

# RADIO TEST REPORT

(for 2.4 GHz WLAN)

Project No. : SKZ-21-065  
Client : Sony Group Corporation  
Client's Address : 1-7-1 Konan Minato-ku Tokyo, 108-0075 Japan  
Product Name : Wireless LAN module  
Model No. : WCBN3515A  
FCC ID : AK8100224111  
Test Standard : 47 CFR Part 15 Subpart C  
Sample Receipt Date : January 22, 2021  
Test Date : February 5, 2021 to February 11, 2021  
Report Date : April 27, 2021  
Test Result : Complied

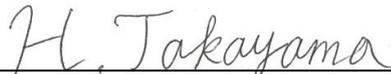
Notice:

*\* These test results relate only to the items (combination equipment, test configuration, operation condition etc.) tested.*

*\* This report shall not be reproduced except in full, without written approval of the laboratory.*

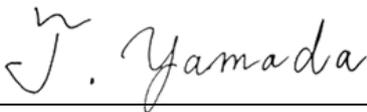
*\* All test results are traceable to the national and /or international standards.*

Reported by:

  
\_\_\_\_\_

Hisae Takayama  
Test Engineer  
EMC/RF Test Laboratory, Main Lab.  
Design Technology Division

Approved Signatory:

  
\_\_\_\_\_

Takashi Yamada  
Technical Manager  
EMC/RF Test Laboratory, Main Lab.  
Design Technology Division

## TABLE OF CONTENTS

<b>1.</b>	<b>General Information.....</b>	<b>3</b>
	1.1. Description of Equipment Under Test (EUT).....	3
	1.2. Summary of Test Result.....	4
	1.3. Tested Methodology .....	4
	1.4. Measurement Procedures .....	5
	1.5. Test Location.....	7
	1.6. Uncertainty .....	7
<b>2.</b>	<b>Test Specification.....</b>	<b>8</b>
	2.1. Validation .....	8
	2.2. Operating Condition.....	8
	2.3. Special Accessories .....	9
	2.4. EUT Modifications .....	9
	2.5. Configuration of EUT System .....	10
	2.6. Typical setup arrangement.....	11
<b>3.</b>	<b>Test Data.....</b>	<b>12</b>
	3.1. Radiated Spurious Emissions.....	12
<b>4.</b>	<b>Method of Calculation .....</b>	<b>18</b>
	4.1. Radiated Spurious Emissions.....	18
<b>5.</b>	<b>List of Test Equipment.....</b>	<b>18</b>
	5.1. Radiated Spurious Emissions.....	18
<b>6.</b>	<b>Photographs of test setup.....</b>	<b>19</b>
	6.1. Radiated Spurious Emissions Photo(s).....	19

Note

- indicates that the listed condition, standard or equipment is applicable for this report.
- indicates that the listed condition, standard or equipment is not applicable for this report.

### Revision History

Revision	Date	Overview	Page
SKZ-21-065 (Original)	April 27, 2021	-	-

### Disclaimer

This report includes the information provided by the customer as below;

- Cover page : Client and product related information
- Clause 1.1 : Description of Equipment Under Test (EUT)
- Clause 2 : Operating mode / conditions

\* The laboratory is not responsible for any test results affected by the above information.

## 1. General Information

### 1.1. Description of Equipment Under Test (EUT)

#### General Specification

Test Sample Condition :  Prototype  Pre-production  Mass-production  
 Product Name : Wireless LAN module  
 Trade Name : LITE-ON  
 Model No. : WCBN3515A  
 Serial No. : 001

Similar model(s) to be covered by this report

Model No. : None

#### Radio Specification

Function of the Equipment : Transceiver

Operating Frequency :

IEEE Standard	Operating Frequency Band [MHz]	Channel Spacing [MHz]	Bandwidth [MHz]	Number of Channel
802.11b	2412 to 2462	5	5* 10* 20	11
802.11g	2412 to 2462	5	5* 10* 20	11
802.11n-HT20	2412 to 2462	5	5* 10* 20	11
802.11n-HT40	2422 to 2452	5	40	7

\* Special Wireless System

Modulation Type :

IEEE Standard	Type of modulation
802.11b	DSSS (DBPSK, DQPSK, CCK)
802.11g	OFDM (BPSK, QPSK, 16QAM, 64QAM)
802.11n	OFDM (BPSK, QPSK, 16QAM, 64QAM)

Antenna Type / Antenna Gain :

Port / Chain	Antenna Type	Antenna Gain [dBi]
Port 1 / Chain 0	Dipole antenna	+ 2.8
Port 2 / Chain 1	Patch antenna	+ 3.6

Antenna Connector Type

: MHF

## 1.2. Summary of Test Result

Test Item	Test Method	Worst Margin	Results	Note
AC Power-line Conducted Emissions	-	-	N/A	*1
6dB Bandwidth	-	-	N/A	*1
Maximum Conducted Output Power	-	-	N/A	*1
Power Spectral Density	-	-	N/A	*1
Radiated Spurious Emissions	Radiated	1.0 dB (AV) 2483.500 MHz Vertical	Complied	-
Radiated Spurious Emissions for Band Edge	Radiated	29.31 dB 2397.47 MHz Vertical	Complied	-

Note

\*1: This item is referred to Test Report No. FR020615AC (issued by Sporton International Inc. Hsinhua Laboratory).

### Other requirements

Part 15.31(e) Supply voltage requirement

: Complied (The EUT was supplied with a stable voltage by host device.)

