



RADIO TEST REPORT

Test Report No. : 12327512S-A

Applicant : Sony Corporation
Type of Equipment : Wireless Noise Canceling Stereo Headset
Model No. : WI-C600N
FCC ID : AK8WIC600N
Test regulation : FCC Part 15 Subpart C: 2018
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 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 EMC technical requirements.
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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.

Date of test: May 20 to 29, 2018

Representative test engineer:

M. Hosaka

Makoto Hosaka
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Consumer Technology Division

Approved by:

T. Imamura

Toyokazu Imamura
Leader
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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

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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	:	+604-3835019
Contact Person	:	Maizatul Akmal Binti Mat Zan

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.	:	WI-C600N
Serial No.	:	Refer to Section 4, Clause 4.2
Rating	:	DC 3.7 V: Built-in lithium-ion rechargeable battery DC 5 V: When charged using USB
Receipt Date of Sample	:	May 10, 2018
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: WI-C600N (referred to as the EUT in this report) is a Wireless Noise Canceling Stereo Headset.

Radio Specification

Bluetooth

Radio Type	:	Transceiver
Frequency of Operation	:	2402 MHz - 2480 MHz
Modulation	:	GFSK, $\pi/4$ -DQPSK, 8DPSK
Antenna type	:	Chip Antenna
Antenna Gain	:	2.85 dBi
Clock frequency (Maximum)	:	26 MHz (XTAL)

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

* Also the EUT complies with FCC Part 15 Subpart B. Refer to the test report: 12327512S-E.

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	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	7.3 dB 2557.980 MHz, AV, Hori. Tx, 3DH5 2402 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).

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 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	
Radiated emission (Measurement distance: 3 m)	9 kHz-30 MHz	3.2 dB	3.2 dB	3.3 dB	-	-	
	30 MHz-200 MHz	4.9 dB	4.8 dB	4.9 dB	-	-	
	200 MHz-1 GHz	6.1 dB	6.1 dB	6.1 dB	-	-	
	1 GHz-6 GHz	4.7 dB	4.7 dB	4.7 dB	-	-	
	6 GHz-18 GHz	5.3 dB	5.3 dB	5.3 dB	-	-	
	18 GHz-40 GHz	5.6 dB	5.6 dB	5.6 dB	-	-	
Radiated emission (Measurement distance: 1 m)	1 GHz-18 GHz	5.6 dB	5.6 dB	5.6 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

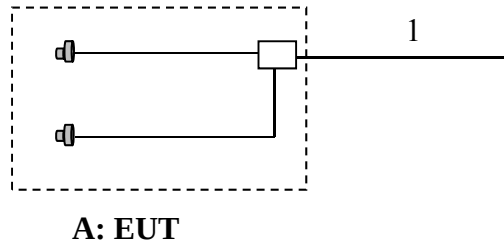
4.1 Operating Mode(s)

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

Details of Operating Mode(s)

Test Item	Mode	Tested frequency
Conducted Emission, Spurious Emission (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 test items based on Bluetooth Core specification. *EUT has the power settings by the software as follows; Power settings: BDR: Ext.=7, Int.=27 EDR: Ext.=72, Int.=38 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.		

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	WI-C600N	1000232 *1) 1000227*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	0.2	Shielded	Shielded	-

SECTION 6: 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	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	3.92 m*2) (1 GHz – 13 GHz), 1 m*3) (13 GHz – 26.5 GHz)		3.92 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: $20 \times \log (3.92 \text{ m}/3.0 \text{ m}) = 2.33 \text{ dB}$

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

- The carrier level and noise levels were confirmed at 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	X	Z	Z	X
Vertical	X	X	Y	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	Peak	Max Hold	Spectrum Analyzer
Maximum Peak Output Power	-	-	-	Auto	Peak Average *2)	-	Power Meter (Sensor: 50MHz BW)
Carrier Frequency Separation	3 MHz	100 kHz	300 kHz	Auto	Peak	Max Hold	Spectrum Analyzer
Number of Hopping Frequency	30 MHz	300 kHz	1 MHz	Auto	Peak	Max Hold	Spectrum Analyzer
Dwell Time	Zero Span	100 kHz, 1 MHz	300 kHz, 3 MHz	As necessary capture the entire dwell time per hopping channel	Peak	Clear Write	Spectrum Analyzer
Conducted Spurious Emission *3)	9 kHz to 150 kHz	200 Hz	620 Hz	Auto	Peak	Max Hold	Spectrum Analyzer
	150 kHz to 30 MHz	10 kHz	30 kHz				
	30 MHz to 25 GHz	100 kHz	300 kHz				
Conducted Spurious Emission Band Edge compliance	10 MHz	100 kHz	300 kHz	Auto	Peak	Max Hold	Spectrum Analyzer

*1) 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.

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

Test data	: APPENDIX
Test result	: Pass

APPENDIX 1: Test data

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

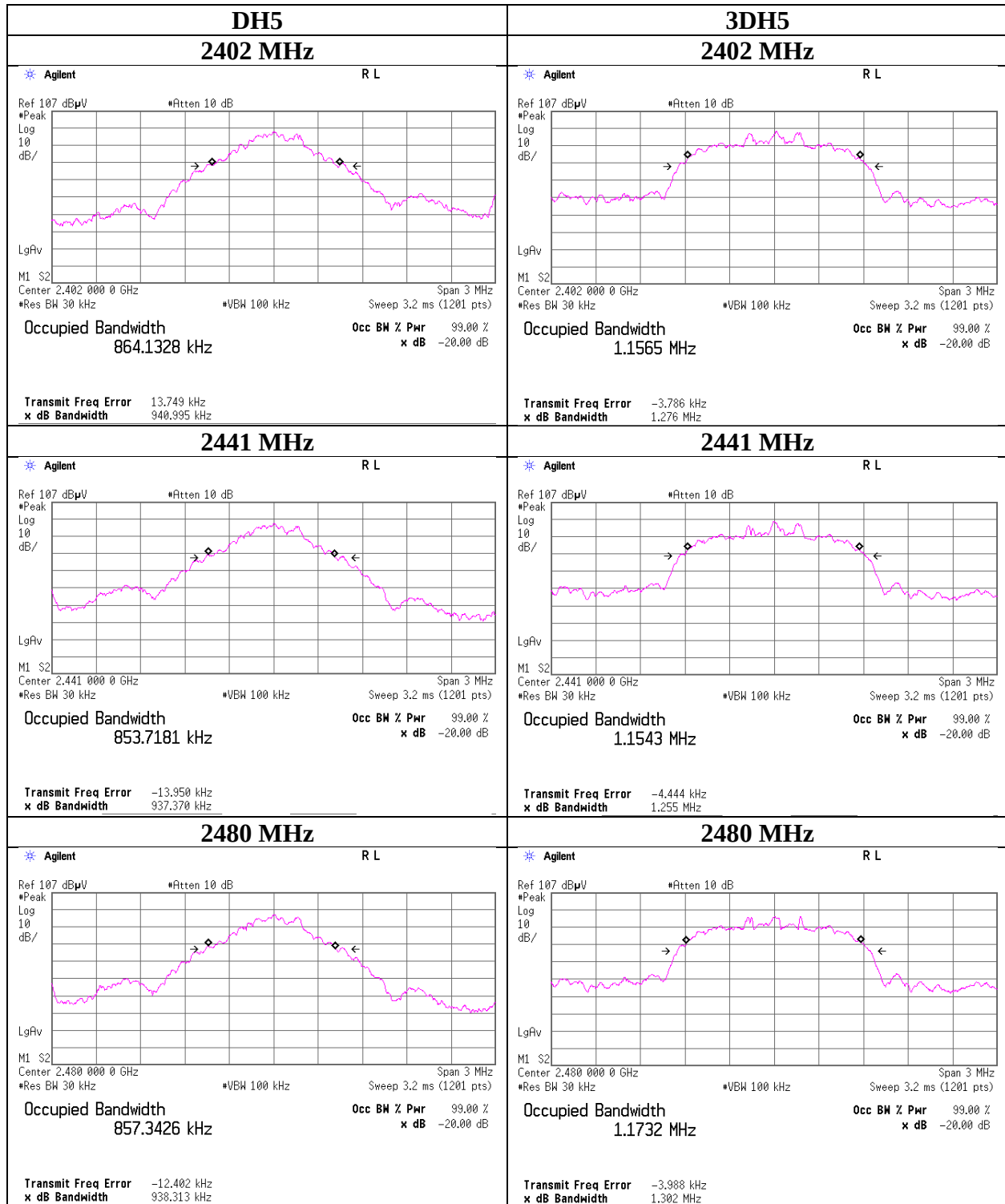
Report No.	12327512S-A
Test place	Shonan EMC Lab. No.5 Shielded Room
Date	May 29, 2018
Temperature / Humidity	25 deg. C / 46 % RH
Engineer	Makoto Hosaka
Mode	Tx, Hopping Off, Tx, Hopping On

Mode	Freq. [MHz]	20dB Bandwidth [MHz]	99% Occupied Bandwidth [kHz]	Carrier Frequency Separation [MHz]	Limit for Carrier Frequency separation [MHz]
DH5	2402.0	0.9410	864.1328	1.000	≥ 0.627
DH5	2441.0	0.9374	853.7181	1.000	≥ 0.625
DH5	2480.0	0.9383	857.3426	1.000	≥ 0.626
DH5	Hopping On	-	78.5938	-	-
3DH5	2402.0	1.276	1156.5	1.000	≥ 0.850
3DH5	2441.0	1.255	1154.3	1.000	≥ 0.837
3DH5	2480.0	1.302	1173.2	1.000	≥ 0.868
3DH5	Hopping On	-	78.7039	-	-

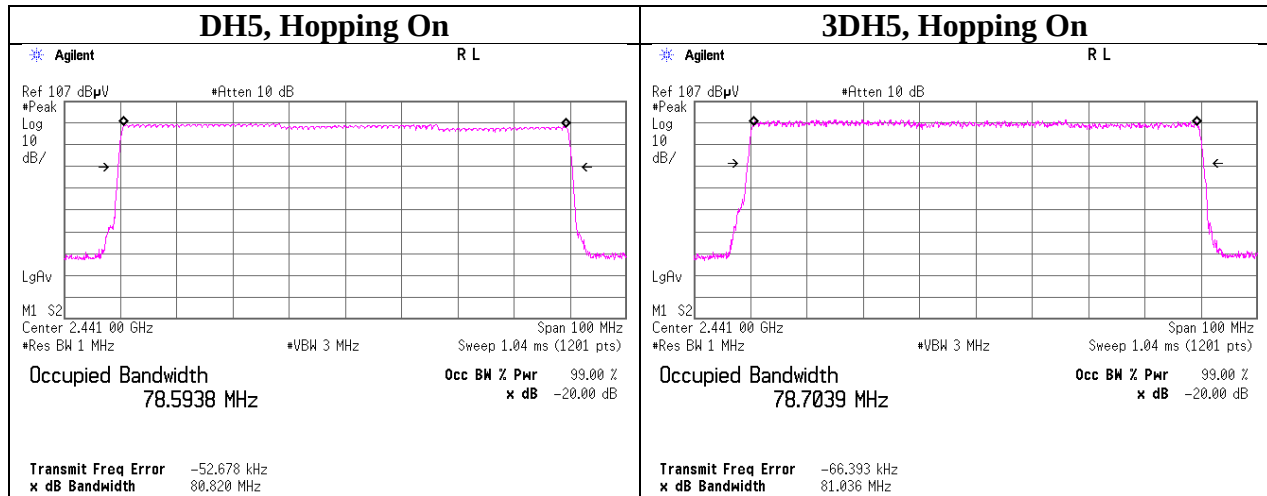
Limit: Two-thirds of 20dB Bandwidth or 25kHz (whichever is greater).

No limit applies to 20dB Bandwidth.

20dB Bandwidth and 99% Occupied Bandwidth



20dB Bandwidth and 99% Occupied Bandwidth



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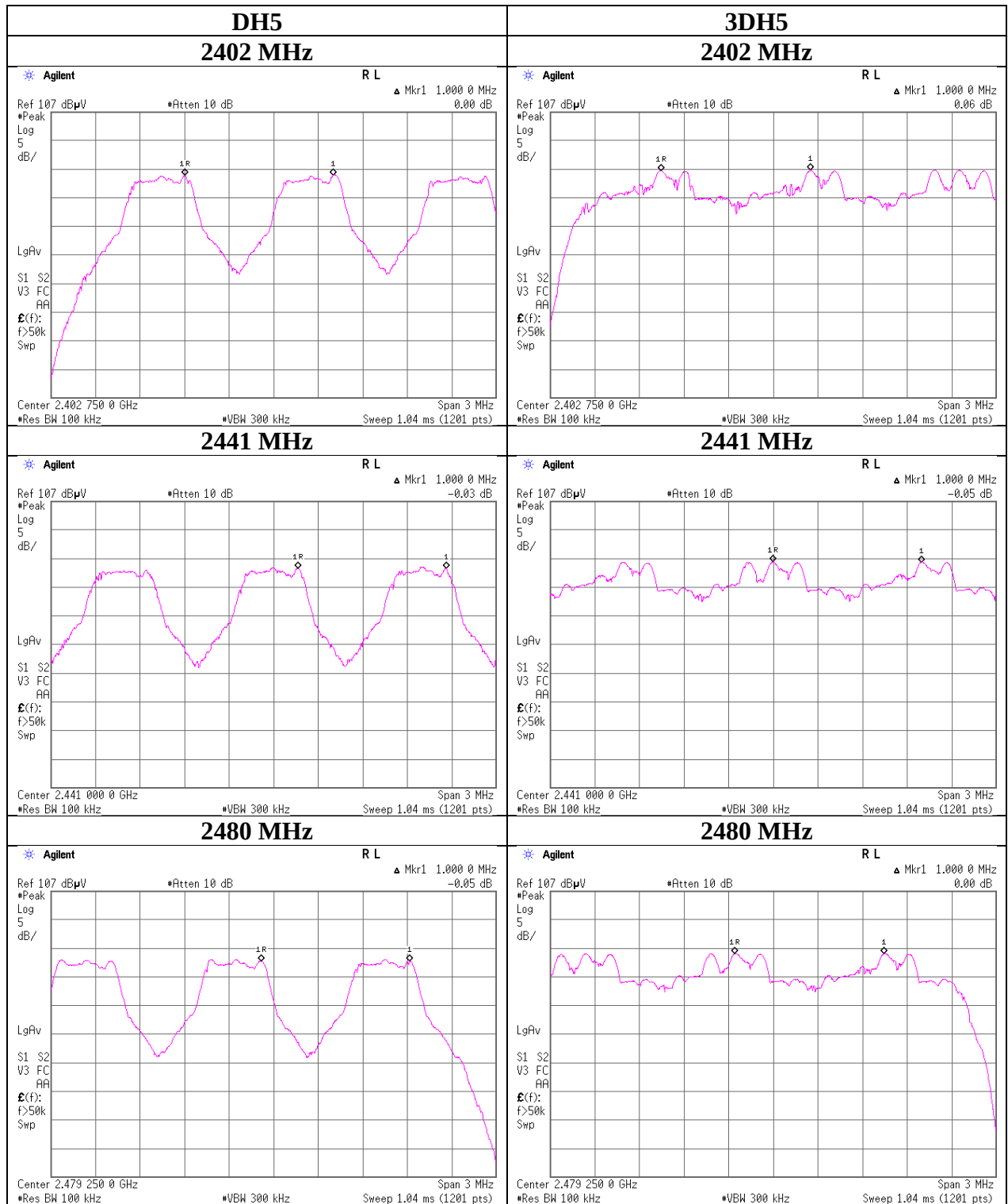
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Carrier Frequency Separation



