RADIO TEST REPORT

Test Report No. 14568085S-B-R2

Customer	**Sony Group Corporation**
Description of EUT	**IEEE 802.11 1X1 a/b/g/n/ac/ax Wireless LAN + Bluetooth 5.2 + 802.15.4 Tri-radio 12 x 12 LGA Module**
Model Number of EUT	**AW-XM553**
FCC ID	**AK8XM553**
Test Regulation	**FCC Part 15 Subpart C**
Test Result	**Complied (Refer to SECTION 3)**
Issue Date	**May 19, 2023**
Remarks	**Bluetooth (BR / EDR) parts** **This EUT uses Bluetooth and IEEE 802.11 a/n (20 MHz / 40 MHz) only.**

Representative Test Engineer	**Approved By**
K. Adachi	T. Imamura
Kenichi Adachi Engineer	Toyokazu Imamura Leader

CERTIFICATE 1266.03

☐ The testing in which "Non-accreditation" is displayed is outside the accreditation scopes in UL Japan, Inc.

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

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REVISION HISTORY

Original Test Report No.: 14568085S-B

This report is a revised version of 14568085S-B-R1. 14568085S-B-R1 is replaced with this report.

Revision	Test Report No.	Date	Page Revised Contents
- (Original)	14568085S-B	April 3, 2023	-
1	14568085S-B-R1	May 16, 2023	p.5: Corrected the rating from “DC 3.3 V and DC 1.8 V” to “DC 3.3 V”. p.7: Corrected from “The RF Module has its own regulator. The RF Module is constantly provided with voltage through the regulator regardless of input voltage.” to “This EUT provides stable voltage constantly to RF Module regardless of input voltage.” p.10: Added the test program used for radiated emission tests.
2	14568085S-B-R2	May 19, 2023	p.7: Corrected from “This EUT provides stable voltage constantly to RF Module regardless of input voltage.” to “The EUT is constantly provided with stable voltage from the host device regardless of input voltage.”

Reference: Abbreviations (Including words undescribed in this report)

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

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SECTION 1: Customer Information

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

The information provided from the customer is as follows;
- Customer, Description 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 and Test 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

Description	IEEE 802.11 1X1 a/b/g/n/ac/ax Wireless LAN + Bluetooth 5.2 + 802.15.4 Tri-radio 12 x 12 LGA Module
Model Number	AW-XM553
Serial Number	Refer to SECTION 4.2
Condition	Engineering prototype (Not for Sale: This sample is equivalent to mass-produced items.)
Modification	No Modification by the test lab
Receipt Date	November 10, 2022
Test Date	November 11, 2022 to January 19, 2023

2.2 Product Description

General Specification

Rating	DC 3.3 V
Operating temperature	0 deg. C to 70 deg. C

Radio Specification

Bluetooth (BR / EDR / Low Energy)

Equipment Type	Transceiver
Frequency of Operation	2402 MHz to 2480 MHz
Type of Modulation	BT: FHSS (GFSK, π/4 DQPSK, 8 DPSK) BT LE: GFSK
Antenna Type	Type D (IW611-IW620-D): Dipole Antenna Type G (IW611-IW620-G): Dipole Antenna
Antenna Gain	Type D (IW611-IW620-D): 0.38 dBi max (include 100 mm antenna cable) Type G (IW611-IW620-G): 0.29 dBi max (include 100 mm antenna cable)

WLAN (IEEE802.11a/11n-20/11n-40)

Equipment Type	Transceiver	
Frequency of Operation	20 MHz Band:	5180 MHz to 5240 MHz 5260 MHz to 5320 MHz 5500 MHz to 5700 MHz 5745 MHz to 5825 MHz
	40 MHz Band:	5190 MHz to 5230 MHz 5270 MHz to 5310 MHz 5510 MHz to 5670 MHz 5755 MHz to 5795 MHz
Type of Modulation	OFDM	
Antenna Type	Type D (IW611-IW620-D): Dipole Antenna Type G (IW611-IW620-G): Dipole Antenna	
Antenna Gain	Type D (IW611-IW620-D): 1.68 dBi max (include 100 mm antenna cable) Type G (IW611-IW620-G): 1.36 dBi max (include 100 mm antenna cable)	

* This test report applies to Bluetooth (BR/EDR) part.

* Following channels are not used.
- 20 MHz Bandwidth (5600 MHz - 5640 MHz)
- 40 MHz Bandwidth (5590 MHz - 5630 MHz)

SECTION 3: Test Specification, Procedures & Results

3.1 Test Specification

Test Specification	FCC Part 15 Subpart C The latest version on the first day of the testing period
Title	FCC 47 CFR Part 15 Radio Frequency Device Subpart C Intentional Radiators Section 15.207 Conducted limits Section 15.247 Operation within the bands 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz

3.2 Procedures and Results

Item	Test Procedure	Specification	Worst Margin	Results	Remarks
Conducted Emission	**FCC:** ANSI C63.10-2013 6. Standard test methods	**FCC:** Section 15.207	15.3 dB, 0.99868 MHz, QP, L1	Complied a)	-
	ISED: RSS-Gen 8.8	**ISED:** RSS-Gen 8.8			
Carrier Frequency Separation	**FCC:** KDB 558074 D01 15.247 Meas Guidance v05r02	**FCC:** Section15.247(a)(1)	See data.	Complied b)	Conducted
	ISED: -	**ISED:** RSS-247 5.1 (b)			
20 dB Bandwidth	**FCC:** KDB 558074 D01 15.247 Meas Guidance v05r02	**FCC:** Section15.247(a)(1)		Complied b)	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 c)	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 d)	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 e)	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)	3.2 dB 499.700 MHz, QP, Hori., Tx, Hopping Off, 3DH5 2402 MHz	Complied f) / g)	Conducted/ Radiated (above 30 MHz) *1)
	ISED: RSS-Gen 6.13	**ISED:** RSS-247 5.5 RSS-Gen 8.9 RSS-Gen 8.10			

Note: UL Japan, Inc.'s EMI Work Procedures: Work Instructions-ULID-003591 and Work Instructions-ULID-003593.
* In case any questions arise about test procedure, ANSI C63.10: 2013 is also referred.

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

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

FCC Part 15.31 (e)

The EUT is constantly provided with stable voltage from the host device regardless of input voltage.
Therefore, this EUT complies with the requirement.

FCC Part 15.203/212 Antenna requirement

The EUT has a unique antenna connector (U.FL).
Therefore, the equipment complies with the requirement of 15.203/212.

3.3 Addition to Standard

Item	Test Procedure	Specification	Worst Margin	Results	Remarks
99 % Occupied Bandwidth	**ISED:** RSS-Gen 6.7	**ISED:** -	N/A	- b)	Conducted
b) Refer to APPENDIX 1 (data of 20dB 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

Measurement uncertainty is not taken into account when stating conformity with a specified requirement.
Note: When margins obtained from test results are less than the measurement uncertainty, the test results may exceed the limit.

The following uncertainties have been calculated to provide a confidence level of 95 % using a coverage factor $k = 2$.

Item	Frequency range	Uncertainty (+/-)
Conducted emission (AC Mains) LISN	150 kHz-30 MHz	3.1 dB
Radiated emission (Measurement distance: 3 m)	9 kHz-30 MHz	3.3 dB
	30 MHz-200 MHz	4.8 dB
	200 MHz-1 GHz	6.1 dB
	1 GHz-6 GHz	4.7 dB
	6 GHz-18 GHz	5.3 dB
	18 GHz-40 GHz	5.5 dB
Radiated emission (Measurement distance: 1 m)	1 GHz-18 GHz	5.6 dB
	18 GHz-40 GHz	5.8 dB

Antenna terminal test	Uncertainty (+/-)
Power Measurement above 1 GHz (Average Detector)_SPM-06	1.3 dB
Power Measurement above 1 GHz (Peak Detector)_SPM-06	2.1 dB
Power Measurement above 1 GHz (Average Detector)_SPM-07	1.1 dB
Power Measurement above 1 GHz (Peak Detector)_SPM-07	1.2 dB
Power Measurement above 1 GHz (Average Detector)_SPM-13	1.1 dB
Power Measurement above 1 GHz (Peak Detector)_SPM-13	1.4 dB
Spurious emission (Conducted) below 1 GHz	0.84 dB
Conducted emissions Power Density Measurement 1 GHz-3 GHz	0.86 dB
Conducted emissions Power Density Measurement 3 GHz-18 GHz	2.4 dB
Spurious emission (Conducted) 18 GHz-26.5 GHz	2.4 dB
Spurious emission (Conducted) 26.5 GHz-40 GHz	2.2 dB
Bandwidth Measurement	0.012 %
Duty cycle and Time Measurement	0.27 %
Temperature_SCH-01	0.87 deg.C.
Humidity_SCH-01	3.5 %
Temperature_SCH-02	2.0 deg.C.
Humidity_SCH-02	6.7 %
Voltage	0.92 %

3.5 Test Location

UL Japan, Inc. Shonan EMC Lab.
1-22-3, Megumigaoka, Hiratsuka-shi, Kanagawa-ken 259-1220 Japan
Telephone: +81-463-50-6400
A2LA Certificate Number: 1266.03
(FCC test firm registration number: 626366, ISED lab company number: 2973D / CAB identifier: JP0001)

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

3.6 Test Data, Test Instruments, and Test Set Up

Refer to APPENDIX.

SECTION 4: Operation of EUT during testing

4.1 Operating Mode(s)

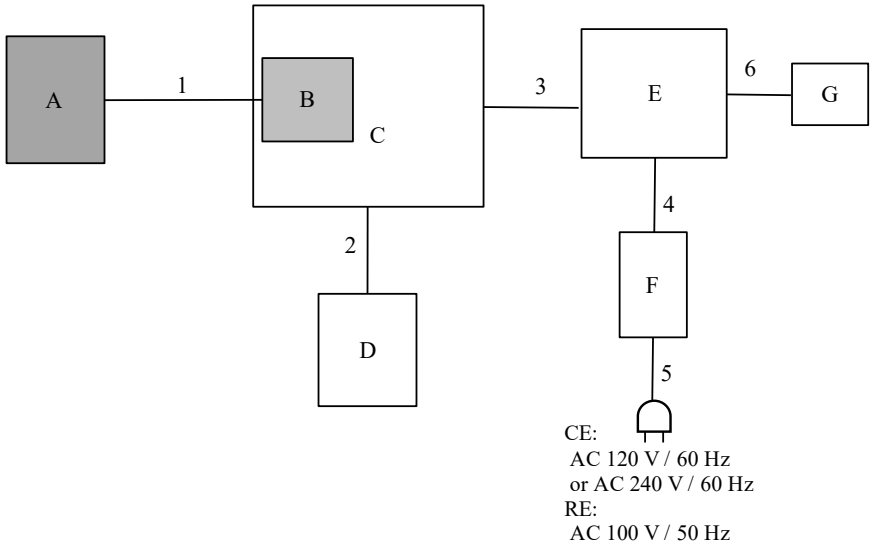
Mode	Remarks*
Bluetooth (BT)	BR / EDR, Payload: PRBS9
*EUT has the power settings by the software as follows; Power Setting: 4 Software: IW611 BT Test Version 1.3 (For antenna terminal conducted tests) (Date: 2022.11.10, Storage location: Driven by connected PC) Dut LabTool, Version 1.0.0.29 (For radiated emission tests) (Date: 2022.12.15, Storage location: Driven by connected PC) *This setting of software is the worst case. Any conditions under the normal use do not exceed the condition of setting. In addition, end users cannot change the settings of the output power of the product.	

Details of Operating Mode(s)

Test Item	Mode	Hopping	Tested Frequency
Conducted Emission, Radiated Spurious Emission (Below 1 GHz)	Tx 3DH5 *1)	Off	2402 MHz
Radiated Spurious Emission (Above 1 GHz), Conducted Spurious Emission	Tx DH5 Tx 3DH5	Off	2402 MHz 2441 MHz 2480 MHz
Radiated Spurious Emission (Above 1 GHz)	Tx DH5 with Tx 11n-20 5580 MHz Tx 3DH5 with Tx 11n-20 5580 MHz	Off	2402 MHz 2480 MHz
Carrier Frequency Separation	Tx DH5 Tx 3DH5	On	2402 MHz 2441 MHz 2480 MHz
20dB Bandwidth	Tx DH5 Tx 3DH5	Off	2402 MHz 2441 MHz 2480 MHz
Number of Hopping Frequency	Tx DH5 Tx 3DH5	On	-
Dwell time	Tx DH1, DH3, DH5 Tx 3DH1, 3DH3, 3DH5	On	-
Maximum Peak Output Power	Tx DH5 Tx 2DH5 Tx 3DH5	Off	2402 MHz 2441 MHz 2480 MHz
Band Edge Compliance (Conducted)	Tx DH5 Tx 3DH5	On Off	2402 MHz 2480 MHz
99% Occupied Bandwidth	Tx DH5 Tx 3DH5	On 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.			
*1) Conducted emissions and Spurious emissions for frequencies below 1 GHz were limited to the channel that had the highest power during the antenna terminal test, as preliminary testing indicated that changing the operating frequency had no significant impact on the emissions in those frequency bands.			

4.2 Configuration and Peripherals

<Radiated Emission test and Conducted Emission test >



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

*As a result of comparing AC 120 V and AC 240 V at pre-check, conducted emission test was performed with AC 120 V of the worst voltage as representative.

** The antenna used in these tests were the worst of two type of antennas in the pre-check.
(Type D (=IW611-IW620-D) or Type G (=IW611-IW620-G))

** The antenna cable used in these tests were the worst of two type of antenna cable in the pre-check.
(100 mm or 800 mm)

Description of EUT and Support Equipment

No.	Item	Model number	Serial Number	Manufacturer	Remarks
A	Antenna	Type D	001	SONY	EUT
		Type G	001	SONY	EUT
B	IEEE 802.11 1X1 a/b/g/n/ac/ax Wireless LAN + Bluetooth 5.2 + 802.15.4 Tri-radio 12 x 12 LGA Module	AW-XM553	2C:3B:70:E7:BB:D8	AzureWave	EUT
C	Evaluation board	AW-XM553-EVB	2-01-221122	AzureWave	-
D	Jig Board	AW-NM383	1256-13	AzureWave	-
E	Laptop Computer	FMVNA8HEC	R9312957	FUJITSU	-
F	AC Adapter	SED100P2-19.0	CP293664-01	Lenovo	-
G	HDD	-	-	Transcend	-

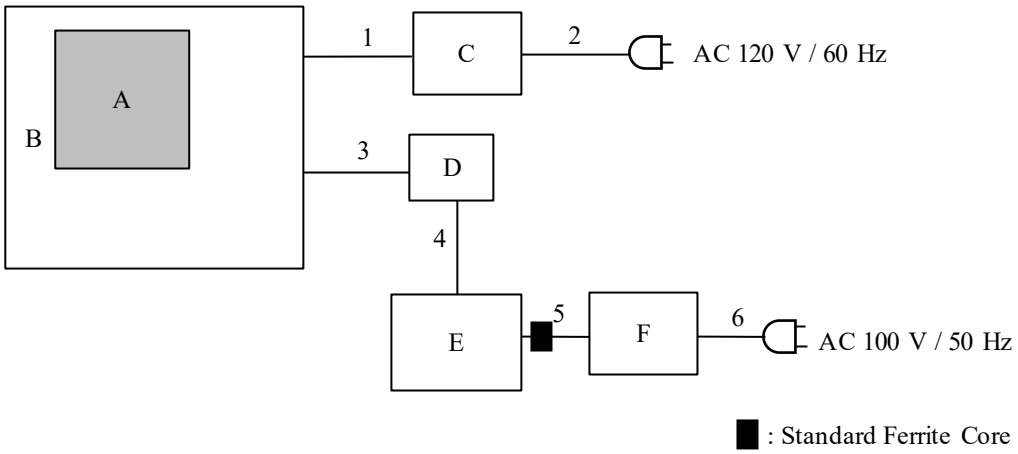
List of Cables Used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	Antenna	0.1 *1) 0.8 *2)	Shielded	Shielded	-
2	Signal	0.15	Unshielded	Unshielded	-
3	USB	1.0	Shielded	Shielded	-
4	DC	0.9	Unshielded	Unshielded	-
5	AC	0.9	Unshielded	Unshielded	-
6	USB	1.8	Shielded	Shielded	-

*1) Used for Radiated Emission test above 1 GHz

*2) Used for Radiated Emission test below 1 GHz and Conducted Emission test

<Antenna Terminal conducted test>



Description of EUT and Support Equipment

No.	Item	Model number	Serial Number	Manufacturer	Remarks
A	IEEE 802.11 1X1 a/b/g/n/ac/ax Wireless LAN + Bluetooth 5.2 + 802.15.4 Tri-radio 12 x 12 LGA Module	AW-XM553	14-D4-24-DE-11-29	AzureWave	EUT
B	AE-C EVT	AE-C EVT	015	SONY	-
C	AC Adapter	AC-M1215WW	M2220096354	SONY	-
D	Jig Board	EBISU JIG	0001	SONY	-
E	Laptop Computer	7666-77J	LV-B8PVT 08/05	Lenovo	-
F	AC Adapter	42T4422	11S42T4422Z1ZF3D9BV4XN	Lenovo	-

List of Cables Used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	DC	1.0	Unshielded	Unshielded	-
2	AC	0.6	Unshielded	Unshielded	-
3	Signal	0.15	Unshielded	Unshielded	-
4	USB	1.2	Shielded	Shielded	-
5	DC	1.8	Unshielded	Unshielded	-
6	AC	0.9	Unshielded	Unshielded	-

SECTION 5: Conducted Emission

Test Procedure and Conditions

EUT was placed on a urethane platform of nominal size, 1.0 m by 2.0 m, raised 0.8 m above the conducting ground plane.
The rear of tabletop was located 40 cm to the vertical conducting plane. The rear of EUT, including peripherals, was aligned and flushed with rear of tabletop. All other surfaces of tabletop were at least 80cm from any other grounded conducting surface. EUT was located 80 cm from a Line Impedance Stabilization Network (LISN) / Artificial mains Network (AMN).

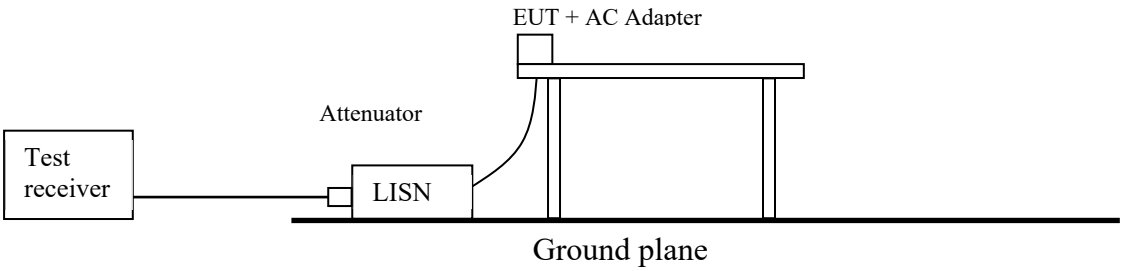
1) For the tests on EUT with other peripherals (as a whole system)
I/O cables were connected to 40 cm height to the ground plane.

The AC Mains Terminal Continuous disturbance Voltage has been measured with the EUT via AC Adapter in a Shielded room.
The EUT via AC Adapter was connected to a LISN (AMN).
An overview sweep with peak detection has been performed.

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

Detector : QP and CISPR AV
Measurement Range : 0.15 MHz to 30 MHz
Test Data : APPENDIX
Test Result : Pass

Figure 1: Test Setup



SECTION 6: Radiated Spurious Emission

Test Procedure

[For below 1 GHz]
EUT was placed on a urethane platform of nominal size, 1.0 m by 2.0 m, raised 0.8 m above the conducting ground plane. The Radiated Electric Field Strength has been measured in a Semi Anechoic Chamber with a ground plane.

[For above 1 GHz]
EUT was placed on a urethane platform of nominal size, 0.5 m by 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. 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 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.
The measurements were performed for both vertical and horizontal antenna polarization with the Test Receiver, or the Spectrum Analyzer.
The measurements were made with the following detector function of the test receiver and the Spectrum analyzer (in linear mode).
The test was made with the detector (RBW/VBW) in the following table.
When using Spectrum analyzer, the test was made with adjusting span to zero by using peak hold.

Test Antennas are used as below;

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

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

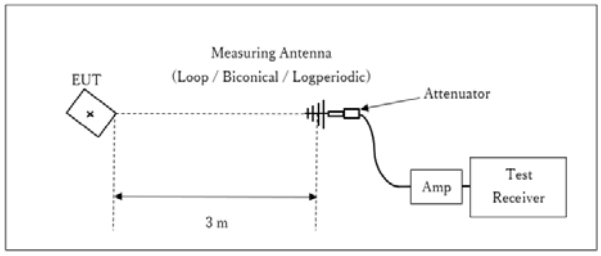
20 dBc was applied to the frequency over the limit of FCC 15.209 / Table 4 of RSS-Gen 8.9 (ISED) and outside the restricted band of FCC15.205 / Table 6 of RSS-Gen 8.10 (ISED).

