RADIO TEST REPORT

Test Report No. 15096679S-C-R1

Customer	**Sony Group Corporation**
Description of EUT	**Wireless Stereo Headset**
Model Number of EUT	**YY2964**
FCC ID	**AK8YY2964**
Test Regulation	**FCC Part 15 Subpart C**
Test Result	**Complied**
Issue Date	**March 14, 2024**
Remarks	**Bluetooth Low Energy part(s)**

Representative Test Engineer	**Approved By**
M. Ikudome	T. Imamura
Miku Ikudome Engineer	Toyokazu Imamura Engineer

CERTIFICATE 1266.03

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REVISION HISTORY

Original Test Report No.: 15096679S-C

This report is a revised version of 15096679S-C. 15096679S-C is replaced with this report.

Revision	Test Report No.	Date	Page Revised Contents
- (Original)	15096679S-C	February 29, 2024	-
1	15096679S-C-R1	March 14, 2024	Page 9 - Corrected the operating mode and tested frequency of Radiated Spurious Emission (Below 1 GHz) from 1M-PHY and 2402 MHz to 2M-PHY and 2480 MHz. Pages 20 to 38 - Corrected from “0.00” to “-“ (dash) in the Gain column of each table. - Corrected the calculation formula to include Gain in the “Loss” part, as follows. [Previously] Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) … [Now] Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz) - Gain(Amplifier)) …

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	Quadri-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

CONTENTS PAGE

SECTION 1: Customer Information 5
SECTION 2: Equipment Under Test (EUT) 5
SECTION 3: Test Specification, Procedures & Results 6
SECTION 4: Operation of EUT during testing 9
SECTION 5: Radiated Spurious Emission 11
SECTION 6: Antenna Terminal Conducted Tests 13
APPENDIX 1: Test Data 14
99 % Occupied Bandwidth and 6 dB Bandwidth 14
Maximum Peak Output Power 17
Average Output Power 18
Radiated Spurious Emission 20
Conducted Spurious Emission 42
Power Density 48
APPENDIX 2: Test Instruments 50
APPENDIX 3: Photographs of Test Setup 52
Radiated Spurious Emission 52
Pre-check of Worst Case Position 53
Antenna Terminal Conducted Tests 54

SECTION 1: Customer Information

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

The information provided by 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

SECTION 2: Equipment Under Test (EUT)

2.1 Identification of EUT

Description	Wireless Stereo Headset
Model Number	YY2964
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	December 12, 2023
Test Date	December 18, 2023 to February 9, 2024

2.2 Product Description

General Specification

Rating	DC 3.85 V (Battery)
Operating temperature	0 deg. C to 40 deg. C

Radio Specification

This report contains data provided by the customer which can impact the validity of results.
UL Japan, Inc. is only responsible for the validity of results after the integration of the data provided by the customer.
The data provided by the customer is marked “a)” in the table below.

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 Gain[a)]	-4.5 dBi

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

*The customer has declared that the EUT complies with FCC Part 15 Subpart B as SDoC.

3.2 Procedures and Results

Item	Test Procedure	Specification	Worst Margin	Results	Remarks
Conducted Emission	**FCC:** ANSI C63.10-2013 6. Standard test methods	**FCC:** Section 15.207	-	N/A	*1)
	ISED: RSS-Gen 8.8	**ISED:** RSS-Gen 8.8			
6dB Bandwidth	**FCC:** KDB 558074 D01 15.247 Meas Guidance v05r02	**FCC:** Section 15.247(a)(2)	See data.	Complied	Conducted
	ISED: -	**ISED:** RSS-247 5.2(a)			
Maximum Peak Output Power	**FCC:** KDB 558074 D01 15.247 Meas Guidance v05r02	**FCC:** Section 15.247(b)(3)		Complied	Conducted
	ISED: RSS-Gen 6.12	**ISED:** RSS-247 5.4(d)			
Power Density	**FCC:** KDB 558074 D01 15.247 Meas Guidance v05r02	**FCC:** Section 15.247(e)		Complied	Conducted
	ISED: -	**ISED:** RSS-247 5.2(b)			
Spurious Emission Restricted Band Edges	**FCC:** KDB 558074 D01 15.247 Meas Guidance v05r02	**FCC:** Section15.247(d)	10.9 dB 2483.500 MHz, AV, Horizontal Mode: Tx BT LE 2M-PHY 2480 MHz, Left	Complied	Conducted (below 30 MHz)/ Radiated (above 30 MHz) *2)
	ISED: RSS-Gen 6.13	**ISED:** RSS-247 5.5 RSS-Gen 8.9 RSS-Gen 8.10			

Note: UL Japan, Inc.'s EMI Work Procedures: 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) The test was not applicable since the BLE does not operate during charging.
*2) Radiated test was selected over 30 MHz based on section 15.247(d) and KDB 558074 D01 15.247 Meas Guidance v05r02 8.5 and 8.6.

FCC Part 15.31 (e)
This EUT provides the stable voltage constantly to RF Part regardless of input voltage.
Therefore, this EUT complies with the requirement.

FCC Part 15.203 Antenna requirement
It is impossible for end users to replace the antenna, because the antenna is mounted inside of the EUT.
Therefore, the equipment complies with the antenna requirement of Section 15.203.

3.3 Addition to Standard

Item	Test Procedure	Specification	Worst Margin	Results	Remarks
99% Occupied Bandwidth	**ISED:** RSS-Gen 6.7	**ISED: -**	N/A	-	Conducted

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 to 30 MHz	3.2 dB
Radiated Emission (Measurement distance: 3 m)	9 kHz to 30 MHz	3.3 dB
	30 MHz to 200 MHz	4.9 dB
	200 MHz to 1 GHz	6.2 dB
	1 GHz to 6 GHz	4.7 dB
	6 GHz to 18 GHz	5.3 dB
	18 GHz to 40 GHz	5.5 dB
Radiated Emission (Measurement distance: 1 m)	1 GHz to 18 GHz	5.6 dB
	18 GHz to 40 GHz	5.8 dB

Antenna terminal test	Uncertainty (+/-)
Power Measurement above 1 GHz (Average Detector) SPM-06	1.1 dB
Power Measurement above 1 GHz (Peak Detector) SPM-06	1.8 dB
Power Measurement above 1 GHz (Average Detector) SPM-07	1.0 dB
Power Measurement above 1 GHz (Peak Detector) SPM-07	1.2 dB
Power Measurement above 1 GHz (Average Detector) SPM-13	0.81 dB
Power Measurement above 1 GHz (Peak Detector) SPM-13	1.1 dB
Spurious Emission (Conducted) below 1 GHz	0.91 dB
Conducted Emissions Power Density Measurement 1 GHz to 3 GHz	1.3 dB
Conducted Emissions Power Density Measurement 3 GHz to 18 GHz	2.5 dB
Spurious Emission (Conducted) 18 GHz to 26.5 GHz	2.8 dB
Spurious Emission (Conducted) 26.5 GHz to 40 GHz	2.6 dB
Bandwidth Measurement	0.012 %
Duty Cycle and Time Measurement	0.27 %
Temperature_SCH-01	0.96 deg.C.
Humidity_SCH-01	4.0 %
Temperature_SCH-02	2.2 deg.C.
Voltage	0.74 %

