



RADIO TEST REPORT

Test Report No. : 13024969S-AA-R3

Applicant : Canon Inc.
Type of EUT : Wireless LAN/Bluetooth Combo Module
Model Number of EUT : ES204
FCC ID : AZD241
Test regulation : FCC Part 15 Subpart C: 2019
*Bluetooth BDR/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.
4. The test results in this test report are traceable to the national or international standards.
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6. This test report covers Radio technical requirements.
It does not cover administrative issues such as Manual or non-Radio test related Requirements. (if applicable)
7. The all test items in this test report are conducted by UL Japan, Inc. Shonan EMC Lab.
8. The opinions and the interpretations to the result of the description in this report are outside scopes where UL Japan has been accredited.
9. The information provided from the customer for this report is identified in SECTION 1.
10. This report is a revised version of 13024969S-AA-R2. 13024969S-AA-R2 is replaced with this report.

Date of test: October 23, 2019 to January 16, 2020

Representative test engineer:

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CERTIFICATE 1266.03

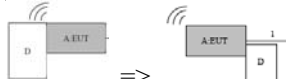
- ☐ The testing in which "Non-accreditation" is displayed is outside the accreditation scopes in UL Japan.
☒ There is no testing item of "Non-accreditation".

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REVISION HISTORY

Original Test Report No.: 13024969S-AA

Revision	Test report No.	Date	Page revised	Contents
- (Original)	13024969S-AA	March 9, 2020	-	-
1	13024969S-AA-R1	March 30, 2020	P.12	Addition of Support equipment: No. D Grand Plate
2	13024969S-AA-R2	April 2, 2020	P.12	Modification of Configuration and peripherals 
			P.15	Addition of “* Taking in consideration of antenna characteristics, the setup that does not affect spurious emissions was used.”
3	13024969S-AA-R3	April 6, 2020	P.12	Addition of “* Taking in consideration of antenna characteristics, the setup that does not affect spurious emissions was used.”
			P.15	Deletion of “* Taking in consideration of antenna characteristics, the setup that does not affect spurious emissions was used.”

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	:	Canon Inc.
Address	:	30-2, Shimomaruko 3-chome, Ohta-ku, Tokyo 146-8501 Japan
Telephone Number	:	+81-3-5482-7283
Contact Person	:	Tomohiro Suzuki

The information provided from the customer is as follows;

- Applicant, Type of Equipment, Model No., 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 (E.U.T.)
 - SECTION 4: Operation of E.U.T. 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 (E.U.T.)

2.1 Identification of E.U.T.

Type of Equipment	:	Wireless LAN/Bluetooth Combo Module
Model No.	:	ES204
Serial No.	:	Refer to SECTION 4.2
Rating	:	DC 3.3 V
Receipt Date of Sample (Information from test lab.)	:	August 28, 2019
Country of Mass-production	:	Japan
Condition of EUT	:	Engineering prototype (Not for Sale: This sample is equivalent to mass-produced items.)
Modification of EUT	:	No Modification by the test lab.

2.2 Product Description

Model: ES204 (referred to as the EUT in this report) is a Wireless LAN/Bluetooth Combo Module.

Radio Specification

Wireless LAN/Bluetooth Combo Module : ES204
 Radio Type : Transceiver
 Clock frequency (Maximum) : 38.4 MHz

	Bluetooth (BDR/EDR)	Bluetooth (Low energy)
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)	

	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 - 5700 MHz 5745 MHz - 5825 MHz	2422 MHz - 2452 MHz 5190 MHz - 5230 MHz 5270 MHz - 5310 MHz 5510 MHz - 5670 MHz 5755 MHz - 5795 MHz
Channel spacing	5 MHz		2.4 GHz band 5 MHz 5 GHz band 20 MHz	2.4 GHz band 5 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 - 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	5210 MHz 5290 MHz 5530 MHz - 5610 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 / connector type	Printed on the PCB.
Antenna gain	2.98 dBi (2.4 GHz band) / 4.94 dBi (5 GHz band) *including cable loss of 0.01m length. 1.75 dBi (2.4 GHz band) / 2.27 dBi (5 GHz band) *including cable loss of 0.2 m length.

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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 July 19, 2019 and effective August 19, 2019 except 15.258
The revision does not affect the test specification applied to the EUT.

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 ISED: RSS-Gen 8.8	FCC: Section 15.207 ISED: RSS-Gen 8.8	28.8 dB, 0.50163 MHz, L1, QP Mode: BT, 3DH5 2402 MHz	Complied a)	-
Carrier Frequency Separation	FCC: KDB 558074 D01 15.247 Meas Guidance v05r02 ISED: -	FCC: Section15.247(a)(1) ISED: RSS-247 5.1 (b)	See data.	Complied b)	Conducted
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	9.0 dB 9764.00 MHz, AV, Hori Mode: Tx, DH5 2441 MHz	Complied f) / g)	Conducted/ Radiated (above 30 MHz) *1)

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) and KDB 558074 D01 15.247 Meas Guidance v05 8.5 and 8.6.

- 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 RF Module has its own regulator. The RF Module is constantly provided voltage through the regulator regardless of input voltage. Therefore, this EUT complies with the requirement.

FCC Part 15.203/212 Antenna requirement

It is impossible for end users to replace the antenna, because the antenna is mounted inside of the host device. 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	RSS-Gen 6.7	ISED: -	N/A	- a)	Conducted
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) and KDB 558074 D01 15.247 Meas Guidance v05.8.5 and 8.6.					
a) Refer to APPENDIX 1 (data of 20dB Bandwidth, 99%Occupied Bandwidth and Carrier Frequency Separation)					
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.				

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)

Test site	Width x Depth x Height (m)	Size of reference ground plane (m) / horizontal conducting plane	Maximum measurement distance
No.1 Semi-anechoic chamber	20.6 x 11.3 x 7.65	20.6 x 11.3	10 m
No.2 Semi-anechoic chamber	20.6 x 11.3 x 7.65	20.6 x 11.3	10 m
No.3 Semi-anechoic chamber	12.7 x 7.7 x 5.35	12.7 x 7.7	5 m
No.4 Semi-anechoic chamber	8.1 x 5.1 x 3.55	8.1 x 5.1	-
No.1 Shielded room	6.8 x 4.1 x 2.7	6.8 x 4.1	-
No.2 Shielded room	6.8 x 4.1 x 2.7	6.8 x 4.1	-
No.3 Shielded room	6.3 x 4.7 x 2.7	6.3 x 4.7	-
No.4 Shielded room	4.4 x 4.7 x 2.7	4.4 x 4.7	-
No.5 Shielded room	7.8 x 6.4 x 2.7	7.8 x 6.4	-
No.6 Shielded room	7.8 x 6.4 x 2.7	7.8 x 6.4	-
No.8 shielded room	3.45 x 5.5 x 2.4	3.45 x 5.5	-
No.1 Measurement room	2.55 x 4.1 x 2.5	-	-

3.6 Test data, Test instruments, and Test set up

Refer to APPENDIX.

SECTION 4: Operation of E.U.T. during testing

4.1 Operating Mode(s)

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

Details of Operating Mode(s)

Test Item	Mode	Tested frequency
Conducted Emission, Spurious Emission (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 11ac-40 Tx 5190 MHz	2402 MHz 2441 MHz 2480 MHz
Carrier Frequency Separation	Tx (Hopping On) DH5, 3DH5	2402 MHz 2441 MHz 2480 MHz
20dB Bandwidth	Tx (Hopping Off) DH5, 3DH5	2402 MHz 2441 MHz 2480 MHz
Number of Hopping Frequency	Tx (Hopping On) DH5, 3DH5	-
Dwell time	Tx (Hopping On), -DH1, DH3, DH5 -3DH1, 3DH3, 3DH5	-
Maximum Peak Output Power	Tx (Hopping Off) DH5, 2DH5, 3DH5	2402 MHz 2441 MHz 2480 MHz
Band Edge Compliance (Conducted)	Tx DH5, 3DH5 -Hopping On -Hopping Off	2402 MHz 2480 MHz
99% Occupied Bandwidth	Tx DH5, 3DH5 -Hopping On -Hopping Off	2402 MHz 2441 MHz 2480 MHz

*As a result of preliminary test, the formal test was performed with the above modes, which had the maximum payload length (except Dwell time test)
 *2DH mode (2Mb/s EDR: pi/4DQPSK) was excluded for other tests than power measurement by using 3DH mode (3 Mb/s EDR: 8DPSK) as a representative.
 * It is considered that the non-tested packet type (e.g. inquiry) can be omitted as it is complied with above all test items based on Bluetooth Core specification.

*EUT has the power settings by the software as follows;
 Power settings: BDR: 5 dBm
 EDR: 2 dBm
 Software: Tera Term Version 4.9.8
 (Date:2017.8.31, Storage location: Driven by connected PC)

*This setting of software is the worst case.
 Any conditions under the normal use do not exceed the condition of setting.
 In addition, end users cannot change the settings of the output power of the product.

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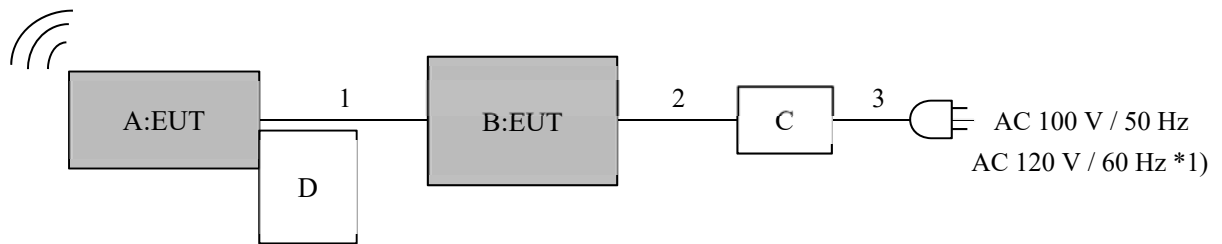
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4.2 Configuration and peripherals



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

*1) Conducted Emission test

Description of EUT and Support equipment

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	Antenna	-	1(0.01 m) *2) 4(0.2 m) *2)	Canon Inc.	EUT
B	Wireless LAN/Bluetooth Combo Module	ES204	16 *3) 17 *4)	Canon Inc.	EUT
C	Power Supply	PAN35-10A	ML002085	KIKUSUI	-
D	Grand Plate	-	-	Canon Inc	*5)

*2) The antenna used for the measurement was confirmed by pre-check, and Serial number 4 was used for the measurement.

*3) Used for Antenna Terminal conducted test

*4) Used for Conducted Emission test and Radiated Emission test

*5) Grand Plate for matching. Taking in consideration of antenna characteristics, the setup that does not affect spurious emissions was used.

List of cables used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	Coaxial	0.01 *6) 0.2 *7)	Shielded	Sshielded	-
2	DC	0.06 + 1.5	Unshielded	Unshielded	-
3	AC	1.8	Unshielded	Unshielded	-

*6) Used for Serial number 1 Antenna.

*7) Used for Serial number 4 Antenna.

SECTION 5: Conducted Emission

Test Procedure and conditions

EUT was placed on a urethane platform of nominal size, 1.0 m by 2.0 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.

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 via DC power supply in a Semi Anechoic Chamber.

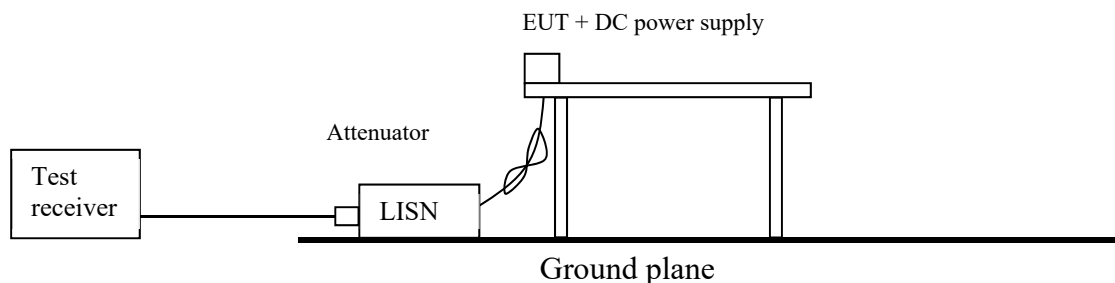
The EUT via DC power supply was connected to a LISN (AMN).

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 2.0 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 1.0 m, raised 1.5 m above the conducting ground plane. The Radiated Electric Field Strength has been measured in a Semi Anechoic Chamber with absorbent materials lined on a ground plane.

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

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

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

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

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

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

Test Antennas are used as below;

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

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

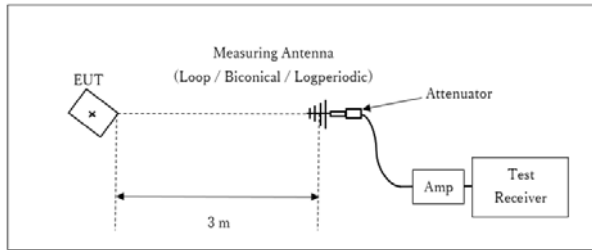
20 dBc was applied to the frequency over the limit of FCC 15.209 / Table 4 of RSS-Gen 8.9 (ISED) and outside the restricted band of FCC15.205 / Table 6 of RSS-Gen 8.10 (ISED).

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

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

Figure 2: Test Setup

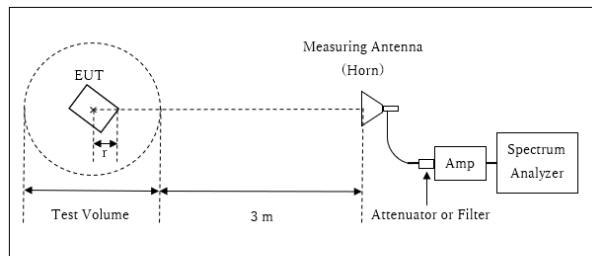
Below 1 GHz



x : Center of turn table

Test Distance: 3 m

1 GHz – 13 GHz



r : Radius of an outer periphery of EUT

x : Center of turn table

Distance Factor: $20 \times \log (3.93\text{m} / 3.0 \text{ m}) = 2.35$

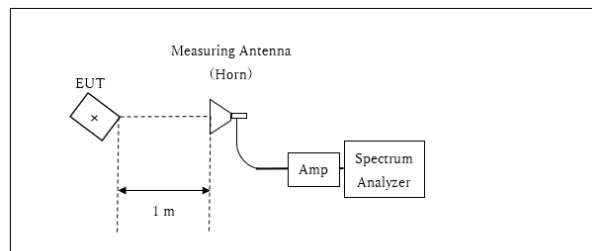
* Test Distance: $(3 + \text{Test Volume} / 2) - r = 3.93\text{m}$

Test Volume : 2.0 m

(Test Volume has been calibrated based on CISPR 16-1-4.)

$r = 0.07\text{m}$

13 GHz – 26.5 GHz



x : Center of turn table

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

*Test Distance: 1 m

- The carrier level and noise levels were confirmed at each position of X, Y and Z axes of EUT to see the position of maximum noise, and the test was made at the position that has the maximum noise.

Module

Antenna polarization	Carrier	Spurious (30 MHz - 1 GHz)	Spurious (1 GHz – 2.8 GHz)	Spurious (2.8 GHz – 13 GHz)	Spurious (13 GHz – 18 GHz)	Spurious (18 GHz – 26.5 GHz)
Horizontal	Z	X	Z	X	X	X
Vertical	Z	X	Z	X	X	X

Antenna

Antenna polarization	Carrier	Spurious (30 MHz - 1 GHz)	Spurious (1 GHz – 2.8 GHz)	Spurious (2.8 GHz – 13 GHz)	Spurious (13 GHz – 18 GHz)	Spurious (18 GHz – 26.5 GHz)
Horizontal	X	X	X	X	X	X
Vertical	Z	Y	Z	X	X	X

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

Measurement range : 30 MHz - 26.5 GHz

Test data : APPENDIX

Test result : Pass

UL Japan, Inc.

Shonan EMC Lab.

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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: 160MHz 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)	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)

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

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Shonan EMC Lab.

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APPENDIX 1: Test data

Conducted Emission

DATA OF CONDUCTED EMISSION TEST

UL Japan, Inc. Shonan EMC Lab. No.3 Semi-Anechoic Chamber
Date : 2020/01/06

Mode : BT DH5 2402 MHz

Power : DC 3.3 V (AC 120V/ 60 Hz)
Temp./Humi. : 25 deg.C / 30 %RH

Remarks : -

Limit : FCC_Part 15 Subpart C(15.207)

Engineer : Makoto Hosaka

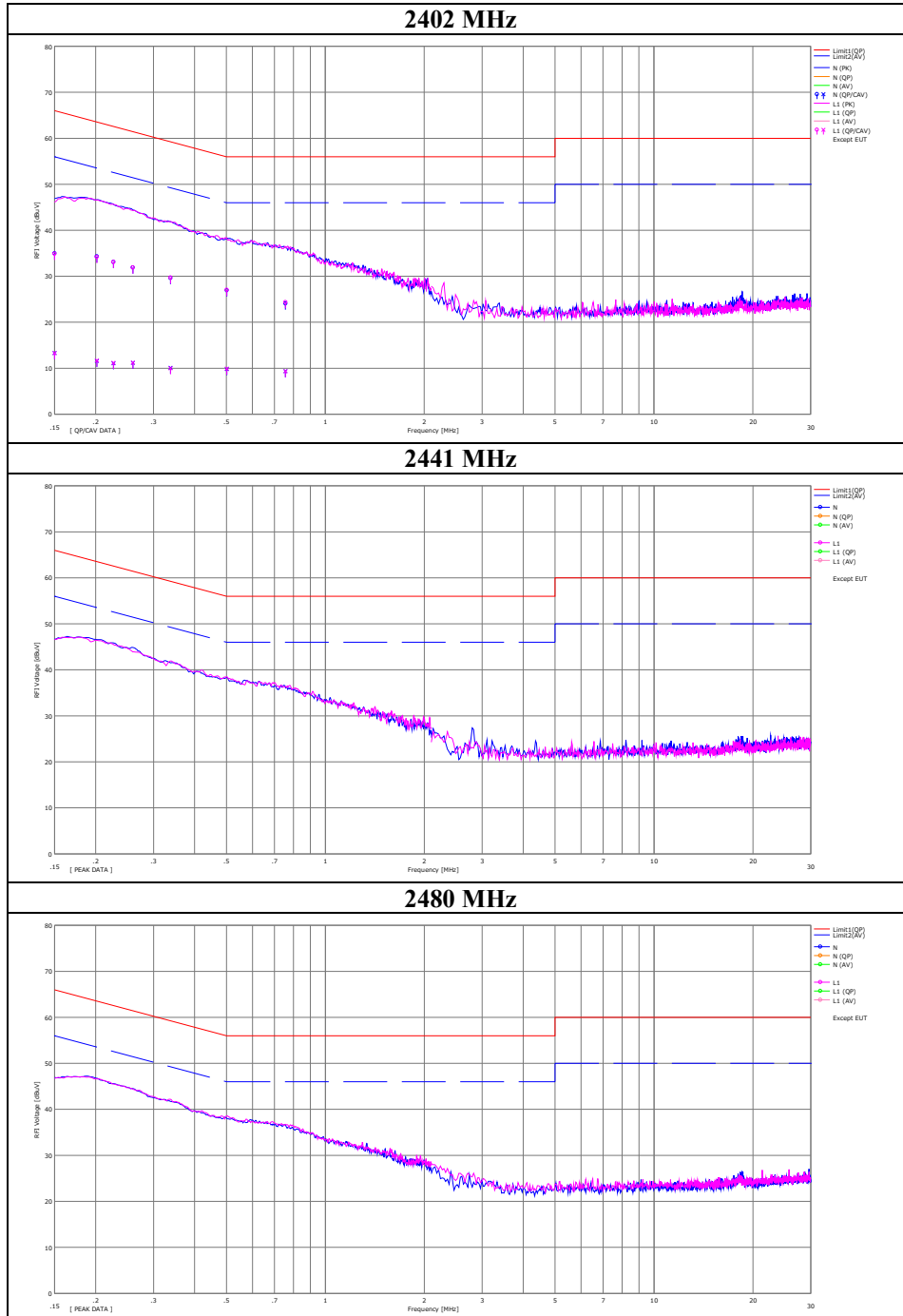
<< QP/CAV DATA >>

No.	Freq. [MHz]	Reading		C.Fac. [dB]	Results		Limit		Margin		Phase	Comment
		(QP) [dBuV]	(CAV) [dBuV]		(QP) [dBuV]	(CAV) [dBuV]	(QP) [dBuV]	(AV) [dBuV]	(QP) [dB]	(AV) [dB]		
1	0.15000	22.50	0.80	12.48	34.98	13.28	66.00	56.00	31.0	42.7	N	
2	0.20178	21.80	-0.90	12.50	34.30	11.60	63.54	53.54	29.2	41.9	N	
3	0.22663	20.60	-1.40	12.49	33.09	11.09	62.57	52.57	29.4	41.4	N	
4	0.25954	19.40	-1.30	12.49	31.89	11.19	61.45	51.45	29.5	40.2	N	
5	0.33798	17.10	-2.40	12.50	29.60	10.10	59.25	49.25	29.6	39.1	N	
6	0.50150	14.40	-2.70	12.53	26.93	9.83	56.00	46.00	29.0	36.1	N	
7	0.75623	11.50	-3.20	12.56	24.06	9.36	56.00	46.00	31.9	36.6	N	
8	0.15000	22.40	0.80	12.48	34.88	13.28	66.00	56.00	31.1	42.7	L1	
9	0.20178	21.70	-0.80	12.48	34.18	11.68	63.54	53.54	29.3	41.8	L1	
10	0.22663	20.60	-1.30	12.49	33.09	11.19	62.57	52.57	29.4	41.3	L1	
11	0.25954	19.40	-1.30	12.50	31.90	11.20	61.45	51.45	29.5	40.2	L1	
12	0.33798	17.20	-2.50	12.50	29.70	10.00	59.25	49.25	29.5	39.2	L1	
13	0.50150	14.50	-2.60	12.53	27.03	9.93	56.00	46.00	28.9	36.0	L1	
14	0.75623	11.80	-3.20	12.56	24.36	9.36	56.00	46.00	31.6	36.6	L1	

