) No.12, Pulong East 1st Road, Tangxia Town, Dongguan, Guangdong, China Tel: +86-769-86858888 Fax: +86-769-86858891 www.baclcorp.com.cn

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

EUT Name:	LoRaWAN Gateway
Test Model:	UG67-L04EU-868M
Multiple Models:	UG67-L00E-868M, UG67-868M, UG67-L04EU-868M-H32,UG67-L00E-868M-H32, UG67-868M-H32
Model Difference:	Refer to Dos
Rated Input Voltage:	DC 56V from POE
Serial Number:	RXM210219050-RF-S1
EUT Received Date:	2021.02.20
EUT Received Status:	Good

Objective

This report is prepared on behalf of ***Xiamen Milesight IoT Co., Ltd.*** in accordance with ETSI EN 303 413 V1.2.1 (2021-04) Satellite Earth Stations and Systems (SES); Global Navigation Satellite System (GNSS) receivers; Radio equipment operating in the 1 164 MHz to 1 300 MHz and 1 559 MHz to 1 610 MHz frequency bands; Harmonised Standard for access to radio spectrum.

The objective is to determine the compliance of EUT with: ETSI EN 303 413 V1.2.1 (2021-04).

Test Methodology

All measurements contained in this report were conducted with ETSI EN 303 413 V1.2.1 (2021-04) Satellite Earth Stations and Systems (SES); Global Navigation Satellite System (GNSS) receivers; Radio equipment operating in the 1 164 MHz to 1 300 MHz and 1 559 MHz to 1 610 MHz frequency bands; Harmonised Standard for access to radio spectrum.

Measurement Uncertainty

Parameter	Flab	Maximum allow uncertainty
Radiated emission of transmitter, valid to 26,5 GHz	±3.62dB	±6dB
Radiated emission of transmitter, valid between 26,5 GHz and 66 GHz	±3.62dB	±8dB
Radiated emission of receiver, valid to 26,5 GHz	±3.62dB	±6dB
Radiated emission of receiver, valid between 26,5 GHz and 66 GHz	±3.62dB	±8dB
Humidity	±5%	±5%
Temperature	±1℃	±1℃
Voltage(DC)	±0.4%	±1%
Voltage(AC,<10kHz)	±1%	±2%

Note: Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty. The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor K with the 95% confidence interval.

Declarations

BACL is not responsible for the authenticity of any test data provided by the applicant. Data included from the applicant that may affect test results are marked with a triangle symbol "▲". Customer model name, addresses, names, trademarks etc. are not considered data.

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SYSTEM TEST CONFIGURATION

Description of Test Configuration

The system was configured for testing in engineering mode, which was provided by the manufacturer.

Equipment Modifications

No modification was made to the EUT.

EUT Exercise Software

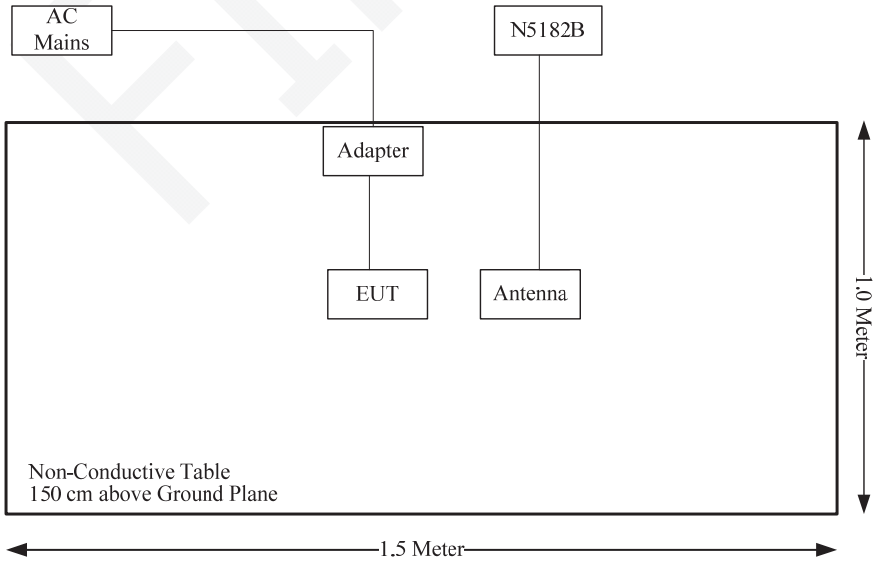
Software "SecureCRT_V6.5.0" was used for testing.