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

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

Figure 2: Test Setup

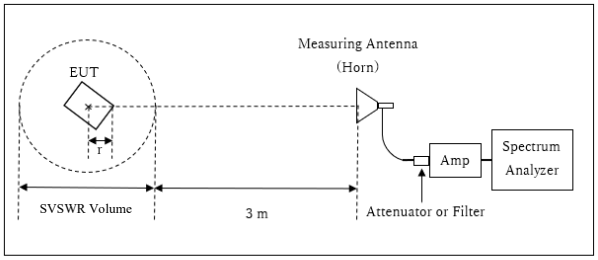
Below 1 GHz



× : Center of turn table

Test Distance: 3 m

1 GHz to 10 GHz

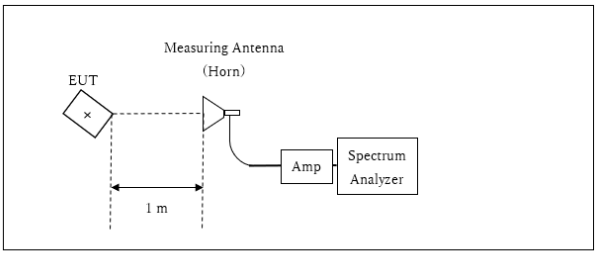


r : Radius of an outer periphery of EUT
× : Center of turn table

Distance Factor: 20 x log (3.89 m / 3.0 m) = 2.26 dB
* Test Distance: (3 + SVSWR Volume /2) - r = 3.89 m

SVSWR Volume : 2.0 m
(SVSWR Volume has been calibrated based on CISPR 16-1-4.)
r = 0.11 m

10 GHz to 26.5 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 X, Y and Z axes of EUT and antenna to see the position of maximum noise, and the test was made at the position that has the maximum noise.
- The one of antenna was used for this test to be worst data in the pre-check.
- The one of antenna cable were used for this test to be worst data in the pre-check.

		Conducted emission	Below 30 MHz	1-2.8 GHz	2.8-10 GHz	10-18 GHz	18-26.5 GHz
EUT (module)	Horizontal	-	X	X	X	X	X
	Vertical		X	X	X	X	X
Antenna	Horizontal	-	X	X	X	X	X
	Vertical		X	Z	X	X	X
Used antenna	Horizontal	Type D	Type D	Type D	Type D	Type D	Type D
	Vertical		Type D	Type D	Type D	Type D	Type D
Antenna cable	Horizontal	800 mm	800 mm	100 mm	100 mm	100 mm	100 mm
	Vertical		800 mm	100 mm	100 mm	100 mm	100 mm

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

Measurement Range : 30 MHz to 26.5 GHz
Test Data : APPENDIX
Test Result : Pass

SECTION 7: Antenna Terminal Conducted Tests

Test Procedure

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

Test	Span	RBW	VBW	Sweep time	Detector	Trace	Instrument Used
20 dB Bandwidth	3 MHz	30 kHz	100 kHz	Auto	Peak	Max Hold	Spectrum Analyzer
99 % Occupied Bandwidth *1)	Enough width to display emission skirts	1 to 5 % of OBW	Three times of RBW	Auto	Peak	Max Hold	Spectrum Analyzer
Maximum Peak Output Power	-	-	-	Auto	Peak Average *2)	-	Power Meter (Sensor: 160 MHz BW)
Carrier Frequency Separation	3 MHz	100 kHz	300 kHz	Auto	Peak	Max Hold	Spectrum Analyzer
Number of Hopping Frequency	30 MHz	200 kHz	620 kHz	Auto	Peak	Max Hold	Spectrum Analyzer
Dwell Time	Zero Span	100 kHz, 1 MHz	300 kHz, 3 MHz	As necessary capture the entire dwell time per hopping channel	Peak	Clear Write	Spectrum Analyzer
Conducted Spurious Emission *3) *4)	9 kHz to 150 kHz	200 Hz	620 Hz	Auto	Peak	Max Hold	Spectrum Analyzer
	150 kHz to 30 MHz	10 kHz	30 kHz				
	30 MHz to 25 GHz	100 kHz	300 kHz				
Conducted Spurious Emission Band Edge compliance	13 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.
①Then, 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

Conducted Emission

DATA OF CONDUCTED EMISSION TEST

UL Japan,Inc. Shonan EMC Lab. No.3 Shielded Room
Date : 2023/01/11

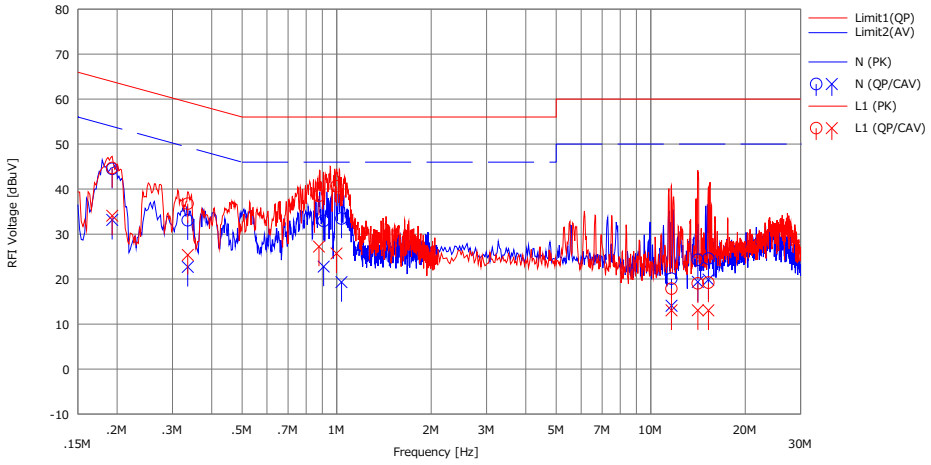
Mode : Tx BT 3DH5 2402 MHz

Power : AC 120 V / 60 Hz
Temp./Humi. : 22 deg.C / 34 %RH

Remarks : ANT(Type D), RF cable: 800 mm

Limit : FCC_Part 15 Subpart C(15.207)

Engineer : Takahiro Suzuki



No.	Freq.	Reading		C.Fac	Results		Limit		Margin		Phase	Comment
		(QP)	(CAV)		(QP)	(CAV)	(QP)	(AV)	(QP)	(AV)		
	[MHz]	[dBuV]	[dBuV]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dB]	[dB]		
1	0.19290	32.05	20.72	12.43	44.48	33.15	63.91	53.91	19.4	20.7	N	
2	0.33568	20.62	10.26	12.45	33.07	22.71	59.31	49.31	26.2	26.6	N	
3	0.90868	20.42	10.27	12.49	32.91	22.76	56.00	46.00	23.0	23.2	N	
4	1.03609	20.95	6.83	12.49	33.44	19.32	56.00	46.00	22.5	26.6	N	
5	11.63739	7.06	1.08	13.00	20.06	14.08	60.00	50.00	39.9	35.9	N	
6	14.12518	11.17	6.28	13.10	24.27	19.38	60.00	50.00	35.7	30.6	N	
7	15.26005	11.41	6.73	13.15	24.56	19.88	60.00	50.00	35.4	30.1	N	
8	0.19290	32.25	21.64	12.44	44.69	34.08	63.91	53.91	19.2	19.8	L1	
9	0.33568	24.31	12.89	12.46	36.77	25.35	59.31	49.31	22.5	23.9	L1	
10	0.87855	26.00	14.73	12.49	38.49	27.22	56.00	46.00	17.5	18.7	L1	
11	0.99868	28.12	13.19	12.50	40.62	25.69	56.00	46.00	15.3	20.3	L1	
12	11.63739	4.95	0.12	12.92	17.87	13.04	60.00	50.00	42.1	36.9	L1	
13	14.12518	6.07	0.08	12.98	19.05	13.06	60.00	50.00	40.9	36.9	L1	
14	15.26005	6.18	0.03	13.01	19.19	13.04	60.00	50.00	40.8	36.9	L1	

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

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

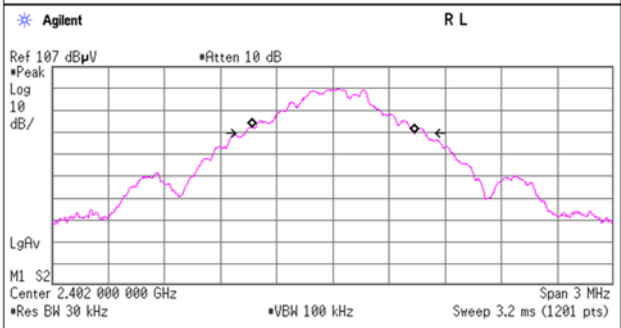
Test place	Shonan EMC Lab. No.5 Shielded Room	
Date	November 17, 2022	November 22, 2022
Temperature / Humidity	25 deg. C / 39 % RH	25 deg. C / 38 % RH
Engineer	Miku Ikudome	Miku Ikudome
Mode	Tx, Hopping Off, Tx, Hopping On	

Mode	Freq. [MHz]	20 dB Bandwidth [MHz]	99 % Occupied Bandwidth [kHz]	Carrier Frequency Separation [MHz]	Limit for Carrier Frequency separation [MHz]
DH5	2402.0	0.961	869.0	1.000	>= 0.641
DH5	2441.0	0.958	867.7	1.000	>= 0.639
DH5	2480.0	0.960	867.8	1.000	>= 0.640
DH5	Hopping On	-	78658.9	-	-
3DH5	2402.0	1.300	1177.6	1.000	>= 0.867
3DH5	2441.0	1.301	1178.8	1.000	>= 0.867
3DH5	2480.0	1.302	1179.0	1.000	>= 0.868
3DH5	Hopping On	-	78773.6	-	-

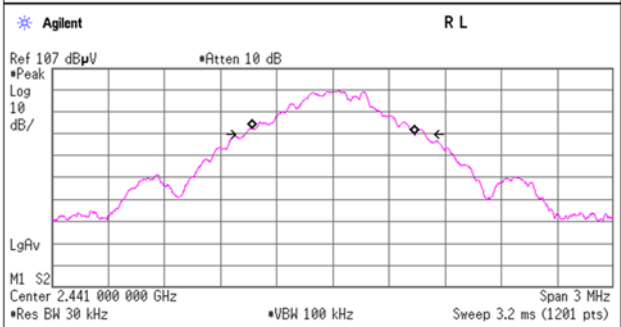
20 dB Bandwidth and 99 % Occupied Bandwidth

DH5

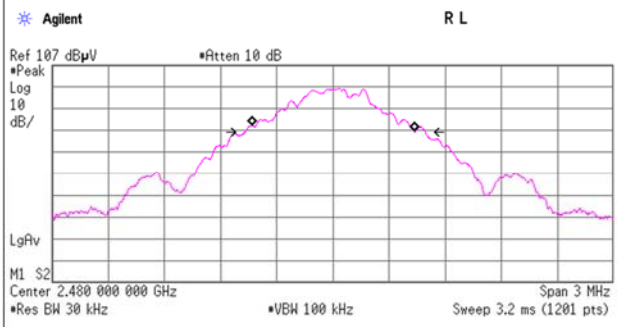
2402 MHz



2441 MHz

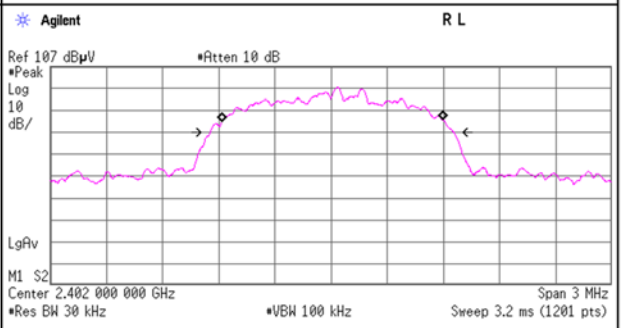


2480 MHz

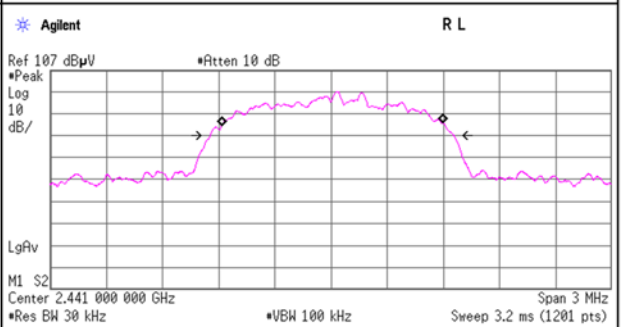


3DH5

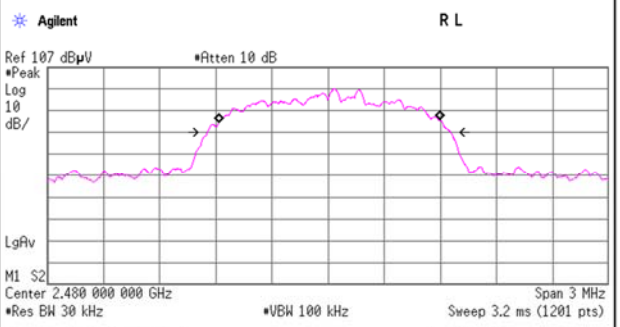
2402 MHz



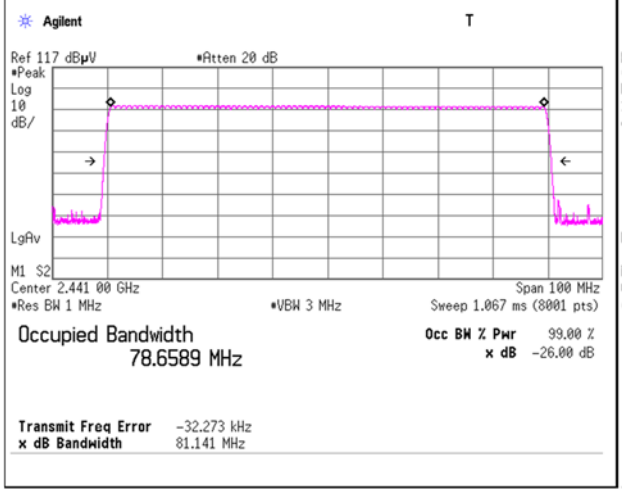
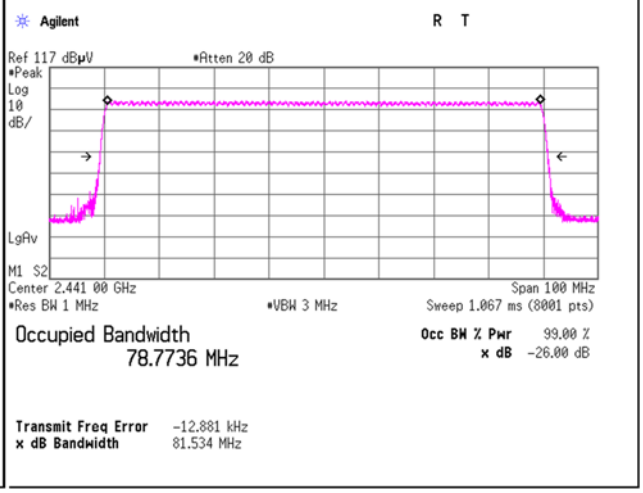
2441 MHz



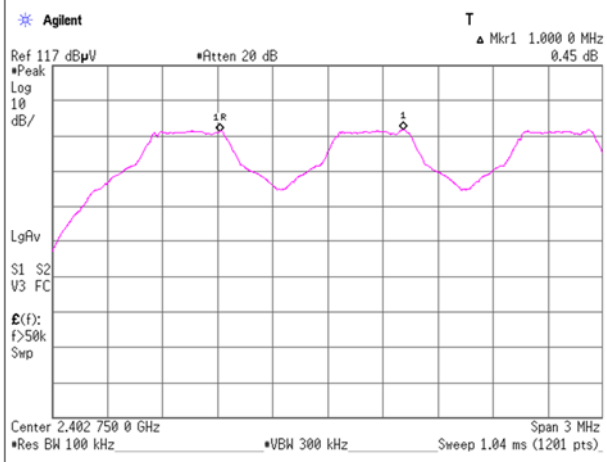
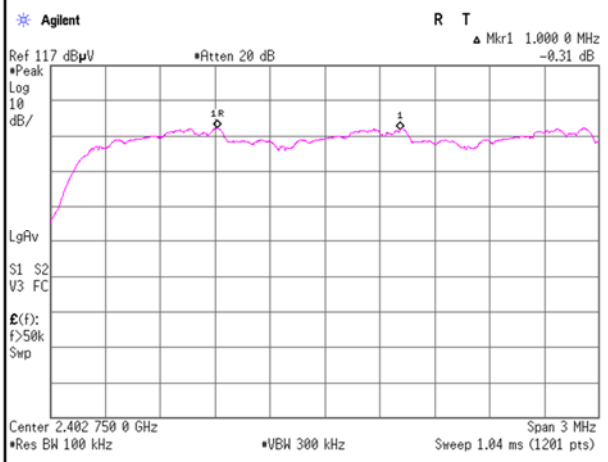
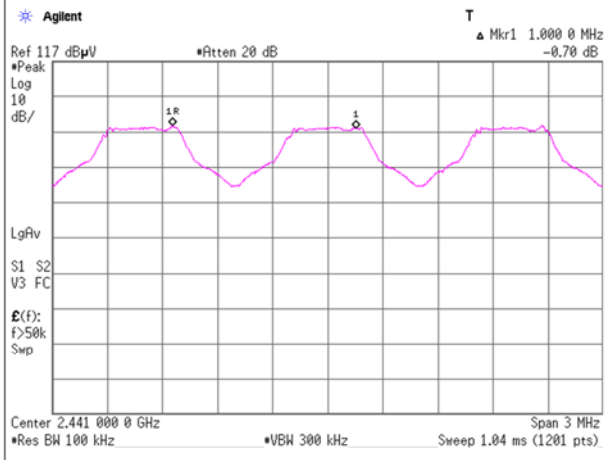
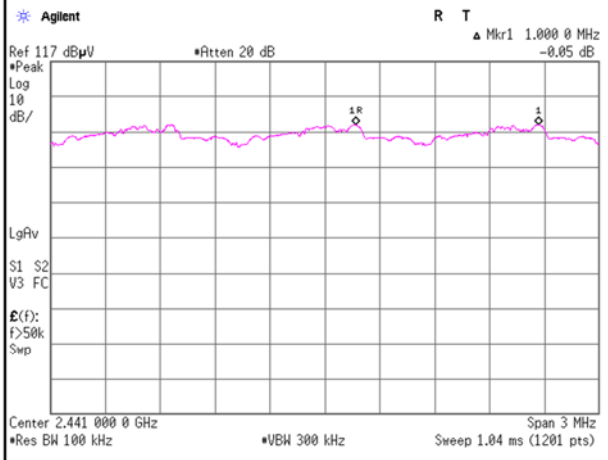
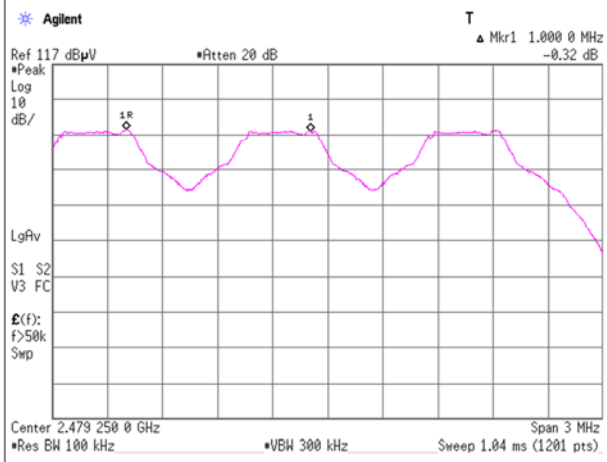
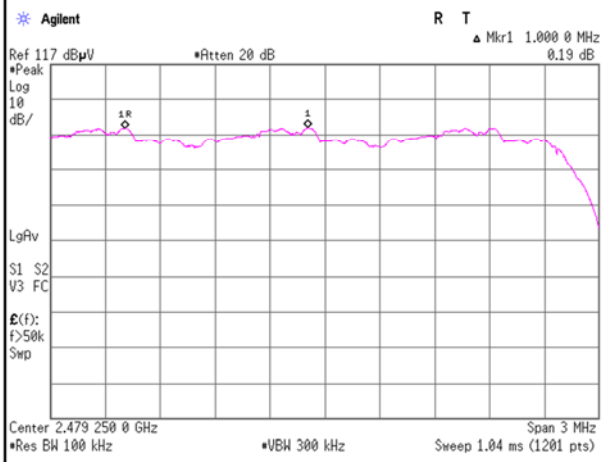
2480 MHz



