



**SGS-CSTC Standards Technical Services  
(Shanghai) Co., Ltd.**

Report No.: SHEM191101874203

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**1 Cover Page**

**TEST REPORT**

**Application No.:** SHEM1911018742CR  
**Japan MIC No.:**  
**Applicant:** Advantech Co., Ltd.  
**Address of Applicant:** No.1, Alley 20, Lane 26, Rueiguang Road, Neihu District, Taipei, Taiwan 11491  
**Manufacturer:** Hangzhou Zkong Networks Co., Ltd.  
**Address of Manufacturer:** Room 1208-1210, 17 Block 57, Baiyang Street Science Park Road, Hangzhou Economic and Technological Development Zone, Zhejiang Province  
**Factory:** Zhejiang Sunparl Information Technology Co., Ltd.  
**Address of Factory:** No. 19, Xinxing Road, Haining Lianhang Economic Zone, Zhejiang, China  
**Japan MIC No**  
**Equipment Under Test (EUT):**  
**EUT Name:** Bluetooth Wireless Base Station  
**Model No.:** USM-D22  
**Trade Mark:** Advantech  
**Standard(s) :** MIC Item 19 of Article 2 Paragraph 1  
**Date of Receipt:** 2019-06-21  
**Date of Test:** 2019-06-27 to 2019-08-15 , 2019-08-28 to 2019-08-29, 2019-09-04  
**Date of Issue:** 2019-11-11

<b>Test Result:</b>	<b>Pass*</b>
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\* In the configuration tested, the EUT complied with the standards specified above.

Parlam Zhan

Parlam Zhan  
E&E Section Manager

The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards. Any mention of SGS International Electrical Approvals or testing done by SGS International Electrical Approvals in connection with, distribution or use of the product described in this report must be approved by SGS International Electrical Approvals in writing.



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00	Co-license	2019-11-11	Based on SHEM190601433903

Authorized for issue by:			
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## 2 Test Summary

Test	Test Requirement	Limit/Severity	Result
Antenna Requirement	Item 19-3, 19-3-2 of Article 2-1		PASS
Frequency Error		±20 PPM or less	PASS
Occupied Bandwidth		Refer to Clause 7.2	PASS
Antenna Power and EIRP		Refer to Clause 7.3	PASS
Adjacent channel power tolerance		Refer to Clause 7.4	PASS
Out-band emission power		Refer to Clause 7.5	PASS
Spurious Emission Intensity		Refer to Clause 7.6	PASS
Secondary Radiated Emission		(1) Below 1 GHz: -54dBm (2) Above 1GHz: -47dBm	PASS
Interference prevention function		Notice 88 Appendix 45	PASS
Carrier sensing Capability		Shall not transmit radio wave when receiving over 100mV/m	PASS
Transmission Burst Length		4ms or less	PASS

**Remark:**

EUT: In this whole report EUT means Equipment Under Test.

Tx: In this whole report Tx (or tx) means Transmitter.

Rx: In this whole report Rx (or rx) means Receiver.

RF: In this whole report RF means Radio Frequency.

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## 4 General Information

### 4.1 Details of E.U.T.

Power supply:	DC 48V by POE POE: Model.:G1081-480-032 Input:100-240V~50/60Hz 0.5A MAX Output:48V 0.32A
Test voltage:	AC 100V 60Hz
Cable:	DC Cable 3m for POE
Operation Frequency:	802.11a/n(HT20)/ac(HT20): 5180-5240MHz 802.11n(HT40)/ac(HT40): 5190-5230MHz
Modulation Technique:	OFDM(64QAM, 16QAM, QPSK, BPSK) 802.11a: 6/9/12/18/24/36/48/54Mbps
Data Rate:	802.11n: MCS0-7 802.11ac: MCS0-9
Number of Channel:	802.11 a/n(HT20)/ac(HT20): 4 Channel 36, 40, 44, 48 802.11 n(HT40)/ac(HT40): 2 Channel 38, 46
Antenna Type	Integral Antenna
Antenna Gain	Antenna 1: 5.21 dBi Antenna 2: 5.12 dBi

### 4.2 Description of Support Units

Description	Manufacturer	Model No.	Serial No.
Laptop	Lenovo	ThinkPad X100e	/
Serial port adapter plate	/	Test Plate 3	/

#### 4.3 Measurement Uncertainty

No.	Item	Measurement Uncertainty
1	Radio Frequency	$\pm 8.4 \times 10^{-8}$
2	Timeout	$\pm 2s$
3	Duty cycle	$\pm 0.37\%$
4	Occupied Bandwidth	$\pm 3\%$
5	RF conducted power	$\pm 0.6dB$
6	RF power density	$\pm 2.84dB$
7	Conducted Spurious emissions	$\pm 0.75dB$
8	RF Radiated power	$\pm 4.6dB$ (Below 1GHz) $\pm 4.1dB$ (Above 1GHz)
9	Radiated Spurious emission test	$\pm 4.2dB$ (Below 30MHz) $\pm 4.4dB$ (30MHz-1GHz) $\pm 4.8dB$ (1GHz-18GHz) $\pm 5.2dB$ (Above 18GHz)
10	Temperature test	$\pm 1^{\circ}C$
11	Humidity test	$\pm 3\%$
12	Supply voltages	$\pm 1.5\%$
13	Time	$\pm 3\%$

Note: The measurement uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of  $k=2$ .

#### 4.4 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. E&E Lab

588 West Jindu Road, Xinqiao, Songjiang, 201612 Shanghai, China

Tel: +86 21 6191 5666

Fax: +86 21 6191 5678

No tests were sub-contracted.

#### 4.5 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

- **CNAS (No. CNAS L0599)**

CNAS has accredited SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration Laboratories (CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence in the field of testing.

- **NVLAP (Certificate No. 201034-0)**

SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP). Certificate No. 201034-0.

- **FCC –Designation Number: CN5033**

SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. has been recognized as an accredited testing laboratory.

Designation Number: CN5033. Test Firm Registration Number: 479755.

- **Innovation, Science and Economic Development Canada**

SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. EMC Laboratory has been recognized by ISED as an accredited testing laboratory.

IC Registration No.: 8617A-1. CAB identifier: CN0020.

- **VCCI (Member No.: 3061)**

The 3m Semi-anechoic chamber and Shielded Room of SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-13868, C-14336, T-12221, G-10830 respectively.

#### 4.6 Deviation from Standards

None

#### 4.7 Abnormalities from Standard Conditions

None

## 5 Equipment List

Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date	Certifier	Cal body
<b>Conducted Test</b>							
Spectrum Analyzer	R&S	FSP-30	SHEM002-1	2018-12-20	2019-12-19	(C)	STMS
Spectrum Analyzer	Agilent	N9020A	SHEM181-1	2018-08-13	2019-08-12	(C)	STMS
Spectrum Analyzer	Agilent	N9020A	SHEM181-1	2019-08-12	2020-08-11	(C)	STMS
Signal Generator	R&S	SMR20	SHEM006-1	2018-08-13	2019-08-12	(C)	STMS
Signal Generator	R&S	SMR20	SHEM006-1	2019-08-12	2020-08-11	(C)	STMS
Signal Generator	Agilent	N5182A	SHEM182-1	2018-08-13	2019-08-12	(C)	STMS
Signal Generator	Agilent	N5182A	SHEM182-1	2019-08-12	2020-08-11	(C)	STMS
Communication Tester	R&S	CMW270	SHEM183-1	2018-08-13	2019-08-12	(C)	STMS
Communication Tester	R&S	CMW270	SHEM183-1	2019-08-12	2020-08-11	(C)	STMS
Switcher	Tonscend	JS0806	SHEM184-1	2018-08-13	2019-08-12	(C)	STMS
Switcher	Tonscend	JS0806	SHEM184-1	2019-08-12	2020-08-11	(C)	STMS
Power Sensor	Keysight	U2021XA * 4	SHEM184-1	2018-08-13	2019-08-12	(C)	STMS
Power Sensor	Keysight	U2021XA * 4	SHEM184-1	2019-08-12	2020-08-11	(C)	STMS
Splitter	Anritsu	MA1612A	SHEM185-1	/	/	(C)	STMS
Coupler	e-meca	803-S-1	SHEM186-1	/	/	(C)	STMS
High-low Temp Cabinet	Suzhou Zhihe	TL-40	SHEM087-1	2017-09-25	2020-09-24	(C)	STMS
AC Power Stabilizer	WOCEN	6100	SHEM045-1	2018-12-26	2019-12-25	(C)	STMS
DC Power Supply	MCN	MCH-303A	SHEM210-1	2018-12-26	2019-12-25	(C)	STMS
Conducted test Cable	/	RF01~RF04	/	2018-12-26	2019-12-25	(C)	STMS

