



RADIO TEST REPORT

Test Report No. : 12622649S-B-R2

Applicant : JVC KENWOOD Corporation
Type of Equipment : GPS NAVIGATION SYSTEM
Model No. : DNX696S
FCC ID : IOMJ5219
Test regulation : FCC Part 15 Subpart C: 2018
* Bluetooth BDR/EDR part
Test Result : Complied (Refer to Section 3.2)

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2. The results in this report apply only to the sample tested.
3. This sample tested is in compliance with the limits of the above regulation.
4. The test results in this test report are traceable to the national or international standards.
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6. This test report covers Radio technical requirements.
It does not cover administrative issues such as Manual or non-Radio test related Requirements. (if applicable)
7. The all test items in this test report are conducted by UL Japan, Inc. Shonan EMC Lab.
8. The opinions and the interpretations to the result of the description in this report are outside scopes where UL Japan has been accredited.
9. The information provided from the customer for this report is identified in SECTION 1.
10. This report is a revised version of 12622649S-B-R1. 12622649S-B-R1 is replaced with this report.

Date of test: December 5 to 10, 2018

Representative test engineer:

Yosuke Ishikawa
Engineer
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Approved by:

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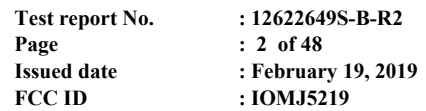


- ☐ The testing in which "Non-accreditation" is displayed is outside the accreditation scopes in UL Japan.
☒ There is no testing item of "Non-accreditation".

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13-EM-F0429



Original Test Report No.: 12622649S-B

[illegible]

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SECTION 1: Customer information

Company Name : JVC KENWOOD Corporation
Address : 2967-3, Ishikawa-machi, Hachioji, Tokyo 192-8525 Japan
Telephone Number : +81-42-646-5525
Facsimile Number : +81-42-646-1440
Contact Person : Seigo Tsutsumi

The information provided from the customer is as follows;

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

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

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

2.1 Identification of E.U.T.

Type of Equipment : GPS NAVIGATION SYSTEM
Model No. : DNX696S
Serial No. : Refer to Section 4, Clause 4.2
Rating : DC 12 V
Receipt Date of Sample : November 27, 2018
(Information from test lab.)
Country of Mass-production : Indonesia
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: DNX696S (referred to as the EUT in this report) is a GPS NAVIGATION SYSTEM.

Similar model:

Model	Brand	Navigation Function	Panel	DVD Slot	DVD	Dashborad Camera terminal	HD Radio	Display	SD Card
DNX696S*	KENWOOD	Yes	Fix Panel	Panel Top	Yes	Yes	Yes	TN LCD Panel	Yes
DNX576S	KENWOOD	Yes	Fix Panel	Panel Top	Yes	Yes	None	TN LCD Panel	Yes
DNR476S	KENWOOD	Yes	Fix Panel	-	None	Yes	None	TN LCD Panel	Yes
DNR46EX	KENWOOD	Yes	Fix Panel	-	None	Yes	None	TN LCD Panel	Yes

* Tested model

These differences cause no influence to radio specification.

There was no degradation of EMC characteristic.

Therefore we can consider them electrically identical.

DNR476S and DNR46EX are only the difference in model name due to the difference in sales route.



Radio Specification

Bluetooth

Radio Type	:	Transceiver
Frequency of Operation	:	2402 MHz - 2480 MHz
Modulation	:	FHSS
Antenna type	:	Internal Antenna (Chip Antenna)
Antenna Gain	:	-2.3 dBi
Clock frequency (Maximum)	:	37.4 MHz
Power Supply (radio art input)	:	DC 3.6 V/ 3.3 V/1.8 V



SECTION 3: Test specification, procedures & results

3.1 Test Specification

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

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

3.2 Procedures and results

Item	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 a)	Conducted
20dB Bandwidth	FCC: FCC Public Notice DA 00-705 IC: -	FCC: Section15.247(a)(1) IC: RSS-247 5.1 (a)		Complied 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 b)	Conducted
Dwell time	FCC: FCC Public Notice DA 00-705 IC: -	FCC: Section15.247(a)(1)(iii) IC: RSS-247 5.1 (d)		Complied c)	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 d)	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	5.8 dB 932.998 MHz, QP, Hori. Tx, Hopping Off, 3DH5 2402 MHz	Complied e)/f)	Conducted/ Radiated (above 30 MHz) *2)

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 does not have AC Mains.

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

a) Refer to APPENDIX 1 (data of 20dB Bandwidth, 99%Occupied Bandwidth and Carrier Frequency Separation)

b) Refer to APPENDIX 1 (data of Number of Hopping Frequency)

c) Refer to APPENDIX 1 (data of Dwell time)

d) Refer to APPENDIX 1 (data of Maximum Peak Output Power)

e) Refer to APPENDIX 1 (data of Conducted Spurious Emission)

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

Symbols:

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

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

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

FCC Part 15.31 (e)

The EUT provides stable voltage 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 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 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	RSS-Gen 6.7	IC: -	N/A	Complied a)	Conducted
Note: UL Japan, Inc.'s EMI Work Procedures No. 13-EM-W0420 and 13-EM-W0422. a) Refer to APPENDIX 1 (data of 20dB Bandwidth, 99%Occupied Bandwidth and Carrier Frequency Separation)					

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

3.4 Uncertainty

EMI

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

The following uncertainties have been calculated to provide a confidence level of 95 % using a coverage factor $k=2$.
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Item	Frequency range	Uncertainty (+/-)		
		No. 1 SAC / SR	No. 2 SAC / SR	No. 3 SAC / SR
Radiated emission (Measurement distance: 3 m)	9 kHz-30 MHz	3.0 dB	3.0 dB	3.1 dB
	30 MHz-200 MHz	4.6 dB	4.6 dB	4.7 dB
	200 MHz-1 GHz	6.0 dB	6.0 dB	6.1 dB
	1 GHz-6 GHz	4.8 dB	4.8 dB	4.8 dB
	6 GHz-18 GHz	5.4 dB	5.4 dB	5.4 dB
Radiated emission (Measurement distance: 1 m)	18 GHz-40 GHz	5.6 dB	5.6 dB	5.6 dB
	1 GHz-18 GHz	5.7 dB	5.7 dB	5.7 dB
	18 GHz-40 GHz	5.9 dB	5.9 dB	5.9 dB

SAC=Semi-Anechoic Chamber

SR= Shielded Room is applied besides radiated emission

Antenna terminal test	Uncertainty (+/-)
Power Measurement above 1 GHz (Average Detector)_SPM-06	0.48 dB
Power Measurement above 1 GHz (Peak Detector)_SPM-06	0.66 dB
Power Measurement above 1 GHz (Average Detector)_SPM-07	0.47 dB
Power Measurement above 1 GHz (Peak Detector)_SPM-07	0.64 dB
Power Measurement above 1 GHz (Average Detector)_SPM-13	0.90 dB
Power Measurement above 1 GHz (Peak Detector)_SPM-13	1.04 dB
Spurious emission (Conducted) below 1GHz	1.8 dB
Spurious emission (Conducted) 1 GHz-3 GHz	1.7 dB
Spurious emission (Conducted) 3 GHz-18 GHz	2.5 dB
Spurious emission (Conducted) 18 GHz-26.5 GHz	2.5 dB
Spurious emission (Conducted) 26.5 GHz-40 GHz	2.7 dB
Bandwidth Measurement	1.01 %
Duty cycle and Time Measurement	0.012 %



3.5 Test Location

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JAB Accreditation No. RTL02610
FCC Test Firm Registration Number: 839876

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

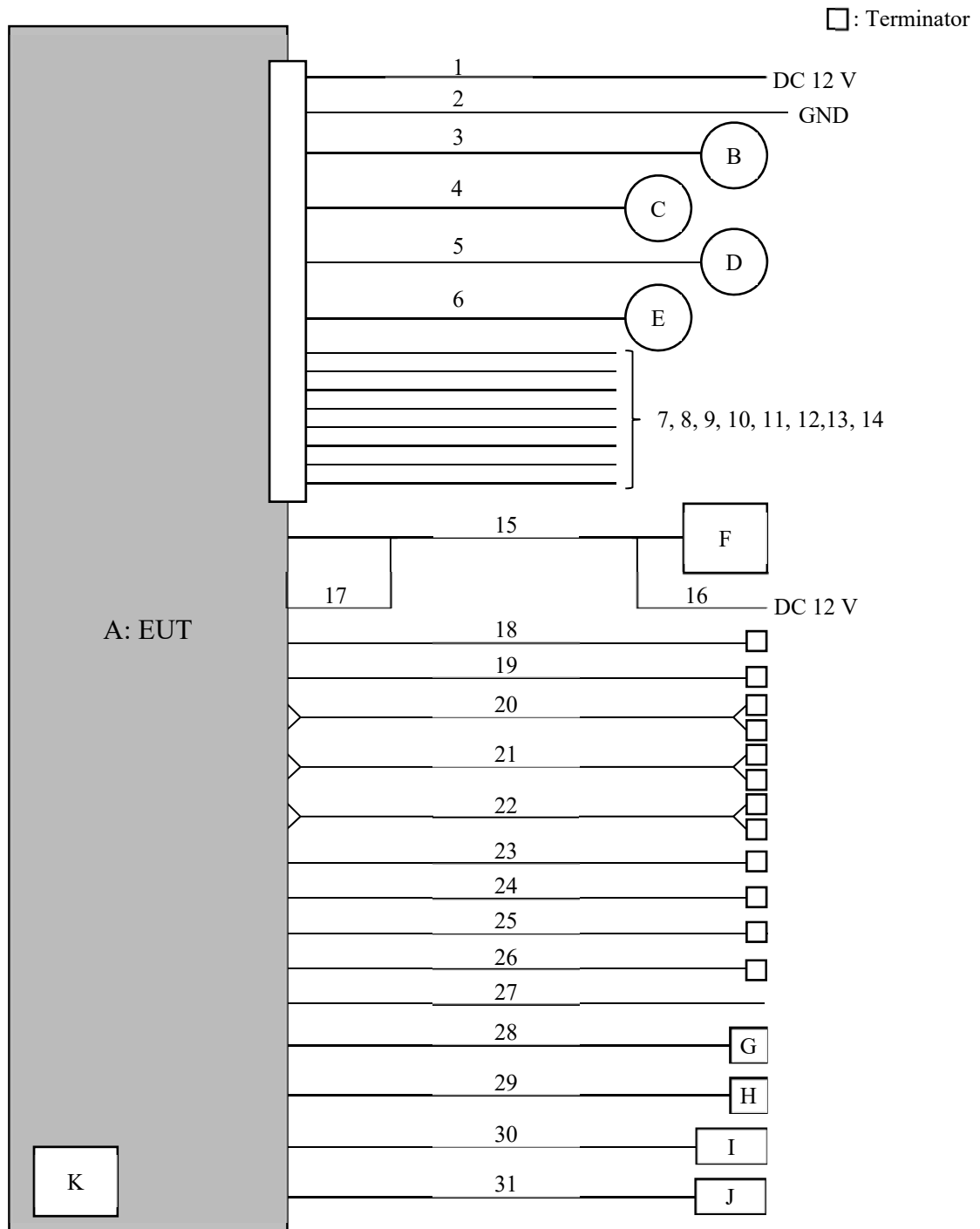
4.1 Operating Mode(s)

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

Details of Operating Mode(s)

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 : Syscom : 0.0.0189.3100 Panel CPU : 0.0.0139.3700 SoC : 0.0.2409.4100 *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



* 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	GPS NAVIGATION SYSTEM	DNX696S	PK-X0001 *1) PK-X0002 *2)	JVC KENWOOD	EUT
B	Speaker	KFC-RS160	-	KENWOOD	-
C	Speaker	KFC-RS160	-	KENWOOD	-
D	Speaker	KFC-RS160	-	KENWOOD	-
E	Speaker	KFC-RS160	-	KENWOOD	-
F	DASH BOARD CAMERA	DRV-N520	082T1224	JVC KENWOOD	-
G	GPS Antenna	-	-	JVC KENWOOD	-
H	Microphone	-	-	JVC KENWOOD	-
I	USB Memory	AH321	-	Apacer	-
J	USB Memory	USMQ	-	SONY	-
K	SDHC MEMORY CARD	MF-FSDH08GC6	-	ELECOM	-

*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	DC (ACC, B+)	0.2 + 3.3	Unshielded	Unshielded	-
2	GND	0.4 + 3.3	Unshielded	Unshielded	-
3	Speaker	0.15 + 1.9	Unshielded	Unshielded	-
4	Speaker	0.15 + 1.9	Unshielded	Unshielded	-
5	Speaker	0.15 + 1.9	Unshielded	Unshielded	-
6	Speaker	0.15 + 1.9	Unshielded	Unshielded	-
7	ANT. CONT	0.15 + 1.0	Unshielded	Unshielded	-
8	P. CONT	0.15 + 1.0	Unshielded	Unshielded	-
9	ILLUMI	0.15 + 1.0	Unshielded	Unshielded	-
10	REMOTE CONT	0.15 + 1.0	Unshielded	Unshielded	-
11	CAM +	0.15 + 1.0	Unshielded	Unshielded	-
12	CAM -	0.15 + 1.0	Unshielded	Unshielded	-
13	PRK SW	0.15 + 1.0	Unshielded	Unshielded	-
14	REVERSE	0.15 + 1.0	Unshielded	Unshielded	-
15	DASH CAM	3.5	Unshielded	Unshielded	-
16	DC	1.9	Unshielded	Unshielded	-
17	FRONT VIEW CAMERA	0.2	Shielded	Shielded	-
18	REAR VIEW CAMERA	0.2 + 1.4	Shielded	Shielded	-
19	VIDEO OUT	0.2 + 3.0	Shielded	Shielded	-
20	AUDIO (FRONT)	1.1	Shielded	Shielded	-
21	AUDIO (REAR)	0.9	Shielded	Shielded	-
22	AUDIO (SW)	1.2	Shielded	Shielded	-
23	AV-OUT AUDIO	1.8	Shielded	Shielded	-
24	AV-IN	1.2	Shielded	Shielded	-
25	Antenna	0.15 + 2.1	Shielded	Shielded	-
26	Data Link	0.2+3.6	Shielded	Shielded	-
27	EXT-I/F	1.0	Shielded	Shielded	-
28	GPS	3.5	Shielded	Shielded	-
29	Microphone	3.0	Shielded	Shielded	-
30	USB	0.2 + 1.0	Shielded	Shielded	-
31	USB	0.2 + 1.0	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, 1.5 m by 1.0 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, 0.5 m by 0.5 m, raised 1.5 m above the conducting ground plane.

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

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

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

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

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

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

Test Antennas are used as below;

Frequency	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.

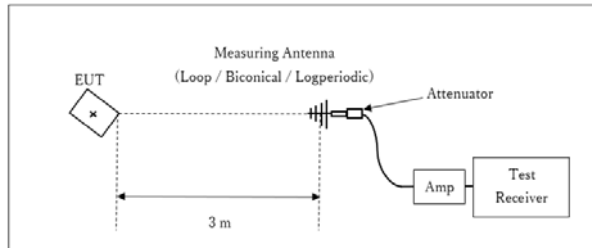
20 dBc was applied to the frequency over the limit of FCC 15.209 / Table 4 of RSS-Gen 8.9 (IC) and outside the restricted band of FCC15.205 / Table 6 of RSS-Gen 8.10 (IC).