Part 15.203 / 212 Antenna requirement

: Complied (Users cannot replace the external antenna, since it is mounted to the inside of the host device.)

## 1.3. Tested Methodology

Test Standard : 47 CFR Part15 Subpart C

Test Method : ANSI C63.10 - 2013  
KDB 558074 D01 15.247 Meas Guidance v05r02

Test Condition

### Radiated Spurious Emissions

Test Distance :  3 m  10m (9 kHz to 30 MHz)  
 3 m  10m (30 MHz to 1000 MHz)  
 3 m (1 GHz to 26.5 GHz)

Dimensions of the EUT table : 0.8 m (below 1 GHz) or 1.5 m (above 1 GHz) height, 2.0 m width and 1 m depth.

Dimensions of validated test volume : 2 m diameter, 3 m top height, 0.5 m bottom height.

### 1.4. Measurement Procedures

We performed the measurements in accordance with NV3-06, available upon the request.

- No deviation
- Deviation from the above procedure

The summary of the above procedure is mentioned below

#### Radiated Spurious Emissions

1. The non-conductive table (EUT table) made of ( FRP,  Styrene Foam,  other non-conductive material) was placed in the center of the turntable.
2. The EUT was placed on the center of the tabletop.
3. The test antenna was placed away from the EUT at test distance.
4. The limits were compensated the distance factor with follows:  
 9 kHz to 490 kHz [Limit at 3 m] = [Limit at 300 m] + 40log (300[m] / 3[m])  
 490 kHz to 30 MHz [Limit at 3 m] = [Limit at 30 m] + 40log (30[m] / 3[m])
5. Find the worst arrangement of the EUT according to follows:
  - Rotating the turntable and/or scanning the antenna.
  - On every condition, exploring the highest emissions with the spectrum analyzer. (9 kHz to 26.5 GHz, peak detector)
6. On the worst arrangement of the EUT found in above, choose the six highest harmonics or spurious emissions on the spectrum data. (\*excluding carrier band edges)  
 The final measurements of all test operating modes carried out on these emissions as follows:

The test antenna and the turntable were performed with follows:

	9 kHz to 30 MHz	30 MHz to 1000 MHz	1 GHz to 26.5 GHz
Antenna	Loop Antenna	Bi-conical Antenna, Log-periodic Antenna	Horn Antenna
Antenna scanning range	1 m, Vertical, 360 degrees	1 m to 4 m, Horizontal and Vertical	1 m to 4 m *, Horizontal and Vertical
Turntable rotating range	360 degrees	360 degrees	360 degrees

\*: When the measurement frequencies above 1 GHz, final measurements are performed keeping the antenna in the "cone of radiation" from EUT area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response.

Instruments settings were carried out with follows:

	9 kHz to 90 kHz 110 kHz to 490 kHz	90 kHz to 110 kHz 490 kHz to 30 MHz	30 MHz to 1000 MHz	1 GHz to 26.5 GHz
Detector	Peak / Average	Quasi-peak	Quasi-peak	Peak / Average
RBW	200 Hz (6 dB) or 9 kHz (6 dB) *1	200 Hz (6 dB) or 9 kHz (6 dB) *1	120 kHz (6 dB)	1 MHz (6 dB)
VBW	N/A	N/A	N/A	3 MHz (for peak) 10 kHz (for average) *2
Instrument	EMI test receiver	EMI test receiver	EMI test receiver	Spectrum analyzer

\*1: When the measurement frequencies below 150 kHz, RBW: 200 Hz was used.

\*2: VBW setting (for average) was higher than 1/T, and up to 10 kHz. refer to the test data. (T is the minimum transmission duration)

7. If the final measurement result exceeded the limit in non-restricted band(excluding carrier band edges), the measurement is carried out additionally with follows;

Measurement points

- Fundamental Frequency
- Frequency that exceeded the limit in non-restricted band (excluding carrier band edges)

	9 kHz to 150 kHz	150 kHz to 30 MHz	30 MHz to 26.5 GHz
Detector	Peak	Peak	Peak
RBW	300 Hz (6 dB) *	10 kHz (6 dB) *	100 kHz (6 dB)
Instrument	Spectrum analyzer	Spectrum analyzer	Spectrum analyzer

\*: Correction factor of RBW was compensated to a measurement result by the following formula.

$$\text{C.F. of RBW [dB]} = 10 * \log (100 \text{ kHz} / \text{used RBW})$$

8. If the final average measurement result exceeded the limit in the authorized band edge, the integration method is carried out with follows;

	2.4835 GHz to 2.4855 GHz
Detector	Peak
RBW	100 kHz (6 dB)
Instrument	Spectrum analyzer
Function	Channel Power (integration BW : 1 MHz)

9. Although these tests for below 30MHz were performed other than open field area test site, adequate comparison measurements were confirmed against 30 m open field area test site. Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the ones of tests made in an open field based on KDB 414788 D01.

Further these test for above 1GHz were performed test site complied with CISPR 16-1-4.

In the case of EUT size smaller than the validated test volume, the antenna position is adjusted such that the distance between the EUT and the antenna reference point is identical to the 3m used for the S-VSWR validation measurements. These method based on clause 7.3.1 of CISPR16-1-4 Edition 4, therefore correcting distance factor is not applied.

