



# RADIO TEST REPORT

**Test Report No. : 12751051S-J-R1**

**Applicant** : Canon Inc.  
**Type of Equipment** : Wireless LAN Module  
**Model No.** : K30374  
**FCC ID** : AZDK30374  
**Test regulation** : **FCC Part 15 Subpart C: 2018**  
For Permissive Change  
(Radiated Spurious Emission tests only)  
**Test Result** : **Complied (Refer to SECTION 3.2)**

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2. The results in this report apply only to the sample tested.
3. This sample tested is in compliance with the limits of the above regulation.
4. The test results in this test report are traceable to the national or international standards.
5. This test report must not be used by the customer to claim product certification, approval, or endorsement by any agency of the Federal Government.
6. This test report covers Radio technical requirements.  
It does not cover administrative issues such as Manual or non-Radio test related Requirements. (if applicable)
7. The all test items in this test report are conducted by UL Japan, Inc. Shonan EMC Lab.
8. The opinions and the interpretations to the result of the description in this report are outside scopes where UL Japan has been accredited.
9. The information provided from the customer for this report is identified in SECTION 1.
10. This report is a revised version of 12751051S-J. 12751051S-J is replaced with this report.

**Date of test:** March 14 to April 7, 2019

**Representative test engineer:** *K. Takayama*  
Kazutaka Takayama  
Engineer  
Consumer Technology Division

**Approved by:** *S. Takano*  
Shinichi Takano  
Engineer  
Consumer Technology Division



CERTIFICATE 1266.03

- The testing in which "Non-accreditation" is displayed is outside the accreditation scopes in UL Japan.  
 There is no testing item of "Non-accreditation".

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## **SECTION 1: Customer information**

Company Name : Canon Inc.  
Address : 3-451 Tsukakoshi, Saiwai-ku, Kawasaki, kanagawa 212-8530 Japan  
Telephone Number : +81-3-3758-2111  
Contact Person : Hiroyuki Saito

The information provided from the customer is as follows;

- Applicant, Type of Equipment, Model No., FCC ID on the cover and other relevant pages
- SECTION 1: Customer information
- SECTION 2: Equipment under test (E.U.T.)
- SECTION 4: Operation of E.U.T. during testing

\* The laboratory is exempted from liability of any test results affected from the above information in SECTION 2 and 4.

## **SECTION 2: Equipment under test (E.U.T.)**

### **2.1 Identification of E.U.T.**

Type of Equipment : Wireless LAN Module  
Model No. : K30374  
Serial No. : Refer to SECTION 4.2  
Rating : DC 3.3 V  
Receipt Date of Sample : March 6, 2019  
(Information from test lab.)  
Country of Mass-production : Thailand  
Condition of EUT : Engineering prototype  
(Not for Sale: This sample is equivalent to mass-produced items.)  
Modification of EUT : No Modification by the test lab

### **2.2 Product Description**

Model: K30374 (referred to as the EUT in this report) is a Wireless LAN Module.

### **Radio Specification**

Type of radio	IEEE802.11b	IEEE802.11g	IEEE802.11a	IEEE802.11n (20 M band)	IEEE802.11n (40 M band)
Frequency of operation	2412 MHz - 2462 MHz	2412 MHz - 2462 MHz	5180 MHz -5320 MHz 5500 MHz -5700 MHz 5745 MHz -5825 MHz	2412 MHz -2462 MHz 5180 MHz -5320 MHz 5500 MHz -5700 MHz 5745 MHz -5825 MHz	2422 MHz -2452 MHz 5190 MHz -5310 MHz 5510 MHz -5670 MHz 5755 MHz -5795 MHz
Type of modulation	DSSS (CCK, DQPSK, DBPSK)	OFDM-CCK (64QAM, 16QAM, QPSK, BPSK)	OFDM (64QAM, 16QAM, QPSK, BPSK)		
Channel spacing	5 MHz		20 MHz	2.4 GHz band 5 MHz 5 GHz band 20 MHz	2.4 GHz band 5 MHz 5 GHz band 40 MHz
Radio Type	Transceiver				
Antenna Gain	-1.69 dBi (2.4 GHz), -3.73 dBi (5 GHz) (In (W52,W53)) -2.22 dBi (5 GHz) (Out (W56))				
Antenna type / connector type	Inverted-L antenna / Connector : U.FL				
Clock frequency	40 MHz				

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## **SECTION 3: Test specification, procedures & results**

### **3.1 Test Specification**

Test Specification : FCC Part 15 Subpart C  
FCC Part 15 final revised on March 12, 2018 and effective April 11, 2018

Title : FCC 47CFR Part15 Radio Frequency Device Subpart C Intentional Radiators  
Section 15.207 Conducted limits  
Section 15.247 Operation within the bands 902-928MHz,  
2400-2483.5MHz, and 5725-5850MHz

### **3.2 Procedures and results**

Item*1)	Test Procedure	Specification	Worst margin	Results	Remarks
Spurious Emission Restricted Band Edges	FCC: KDB 558074 D01 15.247 Meas Guidance v05r01	FCC: Section15.247(d)	4.1 dB 2483.500 MHz	Complied# a)	Radiated (above 30 MHz) *2)
	IC: RSS-Gen 6.13	IC: RSS-247 5.5 RSS-Gen 8.9 RSS-Gen 8.10	AV, Hori. Tx 11n-20 2462 MHz		

Note: UL Japan, Inc.'s EMI Work Procedures No. 13-EM-W0420 and 13-EM-W0422.

\*1) The change is for the parts related to 5 GHz WLAN signal, and there is no impact on 2.4 GHz WLAN characteristics subject to the FCC 15C. Therefore, Output power measurement has been omitted.

\*2) Radiated test was selected over 30 MHz based on section 15.247(d) and KDB 558074 D01 15.247 Meas Guidance v05r01 8.5 and 8.6.

a) Refer to APPENDIX 1 (data of Radiated Spurious Emission)

Symbols:

Complied The data of this test item has enough margin, more than the measurement uncertainty.

Complied# The data of this test item meets the limits unless the measurement uncertainty is taken into consideration.

\* In case any questions arise about test procedure, ANSI C63.10: 2013 is also referred.

#### **FCC Part 15.31 (e)**

The host device provides stable voltage constantly to RF Module regardless of input voltage. Therefore, this EUT complies with the requirement.

#### **FCC Part 15.203/212 Antenna requirement**

The antenna is not removable from the EUT. Therefore, the equipment complies with the antenna requirement of Section 15.203.

### **3.3 Addition to standard**

No addition, exclusion nor deviation has been made from the standard.

### 3.4 Uncertainty

#### EMI

There is no applicable rule of uncertainty in this applied standard. Therefore, the following results are derived depending on whether or not laboratory uncertainty is applied.

The following uncertainties have been calculated to provide a confidence level of 95 % using a coverage factor  $k=2$ .  
Shonan EMC Lab.

Item	Frequency range	Uncertainty (+/-)		
		No. 1 SAC / SR	No. 2 SAC / SR	No. 3 SAC / SR
Radiated emission (Measurement distance: 3 m)	9 kHz-30 MHz	3.0 dB	3.0 dB	3.1 dB
	30 MHz-200 MHz	4.6 dB	4.6 dB	4.7 dB
	200 MHz-1 GHz	6.0 dB	6.0 dB	6.1 dB
	1 GHz-6 GHz	4.8 dB	4.8 dB	4.8 dB
	6 GHz-13 GHz	5.4 dB	5.4 dB	5.4 dB
Radiated emission (Measurement distance: 1 m)	13 GHz-18 GHz	5.7 dB	5.7 dB	5.7 dB
	18 GHz-40 GHz	5.9 dB	5.9 dB	5.9 dB

SAC=Semi-Anechoic Chamber

SR= Shielded Room is applied besides radiated emission

### 3.5 Test Location

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A2LA Certificate Number: 1266.03

FCC Test Firm Registration Number: 626366

Test site	IC Registration Number	Width x Depth x Height (m)	Size of reference ground plane (m) / horizontal conducting plane	Maximum measurement distance
No.1 Semi-anechoic chamber	2973D-1	20.6 x 11.3 x 7.65	20.6 x 11.3	10 m
No.2 Semi-anechoic chamber	2973D-2	20.6 x 11.3 x 7.65	20.6 x 11.3	10 m
No.3 Semi-anechoic chamber	2973D-3	12.7 x 7.7 x 5.35	12.7 x 7.7	5 m
No.4 Semi-anechoic chamber	-	8.1 x 5.1 x 3.55	8.1 x 5.1	-
No.1 Shielded room	-	6.8 x 4.1 x 2.7	6.8 x 4.1	-
No.2 Shielded room	-	6.8 x 4.1 x 2.7	6.8 x 4.1	-
No.3 Shielded room	-	6.3 x 4.7 x 2.7	6.3 x 4.7	-
No.4 Shielded room	-	4.4 x 4.7 x 2.7	4.4 x 4.7	-
No.5 Shielded room	-	7.8 x 6.4 x 2.7	7.8 x 6.4	-
No.6 Shielded room	-	7.8 x 6.4 x 2.7	7.8 x 6.4	-
No.8 shielded room	-	3.45 x 5.5 x 2.4	3.45 x 5.5	-
No.1 Measurement room	-	2.55 x 4.1 x 2.5	-	-

### 3.6 Test data, Test instruments, and Test set up

Refer to APPENDIX.

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## **SECTION 4: Operation of E.U.T. during testing**

### **4.1 Operating Mode(s)**

Test operating mode was determined as follows according to “Section 1 of 6 802.11 a/b/g/n testing - Managing Complex Regulatory Approvals - ” of TCB Council Workshop October 2009.

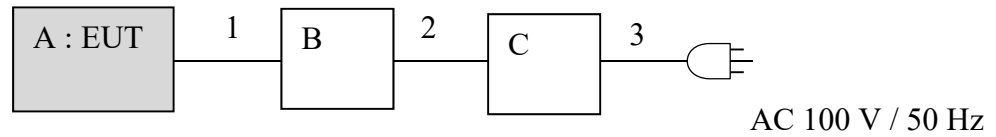
<b>Mode</b>	<b>Remarks*</b>
IEEE 802.11b (11b)	1 Mbps, PN9
IEEE 802.11g (11g)	24 Mbps, PN9
IEEE 802.11n 20 MHz BW (11n-20)	MCS 4, PN9
IEEE 802.11n 40 MHz BW (11n-40)	MCS 4, PN9
*Transmitting duty was 100 % on all tests.	
*The worst condition was determined based on the test result of RF Output power (Test report 11259492S-A-R3)	
*Power of the EUT was set by the software as follows; Power settings: 11b : 12 dBm, 11g/11n-20 : 10 dBm, 11n-40 : 7 dBm Software: DutApiBRIDGEETH8782.exe, Ver.1.0.7.32 *This setting of software is the worst case. Any conditions under the normal use do not exceed the condition of setting. In addition, end users cannot change the settings of the output power of the product.	

\*The details of Operating mode(s)

<b>Test Item</b>	<b>Operating Mode</b>	<b>Tested frequency</b>
Spurious Emission (below 1 GHz)	Tx, 11g	2412 MHz
Spurious Emission (above 1 GHz)	Tx, 11b	2412 MHz
	Tx, 11 g	2437 MHz
		2462 MHz
	Tx, 11 n-20 *1)	2412 MHz
		2462 MHz
	Tx, 11n-40	2422 MHz
		2437 MHz
		2452 MHz

\*1) These were carried out only in Band edge.

