RADIO TEST REPORT

Test Report No. : 13462774S-A-R2

Applicant	:	**Panasonic Corporation**
Type of EUT	:	**Car Navigation**
Model Number of EUT	:	**AT2105**
FCC ID	:	**ACJ932AT2105**
Test regulation	:	**FCC Part 15 Subpart C: 2020** ***Bluetooth BR/EDR part**
Test Result	:	**Complied (Refer to SECTION 3.2)**

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2. The results in this report apply only to the sample tested.
3. This sample tested is in compliance with the limits of the above regulation.
4. The test results in this test report are traceable to the national or international standards.
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6. This test report covers Radio technical requirements.
   It does not cover administrative issues such as Manual or non-Radio test related Requirements. (if applicable)
7. The all test items in this test report are conducted by UL Japan, Inc. 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 13462774S-A-R1. 13462774S-A-R1 is replaced with this report.

Date of test: August 18 to September 9, 2020

Representative test engineer:

Shiro Kobayashi
Engineer
Consumer Technology Division

Approved by:

Shinichi Takano
Engineer
Consumer Technology Division

CERTIFICATE 1266.03

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

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REVISION HISTORY

Original Test Report No.: 13462774S-A

Revision	Test report No.	Date	Page revised	Contents
- (Original)	13462774S-A	October 22, 2020	-	-
1	13462774S-A-R1	November 20, 2020	P.63	Addition comment: *1)
2	13462774S-A-R2	December 22, 2020	P.27	Deletion of *1)

Reference: Abbreviations (Including words undescribed in this report)

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

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SECTION 1: Customer information

Company Name	:	Panasonic Corporation
Address	:	4261 Ikonobe-cho, Tsuzuki-ku, Yokohama-shi, Kanagawa-ken, 224-8520, Japan
Telephone Number	:	+81-50-3689-7112
Contact Person	:	Takahisa Sakai

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	:	Car Navigation
Model Number	:	AT2105
Serial Number	:	Refer to SECTION 4.2
Rating	:	DC 13.2 V
Receipt Date	:	July 31, 2020
Country of Mass-production	:	Japan, Mexico, Czech Republic
Condition	:	Production prototype (Not for Sale: This sample is equivalent to mass-produced items.)
Modification	:	No Modification by the test lab.

2.2 Product Description

Model: AT2105 (referred to as the EUT in this report) is a Car Navigation.

Radio Specification

	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, 5745 MHz – 5825 MHz	5190 MHz, 5230 MHz, 5755 MHz, 5795 MHz
Channel spacing	5 MHz		2.4 GHz band: 5 MHz 5 GHz band: 20 MHz	40 MHz
Modulation	DSSS (CCK, DQPSK, DBPSK)	OFDM-CCK (64QAM, 16QAM, QPSK, BPSK)	OFDM (64QAM, 16QAM, QPSK, BPSK)	
	IEEE802.11a	**IEEE802.11ac (20 MHz band)**	**IEEE802.11ac (40 MHz band)**	**IEEE802.11ac (80 MHz band)**
Frequency of operation	5180 MHz – 5240 MHz, 5745 MHz – 5825 MHz	5180 MHz – 5240 MHz, 5745 MHz – 5825 MHz	5190 MHz, 5230 MHz, 5755 MHz, 5795 MHz	5210 MHz, 5775 MHz
Channel spacing	20 MHz		40 MHz	80 MHz
Modulation	OFDM (64QAM, 16QAM, QPSK, BPSK)	OFDM (256QAM,16QAM,QPSK,BPSK)		

	Bluetooth (BR/EDR)	**Bluetooth Low Energy**	
Frequency of operation	2402 MHz – 2480 MHz	2402 MHz – 2480 MHz	
Channel spacing	1 MHz	2 MHz	
Modulation	FHSS, GFSK, π/4DQPSK, 8DPSK	FHSS, GFSK	
Antenna type	Inverted F type antenna		
Antenna Gain	RF0	2.4 GHz WLAN	-1.44 dBi
		U-NII-1	-1.25 dBi
		U-NII-3	0.24 dBi
	RF1	BT, BT LE	0.05 dBi
		U-NII-1	0.33 dBi
		U-NII-3	0.01 dBi
Antenna Connector type	HFC IV Coaxial connector		
Operating Temperature	-30 deg. C to + 65 deg. C		

SECTION 3: Test specification, procedures & results

3.1 Test Specification

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

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

3.2 Procedures and results

Item	Test Procedure	Specification	Worst Margin	Results	Remarks
Conducted Emission	**FCC:** ANSI C63.10-2013 6. Standard test methods	**FCC:** Section 15.207	-	N/A *1)	-
	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 a)	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)		Complied a)	Conducted
	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)		Complied b)	Conducted
	ISED: -	**ISED:** RSS-247 5.1 (d)			
Dwell time	**FCC:** KDB 558074 D01 15.247 Meas Guidance v05r02	**FCC:** Section15.247(a)(1)(iii)		Complied c)	Conducted
	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)		Complied d)	Conducted
	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)	7.0 dB 870.620 MHz, QP, Hori. Mode: Tx, Hopping Off, DH5 2441 MHz	Complied e) / f)	Conducted/ Radiated (above 30 MHz) *2)
	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) The test is not applicable since the EUT does not have AC Mains.
*2) Radiated test was selected over 30 MHz based on section 15.247(d) and KDB 558074 D01 15.247 Meas Guidance v05r02 8.5 and 8.6.

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

Symbols:
Complied The data of this test item has enough margin, more than the measurement uncertainty.
Complied# The data of this test item meets the limits unless the measurement uncertainty is taken into consideration.

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

FCC Part 15.31 (e)

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

FCC Part 15.203 Antenna requirement

The EUT has a unique antenna connector (HFC IV Coaxial connector). Therefore the equipment complies with the requirement of 15.203.

3.3 Addition to standard

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

Shonan EMC Lab.

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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Telephone: +81 463 50 6400, Facsimile: +81 463 50 6401
A2LA Certificate Number: 1266.03 (FCC Test Firm Registration Number: 626366, ISED Lab Company Number: 2973D)

Test site	IC Registration Number	Width x Depth x Height (m)	Size of reference ground plane (m) / horizontal conducting plane	Maximum measurement distance
No.1 Semi-anechoic chamber	2973D-1	20.6 x 11.3 x 7.65	20.6 x 11.3	10 m
No.2 Semi-anechoic chamber	2973D-2	20.6 x 11.3 x 7.65	20.6 x 11.3	10 m
No.3 Semi-anechoic chamber	2973D-3	12.7 x 7.7 x 5.35	12.7 x 7.7	5 m
No.4 Semi-anechoic chamber	-	8.1 x 5.1 x 3.55	8.1 x 5.1	-
No.1 Shielded room	-	6.8 x 4.1 x 2.7	6.8 x 4.1	-
No.2 Shielded room	-	6.8 x 4.1 x 2.7	6.8 x 4.1	-
No.3 Shielded room	-	6.3 x 4.7 x 2.7	6.3 x 4.7	-
No.4 Shielded room	-	4.4 x 4.7 x 2.7	4.4 x 4.7	-
No.5 Shielded room	-	7.8 x 6.4 x 2.7	7.8 x 6.4	-
No.6 Shielded room	-	7.8 x 6.4 x 2.7	7.8 x 6.4	-
No.8 Shielded room	-	3.45 x 5.5 x 2.4	3.45 x 5.5	-
No.1 Measurement room	-	2.55 x 4.1 x 2.5	-	-

3.6 Test data, Test instruments, and Test set up

Refer to APPENDIX.

SECTION 4: Operation of EUT during testing

4.1 Operating Mode(s)

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

Details of Operating Mode(s)

Test Item	Mode	Tested frequency
Spurious Emission (Conducted)	Tx (Hopping Off) DH5, 3DH5	2402 MHz 2441 MHz 2480 MHz
Spurious Emission (Radiated)	Tx (Hopping Off) DH5, 3DH5	2402 MHz 2441 MHz 2480 MHz
	Tx (Hopping Off) DH5, 3DH5 with 11ac-20 CDD 5240 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

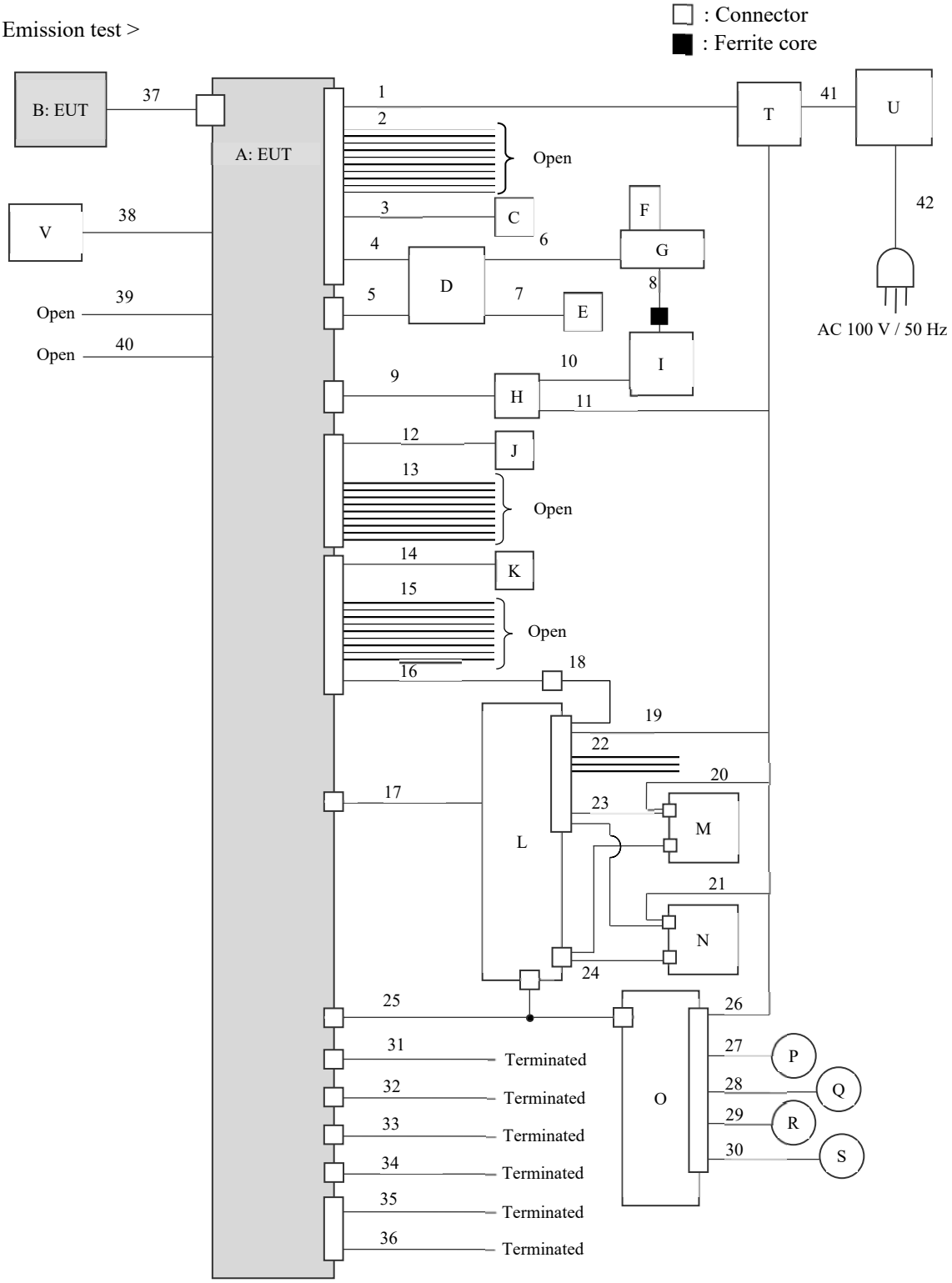
*As a result of preliminary test, the formal test was performed with the above modes, which had the maximum payload length (except Dwell time test)
*2DH mode (2Mb/s EDR: pi/4DQPSK) was excluded for other tests than power measurement by using 3DH mode (3 Mb/s EDR: 8DPSK) as a representative.
* It is considered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

*EUT has the power settings by the software as follows;
Power settings: Fixed
Software: Labtool Version: 2.0.0.71
(Date: 2020.05.29, Storage location: EUT memory)

*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.

4.2 Configuration and peripherals

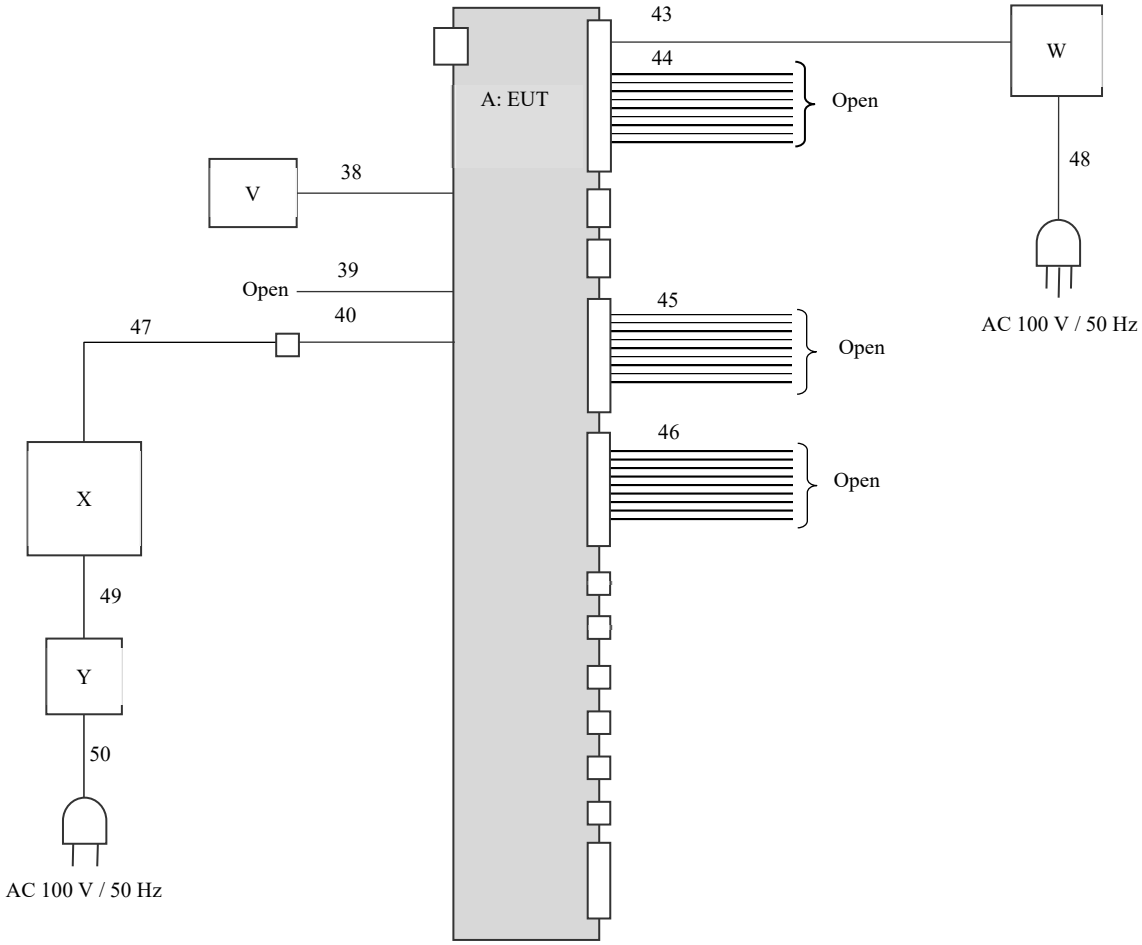
< Radiated Emission test >



* Cabling and setup(s) were taken into consideration and test data was taken under worse case conditions.
*It was preliminary confirmed that there was no difference in emission level due to a standard ferrite core.

< Antenna Terminal Conducted test >

□ : Connector



Description of EUT and Support equipment

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	Car Navigation	AT2105	002 *1) 001 *2)	Panasonic Corporation	EUT
B	Antenna	CA-AL8BX0AJ	001	Panasonic Corporation	EUT
C	Steering Switch	-	1142	Panasonic Corporation	-
D	IF Box	DEP32-10078	033	Panasonic Corporation	-
E	Bluetooth Speaker	SRS-X11	2154715	Sony Corporation	-
F	USB memory	USM4GU	-	Sony Corporation	-
G	USB Hub	U3H-A422BX	0600341	ELECOM	-
H	JIG Bord	GVIF2HDJIG	16	Panasonic Corporation	-
I	Separate Display	On-Lap 1102I	11102100908028	TEKWIND	-
J	Mic	GP-SDA3510A	0DC062856	Panasonic Corporation	-
K	Mic	GP-SDA3510A	0DC062519	Panasonic Corporation	-
L	RSE ECU	CR-EL3BX0AJ	1S-188	Panasonic Corporation	-
M	RSE Display	CR-FL3BJ0AJ	107	Panasonic Corporation	-
N	RSE Display	CR-FL3BJ0AJ	108	Panasonic Corporation	-
O	MOST AMP	CL-DL47X2AJ	-	Panasonic Corporation	-
P	Speaker	KFC-RS160	-	KENWOOD	-
Q	Speaker	KFC-RS160	-	KENWOOD	-
R	Speaker	KFC-RS160	-	KENWOOD	-
S	Speaker	KFC-RS160	-	KENWOOD	-
T	Terminal Block	-	-	-	-
U	Power Supply (DC)	PAN35-10A	DE001677	KIKUSUI	-
V	Jig board	RCarDBG_JTAG2	WR19-4014 *1) WR12-3224 *2)	WESTEK	-
W	Power Supply (DC)	PAN35-10A	ML002085	KIKUSUI	-
X	Laptop Computer	7666-77J	LV-B8R1X 08/05	Lenovo	-
Y	AC Adapter	42T4422	11S92P1154Z1DXF 1DBFDN	Lenovo	-

*1) Used for Antenna Terminal conducted test
*2) Used for Radiated Emission test

List of cables used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	DC	2.0	Unshielded	Unshielded	-
2	Signal	2.0	Unshielded	Unshielded	-
3	Signal	2.0 + 0.1	Unshielded	Unshielded	-
4	IF Box Power	2.0 + 0.3	Unshielded	Unshielded	-
5	Signal	2.0	Unshielded	Unshielded	-
6	USB	0.07	Shielded	Shielded	-
7	USB type C	0.9	Shielded	Shielded	-
8	USB	2.0	Shielded	Shielded	-
9	GVIF(Separate Display)	2.5	Shielded	Shielded	-
10	HDMI	1.2	Shielded	Shielded	-
11	DC	1.0	Unshielded	Unshielded	-
12	Mic	2.0 + 0.5	Unshielded	Unshielded	-
13	Signal	2.0	Unshielded	Unshielded	-
14	Mic	2.0 + 0.5	Unshielded	Unshielded	-
15	Signal	2.0	Unshielded	Unshielded	-
16	Signal	2.0	Unshielded	Unshielded	-
17	RSE	3.0	Shielded	Shielded	-
18	Signal	1.0	Unshielded	Unshielded	-
19	DC	1.0	Unshielded	Unshielded	-
20	DC	2.0	Unshielded	Unshielded	-
21	DC	2.0	Unshielded	Unshielded	-
22	Signal	1.0	Unshielded	Unshielded	-
23	RSE DISP-ECU	2.0	Shielded	Shielded	-
24	Main(RSE)	1.0	Unshielded	Unshielded	-
25	MOST AMP	2.5	Unshielded	Unshielded	-
26	DC	1.0	Unshielded	Unshielded	-
27	Speaker	1.0	Unshielded	Unshielded	-
28	Speaker	1.0	Unshielded	Unshielded	-
29	Speaker	1.0	Unshielded	Unshielded	-
30	Speaker	1.0	Unshielded	Unshielded	-
31	A2B	3.0	Unshielded	Unshielded	-
32	DCM	3.0	Shielded	Shielded	-
33	GPS	0.12 + 1.5	Shielded	Shielded	-
34	Sirius XM	2.5	Unshielded	Unshielded	-
35	FM	1.5	Shielded	Shielded	-
36	FM	1.5	Shielded	Shielded	-
37	BT/WLAN Antenna	0.3	Shielded	Shielded	-
38	Signal	0.1	Unshielded	Unshielded	*3)
39	Signal	0.2	Unshielded	Unshielded	*3)
40	UART	0.3	Unshielded	Unshielded	*3)
41	DC	1.0	Unshielded	Unshielded	-
42	AC	2.0	Unshielded	Unshielded	-
43	DC	1.0	Unshielded	Unshielded	-
44	SIgnal	0.2	Unshielded	Unshielded	-
45	SIgnal	0.2	Unshielded	Unshielded	-
46	SIgnal	0.2	Unshielded	Unshielded	-
47	UART-USB	1.8	Shielded	Shielded	-
48	AC	2.0	Unshielded	Unshielded	-
49	DC	1.8	Unshielded	Unshielded	-
50	AC	0.9	Unshielded	Unshielded	-

*3) This cable is for testing and is not included with products.

SECTION 5: Radiated Spurious Emission

Test Procedure

[For below 1 GHz]
EUT was placed on a urethane platform of nominal size, 1.0 m by 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 0.5 m, raised 1.5 m above the conducting ground plane.
The Radiated Electric Field Strength has been measured in a Semi Anechoic Chamber with absorbent materials lined on a ground plane.

The height of the measuring antenna varied between 1 m and 4 m and EUT was rotated a full revolution in order to obtain the maximum value of the electric field strength.
Test antenna was aimed at the EUT for receiving the maximum signal and always kept within the illumination area of the 3 dB beamwidth of the antenna.
The measurements were performed for both vertical and horizontal antenna polarization with the Test Receiver, or the Spectrum Analyzer.
The measurements were made with the following detector function of the test receiver and the Spectrum analyzer (in linear mode).
The test was made with the detector (RBW/VBW) in the following table.
When using Spectrum analyzer, the test was made with adjusting span to zero by using peak hold.