### Remark:

- Calibration conducted by the National Institute of Information and Communications Technology (NICT) in Japan (hereinafter referred to as "NICT") or a designated calibration agency under Article 102-18 paragraph (1) in JRL.
- Correction conducted pursuant to the provisions of Article 135 or Article 144 of the Measurement Act (Act No. 51 of 1992) .
- Calibration conducted in countries except Japan, which shall be equivalent to the calibration conducted by the NICT or a designated calibration agency under Article 102-18 paragraph (1).
- Calibration, etc. conducted by using measuring instruments and other equipment listed in the right column of appended table No. 3, which shall have been given any type of calibration, etc. listed above from (a) to (c).

From JRL Article 24-2, paragraph 4, Item 2

**Notice: Calibration duration for above equipments is 1 year.**



## 6 Radio Spectrum Technical Requirement

### 6.1 E.U.T. test conditions

<b>Environment:</b>	Temperature:	20.0 -25.0 °C
	Humidity:	35-75 % RH
	Atmospheric Pressure:	99.2 -102.0 kPa

**Power supply:** Test Voltage: rated voltage and  $\pm 10\%$  of the rated voltage.

The product is supplied by AC 100V. The fluctuation of input voltage to the circuit of RF unit of test equipment is under  $\pm 1\%$ , when input voltage to the test equipment is fluctuated by  $\pm 10\%$ . So, all measurement has been conducted by only rated voltage AC 100V

Test Mode Classify	Power Supply	Measured Value	Tolerance
TM 1	AC 100V 60Hz	DC 3.30V	0%
TM 2	AC 90V 60Hz	DC 3.29V	-0.3%
TM 3	AC 110V 60Hz	DC 3.31V	0.3%

**Test frequencies:**

If the EUT can be set to 3 or more different (carrier) frequencies in 1 allocated band, testing shall be performed using the Lowest, Middle and the Highest frequency (L, M and H). If there are 2 or fewer frequencies, testing shall be performed with the available frequencies.

**Test frequencies:**

If the EUT can be set to 3 or more different (carrier) frequencies in 1 allocated band, testing shall be performed using the Lowest, Middle and the Highest frequency (L, M and H). If there are 2 or fewer frequencies, testing shall be performed with the available frequencies.

EUT channels and frequencies list:

802.11 a/n/ac(HT20)

Channel	Frequency (MHz)
CH36	5180MHz
CH40	5200MHz
CH44	5220MHz
CH48	5240MHz

802.11 n/ac(HT40):

Channel	Frequency (MHz)
CH38	5190MHz
CH46	5230MHz

Using test software was control EUT work in continuous transmitter mode. And select test channel as below:  
Through Preliminary tests were performed in all tests in different data rata and antenna configurations at  
lowest channel, the data rates of worse case as above were chosen for final test.

802.11 a/n/ac(HT20)			802.11 n/ac(HT40):	
Frequency	Data rate		Frequency	Data rate
	a	n/ac20		
5180MHz	6Mbps	MCS0	5190MHz	MCS0
5220MHz	6Mbps	MCS0	5230MHz	MCS0
5240MHz	6Mbps	MCS0		

## 6.2 Antenna Requirement

### 6.2.1 Test Requirement:

MIC Item 19-3, 19-3-2 of Article 2 Paragraph 1

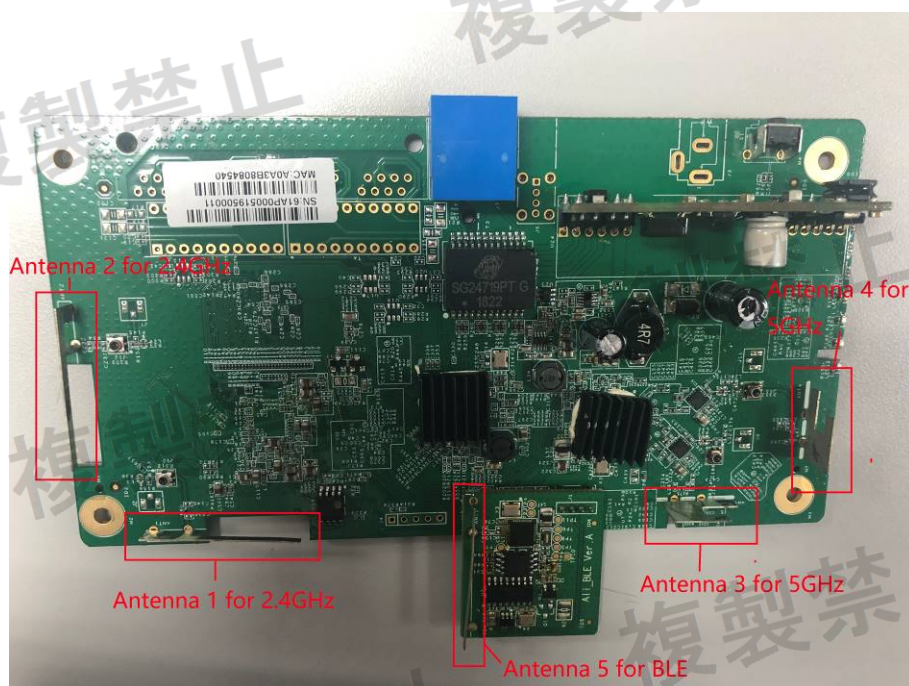
### 6.2.2 Conclusion

Standard requirement:

Applicable for equipment with an antenna terminal, including testing terminals. If an antenna connector is available, all relevant tests will be carried out conducted. If not, tests will be carried out in an anechoic room or with a suitable test-fixture.

EUT Details:

The antenna is PCB antenna and no consideration of replacement. The best case gain of the antenna is 5.4dBi.



Result:

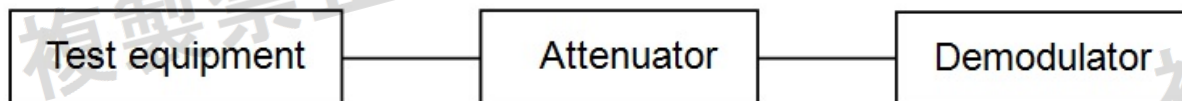
An antenna connector is available, all relevant tests will be carried out conducted.

### 6.3 Interference prevention capability

#### 6.3.1 Test Requirement:

MIC Item 19-3, 19-3-2 of Article 2 Paragraph 1

#### 6.3.2 Test Setup Diagram



#### 6.3.3 Conclusion

Standard Requirement:

- 1) Measurement system diagram as shown above and test equipment keep transmitting identification code.
- 2) Condition of measuring instrument
  - (1) Demodulator must be able to demodulate the transmitting signal emitted by test equipment and to indicate the identification code.
- 3) Condition of test equipment the mode of normal use.
- 4) Measuring operation procedure
  - (1) When test equipment has the function to transmit identification code automatically:
    - A) Transmit the predetermined identification code from test equipment.
    - B) Confirm the transmitted identification code by demodulator.

EUT Details:

The unit does meet the requirements (Good).

A0:A3:B8:08:45:40



## 6.4 RF accessibility

### 6.4.1 Test Requirement:

MIC Item 19-3, 19-3-2 of Article 2 Paragraph 1

### 6.4.2 Conclusion

Standard Requirement:

The EUT shall be constructed in such a way that sensitive RF parts, (like modulation and oscillator parts) cannot be reached easily by the user. These parts shall be covered by soldered metal caps or glue or by other mechanical covers. If the covers are fixed with screws, these shall be not the common type(s) like a Phillips, but special versions like Torx, so that the user cannot open the device with common tools.