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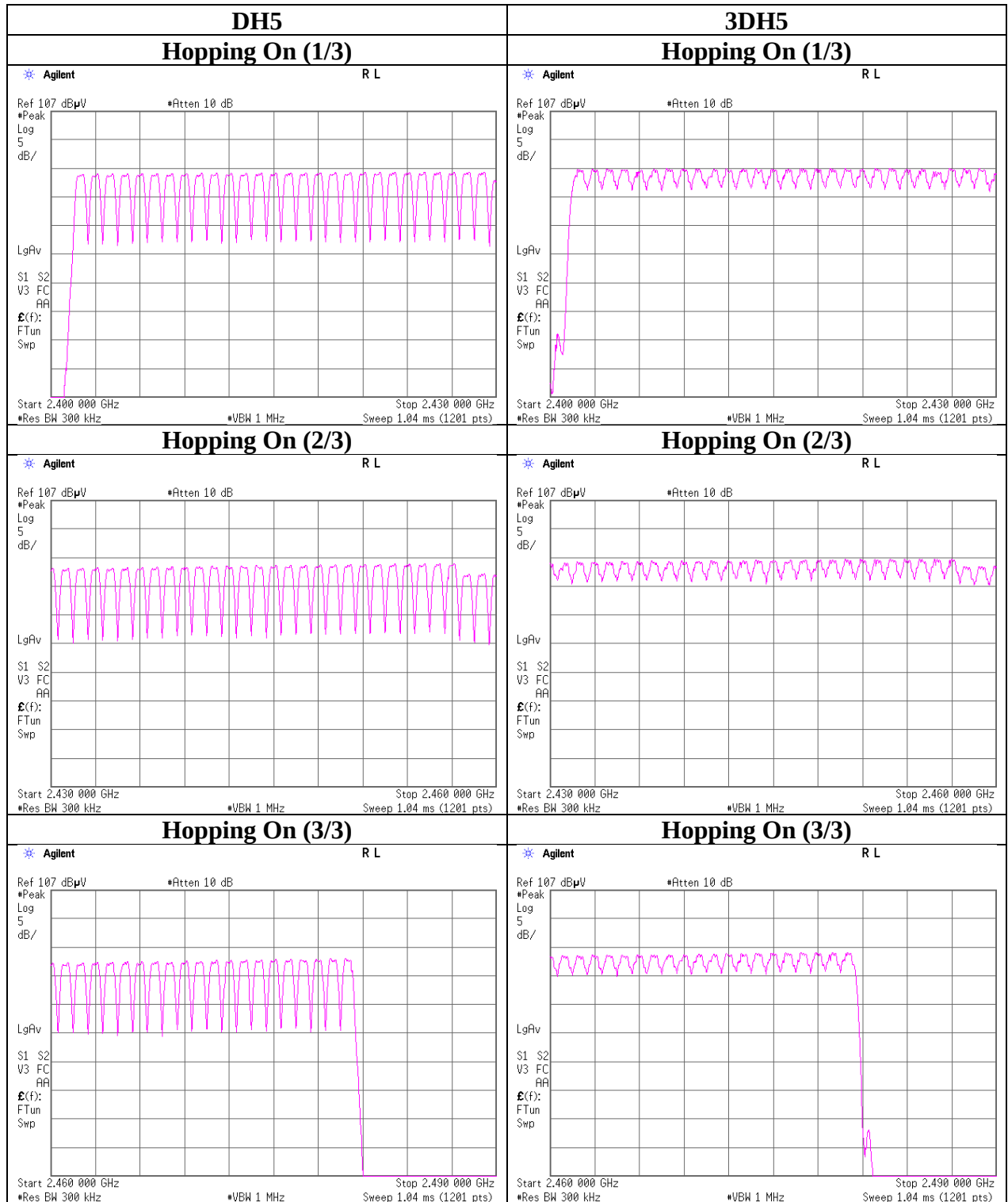
Number of Hopping Frequency

Report No. 12327512S-A
Test place Shonan EMC Lab. No.5 Shielded Room
Date May 29, 2018
Temperature / Humidity 25 deg. C / 46 % RH
Engineer Makoto Hosaka
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. 12327512S-A
Test place Shonan EMC Lab. No.5 Shielded Room
Date May 29, 2018
Temperature / Humidity 25 deg. C / 46 % RH
Engineer Makoto Hosaka
Mode Tx, Hopping On

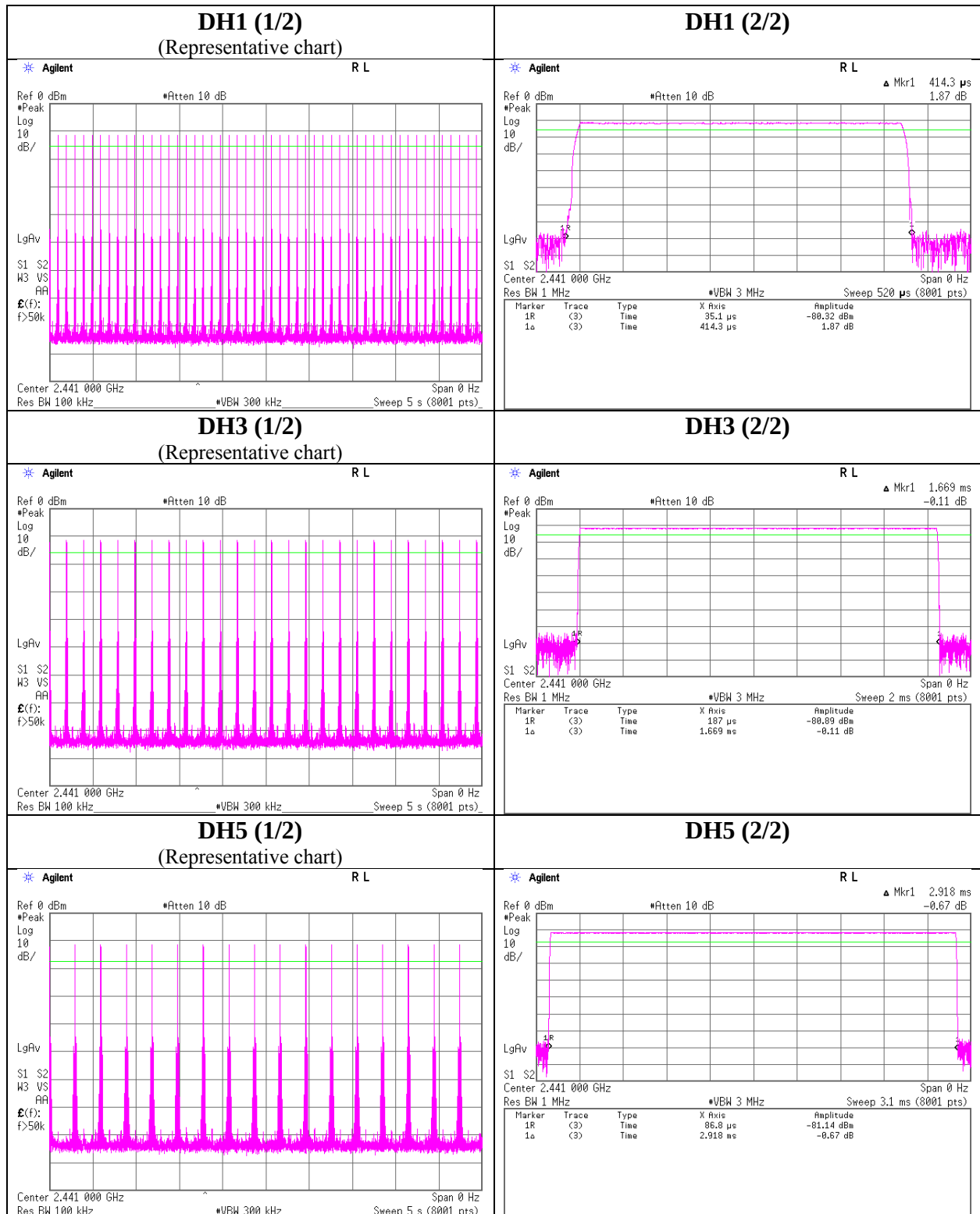
Mode	Number of transmission in a 31.6(79 Hopping x 0.4) second period				Length of transmission [msec]	Result [msec]	Limit [msec]
DH1	51.0 times	/	5 sec.	x 31.6 sec. = 323 times	0.414	134	400
DH3	26.0 times	/	5 sec.	x 31.6 sec. = 165 times	1.669	275	400
DH5	17.0 times	/	5 sec.	x 31.6 sec. = 108 times	2.918	315	400
3DH1	51.0 times	/	5 sec.	x 31.6 sec. = 323 times	0.433	140	400
3DH3	26.0 times	/	5 sec.	x 31.6 sec. = 165 times	1.682	278	400
3DH5	17.0 times	/	5 sec.	x 31.6 sec. = 108 times	2.932	317	400

Sample Calculation

Result = Number of transmission x Length of transmission

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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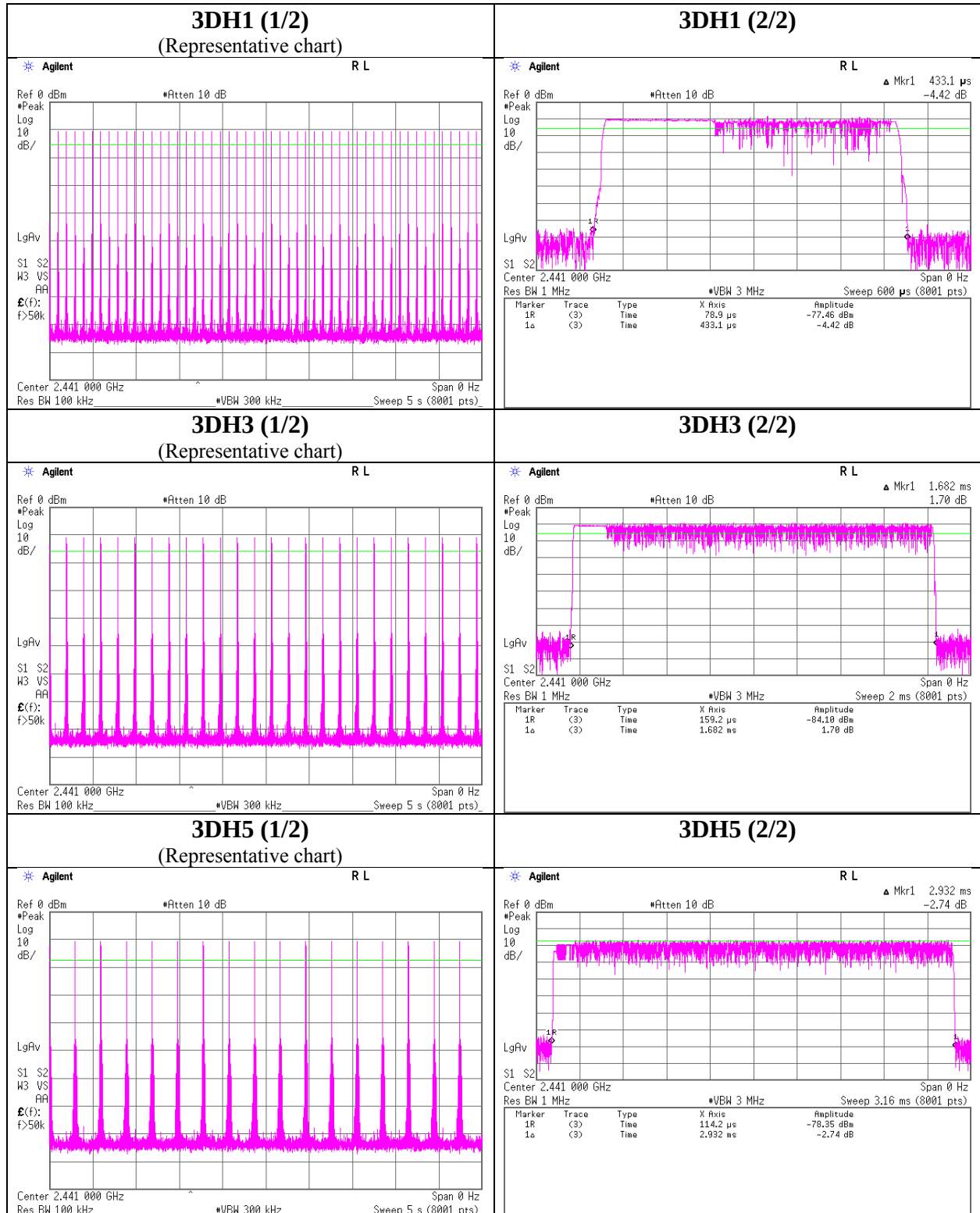
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Dwell time