Test Antennas are used as below;

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

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

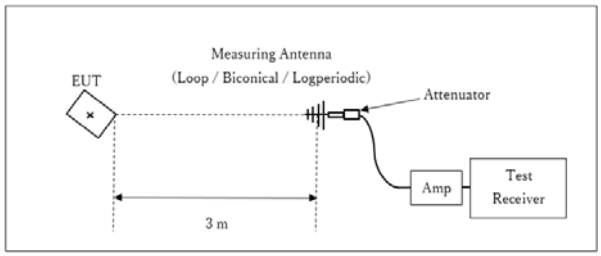
20 dBc was applied to the frequency over the limit of FCC 15.209 / Table 4 of RSS-Gen 8.9 (ISED) and outside the restricted band of FCC15.205 / Table 6 of RSS-Gen 8.10 (ISED).

Frequency	Below 1 GHz	Above 1 GHz		20 dBc
Instrument used	Test Receiver	Spectrum Analyzer		Spectrum Analyzer
Detector	QP	PK	AV *1), *2)	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.
*2) In unwanted emission derived from carrier, measurement with Average detector was not performed.
The limit for Average detector is applied to the measurement value with Peak detector used Duty cycle correction factor (DCCF).

Figure 1: Test Setup

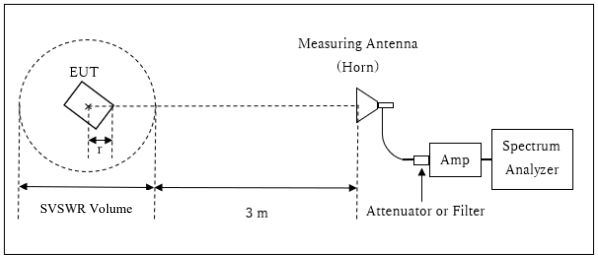
Below 1 GHz



× : Center of turn table

Test Distance: 3 m

1 GHz - 10 GHz



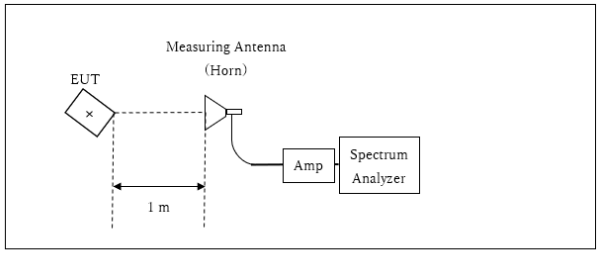
r : Radius of an outer periphery of EUT

× : Center of turn table

Distance Factor: 20 x log (3.82 m / 3.0 m) = 2.10 dB
* Test Distance: (3 + SVSWR Volume /2) - r = 3.82 m

SVSWR Volume : 2.0 m
(SVSWR Volume has been calibrated based on CISPR 16-1-4.)
r = 0.18 m

10 GHz - 40 GHz



× : Center of turn table

Distance Factor: 20 x log (1.0 m / 3.0 m) = -9.54 dB
*Test Distance: 1 m

- The carrier level and noise levels were confirmed at each position of 0 deg and 30 deg of EUT and -90 deg, 0 deg and 90 deg of Antenna to see the position of maximum noise, and the test was made at the position that has the maximum noise.

Worst case:

EUT

Antenna polarization	Carrier (Band edge)	Spurious				
		Below 1 GHz	Above 1 GHz			
			1 GHz - 2.8 GHz	2.8 GHz - 10 GHz	10 GHz - 18 GHz	18 GHz - 26.5 GHz
Horizontal	0 deg.	0 deg.	0 deg.	0 deg.	0 deg.	0 deg.
Vertical	0 deg.	0 deg.	0 deg.	0 deg.	0 deg.	0 deg.

Antenna

Antenna polarization	Carrier (Band edge)	Spurious				
		Below 1 GHz	Above 1 GHz			
			1 GHz - 2.8 GHz	2.8 GHz - 10 GHz	10 GHz - 18 GHz	18 GHz - 26.5 GHz
Horizontal	-90 deg.	0 deg.	-90 deg.	-90 deg.	0 deg.	0 deg.
Vertical	-90 deg.	0 deg.	-90 deg.	-90 deg.	0 deg.	0 deg.

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

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

SECTION 6: Antenna Terminal Conducted Tests

Test Procedure

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

Test	Span	RBW	VBW	Sweep time	Detector	Trace	Instrument used
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 Ohmes. 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

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

Report No.	13462774S-A-R2
Test place	Shonan EMC Lab. No.5 Shielded Room
Date	September 3, 2020
Temperature / Humidity	23 deg. C / 54 % RH
Engineer	Yohsuke Matsuzawa
Mode	Tx, Hopping Off, Tx, Hopping On

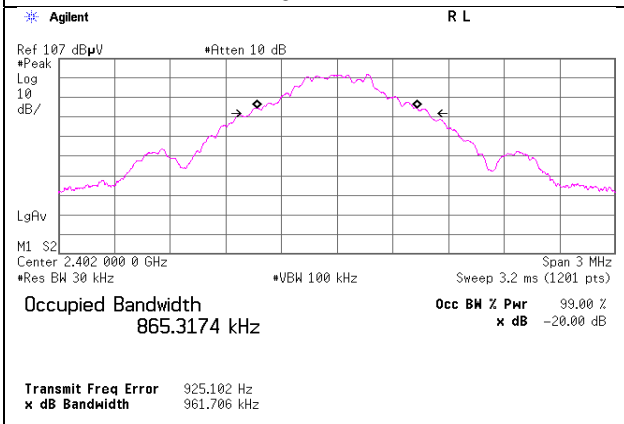
Mode	Freq. [MHz]	20 dB Bandwidth [MHz]	99 % Occupied Bandwidth [kHz]	Carrier Frequency Separation [MHz]	Limit for Carrier Frequency separation [MHz]
DH5	2402.0	0.962	865.317	1.000	>= 0.641
DH5	2441.0	0.961	864.076	1.000	>= 0.641
DH5	2480.0	0.963	866.989	1.000	>= 0.642
DH5	Hopping On	-	78651.2	-	-
3DH5	2402.0	1.302	1172.1	1.000	>= 0.868
3DH5	2441.0	1.302	1172.1	1.000	>= 0.868
3DH5	2480.0	1.302	1172.5	1.000	>= 0.868
3DH5	Hopping On	-	78724.7	-	-

Limit: Two-thirds of 20 dB Bandwidth or 25 kHz (whichever is greater).
No limit applies to 20 dB Bandwidth.

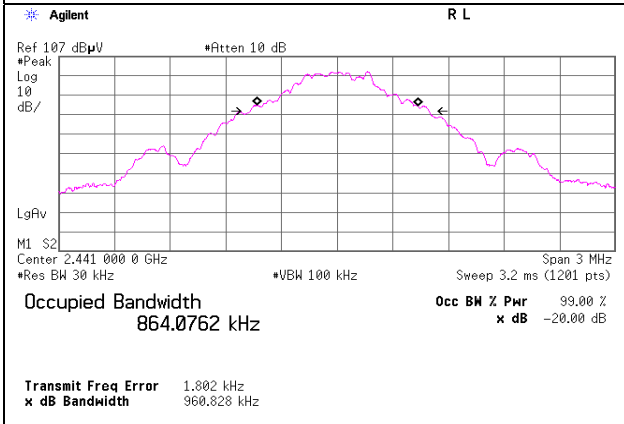
20 dB Bandwidth and 99 % Occupied Bandwidth

DH5

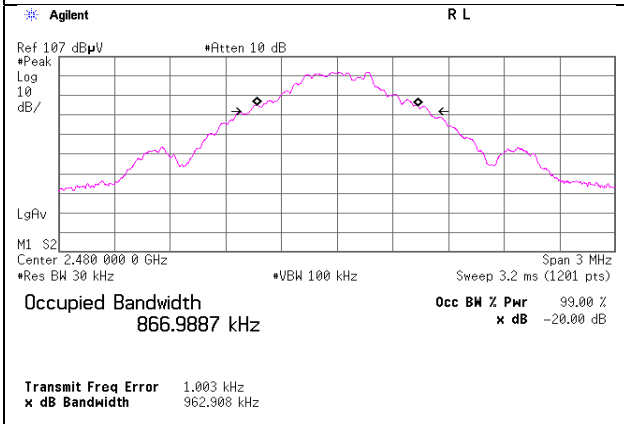
2402 MHz



2441 MHz

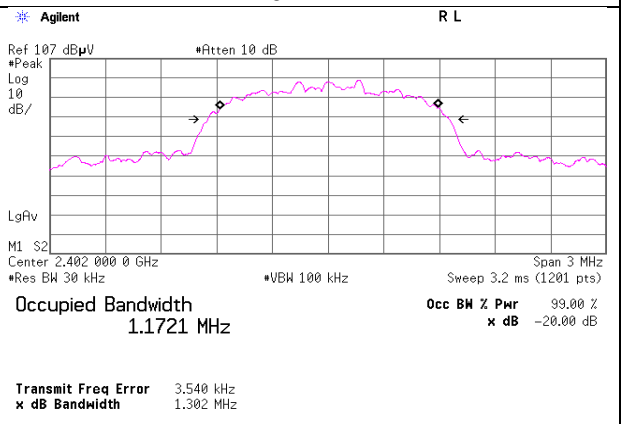


2480 MHz

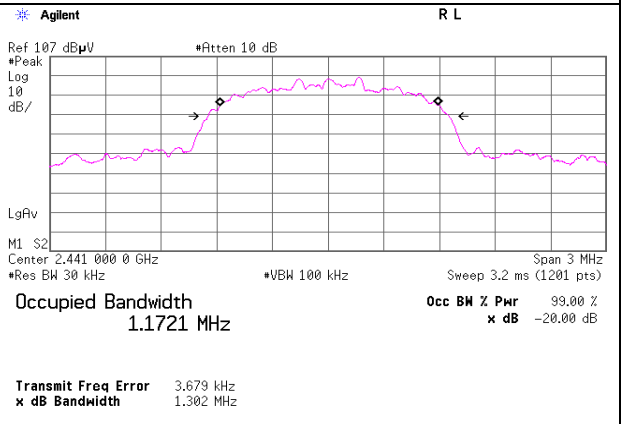


3DH5

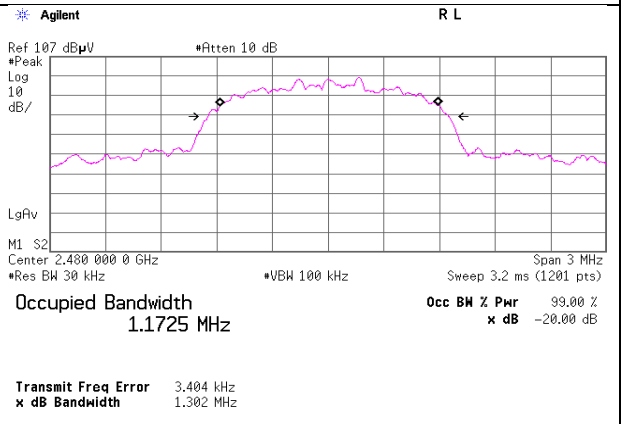
2402 MHz



2441 MHz

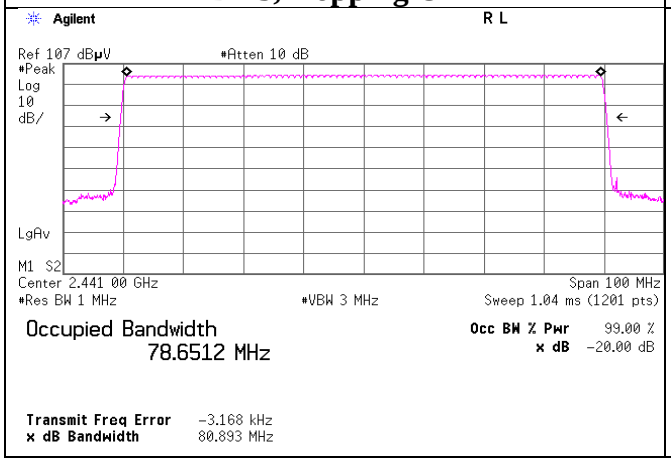


2480 MHz

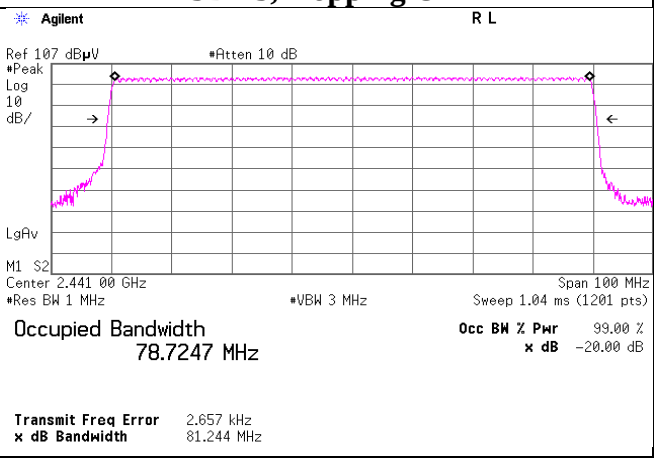


20 dB Bandwidth and 99 % Occupied Bandwidth

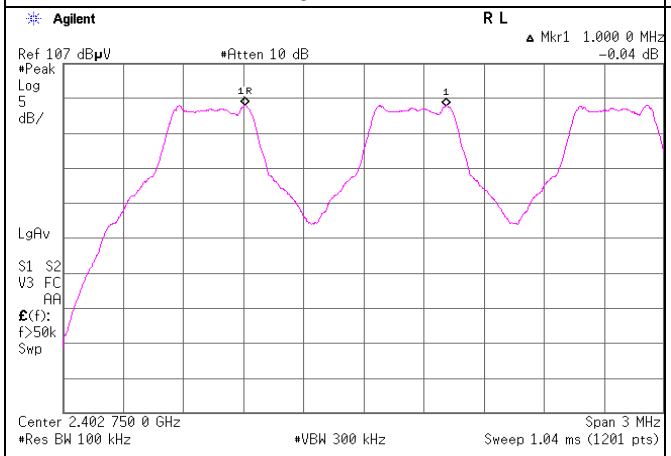
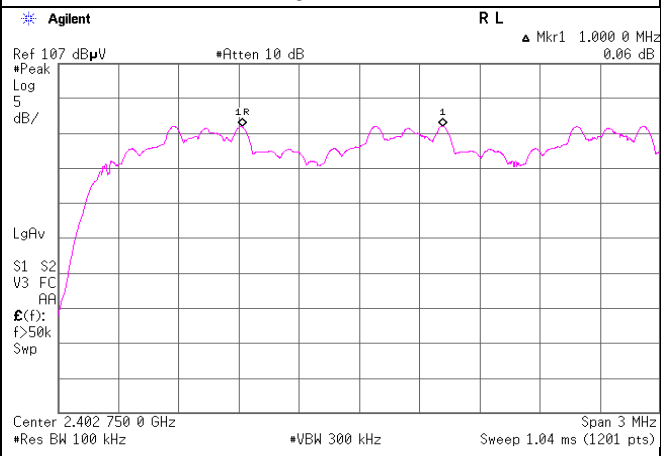
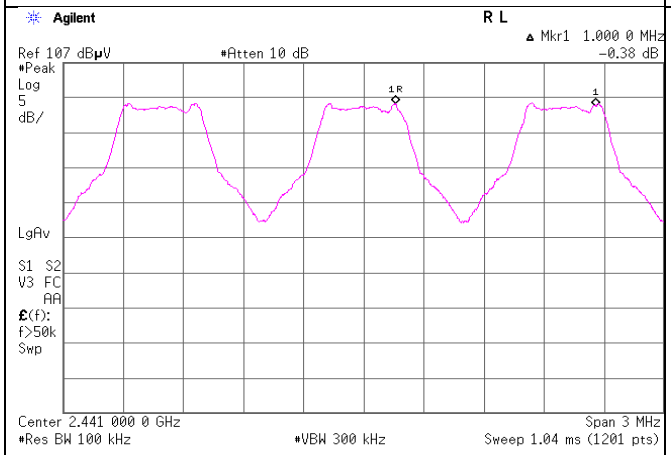
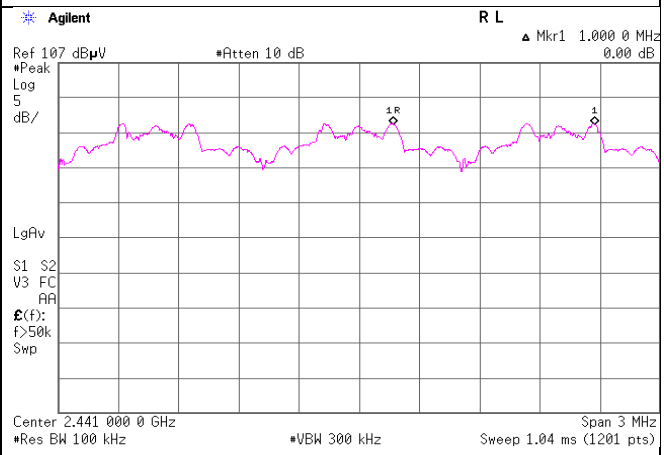
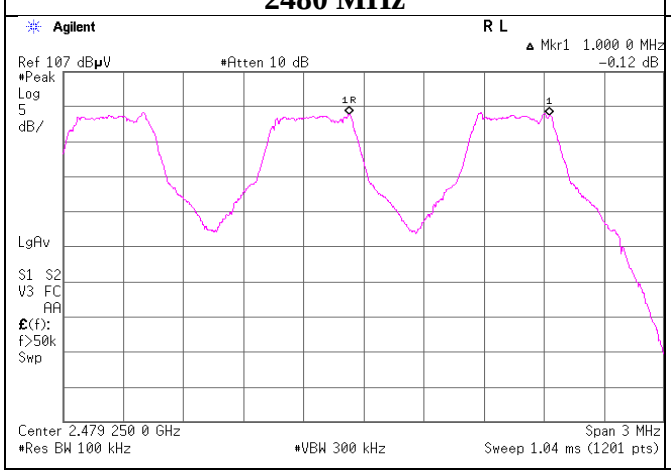
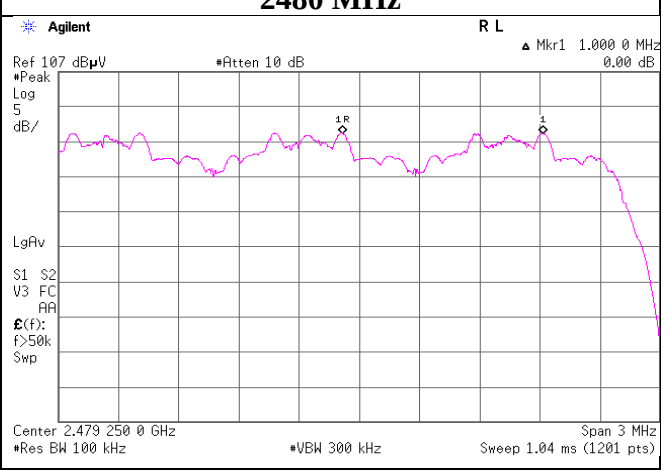
DH5, Hopping On



3DH5, Hopping On



Carrier Frequency Separation

DH5	3DH5
2402 MHz	2402 MHz
	
2441 MHz	2441 MHz
	
2480 MHz	2480 MHz
	

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Facsimile : +81 463 50 6401

Number of Hopping Frequency

Report No.	13462774S-A-R2
Test place	Shonan EMC Lab. No.5 Shielded Room
Date	September 3, 2020
Temperature / Humidity	23 deg. C / 54 % RH
Engineer	Yohsuke Matsuzawa
Mode	Tx, Hopping On

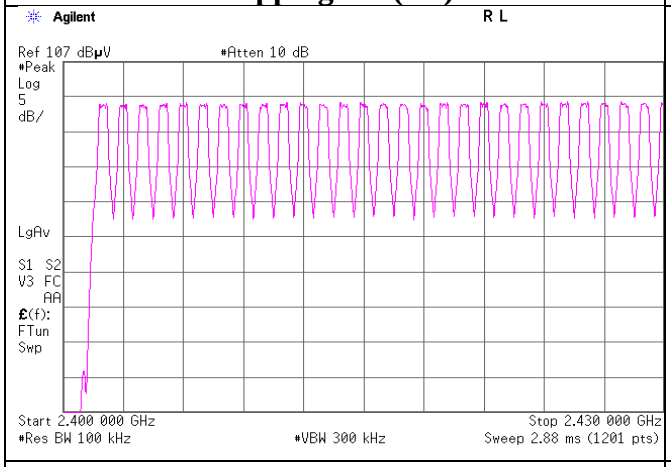
Mode	Number of channel [channels]	Limit [channels]
DH5	79	>= 15
3DH5	79	>= 15

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.