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 room	Width x Depth x Height (m)	Size of reference ground plane (m) / horizontal conducting plane	Maximum measurement distance
No.1 Semi-anechoic chamber (SAC1)	20.6 x 11.3 x 7.65	20.6 x 11.3	10 m
No.2 Semi-anechoic chamber (SAC2)	20.6 x 11.3 x 7.65	20.6 x 11.3	10 m
No.3 Semi-anechoic chamber (SAC3)	12.7 x 7.7 x 5.35	12.7 x 7.7	5 m
No.4 Semi-anechoic chamber (SAC4)	8.1 x 5.1 x 3.55	8.1 x 5.1	-
Wireless anechoic chamber 1 (WAC1)	9.5 x 6.0 x 5.4	9.5 x 6.0	3 m
Wireless anechoic chamber 2 (WAC2)	9.5 x 6.0 x 5.4	9.5 x 6.0	3 m
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	-	-
No.2 Measurement room	4.5 x 3.5 x 2.5	-	-
Wireless shielded room 1	3.0 x 4.5 x 2.7	3.0 x 4.5	-
Wireless shielded room 2	3.0 x 4.5 x 2.7	3.0 x 4.5	-

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 Low Energy (BT LE) 1M-PHY Uncoded PHY (1M-PHY)	Maximum Packet Size, PRBS9
Bluetooth Low Energy (BT LE) 2M-PHY Uncoded PHY (2M-PHY)	Maximum Packet Size, PRBS9

*Power of the EUT was set by the software as follows;
Power Setting: 50
Software: Earbuds RF Test Ver 1.05
(Date: 2023.12 18, 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.

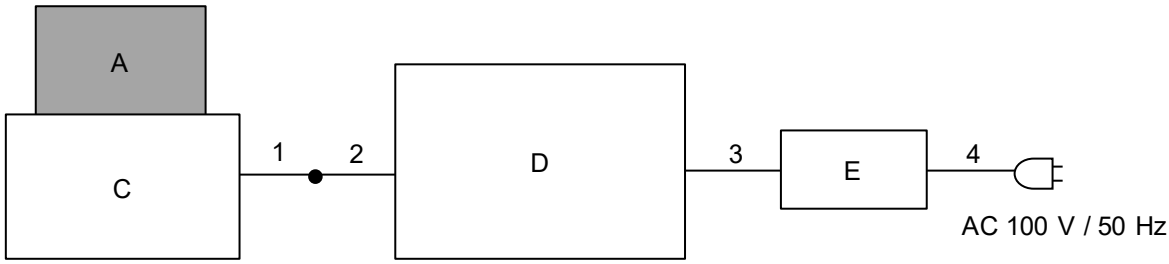
*Details of Operating Mode(s)

Test Item	Operating Mode	Tested Frequency
Radiated Spurious Emission (Below 1 GHz)	Tx BT LE, 2M-PHY *1)	2480 MHz
Radiated Spurious Emission (Above 1 GHz), Maximum Peak Output Power, Power Density, 6dB Bandwidth, 99% Occupied Bandwidth, Conducted Spurious Emission	Tx BT LE, 1M-PHY Tx BT LE, 2M-PHY	2402 MHz 2440 MHz 2480 MHz

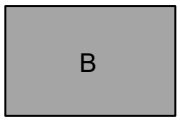
*1) Spurious emissions for frequencies below 1 GHz were limited to the channel that had the highest power during the antenna terminal test, as preliminary testing indicated that changing the operating frequency had no significant impact on the emissions in those frequency bands.

4.2 Configuration and Peripherals

[Antenna Terminal Conducted tests]



[Radiated Emission test]



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

Description of EUT and Support Equipment

No.	Item	Model Number	Serial Number	Manufacturer	Remarks
A	Wireless Stereo Headset	YY2964	1200844	Sony Group Corporation	EUT (Left)
B	Wireless Stereo Headset	YY2964	1200825	Sony Group Corporation	EUT (Left, Right)
C	Case	YY2964	1200844	Sony Group Corporation	-
D	Laptop Computer	ThinkPad L580	PF1PLZHX	LENOVO	-
E	AC Adapter	ADLX45YLC2A	8SSA10E75842L1CZ94J0D3R	LENOVO	-

List of Cables Used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	USB	0.2	Shielded	Shielded	-
2	USB	2.0	Shielded	Shielded	-
3	DC	1.8	Unshielded	Unshielded	-
4	AC	0.9	Unshielded	Unshielded	-

SECTION 5: Radiated Spurious Emission

Test Procedure

It was measured based on "8.5 and 8.6 of KDB 558074 D01 15.247 Meas Guidance v05r02".

[For below 1 GHz]
EUT was placed on a urethane platform of nominal size, 1.0 m by 1.5 m, raised 0.8 m above the conducting ground plane. The Radiated Electric Field Strength has been measured in a Semi Anechoic Chamber with a ground plane.

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

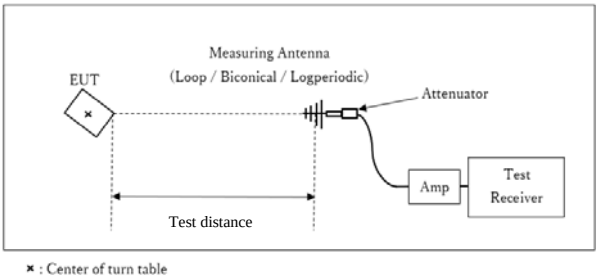
20 dBc was applied to the frequency over the limit of FCC 15.209 / Table 4 of RSS-Gen 8.9(ISED) and outside the restricted band of FCC15.205 / Table 6 of RSS-Gen 8.10 (ISED).

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	11.12.2.5.2 RBW: 1 MHz VBW: 3 MHz Detector: Power Averaging (Linear voltage) Trace: 100 traces Duty factor was added to the results.	RBW: 100 kHz VBW: 300 kHz

*1) Average Power Measurement was performed based on ANSI C63.10-2013.

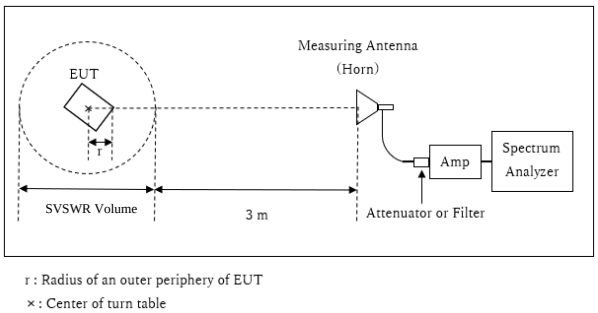
Figure 2: Test Setup

Below 1 GHz



Test Distance: 3 m

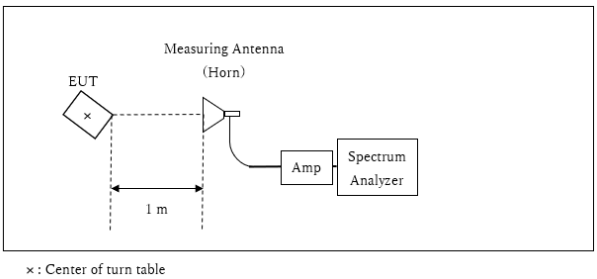
1 GHz to 10 GHz



Distance Factor: 20 x log (3.99 m / 3.0 m) = 2.48 dB
* Test Distance: (3 + SVSWR Volume /2) - r = 3.99 m

SVSWR Volume : 2.0 m
(SVSWR Volume has been calibrated based on CISPR 16-1-4.)
r = 0.01 m

10 GHz to 26.5 GHz



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 to see the position of maximum noise, and the test was made at the position that has the maximum noise.