Frequency	Below 1 GHz	Above 1 GHz		20 dBc
Instrument used	Test Receiver	Spectrum Analyzer		Spectrum Analyzer
Detector	QP	PK	AV	Detector
IF Bandwidth	BW 120 kHz	RBW: 1 MHz VBW: 3 MHz	RBW: 1 MHz VBW: 10 Hz *1)	IF Bandwidth

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

Figure 2: Test Setup

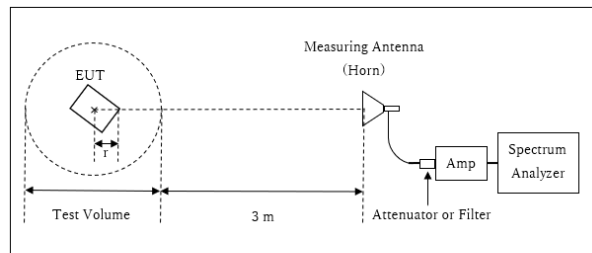
Below 1 GHz



x : Center of turn table

Test Distance: 3 m

1 GHz - 13 GHz



r : Radius of an outer periphery of EUT

x : Center of turn table

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

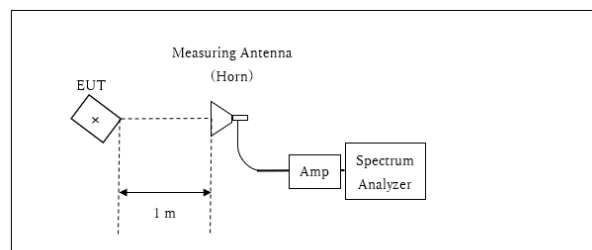
* Test Distance: $(3 + \text{Test Volume} / 2) - r = 3.88 \text{ m}$

Test Volume : 2.0 m

(Test Volume has been calibrated based on CISPR 16-1-4.)

$r = 0.12 \text{ m}$

13 GHz - 40 GHz



x : Center of turn table

Distance Factor: $20 \times \log (1.0 \text{ m} / 3.0 \text{ m}) = -9.5 \text{ dB}$

*Test Distance: 1 m

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 (0 deg.) that has the maximum noise.

Frequency	30 MHz - 1000 MHz	1 GHz - 13 GHz	13 GHz - 40 GHz
Worst angle	0 deg.	0 deg.	0 deg.

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

Measurement range : 30 MHz - 40 GHz

Test data : APPENDIX

Test result : Pass



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 *1)	Enough width to display emission skirts	1 to 5 % of OBW	Three times of RBW	Auto	Peak	Max Hold	Spectrum Analyzer
Maximum Peak Output Power	-	-	-	Auto	Peak Average *2)	-	Power Meter (Sensor: 50 MHz 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) Peak hold was applied as Worst-case measurement.

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

Test data : APPENDIX

Test result : Pass



APPENDIX 1: Test data

20dB Bandwidth, 99%Occupied Bandwidth and Carrier Frequency Separation

Report No. 12622649S-B-R2
Test place Shonan EMC Lab. No.1 Measurement Room
Date December 10, 2018
Temperature / Humidity 21 deg. C / 34 % RH
Engineer Yosuke Ishikawa
Mode Tx, Hopping Off, Tx, Hopping On

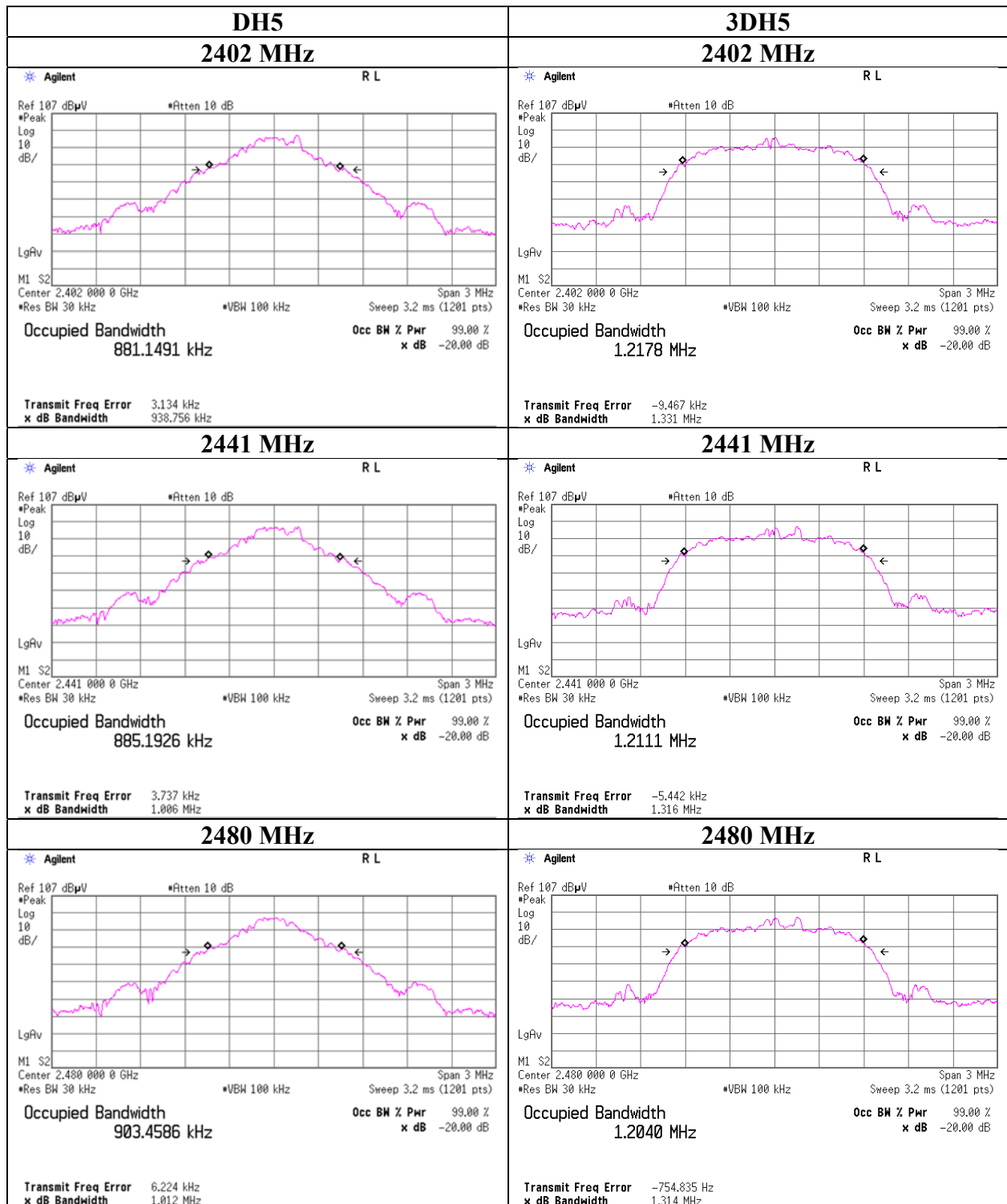
Mode	Freq. [MHz]	20dB Bandwidth [MHz]	99% Occupied Bandwidth [kHz]	Carrier Frequency Separation [MHz]	Limit for Carrier Frequency separation [MHz]
DH5	2402.0	0.939	881.149	0.990	≥ 0.626
DH5	2441.0	1.006	885.193	1.003	≥ 0.671
DH5	2480.0	1.012	903.459	1.005	≥ 0.675
DH5	Hopping On	-	78585.6	-	-
3DH5	2402.0	1.331	1217.8	1.005	≥ 0.887
3DH5	2441.0	1.316	1211.1	0.998	≥ 0.877
3DH5	2480.0	1.314	1204.0	1.003	≥ 0.876
3DH5	Hopping On	-	78738.4	-	-

Limit: Two-thirds of 20dB Bandwidth or 25kHz (whichever is greater).

No limit applies to 20dB Bandwidth.

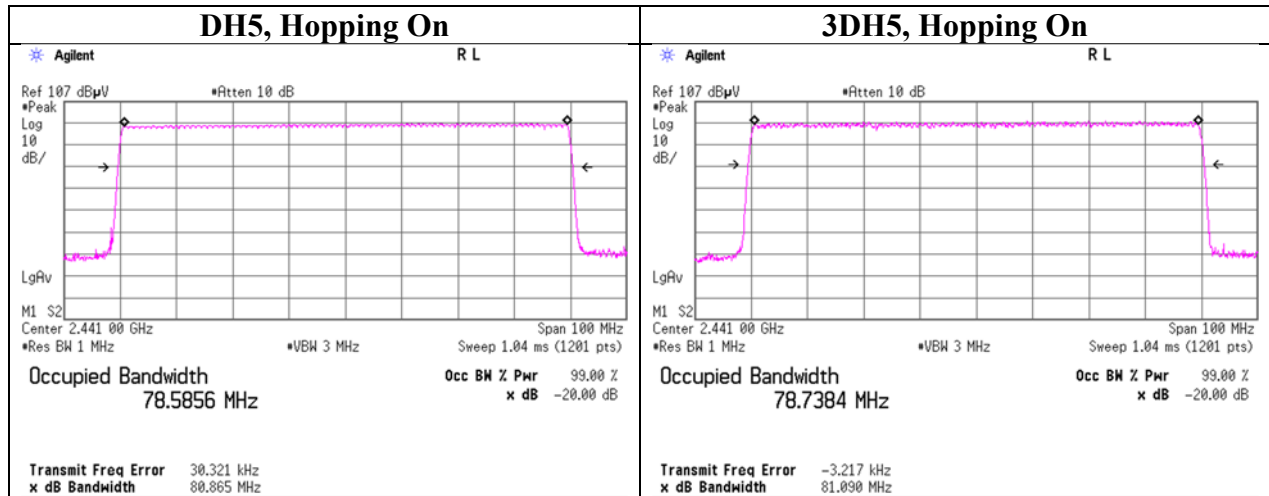


20dB Bandwidth and 99% Occupied Bandwidth





20dB Bandwidth and 99% Occupied Bandwidth



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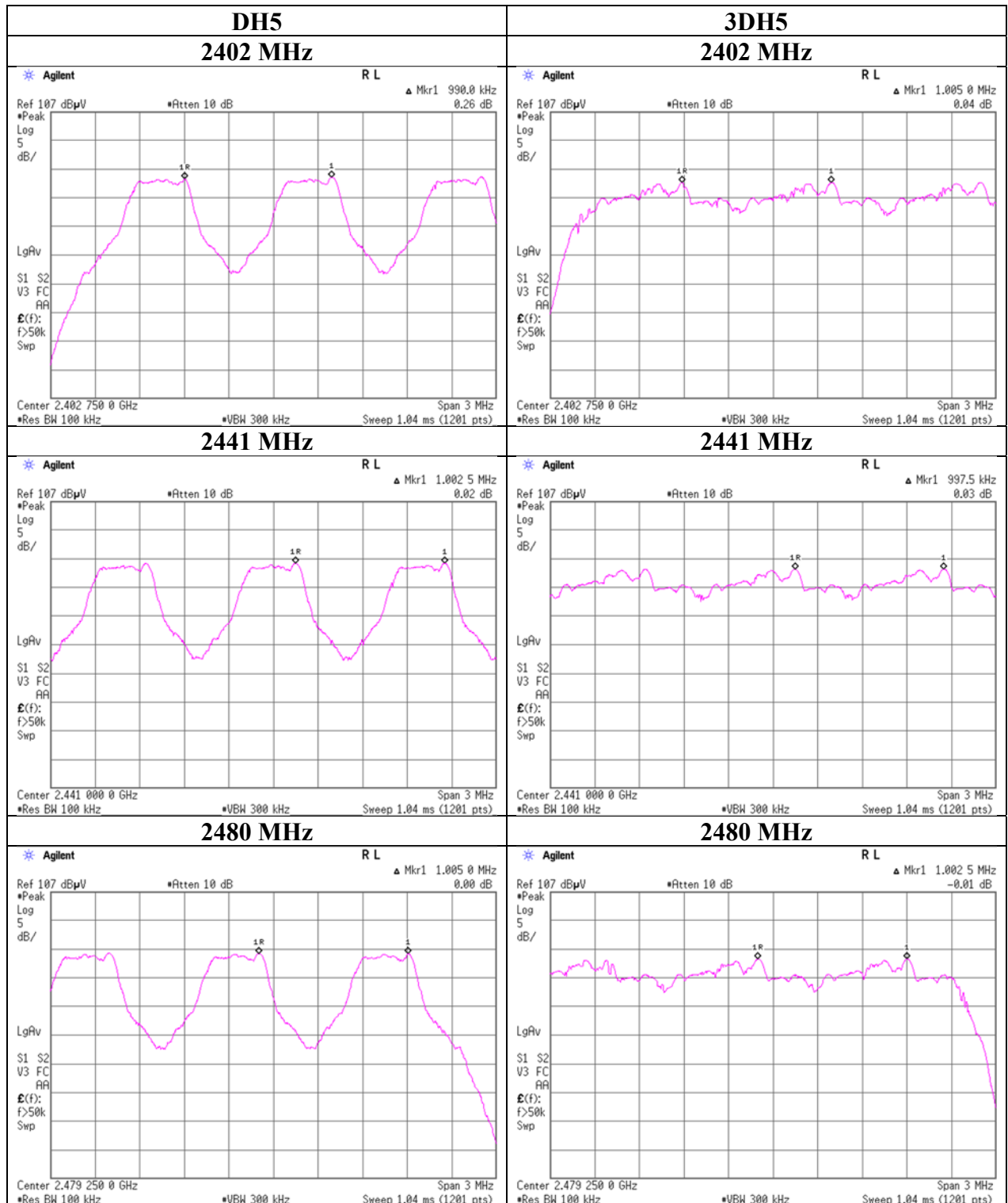
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Carrier Frequency Separation





Number of Hopping Frequency

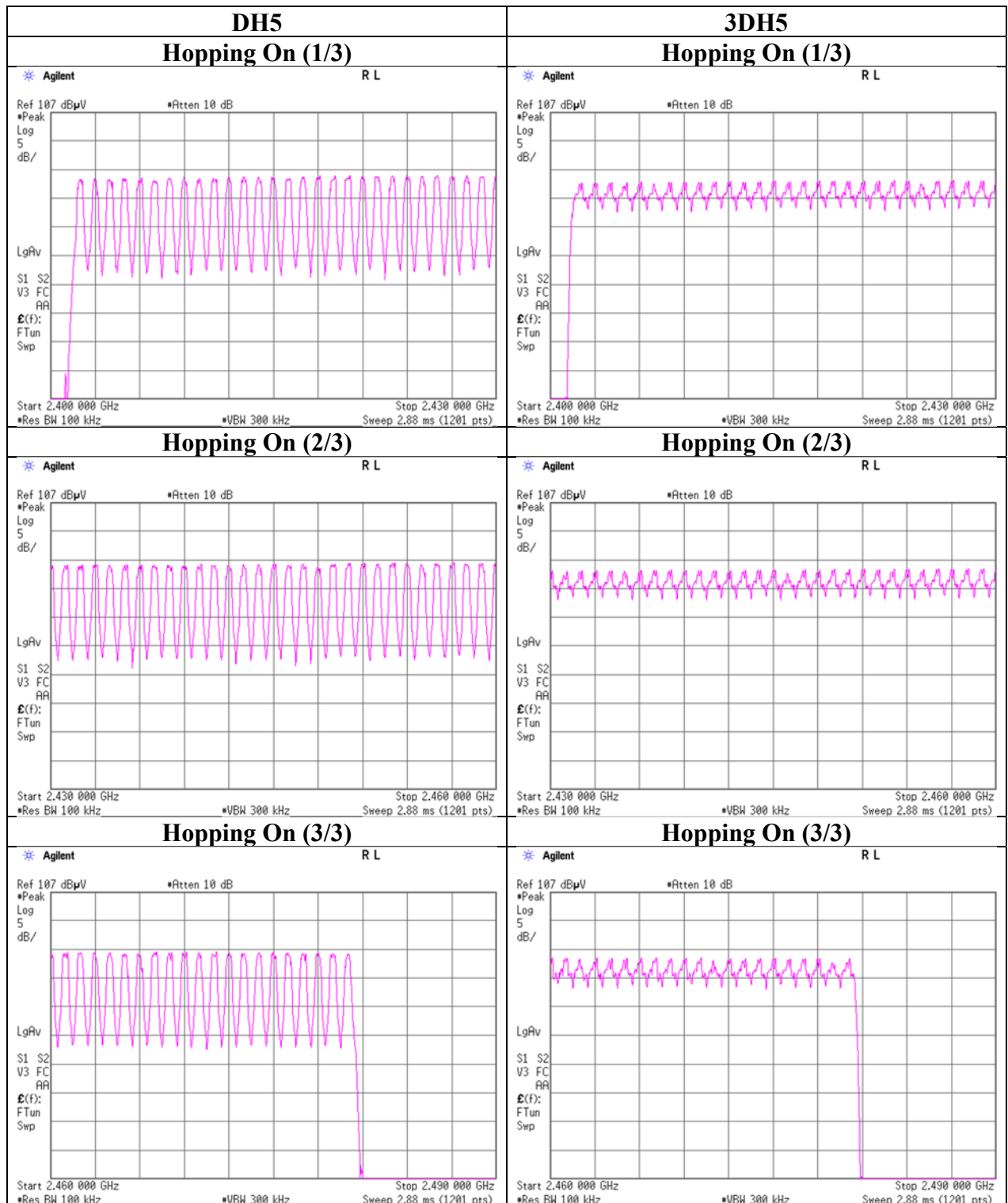
Report No. 12622649S-B-R2
Test place Shonan EMC Lab. No.1 Measurement Room
Date December 10, 2018
Temperature / Humidity 21 deg. C / 34 % RH
Engineer Yosuke Ishikawa
Mode Tx, Hopping On

