

TEST REPORT

REGULATIONS : FCC Part15 C §15.247(d), §15.207,
§15.209(d), §15.205
RSS-247 Issue 2
Spurious Emissions

Applicant	Testing Laboratory
YOKOTA INDUSTRIAL CO., LTD. 5-55 Nishiiwata, 3-shime, Higashiosaka-City, Osaka, 578-0947 Japan Tel.: +81 6 6788 1267 / Fax.: +81 6 6788 5953	Intertek Japan K.K. Matsuda Laboratory (Open area test site) 1283 Yadoriki, Matsuda-machi, Ashigarakami-gun, Kanagawa-ken, 258-0001 Japan Tel.: +81 465 89 2316 Fax.: +81 465 89 2160 URL: http://www.japan.intertek-etlsemko.com

Equipment Type	Wireless Unit
Trademark	Yokota
Model(s)	WU-1
Serial No.	1R0300/v1.13
FCC ID	2AMNN-WU1-01
ISED CN and UPN	22912-WU101
Test Result	Complied
Report Number	17050260JMA-002
Original Issue Date	August 23, 2018

This report is for the exclusive use of Intertek's Client and is provided pursuant to the agreement between Intertek and its Client. Intertek's responsibility and liability are limited to the terms and conditions of the agreement. Intertek assumes no liability to any party, other than to the Client in accordance with the agreement, for any loss, expense or damage occasioned by the use of this report. Only the Client is authorized to permit copying or distribution of this report and then only in its entirety. Any use of the Intertek name or one of its marks for the sale or advertisement of the tested material, product or service must first be approved in writing by Intertek. The observations and test results in this report are relevant only to the sample tested. This report by itself does not imply that the material, product, or service is or has ever been under an Intertek certification program.

Approved by 
Hideaki Kosemura
[Reviewer]

Tested by 
Naohei Murakami
[Engineer]



Responsible Party of Test Item (Product)

Responsible Party	:
Add.	:
Tel.	:
Fax.	:
Contact Person	:

TABLE OF CONTENTS

	Page
SECTION 1. GENERAL INFORMATION	3
SECTION 2. SUMMARY OF TEST RESULTS	4
SECTION 3. EQUIPMENT UNDER TEST	5
SECTION 4. SUPPORT EQUIPMENT	6
SECTION 5. USED CABLE(S).....	7
SECTION 6. TEST CONFIGURATION	8
SECTION 7. OPERATING CONDITION	9
SECTION 8. UNCERTAINTY	10
SECTION 9. TEST DATA	11
9.1 Radiated Spurious Emissions and Band Edge of Restrict Band.....	11
9.2 AC Conducted Emissions	21
ANNEX	25
 APPENDIX PHOTOGRAPHS OF MAXIMUM EMISSION SET-UP	

SECTION 1. GENERAL INFORMATION

Test Performed

EUT Received	November 10, 2017	
Date of Test	From November 30, 2017 to December 2, 2017	
Standard Applied	FCC	ISED
	FCC Part15 C (§15.247, §15.207, §15.209)	RSS-247 Issue 2
Test methods	ANSI C63.10-2013	RSS-Gen Issue 5 ANSI C63.10-2013
Deviation from Standard(s)	None	

Qualifications of Testing Laboratory

Accreditation	Scope	Lab. Code	Remarks
VLAC	EMC Testing	VLAC-008-3	JAPAN
BSMI	EMC Testing	SL2-IN-E-6009	TAIWAN
Filing			
VCCI	EMC Testing	A-0127	JAPAN
FCC	EMC Testing	Designation Number : JP0009	USA
IC	EMC Testing	2042S-1, 2042S-2, 2042S-3	Canada
CB-Scheme	EMC Testing	TL223	IECEE
SAUDI ARABIA	EMC Testing	N/A	

Abbreviations

EUT	Equipment Under Test	DoC	Declaration of Conformity
AMN	Artificial Mains Network	ISN	Impedance Stabilization Network
LISN	Line Impedance Stabilization Network	Q-P	Quasi-peak
AMP	Amplifier	AVG	Average
ATT	Attenuator	PK	Peak
ANT	Antenna	Cal	Calibration
BBA	Broadband Antenna	N/A	Not applicable or Not available
DIP	Dipole Antenna	LCD	Liquid-Crystal Display
AE	Associated Equipment	HDMI	High-Definition Multimedia Interface
AFH	Adaptive Hopping Frequency		

SECTION 2. SUMMARY OF TEST RESULTS

Test Item	Specification	Results	Detail
Radiated Spurious Emissions	FCC Part15C §15.209 RSS-Gen Issue 5 (8.9)	PASS	Section 9.1
AC Conducted Emissions	FCC Part15C §15.207 RSS-Gen Issue 5 (8.8)	PASS	Section 9.2

Limitation on Results

The test result of this report is effective equipment under test itself and under the test configuration described on the report.

This test report does not assure that whether the test result taken in other testing laboratory is compatible or reproducible to the test result on this report or not.

SECTION 3. EQUIPMENT UNDER TEST

The equipment under test (EUT) consisted of the following apparatus.

3.1 System Configuration

Symbol	Item	Model No.	Serial No.	Manufacturer
A	Wireless Unit	WU-1	1R0300/v1.13	YOKOTA INDUSTRIAL CO., LTD.
Rated Power		DC24 V, 1.2 Ah		
Supplied Power		DC24 V		
Condition of Equipment		Prototype		
Type		Desktop type		
Suppression Devices		No Modifications by the laboratory were made to the device		

3.2 Port(s)/Connector(s)

Port Name	Connector Type	Connector Pin	Remarks
-	-	-	-

3.3 Over View of EUT

Wireless LAN Module	BP3599
Manufacturer	ROHM Co., Ltd.
Access method	WLAN 802.11b/g/n20
Rated Output Power	11b 15 dBm +/-2dBm (Module Output)
	11g 13 dBm +/-2dBm (Module Output)
	11n20 12 dBm +/-2dBm (Module Output)
Frequency Range of Operating	2412 – 2462 MHz
Number of Channels	11 ch
Modulation Method	DSSS, OFDM
Antenna Gain	2 dBi

SECTION 4. SUPPORT EQUIPMENT

The EUT was supported by the following equipment during the test.