20 dB Bandwidth and 99 % Occupied Bandwidth

DH5	3DH5
Hopping On	Hopping On
	

Carrier Frequency Separation

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

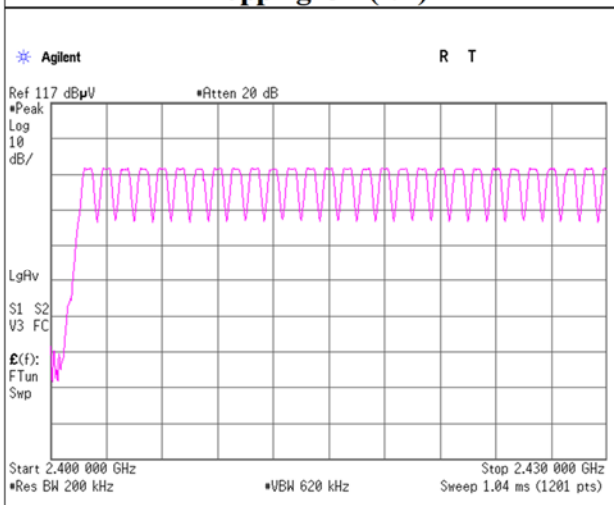
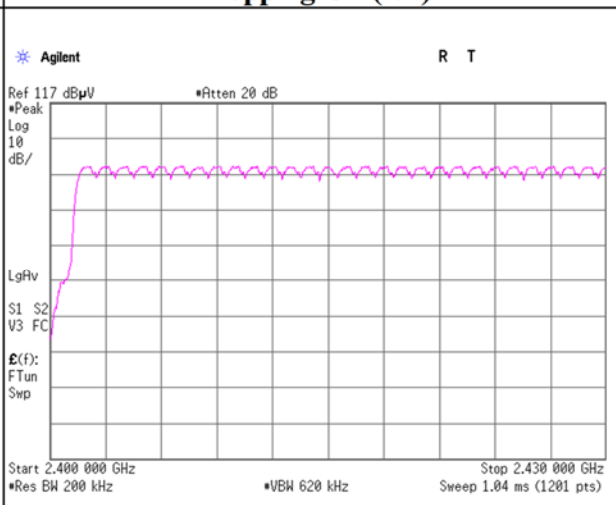
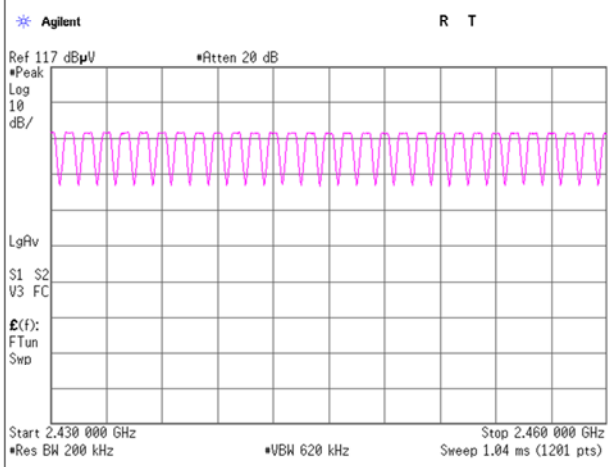
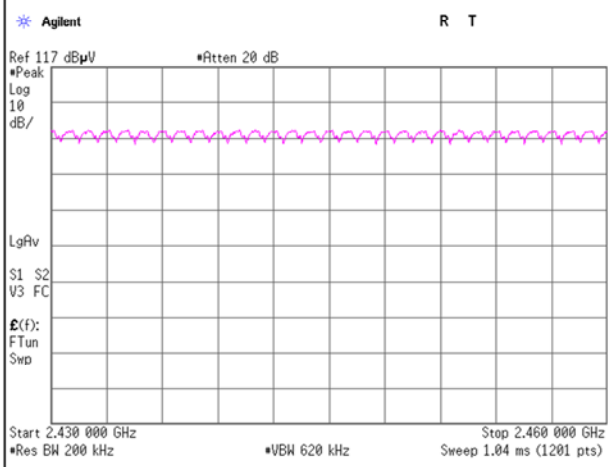
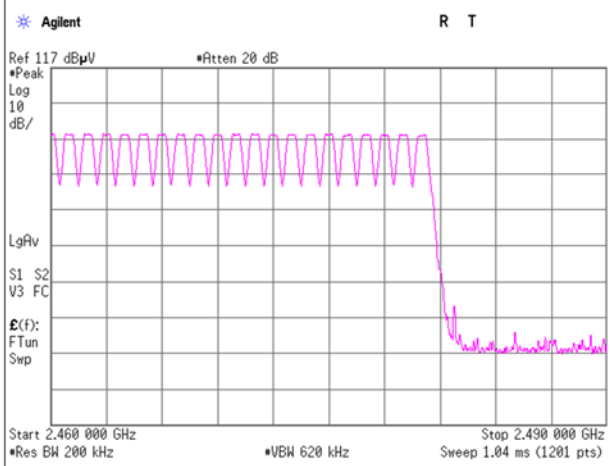
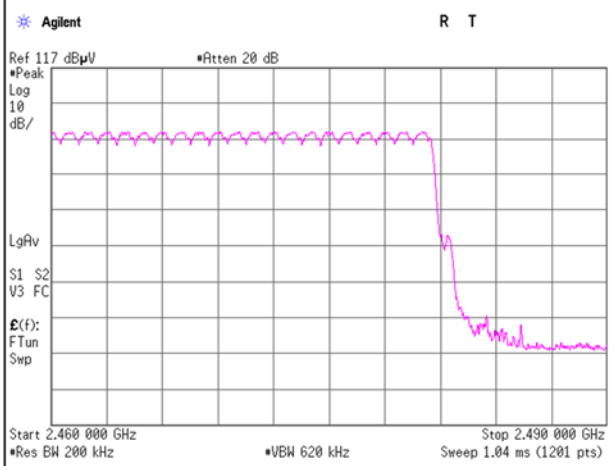
Number of Hopping Frequency

Test place	Shonan EMC Lab. No.5 Shielded Room	
Date	November 17, 2022	November 22, 2022
Temperature / Humidity	25 deg. C / 39 % RH	25 deg. C / 38 % RH
Engineer	Miku Ikudome	Miku Ikudome
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	3DH5
Hopping On (1/3)	**Hopping On (1/3)**
	
Hopping On (2/3)	**Hopping On (2/3)**
	
Hopping On (3/3)	**Hopping On (3/3)**
	

Dwell time

Test place	Shonan EMC Lab. No.5 Shielded Room	
Date	November 17, 2022	November 22, 2022
Temperature / Humidity	25 deg. C / 39 % RH	25 deg. C / 38 % RH
Engineer	Miku Ikudome	Miku Ikudome
Mode	Tx, Hopping On	

Mode	Number of transmission in a 31.6 (79 Hopping x 0.4)				Length of transmission [ms]	Result [ms]	Limit [ms]
DH1	50.6 times	/ 5 s	x 31.6 s	= 320 times	0.387	124	400
DH3	26.2 times	/ 5 s	x 31.6 s	= 166 times	1.649	274	400
DH5	19.8 times	/ 5 s	x 31.6 s	= 126 times	2.892	364	400
3DH1	50.2 times	/ 5 s	x 31.6 s	= 318 times	0.394	125	400
3DH3	27.6 times	/ 5 s	x 31.6 s	= 175 times	1.645	288	400
3DH5	19.6 times	/ 5 s	x 31.6 s	= 124 times	2.896	359	400

Sample Calculation

Result = Number of transmission x Length of transmission

*Average data of 5 tests.

Mode	Sampling [times]					Average [times]
	1	2	3	4	5	
DH1	51	50	50	50	52	50.6
DH3	29	25	25	28	24	26.2
DH5	20	20	19	21	19	19.8
3DH1	50	50	51	50	50	50.2
3DH3	27	27	29	27	28	27.6
3DH5	21	19	19	19	20	19.6

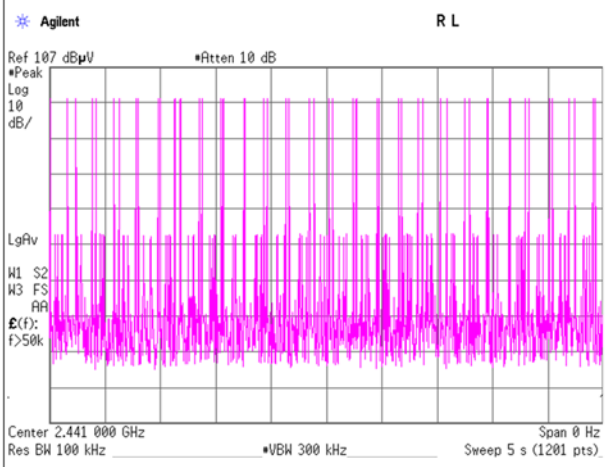
Sample Calculation

Average = Summation (Sampling 1 to 5) / 5

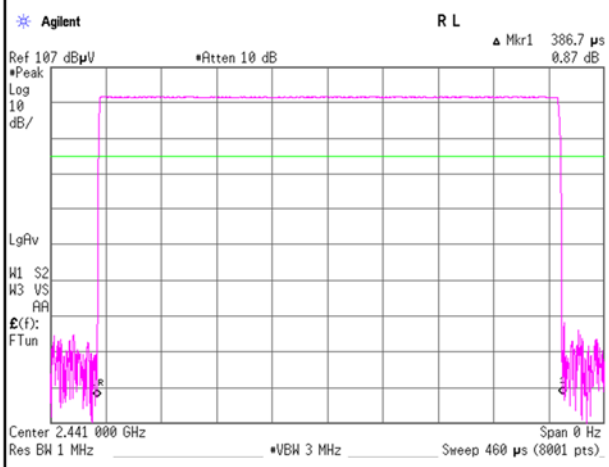
This device complies with the Bluetooth protocol for FHSS operation, employing a pseudo random channel selection and hopping rate to ensure that the occupancy time in N x 0.4 s, where N is the number of channels being used in the hopping sequence ($20 \leq N \leq 79$), is always less than 0.4 s regardless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

Dwell time

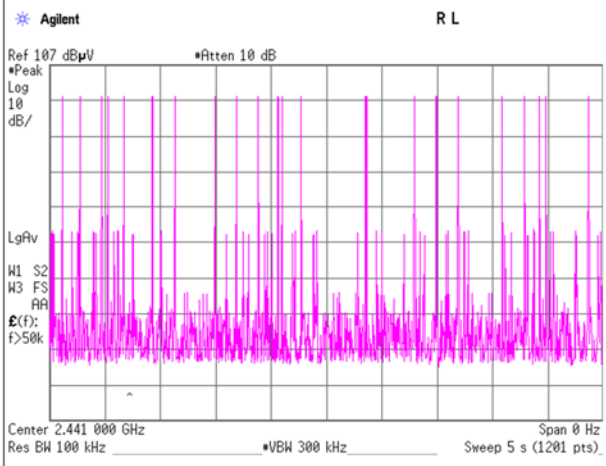
DH1 (1/2)
(Representative chart)



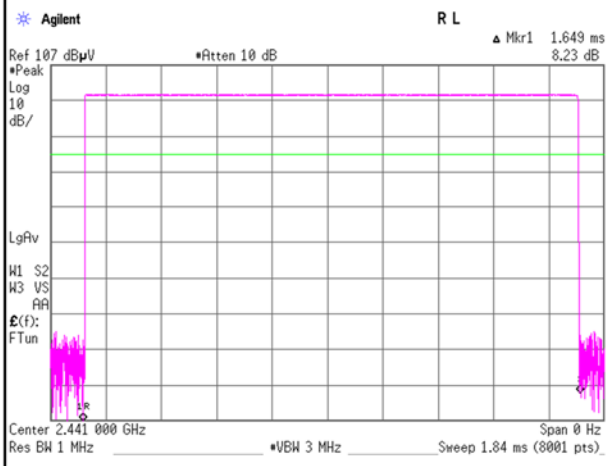
DH1 (2/2)



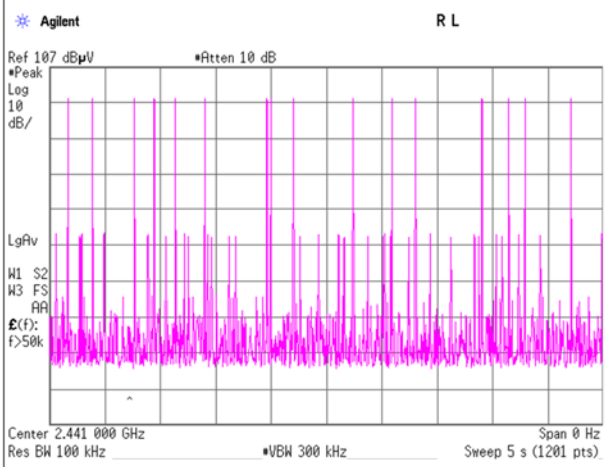
DH3 (1/2)
(Representative chart)



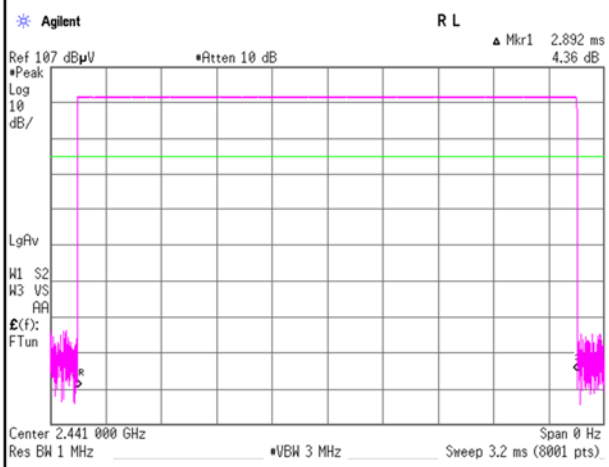
DH3 (2/2)



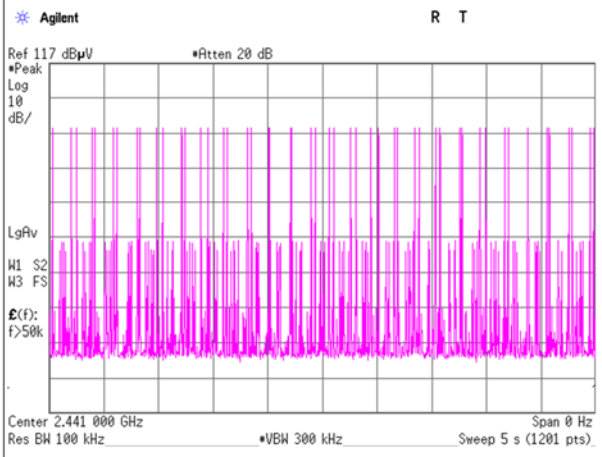
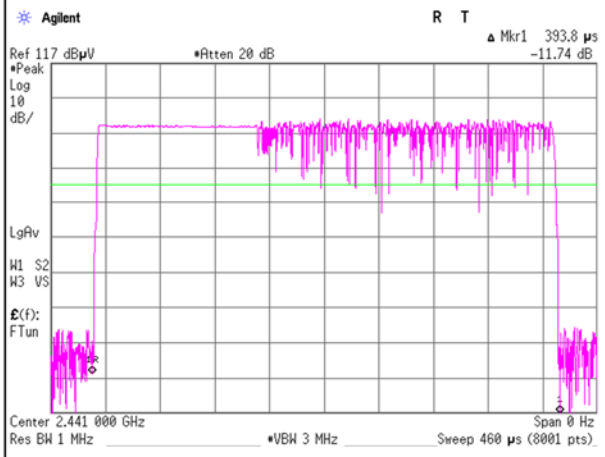
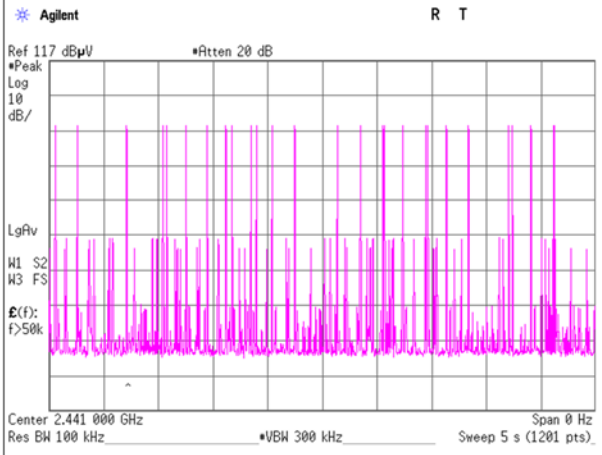
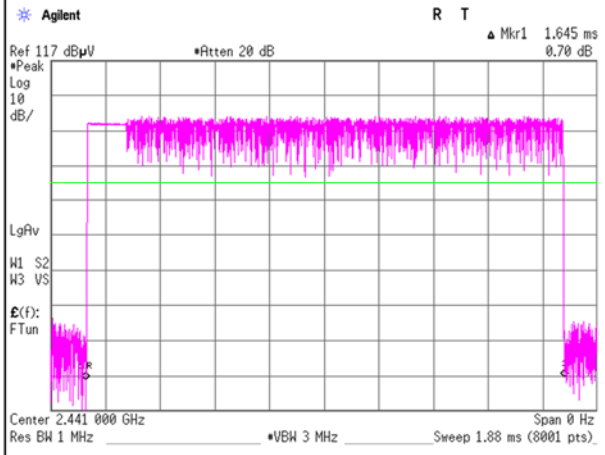
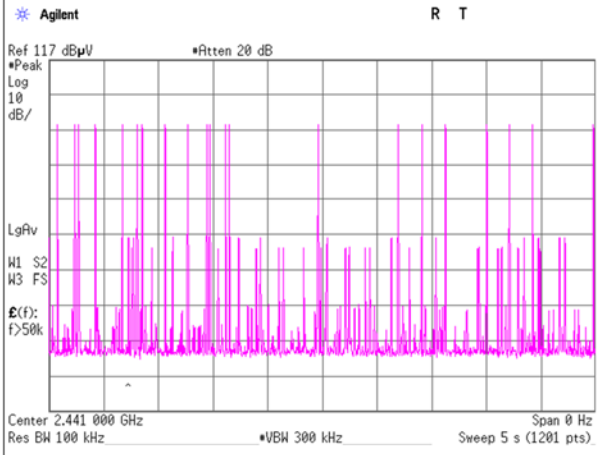
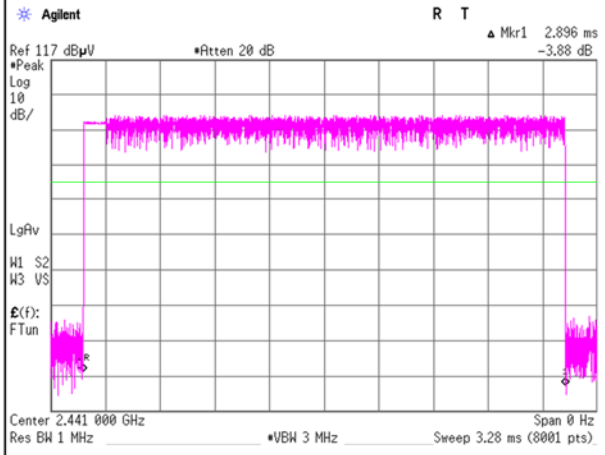
DH5 (1/2)
(Representative chart)



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 & Average Power (reference data for RF Exposure)

Test place	Shonan EMC Lab. No.5 Shielded Room
Date	November 16, 2022
Temperature / Humidity	24 deg. C / 34 % RH
Engineer	Miku Ikudome
Mode	Tx, Hopping Off

Maximum peak output power

					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	-7.33	0.99	9.82	3.48	2.23	20.97	125	17.49	0.38	3.86	2.43	36.02	4000	32.16
DH5	2441	-7.50	1.01	9.82	3.33	2.15	20.97	125	17.64	0.38	3.71	2.35	36.02	4000	32.31
DH5	2480	-7.81	1.01	9.82	3.02	2.00	20.97	125	17.95	0.38	3.40	2.19	36.02	4000	32.62
2DH5	2402	-5.45	0.99	9.82	5.36	3.44	20.97	125	15.61	0.38	5.74	3.75	36.02	4000	30.28
2DH5	2441	-5.56	1.01	9.82	5.27	3.37	20.97	125	15.70	0.38	5.65	3.67	36.02	4000	30.37
2DH5	2480	-5.76	1.01	9.82	5.07	3.21	20.97	125	15.90	0.38	5.45	3.51	36.02	4000	30.57
3DH5	2402	-5.19	0.99	9.82	5.62	3.65	20.97	125	15.35	0.38	6.00	3.98	36.02	4000	30.02
3DH5	2441	-5.31	1.01	9.82	5.52	3.56	20.97	125	15.45	0.38	5.90	3.89	36.02	4000	30.12
3DH5	2480	-5.51	1.01	9.82	5.32	3.40	20.97	125	15.65	0.38	5.70	3.72	36.02	4000	30.32

Sample Calculation:
Result = Reading + Cable Loss + Attenuator Loss
e.i.r.p. Result = Conducted Power Result + Antenna Gain
*The equipment and cables were not used for factor 0 dB of the data sheets.