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

Report No. 12622649S-B-R2
Test place Shonan EMC Lab. No.1 Measurement Room
Date December 10, 2018
Temperature / Humidity 21 deg. C / 34 % 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	50.0 times	/	5 sec.	x 31.6 sec. = 316 times	0.422	133	400
DH3	27.0 times	/	5 sec.	x 31.6 sec. = 171 times	1.679	287	400
DH5	20.0 times	/	5 sec.	x 31.6 sec. = 127 times	2.931	372	400
3DH1	49.8 times	/	5 sec.	x 31.6 sec. = 315 times	0.428	135	400
3DH3	26.2 times	/	5 sec.	x 31.6 sec. = 166 times	1.680	279	400
3DH5	17.0 times	/	5 sec.	x 31.6 sec. = 108 times	2.935	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	49	48	51	50	52	50
DH3	27	26	28	24	30	27
DH5	18	19	23	18	22	20
3DH1	50	50	49	49	51	49.8
3DH3	26	26	25	28	26	26.2
3DH5	18	14	16	16	21	17

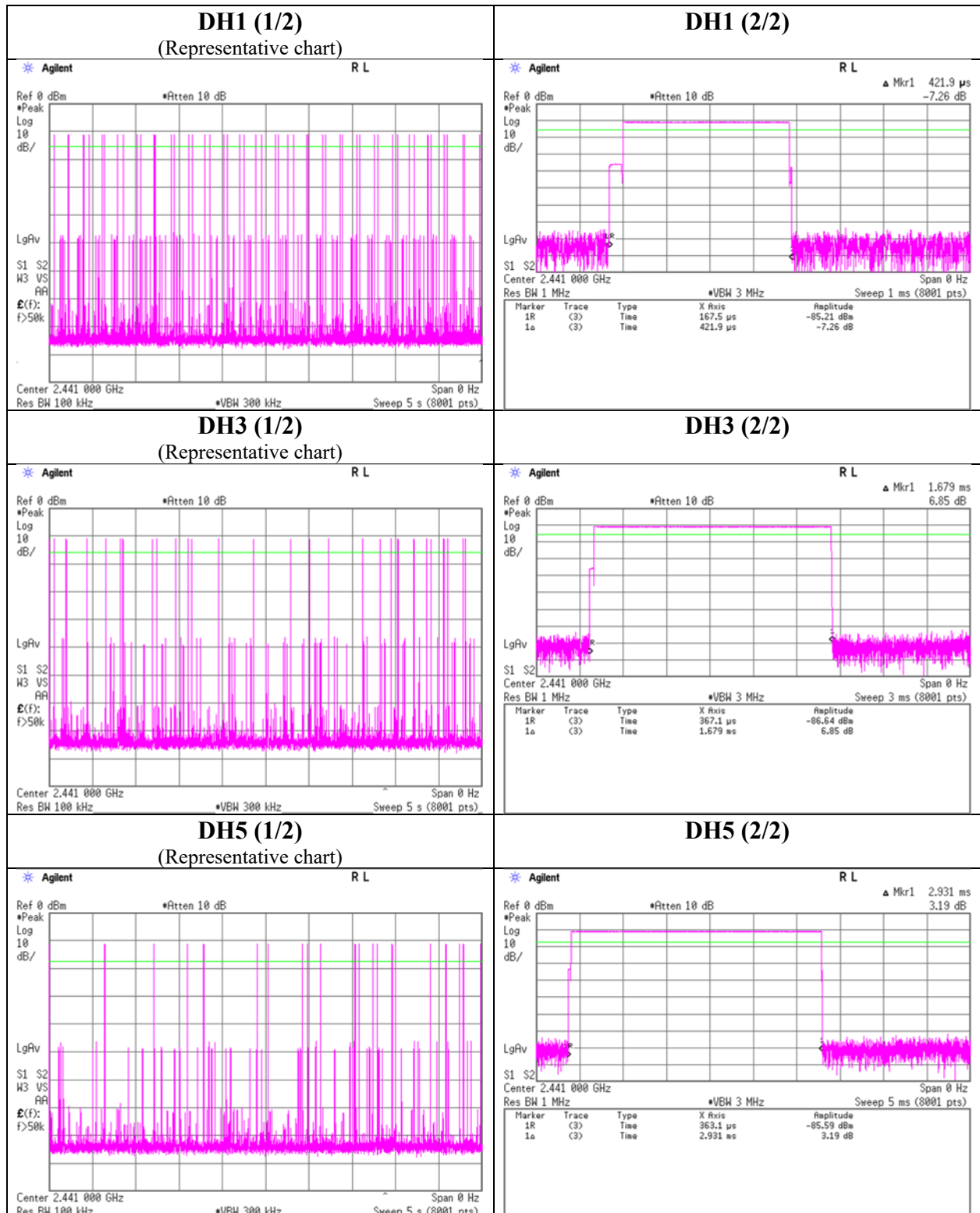
Sample Calculation

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



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Shonan EMC Lab.

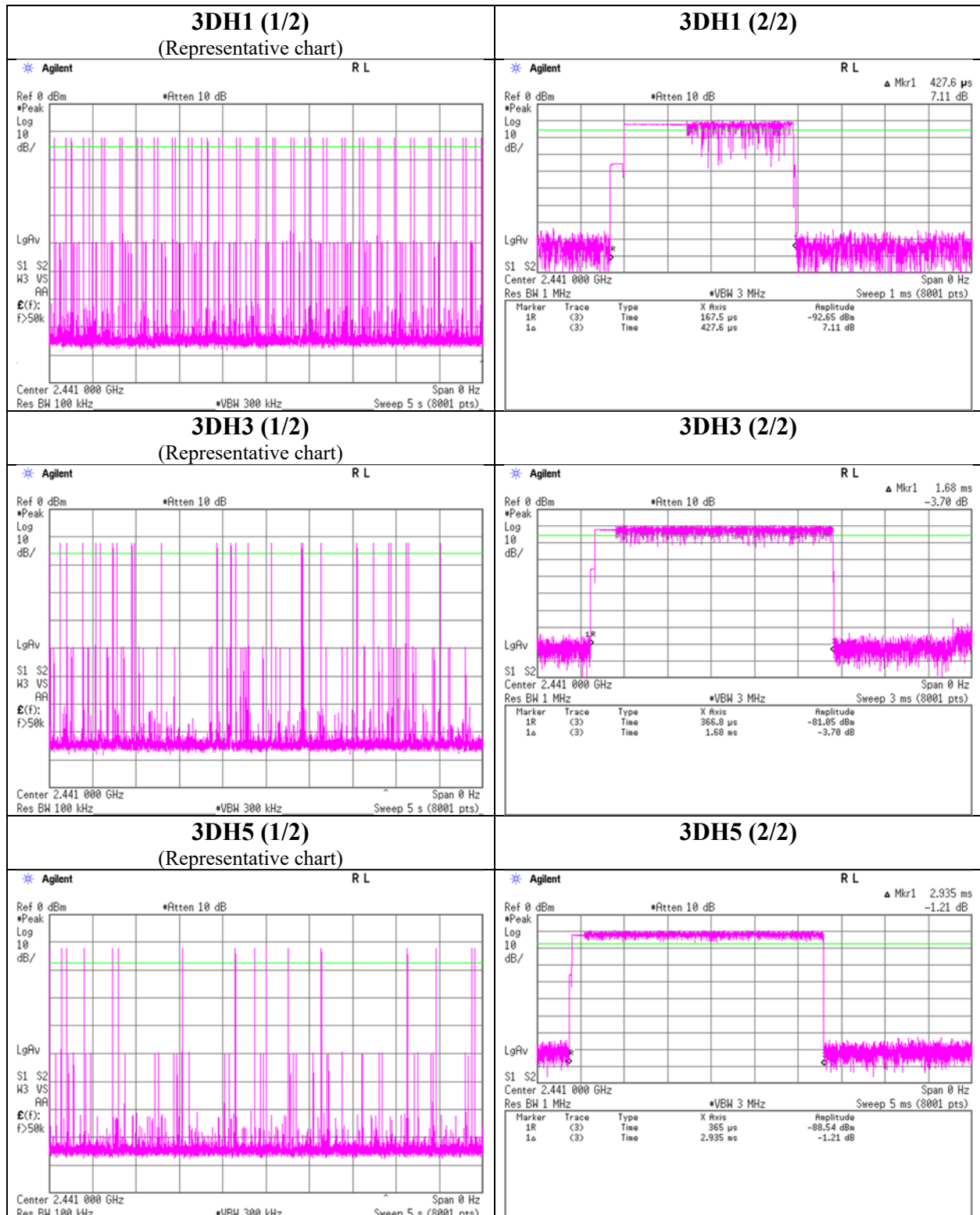
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Dwell time





Maximum Peak Output Power

Report No. 12622649S-B-R2
Test place Shonan EMC Lab. No.1 Measurement Room
Date December 6, 2018
Temperature / Humidity 21 deg. C / 39 % RH
Engineer Kazutaka Takeyama
Mode Tx, Hopping Off

Mode	Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Conducted Power					e.i.r.p. for RSS-247					
					Result		Limit		Margin	Antenna Gain [dBi]	Result		Limit		Margin
					[dBm]	[mW]	[dBm]	[mW]			[dBm]	[mW]	[dBm]	[mW]	
DH5	2402.0	-11.74	2.36	9.82	0.44	1.11	20.96	125	20.52	-2.30	-1.86	0.65	36.02	4000	37.88
DH5	2441.0	-11.04	2.38	9.82	1.16	1.31	20.96	125	19.80	-2.30	-1.14	0.77	36.02	4000	37.16
DH5	2480.0	-10.97	2.39	9.82	1.24	1.33	20.96	125	19.72	-2.30	-1.06	0.78	36.02	4000	37.08
2DH5	2402.0	-10.38	2.36	9.82	1.80	1.51	20.96	125	19.16	-2.30	-0.50	0.89	36.02	4000	36.52
2DH5	2441.0	-9.92	2.38	9.82	2.28	1.69	20.96	125	18.68	-2.30	-0.02	1.00	36.02	4000	36.04
2DH5	2480.0	-9.90	2.39	9.82	2.31	1.70	20.96	125	18.65	-2.30	0.01	1.00	36.02	4000	36.01
3DH5	2402.0	-10.25	2.36	9.82	1.93	1.56	20.96	125	19.03	-2.30	-0.37	0.92	36.02	4000	36.39
3DH5	2441.0	-9.80	2.38	9.82	2.40	1.74	20.96	125	18.56	-2.30	0.10	1.02	36.02	4000	35.92
3DH5	2480.0	-9.70	2.39	9.82	2.51	1.78	20.96	125	18.45	-2.30	0.21	1.05	36.02	4000	35.81

Sample Calculation:

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

e.i.r.p. Result = Conducted Power Result + Antenna Gain

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)

Report No. 12622649S-B-R2
Test place Shonan EMC Lab. No.1 Measurement Room
Date December 6, 2018
Temperature / Humidity 21 deg. C / 39 % RH
Engineer Kazutaka Takeyama
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	-13.51	2.36	9.82	-1.33	0.74	1.07	-0.26	0.94
DH5	2441.0	-12.74	2.38	9.82	-0.54	0.88	1.07	0.53	1.13
DH5	2480.0	-12.69	2.39	9.82	-0.48	0.90	1.07	0.59	1.15
2DH5	2402.0	-14.48	2.36	9.82	-2.30	0.59	1.07	-1.23	0.75
2DH5	2441.0	-13.93	2.38	9.82	-1.73	0.67	1.07	-0.66	0.86
2DH5	2480.0	-13.91	2.39	9.82	-1.70	0.68	1.07	-0.63	0.86
3DH5	2402.0	-14.46	2.36	9.82	-2.28	0.59	1.06	-1.22	0.76
3DH5	2441.0	-13.90	2.38	9.82	-1.70	0.68	1.06	-0.64	0.86
3DH5	2480.0	-13.88	2.39	9.82	-1.67	0.68	1.06	-0.61	0.87

Sample Calculation:

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

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

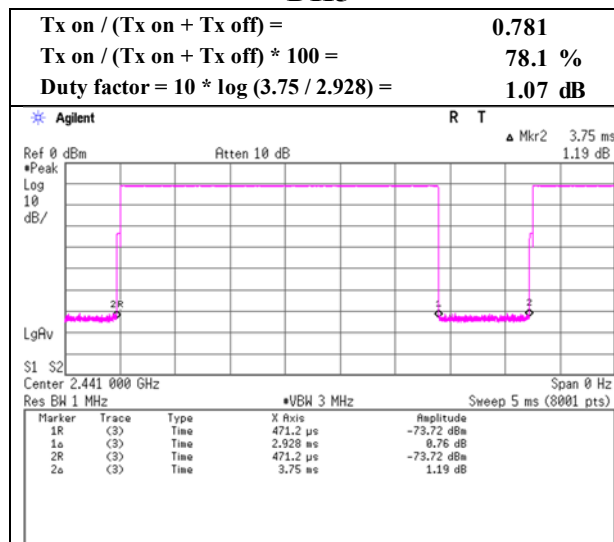
*The equipment and cables were not used for factor 0 dB of the data sheets.



