



RADIO TEST REPORT

Test Report No. : 13554183S-B

Applicant : Sony Corporation, Japan and Sony Group Companies
Type of EUT : CONTROL BOX
Model Number of EUT : TMR-A9WT (Module: WM-BAC-AT-49)
FCC ID : AK8TMRA9WT
Test regulation : FCC Part 15 Subpart C: 2021
*Bluetooth (BR / EDR) part
Test Result : Complied (Refer to SECTION 3.2)

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

Date of test: October 14 to November 28, 2020

Representative test engineer: K. Noda
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CERTIFICATE 1266.03

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 There is no testing item of "Non-accreditation".

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REVISION HISTORY

Original Test Report No.: 13554183S-B

Revision	Test report No.	Date	Page revised	Contents
- (Original)	13554183S-B	February 26, 2021	-	-

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Reference: Abbreviations (Including words undescribed in this report)

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

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SECTION 1: Customer information

Company Name : Sony Corporation, Japan and Sony Group Companies
Address : 1-7-1 Konan Minato-ku, Tokyo, 108-0075 Japan
Contact Person : Kazuhiko Nagano

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 : CONTROL BOX
Model Number : TMR-A9WT
Serial Number : Refer to SECTION 4.2
Rating : AC adapter Input: AC 100 V – 240 V, 50/60 Hz
DC 12 V
Receipt Date : October 1, 2020
Country of Mass-production : Malaysia
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: TMR-A9WT (referred to as the EUT in this report) is a CONTROL BOX.

Clock frequency of the EUT : 48 MHz (MAX) (Module A: WM-BAC-AT-49)
48 MHz (MAX) (Module B: 1PJ)

Radio Specification

<Module A: model No. WM-BAC-AT-49> (* The module covered by this report.)

	Bluetooth (BR/EDR) *1)	Bluetooth (Low Energy) *1)
Frequency of operation	2402 MHz - 2480 MHz	2402 MHz - 2480 MHz
Channel spacing	1 MHz	2 MHz
Modulation	FHSS: GFSK (*, EDR: GFSK+ /4-DQPSK, GFSK+ 8DPSK)	
Antenna type	Dipole antenna	
Antenna Gain	3.54 dBi	
Antenna Connector type	U.FL connector	

*1) The Bluetooth part antenna and the Module B antenna are common antenna.

	IEEE802.11b	IEEE802.11g	IEEE802.11n (20 MHz band)	IEEE802.11n (40 MHz band)
Frequency of operation	2412 MHz - 2462 MHz	2412 MHz - 2462 MHz	2412 MHz - 2462 MHz 5180 MHz - 5240 MHz 5260 MHz - 5320 MHz 5500 MHz - 5720 MHz 5745 MHz - 5825 MHz	5190 MHz - 5230 MHz 5270 MHz - 5310 MHz 5510 MHz - 5710 MHz 5755 MHz - 5795 MHz
Channel spacing	5 MHz		2.4 GHz band 5 MHz 5 GHz band 20 MHz	5 GHz band 40 MHz
Modulation	DSSS: DBPSK, DQPSK, CCK	OFDM: BPSK, QPSK, 16QAM, 64QAM		
	IEEE802.11a	IEEE802.11ac (20 MHz band)	IEEE802.11ac (40 MHz band)	IEEE802.11ac (80 MHz band)
Frequency of operation	5180 MHz - 5240 MHz 5260 MHz - 5320 MHz 5500 MHz - 5720 MHz 5745 MHz - 5825 MHz	5180 MHz - 5240 MHz 5260 MHz - 5320 MHz 5500 MHz - 5720 MHz 5745 MHz - 5825 MHz	5190 MHz - 5230 MHz 5270 MHz - 5310 MHz 5510 MHz - 5710 MHz 5755 MHz - 5795 MHz	5210 MHz 5290 MHz 5530 MHz - 5610 MHz 5690 MHz 5775 MHz
Channel spacing	20 MHz		40 MHz	80 MHz
Modulation	OFDM BPSK, QPSK, 16QAM, 64QAM, 256QAM (*256QAM is only for IEEE802.11ac 80 MHz band)			
Antenna type	Dipole antenna			
Antenna Gain	ANT0 : 1.36 dBi (2.4 GHz), 3.71 dBi (U-NII-1), 2.60 dBi (U-NII-2A), 2.48 dBi (U-NII-2C), 3.09 dBi (U-NII-3) ANT1 : 1.90 dBi (2.4 GHz), 5.79 dBi (U-NII-1), 5.79 dBi (U-NII-2A), 5.12 dBi (U-NII-2C), 4.13 dBi (U-NII-3)			
Antenna Connector type	U.FL connector			

<Module B: Model No. 1PJ>

	IEEE802.11a	IEEE802.11n (20 MHz band)	IEEE802.11n (40 MHz band)
Frequency of operation	5180 MHz - 5240 MHz 5260 MHz - 5320 MHz 5500 MHz - 5700 MHz 5745 MHz - 5825 MHz	5180 MHz - 5240 MHz 5260 MHz - 5320 MHz 5500 MHz - 5700 MHz 5745 MHz - 5825 MHz	5190 MHz - 5230 MHz 5270 MHz - 5310 MHz 5510 MHz - 5670 MHz 5755 MHz - 5795 MHz
Channel spacing	20 MHz	20 MHz	40 MHz
Modulation	DSSS: DBPSK, DQPSK, CCK	OFDM: BPSK, QPSK, 16QAM, 64QAM	
Antenna type	Dipole antenna		
Antenna Gain	ANT : 4.64 dBi (U-NII-1), 4.48 dBi (U-NII-2A), 4.76 dBi (U-NII-2C), 4.76 dBi (U-NII-3)		
Antenna Connector type	U.FL connector		

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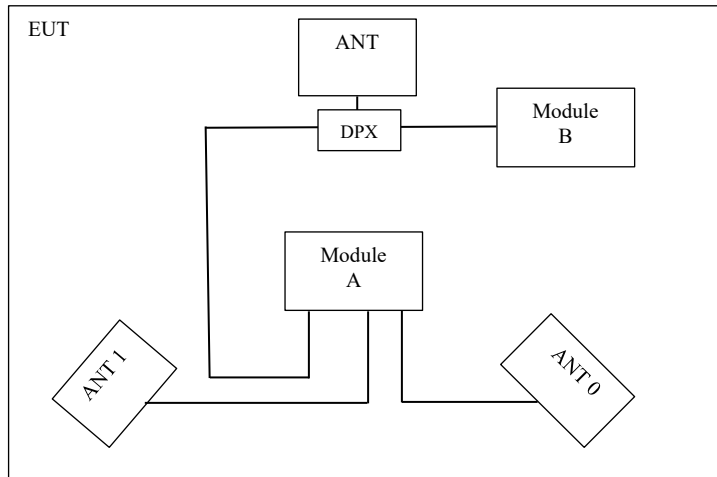
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Additional information for specification:



The EUT has Module A and Module B.

* DPX: Diplexer.

Combination of antennas used

	BT	BT LE	WLAN 2.4 GHz	WLAN 5 GHz
ANT	Module A	Module A	-	Module B
ANT 0	-	-	Module A	Module A
ANT 1	-	-	Module A	Module A

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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
* The revision does not affect the test result conducted before its effective date.

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

3.2 Procedures and results

Item	Test Procedure	Specification	Worst Margin	Results	Remarks
Conducted Emission	FCC: ANSI C63.10-2013 6. Standard test methods	FCC: Section 15.207	14.3 dB 11.66100 MHz, AV, N Tx 3DH5 2402 MHz with Module A 11n-20 5320 MHz and Module B 11n-20 5580 MHz	Complied a)	-
	ISED: RSS-Gen 8.8	ISED: RSS-Gen 8.8			
Carrier Frequency Separation	FCC: KDB 558074 D01 15.247 Meas Guidance v05r02	FCC: Section15.247(a)(1)	See data.	Complied b)	Conducted
	ISED: -	ISED: RSS-247 5.1 (b)			
20 dB Bandwidth	FCC: KDB 558074 D01 15.247 Meas Guidance v05r02	FCC: Section15.247(a)(1)			
	ISED: -	ISED: RSS-247 5.1 (a)			
Number of Hopping Frequency	FCC: KDB 558074 D01 15.247 Meas Guidance v05r02	FCC: Section15.247(a)(1)(iii)			
	ISED: -	ISED: RSS-247 5.1 (d)			
Dwell time	FCC: KDB 558074 D01 15.247 Meas Guidance v05r02	FCC: Section15.247(a)(1)(iii)			
	ISED: -	ISED: RSS-247 5.1 (d)			
Maximum Peak Output Power	FCC: KDB 558074 D01 15.247 Meas Guidance v05r02	FCC: Section15.247(a)(b)(1)			
	ISED: RSS-Gen 6.12	ISED: RSS-247 5.4 (b)			
Spurious Emission & Band Edge Compliance	FCC: KDB 558074 D01 15.247 Meas Guidance v05r02	FCC: Section15.247(d)	7.5 dB 45.048 MHz, QP, Vert. Tx, 3DH5 2480 MHz	Complied f) / g)	Conducted/ Radiated (above 30 MHz) *1)
	ISED: RSS-Gen 6.13	ISED: RSS-247 5.5 RSS-Gen 8.9 RSS-Gen 8.10			

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	No. 4,5,6,8 SR
Conducted emission (AC Mains) LISN	150 kHz-30 MHz	2.6 dB	2.6 dB	2.5 dB	2.6 dB
Radiated emission (Measurement distance: 3 m)	9 kHz-30 MHz	3.0 dB	3.0 dB	3.0 dB	-
	30 MHz-200 MHz	4.6 dB	4.6 dB	4.6 dB	-
	200 MHz-1 GHz	6.0 dB	6.0 dB	6.0 dB	-
	1 GHz-6 GHz	4.9 dB	4.9 dB	4.9 dB	-
	6 GHz-18 GHz	5.5 dB	5.5 dB	5.5 dB	-
	18 GHz-40 GHz	5.4 dB	5.4 dB	5.4 dB	-
Radiated emission (Measurement distance: 1 m)	1 GHz-18 GHz	5.8 dB	5.8 dB	5.8 dB	-
	18 GHz-40 GHz	5.7 dB	5.7 dB	5.7 dB	-

SAC=Semi-Anechoic Chamber

SR= Shielded Room is applied besides radiated emission

Antenna terminal test	Uncertainty (+/-)
Power Measurement above 1 GHz (Average Detector)_SPM-06	0.98 dB
Power Measurement above 1 GHz (Peak Detector)_SPM-06	1.75 dB
Power Measurement above 1 GHz (Average Detector)_SPM-07	0.89 dB
Power Measurement above 1 GHz (Peak Detector)_SPM-07	1.12 dB
Power Measurement above 1 GHz (Average Detector)_SPM-13	1.06 dB
Power Measurement above 1 GHz (Peak Detector)_SPM-13	1.24 dB
Spurious emission (Conducted) below 1GHz	0.9 dB
Spurious emission (Conducted) 1 GHz-3 GHz	0.9 dB
Spurious emission (Conducted) 3 GHz-18 GHz	2.9 dB
Spurious emission (Conducted) 18 GHz-26.5 GHz	2.6 dB
Spurious emission (Conducted) 26.5 GHz-40 GHz	2.0 dB
Bandwidth Measurement	0.07 %
Duty cycle and Time Measurement	0.262 %
Temperature	0.95 deg.C.
Voltage	0.83 %

3.5 Test Location

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A2LA Certificate Number: 1266.03

(FCC test firm registration number: 626366, ISED lab company number: 2973D / 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 (BT): Transmitting (Tx), Payload: PRBS9

Details of Operating Mode(s)

Test Item	Mode	Tested frequency
Spurious Emission (Conducted)	Tx (Hopping Off) DH5, 3DH5	2402 MHz 2441 MHz 2480 MHz
Conducted Emission, Spurious Emission (Radiated)	Tx (Hopping Off) DH5, 3DH5	2402 MHz 2441 MHz 2480 MHz
	Tx (Hopping Off) DH5, 3DH5 with Module A 11n-20 5320 MHz and Module B 11n-20 5580 MHz	2402 MHz 2441 MHz 2480 MHz
Carrier Frequency Separation	Tx (Hopping On) DH5, 3DH5	2402 MHz 2441 MHz 2480 MHz
20 dB 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: (single transmission) AT-49 BT Test Ver 1.1 (Date: 2020.10.14, Storage location: Driven by connected PC)</p> <p>(simultaneous transmission) AT-49 BT Test Ver 1.2, LBEE5ZZ1PJ_331_RF_Test_v1.1 (Date: 2020.11.06, Storage location: Driven by connected PC) AT-49 RF Test Ver 1.4 (Date: 2020.11.20, 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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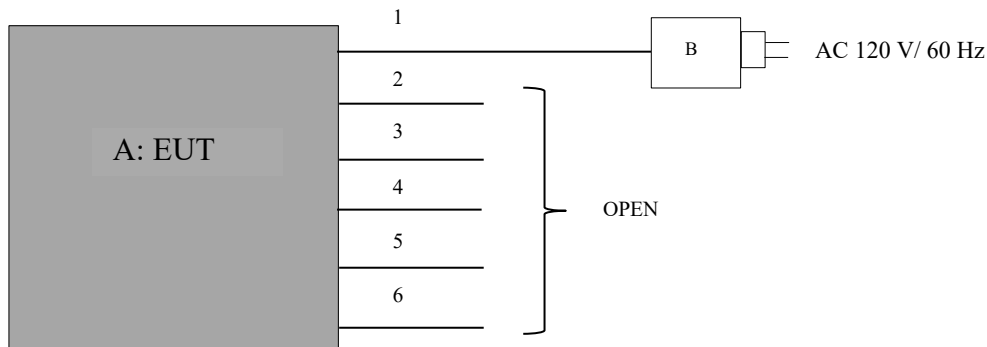
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4.2 Configuration and peripherals



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

Description of EUT and Support equipment

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	CONTROL BOX	TMR-A9WT	1 *1) 1000002 *2) 1000015 *3)	SONY	EUT *4)
B	AC Adaptor	AC-M1215UC	M2090660255	SONY	-

*1) Used for Antenna Terminal conducted test

*2) Used for Radiated Emission test (single transmission)

*3) Used for Conducted Emission test and Radiated Emission test (simultaneous transmission)

*4) The EUT is mounted Module A(WM-BAC-AT-49) and Module B(1PJ) on its inside.

List of cables used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	DC	1.5	Unshielded	Unshielded	-
2	USB	1.7	Shielded	Shielded	-
3	Audio	2.0	Shielded	Shielded	-
4	LAN	1.0	Unshielded	Unshielded	Cat.5e
5	HDMI	1.5	Shielded	Shielded	HDMI OUT
6	HDMI	1.8	Shielded	Shielded	HDMI IN

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 80cm 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.

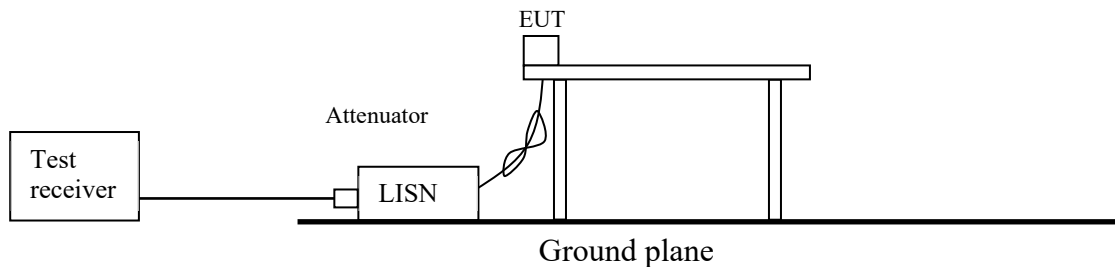
The AC Mains Terminal Continuous disturbance Voltage has been measured with the EUT in a Semi Anechoic Chamber. The EUT was connected to a LISN (AMN).

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, 1.0 m by 1.5 m, raised 0.8 m above the conducting ground plane. The Radiated Electric Field Strength has been measured in a Semi Anechoic Chamber with a ground plane.

[For above 1 GHz]

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

The height of the measuring antenna varied between 1 m and 4 m and EUT was rotated a full revolution in order to obtain the maximum value of the electric field strength.

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

The measurements were performed for both vertical and horizontal antenna polarization with the Test Receiver, or the Spectrum Analyzer.

The measurements were made with the following detector function of the test receiver and the Spectrum analyzer (in linear mode).

The test was made with the detector (RBW/VBW) in the following table.

When using Spectrum analyzer, the test was made with adjusting span to zero by using peak hold.

Test Antennas are used as below;

Frequency	30 MHz to 200 MHz	200 MHz to 1 GHz	Above 1 GHz
Antenna Type	Biconical	Logperiodic	Horn

In any 100 kHz bandwidth outside the restricted band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator confirmed 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on a radiated measurement.

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

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

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

*a) The Spectrum Analyzer was used in 3 dB resolution bandwidth.

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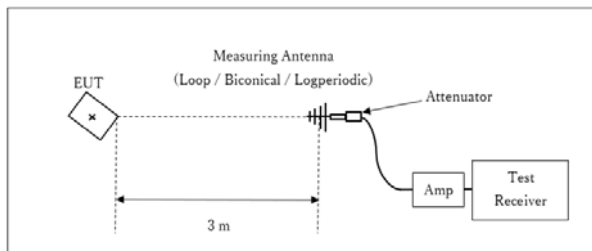
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

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Facsimile : +81 463 50 6401

Figure 2: Test Setup

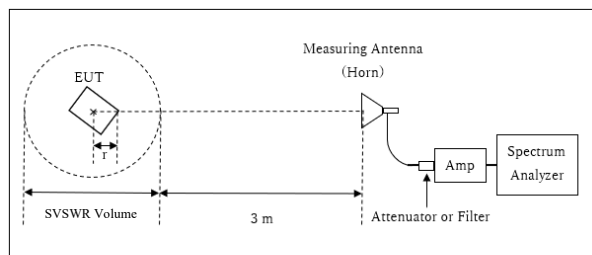
Below 1 GHz



× : Center of turn table

Test Distance: 3 m

1 GHz - 10 GHz



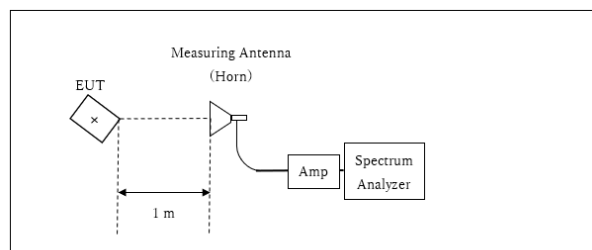
r : Radius of an outer periphery of EUT
 × : Center of turn table

Distance Factor: $20 \times \log(3.9 \text{ m} / 3.0 \text{ m}) = 2.28 \text{ dB}$
 * Test Distance: $(3 + \text{SVSWR Volume} / 2) - r = 3.9 \text{ m}$

SVSWR Volume : 2.0 m
 (SVSWR Volume has been calibrated based on CISPR 16-1-4.)
 $r = 0.1 \text{ m}$

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

10 GHz - 26.5 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 test was made on EUT at the normal use position.

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

Measurement range : 30 MHz - 26.5 GHz
Test data : APPENDIX
Test result : Pass

SECTION 7: Antenna Terminal Conducted Tests

Test Procedure

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

Test	Span	RBW	VBW	Sweep time	Detector	Trace	Instrument used
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

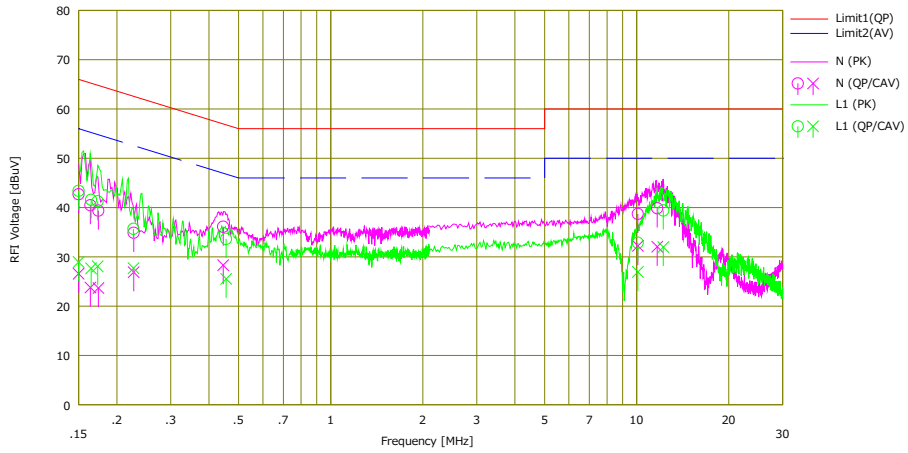
UL Japan, Inc. Shonan EMC Lab. No.1 Shielded Room
Date : 2020/11/28

Mode : Tx DH5 2402 MHz
Power : AC 120 V / 60 Hz
Temp./Humi. : 22 deg.C / 45 %RH

Remarks : -

Limit : FCC_Part 15 Subpart C(15.207)