Symbol	Item	Model No.	Serial No.	Manufacturer	FCC ID
B	AC Adapter	UIA345-2419	G04-0257971	UNIFIVE	N/A

SECTION 5. USED CABLE(S)

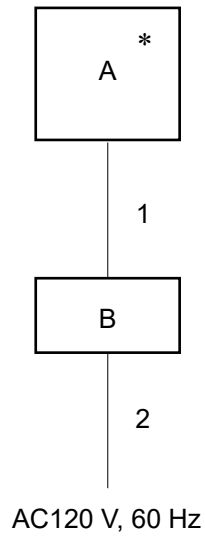
No.	Name	Length (m)	Shield	Metal Connector	Ferrite Core
1	DC cable	1.80	No	No	-
2	AC cable	1.50	No	No	-

Note :

1. No ferrite core is attached to the outer cables.

SECTION 6. TEST CONFIGURATION

* : EUT
■ : Ferrite core



The symbols and numbers assigned to the equipment and cables on this diagram correspond to the ones in Sections 3 to 5.

SECTION 7. OPERATING CONDITION

The test was carried out under the following mode.

Test program used to control the EUT for staying in continuous transmitting and receiving mode is programmed.

7.1 Test Channel

In accordance with Section 15.31 (m), all test items was conducted in the following three channels:

Operating mode	Test Channel	Frequency [MHz]
WLAN 802.11b/g/n20	Low	2412
	Middle	2437
	High	2462

7.2 Test modes

Test Item	Operating modes
Radiated Spurious Emissions	2412MHz, 2437MHz, 2462MHz
AC Conducted Emissions	2412MHz

Note: The Test modes were configured in typical fashion as a customer would normally use it.

SECTION 8. UNCERTAINTY

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

Traceability to national standard in SI units is ensured with these values.

Compliance with the limits in this standard are determined without in consideration of the measurement uncertainty of the measurement instrumentation.

8.1 Emission tests

Test items	$U_{lab} [k = 2]$	U_{cisp}
Radiated Spurious Emissions at 3m		
30 MHz – 1000 MHz	+/- 5.08 dB	6.3 dB
Above 1 GHz	+/- 4.82 dB	5.2 dB
AC Conducted Emissions		
150 kHz – 30 MHz	+/- 1.56 dB	3.4 dB

The above expanded instrumentation uncertainty, U_{lab} , is estimated in accordance with CISPR 16-4-2:2011.

SECTION 9. TEST DATA

9.1 Radiated Spurious Emissions and Band Edge of Restrict Band

Regulations	FCC Part15C §15.209, §15.205 RSS-247 5.5 RSS-Gen 8.9
Test Method/Guide	ANSI C63.10-2013 clause 6.5 and 6.6

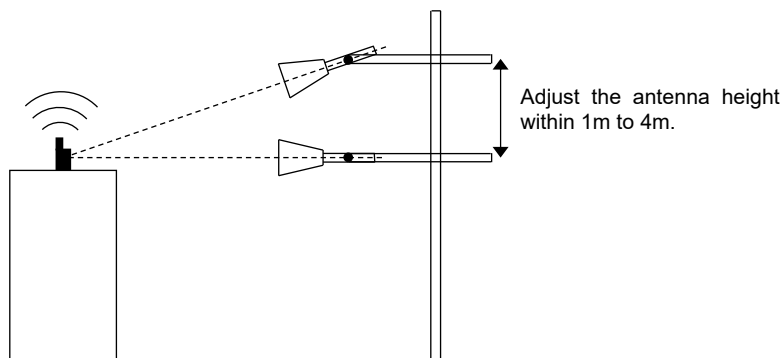
Test Procedure

1. The EUT and test instrument were set up as shown on section 10.2.
2. The measurement antenna was placed at a distance of 3 m from the EUT.
4. The turntable azimuth (EUT direction, 0 – 360 degree) and antenna height (1 – 4 m) are adjusted the position so that maximum field strength is obtained for each frequency spectrum to be measured.

The equipment and cables are arranged or manipulated within the range of the test standard in the above condition. At least six highest spectrums are measured by the test receiver (below 1 GHz) and spectrum analyzer (above 1 GHz).

For measurements above 1GHz, the emission signal shall be kept within the illumination area of the 3 dB beam width of the antenna so that the maximum emission from the EUT is measured.

And the antenna angle toward the source of the emission.



5. Adjust the test instrument for the following setting:

Frequency	Instruments	Detector	RBW	VBW	Remarks
30 – 1000 MHz	CISPR Receiver	QP	120 kHz	N/A	-
Above 1000 MHz	Spectrum Analyzer	Peak	1 MHz	1 MHz	for Peak
				10 Hz	for Average

6. Measurement data correction;

$$\text{Emission Level [dBuV/m]} = \text{Reading [dBuV]} + \text{Factor [dB/m]}$$

$$\text{Margin [dB]} = \text{Limit [dBuV/m]} - \text{Emission Level [dBuV/m]}$$

$$\begin{aligned} * \text{ Factor} &= \text{Antenna Factor} + \text{Amplifier gain} + \text{Cable loss} + \text{Attenuator (+ Filter)} \\ &\quad (+ \text{Distance Conversion Factor})^* \end{aligned}$$

* For other than Standard distance:

$$\text{Distance Conversion Factor} = 20 \log (\text{Measurement distance} / \text{Standard distance})$$

Note: Did not carried out the fainal measurement about frequency range of 9 kHz to 30 MHz, because result of pre-check in shield room, spurious emissions was not detected.