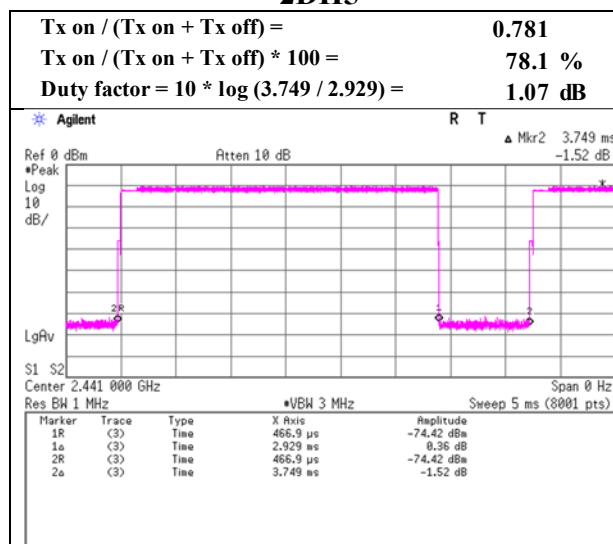
Burst Rate Confirmation

Report No. 12622649S-B-R2
Test place Shonan EMC Lab. No.1 Measurement Room
Date December 6, 2018
Temperature / Humidity 21 deg. C / 39 % RH
Engineer Kazutaka Takeyama
Mode Tx, Hopping Off

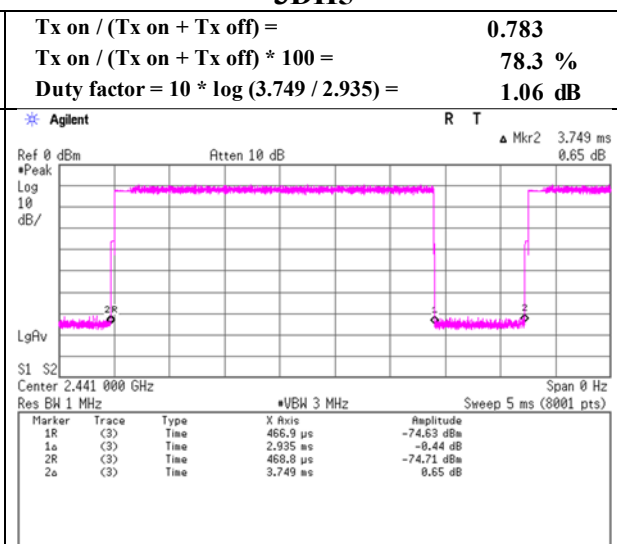
DH5



2DH5



3DH5





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Issued date : February 19, 2019
FCC ID : IOMJ5219

Radiated Spurious Emission

Report No.	12622649S-B-R2		
Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	No.2	No.2	No.2
Date	December 7, 2018	December 5, 2018	December 7, 2018
Temperature / Humidity	22 deg. C / 48 % RH	23 deg. C / 50 % RH	22 deg. C / 48 % RH
Engineer	Shiro Kobayashi	Shiro Kobayashi	Shiro Kobayashi
	(30 MHz -1 GHz)	(1 GHz -18 GHz)	(18 GHz - 40 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.	65.445	QP	39.48	7.12	6.94	31.90	0.00	21.64	40.00	18.3	314	142	
Hori.	121.502	QP	37.17	13.22	7.94	31.86	0.00	26.47	43.50	17.0	395	72	
Hori.	156.038	QP	36.75	14.90	8.63	31.82	0.00	28.46	43.50	15.0	209	131	
Hori.	221.182	QP	47.27	11.10	5.58	31.76	0.00	32.19	46.00	13.8	151	102	
Hori.	269.996	QP	51.31	12.76	5.97	31.72	0.00	38.32	46.00	7.6	175	281	
Hori.	417.790	QP	42.88	16.01	7.12	31.67	0.00	34.34	46.00	11.6	100	75	
Hori.	466.944	QP	41.77	16.94	7.32	31.66	0.00	34.37	46.00	11.6	100	175	
Hori.	933.004	QP	39.40	22.01	9.24	30.68	0.00	39.97	46.00	6.0	116	86	
Hori.	960.272	QP	39.55	22.05	9.34	30.47	0.00	40.47	53.90	13.4	116	86	
Hori.	2390.000	PK	45.14	27.91	14.07	37.10	2.24	52.26	73.90	21.6	257	127	
Hori.	4804.000	PK	44.38	31.31	6.60	36.64	2.24	47.89	73.90	26.0	150	0	
Hori.	7206.000	PK	44.37	36.77	7.65	36.92	2.24	54.11	73.90	19.7	150	0	
Hori.	9608.000	PK	46.01	38.11	8.71	36.71	2.24	58.36	73.90	15.5	150	0	
Hori.	2390.000	AV	32.99	27.91	14.07	37.10	2.24	40.11	53.90	13.7	257	127	
Hori.	4804.000	AV	31.87	31.31	6.60	36.64	2.24	35.38	53.90	18.5	150	0	
Hori.	7206.000	AV	32.75	36.77	7.65	36.92	2.24	42.49	53.90	11.4	150	0	
Hori.	9608.000	AV	33.43	38.11	8.71	36.71	2.24	45.78	53.90	8.1	150	0	
Vert.	33.868	QP	25.69	17.15	6.83	31.93	0.00	17.74	40.00	22.2	100	45	
Vert.	65.445	QP	30.44	7.12	6.94	31.90	0.00	12.60	40.00	27.4	100	336	
Vert.	121.502	QP	37.28	13.22	7.94	31.86	0.00	26.58	43.50	16.9	100	272	
Vert.	156.038	QP	34.20	14.90	8.63	31.82	0.00	25.91	43.50	17.5	100	293	
Vert.	221.182	QP	39.71	11.10	5.58	31.76	0.00	24.63	46.00	21.3	100	230	
Vert.	269.996	QP	46.23	12.76	5.97	31.72	0.00	33.24	46.00	12.7	100	231	
Vert.	417.790	QP	35.90	16.01	7.12	31.67	0.00	27.36	46.00	18.6	100	65	
Vert.	466.944	QP	36.04	16.94	7.32	31.66	0.00	28.64	46.00	17.3	100	145	
Vert.	960.272	QP	32.65	22.05	9.34	30.47	0.00	33.57	53.90	20.3	100	59	
Vert.	2390.000	PK	45.54	27.91	14.07	37.10	2.24	52.66	73.90	21.2	248	312	
Vert.	4804.000	PK	44.41	31.31	6.60	36.64	2.24	47.92	73.90	25.9	150	0	
Vert.	7206.000	PK	44.79	36.77	7.65	36.92	2.24	54.53	73.90	19.3	150	0	
Vert.	9608.000	PK	45.21	38.11	8.71	36.71	2.24	57.56	73.90	16.3	150	0	
Vert.	2390.000	AV	33.02	27.91	14.07	37.10	2.24	40.14	53.90	13.7	248	312	
Vert.	4804.000	AV	31.85	31.31	6.60	36.64	2.24	35.36	53.90	18.5	150	0	
Vert.	7206.000	AV	32.76	36.77	7.65	36.92	2.24	42.50	53.90	11.4	150	0	
Vert.	9608.000	AV	33.39	38.11	8.71	36.71	2.24	45.74	53.90	8.1	150	0	

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

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

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

* 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	74.06	27.90	14.08	37.10	2.24	81.18	-	-	Carrier
Hori.	2400.000	PK	36.91	27.91	14.08	37.10	2.24	44.04	61.18	17.1	
Vert.	2402.000	PK	75.08	27.90	14.08	37.10	2.24	82.20	-	-	Carrier
Vert.	2400.000	PK	36.66	27.91	14.08	37.10	2.24	43.79	62.20	18.4	

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

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Shonan EMC Lab.

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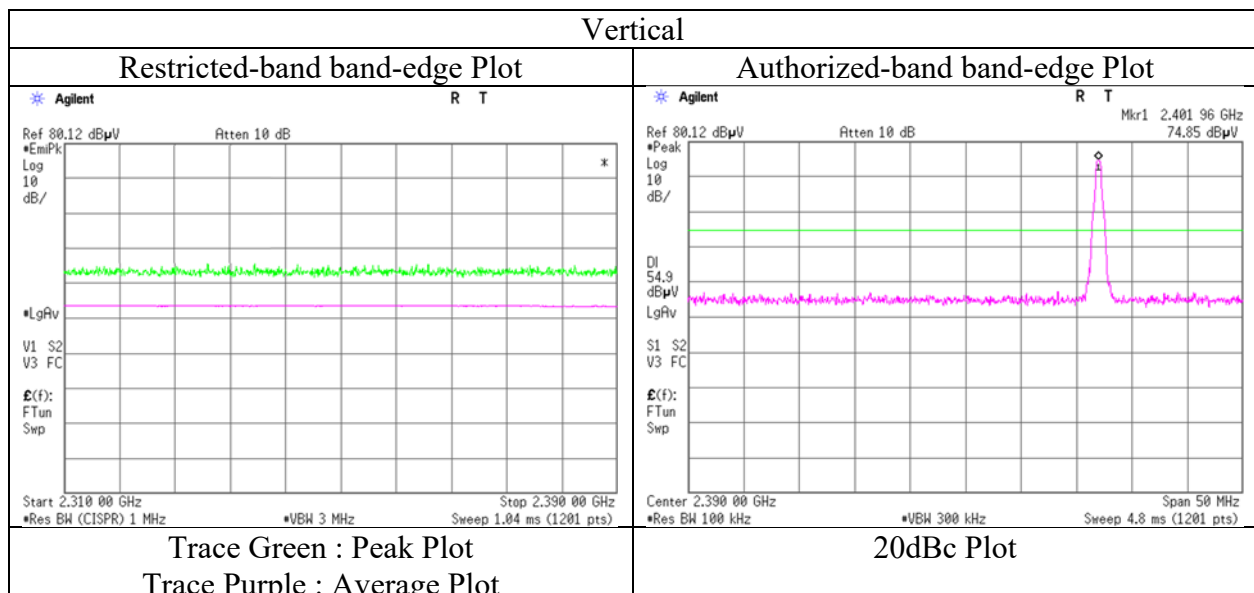
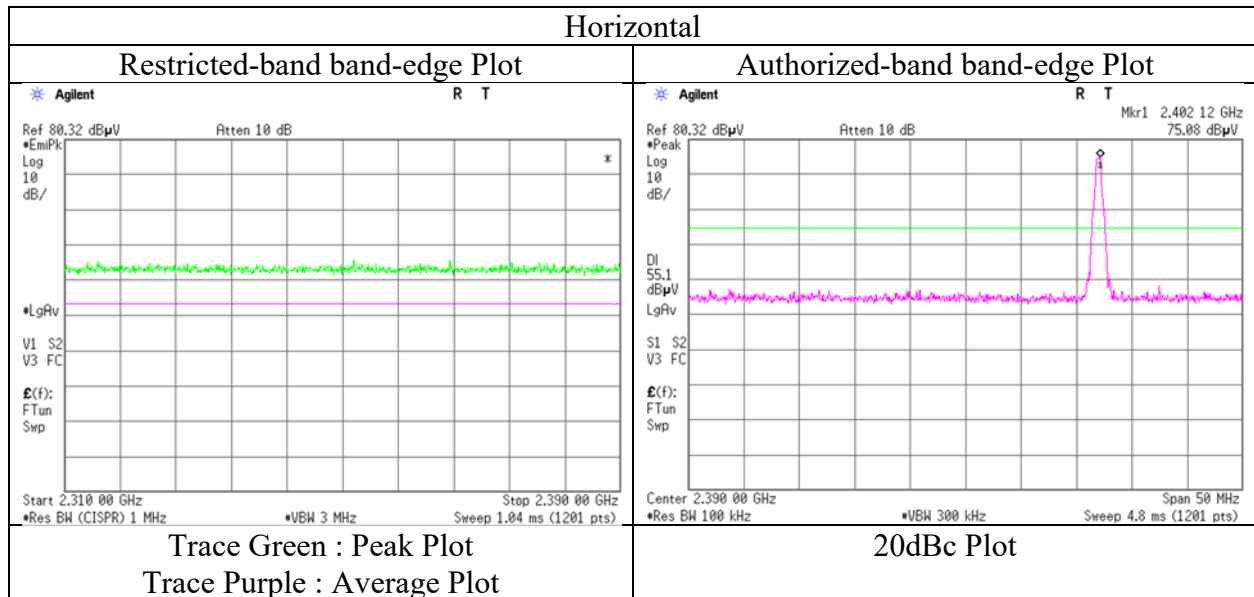
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Radiated Spurious Emission (Reference Plot for band-edge)

Report No. 12622649S-B-R2
Test place Shonan EMC Lab.
Semi Anechoic Chamber No.2
Date December 5, 2018
Temperature / Humidity 23 deg. C / 50 % RH
Engineer Shiro Kobayashi
(1 GHz ~2.8 GHz)
Mode Tx, Hopping Off, DH5 2402 MHz



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

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

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Radiated Spurious Emission

Report No.	12622649S-B-R2		
Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	No.2	No.2	No.2
Date	December 7, 2018	December 5, 2018	December 7, 2018
Temperature / Humidity	22 deg. C / 48 % RH	23 deg. C / 50 % RH	22 deg. C / 48 % RH
Engineer	Shiro Kobayashi	Shiro Kobayashi	Shiro Kobayashi
	(30 MHz - 1 GHz)	(1 GHz - 18 GHz)	(18 GHz - 40 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.	64.496	QP	36.86	7.28	6.92	31.90	0.00	19.16	40.00	20.8	340	141	
Hori.	121.499	QP	37.56	13.21	7.94	31.86	0.00	26.85	43.50	16.6	384	52	
Hori.	156.023	QP	35.54	14.90	8.63	31.82	0.00	27.25	43.50	16.2	195	34	
Hori.	221.186	QP	47.56	11.10	5.58	31.76	0.00	32.48	46.00	13.5	162	104	
Hori.	270.000	QP	51.73	12.76	5.97	31.72	0.00	38.74	46.00	7.2	176	271	
Hori.	417.790	QP	43.25	16.01	7.12	31.67	0.00	34.71	46.00	11.2	100	72	
Hori.	466.941	QP	42.40	16.94	7.32	31.66	0.00	35.00	46.00	11.0	100	135	
Hori.	929.998	QP	39.45	22.02	9.22	30.70	0.00	39.99	46.00	6.0	100	253	
Hori.	960.271	QP	39.58	22.05	9.34	30.47	0.00	40.50	53.90	13.4	100	253	
Hori.	4882.000	PK	44.51	31.14	6.64	36.63	2.24	47.90	73.90	26.0	150	0	
Hori.	7323.000	PK	44.52	36.84	7.72	36.90	2.24	54.42	73.90	19.5	150	0	
Hori.	9764.000	PK	45.35	38.59	8.85	36.66	2.24	58.37	73.90	15.5	150	0	
Hori.	4882.000	AV	31.62	31.14	6.64	36.63	2.24	35.01	53.90	18.9	150	0	
Hori.	7323.000	AV	32.00	36.84	7.72	36.90	2.24	41.90	53.90	12.0	150	0	
Hori.	9764.000	AV	32.51	38.59	8.85	36.66	2.24	45.53	53.90	8.4	150	0	
Vert.	45.130	QP	35.31	12.94	7.10	31.91	0.00	23.44	40.00	16.5	100	312	
Vert.	64.496	QP	31.60	7.28	6.92	31.90	0.00	13.90	40.00	26.1	100	239	
Vert.	121.499	QP	38.09	13.21	7.94	31.86	0.00	27.38	43.50	16.1	100	214	
Vert.	156.023	QP	34.33	14.90	8.63	31.82	0.00	26.04	43.50	17.4	100	281	
Vert.	221.186	QP	39.73	11.10	5.58	31.76	0.00	24.65	46.00	21.3	100	357	
Vert.	270.000	QP	46.49	12.76	5.97	31.72	0.00	33.50	46.00	12.5	100	190	
Vert.	417.790	QP	35.98	16.01	7.12	31.67	0.00	27.44	46.00	18.5	100	61	
Vert.	466.941	QP	35.52	16.94	7.32	31.66	0.00	28.12	46.00	17.8	100	170	
Vert.	960.271	QP	32.77	22.05	9.34	30.47	0.00	33.69	53.90	20.2	100	55	
Vert.	4882.000	PK	44.09	31.14	6.64	36.63	2.24	47.48	73.90	26.4	150	0	
Vert.	7323.000	PK	43.98	36.84	7.72	36.90	2.24	53.88	73.90	20.0	150	0	
Vert.	9764.000	PK	45.82	38.59	8.85	36.66	2.24	58.84	73.90	15.1	150	0	
Vert.	4882.000	AV	31.62	31.14	6.64	36.63	2.24	35.01	53.90	18.9	150	0	
Vert.	7323.000	AV	31.98	36.84	7.72	36.90	2.24	41.88	53.90	12.0	150	0	
Vert.	9764.000	AV	32.75	38.59	8.85	36.66	2.24	45.77	53.90	8.1	150	0	

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

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

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

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

UL Japan, Inc.

Shonan EMC Lab.