Engineer : Kazuya Noda

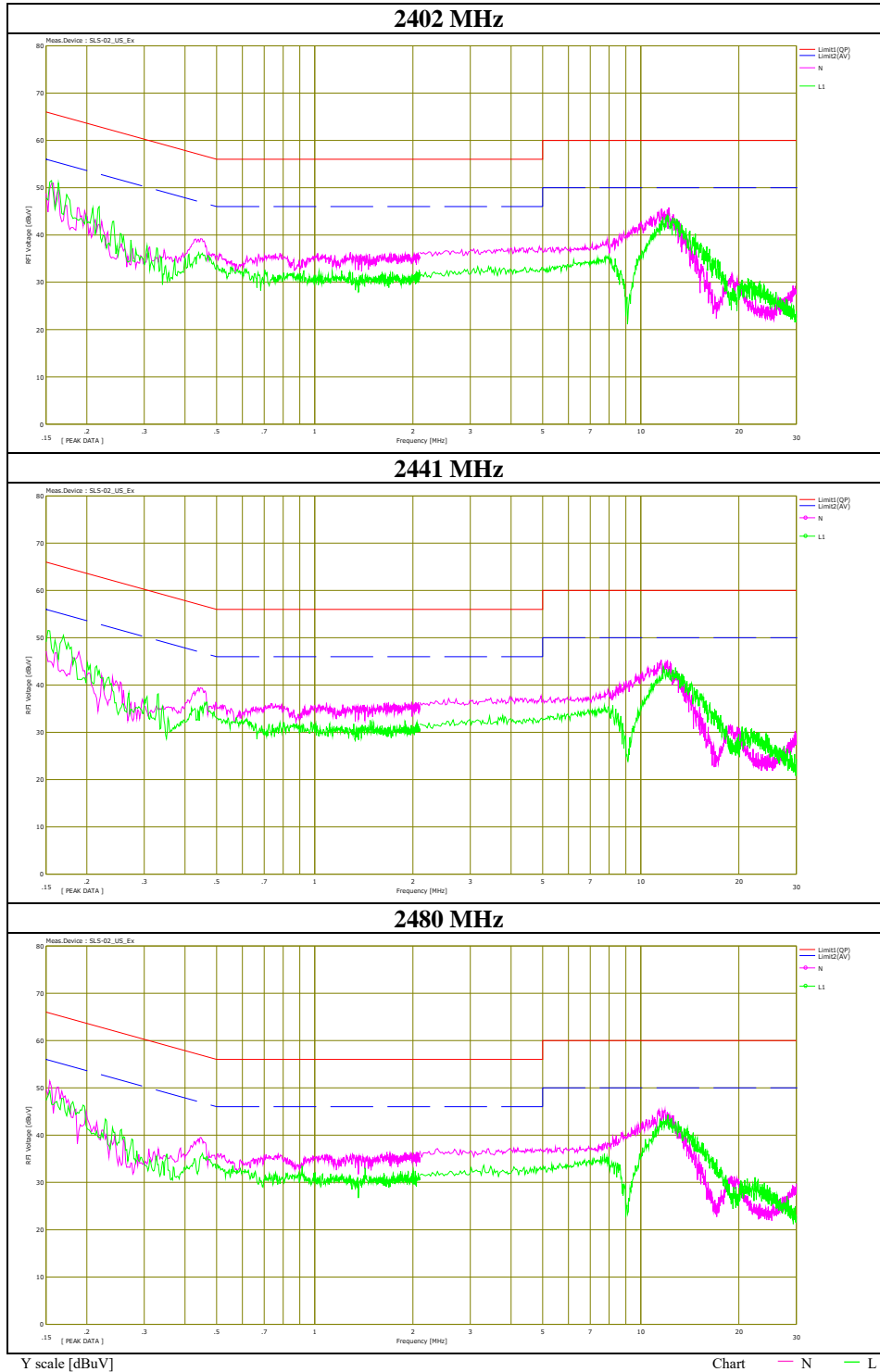


No.	Freq. [MHz]	Reading		C.Fac [dB]	Results		Limit		Margin		Phase	Comment
		<QP> [dBuV]	<CAV> [dBuV]		<QP> [dBuV]	<CAV> [dBuV]	<QP> [dB]	<AV> [dB]	<QP> [dB]	<AV> [dB]		
1	0.15000	30.10	14.00	12.60	42.70	26.60	66.00	56.00	23.3	29.4	N	
2	0.16395	27.90	11.20	12.59	40.49	23.79	65.26	55.26	24.7	31.4	N	
3	0.17400	26.80	11.10	12.59	39.39	23.69	64.77	54.77	25.3	31.0	N	
4	0.22704	22.30	14.30	12.60	34.90	26.90	62.56	52.56	27.6	25.6	N	
5	0.44530	23.50	15.70	12.62	36.12	28.32	56.96	46.96	20.8	18.6	N	
6	10.08550	25.10	18.60	13.62	38.72	32.22	60.00	50.00	21.2	17.7	N	
7	11.67050	26.10	18.30	13.76	39.86	32.06	60.00	50.00	20.1	17.9	N	
8	0.15000	30.80	16.40	12.58	43.38	28.98	66.00	56.00	22.6	27.0	L1	
9	0.16472	29.00	15.10	12.58	41.58	27.68	65.22	55.22	23.6	27.5	L1	
10	0.17314	28.70	15.50	12.58	41.28	28.08	64.81	54.81	23.5	26.7	L1	
11	0.22666	23.10	15.10	12.59	35.69	27.69	62.57	52.57	26.8	24.8	L1	
12	0.45520	21.00	12.90	12.64	33.64	25.54	56.78	46.78	23.1	21.2	L1	
13	10.08630	19.40	13.50	13.46	32.86	26.96	60.00	50.00	27.1	23.0	L1	
14	12.21930	25.80	18.40	13.61	39.41	32.01	60.00	50.00	20.5	17.9	L1	

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

Conducted Emission

Report No.	13554183S-B
Test place	Shonan EMC Lab. No.1 Shielded Room
Date	November 28, 2020
Temperature / Humidity	22 deg. C / 45 % RH
Engineer	Kazuya Noda
Mode	Tx, Hopping Off, DH5



Y scale [dBuV]

Chart — N — L

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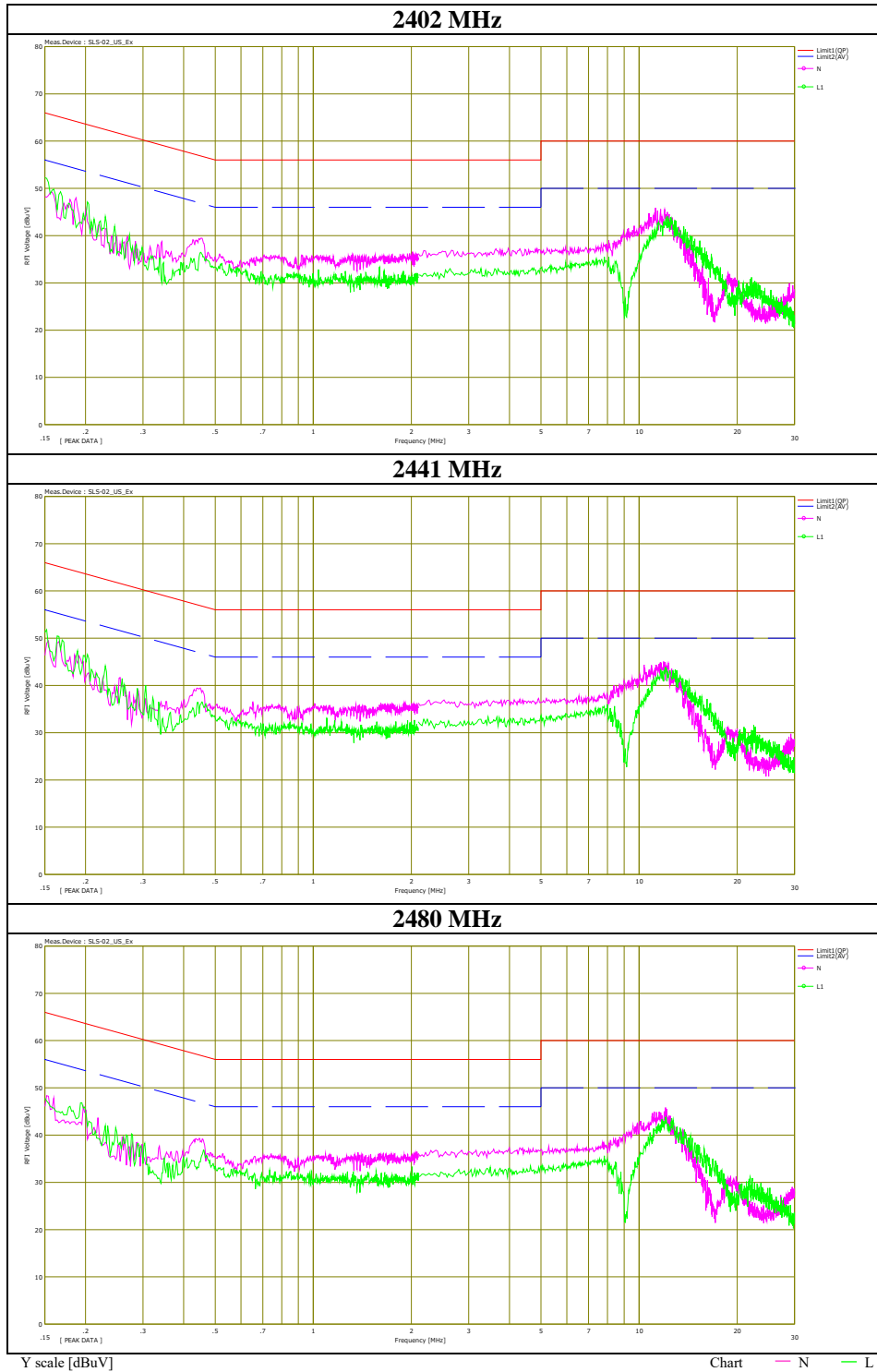
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Facsimile : +81 463 50 6401

Conducted Emission

Report No. 13554183S-B
Test place Shonan EMC Lab. No.1 Shielded Room
Date November 28, 2020
Temperature / Humidity 22 deg. C / 45 % RH
Engineer Kazuya Noda
Mode Tx, Hopping Off, 3DH5



Conducted Emission

DATA OF CONDUCTED EMISSION TEST

UL Japan, Inc. Shonan EMC Lab. No.1 Shielded Room
 Date : 2020/11/28

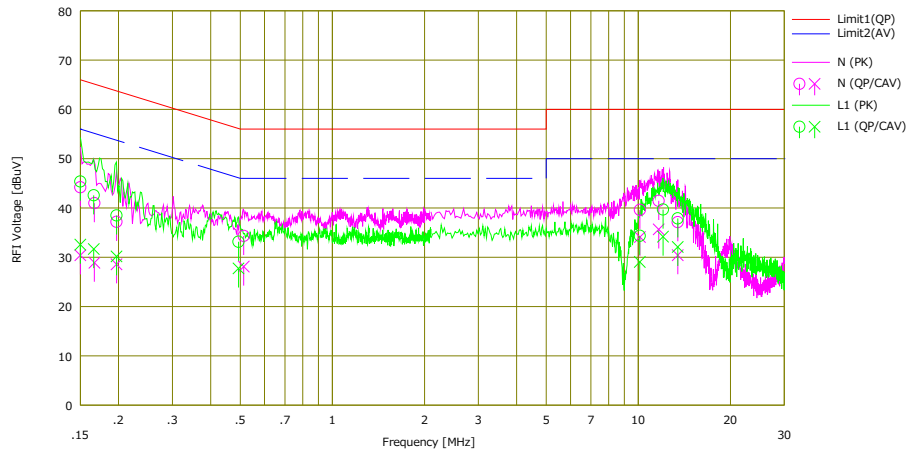
Mode : Tx 3DH5 2402 MHz

Power : AC 120 V / 60 Hz
 Temp./Humi. : 22 deg.C / 45 %RH

Remarks : with Module A 11n-20 5320 MHz and Module B 11n-20 5580 MHz

Limit : FCC_Part 15 Subpart C(15.207)

Engineer : Kazuya Noda



No.	Freq. [MHz]	Reading		C.Fac	Results		Limit		Margin		Phase	Comment
		<QP> [dBuV]	<CAV> [dBuV]		[dB]	<QP> [dBuV]	<CAV> [dBuV]	<QP> [dBuV]	<AV> [dBuV]	<QP> [dB]		
1	0.15000	31.60	17.80	12.60	44.20	30.40	66.00	56.00	21.8	25.6	N	
2	0.16670	28.40	16.30	12.59	40.99	28.89	65.12	55.12	24.1	26.2	N	
3	0.19698	24.60	16.00	12.59	37.19	28.59	63.74	53.74	26.5	25.1	N	
4	0.51296	21.70	15.50	12.63	34.33	28.13	56.00	46.00	21.6	17.8	N	
5	10.12200	26.00	20.50	13.62	39.62	34.12	60.00	50.00	20.3	15.8	N	
6	11.66100	27.70	21.90	13.76	41.46	35.66	60.00	50.00	18.5	14.3	N	
7	13.45747	23.20	16.50	13.93	37.13	30.43	60.00	50.00	22.8	19.5	N	
8	0.15000	32.80	20.00	12.58	45.38	32.58	66.00	56.00	20.6	23.4	L1	
9	0.16594	30.00	19.10	12.58	42.58	31.68	65.16	55.16	22.5	23.4	L1	
10	0.19704	25.90	17.60	12.59	38.49	30.19	63.73	53.73	25.2	23.5	L1	
11	0.49340	20.50	15.10	12.65	33.15	27.75	56.11	46.11	22.9	18.3	L1	
12	10.11194	20.90	15.60	13.46	34.36	29.06	60.00	50.00	25.6	20.9	L1	
13	12.04380	26.10	20.60	13.60	39.70	34.20	60.00	50.00	20.3	15.8	L1	
14	13.45907	24.20	18.40	13.70	37.90	32.10	60.00	50.00	22.1	17.9	L1	

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

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

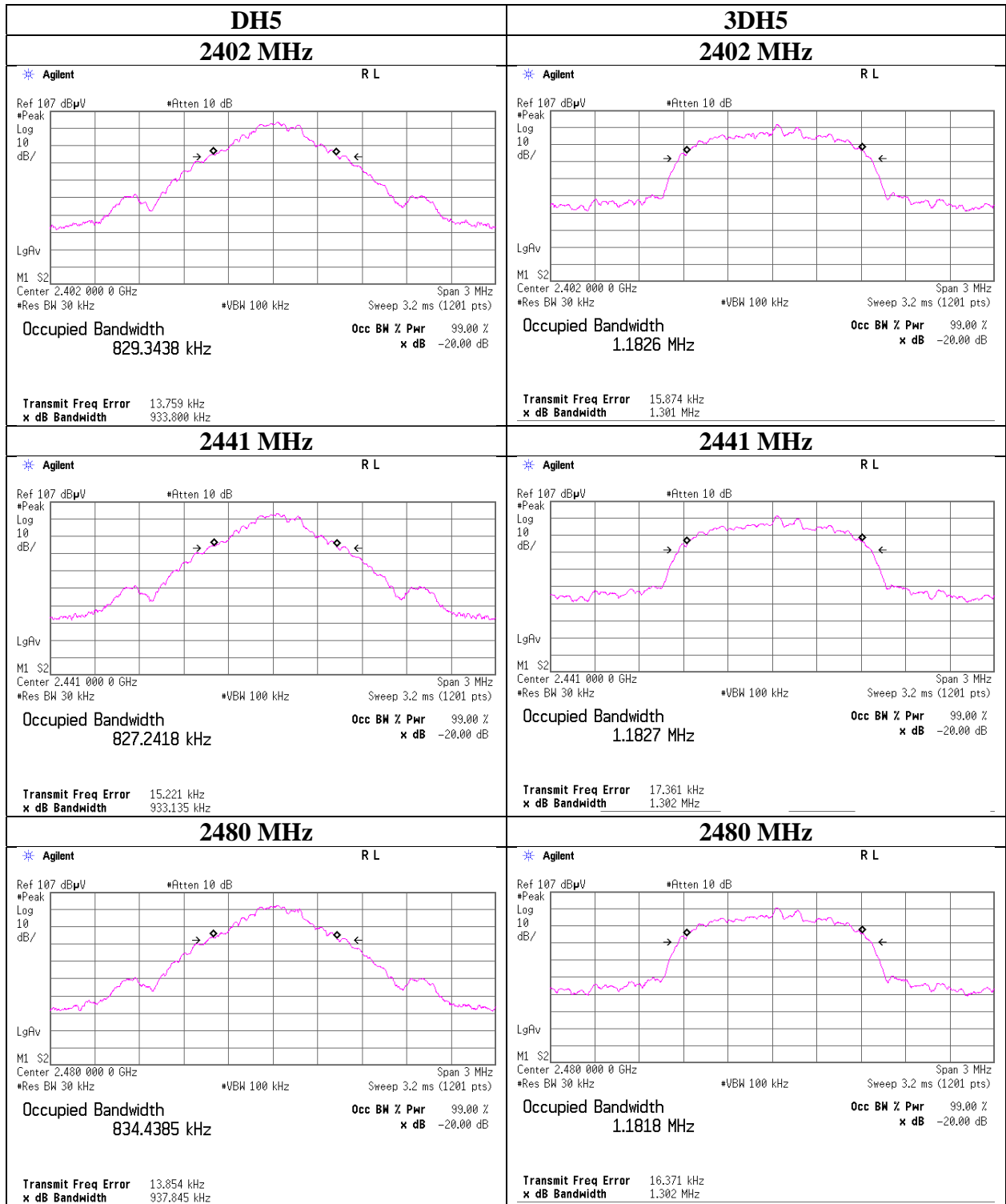
Report No. 13554183S-B
Test place Shonan EMC Lab. No.6 Shielded Room
Date October 14, 2020
Temperature / Humidity 27 deg. C / 45 % RH
Engineer Kazuya Noda
Mode Tx, Hopping Off, Tx, Hopping On

Mode	Freq. [MHz]	20dB Bandwidth [MHz]	99% Occupied Bandwidth [kHz]	Carrier Frequency Separation [MHz]	Limit for Carrier Frequency separation [MHz]
DH5	2402.0	0.934	829.344	1.000	≥ 0.623
DH5	2441.0	0.933	827.242	1.000	≥ 0.622
DH5	2480.0	0.938	834.439	1.000	≥ 0.625
DH5	Hopping On	-	78604.300	-	-
3DH5	2402.0	1.301	1182.600	1.000	≥ 0.867
3DH5	2441.0	1.302	1182.700	1.000	≥ 0.868
3DH5	2480.0	1.302	1181.800	1.000	≥ 0.868
3DH5	Hopping On	-	78709.600	-	-

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

No limit applies to 20dB Bandwidth.

20 dB Bandwidth and 99 % Occupied Bandwidth



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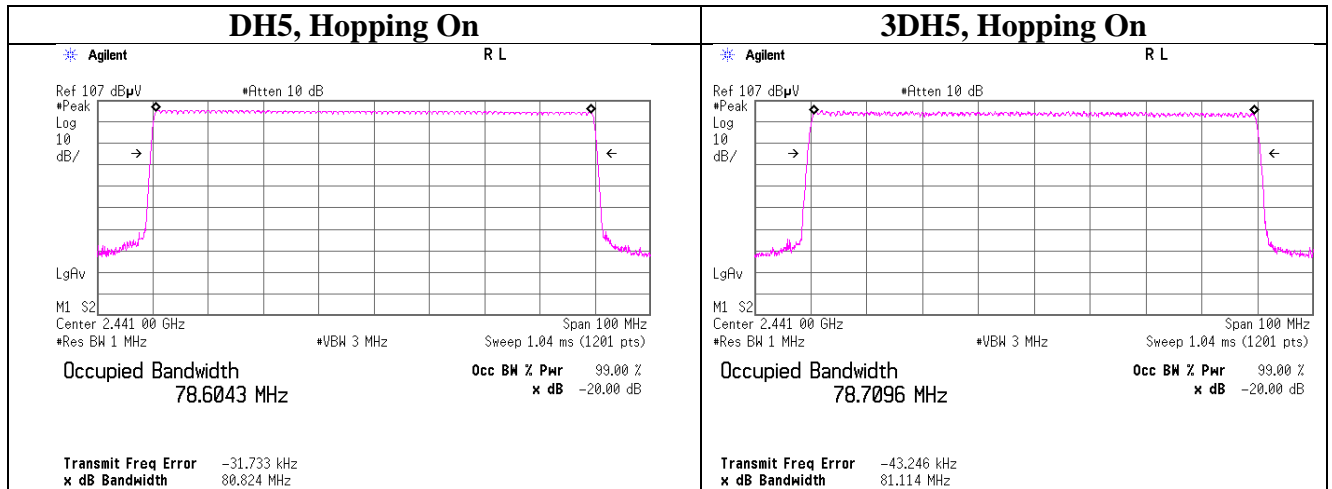
Shonan EMC Lab.

