




# RADIO TEST REPORT


Test Report No. : 11691426S-A-R1

**Applicant** : PIONEER CORPORATION  
**Type of Equipment** : MAIN UNIT  
**Model No.** : D172G  
**FCC ID** : AJDK102  
**Test regulation** : FCC Part 15 Subpart C: 2017  
**Test Result** : Complied

1. This test report shall not be reproduced in full or partial, without the written approval of UL Japan, Inc.
2. The results in this report apply only to the sample tested.
3. This sample tested is in compliance with the above regulation.
4. The test results in this report are traceable to the national or international standards.
5. The opinions and the interpretations to the result of the description in this report are outside scopes where UL Japan has been accredited.
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. This report is a revised version of 11691426S-A.

**Date of test:** June 1 to 8, 2017

**Representative test engineer:**   
Yosuke Ishikawa  
Engineer  
Consumer Technology Division

**Approved by:**   
Akio Hayashi  
Leader  
Consumer Technology Division



- 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 : PIONEER CORPORATION  
Address : 25-1, Yamada, Kawagoe-shi, Saitama-ken 350-8555, JAPAN  
Telephone Number : +81-49-228-7787  
Facsimile Number : +81-49-228-6493  
Contact Person : Tomoyuki Tanaka

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

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

Type of Equipment : MAIN UNIT  
Model No. : D172G  
Serial No. : Refer to Section 4, Clause 4.2  
Rating : DC 12.0 V  
Receipt Date of Sample : May 31, 2017  
Country of Mass-production : Mexico  
Condition of EUT : Production 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: D172G (referred to as the EUT in this report) is a MAIN UNIT.

Clock frequency(ies) in the system : Oscillator (Module) 0.032768 MHz  
Internal Communication (Module) 195 MHz

## **Radio Specification**

### **[Bluetooth]**

Radio Type : Transceiver  
Frequency of Operation : 2402 MHz - 2480 MHz  
Modulation : GFSK,  $\pi/4$ DQPSK, 8DPSK  
Power Supply (radio part input) : DC 3.3 V / 1.8 V  
Antenna type : Pattern inverted F type  
Antenna Gain : 2.94 dBi (max)  
Operating Temperature : -30 deg. C to +65 deg. C

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

### **3.1 Test Specification**

Test Specification : FCC Part 15 Subpart C  
FCC Part 15 final revised on June 14, 2017 and effective July 14, 2017

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

\* The revision on June 14, 2017, does not affect the test specification applied to the EUT.

### **3.2 Procedures and results**

Item	Test Procedure	Specification	Worst Margin	Results	Remarks
Conducted Emission	FCC: ANSI C63.10-2013 6. Standard test methods IC: RSS-Gen 8.8	FCC: Section 15.207 IC: RSS-Gen 8.8	N/A	N/A	N/A*1)
Carrier Frequency Separation	FCC: FCC Public Notice DA 00-705 IC: -	FCC: Section15.247(a)(1) IC: RSS-247 5.1 (b)	See data.	Complied	Conducted
20dB Bandwidth	FCC: FCC Public Notice DA 00-705 IC: -	FCC: Section15.247(a)(1) IC: RSS-247 5.1 (a)		Complied	Conducted
Number of Hopping Frequency	FCC: FCC Public Notice DA 00-705 IC: -	FCC: Section15.247(a)(1)(iii) IC: RSS-247 5.1 (d)		Complied	Conducted
Dwell time	FCC: FCC Public Notice DA 00-705 IC: -	FCC: Section15.247(a)(1)(iii) IC: RSS-247 5.1 (d)		Complied	Conducted
Maximum Peak Output Power	FCC: FCC Public Notice DA 00-705 IC: RSS-Gen 6.12	FCC: Section15.247(a)(b)(1) IC: RSS-247 5.4 (b)		Complied	Conducted
Spurious Emission & Band Edge Compliance	FCC: FCC Public Notice DA 00-705 IC: RSS-Gen 6.13	FCC: Section15.247(d) IC: RSS-247 5.5 RSS-Gen 8.9 RSS-Gen 8.10	10.9 dB 9920.000 MHz, AV, Vert. Tx, Hopping Off, 3DH5 2480 MHz	Complied	Conducted/ Radiated (above 30 MHz) *2)

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

\*1) The test is not applicable since the EUT does not have AC power ports.

\*2) Radiated test was selected over 30 MHz based on section 15.247(d).

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

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

This EUT provides stable voltage (DC 3.3 V / 1.8 V) constantly to the wireless transmitter regardless of input voltage. Instead of a new battery, DC power supply was used for the test. That does not affect the test result, Therefore this EUT complies with the requirement.

#### **FCC Part 15.203 Antenna requirement**

The EUT has a unique coupling/antenna connector (U.FL). Therefore, the equipment complies with the antenna requirement of Section 15.203.

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### 3.3 Addition to standard

Item	Test Procedure	Specification	Worst margin	Results	Remarks
99% Occupied Bandwidth	IC: RSS-Gen 6.6	IC: -	N/A	-	Conducted

Other than above, no addition, exclusion nor deviation has been made from the standard.

### 3.4 Uncertainty

#### EMI

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

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Item	Frequency range	Uncertainty (+/-)				
		No. 1 SAC / SR	No. 2 SAC / SR	No. 3 SAC / SR	No. 4 SAC / SR	No. 5,6,8 SR
Conducted emission (AC Mains) LISN	150 kHz-30 MHz	2.6 dB	2.5 dB	2.6 dB	2.5 dB	2.5 dB
Radiated emission (Measurement distance: 3 m)	9 kHz-30 MHz	3.1 dB	3.1 dB	3.1 dB	-	-
	30 MHz-200 MHz	4.6 dB	4.4 dB	4.6 dB	-	-
	200 MHz-1 GHz	5.8 dB	5.7 dB	5.8 dB	-	-
	1 GHz-13 GHz	4.9 dB	4.9 dB	4.9 dB	-	-
Radiated emission (Measurement distance: 1 m)	13 GHz-18 GHz	4.6 dB	4.6 dB	4.6 dB	-	-
	18 GHz-40 GHz	4.9 dB	4.9 dB	4.9 dB	-	-

SAC=Semi-Anechoic Chamber

SR= Shielded Room is applied besides radiated emission

Antenna terminal test	Uncertainty (+/-)
Power Measurement above 1 GHz (Average Detector)_SPM-06	0.72 dB
Power Measurement above 1 GHz (Peak Detector)_SPM-06	0.85 dB
Power Measurement above 1 GHz (Average Detector)_SPM-07	0.74 dB
Power Measurement above 1 GHz (Peak Detector)_SPM-07	0.91 dB
Spurious emission (Conducted) below 1GHz	1.6 dB
Spurious emission (Conducted) 1 GHz-3 GHz	1.3 dB
Spurious emission (Conducted) 3 GHz-18 GHz	2.2 dB
Spurious emission (Conducted) 18 GHz-26.5 GHz	2.3 dB
Spurious emission (Conducted) 26.5 GHz-40 GHz	2.4 dB
Bandwidth Measurement	1.01 %
Duty cycle and Time Measurement	0.012 %

#### Radiated emission test

The data listed in this test report has enough margin, more than the site margin.

### 3.5 Test Location

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JAB Accreditation No. RTL02610

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.

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

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

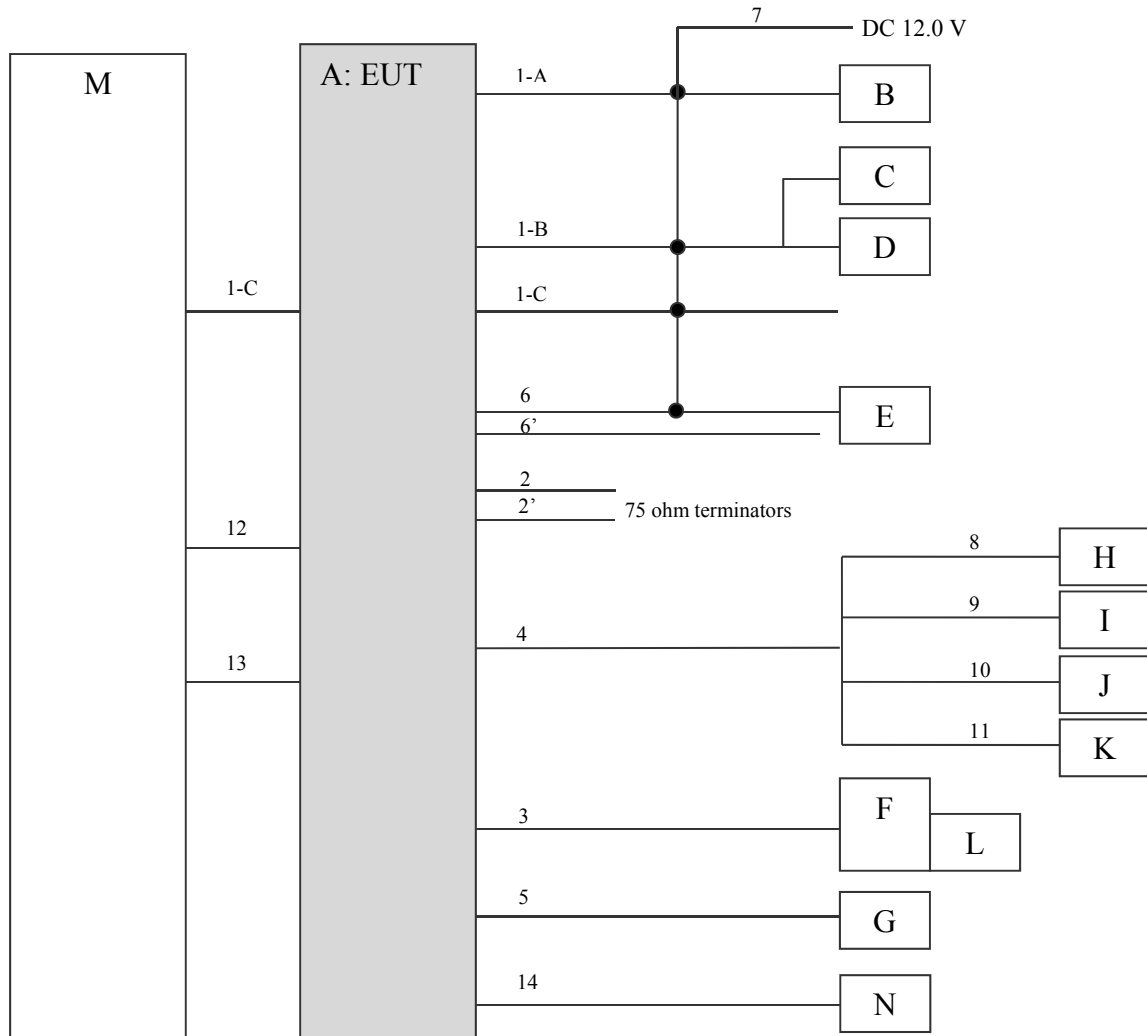
Bluetooth (BT): Transmitting (Tx), Payload: PRBS9

Details of Operating Mode(s)

<b>Test Item</b>	<b>Mode</b>	<b>Tested frequency</b>
Spurious Emission (Conducted/Radiated)	Tx (Hopping Off) DH5, 3DH5	2402 MHz 2441 MHz 2480 MHz
Carrier Frequency Separation	Tx (Hopping On) DH5, 3DH5	2402 MHz 2441 MHz 2480 MHz
20dB Bandwidth	Tx (Hopping Off) DH5, 3DH5	2402 MHz 2441 MHz 2480 MHz
Number of Hopping Frequency	Tx (Hopping On) DH5, 3DH5	-
Dwell time	Tx (Hopping On), -DH1, DH3, DH5 -3DH1, 3DH3, 3DH5	-
Maximum Peak Output Power	Tx (Hopping Off) DH5, 2DH5, 3DH5	2402 MHz 2441 MHz 2480 MHz
Band Edge Compliance (Conducted)	Tx DH5, 3DH5 -Hopping On -Hopping Off	2402 MHz 2480 MHz
99% Occupied Bandwidth	Tx DH5, 3DH5 -Hopping On -Hopping Off	2402 MHz 2441 MHz 2480 MHz
<p>*As a result of preliminary test, the formal test was performed with the above modes, which had the maximum payload length (except Dwell time test)</p> <p>*2DH mode (2Mb/s EDR: pi/4DQPSK) was excluded for other tests than power measurement by using 3DH mode (3 Mb/s EDR: 8DPSK) as a representative.</p> <p>*EUT has the power settings by the software as follows;  Power settings: Table Index (Fixed)  Software: BT: B080  *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.</p>		



## 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 and Support equipment**

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	MAIN UNIT	D172G	AABB999997US *1) AABB999996US *2)	PIONEER	EUT
B	Steering SW	75E921LH/RH	8P11533479-002A-7	-	-
C	Mic	-	-	-	-
D	Rear Camera	-	-	-	-
E	Air-con ECU	-	-	DENSO	-
F	USB	-	-	-	-
G	GPS Antenna	86860-71011	-	AISIN	-
H	Speaker	TS-F1030	V44QAH2	PIONEER	-
I	Speaker	TS-F1030	V44QAH2	PIONEER	-
J	Speaker	TS-F1030	V44QBA1	PIONEER	-
K	Speaker	TS-F1030	V44QBA1	PIONEER	-
L	USB Memory	-	-	-	-
M	Display	-	-	PIONEER	-
N	XM Antenna	-	-	-	-

\*1) Used for Antenna Terminal conducted test

\*2) Used for Radiated Emission test

**List of cables used**

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1-A	Wire Harness Set	1.0	Unshielded	Unshielded	-
1-B	Wire Harness	1.0	Unshielded	Unshielded	-
1-C	Wire Harness	1.0 + 1.0	Unshielded	Unshielded	-
2, 2'	Radio antenna	1.5	Shielded	Shielded	-
3	USB connector	1.1	Shielded	Shielded	-
4	Speaker	1.1	Unshielded	Unshielded	-
5	GPS antenna connector	1.3	Shielded	Shielded	-
6, 6'	Wire Harness (Air-con ECU)	1.9	Unshielded	Unshielded	-
7	DC	1.2	Shielded	Unshielded	-
8	Speaker	2.0	Unshielded	Unshielded	-
9	Speaker	2.0	Unshielded	Unshielded	-
10	Speaker	2.0	Unshielded	Unshielded	-
11	Speaker	2.0	Unshielded	Unshielded	-
12	Flat cable	0.5	Unshielded	Unshielded	-
13	Flat cable	0.5	Unshielded	Unshielded	-
14	XM Antenna	1.3	Shielded	Shielded	-

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

### **Test Procedure**

[For below 1 GHz]

EUT was placed on a urethane platform of nominal size, 1.0 m by 2.0 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, 0.25 m by 0.25 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	30 MHz to 200 MHz	200 MHz to 1 GHz	Above 1 GHz
Antenna Type	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	PK
IF Bandwidth	BW 120 kHz	RBW: 1 MHz VBW: 3 MHz	RBW: 1 MHz VBW: 10 Hz *1)	RBW: 100 kHz VBW: 300 kHz
Test Distance	3 m	3.87 m*2) (1 GHz – 13 GHz), 1 m*3) (13 GHz – 26.5 GHz)		3.87 m*2) (1 GHz – 13 GHz), 1 m*3) (13 GHz – 26.5 GHz)

\*1) Although 00-705 accepts VBW = 10 Hz for AV measurements, confirmed that superfluous smoothing was not performed.

\*2) Distance Factor:  $20 \times \log(3.87 \text{ m}/3.0 \text{ m}) = 2.22 \text{ dB}$

\*3) Distance Factor:  $20 \times \log(1.0 \text{ m}/3.0 \text{ m}) = -9.54 \text{ dB}$

The carrier level and noise levels were confirmed at angle of 0 deg. to 30 deg. based on the product specification 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 - 18 GHz	18 GHz – 26.5 GHz
Horizontal	0 deg.	30 deg.	0 deg.	30 deg.
Vertical	0 deg.	30 deg.	0 deg.	30 deg.

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

**Measurement range** : 30 MHz - 26.5 GHz

**Test data** : APPENDIX

**Test result** : Pass

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## **SECTION 6: Antenna Terminal Conducted Tests**

### **Test Procedure**

The tests were made with below setting connected to the antenna port.

