



RADIO TEST REPORT

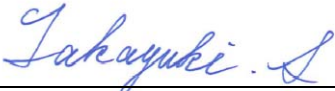
Test Report No. : 13698456H-A-R1

Applicant : Sony Interactive Entertainment Inc.
Type of EUT : Wireless Controller
Model Number of EUT : CFI-ZCT1W
FCC ID : AK8CFIZCT1A
Test regulation : FCC Part 15 Subpart C: 2021
Test Result : Complied (Refer to SECTION 3.2)

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2. The results in this report apply only to the sample tested.
3. This sample tested is in compliance with the limits of the above regulation.
4. The test results in this test report are traceable to the national or international standards.
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6. This test report covers Radio technical requirements.
It does not cover administrative issues such as Manual or non-Radio test related Requirements. (if applicable)
7. The all test items in this test report are conducted by UL Japan, Inc. Ise 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 13698456H-A. 13698456H-A is replaced with this report.

Date of test: February 9 to 21, 2021

Representative test engineer: 
Takeshi Hiyaji
Engineer
Consumer Technology Division

Approved by: 
Takayuki Shimada
Leader
Consumer Technology Division



CERTIFICATE 5107.02

- 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.: 13698456H-A

Revision	Test report No.	Date	Page revised	Contents
- (Original)	13698456H-A	February 25, 2021	-	-
1	13698456H-A-R1	March 5, 2021	P37	Corrected data for MHz band
1	13698456H-A-R1	March 5, 2021	P51	Corrected Last Calibration Date for CE (MOS-41); 12/19/2019 → 12/06/2020

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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 Interactive Entertainment Inc.
Brand Name	SONY
Address	1-7-1 Konan, Minato-ku, Tokyo, 108-0075 Japan
Telephone Number	+81-50-3807-5639
Facsimile Number	+81-50-3807-9594
Contact Person	Miho Nakamura

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	Wireless Controller
Model Number	CFI-ZCT1W
Serial Number	Refer to SECTION 4.2
Country of Mass-production	China
Receipt Date	February 2, 2021
Condition	Production prototype (Not for Sale: This sample is equivalent to mass-produced items.)
Modification	No Modification by the test lab.

2.2 Product Description

Model: CFI-ZCT1W is the Wireless Controller.

Product Specification

Operating Temperature	5 deg. C to 35 deg. C
Power Supply	DC 5 V (USB Bus Power)
Battery Supply	DC 3.65 V

Radio Specification: Bluetooth

Equipment Type	Transceiver
Frequency of Operation	2402 MHz to 2480 MHz
Type of Modulation	FHSS (GFSK, $\pi/4$ DQPSK, 8DPSK)
Bandwidth & Channel spacing	79MHz & 1MHz
Method of frequency generation	Synthesizer
Antenna Type	IFA
Antenna Gain	2.6 dBi max
Maximum clock frequency	6 GHz

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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 January 12, 2021 and effective February 11, 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

* 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	20.89 dB, (0.56271 MHz, L) (0.56060 MHz, L)	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
20dB 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		9.1 dB (344.803 MHz, QP, Horizontal)	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 20dB 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)

The EUT is a battery-operated device and test was performed with the full-charged battery.
This EUT provides 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.

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)					

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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Antenna Terminal test

Test Item	Uncertainty (+/-)
20 dB Bandwidth / 99 % Occupied Bandwidth	0.96 %
Maximum Peak Output Power / Average Output Power	1.4 dB
Carrier Frequency Separation	0.42 %
Dwell time / Burst rate	0.10 %
Conducted Spurious Emission	2.6 dB

Conducted emission

using item	Frequency range	Uncertainty (+/-)
AMN (LISN)	0.009 MHz to 0.15 MHz	3.4 dB
	0.15 MHz to 30 MHz	2.9 dB

Radiated emission

Measurement distance	Frequency range	Uncertainty (+/-)
3 m	9 kHz to 30 MHz	3.3 dB
10 m		3.2 dB
3 m	30 MHz to 200 MHz (Horizontal) (Vertical)	4.8 dB
		5.0 dB
	200 MHz to 1000 MHz (Horizontal) (Vertical)	5.2 dB
		6.3 dB
10 m	30 MHz to 200 MHz (Horizontal) (Vertical)	4.8 dB
		4.8 dB
	200 MHz to 1000 MHz (Horizontal) (Vertical)	5.0 dB
		5.0 dB
3 m	1 GHz to 6 GHz	4.9 dB
	6 GHz to 18 GHz	5.2 dB
1 m	10 GHz to 26.5 GHz	5.5 dB
	26.5 GHz to 40 GHz	5.5 dB
10 m	1 GHz to 18 GHz	5.2 dB

3.5 Test Location

UL Japan, Inc. Ise EMC Lab.

*A2LA Certificate Number: 5107.02 / FCC Test Firm Registration Number: 199967

ISED Lab Company Number: 2973C / CAB identifier: JP0002

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Test site	Width x Depth x Height (m)	Size of reference ground plane (m) / horizontal conducting plane	Other rooms	Maximum measurement distance
No.1 semi-anechoic chamber	19.2 x 11.2 x 7.7	7.0 x 6.0	No.1 Power source room	10 m
No.2 semi-anechoic chamber	7.5 x 5.8 x 5.2	4.0 x 4.0	-	3 m
No.3 semi-anechoic chamber	12.0 x 8.5 x 5.9	6.8 x 5.75	No.3 Preparation room	3 m
No.3 shielded room	4.0 x 6.0 x 2.7	N/A	-	-
No.4 semi-anechoic chamber	12.0 x 8.5 x 5.9	6.8 x 5.75	No.4 Preparation room	3 m
No.4 shielded room	4.0 x 6.0 x 2.7	N/A	-	-
No.5 semi-anechoic chamber	6.0 x 6.0 x 3.9	6.0 x 6.0	-	-
No.5 measurement room	6.4 x 6.4 x 3.0	6.4 x 6.4	-	-
No.6 shielded room	4.0 x 4.5 x 2.7	4.0 x 4.5	-	-
No.6 measurement room	4.75 x 5.4 x 3.0	4.75 x 4.15	-	-
No.7 shielded room	4.7 x 7.5 x 2.7	4.7 x 7.5	-	-
No.8 measurement room	3.1 x 5.0 x 2.7	3.1 x 5.0	-	-
No.9 measurement room	8.8 x 4.6 x 2.8	2.4 x 2.4	-	-
No.11 measurement room	6.2 x 4.7 x 3.0	4.8 x 4.6	-	-

* Size of vertical conducting plane (for Conducted Emission test) : 2.0 x 2.0 m for No.1, No.2, No.3, and No.4 semi-anechoic chambers and No.3 and No.4 shielded rooms.

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), 20dB Bandwidth	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
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) *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.</p> <p>*EUT has the power settings by the software as follows; Power settings: 7 Software: BT Tool, Version: W1645 Firmware: PlayStationWirelessControllerFW for functionControl, Version: 1.2.10 (Date: January 26, 2021 / Storage location: IC101)</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>		

4.2 Configuration and peripherals

This page has been submitted for a separate exhibit.

SECTION 5: Conducted Emission

Test Procedure and conditions

EUT was placed on a urethane platform of nominal size, 0.5 m by 1.0 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.

For the tests on EUT with other peripherals (as a whole system)

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. All unused 50 ohm connectors of the LISN (AMN) were resistivity terminated in 50 ohm when not connected to the measuring equipment.

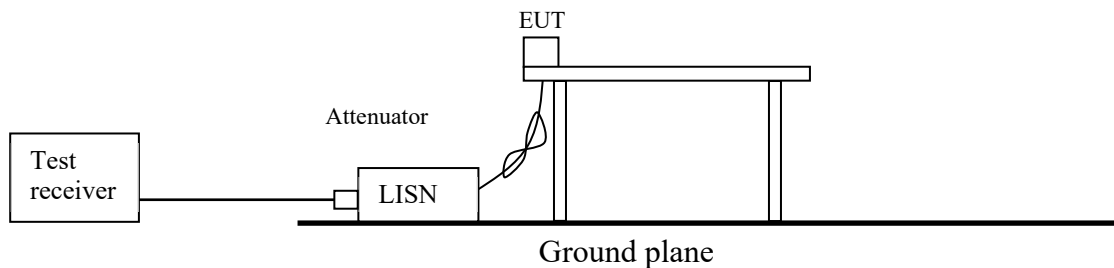
The AC Mains Terminal Continuous disturbance Voltage has been measured with the EUT in a Semi Anechoic Chamber. The EUT was connected to a LISN (AMN).

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, 0.5 m by 1.0 m, raised 0.8 m above the conducting ground plane. The Radiated Electric Field Strength has been measured in a Semi Anechoic Chamber with a ground plane.

[For above 1 GHz]

EUT was placed on a urethane platform of nominal size, 0.5 m by 0.5 m, raised 1.5 m above the conducting ground plane. The Radiated Electric Field Strength has been measured in a Semi Anechoic Chamber with absorbent materials lined on a ground plane.

The height of the measuring antenna varied between 1 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.

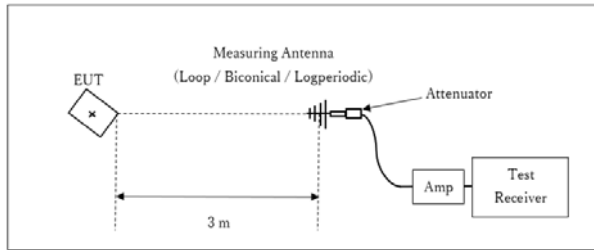
20 dBc was applied to the frequency over the limit of FCC 15.209 / Table 4 of RSS-Gen 8.9 (ISED) and outside the restricted band of FCC15.205 / Table 6 of RSS-Gen 8.10 (ISED).

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: 3 MHz Detector: Power Averaging (RMS) Trace: 100 traces Duty factor was added to the results.	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

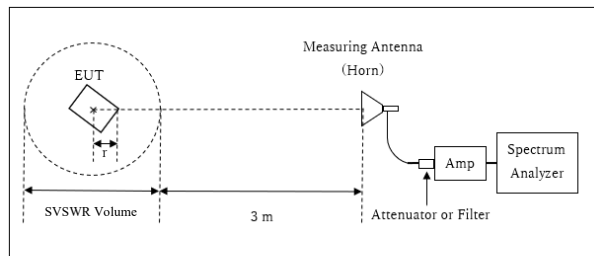
Below 1 GHz



× : Center of turn table

Test Distance: 3 m

1 GHz - 10 GHz



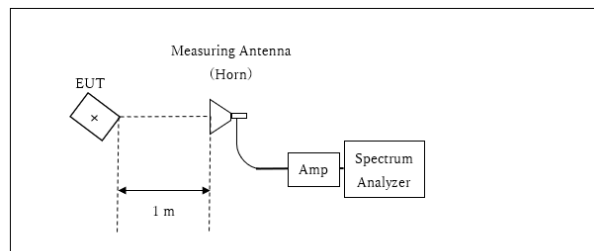
r : Radius of an outer periphery of EUT
 × : Center of turn table

Distance Factor: $20 \times \log(4.0 \text{ m} / 3.0 \text{ m}) = 2.5 \text{ dB}$
 * Test Distance: $(3 + \text{SVSWR Volume} / 2) - r = 4.0 \text{ m}$

SVSWR Volume : 2.0 m
 (SVSWR Volume has been calibrated based on CISPR 16-1-4.)
 r = 0.0 m

* The test was performed with r = 0.0 m since EUT is small and it was the rather conservative condition.

10 GHz - 30 GHz



× : Center of turn table

Distance Factor: $20 \times \log(1.0 \text{ m} / 3.0 \text{ m}) = -9.5 \text{ dB}$
 *Test Distance: 1 m

- The carrier level and noise levels were confirmed at 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.

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

Measurement range : 30 MHz - 30 GHz
Test data : APPENDIX
Test result : Pass

SECTION 7: Antenna Terminal Conducted Tests

Test Procedure

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

Test	Span	RBW	VBW	Sweep time	Detector	Trace	Instrument used
20dB Bandwidth	3 MHz	30 kHz	100 kHz	Auto	Peak	Max Hold	Spectrum Analyzer
99% Occupied Bandwidth *1)	Enough width to display emission skirts	1 to 5 % of OBW	Three times of RBW	Auto	Peak	Max Hold	Spectrum Analyzer
Maximum Peak Output Power	-	-	-	Auto	Peak Average *2)	-	Power Meter (Sensor: 50MHz BW)
Carrier Frequency Separation	3 MHz	30 kHz	100 kHz	Auto	Peak	Max Hold	Spectrum Analyzer
Number of Hopping Frequency	30 MHz	200 kHz	620 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	9.1 kHz	27 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 = 9.1 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

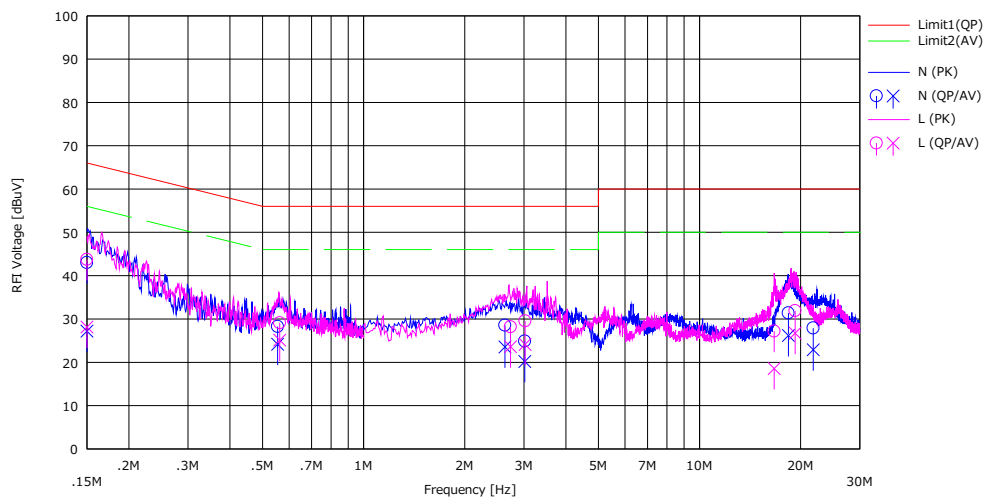
Test result : Pass

APPENDIX 1: Test data

Conducted Emission

Report No. 13698456H
Test place Ise EMC Lab. No.2 Semi Anechoic Chamber
Date February 21, 2021
Temperature / Humidity 23 deg. C / 30 % RH
Engineer Yuichiro Yamazaki
Mode Tx Hopping Off, DH5 2441 MHz

Limit : FCC_Part 15 Subpart C(15.207)



No.	Freq. [MHz]	Reading		LISN [dB]	LOSS [dB]	Results		Limit		Margin		Phase	Comment
		<QP> [dBuV]	<AV> [dBuV]			<QP> [dBuV]	<AV> [dBuV]	<QP> [dB]	<AV> [dB]	<QP> [dB]	<AV> [dB]		
1	0.15000	29.80	14.00	0.07	13.13	43.00	27.20	66.00	56.00	23.00	28.80	N	
2	0.55490	15.00	10.90	0.06	13.21	28.27	24.17	56.00	46.00	27.73	21.83	N	
3	2.63600	15.00	10.00	0.10	13.44	28.54	23.54	56.00	46.00	27.46	22.46	N	
4	3.01831	11.30	6.60	0.10	13.48	24.88	20.18	56.00	46.00	31.12	25.82	N	
5	18.38382	16.80	11.60	0.37	14.22	31.39	26.19	60.00	50.00	28.61	23.81	N	
6	21.81151	13.10	8.10	0.44	14.35	27.89	22.89	60.00	50.00	32.11	27.11	N	
7	0.15000	30.50	14.90	0.10	13.13	43.73	28.13	66.00	56.00	22.27	27.87	L	
8	0.56271	15.80	11.80	0.10	13.21	29.11	25.11	56.00	46.00	26.89	20.89	L	
9	2.73663	14.60	10.00	0.14	13.45	28.19	23.59	56.00	46.00	27.81	22.41	L	
10	3.02431	15.90	10.50	0.15	13.48	29.53	24.13	56.00	46.00	26.47	21.87	L	
11	16.68210	12.60	4.00	0.41	14.16	27.17	18.57	60.00	50.00	32.83	31.43	L	
12	19.26351	17.20	12.00	0.47	14.25	31.92	26.72	60.00	50.00	28.08	23.28	L	

CHART: WITH FACTOR Peak hold data. CALCULATION : RESULT = READING + LISN + LOSS (CABLE + ATT)
Except for the above table: adequate margin data below the limits.

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Ise EMC Lab.

