

# MIC Test Report

**Equipment** : 802.11abgn USB Module  
**Brand Name** : SparkLAN  
**Model No.** : WUBR-508N  
**Standard** : MIC Certification Rule, Article 2 Paragraph 1 Item 19  
**Category** : WW  
**Measured Standard** : ARIB STD-T66  
**Frequency Range** : 2400 – 2483.5 MHz  
**Applicant /  
Manufacturer** : SparkLAN Communications, Inc.  
8F., No.257, Sec. 2, Tiding Blvd., Neihu  
District, Taipei City 11493, Taiwan

The product sample received on Aug. 01, 2013 and completely tested on Feb. 09, 2018. We, SPORTON, would like to declare that the tested sample has been evaluated in accordance with the procedures given in MIC Notice No.88 Appendix No.43 and shown compliance with the applicable MIC Ordinance Regulating Radio Equipment Article 49.20 and ARIB STD-66 technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory, the test report shall not be reproduced except in full.

Reviewed by:



Allen Lin



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**APPENDIX A. TEST PHOTOS**

**APPENDIX B. TEST RESULT**

**PHOTOGRAPHS OF EUT v01**



## Summary of Test Result

MIC Regulations Requirements				
Report Clause	Ref. Std. Article	Description	Measured	Result
1.1.6	ORE:49.20	Communication Method	half duplex operation	Complied
1.1.6	ORE:49.20	Modulation Method	OFDM, DSSS	Complied
1.1.6	n/a	Signal Transmission Rate	refer to type specification	Complied
1.1.1	RLE:6	Frequency Band	refer to RF info.	Complied
3.1	ORE:5	Frequency Error	refer to test data within 50ppm	Complied
3.2	ORE:6	Occupied Bandwidth	refer to test data	Complied
3.2	ORE:49.20	Spread Bandwidth / Factor	refer to test data	Complied
3.3	ORE:49.20	Antenna Power	refer to test data	Complied
3.3	ORE:14	Antenna Power Error	refer to test data within +20~-80%	Complied
3.4	ORE:49.20	Antenna Beamwidth, EIRP Limit	refer to test data	Complied
3.5	ORE:49.20	Radiated EIRP* <sup>1</sup>	refer to test data	N/A
3.6	ORE:7, Table 3	Transmitter Spurious Emissions	refer to test data	Complied
3.7	ORE:24	Receiver Spurious Emissions	refer to test data	Complied
3.8	TR:9	Identification Code	48 bits	Complied
3.9	TR:9	Carrier Sense* <sup>2</sup>	refer to test data	Complied
3.10	ORE:49.20	EUT Construction Protection	Shielded Case	Complied
<p>RLE: Radio Law Enforcement Regulations            ORE: Ordinance Regulating Radio Equipment            TR: Terminal and Other Equipment Regulations            NT: Notification of the Ministry of Internal Affairs and Communications            *<sup>1</sup>: If EIRP &lt; (Antenna Power Limit +2.14 dBi), Radiated EIRP test could be exempted.            *<sup>2</sup>: If OFDM modulation and Occupied Bandwidth ≥ 26MHz, Carrier Sense shall be performed.</p>				



# 1 General Description

## 1.1 Information

### 1.1.1 RF General Information

RF General Information					
Frequency Range (MHz)	IEEE Std. 802.11	Ch. Frequency (MHz)	Channel Number	Transmit Chains (N <sub>TX</sub> )	Antenna Power (mW/MHz)
2400-2483.5	b	2412-2472	1-13 [13]	1	5.10
2400-2483.5	g	2412-2472	1-13 [13]	1	2.21
2400-2483.5	n (HT20)	2412-2472	1-13 [13]	2	2.45
2400-2483.5	n (HT40)	2422-2462	3-11 [9]	2	1.19

Note 1: 802.11b uses a combination of DSSS-DBPSK, DQPSK, CCK modulation.  
 Note 2: 802.11g/n uses a combination of OFDM-BPSK, QPSK, 16QAM, 64QAM modulation.

### 1.1.2 Antenna Information

Antenna Category	
<input type="checkbox"/>	Equipment placed on the market without antennas
<input checked="" type="checkbox"/>	Integral antenna (antenna permanently attached)
<input checked="" type="checkbox"/>	Temporary RF connector provided
<input type="checkbox"/>	No temporary RF connector provided Transmit chains bypass antenna and soldered temporary RF connector provided for connected measurement. In case of conducted measurements the transmitter shall be connected to the measuring equipment via a suitable attenuator and correct for all losses in the RF path.
<input checked="" type="checkbox"/>	External antenna (dedicated antennas)

Antenna General Information					
No.	Ant. Cat.	Ant. Type	Brand	Model	Gain (dBi)
1	External	Dipole	Lct	FDE_ACBSMA-BGP	3.00
2	Integral	Printed	SparkLAN	WUBR-508N	3.79
3	Integral	PCB	NISSEI	FML2.4WA-200	1.84
4	Integral	PCB	SANAV	GEPH-013	1.00
5	External	Dipole	VOXMICRO LTD GROUP	WAND2DBI	1.87

**1.1.3 Type of EUT**

Identify EUT	
Presentation of Equipment	<input type="checkbox"/> Production ; <input checked="" type="checkbox"/> Pre-Production ; <input type="checkbox"/> Prototype
Type of EUT	
<input checked="" type="checkbox"/>	Stand-alone
<input type="checkbox"/>	Combined (EUT where the radio part is fully integrated within another device) Combined Equipment - Brand Name / Model No.:
<input type="checkbox"/>	Plug-in radio (EUT intended for a variety of host systems) Host System - Brand Name / Model No.:
<input type="checkbox"/>	Other:

**1.1.4 EUT Operational Condition**

Supply Voltage	<input type="checkbox"/> AC mains	<input checked="" type="checkbox"/> DC	
Type of DC Source	<input type="checkbox"/> Internal DC supply	<input checked="" type="checkbox"/> System	<input type="checkbox"/> Battery

**1.1.5 Table for Existing Change**

This product is an extension of original one reported under Sporton project number: JR373103-01WW

Below is the table for the change of the product with respect to the original one.

Modifications	Performance Checking
Add Dipole antenna (WAND2DBI)	N/A

1.1.6 Type Specifications

No. 3 Type Specifications			
<b>1 Communication Method</b>	Semi-duplex		
<b>2 Transmitter</b>	<b>(1) Rated Output</b>	Refer test report clause 1.1.1 antenna power	
	<b>(2) Freq. Range of Radio Wave</b>	Refer test report clause 1.1.1 frequency band and channel	
	<b>(3) Oscillation</b>	Synthesizer with Crystal Oscillation (40MHz) (Zero IF)	
	<b>(4) Modulation</b>	DSSS: G1D (BPSK, QPSK, CCK) OFDM: D1D (16QAM,64QAM), G1D (BPSK, QPSK) Max. Signal Transmission Rate: 11b = 11 Mbps 11g = 54 Mbps 11n BW <sub>ch</sub> 20MHz = 130 Mbps (MCS8; N <sub>SS</sub> =2) BW <sub>ch</sub> 40MHz = 270 Mbps (MCS8; N <sub>SS</sub> =2)	
<b>3 Manufacturer (Brand) Information</b>	<b>Manufacturer (Brand)</b>	<b>Model Type or Name</b>	<b>Serial Number</b>
	SparkLAN	WUBR-508N	n/a
<b>4 Antenna</b>	Type, Structure, Gain refer antenna report and test report clause 1.1.2.		
<b>5 Classification and Model Name of Auxiliary Equipment</b>	Protection Against Interference Automatic Transmission/reception of ID code (Radio equipment law article 9-4, item 9 is carrier sensing.)		
<b>6 Other Type Specifications Items</b>	Other design specifications that are not mentioned under above item 1 to 5 all comply with the technical standard stipulated by the 3rd section of radio law.		
<b>7 Attached Drawing</b>	Radio Equipment System Diagram, Schematic Diagram, Layout		
<b>8 Reference Information</b>	Antenna Impedance : 50Ω Occupied frequency bandwidth wider than 26MHz and narrower then 38MHz, whether the carrier sense function.		

## 1.2 Support Equipment

Support Equipment				
No.	Equipment	Brand Name	Model Name	Serial No.
1	Notebook	DELL	Inspiron 6400	DoC

## 1.3 Testing Applied Standards

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

- ◆ MIC Ordinance Regulating Radio Equipment Article 49.20
- ◆ MIC Notice No.88 Appendix No.43

## 1.4 Testing Location Information

Testing Location				
<input checked="" type="checkbox"/>	HWA YA	ADD : No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.)		
		TEL : 886-3-327-3456	FAX : 886-3-327-0973	
<input type="checkbox"/>	JHUBEI	ADD : No.8, Ln. 724, Bo'ai St., Zhubei City, Hsinchu County, Taiwan (R.O.C.)		
		TEL : 886-3-656-9065	FAX : 886-3-656-9085	

Test Condition	Test Site No.	Test Engineer	Test Environment	Test Date
RF Conducted	TH06-HY	Shiming	24.6°C / 62%	04/Sep/2013 ~ 05/Sep/2013
RF Conducted <For carrier sense>	TH01-HY	Andy	21.5°C / 65.5%	09/Feb/2018

## 1.5 Measurement Uncertainty

ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level (based on a coverage factor (k=2))

<b>Measurement Uncertainty</b>			
<b>Test Item</b>		<b>Uncertainty</b>	<b>Limit</b>
Radio frequency		$\pm 8.7 \times 10^{-7}$	$\pm 1 \times 10^{-5}$
RF output power, conducted		$\pm 0.63$ dB	$\pm 1.5$ dB
RF power radiated		$\pm 2.59$ dB	$\pm 6$ dB
conducted	30 – 1000 MHz	$\pm 0.51$ dB	$\pm 3$ dB
	1 – 18 GHz	$\pm 0.67$ dB	$\pm 3$ dB
	18 – 26 GHz	$\pm 0.83$ dB	$\pm 3$ dB
radiated	30 – 1000 MHz	$\pm 2.28$ dB	$\pm 6$ dB
	1 – 18 GHz	$\pm 2.59$ dB	$\pm 6$ dB
	18 – 26 GHz	$\pm 2.87$ dB	$\pm 6$ dB
Temperature		$\pm 0.8$ °C	$\pm 1$ °C
Humidity		$\pm 3$ %	$\pm 5$ %
Time		$\pm 1.42$ %	$\pm 10$ %

## 2 Test Configuration of EUT

### 2.1 The Worse Case Modulation Configuration

Worst Modulation Used for Conformance Testing			
Modulation Mode	Transmit Chains (N <sub>TX</sub> )	Data Rate / MCS	Worst Data Rate / MCS
11b,1-11Mbps	1	1-11Mbps	11Mbps
11g,6-54Mbps	1	6-54Mbps	6Mbps
HT20,M8-15	2	M8-15	M8
HT40,M8-15	2	M8-15	M8

Note 1: Modulation modes consist of below configuration:  
 11b: IEEE 802.11b, 11g: IEEE 802.11g, HT20/HT40: IEEE 802.11n.  
 Note 2: IEEE Std. 802.11n/ac modulation consists of HT20, HT40. Then EUT support HT20, HT40.  
 Worst modulation mode: HT20, HT40. Worst modulation of Guard Interval (GI) is 800ns.

### 2.2 The Worse Case Power Setting Parameter

The Worst Case Power Setting Parameter							
Test Software Version	RT5x7xQA V1.0.5.9						
Modulation Mode	N <sub>TX</sub>	Test Frequency (MHz)					
		NCB: 20MHz			NCB: 40MHz		
		2412	2442	2472	2422	2437	2462
11b,1-11Mbps	1	18	18	18	-	-	-
11g,6-54Mbps	1	16	16	17	-	-	-
HT20,M8-15	2	16,1B	17,1C	17,1D	-	-	-
HT40,M8-15	2	-	-	-	17,1B	17,1C	18,1D

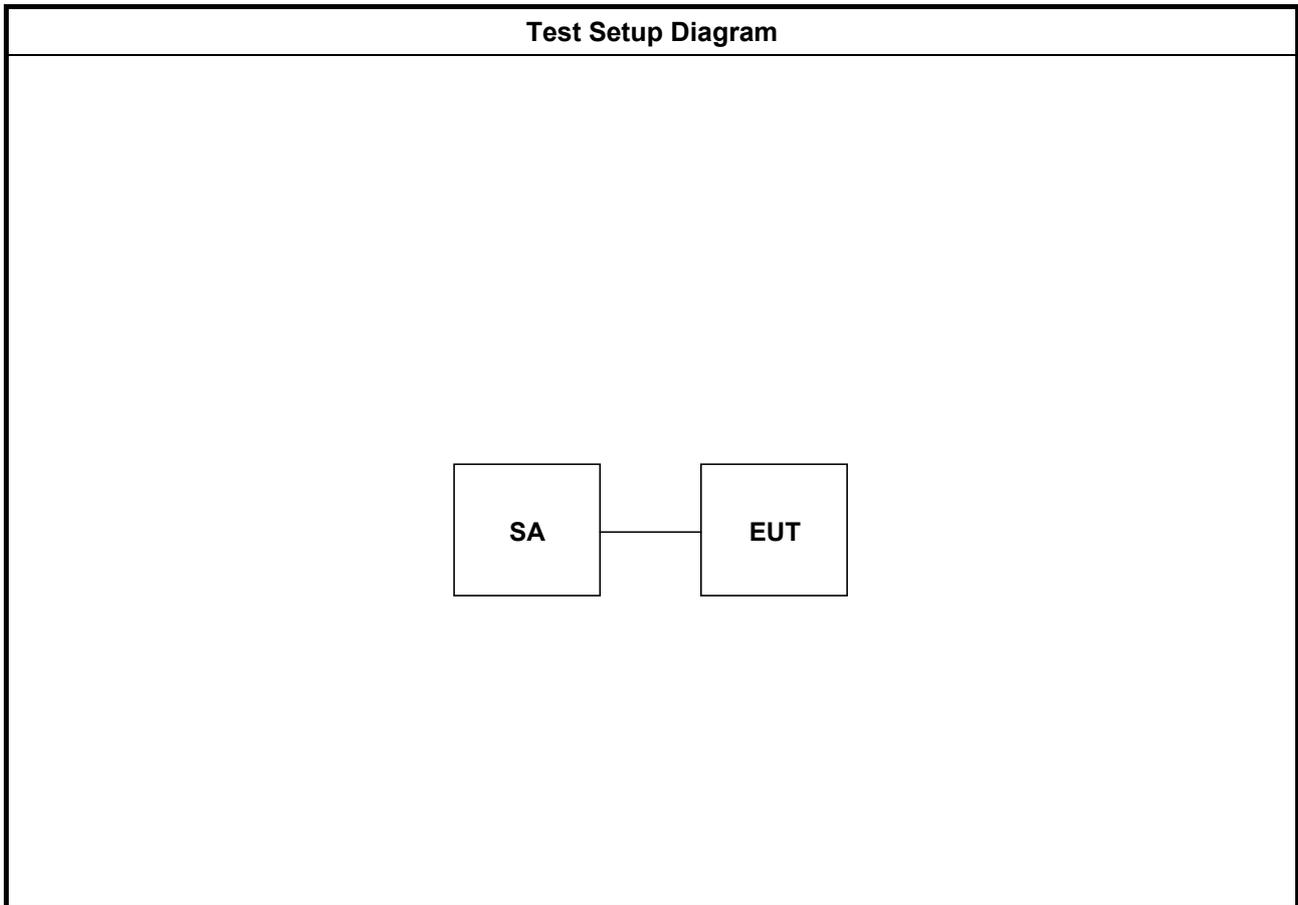
### 2.3 The Worst Case Measurement Configuration

