




RADIO TEST REPORT


Test Report No. : 13434268S-A-R2

Applicant : Nintendo Co., Ltd.
Type of EUT : Game controller
Model Number of EUT : HAC-043
FCC ID : BKEHAC043
Test regulation : FCC Part 15 Subpart C: 2021
Test Result : Complied (Refer to SECTION 3)

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2. The results in this report apply only to the sample tested.
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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.
9. The information provided from the customer for this report is identified in SECTION 1.
10. This report is a revised version of 13434268S-A-R1. 13434268S-A-R1 is replaced with this report.

Date of test: February 19 to August 18, 2021

Representative test engineer: 
Shiro Kobayashi
Engineer

Approved by: 
Akio Hayashi
Manager



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.: 13434268S-A

Revision	Test report No.	Date	Page revised	Contents
- (Original)	13434268S-A	May 18, 2021	-	-
1	13434268S-A-R1	July 26, 2021	5	Correction of Address: “2-1 Minamimatsuda-cho, Higashikujo, Minami-ku, Kyoto” to “11-1 Hokotate-cho, Kamitoba, Minami-ku, Kyoto 601-8501, Japan” Update of Rating: “DC 5 V” to “DC 5 V (USB), DC 4.2 V (Battery)” Update of Clock frequency: “CPU: 96 MHz” to “CPU: 96 MHz (XTAL: 24 MHz)”
			6	Update of 3.1: “January 12, 2021 and effective February 11, 2021” to “May 3, 2021 and effective July 2, 2021” Addition of “* The revision does not affect the test result conducted before its effective date.”
			16-21	Correction of Model No. “HAT-043” to “HAC-043”
2	13434268S-A-R2	August 19, 2021	1	Update Date of test: From “February 19 to March 12, 2021” To “February 19 to August 18, 2021”
			6	Update Worst Margin of Spurious Emission & Band Edge Compliance: From 8.5 dB[Ⓔ] To 8.7 dB[Ⓔ] 9920.000 MHz,[Ⓔ] 9764.000 MHz,[Ⓔ] Vertical, AV,[Ⓔ] Horizontal, AV,[Ⓔ] 3DH5 2480 MHz[Ⓔ] DH5 2441 MHz[Ⓔ]
			14	Correction of r: From “3.91” m to “0.09 m”
			39-44	Update Radiated Spurious Emission Data of Tx, Hopping Off, 3DH5 mode.
			53-54	Update and Addition of Test equipment.

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 : Nintendo Co., Ltd.
Address : 11-1 Hokotate-cho, Kamitoba, Minami-ku, Kyoto 601-8501, Japan
Telephone Number : +81-75-662-9600
Facsimile Number : +81-75-662-9624
Contact Person : Yosuke Ishikawa

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 : Game controller
Model Number : HAC-043
Serial Number : Refer to SECTION 4.2
Rating : DC 5 V (USB), DC 4.2 V (Battery)
Receipt Date : February 4, 2021
Country of Mass-production : China
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: HAC-043 (referred to as the EUT in this report) is a Game controller.

Radio Specification

Bluetooth (BDR / EDR function)

Radio Type : Transceiver
Frequency of Operation : 2402 MHz - 2480 MHz
Modulation : FHSS
Antenna type : $\lambda/4$ Invert F antenna
Antenna Gain : 1.99 dBi
Clock frequency (Maximum) : CPU: 96 MHz (XTAL: 24 MHz)

SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification : FCC Part 15 Subpart C
FCC Part 15 final revised on May 3, 2021 and effective July 2, 2021
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

* The revision does not affect the test result conducted before its effective date.
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	29.6 dB, 0.41337 MHz, N AV, DH5 2402 MHz	Complied 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 b)	Conducted
20 dB Bandwidth	FCC: KDB 558074 D01 15.247 Meas Guidance v05r02 ISED: -	FCC: Section15.247(a)(1) ----- ISED: RSS-247 5.1 (a)		Complied b)	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 c)	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 d)	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 e)	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		8.7 dB 9764.000 MHz, Horizontal, AV, DH5 2441 MHz	Complied f) / g)

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

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

- a) Refer to APPENDIX 1 (data of Conducted Emission)
- b) Refer to APPENDIX 1 (data of 20 dB Bandwidth, 99 % Occupied Bandwidth and Carrier Frequency Separation)
- c) Refer to APPENDIX 1 (data of Number of Hopping Frequency)
- d) Refer to APPENDIX 1 (data of Dwell time)
- e) Refer to APPENDIX 1 (data of Maximum Peak Output Power)
- f) Refer to APPENDIX 1 (data of Conducted Spurious Emission)
- g) 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)

This EUT provides the stable voltage constantly to RF Part regardless of input voltage. 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	ISED: RSS-Gen 6.7	ISED: -	N/A	- b)	Conducted
b) Refer to APPENDIX 1 (data of 20 dB 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
Conducted emission (AC Mains) LISN	150 kHz-30 MHz	2.6 dB	2.6 dB	2.56dB
Radiated emission (Measurement distance: 3 m)	9 kHz-30 MHz	3.0 dB	2.7 dB	2.7 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	4.8 dB	4.8 dB	4.8 dB
	6 GHz-18 GHz	5.4 dB	5.4 dB	5.4 dB
	18 GHz-40 GHz	5.3 dB	5.3 dB	5.3 dB
Radiated emission (Measurement distance: 1 m)	1 GHz-18 GHz	5.7 dB	5.7 dB	5.7 dB
	18 GHz-40 GHz	5.6 dB	5.6 dB	5.6 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	1.4 dB
Power Measurement above 1 GHz (Peak Detector)_SPM-06	1.6 dB
Power Measurement above 1 GHz (Average Detector)_SPM-07	0.89 dB
Power Measurement above 1 GHz (Peak Detector)_SPM-07	1.2 dB
Power Measurement above 1 GHz (Average Detector)_SPM-13	0.91 dB
Power Measurement above 1 GHz (Peak Detector)_SPM-13	1.2 dB
Spurious emission (Conducted) below 1GHz	0.87 dB
Spurious emission (Conducted) 1 GHz-3 GHz	0.96 dB
Spurious emission (Conducted) 3 GHz-18 GHz	3.0 dB
Spurious emission (Conducted) 18 GHz-26.5 GHz	2.6 dB
Spurious emission (Conducted) 26.5 GHz-40 GHz	2.2 dB
Bandwidth Measurement	0.012 %
Duty cycle and Time Measurement	0.27 %
Temperature_SCH-01	0.95 deg.C.
Humidity_SCH-01	0.83 %
Temperature_SCH-02	2.0 deg.C.
Humidity_SCH-02	6.6 %
Voltage	0.86 %

3.5 Test Location

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A2LA Certificate Number: 1266.03
(FCC test firm registration number: 626366, ISED lab company number: 2973D / CAB identifier: JP0001)

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: Transmitting, 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
<p>*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)</p> <p>*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.</p> <p>* 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.</p> <p>*EUT has the power settings by the software as follows; Power settings: Fixed Software: CyBluetool Version 0.1.97.1 (Date: 2021.1.20, Storage location: Driven by connected PC)</p> <p>*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.</p>		

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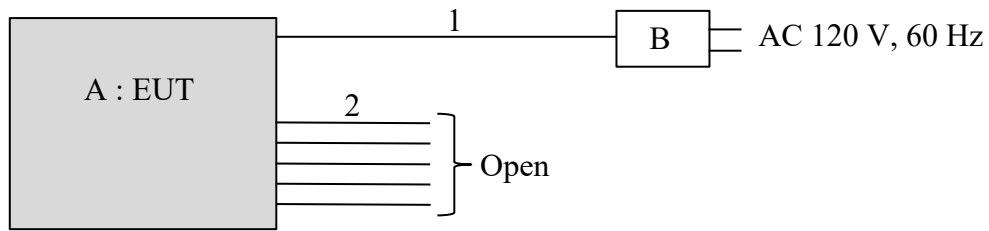
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4.2 Configuration and peripherals

[Radiated Emission test, Conducted Emission test]



* Cabling and setup(s) were taken into consideration and test data was taken under worse case conditions.
As a result of comparing AC 120 V and AC 240 V at pre-check, conducted emission test was performed with AC 120 V of the worst voltage as representative.

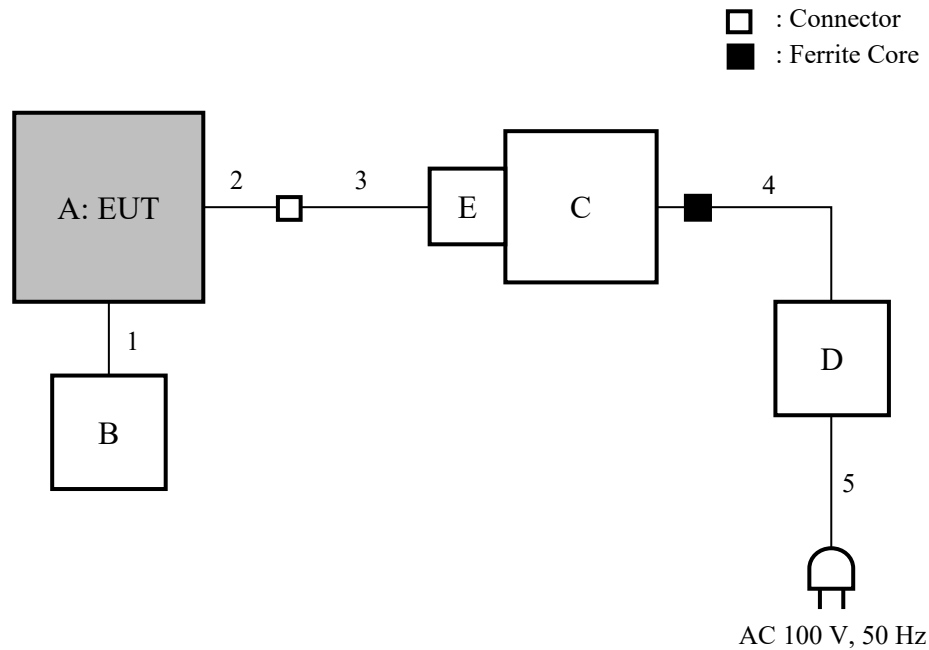
Description of EUT and Support equipment

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	Game Controller	HAC-043	S-1290	Nintendo Co., Ltd.	EUT
B	AC Adapter	HAC-002(USZ)	S-992	Nintendo Co., Ltd.	-

List of cables used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	DC	1.5	Unshielded	Unshielded	-
2	Signal	0.2	Unshielded	Unshielded	-

[Antenna Terminal Conducted tests]



Description of EUT and Support equipment

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	Game Controller	HAC-043	S-1158	Nintendo	EUT
B	RECHARGEABLE LI-ION BATTERY	HAC-006	S-1159	Nintendo	-
C	Laptop PC	CF-SV9RDQVS	S-1253	Panasonic	-
D	AC Adapter	CF-AA65D2A M1	65D2AM1208002421WA	Panasonic	-
E	UART-USB cable	TTL-232RG	S-1292	FTDI	-

List of cables used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	DC	0.03	Unshielded	Unshielded	-
2	UART	0.15	Unshielded	Unshielded	-
3	USB	2.0	Shielded	Shielded	-
4	DC	1.0	Unshielded	Unshielded	-
5	AC	0.8	Unshielded	Unshielded	-

SECTION 5: Conducted Emission

Test Procedure and conditions

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 rear of tabletop was located 40 cm to the vertical conducting plane. The rear of EUT, including peripherals aligned and flushed with rear of tabletop. All other surfaces of tabletop were at least 80 cm from any other grounded conducting surface. EUT was located 80 cm from a Line Impedance Stabilization Network (LISN) / Artificial mains Network (AMN) and excess AC cable was bundled in center.

I/O cables that were connected to the peripherals were bundled in center. They were folded back and forth forming a bundle 30 cm to 40 cm long and were hanged at a 40 cm height to the ground plane.

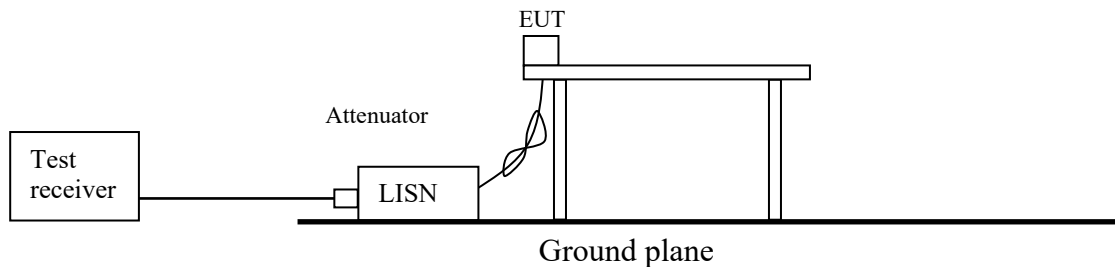
The AC Mains Terminal Continuous disturbance Voltage has been measured with the EUT in a Shielded Room. The EUT was connected to a LISN (AMN).

An overview sweep with peak detection has been performed.

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

Detector : QP and CISPR AV
Measurement range : 0.15 MHz - 30 MHz
Test data : APPENDIX
Test result : Pass

Figure 1: Test Setup



SECTION 6: Radiated Spurious Emission

Test Procedure

[For below 1 GHz]

EUT was placed on a urethane platform of nominal size, 2.0 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 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

Frequency	Below 1 GHz	Above 1GHz	
Instrument used	Test Receiver	Spectrum Analyzer	
Detector	QP	PK	AV *1)
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

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

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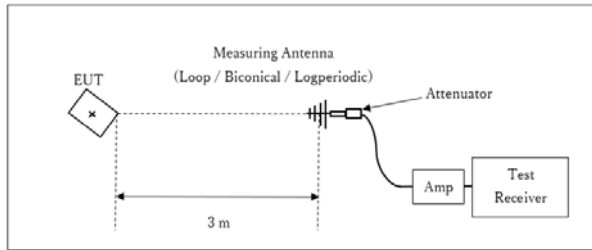
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Figure 2: Test Setup

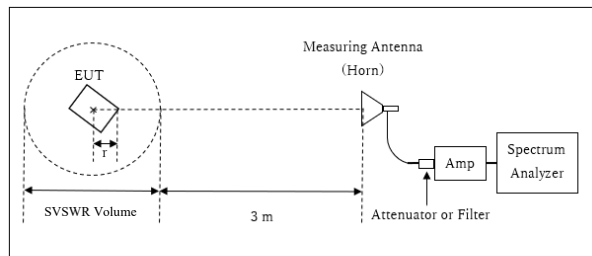
Below 1 GHz



× : Center of turn table

Test Distance: 3 m

1 GHz - 10 GHz

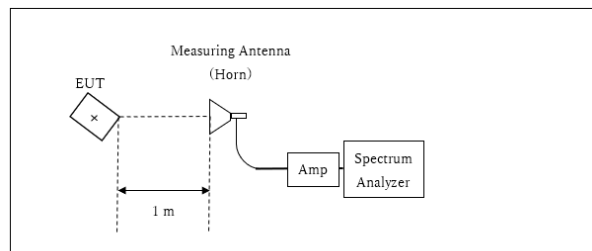


r : Radius of an outer periphery of EUT
× : Center of turn table

Distance Factor: $20 \times \log(3.91 \text{ m} / 3.0 \text{ m}) = 2.31 \text{ dB}$
* Test Distance: $(3 + \text{SVSWR Volume} / 2) - r = 3.91 \text{ m}$

SVSWR Volume : 2.0 m
(SVSWR Volume has been calibrated based on CISPR 16-1-4.)
r = 0.09 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 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	Below 1 GHz	1-10 GHz	10-18 GHz	18-26.5 GHz
Horizontal	X	Z	X	X
Vertical	X	Z	X	X

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
20 dB 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: 160 MHz 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

Conducted Emission

DATA OF CONDUCTED EMISSION TEST

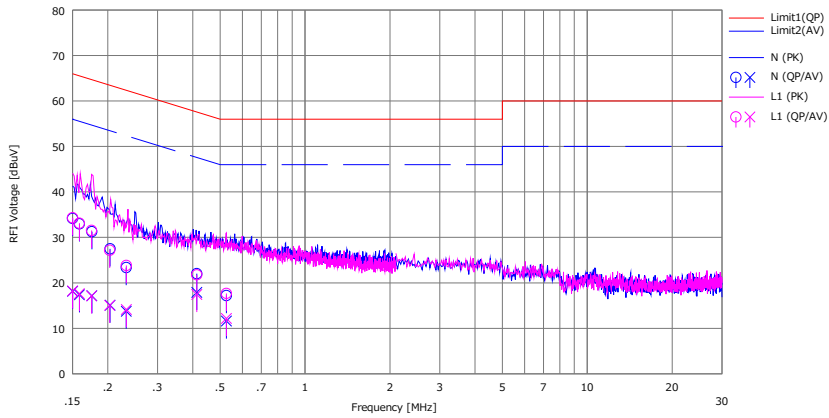
UL Japan, Inc. Shonan EMC Lab. No.2 Shielded Room
Date : 2021/03/12

Company : Nintendo Co., Ltd.
Kind of EUT : Game Controller
Model No. : HAC-043
Serial No. : S-1290
Remarks : -

Mode : DH5 2402 MHz
Order No. : 13434268S
Power : AC 120 V / 60 Hz / USB 5 V
Temp./Humi. : 20 deg.C / 34 %RH

Limit : FCC_Part 15 Subpart C(15.207)

