



RADIO TEST REPORT

Test Report No. : 11986349S-F-R1

Applicant : Sony Corporation
Type of Equipment : Wireless Noise Canceling Stereo Headset
Model No. : WH-CH700N
FCC ID : AK8WHCH700N
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 11986349S-F. 11986349S-F is replaced with this report.

Date of test: October 10 to 19, 2017

Representative test engineer:

Shiro Kobayashi
Engineer

Consumer Technology Division

Approved by:

Toyokazu Imamura

Leader

Consumer Technology Division



JAB
Testing
RTL02610

☐ 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.: 11986349S-F

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SECTION 1: Customer information

Company Name	:	Sony Corporation
Address	:	1-7-1 Konan Minato-ku, Tokyo, 108-0075 Japan
Telephone Number	:	+604-3835075
Contact Person	:	Sia Jia Hong

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

2.1 Identification of E.U.T.

Type of Equipment	:	Wireless Noise Canceling Stereo Headset
Model No.	:	WH-CH700N
Serial No.	:	Refer to Section 4, Clause 4.2
Rating	:	DC 3.65 V: Built-in lithium-ion rechargeable battery DC 5 V: When charged using USB
Receipt Date of Sample	:	September 26, 2017
Country of Mass-production	:	Malaysia
Condition of EUT	:	Engineering prototype (Not for Sale: This sample is equivalent to mass-produced items.)
Modification of EUT	:	No Modification by the test lab

2.2 Product Description

Model: WH-CH700N (referred to as the EUT in this report) is a Wireless Noise Canceling Stereo Headset.

Radio Specification

Radio Type	:	Transceiver
Frequency of Operation	:	2402 MHz - 2480 MHz
Modulation	:	GFSK, $\pi/4$ -DQPSK, 8DPSK
Power Supply (radio part input)	:	DC 1.35 V
Antenna type	:	Chip Antenna
Antenna Gain	:	2.61 dBi
Clock frequency	:	crystal (X201: 26 MHz).

SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification : FCC Part 15 Subpart C
FCC Part 15 final revised on November 2, 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 November 2, 2017, does not affect the test specification applied to the EUT.

* Also the EUT complies with FCC Part 15 Subpart B. Refer to the test report: 11986349S-J.

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 *1)
Carrier Frequency Separation	FCC: FCC Public Notice DA 00-705 IC: -	FCC: Section15.247(a)(1) IC: RSS-247 5.1 (b)	See data.	Complied	Conducted
20dB Bandwidth	FCC: FCC Public Notice DA 00-705 IC: -	FCC: Section15.247(a)(1) IC: RSS-247 5.1 (a)		Complied	Conducted
Number of Hopping Frequency	FCC: FCC Public Notice DA 00-705 IC: -	FCC: Section15.247(a)(1)(iii) IC: RSS-247 5.1 (d)		Complied	Conducted
Dwell time	FCC: FCC Public Notice DA 00-705 IC: -	FCC: Section15.247(a)(1)(iii) IC: RSS-247 5.1 (d)		Complied	Conducted
Maximum Peak Output Power	FCC: FCC Public Notice DA 00-705 IC: RSS-Gen 6.12	FCC: Section15.247(a)(b)(1) IC: RSS-247 5.4 (b)		Complied	Conducted
Spurious Emission & Band Edge Compliance	FCC: FCC Public Notice DA 00-705 IC: RSS-Gen 6.13	FCC: Section15.247(d) IC: RSS-247 5.5 RSS-Gen 8.9 RSS-Gen 8.10	10.7 dB 443.997 MHz, PK, Hori. Tx, Hopping Off, DH5 2441 MHz	Complied	Conducted/ Radiated (above 30 MHz) *2)

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

*1) The EUT operates with a battery. AC Line can be connected to the EUT via other device's USB port; however, the EUT stops transmission during recharging. Therefore, the test is not applicable to the EUT.

*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 EUT is a battery-operated device and test was performed with the full-charged battery. Therefore, this 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	IC: RSS-Gen 6.6	IC: -	N/A	-	Conducted

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

3.4 Uncertainty

EMI

The following uncertainties have been calculated to provide a confidence level of 95 % using a coverage factor $k=2$.
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Item	Frequency range	Uncertainty (+/-)				
		No. 1 SAC / SR	No. 2 SAC / SR	No. 3 SAC / SR	No. 4 SAC / SR	No. 5,6,8 SR
Conducted emission (AC Mains) LISN	150 kHz-30 MHz	2.6 dB	2.5 dB	2.6 dB	2.5 dB	2.5 dB
Radiated emission (Measurement distance: 3 m)	9 kHz-30 MHz	3.1 dB	3.1 dB	3.1 dB	-	-
	30 MHz-200 MHz	4.6 dB	4.4 dB	4.6 dB	-	-
	200 MHz-1 GHz	5.8 dB	5.7 dB	5.8 dB	-	-
Radiated emission (Measurement distance: 1 m)	1 GHz-13 GHz	4.9 dB	4.9 dB	4.9 dB	-	-
	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
 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	-

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: BDR: Ext.=7, Int.=30 EDR: Ext.=72, Int.=41 Software: CSR BlueSuite BlueTest3 Version 2.6.6 *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.		

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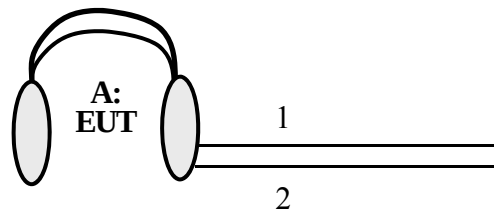
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4.2 Configuration and peripherals



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

Description of EUT

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	Wireless Noise Canceling Stereo Headset	WH-CH700N	251 *1) 250 *2)	Sony Corporation	EUT

*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	USB Cable	2.0+0.5	Shielded	Shielded	-
2	Stereo Cable	1.2+2.0	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 2.0 m, raised 0.8 m above the conducting ground plane. The table is made of expanded polystyrol and expanded polypropylene and the table top is covered with polycarbonate. 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 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	3.91 m*2) (1 GHz – 13 GHz), 1 m*3) (13 GHz – 26.5 GHz)		3.91 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: $20 \times \log (3.91 \text{ m}/3.0 \text{ m}) = 2.31 \text{ dB}$

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

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

Antenna polarization	Frequency			
	Below 1 GHz	1 GHz - 2.8 GHz	2.8 GHz - 13 GHz	13 GHz - 26.5 GHz
Horizontal	Z	X	X	X
Vertical	Z	Z	Z	X

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

SECTION 7: 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	Sample	Max Hold	Spectrum Analyzer
Maximum Peak Output Power	-	-	-	Auto	Peak Average *2)	-	Power Meter (Sensor: 160MHz BW)
Carrier Frequency Separation	3 MHz	100 kHz	300 kHz	Auto	Peak	Max Hold	Spectrum Analyzer
Number of Hopping Frequency	30 MHz	300 kHz	1 MHz	Auto	Peak	Max Hold	Spectrum Analyzer
Dwell Time	Zero Span	100 kHz, 1 MHz	300 kHz, 3 MHz	As necessary capture the entire dwell time per hopping channel	Peak	Clear Write	Spectrum Analyzer
Conducted Spurious Emission *2)	9 kHz to 150 kHz	200 Hz	620 Hz	Auto	Peak	Max Hold	Spectrum Analyzer
	150 kHz to 30 MHz	10 kHz	30 kHz				
	30 MHz to 25 GHz	100 kHz	300 kHz				
Conducted Spurious Emission Band Edge compliance	10 MHz	100 kHz	300 kHz	Auto	Peak	Max Hold	Spectrum Analyzer

*1) The measurement was performed with Max Hold since the duty cycle was not 100 %.

*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 equipment and cables were not used for factor 0.0 dB of the data sheets.

Test data : APPENDIX

Test result : Pass

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APPENDIX 1: Test data

20dB Bandwidth and Carrier Frequency Separation

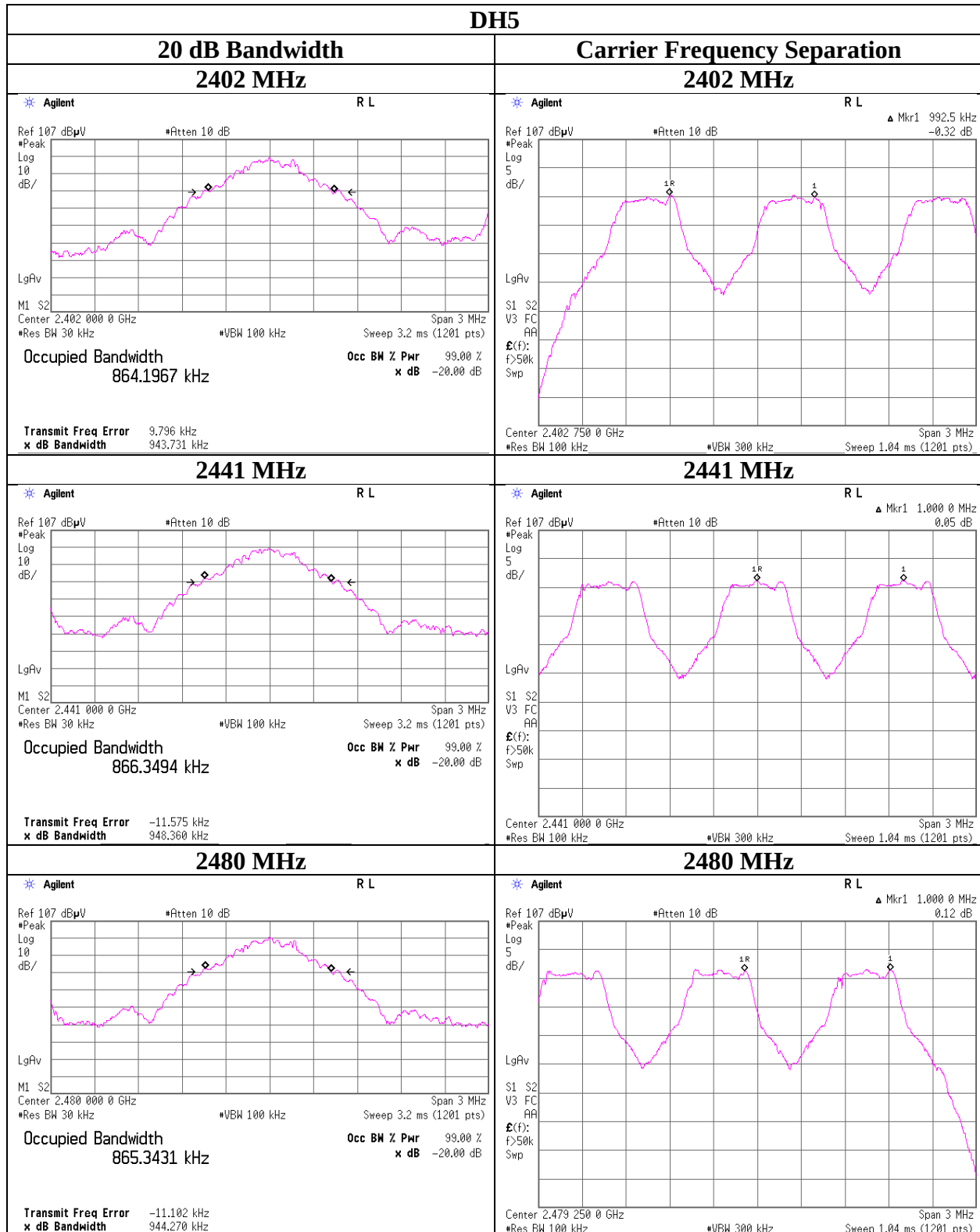
Test place Shonan EMC Lab. No.5 Shielded Room
Report No. 11986349S-F-R1
Date October 10, 2017
Temperature / Humidity 26 deg. C / 52 % RH
Engineer Shiro Kobayashi
Mode Tx, Hopping On

Mode	Freq. [MHz]	20dB Bandwidth [MHz]	Carrier Frequency Separation [MHz]	Limit for Carrier Frequency separation [MHz]
DH5	2402.0	0.944	0.993	≥ 0.629
DH5	2441.0	0.948	1.000	≥ 0.632
DH5	2480.0	0.944	1.000	≥ 0.630
3DH5	2402.0	1.261	1.000	≥ 0.841
3DH5	2441.0	1.264	1.000	≥ 0.842
3DH5	2480.0	1.283	1.000	≥ 0.855

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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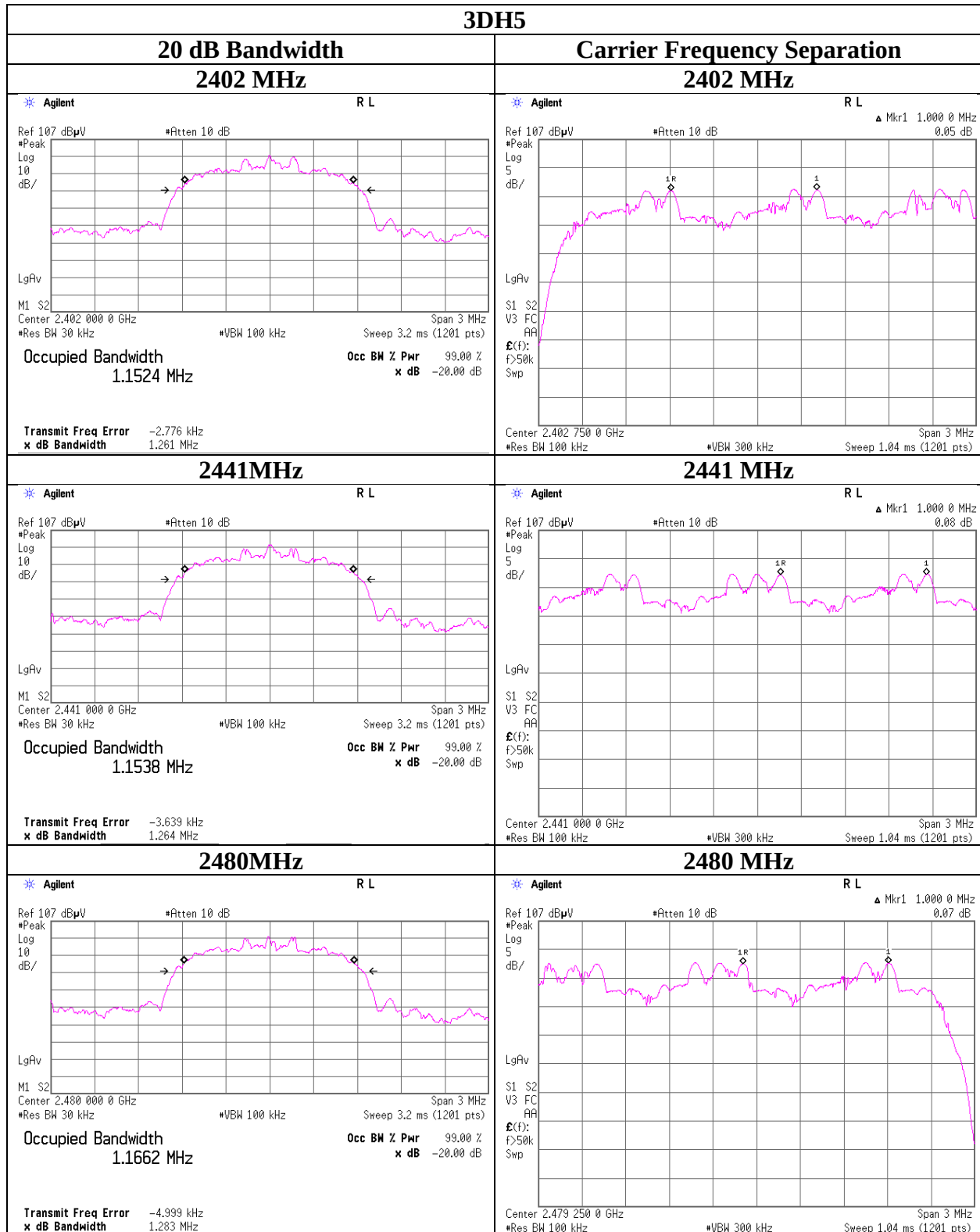
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20dB Bandwidth and Carrier Frequency Separation