<b>Tests Item</b>	Frequency Error
<b>Test Condition</b>	Conducted measurement at transmit chains.
<b>Modulation Mode</b>	Un-modulation

<b>Tests Item</b>	Occupied Bandwidth, Spread Bandwidth, Spread Factor, Antenna Power, Antenna Power Error, EIRP Power, Transmitter Spurious Emissions, Receiver Spurious Emissions, Identification Code, Carrier Sense
<b>Test Condition</b>	Conducted measurement at transmit chains.
<b>Modulation Mode</b>	11b, 11g, HT20, HT40

<b>Tests Item</b>	Antenna Beamwidth
<b>Test Condition</b>	Radiated measurement
<b>Modulation Mode</b>	11b, 11g, HT20, HT40

### 2.4 Test Setup Diagram



### 3 Test Result

#### 3.1 Frequency Error

##### 3.1.1 Frequency Error Limit

<b>Frequency Error Limit</b>
$\leq \pm 50$ ppm

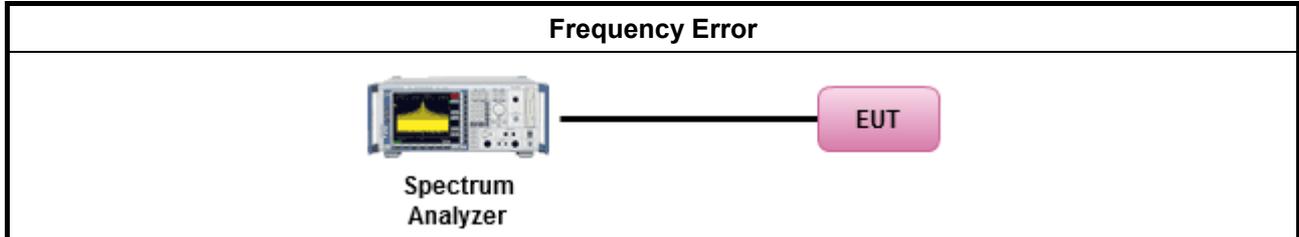
##### 3.1.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.

##### 3.1.3 Test Procedures

Test Method	
Measuring Equipment Conditions	MIC Notice No.88 Appendix No.43, clause 3.2
Conditions of Equipment under Test	MIC Notice No.88 Appendix No.43, clause 3.3
Measuring Operation Procedures	MIC Notice No.88 Appendix No.43, clause 3.4
Presentation of Results	MIC Notice No.88 Appendix No.43, clause 3.5
Other Conditions	MIC Notice No.88 Appendix No.43, clause 3.6

##### 3.1.4 Test Setup



##### 3.1.5 Test Result of Frequency Error

Appendix	Mode	Item
B	Un-modulation	2

### 3.2 Occupied Bandwidth, Spread Bandwidth and Spread Factor

#### 3.2.1 Occupied Bandwidth Limit

Occupied Bandwidth Limit	
FHSS	83.5 MHz
FHSS + DSSS	83.5 MHz
FHSS + OFDM	83.5 MHz
OFDM	38 MHz
Other	26 MHz

Spread Bandwidth and Spread Factor Limit	
Spread Bandwidth	≥500kHz
Spread Factor	≥5

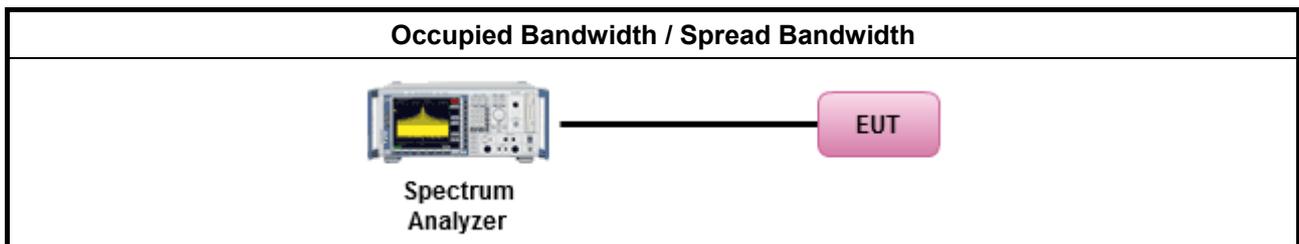
#### 3.2.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.

#### 3.2.3 Test Procedures

Test Method	
Measuring Equipment Conditions	MIC Notice No.88 Appendix No.43, clause 4.2
Conditions of Equipment under Test	MIC Notice No.88 Appendix No.43, clause 4.3
Measuring Operation Procedures	MIC Notice No.88 Appendix No.43, clause 4.4
Presentation of Results	MIC Notice No.88 Appendix No.43, clause 4.5
Other Conditions	MIC Notice No.88 Appendix No.43, clause 4.6

#### 3.2.4 Test Setup



#### 3.2.5 Test Result of Occupied Bandwidth / Spread Bandwidth / Spread Factor

Appendix	Mode	Item
B	11b, 11g, HT20, HT40	2,8

### 3.3 Antenna Power, Antenna Power Error

#### 3.3.1 Antenna Power and Antenna Power Error Limit

Antenna Power Limit (mW/MHz)
≤ 3mW/MHz (FHSS, FHSS+DSSS, FHSS+OFDM form 2427~2470.75 MHz)
≤ 10mW/MHz (DSSS from 2400~2483.5MHz)
≤ 10mW/MHz (OFDM from 2400~2483.5MHz) – [OBW≤26MHz]
≤ 5mW/MHz (OFDM from 2400~2483.5MHz) – [26MHz<OBW≤38MHz]
≤ 10mW (Other from 2400~2483.5MHz)

Antenna Power Error Limit (%)
+20% ~ -80%

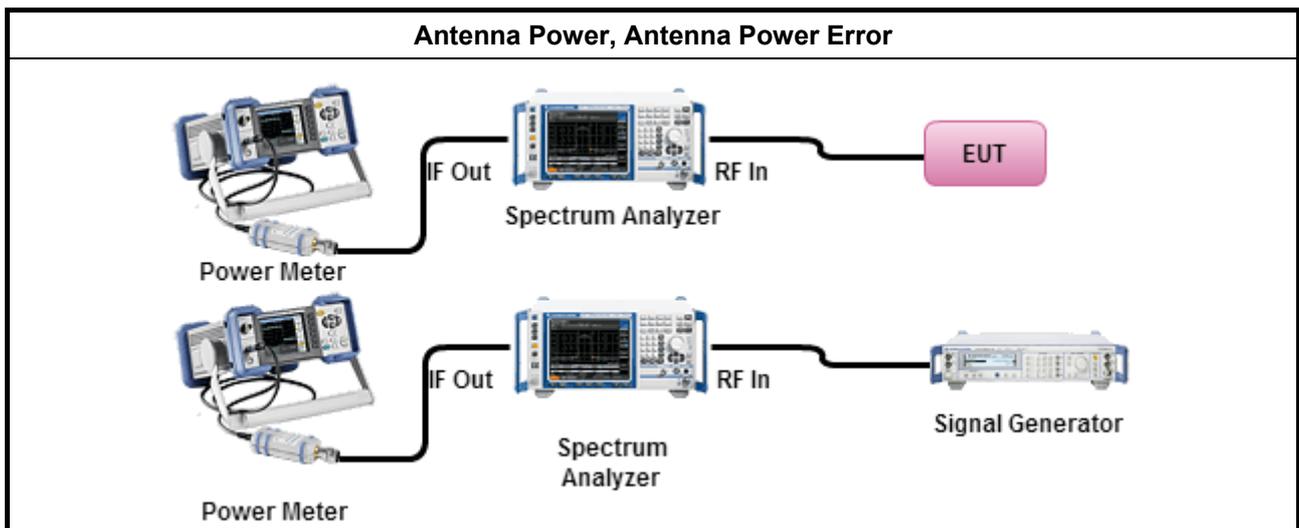
#### 3.3.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.

#### 3.3.3 Test Procedures

Test Method	
Measuring Equipment Conditions	MIC Notice No.88 Appendix No.43, clause 6.2
Conditions of Equipment under Test	MIC Notice No.88 Appendix No.43, clause 6.3
Measuring Operation Procedures	MIC Notice No.88 Appendix No.43, clause 6.4
Presentation of Results	MIC Notice No.88 Appendix No.43, clause 6.5
Other Conditions	MIC Notice No.88 Appendix No.43, clause 6.6

#### 3.3.4 Test Setup



#### 3.3.5 Test Result of Antenna Power and Antenna Power Error

Appendix	Mode	Item
B	11b, 11g, HT20, HT40	2, 3

### 3.4 Antenna Beamwidth and EIRP Limit

#### 3.4.1 EIRP and Antenna Beamwidth Limit

Antenna Beamwidth Limit
$\leq 360/A$ ; $A = \text{EIRP}[\text{mW}/\text{MHz}]/4.91$ (FHSS, FHSS+DSSS, FHSS+OFDM form 2427 - 2470.75 MHz)
$\leq 360/A$ ; $A = \text{EIRP}[\text{mW}/\text{MHz}]/16.37$ (DSSS from 2400~2483.5MHz)
$\leq 360/A$ ; $A = \text{EIRP}[\text{mW}/\text{MHz}]/16.37$ (OFDM from 2400~2483.5MHz) – [OBW $\leq$ 26MHz]
$\leq 360/A$ ; $A = \text{EIRP}[\text{mW}/\text{MHz}]/8.18$ (OFDM from 2400~2483.5MHz) – [26MHz<OBW $\leq$ 38MHz]
$\leq 360/A$ ; $A = \text{EIRP}[\text{mW}]/16.37$ (Other from 2400~2483.5MHz)

Max. EIRP Limit for Antenna Beamwidth $\leq 10^\circ$
$\leq 16.91\text{dBm}/\text{MHz}$ (FHSS, FHSS+DSSS, FHSS+OFDM form 2427~2470.75 MHz)
$\leq 22.14\text{dBm}/\text{MHz}$ (DSSS from 2400~2483.5MHz)
$\leq 22.14\text{dBm}/\text{MHz}$ (OFDM from 2400~2483.5MHz) – [OBW $\leq$ 26MHz]
$\leq 19.14\text{dBm}/\text{MHz}$ (OFDM from 2400~2483.5MHz) – [26MHz<OBW $\leq$ 38MHz]
$\leq 22.14\text{dBm}$ (Other from 2400~2483.5MHz)

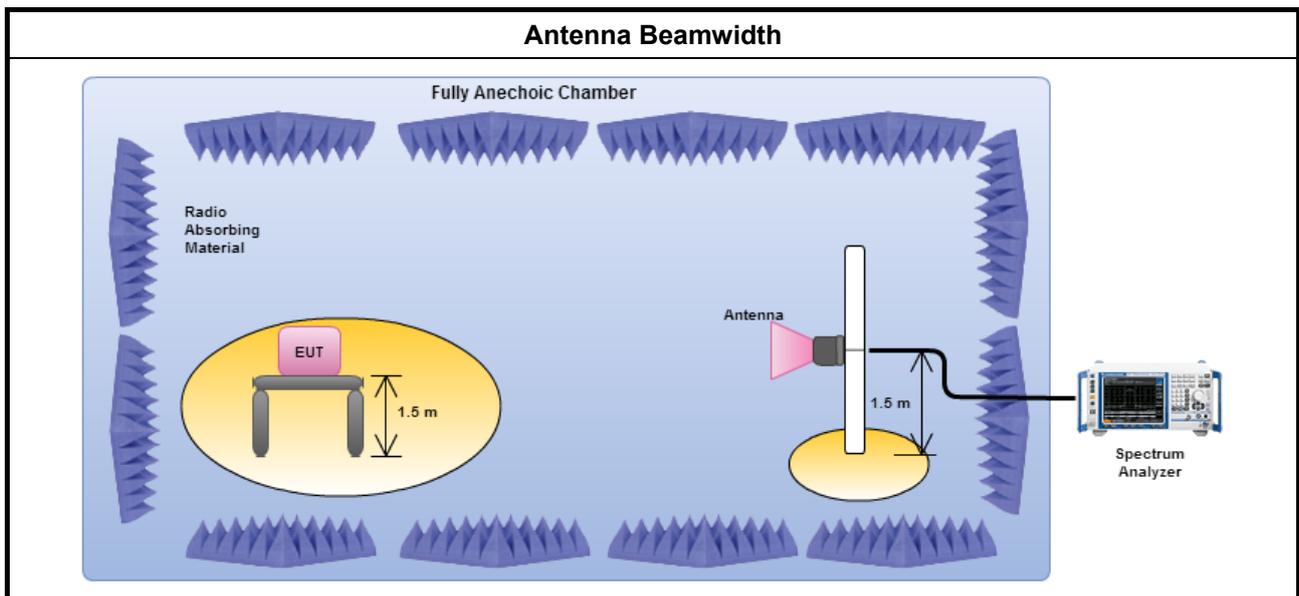
#### 3.4.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.