Engineer : Yusuke Tanikawara



No.	Freq. [MHz]	Reading		C.Fac	Results		Limit		Margin		Phase	Comment
		(QP) [dBuV]	(AV) [dBuV]		(QP) [dBuV]	(AV) [dBuV]	(QP) [dBuV]	(AV) [dBuV]	(QP) [dB]	(AV) [dB]		
1	0.15000	21.60	5.60	12.56	34.16	18.16	66.00	56.00	31.8	37.8	N	
2	0.15868	20.40	4.80	12.56	32.96	17.36	65.53	55.53	32.5	38.1	N	
3	0.17571	18.70	4.60	12.56	31.26	17.16	64.69	54.69	33.4	37.5	N	
4	0.20371	14.90	2.50	12.58	27.48	15.08	63.46	53.46	35.9	38.3	N	
5	0.23245	10.80	1.20	12.57	23.37	13.77	62.36	52.36	38.9	38.5	N	
6	0.41337	9.40	5.30	12.61	22.01	17.91	57.58	47.58	35.5	29.6	N	
7	0.52631	4.60	-1.00	12.60	17.20	11.60	56.00	46.00	38.8	34.4	N	
8	0.15000	21.70	5.60	12.61	34.31	18.21	66.00	56.00	31.6	37.7	L1	
9	0.15865	20.50	5.00	12.61	33.11	17.61	65.53	55.53	32.4	37.9	L1	
10	0.17521	18.90	4.50	12.62	31.52	17.12	64.71	54.71	33.1	37.5	L1	
11	0.20321	14.50	2.40	12.65	27.15	15.05	63.48	53.48	36.3	38.4	L1	
12	0.23269	11.20	1.50	12.63	23.83	14.13	62.35	52.35	38.5	38.2	L1	
13	0.41337	9.10	4.80	12.65	21.75	17.45	57.58	47.58	35.8	30.1	L1	
14	0.52632	5.00	-0.50	12.68	17.68	12.18	56.00	46.00	38.3	33.8	L1	

Calculation: Result[dBuV]=Reading[dBuV]+C.Fac(LISN(AMN)+Cable+ATT)[dB]
LISN(AMN):SLS-02

Conducted Emission

DATA OF CONDUCTED EMISSION TEST

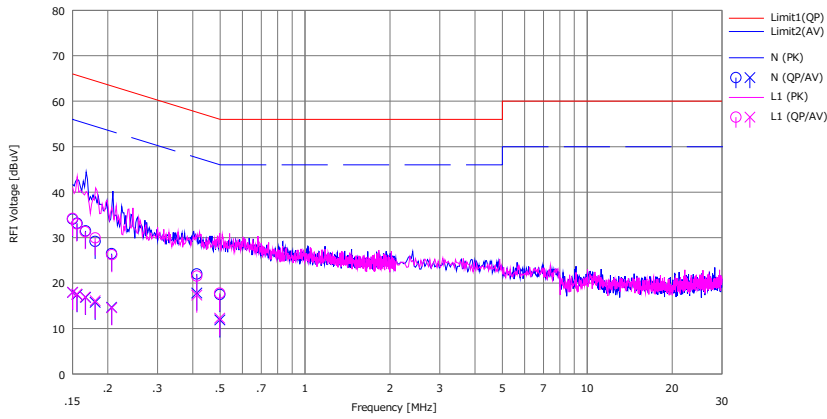
UL Japan, Inc. Shonan EMC Lab. No.2 Shielded Room
Date : 2021/03/12

Company : Nintendo Co., Ltd.
Kind of EUT : Game Controller
Model No. : HAC-043
Serial No. : S-1290
Remarks : -

Mode : DH5 2441 MHz
Order No. : 13434268S
Power : AC 120 V / 60 Hz / USB 5 V
Temp./Humi. : 20 deg.C / 34 %RH

Limit : FCC_Part 15 Subpart C(15.207)

Engineer : Yusuke Tanikawara



No.	Freq. [MHz]	Reading		C.Fac [dB]	Results		Limit		Margin		Phase	Comment
		(QP) [dBuV]	(AV) [dBuV]		(QP) [dBuV]	(AV) [dBuV]	(QP) [dBuV]	(AV) [dBuV]	(QP) [dB]	(AV) [dB]		
1	0.15000	21.50	5.40	12.56	34.06	17.96	66.00	56.00	31.9	38.0	N	
2	0.15561	20.60	4.90	12.56	33.16	17.46	65.70	55.70	32.5	38.2	N	
3	0.16683	18.90	4.30	12.56	31.46	16.86	65.12	55.12	33.6	38.2	N	
4	0.18041	16.60	3.20	12.56	29.16	15.76	64.47	54.47	35.3	38.7	N	
5	0.20625	13.90	2.10	12.58	26.48	14.68	63.35	53.35	36.8	38.6	N	
6	0.41337	9.40	5.20	12.61	22.01	17.81	57.58	47.58	35.5	29.7	N	
7	0.49902	4.90	-0.70	12.59	17.49	11.89	56.02	46.02	38.5	34.1	N	
8	0.15000	21.60	5.40	12.61	34.21	18.01	66.00	56.00	31.7	37.9	L1	
9	0.15529	20.40	5.00	12.61	33.01	17.61	65.71	55.71	32.7	38.1	L1	
10	0.16623	18.70	4.30	12.62	31.32	16.92	65.15	55.15	33.8	38.2	L1	
11	0.18045	17.30	3.50	12.63	29.93	16.13	64.46	54.46	34.5	38.3	L1	
12	0.20665	13.60	1.90	12.65	26.25	14.55	63.34	53.34	37.0	38.7	L1	
13	0.41338	8.90	4.70	12.65	21.55	17.35	57.58	47.58	36.0	30.2	L1	
14	0.49838	5.10	-0.40	12.67	17.77	12.27	56.03	46.03	38.2	33.7	L1	

Calculation: Result[dBuV]=Reading[dBuV]+C.Fac(LISN(AMN))+Cable+ATT[dB]
LISN(AMN):SLS-02

Conducted Emission

DATA OF CONDUCTED EMISSION TEST

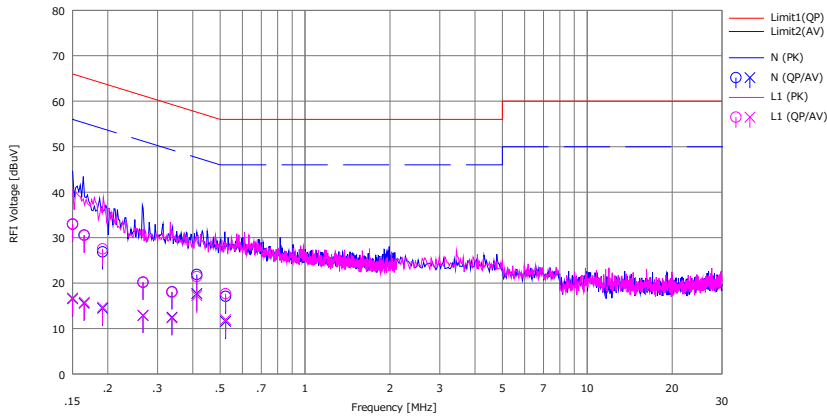
UL Japan, Inc. Shonan EMC Lab. No.2 Shielded Room
Date : 2021/03/12

Company : Nintendo Co., Ltd.
Kind of EUT : Game Controller
Model No. : HAC-043
Serial No. : S-1290
Remarks : -

Mode : DH5 2480 MHz
Order No. : 13434268S
Power : AC 120 V / 60 Hz / USB 5 V
Temp./Humi. : 20 deg.C / 34 %RH

Limit : FCC_Part 15 Subpart C(15.207)

Engineer : Yusuke Tanikawara



No.	Freq. [MHz]	Reading		C.Fac	Results		Limit		Margin		Phase	Comment
		(QP) [dBuV]	(AV) [dBuV]		(QP) [dBuV]	(AV) [dBuV]	(QP) [dBuV]	(AV) [dBuV]	(QP) [dB]	(AV) [dB]		
1	0.15000	20.40	4.00	12.56	32.96	16.56	66.00	56.00	33.0	39.4	N	
2	0.16490	18.00	3.00	12.56	30.56	15.56	65.21	55.21	34.6	39.6	N	
3	0.19159	14.30	1.90	12.57	26.87	14.47	63.97	53.97	37.1	39.5	N	
4	0.26657	7.60	0.30	12.57	20.17	12.87	61.22	51.22	41.0	38.3	N	
5	0.33785	5.50	-0.10	12.58	18.08	12.48	59.26	49.26	41.1	36.7	N	
6	0.41335	9.30	5.10	12.61	21.91	17.71	57.58	47.58	35.6	29.8	N	
7	0.52294	4.50	-1.00	12.59	17.09	11.59	56.00	46.00	38.9	34.4	N	
8	0.15000	20.40	4.10	12.61	33.01	16.71	66.00	56.00	32.9	39.2	L1	
9	0.16538	17.90	3.20	12.62	30.52	15.82	65.19	55.19	34.6	39.3	L1	
10	0.19167	14.90	2.10	12.63	27.53	14.73	63.96	53.96	36.4	39.2	L1	
11	0.26665	7.60	0.30	12.62	20.22	12.92	61.22	51.22	41.0	38.3	L1	
12	0.33715	5.40	-0.30	12.63	18.03	12.33	59.27	49.27	41.2	36.9	L1	
13	0.41337	8.80	4.60	12.65	21.45	17.25	57.58	47.58	36.1	30.3	L1	
14	0.52292	5.00	-0.70	12.67	17.67	11.97	56.00	46.00	38.3	34.0	L1	

Calculation: Result[dBuV]=Reading[dBuV]+C.Fac(LISN(AMN))+Cable+ATT[dB]
LISN(AMN):SLS-02

Conducted Emission

DATA OF CONDUCTED EMISSION TEST

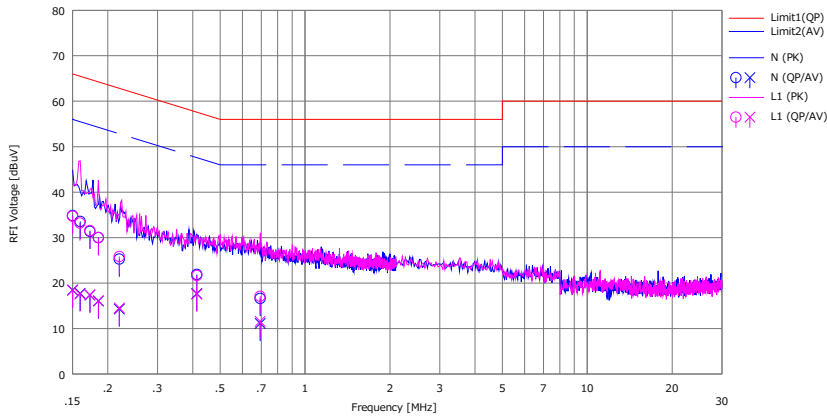
UL Japan, Inc. Shonan EMC Lab. No.2 Shielded Room
Date : 2021/03/12

Company : Nintendo Co., Ltd.
Kind of EUT : Game Controller
Model No. : HAC-043
Serial No. : S-1290
Remarks : -

Mode : 3DH5 2402 MHz
Order No. : 13434268S
Power : AC 120 V / 60 Hz / USB 5 V
Temp./Humi. : 20 deg.C / 34 %RH

Limit : FCC_Part 15 Subpart C(15.207)

Engineer : Yusuke Tanikawara



No.	Freq. [MHz]	Reading		C.Fac	Results		Limit		Margin		Phase	Comment
		(QP) [dBuV]	(AV) [dBuV]		(QP) [dBuV]	(AV) [dBuV]	(QP) [dBuV]	(AV) [dBuV]	(QP) [dB]	(AV) [dB]		
1	0.15000	22.30	5.90	12.56	34.86	18.46	66.00	56.00	31.1	37.5	N	
2	0.15969	21.00	5.20	12.56	33.56	17.76	65.48	55.48	31.9	37.7	N	
3	0.17292	18.80	4.80	12.56	31.36	17.36	64.82	54.82	33.4	37.4	N	
4	0.18526	17.40	3.50	12.57	29.97	16.07	64.25	54.25	34.2	38.1	N	
5	0.21972	12.70	1.70	12.58	25.28	14.28	62.83	52.83	37.5	38.5	N	
6	0.41338	9.30	5.10	12.61	21.91	17.71	57.58	47.58	35.6	29.8	N	
7	0.69372	4.00	-1.50	12.63	16.63	11.13	56.00	46.00	39.3	34.8	N	
8	0.15000	22.10	5.80	12.61	34.71	18.41	66.00	56.00	31.2	37.5	L1	
9	0.15929	20.60	5.00	12.61	33.21	17.61	65.50	55.50	32.2	37.8	L1	
10	0.17283	18.90	4.80	12.62	31.52	17.42	64.82	54.82	33.3	37.4	L1	
11	0.18514	17.40	3.50	12.63	30.03	16.13	64.25	54.25	34.2	38.1	L1	
12	0.21979	13.20	1.90	12.64	25.84	14.54	62.83	52.83	36.9	38.2	L1	
13	0.41338	9.00	4.90	12.65	21.65	17.55	57.58	47.58	36.9	30.0	L1	
14	0.69304	4.40	-1.10	12.69	17.09	11.59	56.00	46.00	38.9	34.4	L1	

Calculation: Result[dBuV]=Reading[dBuV]+C.Fac(LISN(AMN))+Cable+ATT[dB]
LISN(AMN):SLS-02

Conducted Emission

DATA OF CONDUCTED EMISSION TEST

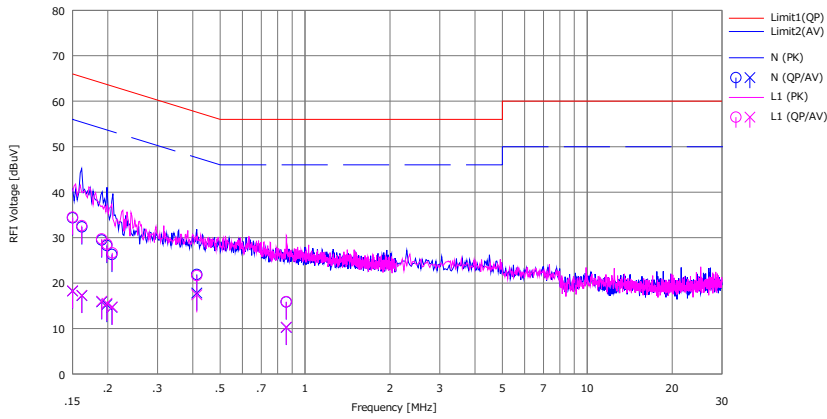
UL Japan, Inc. Shonan EMC Lab. No.2 Shielded Room
Date : 2021/03/12

Company : Nintendo Co., Ltd.
Kind of EUT : Game Controller
Model No. : HAC-043
Serial No. : S-1290
Remarks : -

Mode : 3DH5 2441 MHz
Order No. : 13434268S
Power : AC 120 V / 60 Hz / USB 5 V
Temp./Humi. : 20 deg.C / 34 %RH

Limit : FCC_Part 15 Subpart C(15.207)

Engineer : Yusuke Tanikawara



No.	Freq. [MHz]	Reading		C.Fac	Results		Limit		Margin		Phase	Comment
		(QP) [dBuV]	(AV) [dBuV]		(QP) [dBuV]	(AV) [dBuV]	(QP) [dBuV]	(AV) [dBuV]	(QP) [dB]	(AV) [dB]		
1	0.15000	21.80	5.70	12.56	34.36	18.26	66.00	56.00	31.6	37.7	N	
2	0.16198	19.80	4.70	12.56	32.36	17.26	65.36	55.36	33.0	38.1	N	
3	0.19027	16.90	3.30	12.57	29.47	15.87	64.02	54.02	34.5	38.1	N	
4	0.19840	15.70	2.70	12.58	28.28	15.28	63.68	53.68	35.4	38.4	N	
5	0.20686	13.70	2.10	12.58	26.28	14.68	63.33	53.33	37.0	38.6	N	
6	0.41338	9.30	5.20	12.61	21.91	17.81	57.58	47.58	35.6	29.7	N	
7	0.85769	3.20	-2.40	12.65	15.85	10.25	56.00	46.00	40.1	35.7	N	
8	0.15000	21.90	5.70	12.61	34.51	18.31	66.00	56.00	31.4	37.6	L1	
9	0.16172	20.00	4.70	12.62	32.62	17.32	65.38	55.38	32.7	38.0	L1	
10	0.19026	17.10	3.40	12.63	29.73	16.03	64.03	54.03	34.3	38.0	L1	
11	0.19871	15.90	2.90	12.65	28.55	15.55	63.66	53.66	35.1	38.1	L1	
12	0.20737	14.00	2.10	12.65	26.65	14.75	63.31	53.31	36.6	38.5	L1	
13	0.41338	9.00	4.80	12.65	21.65	17.45	57.58	47.58	35.9	30.1	L1	
14	0.85787	3.20	-2.40	12.71	15.91	10.31	56.00	46.00	40.0	35.6	L1	

Calculation: Result[dBuV]=Reading[dBuV]+C.Fac(LISN(AMN))+Cable+ATT[dB]
LISN(AMN):SLS-02

Conducted Emission

DATA OF CONDUCTED EMISSION TEST

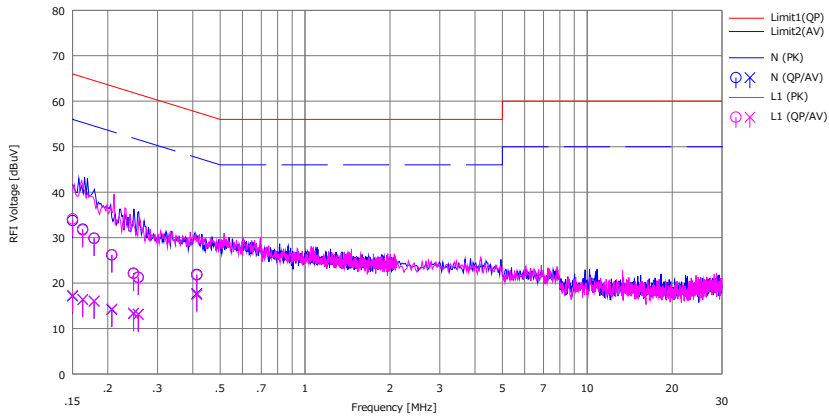
UL Japan, Inc. Shonan EMC Lab. No.2 Shielded Room
Date : 2021/03/12

Company : Nintendo Co., Ltd.
Kind of EUT : Game Controller
Model No. : HAC-043
Serial No. : S-1290
Remarks : -

Mode : 3DH5 2480 MHz
Order No. : 13434268S
Power : AC 120 V / 60 Hz / USB 5 V
Temp./Humi. : 20 deg.C / 34 %RH

Limit : FCC_Part 15 Subpart C(15.207)