Calculation: Result[dBuV]=Reading[dBuV]+C.Fac(LISN(AMN)+Cable+ATT)[dB]
LISN(AMN)= SLS-05

Conducted Emission

Report No. 13024969S-AA-R3
Test place Shonan EMC Lab. No.3 Semi Anechoic Chamber
Date January 6, 2020
Temperature / Humidity 25 deg. C / 30 % RH
Engineer Makoto Hosaka
Mode Tx, Hopping Off, DH5



Conducted Emission

DATA OF CONDUCTED EMISSION TEST

UL Japan, Inc. Shonan EMC Lab. No.3 Semi-Anechoic Chamber
Date : 2020/01/06

Mode : BT 3DHS 2402 MHz

Power : DC 3.3 V (AC 120V/ 60 Hz)

Temp./Humi. : 25 deg.C / 30 %RH

Remarks : -

Limit : FCC_Part 15 Subpart C(15.207)

Engineer : Makoto Hosaka

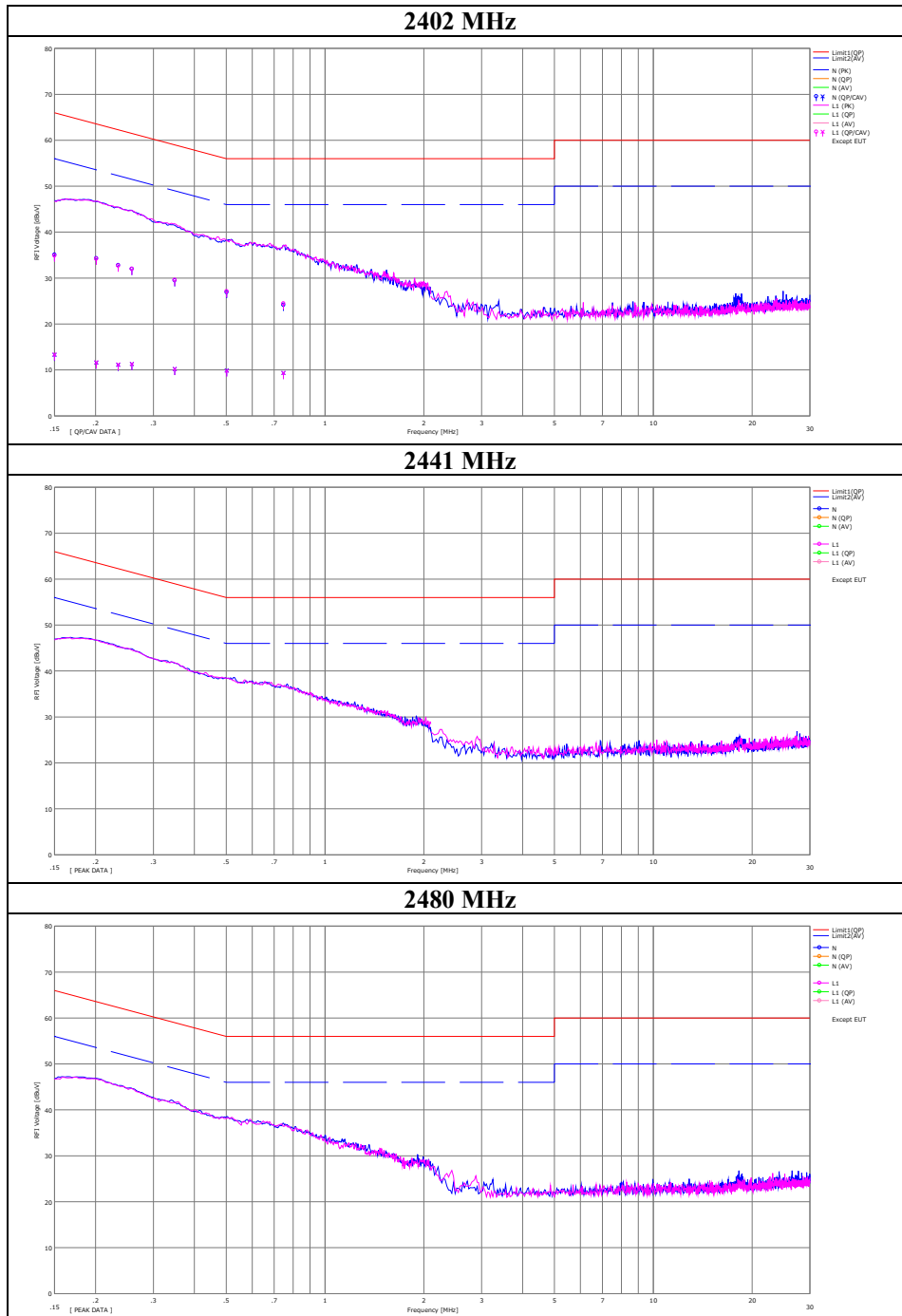
<< QP/CAV DATA >>

No.	Freq. [MHz]	Reading		C.Fac	Results		Limit		Margin		Phase	Comment
		(QP)	(CAV)		(QP)	(CAV)	(QP)	(AV)	(QP)	(AV)		
		[dBuV]	[dBuV]		[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dB]	[dB]		
1	0.15000	22.60	0.80	12.48	35.08	13.28	66.00	56.00	30.9	42.7	N	
2	0.20096	21.80	-0.90	12.50	34.30	11.60	63.57	53.57	29.2	41.9	N	
3	0.23448	20.30	-1.40	12.49	32.79	11.09	62.29	52.29	29.5	41.2	N	
4	0.25801	19.50	-1.20	12.49	31.99	11.29	61.50	51.50	29.5	40.2	N	
5	0.34856	17.00	-2.30	12.50	29.50	10.20	59.00	49.00	29.5	38.8	N	
6	0.50163	14.40	-2.60	12.53	26.93	9.93	56.00	46.00	29.0	36.0	N	
7	0.74702	11.60	-3.20	12.56	24.16	9.36	56.00	46.00	31.8	36.6	N	
8	0.15000	22.40	0.90	12.48	34.88	13.38	66.00	56.00	31.1	42.6	L1	
9	0.20096	21.70	-0.80	12.48	34.18	11.68	63.57	53.57	29.3	41.8	L1	
10	0.23448	20.20	-1.30	12.49	32.69	11.19	62.29	52.29	29.6	41.1	L1	
11	0.25801	19.50	-1.20	12.50	32.00	11.30	61.50	51.50	29.5	40.2	L1	
12	0.34856	17.10	-2.30	12.50	29.60	10.20	59.00	49.00	29.4	38.8	L1	
13	0.50163	14.60	-2.70	12.53	27.13	9.83	56.00	46.00	28.8	36.1	L1	
14	0.74702	11.90	-3.20	12.56	24.46	9.36	56.00	46.00	31.5	36.6	L1	

Calculation: Result[dBuV]=Reading[dBuV]+C.Fac(LISN(AMN)+Cable+ATT)[dB]
LISN(AMN)= SLS-05

Conducted Emission

Report No. 13024969S-AA-R3
Test place Shonan EMC Lab. No.3 Semi Anechoic Chamber
Date January 6, 2020
Temperature / Humidity 25 deg. C / 30 % RH
Engineer Makoto Hosaka
Mode Tx, Hopping Off, 3DH5



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

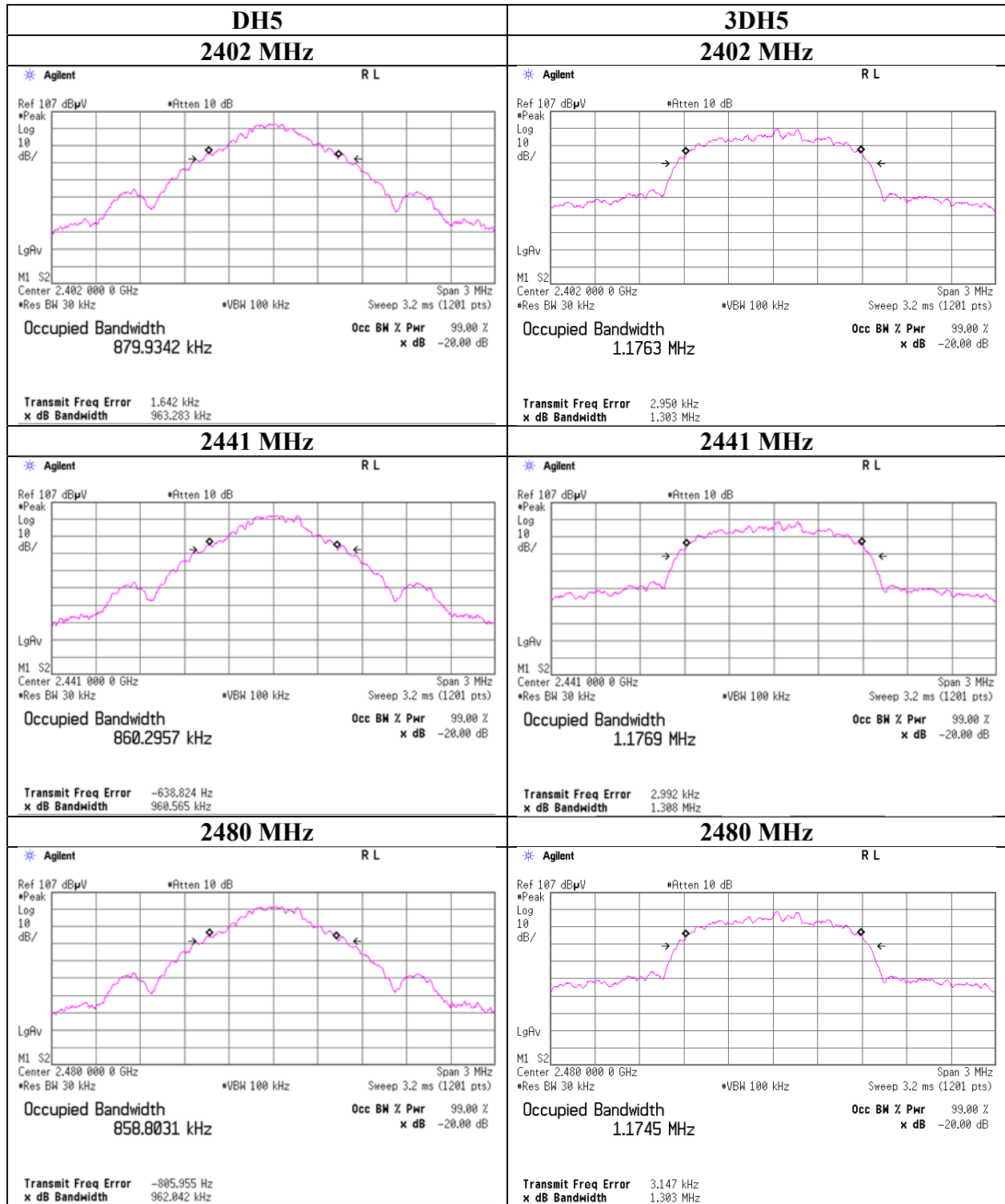
Report No.	13024969S-AA-R3
Test place	Shonan EMC Lab. No.5 Shielded Room
Date	December 2, 2019 December 4, 2019
Temperature / Humidity	20 deg. C / 45 % RH 22 deg. C / 45 % RH
Engineer	Takahiro Kawakami Toshinori Yamada
Mode	Tx, Hopping Off, Tx, Hopping On

Mode	Freq. [MHz]	20dB Bandwidth [MHz]	99% Occupied Bandwidth [kHz]	Carrier Frequency Separation [MHz]	Limit for Carrier Frequency separation [MHz]
DH5	2402.0	0.963	879.9342	1.000	≥ 0.642
DH5	2441.0	0.961	860.2957	1.000	≥ 0.640
DH5	2480.0	0.962	858.8031	1.000	≥ 0.641
DH5	Hopping On	-	78641.2	-	-
3DH5	2402.0	1.303	1176.3	1.000	≥ 0.869
3DH5	2441.0	1.308	1176.9	1.000	≥ 0.872
3DH5	2480.0	1.303	1174.5	1.000	≥ 0.869
3DH5	Hopping On	-	78709.8	-	-

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

No limit applies to 20dB Bandwidth.

20dB Bandwidth and 99% Occupied Bandwidth



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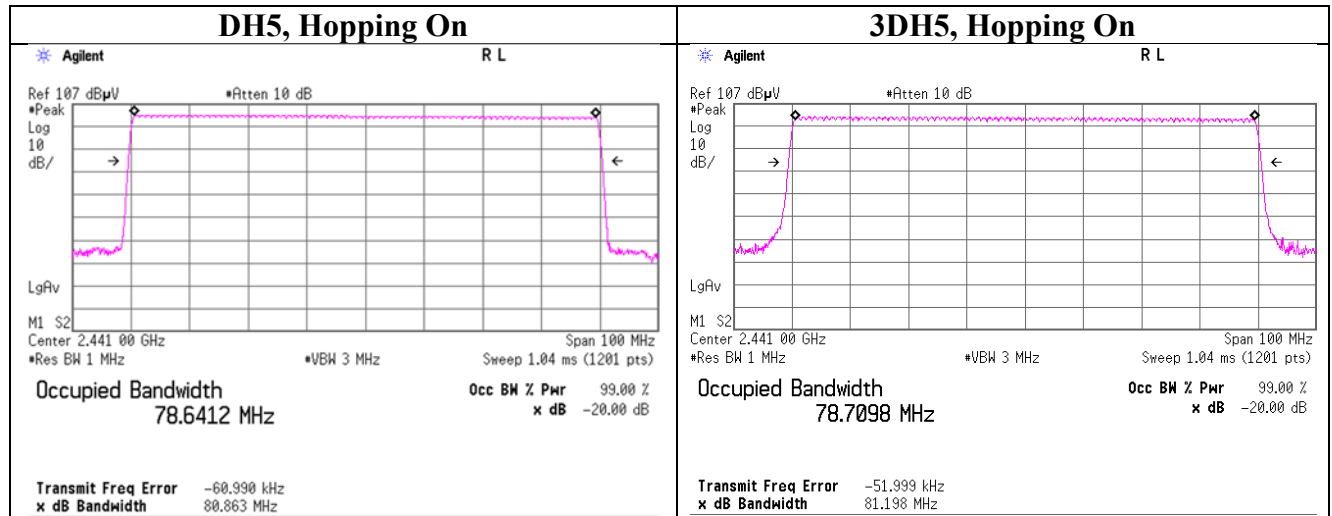
Shonan EMC Lab.

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20dB Bandwidth and 99% Occupied Bandwidth



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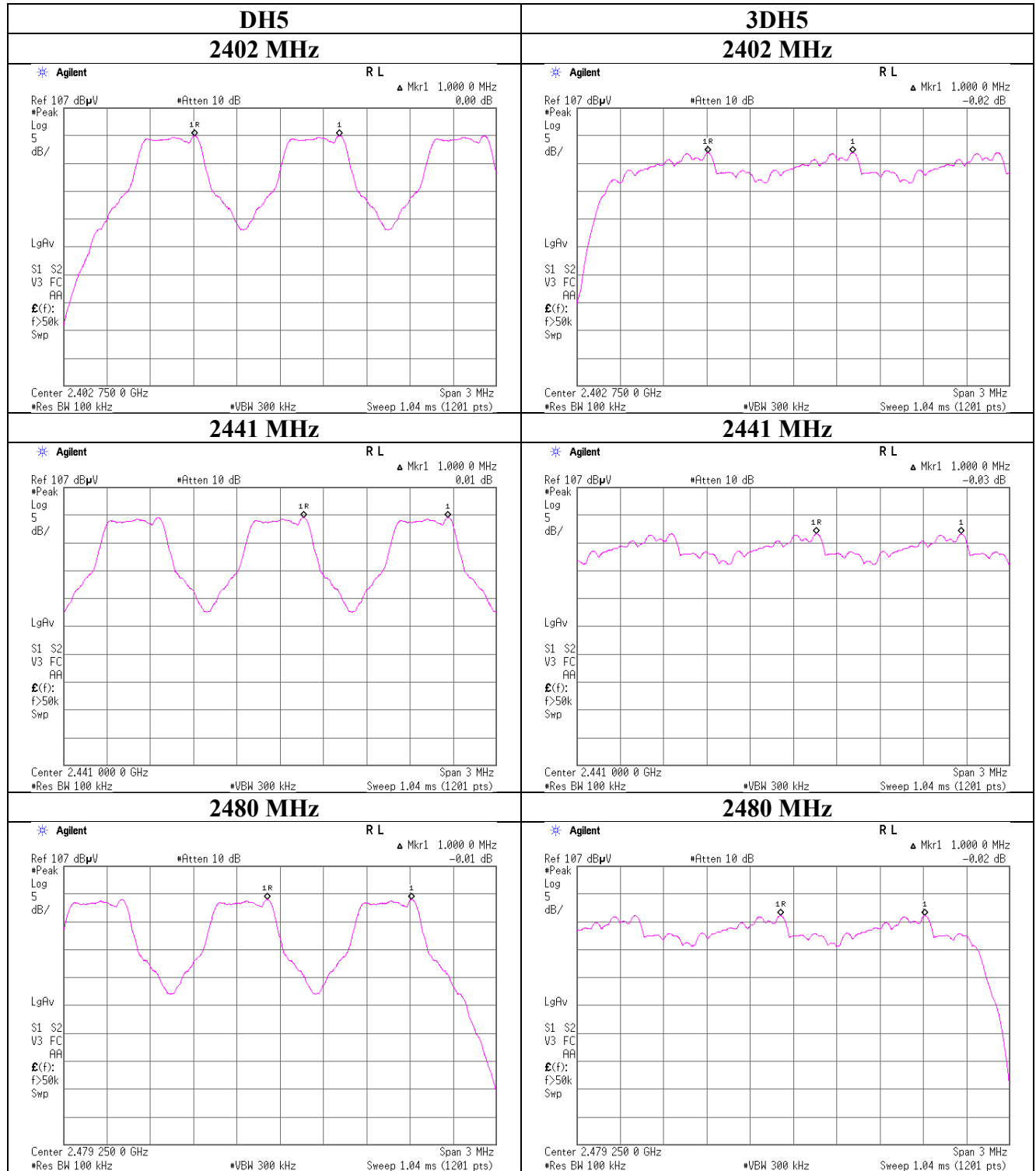
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Carrier Frequency Separation



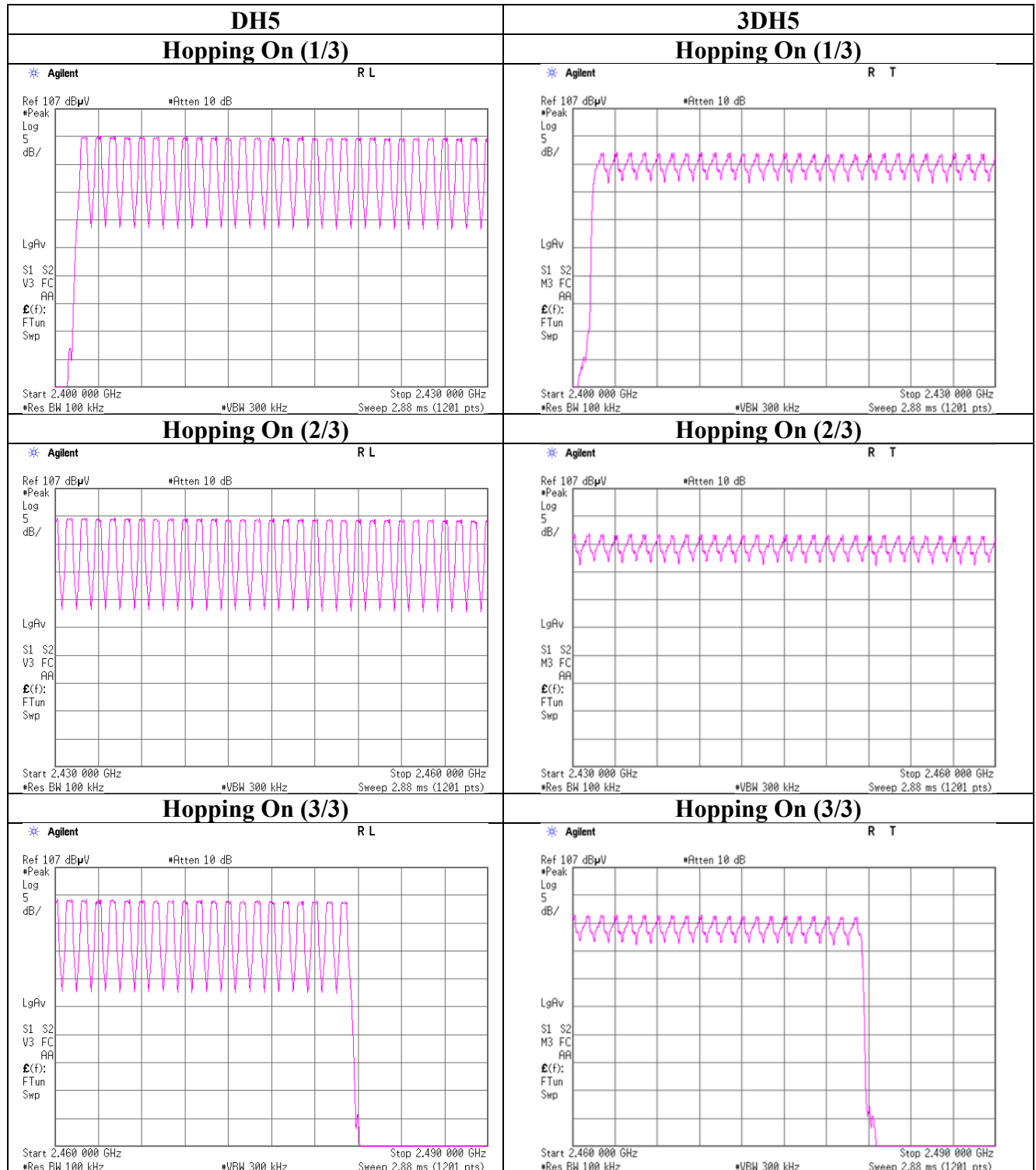
Number of Hopping Frequency

Report No. 13024969S-AA-R3
Test place Shonan EMC Lab. No.5 Shielded Room
Date December 2, 2019 December 4, 2019
Temperature / Humidity 20 deg. C / 45 % RH 22 deg. C / 45 % RH
Engineer Takahiro Kawakami Toshinori Yamada
Mode Tx, Hopping On