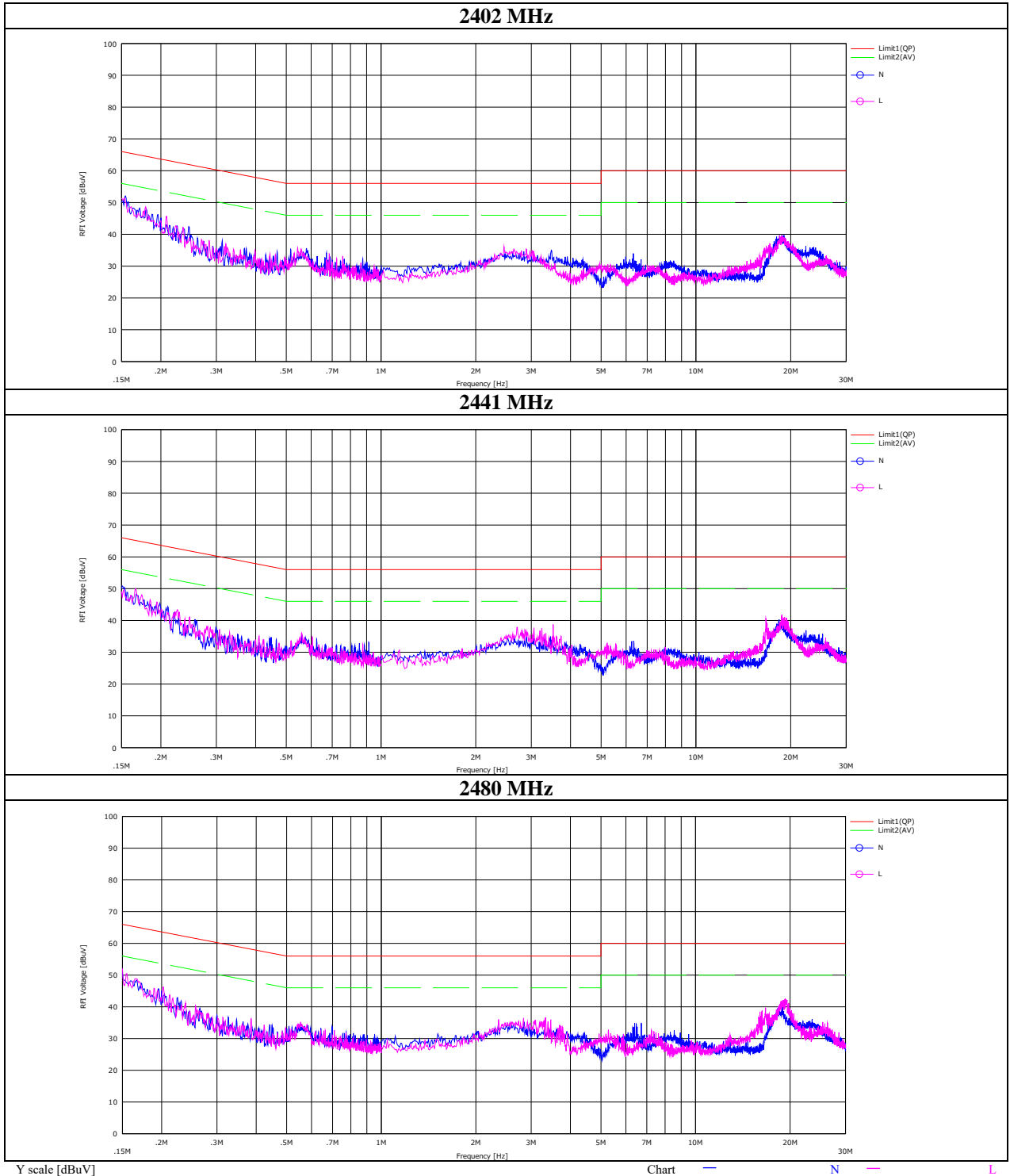
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Facsimile : +81 596 24 8124

Conducted Emission

Report No.	13698456H
Test place	Ise EMC Lab. No.2 Semi Anechoic Chamber
Date	February 21, 2021
Temperature / Humidity	23 deg. C / 30 % RH
Engineer	Yuichiro Yamazaki
Mode	Tx Hopping Off, DH5



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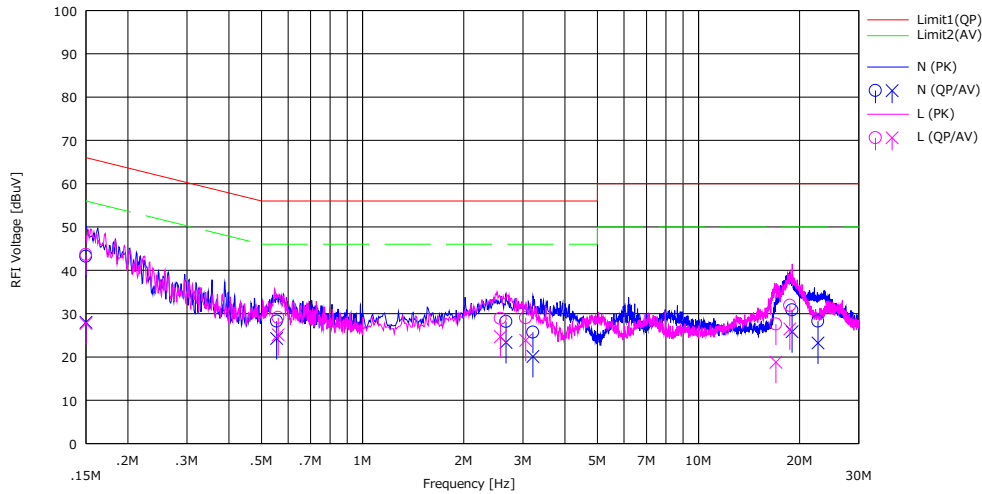
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Facsimile : +81 596 24 8124

Conducted Emission

Report No. 13698456H
 Test place Ise EMC Lab. No.2 Semi Anechoic Chamber
 Date February 21, 2021
 Temperature / Humidity 23 deg. C / 30 % RH
 Engineer Yuichiro Yamazaki
 Mode Tx Hopping Off, 3DH5 2441 MHz

Limit : FCC_Part 15 Subpart C(15.207)



No.	Freq. [MHz]	Reading		USN [dB]	LOSS [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			30.00	14.80	0.07	13.13	43.20	28.00		
2	0.55472	15.00	11.00	0.06	13.21	28.27	24.27	56.00	46.00	27.73	21.73	N	
3	2.67400	14.60	9.80	0.10	13.45	28.15	23.35	56.00	46.00	27.85	22.65	N	
4	3.21421	12.10	6.50	0.10	13.50	25.70	20.10	56.00	46.00	30.30	25.90	N	
5	18.98945	16.20	11.20	0.38	14.24	30.82	25.82	60.00	50.00	29.18	24.18	N	
6	22.68161	13.40	8.40	0.46	14.37	28.23	23.23	60.00	50.00	31.77	26.77	N	
7	0.15000	30.40	14.50	0.10	13.13	43.63	27.73	66.00	56.00	22.37	28.27	L	
8	0.56060	15.80	11.80	0.10	13.21	29.11	25.11	56.00	46.00	26.89	20.89	L	
9	2.57322	15.30	11.10	0.14	13.44	28.88	24.68	56.00	46.00	27.12	21.32	L	
10	3.05850	15.40	10.20	0.15	13.48	29.03	23.83	56.00	46.00	26.97	22.17	L	
11	16.98421	13.00	4.20	0.42	14.17	27.59	18.79	60.00	50.00	32.41	31.21	L	
12	18.70908	17.20	11.80	0.45	14.23	31.88	26.48	60.00	50.00	28.12	23.52	L	

CHART: WITH FACTOR Peak hold data. CALCULATION : RESULT = READING + LISN + LOSS (CABLE + ATT)
 Except for the above table: adequate margin data below the limits.

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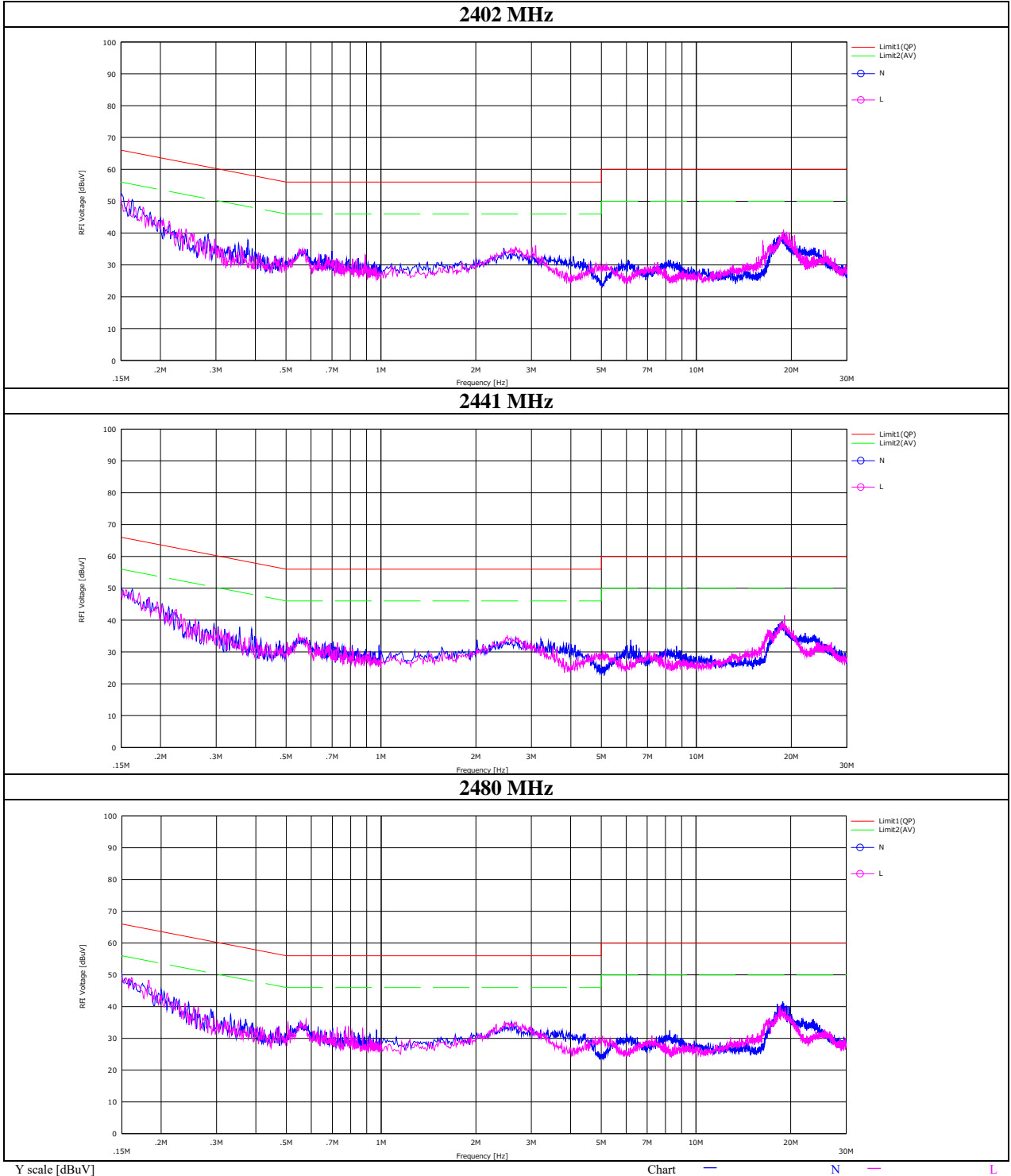
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Conducted Emission

Report No.	13698456H
Test place	Ise EMC Lab. No.2 Semi Anechoic Chamber
Date	February 21, 2021
Temperature / Humidity	23 deg. C / 30 % RH
Engineer	Yuichiro Yamazaki
Mode	Tx Hopping Off, DH5 2441 MHz



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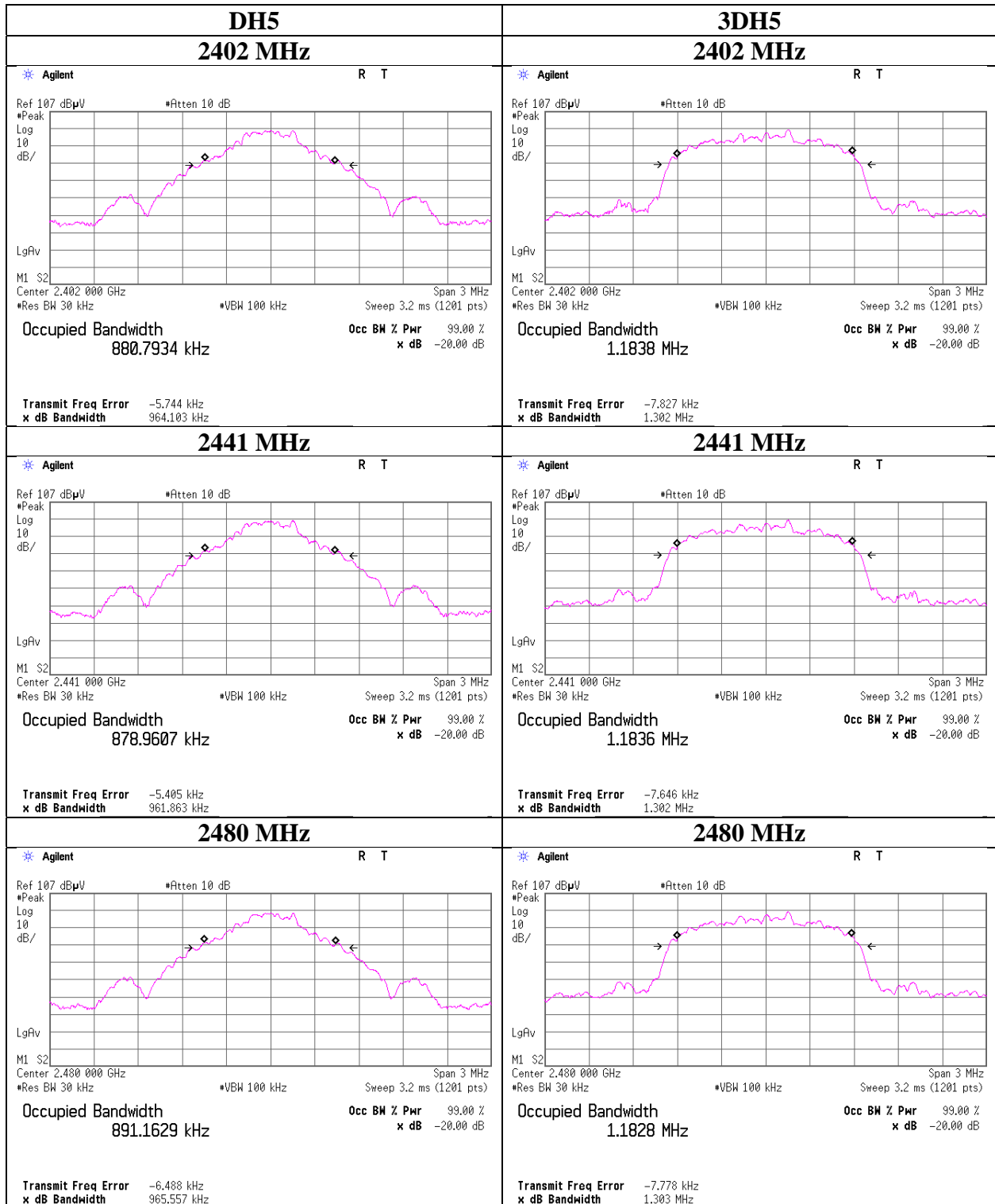
20dB Bandwidth, 99%Occupied Bandwidth and Carrier Frequency Separation

Report No. 13698456H
Test place Ise EMC Lab. No.6 Measurement Room
Date February 9, 2021
Temperature / Humidity 23 deg. C / 45 % RH
Engineer Takeshi Hiyaji
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	0.964	880.793	1.000	>= 0.643
DH5	2441.0	0.962	878.961	1.000	>= 0.641
DH5	2480.0	0.966	891.163	1.000	>= 0.644
DH5	Hopping On	-	78631.300	-	-
3DH5	2402.0	1.302	1183.800	1.000	>= 0.868
3DH5	2441.0	1.302	1183.600	1.000	>= 0.868
3DH5	2480.0	1.303	1182.800	1.000	>= 0.869
3DH5	Hopping On	-	78804.200	-	-

