JAPAN Radio Test Report

WLAN 2.4GHz Band_Ch14

APPLICANT	:	**Espressif Systems (Shanghai) Co.,Ltd.**
PRODUCT NAME	:	**2.4G Bluetooth& Wi-Fi IoT module**
BRAND NAME	:	**ESPRESSIF**
MODEL NAME	:	**ESP32-PICO-MINI-02**
TYPE EMISSIONS	:	**19M1G1D**
DECLARATION OUTPUT POWER	:	**6.000 mW/MHz**
STANDARD	:	**Article 49-20 and the relevant articles of the Ordinance Regulating Radio Equipment.**
TEST PROCEDURE	:	**MIC Notice No.88 Appendix No.44**
TEST DATE(S)	:	**Sep. 16, 2023 ~ Sep. 19, 2023**

We, Sporton International Inc. (Kunshan), would like to declare that the tested sample has been evaluated in accordance with the procedures given in MIC Notice No.88 Appendix No.44 and shown to be compliant with the applicable technical standards. Article 2 Paragraph 1 Item 19-2 of the Certificate Ordinance of the Radio Law indicates the classification of the specified radio equipment.

The test results in this report apply exclusively to the tested model / sample. Without written approval of Sporton International Inc. (Kunshan), the test report shall not be reproduced except in full.

Infi Lee

Approved by: Infi Lee

ACCREDITED Cert #5145.02

Sporton International Inc. (Kunshan)
No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300
People's Republic of China

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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
JR380821C	Rev. 01	Initial issue of report	Nov. 30, 2023

SUMMARY OF TEST RESULT

Report Section	Description	Result
3.1	Frequency Tolerance	Pass
3.2	Occupied Bandwidth and Spread-spectrum Bandwidth / Spread Factor	Pass
3.3	Unwanted Emission Intensity	Pass
3.4	RF Output Power / Tolerance	Pass
3.5	Limitation of Collateral Emission of Receiver	Pass
3.6	Transmission Antenna Gain (EIRP Antenna Power)	N/A
3.7	Transmission Radiation Angle Width (3dB Beam width)	N/A
3.8	Radio Interference Prevention Capability	Pass
3.9	Carrier Sense Function	Pass
3.10	Construction Protection Confirmation	Pass

Conformity Assessment Condition:

1. The test results (PASS/FAIL) with all measurement uncertainty excluded are presented against the regulation limits or in accordance with the requirements stipulated by the applicant/manufacturer who shall bear all the risks of non-compliance that may potentially occur if measurement uncertainty is taken into account.
2. The measurement uncertainty please refer to each test result in the section “Measurement Uncertainty”

Disclaimer:

The product specifications of the EUT presented in the test report that may affect the test assessments are declared by the manufacturer who shall take full responsibility for the authenticity.

1 General Description

1.1 Applicant

Espressif Systems (Shanghai) Co.,Ltd.
Suite 204, Block 2, 690 Bibo Road, Zhang Jiang Hi-Tech Park, Shanghai, China

1.2 Manufacturer

Espressif Systems (Shanghai) Co.,Ltd.
Suite 204, Block 2, 690 Bibo Road, Zhang Jiang Hi-Tech Park, Shanghai, China

1.3 Feature of Equipment Under Test

Product Feature & Specification		
Product Name	2.4G Bluetooth& Wi-Fi IoT module	
Brand Name	ESPRESSIF	
Model Name	ESP32-PICO-MINI-02	
Tx/Rx Frequency Range	2471 MHz ~ 2497 MHz	
WLAN Type of Modulation	■ Direct Spreading (DS) □ Orthogonal frequency-division multiplexing (OFDM) □ Frequency Hopping (FH)	
RF Technology	■ 802.11b □ 802.11g □ 802.11n-HT20 □ 802.11n-HT40	
Number of Channels	1	
Declaration RF Output Power	6.000 mW/MHz	
Antenna Power (E.I.R.P)	11.942 dBm/MHz	
Type of Modulation	■ BPSK ■ QPSK □ 16QAM □ 64QAM □ 256QAM	
Power Source[NOTE]	■ Commercial power	AC 100 ~ 240V
	■ External Power Source	DC 3.30V
	□ Lithium battery	DC 3.7V, mAh
	□ UM battery	DC 1.2V

NOTE:

Manufacturer declares that when the normal supply voltage of EUT varies to ±10% extreme voltage , the input voltage of internal RF circuit can be controlled within ±1% range.

Hence, all the rest of test cases were done only with the normal supply voltage.

Antenna Information			
Brand Name :	N/A	**Model Name :**	N/A
Antenna Type :	PCB	**Antenna Gain :**	4.16 dBi

Remark: The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

1.4 Modification of EUT

No modifications are made to the EUT during all test items.

1.5 Testing Site

Sporton International Inc. (Kunshan) is accredited to ISO/IEC 17025:2017 by American Association for Laboratory Accreditation with Certificate Number 5145.02.