		Below 30 MHz	1 to 2.8 GHz	2.8 to 10 GHz	10 to 18 GHz	18 to 26.5 GHz
EUT (Left)	Horizontal	X	Y	Y	Y	X
	Vertical	X	X	Z	Z	X
EUT(Right)	Horizontal	X	Y	Z	Y	X
	Vertical	X	X	Z	Z	X

Test results are rounded off and limit are rounded down, so some differences might be observed.

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

SECTION 6: Antenna Terminal Conducted Tests

Test Procedure

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

Test	Span	RBW	VBW	Sweep time	Detector	Trace	Instrument Used
6dB Bandwidth	Enough width to display emission skirts	100 kHz	300 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)
Peak Power Density	1.5 times the 6dB Bandwidth	3 kHz	9.1 kHz	Auto	Peak	Max Hold	Spectrum Analyzer *3)
Conducted Spurious Emission *4) *5)	9 kHz to 150 kHz	200 Hz	620 Hz	Auto	Peak	Max Hold	Spectrum Analyzer
	150 kHz to 30 MHz	10 kHz	30 kHz				

*1) Peak hold was applied as Worst-case measurement.
*2) Reference data
*3) Section 11.10.2 Method PKPSD (peak PSD) of "ANSI C63.10-2013".
*4) In the frequency range below 30MHz, RBW was narrowed to separate the noise contents.
Then, wide-band noise near the limit was checked separately, however the noise was not detected as shown in the chart.
(9 kHz - 150 kHz: RBW = 200 Hz, 150 kHz - 30 MHz: RBW = 10 kHz)
*5) 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.

Test results are rounded off and limit are rounded down, 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

99 % Occupied Bandwidth and 6 dB Bandwidth

Test place	Shonan EMC Lab. No.5 Shielded Room	
Date	December 18, 2023	December 19, 2023
Temperature / Humidity	23 deg. C / 35 % RH	23 deg. C / 38 % RH
Engineer	Miku Ikudome	Yohsuke Matsuzawa
Mode	Tx	

BT LE 1M-PHY

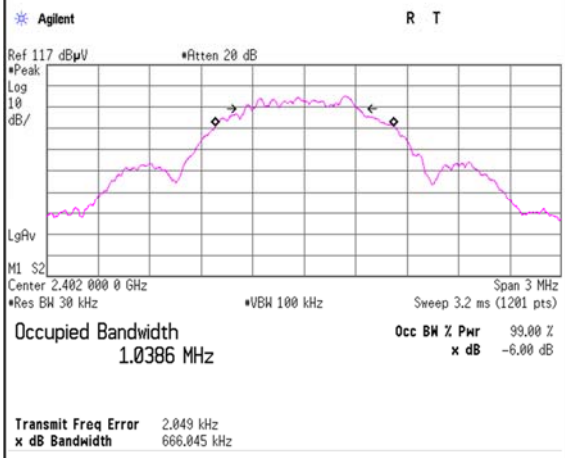
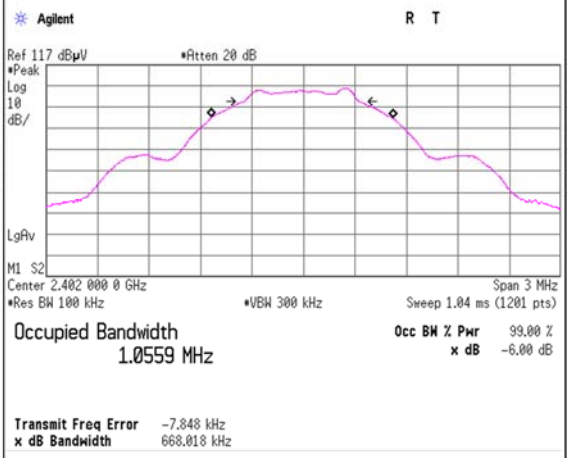
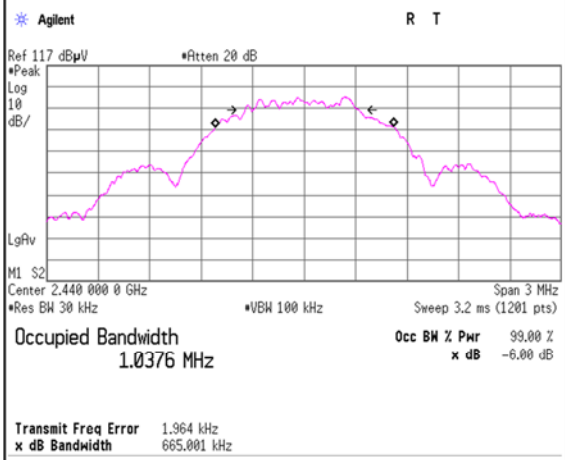
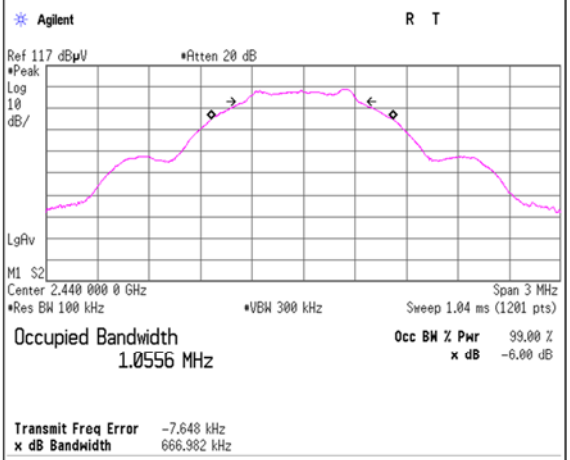
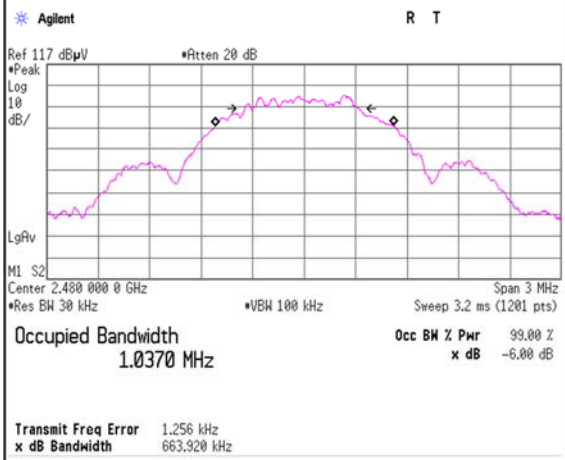
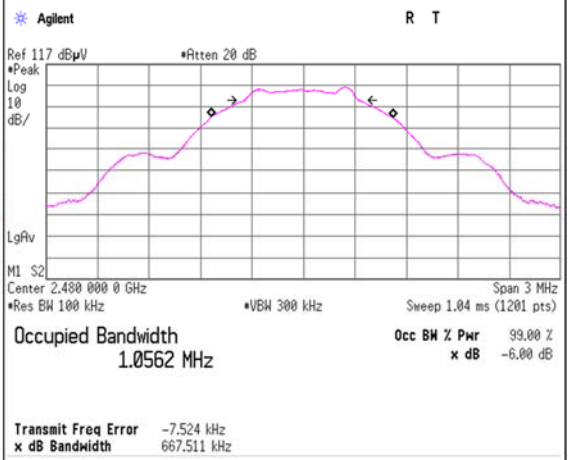
Frequency [MHz]	99 % Occupied Bandwidth [kHz]	6 dB Bandwidth [MHz]	Limit for 6 dB Bandwidth [MHz]
2402	1038.6	0.668	> 0.5000
2440	1037.6	0.667	> 0.5000
2480	1037.0	0.668	> 0.5000