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Maximum Peak Output Power

Report No. 12327512S-A
Test place Shonan EMC Lab. No.5 Shielded Room
Date May 29, 2018
Temperature / Humidity 25 deg. C / 46 % RH
Engineer Makoto Hosaka
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 [dB]	Antenna Gain [dBi]	Result		Limit		Margin [dB]
					[dBm]	[mW]	[dBm]	[mW]			[dBm]	[mW]	[dBm]	[mW]	
DH5	2402.0	-10.31	1.22	9.86	0.77	1.19	20.96	125	20.19	2.85	3.62	2.30	36.02	4000	32.40
DH5	2441.0	-10.78	1.22	9.86	0.30	1.07	20.96	125	20.66	2.85	3.15	2.07	36.02	4000	32.87
DH5	2480.0	-11.21	1.23	9.85	-0.13	0.97	20.96	125	21.09	2.85	2.72	1.87	36.02	4000	33.30
2DH5	2402.0	-7.90	1.22	9.86	3.18	2.08	20.96	125	17.78	2.85	6.03	4.01	36.02	4000	29.99
2DH5	2441.0	-8.25	1.22	9.86	2.83	1.92	20.96	125	18.13	2.85	5.68	3.70	36.02	4000	30.34
2DH5	2480.0	-8.62	1.23	9.85	2.46	1.76	20.96	125	18.50	2.85	5.31	3.40	36.02	4000	30.71
3DH5	2402.0	-7.18	1.22	9.86	3.90	2.45	20.96	125	17.06	2.85	6.75	4.73	36.02	4000	29.27
3DH5	2441.0	-7.67	1.22	9.86	3.41	2.19	20.96	125	17.55	2.85	6.26	4.23	36.02	4000	29.76
3DH5	2480.0	-7.89	1.23	9.85	3.19	2.08	20.96	125	17.77	2.85	6.04	4.02	36.02	4000	29.98

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.	12327512S-A
Test place	Shonan EMC Lab. No.5 Shielded Room
Date	May 29, 2018
Temperature / Humidity	25 deg. C / 46 % RH
Engineer	Makoto Hosaka
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	-12.21	1.22	9.86	-1.13	0.77	1.09	-0.04	0.99
DH5	2441.0	-12.74	1.22	9.86	-1.66	0.68	1.09	-0.57	0.88
DH5	2480.0	-13.13	1.23	9.85	-2.05	0.62	1.09	-0.96	0.80
2DH5	2402.0	-12.49	1.22	9.86	-1.41	0.72	1.07	-0.34	0.92
2DH5	2441.0	-12.93	1.22	9.86	-1.85	0.65	1.07	-0.78	0.84
2DH5	2480.0	-13.15	1.23	9.85	-2.07	0.62	1.07	-1.00	0.79
3DH5	2402.0	-12.49	1.22	9.86	-1.41	0.72	1.06	-0.35	0.92
3DH5	2441.0	-12.93	1.22	9.86	-1.85	0.65	1.06	-0.79	0.83
3DH5	2480.0	-13.15	1.23	9.85	-2.07	0.62	1.06	-1.01	0.79

Sample Calculation:

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

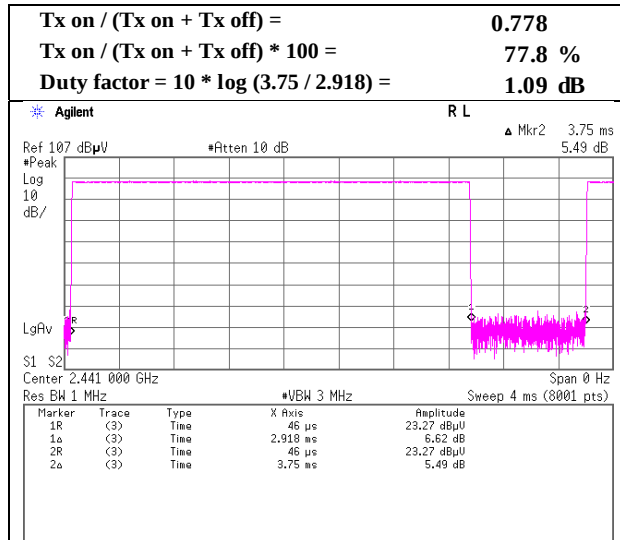
Result (Burst power average) = Time average + Duty factor

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

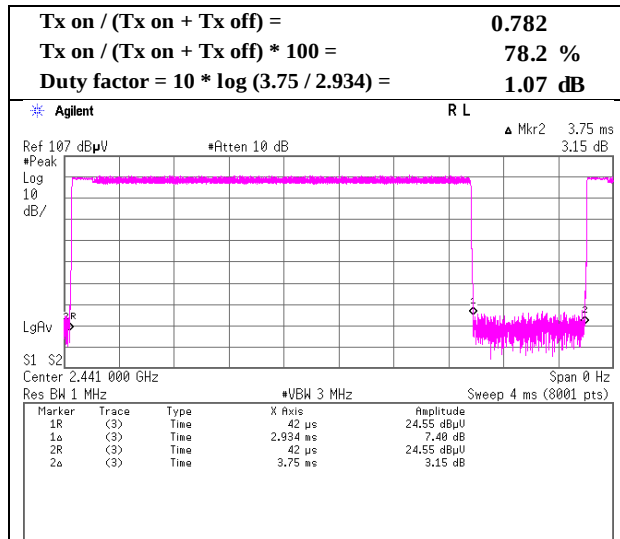
Burst Rate Confirmation

Report No. 12327512S-A
Test place Shonan EMC Lab. No.5 Shielded Room
Date May 29, 2018
Temperature / Humidity 25 deg. C / 46 % RH
Engineer Makoto Hosaka
Mode Tx, Hopping Off

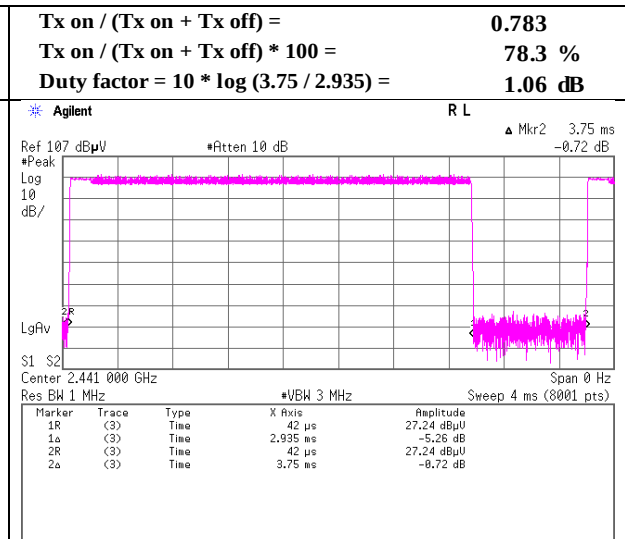
DH5



2DH5



3DH5



Radiated Spurious Emission

Report No.	12327512S-A		
Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	No.1	No.1	No.1
Date	May 21, 2016	May 20, 2016	May 21, 2016
Temperature / Humidity	25 deg. C / 31 % RH	22 deg. C / 45 % RH	23 deg. C / 35 % RH
Engineer	Kazuya Noda (30 MHz -1 GHz)	Yasumasa Owaki (1 GHz - 13 GHz)	Kazutaka Takeyama (13 GHz - 26.5 GHz)
Mode	Tx, Hopping Off, DH5 2402 MHz		

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	156.002	QP	28.22	14.82	8.89	31.78	0.00	20.15	43.50	23.3	198	247	
Hori.	159.998	QP	28.50	14.94	8.92	31.78	0.00	20.58	43.50	22.9	189	247	
Hori.	327.999	QP	28.86	14.05	7.09	31.77	0.00	18.23	46.00	27.7	100	75	
Hori.	449.414	QP	21.35	16.61	7.69	31.89	0.00	13.76	46.00	32.2	100	359	
Hori.	634.062	QP	21.63	19.37	8.48	32.05	0.00	17.43	46.00	28.5	100	0	
Hori.	883.787	QP	21.19	21.79	9.61	31.43	0.00	21.16	46.00	24.8	100	359	
Hori.	2390.000	PK	44.14	27.14	14.49	36.58	2.33	51.52	73.90	22.3	149	132	
Hori.	2557.980	PK	45.78	27.63	14.65	36.52	2.33	53.87	73.90	20.0	188	159	
Hori.	4804.000	PK	46.93	31.13	7.16	36.88	2.33	50.67	73.90	23.2	114	60	
Hori.	7206.000	PK	44.26	36.35	8.80	37.26	2.33	54.48	73.90	19.4	150	0	
Hori.	9608.000	PK	44.74	38.11	10.36	38.47	2.33	57.07	73.90	16.8	150	0	
Hori.	19220.000	PK	52.13	40.04	11.73	48.16	-9.54	46.20	73.90	27.7	163	103	
Hori.	2390.000	AV	31.66	27.14	14.49	36.58	2.33	39.04	53.90	14.8	149	132	
Hori.	2557.980	AV	35.17	27.63	14.65	36.52	2.33	43.26	53.90	10.6	188	159	
Hori.	4804.000	AV	36.80	31.13	7.16	36.88	2.33	40.54	53.90	13.3	114	60	
Hori.	7206.000	AV	32.71	36.35	8.80	37.26	2.33	42.93	53.90	10.9	150	0	
Hori.	9608.000	AV	32.66	38.11	10.36	38.47	2.33	44.99	53.90	8.9	150	0	
Hori.	19220.000	AV	47.35	40.04	11.73	48.16	-9.54	41.42	53.90	12.4	163	103	
Vert.	181.848	QP	21.62	16.11	8.96	31.77	0.00	14.92	43.50	28.5	100	359	
Vert.	605.980	QP	23.67	19.19	8.35	32.01	0.00	19.20	46.00	26.8	100	121	
Vert.	2390.000	PK	44.29	27.14	14.49	36.58	2.33	51.67	73.90	22.2	137	131	
Vert.	2558.039	PK	44.69	27.63	14.65	36.52	2.33	52.78	73.90	21.1	151	99	
Vert.	4804.000	PK	47.14	31.13	7.16	36.88	2.33	50.88	73.90	23.0	138	334	
Vert.	7206.000	PK	44.27	36.35	8.80	37.26	2.33	54.49	73.90	19.4	150	0	
Vert.	9608.000	PK	45.05	38.11	10.36	38.47	2.33	57.38	73.90	16.5	150	0	
Vert.	19220.010	PK	51.74	40.04	11.73	48.16	-9.54	45.81	73.90	28.0	163	267	
Vert.	2390.000	AV	30.23	27.14	14.49	36.58	2.33	37.61	53.90	16.2	137	131	
Vert.	2558.039	AV	33.19	27.63	14.65	36.52	2.33	41.28	53.90	12.6	151	99	
Vert.	4804.000	AV	36.67	31.13	7.16	36.88	2.33	40.41	53.90	13.4	138	334	
Vert.	7206.000	AV	33.22	36.35	8.80	37.26	2.33	43.44	53.90	10.4	150	0	
Vert.	9608.000	AV	33.18	38.11	10.36	38.47	2.33	45.51	53.90	8.3	150	0	
Vert.	19220.010	AV	45.78	40.04	11.73	48.16	-9.54	39.85	53.90	14.0	163	267	

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

Distance factor : 1 GHz - 13 GHz : 20log (3.92 m / 3.0 m) = 2.33 dB

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

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

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2402.000	PK	89.41	27.18	14.50	36.57	2.33	96.85	-	-	Carrier
Hori.	2400.000	PK	43.05	27.17	14.50	36.58	2.33	50.47	76.85	26.4	
Vert.	2402.000	PK	86.18	27.18	14.50	36.57	2.33	93.62	-	-	Carrier
Vert.	2400.000	PK	40.46	27.17	14.50	36.58	2.33	47.88	73.62	25.7	

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

Distance factor : 1 GHz - 13 GHz : 20log (3.92 m / 3.0 m) = 2.33 dB

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

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Shonan EMC Lab.

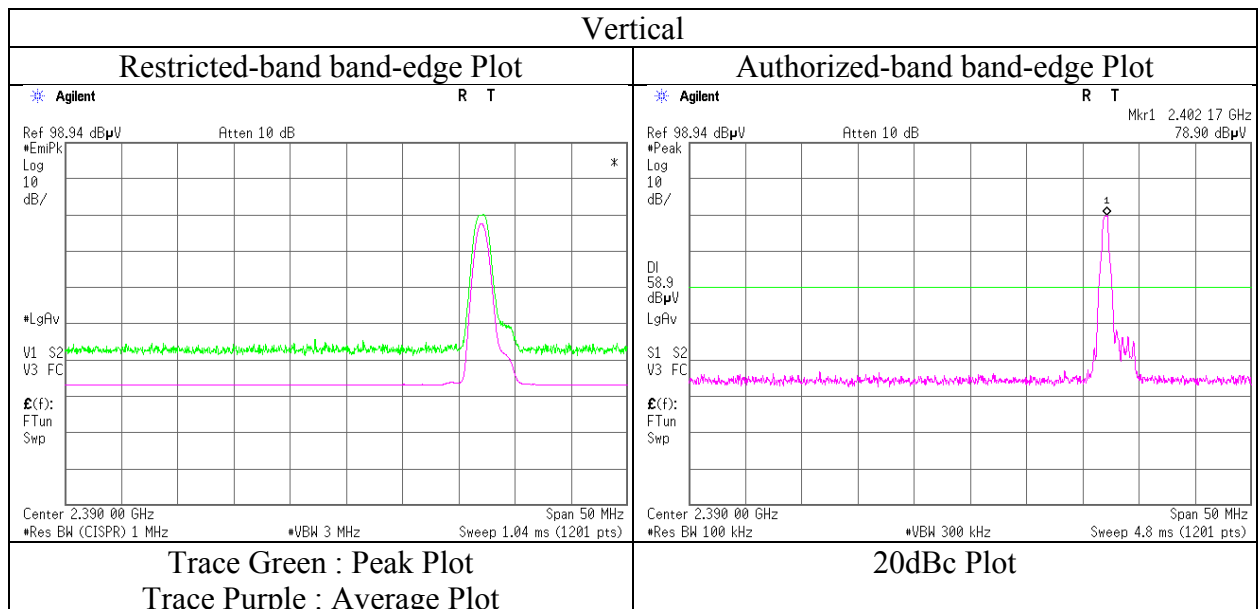
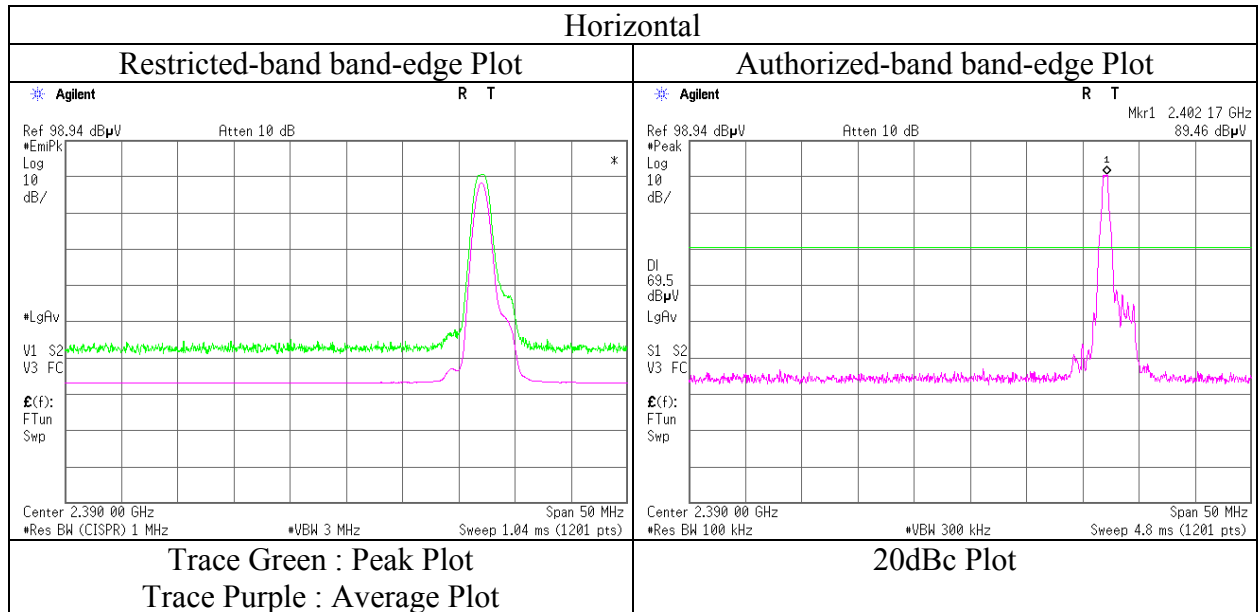
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