## 4.2 Configuration and peripherals



\* Cabling and setup(s) were taken into consideration and test data was taken under worse case conditions.

### Description of EUT

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	Wireless LAN Module	K30374	2	Canon	EUT
B	WLAN JOINT PCB	-	-	Canon	-
C	Power Supply	PAN35-10A	NA000955	KIKUSUI	-

### List of cables used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	Flat	0.1	Unshielded	Unshielded	-
2	DC	2.0	Unshielded	Unshielded	-
3	AC	1.8	Unshielded	Unshielded	-



## **SECTION 5: Radiated Spurious Emission**

### **Test Procedure**

It was measured based on "8.5 and 8.6 of KDB 558074 D01 15.247 Meas Guidance v05r01".

[For below 1 GHz]

EUT was placed on a urethane platform of nominal size, 0.5 m by 0.5 m, raised 0.8 m above the conducting ground plane. The Radiated Electric Field Strength has been measured in a Semi Anechoic Chamber with a ground plane.

[For above 1 GHz]

EUT was placed on a urethane platform of nominal size, 0.5 m by 0.5 m, raised 1.5 m above the conducting ground plane.

The Radiated Electric Field Strength has been measured in a Semi Anechoic Chamber with absorbent materials lined on a ground plane.

The height of the measuring antenna varied between 1 and 4 m and EUT was rotated a full revolution in order to obtain the maximum value of the electric field strength.

The measurements were performed for both vertical and horizontal antenna polarization with the Test Receiver, or the Spectrum Analyzer.

The measurements were made with the following detector function of the test receiver and the Spectrum analyzer (in linear mode).

The test was made with the detector (RBW/VBW) in the following table.

When using Spectrum analyzer, the test was made with adjusting span to zero by using peak hold.

### **Test Antennas are used as below;**

Frequency	Below 30 MHz	30 MHz to 200 MHz	200 MHz to 1 GHz	Above 1 GHz
Antenna Type	Loop	Biconical	Logperiodic	Horn

In any 100 kHz bandwidth outside the restricted band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator confirmed 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on a radiated measurement.

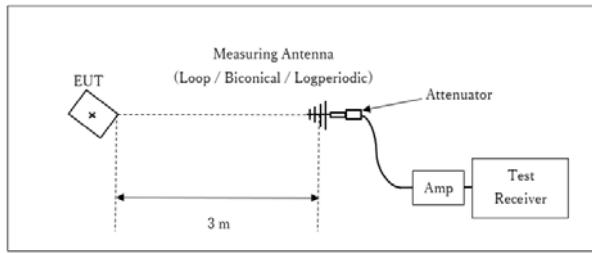
### **20 dBc was applied to the frequency over the limit of FCC 15.209 / Table 4 of RSS-Gen 8.9(IC) and outside the restricted band of FCC15.205 / Table 6 of RSS-Gen 8.10 (IC).**

Frequency	Below 1 GHz	Above 1 GHz		20 dBc
Instrument used	Test Receiver	Spectrum Analyzer		Spectrum Analyzer
Detector	QP	PK	AV *1)	PK
IF Bandwidth	BW 120 kHz	RBW: 1 MHz VBW: 3 MHz	Average Power Method: 11.12.2.5.1 RBW: 1 MHz VBW: 3 MHz Detector: Power Averaging (Linear voltage) Trace: 100 traces If duty cycle was less than 98 %, a duty factor was added to the results.	RBW: 100 kHz VBW: 300 kHz

\*1) Average Power Measurement was performed based on ANSI C63.10-2013.

**Figure 1: Test Setup**

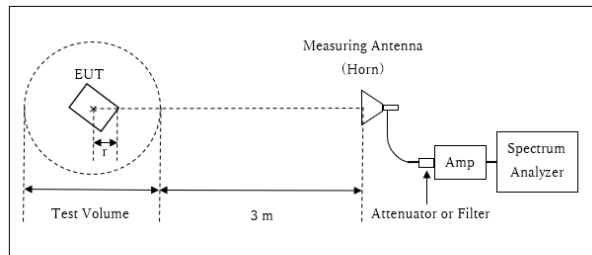
Below 1 GHz



× : Center of turn table

Test Distance: 3 m

1 GHz - 13 GHz

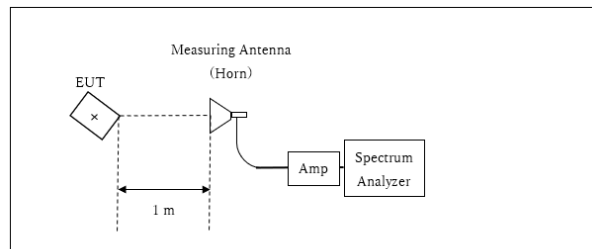


r : Radius of an outer periphery of EUT  
× : Center of turn table

Distance Factor:  $20 \times \log(3.99 \text{ m} / 3.0 \text{ m}) = 2.48 \text{ dB}$   
\* Test Distance:  $(3 + \text{Test Volume} / 2) - r = 3.99 \text{ m}$

Test Volume : 2.0 m  
(Test Volume has been calibrated based on CISPR 16-1-4.)  
r = 0.01 m

13 GHz - 26.5 GHz



× : Center of turn table

Distance Factor:  $20 \times \log(1.0 \text{ m} / 3.0 \text{ m}) = -9.54 \text{ dB}$   
\*Test Distance: 1 m

- The carrier level and noise levels were confirmed at each position of X, Y and Z axes of EUT to see the position of maximum noise, and the test was made at the position that has the maximum noise.

**Worst case:**

Antenna polarization	Carrier (Band edge)	Spurious			
		Below 1 GHz	Above 1 GHz		
			1 GHz- 2.8 GHz	2.8 GHz -13 GHz	13 GHz - 26.5 GHz
Horizontal	Y	X	Y	Y	X
Vertical	Z	X	Z	Y	X

The test results and limit are rounded off to one decimal place, so some differences might be observed.

**Measurement range** : 9 kHz - 26.5 GHz  
**Test data** : APPENDIX  
**Test result** : Pass

## APPENDIX 1: Test data

### Radiated Spurious Emission

Report No. 12751051S-J-R1  
Test place Shonan EMC Lab.  
Semi Anechoic Chamber 1 2 2  
Date March 14, 2019 March 29, 2019 March 31, 2019  
Temperature / Humidity 23 deg. C / 35 % RH 24 deg. C / 31 % RH 22 deg. C / 41 % RH  
Engineer Kazuya Noda Kazutaka Takeyama Kazuya Noda  
(1 GHz – 2.8 GHz) (2.8 GHz – 13 GHz) (13 GHz – 26.5 GHz)  
Mode Tx 11b 2412 MHz

(\* PK: Peak, AV: Average, QP: Quasi-Peak)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	2390.000	PK	46.67	27.89	14.06	39.46	2.48	51.64	73.90	22.2	219	264	
Hori.	4824.000	PK	47.88	31.29	6.52	39.50	2.48	48.67	73.90	25.2	255	122	
Hori.	7236.000	PK	46.28	36.80	8.06	39.31	2.48	54.31	73.90	19.5	150	0	
Hori.	9648.000	PK	46.56	38.29	9.30	39.49	2.48	57.14	73.90	16.7	150	0	
Hori.	2390.000	AV	37.22	27.89	14.06	39.46	2.48	42.19	53.90	11.7	219	264	
Hori.	4824.000	AV	38.60	31.29	6.52	39.50	2.48	39.39	53.90	14.5	255	122	
Hori.	7236.000	AV	35.18	36.80	8.06	39.31	2.48	43.21	53.90	10.7	150	0	
Hori.	9648.000	AV	36.32	38.29	9.30	39.49	2.48	46.90	53.90	7.0	150	0	
Vert.	2390.000	PK	46.87	27.89	14.06	39.46	2.48	51.84	73.90	22.0	105	104	
Vert.	4824.000	PK	48.28	31.29	6.52	39.50	2.48	49.07	73.90	24.8	153	303	
Vert.	7236.000	PK	45.60	36.80	8.06	39.31	2.48	53.63	73.90	20.2	150	0	
Vert.	9648.000	PK	45.35	38.29	9.30	39.49	2.48	55.93	73.90	17.9	150	0	
Vert.	2390.000	AV	38.79	27.89	14.06	39.46	2.48	43.76	53.90	10.1	105	104	
Vert.	4824.000	AV	39.99	31.29	6.52	39.50	2.48	40.78	53.90	13.1	153	303	
Vert.	7236.000	AV	35.79	36.80	8.06	39.31	2.48	43.82	53.90	10.0	150	0	
Vert.	9648.000	AV	36.45	38.29	9.30	39.49	2.48	47.03	53.90	6.8	150	0	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 13 GHz : 20log(3.99 m / 3.0 m) = 2.48 dB

13 GHz - 40 GHz : 20log(1.0 m / 3.0 m) = -9.54 dB

#### 20 dBc Data Sheet (RBW 100 kHz, VBW 300 kHz)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2412.000	PK	92.20	27.86	14.08	39.46	2.48	97.16	-	-	Carrier
Hori.	2396.997	PK	51.71	27.89	14.07	39.46	2.48	56.69	77.16	20.4	
Hori.	2400.000	PK	42.36	27.89	14.07	39.46	2.48	47.34	77.16	29.8	
Vert.	2412.000	PK	92.04	27.86	14.08	39.46	2.48	97.00	-	-	Carrier
Vert.	2397.002	PK	51.20	27.89	14.07	39.46	2.48	56.18	77.00	20.8	
Vert.	2400.000	PK	42.23	27.89	14.07	39.46	2.48	47.21	77.00	29.7	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 13 GHz : 20log(3.99 m / 3.0 m) = 2.48 dB