## 1.5. Test Location

Test Facility Name : Sony Global Manufacturing & Operations Corporation  
EMC/RF Test Laboratory, Main Lab.  
Address : 8-4 Shiomi Kisarazu-shi Chiba-ken, 292-0834, Japan  
Phone : +81 438 37 2750

### Radiated Spurious Emissions

Semi-Anechoic chamber

4th Site     EMC Site

## 1.6. Uncertainty

Test Item	Frequency	Distance	4th Site
Radiated Emissions	9 kHz to 30 MHz	3m	± 2.60 dB
	30 MHz to 1000 MHz	3m	± 4.96 dB
	1 GHz to 18 GHz	3m	± 5.22 dB
	18 GHz to 26.5 GHz	3m	± 5.36 dB

## 2. Test Specification

### 2.1. Validation

The system was configured for testing in a typical (as a customer would normally use it).  
The tests were conducted with the worst-case modes as follows.

### 2.2. Operating Condition

The test mode was determined by client request.

The EUT was tested with maximum power settings in original test report No. FR020615AC.

The power settings A (in actual use) is lower than power settings B (maximum power of this module).

Spurious (Harmonics):

The Channel with the largest difference between A and B was selected.

\*In the representative channel, if there is no problem, it is omitted.

Spurious (Band Edge):

The Channel with the largest difference between A and B was selected, and the channel close to the Band Edge Limit was measured.

[ Transmitting mode ]

	Mode	Test Channels [MHz]	Data Rate	Normal mode Power Table Typ. (dBm)	Tolerance [dB]	1-7 GHz	Band Edge	7-18 GHz	18-26.5 GHz	26.5-40 GHz
Harmonics	802.11b-10M	2437	1 Mbps	15	+2.0	x	-	x	x	-
Band Edge		Not applicable	-	-	-	-	-	-	-	-
Harmonics	802.11b-20M	2412	1 Mbps	15.5	+1.5	-	x	-	-	-
Band Edge		2437	1 Mbps	15.5	+1.5	x	-	x	Abridgement	-
Harmonics	802.11g -10M	2437	6 Mbps	16	+2.0	x	-	x	x	-
Band Edge		2462	6 Mbps	16	+2.0	-	x	-	-	-
Harmonics	802.11g -20M	2437	6 Mbps	16.5	+1.5	x	-	x	Abridgement	-
Band Edge		Not applicable	-	-	-	-	-	-	-	-
Harmonics	802.11n(HT20) -10M	2437	MCS0	16	+2.0	x	-	x	x	-
Band Edge		2462	MCS0	16	+2.0	-	x	-	-	-
Harmonics	802.11n(HT20) -20M	2437	MCS0	16.5	+1.5	x	-	x	Abridgement	-
Band Edge		Not applicable	-	-	-	-	-	-	-	-
Harmonics	11n HT40 -20M	2437	MCS0	16.5	+1.5	x	x Additional Measurement	x	Abridgement	-
Band Edge		Not applicable	-	-	-	-	-	-	-	-

Note

The measurement axis was tested according to the worst condition of LITE-ON report.

### The Software for Operating Mode

Software Name : Radio Control Tool V4.0  
Software Version : 4.0.00168.0

### 2.3. Special Accessories

Special accessories needed for connecting the EUT to achieve compliance:

Item	Manufacturer	Model No.	Serial No.	Remark
-	-	-	-	-

### 2.4. EUT Modifications

- No equipment modification to achieve compliance to the standard levels was done during the tests.  
 Equipment was modified to achieve compliance to the standard level as below.

Responsible Party Signature

\_\_\_\_\_  
Typed/ Print Name :  
Responsible Party :  
Position :  
Date :

## 2.5. Configuration of EUT System

### Radiated Spurious Emissions

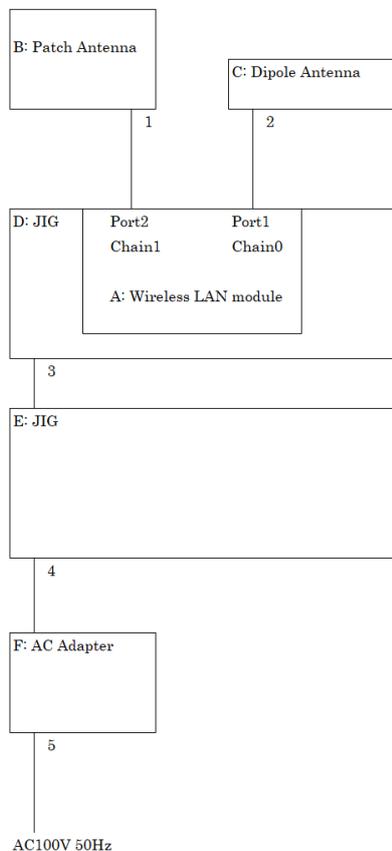
[ EUT and Associated Equipment (AE) ]

Symbol	EUT/AE	Item	Manufacturer	Model No.	Serial No.
A	EUT	Wireless LAN module	LITE-ON TECHNOLOGY (changzhou) CO., LTD	WCBN3515A	001
B	EUT	Patch Antenna	INPAQ Technology Co., Ltd	Patch 3001	001
C	EUT	Dipole Antenna	Itabashiseiki Co., Ltd	ANW-3001	001
D	EUT	JIG	-	-	001
E	EUT	JIG	-	-	001
F	AE	AC Adapter	SONY	AC-UES1230M	18602954

[ Type of Cable ]