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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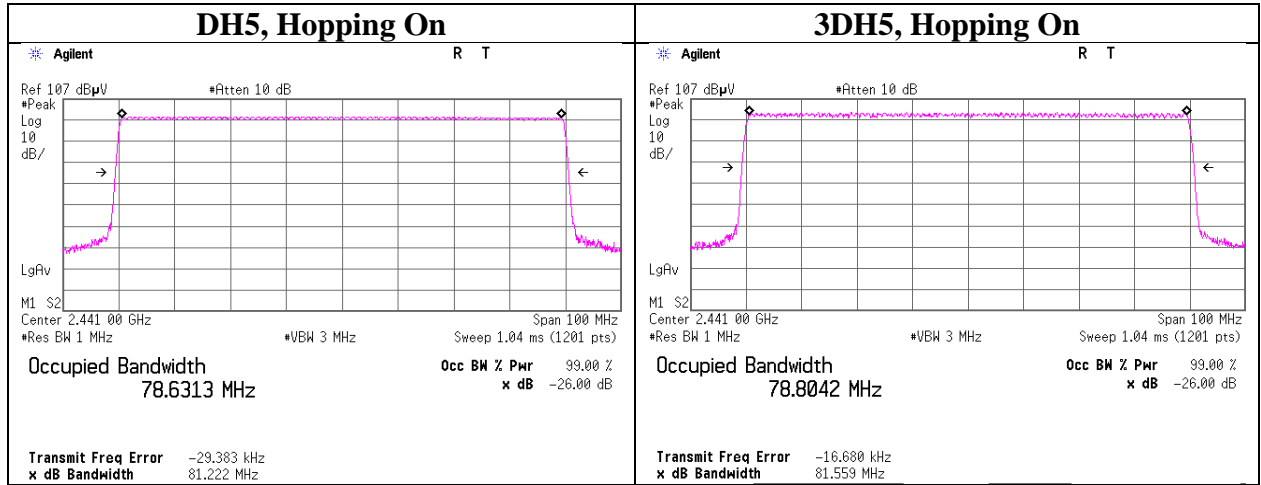
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20dB Bandwidth and 99% Occupied Bandwidth



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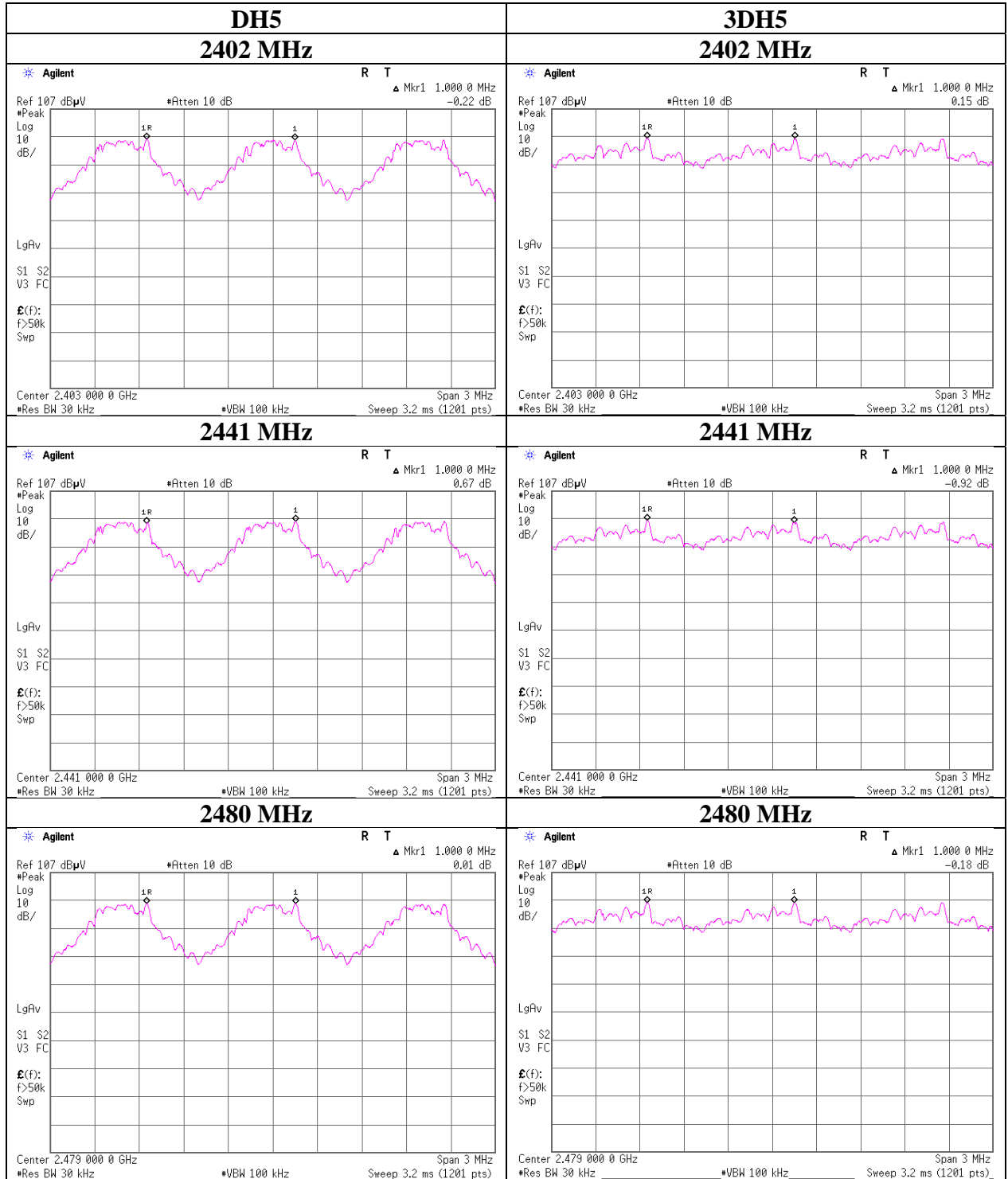
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Carrier Frequency Separation



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Number of Hopping Frequency

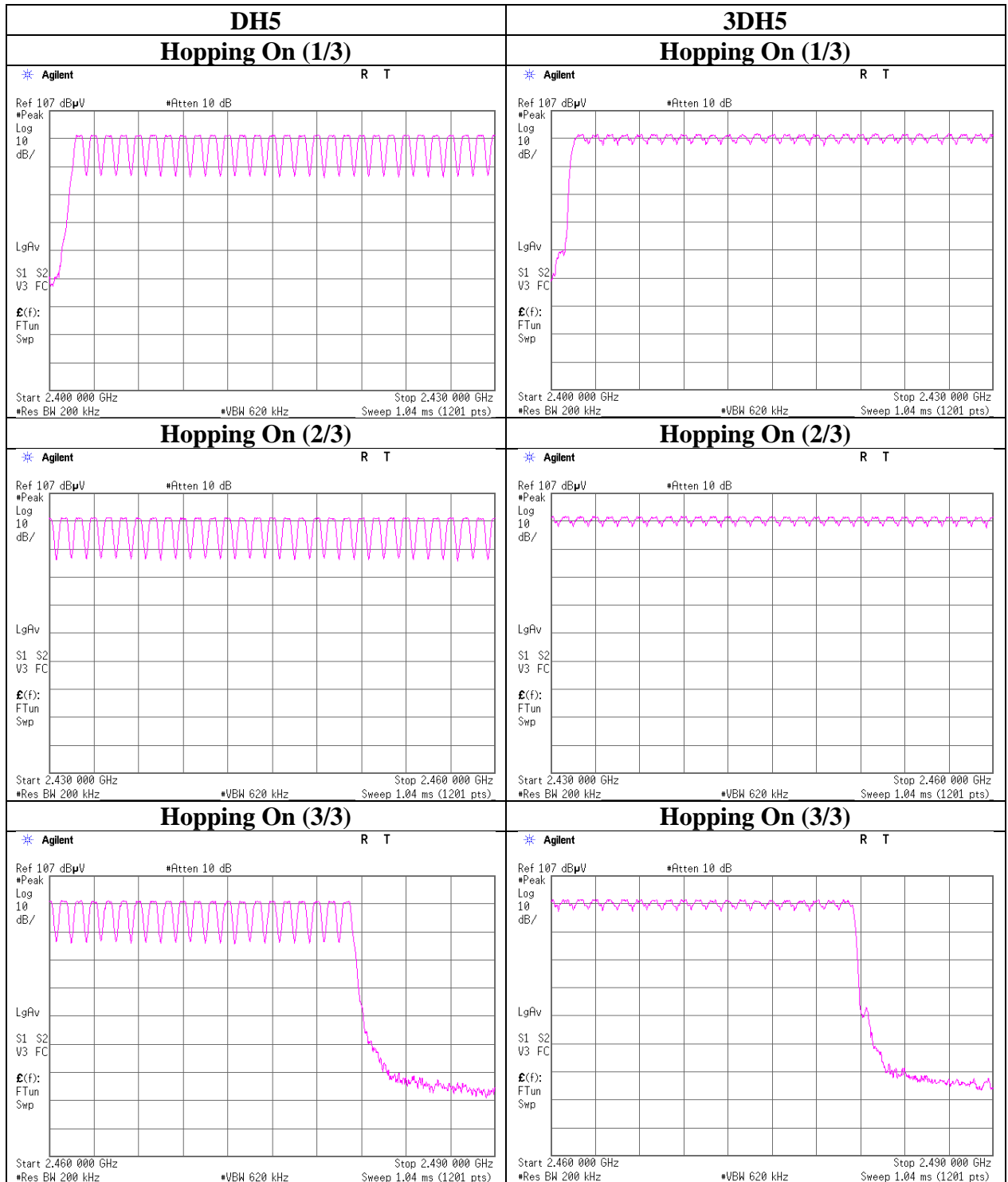
Report No. 13698456H
Test place Ise EMC Lab. No.6 Measurement Room
Date February 9, 2021
Temperature / Humidity 23 deg. C / 45 % RH
Engineer Takeshi Hiyaji
Mode Tx, Hopping On

BT1

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



Dwell time

Report No. 13698456H
Test place Ise EMC Lab. No.6 Measurement Room
Date February 9, 2021
Temperature / Humidity 23 deg. C / 45 % RH
Engineer Takeshi Hiyaji
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	49.6 times	/	5 sec. x	31.6 sec. =	314 times	0.372	117	400
DH3	27.2 times	/	5 sec. x	31.6 sec. =	172 times	1.629	280	400
DH5	21.4 times	/	5 sec. x	31.6 sec. =	136 times	2.877	391	400
3DH1	49.8 times	/	5 sec. x	31.6 sec. =	315 times	0.380	120	400
3DH3	25.8 times	/	5 sec. x	31.6 sec. =	164 times	1.631	268	400
3DH5	21.4 times	/	5 sec. x	31.6 sec. =	136 times	2.883	392	400

Sample Calculation

Result = Number of transmission x Length of transmission

***Average data of 5 tests.(except Inquiry)**

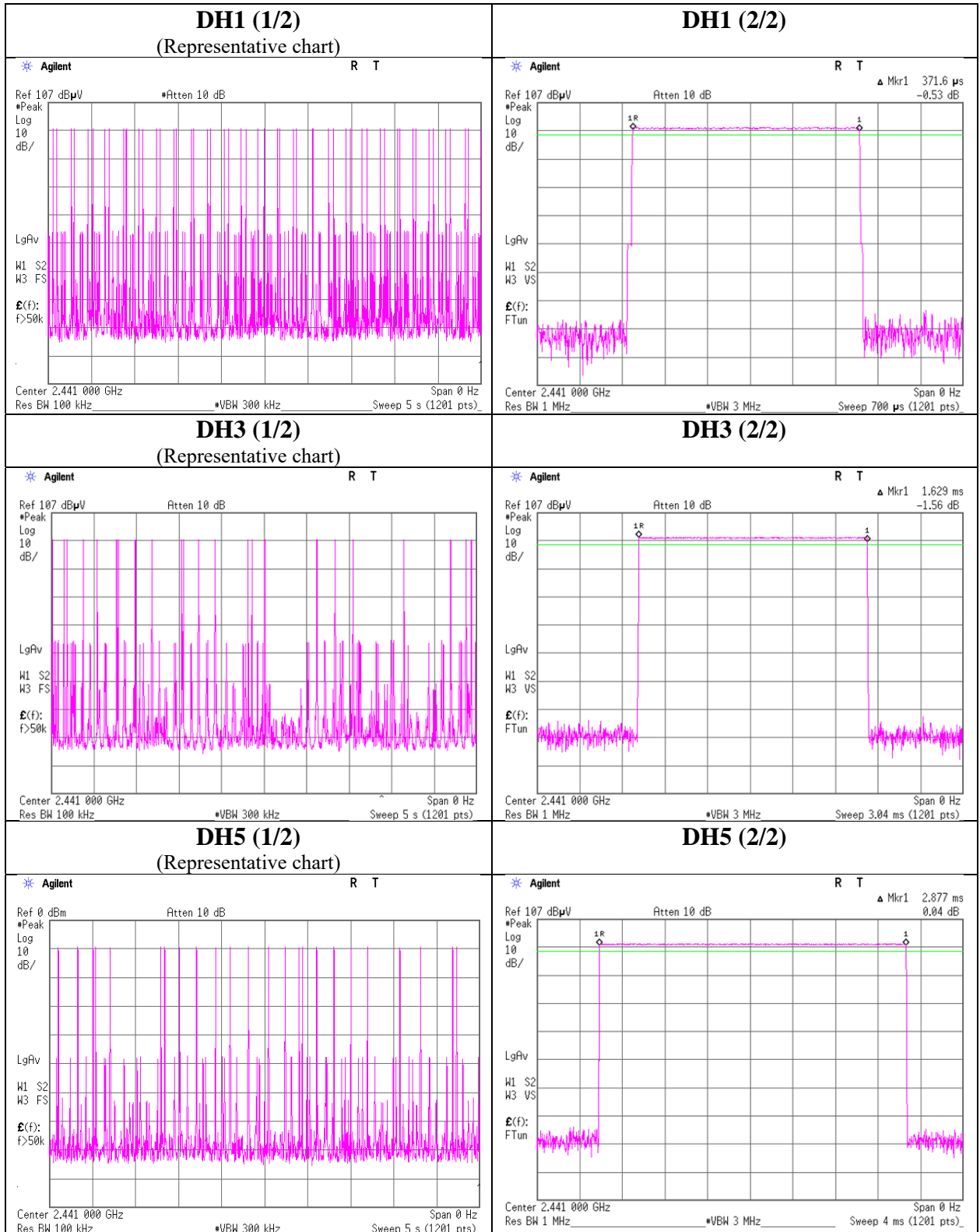
Mode	Sampling [times]					Average [times]
	1	2	3	4	5	
DH1	50	48	50	50	50	49.6
DH3	28	25	26	28	29	27.2
DH5	24	19	22	22	20	21.4
3DH1	50	51	49	50	49	49.8
3DH3	28	30	26	23	22	25.8
3DH5	25	18	18	22	24	21.4

Sample Calculation

Average = Summation (Sampling 1 to 5) / 5

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

Dwell time



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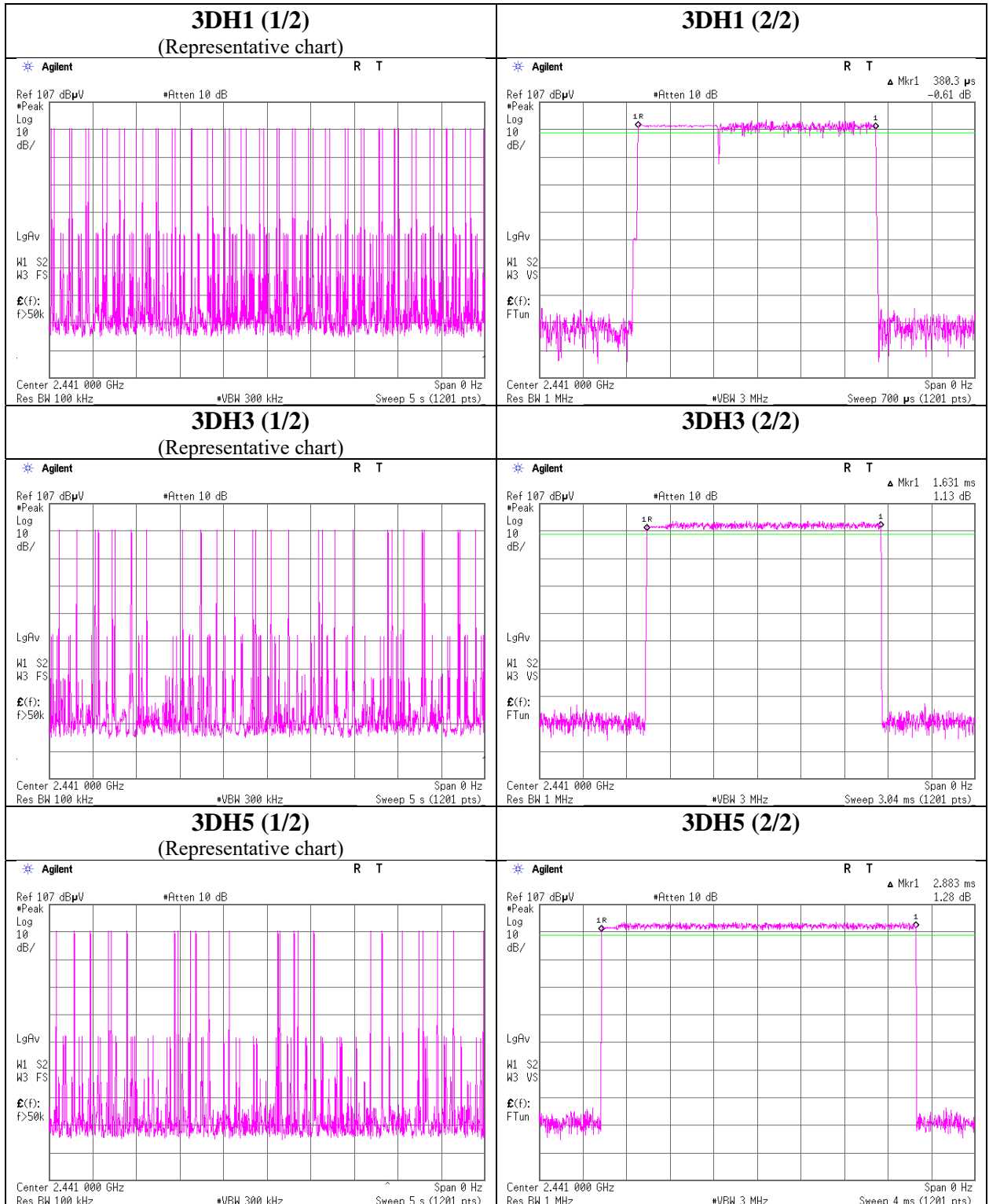
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Dwell time