Manufacturer	Description	Model	Serial Number
Agilent	MXG Vector Signal Generator	N5182B	MY51350142

Support Cable List and Details

Cable Description	Shielding Cable	Ferrite Core	Length (m)	From Port	To
AC Line	No	No	1.5	AC main	POE
RJ45	No	No	1.2	POE	EUT

Block Diagram of Test Setup



Test Equipment List

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Radiated emissions below 1GHz					
Sunol Sciences	Antenna	JB3	A060611-2	2020-08-25	2023-08-25
R&S	EMI Test Receiver	ESCI	100224	2020-09-12	2021-09-12
Unknown	Coaxial Cable	C-NJNJ-50	C-1000-01	2021-08-19	2022-08-18
Unknown	Coaxial Cable	C-NJNJ-50	C-0400-02	2021-08-19	2022-08-18
Unknown	Coaxial Cable	C-NJNJ-50	C-0530-01	2021-08-19	2022-08-18
Sonoma	Amplifier	310N	185914	2021-08-19	2022-08-18
EMCO	Adjustable Dipole Antenna	3121C	9109-753	N/A	N/A
Unknown	Coaxial Cable	C-NJNJ-50	C-0200-02	2021-09-04	2022-09-03
Agilent	Signal Generator	E8247C	MY43321350	2021-04-25	2022-04-24
Radiated emissions above 1GHz					
ETS-Lindgren	Horn Antenna	3115	000 527 35	2018-10-12	2021-10-12
Agilent	Spectrum Analyzer	E4440A	SG43360054	2020-07-22	2021-07-21
Unknown	Coaxial Cable	C-SJSJ-50	C-0800-01	2020-09-04	2021-09-03
Mini-Circuit	Amplifier	ZVA-213-S+	54201245	2020-09-04	2021-09-03
TDK RF	Horn Antenna	HRN-0118	130 084	2018-10-12	2021-10-12
Unknown	Coaxial Cable	C-NJNJ-50	C-0200-02	2020-09-04	2021-09-03
Agilent	Signal Generator	E8247C	MY43321350	2020-12-09	2021-12-08
Agilent	MXG Vector Signal Generator	N5182B	MY51350142	2020-11-08	2021-11-07
HP	Step Attenuator	8494B	1510A05007	2020-09-06	2021-09-06
Agilent	Step Attenuator	8496B	2815A10904	2020-09-06	2021-09-06
ThinkPad	Laptop	E450	PF-0MR8KV 16/08	/	/

* Statement of Traceability: Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Environmental Conditions

Test Item:	Radiated emissions Below 1GHz	Radiated emissions above 1GHz
Temperature:	28.4 °C	26.2 °C
Relative Humidity:	61 %	55 %
ATM Pressure:	100.6 kPa	102 kPa
Tester:	Johnson Huang	Lee Li
Test Date:	2021.09.06	2021.03.19

SUMMARY OF TEST RESULTS

SN	Rule and Clause	Description of Test	Test Result
1	EN 303 413 Clause 4.2.1	Receiver blocking	Compliance
2	EN 303 413 Clause 4.2.2	Receiver spurious emissions	Compliance

Note: The GNSS module L76-L was to receiving and dealing the GNSS signal.

1 –RECEIVER BLOCKING

Applicable Standard

According to ETSI EN 303 413 V1.2.1, GUE adjacent frequency band selectivity is the ability of the GUE to achieve the specified performance in the presence of noise produced by signals operating in accordance with the allocation table of the ITU Radio Regulations [i.13] in frequency bands adjacent or near-adjacent to the relevant RNSS band.

EUT Setup

The radiated emission tests were performed in the 3-meter Chamber, using the setup accordance with ETSI EN 303 413 V1.2.1. The specifications used were the ETSI EN 303 413 V1.2.1 (2021-04) limits.

