



RADIO TEST REPORT

Test Report No. : 13540585S-A-R1

Applicant : Sony Corporation, Japan and Sony Group Companies
Type of EUT : AV Receiver
Model Number of EUT : XAV-AX5110
FCC ID : AK8XAVAX5110
Test regulation : FCC Part 15 Subpart C: 2020
Test Result : Complied (Refer to SECTION 3.2)

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3. This sample tested is in compliance with the limits of the above regulation.
4. The test results in this test report are traceable to the national or international standards.
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6. This test report covers Radio technical requirements.
It does not cover administrative issues such as Manual or non-Radio test related Requirements. (if applicable)
7. The all test items in this test report are conducted by UL Japan, Inc. Shonan EMC Lab.
8. The opinions and the interpretations to the result of the description in this report are outside scopes where UL Japan has been accredited.
9. The information provided from the customer for this report is identified in SECTION 1.
10. This report is a revised version of 13540585S-A. 13540585S-A is replaced with this report.

Date of test: October 15 to 18, 2020

Representative test engineer:


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Consumer Technology Division



CERTIFICATE 1266.03

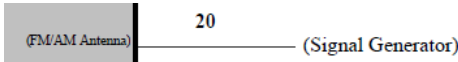
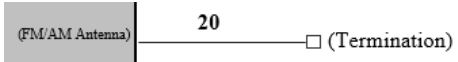
- ☐ The testing in which "Non-accreditation" is displayed is outside the accreditation scopes in UL Japan.
- ☒ There is no testing item of "Non-accreditation".

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REVISION HISTORY

Original Test Report No.: 13540585S-A

Revision	Test report No.	Date	Page revised	Contents
- (Original)	13540585S-A	October 29, 2020	-	-
1	13540585S-A-R1	November 11, 2020	P.11	Correction of Configuration and peripherals from  to 

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Reference: Abbreviations (Including words undescribed in this report)

A2LA	The American Association for Laboratory Accreditation	MCS	Modulation and Coding Scheme
AC	Alternating Current	MRA	Mutual Recognition Arrangement
AFH	Adaptive Frequency Hopping	N/A	Not Applicable
AM	Amplitude Modulation	NIST	National Institute of Standards and Technology
Amp, AMP	Amplifier	NS	No signal detect.
ANSI	American National Standards Institute	NSA	Normalized Site Attenuation
Ant, ANT	Antenna	NVLAP	National Voluntary Laboratory Accreditation Program
AP	Access Point	OBW	Occupied Band Width
ASK	Amplitude Shift Keying	OFDM	Orthogonal Frequency Division Multiplexing
Atten., ATT	Attenuator	P/M	Power meter
AV	Average	PCB	Printed Circuit Board
BPSK	Binary Phase-Shift Keying	PER	Packet Error Rate
BR	Bluetooth Basic Rate	PHY	Physical Layer
BT	Bluetooth	PK	Peak
BT LE	Bluetooth Low Energy	PN	Pseudo random Noise
BW	BandWidth	PRBS	Pseudo-Random Bit Sequence
Cal Int	Calibration Interval	PSD	Power Spectral Density
CCK	Complementary Code Keying	QAM	Quadrature Amplitude Modulation
Ch., CH	Channel	QP	Quasi-Peak
CISPR	Comite International Special des Perturbations Radioelectriques	QPSK	Quadri-Phase Shift Keying
CW	Continuous Wave	RBW	Resolution Band Width
DBPSK	Differential BPSK	RDS	Radio Data System
DC	Direct Current	RE	Radio Equipment
D-factor	Distance factor	RF	Radio Frequency
DFS	Dynamic Frequency Selection	RMS	Root Mean Square
DQPSK	Differential QPSK	RSS	Radio Standards Specifications
DSSS	Direct Sequence Spread Spectrum	Rx	Receiving
EDR	Enhanced Data Rate	SA, S/A	Spectrum Analyzer
EIRP, e.i.r.p.	Equivalent Isotropically Radiated Power	SG	Signal Generator
EMC	ElectroMagnetic Compatibility	SVSWR	Site-Voltage Standing Wave Ratio
EMI	ElectroMagnetic Interference	TR	Test Receiver
EN	European Norm	Tx	Transmitting
ERP, e.r.p.	Effective Radiated Power	VBW	Video BandWidth
EU	European Union	Vert.	Vertical
EUT	Equipment Under Test	WLAN	Wireless LAN
Fac.	Factor		
FCC	Federal Communications Commission		
FHSS	Frequency Hopping Spread Spectrum		
FM	Frequency Modulation		
Freq.	Frequency		
FSK	Frequency Shift Keying		
GFSK	Gaussian Frequency-Shift Keying		
GNSS	Global Navigation Satellite System		
GPS	Global Positioning System		
Hori.	Horizontal		
ICES	Interference-Causing Equipment Standard		
IEC	International Electrotechnical Commission		
IEEE	Institute of Electrical and Electronics Engineers		
IF	Intermediate Frequency		
ILAC	International Laboratory Accreditation Conference		
ISED	Innovation, Science and Economic Development Canada		
ISO	International Organization for Standardization		
JAB	Japan Accreditation Board		
LAN	Local Area Network		
LIMS	Laboratory Information Management System		

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SECTION 1: Customer information

Company Name	:	Sony Corporation, Japan and Sony Group Companies
Address	:	700/402 Moo. 7, Amata City Chonburi Industrial Estate, Don Hua Roh, Muang Chonburi, Chonburi 20000, Thailand
Telephone Number	:	+66 38 214900 17 Ext : 1932
Contact Person	:	Jumroen Phaoenchoke

The information provided from the customer is as follows;

- Applicant, Type of EUT, Model Number of EUT, FCC ID on the cover and other relevant pages
- Operating/Test Mode(s) (Mode(s)) on all the relevant pages
- SECTION 1: Customer information
- SECTION 2: Equipment under test (EUT) other than the Receipt Date
- SECTION 4: Operation of EUT during testing

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

SECTION 2: Equipment under test (EUT)

2.1 Identification of EUT

Type	:	AV Receiver
Model Number	:	XAV-AX5110
Serial Number	:	Refer to SECTION 4.2
Rating	:	DC 12 V
Receipt Date	:	October 12, 2020
Country of Mass-production	:	Thailand
Condition	:	Engineering prototype (Not for Sale: This sample is equivalent to mass-produced items.)
Modification	:	No Modification by the test lab.

2.2 Product Description

Model: XAV-AX5110 (referred to as the EUT in this report) is a AV Receiver.

General Specification

Clock frequency(ies) in the system : 32.768 kHz, 9.25 MHz, 12 MHz (Tuner), 12 MHz (DSP IC), 24 MHz, 25 MHz, 26 MHz

Radio Specification

Bluetooth (BDR / EDR function)

Radio Type	:	Transceiver
Frequency of Operation	:	2402 MHz - 2480 MHz
Modulation	:	FHSS, GFSK, $\pi/4$ -DQPSK, 8DPSK
Antenna type	:	Meander Monopole antenna
Antenna Gain *1)	:	-0.63 dBi (Peak), -4.86 dBi (Average)
Operating Temperature	:	-20 deg. C to +60 deg. C
Clock frequency	:	26 MHz

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SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification : FCC Part 15 Subpart C
FCC Part 15 final revised on October 13, 2020

Title : FCC 47 CFR Part 15 Radio Frequency Device Subpart C Intentional Radiators
Section 15.207 Conducted limits
Section 15.247 Operation within the bands 902-928 MHz, 2400-2483.5 MHz,
and 5725-5850 MHz

* Also the EUT complies with FCC Part 15 Subpart B.

3.2 Procedures and results

Item	Test Procedure	Specification	Worst Margin	Results	Remarks
Conducted Emission	FCC: ANSI C63.10-2013 6. Standard test methods ISED: RSS-Gen 8.8	FCC: Section 15.207 ISED: RSS-Gen 8.8	N/A *1)	N/A	-
Carrier Frequency Separation	FCC: KDB 558074 D01 15.247 Meas Guidance v05r02 ISED: -	FCC: Section15.247(a)(1) ISED: RSS-247 5.1 (b)	See data.	Complied a)	Conducted
20dB Bandwidth	FCC: KDB 558074 D01 15.247 Meas Guidance v05r02 ISED: -	FCC: Section15.247(a)(1) ISED: RSS-247 5.1 (a)		Complied a)	Conducted
Number of Hopping Frequency	FCC: KDB 558074 D01 15.247 Meas Guidance v05r02 ISED: -	FCC: Section15.247(a)(1)(iii) ISED: RSS-247 5.1 (d)		Complied b)	Conducted
Dwell time	FCC: KDB 558074 D01 15.247 Meas Guidance v05r02 ISED: -	FCC: Section15.247(a)(1)(iii) ISED: RSS-247 5.1 (d)		Complied c)	Conducted
Maximum Peak Output Power	FCC: KDB 558074 D01 15.247 Meas Guidance v05r02 ISED: RSS-Gen 6.12	FCC: Section15.247(a)(b)(1) ISED: RSS-247 5.4 (b)		Complied d)	Conducted
Spurious Emission & Band Edge Compliance	FCC: KDB 558074 D01 15.247 Meas Guidance v05r02 ISED: RSS-Gen 6.13	FCC: Section15.247(d) ISED: RSS-247 5.5 RSS-Gen 8.9 RSS-Gen 8.10	4.7 dB 389.362 MHz, QP, Hori. Mode: Tx, DH5 2402 MHz	Complied# e) / f)	Conducted/ Radiated (above 30 MHz) *2)
Note: UL Japan, Inc.'s EMI Work Procedures No. 13-EM-W0420 and 13-EM-W0422. *1) The test is not applicable since the EUT does not have AC power ports. *2) Radiated test was selected over 30 MHz based on section 15.247(d) a) Refer to APPENDIX 1 (data of 20dB Bandwidth, 99%Occupied Bandwidth and Carrier Frequency Separation) b) Refer to APPENDIX 1 (data of Number of Hopping Frequency) c) Refer to APPENDIX 1 (data of Dwell time) d) Refer to APPENDIX 1 (data of Maximum Peak Output Power) e) Refer to APPENDIX 1 (data of Conducted Spurious Emission) f) Refer to APPENDIX 1 (data of Radiated Spurious Emission) Symbols: Complied The data of this test item has enough margin, more than the measurement uncertainty. Complied# The data of this test item meets the limits unless the measurement uncertainty is taken into consideration.					

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

FCC Part 15.31 (e)

The EUT provides stable voltage constantly to the wireless transmitter regardless of input voltage. Instead of a new battery, DC power supply was used for the test. That does not affect the test result, therefore the EUT complies with the requirement.

FCC Part 15.203 Antenna requirement

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

3.3 Addition to standard

Item	Test Procedure	Specification	Worst margin	Results	Remarks
99% Occupied Bandwidth	ISED: RSS-Gen 6.7	ISED: -	N/A	- a)	Conducted

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

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

3.4 Uncertainty

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

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

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Item	Frequency range	Uncertainty (+/-)			
		No. 1 SAC / SR	No. 2 SAC / SR	No. 3 SAC / SR	No. 4,5,6,8 SR
Conducted emission (AC Mains) LISN	150 kHz-30 MHz	2.6 dB	2.6 dB	2.5 dB	2.6 dB
Radiated emission (Measurement distance: 3 m)	9 kHz-30 MHz	3.0 dB	3.0 dB	3.0 dB	-
	30 MHz-200 MHz	4.6 dB	4.6 dB	4.6 dB	-
	200 MHz-1 GHz	6.0 dB	6.0 dB	6.0 dB	-
	1 GHz-6 GHz	4.9 dB	4.9 dB	4.9 dB	-
	6 GHz-18 GHz	5.5 dB	5.5 dB	5.5 dB	-
	18 GHz-40 GHz	5.4 dB	5.4 dB	5.4 dB	-
Radiated emission (Measurement distance: 1 m)	1 GHz-18 GHz	5.8 dB	5.8 dB	5.8 dB	-
	18 GHz-40 GHz	5.7 dB	5.7 dB	5.7 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	0.98 dB
Power Measurement above 1 GHz (Peak Detector)_SPM-06	1.75 dB
Power Measurement above 1 GHz (Average Detector)_SPM-07	0.89 dB
Power Measurement above 1 GHz (Peak Detector)_SPM-07	1.12 dB
Power Measurement above 1 GHz (Average Detector)_SPM-13	1.06 dB
Power Measurement above 1 GHz (Peak Detector)_SPM-13	1.24 dB
Spurious emission (Conducted) below 1 GHz	0.9 dB
Spurious emission (Conducted) 1 GHz-3 GHz	0.9 dB
Spurious emission (Conducted) 3 GHz-18 GHz	2.9 dB
Spurious emission (Conducted) 18 GHz-26.5 GHz	2.6 dB
Spurious emission (Conducted) 26.5 GHz-40 GHz	2.0 dB
Bandwidth Measurement	0.07 %
Duty cycle and Time Measurement	0.262 %
Temperature	0.95 deg.C.
Voltage	0.83 %

3.5 Test Location

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A2LA Certificate Number: 1266.03 (FCC Test Firm Registration Number: 626366, ISED Lab Company Number: 2973D)

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 EUT 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 (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.=23, Int.=39 EDR: Ext.=73, Int.=48 Software: CSR BlueSuite BlueTest Version 2.6.9 (Date: 2017.10.30, Storage location: Driven by connected PC) *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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Description of EUT and support equipment

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	AV RECEIVER	XAV-AX5110	5	Sony	EUT
B	USB memory	USM4GL-W	-	Sony	-
C	USB memory	USM4GL-W	-	Sony	-
D	GPS Antenna	-	-	Sony	-
E	Speaker 1	XS-PFK1621	-	Sony	-
F	Speaker 2	XS-PFK1621	-	Sony	-
G	Speaker 3	IS-10	-	-	-
H	Speaker 4	IS-10	-	-	-
I	Navigation Module	XA-NV400	EPP0024	Sony	-
J	Camera	CC-7020M-A	0090854	Sony	-
K	Power Supply(DC)	PAN35-10A	NA000955	Kikusui	-

List of cables used

No.	Name	Length (m)	Shield (Cable)		Remarks
			Cable	Connector	
1	DC Power	0.05 + 1.8	Unshielded	Unshielded	-
2	Speaker (1)	0.05 + 2.0	Unshielded	Unshielded	-
3	Speaker (2)	0.05 + 2.0	Unshielded	Unshielded	-
4	Speaker (3)	0.05 + 2.0	Unshielded	Unshielded	-
5	Speaker (4)	0.05 + 2.0	Unshielded	Unshielded	-
6	AC	1.8	Unshielded	Unshielded	-
7	DC Power (+)	1.5 + 1.5	Unshielded	Unshielded	-
8	DC Power (-)	1.5 + 1.5	Unshielded	Unshielded	-
9	Navigation	1.5	Shielded	Shielded	-
10	GPS Antenna	3.0	Shielded	Shielded	-
11	RCA (Subwoofer Out)	3.0	Shielded	Shielded	-
12	AMP Remote	0.05 + 1.0	Unshielded	Unshielded	-
13	Illumination	0.05 + 1.0	Unshielded	Unshielded	-
14	Reverse In	0.05 + 1.0	Unshielded	Unshielded	-
15	Signal-1	0.05 + 1.0	Unshielded	Unshielded	-
16	Camera	1.2	Shielded	Shielded	-
17	USB	2.0	Shielded	Shielded	-
18	USB	1.1	Shielded	Shielded	-
19	Signal-2	0.05 + 1.0	Unshielded	Unshielded	-
20	FM/AM Antenna	1.0	Shielded	Shielded	-
21	Reverse	1.0	Unshielded	Unshielded	-

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SECTION 5: Radiated Spurious Emission

Test Procedure

[For below 1 GHz]

EUT was placed on a urethane platform of nominal size, 1.0 m by 1.5 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 m and 4 m and EUT was rotated a full revolution in order to obtain the maximum value of the electric field strength.

Test antenna was aimed at the EUT for receiving the maximum signal and always kept within the illumination area of the 3 dB beamwidth of the antenna.

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.

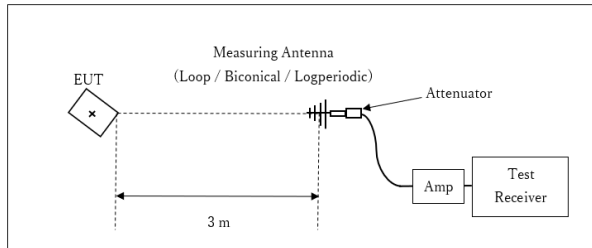
20 dBc was applied to the frequency over the limit of FCC 15.209 / Table 4 of RSS-Gen 8.9 (ISED) and outside the restricted band of FCC15.205 / Table 6 of RSS-Gen 8.10 (ISED).