Test Site	Sporton International Inc. (Kunshan)
Test Site Location	No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300 People's Republic of China TEL : +86-512-57900158
Test Site No.	**Sporton Site No.:** TH01-KS

1.6 Test Software

Item	Site	Manufacturer	Name	Version
1.	TH01-KS	SPORTON	JRF_WLAN_Ver3.0 for China_210602	3.0

1.7 Measurement Uncertainty

Test Items	Uncertainty	Remark
Occupied Channel Bandwidth	±0.1%	Confidence 95%
RF output power, conducted	±0.46 dB	Confidence 95%
Frequency Tolerance	0.4ppm	Confidence 95%
Power density, conducted	±0.88 dB	Confidence 95%
Unwanted Emission	±2.26 dB	Confidence 95%
Temperature	±0.2 °C	Confidence 95%
Humidity	±2.00 %	Confidence 95%
Time	±0.33 %	Confidence 95%

1.8 Applied Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- Article 49-20 and the relevant articles of the Ordinance Regulating Radio Equipment

Remark:

1. All test items were verified and recorded according to the standards and without any deviation during the test.
2. The measurement was implemented in accordance with MIC Notice No. 88 Appendix No. 44.

1.9 Ancillary Equipment List

Item	Equipment	Trade Name	Model Name	JRL Certification	TBL Certification	Note
1.	Test Jig	N/A	N/A	N/A	N/A	

2 Test Configuration of Equipment Under Test

2.1 Carrier Frequency Channel

Channel	Frequency (MHz)
1	2484

2.2 EUT Operation Test Setup

During testing, RF test program provided by the customer was used to control the operating channel as well as the output power level.

3 Test Result

3.1 Frequency Tolerance Measurement

3.1.1 Limit

Item	Limits
Frequency Tolerance	≤50ppm

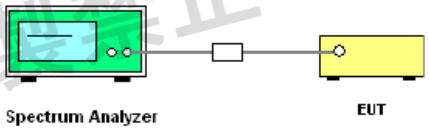
3.1.2 Measuring Instruments

See list of measuring instruments of this test report.

3.1.3 Test Procedure

1. Frequency accuracy of instrument shall be less than 10% of limits tolerance (5ppm).
2. Two testing methods
   a. CW Tone method
      i. Setting of SA is following as: RBW:1kHz / VBW:30kHz.
      ii. Maker Max. level to get measuring frequency f.
   b. 10dB down method
      i. Setting of SA is following as: RBW:100kHz / VBW: 100kHz / Trace: MaxHold
      ii. Display line Level = Max. level – 10dB to place two markers, highest(fH) and lowest(fL) frequency
      iii. Determine measuring frequency f = (fH-fL)/2
3. The frequency tolerance test case is directly measured using spectrum analyzer. Then the frequency error formula is $(f-fc)/fc\times10^6$ ppm and the limit is less than ±50ppm.

3.1.4 Test Setup



3.1.5 Test Deviation

There is no deviation with the original standard.

3.1.6 EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

3.1.7 Test Result of Frequency Tolerance

Please refer to Appendix B.

3.2 Occupied Bandwidth and Spread-spectrum Bandwidth / Spread Factor Measurement

3.2.1 Limit

Item	Limits
Occupied Band Width	DS ≤ 26MHz;
Spreading Bandwidth	≥ 500 kHz (DS)
Spreading Factor	≥ 10

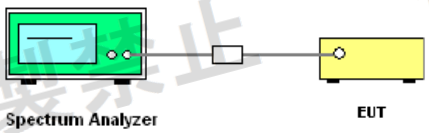
3.2.2 Measuring Instruments

See list of measuring instruments of this test report.

3.2.3 Test Procedures

1. Setting of SA is following as: RBW: 300KHz / VBW:300KHz / Sweep Mode: Continuous sweep / Detect mode: Positive peak / Trace mode: Max hold.
2. EUT have transmitted each modulation signal and fixed channelize (For DSSS Device). SA set to 99% of occupied bandwidth to measure occupied bandwidth. The limit is less than 26MHz.
3. SA set to 90% of occupied bandwidth to measure Spread Spectrum Bandwidth and must greater than 500kHz.
4. Spread Spectrum Factor = Spread Spectrum Bandwidth / modulation rate of EUT.
5. Spread Spectrum Factor limit is greater than 10.

3.2.4 Test Setup



3.2.5 Test Deviation

There is no deviation with the original standard.

3.2.6 EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

3.2.7 Test Result of Occupied Bandwidth and Spread-spectrum Bandwidth / Spread Factor Measurement

Please refer to Appendix B.

3.3 Unwanted Emission Intensity Measurement

3.3.1 Limit

Item	Limits
Tx Spurious Emission	≤ 2.5 μW/MHz (f < 2458MHz ; f > 2510MHz)
	≤ 25 μW/MHz (2458-2471MHz) and (2497MHz-2510Mz)

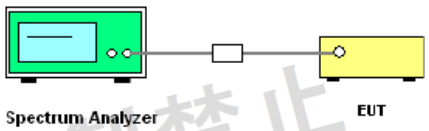
3.3.2 Measuring Instruments

See list of measuring instruments of this test report.

