

# MIC Test Report

**Equipment** : 802.11abgn USB Module  
**Brand Name** : SparkLAN  
**Model No.** : WUBR-508N  
**Standard** : MIC Certification Rule, Article 2 Paragraph 1 Item 19-3  
**Category** : XW (W52)  
**Measured Standard** : ARIB STD-T71  
**Frequency Range** : 5150 – 5250 MHz  
**Applicant** : SparkLAN Communications, Inc.  
**Manufacturer** : 8F., No.257, Sec. 2, Tiding Blvd., Neihu District,  
Taipei City 11493, Taiwan  
**Operate Mode** : Slave without radar detection

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.45 and shown compliance with the applicable MIC Ordinance Regulating Radio Equipment Article 49.20 and ARIB STD-71 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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## Summary of Test Result

MIC Regulations Requirements				
Report Clause	Ref. Std. Article	Description	Measured	Result
1.1.7	ORE:49.20	Communication Method	half duplex operation	Complied
1.1.7	ORE:49.20	Modulation Method	OFDM	Complied
1.1.7	ORE:49.20	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 20ppm	Complied
3.2	ORE:6	Occupied Bandwidth	refer to test data	Complied
3.3	ORE:49.20	Antenna Power, EIRP Power	refer to test data	Complied
3.3	ORE:14	Antenna Power Error	refer to test data	Complied
3.4	ORE:49.20	Adjacent Channel Power	refer to test data	Complied
3.5	ORE:49.20	Transmitter Out-band Emissions	refer to test data	Complied
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	ORE:49.20	Transmission Burst Length	<4ms	Complied
3.10	TR:9	Carrier Sense	refer to test data	Complied
3.11	ORE:49.20	EUT Construction Protection	Shielded Case	Complied
-	ORE:49.20	Transmit Power Control (TPC)	n/a or W53 > 3dB	N/A
-	NT No.368,2011	DFS – Master Device	refer to test data	N/A
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				

## Revision History

[illegible]

# 1 General Description

## 1.1 Information

### 1.1.1 Frequency Band

Frequency Band	
<input checked="" type="checkbox"/>	(20MHz) - 5180, 5200, 5220, 5240 MHz
<input checked="" type="checkbox"/>	(40MHz) - 5190, 5230MHz
<input type="checkbox"/>	(80MHz) - 5210MHz

### 1.1.2 RF General Information

RF General Information for Category XW (W52)						
Frequency Range (MHz)	IEEE Std. 802.11 Protocol	Ch. Frequency (MHz)	Channel Number	Number of Transmit Chains (N <sub>TX</sub> )	Antenna Power (mW/MHz)	EIRP (mW/MHz)
5150-5250	a	5180-5240	36-48 [4]	1	1.75	8.08690
5150-5250	n (HT20)	5180-5240	36-48 [4]	2	1.69	7.79625
5150-5250	n (HT40)	5190-5230	38-46 [2]	2	0.77	3.52951
Note 1: 802.11a/n uses a combination of OFDM-BPSK, QPSK, 16QAM, 64QAM modulation.						

### 1.1.3 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	5.00
2	Integral	Printed	SparkLAN	WUBR-508N	6.64
3	Integral	PCB	NISSEI	FML2.4WA-200	0.42
4	Integral	PCB	SANAV	GEPH-013	1.90
5	External	Dipole	VOXMICRO LTD GROUP	WAND2DBI	2.69

**1.1.4 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:

**1.1.5 EUT Operational Condition**

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

**1.1.6 Table for Existing Change**

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

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

### 1.1.7 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 1.1.2 antenna power	
	<b>(2) Freq. Range of Radio Wave</b>	Refer test report clause 1.1.1 frequency band	
	<b>(3) Oscillation</b>	Synthesizer with Crystal Oscillation (40MHz) (Zero IF)	
	<b>(4) Modulation</b>	OFDM: D1D (16QAM,64QAM), G1D (BPSK, QPSK) Max. Signal Transmission Rate: 11a = 54 Mbps 11n BW <sub>ch</sub> 20MHz = 130Mbps (MCS8; N <sub>ss</sub> =2) BW <sub>ch</sub> 40MHz = 270Mbps (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 1.1.3.		
<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		

### 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.45

### 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%	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))

Measurement Uncertainty			
Test Item		Uncertainty	Limit
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
Spurious emissions, 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
Spurious emissions, 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
11a,6-54Mbps	1	6-54Mbps	6Mbps
HT20, M8-15	2	M8-15	M8
HT40, M8-15	2	M8-15	M8

### 2.2 The Worse Case Power Setting Parameter

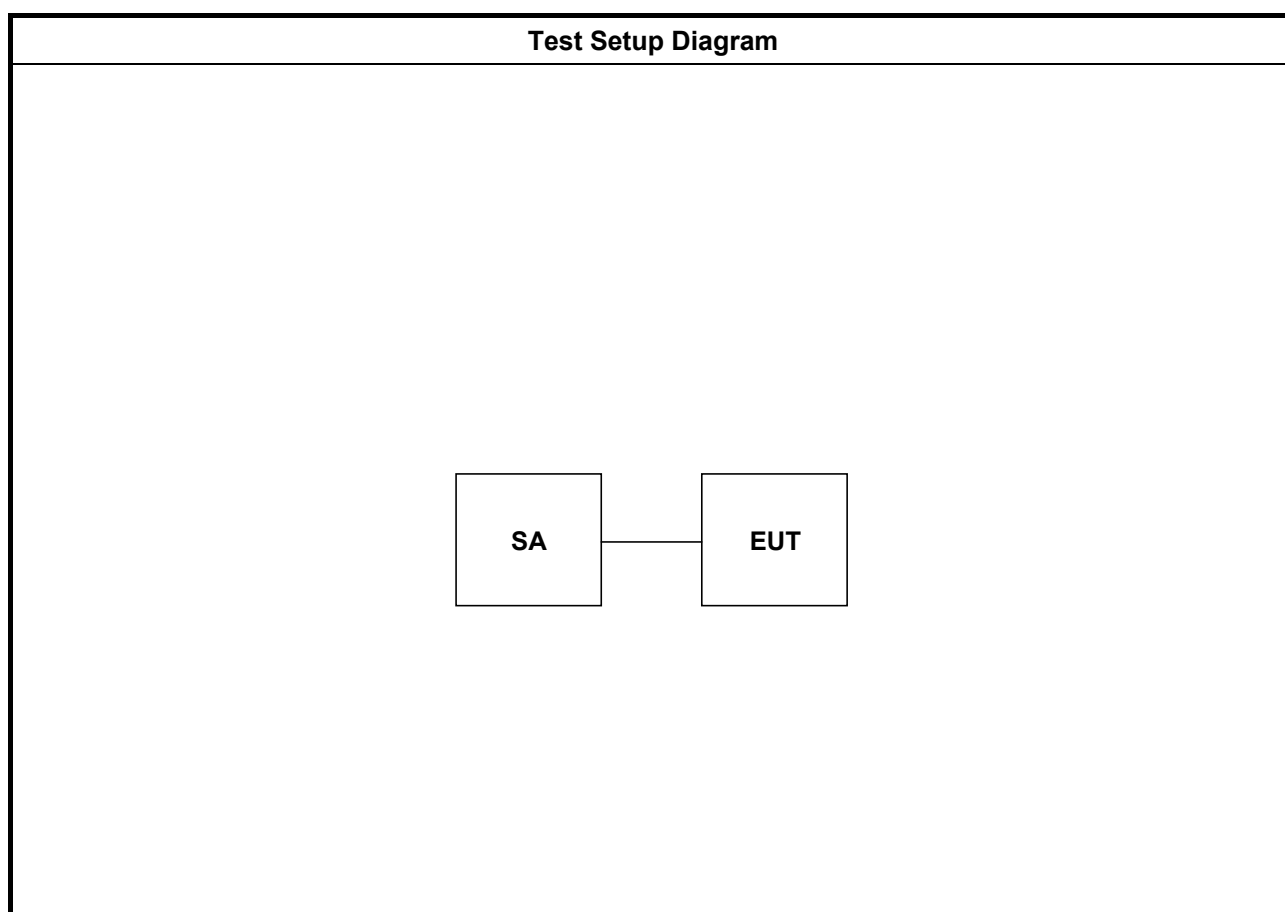
The Worst Case Power Setting Parameter						
Test Software Version	RT5x7xQA V1.0.5.9					
Modulation Mode	N <sub>TX</sub>	Test Frequency (MHz)				
		NCB: 20MHz			NCB: 40MHz	
		5180	5200	5240	5190	5230
11a,6-54Mbps	1	25	25	27	-	-
HT20, M8-15	2	25 / 24	25 / 24	2A / 26	-	-
HT40, M8-15	2	-	-	-	26 / 24	28 / 25

## 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, Antenna Power, Antenna Power Error, EIRP Power, Adjacent Channel Power, Transmitter Out-band Emissions, Transmitter Spurious Emissions, Receiver Spurious Emissions, Transmission Burst Length, Identification Code, Carrier Sense,
<b>Test Condition</b>	Conducted measurement at transmit chains.
<b>Modulation Mode</b>	11a, HT20, HT40

## 2.4 Test Setup Diagram



### 3 Test Result

#### 3.1 Frequency Error

##### 3.1.1 Frequency Error Limit

Frequency Error Limit
$\leq \pm 20$ ppm

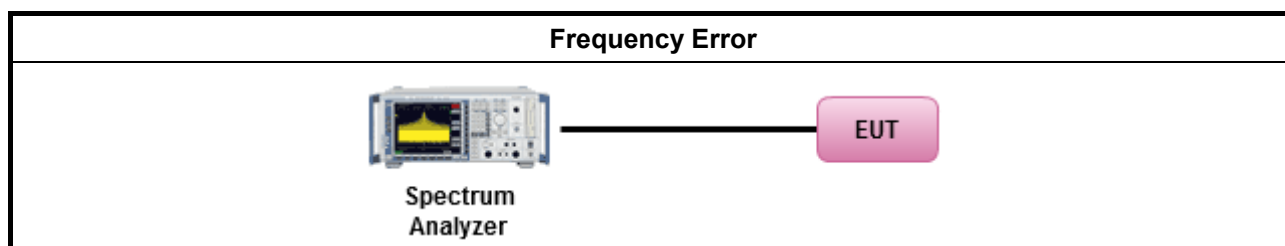
##### 3.1.2 Measuring Instruments

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.45, clause 3.2
Conditions of Equipment under Test	MIC Notice No.88 Appendix No.45, clause 3.3
Measuring Operation Procedures	MIC Notice No.88 Appendix No.45, clause 3.4
Presentation of Results	MIC Notice No.88 Appendix No.45, clause 3.5
Other Conditions	MIC Notice No.88 Appendix No.45, 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

### 3.2.1 Occupied Bandwidth Limit

Occupied Bandwidth Limit
(BW <sub>ch</sub> 20MHz)[W52/W53] - $\leq$ 19MHz(OFDM, DSSS); (BW <sub>ch</sub> 20MHz)[W52/W53] - $\leq$ 18MHz(Other); (BW <sub>ch</sub> 20MHz) [W56] - $\leq$ 19.7MHz (OFDM, DSSS, Other); (BW <sub>ch</sub> 40MHz) - $\leq$ 38MHz (OFDM); (BW <sub>ch</sub> 80MHz) - $\leq$ 78MHz (OFDM); (BW <sub>ch</sub> 160MHz - contiguous) - $\leq$ 158MHz (OFDM) (BW <sub>ch</sub> 80+80MHz - non-contiguous) - $\leq$ 78MHz (OFDM)

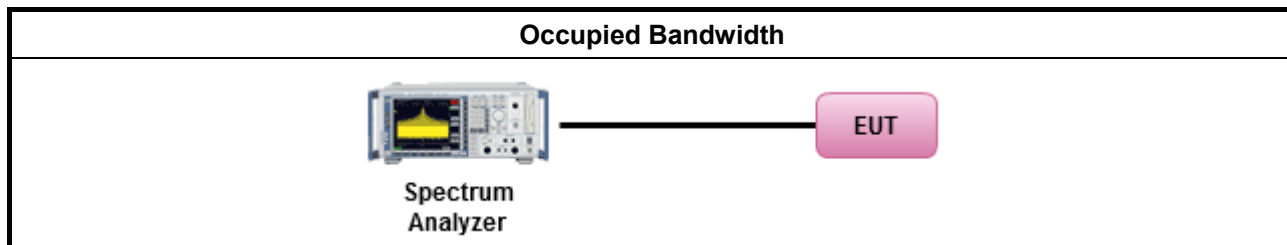
### 3.2.2 Measuring Instruments

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.45, clause 4.2
Conditions of Equipment under Test	MIC Notice No.88 Appendix No.45, clause 4.3
Measuring Operation Procedures	MIC Notice No.88 Appendix No.45, clause 4.4
Presentation of Results	MIC Notice No.88 Appendix No.45, clause 4.5
Other Conditions	MIC Notice No.88 Appendix No.45, clause 4.6

### 3.2.4 Test Setup



### 3.2.5 Test Result of Occupied Bandwidth

Appendix	Mode	Item
B	11a, HT20, HT40	2

### 3.3 Antenna Power, Antenna Power Error and EIRP Power

#### 3.3.1 Antenna Power, Antenna Power Error and EIRP Power Limit

Antenna Power Limit (mW/MHz)
(BW <sub>ch</sub> 20MHz) - ≤10; (BW <sub>ch</sub> 40MHz) - ≤5; (BW <sub>ch</sub> 80MHz) - ≤2.5; (BW <sub>ch</sub> 160MHz) - ≤1.25;

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

EIRP Limit (mW/MHz)
(BW <sub>ch</sub> 20MHz) - ≤10 ; (BW <sub>ch</sub> 40MHz) - ≤5 ; (BW <sub>ch</sub> 80MHz) - ≤2.5 ; (BW <sub>ch</sub> 160MHz) - ≤1.25