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Radiated Spurious Emission (Reference Plot for band-edge)

Report No.	12327512S-A
Test place	Shonan EMC Lab.
Semi Anechoic Chamber	No.1
Date	May 20, 2016
Temperature / Humidity	22 deg. C / 45 % RH
Engineer	Yasumasa Owaki
Mode	Tx, Hopping Off, DH5 2402 MHz



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

Radiated Spurious Emission

Report No.	12327512S-A		
Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	No.1	No.1	No.1
Date	May 21, 2016	May 20, 2016	May 21, 2016
Temperature / Humidity	25 deg. C / 31 % RH	22 deg. C / 45 % RH	23 deg. C / 35 % RH
Engineer	Kazuya Noda	Yasumasa Owaki	Kazutaka Takeyama
	(30 MHz -1 GHz)	(1 GHz - 13 GHz)	(13 GHz - 26.5 GHz)
Mode	Tx, Hopping Off, DH5 2441 MHz		

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	156.001	QP	27.93	14.82	8.89	31.78	0.00	19.86	43.50	23.6	187	58	
Hori.	159.997	QP	29.55	14.94	8.92	31.78	0.00	21.63	43.50	21.8	204	245	
Hori.	260.001	QP	27.37	12.05	6.48	31.75	0.00	14.15	46.00	31.8	115	17	
Hori.	336.001	QP	28.64	14.22	7.15	31.77	0.00	18.24	46.00	27.7	100	236	
Hori.	589.781	QP	21.44	19.00	8.29	32.01	0.00	16.72	46.00	29.2	100	359	
Hori.	907.157	QP	20.93	22.02	9.69	31.31	0.00	21.33	46.00	24.6	100	0	
Hori.	2596.973	PK	45.68	27.72	14.69	36.53	2.33	53.89	73.90	20.0	163	151	
Hori.	4882.000	PK	46.76	31.31	7.25	36.91	2.33	50.74	73.90	23.1	139	53	
Hori.	7323.000	PK	44.42	36.51	8.93	37.44	2.33	54.75	73.90	19.1	150	0	
Hori.	9764.000	PK	44.72	38.37	10.37	38.66	2.33	57.13	73.90	16.7	150	0	
Hori.	19524.000	PK	52.87	40.02	11.89	47.70	-9.54	47.54	73.90	26.3	170	53	
Hori.	2596.973	AV	35.38	27.72	14.69	36.53	2.33	43.59	53.90	10.3	163	151	
Hori.	4882.000	AV	35.75	31.31	7.25	36.91	2.33	39.73	53.90	14.1	139	53	
Hori.	7323.000	AV	32.26	36.51	8.93	37.44	2.33	42.59	53.90	11.3	150	0	
Hori.	9764.000	AV	32.64	38.37	10.37	38.66	2.33	45.05	53.90	8.8	150	0	
Hori.	19524.000	AV	48.00	40.02	11.89	47.70	-9.54	42.67	53.90	11.2	170	53	
Vert.	192.022	QP	21.63	16.49	9.00	31.77	0.00	15.35	43.50	28.1	100	0	
Vert.	620.781	QP	21.67	19.29	8.41	32.03	0.00	17.34	46.00	28.6	100	359	
Vert.	2597.038	PK	45.59	27.72	14.69	36.53	2.33	53.80	73.90	20.1	130	1	
Vert.	4882.000	PK	46.71	31.31	7.25	36.91	2.33	50.69	73.90	23.2	147	333	
Vert.	7323.000	PK	44.64	36.51	8.93	37.44	2.33	54.97	73.90	18.9	150	0	
Vert.	9764.000	PK	44.40	38.37	10.37	38.66	2.33	56.81	73.90	17.0	150	0	
Vert.	19524.000	PK	51.81	40.02	11.89	47.70	-9.54	46.48	73.90	27.4	156	263	
Vert.	2597.038	AV	35.06	27.72	14.69	36.53	2.33	43.27	53.90	10.6	130	1	
Vert.	4882.000	AV	37.10	31.31	7.25	36.91	2.33	41.08	53.90	12.8	147	333	
Vert.	7323.000	AV	32.11	36.51	8.93	37.44	2.33	42.44	53.90	11.4	150	0	
Vert.	9764.000	AV	32.37	38.37	10.37	38.66	2.33	44.78	53.90	9.1	150	0	
Vert.	19524.000	AV	45.18	40.02	11.89	47.70	-9.54	39.85	53.90	14.0	156	263	

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

Distance factor : 1 GHz - 13 GHz : $20\log(3.92\text{ m} / 3.0\text{ m}) = 2.33\text{ dB}$

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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Radiated Spurious Emission

Report No.	12327512S-A		
Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	No.1	No.1	No.1
Date	May 21, 2016	May 20, 2016	May 21, 2016
Temperature / Humidity	25 deg. C / 31 % RH	22 deg. C / 45 % RH	23 deg. C / 35 % RH
Engineer	Kazuya Noda	Yasumasa Owaki	Kazutaka Takeyama
	(30 MHz -1 GHz)	(1 GHz - 13 GHz)	(13 GHz - 26.5 GHz)
Mode	Tx, Hopping Off, DH5 2480 MHz		

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	155.999	QP	27.78	14.82	8.89	31.78	0.00	19.71	43.50	23.7	192	53	
Hori.	160.004	QP	32.06	14.94	8.92	31.78	0.00	24.14	43.50	19.3	191	242	
Hori.	336.003	QP	28.67	14.22	7.15	31.77	0.00	18.27	46.00	27.7	100	232	
Hori.	627.614	QP	21.62	19.33	8.45	32.04	0.00	17.36	46.00	28.6	100	359	
Hori.	903.865	QP	21.55	22.01	9.68	31.33	0.00	21.91	46.00	24.0	100	0	
Hori.	2483.500	PK	44.53	27.45	14.59	36.52	2.33	52.38	73.90	21.5	113	141	
Hori.	2636.004	PK	45.85	27.81	14.72	36.53	2.33	54.18	73.90	19.7	175	151	
Hori.	4960.000	PK	45.98	31.48	7.35	36.93	2.33	50.21	73.90	23.6	145	272	
Hori.	7440.000	PK	44.41	36.68	9.07	37.63	2.33	54.86	73.90	19.0	150	0	
Hori.	9920.000	PK	44.65	38.63	10.38	38.84	2.33	57.15	73.90	16.7	150	0	
Hori.	19836.000	PK	53.60	39.99	12.01	47.72	-9.54	48.34	73.90	25.5	173	76	
Hori.	2483.500	AV	32.31	27.45	14.59	36.52	2.33	40.16	53.90	13.7	113	141	
Hori.	2636.004	AV	35.69	27.81	14.72	36.53	2.33	44.02	53.90	9.8	175	151	
Hori.	4960.000	AV	35.13	31.48	7.35	36.93	2.33	39.36	53.90	14.5	145	272	
Hori.	7440.000	AV	32.32	36.68	9.07	37.63	2.33	42.77	53.90	11.1	150	0	
Hori.	9920.000	AV	32.28	38.63	10.38	38.84	2.33	44.78	53.90	9.1	150	0	
Hori.	19836.000	AV	48.57	39.99	12.01	47.72	-9.54	43.31	53.90	10.5	173	76	
Vert.	193.506	QP	21.34	16.55	9.01	31.77	0.00	15.13	43.50	28.3	100	359	
Vert.	375.792	QP	21.30	15.07	7.36	31.80	0.00	11.93	46.00	34.0	100	0	
Vert.	619.991	QP	24.06	19.28	8.41	32.03	0.00	19.72	46.00	26.2	100	109	
Vert.	2483.500	PK	44.41	27.45	14.59	36.52	2.33	52.26	73.90	21.6	108	134	
Vert.	2635.976	PK	43.97	27.81	14.72	36.53	2.33	52.30	73.90	21.6	148	344	
Vert.	4960.000	PK	46.69	31.48	7.35	36.93	2.33	50.92	73.90	22.9	151	182	
Vert.	7440.000	PK	44.48	36.68	9.07	37.63	2.33	54.93	73.90	18.9	150	0	
Vert.	9920.000	PK	44.50	38.63	10.38	38.84	2.33	57.00	73.90	16.9	150	0	
Vert.	19836.010	PK	50.28	39.99	12.01	47.72	-9.54	45.02	73.90	28.8	162	86	
Vert.	2483.500	AV	32.36	27.45	14.59	36.52	2.33	40.21	53.90	13.6	108	134	
Vert.	2635.976	AV	31.94	27.81	14.72	36.53	2.33	40.27	53.90	13.6	148	344	
Vert.	4960.000	AV	36.22	31.48	7.35	36.93	2.33	40.45	53.90	13.4	151	182	
Vert.	7440.000	AV	32.33	36.68	9.07	37.63	2.33	42.78	53.90	11.1	150	0	
Vert.	9920.000	AV	32.29	38.63	10.38	38.84	2.33	44.79	53.90	9.1	150	0	
Vert.	19836.010	AV	43.97	39.99	12.01	47.72	-9.54	38.71	53.90	15.1	162	86	

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

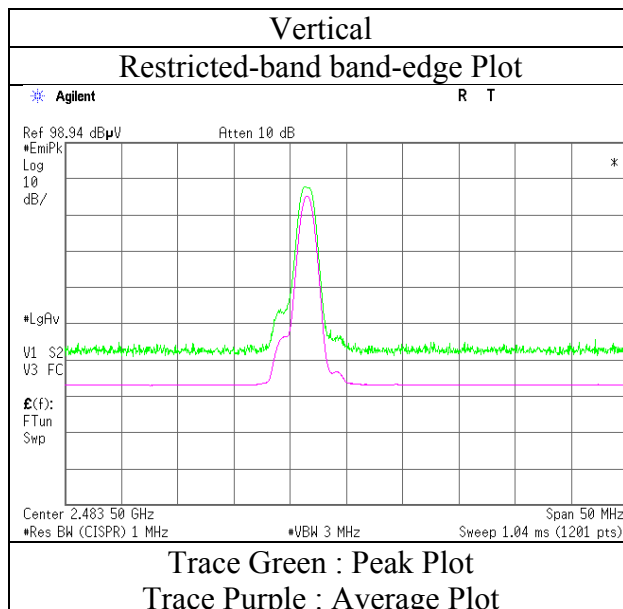
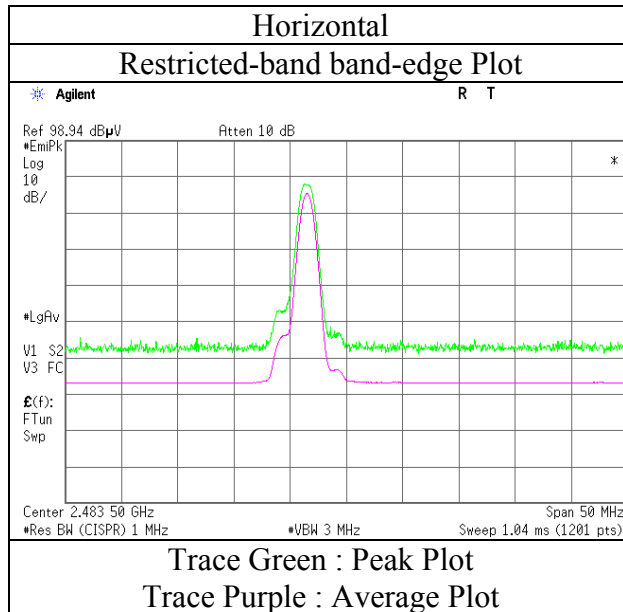
Distance factor : 1 GHz - 13 GHz : $20\log(3.92\text{ m} / 3.0\text{ m}) = 2.33\text{ dB}$

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

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

Radiated Spurious Emission (Reference Plot for band-edge)

Report No.	12327512S-A
Test place	Shonan EMC Lab.
Semi Anechoic Chamber	No.1
Date	May 20, 2016
Temperature / Humidity	22 deg. C / 45 % RH
Engineer	Yasumasa Owaki
Mode	Tx, Hopping Off, DH5 2480 MHz