BT LE 2M-PHY

Frequency [MHz]	99 % Occupied Bandwidth [kHz]	6 dB Bandwidth [MHz]	Limit for 6 dB Bandwidth [MHz]
2402	2075.7	1.248	> 0.5000
2440	2075.2	1.206	> 0.5000
2480	2073.3	1.259	> 0.5000

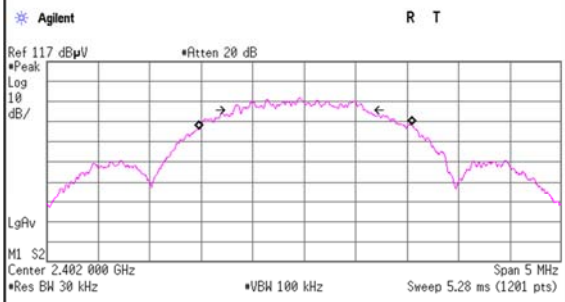
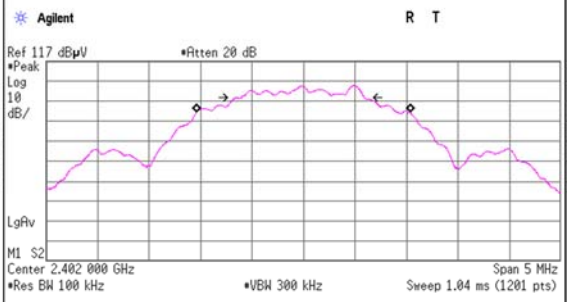
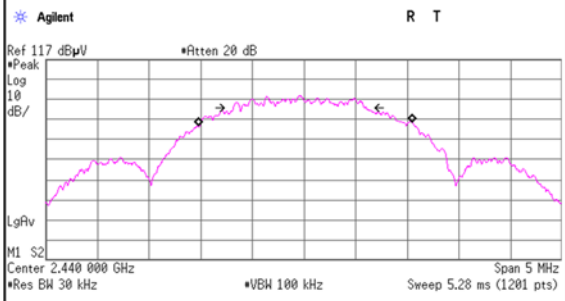
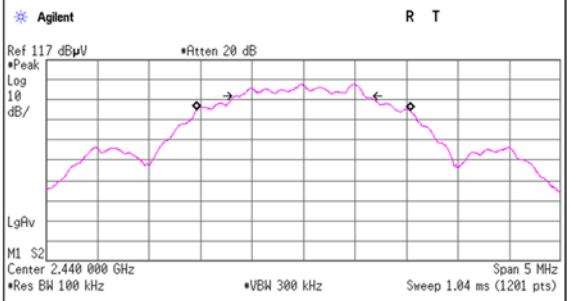
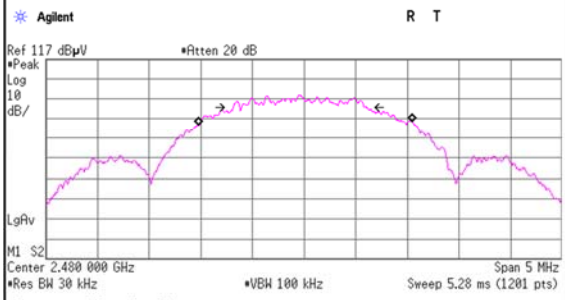
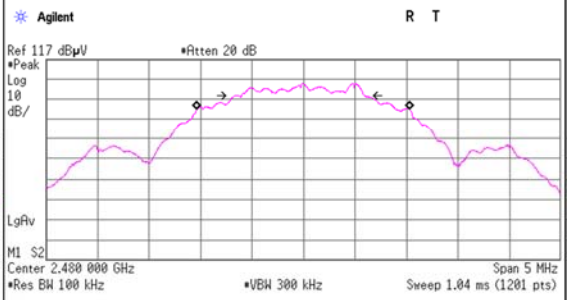
99 % Occupied Bandwidth and 6 dB Bandwidth

BT LE 1M-PHY

99 % Occupied Bandwidth	6 dB Bandwidth
2402 MHz	**2402 MHz**
	
2440 MHz	**2440 MHz**
	
2480 MHz	**2480 MHz**
	

99 % Occupied Bandwidth and 6 dB Bandwidth

BT LE 2M-PHY

99 % Occupied Bandwidth	6 dB Bandwidth
2402 MHz	**2402 MHz**
 Occupied Bandwidth 2.0757 MHz Occ BW % Pwr 99.00 % x dB -6.00 dB Transmit Freq Error 13.883 kHz x dB Bandwidth 1.288 MHz	 Occupied Bandwidth 2.0763 MHz Occ BW % Pwr 99.00 % x dB -6.00 dB Transmit Freq Error -542.824 Hz x dB Bandwidth 1.248 MHz
2440 MHz	**2440 MHz**
 Occupied Bandwidth 2.0752 MHz Occ BW % Pwr 99.00 % x dB -6.00 dB Transmit Freq Error 13.868 kHz x dB Bandwidth 1.289 MHz	 Occupied Bandwidth 2.0755 MHz Occ BW % Pwr 99.00 % x dB -6.00 dB Transmit Freq Error -1.336 kHz x dB Bandwidth 1.206 MHz
2480 MHz	**2480 MHz**
 Occupied Bandwidth 2.0733 MHz Occ BW % Pwr 99.00 % x dB -6.00 dB Transmit Freq Error 13.977 kHz x dB Bandwidth 1.289 MHz	 Occupied Bandwidth 2.0665 MHz Occ BW % Pwr 99.00 % x dB -6.00 dB Transmit Freq Error -4.828 kHz x dB Bandwidth 1.259 MHz

Maximum Peak Output Power

Test place	Shonan EMC Lab. No.5 Shielded Room
Date	February 7, 2024
Temperature / Humidity	25 deg. C / 35 % RH
Engineer	Yohsuke Matsuzawa
Mode	Tx BT LE