Symbol	Description	Identification (Manufacturer etc.)	Shielded Yes / No	Ferrite Core	Length (m)	Bundled
1	RF Cable	-	Yes	No	0.3	-
2	RF Cable	-	Yes	No	0.1	-
3	JIG Cable	-	No	No	0.1	-
4	DC Cable	-	No	No	1.0	-
5	AC Cable	-	No	No	1.6	-

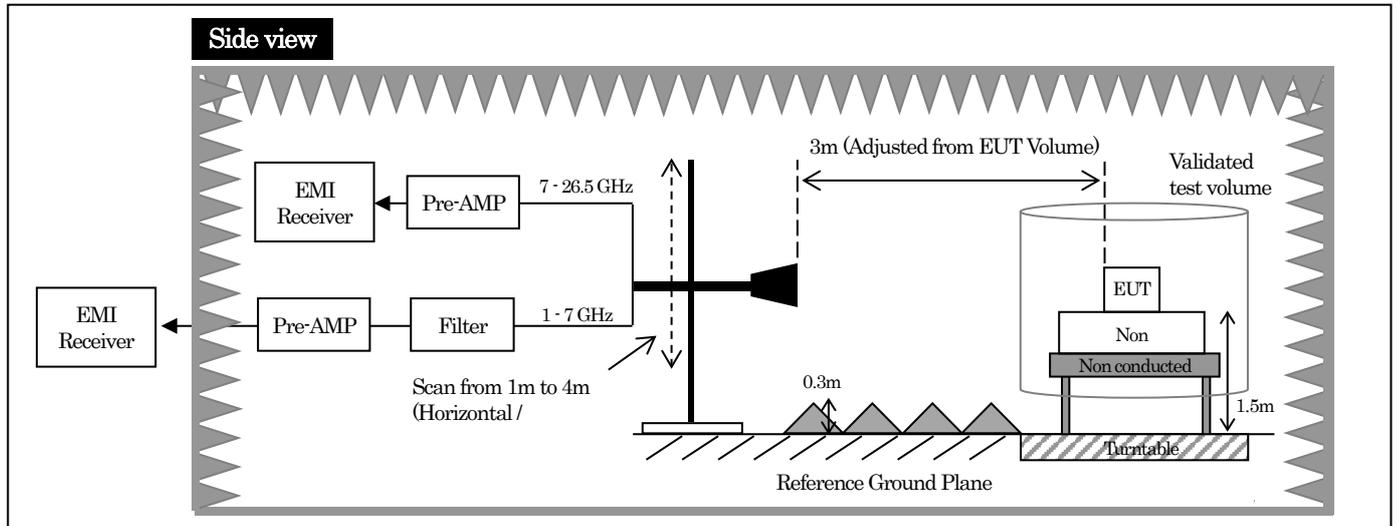
[ Connecting Diagram ]



## 2.6. Typical setup arrangement

### Radiated spurious emissions

< 1 GHz - 26.5 GHz >



### 3. Test Data

#### 3.1. Radiated Spurious Emissions

Measurement band	Date of measurement	Ambient temperature	Relative humidity	Measured by
1 GHz to 7 GHz	February 5, 20210	21.0 deg.C	52.0 %	M. Kouga
	February 10, 20210	22.0 deg.C	48.0 %	M. Kouga
7 GHz to 18 GHz	February 10, 20210	22.0 deg.C	48.0 %	M. Kouga
	February 11, 20210	22.0 deg.C	46.0 %	M. Kouga
18 GHz to 26.5 GHz	February 11, 20210	22.0 deg.C	46.0 %	M. Kouga

#### 1 GHz to 26.5 GHz

\* Although "Height" in radiated emissions data, which shows the height of the boom of the antenna mast, might exceed 400.0 cm. because of the antenna tilt positioner attached to the edge of the boom for the bore-sighting measurement, the height of the reference point of the antenna does not exceed 400.0 cm.

#### [ 802.11b / 2412 MHz ]

Frequency [MHz]	Detector	Polar.	Reading [dBμV]	C.F. [dB/m]	Result [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [degree]	EUT Position	VBW [kHz]
2390.000	AV	H	44.5	-5.0	39.5	54.0	14.5	159.0	89.0	X	10.0
2390.000	PK	H	54.3	-5.0	49.3	74.0	24.7	156.0	86.0	X	-
4823.925	AV	H	45.9	-3.5	42.4	54.0	11.6	100.0	85.0	X	10.0
4823.987	PK	H	50.1	-3.5	46.6	74.0	27.4	100.0	84.0	X	-
2390.000	AV	V	48.1	-5.0	43.1	54.0	10.9	172.0	336.0	X	10.0
2390.288	PK	V	58.0	-5.0	53.0	74.0	21.0	185.0	14.0	X	-

