



RADIO TEST REPORT

Test Report No. : 11766300S-A-R2

Applicant : Sony Corporation
Type of Equipment : AV Receiver
Model No. : XAV-AX200
FCC ID : AK8XAVAX200
Test regulation : FCC Part 15 Subpart C: 2017
Test Result : Complied

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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 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 11766300S-A-R1. 11766300S-A-R1 is replaced with this report.

Date of test: May 15 to 23, 2017

Representative test engineer:

Hiroyuki Morikawa
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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13-EM-F0429

REVISION HISTORY

Original Test Report No.: 11766300S-A

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SECTION 1: Customer information

Company Name	:	Sony Global Manufacturing & Operations Corporation
Address	:	8-4 Shiomi Kisarazu-shi, Chiba, 292-0834 Japan
Contact Person	:	Kazuhiko Nagano

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

2.1 Identification of E.U.T.

Type of Equipment	:	AV Receiver
Model No.	:	XAV-AX200
Serial No.	:	Refer to Section 4, Clause 4.2
Rating	:	DC 12 V
Receipt Date of Sample	:	May 11, 2017
Country of Mass-production	:	China
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: XAV-AX200 (referred to as the EUT in this report) is an AV Receiver.

Clock frequency(ies) in the system	:	27 MHz, 32 MHz, 26 MHz, 8 MHz, 37.05 MHz
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Radio Specification

Radio Type	:	Transceiver
Frequency of Operation	:	2402 MHz - 2480 MHz
Modulation	:	FHSS
Power Supply (radio part input)	:	DC 3.3 V
Antenna type	:	PIFA
Antenna Gain	:	1.68 dBi

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	*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)		-	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	7.4 dB 3982.521 MHz, AV, Vertical Tx 2480 MHz 3-DH5	Complied	Conducted/ Radiated (above 30 MHz) *1)

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

*1) The test is not applicable since the EUT has no AC mains.

*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)

The equipment provides the wireless transmitter with stable power supply (DC 3.3 V). Instead of a new battery, DC power supply was used for the test. That does not affect the test result, therefore the EUT complies with the requirement.

FCC Part 15.203 Antenna requirement

It is impossible for end users to replace the antenna, because the antenna is mounted inside of the EUT. Therefore, the equipment complies with the requirement.

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.

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3.4 Uncertainty

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	10m
No.2 Semi-anechoic chamber	2973D-2	20.6 x 11.3 x 7.65	20.6 x 11.3	10m
No.3 Semi-anechoic chamber	2973D-3	12.7 x 7.7 x 5.35	12.7 x 7.7	5m
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)

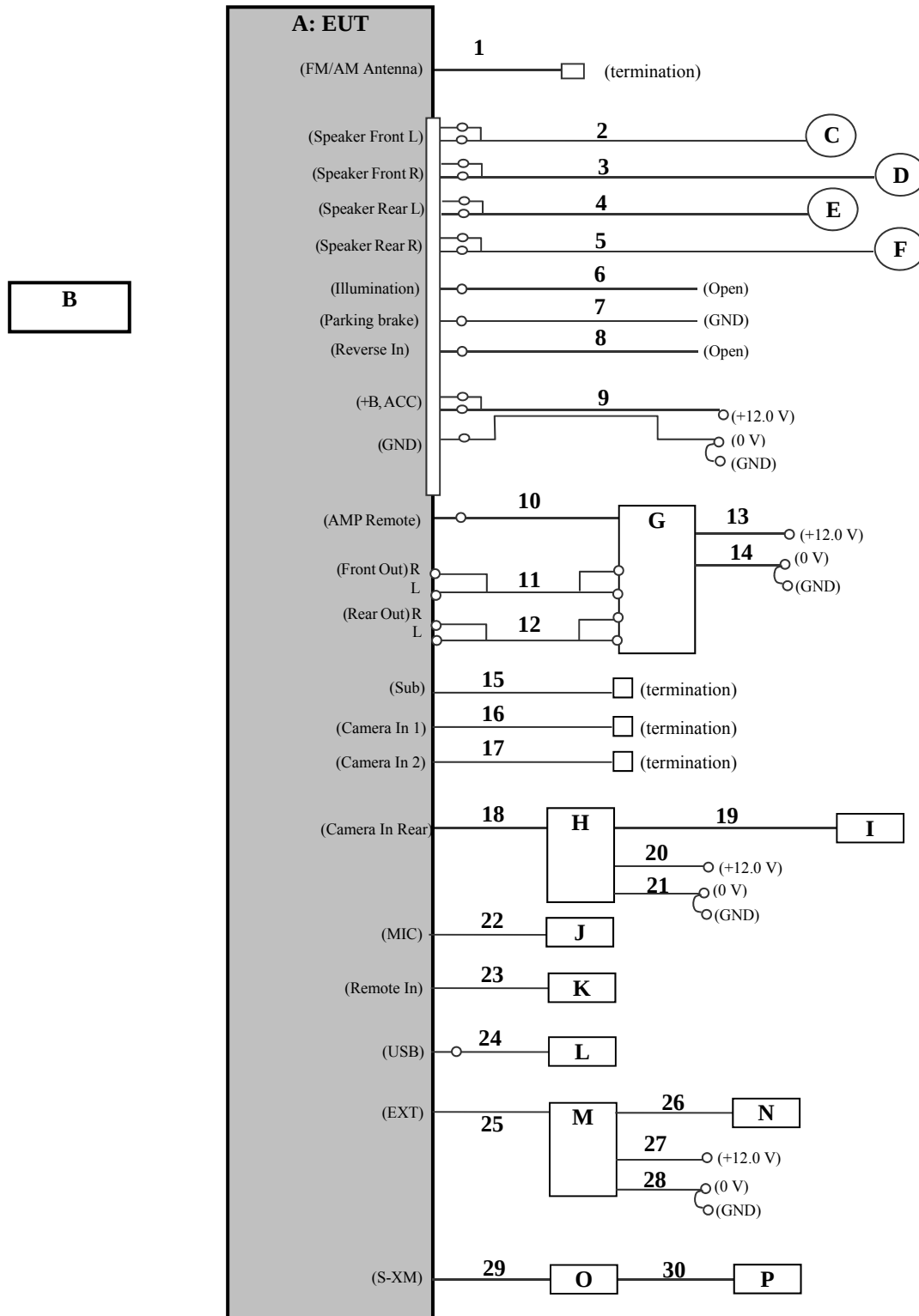
Bluetooth (BT): Transmitting (Tx), Payload: PRBS9

Details of Operating Mode(s)

Test Item	Mode	Tested frequency
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
*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) *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. * It is considered that the non-tested packet type (e.g. inquiry) can be omitted as it is complied with above all the test items based on Bluetooth Core specification. *EUT has the power settings by the software as follows; Power settings: Fixed Software: RDA Host Controller Data Transfer Tester Application *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.		

4.2 Configuration and peripherals

—○— : Connector



* Cabling and setup 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	AV Receiver	XAV-AX200	ETUC041 *1) ETUC001 *2)	Sony	EUT
B	Remote Commander	RM-X170	-	Sony	-
C	Speaker 1	IS-10	-	Sony	-
D	Speaker 2	IS-10	-	Sony	-
E	Speaker 3	XS-GTF1625R	-	Sony	-
F	Speaker 4	XS-GTF1625R	-	Sony	-
G	Stereo Power Amplifier	XM-4S-020	SoC5	Sony	-
H	Rear View Camera	XA-R800C	100114	Sony	-
I	Camera	-	-	Sony	-
J	MIC	-	-	Sony	-
K	Wired Remote Controller	RM-X4S	-	Sony	-
L	USB Memory	SDK-USM4GL(B)	10615MEDB	Sony	-
M	Navigation Module	XA-NV400	EPP0024	Sony	-
N	GPS Antenna	-	-	Sony	-
O	Vehicle Tuner	SXV300	QM90DWR	Sony	-
P	Antenna	NGVA3	1624A	Sony	-

*1) for Radiated emission test

*2) for Antenna terminal test

List of cables used

No.	Name	Length (m)	Shield (Cable)	Shield (Connector)	Remarks
1	FM antenna	1.1	Shielded	Shielded	-
2	Speaker (1)	0.15+2.4	Unshielded	Unshielded	-
3	Speaker (2)	0.15+2.4	Unshielded	Unshielded	-
4	Speaker (3)	0.15+1.9	Unshielded	Unshielded	-
5	Speaker (4)	0.15+1.9	Unshielded	Unshielded	-
6	Illumination	0.15+1.0	Unshielded	Unshielded	-
7	Parking	0.15+1.0	Unshielded	Unshielded	-
8	Reverse In	0.15+1.9	Unshielded	Unshielded	-
9	DC Power	0.15+2.4	Unshielded	Unshielded	-
10	AMP Remote	0.15+1.4	Unshielded	Unshielded	-
11	RCA (Front Audio Out)	5.0	Shielded	Shielded	-
12	RCA (Rear Audio Out)	3.5	Shielded	Shielded	-
13	DC Power (+)	1.1	Unshielded	Unshielded	-
14	DC Power (-)	1.1	Unshielded	Unshielded	-
15	RCA (Sub Audio Out)	1.1	Shielded	Shielded	-
16	Video	5.0	Shielded	Shielded	-
17	Video	3.0	Shielded	Shielded	-
18	Video	5.9	Shielded	Shielded	-
19	Camera	3.0	Shielded	Shielded	-
20	DC Power (+)	0.9	Unshielded	Unshielded	-
21	DC Power (-)	0.9	Unshielded	Unshielded	-
22	MIC	3.5	Shielded	Shielded	-
23	REMOTE IN	1.9	Shielded	Shielded	-
24	USB	0.2+1.3	Shielded	Shielded	-
25	EXT	1.5	Shielded	Shielded	-
26	Antenna	2.9	Shielded	Shielded	-
27	DC Power (+)	1.5+0.25	Unshielded	Unshielded	-
28	DC Power (-)	1.5+0.25	Unshielded	Unshielded	-
29	S-XM	0.6	Shielded	Shielded	-
30	Antenna	7.0	Shielded	Shielded	-

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SECTION 5: Radiated Spurious Emission

Test Procedure

[For below 1 GHz]

EUT was placed on a platform of nominal size, 1.0 m by 1.5 m, raised 0.8 m above the conducting ground plane. The table is made of Styrofoam and covered with polyvinyl chloride. That has very low permittivity. 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 m 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	3.88 m*2) (1 GHz – 13 GHz), 1 m*3) (13 GHz – 26.5 GHz)		3.88 m*2) (1 GHz – 13 GHz), 1 m*3) (13 GHz – 26.5 GHz)

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

*2) Distance Factor: $20 \times \log (3.88 \text{ m}/3.0 \text{ m}) = 2.24 \text{ dB}$

*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 -45 deg. to +45 deg. based on the product specification to see the position of maximum noise, and the test was made at the worst case condition (0 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.

Test	Span	RBW	VBW	Sweep time	Detector	Trace	Instrument used
20dB Bandwidth	3 MHz	30 kHz	100 kHz	Auto	Peak	Max Hold	Spectrum Analyzer
99% Occupied Bandwidth	Enough width to display emission skirts	1 to 5 % of OBW	Three times of RBW	Auto	Peak	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 *3)	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 %.

*2) Reference data

*3) 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

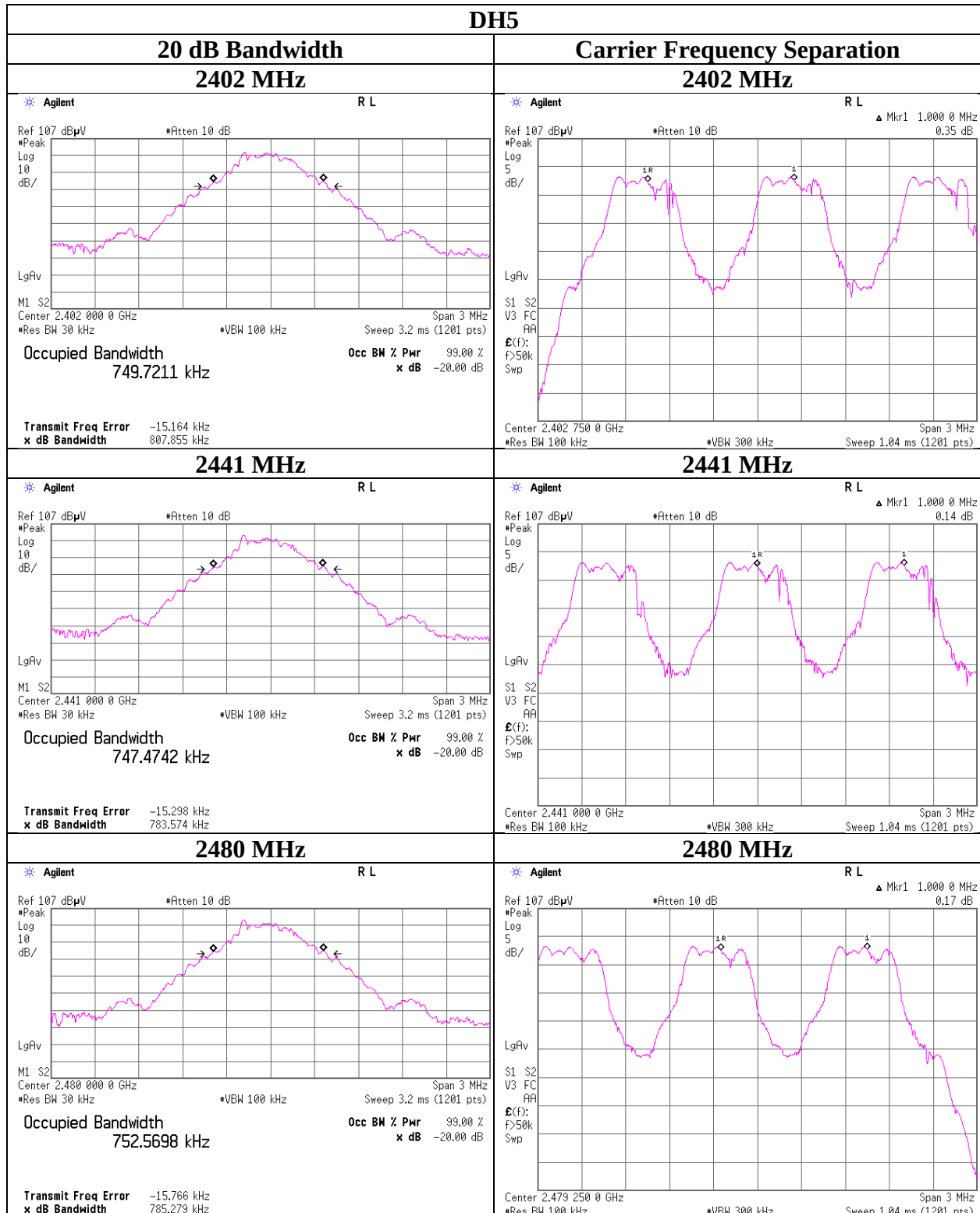
Test place Shonan EMC Lab. No.5 Shielded Room
Report No. 11766300S-A-R2
Date May 23, 2017
Temperature / Humidity 25 deg. C / 49 % RH
Engineer Yosuke Ishikawa
Mode Tx, Hopping Off, DH5