Maximum degradation in C/N_0

$$\Delta C/N_0 \leq 1 \text{ dB}$$

GNSS Signals

The GNSS signals are the (wanted) signal(s) used during the conformance testing to simulate the GNSS satellites supported by the GUE. The Maximum signal levels for each GNSS supported should according to Table B-3.

Table B-3: (Maximum) signal levels for each GNSS supported

GNSS	Parameters	Value
GPS	(Maximum) signal level	-128,5 dBm
Galileo	(Maximum) signal level	-127 dBm
GLONASS	(Maximum) signal level	-131 dBm
SBAS	(Maximum) signal level	-131 dBm
BDS	(Maximum) signal level	-133 dBm

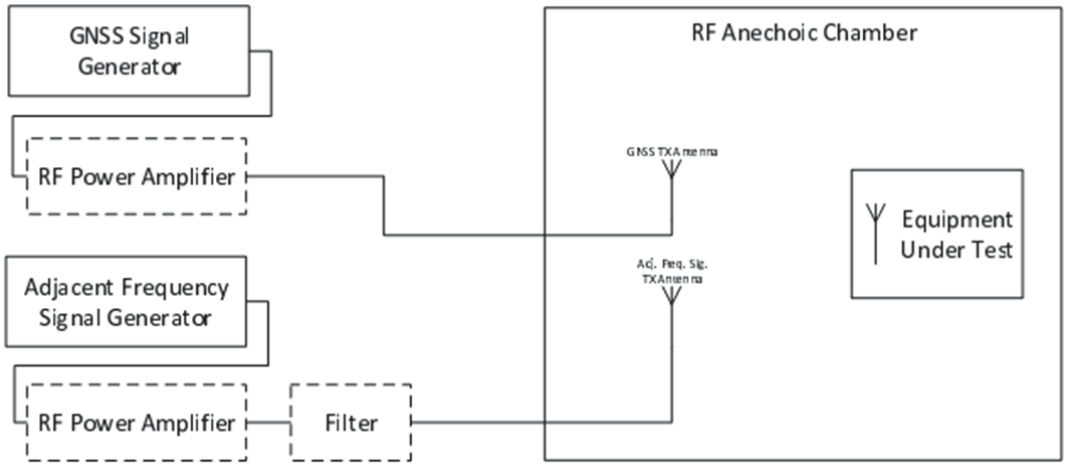
Test Procedure

According to ETSI EN 303 413 V1.2.1, the EUT was tested follow the test procedure below:

This method of measurement applies to receivers having a permanent antenna connector.

1) Configure the GNSS signal generator to simulate those GNSS and GNSS signals from table 4-1 declared as supported by the GUE, with power levels and other details as specified in clause B.2.
2) With the adjacent frequency signal switched off, the EUT shall be given sufficient time to acquire all simulated satellites from the declared GNSS system(s).
3) Record the baseline C/N_0 value(s) reported by the EUT. Sufficient filtering shall be used to obtain a stable value. C/N_0 may be averaged across all the satellites in view for each GNSS constellation. However, C/N_0 shall not be averaged across satellite signals in different GNSS constellations. For a multi-GNSS EUT, there shall be a separate C/N_0 value recorded for each GNSS constellation and each GNSS signal supported.
4) The adjacent frequency signal generator shall be configured to generate the signal defined in table 4-4, at the first test point centre frequency and signal power level as specified in table 4-2.
5) The adjacent frequency signal shall be switched on, and the EUT's C/N_0 value(s) recorded as in step 3) to measure the degradation with respect to the baseline value(s) recorded in step 3).

6) Test point Pass/Fail Criteria: If the C/N_0 degradation from step 5) does not exceed the value in equation 4-1, then this test point is set to "pass". If the C/N_0 degradation exceeds the value in equation 4-1, then this test point is set to "fail." For a multi-GNSS and multi-signal EUT, there shall be a separate pass/fail determination for each GNSS and for each GNSS signal supported. If the C/N_0 degradation exceeds the value in equation 4-1 for any supported GNSS or supported GNSS signal, then this test point is set to "fail".
7) Step 1) through step 6) shall be repeated for all test point centre frequencies (and associated signal power level) specified in table 4-2.