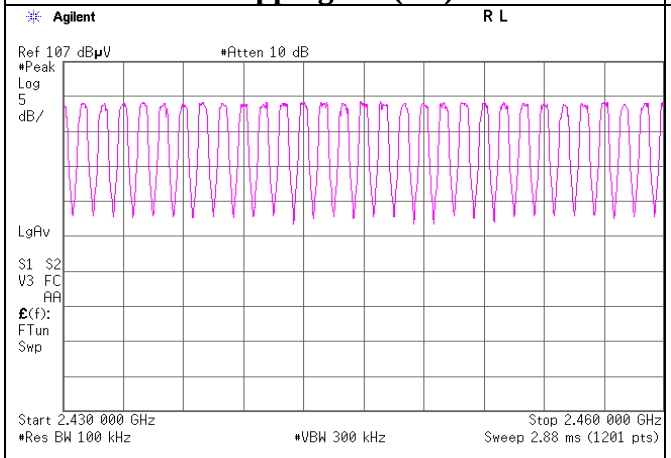
Number of Hopping Frequency

DH5

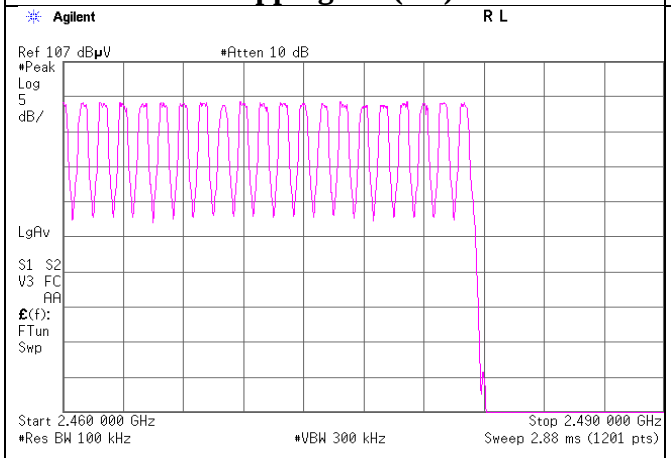
Hopping On (1/3)



Hopping On (2/3)

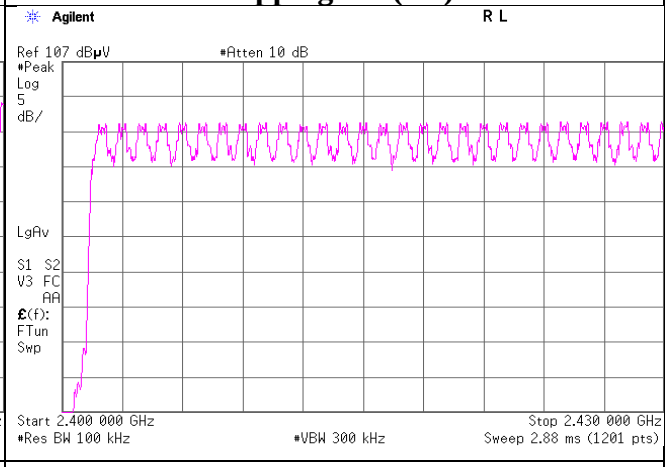


Hopping On (3/3)

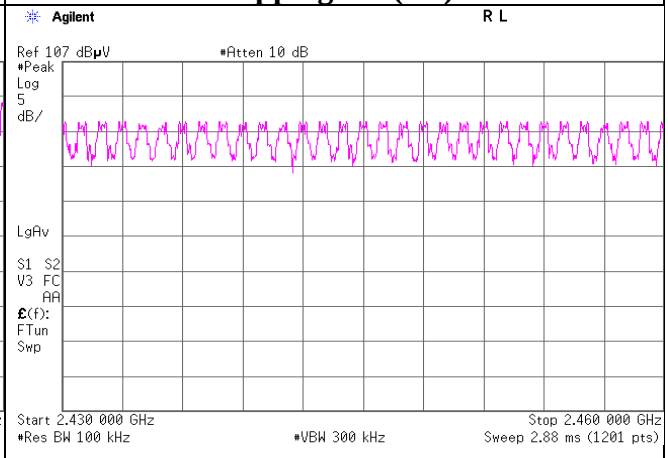


3DH5

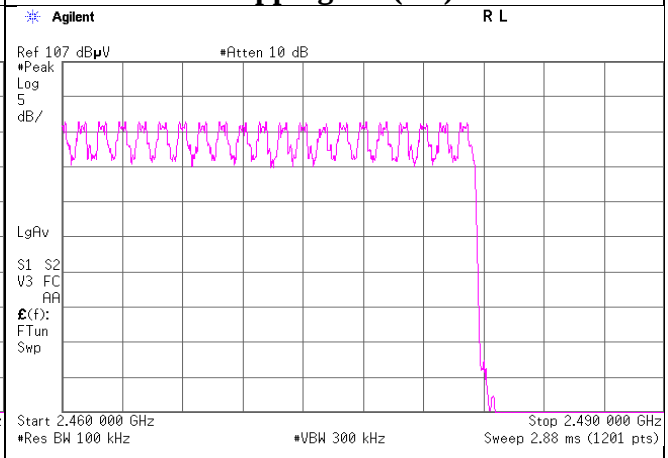
Hopping On (1/3)



Hopping On (2/3)



Hopping On (3/3)



Dwell time

Report No.	13462774S-A-R2
Test place	Shonan EMC Lab. No.5 Shielded Room
Date	September 3, 2020
Temperature / Humidity	23 deg. C / 54 % RH
Engineer	Yohsuke Matsuzawa
Mode	Tx, Hopping On

Mode	Number of transmission in a 31.6(79 Hopping x 0.4)				Length of transmission [msec]	Result [msec]	Limit [msec]
DH1	49.4 times /	5 sec. x	31.6 sec. =	313 times	0.392	123	400
DH3	28.2 times /	5 sec. x	31.6 sec. =	179 times	1.650	295	400
DH5	21.2 times /	5 sec. x	31.6 sec. =	134 times	2.899	388	400
3DH1	49.4 times /	5 sec. x	31.6 sec. =	313 times	0.392	123	400
3DH3	28.8 times /	5 sec. x	31.6 sec. =	183 times	1.647	301	400
3DH5	20.4 times /	5 sec. x	31.6 sec. =	129 times	2.900	374	400

Sample Calculation
Result = Number of transmission x Length of transmission

*Average data of 5 tests.(except Inquiry)

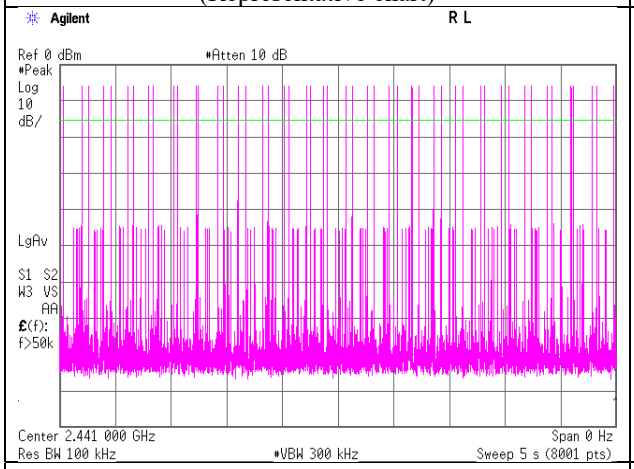
Mode	Sampling [times]					Average [times]
	1	2	3	4	5	
DH1	49	48	49	50	51	49.4
DH3	28	27	28	28	30	28.2
DH5	23	22	19	21	21	21.2
3DH1	48	50	50	51	48	49.4
3DH3	27	28	30	28	31	28.8
3DH5	21	20	20	21	20	20.4

Sample Calculation
Average = Summation (Sampling 1 to 5) / 5

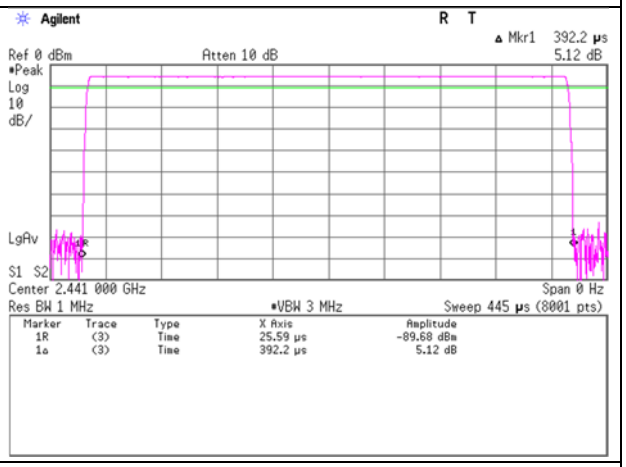
This device complies with the Bluetooth protocol for FHSS operation, employing a pseudo random channel selection and hopping rate to ensure that the occupancy time in N x 0.4s, where N is the number of channels being used in the hopping sequence ($20 \leq N \leq 79$), is always less than 0.4s regardless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

Dwell time

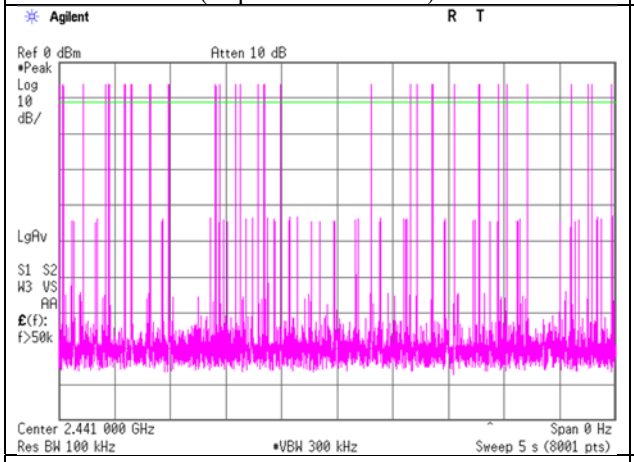
DH1 (1/2)
(Representative chart)



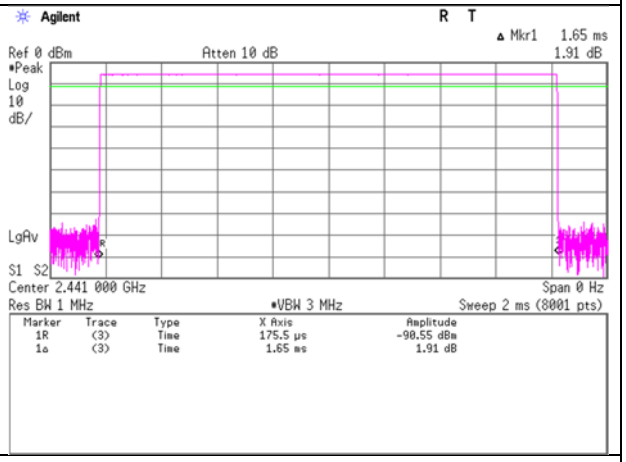
DH1 (2/2)



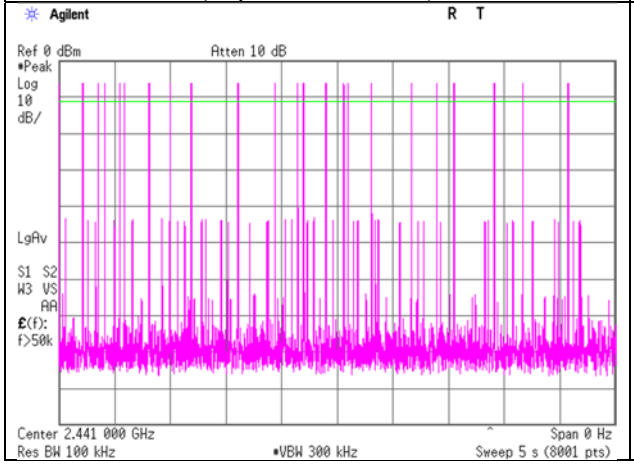
DH3 (1/2)
(Representative chart)



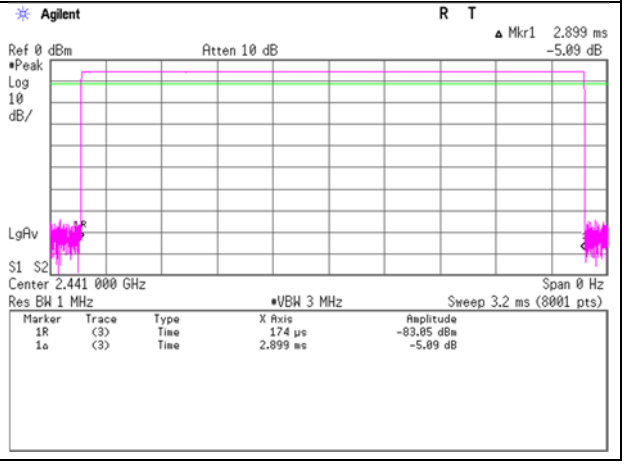
DH3 (2/2)



DH5 (1/2)
(Representative chart)

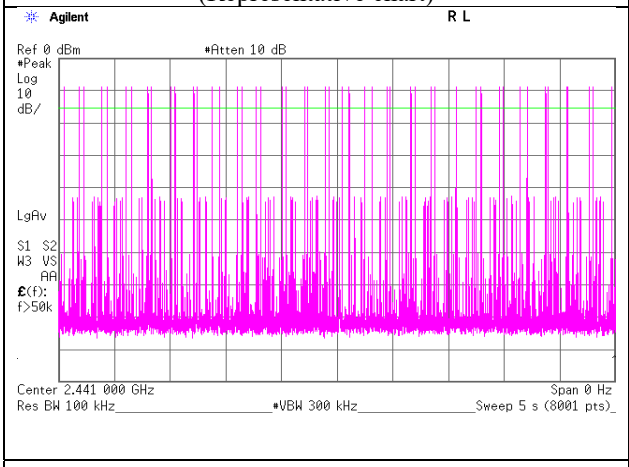


DH5 (2/2)

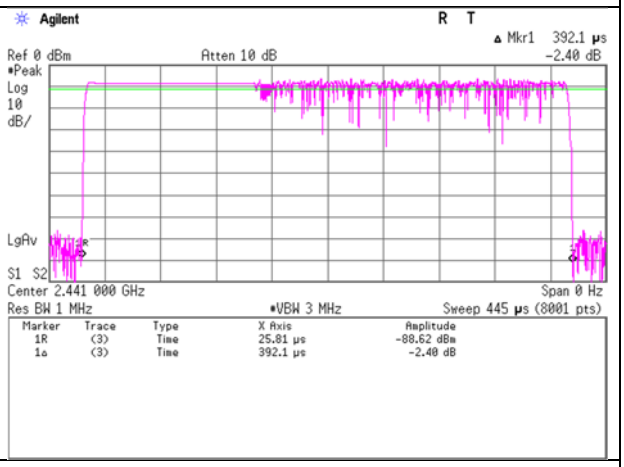


Dwell time

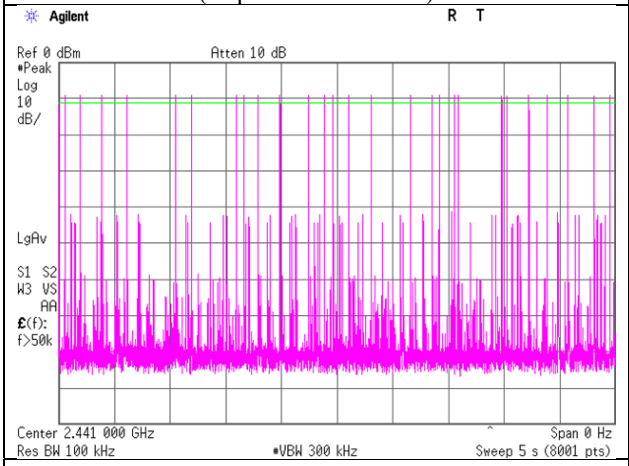
3DH1 (1/2)
(Representative chart)



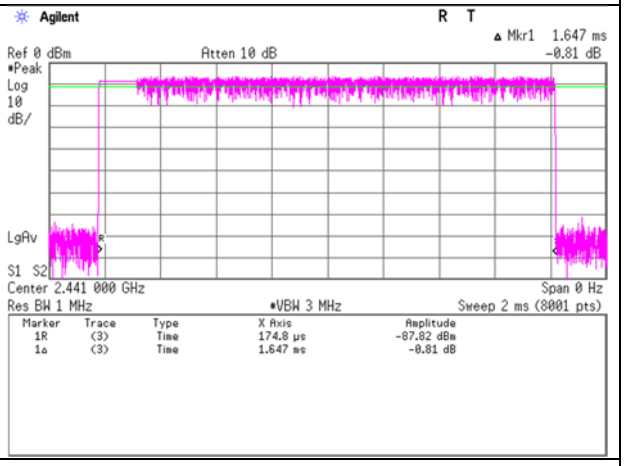
3DH1 (2/2)



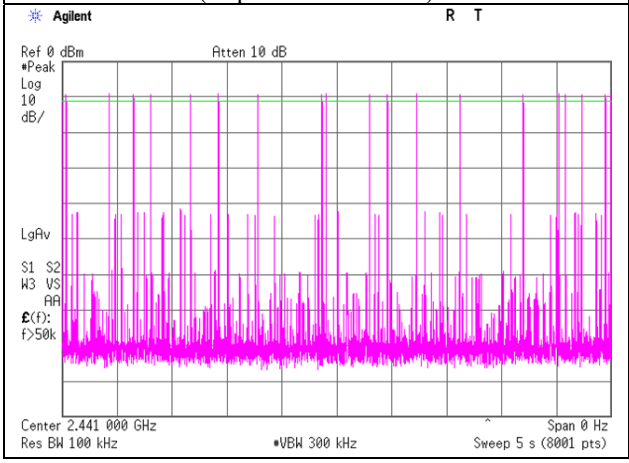
3DH3 (1/2)
(Representative chart)



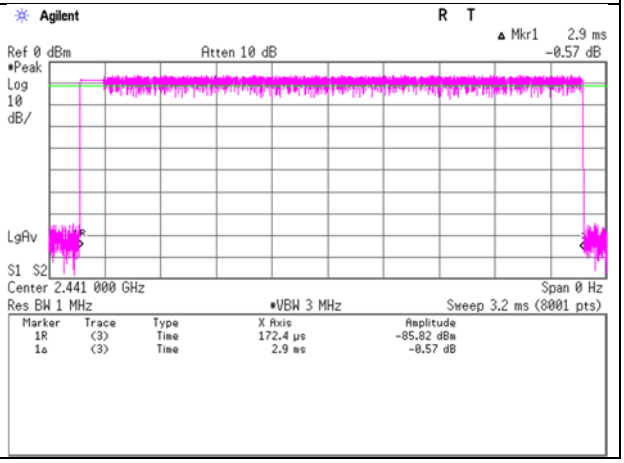
3DH3 (2/2)



3DH5 (1/2)
(Representative chart)



3DH5 (2/2)



Maximum Peak Output Power

Report No.	13462774S-A-R2
Test place	Shonan EMC Lab. No.5 Shielded Room
Date	August 18, 2020
Temperature / Humidity	24 deg. C / 40 % RH
Engineer	Shiro Kobayashi
Mode	Tx, Hopping Off

					Conducted Power					e.i.r.p. for RSS-247					
Mode	Freq.	Reading	Cable Loss	Atten. Loss	Result		Limit		Margin	Antenna Gain	Result		Limit		Margin
	[MHz]	[dBm]	[dB]	[dB]	[dBm]	[mW]	[dBm]	[mW]	[dB]	[dBi]	[dBm]	[mW]	[dBm]	[mW]	[dB]
DH5	2402.0	-5.80	2.10	9.88	6.18	4.15	20.96	125	14.78	0.05	6.23	4.20	36.02	4000	29.79
DH5	2441.0	-5.56	2.11	9.88	6.43	4.40	20.96	125	14.53	0.05	6.48	4.45	36.02	4000	29.54
DH5	2480.0	-5.62	2.12	9.88	6.38	4.35	20.96	125	14.58	0.05	6.43	4.40	36.02	4000	29.59
2DH5	2402.0	-6.54	2.10	9.88	5.44	3.50	20.96	125	15.52	0.05	5.49	3.54	36.02	4000	30.53
2DH5	2441.0	-6.31	2.11	9.88	5.68	3.70	20.96	125	15.28	0.05	5.73	3.74	36.02	4000	30.29
2DH5	2480.0	-6.38	2.12	9.88	5.62	3.65	20.96	125	15.34	0.05	5.67	3.69	36.02	4000	30.35
3DH5	2402.0	-6.26	2.10	9.88	5.72	3.73	20.96	125	15.24	0.05	5.77	3.78	36.02	4000	30.25
3DH5	2441.0	-6.02	2.11	9.88	5.97	3.95	20.96	125	14.99	0.05	6.02	4.00	36.02	4000	30.00
3DH5	2480.0	-6.11	2.12	9.88	5.89	3.88	20.96	125	15.07	0.05	5.94	3.93	36.02	4000	30.08

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

Test was not performed at AFH mode, because the decrease of number of channel (min: 20 ch) at AFH mode does not influence on the output power and bandwidth of the EUT.
As this device had AFH mode and frequency separation could not meet the requirement of over 20 dB BW without 2/3 relaxation, 125 mW power limit was applied to it.

Average Output Power
(Reference data for RF Exposure)

Report No.	13462774S-A-R2
Test place	Shonan EMC Lab. No.5 Shielded Room
Date	August 18, 2020
Temperature / Humidity	24 deg. C / 40 % RH
Engineer	Shiro Kobayashi
Mode	Tx, Hopping Off

Mode	Freq.	Reading	Cable Loss	Atten. Loss	Result (Time average)		Duty factor	Result (Burst power average)	
	[MHz]	[dBm]	[dB]	[dB]	[dBm]	[mW]	[dB]	[dBm]	[mW]
DH5	2402.0	-7.11	2.10	9.88	4.87	3.07	1.13	6.00	3.98
DH5	2441.0	-6.86	2.11	9.88	5.13	3.26	1.13	6.26	4.23
DH5	2480.0	-6.96	2.12	9.88	5.04	3.19	1.13	6.17	4.14
2DH5	2402.0	-10.23	2.10	9.88	1.75	1.50	1.13	2.88	1.94
2DH5	2441.0	-10.00	2.11	9.88	1.99	1.58	1.13	3.12	2.05
2DH5	2480.0	-10.08	2.12	9.88	1.92	1.56	1.13	3.05	2.02
3DH5	2402.0	-10.22	2.10	9.88	1.76	1.50	1.13	2.89	1.95
3DH5	2441.0	-9.99	2.11	9.88	2.00	1.58	1.13	3.13	2.06
3DH5	2480.0	-10.08	2.12	9.88	1.92	1.56	1.13	3.05	2.02

Sample Calculation:
Result (Time average) = Reading + Cable Loss (including the cable(s) customer supplied) + Attenuator Loss
Result (Burst power average) = Time average + Duty factor

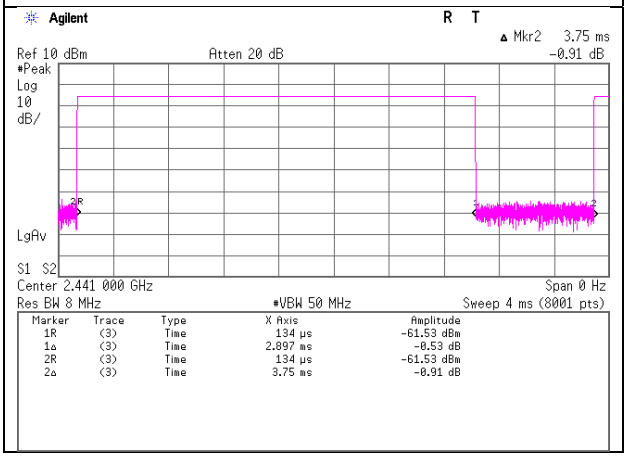
*The equipment and cables were not used for factor 0 dB of the data sheets.

