



LCIE

Bluetooth Low Energy Template : Release July 2nd, 2021

# TEST REPORT

N°: 24329407-806668-B(FILE#9310523)

Version : 01

## Subject

Radio spectrum Matters (ERM) tests according to:  
Japanese Radio Law for Article 2 paragraph 1 item (19)  
specified radio equipment categories equipment  
Article 49-20 and the relevant articles of the Ordinance Regulating  
Radio Equipment and MIC Notice No.88 Appendix No.43 Test method

## Issued to

STMICROELECTRONICS (Rousset) SAS  
190 Avenue Celestin Coq  
13106 - Rousset  
FRANCE

## Apparatus under test

- Product
- Trade mark
- Manufacturer
- Model under test
- Serial number

Bluetooth®LE and IEEE 802.15.4 radio module  
STMICROELECTRONICS  
STMICROELECTRONICS  
STM32WBA5MMG  
None

## Conclusion

See Test Program chapter

## Test date

December 18, 2024 to December 23, 2024

## Test location

Moirans

## Composition of document

43 pages

## Document issued on

March 10, 2025

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## PUBLICATION HISTORY

Version	Date	Author	Modification
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## 1. TEST PROGRAM

### References

Japanese Radio Law for Article 2 paragraph 1 item (19) categories equipment, as defined in Japanese Certification Ordinance

### Radio requirement:

Description	Result - Comments			
Communication Method	<input checked="" type="checkbox"/> PASS	<input type="checkbox"/> FAIL	<input type="checkbox"/> NA	<input type="checkbox"/> NP(1)
Modulation Method	<input checked="" type="checkbox"/> PASS	<input type="checkbox"/> FAIL	<input type="checkbox"/> NA	<input type="checkbox"/> NP(1)
Frequency Band	<input checked="" type="checkbox"/> PASS	<input type="checkbox"/> FAIL	<input type="checkbox"/> NA	<input type="checkbox"/> NP(1)
Antenna Power & Antenna Power Tolerance & EIRP	<input checked="" type="checkbox"/> PASS	<input type="checkbox"/> FAIL	<input type="checkbox"/> NA	<input type="checkbox"/> NP(1)
Spread Bandwidth	<input checked="" type="checkbox"/> PASS	<input type="checkbox"/> FAIL	<input type="checkbox"/> NA	<input type="checkbox"/> NP(1)
Spread Factor	<input type="checkbox"/> PASS	<input type="checkbox"/> FAIL	<input checked="" type="checkbox"/> NA	<input type="checkbox"/> NP(1)
Occupied Bandwidth	<input checked="" type="checkbox"/> PASS	<input type="checkbox"/> FAIL	<input type="checkbox"/> NA	<input type="checkbox"/> NP(1)
Spurious Emissions Intensity	<input checked="" type="checkbox"/> PASS	<input type="checkbox"/> FAIL	<input type="checkbox"/> NA	<input type="checkbox"/> NP(1)
Limit On Secondary Spurious Emissions	<input checked="" type="checkbox"/> PASS	<input type="checkbox"/> FAIL	<input checked="" type="checkbox"/> NA	<input type="checkbox"/> NP(1)
Antenna Gain	<input checked="" type="checkbox"/> PASS	<input type="checkbox"/> FAIL	<input type="checkbox"/> NA	<input type="checkbox"/> NP(1)
Half Power Beam Angle	<input type="checkbox"/> PASS	<input type="checkbox"/> FAIL	<input checked="" type="checkbox"/> NA	<input type="checkbox"/> NP(1)
Carrier Sensing Function	<input type="checkbox"/> PASS	<input type="checkbox"/> FAIL	<input checked="" type="checkbox"/> NA	<input type="checkbox"/> NP(1)
Dwell Time	<input type="checkbox"/> PASS	<input type="checkbox"/> FAIL	<input checked="" type="checkbox"/> NA	<input type="checkbox"/> NP(1)
Number of Carrier	<input type="checkbox"/> PASS	<input type="checkbox"/> FAIL	<input checked="" type="checkbox"/> NA	<input type="checkbox"/> NP(1)
Housing Requirements	<input checked="" type="checkbox"/> PASS (2)	<input type="checkbox"/> FAIL	<input type="checkbox"/> NA	<input type="checkbox"/> NP(1)
Interference Prevention Function	<input checked="" type="checkbox"/> PASS (3)	<input type="checkbox"/> FAIL	<input type="checkbox"/> NA	<input type="checkbox"/> NP(1)

This table is a summary of test report, see conclusion of each clause of this test report for detail.

(1): Limited Program. Integration of a radio module already assessed

(2): The high-frequency section and modulation section cannot be easily opened

(3): The EUT sends a specific identification code to the wireless associated equipment

PASS: EUT complies with standard's requirement

FAIL: EUT does not comply with standard's requirement

NA: Not Applicable

NP: Test Not Performed

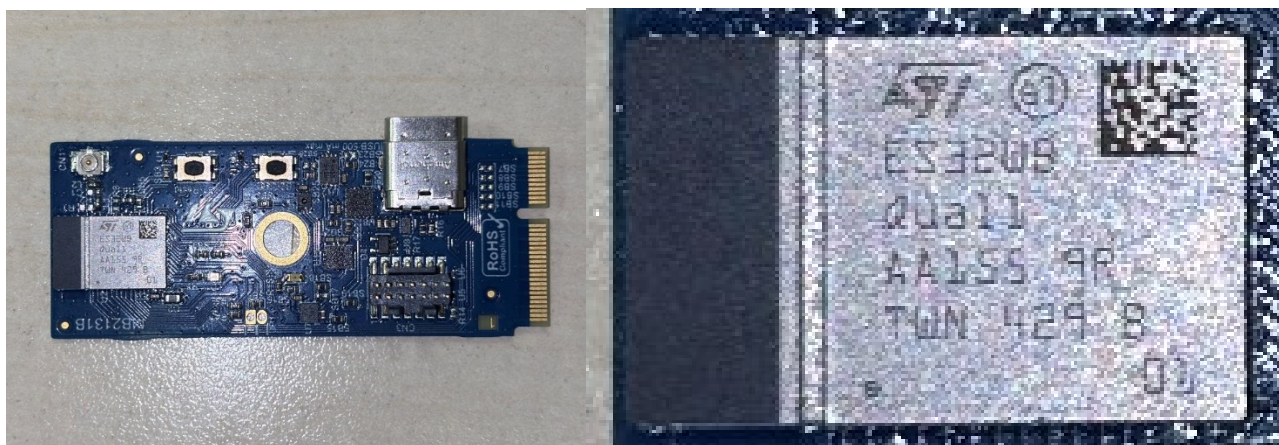
DP: Declaration of provider

## 2. EQUIPMENT UNDER TEST: CONFIGURATION (DECLARED BY PROVIDER)

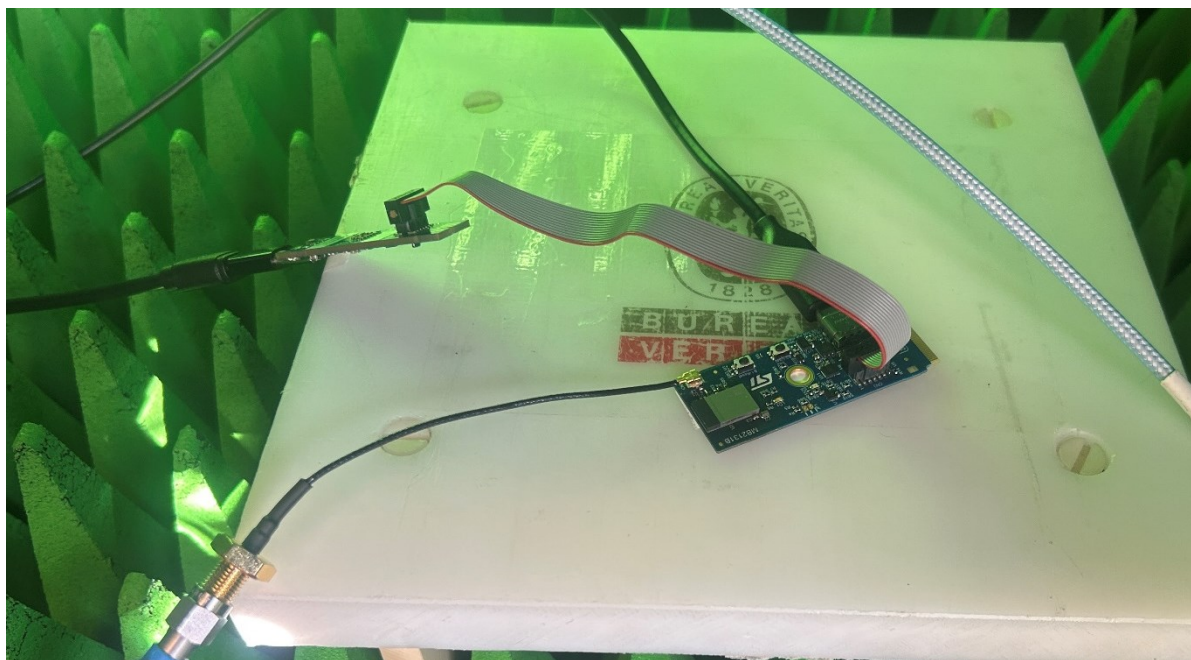
### 2.1. HARDWARE IDENTIFICATION (EUT AND AUXILIARIES):

Equipment under test (EUT):  
STM32WBA5MMG

Serial Number: None



Equipment Under Test



**Power supply:**

Name	Type	Rating	Reference / Sn	Comments
Supply1	DC	1.71 to 3.6 V	/	Module power supply
Supply2	DC	USB power supply (4 – 5.75V)	/	Switching AC/ Adapter

NC: Not communicated by provider

**Inputs/outputs - Cable:**

Access	Type	Length used (m)	Declared <3m	Shielded	Comments
Supply1	USB C	1.5	No	No	USB only on board and only for power
Supply2	USB C	1.5	No	No	100/240VAC – 5VDC
Access1	JTAG	0.1	No	No	Only for debug

NC: Not communicated by provider

**Auxiliary equipment used during test:**

Type	Reference	Sn	Comments
LAPTOP	LENOVO	/	/
Daughter board	STLINK-V3MINE	/	/

NC: Not communicated by provider

**Software & Hardware identification:**

-Software version: 1.5.0

-Hardware version: -

**Equipment information:**

<b>802.15.4:</b>	<b>ZigBee</b>
Chipset / RF Module	<b>STM32WBA5MMG</b>
Frequency band:	[2400 – 2483.5] MHz
Spectrum Modulation:	DSSS
Number of Channel:	16
Spacing channel:	5MHz
Channel bandwidth:	2MHz
Antenna Type:	Internal
Antenna connector:	None
Transmit chains:	1
Receiver chains	1
Adaptivity mode:	No