Frequency	Below 1 GHz	Above 1 GHz		20 dBc
Instrument used	Test Receiver	Spectrum Analyzer		Spectrum Analyzer
Detector	QP	PK	AV *1)	PK
IF Bandwidth	BW 120 kHz	RBW: 1 MHz VBW: 3 MHz	RBW: 1 MHz VBW: 1/T (T: burst length, refer to Burst rate confirmation sheet) Detector: Peak	RBW: 100 kHz VBW: 300 kHz

*1) Average Power Measurement was performed based on KDB 558074 D01 15.247 Meas Guidance v05r02.

Figure 2: Test Setup

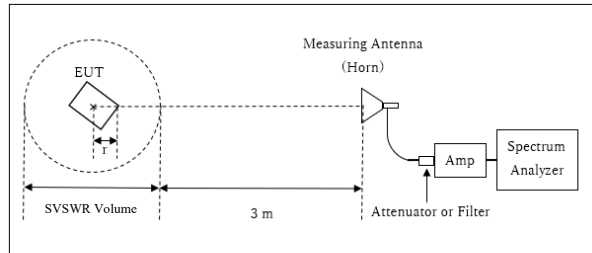
Below 1 GHz



× : Center of turn table

Test Distance: 3 m

1 GHz - 10 GHz

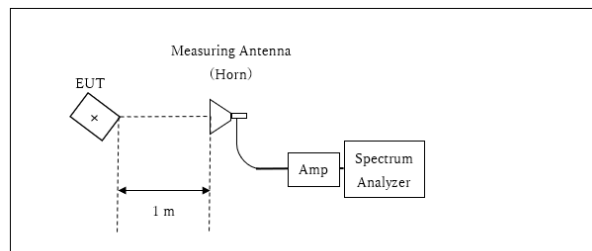


r : Radius of an outer periphery of EUT
× : Center of turn table

Distance Factor: $20 \times \log (3.88 \text{ m} / 3.0 \text{ m}) = 2.24 \text{ dB}$
* Test Distance: $(3 + \text{SVSWR Volume} / 2) - r = 3.88 \text{ m}$

SVSWR Volume : 2.0 m
(SVSWR Volume has been calibrated based on CISPR 16-1-4.)
r = 0.12 m

10 GHz - 26.5 GHz



× : Center of turn table

Distance Factor: $20 \times \log (1.0 \text{ m} / 3.0 \text{ m}) = -9.54 \text{ dB}$
*Test Distance: 1 m

- The carrier level and noise levels were confirmed at each position of 0 deg. to 30 deg. of EUT to see the position of maximum noise, and the test was made at the position that has the maximum noise.

Worst case

Antenna polarization	Carrier	Spurious (Below 1 GHz)	Spurious (1 GHz – 2.8 GHz)	Spurious (2.8 GHz – 13 GHz)	Spurious (13 GHz – 18 GHz)	Spurious (18 GHz – 26.5 GHz)
Horizontal	30 deg.	30 deg.	30 deg.	0 deg.	0 deg.	0 deg.
Vertical	0 deg.	30 deg.	0 deg.	0 deg.	0 deg.	0 deg.

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

Measurement range : 30 MHz - 26.5 GHz

Test data : APPENDIX

Test result : Pass

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SECTION 6: Antenna Terminal Conducted Tests

Test Procedure

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

Test	Span	RBW	VBW	Sweep time	Detector	Trace	Instrument used
20dB Bandwidth	3 MHz	30 kHz	100 kHz	Auto	Peak	Max Hold	Spectrum Analyzer
99% Occupied Bandwidth *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	100 kHz	300 kHz	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) *4)	9 kHz to 150 kHz	200 Hz	620 Hz	Auto	Peak	Max Hold	Spectrum Analyzer
	150 kHz to 30 MHz	10 kHz	30 kHz				
	30 MHz to 25 GHz	100 kHz	300 kHz				
Conducted Spurious Emission Band Edge compliance	10 MHz	100 kHz	300 kHz	Auto	Peak	Max Hold	Spectrum Analyzer

*1) Peak hold was applied as Worst-case measurement.

*2) Reference data

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

Then, wide-band noise near the limit was checked separately, however the noise was not detected as shown in the chart.

(9 kHz -150 kHz: RBW = 200 Hz, 150 kHz - 30 MHz: RBW = 10 kHz) *4) The limits in CFR 47, Part 15, Subpart C, paragraph 15.209(a), are identical to those in RSS-Gen section 8.9, Table 6, since the measurements are performed in terms of magnetic field strength and converted to electric field strength levels (as reported in the table) using the free space impedance of 377 Ohms. For example, the measurement at frequency 9 kHz resulted in a level of 45.5 dBuV/m, which is equivalent to $45.5 - 51.5 = -6.0$ dBuA/m, which has the same margin, 3 dB, to the corresponding RSS-Gen Table 6 limit as it has to 15.209(a) limit.

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

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

Test data : APPENDIX

Test result : Pass

APPENDIX 1: Test data

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

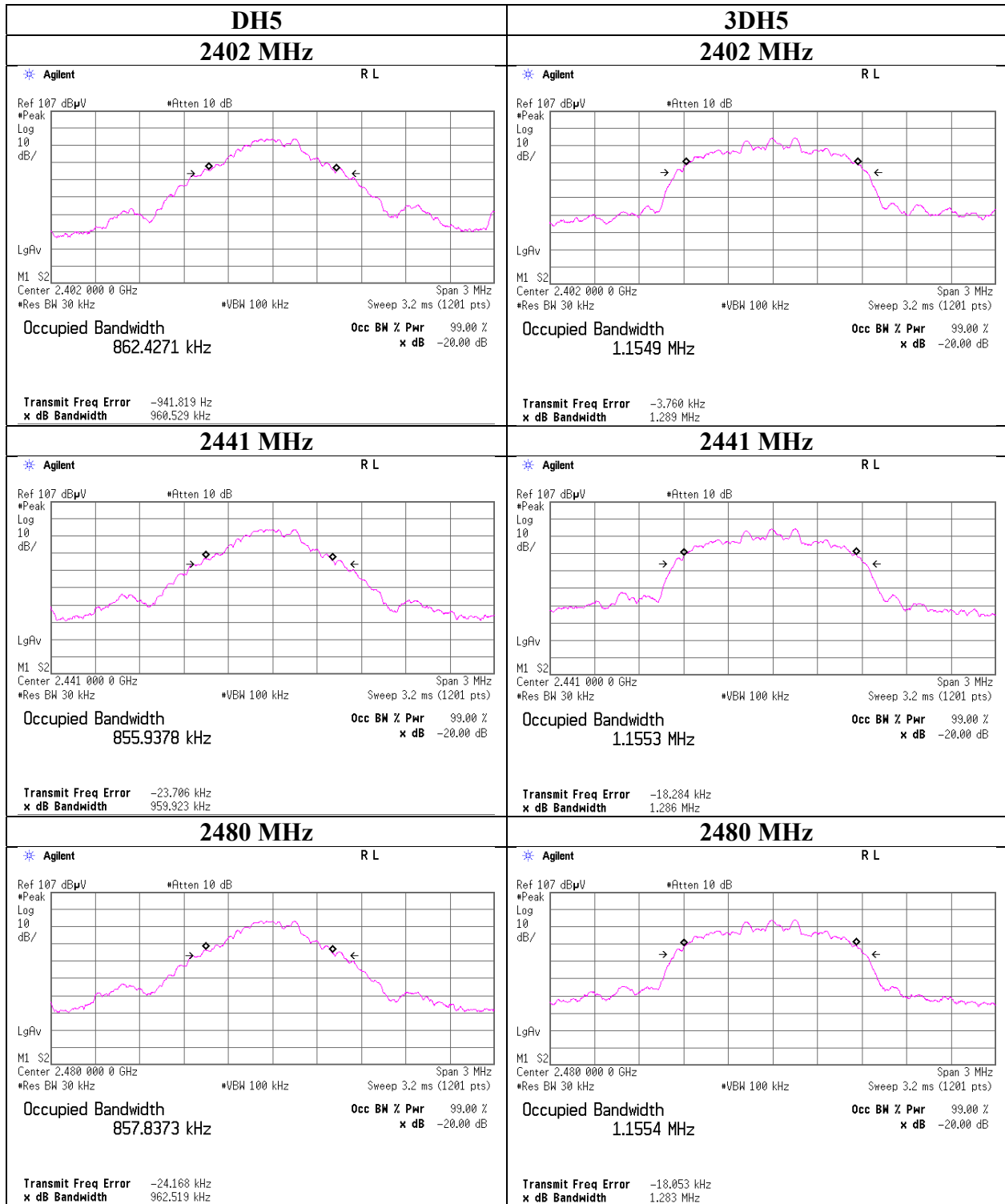
Report No. 13540585S-A-R1
Test place Shonan EMC Lab. No.5 Shielded Room
Date October 15, 2020
Temperature / Humidity 23 deg. C / 57 % RH
Engineer Yosuke Murakami
Mode Tx, Hopping Off, Tx, Hopping On

Mode	Freq. [MHz]	20dB Bandwidth [MHz]	99% Occupied Bandwidth [kHz]	Carrier Frequency Separation [MHz]	Limit for Carrier Frequency separation [MHz]
DH5	2402.0	0.961	862.427	1.000	≥ 0.640
DH5	2441.0	0.960	855.938	1.000	≥ 0.640
DH5	2480.0	0.963	857.837	1.000	≥ 0.642
DH5	Hopping On	-	-	-	-
3DH5	2402.0	1.289	1154.883	1.000	≥ 0.860
3DH5	2441.0	1.286	1155.304	1.000	≥ 0.857
3DH5	2480.0	1.283	1155.368	1.000	≥ 0.855
3DH5	Hopping On	-	-	-	-

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

No limit applies to 20dB Bandwidth.

20dB Bandwidth and 99% Occupied Bandwidth



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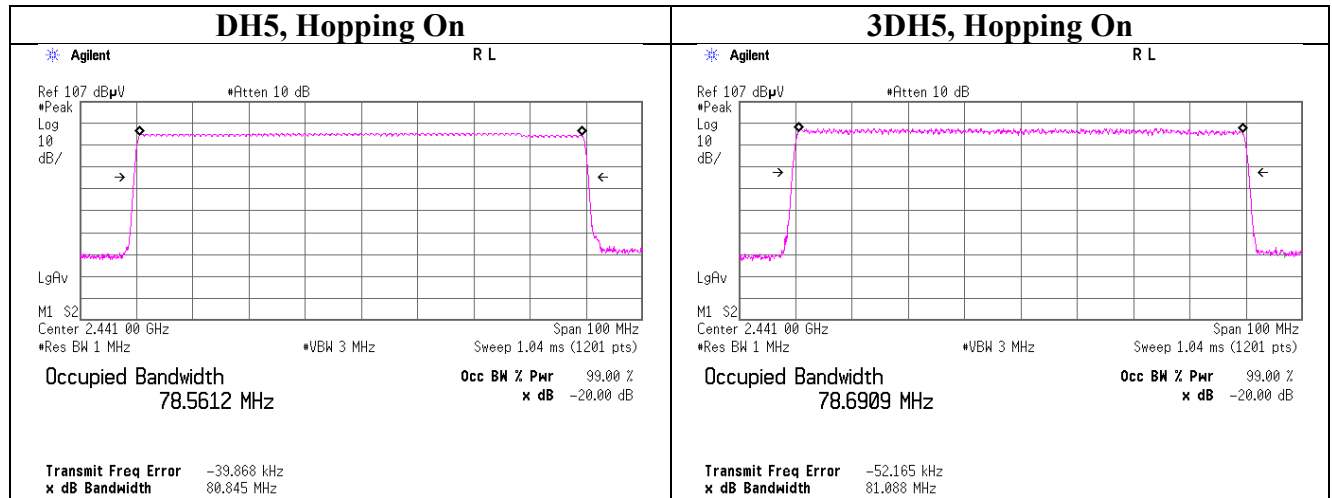
Shonan EMC Lab.

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

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

20dB Bandwidth and 99% Occupied Bandwidth



UL Japan, Inc.

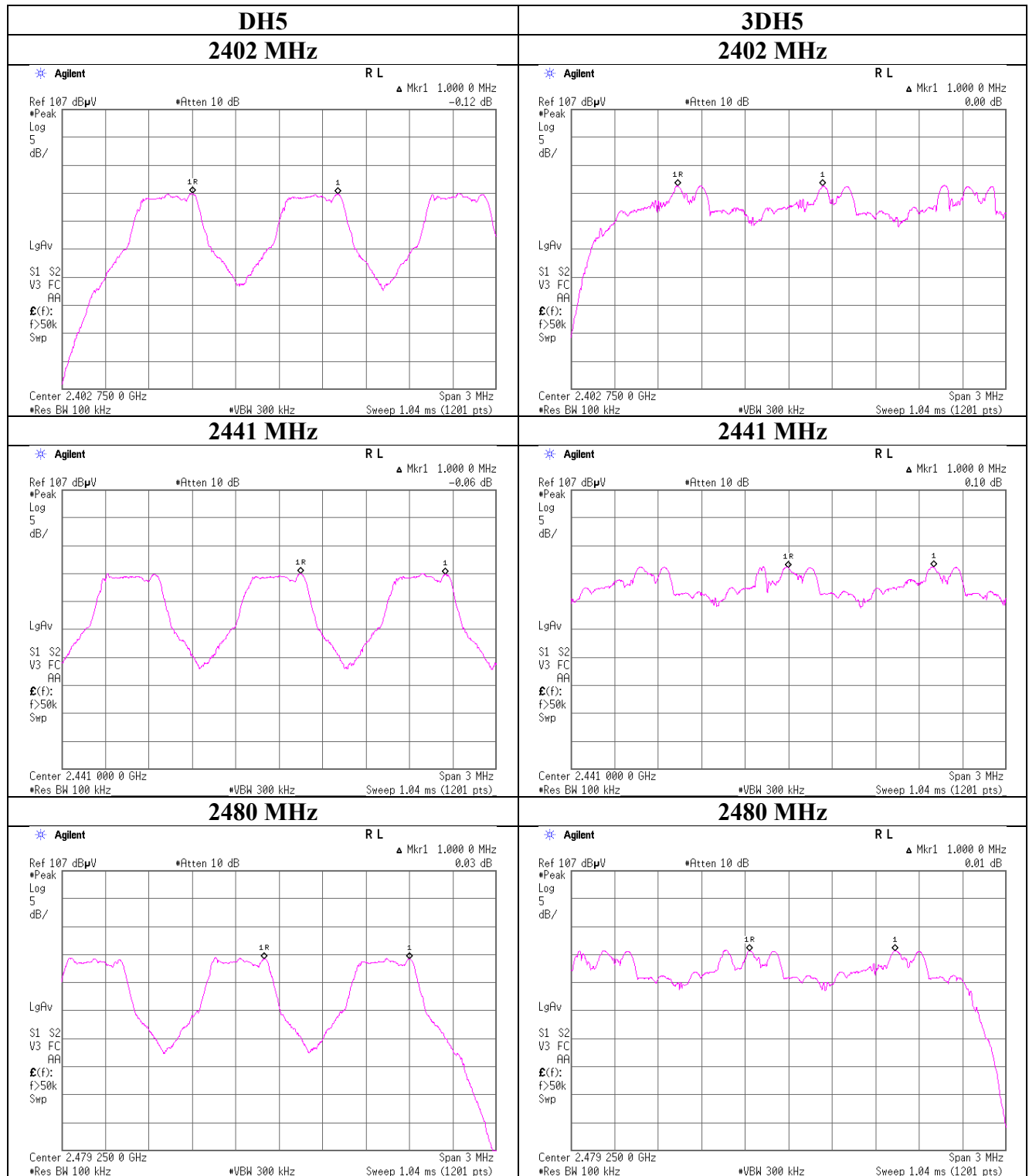
Shonan EMC Lab.