Test Data

Please refer to following table:

Mode	Frequency band	Test point centre frequency	Adjacent frequency signal power level	Messured Result C/N0			Limit
				No interfering signal	With interfering signal	degradation in C/N0	
	(MHz)	(MHz)	(dBm)				
GPS L1C/A	1518-1525	1524	-65	36	36	0	Δ C/N0 ≤ 1 dB
	1525-1549	1548	-95	36	36	0	
	1549-1559	1554	-105	37	36	1	
	1559-1610	GUE RNSS band under test					
	1610-1626	1615	-105	37	36	1	
	1626-1640	1627	-85	36	36	0	
BDS B11	1518-1525	1524	-65	36	36	0	Δ C/N0 ≤ 1 dB
	1525-1549	1548	-95	36	36	0	
	1549-1559	1554	-105	37	36	1	
	1559-1610	GUE RNSS band under test					
	1610-1626	1615	-105	37	36	1	
	1626-1640	1627	-85	36	36	0	

Note: The EUT was set in engineering mode, configured by a laptop with software “SecureCRT_V6.5.0”, “C/N_0” was tested in engineering mode, .

2 –RECEIVER SPURIOUS EMISSIONS

Applicable Standard

According to ETSI EN 303 413 V1.2.1, Receiver spurious emissions are emissions at any frequency when the GUE is in receive-only operating mode.

EUT Setup

Radiated emission:
The radiated emission tests were performed in the 3-meter Chamber, using the setup accordance with ETSI EN 303 413 V1.2.0. The spurious emissions of the GUE shall not exceed the values given in table 4-5.

Conducted measurement:
In case of conducted measurements, the EUT shall be connected to the measuring equipment via an attenuator. If required, the necessary GNSS signals shall be applied to the EUT.
The spectrum in the spurious domain shall be searched for em issions that exceed the limit values given in table 4-5 or that come to within 6 dB below these lim its. Each occurrence shall be recorded.
NOTE: Given the unknown characteristics of the EUT's emissions, which may depend on EUT properties (e.g. clock frequency), some spectrum analyser settings lik e measurement time and number of sweeps are not specified. It is recommended to deri ve these settings according to the me thods described in the following standards: EN IEC 55016-1-1 [i.14], EN 55016-2-3 [i.15] and EN 55032 [i.16].

Table 4-5: Spurious emission limits

Frequency range	Maximum power	Bandwidth
30 MHz to 1 GHz	-57 dBm	100 kHz
1 GHz to 8,3 GHz	-47 dBm	1 MHz

Test Procedure

According to ETSI EN 303 413 V1.2.1, The test site as described in ETSI EN 300 328 [1], annex B and the applicable measurement procedures as described in ETSI EN 300 328 [1], annex C shall be used.

Test Data

Pre-Scan all modes, the worst case please refer to following table:

Radiated Emission:

Receiver mode_GPS L1 C/A

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
1125.00	H	45.90	-57.73	7.38	1.04	-51.39	-47.00	4.39
1125.00	V	46.84	-57.36	7.38	1.04	-51.02	-47.00	4.02
89.87	H	48.70	-61.91	0.00	0.36	-62.27	-57.00	5.27
125.87	V	45.77	-65.38	0.00	0.32	-65.70	-57.00	8.70