Burst Rate Confirmation

Report No.	13462774S-A-R2
Test place	Shonan EMC Lab. No.5 Shielded Room
Date	August 18, 2020
Temperature / Humidity	24 deg. C / 40 % RH
Engineer	Shiro Kobayashi
Mode	Tx, Hopping Off

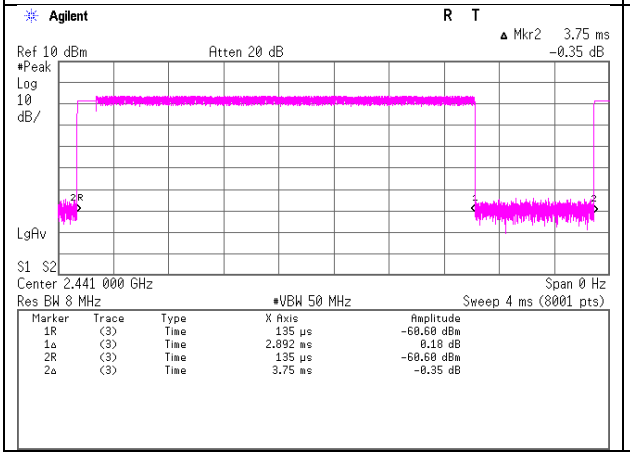
DH5

Tx on / (Tx on + Tx off) =	**0.773**
Tx on / (Tx on + Tx off) * 100 =	**77.3 %**
Duty factor = 10 * log (3.75 / 2.897) =	**1.13 dB**



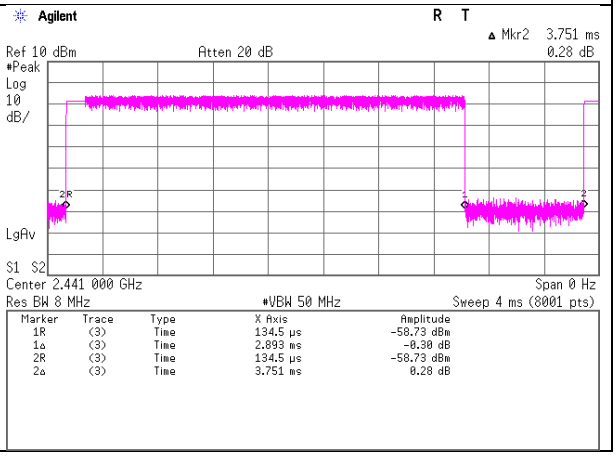
2DH5

Tx on / (Tx on + Tx off) =	**0.771**
Tx on / (Tx on + Tx off) * 100 =	**77.1 %**
Duty factor = 10 * log (3.75 / 2.892) =	**1.13 dB**



3DH5

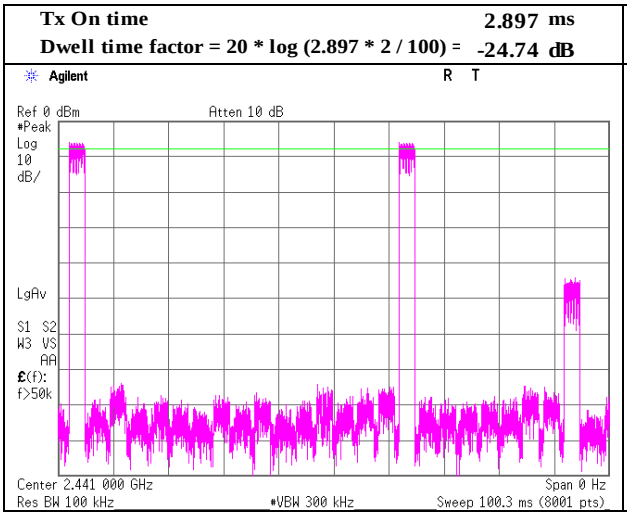
Tx on / (Tx on + Tx off) =	**0.771**
Tx on / (Tx on + Tx off) * 100 =	**77.1 %**
Duty factor = 10 * log (3.751 / 2.893) =	**1.13 dB**



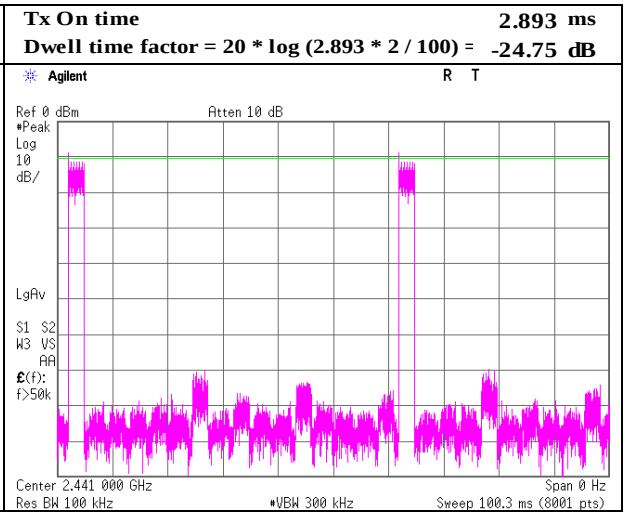
Duty cycle correction factor

Report No.	13462774S-A-R2
Test place	Shonan EMC Lab. No.5 Shielded Room
Date	August 18, 2020
Temperature / Humidity	24 deg. C / 40 % RH
Engineer	Shiro Kobayashi
Mode	Tx, Hopping On

DH5



3DH5



As for Tx On time, refer to “Burst Rate Confirmation”.

Radiated Spurious Emission

Report No.	13462774S-A-R2			
Test place	Shonan EMC Lab.			
Semi Anechoic Chamber	3	3	3	3
Date	August 25, 2020	August 22, 2020	August 23, 2020	August 24, 2020
Temperature / Humidity	25 deg. C / 54 % RH	21 deg. C / 60 % RH	25 deg. C / 61 % RH	25 deg. C / 60 % RH
Engineer	Yohsuke Matsuzawa	Yohsuke Matsuzawa	Yohsuke Matsuzawa	Yosuke Murakami
	(30 MHz - 1 GHz)	(1 GHz - 2.8 GHz)	(2.8 GHz - 10 GHz)	(10 GHz - 26.5 GHz)
Mode	Tx, Hopping Off, DH5 2402 MHz			

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	186.553	QP	37.50	16.21	7.78	32.05	0.00	29.44	43.5	14.0	167	359	-
Hori.	194.429	QP	35.60	16.46	7.79	32.05	0.00	27.80	43.5	15.7	168	1	-
Hori.	215.176	QP	41.10	11.22	8.06	32.03	0.00	28.35	43.5	15.1	153	336	-
Hori.	237.430	QP	46.20	11.51	8.19	32.00	0.00	33.90	46.0	12.1	147	335	-
Hori.	425.015	QP	44.30	16.06	9.12	31.94	0.00	37.54	46.0	8.4	100	303	-
Hori.	496.463	QP	31.70	17.72	9.40	31.92	0.00	26.90	46.0	19.1	303	359	-
Hori.	519.929	QP	41.70	17.67	9.49	31.95	0.00	36.91	46.0	9.0	164	122	-
Hori.	785.335	QP	36.30	20.58	10.45	31.68	0.00	35.65	46.0	10.3	100	0	-
Hori.	870.615	QP	37.30	22.00	10.73	31.21	0.00	38.82	46.0	**7.1**	100	239	-
Hori.	2390.000	PK	47.85	28.41	14.22	41.66	2.10	50.92	73.9	22.9	133	132	-
Hori.	4804.000	PK	50.90	31.60	6.68	42.92	2.10	48.36	73.9	25.5	201	41	-
Hori.	7206.000	PK	53.72	37.60	8.16	43.39	2.10	58.19	73.9	15.7	319	225	-
Vert.	519.765	QP	39.30	17.67	9.49	31.95	0.00	34.51	46.0	11.4	117	155	-
Vert.	2390.000	PK	49.13	28.41	14.22	41.66	2.10	52.20	73.9	21.7	162	314	-
Vert.	3356.432	PK	52.86	28.71	6.09	42.09	2.10	47.67	73.9	26.2	151	33	-
Vert.	4804.000	PK	51.67	31.60	6.68	42.92	2.10	49.13	73.9	24.7	279	129	-
Vert.	7206.000	PK	55.72	37.60	8.16	43.39	2.10	60.19	73.9	13.7	151	115	-
Vert.	3356.432	AV	43.61	28.71	6.09	42.09	2.10	38.42	53.9	15.4	151	33	VBW: 10 Hz

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.82 m / 3.0 m) = 2.10 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

Peak measurement value with Duty cycle correction factor (DCCF)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	DCCF [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2390.000	PK	47.85	28.41	14.22	41.66	-24.74	2.10	26.18	53.9	27.7	*1)
Hori.	4804.000	PK	50.90	31.60	6.68	42.92	-24.74	2.10	23.62	53.9	30.2	-
Hori.	7206.000	PK	53.72	37.60	8.16	43.39	-24.74	2.10	33.45	53.9	20.4	-
Vert.	2390.000	PK	49.13	28.41	14.22	41.66	-24.74	2.10	27.46	53.9	26.4	*1)
Vert.	4804.000	PK	51.67	31.60	6.68	42.92	-24.74	2.10	24.39	53.9	29.5	-
Vert.	7206.000	PK	55.72	37.60	8.16	43.39	-24.74	2.10	35.45	53.9	18.4	-

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + DCCF + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.82 m / 3.0 m) = 2.10 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB
Duty cycle correction factor (DCCF) refer to "Duty cycle correction factor" sheet.
*1) Not out of band emission (Leakage Power)

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	98.17	28.38	14.23	41.67	2.10	101.21	-	-	Carrier
Hori.	2400.000	PK	41.64	28.38	14.22	41.67	2.10	44.67	81.2	36.5	-
Vert.	2402.000	PK	98.65	28.38	14.23	41.67	2.10	101.69	-	-	Carrier
Vert.	2400.000	PK	41.85	28.38	14.22	41.67	2.10	44.88	81.6	36.7	-

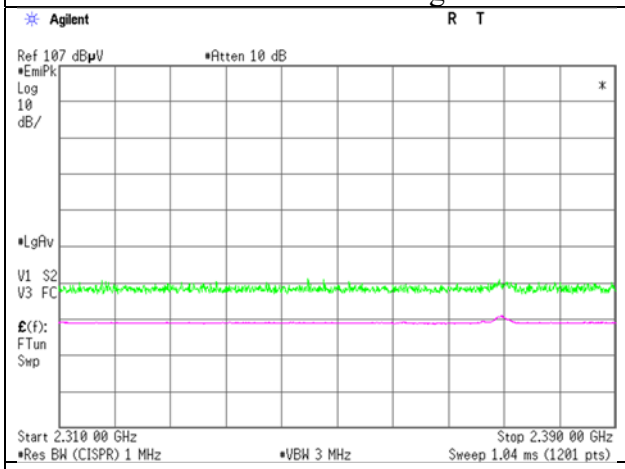
Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.82 m / 3.0 m) = 2.10 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

Radiated Spurious Emission
(Reference Plot for band-edge)

Report No.	13462774S-A-R2
Test place	Shonan EMC Lab.
Semi Anechoic Chamber	3
Date	August 22, 2020
Temperature / Humidity	21 deg. C / 60 % RH
Engineer	Yohsuke Matsuzawa
Mode	Tx, Hopping Off, DH5 2402 MHz

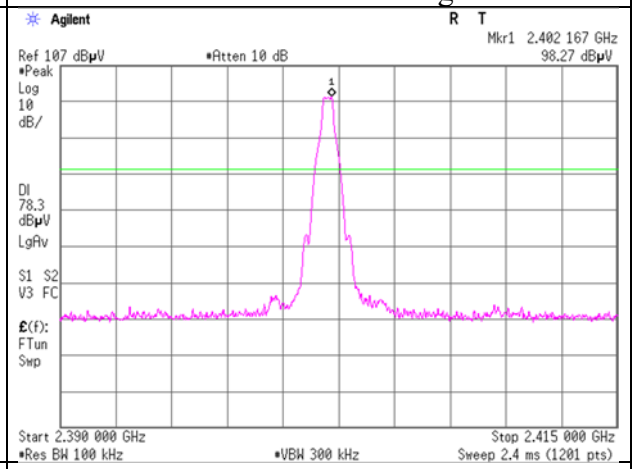
Horizontal

Restricted-band band-edge Plot



Trace Green : Peak Plot
Trace Purple : Average Plot

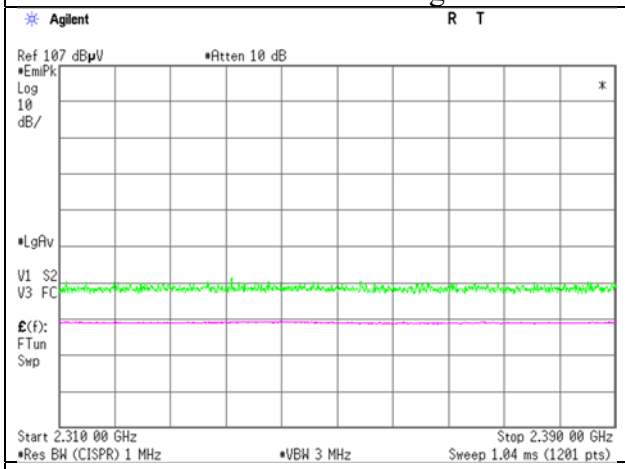
Authorized-band band-edge Plot



20dBc Plot

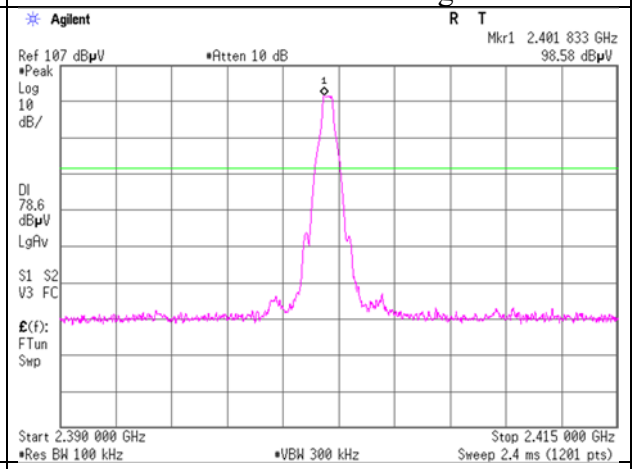
Vertical

Restricted-band band-edge Plot



Trace Green : Peak Plot
Trace Purple : Average Plot

Authorized-band band-edge Plot



20dBc Plot

* 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.	13462774S-A-R2			
Test place	Shonan EMC Lab.			
Semi Anechoic Chamber	3	3	3	3
Date	August 25, 2020	August 22, 2020	August 23, 2020	August 24, 2020
Temperature / Humidity	25 deg. C / 54 % RH	21 deg. C / 60 % RH	25 deg. C / 61 % RH	25 deg. C / 60 % RH
Engineer	Yohsuke Matsuzawa	Yohsuke Matsuzawa	Yohsuke Matsuzawa	Yosuke Murakami
	(30 MHz - 1 GHz)	(1 GHz - 2.8 GHz)	(2.8 GHz - 10 GHz)	(10 GHz - 26.5 GHz)
Mode	Tx, Hopping Off, DH5 2441 MHz			

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	175.015	QP	41.30	15.73	7.81	32.06	0.00	32.78	43.5	10.7	192	1	-
Hori.	186.532	QP	37.60	16.21	7.78	32.05	0.00	29.54	43.5	13.9	166	359	-
Hori.	194.430	QP	35.80	16.46	7.79	32.05	0.00	28.00	43.5	15.5	170	1	-
Hori.	215.102	QP	41.11	11.22	8.06	32.03	0.00	28.36	43.5	15.1	144	342	-
Hori.	240.008	QP	48.60	11.57	8.20	32.00	0.00	36.37	46.0	9.6	167	334	-
Hori.	425.014	QP	44.50	16.06	9.12	31.94	0.00	37.74	46.0	8.2	100	304	-
Hori.	519.748	QP	41.30	17.68	9.49	31.95	0.00	36.52	46.0	9.4	224	203	-
Hori.	784.844	QP	36.50	20.57	10.45	31.68	0.00	35.84	46.0	10.1	100	1	-
Hori.	870.620	QP	37.40	22.00	10.73	31.21	0.00	38.92	46.0	**7.0**	100	234	-
Hori.	4882.000	PK	48.94	31.63	6.72	42.93	2.10	46.46	73.9	27.4	148	185	-
Hori.	7323.000	PK	50.84	37.71	8.21	43.49	2.10	55.37	73.9	18.5	113	328	-
Vert.	519.944	QP	40.60	17.67	9.49	31.95	0.00	35.81	46.0	10.1	179	45	-
Vert.	3356.468	PK	52.35	28.71	6.09	42.09	2.10	47.16	73.9	26.7	151	32	-
Vert.	4882.000	PK	50.98	31.63	6.72	42.93	2.10	48.50	73.9	25.4	154	183	-
Vert.	7323.000	PK	51.53	37.71	8.21	43.49	2.10	56.06	73.9	17.8	204	128	-
Vert.	3356.468	AV	44.39	28.71	6.09	42.09	2.10	39.20	53.9	14.7	151	32	VBW: 10 Hz

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.82 m / 3.0 m) = 2.10 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

Peak measurement value with Duty cycle correction factor (DCCF)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	DCCF [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	4882.000	PK	48.94	31.63	6.72	42.93	-24.74	2.10	21.72	53.9	32.1	-
Hori.	7323.000	PK	50.84	37.71	8.21	43.49	-24.74	2.10	30.63	53.9	23.2	-
Vert.	4882.000	PK	50.98	31.63	6.72	42.93	-24.74	2.10	23.76	53.9	30.1	-
Vert.	7323.000	PK	51.53	37.71	8.21	43.49	-24.74	2.10	31.32	53.9	22.5	-

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + DCCF + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.82 m / 3.0 m) = 2.10 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB
Duty cycle correction factor (DCCF) refer to "Duty cycle correction factor" sheet.