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Carrier Frequency Separation



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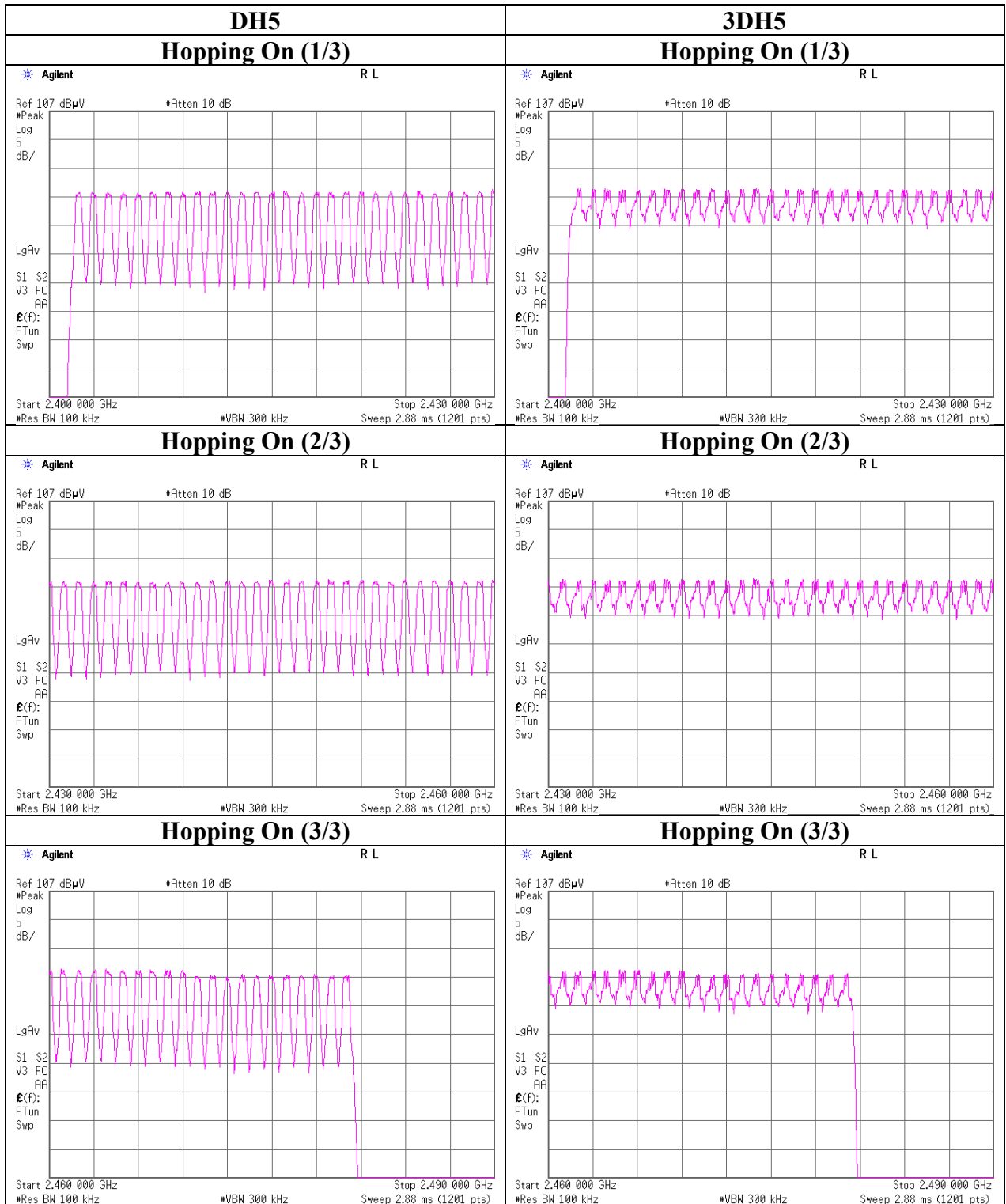
Number of Hopping Frequency

Report No. 13540585S-A-R1
Test place Shonan EMC Lab. No.5 Shielded Room
Date October 15, 2020
Temperature / Humidity 23 deg. C / 57 % RH
Engineer Yosuke Murakami
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



UL Japan, Inc.

Shonan EMC Lab.

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

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Facsimile : +81 463 50 6401

Dwell time

Report No. 13540585S-A-R1
Test place Shonan EMC Lab. No.1 Shielded Room
Date October 15, 2020 October 16, 2020
Temperature / Humidity 23 deg. C / 57 % RH 25 deg. C / 41 % RH
Engineer Yosuke Murakami
Mode Tx, Hopping On

Mode	Number of transmission in a 31.6(79 Hopping x 0.4) / 12.8 (32 Hopping x 0.4) second period				Length of transmission [msec]	Result [msec]	Limit [msec]
DH1	51.0 times	/	5 sec. x	31.6 sec. = 323 times	0.413	133	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	2.917	315	400
3DH1	51.0 times	/	5 sec. x	31.6 sec. = 323 times	0.428	138	400
3DH3	26.0 times	/	5 sec. x	31.6 sec. = 165 times	1.679	277	400
3DH5	17.0 times	/	5 sec. x	31.6 sec. = 108 times	2.933	317	400

Sample Calculation

Result = Number of transmission x Length of transmission

*Average data of 5 tests.(except Inquiry)

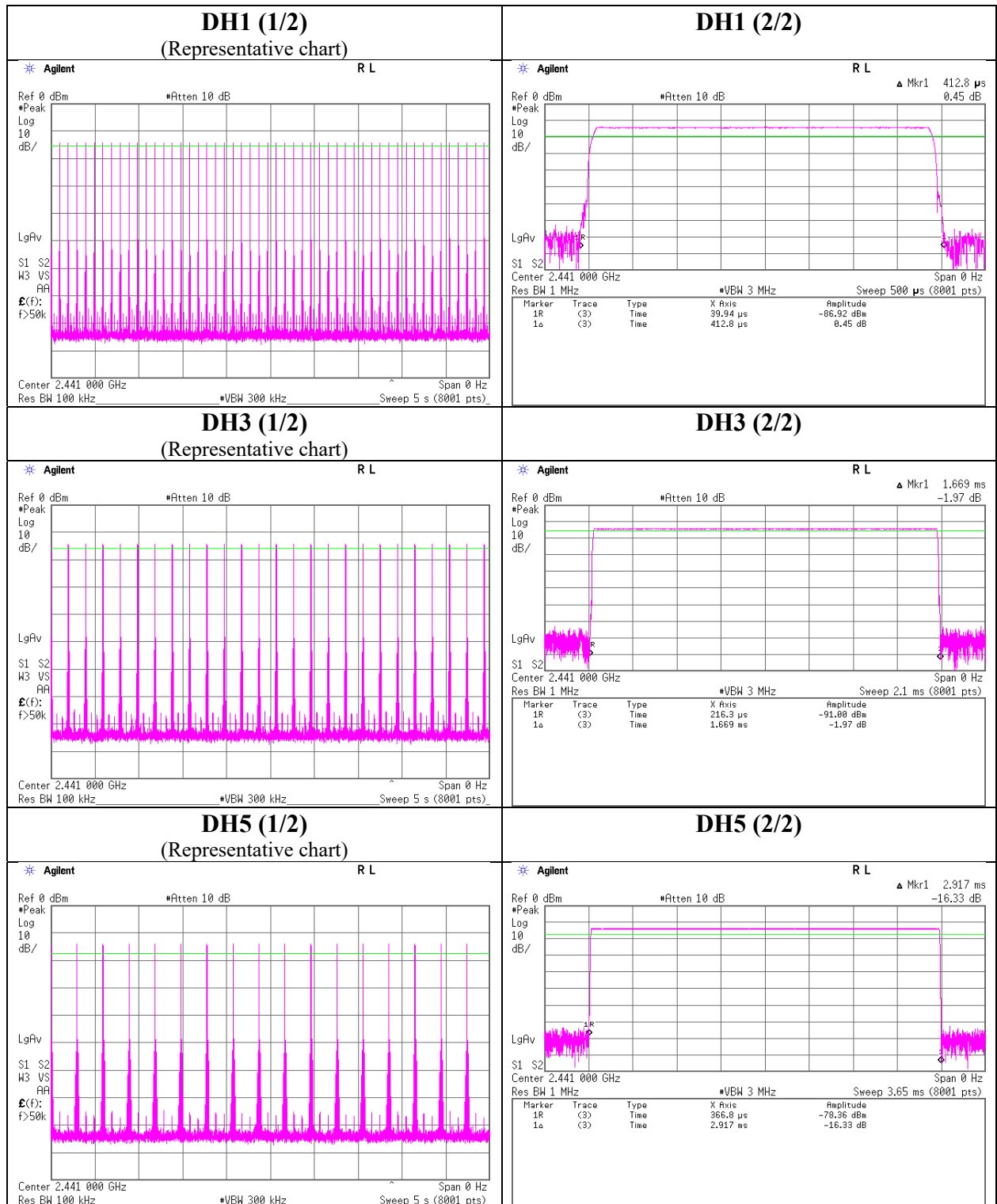
Mode	Sampling [times]					Average [times]
	1	2	3	4	5	
DH1	51	51	51	51	51	51
DH3	26	26	26	26	26	26
DH5	17	17	17	17	17	17
3DH1	51	51	51	51	51	51
3DH3	26	26	26	26	26	26
3DH5	17	17	17	17	17	17

Sample Calculation

Average = Summation (Sampling 1 to 5) / 5

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

Dwell time



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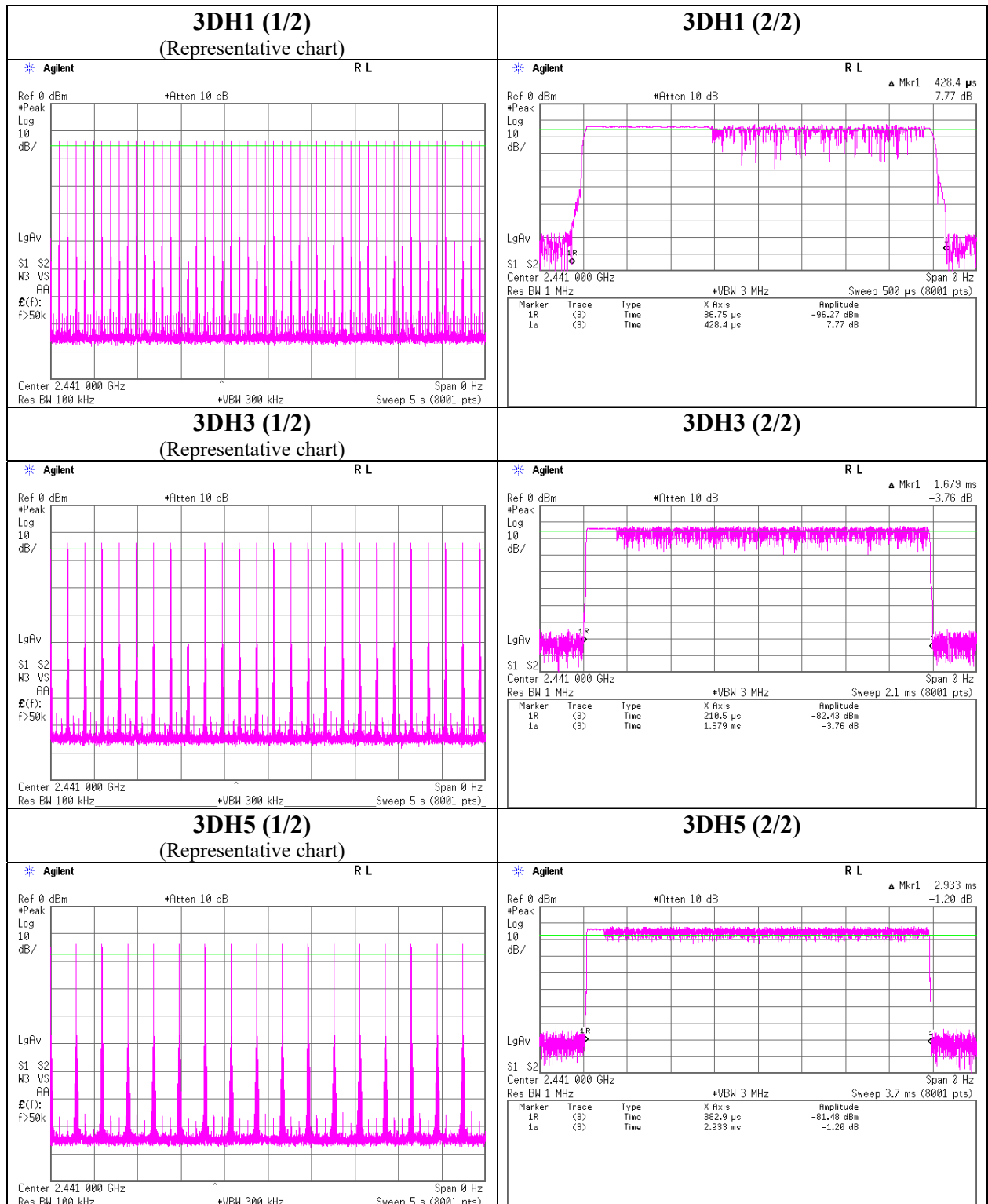
Shonan EMC Lab.

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Facsimile : +81 463 50 6401

Dwell time



UL Japan, Inc.

Shonan EMC Lab.

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

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Maximum Peak Output Power

Report No. 13540585S-A-R1
Test place Shonan EMC Lab. No.5 Shielded Room
Date October 15, 2020
Temperature / Humidity 23 deg. C / 57 % RH
Engineer Yosuke Murakami
Mode Tx, Hopping Off

Mode	Freq.	Reading	Cable Loss	Atten. Loss	Conducted Power					e.i.r.p. for RSS-247								
					Result		Limit		Margin	Antenna Gain	Result		Limit		Margin			
					[dBm]	[mW]	[dBm]	[mW]			[dB]	[dBi]	[dBm]	[mW]		[dBm]	[mW]	[dB]
DH5	2402.0	-13.14	1.04	10.18	-1.92	0.64	20.96	125	22.88	-0.63	-2.55	0.56	36.02	4000	38.57			
DH5	2441.0	-12.88	1.04	10.18	-1.66	0.68	20.96	125	22.62	-0.63	-2.29	0.59	36.02	4000	38.31			
DH5	2480.0	-13.54	1.05	10.18	-2.31	0.59	20.96	125	23.27	-0.63	-2.94	0.51	36.02	4000	38.96			
2DH5	2402.0	-11.91	1.04	10.18	-0.69	0.85	20.96	125	21.65	-0.63	-1.32	0.74	36.02	4000	37.34			
2DH5	2441.0	-11.92	1.04	10.18	-0.70	0.85	20.96	125	21.66	-0.63	-1.33	0.74	36.02	4000	37.35			
2DH5	2480.0	-12.42	1.05	10.18	-1.19	0.76	20.96	125	22.15	-0.63	-1.82	0.66	36.02	4000	37.84			
3DH5	2402.0	-11.58	1.04	10.18	-0.36	0.92	20.96	125	21.32	-0.63	-0.99	0.80	36.02	4000	37.01			
3DH5	2441.0	-11.57	1.04	10.18	-0.35	0.92	20.96	125	21.31	-0.63	-0.98	0.80	36.02	4000	37.00			
3DH5	2480.0	-12.00	1.05	10.18	-0.77	0.84	20.96	125	21.73	-0.63	-1.40	0.72	36.02	4000	37.42			

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.

However, the limit level 125mW of AFH mode was used for the test.