EUT Details:

RF chip and modulation be sealed with special screws, that end user cannot open with common tools.



## 7 Radio Spectrum Matter Test Results

### 7.1 Frequency Error

Test Requirement MIC Item 19-3, 19-3-2 of Article 2 Paragraph 1

Test Method: MIC Notice No.88 Appendix No.45

Limit: Tolerance of frequency:  $\pm 20 \times 10^{-6}$

#### 7.1.1 E.U.T. Operation

Operating Environment:

Temperature: 23 °C Humidity: 54 % RH Atmospheric Pressure: 1010 mbar

Test mode Test the EUT in transmitting mode.

#### 7.1.2 Measurement Procedure and Data

1. Test Conditions:

Spectrum Analyzer is used for measurement.

2. EUT conditions:

Modulation/Spread/Hopping OFF, CW Tx

3. Spectrum Analyzer conditions:

Frequency: Test Frequency

Span 1MHz

RBW 10 kHz (Modulation OFF),

VBW 10 kHz (Modulation OFF),

Sweep Time Auto

Detector mode Positive peak

Indication mode Max hold

Alternative method:

Frequency: Test Frequency

Span 2 times channel bandwidth

RBW 100 kHz (Modulation ON),

VBW 100 kHz (Modulation ON),

Sweep Time Auto

Detector mode Positive peak

Indication mode Max hold

#### 7.1.3 Test Result

The detailed test data see: Appendix C for SHEM191101874203

## 7.2 Occupied Bandwidth (99%)

Test Requirement	MIC Item 19-3, 19-3-2 of Article 2 Paragraph 1
Test Method:	MIC Notice No.88 Appendix No.45
Limit:	<b>20 MHz system:</b> 5.2 GHz and 5.3 GHz band: OFDM: 19 MHz or less Other than OFDM: 18 MHz or less 5.6 GHz band: 19.7 MHz or less <b>40 MHz system:</b> 38MHz or less <b>80 MHz system:</b> 78MHz or less <b>160 MHz system:</b> 158MHz or less <b>160 MHz (80+80MHz) system:</b> 78MHz or less per band

### 7.2.1 E.U.T. Operation

Operating Environment:

Temperature: 23 °C      Humidity: 54 % RH      Atmospheric Pressure: 1010 mbar  
Test mode      Test the EUT in transmitting mode.

### 7.2.2 Test Setup Diagram



### 7.2.3 Measurement Procedure and Data

**Center frequency:** Test Frequency

**Sweep frequency band:** 2-3.5 times tolerance 40/80 MHz (OFDM; DSSS);

**Resolution bandwidth:** under 3% of tolerance. 300kHz (OFDM; DSSS);

**Video bandwidth:** comparable level to resolution bandwidth 300kHz (OFDM; DSSS);

**Sweep Time:** Auto

**Sweep mode:** continuous sweep

**detector mode:** Positive peak

**Indication mode:** Max hold

OBW 99%

### 7.2.4 Test Result

The detailed test data see: Appendix C for SHEM191101874203

**7.3 Antenna Power**

Test Requirement	MIC Item 19-3, 19-3-2 of Article 2 Paragraph 1
Test Method:	MIC Notice No.88 Appendix No.45
Limit:	Tolerance:
	- 5.2 GHz and 5.3 GHz bands: +20% to -80%
	- 5.6 GHz band: +50% to -50%

<b>5.2 and 5.3GHz Bands</b>	
<b>Antenna Power</b>	
(1) DSSS	10mW/MHz or less
(2) OFDM	
OBW ≤ 19 MHz	10mW/MHz or less
19 MHz < OBW ≤ 38 MHz	5mW/MHz or less
38 MHz < OBW ≤ 78 MHz	2.5mW/MHz or less
78 MHz < OBW ≤ 158 MHz	1.25mW/MHz or less
(3) Other than DSSS OFDM	10mW
<b>EIRP</b>	
(1) OBW ≤ 19 MHz	
5.2 GHz Band	10mW/MHz or less
5.3 GHz Band	10mW/MHz or less 5mW/MHz or less (for EUTs that do NOT have Transmit Power Control functions)
(2) 19 MHz < OBW ≤ 38 MHz	
5.2 GHz Band	5mW/MHz or less
5.3 GHz Band	5mW/MHz or less 2.5mW/MHz or less (for EUTs that do NOT have Transmit Power Control functions)
(3) 38 MHz < OBW ≤ 78 MHz	
5.2 GHz Band	2.5mW/MHz or less
5.3 GHz Band	2.5mW/MHz or less 1.25mW/MHz or less (for EUTs that do NOT have Transmit Power Control functions)
(4) 78 MHz < OBW ≤ 158 MHz	
5.2 GHz and 5.3 GHz Band	1.25mW/MHz or less 0.625mW/MHz or less (for EUTs that do NOT have Transmit Power Control functions)
<b>5.6GHz Band</b>	
<b>Antenna Power</b>	
(1) DSSS	10mW/MHz or less
(2) OFDM	
OBW ≤ 19.7 MHz	10mW/MHz or less
19.7 MHz < OBW ≤ 38 MHz	5mW/MHz or less
38 MHz < OBW ≤ 78 MHz	2.5mW/MHz or less
78 MHz < OBW ≤ 158 MHz	1.25mW/MHz or less
(3) Others	10mW
<b>EIRP</b>	
(1) OBW ≤ 19.7 MHz	50mW/MHz or less



	25mW/MHz or less (for EUTs that do NOT have Transmit Power Control functions)
(2) 19.7 MHz < OBW ≤ 38 MHz	25mW/MHz or less 12.5mW/MHz or less (for EUTs that do NOT have Transmit Power Control functions)
(3) 38MHz < OBW ≤ 78MHz	12.5mW/MHz or less 6.25mW/MHz or less (for EUTs that do NOT have Transmit Power Control functions)
(4) 78 MHz < OBW ≤ 158 MHz	6.25mW/MHz or less 3.125mW/MHz or less (for EUTs that do NOT have Transmit Power Control functions)
<b>Transmission using two bandwidths under 5.2GHz, 5.3GHz and 5.6GHz band</b>	
<b>Antenna Power</b>	
38MHz < OBW ≤ 78MHz	1.25mW/MHz or less
<b>EIRP</b>	
5.2 GHz band and 5.6 GHz band	1.25mW/MHz or less
5.3 GHz band and 5.6 GHz band	1.25mW/MHz or less 0.625mW/MHz or less (for EUTs that do NOT have Transmit Power Control functions)

### 7.3.1 E.U.T. Operation

Operating Environment:

Temperature: 23 °C Humidity: 54 % RH Atmospheric Pressure: 1010 mbar

Test mode Test the EUT in transmitting mode.