Mode	Freq. [MHz]	20dB Bandwidth [MHz]	Carrier Frequency Separation [MHz]	Limit for Carrier Frequency separation [MHz]
DH5	2402.0	0.808	1.000	≥ 0.539
DH5	2441.0	0.784	1.000	≥ 0.522
DH5	2480.0	0.785	1.000	≥ 0.524
3DH5	2402.0	1.066	1.000	≥ 0.710
3DH5	2441.0	1.068	1.000	≥ 0.712
3DH5	2480.0	1.087	1.000	≥ 0.724

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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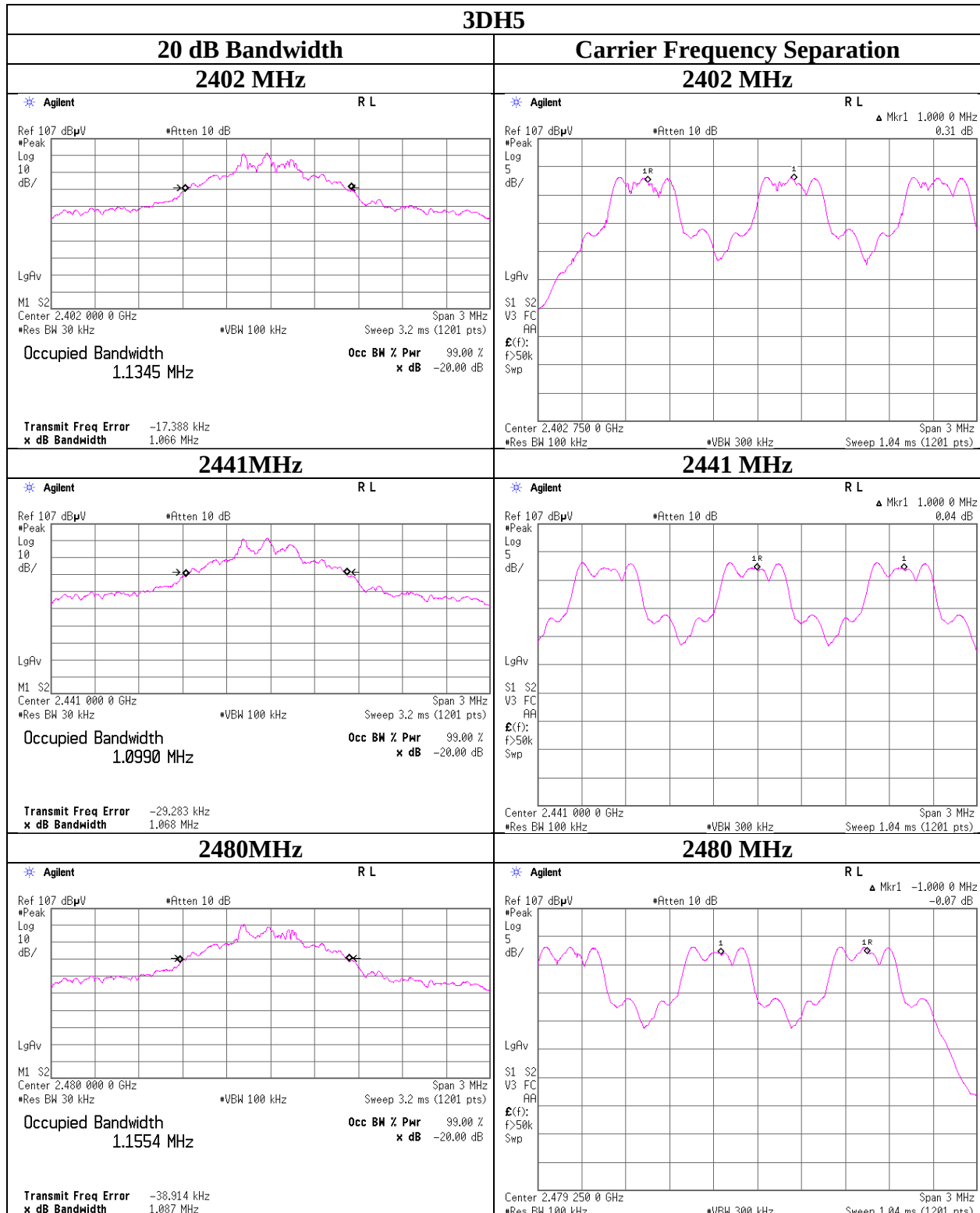
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20dB Bandwidth and Carrier Frequency Separation



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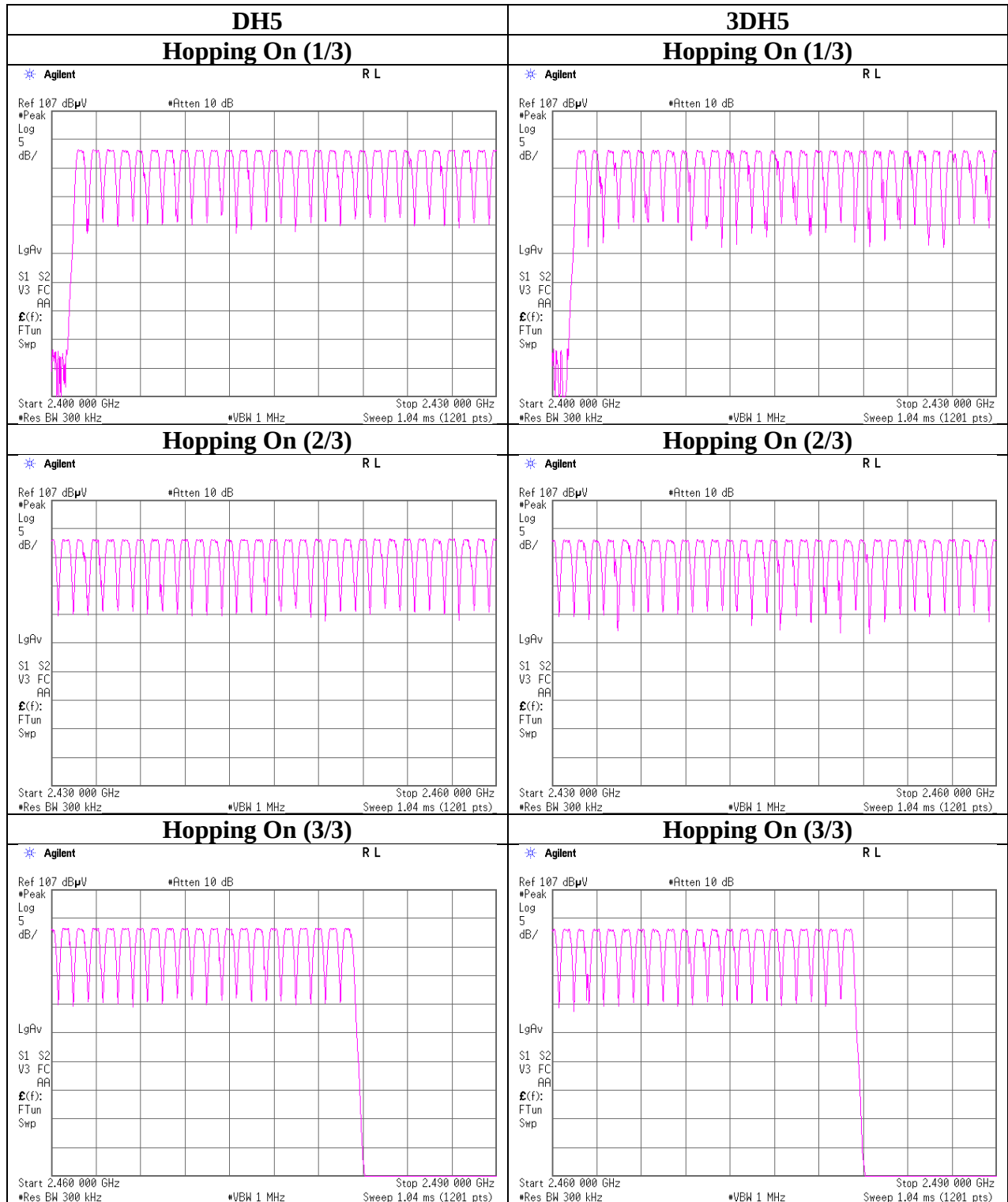
Number of Hopping Frequency

Test place Shonan EMC Lab. No.5 Shielded Room
Report No. 11766300S-A-R2
Date May 23, 2017
Temperature / Humidity 25 deg. C / 49 % RH
Engineer Yosuke Ishikawa
Mode Tx, Hopping On

Mode	Number of channel [channels]	Limit [channels]
DH5	79	≥ 15
3DH5	79	≥ 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



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Dwell time

Test place : Shonan EMC Lab. No.5 Shielded Room
Report No. : 11766300S-A-R2
Date : May 23, 2017
Temperature / Humidity : 25 deg. C / 49 % 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	51.0 times	/	5 sec.	x 31.6 sec. = 323 times	0.416	134	400
DH3	26.0 times	/	5 sec.	x 31.6 sec. = 165 times	1.690	279	400
DH5	17.0 times	/	5 sec.	x 31.6 sec. = 108 times	2.947	318	400
3DH1	51.0 times	/	5 sec.	x 31.6 sec. = 323 times	0.416	134	400
3DH3	26.0 times	/	5 sec.	x 31.6 sec. = 165 times	1.690	279	400
3DH5	17.0 times	/	5 sec.	x 31.6 sec. = 108 times	2.934	317	400

Sample Calculation

Result = Number of transmission x Length of transmission

*Average data of 5 tests.(except Inquiry)

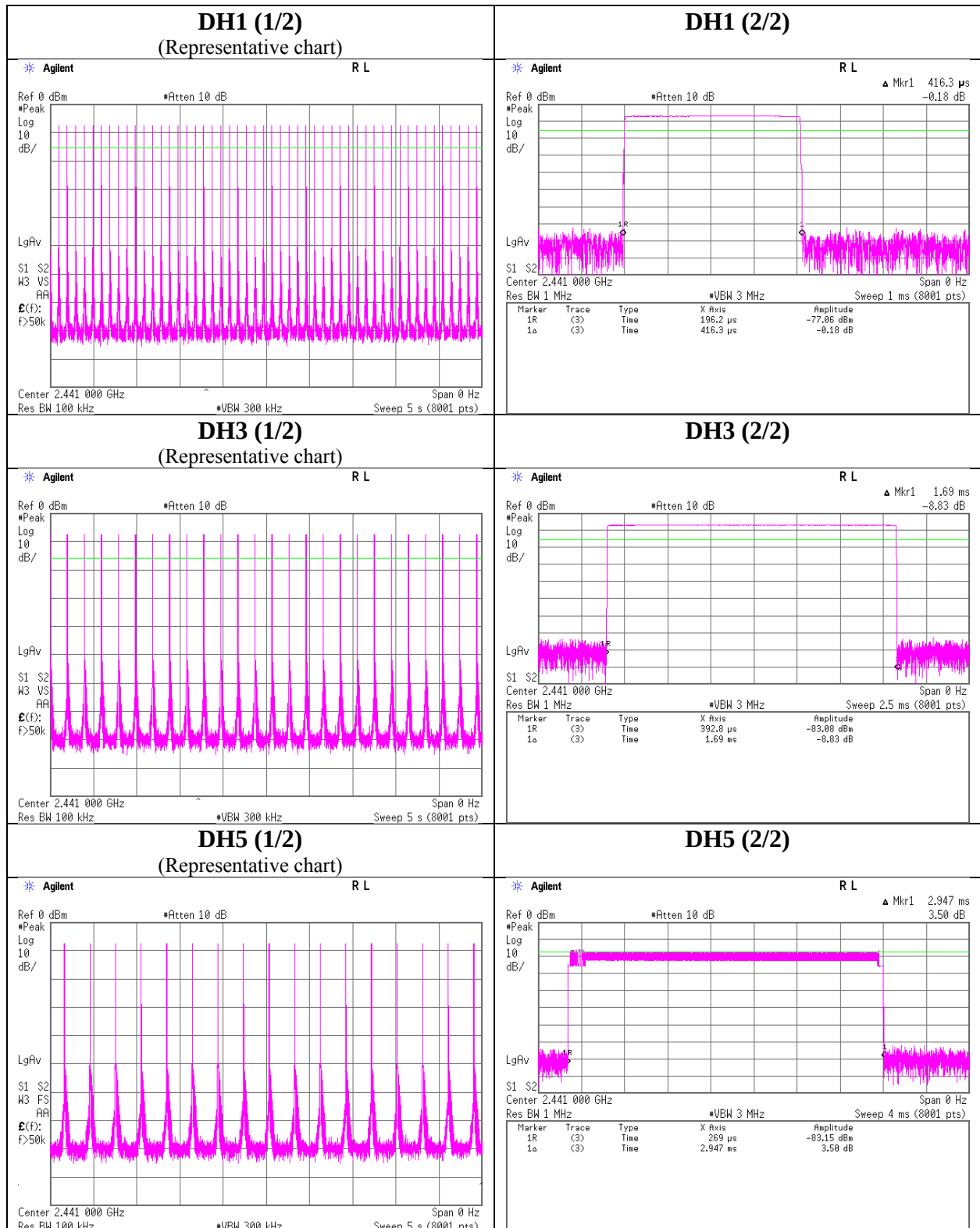
Mode	Sampling [times]					Average [times]
	1	2	3	4	5	
DH1	51	51	51	51	51	51
DH3	26	26	26	26	26	26
DH5	17	17	17	17	17	17
3DH1	51	51	51	51	51	51
3DH3	26	26	26	26	26	26
3DH5	17	17	17	17	17	17