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

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

Number of Hopping Frequency



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Dwell time

Report No. 13024969S-AA-R3
Test place Shonan EMC Lab. No.5 Shielded Room
Date December 2, 2019 December 4, 2019
Temperature / Humidity 20 deg. C / 45 % RH 22 deg. C / 45 % RH
Engineer Takahiro Kawakami Toshinori Yamada
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	49.2 times	/	5 sec. x	31.6 sec. = 311 times	0.393	122	400
DH3	28.0 times	/	5 sec. x	31.6 sec. = 177 times	1.648	292	400
DH5	19.8 times	/	5 sec. x	31.6 sec. = 126 times	2.899	365	400
3DH1	50.0 times	/	5 sec. x	31.6 sec. = 316 times	0.393	124	400
3DH3	27.4 times	/	5 sec. x	31.6 sec. = 174 times	1.645	286	400
3DH5	20.2 times	/	5 sec. x	31.6 sec. = 128 times	2.896	371	400

Sample Calculation

Result = Number of transmission x Length of transmission

*Average data of 5 tests.(except Inquiry)

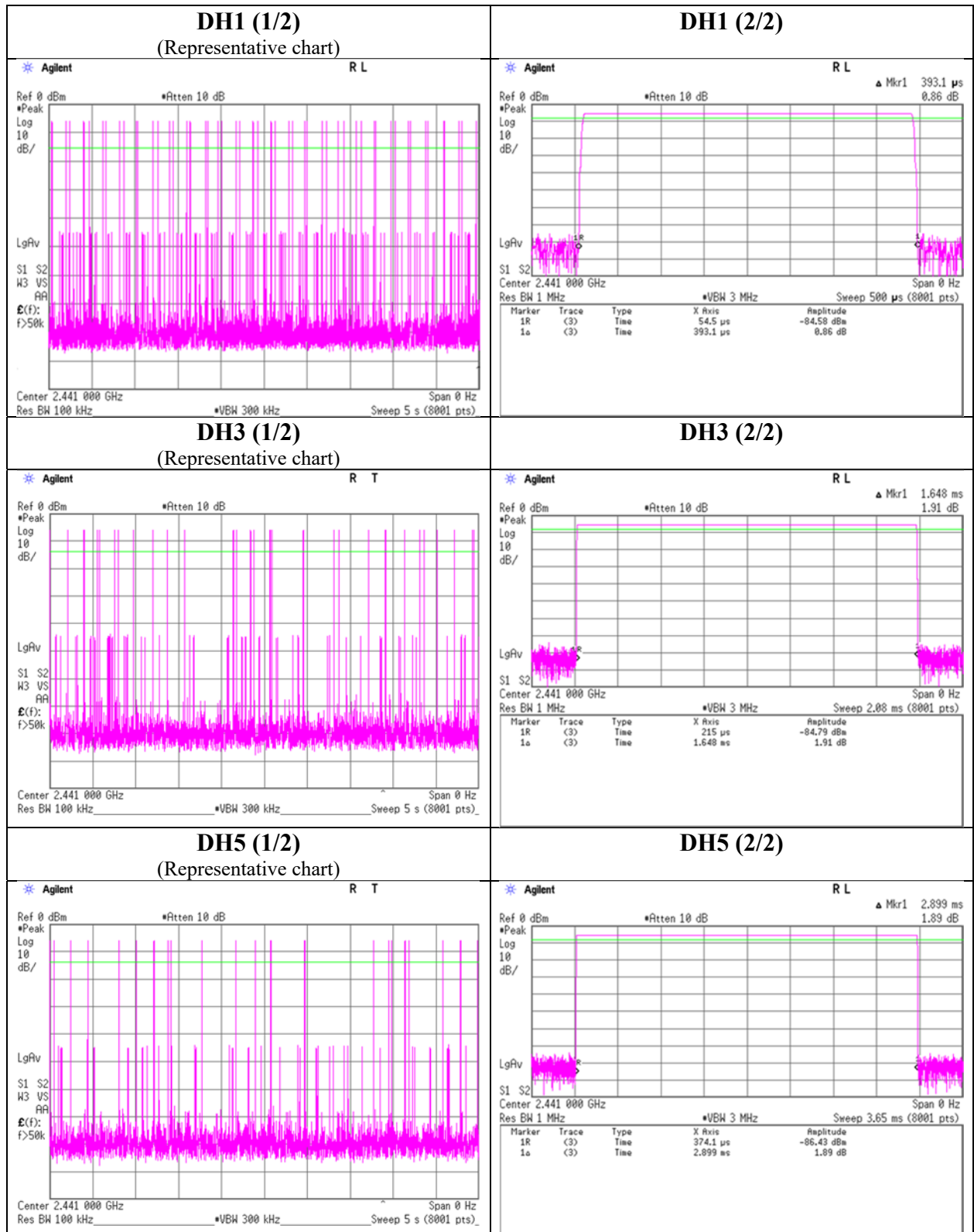
Mode	Sampling [times]					Average [times]
	1	2	3	4	5	
DH1	49	51	48	48	50	49.2
DH3	29	28	28	28	27	28
DH5	22	18	18	21	20	19.8
3DH1	50	50	50	51	49	50
3DH3	26	30	24	30	27	27.4
3DH5	19	20	22	19	21	20.2

Sample Calculation

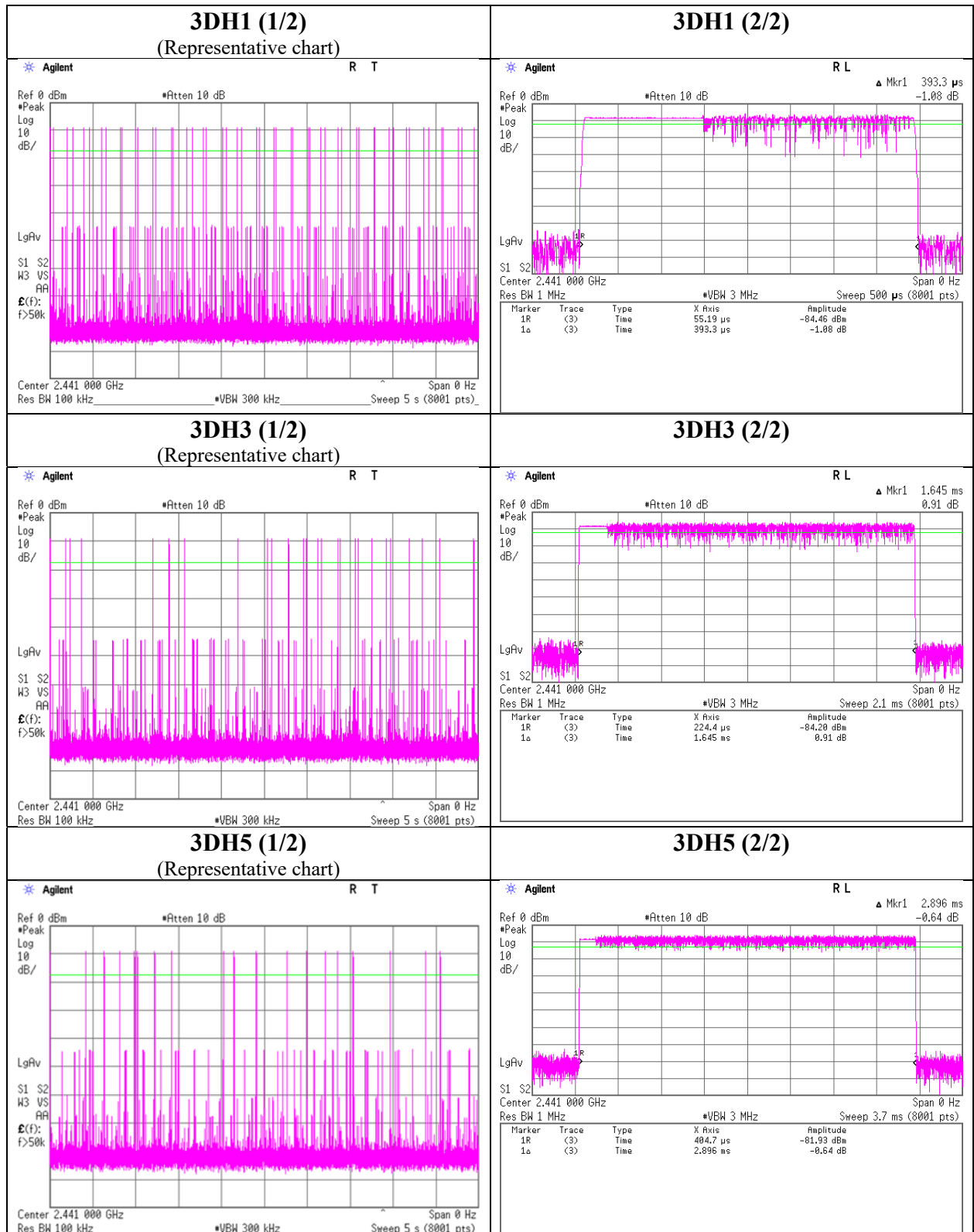
Average = Summation (Sampling 1 to 5) / 5

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



Dwell time



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Maximum Peak Output Power

Report No. 13024969S-AA-R3
Test place Shonan EMC Lab. No.5 Shielded Room
Date November 5, 2019
Temperature / Humidity 26 deg. C / 48 % RH
Engineer Hiromasa Sato
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	Antenna Gain [dBi]	Result		Limit	
					[dBm]	[mW]	[dBm]	[mW]			[dBm]	[mW]	[dBm]	[mW]
DH5	2402.0	-5.72	1.81	9.89	5.98	3.96	20.96	125	14.98	2.98	8.96	7.87	36.02	4000
DH5	2441.0	-6.08	1.83	9.89	5.64	3.66	20.96	125	15.32	2.98	8.62	7.28	36.02	4000
DH5	2480.0	-6.79	1.84	9.89	4.94	3.12	20.96	125	16.02	2.98	7.92	6.19	36.02	4000
2DH5	2402.0	-6.45	1.81	9.89	5.25	3.35	20.96	125	15.71	2.98	8.23	6.65	36.02	4000
2DH5	2441.0	-6.71	1.83	9.89	5.01	3.17	20.96	125	15.95	2.98	7.99	6.30	36.02	4000
2DH5	2480.0	-7.28	1.84	9.89	4.45	2.79	20.96	125	16.51	2.98	7.43	5.53	36.02	4000
3DH5	2402.0	-6.13	1.81	9.89	5.57	3.61	20.96	125	15.39	2.98	8.55	7.16	36.02	4000
3DH5	2441.0	-6.38	1.83	9.89	5.34	3.42	20.96	125	15.62	2.98	8.32	6.79	36.02	4000
3DH5	2480.0	-7.02	1.84	9.89	4.71	2.96	20.96	125	16.25	2.98	7.69	5.87	36.02	4000

Sample Calculation:

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

e.i.r.p. Result = Conducted Power Result + Antenna Gain

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

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

Average Output Power (Reference data for RF Exposure)

Report No.	13024969S-AA-R3
Test place	Shonan EMC Lab. No.5 Shielded Room
Date	November 5, 2019
Temperature / Humidity	26 deg. C / 48 % RH
Engineer	Hiromasa Sato
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	-7.05	1.81	9.89	4.65	2.92	1.12	5.77	3.78
DH5	2441.0	-7.41	1.83	9.89	4.31	2.70	1.12	5.43	3.49
DH5	2480.0	-8.16	1.84	9.89	3.57	2.28	1.12	4.69	2.94
2DH5	2402.0	-10.30	1.81	9.89	1.40	1.38	1.12	2.52	1.79
2DH5	2441.0	-10.54	1.83	9.89	1.18	1.31	1.12	2.30	1.70
2DH5	2480.0	-11.20	1.84	9.89	0.53	1.13	1.12	1.65	1.46
3DH5	2402.0	-10.27	1.81	9.89	1.43	1.39	1.12	2.55	1.80
3DH5	2441.0	-10.53	1.83	9.89	1.19	1.32	1.12	2.31	1.70
3DH5	2480.0	-11.20	1.84	9.89	0.53	1.13	1.12	1.65	1.46

Sample Calculation:

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

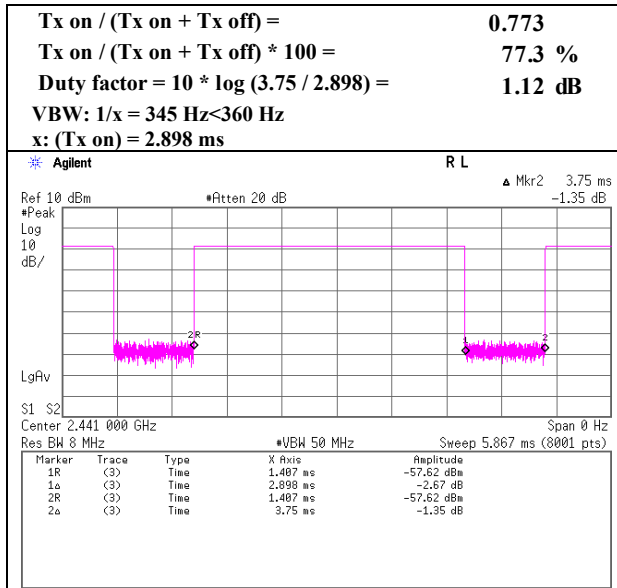
Result (Burst power average) = Time average + Duty factor

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

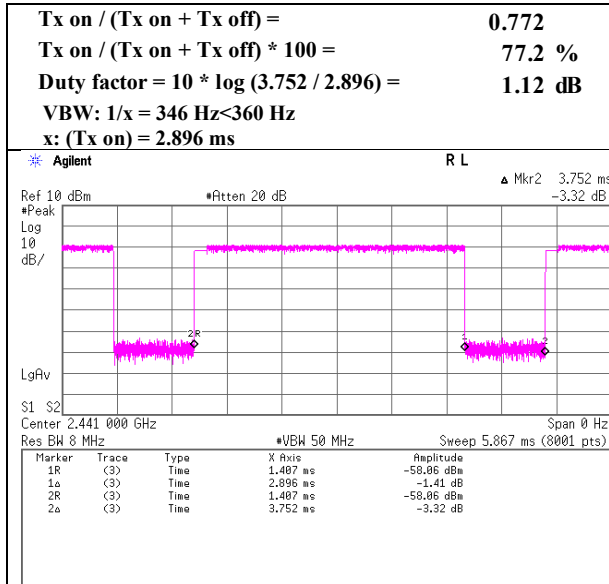
Burst Rate Confirmation

Report No. 13024969S-AA-R3
Test place Shonan EMC Lab. No.5 Shielded Room
Date October 23, 2019
Temperature / Humidity 24 deg. C / 50 % RH
Engineer Takahiro Kawakami
Mode Tx, Hopping Off

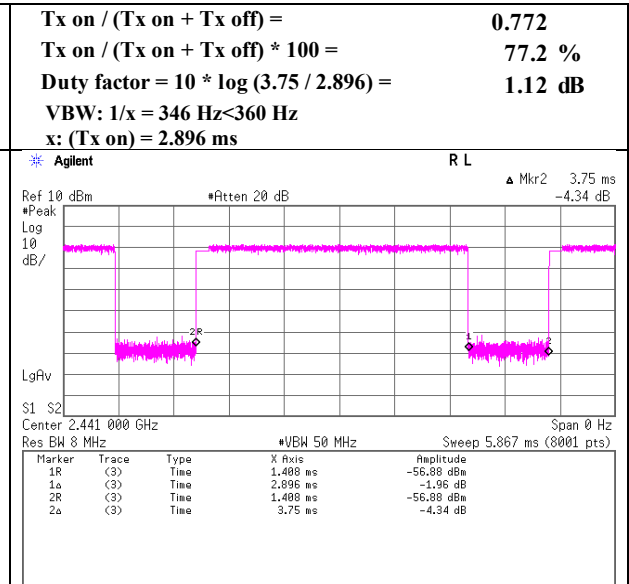
DH5



2DH5



3DH5



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Radiated Spurious Emission

Report No.	13024969S-AA-R3		
Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	No.3	No.3	No.3
Date	December 12, 2019	November 22, 2019	November 25, 2019
Temperature / Humidity	22 deg. C / 45 % RH	22 deg. C / 39 % RH	23 deg. C / 55 % RH
Engineer	Toshinori Yamada	Takahiro Suzuki	Yasumasa Owaki
	(30 MHz -1 GHz)	(1 GHz -13 GHz)	(13 GHz -26.5 GHz)
Mode	Tx, Hopping Off, DH5 2402 MHz		

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	31.101	QP	22.30	17.89	6.49	32.19	0.00	14.49	40.0	25.5	201	0	
Hori.	33.724	QP	21.40	17.05	6.54	32.19	0.00	12.80	40.0	27.2	150	0	
Hori.	175.026	QP	23.90	15.71	7.89	32.09	0.00	15.41	43.5	28.0	163	319	
Hori.	914.793	QP	21.90	21.61	11.06	30.96	0.00	23.61	46.0	22.3	100	359	
Hori.	2307.000	PK	52.11	28.50	14.02	41.56	2.35	55.42	73.9	18.4	131	87	
Hori.	2390.000	PK	49.08	28.33	14.10	41.59	2.35	52.27	73.9	21.6	145	86	
Hori.	2498.522	PK	51.82	28.23	14.19	41.63	2.35	54.96	73.9	18.9	130	71	
Hori.	4804.000	PK	49.01	31.62	6.44	42.88	2.35	46.54	73.9	27.3	137	116	
Hori.	7206.000	PK	49.16	37.23	7.87	42.92	2.35	53.69	73.9	20.2	150	0	
Hori.	9608.000	PK	46.88	38.84	9.16	43.17	2.35	54.06	73.9	19.8	150	0	
Hori.	2307.000	AV	37.82	28.50	14.02	41.56	2.35	41.13	53.9	12.7	131	87	VBW: 360 Hz
Hori.	2390.000	AV	35.79	28.33	14.10	41.59	2.35	38.98	53.9	14.9	145	86	VBW: 360 Hz
Hori.	2498.522	AV	38.12	28.23	14.19	41.63	2.35	41.26	53.9	12.6	130	71	VBW: 360 Hz
Hori.	4804.000	AV	37.12	31.62	6.44	42.88	2.35	34.65	53.9	19.2	137	116	VBW: 360 Hz
Hori.	7206.000	AV	37.07	37.23	7.87	42.92	2.35	41.60	53.9	12.3	150	0	VBW: 360 Hz
Hori.	9608.000	AV	36.87	38.84	9.16	43.17	2.35	44.05	53.9	9.8	150	0	VBW: 360 Hz
Vert.	175.063	QP	25.40	15.71	7.89	32.09	0.00	16.91	43.5	26.5	100	81	
Vert.	333.066	QP	27.50	14.29	8.97	31.97	0.00	18.79	46.0	27.2	100	252	
Vert.	828.364	QP	21.00	20.54	10.80	31.48	0.00	20.86	46.0	25.1	100	359	
Vert.	865.279	QP	20.80	21.46	10.91	31.28	0.00	21.89	46.0	24.1	100	359	
Vert.	2307.000	PK	50.82	28.50	14.02	41.56	2.35	54.13	73.9	19.7	175	152	
Vert.	2390.000	PK	48.53	28.33	14.10	41.59	2.35	51.72	73.9	22.1	227	167	
Vert.	2498.511	PK	50.12	28.23	14.19	41.63	2.35	53.26	73.9	20.6	197	130	
Vert.	4804.000	PK	48.78	31.62	6.44	42.88	2.35	46.31	73.9	27.5	148	29	
Vert.	7206.000	PK	49.24	37.23	7.87	42.92	2.35	53.77	73.9	20.1	150	0	
Vert.	9608.000	PK	48.69	38.84	9.16	43.17	2.35	55.87	73.9	18.0	150	0	
Vert.	2307.000	AV	37.44	28.50	14.02	41.56	2.35	40.75	53.9	13.1	175	152	VBW: 360 Hz
Vert.	2390.000	AV	35.75	28.33	14.10	41.59	2.35	38.94	53.9	14.9	227	167	VBW: 360 Hz
Vert.	2498.511	AV	37.31	28.23	14.19	41.63	2.35	40.45	53.9	13.4	197	130	VBW: 360 Hz
Vert.	4804.000	AV	36.86	31.62	6.44	42.88	2.35	34.39	53.9	19.5	148	29	VBW: 360 Hz
Vert.	7206.000	AV	37.29	37.23	7.87	42.92	2.35	41.82	53.9	12.0	150	0	VBW: 360 Hz
Vert.	9608.000	AV	36.94	38.84	9.16	43.17	2.35	44.12	53.9	9.7	150	0	VBW: 360 Hz