Radiated Spurious Emission

Report No.	13462774S-A-R2			
Test place	Shonan EMC Lab.			
Semi Anechoic Chamber	3	3	3	3
Date	August 26, 2020	August 22, 2020	August 23, 2020	August 24, 2020
Temperature / Humidity	23 deg. C / 60 % RH	21 deg. C / 60 % RH	25 deg. C / 61 % RH	25 deg. C / 60 % RH
Engineer	Kazuya Noda	Yohsuke Matsuzawa	Yohsuke Matsuzawa	Yosuke Murakami
	(30 MHz - 1 GHz)	(1 GHz - 2.8 GHz)	(2.8 GHz - 10 GHz)	(10 GHz - 26.5 GHz)
Mode	Tx, Hopping Off, DH5 2480 MHz			

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	200.000	QP	39.10	16.56	7.83	32.04	0.00	31.45	43.5	12.0	161	312	-
Hori.	214.956	QP	43.70	11.22	8.06	32.03	0.00	30.95	43.5	12.5	146	353	-
Hori.	240.009	QP	48.40	11.57	8.20	32.00	0.00	36.17	46.0	9.8	124	341	-
Hori.	375.012	QP	43.60	15.11	8.89	31.93	0.00	35.67	46.0	10.3	100	61	-
Hori.	425.014	QP	40.40	16.06	9.12	31.94	0.00	33.64	46.0	12.3	100	287	-
Hori.	519.952	QP	41.20	17.67	9.49	31.95	0.00	36.41	46.0	9.5	176	124	-
Hori.	762.466	QP	37.70	20.33	10.38	31.71	0.00	36.70	46.0	9.3	100	19	-
Hori.	870.868	QP	36.30	22.01	10.73	31.20	0.00	37.84	46.0	**8.1**	100	231	-
Hori.	2483.500	PK	53.42	28.28	14.31	41.69	2.10	56.42	73.9	17.4	178	138	-
Hori.	4960.000	PK	50.88	31.79	6.79	42.94	2.10	48.62	73.9	25.2	330	156	-
Hori.	7440.000	PK	50.95	37.88	8.26	43.60	2.10	55.59	73.9	18.3	153	150	-
Vert.	55.719	QP	35.80	9.29	6.70	32.16	0.00	19.63	40.0	20.3	100	286	-
Vert.	786.428	QP	36.80	20.60	10.45	31.68	0.00	36.17	46.0	9.8	100	150	-
Vert.	2483.500	PK	54.87	28.28	14.31	41.69	2.10	57.87	73.9	16.0	151	314	-
Vert.	3355.624	PK	52.64	28.71	6.08	42.09	2.10	47.44	73.9	26.4	151	33	-
Vert.	4960.000	PK	51.49	31.79	6.79	42.94	2.10	49.23	73.9	24.6	230	176	-
Vert.	7440.000	PK	52.00	37.88	8.26	43.60	2.10	56.64	73.9	17.2	150	8	-
Vert.	3355.624	AV	44.63	28.71	6.08	42.09	2.10	39.43	53.9	14.4	151	33	VBW: 10 Hz

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.82 m / 3.0 m) = 2.10 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

Peak measurement value with Duty cycle correction factor (DCCF)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	DCCF [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2483.500	PK	53.42	28.28	14.31	41.69	-24.74	2.10	31.68	53.9	22.2	*1)
Hori.	4960.000	PK	50.88	31.79	6.79	42.94	-24.74	2.10	23.88	53.9	30.0	-
Hori.	7440.000	PK	50.95	37.88	8.26	43.60	-24.74	2.10	30.85	53.9	23.0	-
Vert.	2483.500	PK	54.87	28.28	14.31	41.69	-24.74	2.10	33.13	53.9	20.7	*1)
Vert.	4960.000	PK	51.49	31.79	6.79	42.94	-24.74	2.10	24.49	53.9	29.4	-
Vert.	7440.000	PK	52.00	37.88	8.26	43.60	-24.74	2.10	31.90	53.9	22.0	-

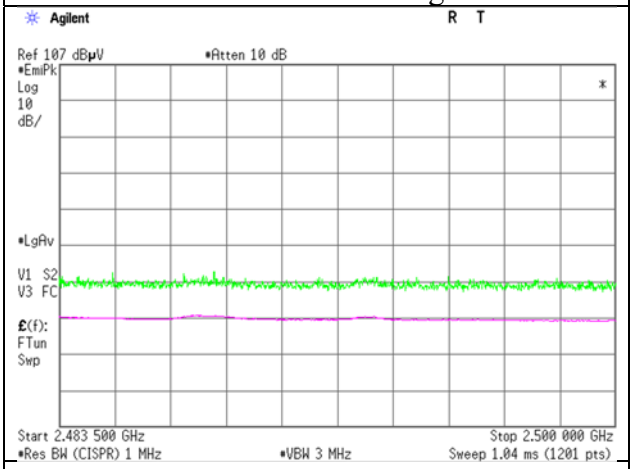
Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + DCCF + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.82 m / 3.0 m) = 2.10 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB
Duty cycle correction factor (DCCF) refer to "Duty cycle correction factor" sheet.
*1) Not out of band emission (Leakage Power)

Radiated Spurious Emission
(Reference Plot for band-edge)

Report No.	13462774S-A-R2
Test place	Shonan EMC Lab.
Semi Anechoic Chamber	3
Date	August 22, 2020
Temperature / Humidity	21 deg. C / 60 % RH
Engineer	Yohsuke Matsuzawa
Mode	Tx, Hopping Off, DH5 2480 MHz

Horizontal

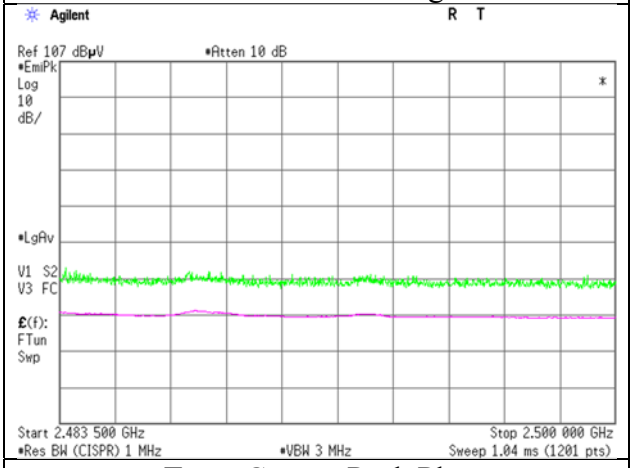
Restricted-band band-edge Plot



Trace Green : Peak Plot
Trace Purple : Average Plot

Vertical

Restricted-band band-edge Plot



Trace Green : Peak Plot
Trace Purple : Average Plot

* 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.	13462774S-A-R2			
Test place	Shonan EMC Lab.			
Semi Anechoic Chamber	3	3	3	3
Date	August 26, 2020	August 22, 2020	August 23, 2020	August 24, 2020
Temperature / Humidity	23 deg. C / 60 % RH	21 deg. C / 60 % RH	25 deg. C / 61 % RH	25 deg. C / 60 % RH
Engineer	Kazuya Noda	Yohsuke Matsuzawa	Yohsuke Matsuzawa	Yosuke Murakami
	(30 MHz - 1 GHz)	(1 GHz - 2.8 GHz)	(2.8 GHz - 10 GHz)	(10 GHz - 26.5 GHz)
Mode	Tx, Hopping Off, 3DH5 2402 MHz			

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	200.000	QP	38.90	16.56	7.83	32.04	0.00	31.25	43.5	12.2	167	312	-
Hori.	214.910	QP	44.50	11.22	8.06	32.03	0.00	31.75	43.5	11.7	162	354	-
Hori.	240.010	QP	48.80	11.57	8.20	32.00	0.00	36.57	46.0	9.4	140	335	-
Hori.	375.013	QP	43.60	15.11	8.89	31.93	0.00	35.67	46.0	10.3	100	39	-
Hori.	519.749	QP	41.30	17.68	9.49	31.95	0.00	36.52	46.0	9.4	177	125	-
Hori.	767.497	QP	37.40	20.41	10.40	31.71	0.00	36.50	46.0	9.5	100	14	-
Hori.	870.488	QP	35.90	21.99	10.73	31.21	0.00	37.41	46.0	**8.5**	100	232	-
Hori.	2390.000	PK	47.81	28.41	14.22	41.66	2.10	50.88	73.9	23.0	135	133	-
Hori.	4804.000	PK	49.44	31.60	6.68	42.92	2.10	46.90	73.9	27.0	118	192	-
Hori.	7206.000	PK	52.77	37.60	8.16	43.39	2.10	57.24	73.9	16.6	100	222	-
Vert.	55.626	QP	35.40	9.32	6.70	32.16	0.00	19.26	40.0	20.7	100	273	-
Vert.	786.422	QP	36.50	20.60	10.45	31.68	0.00	35.87	46.0	10.1	100	150	-
Vert.	2390.000	PK	49.77	28.41	14.22	41.66	2.10	52.84	73.9	21.0	218	195	-
Vert.	3353.769	PK	52.83	28.71	6.08	42.08	2.10	47.64	73.9	26.2	151	32	-
Vert.	4804.000	PK	51.35	31.60	6.68	42.92	2.10	48.81	73.9	25.0	203	184	-
Vert.	7206.000	PK	52.89	37.60	8.16	43.39	2.10	57.36	73.9	16.5	133	130	-
Vert.	3353.769	AV	43.41	28.71	6.08	42.08	2.10	38.22	53.9	15.6	151	32	VBW: 10 Hz

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.82 m / 3.0 m) = 2.10 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

Peak measurement value with Duty cycle correction factor (DCCF)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	DCCF [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2390.000	PK	47.81	28.41	14.22	41.66	-24.75	2.10	26.13	53.9	27.7	*1)
Hori.	4804.000	PK	49.44	31.60	6.68	42.92	-24.75	2.10	22.15	53.9	31.7	-
Hori.	7206.000	PK	52.77	37.60	8.16	43.39	-24.75	2.10	32.49	53.9	21.4	-
Vert.	2390.000	PK	49.77	28.41	14.22	41.66	-24.75	2.10	28.09	53.9	25.8	*1)
Vert.	4804.000	PK	51.35	31.60	6.68	42.92	-24.75	2.10	24.06	53.9	29.8	-
Vert.	7206.000	PK	52.89	37.60	8.16	43.39	-24.75	2.10	32.61	53.9	21.2	-

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + DCCF + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.82 m / 3.0 m) = 2.10 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB
Duty cycle correction factor (DCCF) refer to "Duty cycle correction factor" sheet.
*1) Not out of band emission (Leakage Power)

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2402.000	PK	95.20	28.38	14.23	41.67	2.10	98.24	-	-	Carrier
Hori.	2400.000	PK	47.08	28.38	14.22	41.67	2.10	50.11	78.2	28.0	-
Vert.	2402.000	PK	93.72	28.38	14.23	41.67	2.10	96.76	-	-	Carrier
Vert.	2400.000	PK	45.27	28.38	14.22	41.67	2.10	48.30	76.7	28.4	-

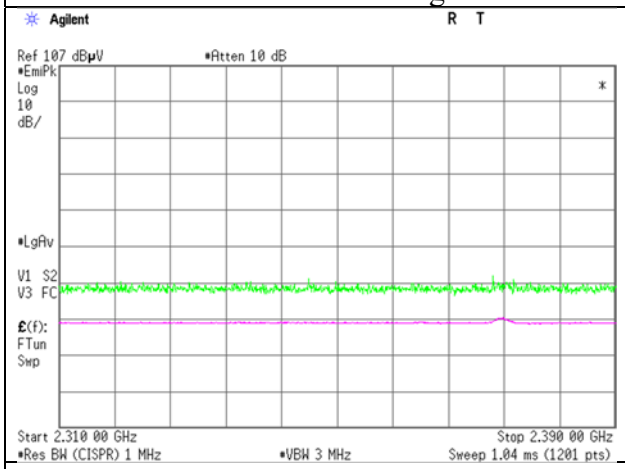
Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.82 m / 3.0 m) = 2.10 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

Radiated Spurious Emission
(Reference Plot for band-edge)

Report No.	13462774S-A-R2
Test place	Shonan EMC Lab.
Semi Anechoic Chamber	3
Date	August 22, 2020
Temperature / Humidity	21 deg. C / 60 % RH
Engineer	Yohsuke Matsuzawa
Mode	Tx, Hopping Off, 3DH5 2402 MHz

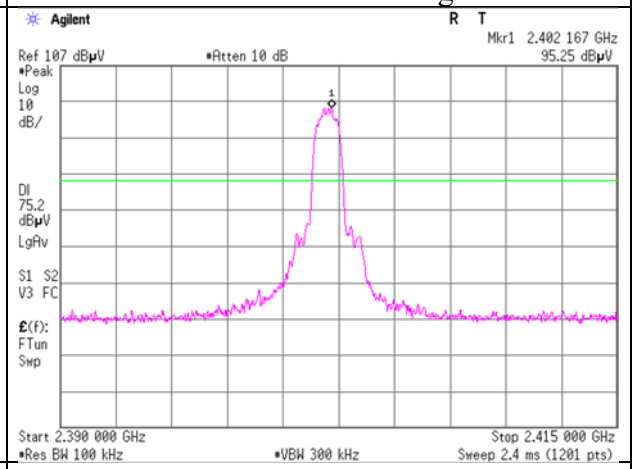
Horizontal

Restricted-band band-edge Plot



Trace Green : Peak Plot
Trace Purple : Average Plot

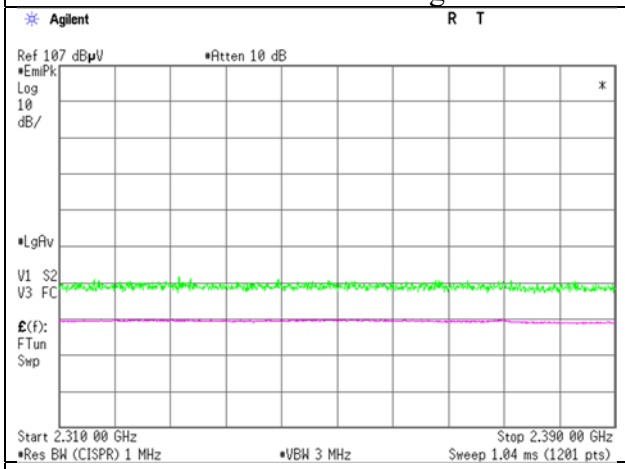
Authorized-band band-edge Plot



20dBc Plot

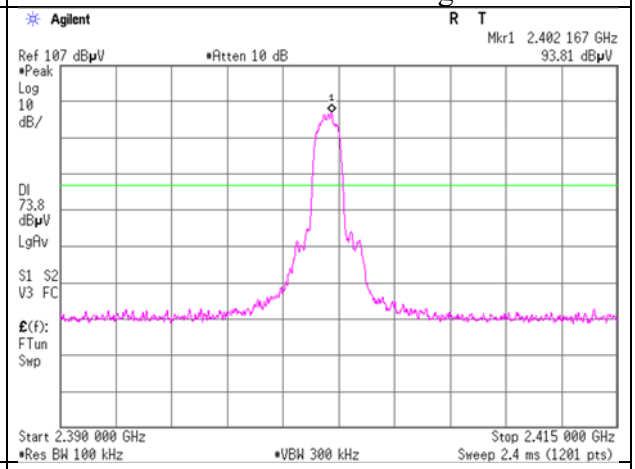
Vertical

Restricted-band band-edge Plot



Trace Green : Peak Plot
Trace Purple : Average Plot

Authorized-band band-edge Plot



20dBc Plot

* 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.	13462774S-A-R2			
Test place	Shonan EMC Lab.			
Semi Anechoic Chamber	3	3	3	3
Date	August 26, 2020	August 22, 2020	August 23, 2020	August 24, 2020
Temperature / Humidity	23 deg. C / 60 % RH	21 deg. C / 60 % RH	25 deg. C / 61 % RH	25 deg. C / 60 % RH
Engineer	Kazuya Noda	Yohsuke Matsuzawa	Yohsuke Matsuzawa	Yosuke Murakami
	(30 MHz - 1 GHz)	(1 GHz - 2.8 GHz)	(2.8 GHz - 10 GHz)	(10 GHz - 26.5 GHz)
Mode	Tx, Hopping Off, 3DH5 2441 MHz			

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	200.000	QP	38.90	16.56	7.83	32.04	0.00	31.25	43.5	12.2	166	313	-
Hori.	214.858	QP	44.20	11.22	8.06	32.03	0.00	31.45	43.5	12.0	146	353	-
Hori.	240.006	QP	49.00	11.57	8.20	32.00	0.00	36.77	46.0	9.2	172	338	-
Hori.	375.012	QP	43.80	15.11	8.89	31.93	0.00	35.87	46.0	10.1	100	40	-
Hori.	520.120	QP	41.80	17.67	9.49	31.95	0.00	37.01	46.0	8.9	177	122	-
Hori.	762.431	QP	37.80	20.33	10.38	31.71	0.00	36.80	46.0	9.2	100	11	-
Hori.	871.078	QP	35.90	22.01	10.73	31.20	0.00	37.44	46.0	**8.5**	100	233	-
Hori.	4882.000	PK	48.98	31.63	6.72	42.93	2.10	46.50	73.9	27.4	146	185	-
Hori.	7323.000	PK	50.35	37.71	8.21	43.49	2.10	54.88	73.9	19.0	201	159	-
Vert.	55.664	QP	35.90	9.30	6.70	32.16	0.00	19.74	40.0	20.2	100	282	-
Vert.	786.431	QP	36.30	20.60	10.45	31.68	0.00	35.67	46.0	10.3	100	153	-
Vert.	3353.957	PK	53.27	28.71	6.08	42.08	2.10	48.08	73.9	25.8	151	32	-
Vert.	4882.000	PK	50.75	31.63	6.72	42.93	2.10	48.27	73.9	25.6	156	178	-
Vert.	7323.000	PK	50.46	37.71	8.21	43.49	2.10	54.99	73.9	18.9	179	129	-
Vert.	3353.957	AV	44.33	28.71	6.08	42.08	2.10	39.14	53.9	14.7	151	32	VBW: 10 Hz

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.82 m / 3.0 m) = 2.10 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

Peak measurement value with Duty cycle correction factor (DCCF)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	DCCF [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	4882.000	PK	48.98	31.63	6.72	42.93	-24.75	2.10	21.75	53.9	32.1	-
Hori.	7323.000	PK	50.35	37.71	8.21	43.49	-24.75	2.10	30.13	53.9	23.7	-
Vert.	4882.000	PK	50.75	31.63	6.72	42.93	-24.75	2.10	23.52	53.9	30.3	-
Vert.	7323.000	PK	50.46	37.71	8.21	43.49	-24.75	2.10	30.24	53.9	23.6	-

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + DCCF + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.82 m / 3.0 m) = 2.10 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB
Duty cycle correction factor (DCCF) refer to "Duty cycle correction factor" sheet.

Radiated Spurious Emission

Report No.	13462774S-A-R2			
Test place	Shonan EMC Lab.			
Semi Anechoic Chamber	3	3	3	3
Date	August 26, 2020	August 22, 2020	August 23, 2020	August 24, 2020
Temperature / Humidity	23 deg. C / 60 % RH	21 deg. C / 60 % RH	25 deg. C / 61 % RH	25 deg. C / 60 % RH
Engineer	Kazuya Noda	Yohsuke Matsuzawa	Yohsuke Matsuzawa	Yosuke Murakami
	(30 MHz - 1 GHz)	(1 GHz - 2.8 GHz)	(2.8 GHz - 10 GHz)	(10 GHz - 26.5 GHz)
Mode	Tx, Hopping Off, 3DH5 2480 MHz			

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	200.000	QP	39.00	16.56	7.83	32.04	0.00	31.35	43.5	12.1	168	313	-
Hori.	214.908	QP	44.60	11.22	8.06	32.03	0.00	31.85	43.5	11.6	168	354	-
Hori.	240.010	QP	48.90	11.57	8.20	32.00	0.00	36.67	46.0	9.3	137	336	-
Hori.	375.010	QP	43.80	15.11	8.89	31.93	0.00	35.87	46.0	10.1	100	59	-
Hori.	519.740	QP	41.50	17.68	9.49	31.95	0.00	36.72	46.0	9.2	182	124	-
Hori.	761.998	QP	37.30	20.32	10.38	31.71	0.00	36.29	46.0	9.7	100	12	-
Hori.	870.812	QP	36.10	22.00	10.73	31.20	0.00	37.63	46.0	**8.3**	100	235	-
Hori.	2483.500	PK	53.46	28.28	14.31	41.69	2.10	56.46	73.9	17.4	180	137	-
Hori.	4960.000	PK	49.81	31.79	6.79	42.94	2.10	47.55	73.9	26.3	117	211	-
Hori.	7440.000	PK	49.64	37.88	8.26	43.60	2.10	54.28	73.9	19.6	112	148	-
Vert.	55.363	QP	35.30	9.39	6.71	32.16	0.00	19.24	40.0	20.7	100	279	-
Vert.	786.422	QP	35.80	20.60	10.45	31.68	0.00	35.17	46.0	10.8	100	151	-
Vert.	2483.500	PK	56.67	28.28	14.31	41.69	2.10	59.67	73.9	14.2	155	313	-
Vert.	3355.423	PK	52.77	28.71	6.08	42.09	2.10	47.57	73.9	26.3	152	33	-
Vert.	4960.000	PK	51.12	31.79	6.79	42.94	2.10	48.86	73.9	25.0	143	183	-
Vert.	7440.000	PK	51.15	37.88	8.26	43.60	2.10	55.79	73.9	18.1	141	11	-
Vert.	3355.423	AV	44.24	28.71	6.08	42.09	2.10	39.04	53.9	14.8	152	33	VBW: 10 Hz

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.82 m / 3.0 m) = 2.10 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

Peak measurement value with Duty cycle correction factor (DCCF)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	DCCF [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2483.500	PK	53.46	28.28	14.31	41.69	-24.75	2.10	31.71	53.9	22.1	*1)
Hori.	4960.000	PK	49.81	31.79	6.79	42.94	-24.75	2.10	22.80	53.9	31.1	-
Hori.	7440.000	PK	49.64	37.88	8.26	43.60	-24.75	2.10	29.53	53.9	24.3	-
Vert.	2483.500	PK	56.67	28.28	14.31	41.69	-24.75	2.10	34.92	53.9	18.9	*1)
Vert.	4960.000	PK	51.12	31.79	6.79	42.94	-24.75	2.10	24.11	53.9	29.7	-
Vert.	7440.000	PK	51.15	37.88	8.26	43.60	-24.75	2.10	31.04	53.9	22.8	-

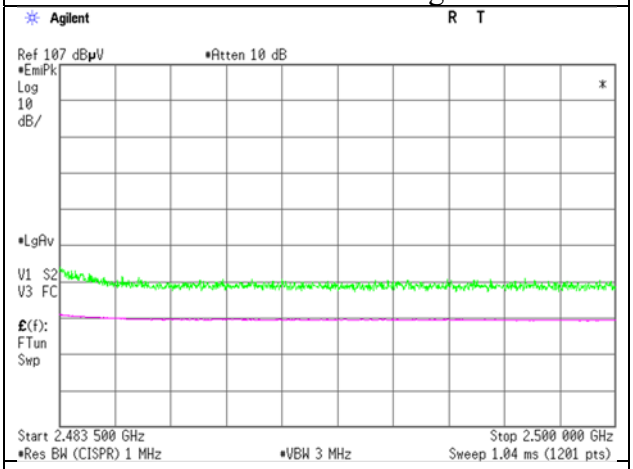
Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + DCCF + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.82 m / 3.0 m) = 2.10 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB
Duty cycle correction factor (DCCF) refer to "Duty cycle correction factor" sheet.
*1) Not out of band emission (Leakage Power)

Radiated Spurious Emission
(Reference Plot for band-edge)

Report No.	13462774S-A-R2
Test place	Shonan EMC Lab.
Semi Anechoic Chamber	3
Date	August 22, 2020
Temperature / Humidity	21 deg. C / 60 % RH
Engineer	Yohsuke Matsuzawa
Mode	Tx, Hopping Off, 3DH5 2480 MHz