13 GHz - 40 GHz : 20log(1.0 m / 3.0 m) = -9.54 dB

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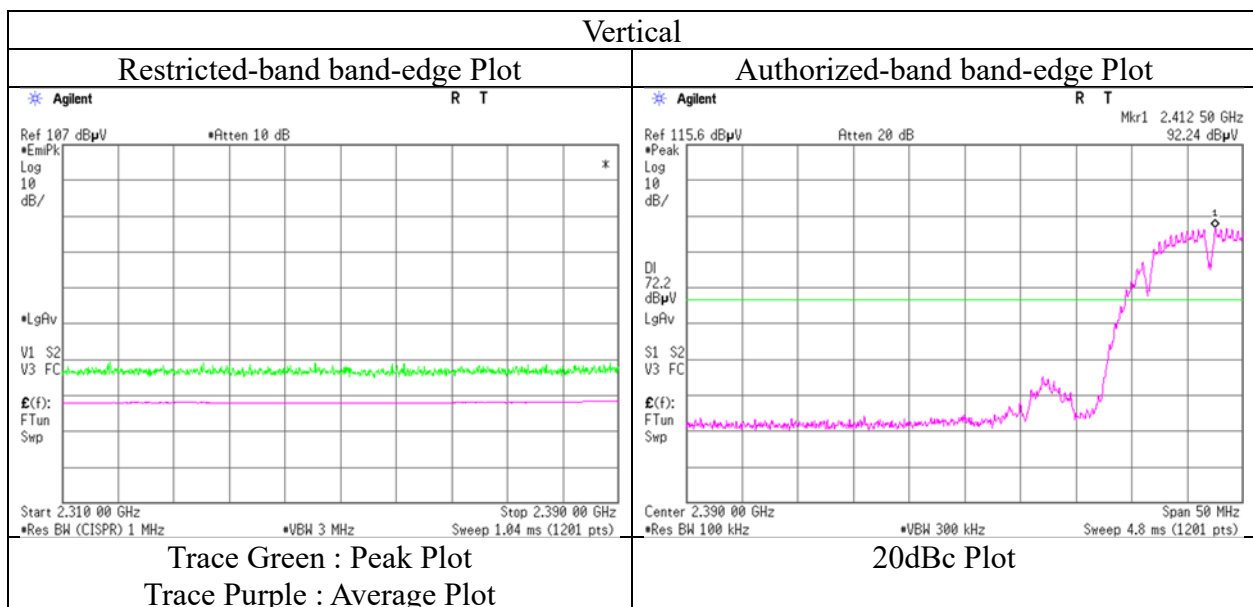
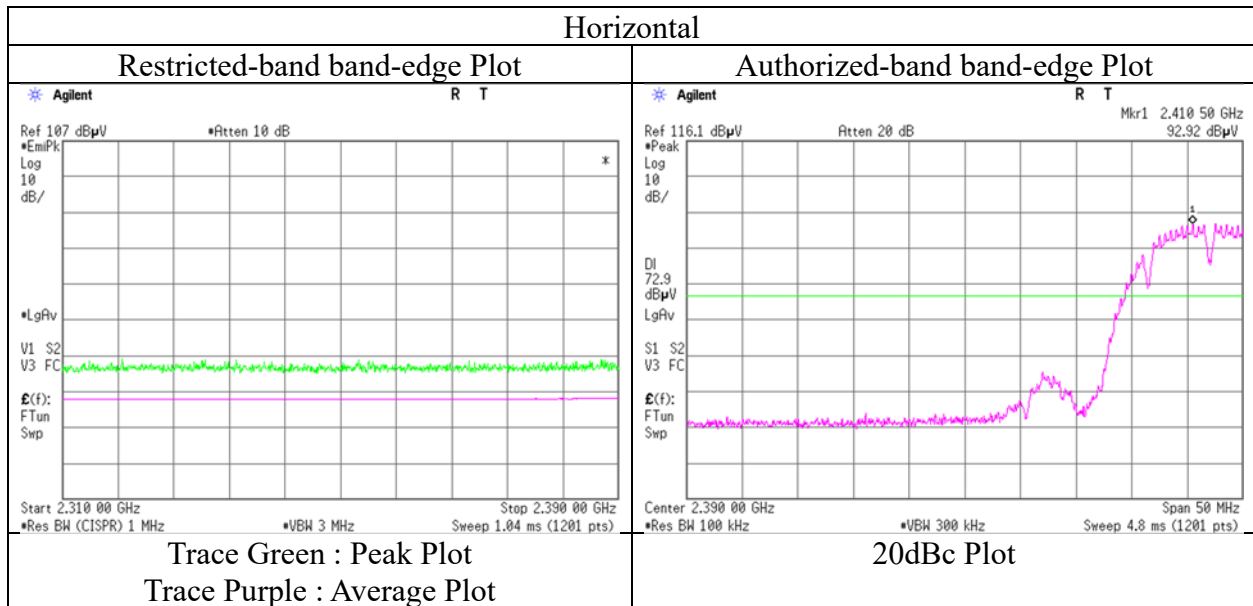
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## Radiated Spurious Emission (Reference Plot for band-edge)

Report No.	12751051S-J-R1
Test place	Shonan EMC Lab.
Semi Anechoic Chamber	1
Date	March 14, 2019
Temperature / Humidity	23 deg. C / 35 % RH
Engineer	Kazuya Noda
Mode	Tx 11b 2412 MHz



\* The measurement was conducted for a sufficiently long enough time to detect any possible spurious emissions.  
Final result of restricted band edge was shown in tabular data.

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## Radiated Spurious Emission

Report No.	12751051S-J-R1	
Test place	Shonan EMC Lab.	
Semi Anechoic Chamber	2	2
Date	March 29, 2019	March 31, 2019
Temperature / Humidity	24 deg. C / 31 % RH	22 deg. C / 41 % RH
Engineer	Kazutaka Takeyama	Kazuya Noda
	(1 GHz – 13 GHz)	(13 GHz – 26.5 GHz)
Mode	Tx 11b 2437 MHz	

(\* PK: Peak, AV: Average, QP: Quasi-Peak)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	4874.000	PK	49.13	31.17	6.58	39.50	2.48	49.86	73.90	24.0	145	118	
Hori.	7311.000	PK	45.50	36.82	8.15	39.35	2.48	53.60	73.90	20.3	150	0	
Hori.	9748.000	PK	45.29	38.55	9.32	39.42	2.48	56.22	73.90	17.6	150	0	
Hori.	4874.000	AV	42.10	31.17	6.58	39.50	2.48	42.83	53.90	11.0	145	118	
Hori.	7311.000	AV	35.24	36.82	8.15	39.35	2.48	43.34	53.90	10.5	150	0	
Hori.	9748.000	AV	35.12	38.55	9.32	39.42	2.48	46.05	53.90	7.8	150	0	
Vert.	4874.000	PK	48.89	31.17	6.58	39.50	2.48	49.62	73.90	24.2	135	298	
Vert.	7311.000	PK	45.56	36.82	8.15	39.35	2.48	53.66	73.90	20.2	150	0	
Vert.	9748.000	PK	45.43	38.55	9.32	39.42	2.48	56.36	73.90	17.5	150	0	
Vert.	4874.000	AV	43.35	31.17	6.58	39.50	2.48	44.08	53.90	9.8	135	298	
Vert.	7311.000	AV	34.25	36.82	8.15	39.35	2.48	42.35	53.90	11.5	150	0	
Vert.	9748.000	AV	34.39	38.55	9.32	39.42	2.48	45.32	53.90	8.5	150	0	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 13 GHz :  $20\log(3.99\text{ m} / 3.0\text{ m}) = 2.48\text{ dB}$

13 GHz - 40 GHz :  $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

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**Shonan EMC Lab.**

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## Radiated Spurious Emission

Report No.	12751051S-J-R1	
Test place	Shonan EMC Lab.	
Semi Anechoic Chamber	1	2
Date	March 14, 2019	March 31, 2019
Temperature / Humidity	23 deg. C / 35 % RH	22 deg. C / 41 % RH
Engineer	Kazuya Noda	Kazuya Noda
	(1 GHz – 13 GHz)	(13 GHz – 26.5 GHz)
Mode	Tx 11b 2462 MHz	

(\* PK: Peak, AV: Average, QP: Quasi-Peak)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	2483.500	PK	48.41	27.64	14.12	39.46	2.48	53.19	73.90	20.7	237	266	
Hori.	4924.000	PK	49.11	31.22	6.67	39.50	2.48	49.98	73.90	23.9	147	126	
Hori.	7386.000	PK	44.43	36.75	7.74	39.39	2.48	52.01	73.90	21.8	150	0	
Hori.	9848.000	PK	44.74	38.76	8.96	39.35	2.48	55.59	73.90	18.3	150	0	
Hori.	2483.500	AV	38.54	27.64	14.12	39.46	2.48	43.32	53.90	10.5	237	266	
Hori.	4924.000	AV	42.85	31.22	6.67	39.50	2.48	43.72	53.90	10.1	147	126	
Hori.	7386.000	AV	33.15	36.75	7.74	39.39	2.48	40.73	53.90	13.1	150	0	
Hori.	9848.000	AV	33.48	38.76	8.96	39.35	2.48	44.33	53.90	9.5	150	0	
Vert.	2483.500	PK	48.02	27.64	14.12	39.46	2.48	52.80	73.90	21.1	133	114	
Vert.	4924.000	PK	49.55	31.22	6.67	39.50	2.48	50.42	73.90	23.4	144	289	
Vert.	7386.000	PK	44.46	36.75	7.74	39.39	2.48	52.04	73.90	21.8	150	0	
Vert.	9848.000	PK	44.13	38.76	8.96	39.35	2.48	54.98	73.90	18.9	150	0	
Vert.	2483.500	AV	38.99	27.64	14.12	39.46	2.48	43.77	53.90	10.1	133	114	
Vert.	4924.000	AV	43.87	31.22	6.67	39.50	2.48	44.74	53.90	9.1	144	289	
Vert.	7386.000	AV	33.75	36.75	7.74	39.39	2.48	41.33	53.90	12.5	150	0	
Vert.	9848.000	AV	33.43	38.76	8.96	39.35	2.48	44.28	53.90	9.6	150	0	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 13 GHz :  $20\log(3.99\text{ m} / 3.0\text{ m}) = 2.48\text{ dB}$

13 GHz - 40 GHz :  $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

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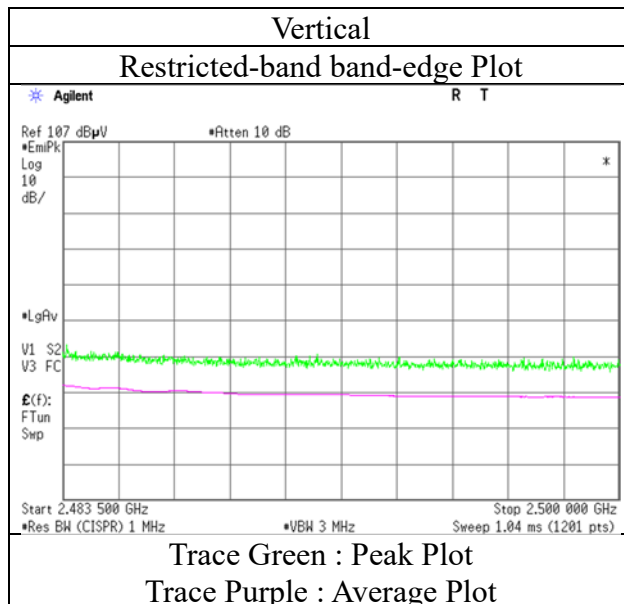
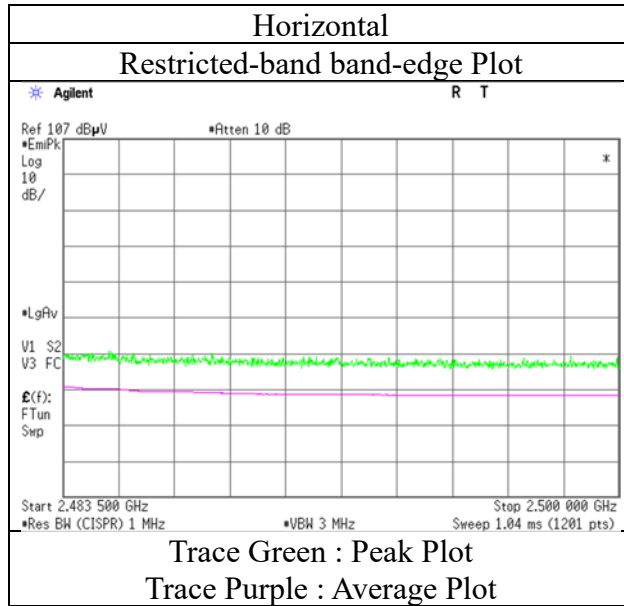
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**Radiated Spurious Emission**  
**(Reference Plot for band-edge)**

Report No. 12751051S-J-R1  
Test place Shonan EMC Lab.  
Semi Anechoic Chamber 1  
Date March 14, 2019  
Temperature / Humidity 23 deg. C / 35 % RH  
Engineer Kazuya Noda  
Mode Tx 11b 2462 MHz



\* The measurement was conducted for a sufficiently long enough time to detect any possible spurious emissions.  
Final result of restricted band edge was shown in tabular data.