3.3.3 Test Procedures

1. EUT have transmitted the maximum power and fixed channelize.
2. Setting of SA is following as: RBW:1MHz / VBW:1MHz above 1GHz, Sweep time: Auto / Sweep Mode: Continuous sweep / Detect mode: Positive peak / Trace mode: Max hold.
3. Setting of SA is following as: RBW:100KHz / VBW:100KHz under 1GHz, Sweep time: Auto / Sweep Mode: Continuous sweep / Detect mode: Positive peak / Trace mode: Max hold.
4. Setting of SA is following as 30MHz and stop frequency 2458MHz Then to mark peak reading value + cable loss shall be less than 2.5μW.
5. SA adjusted to start frequency 2458MHz and stop frequency 2471MHz. Then to mark peak reading value + cable loss shall be less than 25μW.
6. SA adjusted to start frequency 2497MHz and stop frequency 2510MHz Then to mark peak reading value + cable loss shall be less than 25μW.
7. SA adjusted to start frequency 2510MHz and stop frequency 12500MHz Then to mark peak reading value + cable loss shall be less than 2.5μW.
8. If the Result_Value is over the requirement, take total sum of 1MHz band centered at the spur frequency like ACLP measurement as Result_Value.

3.3.4 Test Setup



3.3.5 Test Deviation

There is no deviation with the original standard.

3.3.6 EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

3.3.7 Test Result of Unwanted Emission Intensity

Please refer to Appendix B.

3.4 RF Output Power / Tolerance

3.4.1 Limit

Item	Limits
Antenna Power Density	≤ 10mW/MHz
Antenna Power Error	+20%, -80% (Base on manufacturer declare antenna power density)

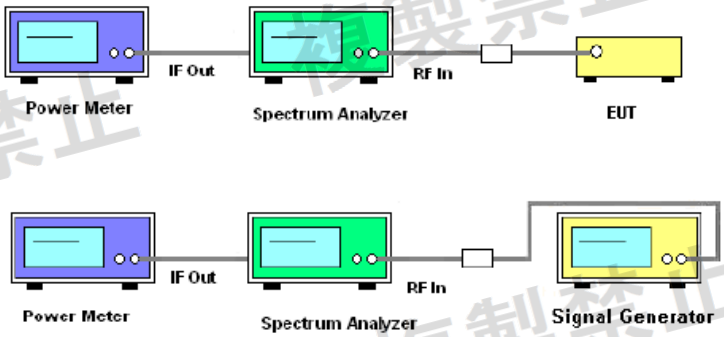
3.4.2 Measuring Instruments

See list of measuring instruments of this test report.

3.4.3 Test Procedures

1. A power meter is connected on the IF output port of the spectrum analyzer.
2. Adjust the spectrum analyzer to have the center frequency the same with the measured carrier. RBW=VBW=1MHz, detector mode is positive peak. Turn off the averaging function and use zero span.
3. The calibrating signal power shall be reduced to 0 dBm and it shall be verified that the power meter reading also reduces by 10 dB.
4. Connect the equipment to be measured. Using the following settings of the spectrum analyzer in combination with "max hold" function, find the frequency of highest power output in the power envelope: center frequency equal to operating frequency; RBW & VBW: 1 MHz; detector mode: positive peak; averaging: off; span: 3 times the spectrum width; amplitude: adjust for middle of the instrument's range. The frequency found shall be recorded.
5. Set the center frequency of the spectrum analyzer to the found frequency and switch to zero span. The power meter indicates the measured power density “E”.
6. Remove the EUT and put the replacing standard signal generator (SSG). Set the standard signal generator (SSG) at same frequency and transmit on, then set SSG output power at Pt to give the equivalent output level of “E”.
7. Calculate antenna power density by the formula below PD = Pt + 10*log(1/x).
   x: The duty cycle of the EUT in continuously transmitting mode
   Pt: Output power of the SSG
8. Antenna Power Error is definition that actual measure antenna power tolerance between + 20% to - 80% power range that base on manufacturer declare the conducted power density.

3.4.4 Test Setup



3.4.5 Test Deviation

There is no deviation with the original standard.

3.4.6 EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

3.4.7 Test Result of RF Output Power / Tolerance

Please refer to Appendix B.

3.5 Limitation of Collateral Emission of Receiver Measurement

3.5.1 Limit

Item	Limits
Rx Spurious Emission	≤ 4nW (f < 1GHz)
	≤ 20nW (1GHz ≤ f)

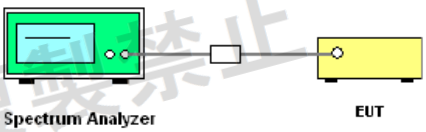
3.5.2 Measuring Instruments

See list of measuring instruments of this test report.