CHANNEL PLAN	
Channel	Frequency (MHz)
<b>Cmin: 11</b>	2405
12	2410
13	2415
14	2420
15	2425
16	2430
17	2435
<b>Cmid: 18</b>	2440
19	2445
20	2450
21	2455
22	2460
23	2465
24	2470
25	2475
<b>Cmax: 26</b>	2480

DATA RATE		
Data Rate (Mbps)	Modulation Type	Worst Case Modulation
0.25	O-QPSK	<input checked="" type="checkbox"/>

## 2.2. RUNNING MODE

The EUT is set in the following modes during tests:

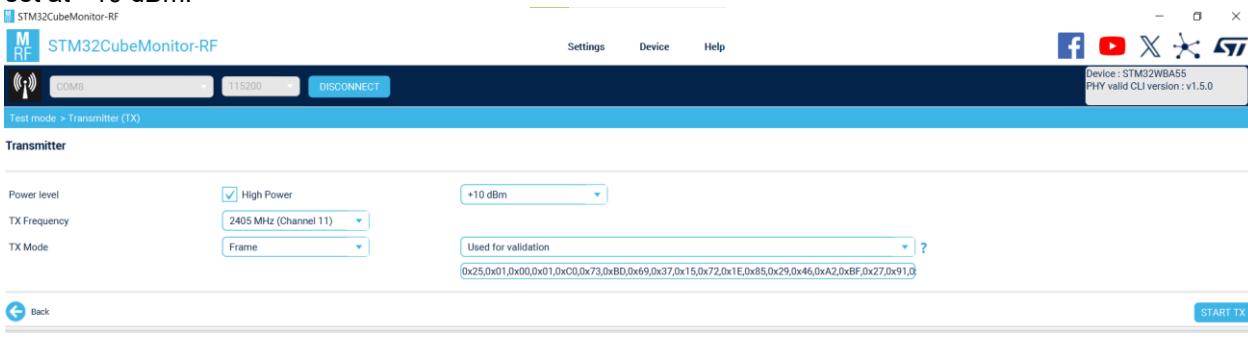
- Permanent emission with modulation on a fixed channel at the highest power
- Permanent emission without modulation on a fixed channel at the highest power

The EUT is set in the following modes during tests:

- Permanent emission with modulation on a fixed channel at the highest power
- Permanent emission without modulation on a fixed channel at the highest power
- Permanent reception





Test mode	Description of test mode
Test mode 1	<p>Permanent emission with modulation on a fixed channel in the data rate that produced the power set at +10 dBm.</p> 
Test mode 2	<p>Permanent emission without modulation on a fixed channel in the data rate that produced the power set at +10 dBm.</p>



Test mode 3	Permanent reception
-------------	---------------------

### 2.3. EQUIPMENT LABELLING

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### 2.4. EQUIPMENT MODIFICATION

☒ None      ☐ Modification:

### 2.5. CALIBRATION DATE

The calibration intervals are extended at 12+2 months. This extended interval is based on the fact that there is sufficient calibration data to statistically establish a trend or based on experience of use of the test equipment to assure good measurement results for a longer period.

### 3. ANTENNA GAIN & ANTENNA PATTERN

#### 3.1. TEST CONDITIONS

Test performed by : Akram HAKKARI  
 Date of test : December 19, 2024  
 Ambient temperature : 23 °C  
 Relative humidity : 38 %

#### 3.2. MANUFACTURER DECLARATION

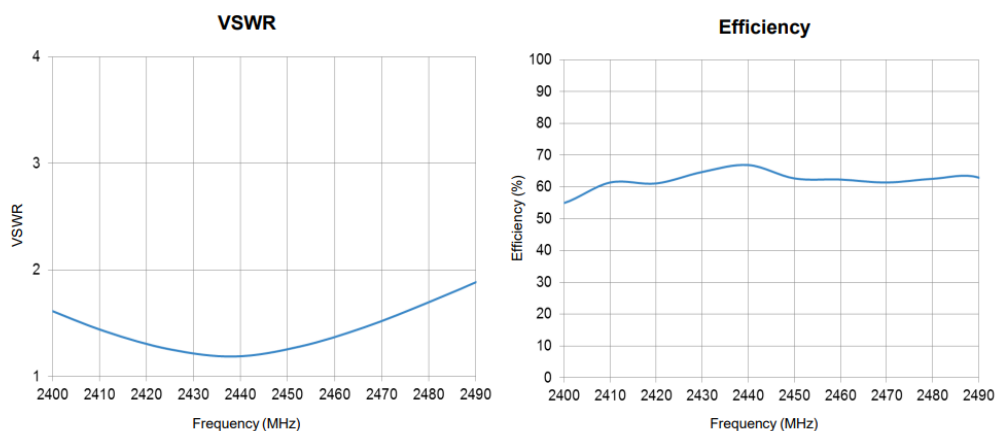
Reference antenna: Ethertronics Part Number : 1001312

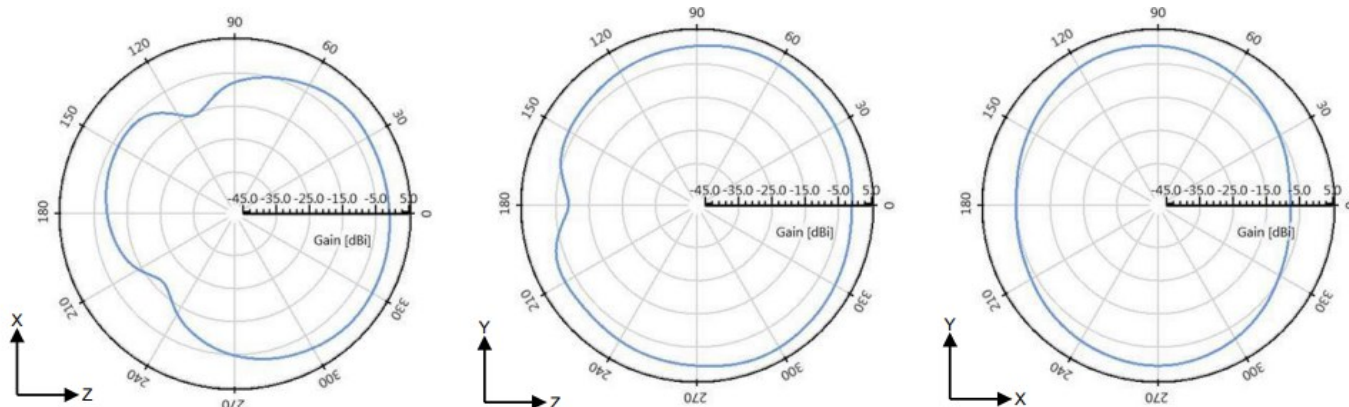
Specifications:

Electrical	
Model Number	1001312
Frequency Range	2400-2500MHZ
Polarization	Linear
Gain	1.88dBi
3dB Beam-Width. H-Plan	360°
3dB Beam-Width. E-Plan	80°
VSWR	1.8:1 max
Input Impedance	50Ω
Power Handling	0.5 Watt CW
Average Efficiency	62%
Mechanical	
Mounting	SMT
Dimensions H*W*D (mm)	2.00 x 1.20 x 0.55
Weight	0.003 g

#### VSWR, Efficiency Plots

Typical performance on 55 x 25 mm PCB





### 3.3. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION

☒ None
 ☐ Divergence:

### 3.4. RESULTS

Voltage	Vnom		
Channel	Cmin	Cmid	Cmax
Antenna Gain (dBi)	1.88	1.88	1.88

### 3.5. CONCLUSION

Antenna Pattern & Antenna Gain measurement performed on the sample of the product **STM32WBA5MMG**, SN: **None**, in configuration and description presented in this test report, show levels **compliant** to the Japanese Radio Law for Article 2 paragraph 1 item 19 specified radio equipment category.

## 4. ANTENNA POWER & TOLERANCE FOR ANTENNA POWER & EIRP

### 4.1. TEST CONDITIONS

Test performed by : Akram HAKKARI  
Date of test : December 19, 2024  
Ambient temperature : 23 °C  
Relative humidity : 38 %

### 4.2. TEST SETUP

- The Equipment under Test is installed:  
☒ FAR ☐ On a table
- Measurement is performed with a spectrum analyzer  
☒ On the EUT conducted access

The Antenna Power & Tolerance or Antenna Power are measured with a thermocouple power meter.  
Mean power at the output of the transmitter (A) is deduced after correction due to RF cables loss between the EUT and the spectrum analyzer.

The Equivalent Isotropic Radiated Power (EIRP in dBm) is defined with the following formula:

$EIRP = \text{Antenna Power} + G$

Antenna Power (dBm): mean power at the output of the transmitter  $+10 \cdot \log(1/x)$

G (dBi): Antenna gain

x: Duty cycle

#### Pre-scan Spectrum Analyzer Setting:

Center frequency= Test frequency  
Span= Twice wider than the Occupied Bandwidth  
Amplitude= Sufficient to observe the signal amplitude  
RBW= 1MHz  
VBW= 3MHz  
Sweep= Auto  
Sweep Point= 5000 points  
Continue Sweep  
Trace= Max Hold  
Detector= Peak  
Marker Search Peak

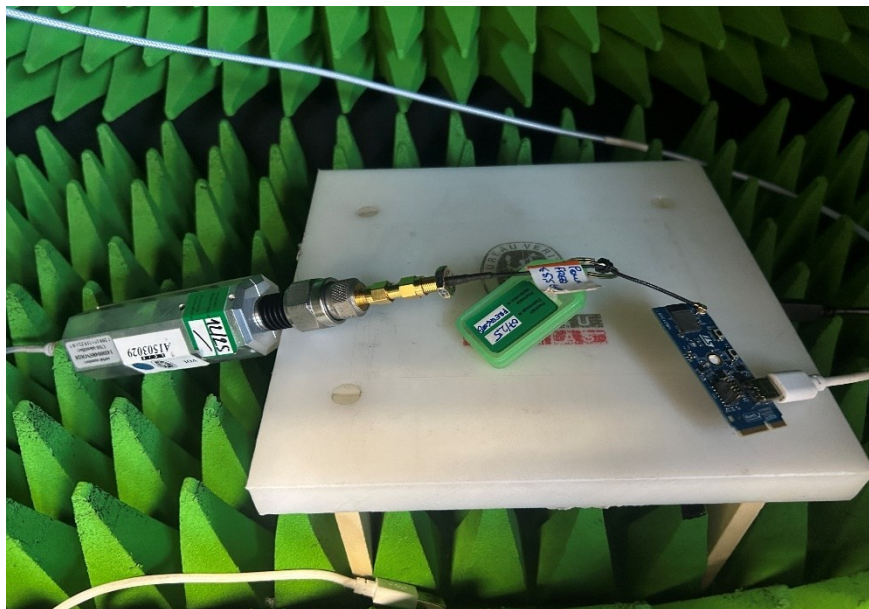
#### Final measurement

##### Spectrum Analyzer Setting:

Center frequency= Marker Search Peak during Pre-scan  
Span= 0  
Amplitude= Sufficient to observe the signal amplitude  
RBW= 1MHz  
VBW= 1MHz  
Sweep= Auto  
Sweep Point= 5000 points  
Continuous Sweep  
Trace= Clear/Write  
Detector= Peak