All comparison were carried out on same frequency and measurement factors.

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 power (Reference data for RF Exposure)

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	-9.21	0.99	9.82	1.60	1.45	1.12	2.72	1.87
DH5	2441	-9.32	1.01	9.82	1.51	1.42	1.12	2.63	1.83
DH5	2480	-9.62	1.01	9.82	1.21	1.32	1.12	2.33	1.71
2DH5	2402	-8.99	0.99	9.82	1.82	1.52	1.13	2.95	1.97
2DH5	2441	-9.08	1.01	9.82	1.75	1.50	1.13	2.88	1.94
2DH5	2480	-9.26	1.01	9.82	1.57	1.44	1.13	2.70	1.86
3DH5	2402	-8.98	0.99	9.82	1.83	1.52	1.13	2.96	1.98
3DH5	2441	-9.08	1.01	9.82	1.75	1.50	1.13	2.88	1.94
3DH5	2480	-9.25	1.01	9.82	1.58	1.44	1.13	2.71	1.87

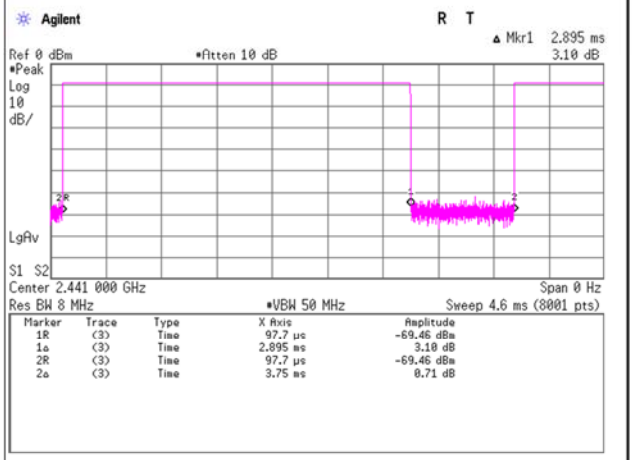
Sample Calculation:
Result (Time average) = Reading + Cable Loss + Attenuator Loss
Result (Burst power average) = Result (Time average) + Duty factor
*The equipment and cables were not used for factor 0 dB of the data sheets.

Burst Rate Confirmation

Test place	Shonan EMC Lab. No.5 Shielded Room
Date	November 11, 2022
Temperature / Humidity	26 deg. C / 30 % RH
Engineer	Kenichi Adachi
Mode	Tx, Hopping Off

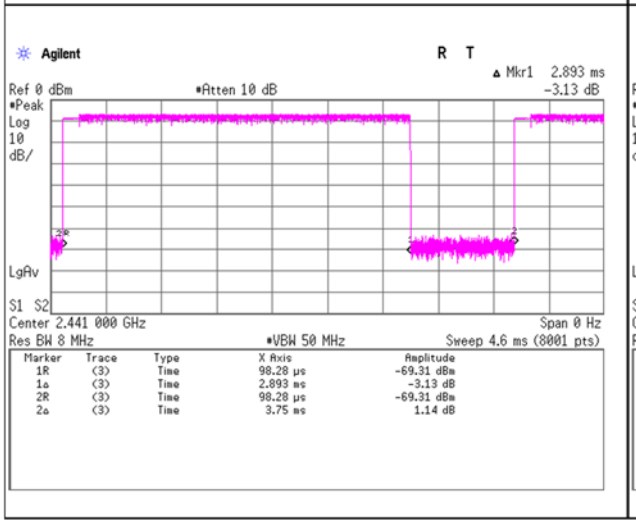
DH5

Tx on / (Tx on + Tx off) =	**0.772**
Tx on / (Tx on + Tx off) * 100 =	**77.2 %**
Duty factor = 10 * log (3.75 / 2.895) =	**1.12 dB**
VBW: 1 / on time = 345.44 Hz <	**360.00 Hz**



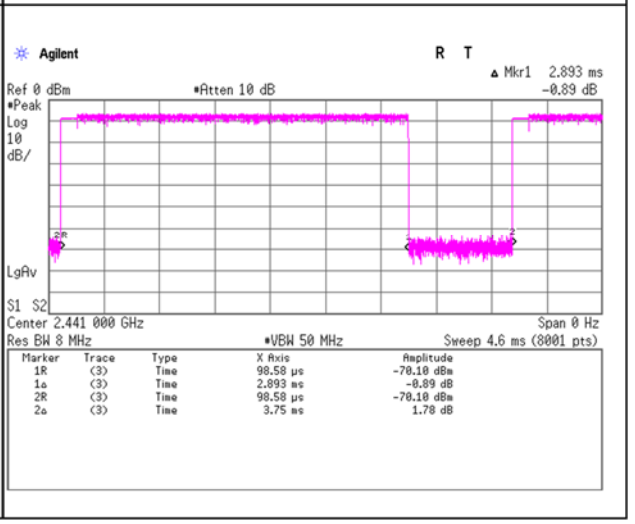
2DH5

Tx on / (Tx on + Tx off) =	**0.771**
Tx on / (Tx on + Tx off) * 100 =	**77.1 %**
Duty factor = 10 * log (3.75 / 2.893) =	**1.13 dB**
VBW: 1 / on time = 345.71 Hz <	**360.00 Hz**



3DH5

Tx on / (Tx on + Tx off) =	**0.771**
Tx on / (Tx on + Tx off) * 100 =	**77.1 %**
Duty factor = 10 * log (3.75 / 2.893) =	**1.13 dB**
VBW: 1 / on time = 345.7 Hz <	**360.00 Hz**



Radiated Spurious Emission

Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	No.1	No.1	No.3
Date	December 23, 2022	December 24, 2022	January 9, 2023
Temperature / Humidity	23 deg.C, 35 %RH	23 deg.C, 31 %RH	20 deg.C, 27 %RH
Engineer	Yohsuke Matsuzawa	Takahiro Kawakami	Takahiro Kawakami
	(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.	2390.000	PK	46.45	27.85	14.86	39.62	2.26	51.80	73.9	22.1	143	266	-
Hori.	4804.000	PK	45.95	31.17	7.87	39.73	2.26	47.52	73.9	26.3	150	0	-
Hori.	7206.000	PK	44.97	36.88	9.51	39.52	2.26	54.10	73.9	19.8	150	0	-
Hori.	9608.000	PK	44.58	38.11	11.08	39.73	2.26	56.30	73.9	17.6	150	0	-
Hori.	2390.000	AV	33.59	27.85	14.86	39.62	2.26	38.94	53.9	14.9	143	266	VBW:360 Hz
Hori.	4804.000	AV	33.77	31.17	7.87	39.73	2.26	35.34	53.9	18.5	150	0	VBW:360 Hz,Floor noise
Hori.	7206.000	AV	33.41	36.88	9.51	39.52	2.26	42.54	53.9	11.3	150	0	VBW:360 Hz,Floor noise
Hori.	9608.000	AV	33.43	38.11	11.08	39.73	2.26	45.15	53.9	**8.7**	150	0	VBW:360 Hz,Floor noise
Vert.	2390.000	PK	45.43	27.85	14.86	39.62	2.26	50.78	73.9	23.1	187	290	-
Vert.	4804.000	PK	46.14	31.17	7.87	39.73	2.26	47.71	73.9	26.1	150	0	-
Vert.	7206.000	PK	45.80	36.88	9.51	39.52	2.26	54.93	73.9	18.9	150	0	-
Vert.	9608.000	PK	45.46	38.11	11.08	39.73	2.26	57.18	73.9	16.7	150	0	-
Vert.	2390.000	AV	33.56	27.85	14.86	39.62	2.26	38.91	53.9	14.9	187	290	VBW:360 Hz
Vert.	4804.000	AV	33.82	31.17	7.87	39.73	2.26	35.39	53.9	18.5	150	0	VBW:360 Hz,Floor noise
Vert.	7206.000	AV	34.06	36.88	9.51	39.52	2.26	43.19	53.9	10.7	150	0	VBW:360 Hz,Floor noise
Vert.	9608.000	AV	33.40	38.11	11.08	39.73	2.26	45.12	53.9	**8.7**	150	0	VBW:360 Hz,Floor noise

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.89 m / 3.0 m) = 2.26 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB
*These results have sufficient margin without taking account Duty cycle correction factor.

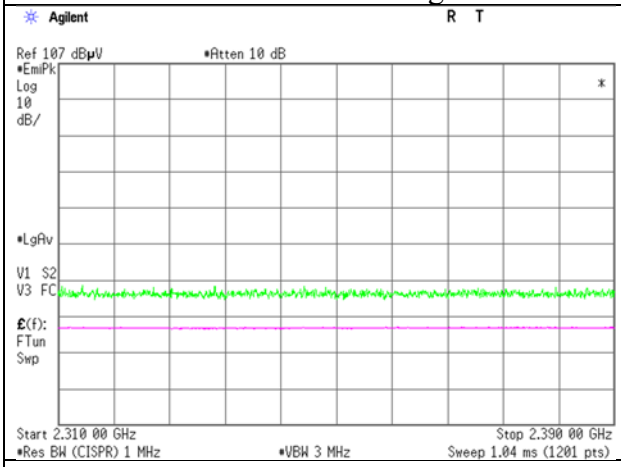
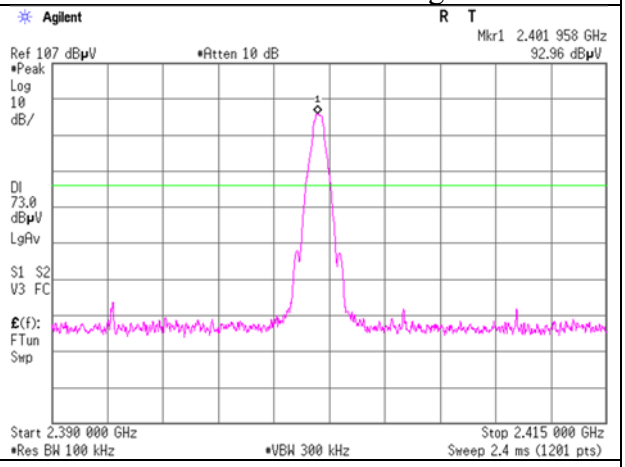
20 dBc Data Sheet **(RBW 100 kHz, VBW 300 kHz)**

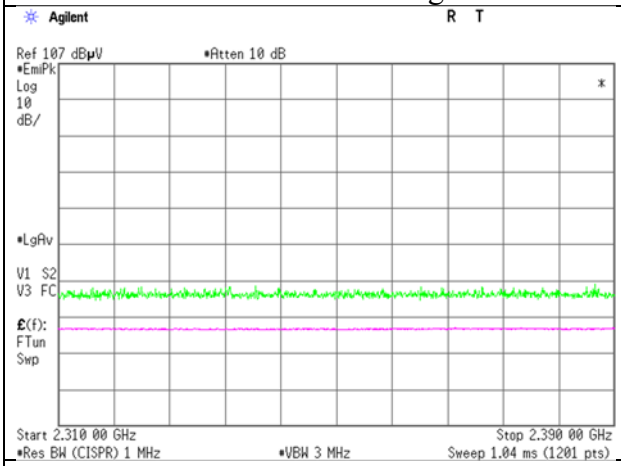
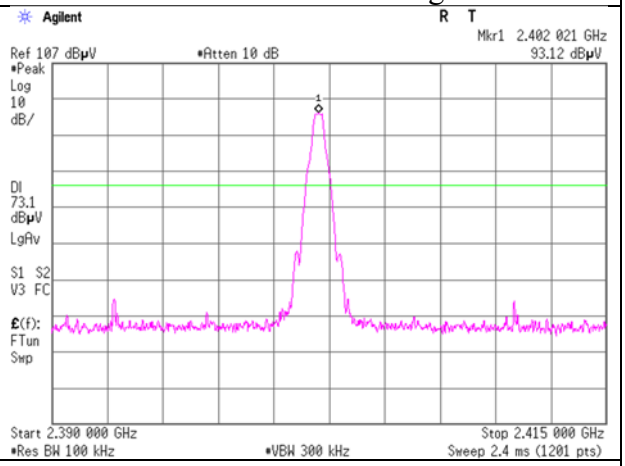
Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2402.000	PK	93.17	27.83	14.88	39.62	2.26	98.52	-	-	Carrier
Hori.	2392.845	PK	42.77	27.84	14.87	39.62	2.26	48.12	78.5	30.3	-
Hori.	2400.000	PK	37.55	27.83	14.88	39.62	2.26	42.90	78.5	35.6	-
Vert.	2402.000	PK	92.64	27.83	14.88	39.62	2.26	97.99	-	-	Carrier
Vert.	2392.852	PK	42.02	27.84	14.87	39.62	2.26	47.37	77.9	30.5	-
Vert.	2400.000	PK	38.93	27.83	14.88	39.62	2.26	44.28	77.9	33.6	-

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.89 m / 3.0 m) = 2.26 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

Radiated Spurious Emission
(Reference Plot for band-edge)

Test place	Shonan EMC Lab.
Semi Anechoic Chamber	No.1
Date	December 23, 2022
Temperature / Humidity	23 deg.C, 35 %RH
Engineer	Yohsuke Matsuzawa
	(1 GHz -2.8 GHz)
Mode	Tx, Hopping Off, DH5 2402 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

Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	No.1	No.1	No.3
Date	December 23, 2022	December 24, 2022	January 9, 2023
Temperature / Humidity	23 deg.C, 35 %RH	23 deg.C, 31 %RH	20 deg.C, 27 %RH
Engineer	Yohsuke Matsuzawa	Takahiro Kawakami	Takahiro Kawakami
	(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.	4882.000	PK	44.98	31.23	7.93	39.76	2.26	46.64	73.9	27.2	150	0	-
Hori.	7323.000	PK	44.85	36.93	9.61	39.48	2.26	54.17	73.9	19.7	150	0	-
Hori.	9764.000	PK	45.13	38.56	11.10	39.66	2.26	57.39	73.9	16.5	150	0	-
Hori.	4882.000	AV	34.37	31.23	7.93	39.76	2.26	36.03	53.9	17.8	150	0	VBW:360 Hz,Floor noise
Hori.	7323.000	AV	33.79	36.93	9.61	39.48	2.26	43.11	53.9	10.7	150	0	VBW:360 Hz,Floor noise
Hori.	9764.000	AV	33.85	38.56	11.10	39.66	2.26	46.11	53.9	**7.7**	150	0	VBW:360 Hz,Floor noise
Vert.	4882.000	PK	45.43	31.23	7.93	39.76	2.26	47.09	73.9	26.8	150	0	-
Vert.	7323.000	PK	44.95	36.93	9.61	39.48	2.26	54.27	73.9	19.6	150	0	-
Vert.	9764.000	PK	45.70	38.56	11.10	39.66	2.26	57.96	73.9	15.9	150	0	-
Vert.	4882.000	AV	33.68	31.23	7.93	39.76	2.26	35.34	53.9	18.5	150	0	VBW:360 Hz,Floor noise
Vert.	7323.000	AV	33.88	36.93	9.61	39.48	2.26	43.20	53.9	10.7	150	0	VBW:360 Hz,Floor noise
Vert.	9764.000	AV	33.80	38.56	11.10	39.66	2.26	46.06	53.9	7.8	150	0	VBW:360 Hz,Floor noise

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

Distance factor : 1 GHz - 10 GHz : 20log (3.89 m / 3.0 m) = 2.26 dB

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

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

Radiated Spurious Emission

Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	No.1	No.1	No.3
Date	December 23, 2022	December 24, 2022	January 9, 2023
Temperature / Humidity	23 deg.C, 35 %RH	23 deg.C, 31 %RH	20 deg.C, 27 %RH
Engineer	Yohsuke Matsuzawa	Takahiro Kawakami	Takahiro Kawakami
	(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.	2483.500	PK	49.63	27.72	14.98	39.65	2.26	54.94	73.9	18.9	163	267	-
Hori.	2488.884	PK	50.54	27.72	14.98	39.66	2.26	55.84	73.9	18.0	163	267	-
Hori.	4960.000	PK	45.50	31.40	7.99	39.79	2.26	47.36	73.9	26.5	150	0	-
Hori.	7440.000	PK	44.75	37.02	9.69	39.43	2.26	54.29	73.9	19.6	150	0	-
Hori.	9920.000	PK	45.76	38.57	11.12	39.60	2.26	58.11	73.9	15.7	150	0	-
Hori.	2483.500	AV	34.03	27.72	14.98	39.65	2.26	39.34	53.9	14.5	163	267	VBW:360 Hz
Hori.	2488.884	AV	33.78	27.72	14.98	39.66	2.26	39.08	53.9	14.8	163	267	VBW:360 Hz
Hori.	4960.000	AV	34.33	31.40	7.99	39.79	2.26	36.19	53.9	17.7	150	0	VBW:360 Hz,Floor noise
Hori.	7440.000	AV	33.76	37.02	9.69	39.43	2.26	43.30	53.9	10.6	150	0	VBW:360 Hz,Floor noise
Hori.	9920.000	AV	33.68	38.57	11.12	39.60	2.26	46.03	53.9	7.8	150	0	VBW:360 Hz,Floor noise
Vert.	2483.500	PK	48.78	27.72	14.98	39.65	2.26	54.09	73.9	19.8	108	291	-
Vert.	2488.833	PK	50.75	27.72	14.98	39.66	2.26	56.05	73.9	17.8	108	291	-
Vert.	4960.000	PK	45.55	31.40	7.99	39.79	2.26	47.41	73.9	26.4	150	0	-
Vert.	7440.000	PK	45.44	37.02	9.69	39.43	2.26	54.98	73.9	18.9	150	0	-
Vert.	9920.000	PK	45.30	38.57	11.12	39.60	2.26	57.65	73.9	16.2	150	0	-
Vert.	2483.500	AV	34.11	27.72	14.98	39.65	2.26	39.42	53.9	14.4	108	291	VBW:360 Hz
Vert.	2488.833	AV	33.77	27.72	14.98	39.66	2.26	39.07	53.9	14.8	108	291	VBW:360 Hz
Vert.	4960.000	AV	34.05	31.40	7.99	39.79	2.26	35.91	53.9	17.9	150	0	VBW:360 Hz,Floor noise
Vert.	7440.000	AV	33.84	37.02	9.69	39.43	2.26	43.38	53.9	10.5	150	0	VBW:360 Hz,Floor noise
Vert.	9920.000	AV	33.83	38.57	11.12	39.60	2.26	46.18	53.9	**7.7**	150	0	VBW:360 Hz,Floor noise

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

Distance factor : 1 GHz - 10 GHz : 20log (3.89 m / 3.0 m) = 2.26 dB

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

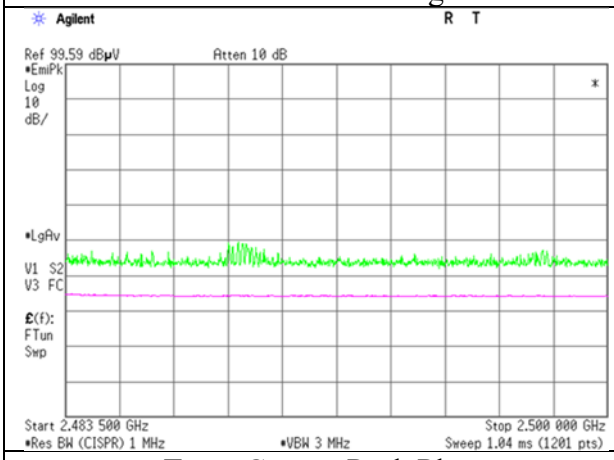
*These results have sufficient margin without taking account Duty cycle correction factor.