#### [ 802.11b / 2437 MHz ]

Frequency [MHz]	Detector	Polar.	Reading [dBμV]	C.F. [dB/m]	Result [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [degree]	EUT Position	VBW [kHz]
4873.966	PK	H	50.3	-3.4	46.9	74.0	27.1	250.0	61.0	X	-
4873.991	AV	H	45.8	-3.4	42.4	54.0	11.6	252.0	61.0	X	10.0
9747.907	AV	H	45.2	-3.3	41.9	54.0	12.1	394.0	165.3	X	10.0
9748.041	PK	H	50.9	-3.3	47.6	74.0	26.4	394.0	162.3	X	-
4873.832	PK	V	49.3	-3.4	45.9	74.0	28.1	149.0	167.0	X	-
4873.942	AV	V	44.2	-3.4	40.8	54.0	13.2	148.8	168.0	X	10.0
9747.923	AV	V	49.6	-3.3	46.3	54.0	7.7	397.0	316.0	X	10.0
9748.025	PK	V	53.0	-3.3	49.7	74.0	24.3	398.0	317.0	X	-
4873.974	PK	H	50.1	-3.4	46.7	74.0	27.3	131.0	82.0	X	-
4874.022	AV	H	45.3	-3.4	41.9	54.0	12.1	130.0	82.0	X	10.0
9747.959	PK	H	49.5	-3.3	46.2	74.0	27.8	395.0	219.0	X	-
9747.965	AV	H	43.4	-3.3	40.1	54.0	13.9	422.0	156.0	X	10.0
24370.000	AV	H	33.0	4.5	37.5	54.0	16.5	398.0	222.3	X	10.0
24370.000	PK	H	43.0	4.5	47.5	74.0	26.5	400.0	224.3	X	-
4873.972	AV	V	44.9	-3.4	41.5	54.0	12.5	147.0	199.0	X	10.0
4873.974	PK	V	49.8	-3.4	46.4	74.0	27.6	149.0	200.0	X	-
9747.896	AV	V	47.2	-3.3	43.9	54.0	10.1	382.0	316.0	X	10.0
9747.981	PK	V	51.2	-3.3	47.9	74.0	26.1	384.0	317.0	X	-
21933.000	AV	V	32.2	4.9	37.1	54.0	16.9	399.0	314.3	X	10.0
21933.000	PK	V	42.1	4.9	47.0	74.0	27.0	396.0	316.0	X	-

[ 802.11g / 2437 MHz ]

Frequency [MHz]	Detector	Polar.	Reading [dB $\mu$ V]	C.F. [dB/m]	Result [dB $\mu$ V/m]	Limit [dB $\mu$ V/m]	Margin [dB]	Height [cm]	Angle [degree]	EUT Position	VBW [kHz]
2484.938	AV	H	51.4	-4.7	46.7	54.0	7.3	187.0	84.0	X	10.0
2485.215	PK	H	60.2	-4.7	55.5	74.0	18.5	186.0	85.0	X	-
4873.879	AV	H	44.3	-3.4	40.9	54.0	13.1	318.0	60.0	X	10.0
4874.119	PK	H	49.2	-3.4	45.8	74.0	28.2	320.0	61.0	X	-
9747.966	AV	H	46.3	-3.3	43.0	54.0	11.0	422.0	224.0	X	10.0
9747.993	PK	H	50.9	-3.3	47.6	74.0	26.4	420.0	225.3	X	-
2484.596	PK	V	60.1	-4.7	55.4	74.0	18.6	252.0	150.0	X	-
2484.986	AV	V	51.3	-4.7	46.6	54.0	7.4	251.0	148.0	X	10.0
4873.989	AV	V	43.5	-3.4	40.1	54.0	13.9	156.0	172.0	X	10.0
4874.010	PK	V	48.6	-3.4	45.2	74.0	28.8	155.0	171.0	X	-
9747.960	AV	V	49.4	-3.3	46.1	54.0	7.9	405.0	309.0	X	10.0
9748.041	PK	V	52.8	-3.3	49.5	74.0	24.5	408.0	308.0	X	-
2484.565	PK	H	59.4	-4.7	54.7	74.0	19.3	184.0	83.0	X	-
2485.123	AV	H	50.7	-4.7	46.0	54.0	8.0	185.6	81.0	X	10.0
4873.947	PK	H	49.2	-3.4	45.8	74.0	28.2	321.0	59.0	X	-
4874.055	AV	H	43.8	-3.4	40.4	54.0	13.6	322.8	56.0	X	10.0
9747.762	PK	H	50.8	-3.3	47.5	74.0	26.5	407.0	222.0	X	-
9747.841	AV	H	45.6	-3.3	42.3	54.0	11.7	394.0	156.3	X	10.0
24370.000	AV	H	32.9	4.5	37.4	54.0	16.6	396.0	225.3	X	10.0
24370.000	PK	H	42.9	4.5	47.4	74.0	26.6	400.0	224.3	X	-
2484.824	AV	V	50.7	-4.7	46.0	54.0	8.0	216.0	144.0	X	10.0
2484.930	PK	V	59.5	-4.7	54.8	74.0	19.2	215.0	143.0	X	-
4873.925	PK	V	48.5	-3.4	45.1	74.0	28.9	161.0	170.0	X	-
4873.928	AV	V	43.5	-3.4	40.1	54.0	13.9	160.0	168.5	X	10.0
9747.783	PK	V	53.1	-3.3	49.8	74.0	24.2	407.0	315.8	X	-
9747.931	AV	V	49.3	-3.3	46.0	54.0	8.0	397.0	316.3	X	10.0
19496.000	AV	V	31.5	5.5	37.0	54.0	17.0	398.0	318.3	X	10.0
19496.000	PK	V	41.0	5.5	46.5	74.0	27.5	399.0	317.3	X	-

[ 802.11g / 2462 MHz ]

