

ETSI EN 300 328 V2.2.2 (2019-07)

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-22BA1
Report Date:	2022-06-10
Reviewed By:	Rocky Xiao RF Engineer
Test Laboratory:	Bay Area Compliance Laboratories Corp. (Dongguan) No.12, Pulong East 1 st 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	RXM210219050-22B	Original Report	2021-09-17
1	XMDN220516-20735E-22BA1	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 ;
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

Email: tongztl@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)	✓	
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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 300328 V2.2.2 (2019-07)
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

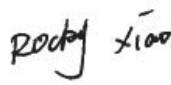
Report Type: Original Report	Product Type: LoRaWAN Gateway
Report Number:	RXM210219050-22B
Report Date:	2021-09-17
Reviewed By:	Rocky Xiao RF Engineer 
Test Laboratory:	Bay Area Compliance Laboratories Corp. (Dongguan) No.12, Pulong East 1 st Road, Tangxia Town, Dongguan, Guangdong, China Tel: +86-769-86858888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

Technical Specification

Operation Frequency Range (MHz):		802.11b/g/n20: 2412-2472 802.11n40: 2422-2462
RF Output Power (EIRP) (dBm):		802.11b: 13.46 802.11g: 13.58 802.11n20: 13.16 802.11n40: 12.06
Number of Chains	Transmit:	1
	Receive:	1
Antenna Gain (dBi)[▲]:		3
Modulation Type:		DSSS, OFDM

Objective

This report is prepared on behalf of *Xiamen Milesight IoT Co., Ltd.* in accordance with ETSI EN 300328 V2.2.2 (2019-07), Wideband transmission systems; Data transmission equipment operating in the 2,4 GHz band; Harmonised Standard for access to radio spectrum.

The objective is to determine the compliance of EUT with ETSI EN 300328 V2.2.2 (2019-07).

Test Methodology

All measurements contained in this report were conducted with ETSI EN 300328 V2.2.2 (2019-07).

Measurement Uncertainty

Parameter	Flab	Maximum allow uncertainty
Occupied Channel Bandwidth	±5 %	±5 %
RF output power, conducted	±0.61dB	±1,5 dB
Power Spectral Density, conducted	±3 dB	±3 dB
Unwanted Emissions, conducted	±2.47dB	±3 dB
All emissions, radiated	±3.62dB	±6 dB
Temperature	±1 °C	±3 °C
Supply voltages	±0.4%	±3 %
Duty Cycle	1%	±5 %

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

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SYSTEM TEST CONFIGURATION

Description of Test Configuration

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

2.4GHz WLAN, 13 channels are provided to testing.

The 802.11b, 802.11g and 802.11n-HT20 modes were tested with Channel 1, 7 and 13.

802.11n ht40 was tested with Channel 3, 7 and 11.

Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2412	8	2447
2	2417	9	2452
3	2422	10	2457
4	2427	11	2462
5	2432	12	2467
6	2437	13	2472
7	2442	/	/

The extreme temperature test conditions which were declared by the manufacturer and the normal conditions are as below:

NT: Normal Temperature 25°C

LT: Low Temperature -20°C

HT: High Temperature +50°C

Equipment Modifications

No modification was made to the EUT tested.