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

Distance factor : 1 GHz - 13 GHz : $20\log(3.93 \text{ m} / 3.0 \text{ m}) = 2.35 \text{ dB}$

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

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

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2402.000	PK	101.38	28.31	14.11	41.60	2.35	104.55	-	-	Carrier
Hori.	2400.000	PK	44.63	28.31	14.10	41.60	2.35	47.79	84.6	36.7	
Vert.	2402.000	PK	100.54	28.31	14.11	41.60	2.35	103.71	-	-	Carrier
Vert.	2400.000	PK	41.51	28.31	14.10	41.60	2.35	44.67	83.7	39.0	

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

Distance factor : 1 GHz - 13 GHz : $20\log(3.93 \text{ m} / 3.0 \text{ m}) = 2.35 \text{ dB}$

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

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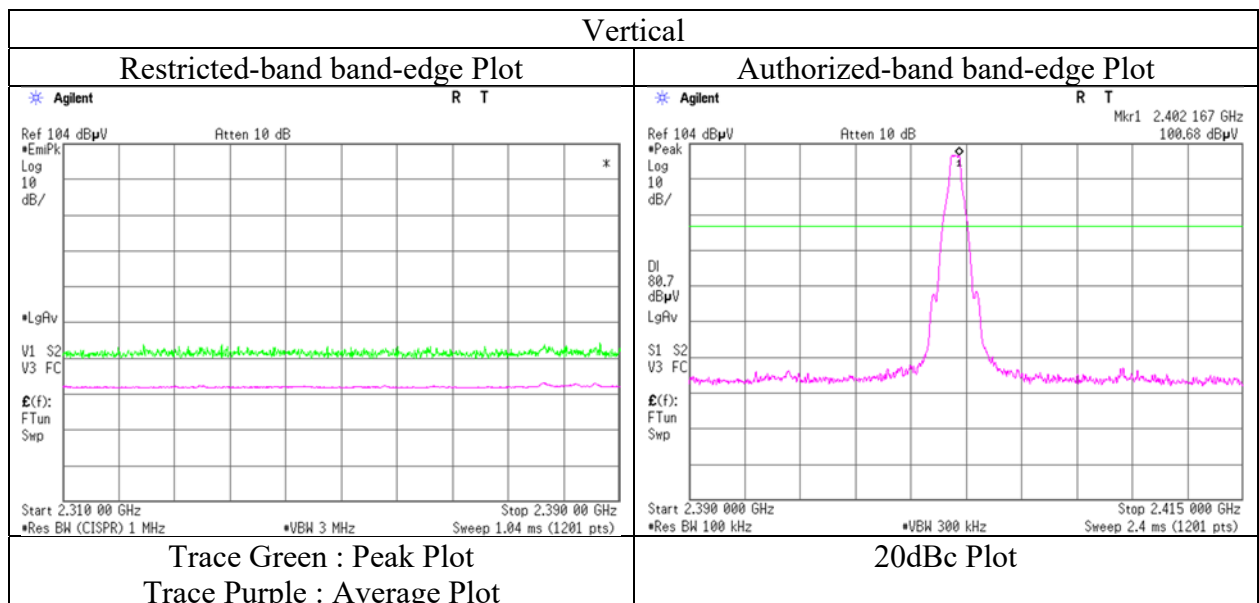
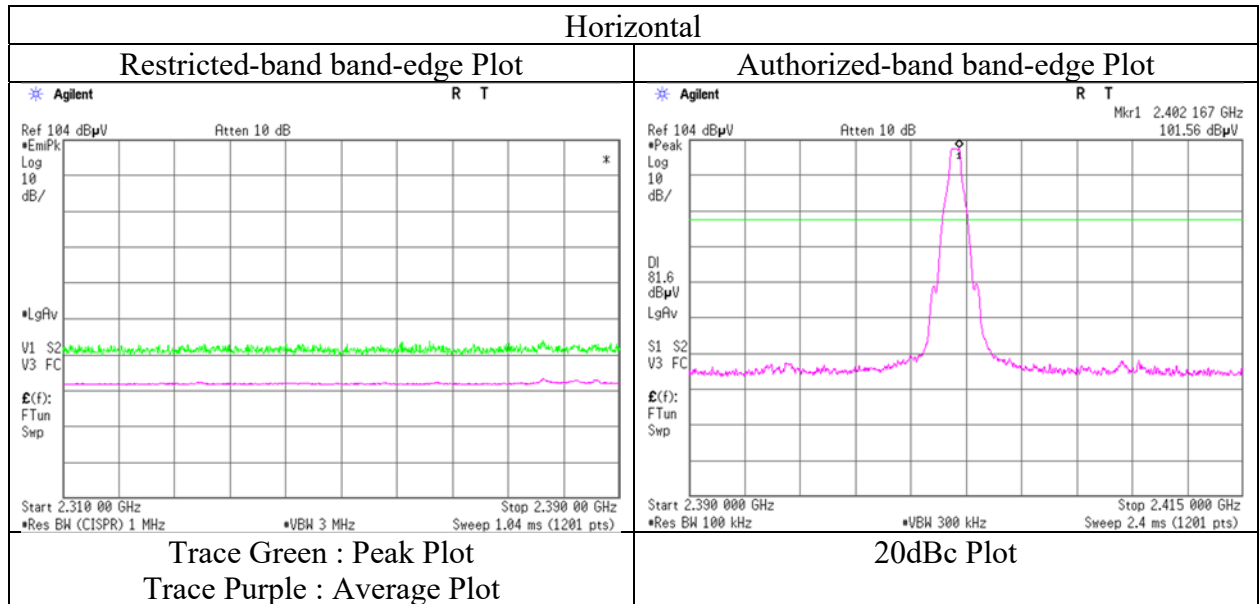
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Radiated Spurious Emission (Reference Plot for band-edge)

Report No.	13024969S-AA-R3
Test place	Shonan EMC Lab.
Semi Anechoic Chamber	No.3
Date	November 22, 2019
Temperature / Humidity	22 deg. C / 39 % RH
Engineer	Takahiro Suzuki
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.

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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

Report No.	13024969S-AA-R3		
Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	No.3	No.3	No.3
Date	December 12, 2019	November 22, 2019	November 25, 2019
Temperature / Humidity	22 deg. C / 45 % RH	22 deg. C / 39 % RH	23 deg. C / 55 % RH
Engineer	Toshinori Yamada	Takahiro Suzuki	Yasumasa Owaki
	(30 MHz -1 GHz)	(1 GHz -13 GHz)	(13 GHz -26.5 GHz)
Mode	Tx, Hopping Off, DH5 2441 MHz		

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	30.867	QP	22.40	17.97	6.49	32.19	0.00	14.67	40.0	25.3	150	359	
Hori.	37.937	QP	22.30	15.45	6.63	32.19	0.00	12.19	40.0	27.8	200	0	
Hori.	194.712	QP	21.90	16.32	7.88	32.08	0.00	14.02	43.5	29.4	200	0	
Hori.	893.298	QP	20.60	21.55	10.99	31.13	0.00	22.01	46.0	23.9	100	359	
Hori.	918.491	QP	20.90	21.64	11.07	30.92	0.00	22.69	46.0	23.3	100	359	
Hori.	2341.536	PK	52.62	28.43	14.05	41.58	2.35	55.87	73.9	18.0	142	81	
Hori.	2541.052	PK	51.24	28.21	14.22	41.64	2.35	54.38	73.9	19.5	248	82	
Hori.	4882.000	PK	49.59	31.71	6.49	42.89	2.35	47.25	73.9	26.6	145	114	
Hori.	7323.000	PK	47.52	37.39	7.96	43.15	2.35	52.07	73.9	21.8	150	0	
Hori.	9764.000	PK	46.18	39.34	9.22	43.01	2.35	54.08	73.9	19.8	150	0	
Hori.	2341.536	AV	39.57	28.43	14.05	41.58	2.35	42.82	53.9	11.0	142	81	VBW: 360 Hz
Hori.	2541.052	AV	38.27	28.21	14.22	41.64	2.35	41.41	53.9	12.4	248	82	VBW: 360 Hz
Hori.	4882.000	AV	38.27	31.71	6.49	42.89	2.35	35.93	53.9	17.9	145	114	VBW: 360 Hz
Hori.	7323.000	AV	37.22	37.39	7.96	43.15	2.35	41.77	53.9	12.1	150	0	VBW: 360 Hz
Hori.	9764.000	AV	36.94	39.34	9.22	43.01	2.35	44.84	53.9	9.0	150	0	VBW: 360 Hz
Vert.	31.170	QP	22.40	17.87	6.49	32.19	0.00	14.57	40.0	25.4	150	359	
Vert.	145.526	QP	24.70	14.51	7.76	32.12	0.00	14.85	43.5	28.6	100	277	
Vert.	911.634	QP	20.60	21.60	11.05	30.99	0.00	22.26	46.0	23.7	100	346	
Vert.	2341.543	PK	51.66	28.43	14.05	41.58	2.35	54.91	73.9	18.9	201	135	
Vert.	2541.034	PK	51.44	28.21	14.22	41.64	2.35	54.58	73.9	19.3	296	155	
Vert.	4882.000	PK	49.93	31.71	6.49	42.89	2.35	47.59	73.9	26.3	233	146	
Vert.	7323.000	PK	49.07	37.39	7.96	43.15	2.35	53.62	73.9	20.2	150	0	
Vert.	9764.000	PK	46.14	39.34	9.22	43.01	2.35	54.04	73.9	19.8	150	0	
Vert.	2341.543	AV	38.55	28.43	14.05	41.58	2.35	41.80	53.9	12.1	201	135	VBW: 360 Hz
Vert.	2541.034	AV	38.42	28.21	14.22	41.64	2.35	41.56	53.9	12.3	296	155	VBW: 360 Hz
Vert.	4882.000	AV	36.86	31.71	6.49	42.89	2.35	34.52	53.9	19.3	233	146	VBW: 360 Hz
Vert.	7323.000	AV	36.78	37.39	7.96	43.15	2.35	41.33	53.9	12.5	150	0	VBW: 360 Hz
Vert.	9764.000	AV	35.44	39.34	9.22	43.01	2.35	43.34	53.9	10.5	150	0	VBW: 360 Hz

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

Distance factor : 1 GHz - 13 GHz : $20\log(3.93\text{ m} / 3.0\text{ m}) = 2.35\text{ dB}$

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

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

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Radiated Spurious Emission

Report No.	13024969S-AA-R3		
Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	No.3	No.3	No.3
Date	December 12, 2019	November 22, 2019	November 25, 2019
Temperature / Humidity	22 deg. C / 45 % RH	22 deg. C / 39 % RH	23 deg. C / 55 % RH
Engineer	Toshinori Yamada	Takahiro Suzuki	Yasumasa Owaki
	(30 MHz -1 GHz)	(1 GHz -13 GHz)	(13 GHz -26.5 GHz)
Mode	Tx, Hopping Off, DH5 2480 MHz		

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	30.658	QP	22.40	18.04	6.49	32.19	0.00	14.74	40.0	25.2	200	0	
Hori.	198.741	QP	21.30	16.40	7.90	32.07	0.00	13.53	43.5	29.9	300	280	
Hori.	844.020	QP	21.00	20.97	10.85	31.40	0.00	21.42	46.0	24.5	150	359	
Hori.	874.957	QP	20.90	21.59	10.93	31.23	0.00	22.19	46.0	23.8	100	359	
Hori.	2378.042	PK	51.95	28.37	14.09	41.59	2.35	55.17	73.9	18.7	145	75	
Hori.	2483.500	PK	51.51	28.24	14.18	41.62	2.35	54.66	73.9	19.2	129	88	
Hori.	2582.465	PK	51.26	28.25	14.26	41.66	2.35	54.46	73.9	19.4	241	89	
Hori.	4960.000	PK	48.60	31.96	6.54	42.91	2.35	46.54	73.9	27.3	163	118	
Hori.	7440.000	PK	47.16	37.56	8.04	43.38	2.35	51.73	73.9	22.1	150	0	
Hori.	9920.000	PK	46.18	39.18	9.27	42.84	2.35	54.14	73.9	19.7	150	0	
Hori.	2378.042	AV	37.84	28.37	14.09	41.59	2.35	41.06	53.9	12.8	145	75	VBW: 360 Hz
Hori.	2483.500	AV	36.66	28.24	14.18	41.62	2.35	39.81	53.9	14.0	129	88	VBW: 360 Hz
Hori.	2582.465	AV	37.72	28.25	14.26	41.66	2.35	40.92	53.9	12.9	241	89	VBW: 360 Hz
Hori.	4960.000	AV	36.49	31.96	6.54	42.91	2.35	34.43	53.9	19.4	163	118	VBW: 360 Hz
Hori.	7440.000	AV	35.43	37.56	8.04	43.38	2.35	40.00	53.9	13.9	150	0	VBW: 360 Hz
Hori.	9920.000	AV	34.21	39.18	9.27	42.84	2.35	42.17	53.9	11.7	150	0	VBW: 360 Hz
Vert.	31.113	QP	22.50	17.89	6.49	32.19	0.00	14.69	40.0	25.3	100	0	
Vert.	188.827	QP	22.00	16.19	7.87	32.08	0.00	13.98	43.5	29.5	100	161	
Vert.	732.354	QP	21.10	19.89	10.48	31.81	0.00	19.66	46.0	26.3	100	359	
Vert.	788.548	QP	20.70	20.23	10.67	31.66	0.00	19.94	46.0	26.0	100	359	
Vert.	2378.000	PK	50.74	28.37	14.09	41.59	2.35	53.96	73.9	19.9	262	160	
Vert.	2483.500	PK	51.92	28.24	14.18	41.62	2.35	55.07	73.9	18.8	264	163	
Vert.	2579.787	PK	50.85	28.25	14.26	41.66	2.35	54.05	73.9	19.8	241	164	
Vert.	4960.000	PK	47.76	31.96	6.54	42.91	2.35	45.70	73.9	28.2	175	160	
Vert.	7440.000	PK	47.23	37.56	8.04	43.38	2.35	51.80	73.9	22.1	150	0	
Vert.	9920.000	PK	46.11	39.18	9.27	42.84	2.35	54.07	73.9	19.8	150	0	
Vert.	2378.000	AV	37.32	28.37	14.09	41.59	2.35	40.54	53.9	13.3	262	160	VBW: 360 Hz
Vert.	2483.500	AV	36.41	28.24	14.18	41.62	2.35	39.56	53.9	14.3	264	163	VBW: 360 Hz
Vert.	2579.787	AV	37.53	28.25	14.26	41.66	2.35	40.73	53.9	13.1	241	164	VBW: 360 Hz
Vert.	4960.000	AV	35.45	31.96	6.54	42.91	2.35	33.39	53.9	20.5	175	160	VBW: 360 Hz
Vert.	7440.000	AV	35.53	37.56	8.04	43.38	2.35	40.10	53.9	13.8	150	0	VBW: 360 Hz
Vert.	9920.000	AV	34.38	39.18	9.27	42.84	2.35	42.34	53.9	11.5	150	0	VBW: 360 Hz

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

Distance factor : 1 GHz - 13 GHz : $20\log(3.93\text{ m} / 3.0\text{ m}) = 2.35\text{ dB}$

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

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

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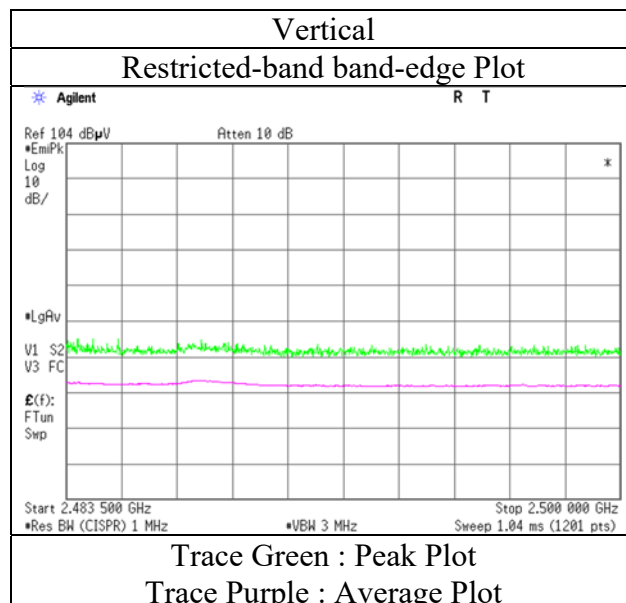
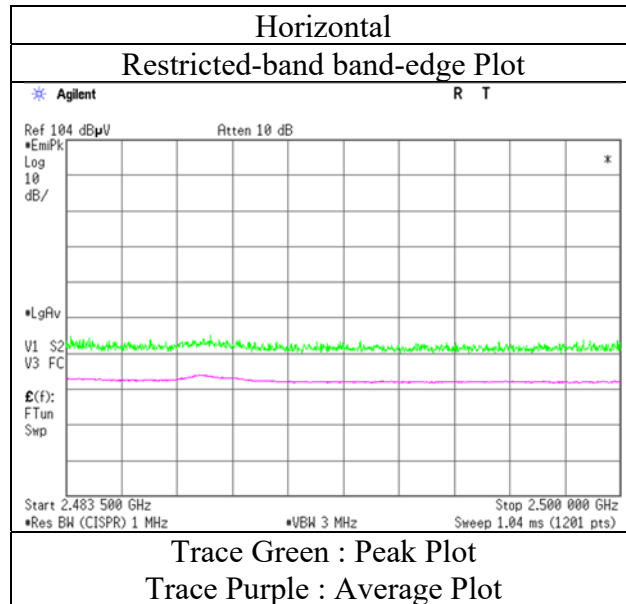
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Radiated Spurious Emission (Reference Plot for band-edge)

Report No.	13024969S-AA-R3
Test place	Shonan EMC Lab.
Semi Anechoic Chamber	No.3
Date	November 22, 2019
Temperature / Humidity	22 deg. C / 39 % RH
Engineer	Takahiro Suzuki
Mode	Tx, Hopping Off, DH5 2480 MHz



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

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

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Radiated Spurious Emission

Report No.	13024969S-AA-R3		
Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	No.3	No.3	No.3
Date	December 12, 2019	November 22, 2019	November 25, 2019
Temperature / Humidity	22 deg. C / 45 % RH	22 deg. C / 39 % RH	23 deg. C / 55 % RH
Engineer	Toshinori Yamada	Takahiro Suzuki	Yasumasa Owaki
	(30 MHz -1 GHz)	(1 GHz -13 GHz)	(13 GHz -26.5 GHz)
Mode	Tx, Hopping Off, 3DH5 2402 MHz		

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	30.678	QP	22.50	18.03	6.49	32.19	0.00	14.83	40.0	25.1	150	0	
Hori.	195.816	QP	21.80	16.36	7.89	32.07	0.00	13.98	43.5	29.5	150	0	
Hori.	832.603	QP	21.20	20.62	10.81	31.46	0.00	21.17	46.0	24.8	150	0	
Hori.	2390.000	PK	47.94	28.33	14.10	41.59	2.35	51.13	73.9	22.7	205	81	
Hori.	4804.000	PK	48.65	31.62	6.44	42.88	2.35	46.18	73.9	27.7	130	116	
Hori.	7206.000	PK	47.95	37.23	7.87	42.92	2.35	52.48	73.9	21.4	150	0	
Hori.	9608.000	PK	46.91	38.84	9.16	43.17	2.35	54.09	73.9	19.8	150	0	
Hori.	2390.000	AV	35.79	28.33	14.10	41.59	2.35	38.98	53.9	14.9	205	81	VBW: 360 Hz
Hori.	4804.000	AV	36.18	31.62	6.44	42.88	2.35	33.71	53.9	20.1	130	116	VBW: 360 Hz
Hori.	7206.000	AV	35.62	37.23	7.87	42.92	2.35	40.15	53.9	13.7	150	0	VBW: 360 Hz
Hori.	9608.000	AV	35.44	38.84	9.16	43.17	2.35	42.62	53.9	11.2	150	0	VBW: 360 Hz
Vert.	36.965	QP	22.40	15.86	6.60	32.19	0.00	12.67	40.0	27.3	100	0	
Vert.	43.401	QP	24.10	13.44	6.73	32.19	0.00	12.08	40.0	27.9	100	261	
Vert.	73.947	QP	31.40	6.16	7.14	32.17	0.00	12.53	40.0	27.4	100	349	
Vert.	192.798	QP	21.50	16.29	7.88	32.08	0.00	13.59	43.5	29.9	100	0	
Vert.	863.229	QP	21.00	21.39	10.90	31.30	0.00	21.99	46.0	24.0	100	0	
Vert.	2390.000	PK	49.56	28.33	14.10	41.59	2.35	52.75	73.9	21.1	225	132	
Vert.	4804.000	PK	49.09	31.62	6.44	42.88	2.35	46.62	73.9	27.2	139	141	
Vert.	7206.000	PK	47.23	37.23	7.87	42.92	2.35	51.76	73.9	22.1	150	0	
Vert.	9608.000	PK	47.03	38.84	9.16	43.17	2.35	54.21	73.9	19.6	150	0	
Vert.	2390.000	AV	35.73	28.33	14.10	41.59	2.35	38.92	53.9	14.9	225	132	VBW: 360 Hz
Vert.	4804.000	AV	35.54	31.62	6.44	42.88	2.35	33.07	53.9	20.8	139	141	VBW: 360 Hz
Vert.	7206.000	AV	35.04	37.23	7.87	42.92	2.35	39.57	53.9	14.3	150	0	VBW: 360 Hz
Vert.	9608.000	AV	35.35	38.84	9.16	43.17	2.35	42.53	53.9	11.3	150	0	VBW: 360 Hz