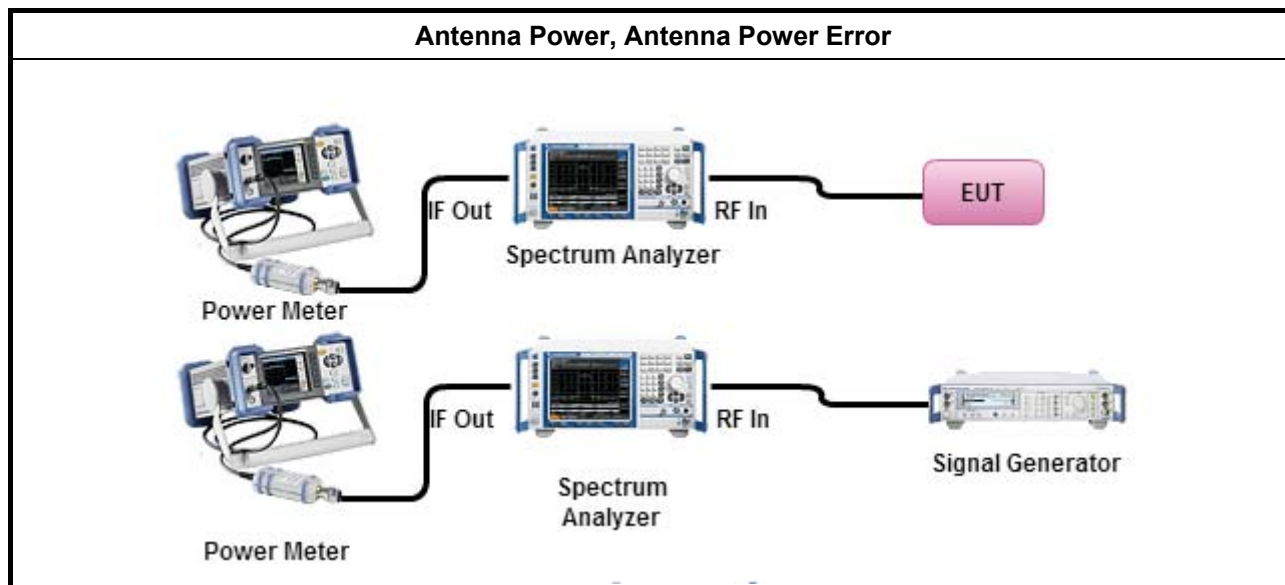
#### 3.3.2 Measuring Instruments

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.45, clause 6.2
Conditions of Equipment under Test	MIC Notice No.88 Appendix No.45, clause 6.3
Measuring Operation Procedures	MIC Notice No.88 Appendix No.45, clause 6.4
Presentation of Results	MIC Notice No.88 Appendix No.45, clause 6.5
Other Conditions	MIC Notice No.88 Appendix No.45, clause 6.6

### 3.3.4 Test Setup



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

Appendix	Mode	Item
B	11a, HT20, HT40	2, 3

### 3.4 Adjacent Channel Power

#### 3.4.1 Adjacent Channel Power Limit

Adjacent Channel Power Limit
(BW <sub>ch</sub> 20MHz & CP/OBW≤18MHz) - fc±20MHz ≥25dB; fc±40MHz ≥40dB
(BW <sub>ch</sub> 20MHz & CP/OBW≤19MHz) - fc±20MHz ≥25dB; fc±40MHz ≥40dB
(BW <sub>ch</sub> 40MHz & CP/OBW≤38MHz) - fc±40MHz ≥25dB; fc±80MHz ≥40dB
(BW <sub>ch</sub> 80MHz & CP/OBW≤78MHz) - fc±80MHz ≥25dB
(BW <sub>ch</sub> 80+80MHz & CP/OBW≤78MHz) - fc±80MHz ≥25dB
(BW <sub>ch</sub> 160MHz & CP/OBW≤158MHz) - N/A

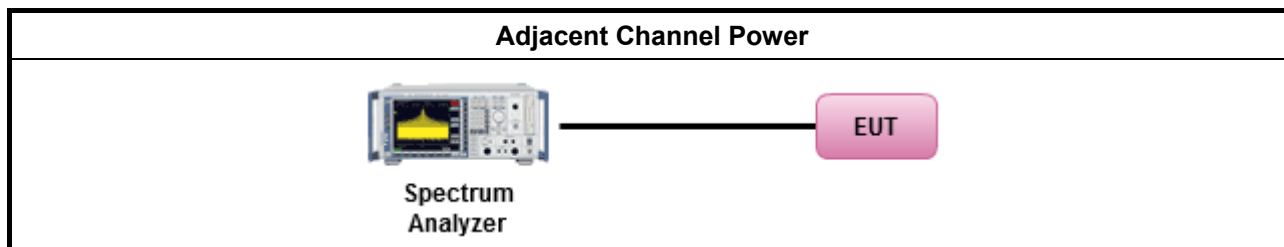
#### 3.4.2 Measuring Instruments

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.45, clause 7.2
Conditions of Equipment under Test	MIC Notice No.88 Appendix No.45, clause 7.3
Measuring Operation Procedures	MIC Notice No.88 Appendix No.45, clause 7.4
Presentation of Results	MIC Notice No.88 Appendix No.45, clause 7.5
Other Conditions	MIC Notice No.88 Appendix No.45, clause 7.6

#### 3.4.4 Test Setup



#### 3.4.5 Test Result of Adjacent Channel Power

Appendix	Mode	Item
B	11a, HT20, HT40	2

### 3.5 Transmitter Out-band Emissions

#### 3.5.1 Transmitter Out-band Emissions Limit

W52 - BW <sub>ch</sub> 20MHz (OBW≤18MHz)					
Out Band Emissions		EIRP Limit			
Range (MHz)		mW/MHz		dBm/MHz	
5140	5142	0.0025	0.0025	-26	-26
5142	5150	0.015	0.015	-18	-18
5250	5251	1	0.1	0	-10
5251	5260	0.1	0.0158	-10	-18
5260	5266.7	0.0158	0.0025	-18	-26
5266.7	5360	0.0025	0.0025	-26	-26

W52 - BW <sub>ch</sub> 40MHz					
Out Band Emissions		EIRP Limit			
Range (MHz)		mW/MHz		dBm/MHz	
5100	5141.6	0.0025	0.0025	-26	-26
5141.6	5150	0.015	0.015	-18	-18
5250	5251	0.5	0.05	-3	-13
5251	5270	0.05	0.0079	-13	-21
5270	5278.4	0.0079	0.0025	-21	-26
5278.4	5400	0.0025	0.0025	-26	-26

W52 - BW <sub>ch</sub> 80MHz					
Out Band Emissions		EIRP Limit			
Range (MHz)		mW/MHz		dBm/MHz	
5020	5123.2	0.0025	0.0025	-26	-26
5123.2	5150	0.015	0.015	-18	-18
5250	5251	0.25	0.025	-6	-16
5251	5290	0.025	0.0040	-16	-24
5290	5296.7	0.0040	0.0025	-24	-26
5296.7	5480	0.0025	0.0025	-26	-26



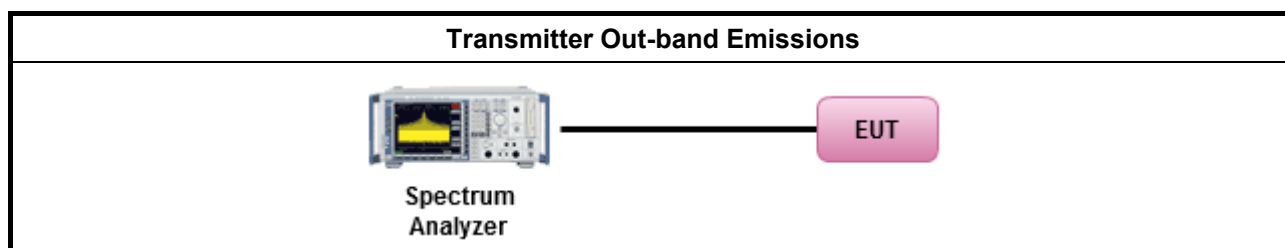
### 3.5.2 Measuring Instruments

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.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

### 3.5.4 Test Setup



### 3.5.5 Test Result of Transmitter Out-band Emissions

Appendix	Mode	Item
B	11a, HT20, HT40	2

### 3.6 Transmitter Spurious Emissions

#### 3.6.1 Transmitter Spurious Emissions Limit

W52 - BW <sub>ch</sub> 20MHz (OBW≤18MHz)						
Transmitter Spurious Emissions					Limit	
Range (MHz)		Bn (MHz)	2.5xBn	fc (MHz)	uW/MHz	dBm/MHz
30	5140	16	40	5180	2.5	-26
5360	26000	16	40	5320	2.5	-26
W52 - BW <sub>ch</sub> 40MHz						
Transmitter Spurious Emissions					EIRP Limit	
Range (MHz)		Bn (MHz)	2.5xBn	fc (MHz)	uW/MHz	dBm/MHz
30	5100	36	90	5190	2.5	-26
5400	26000	36	90	5310	2.5	-26
W52 - BW <sub>ch</sub> 80MHz						
Transmitter Spurious Emissions					Limit	
Range (MHz)		Bn (MHz)	2.5xBn	fc (MHz)	uW/MHz	dBm/MHz
30	5020	76	190	5210	2.5	-26
5480	26000	76	190	5290	2.5	-26

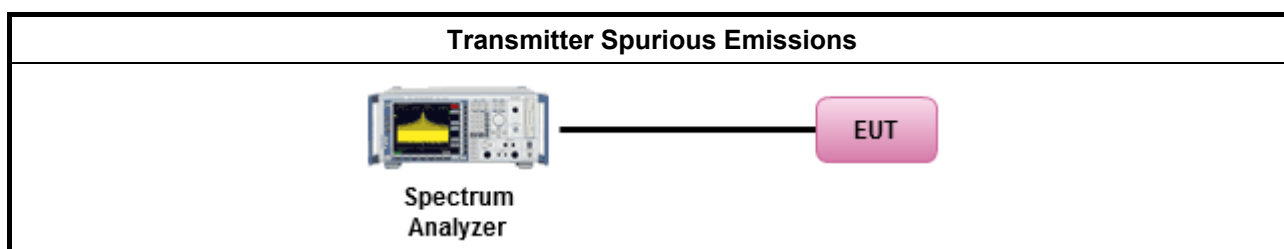
#### 3.6.2 Measuring Instruments

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	11a, HT20, HT40	2

### 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	26000	20	20	-47	-47

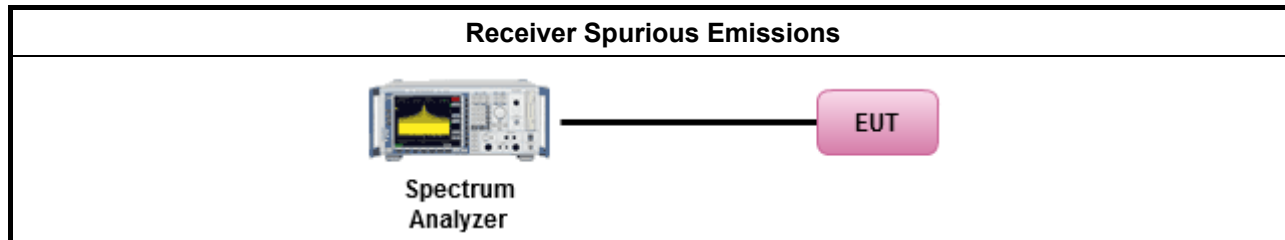
#### 3.7.2 Measuring Instruments

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.45, clause 8.2
Conditions of Equipment under Test	MIC Notice No.88 Appendix No.45, clause 8.3
Measuring Operation Procedures	MIC Notice No.88 Appendix No.45, clause 8.4
Presentation of Results	MIC Notice No.88 Appendix No.45, clause 8.5
Other Conditions	MIC Notice No.88 Appendix No.45, clause 8.6

#### 3.7.4 Test Setup



#### 3.7.5 Test Result of Receiver Spurious Emissions

Appendix	Mode	Item
B	11a, HT20, HT40	4

### 3.8 Identification Code

#### 3.8.1 Identification Code Limit

Identification Code Limit
≥ 19 bits

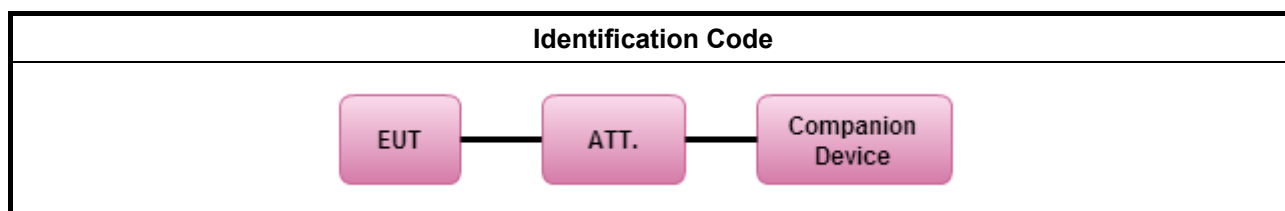
#### 3.8.2 Measuring Instruments

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.45, clause 9.2
Conditions of Equipment under Test	MIC Notice No.88 Appendix No.45, clause 9.3
Measuring Operation Procedures	MIC Notice No.88 Appendix No.45, clause 9.4
Presentation of Results	MIC Notice No.88 Appendix No.45, clause 9.5
Other Conditions	MIC Notice No.88 Appendix No.45, clause 9.6

#### 3.8.4 Test Setup



#### 3.8.5 Test Result of Identification Code

Appendix	Mode	Item
B	11a, HT20, HT40	2

### 3.9 Transmission Burst Length

#### 3.9.1 Transmission Burst Length Limit

Transmission Burst Length Limit
≤ 4msec. (OFDM)

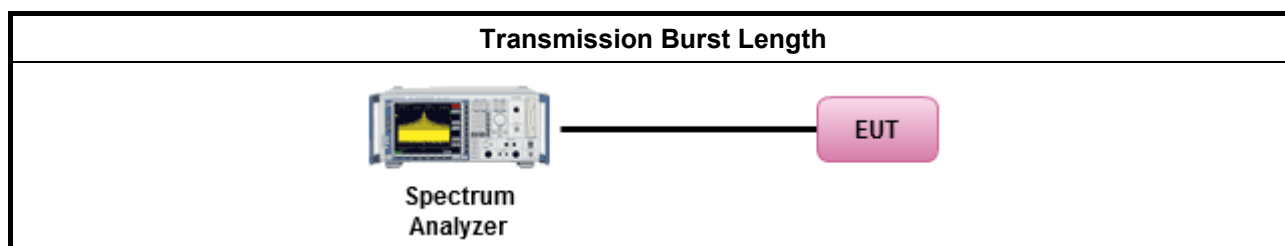
#### 3.9.2 Measuring Instruments

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.45, clause 10.2
Conditions of Equipment under Test	MIC Notice No.88 Appendix No.45, clause 10.3
Measuring Operation Procedures	MIC Notice No.88 Appendix No.45, clause 10.4
Presentation of Results	MIC Notice No.88 Appendix No.45, clause 10.5
Other Conditions	MIC Notice No.88 Appendix No.45, clause 10.6

#### 3.9.4 Test Setup



#### 3.9.5 Test Result of Transmission Burst Length

Appendix	Mode	Item
B	11a, HT20, HT40	2

### 3.10 Carrier Sense

#### 3.10.1 Carrier Sense Limit

Carrier Sense Limit
Stop transmission for interference signal level above 100mV/m (or level at $22.79 + Gr - 20 \cdot \log(f)$ [dBm])