EUT Exercise Software

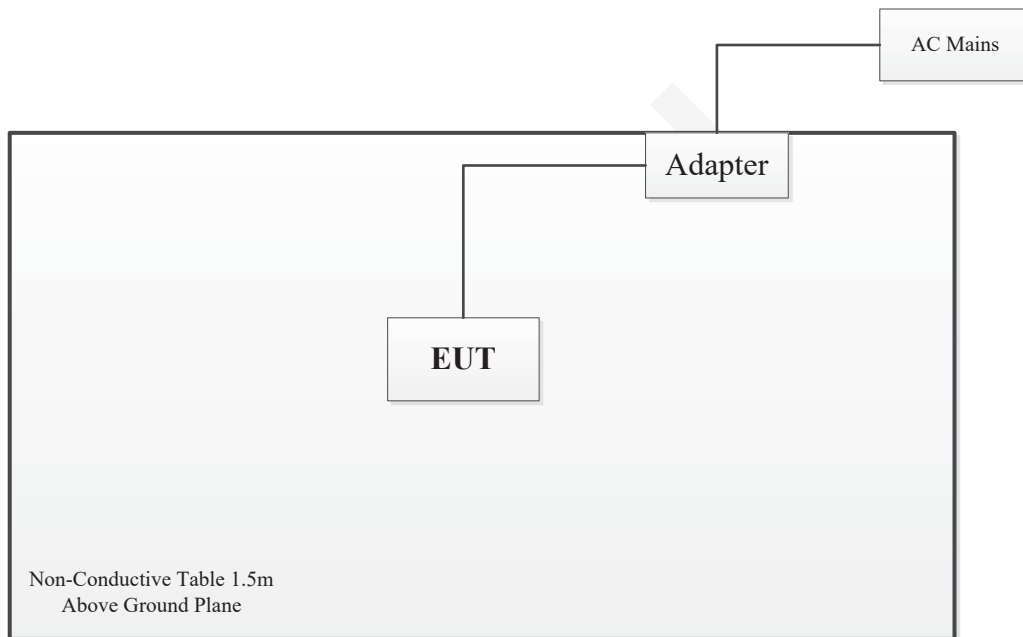
The EUT was tested in engineering mode, setting with software "PUTTY.exe", and the power level was configured as below.

Mode	Channel	Frequency (MHz)	Data rate (Mbps)	Power level
802.11 b	Low	2412	1	20
	Middle	2442	1	20
	High	2472	1	20
802.11 g	Low	2412	6	33
	Middle	2442	6	32
	High	2472	6	32
802.11 n20	Low	2412	MCS0	32
	Middle	2442	MCS0	32
	High	2472	MCS0	32

802.11 n40	Low	2422	MCS0	29
	Middle	2442	MCS0	28
	High	2462	MCS0	28

The worst-case data rates are determined to be as follows for each mode based upon investigation by measuring the average power and PSD across all data rates bandwidths, and modulations.

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	2020-08-19	2021-08-18
Unknown	Coaxial Cable	C-NJNJ-50	C-0400-02	2020-08-19	2021-08-18
Unknown	Coaxial Cable	C-NJNJ-50	C-0530-01	2020-08-19	2021-08-18
Sonoma	Amplifier	310N	185914	2020-08-19	2021-08-18
EMCO	Adjustable Dipole Antenna	3121C	9109-753	N/A	N/A
Unknown	Coaxial Cable	C-NJNJ-50	C-0200-02	2020-09-04	2021-09-03
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
RF conducted					
R&S	Spectrum Analyzer	FSV40	101474	2021-07-06	2022-07-05
Unknown	Coaxial Cable	C-SJ00-0010	C0010/01	Each time	N/A
E-Microwave	Blocking Control	EMDCB-00036	0E01201047	2021-05-06	2022-05-05
E-Microwave	Coaxial Attenuators	EMCA10-5RN-6	OE01203239	2020-09-06	2021-09-06
HP	Step Attenuator	8494B	1510A05007	2020-09-06	2021-09-06
Agilent	USB Wideband Power Sensor	U2022XA	MY5417006	2020-09-12	2021-09-12
R&S	Wideband Radio Communication Tester	CMW500	147473	2020-09-23	2021-09-22
Agilent	MXG Vector Signal Generator	N5182B	MY51350142	2021-04-25	2022-04-24
BACL	TEMP&HUMI Test Chamber	BTH-150	30022	2021-02-24	2022-02-23

* 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	RF conducted
Temperature:	28.4°C	26.2°C	23.1 °C
Relative Humidity:	56%	55%	52 %
ATM Pressure:	102 kPa	102kPa	100.8 kPa
Tester:	Burt Hu	Joker Chen	Jack Zou
Test Date:	2021.06.18	2021.03.19	2021.09.04