<b>Test</b>	<b>Span</b>	<b>RBW</b>	<b>VBW</b>	<b>Sweep time</b>	<b>Detector</b>	<b>Trace</b>	<b>Instrument used</b>
20dB Bandwidth	3 MHz	30 kHz	100 kHz	Auto	Peak	Max Hold	Spectrum Analyzer
99% Occupied Bandwidth *1)	Enough width to display emission skirts	1 to 5 % of OBW	Three times of RBW	Auto	Sample	Max Hold *1)	Spectrum Analyzer
Maximum Peak Output Power	-	-	-	Auto	Peak Average *2)	-	Power Meter (Sensor: 50MHz BW)
Carrier Frequency Separation	3 MHz	100 kHz	300 kHz	Auto	Peak	Max Hold	Spectrum Analyzer
Number of Hopping Frequency	30 MHz	300 kHz	1 MHz	Auto	Peak	Max Hold	Spectrum Analyzer
Dwell Time	Zero Span	100 kHz, 1 MHz	300 kHz, 3 MHz	As necessary capture the entire dwell time per hopping channel	Peak	Clear Write	Spectrum Analyzer
Conducted Spurious Emission *2)	9 kHz to 150 kHz	200 Hz	620 Hz	Auto	Peak	Max Hold	Spectrum Analyzer
	150 kHz to 30 MHz	10 kHz	30 kHz				
	30 MHz to 25 GHz	100 kHz	300 kHz				
Conducted Spurious Emission Band Edge compliance	10 MHz	100 kHz	300 kHz	Auto	Peak	Max Hold	Spectrum Analyzer

\*1) The measurement was performed with Max Hold since the duty cycle was not 100 %. Peak hold was applied as Worst-case measurement.

\*2) In the frequency range below 30MHz, RBW was narrowed to separate the noise contents.

Then, wide-band noise near the limit was checked separately, however the noise was not detected as shown in the chart.  
(9 kHz -150 kHz: RBW = 200 Hz, 150 kHz - 30 MHz: RBW = 10 kHz)

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

**Test data : APPENDIX**  
**Test result : Pass**

## APPENDIX 1: Test data

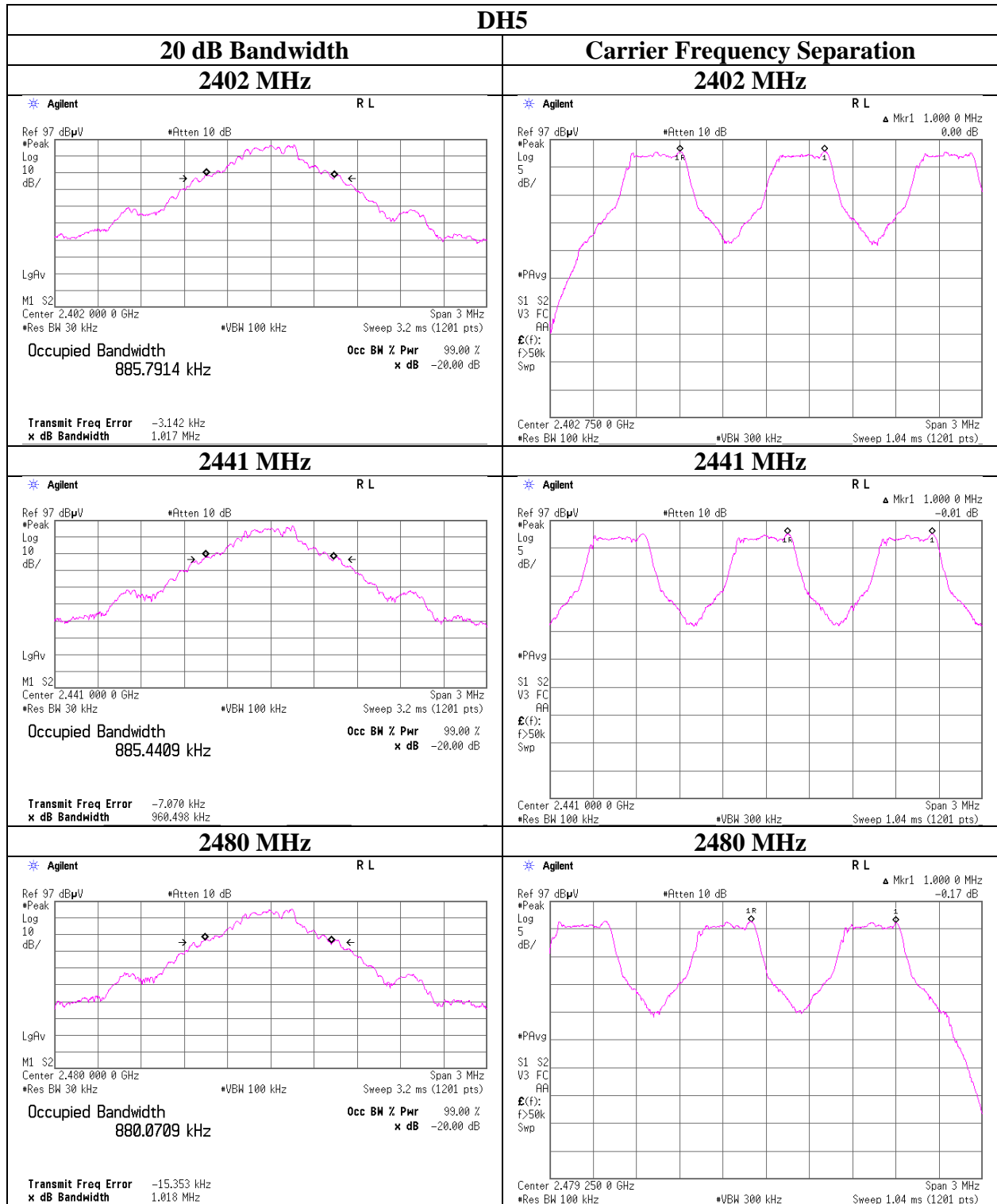
### 20dB Bandwidth and Carrier Frequency Separation

Test place                      Shonan EMC Lab. No.6 Shielded Room  
Report No.                      11691426S-A-R1  
Date                              June 8, 2017  
Temperature / Humidity        27 deg. C / 46 % RH  
Engineer                        Yosuke Ishikawa  
Mode                              Tx, Hopping Off

Mode	Freq. [MHz]	20dB Bandwidth [MHz]	Carrier Frequency Separation [MHz]	Limit for Carrier Frequency separation [MHz]
DH5	2402.0	1.017	1.000	>= 0.678
DH5	2441.0	0.960	1.000	>= 0.640
DH5	2480.0	1.018	1.000	>= 0.679
3DH5	2402.0	1.315	1.000	>= 0.877
3DH5	2441.0	1.315	1.000	>= 0.876
3DH5	2480.0	1.314	1.000	>= 0.876

Limit: Two-thirds of 20dB Bandwidth or 25kHz (whichever is greater).  
No limit applies to 20dB Bandwidth.

## 20dB Bandwidth and Carrier Frequency Separation



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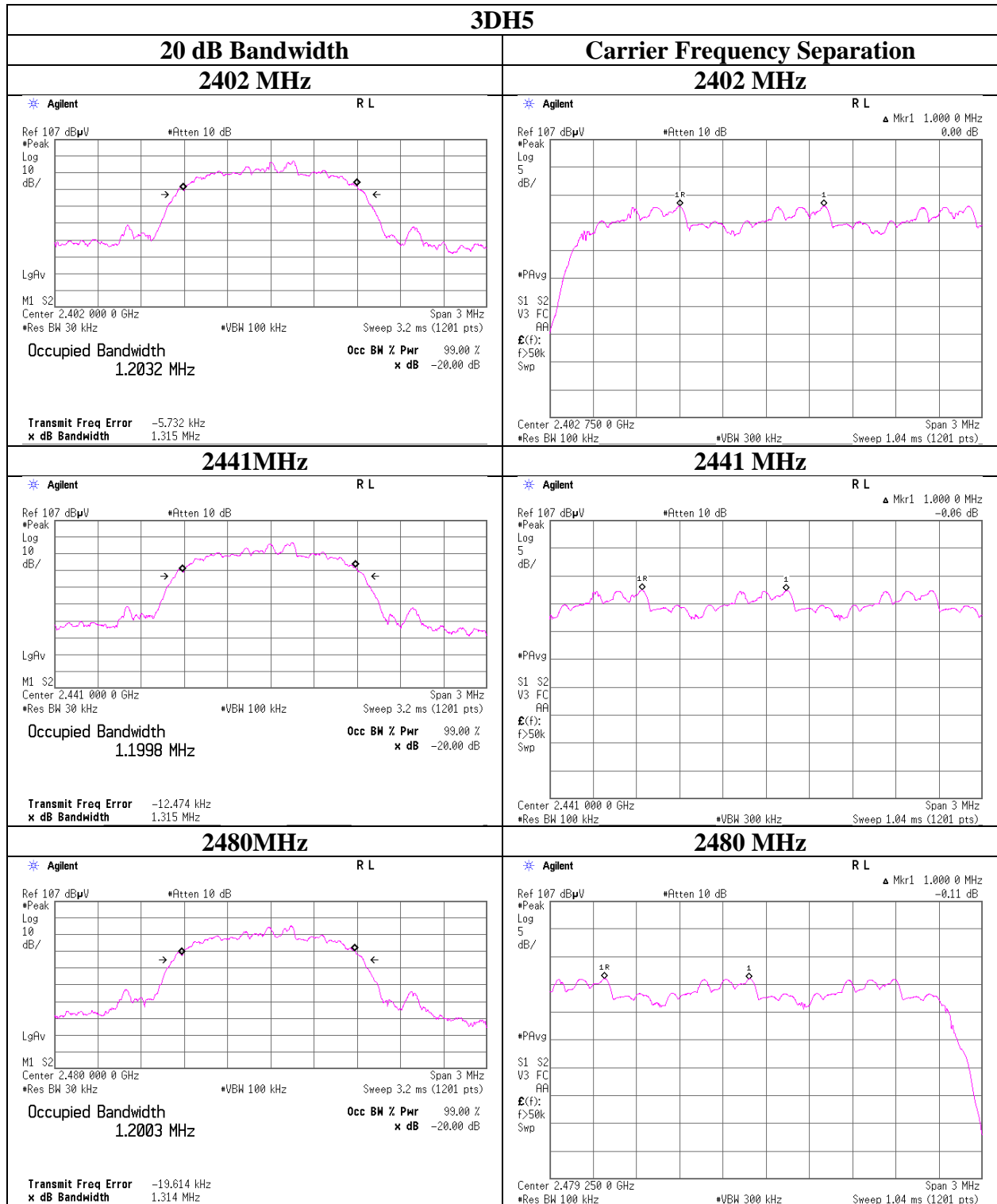
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## 20dB Bandwidth and Carrier Frequency Separation



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### Number of Hopping Frequency

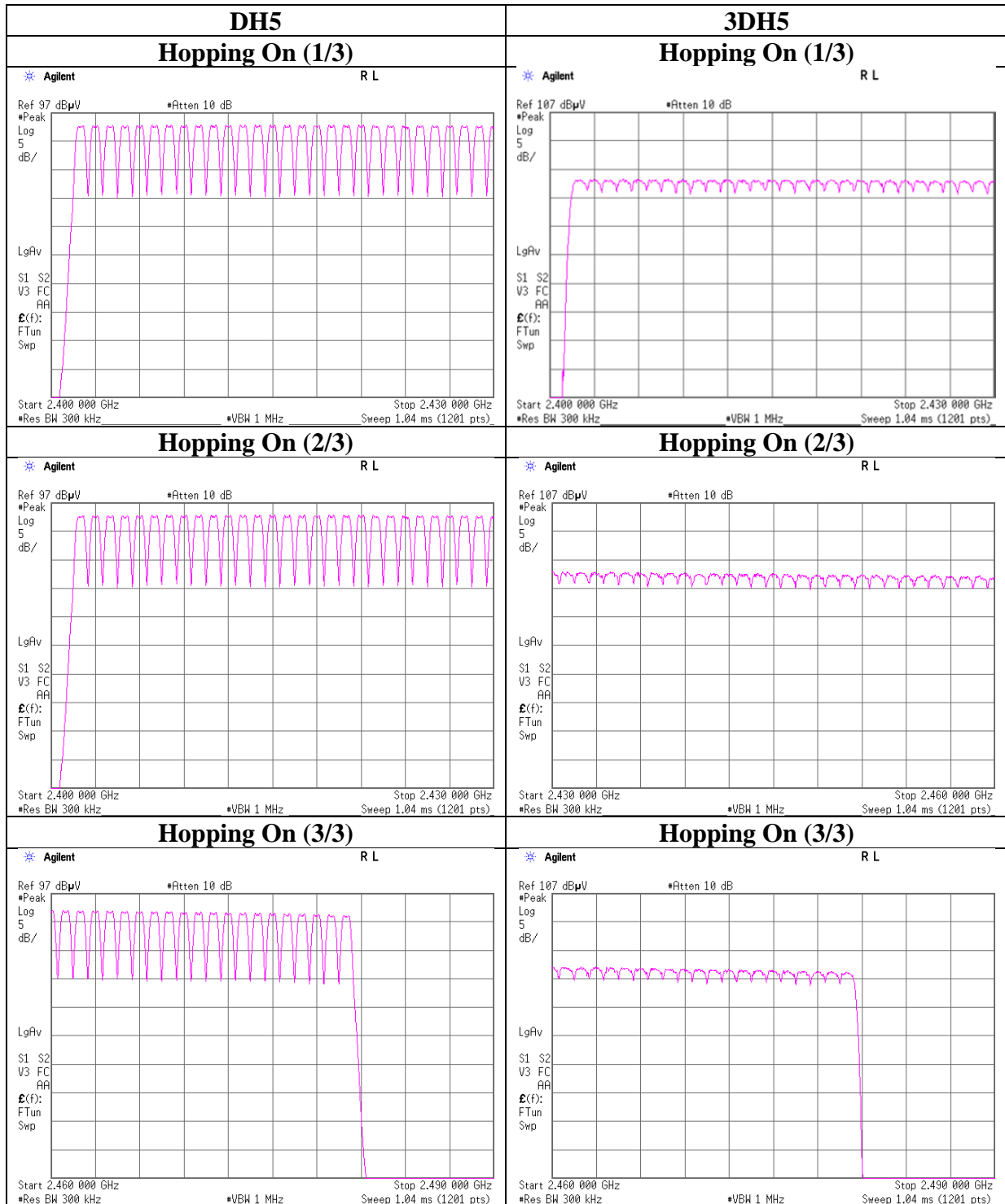
Test place Shonan EMC Lab. No.6 Shielded Room  
Report No. 11691426S-A-R1  
Date June 8, 2017  
Temperature / Humidity 27 deg. C / 46 % RH  
Engineer Yosuke Ishikawa  
Mode Tx, Hopping On

Mode	Number of channel [channels]	Limit [channels]
DH5	79	$\geq 15$
3DH5	79	$\geq 15$

Test was not performed at AFH mode whose number of hopping channel is 20 channels because this Bluetooth radio is in compliance of Bluetooth Specification.