## Radiated Spurious Emission

Report No. 12751051S-J-R1  
Test place Shonan EMC Lab.  
Semi Anechoic Chamber 2 1 2 2  
Date April 7, 2019 March 15, 2019 March 29, 2019 March 31, 2019  
Temperature / Humidity 21 deg. C / 35 % RH 25 deg. C / 31 % RH 24 deg. C / 31 % RH 22 deg. C / 41 % RH  
Engineer Kazuya Noda Kazuya Noda Kazutaka Takeyama Kazuya Noda  
(9 kHz – 30 MHz) (30 MHz – 1 GHz) (1 GHz – 13 GHz) (13 GHz – 26.5 GHz)  
Mode Tx 11g 2412 MHz

(\* PK: Peak, AV: Average, QP: Quasi-Peak)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	32.469	QP	23.81	17.67	7.07	31.84	0.00	16.71	40.00	23.2	300	46	
Hori.	199.999	QP	22.42	16.76	9.06	31.78	0.00	16.46	43.50	27.0	300	170	
Hori.	823.030	QP	22.65	21.01	9.34	31.69	0.00	21.31	46.00	24.6	100	114	
Hori.	934.178	QP	22.35	22.05	9.77	31.06	0.00	23.11	46.00	22.8	100	308	
Hori.	2390.000	PK	53.29	27.91	14.10	39.46	2.48	58.32	73.90	15.5	158	57	
Hori.	4824.000	PK	47.03	31.29	6.52	39.50	2.48	47.82	73.90	26.0	123	251	
Hori.	7236.000	PK	44.96	36.80	8.06	39.31	2.48	52.99	73.90	20.9	150	0	
Hori.	9648.000	PK	45.74	38.29	9.30	39.49	2.48	56.32	73.90	17.5	150	0	
Hori.	2390.000	AV	43.10	27.91	14.10	39.46	2.48	48.13	53.90	5.7	158	57	
Hori.	4824.000	AV	37.97	31.29	6.52	39.50	2.48	38.76	53.90	15.1	123	251	
Hori.	7236.000	AV	35.82	36.80	8.06	39.31	2.48	43.85	53.90	10.0	150	0	
Hori.	9648.000	AV	36.72	38.29	9.30	39.49	2.48	47.30	53.90	6.6	150	0	
Vert.	31.299	QP	23.73	18.08	7.04	31.84	0.00	17.01	40.00	22.9	100	52	
Vert.	200.000	QP	22.51	16.76	9.06	31.78	0.00	16.55	43.50	26.9	100	149	
Vert.	836.188	QP	22.50	21.20	9.41	31.64	0.00	21.47	46.00	24.5	100	23	
Vert.	928.941	QP	22.35	22.10	9.75	31.10	0.00	23.10	46.00	22.9	100	171	
Vert.	2390.000	PK	54.54	27.91	14.10	39.46	2.48	59.57	73.90	14.3	163	89	
Vert.	4824.000	PK	46.34	31.29	6.52	39.50	2.48	47.13	73.90	26.7	165	310	
Vert.	7236.000	PK	45.03	36.80	8.06	39.31	2.48	53.06	73.90	20.8	150	0	
Vert.	9648.000	PK	45.12	38.29	9.30	39.49	2.48	55.70	73.90	18.2	150	0	
Vert.	2390.000	AV	43.90	27.91	14.10	39.46	2.48	48.93	53.90	4.9	163	89	
Vert.	4824.000	AV	37.72	31.29	6.52	39.50	2.48	38.51	53.90	15.3	165	310	
Vert.	7236.000	AV	35.60	36.80	8.06	39.31	2.48	43.63	53.90	10.2	150	0	
Vert.	9648.000	AV	36.42	38.29	9.30	39.49	2.48	47.00	53.90	6.9	150	0	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 13 GHz :  $20\log(3.99\text{ m} / 3.0\text{ m}) = 2.48\text{ dB}$

13 GHz - 40 GHz :  $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

### 20 dBc Data Sheet (RBW 100 kHz, VBW 300 kHz)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2412.000	PK	87.17	27.88	14.12	39.46	2.48	92.19	-	-	Carrier
Hori.	2397.621	PK	50.57	27.91	14.11	39.46	2.48	55.61	72.19	16.5	
Hori.	2400.000	PK	46.75	27.91	14.11	39.46	2.48	51.79	72.19	20.4	
Vert.	2412.000	PK	87.78	27.88	14.12	39.46	2.48	92.80	-	-	Carrier
Vert.	2400.000	PK	48.48	27.91	14.11	39.46	2.48	53.52	72.80	19.2	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 13 GHz :  $20\log(3.99\text{ m} / 3.0\text{ m}) = 2.48\text{ dB}$

13 GHz - 40 GHz :  $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

No noise was detected below 30 MHz.

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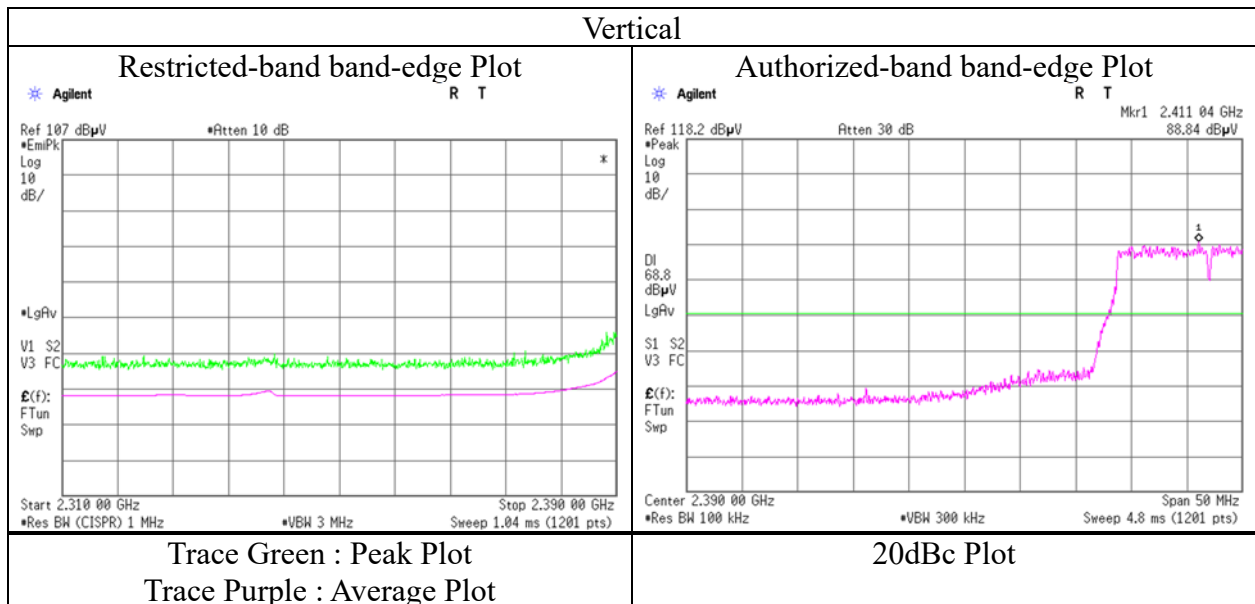
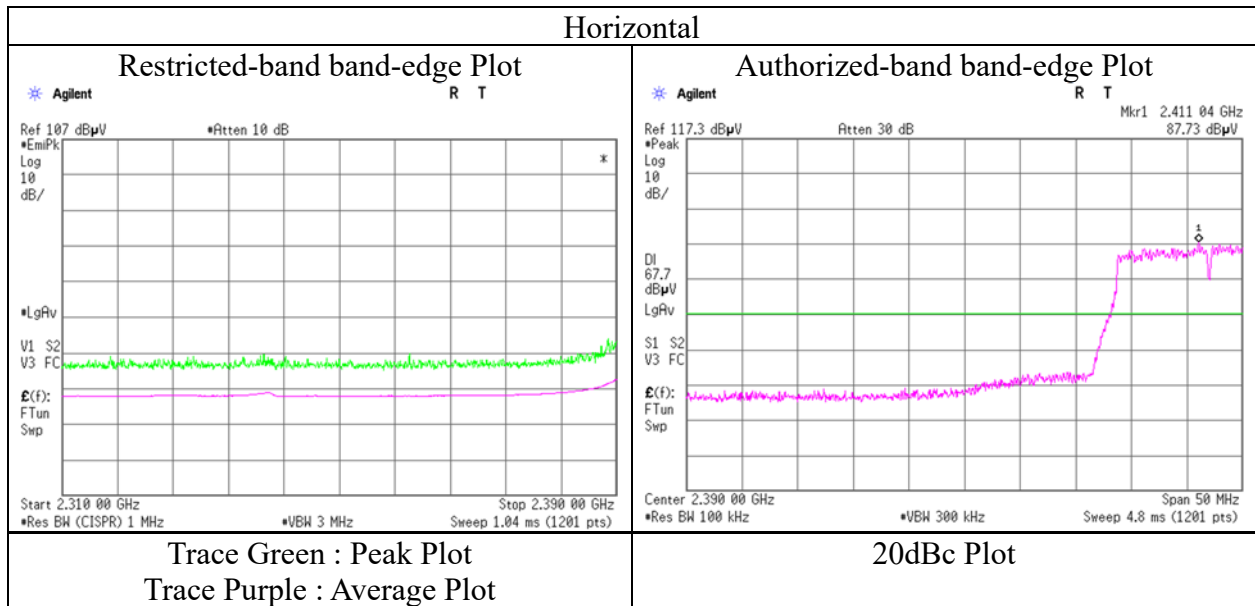
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**Radiated Spurious Emission**  
**(Reference Plot for band-edge)**

Report No. 12751051S-J-R1  
Test place Shonan EMC Lab.  
Semi Anechoic Chamber 2  
Date March 29, 2019  
Temperature / Humidity 24 deg. C / 31 % RH  
Engineer Kazutaka Takeyama  
Mode Tx 11g 2412 MHz



\* The measurement was conducted for a sufficiently long enough time to detect any possible spurious emissions.  
Final result of restricted band edge was shown in tabular data.