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Maximum Peak Output Power

Report No. 13698456H
Test place Ise EMC Lab. No.8 Measurement Room
Date February 19, 2021
Temperature / Humidity 24 deg. C / 34 % RH
Engineer Hiroyuki Furutaka
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	-9.16	0.80	9.98	1.62	1.45	20.96	125	19.34	2.60	4.22	2.64	36.02	4000	31.80
DH5	2441.0	-9.09	0.80	9.98	1.69	1.47	20.96	125	19.27	2.60	4.29	2.68	36.02	4000	31.73
DH5	2480.0	-9.14	0.80	9.98	1.64	1.46	20.96	125	19.32	2.60	4.24	2.65	36.02	4000	31.78
2DH5	2402.0	-6.76	0.80	9.98	4.02	2.52	20.96	125	16.94	2.60	6.62	4.59	36.02	4000	29.40
2DH5	2441.0	-6.68	0.80	9.98	4.10	2.57	20.96	125	16.86	2.60	6.70	4.67	36.02	4000	29.32
2DH5	2480.0	-6.79	0.80	9.98	3.99	2.51	20.96	125	16.97	2.60	6.59	4.56	36.02	4000	29.43
3DH5	2402.0	-6.57	0.80	9.98	4.21	2.63	20.96	125	16.75	2.60	6.81	4.79	36.02	4000	29.21
3DH5	2441.0	-6.52	0.80	9.98	4.26	2.67	20.96	125	16.70	2.60	6.86	4.85	36.02	4000	29.16
3DH5	2480.0	-6.67	0.80	9.98	4.11	2.58	20.96	125	16.85	2.60	6.71	4.69	36.02	4000	29.31

Sample Calculation:

Result = Reading + Cable Loss (including the cable(s) customer supplied) + Attenuator Loss
e.i.r.p. Result = Conducted Power Result + Antenna Gain

Test was not performed at AFH mode, because the decrease of number of channel (min: 20ch) at AFH mode does not influence on the output power and bandwidth of the EUT.

As this device had AFH mode and frequency separation could not meet the requirement of over 20dB BW without 2/3 relaxation, 125mW power limit was applied to it.

Average Output Power
(Reference data for RF Exposure)

Report No. 13698456H
Test place Ise EMC Lab. No.8 Measurement Room
Date February 19, 2021
Temperature / Humidity 24 deg. C / 34 % RH
Engineer Hiroyuki Furutaka
Mode Tx, Hopping Off

Mode	Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Time average)	
					[dBm]	[mW]
DH5	2402.0	-10.77	0.80	9.98	0.01	1.00
DH5	2441.0	-10.65	0.80	9.98	0.13	1.03
DH5	2480.0	-10.74	0.80	9.98	0.04	1.01
2DH5	2402.0	-10.76	0.80	9.98	0.02	1.00
2DH5	2441.0	-10.65	0.80	9.98	0.13	1.03
2DH5	2480.0	-10.75	0.80	9.98	0.03	1.01
3DH5	2402.0	-10.68	0.80	9.98	0.10	1.02
3DH5	2441.0	-10.59	0.80	9.98	0.19	1.04
3DH5	2480.0	-10.69	0.80	9.98	0.09	1.02

Sample Calculation:

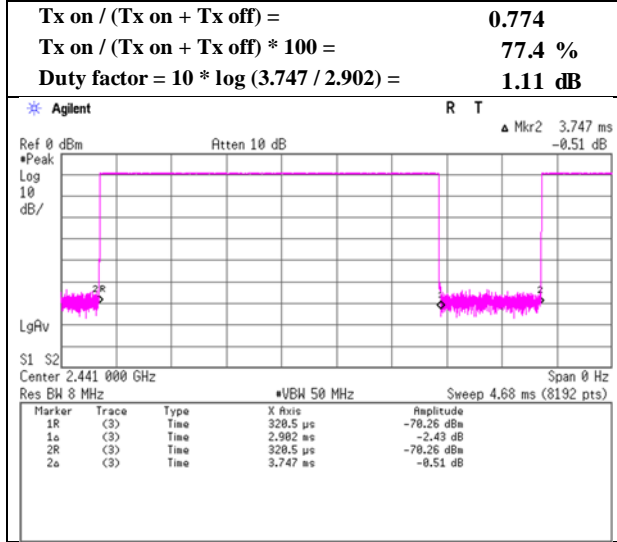
Result (Time average) = Reading + Cable Loss (including the cable(s) customer supplied) + Attenuator Loss

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

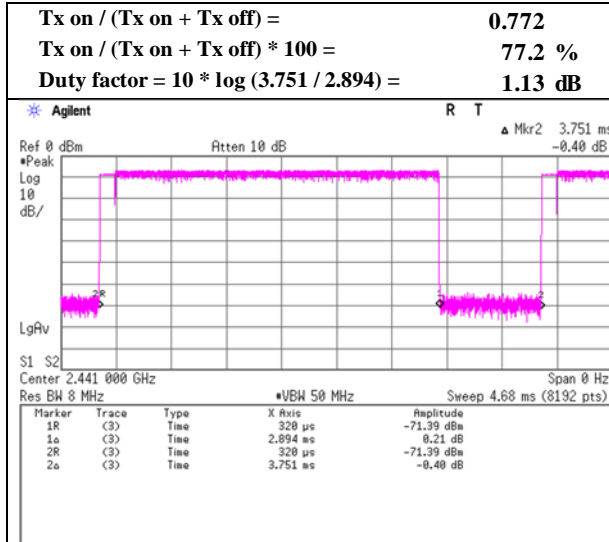
Burst Rate Confirmation

Report No. 13698456H
 Test place Ise EMC Lab. No.8 Measurement Room
 Date February 19, 2021
 Temperature / Humidity 24 deg. C / 34 % RH
 Engineer Hiroyuki Furutaka
 Mode Tx, Hopping Off

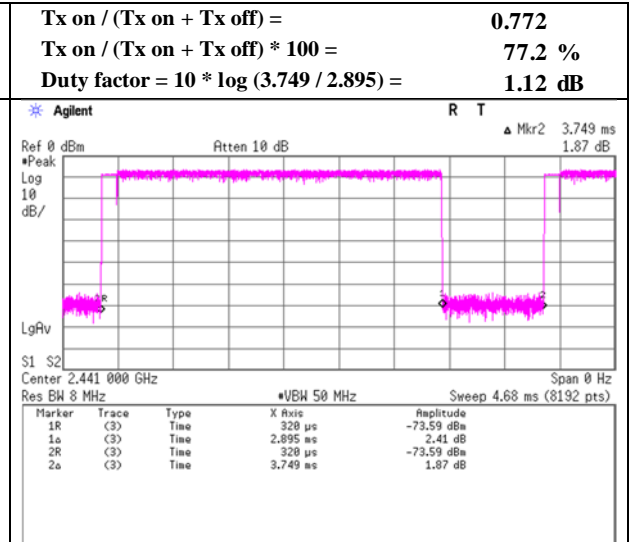
DH5



2DH5



3DH5



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Radiated Spurious Emission

Report No. 13698456H
Test place Ise EMC Lab.
Semi Anechoic Chamber No.4
Date February 21, 2021
Temperature / Humidity 22 deg. C / 34 % RH
Engineer Takeshi Hiyaji
Mode Tx, Hopping Off, DH5 2402 MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	99.741	QP	23.4	10.1	8.0	31.5	-	10.0	43.5	33.6	
Hori.	180.399	QP	30.8	16.0	8.7	31.4	-	24.1	43.5	19.4	
Hori.	344.803	QP	43.3	15.0	9.9	31.3	-	36.9	46.0	9.1	
Hori.	489.208	QP	32.0	17.5	10.7	31.4	-	28.8	46.0	17.2	
Hori.	558.607	QP	26.0	18.1	11.0	31.4	-	23.6	46.0	22.4	
Hori.	628.711	QP	29.7	19.4	11.3	31.5	-	28.9	46.0	17.1	
Hori.	2390.000	PK	42.9	27.8	5.5	31.8	-	44.4	73.9	29.5	
Hori.	4804.000	PK	40.7	31.6	7.7	31.2	-	48.8	73.9	25.1	Floor noise
Hori.	7206.000	PK	41.5	36.5	8.9	32.4	-	54.6	73.9	19.4	Floor noise
Hori.	9608.000	PK	43.0	38.0	9.6	32.6	-	58.0	73.9	15.9	Floor noise
Hori.	2390.000	AV	33.2	27.8	5.5	31.8	1.1	35.8	53.9	18.1	*1)
Hori.	4804.000	AV	31.2	31.6	7.7	31.2	-	39.3	53.9	14.6	Floor noise
Hori.	7206.000	AV	32.3	36.5	8.9	32.4	-	45.4	53.9	8.6	Floor noise
Hori.	9608.000	AV	32.7	38.0	9.6	32.6	-	47.7	53.9	6.2	Floor noise
Vert.	99.741	QP	31.6	10.1	8.0	31.5	-	18.2	43.5	25.4	
Vert.	180.399	QP	33.7	16.0	8.7	31.4	-	27.0	43.5	16.5	
Vert.	344.803	QP	34.6	15.0	9.9	31.3	-	28.2	46.0	17.8	
Vert.	489.208	QP	27.6	17.5	10.7	31.4	-	24.4	46.0	21.6	
Vert.	558.607	QP	26.3	18.1	11.0	31.4	-	23.9	46.0	22.1	
Vert.	628.711	QP	27.1	19.4	11.3	31.5	-	26.3	46.0	19.7	
Vert.	2390.000	PK	43.6	27.8	5.5	31.8	-	45.1	73.9	28.8	
Vert.	4804.000	PK	40.9	31.6	7.7	31.2	-	49.0	73.9	24.9	Floor noise
Vert.	7206.000	PK	41.7	36.5	8.9	32.4	-	54.7	73.9	19.2	Floor noise
Vert.	9608.000	PK	43.3	38.0	9.6	32.6	-	58.3	73.9	15.6	Floor noise
Vert.	2390.000	AV	33.5	27.8	5.5	31.8	1.1	36.1	53.9	17.8	*1)
Vert.	4804.000	AV	31.3	31.6	7.7	31.2	-	39.4	53.9	14.6	Floor noise
Vert.	7206.000	AV	32.3	36.5	8.9	32.4	-	45.4	53.9	8.5	Floor noise
Vert.	9608.000	AV	32.1	38.0	9.6	32.6	-	47.2	53.9	6.8	Floor noise

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier) + Duty factor

*Other frequency noises omitted in this report were not seen or had enough margin (more than 20 dB).

Distance factor: 1 GHz - 10 GHz 20log (4 m / 3.0 m) = 2.5 dB
10 GHz - 26.5 GHz 20log (1.0 m / 3.0 m) = -9.5 dB

*1) Not Out of Band emission(Leakage Power)

20dBc Data Sheet

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2402.000	PK	98.5	27.8	5.5	31.8	100.0	-	-	Carrier
Hori.	2400.000	PK	45.5	27.8	5.5	31.8	47.0	80.0	33.0	
Vert.	2402.000	PK	98.2	27.8	5.5	31.8	99.7	-	-	Carrier
Vert.	2400.000	PK	45.8	27.8	5.5	31.8	47.3	79.7	32.4	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier)

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Ise EMC Lab.

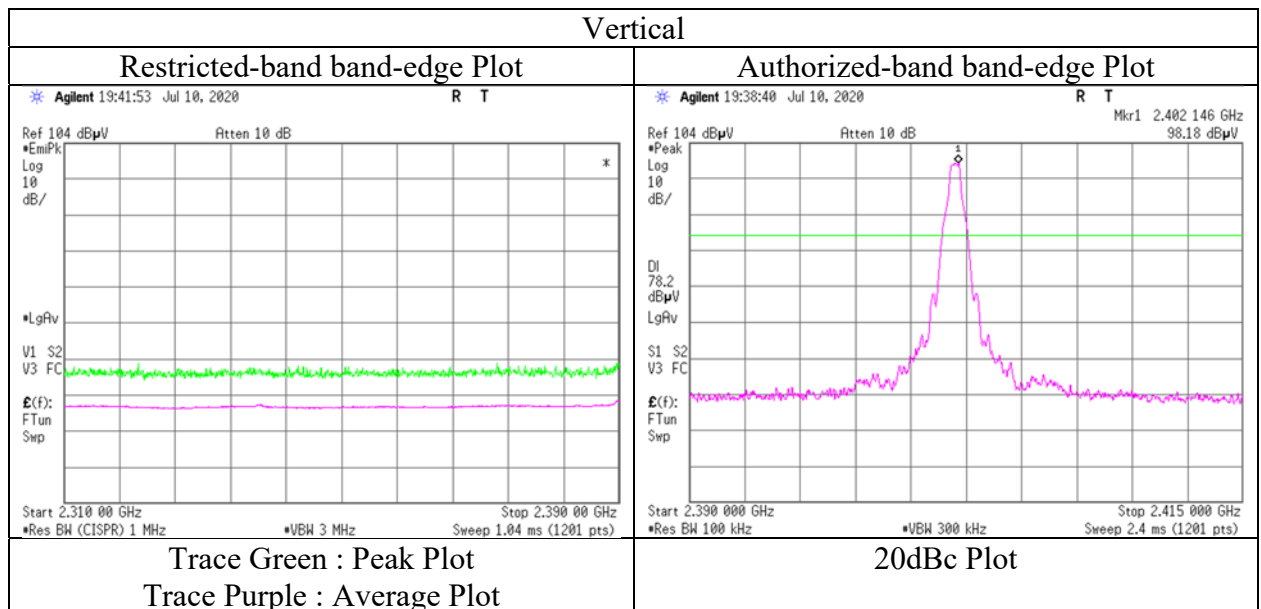
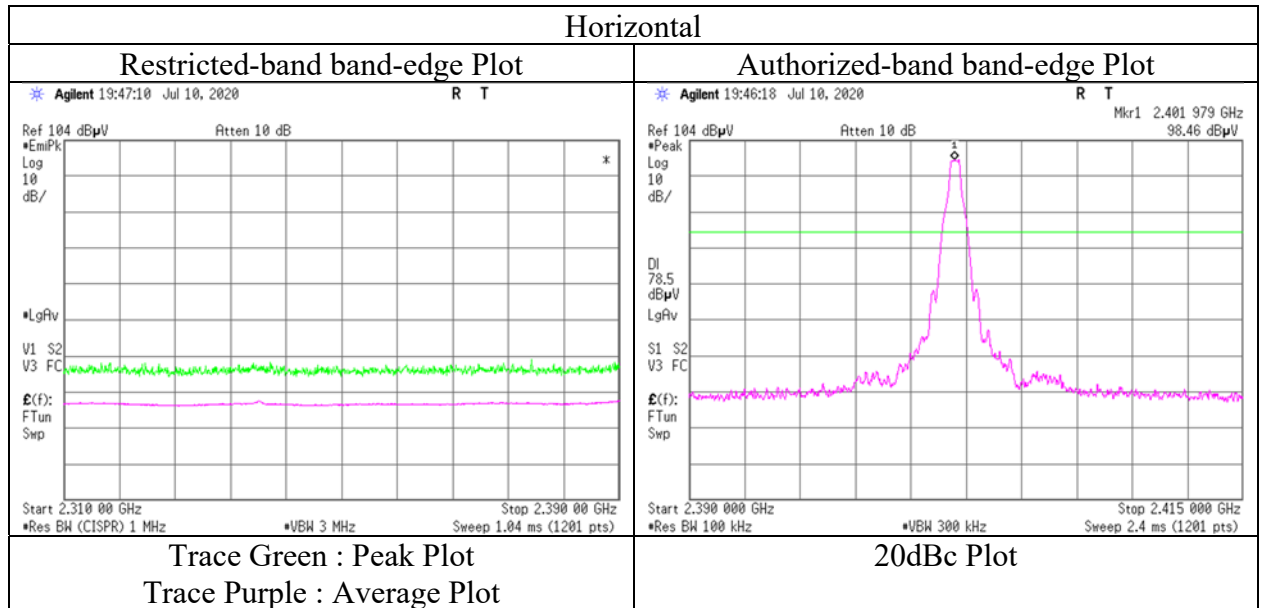
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Radiated Spurious Emission
(Reference Plot for band-edge)

Report No. 13698456H
Test place Ise EMC Lab.
Semi Anechoic Chamber No.4
Date February 21, 2021
Temperature / Humidity 22 deg. C / 34 % RH
Engineer Takeshi Hiyaji
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.