Sample Calculation

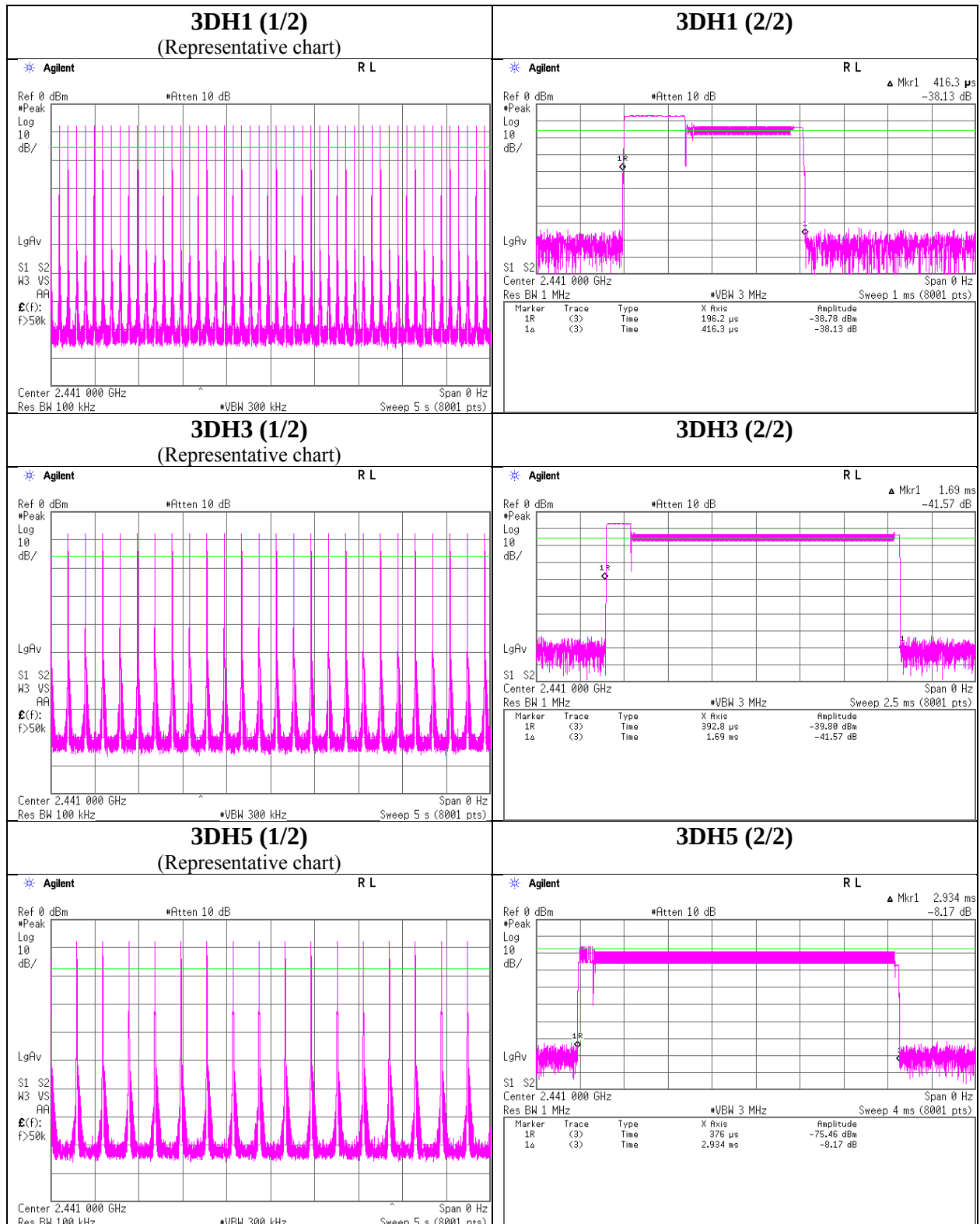
Average = Summation (Sampling 1 to 5) / 5

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



Dwell time



Maximum Peak Output Power

Test place	Shonan EMC Lab. No.5 Shielded Room
Report No.	11766300S-A-R2
Date	May 23, 2017
Temperature / Humidity	25 deg. C / 49 % 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	-5.90	1.08	9.64	4.82	3.03	20.96	125	16.14
DH5	2441.0	-5.92	1.08	9.64	4.80	3.02	20.96	125	16.16
DH5	2480.0	-5.96	1.09	9.65	4.78	3.01	20.96	125	16.18
2DH5	2402.0	-7.22	1.08	9.64	3.50	2.24	20.96	125	17.46
2DH5	2441.0	-7.11	1.08	9.64	3.61	2.30	20.96	125	17.35
2DH5	2480.0	-7.25	1.09	9.65	3.49	2.23	20.96	125	17.47
3DH5	2402.0	-5.99	1.08	9.64	4.73	2.97	20.96	125	16.23
3DH5	2441.0	-5.94	1.08	9.64	4.78	3.01	20.96	125	16.18
3DH5	2480.0	-5.97	1.09	9.65	4.77	3.00	20.96	125	16.19

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.5 Shielded Room
Report No. : 11766300S-A-R2
Date : May 23, 2017
Temperature / Humidity : 25 deg. C / 49 % 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	-8.38	1.08	9.64	2.34	1.71	1.06	3.40	2.19
DH5	2441.0	-8.27	1.08	9.64	2.45	1.76	1.06	3.51	2.24
DH5	2480.0	-8.44	1.09	9.65	2.30	1.70	1.06	3.36	2.17
2DH5	2402.0	-14.35	1.08	9.64	-3.63	0.43	1.06	-2.57	0.55
2DH5	2441.0	-14.28	1.08	9.64	-3.56	0.44	1.06	-2.50	0.56
2DH5	2480.0	-14.33	1.09	9.65	-3.59	0.44	1.06	-2.53	0.56
3DH5	2402.0	-14.40	1.08	9.64	-3.68	0.43	1.06	-2.62	0.55
3DH5	2441.0	-14.33	1.08	9.64	-3.61	0.44	1.06	-2.55	0.56
3DH5	2480.0	-14.43	1.09	9.65	-3.69	0.43	1.06	-2.63	0.55

Sample Calculation:

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

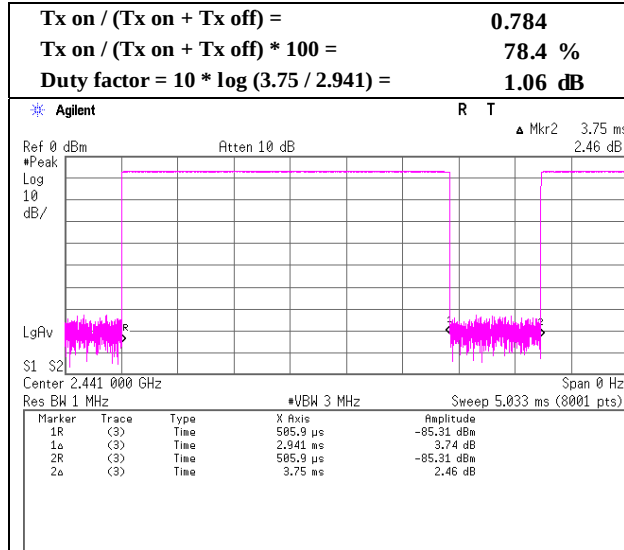
Result (Burst power average) = Time average + Duty factor

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

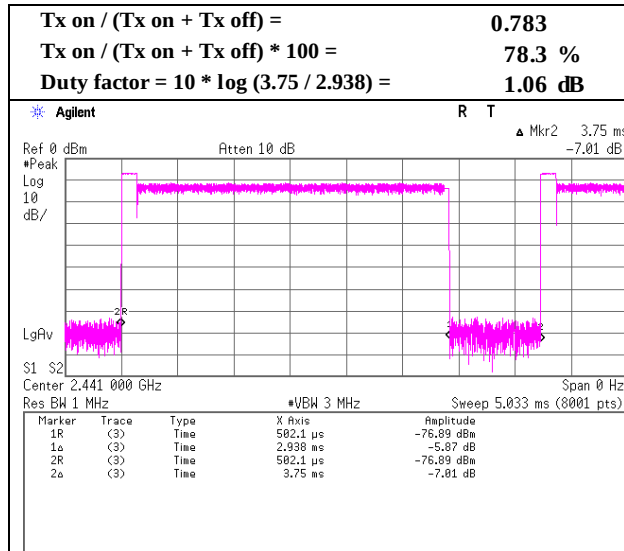
Burst Rate Confirmation

Test place : Shonan EMC Lab. No.5 Shielded Room
Report No. : 11766300S-A-R2
Date : May 23, 2017
Temperature / Humidity : 25 deg. C / 49 % RH
Engineer : Yosuke Ishikawa
Mode : Tx, Hopping Off

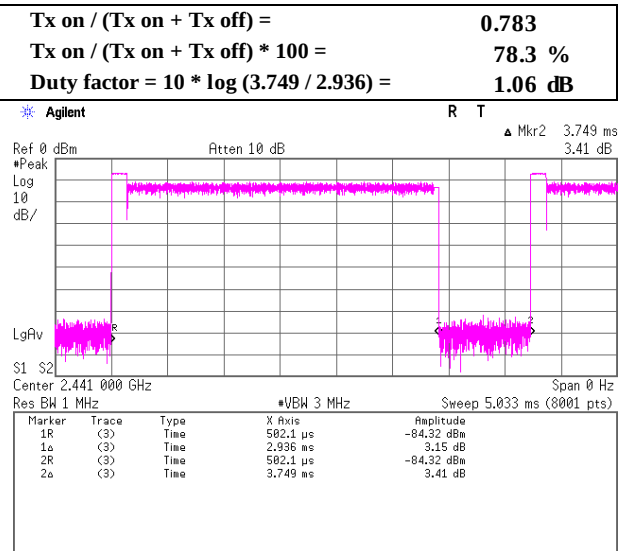
DH5



2DH5

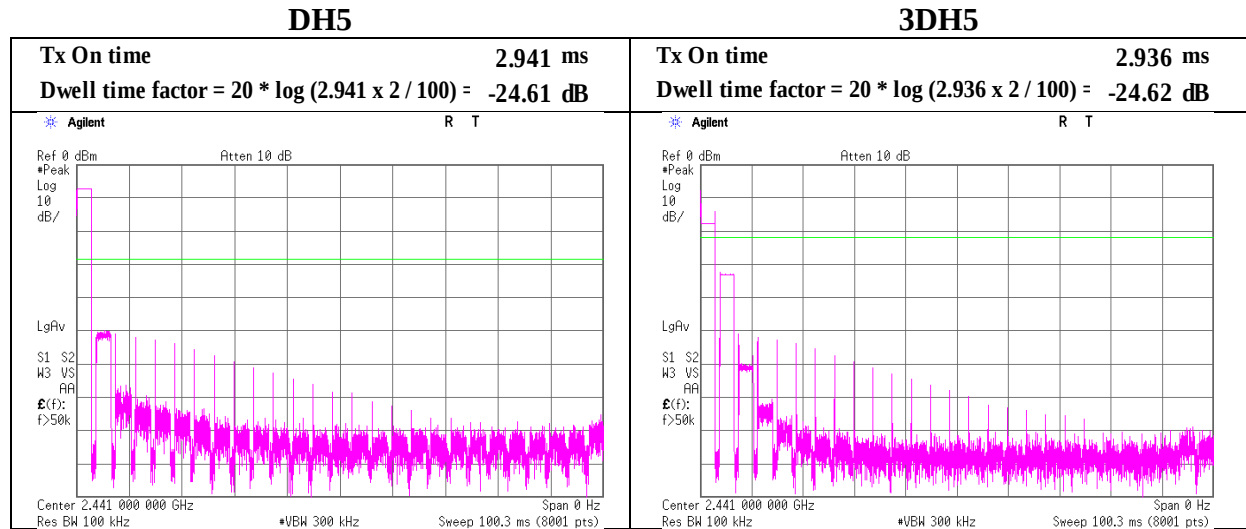


3DH5



Dwell time factor

Test place	Shonan EMC Lab. No.5 Shielded Room
Report No.	11766300S-A-R2
Date	May 23, 2017
Temperature / Humidity	25 deg. C / 49 % RH
Engineer	Yosuke Ishikawa
Mode	Tx, Hopping On



A hopping channel might be occupied 2 times within 100 ms on minimum hopping mode (AFH). Therefore Tx On time was multiplied by 2. As for Tx On time, refer to “Burst Rate Confirmation”.

Radiated Spurious Emission

Report No.	11766300S-A-R2		
Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	No.3	No.3	No.3
Date	May 15, 2017	May 17, 2017	May 15, 2017
Temperature / Humidity	24 deg. C / 45 % RH	24 deg. C / 48 % RH	24 deg. C / 45 % RH
Engineer	Makoto Hosaka	Hiroyuki Morikawa	Hiroyuki Morikawa
	(30 MHz -1 GHz)	(1 GHz -13 GHz)	(13 GHz -25 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.	101.993	QP	45.98	10.27	7.49	32.08	0.00	31.66	43.50	11.8	314	149	
Hori.	127.046	QP	38.58	13.35	7.50	32.05	0.00	27.38	43.50	16.1	260	270	
Hori.	356.200	QP	38.98	14.64	9.02	31.85	0.00	30.79	46.00	15.2	165	324	
Hori.	2390.000	PK	48.03	27.41	14.24	40.85	2.24	51.07	73.90	22.8	145	321	
Hori.	3982.529	PK	58.84	29.63	6.37	42.11	2.24	54.97	73.90	18.9	183	153	
Hori.	4804.000	PK	60.48	31.13	6.58	41.86	2.24	58.57	73.90	15.3	202	206	
Hori.	7206.000	PK	50.06	36.44	8.31	41.18	2.24	55.87	73.90	18.0	397	335	
Hori.	9608.000	PK	45.79	38.63	9.35	40.59	2.24	55.42	73.90	18.4	150	0	
Hori.	2390.000	AV	33.97	27.41	14.24	40.85	2.24	37.01	53.90	16.8	145	321	
Hori.	3982.529	AV	49.43	29.63	6.37	42.11	2.24	45.56	53.90	8.3	183	153	
Vert.	137.781	QP	38.17	14.14	7.70	32.04	0.00	27.97	43.50	15.5	100	117	
Vert.	270.000	QP	35.98	12.36	8.56	31.92	0.00	24.98	46.00	21.0	100	177	
Vert.	356.200	QP	43.78	14.64	9.02	31.85	0.00	35.59	46.00	10.4	153	182	
Vert.	593.998	QP	37.28	18.87	10.00	31.83	0.00	34.32	46.00	11.6	138	357	
Vert.	620.997	QP	40.47	19.08	10.10	31.83	0.00	37.82	46.00	8.1	125	1	
Vert.	2390.000	PK	47.61	27.41	14.24	40.85	2.24	50.65	73.90	23.2	343	214	
Vert.	3982.523	PK	59.72	29.63	6.37	42.11	2.24	55.85	73.90	18.0	161	220	
Vert.	4804.000	PK	59.00	31.13	6.58	41.86	2.24	57.09	73.90	16.8	119	307	
Vert.	7206.000	PK	50.57	36.44	8.31	41.18	2.24	56.38	73.90	17.5	159	334	
Vert.	9608.000	PK	46.31	38.63	9.35	40.59	2.24	55.94	73.90	17.9	150	0	
Vert.	2390.000	AV	33.94	27.41	14.24	40.85	2.24	36.98	53.90	16.9	343	214	
Vert.	3982.523	AV	49.74	29.63	6.37	42.11	2.24	45.87	53.90	8.0	161	220	

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

Distance factor : 1 GHz - 13 GHz : 20log (3.88 m / 3.0 m) = 2.24 dB

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

Dwell time factor relaxation

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Dwell Factor [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	4804.000	AV	55.66	31.13	6.58	41.86	-24.61	2.24	29.14	53.90	24.8	
Hori.	7206.000	AV	40.72	36.44	8.31	41.18	-24.61	2.24	21.92	53.90	32.0	
Hori.	9608.000	AV	33.91	38.63	9.35	40.59	-24.61	2.24	18.93	53.90	35.0	
Vert.	4804.000	AV	53.98	31.13	6.58	41.86	-24.61	2.24	27.46	53.90	26.4	
Vert.	7206.000	AV	41.18	36.44	8.31	41.18	-24.61	2.24	22.38	53.90	31.5	
Vert.	9608.000	AV	33.83	38.63	9.35	40.59	-24.61	2.24	18.85	53.90	35.1	

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

Distance factor : 1 GHz - 13 GHz : 20log (3.88 m / 3.0 m) = 2.24 dB

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

Dwell (time) factor refer to "Dwell time factor Calculation chart" sheet.