Engineer : Yusuke Tanikawara



No.	Freq. [MHz]	Reading		C.Fac [dB]	Results		Limit		Margin		Phase	Comment
		(QP) [dBuV]	(AV) [dBuV]		(QP) [dBuV]	(AV) [dBuV]	(QP) [dBuV]	(AV) [dBuV]	(QP) [dB]	(AV) [dB]		
1	0.15000	21.20	4.60	12.56	33.76	17.16	66.00	56.00	32.2	38.8	N	
2	0.16294	19.30	3.80	12.56	31.86	16.36	65.31	55.31	33.4	38.9	N	
3	0.17896	17.30	3.50	12.56	29.86	16.06	64.53	54.53	34.6	38.4	N	
4	0.20654	13.60	1.60	12.58	26.18	14.18	63.34	53.34	37.1	39.1	N	
5	0.24659	9.60	0.70	12.57	22.17	13.27	61.87	51.87	39.7	38.6	N	
6	0.25649	8.70	0.60	12.57	21.27	13.17	61.54	51.54	40.2	38.3	N	
7	0.41338	9.30	5.10	12.61	21.91	17.71	57.58	47.58	35.6	29.8	N	
8	0.15000	21.50	4.70	12.61	34.11	17.31	66.00	56.00	31.8	38.6	L1	
9	0.16298	19.20	3.90	12.49	31.69	16.39	65.31	55.31	33.6	38.9	L1	
10	0.17869	17.20	3.40	12.63	29.83	16.03	64.55	54.55	34.7	38.5	L1	
11	0.20689	13.60	1.70	12.65	26.25	14.35	63.33	53.33	37.0	38.9	L1	
12	0.24679	9.50	0.80	12.62	22.12	13.42	61.86	51.86	39.7	38.4	L1	
13	0.25641	8.60	0.50	12.62	21.22	13.12	61.55	51.55	40.3	38.4	L1	
14	0.41338	9.10	4.80	12.65	21.75	17.45	57.58	47.58	35.8	30.1	L1	

Calculation: Result[dBuV]=Reading[dBuV]+C.Fac(LISN(AMN))+Cable+ATT[dB]
LISN(AMN):SLS-02

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

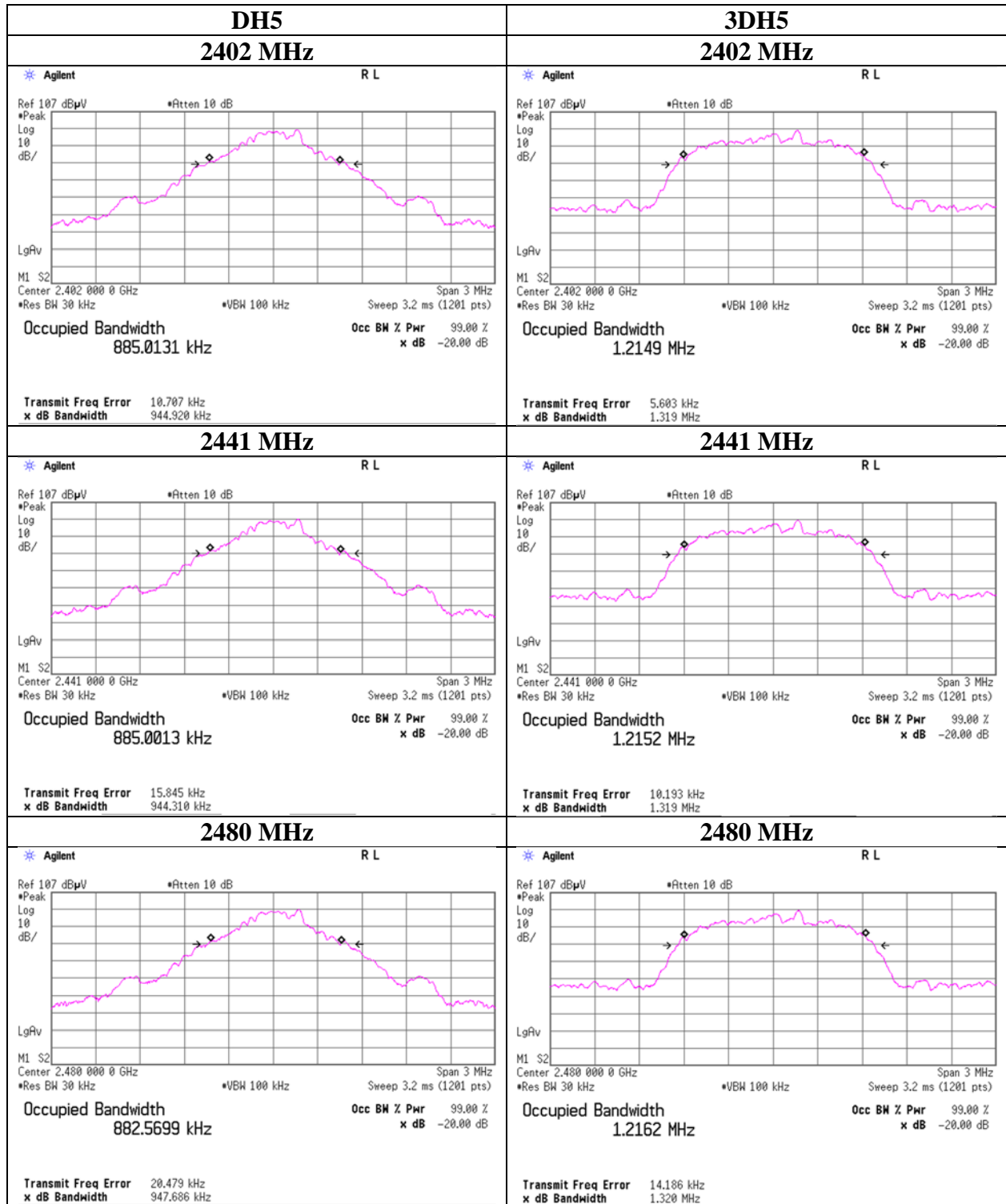
Report No. 13434268S-A-R2
Test place Shonan EMC Lab. No.5 Shielded Room
Date February 19, 2021
Temperature / Humidity 24 deg. C / 42 % RH
Engineer Shiro Kobayashi
Mode Tx, Hopping Off, Tx, Hopping On

Mode	Freq. [MHz]	20 dB Bandwidth [MHz]	99 % Occupied Bandwidth [kHz]	Carrier Frequency Separation [MHz]	Limit for Carrier Frequency separation [MHz]
DH5	2402.0	0.945	885.013	1.000	>= 0.630
DH5	2441.0	0.944	885.001	1.000	>= 0.630
DH5	2480.0	0.948	882.570	1.000	>= 0.632
DH5	Hopping On	-	78589.2	-	-
3DH5	2402.0	1.319	1214.9	1.000	>= 0.880
3DH5	2441.0	1.319	1215.2	1.000	>= 0.879
3DH5	2480.0	1.320	1216.2	1.000	>= 0.880
3DH5	Hopping On	-	78755.8	-	-

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

No limit applies to 20 dB Bandwidth.

20 dB Bandwidth and 99 % Occupied Bandwidth



UL Japan, Inc.

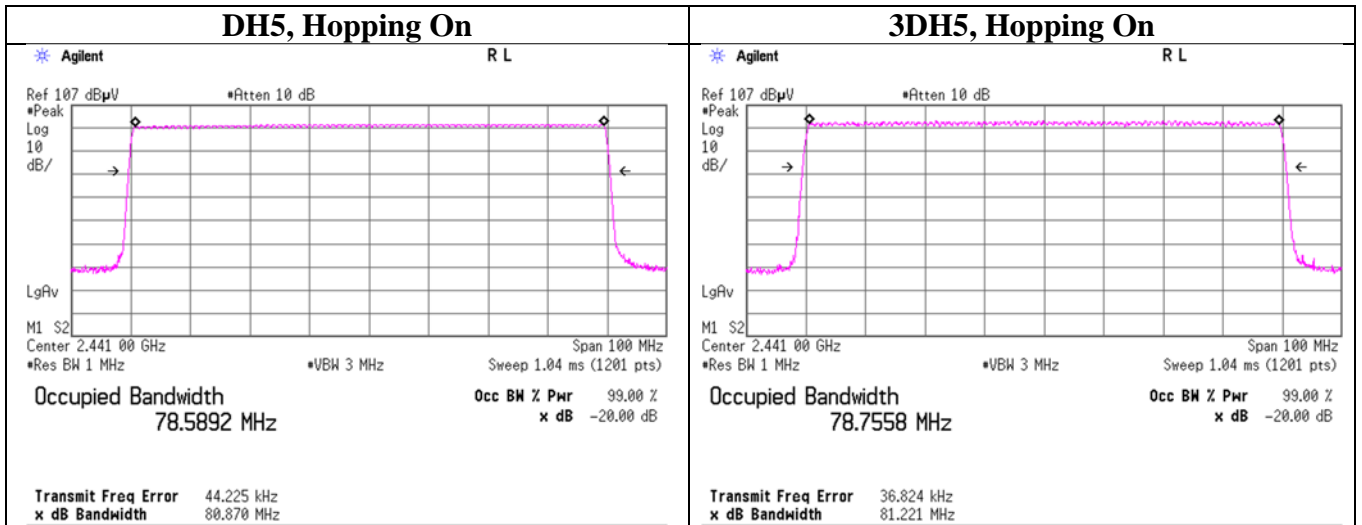
Shonan EMC Lab.

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

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

20 dB Bandwidth and 99 % Occupied Bandwidth



UL Japan, Inc.

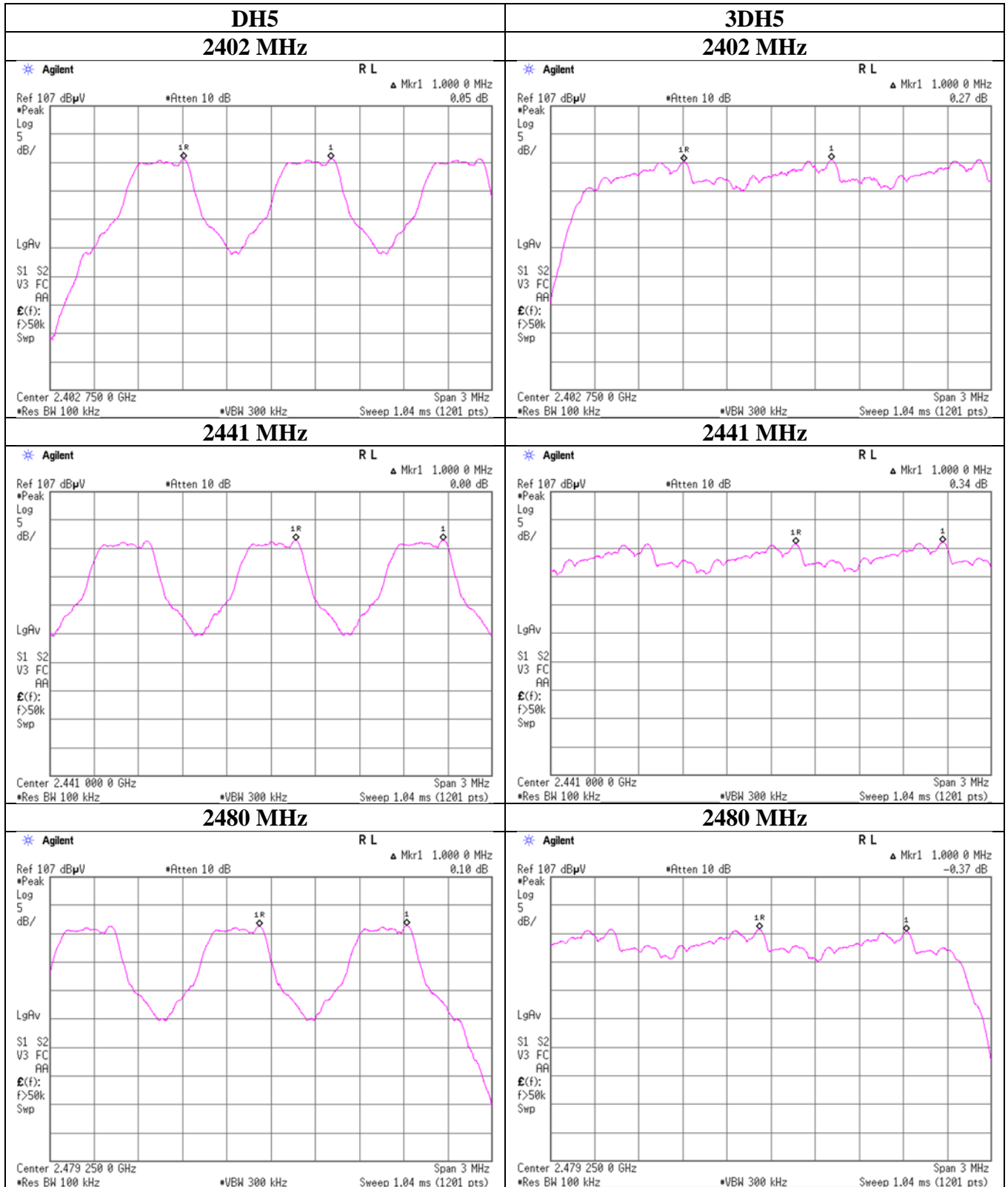
Shonan EMC Lab.

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

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Carrier Frequency Separation



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

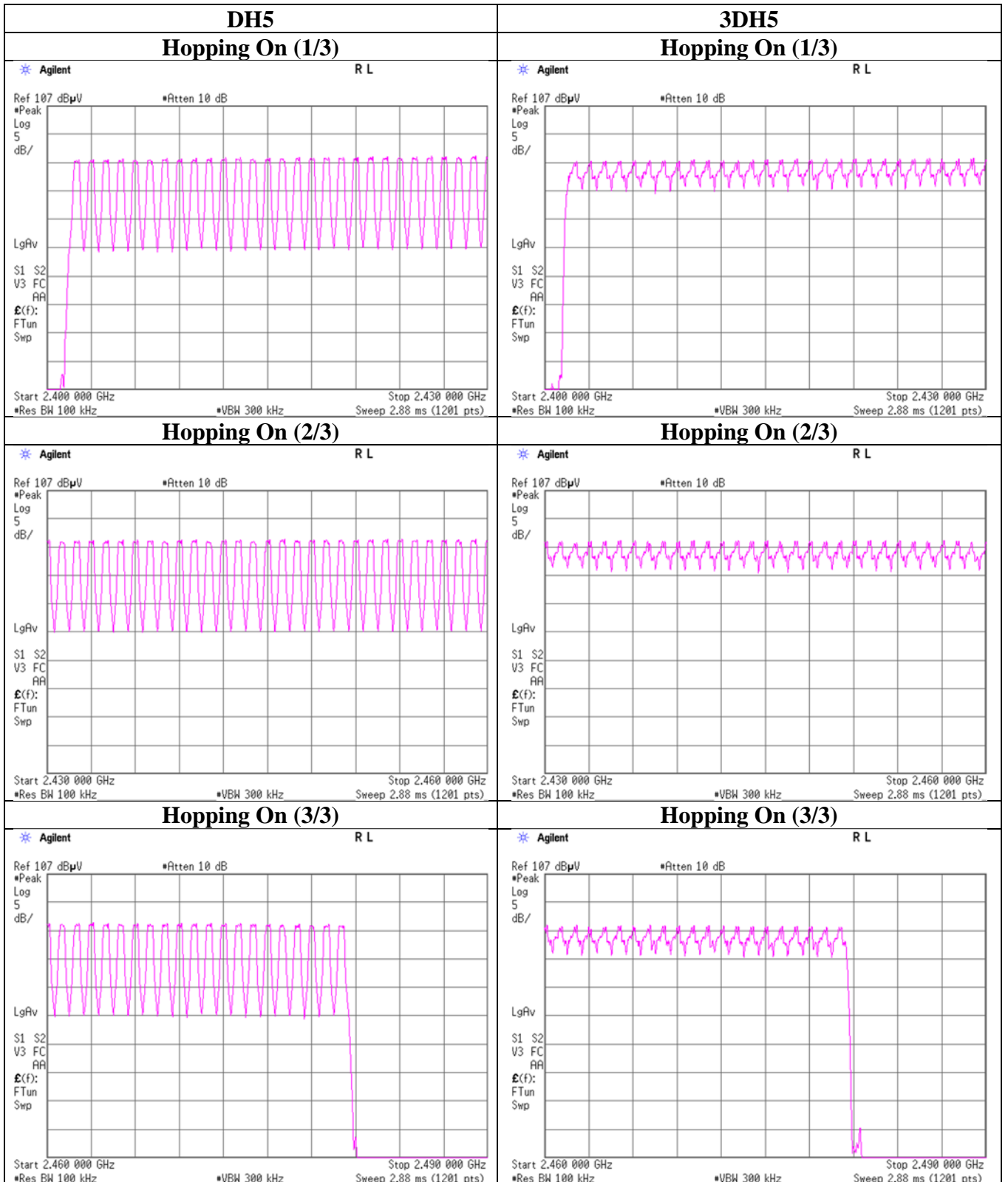
Number of Hopping Frequency

Report No. 13434268S-A-R2
Test place Shonan EMC Lab. No.5 Shielded Room
Date February 19, 2021
Temperature / Humidity 24 deg. C / 42 % RH
Engineer Shiro Kobayashi
Mode Tx, Hopping On

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

Test was not performed at AFH mode whose number of hopping channel is 20 channels because this Bluetooth radio is in compliance of Bluetooth Specification.