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

Radiated Spurious Emission

Report No.	12327512S-A		
Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	No.1	No.1	No.1
Date	May 21, 2016	May 20, 2016	May 21, 2016
Temperature / Humidity	25 deg. C / 31 % RH	22 deg. C / 45 % RH	23 deg. C / 35 % RH
Engineer	Kazuya Noda	Yasumasa Owaki	Kazutaka Takeyama
	(30 MHz -1 GHz)	(1 GHz - 13 GHz)	(13 GHz - 26.5 GHz)
Mode	Tx, Hopping Off, 3DH5 2402 MHz		

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	152.000	QP	24.83	14.70	8.84	31.78	0.00	16.59	43.50	26.9	191	51	
Hori.	160.002	QP	33.53	14.94	8.92	31.78	0.00	25.61	43.50	17.8	191	241	
Hori.	336.000	QP	27.25	14.22	7.15	31.77	0.00	16.85	46.00	29.1	100	57	
Hori.	656.846	QP	21.29	19.52	8.59	32.06	0.00	17.34	46.00	28.6	100	359	
Hori.	752.249	QP	21.70	20.28	9.02	31.94	0.00	19.06	46.00	26.9	100	0	
Hori.	2390.000	PK	44.22	27.14	14.49	36.58	2.33	51.60	73.90	22.3	114	148	
Hori.	2557.980	PK	47.93	27.63	14.65	36.52	2.33	56.02	73.90	17.8	154	146	
Hori.	4804.000	PK	47.26	31.13	7.16	36.88	2.33	51.00	73.90	22.9	148	261	
Hori.	7206.000	PK	44.94	36.35	8.80	37.26	2.33	55.16	73.90	18.7	102	288	
Hori.	19212.010	PK	52.51	40.04	11.72	48.18	-9.54	46.55	73.90	27.3	168	52	
Hori.	2390.000	AV	31.77	27.14	14.49	36.58	2.33	39.15	53.90	14.7	114	148	
Hori.	2557.980	AV	38.45	27.63	14.65	36.52	2.33	46.54	53.90	7.3	154	146	
Hori.	4804.000	AV	37.43	31.13	7.16	36.88	2.33	41.17	53.90	12.7	148	261	
Hori.	7206.000	AV	32.73	36.35	8.80	37.26	2.33	42.95	53.90	10.9	102	288	
Hori.	19212.010	AV	47.29	40.04	11.72	48.18	-9.54	41.33	53.90	12.5	168	52	
Vert.	160.002	QP	29.05	14.94	8.92	31.78	0.00	21.13	43.50	22.3	100	134	
Vert.	496.001	QP	25.75	17.58	7.89	31.89	0.00	19.33	46.00	26.6	100	353	
Vert.	607.999	QP	25.58	19.20	8.36	32.01	0.00	21.13	46.00	24.8	100	119	
Vert.	918.059	QP	21.57	22.06	9.72	31.23	0.00	22.12	46.00	23.8	100	359	
Vert.	2390.000	PK	44.86	27.14	14.49	36.58	2.33	52.24	73.90	21.6	102	252	
Vert.	2558.029	PK	47.14	27.63	14.65	36.52	2.33	55.23	73.90	18.6	139	208	
Vert.	4804.000	PK	48.42	31.13	7.16	36.88	2.33	52.16	73.90	21.7	184	1	
Vert.	7206.000	PK	45.67	36.35	8.80	37.26	2.33	55.89	73.90	18.0	133	352	
Vert.	9608.000	PK	44.81	38.11	10.36	38.47	2.33	57.14	73.90	16.7	150	0	
Vert.	9608.000	PK	44.32	38.11	10.36	38.47	2.33	56.65	73.90	17.2	150	0	
Vert.	19212.010	PK	50.72	40.04	11.72	48.18	-9.54	44.76	73.90	29.1	165	106	
Vert.	2390.000	AV	31.63	27.14	14.49	36.58	2.33	39.01	53.90	14.8	102	252	
Vert.	2558.029	AV	38.26	27.63	14.65	36.52	2.33	46.35	53.90	7.5	139	208	
Vert.	4804.000	AV	38.13	31.13	7.16	36.88	2.33	41.87	53.90	12.0	184	1	
Vert.	7206.000	AV	32.79	36.35	8.80	37.26	2.33	43.01	53.90	10.8	133	352	
Vert.	9608.000	AV	31.88	38.11	10.36	38.47	2.33	44.21	53.90	9.6	150	0	
Vert.	9608.000	AV	31.95	38.11	10.36	38.47	2.33	44.28	53.90	9.6	150	0	
Vert.	19212.010	AV	45.11	40.04	11.72	48.18	-9.54	39.15	53.90	14.7	165	106	

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

Distance factor : 1 GHz - 13 GHz : $20\log(3.92\text{ m} / 3.0\text{ m}) = 2.33\text{ dB}$

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	93.39	27.18	14.50	36.57	2.33	100.83	-	-	Carrier
Hori.	2400.000	PK	45.80	27.17	14.50	36.58	2.33	53.22	80.83	27.6	
Vert.	2402.000	PK	93.78	27.18	14.50	36.57	2.33	101.22	-	-	Carrier
Vert.	2400.000	PK	45.45	27.17	14.50	36.58	2.33	52.87	81.22	28.4	

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

Distance factor : 1 GHz - 13 GHz : $20\log(3.92\text{ m} / 3.0\text{ m}) = 2.33\text{ dB}$

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

UL Japan, Inc.

Shonan EMC Lab.

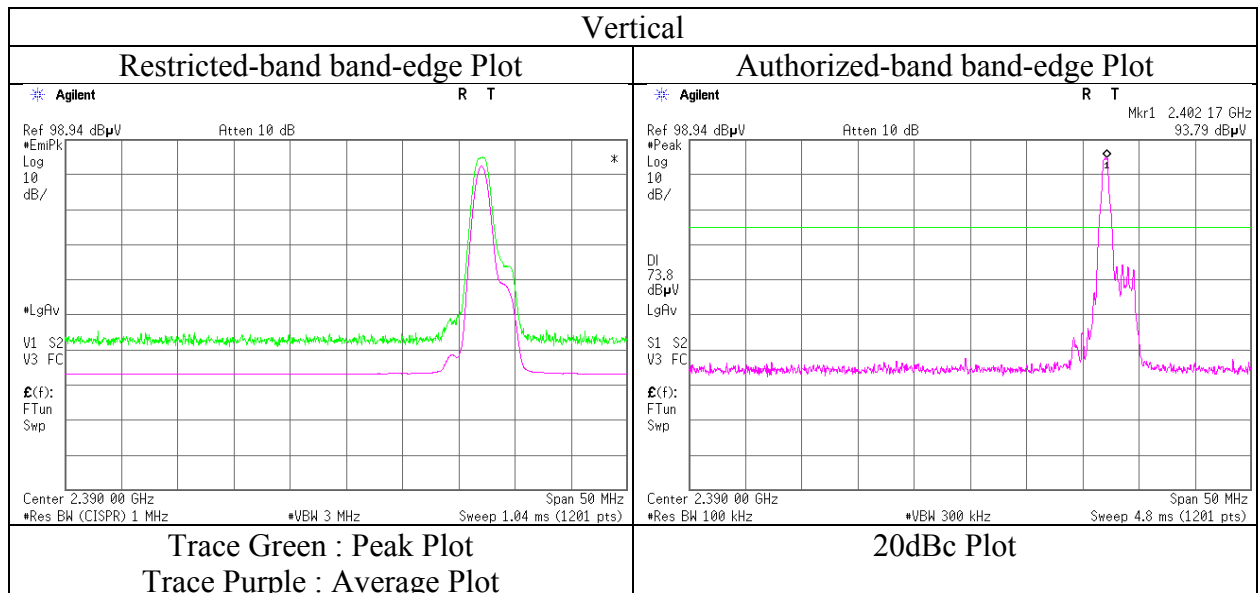
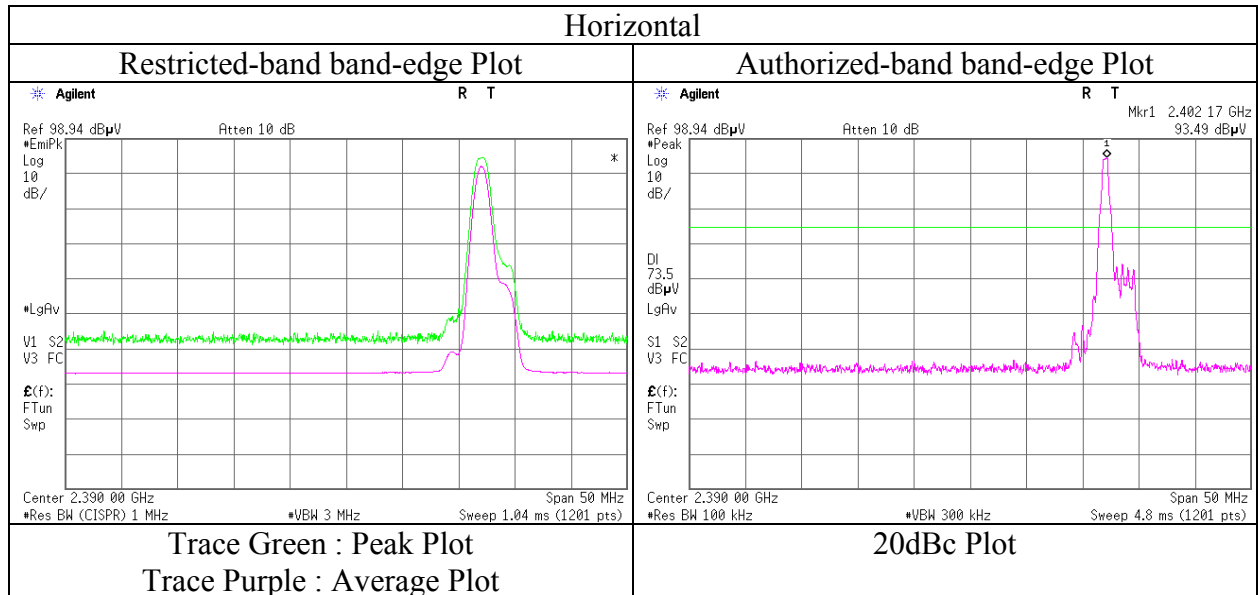
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

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Radiated Spurious Emission (Reference Plot for band-edge)

Report No.	12327512S-A
Test place	Shonan EMC Lab.
Semi Anechoic Chamber	No.1
Date	May 20, 2016
Temperature / Humidity	22 deg. C / 45 % RH
Engineer	Yasumasa Owaki
Mode	Tx, Hopping Off, 3DH5 2402 MHz



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

Radiated Spurious Emission

Report No.	12327512S-A		
Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	No.1	No.1	No.1
Date	May 21, 2016	May 20, 2016	May 21, 2016
Temperature / Humidity	25 deg. C / 31 % RH	22 deg. C / 45 % RH	23 deg. C / 35 % RH
Engineer	Kazuya Noda	Yasumasa Owaki	Kazutaka Takeyama
	(30 MHz -1 GHz)	(1 GHz - 13 GHz)	(13 GHz - 26.5 GHz)
Mode	Tx, Hopping Off, 3DH5 2441 MHz		

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	151.998	QP	27.76	14.70	8.84	31.78	0.00	19.52	43.50	23.9	194	61	
Hori.	160.000	QP	28.86	14.94	8.92	31.78	0.00	20.94	43.50	22.5	190	244	
Hori.	336.002	QP	28.20	14.22	7.15	31.77	0.00	17.80	46.00	28.2	100	67	
Hori.	644.417	QP	21.63	19.44	8.53	32.06	0.00	17.54	46.00	28.4	100	0	
Hori.	913.263	QP	20.82	22.05	9.71	31.26	0.00	21.32	46.00	24.6	100	359	
Hori.	2597.002	PK	46.64	27.72	14.69	36.53	2.33	54.85	73.90	19.0	159	99	
Hori.	4882.000	PK	44.72	31.31	7.25	36.91	2.33	48.70	73.90	25.2	139	251	
Hori.	7323.000	PK	45.12	36.51	8.93	37.44	2.33	55.45	73.90	18.4	150	0	
Hori.	9764.000	PK	44.61	38.37	10.37	38.66	2.33	57.02	73.90	16.8	150	0	
Hori.	19524.010	PK	54.26	40.02	11.89	47.70	-9.54	48.93	73.90	24.9	170	77	
Hori.	2597.002	AV	34.34	27.72	14.69	36.53	2.33	42.55	53.90	11.3	159	99	
Hori.	4882.000	AV	33.43	31.31	7.25	36.91	2.33	37.41	53.90	16.4	139	251	
Hori.	7323.000	AV	32.18	36.51	8.93	37.44	2.33	42.51	53.90	11.3	150	0	
Hori.	9764.000	AV	32.56	38.37	10.37	38.66	2.33	44.97	53.90	8.9	150	0	
Hori.	19524.010	AV	49.92	40.02	11.89	47.70	-9.54	44.59	53.90	9.3	170	77	
Vert.	184.280	QP	21.48	16.20	8.97	31.77	0.00	14.88	43.50	28.6	100	0	
Vert.	516.006	QP	23.18	17.90	7.99	31.94	0.00	17.13	46.00	28.8	100	335	
Vert.	607.019	QP	23.06	19.20	8.35	32.01	0.00	18.60	46.00	27.4	100	127	
Vert.	2596.998	PK	44.58	27.72	14.69	36.53	2.33	52.79	73.90	21.1	150	357	
Vert.	4882.000	PK	45.19	31.31	7.25	36.91	2.33	49.17	73.90	24.7	104	185	
Vert.	7323.000	PK	44.55	36.51	8.93	37.44	2.33	54.88	73.90	19.0	150	0	
Vert.	9764.000	PK	44.42	38.37	10.37	38.66	2.33	56.83	73.90	17.0	150	0	
Vert.	19524.000	PK	52.31	40.02	11.89	47.70	-9.54	46.98	73.90	26.9	162	102	
Vert.	2596.998	AV	31.77	27.72	14.69	36.53	2.33	39.98	53.90	13.9	150	357	
Vert.	4882.000	AV	33.85	31.31	7.25	36.91	2.33	37.83	53.90	16.0	104	185	
Vert.	7323.000	AV	32.23	36.51	8.93	37.44	2.33	42.56	53.90	11.3	150	0	
Vert.	9764.000	AV	32.61	38.37	10.37	38.66	2.33	45.02	53.90	8.8	150	0	
Vert.	19524.000	AV	46.16	40.02	11.89	47.70	-9.54	40.83	53.90	13.0	162	102	