Radiated Spurious Emission
(Reference Plot for band-edge)

Test place	Shonan EMC Lab.
Semi Anechoic Chamber	No.1
Date	December 23, 2022
Temperature / Humidity	23 deg.C, 35 %RH
Engineer	Yohsuke Matsuzawa
	(1 GHz -2.8 GHz)
Mode	Tx, Hopping Off, DH5 2480 MHz

Horizontal

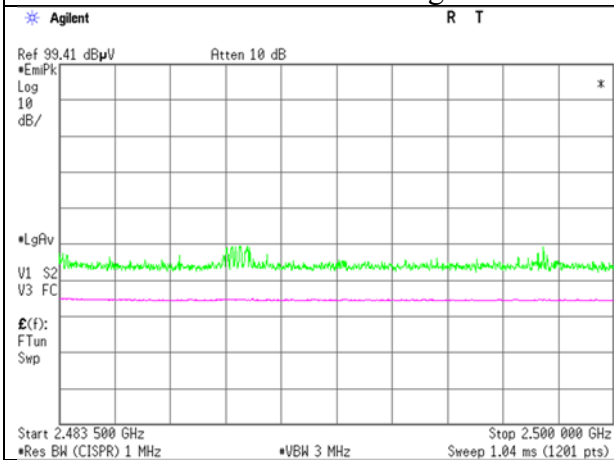
Restricted-band band-edge Plot



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

Test place	Shonan EMC Lab.			
Semi Anechoic Chamber	No.3	No.1	No.1	No.3
Date	January 11, 2023	December 23, 2022	December 24, 2022	January 9, 2023
Temperature / Humidity	23 deg.C, 27 %RH	23 deg.C, 35 %RH	23 deg.C, 31 %RH	20 deg.C, 27 %RH
Engineer	Miku Ikudome	Yohsuke Matsuzawa	Takahiro Kawakami	Takahiro Kawakami
	(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.	99.757	QP	52.72	10.19	7.38	32.12	0.00	38.17	43.5	5.3	312	339	-
Hori.	166.376	QP	44.35	15.43	7.88	32.05	0.00	35.61	43.5	7.8	196	295	-
Hori.	499.700	QP	47.37	17.80	9.51	31.91	0.00	42.77	46.0	**3.2**	100	190	-
Hori.	632.696	QP	43.91	19.54	10.03	31.89	0.00	41.59	46.0	4.4	134	13	-
Hori.	796.743	QP	41.38	20.75	10.61	31.59	0.00	41.15	46.0	4.8	126	231	-
Hori.	2390.000	PK	45.69	27.85	14.86	39.62	2.26	51.04	73.9	22.8	113	284	-
Hori.	4804.000	PK	46.78	31.17	7.87	39.73	2.26	48.35	73.9	25.5	150	0	-
Hori.	7206.000	PK	47.36	36.88	9.51	39.52	2.26	56.49	73.9	17.4	106	7	-
Hori.	9608.000	PK	45.76	38.11	11.08	39.73	2.26	57.48	73.9	16.4	150	0	-
Hori.	2390.000	AV	33.51	27.85	14.86	39.62	2.26	38.86	53.9	15.0	113	284	VBW:360 Hz
Hori.	4804.000	AV	34.33	31.17	7.87	39.73	2.26	35.90	53.9	18.0	150	0	VBW:360 Hz,Floor noise
Hori.	7206.000	AV	34.38	36.88	9.51	39.52	2.26	43.51	53.9	10.3	106	7	VBW:360 Hz
Hori.	9608.000	AV	33.88	38.11	11.08	39.73	2.26	45.60	53.9	8.3	150	0	VBW:360 Hz,Floor noise
Vert.	52.333	QP	46.13	10.45	6.77	32.15	0.00	31.20	40.0	8.8	100	277	-
Vert.	114.939	QP	47.82	12.54	7.23	32.11	0.00	35.48	43.5	8.0	100	205	-
Vert.	499.455	QP	45.75	17.79	9.51	31.91	0.00	41.14	46.0	4.8	173	257	-
Vert.	799.246	QP	38.77	20.77	10.62	31.58	0.00	38.58	46.0	7.4	131	340	-
Vert.	2390.000	PK	45.61	27.85	14.86	39.62	2.26	50.96	73.9	22.9	185	287	-
Vert.	4804.000	PK	46.11	31.17	7.87	39.73	2.26	47.68	73.9	26.2	150	0	-
Vert.	7206.000	PK	47.17	36.88	9.51	39.52	2.26	56.30	73.9	17.6	141	154	-
Vert.	9608.000	PK	46.05	38.11	11.08	39.73	2.26	57.77	73.9	16.1	150	0	-
Vert.	2390.000	AV	33.48	27.85	14.86	39.62	2.26	38.83	53.9	15.0	185	287	VBW:360 Hz
Vert.	4804.000	AV	34.09	31.17	7.87	39.73	2.26	35.66	53.9	18.2	150	0	VBW:360 Hz,Floor noise
Vert.	7206.000	AV	35.38	36.88	9.51	39.52	2.26	44.51	53.9	9.3	141	154	VBW:360 Hz
Vert.	9608.000	AV	33.47	38.11	11.08	39.73	2.26	45.19	53.9	8.7	150	0	VBW:360 Hz,Floor noise

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.89 m / 3.0 m) = 2.26 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB
*These results have sufficient margin without taking account Duty cycle correction factor.

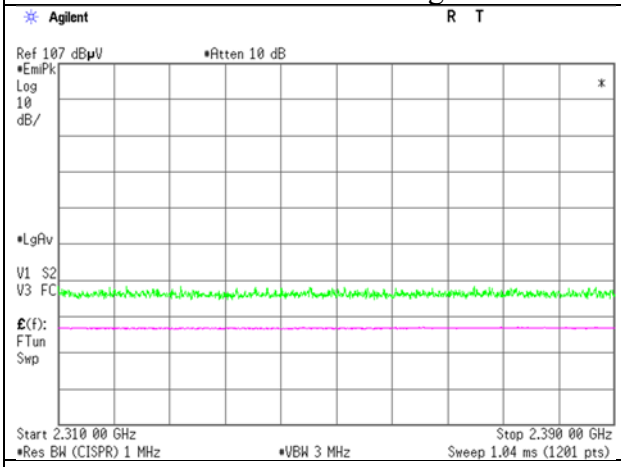
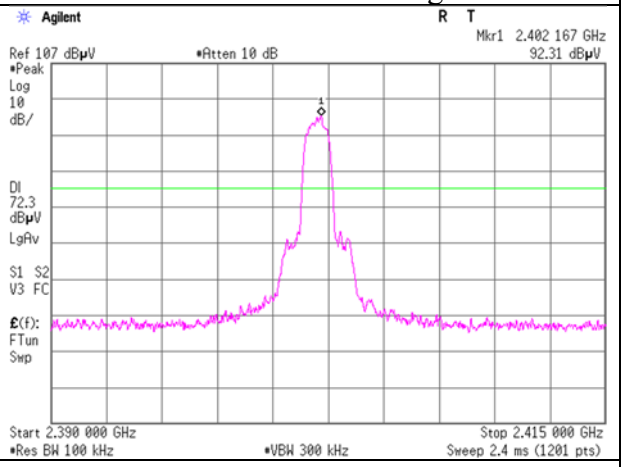
20 dBc Data Sheet **(RBW 100 kHz, VBW 300 kHz)**

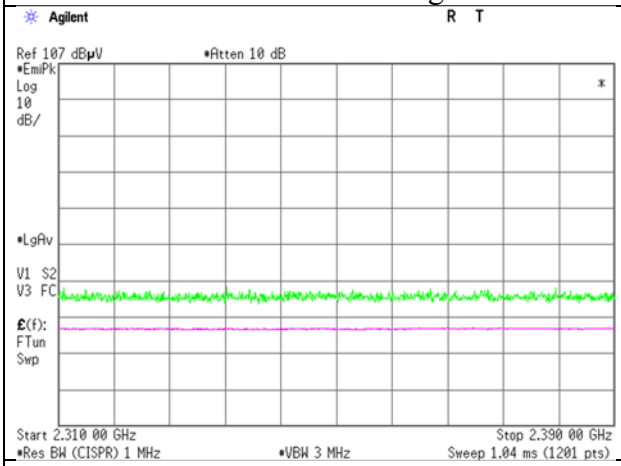
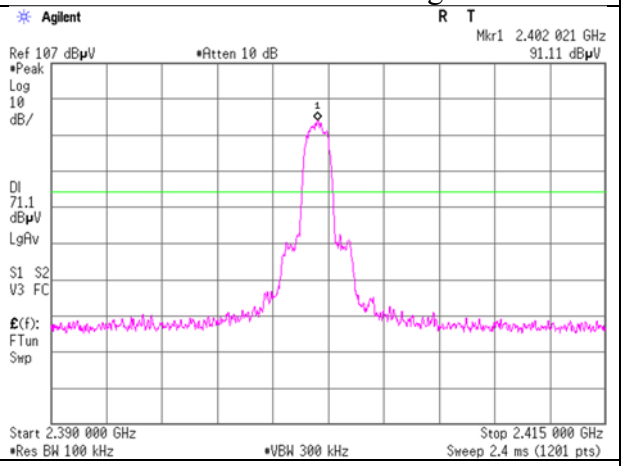
Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2402.000	PK	92.25	27.83	14.88	39.62	2.26	97.60	-	-	Carrier
Hori.	2400.000	PK	43.47	27.83	14.88	39.62	2.26	48.82	77.6	28.7	-
Vert.	2402.000	PK	91.47	27.83	14.88	39.62	2.26	96.82	-	-	Carrier
Vert.	2400.000	PK	43.67	27.83	14.88	39.62	2.26	49.02	76.8	27.7	-

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.89 m / 3.0 m) = 2.26 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

Radiated Spurious Emission
(Reference Plot for band-edge)

Test place	Shonan EMC Lab.
Semi Anechoic Chamber	No.1
Date	December 23, 2022
Temperature / Humidity	23 deg.C, 35 %RH
Engineer	Yohsuke Matsuzawa
	(1 GHz -2.8 GHz)
Mode	Tx, Hopping Off, 3DH5 2402 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

Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	No.1	No.1	No.3
Date	December 23, 2022	December 24, 2022	January 9, 2023
Temperature / Humidity	23 deg.C, 35 %RH	23 deg.C, 31 %RH	20 deg.C, 27 %RH
Engineer	Yohsuke Matsuzawa	Takahiro Kawakami	Takahiro Kawakami
	(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.	4882.000	PK	45.90	31.23	7.93	39.76	2.26	47.56	73.9	26.3	150	0	-
Hori.	7323.000	PK	46.06	36.93	9.61	39.48	2.26	55.38	73.9	18.5	122	5	-
Hori.	9764.000	PK	46.22	38.56	11.10	39.66	2.26	58.48	73.9	15.4	150	0	-
Hori.	4882.000	AV	33.64	31.23	7.93	39.76	2.26	35.30	53.9	18.6	150	0	VBW:360 Hz,Floor noise
Hori.	7323.000	AV	33.38	36.93	9.61	39.48	2.26	42.70	53.9	11.2	122	5	VBW:360 Hz
Hori.	9764.000	AV	34.42	38.56	11.10	39.66	2.26	46.68	53.9	**7.2**	150	0	VBW:360 Hz,Floor noise
Vert.	4882.000	PK	45.52	31.23	7.93	39.76	2.26	47.18	73.9	26.7	150	0	-
Vert.	7323.000	PK	46.61	36.93	9.61	39.48	2.26	55.93	73.9	17.9	256	151	-
Vert.	9764.000	PK	46.45	38.56	11.10	39.66	2.26	58.71	73.9	15.1	150	0	-
Vert.	4882.000	AV	34.43	31.23	7.93	39.76	2.26	36.09	53.9	17.8	150	0	VBW:360 Hz,Floor noise
Vert.	7323.000	AV	34.51	36.93	9.61	39.48	2.26	43.83	53.9	10.0	256	151	VBW:360 Hz
Vert.	9764.000	AV	33.89	38.56	11.10	39.66	2.26	46.15	53.9	7.7	150	0	VBW:360 Hz,Floor noise

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.89 m / 3.0 m) = 2.26 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB
*These results have sufficient margin without taking account Duty cycle correction factor.

Radiated Spurious Emission

Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	No.1	No.1	No.3
Date	December 23, 2022	December 24, 2022	January 9, 2023
Temperature / Humidity	23 deg.C, 35 %RH	23 deg.C, 31 %RH	20 deg.C, 27 %RH
Engineer	Yohsuke Matsuzawa	Takahiro Kawakami	Takahiro Kawakami
	(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.	2483.500	PK	49.66	27.72	14.98	39.65	2.26	54.97	73.9	18.9	201	254	-
Hori.	4960.000	PK	46.34	31.40	7.99	39.79	2.26	48.20	73.9	25.7	150	0	-
Hori.	7440.000	PK	46.54	37.02	9.69	39.43	2.26	56.08	73.9	17.8	150	323	-
Hori.	9920.000	PK	46.86	38.57	11.12	39.60	2.26	59.21	73.9	14.6	150	0	-
Hori.	2483.500	AV	35.25	27.72	14.98	39.65	2.26	40.56	53.9	13.3	201	254	VBW:360 Hz
Hori.	4960.000	AV	33.68	31.40	7.99	39.79	2.26	35.54	53.9	18.3	150	0	VBW:360 Hz,Floor noise
Hori.	7440.000	AV	33.93	37.02	9.69	39.43	2.26	43.47	53.9	10.4	150	323	VBW:360 Hz
Hori.	9920.000	AV	33.83	38.57	11.12	39.60	2.26	46.18	53.9	**7.7**	150	0	VBW:360 Hz,Floor noise
Vert.	2483.500	PK	49.23	27.72	14.98	39.65	2.26	54.54	73.9	19.3	108	289	-
Vert.	4960.000	PK	46.52	31.40	7.99	39.79	2.26	48.38	73.9	25.5	150	0	-
Vert.	7440.000	PK	47.66	37.02	9.69	39.43	2.26	57.20	73.9	16.7	153	160	-
Vert.	9920.000	PK	46.12	38.57	11.12	39.60	2.26	58.47	73.9	15.4	150	0	-
Vert.	2483.500	AV	35.12	27.72	14.98	39.65	2.26	40.43	53.9	13.4	108	289	VBW:360 Hz
Vert.	4960.000	AV	33.72	31.40	7.99	39.79	2.26	35.58	53.9	18.3	150	0	VBW:360 Hz,Floor noise
Vert.	7440.000	AV	34.72	37.02	9.69	39.43	2.26	44.26	53.9	9.6	153	160	VBW:360 Hz
Vert.	9920.000	AV	33.81	38.57	11.12	39.60	2.26	46.16	53.9	**7.7**	150	0	VBW:360 Hz,Floor noise

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

Distance factor : 1 GHz - 10 GHz : 20log (3.89 m / 3.0 m) = 2.26 dB

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

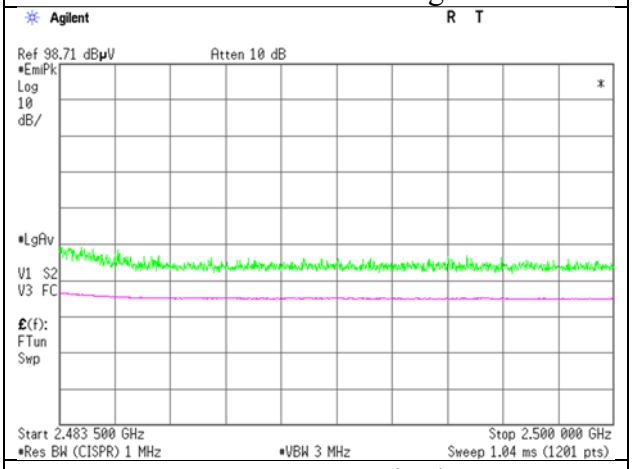
*These results have sufficient margin without taking account Duty cycle correction factor.

Radiated Spurious Emission
(Reference Plot for band-edge)

Test place	Shonan EMC Lab.
Semi Anechoic Chamber	No.1
Date	December 23, 2022
Temperature / Humidity	23 deg.C, 35 %RH
Engineer	Yohsuke Matsuzawa
	(1 GHz -2.8 GHz)
Mode	Tx, Hopping Off, 3DH5 2480 MHz

Horizontal

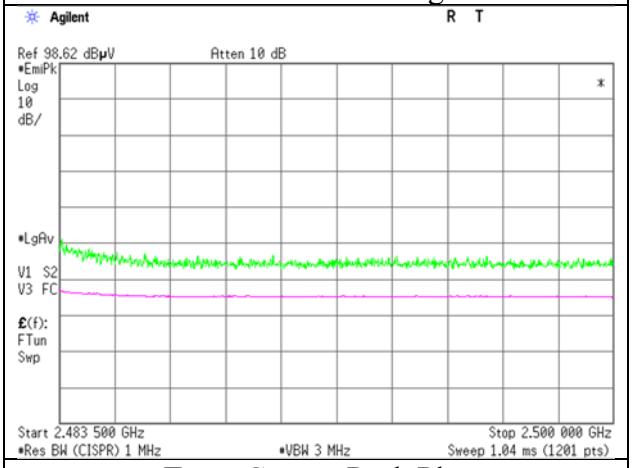
Restricted-band band-edge Plot



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

Test place	Shonan EMC Lab.
Semi Anechoic Chamber	No.3
Date	January 14, 2023
Temperature / Humidity	24 deg.C, 29 %RH
Engineer	Kenichi Adachi
	(1 GHz -10 GHz)
Mode	Tx, Hopping Off, DH5 2402 MHz with Tx 11n-20 5580 MHz

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	2383.468	PK	48.68	28.20	14.49	41.63	2.26	52.00	73.9	21.9	178	287	-
Hori.	2390.000	PK	47.26	28.18	14.49	41.63	2.26	50.56	73.9	23.3	178	287	-
Hori.	2383.468	AV	36.04	28.20	14.49	41.63	2.26	39.36	53.9	14.5	178	287	VBW:360 Hz
Hori.	2390.000	AV	36.01	28.18	14.49	41.63	2.26	39.31	53.9	14.5	178	287	VBW:360 Hz
Vert.	2389.344	PK	49.22	28.18	14.49	41.63	2.26	52.52	73.9	21.3	187	194	-
Vert.	2390.000	PK	47.58	28.18	14.49	41.63	2.26	50.88	73.9	23.0	187	194	-
Vert.	2389.344	AV	36.11	28.18	14.49	41.63	2.26	39.41	53.9	**14.4**	187	194	VBW:360 Hz
Vert.	2390.000	AV	36.02	28.18	14.49	41.63	2.26	39.32	53.9	14.5	187	194	VBW:360 Hz

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.89 m / 3.0 m) = 2.26 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB
*These results have sufficient margin without taking account Duty cycle correction factor.