### 7.3.2 Test Setup Diagram



### 7.3.3 Measurement Procedure and Data

#### [Setting 1] - Search for peak power frequency

Center Frequency	Test frequency
Span	Approximately twice the occupied bandwidth
RBW	1MHz
VBW	Approximately three times the RBW
Sweep time	Auto
Sweep data points	1001 or greater
Detector mode	Positive peak
Indication mode	Max hold

#### [Setting 2] - Measurement of average antenna power for OFDM, DSSS

Frequency	Frequency of peak power found using [Setting 1]
Span	0 Hz
RBW	1MHz
Detector mode	Sample
Sweep	Minimum time required to make an accurate measurement. For burst type (intermittent) transmission, sweep time shall be greater than one burst interval
Sweep data points	1001 or greater

#### [Setting 3] - Measurement of average antenna power other than for DSSS, OFDM

Frequency	Frequency of peak power found using [Setting 1]
Span	0 Hz
RBW	Bandwidth sufficient to cover that occupied by the carrier
VBW	Bandwidth sufficient to cover that occupied by the carrier
Detector mode	Sample
Sweep	Minimum time required to make an accurate measurement. For burst type (intermittent) transmission, sweep time shall be greater than one burst interval
Sweep data points	1001 or greater

### 7.3.4 Test Result

The detailed test data see: Appendix C for SHEM191101874203

**7.4 Adjacent channel leakage power**

Test Requirement MIC Item 19-3, 19-3-2 of Article 2 Paragraph 1

Test Method: MIC Notice No.88 Appendix No.45

Limit:

5.2 GHz and 5.3GHz band			
Test Condition	Measurement Bandwidth	Separation from Center of Transmit Frequency	Limit
OBW $\leq$ 18MHz	18 MHz	20 MHz	25 dB or more
		40 MHz	40 dB or more
18MHz < OBW $\leq$ 19MHz	19 MHz	20 MHz	25 dB or more
		40 MHz	40 dB or more
19MHz < OBW $\leq$ 38MHz	38 MHz	40 MHz	25 dB or more
		80 MHz	40 dB or more
38MHz < OBW $\leq$ 78MHz	78 MHz	80 MHz	25 dB or more

5.6GHz band			
Test Condition	Measurement Bandwidth	Separation from Center of Transmit Frequency	Limit
OFDM	OBW $\leq$ 19.7MHz	19 MHz	20 MHz
		40 MHz	25 dB or more
	19.7MHz < OBW $\leq$ 38MHz	40 MHz	40 dB or more
		80 MHz	25 dB or more
	38MHz < OBW $\leq$ 78MHz	80 MHz	40 dB or more
Other than OFDM	18 MHz	80 MHz	25 dB or more
		40 MHz	40 dB or more

5.2 GHz, 5.3 GHz and 5.6 GHz band			
Test Condition	Measurement Bandwidth	Separation from Center of Transmit Frequency	Limit
38MHz < OBW $\leq$ 78MHz	78 MHz	80 MHz	25 dB or more

**7.4.1 E.U.T. Operation**

Operating Environment:

Temperature: 23 °C Humidity: 54 % RH Atmospheric Pressure: 1010 mbar

Test mode Test the EUT in transmitting mode.

**7.4.2 Test Setup Diagram****7.4.3 Measurement Procedure and Data****[Setting 1]**

Center Frequency	Test Frequency
Span	(see Note1)
RBW	300kHz
VBW	300kHz
Sweep time	Auto
Sweep data points	1001 or greater
Detector mode	Sample (for Continuous Type) Positive peak (for Burst Type)
Indication mode	Single sweep (for Continuous Type) Max hold (for Burst Type)

**Note1****5.2GHz and 5.3GHz Band**

OBW ≤ 18MHz	18MHz
18MHz < OBW ≤ 19MHz	19MHz
19MHz < OBW ≤ 38MHz	38MHz
38MHz < OBW ≤ 78MHz	78MHz

**5.6GHz Band****OFDM**

OBW ≤ 19.7MHz	19MHz
19.7MHz < OBW ≤ 38MHz	38MHz
38MHz < OBW ≤ 78MHz	78MHz

**Others**

18MHz

**EUT Configuration**

- Continuous or burst transmission
- Modulated
- Rated output power declared in the construction design document

**Test Procedure**

- (1) Configure the spectrum analyzer to [Setting 1] and set the EUT to transmit mode
- (2) Measure the transmitter power (defined as  $P_c$ ) using the procedure shown below
  - (a) Set the center of the span to the transmit frequency
  - (b) After sweeping the entire span, send the span data set to the  $P_c$
  - (c) Convert measured data from dBm to Watts
  - (d) Sum all the data to derive the  $P_c$
- (3) Measure the Upper Adjacent Channel Leakage Power (defined as  $P_U$ ) using the procedure shown below. For measurement frequency, see Note2.
  - (a) Set the center of the span to [Transmit Frequency + 20 MHz (or 40 MHz)]



- (b) Sweep the entire span, send the span data set to the  $P_C$
- (c) Convert measured data from dBm to Watts
- (d) Sum all the data to derive the  $P_U$
- (e) After setting the center of the span to [Transmit Frequency + 40MHz (or 80 MHz)], repeat steps (b) through step (d)
- (4) Measure the Lower Adjacent Channel Leakage Power (defined as  $P_L$ ) using the procedure shown below. For measurement frequency, see Note2.
  - (a) Set the center of the span to [Transmit Frequency + 20 MHz (or 40 MHz)]
  - (b) Sweep the entire span, send the span data set to the  $P_C$
  - (c) Convert measured data from dBm to Watts
  - (d) Sum all the data to derive the  $P_L$
  - (e) After setting the center of the span to [Transmit Frequency + 40MHz (or 80 MHz)], repeat steps (b) through step (d)
- (5) Derive all the Adjacent Channel Leakage Power Ratios using the formula shown below
  - Upper Adjacent Channel Leakage Power Ratio =  $10 \log (P_U / P_C)$
  - Lower Adjacent Channel Leakage Power Ratio =  $10 \log (P_L / P_C)$
- (6) If the EUT has multiple antennas then the following steps shall be taken
  - (a) Repeat steps (1) through step (5) for each individual antenna
  - (b) Repeat steps (1) through step (5) with all the antennas combined
  - (c) To derive the total  $P_C$ , sum the individual antenna  $P_C$  measurements from step (a)
  - (d) Derive the total  $P_U$  and total  $P_L$  using the same procedure as step (c)
  - (e) Calculate the Adjacent Channel Leakage Power Ratio using the total  $P_C$ , total  $P_U$  and total  $P_L$  using the formula in step (5)
  - (f) Note 2

#### 5.2 GHz and 5.3 GHz band

OBW $\leq$ 18 MHz	Transmit frequency $\pm$ 20 MHz, $\pm$ 40 MHz
18MHz < OBW $\leq$ 19MHz	Transmit frequency $\pm$ 20 MHz, $\pm$ 40 MHz
19MHz < OBW $\leq$ 38MHz	Transmit frequency $\pm$ 40 MHz, $\pm$ 80 MHz
38MHz < OBW $\leq$ 78MHz	Transmit frequency $\pm$ 80 MHz

#### 5.6GHz Band

##### OFDM

OBW $\leq$ 19.7MHz	Transmit frequency $\pm$ 20 MHz, $\pm$ 40 MHz
19.7MHz < OBW $\leq$ 38MHz	Transmit frequency $\pm$ 40 MHz, $\pm$ 80 MHz
38MHz < OBW $\leq$ 78MHz	Transmit frequency $\pm$ 80 MHz

##### Other than OFDM

Transmit frequency  $\pm$  20 MHz,  $\pm$  40 MHz

#### 7.4.4 Test Result

The detailed test data see: Appendix C for SHEM191101874203

## 7.5 Out of Band Leakage Power

Test Requirement MIC Item 19-3, 19-3-2 of Article 2 Paragraph 1

Test Method: MIC Notice No.88 Appendix No.45

Limit:

### 5.2 GHz and 5.3GHz Band

#### (1) $OBW \leq 18\text{MHz}$

- For 5180 MHz, 5200 MHz, 5220 MHz and 5240 MHz (Reference Channel: 5240MHz)

Frequency Band	EIRP ( $\Delta f$ : frequency in MHz)
5140MHz $\leq f \leq$ 5142MHz	less than 2.5 $\mu\text{W/MHz}$
5142MHz $< f \leq$ 5150MHz	less than 15 $\mu\text{W/MHz}$
5250MHz $\leq f <$ 5251MHz	less than $10^{1-(\Delta f-9)}$ mW/MHz
5251MHz $\leq f <$ 5260MHz	less than $10^{-1-(8/90)(\Delta f-11)}$ mW/MHz
5260MHz $\leq f <$ 5266.7MHz	less than $10^{-1.8-(6/50)(\Delta f-20)}$ mW/MHz
5266.7MHz $\leq f \leq$ 5360MHz	less than 2.5 $\mu\text{W/MHz}$

- For 5260 MHz, 5280 MHz, 5300 MHz and 5320 MHz (Reference Channel: 5260MHz)