BT LE 1M-PHY

Maximum peak output power

				Conducted Power					e.i.r.p. for RSS-247					
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]
2402	-1.28	3.15	9.89	11.76	15.00	30.00	1000	18.24	-4.50	7.26	5.32	36.02	4000	28.76
2440	-1.15	3.16	9.89	11.90	15.49	30.00	1000	18.10	-4.50	7.40	5.50	36.02	4000	28.62
2480	-0.97	3.17	9.89	12.09	16.18	30.00	1000	17.91	-4.50	7.59	5.74	36.02	4000	28.43

BT LE 2M-PHY

Maximum peak output power

				Conducted Power					e.i.r.p. for RSS-247					
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]
2402	-1.28	3.15	9.89	11.76	15.00	30.00	1000	18.24	-4.50	7.26	5.32	36.02	4000	28.76
2440	-1.14	3.16	9.89	11.91	15.52	30.00	1000	18.09	-4.50	7.41	5.51	36.02	4000	28.61
2480	-0.96	3.17	9.89	12.10	16.22	30.00	1000	17.90	-4.50	7.60	5.75	36.02	4000	28.42

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

Average Output Power
(Reference data for RF Exposure)

Test place	Shonan EMC Lab. No.5 Shielded Room
Date	February 7, 2024
Temperature / Humidity	25 deg. C / 35 % RH
Engineer	Yohsuke Matsuzawa
Mode	Tx BT LE

BT LE 1M-PHY

Average power

Freq.	Reading	Cable Loss	Atten. Loss	Result (Time average)		Duty factor	Result (Burst power average)	
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[mW]	[dB]	[dBm]	[mW]
2402	-2.18	3.15	9.89	10.86	12.19	0.68	11.54	14.26
2440	-2.05	3.16	9.89	11.00	12.59	0.68	11.68	14.72
2480	-1.85	3.17	9.89	11.21	13.21	0.68	11.89	15.45

BT LE 2M-PHY

Average power

Freq.	Reading	Cable Loss	Atten. Loss	Result (Time average)		Duty factor	Result (Burst power average)	
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[mW]	[dB]	[dBm]	[mW]
2402	-3.90	3.15	9.89	9.14	8.20	2.40	11.54	14.26
2440	-3.75	3.16	9.89	9.30	8.51	2.40	11.70	14.79
2480	-3.57	3.17	9.89	9.49	8.89	2.40	11.89	15.45

Sample Calculation:

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

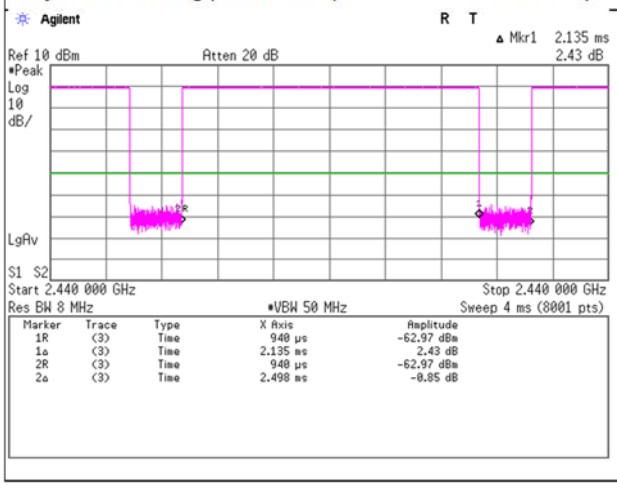
Result (Burst power average) = Result (Time average) + Duty factor

Burst rate confirmation

Test place	Shonan EMC Lab. No.5 Shielded Room
Date	February 6, 2024
Temperature / Humidity	21 deg. C / 49 % RH
Engineer	Yuta Shiba
Mode	Tx BT LE

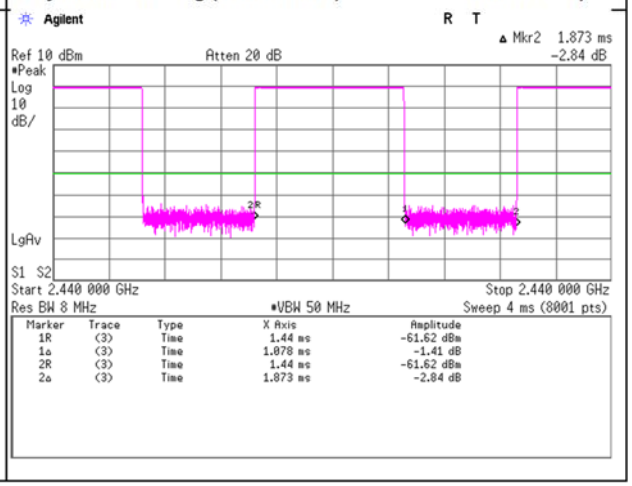
BT LE 1M-PHY (for Average power) *1)
BT LE 1M-PHY (for Radiated emission) *2)

Tx on / (Tx on + Tx off) =	0.855
Tx on / (Tx on + Tx off) * 100 =	85.5 %
Duty factor = 10 * log (2.498 / 2.135) =	0.68 dB *1)
Duty factor = 20 * log (2.498 / 2.135) =	1.37 dB *2)



BT LE 2M-PHY (for Average power) *3)
BT LE 2M-PHY (for Radiated emission) *4)

Tx on / (Tx on + Tx off) =	0.576
Tx on / (Tx on + Tx off) * 100 =	57.6 %
Duty factor = 10 * log (1.873 / 1.078) =	2.40 dB *3)
Duty factor = 20 * log (1.873 / 1.078) =	4.80 dB *4)



Radiated Spurious Emission

Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	WAC1	WAC1	WAC1
Date	February 6, 2024	February 9, 2024	January 9, 2024
Temperature / Humidity	23 deg. C / 31 % RH	23 deg. C / 27 % RH	20 deg. C / 33 % RH
Engineer	Shiro Kobayashi (1 GHz to 10 GHz)	Miku Ikudome (10 GHz to 18 GHz)	Takahiro Suzuki (18 GHz to 26.5 GHz)
Mode	Tx BT LE 1M-PHY 2402 MHz, Left		

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	2390.000	PK	47.94	27.77	-27.48	-	2.48	50.71	73.9	23.1	117	231	-
Hori.	4804.000	PK	48.25	31.53	-34.65	-	2.48	47.61	73.9	26.2	150	0	-
Hori.	7206.000	PK	48.20	36.19	-32.92	-	2.48	53.95	73.9	19.9	150	0	-
Hori.	9608.000	PK	47.22	38.64	-30.10	-	2.48	58.24	73.9	15.6	150	0	-
Hori.	4804.000	AV	36.26	31.53	-34.65	-	2.48	35.62	53.9	18.2	150	0	Floor Noise
Hori.	7206.000	AV	36.86	36.19	-32.92	-	2.48	42.61	53.9	11.2	150	0	Floor Noise
Hori.	9608.000	AV	35.56	38.64	-30.10	-	2.48	46.58	53.9	**7.3**	150	0	Floor Noise
Vert.	2390.000	PK	48.22	27.77	-27.48	-	2.48	50.99	73.9	22.9	146	290	-
Vert.	4804.000	PK	48.79	31.53	-34.65	-	2.48	48.15	73.9	25.7	150	0	-
Vert.	7206.000	PK	48.21	36.19	-32.92	-	2.48	53.96	73.9	19.9	150	0	-
Vert.	9608.000	PK	47.42	38.64	-30.10	-	2.48	58.44	73.9	15.4	150	0	-
Vert.	4804.000	AV	36.29	31.53	-34.65	-	2.48	35.65	53.9	18.2	150	0	Floor Noise
Vert.	7206.000	AV	36.80	36.19	-32.92	-	2.48	42.55	53.9	11.3	150	0	Floor Noise
Vert.	9608.000	AV	35.51	38.64	-30.10	-	2.48	46.53	53.9	**7.3**	150	0	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 (3.99 m / 3.0 m) = 2.48 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