Ise EMC Lab.

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Radiated Spurious Emission

Report No. 13698456H
Test place Ise EMC Lab.
Semi Anechoic Chamber No.4
Date February 21, 2021
Temperature / Humidity 22 deg. C / 34 % RH
Engineer Takeshi Hiyaji
Mode Tx, Hopping Off, DH5 2441 MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	99.792	QP	23.8	10.1	8.0	31.5	-	10.4	43.5	33.2	
Hori.	180.342	QP	31.0	16.0	8.7	31.4	-	24.3	43.5	19.2	
Hori.	337.747	QP	43.0	14.9	9.8	31.3	-	36.4	46.0	9.6	
Hori.	488.814	QP	29.9	17.5	10.7	31.4	-	26.7	46.0	19.3	
Hori.	558.785	QP	24.5	18.1	11.0	31.4	-	22.1	46.0	23.9	
Hori.	628.520	QP	28.7	19.4	11.3	31.5	-	27.9	46.0	18.1	
Hori.	4882.000	PK	41.2	31.6	7.7	31.2	-	49.3	73.9	24.6	Floor noise
Hori.	7323.000	PK	42.5	36.6	8.9	32.4	-	55.6	73.9	18.3	Floor noise
Hori.	9764.000	PK	42.5	38.5	9.6	32.7	-	58.0	73.9	15.9	Floor noise
Hori.	4882.000	AV	31.5	31.6	7.7	31.2	-	39.6	53.9	14.3	Floor noise
Hori.	7323.000	AV	33.3	36.6	8.9	32.4	-	46.3	53.9	7.6	Floor noise
Hori.	9764.000	AV	31.9	38.5	9.6	32.7	-	47.3	53.9	6.6	Floor noise
Vert.	99.792	QP	31.8	10.1	8.0	31.5	-	18.4	43.5	25.2	
Vert.	180.342	QP	34.5	16.0	8.7	31.4	-	27.8	43.5	15.7	
Vert.	337.747	QP	34.5	14.9	9.8	31.3	-	27.9	46.0	18.1	
Vert.	488.814	QP	27.5	17.5	10.7	31.4	-	24.3	46.0	21.7	
Vert.	558.785	QP	27.2	18.1	11.0	31.4	-	24.8	46.0	21.2	
Vert.	628.520	QP	26.3	19.4	11.3	31.5	-	25.5	46.0	20.5	
Vert.	4882.000	PK	41.3	31.6	7.7	31.2	-	49.4	73.9	24.5	Floor noise
Vert.	7323.000	PK	42.8	36.6	8.9	32.4	-	55.9	73.9	18.1	Floor noise
Vert.	9764.000	PK	42.7	38.5	9.6	32.7	-	58.1	73.9	15.8	Floor noise
Vert.	4882.000	AV	31.5	31.6	7.7	31.2	-	39.6	53.9	14.4	Floor noise
Vert.	7323.000	AV	32.9	36.6	8.9	32.4	-	46.0	53.9	8.0	Floor noise
Vert.	9764.000	AV	31.8	38.5	9.6	32.7	-	47.2	53.9	6.7	Floor noise

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier)

*Other frequency noises omitted in this report were not seen or had enough margin (more than 20 dB).

Distance factor: 1 GHz - 10 GHz $20\log(4\text{ m} / 3.0\text{ m}) = 2.5\text{ dB}$
10 GHz - 26.5 GHz $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.5\text{ dB}$

Radiated Spurious Emission

Report No. 13698456H
Test place Ise EMC Lab.
Semi Anechoic Chamber No.4
Date February 21, 2021
Temperature / Humidity 22 deg. C / 34 % RH
Engineer Takeshi Hiyaji
Mode Tx, Hopping Off, DH5 2480 MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	99.942	QP	22.2	10.1	8.0	31.5	-	8.8	43.5	34.7	
Hori.	152.730	QP	29.6	15.1	8.5	31.4	-	21.7	43.5	21.8	
Hori.	322.039	QP	38.8	14.2	9.7	31.3	-	31.5	46.0	14.5	
Hori.	487.880	QP	24.1	17.4	10.7	31.4	-	20.8	46.0	25.2	
Hori.	557.565	QP	25.3	18.1	11.0	31.4	-	22.9	46.0	23.1	
Hori.	627.290	QP	29.1	19.5	11.3	31.5	-	28.3	46.0	17.7	
Hori.	2483.500	PK	45.2	27.7	5.6	31.8	-	46.6	73.9	27.3	
Hori.	4960.000	PK	41.3	31.6	7.7	31.2	-	49.4	73.9	24.5	Floor noise
Hori.	7440.000	PK	42.8	36.7	8.9	32.5	-	56.0	73.9	18.0	Floor noise
Hori.	9920.000	PK	42.6	38.6	9.7	32.7	-	58.2	73.9	15.7	Floor noise
Hori.	2483.500	AV	36.9	27.7	5.6	31.8	1.1	39.5	53.9	14.5	*1)
Hori.	4960.000	AV	32.3	31.6	7.7	31.2	-	40.4	53.9	13.5	Floor noise
Hori.	7440.000	AV	31.6	36.7	8.9	32.5	-	44.7	53.9	9.2	Floor noise
Hori.	9920.000	AV	31.5	38.6	9.7	32.7	-	47.0	53.9	6.9	Floor noise
Vert.	99.942	QP	30.5	10.1	8.0	31.5	-	17.1	43.5	26.4	
Vert.	152.730	QP	31.4	15.1	8.5	31.4	-	23.5	43.5	20.0	
Vert.	322.039	QP	36.9	14.2	9.7	31.3	-	29.6	46.0	16.4	
Vert.	487.880	QP	35.2	17.4	10.7	31.4	-	31.9	46.0	14.1	
Vert.	557.565	QP	30.4	18.1	11.0	31.4	-	28.0	46.0	18.0	
Vert.	627.290	QP	34.2	19.5	11.3	31.5	-	33.4	46.0	12.6	
Vert.	2483.500	PK	46.6	27.7	5.6	31.8	-	48.0	73.9	25.9	
Vert.	4960.000	PK	41.1	31.6	7.7	31.2	-	49.2	73.9	24.7	Floor noise
Vert.	7440.000	PK	42.6	36.7	8.9	32.5	-	55.7	73.9	18.2	Floor noise
Vert.	9920.000	PK	42.4	38.6	9.7	32.7	-	57.9	73.9	16.0	Floor noise
Vert.	2483.500	AV	39.5	27.7	5.6	31.8	1.1	42.1	53.9	11.8	*1)
Vert.	4960.000	AV	32.2	31.6	7.7	31.2	-	40.3	53.9	13.6	Floor noise
Vert.	7440.000	AV	31.5	36.7	8.9	32.5	-	44.6	53.9	9.3	Floor noise
Vert.	9920.000	AV	31.5	38.6	9.7	32.7	-	47.1	53.9	6.8	Floor noise

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier) + Duty factor

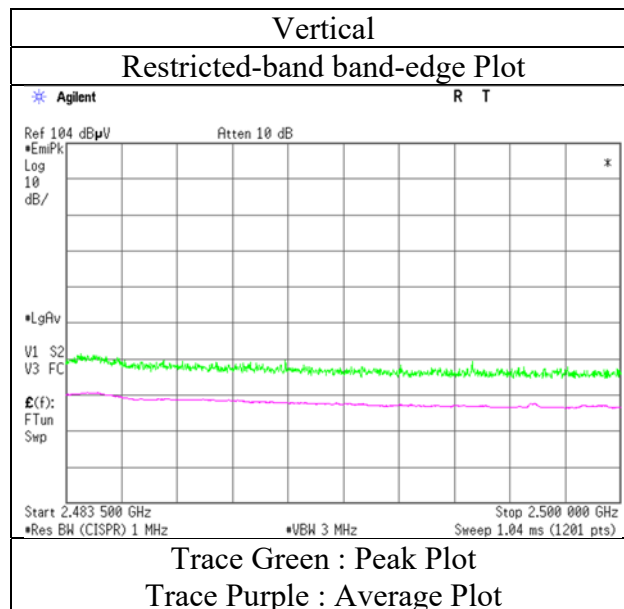
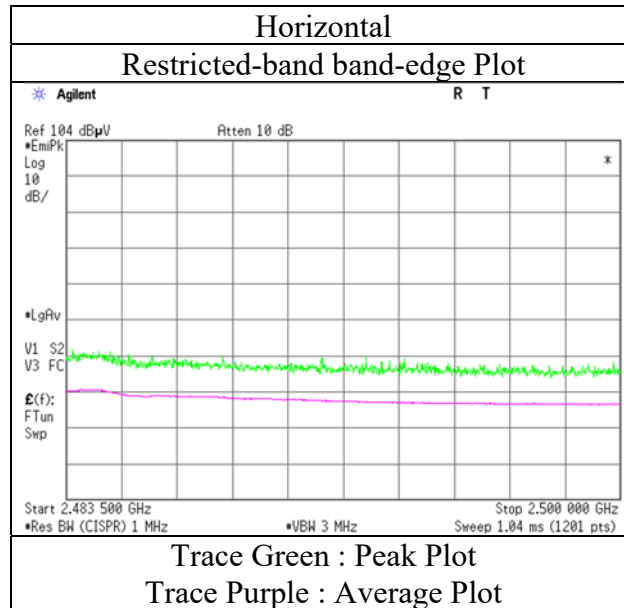
*Other frequency noises omitted in this report were not seen or had enough margin (more than 20 dB).

Distance factor: 1 GHz - 10 GHz $20\log(4\text{ m} / 3.0\text{ m}) = 2.5\text{ dB}$
10 GHz - 26.5 GHz $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.5\text{ dB}$

*1) Not Out of Band emission(Leakage Power)

Radiated Spurious Emission
(Reference Plot for band-edge)

Report No. 13698456H
Test place Ise EMC Lab.
Semi Anechoic Chamber No.4
Date February 21, 2021
Temperature / Humidity 22 deg. C / 34 % RH
Engineer Takeshi Hiyaji
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. 13698456H
Test place Ise EMC Lab.
Semi Anechoic Chamber No.4
Date February 21, 2021
Temperature / Humidity 22 deg. C / 34 % RH
Engineer Takeshi Hiyaji
Mode Tx, Hopping Off, 3DH5 2402 MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	99.854	QP	23.6	10.1	8.0	31.5	-	10.2	43.5	33.3	
Hori.	153.096	QP	26.7	15.1	8.5	31.4	-	18.8	43.5	24.7	
Hori.	322.505	QP	37.8	14.2	9.7	31.3	-	30.5	46.0	15.5	
Hori.	487.907	QP	25.6	17.4	10.7	31.4	-	22.3	46.0	23.7	
Hori.	559.780	QP	27.2	18.1	11.0	31.4	-	24.9	46.0	21.2	
Hori.	627.302	QP	30.4	19.5	11.3	31.5	-	29.6	46.0	16.4	
Hori.	2390.000	PK	43.4	27.8	5.5	31.8	-	44.8	73.9	29.1	
Hori.	4804.000	PK	40.6	31.6	7.7	31.2	-	48.7	73.9	25.2	Floor noise
Hori.	7206.000	PK	41.4	36.5	8.9	32.4	-	54.4	73.9	19.5	Floor noise
Hori.	9608.000	PK	41.4	38.0	9.6	32.6	-	56.5	73.9	17.5	Floor noise
Hori.	2390.000	AV	35.2	27.8	5.5	31.8	1.1	37.8	53.9	16.1	*1)
Hori.	4804.000	AV	31.3	31.6	7.7	31.2	-	39.4	53.9	14.5	Floor noise
Hori.	7206.000	AV	31.8	36.5	8.9	32.4	-	44.8	53.9	9.1	Floor noise
Hori.	9608.000	AV	31.5	38.0	9.6	32.6	-	46.5	53.9	7.4	Floor noise
Vert.	99.854	QP	25.9	10.1	8.0	31.5	-	12.5	43.5	31.1	
Vert.	153.096	QP	31.6	15.1	8.5	31.4	-	23.7	43.5	19.8	
Vert.	322.505	QP	34.1	14.2	9.7	31.3	-	26.8	46.0	19.2	
Vert.	487.907	QP	37.7	17.4	10.7	31.4	-	34.4	46.0	11.6	
Vert.	559.780	QP	36.7	18.1	11.0	31.4	-	34.4	46.0	11.7	
Vert.	627.302	QP	36.3	19.5	11.3	31.5	-	35.5	46.0	10.5	
Vert.	2390.000	PK	43.4	27.8	5.5	31.8	-	44.8	73.9	29.1	
Vert.	4804.000	PK	40.7	31.6	7.7	31.2	-	48.8	73.9	25.1	Floor noise
Vert.	7206.000	PK	41.1	36.5	8.9	32.4	-	54.1	73.9	19.8	Floor noise
Vert.	9608.000	PK	41.1	38.0	9.6	32.6	-	56.1	73.9	17.8	Floor noise
Vert.	2390.000	AV	35.3	27.8	5.5	31.8	1.1	37.9	53.9	16.0	*1)
Vert.	4804.000	AV	31.3	31.6	7.7	31.2	-	39.4	53.9	14.6	Floor noise
Vert.	7206.000	AV	31.8	36.5	8.9	32.4	-	44.8	53.9	9.1	Floor noise
Vert.	9608.000	AV	31.4	38.0	9.6	32.6	-	46.5	53.9	7.4	Floor noise

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier) + Duty factor

*Other frequency noises omitted in this report were not seen or had enough margin (more than 20 dB).