Frequency Band	EIRP ( $\Delta f$ : frequency in MHz)
5140MHz $\leq f \leq$ 5233.3MHz	less than 2.5 $\mu\text{W/MHz}$
5233.3MHz $< f \leq$ 5240MHz	less than $10^{-1.8-(6/50)(\Delta f-20)}$ mW/MHz
5240MHz $< f \leq$ 5249MHz	less than $10^{-1-(8/90)(\Delta f-11)}$ mW/MHz
5249MHz $< f \leq$ 5250MHz	less than $10^{1-(\Delta f-9)}$ mW/MHz
5350MHz $\leq f \leq$ 5360MHz	less than 2.5 $\mu\text{W/MHz}$

#### (2) $18\text{MHz} < OBW \leq 19\text{MHz}$

- For 5180 MHz, 5200 MHz, 5220 MHz and 5240 MHz

Reference Channel: 5180MHz

Frequency Band	EIRP
5135MHz $\leq f \leq$ 5142MHz	less than 2.5 $\mu\text{W/MHz}$
5142MHz $< f \leq$ 5150MHz	less than 15 $\mu\text{W/MHz}$

Reference Channel: 5240MHz

Frequency Band	EIRP ( $\Delta f$ : frequency in MHz)
5250MHz $\leq f <$ 5251MHz	less than $10^{1-(\Delta f-9)}$ mW/MHz
5251MHz $\leq f <$ 5260MHz	less than $10^{-1-(8/90)(\Delta f-11)}$ mW/MHz
5260MHz $\leq f <$ 5266.7MHz	less than $10^{-1.8-(6/50)(\Delta f-20)}$ mW/MHz
5266.7MHz $\leq f \leq$ 5365MHz	less than 2.5 $\mu\text{W/MHz}$

- For 5260MHz, 5280 MHz, 5300MHz and 5320 MHz

Reference Channel: 5260MHz

5135MHz $\leq f \leq$ 5233.3MHz	less than 2.5 $\mu\text{W/MHz}$
5233.3MHz $< f \leq$ 5240MHz	less than $10^{-1.8-(6/50)(\Delta f-20)}$ mW/MHz
5240MHz $< f \leq$ 5249MHz	less than $10^{-1-(8/90)(\Delta f-11)}$ mW/MHz
5249MHz $< f \leq$ 5250MHz	less than $10^{1-(\Delta f-9)}$ mW/MHz

Reference Channel: 5320 MHz

Frequency Band	EIRP
5350MHz $\leq f \leq$ 5365MHz	less than 2.5 $\mu\text{W/MHz}$

#### (3) $19\text{MHz} < OBW \leq 38\text{MHz}$

- For 5190MHz and 5230MHz

Reference Channel: 5190 MHz

Frequency Band	EIRP
5100MHz $\leq f \leq$ 5141.6MHz	less than 2.5 $\mu\text{W/MHz}$
5141.6MHz $< f \leq$ 5150MHz	less than 15 $\mu\text{W/MHz}$

Reference Channel: 5230 MHz

Frequency Band	EIRP ( $\Delta f$ : frequency in MHz)
5250MHz $\leq f <$ 5251MHz	less than $10^{-(\Delta f-20)+\log(1/2)}$ mW/MHz
5251MHz $\leq f <$ 5270MHz	less than $10^{-(8/190)(\Delta f-21)-1+\log(1/2)}$ mW/MHz
5270MHz $\leq f <$ 5278.4MHz	less than $10^{-(3/50)(\Delta f-40)-1.8+\log(1/2)}$ mW/MHz
5278.4MHz $\leq f \leq$ 5 400MHz	less than 2.5 $\mu\text{W/MHz}$

- For 5270MHz and 5310MHz

**Reference Channel: 5270 MHz**

## Frequency Band

5100MHz ≤ f ≤ 5210MHz

5210MHz &lt; f ≤ 5221.6MHz

5221.6MHz &lt; f ≤ 5230MHz

5230MHz &lt; f ≤ 5249MHz

5249Hz &lt; f ≤ 5250MHz

EIRP (Δf: frequency in MHz)

less than 2.5 μW/MHz

less than 2.5 μW/MHz

less than  $10^{-(3/50)(\Delta f-40)-1.8+\log(1/2)}$  mW/MHzless than  $10^{-(8/190)(\Delta f-21)-1+\log(1/2)}$  mW/MHzless than  $10^{-(\Delta f-20)+\log(1/2)}$  mW/MHz**Reference Channel: 5310 MHz**

## Frequency Band

5350MHz ≤ f &lt; 5358.4MHz

5358.4MHz ≤ f ≤ 5400MHz

EIRP

less than 15 μW/MHz

less than 2.5 μW/MHz

**(4) 38MHz < OBW ≤ 78MHz****- For 5210 MHz****Reference Channel: 5210 MHz**

## Frequency Band

5020MHz ≤ f ≤ 5123.2MHz

5123.2MHz &lt; f ≤ 5150MHz

5250MHz ≤ f &lt; 5251MHz

5251MHz ≤ f &lt; 5290MHz

5290MHz ≤ f &lt; 5296.7MHz

5296.7MHz ≤ f ≤ 5480MHz

EIRP (Δf: frequency in MHz)

less than 2.5 μW/MHz

less than 15 μW/MHz

less than  $10^{-(\Delta f-40)+\log(1/4)}$  mW/MHzless than  $10^{-(8/390)(\Delta f-41)-1+\log(1/4)}$  mW/MHzless than  $10^{-(3/100)(\Delta f-80)-1.8+\log(1/4)}$  mW/MHz

less than 2.5 μW/MHz

**- For 5290 MHz****Reference Channel: 5290 MHz**

## Frequency Band

5020MHz ≤ f ≤ 5203.3MHz

5203.3MHz &lt; f ≤ 5210MHz

5210MHz &lt; f ≤ 5249MHz

5249MHz &lt; f ≤ 5250MHz

5350MHz ≤ f &lt; 5376.8MHz

5376.8MHz ≤ f ≤ 5480MHz

EIRP (Δf: frequency in MHz)

less than 2.5 μW/MHz

less than  $10^{-(3/100)(\Delta f-80)-1.8+\log(1/4)}$  mW/MHzless than  $10^{-(8/390)(\Delta f-41)-1+\log(1/4)}$  mW/MHzless than  $10^{-(\Delta f-40)+\log(1/4)}$  mW/MHz

less than 15 μW/MHz

less than 2.5 μW/MHz

**(5) 78MHz < OBW ≤ 158MHz****- For 5250MHz****Reference Channel: 5250 MHz**

## Frequency Band

4916MHz ≤ f ≤ 5099.6MHz

5099.6MHz &lt; f ≤ 5150MHz

5350MHz ≤ f &lt; 5400.4MHz

5400.4MHz ≤ f ≤ 5584MHz

EIRP

less than 2.5 μW/MHz

less than 15 μW/MHz

less than 15 μW/MHz

less than 2.5 μW/MHz

**5.6GHz Band****(1) OBW ≤ 19.7 MHz****- For 5500 MHz, 5520 MHz, 5240 MHz, 5560 MHz, 5580 MHz, 5600 MHz, 5620 MHz, 5640 MHz, 5660 MHz, 5680 MHz and 5700 MHz**

Modulation: Other than OFDM

## Frequency Band

5460MHz ≤ f 5470MHz

5725MHz ≤ f ≤ 5740MHz

EIRP

less than 12.5 μW/MHz

less than 12.5 μW/MHz

Modulation: OFDM

## Frequency Band

5455MHz ≤ f ≤ 5460MHz

5460MHz &lt; f ≤ 5470MHz

5725MHz ≤ f &lt; 5740MHz

5740MHz ≤ f ≤ 5745MHz

EIRP

less than 2.5 μW/MHz

less than 12.5 μW/MHz

less than 12.5 μW/MHz

less than 2.5 μW/MHz

**(2) 19.7MHz < OBW ≤ 38MHz****- For 5510 MHz, 5550 MHz, 5590 MHz, 5630 MHz and 5670 MHz**

## Frequency Band

5420MHz ≤ f ≤ 5460MHz

5460MHz &lt; f ≤ 5470MHz

5725MHz ≤ f ≤ 5760MHz

EIRP

less than 12.5 μW/MHz

less than 50 μW/MHz

less than 12.5 μW/MHz

**(3) 38 MHz < OBW ≤ 78 MHz****- For 5530 MHz and 5610 MHz**



## Frequency Band

5340 MHz  $\leq f \leq$  5460 MHz  
5460 MHz  $< f \leq$  5469.5 MHz  
5469.5 MHz  $< f \leq$  5740 MHz  
5725 MHz  $\leq f \leq$  5800 MHz