Average measurement value with duty factor

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2390.000	AV	36.34	27.77	-27.48	-	1.37	2.48	40.48	53.9	13.4	*1)
Vert.	2390.000	AV	36.36	27.77	-27.48	-	1.37	2.48	40.50	53.9	13.4	*1)

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz) - Gain(Amplifier)) + Duty factor + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.99 m / 3.0 m) = 2.48 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB
Duty factor refer to "Burst rate confirmation" sheet.
*1) Not out of band emission (Leakage Power)

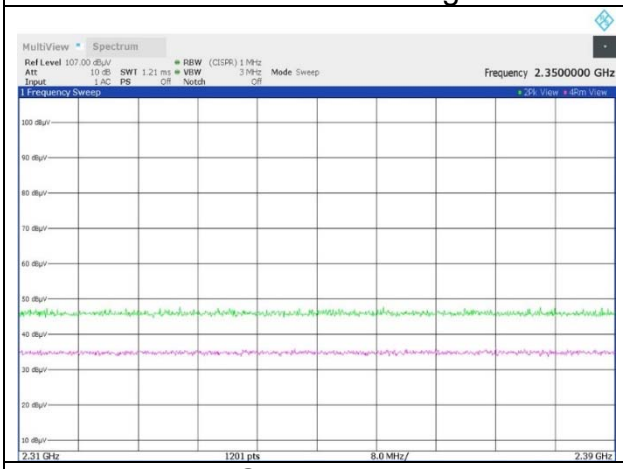
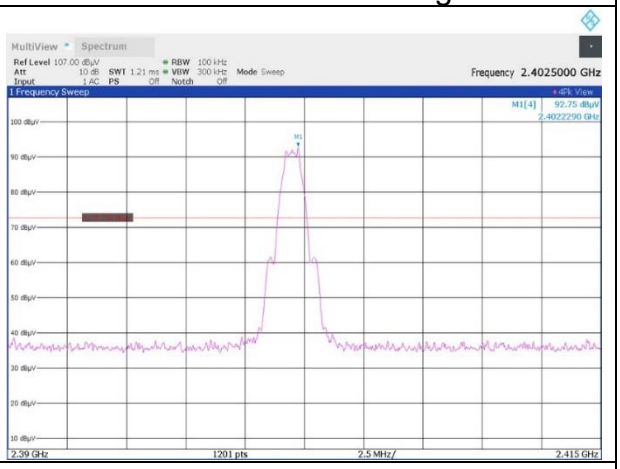
20 dBc Data Sheet **(RBW 100 kHz, VBW 300 kHz)**

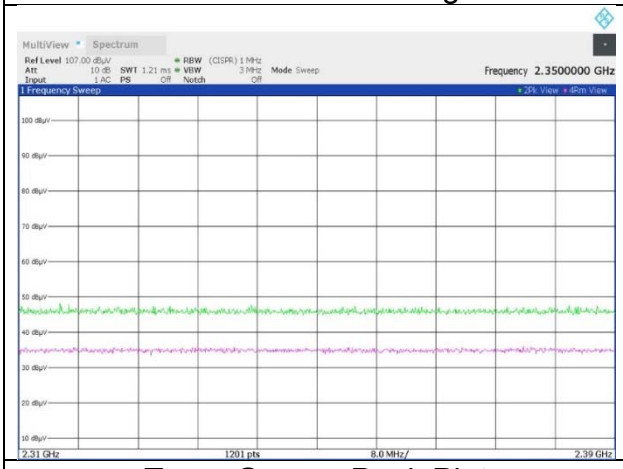
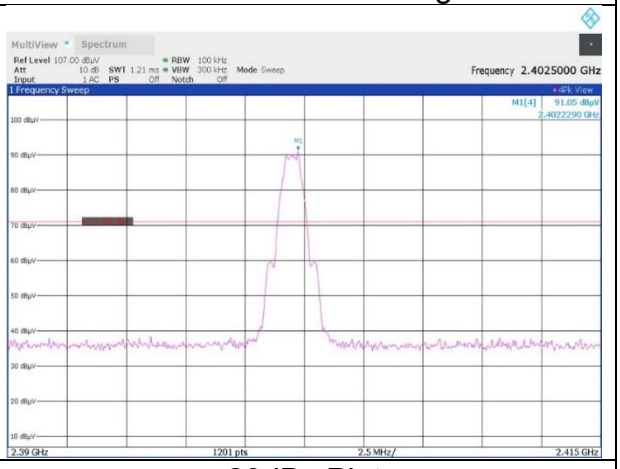
Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2402.000	PK	92.75	27.76	-27.47	-	2.48	95.52	-	-	Carrier
Hori.	2400.000	PK	40.07	27.76	-27.47	-	2.48	42.84	75.5	32.6	-
Vert.	2402.000	PK	91.05	27.76	-27.47	-	2.48	93.82	-	-	Carrier
Vert.	2400.000	PK	39.11	27.76	-27.47	-	2.48	41.88	73.8	31.9	-

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz) - Gain(Amplifier)) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.99 m / 3.0 m) = 2.48 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	WAC1
Date	February 6, 2024
Temperature / Humidity	23 deg. C / 31 % RH
Engineer	Shiro Kobayashi (1 GHz to 10 GHz)
Mode	Tx BT LE 1M-PHY 2402 MHz, Left

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 and authorized band edge were shown in tabular data.

Radiated Spurious Emission

Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	WAC1	WAC1	WAC1
Date	February 6, 2024	February 9, 2024	January 9, 2024
Temperature / Humidity	23 deg. C / 31 % RH	23 deg. C / 27 % RH	20 deg. C / 33 % RH
Engineer	Shiro Kobayashi (1 GHz to 10 GHz)	Miku Ikudome (10 GHz to 18 GHz)	Takahiro Suzuki (18 GHz to 26.5 GHz)
Mode	Tx BT LE 1M-PHY 2440 MHz, Left		