Number of Hopping Frequency



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Dwell time

Report No. 13434268S-A-R2
Test place Shonan EMC Lab. No.5 Shielded Room
Date February 19, 2021
Temperature / Humidity 24 deg. C / 42 % RH
Engineer Shiro Kobayashi
Mode Tx, Hopping On

Mode	Number of transmission in a 31.6(79 Hopping x 0.4) / 12.8 (32 Hopping x 0.4) second period			Length of transmission [msec]	Result [msec]	Limit [msec]
DH1	51.6 times /	5 sec. x	31.6 sec. = 327 times	0.423	138	400
DH3	29.6 times /	5 sec. x	31.6 sec. = 188 times	1.682	316	400
DH5	21.0 times /	5 sec. x	31.6 sec. = 133 times	2.930	390	400
3DH1	50.6 times /	5 sec. x	31.6 sec. = 320 times	0.428	137	400
3DH3	27.6 times /	5 sec. x	31.6 sec. = 175 times	1.679	294	400
3DH5	21.0 times /	5 sec. x	31.6 sec. = 133 times	2.930	390	400

Sample Calculation

Result = Number of transmission x Length of transmission

*Average data of 5 tests.(except Inquiry)

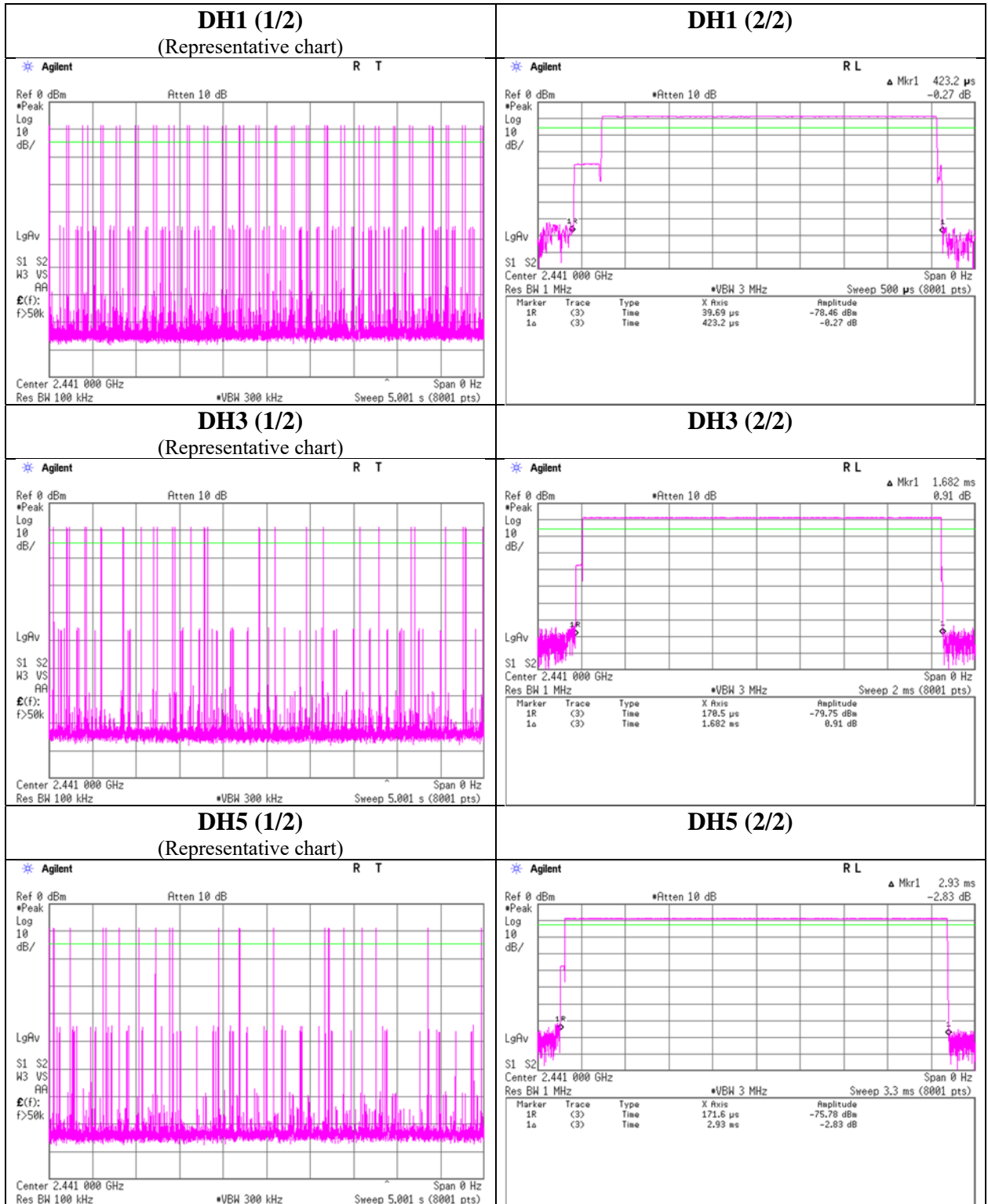
Mode	Sampling [times]					Average [times]
	1	2	3	4	5	
DH1	51	52	51	52	52	51.6
DH3	28	29	31	31	29	29.6
DH5	20	23	19	20	23	21.0
3DH1	51	50	50	52	50	50.6
3DH3	27	27	27	28	29	27.6
3DH5	20	20	24	20	21	21.0

Sample Calculation

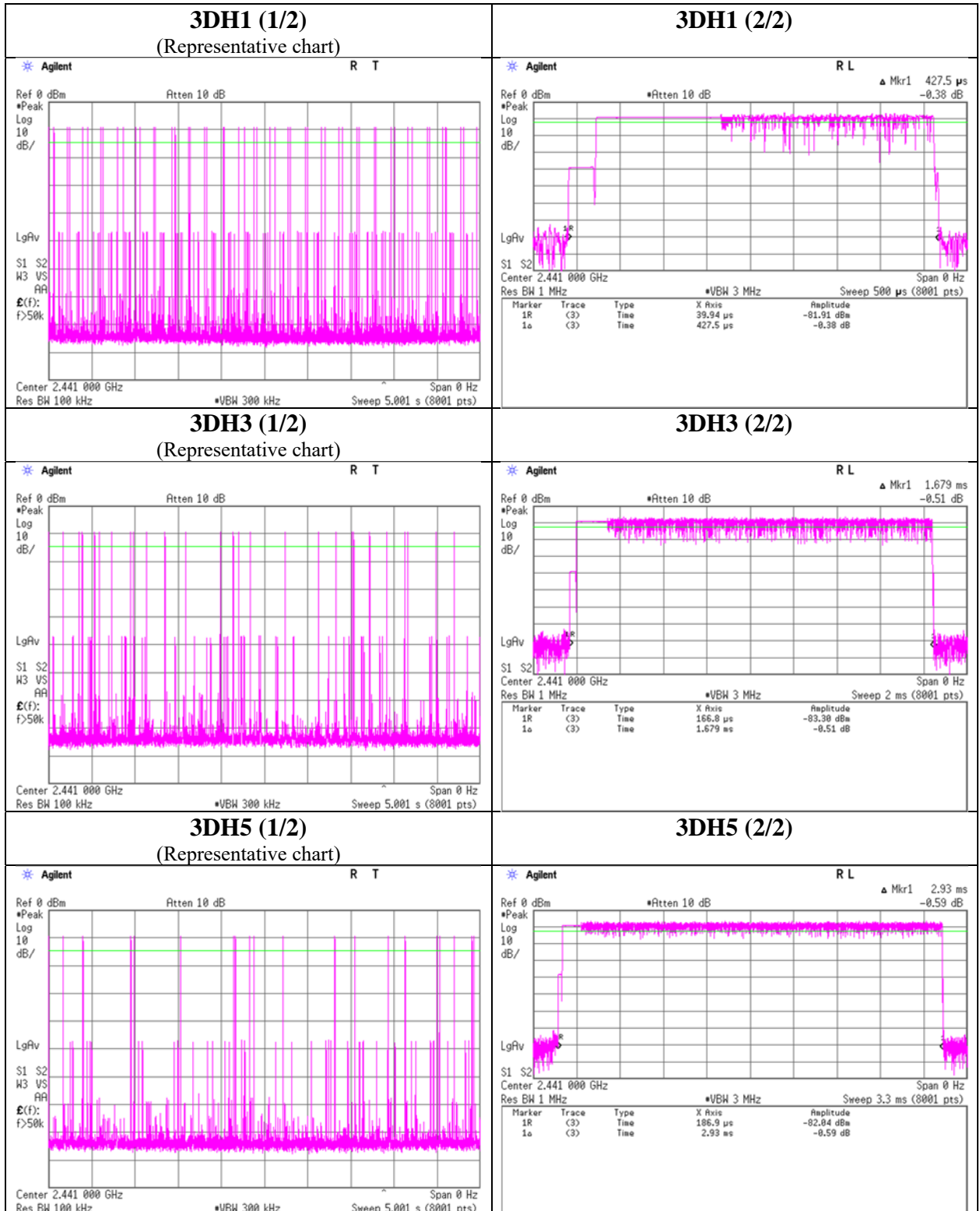
Average = Summation (Sampling 1 to 5) / 5

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

Dwell time



Dwell time



Maximum Peak Output Power

Report No. 13434268S-A-R2
Test place Shonan EMC Lab. No.5 Shielded Room
Date February 19, 2021
Temperature / Humidity 24 deg. C / 42 % RH
Engineer Shiro Kobayashi
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	-9.53	2.33	9.81	2.61	1.82	20.96	125	18.35	1.99	4.60	2.88	36.02	4000	31.42
DH5	2441.0	-8.76	2.34	9.82	3.40	2.19	20.96	125	17.56	1.99	5.39	3.46	36.02	4000	30.63
DH5	2480.0	-8.91	2.35	9.82	3.26	2.12	20.96	125	17.70	1.99	5.25	3.35	36.02	4000	30.77
2DH5	2402.0	-7.36	2.33	9.81	4.78	3.01	20.96	125	16.18	1.99	6.77	4.75	36.02	4000	29.25
2DH5	2441.0	-6.82	2.34	9.82	5.34	3.42	20.96	125	15.62	1.99	7.33	5.41	36.02	4000	28.69
2DH5	2480.0	-7.28	2.35	9.82	4.89	3.08	20.96	125	16.07	1.99	6.88	4.88	36.02	4000	29.14
3DH5	2402.0	-7.22	2.33	9.81	4.92	3.10	20.96	125	16.04	1.99	6.91	4.91	36.02	4000	29.11
3DH5	2441.0	-6.72	2.34	9.82	5.44	3.50	20.96	125	15.52	1.99	7.43	5.53	36.02	4000	28.59
3DH5	2480.0	-7.15	2.35	9.82	5.02	3.18	20.96	125	15.94	1.99	7.01	5.02	36.02	4000	29.01

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: 20 ch) 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 20 dB BW without 2/3 relaxation, 125 mW power limit was applied to it.

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Average Output Power
(Reference data for RF Exposure)

Report No. 13434268S-A-R2
Test place Shonan EMC Lab. No.5 Shielded Room
Date February 19, 2021
Temperature / Humidity 24 deg. C / 42 % RH
Engineer Shiro Kobayashi
Mode Tx, Hopping Off

Mode	Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Time average)		Duty factor [dB]	Result (Burst power average)	
					[dBm]	[mW]		[dBm]	[mW]
DH5	2402.0	-11.08	2.33	9.81	1.06	1.28	1.08	2.14	1.64
DH5	2441.0	-10.25	2.34	9.82	1.91	1.55	1.08	2.99	1.99
DH5	2480.0	-10.45	2.35	9.82	1.72	1.49	1.08	2.80	1.91
2DH5	2402.0	-11.16	2.33	9.81	0.98	1.25	1.08	2.06	1.61
2DH5	2441.0	-10.56	2.34	9.82	1.60	1.45	1.08	2.68	1.85
2DH5	2480.0	-11.03	2.35	9.82	1.14	1.30	1.08	2.22	1.67
3DH5	2402.0	-11.15	2.33	9.81	0.99	1.26	1.08	2.07	1.61
3DH5	2441.0	-10.56	2.34	9.82	1.60	1.45	1.08	2.68	1.85
3DH5	2480.0	-11.02	2.35	9.82	1.15	1.30	1.08	2.23	1.67

Sample Calculation:

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

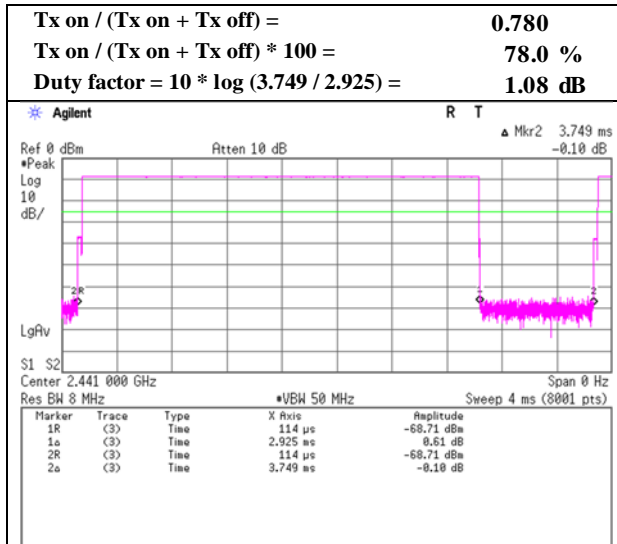
Result (Burst power average) = Time average + Duty factor

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

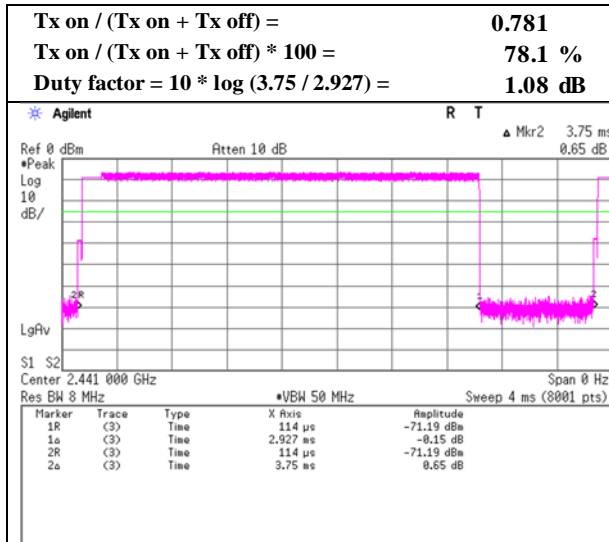
Burst Rate Confirmation

Report No. 13434268S-A-R2
Test place Shonan EMC Lab. No.5 Shielded Room
Date February 19, 2021
Temperature / Humidity 24 deg. C / 42 % RH
Engineer Shiro Kobayashi
Mode Tx, Hopping Off

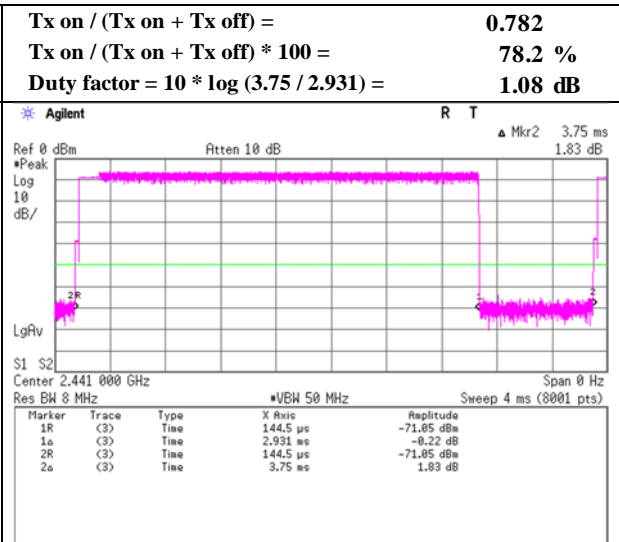
DH5



2DH5



3DH5



Radiated Spurious Emission

Report No.	13434268S-A-R2		
Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	No.3	No.3	No.3
Date	March 4, 2021	March 3, 2021	March 4, 2021
Temperature / Humidity	28 deg.C, 35 %RH	26 deg.C, 39 %RH	28 deg.C, 35 %RH
Engineer	Hiromasa Sato	Hiromasa Sato	Hiromasa Sato
	(30MHz -1 GHz)	(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.	182.254	QP	30.42	16.14	7.79	32.06	0.00	22.29	43.5	21.2	163	99	-
Hori.	319.045	QP	26.33	14.10	8.63	31.96	0.00	17.10	46.0	28.9	149	257	-
Hori.	582.409	QP	27.15	18.84	9.74	31.92	0.00	23.81	46.0	22.1	100	356	-
Hori.	2390.000	PK	46.96	28.41	14.42	41.62	2.31	50.48	73.9	23.4	147	134	-
Hori.	4804.000	PK	47.76	31.60	6.92	42.89	2.31	45.70	73.9	28.2	150	0	-
Hori.	7206.000	PK	47.92	37.60	8.33	43.39	2.31	52.77	73.9	21.1	150	0	-
Hori.	9608.000	PK	47.52	38.92	9.49	43.18	2.31	55.06	73.9	18.8	150	0	-
Hori.	2390.000	AV	35.50	28.41	14.42	41.62	2.31	39.02	53.9	14.8	147	134	VBW:360 Hz
Hori.	4804.000	AV	37.23	31.60	6.92	42.89	2.31	35.17	53.9	18.7	150	0	VBW:360 Hz,Floor noise
Hori.	7206.000	AV	37.40	37.60	8.33	43.39	2.31	42.25	53.9	11.6	150	0	VBW:360 Hz,Floor noise
Hori.	9608.000	AV	37.12	38.92	9.49	43.18	2.31	44.66	53.9	9.2	150	0	VBW:360 Hz,Floor noise
Vert.	49.304	QP	28.34	11.43	6.77	32.17	0.00	14.37	40.0	25.6	100	36	-
Vert.	56.492	QP	32.02	9.07	6.67	32.16	0.00	15.60	40.0	24.4	103	221	-
Vert.	73.329	QP	28.83	6.38	7.04	32.15	0.00	10.10	40.0	29.9	100	182	-
Vert.	89.762	QP	29.98	8.12	7.53	32.14	0.00	13.49	43.5	30.0	100	22	-
Vert.	105.465	QP	31.05	11.13	7.26	32.13	0.00	17.31	43.5	26.1	100	324	-
Vert.	120.202	QP	31.00	13.06	7.23	32.11	0.00	19.18	43.5	24.3	100	345	-
Vert.	182.580	QP	30.30	16.14	7.79	32.06	0.00	22.17	43.5	21.3	151	100	-
Vert.	2390.000	PK	46.76	28.41	14.42	41.62	2.31	50.28	73.9	23.6	187	88	-
Vert.	4804.000	PK	48.46	31.60	6.92	42.89	2.31	46.40	73.9	27.5	150	0	-
Vert.	7206.000	PK	47.56	37.60	8.33	43.39	2.31	52.41	73.9	21.4	150	0	-
Vert.	9608.000	PK	47.38	38.92	9.49	43.18	2.31	54.92	73.9	18.9	150	0	-
Vert.	2390.000	AV	35.39	28.41	14.42	41.62	2.31	38.91	53.9	14.9	187	88	VBW:360 Hz
Vert.	4804.000	AV	37.16	31.60	6.92	42.89	2.31	35.10	53.9	18.8	150	0	VBW:360 Hz,Floor noise
Vert.	7206.000	AV	37.38	37.60	8.33	43.39	2.31	42.23	53.9	11.6	150	0	VBW:360 Hz,Floor noise
Vert.	9608.000	AV	37.27	38.92	9.49	43.18	2.31	44.81	53.9	9.0	150	0	VBW:360 Hz,Floor noise