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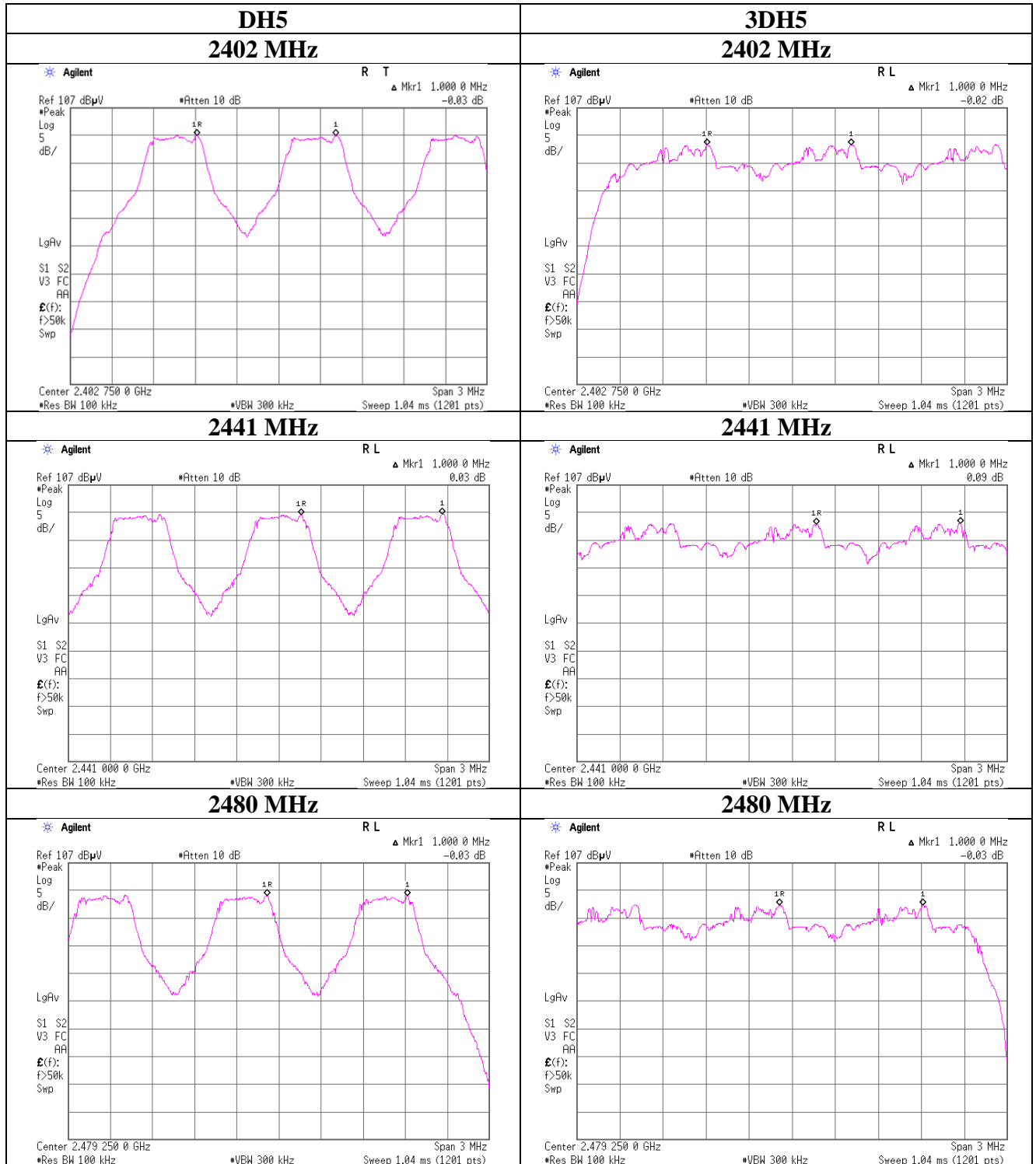
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20 dB Bandwidth and 99 % Occupied Bandwidth



Carrier Frequency Separation



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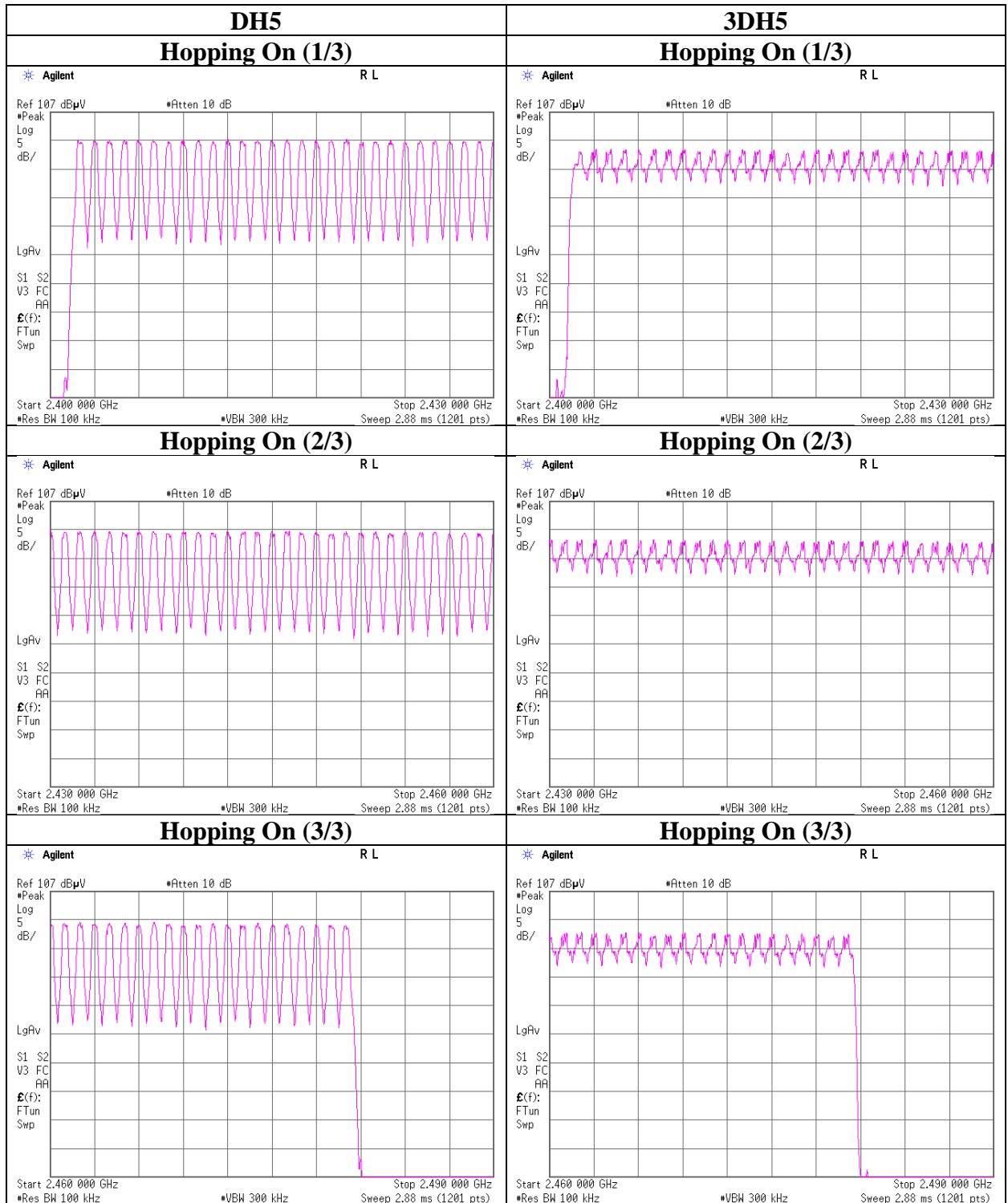
Number of Hopping Frequency

Report No. 13554183S-B
Test place Shonan EMC Lab. No.6 Shielded Room
Date October 14, 2020
Temperature / Humidity 27 deg. C / 45 % RH
Engineer Kazuya Noda
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



Dwell time

Report No. 13554183S-B
Test place Shonan EMC Lab. No.6 Shielded Room
Date October 14, 2020
Temperature / Humidity 27 deg. C / 45 % RH
Engineer Kazuya Noda
Mode Tx, Hopping On

Mode	Number of transmission in a 31.6(79 Hopping x 0.4) / 12.8 (32 Hopping x 0.4) second period			Length of transmission [msec]	Result [msec]	Limit [msec]
DH1	50.0 times /	5 sec. x	31.6 sec. =	316 times	0.405	400
DH3	26.6 times /	5 sec. x	31.6 sec. =	169 times	1.662	400
DH5	21.2 times /	5 sec. x	31.6 sec. =	134 times	2.909	400
3DH1	49.8 times /	5 sec. x	31.6 sec. =	315 times	0.411	400
3DH3	28.6 times /	5 sec. x	31.6 sec. =	181 times	1.664	400
3DH5	21.2 times /	5 sec. x	31.6 sec. =	134 times	2.923	400

Sample Calculation

Result = Number of transmission x Length of transmission

*Average data of 5 tests.(except Inquiry)

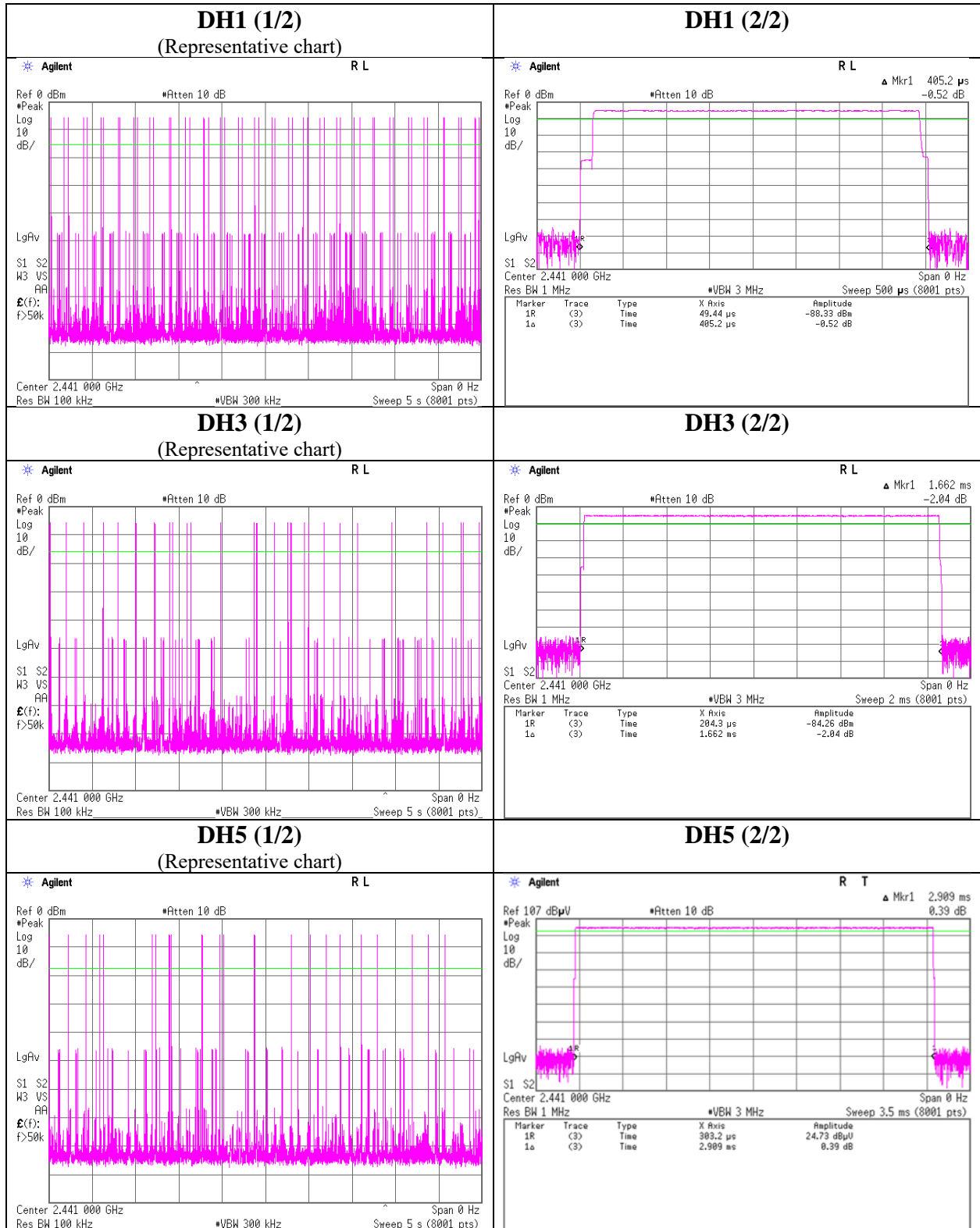
Mode	Sampling [times]					Average [times]
	1	2	3	4	5	
DH1	50	49	50	50	51	50
DH3	27	25	29	27	25	26.6
DH5	22	24	21	18	21	21.2
3DH1	50	48	51	50	50	49.8
3DH3	28	29	30	27	29	28.6
3DH5	21	20	23	23	19	21.2

Sample Calculation

Average = Summation (Sampling 1 to 5) / 5

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

Dwell time



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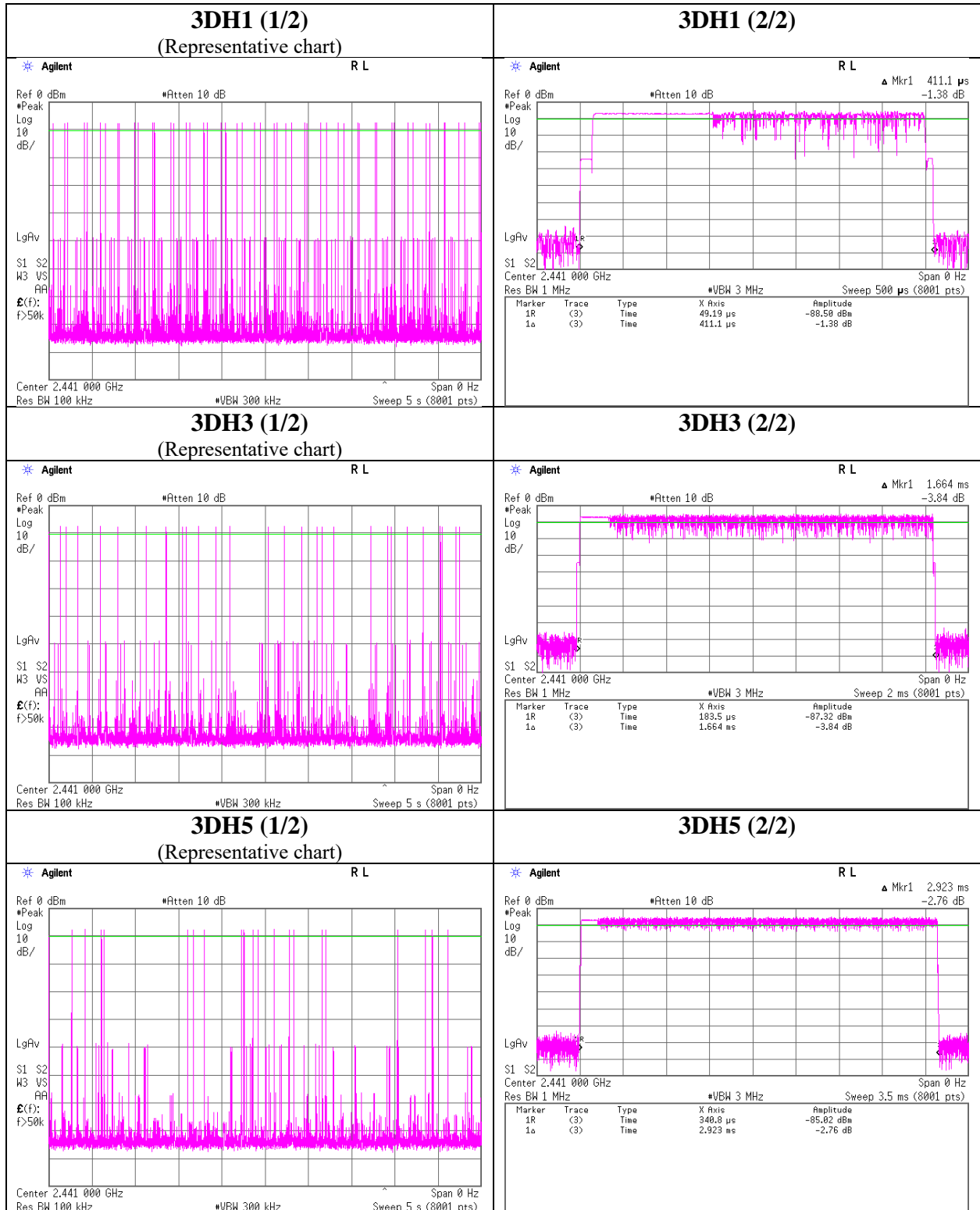
Shonan EMC Lab.

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Dwell time



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Facsimile : +81 463 50 6401

Maximum Peak Output Power

Report No. 13554183S-B
Test place Shonan EMC Lab. No.6 Shielded Room
Date October 14, 2020
Temperature / Humidity 27 deg. C / 45 % RH
Engineer Kazuya Noda
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	-5.04	0.99	9.81	5.76	3.77	20.96	125	15.20	3.54	9.30	8.51	36.02	4000	26.72
DH5	2441.0	-5.26	0.97	9.82	5.53	3.57	20.96	125	15.43	3.54	9.07	8.07	36.02	4000	26.95
DH5	2480.0	-5.91	0.97	9.82	4.88	3.08	20.96	125	16.08	3.54	8.42	6.95	36.02	4000	27.60
2DH5	2402.0	-5.08	0.99	9.81	5.72	3.73	20.96	125	15.24	3.54	9.26	8.43	36.02	4000	26.76
2DH5	2441.0	-5.33	0.97	9.82	5.46	3.52	20.96	125	15.50	3.54	9.00	7.94	36.02	4000	27.02
2DH5	2480.0	-5.95	0.97	9.82	4.84	3.05	20.96	125	16.12	3.54	8.38	6.89	36.02	4000	27.64
3DH5	2402.0	-4.47	0.99	9.81	6.33	4.30	20.96	125	14.63	3.54	9.87	9.71	36.02	4000	26.15
3DH5	2441.0	-4.75	0.97	9.82	6.04	4.02	20.96	125	14.92	3.54	9.58	9.08	36.02	4000	26.44
3DH5	2480.0	-5.36	0.97	9.82	5.43	3.49	20.96	125	15.53	3.54	8.97	7.89	36.02	4000	27.05

Sample Calculation:

Result = Reading + Cable Loss + 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. 13554183S-B
Test place Shonan EMC Lab. No.6 Shielded Room
Date October 14, 2020
Temperature / Humidity 27 deg. C / 45 % RH
Engineer Kazuya Noda
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	-6.50	0.99	9.81	4.30	2.69	1.10	5.40	3.47
DH5	2441.0	-6.77	0.97	9.82	4.02	2.52	1.10	5.12	3.25
DH5	2480.0	-7.43	0.97	9.82	3.36	2.17	1.10	4.46	2.79
2DH5	2402.0	-8.68	0.99	9.81	2.12	1.63	1.08	3.20	2.09
2DH5	2441.0	-8.95	0.97	9.82	1.84	1.53	1.08	2.92	1.96
2DH5	2480.0	-9.61	0.97	9.82	1.18	1.31	1.08	2.26	1.68
3DH5	2402.0	-8.65	0.99	9.81	2.15	1.64	1.08	3.23	2.10
3DH5	2441.0	-8.93	0.97	9.82	1.86	1.53	1.08	2.94	1.97
3DH5	2480.0	-9.59	0.97	9.82	1.20	1.32	1.08	2.28	1.69

Sample Calculation:

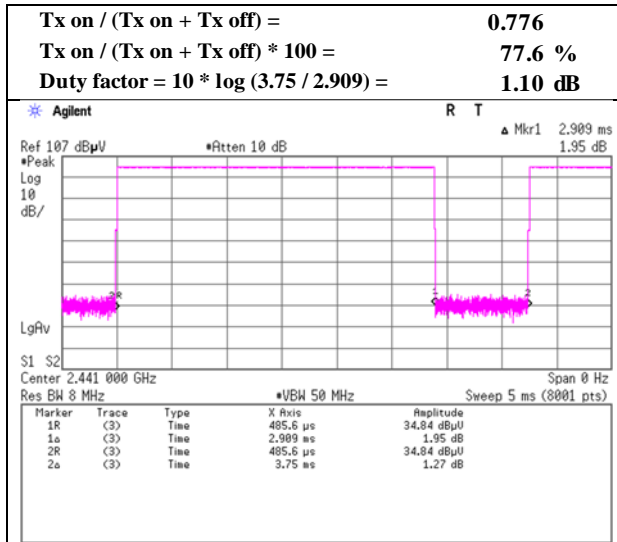
Result (Time average) = Reading + Cable Loss + Attenuator Loss

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

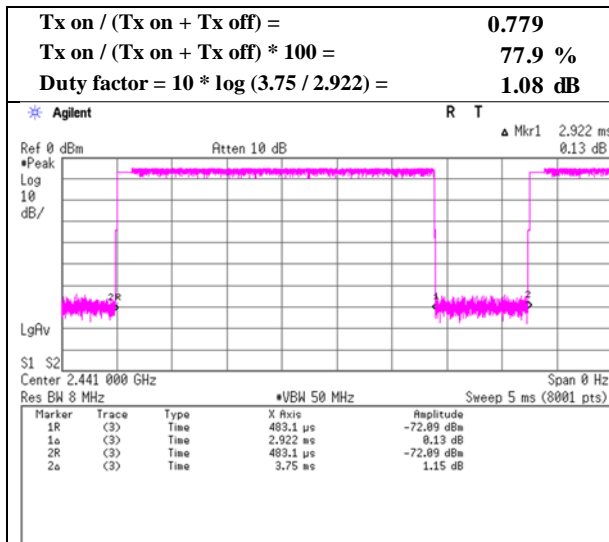
Burst Rate Confirmation

Report No. 13554183S-B
 Test place Shonan EMC Lab. No.6 Shielded Room
 Date October 14, 2020
 Temperature / Humidity 27 deg. C / 45 % RH
 Engineer Kazuya Noda
 Mode Tx, Hopping Off