Test Result

Operating mode	WLAN 802.11b, 2412 MHz, 1Mbps, EUT axis: X		
Location	Matsuda Laboratory No.2 Test Site		
Frequency	30 - 1000 MHz,	1 - 25 GHz	
Test date	December 1, 2017	November 30, 2017	
Temperature	22.0	18.7	[degree C]
Humidity variation	51	55	[%]
Test Engineer	Naohei Murakami		

No.	Freq. [MHz]	Detector	Reading [dBuV]		Factor [dB]	Result [dBuV/m]		Limit [dBuV/m]	Margin [dB]	
			Hor	Ver		Hor	Ver		Hor	Ver
1	30.27	QuasiPeak	39.8	43.3	-7.4	32.4	35.9	40	7.6	4.1
2	299.99	QuasiPeak	44.4	40.0	-1.8	42.6	38.2	46	3.4	7.8
3	449.99	QuasiPeak	34.8	39.3	2.1	36.9	41.4	46	9.1	4.6
4	549.99	QuasiPeak	36.5	35.0	4.5	41.0	39.5	46	5.0	6.5
5	799.98	QuasiPeak	28.2	33.3	9.6	37.8	42.9	46	8.2	3.1
6	2367.11	Peak	41.5	44.2	7.2	48.7	51.4	54	25.3	22.6
7	2367.11	Average	29.6	33.3	7.2	36.8	40.5	54	17.2	13.5
8	4824.00	Peak	44.9	47.0	14.3	59.2	61.3	74	14.8	12.7
9	4824.00	Average	35.1	39.2	14.3	49.4	53.5	54	4.6	0.5
10	7236.00	Peak	42.0	41.1	19.9	61.9	61.0	74	12.1	13.0
11	7236.00	Average	28.6	28.6	19.9	48.5	48.5	54	5.5	5.5
12	9648.00	Peak	41.4	41.5	22.7	64.1	64.2	74	9.9	9.8
13	9648.00	Average	28.8	28.8	22.7	51.5	51.5	54	2.5	2.5

No.	Freq. [MHz]	Detector	Reading [dBuV]		Factor [dB]	Result [dBuV/m]		Limit [dBuV/m]		Margin [dB]	
			Hor	Ver		Hor	Ver	Hor	Ver	Hor	Ver
1*	2412.00	Peak	92.8	98.7	7.2	85.6	91.5	-	-	-	-
2*	2390.00	Peak	72.8	78.7	7.2	30.2	34.2	65.6	71.5	35.4	37.3
3*	2400.00	Peak	72.8	78.7	7.3	39.2	45.4	65.6	71.5	26.4	26.1
4*	2483.50	Peak	72.8	78.7	7.3	30.0	30.6	65.6	71.5	35.6	40.9

Note.

* : Band Edge of Restrict Band

- : Measurement limit

The limit value is -20dBc from the detected the carrier power.

Any Spurious emissions higher than the frequency reported in the table above were not detected during the measurement.

Operating mode	WLAN 802.11b, 2437 MHz, 1Mbps, EUT axis: X		
Location	Matsuda Laboratory No.2 Test Site		
Frequency	30 - 1000 MHz,	1 - 25 GHz	
Test date	December 1, 2017	November 30, 2017	
Temperature	22.0	18.7	[degree C]
Humidity variation	51	55	[%]
Test Engineer	Naohei Murakami		

No.	Freq. [MHz]	Detector	Reading [dBuV]		Factor [dB]	Result [dBuV/m]		Limit [dBuV/m]	Margin [dB]	
			Hor	Ver		Hor	Ver		Hor	Ver
1	30.27	QuasiPeak	39.8	43.3	-7.4	32.4	35.9	40	7.6	4.1
2	299.99	QuasiPeak	44.4	40.0	-1.8	42.6	38.2	46	3.4	7.8
3	449.99	QuasiPeak	34.8	39.3	2.1	36.9	41.4	46	9.1	4.6
4	549.99	QuasiPeak	36.5	35.0	4.5	41.0	39.5	46	5.0	6.5
5	799.98	QuasiPeak	28.2	33.3	9.6	37.8	42.9	46	8.2	3.1
6	4874.00	Peak	41.5	44.2	7.2	48.7	51.4	54	25.3	22.6
7	4874.00	Average	29.6	33.3	7.2	36.8	40.5	54	17.2	13.5

Note.

Any Spurious emissions higher than the frequency reported in the table above were not detected during the measurement.

Operating mode	WLAN 802.11b, 2462 MHz, 1Mbps, EUT axis: X		
Location	Matsuda Laboratory No.2 Test Site		
Frequency	30 - 1000 MHz,	1 - 25 GHz	
Test date	December 1, 2017	November 30, 2017	
Temperature	22.0	18.7	[degree C]
Humidity variation	51	55	[%]
Test Engineer	Naohei Murakami		

No.	Freq. [MHz]	Detector	Reading [dBuV]		Factor [dB]	Result [dBuV/m]		Limit [dBuV/m]	Margin [dB]	
			Hor	Ver		Hor	Ver		Hor	Ver
1	30.27	QuasiPeak	40.0	44.2	-7.4	32.6	36.8	40	7.4	3.2
2	299.99	QuasiPeak	44.3	40.0	-1.8	42.5	38.2	46	3.5	7.8
3	449.99	QuasiPeak	35.2	39.3	2.1	37.3	41.4	46	8.7	4.6
4	549.99	QuasiPeak	36.3	35.1	4.5	40.8	39.6	46	5.2	6.4
5	799.98	QuasiPeak	29.5	32.9	9.6	39.1	42.5	46	6.9	3.5
6	4924.00	Peak	44.5	45.7	14.5	59.0	60.2	74	15.0	13.8
7	4924.00	Average	25.6	38.6	14.5	40.1	53.1	54	13.9	0.9

No.	Freq. [MHz]	Detector	Reading [dBuV]		Factor [dB]	Result [dBuV/m]		Limit [dBuV/m]		Margin [dB]	
			Hor	Ver		Hor	Ver	Hor	Ver	Hor	Ver
1*	2462.00	Peak	86.7	90.8	7.3	79.4	83.5	-	-	-	-
2*	2390.00	Peak	36.9	38.2	7.2	29.7	31.0	59.4	63.5	29.7	32.5
3*	2400.00	Peak	37.7	40.4	7.3	30.4	33.1	59.4	63.5	29.0	30.4
4*	2483.50	Peak	36.7	38.7	7.3	29.4	31.4	59.4	63.5	30.0	32.1

Note.

* : Band Edge of Restrict Band

- : Measurement limit

The limit value is -20dBc from the detected the carrier power.

Any Spurious emissions higher than the frequency reported in the table above were not detected during the measurement.