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

Distance factor : 1 GHz - 10 GHz : 20log(3.91 m / 3.0 m) = 2.31 dB

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

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	94.37	28.38	14.44	41.63	2.31	97.87	-	-	Carrier
Hori.	2400.000	PK	39.87	28.38	14.43	41.63	2.31	43.36	77.8	34.4	-
Vert.	2402.000	PK	94.64	28.38	14.44	41.63	2.31	98.14	-	-	Carrier
Vert.	2400.000	PK	39.84	28.38	14.43	41.63	2.31	43.33	78.1	34.7	-

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

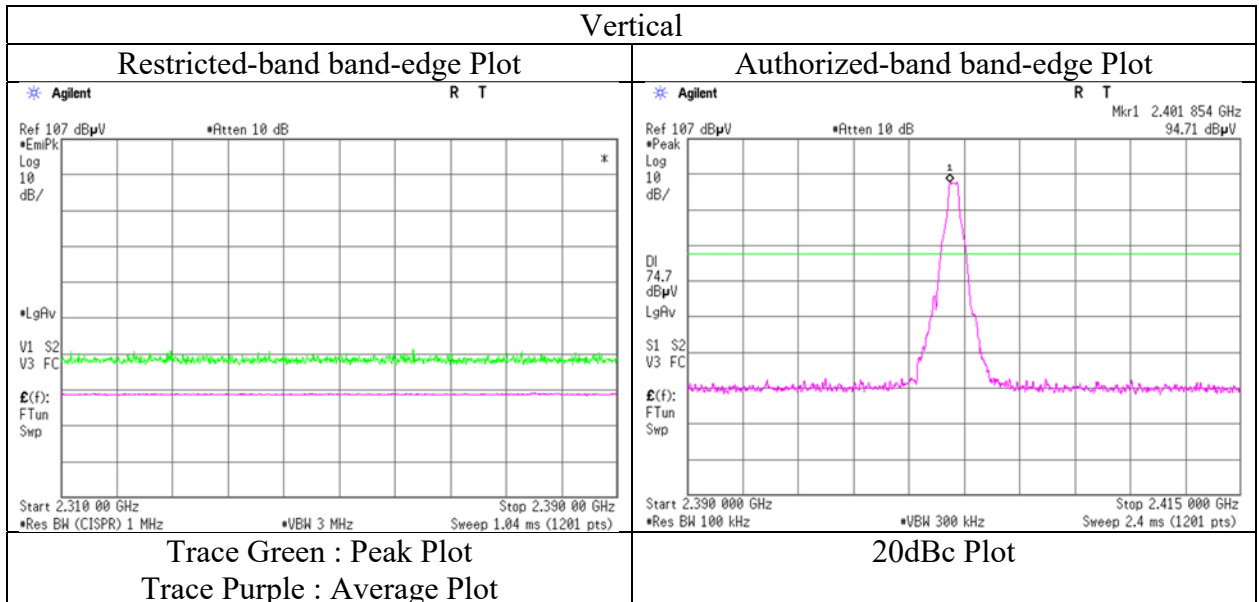
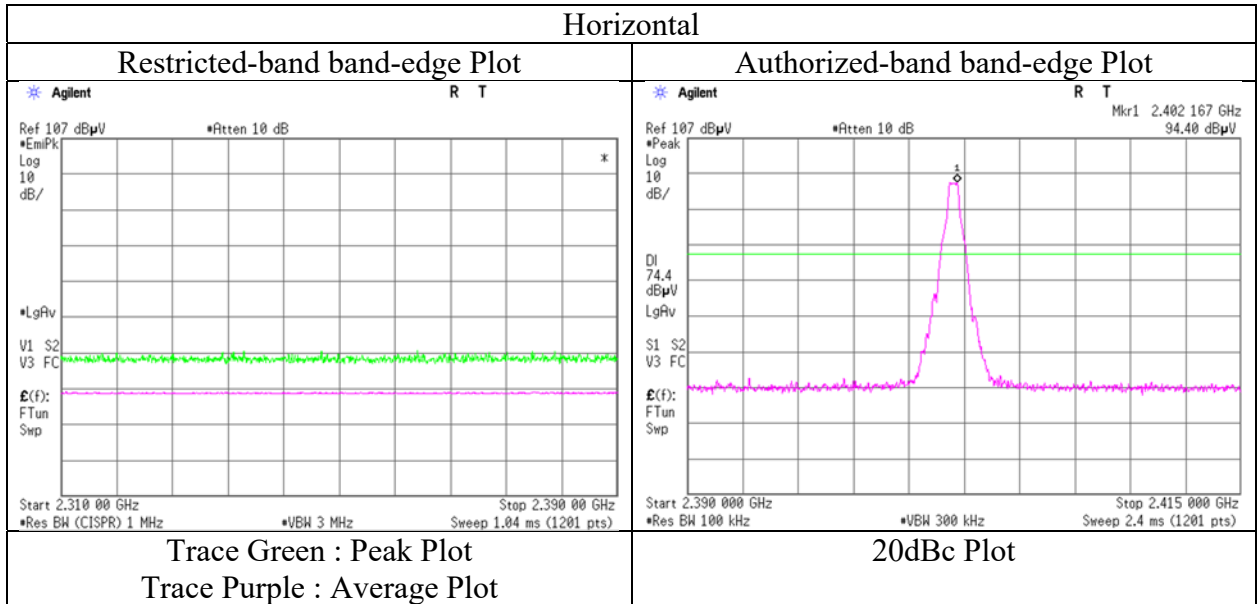
Distance factor : 1 GHz - 10 GHz : 20log(3.91 m / 3.0 m) = 2.31 dB

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

*These results have sufficient margin without taking account Duty cycle correction factor.

Radiated Spurious Emission
(Reference Plot for band-edge)

Report No.	13434268S-A-R2
Test place	Shonan EMC Lab.
Semi Anechoic Chamber	No.3
Date	March 3, 2021
Temperature / Humidity	26 deg.C, 39 %RH
Engineer	Hiromasa Sato (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.

Radiated Spurious Emission

Report No.	13434268S-A-R2		
Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	No.3	No.3	No.3
Date	March 4, 2021	March 3, 2021	March 4, 2021
Temperature / Humidity	28 deg.C, 35 %RH	26 deg.C, 39 %RH	28 deg.C, 35 %RH
Engineer	Hiromasa Sato	Hiromasa Sato	Hiromasa Sato
	(30MHz -1 GHz)	(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.	182.096	QP	26.38	16.14	7.79	32.06	0.00	18.25	43.5	25.2	147	179	-
Hori.	283.877	QP	27.05	13.40	8.44	31.98	0.00	16.91	46.0	29.0	100	105	-
Hori.	318.978	QP	30.17	14.10	8.63	31.96	0.00	20.94	46.0	25.0	100	260	-
Hori.	4882.000	PK	48.82	31.63	6.96	42.89	2.31	46.83	73.9	27.0	150	0	-
Hori.	7323.000	PK	48.90	37.71	8.39	43.52	2.31	53.79	73.9	20.1	150	0	-
Hori.	9764.000	PK	48.48	39.19	9.56	42.97	2.31	56.57	73.9	17.3	150	0	-
Hori.	4882.000	AV	36.62	31.63	6.96	42.89	2.31	34.63	53.9	19.2	150	0	VBW:360 Hz, Floor noise
Hori.	7323.000	AV	37.44	37.71	8.39	43.52	2.31	42.33	53.9	11.5	150	0	VBW:360 Hz, Floor noise
Hori.	9764.000	AV	37.11	39.19	9.56	42.97	2.31	45.20	53.9	8.7	150	0	VBW:360 Hz, Floor noise
Vert.	44.772	QP	25.46	13.07	6.73	32.17	0.00	13.09	40.0	26.9	100	2	-
Vert.	56.788	QP	31.13	8.99	6.65	32.16	0.00	14.61	40.0	25.3	100	25	-
Vert.	89.464	QP	31.22	8.07	7.53	32.14	0.00	14.68	43.5	28.8	100	173	-
Vert.	106.129	QP	30.62	11.24	7.26	32.13	0.00	16.99	43.5	26.5	100	84	-
Vert.	121.489	QP	28.64	13.17	7.25	32.11	0.00	16.95	43.5	26.5	100	57	-
Vert.	179.335	QP	26.46	15.95	7.80	32.07	0.00	18.14	43.5	25.3	100	179	-
Vert.	318.907	QP	29.81	14.10	8.63	31.96	0.00	20.58	46.0	25.4	153	165	-
Vert.	4882.000	PK	48.96	31.63	6.96	42.89	2.31	46.97	73.9	26.9	150	0	-
Vert.	7323.000	PK	48.34	37.71	8.39	43.52	2.31	53.23	73.9	20.6	150	0	-
Vert.	9764.000	PK	48.13	39.19	9.56	42.97	2.31	56.22	73.9	17.6	150	0	-
Vert.	4882.000	AV	36.57	31.63	6.96	42.89	2.31	34.58	53.9	19.3	150	0	VBW:360 Hz, Floor noise
Vert.	7323.000	AV	37.27	37.71	8.39	43.52	2.31	42.16	53.9	11.7	150	0	VBW:360 Hz, Floor noise
Vert.	9764.000	AV	36.98	39.19	9.56	42.97	2.31	45.07	53.9	8.8	150	0	VBW:360 Hz, Floor noise

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

Distance factor : 1 GHz - 10 GHz : 20log(3.91 m / 3.0 m) = 2.31 dB

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

***These results have sufficient margin without taking account Duty cycle correction factor.**

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Shonan EMC Lab.

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Radiated Spurious Emission

Report No.	13434268S-A-R2		
Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	No.3	No.3	No.3
Date	March 4, 2021	March 3, 2021	March 4, 2021
Temperature / Humidity	28 deg.C, 35 %RH	26 deg.C, 39 %RH	28 deg.C, 35 %RH
Engineer	Hiromasa Sato	Hiromasa Sato	Hiromasa Sato
	(30MHz -1 GHz)	(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.	183.187	QP	25.34	16.15	7.78	32.06	0.00	17.21	43.5	26.2	214	139	-
Hori.	288.040	QP	27.65	13.42	8.47	31.98	0.00	17.56	46.0	28.4	100	290	-
Hori.	319.163	QP	30.34	14.11	8.63	31.96	0.00	21.12	46.0	24.8	100	274	-
Hori.	2483.500	PK	47.23	28.28	14.52	41.65	2.31	50.69	73.9	23.2	257	325	-
Hori.	4960.000	PK	47.96	31.79	7.03	42.89	2.31	46.20	73.9	27.7	150	0	-
Hori.	7440.000	PK	48.01	37.88	8.44	43.65	2.31	52.99	73.9	20.9	150	0	-
Hori.	9920.000	PK	47.81	39.05	9.62	42.77	2.31	56.02	73.9	17.8	150	0	-
Hori.	2483.500	AV	35.84	28.28	14.52	41.65	2.31	39.30	53.9	14.6	257	325	VBW:360 Hz
Hori.	4960.000	AV	36.88	31.79	7.03	42.89	2.31	35.12	53.9	18.7	150	0	VBW:360 Hz,Floor noise
Hori.	7440.000	AV	36.87	37.88	8.44	43.65	2.31	41.85	53.9	12.0	150	0	VBW:360 Hz,Floor noise
Hori.	9920.000	AV	36.39	39.05	9.62	42.77	2.31	44.60	53.9	9.3	150	0	VBW:360 Hz,Floor noise
Vert.	45.022	QP	26.39	12.98	6.73	32.17	0.00	13.93	40.0	26.0	100	6	-
Vert.	56.479	QP	30.86	9.07	6.67	32.16	0.00	14.44	40.0	25.5	100	153	-
Vert.	89.579	QP	30.56	8.09	7.53	32.14	0.00	14.04	43.5	29.4	100	3	-
Vert.	105.929	QP	30.15	11.21	7.26	32.13	0.00	16.49	43.5	27.0	100	92	-
Vert.	121.137	QP	29.04	13.14	7.25	32.11	0.00	17.32	43.5	26.1	100	357	-
Vert.	179.722	QP	25.19	15.96	7.79	32.07	0.00	16.87	43.5	26.6	100	267	-
Vert.	319.204	QP	29.49	14.11	8.63	31.96	0.00	20.27	46.0	25.7	137	166	-
Vert.	2483.500	PK	46.71	28.28	14.52	41.65	2.31	50.17	73.9	23.7	198	282	-
Vert.	4960.000	PK	47.74	31.79	7.03	42.89	2.31	45.98	73.9	27.9	150	0	-
Vert.	7440.000	PK	47.69	37.88	8.44	43.65	2.31	52.67	73.9	21.2	150	0	-
Vert.	9920.000	PK	48.06	39.05	9.62	42.77	2.31	56.27	73.9	17.6	150	0	-
Vert.	2483.500	AV	35.96	28.28	14.52	41.65	2.31	39.42	53.9	14.4	198	282	VBW:360 Hz
Vert.	4960.000	AV	37.02	31.79	7.03	42.89	2.31	35.26	53.9	18.6	150	0	VBW:360 Hz,Floor noise
Vert.	7440.000	AV	37.07	37.88	8.44	43.65	2.31	42.05	53.9	11.8	150	0	VBW:360 Hz,Floor noise
Vert.	9920.000	AV	36.11	39.05	9.62	42.77	2.31	44.32	53.9	9.5	150	0	VBW:360 Hz,Floor noise

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

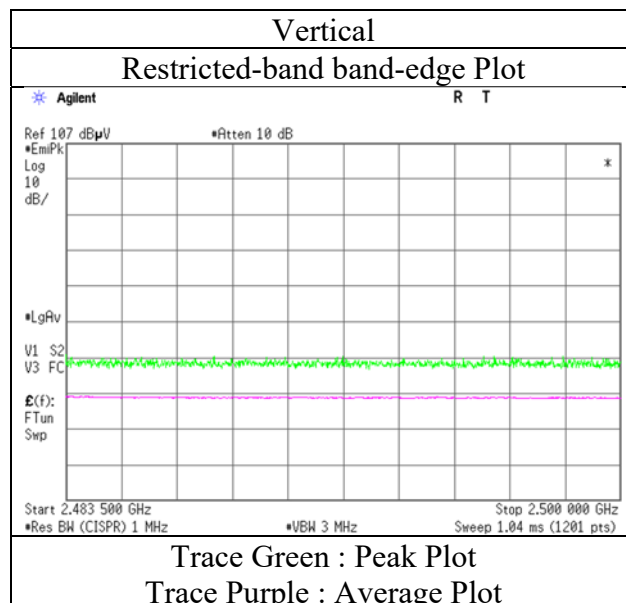
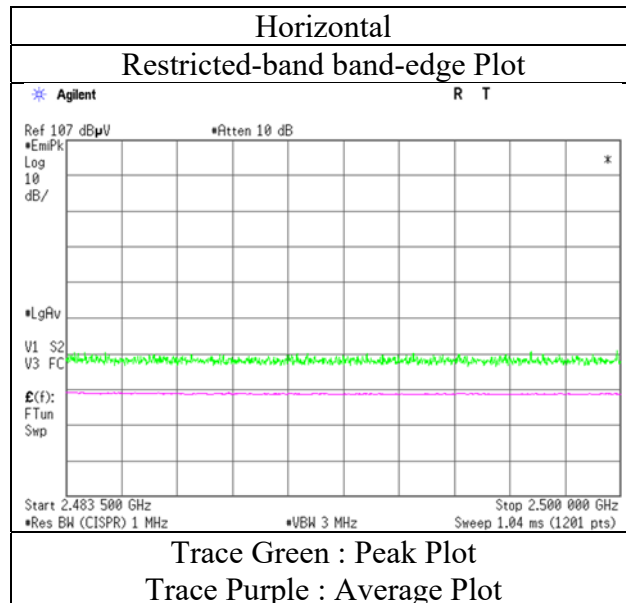
Distance factor : 1 GHz - 10 GHz : 20log(3.91 m / 3.0 m) = 2.31 dB

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

***These results have sufficient margin without taking account Duty cycle correction factor.**

Radiated Spurious Emission
(Reference Plot for band-edge)

Report No. 13434268S-A-R2
Test place Shonan EMC Lab.
Semi Anechoic Chamber No.3
Date March 3, 2021
Temperature / Humidity 26 deg.C, 39 %RH
Engineer Hiromasa Sato
(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.