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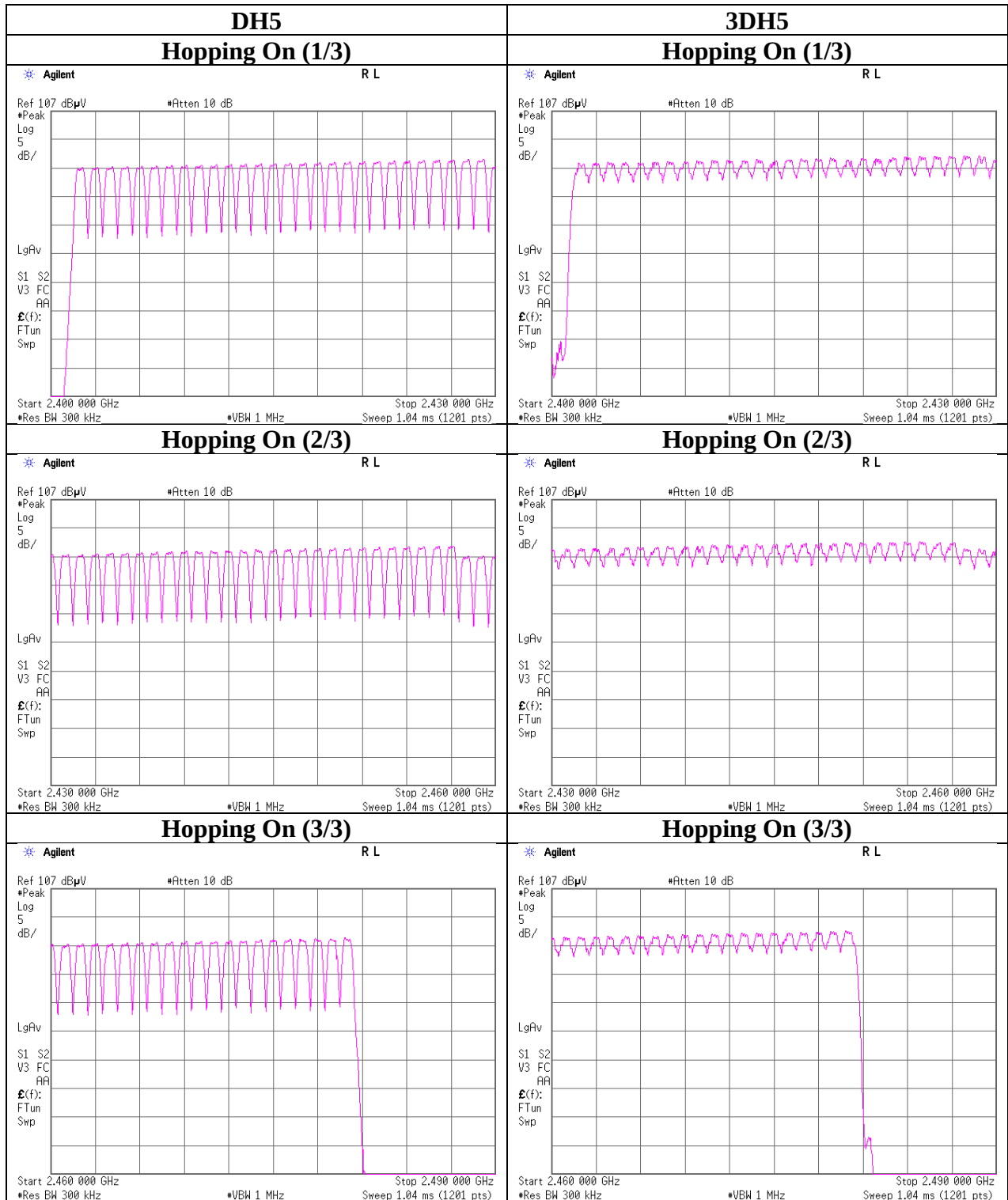
Number of Hopping Frequency

Test place Shonan EMC Lab. No.5 Shielded Room
Report No. 11986349S-F-R1
Date October 10, 2017
Temperature / Humidity 26 deg. C / 52% RH
Engineer Shiro Kobayashi
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. 11986349S-F-R1
Date October 10, 2017
Temperature / Humidity 26 deg. C / 52 % RH
Engineer Shiro Kobayashi
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	50.8 times	/	5 sec.	x	31.6 sec. =	322 times	400
DH3	25.6 times	/	5 sec.	x	31.6 sec. =	162 times	400
DH5	17.0 times	/	5 sec.	x	31.6 sec. =	108 times	400
3DH1	50.6 times	/	5 sec.	x	31.6 sec. =	320 times	400
3DH3	25.4 times	/	5 sec.	x	31.6 sec. =	161 times	400
3DH5	16.8 times	/	5 sec.	x	31.6 sec. =	107 times	400

Sample Calculation

Result = Number of transmission x Length of transmission

*Average data of 5 tests.(except Inquiry)

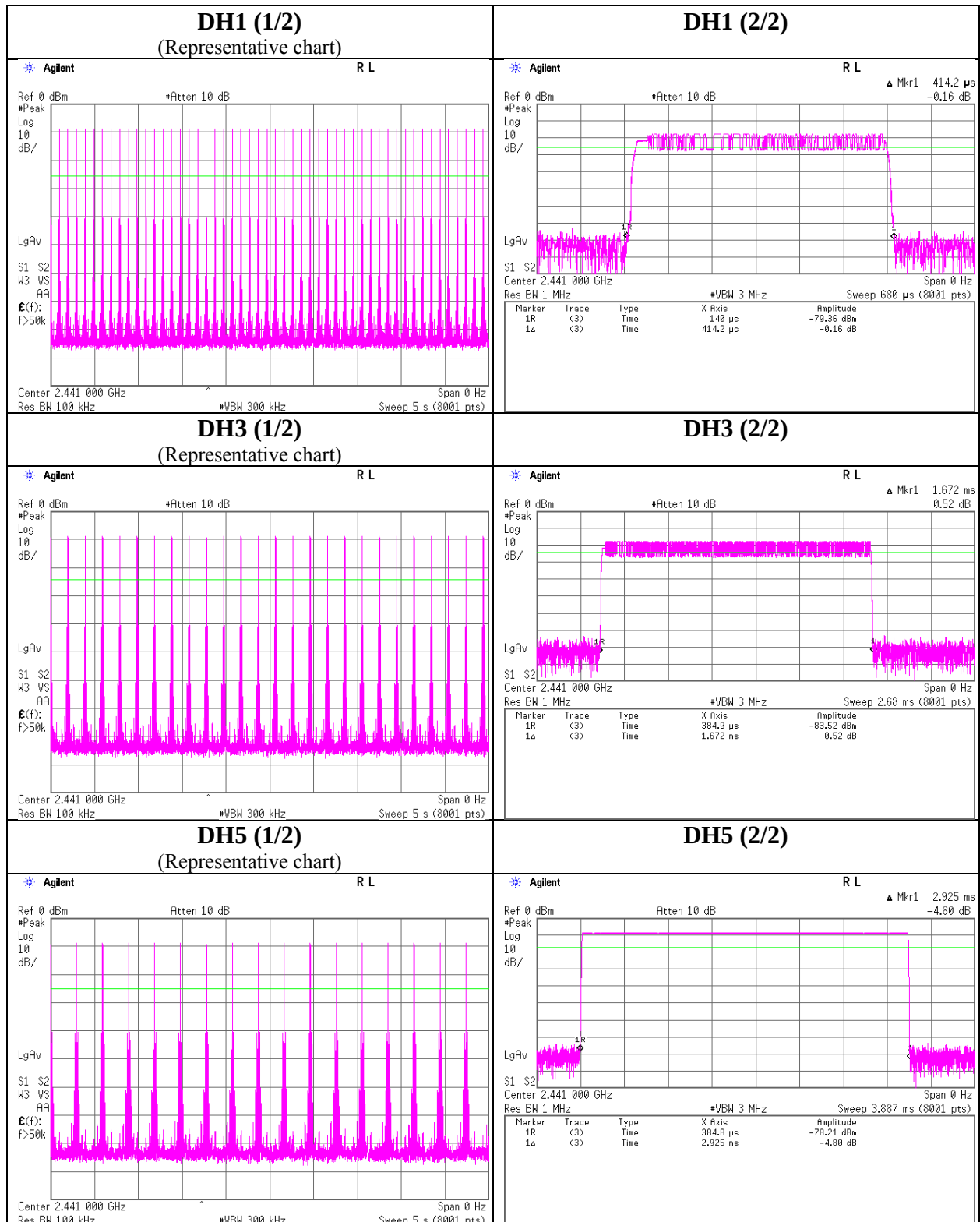
Mode	Sampling [times]					Average [times]
	1	2	3	4	5	
DH1	50	51	51	51	51	50.8
DH3	26	25	26	25	26	25.6
DH5	17	17	18	16	17	17
3DH1	50	50	51	51	51	50.6
3DH3	25	25	26	25	26	25.4
3DH5	17	17	16	17	17	16.8

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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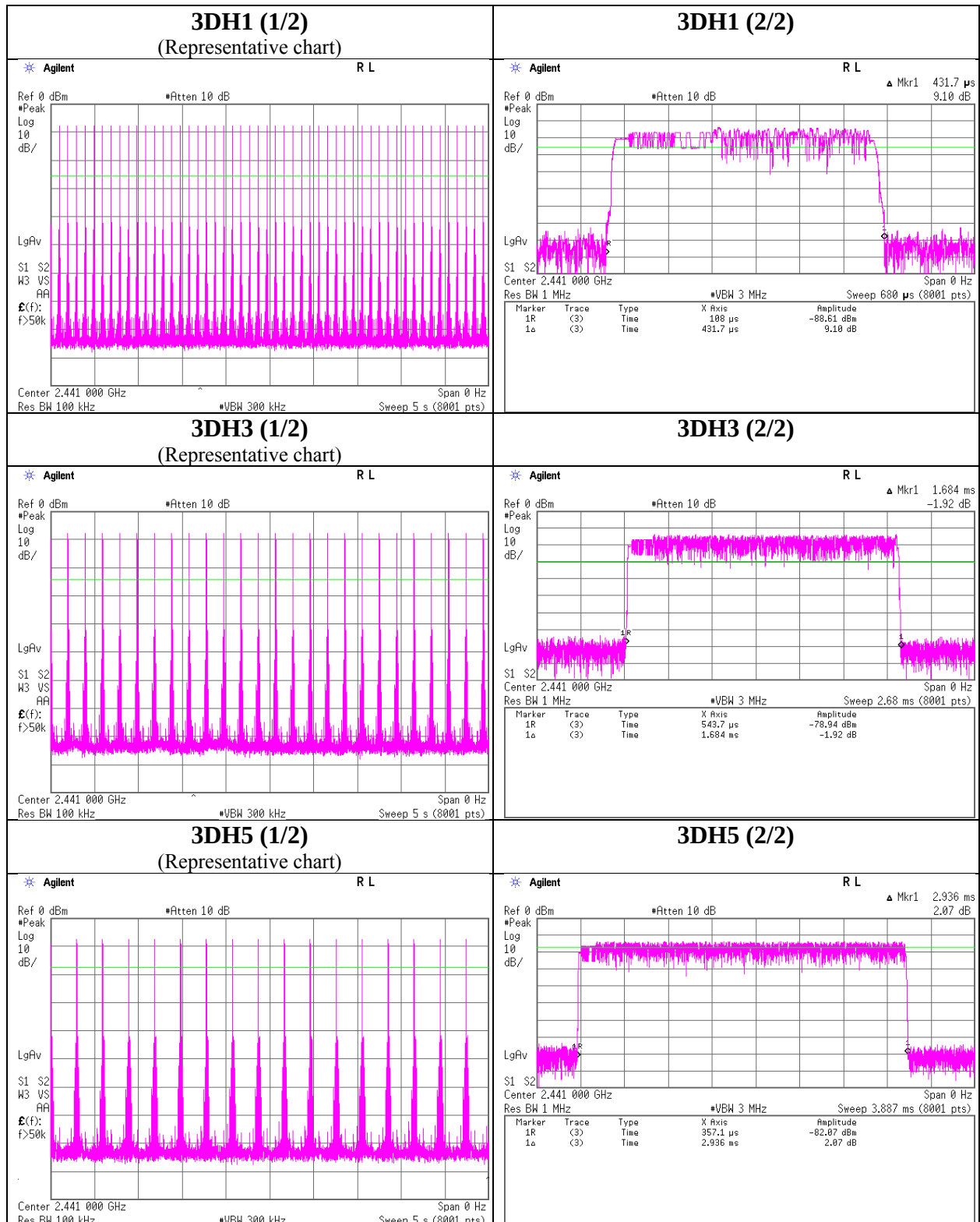
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Dwell time