## Radiated Spurious Emission

Report No.	12751051S-J-R1	
Test place	Shonan EMC Lab.	
Semi Anechoic Chamber	2	2
Date	March 29, 2019	March 31, 2019
Temperature / Humidity	24 deg. C / 31 % RH	22 deg. C / 41 % RH
Engineer	Kazutaka Takeyama	Kazuya Noda
	(1 GHz – 13 GHz)	(13 GHz – 26.5 GHz)
Mode	Tx 11g 2437 MHz	

(\* PK: Peak, AV: Average, QP: Quasi-Peak)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	4874.000	PK	46.61	31.17	6.58	39.50	2.48	47.34	73.90	26.5	189	120	
Hori.	7311.000	PK	44.77	36.82	8.15	39.35	2.48	52.87	73.90	21.0	150	0	
Hori.	9748.000	PK	44.65	38.55	9.32	39.42	2.48	55.58	73.90	18.3	150	0	
Hori.	4874.000	AV	37.57	31.17	6.58	39.50	2.48	38.30	53.90	15.6	189	120	
Hori.	7311.000	AV	35.77	36.82	8.15	39.35	2.48	43.87	53.90	10.0	150	0	
Hori.	9748.000	AV	35.78	38.55	9.32	39.42	2.48	46.71	53.90	7.1	150	0	
Vert.	4874.000	PK	46.77	31.17	6.58	39.50	2.48	47.50	73.90	26.4	160	302	
Vert.	7311.000	PK	44.82	36.82	8.15	39.35	2.48	52.92	73.90	20.9	150	0	
Vert.	9748.000	PK	44.58	38.55	9.32	39.42	2.48	55.51	73.90	18.3	150	0	
Vert.	4874.000	AV	38.06	31.17	6.58	39.50	2.48	38.79	53.90	15.1	160	302	
Vert.	7311.000	AV	35.81	36.82	8.15	39.35	2.48	43.91	53.90	9.9	150	0	
Vert.	9748.000	AV	35.68	38.55	9.32	39.42	2.48	46.61	53.90	7.2	150	0	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 13 GHz : 20log(3.99 m / 3.0 m) = 2.48 dB

13 GHz - 40 GHz : 20log(1.0 m / 3.0 m) = -9.54 dB

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**Shonan EMC Lab.**

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## Radiated Spurious Emission

Report No.	12751051S-J-R1	
Test place	Shonan EMC Lab.	
Semi Anechoic Chamber	2	2
Date	March 29, 2019	March 31, 2019
Temperature / Humidity	24 deg. C / 31 % RH	22 deg. C / 41 % RH
Engineer	Kazutaka Takeyama	Kazuya Noda
	(1 GHz – 13 GHz)	(13 GHz – 26.5 GHz)
Mode	Tx 11g 2462 MHz	

(\* PK: Peak, AV: Average, QP: Quasi-Peak)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	2483.500	PK	52.68	27.67	14.18	39.46	2.48	57.55	73.90	16.3	156	46	
Hori.	4924.000	PK	46.74	31.16	6.63	39.50	2.48	47.51	73.90	26.3	158	20	
Hori.	7386.000	PK	45.30	36.88	8.22	39.39	2.48	53.49	73.90	20.4	150	0	
Hori.	9848.000	PK	44.90	38.78	9.34	39.35	2.48	56.15	73.90	17.7	150	0	
Hori.	2483.500	AV	42.34	27.67	14.18	39.46	2.48	47.21	53.90	6.6	156	46	
Hori.	4924.000	AV	36.87	31.16	6.63	39.50	2.48	37.64	53.90	16.2	158	20	
Hori.	7386.000	AV	36.00	36.88	8.22	39.39	2.48	44.19	53.90	9.7	150	0	
Hori.	9848.000	AV	35.41	38.78	9.34	39.35	2.48	46.66	53.90	7.2	150	0	
Vert.	2483.500	PK	52.55	27.67	14.18	39.46	2.48	57.42	73.90	16.4	157	70	
Vert.	4924.000	PK	46.48	31.16	6.63	39.50	2.48	47.25	73.90	26.6	141	318	
Vert.	7386.000	PK	46.14	36.88	8.22	39.39	2.48	54.33	73.90	19.5	150	0	
Vert.	9848.000	PK	43.52	38.78	9.34	39.35	2.48	54.77	73.90	19.1	150	0	
Vert.	2483.500	AV	42.55	27.67	14.18	39.46	2.48	47.42	53.90	6.4	157	70	
Vert.	4924.000	AV	37.07	31.16	6.63	39.50	2.48	37.84	53.90	16.0	141	318	
Vert.	7386.000	AV	35.91	36.88	8.22	39.39	2.48	44.10	53.90	9.8	150	0	
Vert.	9848.000	AV	35.16	38.78	9.34	39.35	2.48	46.41	53.90	7.4	150	0	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 13 GHz :  $20\log(3.99\text{ m} / 3.0\text{ m}) = 2.48\text{ dB}$

13 GHz - 40 GHz :  $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

**UL Japan, Inc.**

**Shonan EMC Lab.**

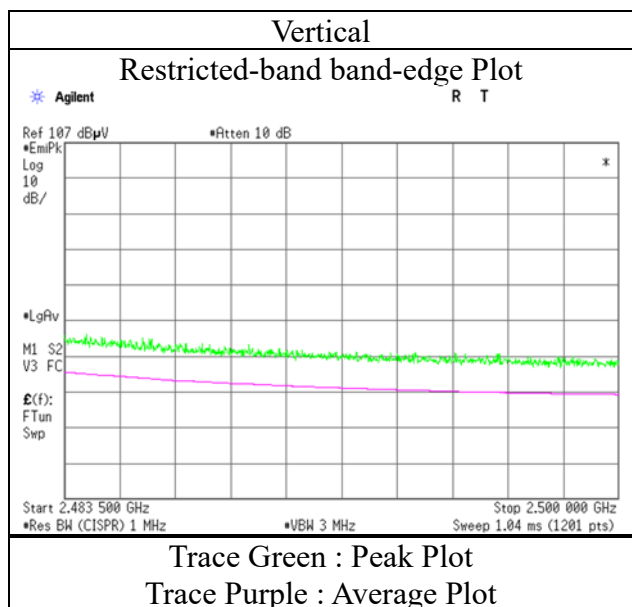
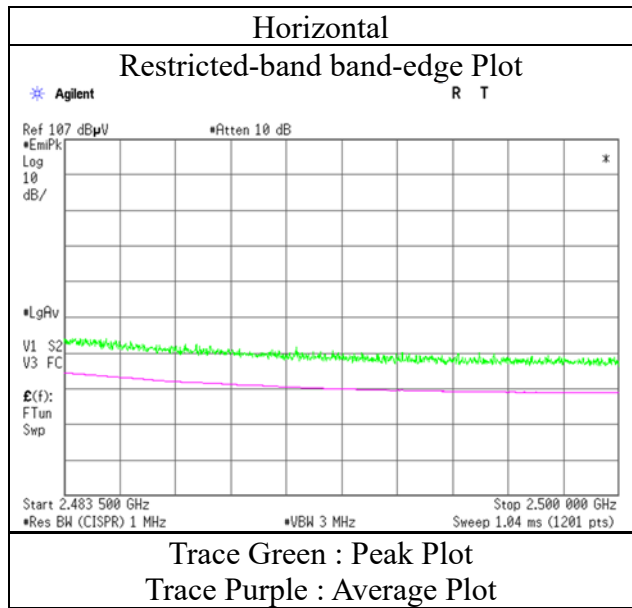
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**Radiated Spurious Emission**  
**(Reference Plot for band-edge)**

Report No. 12751051S-J-R1  
Test place Shonan EMC Lab.  
Semi Anechoic Chamber 2  
Date March 29, 2019  
Temperature / Humidity 24 deg. C / 31 % RH  
Engineer Kazutaka Takeyama  
Mode Tx 11g 2462 MHz



\* The measurement was conducted for a sufficiently long enough time to detect any possible spurious emissions.  
Final result of restricted band edge was shown in tabular data.

## Radiated Spurious Emission

Report No. 12751051S-J-R1  
Test place Shonan EMC Lab.  
Semi Anechoic Chamber 1  
Date March 14, 2019  
Temperature / Humidity 23 deg. C / 35 % RH  
Engineer Kazuya Noda  
Mode Tx 11n-20 2412 MHz

(\* PK: Peak, AV: Average, QP: Quasi-Peak)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	2390.000	PK	56.52	27.89	14.06	39.46	2.48	61.49	73.90	12.4	255	75	
Hori.	2390.000	AV	44.28	27.89	14.06	39.46	2.48	49.25	53.90	4.6	255	75	
Vert.	2390.000	PK	59.93	27.89	14.06	39.46	2.48	64.90	73.90	9.0	139	86	
Vert.	2390.000	AV	44.54	27.89	14.06	39.46	2.48	49.51	53.90	4.3	139	86	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 13 GHz :  $20\log(3.99 \text{ m} / 3.0 \text{ m}) = 2.48 \text{ dB}$

13 GHz - 40 GHz :  $20\log(1.0 \text{ m} / 3.0 \text{ m}) = -9.54 \text{ dB}$

### 20 dBc Data Sheet (RBW 100 kHz, VBW 300 kHz)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2412.000	PK	84.58	27.86	14.08	39.46	2.48	89.54	-	-	Carrier
Hori.	2400.000	PK	48.84	27.89	14.07	39.46	2.48	53.82	69.54	15.7	
Vert.	2412.000	PK	85.86	27.86	14.08	39.46	2.48	90.82	-	-	Carrier
Vert.	2400.000	PK	51.52	27.89	14.07	39.46	2.48	56.50	70.82	14.3	

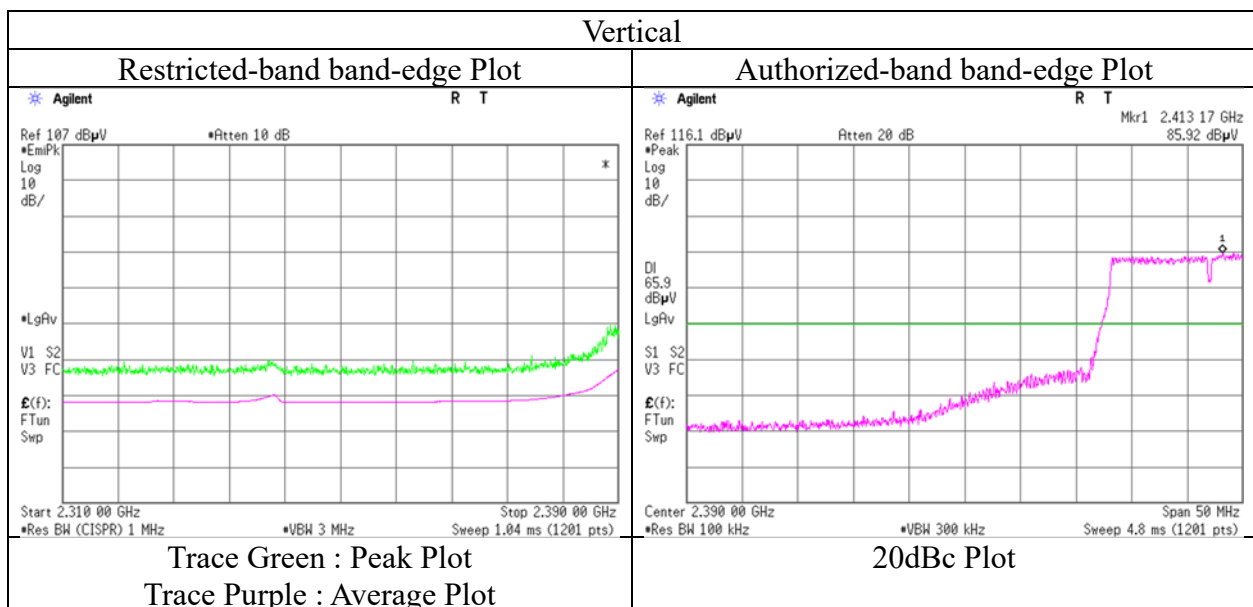
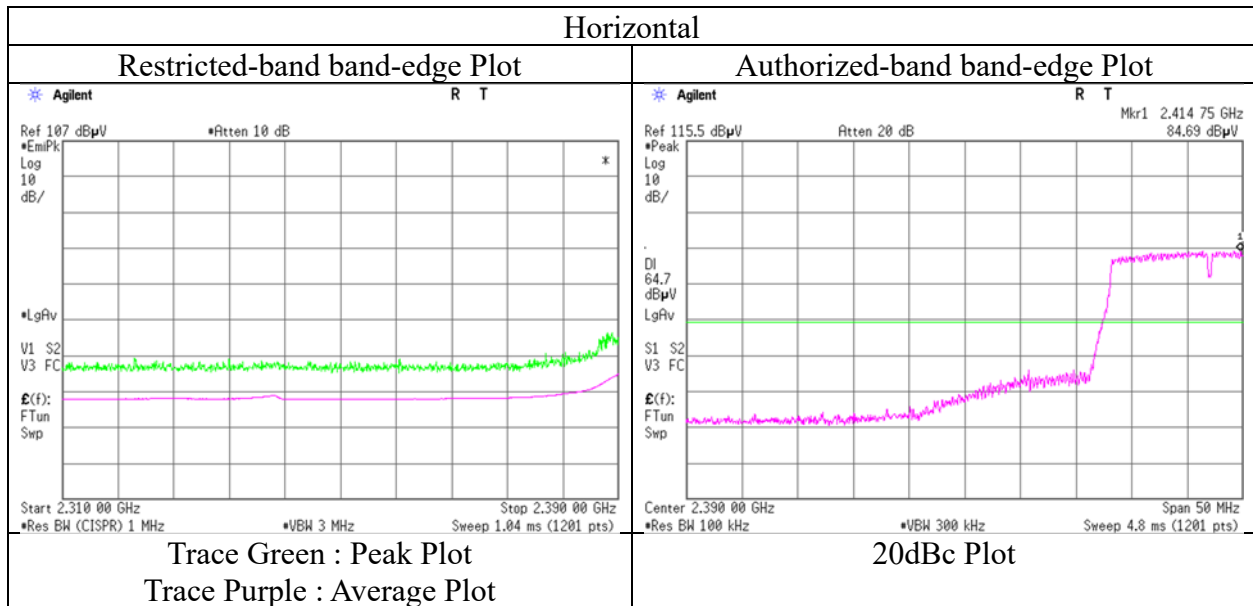
Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 13 GHz :  $20\log(3.99 \text{ m} / 3.0 \text{ m}) = 2.48 \text{ dB}$