Average Output Power
(Reference data for RF Exposure)

Report No. 13540585S-A-R1
Test place Shonan EMC Lab. No.5 Shielded Room
Date October 15, 2020
Temperature / Humidity 23 deg. C / 57 % RH
Engineer Yosuke Murakami
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	-15.34	1.04	10.18	-4.12	0.39	1.10	-3.02	0.50
DH5	2441.0	-15.10	1.04	10.18	-3.88	0.41	1.10	-2.78	0.53
DH5	2480.0	-15.79	1.05	10.18	-4.56	0.35	1.10	-3.46	0.45
2DH5	2402.0	-16.09	1.04	10.18	-4.87	0.33	1.07	-3.80	0.42
2DH5	2441.0	-16.12	1.04	10.18	-4.90	0.32	1.07	-3.83	0.41
2DH5	2480.0	-16.67	1.05	10.18	-5.44	0.29	1.07	-4.37	0.37
3DH5	2402.0	-16.06	1.04	10.18	-4.84	0.33	1.07	-3.77	0.42
3DH5	2441.0	-16.10	1.04	10.18	-4.88	0.33	1.07	-3.81	0.42
3DH5	2480.0	-16.64	1.05	10.18	-5.41	0.29	1.07	-4.34	0.37

Sample Calculation:

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

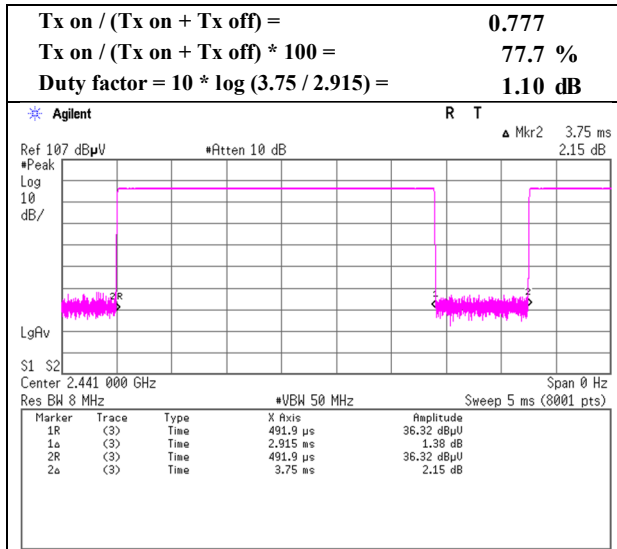
Result (Burst power average) = Time average + Duty factor

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

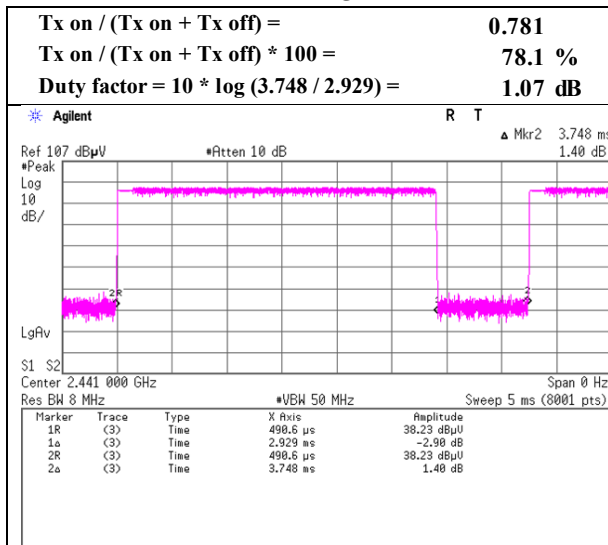
Burst Rate Confirmation

Report No. 13540585S-A-R1
Test place Shonan EMC Lab. No.5 Shielded Room
Date October 15, 2020
Temperature / Humidity 23 deg. C / 57 % RH
Engineer Yosuke Murakami
Mode Tx, Hopping Off

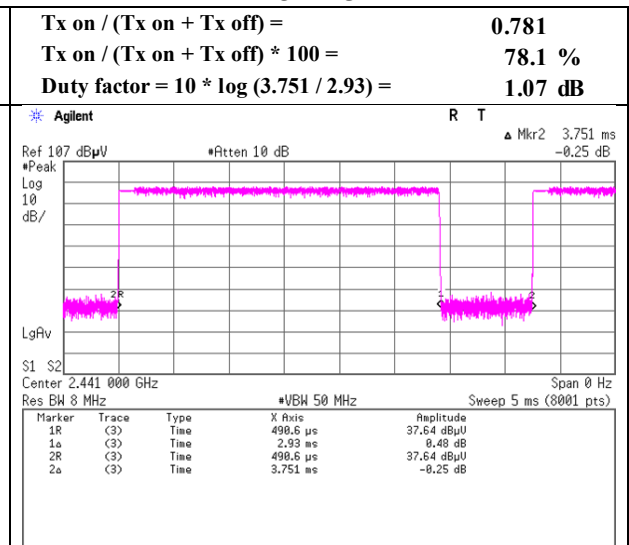
DH5



2DH5



3DH5



Radiated Spurious Emission

Report No.	13540585S-A-R1		
Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	No.1	No.3	No.3
Date	October 17, 2020	October 18, 2020	October 17, 2020
Temperature / Humidity	20 deg. C / 45 % RH	23 deg. C / 46 % RH	23 deg. C / 45 % RH
Engineer	Yohsuke Matsuzawa	Yasumasa Owaki	Yohsuke Matsuzawa
	(30 MHz -1000 MHz)	(1 GHz -10 GHz)	(10 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.	83.079	QP	49.10	6.89	8.40	31.82	0.00	32.57	40.0	7.4	233	122	
Hori.	88.228	QP	44.30	7.88	8.41	31.82	0.00	28.77	43.5	14.7	335	139	
Hori.	99.701	QP	45.50	10.21	8.26	31.82	0.00	32.15	43.5	11.3	328	343	
Hori.	237.012	QP	49.60	11.49	6.10	31.77	0.00	35.42	46.0	10.5	135	10	
Hori.	355.508	QP	44.10	15.09	6.92	31.81	0.00	34.30	46.0	11.7	100	358	
Hori.	389.362	QP	50.60	15.39	7.13	31.85	0.00	41.27	46.0	4.7	100	1	
Hori.	960.261	QP	39.00	22.19	9.86	31.01	0.00	40.04	53.9	13.8	150	186	
Hori.	2375.827	PK	47.87	28.44	14.22	41.66	2.24	51.11	73.9	22.7	148	156	
Hori.	2390.000	PK	47.25	28.41	14.23	41.66	2.24	50.47	73.9	23.4	148	156	
Hori.	4804.000	PK	50.18	31.60	6.82	42.92	2.24	47.92	73.9	25.9	121	220	
Hori.	7206.000	PK	48.91	37.60	8.40	43.39	2.24	53.76	73.9	20.1	150	0	
Hori.	9608.000	PK	49.12	38.92	9.55	43.14	2.24	56.69	73.9	17.2	150	0	
Hori.	2375.827	AV	37.46	28.44	14.22	41.66	2.24	40.70	53.9	13.2	148	156	VBW: 360 Hz
Hori.	2390.000	AV	36.02	28.41	14.23	41.66	2.24	39.24	53.9	14.6	148	156	VBW: 360 Hz
Hori.	4804.000	AV	41.39	31.60	6.82	42.92	2.24	39.13	53.9	14.7	121	220	VBW: 360 Hz
Hori.	7206.000	AV	37.90	37.60	8.40	43.39	2.24	42.75	53.9	11.1	150	0	VBW: 360 Hz
Hori.	9608.000	AV	37.97	38.92	9.55	43.14	2.24	45.54	53.9	8.3	150	0	VBW: 360 Hz
Vert.	99.696	QP	42.50	10.21	8.26	31.82	0.00	29.15	43.5	14.3	100	231	
Vert.	495.000	QP	42.00	17.67	7.71	31.95	0.00	35.43	46.0	10.5	100	137	
Vert.	524.797	QP	41.00	17.60	7.88	32.02	0.00	34.46	46.0	11.5	100	124	
Vert.	2375.817	PK	47.78	28.44	14.22	41.66	2.24	51.02	73.9	22.8	149	199	
Vert.	2390.000	PK	47.24	28.41	14.23	41.66	2.24	50.46	73.9	23.4	149	199	
Vert.	4804.000	PK	51.03	31.60	6.82	42.92	2.24	48.77	73.9	25.1	153	198	
Vert.	7206.000	PK	49.06	37.60	8.40	43.39	2.24	53.91	73.9	19.9	150	0	
Vert.	9608.000	PK	49.00	38.92	9.55	43.14	2.24	56.57	73.9	17.3	150	0	
Vert.	2375.817	AV	36.76	28.44	14.22	41.66	2.24	40.00	53.9	13.9	149	199	VBW: 360 Hz
Vert.	2390.000	AV	36.00	28.41	14.23	41.66	2.24	39.22	53.9	14.6	149	199	VBW: 360 Hz
Vert.	4804.000	AV	43.00	31.60	6.82	42.92	2.24	40.74	53.9	13.1	153	198	VBW: 360 Hz
Vert.	7206.000	AV	37.79	37.60	8.40	43.39	2.24	42.64	53.9	11.2	150	0	VBW: 360 Hz
Vert.	9608.000	AV	37.90	38.92	9.55	43.14	2.24	45.47	53.9	8.4	150	0	VBW: 360 Hz

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

Distance factor : 1 GHz - 10 GHz : $20\log(3.88\text{ m} / 3.0\text{ m}) = 2.24\text{ dB}$

10 GHz - 26.5 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	80.39	28.38	14.24	41.67	2.24	83.58	-	-	Carrier
Hori.	2400.000	PK	38.84	28.38	14.23	41.67	2.24	42.02	63.58	21.5	
Vert.	2402.000	PK	81.29	28.38	14.24	41.67	2.24	84.48	-	-	Carrier
Vert.	2400.000	PK	38.52	28.38	14.23	41.67	2.24	41.70	64.48	22.7	

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

Distance factor : 1 GHz - 10 GHz : $20\log(3.88\text{ m} / 3.0\text{ m}) = 2.24\text{ dB}$

10 GHz - 26.5 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

UL Japan, Inc.

Shonan EMC Lab.

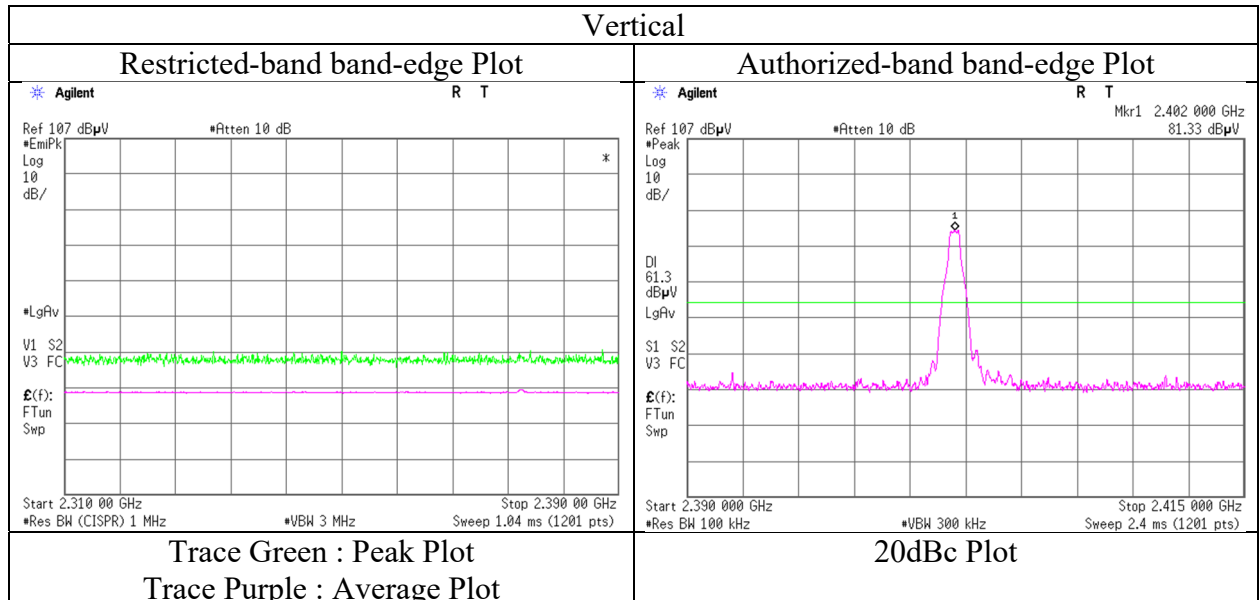
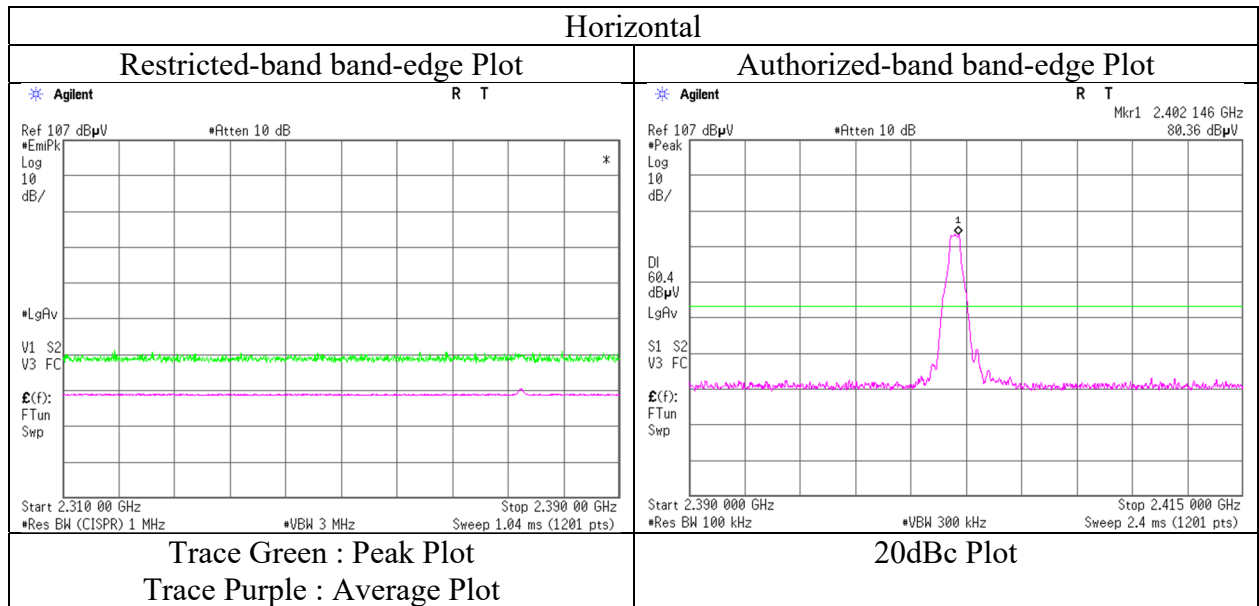
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

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Radiated Spurious Emission (Reference Plot for band-edge)

Report No.	13540585S-A-R1
Test place	Shonan EMC Lab.
Semi Anechoic Chamber	No.3
Date	October 18, 2020
Temperature / Humidity	23 deg. C / 46 % RH
Engineer	Yasumasa Owaki (1 GHz -10 GHz)
Mode	Tx, Hopping Off, DH5 2402 MHz



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

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

UL Japan, Inc.

Shonan EMC Lab.

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

Telephone : +81 463 50 6400

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Radiated Spurious Emission

Report No.	13540585S-A-R1		
Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	No.1	No.3	No.3
Date	October 17, 2020	October 18, 2020	October 17, 2020
Temperature / Humidity	20 deg. C / 45 % RH	23 deg. C / 46 % RH	23 deg. C / 45 % RH
Engineer	Yohsuke Matsuzawa	Yasumasa Owaki	Yohsuke Matsuzawa
	(30 MHz -1000 MHz)	(1 GHz -10 GHz)	(10 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.	83.075	QP	49.00	6.89	8.40	31.82	0.00	32.47	40.00	7.5	230	120	
Hori.	88.235	QP	44.50	7.88	8.41	31.82	0.00	28.97	43.50	14.5	330	140	
Hori.	99.691	QP	45.60	10.21	8.26	31.82	0.00	32.25	43.50	11.2	330	342	
Hori.	237.003	QP	50.00	11.49	6.10	31.77	0.00	35.82	46.00	10.1	135	11	
Hori.	365.536	QP	45.00	15.06	6.98	31.82	0.00	35.22	46.00	10.7	100	1	
Hori.	389.365	QP	50.50	15.39	7.13	31.85	0.00	41.17	46.00	4.8	100	359	
Hori.	960.257	QP	39.30	22.19	9.86	31.01	0.00	40.34	53.90	13.5	151	181	
Hori.	4882.000	PK	50.26	31.63	6.87	42.93	2.24	48.07	73.90	25.8	100	219	
Hori.	7323.000	PK	47.25	37.71	8.47	43.49	2.24	52.18	73.90	21.7	150	0	
Hori.	9764.000	PK	47.13	39.19	9.65	42.96	2.24	55.25	73.90	18.6	150	0	
Hori.	4882.000	AV	41.41	31.63	6.87	42.93	2.24	39.22	53.90	14.6	100	219	VBW: 360 Hz
Hori.	7323.000	AV	36.79	37.71	8.47	43.49	2.24	41.72	53.90	12.1	150	0	VBW: 360 Hz
Hori.	9764.000	AV	36.52	39.19	9.65	42.96	2.24	44.64	53.90	9.2	150	0	VBW: 360 Hz
Vert.	99.696	QP	42.60	10.21	8.26	31.82	0.00	29.25	43.50	14.2	100	230	
Vert.	495.000	QP	42.00	17.67	7.71	31.95	0.00	35.43	46.00	10.5	100	138	
Vert.	524.793	QP	41.20	17.60	7.88	32.02	0.00	34.66	46.00	11.3	100	120	
Vert.	4882.000	PK	51.02	31.63	6.87	42.93	2.24	48.83	73.90	25.0	117	199	
Vert.	7323.000	PK	49.17	37.71	8.47	43.49	2.24	54.10	73.90	19.8	150	0	
Vert.	9764.000	PK	47.73	39.19	9.65	42.96	2.24	55.85	73.90	18.0	150	0	
Vert.	4882.000	AV	42.29	31.63	6.87	42.93	2.24	40.10	53.90	13.8	117	199	VBW: 360 Hz
Vert.	7323.000	AV	36.94	37.71	8.47	43.49	2.24	41.87	53.90	12.0	150	0	VBW: 360 Hz
Vert.	9764.000	AV	36.46	39.19	9.65	42.96	2.24	44.58	53.90	9.3	150	0	VBW: 360 Hz