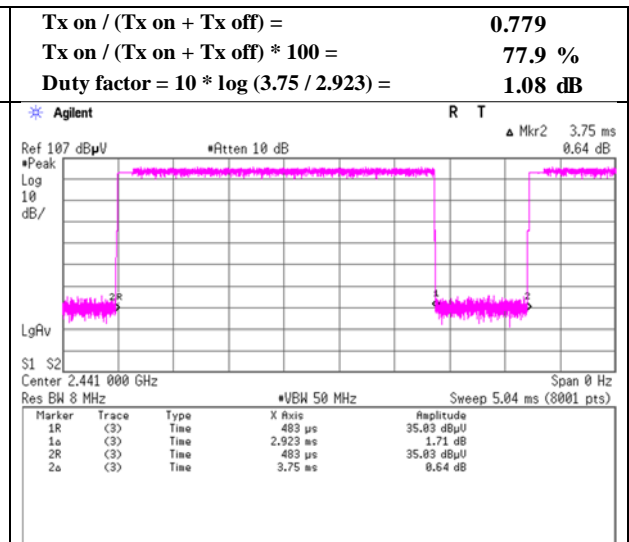
DH5



2DH5



3DH5



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Radiated Spurious Emission

Report No.	13554183S-B			
Test place	Shonan EMC Lab.			
Semi Anechoic Chamber	1	1	1	1
Date	Oct 30, 2020	Oct 19, 2020	Oct 21, 2020	Oct 29, 2020
Temperature / Humidity	21 deg.C, 47 %RH	22 deg.C, 54 %RH	21 deg.C, 47 %RH	22 deg.C, 50 %RH
Engineer	Takahiro Suzuki	Takahiro Suzuki	Yosuke Murakami	Toshinori Yamada
	(30 MHz -1 GHz)	(1 GHz -2.8 GHz)	(2.8 GHz -18 GHz)	(18 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.	115.217	QP	29.86	12.61	8.16	31.81	0.00	18.82	43.5	24.6	260	108	-
Hori.	191.829	QP	26.45	16.39	8.97	31.78	0.00	20.03	43.5	23.4	183	283	-
Hori.	2390.000	PK	47.54	27.93	14.49	39.55	2.28	52.69	73.9	21.2	143	6	-
Hori.	4804.000	PK	46.72	31.47	7.03	39.73	2.28	47.77	73.9	26.1	145	56	-
Hori.	7206.000	PK	45.96	36.90	8.67	39.51	2.28	54.30	73.9	19.6	150	0	-
Hori.	9608.000	PK	45.34	38.23	10.20	39.66	2.28	56.39	73.9	17.5	150	0	-
Hori.	2390.000	AV	33.78	27.93	14.49	39.55	2.28	38.93	53.9	14.9	143	6	VBW: 360 Hz
Hori.	4804.000	AV	33.98	31.47	7.03	39.73	2.28	35.03	53.9	18.8	145	56	VBW: 360 Hz
Hori.	7206.000	AV	33.39	36.90	8.67	39.51	2.28	41.73	53.9	12.1	150	0	Floor noise, VBW: 360 Hz
Hori.	9608.000	AV	32.94	38.23	10.20	39.66	2.28	43.99	53.9	9.9	150	0	Floor noise, VBW: 360 Hz
Vert.	36.247	QP	35.14	16.26	7.19	31.83	0.00	26.76	40.0	13.2	100	223	-
Vert.	45.999	QP	42.57	12.64	7.41	31.83	0.00	30.79	40.0	9.2	100	293	-
Vert.	64.227	QP	43.19	7.37	7.22	31.83	0.00	25.95	40.0	14.0	100	195	-
Vert.	110.375	QP	40.07	11.98	8.17	31.81	0.00	28.41	43.5	15.0	100	1	-
Vert.	116.815	QP	39.05	12.80	8.17	31.81	0.00	28.21	43.5	15.2	100	358	-
Vert.	134.860	QP	33.96	14.23	8.48	31.79	0.00	24.88	43.5	18.6	100	3	-
Vert.	189.376	QP	31.31	16.41	8.96	31.78	0.00	24.90	43.5	18.6	100	195	-
Vert.	2390.000	PK	48.31	27.93	14.49	39.55	2.28	53.46	73.9	20.4	360	52	-
Vert.	4804.000	PK	45.98	31.47	7.03	39.73	2.28	47.03	73.9	26.8	147	114	-
Vert.	7206.000	PK	45.39	36.90	8.67	39.51	2.28	53.73	73.9	20.1	150	0	-
Vert.	9608.000	PK	45.37	38.23	10.20	39.66	2.28	56.42	73.9	17.4	150	0	-
Vert.	2390.000	AV	33.77	27.93	14.49	39.55	2.28	38.92	53.9	14.9	360	52	VBW: 360 Hz
Vert.	4804.000	AV	33.91	31.47	7.03	39.73	2.28	34.96	53.9	18.9	147	114	VBW: 360 Hz
Vert.	7206.000	AV	33.60	36.90	8.67	39.51	2.28	41.94	53.9	11.9	150	0	Floor noise, VBW: 360 Hz
Vert.	9608.000	AV	33.13	38.23	10.20	39.66	2.28	44.18	53.9	9.7	150	0	Floor noise, VBW: 360 Hz

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

Distance factor : 1 GHz - 10 GHz : 20log(3.90 m / 3.0 m) = 2.28 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	98.09	27.92	14.50	39.56	2.28	103.23	-	-	Carrier
Hori.	2400.000	PK	40.77	27.92	14.50	39.56	2.28	45.91	83.2	37.2	-
Vert.	2402.000	PK	88.66	27.92	14.50	39.56	2.28	93.80	-	-	Carrier
Vert.	2400.000	PK	37.36	27.92	14.50	39.56	2.28	42.50	73.8	31.3	-

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

Distance factor : 1 GHz - 10 GHz : 20log(3.90 m / 3.0 m) = 2.28 dB
10 GHz - 40 GHz : 20log(1.0 m / 3.0 m) = -9.54 dB

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Shonan EMC Lab.

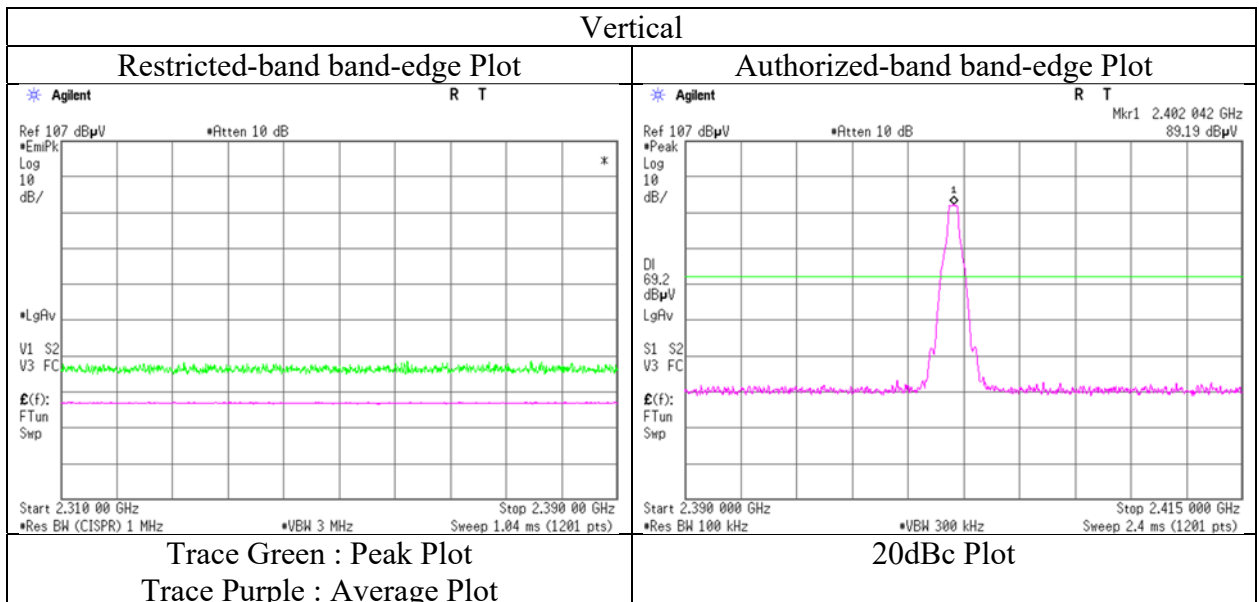
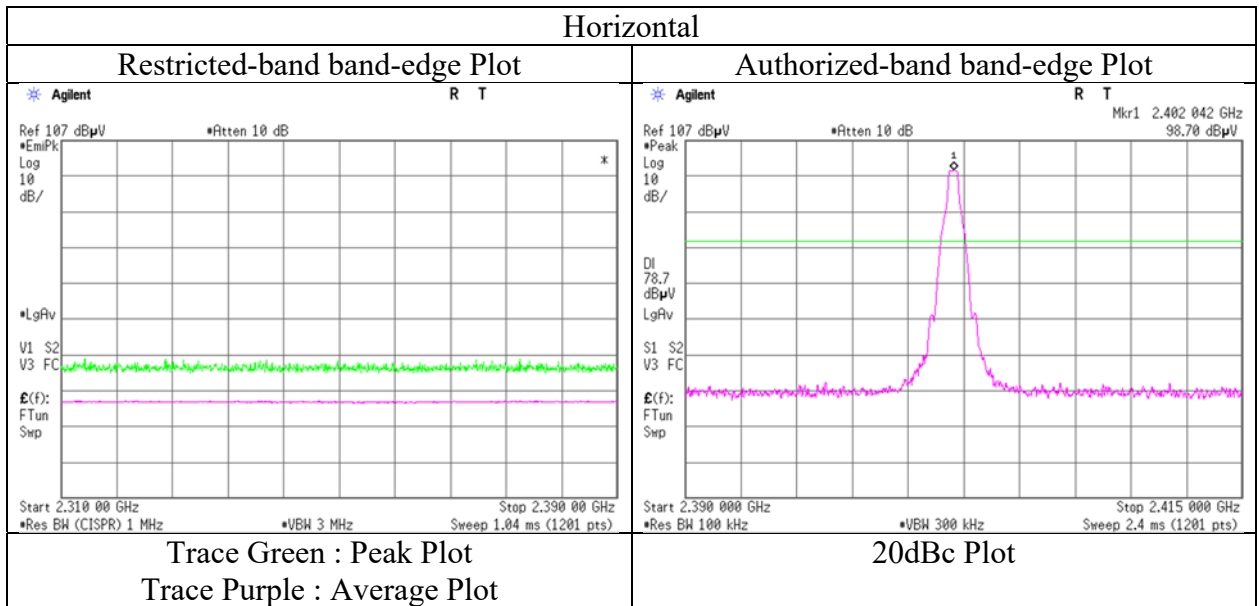
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

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Facsimile : +81 463 50 6401

Radiated Spurious Emission
(Reference Plot for band-edge)

Report No. 13554183S-B
Test place Shonan EMC Lab.
Semi Anechoic Chamber 1
Date Oct 19, 2020
Temperature / Humidity 22 deg.C, 54 %RH
Engineer Takahiro Suzuki
(1 GHz -2.8 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.	13554183S-B			
Test place	Shonan EMC Lab.			
Semi Anechoic Chamber	1	1	1	1
Date	Oct 30, 2020	Oct 19, 2020	Oct 21, 2020	Oct 29, 2020
Temperature / Humidity	21 deg.C, 47 %RH	22 deg.C, 54 %RH	21 deg.C, 47 %RH	22 deg.C, 50 %RH
Engineer	Takahiro Suzuki	Takahiro Suzuki	Yosuke Murakami	Toshinori Yamada
	(30 MHz -1 GHz)	(1 GHz -2.8 GHz)	(2.8 GHz -18 GHz)	(18 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.	116.535	QP	28.24	12.77	8.17	31.81	0.00	17.37	43.5	26.1	272	98	-
Hori.	189.000	QP	27.48	16.39	8.97	31.78	0.00	21.06	43.5	22.4	177	287	-
Hori.	4882.000	PK	46.37	31.51	7.07	39.72	2.28	47.51	73.9	26.3	148	28	-
Hori.	7323.000	PK	45.59	36.94	8.74	39.57	2.28	53.98	73.9	19.9	150	0	-
Hori.	9764.000	PK	46.05	38.63	10.22	39.47	2.28	57.71	73.9	16.1	150	0	-
Hori.	4882.000	AV	33.94	31.51	7.07	39.72	2.28	35.08	53.9	18.8	148	28	VBW: 360 Hz
Hori.	7323.000	AV	33.21	36.94	8.74	39.57	2.28	41.60	53.9	12.3	150	0	Floor noise, VBW: 360 Hz
Hori.	9764.000	AV	33.52	38.63	10.22	39.47	2.28	45.18	53.9	8.7	150	0	Floor noise, VBW: 360 Hz
Vert.	36.366	QP	35.13	16.21	7.19	31.83	0.00	26.70	40.0	13.3	100	19	-
Vert.	45.149	QP	41.85	12.96	7.40	31.83	0.00	30.38	40.0	9.6	100	26	-
Vert.	64.930	QP	43.31	7.23	7.21	31.83	0.00	25.92	40.0	14.0	100	286	-
Vert.	110.806	QP	39.56	12.04	8.16	31.81	0.00	27.95	43.5	15.5	100	334	-
Vert.	119.130	QP	37.27	13.04	8.19	31.80	0.00	26.70	43.5	16.8	100	3	-
Vert.	134.960	QP	32.99	14.24	8.48	31.79	0.00	23.92	43.5	19.5	100	244	-
Vert.	190.541	QP	31.87	16.42	8.97	31.78	0.00	25.48	43.5	18.0	100	195	-
Vert.	4882.000	PK	46.99	31.51	7.07	39.72	2.28	48.13	73.9	25.7	278	168	-
Vert.	7323.000	PK	45.85	36.94	8.74	39.57	2.28	54.24	73.9	19.6	150	0	-
Vert.	9764.000	PK	46.80	38.63	10.22	39.47	2.28	58.46	73.9	15.4	150	0	-
Vert.	4882.000	AV	33.93	31.51	7.07	39.72	2.28	35.07	53.9	18.8	278	168	VBW: 360 Hz
Vert.	7323.000	AV	33.18	36.94	8.74	39.57	2.28	41.57	53.9	12.3	150	0	Floor noise, VBW: 360 Hz
Vert.	9764.000	AV	33.55	38.63	10.22	39.47	2.28	45.21	53.9	8.6	150	0	Floor noise, VBW: 360 Hz

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

Distance factor : 1 GHz - 10 GHz : $20\log(3.90\text{ m} / 3.0\text{ m}) = 2.28\text{ dB}$

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

Radiated Spurious Emission

Report No.	13554183S-B			
Test place	Shonan EMC Lab.			
Semi Anechoic Chamber	1	1	1	1
Date	Oct 30, 2020	Oct 19, 2020	Oct 21, 2020	Oct 29, 2020
Temperature / Humidity	21 deg.C, 47 %RH	22 deg.C, 54 %RH	21 deg.C, 47 %RH	22 deg.C, 50 %RH
Engineer	Takahiro Suzuki	Takahiro Suzuki	Yosuke Murakami	Toshinori Yamada
	(30 MHz -1 GHz)	(1 GHz -2.8 GHz)	(2.8 GHz -18 GHz)	(18 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.	193.298	QP	27.63	16.47	8.99	31.78	0.00	21.31	43.5	22.1	172	282	-
Hori.	211.131	QP	33.82	11.20	5.90	31.77	0.00	19.15	43.5	24.3	148	229	-
Hori.	2483.500	PK	48.90	27.84	14.59	39.58	2.28	54.03	73.9	19.8	140	0	-
Hori.	4960.000	PK	46.68	31.69	7.14	39.71	2.28	48.08	73.9	25.8	139	290	-
Hori.	7440.000	PK	46.31	37.02	8.80	39.62	2.28	54.79	73.9	19.1	150	0	-
Hori.	9920.000	PK	45.24	38.66	10.23	39.28	2.28	57.13	73.9	16.7	150	0	-
Hori.	2483.500	AV	34.61	27.84	14.59	39.58	2.28	39.74	53.9	14.1	140	0	VBW: 360 Hz
Hori.	4960.000	AV	33.81	31.69	7.14	39.71	2.28	35.21	53.9	18.6	139	290	VBW: 360 Hz
Hori.	7440.000	AV	33.69	37.02	8.80	39.62	2.28	42.17	53.9	11.7	150	0	Floor noise, VBW: 360 Hz
Hori.	9920.000	AV	33.17	38.66	10.23	39.28	2.28	45.06	53.9	8.8	150	0	Floor noise, VBW: 360 Hz
Vert.	35.862	QP	35.36	16.41	7.18	31.83	0.00	27.12	40.0	12.8	100	325	-
Vert.	45.790	QP	42.98	12.72	7.41	31.83	0.00	31.28	40.0	8.7	100	284	-
Vert.	63.966	QP	43.35	7.43	7.22	31.83	0.00	26.17	40.0	13.8	100	17	-
Vert.	119.705	QP	31.59	13.10	8.19	31.80	0.00	21.08	43.5	22.4	100	356	-
Vert.	133.720	QP	33.71	14.17	8.45	31.79	0.00	24.54	43.5	18.9	100	359	-
Vert.	143.898	QP	32.27	14.71	8.70	31.78	0.00	23.90	43.5	19.6	100	256	-
Vert.	187.972	QP	31.56	16.32	8.96	31.78	0.00	25.06	43.5	18.4	100	171	-
Vert.	2483.500	PK	46.48	27.84	14.59	39.58	2.28	51.61	73.9	22.2	143	236	-
Vert.	4960.000	PK	46.07	31.69	7.14	39.71	2.28	47.47	73.9	26.4	339	66	-
Vert.	7440.000	PK	46.04	37.02	8.80	39.62	2.28	54.52	73.9	19.3	150	0	-
Vert.	9920.000	PK	45.67	38.66	10.23	39.28	2.28	57.56	73.9	16.3	150	0	-
Vert.	2483.500	AV	33.75	27.84	14.59	39.58	2.28	38.88	53.9	15.0	143	236	VBW: 360 Hz
Vert.	4960.000	AV	33.90	31.69	7.14	39.71	2.28	35.30	53.9	18.6	339	66	VBW: 360 Hz
Vert.	7440.000	AV	33.60	37.02	8.80	39.62	2.28	42.08	53.9	11.8	150	0	Floor noise, VBW: 360 Hz
Vert.	9920.000	AV	33.19	38.66	10.23	39.28	2.28	45.08	53.9	8.8	150	0	Floor noise, VBW: 360 Hz

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

Distance factor : 1 GHz - 10 GHz : $20\log(3.90\text{ m} / 3.0\text{ m}) = 2.28\text{ dB}$

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

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Shonan EMC Lab.

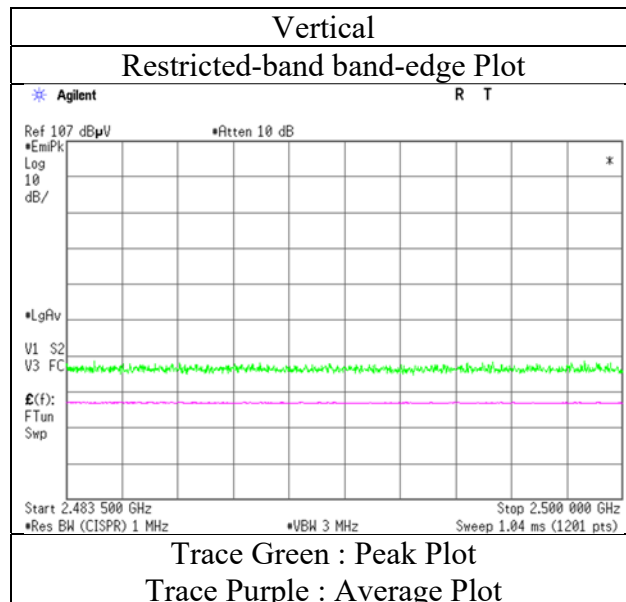
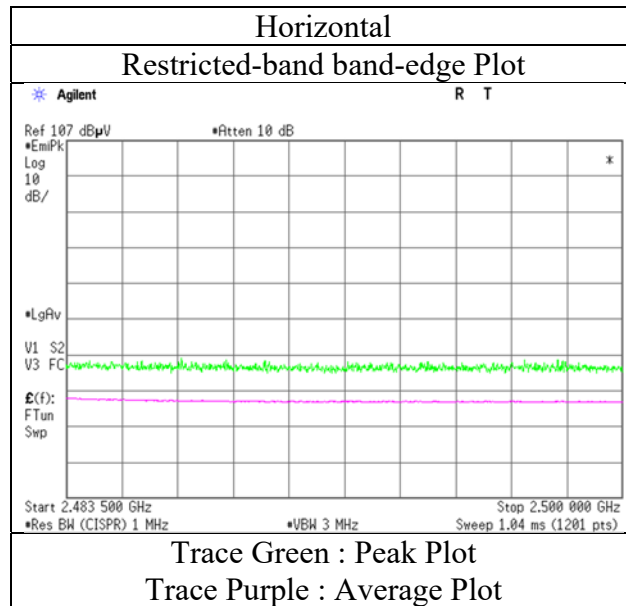
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Radiated Spurious Emission
(Reference Plot for band-edge)