Distance factor: 1 GHz - 10 GHz 20log(4 m / 3.0 m) = 2.5 dB
10 GHz - 26.5 GHz 20log(1.0 m / 3.0 m) = -9.5 dB

*1) Not Out of Band emission(Leakage Power)

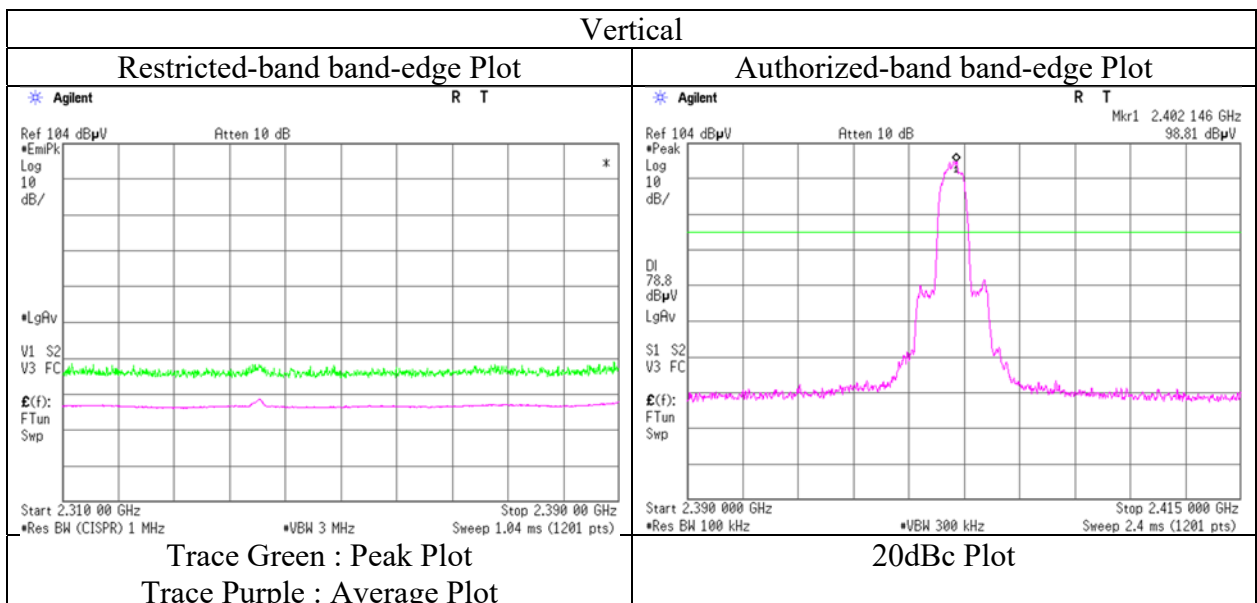
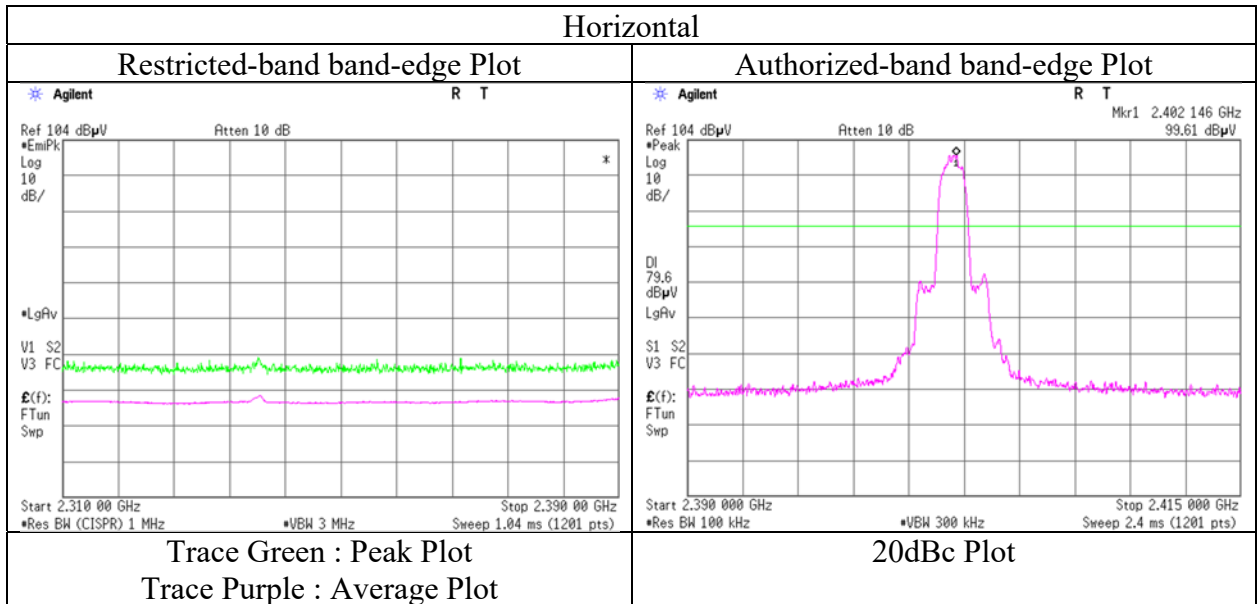
20dBc Data Sheet

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2402.000	PK	99.6	27.8	5.5	31.8	101.1	-	-	Carrier
Hori.	2400.000	PK	44.9	27.8	5.5	31.8	46.4	81.1	34.7	
Vert.	2402.000	PK	98.8	27.8	5.5	31.8	100.3	-	-	Carrier
Vert.	2400.000	PK	44.4	27.8	5.5	31.8	45.9	80.3	34.4	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier)

Radiated Spurious Emission
(Reference Plot for band-edge)

Report No. 13698456H
Test place Ise EMC Lab.
Semi Anechoic Chamber No.4
Date February 21, 2021
Temperature / Humidity 22 deg. C / 34 % RH
Engineer Takeshi Hiyaji
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

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Test place Ise EMC Lab.
Semi Anechoic Chamber No.4
Date February 21, 2021
Temperature / Humidity 22 deg. C / 34 % RH
Engineer Takeshi Hiyaji
Mode Tx, Hopping Off, 3DH5 2441 MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	94.765	QP	28.4	9.2	7.9	31.5	-	14.1	43.5	29.4	
Hori.	152.851	QP	26.7	15.1	8.5	31.4	-	18.8	43.5	24.7	
Hori.	322.430	QP	37.0	14.2	9.7	31.3	-	29.7	46.0	16.3	
Hori.	487.886	QP	24.2	17.4	10.7	31.4	-	20.9	46.0	25.1	
Hori.	557.592	QP	25.6	18.1	11.0	31.4	-	23.2	46.0	22.8	
Hori.	629.810	QP	29.6	19.5	11.3	31.5	-	28.9	46.0	17.2	
Hori.	4882.000	PK	40.2	31.6	7.7	31.2	-	48.3	73.9	25.6	Floor noise
Hori.	7323.000	PK	41.4	36.6	8.9	32.4	-	54.4	73.9	19.5	Floor noise
Hori.	9764.000	PK	41.2	38.5	9.6	32.7	-	56.7	73.9	17.2	Floor noise
Hori.	4882.000	AV	31.1	31.6	7.7	31.2	-	39.2	53.9	14.7	Floor noise
Hori.	7323.000	AV	32.1	36.6	8.9	32.4	-	45.2	53.9	8.7	Floor noise
Hori.	9764.000	AV	31.6	38.5	9.6	32.7	-	47.0	53.9	6.9	Floor noise
Vert.	94.765	QP	33.2	9.2	7.9	31.5	-	18.9	43.5	24.6	
Vert.	152.851	QP	32.8	15.1	8.5	31.4	-	24.9	43.5	18.6	
Vert.	322.430	QP	34.2	14.2	9.7	31.3	-	26.9	46.0	19.1	
Vert.	487.886	QP	38.3	17.4	10.7	31.4	-	35.0	46.0	11.0	
Vert.	557.592	QP	37.1	18.1	11.0	31.4	-	34.7	46.0	11.3	
Vert.	629.810	QP	35.6	19.5	11.3	31.5	-	34.9	46.0	11.2	
Vert.	4882.000	PK	40.3	31.6	7.7	31.2	-	48.4	73.9	25.5	Floor noise
Vert.	7323.000	PK	41.5	36.6	8.9	32.4	-	54.6	73.9	19.3	Floor noise
Vert.	9764.000	PK	41.3	38.5	9.6	32.7	-	56.8	73.9	17.2	Floor noise
Vert.	4882.000	AV	31.3	31.6	7.7	31.2	-	39.4	53.9	14.5	Floor noise
Vert.	7323.000	AV	31.9	36.6	8.9	32.4	-	44.9	53.9	9.0	Floor noise
Vert.	9764.000	AV	31.5	38.5	9.6	32.7	-	46.9	53.9	7.0	Floor noise

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier)

*Other frequency noises omitted in this report were not seen or had enough margin (more than 20 dB).

Distance factor: 1 GHz - 10 GHz $20\log(4\text{ m} / 3.0\text{ m}) = 2.5\text{ dB}$
10 GHz - 26.5 GHz $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.5\text{ dB}$

Radiated Spurious Emission

Report No. 13698456H
Test place Ise EMC Lab.
Semi Anechoic Chamber No.4
Date February 21, 2021
Temperature / Humidity 22 deg. C / 34 % RH
Engineer Takeshi Hiyaji
Mode Tx, Hopping Off, 3DH5 2480 MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	94.737	QP	26.2	9.2	7.9	31.5	-	11.9	43.5	31.6	
Hori.	152.821	QP	29.9	15.1	8.5	31.4	-	22.0	43.5	21.5	
Hori.	322.520	QP	30.4	14.2	9.7	31.3	-	23.1	46.0	22.9	
Hori.	487.876	QP	24.5	17.4	10.7	31.4	-	21.2	46.0	24.8	
Hori.	559.824	QP	23.4	18.1	11.0	31.4	-	21.1	46.0	24.9	
Hori.	627.287	QP	29.5	19.5	11.3	31.5	-	28.7	46.0	17.3	
Hori.	2483.500	PK	46.6	27.7	5.6	31.8	-	48.0	73.9	25.9	
Hori.	4960.000	PK	40.5	31.6	7.7	31.2	-	48.7	73.9	25.2	Floor noise
Hori.	7440.000	PK	41.3	36.7	8.9	32.5	-	54.5	73.9	19.4	Floor noise
Hori.	9920.000	PK	41.3	38.6	9.7	32.7	-	56.8	73.9	17.1	Floor noise
Hori.	2483.500	AV	38.4	27.7	5.6	31.8	1.1	40.9	53.9	13.0	*1)
Hori.	4960.000	AV	30.8	31.6	7.7	31.2	-	39.0	53.9	15.0	Floor noise
Hori.	7440.000	AV	31.6	36.7	8.9	32.5	-	44.7	53.9	9.2	Floor noise
Hori.	9920.000	AV	31.4	38.6	9.7	32.7	-	46.9	53.9	7.0	Floor noise
Vert.	94.737	QP	33.2	9.2	7.9	31.5	-	18.9	43.5	24.6	
Vert.	152.821	QP	32.6	15.1	8.5	31.4	-	24.7	43.5	18.8	
Vert.	322.520	QP	34.4	14.2	9.7	31.3	-	27.1	46.0	18.9	
Vert.	487.876	QP	36.8	17.4	10.7	31.4	-	33.5	46.0	12.5	
Vert.	559.824	QP	32.4	18.1	11.0	31.4	-	30.1	46.0	15.9	
Vert.	627.287	QP	34.0	19.5	11.3	31.5	-	33.2	46.0	12.8	
Vert.	2483.500	PK	45.2	27.7	5.6	31.8	-	46.7	73.9	27.2	
Vert.	4960.000	PK	40.3	31.6	7.7	31.2	-	48.4	73.9	25.5	Floor noise
Vert.	7440.000	PK	41.3	36.7	8.9	32.5	-	54.4	73.9	19.5	Floor noise
Vert.	9920.000	PK	41.3	38.6	9.7	32.7	-	56.8	73.9	17.1	Floor noise
Vert.	2483.500	AV	36.8	27.7	5.6	31.8	1.1	39.4	53.9	14.6	*1)
Vert.	4960.000	AV	30.2	31.6	7.7	31.2	-	38.4	53.9	15.6	Floor noise
Vert.	7440.000	AV	31.3	36.7	8.9	32.5	-	44.5	53.9	9.4	Floor noise
Vert.	9920.000	AV	31.3	38.6	9.7	32.7	-	46.8	53.9	7.1	Floor noise

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier) + Duty factor

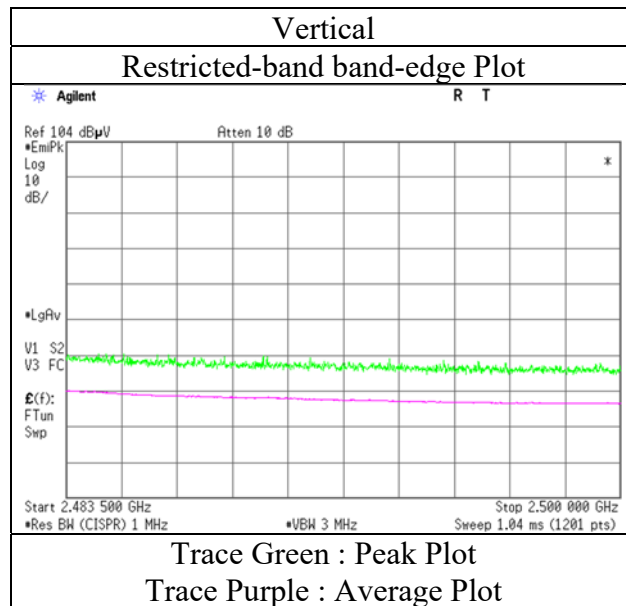
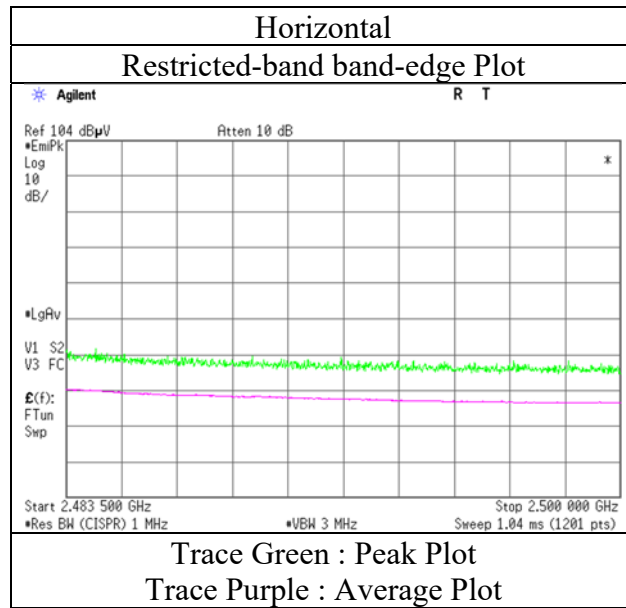
*Other frequency noises omitted in this report were not seen or had enough margin (more than 20 dB).

Distance factor: 1 GHz - 10 GHz $20\log(4\text{ m} / 3.0\text{ m}) = 2.5\text{ dB}$
10 GHz - 26.5 GHz $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.5\text{ dB}$

*1) Not Out of Band emission(Leakage Power)

Radiated Spurious Emission
(Reference Plot for band-edge)

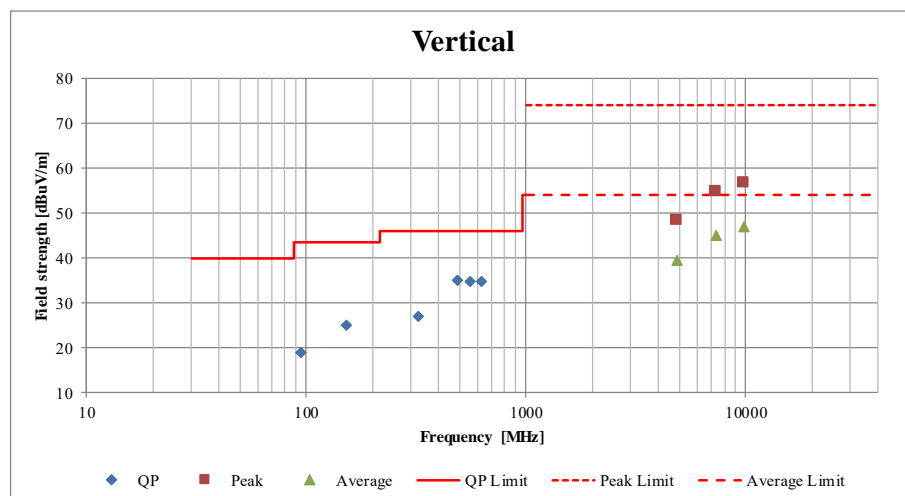
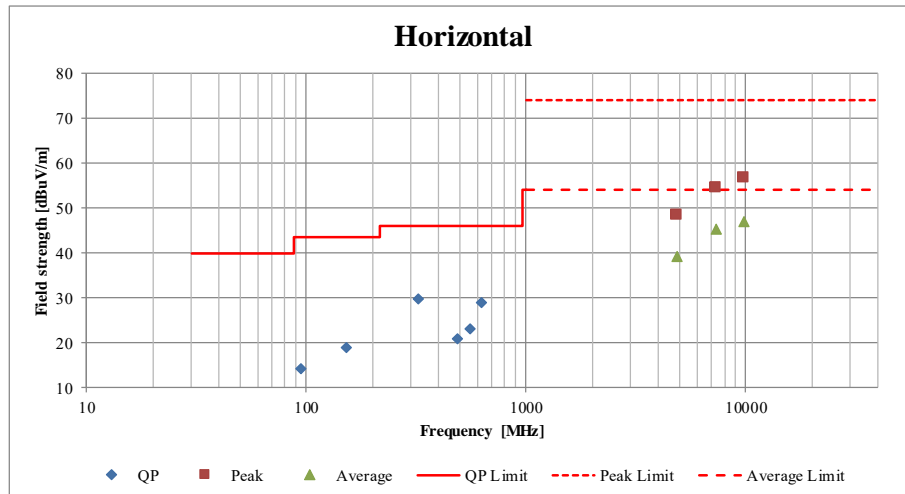
Report No. 13698456H
Test place Ise EMC Lab.
Semi Anechoic Chamber No.4
Date February 21, 2021
Temperature / Humidity 22 deg. C / 34 % RH
Engineer Takeshi Hiyaji
Mode Tx, Hopping Off, 3DH5 2480 MHz



* 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)