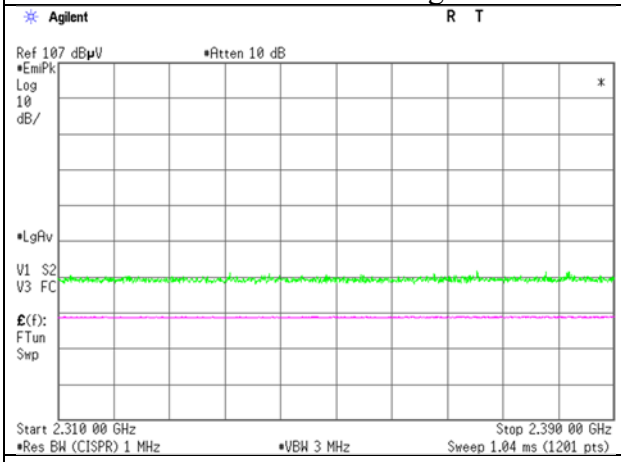
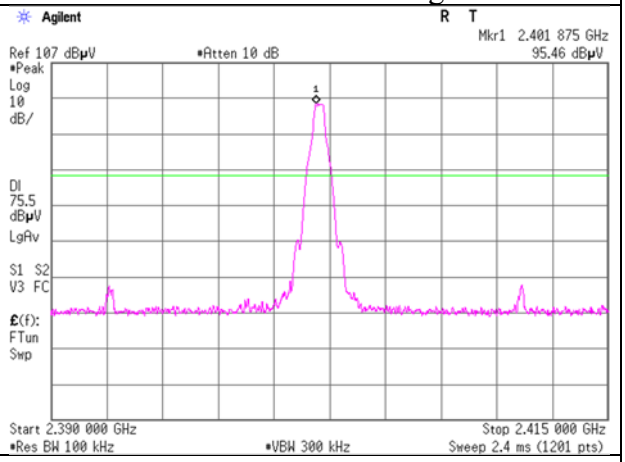
20 dBc Data Sheet **(RBW 100 kHz, VBW 300 kHz)**

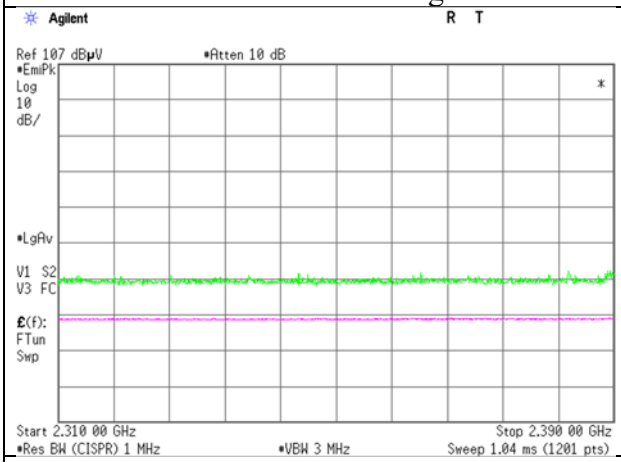
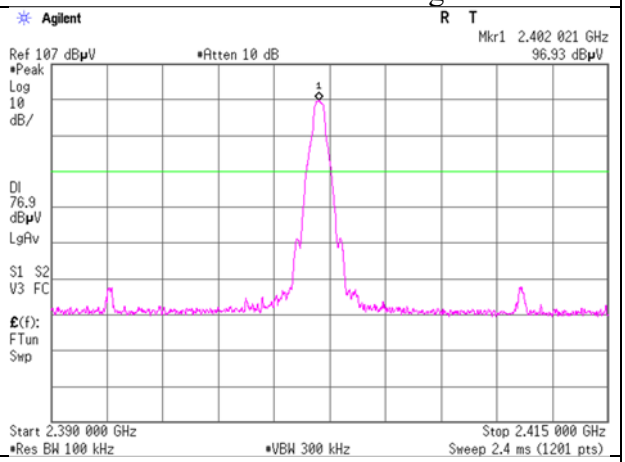
Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2402.000	PK	95.56	28.17	14.51	41.64	2.26	98.86	-	-	Carrier
Hori.	2400.000	PK	41.38	28.17	14.51	41.64	2.26	44.68	78.8	34.1	-
Vert.	2402.000	PK	97.05	28.17	14.51	41.64	2.26	100.35	-	-	Carrier
Vert.	2400.000	PK	44.33	28.17	14.51	41.64	2.26	47.63	80.3	32.6	-

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.89 m / 3.0 m) = 2.26 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

Radiated Spurious Emission
(Reference Plot for band-edge)

Test place	Shonan EMC Lab.
Semi Anechoic Chamber	No.3
Date	January 14, 2023
Temperature / Humidity	24 deg.C, 29 %RH
Engineer	Kenichi Adachi
	(1 GHz -10 GHz)
Mode	Tx, Hopping Off, DH5 2402 MHz with Tx 11n-20 5580 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

Test place	Shonan EMC Lab.
Semi Anechoic Chamber	No.3
Date	January 14, 2023
Temperature / Humidity	24 deg.C, 29 %RH
Engineer	Kenichi Adachi
	(1 GHz -10 GHz)
Mode	Tx, Hopping Off, DH5 2480 MHz with Tx 11n-20 5580 MHz

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	2483.500	PK	50.47	28.08	14.61	41.68	2.26	53.74	73.9	20.1	143	294	-
Hori.	2489.064	PK	52.15	28.08	14.61	41.68	2.26	55.42	73.9	18.4	143	294	-
Hori.	2498.464	PK	49.84	28.08	14.62	41.69	2.26	53.11	73.9	20.7	143	294	-
Hori.	2483.500	AV	36.47	28.08	14.61	41.68	2.26	39.74	53.9	14.1	143	294	VBW:360 Hz
Hori.	2489.064	AV	36.02	28.08	14.61	41.68	2.26	39.29	53.9	14.6	143	294	VBW:360 Hz
Hori.	2498.464	AV	35.98	28.08	14.62	41.69	2.26	39.25	53.9	14.6	143	294	VBW:360 Hz
Vert.	2483.500	PK	51.69	28.08	14.61	41.68	2.26	54.96	73.9	18.9	186	187	-
Vert.	2489.064	PK	53.54	28.08	14.61	41.68	2.26	56.81	73.9	17.0	186	187	-
Vert.	2498.464	PK	51.08	28.08	14.62	41.69	2.26	54.35	73.9	19.5	186	187	-
Vert.	2483.500	AV	36.70	28.08	14.61	41.68	2.26	39.97	53.9	**13.9**	186	187	VBW:360 Hz
Vert.	2489.064	AV	36.27	28.08	14.61	41.68	2.26	39.54	53.9	14.3	186	187	VBW:360 Hz
Vert.	2498.464	AV	36.08	28.08	14.62	41.69	2.26	39.35	53.9	14.5	186	187	VBW:360 Hz

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

Distance factor : 1 GHz - 10 GHz : 20log (3.89 m / 3.0 m) = 2.26 dB

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

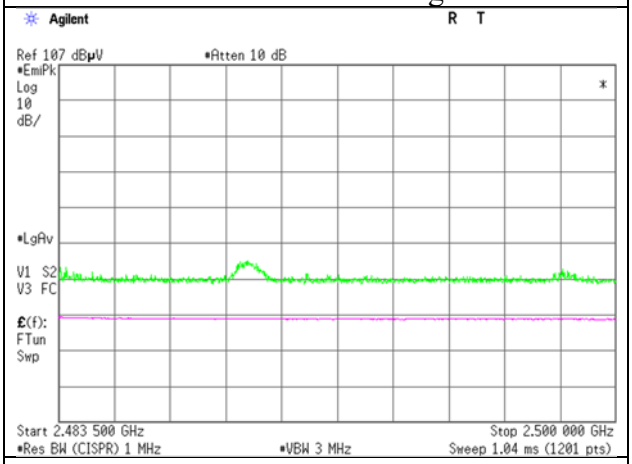
*These results have sufficient margin without taking account Duty cycle correction factor.

Radiated Spurious Emission
(Reference Plot for band-edge)

Test place	Shonan EMC Lab.
Semi Anechoic Chamber	No.3
Date	January 14, 2023
Temperature / Humidity	24 deg.C, 29 %RH
Engineer	Kenichi Adachi
	(1 GHz -10 GHz)
Mode	Tx, Hopping Off, DH5 2480 MHz with Tx 11n-20 5580 MHz

Horizontal

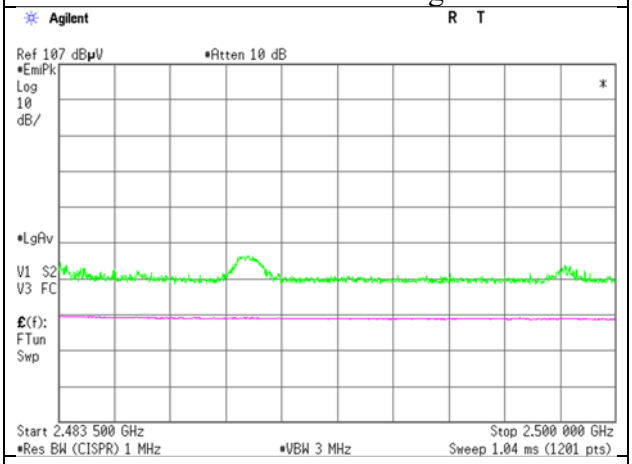
Restricted-band band-edge Plot



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

Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	No.3	No.3	No.3
Date	January 19, 2023	January 14, 2023	January 18, 2023
Temperature / Humidity	22 deg.C, 29 %RH	24 deg.C, 29 %RH	22 deg.C, 28 %RH
Engineer	Hiromasa Sato	Kenichi Adachi	Yusuke Tanikawara
	(30 MHz -1 GHz)	(1 GHz -10 GHz)	(10 GHz -26.5 GHz)
Mode	Tx, Hopping Off, 3DH5 2402 MHz with Tx 11n-20 5580 MHz		

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	54.908	QP	36.64	9.60	6.75	32.15	0.00	20.84	40.0	19.1	399	357	-
Hori.	96.000	QP	40.71	9.44	7.45	32.12	0.00	25.48	43.5	18.0	322	3	-
Hori.	381.603	QP	35.97	15.21	9.00	31.91	0.00	28.27	46.0	17.7	100	354	-
Hori.	2389.668	PK	47.76	28.18	14.49	41.63	2.26	51.06	73.9	22.8	176	290	-
Hori.	2390.000	PK	47.22	28.18	14.49	41.63	2.26	50.52	73.9	23.3	176	290	-
Hori.	4804.000	PK	48.96	31.54	6.95	42.87	2.26	46.84	73.9	27.0	162	29	-
Hori.	7206.000	PK	47.65	37.37	8.40	43.39	2.26	52.29	73.9	21.6	148	321	-
Hori.	9608.000	PK	46.77	38.89	9.50	43.21	2.26	54.21	73.9	19.6	150	0	-
Hori.	2389.668	AV	36.01	28.18	14.49	41.63	2.26	39.31	53.9	14.5	176	290	VBW:360 Hz
Hori.	2390.000	AV	34.38	28.18	14.49	41.63	2.26	37.68	53.9	16.2	176	290	VBW:360 Hz
Hori.	4804.000	AV	38.77	31.54	6.95	42.87	2.26	36.65	53.9	17.2	162	29	VBW:360 Hz
Hori.	7206.000	AV	37.59	37.37	8.40	43.39	2.26	42.23	53.9	11.6	148	321	VBW:360 Hz
Hori.	9608.000	AV	35.84	38.89	9.50	43.21	2.26	43.28	53.9	10.6	150	0	VBW:360 Hz,Floor noise
Vert.	31.217	QP	33.52	18.25	6.48	32.17	0.00	26.08	40.0	13.9	100	295	-
Vert.	54.912	QP	41.45	9.60	6.75	32.15	0.00	25.65	40.0	14.3	100	263	-
Vert.	114.629	QP	47.03	12.50	7.23	32.11	0.00	34.65	43.5	**8.8**	100	235	-
Vert.	259.403	QP	33.95	12.16	8.37	31.97	0.00	22.51	46.0	23.4	123	322	-
Vert.	381.827	QP	33.54	15.22	9.00	31.91	0.00	25.85	46.0	20.1	136	3	-
Vert.	609.633	QP	38.62	19.47	9.94	31.90	0.00	36.13	46.0	9.8	100	356	-
Vert.	999.182	QP	25.62	22.45	11.29	30.09	0.00	29.27	53.9	24.6	150	4	-
Vert.	2389.668	PK	51.98	28.18	14.49	41.63	2.26	55.28	73.9	18.6	191	192	-
Vert.	2390.000	PK	49.39	28.18	14.49	41.63	2.26	52.69	73.9	21.2	191	192	-
Vert.	4804.000	PK	49.74	31.54	6.95	42.87	2.26	47.62	73.9	26.2	193	13	-
Vert.	7206.000	PK	50.84	37.37	8.40	43.39	2.26	55.48	73.9	18.4	229	149	-
Vert.	9608.000	PK	46.82	38.89	9.50	43.21	2.26	54.26	73.9	19.6	150	0	-
Vert.	2389.668	AV	36.68	28.18	14.49	41.63	2.26	39.98	53.9	13.9	191	192	VBW:360 Hz
Vert.	2390.000	AV	34.42	28.18	14.49	41.63	2.26	37.72	53.9	16.1	191	192	VBW:360 Hz
Vert.	4804.000	AV	39.16	31.54	6.95	42.87	2.26	37.04	53.9	16.8	193	13	VBW:360 Hz
Vert.	7206.000	AV	38.39	37.37	8.40	43.39	2.26	43.03	53.9	10.8	229	149	VBW:360 Hz
Vert.	9608.000	AV	35.94	38.89	9.50	43.21	2.26	43.38	53.9	10.5	150	0	VBW:360 Hz,Floor noise

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.89 m / 3.0 m) = 2.26 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB
*These results have sufficient margin without taking account Duty cycle correction factor.

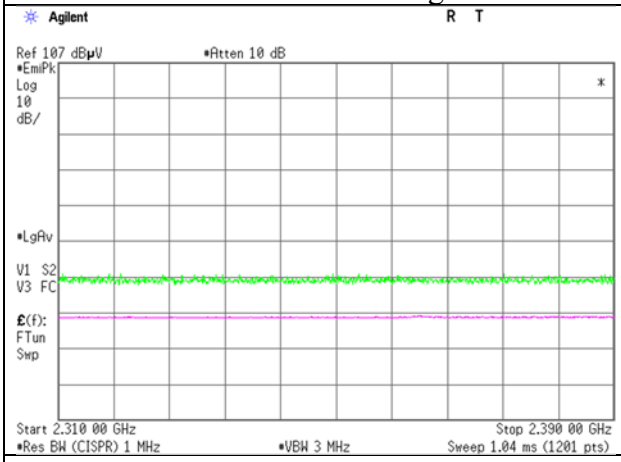
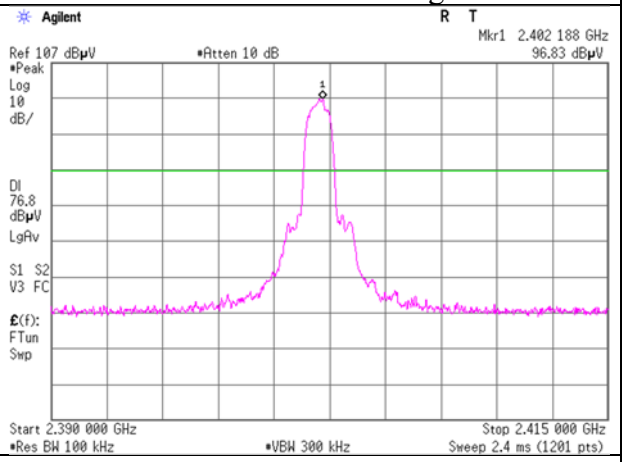
20 dBc Data Sheet **(RBW 100 kHz, VBW 300 kHz)**

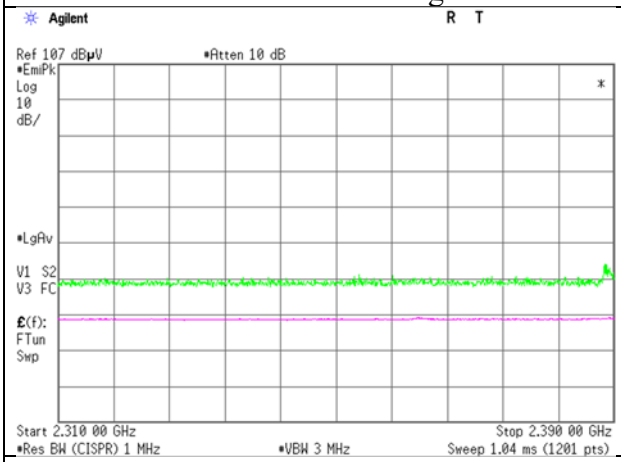
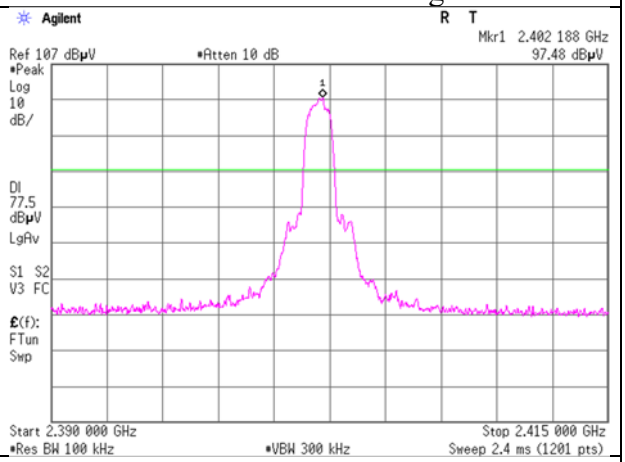
Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2402.000	PK	96.89	28.17	14.51	41.64	2.26	100.19	-	-	Carrier
Hori.	2400.000	PK	47.56	28.17	14.51	41.64	2.26	50.86	80.1	29.2	-
Vert.	2402.000	PK	97.53	28.17	14.51	41.64	2.26	100.83	-	-	Carrier
Vert.	2400.000	PK	49.06	28.17	14.51	41.64	2.26	52.36	80.8	28.4	-

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.89 m / 3.0 m) = 2.26 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

Radiated Spurious Emission
(Reference Plot for band-edge)

Test place	Shonan EMC Lab.
Semi Anechoic Chamber	No.3
Date	January 14, 2023
Temperature / Humidity	24 deg.C, 29 %RH
Engineer	Kenichi Adachi
	(1 GHz -10 GHz)
Mode	Tx, Hopping Off, 3DH5 2402 MHz with Tx 11n-20 5580 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

Test place	Shonan EMC Lab.
Semi Anechoic Chamber	No.3
Date	January 14, 2023
Temperature / Humidity	24 deg.C, 29 %RH
Engineer	Kenichi Adachi
	(1 GHz -10 GHz)
Mode	Tx, Hopping Off, 3DH5 2480 MHz with Tx 11n-20 5580 MHz

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	2483.500	PK	51.22	28.08	14.61	41.68	2.26	54.49	73.9	19.4	141	294	-
Hori.	2483.500	AV	37.38	28.08	14.61	41.68	2.26	40.65	53.9	13.2	141	294	VBW:360 Hz
Vert.	2483.500	PK	51.58	28.08	14.61	41.68	2.26	54.85	73.9	19.0	182	189	-
Vert.	2483.500	AV	37.57	28.08	14.61	41.68	2.26	40.84	53.9	**13.0**	182	189	VBW:360 Hz

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

Distance factor : 1 GHz - 10 GHz : 20log (3.89 m / 3.0 m) = 2.26 dB

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

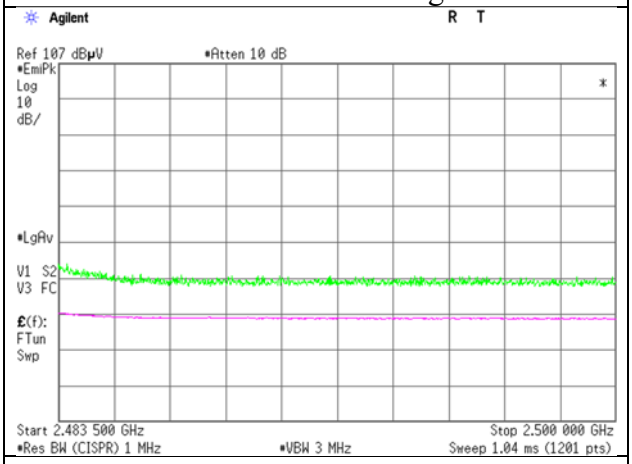
*These results have sufficient margin without taking account Duty cycle correction factor.