#### 3.4.3 Test Procedures

Test Method	
Measuring Equipment Conditions	MIC Notice No.88 Appendix No.43, clause 11.2
Conditions of Equipment under Test	MIC Notice No.88 Appendix No.43, clause 11.3
Measuring Operation Procedures	MIC Notice No.88 Appendix No.43, clause 11.4
Presentation of Results	MIC Notice No.88 Appendix No.43, clause 11.5
Other Conditions	MIC Notice No.88 Appendix No.43, clause 11.6

#### 3.4.4 Test Setup





**3.4.5 Test Result of Antenna Beamwidth**

Appendix	Mode	Item
B	11b, 11g, HT20, HT40	4

### 3.5 Radiated EIRP (For EIRP ≥ Antenna Power Limit +2.14 dBi)

#### 3.5.1 EIRP and Antenna Beamwidth Limit

Antenna Beamwidth Limit
≤360/A; A=EIRP[mW/MHz]/4.91 (FHSS, FHSS+DSSS, FHSS+OFDM form 2427 - 2470.75 MHz)
≤360/A; A=EIRP[mW/MHz]/16.37 (DSSS from 2400~2483.5MHz)
≤360/A; A=EIRP[mW/MHz]/16.37 (OFDM from 2400~2483.5MHz) – [OBW≤26MHz]
≤360/A; A=EIRP[mW/MHz]/8.18 (OFDM from 2400~2483.5MHz) – [26MHz<OBW≤38MHz]
≤360/A; A=EIRP[mW]/16.37 (Other from 2400~2483.5MHz)

Max. EIRP Limit for Antenna Beamwidth ≤ 10°
≤16.91dBm/MHz (FHSS, FHSS+DSSS, FHSS+OFDM form 2427~2470.75 MHz)
≤22.14dBm/MHz (DSSS from 2400~2483.5MHz)
≤22.14dBm/MHz (OFDM from 2400~2483.5MHz) – [OBW≤26MHz]
≤19.14dBm/MHz (OFDM from 2400~2483.5MHz) – [26MHz<OBW≤38MHz]
≤22.14dBm (Other from 2400~2483.5MHz)

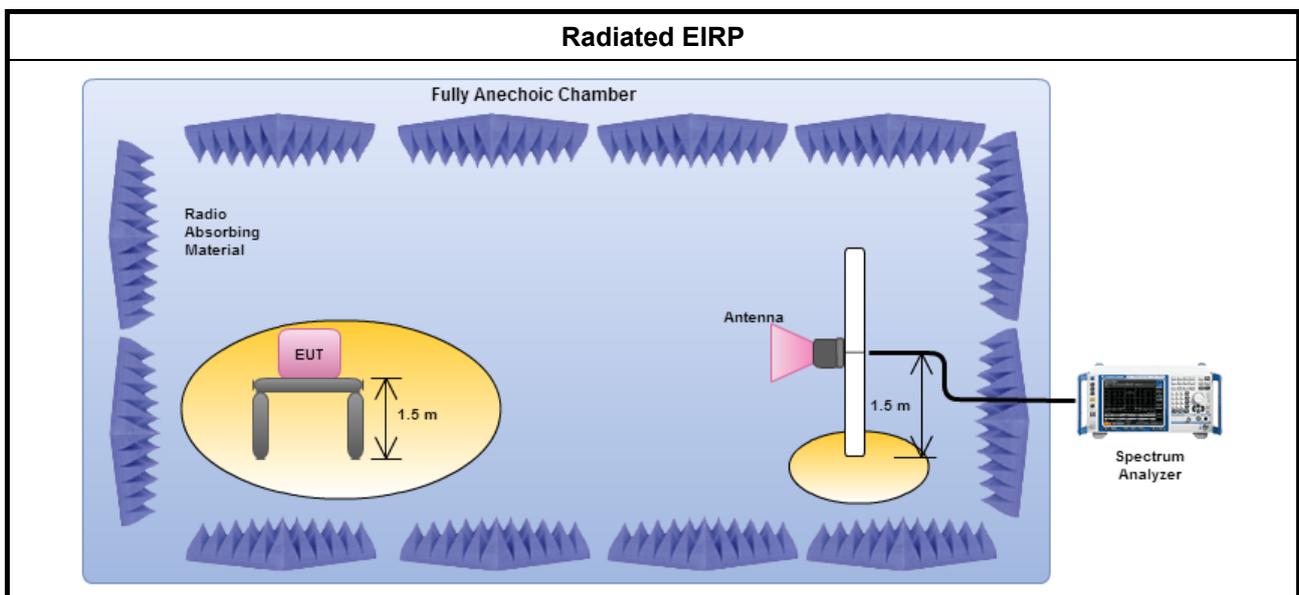
#### 3.5.2 Measuring Instruments

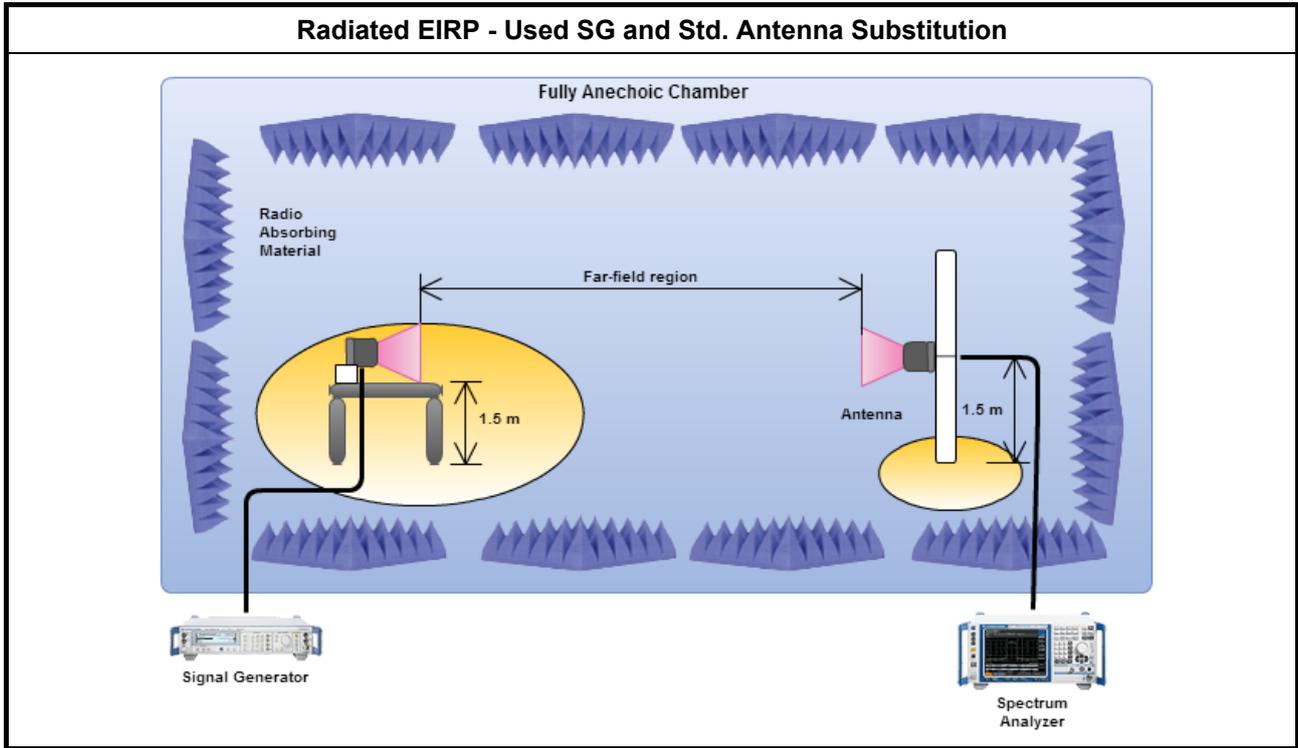
Refer a test equipment and calibration data table in this test report.

#### 3.5.3 Test Procedures

Test Method	
Measuring Equipment Conditions	MIC Notice No.88 Appendix No.43, clause 10.2
Conditions of Equipment under Test	MIC Notice No.88 Appendix No.43, clause 10.3
Measuring Operation Procedures	MIC Notice No.88 Appendix No.43, clause 10.4
Presentation of Results	MIC Notice No.88 Appendix No.43, clause 10.5
Other Conditions	MIC Notice No.88 Appendix No.43, clause 10.6
If EIRP < Antenna Power Limit +2.14 dBi, radiated EIRP test could be exempted.	

#### 3.5.4 Test Setup





### 3.5.5 Test Result of Radiated EIRP

Appendix	Mode	Item
B	-	-

### 3.6 Transmitter Spurious Emissions

#### 3.6.1 Transmitter Spurious Emissions Limit

Transmitter Spurious Emissions		Limit	
Range (MHz)		uW/MHz	dBm/MHz
30	2387	2.5	-26
2387	2400	25	-16
2483.5	2496.5	25	-16
2496.5	12500	2.5	-26

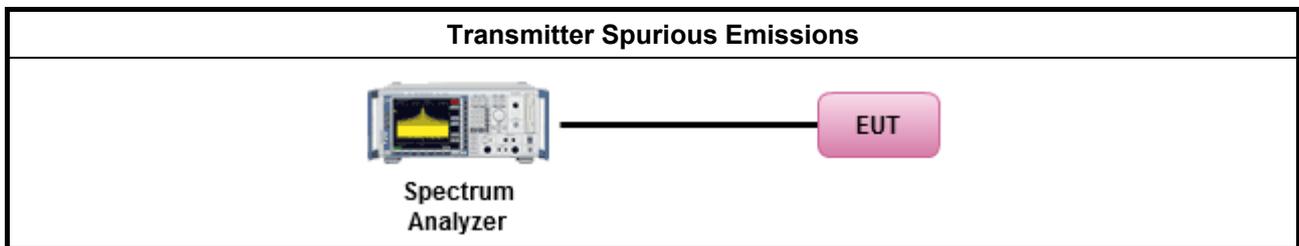
#### 3.6.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.

#### 3.6.3 Test Procedures

Test Method	
Measuring Equipment Conditions	MIC Notice No.88 Appendix No.1, clause 1.3
Conditions of Equipment under Test	MIC Notice No.88 Appendix No.1, clause 1.4
Measuring Operation Procedures	MIC Notice No.88 Appendix No.1, clause 1.5
Presentation of Results	MIC Notice No.88 Appendix No.1, clause 1.6

#### 3.6.4 Test Setup



#### 3.6.5 Test Result of Transmitter Spurious Emissions

Appendix	Mode	Item
B	11b, 11g, HT20, HT40	6

### 3.7 Receiver Spurious Emissions

#### 3.7.1 Receiver Spurious Emissions Limit

RX Spurious Emission		Limit			
Range (MHz)		nW		dBm	
30	1000	4	4	-54	-54
1000	12500	20	20	-47	-47

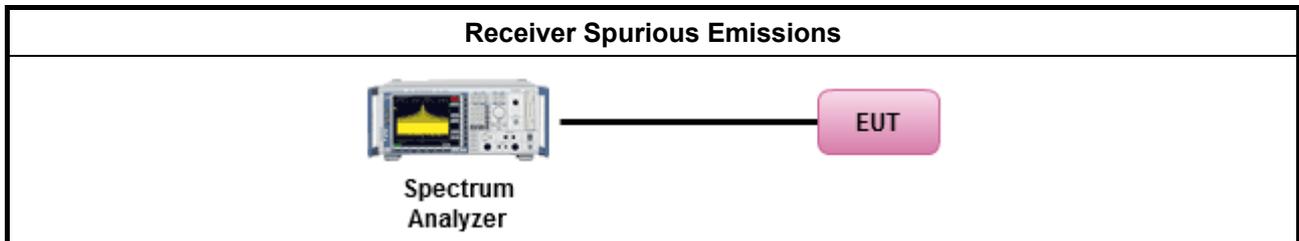
#### 3.7.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.

#### 3.7.3 Test Procedures

Test Method	
Measuring Equipment Conditions	MIC Notice No.88 Appendix No.43, clause 7.2
Conditions of Equipment under Test	MIC Notice No.88 Appendix No.43, clause 7.3
Measuring Operation Procedures	MIC Notice No.88 Appendix No.43, clause 7.4
Presentation of Results	MIC Notice No.88 Appendix No.43, clause 7.5
Other Conditions	MIC Notice No.88 Appendix No.43, clause 7.6

#### 3.7.4 Test Setup



#### 3.7.5 Test Result of Receiver Spurious Emissions

Appendix	Mode	Item
B	11b, 11g, HT20, HT40	7

### 3.8 Identification Code

#### 3.8.1 Identification Code Limit

Identification Code Limit	
48 bits	

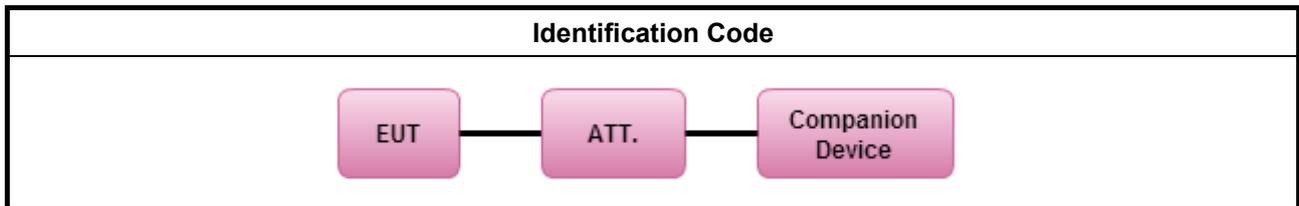
#### 3.8.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.

#### 3.8.3 Test Procedures

Test Method	
Measuring Equipment Conditions	MIC Notice No.88 Appendix No.43, clause 12.2
Conditions of Equipment under Test	MIC Notice No.88 Appendix No.43, clause 12.3
Measuring Operation Procedures	MIC Notice No.88 Appendix No.43, clause 12.4
Presentation of Results	MIC Notice No.88 Appendix No.43, clause 12.5
Other Conditions	MIC Notice No.88 Appendix No.43, clause 12.6

#### 3.8.4 Test Setup



#### 3.8.5 Test Result of Identification Code

Appendix	Mode	Item
B	11b, 11g, HT20, HT40	2

### 3.9 Carrier Sense

#### 3.9.1 Carrier Sense Limit

Carrier Sense Limit
Stop transmission for interference signal level injected.

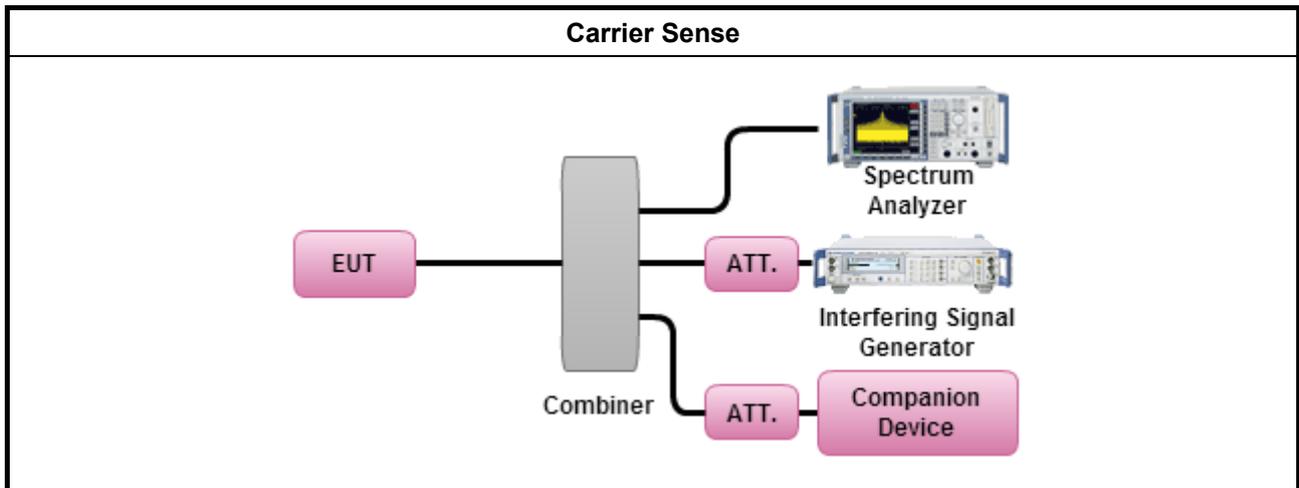
#### 3.9.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.