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

Distance factor : 1 GHz - 13 GHz : $20\log(3.93 \text{ m} / 3.0 \text{ m}) = 2.35 \text{ dB}$

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

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

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2402.000	PK	92.48	28.31	14.11	41.60	2.35	95.65	-	-	Carrier
Hori.	2400.000	PK	42.59	28.31	14.10	41.60	2.35	45.75	75.7	29.9	
Vert.	2402.000	PK	91.63	28.31	14.11	41.60	2.35	94.80	-	-	Carrier
Vert.	2400.000	PK	41.16	28.31	14.10	41.60	2.35	44.32	74.8	30.4	

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

Distance factor : 1 GHz - 13 GHz : $20\log(3.93 \text{ m} / 3.0 \text{ m}) = 2.35 \text{ dB}$

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

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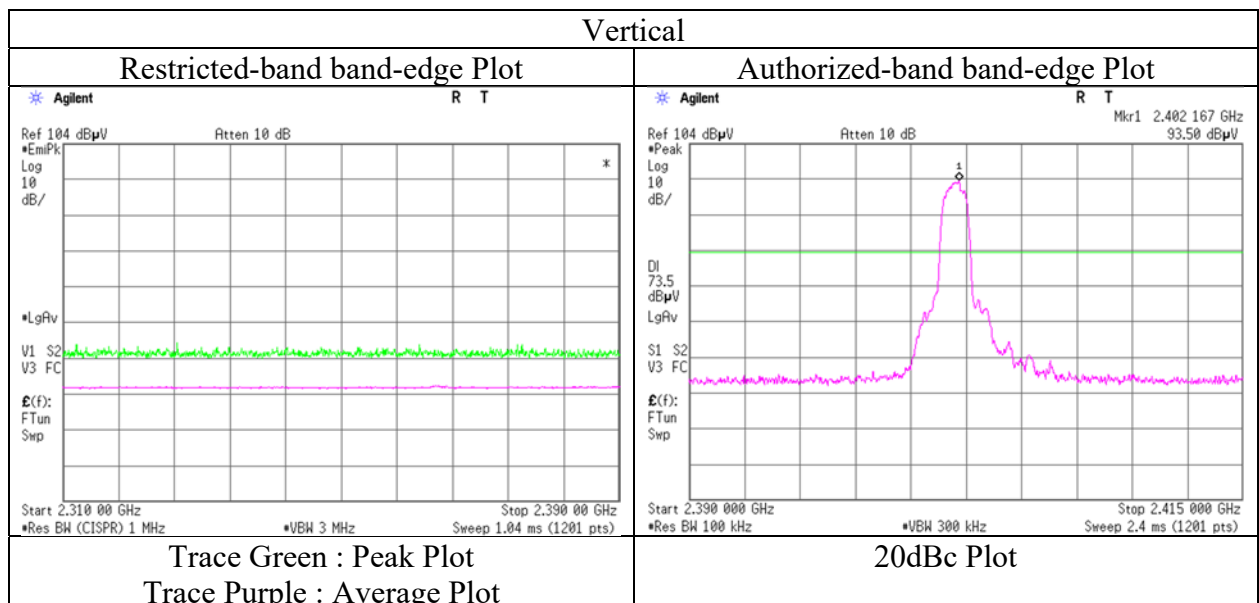
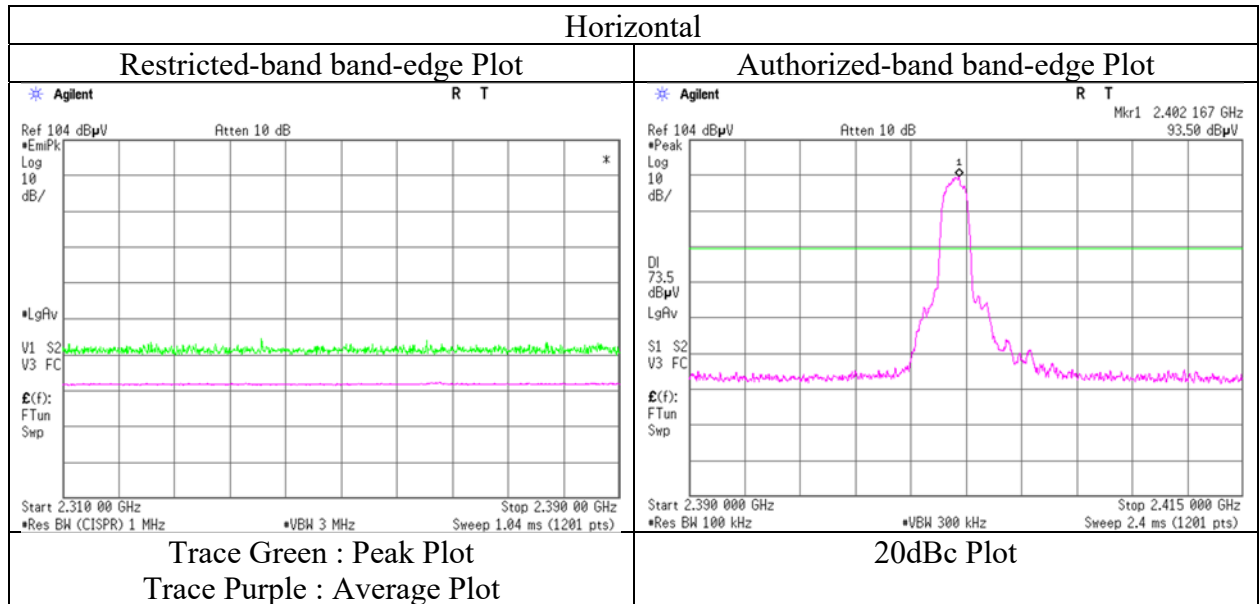
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Radiated Spurious Emission (Reference Plot for band-edge)

Report No.	13024969S-AA-R3
Test place	Shonan EMC Lab.
Semi Anechoic Chamber	No.3
Date	November 22, 2019
Temperature / Humidity	22 deg. C / 39 % RH
Engineer	Takahiro Suzuki
Mode	Tx, Hopping Off, 3DH5 2402 MHz



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

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

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Shonan EMC Lab.

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Radiated Spurious Emission

Report No.	13024969S-AA-R3			
Test place	Shonan EMC Lab.			
Semi Anechoic Chamber	No.3	No.3	No.3	No.3
Date	December 12, 2019	November 22, 2019	November 22, 2019	November 25, 2019
Temperature / Humidity	22 deg. C / 45 % RH	22 deg. C / 39 % RH	22 deg. C / 39 % RH	23 deg. C / 55 % RH
Engineer	Toshinori Yamada	Takahiro Suzuki	Takahiro Suzuki	Yasumasa Owaki
	(30 MHz -1 GHz)	(1 GHz -2.8 GHz)	(2.8 GHz -13 GHz)	(13 GHz -26.5 GHz)
Mode	Tx, Hopping Off, 3DH5 2441 MHz			

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	34.569	QP	21.60	16.73	6.56	32.19	0.00	12.70	40.0	27.3	300	0	
Hori.	801.897	QP	21.10	20.40	10.72	31.61	0.00	20.61	46.0	25.3	100	0	
Hori.	871.728	QP	21.20	21.57	10.93	31.25	0.00	22.45	46.0	23.5	100	0	
Hori.	4882.000	PK	48.92	31.71	6.49	42.89	2.35	46.58	73.9	27.3	133	114	
Hori.	7323.000	PK	47.32	37.39	7.96	43.15	2.35	51.87	73.9	22.0	150	0	
Hori.	9764.000	PK	47.11	39.34	9.22	43.01	2.35	55.01	73.9	18.8	150	0	
Hori.	4882.000	AV	38.45	31.71	6.49	42.89	2.35	36.11	53.9	17.7	133	114	VBW: 360 Hz
Hori.	7323.000	AV	36.83	37.39	7.96	43.15	2.35	41.38	53.9	12.5	150	0	VBW: 360 Hz
Hori.	9764.000	AV	36.46	39.34	9.22	43.01	2.35	44.36	53.9	9.5	150	0	VBW: 360 Hz
Vert.	30.830	QP	22.40	17.98	6.49	32.19	0.00	14.68	40.0	25.3	100	0	
Vert.	34.571	QP	21.60	16.73	6.56	32.19	0.00	12.70	40.0	27.3	100	0	
Vert.	52.606	QP	23.00	10.17	6.79	32.19	0.00	7.77	40.0	32.2	100	225	
Vert.	191.363	QP	21.40	16.26	7.87	32.08	0.00	13.45	43.5	30.0	100	0	
Vert.	865.735	QP	20.90	21.49	10.91	31.28	0.00	22.02	46.0	23.9	100	0	
Vert.	4882.000	PK	48.87	31.71	6.49	42.89	2.35	46.53	73.9	27.3	320	149	
Vert.	7323.000	PK	48.31	37.39	7.96	43.15	2.35	52.86	73.9	21.0	150	0	
Vert.	9764.000	PK	47.98	39.34	9.22	43.01	2.35	55.88	73.9	18.0	150	0	
Vert.	4882.000	AV	37.48	31.71	6.49	42.89	2.35	35.14	53.9	18.7	320	149	VBW: 360 Hz
Vert.	7323.000	AV	36.96	37.39	7.96	43.15	2.35	41.51	53.9	12.3	150	0	VBW: 360 Hz
Vert.	9764.000	AV	36.37	39.34	9.22	43.01	2.35	44.27	53.9	9.6	150	0	VBW: 360 Hz

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

Distance factor : 1 GHz - 13 GHz : $20\log(3.93\text{ m} / 3.0\text{ m}) = 2.35\text{ dB}$

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

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

Radiated Spurious Emission

Report No.	13024969S-AA-R3			
Test place	Shonan EMC Lab.			
Semi Anechoic Chamber	No.3	No.3	No.3	No.3
Date	December 12, 2019	November 22, 2019	November 22, 2019	November 25, 2019
Temperature / Humidity	22 deg. C / 45 % RH	22 deg. C / 39 % RH	22 deg. C / 39 % RH	23 deg. C / 55 % RH
Engineer	Toshinori Yamada	Takahiro Suzuki	Takahiro Suzuki	Yasumasa Owaki
	(30 MHz -1 GHz)	(1 GHz -2.8 GHz)	(2.8 GHz -13 GHz)	(13 GHz -26.5 GHz)
Mode	Tx, Hopping Off, 3DH5 2480 MHz			

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	30.170	QP	22.40	18.21	6.47	32.19	0.00	14.89	40.0	25.1	200	0	
Hori.	34.186	QP	21.50	16.87	6.55	32.19	0.00	12.73	40.0	27.2	150	0	
Hori.	194.815	QP	21.90	16.32	7.88	32.08	0.00	14.02	43.5	29.4	150	0	
Hori.	873.507	QP	20.90	21.61	10.93	31.24	0.00	22.20	46.0	23.8	100	0	
Hori.	941.042	QP	20.10	21.56	11.14	30.72	0.00	22.08	46.0	23.9	100	0	
Hori.	2483.500	PK	55.87	28.24	14.18	41.62	2.35	59.02	73.9	14.8	100	84	
Hori.	4960.000	PK	49.86	31.96	6.54	42.91	2.35	47.80	73.9	26.1	145	111	
Hori.	7440.000	PK	47.99	37.56	8.04	43.38	2.35	52.56	73.9	21.3	150	0	
Hori.	9920.000	PK	46.75	39.18	9.27	42.84	2.35	54.71	73.9	19.1	150	0	
Hori.	2483.500	AV	37.26	28.24	14.18	41.62	2.35	40.41	53.9	13.4	100	84	VBW: 360 Hz
Hori.	4960.000	AV	39.02	31.96	6.54	42.91	2.35	36.96	53.9	16.9	145	111	VBW: 360 Hz
Hori.	7440.000	AV	36.97	37.56	8.04	43.38	2.35	41.54	53.9	12.3	150	0	VBW: 360 Hz
Hori.	9920.000	AV	35.72	39.18	9.27	42.84	2.35	43.68	53.9	10.2	150	0	VBW: 360 Hz
Vert.	31.212	QP	22.40	17.86	6.49	32.19	0.00	14.56	40.0	25.4	100	0	
Vert.	197.099	QP	21.50	16.37	7.90	32.07	0.00	13.70	43.5	29.8	100	0	
Vert.	883.423	QP	21.00	21.59	10.97	31.18	0.00	22.38	46.0	23.6	100	0	
Vert.	2483.500	PK	56.04	28.24	14.18	41.62	2.35	59.19	73.9	14.7	226	134	
Vert.	4960.000	PK	48.93	31.96	6.54	42.91	2.35	46.87	73.9	27.0	299	199	
Vert.	7440.000	PK	47.47	37.56	8.04	43.38	2.35	52.04	73.9	21.8	150	0	
Vert.	9920.000	PK	46.36	39.18	9.27	42.84	2.35	54.32	73.9	19.5	150	0	
Vert.	2483.500	AV	37.53	28.24	14.18	41.62	2.35	40.68	53.9	13.2	226	134	VBW: 360 Hz
Vert.	4960.000	AV	37.47	31.96	6.54	42.91	2.35	35.41	53.9	18.4	299	199	VBW: 360 Hz
Vert.	7440.000	AV	36.99	37.56	8.04	43.38	2.35	41.56	53.9	12.3	150	0	VBW: 360 Hz
Vert.	9920.000	AV	35.61	39.18	9.27	42.84	2.35	43.57	53.9	10.3	150	0	VBW: 360 Hz

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

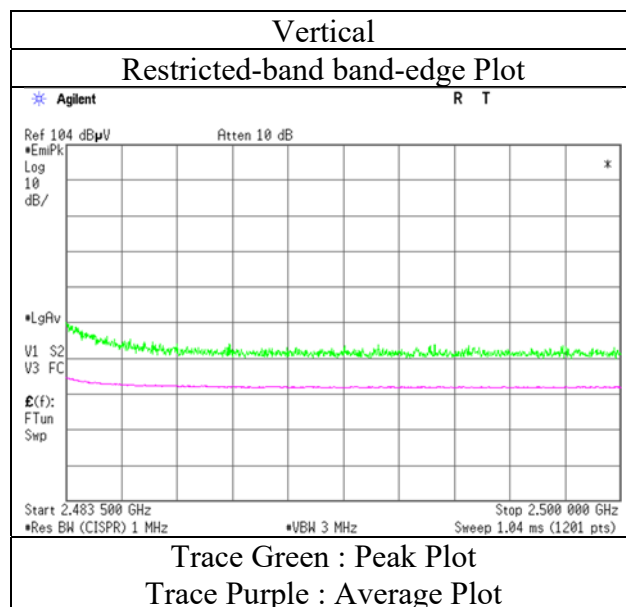
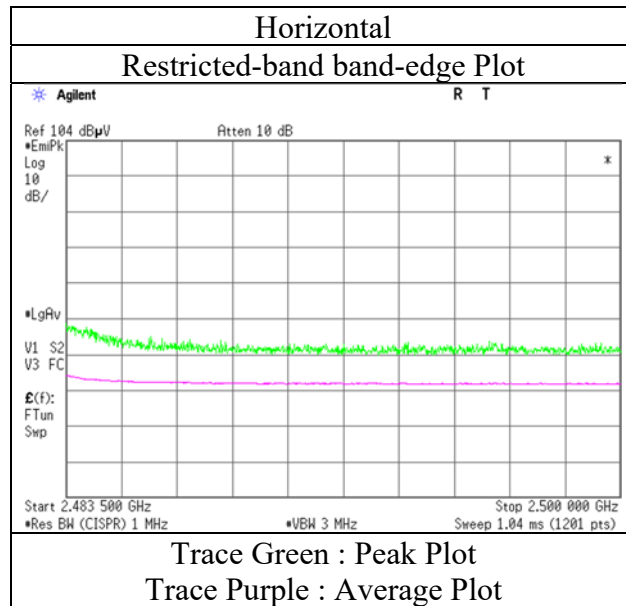
Distance factor : 1 GHz - 13 GHz : $20\log(3.93\text{ m} / 3.0\text{ m}) = 2.35\text{ dB}$

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

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

Radiated Spurious Emission (Reference Plot for band-edge)

Report No.	13024969S-AA-R3
Test place	Shonan EMC Lab.
Semi Anechoic Chamber	No.3
Date	November 22, 2019
Temperature / Humidity	22 deg. C / 39 % RH
Engineer	Takahiro Suzuki
Mode	Tx, Hopping Off, 3DH5 2480 MHz



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

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

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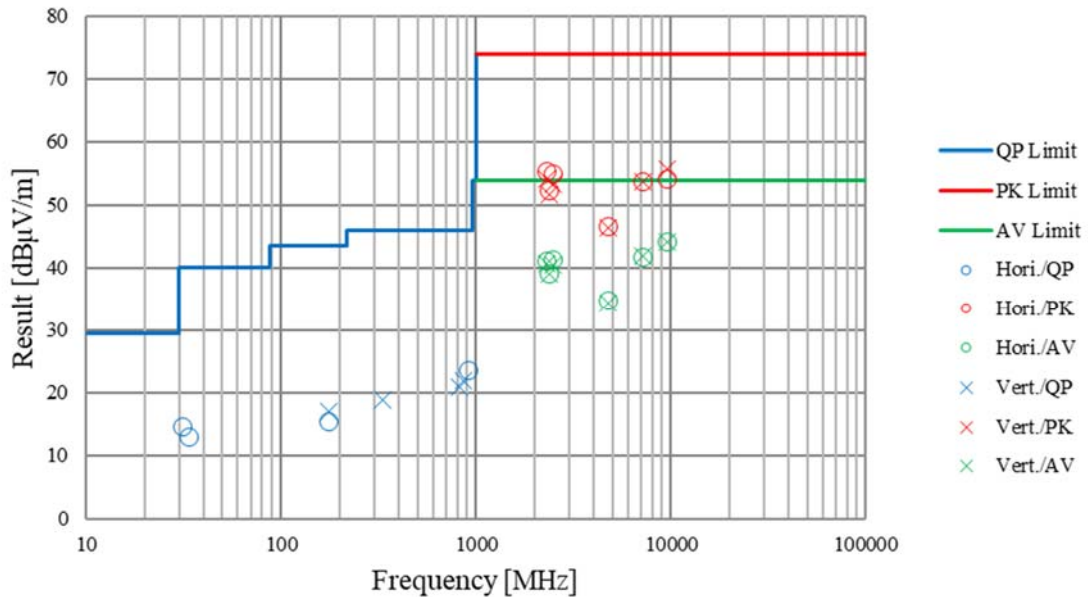
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

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Radiated Spurious Emission (Plot data, Worst case)

Report No.	13024969S-AA-R3		
Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	No.3	No.3	No.3
Date	December 12, 2019	November 22, 2019	November 25, 2019
Temperature / Humidity	22 deg. C / 45 % RH	22 deg. C / 39 % RH	23 deg. C / 55 % RH
Engineer	Toshinori Yamada (30 MHz -1 GHz)	Takahiro Suzuki (1 GHz -13 GHz)	Yasumasa Owaki (13 GHz -26.5 GHz)
Mode	Tx, Hopping Off, DH5 2402 MHz		



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

Radiated Spurious Emission

Report No. 13024969S-AA-R3
Test place Shonan EMC Lab.
Semi Anechoic Chamber No.3
Date January 9, 2020
Temperature / Humidity 21 deg. C / 32 % RH
Engineer Kazuya Noda
(1 GHz – 2.8 GHz)
Mode Tx, Hopping Off, DH5 2402 MHz with 11ac-40 Tx 5190 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	47.33	28.33	14.10	41.59	2.35	50.52	73.9	23.3	212	84	VBW: 360 Hz
Hori.	2390.000	AV	36.39	28.33	14.10	41.59	2.35	39.58	53.9	14.3	212	84	
Vert.	2390.000	PK	47.42	28.33	14.10	41.59	2.35	50.61	73.9	23.2	147	175	
Vert.	2390.000	AV	36.23	28.33	14.10	41.59	2.35	39.42	53.9	14.4	147	175	VBW: 360 Hz