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Maximum Peak Output Power

Test place : Shonan EMC Lab. No.5 Shielded Room
Report No. : 11986349S-F-R1
Date : October 10, 2017
Temperature / Humidity : 26 deg. C / 52 % RH
Engineer : Shiro Kobayashi
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	-10.26	1.52	9.64	0.90	1.23	20.96	125	20.06
DH5	2441.0	-9.35	1.53	9.64	1.82	1.52	20.96	125	19.14
DH5	2480.0	-9.03	1.54	9.65	2.16	1.64	20.96	125	18.80
2DH5	2402.0	-7.93	1.52	9.64	3.23	2.10	20.96	125	17.73
2DH5	2441.0	-6.85	1.53	9.64	4.32	2.70	20.96	125	16.64
2DH5	2480.0	-6.42	1.54	9.65	4.77	3.00	20.96	125	16.19
3DH5	2402.0	-7.37	1.52	9.64	3.79	2.39	20.96	125	17.17
3DH5	2441.0	-6.32	1.53	9.64	4.85	3.05	20.96	125	16.11
3DH5	2480.0	-5.89	1.54	9.65	5.30	3.39	20.96	125	15.66

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.	11986349S-F-R1
Date	October 10, 2017
Temperature / Humidity	26 deg. C / 52 % RH
Engineer	Shiro Kobayashi
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	-12.14	1.52	9.64	-0.98	0.80	1.08	0.10	1.02
DH5	2441.0	-11.15	1.53	9.64	0.02	1.00	1.08	1.10	1.29
DH5	2480.0	-10.81	1.54	9.65	0.38	1.09	1.08	1.46	1.40
2DH5	2402.0	-12.27	1.52	9.64	-1.11	0.77	1.06	-0.05	0.99
2DH5	2441.0	-11.15	1.53	9.64	0.02	1.00	1.06	1.08	1.28
2DH5	2480.0	-10.64	1.54	9.65	0.55	1.14	1.06	1.61	1.45
3DH5	2402.0	-12.24	1.52	9.64	-1.08	0.78	1.04	-0.04	0.99
3DH5	2441.0	-11.13	1.53	9.64	0.04	1.01	1.04	1.08	1.28
3DH5	2480.0	-10.62	1.54	9.65	0.57	1.14	1.04	1.61	1.45

Sample Calculation:

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

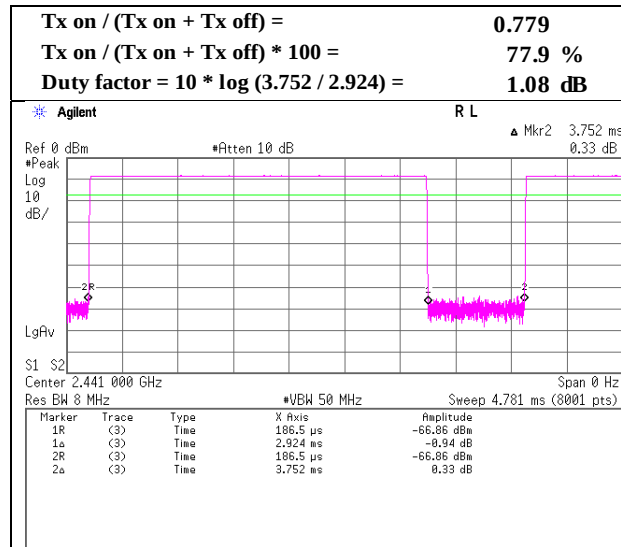
Result (Burst power average) = Time average + Duty factor

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

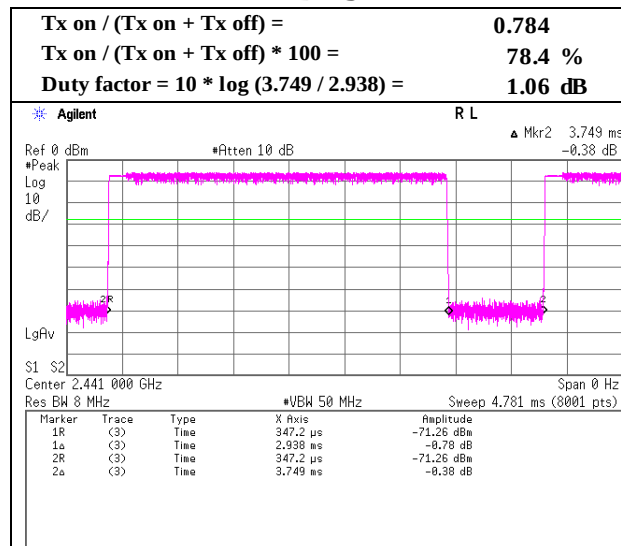
Burst Rate Confirmation

Test place : Shonan EMC Lab. No.5 Shielded Room
Report No. : 11986349S-F-R1
Date : October 10, 2017
Temperature / Humidity : 26 deg. C / 52 % RH
Engineer : Shiro Kobayashi
Mode : Tx, Hopping Off

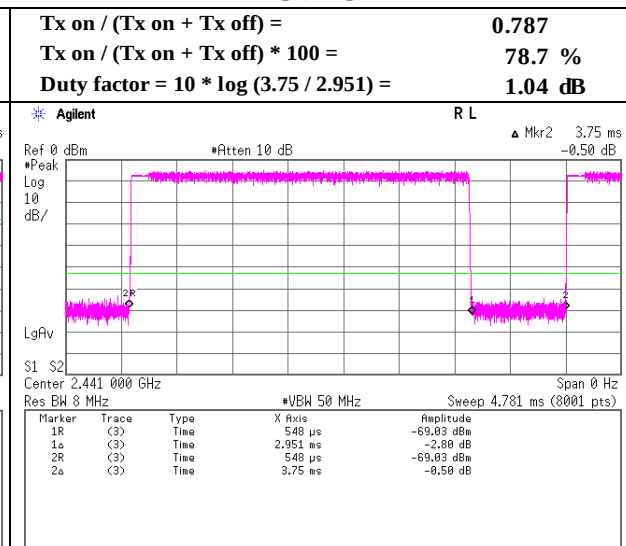
DH5



2DH5



3DH5



Radiated Spurious Emission

Report No.	11986349S-F-R1		
Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	No.2	No.3	No.2
Date	October 19, 2017	October 18, 2017	October 19, 2017
Temperature / Humidity	20 deg. C / 51 % RH	24 deg. C / 41 % RH	20 deg. C / 51 % RH
Engineer	Hiroyuki Morikawa	Ishikawa Yosuke	Hiroyuki Morikawa
	(30 MHz -1000 MHz)	(1GHz -13 GHz)	(13GHz -26 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.	181.982	QP	21.30	16.16	8.87	31.78	0.00	14.55	43.50	28.9	100	1	
Hori.	335.999	QP	36.49	14.26	6.71	31.63	0.00	25.83	46.00	20.1	100	107	
Hori.	435.999	QP	42.33	16.52	7.38	31.61	0.00	34.62	46.00	11.3	100	266	
Hori.	745.601	QP	26.54	20.33	8.94	31.46	0.00	24.35	46.00	21.6	119	141	
Hori.	2390.000	PK	49.80	27.26	14.15	44.13	2.31	49.39	73.90	24.5	211	98	
Hori.	4804.000	PK	56.13	31.40	6.58	44.45	2.31	51.97	73.90	21.9	155	299	
Hori.	7206.000	PK	48.63	36.56	8.06	43.99	2.31	51.57	73.90	22.3	150	1	
Hori.	9608.000	PK	47.72	38.61	9.13	43.83	2.31	53.94	73.90	19.9	150	1	
Hori.	2390.000	AV	36.38	27.26	14.15	44.13	2.31	35.97	53.90	17.9	211	98	
Hori.	4804.000	AV	43.19	31.40	6.58	44.45	2.31	39.03	53.90	14.8	155	299	
Hori.	7206.000	AV	35.69	36.56	8.06	43.99	2.31	38.63	53.90	15.2	150	1	
Hori.	9608.000	AV	36.55	38.61	9.13	43.83	2.31	42.77	53.90	11.1	150	1	
Vert.	167.533	QP	21.56	15.62	8.73	31.79	0.00	14.12	43.50	29.3	100	1	
Vert.	216.000	QP	33.05	11.48	5.80	31.74	0.00	18.59	43.50	24.9	102	102	
Vert.	243.997	QP	29.35	11.69	6.02	31.70	0.00	15.36	46.00	30.6	100	345	
Vert.	327.999	QP	29.49	14.07	6.65	31.64	0.00	18.57	46.00	27.4	100	265	
Vert.	435.997	QP	39.81	16.52	7.38	31.61	0.00	32.10	46.00	13.9	103	220	
Vert.	2390.000	PK	48.96	27.26	14.15	44.13	2.31	48.55	73.90	25.3	136	102	
Vert.	4804.000	PK	56.12	31.40	6.58	44.45	2.31	51.96	73.90	21.9	166	235	
Vert.	7206.000	PK	48.67	36.56	8.06	43.99	2.31	51.61	73.90	22.2	150	1	
Vert.	9608.000	PK	47.81	38.61	9.13	43.83	2.31	54.03	73.90	19.8	150	1	
Vert.	2390.000	AV	36.37	27.26	14.15	44.13	2.31	35.96	53.90	17.9	136	102	
Vert.	4804.000	AV	43.98	31.40	6.58	44.45	2.31	39.82	53.90	14.0	166	235	
Vert.	7206.000	AV	35.72	36.56	8.06	43.99	2.31	38.66	53.90	15.2	150	1	
Vert.	9608.000	AV	36.43	38.61	9.13	43.83	2.31	42.65	53.90	11.2	150	1	

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

Distance factor : 1 GHz - 13 GHz : $20\log(3.91\text{ m} / 3.0\text{ m}) = 2.31\text{ dB}$

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	96.33	27.29	14.16	44.14	2.31	95.95	-	-	Carrier
Hori.	2400.000	PK	49.97	27.29	14.15	44.14	2.31	49.58	75.95	26.4	
Vert.	2402.000	PK	95.70	27.29	14.16	44.14	2.31	95.32	-	-	Carrier
Vert.	2400.000	PK	48.44	27.29	14.15	44.14	2.31	48.05	75.32	27.3	

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

Distance factor : 1 GHz - 13 GHz : $20\log(3.91\text{ m} / 3.0\text{ m}) = 2.31\text{ dB}$

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

UL Japan, Inc.

Shonan EMC Lab.

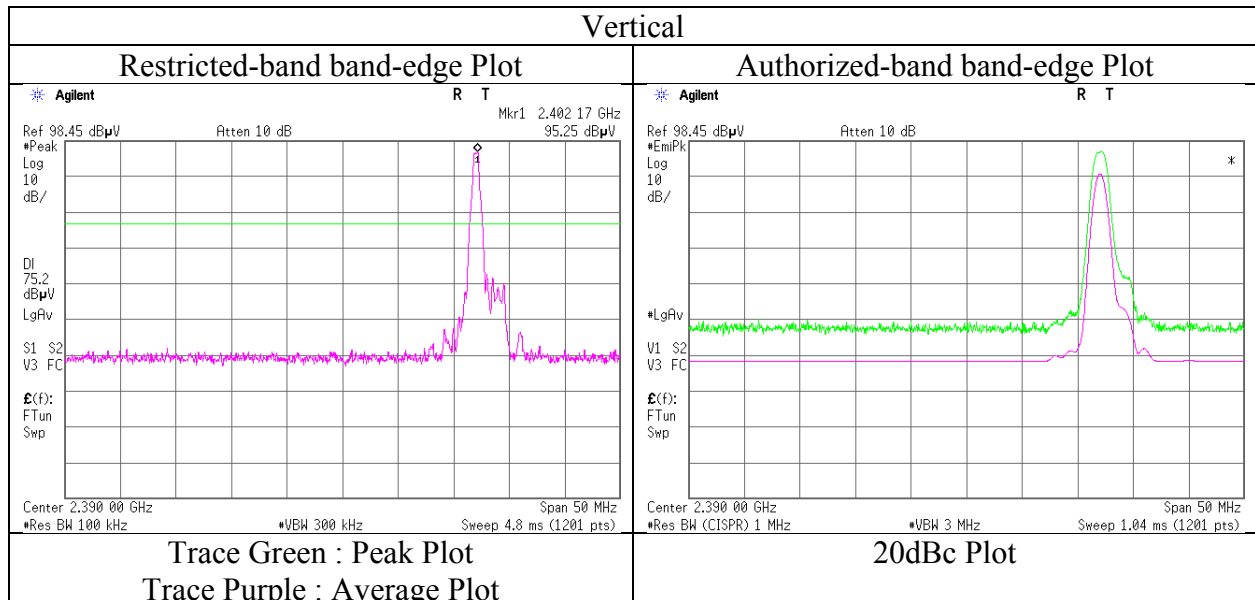
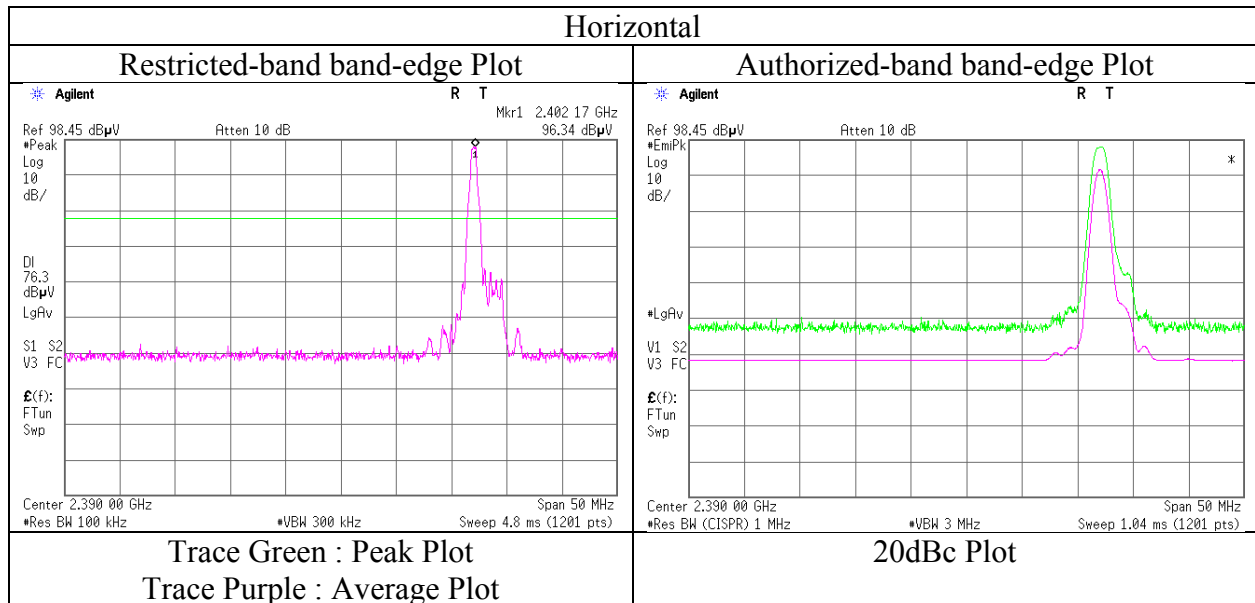
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Radiated Spurious Emission (Reference Plot for band-edge)