Horizontal

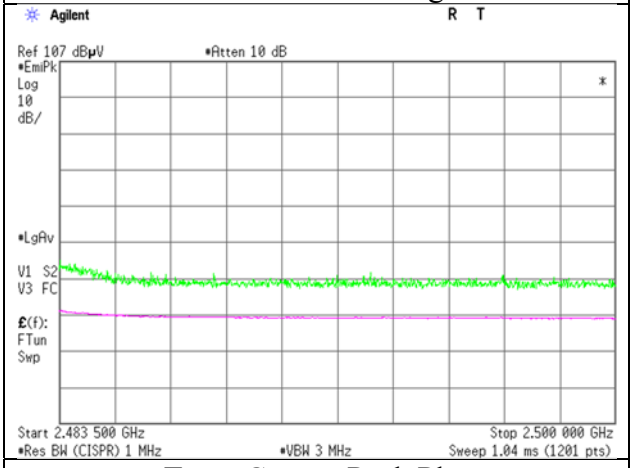
Restricted-band band-edge Plot



Trace Green : Peak Plot
Trace Purple : Average Plot

Vertical

Restricted-band band-edge Plot

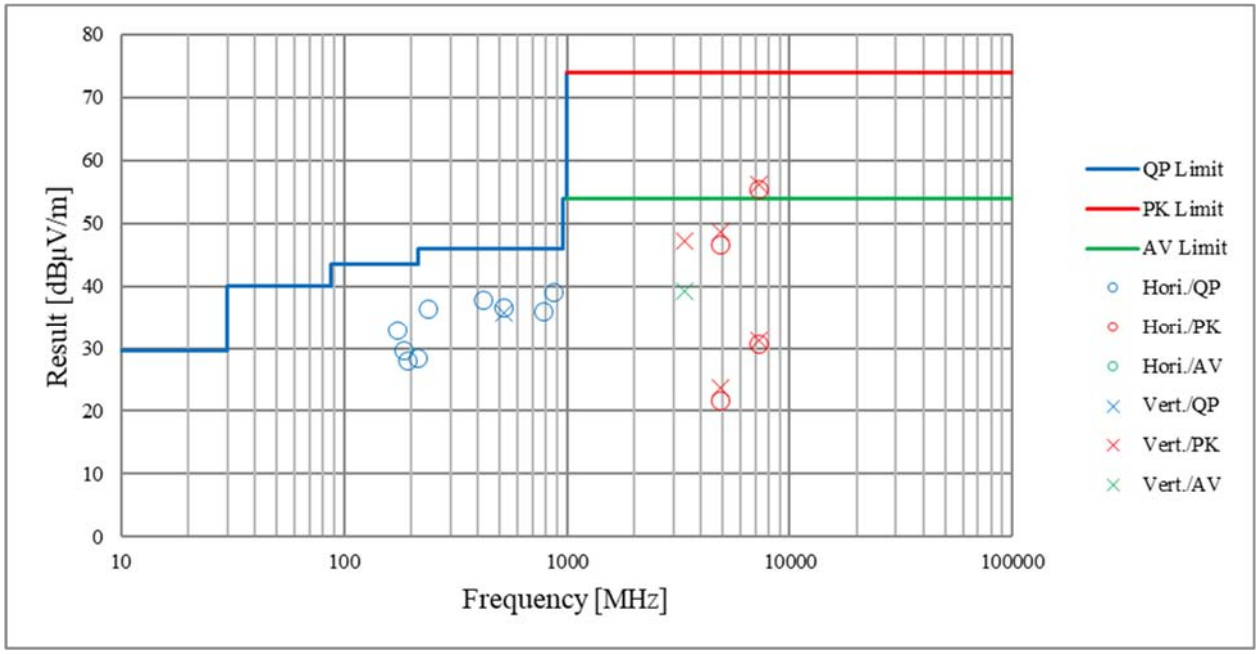


Trace Green : Peak Plot
Trace Purple : Average Plot

* 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.	13462774S-A-R2			
Test place	Shonan EMC Lab.			
Semi Anechoic Chamber	3	3	3	3
Date	August 25, 2020	August 22, 2020	August 23, 2020	August 24, 2020
Temperature / Humidity	25 deg. C / 54 % RH	21 deg. C / 60 % RH	25 deg. C / 61 % RH	25 deg. C / 60 % RH
Engineer	Yohsuke Matsuzawa	Yohsuke Matsuzawa	Yohsuke Matsuzawa	Yosuke Murakami
	(30 MHz - 1 GHz)	(1 GHz - 2.8 GHz)	(2.8 GHz - 10 GHz)	(10 GHz - 26.5 GHz)
Mode	Tx, Hopping Off, DH5 2441 MHz			



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

Radiated Spurious Emission

Report No.	13462774S-A-R2
Test place	Shonan EMC Lab.
Semi Anechoic Chamber	2
Date	September 1, 2020
Temperature / Humidity	25 deg.C / 63 %RH
Engineer	Kazuya Noda
	(1 GHz - 2.8 GHz)
Mode	Tx, Hopping Off, DH5 2402 MHz with 11ac-20 CDD 5240 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	45.81	28.56	14.03	38.68	2.10	51.82	73.9	22.0	109	111	-
Vert.	2390.000	PK	46.46	28.56	14.03	38.68	2.10	52.47	73.9	**21.4**	145	310	-

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.82 m / 3.0 m) = 2.10 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

Peak measurement value with Duty cycle correction factor (DCCF)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	DCCF [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2390.000	PK	45.81	28.56	14.03	38.68	-24.74	2.10	27.08	53.9	26.8	*1)
Vert.	2390.000	PK	46.46	28.56	14.03	38.68	-24.74	2.10	27.73	53.9	26.1	*1)

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + DCCF + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.82 m / 3.0 m) = 2.10 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB
Duty cycle correction factor (DCCF) refer to "Duty cycle correction factor" sheet.
*1) Not out of band emission (Leakage Power)

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

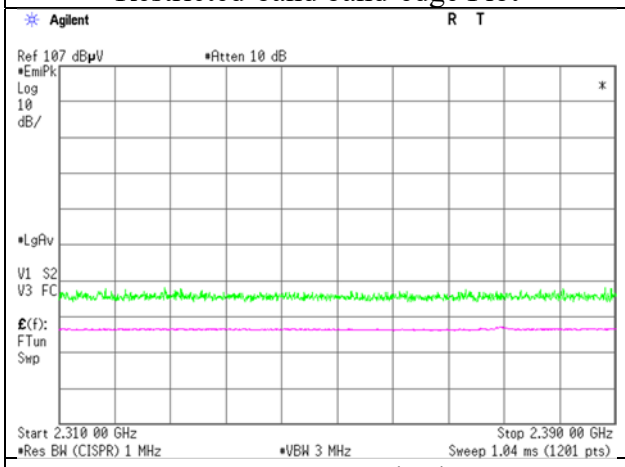
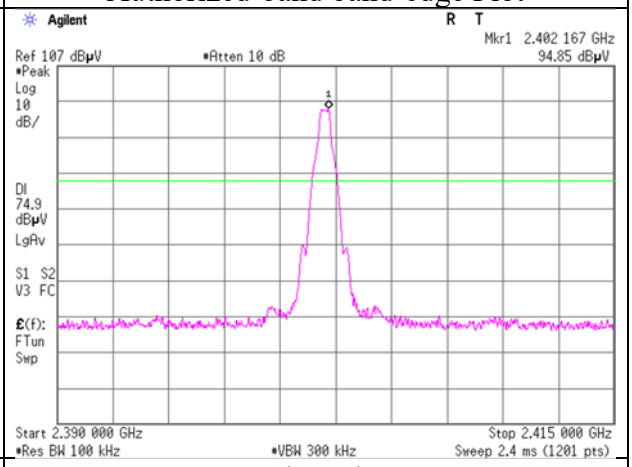
Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2402.000	PK	94.78	28.54	14.04	38.67	2.10	100.79	-	-	Carrier
Hori.	2399.616	PK	40.44	28.54	14.04	38.67	2.10	46.45	80.7	34.2	-
Hori.	2400.000	PK	39.67	28.54	14.04	38.67	2.10	45.68	80.7	35.0	-
Vert.	2402.000	PK	93.70	28.54	14.04	38.67	2.10	99.71	-	-	Carrier
Vert.	2399.556	PK	41.19	28.54	14.04	38.67	2.10	47.20	79.7	32.5	-
Vert.	2400.000	PK	40.02	28.54	14.04	38.67	2.10	46.03	79.7	33.6	-

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.82 m / 3.0 m) = 2.10 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

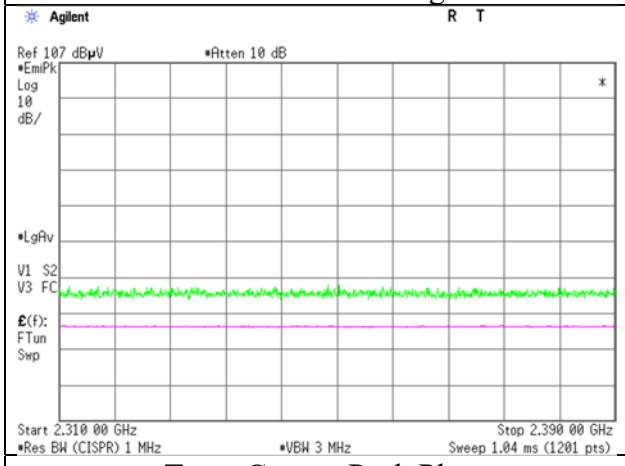
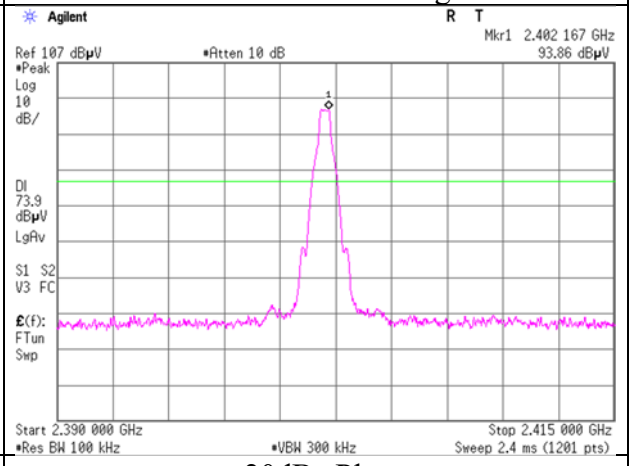
Radiated Spurious Emission
(Reference Plot for band-edge)

Report No.	13462774S-A-R2
Test place	Shonan EMC Lab.
Semi Anechoic Chamber	2
Date	September 1, 2020
Temperature / Humidity	25 deg.C / 63 %RH
Engineer	Kazuya Noda
Mode	Tx, Hopping Off, DH5 2402 MHz with 11ac-20 CDD 5240 MHz

Horizontal

Restricted-band band-edge Plot	Authorized-band band-edge Plot
	
Trace Green : Peak Plot Trace Purple : Average Plot	20dBc Plot

Vertical

Restricted-band band-edge Plot	Authorized-band band-edge Plot
	
Trace Green : Peak Plot Trace Purple : Average Plot	20dBc Plot

* 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.	13462774S-A-R2			
Test place	Shonan EMC Lab.			
Semi Anechoic Chamber	3	2	2	2
Date	August 30, 2020	September 1, 2020	September 3, 2020	September 4, 2020
Temperature / Humidity	25 deg.C / 64 %RH	25 deg.C / 63 %RH	22 deg. C / 65 % RH	24 deg. C / 67 % RH
Engineer	Yosuke Murakami	Kazuya Noda	Kazuya Noda	Yosuke Murakami
	(30 MHz - 1 GHz)	(1 GHz - 10 GHz)	(10 GHz - 18 GHz)	(18 GHz - 26.5 GHz)
Mode	Tx, Hopping Off, DH5 2441 MHz with 11ac-20 CDD 5240 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.	175.005	QP	40.34	15.73	7.81	32.06	0.00	31.82	43.5	11.6	193	8	-
Hori.	184.317	QP	34.13	16.14	7.79	32.06	0.00	26.00	43.5	17.5	186	344	-
Hori.	214.705	QP	41.74	11.23	8.06	32.03	0.00	29.00	43.5	14.5	158	350	-
Hori.	240.008	QP	48.63	11.57	8.20	32.00	0.00	36.40	46.0	9.6	145	342	-
Hori.	425.012	QP	42.14	16.06	9.12	31.94	0.00	35.38	46.0	10.6	100	349	-
Hori.	519.881	QP	41.56	17.67	9.49	31.95	0.00	36.77	46.0	9.2	100	53	-
Hori.	792.577	QP	36.27	20.71	10.47	31.67	0.00	35.78	46.0	10.2	100	4	-
Hori.	870.435	QP	37.25	21.99	10.73	31.21	0.00	38.76	46.0	**7.2**	108	275	-
Hori.	4882.000	PK	45.00	31.58	6.48	38.54	2.10	46.62	73.9	27.2	249	43	-
Hori.	7323.000	PK	47.30	37.74	7.98	39.28	2.10	55.84	73.9	18.0	130	327	-
Vert.	57.103	QP	37.67	8.90	6.65	32.16	0.00	21.06	40.0	18.9	100	263	-
Vert.	84.014	QP	42.70	7.00	7.57	32.15	0.00	25.12	40.0	14.8	100	252	-
Vert.	519.959	QP	38.56	17.67	9.49	31.95	0.00	33.77	46.0	12.2	113	85	-
Vert.	743.058	QP	35.54	20.11	10.32	31.75	0.00	34.22	46.0	11.7	155	145	-
Vert.	870.603	QP	34.57	22.00	10.73	31.21	0.00	36.09	46.0	9.9	129	13	-
Vert.	3353.967	PK	47.82	28.76	5.87	38.25	2.10	46.30	73.9	27.6	128	33	-
Vert.	4882.000	PK	46.84	31.58	6.48	38.54	2.10	48.46	73.9	25.4	186	8	-
Vert.	7323.000	PK	47.78	37.74	7.98	39.28	2.10	56.32	73.9	17.5	195	125	-
Vert.	3353.967	AV	39.80	28.76	5.87	38.25	2.10	38.28	53.9	15.6	128	33	VBW: 10 Hz

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.82 m / 3.0 m) = 2.10 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

Peak measurement value with Duty cycle correction factor (DCCF)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	DCCF [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	4882.000	PK	45.00	31.58	6.48	38.54	-24.74	2.10	21.88	53.9	32.0	-
Hori.	7323.000	PK	47.30	37.74	7.98	39.28	-24.74	2.10	31.10	53.9	22.8	-
Vert.	4882.000	PK	46.84	31.58	6.48	38.54	-24.74	2.10	23.72	53.9	30.1	-
Vert.	7323.000	PK	47.78	37.74	7.98	39.28	-24.74	2.10	31.58	53.9	22.3	-

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + DCCF + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.82 m / 3.0 m) = 2.10 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB
Duty cycle correction factor (DCCF) refer to "Duty cycle correction factor" sheet.
*1) Not out of band emission (Leakage Power)

Radiated Spurious Emission

Report No.	13462774S-A-R2
Test place	Shonan EMC Lab.
Semi Anechoic Chamber	2
Date	September 1, 2020
Temperature / Humidity	25 deg.C / 63 %RH
Engineer	Kazuya Noda
	(1 GHz - 2.8 GHz)
Mode	Tx, Hopping Off, DH5 2480 MHz with 11ac-20 CDD 5240 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	48.33	28.40	14.12	38.62	2.10	54.33	73.9	**19.5**	144	310	-
Vert.	2483.500	PK	47.28	28.40	14.12	38.62	2.10	53.28	73.9	20.6	155	309	-

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.82 m / 3.0 m) = 2.10 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

Peak measurement value with Duty cycle correction factor (DCCF)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	DCCF [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2483.500	PK	48.33	28.40	14.12	38.62	-24.74	2.10	29.59	53.9	24.3	*1)
Vert.	2483.500	PK	47.28	28.40	14.12	38.62	-24.74	2.10	28.54	53.9	25.3	*1)

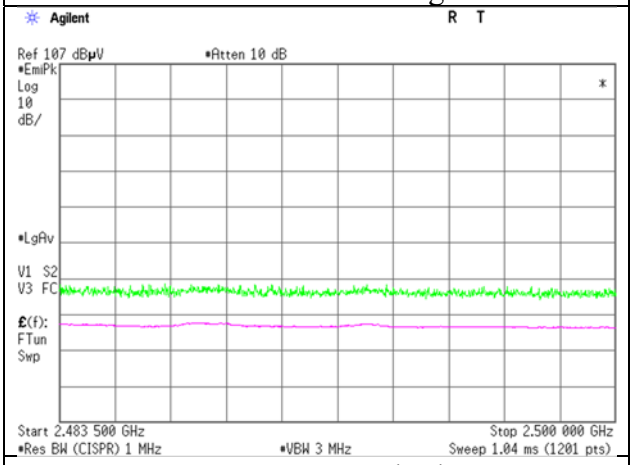
Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + DCCF + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.82 m / 3.0 m) = 2.10 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB
Duty cycle correction factor (DCCF) refer to "Duty cycle correction factor" sheet.
*1) Not out of band emission (Leakage Power)

Radiated Spurious Emission
(Reference Plot for band-edge)

Report No.	13462774S-A-R2
Test place	Shonan EMC Lab.
Semi Anechoic Chamber	2
Date	September 1, 2020
Temperature / Humidity	25 deg.C / 63 %RH
Engineer	Kazuya Noda
Mode	Tx, Hopping Off, DH5 2480 MHz with 11ac-20 CDD 5240 MHz

Horizontal

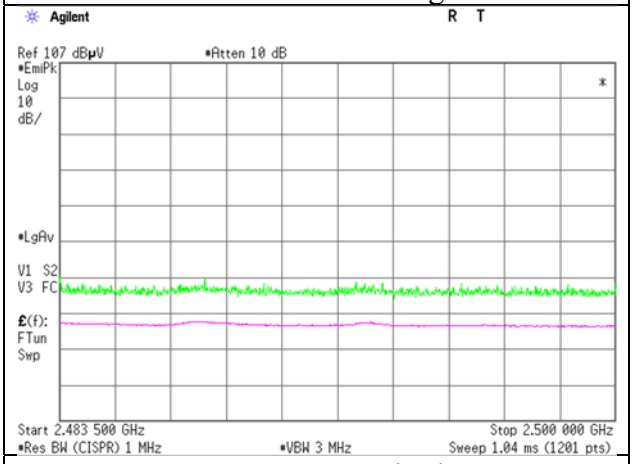
Restricted-band band-edge Plot



Trace Green : Peak Plot
Trace Purple : Average Plot

Vertical

Restricted-band band-edge Plot



Trace Green : Peak Plot
Trace Purple : Average Plot

* 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.	13462774S-A-R2
Test place	Shonan EMC Lab.
Semi Anechoic Chamber	2
Date	September 1, 2020
Temperature / Humidity	25 deg.C / 63 %RH
Engineer	Kazuya Noda
	(1 GHz - 2.8 GHz)
Mode	Tx, Hopping Off, 3DH5 2402 MHz with 11ac-20 CDD 5240 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	45.27	28.56	14.03	38.68	2.10	51.28	73.9	**22.6**	165	131	-
Vert.	2390.000	PK	45.19	28.56	14.03	38.68	2.10	51.20	73.9	22.7	142	311	-

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.82 m / 3.0 m) = 2.10 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

Peak measurement value with Duty cycle correction factor (DCCF)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	DCCF [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2390.000	PK	45.27	28.56	14.03	38.68	-24.75	2.10	26.53	53.9	27.3	*1)
Vert.	2390.000	PK	45.19	28.56	14.03	38.68	-24.75	2.10	26.45	53.9	27.4	*1)

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + DCCF + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.82 m / 3.0 m) = 2.10 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB
Duty cycle correction factor (DCCF) refer to "Duty cycle correction factor" sheet.
*1) Not out of band emission (Leakage Power)

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

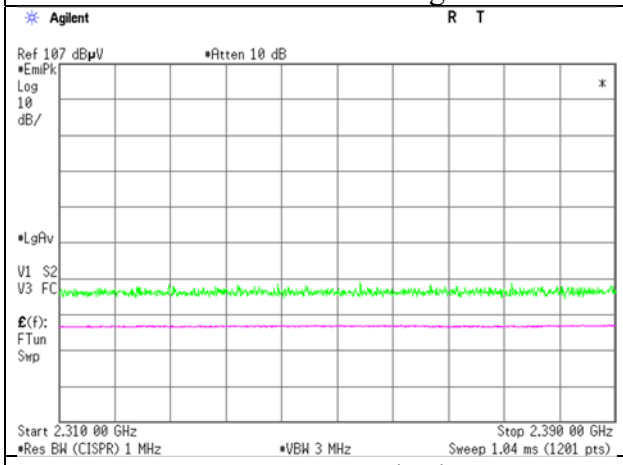
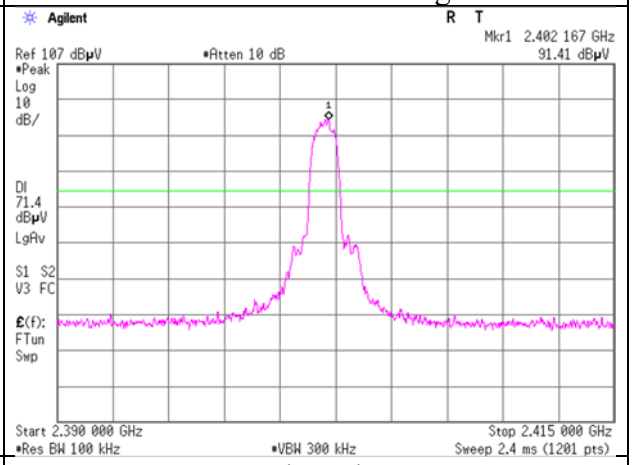
Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2402.000	PK	91.37	28.54	14.04	38.67	2.10	97.38	-	-	Carrier
Hori.	2400.000	PK	44.41	28.54	14.04	38.67	2.10	50.42	77.3	26.8	-
Vert.	2402.000	PK	90.68	28.54	14.04	38.67	2.10	96.69	-	-	Carrier
Vert.	2400.000	PK	43.50	28.54	14.04	38.67	2.10	49.51	76.6	27.0	-

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.82 m / 3.0 m) = 2.10 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