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor
Distance factor : 1 GHz - 13 GHz : $20\log(3.93 \text{ m} / 3.0 \text{ m}) = 2.35 \text{ dB}$

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

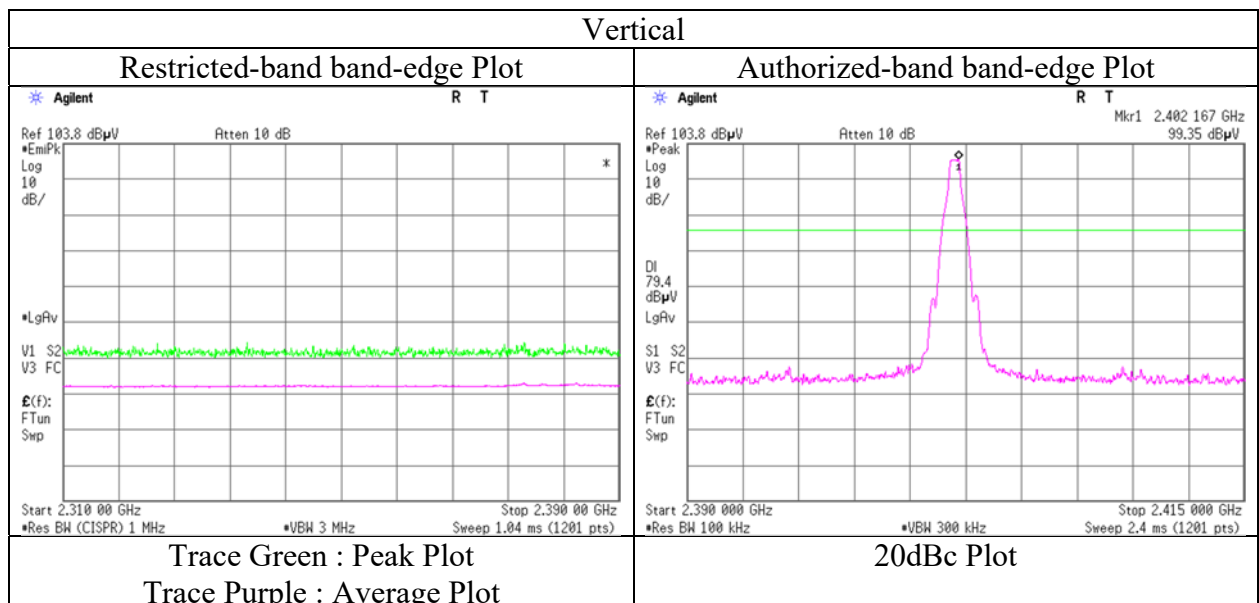
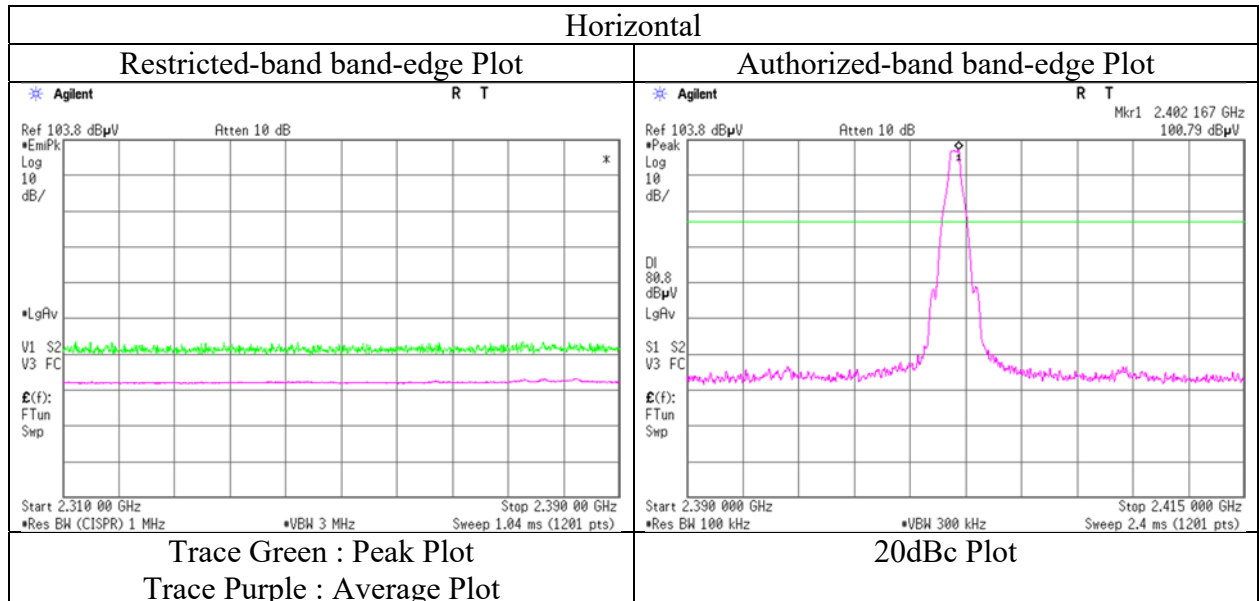
20 dBc Data Sheet (RBW 100 kHz, VBW 300 kHz)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2402.000	PK	100.40	28.31	14.11	41.60	2.35	103.57	-	-	Carrier
Hori.	2400.000	PK	42.04	28.31	14.10	41.60	2.35	45.20	83.57	38.3	Carrier
Vert.	2402.000	PK	98.75	28.31	14.11	41.60	2.35	101.92	-	-	
Vert.	2400.000	PK	41.26	28.31	14.10	41.60	2.35	44.42	81.92	37.5	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor
Distance factor : 1 GHz - 13 GHz : $20\log(3.93 \text{ m} / 3.0 \text{ m}) = 2.35 \text{ dB}$

Radiated Spurious Emission (Reference Plot for band-edge)

Report No.	13024969S-AA-R3
Test place	Shonan EMC Lab.
Semi Anechoic Chamber	No.3
Date	January 9, 2020
Temperature / Humidity	21 deg. C / 32 % RH
Engineer	Kazuya Noda
	(1 GHz – 2.8 GHz)
Mode	Tx, Hopping Off, DH5 2402 MHz with 11ac-40 Tx 5190 MHz



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

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

UL Japan, Inc.

Shonan EMC Lab.

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Radiated Spurious Emission

Report No.	13024969S-AA-R3			
Test place	Shonan EMC Lab.			
Semi Anechoic Chamber	No.3	No.3	No.3	No.3
Date	January 16, 2020	January 9, 2020	January 14, 2020	January 16, 2020
Temperature / Humidity	23 deg. C / 45 % RH	21 deg. C / 32 % RH	22 deg. C / 32 % RH	23 deg. C / 45 % RH
Engineer	Takahiro Kawakami	Kazuya Noda	Takahiro Kawakami	Takahiro Kawakami
	(30 MHz – 1000 MHz)	(1 GHz – 2.8 GHz)	(2.8 GHz - 18 GHz)	(18 GHz – 26.5 GHz)
Mode	Tx, Hopping Off, DH5 2441 MHz with 11ac-40 Tx 5190 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.	49.721	QP	22.57	11.15	6.81	32.19	0.00	8.34	40.0	31.6	100	292	
Hori.	127.326	QP	22.46	13.54	7.39	32.13	0.00	11.26	43.5	32.2	100	1	
Hori.	296.912	QP	21.95	13.48	8.76	32.02	0.00	12.17	46.0	33.8	100	137	
Hori.	730.319	QP	21.91	19.86	10.47	31.81	0.00	20.43	46.0	25.5	153	315	
Hori.	2343.508	PK	51.10	28.43	14.05	41.58	2.35	54.35	73.9	19.5	141	84	
Hori.	2538.256	PK	51.27	28.21	14.22	41.64	2.35	54.41	73.9	19.4	184	87	
Hori.	4882.000	PK	50.20	31.71	6.45	42.89	2.35	47.82	73.9	26.0	131	53	
Hori.	7323.000	PK	48.39	37.39	7.91	43.15	2.35	52.89	73.9	21.0	150	0	
Hori.	9764.000	PK	47.81	39.34	9.10	43.01	2.35	55.59	73.9	18.3	150	0	
Hori.	2343.508	AV	40.69	28.43	14.05	41.58	2.35	43.94	53.9	9.9	141	84	VBW: 360 Hz
Hori.	2538.256	AV	40.03	28.21	14.22	41.64	2.35	43.17	53.9	10.7	184	87	VBW: 360 Hz
Hori.	4882.000	AV	39.86	31.71	6.45	42.89	2.35	37.48	53.9	16.4	131	53	VBW: 360 Hz
Hori.	7323.000	AV	36.32	37.39	7.91	43.15	2.35	40.82	53.9	13.0	150	0	VBW: 360 Hz
Hori.	9764.000	AV	35.94	39.34	9.10	43.01	2.35	43.72	53.9	10.1	150	0	VBW: 360 Hz
Vert.	36.462	QP	22.70	16.00	6.60	32.19	0.00	13.11	40.0	26.8	100	6	
Vert.	133.968	QP	24.09	13.98	7.51	32.13	0.00	13.45	43.5	30.0	100	192	
Vert.	216.801	QP	22.24	10.94	8.19	32.05	0.00	9.32	46.0	36.6	100	3	
Vert.	544.207	QP	22.02	17.58	9.81	31.98	0.00	17.43	46.0	28.5	100	358	
Vert.	2343.626	PK	49.83	28.43	14.05	41.58	2.35	53.08	73.9	20.8	150	177	
Vert.	2538.069	PK	49.33	28.21	14.22	41.64	2.35	52.47	73.9	21.4	139	181	
Vert.	4882.000	PK	48.96	31.71	6.45	42.89	2.35	46.58	73.9	27.3	100	231	
Vert.	7323.000	PK	49.02	37.39	7.91	43.15	2.35	53.52	73.9	20.3	150	0	
Vert.	9764.000	PK	48.25	39.34	9.10	43.01	2.35	56.03	73.9	17.8	150	0	
Vert.	2343.626	AV	38.93	28.43	14.05	41.58	2.35	42.18	53.9	11.7	150	177	VBW: 360 Hz
Vert.	2538.069	AV	38.78	28.21	14.22	41.64	2.35	41.92	53.9	11.9	139	181	VBW: 360 Hz
Vert.	4882.000	AV	36.51	31.71	6.45	42.89	2.35	34.13	53.9	19.7	100	231	VBW: 360 Hz
Vert.	7323.000	AV	36.31	37.39	7.91	43.15	2.35	40.81	53.9	13.0	150	0	VBW: 360 Hz
Vert.	9764.000	AV	35.90	39.34	9.10	43.01	2.35	43.68	53.9	10.2	150	0	VBW: 360 Hz

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

Distance factor : 1 GHz - 13 GHz : $20\log(3.93\text{ m} / 3.0\text{ m}) = 2.35\text{ dB}$

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

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

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Radiated Spurious Emission

Report No. 13024969S-AA-R3
Test place Shonan EMC Lab.
Semi Anechoic Chamber No.3
Date January 9, 2020
Temperature / Humidity 21 deg. C / 32 % RH
Engineer Kazuya Noda
(1 GHz – 2.8 GHz)
Mode Tx, Hopping Off, DH5 2480 MHz with 11ac-40 Tx 5190 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	50.94	28.24	14.18	41.62	2.35	54.09	73.9	19.8	233	92	
Hori.	2483.500	AV	37.40	28.24	14.18	41.62	2.35	40.55	53.9	13.3	233	92	VBW: 360 Hz
Vert.	2483.500	PK	51.21	28.24	14.18	41.62	2.35	54.36	73.9	19.5	192	170	
Vert.	2483.500	AV	37.00	28.24	14.18	41.62	2.35	40.15	53.9	13.7	192	170	VBW: 360 Hz

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor
Distance factor : 1 GHz - 13 GHz : $20\log(3.93\text{ m} / 3.0\text{ m}) = 2.35\text{ dB}$

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

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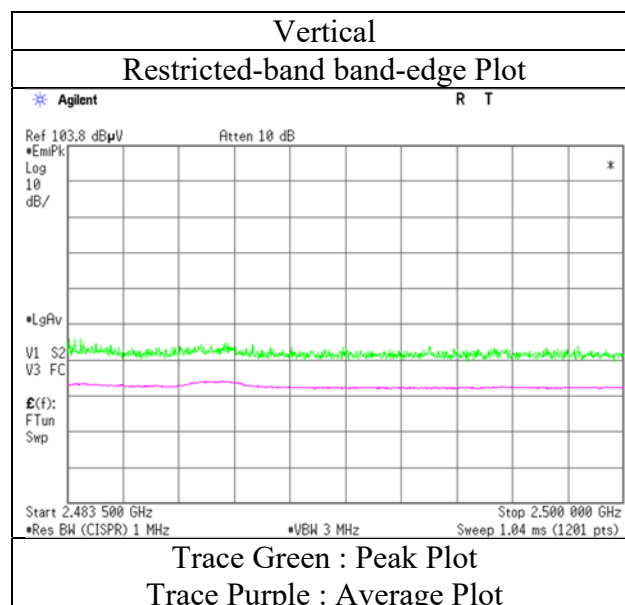
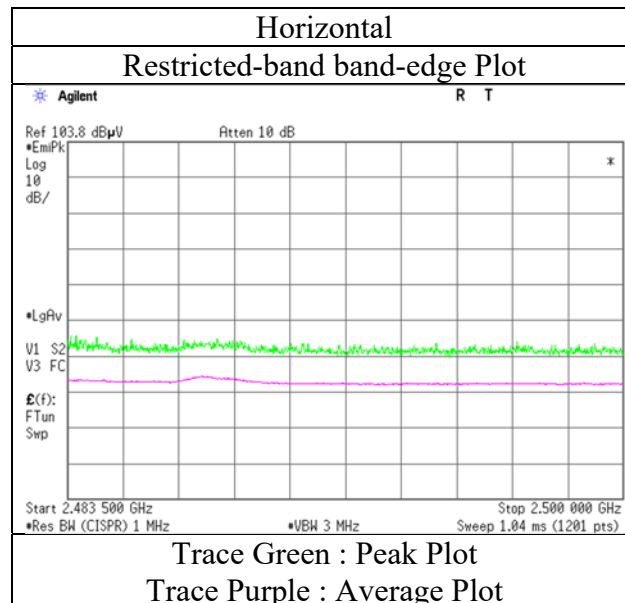
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Radiated Spurious Emission (Reference Plot for band-edge)

Report No.	13024969S-AA-R3
Test place	Shonan EMC Lab.
Semi Anechoic Chamber	No.3
Date	January 9, 2020
Temperature / Humidity	21 deg. C / 32 % RH
Engineer	Kazuya Noda
	(1 GHz – 2.8 GHz)
Mode	Tx, Hopping Off, DH5 2480 MHz with 11ac-40 Tx 5190 MHz



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

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

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Radiated Spurious Emission

Report No. 13024969S-AA-R3
Test place Shonan EMC Lab.
Semi Anechoic Chamber No.3
Date January 9, 2020
Temperature / Humidity 21 deg. C / 32 % RH
Engineer Kazuya Noda
(1 GHz – 2.8 GHz)
Mode Tx, Hopping Off, 3DH5 2402 MHz with 11ac-40 Tx 5190 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	47.77	28.33	14.10	41.59	2.35	50.96	73.9	22.9	142	85	VBW: 360 Hz
Hori.	2390.000	AV	35.82	28.33	14.10	41.59	2.35	39.01	53.9	14.8	142	85	
Vert.	2390.000	PK	48.21	28.33	14.10	41.59	2.35	51.40	73.9	22.5	228	176	
Vert.	2390.000	AV	36.25	28.33	14.10	41.59	2.35	39.44	53.9	14.4	228	176	VBW: 360 Hz

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

Distance factor : 1 GHz - 13 GHz : $20\log(3.93 \text{ m} / 3.0 \text{ m}) = 2.35 \text{ dB}$

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

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

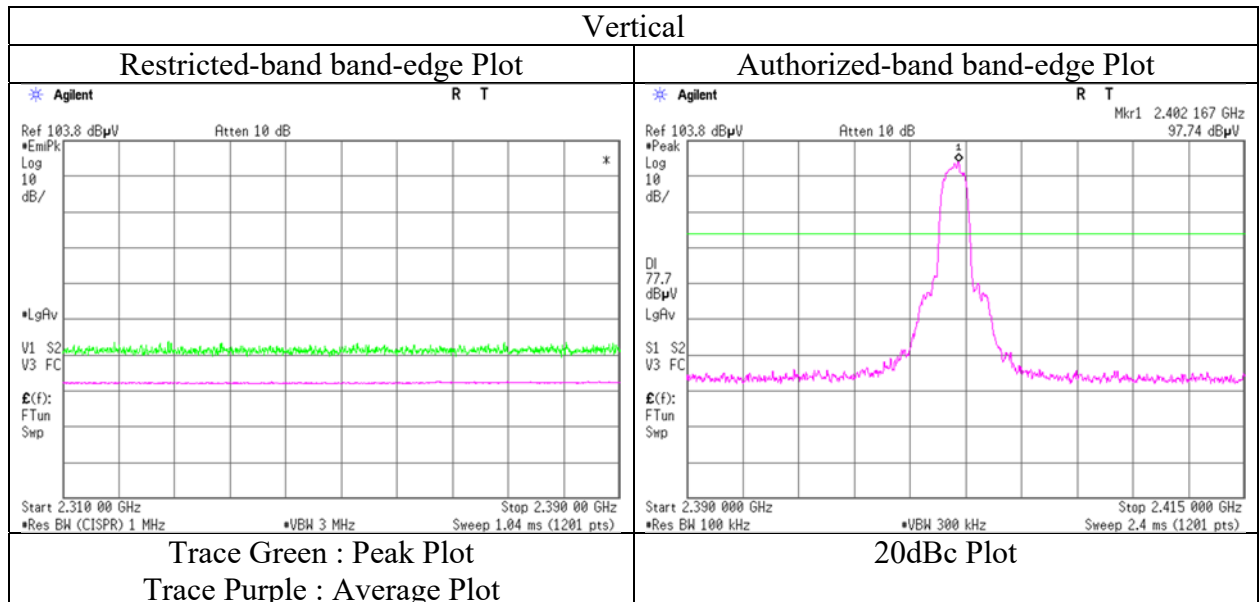
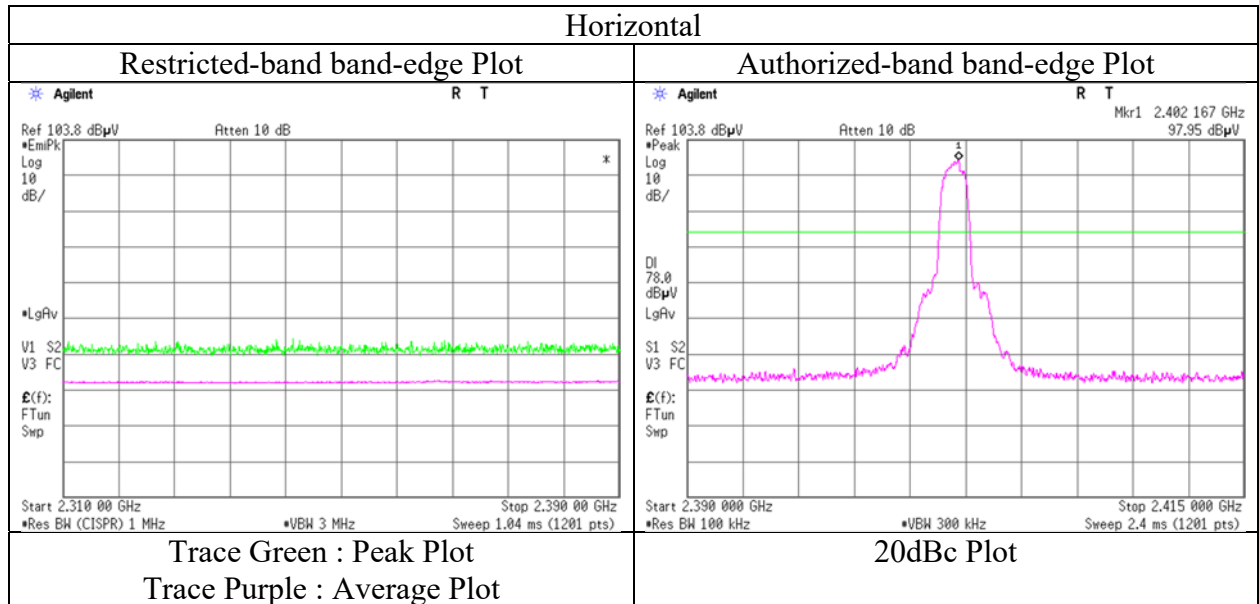
Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2402.000	PK	97.92	28.31	14.11	41.60	2.35	101.09	-	-	Carrier
Hori.	2400.000	PK	44.43	28.31	14.10	41.60	2.35	47.59	81.09	33.5	Carrier
Vert.	2402.000	PK	96.50	28.31	14.11	41.60	2.35	99.67	-	-	
Vert.	2400.000	PK	45.29	28.31	14.10	41.60	2.35	48.45	79.67	31.2	

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

Distance factor : 1 GHz - 13 GHz : $20\log(3.93 \text{ m} / 3.0 \text{ m}) = 2.35 \text{ dB}$

Radiated Spurious Emission (Reference Plot for band-edge)

Report No.	13024969S-AA-R3
Test place	Shonan EMC Lab.
Semi Anechoic Chamber	No.3
Date	January 9, 2020
Temperature / Humidity	21 deg. C / 32 % RH
Engineer	Kazuya Noda
	(1 GHz – 2.8 GHz)
Mode	Tx, Hopping Off, 3DH5 2402 MHz with 11ac-40 Tx 5190 MHz



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

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

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Radiated Spurious Emission

Report No. 13024969S-AA-R3
Test place Shonan EMC Lab.
Semi Anechoic Chamber No.3
Date January 9, 2020
Temperature / Humidity 21 deg. C / 32 % RH
Engineer Kazuya Noda
(1 GHz – 2.8 GHz)
Mode Tx, Hopping Off, 3DH5 2480 MHz with 11ac-40 Tx 5190 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	52.72	28.24	14.18	41.62	2.35	55.87	73.9	18.0	146	84	
Hori.	2483.500	AV	37.79	28.24	14.18	41.62	2.35	40.94	53.9	12.9	146	84	VBW: 360 Hz
Vert.	2483.500	PK	52.02	28.24	14.18	41.62	2.35	55.17	73.9	18.7	216	179	
Vert.	2483.500	AV	37.72	28.24	14.18	41.62	2.35	40.87	53.9	13.0	216	179	VBW: 360 Hz

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor
Distance factor : 1 GHz - 13 GHz : $20\log(3.93\text{ m} / 3.0\text{ m}) = 2.35\text{ dB}$

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

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Shonan EMC Lab.