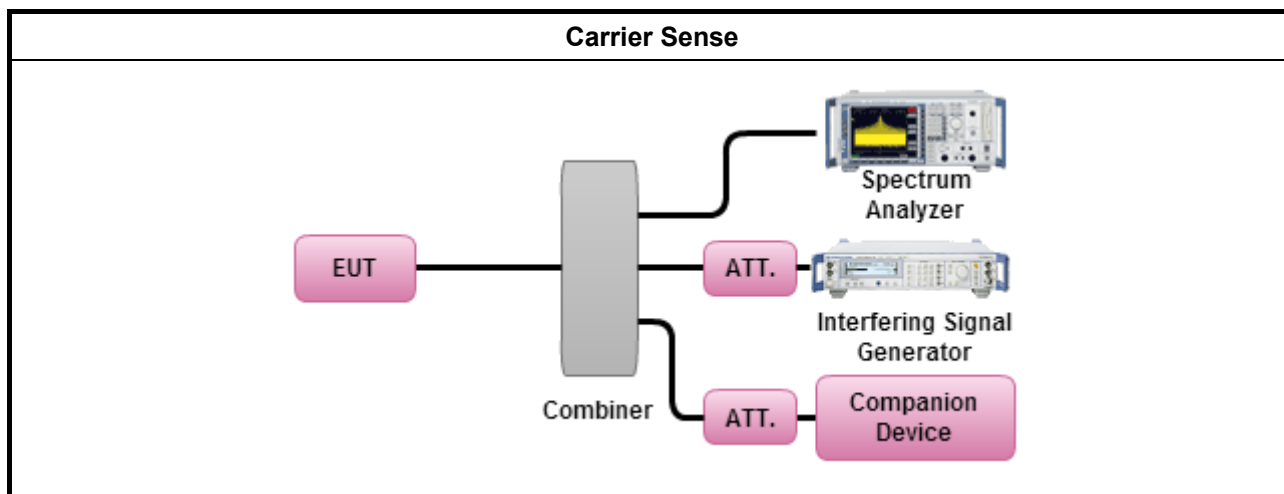
#### 3.10.2 Measuring Instruments

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

#### 3.10.3 Test Procedures

Test Method	
Measuring Equipment Conditions	MIC Notice No.88 Appendix No.45, clause 12.2
Conditions of Equipment under Test	MIC Notice No.88 Appendix No.45, clause 12.3
Measuring Operation Procedures	MIC Notice No.88 Appendix No.45, clause 12.4
Presentation of Results	MIC Notice No.88 Appendix No.45, clause 12.5
Other Conditions	MIC Notice No.88 Appendix No.45, clause 12.6

#### 3.10.4 Test Setup



#### 3.10.5 Test Result of Carrier Sense

Appendix	Mode	Item
B	11a, HT20, HT40	2

### 3.11 EUT Construction Protection

#### 3.11.1 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.	

#### 3.11.2 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

#### 3.11.3 Reference Documents

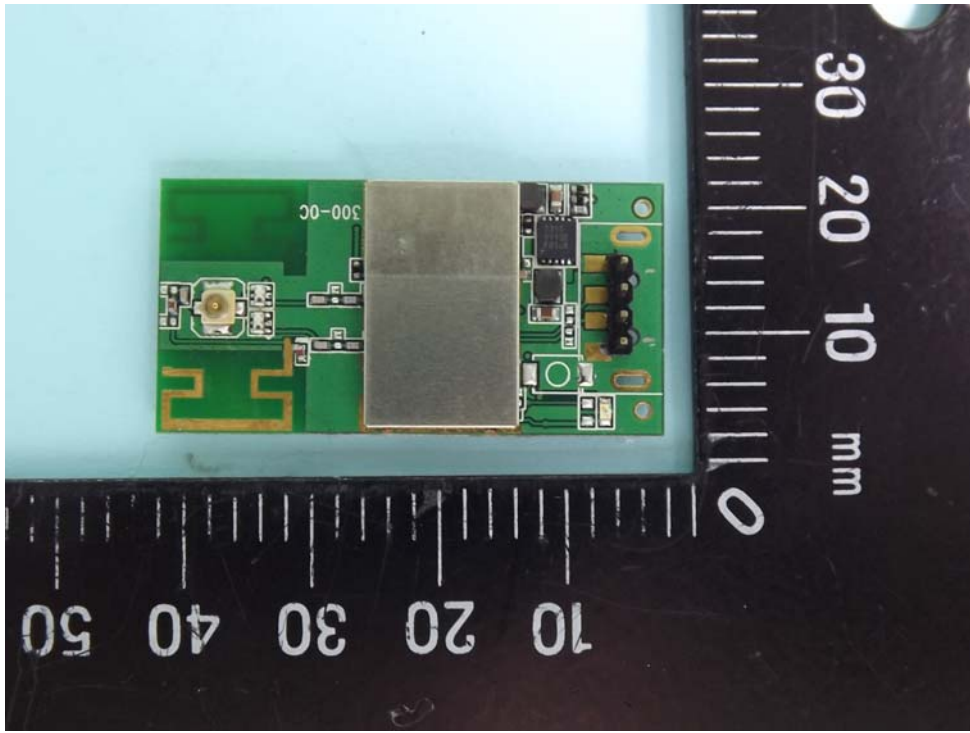
Photo	Item
Photo 1	



Photo 2

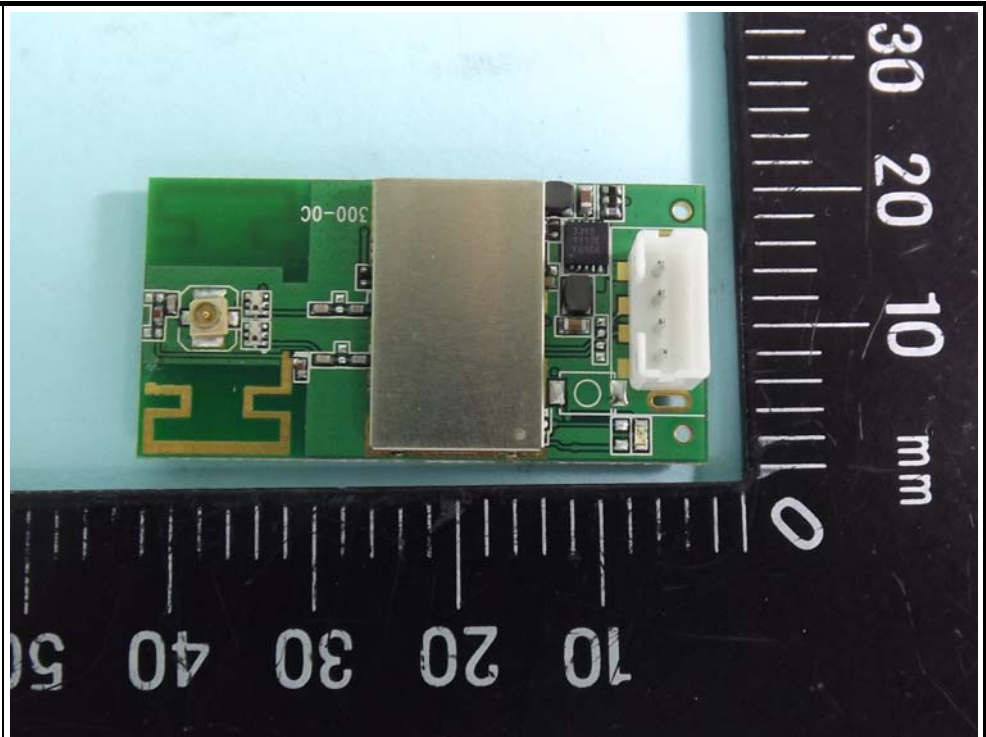
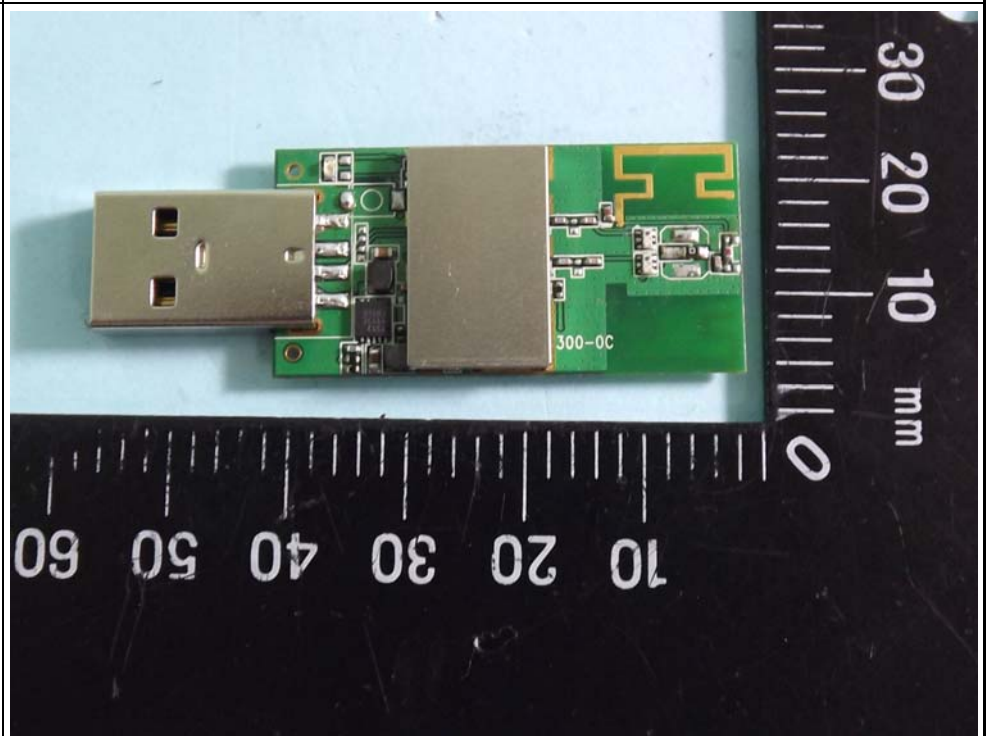


Photo 3



## 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

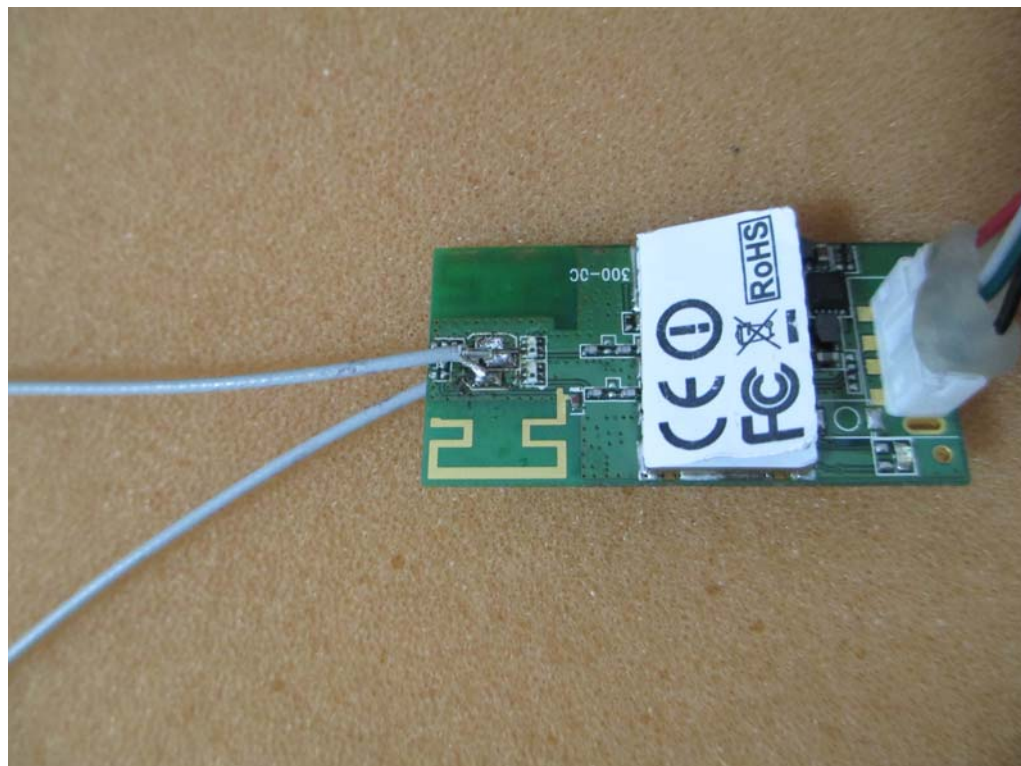
Note: Calibration Interval of instruments listed above is one year.

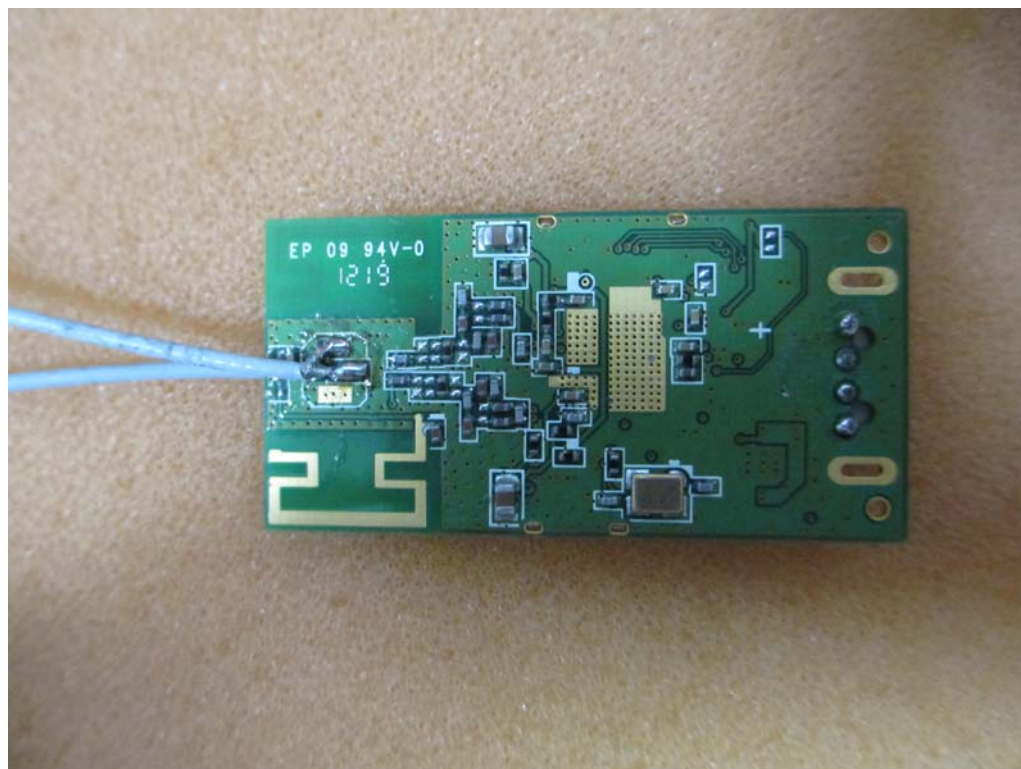
## **Appendix A. Test Photos**











## Appendix B 19-3-11a-G1D(A-Mode)

1. General Information						Sporton No.	JR373103-02
						Test Date for other	2013/9/5
						Test Date for carrier sense	2018/2/9
Specified Radio Equipment	Class	Article 2 Paragraph 1 Item 19-3	Antenna Port	DAC 0	Test Location	SPORTON Lab.	
	Type of Emission	G1D / D1D	Model	WUBR-508N	Temp. / Humid.	24.6℃ / 62%	
	Modulation Type	OFDM: BPSK, QPSK, 16QAM, 64QAM	Serial No.	12635W2002256	Test Site	TH06-HY	
	Frequency	5180~5240MHz(20MHz Space 4 Channels)	Antenna Power	1.75	Engineer	Shiming	
					Department	Radio Service Group	