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

Distance factor : 1 GHz - 10 GHz : $20\log(3.88 \text{ m} / 3.0 \text{ m}) = 2.24 \text{ dB}$

10 GHz - 26.5 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.	13540585S-A-R1		
Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	No.1	No.3	No.3
Date	October 17, 2020	October 18, 2020	October 17, 2020
Temperature / Humidity	20 deg. C / 45 % RH	23 deg. C / 46 % RH	23 deg. C / 45 % RH
Engineer	Yohsuke Matsuzawa	Yasumasa Owaki	Yohsuke Matsuzawa
	(30 MHz -1000 MHz)	(1 GHz -10 GHz)	(10 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.	83.079	QP	49.50	6.89	8.40	31.82	0.00	32.97	40.00	7.0	235	123	
Hori.	88.227	QP	44.50	7.88	8.41	31.82	0.00	28.97	43.50	14.5	330	141	
Hori.	99.697	QP	45.80	10.21	8.26	31.82	0.00	32.45	43.50	11.0	331	340	
Hori.	237.002	QP	49.50	11.49	6.10	31.77	0.00	35.32	46.00	10.6	136	10	
Hori.	365.540	QP	45.20	15.06	6.98	31.82	0.00	35.42	46.00	10.5	100	1	
Hori.	389.364	QP	50.50	15.39	7.13	31.85	0.00	41.17	46.00	4.8	100	359	
Hori.	960.260	QP	39.00	22.19	9.86	31.01	0.00	40.04	53.90	13.8	150	185	
Hori.	2483.500	PK	47.37	28.28	14.32	41.69	2.24	50.52	73.90	23.3	110	239	
Hori.	4960.000	PK	49.24	31.79	6.94	42.94	2.24	47.27	73.90	26.6	181	235	
Hori.	7440.000	PK	47.43	37.88	8.54	43.60	2.24	52.49	73.90	21.4	150	0	
Hori.	9920.000	PK	46.78	39.05	9.73	42.78	2.24	55.02	73.90	18.8	150	0	
Hori.	2483.500	AV	35.69	28.28	14.32	41.69	2.24	38.84	53.90	15.0	110	239	VBW: 360 Hz
Hori.	4960.000	AV	38.59	31.79	6.94	42.94	2.24	36.62	53.90	17.2	181	235	VBW: 360 Hz
Hori.	7440.000	AV	36.40	37.88	8.54	43.60	2.24	41.46	53.90	12.4	150	0	VBW: 360 Hz
Hori.	9920.000	AV	35.65	39.05	9.73	42.78	2.24	43.89	53.90	10.0	150	0	VBW: 360 Hz
Vert.	99.700	QP	42.30	10.21	8.26	31.82	0.00	28.95	43.50	14.5	100	232	
Vert.	495.000	QP	42.30	17.67	7.71	31.95	0.00	35.73	46.00	10.2	100	140	
Vert.	524.793	QP	41.10	17.60	7.88	32.02	0.00	34.56	46.00	11.4	100	125	
Vert.	2483.500	PK	47.31	28.28	14.32	41.69	2.24	50.46	73.90	23.4	157	137	
Vert.	4960.000	PK	49.18	31.79	6.94	42.94	2.24	47.21	73.90	26.6	246	226	
Vert.	7440.000	PK	47.34	37.88	8.54	43.60	2.24	52.40	73.90	21.5	150	0	
Vert.	9920.000	PK	46.78	39.05	9.73	42.78	2.24	55.02	73.90	18.8	150	0	
Vert.	2483.500	AV	35.57	28.28	14.32	41.69	2.24	38.72	53.90	15.1	157	137	VBW: 360 Hz
Vert.	4960.000	AV	40.26	31.79	6.94	42.94	2.24	38.29	53.90	15.6	246	226	VBW: 360 Hz
Vert.	7440.000	AV	36.41	37.88	8.54	43.60	2.24	41.47	53.90	12.4	150	0	VBW: 360 Hz
Vert.	9920.000	AV	35.68	39.05	9.73	42.78	2.24	43.92	53.90	9.9	150	0	VBW: 360 Hz

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

Distance factor : 1 GHz - 10 GHz : $20\log(3.88\text{ m} / 3.0\text{ m}) = 2.24\text{ dB}$

10 GHz - 26.5 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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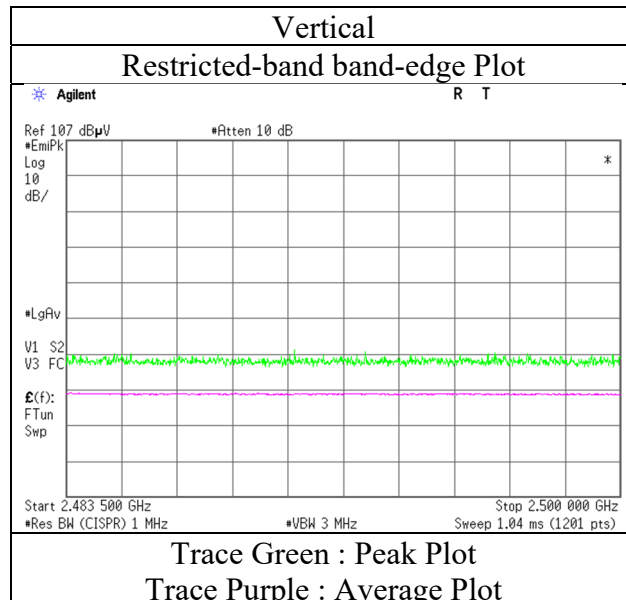
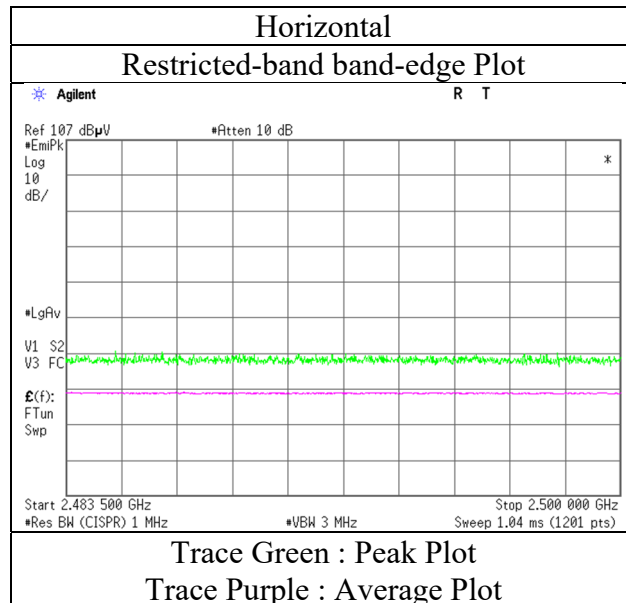
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Radiated Spurious Emission (Reference Plot for band-edge)

Report No.	13540585S-A-R1
Test place	Shonan EMC Lab.
Semi Anechoic Chamber	No.3
Date	October 18, 2020
Temperature / Humidity	23 deg. C / 46 % RH
Engineer	Yasumasa Owaki (1 GHz -10 GHz)
Mode	Tx, Hopping Off, DH5 2480 MHz



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

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

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Radiated Spurious Emission

Report No.	13540585S-A-R1		
Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	No.1	No.3	No.3
Date	October 17, 2020	October 18, 2020	October 17, 2020
Temperature / Humidity	20 deg. C / 45 % RH	23 deg. C / 46 % RH	23 deg. C / 45 % RH
Engineer	Yohsuke Matsuzawa (30 MHz -1000 MHz)	Yasumasa Owaki (1 GHz -10 GHz)	Yohsuke Matsuzawa (10 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.	83.080	QP	49.60	6.89	8.40	31.82	0.00	33.07	40.00	6.9	135	122	
Hori.	88.236	QP	44.50	7.88	8.41	31.82	0.00	28.97	43.50	14.5	330	140	
Hori.	99.698	QP	45.70	10.21	8.26	31.82	0.00	32.35	43.50	11.1	326	340	
Hori.	237.005	QP	49.00	11.49	6.10	31.77	0.00	34.82	46.00	11.1	136	11	
Hori.	365.533	QP	45.80	15.06	6.98	31.82	0.00	36.02	46.00	9.9	100	359	
Hori.	389.360	QP	49.80	15.39	7.13	31.85	0.00	40.47	46.00	5.5	100	44	
Hori.	960.259	QP	39.00	22.19	9.86	31.01	0.00	40.04	53.90	13.8	151	187	
Hori.	2375.868	PK	47.76	28.44	14.22	41.66	2.24	51.00	73.90	22.9	149	158	
Hori.	2390.000	PK	47.47	28.41	14.23	41.66	2.24	50.69	73.90	23.2	149	158	
Hori.	4804.000	PK	50.28	31.60	6.82	42.92	2.24	48.02	73.90	25.8	120	220	
Hori.	7206.000	PK	48.49	37.60	8.40	43.39	2.24	53.34	73.90	20.5	150	0	
Hori.	9608.000	PK	49.27	38.92	9.55	43.14	2.24	56.84	73.90	17.0	150	0	
Hori.	2375.868	AV	37.91	28.44	14.22	41.66	2.24	41.15	53.90	12.7	149	158	VBW: 360 Hz
Hori.	2390.000	AV	35.99	28.41	14.23	41.66	2.24	39.21	53.90	14.6	149	158	VBW: 360 Hz
Hori.	4804.000	AV	38.56	31.60	6.82	42.92	2.24	36.30	53.90	17.6	120	220	VBW: 360 Hz
Hori.	7206.000	AV	37.93	37.60	8.40	43.39	2.24	42.78	53.90	11.1	150	0	VBW: 360 Hz
Hori.	9608.000	AV	37.89	38.92	9.55	43.14	2.24	45.46	53.90	8.4	150	0	VBW: 360 Hz
Vert.	99.698	QP	42.70	10.21	8.26	31.82	0.00	29.35	43.50	14.1	100	232	
Vert.	495.011	QP	41.60	17.67	7.71	31.95	0.00	35.03	46.00	10.9	100	136	
Vert.	524.795	QP	41.00	17.60	7.88	32.02	0.00	34.46	46.00	11.5	100	125	
Vert.	2375.906	PK	47.78	28.44	14.22	41.66	2.24	51.02	73.90	22.8	146	200	
Vert.	2390.000	PK	47.07	28.41	14.23	41.66	2.24	50.29	73.90	23.6	146	200	
Vert.	4804.000	PK	49.90	31.60	6.82	42.92	2.24	47.64	73.90	26.2	153	198	
Vert.	7206.000	PK	49.21	37.60	8.40	43.39	2.24	54.06	73.90	19.8	150	0	
Vert.	9608.000	PK	48.89	38.92	9.55	43.14	2.24	56.46	73.90	17.4	150	0	
Vert.	2375.906	AV	36.41	28.44	14.22	41.66	2.24	39.65	53.90	14.2	146	200	VBW: 360 Hz
Vert.	2390.000	AV	35.47	28.41	14.23	41.66	2.24	38.69	53.90	15.2	146	200	VBW: 360 Hz
Vert.	4804.000	AV	39.85	31.60	6.82	42.92	2.24	37.59	53.90	16.3	153	198	VBW: 360 Hz
Vert.	7206.000	AV	37.74	37.60	8.40	43.39	2.24	42.59	53.90	11.3	150	0	VBW: 360 Hz
Vert.	9608.000	AV	38.03	38.92	9.55	43.14	2.24	45.60	53.90	8.3	150	0	VBW: 360 Hz

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

Distance factor : 1 GHz - 10 GHz : $20\log(3.88 \text{ m} / 3.0 \text{ m}) = 2.24 \text{ dB}$

10 GHz - 26.5 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	82.46	28.38	14.24	41.67	2.24	85.65	-	-	Carrier
Hori.	2400.000	PK	38.24	28.38	14.23	41.67	2.24	41.42	65.65	24.2	
Vert.	2402.000	PK	81.63	28.38	14.24	41.67	2.24	84.82	-	-	Carrier
Vert.	2400.000	PK	38.28	28.38	14.23	41.67	2.24	41.46	64.82	23.3	

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

Distance factor : 1 GHz - 10 GHz : $20\log(3.88 \text{ m} / 3.0 \text{ m}) = 2.24 \text{ dB}$

10 GHz - 26.5 GHz : $20\log(1.0 \text{ m} / 3.0 \text{ m}) = -9.54 \text{ dB}$

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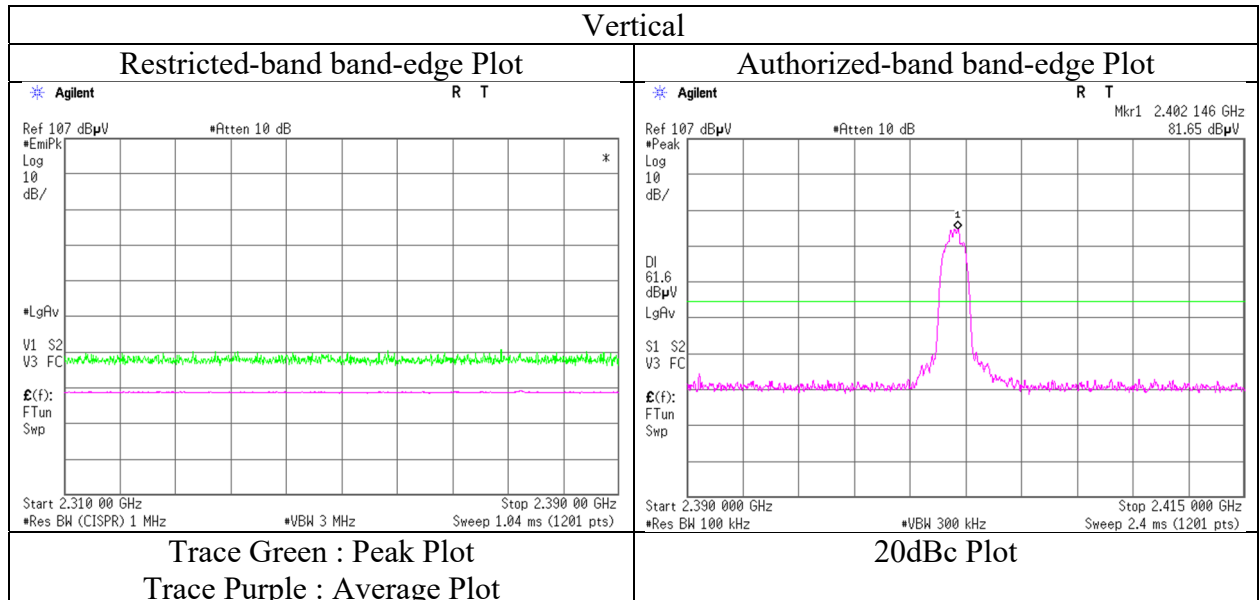
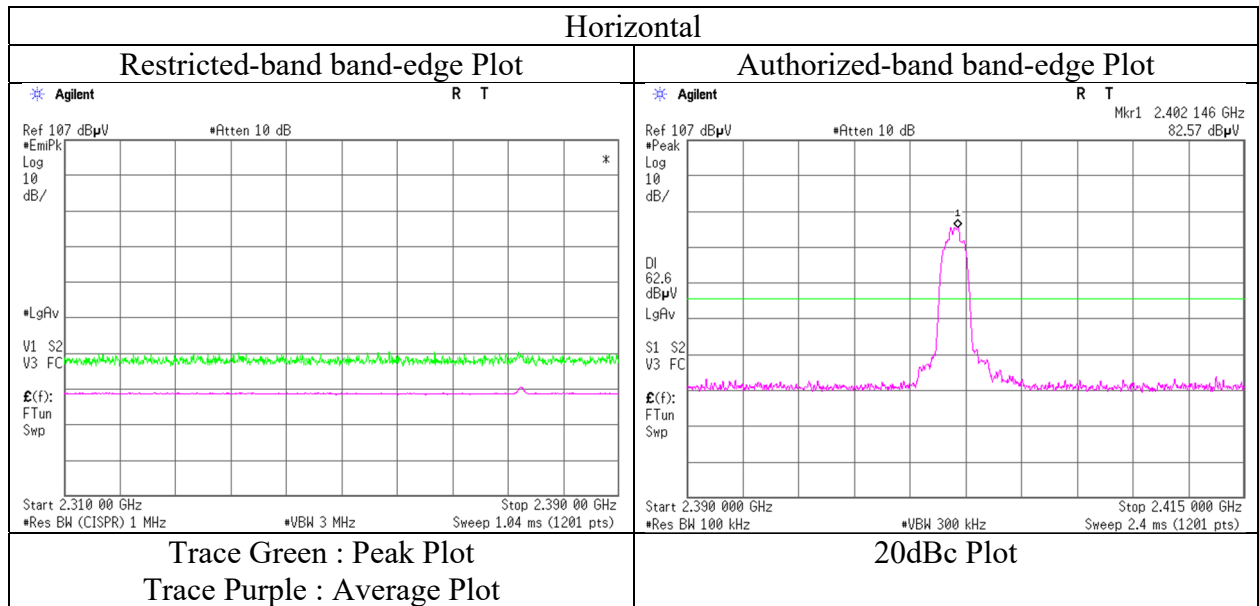
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Radiated Spurious Emission (Reference Plot for band-edge)