Operating mode	WLAN 802.11g, 2412 MHz, 24Mbps, EUT axis: X		
Location	Matsuda Laboratory No.2 Test Site		
Frequency	30 - 1000 MHz,	1 - 25 GHz	
Test date	December 1, 2017	November 30, 2017	
Temperature	22.0	18.7	[degree C]
Humidity variation	51	55	[%]
Test Engineer	Naohei Murakami		

No.	Freq. [MHz]	Detector	Reading [dBuV]		Factor [dB]	Result [dBuV/m]		Limit [dBuV/m]	Margin [dB]	
			Hor	Ver		Hor	Ver		Hor	Ver
1	30.27	QuasiPeak	39.6	45.3	-7.4	32.2	37.9	40	7.8	2.1
2	299.99	QuasiPeak	45.2	39.3	-1.8	43.4	37.5	46	2.6	8.5
3	449.99	QuasiPeak	35.2	39.3	2.1	37.3	41.4	46	8.7	4.6
4	549.99	QuasiPeak	36.2	34.2	4.5	40.7	38.7	46	5.3	7.3
5	799.98	QuasiPeak	28.2	32.5	9.6	37.8	42.1	46	8.2	3.9
6	4824.00	Peak	42.5	44.0	14.3	56.8	58.3	74	17.2	15.7
7	4824.00	Average	30.1	31.1	14.3	44.4	45.4	54	9.6	8.6

No.	Freq. [MHz]	Detector	Reading [dBuV]		Factor [dB]	Result [dBuV/m]		Limit [dBuV/m]		Margin [dB]	
			Hor	Ver		Hor	Ver	Hor	Ver	Hor	Ver
1*	2412.00	Peak	84.7	89.6	7.2	77.5	82.4	-	-	-	-
2*	2390.00	Peak	45.6	50.8	7.2	38.4	43.6	57.5	62.4	19.1	18.8
3*	2400.00	Peak	60.3	65.0	7.3	53.0	57.7	57.5	62.4	4.5	4.7
4*	2483.50	Peak	42.6	36.5	7.3	35.3	29.2	57.5	62.4	22.2	33.2

Note.

* : Band Edge of Restrict Band

- : Measurement limit

The limit value is -20dBc from the detected the carrier power.

Any Spurious emissions higher than the frequency reported in the table above were not detected during the measurement.

Operating mode	WLAN 802.11g, 2437 MHz, 24Mbps, EUT axis: X		
Location	Matsuda Laboratory No.2 Test Site		
Frequency	30 - 1000 MHz,	1 - 25 GHz	
Test date	December 1, 2017	November 30, 2017	
Temperature	22.0	18.7	[degree C]
Humidity variation	51	55	[%]
Test Engineer	Naohei Murakami		

No.	Freq. [MHz]	Detector	Reading [dBuV]		Factor [dB]	Result [dBuV/m]		Limit [dBuV/m]	Margin [dB]	
			Hor	Ver		Hor	Ver		Hor	Ver
1	30.26	QuasiPeak	21.9	27.2	-5.6	16.3	21.6	40	23.7	18.4
2	299.99	QuasiPeak	41.4	41.2	3.3	44.7	44.5	74	29.3	29.5
3	449.99	QuasiPeak	28.1	28.1	3.3	31.4	31.4	54	22.6	22.6
4	549.99	QuasiPeak	40.8	41.4	4.5	45.3	45.9	74	28.7	28.1
5	799.98	QuasiPeak	27.7	27.8	4.5	32.2	32.3	54	21.8	21.7
6	4874.00	Peak	40.8	40.8	8.1	48.9	48.9	74	25.1	25.1
7	4874.00	Average	27.4	27.4	8.1	35.5	35.5	54	18.5	18.5

Note.

Any Spurious emissions higher than the frequency reported in the table above were not detected during the measurement.

Operating mode	WLAN 802.11g, 2462 MHz, 24Mbps, EUT axis: X		
Location	Matsuda Laboratory No.2 Test Site		
Frequency	30 - 1000 MHz,	1 - 25 GHz	
Test date	December 1, 2017	November 30, 2017	
Temperature	22.0	18.7	[degree C]
Humidity variation	51	55	[%]
Test Engineer	Naohei Murakami		

No.	Freq. [MHz]	Detector	Reading [dBuV]		Factor [dB]	Result [dBuV/m]		Limit [dBuV/m]	Margin [dB]	
			Hor	Ver		Hor	Ver		Hor	Ver
1	30.27	QuasiPeak	39.8	45.0	-7.4	32.4	37.6	40	7.6	2.4
2	299.99	QuasiPeak	44.9	40.5	-1.8	43.1	38.7	46	2.9	7.3
3	449.99	QuasiPeak	34.3	39.1	2.1	36.4	41.2	46	9.6	4.8
4	549.99	QuasiPeak	36.4	35.1	4.5	40.9	39.6	46	5.1	6.4
5	799.98	QuasiPeak	28.3	33.0	9.6	37.9	42.6	46	8.1	3.4
6	4923.99	Peak	43.1	43.7	14.5	57.6	58.2	74	16.4	15.8
7	4923.99	Average	30.2	31.1	14.5	44.7	45.6	54	9.3	8.4

No.	Freq. [MHz]	Detector	Reading [dBuV]		Factor [dB]	Result [dBuV/m]		Limit [dBuV/m]		Margin [dB]	
			Hor	Ver		Hor	Ver	Hor	Ver	Hor	Ver
1*	2462.00	Peak	85.6	88.9	7.3	78.3	81.6	-	-	-	-
2*	2390.00	Peak	37.0	40.4	7.2	29.8	33.2	58.3	61.6	28.5	28.4
3*	2400.00	Peak	36.8	39.5	7.3	29.5	32.2	58.3	61.6	28.8	29.4
4*	2483.50	Peak	42.2	45.2	7.3	34.9	37.9	58.3	61.6	23.4	23.7

Note.

* : Band Edge of Restrict Band

- : Measurement limit

The limit value is -20dBc from the detected the carrier power.

Any Spurious emissions higher than the frequency reported in the table above were not detected during the measurement.