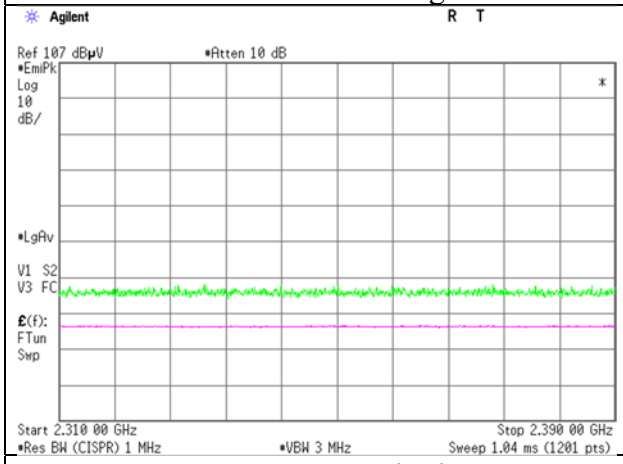
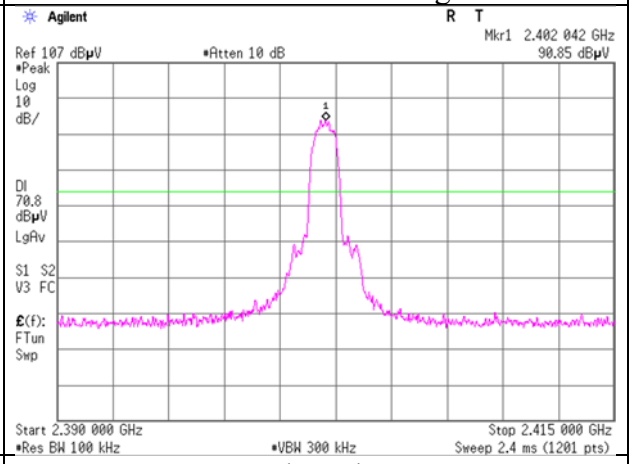
Radiated Spurious Emission
(Reference Plot for band-edge)

Report No.	13462774S-A-R2
Test place	Shonan EMC Lab.
Semi Anechoic Chamber	2
Date	September 1, 2020
Temperature / Humidity	25 deg.C / 63 %RH
Engineer	Kazuya Noda
Mode	Tx, Hopping Off, 3DH5 2402 MHz with 11ac-20 CDD 5240 MHz

Horizontal

Restricted-band band-edge Plot	Authorized-band band-edge Plot
	
Trace Green : Peak Plot Trace Purple : Average Plot	20dBc Plot

Vertical

Restricted-band band-edge Plot	Authorized-band band-edge Plot
	
Trace Green : Peak Plot Trace Purple : Average Plot	20dBc Plot

* 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.	13462774S-A-R2
Test place	Shonan EMC Lab.
Semi Anechoic Chamber	2
Date	September 1, 2020
Temperature / Humidity	25 deg.C / 63 %RH
Engineer	Kazuya Noda
	(1 GHz - 2.8 GHz)
Mode	Tx, Hopping Off, 3DH5 2480 MHz with 11ac-20 CDD 5240 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	47.84	28.40	14.12	38.62	2.10	53.84	73.9	20.0	145	309	-
Vert.	2483.500	PK	48.84	28.40	14.12	38.62	2.10	54.84	73.9	**19.0**	156	308	-

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.82 m / 3.0 m) = 2.10 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

Peak measurement value with Duty cycle correction factor (DCCF)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	DCCF [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2483.500	PK	47.84	28.40	14.12	38.62	-24.75	2.10	29.09	53.9	24.8	*1)
Vert.	2483.500	PK	48.84	28.40	14.12	38.62	-24.75	2.10	30.09	53.9	23.8	*1)

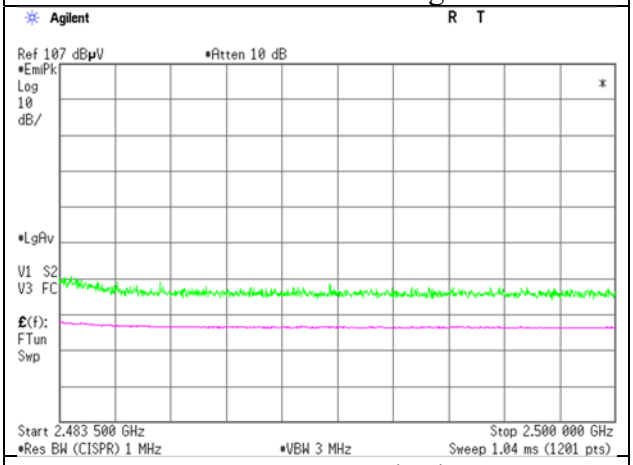
Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + DCCF + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.82 m / 3.0 m) = 2.10 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB
Duty cycle correction factor (DCCF) refer to "Duty cycle correction factor" sheet.
*1) Not out of band emission (Leakage Power)

Radiated Spurious Emission
(Reference Plot for band-edge)

Report No.	13462774S-A-R2
Test place	Shonan EMC Lab.
Semi Anechoic Chamber	2
Date	September 1, 2020
Temperature / Humidity	25 deg.C / 63 %RH
Engineer	Kazuya Noda
Mode	Tx, Hopping Off, 3DH5 2480 MHz with 11ac-20 CDD 5240 MHz

Horizontal

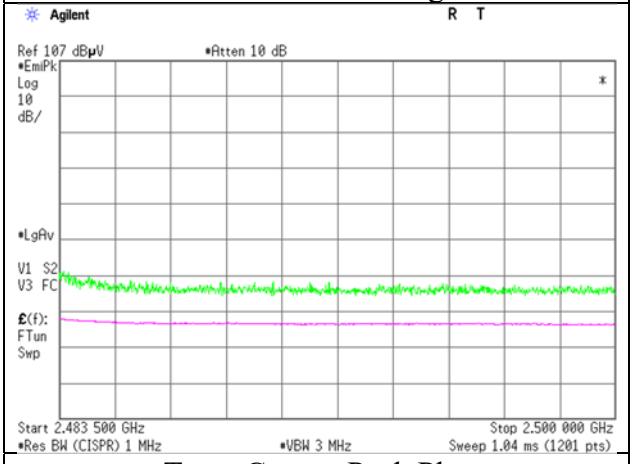
Restricted-band band-edge Plot



Trace Green : Peak Plot
Trace Purple : Average Plot

Vertical

Restricted-band band-edge Plot

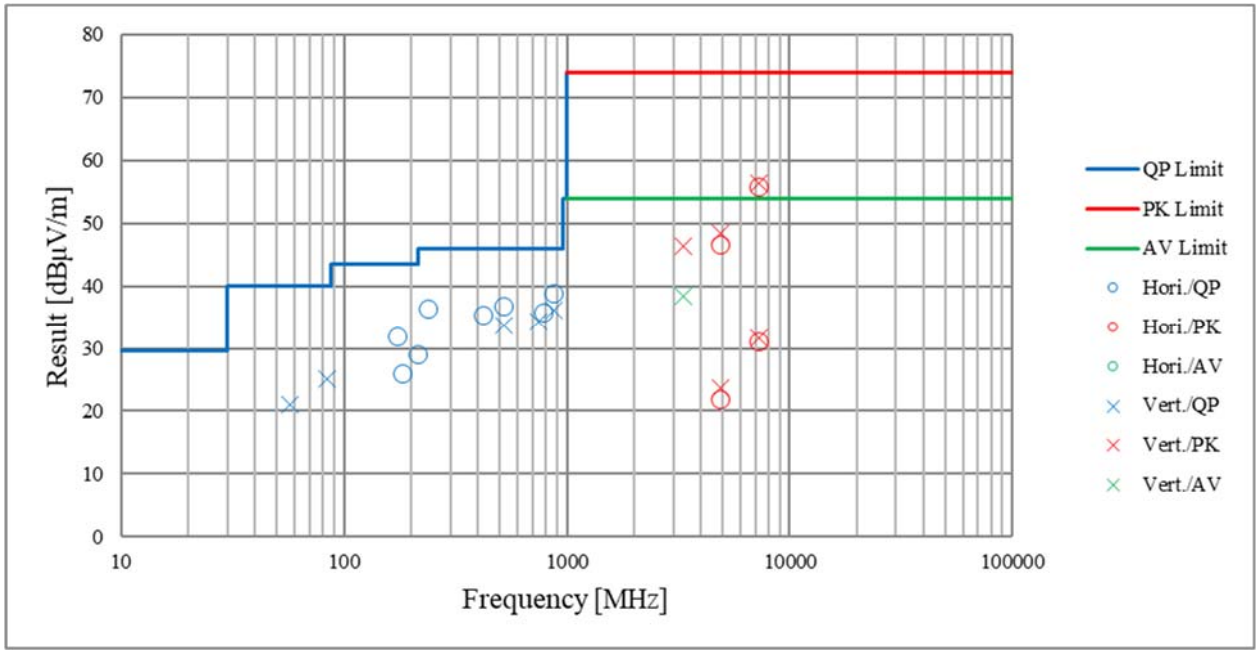


Trace Green : Peak Plot
Trace Purple : Average Plot

* 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.	13462774S-A-R2			
Test place	Shonan EMC Lab.			
Semi Anechoic Chamber	3	2	2	2
Date	August 30, 2020	September 1, 2020	September 3, 2020	September 4, 2020
Temperature / Humidity	25 deg.C / 64 %RH	25 deg.C / 63 %RH	22 deg. C / 65 % RH	24 deg. C / 67 % RH
Engineer	Yosuke Murakami	Kazuya Noda	Kazuya Noda	Yosuke Murakami
	(30 MHz - 1 GHz)	(1 GHz - 10 GHz)	(10 GHz – 18 GHz)	(18 GHz – 26.5 GHz)
Mode	Tx, Hopping Off, DH5 2441 MHz with 11ac-20 CDD 5240 MHz			



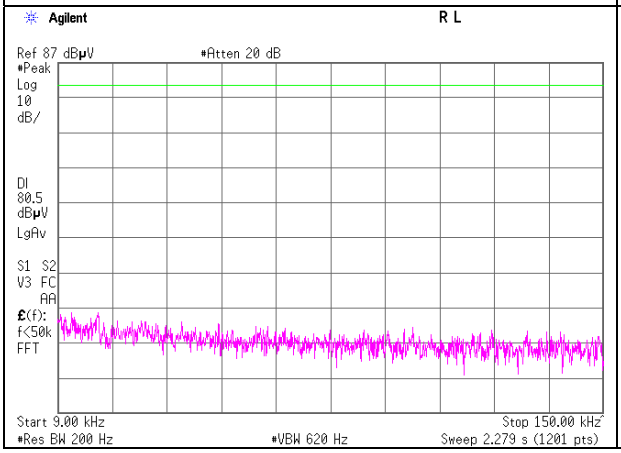
*These plots data contains sufficient number to show the trend of characteristic features for EUT.

Conducted Spurious Emission

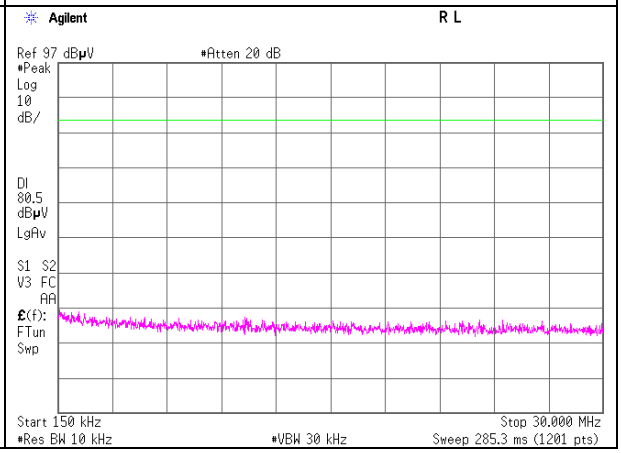
Report No.	13462774S-A-R2
Test place	Shonan EMC Lab. No.5 Shielded Room
Date	September 9, 2020
Temperature / Humidity	24 deg. C / 57 % RH
Engineer	Shiro Kobayashi
Mode	Tx, Hopping Off, DH5

2402 MHz

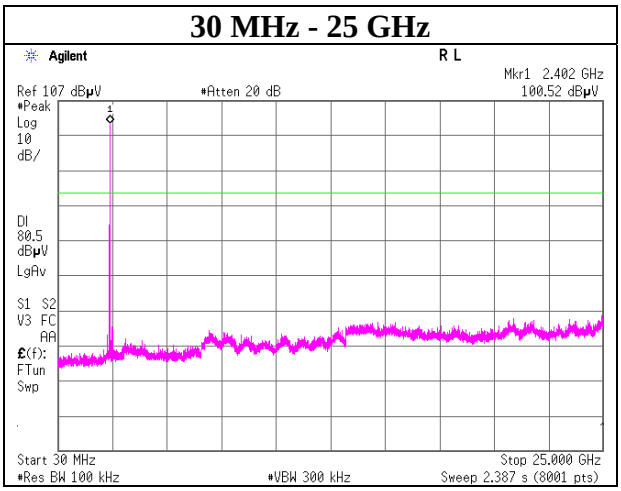
9 kHz - 150 kHz



150 kHz - 30 MHz



30 MHz - 25 GHz

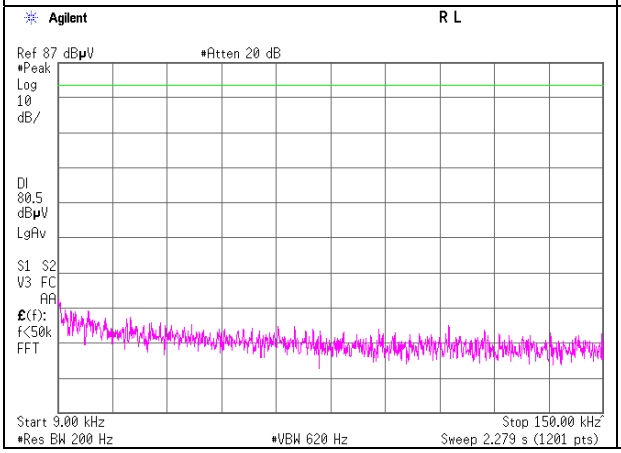


Conducted Spurious Emission

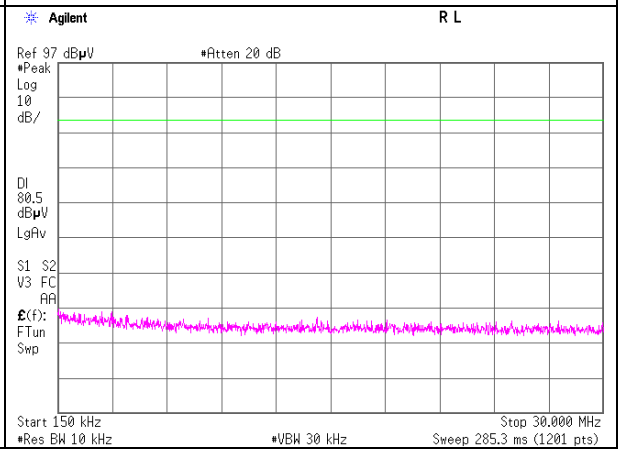
Report No.	13462774S-A-R2
Test place	Shonan EMC Lab. No.5 Shielded Room
Date	September 9, 2020
Temperature / Humidity	24 deg. C / 57 % RH
Engineer	Shiro Kobayashi
Mode	Tx, Hopping Off, DH5

2441 MHz

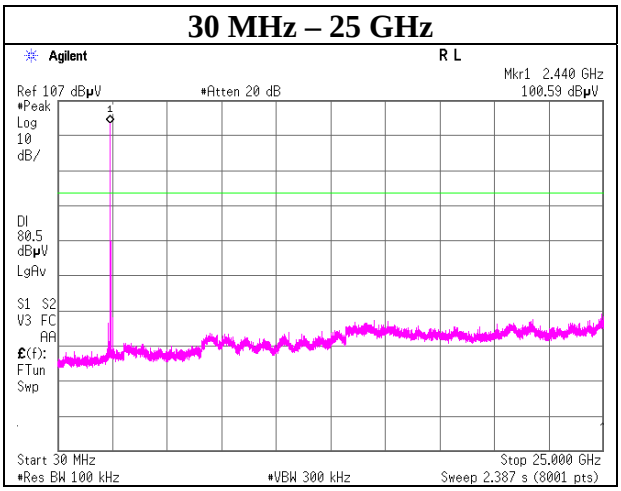
9 kHz – 150 kHz



150 kHz – 30 MHz



30 MHz – 25 GHz

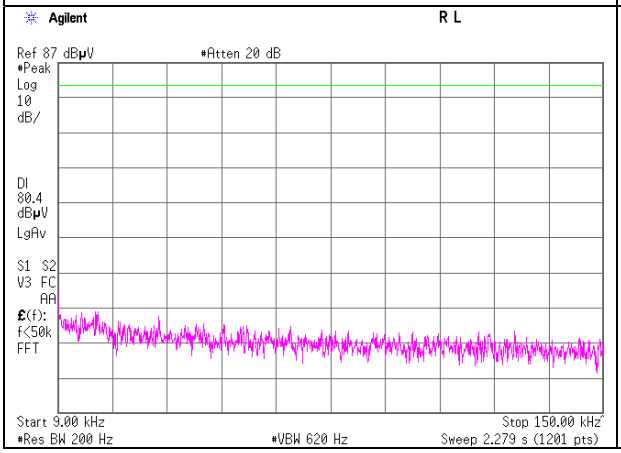


Conducted Spurious Emission

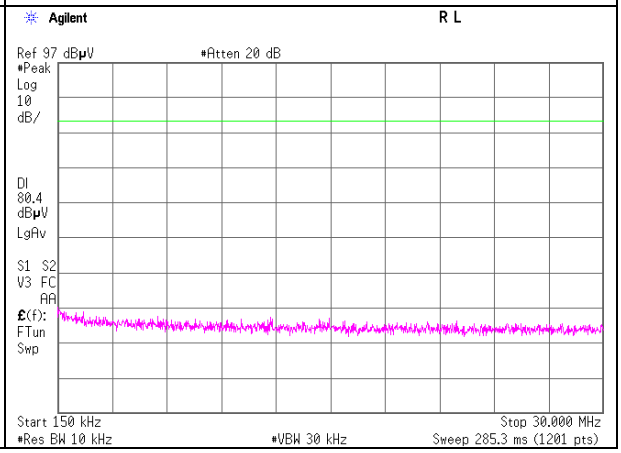
Report No.	13462774S-A-R2
Test place	Shonan EMC Lab. No.5 Shielded Room
Date	September 9, 2020
Temperature / Humidity	24 deg. C / 57 % RH
Engineer	Shiro Kobayashi
Mode	Tx, Hopping Off, DH5

2480 MHz

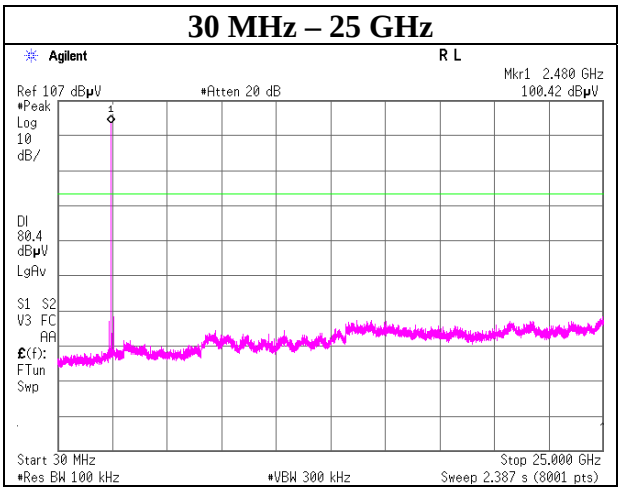
9 kHz – 150 kHz



150 kHz – 30 MHz



30 MHz – 25 GHz

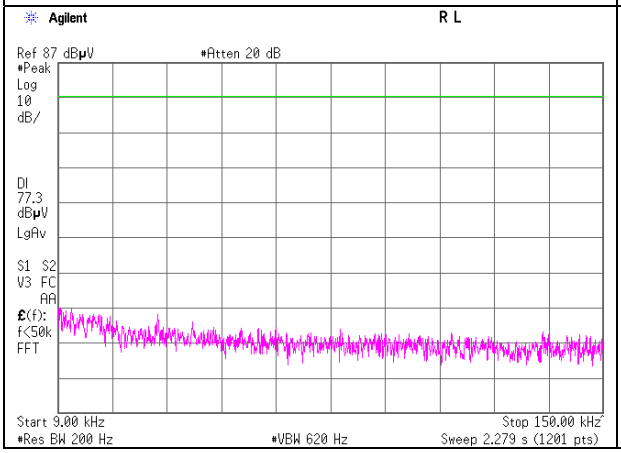


Conducted Spurious Emission

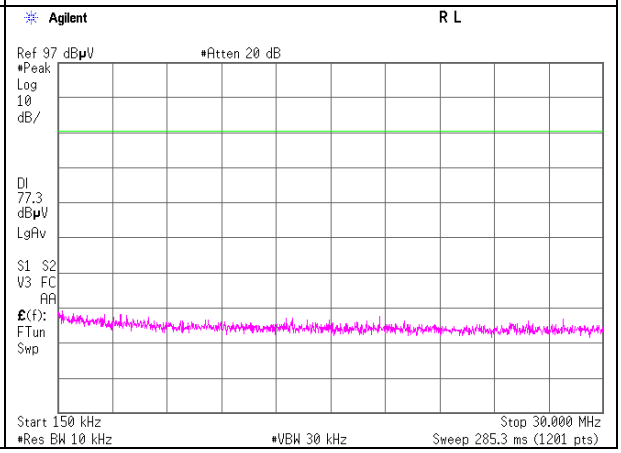
Report No.	13462774S-A-R2
Test place	Shonan EMC Lab. No.5 Shielded Room
Date	September 9, 2020
Temperature / Humidity	24 deg. C / 57 % RH
Engineer	Shiro Kobayashi
Mode	Tx, Hopping Off, 3DH5