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	89.04	27.46	14.25	40.84	2.24	92.15	-	-	Carrier
Hori.	2400.000	PK	44.82	27.45	14.25	40.84	2.24	47.92	72.15	24.2	
Vert.	2402.000	PK	87.31	27.46	14.25	40.84	2.24	90.42	-	-	Carrier
Vert.	2400.000	PK	43.27	27.45	14.25	40.84	2.24	46.37	70.42	24.1	

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

Distance factor : 1 GHz - 13 GHz : 20log (3.88 m / 3.0 m) = 2.24 dB

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

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Shonan EMC Lab.

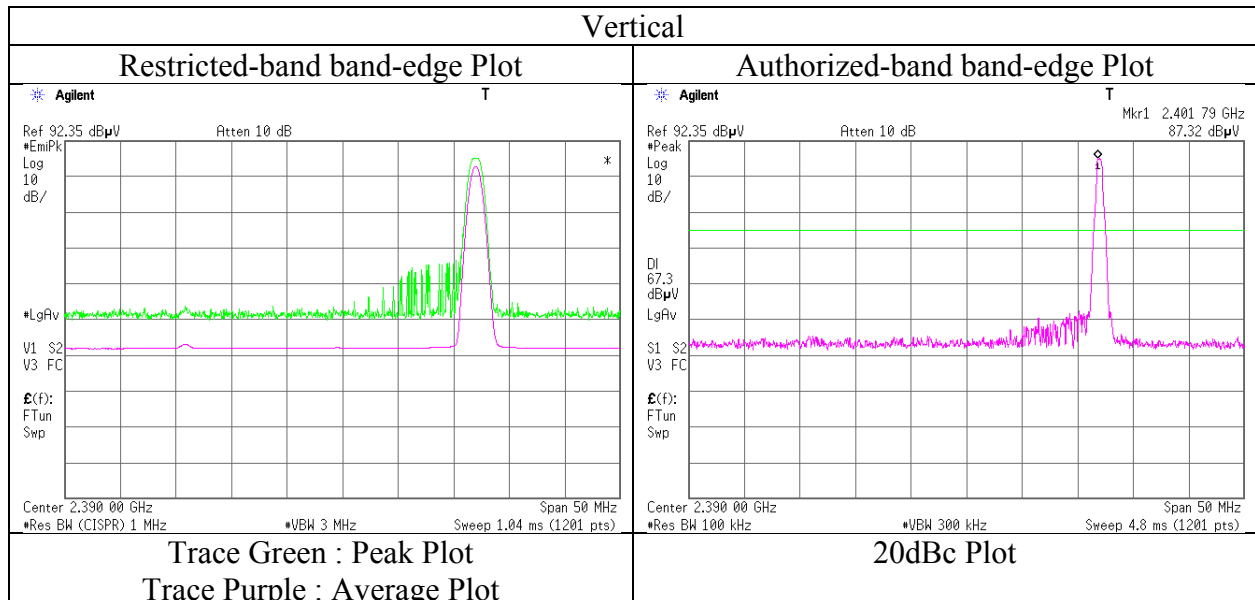
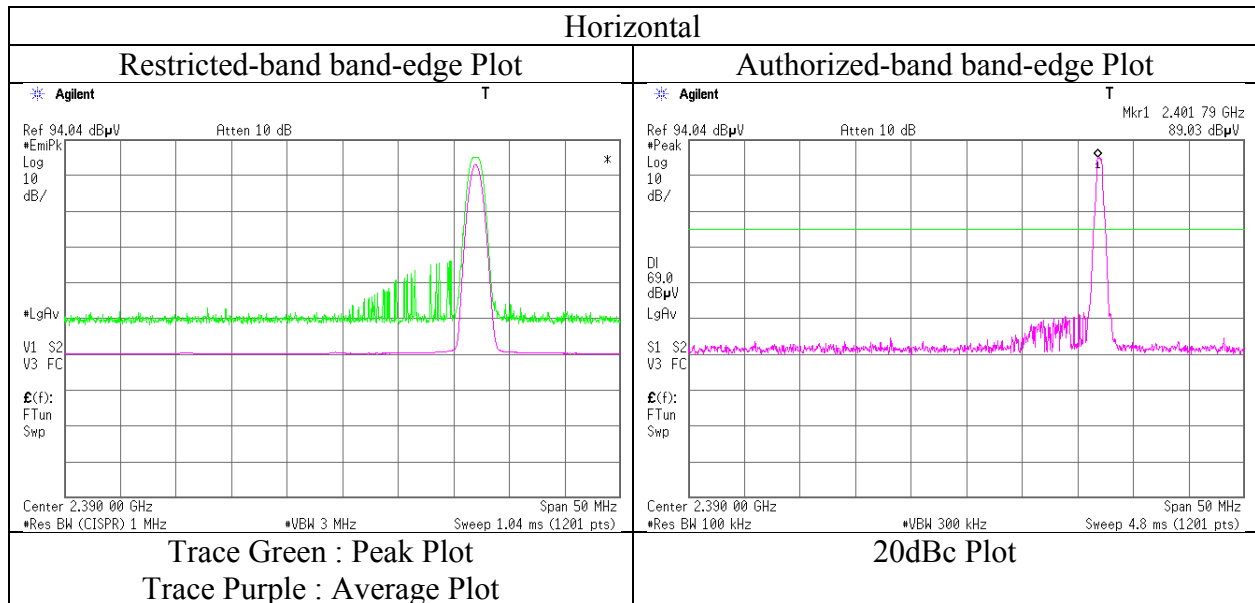
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Radiated Spurious Emission (Reference Plot for band-edge)

Report No.	11766300S-A-R2
Test place	Shonan EMC Lab.
Semi Anechoic Chamber	No.3
Date	May 17, 2017
Temperature / Humidity	24 deg. C / 48 % RH
Engineer	Hiroyuki Morikawa (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.	11766300S-A-R2		
Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	No.3	No.3	No.3
Date	May 15, 2017	May 17, 2017	May 15, 2017
Temperature / Humidity	24 deg. C / 45 % RH	24 deg. C / 48 % RH	24 deg. C / 45 % RH
Engineer	Hiroyuki Morikawa	Hiroyuki Morikawa	Hiroyuki Morikawa
	(30 MHz -1 GHz)	(1 GHz -13 GHz)	(13 GHz -25 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.	102.044	QP	45.80	10.27	7.49	32.08	0.00	31.48	43.50	12.0	195	282	
Hori.	134.269	QP	40.50	13.88	7.63	32.05	0.00	29.96	43.50	13.5	231	275	
Hori.	356.358	QP	44.10	14.65	9.02	31.85	0.00	35.92	46.00	10.0	114	8	
Hori.	378.001	QP	43.50	15.13	9.11	31.86	0.00	35.88	46.00	10.1	101	213	
Hori.	3982.573	PK	58.02	29.63	6.37	42.11	2.24	54.15	73.90	19.7	174	155	
Hori.	4882.000	PK	59.74	31.29	6.63	41.76	2.24	58.14	73.90	15.7	154	211	
Hori.	7323.000	PK	50.42	36.77	8.47	41.27	2.24	56.63	73.90	17.2	124	334	
Hori.	9764.000	PK	43.89	38.75	9.48	40.62	2.24	53.74	73.90	20.1	150	0	
Hori.	3982.573	AV	48.69	29.63	6.37	42.11	2.24	44.82	53.90	9.0	174	155	
Vert.	125.321	QP	42.50	13.23	7.47	32.05	0.00	31.15	43.50	12.3	100	252	
Vert.	620.994	QP	40.70	19.08	10.10	31.83	0.00	38.05	46.00	7.9	123	15	
Vert.	701.999	QP	35.20	19.60	10.40	31.73	0.00	33.47	46.00	12.5	115	338	
Vert.	810.001	QP	33.20	20.71	10.74	31.42	0.00	33.23	46.00	12.7	100	0	
Vert.	3982.573	PK	60.03	29.63	6.37	42.11	2.24	56.16	73.90	17.7	159	223	
Vert.	4882.000	PK	57.85	31.29	6.63	41.76	2.24	56.25	73.90	17.6	129	297	
Vert.	7323.000	PK	49.63	36.77	8.47	41.27	2.24	55.84	73.90	18.0	170	351	
Vert.	9764.000	PK	44.13	38.75	9.48	40.62	2.24	53.98	73.90	19.9	150	0	
Vert.	3982.573	AV	49.43	29.63	6.37	42.11	2.24	45.56	53.90	8.3	159	223	

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

Distance factor : 1 GHz - 13 GHz : $20\log(3.88\text{ m} / 3.0\text{ m}) = 2.24\text{ dB}$

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

Dwell time factor relaxation

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Dwell Factor [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	4882.000	AV	54.84	31.29	6.63	41.76	-24.61	2.24	28.63	53.90	25.3	
Hori.	7323.000	AV	41.75	36.77	8.47	41.27	-24.61	2.24	23.35	53.90	30.6	
Hori.	9764.000	AV	32.38	38.75	9.48	40.62	-24.61	2.24	17.62	53.90	36.3	
Vert.	4882.000	AV	52.91	31.29	6.63	41.76	-24.61	2.24	26.70	53.90	27.2	
Vert.	7323.000	AV	40.89	36.77	8.47	41.27	-24.61	2.24	22.49	53.90	31.4	
Vert.	9764.000	AV	32.37	38.75	9.48	40.62	-24.61	2.24	17.61	53.90	36.3	

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

Distance factor : 1 GHz - 13 GHz : $20\log(3.88\text{ m} / 3.0\text{ m}) = 2.24\text{ dB}$

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

Dwell (time) factor refer to "Dwell time factor Calculation chart" sheet.

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Radiated Spurious Emission

Report No.	11766300S-A-R2		
Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	No.3	No.3	No.3
Date	May 15, 2017	May 17, 2017	May 15, 2017
Temperature / Humidity	24 deg. C / 45 % RH	24 deg. C / 48 % RH	24 deg. C / 45 % RH
Engineer	Makoto Hosaka	Hiroyuki Morikawa	Hiroyuki Morikawa
	(30 MHz -1 GHz)	(1 GHz -13 GHz)	(13 GHz -25 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.	101.997	QP	46.77	10.27	7.49	32.08	0.00	32.45	43.50	11.0	301	282	
Hori.	307.202	QP	35.98	13.55	8.76	31.90	0.00	26.39	46.00	19.6	116	120	
Hori.	356.354	QP	44.57	14.65	9.02	31.85	0.00	36.39	46.00	9.6	121	0	
Hori.	377.856	QP	42.40	15.13	9.11	31.86	0.00	34.78	46.00	11.2	108	209	
Hori.	2483.500	PK	49.53	27.79	14.35	40.81	2.24	53.10	73.90	20.8	140	290	
Hori.	3982.542	PK	58.80	29.63	6.37	42.11	2.24	54.93	73.90	18.9	176	157	
Hori.	4960.000	PK	55.17	31.45	6.68	41.65	2.24	53.89	73.90	20.0	154	210	
Hori.	7440.000	PK	50.30	37.11	8.63	41.36	2.24	56.92	73.90	16.9	112	315	
Hori.	9920.000	PK	43.21	38.87	9.60	40.66	2.24	53.26	73.90	20.6	150	0	
Hori.	2483.500	AV	34.26	27.79	14.35	40.81	2.24	37.83	53.90	16.0	140	290	
Hori.	3982.542	AV	49.82	29.63	6.37	42.11	2.24	45.95	53.90	7.9	176	157	
Vert.	125.265	QP	37.48	13.22	7.47	32.05	0.00	26.12	43.50	17.3	298	1	
Vert.	356.354	QP	40.82	14.65	9.02	31.85	0.00	32.64	46.00	13.3	161	3	
Vert.	702.000	QP	38.77	19.60	10.40	31.73	0.00	37.04	46.00	8.9	112	27	
Vert.	810.000	QP	36.67	20.71	10.74	31.42	0.00	36.70	46.00	9.3	100	4	
Vert.	2483.500	PK	45.72	27.79	14.35	40.81	2.24	49.29	73.90	24.6	137	123	
Vert.	3982.540	PK	60.32	29.63	6.37	42.11	2.24	56.45	73.90	17.4	155	223	
Vert.	4960.000	PK	54.20	31.45	6.68	41.65	2.24	52.92	73.90	20.9	146	286	
Vert.	7440.000	PK	50.73	37.11	8.63	41.36	2.24	57.35	73.90	16.5	190	319	
Vert.	9920.000	PK	43.54	38.87	9.60	40.66	2.24	53.59	73.90	20.3	150	0	
Vert.	2483.500	AV	33.96	27.79	14.35	40.81	2.24	37.53	53.90	16.3	137	123	
Vert.	3982.540	AV	50.09	29.63	6.37	42.11	2.24	46.22	53.90	7.6	155	223	

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

Distance factor : 1 GHz - 13 GHz : 20log (3.88 m / 3.0 m) = 2.24 dB

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

Dwell time factor relaxation

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Dwell Factor [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	4960.000	AV	49.32	31.45	6.68	41.65	-24.61	2.24	23.43	53.90	30.5	
Hori.	7440.000	AV	41.64	37.11	8.63	41.36	-24.61	2.24	23.65	53.90	30.3	
Hori.	9920.000	AV	31.57	38.87	9.60	40.66	-24.61	2.24	17.01	53.90	36.9	
Vert.	4960.000	AV	47.92	31.45	6.68	41.65	-24.61	2.24	22.03	53.90	31.9	
Vert.	7440.000	AV	41.99	37.11	8.63	41.36	-24.61	2.24	24.00	53.90	29.9	
Vert.	9920.000	AV	31.58	38.87	9.60	40.66	-24.61	2.24	17.02	53.90	36.9	

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

Distance factor : 1 GHz - 13 GHz : 20log (3.88 m / 3.0 m) = 2.24 dB

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

Dwell (time) factor refer to "Dwell time factor Calculation chart" sheet.

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Shonan EMC Lab.