Report No.	13540585S-A-R1
Test place	Shonan EMC Lab.
Semi Anechoic Chamber	No.3
Date	October 18, 2020
Temperature / Humidity	23 deg. C / 46 % RH
Engineer	Yasumasa Owaki
	(1 GHz -10 GHz)
Mode	Tx, Hopping Off, 3DH5 2402 MHz



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

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

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Radiated Spurious Emission

Report No.	13540585S-A-R1		
Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	No.1	No.3	No.3
Date	October 17, 2020	October 18, 2020	October 17, 2020
Temperature / Humidity	20 deg. C / 45 % RH	23 deg. C / 46 % RH	23 deg. C / 45 % RH
Engineer	Yohsuke Matsuzawa	Yasumasa Owaki	Yohsuke Matsuzawa
	(30 MHz -1000 MHz)	(1 GHz -10 GHz)	(10 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.	83.076	QP	50.10	6.89	8.40	31.82	0.00	33.57	40.00	6.4	232	121	
Hori.	88.241	QP	44.60	7.89	8.41	31.82	0.00	29.08	43.50	14.4	330	143	
Hori.	99.691	QP	45.70	10.21	8.26	31.82	0.00	32.35	43.50	11.1	330	341	
Hori.	237.007	QP	48.70	11.49	6.10	31.77	0.00	34.52	46.00	11.4	136	8	
Hori.	365.532	QP	46.20	15.06	6.98	31.82	0.00	36.42	46.00	9.5	100	357	
Hori.	389.366	QP	49.30	15.39	7.13	31.85	0.00	39.97	46.00	6.0	100	45	
Hori.	960.262	QP	39.50	22.19	9.86	31.01	0.00	40.54	53.90	13.3	151	187	
Hori.	4882.000	PK	49.02	31.63	6.87	42.93	2.24	46.83	73.90	27.0	100	220	
Hori.	7323.000	PK	48.32	37.71	8.47	43.49	2.24	53.25	73.90	20.6	150	0	
Hori.	9764.000	PK	47.88	39.19	9.65	42.96	2.24	56.00	73.90	17.9	150	0	
Hori.	4882.000	AV	38.48	31.63	6.87	42.93	2.24	36.29	53.90	17.6	100	220	VBW: 360 Hz
Hori.	7323.000	AV	36.83	37.71	8.47	43.49	2.24	41.76	53.90	12.1	150	0	VBW: 360 Hz
Hori.	9764.000	AV	36.48	39.19	9.65	42.96	2.24	44.60	53.90	9.3	150	0	VBW: 360 Hz
Vert.	99.698	QP	42.70	10.21	8.26	31.82	0.00	29.35	43.50	14.1	100	230	
Vert.	495.010	QP	41.60	17.67	7.71	31.95	0.00	35.03	46.00	10.9	100	142	
Vert.	524.795	QP	40.60	17.60	7.88	32.02	0.00	34.06	46.00	11.9	100	121	
Vert.	4882.000	PK	49.40	31.63	6.87	42.93	2.24	47.21	73.90	26.6	111	200	
Vert.	7323.000	PK	48.23	37.71	8.47	43.49	2.24	53.16	73.90	20.7	150	0	
Vert.	9764.000	PK	48.00	39.19	9.65	42.96	2.24	56.12	73.90	17.7	150	0	
Vert.	4882.000	AV	38.85	31.63	6.87	42.93	2.24	36.66	53.90	17.2	111	200	VBW: 360 Hz
Vert.	7323.000	AV	36.83	37.71	8.47	43.49	2.24	41.76	53.90	12.1	150	0	VBW: 360 Hz
Vert.	9764.000	AV	36.54	39.19	9.65	42.96	2.24	44.66	53.90	9.2	150	0	VBW: 360 Hz

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

Distance factor : 1 GHz - 10 GHz : $20\log(3.88\text{ m} / 3.0\text{ m}) = 2.24\text{ dB}$

10 GHz - 26.5 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.	13540585S-A-R1		
Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	No.1	No.3	No.3
Date	October 17, 2020	October 18, 2020	October 17, 2020
Temperature / Humidity	20 deg. C / 45 % RH	23 deg. C / 46 % RH	23 deg. C / 45 % RH
Engineer	Yohsuke Matsuzawa	Yasumasa Owaki	Yohsuke Matsuzawa
	(30 MHz -1000 MHz)	(1 GHz -10 GHz)	(10 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.	83.080	QP	45.60	6.89	8.40	31.82	0.00	29.07	40.00	10.9	135	120	
Hori.	88.251	QP	45.50	7.89	8.40	31.82	0.00	29.97	43.50	13.5	327	315	
Hori.	99.695	QP	46.30	10.21	8.26	31.82	0.00	32.95	43.50	10.5	330	338	
Hori.	234.190	QP	47.30	11.43	6.08	31.77	0.00	33.04	46.00	12.9	142	8	
Hori.	365.538	QP	45.00	15.06	6.98	31.82	0.00	35.22	46.00	10.7	100	357	
Hori.	389.365	QP	50.30	15.39	7.13	31.85	0.00	40.97	46.00	5.0	100	42	
Hori.	960.263	QP	39.00	22.19	9.86	31.01	0.00	40.04	53.90	13.8	144	180	
Hori.	2483.500	PK	48.23	28.28	14.32	41.69	2.24	51.38	73.90	22.5	111	240	
Hori.	4960.000	PK	48.62	31.79	6.94	42.94	2.24	46.65	73.90	27.2	179	219	
Hori.	7440.000	PK	47.40	37.88	8.54	43.60	2.24	52.46	73.90	21.4	150	0	
Hori.	9920.000	PK	46.92	39.05	9.73	42.78	2.24	55.16	73.90	18.7	150	0	
Hori.	2483.500	AV	35.55	28.28	14.32	41.69	2.24	38.70	53.90	15.2	111	240	VBW: 360 Hz
Hori.	4960.000	AV	37.61	31.79	6.94	42.94	2.24	35.64	53.90	18.2	179	219	VBW: 360 Hz
Hori.	7440.000	AV	36.42	37.88	8.54	43.60	2.24	41.48	53.90	12.4	150	0	VBW: 360 Hz
Hori.	9920.000	AV	35.71	39.05	9.73	42.78	2.24	43.95	53.90	9.9	150	0	VBW: 360 Hz
Vert.	99.698	QP	42.30	10.21	8.26	31.82	0.00	28.95	43.50	14.5	100	231	
Vert.	495.013	QP	42.20	17.67	7.71	31.95	0.00	35.63	46.00	10.3	100	135	
Vert.	524.794	QP	41.00	17.60	7.88	32.02	0.00	34.46	46.00	11.5	100	125	
Vert.	2483.500	PK	48.01	28.28	14.32	41.69	2.24	51.16	73.90	22.7	107	198	
Vert.	4960.000	PK	49.49	31.79	6.94	42.94	2.24	47.52	73.90	26.3	245	227	
Vert.	7440.000	PK	47.73	37.88	8.54	43.60	2.24	52.79	73.90	21.1	150	0	
Vert.	9920.000	PK	46.79	39.05	9.73	42.78	2.24	55.03	73.90	18.8	150	0	
Vert.	2483.500	AV	35.58	28.28	14.32	41.69	2.24	38.73	53.90	15.1	107	198	VBW: 360 Hz
Vert.	4960.000	AV	38.37	31.79	6.94	42.94	2.24	36.40	53.90	17.5	245	227	VBW: 360 Hz
Vert.	7440.000	AV	36.38	37.88	8.54	43.60	2.24	41.44	53.90	12.4	150	0	VBW: 360 Hz
Vert.	9920.000	AV	35.76	39.05	9.73	42.78	2.24	44.00	53.90	9.9	150	0	VBW: 360 Hz

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

Distance factor : 1 GHz - 10 GHz : $20\log(3.88\text{ m} / 3.0\text{ m}) = 2.24\text{ dB}$

10 GHz - 26.5 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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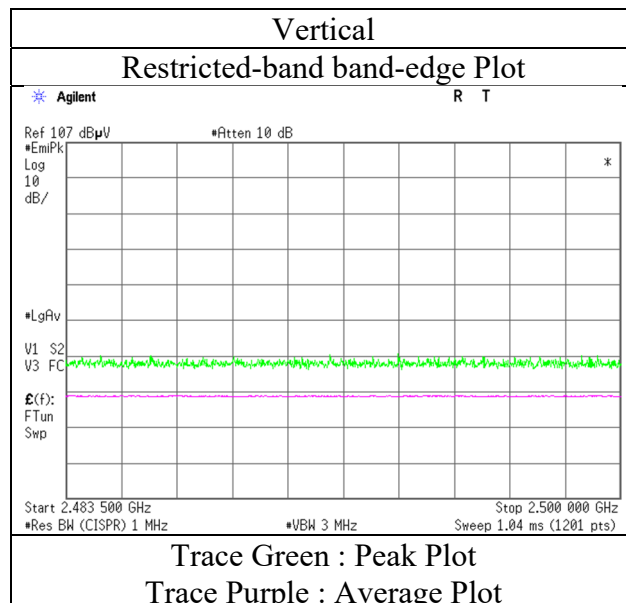
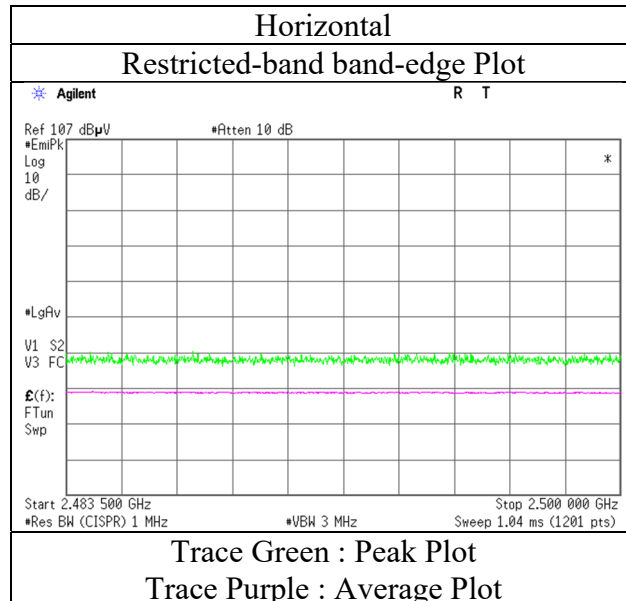
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

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Radiated Spurious Emission (Reference Plot for band-edge)

Report No.	13540585S-A-R1
Test place	Shonan EMC Lab.
Semi Anechoic Chamber	No.3
Date	October 18, 2020
Temperature / Humidity	23 deg. C / 46 % RH
Engineer	Yasumasa Owaki (1 GHz -10 GHz)
Mode	Tx, Hopping Off, 3DH5 2480 MHz



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

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

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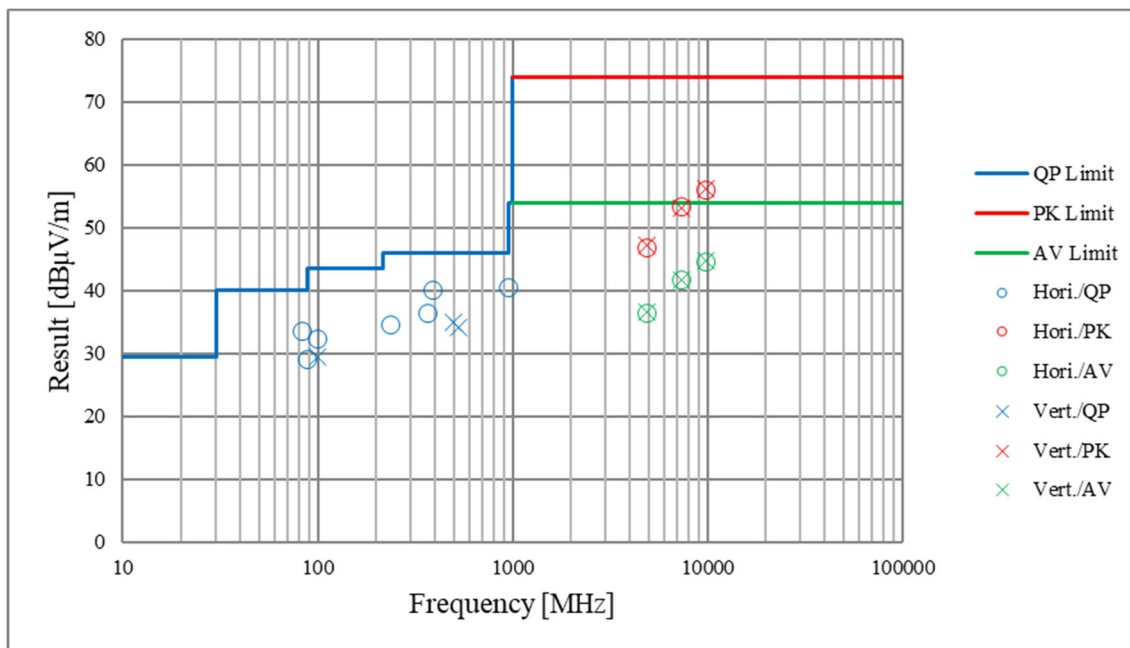
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

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Radiated Spurious Emission (Plot data, Worst case)

Report No.	13540585S-A-R1		
Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	No.1	No.3	No.3
Date	October 17, 2020	October 18, 2020	October 17, 2020
Temperature / Humidity	20 deg. C / 45 % RH	23 deg. C / 46 % RH	23 deg. C / 45 % RH
Engineer	Yohsuke Matsuzawa (30 MHz -1000 MHz)	Yasumasa Owaki (1 GHz -10 GHz)	Yohsuke Matsuzawa (10 GHz -26.5 GHz)
Mode	Tx, Hopping Off, 3DH5 2441 MHz		

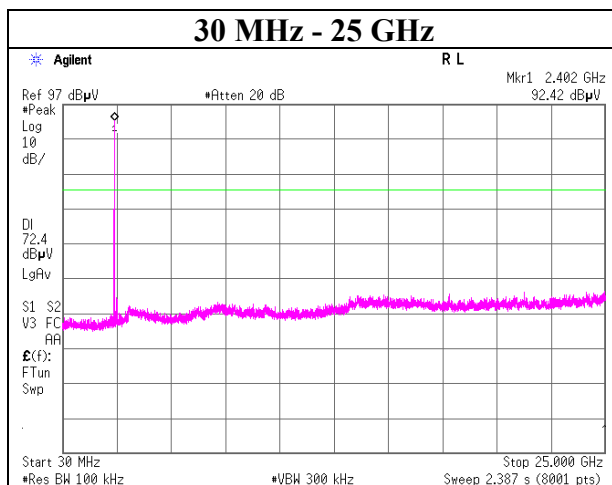
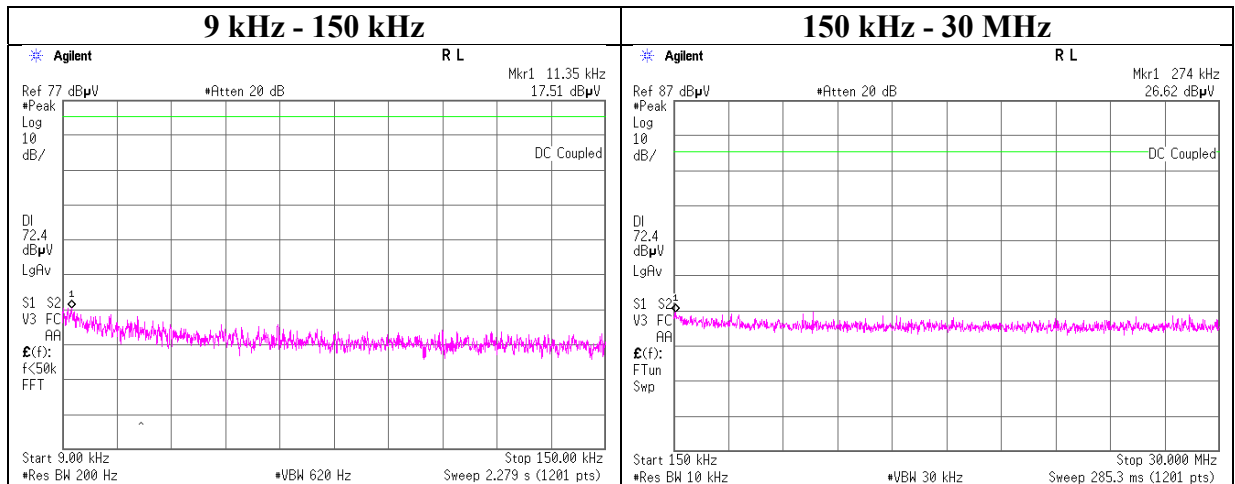


*These plots data contains sufficient number to show the trend of characteristic features for EUT.