Radiated Spurious Emission

Report No.	13434268S-A-R2		
Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	No.3	No.3	No.3
Date	March 4, 2021	August 18, 2021	March 4, 2021
Temperature / Humidity	28 deg.C, 35 %RH	21 deg.C, 69 %RH	28 deg.C, 35 %RH
Engineer	Hirosasa Sato	Shiro Kobayashi	Hirosasa Sato
	(30MHz -1 GHz)	(1 GHz -10 GHz)	(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.	181.968	QP	25.44	16.13	7.78	32.06	0.00	17.29	43.5	26.2	148	193	-
Hori.	288.849	QP	27.33	13.42	8.47	31.98	0.00	17.24	46.0	28.7	150	220	-
Hori.	319.123	QP	30.37	14.11	8.63	31.96	0.00	21.15	46.0	24.8	100	355	-
Hori.	2390.000	PK	48.14	28.33	14.43	41.62	2.31	51.59	73.9	22.3	152	144	-
Hori.	4804.000	PK	48.71	31.77	7.02	42.89	2.31	46.92	73.9	26.9	100	0	-
Hori.	7206.000	PK	48.23	37.37	8.49	43.39	2.31	53.01	73.9	20.8	100	0	-
Hori.	9608.000	PK	48.56	39.12	9.66	43.18	2.31	56.47	73.9	17.4	100	0	-
Hori.	2390.000	AV	35.53	28.33	14.43	41.62	2.31	38.98	53.9	14.9	152	144	VBW: 360 Hz
Hori.	4804.000	AV	36.37	31.77	7.02	42.89	2.31	34.58	53.9	19.3	100	0	VBW: 360 Hz, Floor noise
Hori.	7206.000	AV	36.09	37.37	8.49	43.39	2.31	40.87	53.9	13.0	100	0	VBW: 360 Hz, Floor noise
Hori.	9608.000	AV	36.54	39.12	9.66	43.18	2.31	44.45	53.9	9.4	100	0	VBW: 360 Hz, Floor noise
Vert.	44.695	QP	26.16	13.10	6.73	32.17	0.00	13.82	40.0	26.1	100	6	-
Vert.	57.103	QP	30.75	8.90	6.65	32.16	0.00	14.14	40.0	25.8	100	207	-
Vert.	89.809	QP	30.21	8.13	7.53	32.14	0.00	13.73	43.5	29.7	100	244	-
Vert.	106.621	QP	30.08	11.31	7.25	32.12	0.00	16.52	43.5	26.9	100	180	-
Vert.	121.015	QP	29.57	13.14	7.25	32.11	0.00	17.85	43.5	25.6	100	341	-
Vert.	182.921	QP	25.34	16.15	7.79	32.06	0.00	17.22	43.5	26.2	100	165	-
Vert.	319.341	QP	29.56	14.12	8.63	31.96	0.00	20.35	46.0	25.6	150	181	-
Vert.	2390.000	PK	47.60	28.33	14.43	41.62	2.31	51.05	73.9	22.8	139	225	-
Vert.	4804.000	PK	48.41	31.77	7.02	42.89	2.31	46.62	73.9	27.2	100	0	-
Vert.	7206.000	PK	47.81	37.37	8.49	43.39	2.31	52.59	73.9	21.3	100	0	-
Vert.	9608.000	PK	48.76	39.12	9.66	43.18	2.31	56.67	73.9	17.2	100	0	-
Vert.	2390.000	AV	35.47	28.33	14.43	41.62	2.31	38.92	53.9	14.9	139	225	VBW: 360 Hz
Vert.	4804.000	AV	36.42	31.77	7.02	42.89	2.31	34.63	53.9	19.2	100	0	VBW: 360 Hz, Floor noise
Vert.	7206.000	AV	36.12	37.37	8.49	43.39	2.31	40.90	53.9	13.0	100	0	VBW: 360 Hz, Floor noise
Vert.	9608.000	AV	36.63	39.12	9.66	43.18	2.31	44.54	53.9	9.3	100	0	VBW: 360 Hz, Floor noise

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

Distance factor : 1 GHz - 10 GHz : 20log(3.91 m / 3.0 m) = 2.31 dB

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

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	95.28	28.31	14.45	41.63	2.31	98.72	-	-	Carrier
Hori.	2400.000	PK	40.11	28.31	14.45	41.63	2.31	43.55	78.7	35.1	-
Vert.	2402.000	PK	95.71	28.31	14.45	41.63	2.31	99.15	-	-	Carrier
Vert.	2400.000	PK	40.90	28.31	14.45	41.63	2.31	44.34	79.1	34.7	-

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

Distance factor : 1 GHz - 10 GHz : 20log(3.91 m / 3.0 m) = 2.31 dB

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

*These results have sufficient margin without taking account Duty cycle correction factor.

UL Japan, Inc.

Shonan EMC Lab.

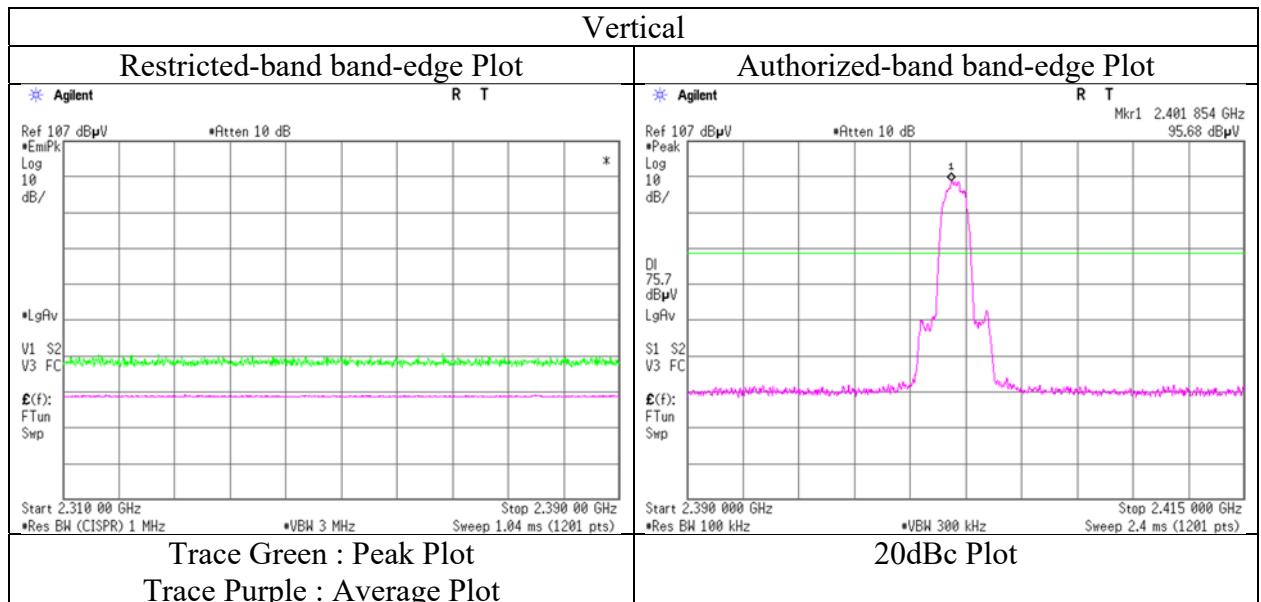
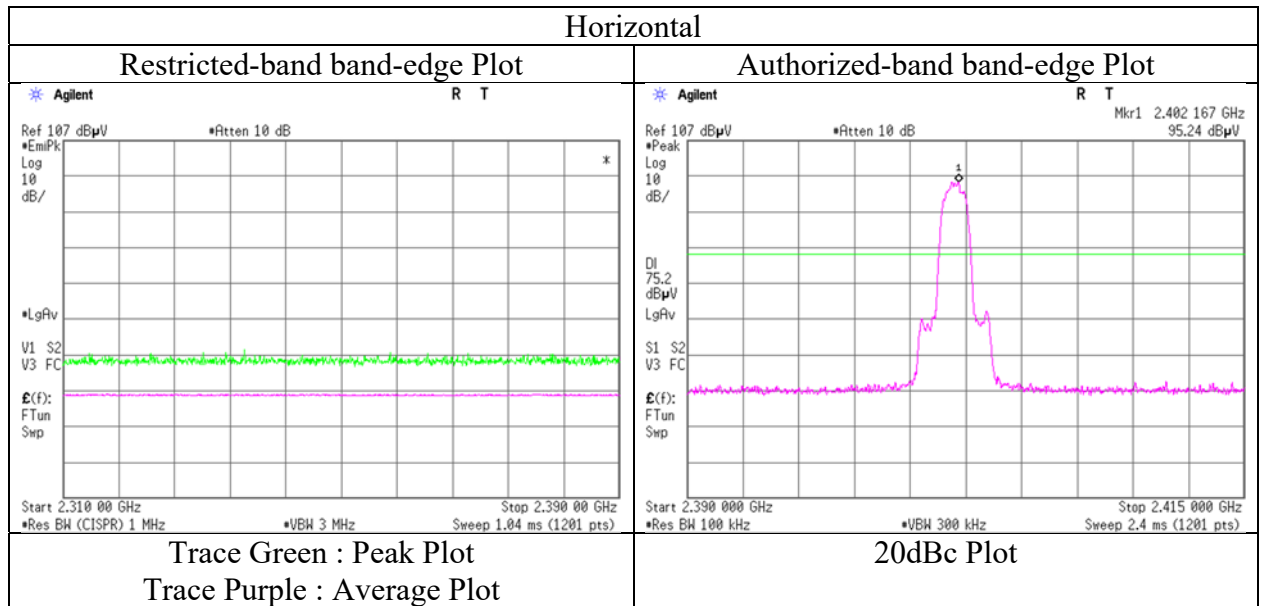
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

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Radiated Spurious Emission
(Reference Plot for band-edge)

Report No. 13434268S-A-R2
Test place Shonan EMC Lab.
Semi Anechoic Chamber No.3
Date August 18, 2021
Temperature / Humidity 21 deg.C, 69 %RH
Engineer Shiro Kobayashi
(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.

Radiated Spurious Emission

Report No.	13434268S-A-R2		
Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	No.3	No.3	No.3
Date	March 4, 2021	August 18, 2021	March 4, 2021
Temperature / Humidity	28 deg.C, 35 %RH	21 deg.C, 69 %RH	28 deg.C, 35 %RH
Engineer	Hiromasa Sato	Shiro Kobayashi	Hiromasa Sato
	(30MHz -1 GHz)	(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.	182.911	QP	25.29	16.15	7.79	32.06	0.00	17.17	43.5	26.3	243	66	-
Hori.	287.987	QP	27.56	13.42	8.47	31.98	0.00	17.47	46.0	28.5	100	208	-
Hori.	319.069	QP	30.28	14.10	8.63	31.96	0.00	21.05	46.0	24.9	100	271	-
Hori.	4882.000	PK	48.59	31.87	7.08	42.89	2.31	46.96	73.9	26.9	100	0	-
Hori.	7323.000	PK	47.33	37.54	8.57	43.52	2.31	52.23	73.9	21.6	100	0	-
Hori.	9764.000	PK	47.06	39.41	9.75	42.97	2.31	55.56	73.9	18.3	100	0	-
Hori.	4882.000	AV	36.36	31.87	7.08	42.89	2.31	34.73	53.9	19.1	100	0	VBW: 360 Hz, Floor noise
Hori.	7323.000	AV	36.07	37.54	8.57	43.52	2.31	40.97	53.9	12.9	100	0	VBW: 360 Hz, Floor noise
Hori.	9764.000	AV	35.59	39.41	9.75	42.97	2.31	44.09	53.9	9.8	100	0	VBW: 360 Hz, Floor noise
Vert.	44.319	QP	26.85	13.23	6.71	32.17	0.00	14.62	40.0	25.3	100	101	-
Vert.	50.121	QP	27.03	11.14	6.78	32.17	0.00	12.78	40.0	27.2	100	43	-
Vert.	56.303	QP	30.71	9.12	6.68	32.16	0.00	14.35	40.0	25.6	100	118	-
Vert.	90.530	QP	30.07	8.26	7.52	32.14	0.00	13.71	43.5	29.7	100	9	-
Vert.	105.881	QP	30.26	11.20	7.26	32.13	0.00	16.59	43.5	26.9	100	29	-
Vert.	120.514	QP	29.76	13.09	7.23	32.11	0.00	17.97	43.5	25.5	100	176	-
Vert.	183.019	QP	25.11	16.15	7.79	32.06	0.00	16.99	43.5	26.5	100	224	-
Vert.	319.106	QP	29.37	14.11	8.63	31.96	0.00	20.15	46.0	25.8	148	197	-
Vert.	4882.000	PK	48.85	31.87	7.08	42.89	2.31	47.22	73.9	26.6	100	0	-
Vert.	7323.000	PK	47.35	37.54	8.57	43.52	2.31	52.25	73.9	21.6	100	0	-
Vert.	9764.000	PK	46.98	39.41	9.75	42.97	2.31	55.48	73.9	18.4	100	0	-
Vert.	4882.000	AV	36.58	31.87	7.08	42.89	2.31	34.95	53.9	18.9	100	0	VBW: 360 Hz, Floor noise
Vert.	7323.000	AV	36.01	37.54	8.57	43.52	2.31	40.91	53.9	12.9	100	0	VBW: 360 Hz, Floor noise
Vert.	9764.000	AV	35.61	39.41	9.75	42.97	2.31	44.11	53.9	9.7	100	0	VBW: 360 Hz, Floor noise

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

Distance factor : 1 GHz - 10 GHz : $20\log(3.91\text{ m} / 3.0\text{ m}) = 2.31\text{ dB}$

10 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 Duty cycle correction factor.**

UL Japan, Inc.

Shonan EMC Lab.

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Radiated Spurious Emission

Report No.	13434268S-A-R2		
Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	No.3	No.3	No.3
Date	March 4, 2021	August 18, 2021	March 4, 2021
Temperature / Humidity	28 deg.C, 35 %RH	21 deg.C, 69 %RH	28 deg.C, 35 %RH
Engineer	Hiromasa Sato	Shiro Kobayashi	Hiromasa Sato
	(30MHz -1 GHz)	(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.	182.969	QP	25.37	16.15	7.79	32.06	0.00	17.25	43.5	26.2	140	276	-
Hori.	287.588	QP	27.87	13.42	8.46	31.98	0.00	17.77	46.0	28.2	150	3	-
Hori.	319.020	QP	30.37	14.10	8.63	31.96	0.00	21.14	46.0	24.8	100	62	-
Hori.	2483.500	PK	47.79	28.24	14.53	41.65	2.31	51.22	73.9	22.6	309	343	-
Hori.	4960.000	PK	48.74	32.14	7.14	42.89	2.31	47.44	73.9	26.4	150	0	-
Hori.	7440.000	PK	47.74	37.62	8.64	43.65	2.31	52.66	73.9	21.2	150	0	-
Hori.	9920.000	PK	47.16	39.30	9.83	42.77	2.31	55.83	73.9	18.0	150	0	-
Hori.	2483.500	AV	36.05	28.24	14.53	41.65	2.31	39.48	53.9	14.4	309	343	VBW: 360 Hz
Hori.	4960.000	AV	37.33	32.14	7.14	42.89	2.31	36.03	53.9	17.8	150	0	VBW: 360 Hz, Floor noise
Hori.	7440.000	AV	36.67	37.62	8.64	43.65	2.31	41.59	53.9	12.3	150	0	VBW: 360 Hz, Floor noise
Hori.	9920.000	AV	35.87	39.30	9.83	42.77	2.31	44.54	53.9	9.3	150	0	VBW: 360 Hz, Floor noise
Vert.	45.167	QP	26.05	12.93	6.73	32.17	0.00	13.54	40.0	26.4	100	4	-
Vert.	49.587	QP	26.26	11.33	6.78	32.17	0.00	12.20	40.0	27.8	100	290	-
Vert.	57.048	QP	30.36	8.91	6.64	32.16	0.00	13.75	40.0	26.2	100	6	-
Vert.	89.919	QP	30.11	8.15	7.53	32.14	0.00	13.65	43.5	29.8	100	6	-
Vert.	105.069	QP	30.17	11.06	7.27	32.13	0.00	16.37	43.5	27.1	100	337	-
Vert.	120.417	QP	29.59	13.08	7.23	32.11	0.00	17.79	43.5	25.7	100	0	-
Vert.	183.070	QP	25.28	16.15	7.79	32.06	0.00	17.16	43.5	26.3	100	227	-
Vert.	319.031	QP	29.20	14.10	8.63	31.96	0.00	19.97	46.0	26.0	150	187	-
Vert.	2483.500	PK	47.89	28.24	14.53	41.65	2.31	51.32	73.9	22.5	217	260	-
Vert.	4960.000	PK	48.07	32.14	7.14	42.89	2.31	46.77	73.9	27.1	150	0	-
Vert.	7440.000	PK	48.36	37.62	8.64	43.65	2.31	53.28	73.9	20.6	150	0	-
Vert.	9920.000	PK	46.80	39.30	9.83	42.77	2.31	55.47	73.9	18.4	150	0	-
Vert.	2483.500	AV	36.09	28.24	14.53	41.65	2.31	39.52	53.9	14.3	217	260	VBW: 360 Hz
Vert.	4960.000	AV	37.27	32.14	7.14	42.89	2.31	35.97	53.9	17.9	150	0	VBW: 360 Hz, Floor noise
Vert.	7440.000	AV	36.51	37.62	8.64	43.65	2.31	41.43	53.9	12.4	150	0	VBW: 360 Hz, Floor noise
Vert.	9920.000	AV	35.50	39.30	9.83	42.77	2.31	44.17	53.9	9.7	150	0	VBW: 360 Hz, Floor noise

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

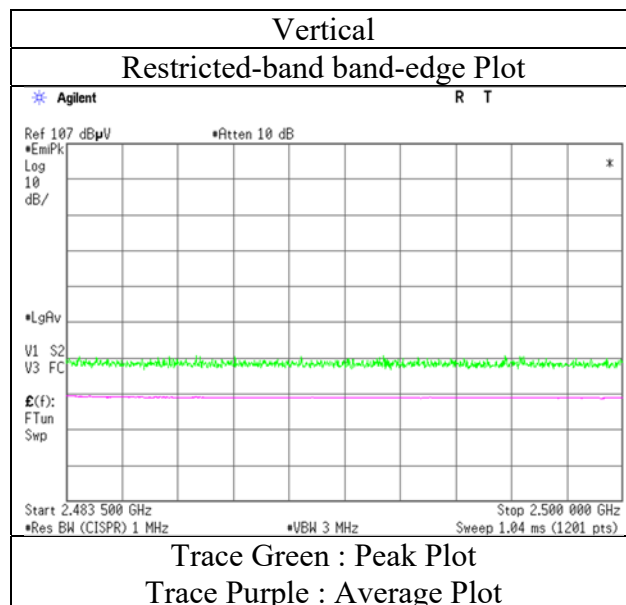
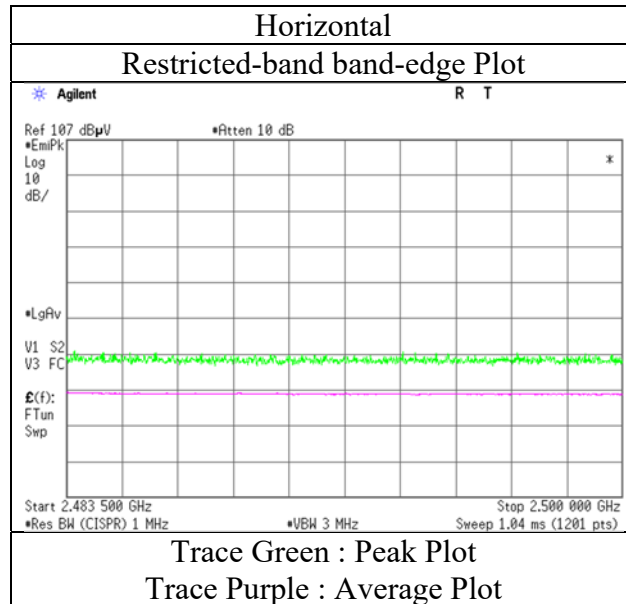
Distance factor : 1 GHz - 10 GHz : $20\log(3.91\text{ m} / 3.0\text{ m}) = 2.31\text{ dB}$

10 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 Duty cycle correction factor.