Frequency [MHz]	Detector	Polar.	Reading [dB $\mu$ V]	C.F. [dB/m]	Result [dB $\mu$ V/m]	Limit [dB $\mu$ V/m]	Margin [dB]	Height [cm]	Angle [degree]	EUT Position	VBW [kHz]
2483.500	AV	H	51.3	-4.7	46.6	54.0	7.4	189.0	88.0	X	10.0
2483.500	PK	H	62.2	-4.7	57.5	74.0	16.5	188.0	86.0	X	-
2483.500	AV	V	51.4	-4.7	46.7	54.0	7.3	248.0	160.0	X	10.0
2483.500	PK	V	61.0	-4.7	56.3	74.0	17.7	246.0	160.0	X	-
4923.955	AV	V	46.8	-3.3	43.5	54.0	10.5	168.6	175.0	X	10.0
4924.141	PK	V	52.3	-3.3	49.0	74.0	25.0	169.0	176.0	X	-

## [ 802.11n-HT20 (MIMO) / 2437 MHz]

Frequency [MHz]	Detector	Polar.	Reading [dB $\mu$ V]	C.F. [dB/m]	Result [dB $\mu$ V/m]	Limit [dB $\mu$ V/m]	Margin [dB]	Height [cm]	Angle [degree]	EUT Position	VBW [kHz]
2483.500	PK	H	60.6	-4.7	55.9	74.0	18.1	190.0	82.0	X	-
2484.914	AV	H	51.0	-4.7	46.3	54.0	7.7	189.0	84.0	X	10.0
4874.004	AV	H	44.3	-3.4	40.9	54.0	13.1	358.5	91.0	X	10.0
4874.213	PK	H	49.1	-3.4	45.7	74.0	28.3	357.7	90.0	X	-
9747.911	AV	H	46.0	-3.3	42.7	54.0	11.3	421.0	225.3	X	10.0
9748.016	PK	H	50.4	-3.3	47.1	74.0	26.9	422.0	224.0	X	-
2390.000	AV	V	48.2	-5.0	43.2	54.0	10.7	124.3	180.0	X	10.0
2390.000	PK	V	57.7	-5.0	52.7	74.0	21.3	125.0	179.0	X	-
2483.500	PK	V	58.9	-4.7	54.2	74.0	19.8	150.0	188.0	X	-
2484.917	AV	V	49.8	-4.7	45.1	54.0	8.9	151.0	189.0	X	10.0
4874.045	AV	V	43.6	-3.4	40.2	54.0	13.8	142.0	171.0	X	10.0
4874.068	PK	V	48.6	-3.4	45.2	74.0	28.8	141.0	170.0	X	-
9747.963	AV	V	49.4	-3.3	46.1	54.0	7.9	400.0	316.3	X	10.0
9748.002	PK	V	52.5	-3.3	49.2	74.0	24.8	399.0	316.3	X	-
4873.908	AV	H	44.4	-3.4	41.0	54.0	13.0	176.0	55.0	X	10.0
4873.961	PK	H	49.2	-3.4	45.8	74.0	28.2	178.0	56.0	X	-
9747.906	PK	H	50.1	-3.3	46.8	74.0	27.2	419.0	226.3	X	-
9747.962	AV	H	46.0	-3.3	42.7	54.0	11.3	420.0	224.0	X	10.0
24370.000	AV	H	32.6	4.5	37.1	54.0	16.9	394.0	220.0	X	10.0
24370.000	PK	H	42.6	4.5	47.1	74.0	26.9	396.0	222.3	X	-
2484.886	AV	V	51.6	-4.7	46.9	54.0	7.1	212.0	144.0	X	10.0
2484.971	PK	V	60.2	-4.7	55.5	74.0	18.5	210.0	145.0	X	-
4874.000	PK	V	49.0	-3.4	45.6	74.0	28.4	139.0	171.0	X	-
4874.016	AV	V	42.8	-3.4	39.4	54.0	14.6	135.0	167.0	X	10.0
9747.962	AV	V	49.3	-3.3	46.0	54.0	8.0	409.0	316.0	X	10.0
9748.010	PK	V	52.7	-3.3	49.4	74.0	24.6	410.0	317.3	X	-
21933.000	AV	V	32.4	4.9	37.3	54.0	16.7	398.0	317.0	X	10.0
21933.000	PK	V	42.1	4.9	47.0	74.0	27.0	399.0	316.0	X	-

## [ 802.11n-HT20 (MIMO) / 2462 MHz]

Frequency [MHz]	Detector	Polar.	Reading [dB $\mu$ V]	C.F. [dB/m]	Result [dB $\mu$ V/m]	Limit [dB $\mu$ V/m]	Margin [dB]	Height [cm]	Angle [degree]	EUT Position	VBW [kHz]
2483.500	AV	H	51.3	-4.7	46.6	54.0	7.4	161.0	82.0	X	10.0
2483.500	PK	H	60.7	-4.7	56.0	74.0	18.0	162.0	81.9	X	-
2483.500	AV	V	52.8	-4.7	48.1	54.0	5.9	298.0	146.0	X	10.0
2483.500	PK	V	62.7	-4.7	58.0	74.0	16.0	296.0	148.0	X	-
4923.848	PK	V	50.9	-3.3	47.6	74.0	26.4	156.0	165.0	X	-
4923.996	AV	V	46.2	-3.3	42.9	54.0	11.1	157.0	167.0	X	10.0

[ 802.11n-HT40 (MIMO) / 2437 MHz]