## 2. Test Results

Test Voltage		V	Normal Voltage ( 5V )								Remarks
Testing for Electrical Specification	Test Frequency	MHz	5180	5200	5240						Low/Mid/High of test frequency range
	Measured Frequency	MHz	5179.9352	5199.9334	5239.9346						
	Frequency Error	ppm	12.51	12.81	12.48						Limit ≤ 20 ppm
	Occupied Bandwidth	MHz	16.64	16.60	16.60						99% OBW Limit ≤ 19 MHz (RB/VB : 300kHz)
	Spreading Bandwidth (DSSS only)	MHz	14.56	14.52	14.52						90% of total emission power
	EIRP Power	mW/MHz	8.08690	7.25742	7.95760						Ant Gain : 6.64 [dBi]
	Antenna Power (Conducted)	mW/MHz	1.75300	1.57319	1.72497						Limit ≤ 10 mW/MHz - Antenna power & EIRP power
	Antenna Power Error	Δp	0.00300	-0.17681	-0.02503						
	Power Error Rate	%	0.17	-10.10	-1.43						Limit + 20% - 80%
	Adjacent Channel Leakage Power	-20MHz	dB	33.52	35.58	34.30					Limit ≥ 25dB (18MHz)
		+20MHz	dB	33.18	35.68	34.95					Limit ≥ 25dB (18MHz)
		-40MHz	dB	52.20	52.44	52.94					Limit ≥ 40dB (18MHz)
		+40MHz	dB	53.97	53.38	57.17					Limit ≥ 40dB (18MHz)
	Limitation of Collateral Emission of Receiver	< 1GHz	nW	0.0192	0.0323	0.0164					Limit ≤ 4 nW (-54 dBm)
		≥ 1GHz	nW	0.9419	0.9354	1.2331					Limit ≤ 20 nW (-47 dBm)
	Transmission Burst Length	msec	2.3000	2.3000	2.3000						Limit ≤ 4msec
Radio Interface Prevention Function	Carrier Sense (100mV/m)	OK / NG	OK	OK	OK						Pin = 22.79+Gr-20*log(freq_MHz) [dBm]
	ID code	ID code	Good, MAC Address:00-0E-8E-40-89-82								
	Test Frequency (W53)	MHz	-	-	-						Pin = Gr - 62 [dBm]Gr is max receiveing antenna gain in dBi
	DPS function	OK / NG	-	-	-						
	Test Frequency (W53)	MHz	-	-	-						If EIRP power density of EUT is less than 5mW/MHz, without TPC function
Testing for Electrical Specification	Unwanted Emission Intensity	Test Frequency	MHz	5180	5200	5240					Low/Mid/High of test frequency range
		Max value in the band	MHz	5135.00	5135.00	5043.11					
		Raw dBm	-39.25	-44.26	-43.29						30MHz~5135MHz Limit ≤ 2.5 μW/MHz (-26 dBm/MHz)
		dBm/MHz	-37.00	-42.01	-41.04						
		μW/MHz	0.19953	0.06295	0.07870						
	Max value in the band	Test Frequency	MHz	51955.54	51790.46	51955.54					
		Raw dBm	-33.41	-33.95	-34.27						5365MHz~26000MHz Limit ≤ 2.5 μW/MHz (-26 dBm/MHz)
		dBm/MHz	-29.73	-30.27	-30.59						
		μW/MHz	1.06414	0.93972	0.87297						
		TPC function	-	-	-						
	Out-Band Leakage Power (EIRP)	Test Frequency	MHz	5180	5200	5240					Low/Mid/High of test frequency range
		Max value in the band	MHz	5137.17	5135.41	5137.09					
		Raw dBm	-37.83	-41.96	-43.67						5135MHz~5142MHz Limit ≤ 2.5 μW/MHz (-26 dBm/MHz)
		dBm/MHz	-28.94	-33.07	-34.78						
		μW/MHz	1.27644	0.49317	0.33266						
		Max value in the band	MHz	5148.90	5146.94	5145.34					
		Raw dBm	-32.19	-39.20	-43.46						5142MHz~5150MHz Limit ≤ 15 μW/MHz (-18.24 dBm/MHz)
		dBm/MHz	-23.30	-30.31	-34.57						
		μW/MHz	4.67735	0.93111	0.34914						
		Max value in the band	MHz	5250.14	5251.00	5250.00					
		Raw dBm	-43.80	-42.77	-12.13						5250MHz~5251MHz Limit ≤ 1000 - 100 μW/MHz (0 - -10 dBm/MHz)
		dBm/MHz	-34.91	-33.88	-3.24						
		μW/MHz	0.32285	0.40926	474.24199						
		dB	33.53	23.92	3.24						Margin to the technical requirement
		Max value in the band	MHz	5259.30	5252.48	5251.04					
		Raw dBm	-44.58	-40.78	-30.09						5251MHz~5260MHz Limit ≤ 100 - 15.8 μW/MHz (-10 - -18 dBm/MHz)
		dBm/MHz	-35.69	-31.89	-21.20						
		μW/MHz	0.26977	0.64714	7.58578						Margin to the technical requirement
		Max value in the band	MHz	5265.35	5265.95	5260.00					
		Raw dBm	-44.23	-44.02	-39.91						5260MHz~5266.7MHz Limit ≤ 15.8 - 2.5 μW/MHz (-18 - -26 dBm/MHz)
		dBm/MHz	-35.34	-35.13	-31.02						
		μW/MHz	0.29242	0.30690	0.79068						
		dB	10.92	9.99	13.02						Margin to the technical requirement
		Max value in the band	MHz	5271.62	5267.09	5267.49					
		Raw dBm	-45.15	-44.04	-36.20						5266.7MHz~5365MHz Limit ≤ 2.5 μW/MHz (-26 dBm/MHz)
		dBm/MHz	-36.26	-35.15	-27.31						
		μW/MHz	0.23659	0.30549	1.85780						



## Appendix B 19-3-11a-G1D-Power(A-Mode)

## 3. Antenna Power (Conducted Power)

Antenna Power	Test Voltage	V	Normal Voltage ( 5V )									Remarks
	Test Frequency	MHz	5180	5200	5240							
	Power Meter Raw (IF of Spectrum)	dBm	-18.26	-18.73	-18.33							
	Power Measurement System Loss	dB	21.19	21.19	21.19							Refer to Calibration Result
	Transmitter Duty Cycle Factor	dB	0.00	0.00	0.00							Duty Factor = $10 \times 10\log_{10}(1/\text{Duty Cycle})$
	Equivalent Noise Bandwidth	MHz	1.12	1.12	1.12							ENB = $\text{Total\_Sum}^2 / \text{Peak\_Level} * \text{Point\_Width}$
	Equivalent Noise Bandwidth Factor	dB	0.49	0.49	0.49							ENB Factor = $10 \times 10\log_{10}(1/\text{ENB})$
	Antenna Power (Conducted)	dBm/MHz	2.44	1.97	2.37							Limit $\leq 10$ mW/MHz (10 dBm/MHz)
	Antenna Power (Conducted)	mW/MHz	1.7530	1.5732	1.7250							
	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. Limitation of Collateral Emission of Receiver

Limitation of Collateral Emission	Test Voltage	V	Normal Voltage ( 5V )									Remarks
	Test Frequency	MHz	5180	5200	5240							
	Spurious Emission Frequency	* 1	MHz	844.80	76.56	452.92						1st 30MHz~1000MHz:: Maximum emission and
		* 1	MHz	-	-	-						2nd all emissions beyond 1/10 of the limitation
		* 1	MHz	-	-	-						3rd must be indicated.
		* 2	MHz	21950.00	21950.00	3450.00						1st 1000MHz~26GHz:: Maximum emission and all
		* 2	MHz	-	-	-						2nd emissions beyond 1/10 of the limitation must
		* 2	MHz	-	-	-						3rd be indicated.
	Cable Loss	* 1	dB	0.78	0.78	0.78						1st
		* 1	dB	-	-	-						2nd
		* 1	dB	-	-	-						3rd
		* 2	dB	3.68	3.68	3.68						1st
		* 2	dB	-	-	-						2nd
		* 2	dB	-	-	-						3rd
	Spectrum Raw	* 1	dBm	-77.95	-75.69	-78.62						1st
		* 1	dBm	-	-	-						2nd
		* 1	dBm	-	-	-						3rd
		* 2	dBm	-63.94	-63.97	-62.77						1st
		* 2	dBm	-	-	-						2nd
		* 2	dBm	-	-	-						3rd
	Spurious Emission Intensity	* 1	dBm	-77.17	-74.91	-77.84						1st Limit $\leq 4$ nW (-54 dBm)
		* 1	dBm	-	-	-						2nd RBW : 100 kHz ; VBW : 100 kHz
		* 1	dBm	-	-	-						3rd
		* 2	dBm	-60.26	-60.29	-59.09						1st Limit $\leq 20$ nW (-47 dBm)
		* 2	dBm	-	-	-						2nd RBW : 1 MHz ; VBW : 1 MHz
		* 2	dBm	-	-	-						3rd
	Spurious Emission Intensity	* 1	nW	0.0192	0.0323	0.0164						Total Emission Power
		* 1	nW	0.0192	0.0323	0.0164						1st Limit $\leq 4$ nW (-54 dBm)
		* 1	nW	-	-	-						2nd RBW : 100 kHz ; VBW : 100 kHz
		* 1	nW	-	-	-						3rd
		* 2	nW	0.9419	0.9354	1.2331						Total Emission Power
		* 2	nW	0.9419	0.9354	1.2331						1st Limit $\leq 20$ nW (-47 dBm)
		* 2	nW	-	-	-						2nd RBW : 1 MHz ; VBW : 1 MHz
		* 2	nW	-	-	-						3rd

\* 1: Frequency Band 5 (30 MHz  $\leq$  f < 1000 MHz) \* 2: Frequency Band 6 (1000 MHz  $\leq$  f < 26 GHz)

## 5. Carrier Sense Capability

Carrier Sense	Test Voltage	V	Normal Voltage ( 5V )									Remarks
	Test Frequency	MHz	5180	5200	5240							
	Mini. Antenna Gain	dBi	0.42	0.42	0.42							
	Carrier Level	dBm	-51.08	-51.11	-51.18							Pin = $22.79 + Gr - 20 * \log(\text{freq\_MHz})$ [dBm]
	Result	Good/Fail	Good	Good	Good							

## Appendix B 19-3-11n-20M

Sporton No.	JR373103-02
Test Date for other	2013/9/5
Test Date for carrier sense	2018/2/9
Test Location	SPORTON Lab.
Temp. / Humid.	24.6℃ / 62%
Test Site	TH06-HY
Engineer	Shiming
Department	Radio Service Group

## 1. General Information

Specified Radio Equipment	Class	Article 2 Paragraph 1 Item 19-3	Antenna Port	DAC 0	Test Location	SPORTON Lab.
	Type of Emission	G1D / D1D	Model	WU8R-508N	Temp. / Humid.	24.6℃ / 62%
	Modulation Type	OFDM: BPSK, QPSK, 16QAM, 64QAM	Serial No.	12635W2002256	Test Site	TH06-HY
	Frequency	5180~5240MHz(20MHz Space 4 Channels)	Antenna Power	0.86 mW/MHz	Engineer	Shiming
				W52	Department	Radio Service Group

## 2. Test Results

Testing for Electrical Specification	Test Voltage		V	Normal Voltage ( 5V)										Remarks		
	Test Frequency		MHz	5180	5200	5240								Low/Mid/High of test frequency range		
	Measured Frequency		MHz	5180.0054	5200.0078	5240.0060										
	Frequency Error		ppm	-1.04	-1.50	-1.15								Limit ≤ 20 ppm		
	Occupied Bandwidth		MHz	17.52	17.48	17.52								99% OBW Limit ≤ 19 MHz (RB/VB : 300kHz)		
	Spreading Bandwidth (DSSS only)		MHz	15.08	15.12	15.08								90% of total emission power		
	EIRP Power		mW/MHz	3.71349	3.61228	3.96992								Ant Gain :	6.64	[dBi]
	Antenna Power (Conducted)		mW/MHz	0.80497	0.78304	0.86056								Limit ≤ 10 mW/MHz - Antenna power & EIRP power		
	Antenna Power Error		Δp	mW/MHz	-0.05503	-0.07696	0.00056									
	Power Error Rate			%	-6.40	-8.95	0.07							Limit + 20% ~ - 80%		
	Adjacent Channel Power		-20MHz	dB	37.10	36.54	35.83							Limit ≥ 25dB (18MHz)		
			+20MHz	dB	38.51	37.36	37.39							Limit ≥ 25dB (18MHz)		
			-40MHz	dB	51.78	52.33	52.04							Limit ≥ 40dB (18MHz)		
			+40MHz	dB	52.40	53.00	52.84							Limit ≥ 40dB (18MHz)		
	Limitation of Collateral Emission of Receiver		< 1GHz	nW	0.0183	0.0262	0.0185							Limit ≤ 4 nW (-54 dBm)		
			≥ 1GHz	nW	0.8590	0.8185	3.3554							Limit ≤ 20 nW (-47 dBm)		
	Transmission Burst Length		msec	2.3000	2.3000	2.3000								Limit ≤ 4msec		
Radio Interface Prevention Function	Carrier Sense (100mV/m)	OK / NG	OK	OK	OK								Pin = 22.79+Gr-20*log(freq_MHz) [dBm]			
	ID code	ID code	Good, MAC Address:00-0E-8E-40-89-82													
	Test Frequency (W53)	MHz	-										Pin = Gr - 62 [dBm]Gr is max receiveing antenna gain in dBi			
	DFS function	OK / NG	-													
	Test Frequency (W53)	MHz	-	-	-								If EIRP power density of EUT is less than 5mW/MHz, without TPC function			
TPC function		dB	-	-	-											
Unwanted Emission Intensity	W52	Test Frequency	MHz	5180	5200	5240								Low/Mid/High of test frequency range		
		Max value in the band	MHz	5135.00	5063.53	5012.48								30MHz~5135MHz Limit ≤ 2.5 μW/MHz (-26 dBm/MHz)		
			Raw dBm	-42.54	-44.12	-43.42										
			dBm/MHz	-40.29	-41.87	-41.17										
			μW/MHz	0.09354	0.06501	0.07638										
		Max value in the band	MHz	20634.90	21955.54	21831.73								5365MHz~26000MHz Limit ≤ 2.5 μW/MHz (-26 dBm/MHz)		
			Raw dBm	-33.43	-34.81	-33.99										
			dBm/MHz	-29.75	-31.13	-30.31										
			μW/MHz	1.05925	0.77090	0.93111										
		Out-Band Leakage Power (EIRP)	W52	Test Frequency	MHz	5180	5200	5240								Low/Mid/High of test frequency range
Max value in the band	MHz			5141.69	5137.44	5140.80								5135MHz~5142MHz Limit ≤ 2.5 μW/MHz (-26 dBm/MHz)		
	Raw dBm			-43.51	-43.40	-43.37										
	dBm/MHz			-34.62	-34.51	-34.48										
	μW/MHz			0.34514	0.35400	0.35645										
Max value in the band	MHz			5148.35	5148.00	5142.66								5142MHz~5150MHz Limit ≤ 15 μW/MHz (-18.24 dBm/MHz)		
	Raw dBm			-40.12	-40.95	-43.41										
	dBm/MHz			-31.23	-32.06	-34.52										
	μW/MHz			0.75336	0.62230	0.35318										
Max value in the band	MHz			5250.14	5250.99	5250.04								5250MHz~5251MHz Limit ≤ 1000 ~ 100 μW/MHz (0 ~ -10 dBm/MHz)		
	Raw dBm			-44.68	-43.80	-12.02										
	dBm/MHz			-35.79	-34.91	-3.13										
	μW/MHz			0.26363	0.32285	486.40721										
Max value in the band	dB			34.39	25.01	2.73								Margin to the technical requirement		
	MHz			5255.48	5252.48	5252.40								5251MHz~5260MHz Limit ≤ 100 ~ 15.8 μW/MHz (-10 ~ -18 dBm/MHz)		
	Raw dBm			-45.03	-42.05	-37.08										
	dBm/MHz			-36.14	-33.16	-28.19										
Max value in the band	μW/MHz			0.24322	0.48306	1.51705								Margin to the technical requirement		
	dB			22.16	21.85	16.94										
	MHz			5266.30	5265.20	5260.52								5260MHz~5266.7MHz Limit ≤ 15.8 ~ 2.5 μW/MHz (-18 ~ -26 dBm/MHz)		
	Raw dBm	-44.92	-44.53	-31.18												
	dBm/MHz	-36.03	-35.64	-22.29												
	μW/MHz	0.24946	0.27290	5.90201												
	dB	10.47	11.40	3.66								Margin to the technical requirement				
	MHz	5295.99	5268.27	5267.88								5266.7MHz~5365MHz Limit ≤ 2.5 μW/MHz (-26 dBm/MHz)				