Operating mode	WLAN 802.11n, 2412 MHz, MCS6, EUT axis: X		
Location	Matsuda Laboratory No.2 Test Site		
Frequency	30 - 1000 MHz,	1 - 25 GHz	
Test date	December 1, 2017	November 30, 2017	
Temperature	22.0	18.7	[degree C]
Humidity variation	51	55	[%]
Test Engineer	Naohei Murakami		

No.	Freq. [MHz]	Detector	Reading [dBuV]		Factor [dB]	Result [dBuV/m]		Limit [dBuV/m]	Margin [dB]	
			Hor	Ver		Hor	Ver		Hor	Ver
1	30.27	QuasiPeak	39.4	44.6	-7.4	32.0	37.2	40	8.0	2.8
2	299.99	QuasiPeak	43.7	39.7	-1.8	41.9	37.9	46	4.1	8.1
3	449.99	QuasiPeak	35.8	39.7	2.1	37.9	41.8	46	8.1	4.2
4	549.99	QuasiPeak	36.8	34.6	4.5	41.3	39.1	46	4.7	6.9
5	799.98	QuasiPeak	30.4	32.8	9.6	40.0	42.4	46	6.0	3.6
6	4924.00	Peak	42.7	43.1	14.5	57.2	57.6	74	16.8	16.4
7	4924.00	Average	30.0	30.7	14.5	44.5	45.2	54	9.5	8.8

No.	Freq. [MHz]	Detector	Reading [dBuV]		Factor [dB]	Result [dBuV/m]		Limit [dBuV/m]		Margin [dB]	
			Hor	Ver		Hor	Ver	Hor	Ver	Hor	Ver
1*	2412.00	Peak	81.1	86.2	7.2	73.9	79.0	-	-	-	-
2*	2390.00	Peak	41.7	48.0	7.2	34.5	40.8	53.9	59.0	19.4	18.2
3*	2400.00	Peak	60.0	64.9	7.3	52.7	57.6	53.9	59.0	1.2	1.4
4*	2483.50	Peak	37.1	39.2	7.3	29.8	31.9	53.9	59.0	24.1	27.1

Note.

* : Band Edge of Restrict Band

- : Measurement limit

The limit value is -20dBc from the detected the carrier power.

Any Spurious emissions higher than the frequency reported in the table above were not detected during the measurement.

Operating mode	WLAN 802.11n, 2437 MHz, MCS6, EUT axis: X		
Location	Matsuda Laboratory No.2 Test Site		
Frequency	30 - 1000 MHz,	1 - 25 GHz	
Test date	December 1, 2017	November 30, 2017	
Temperature	22.0	18.7	[degree C]
Humidity variation	51	55	[%]
Test Engineer	Naohei Murakami		

No.	Freq. [MHz]	Detector	Reading [dBuV]		Factor [dB]	Result [dBuV/m]		Limit [dBuV/m]	Margin [dB]	
			Hor	Ver		Hor	Ver		Hor	Ver
1	30.29	QuasiPeak	40.8	45.4	-7.4	33.4	38.0	40	6.6	2.0
2	299.99	QuasiPeak	44.0	40.3	-1.8	42.2	38.5	46	3.8	7.5
3	449.99	QuasiPeak	36.0	39.6	2.1	38.1	41.7	46	7.9	4.3
4	549.99	QuasiPeak	37.0	34.9	4.5	41.5	39.4	46	4.5	6.6
5	799.98	QuasiPeak	27.8	33.0	9.6	37.4	42.6	46	8.6	3.4
6	4873.99	Peak	43.8	43.5	14.5	58.3	58.0	74	15.7	16.0
7	4873.99	Average	30.0	31.0	14.5	44.5	45.5	54	9.5	8.5
8	9747.99	Peak	41.7	42.0	23.1	64.8	65.1	74	9.2	8.9
9	9747.99	Average	29.0	29.1	23.1	52.1	52.2	54	1.9	1.8

Note.

Any Spurious emissions higher than the frequency reported in the table above were not detected during the measurement.

Operating mode	WLAN 802.11n, 2462 MHz, MCS6, EUT axis: X		
Location	Matsuda Laboratory No.2 Test Site		
Frequency	30 - 1000 MHz,	1 - 25 GHz	
Test date	December 1, 2017	November 30, 2017	
Temperature	22.0	18.7	[degree C]
Humidity variation	51	55	[%]
Test Engineer	Naohei Murakami		

No.	Freq. [MHz]	Detector	Reading [dBuV]		Factor [dB]	Result [dBuV/m]		Limit [dBuV/m]	Margin [dB]	
			Hor	Ver		Hor	Ver		Hor	Ver
1	30.26	QuasiPeak	40.5	45.8	-7.4	33.1	38.4	40	6.9	1.6
2	299.99	QuasiPeak	43.4	40.2	-1.8	41.6	38.4	46	4.4	7.6
3	449.99	QuasiPeak	36.1	39.2	2.1	38.2	41.3	46	7.8	4.7
4	549.99	QuasiPeak	37.0	34.5	4.5	41.5	39.0	46	4.5	7.0
5	799.98	QuasiPeak	29.2	32.7	9.6	38.8	42.3	46	7.2	3.7
6	4923.99	Peak	42.6	43.4	14.5	57.1	57.9	74	16.9	16.1
7	4923.99	Average	29.9	30.7	14.5	44.4	45.2	54	9.6	8.8
8	9847.99	Peak	42.0	41.3	23.5	65.5	64.8	74	8.5	9.2
9	9847.99	Average	28.9	28.9	23.5	52.4	52.4	54	1.6	1.6

No.	Freq. [MHz]	Detector	Reading [dBuV]		Factor [dB]	Result [dBuV/m]		Limit [dBuV/m]		Margin [dB]	
			Hor	Ver		Hor	Ver	Hor	Ver	Hor	Ver
1*	2462.00	Peak	82.6	87.1	7.3	75.3	79.8	-	-	-	-
2*	2390.00	Peak	39.3	41.8	7.2	32.1	34.6	55.3	59.8	23.2	25.2
3*	2400.00	Peak	40.3	43.7	7.3	33.0	36.4	55.3	59.8	22.3	23.4
4*	2483.50	Peak	40.9	45.8	7.3	33.6	38.5	55.3	59.8	21.7	21.3

Note.

* : Band Edge of Restrict Band

- : Measurement limit

The limit value is -20dBc from the detected the carrier power.

Any Spurious emissions higher than the frequency reported in the table above were not detected during the measurement.