### Number of Hopping Frequency



## Dwell time

Test place	Shonan EMC Lab. No.6 Shielded Room
Report No.	11691426S-A-R1
Date	June 8, 2017
Temperature / Humidity	27 deg. C / 46 % RH
Engineer	Yosuke Ishikawa
Mode	Tx, Hopping On

Mode	Number of transmission in a 31.6(79 Hopping x 0.4) / 12.8 (32 Hopping x 0.4) second period				Length of transmission [msec]	Result [msec]	Limit [msec]
DH1	48.4 times / 5 sec.	x	31.6 sec. =	306 times	0.422	129	400
DH3	25.4 times / 5 sec.	x	31.6 sec. =	161 times	1.682	271	400
DH5	18.6 times / 5 sec.	x	31.6 sec. =	118 times	2.927	345	400
3DH1	49.0 times / 5 sec.	x	31.6 sec. =	310 times	0.426	132	400
3DH3	26.2 times / 5 sec.	x	31.6 sec. =	166 times	1.678	279	400
3DH5	19.2 times / 5 sec.	x	31.6 sec. =	122 times	2.930	357	400

Sample Calculation

Result = Number of transmission x Length of transmission

\*Average data of 5 tests.(except Inquiry)

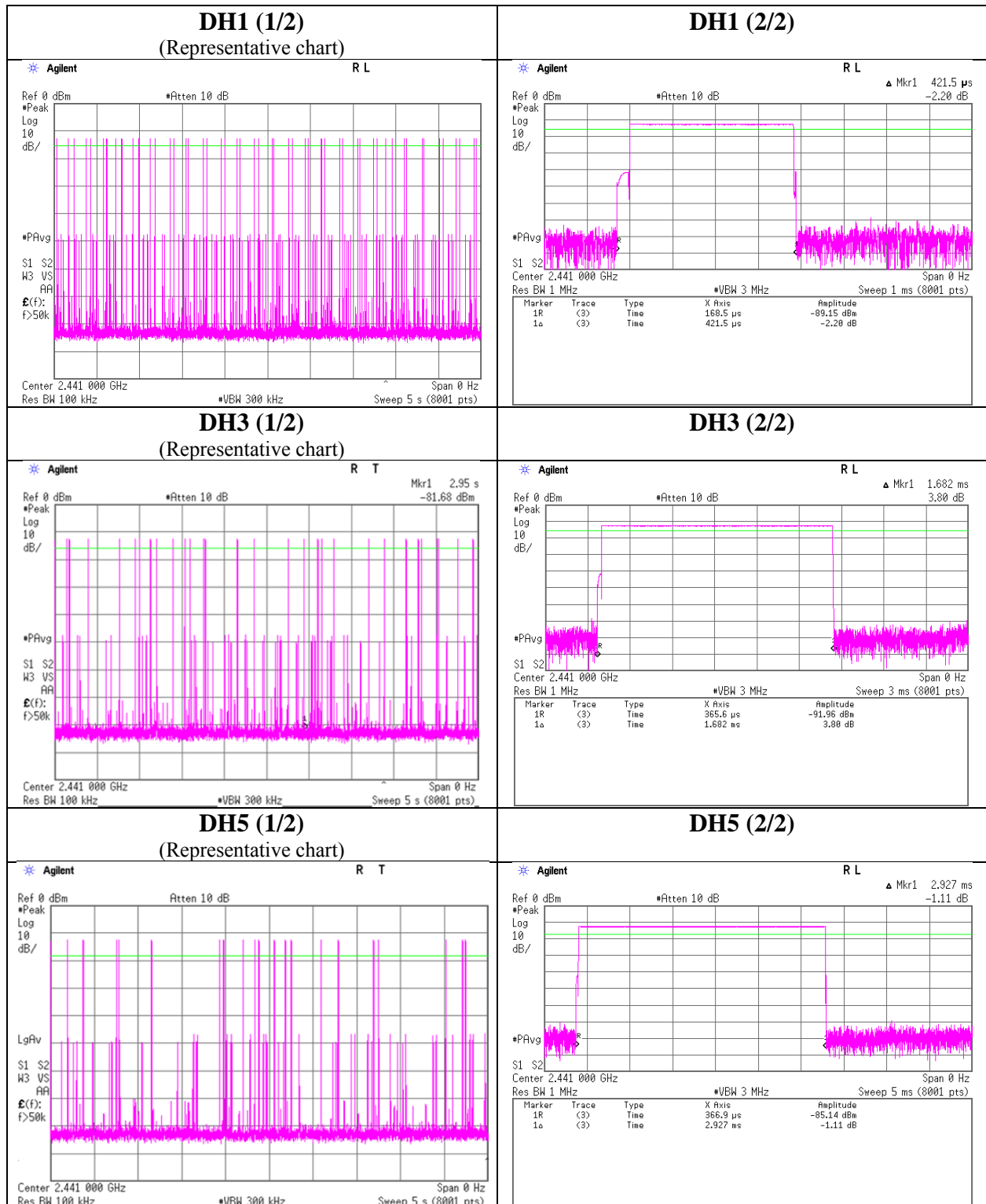
Mode	Sampling [times]					Average [times]
	1	2	3	4	5	
DH1	50	47	48	50	47	48.4
DH3	27	29	24	25	22	25.4
DH5	21	18	19	18	17	18.6
3DH1	46	48	51	51	49	49
3DH3	27	25	26	25	28	26.2
3DH5	17	22	20	19	18	19.2

Sample Calculation

Average = Summation (Sampling 1 to 5) / 5

This device complies with the Bluetooth protocol for FHSS operation, employing a pseudo random channel selection and hopping rate to ensure that the occupancy time in  $N \times 0.4s$ , where  $N$  is the number of channels being used in the hopping sequence ( $20 \leq N \leq 79$ ), is always less than  $0.4s$  regardless of packet size. This is confirmed in the test report for  $N = 79$ .

### Dwell time



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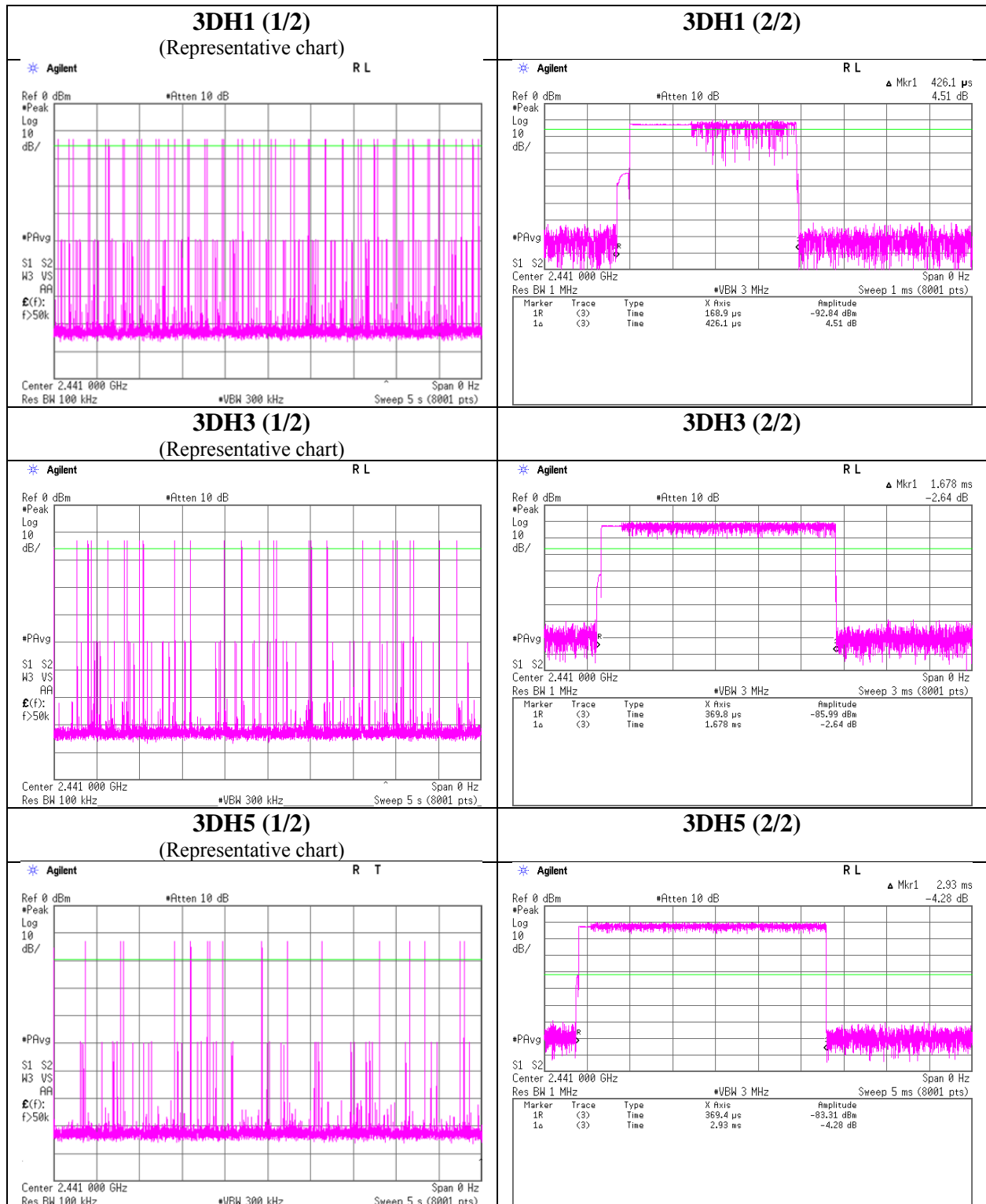
**Shonan EMC Lab.**

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### Dwell time



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## Maximum Peak Output Power

Test place : Shonan EMC Lab. No.6 Shielded Room  
Report No. : 11691426S-A-R1  
Date : June 8, 2017  
Temperature / Humidity : 27 deg. C / 46 % RH  
Engineer : Yosuke Ishikawa  
Mode : Tx, Hopping Off

Mode	Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result		Limit		Margin [dB]
					[dBm]	[mW]	[dBm]	[mW]	
DH5	2402.0	-11.91	1.91	9.96	-0.04	0.99	20.96	125	21.00
DH5	2441.0	-11.99	1.92	9.97	-0.10	0.98	20.96	125	21.06
DH5	2480.0	-13.28	1.93	9.97	-1.38	0.73	20.96	125	22.34
2DH5	2402.0	-9.14	1.91	9.96	2.73	1.87	20.96	125	18.23
2DH5	2441.0	-9.52	1.92	9.97	2.37	1.73	20.96	125	18.59
2DH5	2480.0	-10.87	1.93	9.97	1.03	1.27	20.96	125	19.93
3DH5	2402.0	-8.93	1.91	9.96	2.94	1.97	20.96	125	18.02
3DH5	2441.0	-9.37	1.92	9.97	2.52	1.79	20.96	125	18.44
3DH5	2480.0	-10.69	1.93	9.97	1.21	1.32	20.96	125	19.75

Sample Calculation:

Result = Reading + Cable Loss (including the cable(s) customer supplied) + Attenuator Loss

\*The equipment and cables were not used for factor 0 dB of the data sheets.

Test was not performed at AFH mode, because the decrease of number of channel (min: 20ch) at AFH mode does not influence on the output power and bandwidth of the EUT.

As this device had AFH mode and frequency separation could not meet the requirement of over 20dB BW without 2/3 relaxation, 125mW power limit was applied to it.

**Average Output Power**  
**(Reference data for RF Exposure)**

Test place                      Shonan EMC Lab. No.6 Shielded Room  
Report No.                     11691426S-A-R1  
Date                             June 8, 2017  
Temperature / Humidity       27 deg. C / 46 % RH  
Engineer                        Yosuke Ishikawa  
Mode                              Tx, Hopping Off

Mode	Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Time average)		Duty factor [dB]	Result (Burst power average)	
					[dBm]	[mW]		[dBm]	[mW]
DH5	2402.0	-13.66	1.91	9.96	-1.79	0.66	1.08	-0.71	0.85
DH5	2441.0	-13.82	1.92	9.97	-1.93	0.64	1.08	-0.85	0.82
DH5	2480.0	-15.24	1.93	9.97	-3.34	0.46	1.08	-2.26	0.59
2DH5	2402.0	-13.13	1.91	9.96	-1.26	0.75	1.07	-0.19	0.96
2DH5	2441.0	-13.65	1.92	9.97	-1.76	0.67	1.07	-0.69	0.85
2DH5	2480.0	-15.08	1.93	9.97	-3.18	0.48	1.07	-2.11	0.62
3DH5	2402.0	-13.12	1.91	9.96	-1.25	0.75	1.07	-0.18	0.96
3DH5	2441.0	-13.64	1.92	9.97	-1.75	0.67	1.07	-0.68	0.86
3DH5	2480.0	-15.05	1.93	9.97	-3.15	0.48	1.07	-2.08	0.62

Sample Calculation:

Result (Time average) = Reading + Cable Loss (including the cable(s) customer supplied) + Attenuator Loss

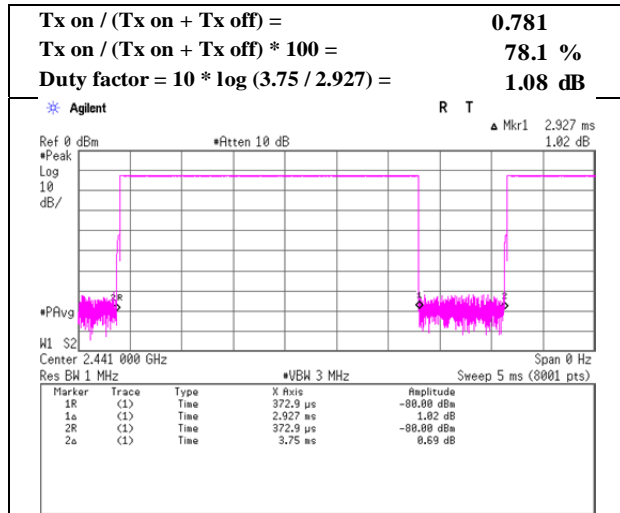
Result (Burst power average) = Time average + Duty factor

\*The equipment and cables were not used for factor 0 dB of the data sheets.

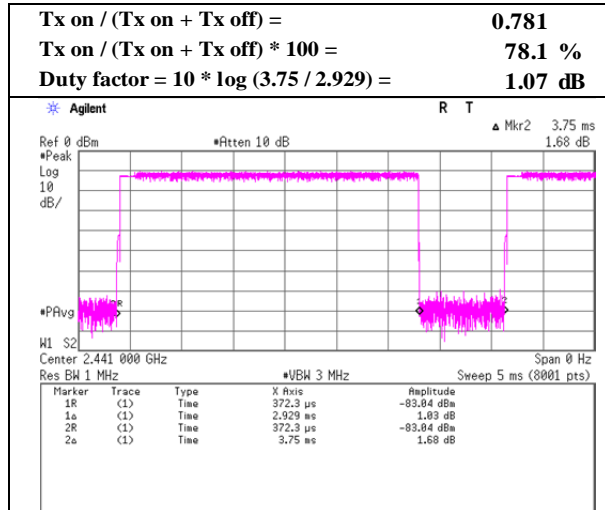
### Burst Rate Confirmation

Test place	Shonan EMC Lab. No.6 Shielded Room
Report No.	11691426S-A-R1
Date	June 8, 2017
Temperature / Humidity	27 deg. C / 46 % RH
Engineer	Yosuke Ishikawa
Mode	Tx, Hopping Off