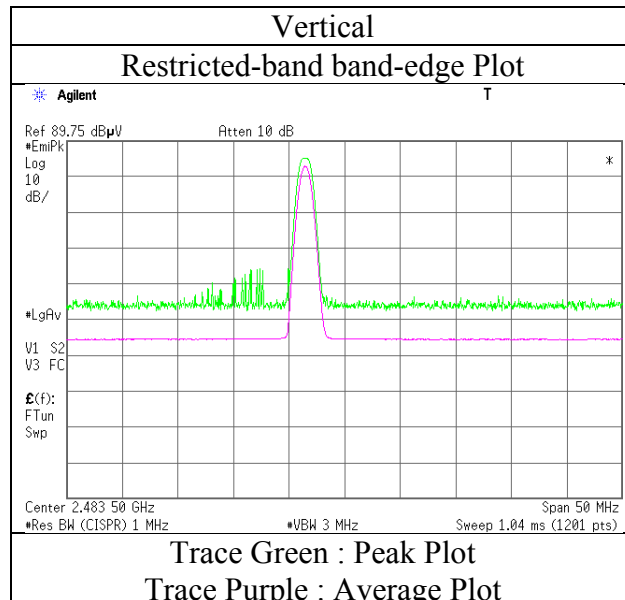
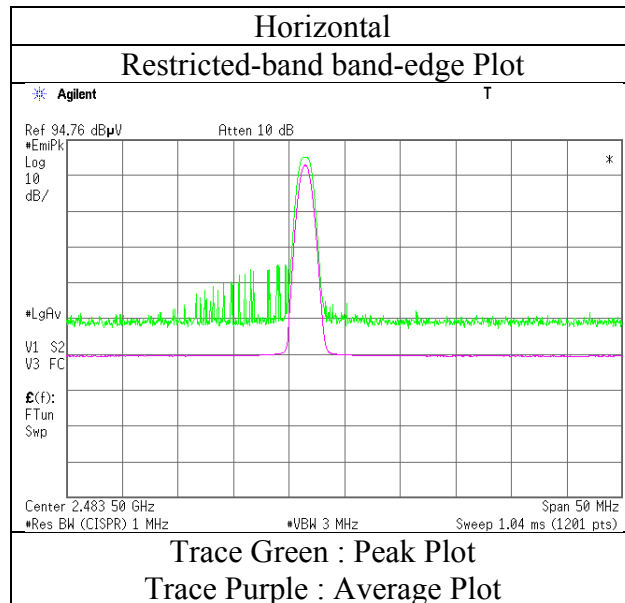
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Radiated Spurious Emission (Reference Plot for band-edge)

Report No.	11766300S-A-R2
Test place	Shonan EMC Lab.
Semi Anechoic Chamber	No.3
Date	May 17, 2017
Temperature / Humidity	24 deg. C / 48 % RH
Engineer	Hiroyuki Morikawa (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.	11766300S-A-R2		
Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	No.3	No.3	No.3
Date	May 15, 2017	May 17, 2017	May 15, 2017
Temperature / Humidity	24 deg. C / 45 % RH	24 deg. C / 48 % RH	24 deg. C / 45 % RH
Engineer	Makoto Hosaka	Hiroyuki Morikawa	Hiroyuki Morikawa
	(30 MHz -1 GHz)	(1 GHz -13 GHz)	(13 GHz -25 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.	102.041	QP	43.55	10.27	7.49	32.08	0.00	29.23	43.50	14.2	313	169	
Hori.	356.203	QP	42.95	14.64	9.02	31.85	0.00	34.76	46.00	11.2	100	195	
Hori.	377.996	QP	43.87	15.13	9.11	31.86	0.00	36.25	46.00	9.7	108	215	
Hori.	2390.000	PK	47.28	27.41	14.24	40.85	2.24	50.32	73.90	23.5	146	322	
Hori.	3982.515	PK	58.02	29.63	6.37	42.11	2.24	54.15	73.90	19.7	186	156	
Hori.	4804.000	PK	59.82	31.13	6.58	41.86	2.24	57.91	73.90	15.9	208	206	
Hori.	7206.000	PK	51.01	36.44	8.31	41.18	2.24	56.82	73.90	17.0	388	354	
Hori.	9608.000	PK	46.87	38.63	9.35	40.59	2.24	56.50	73.90	17.4	150	0	
Hori.	2390.000	AV	33.94	27.41	14.24	40.85	2.24	36.98	53.90	16.9	146	322	
Hori.	3982.515	AV	49.35	29.63	6.37	42.11	2.24	45.48	53.90	8.4	186	156	
Vert.	125.308	QP	42.32	13.23	7.47	32.05	0.00	30.97	43.50	12.5	100	269	
Vert.	139.630	QP	39.25	14.27	7.75	32.04	0.00	29.23	43.50	14.2	100	113	
Vert.	377.996	QP	39.09	15.13	9.11	31.86	0.00	31.47	46.00	14.5	100	4	
Vert.	620.998	QP	35.17	19.08	10.10	31.83	0.00	32.52	46.00	13.4	105	190	
Vert.	701.999	QP	36.63	19.60	10.40	31.73	0.00	34.90	46.00	11.1	122	25	
Vert.	2390.000	PK	47.05	27.41	14.24	40.85	2.24	50.09	73.90	23.8	340	215	
Vert.	3982.554	PK	59.38	29.63	6.37	42.11	2.24	55.51	73.90	18.3	242	219	
Vert.	4804.000	PK	58.30	31.13	6.58	41.86	2.24	56.39	73.90	17.5	123	303	
Vert.	7206.000	PK	50.26	36.44	8.31	41.18	2.24	56.07	73.90	17.8	161	336	
Vert.	9608.000	PK	45.58	38.63	9.35	40.59	2.24	55.21	73.90	18.6	150	0	
Vert.	2390.000	AV	33.92	27.41	14.24	40.85	2.24	36.96	53.90	16.9	340	215	
Vert.	3982.554	AV	49.95	29.63	6.37	42.11	2.24	46.08	53.90	7.8	242	219	

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

Distance factor : 1 GHz - 13 GHz : 20log (3.88 m / 3.0 m) = 2.24 dB

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

Dwell time factor relaxation

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Dwell Factor [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	4804.000	AV	50.80	31.13	6.58	41.86	-24.62	2.24	24.27	53.90	29.6	
Hori.	7206.000	AV	39.71	36.44	8.31	41.18	-24.62	2.24	20.90	53.90	33.0	
Hori.	9608.000	AV	33.96	38.63	9.35	40.59	-24.62	2.24	18.97	53.90	34.9	
Vert.	4804.000	AV	49.49	31.13	6.58	41.86	-24.62	2.24	22.96	53.90	30.9	
Vert.	7206.000	AV	38.91	36.44	8.31	41.18	-24.62	2.24	20.10	53.90	33.8	
Vert.	9608.000	AV	33.91	38.63	9.35	40.59	-24.62	2.24	18.92	53.90	35.0	

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

Distance factor : 1 GHz - 13 GHz : 20log (3.88 m / 3.0 m) = 2.24 dB

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

Dwell (time) factor refer to "Dwell time factor Calculation chart" sheet.

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	89.12	27.46	14.25	40.84	2.24	92.23	-	-	Carrier
Hori.	2400.000	PK	49.15	27.45	14.25	40.84	2.24	52.25	72.23	20.0	
Vert.	2402.000	PK	87.52	27.46	14.25	40.84	2.24	90.63	-	-	Carrier
Vert.	2400.000	PK	47.93	27.45	14.25	40.84	2.24	51.03	70.63	19.6	

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

Distance factor : 1 GHz - 13 GHz : 20log (3.88 m / 3.0 m) = 2.24 dB

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

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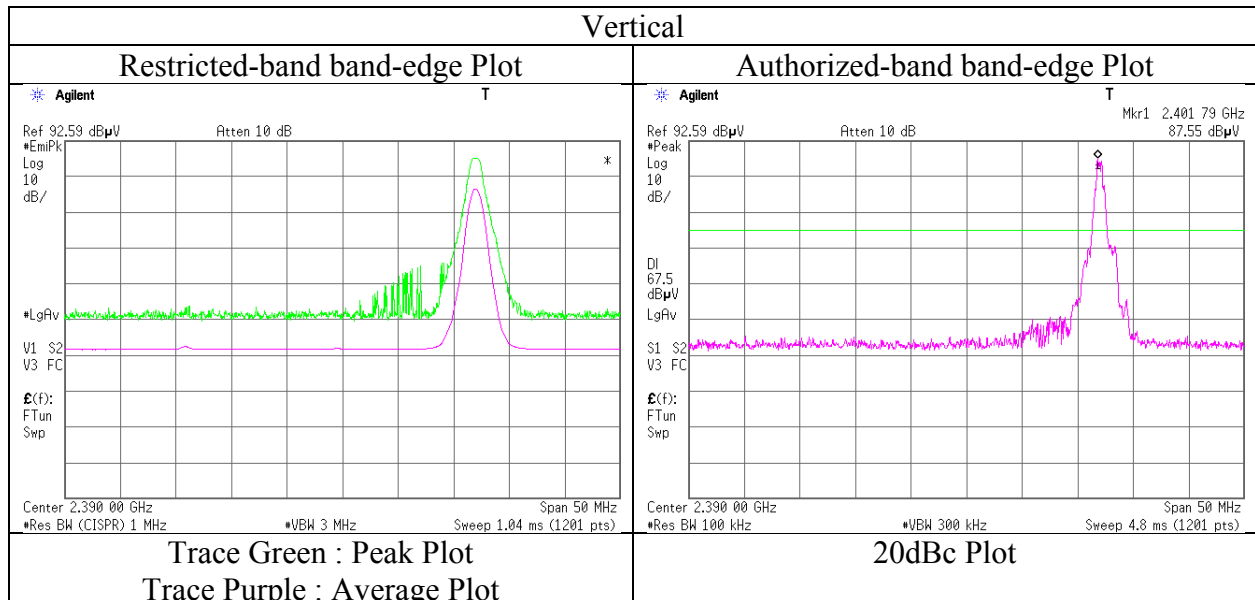
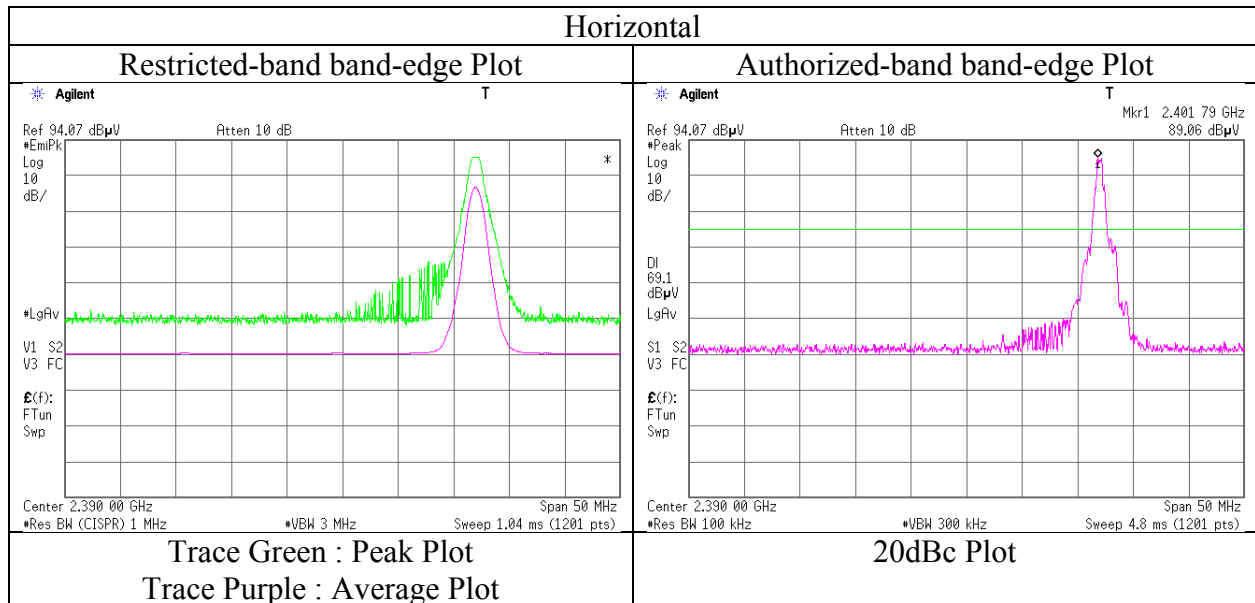
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

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Facsimile : +81 463 50 6401

Radiated Spurious Emission (Reference Plot for band-edge)

Report No.	11766300S-A-R2
Test place	Shonan EMC Lab.
Semi Anechoic Chamber	No.3
Date	May 17, 2017
Temperature / Humidity	24 deg. C / 48 % RH
Engineer	Hiroyuki Morikawa (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.	11766300S-A-R2		
Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	No.3	No.3	No.3
Date	May 15, 2017	May 17, 2017	May 15, 2017
Temperature / Humidity	24 deg. C / 45 % RH	24 deg. C / 48 % RH	24 deg. C / 45 % RH
Engineer	Makoto Hosaka	Hiroyuki Morikawa	Hiroyuki Morikawa
	(30 MHz -1 GHz)	(1 GHz -13 GHz)	(13 GHz -25 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.	102.036	QP	46.77	10.27	7.49	32.08	0.00	32.45	43.50	11.0	310	277	
Hori.	258.052	QP	43.92	11.96	8.49	31.92	0.00	32.45	46.00	13.5	139	61	
Hori.	356.353	QP	44.43	14.65	9.02	31.85	0.00	36.25	46.00	9.7	118	5	
Hori.	378.000	QP	43.57	15.13	9.11	31.86	0.00	35.95	46.00	10.0	100	220	
Hori.	3982.569	PK	57.62	29.63	6.37	42.11	2.24	53.75	73.90	20.1	185	155	
Hori.	4882.000	PK	58.57	31.29	6.63	41.76	2.24	56.97	73.90	16.9	139	222	
Hori.	7323.000	PK	49.65	36.77	8.47	41.27	2.24	55.86	73.90	18.0	382	331	
Hori.	9764.000	PK	43.68	38.75	9.48	40.62	2.24	53.53	73.90	20.3	150	0	
Hori.	3982.569	AV	49.52	29.63	6.37	42.11	2.24	45.65	53.90	8.2	185	155	
Vert.	125.293	QP	42.05	13.23	7.47	32.05	0.00	30.70	43.50	12.8	100	267	
Vert.	258.051	QP	40.46	11.96	8.49	31.92	0.00	28.99	46.00	17.0	100	182	
Vert.	356.355	QP	41.98	14.65	9.02	31.85	0.00	33.80	46.00	12.2	153	354	
Vert.	620.960	QP	40.85	19.08	10.10	31.83	0.00	38.20	46.00	7.8	124	24	
Vert.	702.000	QP	36.86	19.60	10.40	31.73	0.00	35.13	46.00	10.8	113	32	
Vert.	3982.538	PK	59.19	29.63	6.37	42.11	2.24	55.32	73.90	18.5	237	218	
Vert.	4882.000	PK	56.82	31.29	6.63	41.76	2.24	55.22	73.90	18.6	188	290	
Vert.	7323.000	PK	50.20	36.77	8.47	41.27	2.24	56.41	73.90	17.4	175	316	
Vert.	9764.000	PK	44.59	38.75	9.48	40.62	2.24	54.44	73.90	19.4	150	0	
Vert.	3982.538	AV	50.09	29.63	6.37	42.11	2.24	46.22	53.90	7.6	237	218	

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

Distance factor : 1 GHz - 13 GHz : $20\log(3.88\text{ m} / 3.0\text{ m}) = 2.24\text{ dB}$

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

Dwell time factor relaxation

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Dwell Factor [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	4882.000	AV	49.38	31.29	6.63	41.76	-24.62	2.24	23.16	53.90	30.7	
Hori.	7323.000	AV	38.43	36.77	8.47	41.27	-24.62	2.24	20.02	53.90	33.9	
Hori.	9764.000	AV	32.59	38.75	9.48	40.62	-24.62	2.24	17.82	53.90	36.1	
Vert.	4882.000	AV	47.08	31.29	6.63	41.76	-24.62	2.24	20.86	53.90	33.0	
Vert.	7323.000	AV	39.42	36.77	8.47	41.27	-24.62	2.24	21.01	53.90	32.9	
Vert.	9764.000	AV	32.61	38.75	9.48	40.62	-24.62	2.24	17.84	53.90	36.1	

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

Distance factor : 1 GHz - 13 GHz : $20\log(3.88\text{ m} / 3.0\text{ m}) = 2.24\text{ dB}$

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

Dwell (time) factor refer to "Dwell time factor Calculation chart" sheet.