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

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Radiated Spurious Emission

Report No.	12622649S-B-R2		
Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	No.2	No.2	No.2
Date	December 7, 2018	December 5, 2018	December 7, 2018
Temperature / Humidity	22 deg. C / 48 % RH	23 deg. C / 50 % RH	22 deg. C / 48 % RH
Engineer	Shiro Kobayashi	Shiro Kobayashi	Shiro Kobayashi
	(30 MHz -1 GHz)	(1 GHz -18 GHz)	(18 GHz - 40 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.	81.002	QP	39.99	6.60	8.07	31.89	0.00	22.77	40.00	17.2	393	205	
Hori.	121.513	QP	37.95	13.22	7.94	31.86	0.00	27.25	43.50	16.2	398	48	
Hori.	156.009	QP	39.82	14.90	8.63	31.82	0.00	31.53	43.50	11.9	201	38	
Hori.	221.183	QP	47.93	11.10	5.58	31.76	0.00	32.85	46.00	13.1	155	101	
Hori.	269.996	QP	51.36	12.76	5.97	31.72	0.00	38.37	46.00	7.6	169	285	
Hori.	417.796	QP	44.38	16.01	7.12	31.67	0.00	35.84	46.00	10.1	100	74	
Hori.	466.940	QP	42.30	16.94	7.32	31.66	0.00	34.90	46.00	11.1	100	131	
Hori.	933.012	QP	39.02	22.01	9.24	30.68	0.00	39.59	46.00	6.4	124	359	
Hori.	960.275	QP	39.67	22.05	9.34	30.47	0.00	40.59	53.90	13.3	117	88	
Hori.	2483.500	PK	45.32	27.67	14.14	37.08	2.24	52.29	73.90	21.6	312	138	
Hori.	4960.000	PK	44.17	31.33	6.69	36.62	2.24	47.81	73.90	26.0	150	0	
Hori.	7440.000	PK	44.49	36.97	7.78	36.87	2.24	54.61	73.90	19.2	150	0	
Hori.	9920.000	PK	44.75	38.80	9.00	36.61	2.24	58.18	73.90	15.7	150	0	
Hori.	2483.500	AV	33.03	27.67	14.14	37.08	2.24	40.00	53.90	13.9	312	138	
Hori.	4960.000	AV	31.63	31.33	6.69	36.62	2.24	35.27	53.90	18.6	150	0	
Hori.	7440.000	AV	31.71	36.97	7.78	36.87	2.24	41.83	53.90	12.0	150	0	
Hori.	9920.000	AV	31.85	38.80	9.00	36.61	2.24	45.28	53.90	8.6	150	0	
Vert.	81.002	QP	35.18	6.60	8.07	31.89	0.00	17.96	40.00	22.0	134	321	
Vert.	121.513	QP	38.58	13.22	7.94	31.86	0.00	27.88	43.50	15.6	100	216	
Vert.	156.009	QP	36.45	14.90	8.63	31.82	0.00	28.16	43.50	15.3	100	310	
Vert.	221.183	QP	39.68	11.10	5.58	31.76	0.00	24.60	46.00	21.4	100	353	
Vert.	269.996	QP	46.02	12.76	5.97	31.72	0.00	33.03	46.00	12.9	100	188	
Vert.	417.796	QP	36.26	16.01	7.12	31.67	0.00	27.72	46.00	18.2	100	66	
Vert.	466.940	QP	34.89	16.94	7.32	31.66	0.00	27.49	46.00	18.5	100	159	
Vert.	960.275	QP	32.82	22.05	9.34	30.47	0.00	33.74	53.90	20.1	100	59	
Vert.	2483.500	PK	45.68	27.67	14.14	37.08	2.24	52.65	73.90	21.2	142	312	
Vert.	4960.000	PK	44.31	31.33	6.69	36.62	2.24	47.95	73.90	25.9	150	0	
Vert.	7440.000	PK	44.15	36.97	7.78	36.87	2.24	54.27	73.90	19.6	150	0	
Vert.	9920.000	PK	44.80	38.80	9.00	36.61	2.24	58.23	73.90	15.6	150	0	
Vert.	2483.500	AV	33.02	27.67	14.14	37.08	2.24	39.99	53.90	13.9	142	312	
Vert.	4960.000	AV	31.64	31.33	6.69	36.62	2.24	35.28	53.90	18.6	150	0	
Vert.	7440.000	AV	31.76	36.97	7.78	36.87	2.24	41.88	53.90	12.0	150	0	
Vert.	9920.000	AV	31.89	38.80	9.00	36.61	2.24	45.32	53.90	8.5	150	0	

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

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

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

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

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Shonan EMC Lab.

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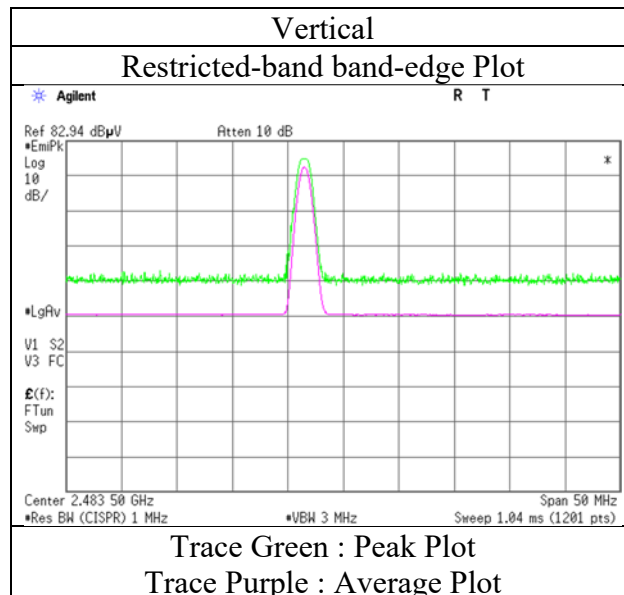
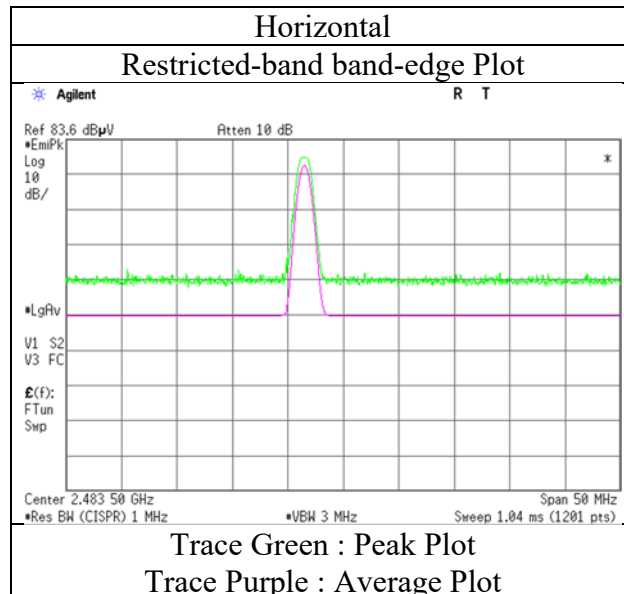
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Radiated Spurious Emission **(Reference Plot for band-edge)**

Report No. 12622649S-B-R2
Test place Shonan EMC Lab.
Semi Anechoic Chamber No.2
Date December 5, 2018
Temperature / Humidity 23 deg. C / 50 % RH
Engineer Shiro Kobayashi
(1 GHz -2.8 GHz)
Mode Tx, Hopping Off, DH5 2480 MHz



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



Radiated Spurious Emission

Report No.	12622649S-B-R2		
Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	No.2	No.2	No.2
Date	December 7, 2018	December 5, 2018	December 7, 2018
Temperature / Humidity	22 deg. C / 48 % RH	23 deg. C / 50 % RH	22 deg. C / 48 % RH
Engineer	Shiro Kobayashi	Shiro Kobayashi	Shiro Kobayashi
	(30 MHz -1 GHz)	(1 GHz -18 GHz)	(18 GHz - 40 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.	80.996	QP	40.27	6.60	8.07	31.89	0.00	23.05	40.00	16.9	392	212	
Hori.	121.511	QP	38.19	13.22	7.94	31.86	0.00	27.49	43.50	16.0	381	64	
Hori.	156.028	QP	40.17	14.90	8.63	31.82	0.00	31.88	43.50	11.6	216	38	
Hori.	221.101	QP	47.81	11.10	5.58	31.76	0.00	32.73	46.00	13.2	151	98	
Hori.	269.998	QP	51.21	12.76	5.97	31.72	0.00	38.22	46.00	7.7	124	282	
Hori.	417.792	QP	46.58	16.01	7.12	31.67	0.00	38.04	46.00	7.9	100	70	
Hori.	466.997	QP	42.37	16.95	7.32	31.66	0.00	34.98	46.00	11.0	100	135	
Hori.	932.998	QP	39.58	22.01	9.24	30.68	0.00	40.15	46.00	5.8	114	87	
Hori.	960.271	QP	39.61	22.05	9.34	30.47	0.00	40.53	53.90	13.3	114	87	
Hori.	2390.000	PK	45.04	27.91	14.07	37.10	2.24	52.16	73.90	21.7	263	127	
Hori.	4804.000	PK	44.44	31.31	6.60	36.64	2.24	47.95	73.90	26.0	150	0	
Hori.	7206.000	PK	45.38	36.77	7.65	36.92	2.24	55.12	73.90	18.8	150	0	
Hori.	9608.000	PK	45.90	38.11	8.71	36.71	2.24	58.25	73.90	15.7	150	0	
Hori.	2390.000	AV	33.00	27.91	14.07	37.10	2.24	40.12	53.90	13.8	263	127	
Hori.	4804.000	AV	31.93	31.31	6.60	36.64	2.24	35.44	53.90	18.5	150	0	
Hori.	7206.000	AV	32.83	36.77	7.65	36.92	2.24	42.57	53.90	11.3	150	0	
Hori.	9608.000	AV	33.49	38.11	8.71	36.71	2.24	45.84	53.90	8.1	150	0	
Vert.	80.996	QP	35.23	6.60	8.07	31.89	0.00	18.01	40.00	21.9	100	315	
Vert.	121.511	QP	38.70	13.22	7.94	31.86	0.00	28.00	43.50	15.5	100	208	
Vert.	156.028	QP	37.03	14.90	8.63	31.82	0.00	28.74	43.50	14.7	100	298	
Vert.	221.101	QP	39.00	11.10	5.58	31.76	0.00	23.92	46.00	22.0	100	357	
Vert.	269.998	QP	45.95	12.76	5.97	31.72	0.00	32.96	46.00	13.0	100	192	
Vert.	417.792	QP	36.20	16.01	7.12	31.67	0.00	27.66	46.00	18.3	121	71	
Vert.	466.940	QP	34.71	16.94	7.32	31.66	0.00	27.31	46.00	18.6	100	160	
Vert.	960.271	QP	32.72	22.05	9.34	30.47	0.00	33.64	53.90	20.2	100	55	
Vert.	2390.000	PK	45.16	27.91	14.07	37.10	2.24	52.28	73.90	21.6	249	311	
Vert.	4804.000	PK	44.65	31.31	6.60	36.64	2.24	48.16	73.90	25.7	150	0	
Vert.	7206.000	PK	45.03	36.77	7.65	36.92	2.24	54.77	73.90	19.1	150	0	
Vert.	9608.000	PK	46.45	38.11	8.71	36.71	2.24	58.80	73.90	15.1	150	0	
Vert.	2390.000	AV	32.99	27.91	14.07	37.10	2.24	40.11	53.90	13.8	249	311	
Vert.	4804.000	AV	31.93	31.31	6.60	36.64	2.24	35.44	53.90	18.5	150	0	
Vert.	7206.000	AV	32.84	36.77	7.65	36.92	2.24	42.58	53.90	11.3	150	0	
Vert.	9608.000	AV	33.50	38.11	8.71	36.71	2.24	45.85	53.90	8.1	150	0	

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

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

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

* 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	73.60	27.90	14.08	37.10	2.24	80.72	-	-	Carrier
Hori.	2400.000	PK	36.07	27.91	14.08	37.10	2.24	43.20	60.72	17.5	
Vert.	2402.000	PK	73.69	27.90	14.08	37.10	2.24	80.81	-	-	Carrier
Vert.	2400.000	PK	36.20	27.91	14.08	37.10	2.24	43.33	60.81	17.4	

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

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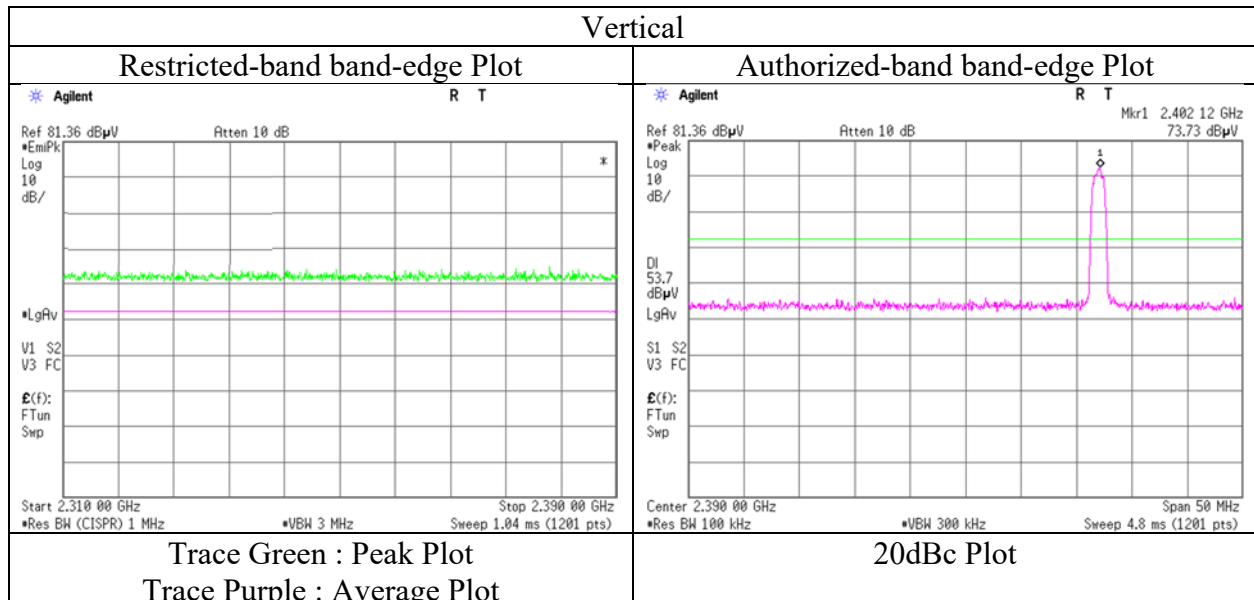
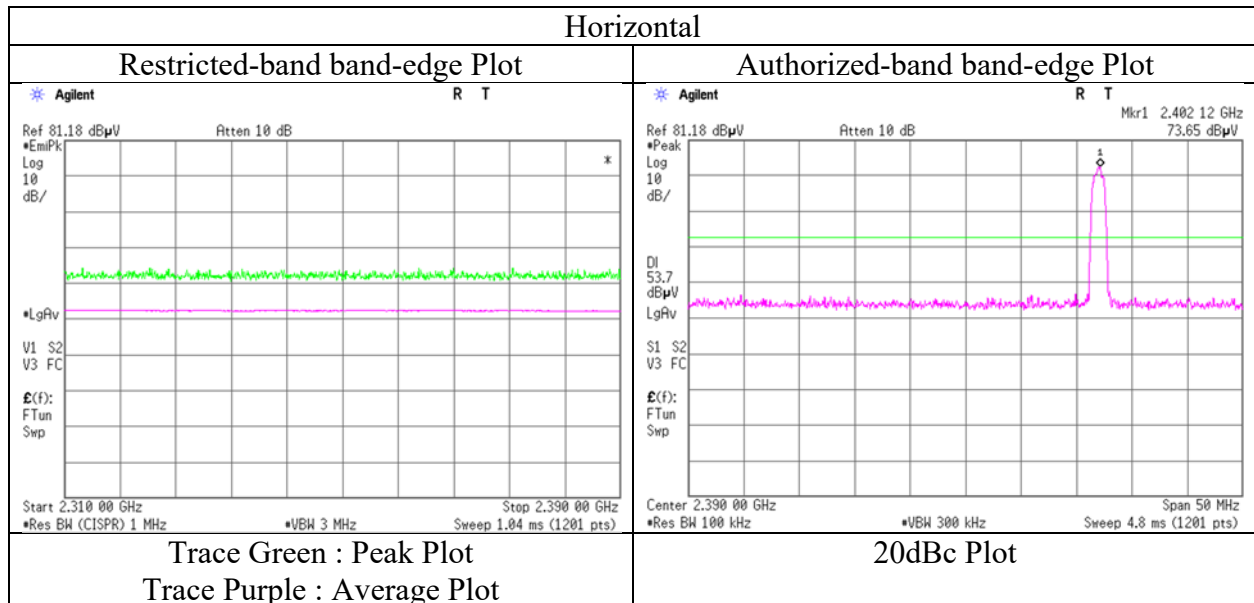
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Radiated Spurious Emission (Reference Plot for band-edge)

Report No. 12622649S-B-R2
Test place Shonan EMC Lab.
Semi Anechoic Chamber No.2
Date December 5, 2018
Temperature / Humidity 23 deg. C / 50 % RH
Engineer Shiro Kobayashi
(1 GHz ~2.8 GHz)
Mode Tx, Hopping Off, 3DH5 2402 MHz



* The measurement was conducted for a sufficiently long enough time to detect any possible spurious emissions.