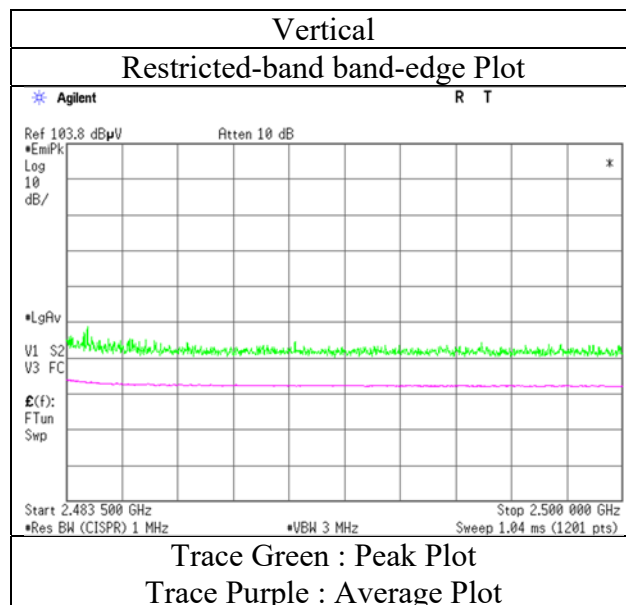
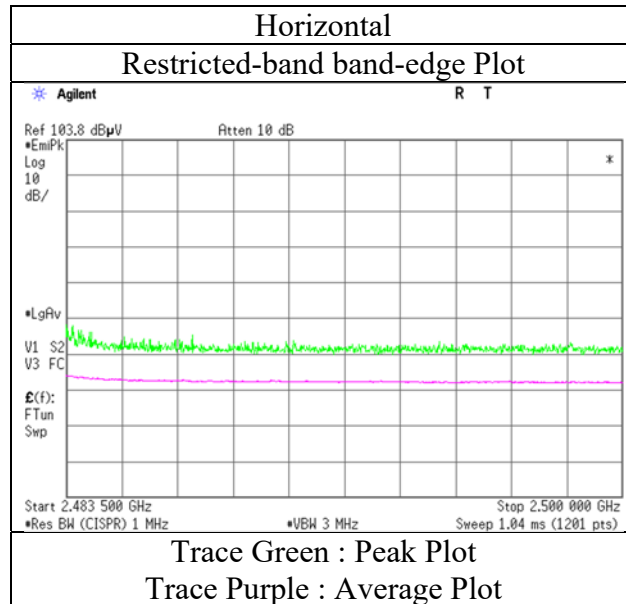
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Radiated Spurious Emission (Reference Plot for band-edge)

Report No.	13024969S-AA-R3
Test place	Shonan EMC Lab.
Semi Anechoic Chamber	No.3
Date	January 9, 2020
Temperature / Humidity	21 deg. C / 32 % RH
Engineer	Kazuya Noda
	(1 GHz – 2.8 GHz)
Mode	Tx, Hopping Off, 3DH5 2480 MHz with 11ac-40 Tx 5190 MHz

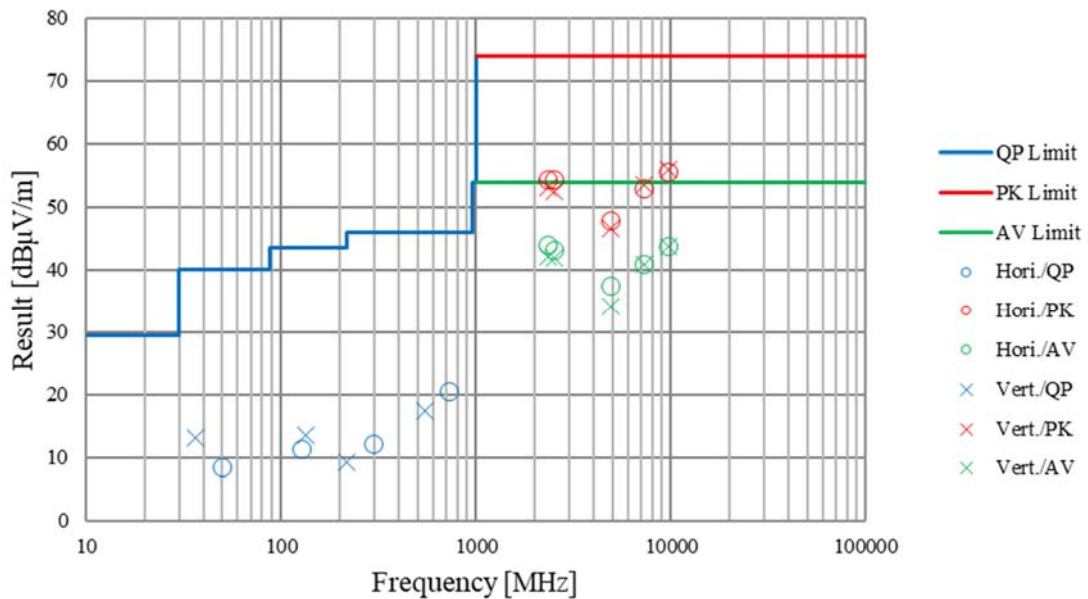


* The measurement was conducted for a sufficiently long enough time to detect any possible spurious emissions.

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

Radiated Spurious Emission (Plot data, Worst case)

Report No.	13024969S-AA-R3			
Test place	Shonan EMC Lab.			
Semi Anechoic Chamber	No.3	No.3	No.3	No.3
Date	January 16, 2020	January 9, 2020	January 14, 2020	January 16, 2020
Temperature / Humidity	23 deg. C / 45 % RH	21 deg. C / 32 % RH	22 deg. C / 32 % RH	23 deg. C / 45 % RH
Engineer	Takahiro Kawakami	Kazuya Noda	Takahiro Kawakami	Takahiro Kawakami
	(30 MHz – 1000 MHz)	(1 GHz – 2.8 GHz)	(2.8 GHz - 18 GHz)	(18 GHz – 26.5 GHz)
Mode	Tx, Hopping Off, DH5 2441 MHz with 11ac-40 Tx 5190 MHz			

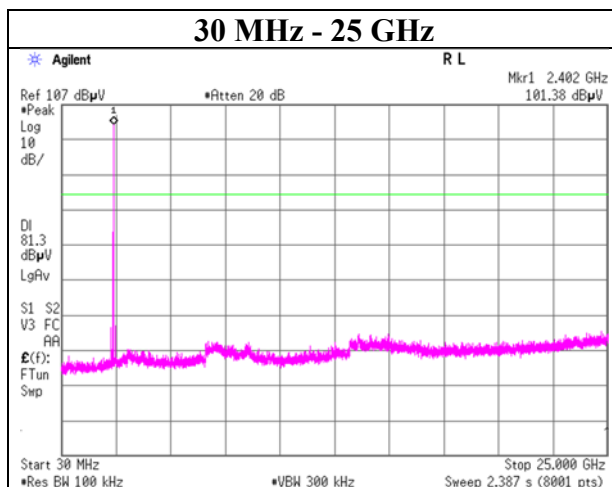
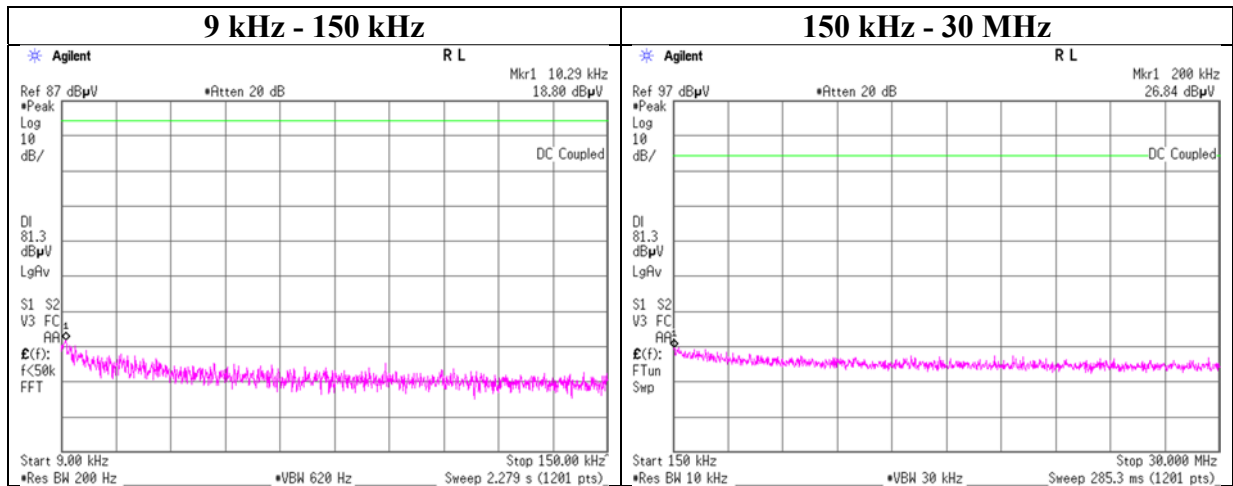


*These plots data contains sufficient number to show the trend of characteristic features for EUT.

Conducted Spurious Emission

Report No. 13024969S-AA-R3
Test place Shonan EMC Lab. No.5 Shielded Room
Date December 2, 2019
Temperature / Humidity 20 deg. C / 45 % RH
Engineer Takahiro Kawakami
Mode Tx, Hopping Off, DH5

2402 MHz



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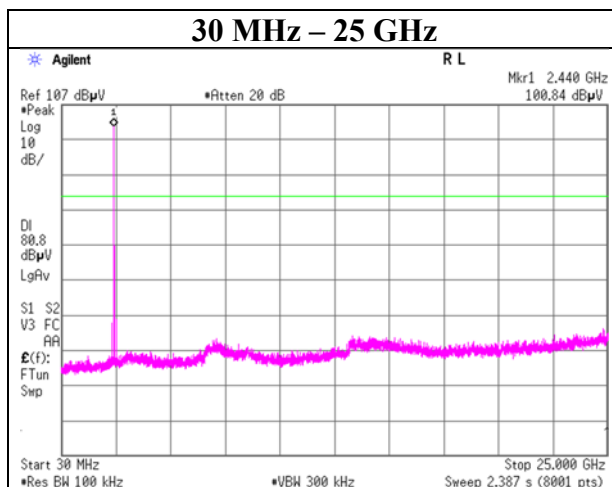
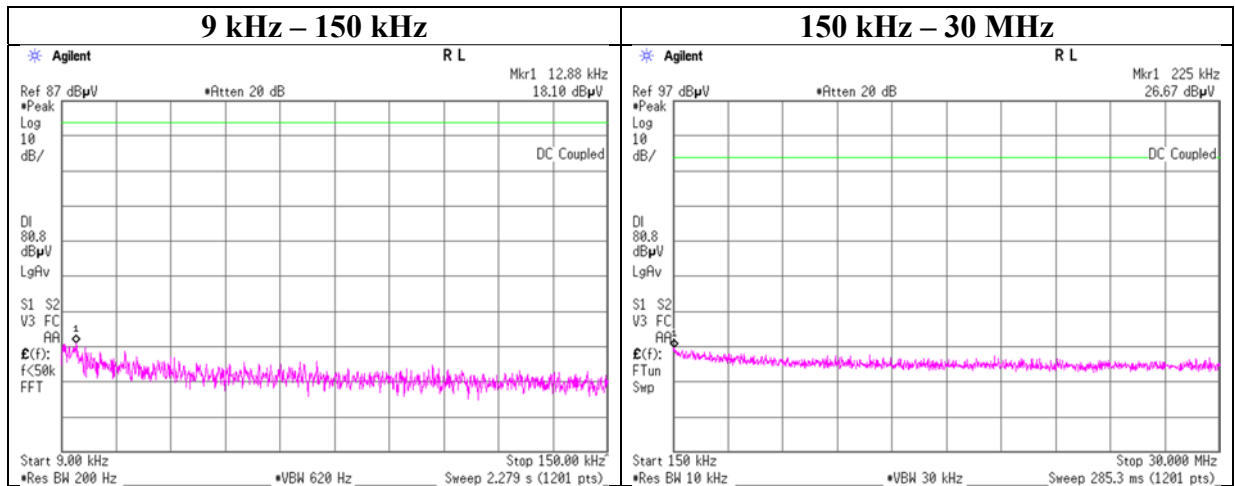
Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Conducted Spurious Emission

Report No. 13024969S-AA-R3
Test place Shonan EMC Lab. No.5 Shielded Room
Date December 2, 2019
Temperature / Humidity 20 deg. C / 45 % RH
Engineer Takahiro Kawakami
Mode Tx, Hopping Off, DH5

2441 MHz



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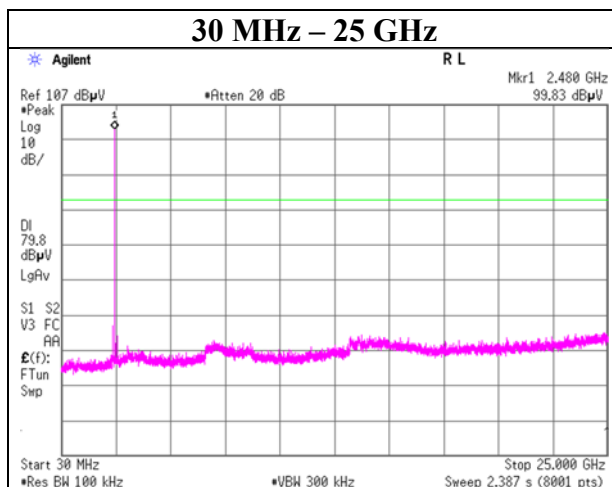
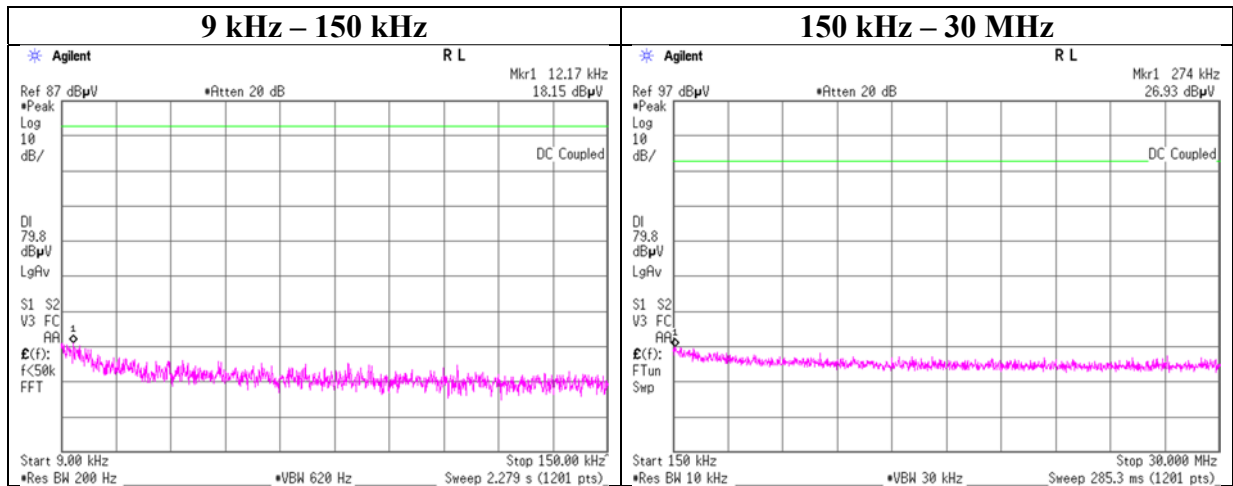
Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Conducted Spurious Emission

Report No. 13024969S-AA-R3
Test place Shonan EMC Lab. No.5 Shielded Room
Date December 2, 2019
Temperature / Humidity 20 deg. C / 45 % RH
Engineer Takahiro Kawakami
Mode Tx, Hopping Off, DH5

2480 MHz



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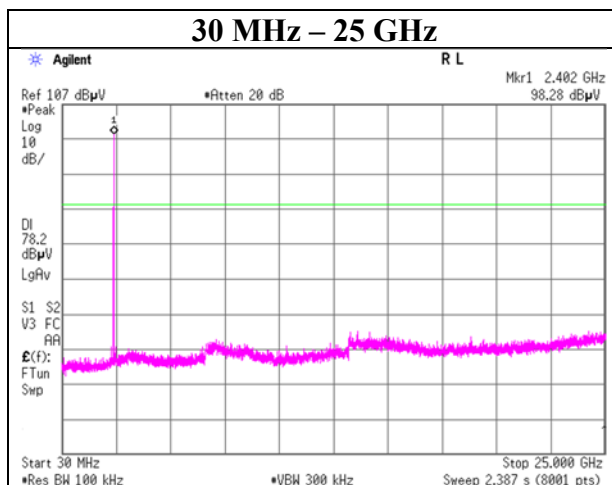
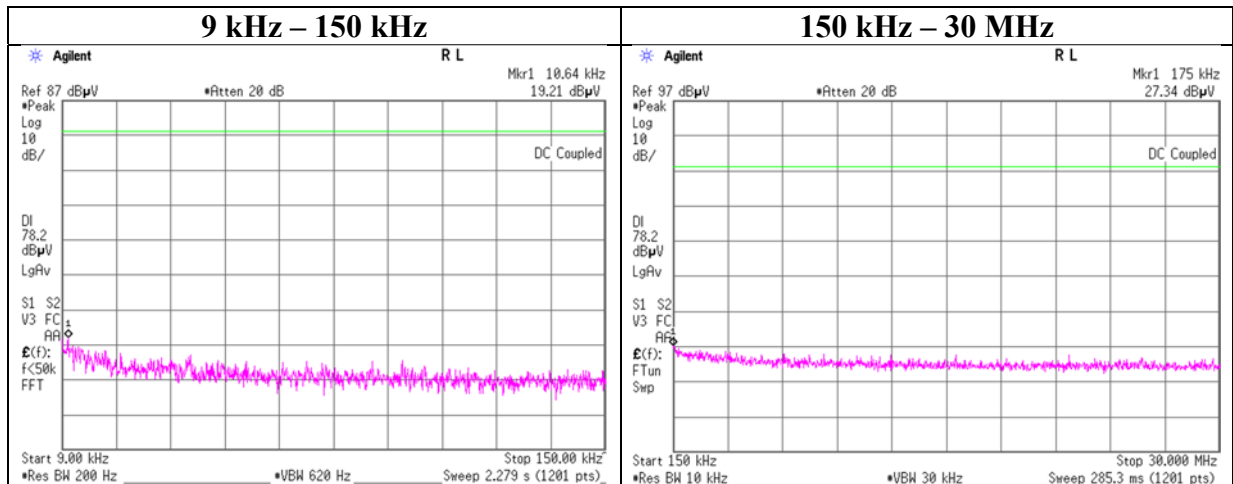
Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Conducted Spurious Emission

Report No. 13024969S-AA-R3
Test place Shonan EMC Lab. No.5 Shielded Room
Date December 4, 2019
Temperature / Humidity 22 deg. C / 45 % RH
Engineer Toshinori Yamada
Mode Tx, Hopping Off, 3DH5