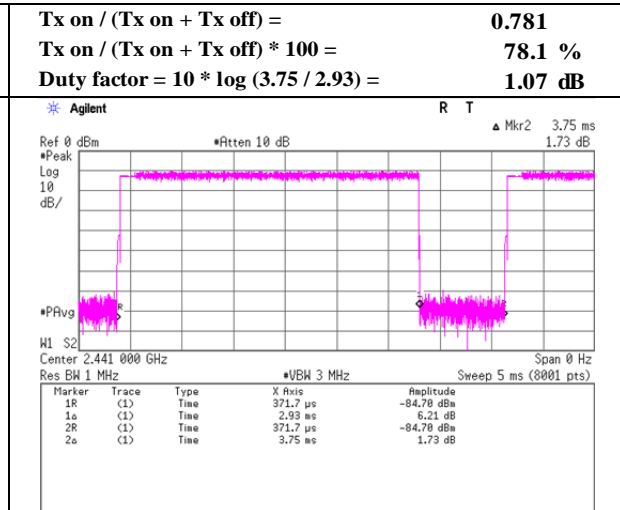
#### DH5



#### 2DH5



#### 3DH5



## Radiated Spurious Emission

Report No.	11691426S-A-R1		
Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	No.2	No.1	No.1
Date	June 5, 2017	June 4, 2017	June 1, 2017
Temperature / Humidity	23 deg. C / 39 % RH	23 deg. C / 36 % RH	25 deg. C / 51 % RH
Engineer	Yasumasa Owaki	Yasumasa Owaki	Makoto Hosaka
	(30 MHz -1000 MHz)	(1 GHz - 13 GHz)	(13 GHz -26.5 GHz)
Mode	Tx, Hopping Off, DH5 2402 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.	74.016	QP	45.00	6.26	7.68	31.87	0.00	27.07	40.00	12.9	252	41	
Hori.	2390.000	PK	46.72	27.21	14.05	40.85	2.22	49.35	73.90	24.5	198	45	
Hori.	4804.000	PK	48.94	31.13	6.38	41.86	2.22	46.81	73.90	27.0	150	0	
Hori.	7206.000	PK	47.58	36.24	8.00	41.18	2.22	52.86	73.90	21.0	150	0	
Hori.	9608.000	PK	44.89	38.13	9.29	40.59	2.22	53.94	73.90	19.9	150	0	
Hori.	2390.000	AV	34.56	27.21	14.05	40.85	2.22	37.19	53.90	16.7	198	45	
Hori.	4804.000	AV	35.86	31.13	6.38	41.86	2.22	33.73	53.90	20.1	150	0	
Hori.	7206.000	AV	34.88	36.24	8.00	41.18	2.22	40.16	53.90	13.7	150	0	
Hori.	9608.000	AV	33.56	38.13	9.29	40.59	2.22	42.61	53.90	<b>11.2</b>	150	0	
Vert.	66.033	QP	31.40	6.88	7.07	31.88	0.00	13.47	40.00	26.5	100	231	
Vert.	68.771	QP	36.00	6.46	7.24	31.87	0.00	17.83	40.00	22.1	100	210	
Vert.	71.173	QP	37.80	6.27	7.42	31.87	0.00	19.62	40.00	20.3	100	61	
Vert.	74.016	QP	44.80	6.26	7.68	31.87	0.00	26.87	40.00	13.1	100	37	
Vert.	592.108	QP	32.70	19.00	8.38	31.58	0.00	28.50	46.00	17.5	100	327	
Vert.	851.164	QP	29.70	21.60	9.61	31.10	0.00	29.81	46.00	16.1	100	41	
Vert.	888.170	QP	30.40	22.14	9.79	30.90	0.00	31.43	46.00	14.5	100	75	
Vert.	2390.000	PK	46.81	27.21	14.05	40.85	2.22	49.44	73.90	24.4	132	96	
Vert.	4804.000	PK	48.44	31.13	6.38	41.86	2.22	46.31	73.90	27.5	150	0	
Vert.	7206.000	PK	47.20	36.24	8.00	41.18	2.22	52.48	73.90	21.4	150	0	
Vert.	9608.000	PK	45.16	38.13	9.29	40.59	2.22	54.21	73.90	19.6	150	0	
Vert.	2390.000	AV	34.53	27.21	14.05	40.85	2.22	37.16	53.90	16.7	132	96	
Vert.	4804.000	AV	35.74	31.13	6.38	41.86	2.22	33.61	53.90	20.2	150	0	
Vert.	7206.000	AV	34.90	36.24	8.00	41.18	2.22	40.18	53.90	13.7	150	0	
Vert.	9608.000	AV	33.63	38.13	9.29	40.59	2.22	42.68	53.90	<b>11.2</b>	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 (3.87 m / 3.0 m) = 2.22 dB

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

\* These results have sufficient margin without taking account Dwell time factor.

### 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.	2402.000	PK	95.11	27.25	14.06	40.84	2.22	97.80	-	-	Carrier
Hori.	2400.000	PK	38.18	27.25	14.06	40.84	2.22	40.87	77.80	36.9	
Vert.	2402.000	PK	94.17	27.25	14.06	40.84	2.22	96.86	-	-	Carrier
Vert.	2400.000	PK	38.53	27.25	14.06	40.84	2.22	41.22	76.86	35.6	

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

Distance factor : 1 GHz - 13 GHz : 20log (3.87 m / 3.0 m) = 2.22 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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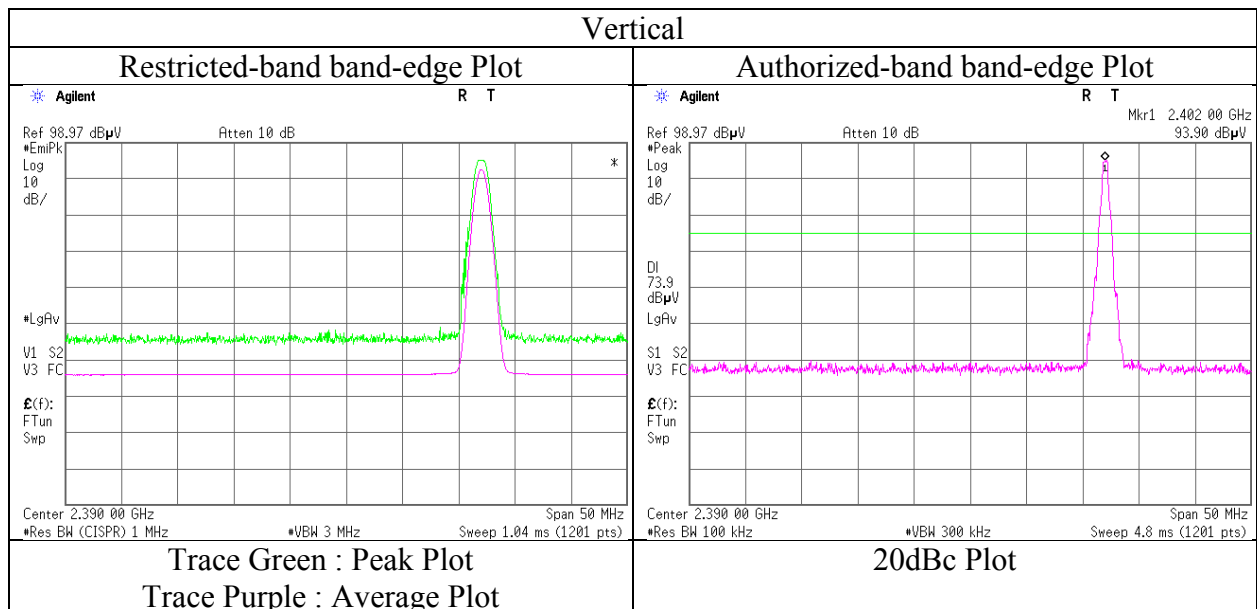
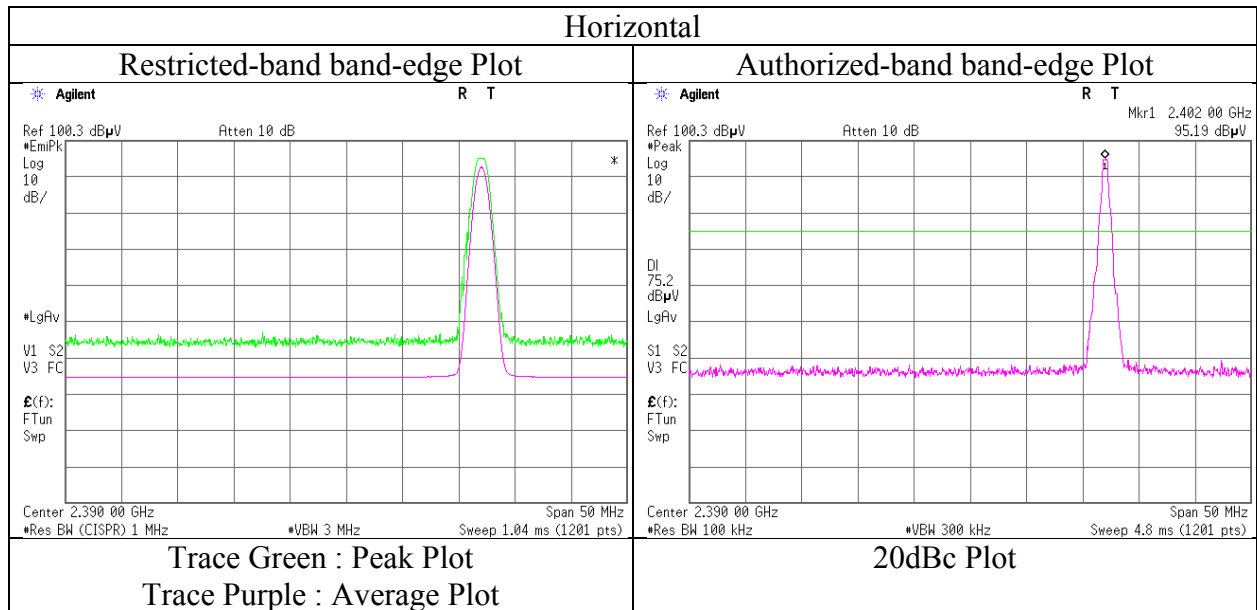
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**Radiated Spurious Emission**  
**(Reference Plot for band-edge)**

Report No.	11691426S-A-R1
Test place	Shonan EMC Lab.
Semi Anechoic Chamber	No.1
Date	June 4, 2017
Temperature / Humidity	23 deg. C / 36 % RH
Engineer	Yasumasa Owaki
	(1 GHz - 13 GHz)
Mode	Tx, Hopping Off, DH5 2402 MHz



\* Final result of restricted band edge was shown in tabular data.

## Radiated Spurious Emission

Report No.	11691426S-A-R1		
Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	No.2	No.1	No.1
Date	June 5, 2017	June 4, 2017	June 1, 2017
Temperature / Humidity	23 deg. C / 39 % RH	23 deg. C / 36 % RH	25 deg. C / 51 % RH
Engineer	Yasumasa Owaki	Yasumasa Owaki	Makoto Hosaka
	(30 MHz -1000 MHz)	(1 GHz - 13 GHz)	(13 GHz -26.5 GHz)
Mode	Tx, Hopping Off, DH5 2441 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.	71.172	QP	37.20	6.27	7.42	31.87	0.00	19.02	40.00	20.9	400	228	
Hori.	74.017	QP	44.40	6.26	7.68	31.87	0.00	26.47	40.00	13.5	261	58	
Hori.	4882.000	PK	47.60	31.29	6.45	41.76	2.22	45.80	73.90	28.1	150	0	
Hori.	7323.000	PK	46.89	36.41	8.13	41.27	2.22	52.38	73.90	21.5	150	0	
Hori.	9764.000	PK	45.43	38.36	9.36	40.62	2.22	54.75	73.90	19.2	150	0	
Hori.	4882.000	AV	35.18	31.29	6.45	41.76	2.22	33.38	53.90	20.5	150	0	
Hori.	7323.000	AV	34.75	36.41	8.13	41.27	2.22	40.24	53.90	13.7	150	0	
Hori.	9764.000	AV	33.32	38.36	9.36	40.62	2.22	42.64	53.90	11.3	150	0	
Vert.	68.772	QP	36.70	6.46	7.24	31.87	0.00	18.53	40.00	21.4	100	208	
Vert.	70.639	QP	35.60	6.27	7.37	31.87	0.00	17.37	40.00	22.6	100	275	
Vert.	74.014	QP	44.10	6.26	7.68	31.87	0.00	26.17	40.00	13.8	100	48	
Vert.	814.162	QP	30.00	21.07	9.44	31.23	0.00	29.28	46.00	16.7	100	65	
Vert.	851.163	QP	29.80	21.60	9.61	31.10	0.00	29.91	46.00	16.0	100	43	
Vert.	888.172	QP	30.80	22.14	9.79	30.90	0.00	31.83	46.00	14.1	100	75	
Vert.	4882.000	PK	47.49	31.29	6.45	41.76	2.22	45.69	73.90	28.2	150	0	
Vert.	7323.000	PK	46.87	36.41	8.13	41.27	2.22	52.36	73.90	21.5	150	0	
Vert.	9764.000	PK	45.45	38.36	9.36	40.62	2.22	54.77	73.90	19.1	150	0	
Vert.	4882.000	AV	35.27	31.29	6.45	41.76	2.22	33.47	53.90	20.4	150	0	
Vert.	7323.000	AV	34.72	36.41	8.13	41.27	2.22	40.21	53.90	13.7	150	0	
Vert.	9764.000	AV	33.35	38.36	9.36	40.62	2.22	42.67	53.90	11.2	150	0	

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

Distance factor : 1 GHz - 13 GHz :  $20\log(3.87\text{ m} / 3.0\text{ m}) = 2.22\text{ dB}$

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

\* These results have sufficient margin without taking account Dwell time factor.

**UL Japan, Inc.**

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## Radiated Spurious Emission

Report No.	11691426S-A-R1		
Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	No.2	No.1	No.1
Date	June 5, 2017	June 4, 2017	June 1, 2017
Temperature / Humidity	23 deg. C / 39 % RH	23 deg. C / 36 % RH	25 deg. C / 51 % RH
Engineer	Yasumasa Owaki	Yasumasa Owaki	Makoto Hosaka
	(30 MHz -1000 MHz)	(1 GHz - 13 GHz)	(13 GHz -26.5 GHz)
Mode	Tx, Hopping Off, DH5 2480 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.	65.038	QP	31.10	7.03	7.01	31.88	0.00	13.26	40.00	26.7	307	226	
Hori.	74.017	QP	44.50	6.26	7.68	31.87	0.00	26.57	40.00	13.4	244	202	
Hori.	75.459	QP	36.10	6.26	7.81	31.87	0.00	18.30	40.00	21.7	262	201	
Hori.	2483.500	PK	46.91	27.52	14.14	40.81	2.22	49.98	73.90	23.9	181	46	
Hori.	4960.000	PK	47.14	31.45	6.50	41.65	2.22	45.66	73.90	28.2	150	0	
Hori.	7440.000	PK	47.59	36.57	8.26	41.36	2.22	53.28	73.90	20.6	150	0	
Hori.	9920.000	PK	45.57	38.58	9.43	40.66	2.22	55.14	73.90	18.8	150	0	
Hori.	2483.500	AV	34.43	27.52	14.14	40.81	2.22	37.50	53.90	16.4	181	46	
Hori.	4960.000	AV	35.23	31.45	6.50	41.65	2.22	33.75	53.90	20.2	150	0	
Hori.	7440.000	AV	34.83	36.57	8.26	41.36	2.22	40.52	53.90	13.4	150	0	
Hori.	9920.000	AV	33.28	38.58	9.43	40.66	2.22	42.85	53.90	11.1	150	0	
Vert.	70.638	QP	35.00	6.27	7.37	31.87	0.00	16.77	40.00	23.2	100	272	
Vert.	74.014	QP	43.70	6.26	7.68	31.87	0.00	25.77	40.00	14.2	100	42	
Vert.	592.112	QP	34.00	19.00	8.38	31.58	0.00	29.80	46.00	16.2	100	323	
Vert.	814.160	QP	29.10	21.07	9.44	31.23	0.00	28.38	46.00	17.6	100	73	
Vert.	888.173	QP	29.80	22.14	9.79	30.90	0.00	30.83	46.00	15.1	100	77	
Vert.	2483.500	PK	47.04	27.52	14.14	40.81	2.22	50.11	73.90	23.8	129	91	
Vert.	4960.000	PK	47.49	31.45	6.50	41.65	2.22	46.01	73.90	27.9	150	0	
Vert.	7440.000	PK	47.23	36.57	8.26	41.36	2.22	52.92	73.90	21.0	150	0	
Vert.	9920.000	PK	45.27	38.58	9.43	40.66	2.22	54.84	73.90	19.1	150	0	
Vert.	2483.500	AV	34.27	27.52	14.14	40.81	2.22	37.34	53.90	16.6	129	91	
Vert.	4960.000	AV	35.21	31.45	6.50	41.65	2.22	33.73	53.90	20.2	150	0	
Vert.	7440.000	AV	34.82	36.57	8.26	41.36	2.22	40.51	53.90	13.4	150	0	
Vert.	9920.000	AV	33.28	38.58	9.43	40.66	2.22	42.85	53.90	11.1	150	0	

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

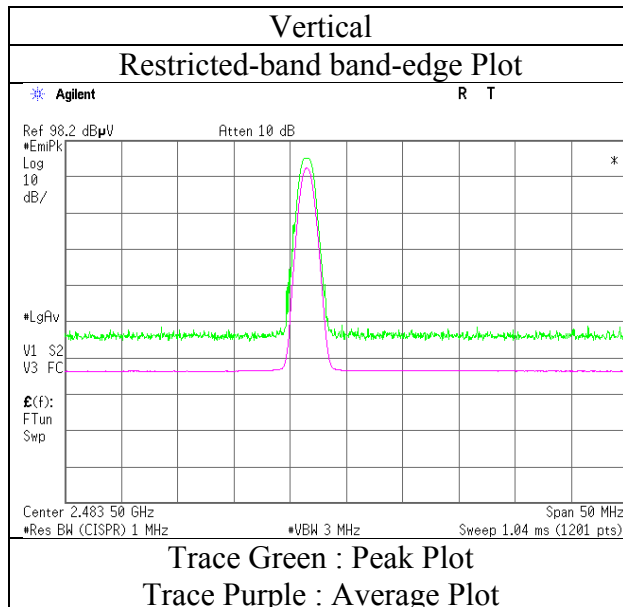
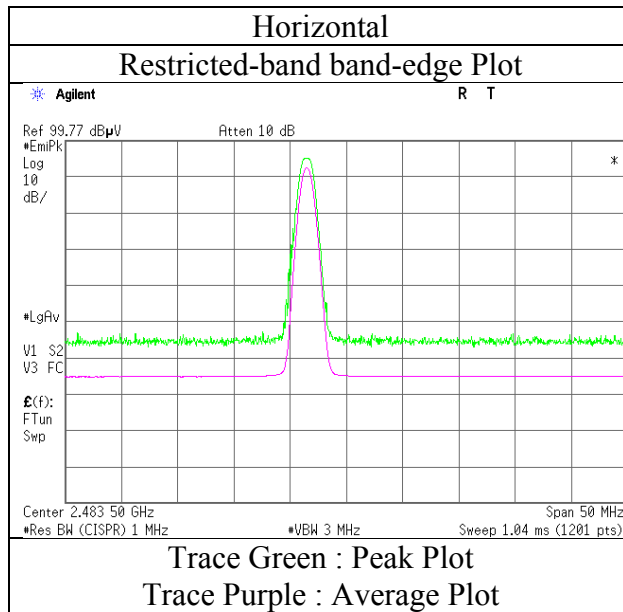
Distance factor : 1 GHz - 13 GHz :  $20\log(3.87\text{ m} / 3.0\text{ m}) = 2.22\text{ dB}$

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

\* These results have sufficient margin without taking account Dwell time factor.