Report No.	11986349S-F-R1
Test place	Shonan EMC Lab.
Semi Anechoic Chamber	No.3
Date	October 18, 2017
Temperature / Humidity	24 deg. C / 41 % RH
Engineer	Ishikawa Yosuke (1GHz -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.	11986349S-F-R1		
Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	No.2	No.3	No.2
Date	October 19, 2017	October 18, 2017	October 19, 2017
Temperature / Humidity	20 deg. C / 51 % RH	24 deg. C / 41 % RH	20 deg. C / 51 % RH
Engineer	Hiroyuki Morikawa	Ishikawa Yosuke	Hiroyuki Morikawa
	(30 MHz -1000 MHz)	(1GHz -13 GHz)	(13GHz -26 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.	188.002	QP	23.76	16.22	8.93	31.77	0.00	17.14	43.50	26.3	100	0	
Hori.	335.999	QP	36.97	14.26	6.71	31.63	0.00	26.31	46.00	19.6	100	257	
Hori.	443.997	QP	42.76	16.68	7.44	31.61	0.00	35.27	46.00	10.7	100	267	
Hori.	731.994	QP	26.43	20.19	8.87	31.48	0.00	24.01	46.00	21.9	107	202	
Hori.	4882.000	PK	55.16	31.62	6.62	44.48	2.31	51.23	73.90	22.6	251	299	
Hori.	7323.000	PK	48.16	36.77	8.06	44.03	2.31	51.27	73.90	22.6	150	1	
Hori.	9764.000	PK	48.51	38.80	9.15	43.85	2.31	54.92	73.90	18.9	150	1	
Hori.	4882.000	AV	46.10	31.62	6.62	44.48	2.31	42.17	53.90	11.7	251	299	
Hori.	7323.000	AV	35.88	36.77	8.06	44.03	2.31	38.99	53.90	14.9	150	1	
Hori.	9764.000	AV	36.00	38.80	9.15	43.85	2.31	42.41	53.90	11.4	150	1	
Vert.	163.916	QP	21.55	15.46	8.69	31.79	0.00	13.91	43.50	29.5	100	1	
Vert.	216.001	QP	33.72	11.48	5.80	31.74	0.00	19.26	46.00	26.7	103	117	
Vert.	243.999	QP	31.66	11.69	6.02	31.70	0.00	17.67	46.00	28.3	100	6	
Vert.	400.001	QP	31.02	15.82	7.14	31.63	0.00	22.35	46.00	23.6	118	223	
Vert.	444.000	QP	38.89	16.68	7.44	31.61	0.00	31.40	46.00	14.6	100	202	
Vert.	4882.000	PK	55.87	31.62	6.62	44.48	2.31	51.94	73.90	21.9	213	235	
Vert.	7323.000	PK	48.53	36.77	8.06	44.03	2.31	51.64	73.90	22.2	150	1	
Vert.	9764.000	PK	47.95	38.80	9.15	43.85	2.31	54.36	73.90	19.5	150	1	
Vert.	4882.000	AV	46.24	31.62	6.62	44.48	2.31	42.31	53.90	11.5	213	235	
Vert.	7323.000	AV	35.53	36.77	8.06	44.03	2.31	38.64	53.90	15.2	150	1	
Vert.	9764.000	AV	36.14	38.80	9.15	43.85	2.31	42.55	53.90	11.3	150	1	

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

Distance factor : 1 GHz - 13 GHz : $20\log(3.91\text{ m} / 3.0\text{ m}) = 2.31\text{ dB}$

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

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

Radiated Spurious Emission

Report No.	11986349S-F-R1		
Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	No.2	No.3	No.2
Date	October 19, 2017	October 18, 2017	October 19, 2017
Temperature / Humidity	20 deg. C / 51 % RH	24 deg. C / 41 % RH	20 deg. C / 51 % RH
Engineer	Hiroyuki Morikawa	Ishikawa Yosuke	Hiroyuki Morikawa
	(30 MHz -1000 MHz)	(1GHz -13 GHz)	(13GHz -26 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.	178.579	QP	21.29	16.08	8.84	31.78	0.00	14.43	43.50	29.0	100	1	
Hori.	336.001	QP	36.67	14.26	6.71	31.63	0.00	26.01	46.00	19.9	102	96	
Hori.	379.998	QP	37.88	15.33	7.00	31.62	0.00	28.59	46.00	17.4	102	55	
Hori.	435.999	QP	40.29	16.52	7.38	31.61	0.00	32.58	46.00	13.4	100	33	
Hori.	751.987	QP	26.65	20.39	8.97	31.45	0.00	24.56	46.00	21.4	117	295	
Hori.	2483.500	PK	49.19	27.55	14.24	44.16	2.31	49.13	73.90	24.7	101	99	
Hori.	4960.000	PK	53.77	31.83	6.65	44.51	2.31	50.05	73.90	23.8	197	300	
Hori.	7440.000	PK	48.30	36.97	8.06	44.08	2.31	51.56	73.90	22.3	150	1	
Hori.	9920.000	PK	47.94	38.98	9.15	43.87	2.31	54.51	73.90	19.3	150	1	
Hori.	2483.500	AV	36.67	27.55	14.24	44.16	2.31	36.61	53.90	17.2	101	99	
Hori.	4960.000	AV	38.37	31.83	6.65	44.51	2.31	34.65	53.90	19.2	197	300	
Hori.	7440.000	AV	36.77	36.97	8.06	44.08	2.31	40.03	53.90	13.8	150	1	
Hori.	9920.000	AV	35.51	38.98	9.15	43.87	2.31	42.08	53.90	11.8	150	1	
Vert.	188.139	QP	21.46	16.22	8.93	31.77	0.00	14.84	43.50	28.6	100	1	
Vert.	224.003	QP	33.51	11.54	5.86	31.73	0.00	19.18	46.00	26.8	100	232	
Vert.	419.999	QP	34.07	16.21	7.28	31.62	0.00	25.94	46.00	20.0	129	228	
Vert.	435.999	QP	38.18	16.52	7.38	31.61	0.00	30.47	46.00	15.5	122	202	
Vert.	2483.500	PK	51.01	27.55	14.24	44.16	2.31	50.95	73.90	22.9	140	91	
Vert.	4960.000	PK	52.47	31.83	6.65	44.51	2.31	48.75	73.90	25.1	122	262	
Vert.	7440.000	PK	48.24	36.97	8.06	44.08	2.31	51.50	73.90	22.4	150	1	
Vert.	9920.000	PK	47.81	38.98	9.15	43.87	2.31	54.38	73.90	19.5	150	1	
Vert.	2483.500	AV	36.88	27.55	14.24	44.16	2.31	36.82	53.90	17.0	140	91	
Vert.	4960.000	AV	38.14	31.83	6.65	44.51	2.31	34.42	53.90	19.4	122	262	
Vert.	7440.000	AV	36.67	36.97	8.06	44.08	2.31	39.93	53.90	13.9	150	1	
Vert.	9920.000	AV	35.43	38.98	9.15	43.87	2.31	42.00	53.90	11.9	150	1	

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

Distance factor : 1 GHz - 13 GHz : $20\log(3.91\text{ m} / 3.0\text{ m}) = 2.31\text{ dB}$

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.

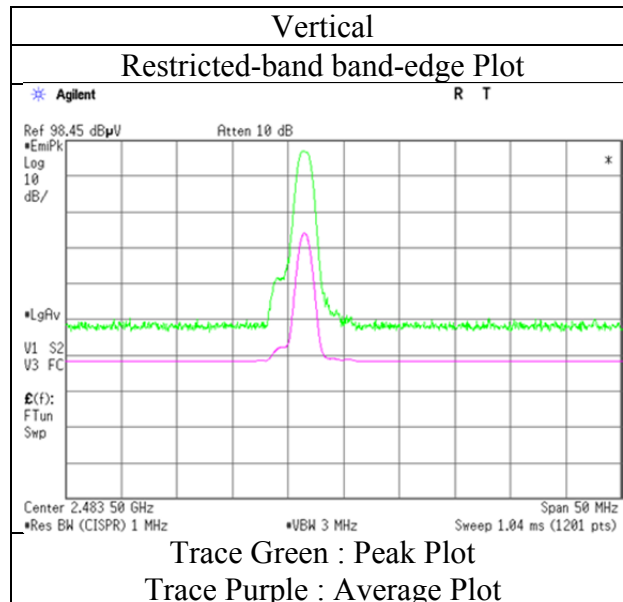
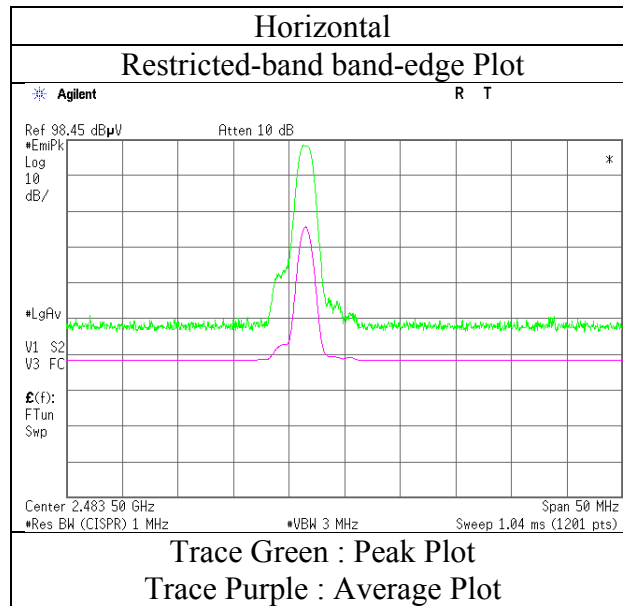
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Radiated Spurious Emission (Reference Plot for band-edge)

Report No.	11986349S-F-R1
Test place	Shonan EMC Lab.
Semi Anechoic Chamber	No.3
Date	October 18, 2017
Temperature / Humidity	24 deg. C / 41 % RH
Engineer	Ishikawa Yosuke (1GHz -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.	11986349S-F-R1		
Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	No.2	No.3	No.2
Date	October 19, 2017	October 18, 2017	October 19, 2017
Temperature / Humidity	20 deg. C / 51 % RH	24 deg. C / 41 % RH	20 deg. C / 51 % RH
Engineer	Hiroyuki Morikawa	Ishikawa Yosuke	Hiroyuki Morikawa
	(30 MHz -1000 MHz)	(1GHz -13 GHz)	(13GHz -26 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.	182.026	QP	21.26	16.16	8.87	31.78	0.00	14.51	43.50	28.9	100	1	
Hori.	344.003	QP	36.55	14.46	6.77	31.62	0.00	26.16	46.00	19.8	100	87	
Hori.	427.997	QP	40.01	16.37	7.33	31.62	0.00	32.09	46.00	13.9	103	55	
Hori.	751.979	QP	26.45	20.39	8.97	31.45	0.00	24.36	46.00	21.6	124	302	
Hori.	2390.000	PK	48.18	27.26	14.15	44.13	2.31	47.77	73.90	26.1	101	91	
Hori.	4804.000	PK	55.61	31.40	6.58	44.45	2.31	51.45	73.90	22.4	141	305	
Hori.	7206.000	PK	48.24	36.56	8.06	43.99	2.31	51.18	73.90	22.7	150	1	
Hori.	9608.000	PK	47.95	38.61	9.13	43.83	2.31	54.17	73.90	19.7	150	1	
Hori.	2390.000	AV	36.43	27.26	14.15	44.13	2.31	36.02	53.90	17.8	101	91	
Hori.	4804.000	AV	42.57	31.40	6.58	44.45	2.31	38.41	53.90	15.4	141	305	
Hori.	7206.000	AV	35.83	36.56	8.06	43.99	2.31	38.77	53.90	15.1	150	1	
Hori.	9608.000	AV	36.13	38.61	9.13	43.83	2.31	42.35	53.90	11.5	150	1	
Vert.	192.862	QP	21.10	16.26	8.98	31.77	0.00	14.57	43.50	28.9	100	1	
Vert.	224.000	QP	33.98	11.54	5.86	31.73	0.00	19.65	46.00	26.3	100	218	
Vert.	376.000	QP	33.78	15.24	6.98	31.62	0.00	24.38	46.00	21.6	121	223	
Vert.	419.999	QP	34.97	16.21	7.28	31.62	0.00	26.84	46.00	19.1	126	220	
Vert.	452.001	QP	35.88	16.83	7.49	31.61	0.00	28.59	46.00	17.4	102	195	
Vert.	2390.000	PK	48.89	27.26	14.15	44.13	2.31	48.48	73.90	25.4	139	149	
Vert.	4804.000	PK	56.99	31.40	6.58	44.45	2.31	52.83	73.90	21.0	184	243	
Vert.	7206.000	PK	48.31	36.56	8.06	43.99	2.31	51.25	73.90	22.6	150	1	
Vert.	9608.000	PK	47.89	38.61	9.13	43.83	2.31	54.11	73.90	19.7	150	1	
Vert.	2390.000	AV	36.41	27.26	14.15	44.13	2.31	36.00	53.90	17.9	139	149	
Vert.	4804.000	AV	43.27	31.40	6.58	44.45	2.31	39.11	53.90	14.7	184	243	
Vert.	7206.000	AV	35.80	36.56	8.06	43.99	2.31	38.74	53.90	15.1	150	1	
Vert.	9608.000	AV	36.21	38.61	9.13	43.83	2.31	42.43	53.90	11.4	150	1	

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

Distance factor : 1 GHz - 13 GHz : $20\log(3.91\text{ m} / 3.0\text{ m}) = 2.31\text{ dB}$

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	98.85	27.29	14.16	44.14	2.31	98.47	-	-	Carrier
Hori.	2400.000	PK	64.79	27.29	14.15	44.14	2.31	64.40	78.47	14.1	
Vert.	2402.000	PK	99.04	27.29	14.16	44.14	2.31	98.66	-	-	Carrier
Vert.	2400.000	PK	65.53	27.29	14.15	44.14	2.31	65.14	78.66	13.5	

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

Distance factor : 1 GHz - 13 GHz : $20\log(3.91\text{ m} / 3.0\text{ m}) = 2.31\text{ dB}$