13 GHz - 40 GHz :  $20\log(1.0 \text{ m} / 3.0 \text{ m}) = -9.54 \text{ dB}$

## Radiated Spurious Emission (Reference Plot for band-edge)

Report No. 12751051S-J-R1  
Test place Shonan EMC Lab.  
Semi Anechoic Chamber 1  
Date March 14, 2019  
Temperature / Humidity 23 deg. C / 35 % RH  
Engineer Kazuya Noda  
Mode Tx 11n-20 2412 MHz



\* The measurement was conducted for a sufficiently long enough time to detect any possible spurious emissions.  
Final result of restricted band edge was shown in tabular data.

## Radiated Spurious Emission

Report No. 12751051S-J-R1  
Test place Shonan EMC Lab.  
Semi Anechoic Chamber 1  
Date March 14, 2019  
Temperature / Humidity 23 deg. C / 35 % RH  
Engineer Kazuya Noda  
Mode Tx 11n-20 2462 MHz

(\* PK: Peak, AV: Average, QP: Quasi-Peak)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	2483.500	PK	57.33	27.64	14.12	39.46	2.48	62.11	73.90	11.7	240	261	
Hori.	2483.500	AV	44.99	27.64	14.12	39.46	2.48	49.77	53.90	4.1	240	261	
Vert.	2483.500	PK	58.53	27.64	14.12	39.46	2.48	63.31	73.90	10.5	114	111	
Vert.	2483.500	AV	44.25	27.64	14.12	39.46	2.48	49.03	53.90	4.8	114	111	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 13 GHz :  $20\log(3.99\text{ m} / 3.0\text{ m}) = 2.48\text{ dB}$

13 GHz - 40 GHz :  $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

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**Shonan EMC Lab.**

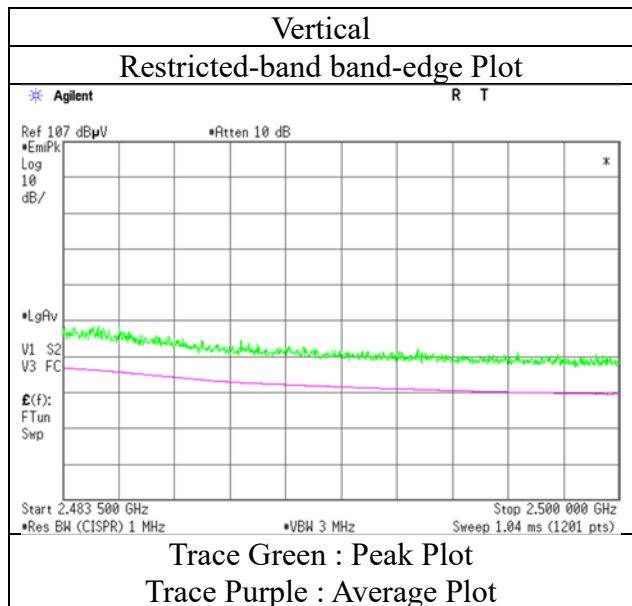
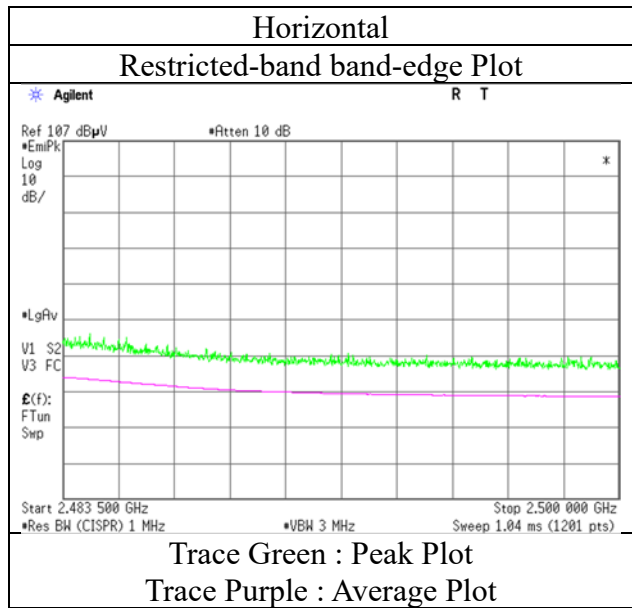
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**Radiated Spurious Emission**  
**(Reference Plot for band-edge)**

Report No. 12751051S-J-R1  
Test place Shonan EMC Lab.  
Semi Anechoic Chamber 1  
Date March 14, 2019  
Temperature / Humidity 23 deg. C / 35 % RH  
Engineer Kazuya Noda  
Mode Tx 11n-20 2462 MHz



\* The measurement was conducted for a sufficiently long enough time to detect any possible spurious emissions.  
Final result of restricted band edge was shown in tabular data.



## Radiated Spurious Emission

Report No.	12751051S-J-R1		
Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	1	2	2
Date	March 14, 2019	March 29, 2019	March 31, 2019
Temperature / Humidity	23 deg. C / 35 % RH	24 deg. C / 31 % RH	22 deg. C / 41 % RH
Engineer	Kazuya Noda	Kazutaka Takeyama	Kazuya Noda
	(1 GHz – 2.8 GHz)	(2.8 GHz – 13 GHz)	(13 GHz – 26.5 GHz)
Mode	Tx 11n-40 2422 MHz		

(\* PK: Peak, AV: Average, QP: Quasi-Peak)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	2390.000	PK	52.30	27.89	14.06	39.46	2.48	57.27	73.90	16.6	249	267	
Hori.	4844.000	PK	45.76	31.27	6.55	39.50	2.48	46.56	73.90	27.3	152	119	
Hori.	7266.000	PK	45.07	36.81	8.11	39.32	2.48	53.15	73.90	20.7	150	0	
Hori.	9688.000	PK	46.45	38.35	9.32	39.46	2.48	57.14	73.90	16.7	150	0	
Hori.	2390.000	AV	42.51	27.89	14.06	39.46	2.48	47.48	53.90	6.4	249	267	
Hori.	4844.000	AV	36.46	31.27	6.55	39.50	2.48	37.26	53.90	16.6	152	119	
Hori.	7266.000	AV	35.95	36.81	8.11	39.32	2.48	44.03	53.90	9.8	150	0	
Hori.	9688.000	AV	36.06	38.35	9.32	39.46	2.48	46.75	53.90	7.1	150	0	
Vert.	2390.000	PK	53.10	27.89	14.06	39.46	2.48	58.07	73.90	15.8	142	87	
Vert.	4844.000	PK	44.93	31.27	6.55	39.50	2.48	45.73	73.90	28.1	142	250	
Vert.	7266.000	PK	45.02	36.81	8.11	39.32	2.48	53.10	73.90	20.8	150	0	
Vert.	9688.000	PK	45.31	38.35	9.32	39.46	2.48	56.00	73.90	17.9	150	0	
Vert.	2390.000	AV	42.63	27.89	14.06	39.46	2.48	47.60	53.90	6.3	142	87	
Vert.	4844.000	AV	36.67	31.27	6.55	39.50	2.48	37.47	53.90	16.4	142	250	
Vert.	7266.000	AV	36.02	36.81	8.11	39.32	2.48	44.10	53.90	9.8	150	0	
Vert.	9688.000	AV	35.70	38.35	9.32	39.46	2.48	46.39	53.90	7.5	150	0	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 13 GHz :  $20\log(3.99\text{ m} / 3.0\text{ m}) = 2.48\text{ dB}$

13 GHz - 40 GHz :  $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

### 20 dBc Data Sheet (RBW 100 kHz, VBW 300 kHz)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2422.000	PK	80.14	27.83	14.08	39.46	2.48	85.07	-	-	Carrier
Hori.	2400.000	PK	43.88	27.89	14.07	39.46	2.48	48.86	65.07	16.2	
Vert.	2422.000	PK	80.32	27.83	14.08	39.46	2.48	85.25	-	-	Carrier
Vert.	2400.000	PK	44.15	27.89	14.07	39.46	2.48	49.13	65.25	16.1	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 13 GHz :  $20\log(3.99\text{ m} / 3.0\text{ m}) = 2.48\text{ dB}$