Conducted Spurious Emission

Report No. 13540585S-A-R1
Test place Shonan EMC Lab. No.5 Shielded Room
Date October 15, 2020
Temperature / Humidity 23 deg. C / 57 % RH
Engineer Yosuke Murakami
Mode Tx, Hopping Off, DH5

2402 MHz



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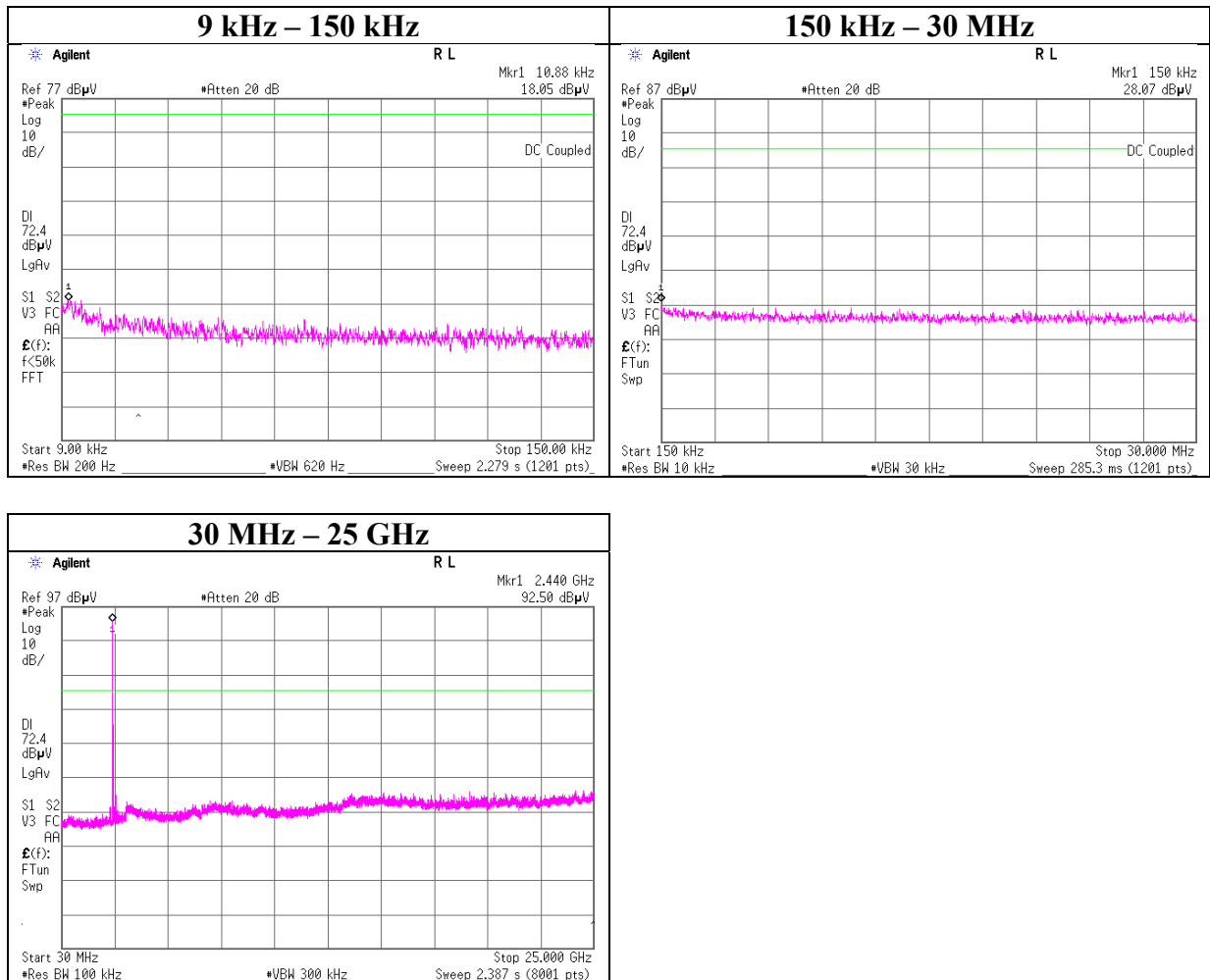
Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Conducted Spurious Emission

Report No. 13540585S-A-R1
Test place Shonan EMC Lab. No.5 Shielded Room
Date October 15, 2020
Temperature / Humidity 23 deg. C / 57 % RH
Engineer Yosuke Murakami
Mode Tx, Hopping Off, DH5

2441 MHz



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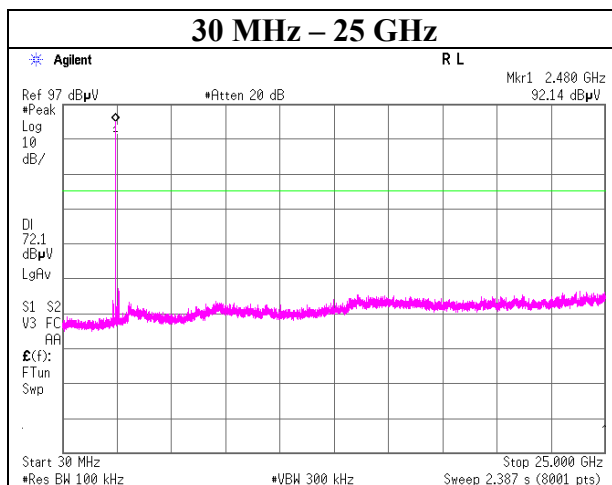
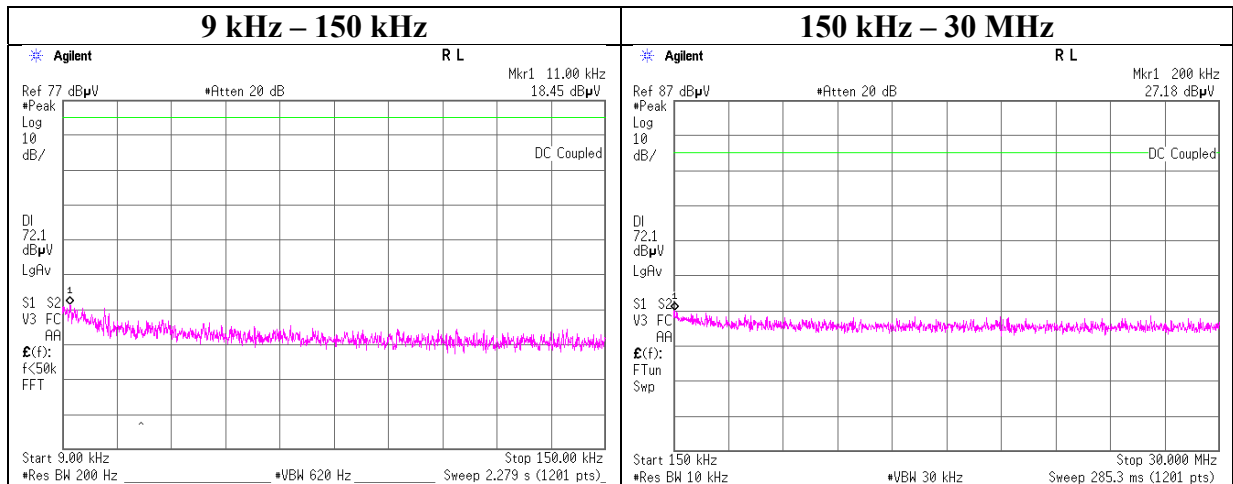
Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Conducted Spurious Emission

Report No. 13540585S-A-R1
Test place Shonan EMC Lab. No.5 Shielded Room
Date October 15, 2020
Temperature / Humidity 23 deg. C / 57 % RH
Engineer Yosuke Murakami
Mode Tx, Hopping Off, DH5

2480 MHz



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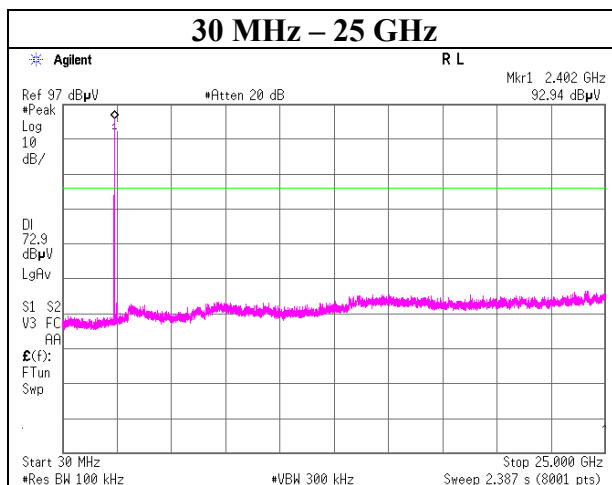
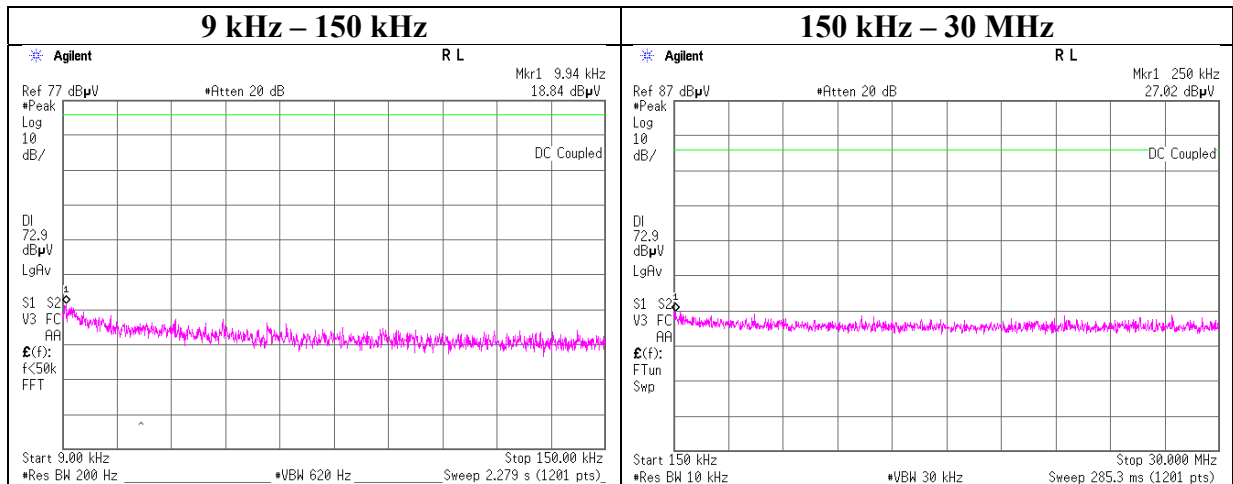
Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Conducted Spurious Emission

Report No. 13540585S-A-R1
Test place Shonan EMC Lab. No.5 Shielded Room
Date October 15, 2020
Temperature / Humidity 23 deg. C / 57 % RH
Engineer Yosuke Murakami
Mode Tx, Hopping Off, DH5

2402 MHz



UL Japan, Inc.

Shonan EMC Lab.

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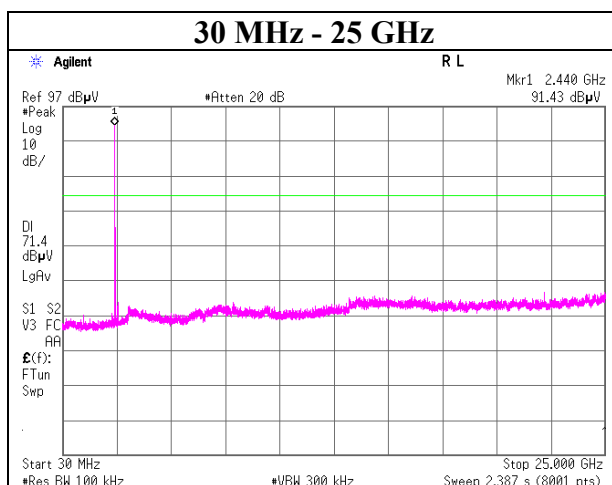
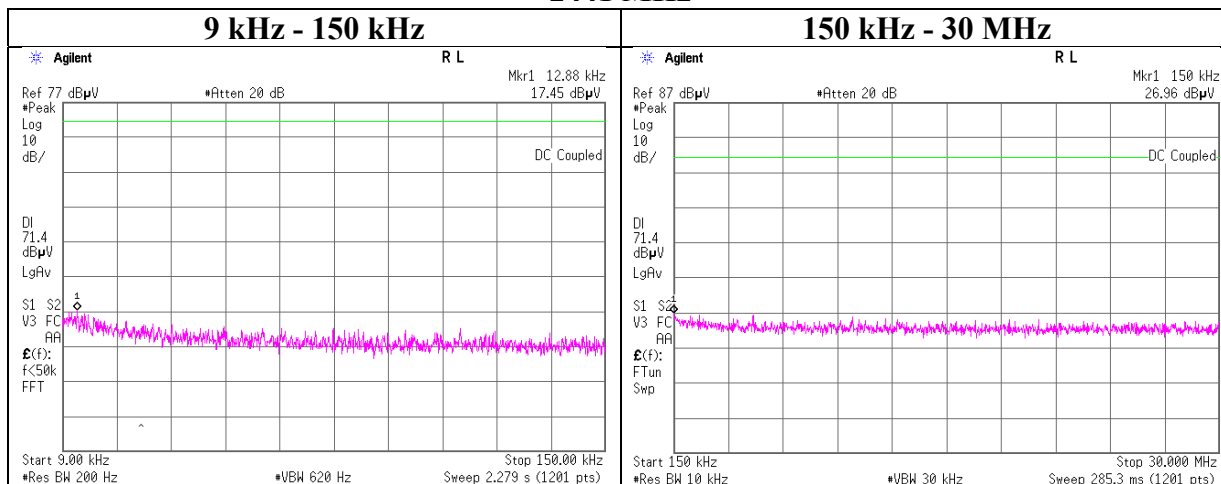
Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Conducted Spurious Emission

Report No. 13540585S-A-R1
Test place Shonan EMC Lab. No.5 Shielded Room
Date October 15, 2020
Temperature / Humidity 23 deg. C / 57 % RH
Engineer Yosuke Murakami
Mode Tx, Hopping Off, 3DH5