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

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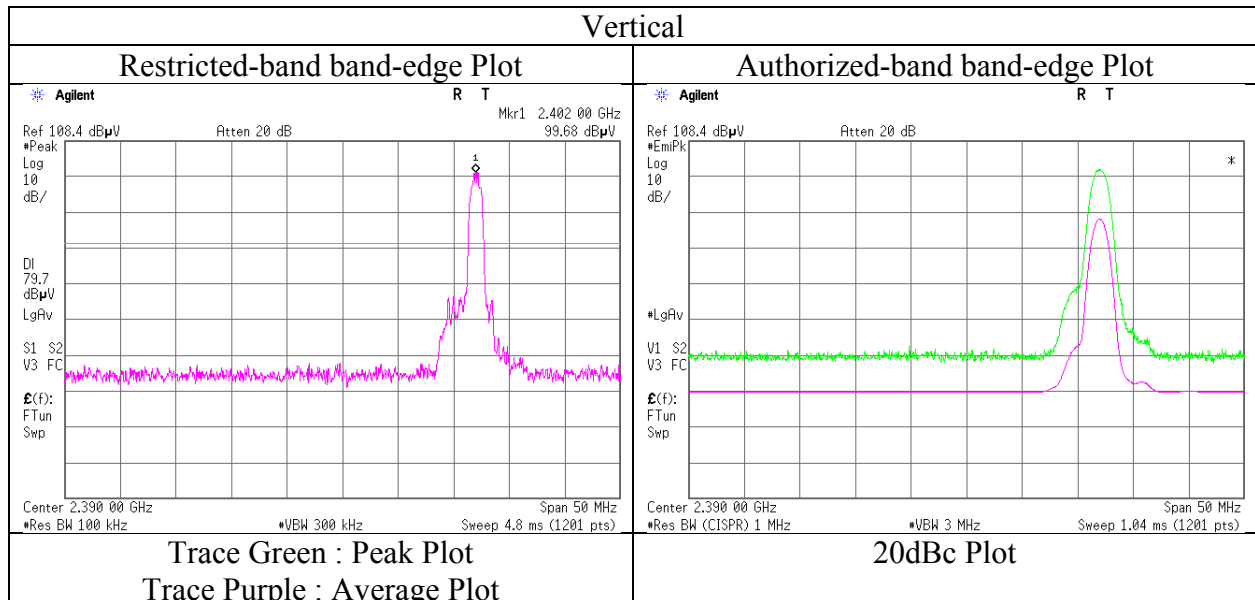
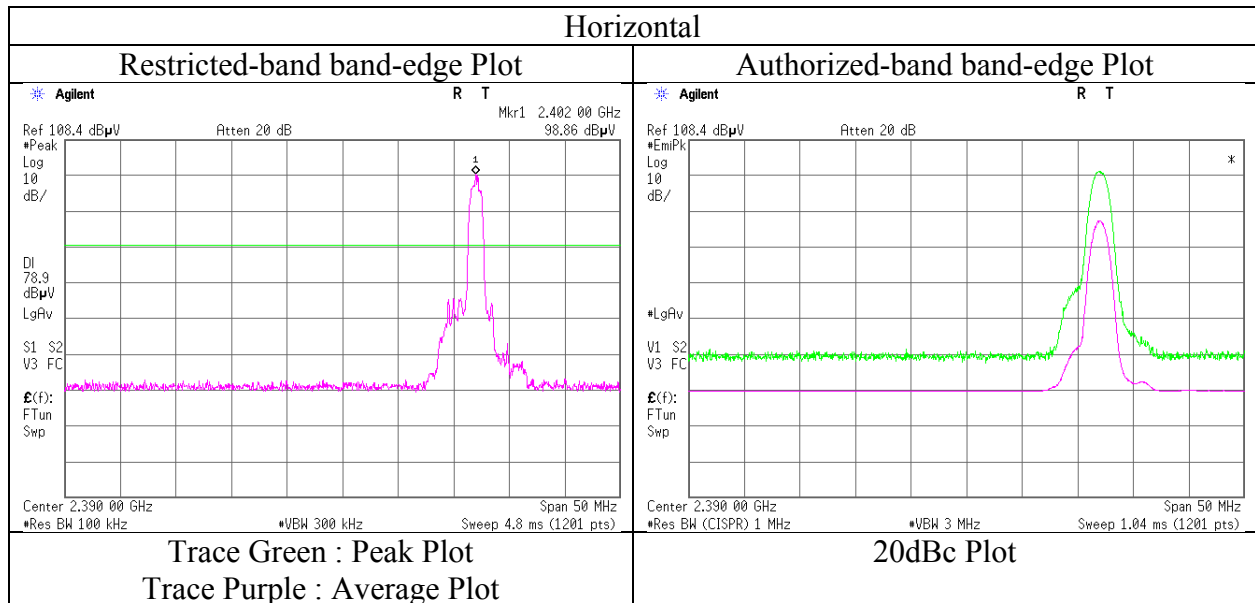
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone : +81 463 50 6400

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Radiated Spurious Emission (Reference Plot for band-edge)

Report No.	11986349S-F-R1
Test place	Shonan EMC Lab.
Semi Anechoic Chamber	No.3
Date	October 18, 2017
Temperature / Humidity	24 deg. C / 41 % RH
Engineer	Ishikawa Yosuke (1GHz -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.	11986349S-F-R1		
Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	No.2	No.3	No.2
Date	October 19, 2017	October 18, 2017	October 19, 2017
Temperature / Humidity	20 deg. C / 51 % RH	24 deg. C / 41 % RH	20 deg. C / 51 % RH
Engineer	Hiroyuki Morikawa	Ishikawa Yosuke	Hiroyuki Morikawa
	(30 MHz -1000 MHz)	(1GHz -13 GHz)	(13GHz -26 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.	191.498	QP	21.41	16.25	8.97	31.77	0.00	14.86	43.50	28.6	100	1	
Hori.	435.995	QP	40.96	16.52	7.38	31.61	0.00	33.25	46.00	12.7	108	71	
Hori.	751.998	QP	26.11	20.39	8.97	31.45	0.00	24.02	46.00	21.9	107	288	
Hori.	4882.000	PK	54.89	31.62	6.62	44.48	2.31	50.96	73.90	22.9	142	298	
Hori.	7323.000	PK	48.11	36.77	8.06	44.03	2.31	51.22	73.90	22.6	150	1	
Hori.	9764.000	PK	47.81	38.80	9.15	43.85	2.31	54.22	73.90	19.6	150	1	
Hori.	4882.000	AV	42.05	31.62	6.62	44.48	2.31	38.12	53.90	15.7	142	298	
Hori.	7323.000	AV	35.87	36.77	8.06	44.03	2.31	38.98	53.90	14.9	150	1	
Hori.	9764.000	AV	36.23	38.80	9.15	43.85	2.31	42.64	53.90	11.2	150	1	
Vert.	183.298	QP	21.18	16.17	8.89	31.78	0.00	14.46	43.50	29.0	100	1	
Vert.	215.998	QP	32.67	11.48	5.80	31.74	0.00	18.21	43.50	25.2	102	234	
Vert.	220.000	QP	32.76	11.51	5.83	31.74	0.00	18.36	46.00	27.6	100	65	
Vert.	224.001	QP	34.35	11.54	5.86	31.73	0.00	20.02	46.00	25.9	100	222	
Vert.	392.002	QP	33.89	15.63	7.08	31.62	0.00	24.98	46.00	21.0	117	215	
Vert.	436.000	QP	39.31	16.52	7.38	31.61	0.00	31.60	46.00	14.4	107	211	
Vert.	4882.000	PK	55.94	31.62	6.62	44.48	2.31	52.01	73.90	21.8	157	264	
Vert.	7323.000	PK	48.22	36.77	8.06	44.03	2.31	51.33	73.90	22.5	150	1	
Vert.	9764.000	PK	47.92	38.80	9.15	43.85	2.31	54.33	73.90	19.5	150	1	
Vert.	4882.000	AV	42.08	31.62	6.62	44.48	2.31	38.15	53.90	15.7	157	264	
Vert.	7323.000	AV	35.97	36.77	8.06	44.03	2.31	39.08	53.90	14.8	150	1	
Vert.	9764.000	AV	36.11	38.80	9.15	43.85	2.31	42.52	53.90	11.3	150	1	

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

Distance factor : 1 GHz - 13 GHz : $20\log(3.91\text{ m} / 3.0\text{ m}) = 2.31\text{ dB}$

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

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

Radiated Spurious Emission

Report No.	11986349S-F-R1		
Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	No.2	No.3	No.2
Date	October 19, 2017	October 18, 2017	October 19, 2017
Temperature / Humidity	20 deg. C / 51 % RH	24 deg. C / 41 % RH	20 deg. C / 51 % RH
Engineer	Hiroyuki Morikawa	Ishikawa Yosuke	Hiroyuki Morikawa
	(30 MHz -1000 MHz)	(1GHz -13 GHz)	(13GHz -26 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.	196.902	QP	21.31	16.30	9.02	31.77	0.00	14.86	43.50	28.6	100	1	
Hori.	335.999	QP	36.06	14.26	6.71	31.63	0.00	25.40	46.00	20.6	102	264	
Hori.	464.004	QP	41.66	17.07	7.55	31.60	0.00	34.68	46.00	11.3	100	276	
Hori.	751.968	QP	23.68	20.39	8.97	31.45	0.00	21.59	46.00	24.4	117	280	
Hori.	2483.500	PK	55.25	27.55	14.24	44.16	2.31	55.19	73.90	18.7	190	95	
Hori.	4960.000	PK	56.26	31.83	6.65	44.51	2.31	52.54	73.90	21.3	128	293	
Hori.	7440.000	PK	49.52	36.97	8.06	44.08	2.31	52.78	73.90	21.1	150	1	
Hori.	9920.000	PK	47.56	38.98	9.15	43.87	2.31	54.13	73.90	19.7	150	1	
Hori.	2483.500	AV	41.14	27.55	14.24	44.16	2.31	41.08	53.90	12.8	190	95	
Hori.	4960.000	AV	41.91	31.83	6.65	44.51	2.31	38.19	53.90	15.7	128	293	
Hori.	7440.000	AV	36.80	36.97	8.06	44.08	2.31	40.06	53.90	13.8	150	1	
Hori.	9920.000	AV	36.41	38.98	9.15	43.87	2.31	42.98	53.90	10.9	150	1	
Vert.	190.945	QP	21.51	16.24	8.96	31.77	0.00	14.94	43.50	28.5	100	1	
Vert.	215.999	QP	31.42	11.48	5.80	31.74	0.00	16.96	43.50	26.5	101	228	
Vert.	224.000	QP	31.18	11.54	5.86	31.73	0.00	16.85	46.00	29.1	101	236	
Vert.	428.000	QP	37.00	16.37	7.33	31.62	0.00	29.08	46.00	16.9	115	208	
Vert.	463.999	QP	37.08	17.07	7.55	31.60	0.00	30.10	46.00	15.9	106	195	
Vert.	2483.500	PK	55.53	27.55	14.24	44.16	2.31	55.47	73.90	18.4	146	85	
Vert.	4960.000	PK	45.70	31.83	6.65	44.51	2.31	41.98	73.90	31.9	205	257	
Vert.	7440.000	PK	48.82	36.97	8.06	44.08	2.31	52.08	73.90	21.8	150	1	
Vert.	9920.000	PK	47.40	38.98	9.15	43.87	2.31	53.97	73.90	19.9	150	1	
Vert.	2483.500	AV	41.25	27.55	14.24	44.16	2.31	41.19	53.90	12.7	146	85	
Vert.	4960.000	AV	41.85	31.83	6.65	44.51	2.31	38.13	53.90	15.7	205	257	
Vert.	7440.000	AV	36.81	36.97	8.06	44.08	2.31	40.07	53.90	13.8	150	1	
Vert.	9920.000	AV	36.43	38.98	9.15	43.87	2.31	43.00	53.90	10.9	150	1	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor
Distance factor : 1 GHz - 13 GHz : 20log (3.91 m / 3.0 m) = 2.31 dB

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

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

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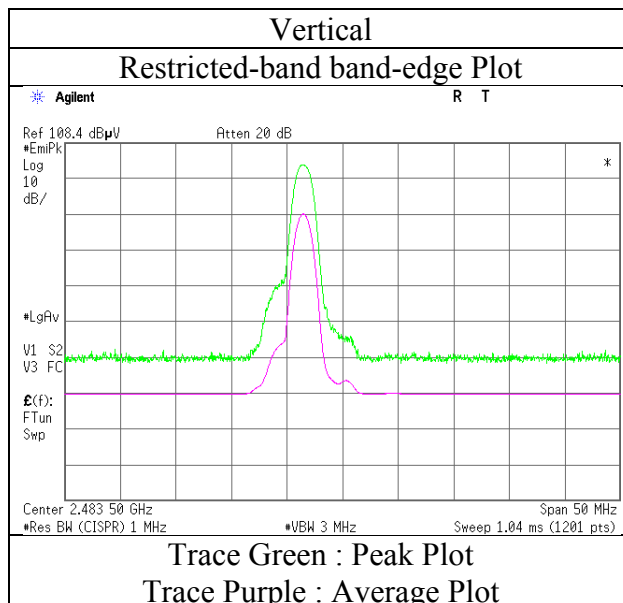
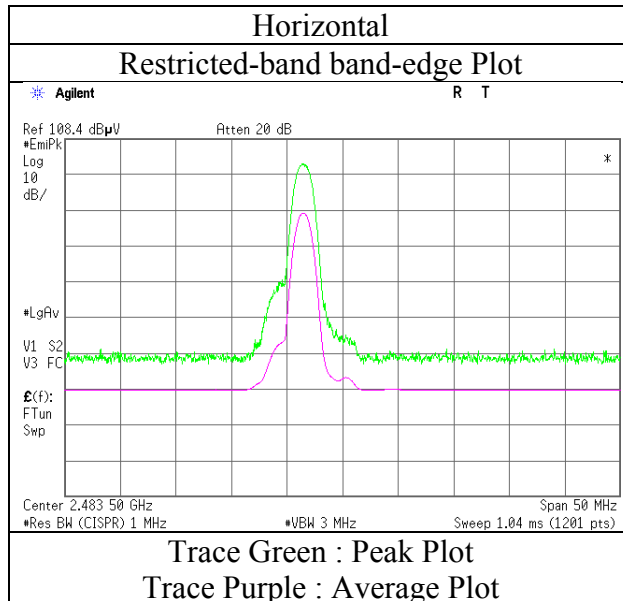
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

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Facsimile : +81 463 50 6401

Radiated Spurious Emission (Reference Plot for band-edge)