9.2 AC Conducted Emissions

Regulations	FCC Part15C §15.207 RSS-Gen 7.2.2
Test Method/Guide	ANSI C63.10-2013 clause 6.2

Test Procedure

1. The EUT and test instrument were set up as shown on section 10.3.
2. The spectrum analyzer is controlled by the computer program to sweep the frequency range to be measured, then spectrum chart is plotted out to find the worst emission.

At least six highest spectrum are measured in quasi-peak and average (if necessary) using the CISPR Receiver.

3. Adjust the test instrument for the following setting:

Frequency	Instruments	Detector	RBW	VBW
0.15 – 30 MHz	CISPR Receiver	QP	9 kHz	N/A
		AVG		

6. Measurement data correction;

Emission Level [dBuV] = Reading [dBuV] + Factor [dB]

Margin [dB] = Limit [dBuV] – Emission Level [dBuV]

* Factor = LISN Factor + Cable loss + Attenuator

Test Result

Test date	December. 2, 2017
Location	Matsuda Laboratory No.2 Test Site
Temperature	18.0 [degree C]
Humidity variation	66.0 [%]
Test Engineer	Naohei Murakami

Operating mode			WLAN 802.11g, 2412 MHz, 24Mbps								
No.	Freq [MHz]	Detector	Reading [dBuV]		Factor [dB]		Emission Level [dBuV]		Limit [dBuV]	Margin [dB]	
			L1	L2	L1	L2	L1	L2		L1	L2
1	0.1550	QuasiPeak	43.7	43.7	10.1	10.1	53.8	53.8	65.7	11.9	11.9
2	0.1550	Average	26.6	26.7	10.1	10.1	36.7	36.8	55.7	19.0	18.9
3	0.1749	QuasiPeak	40.1	40.1	10.1	10.1	50.2	50.2	64.7	14.5	14.5
4	0.1973	QuasiPeak	36.6	37.0	10.1	10.1	46.7	47.1	63.7	17.0	16.6
5	0.3091	QuasiPeak	33.7	33.4	10.2	10.2	43.9	43.6	60.0	16.1	16.4
6	0.5734	QuasiPeak	20.3	21.1	10.2	10.3	30.5	31.4	56.0	25.5	24.6
7	1.5394	QuasiPeak	12.0	13.4	10.4	10.4	22.4	23.8	56.0	33.6	32.2
8	15.1266	QuasiPeak	22.3	20.6	11.1	11.3	33.4	31.9	60.0	26.6	28.1
9	26.3572	QuasiPeak	21.9	20.8	11.3	11.6	33.2	32.4	60.0	26.8	27.6

SECTION 10. LIST AND DIAGRAM OF MEASURING INSTRUMENTS

Test instruments are calibrated according to Quality Manual and Calibration Rules of Intertek Japan K.K.

All measurements equipment used for the measurement is calibrated based on standard.

Each measurement result is traceable to national or international standards.

Antenna used in the measurement is calibrated according to ANSI C63.5:2006.

10.1 Radiated Emission

Instrument	Model No.	Serial No.	Manufacturer	Cal. Interval	Effective period
Radiated disturbance					
Broad Band Antenna	VULB9168	124	Schwarzbeck	1 Y	Aug. 2018
Amplifier	8447D	2727A05809	Hewlett Packard	1 Y	Jan. 2018
Step Attenuator	8494B	2805A14576	Hewlett Packard	1 Y	Jan. 2018
6dB Attenuator	MP721B	M87938	ANRITSU	1 Y	Jan. 2018
Coaxial Cable (R1)	RG214HF(8.0m)	MTS02R3-1	SUHNER	1 Y	Jan. 2018
Coaxial Cable (R2)	12D-SFA(28.0m)	MTS02R3-2	Intertek	1 Y	Jan. 2018
Coaxial Cable (R3)	RG214HF(2.0m)	MTS02R3-3	SUHNER	1 Y	Jan. 2018
Coaxial Cable (R4)	RG214HF(0.4m)	MTS02R3-4	SUHNER	1 Y	Jan. 2018
Coaxial Cable (R5)	RG214HF(0.4m)	MTS02R3-5	SUHNER	1 Y	Jan. 2018
Coaxial Cable (R6)	RG214HF(1.5m)	MTS02R3-6	SUHNER	1 Y	Jan. 2018
Coaxial Cable (R7)	RG214HF(1.5m)	MTS02R3-7	SUHNER	1 Y	Jan. 2018
Coaxial Cable (R8)	RG214HF(1.5m)	MTS02R3-8	SUHNER	1 Y	Jan. 2018
Coaxial Cable (R9)	5D-2W(8.0m)	MTS02R3-9	SUHNER	1 Y	Jan. 2018
Site Attenuation	-	-	-	1 Y	Apr. 2018
Double Ridged Antenna	3115	2568	EMCO	1 Y	Jan. 2018
Amplifier	TPA0118-30	950186	TOYO Corporation	1 Y	Apr. 2018
6dB Attenuator	6806.17.B	E00AT6GA	SUNNER	1 Y	Apr. 2018
Coaxial Cable (R11)	SUCOFLEX 104(6.0m)	65566/4PE	SUNNER	1 Y	Apr. 2018
Coaxial Cable (R12)	SUCOFLEX 104(1.0m)	64587/4PE	SUNNER	1 Y	Apr. 2018
Horn Antenna with Preamplifier	MLA-18265-B03-30	1694440	TSJ	1 Y	Feb. 2018
Coaxial Cable (R13)	5B-048-98-98-6000	120315	Candox Systems	1 Y	Feb. 2018
SVSWR	-	-	-	1 Y	Sep. 2018

Instrument	Model No.	Serial No.	Manufacturer	Cal. Interval	Effective period
Conducted disturbance at mains terminals					
LISN(EUT)	ESH2-Z5	882395/021	Rohde & Schwarz	1 Y	Jun. 2018
10dB LISN Pad	6801.01.A	E00AT10C	HUBER+SUHNER	1 Y	Jun. 2018
Coaxial Cable (C1)	3D-2W(7.8m)	MTS02CSR-1	Intertek	1 Y	Jan. 2018
Coaxial Cable (C2)	RG-5A/U(12.0m)	MTS02CSR-2	Intertek	1 Y	Jan. 2018
Coaxial Cable (C3)	RG214HF(1.5m)	MTS02CSR-3	SUHNER	1 Y	Jan. 2018
Coaxial Cable (C4)	RG214HF(1.5m)	MTS02CSR-4	SUHNER	1 Y	Jan. 2018
Coaxial Cable (C5)	RG214HF(1.5m)	MTS02CSR-5	SUHNER	1 Y	Jan. 2018
Common					
Test Receiver	ESS (Firmware Version 1.07)	842886/010	Rohde & Schwarz	1 Y	Feb. 2018
Test Receiver	ESU26	100006	Rohde & Schwarz	1 Y	Jan. 2018
RF Switch(1)	MP59B	M28942	ANRITSU	1 Y	Jan. 2018
RF Switch(2)	ACX-150-1	E02301501	Intertek	1 Y	Jan. 2018
Testing Software	emiT (Version 3,0,0,0)	-	-	N/A	N/A

ANNEX

Measurement Instruments Configurations

Test was carried out under the following conditions.