Radiated Spurious Emission
(Reference Plot for band-edge)

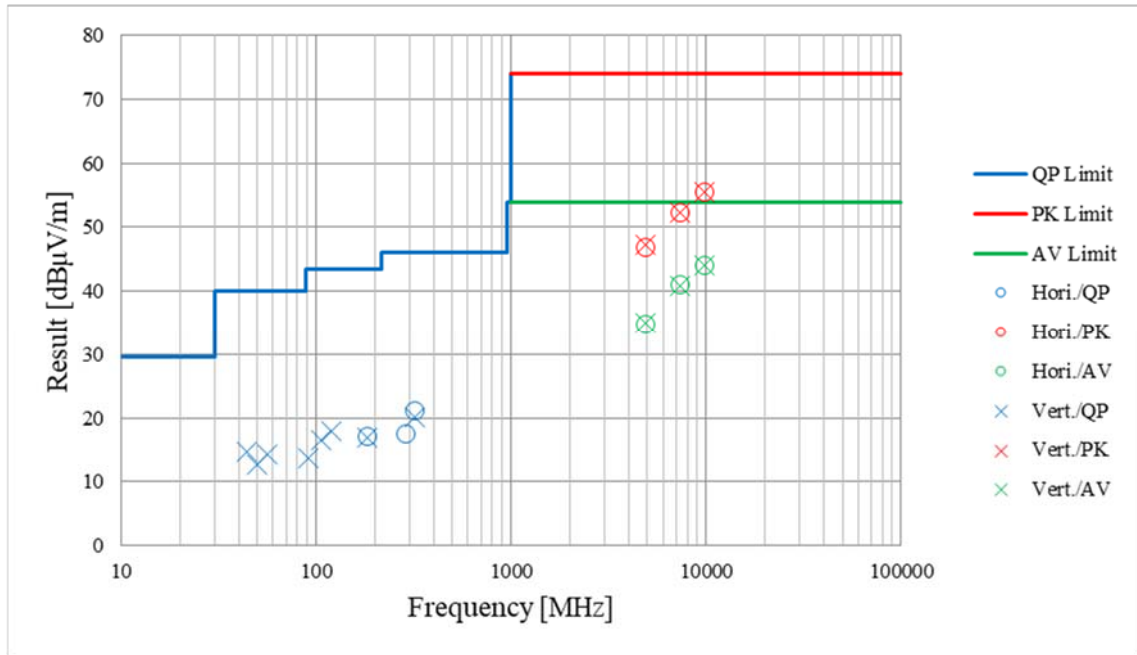
Report No. 13434268S-A-R2
Test place Shonan EMC Lab.
Semi Anechoic Chamber No.3
Date August 18, 2021
Temperature / Humidity 21 deg.C, 69 %RH
Engineer Shiro Kobayashi
(1 GHz -10 GHz)
Mode Tx, Hopping Off, 3DH5 2480 MHz



* 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.

Radiated Spurious Emission (Plot data, Worst case)

Report No.	13434268S-A-R2		
Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	No.3	No.3	No.3
Date	March 4, 2021	August 18, 2021	March 4, 2021
Temperature / Humidity	28 deg.C, 35 %RH	21 deg.C, 69 %RH	28 deg.C, 35 %RH
Engineer	Hiromasa Sato (30MHz -1 GHz)	Shiro Kobayashi (1 GHz -10 GHz)	Hiromasa Sato (10 GHz -26.5 GHz)
Mode	Tx, Hopping Off, 3DH5 2441 MHz		

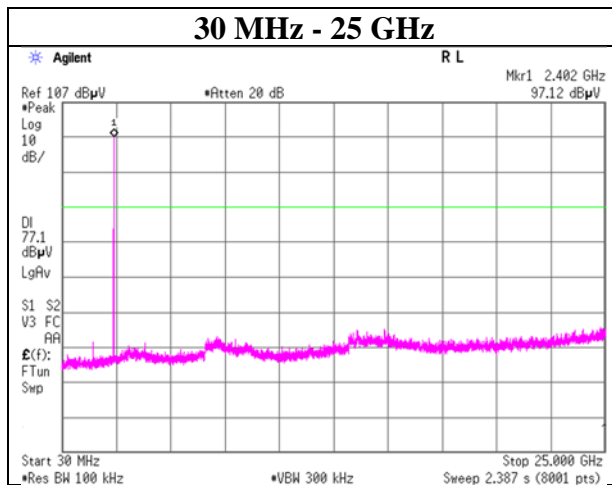
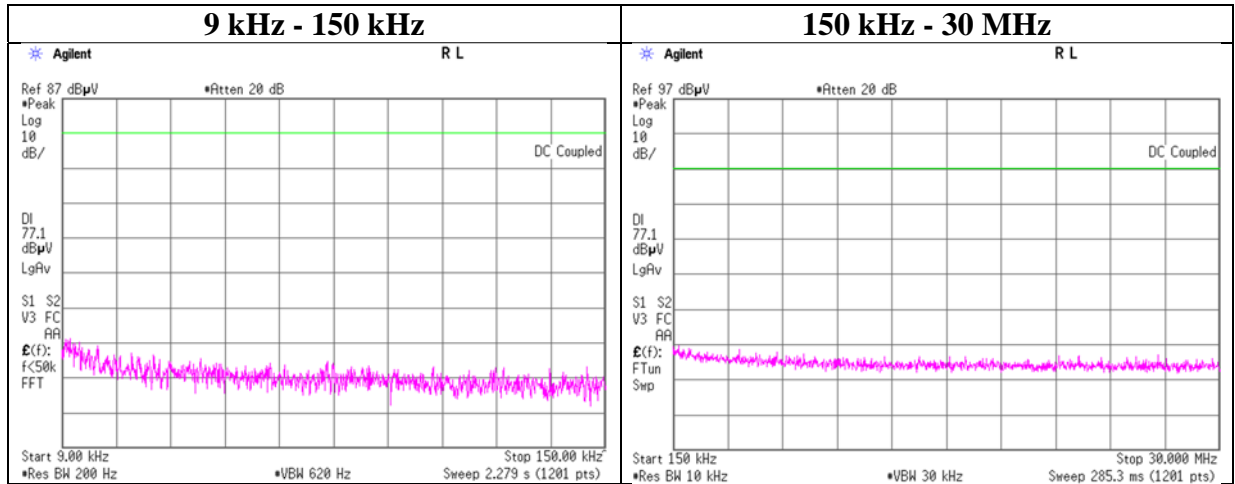


*These plots data contains sufficient number to show the trend of characteristic features for EUT.

Conducted Spurious Emission

Report No.	13434268S-A-R2
Test place	Shonan EMC Lab. No.5 Shielded Room
Date	February 19, 2021
Temperature / Humidity	24 deg. C / 42 % RH
Engineer	Shiro Kobayashi
Mode	Tx, Hopping Off, DH5

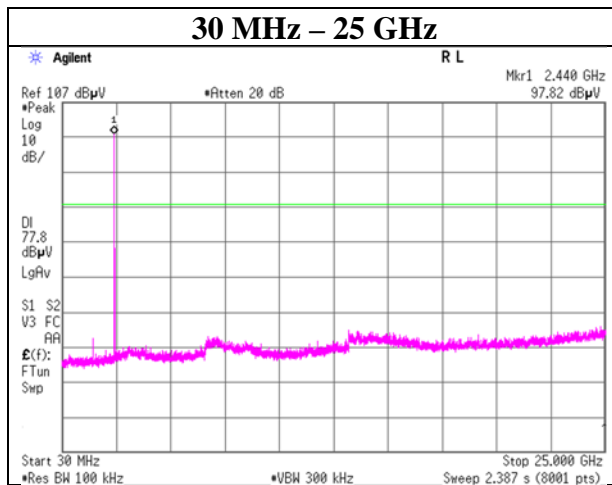
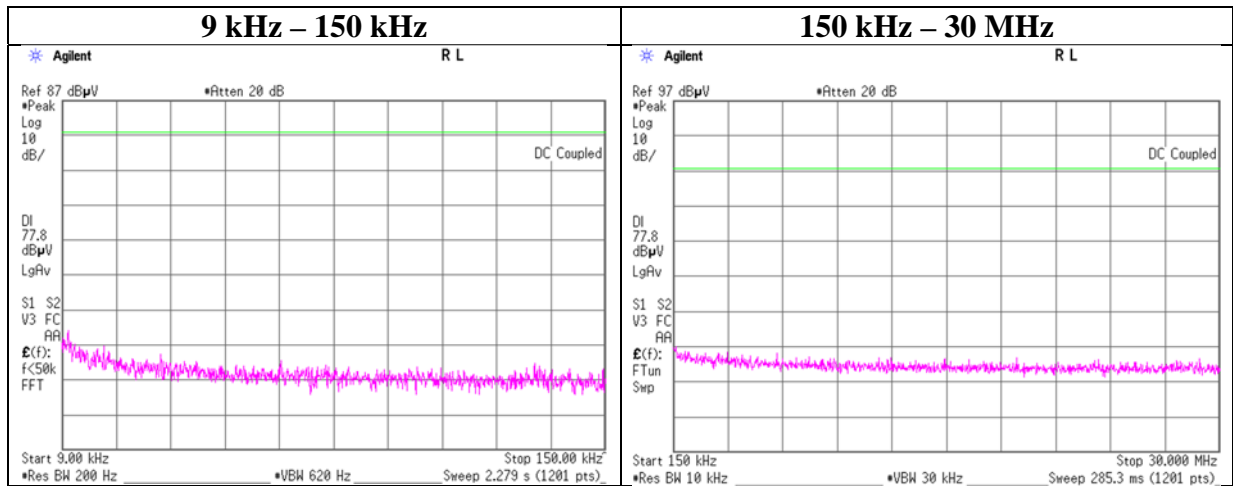
2402 MHz



Conducted Spurious Emission

Report No.	13434268S-A-R2
Test place	Shonan EMC Lab. No.5 Shielded Room
Date	February 19, 2021
Temperature / Humidity	24 deg. C / 42 % RH
Engineer	Shiro Kobayashi
Mode	Tx, Hopping Off, DH5

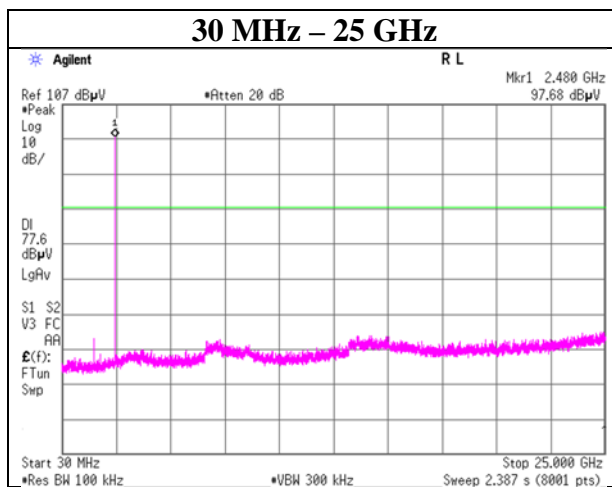
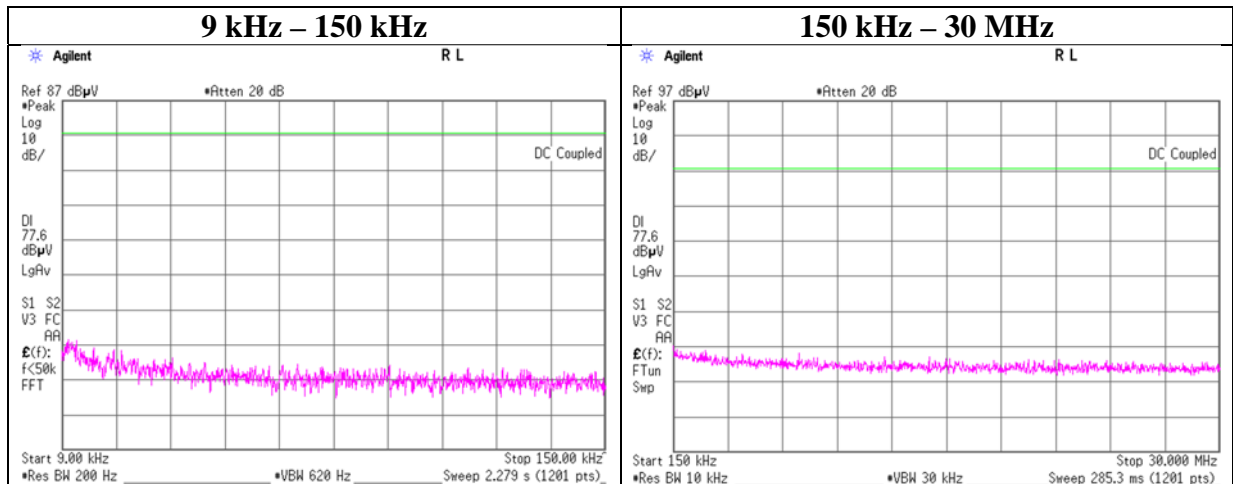
2441 MHz



Conducted Spurious Emission

Report No.	13434268S-A-R2
Test place	Shonan EMC Lab. No.5 Shielded Room
Date	February 19, 2021
Temperature / Humidity	24 deg. C / 42 % RH
Engineer	Shiro Kobayashi
Mode	Tx, Hopping Off, DH5

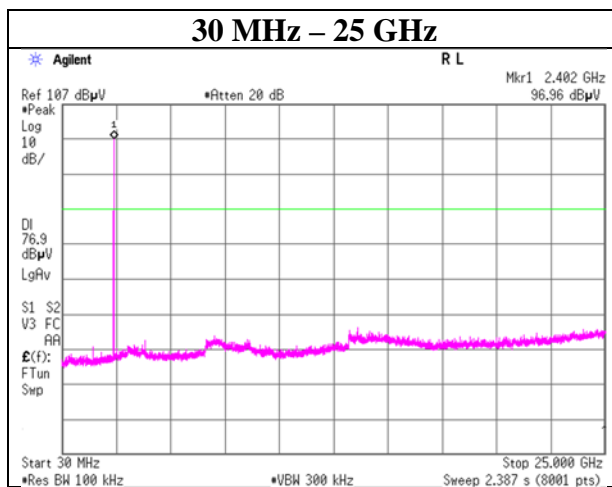
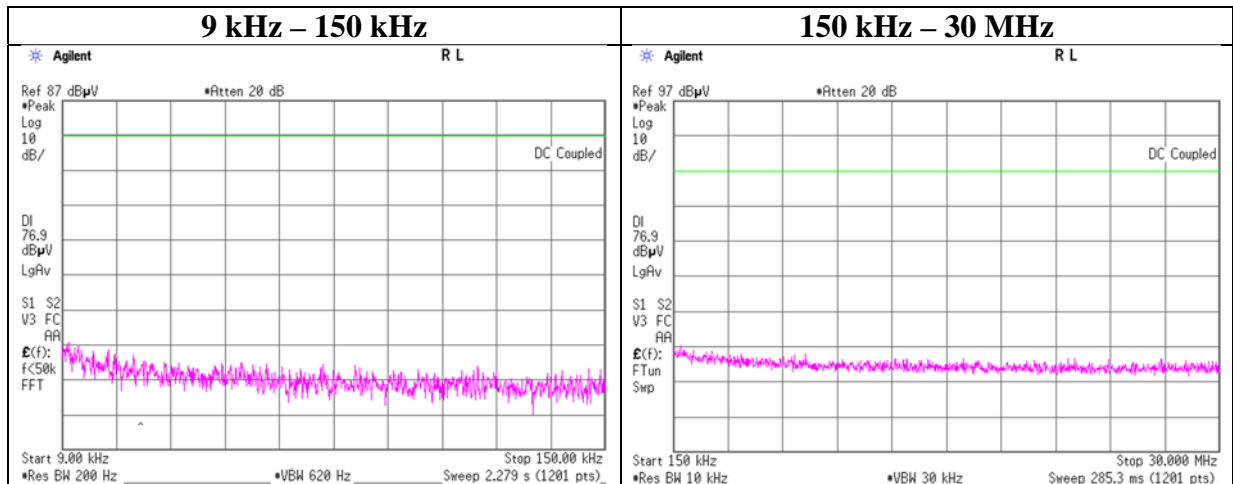
2480 MHz



Conducted Spurious Emission

Report No.	13434268S-A-R2
Test place	Shonan EMC Lab. No.5 Shielded Room
Date	February 19, 2021
Temperature / Humidity	24 deg. C / 42 % RH
Engineer	Shiro Kobayashi
Mode	Tx, Hopping Off, 3DH5

2402 MHz



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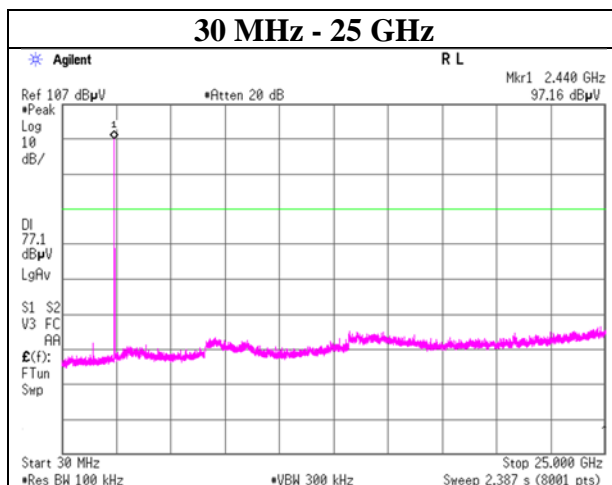
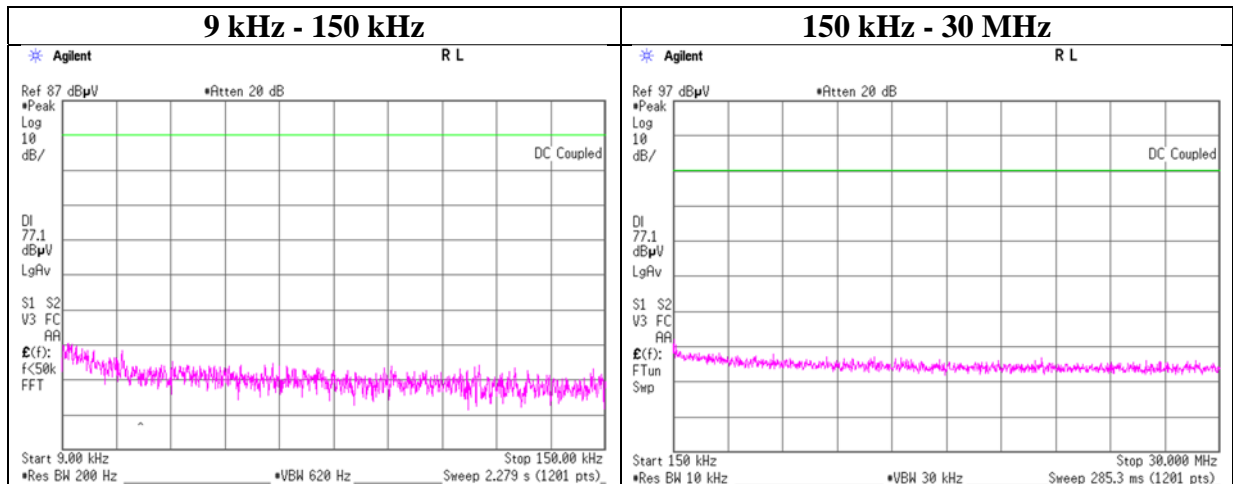
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Conducted Spurious Emission