3.5.3 Test Procedures

1. EUT have the continuous reception mode and fixed only one channelize.
2. SA set RBW: 100KHz and VBW: 100KHz. Then adjust to start frequency 30MHz and stop frequency 1000MHz. Search to mark peak reading value + cable loss shall be less than 4nW.
3. SA set RBW: 1MHz and VBW: 1MHz. Then adjust to start frequency 1000MHz and stop frequency 12500MHz. Search to mark peak reading value + cable loss shall be less than 20nW.
4. If power level of lower emissions are more than 1/10 of limit (.0.4nW for f < 1GHz, 2nW for f >= 1GHz), all those are to be indicated in the 2nd and 3rd lines. If others are 1/10 or less more of the limit, no necessary to be indicated.

3.5.4 Test Setup



3.5.5 Test Deviation

There is no deviation with the original standard.

3.5.6 EUT Operation during Test

The EUT was programmed to be in continuously reception mode.

3.5.7 Test Result of Limitation of Collateral Emission of Receiver

Please refer to Appendix B.

3.6 Transmission Antenna Gain (EIRP Antenna Power) Measurement

3.6.1 Limit

Item	Limits
EIRP Power Density	≤ 12.14dBm/MHz
Remark: This test item will not be applied to EIRP power of EUT is lower than 12.14dBm/MHz.	

3.6.2 Measuring Instruments

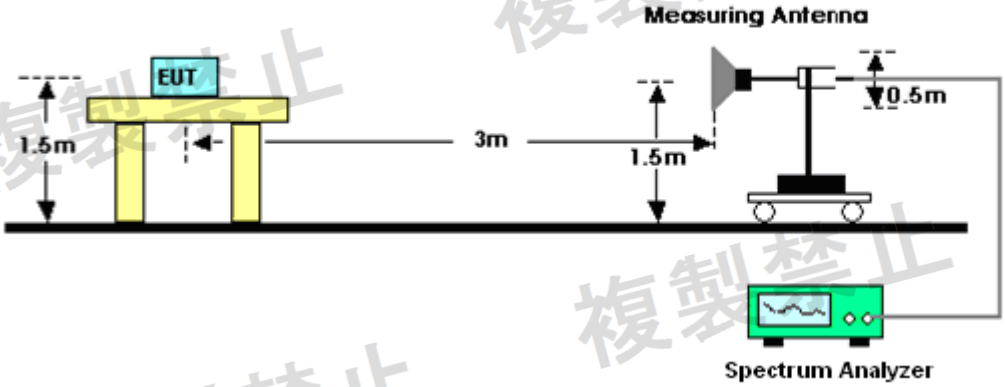
See list of measuring instruments of this test report.

3.6.3 Test Procedures

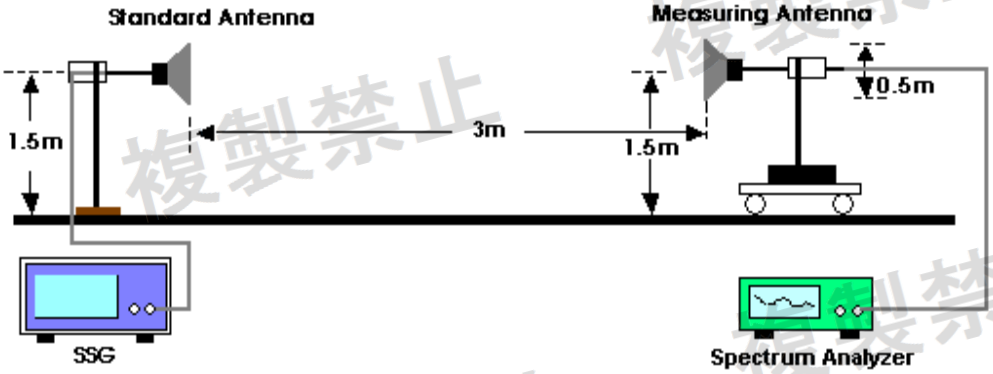
1. Set EUT ad measuring antenna at the same height and roughly facing each other.
2. Move the measuring antenna height up and down within ± 50cm of EUT height and swing it to find the maximum output of the measuring antenna. The output level at the spectrum analyzer is read sa “E“.
3. Remove the EUT from the turn table and put the replacing antenna facing to measuring antenna at same height. Set the standard signal generator (SSG) at same frequency and transmit on then receive the signal.
4. Swing the replacing antenna give a maximum receiving level.
5. Move the measuring antenna height up and down within ± 50cm of replacing antenna height and swing it to find the maximum receiving level.
6. Set SSG output power at Pt to give the equivalent output level of “E” or caluate Pt with SSG output which gives the nearest of “E” and difference (± 1dB). Record the Pt.
7. Calculate EIRP by the formula below EIRP = Gt – L + Pt.
   Gt: gain of replacing antenna (dBi)
   L: feeder loss between SSG and replacing antenna
   Pt: Output power of the SSG
8. If the antenna for the EUT has circular polarization, sum of V-field and H-field will be result if measuring antenna is linear polarization.