##### Power Meter Setting:

Connect the Thermocouple power sensor to the IF spectrum analyzer output



Photograph for Antenna Power & Tolerance for Antenna Power

#### 4.3. LIMIT

Antenna Power shall be 10mW or less

Tolerance for Antenna Power shall be inside +20% & -80% tolerance

EIRP shall be less 12.14dBm to 22.14dBm depending to Half Power Beam Width



#### 4.4. TEST EQUIPMENT LIST

TEST EQUIPMENT USED							
Description	Manufacturer	Model	Identifier	Cal_Date	Cal_Due	Cal. Method	Cal. Agent name
RF Power sensor	DARE	RPR3006W	A1503029	12/24	12/25	c)	C
Emission Cable (SMA 1m)	TELEDYNE	26GHz	A5329874	08/24	08/25	d)	A
DC Power Supply	RS PRO	RS3005P	A7042314	(*)	(*)	N/A	N/A
Full Anechoic Room	SIEPEL	—	D3044024	(*)	(*)	N/A	N/A
SMA 1.5m	SUCOFLEX	18GHz	A5329863	08/24	08/25	d)	A
Thermo-hygrometer	TESTO	608-H1	B4204120	03/24	03/25	d)	A
RADIMATION	RADIMATION	2023.2.4	L1000139	(*)	(*)	N/A	N/A

(\*) : The missing dates are for equipment that was not calibrated because it was not used for measurement.  
N/A: Not applicable

Calibration Agent:

A: LCIE Bureau Veritas, France

B: R&S, Germany

C: Kiwa Dare, The Netherlands

D: Element Metech AB, Sweden

Calibration Method :

a) : Calibration conducted by the National Institute of Information and Communications Technology (NICT) or a designated calibration agency under Article 102-18 paragraph.

b) : Correction conducted pursuant to the provisions of Article 135 or Article 144 of the Measurement Law (Law No. 51 of 1992) (Japan Calibration Service System).

c) : Calibration conducted in foreign countries, which shall be equivalent to the calibration conducted by the NICT or a designated calibration agency under Article 102-18 paragraph

d) Calibration conducted by using other equipment that listed above from a) to c)

#### 4.5. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION

☒ None

☐ Divergence:

#### 4.6. RESULTS

Voltage	Vmin		
Channel	Cmin	Cnom	Cmax
Antenna Power (dBm)	8.44	8.52	8.49
Antenna Power (mW)	6.982	7.112	7.063
Declared Antenna Power (mW)	10	10	10
Tolerance for Antenna Power (%)	-30.18	-28.88	-29.37
EIRP (dBm)	10.32	10.40	10.37
Voltage	Vnom		
Channel	Cmin	Cnom	Cmax
Antenna Power (dBm)	8.48	8.5	8.49
Antenna Power (mW)	7.047	7.079	7.063
Declared Antenna Power (mW)	10	10	10
Tolerance for Antenna Power (%)	-29.53	-29.21	-29.37
EIRP (dBm)	10.36	10.38	10.37
Voltage	Vmax		
Channel	Cmin	Cnom	Cmax
Antenna Power (dBm)	8.48	8.53	8.48
Antenna Power (mW)	7.047	7.129	7.047
Declared Antenna Power (mW)	10	10	10
Tolerance for Antenna Power (%)	-29.53	-28.71	-29.53
EIRP (dBm)	10.36	10.41	10.36

#### 4.7. CONCLUSION

Antenna Power, Tolerance for Antenna Power & EIRP measurement performed on the sample of the **STM32WBA5MMG**, SN: **None**, in configuration and description presented in this test report, show levels **compliant** to the Japanese Radio Law for Article 2 paragraph 1 item 19 specified radio equipment category.



## 5. FREQUENCY TOLERANCE

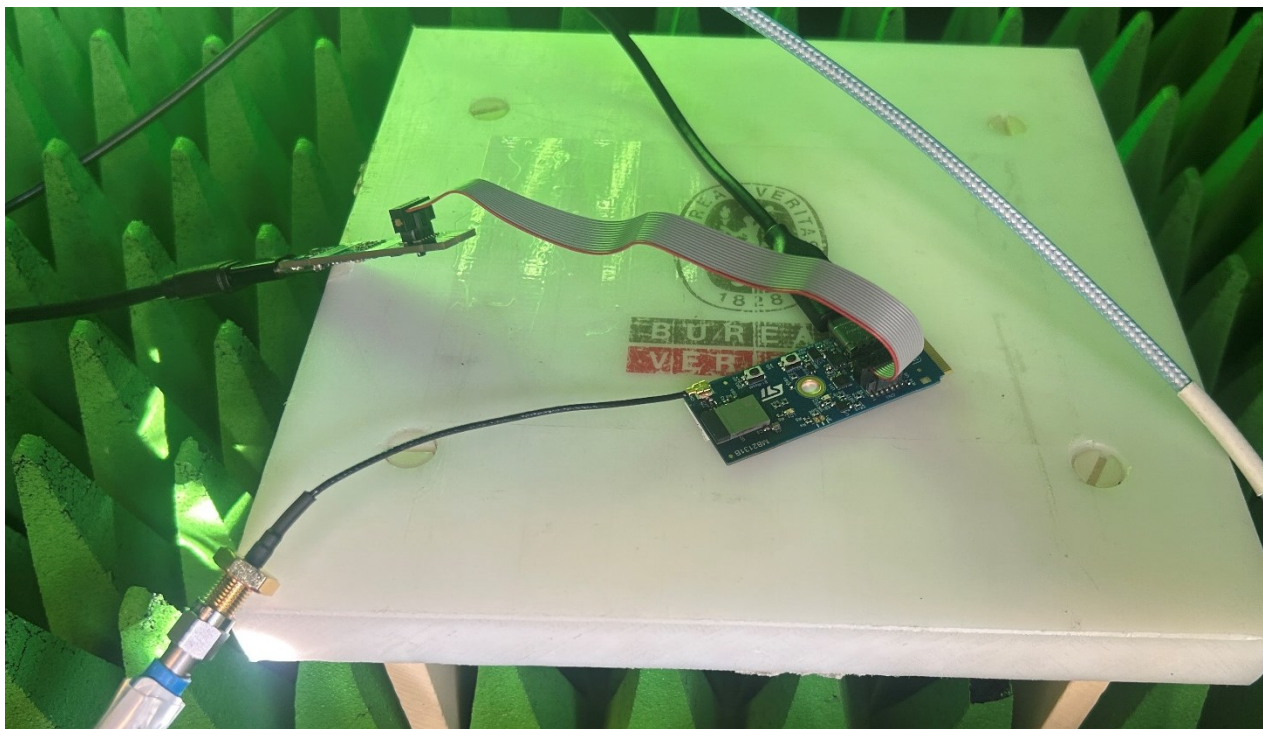
### 5.1. TEST CONDITIONS

Test performed by : Akram HAKKARI  
Date of test : December 20, 2024  
Ambient temperature : 22 °C  
Relative humidity : 38 %

### 5.2. TEST SETUP

- The Equipment under Test is installed:  
☒ FAR ☐ On a table
- Measurement is performed with a spectrum analyzer  
☒ On the EUT conducted access

Spectrum Analyzer Setting for Unmodulated Signal:  
Center frequency= Test frequency  
Span= 100kHz  
Amplitude= Sufficient to observe the signal amplitude  
RBW= 1kHz  
VBW= 3kHz  
Sweep= Auto  
Trace= Max Hold  
Detector= Peak  
Counter function activated



Photograph for Frequency Tolerance

### 5.3. LIMIT

The Frequency Tolerance shall not exceed  $\pm 50\text{ppm}$

### 5.4. TEST EQUIPMENT LIST

TEST EQUIPMENT USED							
Description	Manufacturer	Model	Identifier	Cal_Date	Cal_Due	Cal. Method	Cal. Agent name
Attenuator	Weinschel Associates	WA54-10-1314	A7122330	04/24	04/25	c)	D
Emission Cable (SMA 1m)	TELEDYNE	26GHz	A5329874	08/24	08/25	d)	A
DC Power Supply	RS PRO	RS3005P	A7042314	(*)	(*)	N/A	N/A
Full Anechoic Room	SIEPEL	—	D3044024	(*)	(*)	N/A	N/A
SMA 1.5m	SUCOFLEX	18GHz	A5329863	08/24	08/25	d)	A
Spectrum analyzer	ROHDE & SCHWARZ	FSV 40	A4060059	04/24	04/25	c)	B
Thermo-hygrometer	TESTO	608-H1	B4204120	03/24	03/25	d)	A

(\*) : The missing dates are for equipment that was not calibrated because it was not used for measurement.