Conducted disturbance at mains terminals

Test setup as per standard

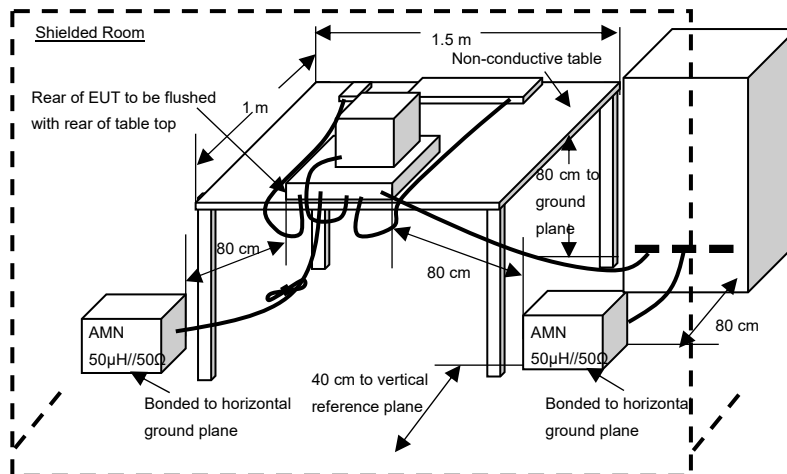
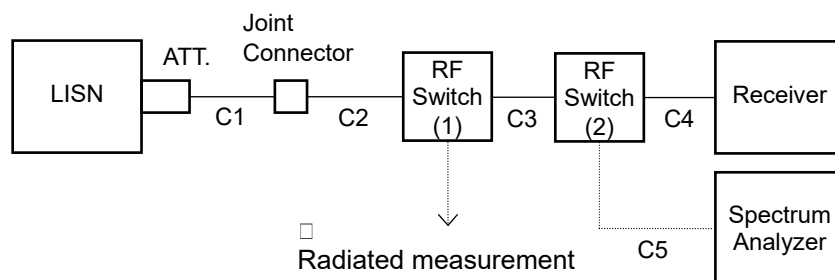


Diagram of the measuring instruments



[Preliminary Measurement]

EUT is tested on all operating conditions.

The spectrum analyzer is controlled by the computer program to sweep the frequency range to be measured, then spectrum chart is plotted out to find the worst emission conditions in operating mode and/or configuration decision for the final test.

All leads other than safety ground are tested.

EUT was placed in transmission mode then tested for conducted emissions per 15.207 to ensure the device complies with 15.207 outside the transmitter fundamental emissions band.

After, with a dummy load in lieu of the antenna from the EUT and only the fundamental emission band was measured to show that the fundamental emission band is in compliance with the 15.207 limits.

*In accordance with "174176 D01 Line Conducted FAQ v01r01"

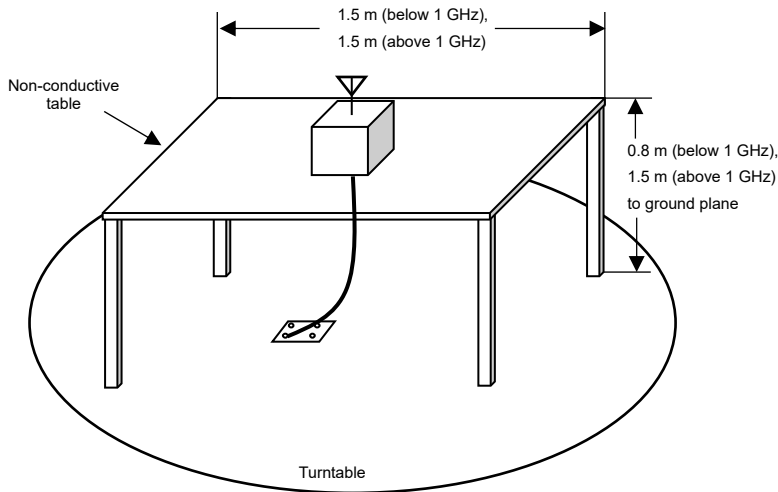
[Final Measurement]

The EUT is operated in the worst emission condition found by the preliminary test.

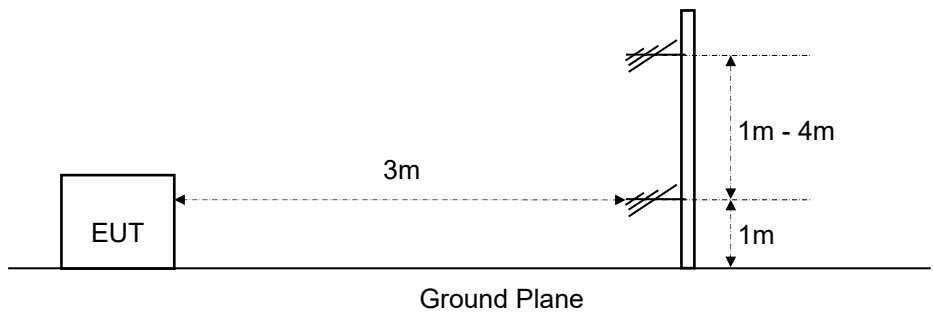
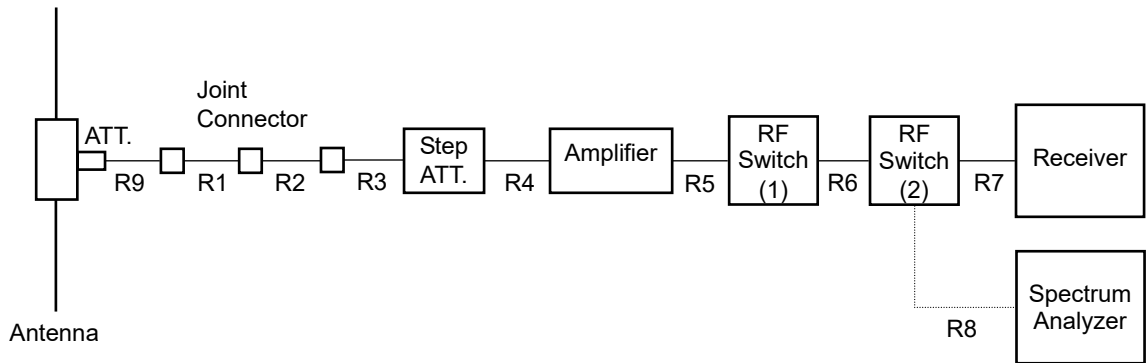
The equipment and cables are arranged or manipulated within the range of the test standard in the above condition.