SUMMARY OF TEST RESULTS

SN	Rule and Clause	Description of Test	Test Result
1	EN 300 328 Clause 4.3.2.2	RF output power	Compliance
2	EN 300 328 Clause 4.3.2.3	Power Spectral Density	Compliance*
3	EN 300 328 Clause 4.3.2.4	Duty cycle, Tx-Sequence, Tx-gap	Not applicable*
4	EN 300 328 Clause 4.3.2.5	Medium Utilisation (MU) factor	Not applicable*
5	EN 300 328 Clause 4.3.2.6	Adaptivity	Compliance*
6	EN 300 328 Clause 4.3.2.7	Occupied Channel Bandwidth	Compliance*
7	EN 300 328 Clause 4.3.2.8	Transmitter unwanted emissions in the out-of-band domain	Compliance*
8	EN 300 328 Clause 4.3.2.9	Transmitter unwanted emissions in the spurious domain	Compliance
9	EN 300 328 Clause 4.3.2.10	Receiver spurious emissions	Compliance
10	EN 300 328 Clause 4.3.2.11	Receiver Blocking	Compliance
11	EN 300 328 Clause 4.3.2.12	Geo-location capability	Not applicable**

Note:

The applicant declared that the equipment is adaptive equipment.

Not applicable*: These requirements only apply for non-adaptive equipment.

Not applicable**: The equipment without geo-location capability.

Compliance*: This device contains module (model No.: F89FTSM13-W3), the Antenna Gain is 3dBi(the antenna gain of the module report is 2.99dBi), difference between the two device was so small that the change will not affect the test result, the test data please refer to the module test report No.: NTC1709097EV00.

1 ETSI EN 300328 V2.2.2 (2019 -07) §4.3.2.2 – RF OUTPUT POWER

Applicable Standard

This requirement applies to all types of non-FHSS equipment.

The RF output power is defined as the mean equivalent isotropic radiated power (e.i.r.p.) of the equipment during a transmission burst.

Limit

The RF output power for non-FHSS equipment shall be equal to or less than 20 dBm.

NOTE: For Non-adaptive FHSS equipment, the manufacturer may have declared a reduced RF Output Power (see clause 5.4.1 m)) and associated Duty Cycle (see clause 5.4.1 e)) that will ensure that the equipment meets the requirement for the Medium Utilization (MU) factor further described in clause 4.3.2.5. This is verified by the conformance test referred to in clause 4.3.2.5.4.

For non-adaptive non-FHSS equipment, where the manufacturer has declared an RF output power of less than 20 dBm e.i.r.p., the RF output power shall be equal to or less than that declared value.

This limit shall apply for any combination of power level and intended antenna assembly.

Test Procedure

The test procedure shall be as follows:

Step 1:

- Use a fast power sensor with a minimum sensitivity of -40 dBm and capable of minimum 1 MS/s.
- Use the following settings:
 - Sample speed 1 MS/s or faster.
 - The samples shall represent the RMS power of the signal.
 - Measurement duration: For non-adaptive equipment: equal to the observation period defined in clause 4.3.1.3.2 or clause 4.3.2.4.2. For adaptive equipment, the measurement duration shall be long enough to ensure a minimum number of bursts (at least 10) is captured.

For adaptive equipment, to increase the measurement accuracy, a higher number of bursts may be used.

Step 2:

- For conducted measurements on devices with one transmit chain:
 - Connect the power sensor to the transmit port, sample the transmit signal and store the raw data. Use these stored samples in all following steps.
- For conducted measurements on devices with multiple transmit chains:
 - Connect one power sensor to each transmit port for a synchronous measurement on all transmit ports.
 - Trigger the power sensors so that they start sampling at the same time. Make sure the time difference between the samples of all sensors is less than 500 ns.
 - For each individual sampling point (time domain), sum the coincident power samples of all ports and store them. Use these summed samples as the new stored data set.