N/A: Not applicable

#### Calibration Agent:

A: LCIE Bureau Veritas, France

B: R&S, Germany

C: Kiwa Dare, The Netherlands

D: Element Metech AB, Sweden

#### Calibration Method :

a) : Calibration conducted by the National Institute of Information and Communications Technology (NICT) or a designated calibration agency under Article 102-18 paragraph.

b) : Correction conducted pursuant to the provisions of Article 135 or Article 144 of the Measurement Law (Law No. 51 of 1992) (Japan Calibration Service System).

c) : Calibration conducted in foreign countries, which shall be equivalent to the calibration conducted by the NICT or a designated calibration agency under Article 102-18 paragraph

d) Calibration conducted by using other equipment that listed above from a) to c)

### 5.5. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION

☒ None

☐ Divergence:

## 5.6. RESULTS



Voltage	Vmin		
Channel	Cmin	Cnom	Cmax
Declared Frequency (MHz)	2405	2440	2480
Low Frequency (MHz)	2403.4805	2438.5311	2478.589
High Frequency (MHz)	2406.5268	2441.4472	2481.3748
Calculated Frequency (MHz)	2405.00365	2439.98915	2479.9819
Frequency Tolerance (ppm)	1.5177	-4.4467	-7.2984
Limite Frequency Tolerance (ppm)	± 50	± 50	± 50
Voltage	Vnom		
Channel	Cmin	Cnom	Cmax
Declared Frequency (MHz)	2405	2440	2480
Low Frequency (MHz)	2403.4515	2438.5384	2478.6107
High Frequency (MHz)	2406.5123	2441.4834	2481.3893
Calculated Frequency (MHz)	2404.9819	2440.0109	2480
Frequency Tolerance (ppm)	-7.5260	4.4672	0.0000
Limite Frequency Tolerance (ppm)	± 50	± 50	± 50
Voltage	Vmax		
Channel	Cmin	Cnom	Cmax
Declared Frequency (MHz)	2405	2440	2480
Low Frequency (MHz)	2403.4732	2438.4805	2478.6035
High Frequency (MHz)	2406.5123	2441.4834	2481.3531
Calculated Frequency (MHz)	2404.99275	2439.98195	2479.9783
Frequency Tolerance (ppm)	-3.0146	-7.3975	-8.7500
Limite Frequency Tolerance (ppm)	± 50	± 50	± 50

## 5.7. CONCLUSION

Frequency Tolerance measurement performed on the sample of the product **STM32WBA5MMG**, SN: **None**, in configuration and description presented in this test report, show levels **compliant** to the Japanese Radio Law for Article 2 paragraph 1 item 19 specified radio equipment category.



## 6. OCCUPIED CHANNEL BANDWIDTH

### 6.1. TEST CONDITIONS

Test performed by : Akram HAKKARI  
Date of test : December 19, 2024  
Ambient temperature : 23 °C  
Relative humidity : 38 %

### 6.2. TEST SETUP

- The Equipment under Test is installed:  
☒ FAR ☐ On table
- Measurement is performed with a spectrum analyzer  
☒ On the EUT conducted access

The spectrum analyzer occupied bandwidth function is used to find the occupied channel bandwidth.

Set the spectrum analyzer as follows:

Center frequency: Test frequency

Frequency sweep width : About 2~3.5 times the Nominal bandwidth

RBW= 300kHz

VBW= 300kHz

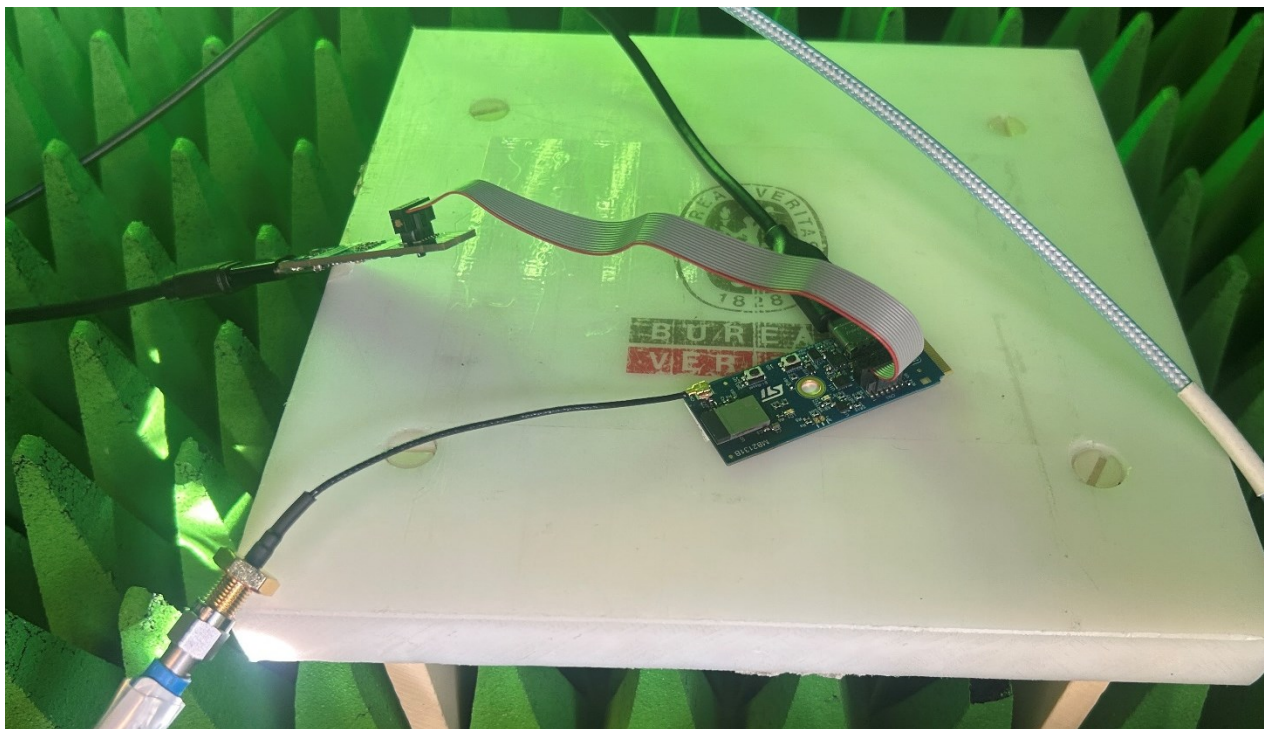
Sweep= Auto

Trace= Max Hold

Detector= Peak

Occupied Bandwidth 99% activated

Spread bandwidth 90% activated



Photograph Occupied Channel Bandwidth



### 6.3. LIMIT

The Occupied Bandwidth shall be 26MHz or less

### 6.4. TEST EQUIPMENT LIST

TEST EQUIPMENT USED							
Description	Manufacturer	Model	Identifier	Cal_Date	Cal_Due	Cal. Method	Cal. Agent name
Attenuator	Weinschel Associates	WA54-10-1314	A7122330	04/24	04/25	c)	D
Emission Cable (SMA 1m)	TELEDYNE	26GHz	A5329874	08/24	08/25	d)	A
DC Power Supply	RS PRO	RS3005P	A7042314	(*)	(*)	N/A	N/A
Full Anechoic Room	SIEPEL	—	D3044024	(*)	(*)	N/A	N/A
SMA 1.5m	SUCOFLEX	18GHz	A5329863	08/24	08/25	d)	A
Spectrum analyzer	ROHDE & SCHWARZ	FSV 40	A4060059	04/24	04/25	c)	B
Thermo-hygrometer	TESTO	608-H1	B4204120	03/24	03/25	d)	A

(\*) : The missing dates are for equipment that was not calibrated because it was not used for measurement.

N/A: Not applicable

#### Calibration Agent:

A: LCIE Bureau Veritas, France

B: R&S, Germany

C: Kiwa Dare, The Netherlands

D: Element Metech AB, Sweden

#### Calibration Method :

a) : Calibration conducted by the National Institute of Information and Communications Technology (NICT) or a designated calibration agency under Article 102-18 paragraph.

b) : Correction conducted pursuant to the provisions of Article 135 or Article 144 of the Measurement Law (Law No. 51 of 1992) (Japan Calibration Service System).

c) : Calibration conducted in foreign countries, which shall be equivalent to the calibration conducted by the NICT or a designated calibration agency under Article 102-18 paragraph

d) Calibration conducted by using other equipment that listed above from a) to c)

### 6.5. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION

☒ None

☐ Divergence:

## 6.6. RESULTS





## Spread bandwidth



Voltage	Vmin		
Channel	Cmin	Cnom	Cmax
Occupied Bandwidth (MHz)	2.583	2.387	2.532
Spread Bandwidth (MHz)	1.664	1.548	1.671
Limit (MHz)	≤ 26MHz	≤ 26MHz	≤ 26MHz
Voltage	Vnom		
Channel	Cmin	Cnom	Cmax
Occupied Bandwidth (MHz)	2.575	2.395	2.481
Spread Bandwidth (MHz)	1.671	1.562	1.628
Limit (MHz)	≤ 26MHz	≤ 26MHz	≤ 26MHz
Voltage	Vmax		
Channel	Cmin	Cnom	Cmax
Occupied Bandwidth (MHz)	2.619	2.387	2.532
Spread Bandwidth (MHz)	1.657	1.570	1.642
Limit (MHz)	≤ 26MHz	≤ 26MHz	≤ 26MHz

## 6.7. CONCLUSION

Occupied Channel Bandwidth measurement performed on the sample of the product. **STM32WBA5MMG**, SN: **None**, in configuration and description presented in this test report, show levels **compliant** to the Japanese Radio Law for Article 2 paragraph 1 item 19 specified radio equipment category.

## 7. SPURIOUS EMISSION INTENSITY

### 7.1. TEST CONDITIONS

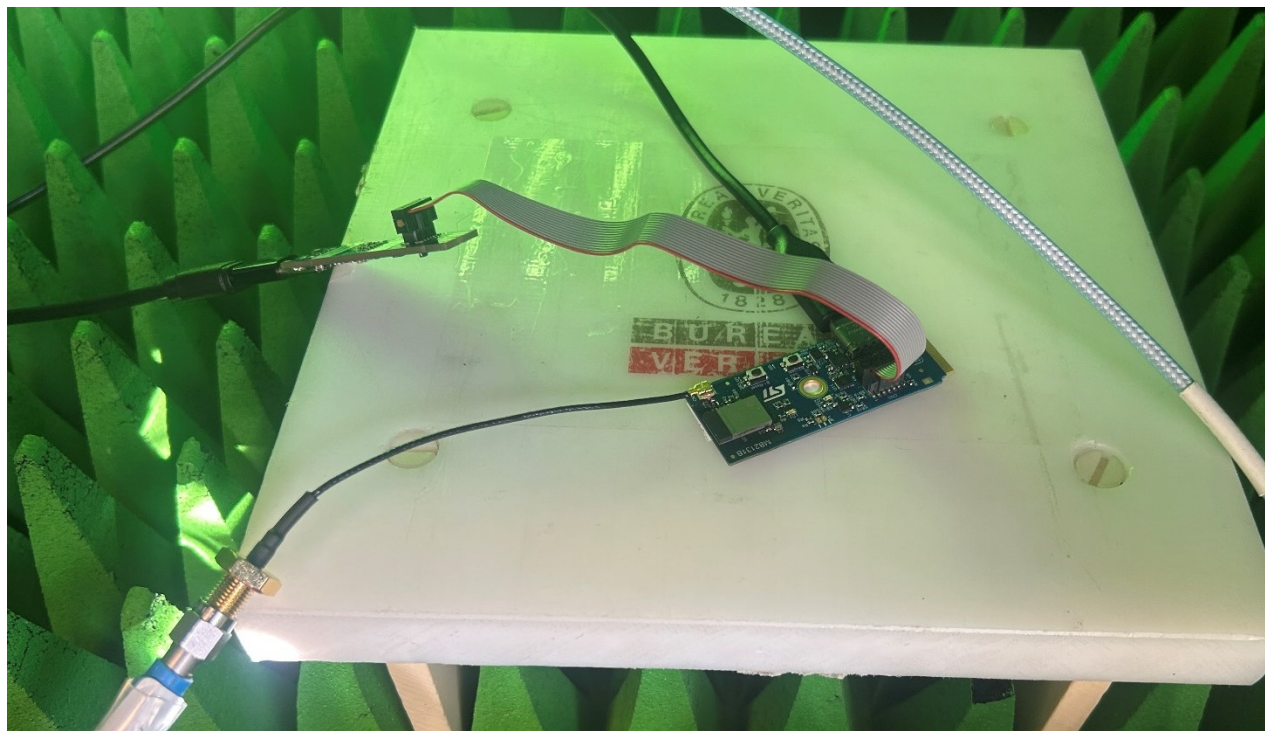
Test performed by : Akram HAKKARI  
Date of test : December 19, 2024  
Ambient temperature : 23 °C  
Relative humidity : 38 %