## EIRP

less than 12.5  $\mu$ W/MHz  
less than 50  $\mu$ W/MHz  
less than 51.2  $\mu$ W/MHz  
less than 12.5  $\mu$ W/MHz

(4) 78 MHz  $<$  OBW  $\leq$  158 MHz

## - For 5570 MHz

## Frequency Band

5236 MHz  $\leq f \leq$  5419.6 MHz  
5419.6 MHz  $< f \leq$  5470 MHz  
5725 MHz  $\leq f \leq$  5904 MHz

## EIRP

less than 12.5  $\mu$ W/MHz  
less than 50  $\mu$ W/MHz  
less than 12.5  $\mu$ W/MHz

## 5.2 GHz, 5.3GHz and 5.6GHz

## Band

- For 80+80 MHz system using either of the following frequency band combinations:

- 5210 MHz and 5530MHz

- 5210 MHz and 5610MHz

Reference Channel: 5210MHz

## Frequency Band

5020 MHz  $\leq f \leq$  5134.8 MHz  
5134.8 MHz  $< f \leq$  5150 MHz  
5250 MHz  $\leq f <$  5251 MHz  
5251 MHz  $\leq f <$  5285.2 MHz  
5285.2 MHz  $\leq f <$  5370MHz

EIRP ( $\Delta f$ : frequency in MHz)

less than 2.5  $\mu$ W/MHz  
less than 12.5  $\mu$ W/MHz  
less than  $10^{-(\Delta f-40)+\log(1/8)}$  mW/MHz  
less than  $10^{-(8/390)(\Delta f-41)-1+\log(1/8)}$  mW/MHz  
less than 2.5  $\mu$ W/MHz

Reference Channel: 5530 MHz

## Frequency Band

5370 MHz  $\leq f \leq$  454.8MHz  
5454.8 Hz  $< f \leq$  5470MHz

## EIRP

less than 2.5  $\mu$ W/MHz  
less than 15  $\mu$ W/MHz

Reference Channel: 5610 MHz

## Frequency Band

5725 MHz  $\leq f \leq$  5800MHz

## EIRP

less than 15  $\mu$ W/MHz

- For 80+80 MHz system using either of the following frequency band combinations:

- 5290 MHz and 5530 MHz

- 5290 MHz and 5610 MHz

Reference Channel: 5610 MHz

## Frequency Band

5020MHz  $\leq f \leq$  5214.8MHz  
5214.8MHz  $< f \leq$  5249MHz  
5249MHz  $< f \leq$  5250MHz  
5350MHz  $\leq f <$  5365.2MHz  
5365.2MHz  $\leq f <$  5410MHz

EIRP ( $\Delta f$ : frequency in MHz)

less than 2.5  $\mu$ W/MHz  
less than  $10^{-(8/390)(\Delta f-41)-1+\log(1/8)}$  mW/MHz  
less than  $10^{-(\Delta f-40)+\log(1/8)}$  mW/MHz  
less than 15  $\mu$ W/MHz  
less than 2.5  $\mu$ W/MHz

Reference Channel: 5530 MHz

## Frequency Band

5410MHz  $\leq f \leq$  5454.8MHz  
5454.8MHz  $< f \leq$  5470MHz  
5725MHz  $\leq f \leq$  5800MHz

## EIRP

less than 2.5  $\mu$ W/MHz  
less than 15  $\mu$ W/MHz  
less than 15  $\mu$ W/MHz

Reference Channel: 5610 MHz

## Frequency Band

5725MHz  $\leq f \leq$  5800MHz

## EIRP

less than 15  $\mu$ W/MHz

## 7.5.1 E.U.T. Operation

Operating Environment:

Temperature: 23 °C

Humidity: 54 % RH

Atmospheric Pressure: 1010 mbar

Test mode Test the EUT in transmitting mode.

## 7.5.2 Measurement Procedure and Data



**[Setting 1]**

Frequency range: (see Note1)  
 RBW: 1 MHz  
 VBW: 1 MHz  
 Sweep time: Minimum time required to make an accurate measurement  
 For burst type (intermittent) transmission, sweep time shall be greater than one burst  
 Detector mode: Positive peak  
 Indication mode: Max hold

**[Setting 2]**

Center Frequency: Frequency of peak power found using [Setting 1]  
 Span: 0 Hz  
 RBW: 1 MHz  
 VBW: 1 MHz  
 Sweep time: Minimum time required to make an accurate measurement  
 For burst type (intermittent) transmission, sweep time shall be greater than one burst  
 Detector mode: Sample

Note 1: Depending upon the EUT's specificat on, the frequency range shall be set as follows:

**For 5180 MHz, 5200 MHz, 5220 MHz, 5240 MHz****OBW ≤ 18MHz:**

5140 MHz - 5142 MHz,	5142 MHz - 5150 MHz,	5250 MHz - 5251 MHz,
5251 MHz - 5260 MHz,	5260 MHz - 5266.7 MHz,	5266.7 MHz - 5360 MHz

**18MHz < OBW ≤ 19MHz:**

5135 MHz - 5142 MHz,	5142 MHz - 5150 MHz,	5250 MHz - 5251 MHz,
5251 MHz - 5260 MHz,	5260 MHz - 5266.7 MHz,	5266.7 MHz - 5365 MHz

**For 5190 MHz, 5230 MHz**

5100 MHz - 5141.6 MHz,	5141.6 MHz - 5150 MHz,	5250 MHz - 5251 MHz,
5251 MHz - 5270 MHz,	5270 MHz - 5278.4 MHz,	5278.4 MHz - 5400 MHz

**For 5210 MHz**

5020 MHz - 5123.2 MHz,	5123.2 MHz - 5150 MHz,	5250 MHz - 5251 MHz,
5251 MHz - 5290 MHz,	5290 MHz - 5296.7 MHz,	5296.7 MHz - 5480 MHz

**For 5250 MHz**

4916 MHz - 5099.6 MHz,	5099.6 MHz - 5150 MHz,	5350 MHz - 5400.4 MHz,
5400.4 MHz - 5584 MHz		

**For 5260 MHz, 5280 MHz, 5300 MHz, 5320 MHz****OBW ≤ 18MHz:**

5140 MHz - 5233.3 MHz,	5233.3 MHz - 5240 MHz,	5240 MHz - 5249 MHz,
5249 MHz - 5250 MHz,	5350 MHz - 5360 MHz	

**18MHz < OBW ≤ 19MHz:**

5135 MHz - 5233.3 MHz,	5233.3 MHz - 5240 MHz,	5240 MHz - 5249 MHz,
5249 MHz - 5250 MHz,	5350 MHz - 5365 MHz	

**For 5270 MHz, 5310 MHz**

5100 MHz - 5210 MHz,	5210 MHz - 5221.6 MHz,	5221.6 MHz - 5230 MHz,
5230 MHz - 5249 MHz,	5249 MHz - 5250 MHz,	5350 MHz - 5358.4 MHz,
5358.4 MHz - 5400 MHz		

**For 5290 MHz**

5020 MHz - 5203.3 MHz,	5203.3 MHz - 5210 MHz,	5210 MHz - 5249 MHz,
5350 MHz - 5376.8 MHz,	5376.8 MHz - 5480 MHz	

**For 5500 MHz, 5520 MHz, 5540 MHz, 5560 MHz, 5580 MHz, 5600 MHz, 5620 MHz, 5630 MHz, 5640 MHz, 5660 MHz, 5670 MHz, 5680 MHz, 5700 MHz****OFDM**