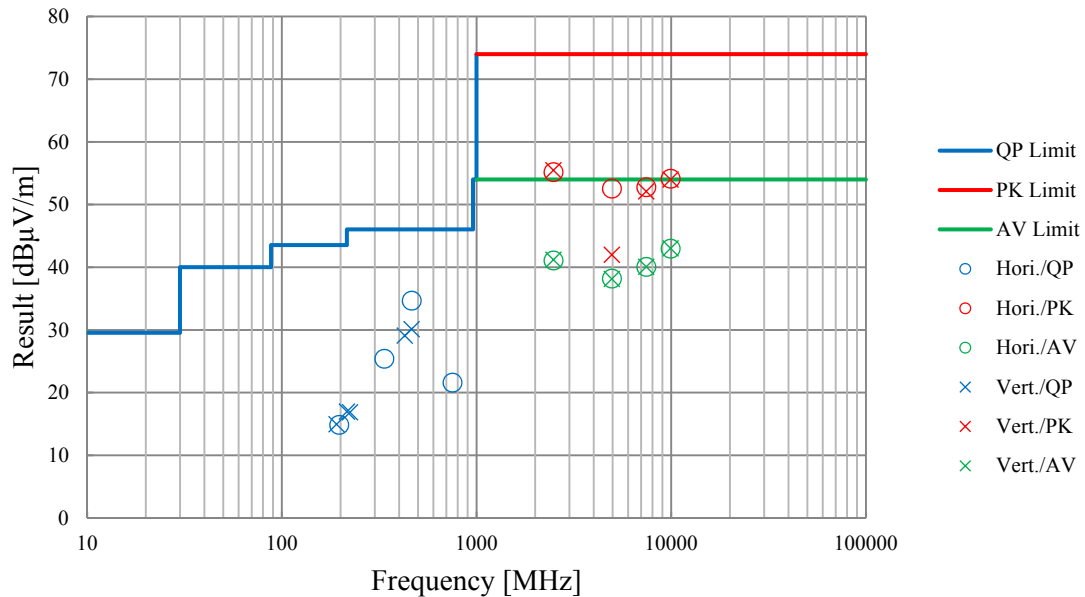
Report No.	11986349S-F-R1
Test place	Shonan EMC Lab.
Semi Anechoic Chamber	No.3
Date	October 18, 2017
Temperature / Humidity	24 deg. C / 41 % RH
Engineer	Ishikawa Yosuke (1GHz -13 GHz)
Mode	Tx, Hopping Off, 3DH5 2480 MHz



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

Radiated Spurious Emission
(Plot data, Worst case)

Report No.	11986349S-F-R1		
Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	No.2	No.3	No.2
Date	October 19, 2017	October 18, 2017	October 19, 2017
Temperature / Humidity	20 deg. C / 51 % RH	24 deg. C / 41 % RH	20 deg. C / 51 % RH
Engineer	Hiroyuki Morikawa	Ishikawa Yosuke	Hiroyuki Morikawa
	(30 MHz -1000 MHz)	(1GHz -13 GHz)	(13GHz -26 GHz)
Mode	Tx, Hopping Off, 3DH5 2480 MHz		

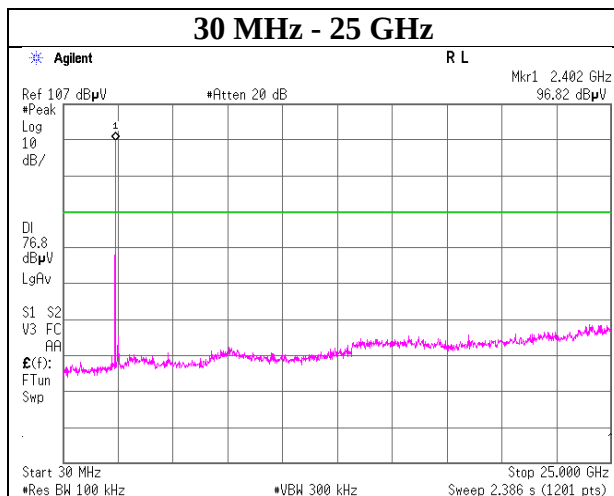
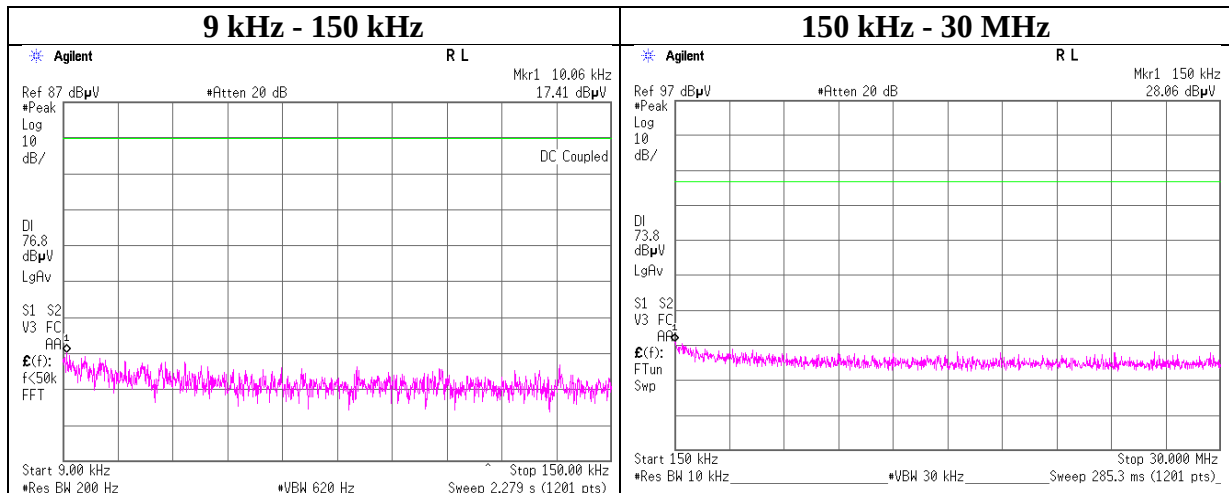


*These plots data contains sufficient number to show the trend of characteristic features for EUT.

Conducted Spurious Emission

Test place : Shonan EMC Lab. No.5 Shielded Room
Report No. : 11986349S-F-R1
Date : October 10, 2017
Temperature / Humidity : 26 deg. C / 52 % RH
Engineer : Shiro Kobayashi
Mode : Tx, Hopping Off, DH5

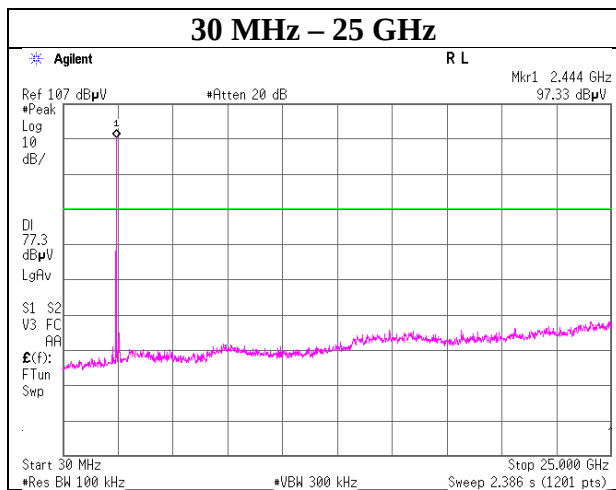
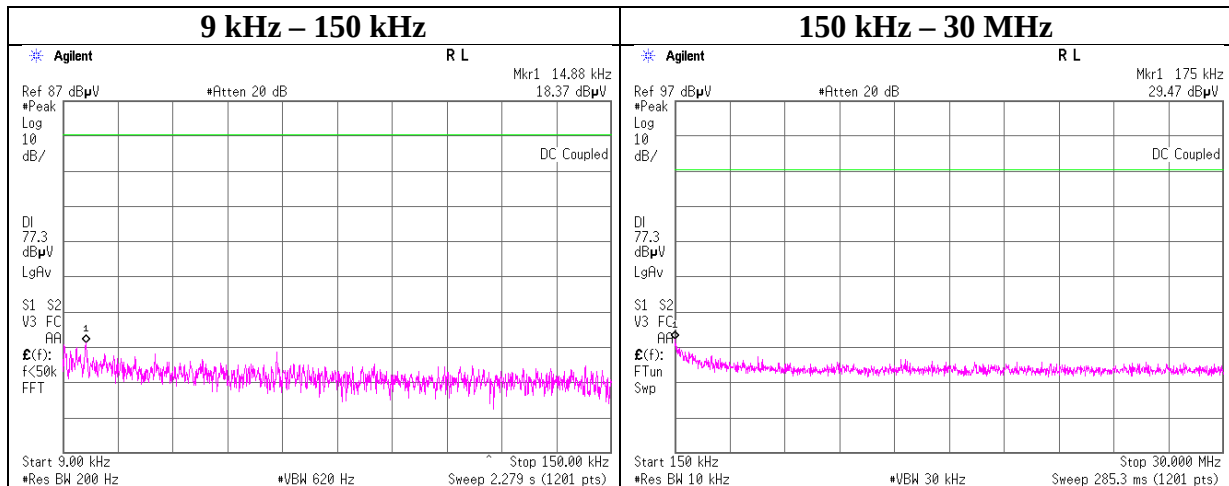
2402 MHz



Conducted Spurious Emission

Test place : Shonan EMC Lab. No.5 Shielded Room
Report No. : 11986349S-F-R1
Date : October 10, 2017
Temperature / Humidity : 26 deg. C / 52 % RH
Engineer : Shiro Kobayashi
Mode : Tx, Hopping Off, DH5

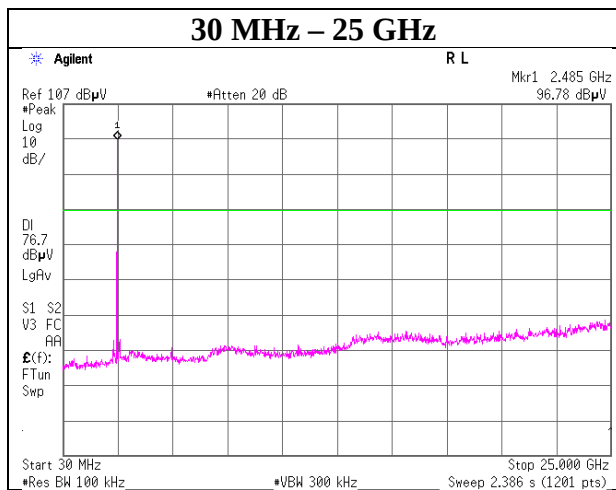
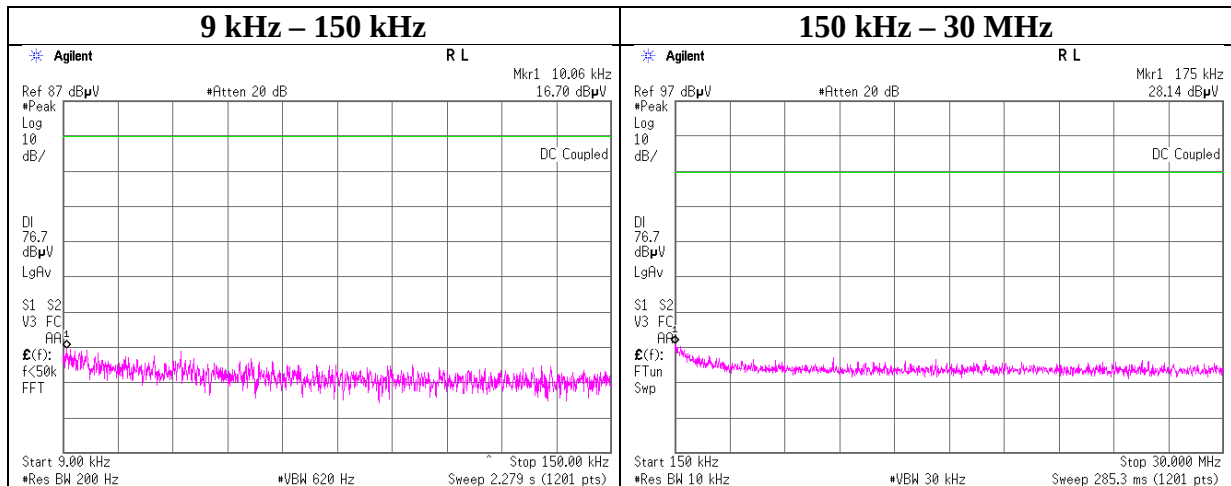
2441 MHz



Conducted Spurious Emission

Test place : Shonan EMC Lab. No.5 Shielded Room
Report No. : 11986349S-F-R1
Date : October 10, 2017
Temperature / Humidity : 26 deg. C / 52 % RH
Engineer : Shiro Kobayashi
Mode : Tx, Hopping Off, DH5

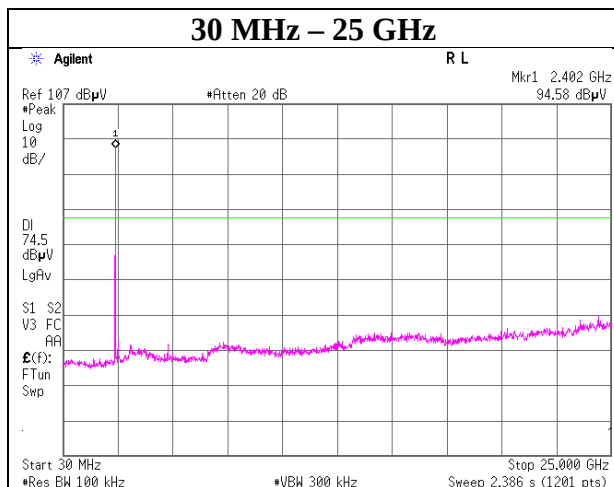
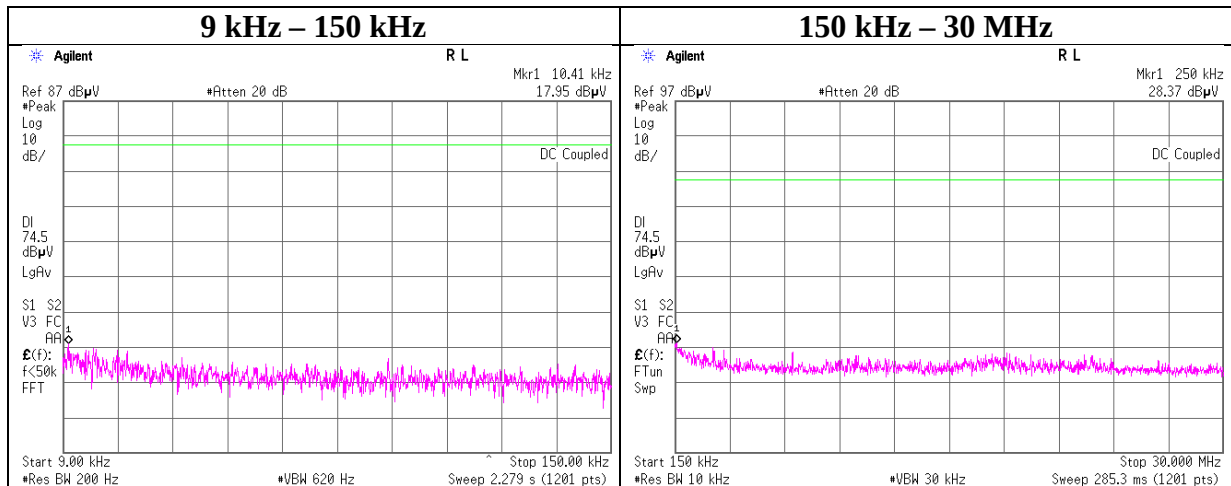
2480 MHz