### 7.2. TEST SETUP

#### Qualification of conducted measurements (30MHz to 12.75GHz):

The power level shall be recorded as the conducted spurious emission level.

The transmitter shall be connected to a 50  $\Omega$  power attenuator. The output of the power attenuator shall be connected to a measuring receiver



Photograph for Spurious Emission Intensity

### 7.3. LIMIT

Spurious Emission Intensity	
Frequencies	Limit
30MHz to 2387MHz	2.5μW (-26dBm)
2387MHz to 2400MHz	25μW (-16dBm)
2483.5MHz to 2496.5MHz	25μW (-16dBm)
2496.5MHz to 12500MHz	2.5μW (-26dBm)

### 7.4. TEST EQUIPMENT LIST

TEST EQUIPMENT USED							
Description	Manufacturer	Model	Identifier	Cal_Date	Cal_Due	Cal. Method	Cal. Agent name
Attenuator	Weinschel Associates	WA54-10-1314	A7122330	04/24	04/25	c)	D
Emission Cable (SMA 1m)	TELEDYNE	26GHz	A5329874	08/24	08/25	d)	A
DC Power Supply	RS PRO	RS3005P	A7042314	(*)	(*)	N/A	N/A
Full Anechoic Room	SIEPEL	—	D3044024	(*)	(*)	N/A	N/A
SMA 1.5m	SUCOFLEX	18GHz	A5329863	08/24	08/25	d)	A
Spectrum analyzer	ROHDE & SCHWARZ	FSV 40	A4060059	04/24	04/25	c)	B
Thermo-hygrometer	TESTO	608-H1	B4204120	03/24	03/25	d)	A

(\*) : The missing dates are for equipment that was not calibrated because it was not used for measurement.

N/A: Not applicable

#### Calibration Agent:

A: LCIE Bureau Veritas, France

B: R&S, Germany

C: Kiwa Dare, The Netherlands

D: Element Metech AB, Sweden

#### Calibration Method :

a) : Calibration conducted by the National Institute of Information and Communications Technology (NICT) or a designated calibration agency under Article 102-18 paragraph.

b) : Correction conducted pursuant to the provisions of Article 135 or Article 144 of the Measurement Law (Law No. 51 of 1992) (Japan Calibration Service System).

c) : Calibration conducted in foreign countries, which shall be equivalent to the calibration conducted by the NICT or a designated calibration agency under Article 102-18 paragraph

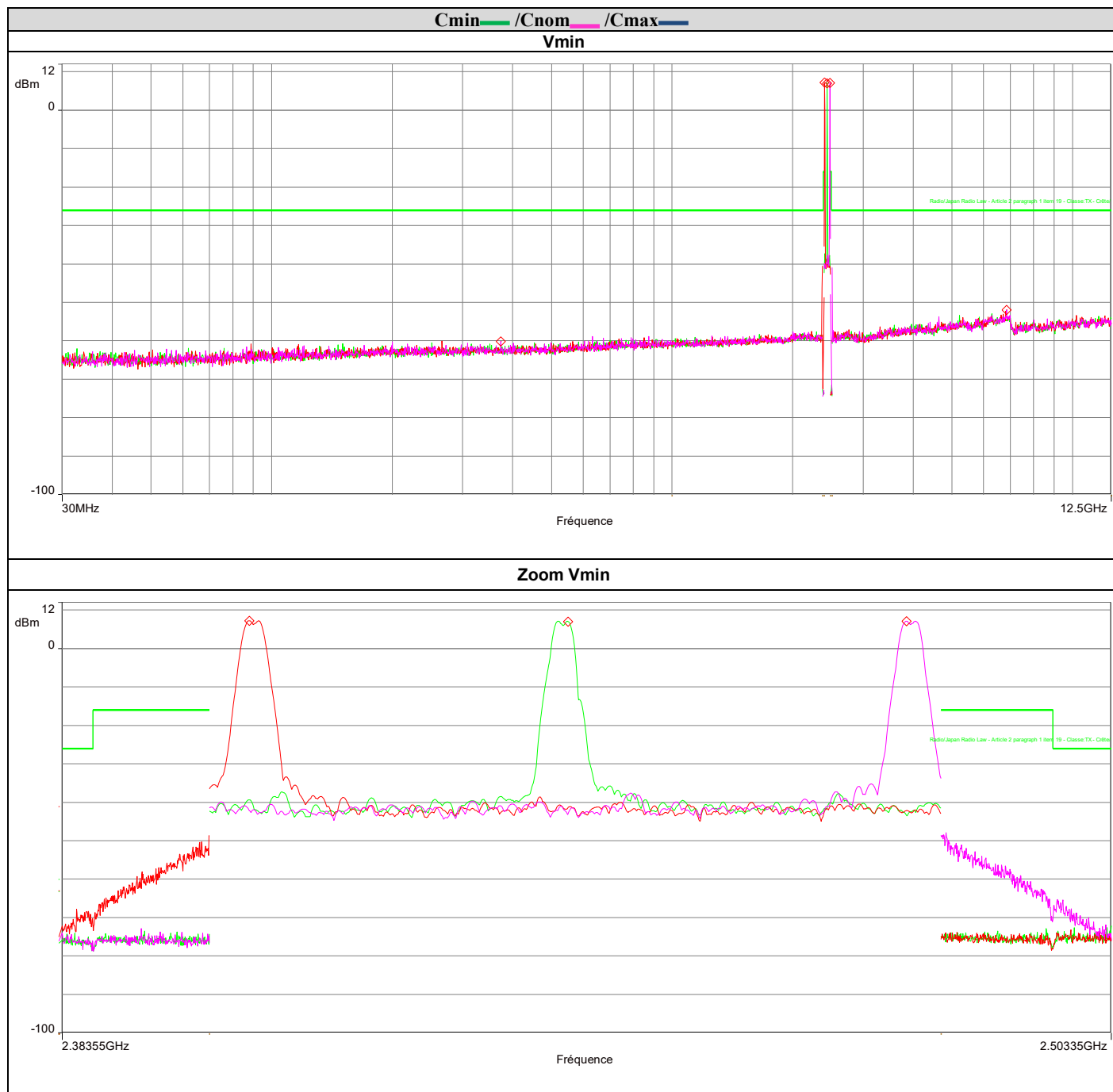
d) Calibration conducted by using other equipment that listed above from a) to c)

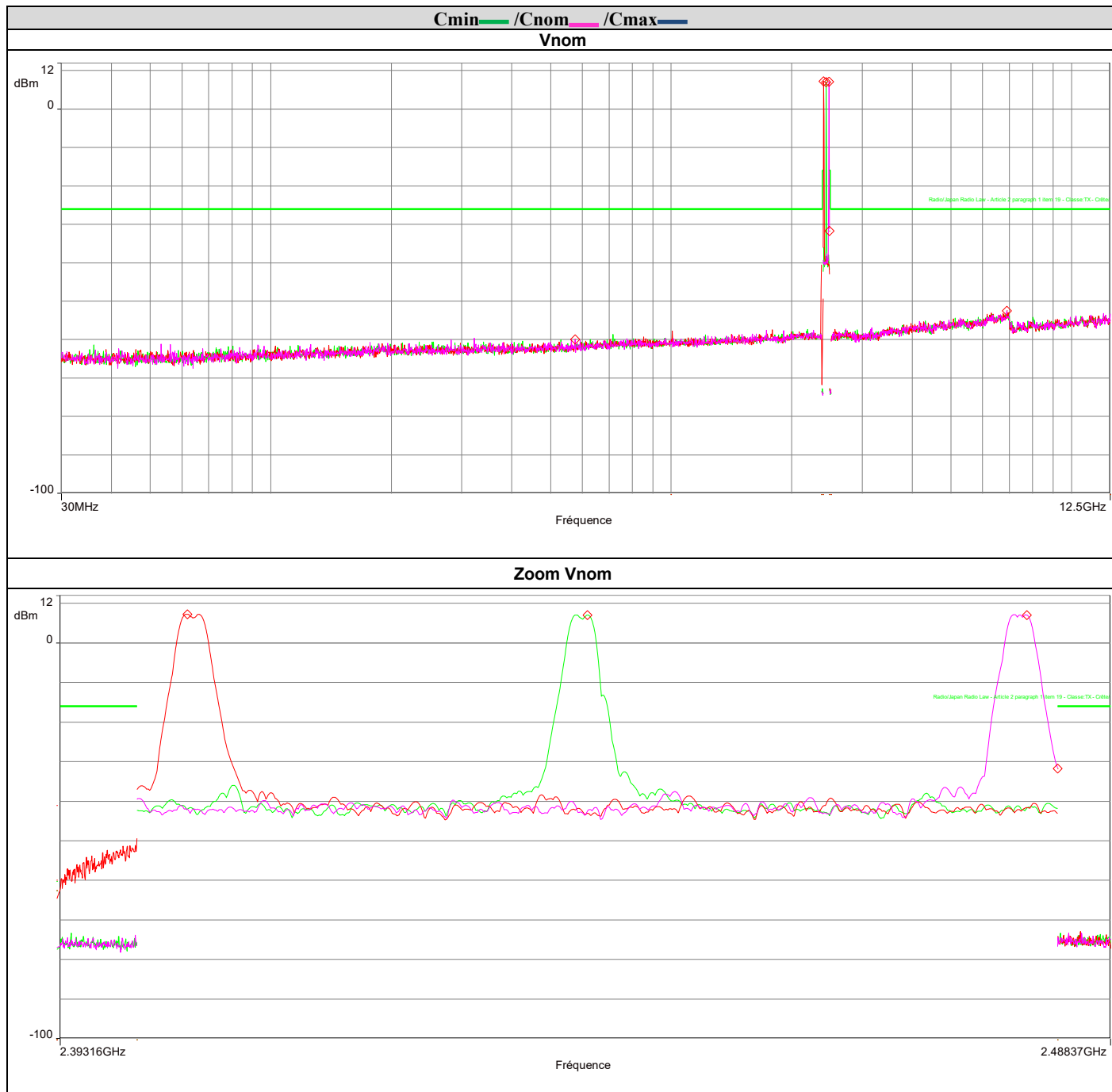
### 7.5. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION

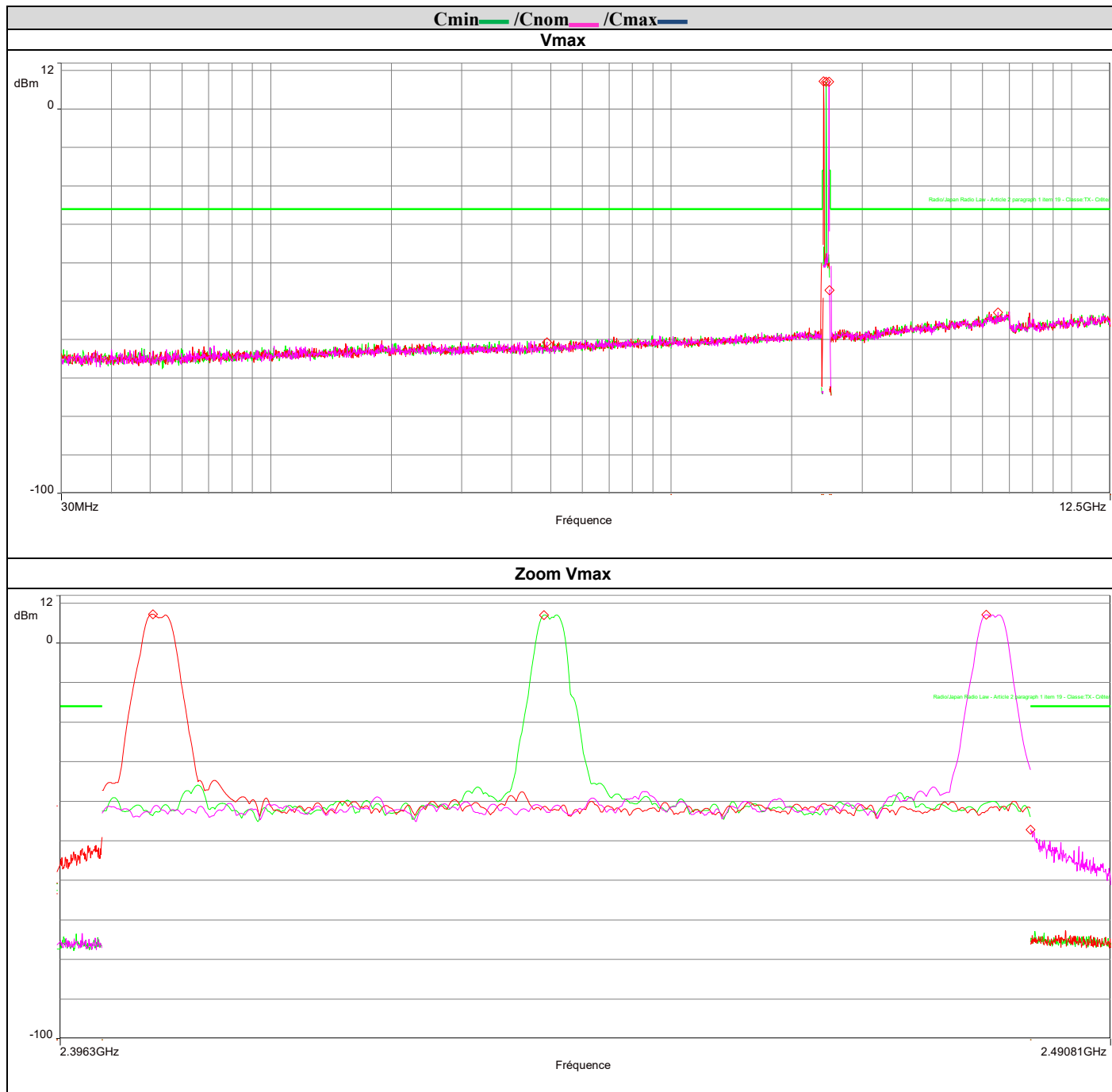
☐ None

☐ Divergence:

## 7.6. RESULTS







Vmin				
Frequency (MHz)	Level (dBm)	Level (μW)	Limit (μW/MHz)	Level (μW)- Limit (μW/MHz)
373.089	-60.14	9.6828E-07	2.5	-2.49999903
2404.509	7.23	5.28445252		
2440.5643	7.02	5.03500609		
2479.48365	7.13	5.16416369		
2484.0902	-47.9	1.6218E-05	25	-24.9999838
6846.37605	-52	6.3096E-06	2.5	-2.49999369
2399.01	-48.68	1.3552E-05	25	-24.9999864

Vmid				
Frequency (MHz)	Level (dBm)	Level (μW)	Limit (μW/MHz)	Level (μW)- Limit (μW/MHz)
575.625	-59.92	1.0186E-06	2.5	-2.49999898
2404.50065	7.24	5.29663444		
2440.4808	7.03	5.04661298		
2480.6443	7.04	5.05824662		
2483.5	-31.71	0.00067453	25	-24.9993255
6904.32095	-52.5	5.6234E-06	2.5	-2.49999438
2399.012131	-49.35	1.1614E-05	25	-24.9999884

Vmax				
Frequency (MHz)	Level (dBm)	Level (μW)	Limit (μW/MHz)	Level (μW)- Limit (μW/MHz)
489.198	-60.69	8.531E-07	2.5	-2.49999915
2404.509	7.24	5.29663444		
2439.38695	7.04	5.05824662		
2479.43355	7.11	5.14043652		
2483.5	-47.21	1.9011E-05	25	-24.999981
6551.6563	-52.97	5.0466E-06	2.5	-2.49999495
2399.011923	-49.72	1.0666E-05	25	-24.9999893

## 7.7. CONCLUSION

Spurious Emission Intensity measurement performed on the sample of the product. **STM32WBA5MMG**, SN: **None**, in configuration and description presented in this test report, show levels **compliant** to the Japanese Radio Law for Article 2 paragraph 1 item 19 specified radio equipment category.



## 8. LIMIT ON SECONDARY RADIATED EMISSIONS

### 8.1. TEST CONDITIONS

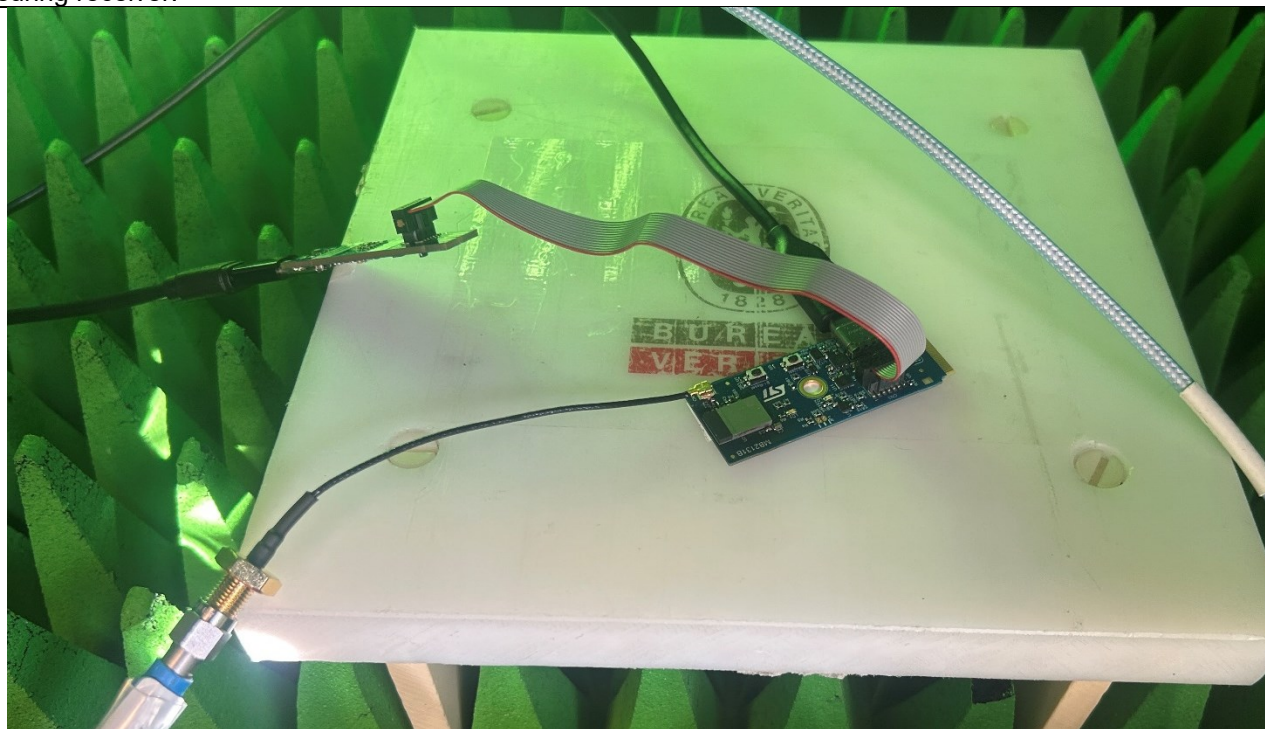
Test performed by : Akram HAKKARI  
Date of test : December 20, 2024  
Ambient temperature : 22 °C  
Relative humidity : 39 %

### 8.2. TEST SETUP

#### Qualification of conducted measurements (30MHz to 12.75GHz):

The power level shall be recorded as the conducted spurious emission level.