Step 3:

- Find the start and stop times of each burst in the stored measurement samples.

The start and stop times are defined as the points where the power is at least 30 dB below the highest value of the stored samples in step 2.

In case of insufficient sensitivity of the power sensor (e.g. in case of radiated measurements), the value of 30 dB may need to be reduced appropriately.

Step 4:

- Between the start and stop times of each individual burst calculate the RMS power over the burst using the formula below. The start and stop points shall be included. Save these Pburst values, as well as the start and stop times for each burst.

$$P_{burst} = \frac{1}{k} \sum_{n=1}^k P_{sample}(n)$$

with k being the total number of samples and n the actual sample number.

Step 5:

- The highest of all Pburst values (value A in dBm) will be used for maximum e.i.r.p. calculations.

Step 6:

- Add the (stated) antenna assembly gain G in dBi of the individual antenna.
- In case of smart antenna systems operating in mode with beamforming (see clause 5.3.2.2.4), add the additional beamforming gain Y in dB.
- If more than one antenna assembly is intended for this power setting, the maximum overall antenna gain (G or G + Y) shall be used.
- The RF Output Power (Pout) shall be calculated using the formula below:
Pout = A + G + Y
- This value, which shall comply with the limit given in clause 4.3.1.2.3 or clause 4.3.2.2.3, shall be recorded in the test report.

Test Data

Test Result: Compliance. Please refer to following tables.

Mode	Channel	Conducted output power (dBm)			EIRP (dBm)			Limit (dBm)
		LT	NT	HT	LT	NT	HT	
802.11 b	Low	10.46	10.07	10.23	13.46	13.07	13.23	20
	Middle	10.18	9.83	10.21	13.18	12.83	13.21	
	High	9.96	9.41	9.75	12.96	12.41	12.75	
802.11 g	Low	10.31	9.84	10.00	13.31	12.84	13.00	
	Middle	10.58	10.21	10.35	13.58	13.21	13.35	
	High	10.29	9.94	10.02	13.29	12.94	13.02	
802.11 n20	Low	9.98	9.63	9.89	12.98	12.63	12.89	
	Middle	10.16	10.04	9.97	13.16	13.04	12.97	
	High	10.12	9.85	9.94	13.12	12.85	12.94	
802.11 n40	Low	9.06	8.77	8.85	12.06	11.77	11.85	
	Middle	8.69	8.20	8.31	11.69	11.20	11.31	
	High	8.23	8.07	8.16	11.23	11.07	11.16	

Note:

1, The *Conducted output power* is the *Output power* refer to the module report No.: NTC1709171EV00, it is the output power from the module, corrected by adding the cable loss between the EUT to the test equipment into the reading value;

2, $EIRP (dBm) = \text{Conducted output power}(dBm) + \text{Antenna Gain}(dBi, 3dBi)$

8 – TRANSMITTER UNWANTED EMISSION IN THE SPURIOUS DOMAIN

Applicable Standard

This requirement applies to all types of non-FHSS equipment.

In the present document, transmitter unwanted emissions in the spurious domain are emissions outside the allocated band and outside the Out-of-band Domain as indicated in figure 3 when the equipment is in Transmit mode.

Limit

The transmitter unwanted emissions in the spurious domain shall not exceed the values given in table 12.

In case of equipment with antenna connectors, these limits apply to emissions at the antenna port (conducted). For emissions radiated by the cabinet or emissions radiated by integral antenna equipment (without antenna connectors), these limits are e.r.p. for emissions up to 1 GHz and as e.i.r.p. for emissions above 1 GHz.