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

Report No.	11691426S-A-R1
Test place	Shonan EMC Lab.
Semi Anechoic Chamber	No.1
Date	June 4, 2017
Temperature / Humidity	23 deg. C / 36 % RH
Engineer	Yasumasa Owaki
	(1 GHz - 13 GHz)
Mode	Tx, Hopping Off, DH5 2480 MHz



\* Final result of restricted band edge was shown in tabular data.

## Radiated Spurious Emission

Report No.	11691426S-A-R1		
Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	No.2	No.1	No.1
Date	June 5, 2017	June 4, 2017	June 1, 2017
Temperature / Humidity	23 deg. C / 39 % RH	23 deg. C / 36 % RH	25 deg. C / 51 % RH
Engineer	Yasumasa Owaki	Yasumasa Owaki	Makoto Hosaka
	(30 MHz -1000 MHz)	(1 GHz - 13 GHz)	(13 GHz -26.5 GHz)
Mode	Tx, Hopping Off, 3DH5 2402 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.	70.640	QP	35.50	6.27	7.37	31.87	0.00	17.27	40.00	22.7	265	68	
Hori.	74.019	QP	44.00	6.26	7.68	31.87	0.00	26.07	40.00	13.9	249	203	
Hori.	2390.000	PK	46.51	27.21	14.05	40.85	2.22	49.14	73.90	24.8	192	44	
Hori.	4804.000	PK	47.98	31.13	6.38	41.86	2.22	45.85	73.90	28.1	150	0	
Hori.	7206.000	PK	46.94	36.24	8.00	41.18	2.22	52.22	73.90	21.7	150	0	
Hori.	9608.000	PK	45.23	38.13	9.29	40.59	2.22	54.28	73.90	19.6	150	0	
Hori.	2390.000	AV	34.39	27.21	14.05	40.85	2.22	37.02	53.90	16.9	192	44	
Hori.	4804.000	AV	35.64	31.13	6.38	41.86	2.22	33.51	53.90	20.4	150	0	
Hori.	7206.000	AV	34.64	36.24	8.00	41.18	2.22	39.92	53.90	14.0	150	0	
Hori.	9608.000	AV	33.16	38.13	9.29	40.59	2.22	42.21	53.90	11.7	150	0	
Vert.	68.767	QP	39.20	6.46	7.24	31.87	0.00	21.03	40.00	18.9	100	210	
Vert.	74.018	QP	43.20	6.26	7.68	31.87	0.00	25.27	40.00	14.7	100	43	
Vert.	592.114	QP	34.30	19.00	8.38	31.58	0.00	30.10	46.00	15.9	100	331	
Vert.	814.156	QP	29.10	21.07	9.44	31.23	0.00	28.38	46.00	17.6	100	75	
Vert.	851.164	QP	28.90	21.60	9.61	31.10	0.00	29.01	46.00	16.9	100	59	
Vert.	888.171	QP	28.20	22.14	9.79	30.90	0.00	29.23	46.00	16.7	100	71	
Vert.	2390.000	PK	46.71	27.21	14.05	40.85	2.22	49.34	73.90	24.6	133	93	
Vert.	4804.000	PK	47.97	31.13	6.38	41.86	2.22	45.84	73.90	28.1	150	0	
Vert.	7206.000	PK	46.99	36.24	8.00	41.18	2.22	52.27	73.90	21.6	150	0	
Vert.	9608.000	PK	45.76	38.13	9.29	40.59	2.22	54.81	73.90	19.1	150	0	
Vert.	2390.000	AV	34.34	27.21	14.05	40.85	2.22	36.97	53.90	16.9	133	93	
Vert.	4804.000	AV	35.62	31.13	6.38	41.86	2.22	33.49	53.90	20.4	150	0	
Vert.	7206.000	AV	34.56	36.24	8.00	41.18	2.22	39.84	53.90	14.1	150	0	
Vert.	9608.000	AV	33.15	38.13	9.29	40.59	2.22	42.20	53.90	11.7	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 (3.87 m / 3.0 m) = 2.22 dB

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

\* These results have sufficient margin without taking account Dwell time factor.

### 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.	2402.000	PK	94.10	27.25	14.06	40.84	2.22	96.79	-	-	Carrier
Hori.	2400.000	PK	38.81	27.25	14.06	40.84	2.22	41.50	76.79	35.3	
Vert.	2402.000	PK	93.57	27.25	14.06	40.84	2.22	96.26	-	-	Carrier
Vert.	2400.000	PK	38.20	27.25	14.06	40.84	2.22	40.89	76.26	35.4	

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

Distance factor : 1 GHz - 13 GHz : 20log (3.87 m / 3.0 m) = 2.22 dB

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

**UL Japan, Inc.**

**Shonan EMC Lab.**

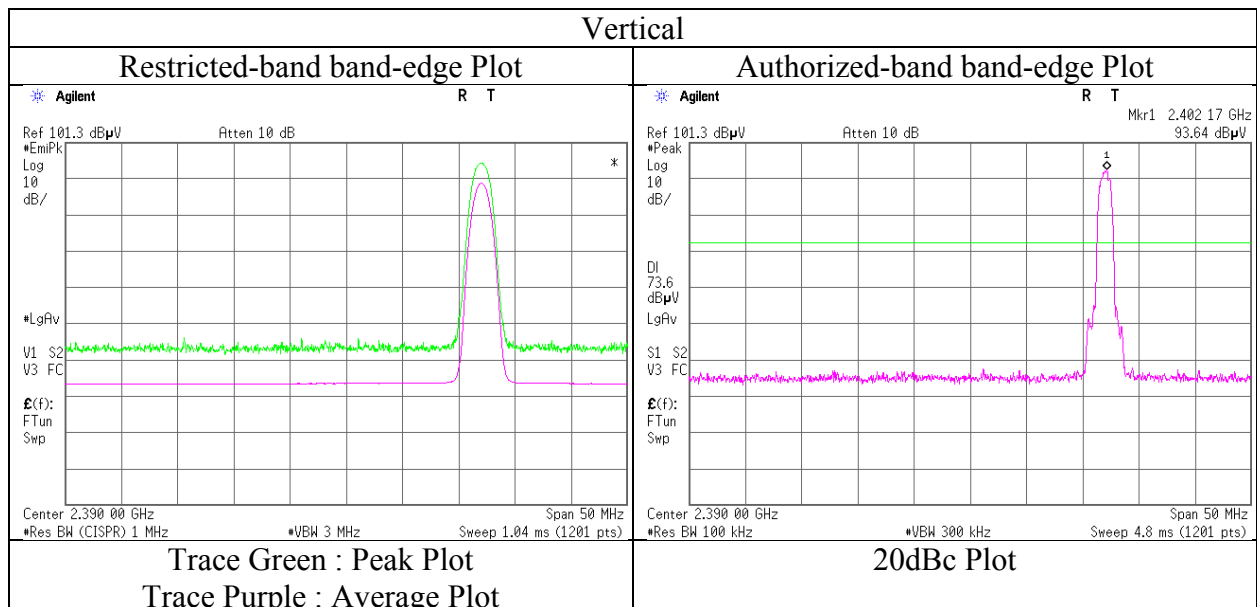
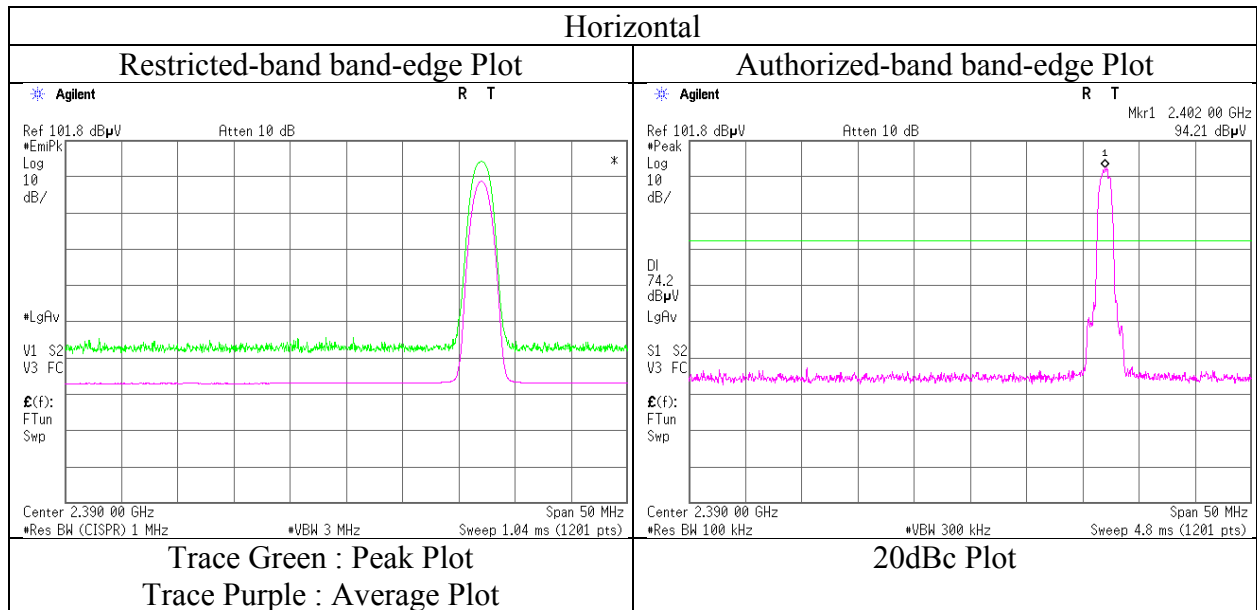
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

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

Report No.	11691426S-A-R1
Test place	Shonan EMC Lab.
Semi Anechoic Chamber	No.1
Date	June 4, 2017
Temperature / Humidity	23 deg. C / 36 % RH
Engineer	Yasumasa Owaki
	(1 GHz - 13 GHz)
Mode	Tx, Hopping Off, 3DH5 2402 MHz



\* Final result of restricted band edge was shown in tabular data.

## Radiated Spurious Emission

Report No.	11691426S-A-R1		
Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	No.2	No.1	No.1
Date	June 5, 2017	June 4, 2017	June 1, 2017
Temperature / Humidity	23 deg. C / 39 % RH	23 deg. C / 36 % RH	25 deg. C / 51 % RH
Engineer	Yasumasa Owaki	Yasumasa Owaki	Makoto Hosaka
	(30 MHz -1000 MHz)	(1 GHz - 13 GHz)	(13 GHz -26.5 GHz)
Mode	Tx, Hopping Off, 3DH5 2441 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.	68.763	QP	36.00	6.46	7.24	31.87	0.00	17.83	40.00	22.1	286	209	
Hori.	74.015	QP	45.30	6.26	7.68	31.87	0.00	27.37	40.00	12.6	257	209	
Hori.	4882.000	PK	47.78	31.29	6.45	41.76	2.22	45.98	73.90	27.9	150	0	
Hori.	7323.000	PK	46.71	36.41	8.13	41.27	2.22	52.20	73.90	21.7	150	0	
Hori.	9764.000	PK	45.12	38.36	9.36	40.62	2.22	54.44	73.90	19.5	150	0	
Hori.	4882.000	AV	35.31	31.29	6.45	41.76	2.22	33.51	53.90	20.4	150	0	
Hori.	7323.000	AV	34.59	36.41	8.13	41.27	2.22	40.08	53.90	13.8	150	0	
Hori.	9764.000	AV	33.10	38.36	9.36	40.62	2.22	42.42	53.90	11.5	150	0	
Vert.	71.165	QP	37.00	6.27	7.42	31.87	0.00	18.82	40.00	21.1	100	236	
Vert.	74.014	QP	43.80	6.26	7.68	31.87	0.00	25.87	40.00	14.1	100	33	
Vert.	592.115	QP	33.40	19.00	8.38	31.58	0.00	29.20	46.00	16.8	119	329	
Vert.	814.157	QP	29.00	21.07	9.44	31.23	0.00	28.28	46.00	17.7	100	74	
Vert.	851.163	QP	28.90	21.60	9.61	31.10	0.00	29.01	46.00	16.9	100	53	
Vert.	888.172	QP	30.10	22.14	9.79	30.90	0.00	31.13	46.00	14.8	100	71	
Vert.	4882.000	PK	47.89	31.29	6.45	41.76	2.22	46.09	73.90	27.8	150	0	
Vert.	7323.000	PK	47.21	36.41	8.13	41.27	2.22	52.70	73.90	21.2	150	0	
Vert.	9764.000	PK	45.41	38.36	9.36	40.62	2.22	54.73	73.90	19.2	150	0	
Vert.	4882.000	AV	35.32	31.29	6.45	41.76	2.22	33.52	53.90	20.4	150	0	
Vert.	7323.000	AV	34.42	36.41	8.13	41.27	2.22	39.91	53.90	14.0	150	0	
Vert.	9764.000	AV	32.98	38.36	9.36	40.62	2.22	42.30	53.90	11.6	150	0	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor  
Distance factor : 1 GHz - 13 GHz :  $20\log(3.87\text{ m} / 3.0\text{ m}) = 2.22\text{ dB}$   
13 GHz - 40 GHz :  $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

\* These results have sufficient margin without taking account Dwell time factor.