At least six highest spectrum are measured in quasi-peak and average (if necessary) using the test receiver.

Radiated disturbance
Test setup as per standard



30-1000MHz



Above 1GHz

Diagram of the measurement instruments (1 - 18 GHz)

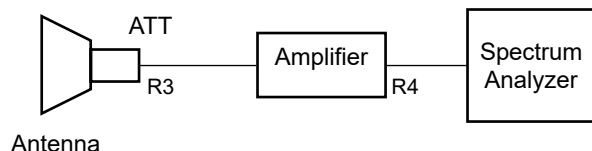


Diagram of the measurement instruments (1000- 2000 and 3000 – 18000 MHz)

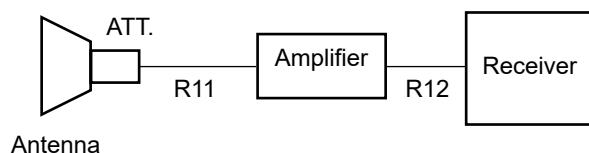
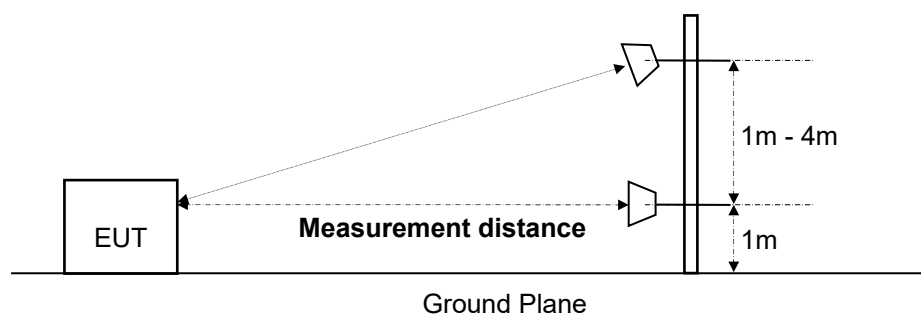
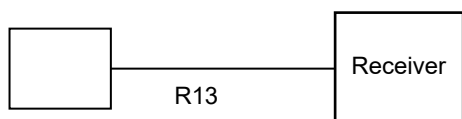


Diagram of the measurement instruments (Above 18 GHz)



[Preliminary Measurement]

EUT is tested on all operating conditions.

The spectrum analyzer is set max-hold mode and swept during turntable was rotated 0 to 360 degree, And find the worst emission conditions in configuration, operating mode, or ambient noise notation.

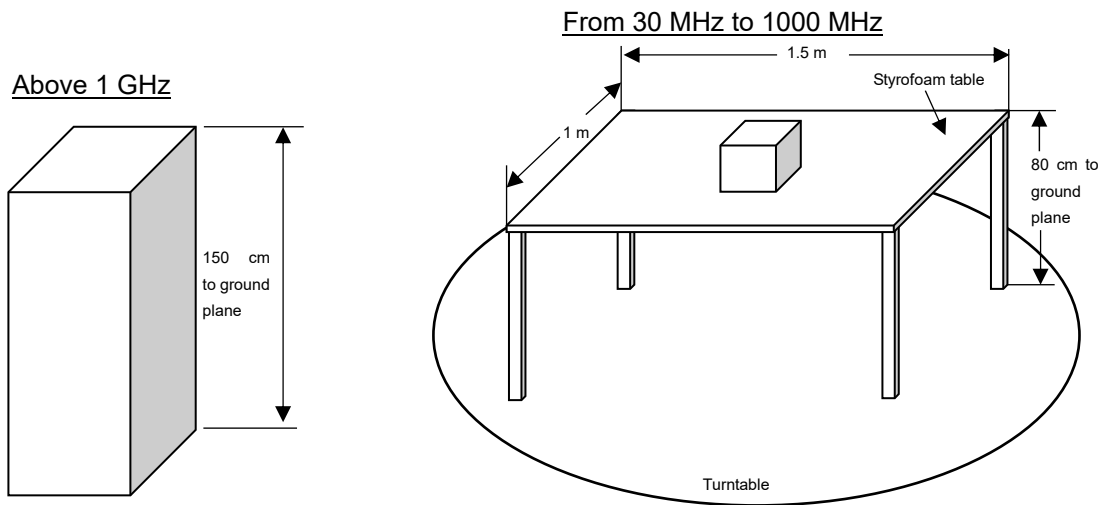
[Final Measurement]

The EUT operated in the worst emission condition found by the preliminary test.

The turntable azimuth (EUT direction) and antenna height are adjusted the position so that maximum field strength is obtained for each frequency spectrum to be measured.

The equipment and cables are arranged or manipulated within the range of the test standard in the above condition. At least six highest spectrums are measured by the test receiver (quasi-peak) and spectrum analyzer (peak and average). When the uncertain result was obtained (30 – 1000 MHz), the measurement is retried by using the half wave dipole antenna instead of the broadband antenna.

**EUT set-up as per standard
 Radiated disturbance**



Absorber placement and Receive Antenna location in Radiated disturbance above 1 GHz