#### 3.9.3 Test Procedures

Test Method	
Measuring Equipment Conditions	MIC Notice No.88 Appendix No.43, clause 8.2
Conditions of Equipment under Test	MIC Notice No.88 Appendix No.43, clause 8.3
Measuring Operation Procedures	MIC Notice No.88 Appendix No.43, clause 8.4
Presentation of Results	MIC Notice No.88 Appendix No.43, clause 8.5
Other Conditions	MIC Notice No.88 Appendix No.43, clause 8.6

#### 3.9.4 Test Setup



#### 3.9.5 Test Result of Carrier Sense

Appendix	Mode	Item
B	HT40	8

### 3.10 EUT Construction Protection

#### 3.10.1 EUT Construction Protection Limit

EUT Construction Protection 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 EUT Construction Protection

Refer a test equipment and calibration data table in this test report.

EUT Construction Protection	
Protected Method	Description
Shielding Case	RF and Modulation components are covered with shielding case and this shielding case is soldered

#### 3.10.3 Reference Documents

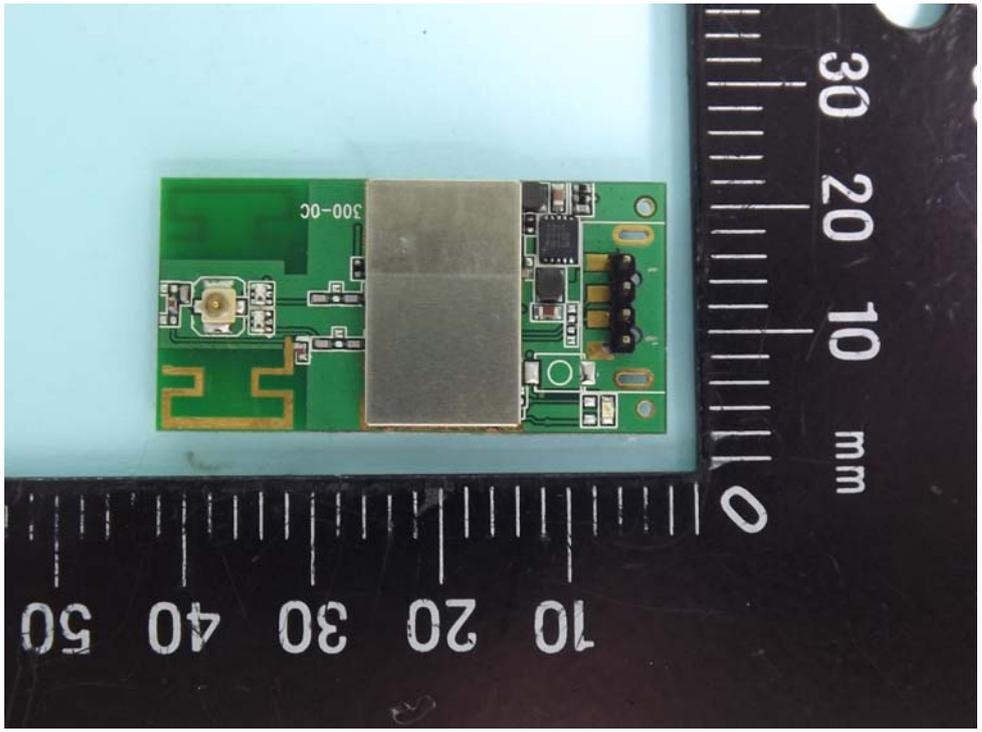
Photo	Item
Photo 1	

Photo 2

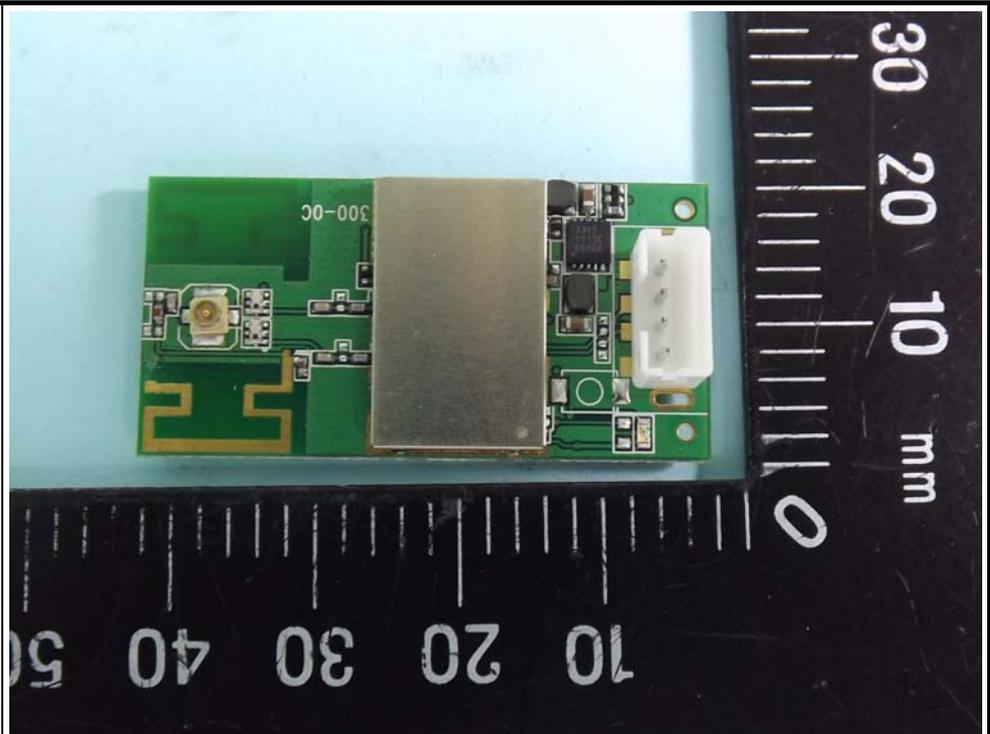
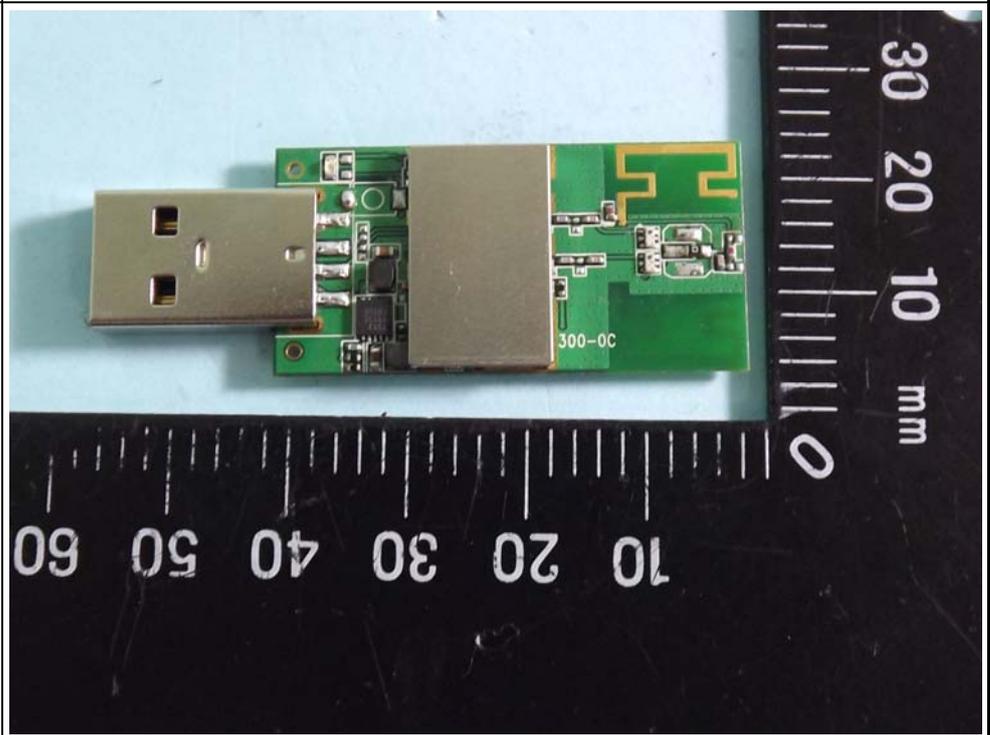


Photo 3





## 4 Test Equipment and Calibration Data

Instrument	Manufacturer	Model No.	Serial No.	Spec.	Calibration Date	Calibration Until	Cal. Body
Spectrum Analyzer	R&S	FSP 40	100305	9kHz~40GHz	20/Mar/2013	19/Mar/2014	ETC
DC Power Source	G.W.	GPC-6030D	C671845	DC 1V ~ 60V	21/Jun/2013	20/Jun/2014	ETC
Signal Generator	R&S	SMR40	100116	10MHz ~ 40GHz	27/Jun/2013	26/Jun/2014	ETC
Power Sensor	Anritsu	MA2411B	0917017	300MHz ~ 40GHz	02/Feb/2013	01/Feb/2014	ETC
Power Meter	Anritsu	ML2495A	0949003	300MHz ~ 40GHz	02/Feb/2013	01/Feb/2014	ETC

Note: Calibration Interval of instruments listed above is one year.

### <For carrier sense>

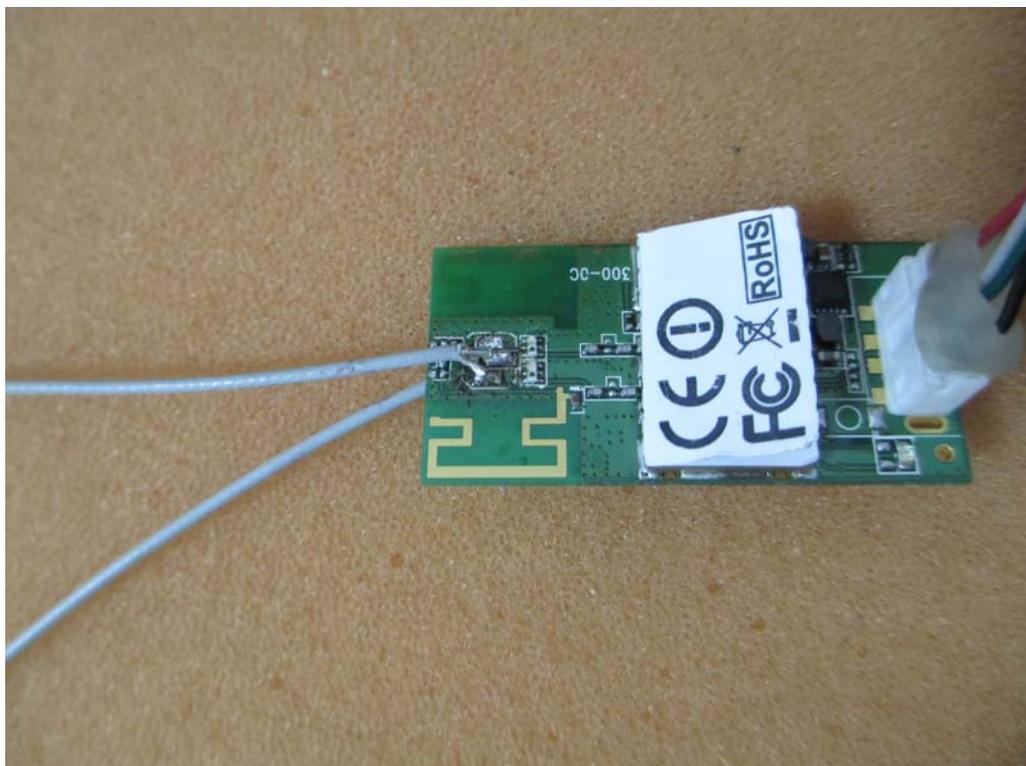
Instrument	Manufacturer	Model No.	Serial No.	Spec.	Calibration Date	Calibration Until	Cal. Body
Spectrum Analyzer	R&S	FSV 40	101515	9kHz~40GHz	08/Dec/2017	07/Dec/2018	R&S
Signal Generator	R&S	SMR40	100116	10MHz ~ 40GHz	27/Jul/2017	26/Jul/2018	R&S
RF Cable-0.2m	HUBER+SUHNER	SUCOFLEX_104	MY10710/4	30MHz ~ 26.5GHz	25/Aug/2017	24/Aug/2018	Sporton

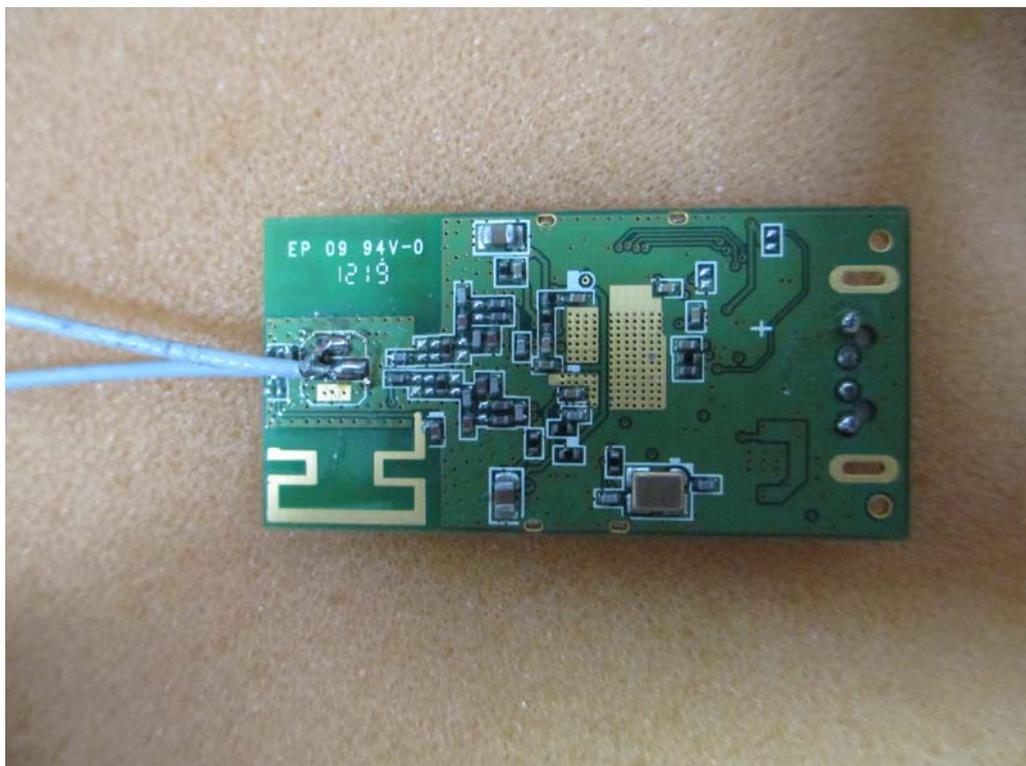
Note: Calibration Interval of instruments listed above is one year.