UL Japan, Inc.

Shonan EMC Lab.

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Radiated Spurious Emission

Report No.	11766300S-A-R2		
Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	No.3	No.3	No.3
Date	May 15, 2017	May 17, 2017	May 15, 2017
Temperature / Humidity	24 deg. C / 45 % RH	24 deg. C / 48 % RH	24 deg. C / 45 % RH
Engineer	Hiroyuki Morikawa	Hiroyuki Morikawa	Hiroyuki Morikawa
	(30 MHz -1 GHz)	(1 GHz -13 GHz)	(13 GHz -25 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.	102.045	QP	46.60	10.27	7.49	32.08	0.00	32.28	43.50	11.2	297	277	
Hori.	134.268	QP	41.40	13.88	7.63	32.05	0.00	30.86	43.50	12.6	339	272	
Hori.	350.989	QP	45.20	14.53	8.99	31.84	0.00	36.88	46.00	9.1	118	131	
Hori.	377.996	QP	44.00	15.13	9.11	31.86	0.00	36.38	46.00	9.6	100	212	
Hori.	2483.500	PK	49.19	27.79	14.35	40.81	2.24	52.76	73.90	21.1	139	290	
Hori.	3982.534	PK	58.13	29.63	6.37	42.11	2.24	54.26	73.90	19.6	179	154	
Hori.	4960.000	PK	55.64	31.45	6.68	41.65	2.24	54.36	73.90	19.5	183	218	
Hori.	7440.000	PK	49.52	37.11	8.63	41.36	2.24	56.14	73.90	17.7	150	0	
Hori.	9920.000	PK	43.12	38.87	9.60	40.66	2.24	53.17	73.90	20.7	150	0	
Hori.	2483.500	AV	34.60	27.79	14.35	40.81	2.24	38.17	53.90	15.7	139	290	
Hori.	3982.534	AV	49.57	29.63	6.37	42.11	2.24	45.70	53.90	8.2	179	154	
Vert.	125.317	QP	41.80	13.23	7.47	32.05	0.00	30.45	43.50	13.0	100	288	
Vert.	258.052	QP	40.30	11.96	8.49	31.92	0.00	28.83	46.00	17.1	100	186	
Vert.	701.997	QP	35.70	19.60	10.40	31.73	0.00	33.97	46.00	12.0	119	30	
Vert.	810.003	QP	33.20	20.71	10.74	31.42	0.00	33.23	46.00	12.7	100	359	
Vert.	2483.500	PK	46.51	27.79	14.35	40.81	2.24	50.08	73.90	23.8	145	44	
Vert.	3982.521	PK	59.57	29.63	6.37	42.11	2.24	55.70	73.90	18.2	242	218	
Vert.	4960.000	PK	54.57	31.45	6.68	41.65	2.24	53.29	73.90	20.6	146	267	
Vert.	7440.000	PK	49.97	37.11	8.63	41.36	2.24	56.59	73.90	17.3	176	314	
Vert.	9920.000	PK	43.24	38.87	9.60	40.66	2.24	53.29	73.90	20.6	150	0	
Vert.	2483.500	AV	34.07	27.79	14.35	40.81	2.24	37.64	53.90	16.2	145	44	
Vert.	3982.521	AV	50.32	29.63	6.37	42.11	2.24	46.45	53.90	7.4	242	218	

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

Distance factor : 1 GHz - 13 GHz : 20log (3.88 m / 3.0 m) = 2.24 dB

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

Dwell time factor relaxation

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Dwell Factor [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	4960.000	AV	47.32	31.45	6.68	41.65	-24.62	2.24	21.42	53.90	32.5	
Hori.	7440.000	AV	38.14	37.11	8.63	41.36	-24.62	2.24	20.14	53.90	33.8	
Hori.	9920.000	AV	31.63	38.87	9.60	40.66	-24.62	2.24	17.06	53.90	36.8	
Vert.	4960.000	AV	45.78	31.45	6.68	41.65	-24.62	2.24	19.88	53.90	34.0	
Vert.	7440.000	AV	39.77	37.11	8.63	41.36	-24.62	2.24	21.77	53.90	32.1	
Vert.	9920.000	AV	31.63	38.87	9.60	40.66	-24.62	2.24	17.06	53.90	36.8	

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

Distance factor : 1 GHz - 13 GHz : 20log (3.88 m / 3.0 m) = 2.24 dB

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

Dwell (time) factor refer to "Dwell time factor Calculation chart" sheet.

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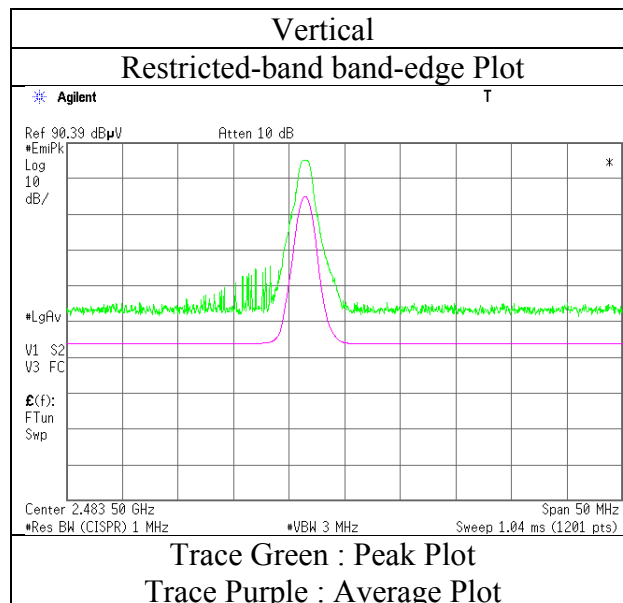
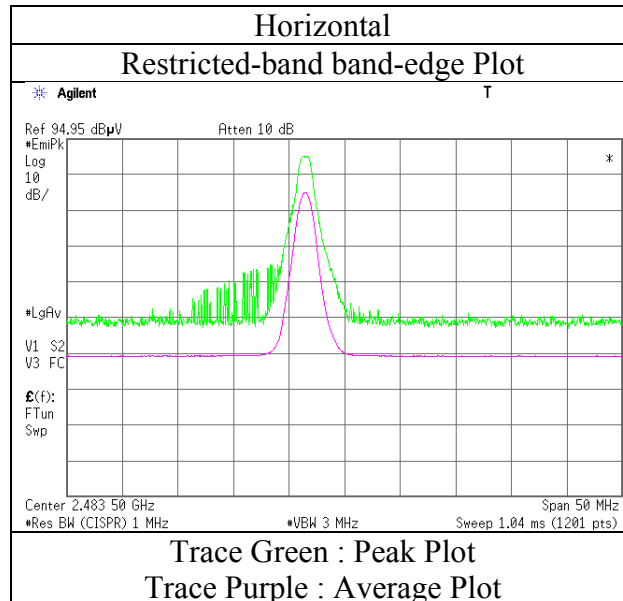
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

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Radiated Spurious Emission (Reference Plot for band-edge)

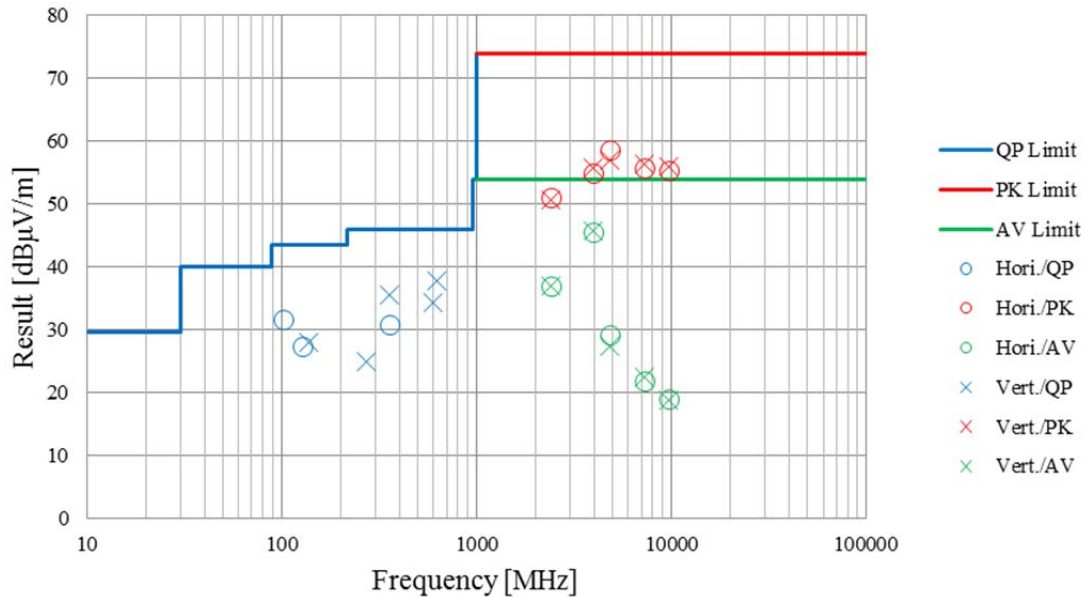
Report No.	11766300S-A-R2
Test place	Shonan EMC Lab.
Semi Anechoic Chamber	No.3
Date	May 17, 2017
Temperature / Humidity	24 deg. C / 48 % RH
Engineer	Hiroyuki Morikawa (1 GHz -13 GHz)
Mode	Tx, Hopping Off, 3DH5 2480 MHz



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

Radiated Spurious Emission
(Plot data, Worst case)

Report No.	11766300S-A-R2		
Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	No.3	No.3	No.3
Date	May 15, 2017	May 17, 2017	May 15, 2017
Temperature / Humidity	24 deg. C / 45 % RH	24 deg. C / 48 % RH	24 deg. C / 45 % RH
Engineer	Makoto Hosaka (30 MHz -1 GHz)	Hiroyuki Morikawa (1 GHz -13 GHz)	Hiroyuki Morikawa (13 GHz -25 GHz)
Mode	Tx, Hopping Off, DH5 2402 MHz		

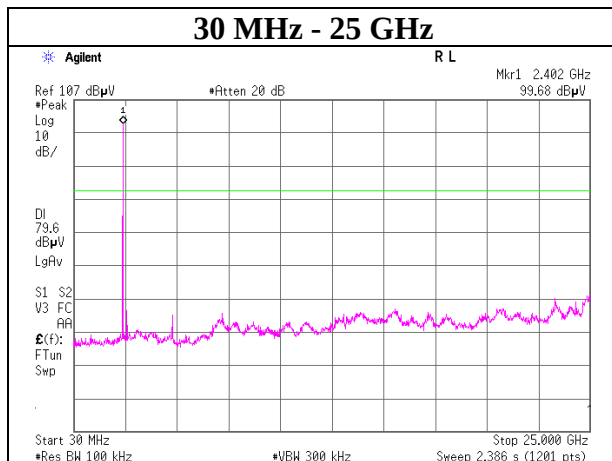
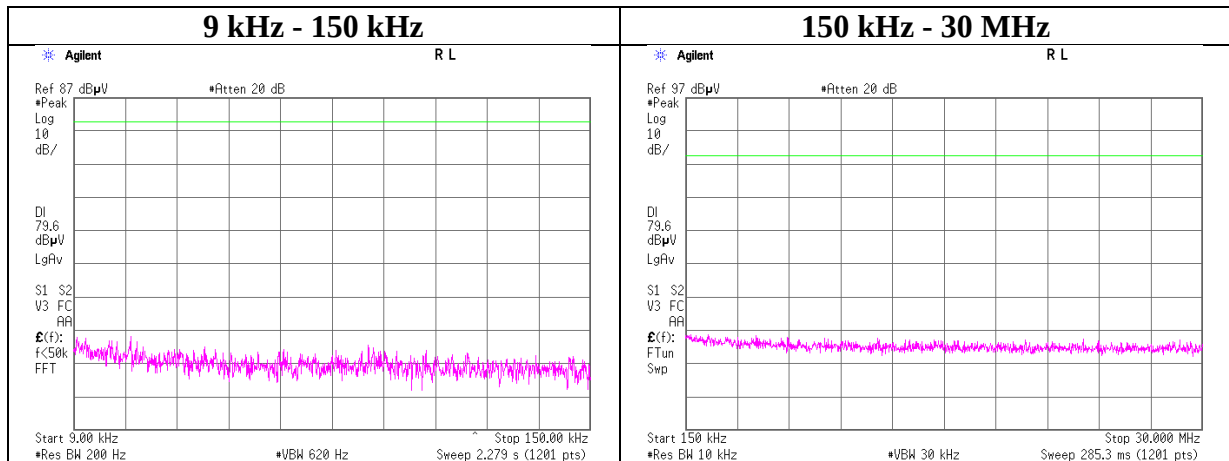


*These plots data contains sufficient number to show the trend of characteristic features for EUT.