3.6.4 Test Setup

<For EUT radiation measurement>



<For standard antenna measurement>



3.6.5 Test Deviation

There is no deviation with the original standard.

3.6.6 EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

3.6.7 Test Result of Transmission Antenna Gain (EIRP Antenna Power)

Please refer to Appendix B. For the antenna gain, please refer to antenna test report.

Remark: This test item will not be applied to EIRP power of EUT is lower than 12.14dBm/MHz.

3.7 Transmission Radiation Angle Width (3dB Beamwidth) Measurement

3.7.1 Limit

Item	Limits
3dB antenna beamwidth	360/A (If A < 1; then A = 1) A = {EIRP Power [dBm/MHz] – 12.14 [dBm/MHz] for DS }
Remark: This test item will not be applied to EIRP power of EUT is lower than 12.14dBm/MHz.	

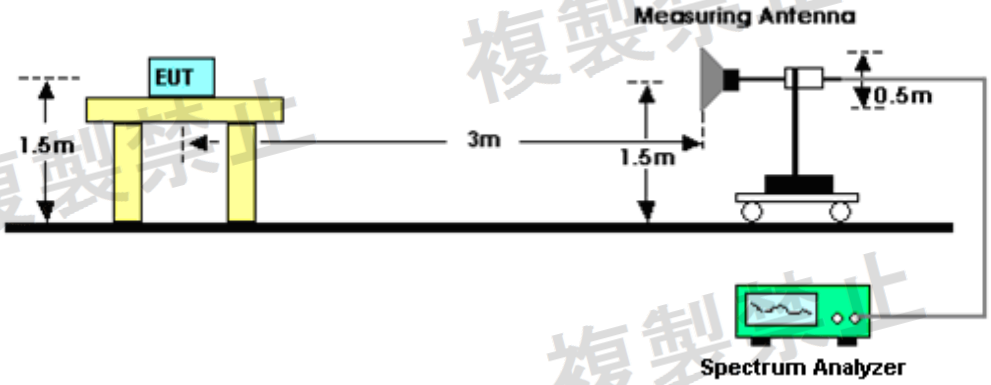
3.7.2 Measuring Instruments

See list of measuring instruments of this test report.

3.7.3 Test Procedures

1. Set EUT and measuring antenna at the same height and roughly facing each other.
2. Set spectrum analyzer with condition in section 3.7.2 and tune reference level to observe receiving signal position.
3. Rotate directions of the EUT horizontally and vertically to find the maximum receiving power.
4. Move the measuring antenna height up and down within ± 50cm of EUT height and swing it to find the maximum output of measuring antenna. The output level at the spectrum analyzer is read as “E”.
5. Calculate permitted radiation angle in horizontal and vertical using EIRP measured in another test method.
6. Calculate 3dB antenna beam width by the formula below 360/A (If A<1; then A=1).
   A = {EIRP Power [dBm/MHz] – 12.14 [dBm/MHz] for DS }.

3.7.4 Test Setup



3.7.5 Test Deviation

There is no deviation with the original standard.

3.7.6 EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

3.7.7 Test Result of Transmission Radiation Angle Width (3dB Beamwidth)

Please refer to Appendix B.

For the antenna gain, please refer to antenna test report.

Remark: This test item will not be applied to EIRP power of EUT is lower than 12.14dBm/MHz.

3.8 Radio Interference Prevention Capability Measurement

3.8.1 Limit

Item	Limits
Identification code	≥ 48 bits

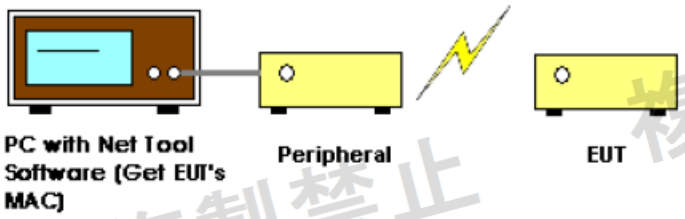
3.8.2 Measuring Instruments

See list of measuring instruments of this test report.

3.8.3 Test Procedures

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.

3.8.4 Test Setup



3.8.5 Test Deviation

There is no deviation with the original standard.

3.8.6 EUT Operation during Test

The EUT was programmed to be in normal transmitting mode.

3.8.7 Test Result of Radio Interference Prevention Capability

Please refer to Appendix B.

3.9 Carrier Sense

3.9.1 Limit

The radio equipment connected to telecommunication circuit equipment shall be equipped with a device which detects emissions radiated from another radio station and prevents interference, or a device which prevents interference by operation on a receive signal and a signal for diffusion for signal level detection.

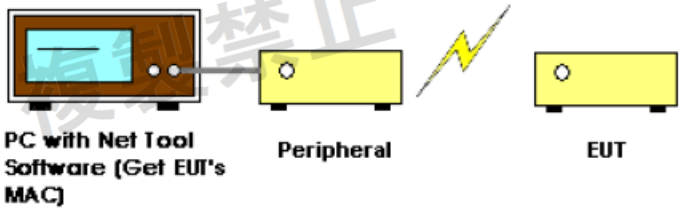
3.9.2 Measuring Instruments

See list of measuring instruments of this test report.