## Radiated Spurious Emission

Report No.	11691426S-A-R1		
Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	No.2	No.1	No.1
Date	June 5, 2017	June 4, 2017	June 1, 2017
Temperature / Humidity	23 deg. C / 39 % RH	23 deg. C / 36 % RH	25 deg. C / 51 % RH
Engineer	Yasumasa Owaki	Yasumasa Owaki	Makoto Hosaka
	(30 MHz -1000 MHz)	(1 GHz - 13 GHz)	(13 GHz -26.5 GHz)
Mode	Tx, Hopping Off, 3DH5 2480 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.	74.010	QP	44.10	6.26	7.68	31.87	0.00	26.17	40.00	13.8	258	211	
Hori.	2483.500	PK	47.87	27.52	14.14	40.81	2.22	50.94	73.90	23.0	175	41	
Hori.	4960.000	PK	47.11	31.45	6.50	41.65	2.22	45.63	73.90	28.3	150	0	
Hori.	7440.000	PK	46.76	36.57	8.26	41.36	2.22	52.45	73.90	21.5	150	0	
Hori.	9920.000	PK	45.94	38.58	9.43	40.66	2.22	55.51	73.90	18.4	150	0	
Hori.	2483.500	AV	34.52	27.52	14.14	40.81	2.22	37.59	53.90	16.3	175	41	
Hori.	4960.000	AV	35.32	31.45	6.50	41.65	2.22	33.84	53.90	20.1	150	0	
Hori.	7440.000	AV	34.77	36.57	8.26	41.36	2.22	40.46	53.90	13.4	150	0	
Hori.	9920.000	AV	33.36	38.58	9.43	40.66	2.22	42.93	53.90	11.0	150	0	
Vert.	65.034	QP	30.10	7.03	7.01	31.88	0.00	12.26	40.00	27.7	100	239	
Vert.	66.028	QP	32.60	6.88	7.07	31.88	0.00	14.67	40.00	25.3	100	255	
Vert.	68.756	QP	39.00	6.46	7.24	31.87	0.00	20.83	40.00	19.1	100	206	
Vert.	74.010	QP	42.70	6.26	7.68	31.87	0.00	24.77	40.00	15.2	100	34	
Vert.	592.112	QP	34.50	19.00	8.38	31.58	0.00	30.30	46.00	15.7	113	331	
Vert.	777.150	QP	28.50	20.64	9.27	31.36	0.00	27.05	46.00	18.9	100	318	
Vert.	814.157	QP	29.40	21.07	9.44	31.23	0.00	28.68	46.00	17.3	100	74	
Vert.	2483.500	PK	47.55	27.52	14.14	40.81	2.22	50.62	73.90	23.3	137	94	
Vert.	4960.000	PK	47.51	31.45	6.50	41.65	2.22	46.03	73.90	27.9	150	0	
Vert.	7440.000	PK	46.91	36.57	8.26	41.36	2.22	52.60	73.90	21.3	150	0	
Vert.	9920.000	PK	45.22	38.58	9.43	40.66	2.22	54.79	73.90	19.1	150	0	
Vert.	2483.500	AV	34.43	27.52	14.14	40.81	2.22	37.50	53.90	16.4	137	94	
Vert.	4960.000	AV	35.30	31.45	6.50	41.65	2.22	33.82	53.90	20.1	150	0	
Vert.	7440.000	AV	34.74	36.57	8.26	41.36	2.22	40.43	53.90	13.5	150	0	
Vert.	9920.000	AV	33.39	38.58	9.43	40.66	2.22	42.96	53.90	<b>10.9</b>	150	0	

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

Distance factor : 1 GHz - 13 GHz :  $20\log(3.87\text{ m} / 3.0\text{ m}) = 2.22\text{ dB}$

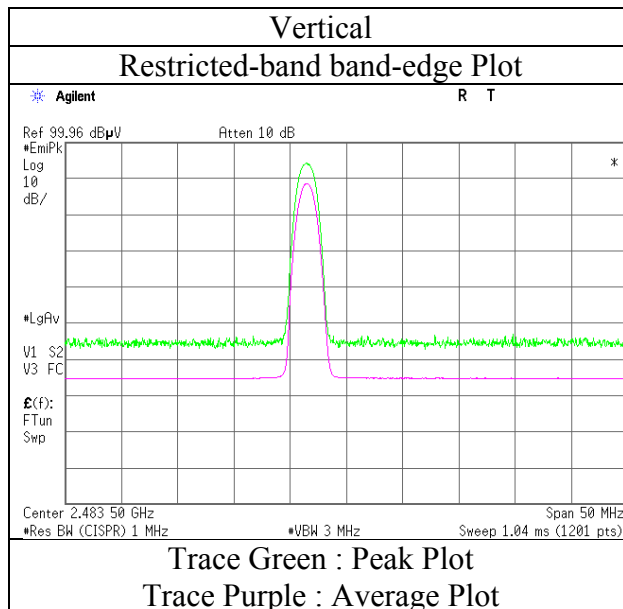
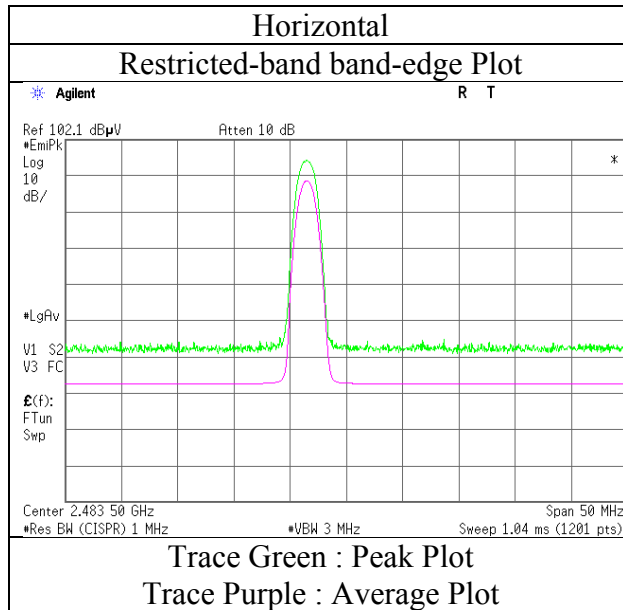
13 GHz - 40 GHz :  $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

\* These results have sufficient margin without taking account Dwell time factor.



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

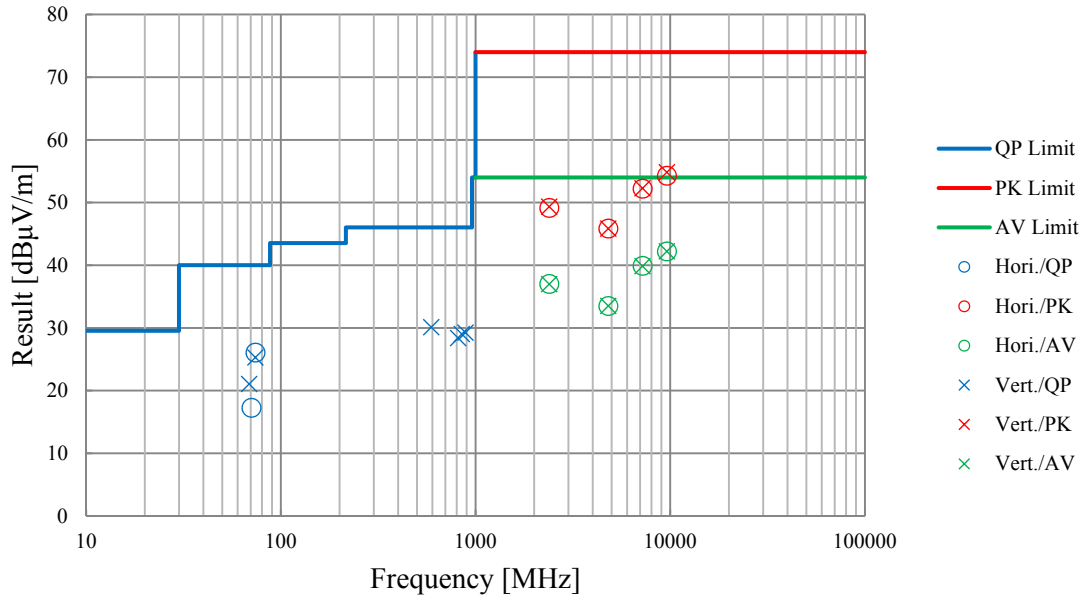
Report No. 11691426S-A-R1  
Test place Shonan EMC Lab.  
Semi Anechoic Chamber No.1  
Date June 4, 2017  
Temperature / Humidity 23 deg. C / 36 % RH  
Engineer Yasumasa Owaki  
(1 GHz - 13 GHz)  
Mode Tx, Hopping Off, 3DH5 2480 MHz



\* Final result of restricted band edge was shown in tabular data.

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

Report No.	11691426S-A-R1		
Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	No.2	No.1	No.1
Date	June 5, 2017	June 4, 2017	June 1, 2017
Temperature / Humidity	23 deg. C / 39 % RH	23 deg. C / 36 % RH	25 deg. C / 51 % RH
Engineer	Yasumasa Owaki	Yasumasa Owaki	Makoto Hosaka
	(30 MHz -1000 MHz)	(1 GHz - 13 GHz)	(13 GHz -26.5 GHz)
Mode	Tx, Hopping Off, 3DH5 2402 MHz		

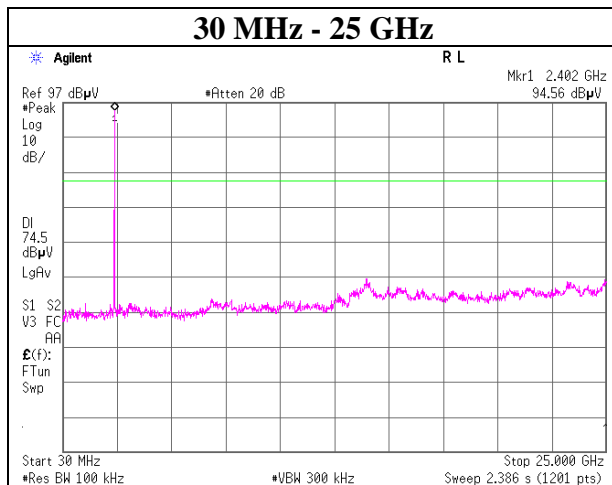
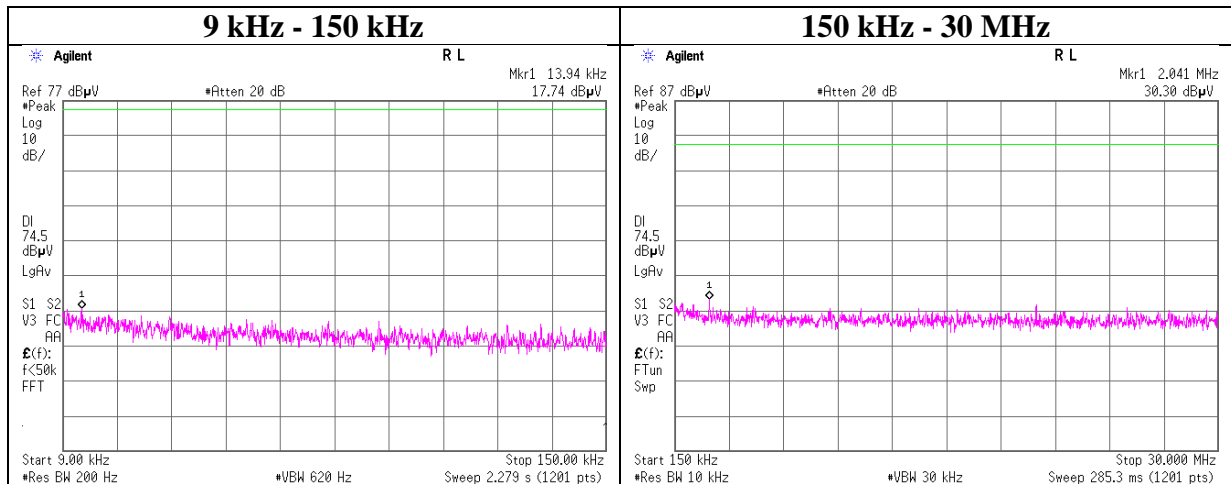


\*These plots data contains sufficient number to show the trend of characteristic features for EUT.

## Conducted Spurious Emission

Test place	Shonan EMC Lab. No.6 Shielded Room
Report No.	11691426S-A-R1
Date	June 8, 2017
Temperature / Humidity	27 deg. C / 46 % RH
Engineer	Yosuke Ishikawa
Mode	Tx, Hopping Off, DH5 2402 MHz

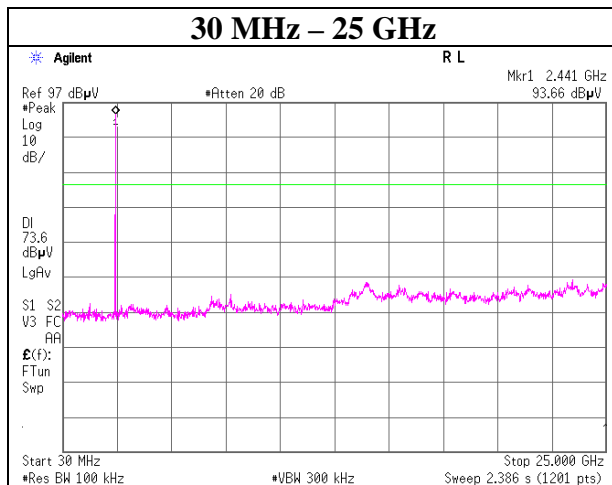
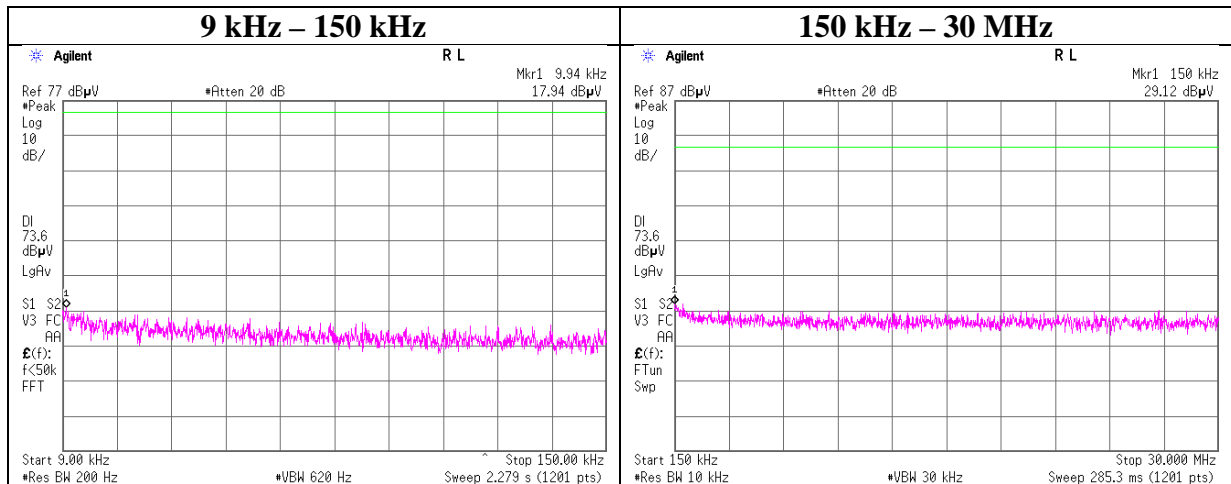
### 2402 MHz



## Conducted Spurious Emission

Test place	Shonan EMC Lab. No.6 Shielded Room
Report No.	11691426S-A-R1
Date	June 8, 2017
Temperature / Humidity	27 deg. C / 46 % RH
Engineer	Yosuke Ishikawa
Mode	Tx, Hopping Off, DH5 2441 MHz