Conducted Spurious Emission

Test place : Shonan EMC Lab. No.5 Shielded Room
Report No. : 11766300S-A-R2
Date : May 23, 2017
Temperature / Humidity : 25 deg. C / 49 % RH
Engineer : Yosuke Ishikawa
Mode : Tx, Hopping Off, DH5

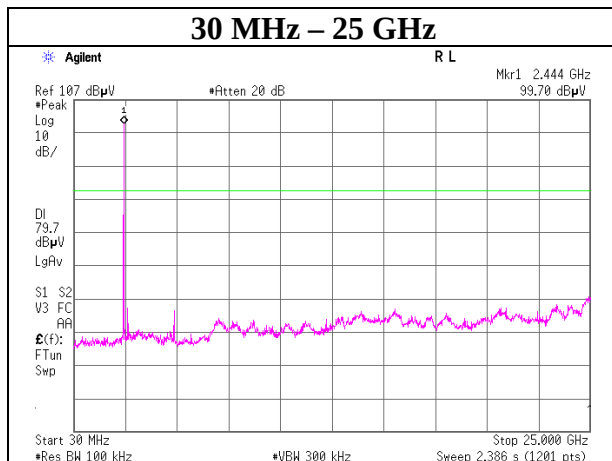
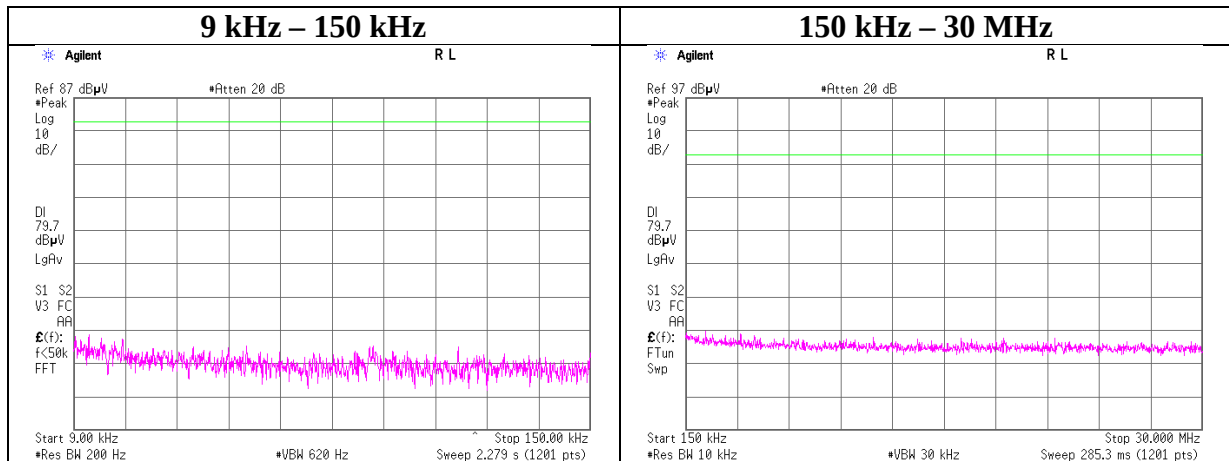
2402 MHz



Conducted Spurious Emission

Test place : Shonan EMC Lab. No.5 Shielded Room
Report No. : 11766300S-A-R2
Date : May 23, 2017
Temperature / Humidity : 25 deg. C / 49 % RH
Engineer : Yosuke Ishikawa
Mode : Tx, Hopping Off, DH5

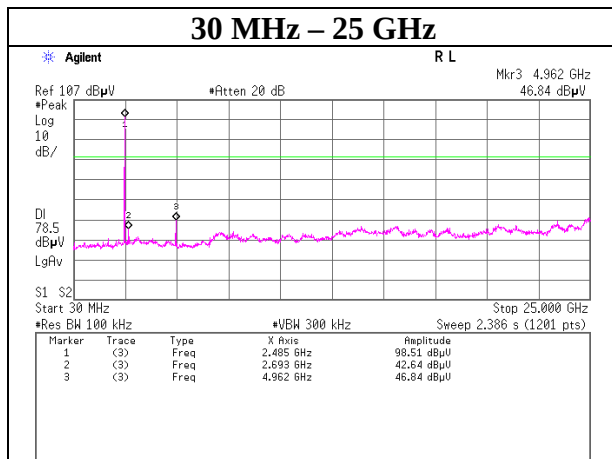
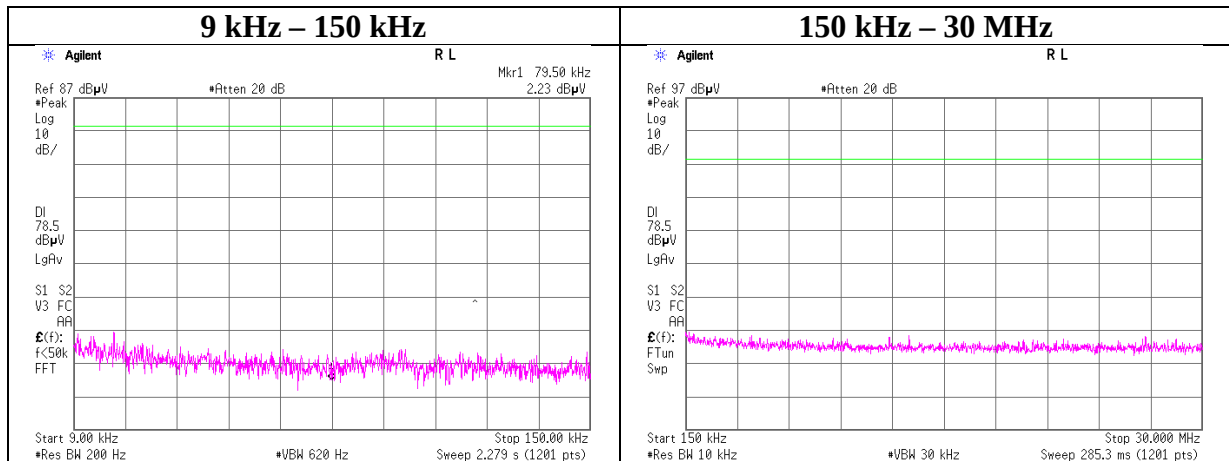
2441 MHz



Conducted Spurious Emission

Test place : Shonan EMC Lab. No.5 Shielded Room
Report No. : 11766300S-A-R2
Date : May 23, 2017
Temperature / Humidity : 25 deg. C / 49 % RH
Engineer : Yosuke Ishikawa
Mode : Tx, Hopping Off, DH5

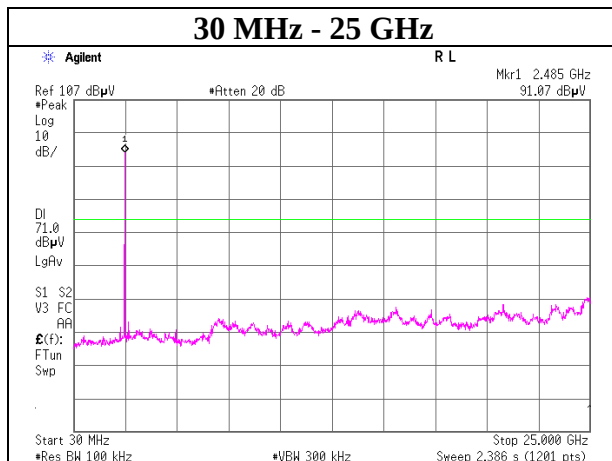
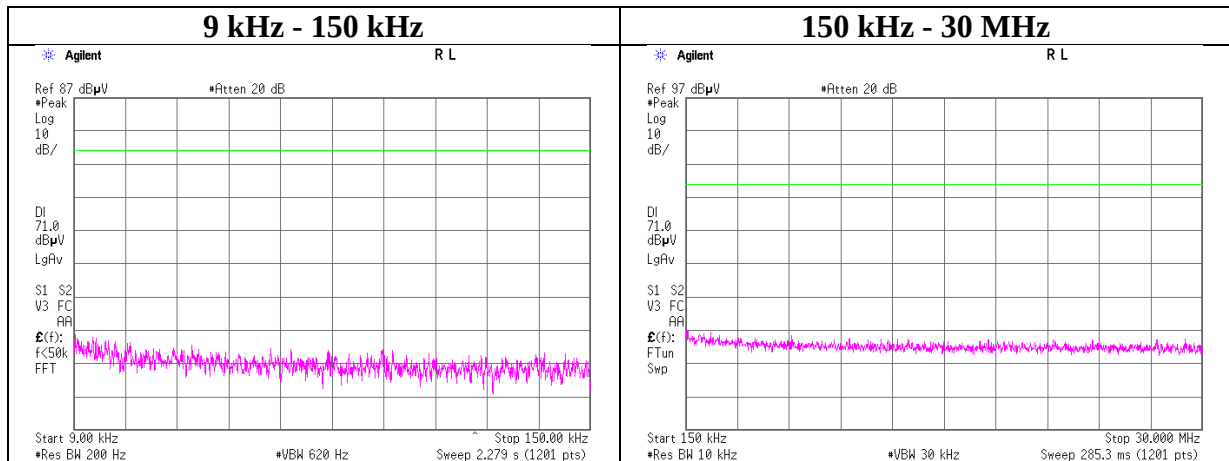
2480 MHz



Conducted Spurious Emission

Test place : Shonan EMC Lab. No.5 Shielded Room
Report No. : 11766300S-A-R2
Date : May 23, 2017
Temperature / Humidity : 25 deg. C / 49 % RH
Engineer : Yosuke Ishikawa
Mode : Tx, Hopping Off, 3DH5

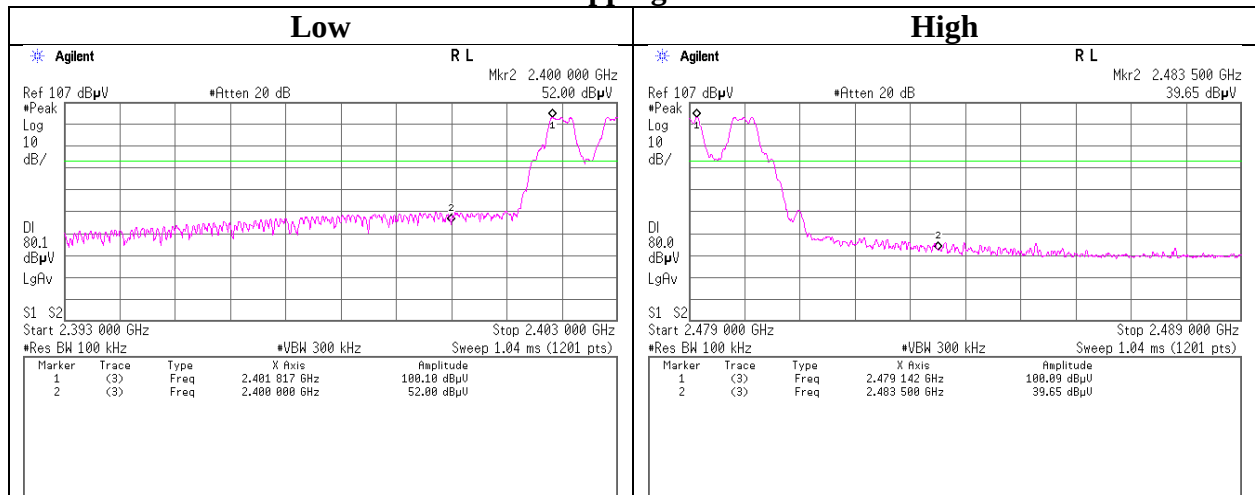
2480 MHz



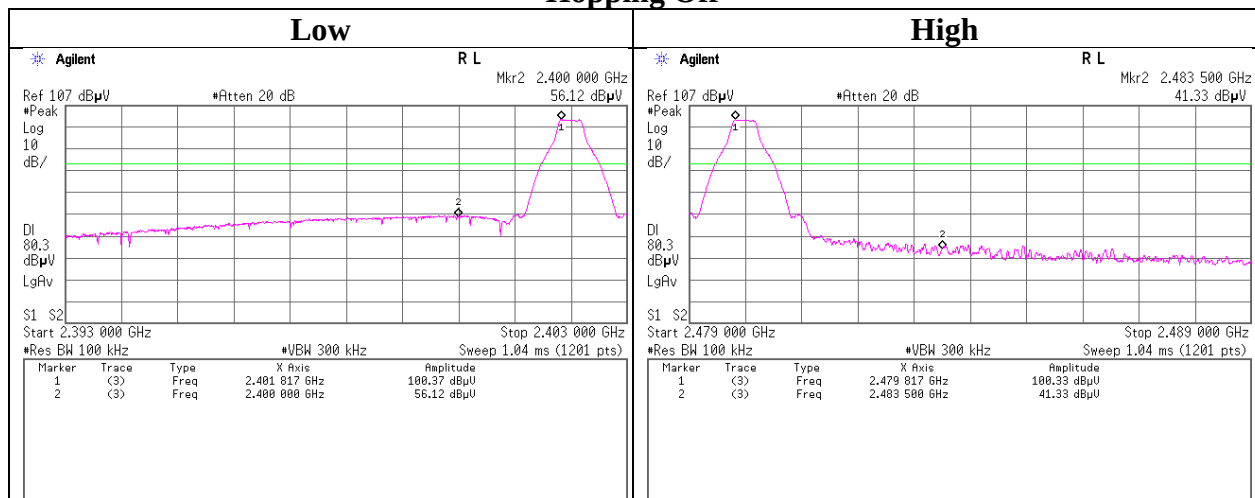
Conducted Emission Band Edge compliance

Test place	Shonan EMC Lab. No.5 Shielded Room
Report No.	11766300S-A-R2
Date	May 23, 2017
Temperature / Humidity	25 deg. C / 49 % RH
Engineer	Yosuke Ishikawa
Mode	Tx DH5

Hopping On



Hopping Off



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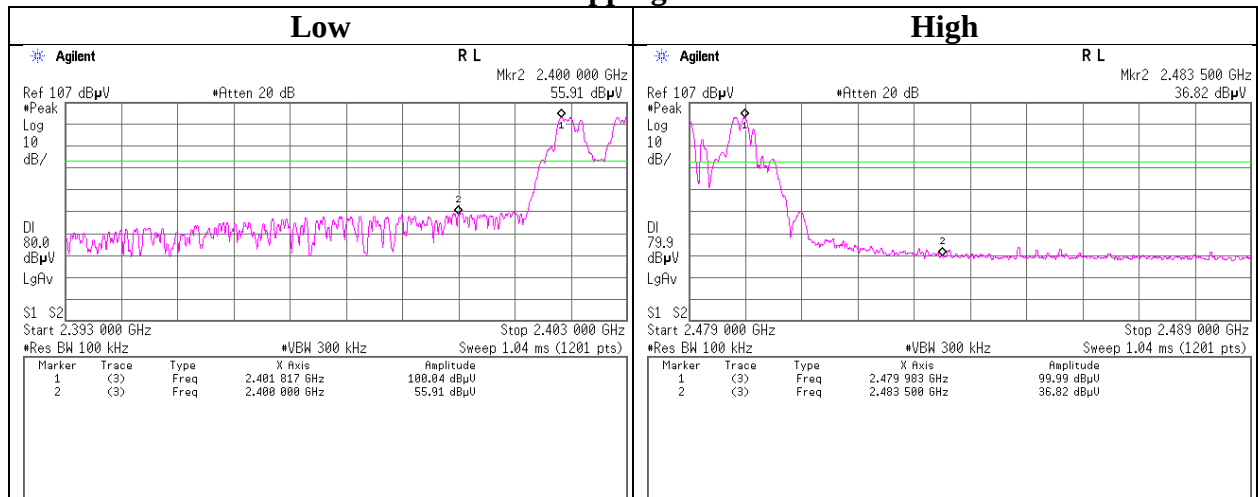
Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