## **Appendix A. Test Photos**









Appendix B 19-11b-G1D(20MHz Mode)

Sporton No.	JR373103-02
Test Date	2013/9/5
Test Location	SPORTON Lab.
Temp. / Humid.	24.6°C / 62%
Test Site	TH06-HY
Engineer	Shiming
Department	Radio Service Group

1. General Information

Specified Radio Equipment	Class	Article 2 Paragraph 1 Item 19	Model	WUBR-508N
	Type of Emission	G1D	Serial No.	12635W2002256
	Modulation Type	DSSS: BPSK, QPSK, CCK	Antenna Power	5.10 mW/MHz
	Frequency	2412~2472 MHz	Antenna Port	DAC 0

2. Test Results

Testing for Electrical Specification	Test Voltage	V	Normal Voltage ( 5V )			Remarks
	Test Frequency	MHz	2412	2442	2472	Low/Mid/High of test frequency range
Measured Frequency	MHz	2411.9700	2441.9682	2471.9676		
Frequency Error	ppm	-12.44	-13.02	-13.11	Limit ≤ 50 ppm	
Occupied Bandwidth	MHz	14.36	14.36	14.32	Limit ≤ 26 MHz (RB/VB : 300kHz)	
Spread-spectrum Bandwidth	MHz	10.60	10.60	10.56	Spread Factor Limit ≥ 5 (DSSS and FHSS)	
Unwanted Emission Intensity (Power emission within 1MHz bandwidth)	※ 1	μW	0.08472	0.09419	0.13552	Limit ≤ 2.5 μW/MHz (-26 dBm)
	※ 2	μW	5.84790	0.09772	0.07516	Limit ≤ 25 μW/MHz (-16 dBm)
	※ 3	μW	0.05984	0.09204	10.06932	Limit ≤ 25 μW/MHz (-16 dBm)
	※ 4	μW	0.07244	0.09528	0.09795	Limit ≤ 2.5 μW/MHz (-26 dBm)
Antenna Power (Conducted)	mW/MHz	5.05571	5.02900	5.10249	Limit ≤ 10 mW/MHz (10 dBm/MHz)	
Antenna Power Error	mW/MHz	-0.04429	-0.07100	0.00249		
	%	-0.87	-1.39	0.05	Limit + 20% ~ - 80%	
Limitation of Collateral Emission of Receiver	※ 5	nW	0.0175	0.0188	0.0169	Limit ≤ 4 nW (-54 dBm)
	※ 6	nW	1.1912	1.2331	0.8035	Limit ≤ 20 nW (-47 dBm)
Hopping Frequency Dwell Time	sec	-	-	-	Limit ≤ 0.4 sec (In 0.4 sec × spreading rate)	
Radio Interference Prevention Function	ID Code	Good, MAC Address:00-0E-8E-40-89-82				
	Carrier Sense	NR	NR	NR		NR: Not Require

- ※ 1: Frequency Band 1 (30 MHz ≤ f ≤ 2387 MHz)
- ※ 2: Frequency Band 2 (2387 MHz < f ≤ 2400 MHz)
- ※ 3: Frequency Band 3 (2483.5 MHz ≤ f < 2496.5 MHz)
- ※ 4: Frequency Band 4 (2496.5 MHz ≤ f < 12.5 GHz)
- ※ 5: Frequency Band 5 (30 MHz ≤ f < 1000 MHz)
- ※ 6: Frequency Band 6 (1000 MHz ≤ f < 12.5 GHz)

3. Antenna Power (Conducted Power)

Testing for Electrical Specification	Test Voltage	V	Normal Voltage ( 5V )			Remarks
	Test Frequency	MHz	2412	2442	2472	
Power Meter Raw (IF of Spectrum)	dBm	-12.96	-12.98	-12.92		
Power Measurement System Loss	dB	20.49	20.49	20.49	Refer to Calibration Result	
Transmitter Duty Cycle Factor	dB	0.00	0.00	0.00	Duty Factor = 10 × 10Log <sub>10</sub> (1/Duty Cycle)	
Equivalent Noise Bandwidth	MHz	1.12	1.12	1.12	ENB = Total_Sum^2 / Peak_Level * Point_Width	
Equivalent Noise Bandwidth Factor	dB	0.49	0.49	0.49	ENB Factor = 10 × 10Log <sub>10</sub> (1/ENB)	
Antenna Power (Conducted)	dBm/MHz	7.04	7.01	7.08	Limit ≤ 10 mW/MHz (10 dBm/MHz)	
Antenna Power (Conducted)	mW/MHz	5.0557	5.0290	5.1025		
Antenna Power Error	mW	-0.0443	-0.0710	0.0025		
	%	-0.87	-1.39	0.05	Limit + 20% ~ - 80%	
Transmitter ON <sub>Time</sub>	msec	1.0000			RBW : 1 MHz ; VBW : 1 MHz ; SP : 0Hz	
Transmitter (ON+OFF) <sub>Time</sub>	msec	1.0000				
Transmitter Duty Cycle	%	100.00%				

4. Transmission Radiation Angle Width (This test item will not be applied to the EIRP power is lower than 12.14dBm/MHz)

No.	Antenna Power	Antenna				Cable			Total Gain D=B+C	EIRP F=A+D	Permitted Angle	Judgement	Remarks (Antenna Model)
	A (dBm/MHz)	Type	Gain B (dBi)	3dB Beam-width Horizontal (Degree)	3dB Beam-width Vertical (Degree)	Model	Length (m)	Loss C (dB)					
1	7.08	Dipole	3.00	-	-	-	-	0.00	3.00	10.08	360.00	Good	FDE_ACBSMA-BGP
2	7.08	Printed	3.79	-	-	-	-	0.00	3.79	10.87	360.00	Good	WUBR-508N
3	7.08	PCB	1.84	-	-	-	-	0.00	1.84	8.92	360.00	Good	FML2.4WA-200
4	7.08	PCB	1.00	-	-	-	-	0.00	1.00	8.08	360.00	Good	GEPH-013
5	7.08	Dipole	1.87	-	-	-	-	0.00	1.87	8.95	360.00	Good	WAND2DBI
6													
7													
8													
9													
10													
11													
12													

**SPORTON International Inc.**

**6. Unwanted Emission Intensity**

Test Voltage		V	Normal Voltage ( 5V )							Remarks
Test Frequency		MHz	2412	2442	2472					
Unwanted Emission Frequency	※ 1	MHz	2358.72	1628.05	1646.90					RBW : 1 MHz ; VBW : 1 MHz
	※ 2	MHz	2397.24	2387.13	2387.31					
	※ 3	MHz	2488.88	2495.98	2486.78					
	※ 4	MHz	3216.75	2496.50	3196.75					
Cable Loss	※ 1	dB	1.34	1.34	1.34					
	※ 2	dB	1.34	1.34	1.34					
	※ 3	dB	1.34	1.34	1.34					
	※ 4	dB	3.68	3.68	3.68					
Spectrum Raw	※ 1	dBm	-42.06	-41.60	-40.02					
	※ 2	dBm	-23.67	-41.44	-42.58					
	※ 3	dBm	-43.57	-41.70	-21.31					
	※ 4	dBm	-45.08	-43.89	-43.77					
Unwanted Emission Intensity	※ 1	dBm	-40.72	-40.26	-38.68					Limit ≤ 2.5 μW/MHz (-26 dBm)
	※ 2	dBm	-22.33	-40.10	-41.24					Limit ≤ 25 μW/MHz (-16 dBm)
	※ 3	dBm	-42.23	-40.36	-19.97					Limit ≤ 25 μW/MHz (-16 dBm)
	※ 4	dBm	-41.40	-40.21	-40.09					Limit ≤ 2.5 μW/MHz (-26 dBm)
Unwanted Emission Intensity	※ 1	μW	0.0847	0.0942	0.1355					Limit ≤ 2.5 μW/MHz (-26 dBm)
	※ 2	μW	5.8479	0.0977	0.0752					Limit ≤ 25 μW/MHz (-16 dBm)
	※ 3	μW	0.0598	0.0920	10.0693					Limit ≤ 25 μW/MHz (-16 dBm)
	※ 4	μW	0.0724	0.0953	0.0979					Limit ≤ 2.5 μW/MHz (-26 dBm)

- ※ 1: Frequency Band 1 (30 MHz ≤ f ≤ 2387 MHz)
- ※ 2: Frequency Band 2 (2387 MHz < f ≤ 2400 MHz)
- ※ 3: Frequency Band 3 (2483.5 MHz ≤ f < 2496.5 MHz)
- ※ 4: Frequency Band 4 (2496.5 MHz ≤ f < 12.5 GHz)
- ※ 5: Frequency Band 5 (30 MHz ≤ f < 1000 MHz)
- ※ 6: Frequency Band 6 (1000 MHz ≤ f < 12.5 GHz)

**7. Limitation of Collateral Emission of Receiver**

Test Voltage		V	Normal Voltage ( 5V )							Remarks		
Test Frequency		MHz	2412	2442	2472							
Spurious Emission Frequency	※ 5	MHz	774.96	542.16	724.52					1st	30MHz~1000MHz:: Maximum emission and all emissions beyond 1/10 of the limitation must be indicated.	
	※ 5	MHz	-	-	-					2nd		
	※ 5	MHz	-	-	-					3rd		
	Cable Loss	※ 6	MHz	3208.00	3254.00	3300.00					1st	1000MHz~12.5GHz:: Maximum emission and all emissions beyond 1/10 of the limitation must be indicated.
		※ 6	MHz	-	-	-					2nd	
		※ 6	MHz	-	-	-					3rd	
Spectrum Raw		※ 5	dB	0.78	0.78	0.78					1st	
		※ 5	dB	-	-	-					2nd	
		※ 5	dB	-	-	-					3rd	
	※ 6	dB	3.68	3.68	3.68					1st		
	※ 6	dB	-	-	-					2nd		
	※ 6	dB	-	-	-					3rd		
Spurious Emission Intensity	※ 5	dBm	-78.35	-78.03	-78.51					1st		
	※ 5	dBm	-	-	-					2nd		
	※ 5	dBm	-	-	-					3rd		
	※ 6	dBm	-77.57	-77.25	-77.73					1st	Limit ≤ 4 nW (-54 dBm)	
	※ 5	dBm	-	-	-					2nd	RBW : 100 kHz ; VBW : 100 kHz	
	※ 5	dBm	-	-	-					3rd		
Spurious Emission Intensity	※ 6	dBm	-59.24	-59.09	-60.95					1st	Limit ≤ 20 nW (-47 dBm)	
	※ 6	dBm	-	-	-					2nd	RBW : 1 MHz ; VBW : 1 MHz	
	※ 6	dBm	-	-	-					3rd		
	※ 5	nW	0.0175	0.0188	0.0169					Total Emission Power		
	※ 5	nW	0.0175	0.0188	0.0169					1st	Limit ≤ 4 nW (-54 dBm)	
	※ 5	nW	-	-	-					2nd	RBW : 100 kHz ; VBW : 100 kHz	
Spurious Emission Intensity	※ 5	nW	-	-	-					3rd		
	※ 6	nW	1.1912	1.2331	0.8035					Total Emission Power		
	※ 6	nW	1.1912	1.2331	0.8035					1st	Limit ≤ 20 nW (-47 dBm)	
	※ 6	nW	-	-	-					2nd	RBW : 1 MHz ; VBW : 1 MHz	
	※ 6	nW	-	-	-					3rd		

- ※ 1: Frequency Band 1 (30 MHz ≤ f ≤ 2387 MHz)
- ※ 2: Frequency Band 2 (2387 MHz < f ≤ 2400 MHz)
- ※ 3: Frequency Band 3 (2483.5 MHz ≤ f < 2496.5 MHz)
- ※ 4: Frequency Band 4 (2496.5 MHz ≤ f < 12.5 GHz)
- ※ 5: Frequency Band 5 (30 MHz ≤ f < 1000 MHz)
- ※ 6: Frequency Band 6 (1000 MHz ≤ f < 12.5 GHz)

**8. Spread Factor**

Test Voltage		V	Normal Voltage ( 5V )							Remarks
Test Frequency		MHz	2412	2442	2472					
Spread-Spectrum Bandwidth		MHz	10.60	10.60	10.56					
Modulation Rate		Mcps	1.375	1.375	1.375					
Spread Factor			7.7091	7.7091	7.6800					Spread Factor Limit ≥ 5 (DSSS and FHSS)

Appendix B 19-11g-G1D(20MHz Mode)

Sporton No.	JR373103-02
Test Date	2013/9/5
Test Location	SPORTON Lab.
Temp. / Humid.	24.6°C / 62%
Test Site	TH06-HY
Engineer	Shiming
Department	Radio Service Group

1. General Information

Specified Radio Equipment	Class	Article 2 Paragraph 1 Item 19	Model	WUJBR-508N	Temp. / Humid.	24.6°C / 62%
	Type of Emission	G1D / D1D	Serial No.	12635W2002256	Test Site	TH06-HY
	Modulation Type	OFDM: BPSK, QPSK, 16QAM, 64QAM	Antenna Power	2.21 mW/MHz	Engineer	Shiming
	Frequency	2412~2472 MHz	Antenna Port	DAC 0	Department	Radio Service Group

2. Test Results

Test Voltage	V	Normal Voltage ( 5V )			Remarks	
Test Frequency	MHz	2412	2442	2472	Low/Mid/High of test frequency range	
Measured Frequency	MHz	2411.9694	2441.9688	2471.9682		
Frequency Error	ppm	-12.69	-12.78	-12.86	Limit ≤ 50 ppm	
Occupied Bandwidth	MHz	16.64	16.60	16.64	Limit ≤ 26 MHz (RB/VB : 300kHz)	
Spread-spectrum Bandwidth	MHz	14.56	14.60	14.60	Spread Factor Limit ≥ 5 (DSSS and FHSS)	
Unwanted Emission Intensity (Power emission within 1MHz bandwidth)	※ 1	μW	0.19275	0.07482	0.07278	Limit ≤ 2.5 μW/MHz (-26 dBm)
	※ 2	μW	1.33660	0.20654	0.08851	Limit ≤ 25 μW/MHz (-16 dBm)
	※ 3	μW	0.09572	0.18793	2.25944	Limit ≤ 25 μW/MHz (-16 dBm)
	※ 4	μW	0.09638	0.13709	1.43219	Limit ≤ 2.5 μW/MHz (-26 dBm)
Antenna Power (Conducted)	mW/MHz	2.19170	2.20182	2.21198	Limit ≤ 10 mW/MHz (10 dBm/MHz)	
Antenna Power Error	mW/MHz	-0.01830	-0.00818	0.00198		
	%	-0.83	-0.37	0.09	Limit + 20% ~ - 80%	
Limitation of Collateral Emission of Receiver	※ 5	nW	0.0180	0.0167	0.0165	Limit ≤ 4 nW (-54 dBm)
	※ 6	nW	1.1858	1.1967	0.7603	Limit ≤ 20 nW (-47 dBm)
Hopping Frequency Dwell Time	sec	-	-	-	Limit ≤ 0.4 sec (In 0.4 sec × spreading rate)	
Radio Interference Prevention Function	ID Code	Good, MAC Address:00-0E-8E-40-89-82				
	Carrier Sense	NR	NR	NR	NR: Not Require	