13 GHz - 40 GHz :  $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

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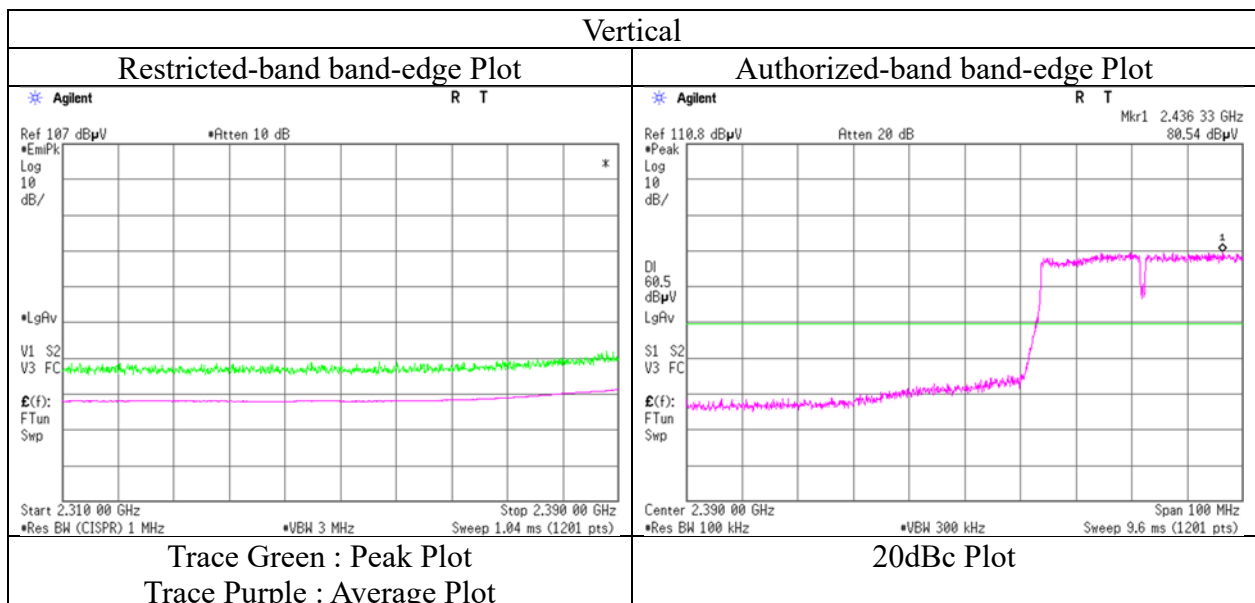
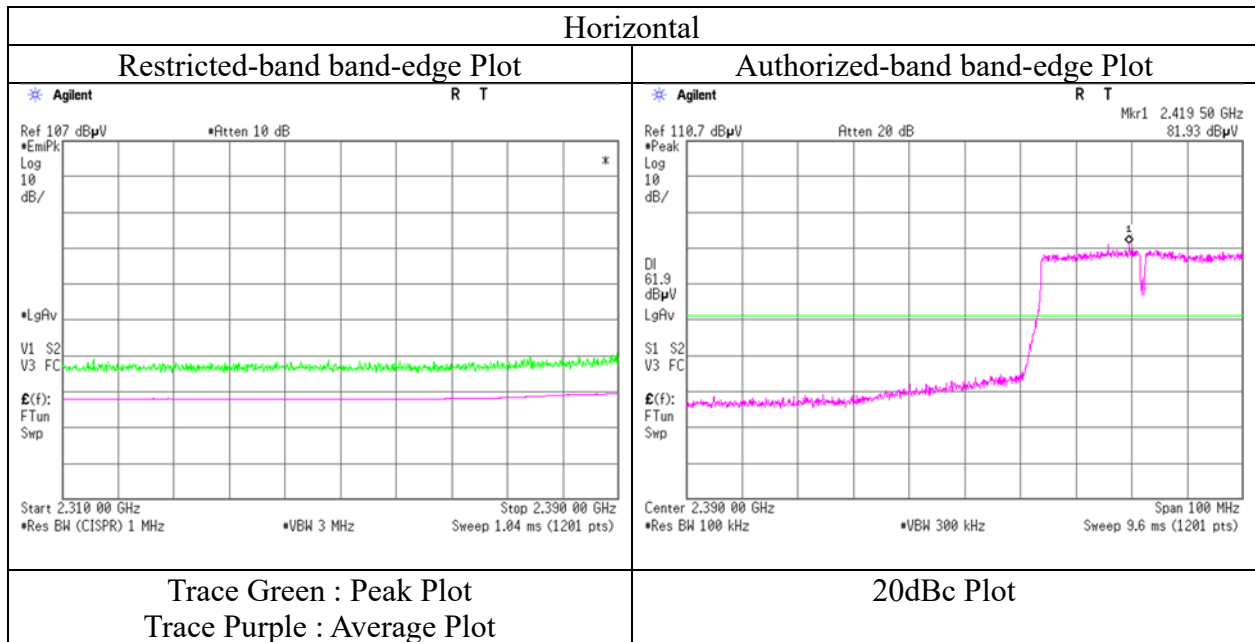
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**Radiated Spurious Emission**  
**(Reference Plot for band-edge)**

Report No. 12751051S-J-R1  
Test place Shonan EMC Lab.  
Semi Anechoic Chamber 1  
Date March 14, 2019  
Temperature / Humidity 23 deg. C / 35 % RH  
Engineer Kazuya Noda  
Mode Tx 11n-40 2422 MHz



\* The measurement was conducted for a sufficiently long enough time to detect any possible spurious emissions.  
Final result of restricted band edge was shown in tabular data.

## Radiated Spurious Emission

Report No.	12751051S-J-R1	
Test place	Shonan EMC Lab.	
Semi Anechoic Chamber	2	2
Date	March 29, 2019	March 31, 2019
Temperature / Humidity	24 deg. C / 31 % RH	22 deg. C / 41 % RH
Engineer	Kazutaka Takeyama	Kazuya Noda
	(1 GHz – 13 GHz)	(13 GHz – 26.5 GHz)
Mode	Tx 11n-40 2437 MHz	

(\* PK: Peak, AV: Average, QP: Quasi-Peak)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	4874.000	PK	45.75	31.17	6.58	39.50	2.48	46.48	73.90	27.4	188	334	
Hori.	7311.000	PK	44.59	36.82	8.15	39.35	2.48	52.69	73.90	21.2	150	0	
Hori.	9748.000	PK	46.07	38.55	9.32	39.42	2.48	57.00	73.90	16.9	150	0	
Hori.	4874.000	AV	36.57	31.17	6.58	39.50	2.48	37.30	53.90	16.6	188	334	
Hori.	7311.000	AV	35.79	36.82	8.15	39.35	2.48	43.89	53.90	10.0	150	0	
Hori.	9748.000	AV	35.67	38.55	9.32	39.42	2.48	46.60	53.90	7.3	150	0	
Vert.	4874.000	PK	45.66	31.17	6.58	39.50	2.48	46.39	73.90	27.5	115	112	
Vert.	7311.000	PK	45.49	36.82	8.15	39.35	2.48	53.59	73.90	20.3	150	0	
Vert.	9748.000	PK	45.35	38.55	9.32	39.42	2.48	56.28	73.90	17.6	150	0	
Vert.	4874.000	AV	36.81	31.17	6.58	39.50	2.48	37.54	53.90	16.3	115	112	
Vert.	7311.000	AV	36.01	36.82	8.15	39.35	2.48	44.11	53.90	9.8	150	0	
Vert.	9748.000	AV	35.40	38.55	9.32	39.42	2.48	46.33	53.90	7.5	150	0	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 13 GHz : 20log(3.99 m / 3.0 m) = 2.48 dB

13 GHz - 40 GHz : 20log(1.0 m / 3.0 m) = -9.54 dB

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**Shonan EMC Lab.**

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## Radiated Spurious Emission

Report No.	12751051S-J-R1		
Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	1	2	2
Date	March 14, 2019	March 29, 2019	March 31, 2019
Temperature / Humidity	23 deg. C / 35 % RH	24 deg. C / 31 % RH	22 deg. C / 41 % RH
Engineer	Kazuya Noda	Kazutaka Takeyama	Kazuya Noda
	(1 GHz – 2.8 GHz)	(2.8 GHz – 13 GHz)	(13 GHz – 26.5 GHz)
Mode	Tx 11n-40 2452 MHz		

(\* PK: Peak, AV: Average, QP: Quasi-Peak)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	2483.500	PK	52.47	27.64	14.12	39.46	2.48	57.25	73.90	16.6	244	80	
Hori.	4904.000	PK	45.82	31.09	6.60	39.50	2.48	46.49	73.90	27.4	147	350	
Hori.	7356.000	PK	44.80	36.89	8.19	39.37	2.48	52.99	73.90	20.9	150	0	
Hori.	9808.000	PK	44.91	38.68	9.33	39.38	2.48	56.02	73.90	17.8	150	0	
Hori.	2483.500	AV	42.13	27.64	14.12	39.46	2.48	46.91	53.90	6.9	244	80	
Hori.	4904.000	AV	37.04	31.09	6.60	39.50	2.48	37.71	53.90	16.2	147	350	
Hori.	7356.000	AV	35.70	36.89	8.19	39.37	2.48	43.89	53.90	10.0	150	0	
Hori.	9808.000	AV	35.75	38.68	9.33	39.38	2.48	46.86	53.90	7.0	150	0	
Vert.	2483.500	PK	52.25	27.64	14.12	39.46	2.48	57.03	73.90	16.8	138	87	
Vert.	4904.000	PK	46.46	31.09	6.60	39.50	2.48	47.13	73.90	26.7	104	111	
Vert.	7356.000	PK	45.74	36.89	8.19	39.37	2.48	53.93	73.90	19.9	150	0	
Vert.	9808.000	PK	45.07	38.68	9.33	39.38	2.48	56.18	73.90	17.7	150	0	
Vert.	2483.500	AV	43.20	27.64	14.12	39.46	2.48	47.98	53.90	5.9	138	87	
Vert.	4904.000	AV	37.06	31.09	6.60	39.50	2.48	37.73	53.90	16.1	104	111	
Vert.	7356.000	AV	35.69	36.89	8.19	39.37	2.48	43.88	53.90	10.0	150	0	
Vert.	9808.000	AV	35.55	38.68	9.33	39.38	2.48	46.66	53.90	7.2	150	0	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 13 GHz :  $20\log(3.99\text{ m} / 3.0\text{ m}) = 2.48\text{ dB}$

13 GHz - 40 GHz :  $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

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**Shonan EMC Lab.**

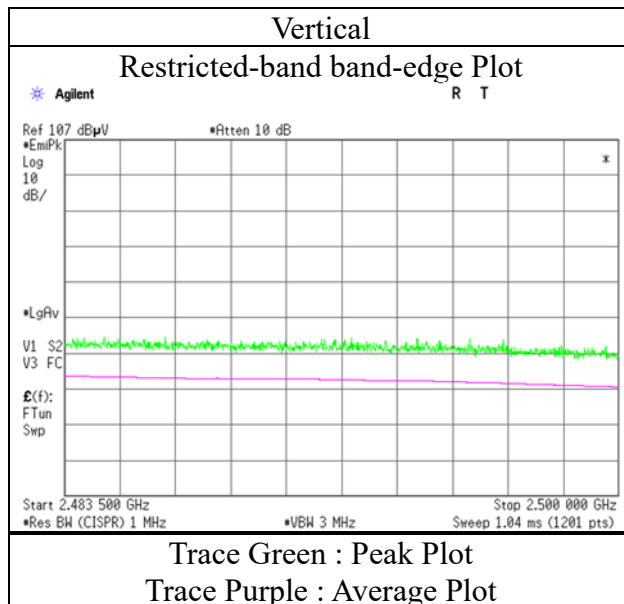
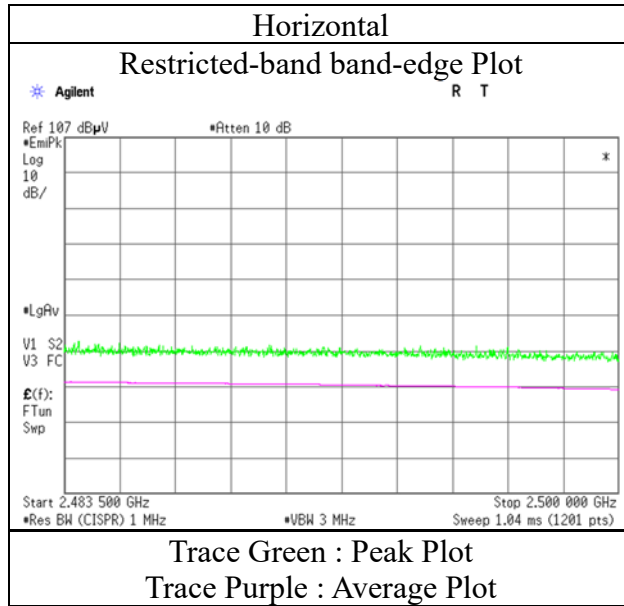
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**Radiated Spurious Emission**  
**(Reference Plot for band-edge)**