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

Distance factor : 1 GHz - 13 GHz : $20\log(3.92\text{ m} / 3.0\text{ m}) = 2.33\text{ dB}$

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.	12327512S-A		
Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	No.1	No.1	No.1
Date	May 21, 2016	May 20, 2016	May 21, 2016
Temperature / Humidity	25 deg. C / 31 % RH	22 deg. C / 45 % RH	23 deg. C / 35 % RH
Engineer	Kazuya Noda	Yasumasa Owaki	Kazutaka Takeyama
	(30 MHz -1 GHz)	(1 GHz - 13 GHz)	(13 GHz - 26.5 GHz)
Mode	Tx, Hopping Off, 3DH5 2480 MHz		

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	156.000	QP	26.96	14.82	8.89	31.78	0.00	18.89	43.50	24.6	190	62	
Hori.	159.998	QP	29.86	14.94	8.92	31.78	0.00	21.94	43.50	21.5	192	245	
Hori.	336.001	QP	28.62	14.22	7.15	31.77	0.00	18.22	46.00	27.7	100	65	
Hori.	562.211	QP	20.78	18.59	8.19	32.04	0.00	15.52	46.00	30.4	100	359	
Hori.	894.845	QP	20.84	21.93	9.65	31.38	0.00	21.04	46.00	24.9	100	0	
Hori.	2483.500	PK	45.22	27.45	14.59	36.52	2.33	53.07	73.90	20.8	137	53	
Hori.	2636.065	PK	46.17	27.81	14.72	36.53	2.33	54.50	73.90	19.4	149	140	
Hori.	4960.000	PK	45.32	31.48	7.35	36.93	2.33	49.55	73.90	24.3	126	240	
Hori.	7440.000	PK	44.71	36.68	9.07	37.63	2.33	55.16	73.90	18.7	150	0	
Hori.	9920.000	PK	44.88	38.63	10.38	38.84	2.33	57.38	73.90	16.5	150	0	
Hori.	19835.990	PK	51.98	39.99	12.01	47.72	-9.54	46.72	73.90	27.1	174	85	
Hori.	2483.500	AV	32.53	27.45	14.59	36.52	2.33	40.38	53.90	13.5	137	53	
Hori.	2636.065	AV	32.99	27.81	14.72	36.53	2.33	41.32	53.90	12.5	149	140	
Hori.	4960.000	AV	33.72	31.48	7.35	36.93	2.33	37.95	53.90	15.9	126	240	
Hori.	7440.000	AV	32.05	36.68	9.07	37.63	2.33	42.50	53.90	11.4	150	0	
Hori.	9920.000	AV	32.05	38.63	10.38	38.84	2.33	44.55	53.90	9.3	150	0	
Hori.	19835.990	AV	47.08	39.99	12.01	47.72	-9.54	41.82	53.90	12.0	174	85	
Vert.	191.538	QP	21.55	16.47	8.99	31.77	0.00	15.24	43.50	28.2	100	0	
Vert.	604.605	QP	22.59	19.18	8.34	32.01	0.00	18.10	46.00	27.9	100	336	
Vert.	721.011	QP	21.50	19.99	8.91	32.00	0.00	18.40	46.00	27.6	100	359	
Vert.	2483.500	PK	46.06	27.45	14.59	36.52	2.33	53.91	73.90	19.9	165	19	
Vert.	2636.083	PK	45.11	27.81	14.72	36.53	2.33	53.44	73.90	20.4	167	20	
Vert.	4960.000	PK	45.38	31.48	7.35	36.93	2.33	49.61	73.90	24.2	135	196	
Vert.	7440.000	PK	45.57	36.68	9.07	37.63	2.33	56.02	73.90	17.8	150	0	
Vert.	9920.000	PK	44.81	38.63	10.38	38.84	2.33	57.31	73.90	16.5	150	0	
Vert.	19835.990	PK	50.51	39.99	12.01	47.72	-9.54	45.25	73.90	28.6	160	90	
Vert.	2483.500	AV	33.23	27.45	14.59	36.52	2.33	41.08	53.90	12.8	165	19	
Vert.	2636.083	AV	33.18	27.81	14.72	36.53	2.33	41.51	53.90	12.3	167	20	
Vert.	4960.000	AV	33.65	31.48	7.35	36.93	2.33	37.88	53.90	16.0	135	196	
Vert.	7440.000	AV	32.03	36.68	9.07	37.63	2.33	42.48	53.90	11.4	150	0	
Vert.	9920.000	AV	32.04	38.63	10.38	38.84	2.33	44.54	53.90	9.3	150	0	
Vert.	19835.990	AV	44.08	39.99	12.01	47.72	-9.54	38.82	53.90	15.0	160	90	

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

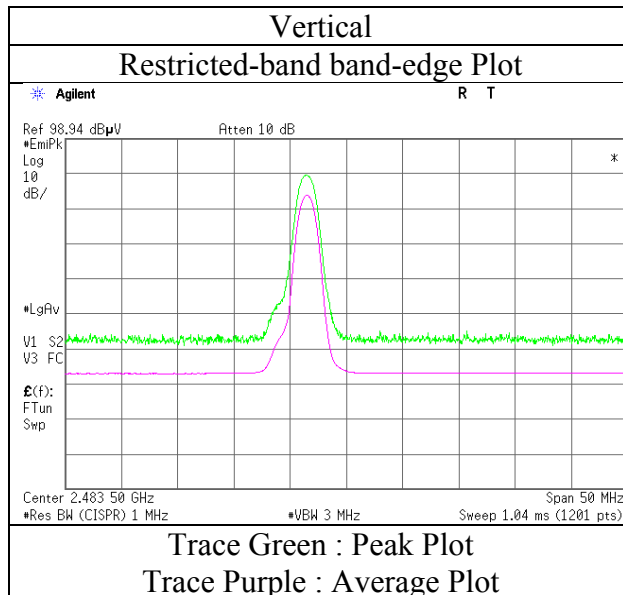
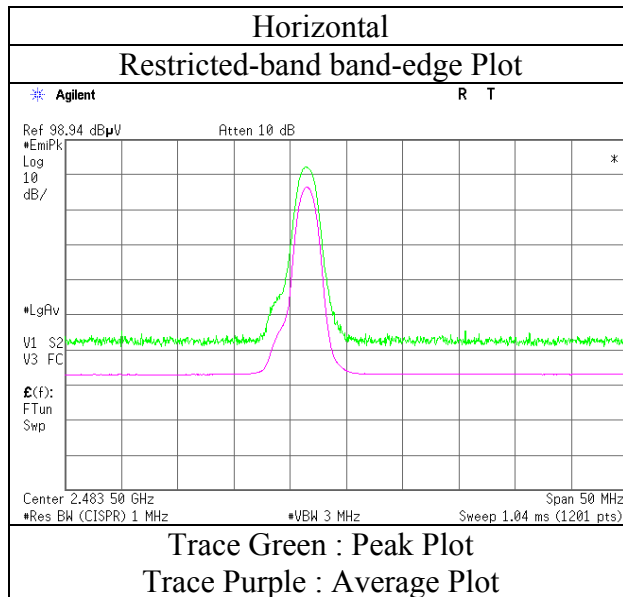
Distance factor : 1 GHz - 13 GHz : $20\log(3.92\text{ m} / 3.0\text{ m}) = 2.33\text{ dB}$

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

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

Radiated Spurious Emission (Reference Plot for band-edge)

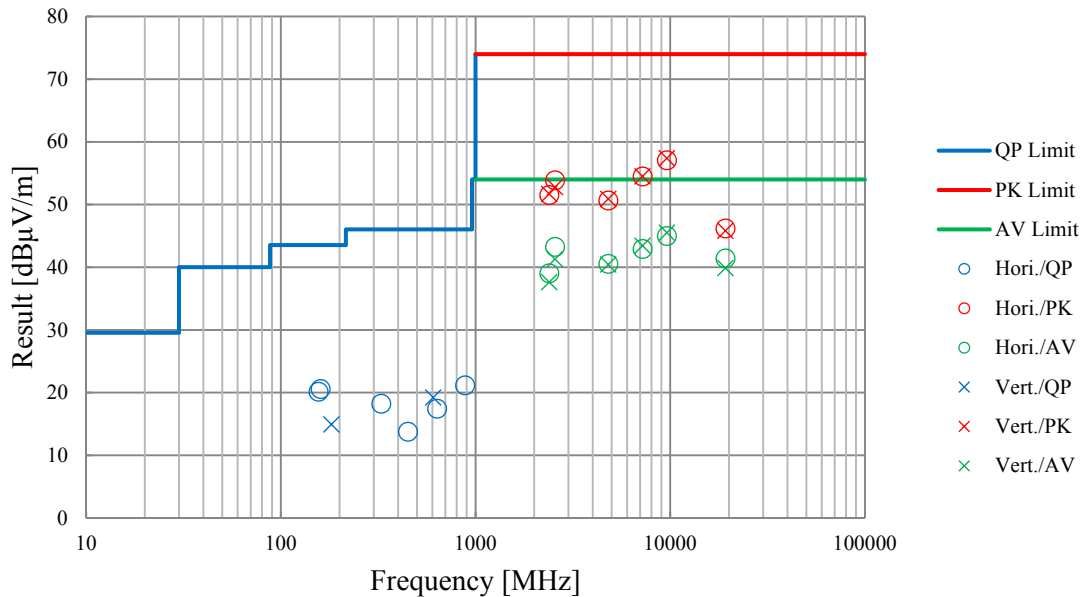
Report No.	12327512S-A
Test place	Shonan EMC Lab.
Semi Anechoic Chamber	No.1
Date	May 20, 2016
Temperature / Humidity	22 deg. C / 45 % RH
Engineer	Yasumasa Owaki
Mode	Tx, Hopping Off, 3DH5 2480 MHz



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

Radiated Spurious Emission
(Plot data, Worst case)

Report No.	12327512S-A		
Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	No.1	No.1	No.1
Date	May 21, 2016	May 20, 2016	May 21, 2016
Temperature / Humidity	25 deg. C / 31 % RH	22 deg. C / 45 % RH	23 deg. C / 35 % RH
Engineer	Kazuya Noda (30 MHz - 1 GHz)	Yasumasa Owaki (1 GHz - 13 GHz)	Kazutaka Takeyama (13 GHz - 26.5 GHz)
Mode	Tx, Hopping Off, 3DH5 2402 MHz		

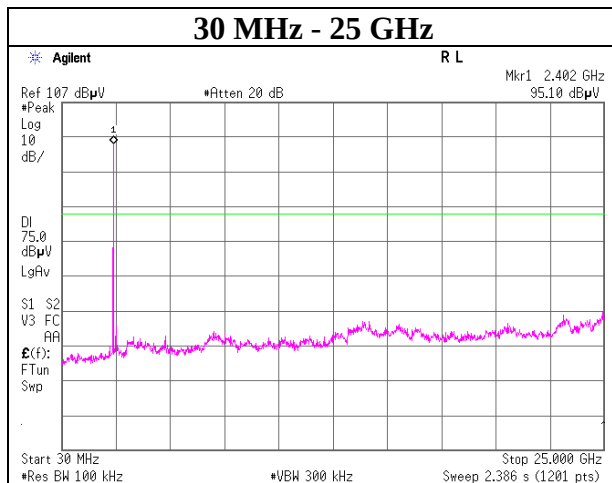
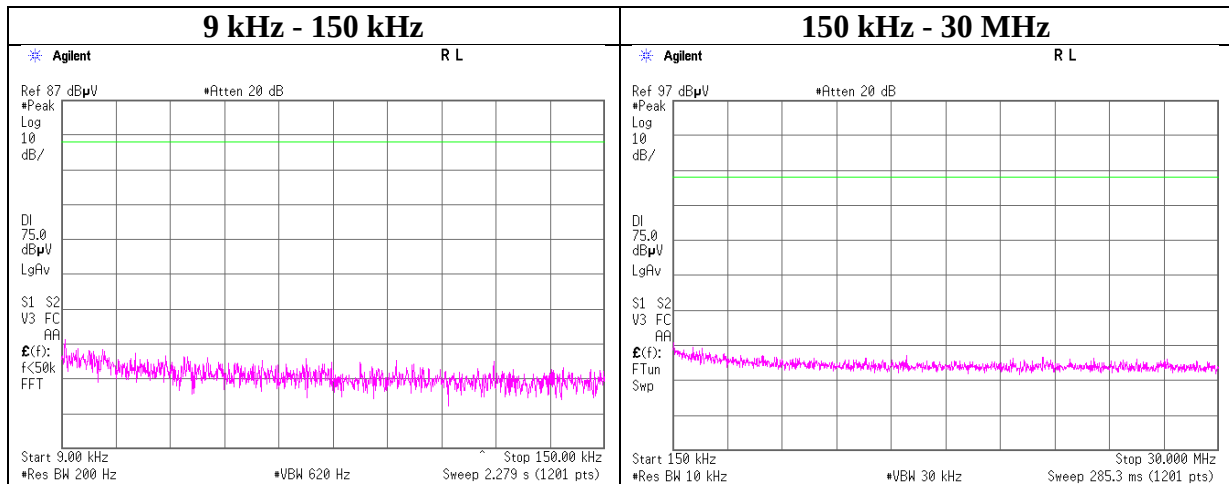


*These plots data contains sufficient number to show the trend of characteristic features for EUT.