Table 12 Transmitter limits for spurious emissions

Frequency Range	Maximum power	Bandwidth
30 MHz to 47 MHz	-36 dBm	100 kHz
47 MHz to 74 MHz	-54 dBm	100 kHz
74 MHz to 87,5 MHz	-36 dBm	100 kHz
87,5 MHz to 118 MHz	-54 dBm	100 kHz
118 MHz to 174 MHz	-36 dBm	100 kHz
174 MHz to 230 MHz	-54 dBm	100 kHz
230 MHz to 470 MHz	-36 dBm	100 kHz
470 MHz to 694 MHz	-54 dBm	100 kHz
694 MHz to 1 GHz	-36 dBm	100 kHz
1 GHz to 12,75 GHz	-30 dBm	1 MHz

NOTE: In case of equipment with antenna connectors, these limits apply to emissions at the antenna port (conducted) and to the emissions radiated by the cabinet. In case of integral antenna equipment (without temporary antenna connectors), these limits apply to emissions radiated by the equipment.

Test Procedure

According to ETSI EN 300328 V2.2.2 (2019 -07) §5.4.9.2

Test Data

Pre-scan all modes, worst case as below:

Please refer to following table:

802.11b_low channel			2412 MHz			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
Frequency (MHz)	Polar (H/V)	Receiver Reading (dB μ V)	Substituted Method					
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
4824.00	H	45.20	-50.89	14.20	1.55	-38.24	-30.00	8.24
4824.00	V	45.55	-50.38	14.20	1.55	-37.73	-30.00	7.73
7236.00	H	35.05	-54.55	13.01	1.59	-43.13	-30.00	13.13
7236.00	V	35.04	-54.70	13.01	1.59	-43.28	-30.00	13.28
1200.00	H	49.87	-53.11	7.30	1.09	-46.90	-30.00	16.90
1125.00	V	46.96	-57.24	7.38	1.04	-50.90	-30.00	20.90
68.80	H	55.20	-51.84	-5.64	0.18	-57.66	-54.00	3.66
375.32	V	50.23	-54.61	0.00	0.36	-54.97	-36.00	18.97

802.11b_high channel			2472 MHz			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
Frequency (MHz)	Polar (H/V)	Receiver Reading (dB μ V)	Substituted Method					
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
4944.00	H	35.11	-60.90	13.94	1.45	-48.41	-30.00	18.41
4944.00	V	41.19	-54.15	13.94	1.45	-41.66	-30.00	11.66
7416.00	H	35.01	-53.92	13.28	1.41	-42.05	-30.00	12.05
7416.00	V	35.08	-54.23	13.28	1.41	-42.36	-30.00	12.36
1200.00	H	49.61	-53.37	7.30	1.09	-47.16	-30.00	17.16
1185.00	V	47.84	-56.26	7.32	1.08	-50.02	-30.00	20.02
72.68	H	53.85	-53.59	-3.66	0.18	-57.43	-54.00	3.43
372.60	V	51.30	-53.61	0.00	0.36	-53.97	-36.00	17.97

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

9 – RECEIVER SPURIOUS EMISSIONS

Applicable Standard

This requirement applies to all types of non-FHSS equipment.

Receiver spurious emissions are emissions at any frequency when the equipment is in receive mode.

Limit

The spurious emissions of the receiver shall not exceed the values given in table 13.

In case of non-FHSS equipment with antenna connectors, these limits apply to emissions at the antenna port (conducted). For emissions radiated by the cabinet or for emissions radiated by integral antenna equipment (without antenna connectors), these limits are e.r.p. for emissions up to 1 GHz and e.i.r.p. for emissions above 1 GHz.

Table 13

Frequency Range	Maximum power	Measurement Bandwidth
30 MHz to 1 GHz	-57 dBm	100 kHz
1 GHz to 12,75 GHz	-47 dBm	1 MHz

NOTE: In case of equipment with antenna connectors, these limits apply to emissions at the antenna port (conducted) and to the emissions radiated by the cabinet. In case of integral antenna equipment (without temporary antenna connectors), these limits apply to emissions radiated by the equipment.