- ※ 1: Frequency Band 1 (30 MHz ≤ f ≤ 2387 MHz)
- ※ 2: Frequency Band 2 (2387 MHz < f ≤ 2400 MHz)
- ※ 3: Frequency Band 3 (2483.5 MHz ≤ f < 2496.5 MHz)
- ※ 4: Frequency Band 4 (2496.5 MHz ≤ f < 12.5 GHz)
- ※ 5: Frequency Band 5 (30 MHz ≤ f < 1000 MHz)
- ※ 6: Frequency Band 6 (1000 MHz ≤ f < 12.5 GHz)

3. Antenna Power (Conducted Power)

Test Voltage	V	Normal Voltage ( 5V )			Remarks
Test Frequency	MHz	2412	2442	2472	
Power Meter Raw (IF of Spectrum)	dBm	-16.59	-16.57	-16.55	
Power Measurement System Loss	dB	20.49	20.49	20.49	Refer to Calibration Result
Transmitter Duty Cycle Factor	dB	0.00	0.00	0.00	Duty Factor = 10 × 10Log <sub>10</sub> (1/Duty Cycle)
Equivalent Noise Bandwidth	MHz	1.12	1.12	1.12	ENB = Total_Sum^2 / Peak_Level * Point_Width
Equivalent Noise Bandwidth Factor	dB	0.49	0.49	0.49	ENB Factor = 10 × 10Log <sub>10</sub> (1/ENB)
Antenna Power (Conducted)	dBm/MHz	3.41	3.43	3.45	Limit ≤ 10 mW/MHz (10 dBm/MHz)
Antenna Power (Conducted)	mW/MHz	2.1917	2.2018	2.2120	
Antenna Power Error	mW	-0.0183	-0.0082	0.0020	
	%	-0.83	-0.37	0.09	Limit + 20% ~ - 80%
Transmitter ON <sub>Time</sub>	msec	1.0000			RBW : 1 MHz ; VBW : 1 MHz ; SP : 0Hz
Transmitter (ON+OFF) <sub>Time</sub>	msec	1.0000			
Transmitter Duty Cycle	%	100.00%			

4. Transmission Radiation Angle Width (This test item will not be applied to the EIRP power is lower than 12.14dBm/MHz)

No.	Antenna Power		Antenna				Cable			Total Gain D=B+C	EIRP F=A+D	Permitted Angle	Judgement	Remarks (Antenna Model)
	A	(dBm/MHz)	Type	Gain B (dBi)	3dB Beam- width Horizontal (Degree)	3dB Beam- width Vertical (Degree)	Model	Length (m)	Loss C (dB)					
1	3.45		Dipole	3.00	-	-	-	-	0	3.00	6.45	360.00	Good	FDE_ACBSMA-BGP
2	3.45		Printed	3.79	-	-	-	-	0	3.79	7.24	360.00	Good	WUJBR-508N
3	3.45		PCB	1.84	-	-	-	-	0	1.84	5.29	360.00	Good	FML2.4WA-200
4	3.45		PCB	1.00	-	-	-	-	0	1.00	4.45	360.00	Good	GEPH-013
5	3.45		Dipole	1.87	-	-	-	-	0	1.87	5.32	360.00	Good	WAND2DBI
6														
7														
8														
9														
10														
11														
12														

6. Unwanted Emission Intensity										
Test Voltage		V	Normal Voltage ( 5V )							Remarks
Test Frequency		MHz	2412	2442	2472					
Unwanted Emission Frequency	※ 1	MHz	2387.00	2387.00	2349.29					RBW : 1 MHz ; VBW : 1 MHz
	※ 2	MHz	2399.87	2389.55	2389.31					
	※ 3	MHz	2493.20	2494.55	2484.36					
	※ 4	MHz	2516.51	2496.50	2496.50					
Cable Loss	※ 1	dB	1.34	1.34	1.34					
	※ 2	dB	1.34	1.34	1.34					
	※ 3	dB	1.34	1.34	1.34					
	※ 4	dB	3.68	3.68	3.68					
Spectrum Raw	※ 1	dBm	-38.49	-42.60	-42.72					
	※ 2	dBm	-30.08	-38.19	-41.87					
	※ 3	dBm	-41.53	-38.60	-27.80					
	※ 4	dBm	-43.84	-42.31	-32.12					
Unwanted Emission Intensity	※ 1	dBm	-37.15	-41.26	-41.38					Limit ≤ 2.5 μW/MHz (-26 dBm)
	※ 2	dBm	-28.74	-36.85	-40.53					Limit ≤ 25 μW/MHz (-16 dBm)
	※ 3	dBm	-40.19	-37.26	-26.46					Limit ≤ 25 μW/MHz (-16 dBm)
	※ 4	dBm	-40.16	-38.63	-28.44					Limit ≤ 2.5 μW/MHz (-26 dBm)
Unwanted Emission Intensity	※ 1	μW	0.1928	0.0748	0.0728					Limit ≤ 2.5 μW/MHz (-26 dBm)
	※ 2	μW	1.3366	0.2065	0.0885					Limit ≤ 25 μW/MHz (-16 dBm)
	※ 3	μW	0.0957	0.1879	2.2594					Limit ≤ 25 μW/MHz (-16 dBm)
	※ 4	μW	0.0964	0.1371	1.4322					Limit ≤ 2.5 μW/MHz (-26 dBm)

- ※ 1: Frequency Band 1 (30 MHz ≤ f ≤ 2387 MHz)
- ※ 2: Frequency Band 2 (2387 MHz < f ≤ 2400 MHz)
- ※ 3: Frequency Band 3 (2483.5 MHz ≤ f < 2496.5 MHz)
- ※ 4: Frequency Band 4 (2496.5 MHz ≤ f < 12.5 GHz)
- ※ 5: Frequency Band 5 (30 MHz ≤ f < 1000 MHz)
- ※ 6: Frequency Band 6 (1000 MHz ≤ f < 12.5 GHz)

7. Limitation of Collateral Emission of Receiver

7. Limitation of Collateral Emission of Receiver											
Test Voltage		V	Normal Voltage ( 5V )							Remarks	
Test Frequency		MHz	2412	2442	2472						
Spurious Emission Frequency	※ 5	MHz	513.06	866.14	187.14					1st	30MHz~1000MHz:: Maximum emission and all emissions beyond 1/10 of the limitation must be indicated.
	※ 5	MHz	-	-	-					2nd	
	※ 5	MHz	-	-	-					3rd	
	※ 6	MHz	3208.00	3254.00	3300.00					1st	
	※ 6	MHz	-	-	-					2nd	
	※ 6	MHz	-	-	-					3rd	
Cable Loss	※ 5	dB	0.78	0.78	0.78					1st	
	※ 5	dB	-	-	-					2nd	
	※ 5	dB	-	-	-					3rd	
	※ 6	dB	3.68	3.68	3.68					1st	
	※ 6	dB	-	-	-					2nd	
	※ 6	dB	-	-	-					3rd	
Spectrum Raw	※ 5	dBm	-78.23	-78.56	-78.60					1st	
	※ 5	dBm	-	-	-					2nd	
	※ 5	dBm	-	-	-					3rd	
	※ 6	dBm	-62.94	-62.90	-64.87					1st	
	※ 6	dBm	-	-	-					2nd	
	※ 6	dBm	-	-	-					3rd	
Spurious Emission Intensity	※ 5	dBm	-77.45	-77.78	-77.82					1st	Limit ≤ 4 nW (-54 dBm) RBW : 100 kHz ; VBW : 100 kHz
	※ 5	dBm	-	-	-					2nd	
	※ 5	dBm	-	-	-					3rd	
	※ 6	dBm	-59.26	-59.22	-61.19					1st	
	※ 6	dBm	-	-	-					2nd	
	※ 6	dBm	-	-	-					3rd	
Spurious Emission Intensity	※ 5	nW	0.0180	0.0167	0.0165					Total Emission Power	
	※ 5	nW	0.0180	0.0167	0.0165					1st	Limit ≤ 4 nW (-54 dBm) RBW : 100 kHz ; VBW : 100 kHz
	※ 5	nW	-	-	-					2nd	
	※ 5	nW	-	-	-					3rd	
	※ 6	nW	1.1858	1.1967	0.7603					Total Emission Power	
	※ 6	nW	1.1858	1.1967	0.7603					1st	Limit ≤ 20 nW (-47 dBm) RBW : 1 MHz ; VBW : 1 MHz
※ 6	nW	-	-	-					2nd		
※ 6	nW	-	-	-					3rd		

- ※ 1: Frequency Band 1 (30 MHz ≤ f ≤ 2387 MHz)
- ※ 2: Frequency Band 2 (2387 MHz < f ≤ 2400 MHz)
- ※ 3: Frequency Band 3 (2483.5 MHz ≤ f < 2496.5 MHz)
- ※ 4: Frequency Band 4 (2496.5 MHz ≤ f < 12.5 GHz)
- ※ 5: Frequency Band 5 (30 MHz ≤ f < 1000 MHz)
- ※ 6: Frequency Band 6 (1000 MHz ≤ f < 12.5 GHz)

Appendix B 19-11n-G1D

Sporton No.	JR373103-02
Test Date	2013/9/4
Test Location	SPORTON Lab.
Temp. / Humid.	24.6°C / 56%
Test Site	TH06-HY
Engineer	Shiming
Department	Radio Service Group

1. General Information

Specified Radio Equipment	Class	Article 2 Paragraph 1 Item 19			Model	WUBR-508N				
	Type of Emission	G1D			Serial No.	12635W2002256				
	Modulation Type	DSSS: BPSK, QPSK, CCK			Antenna Power	2.45 mW/MHz				
	Frequency	2412~2472 MHz								

2. Test Results

Testing for Electrical Specification	Test Voltage	V	Normal Voltage (5V) Port 1			Normal Voltage (5V) Port 2			Normal Voltage (5V) Port Total			Remarks	
		Test Frequency	MHz	2412	2442	2472	2412	2442	2472	2412	2442	2472	Low/Mid/High of test frequency range
	Measured Frequency	MHz	2411.9706	2441.9712	2471.9712	2411.9706	2441.9712	2471.9712	-	-	-		
	Frequency Error	ppm	-12.19	-11.79	-11.65	-12.19	-11.79	-11.65	-	-	-	Limit ≤ 50 ppm	
	Occupied Bandwidth	MHz	17.52	17.52	17.48	17.52	17.52	17.52	-	-	-	Limit ≤ 26 MHz (RB/VB : 300kHz)	
	Spread-spectrum Bandwidth	MHz	15.16	15.16	15.16	15.20	15.20	15.20	-	-	-	Spread Factor Limit ≥ 5 (DSSS and FHSS)	
	Unwanted Emission Intensity (Power emission within 1MHz bandwidth)	※ 1	μW	0.10023	0.05458	0.05000	0.13583	0.10691	0.09376	0.23606	0.16148	0.14376	Limit ≤ 2.5 μW (-26 dBm)
		※ 2	μW	6.87068	0.13772	0.05875	1.91867	0.18923	0.08995	8.78935	0.32696	0.14870	Limit ≤ 25 μW (-16 dBm)
		※ 3	μW	0.05164	0.13305	0.57810	0.05768	0.17258	0.39994	0.10932	0.30563	0.97804	Limit ≤ 25 μW (-16 dBm)
		※ 4	μW	0.08433	0.09572	0.20749	0.11912	0.09484	0.14859	0.20346	0.19056	0.35608	Limit ≤ 2.5 μW (-26 dBm)
	Antenna Power (Conducted)	mW/MHz	1.19339	1.19890	1.22119	1.24389	1.25251	1.19890	2.43728	2.45141	2.42008	Limit ≤ 10 mW/MHz (10 dBm/MHz)	
	Antenna Power Error	mW/MHz	-1.25661	-1.25110	-1.22881	-1.20611	-1.19749	-1.25110	-0.01272	0.00141	-0.02992		
		%	-51.29	-51.07	-50.16	-49.23	-48.88	-51.07	-0.52	0.06	-1.22	Limit + 20% ~ - 80%	
	Limitation of Collateral Emission of Receiver	※ 5	nW	0.0194	0.0171	0.0192	0.0179	0.0177	0.0176	0.0373	0.0347	0.0368	Limit ≤ 4 nW (-54 dBm)
		※ 6	nW	1.1298	1.1641	0.6577	0.3741	0.3342	0.2344	1.5039	1.4983	0.8921	Limit ≤ 20 nW (-47 dBm)
	Hopping Frequency Dwell Time	sec	-	-	-	-	-	-	-	-	-	Limit ≤ 0.4 sec (In 0.4 sec × spreading rate)	
	Radio Interference Prevention Function	ID Code	Good, MAC Address:00-0E-8E-40-89-82										
		Carrier Sense	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR: Not Require	

- ※ 1: Frequency Band 1 (30 MHz ≤ f ≤ 2387 MHz)
- ※ 2: Frequency Band 2 (2387 MHz < f ≤ 2400 MHz)
- ※ 3: Frequency Band 3 (2483.5 MHz ≤ f < 2496.5 MHz)
- ※ 4: Frequency Band 4 (2496.5 MHz ≤ f < 12.5 GHz)
- ※ 5: Frequency Band 5 (30 MHz ≤ f < 1000 MHz)
- ※ 6: Frequency Band 6 (1000 MHz ≤ f < 12.5 GHz)

3. Antenna Power (Conducted Power)

Testing for Electrical Specification	Test Voltage	V	Normal Voltage (5V) Port 1			Normal Voltage (5V) Port 2			Normal Voltage (5V) Port Total			Remarks
		Test Frequency	MHz	2412	2442	2472	2412	2442	2472	2412	2442	2472
	Power Meter Raw (IF of Spectrum)	dBm	-19.23	-19.21	-19.13	-19.05	-19.02	-19.21	-16.13	-16.10	-16.16	
	Power Measurement System Loss	dB	20.49	20.49	20.49	20.49	20.49	20.49	20.49	20.49	20.49	Refer to Calibration Result
	Transmitter Duty Cycle Factor	dB	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	Duty Factor = 10 × 10Log <sub>10</sub> (1/Duty Cycle)
	Equivalent Noise Bandwidth	MHz	1.12	1.12	1.12	1.12	1.12	1.12	1.12	1.12	1.12	ENB = Total_Sum^2 / Peak_Level * Point_Width
	Equivalent Noise Bandwidth Factor	dB	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.49	ENB Factor = 10 × 10Log <sub>10</sub> (1/ENB)
	Antenna Power (Conducted)	dBm/MHz	0.77	0.79	0.87	0.95	0.98	0.79	3.87	3.89	3.84	Limit ≤ 10 mW/MHz (10 dBm/MHz)
	Antenna Power (Conducted)	mW/MHz	1.1934	1.1989	1.2212	1.2439	1.2525	1.1989	2.4373	2.4514	2.4201	
	Antenna Power Error	mW	-1.2566	-1.2511	-1.2288	-1.2061	-1.1975	-1.2511	-0.0127	0.0014	-0.0299	
		%	-51.29	-51.07	-50.16	-49.23	-48.88	-51.07	-0.52	0.06	-1.22	Limit + 20% ~ - 80%
	Transmitter ON <sub>time</sub>	msec	1.0000									RBW : 1 MHz ; VBW : 1 MHz ; SP : 0Hz
	Transmitter (ON+OFF) <sub>time</sub>	msec	1.0000									
	Transmitter Duty Cycle	%	100.00%									