(* 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.	4880.000	PK	48.57	31.62	-34.71	-	2.48	47.96	73.9	25.9	150	0	-
Hori.	7320.000	PK	48.68	36.27	-32.70	-	2.48	54.73	73.9	19.1	150	0	-
Hori.	9760.000	PK	48.06	39.01	-29.94	-	2.48	59.61	73.9	14.2	150	0	-
Hori.	4880.000	AV	36.63	31.62	-34.71	-	2.48	36.02	53.9	17.8	150	0	Floor Noise
Hori.	7320.000	AV	37.03	36.27	-32.70	-	2.48	43.08	53.9	10.8	150	0	Floor Noise
Hori.	9760.000	AV	35.87	39.01	-29.94	-	2.48	47.42	53.9	**6.4**	150	0	Floor Noise
Vert.	4880.000	PK	48.44	31.62	-34.71	-	2.48	47.83	73.9	26.0	150	0	-
Vert.	7320.000	PK	48.47	36.27	-32.70	-	2.48	54.52	73.9	19.3	150	0	-
Vert.	9760.000	PK	47.69	39.01	-29.94	-	2.48	59.24	73.9	14.6	150	0	-
Vert.	4880.000	AV	36.72	31.62	-34.71	-	2.48	36.11	53.9	17.7	150	0	Floor Noise
Vert.	7320.000	AV	37.04	36.27	-32.70	-	2.48	43.09	53.9	10.8	150	0	Floor Noise
Vert.	9760.000	AV	35.66	39.01	-29.94	-	2.48	47.21	53.9	6.6	150	0	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 (3.99 m / 3.0 m) = 2.48 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

Radiated Spurious Emission

Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	WAC1	WAC1	WAC1
Date	February 6, 2024	February 9, 2024	January 9, 2024
Temperature / Humidity	23 deg. C / 31 % RH	23 deg. C / 27 % RH	20 deg. C / 33 % RH
Engineer	Shiro Kobayashi (1 GHz to 10 GHz)	Miku Ikudome (10 GHz to 18 GHz)	Takahiro Suzuki (18 GHz to 26.5 GHz)
Mode	Tx BT LE 1M-PHY 2480 MHz, Left		

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	2483.500	PK	48.35	27.75	-27.41	-	2.48	51.17	73.9	22.7	193	226	-
Hori.	4960.000	PK	47.75	31.72	-34.78	-	2.48	47.17	73.9	26.7	150	0	-
Hori.	7440.000	PK	48.78	36.45	-32.47	-	2.48	55.24	73.9	18.6	150	0	-
Hori.	9920.000	PK	48.09	38.86	-29.76	-	2.48	59.67	73.9	14.2	150	0	-
Hori.	4960.000	AV	36.48	31.72	-34.78	-	2.48	35.90	53.9	18.0	150	0	Floor Noise
Hori.	7440.000	AV	37.17	36.45	-32.47	-	2.48	43.63	53.9	10.2	150	0	Floor Noise
Hori.	9920.000	AV	35.40	38.86	-29.76	-	2.48	46.98	53.9	**6.9**	150	0	Floor Noise
Vert.	2483.500	PK	48.50	27.75	-27.41	-	2.48	51.32	73.9	22.5	113	150	-
Vert.	4960.000	PK	47.94	31.72	-34.78	-	2.48	47.36	73.9	26.5	150	0	-
Vert.	7440.000	PK	48.81	36.45	-32.47	-	2.48	55.27	73.9	18.6	150	0	-
Vert.	9920.000	PK	47.08	38.86	-29.76	-	2.48	58.66	73.9	15.2	150	0	-
Vert.	4960.000	AV	36.74	31.72	-34.78	-	2.48	36.16	53.9	17.7	150	0	Floor Noise
Vert.	7440.000	AV	37.15	36.45	-32.47	-	2.48	43.61	53.9	10.2	150	0	Floor Noise
Vert.	9920.000	AV	35.14	38.86	-29.76	-	2.48	46.72	53.9	7.1	150	0	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 (3.99 m / 3.0 m) = 2.48 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

Average measurement value with duty factor

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2483.500	AV	36.65	27.75	-27.41	-	1.37	2.48	40.84	53.9	13.0	*1)
Vert.	2483.500	AV	36.42	27.75	-27.41	-	1.37	2.48	40.61	53.9	13.2	*1)

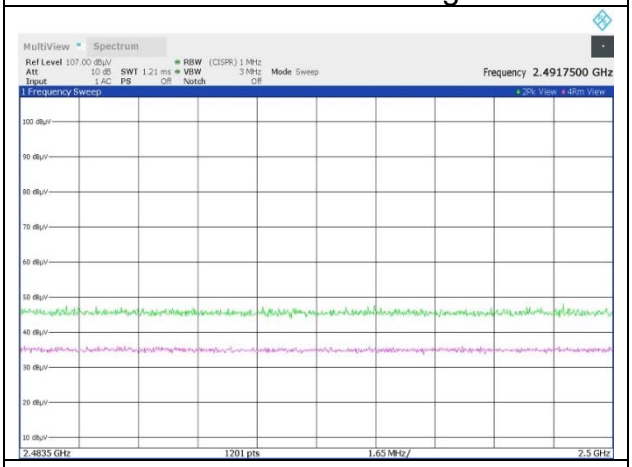
Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz) - Gain(Amplifier)) + Duty factor + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.99 m / 3.0 m) = 2.48 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB
Duty factor refer to "Burst rate confirmation" sheet.
*1) Not out of band emission (Leakage Power)

Radiated Spurious Emission
(Reference Plot for band-edge)

Test place	Shonan EMC Lab.
Semi Anechoic Chamber	WAC1
Date	February 6, 2024
Temperature / Humidity	23 deg. C / 31 % RH
Engineer	Shiro Kobayashi (1 GHz to 10 GHz)
Mode	Tx BT LE 1M-PHY 2480 MHz, Left

Horizontal

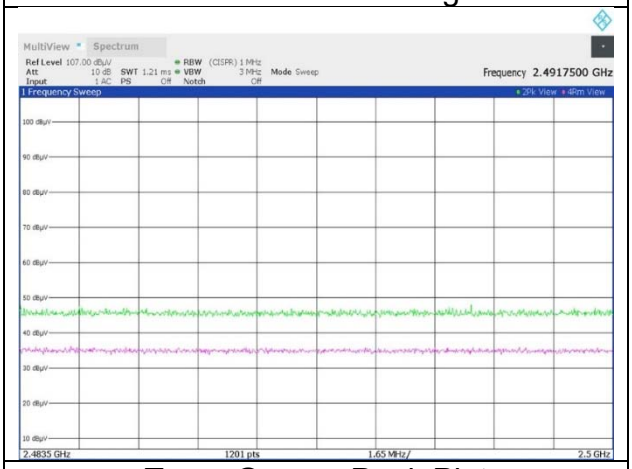
Restricted-band band-edge Plot



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	WAC2	WAC1	WAC1
Date	February 8, 2024	February 9, 2024	January 9, 2024
Temperature / Humidity	21 deg. C / 31 % RH	23 deg. C / 27 % RH	20 deg. C / 33 % RH
Engineer	Miku Ikudome	Miku Ikudome	Takahiro Suzuki
	(1 GHz to 10 GHz)	(10 GHz to 18 GHz)	(18 GHz to 26.5 GHz)
Mode	Tx BT LE 2M-PHY 2402 MHz, Left		