5455 MHz - 5460 MHz,  
5740 MHz - 5745 MHz,

**Other than OFDM**

5460 MHz - 5470 MHz,

5460 MHz - 5470 MHz,

5725 MHz - 5740 MHz,

5725 MHz - 5740 MHz,

**For 5510 MHz, 5550 MHz, 5590 MHz, 5630 MHz, 5670 MHz**

5240 MHz - 5460 MHz,

5460 MHz - 5470 MHz,

5725 MHz - 5760 MHz

**For 5530 MHz, 5610 MHz**

5340 MHz - 5460 MHz,

5460 MHz - 5469.5 MHz,

5469.5 MHz - 5470 MHz,

5725 MHz - 5800 MHz

**For 5570 MHz**

5236 MHz - 5419.6 MHz,

5419.6 MHz - 5470 MHz,

5725 MHz - 5904 MHz

**For 5210 MHz + 5530 MHz, or 5210 MHz + 5610 MHz**

5020 MHz - 5134.8 MHz,

5134.8 MHz - 5150 MHz,

5250 MHz - 5251 MHz,

5251 MHz - 5285.2 MHz,

5285.2 MHz - 5370 MHz,

5370 MHz - 5454.8 MHz,

5454.8 MHz - 5470 MHz,

5725 MHz - 5800 MHz

**For 5290MHz + 5530MHz, or 5290MHz + 5610MHz**

5020 MHz - 5214.8 MHz,

5214.8 MHz - 5249 MHz,

5249 MHz - 5250 MHz,

5350 MHz - 5365.2 MHz,

5365.2 MHz - 5410 MHz,

5410 MHz - 5454.8 MHz,

5454.8 MHz - 5470 MHz,

5725 MHz - 5800 MHz

**Test Procedure**

(1) Configuring the spectrum analyzer to [Setting 1] and set the EUT to transmit mode

(2) After sweeping the frequency range, search for the highest spurious emission. If EIRP converted from the highest spurious emission is lower than the Limit defined in 9.7 (Technical Standard), the result is "Pass", otherwise go to (3)

(3) After configuring the spectrum analyzer using [Setting 2], then measure the average signal amplitude of the spurious an convert from the average value into EIRP. If the EIRP is lower than the Limit, the result is "Pass", otherwise "Fail".

If the spurious emission is burst type (intermittent), then the average value shall not include signal OFF time.

(4) If the EUT has multiple antennas, obtain EIRPs form each individual antenna using steps (1) through (3). For the measurement, antenna gain from each antenna shall be used to calculate individual EIRPs

(5) Convert the individual EIRPs (step (4)) from dB to absolute values

(6) Combine (sum) the absolute values of the EIRPs at each frequency for each antenna (to create a single composite spectrum of EIRPs)

(7) Ensure that the composite spectrum does not exceed the Limit

(8) Measure the spurious emissions with all the antennas electrically combined  
EIRP (defined POA) shall be calculated using the formula shown below.

$$P_{OA} = P_A + G_T - L_F$$

Where:

$P_A$ : Measured value found in step (3) [dBm/MHz]

$G_T$ : antenna gain at the frequency of the spurious emission [dBi]

$L_F$ : cable loss [dB]

Note:  $G_T$  &  $L_F$  Compensated to SA offset

### 7.5.3 Test Result

The detailed test data see: Appendix C for SHEM191101874203

## 7.6 Spurious Emission of TX

Test Requirement MIC Item 19-3, 19-3-2 of Article 2 Paragraph 1

Test Method: MIC Notice No.88 Appendix No.45

Limit:

### 5.2GHz and 5.3GHz band

#### (1) $OBW \leq 18\text{ MHz}$

Below 5140 MHz: 2.5 $\mu$ W or less

Over 5360 MHz: 2.5 $\mu$ W or less

#### (2) $18\text{ MHz} < OBW \leq 19\text{ MHz}$

Below 5135 MHz: 2.5 $\mu$ W or less

Over 5365 MHz: 2.5 $\mu$ W or less

#### (3) $19\text{ MHz} < OBW \leq 38\text{ MHz}$

Below 5100 MHz: 2.5 $\mu$ W or less

Over 5400 MHz: 2.5 $\mu$ W or less

#### (4) $38\text{ MHz} < OBW \leq 78\text{ MHz}$

Below 5020 MHz: 2.5 $\mu$ W or less

Over 5480 MHz: 2.5 $\mu$ W or less

#### (5) $78\text{ MHz} < OBW$

Below 4916 MHz: 2.5 $\mu$ W or less

Over 5584 MHz: 2.5 $\mu$ W or less

### 5.6GHz Band

#### (1) $OBW \leq 19.7\text{ MHz}$

OFDM

Below 5455 MHz: 2.5 $\mu$ W or less

Over 5745 MHz: 2.5 $\mu$ W or less

Others

Below 5460 MHz: 2.5 $\mu$ W or less

Over 5740 MHz: 2.5 $\mu$ W or less

#### (2) $19.7\text{ MHz} < OBW \leq 38\text{ MHz}$

Below 5420 MHz: 2.5 $\mu$ W or less

Over 5760 MHz: 2.5 $\mu$ W or less

#### (3) $38\text{ MHz} < OBW \leq 78\text{ MHz}$

Below 5340 MHz: 2.5 $\mu$ W or less

Over 5800 MHz: 2.5 $\mu$ W or less

#### (4) $78\text{ MHz} < OBW$

Below 5236 MHz: 2.5 $\mu$ W or less

Over 5904 MHz: 2.5 $\mu$ W or less

### 7.6.1 E.U.T. Operation

Operating Environment:

Temperature: 23 °C Humidity: 54 % RH Atmospheric Pressure: 1010 mbar

Test mode TX mode\_Keep the EUT in Transmitting mode.

### 7.6.2 Measurement Procedure and Data

#### [Setting 1]

Frequency range: (see note)  
RBW: 30MHz~1GHz(100KHz) Above 1GHz:1 MHz  
VBW: 30MHz~1GHz(100KHz) Above 1GHz:1 MHz  
Sweep time: Auto  
Sweep data points: 1001 or greater  
Detector mode: Positive peak  
Indication mode: Max hold (see note)

Note: measurement range shall be 30 MHz to 26 GHz, except for the following cases:

#### - OBW ≤ 18 MHz

5.2 GHz and 5.3 GHz Band: 5140 MHz to 5360 MHz

5.6 GHz Band: 5460 MHz to 5740 MHz

#### - 18 MHz < OBW ≤ 19 MHz

5.2 GHz and 5.3 GHz Band: 5135 MHz to 5365 MHz

5.6 GHz Band: 5455 MHz to 5745 MHz

#### - 19 MHz < OBW ≤ 38 MHz

5.2 GHz and 5.3 GHz Band: 5100 MHz to 5400 MHz

5.6 GHz Band: 5420 MHz to 5760 MHz

#### - 38 MHz < OBW ≤ 78 MHz

5.2 GHz and 5.3 GHz Band: 5020 MHz to 5480 MHz

5.6 GHz Band: 5340 MHz to 5800 MHz

#### - 78 MHz < OBW

5.2 GHz and 5.3 GHz Band: 4916 MHz to 5584 MHz

5.6 GHz Band: 5236 MHz to 5904 MHz

Note: sweep shall be repeated until the max hold waveform is stable.

#### [Setting 2]

Center Frequency: Frequency of spurious emission found using [Setting 1]  
Span: 0 Hz  
RBW: 30MHz~1GHz(100KHz) Above 1GHz:1 MHz  
VBW: 30MHz~1GHz(100KHz) Above 1GHz:1 MHz  
Sweep: Minimum time required to make an accurate measurement.  
For burst type (intermittent) spurious, sweep time shall be greater than one burst interval.  
Sweep data points: 1001 or greater  
Detector mode: Sample

#### EUT Configuration

- Continuous or burst transmission
- Modulated
- Rated output power should be as declared in the construction design document
- For 80+80MHz bandwidth systems, transmission should use both bandwidths simultaneously

#### Test Procedure

- (1) After configuring the spectrum analyzer to [Setting 1], search for spurious emissions from 30 MHz to 26GHz. If spurious emissions greater than [limit - 3dB] are found, then more detailed measurements are required, go to step (2)
- (2) Configure the spectrum analyzer using [Setting 2] and measure the average signal amplitude. If the spurious emission is burst type (intermittent), then the average value shall not include signal OFF time.