## Appendix B 19-3-11n-20M-Power

## 3. Antenna Power (Conducted Power)

Antenna Power	Test Voltage	V	Normal Voltage ( 5V)									Remarks	
	Test Frequency	MHz	5180	5200	5240								
	Power Meter Raw (IF of Spectrum)	dBm	-21.64	-21.76	-21.35								
	Power Measurement System Loss	dB	21.19	21.19	21.19							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	-0.94	-1.06	-0.65							Limit ≤ 10 mW/MHz (10 dBm/MHz)	
	Antenna Power (Conducted)	mW/MHz	0.8050	0.7830	0.8606								
	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. Limitation of Collateral Emission of Receiver

Limitation of Collateral Emission	Test Voltage		V		Normal Voltage ( 5V)								Remarks	
	Test Frequency		MHz	5180	5200	5240								
	Spurious Emission Frequency	※ 1	MHz	119.24	74.62	738.10							1st	30MHz~ 1000MHz:: Maximum emission and all emissions beyond 1/10 of the limitation must be indicated.
		※ 1	MHz	-	-	-							2nd	
		※ 1	MHz	-	-	-							3rd	
		※ 2	MHz	3438.00	22000.00	3450.00							1st	1000MHz~ 26GHz:: Maximum emission and all emissions beyond 1/10 of the limitation must be indicated.
		※ 2	MHz	-	-	21950.00							2nd	
		※ 2	MHz	-	-	21800.00							3rd	
	Cable Loss	※ 1	dB	0.78	0.78	0.78							1st	
		※ 1	dB	-	-	-							2nd	
		※ 1	dB	-	-	-							3rd	
		※ 2	dB	3.68	3.68	3.68							1st	
		※ 2	dB	-	-	3.68							2nd	
		※ 2	dB	-	-	3.68							3rd	
	Spectrum Raw	※ 1	dBm	-78.15	-76.60	-78.11							1st	
		※ 1	dBm	-	-	-							2nd	
		※ 1	dBm	-	-	-							3rd	
		※ 2	dBm	-64.34	-64.55	-62.51							1st	
		※ 2	dBm	-	-	-63.19							2nd	
		※ 2	dBm	-	-	-64.01							3rd	
	Spurious Emission Intensity	※ 1	dBm	-77.37	-75.82	-77.33							1st	Limit ≤ 4 nW (-54 dBm) RBW : 100 kHz ; VBW : 100 kHz
		※ 1	dBm	-	-	-							2nd	
		※ 1	dBm	-	-	-							3rd	
		※ 2	dBm	-60.66	-60.87	-58.83							1st	Limit ≤ 20 nW (-47 dBm) RBW : 1 MHz ; VBW : 1 MHz
		※ 2	dBm	-	-	-59.51							2nd	
		※ 2	dBm	-	-	-60.33							3rd	
	Spurious Emission Intensity	※ 1	nW	0.0183	0.0262	0.0185							Total Emission Power	
		※ 1	nW	0.0183	0.0262	0.0185							1st	Limit ≤ 4 nW (-54 dBm) RBW : 100 kHz ; VBW : 100 kHz
		※ 1	nW	-	-	-							2nd	
		※ 1	nW	-	-	-							3rd	
		※ 2	nW	0.8590	0.8185	3.3554							Total Emission Power	
		※ 2	nW	0.8590	0.8185	1.3092							1st	Limit ≤ 20 nW (-47 dBm) RBW : 1 MHz ; VBW : 1 MHz
		※ 2	nW	-	-	1.1194							2nd	
		※ 2	nW	-	-	0.9268							3rd	

※ 1: Frequency Band 5 (30 MHz  $\leq f < 1000$  MHz) ※ 2: Frequency Band 6 (1000 MHz  $\leq f < 26$  GHz)

## 5. Carrier Sense Capability

Carrier Sense	Test Voltage	V	Normal Voltage ( 5V)									Remarks
	Test Frequency	MHz	5180	5200	5240							
	Mini. Antenna Gain	dBi	0.42	0.42	0.42							
	Carrier Level	dBm	-51.08	-51.11	-51.18							Pin = $22.79 + \text{Gr} - 20 * \log(\text{freq\_MHz})$ [dBm]
	Result	Good/Fail	Good	Good	Good							

## Appendix B 19-3-11n-20M

										Sporton No.		JR373103-02			
										Test Date for other		2013/9/5			
										Test Date for carrier sense		2018/2/9			
										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 19-3				Antenna Port		DAC 1			
				Type of Emission		G1D / D1D				Model		WUBR-508N			
				Modulation Type		OFDM: BPSK, QPSK, 16QAM, 64QAM				Serial No.		12635W2002256			
				Frequency		5180 ~ 5240MHz(20MHz Space 4 Channels)				Antenna Power		0.83 mW/MHz			
												W52			
2. Test Results															
Testing for Electrical Specification															
Test Voltage				V		Normal Voltage ( 5V )									
Test Frequency				MHz		5180		5200		5240		Remarks			
Measured Frequency				MHz		5180.0054		5200.0078		5240.0060		Low/Mid/High of test frequency range			
Frequency Error				ppm		-1.04		-1.50		-1.15					
Occupied Bandwidth				MHz		17.52		17.56		17.52		Limit ≤ 20 ppm			
Spreading Bandwidth (DSSS only)				MHz		15.20		15.24		15.16		99% OBW Limit ≤ 19 MHz (RB/VB : 300kHz)			
EIRP Power				mW/MHz		2.86934		3.01149		3.82633		90% of total emission power			
Antenna Power (Conducted)				mW/MHz		0.62199		0.65280		0.82943		Ant Gain : 6.64 [dBi]			
Antenna Power Error				Δp		mW/MHz		-0.20801		-0.17720		-0.00057			
Power Error Rate						%		-25.06		-21.35		-0.07			
Adjacent Channel Power				-20MHz		dB		37.55		38.18		37.21			
				+20MHz		dB		37.61		37.44		36.85			
				-40MHz		dB		51.84		52.40		52.36			
				+40MHz		dB		52.64		53.00		52.87			
Limitation of Collateral Emission of Receiver				< 1GHz		nW		0.0155		0.0321		0.0169			
				≥ 1GHz		nW		0.3664		0.7621		3.0754			
Transmission Burst Length				msec		2.3000		2.3000		2.3000		Limit ≤ 20 nW (-47 dBm)			
												Limit ≤ 4msec			
Radio Interface Prevention Function				Carrier Sense (100mV/m)		OK / NG		OK		OK		Limit ≤ 4msec			
				ID code		ID code		Good, MAC Address: 00-0E-8E-40-89-82							
				Test Frequency (W53)		MHz				-				Pin = 22.79+Gr-20*log(freq_MHz) [dBm]	
				DFS function		OK / NG				-					
				Test Frequency (W53)		MHz				-				Pin = Gr - 62 [dBm]Gr is max receiving antenna gain in dBi	
TPC function				dB				-				If EIRP power density of EUT is less than 5mW/MHz, without TPC function			
Unwanted Emission Intensity				Test Frequency		MHz		5180		5200		5240			
						MHz		5135.00		4981.85		4941.01			
				Max value in the band		Raw dBm		-43.08		-44.19		-44.32			
						dBm/MHz		-40.83		-41.94		-42.07		30MHz~5135MHz Limit ≤ 2.5 μW/MHz (-26 dBm/MHz)	
				Max value in the band		μW/MHz		0.08260		0.06397		0.06209			
						MHz		21831.73		21996.81		21749.19			
				Max value in the band		Raw dBm		-33.98		-33.99		-34.12			
						dBm/MHz		-30.30		-30.31		-30.44		5365MHz~26000MHz Limit ≤ 2.5 μW/MHz (-26 dBm/MHz)	
				Max value in the band		μW/MHz		0.93325		0.93111		0.90365			
Testing for Electrical Specification				Test Frequency		MHz		5180		5200		5240			
						MHz		5141.99		5135.24		5141.41			
				Max value in the band		Raw dBm		-42.94		-43.68		-44.43		Low/Mid/High of test frequency range	
						dBm/MHz		-34.05		-34.79		-35.54			
				Max value in the band		μW/MHz		0.39355		0.33189		0.27925		5135MHz~5142MHz Limit ≤ 2.5 μW/MHz (-26 dBm/MHz)	
						MHz		5145.25		5148.11		5149.78			
				Max value in the band		Raw dBm		-37.99		-40.63		-43.57			
						dBm/MHz		-29.10		-31.74		-34.68		5142MHz~5150MHz Limit ≤ 15 μW/MHz (-18.24 dBm/MHz)	
				Max value in the band		μW/MHz		1.23027		0.66988		0.34041			
						MHz		5250.97		5250.95		5250.00			
				Max value in the band		Raw dBm		-45.25		-42.49		-13.44			
						dBm/MHz		-36.36		-33.60		-4.55		5250MHz~5251MHz Limit ≤ 1000 ~ 100 μW/MHz (0 ~ -10 dBm/MHz)	
				Max value in the band		μW/MHz		0.23121		0.43652		350.75187			
						dB		26.64		24.08		4.55			
				Max value in the band		MHz		5257.93		5251.90		5251.50		Margin to the technical requirement	
						Raw dBm		-44.97		-41.05		-36.02			
				Max value in the band		dBm/MHz		-36.08		-32.16		-27.13		5251MHz~5260MHz Limit ≤ 100 ~ 15.8 μW/MHz (-10 ~ -18 dBm/MHz)	
						μW/MHz		0.24660		0.60814		1.93642			
				Max value in the band		dB		19.92		21.36		16.68			
						MHz		5260.13		5264.48		5260.72		Margin to the technical requirement	
				Max value in the band		Raw dBm		-45.25		-44.09		-29.34			
						dBm/MHz		-36.36		-35.20		-20.45		5260MHz~5266.7MHz Limit ≤ 15.8 ~ 2.5 μW/MHz (-18 ~ -26 dBm/MHz)	
				Max value in the band		μW/MHz		0.23121		0.30200		9.01571			
						dB		18.20		11.83		1.58			
				Max value in the band		MHz		5270.63		5268.08		5267.68		Margin to the technical requirement	
						Raw dBm		-45.35		-44.38		-40.64			
				Max value in the band		dBm/MHz		-36.46		-35.49		-31.75			
						μW/MHz		0.22594		0.28249		0.66834		5266.7MHz~5365MHz Limit ≤ 2.5 μW/MHz (-26 dBm/MHz)	

## Appendix B 19-3-11n-20M-Power

## 3. Antenna Power (Conducted Power)

Antenna Power	Test Voltage	V	Normal Voltage ( 5V)									Remarks
	Test Frequency	MHz	5180	5200	5240							
	Power Meter Raw (IF of Spectrum)	dBm	-22.76	-22.55	-21.51							
	Power Measurement System Loss	dB	21.19	21.19	21.19							Refer to Calibration Result
	Transmitter Duty Cycle Factor	dB	0.00	0.00	0.00							Duty Factor = $10 \times 10\log_{10}(1/\text{Duty Cycle})$
	Equivalent Noise Bandwidth	MHz	1.12	1.12	1.12							ENB = $\text{Total\_Sum}^2 / \text{Peak\_Level} * \text{Point\_Width}$
	Equivalent Noise Bandwidth Factor	dB	0.49	0.49	0.49							ENB Factor = $10 \times 10\log_{10}(1/\text{ENB})$
	Antenna Power (Conducted)	dBm/MHz	-2.06	-1.85	-0.81							Limit $\leq 10$ mW/MHz (10 dBm/MHz)
	Antenna Power (Conducted)	mW/MHz	0.6220	0.6528	0.8294							
	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. Limitation of Collateral Emission of Receiver