2402 MHz

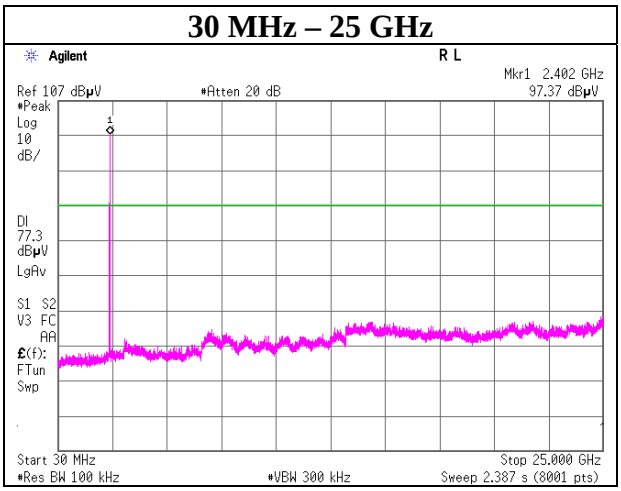
9 kHz – 150 kHz



150 kHz – 30 MHz



30 MHz – 25 GHz

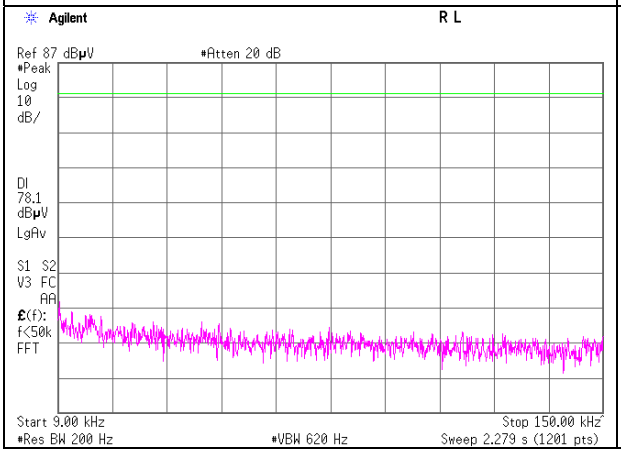


Conducted Spurious Emission

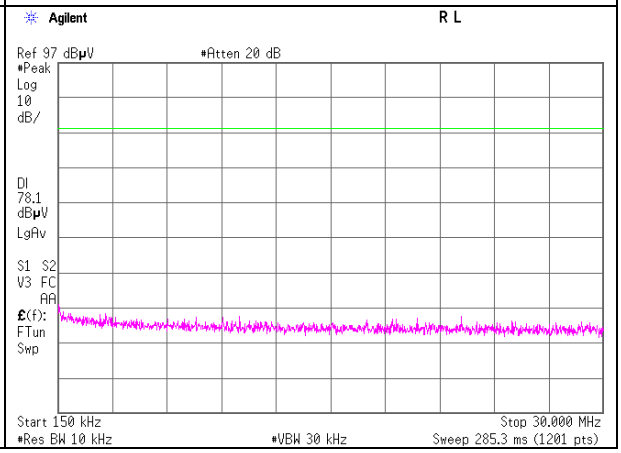
Report No.	13462774S-A-R2
Test place	Shonan EMC Lab. No.5 Shielded Room
Date	September 9, 2020
Temperature / Humidity	24 deg. C / 57 % RH
Engineer	Shiro Kobayashi
Mode	Tx, Hopping Off, 3DH5

2441 MHz

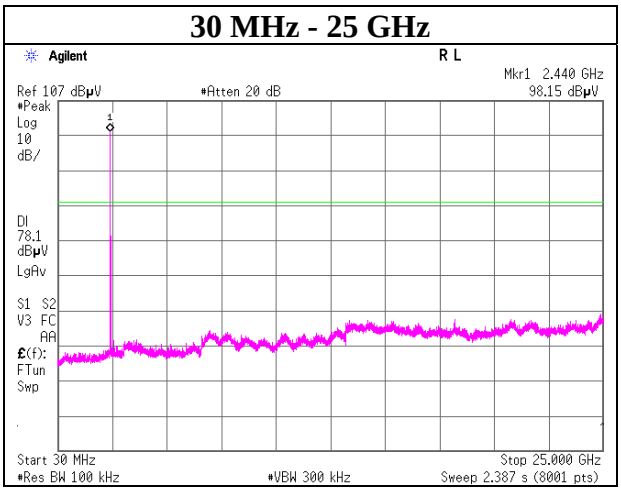
9 kHz - 150 kHz



150 kHz - 30 MHz



30 MHz - 25 GHz

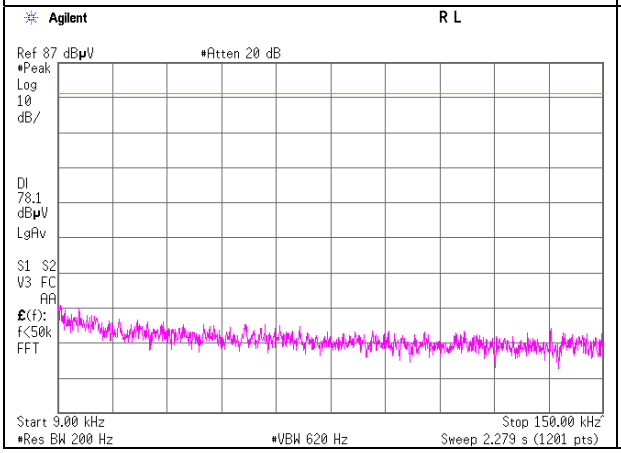


Conducted Spurious Emission

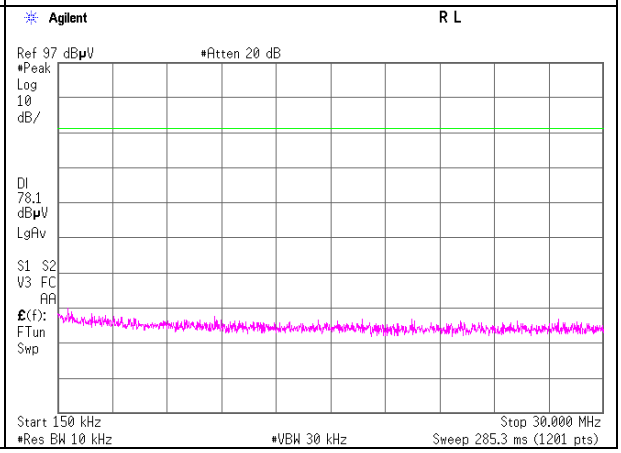
Report No.	13462774S-A-R2
Test place	Shonan EMC Lab. No.5 Shielded Room
Date	September 9, 2020
Temperature / Humidity	24 deg. C / 57 % RH
Engineer	Shiro Kobayashi
Mode	Tx, Hopping Off, 3DH5

2480 MHz

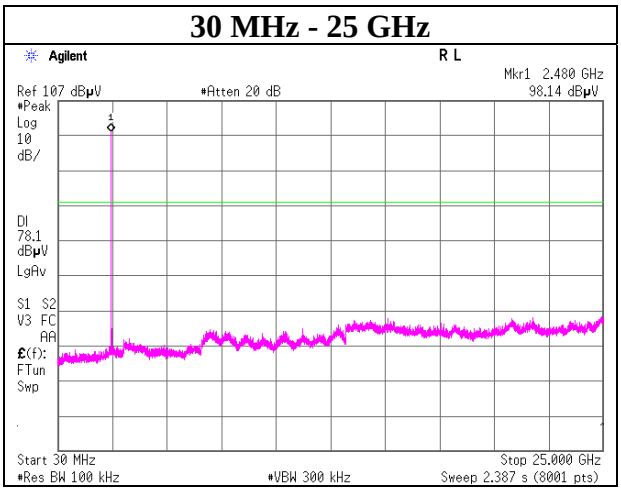
9 kHz - 150 kHz



150 kHz - 30 MHz



30 MHz - 25 GHz

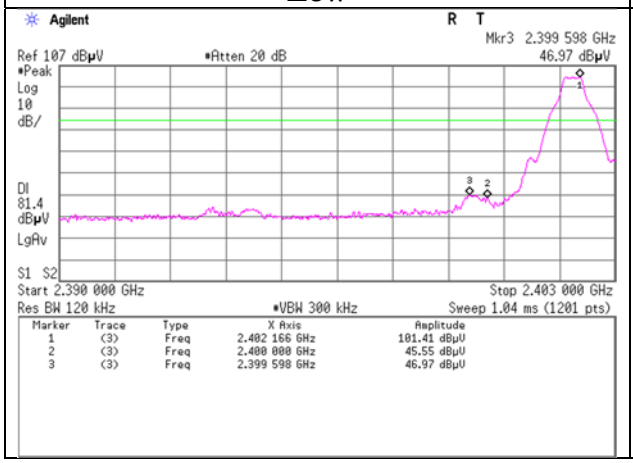


Conducted Emission Band Edge compliance

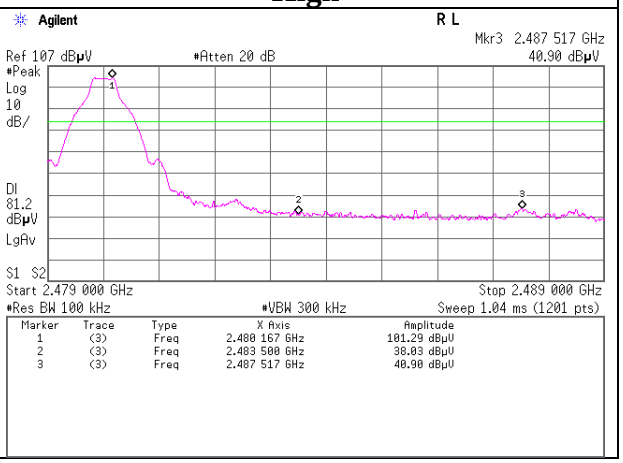
Report No.	13462774S-A-R2
Test place	Shonan EMC Lab. No.5 Shielded Room
Date	September 4, 2020
Temperature / Humidity	23 deg. C / 54 % RH
Engineer	Toshinori Yamada
Mode	Tx DH5

Hopping Off

Low

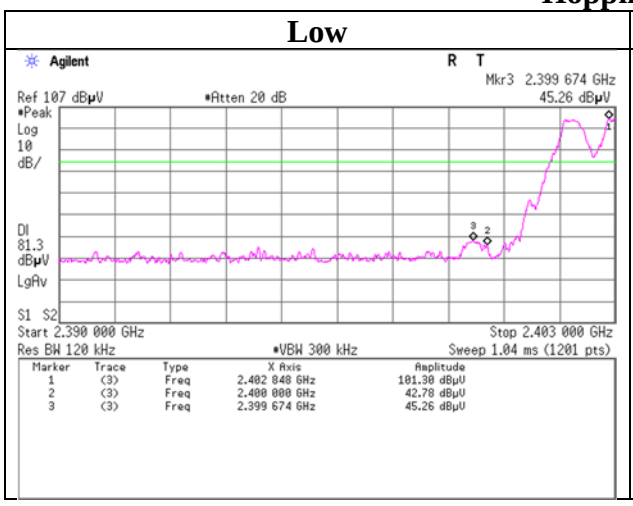


High

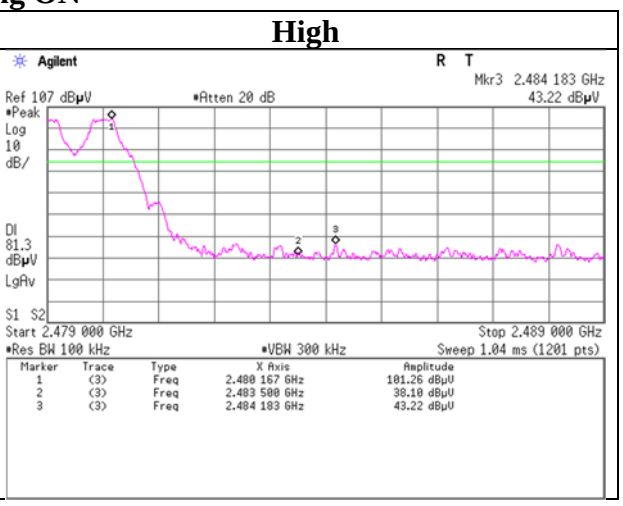


Hopping ON

Low



High

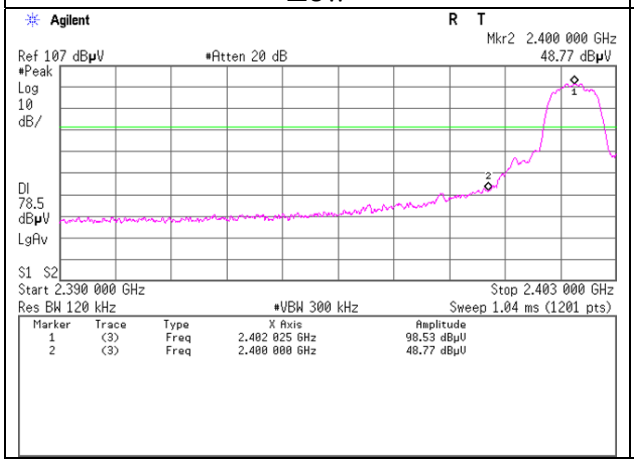


Conducted Emission Band Edge compliance

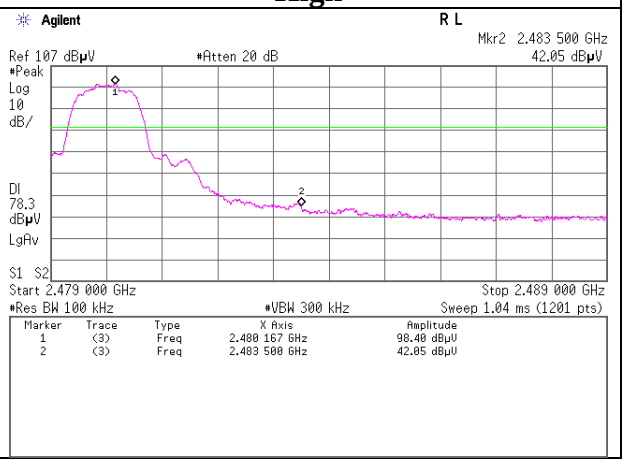
Report No.	13462774S-A-R2
Test place	Shonan EMC Lab. No.5 Shielded Room
Date	September 4, 2020
Temperature / Humidity	23 deg. C / 54 % RH
Engineer	Toshinori Yamada
Mode	Tx 3DH5

Hopping Off

Low

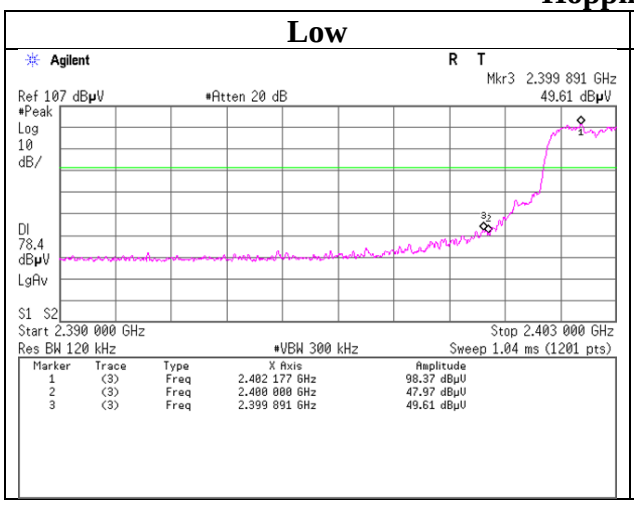


High

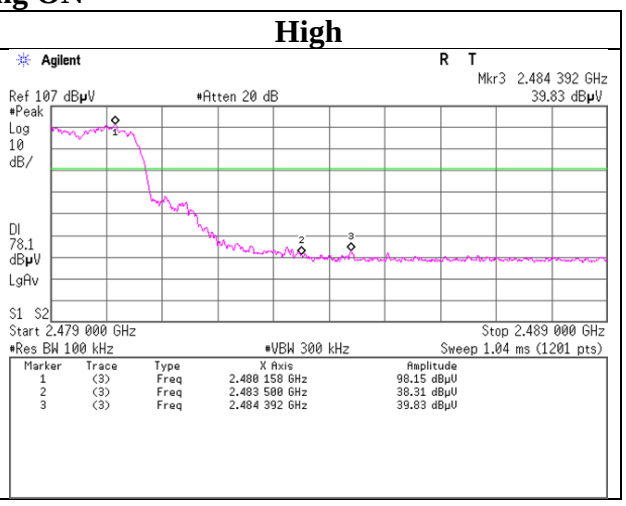


Hopping ON

Low



High



APPENDIX 2: Test instruments

Test equipment [1/2]

Test Name	Local ID	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Calibration Interval (Month)
AT	KSA-08	145089	Spectrum Analyzer	Keysight Technologies Inc	E4446A	MY46180525	2019/11/05	12
AT	KTS-07	145111	Digital Tester	SANWA	PC500	7019232	2019/10/01	12
AT	SAT10-16	160494	Attenuator	Weinschel Corp.	54A-10	83420	2019/12/12	12
AT	SCC-G66	196947	Coaxial Cable	HUBER+SUNER	SUCOFLEX 102	803478/2	2020/03/10	12
AT	SOS-19	175823	Humidity Indicator	CUSTOM. Inc	CTH-201	-	2019/12/19	12
AT	SPM-07	146247	Power Meter	Keysight Technologies Inc	8990B	MY5100272	2020/05/27	12
AT	SPSS-05	146311	Power sensor	Keysight Technologies Inc	N1923A	MY5349008	2020/05/27	12
AT	STM-G6	146207	Terminator	JFW	50T-128	-	2019/11/05	12
AT,RE	SSA-02	145800	Spectrum Analyzer	Keysight Technologies Inc	E4448A	MY48250106	2020/04/16	12
RE	COTS-SEMI-5	170932	EMI Software	TSJ (Techno Science Japan)	TEPTO-DV3(RE,CE,ME,PE)	-	-	-
RE	KJM-02	146432	Measure	TAJIMA	GL19-55	-	-	-
RE	SAEC-02(SVSWR)	145598	Semi-Anechoic Chamber	TDK	SAEC-02(SVSWR)	2	2020/05/07	12
RE	SAEC-03(NSA)	145565	Semi-Anechoic Chamber	TDK	SAEC-03(NSA)	3	2020/04/12	12
RE	SAEC-03(SVSWR)	145566	Semi-Anechoic Chamber	TDK	SAEC-03(SVSWR)	3	2020/05/11	12
RE	SAF-03	145126	Pre Amplifier	SONOMA	310N	290213	2020/02/19	12
RE	SAF-05	145128	Pre Amplifier	Toyo Corporation	TPA0118-36	1440490	2020/06/03	12
RE	SAF-06	145005	Pre Amplifier	Toyo Corporation	TPA0118-36	1440491	2020/02/20	12
RE	SAF-08	145007	Pre Amplifier	Toyo Corporation	HAP18-26W	19	2020/03/03	12
RE	SAT10-05	145136	Attenuator(above1GHz)	Keysight Technologies Inc	8493C-010	74864	2019/11/06	12
RE	SAT6-13	167094	Attenuator	JFW	50HF-006N	-	2020/02/21	12
RE	SBA-03	145023	Biconical Antenna	Schwarzbeck Mess - Elektronik	BBA9106	91032666	2020/05/17	12
RE	SCC-C1/C2/C3/C4/C5/C10/SRSE-03	145171	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhner/Suhner/Suhner/TOYO	8D2W/12DSFA/141PE/141PE/141PE/141PE/NS4906	-/0901-271(RF Selector)	2020/04/12	12
RE	SCC-G15	145176	Coaxial Cable	Suhner	SUCOFLEX 102	32703/2	2020/03/04	12
RE	SCC-G40	166491	Coaxial Cable	Junkosha	MWX221-01000NFSNMS/B	1612S005	2020/01/08	12
RE	SCC-G41	151617	Coaxial Cable	Junkosha	MWX221-01000NFSNMS/B	1612S006	2020/01/08	12
RE	SCC-G43	156380	Coaxial Cable	HUBER+SUNER	SUCOFLEX_104_E	SN MY 13406/4E	2020/06/04	12
RE	SCC-G50	178573	Coaxial Cable	HUBER+SUNER	SUCOFLEX_104_E	MY13407/4E	2020/03/09	12
RE	SCC-G51	178572	Coaxial Cable	HUBER+SUNER	SUCOFLEX 104	800288 /4A	2020/03/09	12

Test equipment [2/2]

Test Name	Local ID	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Calibration Interval (Month)
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-G69	200009	Coaxial Cable	HUBER+SUNER	SUCOFLEX 104	575617/4	2020/07/07	12
RE	SCC-G70	200010	Coaxial Cable	HUBER+SUNER	SUCOFLEX 104	575618/4	2020/07/07	12
RE	SFL-03	145377	Highpass Filter	MICRO-TRONICS	HPM50112	28	2019/11/06	12
RE	SFL-18	145305	Highpass Filter	MICRO-TRONICS	HPM50111	119	2020/04/03	12
RE	SHA-02	145384	Horn Antenna	Schwarzbeck Mess - Elektronik	BBHA9120D	9120D-726	2020/06/15	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-09	194684	Horn Antenna	Schwarzbeck Mess - Elektronik	BBHA 9120 C	695	2020/02/17	12
RE	SHA-10	194685	Horn Antenna	Schwarzbeck Mess - Elektronik	BBHA 9120 C	711	2020/02/17	12
RE	SJM-09	145336	Measure	PROMART	SEN1935	-	-	-
RE	SLA-07	145529	Logperiodic Antenna	Schwarzbeck Mess - Elektronik	VUSLP9111B	196	2020/05/17	12
RE	SOS-21	191838	Humidity Indicator	CUSTOM. Inc	CTH-201	-	2019/12/12	12
RE	SOS-23	191840	Humidity Indicator	CUSTOM. Inc	CTH-201	-	2019/12/12	12
RE	STR-08	150463	Test Receiver	Rohde & Schwarz	ESW44	101581	2019/11/22	12
RE	STS-02	145793	Digital Hitester	Hioki	3805-50	80997819	2020/04/09	12
RE	STS-03	146210	Digital Hitester	Hioki	3805-50	80997823	2019/10/01	12

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

The expiration date of the calibration is the end of the expired month.
As for some calibrations performed after the tested dates, those test equipment have been controlled by means of an unbroken chains of calibrations.

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

Test item: **RE: Radiated Emission test**
AT: Antenna Terminal Conducted test