Radiated Spurious Emission
(Reference Plot for band-edge)

Test place	Shonan EMC Lab.
Semi Anechoic Chamber	No.1
Date	December 23, 2022
Temperature / Humidity	23 deg.C, 35 %RH
Engineer	Yohsuke Matsuzawa
	(1 GHz -2.8 GHz)
Mode	Tx, Hopping Off, 3DH5 2480 MHz with Tx 11n-20 5580 MHz

Horizontal

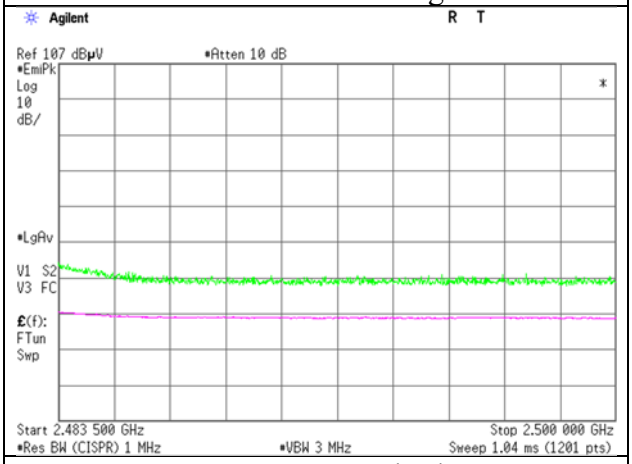
Restricted-band band-edge Plot



Trace Green : Peak Plot
Trace Purple : Average Plot

Vertical

Restricted-band band-edge Plot

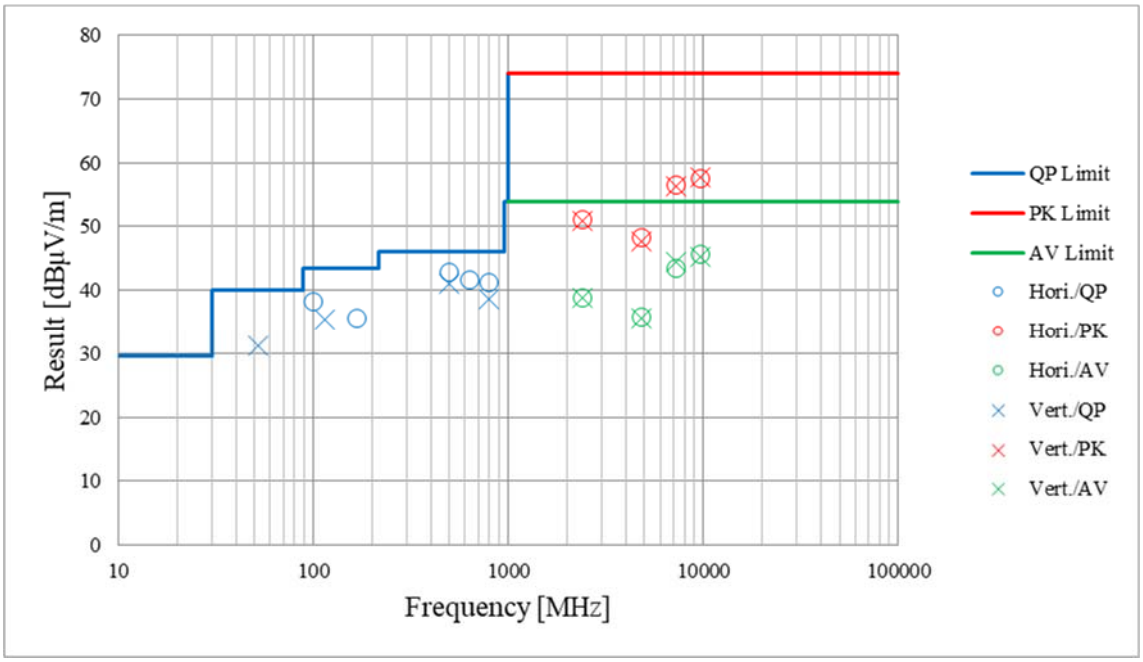


Trace Green : Peak Plot
Trace Purple : Average Plot

* 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 mode for Maximum Peak Output Power)

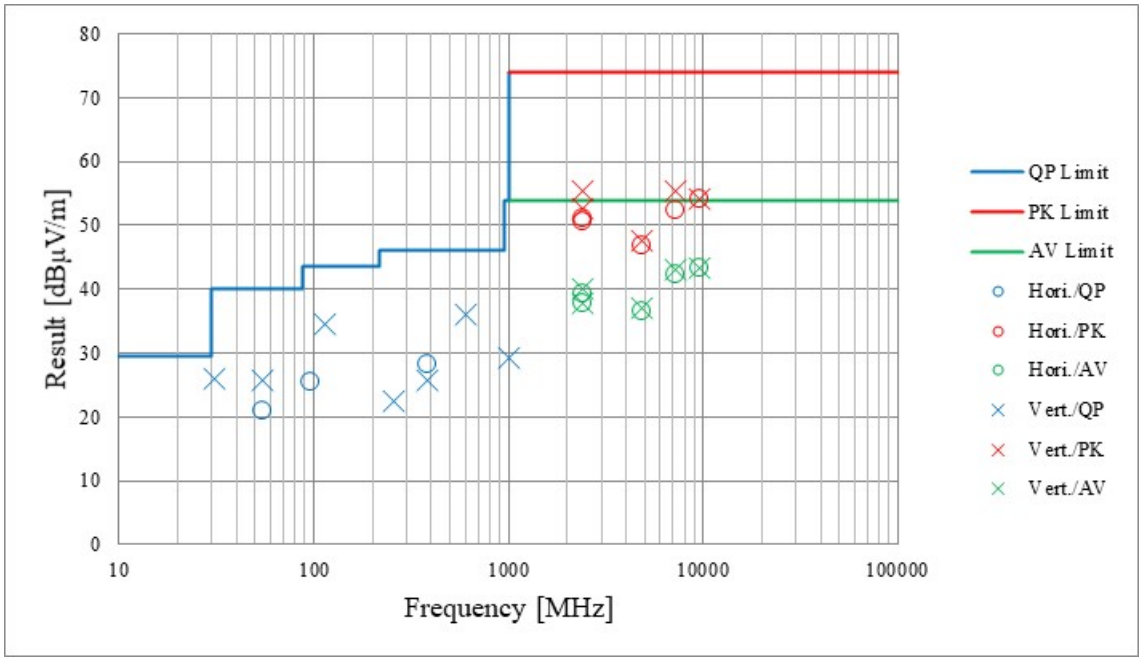
Test place	Shonan EMC Lab.			
Semi Anechoic Chamber	No.3	No.1	No.1	No.3
Date	January 11, 2023	December 23, 2022	December 24, 2022	January 9, 2023
Temperature / Humidity	23 deg.C, 27 %RH	23 deg.C, 35 %RH	23 deg.C, 31 %RH	20 deg.C, 27 %RH
Engineer	Miku Ikudome	Yohsuke Matsuzawa	Takahiro Kawakami	Takahiro Kawakami
	(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			



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

Radiated Spurious Emission
(Plot data, Worst case mode for Maximum Peak Output Power)

Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	No.3	No.3	No.3
Date	January 19, 2023	January 14, 2023	January 18, 2023
Temperature / Humidity	22 deg.C, 29 %RH	24 deg.C, 29 %RH	22 deg.C, 28 %RH
Engineer	Hiromasa Sato	Kenichi Adachi	Yusuke Tanikawara
	(30 MHz -1 GHz)	(1 GHz -10 GHz)	(10 GHz -26.5 GHz)
Mode	Tx, Hopping Off, 3DH5 2402 MHz with Tx 11n-20 5580 MHz		



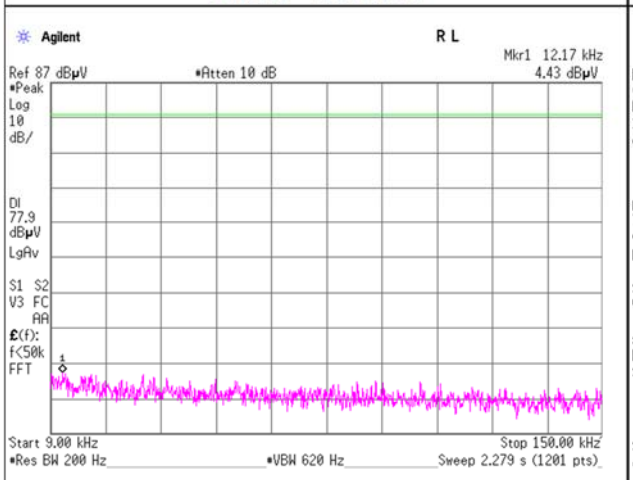
*These plots data contains sufficient number to show the trend of characteristic features for EUT.

Conducted Spurious Emission

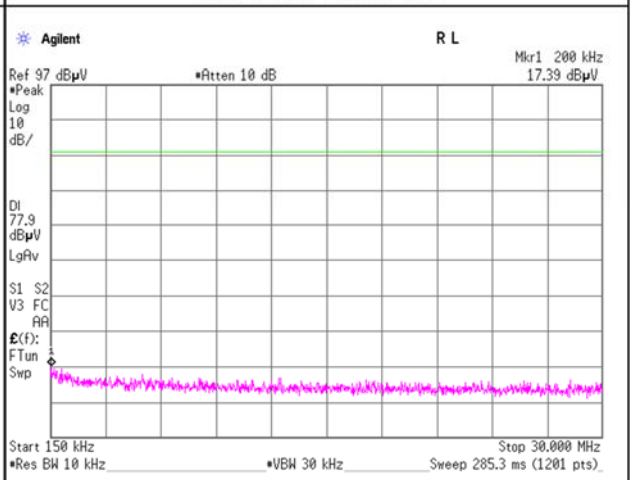
Test place	Shonan EMC Lab. No.5 Shielded Room
Date	November 17, 2022
Temperature / Humidity	25 deg. C / 39 % RH
Engineer	Miku Ikudome
Mode	Tx, Hopping Off, DH5

2402 MHz

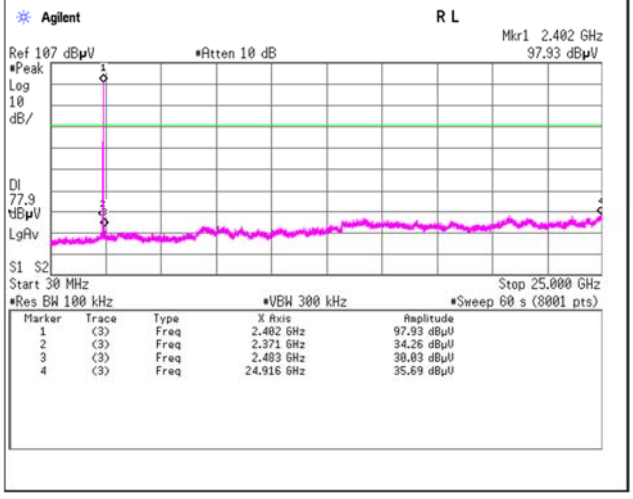
9 kHz - 150 kHz



150 kHz - 30 MHz



30 MHz - 25 GHz

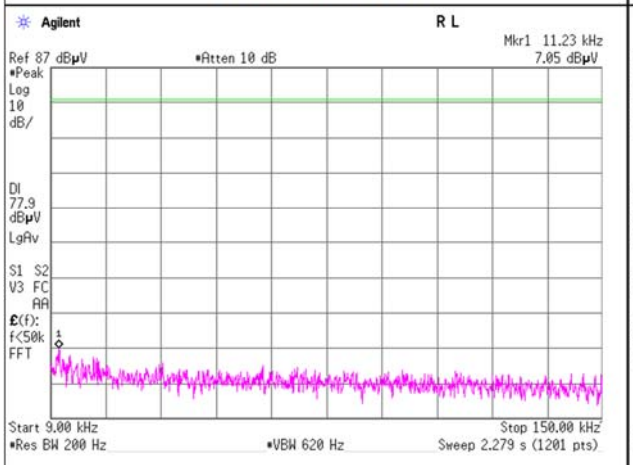


Conducted Spurious Emission

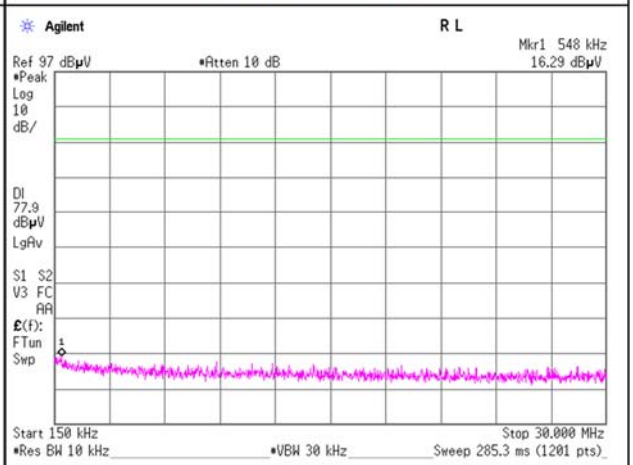
Test place	Shonan EMC Lab. No.5 Shielded Room
Date	November 17, 2022
Temperature / Humidity	25 deg. C / 39 % RH
Engineer	Miku Ikudome
Mode	Tx, Hopping Off, DH5

2441 MHz

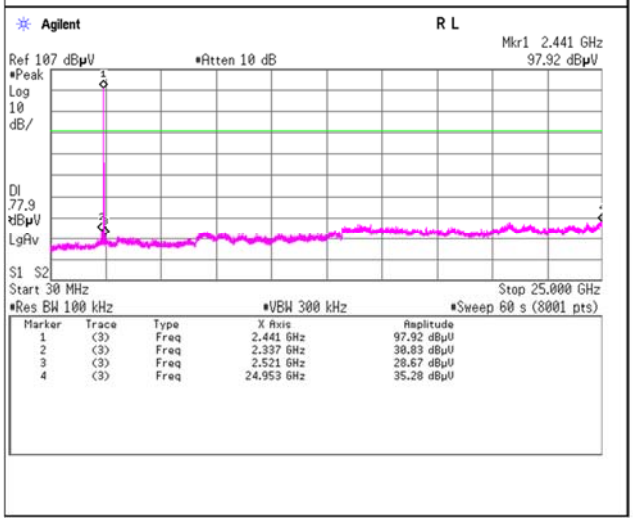
9 kHz - 150 kHz



150 kHz - 30 MHz



30 MHz - 25 GHz

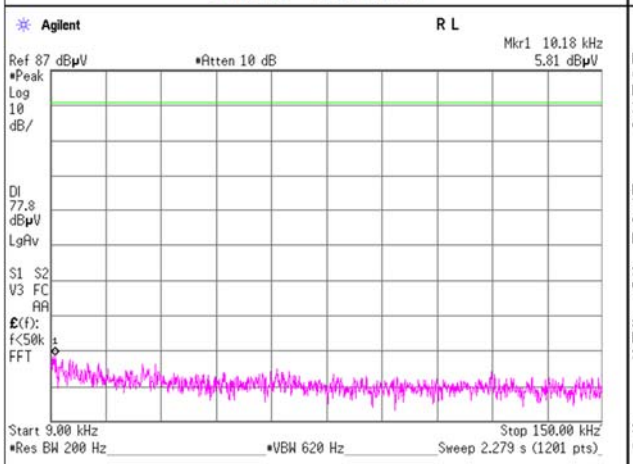


Conducted Spurious Emission

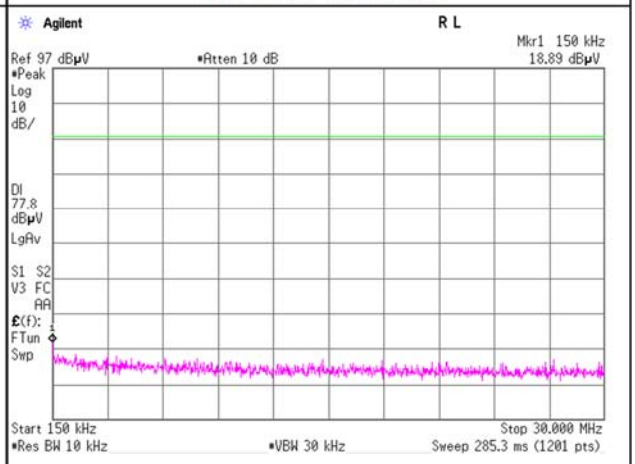
Test place	Shonan EMC Lab. No.5 Shielded Room
Date	November 17, 2022
Temperature / Humidity	25 deg. C / 39 % RH
Engineer	Miku Ikudome
Mode	Tx, Hopping Off, DH5

2480 MHz

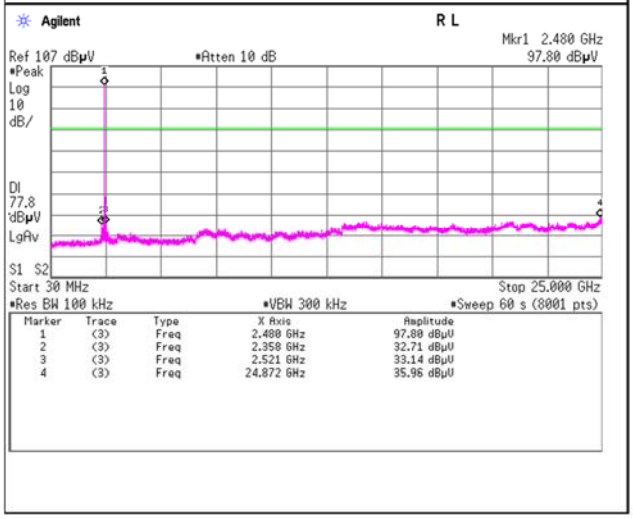
9 kHz - 150 kHz



150 kHz - 30 MHz



30 MHz - 25 GHz

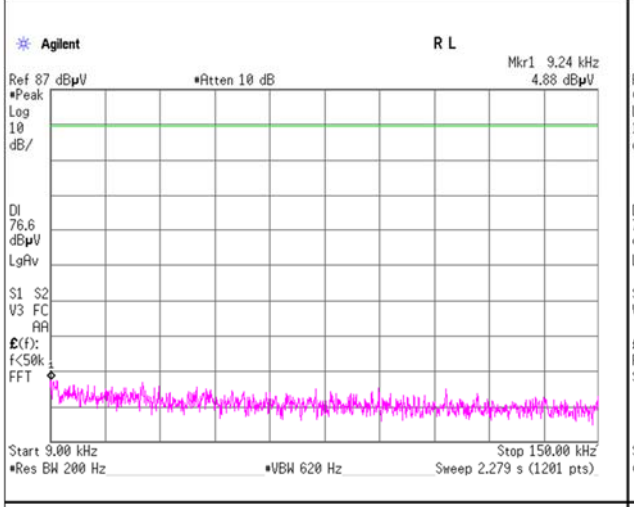


Conducted Spurious Emission

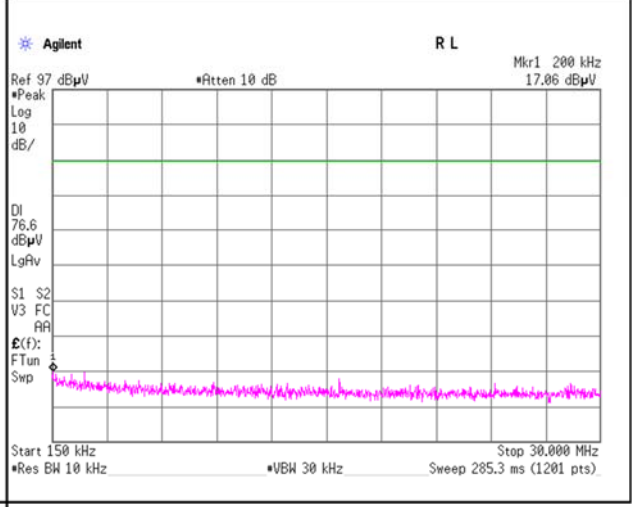
Test place	Shonan EMC Lab. No.5 Shielded Room
Date	November 17, 2022
Temperature / Humidity	25 deg. C / 39 % RH
Engineer	Miku Ikudome
Mode	Tx, Hopping Off, 3DH5

2402 MHz

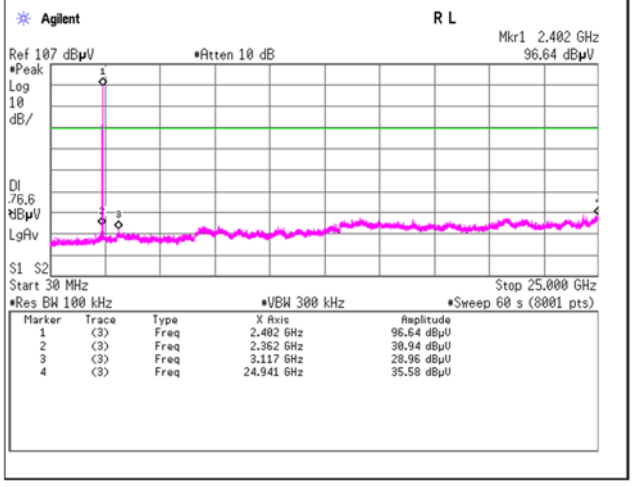
9 kHz - 150 kHz



150 kHz - 30 MHz



30 MHz - 25 GHz

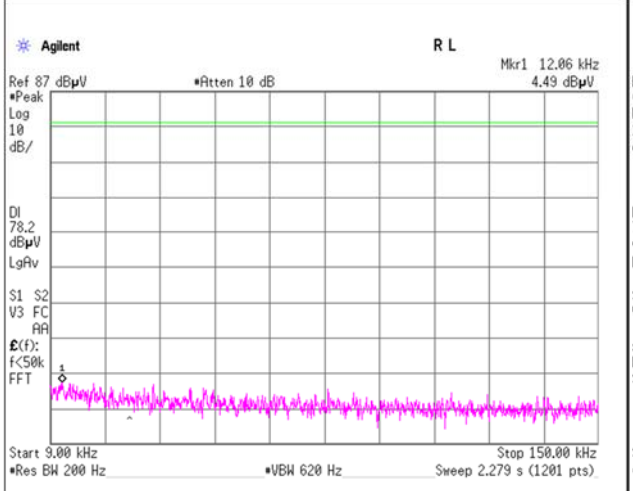


Conducted Spurious Emission

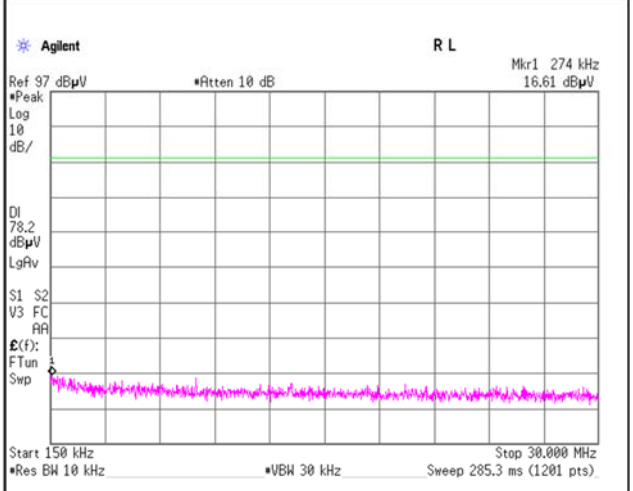
Test place	Shonan EMC Lab. No.5 Shielded Room
Date	November 17, 2022
Temperature / Humidity	25 deg. C / 39 % RH
Engineer	Miku Ikudome
Mode	Tx, Hopping Off, 3DH5