Report No. 13554183S-B
Test place Shonan EMC Lab.
Semi Anechoic Chamber 1
Date Oct 19, 2020
Temperature / Humidity 22 deg.C, 54 %RH
Engineer Takahiro Suzuki
(1 GHz -2.8 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. 13554183S-B
Test place Shonan EMC Lab.
Semi Anechoic Chamber 1 1 1 1
Date Oct 30, 2020 Oct 19, 2020 Oct 21, 2020 Oct 29, 2020
Temperature / Humidity 21 deg.C, 47 %RH 22 deg.C, 54 %RH 21 deg.C, 47 %RH 22 deg.C, 50 %RH
Engineer Takahiro Suzuki Takahiro Suzuki Yosuke Murakami Toshinori Yamada
(30 MHz -1 GHz) (1 GHz -2.8 GHz) (2.8 GHz -18 GHz) (18 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.	192.792	QP	28.25	16.44	8.98	31.78	0.00	21.89	43.5	21.6	169	282	-
Hori.	212.226	QP	34.93	11.19	5.91	31.77	0.00	20.26	43.5	23.2	168	214	-
Hori.	2390.000	PK	45.53	27.93	14.49	39.55	2.28	50.68	73.9	23.2	144	9	-
Hori.	4804.000	PK	45.48	31.47	7.03	39.73	2.28	46.53	73.9	27.3	142	47	-
Hori.	7206.000	PK	46.16	36.90	8.67	39.51	2.28	54.50	73.9	19.4	150	0	-
Hori.	9608.000	PK	45.87	38.23	10.20	39.66	2.28	56.92	73.9	16.9	150	0	-
Hori.	2390.000	AV	32.30	27.93	14.49	39.55	2.28	37.45	53.9	16.4	144	9	VBW: 360 Hz
Hori.	4804.000	AV	34.08	31.47	7.03	39.73	2.28	35.13	53.9	18.7	142	47	VBW: 360 Hz
Hori.	7206.000	AV	33.52	36.90	8.67	39.51	2.28	41.86	53.9	12.0	150	0	Floor noise, VBW: 360 Hz
Hori.	9608.000	AV	33.19	38.23	10.20	39.66	2.28	44.24	53.9	9.6	150	0	Floor noise, VBW: 360 Hz
Vert.	36.698	QP	35.08	16.07	7.19	31.83	0.00	26.51	40.0	13.4	100	135	-
Vert.	46.071	QP	43.56	12.61	7.41	31.83	0.00	31.75	40.0	8.2	100	101	-
Vert.	62.510	QP	43.79	7.69	7.24	31.83	0.00	26.89	40.0	13.1	100	247	-
Vert.	111.633	QP	42.17	12.15	8.16	31.81	0.00	30.67	43.5	12.8	100	339	-
Vert.	132.162	QP	35.25	14.05	8.42	31.79	0.00	25.93	43.5	17.5	100	52	-
Vert.	172.759	QP	32.63	15.77	8.95	31.78	0.00	25.57	43.5	17.9	100	232	-
Vert.	187.208	QP	31.84	16.29	8.96	31.78	0.00	25.31	43.5	18.1	100	115	-
Vert.	2390.000	PK	46.29	27.93	14.49	39.55	2.28	51.44	73.9	22.4	141	154	-
Vert.	4804.000	PK	46.24	31.47	7.03	39.73	2.28	47.29	73.9	26.6	265	141	-
Vert.	7206.000	PK	45.62	36.90	8.67	39.51	2.28	53.96	73.9	19.9	150	0	-
Vert.	9608.000	PK	45.70	38.23	10.20	39.66	2.28	56.75	73.9	17.1	150	0	-
Vert.	2390.000	AV	33.71	27.93	14.49	39.55	2.28	38.86	53.9	15.0	141	154	VBW: 360 Hz
Vert.	4804.000	AV	34.01	31.47	7.03	39.73	2.28	35.06	53.9	18.8	265	141	VBW: 360 Hz
Vert.	7206.000	AV	33.52	36.90	8.67	39.51	2.28	41.86	53.9	12.0	150	0	Floor noise, VBW: 360 Hz
Vert.	9608.000	AV	33.22	38.23	10.20	39.66	2.28	44.27	53.9	9.6	150	0	Floor noise, VBW: 360 Hz

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

Distance factor : 1 GHz - 10 GHz : 20log(3.90 m / 3.0 m) = 2.28 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	97.83	27.92	14.50	39.56	2.28	102.97	-	-	Carrier
Hori.	2400.000	PK	39.58	27.92	14.50	39.56	2.28	44.72	82.9	38.1	-
Vert.	2402.000	PK	85.66	27.92	14.50	39.56	2.28	90.80	-	-	Carrier
Vert.	2400.000	PK	35.48	27.92	14.50	39.56	2.28	40.62	70.8	30.1	-

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

Distance factor : 1 GHz - 10 GHz : 20log(3.90 m / 3.0 m) = 2.28 dB

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

UL Japan, Inc.

Shonan EMC Lab.

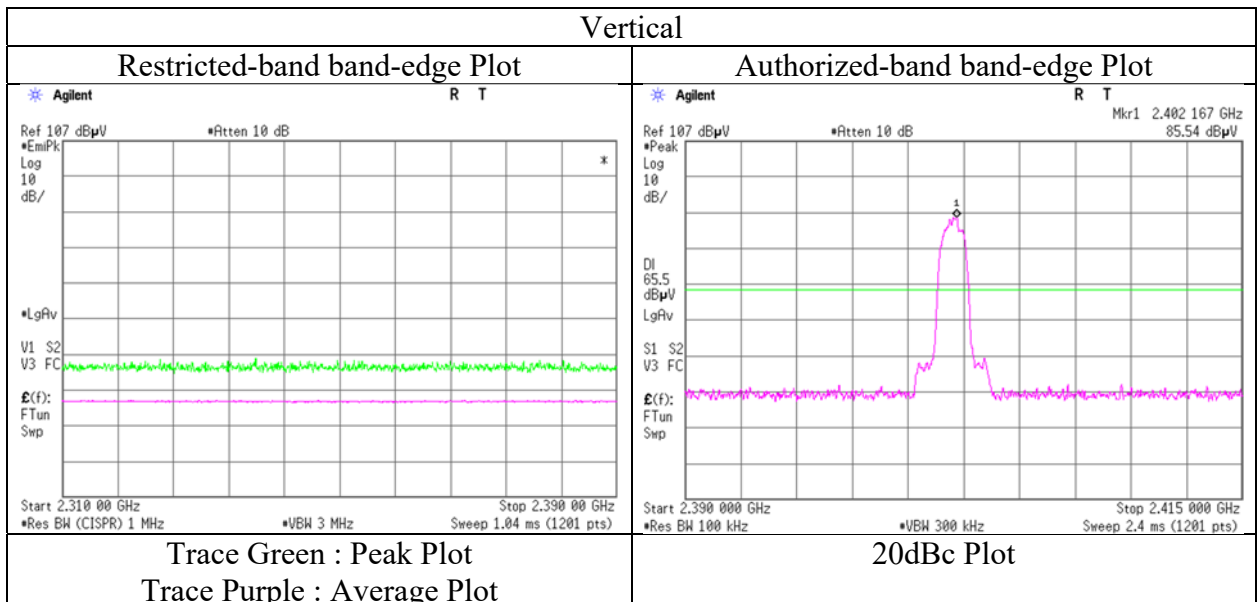
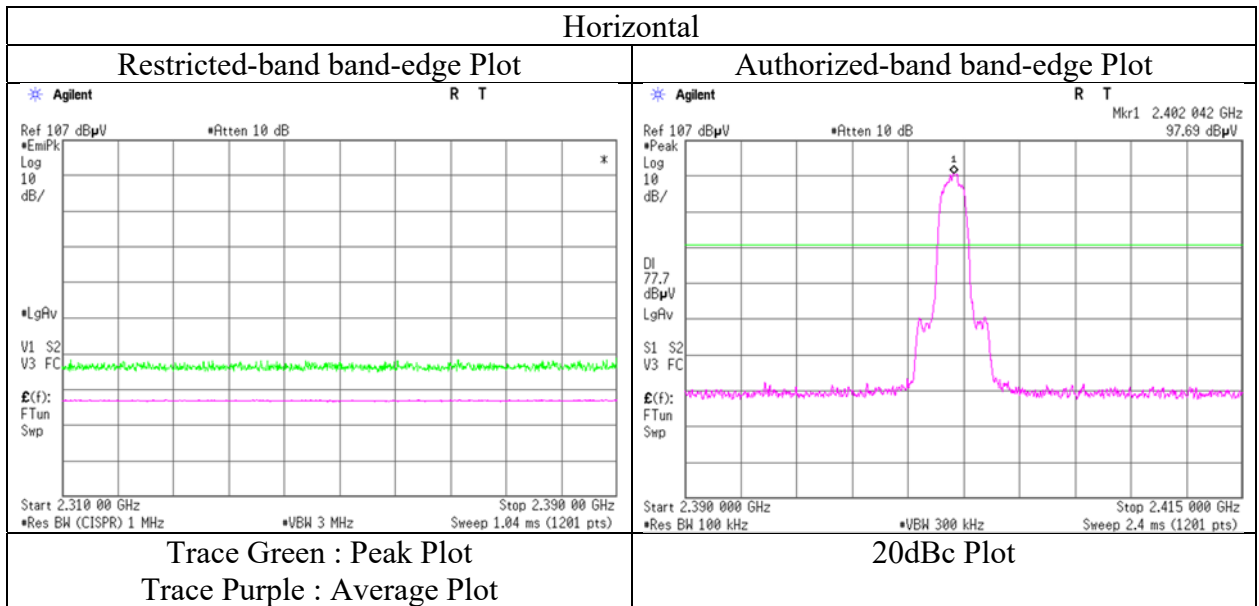
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Radiated Spurious Emission
(Reference Plot for band-edge)

Report No. 13554183S-B
Test place Shonan EMC Lab.
Semi Anechoic Chamber 1
Date Oct 19, 2020
Temperature / Humidity 22 deg.C, 54 %RH
Engineer Takahiro Suzuki
(1 GHz -2.8 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.	13554183S-B			
Test place	Shonan EMC Lab.			
Semi Anechoic Chamber	1	1	1	1
Date	Oct 30, 2020	Oct 19, 2020	Oct 21, 2020	Oct 29, 2020
Temperature / Humidity	21 deg.C, 47 %RH	22 deg.C, 54 %RH	21 deg.C, 47 %RH	22 deg.C, 50 %RH
Engineer	Takahiro Suzuki	Takahiro Suzuki	Yosuke Murakami	Toshinori Yamada
	(30 MHz -1 GHz)	(1 GHz -2.8 GHz)	(2.8 GHz -18 GHz)	(18 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.	189.984	QP	28.02	16.43	8.97	31.78	0.00	21.64	43.5	21.8	181	305	-
Hori.	210.244	QP	34.23	11.21	5.89	31.77	0.00	19.56	43.5	23.9	150	212	-
Hori.	4882.000	PK	45.56	31.51	7.07	39.72	2.28	46.70	73.9	27.2	151	78	-
Hori.	7323.000	PK	45.88	36.94	8.74	39.57	2.28	54.27	73.9	19.6	150	0	-
Hori.	9764.000	PK	46.09	38.63	10.22	39.47	2.28	57.75	73.9	16.1	150	0	-
Hori.	4882.000	AV	33.83	31.51	7.07	39.72	2.28	34.97	53.9	18.9	151	78	VBW: 360 Hz
Hori.	7323.000	AV	33.26	36.94	8.74	39.57	2.28	41.65	53.9	12.2	150	0	Floor noise, VBW: 360 Hz
Hori.	9764.000	AV	33.51	38.63	10.22	39.47	2.28	45.17	53.9	8.7	150	0	Floor noise, VBW: 360 Hz
Vert.	36.543	QP	35.86	16.14	7.19	31.83	0.00	27.36	40.0	12.6	100	114	-
Vert.	44.724	QP	43.16	13.12	7.39	31.83	0.00	31.84	40.0	8.1	100	52	-
Vert.	63.136	QP	42.95	7.58	7.23	31.83	0.00	25.93	40.0	14.0	100	234	-
Vert.	113.766	QP	40.84	12.39	8.15	31.81	0.00	29.57	43.5	13.9	100	227	-
Vert.	131.859	QP	34.83	14.03	8.41	31.79	0.00	25.48	43.5	18.0	100	359	-
Vert.	172.148	QP	32.69	15.77	8.95	31.78	0.00	25.63	43.5	17.8	100	192	-
Vert.	183.139	QP	31.78	16.17	8.94	31.78	0.00	25.11	43.5	18.3	100	108	-
Vert.	4882.000	PK	45.67	31.51	7.07	39.72	2.28	46.81	73.9	27.0	211	5	-
Vert.	7323.000	PK	45.71	36.94	8.74	39.57	2.28	54.10	73.9	19.8	150	0	-
Vert.	9764.000	PK	45.94	38.63	10.22	39.47	2.28	57.60	73.9	16.3	150	0	-
Vert.	4882.000	AV	33.84	31.51	7.07	39.72	2.28	34.98	53.9	18.9	211	5	VBW: 360 Hz
Vert.	7323.000	AV	33.20	36.94	8.74	39.57	2.28	41.59	53.9	12.3	150	0	Floor noise, VBW: 360 Hz
Vert.	9764.000	AV	33.56	38.63	10.22	39.47	2.28	45.22	53.9	8.6	150	0	Floor noise, VBW: 360 Hz

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

Distance factor : 1 GHz - 10 GHz : $20\log(3.90\text{ m} / 3.0\text{ m}) = 2.28\text{ dB}$

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

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Shonan EMC Lab.

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Radiated Spurious Emission

Report No.	13554183S-B			
Test place	Shonan EMC Lab.			
Semi Anechoic Chamber	1	1	1	1
Date	Oct 30, 2020	Oct 19, 2020	Oct 21, 2020	Oct 29, 2020
Temperature / Humidity	21 deg.C, 47 %RH	22 deg.C, 54 %RH	21 deg.C, 47 %RH	22 deg.C, 50 %RH
Engineer	Takahiro Suzuki	Takahiro Suzuki	Yosuke Murakami	Toshinori Yamada
	(30 MHz -1 GHz)	(1 GHz -2.8 GHz)	(2.8 GHz -18 GHz)	(18 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.	189.300	QP	28.42	16.40	8.96	31.78	0.00	22.00	43.5	21.5	175	286	-
Hori.	211.897	QP	33.94	11.19	5.90	31.77	0.00	19.26	43.5	24.2	146	46	-
Hori.	2483.500	PK	48.02	27.84	14.59	39.58	2.28	53.15	73.9	20.7	138	0	-
Hori.	4960.000	PK	45.47	31.69	7.14	39.71	2.28	46.87	73.9	27.0	146	341	-
Hori.	7440.000	PK	46.19	37.02	8.80	39.62	2.28	54.67	73.9	19.2	150	0	-
Hori.	9920.000	PK	45.44	38.66	10.23	39.28	2.28	57.33	73.9	16.5	150	0	-
Hori.	2483.500	AV	34.29	27.84	14.59	39.58	2.28	39.42	53.9	14.4	138	0	VBW: 360 Hz
Hori.	4960.000	AV	33.62	31.69	7.14	39.71	2.28	35.02	53.9	18.8	146	341	VBW: 360 Hz
Hori.	7440.000	AV	33.68	37.02	8.80	39.62	2.28	42.16	53.9	11.7	150	0	Floor noise, VBW: 360 Hz
Hori.	9920.000	AV	33.23	38.66	10.23	39.28	2.28	45.12	53.9	8.7	150	0	Floor noise, VBW: 360 Hz
Vert.	36.613	QP	35.74	16.11	7.19	31.83	0.00	27.21	40.0	12.7	100	223	-
Vert.	45.048	QP	43.91	13.00	7.40	31.83	0.00	32.48	40.0	7.5	100	359	-
Vert.	63.577	QP	43.25	7.50	7.22	31.83	0.00	26.14	40.0	13.8	100	159	-
Vert.	108.247	QP	38.16	11.62	8.18	31.81	0.00	26.15	43.5	17.3	100	334	-
Vert.	114.072	QP	40.02	12.43	8.16	31.81	0.00	28.80	43.5	14.7	100	118	-
Vert.	131.710	QP	34.98	14.03	8.41	31.79	0.00	25.63	43.5	17.8	100	61	-
Vert.	184.959	QP	32.35	16.22	8.95	31.78	0.00	25.74	43.5	17.7	100	131	-
Vert.	2483.500	PK	46.48	27.84	14.59	39.58	2.28	51.61	73.9	22.2	379	88	-
Vert.	4960.000	PK	44.72	31.69	7.14	39.71	2.28	46.12	73.9	27.7	361	1	-
Vert.	7440.000	PK	46.85	37.02	8.80	39.62	2.28	55.33	73.9	18.5	150	0	-
Vert.	9920.000	PK	45.95	38.66	10.23	39.28	2.28	57.84	73.9	16.0	150	0	-
Vert.	2483.500	AV	33.85	27.84	14.59	39.58	2.28	38.98	53.9	14.9	379	88	VBW: 360 Hz
Vert.	4960.000	AV	33.69	31.69	7.14	39.71	2.28	35.09	53.9	18.8	361	1	VBW: 360 Hz
Vert.	7440.000	AV	33.63	37.02	8.80	39.62	2.28	42.11	53.9	11.7	150	0	Floor noise, VBW: 360 Hz
Vert.	9920.000	AV	33.30	38.66	10.23	39.28	2.28	45.19	53.9	8.7	150	0	Floor noise, VBW: 360 Hz

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

Distance factor : 1 GHz - 10 GHz : 20log(3.90 m / 3.0 m) = 2.28 dB

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

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Shonan EMC Lab.

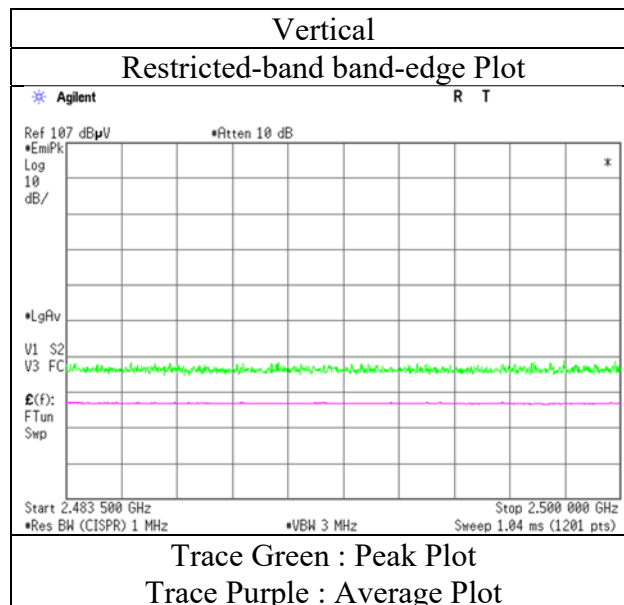
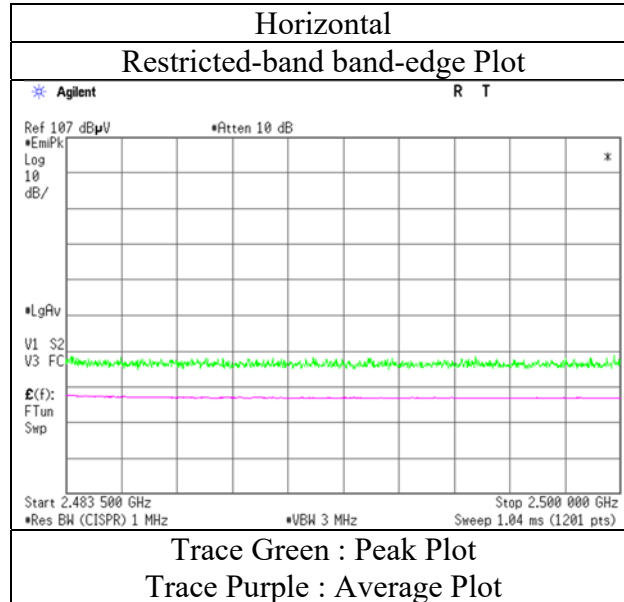
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

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Radiated Spurious Emission
(Reference Plot for band-edge)

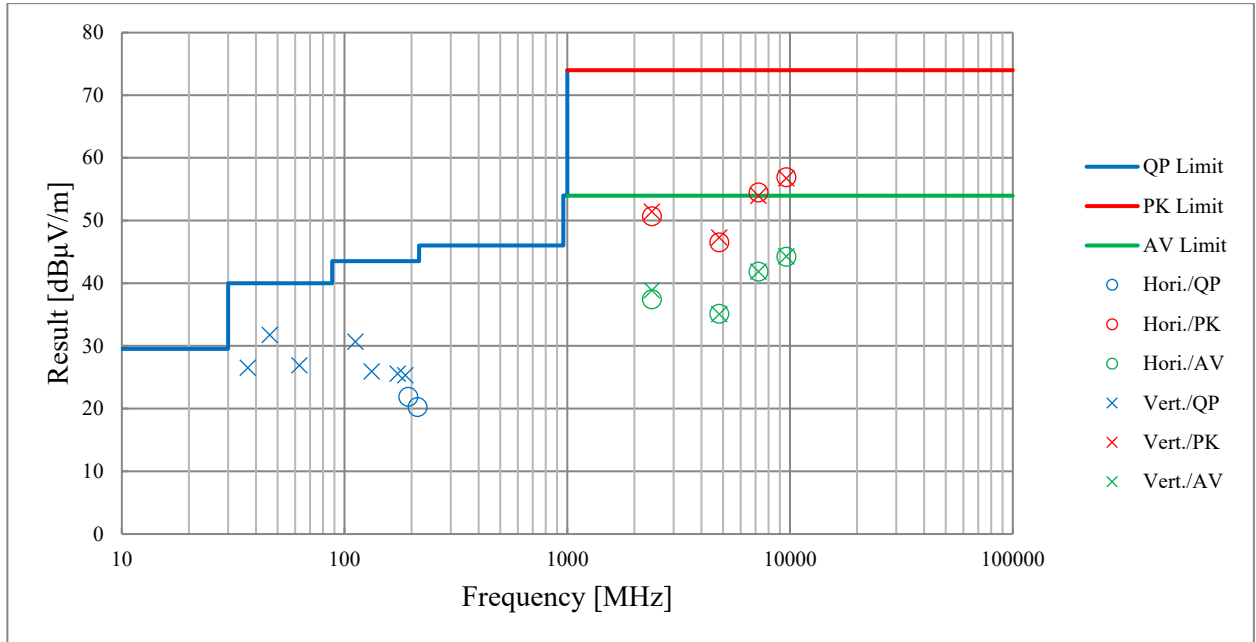
Report No. 13554183S-B
Test place Shonan EMC Lab.
Semi Anechoic Chamber 1
Date Oct 19, 2020
Temperature / Humidity 22 deg.C, 54 %RH
Engineer Takahiro Suzuki
(1 GHz -2.8 GHz)
Mode Tx, Hopping Off, 3DH5 2480 MHz