Conducted Spurious Emission

Test place : Shonan EMC Lab. No.5 Shielded Room
Report No. : 11986349S-F-R1
Date : October 10, 2017
Temperature / Humidity : 26 deg. C / 52 % RH
Engineer : Shiro Kobayashi
Mode : Tx, Hopping Off, 3DH5

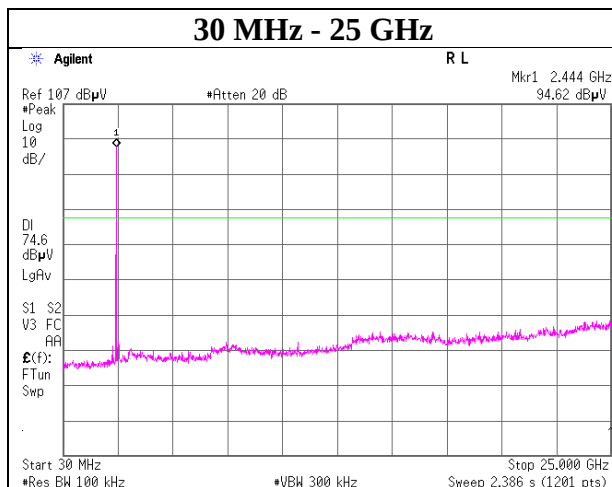
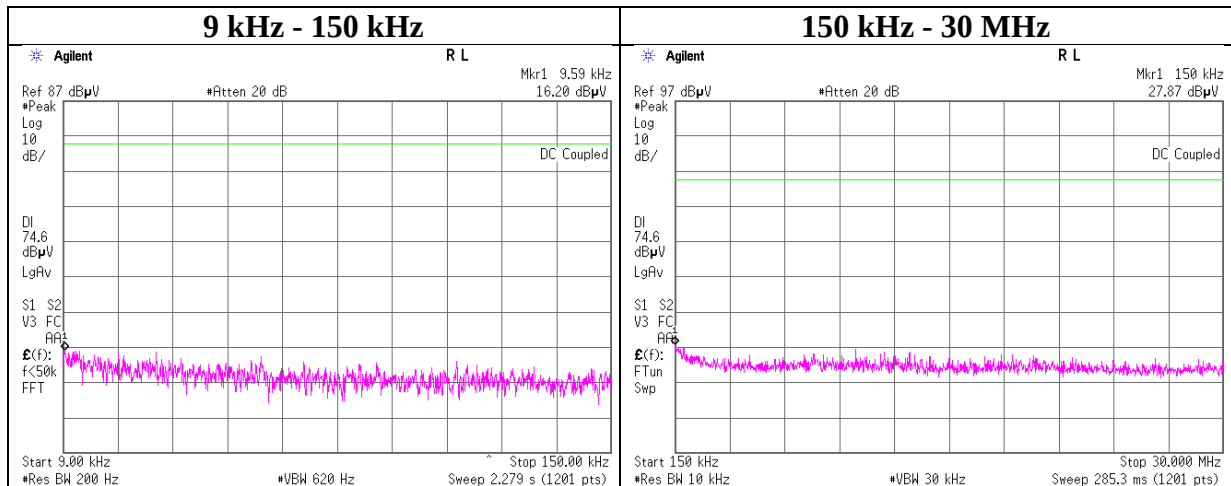
2402 MHz



Conducted Spurious Emission

Test place : Shonan EMC Lab. No.5 Shielded Room
Report No. : 11986349S-F-R1
Date : October 10, 2017
Temperature / Humidity : 26 deg. C / 52 % RH
Engineer : Shiro Kobayashi
Mode : Tx, Hopping Off, 3DH5

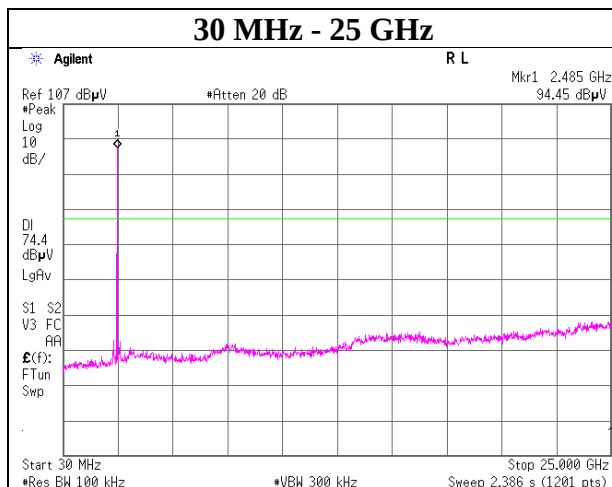
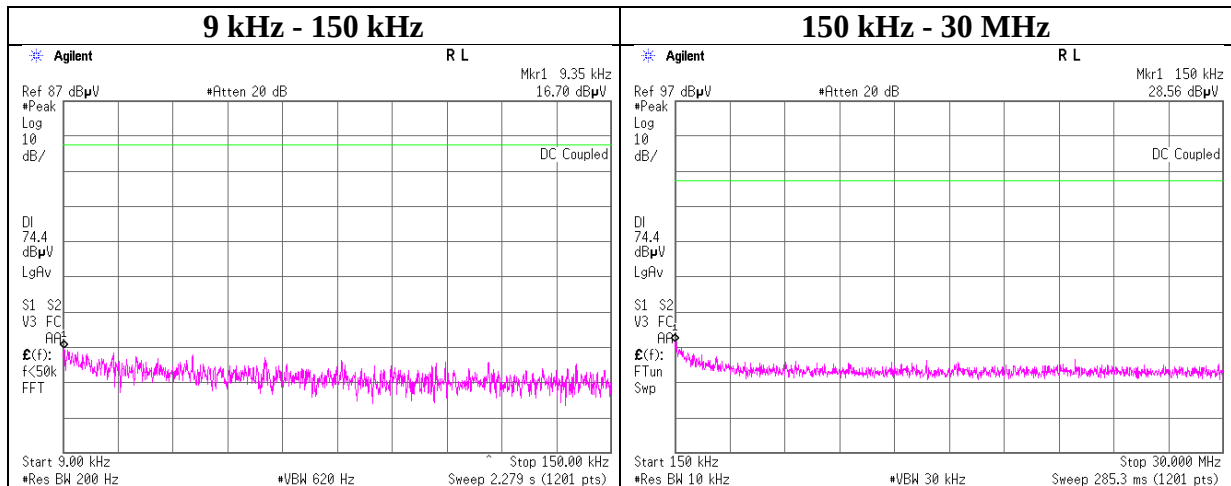
2441 MHz



Conducted Spurious Emission

Test place : Shonan EMC Lab. No.5 Shielded Room
Report No. : 11986349S-F-R1
Date : October 10, 2017
Temperature / Humidity : 26 deg. C / 52 % RH
Engineer : Shiro Kobayashi
Mode : Tx, Hopping Off, 3DH5

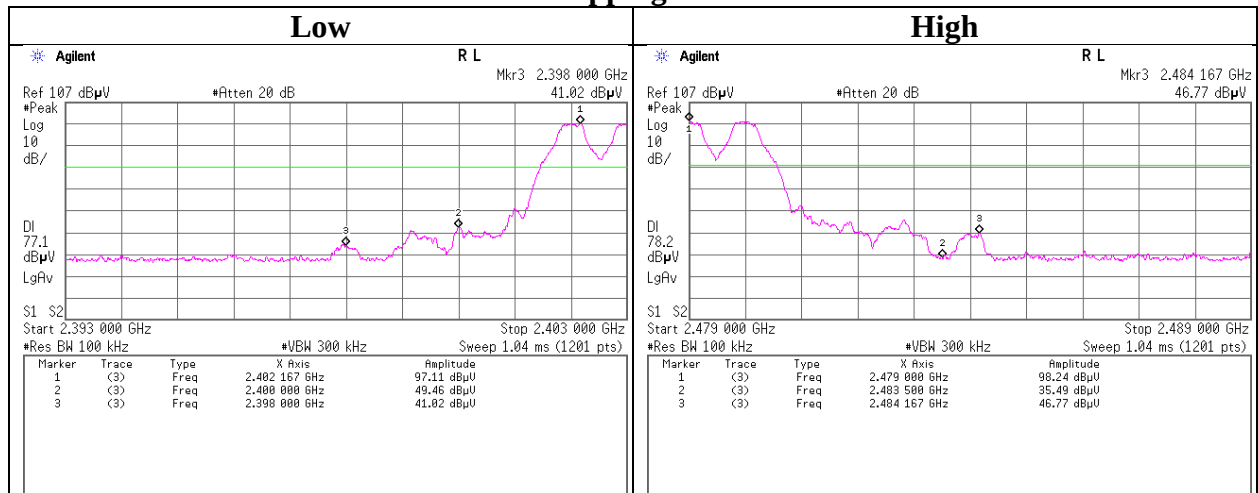
2480 MHz



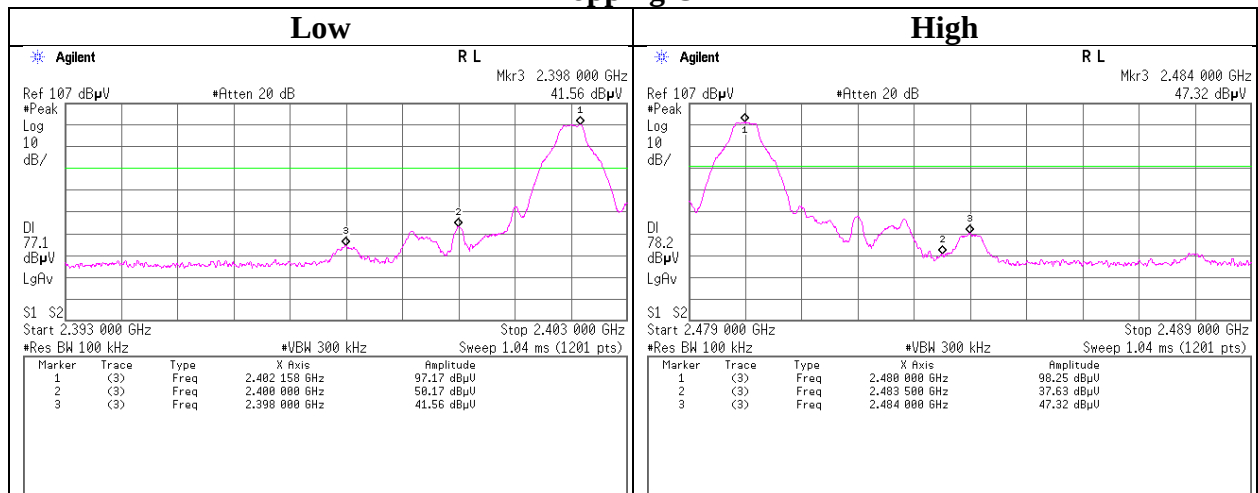
Conducted Emission Band Edge compliance

Test place : Shonan EMC Lab. No.5 Shielded Room
Report No. : 11986349S-F-R1
Date : October 10, 2017
Temperature / Humidity : 26 deg. C / 52 % RH
Engineer : Shiro Kobayashi
Mode : Tx DH5

Hopping On



Hopping Off



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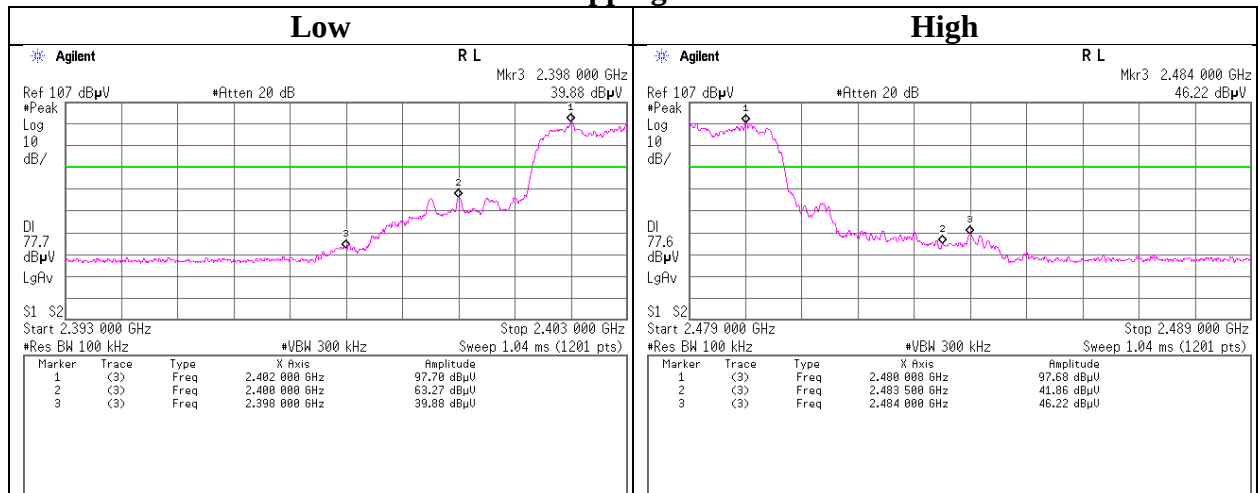
Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

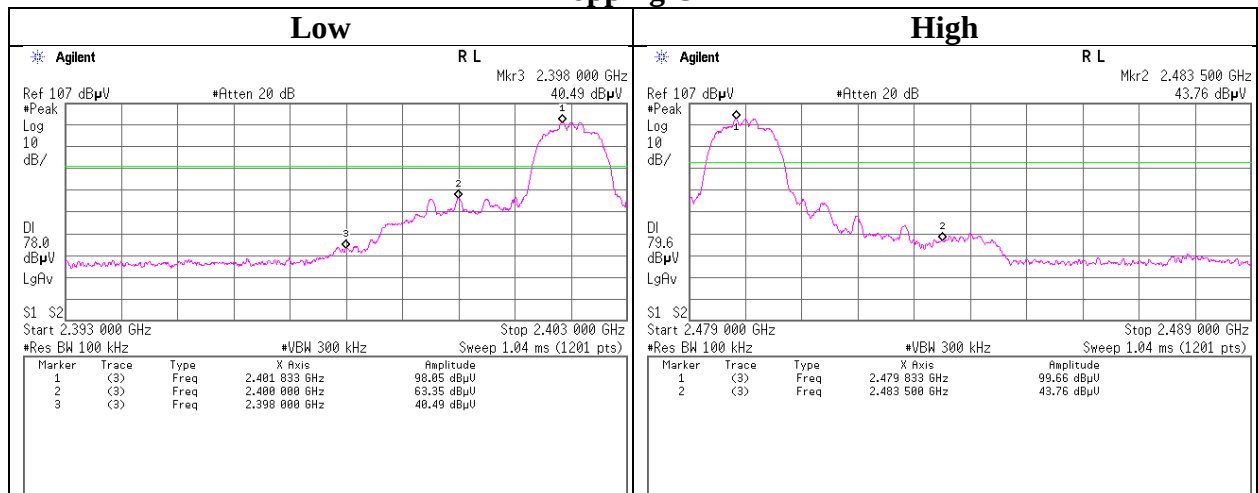
Conducted Emission Band Edge compliance

Test place	Shonan EMC Lab. No.5 Shielded Room
Report No.	11986349S-F-R1
Date	October 10, 2017
Temperature / Humidity	26 deg. C / 52 % RH
Engineer	Shiro Kobayashi
Mode	Tx 3DH5