3.9.3 Test Procedures

1. Set a signal generator (simulate a radio device which co-exists with EUT) at same frequency channel with a proper signal level (exceeding 100mV/m) output to act as interference signal.
2. Monitor the signal transmission between the EUT and peripheral, while the interference signal presents. The EUT would stop transmitting once it detects interference signal over the air, then record it pass, otherwise, the result is fail.

3.9.4 Test Setup



3.9.5 Test Deviation

There is no deviation with the original standard.

3.9.6 EUT Operation during Test

The EUT was programmed to be in normal transmitting mode.

3.9.7 Test Result of Carrier Sense

Please refer to Appendix B.

3.10 Construction Protection Confirmation Method

3.10.1 Limit

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

3.10.2 Confirmation Method

□	Sealed with special screws.
□	Plastic chassis is being welded using ultrasonic waves.
□	Chassis is glued using a special adhesive.
□	Metal covers are spot-fused.
□	Cover is specially interlocked.
■	RF and Modulation components are covered with shielding case and this shielding case is soldered.
□	Shield case is welded at RF and modulation parts, and ID-ROM is welded using the BGA Method.
□	Shield case is welded at RF and modulation parts, and ID-ROM is glued at its lead with a special adhesive.
□	Shield case is welded at RF and modulation parts, and ID-ROM is glued with a non-transparent laminating agent.
□	Other :

3.10.3 The Photos of Construction Protection

4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Periods of Test	Due Date	Calibration Body	Calibration Method
Spectrum Analyzer	R&S	FSV40	101040	10Hz~40GHz	Oct. 12, 2022	Sep. 16, 2023~ Sep. 19, 2023	Oct. 11, 2023	Guangzhou Lisai metrology&Test Co. , Ltd.	C
Pulse Power Senor	Anritsu	MA2411B	0917070	300MHz~40GHz	Jan. 05, 2023	Sep. 16, 2023~ Sep. 19, 2023	Jan. 04, 2024	Guangzhou Lisai metrology&Test Co. , Ltd.	C
Power Meter	Anritsu	ML2495A	1005002	50MHz Bandwidth	Jan. 05, 2023	Sep. 16, 2023~ Sep. 19, 2023	Jan. 04, 2024	Guangzhou Lisai metrology&Test Co. , Ltd.	C
DC Power Supply	GW INSTEK	GPD-2303S	GEO861339	Max 31V,3A	Oct. 12, 2022	Sep. 16, 2023~ Sep. 19, 2023	Oct. 11, 2023	Guangzhou Lisai metrology&Test Co. , Ltd.	C
Vector Signal Generator	R&S	SMBV100A	258305	9kHz~6GHz	Jan. 05, 2023	Sep. 16, 2023~ Sep. 19, 2023	Jan. 04, 2024	Guangzhou Lisai metrology&Test Co. , Ltd.	C
Multi-meter	ELECALL	MF-47	VN-MF47-181013	-	May 16, 2023	Sep. 16, 2023~ Sep. 19, 2023	May 15, 2024	Guangzhou Lisai metrology&Test Co. , Ltd.	C

Note: Above test equipment was used and kept valid calibration period during test.

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

(1) TELEC Engineering Center, Intertek Japan K.K., Keysight Technologies, Inc∽.

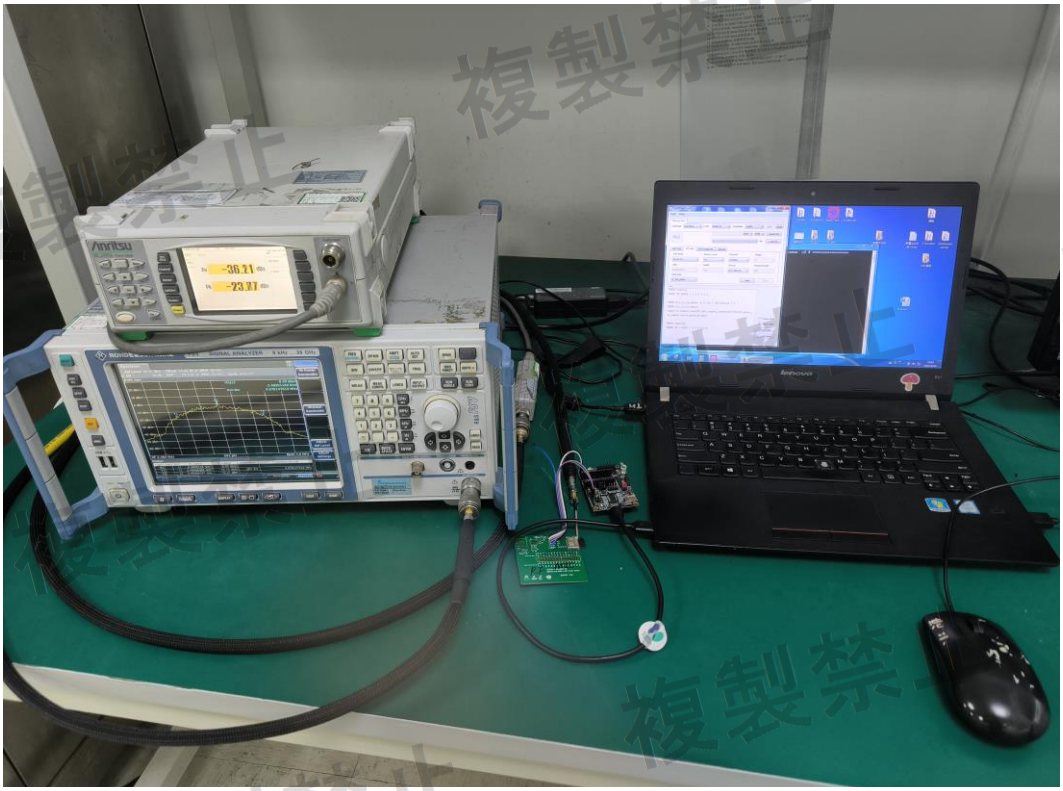
b) : Correction conducted pursuant to the provisions of Article 135 or Article 144 of the Measurement Law (Law No. 51 of 1992)∽Japan Calibration Service System∽