Frequency [MHz]	Detector	Polar.	Reading [dB $\mu$ V]	C.F. [dB/m]	Result [dB $\mu$ V/m]	Limit [dB $\mu$ V/m]	Margin [dB]	Height [cm]	Angle [degree]	EUT Position	VBW [kHz]
2390.000	AV	H	55.6	-5.0	50.6	54.0	3.4	145.0	80.0	X	10.0
2390.000	PK	H	68.3	-5.0	63.3	74.0	10.7	145.0	80.0	X	-
2483.500	AV	H	54.3	-4.7	49.6	54.0	4.4	149.0	81.0	X	0.2
2483.500	PK	H	70.4	-4.7	65.7	74.0	8.3	151.0	82.0	X	-
4873.909	PK	H	49.5	-3.4	46.1	74.0	27.9	287.0	59.0	X	-
4874.038	AV	H	44.3	-3.4	40.9	54.0	13.1	286.0	58.0	X	10.0
9747.844	PK	H	50.4	-3.3	47.1	74.0	26.9	421.0	224.3	X	-
9747.899	AV	H	46.1	-3.3	42.8	54.0	11.2	420.0	222.3	X	10.0
2390.000	AV	V	56.9	-5.0	51.9	54.0	2.1	149.0	350.5	X	0.2
2390.000	PK	V	74.6	-5.0	69.6	74.0	4.4	148.0	351.0	X	-
2483.500	AV	V	57.7	-4.7	53.0	54.0	1.0	168.0	168.0	X	0.2
2483.500	PK	V	74.3	-4.7	69.6	74.0	4.4	168.0	170.0	X	-
4873.950	AV	V	43.4	-3.4	40.0	54.0	14.0	100.0	175.0	X	10.0
4873.951	PK	V	49.1	-3.4	45.7	74.0	28.3	100.0	174.0	X	-
9747.757	PK	V	52.6	-3.3	49.3	74.0	24.7	411.0	317.3	X	-
9747.839	AV	V	49.2	-3.3	45.9	54.0	8.1	409.0	316.0	X	10.0

Plot data for 2.4 GHz Restricted-Band Edge

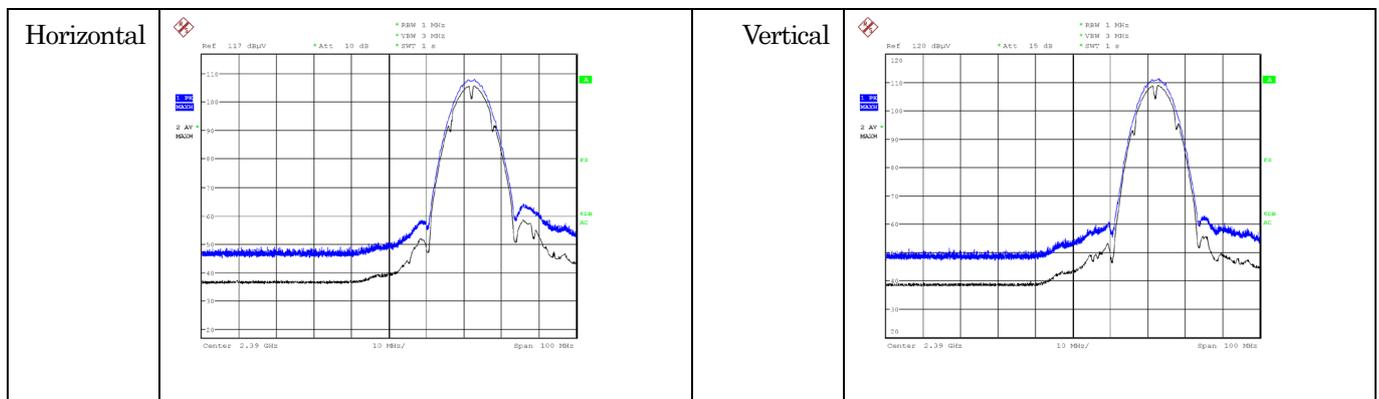
These plot data show peak (trace blue) and average (trace black) spectrum for worst case emissions in the restricted-band edges. (Restricted band edges: below 2390 MHz and above 2483.5 MHz)

The result of the final radiated spurious emissions measurement refers in previous pages.