Hopping On



Hopping Off



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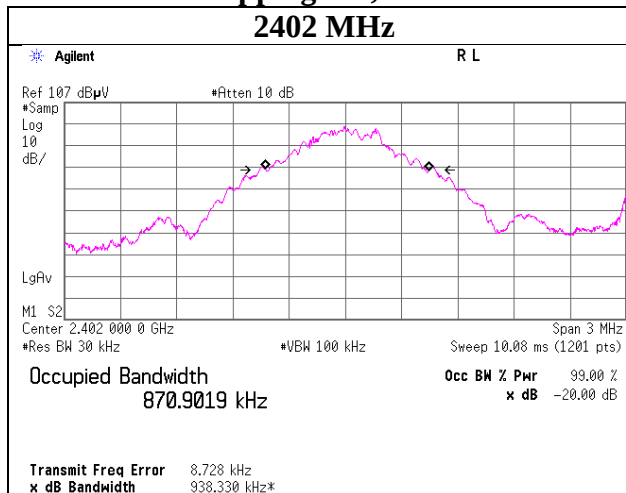
Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

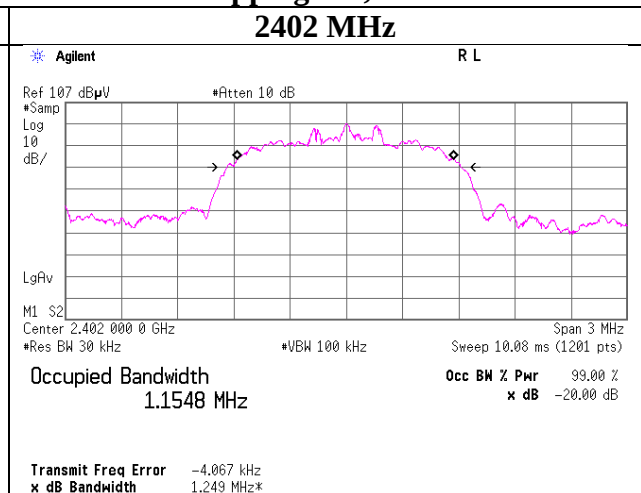
99% Occupied Bandwidth

Test place : Shonan EMC Lab. No.5 Shielded Room
Report No. : 11986349S-F-R1
Date : October 10, 2017
Temperature / Humidity : 26 deg. C / 52 % RH
Engineer : Shiro Kobayashi
Mode : Tx Hopping Off

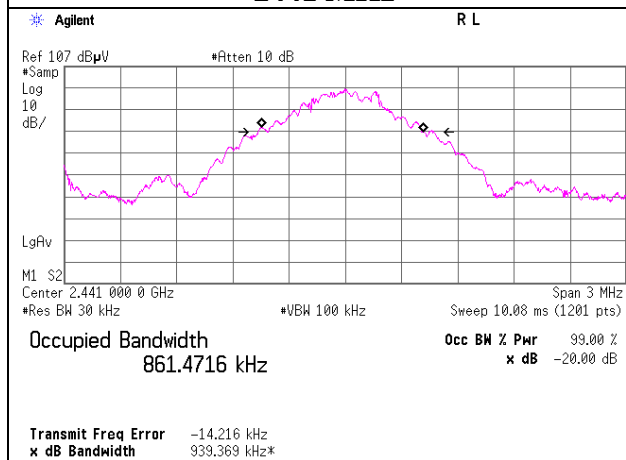
Hopping Off, DH5



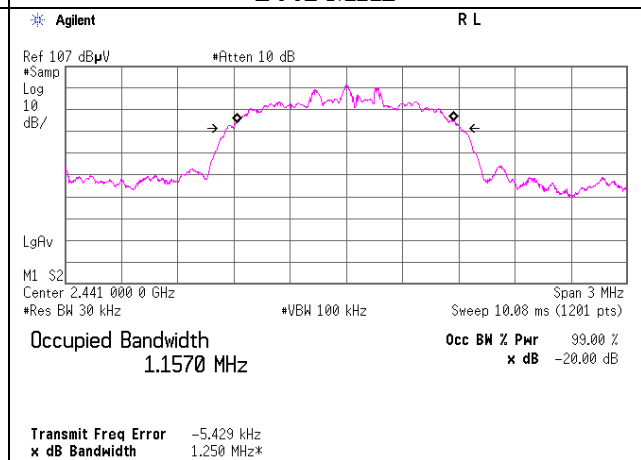
Hopping Off, 3DH5



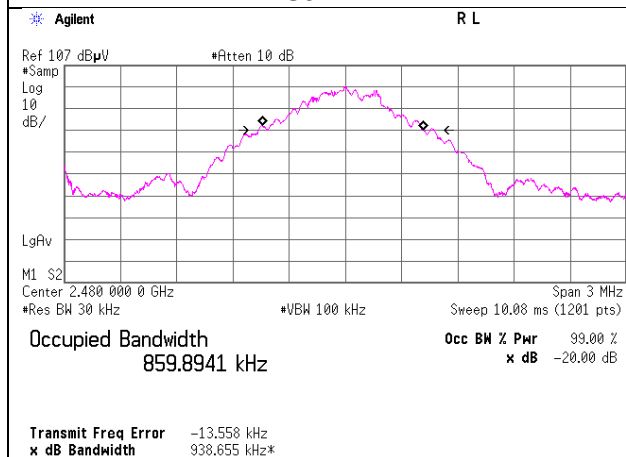
2441 MHz



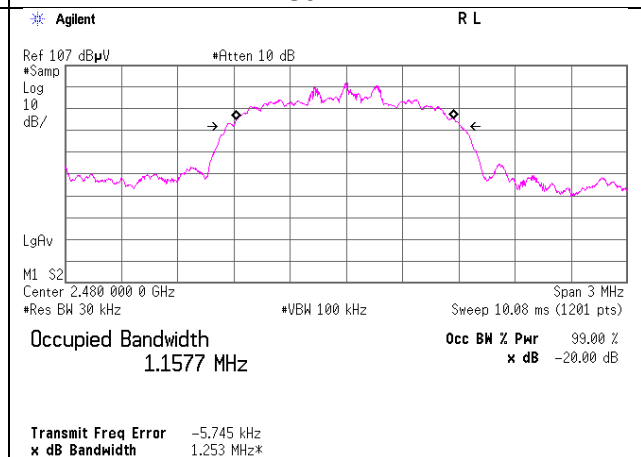
2441 MHz



2480 MHz



2480 MHz



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Shonan EMC Lab.

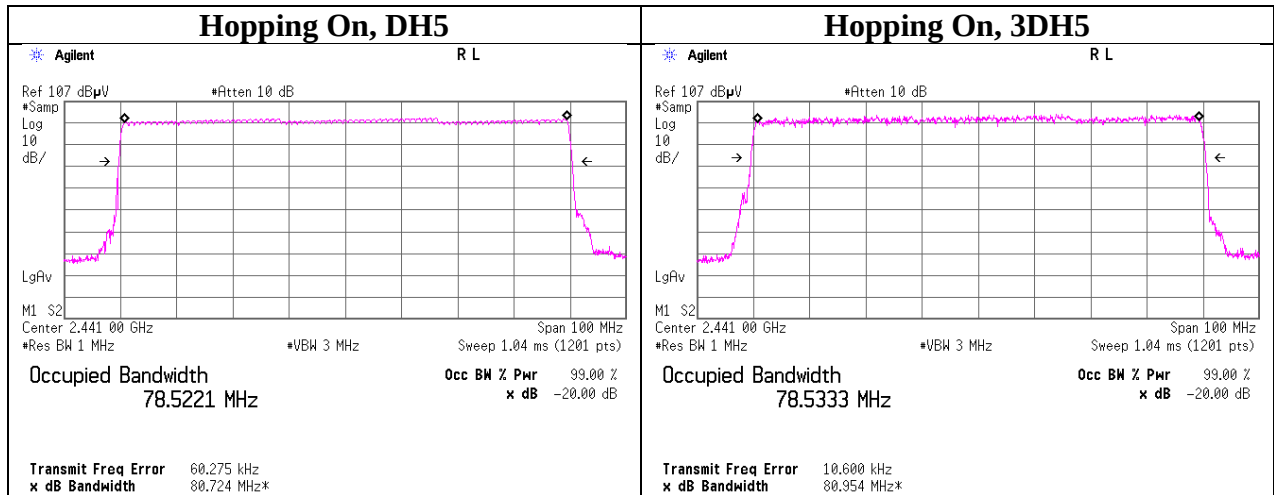
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

99% Occupied Bandwidth

Test place	Shonan EMC Lab. No.5 Shielded Room
Report No.	11986349S-F-R1
Date	October 10, 2017
Temperature / Humidity	26 deg. C / 52 % RH
Engineer	Shiro Kobayashi
Mode	Tx Hopping On



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Facsimile : +81 463 50 6401

APPENDIX 2: Test instruments

Test equipment

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
SPM-07	Power Meter	Agilent	8990B	MY5100272	AT	2017/05/01 * 12
SPSS-05	Power sensor	Agilent	N1923A	MY5349008	AT	2017/05/01 * 12
SCC-G14	Coaxial Cable	Suhner	SUCOFLEX 102	31600/2	AT	2017/03/23 * 12
SAT10-14	Attenuator	Weinschel Corp.	54A-10	81595	AT	2017/04/20 * 12
SRENT-10	Spectrum Analyzer	Agilent	E4440A	US41421511	AT	2016/12/05 * 12
SOS-09	Humidity Indicator	A&D	AD-5681	4061484	AT	2016/12/13 * 12
SAEC-03(SVS WR)	Semi-Anechoic Chamber	TDK	SAEC-03(SV SWR)	3	RE	2017/07/17 * 12
SAF-06	Pre Amplifier	TOYO Corporation	TPA0118-36	2046104	RE	2017/09/22 * 12
SCC-G06	Coaxial Cable	Junkosha	J12J102207-00	MAY-23-16-091	RE	2017/06/13 * 12
SCC-G23	Coaxial Cable	Suhner	SUCOFLEX 104	297342/4	RE	2017/05/08 * 12
SHA-03	Horn Antenna	Schwarzbeck	BBHA9120D	9120D-739	RE	2017/08/23 * 12
SOS-05	Humidity Indicator	A&D	AD-5681	4062518	RE	2016/10/12 * 12
SRENT-08	Spectrum Analyzer	Agilent	E4448A	MY50180019	RE	2016/10/24 * 12
SJM-02	Measure	KOMELON	KMC-36	-	RE	-
COTS-SEMI-1	EMI Software	TSJ	TEPTO-DV(RE,CE,RFI,M F)	-	RE	-
STS-03	Digital Hitester	Hioki	3805-50	080997823	RE	2017/10/16 * 12
SCC-G23	Coaxial Cable	Suhner	SUCOFLEX 104	297342/4	RE	2017/05/08 * 12
SAT10-05	Attenuator(above1GHz)	Agilent	8493C-010	74864	RE	2016/11/07 * 12
SAF-02	Pre Amplifier	SONOMA	310N	290212	RE	2017/02/09 * 12
SAT6-02	Attenuator	JFW	50HF-006N	-	RE	2017/02/09 * 12
SAT3-11	Attenuator	JFW	50HF-003N	-	RE	2017/02/23 * 12
SBA-02	Biconical Antenna	Schwarzbeck	BBA9106	91032665	RE	2016/11/23 * 12
SCC-B1/B3/B5/B7/B8/B13/SR SE-02	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhner/Suhner/Suhner/Suhner/TOYO	8D2W/12DSF A/141PE/141PE/141PE/141PE/NS4906	-/0901-270(R F Selector)	RE	2017/04/07 * 12
SCC-B2/B4/B6/B7/B8/B13/SR SE-02	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhner/Suhner/Suhner/Suhner/TOYO	8D2W/12DSF A/141PE/141PE/141PE/141PE/NS4906	-/0901-270(R F Selector)	RE	2017/04/07 * 12
SLA-06	Logperiodic Antenna	Schwarzbeck	VUSLP9111 B	195	RE	2017/01/05 * 12
SOS-03	Humidity Indicator	A&D	AD-5681	4063325	RE	2016/10/12 * 12
STR-01	Test Receiver	Rohde & Schwarz	ESU40	100093	RE	2017/04/12 * 12
SJM-09	Measure	PROMART	SEN1935	-	RE	-
SAEC-02(NSA)	Semi-Anechoic Chamber	TDK	SAEC-02(NSA)	2	RE	2017/06/08 * 12
STS-02	Digital Hitester	Hioki	3805-50	080997819	RE	2017/03/08 * 12
SHA-05	Horn Antenna	ETS LINDGREN	3160-09	LM4210	RE	2017/03/15 * 12
SHA-02	Horn Antenna	Schwarzbeck	BBHA9120D	9120D-726	RE	2017/08/14 * 12
SCC-G33	Coaxial Cable	Junkosha	MWX241-01000KMSKMS	-	RE	2017/04/20 * 12

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Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
SCC-G40	Coaxial Cable	Junkosha	MWX221-01 000NFSNMS/ B	1612S005	RE	2017/01/08 * 12
SCC-G22	Coaxial Cable	Suhner	SUCOFLEX 104	296199/4	RE	2017/05/08 * 12
SCC-G05	Coaxial Cable	Junkosha	J12J102207-0 0	APR-30-15-0 37	RE	2017/01/08 * 12
SCC-G19	Coaxial Cable	Suhner	SUCOFLEX 102A	1188/2A	RE	2017/03/23 * 12
SFL-02	Highpass Filter	MICRO-TRONICS	HPM50111	051	RE	2016/11/29 * 12
SAF-05	Pre Amplifier	TOYO Corporation	TPA0118-36	1440490	RE	2017/02/17 * 12
SAF-09	Pre Amplifier	TOYO Corporation	HAP18-26W	00000018	RE	2017/09/22 * 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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