Conducted Spurious Emission

Report No. 12327512S-A
Test place Shonan EMC Lab. No.5 Shielded Room
Date May 29, 2018
Temperature / Humidity 25 deg. C / 46 % RH
Engineer Makoto Hosaka
Mode Tx, Hopping Off, DH5

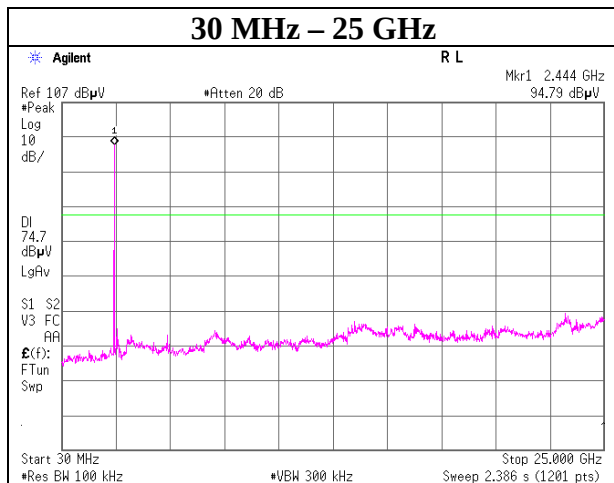
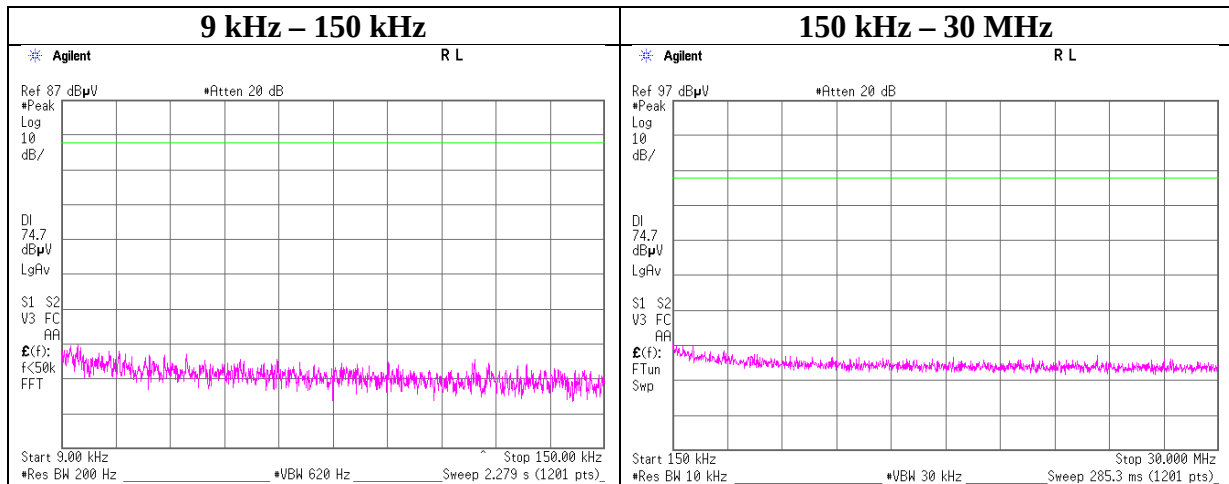
2402 MHz



Conducted Spurious Emission

Report No. 12327512S-A
Test place Shonan EMC Lab. No.5 Shielded Room
Date May 29, 2018
Temperature / Humidity 25 deg. C / 46 % RH
Engineer Makoto Hosaka
Mode Tx, Hopping Off, DH5

2441 MHz



UL Japan, Inc.

Shonan EMC Lab.

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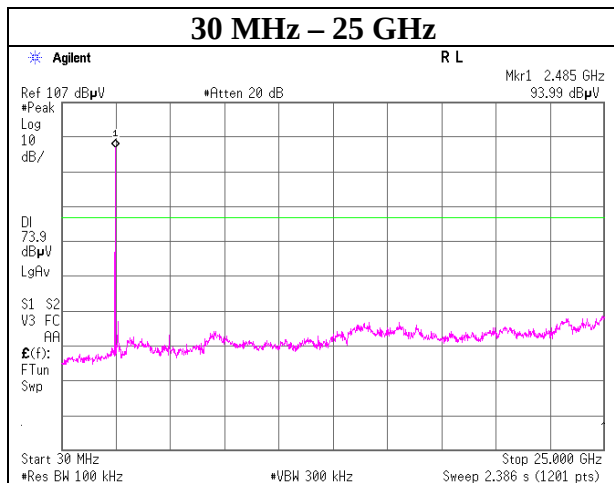
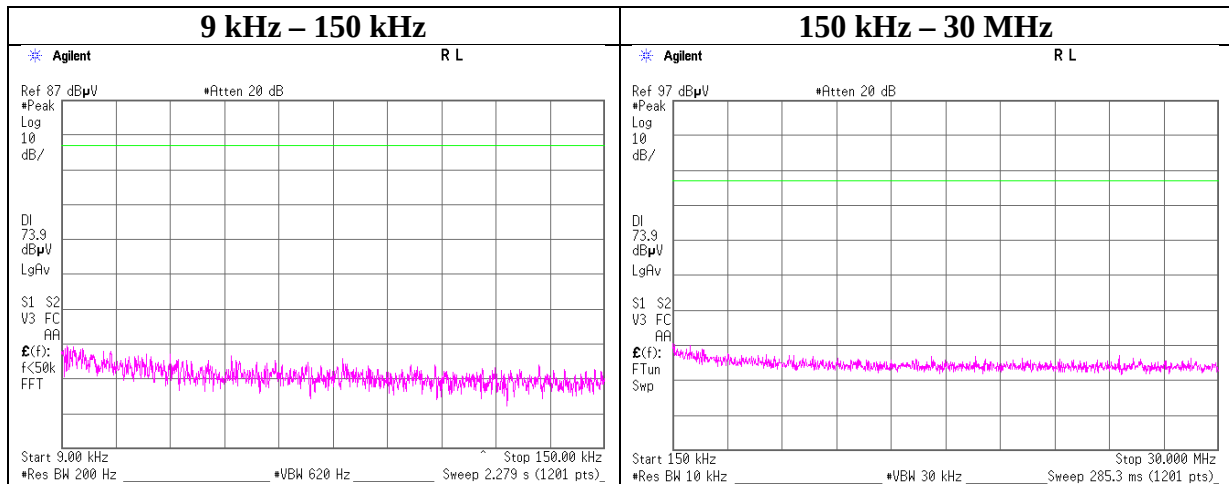
Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Conducted Spurious Emission

Report No.	12327512S-A
Test place	Shonan EMC Lab. No.5 Shielded Room
Date	May 29, 2018
Temperature / Humidity	25 deg. C / 46 % RH
Engineer	Makoto Hosaka
Mode	Tx, Hopping Off, DH5

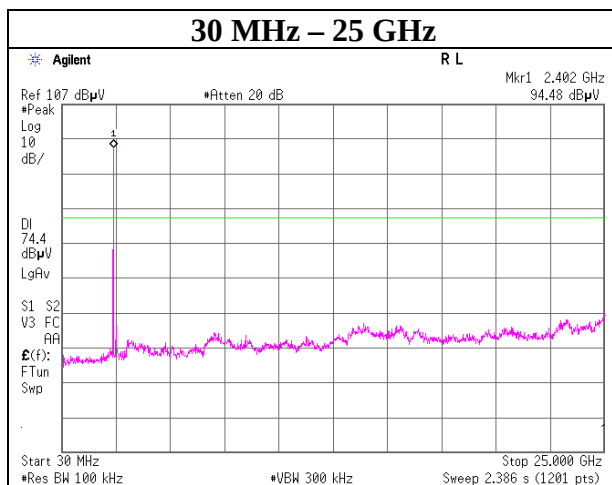
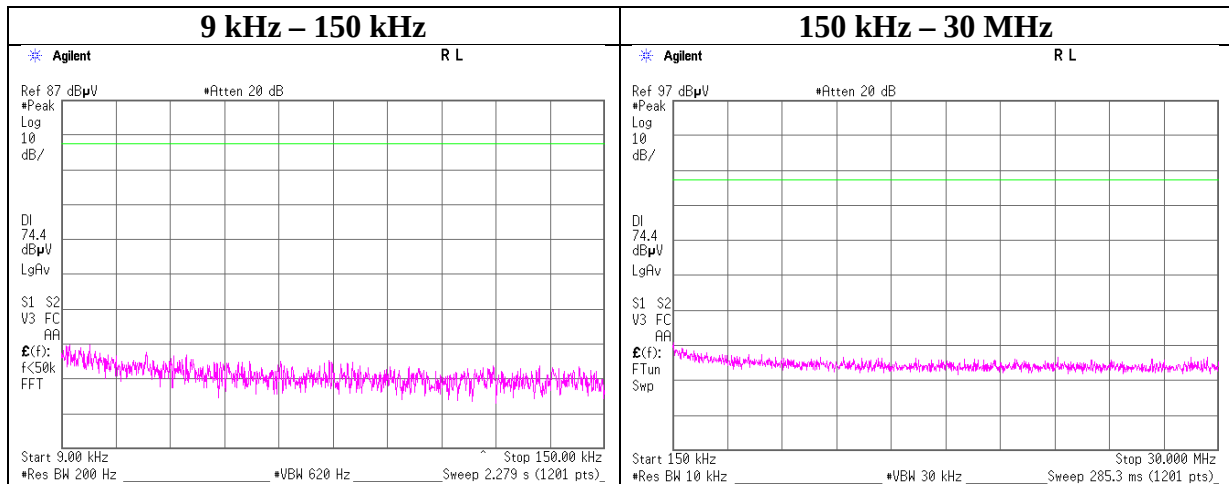
2480 MHz



Conducted Spurious Emission

Report No. 12327512S-A
Test place Shonan EMC Lab. No.5 Shielded Room
Date May 29, 2018
Temperature / Humidity 25 deg. C / 46 % RH
Engineer Makoto Hosaka
Mode Tx, Hopping Off, DH5

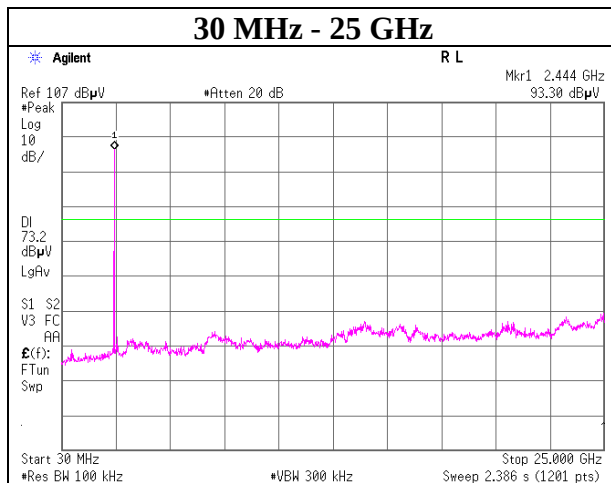
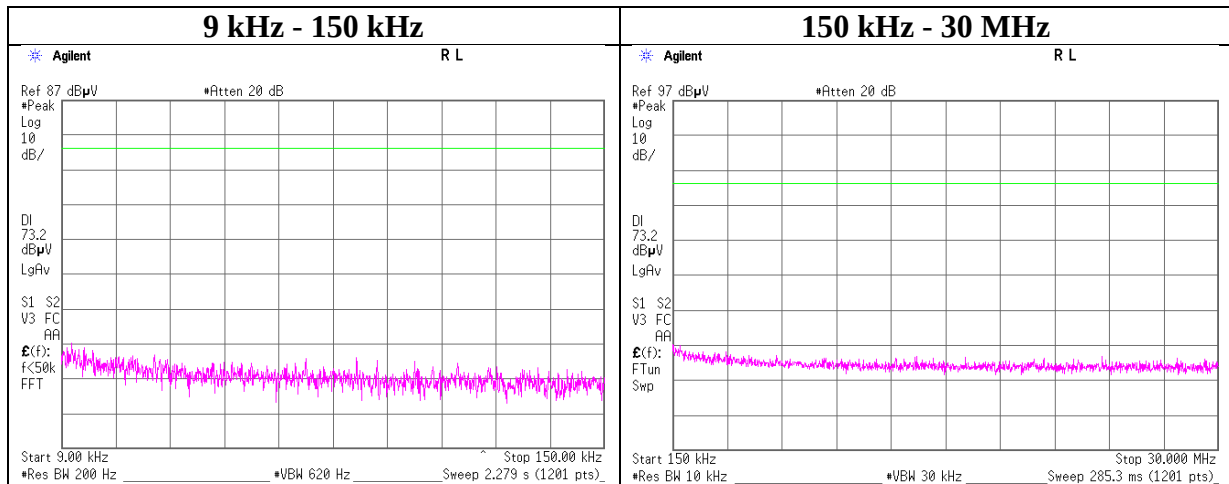
2402 MHz



Conducted Spurious Emission

Report No. 12327512S-A
Test place Shonan EMC Lab. No.5 Shielded Room
Date May 29, 2018
Temperature / Humidity 25 deg. C / 46 % RH
Engineer Makoto Hosaka
Mode Tx, Hopping Off, 3DH5

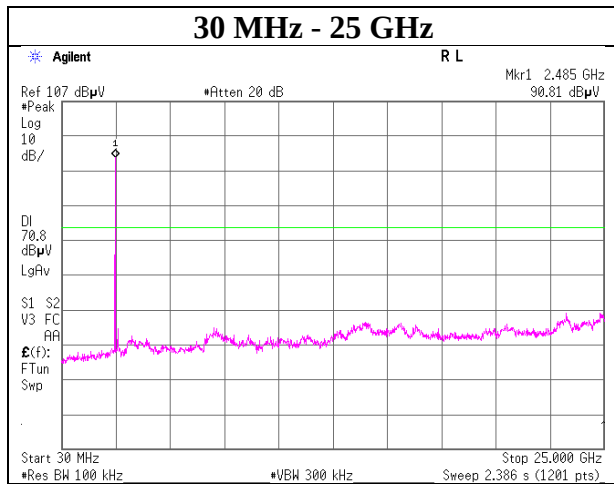
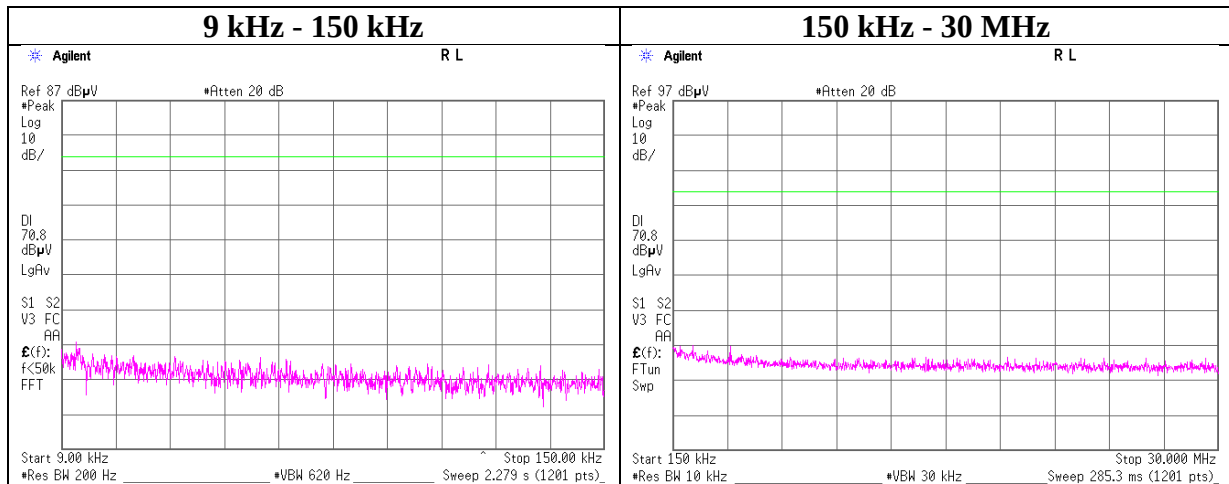
2441 MHz