* 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.	13554183S-B			
Test place	Shonan EMC Lab.			
Semi Anechoic Chamber	1	1	1	1
Date	Oct 30, 2020	Oct 19, 2020	Oct 21, 2020	Oct 29, 2020
Temperature / Humidity	21 deg.C, 47 %RH	22 deg.C, 54 %RH	21 deg.C, 47 %RH	22 deg.C, 50 %RH
Engineer	Takahiro Suzuki	Takahiro Suzuki	Yosuke Murakami	Toshinori Yamada
Mode	(30 MHz -1 GHz) Tx, Hopping Off, 3DH5 2402 MHz	(1 GHz -2.8 GHz)	(2.8 GHz -18 GHz)	(18 GHz -26.5 GHz)



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

Radiated Spurious Emission

Report No. 13554183S-B
Test place Shonan EMC Lab.
Semi Anechoic Chamber 1
Date November 24, 2020
Temperature / Humidity 21 deg.C, 41 %RH
Engineer Yosuke Murakami
(1 GHz -2.8 GHz)
Mode Tx, Hopping Off, DH5 2402 MHz with Module A 11n-20 5320 MHz and Module B 11n-20 5580 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.	2390.000	PK	44.88	27.93	14.50	39.55	2.28	50.04	73.9	23.8	114	10	-
Hori.	2390.000	AV	32.30	27.93	14.50	39.55	2.28	37.46	53.9	16.4	114	10	VBW: 360 Hz
Vert.	2390.000	PK	45.21	27.93	14.50	39.55	2.28	50.37	73.9	23.5	108	142	-
Vert.	2390.000	AV	33.51	27.93	14.50	39.55	2.28	38.67	53.9	15.2	108	142	VBW: 360 Hz

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

Distance factor : 1 GHz - 10 GHz : $20\log(3.90\text{ m} / 3.0\text{ m}) = 2.28\text{ dB}$

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

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	99.09	27.92	14.51	39.56	2.28	104.24	-	-	Carrier
Hori.	2400.000	PK	40.85	27.92	14.51	39.56	2.28	46.00	84.2	38.2	-
Vert.	2402.000	PK	90.48	27.92	14.51	39.56	2.28	95.63	-	-	Carrier
Vert.	2400.000	PK	36.94	27.92	14.51	39.56	2.28	42.09	75.6	33.5	-

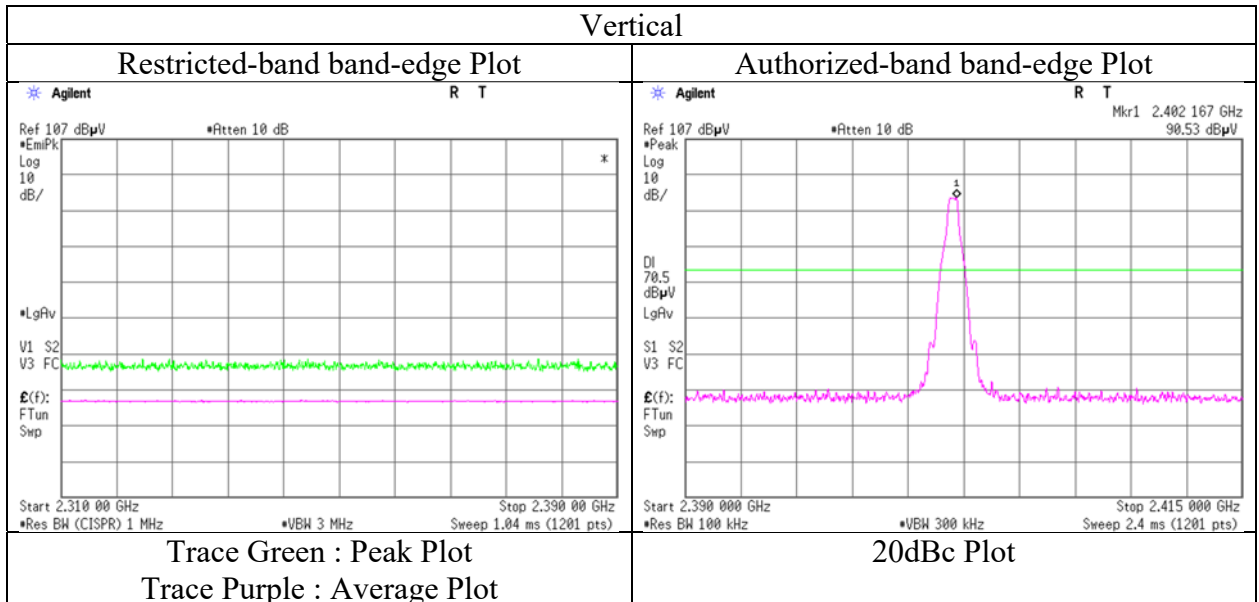
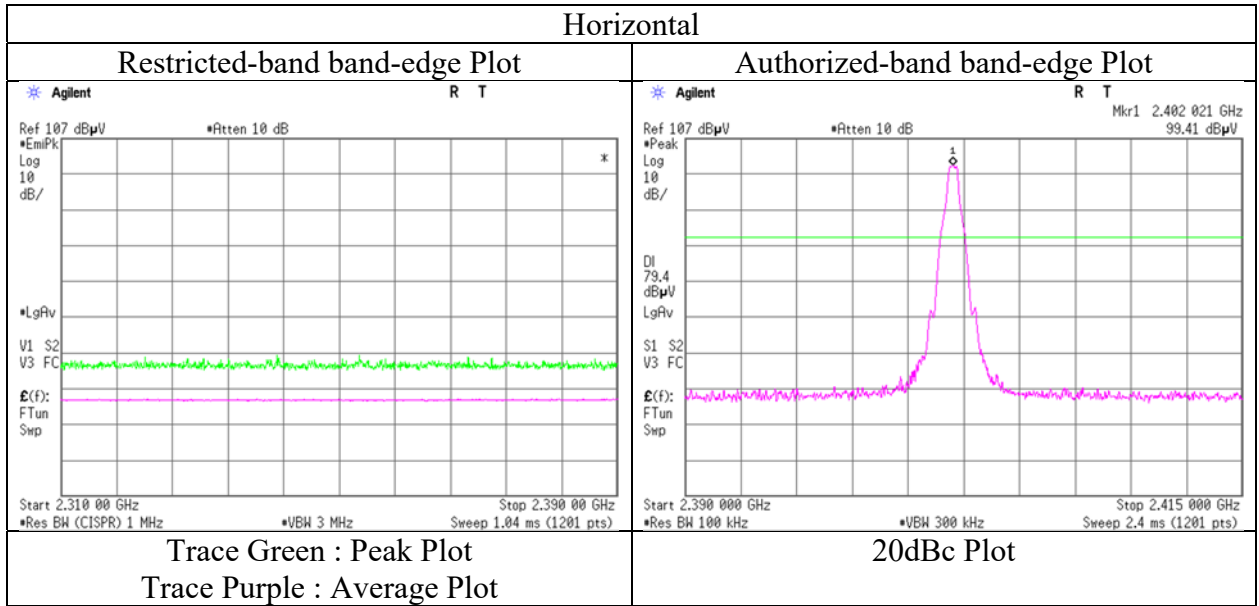
Result = Reading + Ant. Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 10 GHz : $20\log(3.90\text{ m} / 3.0\text{ m}) = 2.28\text{ dB}$

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

Radiated Spurious Emission
(Reference Plot for band-edge)

Report No. 13554183S-B
Test place Shonan EMC Lab.
Semi Anechoic Chamber 1
Date November 24, 2020
Temperature / Humidity 21 deg.C, 41 %RH
Engineer Yosuke Murakami
(1 GHz -2.8 GHz)
Mode Tx, Hopping Off, DH5 2402 MHz with Module A 11n-20 5320 MHz and Module B 11n-20 5580 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. 13554183S-B
Test place Shonan EMC Lab.
Semi Anechoic Chamber 3
Date November 23, 2020
Temperature / Humidity 22 deg.C, 45 %RH
Engineer Yasumasa Owaki
(1 GHz -2.8 GHz)
Mode Tx, Hopping Off, DH5 2480 MHz with Module A 11n-20 5320 MHz and Module B 11n-20 5580 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.	2483.500	PK	49.20	28.28	14.31	41.69	2.28	52.38	73.9	21.5	183	6	-
Hori.	2483.500	AV	36.88	28.28	14.31	41.69	2.28	40.06	53.9	13.8	183	6	VBW: 360 Hz
Vert.	2483.500	PK	47.58	28.28	14.31	41.69	2.28	50.76	73.9	23.1	149	147	-
Vert.	2483.500	AV	35.69	28.28	14.31	41.69	2.28	38.87	53.9	15.0	149	147	VBW: 360 Hz

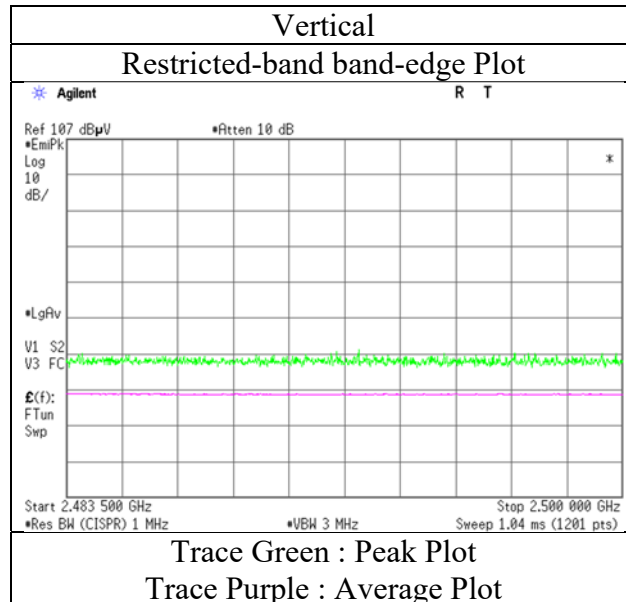
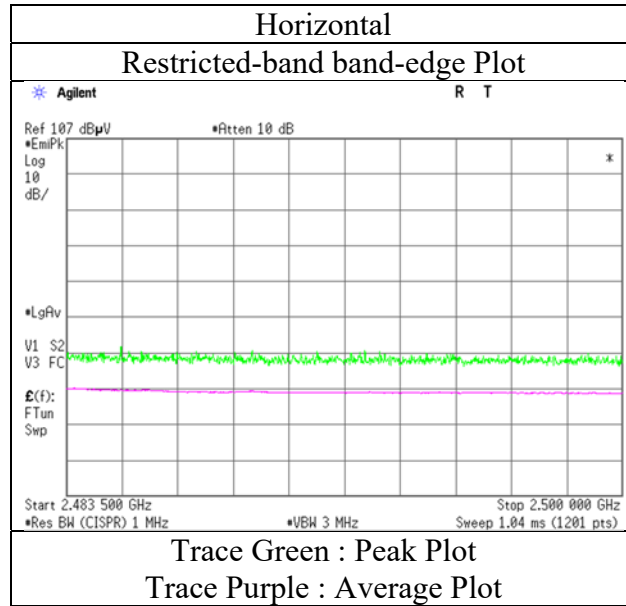
Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 10 GHz : $20\log(3.90\text{ m} / 3.0\text{ m}) = 2.28\text{ dB}$

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

Radiated Spurious Emission
(Reference Plot for band-edge)

Report No. 13554183S-B
Test place Shonan EMC Lab.
Semi Anechoic Chamber 3
Date November 23, 2020
Temperature / Humidity 22 deg.C, 45 %RH
Engineer Yasumasa Owaki
(1 GHz -2.8 GHz)
Mode Tx, Hopping Off, DH5 2480 MHz with Module A 11n-20 5320 MHz and Module B 11n-20 5580 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. 13554183S-B
Test place Shonan EMC Lab.
Semi Anechoic Chamber 1 3 1
Date November 27, 2020 November 23, 2020 November 26, 2020
Temperature / Humidity 20 deg.C, 46 %RH 22 deg.C, 45 %RH 21 deg.C, 48 %RH
Engineer Yosuke Murakami Yasumasa Owaki Yosuke Murakami
(30 MHz -1 GHz) (1 GHz -10 GHz) (10 GHz -26.5 GHz)
Mode Tx, Hopping Off, 3DH5 2402 MHz with Module A 11n-20 5320 MHz and Module B 11n-20 5580 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.	688.128	QP	36.84	19.66	8.70	32.16	0.00	33.04	46.0	12.9	129	32	-
Hori.	712.703	QP	39.12	20.00	8.82	32.13	0.00	35.81	46.0	10.1	120	187	-
Hori.	811.007	QP	35.24	20.82	9.24	31.96	0.00	33.34	46.0	12.6	104	299	-
Hori.	840.005	QP	33.72	21.27	9.38	31.79	0.00	32.58	46.0	13.4	100	297	-
Hori.	860.160	QP	33.89	21.71	9.47	31.68	0.00	33.39	46.0	12.6	100	10	-
Hori.	909.413	QP	34.40	22.07	9.67	31.42	0.00	34.72	46.0	11.2	100	13	-
Hori.	933.887	QP	34.45	21.98	9.76	31.24	0.00	34.95	46.0	11.0	100	11	-
Hori.	2390.000	PK	45.79	27.93	14.50	39.55	2.28	50.95	73.9	22.9	148	9	-
Hori.	4804.000	PK	49.96	31.60	6.68	42.92	2.28	47.60	73.9	26.3	377	283	-
Hori.	7206.000	PK	49.10	37.60	8.16	43.39	2.28	53.75	73.9	20.1	100	0	-
Hori.	9608.000	PK	48.20	38.92	9.33	43.14	2.28	55.59	73.9	18.3	100	0	-
Hori.	2390.000	AV	33.67	27.93	14.50	39.55	2.28	38.83	53.9	15.0	148	9	VBW: 360 Hz
Hori.	4804.000	AV	39.14	31.60	6.68	42.92	2.28	36.78	53.9	17.1	377	283	VBW: 360 Hz
Hori.	7206.000	AV	37.63	37.60	8.16	43.39	2.28	42.28	53.9	11.6	100	0	Floor noise, VBW: 360 Hz
Hori.	9608.000	AV	37.14	38.92	9.33	43.14	2.28	44.53	53.9	9.3	100	0	Floor noise, VBW: 360 Hz
Vert.	50.366	QP	45.21	11.05	7.46	31.83	0.00	31.89	40.0	8.1	100	226	-
Vert.	54.795	QP	41.83	9.58	7.44	31.83	0.00	27.02	40.0	12.9	100	268	-
Vert.	135.336	QP	36.13	14.25	8.50	31.79	0.00	27.09	43.5	16.4	100	305	-
Vert.	959.983	QP	29.04	22.18	9.86	31.02	0.00	30.06	46.0	15.9	100	158	-
Vert.	2390.000	PK	44.29	27.93	14.50	39.55	2.28	49.45	73.9	24.4	108	140	-
Vert.	4804.000	PK	49.47	31.60	6.68	42.92	2.28	47.11	73.9	26.7	264	296	-
Vert.	7206.000	PK	48.51	37.60	8.16	43.39	2.28	53.16	73.9	20.7	100	0	-
Vert.	9608.000	PK	48.53	38.92	9.33	43.14	2.28	55.92	73.9	17.9	100	0	-
Vert.	2390.000	AV	33.57	27.93	14.50	39.55	2.28	38.73	53.9	15.1	108	140	VBW: 360 Hz
Vert.	4804.000	AV	37.52	31.60	6.68	42.92	2.28	35.16	53.9	18.7	264	296	VBW: 360 Hz
Vert.	7206.000	AV	37.40	37.60	8.16	43.39	2.28	42.05	53.9	11.8	100	0	Floor noise, VBW: 360 Hz
Vert.	9608.000	AV	37.03	38.92	9.33	43.14	2.28	44.42	53.9	9.4	100	0	Floor noise, VBW: 360 Hz

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

Distance factor : 1 GHz - 10 GHz : 20log(3.90 m / 3.0 m) = 2.28 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	97.51	27.92	14.51	39.56	2.28	102.66	-	-	Carrier
Hori.	2400.000	PK	41.16	27.92	14.51	39.56	2.28	46.31	82.6	36.2	-
Vert.	2402.000	PK	88.80	27.92	14.51	39.56	2.28	93.95	-	-	Carrier
Vert.	2400.000	PK	36.10	27.92	14.51	39.56	2.28	41.25	73.9	32.6	-

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

Distance factor : 1 GHz - 10 GHz : 20log(3.90 m / 3.0 m) = 2.28 dB
10 GHz - 40 GHz : 20log(1.0 m / 3.0 m) = -9.54 dB

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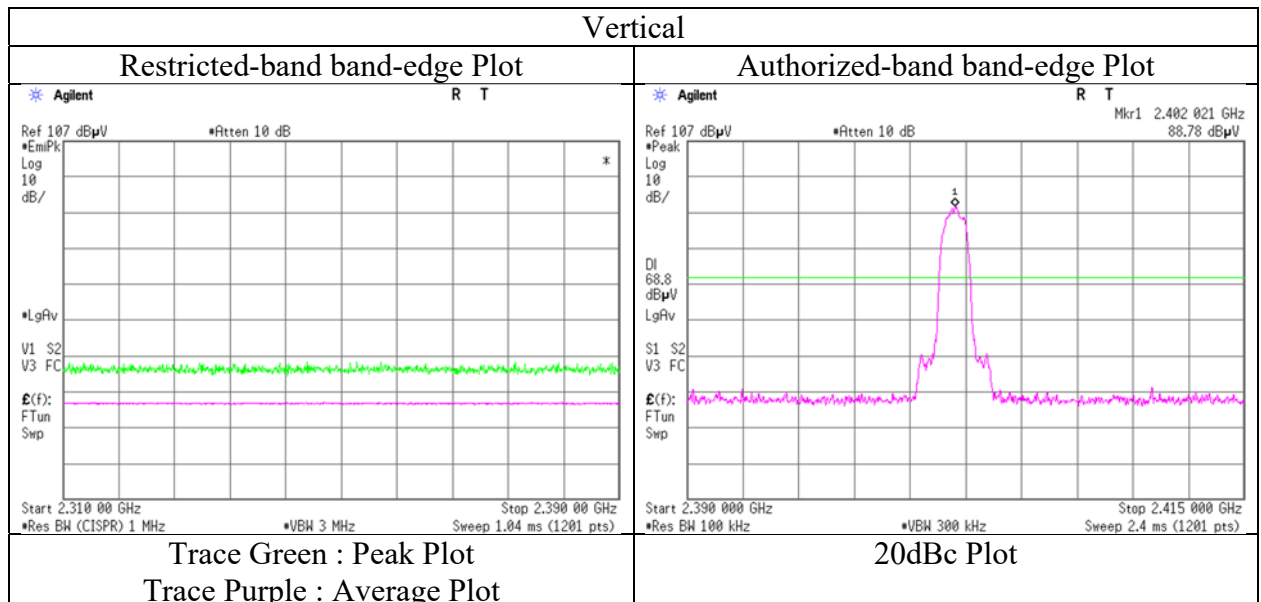
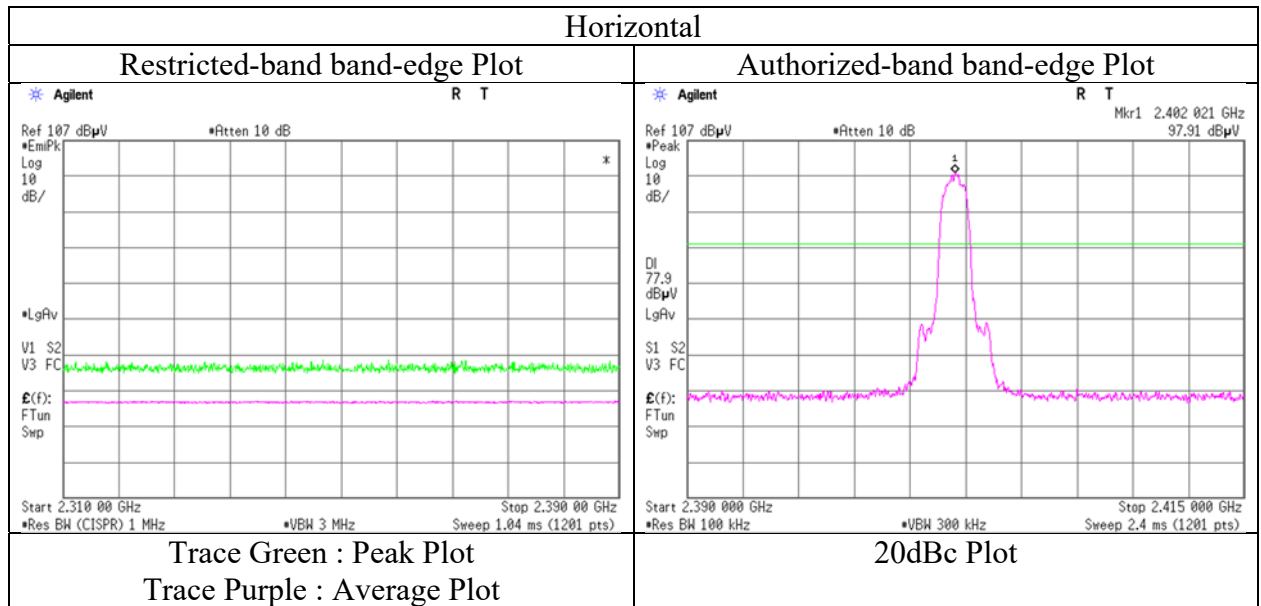
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