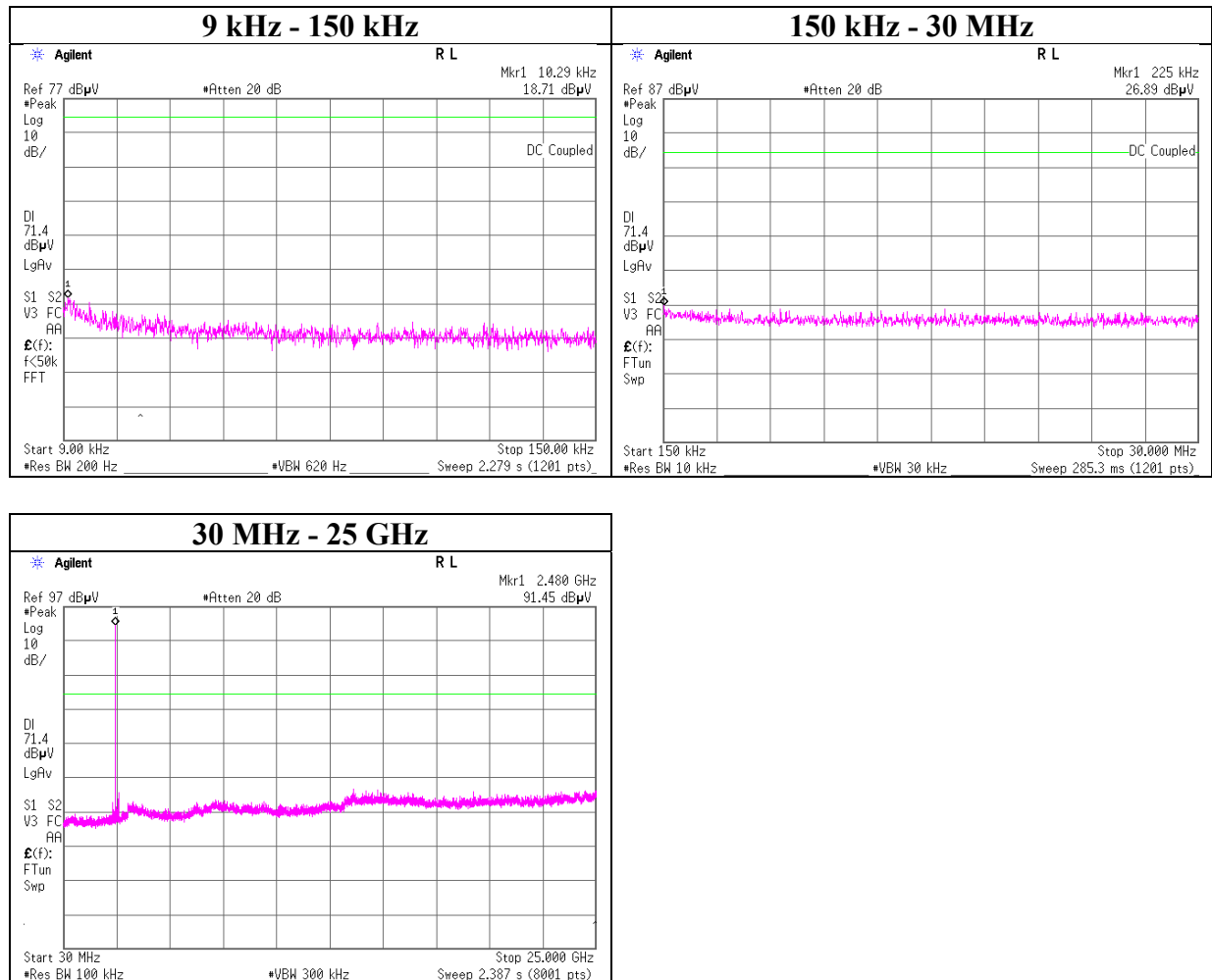
2441 MHz



Conducted Spurious Emission

Report No. 13540585S-A-R1
Test place Shonan EMC Lab. No.5 Shielded Room
Date October 15, 2020
Temperature / Humidity 23 deg. C / 57 % RH
Engineer Yosuke Murakami
Mode Tx, Hopping Off, 3DH5

2480 MHz



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Shonan EMC Lab.

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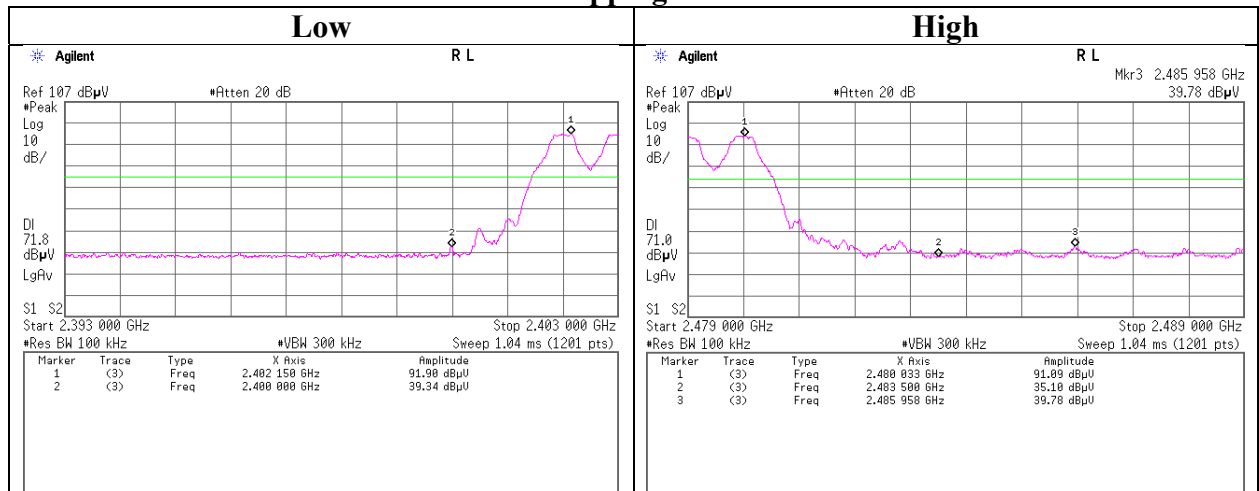
Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

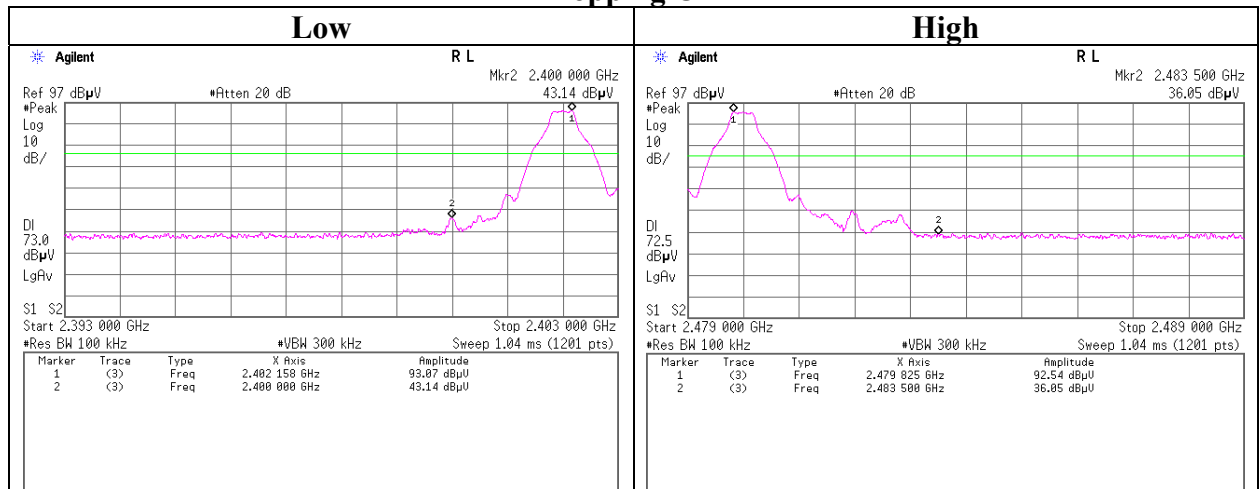
Conducted Emission Band Edge compliance

Report No.	13540585S-A-R1
Test place	Shonan EMC Lab. No.5 Shielded Room
Date	October 15, 2020
Temperature / Humidity	23 deg. C / 57 % RH
Engineer	Yosuke Murakami
Mode	Tx DH5

Hopping On



Hopping Off



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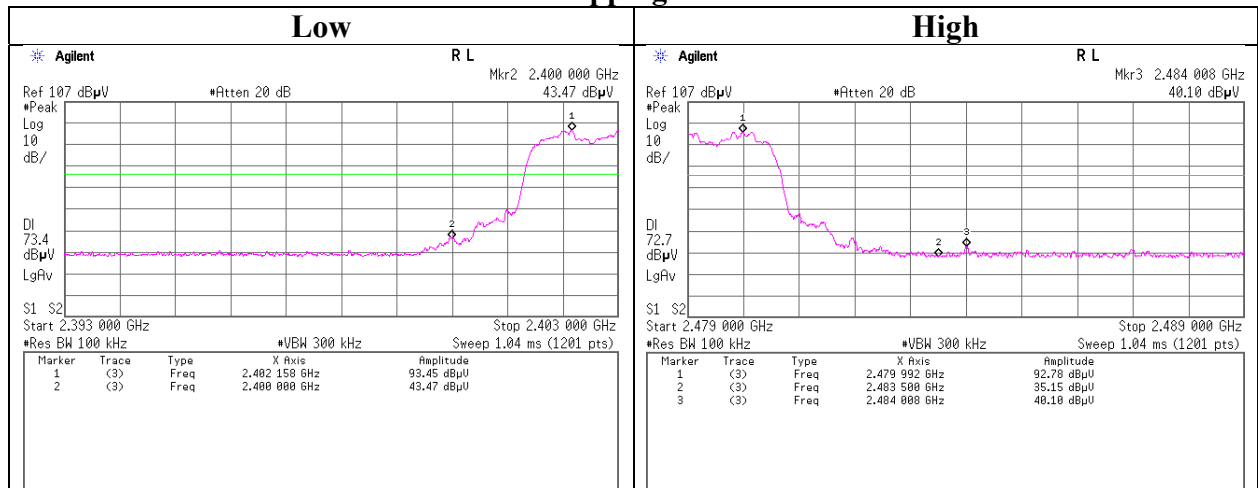
Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

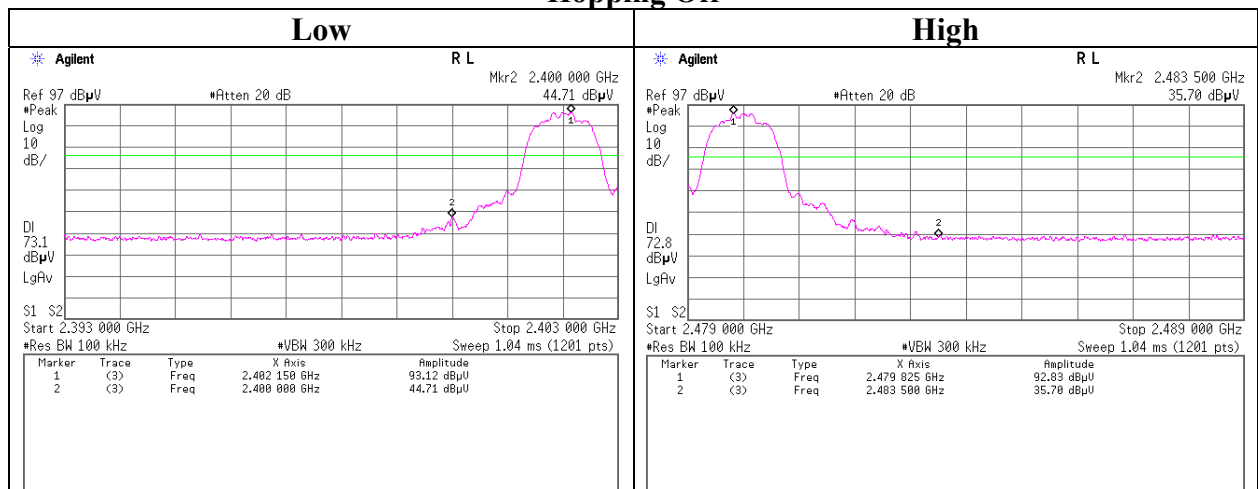
Conducted Emission Band Edge compliance

Report No.	13540585S-A-R1
Test place	Shonan EMC Lab. No.5 Shielded Room
Date	October 15, 2020
Temperature / Humidity	23 deg. C / 57 % RH
Engineer	Yosuke Murakami
Mode	Tx 3DH5

Hopping On



Hopping Off



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APPENDIX 2: Test instruments

Test equipment

Test Item	Local ID	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Cal Int
AT	SAT10-15	160493	Attenuator	Weinschel Corp.	54A-10	83406	2019/12/12	12
AT	SCC-G63	196946	Coaxial Cable	HUBER+SUNER	SUCOFLEX 102	803411/2	2020/03/10	12
AT	SOS-27	191845	Humidity Indicator	CUSTOM. Inc	CTH-201	-	2020/09/29	12
AT	SPM-13	169910	Power Meter	Keysight Technologies Inc	8990B	MY51000448	2020/01/28	12
AT	SPSS-06	169911	Power sensor	Keysight Technologies Inc	N1923A	MY57270004	2020/01/28	12
AT	SRENT-09	150461	Spectrum Analyzer	Keysight Technologies Inc	E4440A	MY46186392	2020/02/10	12
AT	STS-05	146212	Digital Hitester	Hioki	3805-50	80997828	2019/10/01	12

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

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

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

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

Test item: AT: Antenna Terminal Conducted test

Test equipment

Test Item	Local ID	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Cal Int
RE	COTS-SEMI-5	170932	EMI Software	TSJ (Techno Science Japan)	TEPTO-DV3(RE,CE,ME,PE)	-	-	-
RE	KAT6-04	144899	Attenuator	Inmet	18N-6dB	-	2019/12/05	12
RE	KJM-02	146432	Measure	TAJIMA	GL19-55	-	-	-
RE	KJM-09	145929	Measure	KOMELON	KMC-36	-	-	-
RE	SAEC-01(NSA)	145597	Semi-Anechoic Chamber	TDK	SAEC-01(NSA)	1	2020/04/08	12
RE	SAEC-03(SVSWR)	145566	Semi-Anechoic Chamber	TDK	SAEC-03(SVSWR)	3	2020/05/11	12
RE	SAF-01	145003	Pre Amplifier	SONOMA	310N	290211	2020/02/19	12
RE	SAF-06	145005	Pre Amplifier	Toyo Corporation	TPA0118-36	1440491	2020/02/20	12
RE	SAF-08	145007	Pre Amplifier	Toyo Corporation	HAP18-26W	19	2020/03/03	12
RE	SAT10-06	145137	Attenuator	Keysight Technologies Inc	8493C-010	74865	2020/10/05	12
RE	SAT3-09	144959	Attenuator	JFW	50HF-003N	-	2020/08/18	12
RE	SBA-01	145161	Biconical Antenna	Schwarzbeck Mess Elektronik	BBA9106	91032664	2020/04/04	12
RE	SCC-A1/A3/A5/A7/A8/A13/SRSE-01	144967	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhner/Suhner/Suhner/T OYO	8D2W/12DSFA/141P E/141PE/141PE/141P E/NS4906	-/0901-269(RF Selector)	2020/04/12	12
RE	SCC-A2/A4/A6/A7/A8/A13/SRSE-01	144968	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhner/Suhner/Suhner/T OYO	8D2W/12DSFA/141P E/141PE/141PE/141P E/NS4906	-/0901-269(RF Selector)	2020/04/12	12
RE	SCC-G15	145176	Coaxial Cable	Suhner	SUCOFLEX 102	32703/2	2020/03/04	12
RE	SCC-G40	166491	Coaxial Cable	Junkosha	MWX221-01000NFSNMS/B	1612S005	2020/01/08	12
RE	SCC-G43	156380	Coaxial Cable	HUBER+SUNER	SUCOFLEX_104_E	SN MY 13406/4E	2020/06/04	12
RE	SCC-G57	179540	Coaxial Cable	HUBER+SUNER	SUCOFLEX 102	802815/2	2020/05/12	12
RE	SCC-G58	183047	Coaxial Cable	HUBER+SUNER	SUCOFLEX 104	800287/4A	2020/06/04	12
RE	SCC-G70	200010	Coaxial Cable	HUBER+SUNER	SUCOFLEX 104	575618/4	2020/07/07	12
RE	SFL-02	145301	Highpass Filter	MICRO-TRONICS	HPM50111	51	2020/10/05	12
RE	SHA-03	145501	Horn Antenna	Schwarzbeck Mess Elektronik	BBHA9120D	9120D-739	2020/06/15	12
RE	SHA-04	145512	Horn Antenna	ETS LINDGREN	3160-09	00094868	2020/06/15	12
RE	SHA-10	194685	Horn Antenna	Schwarzbeck Mess Elektronik	BBHA 9120 C	711	2020/02/17	12
RE	SLA-05	145527	Logperiodic Antenna	Schwarzbeck Mess Elektronik	VUSLP9111B	193	2020/04/04	12
RE	SOS-20	191837	Humidity Indicator	CUSTOM. Inc	CTH-201	-	2020/09/28	12
RE	SOS-23	191840	Humidity Indicator	CUSTOM. Inc	CTH-201	-	2020/09/28	12
RE	SSA-02	145800	Spectrum Analyzer	Keysight Technologies Inc	E4448A	MY48250106	2020/04/16	12
RE	STR-01	145790	Test Receiver	Rohde & Schwarz	ESU40	100093	2020/04/24	12
RE	STS-01	145792	Digital Hitester	Hioki	3805-50	80997812	2019/10/01	12
RE	STS-03	146210	Digital Hitester	Hioki	3805-50	80997823	2019/10/01	12

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

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

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

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Test item: RE: Radiated Emission test

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