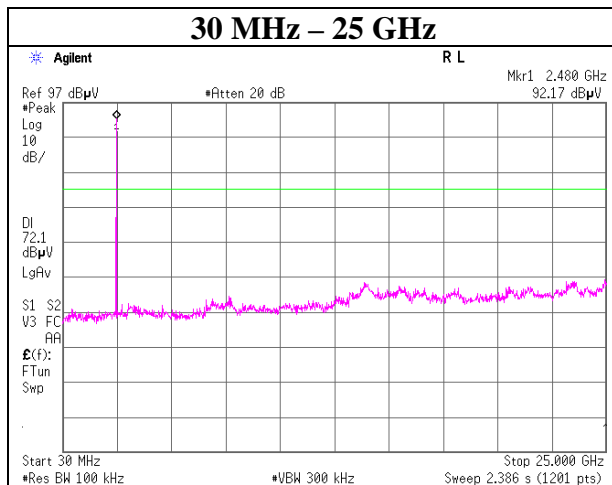
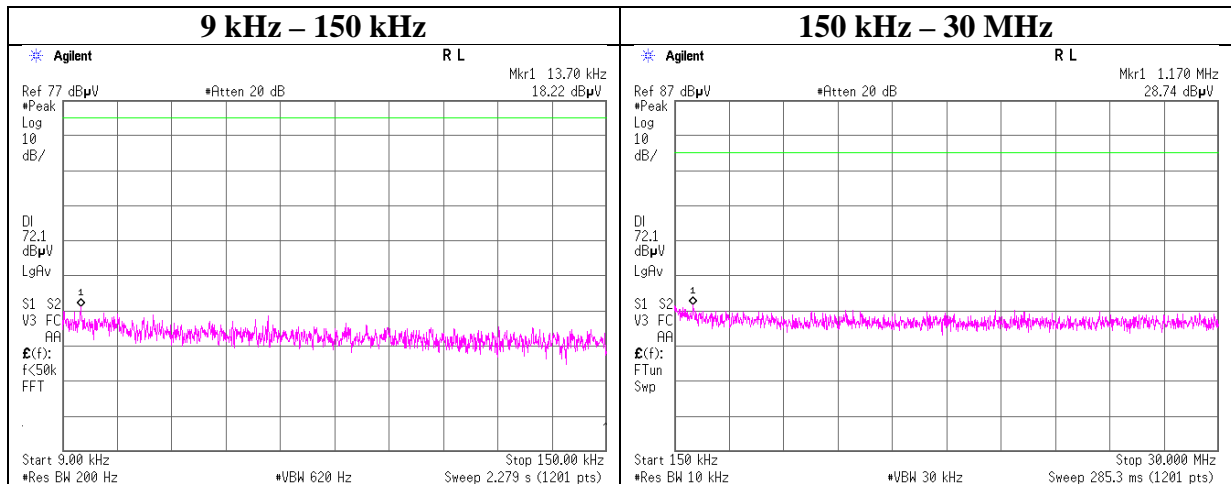
### 2441 MHz



## Conducted Spurious Emission

Test place	Shonan EMC Lab. No.6 Shielded Room
Report No.	11691426S-A-R1
Date	June 8, 2017
Temperature / Humidity	27 deg. C / 46 % RH
Engineer	Yosuke Ishikawa
Mode	Tx, Hopping Off, DH5 2480 MHz

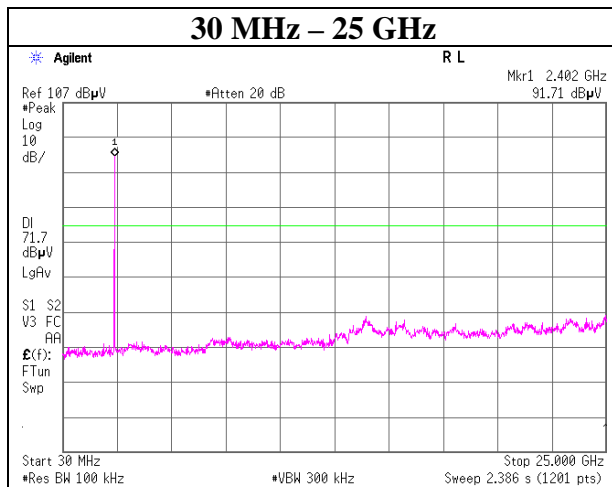
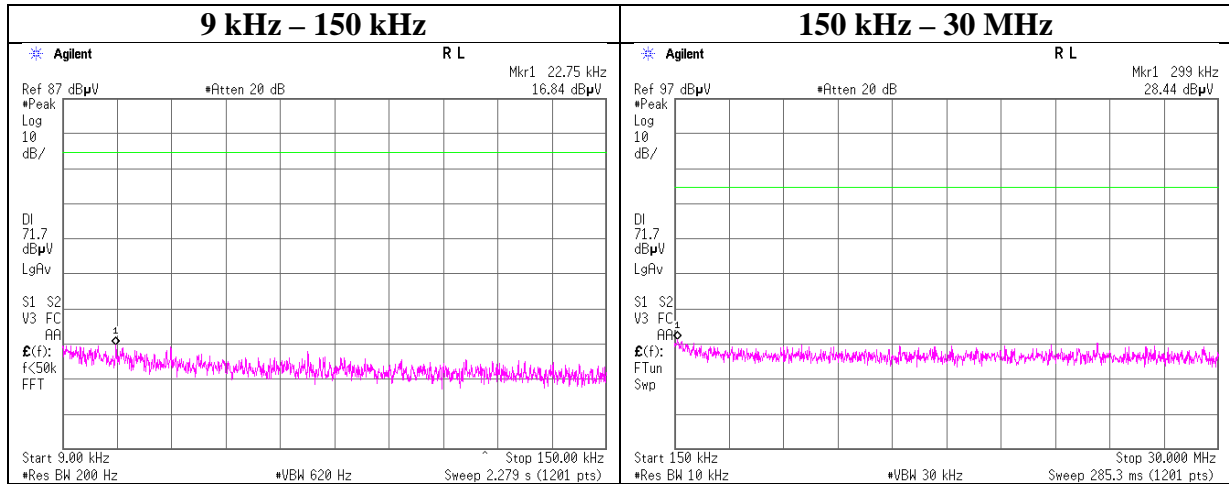
### 2480 MHz



## Conducted Spurious Emission

Test place	Shonan EMC Lab. No.6 Shielded Room
Report No.	11691426S-A-R1
Date	June 8, 2017
Temperature / Humidity	27 deg. C / 46 % RH
Engineer	Yosuke Ishikawa
Mode	Tx, Hopping Off, 3DH5 2402 MHz

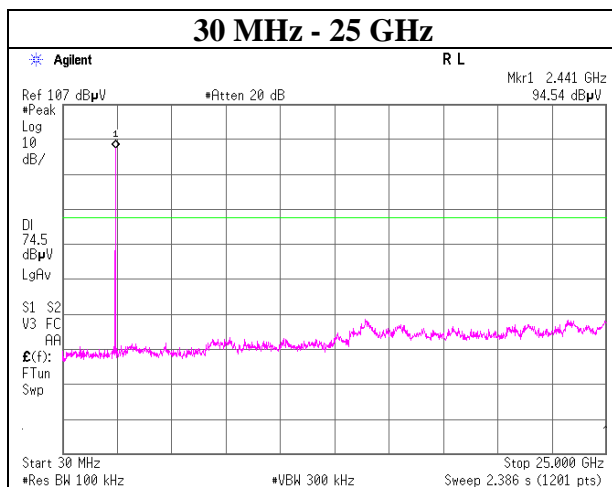
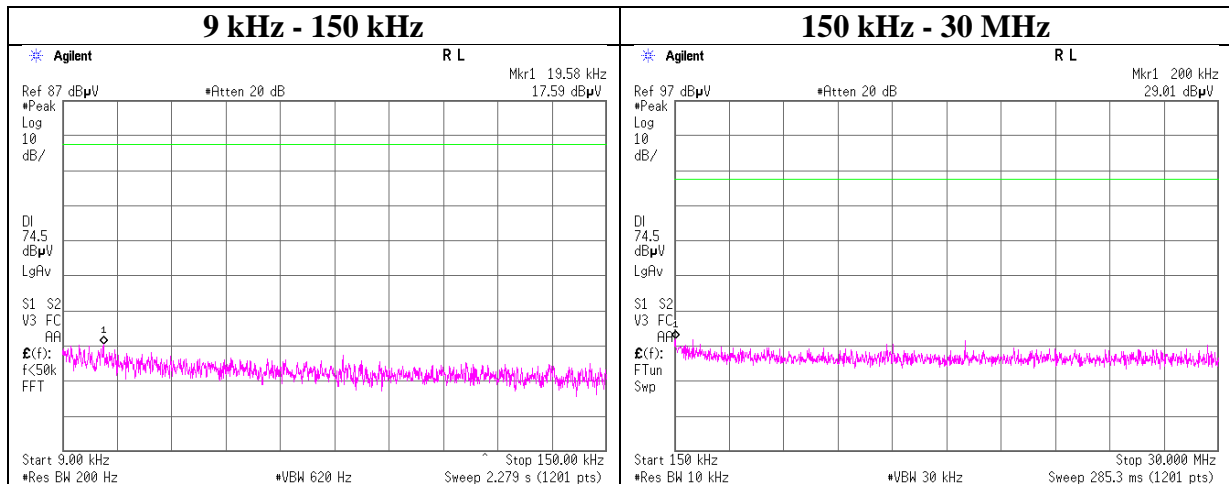
### 2402 MHz



## Conducted Spurious Emission

Test place	Shonan EMC Lab. No.6 Shielded Room
Report No.	11691426S-A-R1
Date	June 8, 2017
Temperature / Humidity	27 deg. C / 46 % RH
Engineer	Yosuke Ishikawa
Mode	Tx, Hopping Off, 3DH5 2441 MHz

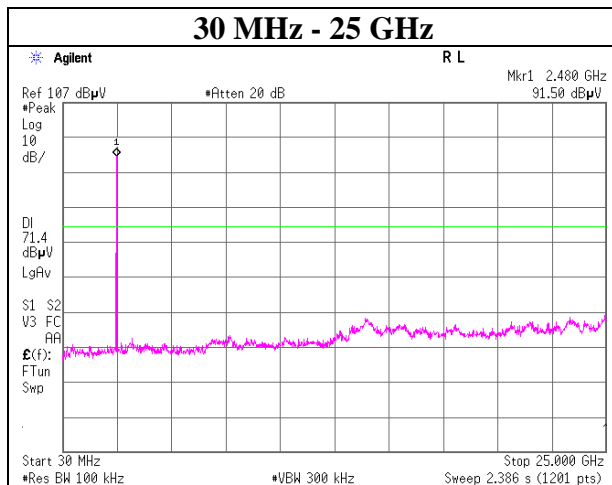
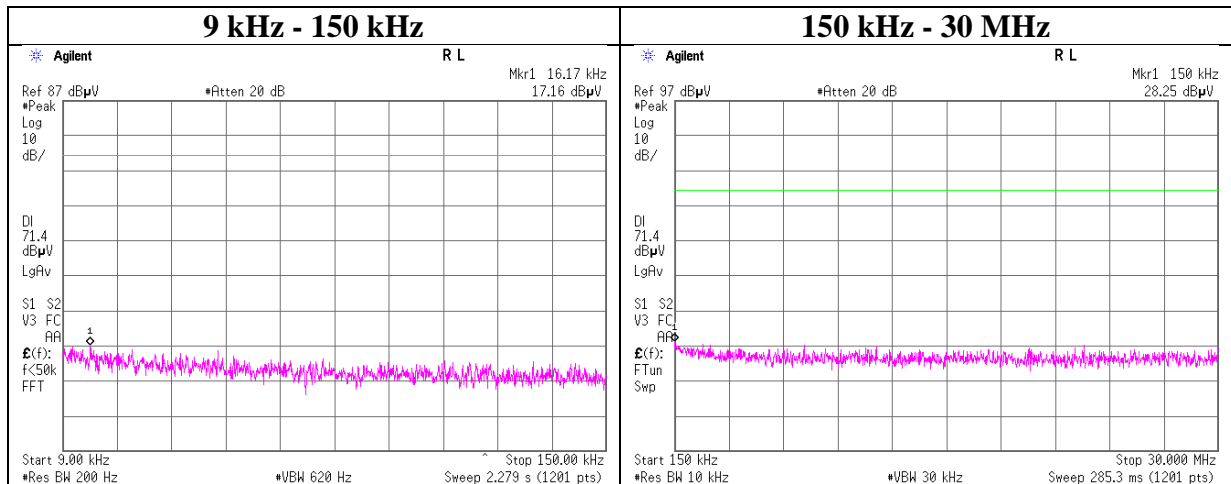
### 2441 MHz



## Conducted Spurious Emission

Test place	Shonan EMC Lab. No.6 Shielded Room
Report No.	11691426S-A-R1
Date	June 8, 2017
Temperature / Humidity	27 deg. C / 46 % RH
Engineer	Yosuke Ishikawa
Mode	Tx, Hopping Off, 3DH5 2480 MHz

### 2480 MHz

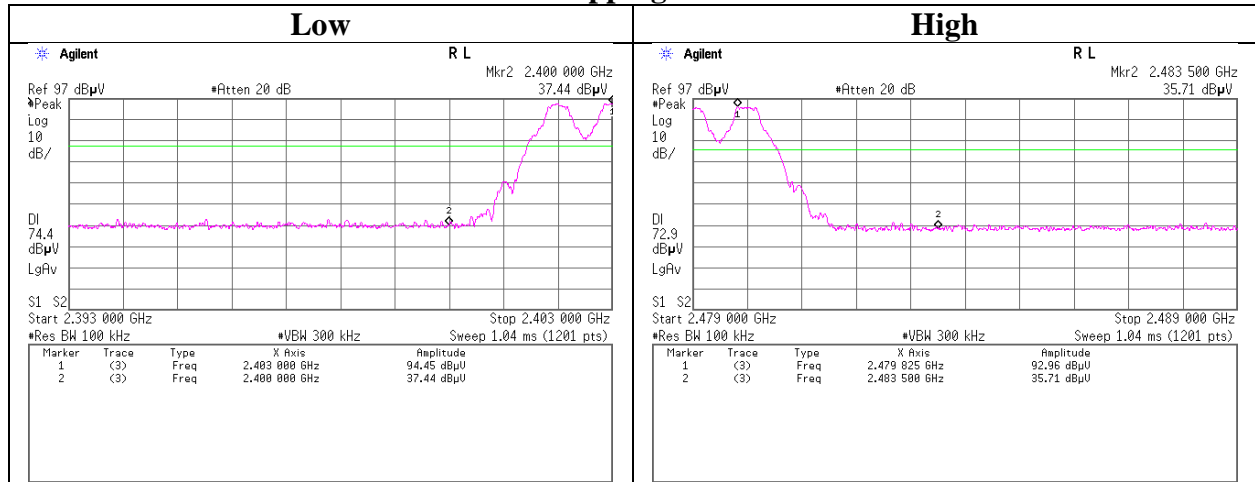




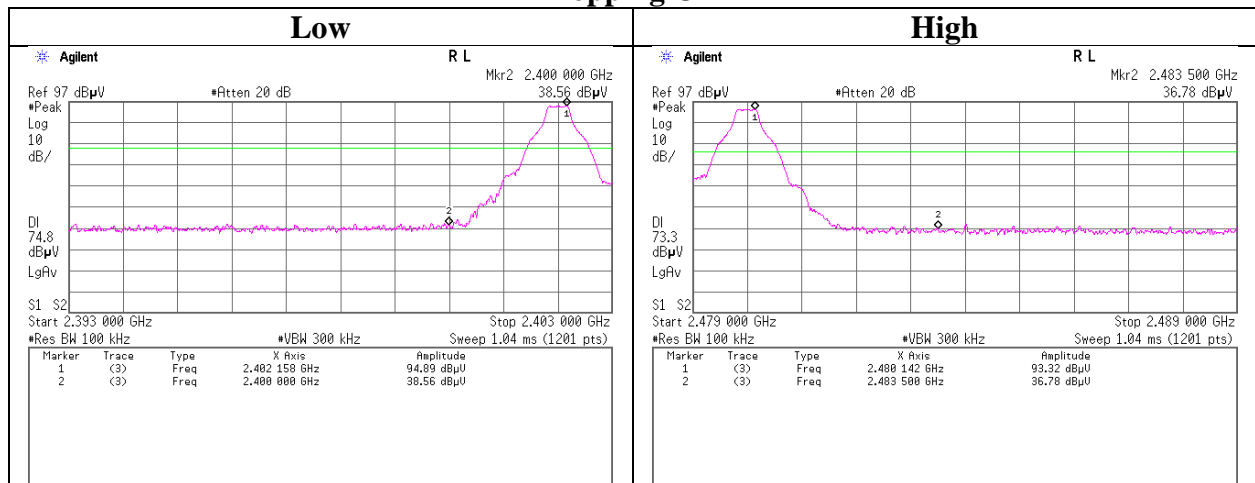
## Conducted Emission Band Edge compliance

Test place	Shonan EMC Lab. No.6 Shielded Room
Report No.	11691426S-A-R1
Date	June 8, 2017
Temperature / Humidity	27 deg. C / 46 % RH
Engineer	Yosuke Ishikawa
Mode	Tx, DH5