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Radiated Spurious Emission
(Reference Plot for band-edge)

Report No. 13554183S-B
Test place Shonan EMC Lab.
Semi Anechoic Chamber 3
Date November 23, 2020
Temperature / Humidity 22 deg.C, 45 %RH
Engineer Yasumasa Owaki
(1 GHz -10 GHz)
Mode Tx, Hopping Off, 3DH5 2402 MHz with Module A 11n-20 5320 MHz and Module B 11n-20 5580 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. 13554183S-B
Test place Shonan EMC Lab.
Semi Anechoic Chamber 3
Date November 23, 2020
Temperature / Humidity 22 deg.C, 45 %RH
Engineer Yasumasa Owaki
(1 GHz -2.8 GHz)
Mode Tx, Hopping Off, 3DH5 2480 MHz with Module A 11n-20 5320 MHz and Module B 11n-20 5580 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.	2483.500	PK	49.78	28.28	14.31	41.69	2.28	52.96	73.9	20.9	130	6	-
Hori.	2483.500	AV	35.20	28.28	14.31	41.69	2.28	38.38	53.9	15.5	130	6	VBW: 360 Hz
Vert.	2483.500	PK	48.45	28.28	14.31	41.69	2.28	51.63	73.9	22.2	373	57	-
Vert.	2483.500	AV	35.56	28.28	14.31	41.69	2.28	38.74	53.9	15.1	373	57	VBW: 360 Hz

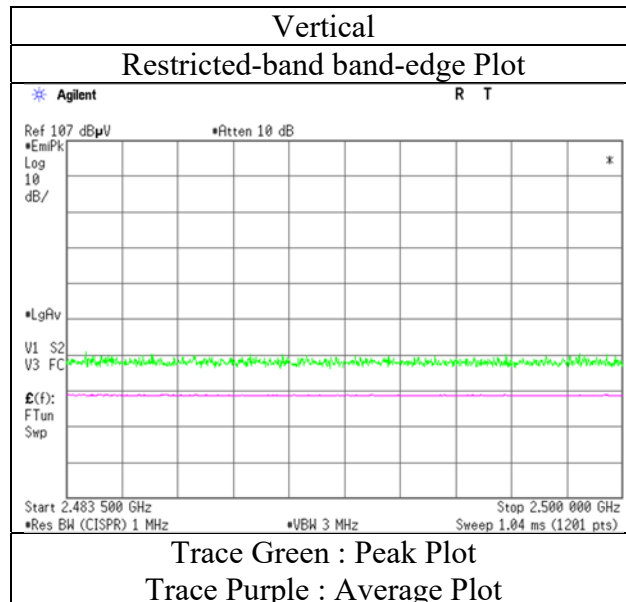
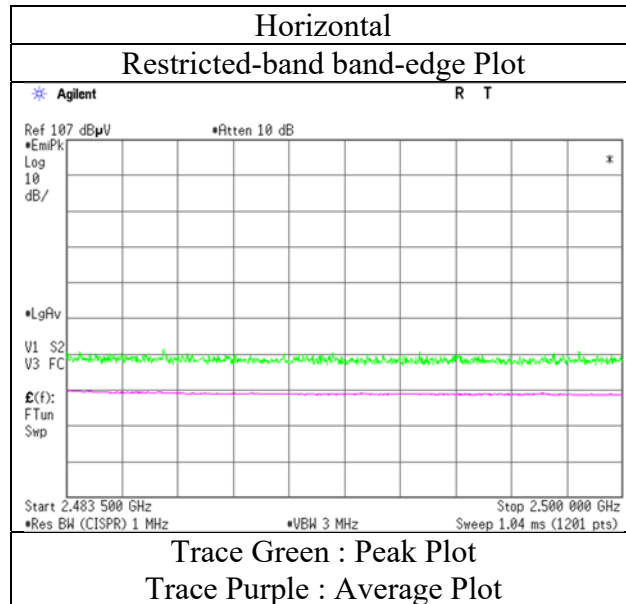
Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 10 GHz : 20log(3.90 m / 3.0 m) = 2.28 dB

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

Radiated Spurious Emission
(Reference Plot for band-edge)

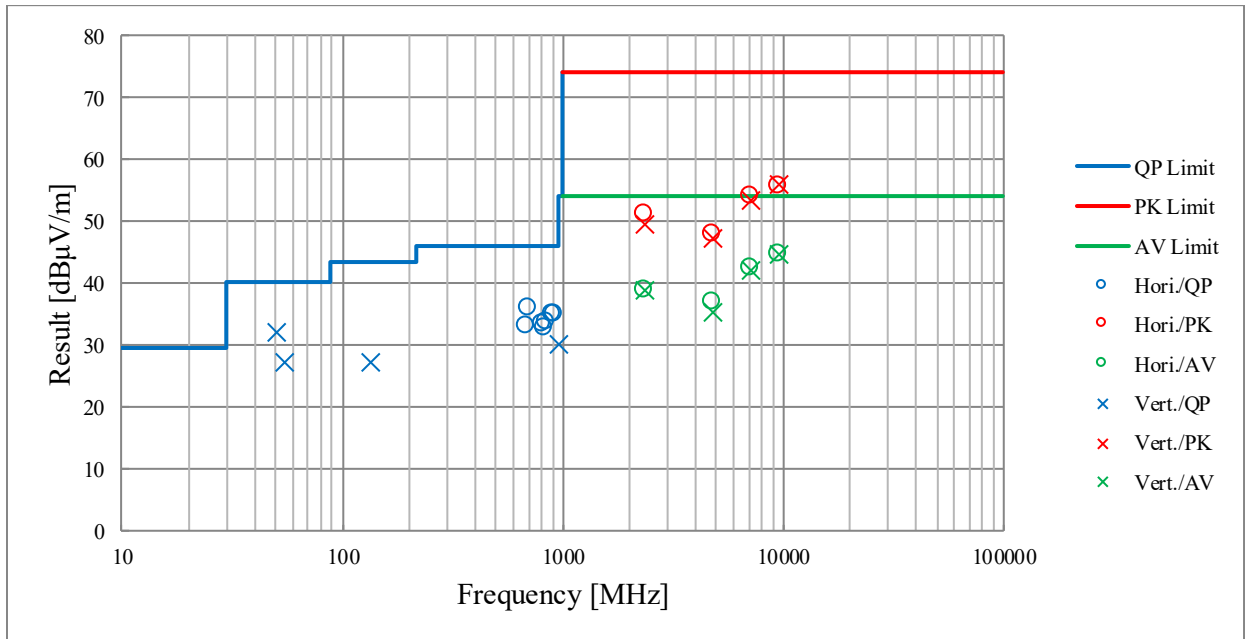
Report No. 13554183S-B
Test place Shonan EMC Lab.
Semi Anechoic Chamber 3
Date November 23, 2020
Temperature / Humidity 22 deg.C, 45 %RH
Engineer Yasumasa Owaki
(1 GHz -2.8 GHz)
Mode Tx, Hopping Off, 3DH5 2480 MHz with Module A 11n-20 5320 MHz and Module B 11n-20 5580 MHz



* 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.	13554183S-B		
Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	1	3	1
Date	November 27, 2020	November 23, 2020	November 26, 2020
Temperature / Humidity	20 deg.C, 46 %RH	22 deg.C, 45 %RH	21 deg.C, 48 %RH
Engineer	Yosuke Murakami (30 MHz -1 GHz)	Yasumasa Owaki (1 GHz -10 GHz)	Yosuke Murakami (10 GHz -26.5 GHz)
Mode	Tx, Hopping Off, 3DH5 2402 MHz with Module A 11n-20 5320 MHz and Module B 11n-20 5580 MHz		

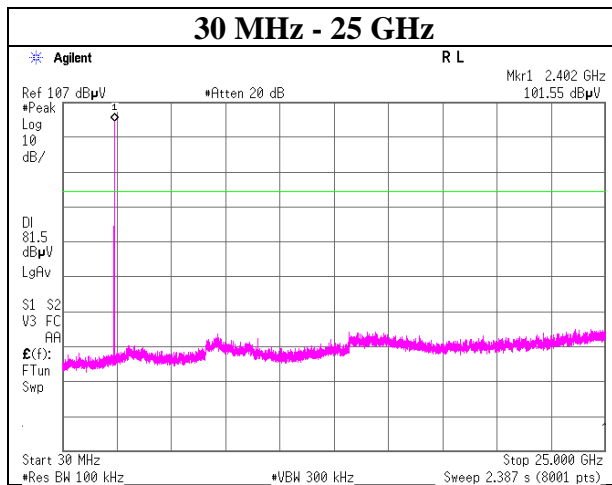
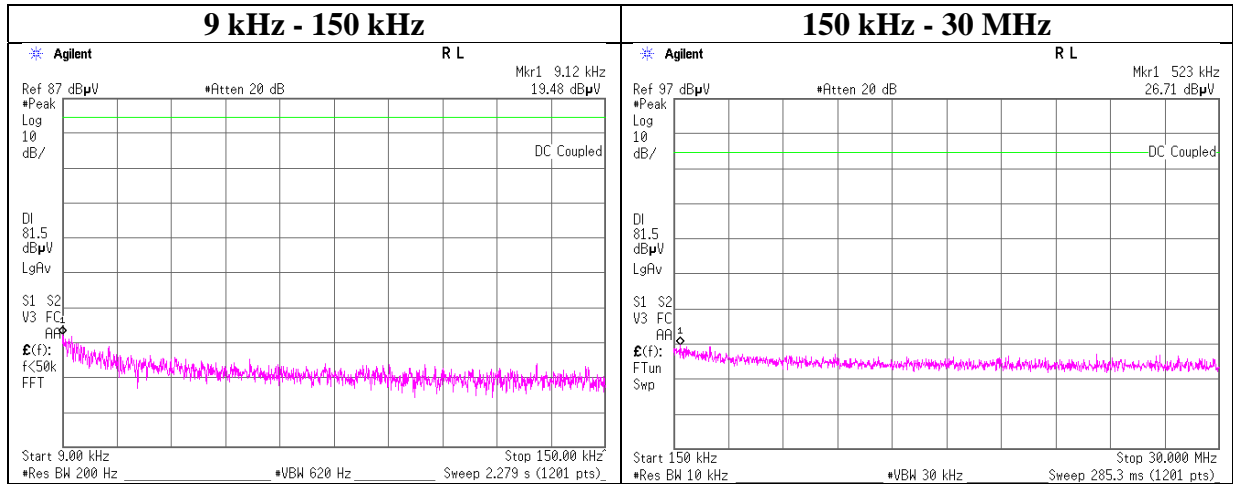


*These plots data contains sufficient number to show the trend of characteristic features for EUT.

Conducted Spurious Emission

Report No.	13554183S-B
Test place	Shonan EMC Lab. No.6 Shielded Room
Date	October 14, 2020
Temperature / Humidity	27 deg. C / 45 % RH
Engineer	Kazuya Noda
Mode	Tx, Hopping Off, DH5

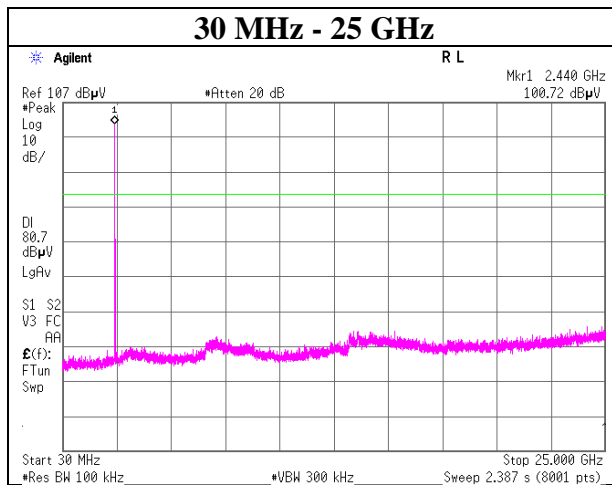
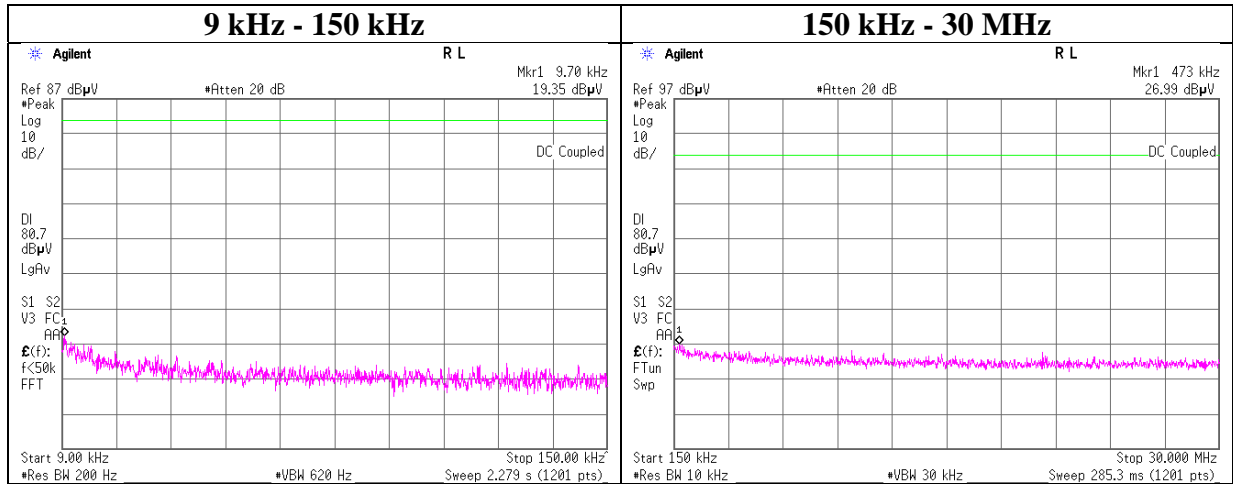
2402 MHz



Conducted Spurious Emission

Report No.	13554183S-B
Test place	Shonan EMC Lab. No.6 Shielded Room
Date	October 14, 2020
Temperature / Humidity	27 deg. C / 45 % RH
Engineer	Kazuya Noda
Mode	Tx, Hopping Off, DH5

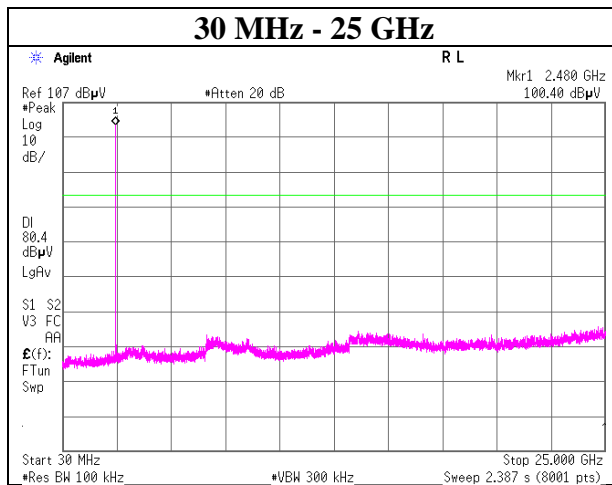
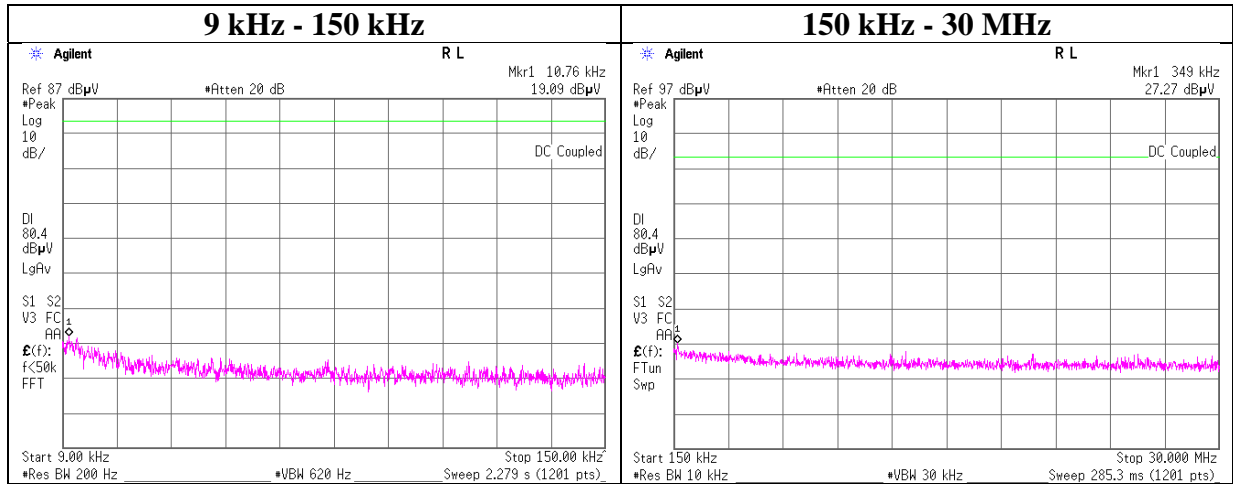
2441 MHz



Conducted Spurious Emission

Report No.	13554183S-B
Test place	Shonan EMC Lab. No.6 Shielded Room
Date	October 14, 2020
Temperature / Humidity	27 deg. C / 45 % RH
Engineer	Kazuya Noda
Mode	Tx, Hopping Off, DH5

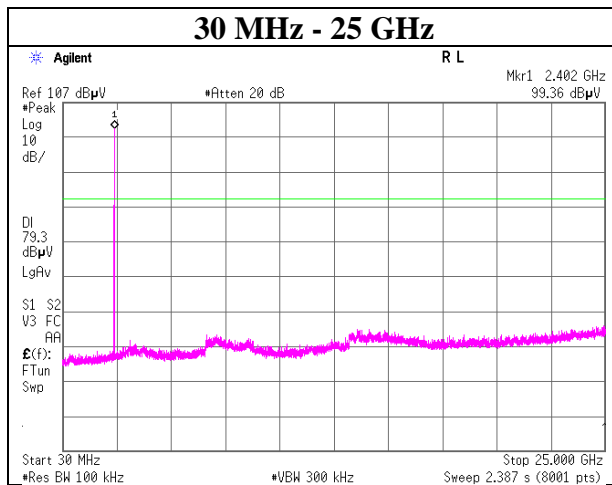
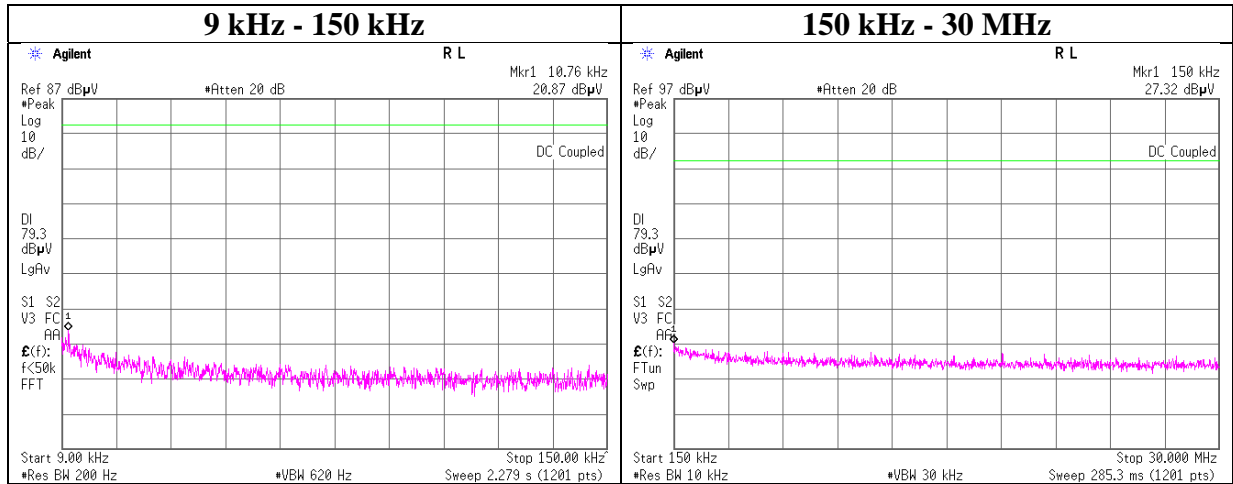
2480 MHz



Conducted Spurious Emission

Report No.	13554183S-B
Test place	Shonan EMC Lab. No.6 Shielded Room
Date	October 14, 2020
Temperature / Humidity	27 deg. C / 45 % RH
Engineer	Kazuya Noda
Mode	Tx, Hopping Off, 3DH5