The transmitter shall be connected to a 50  $\Omega$  power attenuator. The output of the power attenuator shall be connected to a measuring receiver.



Photograph for Limit On Secondary Radiated Emissions

### 8.3. LIMIT

Limit On Secondary Radiated Emissions	
Frequencies	Limit
30MHz to 1GHz	4nW/100kHz
1GHz to 12.75GHz	20nW/MHz

### 8.4. TEST EQUIPMENT LIST

TEST EQUIPMENT USED							
Description	Manufacturer	Model	Identifier	Cal_Date	Cal_Due	Cal. Method	Cal. Agent name
Attenuator	Weinschel Associates	WA54-10-1314	A7122330	04/24	04/25	c)	D
Emission Cable (SMA 1m)	TELEDYNE	26GHz	A5329874	08/24	08/25	d)	A
DC Power Supply	RS PRO	RS3005P	A7042314	(*)	(*)	N/A	N/A
Full Anechoic Room	SIEPEL	_	D3044024	(*)	(*)	N/A	N/A
SMA 1.5m	SUCOFLEX	18GHz	A5329863	08/24	08/25	d)	A
Spectrum analyzer	ROHDE & SCHWARZ	FSV 40	A4060059	04/24	04/25	c)	B
Thermo-hygrometer	TESTO	608-H1	B4204120	03/24	03/25	d)	A

(\*) : The missing dates are for equipment that was not calibrated because it was not used for measurement.

N/A: Not applicable

#### Calibration Agent:

A: LCIE Bureau Veritas, France

B: R&S, Germany

C: Kiwa Dare, The Netherlands

D: Element Metech AB, Sweden

#### Calibration Method :

a) : Calibration conducted by the National Institute of Information and Communications Technology (NICT) or a designated calibration agency under Article 102-18 paragraph.

b) : Correction conducted pursuant to the provisions of Article 135 or Article 144 of the Measurement Law (Law No. 51 of 1992) (Japan Calibration Service System).

c) : Calibration conducted in foreign countries, which shall be equivalent to the calibration conducted by the NICT or a designated calibration agency under Article 102-18 paragraph

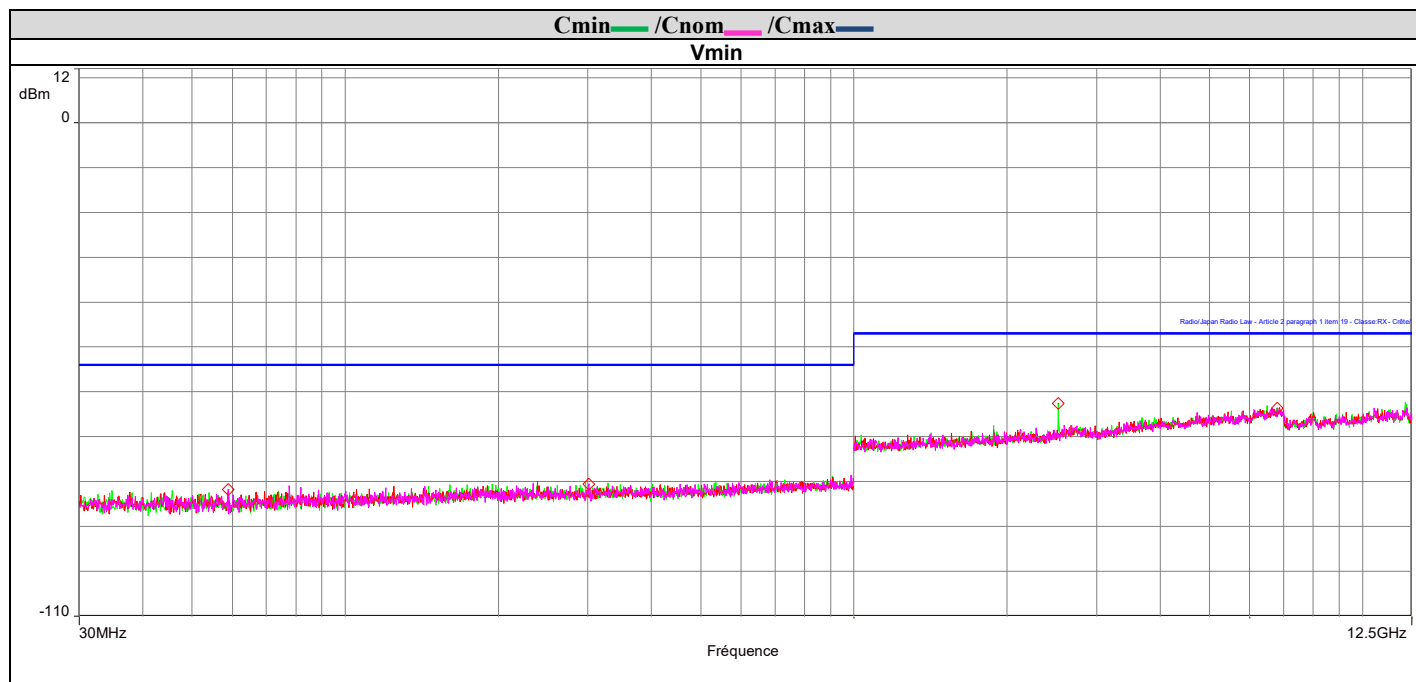
d) Calibration conducted by using other equipment that listed above from a) to c)

### 8.5. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION

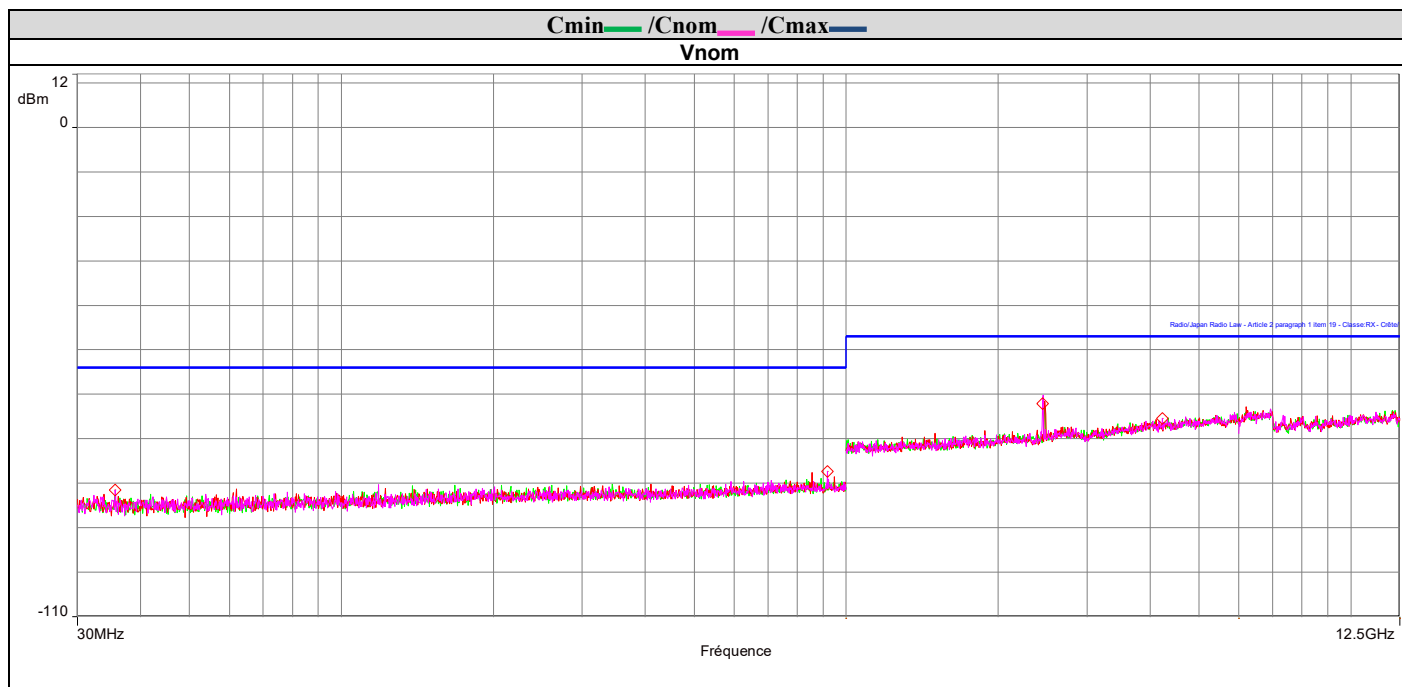
☒ None

☐ Divergence:

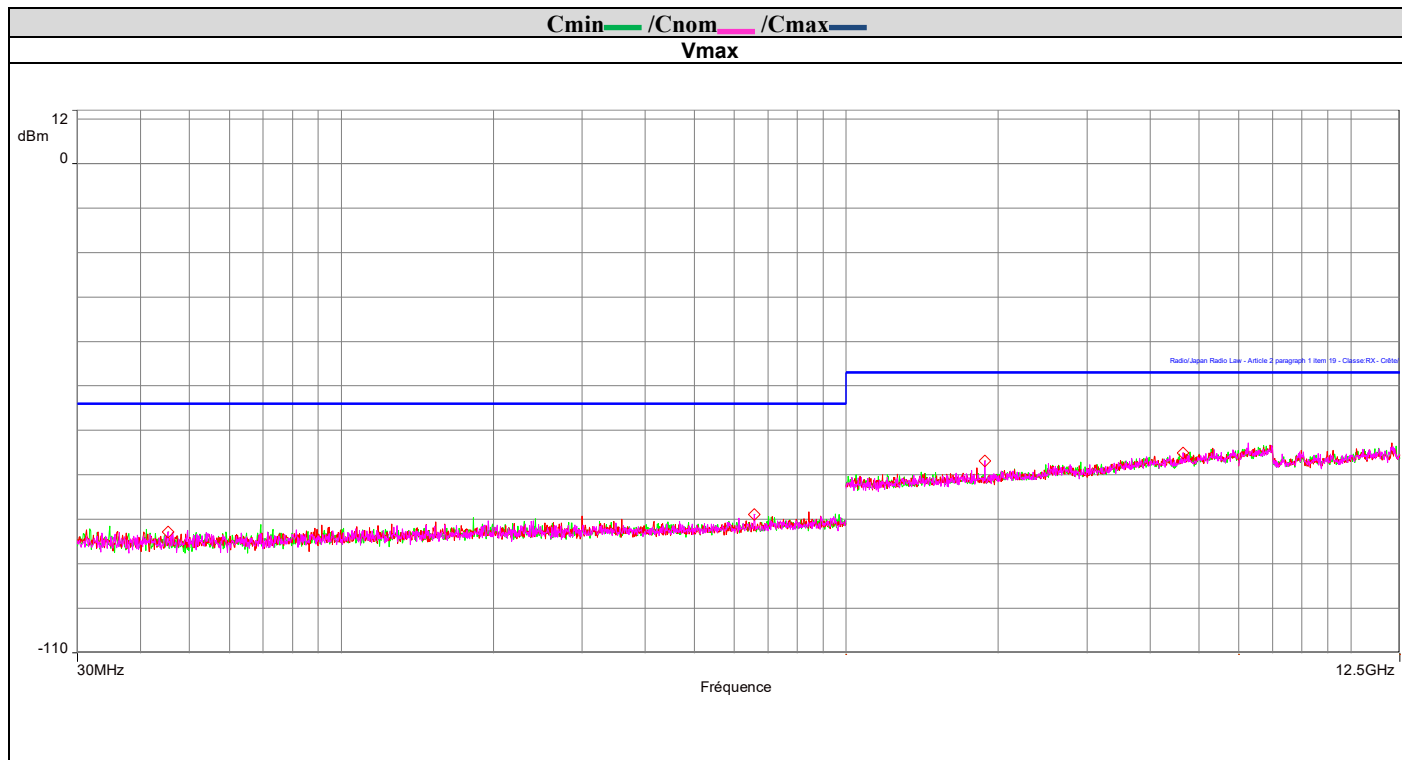
## 8.6. RESULTS



Vmin				
Frequency (MHz)	Level (dBm)	Level (nW)	Limit (nW)	Level (nW)- Limit (nW)
58.906	-81.73	6.7143E-09	4	-3.99999999
301.503	-80.51	8.892E-09	4	-3.99999999
2521.5	-62.59	5.5081E-07	20	-19.9999994
6795.6	-63.62	4.3451E-07	20	-19.9999996



Vmid				
Frequency (MHz)	Level (dBm)	Level (nW)	Limit (nW)	Level (nW)- Limit (nW)
35.626	-81.51	7.0632E-09	4	-3.99999999
917.162	-77.38	1.8281E-08	4	-3.99999998
2452	-62.07	6.2087E-07	20	-19.9999994
4231.5	-65.39	2.8907E-07	20	-19.9999997



Vmax				
Frequency (MHz)	Level (dBm)	Level (nW)	Limit (nW)	Level (nW)- Limit (nW)
45.326	-82.81	5.236E-09	4	-3.99999999
657.59	-78.91	1.2853E-08	4	-3.99999999
1882	-66.9	2.0417E-07	20	-19.9999998
4645	-65.08	3.1046E-07	20	-19.9999997



## 8.7. CONCLUSION

Limit On Secondary Radiated Emissions measurement performed on the sample of the product **STM32WBA5MMG**, SN: **None**, in configuration and description presented in this test report, show levels **compliant** to the Japanese Radio Law for Article 2 paragraph 1 item 19 specified radio equipment category.

## 9. RADIO INTERFERENCE PREVENTION CAPABILITY MEASUREMENT

### 9.1. TEST CONDITIONS

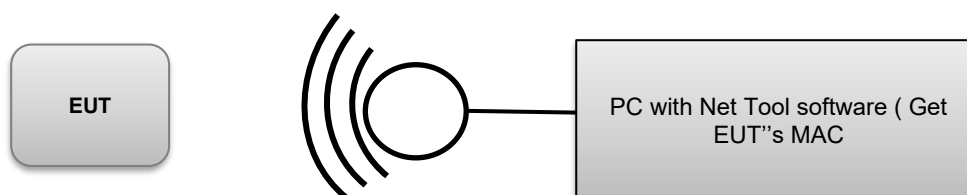
Test performed by : Akram HAKKARI  
Date of test : December 20, 2024  
Ambient temperature : 23 °C  
Relative humidity : 38 %

### 9.2. TEST SETUP

The Equipment Under Test is installed on a table.  
Measurement is performed with a test fixture **and EUT was programmed to be in normal mode.**

Test method which surpass to Clause 23 of Annex No.43 of MIC Notification No.88.

1. In the case that the EUT has the function of automatically transmitting the identification code:
  - a. Transmit the predetermined identification codes form EUT.
  - b. Check the transmitted identification codes with the demodulator.
2. In the case of receiving the identification code:
  - a. Transmit the predetermined identification codes form the counterpart.
  - b. Check if communication is normal.
  - c. Transmit the signals other than predetermined ID codes form the counterpart.
  - d. Check if the EUT stops the transmission, or if it displays that identification codes are different from the predetermined ones.



*Radio interference prevention capability measurement*

### 9.3. LIMIT

Identification code shall  $\geq 48$  bits.

### 9.4. TEST EQUIPMENT LIST

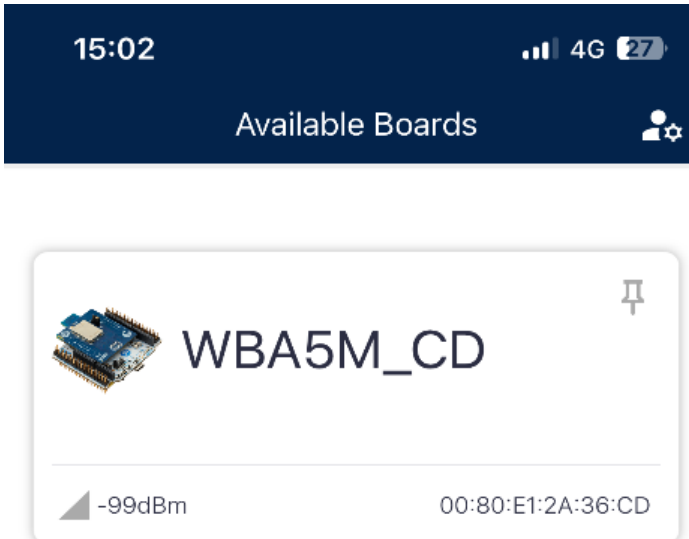
TEST EQUIPMENT USED			
Description	Manufacturer	Model	Software used
Smartphone	APPLE	IPHONE 14	ST BLE Sensor

### 9.5. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION

None

### 9.6. RESULTS

Configuration: Normal mode

identification code:
<b>00:80:E1:2A:36:CD</b>


### 9.7. CONCLUSION

Radio interference prevention capability measurement performed on the sample of the product **STM32WBA5MMG**, SN: **None**, in configuration and description presented in this test report, show levels **compliant** to the **Japanese Radio Law for Article 2 paragraph 1 item 19** limits.



## 10. CONSTRUCTION PROTECTION CONFIRMATION METHOD

### 10.1. TEST CONDITIONS

Test performed by : Akram HAKKARI  
Date of test : December 20, 2024  
Ambient temperature : 23 °C  
Relative humidity : 38 %

### 10.2. TEST SETUP

The RF and modulation portions are protected against illegal modification as following method:

No	Method
1	Sealed with special screws.
2	Plastic chassis is being welded using ultrasonic waves.
3	Chassis is glued using a special adhesive.
4	Metal covers are spot-fused.
5	Cover is specially interlocked.
6	RF and Modulation components are covered with shielding case and this shielding case is soldered
7	Shield case is welded at RF and modulation parts, and ID-ROM is welded using the BGA Method.
8	Shield case is welded at RF and modulation parts, and ID-ROM is glued at its lead with a special adhesive.
9	Shield case is welded at RF and modulation parts, and ID-ROM is glued with a non-transparent laminating agent.
10	RF and Modulation parts are mounted on PCB with surface mount technology, and there is no any adjustable part on PCB or adjustable parts are not exposed.

### 10.3. LIMIT

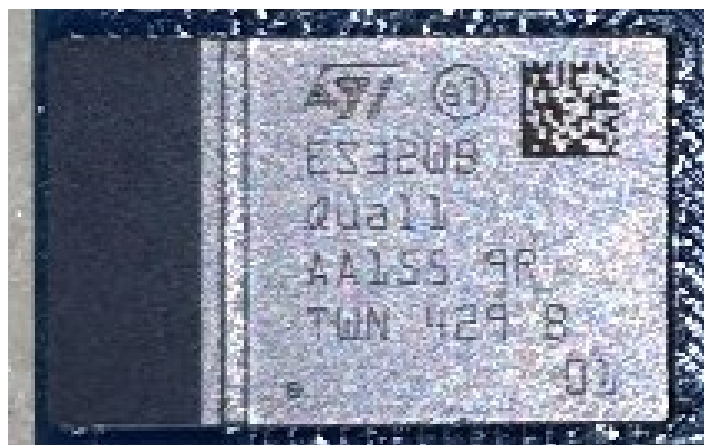
(See Article 49-20, Item 1-a of the Ordinance Regulating Radio Equipment)

The high-frequency section and modulation section of the radio equipment except for the antenna system shall not be capable of being opened easily.

### 10.4. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION

None

## 10.5. RESULTS



*Construction Protection Confirmation Method*

No	Method	
10	RF and Modulation parts are mounted on PCB with surface mount technology, and there is no any adjustable part on PCB or adjustable parts are not exposed.	<input checked="" type="checkbox"/>

## 10.6. CONCLUSION

Construction protection confirmation method t performed on the sample of the product **STM32WBA5MMG**, SN: **None**, in configuration and description presented in this test report, show levels **compliant** to the **Japanese Radio Law for Article 2 paragraph 1 item 19** limits.

## 11. UNCERTAINTIES CHART

Kind of test	Wide uncertainty laboratory (k=2) $\pm x(\text{dB}) / (\text{Hz}) / \text{ms}$	Uncertainty limit
RF Output Power, Conducted	$\pm 0.6 \text{ dB}$	$\pm 1.5 \text{ dB}$
Power Spectral Density, Conducted	$\pm 0.6 \text{ dB}$	$\pm 3 \text{ dB}$
Unwanted Emissions, Conducted	$\pm 0.6 \text{ dB}$	$\pm 3 \text{ dB}$
All Emissions, Radiated below 1GHz	$\pm 3.9 \text{ dB}$	$\pm 6 \text{ dB}$
All Emissions, Radiated above 1GHz	$\pm 3.1 \text{ dB}$	$\pm 6 \text{ dB}$
Temperature	$\pm 0.5^\circ \text{C}$	$\pm 3^\circ \text{C}$

The uncertainty values calculated by the laboratory are lower than limit uncertainty values defined by the CISPR. The conformity of the sample is directly established by the applicable limits values. This table includes all uncertainties maximum feasible for testing in the laboratory, whether or not made in this report