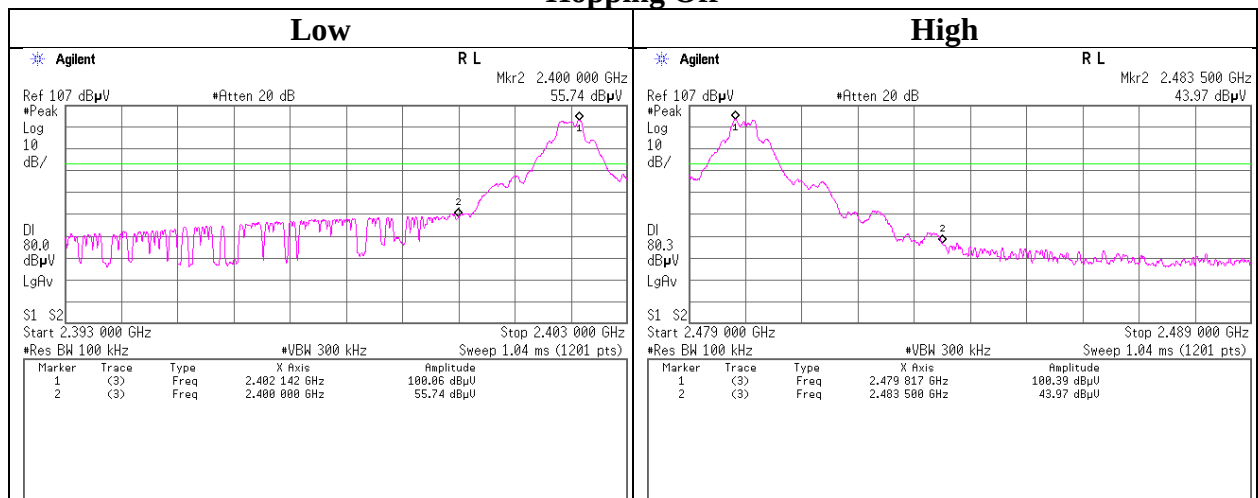
Conducted Emission Band Edge compliance

Test place	Shonan EMC Lab. No.5 Shielded Room
Report No.	11766300S-A-R2
Date	May 23, 2017
Temperature / Humidity	25 deg. C / 49 % RH
Engineer	Yosuke Ishikawa
Mode	Tx 3DH5

Hopping On



Hopping Off



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Telephone : +81 463 50 6400

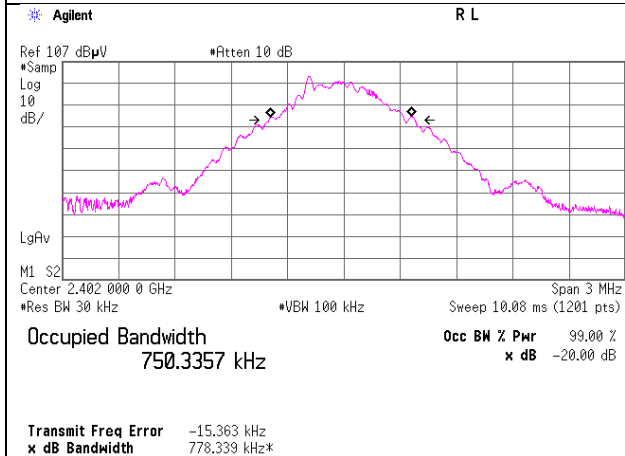
Facsimile : +81 463 50 6401

99% Occupied Bandwidth

Test place	Shonan EMC Lab. No.5 Shielded Room
Report No.	11766300S-A-R2
Date	May 23, 2017
Temperature / Humidity	25 deg. C / 49 % RH
Engineer	Yosuke Ishikawa
Mode	Tx Hopping Off

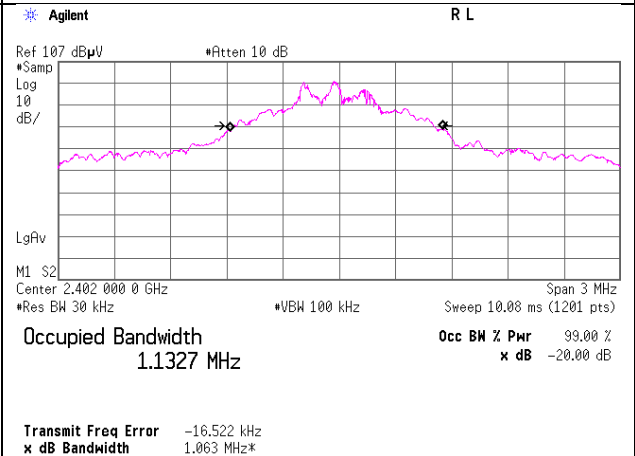
Hopping Off, DH5

2402 MHz

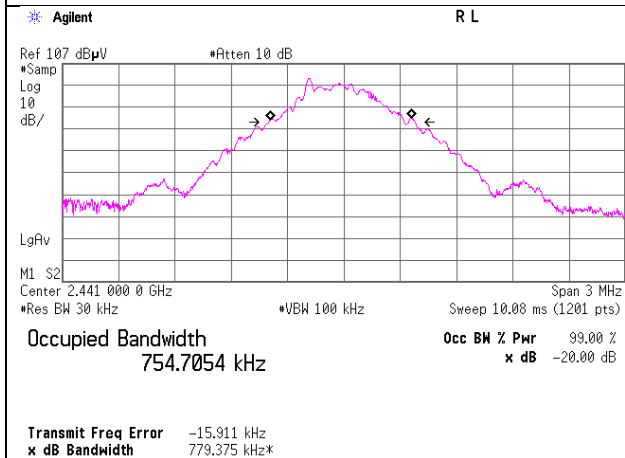


Hopping Off, 3DH5

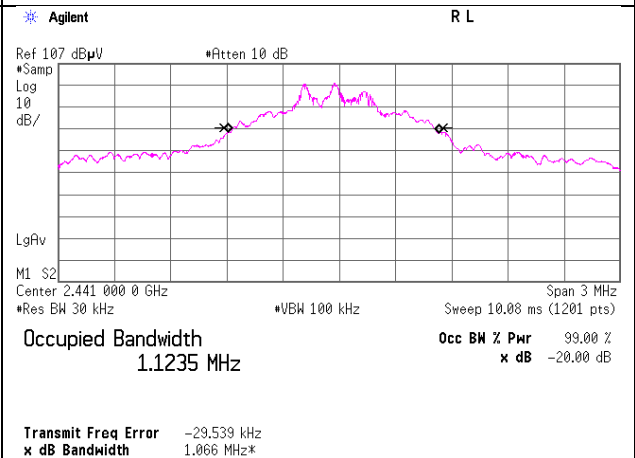
2402 MHz



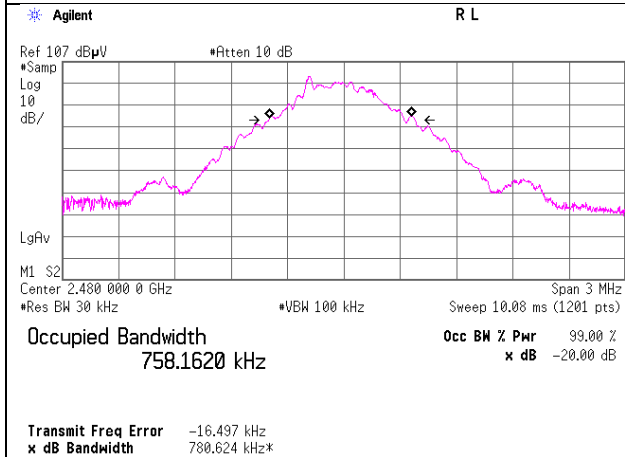
2441 MHz



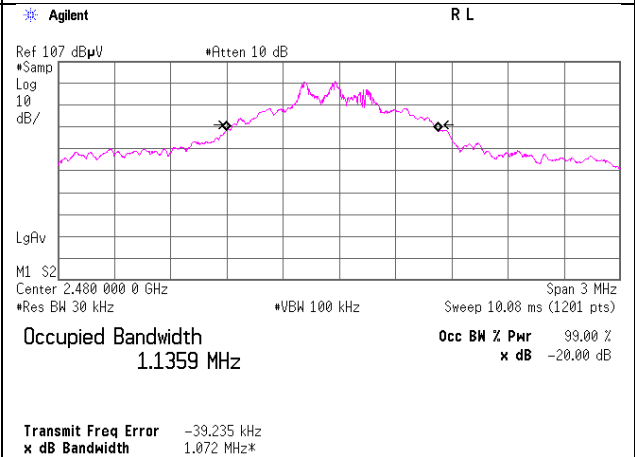
2441 MHz



2480 MHz



2480 MHz



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Shonan EMC Lab.

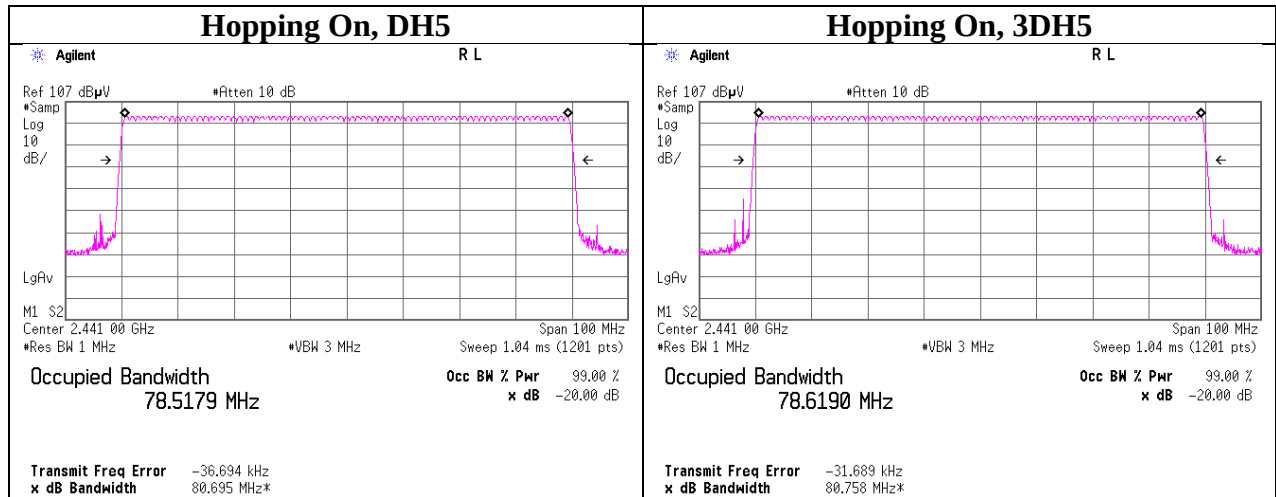
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

99% Occupied Bandwidth

Test place	Shonan EMC Lab. No.5 Shielded Room
Report No.	11766300S-A-R2
Date	May 23, 2017
Temperature / Humidity	25 deg. C / 49 % RH
Engineer	Yosuke Ishikawa
Mode	Tx Hopping On



APPENDIX 2: Test instruments

Test equipment

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
KSA-08	Spectrum Analyzer	Agilent	E4446A	MY46180525	AT	2016/10/11 * 12
SPM-07	Power Meter	Agilent	8990B	MY5100272	AT	2017/05/01 * 12
SPSS-04	Power sensor	Agilent	N1923A	MY5326009	AT	2017/05/01 * 12
SCC-G31	Coaxial Cable	Junkosha	MWX241-0100 0KMSKMS	OCT-08-13-0 46	AT	2017/04/20 * 12
SAT10-09	Attenuator	Weinschel Corp.	54A-10	W5692	AT	2016/11/07 * 12
SOS-09	Humidity Indicator	A&D	AD-5681	4061484	AT	2016/12/13 * 12
STS-05	Digital Hitester	Hioki	3805-50	080997828	AT	2016/10/17 * 12
SAEC-03(NSA)	Semi-Anechoic Chamber	TDK	SAEC-03(NSA)	3	RE	2016/07/15 * 12
SBA-03	Biconical Antenna	Schwarzbeck	BBA9106	91032666	RE	2016/10/18 * 12
SLA-07	Logperiodic Antenna	Schwarzbeck	VUSLP9111B	196	RE	2017/01/26 * 12
SAT6-08	Attenuator	HIROSE ELECTRIC CO.,LTD.	AT-406(40)	-	RE	2016/08/04 * 12
SCC-C1/C2/C3/C 4/C5/C10/SRSE- 03	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhner /Suhner/Suhner/Suhner/T OYO	8D2W/12DSFA /141PE/141PE/ 141PE/141PE/ NS4906	-/0901-271(R F Selector)	RE	2017/04/07 * 12
SAF-03	Pre Amplifier	SONOMA	310N	290213	RE	2017/02/09 * 12
STR-08	Test Receiver	Rohde & Schwarz	ESW44	101581	RE	2016/11/08 * 12
COTS-SEMI-1	EMI Software	TSJ	TEPTO-DV(RE ,CE,RFI,MF)	-	RE	-
SOS-05	Humidity Indicator	A&D	AD-5681	4062518	RE	2016/10/12 * 12
SJM-02	Measure	KOMELON	KMC-36	-	RE	-
STS-03	Digital Hitester	Hioki	3805-50	080997823	RE	2016/10/17 * 12
SAF-09	Pre Amplifier	TOYO Corporation	HAP18-26W	00000018	RE	2016/09/27 * 12
SCC-G33	Coaxial Cable	Junkosha	MWX241-0100 0KMSKMS	-	RE	2017/04/20 * 12
SCC-G20	Coaxial Cable	Junkosha	J12J102518-00	APR-15-15-0 03	RE	2017/04/20 * 12
SHA-05	Horn Antenna	ETS LINDGREN	3160-09	LM4210	RE	2017/03/15 * 12
SSA-02	Spectrum Analyzer	Agilent	E4448A	MY48250106	RE	2017/03/07 * 12
SHA-03	Horn Antenna	Schwarzbeck	BBHA9120D	9120D-739	RE	2016/08/22 * 12
SCC-G40	Coaxial Cable	Junkosha	MWX221-0100 0NFSNMS/B	1612S005	RE	2017/01/08 * 12
SCC-G23	Coaxial Cable	Suhner	SUCOFLEX 104	297342/4	RE	2016/05/11 * 12
SCC-G06	Coaxial Cable	Junkosha	J12J102207-00	MAY-23-16- 091	RE	2016/06/14 * 12
SAF-04	Pre Amplifier	TOYO Corporation	TPA0118-36	1440489	RE	2017/03/17 * 12
SFL-02	Highpass Filter	MICRO-TRONICS	HPM50111	051	RE	2016/11/29 * 12
SAEC-03(SVSW R)	Semi-Anechoic Chamber	TDK	SAEC-03(SVS WR)	3	RE	2016/07/25 * 12
SAT10-05	Attenuator(above1GHz)	Agilent	8493C-010	74864	RE	2016/11/07 * 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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