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

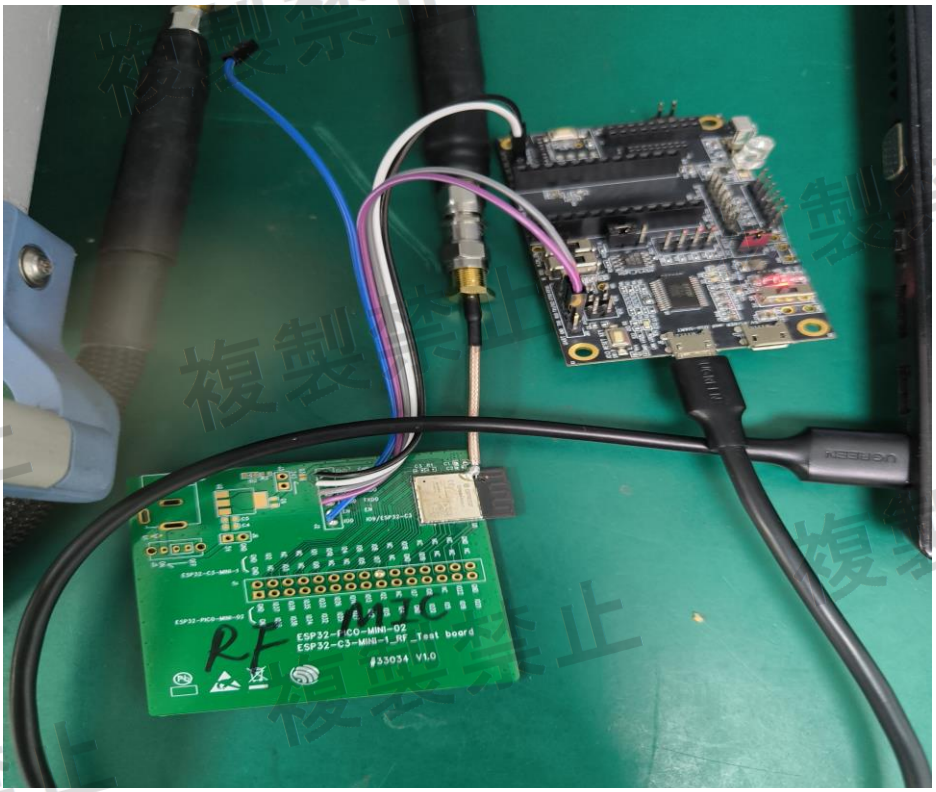
(1)∽ TELEC Engineering Center, Intertek Japan K.K., Keysight Technologies, Inc∽.

Appendix A. Setup Photographs

Front View



Near View



Appendix B. Test Results

Please refer to the following pages for test results.

Mode	Channel	Power Setting
802.11b	14	0

TEST RESULTS DATA
WLAN 2.4G Band - 802.11b Ch14

Environment of Test Room	Temperature	23~26	°C
	Humidity	49~53	%
Test Engineer	Jacob Zhang		

Modulatoin Type :	DS
Type Emissions :	19M1G1D

Peak Antenna Gain	4.16	---	dBi
Declaration Output Power	6.00	---	mW/MHz
Declaration Output Power	7.782	---	dBm/MHz
E.I.R.P	**11.942**	**---**	**dBm/MHz**

Antenna System	**SISO**

Antenna	No.	Type	Gain
	1	PCB	4.16
	2	---	---
	3	---	---

Tested Circuit Insertion Loss		5.5	dB
Burst	ON TIME	-Not applicable-	msec
	OFF TIME	-Not applicable-	msec
	Ratio	100.000	%
Packet Type (Mode)		1Mbps	mode

Frequency equal to the transmission rate of the modulation signal (11Mbps mode)
1.375

Test Category : 2.4GHz Band Low-Power Data Communication System

Comprehensive operation test

Use the DC Power Supply to adjust voltage.