Limitation of Collateral Emission	Test Voltage	V	Normal Voltage ( 5V)									Remarks
	Test Frequency	MHz	5180	5200	5240							
	Spurious Emission Frequency	* 1	MHz	74.62	72.68	712.88						1st 30MHz~1000MHz:: Maximum emission and
		* 1	MHz	-	-	-						2nd all emissions beyond 1/10 of the limitation
		* 1	MHz	-	-	-						3rd must be indicated.
		* 2	MHz	3438.00	21900.00	21950.00						1st 1000MHz~26GHz:: Maximum emission and all
		* 2	MHz	-	-	21800.00						2nd emissions beyond 1/10 of the limitation must
		* 2	MHz	-	-	21250.00						3rd be indicated.
	Cable Loss	* 1	dB	0.78	0.78	0.78						1st
		* 1	dB	-	-	-						2nd
		* 1	dB	-	-	-						3rd
		* 2	dB	3.68	3.68	3.68						1st
		* 2	dB	-	-	3.68						2nd
		* 2	dB	-	-	3.68						3rd
	Spectrum Raw	* 1	dBm	-78.87	-75.71	-78.51						1st
		* 1	dBm	-	-	-						2nd
		* 1	dBm	-	-	-						3rd
		* 2	dBm	-68.04	-64.86	-63.13						1st
		* 2	dBm	-	-	-63.64						2nd
		* 2	dBm	-	-	-63.99						3rd
	Spurious Emission Intensity	* 1	dBm	-78.09	-74.93	-77.73						1st Limit $\leq 4$ nW (-54 dBm)
		* 1	dBm	-	-	-						2nd RBW : 100 kHz ; VBW : 100 kHz
		* 1	dBm	-	-	-						3rd
		* 2	dBm	-64.36	-61.18	-59.45						1st Limit $\leq 20$ nW (-47 dBm)
		* 2	dBm	-	-	-59.96						2nd RBW : 1 MHz ; VBW : 1 MHz
		* 2	dBm	-	-	-60.31						3rd
	Spurious Emission Intensity	* 1	nW	0.0155	0.0321	0.0169						Total Emission Power
		* 1	nW	0.0155	0.0321	0.0169						1st Limit $\leq 4$ nW (-54 dBm)
		* 1	nW	-	-	-						2nd RBW : 100 kHz ; VBW : 100 kHz
		* 1	nW	-	-	-						3rd
		* 2	nW	0.3664	0.7621	3.0754						Total Emission Power
		* 2	nW	0.3664	0.7621	1.1350						1st Limit $\leq 20$ nW (-47 dBm)
		* 2	nW	-	-	1.0093						2nd RBW : 1 MHz ; VBW : 1 MHz
		* 2	nW	-	-	0.9311						3rd

\* 1: Frequency Band 5 (30 MHz  $\leq f < 1000$  MHz) \* 2: Frequency Band 6 (1000 MHz  $\leq f < 26$  GHz)

## 5. Carrier Sense Capability

Carrier Sense	Test Voltage	V	Normal Voltage ( 5V)									Remarks
	Test Frequency	MHz	5180	5200	5240							
	Mini. Antenna Gain	dBi	0.42	0.42	0.42							
	Carrier Level	dBm	-51.08	-51.11	-51.18							Pin = $22.79 + \text{Gr} - 20 * \log(\text{freq\_MHz})$ [dBm]
	Result	Good/Fail	Good	Good	Good							

## Appendix B 19-3-11n-20M

Sporton No.	JR373103-02
Test Date for other	2013/9/5
Test Date for carrier sense	2018/2/9
Test Location	SPORTON Lab.
Temp. / Humid.	24.6℃ / 62%
Test Site	TH06-HY
Engineer	Shiming
Department	Radio Service Group

## 1. General Information

Specified Radio Equipment	Class	Article 2 Paragraph 1 Item 19-3	Antenna Port	DAC 0+DAC 1	Test Location	SPORTON Lab.
	Type of Emission	G1D / D1D	Model	WUBR-508N	Temp. / Humid.	24.6℃ / 62%
	Modulation Type	OFDM: BPSK, QPSK, 16QAM, 64QAM	Serial No.	12635W2002256	Test Site	TH06-HY
	Frequency	5180~5240MHz(20MHz Space 4 Channels)	Antenna Power	1.69 mW/MHz	Engineer	Shiming
				W52	Department	Radio Service Group

## 2. Test Results

Test Voltage		V	Normal Voltage ( 5V)							Remarks			
Test Frequency		MHz	5180	5200	5240					Low/Mid/High of test frequency range			
Testing for Electrical Specification	Measured Frequency		MHz	-	-	-							
	Frequency Error		ppm	-	-	-					Limit ≤ 20 ppm		
	Occupied Bandwidth		MHz	-	-	-					99% OBW Limit ≤ 19 MHz (RB/VB : 300kHz)		
	Spreading Bandwidth (DSSS only)		MHz	-	-	-					90% of total emission power		
	EIRP Power		mW/MHz	6.58283	6.62378	7.79625					Ant Gain : 6.64 [dBi]		
	Antenna Power (Conducted)		mW/MHz	1.42696	1.43584	1.69000					Limit ≤ 10 mW/MHz - Antenna power & EIRP power		
	Antenna Power Error		Δp	-0.26304	-0.25416	0.00000							
	Power Error Rate		%	-15.56	-15.04	0.00					Limit + 20% ~ - 80%		
	Adjacent Channel Power	-20MHz	dB	-	-	-					Limit ≥ 25dB (18MHz)		
		+20MHz	dB	-	-	-					Limit ≥ 25dB (18MHz)		
-40MHz		dB	-	-	-					Limit ≥ 40dB (18MHz)			
+40MHz		dB	-	-	-					Limit ≥ 40dB (18MHz)			
Limitation of Collateral Emission of Receiver		< 1GHz	nW	0.0338	0.0583	0.0354					Limit ≤ 4 nW (-54 dBm)		
		≥ 1GHz	nW	1.2255	1.5805	6.4308					Limit ≤ 20 nW (-47 dBm)		
Transmission Burst Length		msec	2.3000	2.3000	2.3000					Limit ≤ 4msec			
Radio Interface Prevention Function	Carrier Sense (100mV/m)		OK / NG	OK	OK	OK					Pin = 22.79+Gr-20*log(freq_MHz) [dBm]		
	ID code		ID code	Good, MAC Address:00-0E-8E-40-89-82									
	Test Frequency (W53)		MHz	-	-	-					Pin = Gr - 62 [dBm]Gr is max receiving antenna gain in dBi		
	DFS function		OK / NG	-	-	-							
	Test Frequency (W53)		MHz	-	-	-					If EIRP power density of EUT is less than 5mW/MHz, without TPC function		
TPC function		dB	-	-	-								
Unwanted Emission Intensity	Test Frequency		MHz	5180	5200	5240					Low/Mid/High of test frequency range		
	W52	MHz	-	-	-	-							
		Raw dBm	-	-	-	-							
		dBm/MHz	-37.54	-38.89	-38.59					30MHz~5135MHz Limit ≤ 2.5 μW/MHz (-26 dBm/MHz)			
		μW/MHz	0.17614	0.12899	0.13847								
	W53	MHz	-	-	-	-							
		Raw dBm	-	-	-	-							
		dBm/MHz	-27.01	-27.69	-27.36					5365MHz~26000MHz Limit ≤ 2.5 μW/MHz (-26 dBm/MHz)			
		μW/MHz	1.99251	1.70201	1.83476								
	Test Frequency		MHz	5180	5200	5240					Low/Mid/High of test frequency range		
Out-Band Leakage Power (EIRP)	Max value in the band	MHz	-	-	-								
		Raw dBm	-	-	-								
		dBm/MHz	-31.32	-31.64	-31.97					5135MHz~5142MHz Limit ≤ 2.5 μW/MHz (-26 dBm/MHz)			
		μW/MHz	0.73869	0.68589	0.63571								
	Max value in the band	MHz	-	-	-								
		Raw dBm	-	-	-								
		dBm/MHz	-27.03	-28.89	-31.59					5142MHz~5150MHz Limit ≤ 15 μW/MHz (-18.24 dBm/MHz)			
		μW/MHz	1.98362	1.29218	0.69359								
	Max value in the band	MHz	-	-	-								
		Raw dBm	-	-	-								
		dBm/MHz	-33.06	-31.20	-0.77					5250MHz~5251MHz Limit ≤ 1000 ~ 100 μW/MHz (0 ~ -10 dBm/MHz)			
		μW/MHz	0.49484	0.75937	837.15908								
Max value in the band	MHz	-	-	-									
	Raw dBm	-	-	-									
	dBm/MHz	-33.10	-29.62	-24.62					5251MHz~5260MHz Limit ≤ 100 ~ 15.8 μW/MHz (-10 ~ -18 dBm/MHz)				
	μW/MHz	0.48982	1.09119	3.45347									
Max value in the band	MHz	-	-	-									
	Raw dBm	-	-	-									
	dBm/MHz	-33.18	-32.40	-18.26					5260MHz~5266.7MHz Limit ≤ 15.8 ~ 2.5 μW/MHz (-18 ~ -26 dBm/MHz)				
	μW/MHz	0.48067	0.57489	14.91772									
	MHz	-	-	-									
	Raw dBm	-	-	-									
	dBm/MHz	-33.54	-32.79	-28.71					5266.7MHz~5365MHz Limit ≤ 2.5 μW/MHz (-26 dBm/MHz)				
	μW/MHz	0.44271	0.52571	1.34599									

## Appendix B 19-3-11n-20M-Power

## 3. Antenna Power (Conducted Power)

Antenna Power	Test Voltage	V	Normal Voltage ( 5V)								Remarks
	Test Frequency	MHz	5180	5200	5240						
	Power Meter Raw (IF of Spectrum)	dBm	-19.15	-19.13	-18.42						
	Power Measurement System Loss	dB	21.19	21.19	21.19						Refer to Calibration Result
	Transmitter Duty Cycle Factor	dB	0.00	0.00	0.00						Duty Factor = $10 \times 10\log_{10}(1/\text{Duty Cycle})$
	Equivalent Noise Bandwidth	MHz	1.12	1.12	1.12						ENB = $\text{Total\_Sum}^2 / \text{Peak\_Level} * \text{Point\_Width}$
	Equivalent Noise Bandwidth Factor	dB	0.49	0.49	0.49						ENB Factor = $10 \times 10\log_{10}(1/\text{ENB})$
	Antenna Power (Conducted)	dBm/MHz	1.54	1.57	2.28						Limit $\leq 10$ mW/MHz (10 dBm/MHz)
	Antenna Power (Conducted)	mW/MHz	1.4270	1.4358	1.6900						
	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. Limitation of Collateral Emission of Receiver

Limitation of Collateral Emission	Test Voltage	V	Normal Voltage ( 5V)								Remarks
	Test Frequency	MHz	5180	5200	5240						
	Spurious Emission Frequency	* 1	MHz	-	-	-					1st 30MHz~1000MHz:: Maximum emission and
		* 1	MHz	-	-	-					2nd all emissions beyond 1/10 of the limitation
		* 1	MHz	-	-	-					3rd must be indicated.
		* 2	MHz	-	-	-					1st 1000MHz~26GHz:: Maximum emission and all
		* 2	MHz	-	-	-					2nd emissions beyond 1/10 of the limitation must
		* 2	MHz	-	-	-					3rd be indicated.
	Cable Loss	* 1	dB	0.78	0.78	0.78					1st
		* 1	dB	-	-	-					2nd
		* 1	dB	-	-	-					3rd
		* 2	dB	3.68	3.68	3.68					1st
		* 2	dB	-	-	3.68					2nd
		* 2	dB	-	-	3.68					3rd
	Spectrum Raw	* 1	dBm	-	-	-					1st
		* 1	dBm	-	-	-					2nd
		* 1	dBm	-	-	-					3rd
		* 2	dBm	-	-	-					1st
		* 2	dBm	-	-	-					2nd
		* 2	dBm	-	-	-					3rd
	Spurious Emission Intensity	* 1	dBm	-74.70	-72.34	-74.52					1st Limit $\leq 4$ nW (-54 dBm)
		* 1	dBm	-	-	-					2nd RBW : 100 kHz ; VBW : 100 kHz
		* 1	dBm	-	-	-					3rd
		* 2	dBm	-59.12	-58.01	-56.12					1st Limit $\leq 20$ nW (-47 dBm)
		* 2	dBm	-	-	-56.72					2nd RBW : 1 MHz ; VBW : 1 MHz
		* 2	dBm	-	-	-57.31					3rd
	Spurious Emission Intensity	* 1	nW	0.0338	0.0583	0.0354					Total Emission Power
		* 1	nW	0.0338	0.0583	0.0354					1st Limit $\leq 4$ nW (-54 dBm)
		* 1	nW	-	-	-					2nd RBW : 100 kHz ; VBW : 100 kHz
		* 1	nW	-	-	-					3rd
		* 2	nW	1.2255	1.5805	6.4308					Total Emission Power
		* 2	nW	1.2255	1.5805	2.4442					1st Limit $\leq 20$ nW (-47 dBm)
		* 2	nW	-	-	2.1287					2nd RBW : 1 MHz ; VBW : 1 MHz
		* 2	nW	-	-	1.8579					3rd

\* 1: Frequency Band 5 (30 MHz  $\leq f < 1000$  MHz) \* 2: Frequency Band 6 (1000 MHz  $\leq f < 26$  GHz)

## 5. Carrier Sense Capability

Carrier Sense	Test Voltage	V	Normal Voltage ( 5V)								Remarks
	Test Frequency	MHz	5180	5200	5240						
	Mini. Antenna Gain	dBi	0.42	0.42	0.42						
	Carrier Level	dBm	-51.08	-51.11	-51.18						Pin = $22.79 + Gr - 20 * \log(\text{freq\_MHz})$ [dBm]
	Result	Good/Fail	Good	Good	Good						

## Appendix B 19-3-11n-D1D (40MHz mode)

Sporton No.	JR373103-02
Test Date for other	2013/9/5
Test Date for carrier sense	2018/2/9
Test Location	SPORTON Lab.
Temp. / Humid.	24.6℃ / 62%
Test Site	TH06-HY
Engineer	Shiming
Department	Radio Service Group

## 1. General Information

Specified Radio Equipment	Class	Article 2 Paragraph 1 Item 19-3	Antenna Port	DAC 0	Test Location	SPORTON Lab.
	Type of Emission	G1D / DID	Model	WUBR-508N	Temp. / Humid.	24.6℃ / 62%
	Modulation Type	OFDM: BPSK, QPSK, 16QAM, 64QAM	Serial No.	12635W2002256	Test Site	TH06-HY
	Frequency	5190~5230MHz(40MHz Space 2 Channels)	Antenna Power	0.41 mW/MHz	Engineer	Shiming
				W52	Department	Radio Service Group