Test Procedure

According to ETSI EN 300328 V2.2.2 (2019 -07) §5.4.10.2

Test Data

Pre-scan all modes, worst case as below:

Please refer to following table:

802.11 low channel			2412 MHz			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
Frequency (MHz)	Polar (H/V)	Receiver Reading (dB μ V)	Substituted Method					
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
1125.00	H	45.62	-58.01	7.38	1.04	-51.67	-47.00	4.67
1200.00	H	44.08	-58.90	7.30	1.09	-52.69	-47.00	5.69
1910.00	H	38.95	-63.87	11.82	1.03	-53.08	-47.00	6.08
1125.00	V	47.82	-56.38	7.38	1.04	-50.04	-47.00	3.04
1185.00	V	36.45	-67.65	7.32	1.08	-61.41	-47.00	14.41
113.42	H	50.80	-59.45	0.00	0.17	-59.62	-57.00	2.62
375.32	V	47.20	-57.64	0.00	0.36	-58.00	-57.00	1.00

802.11 high channel			2472 MHz			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
Frequency (MHz)	Polar (H/V)	Receiver Reading (dB μ V)	Substituted Method					
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
1125.00	H	45.57	-58.06	7.38	1.04	-51.72	-47.00	4.72
1200.00	H	41.01	-61.97	7.30	1.09	-55.76	-47.00	8.76
1620.00	H	41.92	-62.53	10.24	0.69	-52.98	-47.00	5.98
1125.00	V	47.75	-56.45	7.38	1.04	-50.11	-47.00	3.11
1185.00	V	37.12	-66.98	7.32	1.08	-60.74	-47.00	13.74
112.50	H	50.60	-59.74	0.00	0.17	-59.91	-57.00	2.91
376.50	V	47.10	-57.70	0.00	0.36	-58.06	-57.00	1.06

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

ETSI EN 300328 V2.2.2 (2019 -07) §4.3.2.11 - RECEIVER BLOCKING

Applicable Standard

This requirement applies to all types of non-FHSS equipment.

Receiver blocking is a measure of the ability of the equipment to receive a wanted signal on its operating channel without exceeding a given degradation due to the presence of an unwanted input signal (blocking signal) at frequencies other than those of the operating band and spurious responses.

For equipment that supports a PER or FER test to be performed, the minimum performance criterion shall be a PER or FER less than or equal to 10 %.

For equipment that does not support a PER or a FER test to be performed, the minimum performance criterion shall be no loss of the wireless transmission function needed for the intended use of the equipment.

Limit

While maintaining the minimum performance criteria as defined in clause 4.3.2.11.3, the blocking levels at specified frequency offsets shall be equal to or greater than the limits defined for the applicable receiver category provided in table 14, table 15 or table 16.

Table 14: Receiver Blocking parameters for Receiver Category 1 equipment

Wanted signal mean power from companion device (dBm) (see notes 1 and 4)	Blocking signal frequency (MHz)	Blocking signal power (dBm) (see note 4)	Type of blocking signal
(-133 dBm + 10 × log ₁₀ (OCBW)) or -68 dBm whichever is less (see note 2)	2 380 2 504	-34	CW
(-139 dBm + 10 × log ₁₀ (OCBW)) or -74 dBm whichever is less (see note 3)	2 300 2 330 2 360 2 524 2 584 2 674		
NOTE 1: OCBW is in Hz.			
NOTE 2: In case of radiated measurements using a companion device and the level of the wanted signal from the companion device cannot be determined, a relative test may be performed using a wanted signal up to P _{min} + 26 dB where P _{min} is the minimum level of wanted signal required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal.			
NOTE 3: In case of radiated measurements using a companion device and the level of the wanted signal from the companion device cannot be determined, a relative test may be performed using a wanted signal up to P _{min} + 20 dB where P _{min} is the minimum level of wanted signal required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal.			
NOTE 4: The level specified is the level at the UUT receiver input assuming a 0 dBi antenna assembly gain. In case of conducted measurements, this level has to be corrected for the (in-band) antenna assembly gain (G). In case of radiated measurements, this level is equivalent to a power flux density (PFD) in front of the UUT antenna with the UUT being configured/positioned as recorded in clause 5.4.3.2.2.			