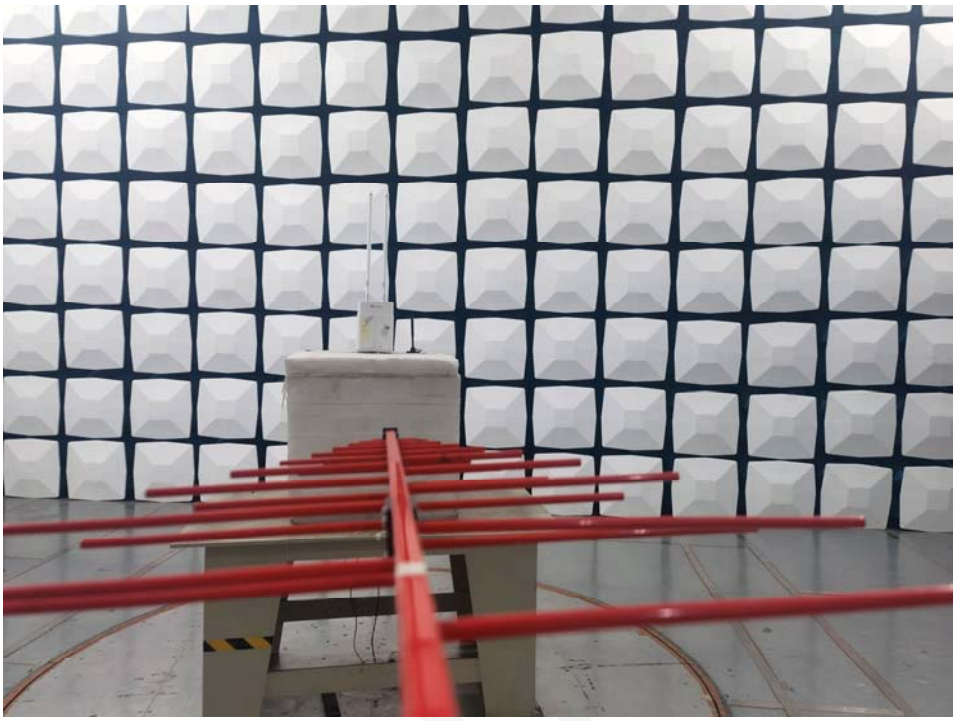
Note 1:The unit of antenna gain is dBd for frequency below 1GHz and is dBi for frequency above 1GHz.
Note 2:
Absolute Level = Substituted Level - Cable loss + Antenna Gain
Margin = Limit- Absolute Level

EXHIBIT A – EUT PHOTOGRAPHS

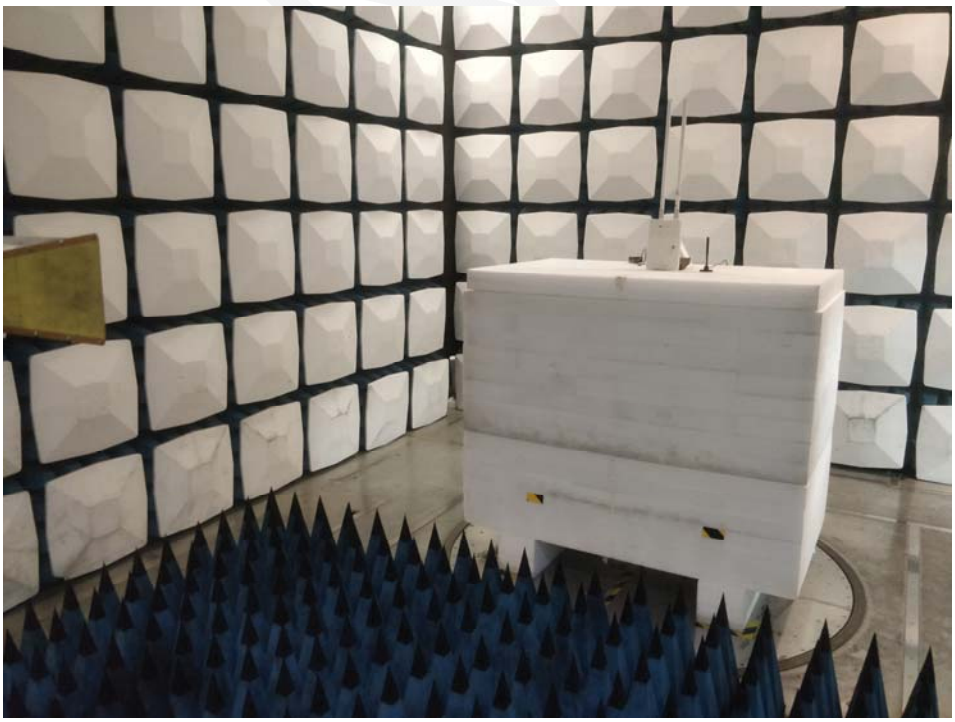
For photos in this section, please refer to report No.: RXM210219050-02 EXHIBIT A.

EXHIBIT B – TEST SETUP PHOTOGRAPHS

RE Below 1GHz



RE Above 1GHz



*******END OF REPORT*******