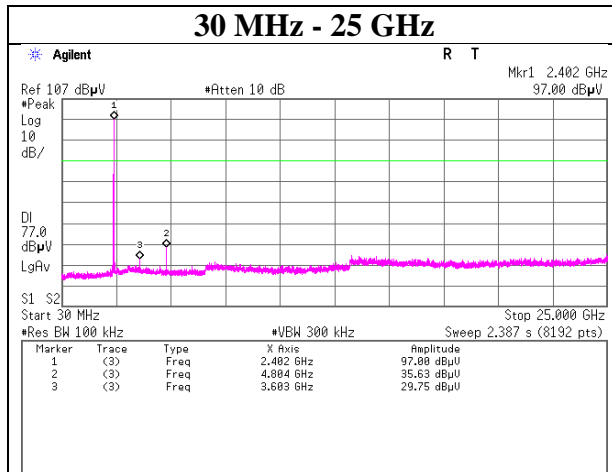
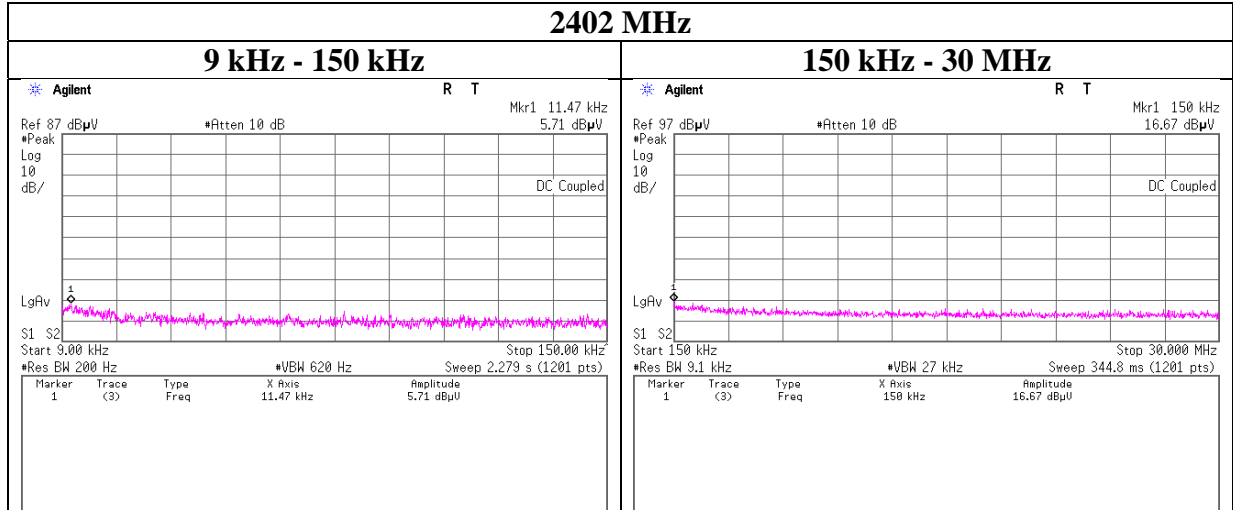
Report No. 13698456H
Test place Ise EMC Lab.
Semi Anechoic Chamber No.4
Date February 21, 2021
Temperature / Humidity 22 deg. C / 34 % RH
Engineer Takeshi Hiyaji
Mode Tx, Hopping Off, 3DH5 2441 MHz



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

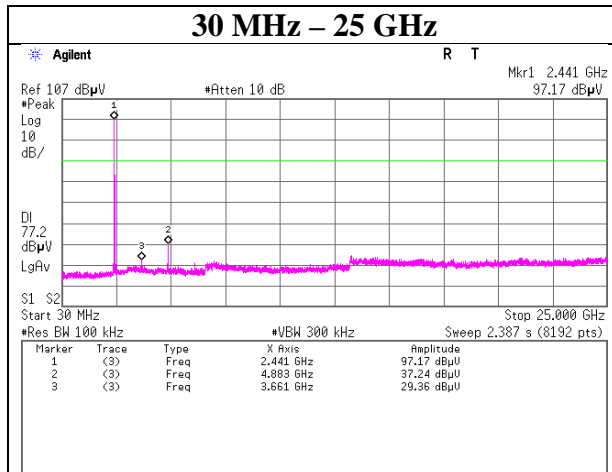
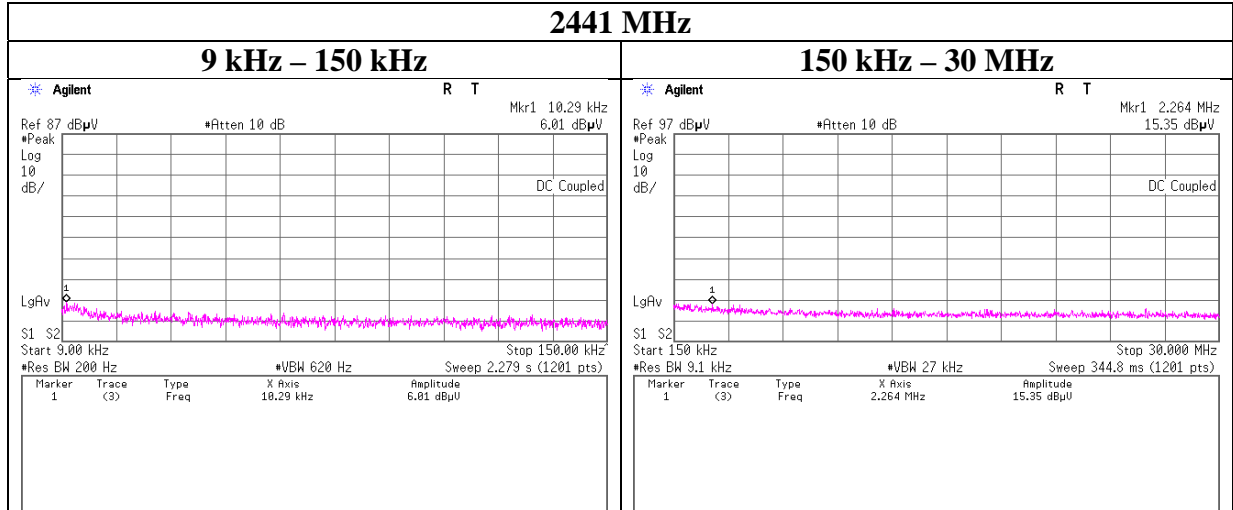
Conducted Spurious Emission

Report No.	13698456H
Test place	Ise EMC Lab. No.6 Measurement Room
Date	February 9, 2021
Temperature / Humidity	23 deg. C / 45 % RH
Engineer	Takeshi Hiyaji
Mode	Tx, Hopping Off, DH5



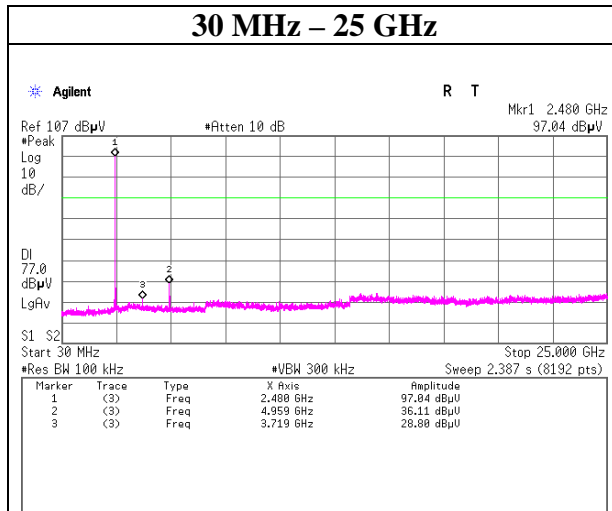
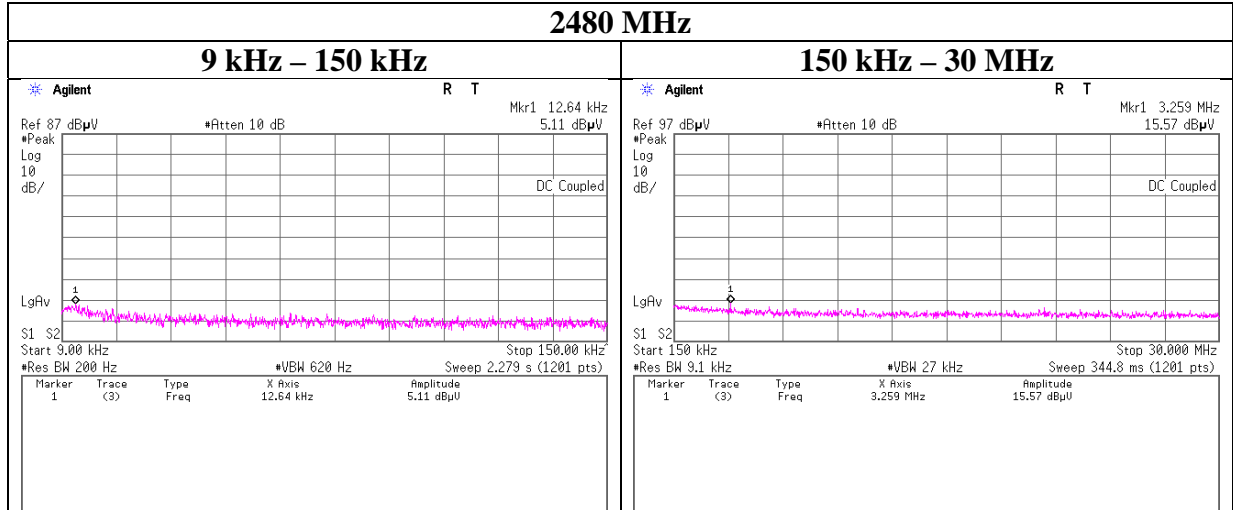
Conducted Spurious Emission

Report No.	13698456H
Test place	Ise EMC Lab. No.6 Measurement Room
Date	February 9, 2021
Temperature / Humidity	23 deg. C / 45 % RH
Engineer	Takeshi Hiyaji
Mode	Tx, Hopping Off, DH5



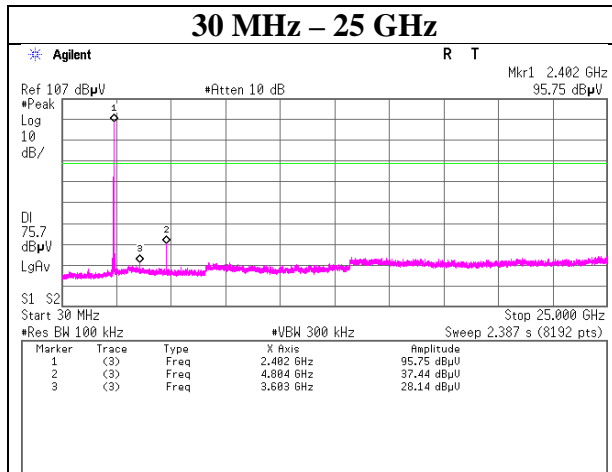
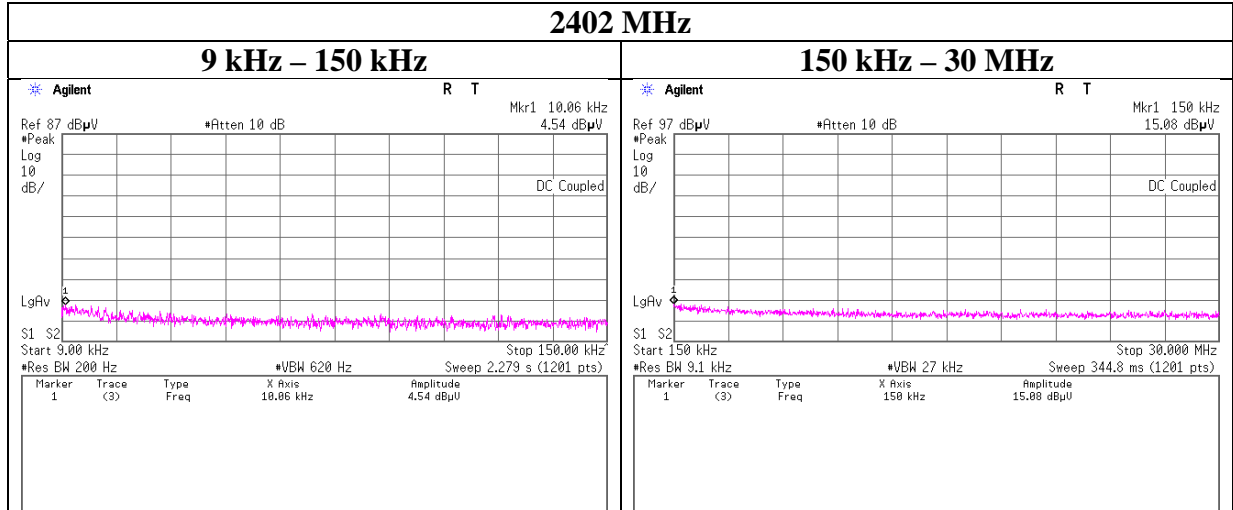
Conducted Spurious Emission

Report No.	13698456H
Test place	Ise EMC Lab. No.6 Measurement Room
Date	February 9, 2021
Temperature / Humidity	23 deg. C / 45 % RH
Engineer	Takeshi Hiyaji
Mode	Tx, Hopping Off, DH5



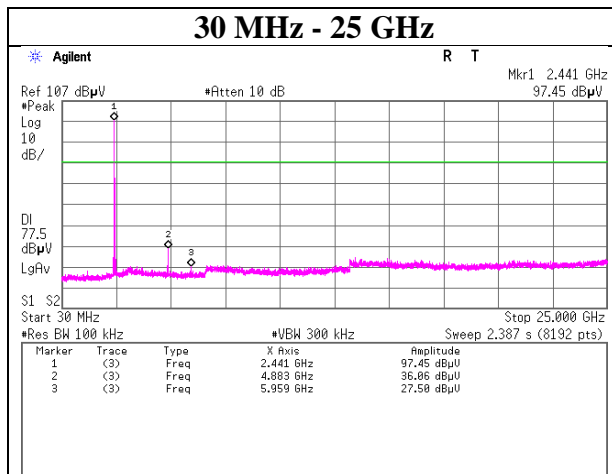
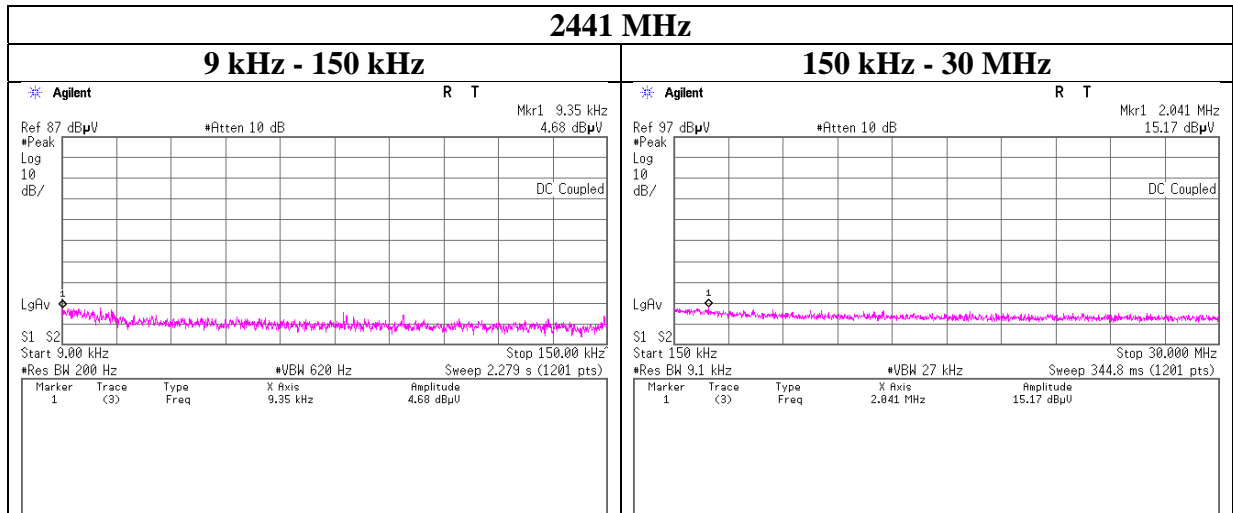
Conducted Spurious Emission

Report No.	13698456H
Test place	Ise EMC Lab. No.6 Measurement Room
Date	February 9, 2021
Temperature / Humidity	23 deg. C / 45 % RH
Engineer	Takeshi Hiyaji
Mode	Tx, Hopping Off, 3DH5