2402 MHz



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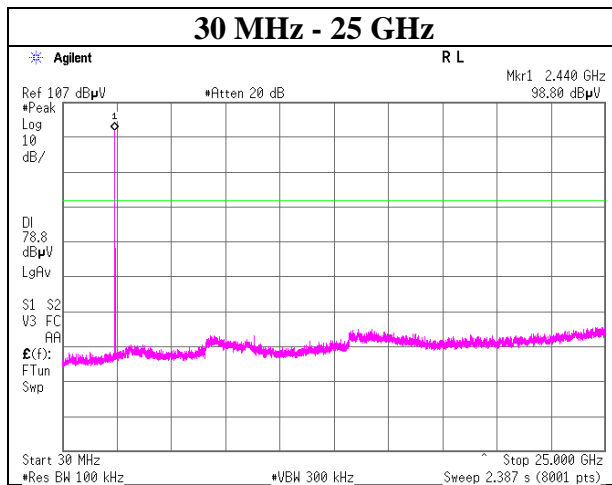
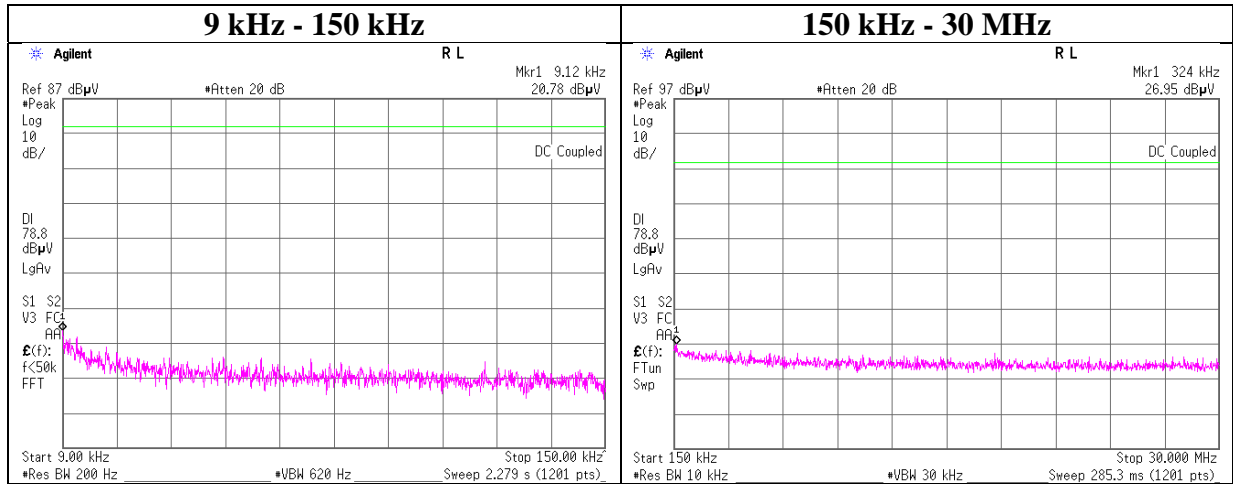
Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Conducted Spurious Emission

Report No.	13554183S-B
Test place	Shonan EMC Lab. No.6 Shielded Room
Date	October 14, 2020
Temperature / Humidity	27 deg. C / 45 % RH
Engineer	Kazuya Noda
Mode	Tx, Hopping Off, 3DH5

2441 MHz



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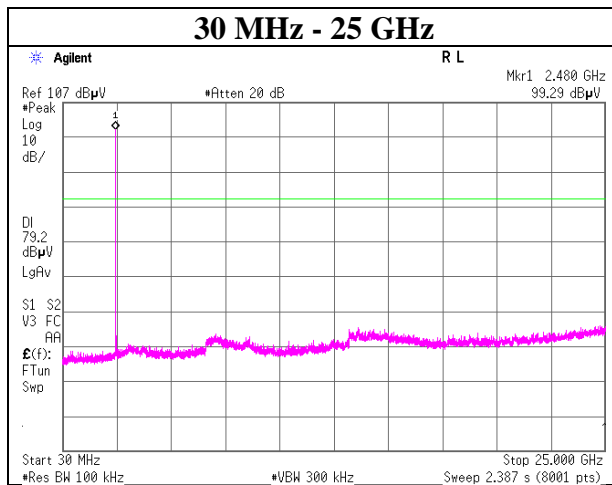
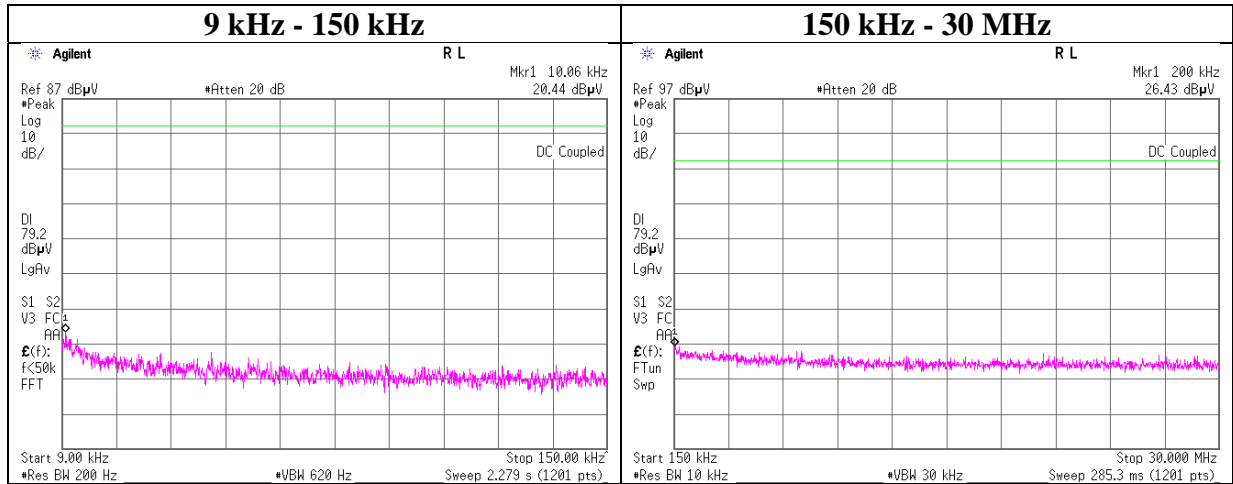
Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Conducted Spurious Emission

Report No.	13554183S-B
Test place	Shonan EMC Lab. No.6 Shielded Room
Date	October 14, 2020
Temperature / Humidity	27 deg. C / 45 % RH
Engineer	Kazuya Noda
Mode	Tx, Hopping Off, 3DH5

2480 MHz



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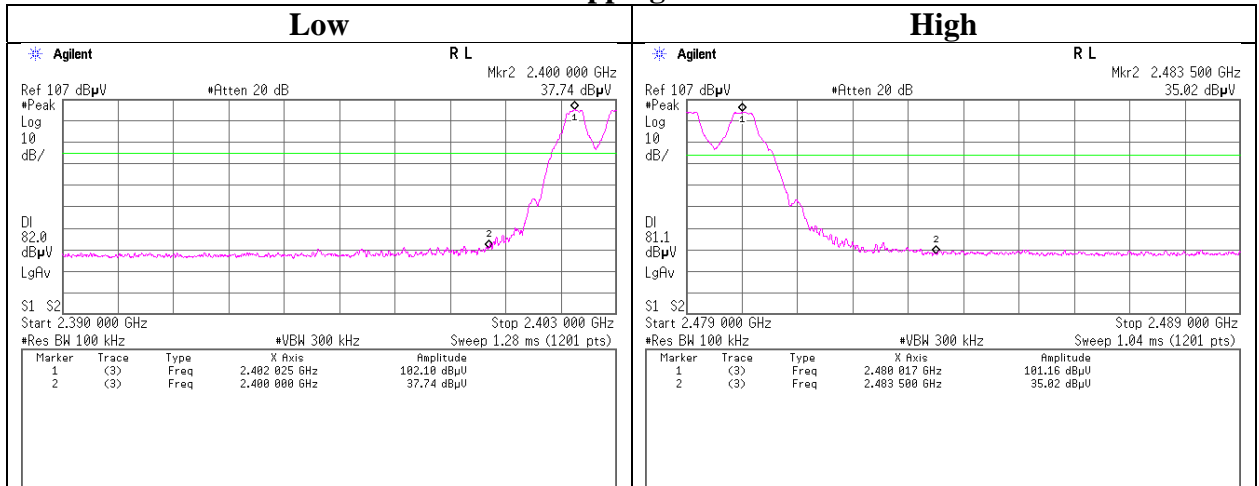
Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

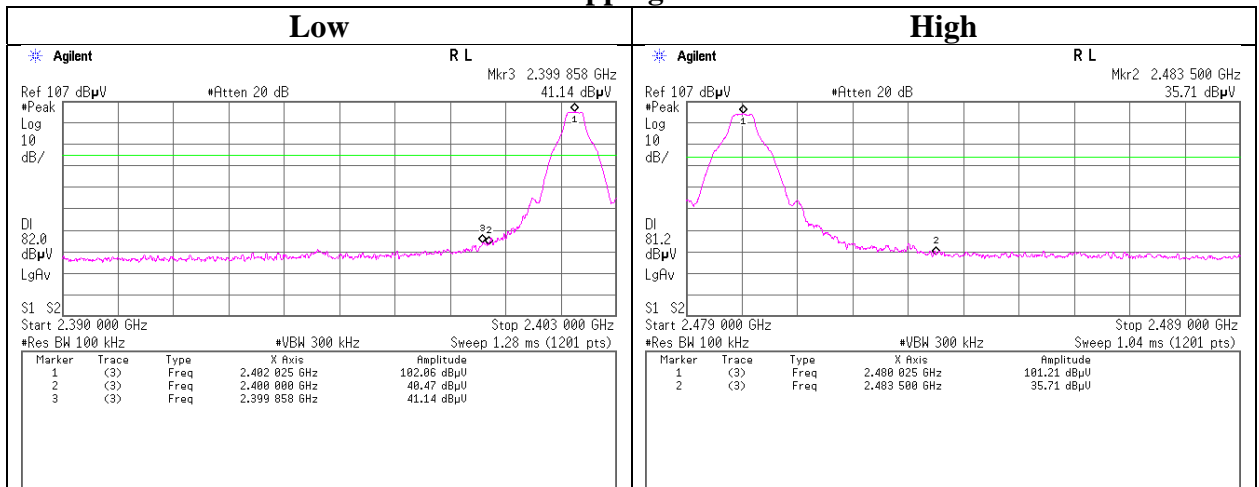
Conducted Emission Band Edge compliance

Report No. 13554183S-B
 Test place Shonan EMC Lab. No.6 Shielded Room
 Date October 14, 2020
 Temperature / Humidity 27 deg. C / 45 % RH
 Engineer Kazuya Noda
 Mode Tx DH5

Hopping On



Hopping Off



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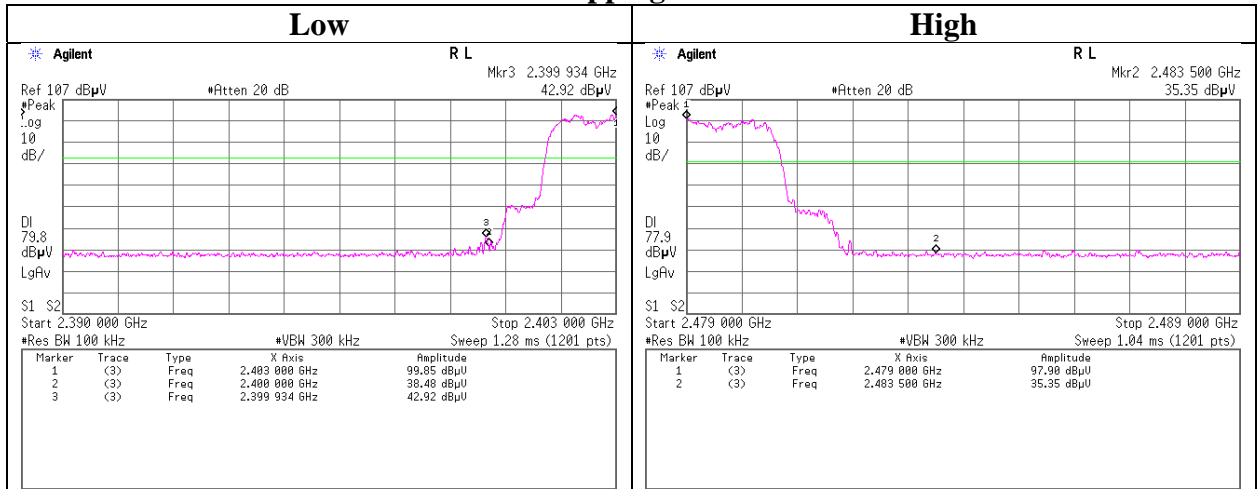
Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

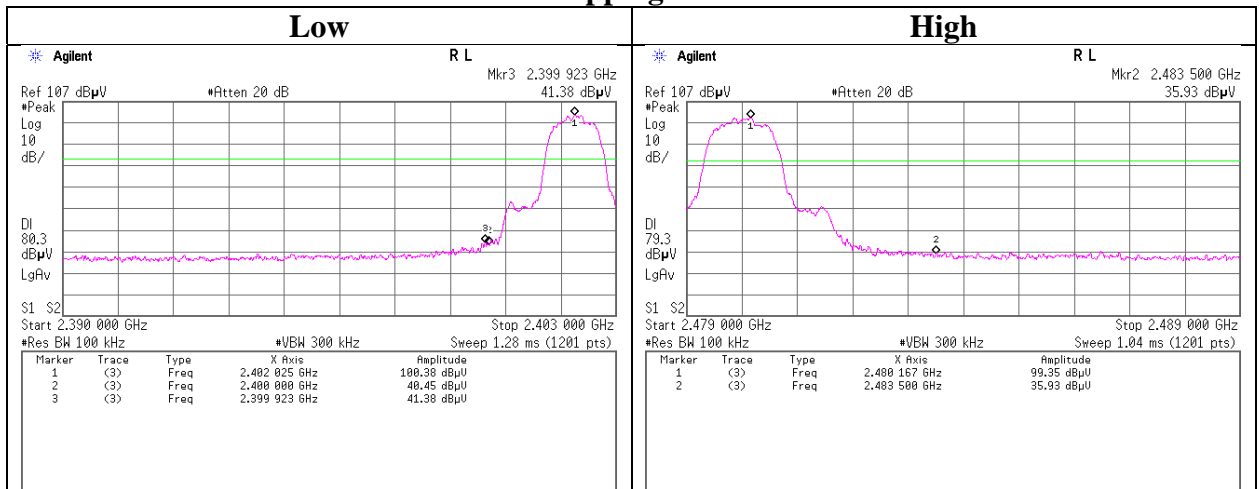
Conducted Emission Band Edge compliance

Report No. 13554183S-B
 Test place Shonan EMC Lab. No.6 Shielded Room
 Date October 14, 2020
 Temperature / Humidity 27 deg. C / 45 % RH
 Engineer Kazuya Noda
 Mode Tx 3DH5

Hopping On



Hopping Off



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APPENDIX 2: Test instruments

Test equipment(1/3)

Test Name	Local ID	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Calibration Interval (Month)
AT	KTS-06	145110	Digital Tester	SANWA	PC500	7019240	2020/04/09	12
AT	SAT10-14	154591	Attenuator	Weinschel Corp.	54A-10	81595	2020/04/01	12
AT	SCC-G53	179107	Coaxial Cable	Junkosha	MWX241-01000KMSKMS/B	1901Q062-R	2020/04/01	12
AT	SCC-H21	197395	Microwave cable	RS Pro	R-132G7210100CO	-	2020/04/07	12
AT	SCC-H22	197396	Microwave cable	RS Pro	R-132G7210100CO	-	2020/04/07	12
AT	SCC-H23	199603	Microwave cable	RS Pro	R-132G7210100CO	-	2020/06/12	12
AT	SOS-05	146293	Humidity Indicator	A&D Company	AD-5681	4062518	2020/09/30	12
AT	SPM-07	146247	Power Meter	Keysight Technologies Inc	8990B	MY5100272	2020/05/27	12
AT	SPSS-04	146310	Power sensor	Keysight Technologies Inc	N1923A	MY5326009	2020/05/27	12
AT	SRENT-15	160899	Spectrum Analyzer	Keysight Technologies Inc	E4440A	MY46185516	2020/01/15	12
AT	STM-G7	171614	Terminator	Weinschel - API Technologies Corp	M1459A	88995	2020/06/03	12
AT	STM-G8	171615	Terminator	Weinschel - API Technologies Corp	M1459A	88997	2020/06/03	12
CE	SAT3-13	150923	Attenuator	JFW	50HF-003N	-	2020/01/30	12
CE	SCC-A12/A13/SRSE-01	144966	Coaxial Cable&RF Selector	Suhner/Suhner/TOYO	RG223U/141PE/N S4906	-/0901-269(RF Selector)	2020/04/12	12
CE	SLS-02	145539	LISN	Rohde & Schwarz	ENV216	100512	2020/02/18	12
CE	SOS-16	167990	Humidity Indicator	CUSTOM. Inc	CTH-202	708Q08R	2020/10/01	12
CE	STR-06	146208	Test Receiver	Rohde & Schwarz	ESCI	101259	2020/04/01	12
CE,RE	COTS-SEMI-5	170932	EMI Software	TSJ (Techno Science Japan)	TEPTO-DV3(RE,CE,ME,P E)	-	-	-
CE,RE	KJM-09	145929	Measure	KOMELON	KMC-36	-	-	-
CE,RE	STS-01	145792	Digital Hitester	Hioki	3805-50	80997812	2020/10/19	12

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Test equipment(2/3)

Test Name	Local ID	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Calibration Interval (Month)
RE	KJM-02	146432	Measure	TAJIMA	GL19-55	-	-	-
RE	KSA-08	145089	Spectrum Analyzer	Keysight Technologies Inc	E4446A	MY46180525	2019/11/05	12
RE	SAEC-01(NSA)	145597	Semi-Anechoic Chamber	TDK	SAEC-01(NSA)	1	2020/04/08	12
RE	SAEC-01(SVS WR)	145561	Semi-Anechoic Chamber	TDK	SAEC-01(SVSWR)	1	2020/05/04	12
RE	SAEC-03(SVS WR)	145566	Semi-Anechoic Chamber	TDK	SAEC-03(SVSWR)	3	2020/05/11	12
RE	SAF-04	145127	Pre Amplifier	Toyo Corporation	TPA0118-36	2072554	2020/06/02	12
RE	SAF-06	145005	Pre Amplifier	Toyo Corporation	TPA0118-36	1440491	2020/02/20	12
RE	SAF-08	145007	Pre Amplifier	Toyo Corporation	HAP18-26W	19	2020/03/03	12
RE	SAF-10	145129	Pre Amplifier	Toyo Corporation	HAP26-40W	10	2020/03/03	12
RE	SAT10-05	145136	Attenuator	Keysight Technologies Inc	8493C-010	74864	2020/10/05	12
RE	SAT10-06	145137	Attenuator	Keysight Technologies Inc	8493C-010	74865	2020/10/05	12
RE	SCC-G05	145039	Coaxial Cable	Junkosha	J12J102207-00	APR-30-15-037	2020/01/31	12
RE	SCC-G15	145176	Coaxial Cable	Suhner	SUCOFLEX 102	32703/2	2020/03/04	12
RE	SCC-G40	166491	Coaxial Cable	Junkosha	MWX221-01000NFSNMS/B	1612S005	2020/01/08	12
RE	SCC-G41	151617	Coaxial Cable	Junkosha	MWX221-01000NFSNMS/B	1612S006	2020/01/08	12
RE	SCC-G43	156380	Coaxial Cable	HUBER+SUNER	SUCOFLEX_104E	SN MY 13406/4E	2020/06/04	12
RE	SCC-G57	179540	Coaxial Cable	HUBER+SUNER	SUCOFLEX 102	802815/2	2020/05/12	12
RE	SCC-G58	183047	Coaxial Cable	HUBER+SUNER	SUCOFLEX 104	800287/4A	2020/06/04	12
RE	SCC-G62	196985	Coaxial Cable	HUBER+SUNER	SUCOFLEX 102	803650/2	2020/03/10	12
RE	SCC-G68	200008	Coaxial Cable	HUBER+SUNER	SUCOFLEX 104	575616/4	2020/07/07	12

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Test equipment(3/3)

Test Name	Local ID	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Calibration Interval (Month)
RE	SFL-02	145301	Highpass Filter	MICRO-TRONICS	HPM50111	51	2020/10/05	12
RE	SFL-03	145377	Highpass Filter	MICRO-TRONICS	HPM50112	28	2020/10/05	12
RE	SFL-18	145305	Highpass Filter	MICRO-TRONICS	HPM50111	119	2020/04/03	12
RE	SHA-01	145383	Horn Antenna	Schwarzbeck Mess - Elektronik	BBHA9120D	9120D-725	2020/05/27	12
RE	SHA-03	145501	Horn Antenna	Schwarzbeck Mess - Elektronik	BBHA9120D	9120D-739	2020/06/15	12
RE	SHA-04	145512	Horn Antenna	ETS LINDGREN	3160-09	00094868	2020/06/15	12
RE	SHA-06	145514	Horn Antenna	ETS LINDGREN	3160-10	00092383	2020/07/16	12
RE	SHA-08	194683	Horn Antenna	Schwarzbeck Mess - Elektronik	BBHA 9120 C	694	2020/02/17	12
RE	SOS-20	191837	Humidity Indicator	CUSTOM. Inc	CTH-201	-	2020/09/28	12
RE	SOS-23	191840	Humidity Indicator	CUSTOM. Inc	CTH-201	-	2020/09/28	12
RE	SRENT-09	150461	Spectrum Analyzer	Keysight Technologies Inc	E4440A	MY46186392	2020/02/10	12
RE	SSA-02	145800	Spectrum Analyzer	Keysight Technologies Inc	E4448A	MY48250106	2020/04/16	12
RE	SSA-03	145801	Spectrum Analyzer	Keysight Technologies Inc	E4448A	MY48250152	2020/08/12	12
RE	STS-03	146210	Digital Hitester	Hioki	3805-50	80997823	2020/10/19	12
RE	STS-04	146211	Digital Hitester	Hioki	3805-50	80997827	2020/04/09	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

UL Japan, Inc.

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