4. Transmission Radiation Angle Width (This test item will not be applied to the EIRP power is lower than 12.14dBm/MHz)

No.	Antenna Power	Antenna			Cable			Total Gain D=B-C	EIRP F=A+D	Permitted Angle	Judgement	Remarks (Antenna Model)	
	A (dBm/MHz)	Type	Gain B (dBi)	3dB Beam-width Horizontal (Degree)	3dB Beam-width Vertical (Degree)	Model	Length (m)						Loss C (dB)
1	3.89	Dipole	3.00	-	-	-	-	0.00	3.00	6.89	360.00	Good	FDE_ACBSMA-BGP
2	3.89	Printed	3.79	-	-	-	-	0.00	3.79	7.68	360.00	Good	WUBR-508N
3	3.89	PCB	1.84	-	-	-	-	0.00	1.84	5.73	360.00	Good	FML2.4WA-200
4	3.89	PCB	1.00	-	-	-	-	0.00	1.00	4.89	360.00	Good	GEPH-013
5	3.89	Dipole	1.87	-	-	-	-	0.00	1.87	5.76	360.00	Good	WAND2DB1
6													
7													
8													
9													
10													
11													
12													

6. Unwanted Emission Intensity

Test Voltage		V	Normal Voltage (5V) Port 1			Normal Voltage (5V) Port 2			Normal Voltage (5V) Port Total			Remarks	
Test Frequency		MHz	2412	2442	2472	2412	2442	2472	2412	2442	2472		
Unwanted Emission Intensity	Unwanted Emission Frequency	※ 1	MHz	2387.00	2377.57	2335.15	2363.43	2321.00	2335.15	-	-	-	RBW : 1 MHz ; VBW : 1 MHz
		※ 2	MHz	2399.45	2389.81	2390.41	2399.84	2389.47	2398.78	-	-	-	
		※ 3	MHz	2495.67	2493.82	2484.25	2493.72	2494.24	2483.53	-	-	-	
		※ 4	MHz	3156.73	3116.72	2496.50	3126.75	2496.50	2496.50	-	-	-	
Cable Loss	※ 1	dB	1.34	1.34	1.34	1.34	1.34	1.34	1.34	1.34	1.34		
	※ 2	dB	1.34	1.34	1.34	1.34	1.34	1.34	1.34	1.34	1.34		
	※ 3	dB	1.34	1.34	1.34	1.34	1.34	1.34	1.34	1.34	1.34		
	※ 4	dB	3.68	3.68	3.68	3.68	3.68	3.68	3.68	3.68	3.68		
Spectrum Raw	※ 1	dBm	-41.33	-43.97	-44.35	-40.01	-41.05	-41.62	-37.61	-39.26	-39.76		
	※ 2	dBm	-22.97	-39.95	-43.65	-28.51	-38.57	-41.80	-21.90	-36.20	-39.62		
	※ 3	dBm	-44.21	-40.10	-33.72	-43.73	-38.97	-35.32	-40.95	-36.49	-31.44		
	※ 4	dBm	-44.42	-43.87	-40.51	-42.92	-43.91	-41.96	-40.60	-40.88	-38.16		
Unwanted Emission Intensity	※ 1	dBm	-39.99	-42.63	-43.01	-38.67	-39.71	-40.28	-36.27	-37.92	-38.42	Limit ≤ 2.5 μW (-26 dBm)	
	※ 2	dBm	-21.63	-38.61	-42.31	-27.17	-37.23	-40.46	-20.56	-34.86	-38.28	Limit ≤ 25 μW (-16 dBm)	
	※ 3	dBm	-42.87	-38.76	-32.38	-42.39	-37.63	-33.98	-39.61	-35.15	-30.10	Limit ≤ 25 μW (-16 dBm)	
	※ 4	dBm	-40.74	-40.19	-36.83	-39.24	-40.23	-38.28	-36.92	-37.20	-34.48	Limit ≤ 2.5 μW (-26 dBm)	
Unwanted Emission Intensity	※ 1	μW	0.1002	0.0546	0.0500	0.1358	0.1069	0.0938	0.2361	0.1615	0.1438	Limit ≤ 2.5 μW (-26 dBm)	
	※ 2	μW	6.8707	0.1377	0.0587	1.9187	0.1892	0.0899	8.7894	0.3270	0.1487	Limit ≤ 25 μW (-16 dBm)	
	※ 3	μW	0.0516	0.1330	0.5781	0.0577	0.1726	0.3999	0.1093	0.3056	0.9780	Limit ≤ 25 μW (-16 dBm)	
	※ 4	μW	0.0843	0.0957	0.2075	0.1191	0.0948	0.1486	0.2035	0.1906	0.3561	Limit ≤ 2.5 μW (-26 dBm)	

- ※ 1: Frequency Band 1 (30 MHz ≤ f ≤ 2387 MHz)
- ※ 2: Frequency Band 2 (2387 MHz < f ≤ 2400 MHz)
- ※ 3: Frequency Band 3 (2483.5 MHz ≤ f < 2496.5 MHz)
- ※ 4: Frequency Band 4 (2496.5 MHz ≤ f < 12.5 GHz)
- ※ 5: Frequency Band 5 (30 MHz ≤ f < 1000 MHz)
- ※ 6: Frequency Band 6 (1000 MHz ≤ f < 12.5 GHz)

7. Limitation of Collateral Emission of Receiver

Test Voltage		V	Normal Voltage (5V) Port 1			Normal Voltage (5V) Port 2			Normal Voltage (5V) Port Total			Remarks		
Test Frequency		MHz	2412	2442	2472	2412	2442	2472	2412	2442	2472			
Spurious Emission Frequency	※ 5	MHz	871.96	773.02	518.88	322.94	47.46	866.14	-	-	-	1st	30MHz~1000MHz:: Maximum emission and all emissions beyond 1/10 of the limitation must be indicated.	
	※ 5	MHz	-	-	-	-	-	-	-	-	-	2nd		
	※ 5	MHz	-	-	-	-	-	-	-	-	-	3rd		
	※ 6	MHz	3208.00	3254.00	3300.00	3208.00	3254.00	3300.00	-	-	-	1st		1000MHz~12.5GHz:: Maximum emission and all emissions beyond 1/10 of the limitation must be indicated.
	※ 6	MHz	-	-	-	-	-	-	-	-	-	2nd		
	※ 6	MHz	-	-	-	-	-	-	-	-	-	3rd		
Cable Loss	※ 5	dB	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	1st		
	※ 5	dB	-	-	-	-	-	-	-	-	-	2nd		
	※ 5	dB	-	-	-	-	-	-	-	-	-	3rd		
	※ 6	dB	3.68	3.68	3.68	3.68	3.68	3.68	3.68	3.68	3.68	1st		
	※ 6	dB	-	-	-	-	-	-	-	-	-	2nd		
	※ 6	dB	-	-	-	-	-	-	-	-	-	3rd		
Spectrum Raw	※ 5	dBm	-77.91	-78.46	-77.95	-78.24	-78.31	-78.33	-75.06	-75.37	-75.13	1st		
	※ 5	dBm	-	-	-	-	-	-	-	-	-	2nd		
	※ 5	dBm	-	-	-	-	-	-	-	-	-	3rd		
	※ 6	dBm	-63.15	-63.02	-65.50	-67.95	-68.44	-69.98	-61.91	-61.92	-64.18	1st		
	※ 6	dBm	-	-	-	-	-	-	-	-	-	2nd		
	※ 6	dBm	-	-	-	-	-	-	-	-	-	3rd		
Spurious Emission Intensity	※ 5	dBm	-77.13	-77.68	-77.17	-77.46	-77.53	-77.55	-74.28	-74.59	-74.35	1st	Limit ≤ 4 nW (-54 dBm) RBW : 100 kHz ; VBW : 100 kHz	
	※ 5	dBm	-	-	-	-	-	-	-	-	-	2nd		
	※ 5	dBm	-	-	-	-	-	-	-	-	-	3rd		
	※ 6	dBm	-59.47	-59.34	-61.82	-64.27	-64.76	-66.30	-58.23	-58.24	-60.50	1st	Limit ≤ 20 nW (-47 dBm) RBW : 1 MHz ; VBW : 1 MHz	
	※ 6	dBm	-	-	-	-	-	-	-	-	-	2nd		
	※ 6	dBm	-	-	-	-	-	-	-	-	-	3rd		
Spurious Emission Intensity	※ 5	nW	0.0194	0.0171	0.0192	0.0179	0.0177	0.0176	0.0373	0.0347	0.0368	Total Emission Power		
	※ 5	nW	0.0194	0.0171	0.0192	0.0179	0.0177	0.0176	0.0373	0.0347	0.0368	1st	Limit ≤ 4 nW (-54 dBm) RBW : 100 kHz ; VBW : 100 kHz	
	※ 5	nW	-	-	-	-	-	-	-	-	-	2nd		
	※ 5	nW	-	-	-	-	-	-	-	-	-	3rd		
	※ 6	nW	1.1298	1.1641	0.6577	0.3741	0.3342	0.2344	1.5039	1.4983	0.8921	Total Emission Power		
	※ 6	nW	1.1298	1.1641	0.6577	0.3741	0.3342	0.2344	1.5039	1.4983	0.8921	1st	Limit ≤ 20 nW (-47 dBm) RBW : 1 MHz ; VBW : 1 MHz	
※ 6	nW	-	-	-	-	-	-	-	-	-	2nd			
※ 6	nW	-	-	-	-	-	-	-	-	-	3rd			

- ※ 1: Frequency Band 1 (30 MHz ≤ f ≤ 2387 MHz)
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- ※ 3: Frequency Band 3 (2483.5 MHz ≤ f < 2496.5 MHz)
- ※ 4: Frequency Band 4 (2496.5 MHz ≤ f < 12.5 GHz)
- ※ 5: Frequency Band 5 (30 MHz ≤ f < 1000 MHz)
- ※ 6: Frequency Band 6 (1000 MHz ≤ f < 12.5 GHz)

Appendix B 19-11n-G1D

Sporton No.	JR373103-02
Test Date for other	2013/9/4
Test Date for carrier sense	2018/2/9
Test Location	SPORTON Lab.
Temp. / Humid.	24.6°C / 56%
Test Site	TH06-HY
Engineer	Shiming
Department	Radio Service Group

1. General Information

Specified Radio Equipment	Class	Article 2 Paragraph 1 Item 19	Model	WUBR-508N
	Type of Emission	G1D / D1D	Serial No.	12635W2002256
	Modulation Type	OFDM: BPSK, QPSK, 16QAM, 64QAM	Antenna Power	1.19 mW/MHz
	Frequency	2422~2462 MHz		

2. Test Results

Test Voltage	V	Normal Voltage (5V) Port 1			Normal Voltage (5V) Port 2			Normal Voltage (5V) Port Total			Remarks	
		2422	2442	2462	2422	2442	2462	2422	2442	2462		
Test Frequency	MHz	2422.9724	2441.9826	2461.9778	2422.9724	2441.9826	2461.9778	-	-	-	Low/Mid/High of test frequency range	
Measured Frequency	MHz	2421.9724	2441.9826	2461.9778	2421.9724	2441.9826	2461.9778	-	-	-		
Frequency Error	ppm	-11.40	-7.13	-9.02	-11.40	-7.13	-9.02	-	-	-	Limit ≤ 50 ppm	
Occupied Bandwidth	MHz	35.92	35.92	35.92	35.92	36.00	36.00	-	-	-	Limit ≤ 38 MHz (RB/VB : 300kHz)	
Spread-spectrum Bandwidth	MHz	31.92	31.92	31.84	32.08	32.16	32.16	-	-	-	Spread Factor Limit ≥ 5 (DSSS and FHSS)	
Unwanted Emission Intensity (Power emission within 1MHz bandwidth)	※ 1	μW	1.53462	0.06823	0.06982	0.20701	0.10351	0.10593	1.74163	0.17175	0.17575	Limit ≤ 2.5 μW (-26 dBm)
	※ 2	μW	3.54813	0.81470	0.06730	1.58855	0.20559	0.07345	5.13668	1.02029	0.14075	Limit ≤ 25 μW (-16 dBm)
	※ 3	μW	0.07603	1.24165	8.24138	0.05875	0.80353	5.18800	0.13478	2.04518	13.42938	Limit ≤ 25 μW (-16 dBm)
	※ 4	μW	0.08730	0.08166	0.19011	0.11455	0.07852	0.11092	0.20185	0.16018	0.30103	Limit ≤ 2.5 μW (-26 dBm)
Antenna Power (Conducted)	mW/MHz	0.57914	0.57119	0.60087	0.55307	0.55819	0.59126	1.13221	1.12938	1.19214	Limit ≤ 5 mW/MHz (7 dBm/MHz)	
Antenna Power Error	mW/MHz	-0.61086	-0.61881	-0.58913	-0.63693	-0.63181	-0.59874	-0.05779	-0.06062	0.00214		
	%	-51.33	-52.00	-49.51	-53.52	-53.09	-50.31	-4.86	-5.09	0.18	Limit + 20% ~ - 80%	
Limitation of Collateral Emission of Receiver	※ 5	nW	0.0199	0.0206	0.0160	0.0244	0.0187	0.0236	0.0443	0.0393	0.0396	Limit ≤ 4 nW (-54 dBm)
	※ 6	nW	1.1641	1.1117	0.8260	0.3776	0.3206	0.2138	1.5417	1.4324	1.0398	Limit ≤ 20 nW (-47 dBm)
Hopping Frequency Dwell Time	sec	-	-	-	-	-	-	-	-	-	Limit ≤ 0.4 sec (In 0.4 sec × spreading rate)	
Radio Interference Prevention Function	ID Code	Good, MAC Address:00-DE-8E-40-89-82										
	Carrier Sense	Good	Good	Good	Good	Good	Good	Good	Good	Good	NR: Not Require	

- ※ 1: Frequency Band 1 (30 MHz ≤ f ≤ 2387 MHz)
- ※ 2: Frequency Band 2 (2387 MHz < f ≤ 2400 MHz)
- ※ 3: Frequency Band 3 (2483.5 MHz ≤ f < 2496.5 MHz)
- ※ 4: Frequency Band 4 (2496.5 MHz ≤ f < 12.5 GHz)
- ※ 5: Frequency Band 5 (30 MHz ≤ f < 1000 MHz)
- ※ 6: Frequency Band 6 (1000 MHz ≤ f < 12.5 GHz)