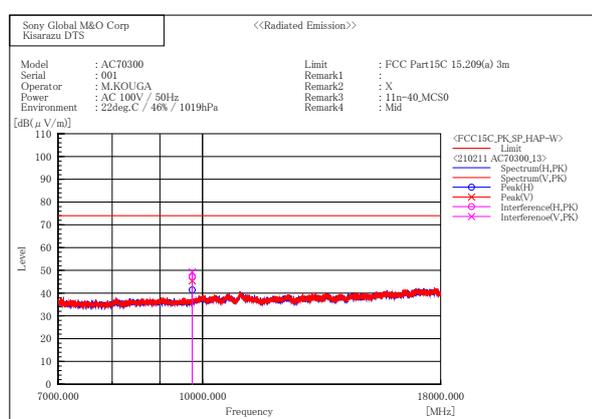
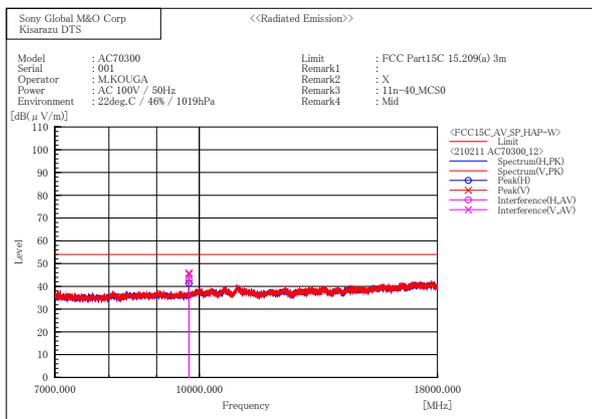
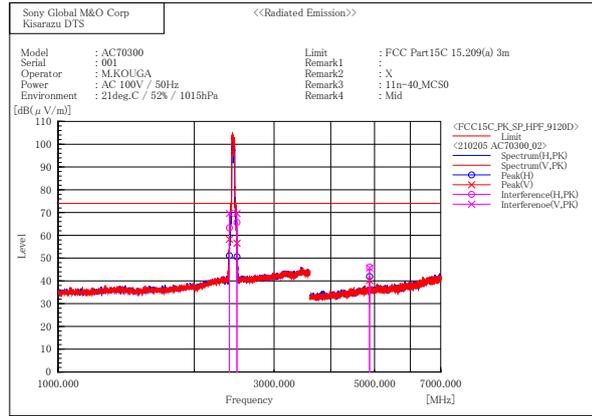
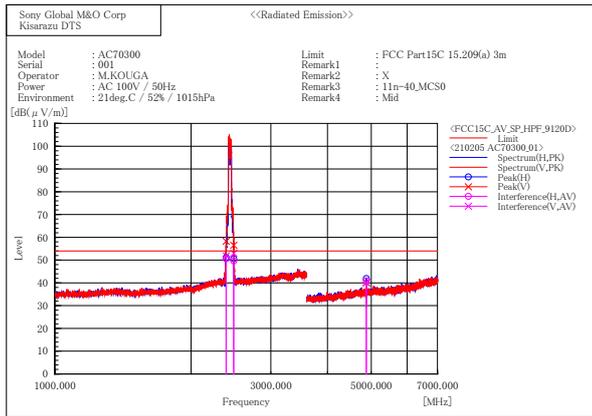
[ 802.11b/ 2412 MHz ]

< Non-restricted band emissions (RBW:100kHz, PK) >

Polar.	Frequency [MHz]	Reading [dBuV]	C.F. [dB/m]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]
H	2412.49	107.15	-5.00	102.15	-	-
	2398.51	53.22	-5.00	48.22	82.15	33.93
V	2412.98	110.88	-5.00	105.88	-	-
	2397.47	61.57	-5.00	56.57	85.88	29.31



Plot data for above 1GHz in worst mode



## 4. Method of Calculation

### 4.1. Radiated Spurious Emissions

Method of calculation : Software  
 Software Name : V-Scan  
 Software Version : Ver.4.0.30

Test Result [ dBuV/ m ] = Meter Reading [ dBuV ] + C.F. [ dB/ m ]

Note (a) Meter Reading : Reading of the EMI test receiver or the spectrum analyzer.  
 (b) C.F. :  Antenna Factor (including Balun Loss) + System GainLoss  
 :  Antenna Factor (including Balun Loss) + System GainLoss + 20 log (3 m/ 10 m)

## 5. List of Test Equipment

All test results are traceable to the national and/ or international standards.

### 5.1. Radiated Spurious Emissions

Used	Ctrl#	Equipment	Model No.	Serial No.	Manufacturer	Cal.Interval	Last Cal.
-	M0515	EMI Receiver	ESCI	100606	Rohde & Schwarz	12 months	20.11.18
x	M0504	EMI Receiver	ESCI	100086	Rohde & Schwarz	12 months	20.12.02
-	A0073	Loop Antenna	HFH2-Z2	100171	Rohde & Schwarz	12 months	20.12.01
-	A0043	Biconical Antenna	BBA9106	V5(91032598)	Schwarzbeck	12 months	20.12.07
-	A0046	Log periodic Antenna	UHALP9108A1	0830	Schwarzbeck	12 months	20.12.07
x	A0056	Horn Antenna	BBHA9120D	670	Schwarzbeck	12 months	20.06.14
x	A0057	Horn Antenna	HAP06-18W	00000037	Toyo Corporation	12 months	20.06.14
x	A0058	Horn Antenna	HAP18-26W	00000016	Toyo Corporation	12 months	20.10.02
-	A0060	Horn Antenna	HAP26-40W	00000009	Toyo Corporation	12 months	20.12.02
-	CS0037	Fourth Site RE Cable SYS1	-	-	-	12 months	20.06.14
x	CS0039	Fourth Site RE Cable SYS3	-	-	-	12 months	20.06.14
x	CS0054	Fourth Site EMF Cable SYS	-	-	-	12 months	20.06.14
x	M1055	GHz Filter Box	WSF-109	17111786	Wakoh	12 months	20.06.14
x	M0510	RF Selector	NS4900	0802-226	Toyo Corporation	12 months	20.06.14
x	M0620	RF Pre-Amp	8447D	2944A10720	Agilent	12 months	20.06.14
x	M0706	3dB Attenuator	8491A	MY39267782	Agilent	12 months	20.06.14
x	M5151	Temperature Meter	608-H2	41475968	testo	24 months	19.11.20
x	M5061	Scientific Ambient Monitor	0560 6220	39515471/801	testo	12 months	20.04.17

About calibration interval

Valid until the end of the month listed in "Cal. Int." column.