TEST Results

Measurement Frequency	MHz		2484		Regulation	Result
Channel Number	Ch.		14		-----	-----
Input Power Voltage	Vdc		3.30		-----	-----
Reading Frequency (TX1)	MHz		2483.964		-----	-----
Frequency Tolerance (TX1)	ppm		-14.4928		50	**PASS**
Occupied Bandwidth (TX1)	MHz		19.10		26	**PASS**
Spread Bandwidth (TX1)	MHz		14.11		0.5	**PASS**
RF Output Power (TX1)	mW/MHz		6.181		-----	-----
RF Output Power (Max)	mW/MHz		6.181		10.00	**PASS**
RF Output Power Tolerance Max(TX1,TX2,TX3)	%		3.02		20%~-80%	**PASS**
Real Total Output Power (TX1)	dBm		18.39		-----	-----
Real Total Output Power (Max)	dBm		18.39		-----	-----

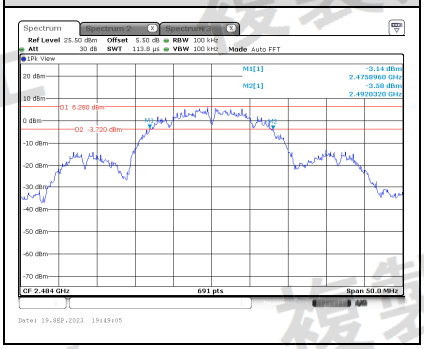
TEST Results

Measurement Frequency		MHz		2484		Regulation	Result
Channel Number		Ch.		14		-----	-----
Input Power Voltage		Vdc		3.3		-----	-----
Unwanted Emission Strength (TX1) for Ch1 ~13	Under 2458MHz	µW/MHz		0.163305		2.5	**PASS**
		MHz		2457.636		-----	-----
	2458-2471MHz	µW/MHz		19.769696		25	**PASS**
		MHz		2467.657		-----	-----
	2497-2510MHz	µW/MHz		9.289664		25	**PASS**
		MHz		2501.239		-----	-----
	2510MHz-12.5GHz	µW/MHz		0.110154		2.5	**PASS**
		MHz		7452.058		-----	-----
Secondarily Emitted Radio Wave Strength (RX Spurious) (RX1)	Under 1GHz	nW		0.058210		4	**PASS**
		MHz		929.246		-----	-----
	1 - 12.5GHz	nW		0.612350		20	**PASS**
		MHz	-----	6589.972	-----	-----	-----
Spread Factor		-----	-----	10.26	-----	10.00	**PASS**
Carrier Sensing Function		-----		-42.51		-41.06	**PASS**
Interference Prevention Function		-----		good		-----	**PASS**

Appendix C. Test Plots

C.1. Frequency Tolerance

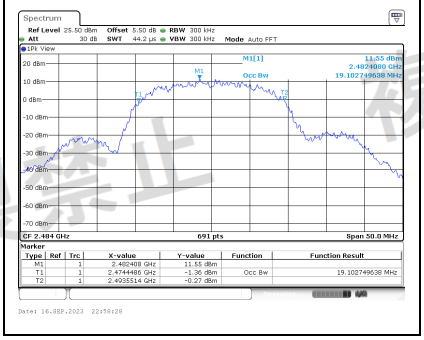
CH14



C.2. Occupied Bandwidth and Spread-spectrum Bandwidth

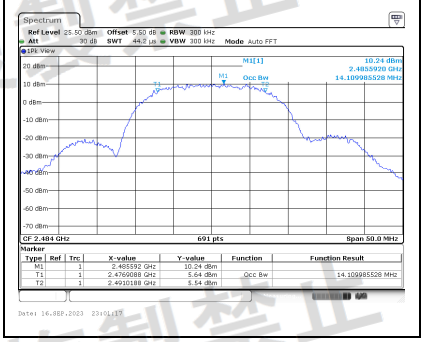
Occupied Bandwidth

CH14



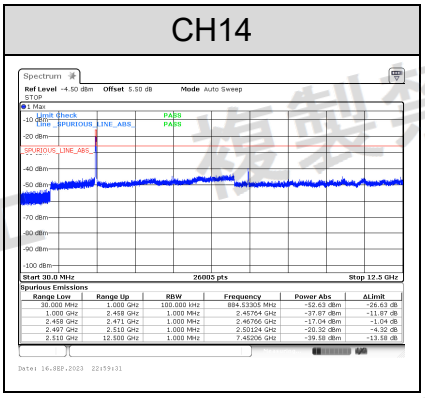
Spread-spectrum Bandwidth

CH14



C.3. Unwanted Emission Intensity

CH14



C.4. Limitation of Collateral Emission of Receiver

CH14