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

UL Japan, Inc.

Shonan EMC Lab.

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

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Radiated Spurious Emission

Report No. 12622649S-B-R2
Test place Shonan EMC Lab.
Semi Anechoic Chamber No.2 No.2 No.2
Date December 7, 2018 December 5, 2018 December 7, 2018
Temperature / Humidity 22 deg. C / 48 % RH 23 deg. C / 50 % RH 22 deg. C / 48 % RH
Engineer Shiro Kobayashi Shiro Kobayashi Shiro Kobayashi
(30 MHz -1 GHz) (1 GHz -18 GHz) (18 GHz - 40 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.	73.729	QP	43.74	6.31	7.56	31.90	0.00	25.71	40.00	14.2	252	30	
Hori.	128.705	QP	38.03	13.89	8.07	31.85	0.00	28.14	43.50	15.3	370	61	
Hori.	156.016	QP	40.60	14.90	8.63	31.82	0.00	32.31	43.50	11.1	206	31	
Hori.	221.183	QP	47.79	11.10	5.58	31.76	0.00	32.71	46.00	13.2	151	105	
Hori.	269.997	QP	50.75	12.76	5.97	31.72	0.00	37.76	46.00	8.2	131	282	
Hori.	417.791	QP	44.48	16.01	7.12	31.67	0.00	35.94	46.00	10.0	100	73	
Hori.	466.946	QP	42.40	16.95	7.32	31.66	0.00	35.01	46.00	10.9	100	138	
Hori.	933.085	QP	39.45	22.01	9.24	30.68	0.00	40.02	46.00	5.9	116	355	
Hori.	960.278	QP	40.06	22.05	9.34	30.47	0.00	40.98	53.90	12.9	100	253	
Hori.	4882.000	PK	44.46	31.14	6.64	36.63	2.24	47.85	73.90	26.0	150	0	
Hori.	7323.000	PK	44.67	36.84	7.72	36.90	2.24	54.57	73.90	19.3	150	0	
Hori.	9764.000	PK	45.66	38.59	8.85	36.66	2.24	58.68	73.90	15.2	150	0	
Hori.	4882.000	AV	31.78	31.14	6.64	36.63	2.24	35.17	53.90	18.7	150	0	
Hori.	7323.000	AV	32.17	36.84	7.72	36.90	2.24	42.07	53.90	11.8	150	0	
Hori.	9764.000	AV	32.66	38.59	8.85	36.66	2.24	45.68	53.90	8.2	150	0	
Vert.	45.155	QP	35.99	12.93	7.10	31.91	0.00	24.11	40.00	15.8	100	280	
Vert.	128.705	QP	38.65	13.89	8.07	31.85	0.00	28.76	43.50	14.7	100	204	
Vert.	156.016	QP	37.08	14.90	8.63	31.82	0.00	28.79	43.50	14.7	100	298	
Vert.	221.183	QP	39.07	11.10	5.58	31.76	0.00	23.99	46.00	22.0	100	262	
Vert.	269.997	QP	45.62	12.76	5.97	31.72	0.00	32.63	46.00	13.3	100	184	
Vert.	417.791	QP	36.27	16.01	7.12	31.67	0.00	27.73	46.00	18.2	100	70	
Vert.	466.946	QP	35.45	16.95	7.32	31.66	0.00	28.06	46.00	17.9	121	160	
Vert.	960.278	QP	32.83	22.05	9.34	30.47	0.00	33.75	53.90	20.1	100	58	
Vert.	4882.000	PK	43.42	31.14	6.64	36.63	2.24	46.81	73.90	27.0	150	0	
Vert.	7323.000	PK	44.88	36.84	7.72	36.90	2.24	54.78	73.90	19.1	150	0	
Vert.	9764.000	PK	45.34	38.59	8.85	36.66	2.24	58.36	73.90	15.5	150	0	
Vert.	4882.000	AV	31.77	31.14	6.64	36.63	2.24	35.16	53.90	18.7	150	0	
Vert.	7323.000	AV	32.16	36.84	7.72	36.90	2.24	42.06	53.90	11.8	150	0	
Vert.	9764.000	AV	32.70	38.59	8.85	36.66	2.24	45.72	53.90	8.1	150	0	

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

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

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

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



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Issued date : February 19, 2019
FCC ID : IOMJ5219

Radiated Spurious Emission

Report No.	12622649S-B-R2		
Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	No.2	No.2	No.2
Date	December 7, 2018	December 5, 2018	December 7, 2018
Temperature / Humidity	22 deg. C / 48 % RH	23 deg. C / 50 % RH	22 deg. C / 48 % RH
Engineer	Shiro Kobayashi	Shiro Kobayashi	Shiro Kobayashi
	(30 MHz -1 GHz)	(1 GHz -18 GHz)	(18 GHz - 40 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.	73.753	QP	44.00	6.31	7.56	31.90	0.00	25.97	40.00	14.0	254	31	
Hori.	121.493	QP	38.02	13.21	7.94	31.86	0.00	27.31	43.50	16.1	371	63	
Hori.	156.015	QP	37.97	14.90	8.63	31.82	0.00	29.68	43.50	13.8	206	28	
Hori.	221.184	QP	47.47	11.10	5.58	31.76	0.00	32.39	46.00	13.6	154	104	
Hori.	269.995	QP	50.05	12.76	5.97	31.72	0.00	37.06	46.00	8.9	122	282	
Hori.	417.791	QP	43.36	16.01	7.12	31.67	0.00	34.82	46.00	11.1	100	71	
Hori.	466.945	QP	42.16	16.95	7.32	31.66	0.00	34.77	46.00	11.2	100	136	
Hori.	933.122	QP	39.40	22.01	9.24	30.68	0.00	39.97	46.00	6.0	121	356	
Hori.	960.272	QP	40.05	22.05	9.34	30.47	0.00	40.97	53.90	12.9	100	252	
Hori.	2483.500	PK	45.77	27.67	14.14	37.08	2.24	52.74	73.90	21.1	314	139	
Hori.	4960.000	PK	44.39	31.33	6.69	36.62	2.24	48.03	73.90	25.8	150	0	
Hori.	7440.000	PK	44.39	36.97	7.78	36.87	2.24	54.51	73.90	19.3	150	0	
Hori.	9920.000	PK	44.76	38.80	9.00	36.61	2.24	58.19	73.90	15.7	150	0	
Hori.	2483.500	AV	33.02	27.67	14.14	37.08	2.24	39.99	53.90	13.9	314	139	
Hori.	4960.000	AV	31.64	31.33	6.69	36.62	2.24	35.28	53.90	18.6	150	0	
Hori.	7440.000	AV	31.82	36.97	7.78	36.87	2.24	41.94	53.90	11.9	150	0	
Hori.	9920.000	AV	31.94	38.80	9.00	36.61	2.24	45.37	53.90	8.5	150	0	
Vert.	45.162	QP	36.40	12.93	7.10	31.91	0.00	24.52	40.00	15.4	100	295	
Vert.	121.493	QP	38.44	13.21	7.94	31.86	0.00	27.73	43.50	15.7	100	198	
Vert.	156.015	QP	34.62	14.90	8.63	31.82	0.00	26.33	43.50	17.1	100	294	
Vert.	221.184	QP	39.06	11.10	5.58	31.76	0.00	23.98	46.00	22.0	100	1	
Vert.	269.995	QP	44.83	12.76	5.97	31.72	0.00	31.84	46.00	14.1	100	180	
Vert.	417.791	QP	36.38	16.01	7.12	31.67	0.00	27.84	46.00	18.1	121	66	
Vert.	466.945	QP	34.72	16.95	7.32	31.66	0.00	27.33	46.00	18.6	128	166	
Vert.	960.272	QP	32.82	22.05	9.34	30.47	0.00	33.74	53.90	20.1	100	57	
Vert.	2483.500	PK	45.48	27.67	14.14	37.08	2.24	52.45	73.90	21.4	142	311	
Vert.	4960.000	PK	44.01	31.33	6.69	36.62	2.24	47.65	73.90	26.2	150	0	
Vert.	7440.000	PK	44.35	36.97	7.78	36.87	2.24	54.47	73.90	19.4	150	0	
Vert.	9920.000	PK	45.03	38.80	9.00	36.61	2.24	58.46	73.90	15.4	150	0	
Vert.	2483.500	AV	33.01	27.67	14.14	37.08	2.24	39.98	53.90	13.9	142	311	
Vert.	4960.000	AV	31.67	31.33	6.69	36.62	2.24	35.31	53.90	18.5	150	0	
Vert.	7440.000	AV	31.76	36.97	7.78	36.87	2.24	41.88	53.90	12.0	150	0	
Vert.	9920.000	AV	31.85	38.80	9.00	36.61	2.24	45.28	53.90	8.6	150	0	

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

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

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

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

UL Japan, Inc.

Shonan EMC Lab.

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

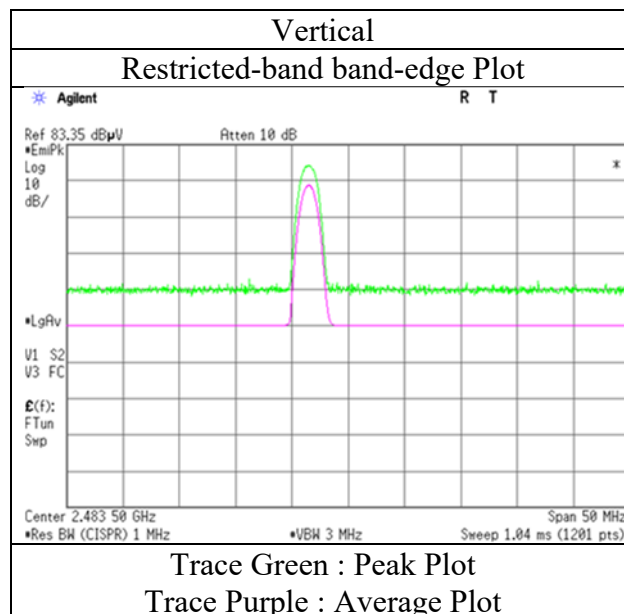
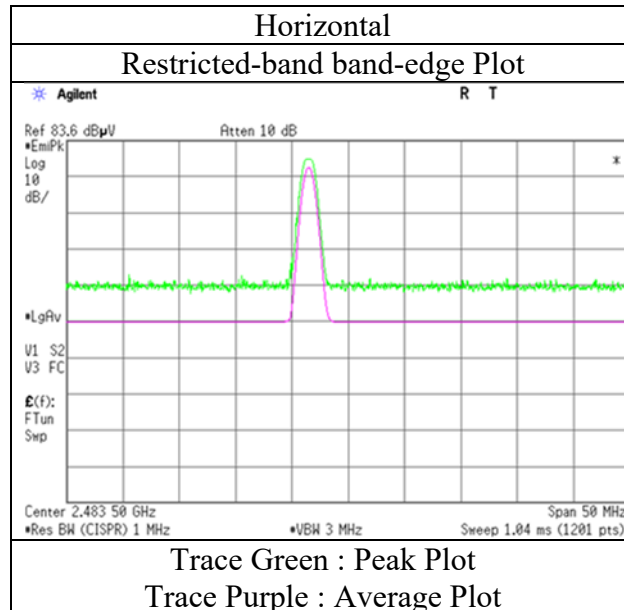
Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401



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

Report No. 12622649S-B-R2
Test place Shonan EMC Lab.
Semi Anechoic Chamber No.2
Date December 5, 2018
Temperature / Humidity 23 deg. C / 50 % RH
Engineer Shiro Kobayashi
(1 GHz ~2.8 GHz)
Mode Tx, Hopping Off, 3DH5 2480 MHz



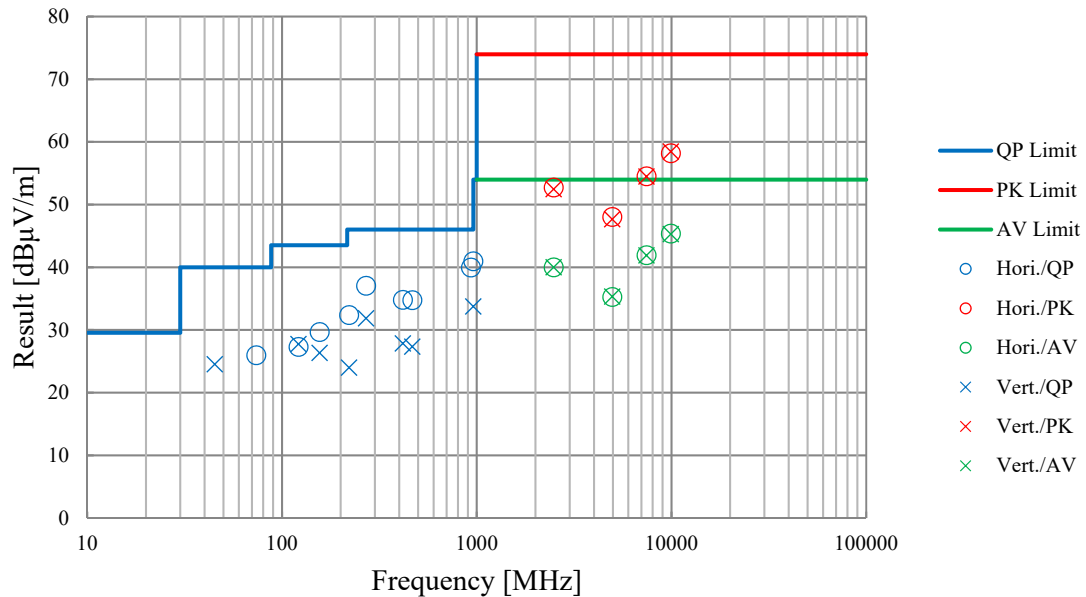
* The measurement was conducted for a sufficiently long enough time to detect any possible spurious emissions.