- (3) If the EUT has multiple antennas, measure the spurious emission from each individual antenna using steps (1) through (2)
- (4) Convert the individual antenna spurious level measurements (step (3)) from dB to absolute values
- (5) Combine (sum) the absolute values of the spurious measurements at each frequency for each antenna (to create a single composite spectrum of spurious emissions)
- (6) Ensure that the composite spectrum does not exceed the Limit

### 7.6.3 Test Result

The detailed test data see: Appendix C for SHEM191101874203

**7.7 Radiated Emissions of RX**

Test Requirement MIC Item 19-3, 19-3-2 of Article 2 Paragraph 1

Test Method: MIC Notice No.88 Appendix No.45

Limit: (1) Below 1 GHz: 4 nW (-54dBm) or less  
(2) Above 1 GHz: 20 nW (-47dBm) or less

**7.7.1 E.U.T. Operation**

Operating Environment:

Temperature: 23 °C Humidity: 54 % RH Atmospheric Pressure: 1010 mbar

Test mode RX mode\_Keep the EUT in receiving mode.

**7.7.2 Measurement Procedure and Data****Spectrum Analyzer Settings****[Setting 1]**

Frequency: 30 MHz - 26 GHz  
RBW: Below 1GHz: 100 kHz  
Above 1GHz: 1 MHz  
VBW: Below 1GHz: 100 kHz  
Above 1GHz: 1 MHz  
Sweep time: Auto  
Sweep data points: 1001 or greater  
Detector mode: Positive peak  
Indication mode: Max hold

**[Setting 2]**

Frequency: Frequency of spurious emission  
Span: 0 Hz  
RBW: Below 1GHz: 100 kHz  
Above 1GHz: 1 MHz  
VBW: Below 1GHz: 100 kHz  
Above 1GHz: 1 MHz  
Sweep time: Auto  
Sweep data points: 1001 or greater  
Detector mode: Sample

**EUT Configuration**

Continuous receive.

**Test Proceed**

(1) Configure the spectrum analyzer to [Setting 1] and then search for spurious emissions in the range 30 MHz to 26GHz. If the sweep range does not cover the required measurement frequency range then the measurement range will need to be divided into sufficient sections of size [RBW x Sweep Data Points].

(2) If spurious emissions are found with an amplitude greater than [Limit - 10dB] then perform further detailed measurement as described in (3)

(3) Configure the spectrum analyzer using [Setting 2] and measure the average signal amplitude. If the spurious emission is burst type (intermittent), then the average value shall not include signal OFF time Multiple Antenna Systems

If the EUT has multiple antennas then emissions from each antenna shall be measured individually, as described below

(4) For each antenna repeat steps (1) through (3). Convert all spurious level measurements from dB to absolute value

(5) Combine (sum) the absolute values of the spurious measurements at each frequency for each antenna (to create a single composite spectrum of spurious emissions)

(6) Ensure that the composite spectrum does not exceed the Limit defined in 10.7 (Technical Standard)

**Presentation of Results**

All secondary radiated emission measurements shall be recorded in two ranges:

- (1) Below 1 GHz
- (2) Above 1 GHz

Each antenna results shall be recorded in the report as follows:

- If the emissions are below the value [Limit - 10dB], then record only the maximum spurious

emissions

- If the emissions are over the value [Limit - 10dB], then record all spurious emissions

For multiple antenna systems, the combined spectrum measurements from section (7) shall be recorded in the report as follows:

- If the emissions are below the value [(Limit / Number of Antenna) - 10dB], then record only the maximum spurious emission

- If the emissions are over the value [(Limit / Number of Antenna) - 10dB], then record all spurious emissions

### 7.7.3 Test Result

The detailed test data see: Appendix C for SHEM191101874203

## 7.8 Transmission Burst Length

Test Requirement MIC Item 19-3, 19-3-2 of Article 2 Paragraph 1  
Test Method: MIC Notice No.88 Appendix No.45  
Limit: Transmission Burst Length shall be 4ms or less

### 7.8.1 E.U.T. Operation

Operating Environment:  
Temperature: 23 °C Humidity: 54 % RH Atmospheric Pressure: 1010 mbar  
Test mode Test the EUT in transmitting mode.

### 7.8.2 Measurement Procedure and Data

#### Spectrum Analyzer Settings

##### [Setting 1]

Frequency: Test frequency  
Span: 0Hz  
RBW: 10MHz or greater  
VBW: 10MHz  
Sweep time: Auto  
Detector mode: Positive peak  
Trigger: Rising edge

#### EUT Configuration

- burst transmission
- Modulated

#### Test Procedure

- (1) Configure the spectrum analyzer using [Setting 1] and set the EUT into transmit mode, then measure the Transmission Burst Length.
- (2) For multiple antennas systems, all antenna shall be combined as shown below. The resulting waveform will show the separate antenna signals superimposed, measure the Combined Transmission Burst Length from the start of the rising edge to the end of the falling edge.

### 7.8.3 Test Result

The detailed test data see: Appendix C for SHEM191101874203

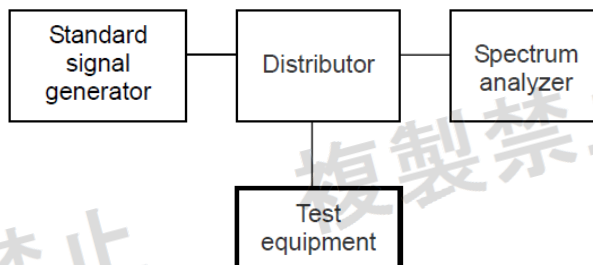


## 7.9 Carrier Sensing Capability

Test Requirement	MIC Item 19-3, 19-3-2 of Article 2 Paragraph 1
Test Method:	MIC Notice No.88 Appendix No.45
Limit:	Shall not transmit radio wave when receiving over 100mV/m

### 7.9.1 Test Configuration:

Test with test equipment only



### 7.9.2 E.U.T. Operation

Operating Environment:

Temperature: 23 °C Humidity: 54 % RH Atmospheric Pressure: 1010 mbar

Test mode Set the test equipment at the test frequency and the test spread code, and set it to the receiving mode, when using external test equipment, establish a connection

### 7.9.3 Measurement Procedure and Data

#### Test Procedure:

- (1) Set the standard signal generator as follows:
  - Carrier frequency: Center frequency of receiving frequency band of test equipment
  - Modulation: No modulation (when the carrier sense function does not work by the the unmodulated subcarrier in center frequency, shift the frequency or modulate if needed.)
  - Output level: In the antenna input unit of a test equipment, field intensity is equivalent to the value which becomes 100mV/m.
- (2) Set the spectrum analyzer as follows:
  - Center frequency: Center frequency of the bandwidth used.
  - Sweep frequency band: 50MHz
  - Resolution bandwidth: Approximately 1 MHz
  - Video bandwidth: Approximately same as the resolution bandwidth
  - Y-axis scale: 10dB/Div
  - Trigger condition: Free-run
  - Detective mode: Positive peak
- (3) Measuring operation
  - (a) Test with test equipment only: Set the test equipment to the transmitting operation with the output of standard signal generator OFF, and confirm that it emits radio wave, using spectrum analyzer.
  - (b) Set the test equipment to the receiving mode.
  - (c) Set the test equipment to the transmitting operation with the output of standard signal generator ON, and confirm that it does not emit radio wave, using spectrum analyzer.

### 7.9.4 Test Result

The detailed test data see: Appendix C for SHEM191101874203

## 8 Photographs

Refer to the < Photographs >

--End of Report--