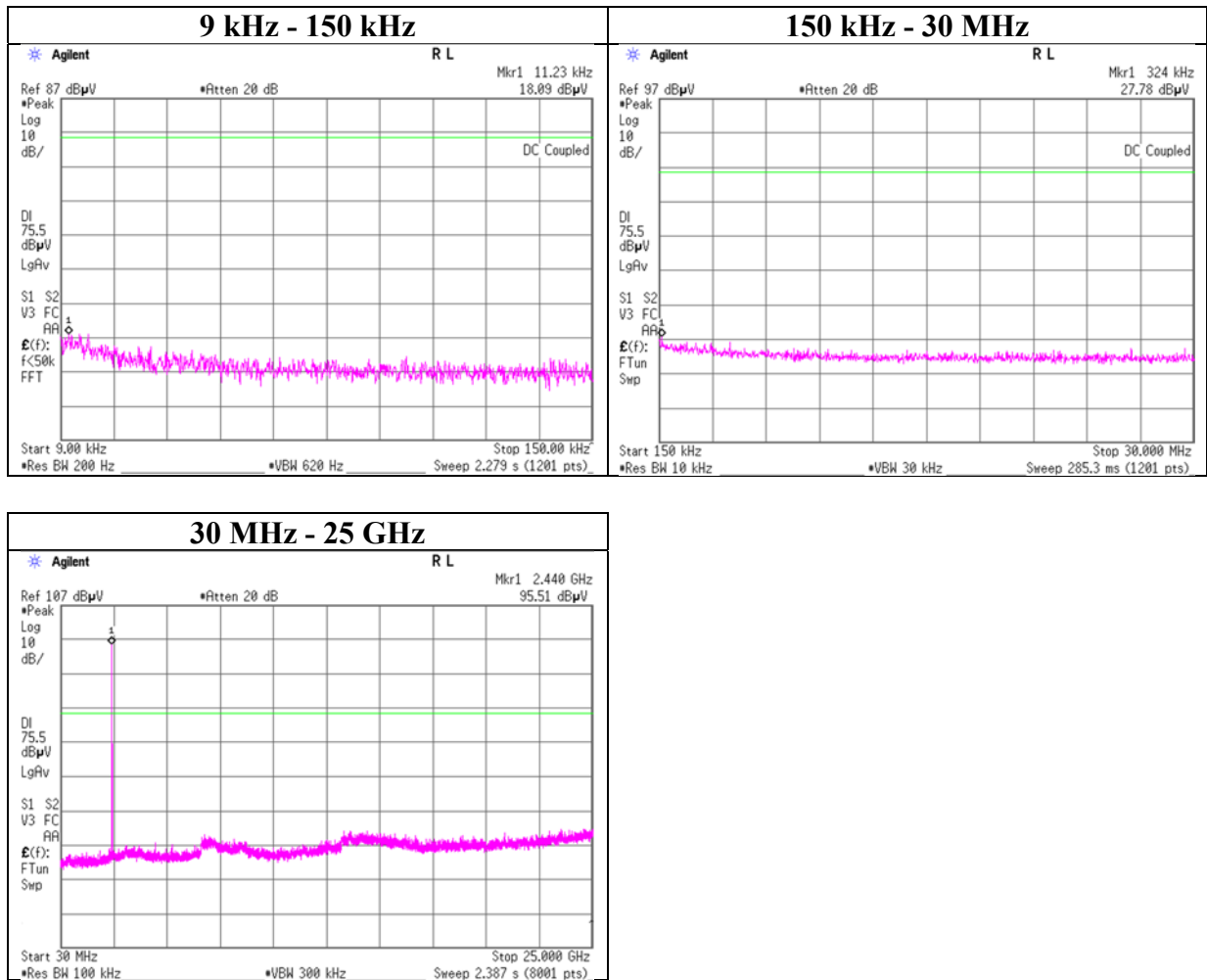
2402 MHz



Conducted Spurious Emission

Report No. 13024969S-AA-R3
Test place Shonan EMC Lab. No.5 Shielded Room
Date December 4, 2019
Temperature / Humidity 22 deg. C / 45 % RH
Engineer Toshinori Yamada
Mode Tx, Hopping Off, 3DH5

2441 MHz



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Shonan EMC Lab.

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

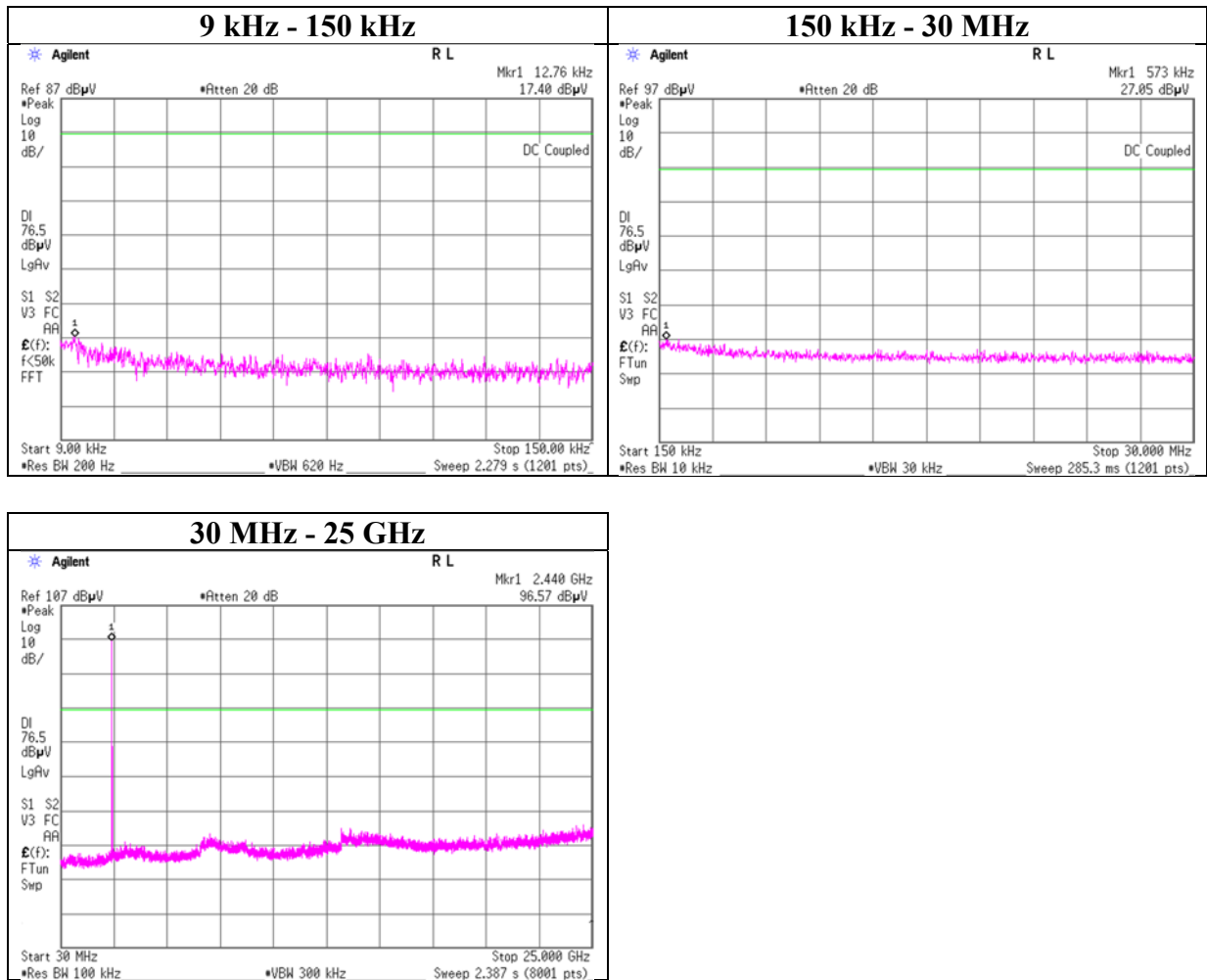
Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Conducted Spurious Emission

Report No. 13024969S-AA-R3
Test place Shonan EMC Lab. No.5 Shielded Room
Date December 4, 2019
Temperature / Humidity 22 deg. C / 45 % RH
Engineer Toshinori Yamada
Mode Tx, Hopping Off, 3DH5

2480 MHz



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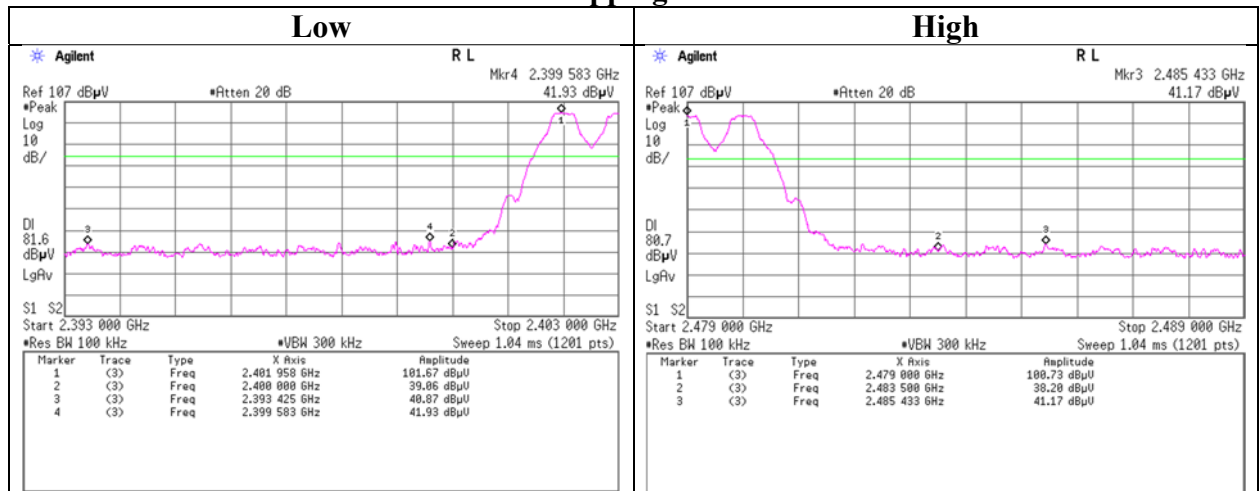
Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

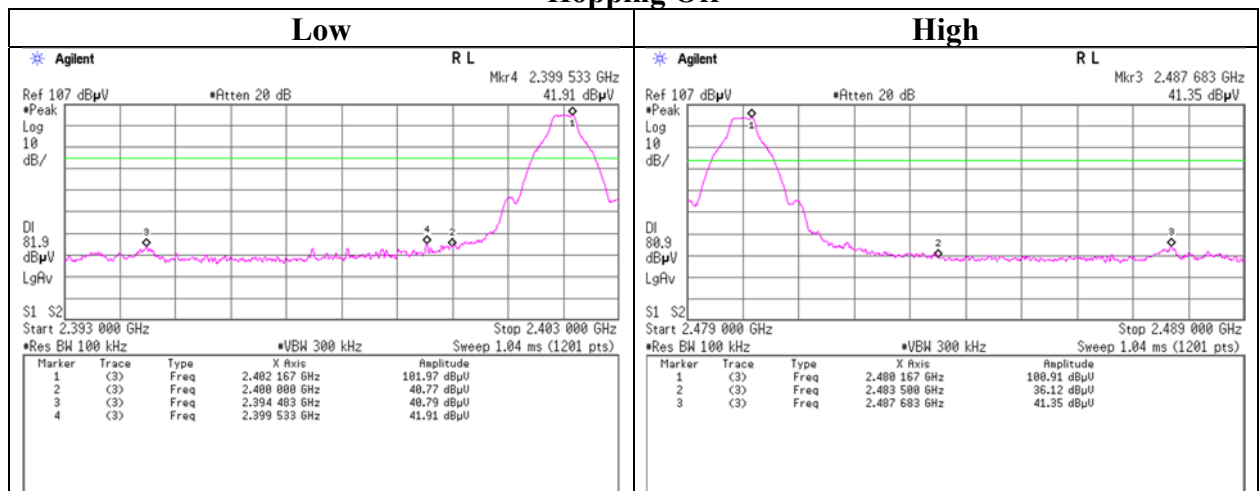
Conducted Emission Band Edge compliance

Report No. 13024969S-AA-R3
Test place Shonan EMC Lab. No.5 Shielded Room
Date December 2, 2019
Temperature / Humidity 20 deg. C / 45 % RH
Engineer Takahiro Kawakami
Mode Tx DH5

Hopping On



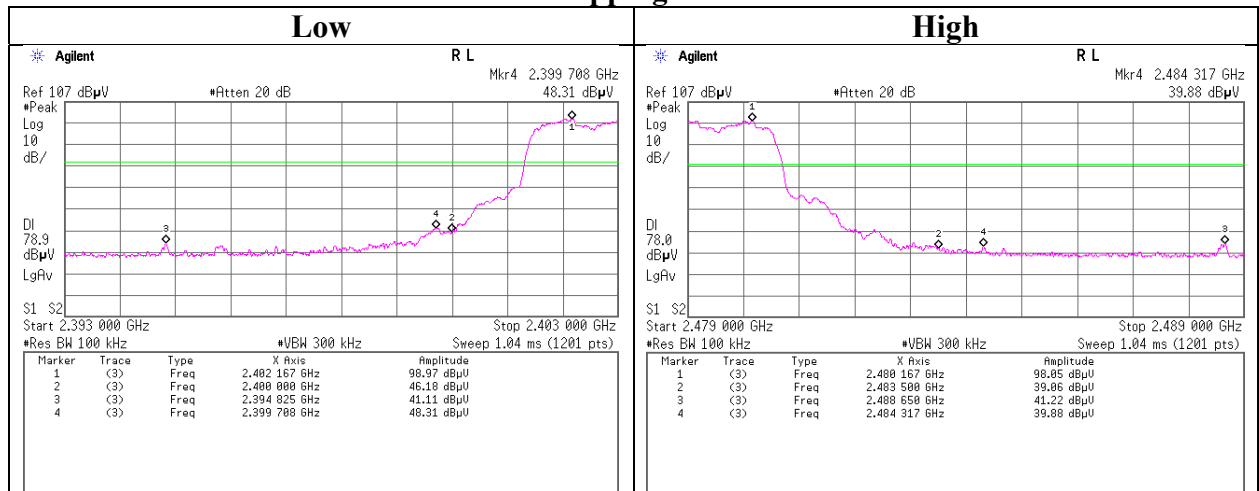
Hopping Off



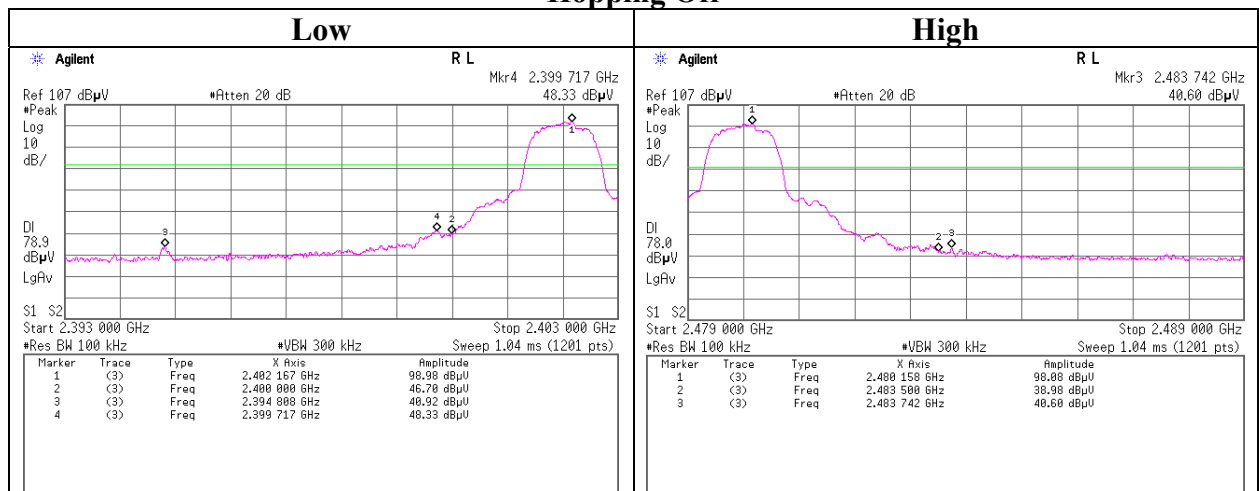
Conducted Emission Band Edge compliance

Report No.	13024969S-AA-R3
Test place	Shonan EMC Lab. No.5 Shielded Room
Date	December 4, 2019
Temperature / Humidity	22 deg. C / 45 % RH
Engineer	Toshinori Yamada
Mode	Tx 3DH5

Hopping On



Hopping Off



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APPENDIX 2: Test instruments

Test Item	Local ID	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Cal Int
AT	KSA-08	145089	Spectrum Analyzer	AGILENT	E4446A	MY46180525	2019/11/05	12
AT	SAT10-16	160494	Attenuator	Weinschel Corp.	54A-10	83406	2019/12/12	12
AT	SCC-G32	145183	Coaxial Cable	Junkosha	MWX241-02000KMSKMS	OCT-09-13-005	-	-
AT	SOS-09	146318	Humidity Indicator	A&D	AD-5681	4061484	-	-
AT	SPM-13	169910	Power Meter	Keysight Technologies Inc	8990B	MY51000448	2019/03/06	12
AT	SPSS-06	169911	Power sensor	Keysight Technologies Inc	N1923A	MY57270004	2019/03/06	12
AT	STS-05	146212	Digital Hitester	HIOKI	3805-50	80997828	2019/10/01	12
CE	KTS-06	145110	Digital Tester	SANWA	PC500	7019240	2019/04/02	12
CE	SAT3-10	144960	Attenuator	JFW	50HF-003N	-	2019/08/06	12
CE	SCC-C6/C7/C8/C10/SRSE-03	145034	Coaxial Cable&RF Selector	Suhner/Fujikura/Suhner/Suhner/TOYO	141PE/12DSFA/141PE/141PE/NS4906	-/0901-271(RF Selector)	2019/04/19	12
CE	SLS-05	145542	LISN	Rohde & Schwarz	ENV216	100516	2019/02/19	12
CE	SOS-22	191839	Humidity Indicator	CUSTOM	CTH-201	-	2019/12/12	12
CE,RE	COTS-SEMI-5	170932	EMI Software	TSJ	TEPTO-DV3(RE,CE,ME,PE)	-	-	-
CE,RE	KJM-02	146432	Measure	TAJIMA	GL19-55	-	-	-
CE,RE	STR-08	150463	Test Receiver	Rohde & Schwarz	ESW44	101581	2019/11/22	12
RE	SAEC-03(NSA)	145565	Semi-Anechoic Chamber	TDK	SAEC-03(NSA)	3	2019/04/08	12
RE	SAEC-03(SVSWR)	145566	Semi-Anechoic Chamber	TDK	SAEC-03(SVSWR)	3	2019/05/03	12
RE	SAF-03	145126	Pre Amplifier	SONOMA	310N	290213	2019/02/05	12
RE	SAF-06	145005	Pre Amplifier	Toyo Corporation	TPA0118-36	1440491	2019/02/08	12
RE	SAF-08	145007	Pre Amplifier	Toyo Corporation	HAP18-26W	19	2019/03/05	12
RE	SAT10-05	145136	Attenuator(above 1GHz)	AGILENT	8493C-010	74864	2019/11/06	12
RE	SAT6-13	167094	Attenuator	JFW	50HF-006N	-	2019/02/05	12
RE	SBA-03	145023	Biconical Antenna	Schwarzbeck	BBA9106	91032666	2019/05/07	12
RE	SCC-C1/C2/C3/C4/C5/C10/SRSE-03	145171	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhner/Suhner/Suhner/Suhner/TOYO	8D2W/12DSFA/141PE/141PE/141PE/141PE/NS4906	-/0901-271(RF Selector)	2019/04/19	12
RE	SCC-G15	145176	Coaxial Cable	Suhner	SUCOFLEX 102	32703/2	2019/03/27	12
RE	SCC-G40	166491	Coaxial Cable	Junkosha	MWX221-01000NFSNMS/B	1612S005	2020/01/08	12
RE	SCC-G43	156380	Coaxial Cable	HUBER+SUNER	SUCOFLEX_104_E	SN MY 13406/4E	2019/07/03	12
RE	SCC-G45	168301	Coaxial Cable	HUBER+SUNER	SUCOFLEX 102 E	800137/2EA	2019/03/26	12
RE	SCC-G57	179540	Coaxial Cable	Huber+Suhner	SUCOFLEX 102	802815/2	2019/05/16	12
RE	SCC-G58	183047	Coaxial Cable	HUBER+SUNER	SUCOFLEX 104	800287/4A	2019/07/23	12
RE	SFL-18	145305	Highpass Filter	MICRO-TRONICS	HPM50111	119	2019/04/16	12
RE	SHA-03	145501	Horn Antenna	Schwarzbeck	BBHA9120D	9120D-739	2019/06/26	12
RE	SHA-04	145512	Horn Antenna	ETS LINDGREN	3160-09	00094868	2019/06/26	12
RE	SLA-07	145529	Logperiodic Antenna	Schwarzbeck	VUSLP9111B	196	2019/05/07	12
RE	SOS-05	146293	Humidity Indicator	A&D	AD-5681	4062518	2019/10/08	12
RE	SOS-23	191840	Humidity Indicator	CUSTOM	CTH-201	-	2019/12/12	12
RE	SRENT-09	150461	Spectrum Analyzer	AGILENT (KEYSIGHT)	E4440A	MY46186392	2019/01/03	12
RE	SSA-02	145800	Spectrum Analyzer	AGILENT	E4448A	MY48250106	2019/04/04	12
RE	SSA-03	145801	Spectrum Analyzer	AGILENT	E4448A	MY48250152	2019/08/08	12
RE	STS-03	146210	Digital Hitester	HIOKI	3805-50	80997823	2019/10/01	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