### Hopping On



### Hopping Off



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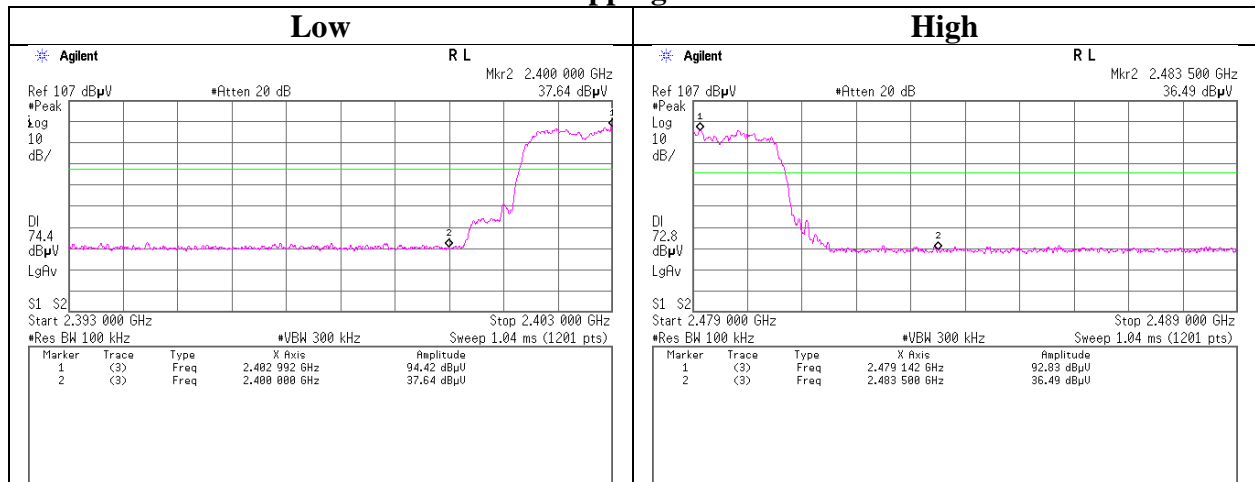
Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

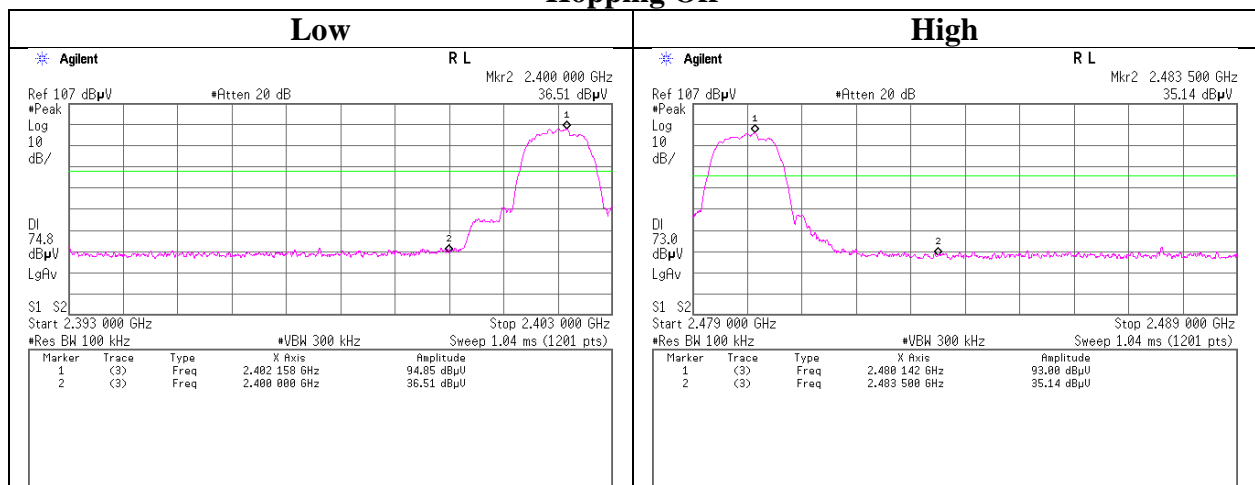
## Conducted Emission Band Edge compliance

Test place	Shonan EMC Lab. No.6 Shielded Room
Report No.	11691426S-A-R1
Date	June 8, 2017
Temperature / Humidity	27 deg. C / 46 % RH
Engineer	Yosuke Ishikawa
Mode	Tx, 3-DH5

### Hopping On



### Hopping Off



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**Shonan EMC Lab.**

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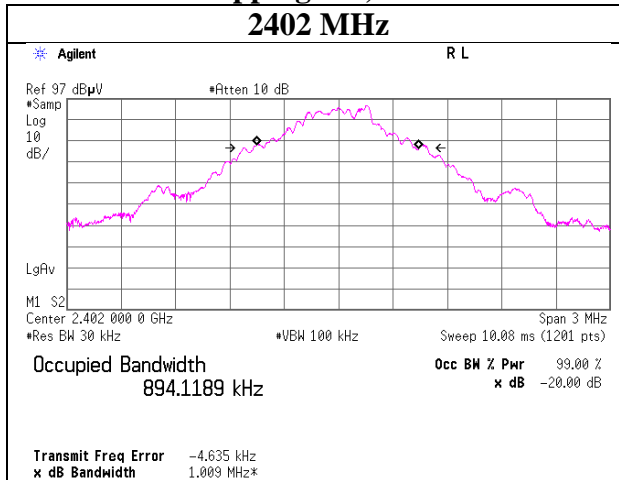
Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

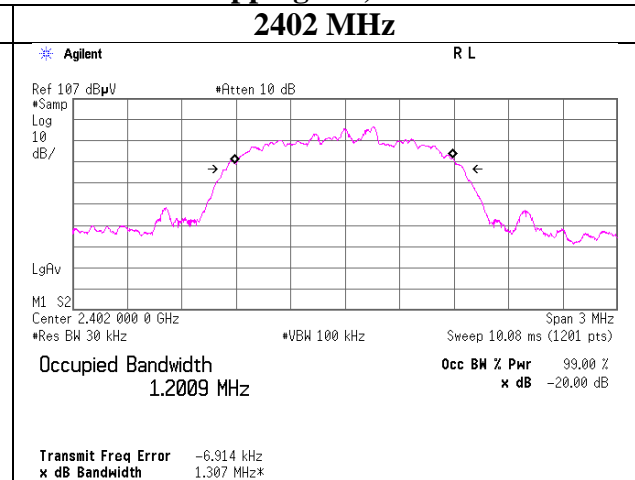
### 99% Occupied Bandwidth

Test place	Shonan EMC Lab. No.6 Shielded Room
Report No.	11691426S-A-R1
Date	June 8, 2017
Temperature / Humidity	27 deg. C / 46 % RH
Engineer	Yosuke Ishikawa
Mode	Tx, Hopping Off

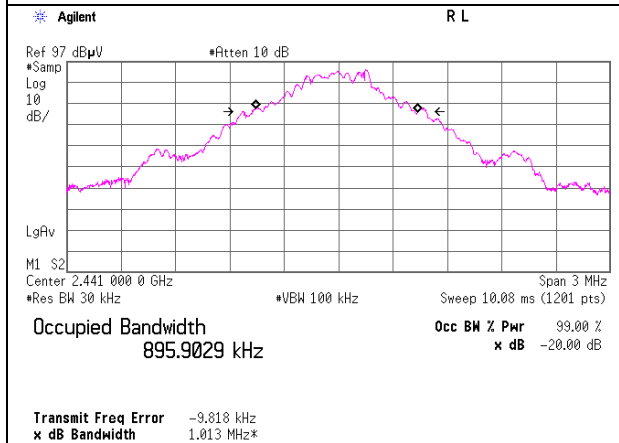
#### Hopping Off, DH5



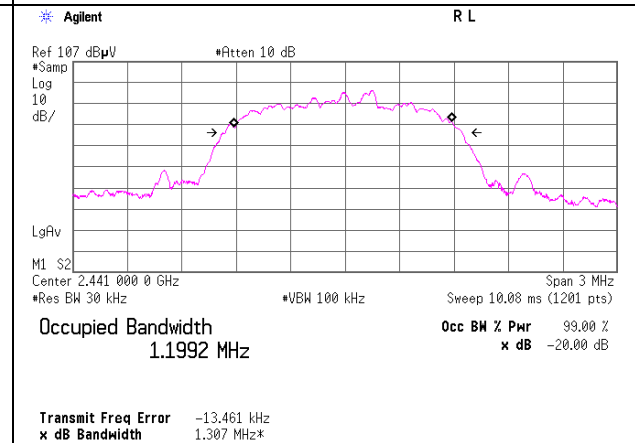
#### Hopping Off, 3DH5



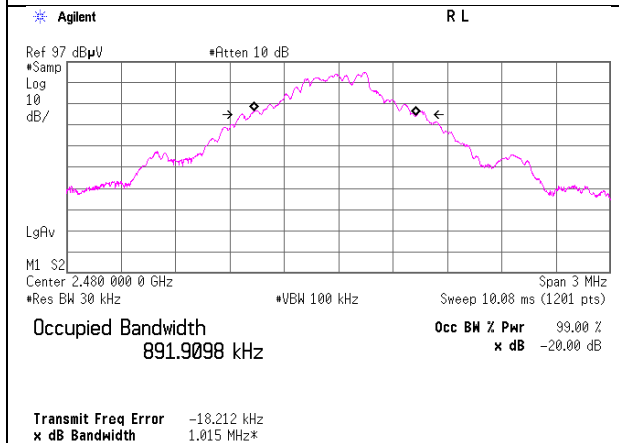
#### 2441 MHz



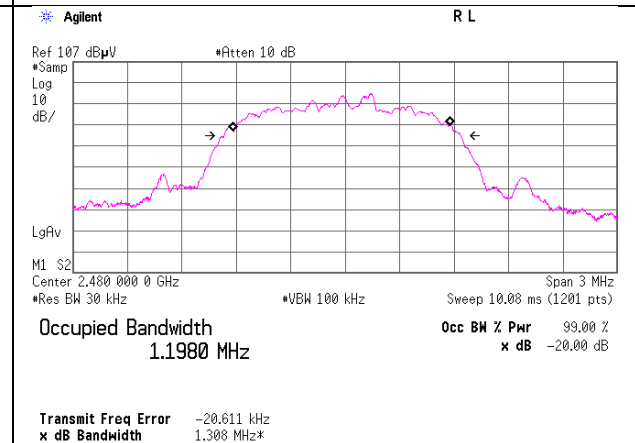
#### 2441 MHz



#### 2480 MHz



#### 2480 MHz



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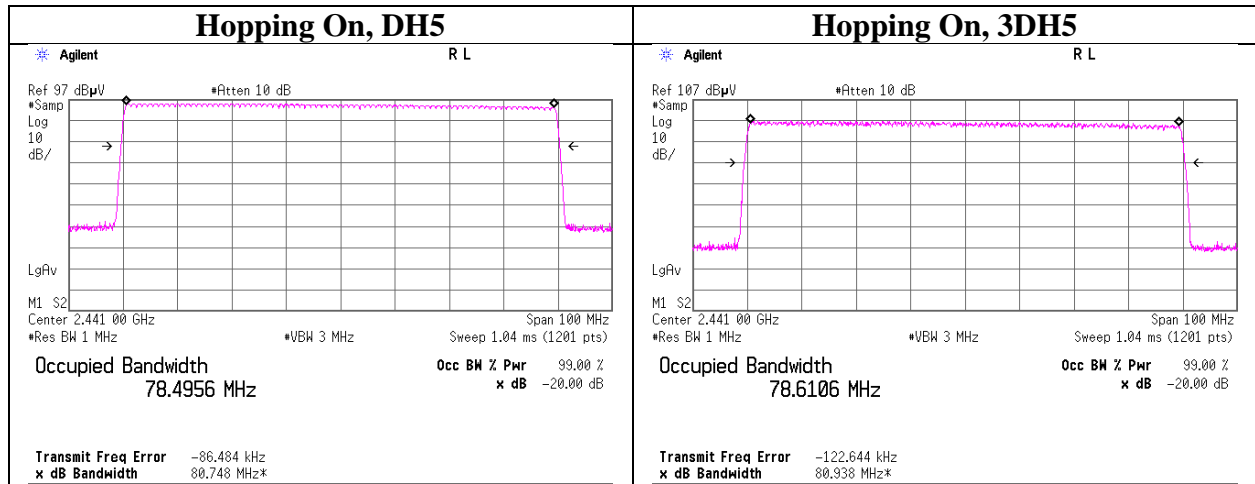
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## 99% Occupied Bandwidth

Test place	Shonan EMC Lab. No.6 Shielded Room
Report No.	11691426S-A-R1
Date	June 8, 2017
Temperature / Humidity	27 deg. C / 46 % RH
Engineer	Yosuke Ishikawa
Mode	Tx, Hopping On



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## **APPENDIX 2: Test instruments**

### **Test equipment**

<b>Control No.</b>	<b>Instrument</b>	<b>Manufacturer</b>	<b>Model No</b>	<b>Serial No</b>	<b>Test Item</b>	<b>Calibration Date * Interval(month)</b>
SAEC-01(NSA)	Semi-Anechoic Chamber	TDK	SAEC-01(NSA)	1	RE	2016/07/14 * 12
SAF-04	Pre Amplifier	TOYO Corporation	TPA0118-36	1440489	RE	2017/03/17 * 12
SCC-G06	Coaxial Cable	Junkosha	J12J102207-00	MAY-23-16-091	RE	2016/06/14 * 12
SCC-G23	Coaxial Cable	Suhner	SUCOFLEX 104	297342/4	RE	2017/05/08 * 12
SHA-01	Horn Antenna	Schwarzbeck	BBHA9120D	9120D-725	RE	2016/08/09 * 12
SOS-01	Humidity Indicator	A&D	AD-5681	4062555	RE	2016/10/12 * 12
SSA-02	Spectrum Analyzer	Agilent	E4448A	MY48250106	RE	2017/03/07 * 12
KJM-09	Measure	KOMELON	KMC-36	-	RE	-
COTS-SEMI-1	EMI Software	TSJ	TEPTO-DV(RE,CE,RFI,MF)	-	RE	-
STS-01	Digital Hitester	Hioki	3805-50	080997812	RE	2016/10/17 * 12
SCC-G41	Coaxial Cable	Junkosha	MWX221-0100	1612S006	RE	2017/01/08 * 12
SCC-G33	Coaxial Cable	Junkosha	MWX241-0100	-	RE	2017/04/20 * 12
SCC-G19	Coaxial Cable	Suhner	SUCOFLEX 102A	1188/2A	RE	2017/03/23 * 12
SAF-09	Pre Amplifier	TOYO Corporation	HAP18-26W	00000018	RE	2016/09/27 * 12
SHA-05	Horn Antenna	ETS LINDGREN	3160-09	LM4210	RE	2017/03/15 * 12
SFL-02	Highpass Filter	MICRO-TRONICS	HPM50111	051	RE	2016/11/29 * 12
KSA-08	Spectrum Analyzer	Agilent	E4446A	MY46180525	RE	2016/10/11 * 12
SAT10-05	Attenuator(above1GHz)	Agilent	8493C-010	74864	RE	2016/11/07 * 12
SRENT-08	Spectrum Analyzer	Agilent	E4448A	MY50180019	AT	2016/10/24 * 12
SCC-G14	Coaxial Cable	Suhner	SUCOFLEX 102	31600/2	AT	2017/03/23 * 12
SAT10-13	Attenuator	Weinschel Corp.	54A-10	81626	AT	2017/03/23 * 12
SPM-07	Power Meter	Agilent	8990B	MY5100272	AT	2017/05/01 * 12
SPSS-05	Power sensor	Agilent	N1923A	MY5349008	AT	2017/05/01 * 12
SOS-10	Humidity Indicator	A&D	AD-5681	4064561	AT	2016/10/12 * 12
STS-06	Digital Hitester	Hioki	3805-50	080997830	AT	2017/03/08 * 12

**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**

**AT: Antenna Terminal Conducted test**

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