2441 MHz

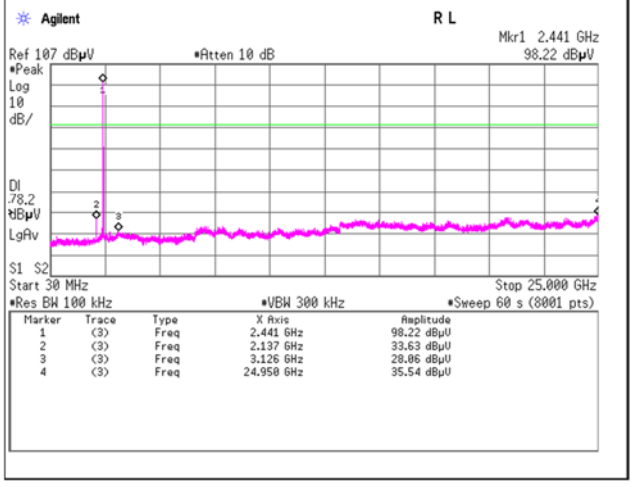
9 kHz - 150 kHz



150 kHz - 30 MHz



30 MHz - 25 GHz

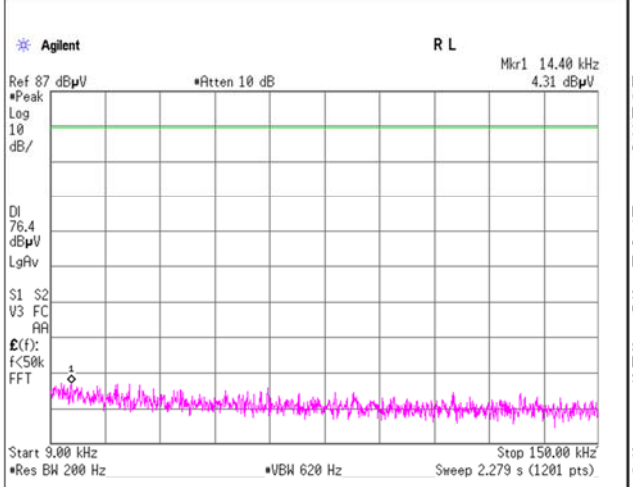


Conducted Spurious Emission

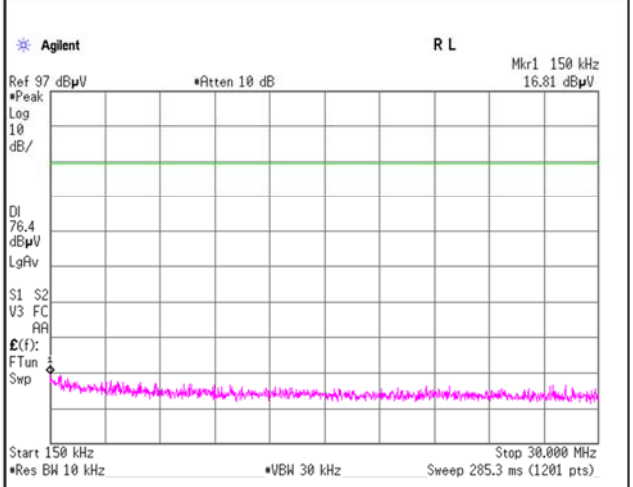
Test place	Shonan EMC Lab. No.5 Shielded Room
Date	November 17, 2022
Temperature / Humidity	25 deg. C / 39 % RH
Engineer	Miku Ikudome
Mode	Tx, Hopping Off, 3DH5

2480 MHz

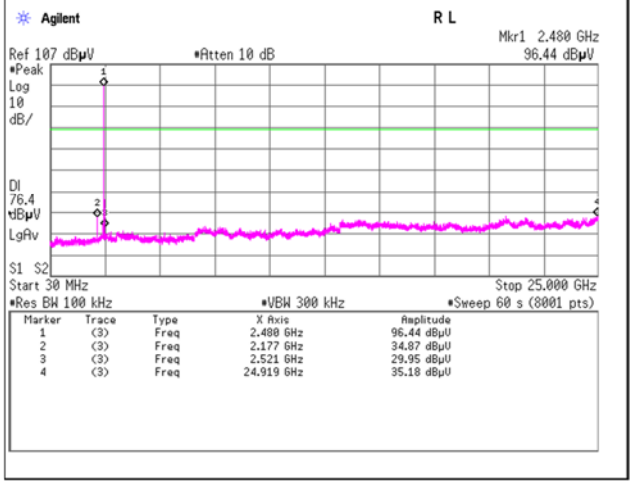
9 kHz - 150 kHz



150 kHz - 30 MHz



30 MHz - 25 GHz

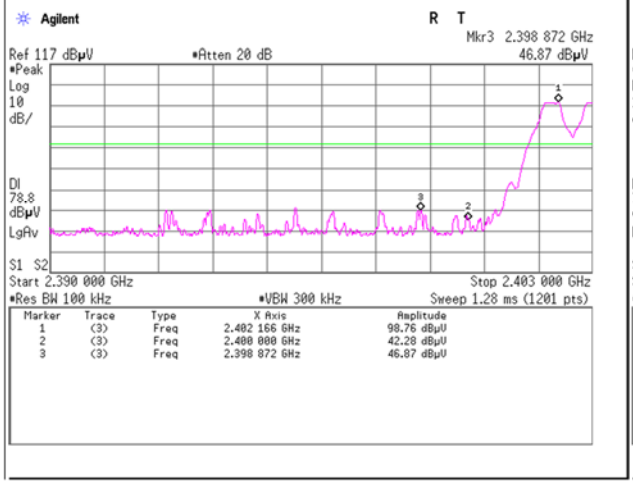


Conducted Emission Band Edge compliance

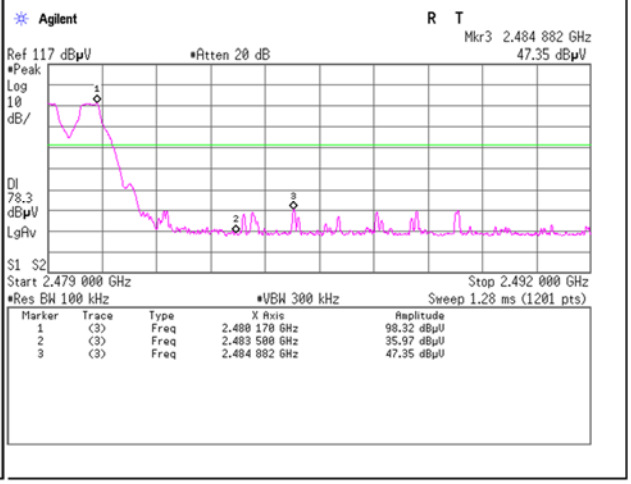
Test place	Shonan EMC Lab. No.5 Shielded Room
Date	November 17, 2022
Temperature / Humidity	25 deg. C / 39 % RH
Engineer	Miku Ikudome
Mode	Tx DH5

Hopping On

Low

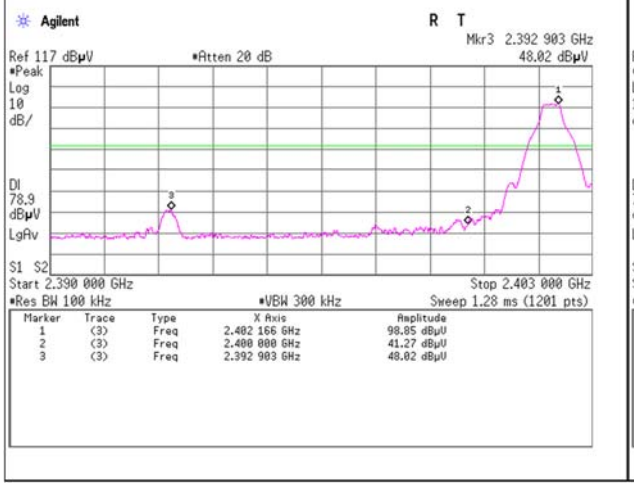


High

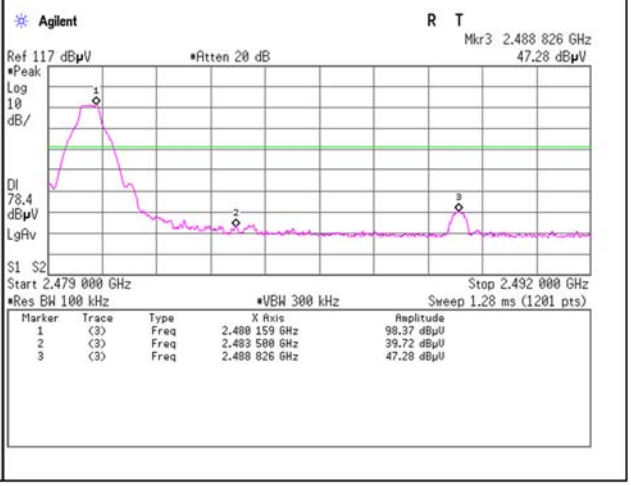


Hopping Off

Low



High

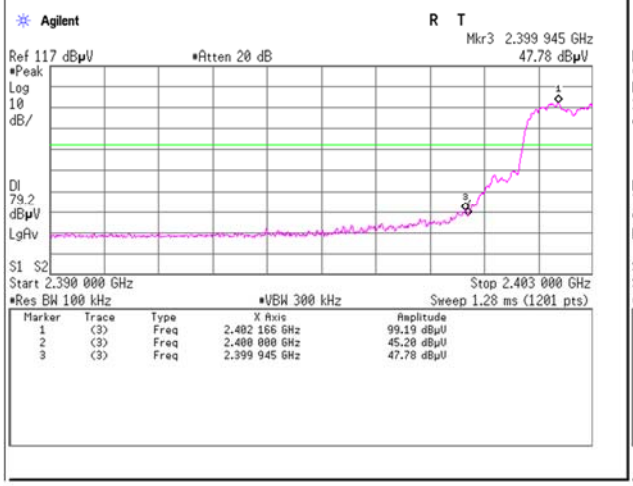


Conducted Emission Band Edge compliance

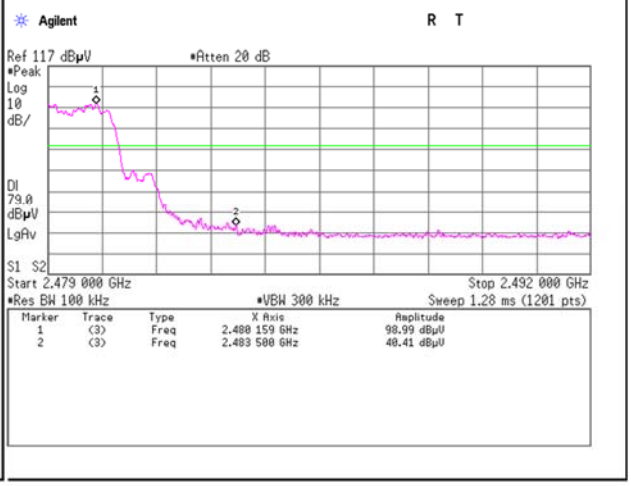
Test place	Shonan EMC Lab. No.5 Shielded Room
Date	November 17, 2022
Temperature / Humidity	25 deg. C / 39 % RH
Engineer	Miku Ikudome
Mode	Tx 3DH5

Hopping On

Low

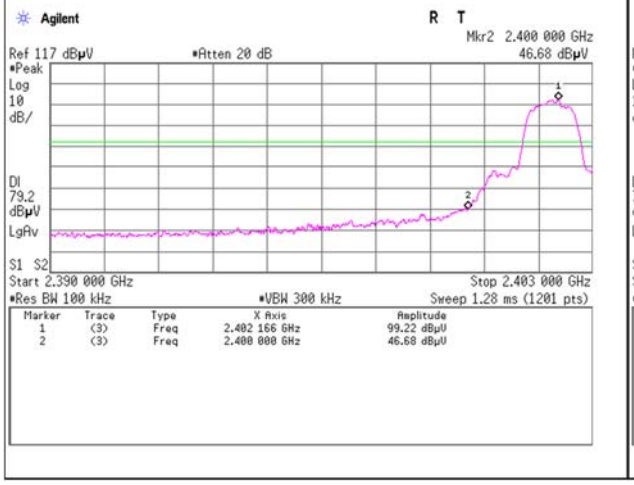


High

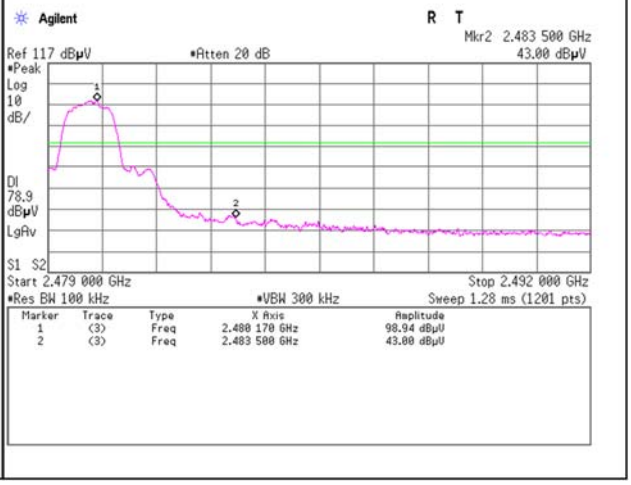


Hopping Off

Low



High



APPENDIX 2: Test Instruments

Test Equipment (1/2)

Test Item	Local ID	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Cal Int
AT	SAT10-14	154591	Attenuator	Weinschel Corp.	54A-10	81595	2022/04/01	12
AT	SCC-G65	196942	Coaxial Cable	Huber+Suhner	SUCOFLEX 102	803416/2	2022/03/01	12
AT	SCC-H23	199603	Microwave cable	RS Pro	R-132G7210 100CO	-	2022/06/03	12
AT	SOS-27	191845	Thermo-Hygrometer	CUSTOM. Inc	CTH-201	-	2022/08/08	12
AT	SPM-13	169910	Power Meter	Keysight Technologies Inc	8990B	MY51000448	2022/11/08	12
AT	SPSS-06	169911	Power sensor	Keysight Technologies Inc	N1923A	MY57270004	2022/11/08	12
AT	SRENT-09	150461	Spectrum Analyzer	Keysight Technologies Inc	E4440A	MY46186392	2022/03/14	12
AT	SSA-02	145800	Spectrum Analyzer	Keysight Technologies Inc	E4448A	MY48250106	2022/05/17	12
AT	STS-05	146212	Digital Hitester	HIOKI E.E. CORPORATION	3805-50	80997828	2022/09/20	12
AT,RE	SSA-03	145801	Spectrum Analyzer	Keysight Technologies Inc	E4448A	MY48250152	2022/08/04	12
CE	SAT3-10	144960	Attenuator	JFW	50HF-003N	-	2022/08/23	12
CE	SCC-C9/C10/SRSE-03	145036	Coaxial Cable&RF Selector	Suhner/Suhner/TOYO	RG223U/141PE/NS4906	-/0901-271(RF Selector)	2022/04/20	12
CE	SLS-05	145542	LISN	Rohde & Schwarz	ENV216	100516	2022/02/24	12
CE	SOS-06	146294	Humidity Indicator	A&D Company	AD-5681	4062118	-	-
CE	STM-05	145762	Terminator	TME	CT-01 BP	-	2022/12/16	12
CE,RE	COTS-SEMI-5	170932	EMI Software	TSJ (Techno Science Japan)	TEPTO-DV3(RE,CE,ME,PE)	-	-	-
CE,RE	KJM-02	146432	Measure	TAJIMA	GL19-55	-	-	-
CE,RE	STR-07	146209	Test Receiver	Rohde & Schwarz	ESU26	100484	2022/09/14	12
CE,RE	STS-03	146210	Digital Hitester	HIOKI E.E. CORPORATION	3805-50	80997823	2022/09/20	12
RE	KSA-08	145089	Spectrum Analyzer	Keysight Technologies Inc	E4446A	MY46180525	2022/11/01	12
RE	SAEC-01(SVSWR)	145561	Semi-Anechoic Chamber	TDK	SAEC-01(SVSWR)	1	2022/05/13	12
RE	SAEC-03(NSA)	145565	Semi-Anechoic Chamber	TDK	SAEC-03(NSA)	3	2022/04/15	12
RE	SAEC-03(SVSWR)	145566	Semi-Anechoic Chamber	TDK	SAEC-03(SVSWR)	3	2022/05/18	12
RE	SAF-03	145126	Pre Amplifier	SONOMA	310N	290213	2022/02/24	12
RE	SAF-04	145127	Pre Amplifier	Toyo Corporation	TPA0118-36	2072554	2022/05/20	12
RE	SAF-06	145005	Pre Amplifier	Toyo Corporation	TPA0118-36	1440491	2022/02/04	12
RE	SAF-08	145007	Pre Amplifier	Toyo Corporation	HAP18-26W	19	2022/03/03	12
RE	SAJ-03	146105	Antenna Tilt Jig	Intelligent System Engineering Co., Ltd	Antenna Tilt Jig	T-S003	-	-
RE	SAT10-05	145136	Attenuator	Keysight Technologies Inc	8493C-010	74864	2022/10/20	12
RE	SAT10-06	145137	Attenuator	Keysight Technologies Inc	8493C-010	74865	2022/10/20	12
RE	SAT6-13	167094	Attenuator	JFW	50HF-006N	-	2022/02/21	12
RE	SBA-03	145023	Biconical Antenna	Schwarzbeck Mess-Elektronik OHG	BBA9106	91032666	2022/05/14	12

Test Equipment (2/2)

Test Item	Local ID	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Cal Int
RE	SCC-C1/C2/C3/C4/C5/C10/SRSE-03	145171	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhner/Suhner/Suhner/Suhner/TOYO	8D2W/12DSFA/141PE/141PE/141PE/141PE/NS4906	-/0901-271(RF Selector)	2022/04/20	12
RE	SCC-G05	145039	Coaxial Cable	Junkosha	J12J102207-00	APR-30-15-037	2022/01/06	12
RE	SCC-G15	145176	Coaxial Cable	Suhner	SUCOFLEX 102	32703/2	2022/03/03	12
RE	SCC-G40	166491	Coaxial Cable	Junkosha	MWX221-01000NFSNMS/B	1612S005	2022/01/06	12
RE	SCC-G41	151617	Coaxial Cable	Junkosha	MWX221-01000NFSNMS/B	1612S006	2022/01/06	12
RE	SCC-G43	156380	Coaxial Cable	Huber+Suhner	SUCOFLEX_104 E	SN MY 13406/4E	2022/05/20	12
RE	SCC-G44	168300	Coaxial Cable	Huber+Suhner	SUCOFLEX 104	800375/4A	2022/11/10	12
RE	SCC-G57	179540	Coaxial Cable	Huber+Suhner	SUCOFLEX 102	802815/2	2022/05/12	12
RE	SCC-G62	196985	Coaxial Cable	Huber+Suhner	SUCOFLEX 102	803650/2	2022/03/08	12
RE	SCC-G70	200010	Coaxial Cable	Huber+Suhner	SUCOFLEX 104	575618/4	2022/07/22	12
RE	SFL-02	145301	Highpass Filter	MICRO-TRONICS	HPM50111	51	2022/10/20	12
RE	SFL-03	145377	Highpass Filter	MICRO-TRONICS	HPM50112	28	2022/10/20	12
RE	SFL-18	145305	Highpass Filter	MICRO-TRONICS	HPM50111	119	2022/03/02	12
RE	SHA-01	145383	Horn Antenna	Schwarzbeck Mess-Elektronik OHG	BBHA9120D	9120D-725	2022/03/01	12
RE	SHA-03	145501	Horn Antenna	Schwarzbeck Mess-Elektronik OHG	BBHA9120D	9120D-739	2022/03/16	12
RE	SHA-04	145512	Horn Antenna	ETS-Lindgren	3160-09	00094868	2022/06/06	12
RE	SHA-10	194685	Horn Antenna	Schwarzbeck Mess-Elektronik OHG	BBHA 9120 C	711	2022/03/16	12
RE	SJM-22	207279	Measuring Tool, Tape Measure	ASKUL	-	-	-	-
RE	SLA-07	145529	Logperiodic Antenna	Schwarzbeck Mess-Elektronik OHG	VUSLP9111B	196	2022/05/14	12
RE	SOS-20	191837	Thermo-Hygrometer	CUSTOM. Inc	CTH-201	-	2022/08/06	12
RE	SOS-23	191840	Thermo-Hygrometer	CUSTOM. Inc	CTH-201	-	2022/08/08	12

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

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

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

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