Conducted Spurious Emission

Report No. 12327512S-A
Test place Shonan EMC Lab. No.5 Shielded Room
Date May 29, 2018
Temperature / Humidity 25 deg. C / 46 % RH
Engineer Makoto Hosaka
Mode Tx, Hopping Off, 3DH5

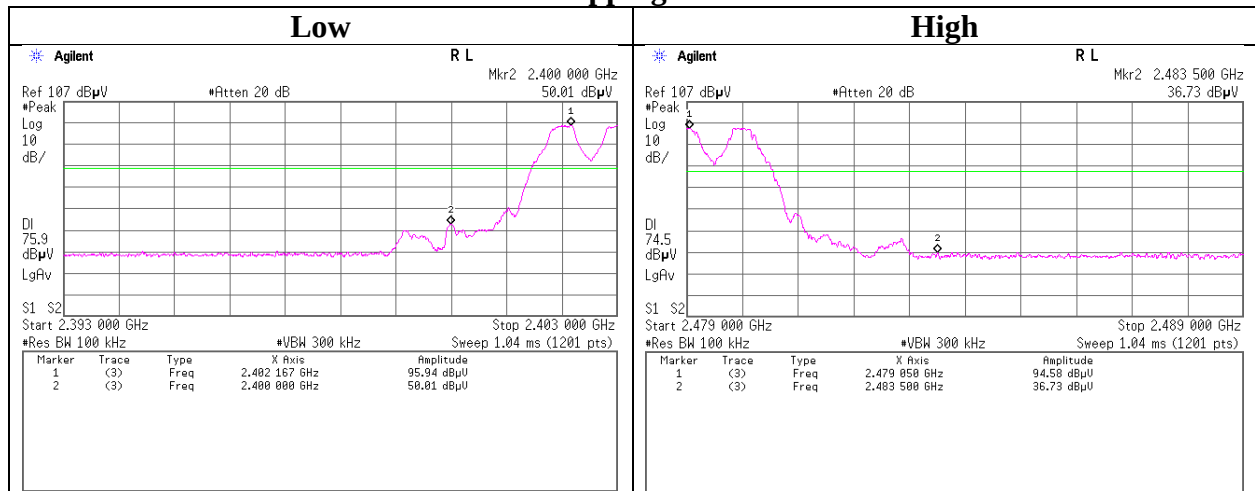
2480 MHz



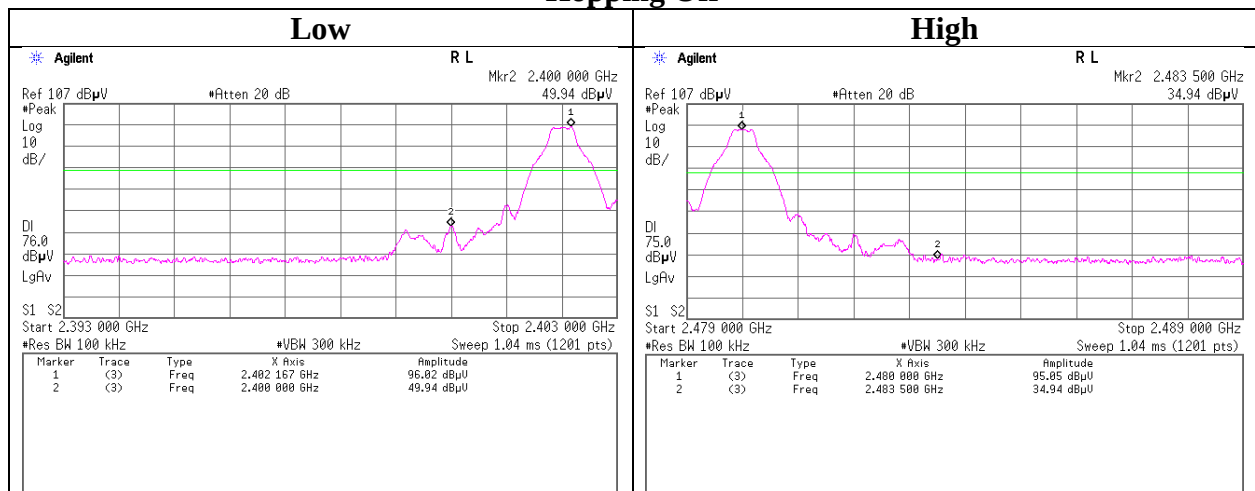
Conducted Emission Band Edge compliance

Report No. 12327512S-A
Test place Shonan EMC Lab. No.5 Shielded Room
Date May 29, 2018
Temperature / Humidity 25 deg. C / 46 % RH
Engineer Makoto Hosaka
Mode Tx DH5

Hopping On



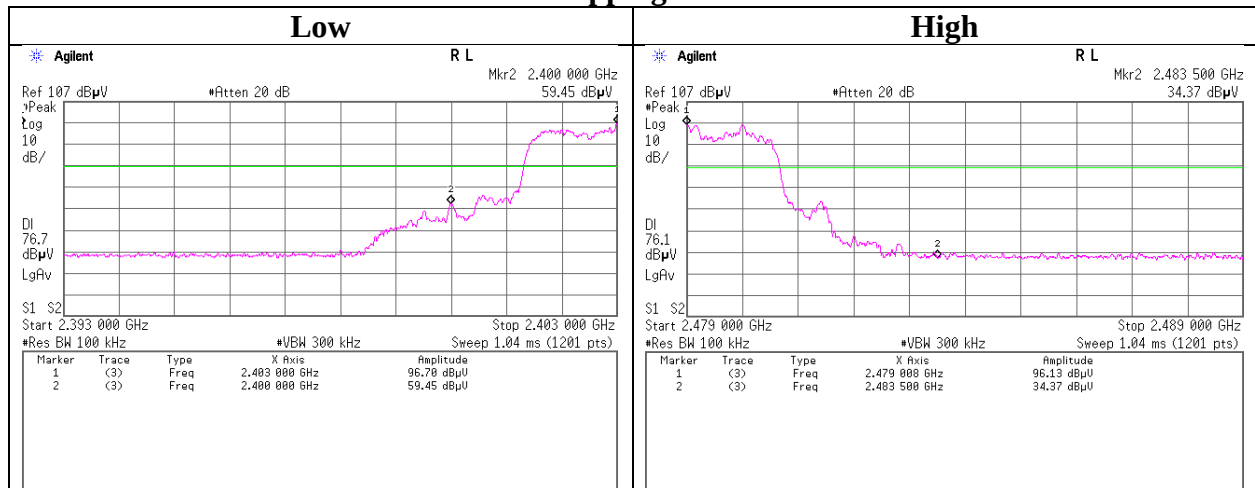
Hopping Off



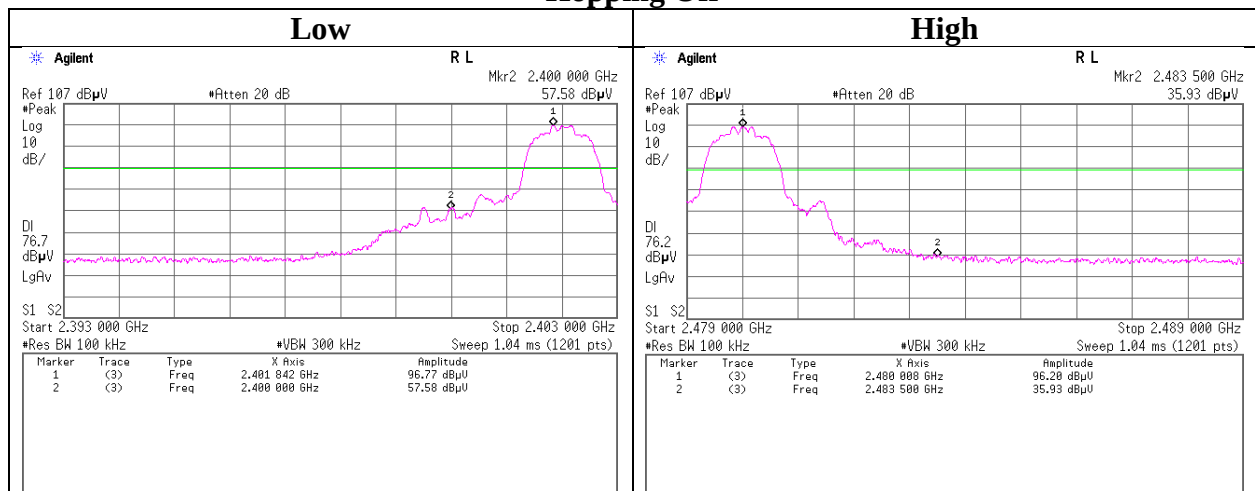
Conducted Emission Band Edge compliance

Report No. 12327512S-A
Test place Shonan EMC Lab. No.5 Shielded Room
Date May 29, 2018
Temperature / Humidity 25 deg. C / 46 % RH
Engineer Makoto Hosaka
Mode Tx 3DH5

Hopping On



Hopping Off



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APPENDIX 2: Test instruments

Test Instruments

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
SAF-05	Pre Amplifier	TOYO Corporation	TPA0118-36	1440490	RE	2018/02/15 * 12
SAF-08	Pre Amplifier	TOYO Corporation	HAP18-26W	00000019	RE	2018/03/27 * 12
SCC-G05	Coaxial Cable	Junkosha	J12J102207-00	APR-30-15-037	RE	2018/01/29 * 12
SCC-G22	Coaxial Cable	Suhner	SUCOFLEX 104	296199/4	RE	2018/05/11 * 12
SCC-G40	Coaxial Cable	Junkosha	MWX221-01000N FSNMS/B	1612S005	RE	2018/01/29 * 12
SCC-G33	Coaxial Cable	Junkosha	MWX241-01000K MSKMS	-	RE	2018/04/20 * 12
SCC-G45	Coaxial Cable	HUBER+SUHNER	SUCOFLEX 102 E	800137/2EA	RE	2018/03/28 * 12
SHA-01	Horn Antenna	Schwarzbeck	BBHA9120D	9120D-725	RE	2017/08/14 * 12
SHA-04	Horn Antenna	ETS LINDGREN	3160-09	LM9861	RE	2017/07/11 * 12
SAT10-06	Attenuator	Agilent	8493C-010	74865	RE	2017/11/22 * 12
SFL-18	Highpass Filter	MICRO-TRONICS	HPM50111	119	RE	2018/04/20 * 12
SOS-01	Humidity Indicator	A&D	AD-5681	4062555	RE	2017/10/30 * 12
KSA-08	Spectrum Analyzer	Agilent	E4446A	MY46180525	RE	2017/10/10 * 12
SSA-02	Spectrum Analyzer	Agilent	E4448A	MY48250106	RE	2018/03/05 * 12
KJM-09	Measure	KOMELON	KMC-36	-	RE	-
SAEC-01(SVS WR)	Semi-Anechoic Chamber	TDK	SAEC-01(SVSWR)	1	RE	2017/07/20 * 12
COTS-SEMI-1	EMI Software	TSJ	TEPTO-DV(RE,C E,RFI,MF)	-	RE	-
STS-01	Digital Hitester	Hioki	3805-50	080997812	RE	2017/10/16 * 12
SAEC-01(NSA)	Semi-Anechoic Chamber	TDK	SAEC-01(NSA)	1	RE	2017/06/09 * 12
SAF-01	Pre Amplifier	SONOMA	310N	290211	RE	2018/02/16 * 12
KAT6-04	Attenuator	INMET	18N-6dB	-	RE	2017/12/14 * 12
SAT3-09	Attenuator	JFW	50HF-003N	-	RE	2017/08/24 * 12
SBA-01	Biconical Antenna	Schwarzbeck	BBA9106	91032664	RE	2017/10/21 * 12
SCC-A1/A3/A5/ A7/A8/A13/SRS E-01	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhn er/Suhner/Suhner/Suhn er/TOYO	8D2W/12DSFA/14 1PE/141PE/141PE/ 141PE/NS4906	-/0901-269(RF Selector)	RE	2018/04/12 * 12
SCC-A2/A4/A6/ A7/A8/A13/SRSE -01	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhn er/Suhner/Suhner/Suhn er/TOYO	8D2W/12DSFA/14 1PE/141PE/141PE/ 141PE/NS4906	-/0901-269(RF Selector)	RE	2018/04/12 * 12
SLA-05	Logperiodic Antenna	Schwarzbeck	VUSLP9111B	193	RE	2017/12/10 * 12
STR-07	Test Receiver	Rohde & Schwarz	ESU26	100484	RE	2017/09/26 * 12
SPM-13	Power Meter	KEYSIGHT	8990B	MY51000448	AT	2018/05/18 * 12
SPSS-06	Power sensor	KEYSIGHT	N1923A	MY57270004	AT	2018/05/18 * 12
SSA-03	Spectrum Analyzer	Agilent	E4448A	MY48250152	AT	2017/08/20 * 12
SAT10-12	Attenuator	Weinschel Corp.	54A-10	81601	AT	2018/03/22 * 12
SCC-G12	Coaxial Cable	Suhner	SUCOFLEX 102	30790/2	AT	2018/03/19 * 12
SOS-09	Humidity Indicator	A&D	AD-5681	4061484	AT	2017/12/21 * 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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