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



Radiated Spurious Emission
(Plot data, Worst case)

Report No.	12622649S-B-R2		
Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	No.2	No.2	No.2
Date	December 7, 2018	December 5, 2018	December 7, 2018
Temperature / Humidity	22 deg. C / 48 % RH	23 deg. C / 50 % RH	22 deg. C / 48 % RH
Engineer	Shiro Kobayashi	Shiro Kobayashi	Shiro Kobayashi
	(30 MHz -1 GHz)	(1 GHz -18 GHz)	(18 GHz - 40 GHz)
Mode	Tx, Hopping Off, 3DH5 2480 MHz		



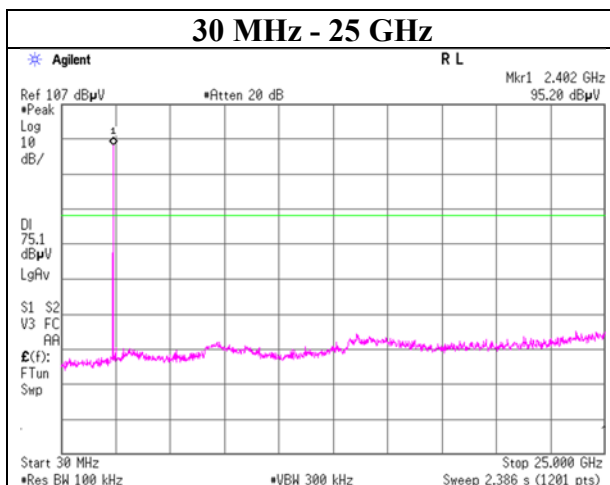
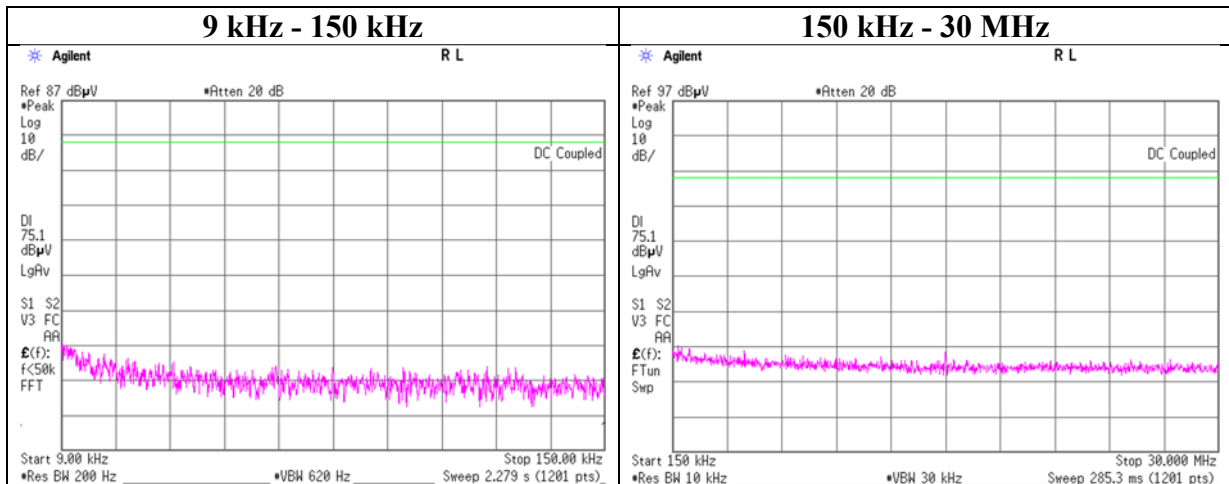
*These plots data contains sufficient number to show the trend of characteristic features for EUT.



Conducted Spurious Emission

Report No. 12622649S-B-R2
Test place Shonan EMC Lab. No.1 Measurement Room
Date December 10, 2018
Temperature / Humidity 21 deg. C / 34 % RH
Engineer Yosuke Ishikawa
Mode Tx, Hopping Off, DH5

2402 MHz

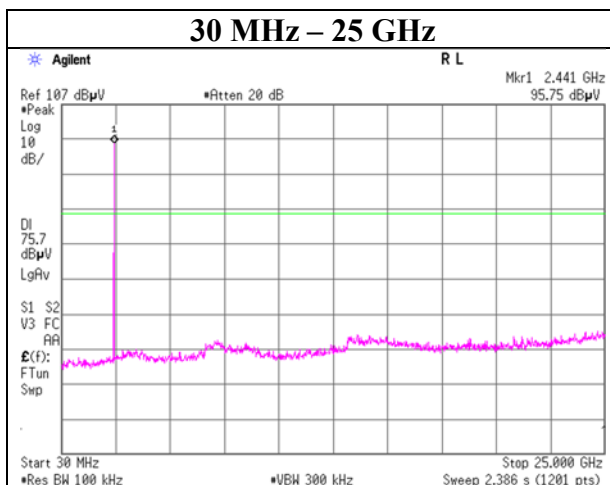
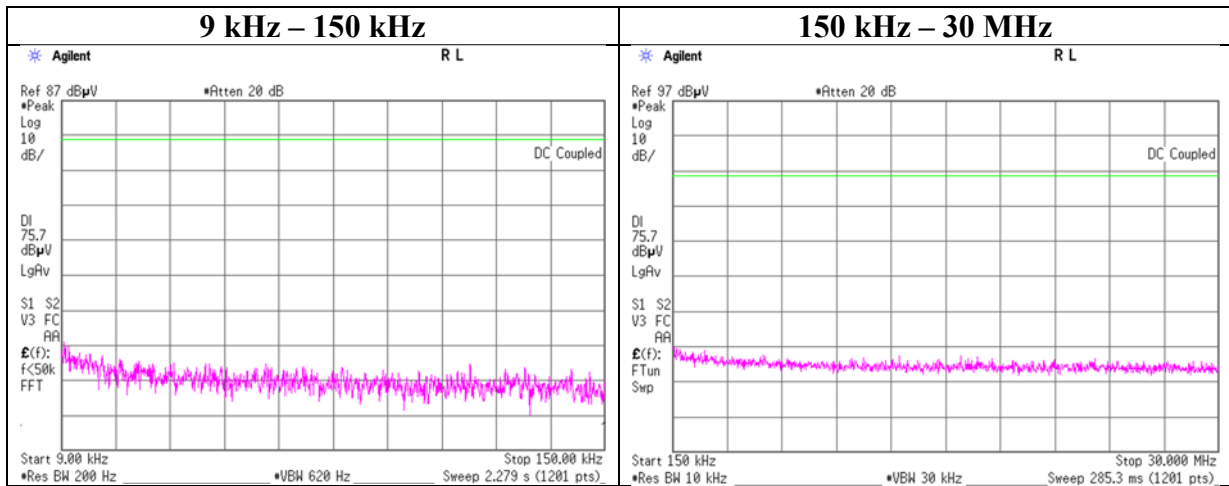




Conducted Spurious Emission

Report No. 12622649S-B-R2
Test place Shonan EMC Lab. No.1 Measurement Room
Date December 10, 2018
Temperature / Humidity 21 deg. C / 34 % RH
Engineer Yosuke Ishikawa
Mode Tx, Hopping Off, DH5

2441 MHz

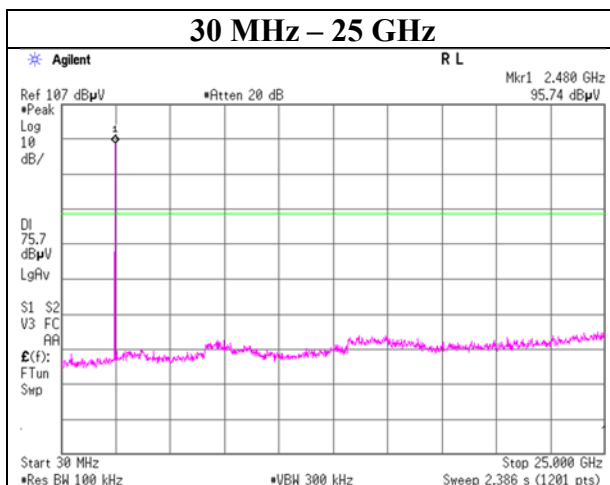
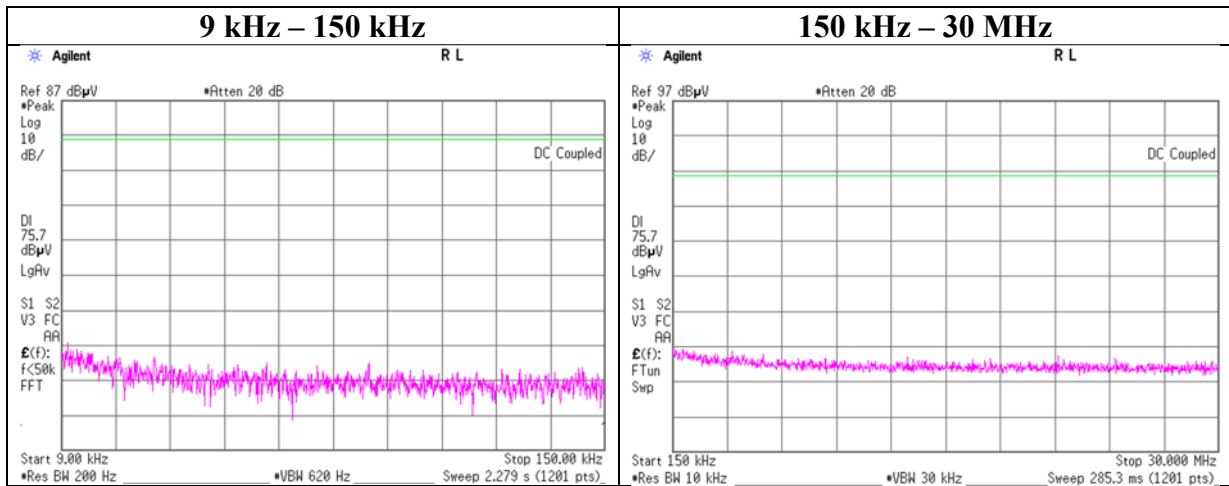




Conducted Spurious Emission

Report No. 12622649S-B-R2
Test place Shonan EMC Lab. No.1 Measurement Room
Date December 10, 2018
Temperature / Humidity 21 deg. C / 34 % RH
Engineer Yosuke Ishikawa
Mode Tx, Hopping Off, DH5

2480 MHz

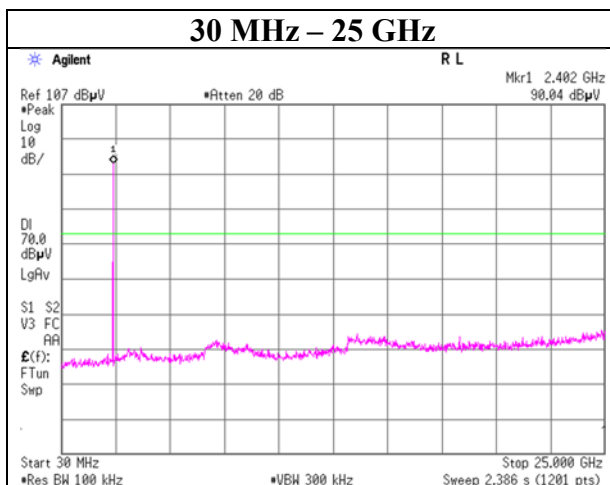
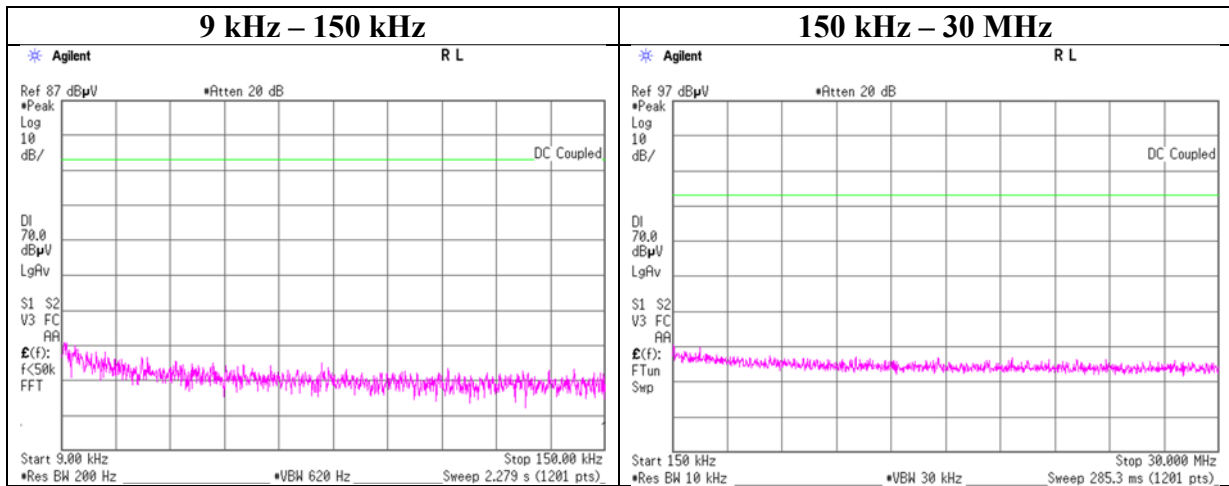




Conducted Spurious Emission

Report No. 12622649S-B-R2
Test place Shonan EMC Lab. No.1 Measurement Room
Date December 10, 2018
Temperature / Humidity 21 deg. C / 34 % RH
Engineer Yosuke Ishikawa
Mode Tx, Hopping Off, 3DH5

2402 MHz

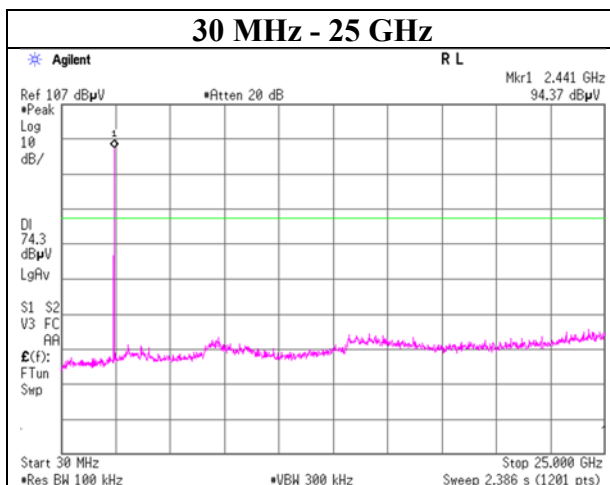
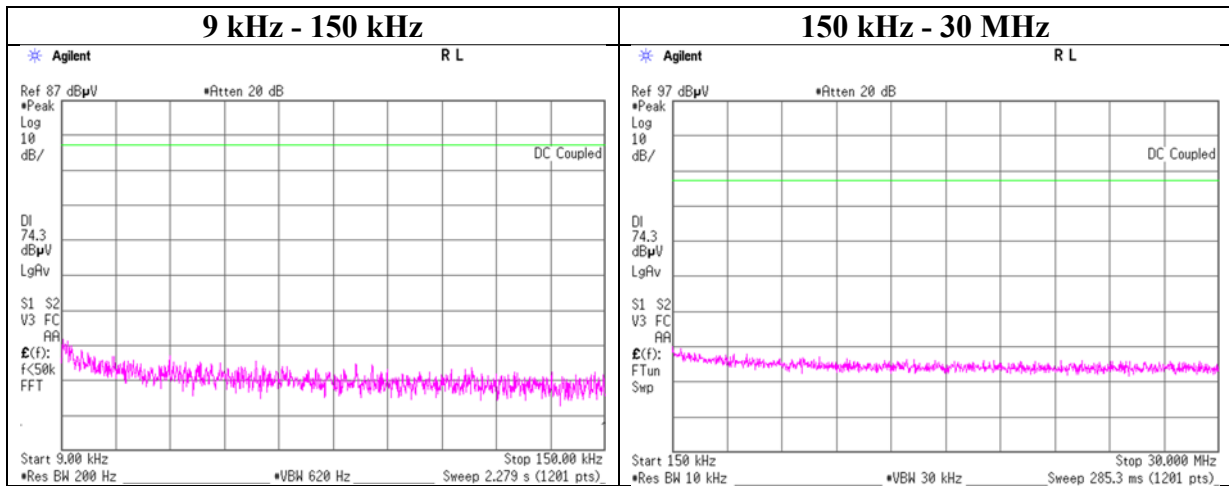




Conducted Spurious Emission

Report No. 12622649S-B-R2
Test place Shonan EMC Lab. No.1 Measurement Room
Date December 10, 2018
Temperature / Humidity 21 deg. C / 34 % RH
Engineer Yosuke Ishikawa
Mode Tx, Hopping Off, 3DH5