3. Antenna Power (Conducted Power)

Test Voltage	V	Normal Voltage (5V) Port 1			Normal Voltage (5V) Port 2			Normal Voltage (5V) Port Total			Remarks
		2422	2442	2462	2422	2442	2462	2422	2442	2462	
Test Frequency	MHz	2422	2442	2462	2422	2442	2462	2422	2442	2462	
Power Meter Raw (IF of Spectrum)	dBm	-22.37	-22.43	-22.21	-22.57	-22.53	-22.28	-19.46	-19.47	-19.23	
Power Measurement System Loss	dB	20.49	20.49	20.49	20.49	20.49	20.49	20.49	20.49	20.49	Refer to Calibration Result
Transmitter Duty Cycle Factor	dB	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	Duty Factor = 10 × 10Log <sub>10</sub> (1/Duty Cycle)
Equivalent Noise Bandwidth	MHz	1.12	1.12	1.12	1.12	1.12	1.12	1.12	1.12	1.12	ENB = Total_Sum^2 / Peak_Level * Point_Width
Equivalent Noise Bandwidth Factor	dB	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.49	ENB Factor = 10 × 10Log <sub>10</sub> (1/ENB)
Antenna Power (Conducted)	dBm/MHz	-2.37	-2.43	-2.21	-2.57	-2.53	-2.28	0.54	0.53	0.76	Limit ≤ 10 mW/MHz (10 dBm/MHz)
Antenna Power (Conducted)	mW/MHz	0.5791	0.5712	0.6009	0.5531	0.5582	0.5913	1.1322	1.1294	1.1921	
Antenna Power Error	mW	-0.6109	-0.6188	-0.5891	-0.6369	-0.6318	-0.5987	-0.0578	-0.0606	0.0021	
	%	-51.33	-52.00	-49.51	-53.52	-53.09	-50.31	-4.86	-5.09	0.18	Limit + 20% ~ - 80%
Transmitter ON <sub>Time</sub>	msec	1.0000									RBW : 1 MHz ; VBW : 1 MHz ; SP : 0Hz
Transmitter (ON+OFF) <sub>Time</sub>	msec	1.0000									
Transmitter Duty Cycle	%	100.00%									

4. Transmission Radiation Angle Width (This test item will not be applied to the EIRP power is lower than 12.14dBm/MHz)

No.	Antenna Power A (dBm/MHz)	Antenna			Cable			Total Gain D=B+C (dB)	EIRP F=A+D dBm/MHz	Permitted Angle (Degree)	Judgement	Remarks (Antenna Model)
		Type	Gain B (dBi)	3dB Beam- width Horizontal (Degree)	3dB Beam- width Vertical (Degree)	Model	Length (m)					
1	0.76	Dipole	3.00	-	-	-	0.00	3.00	3.76	360.00	Good	FDE_ACBSMA-BGP
2	0.76	Printed	3.79	-	-	-	0.00	3.79	4.55	360.00	Good	WUBR-508N
3	0.76	PCB	1.84	-	-	-	0.00	1.84	2.60	360.00	Good	FML2.4WA-200
4	0.76	PCB	1.00	-	-	-	0.00	1.00	1.76	360.00	Good	GEPH-013
5	0.76	Dipole	1.87	-	-	-	0.00	1.87	2.63	360.00	Good	WAND2DBI
6												
7												
8												
9												
10												
11												
12												

6. Unwanted Emission Intensity

Test Voltage	V	Normal Voltage (5V) Port 1			Normal Voltage (5V) Port 2			Normal Voltage (5V) Port Total			Remarks	
Test Frequency	MHz	2422	2442	2462	2422	2442	2462	2422	2442	2462		
Unwanted Emission Frequency	※ 1	MHz	2387.00	2339.86	2363.43	2387.00	2339.86	2358.72	-	-	-	RBW : 1 MHz ; VBW : 1 MHz
	※ 2	MHz	2395.89	2398.02	2391.47	2400.00	2399.45	2387.91	-	-	-	
	※ 3	MHz	2485.09	2486.33	2483.92	2484.93	2483.86	2483.71	-	-	-	
	※ 4	MHz	2516.51	3156.73	2496.50	3216.75	3296.78	2496.50	-	-	-	
Cable Loss	※ 1	dB	1.34	1.34	1.34	1.34	1.34	1.34	1.34	1.34	1.34	
	※ 2	dB	1.34	1.34	1.34	1.34	1.34	1.34	1.34	1.34	1.34	
	※ 3	dB	1.34	1.34	1.34	1.34	1.34	1.34	1.34	1.34	1.34	
	※ 4	dB	3.68	3.68	3.68	3.68	3.68	3.68	3.68	3.68	3.68	
Spectrum Raw	※ 1	dBm	-29.48	-43.00	-42.90	-38.18	-41.19	-41.09	-28.93	-38.99	-38.89	
	※ 2	dBm	-25.84	-32.23	-43.06	-29.33	-38.21	-42.68	-24.23	-31.25	-39.86	
	※ 3	dBm	-42.53	-30.40	-22.18	-43.65	-32.29	-24.19	-40.04	-28.23	-20.06	
	※ 4	dBm	-44.27	-44.56	-40.89	-43.09	-44.73	-43.23	-40.63	-41.63	-38.89	
Unwanted Emission Intensity	※ 1	dBm	-28.14	-41.66	-41.56	-36.84	-39.85	-39.75	-27.59	-37.65	-37.55	Limit ≤ 2.5 μW (-26 dBm)
	※ 2	dBm	-24.50	-30.89	-41.72	-27.99	-36.87	-41.34	-22.89	-29.91	-38.52	Limit ≤ 25 μW (-16 dBm)
	※ 3	dBm	-41.19	-29.06	-20.84	-42.31	-30.95	-22.85	-38.70	-26.89	-18.72	Limit ≤ 25 μW (-16 dBm)
	※ 4	dBm	-40.59	-40.88	-37.21	-39.41	-41.05	-39.55	-36.95	-37.95	-35.21	Limit ≤ 2.5 μW (-26 dBm)
Unwanted Emission Intensity	※ 1	μW	1.5346	0.0682	0.0698	0.2070	0.1035	0.1059	1.741631	0.171748	0.175749	Limit ≤ 2.5 μW (-26 dBm)
	※ 2	μW	3.5481	0.8147	0.0673	1.5885	0.2056	0.0735	5.136681	1.020293	0.140749	Limit ≤ 25 μW (-16 dBm)
	※ 3	μW	0.0760	1.2417	8.2414	0.0587	0.8035	5.1880	0.134782	2.045178	13.429382	Limit ≤ 25 μW (-16 dBm)
	※ 4	μW	0.0873	0.0817	0.1901	0.1146	0.0785	0.1109	0.201848	0.160182	0.301025	Limit ≤ 2.5 μW (-26 dBm)

- ※ 1: Frequency Band 1 (30 MHz ≤ f ≤ 2387 MHz)
- ※ 2: Frequency Band 2 (2387 MHz < f ≤ 2400 MHz)
- ※ 3: Frequency Band 3 (2483.5 MHz ≤ f < 2496.5 MHz)
- ※ 4: Frequency Band 4 (2496.5 MHz ≤ f < 12.5 GHz)
- ※ 5: Frequency Band 5 (30 MHz ≤ f < 1000 MHz)
- ※ 6: Frequency Band 6 (1000 MHz ≤ f < 12.5 GHz)

7. Limitation of Collateral Emission of Receiver

Test Voltage	V	Normal Voltage (5V) Port 1			Normal Voltage (5V) Port 2			Normal Voltage (5V) Port Total			Remarks			
Test Frequency	MHz	2422	2442	2462	2422	2442	2462	2422	2442	2462				
Spurious Emission Frequency	※ 5	MHz	790.48	565.44	80.44	961.20	161.92	961.20	-	-	-	1st	30MHz~1000MHz:: Maximum emission and all emissions beyond 1/10 of the limitation must be indicated.	
	※ 5	MHz	-	-	-	-	-	-	-	-	-	2nd		
	※ 5	MHz	-	-	-	-	-	-	-	-	-	3rd		
	※ 6	MHz	3231.00	3254.00	3277.00	3231.00	3254.00	3277.00	-	-	-	1st		1000MHz~12.5GHz:: Maximum emission and all emissions beyond 1/10 of the limitation must be indicated.
	※ 6	MHz	-	-	-	-	-	-	-	-	-	2nd		
	※ 6	MHz	-	-	-	-	-	-	-	-	-	3rd		
Cable Loss	※ 5	dB	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	1st		
	※ 5	dB	-	-	-	-	-	-	-	-	-	2nd		
	※ 5	dB	-	-	-	-	-	-	-	-	-	3rd		
	※ 6	dB	3.68	3.68	3.68	3.68	3.68	3.68	3.68	3.68	3.68	1st		
	※ 6	dB	-	-	-	-	-	-	-	-	-	2nd		
	※ 6	dB	-	-	-	-	-	-	-	-	-	3rd		
Spectrum Raw	※ 5	dBm	-77.79	-77.65	-78.73	-76.90	-78.06	-77.05	-74.31	-74.84	-74.80	1st		
	※ 5	dBm	-	-	-	-	-	-	-	-	-	2nd		
	※ 5	dBm	-	-	-	-	-	-	-	-	-	3rd		
	※ 6	dBm	-63.02	-63.22	-64.51	-67.91	-68.62	-70.38	-61.80	-62.12	-63.51	1st		
	※ 6	dBm	-	-	-	-	-	-	-	-	-	2nd		
	※ 6	dBm	-	-	-	-	-	-	-	-	-	3rd		
Spurious Emission Intensity	※ 5	dBm	-77.01	-76.87	-77.95	-76.12	-77.28	-76.27	-73.53	-74.06	-74.02	1st	Limit ≤ 4 nW (-54 dBm) RBW : 100 kHz ; VBW : 100 kHz	
	※ 5	dBm	-	-	-	-	-	-	-	-	-	2nd		
	※ 5	dBm	-	-	-	-	-	-	-	-	-	3rd		
	※ 6	dBm	-59.34	-59.54	-60.83	-64.23	-64.94	-66.70	-58.12	-58.44	-59.83	1st	Limit ≤ 20 nW (-47 dBm) RBW : 1 MHz ; VBW : 1 MHz	
	※ 6	dBm	-	-	-	-	-	-	-	-	-	2nd		
	※ 6	dBm	-	-	-	-	-	-	-	-	-	3rd		
Spurious Emission Intensity	※ 5	nW	0.0199	0.0206	0.0160	0.0244	0.0187	0.0236	0.0443	0.0393	0.0396	Total Emission Power		
	※ 5	nW	0.0199	0.0206	0.0160	0.0244	0.0187	0.0236	0.0443	0.0393	0.0396	1st	Limit ≤ 4 nW (-54 dBm) RBW : 100 kHz ; VBW : 100 kHz	
	※ 5	nW	-	-	-	-	-	-	-	-	-	2nd		
	※ 5	nW	-	-	-	-	-	-	-	-	-	3rd		
	※ 6	nW	1.1641	1.1117	0.8260	0.3776	0.3206	0.2138	1.5417	1.4324	1.0398	Total Emission Power		
	※ 6	nW	1.1641	1.1117	0.8260	0.3776	0.3206	0.2138	1.5417	1.4324	1.0398	1st	Limit ≤ 20 nW (-47 dBm) RBW : 1 MHz ; VBW : 1 MHz	
※ 6	nW	-	-	-	-	-	-	-	-	-	2nd			
※ 6	nW	-	-	-	-	-	-	-	-	-	3rd			

- ※ 1: Frequency Band 1 (30 MHz ≤ f ≤ 2387 MHz)
- ※ 2: Frequency Band 2 (2387 MHz < f ≤ 2400 MHz)
- ※ 3: Frequency Band 3 (2483.5 MHz ≤ f < 2496.5 MHz)
- ※ 4: Frequency Band 4 (2496.5 MHz ≤ f < 12.5 GHz)
- ※ 5: Frequency Band 5 (30 MHz ≤ f < 1000 MHz)
- ※ 6: Frequency Band 6 (1000 MHz ≤ f < 12.5 GHz)

8. Carrier Sense Capability

Test Voltage	V	Normal Voltage (5V) Port 1			Normal Voltage (5V) Port 2			Normal Voltage (5V) Port Total			Remarks
Test Frequency	MHz	2422	2442	2462	2422	2442	2462	2422	2442	2462	
Mini. Antenna Gain	dBi	1	1	1	1	1	1	1	1	1	
Carrier Level	dBm	-	-	-	-	-	-	-43.89	-43.96	-44.04	Pin = 22.79+Gr-20*log(freq_MHz) [dBm]
Result	Good/Fail	Good	Good	Good	Good	Good	Good	Good	Good	Good	

## Power Supply Voltage Fluctuation Test

Voltage Fluctuation Test	Normal Voltage	High Voltage + 10% of Normal Voltage	Low Voltage - 10% of Normal Voltage
Input DC Power	5	5.5	4.5
Output DC Power	3.26	3.27	3.25
Voltage Variation (%)	-	0.306748	-0.306748

Note: Voltage Variation (%) = (Output High or Low Voltage - Output Normal Voltage)/Output Normal Voltage X 100  
 During the input supply voltage to the EUT from the external power source is varied by +/- 10%, if output voltage had been confirmed that the fluctuation of power supply to the RF circuit of EUT (excluding power source) is equal to or less than +/- 1%. Exempt extremely high and low supply voltage condition tests, EUT only operated in normal voltage to test all regulations.

## Calibration Result

### 1. Linearity Check

SG Output (dBm)	Spectrum Raw (dBm)	Power Meter Raw (dBm)	Remark
0	-0.86	0.01	· SG Test Frequency : 2450 MHz · RBW : 1 MHz ; VBW : 1 MHz ; SP : 0Hz · ATT(30dB) ; Ref : 20 dBm
-5	-5.73	-4.91	
-10	-10.77	-9.89	
0	-1.54	-0.1	· SG Test Frequency : 5250 MHz · RBW : 1 MHz ; VBW : 1 MHz ; SP : 0Hz · ATT(30dB) ; Ref : 20 dBm
-5	-6.44	-5.03	
-10	-11.43	-9.99	

### 2. Frequency Accuracy Confirmation

SG Output (dBm)	Spectrum Raw (MHz)	Frequency Error (ppm)	Remark
2450	2450.0012	0.4898	· SG Output : 0dBm · RBW : 30 kHz ; VBW : 30 kHz ; SP : 300kHz · Limit ≤ 10% of frequency error limits
5250	5250.0036	0.6857	

### 3. Cable Loss

SG Output (MHz)	Power Meter Raw Without Cable (dBm)	Power Meter Raw With Cable (dBm)	Cable Loss (dB)	Remark
1000	0.23	-0.55	0.78	· SG Output : 0dBm
2450	-0.01	-1.35	1.34	
5250	-0.11	-2.36	2.25	
12500	-0.99	-4.67	3.68	
26000	-2.63	-16.56	13.93	

### 4. Power Measurement System Loss (EUT Output to IF Output of Spectrum)

SG Output (MHz)	Spectrum Raw (dBm)	Power Meter Raw With Cable form IF (dBm)	System Path Loss EUT to IF (dB)	Remark
2450	-1.29	-20.5	20.49	· SG : 0 dBm · RBW : 1 MHz ; VBW : 1 MHz ; SP : 0Hz · ATT(30dB) ; Ref : 20 dBm
5250	-2.1	-21.3	21.19	