## 2. Test Results

Test Voltage		V	Normal Voltage (5V)		Remarks									
Test Frequency		MHz	5190	5230	-									Low/Mid/High of test frequency range
Testing for Electrical Specification	Measured Frequency	MHz	5189.9898	5229.9892	-									
	Frequency Error	ppm	1.97	2.07	-									Limit ≤ 20 ppm
	Occupied Bandwidth	MHz	36.00	36.00	-									99% OBW Limit ≤ 38 MHz (RB/VB : 300kHz)
	Spreading Bandwidth (DSSS only)	MHz	32.08	32.08	-									90% of total emission power
	EIRP Power	mW/MHz	1.74093	1.87837	-									Ant Gain : 6.64 [dBi]
	Antenna Power (Conducted)	mW/MHz	0.37738	0.40718	-									For 40M Limit ≤ 5 mW/MHz - Antenna power & EIRP power
	Antenna Power Error (Cond.)	Δp	-0.03262	-0.00282	-									For W53-40M, EIRP ≤ 2.5mW/MHz, w/o TPC function
	Power Error Rate (Cond.)	%	-7.96	-0.69	-									Limit + 20% - - 80%
	Adjacent Channel Leakage Power	-40MHz	dB	34.32	33.87	-								Limit ≥ 25dB (38MHz)
		+40MHz	dB	35.80	35.64	-								Limit ≥ 25dB (38MHz)
		-80MHz	dB	48.72	48.73	-								Limit ≥ 40dB (38MHz)
		+80MHz	dB	49.86	50.28	-								Limit ≥ 40dB (38MHz)
						-								
	Limitation of Collateral Emission of Receiver	< 1GHz	nW	0.0178	0.0170	-								Limit ≤ 4 nW (-54 dBm)
		≥ 1GHz	nW	0.8790	0.9863	-								Limit ≤ 20 nW (-47 dBm)
	Transmission Burst Length	msec	2.3000	2.3000	-									Limit ≤ 4msec
Radio Interface Prevention Function	Carrier Sense (100mV/m)	OK / NG	OK	OK	-									Pin = 22.79+Gr-20*log(freq_MHz) [dBm]
	ID code	ID code	Good, MAC Address:00-0E-8E-40-89-82											
	Test Frequency (W53)	MHz	-	-	-									Pin = Gr - 62 [dBm]Gr is max receiveing antenna gain in dBi
	DFS function	OK / NG	-	-	-									
	Test Frequency (W53) TPC function	MHz	-	-	-									For W53-40M, EIRP ≤ 2.5mW/MHz, w/o TPC function
Unwanted Emission Intensity	Test Frequency	MHz	5190	5230	-									Low/Mid/High of test frequency range
	W52	Max value in the band	MHz	5089.86	5008.74	-								
			Raw dBm	-44.98	-42.73	-								30MHz~5100MHz Limit ≤ 2.5 μW/MHz (-26 dBm/MHz)
			dBm/MHz	-40.44	-42.73	-								
			μW/MHz	0.09036	0.05333	-								
			MHz	21838.80	21838.80	-								
	W53	Max value in the band	Raw dBm	-34.79	-35.13	-								5400MHz~26000MHz Limit ≤ 2.5 μW/MHz (-26 dBm/MHz)
			dBm/MHz	-31.11	-31.45	-								
			μW/MHz	0.77446	0.71614	-								
			MHz	5139.98	5127.47	-								
			Raw dBm	-49.83	-41.45	-								5100MHz~5142MHz Limit ≤ 2.5 μW/MHz (-26 dBm/MHz)
Testing for Electrical Specification	Out-Band Leakage Power (EIRP)	W52	Max value in the band	dBm/MHz	-40.94	-32.56	-							
				μW/MHz	0.08054	0.55463	-							
				MHz	5148.97	5148.72	-							
				Raw dBm	-43.52	-43.79	-							5142MHz~5150MHz Limit ≤ 15 μW/MHz (-18.24 dBm/MHz)
				dBm/MHz	-34.63	-34.90	-							
		W52	Max value in the band	μW/MHz	0.34435	0.32359	-							
				MHz	5250.03	5250.01	-							
				Raw dBm	-42.61	-18.65	-							5250MHz~5251MHz Limit ≤ 500 ~ 50 μW/MHz (-3 ~ -13 dBm/MHz)
				dBm/MHz	-33.72	-9.76	-							
				dB	30.45	6.69	-							Margin to the technical requirement
		W52	Max value in the band	MHz	5251.95	5251.00	-							
				Raw dBm	-42.82	-35.51	-							
				dBm/MHz	-33.93	-26.62	-							5251MHz~5270MHz Limit ≤ 50 ~ 7.924 μW/MHz (-13 ~ -21 dBm/MHz)
				μW/MHz	0.40458	2.17771	-							
				dB	20.52	13.61	-							Margin to the technical requirement
		W52	Max value in the band	MHz	5271.58	5270.09	-							
				Raw dBm	-45.82	-45.27	-							
				dBm/MHz	-36.93	-36.38	-							5270MHz~5275.8MHz Limit ≤ 7.924 ~ 2.547 μW/MHz (-21 ~ -25.9 dBm/MHz)
				μW/MHz	0.20277	0.23014	-							
				dB	14.58	15.29	-							Margin to the technical requirement
		W52	Max value in the band	MHz	5293.19	5275.80	-							
				Raw dBm	-45.34	-47.48	-							
				dBm/MHz	-36.45	-38.59	-							5275.8MHz~5400MHz Limit ≤ 2.5 μW/MHz (-26 dBm/MHz)
				μW/MHz	0.22646	0.13836	-							



## Appendix B 19-3-11n-D1D-Power (40MHz mode)

## 3. Antenna Power (Conducted Power)

Antenna Power	Test Voltage	V	Normal Voltage ( 5V)								Remarks
	Test Frequency	MHz	5190	5230							
	Power Meter Raw (IF of Spectrum)	dBm	-24.93	-24.60							
	Power Measurement System Loss	dB	21.19	21.19							Refer to Calibration Result
	Transmitter Duty Cycle Factor	dB	0.00	0.00							Duty Factor = $10 \times 10\log_{10}(1/\text{Duty Cycle})$
	Equivalent Noise Bandwidth	MHz	1.12	1.12							ENB = $\text{Total\_Sum}^2 / \text{Peak\_Level} * \text{Point\_Width}$
	Equivalent Noise Bandwidth Factor	dB	0.49	0.49							ENB Factor = $10 \times 10\log_{10}(1/\text{ENB})$
	Antenna Power (Conducted)	dBm/MHz	-4.23	-3.90							Limit $\leq 5 \text{ mW/MHz}$ (7 dBm/MHz)
	Antenna Power (Conducted)	mW/MHz	0.3774	0.4072							
	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. Limitation of Collateral Emission of Receiver

Limitation of Collateral Emission	Test Voltage	V	Normal Voltage ( 5V)								Remarks
	Test Frequency	MHz	5190	5230							
	Spurious Emission Frequency	* 1	MHz	138.64	134.76						1st 30MHz~1000MHz:: Maximum emission and
		* 1	MHz	-	-						2nd all emissions beyond 1/10 of the limitation
		* 1	MHz	-	-						3rd must be indicated.
		* 2	MHz	24800.00	3450.00						1st 1000MHz~26GHz:: Maximum emission and all
		* 2	MHz	-	-						2nd emissions beyond 1/10 of the limitation must
		* 2	MHz	-	-						3rd be indicated.
	Cable Loss	* 1	dB	0.78	0.78						1st
		* 1	dB	-	-						2nd
		* 1	dB	-	-						3rd
		* 2	dB	3.68	3.68						1st
		* 2	dB	-	-						2nd
		* 2	dB	-	-						3rd
	Spectrum Raw	* 1	dBm	-78.28	-78.48						1st
		* 1	dBm	-	-						2nd
		* 1	dBm	-	-						3rd
		* 2	dBm	-64.24	-63.74						1st
		* 2	dBm	-	-						2nd
		* 2	dBm	-	-						3rd
	Spurious Emission Intensity	* 1	dBm	-77.50	-77.70						1st Limit $\leq 4 \text{ nW}$ (-54 dBm)
		* 1	dBm	-	-						2nd RBW : 100 kHz ; VBW : 100 kHz
		* 1	dBm	-	-						3rd
		* 2	dBm	-60.56	-60.06						1st Limit $\leq 20 \text{ nW}$ (-47 dBm)
		* 2	dBm	-	-						2nd RBW : 1 MHz ; VBW : 1 MHz
		* 2	dBm	-	-						3rd
	Spurious Emission Intensity	* 1	nW	0.0178	0.0170						Total Emission Power
		* 1	nW	0.0178	0.0170						1st Limit $\leq 4 \text{ nW}$ (-54 dBm)
		* 1	nW	-	-						2nd RBW : 100 kHz ; VBW : 100 kHz
		* 1	nW	-	-						3rd
		* 2	nW	0.8790	0.9863						Total Emission Power
		* 2	nW	0.8790	0.9863						1st Limit $\leq 20 \text{ nW}$ (-47 dBm)
		* 2	nW	-	-						2nd RBW : 1 MHz ; VBW : 1 MHz
		* 2	nW	-	-						3rd

\* 1: Frequency Band 5 (30 MHz  $\leq f < 1000$  MHz) \* 2: Frequency Band 6 (1000 MHz  $\leq f < 26$  GHz)

## 5. Carrier Sense Capability

Carrier Sense	Test Voltage	V	Normal Voltage ( 5V)								Remarks
	Test Frequency	MHz	5190	5230							
	Mini. Antenna Gain	dBi	0.42	0.42							
	Carrier Level	dBm	-51.09	-51.16							Pin = $22.79 + \text{Gr} - 20 * \log(\text{freq\_MHz})$ [dBm]
	Result	Good/Fail	Good	Good							

## Appendix B 19-3-11n-D1D (40MHz mode)

## 1. General Information

Specified Radio Equipment	Class	Article 2 Paragraph 1 Item 19-3	Antenna Port	DAC 1	Sporton No.	JR373103-02
	Type of Emission	G1D / D1D	Model	WUBR-508N	Test Date for other	2013/9/5
	Modulation Type	OFDM: BPSK, QPSK, 16QAM, 64QAM	Serial No.	12635W2002256	Test Date for carrier sense	2018/2/9
	Frequency	5190~5230MHz(40MHz Space 2 Channels)	Antenna Power	0.37 mW/MHz	Test Location	SPORTON Lab.
				W52	Temp. / Humid.	24.6℃ / 62%
					Test Site	TH06-HY
					Engineer	Shiming
					Department	Radio Service Group

## 2. Test Results

Test Voltage		V	Normal Voltage ( 5V )		Remarks									
Test Frequency		MHz	5190	5230	-									Low/Mid/High of test frequency range
Testing for Electrical Specification	Measured Frequency	MHz	5189.9898	5229.9892										
	Frequency Error	ppm	1.97	2.07										Limit ≤ 20 ppm
	Occupied Bandwidth	MHz	36.08	36.00										99% OBW Limit ≤ 38 MHz (RB/VB : 300kHz)
	Spreading Bandwidth (DSSS only)	MHz	32.32	32.32										90% of total emission power
	EIRP Power	mW/MHz	1.70130	1.65113										Ant Gain : 6.64 [dBi]
	Antenna Power (Conducted)	mW/MHz	0.36879	0.35792										For 40M Limit ≤ 5 mW/MHz - Antenna power & EIRP power
	Antenna Power Error (Cond.)	Δp	-0.00121	-0.01208										For W53-40M, EIRP ≤ 2.5mW/MHz, w/o TPC function
	Power Error Rate (Cond.)	%	-0.33	-3.27										Limit + 20% ~ - 80%
	Adjacent Channel Leakage Power	-40MHz	dB	34.95	35.37									Limit ≥ 25dB (38MHz)
		+40MHz	dB	34.71	35.21									Limit ≥ 25dB (38MHz)
		-80MHz	dB	48.75	48.75									Limit ≥ 40dB (38MHz)
		+80MHz	dB	49.86	49.69									Limit ≥ 40dB (38MHz)
	Limitation of Collateral Emission of Receiver	< 1GHz	nW	0.0231	0.0191									Limit ≤ 4 nW (-54 dBm)
		≥ 1GHz	nW	0.8551	0.8337									Limit ≤ 20 nW (-47 dBm)
	Transmission Burst Length	msec	2.3000	2.3000										Limit ≤ 4msec
Radio Interface Prevention Function	Carrier Sense (100mV/m)	OK / NG	OK	OK										Pin = 22.79+Gr-20*log(freq_MHz) [dBm]
	ID code	ID code	Good, MAC Address:00-0E-8E-40-89-82											
	Test Frequency (W53)	MHz	-	-										Pin = Gr - 62 [dBm]Gr is max receiveing antenna gain in dBi
	DFS function	OK / NG	-	-										
	Test Frequency (W53)	MHz	-	-										For W53-40M, EIRP ≤ 2.5mW/MHz, w/o TPC function
Testing for Electrical Specification	TPC function	dB	-	-										
	Unwanted Emission Intensity	Test Frequency	MHz	5190	5230	-								Low/Mid/High of test frequency range
		Max value in the band	MHz	3203.82	4958.04									
		Raw dBm	-45.50	-45.37										
		dBm/MHz	-42.25	-43.12										30MHz~5100MHz Limit ≤ 2.5 μW/MHz (-26 dBm/MHz)
		μW/MHz	0.05957	0.04875										
		Max value in the band	MHz	21880.00	21838.80									
		Raw dBm	-34.95	-34.69										
		dBm/MHz	-31.27	-31.01										5400MHz~26000MHz Limit ≤ 2.5 μW/MHz (-26 dBm/MHz)
		μW/MHz	0.74645	0.79250										
	Out-Band Leakage Power (EIRP)	Test Frequency	MHz	5190	5230	-								Low/Mid/High of test frequency range
		Max value in the band	MHz	5111.93	5126.80									
		Raw dBm	-47.38	-43.44										
		dBm/MHz	-38.49	-34.55										5100MHz~5142MHz Limit ≤ 2.5 μW/MHz (-26 dBm/MHz)
		μW/MHz	0.14158	0.35075										
		Max value in the band	MHz	5148.74	5148.46									
		Raw dBm	-40.49	-44.52										
		dBm/MHz	-31.60	-35.63										5142MHz~5150MHz Limit ≤ 15 μW/MHz (-18.24 dBm/MHz)
		μW/MHz	0.69183	0.27353										
		Max value in the band	MHz	5250.09	5250.01									
		Raw dBm	-44.50	-19.31										
		dBm/MHz	-35.61	-10.42										5250MHz~5251MHz Limit ≤ 500 ~ 50 μ W/MHz (-3 ~ -13 dBm/MHz)
		μW/MHz	0.27479	90.78205										
		Max value in the band	dB	31.70	7.35									Margin to the technical requirement
		Max value in the band	MHz	5255.64	5255.71									
		Raw dBm	-44.64	-36.24										
		dBm/MHz	-35.75	-27.35										5251MHz~5270MHz Limit ≤ 50 ~ 7.924 μ W/MHz (-13 ~ -21 dBm/MHz)
		μW/MHz	0.26607	1.84077										
		Max value in the band	dB	20.79	12.36									Margin to the technical requirement
		Max value in the band	MHz	5272.38	5272.48									
		Raw dBm	-46.08	-47.91										
		dBm/MHz	-37.19	-39.02										5270MHz~5275.8MHz Limit ≤ 7.924 ~ 2.547 μ W/MHz (-21 ~ -25.9 dBm/MHz)
		μW/MHz	0.19099	0.12531										
		Max value in the band	dB	14.16	15.90									Margin to the technical requirement
		Max value in the band	MHz	5329.21	5275.80									
		Raw dBm	-45.49	-47.55										
		dBm/MHz	-36.60	-38.66										5275.8MHz~5400MHz Limit ≤ 2.5 μW/MHz (-26 dBm/MHz)
		μW/MHz	0.21878	0.13614										