Table 15: Receiver Blocking parameters receiver Category 2 equipment

Wanted signal mean power from companion device (dBm) (see notes 1 and 3)	Blocking signal frequency (MHz)	Blocking signal power (dBm) (see note 3)	Type of blocking signal
$(-139 \text{ dBm} + 10 \times \log_{10}(\text{OCBW}) + 10 \text{ dB})$ or $(-74 \text{ dBm} + 10 \text{ dB})$ whichever is less (see note 2)	2 380 2 504 2 300 2 584	-34	CW
NOTE 1: OCBW is in Hz.			
NOTE 2: In case of radiated measurements using a companion device and the level of the wanted signal from the companion device cannot be determined, a relative test may be performed using a wanted signal up to $P_{\min} + 26 \text{ dB}$ where P_{\min} is the minimum level of wanted signal required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal.			
NOTE 3: The level specified is the level at the UUT receiver input assuming a 0 dBi antenna assembly gain. In case of conducted measurements, this level has to be corrected for the (in-band) antenna assembly gain (G). In case of radiated measurements, this level is equivalent to a power flux density (PFD) in front of the UUT antenna with the UUT being configured/positioned as recorded in clause 5.4.3.2.2.			

Table 16: Receiver Blocking parameters receiver Category 3 equipment

Wanted signal mean power from companion device (dBm) (see notes 1 and 3)	Blocking signal frequency (MHz)	Blocking signal power (dBm) (see note 3)	Type of blocking signal
$(-139 \text{ dBm} + 10 \times \log_{10}(\text{OCBW}) + 20 \text{ dB})$ or $(-74 \text{ dBm} + 20 \text{ dB})$ whichever is less (see note 2)	2 380 2 504 2 300 2 584	-34	CW
NOTE 1: OCBW is in Hz.			
NOTE 2: In case of radiated measurements using a companion device and the level of the wanted signal from the companion device cannot be determined, a relative test may be performed using a wanted signal up to $P_{\min} + 30 \text{ dB}$ where P_{\min} is the minimum level of wanted signal required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal.			
NOTE 3: The level specified is the level at the UUT receiver input assuming a 0 dBi antenna assembly gain. In case of conducted measurements, this level has to be corrected for the (in-band) antenna assembly gain (G). In case of radiated measurements, this level is equivalent to a power flux density (PFD) in front of the UUT antenna with the UUT being configured/positioned as recorded in clause 5.4.3.2.2.			

Test Setup Block diagram

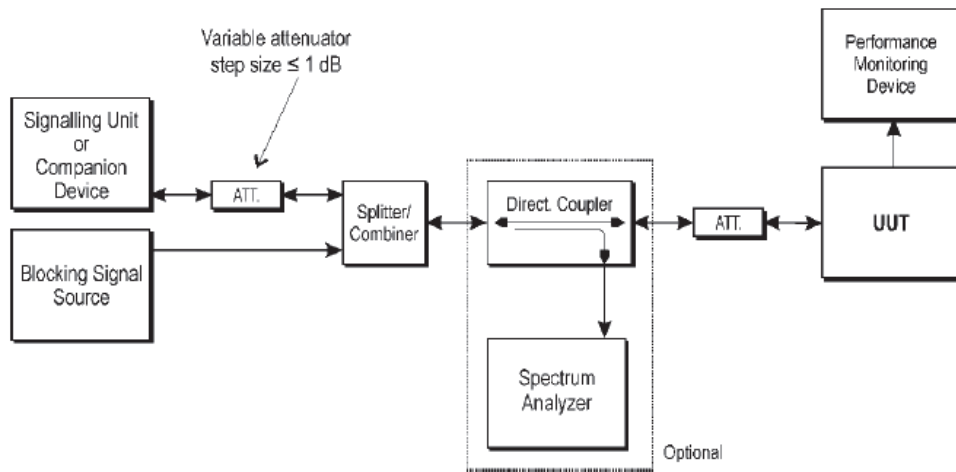


Figure 6: Test Set-up for receiver blocking

Test Procedure

The measurement procedure refer to ETSI EN 300328 V2.2.2 (2019 -07) §5.4.11.2.1

Test Data

Please refer to following table:

Mode	Channel	Frequency (MHz)	Data Rate (Mbps)	Blocking Signal Frequency (MHz)	PER (%)	Limit (%)
b	Low	2412	1	2380	1.20	≤10
				2504	1.20	
				2300	1.30	
				2330	1.30	
				2360	1.20	
				2524	1.10	
				2584	1.00	
				2674	1.30	
	High	2472	1	2380	1.23	≤10
				2504	1.20	
				2300	1.30	
				2330	1.10	
				2360	1.20	
				2524	1.30	
2584	1.20					
				2674	1.20	

Note: EIRP is higher than 10 dBm, and it is adaptive device, so it is belong to category 1.

EXHIBIT A - EUT PHOTOGRAPHS

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

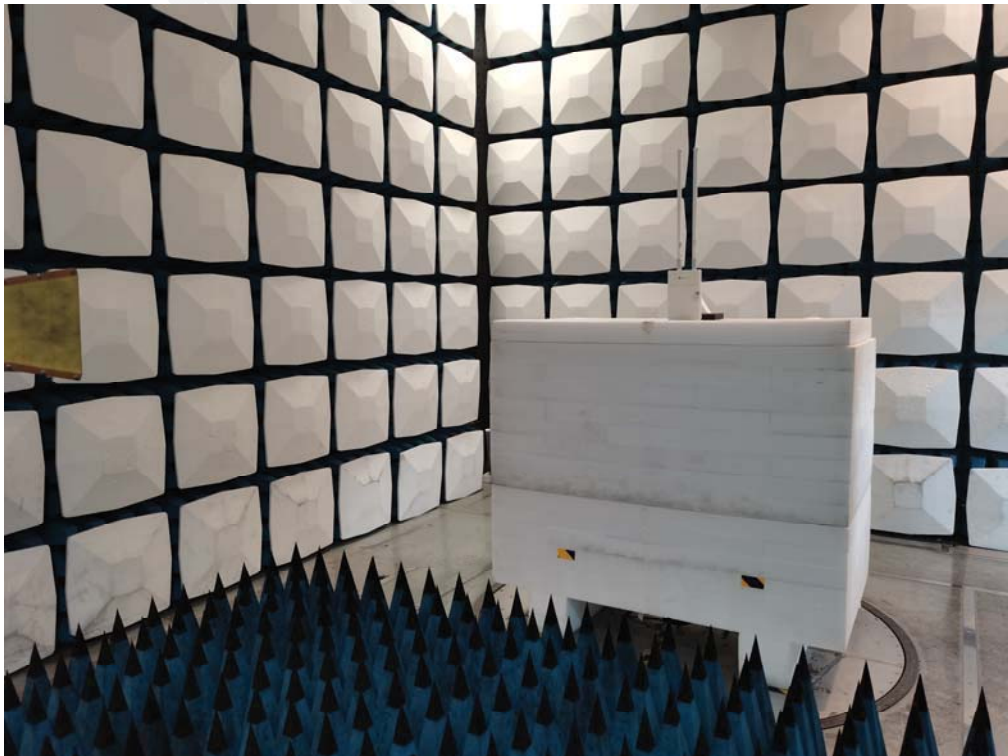
FENVAL

EXHIBIT B – TEST SETUP PHOTOGRAPHS

Radiated Emissions –Below 1GHz



Radiated Emissions –Above 1GHz



****END OF REPORT****