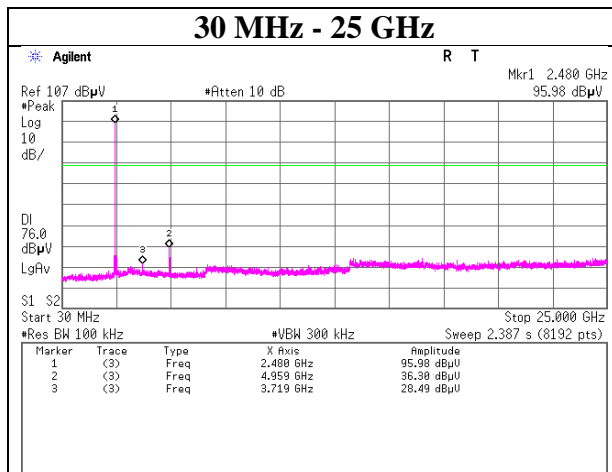
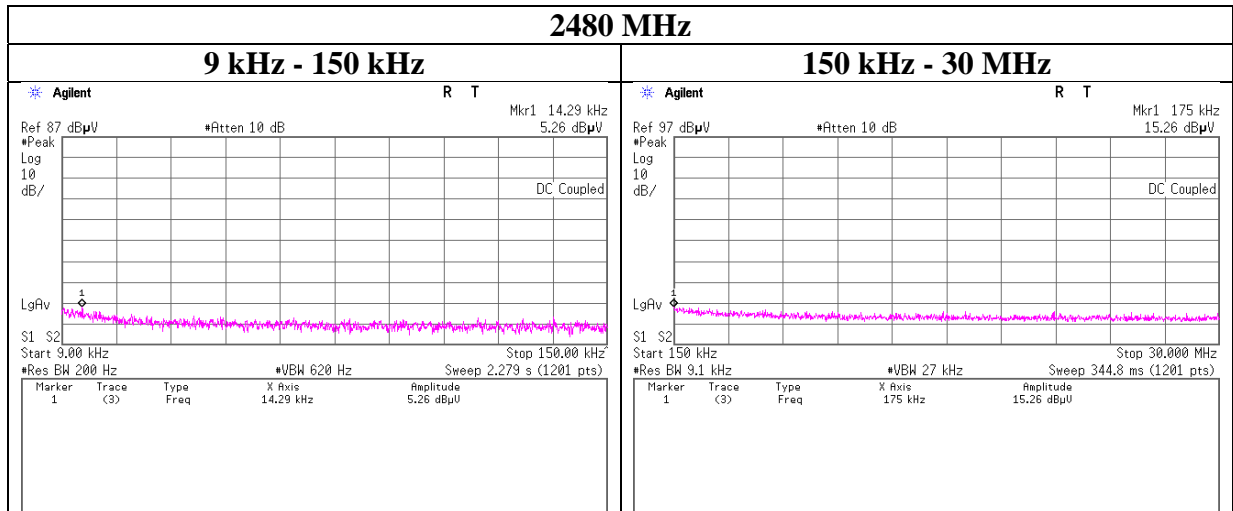
Conducted Spurious Emission

Report No.	13698456H
Test place	Ise EMC Lab. No.6 Measurement Room
Date	February 9, 2021
Temperature / Humidity	23 deg. C / 45 % RH
Engineer	Takeshi Hiyaji
Mode	Tx, Hopping Off, 3DH5



Conducted Spurious Emission

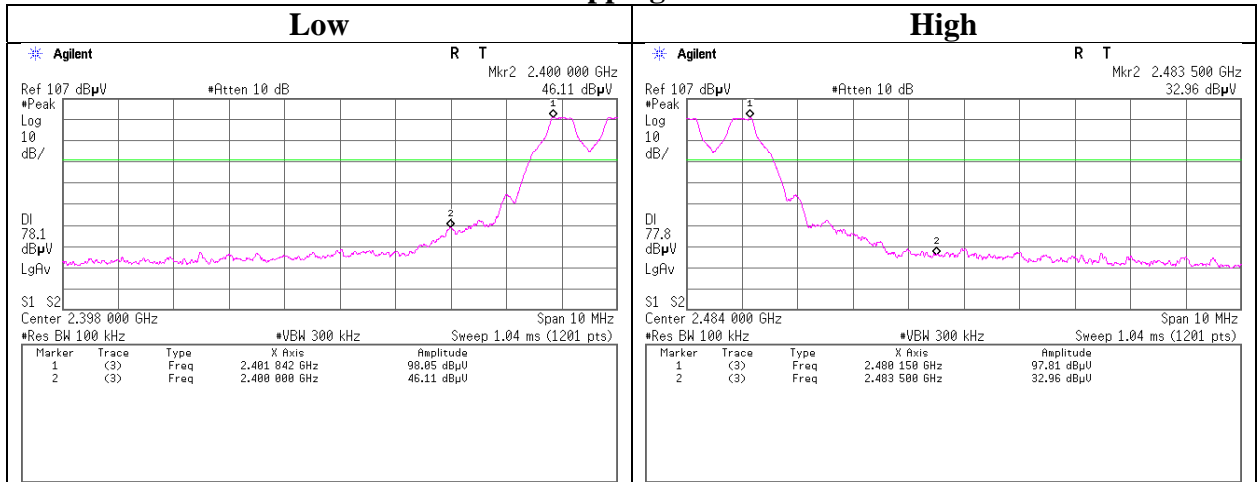
Report No.	13698456H
Test place	Ise EMC Lab. No.6 Measurement Room
Date	February 9, 2021
Temperature / Humidity	23 deg. C / 45 % RH
Engineer	Takeshi Hiyaji
Mode	Tx, Hopping Off, 3DH5



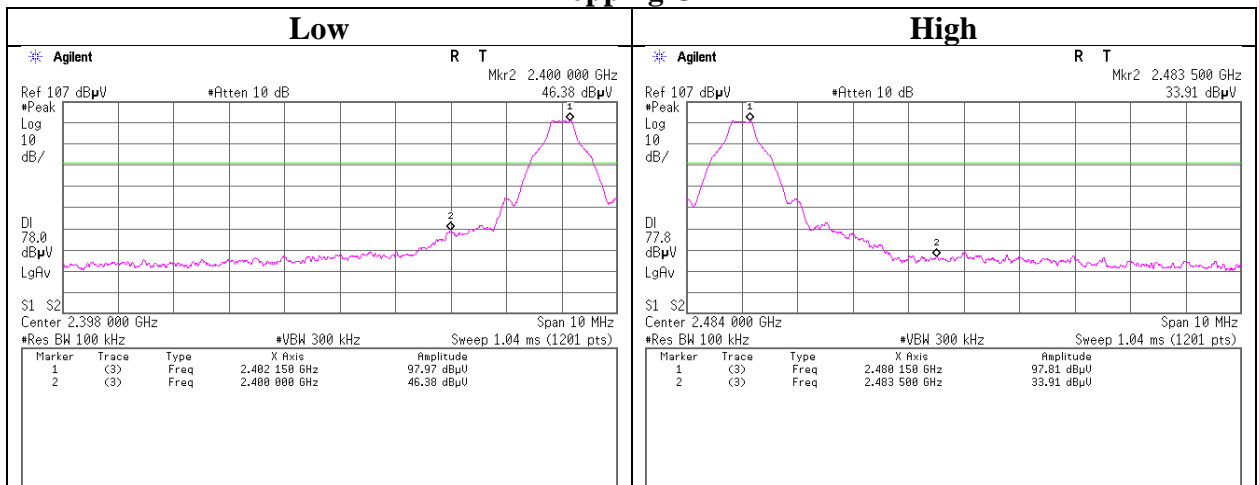
Conducted Emission Band Edge compliance

Report No.	13698456H
Test place	Ise EMC Lab. No.6 Measurement Room
Date	February 9, 2021
Temperature / Humidity	23 deg. C / 45 % RH
Engineer	Takeshi Hiyaji
Mode	Tx DH5

Hopping On



Hopping Off



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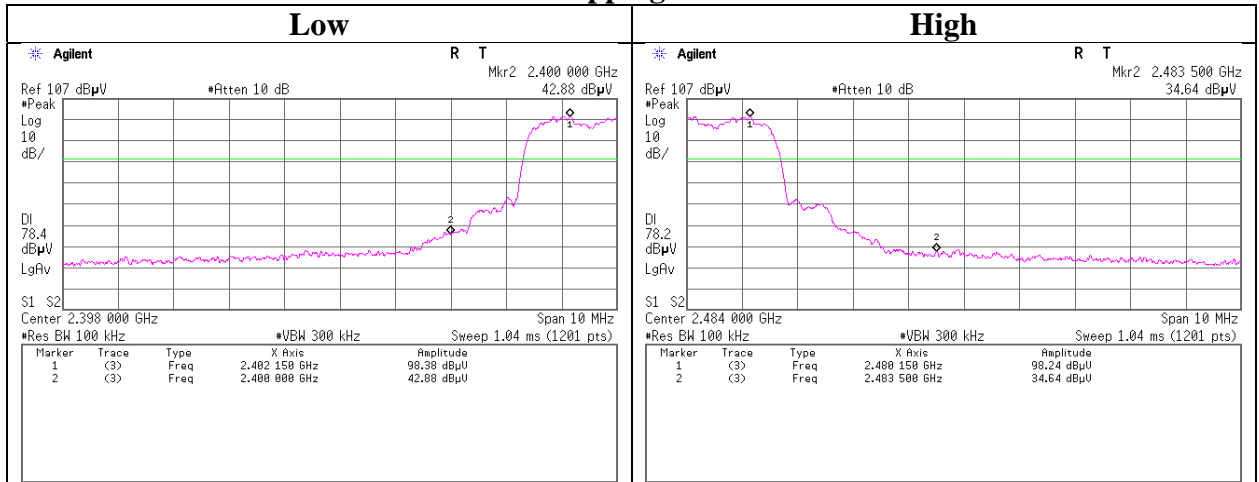
Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

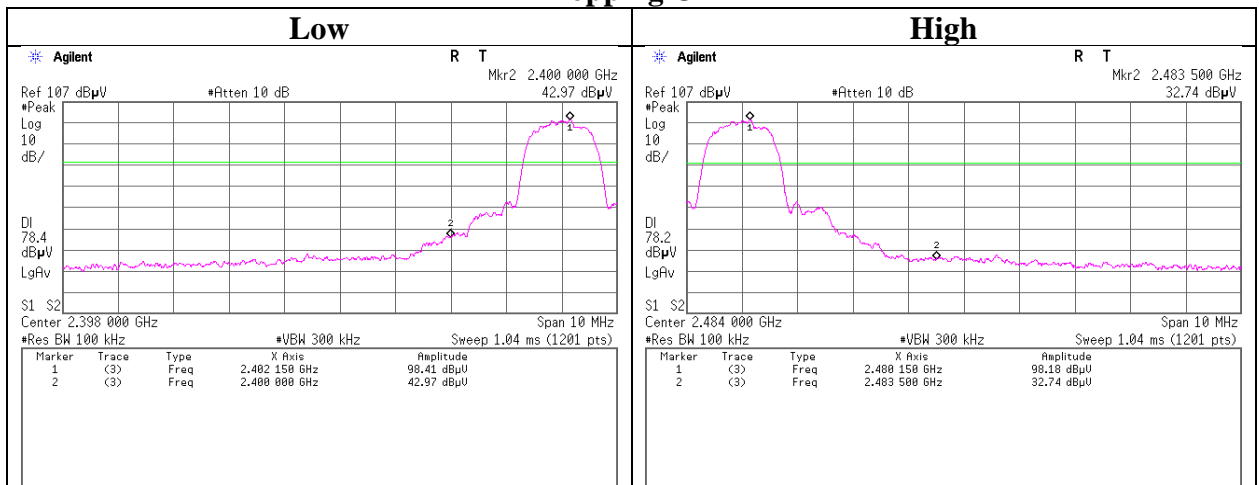
Conducted Emission Band Edge compliance

Report No.	13698456H
Test place	Ise EMC Lab. No.6 Measurement Room
Date	February 9, 2021
Temperature / Humidity	23 deg. C / 45 % RH
Engineer	Takeshi Hiyaji
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	MSA-15	141902	Spectrum Analyzer	Keysight Technologies Inc	E4440A	MY46187105	10/15/2020	12
AT	MPM-13	141810	Power Meter	ANRITSU	ML2495A	824014	12/14/2020	12
AT	MPSE-18	141832	Power sensor	ANRITSU	MA2411B	738174	12/14/2020	12
AT	MAT-91	141420	Attenuator	Weinschel Associates	WA56-10	56100307	05/25/2020	12
AT	MOS-28	141567	Thermo-Hygrometer	CUSTOM	CHT-201	8	01/15/2021	12
AT	MSA-13	141900	Spectrum Analyzer	Keysight Technologies Inc	E4440A	MY46185823	2020/09/24	12
AT	MCC-177	141226	Coaxial Cable	JUNFLOW	MWX221	1502S304	03/18/2020	12
AT	MAT-89	141419	Attenuator	Weinschel Associates	WA56-10	56100305	05/27/2020	12
AT	MOS-24	90289	Thermo-Hygrometer	CUSTOM	CHT-201	5	01/15/2021	12
AT	MMM-12	141547	DIGITAL HiTESTER	HIOKI E.E. CORPORATION	3805	60500120	02/03/2020	12
CE	MAEC-02	142004	AC2 Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-06902	05/26/2020	24
CE	MOS-41	192300	Thermo-Hygrometer	CUSTOM. Inc	CTH-201	0013	12/06/2020	12
CE	MMM-01	141542	Digital Tester	Fluke Corporation	FLUKE 26-3	78030611	08/18/2020	12
CE	MJM-27	142228	Measure	KOMELON	KMC-36	-	-	-
CE	COTS-MEMI-02	178648	EMI measurement program	TSJ (Techno Science Japan)	TEPTO-DV	-	-	-
CE	MLS-23	141357	LISN(AMN)	Schwarzbeck Mess - Elektronik	NSLK8127	8127-729	2020/07/22	12
CE	MCC-13	141222	Coaxial Cable	UL Japan	-	-	02/11/2021	12
CE	MAT-67	141248	Attenuator(13 dB)	JFW Industries, Inc.	50FP-013H2 N	-	12/07/2020	12
CE	MTR-08	141949	Test Receiver	ROHDE & SCHWARZ	ESCI	100767	08/18/2020	12
CE	MSA-03	141884	Spectrum Analyzer	Keysight Technologies Inc	E4448A	MY44020357	2020/03/04	12
RE	MOS-15	141562	Thermo-Hygrometer	CUSTOM. Inc	CTH-201	0010	01/15/2021	12
RE	MMM-10	141545	DIGITAL HiTESTER	HIOKI E.E. CORPORATION	3805	51201148	01/07/2021	12
RE	MJM-26	142227	Measure	KOMELON	KMC-36	-	-	-
RE	COTS-MEMI-02	178648	EMI measurement program	TSJ (Techno Science Japan)	TEPTO-DV	-	-	-
RE	MAEC-04-SVSWR	142017	AC4 Semi Anechoic Chamber(SVSWR)	TDK	Semi Anechoic Chamber 3m	DA-10005	04/04/2019	24
RE	MHA-21	141508	Horn Antenna 1-18GHz	Schwarzbeck Mess - Elektronik	BBHA9120D	557	05/22/2020	12
RE	MSA-04	141885	Spectrum Analyzer	Keysight Technologies Inc	E4448A	US44300523	11/09/2020	12
RE	MPA-12	141581	MicroWave System Amplifier	Keysight Technologies Inc	83017A	00650	10/19/2020	12
RE	MCC-246	199563	Microwave Cable	HUBER+SUNER	SF126E/11PC35/11 PC35/1000M,5000 M	537061/126E / 537072/126E	06/11/2020	12
RE	MHF-26	141296	High Pass Filter 3.5-18.0GHz	UL Japan	HPF SELECTOR	002	09/23/2020	12
RE	MHA-17	141506	Horn Antenna 15-40GHz	Schwarzbeck Mess - Elektronik	BBHA9170	BBHA9170307	07/16/2020	12
RE	MAT-34	141331	Attenuator(6dB)	TME	UFA-01	-	02/05/2020	12
RE	MBA-05	141425	Biconical Antenna	Schwarzbeck Mess - Elektronik	VHA9103+BBA9106	VHA 91031302	08/31/2020	12
RE	MCC-50	141397	Coaxial Cable	UL Japan	-	-	11/06/2020	12
RE	MLA-23	141267	Logperiodic Antenna (200-1000MHz)	Schwarzbeck Mess - Elektronik	VUSLP9111B	9111B-192	09/02/2020	12
RE	MTR-10	141951	EMI Test Receiver	Rohde & Schwarz	ESR26	101408	03/10/2020	12
RE	MAEC-04	142011	AC4 Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-10005	05/25/2020	24
RE	MPA-14	141583	Pre Amplifier	SONOMA INSTRUMENT	11/5/1900	260833	02/18/2020	12
RE	MPA-03	141577	Microwave System Power Amplifier	AGILENT	83050A	MY39500610	10/19/2020	12

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*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