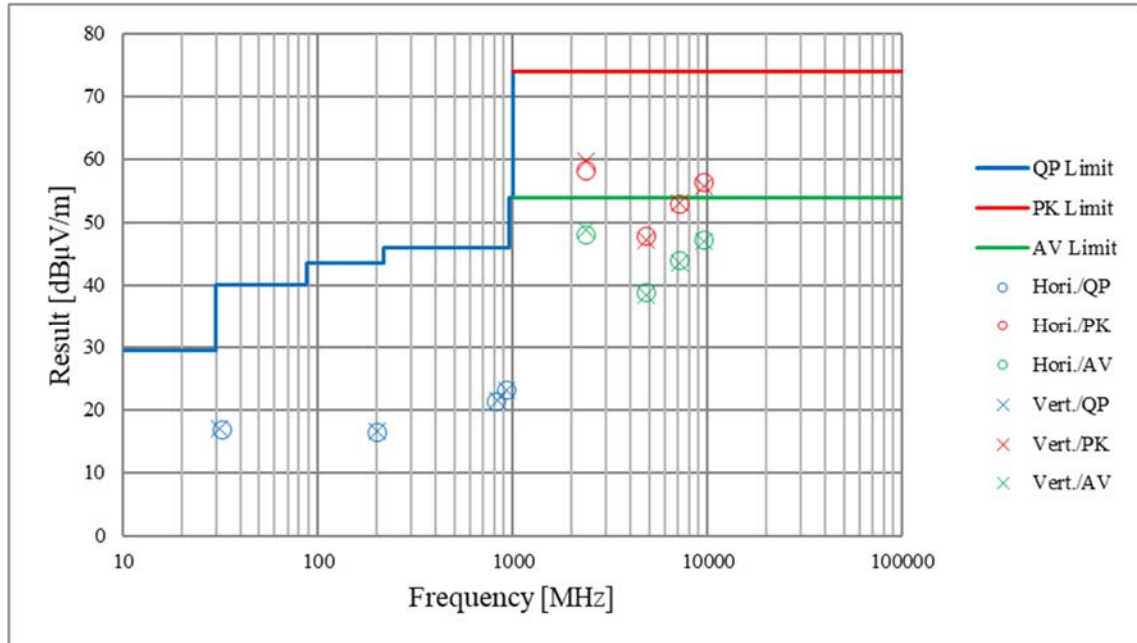
Report No. 12751051S-J-R1  
Test place Shonan EMC Lab.  
Semi Anechoic Chamber 1  
Date March 14, 2019  
Temperature / Humidity 23 deg. C / 35 % RH  
Engineer Kazuya Noda  
Mode Tx 11n-40 2452 MHz



\* The measurement was conducted for a sufficiently long enough time to detect any possible spurious emissions.  
Final result of restricted band edge was shown in tabular data.

**Radiated Spurious Emission**  
**(Plot data, Worst case)**

Report No.	12751051S-J-R1			
Test place	Shonan EMC Lab.			
Semi Anechoic Chamber	2	1	2	2
Date	April 7, 2019	March 15, 2019	March 29, 2019	March 31, 2019
Temperature / Humidity	21 deg. C / 35 % RH	25 deg. C / 31 % RH	24 deg. C / 31 % RH	22 deg. C / 41 % RH
Engineer	Kazuya Noda	Kazuya Noda	Kazutaka Takeyama	Kazuya Noda
	(9 kHz – 30 MHz)	(30 MHz – 1 GHz)	(1 GHz – 13 GHz)	(13 GHz – 26.5 GHz)
Mode	Tx 11g 2412 MHz			



\*These plots data contains sufficient number to show the trend of characteristic features for EUT.

## APPENDIX 2: Test instruments

Local ID	Test Name	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Calibration Due Date	Calibration Interval (Month)
COTS-SEMI-5	RE	170932	EMI Software	TSJ	TEPTO-DV3(RE,CE,ME,PE)	-	-	-	-
KAF-02	RE	144878	Pre Amplifier	HEWLETT PACKARD	8449B	3008A01268	2018/4/4	2019/4/30	12
KAT6-04	RE	144899	Attenuator	Inmet	18N-6dB	-	2018/12/25	2019/12/31	12
KJM-09	RE	145929	Measure	KOMELON	KMC-36	-	-	-	-
SAEC-01(NSA)	RE	145597	Semi-Anechoic Chamber	TDK	SAEC-01(NSA)	1	2018/5/29	2019/5/31	12
SAEC-02(NSA)	RE	145563	Semi-Anechoic Chamber	TDK	SAEC-02(NSA)	2	2018/5/31	2019/5/31	12
SAEC-02(SVSWR)	RE	145598	Semi-Anechoic Chamber	TDK	SAEC-02(SVSWR)	2	2018/7/15	2019/7/31	12
SAF-01	RE	145003	Pre Amplifier	SONOMA	310N	290211	2019/2/5	2020/2/29	12
SAF-02	RE	145004	Pre Amplifier	SONOMA	310N	290212	2019/2/5	2020/2/29	12
SAF-04	RE	145127	Pre Amplifier	Toyo Corporation	TPA0118-36	2072554	2018/6/26	2019/6/30	12
SAF-08	RE	145007	Pre Amplifier	Toyo Corporation	HAP18-26W	19	2019/3/5	2020/3/31	12
SAT10-05	RE	145136	Attenuator(above1GHz)	AGILENT	8493C-010	74864	2018/11/25	2019/11/30	12
SAT10-06	RE	145137	Attenuator	AGILENT	8493C-010	74865	2018/11/25	2019/11/30	12
SAT3-09	RE	144959	Attenuator	JFW	50HF-003N	-	2018/8/23	2019/8/31	12
SAT6-12	RE	145158	Attenuator	HIROSE ELECTRIC CO.,LTD.	AT-406(40)	-	2018/8/23	2019/8/31	12
SBA-01	RE	145161	Biconical Antenna	Schwarzbeck	BBA9106	91032664	2018/6/5	2019/6/30	12
SCC-A1/A3/A5/A7/A8/A13/SRSE-01	RE	144967	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhner/Suhner/Suhner/TOYO	8D2W/12DSFA/141PE/141PE/141PE/141P	-/0901-269(RF Selector)	2018/4/9	2019/4/30	12
SCC-A2/A4/A6/A7/A8/A13/SRSE-01	RE	144968	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhner/Suhner/Suhner/TOYO	8D2W/12DSFA/141PE/141PE/141PE/141P	-/0901-269(RF Selector)	2018/4/9	2019/4/30	12
SCC-B2/B4/B6/B7/B8/B13/SRSE-02	RE	144976	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhner/Suhner/Suhner/TOYO	8D2W/12DSFA/141PE/141PE/141PE/141P	-/0901-270(RF Selector)	2018/4/7	2019/4/30	12
SCC-G33	RE	145184	Coaxial Cable	Junkosha	MWX241-01000KMSKMS	-	2018/4/20	2019/4/30	12
SCC-G40	RE	166491	Coaxial Cable	Junkosha	MWX221-01000NFSNMS/B	1612S005	2019/1/25	2020/1/31	12
SCC-G41	RE	151617	Coaxial Cable	Junkosha	MWX221-01000NFSNMS/B	1612S006	2019/1/25	2020/1/31	12
SCC-G43	RE	156380	Coaxial Cable	HUBER+SUNER	SUCOFLEX_104 E	SN MY 13406/4E	2018/7/10	2019/7/31	12
SCC-G44	RE	168300	Coaxial Cable	HUBER+SUNER	SUCOFLEX_104	800070/4A	2019/3/26	2020/3/31	12
SCC-G45	RE	168301	Coaxial Cable	HUBER+SUNER	SUCOFLEX_102 E	800137/2EA	2019/3/26	2020/3/31	12
SCC-G50	RE	178573	Coaxial Cable	HUBER+SUNER	SUCOFLEX_104 E	MY13407/4E	2019/3/26	2020/3/31	12
SCC-G51	RE	178572	Coaxial Cable	HUBER+SUNER	SUCOFLEX_104	800288 /4A	2019/3/26	2020/3/31	12

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Local ID	Test Name	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Calibration Due Date	Calibration Interval (Month)
SLA-05	RE	145527	Logperiodic Antenna	Schwarzbeck	VUSLP9111B	193	2018/6/5	2019/6/30	12
SFL-18	RE	145305	Highpass Filter	MICRO-TRONICS	HPM50111	119	2018/4/20	2019/4/30	12
SHA-01	RE	145383	Horn Antenna	Schwarzbeck	BBHA9120D	9120D-725	2018/7/23	2019/7/31	12
SHA-02	RE	145384	Horn Antenna	Schwarzbeck	BBHA9120D	9120D-726	2018/7/23	2019/7/31	12
SHA-04	RE	145512	Horn Antenna	ETS LINDGREN	Sep-60	LM3640	2018/7/23	2019/7/31	12
SJM-09	RE	145336	Measure	PROMART	SEN1935	-	-	-	-
SLP-02	RE	145536	Loop Antenna	Rohde & Schwarz	HFH2-Z2	100218	2018/10/10	2019/10/31	12
SOS-01	RE	146316	Humidity Indicator	A&D	AD-5681	4062555	2018/10/25	2019/10/31	12
SOS-03	RE	146317	Humidity Indicator	A&D	AD-5681	4063325	2018/10/25	2019/10/31	12
SRENT-15	RE	160899	Spectrum Analyzer	AGILENT (KEYSIGHT)	E4440A	MY46185516	2019/1/21	2020/1/31	12
SSA-02	RE	145800	Spectrum Analyzer	AGILENT	E4448A	MY48250106	2018/3/5	2019/3/31 (*1)	12
STR-01	RE	145790	Test Receiver	Rohde & Schwarz	ESU40	100093	2018/4/13	2019/4/30	12
STR-07	RE	146209	Test Receiver	Rohde & Schwarz	ESU26	100484	2018/9/26	2019/9/30	12
STS-01	RE	145792	Digital Hitester	HIOKI	3805-50	80997812	2018/10/16	2019/10/31	12
STS-02	RE	145793	Digital Hitester	HIOKI	3805-50	80997819	2019/4/2	2020/4/30	12
STS-03	RE	146210	Digital Hitester	HIOKI	3805-50	80997823	2018/10/16	2019/10/31	12

\*1) This test equipment was used for the tests before the expiration date of the calibration.

\*Hyphens for Last Calibration Date, Calibration Due Date and Cal Int (month) are instruments that Calibration is not required (e.g. software), or instruments checked in advance before use.

The expiration date of the calibration is the end of the expired month.

All equipment is calibrated with valid calibrations. Each measurement data is traceable to the national or international standards.

As for some calibrations performed after the tested dates, those test equipment have been controlled by means of an unbroken chains of calibrations.

Test item: RE: Radiated Emission test

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**Shonan EMC Lab.**

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