2441 MHz

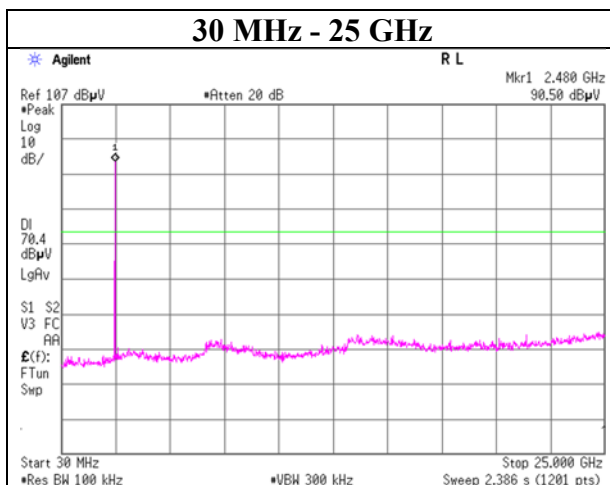
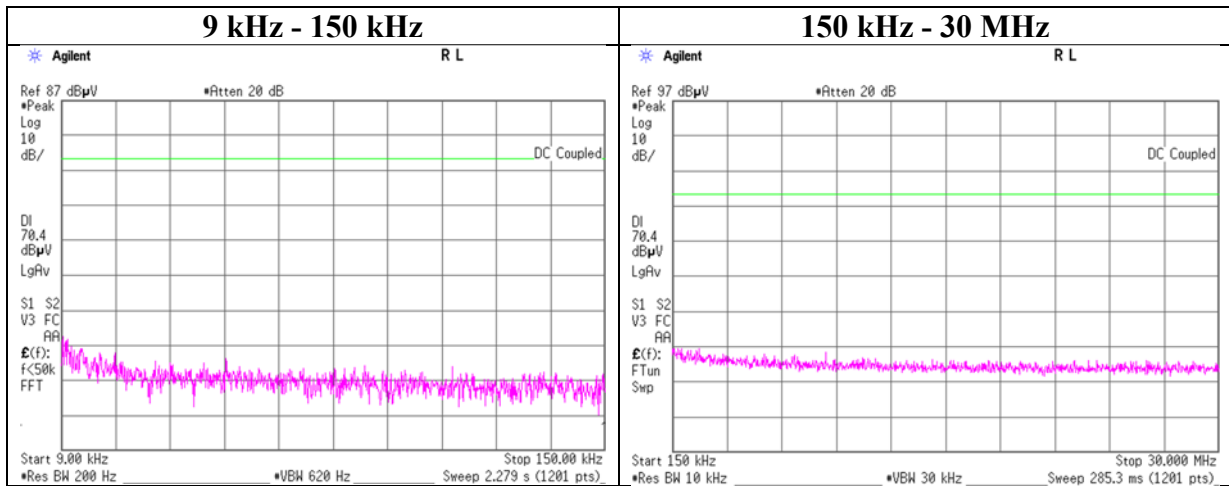




Conducted Spurious Emission

Report No. 12622649S-B-R2
Test place Shonan EMC Lab. No.1 Measurement Room
Date December 10, 2018
Temperature / Humidity 21 deg. C / 34 % RH
Engineer Yosuke Ishikawa
Mode Tx, Hopping Off, 3DH5

2480 MHz

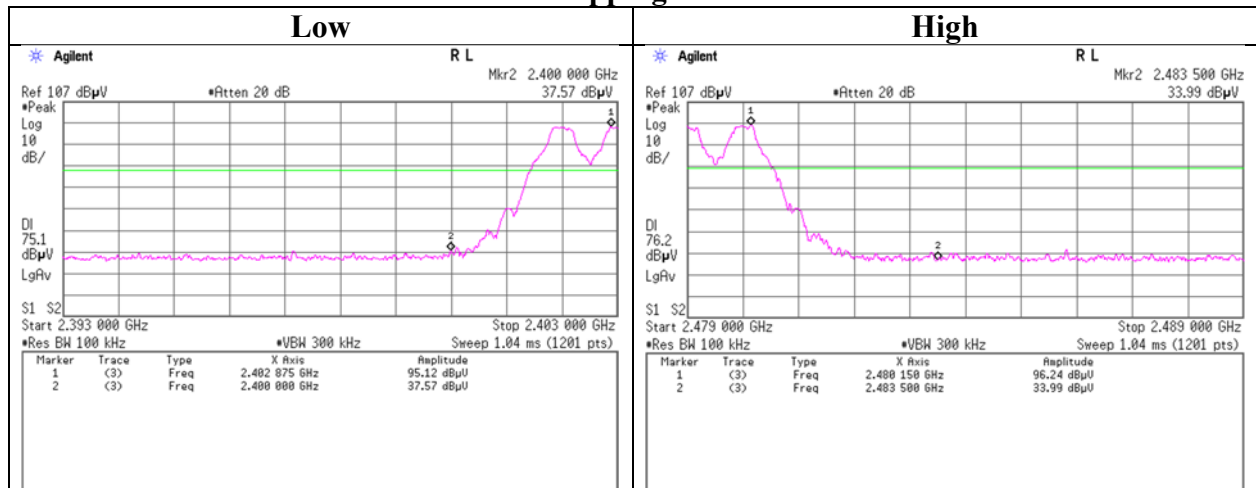




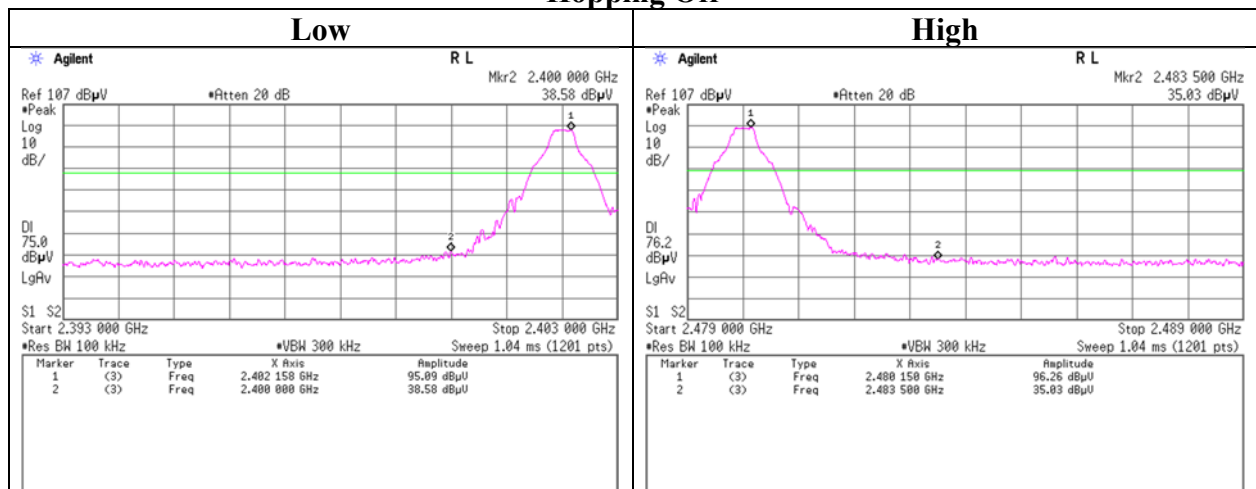
Conducted Emission Band Edge compliance

Report No. 12622649S-B-R2
Test place Shonan EMC Lab. No.1 Measurement Room
Date December 10, 2018
Temperature / Humidity 21 deg. C / 34 % RH
Engineer Yosuke Ishikawa
Mode Tx DH5

Hopping On



Hopping Off

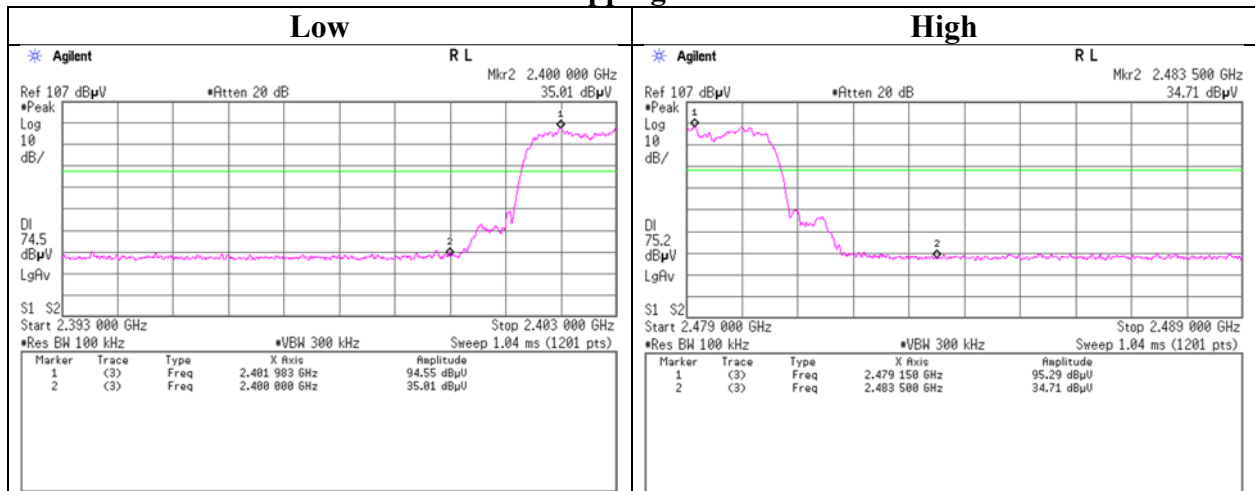




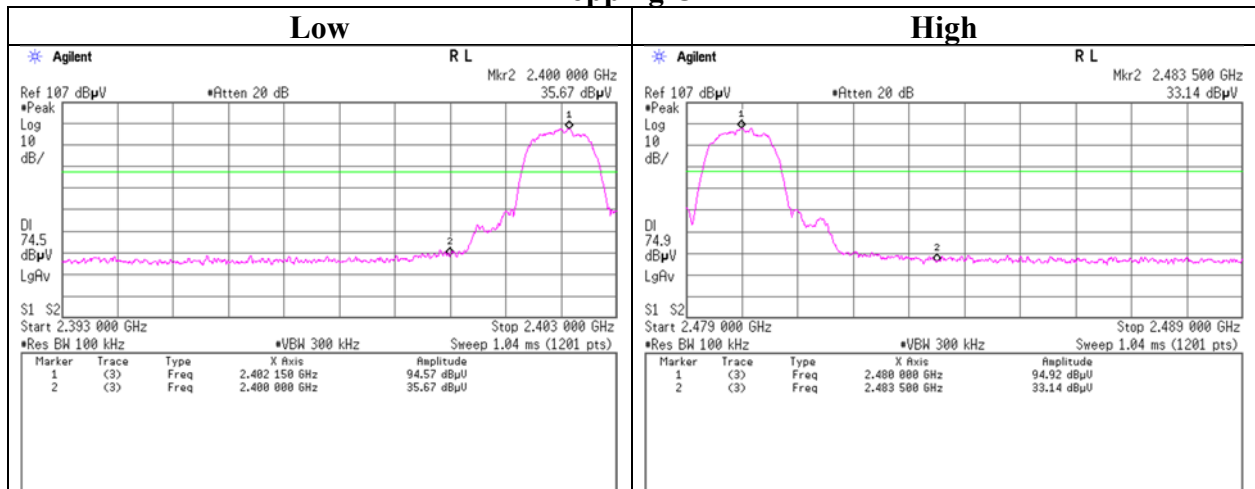
Conducted Emission Band Edge compliance

Report No. 12622649S-B-R2
Test place Shonan EMC Lab. No.1 Measurement Room
Date December 10, 2018
Temperature / Humidity 21 deg. C / 34 % RH
Engineer Yosuke Ishikawa
Mode Tx 3DH5

Hopping On



Hopping Off





APPENDIX 2: Test instruments

Test Instruments (1/2)

Test Item	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Calibration Due Date	Cal Int
AT	145095	Digital Tester	SANWA	PC500	7019224	2018/3/5	2019/3/31	12
AT	154591	Attenuator	Weinschel Corp.	54A-10	81595	2018/4/20	2019/4/30	12
AT	145175	Coaxial Cable	Suhner	SUCOFLEX 102	31600/2	2018/3/19	2019/3/31	12
AT	146319	Humidity Indicator	A&D	AD-5681	4064561	2018/10/25	2019/10/31	12
AT	146247	Power Meter	AGILENT	8990B	MY5100272	2018/7/13	2019/7/31	12
AT	146310	Power sensor	AGILENT	N1923A	MY5326009	2018/7/13	2019/7/31	12
AT	160899	Spectrum Analyzer	AGILENT (KEYSIGHT)	E4440A	MY46185516	2017/12/26	2018/12/31	12
RE	170932	EMI Software	TSJ	TEPTO-DV3(RE,CE,ME,PE)		-	-	-
RE	144878	Pre Amplifier	HEWLETT PACKARD	8449B	3008A01268	2018/4/4	2019/4/30	12
RE	145598	Semi-Anechoic Chamber	TDK	SAEC-02(SVSWR)	2	2018/7/15	2019/7/31	12
RE	145004	Pre Amplifier	SONOMA	310N	290212	2018/2/16	2019/2/28	12
RE	145007	Pre Amplifier	Toyo Corporation	HAP18-26W	19	2018/3/27	2019/3/31	12
RE	145129	Pre Amplifier	Toyo Corporation	HAP26-40W	10	2018/3/27	2019/3/31	12
RE	145136	Attenuator (above1 GHz)	AGILENT	8493C-010	74864	2018/11/25	2019/11/30	12
RE	150921	Attenuator	JFW	50HF-003N	-	2018/2/22	2019/2/28	12
RE	145045	Attenuator	JFW	50HF-006N	-	2018/2/16	2019/2/28	12
RE	145022	Biconical Antenna	Schwarzbeck	BBA9106	91032665	2018/6/5	2019/6/30	12
RE	144975	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhner/Suhner/Suhner/TOYO	8D2W/12DSFA/141PE/141PE/141PE/141P	-/0901-270(RF Selector)	2018/4/9	2019/4/30	12
RE	144976	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhner/Suhner/Suhner/TOYO	8D2W/12DSFA/141PE/141PE/141PE/141P	-/0901-270(RF Selector)	2018/4/7	2019/4/30	12
RE	145184	Coaxial Cable	Junkosha	MWX241-01000KMSKMS	-	2018/4/20	2019/4/30	12
RE	151617	Coaxial Cable	Junkosha	MWX221-01000NFSNMS/B	1612S006	2018/1/29	2019/1/31	12
RE	156380	Coaxial Cable	HUBER+SUNER	SUCOFLEX_104_E	SN MY 13406/4E	2018/7/10	2019/7/31	12
RE	168300	Coaxial Cable	HUBER+SUNER	SUCOFLEX 104	800070/4A	2018/3/28	2019/3/31	12
RE	168301	Coaxial Cable	HUBER+SUNER	SUCOFLEX 102 E	800137/2EA	2018/3/28	2019/3/31	12

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

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

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

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

Test item: RE: Radiated Emission test
AT: Antenna Terminal Conducted test



Test Instruments (2/2)

Test Item	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Calibration Due Date	Cal Int
RE	145305	Highpass Filter	MICRO-TRONICS	HPM50111	119	2018/4/20	2019/4/30	12
RE	145384	Horn Antenna	Schwarzbeck	BBHA9120D	9120D-726	2018/7/23	2019/7/31	12
RE	145512	Horn Antenna	ETS LINDGREN	Sep-60	LM3640	2018/7/23	2019/7/31	12
RE	145514	Horn Antenna	ETS LINDGREN	Oct-60	LM3459	2018/7/23	2019/7/31	12
RE	145336	Measure	PROMART	SEN1935	-	-	-	-
RE	145528	Logperiodic Antenna	Schwarzbeck	VUSLP9111B	195	2018/6/5	2019/6/30	12
RE	146317	Humidity Indicator	A&D	AD-5681	4063325	2018/10/25	2019/10/31	12
RE	145800	Spectrum Analyzer	AGILENT	E4448A	MY48250106	2018/3/5	2019/3/31	12
RE	146256	Signal Generator	AGILENT	E8257D-550	MY53400714	2018/6/5	2019/6/30	12
RE	146209	Test Receiver	Rohde & Schwarz	ESU26	100484	2018/9/26	2019/9/30	12
RE	145793	Digital Hitester	HIOKI	3805-50	80997819	2018/3/8	2019/3/31	12

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

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

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

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

Test item: RE: Radiated Emission test
AT: Antenna Terminal Conducted test