## Appendix B 19-3-11n-D1D-Power (40MHz mode)

## 3. Antenna Power (Conducted Power)

Antenna Power	Test Voltage	V	Normal Voltage ( 5V)								Remarks
	Test Frequency	MHz	5190	5230							
	Power Meter Raw (IF of Spectrum)	dBm	-25.03	-25.16							
	Power Measurement System Loss	dB	21.19	21.19							Refer to Calibration Result
	Transmitter Duty Cycle Factor	dB	0.00	0.00							Duty Factor = $10 \times 10\log_{10}(1/\text{Duty Cycle})$
	Equivalent Noise Bandwidth	MHz	1.12	1.12							ENB = $\text{Total\_Sum}^2 / \text{Peak\_Level} * \text{Point\_Width}$
	Equivalent Noise Bandwidth Factor	dB	0.49	0.49							ENB Factor = $10 \times 10\log_{10}(1/\text{ENB})$
	Antenna Power (Conducted)	dBm/MHz	-4.33	-4.46							Limit $\leq 5 \text{ mW/MHz}$ (7 dBm/MHz)
	Antenna Power (Conducted)	mW/MHz	0.3688	0.3579							
	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. Limitation of Collateral Emission of Receiver

Limitation of Collateral Emission	Test Voltage	V	Normal Voltage ( 5V)								Remarks
	Test Frequency	MHz	5190	5230	-						
	Spurious Emission Frequency	* 1	MHz	961.20	672.14						1st 30MHz~1000MHz:: Maximum emission and all emissions beyond 1/10 of the limitation must be indicated.
		* 1	MHz	-	-						2nd
		* 1	MHz	-	-						3rd
		* 2	MHz	21800.00	21800.00						1st 1000MHz~26GHz:: Maximum emission and all emissions beyond 1/10 of the limitation must be indicated.
		* 2	MHz	-	-						2nd
		* 2	MHz	-	-						3rd
	Cable Loss	* 1	dB	0.78	0.78						1st
		* 1	dB	-	-						2nd
		* 1	dB	-	-						3rd
		* 2	dB	3.68	3.68						1st
		* 2	dB	-	-						2nd
		* 2	dB	-	-						3rd
	Spectrum Raw	* 1	dBm	-77.14	-77.96						1st
		* 1	dBm	-	-						2nd
		* 1	dBm	-	-						3rd
		* 2	dBm	-64.36	-64.47						1st
		* 2	dBm	-	-						2nd
		* 2	dBm	-	-						3rd
	Spurious Emission Intensity	* 1	dBm	-76.36	-77.18						1st Limit $\leq 4 \text{ nW}$ (-54 dBm)
		* 1	dBm	-	-						2nd RBW : 100 kHz ; VBW : 100 kHz
		* 1	dBm	-	-						3rd
		* 2	dBm	-60.68	-60.79						1st Limit $\leq 20 \text{ nW}$ (-47 dBm)
		* 2	dBm	-	-						2nd RBW : 1 MHz ; VBW : 1 MHz
		* 2	dBm	-	-						3rd
	Spurious Emission Intensity	* 1	nW	0.0231	0.0191						Total Emission Power
		* 1	nW	0.0231	0.0191						1st Limit $\leq 4 \text{ nW}$ (-54 dBm)
		* 1	nW	-	-						2nd RBW : 100 kHz ; VBW : 100 kHz
		* 1	nW	-	-						3rd
		* 2	nW	0.8551	0.8337						Total Emission Power
		* 2	nW	0.8551	0.8337						1st Limit $\leq 20 \text{ nW}$ (-47 dBm)
		* 2	nW	-	-						2nd RBW : 1 MHz ; VBW : 1 MHz
		* 2	nW	-	-						3rd

\* 1: Frequency Band 5 (30 MHz  $\leq f < 1000$  MHz) \* 2: Frequency Band 6 (1000 MHz  $\leq f < 26$  GHz)

## 5. Carrier Sense Capability

Carrier Sense	Test Voltage	V	Normal Voltage ( 5V)								Remarks
	Test Frequency	MHz	5190	5230							
	Mini. Antenna Gain	dBi	0.42	0.42							
	Carrier Level	dBm	-51.09	-51.16							Pin = $22.79 + \text{Gr} - 20 * \log(\text{freq\_MHz})$ [dBm]
	Result	Good/Fail	Good	Good							

## Appendix B 19-3-11n-D1D (40MHz mode)

					Sporton No.	JR373103-02		
					Test Date for other	2013/9/5		
					Test Date for carrier sense	2018/2/9		
1. General Information					Test Location	SPORTON Lab.		
Specified Radio Equipment	Class	Article 2 Paragraph 1 Item 19-3	Antenna Port	DAC 0+DAC 1	Temp. / Humid.	24.6℃ / 62%		
	Type of Emission	G1D / D1D	Model	WUBR-508N	Test Site	TH06-HY		
	Modulation Type	OFDM: BPSK, QPSK, 16QAM, 64QAM	Serial No.	12635W2002256	Engineer	Shiming		
	Frequency	5190~5230MHz(40MHz Space 2 Channels)	Antenna Power	0.77 mW/MHz	Department	Radio Service Group		
2. Test Results								
Testing for Electrical Specification	Test Voltage	V	Normal Voltage ( 5V )				Remarks	
	Test Frequency	MHz	5190	5230	-		Low/Mid/High of test frequency range	
	Measured Frequency	MHz	-	-	-			
	Frequency Error	ppm	-	-	-		Limit ≤ 20 ppm	
	Occupied Bandwidth	MHz	-	-	-		99% OBW Limit ≤ 38 MHz (RB/VB : 300kHz)	
	Spreading Bandwidth (DSSS only)	MHz	-	-	-		90% of total emission power	
	EIRP Power	mW/MHz	3.44224	3.52951			Ant Gain : 6.64 [dBi]	
	Antenna Power (Conducted)	mW/MHz	0.74618	0.76509			For 40M Limit ≤ 5 mW/MHz - Antenna power & EIRP power	
	Antenna Power Error (Cond.)	Δp	-0.02382	-0.00491			For W53-40M, EIRP ≤ 2.5mW/MHz, w/o TPC function	
	Power Error Rate (Cond.)	%	-3.09	-0.64			Limit + 20% ~ - 80%	
	Adjacent Channel Leakage Power	-40MHz	dB	-	-			Limit ≥ 25dB (38MHz)
		+40MHz	dB	-	-			Limit ≥ 25dB (38MHz)
		-80MHz	dB	-	-			Limit ≥ 40dB (38MHz)
		+80MHz	dB	-	-			Limit ≥ 40dB (38MHz)
Limitation of Collateral Emission of Receiver	< 1GHz	nW	0.0409	0.0361			Limit ≤ 4 nW (-54 dBm)	
	≥ 1GHz	nW	1.7341	1.8200			Limit ≤ 20 nW (-47 dBm)	
Transmission Burst Length	msec	2.3000	2.3000				Limit ≤ 4msec	
Radio Interface Prevention Function	Carrier Sense (100mV/m)	OK / NG	OK	OK			Pin = 22.79+Gr-20*log(freq_MHz) [dBm]	
	ID code	ID code	Good, MAC Address:00-0E-8E-40-89-82					
	Test Frequency (W53)	MHz	-	-	-		Pin = Gr - 62 [dBm]Gr is max receiveing antenna gain in dBi	
	DFS function	OK / NG	-	-	-			
	Test Frequency (W53)	MHz	-	-	-		For W53-40M, EIRP ≤ 2.5mW/MHz, w/o TPC function	
Unwanted Emission Intensity	TPC function	dB	-	-	-			
	Test Frequency	MHz	5190	5230	-		Low/Mid/High of test frequency range	
	Max value in the band	MHz	-	-	-			
		Raw dBm	-	-	-			
		dBm/MHz	-38.24	-39.91	-		30MHz~5100MHz Limit ≤ 2.5 μW/MHz (-26 dBm/MHz)	
		μW/MHz	0.14993	0.10209	-			
	Max value in the band	MHz	-	-	-			
		Raw dBm	-	-	-			
		dBm/MHz	-28.18	-28.21	-		5400MHz~26000MHz Limit ≤ 2.5 μW/MHz (-26 dBm/MHz)	
		μW/MHz	1.52091	1.50864	-			
Out-Band Leakage Power (EIRP)	Test Frequency	MHz	5190	5230	-		Low/Mid/High of test frequency range	
	Max value in the band	MHz	-	-	-			
		Raw dBm	-	-	-			
		dBm/MHz	-36.53	-30.43	-		5100MHz~5142MHz Limit ≤ 2.5 μW/MHz (-26 dBm/MHz)	
		μW/MHz	0.22212	0.90538	-			
	Max value in the band	MHz	-	-	-			
		Raw dBm	-	-	-			
		dBm/MHz	-29.85	-32.24	-		5142MHz~5150MHz Limit ≤ 15 μW/MHz (-18.24 dBm/MHz)	
		μW/MHz	1.03618	0.59712	-			
	Max value in the band	MHz	-	-	-			
		Raw dBm	-	-	-			
		dBm/MHz	-31.55	-7.07	-		5250MHz~5251MHz Limit ≤ 500 ~ 50 μW/MHz (-3 ~ -13 dBm/MHz)	
		μW/MHz	0.69941	196.46380	-			
	Max value in the band	MHz	-	-	-			
		Raw dBm	-	-	-			
		dBm/MHz	-31.74	-23.96	-		5251MHz~5270MHz Limit ≤ 50 ~ 7.924 μW/MHz (-13 ~ -21 dBm/MHz)	
		μW/MHz	0.67065	4.01848	-			
	Max value in the band	MHz	-	-	-			
		Raw dBm	-	-	-			
		dBm/MHz	-34.05	-34.49	-		5270MHz~5275.8MHz Limit ≤ 7.924 ~ 2.547 μW/MHz (-21 ~ -25.9 dBm/MHz)	
μW/MHz		0.39375	0.35546	-				
Max value in the band	MHz	-	-	-				
	Raw dBm	-	-	-				
	dBm/MHz	-33.51	-35.61	-		5275.8MHz~5400MHz Limit ≤ 2.5 μW/MHz (-26 dBm/MHz)		
	μW/MHz	0.44524	0.27450	-				

## Appendix B 19-3-11n-D1D-Power (40MHz mode)

## 3. Antenna Power (Conducted Power)

Antenna Power	Test Voltage	V	Normal Voltage ( 5V)								Remarks
	Test Frequency	MHz	5190	5230							
	Power Meter Raw (IF of Spectrum)	dBm	-21.97	-21.86							
	Power Measurement System Loss	dB	21.19	21.19							Refer to Calibration Result
	Transmitter Duty Cycle Factor	dB	0.00	0.00							Duty Factor = $10 \times 10\log_{10}(1/\text{Duty Cycle})$
	Equivalent Noise Bandwidth	MHz	1.12	1.12							ENB = $\text{Total\_Sum}^2 / \text{Peak\_Level} * \text{Point\_Width}$
	Equivalent Noise Bandwidth Factor	dB	0.49	0.49							ENB Factor = $10 \times 10\log_{10}(1/\text{ENB})$
	Antenna Power (Conducted)	dBm/MHz	-1.27	-1.16							Limit $\leq 5$ mW/MHz (7 dBm/MHz)
	Antenna Power (Conducted)	mW/MHz	0.7462	0.7651							
	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. Limitation of Collateral Emission of Receiver

Limitation of Collateral Emission	Test Voltage	V	Normal Voltage ( 5V)								Remarks
	Test Frequency	MHz	5190	5230	-						
	Spurious Emission Frequency	* 1	MHz	-	-	-					1st 30MHz~1000MHz:: Maximum emission and all emissions beyond 1/10 of the limitation must be indicated.
		* 1	MHz	-	-	-					2nd
		* 1	MHz	-	-	-					3rd
		* 2	MHz	-	-	-					1st 1000MHz~26GHz:: Maximum emission and all emissions beyond 1/10 of the limitation must be indicated.
		* 2	MHz	-	-	-					2nd
		* 2	MHz	-	-	-					3rd
	Cable Loss	* 1	dB	0.78	0.78	-					1st
		* 1	dB	-	-	-					2nd
		* 1	dB	-	-	-					3rd
		* 2	dB	3.68	3.68	-					1st
		* 2	dB	-	-	-					2nd
		* 2	dB	-	-	-					3rd
	Spectrum Raw	* 1	dBm	-	-	-					1st
		* 1	dBm	-	-	-					2nd
		* 1	dBm	-	-	-					3rd
		* 2	dBm	-	-	-					1st
		* 2	dBm	-	-	-					2nd
		* 2	dBm	-	-	-					3rd
	Spurious Emission Intensity	* 1	dBm	-73.88	-74.42	-					1st Limit $\leq 4$ nW (-54 dBm)
		* 1	dBm	-	-	-					2nd RBW : 100 kHz ; VBW : 100 kHz
		* 1	dBm	-	-	-					3rd
		* 2	dBm	-57.61	-57.40	-					1st Limit $\leq 20$ nW (-47 dBm)
		* 2	dBm	-	-	-					2nd RBW : 1 MHz ; VBW : 1 MHz
		* 2	dBm	-	-	-					3rd
	Spurious Emission Intensity	* 1	nW	0.0409	0.0361	-					Total Emission Power
		* 1	nW	0.0409	0.0361	-					1st Limit $\leq 4$ nW (-54 dBm)
		* 1	nW	-	-	-					2nd RBW : 100 kHz ; VBW : 100 kHz
		* 1	nW	-	-	-					3rd
		* 2	nW	1.7341	1.8200	-					Total Emission Power
		* 2	nW	1.7341	1.8200	-					1st Limit $\leq 20$ nW (-47 dBm)
		* 2	nW	-	-	-					2nd RBW : 1 MHz ; VBW : 1 MHz
		* 2	nW	-	-	-					3rd

\* 1: Frequency Band 5 (30 MHz  $\leq$  f < 1000 MHz) \* 2: Frequency Band 6 (1000 MHz  $\leq$  f < 26 GHz)

## 5. Carrier Sense Capability

Carrier Sense	Test Voltage	V	Normal Voltage ( 5V)								Remarks
	Test Frequency	MHz	5190	5230							
	Mini. Antenna Gain	dBi	0.42	0.42							
	Carrier Level	dBm	-51.09	-51.16							Pin = $22.79 + Gr - 20 * \log(\text{freq\_MHz})$ [dBm]
	Result	Good/Fail	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	<ul style="list-style-type: none"> <li>• SG Test Frequency : 2450 MHz</li> <li>• RBW : 1 MHz ; VBW : 1 MHz ; SP : 0Hz</li> <li>• ATT(30dB) ; Ref : 20 dBm</li> </ul>
-5	-5.73	-4.91	
-10	-10.77	-9.89	
0	-1.54	-0.1	<ul style="list-style-type: none"> <li>• SG Test Frequency : 5250 MHz</li> <li>• RBW : 1 MHz ; VBW : 1 MHz ; SP : 0Hz</li> <li>• ATT(30dB) ; Ref : 20 dBm</li> </ul>
-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	<ul style="list-style-type: none"> <li>• SG Output : 0dBm</li> <li>• RBW : 30 kHz ; VBW : 30 kHz ; SP : 300kHz</li> <li>• Limit <math>\leq</math> 10% of frequency error limits</li> </ul>
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	<ul style="list-style-type: none"> <li>• SG : 10 dBm</li> <li>• RBW : 1 MHz ; VBW : 1 MHz ; SP : 0Hz</li> <li>• ATT(30dB) ; Ref : 20 dBm</li> </ul>
5250	-2.1	-21.3	21.19	