Report No.	13434268S-A-R2
Test place	Shonan EMC Lab. No.5 Shielded Room
Date	February 19, 2021
Temperature / Humidity	24 deg. C / 42 % RH
Engineer	Shiro Kobayashi
Mode	Tx, Hopping Off, 3DH5

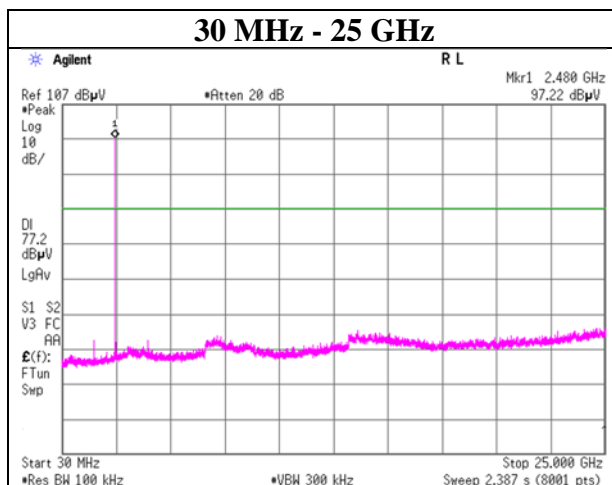
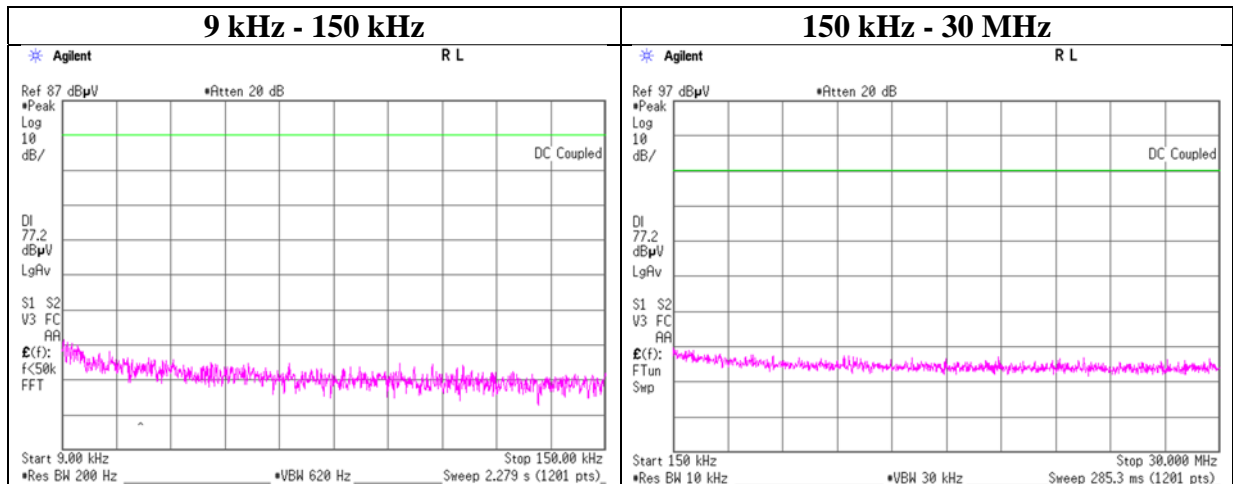
2441 MHz



Conducted Spurious Emission

Report No.	13434268S-A-R2
Test place	Shonan EMC Lab. No.5 Shielded Room
Date	February 19, 2021
Temperature / Humidity	24 deg. C / 42 % RH
Engineer	Shiro Kobayashi
Mode	Tx, Hopping Off, 3DH5

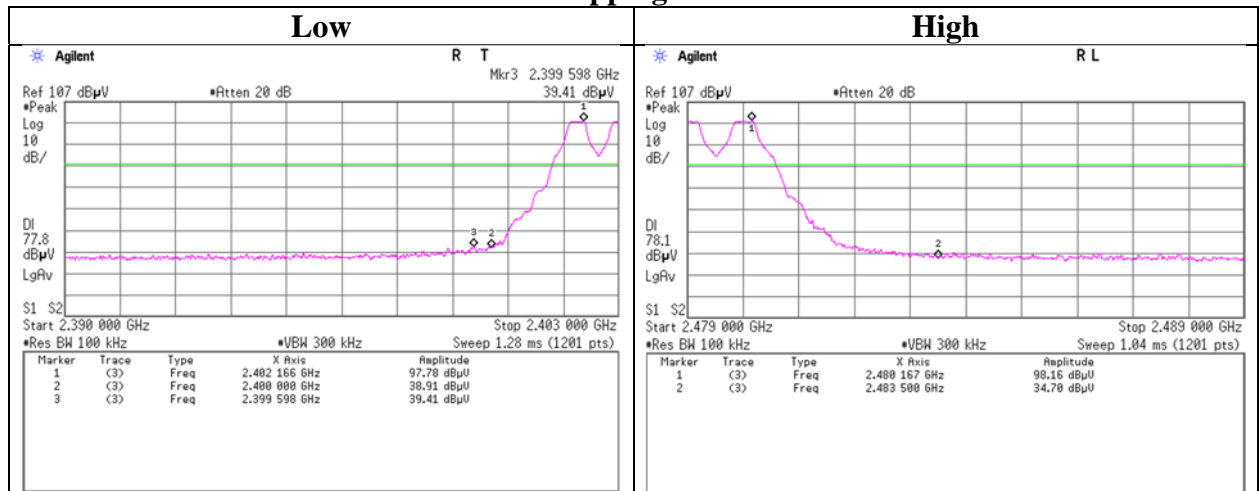
2480 MHz



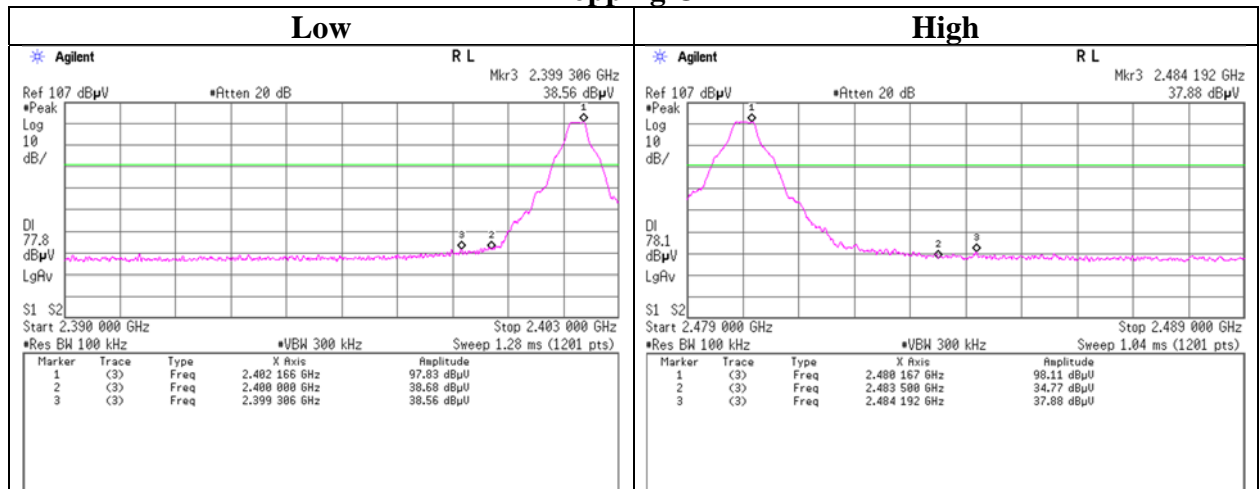
Conducted Emission Band Edge compliance

Report No. 13434268S-A-R2
 Test place Shonan EMC Lab. No.5 Shielded Room
 Date February 19, 2021
 Temperature / Humidity 24 deg. C / 42 % RH
 Engineer Shiro Kobayashi
 Mode Tx DH5

Hopping On



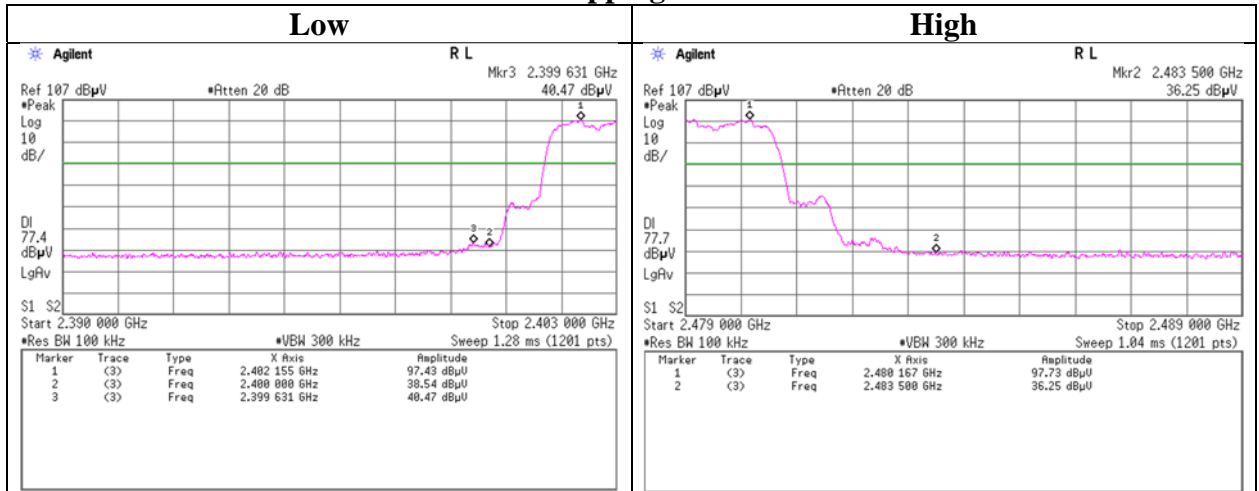
Hopping Off



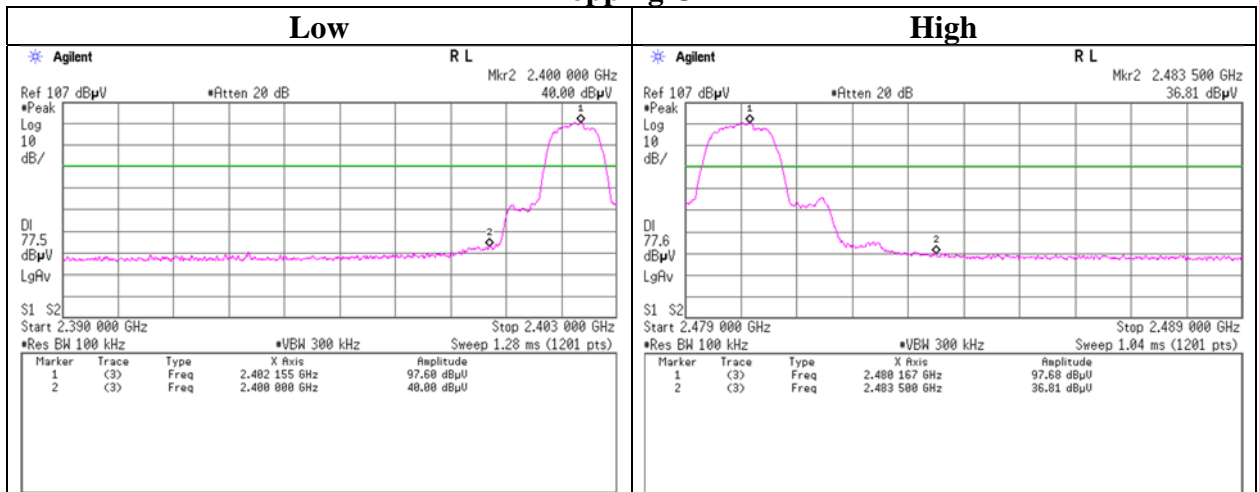
Conducted Emission Band Edge compliance

Report No.	13434268S-A-R2
Test place	Shonan EMC Lab. No.5 Shielded Room
Date	February 19, 2021
Temperature / Humidity	24 deg. C / 42 % RH
Engineer	Shiro Kobayashi
Mode	Tx 3DH5

Hopping On



Hopping Off



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APPENDIX 2: Test instruments

Test equipment [1/2]

Test Item	Local ID	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Cal Int
AT	SAT10-14	154591	Attenuator	Weinschel Corp.	54A-10	81595	2021/04/08	12
AT	SCC-G13	145166	Coaxial Cable	Suhner	SUCOFLEX 102	31599/2	2020/12/21	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	2021/01/25	12
AT	SPSS-07	169912	Power sensor	Keysight Technologies Inc	N1923A	MY57290005	2021/01/25	12
AT	SRENT-15	160899	Spectrum Analyzer	Keysight Technologies Inc	E4440A	MY46185516	2021/01/26	12
AT	STS-05	146212	Digital Hitester	HIOKI E.E. CORPORATION	3805-50	80997828	2020/10/19	12
CE	KJM-10	146454	Measure	KOMELON	KMC-36	-	-	-
CE	SAT3-13	150923	Attenuator	JFW	50HF-003N	-	2021/01/26	12
CE	SCC-B12/ B13/SRSE-02	144969	Coaxial Cable&RF Selector	Suhner/Suhner/TOYO	RG223U/141PE/NS4906	/0901-270(RF Selector)	2021/04/12	12
CE	SLS-02	145539	LISN	Rohde & Schwarz	ENV216	100512	2021/02/24	12
CE	SOS-22	191839	Humidity Indicator	CUSTOM. Inc	CTH-201	-	2020/10/01	12
CE	STR-01	145790	Test Receiver	Rohde & Schwarz	ESU40	100093	2020/04/24	12
CE	STS-02	145793	Digital Hitester	HIOKI E.E. CORPORATION	3805-50	80997819	2020/04/09	12
CE,RE	COTS-SEMI-5	170932	EMI Software	TSJ (Techno Science Japan)	TEPTO-DV3(RE,C E,ME,PE)	-	-	-
RE	KJM-02	146432	Measure	TAJIMA	GL19-55	-	-	-
RE	KSA-08	145089	Spectrum Analyzer	Keysight Technologies Inc	E4446A	MY46180525	2020/11/24	12
RE	SAEC-03(NSA)	145565	Semi-Anechoic Chamber	TDK	SAEC-03(NSA)	3	2020/04/12	12
RE	SAEC-03(SVSWR)	145566	Semi-Anechoic Chamber	TDK	SAEC-03(SVSWR)	3	2021/05/21	12
RE	SAF-03	145126	Pre Amplifier	SONOMA	310N	290213	2021/02/10	12
RE	SAF-06	145005	Pre Amplifier	Toyo Corporation	TPA0118-36	1440491	2021/02/08	12
RE	SAF-08	145007	Pre Amplifier	Toyo Corporation	HAP18-26W	19	2021/03/01	12
RE	SAT10-06	145137	Attenuator	Keysight Technologies Inc	8493C-010	74865	2020/10/05	12
RE	SAT6-13	167094	Attenuator	JFW	50HF-006N	-	2021/02/10	12
RE	SBA-03	145023	Biconical Antenna	Schwarzbeck Mess-Elektronik OHG	BBA9106	91032666	2020/05/17	12
RE	SCC-C1/ C2/C3/C4 /C5/C10/S RSE-03	145171	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhner/Suhner/Suhner/Suhner/TOYO	8D2W/12DSFA/141PE/141PE/141PE/41PE/NS4906	/0901-271(RF Selector)	2021/04/12	12
RE	SCC-G40	166491	Coaxial Cable	Junkosha	MWX221-01000NF SNMS/B	1612S005	2021/01/19	12
RE	SCC-G43	156380	Coaxial Cable	Huber+Suhner	SUCOFLEX_104_E	SN MY 13406/4E	2021/05/17	12
RE	SCC-G44	168300	Coaxial Cable	Huber+Suhner	SUCOFLEX 104	800375/4A	2020/11/20	12
RE	SCC-G58	183047	Coaxial Cable	Huber+Suhner	SUCOFLEX 104	800287/4A	2021/05/17	12

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Test equipment [2/2]

Test Item	Local ID	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Cal Int
RE	SFL-02	145301	Highpass Filter	MICRO-TRONICS	HPM50111	51	2020/10/05	12
RE	SFL-18	145305	Highpass Filter	MICRO-TRONICS	HPM50111	119	2021/04/08	12
RE	SHA-03	145501	Horn Antenna	Schwarzbeck Mess-Elektronik OHG	BBHA9120D	9120D-739	2021/06/14	12
RE	SHA-04	145512	Horn Antenna	ETS-Lindgren	3160-09	00094868	2020/06/15	12
RE	SLA-07	145529	Logperiodic Antenna	Schwarzbeck Mess-Elektronik OHG	VUSLP9111B	196	2020/05/17	12
RE	SOS-23	191840	Humidity Indicator	CUSTOM. Inc	CTH-201	-	2021/08/02	12
RE	SSA-02	145800	Spectrum Analyzer	Keysight Technologies Inc	E4448A	MY48250106	2021/04/13	12
RE	STR-08	150463	Test Receiver	Rohde & Schwarz	ESW44	101581	2020/12/02	12
RE	STS-03	146210	Digital Hitester	HIOKI CORPORATION	E.E.3805-50	80997823	2020/10/19	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: **CE: Conducted Emission test**
 RE: Radiated Emission test
 AT: Antenna Terminal Conducted test