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	2390.000	PK	47.02	27.62	-28.27	-	2.48	48.85	73.9	25.0	209	57	-
Hori.	4804.000	PK	47.52	31.57	-35.70	-	2.48	45.87	73.9	28.0	150	0	-
Hori.	7206.000	PK	47.30	36.04	-34.23	-	2.48	51.59	73.9	22.3	150	0	-
Hori.	9608.000	PK	45.28	37.74	-31.63	-	2.48	53.87	73.9	20.0	150	0	-
Hori.	4804.000	AV	35.12	31.57	-35.70	-	2.48	33.47	53.9	20.4	150	0	Floor Noise
Hori.	7206.000	AV	34.89	36.04	-34.23	-	2.48	39.18	53.9	14.7	150	0	Floor Noise
Hori.	9608.000	AV	32.82	37.74	-31.63	-	2.48	41.41	53.9	12.4	150	0	Floor Noise
Vert.	2390.000	PK	47.21	27.62	-28.27	-	2.48	49.04	73.9	24.8	114	267	-
Vert.	4804.000	PK	47.72	31.57	-35.70	-	2.48	46.07	73.9	27.8	150	0	-
Vert.	7206.000	PK	47.36	36.04	-34.23	-	2.48	51.65	73.9	22.2	150	0	-
Vert.	9608.000	PK	44.83	37.74	-31.63	-	2.48	53.42	73.9	20.4	150	0	-
Vert.	4804.000	AV	35.16	31.57	-35.70	-	2.48	33.51	53.9	20.3	150	0	Floor Noise
Vert.	7206.000	AV	34.83	36.04	-34.23	-	2.48	39.12	53.9	14.7	150	0	Floor Noise
Vert.	9608.000	AV	32.61	37.74	-31.63	-	2.48	41.20	53.9	12.7	150	0	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 (3.99 m / 3.0 m) = 2.48 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

Average measurement value with duty factor

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2390.000	AV	35.32	27.62	-28.27	-	4.80	2.48	41.95	53.9	11.9	*1)
Vert.	2390.000	AV	35.28	27.62	-28.27	-	4.80	2.48	41.91	53.9	11.9	*1)

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz) - Gain(Amplifier)) + Duty factor + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.99 m / 3.0 m) = 2.48 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB
Duty factor refer to "Burst rate confirmation" sheet.
*1) Not out of band emission (Leakage Power)

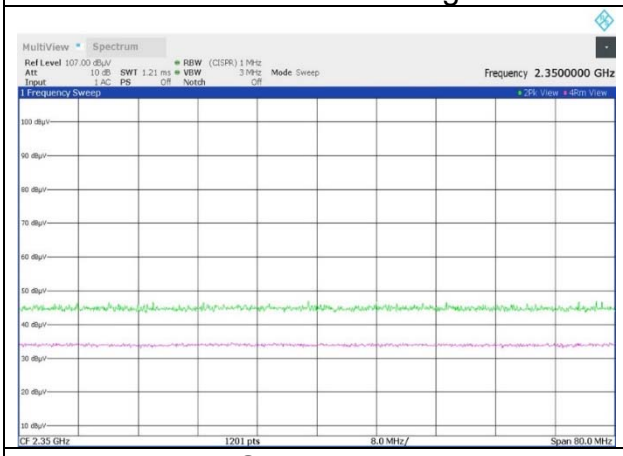
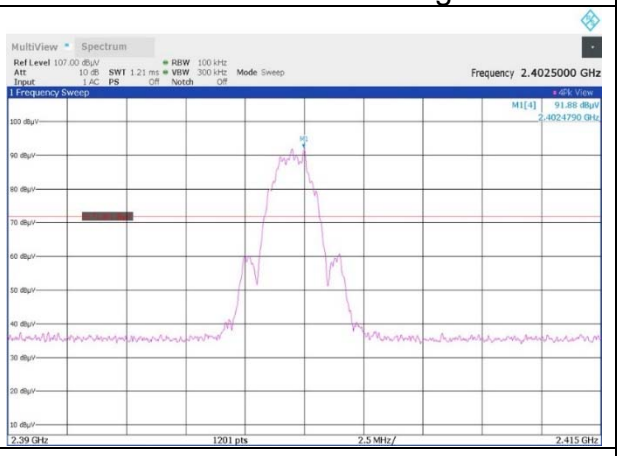
20 dBc Data Sheet **(RBW 100 kHz, VBW 300 kHz)**

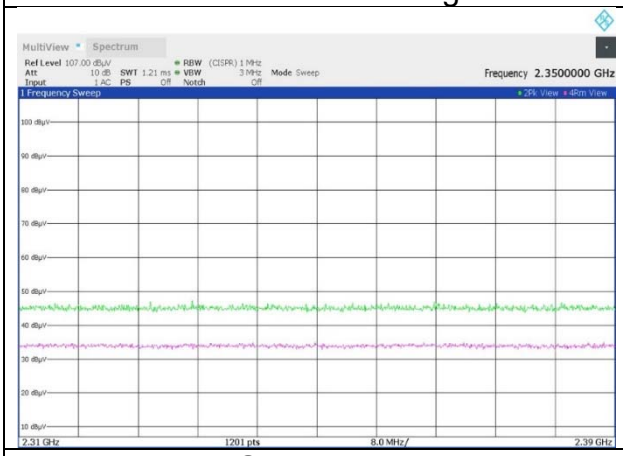
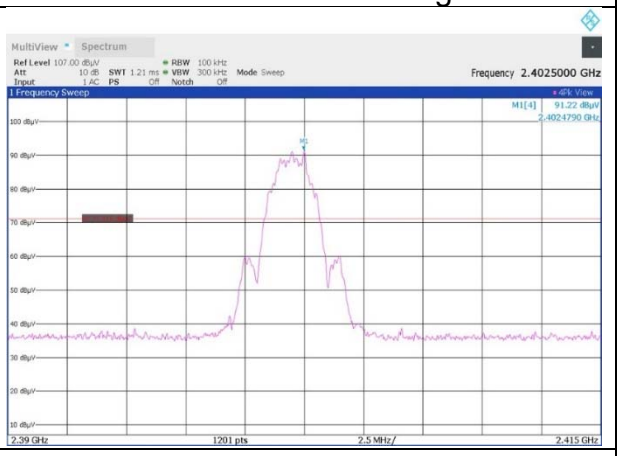
Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2402.000	PK	91.88	27.63	-28.26	-	2.48	93.73	-	-	Carrier
Hori.	2400.000	PK	60.02	27.63	-28.26	-	2.48	61.87	73.7	11.8	-
Vert.	2402.000	PK	91.23	27.63	-28.26	-	2.48	93.08	-	-	Carrier
Vert.	2400.000	PK	59.41	27.63	-28.26	-	2.48	61.26	73.0	**11.7**	-

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz) - Gain(Amplifier)) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.99 m / 3.0 m) = 2.48 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	WAC2
Date	February 8, 2024
Temperature / Humidity	21 deg. C / 31 % RH
Engineer	Miku Ikudome (1 GHz to 10 GHz)
Mode	Tx BT LE 2M-PHY 2402 MHz, Left

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 and authorized band edge were shown in tabular data.

Radiated Spurious Emission

Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	WAC2	WAC1	WAC1
Date	February 8, 2024	February 9, 2024	January 9, 2024
Temperature / Humidity	21 deg. C / 31 % RH	23 deg. C / 27 % RH	20 deg. C / 33 % RH
Engineer	Miku Ikudome	Miku Ikudome	Takahiro Suzuki
	(1 GHz to 10 GHz)	(10 GHz to 18 GHz)	(18 GHz to 26.5 GHz)
Mode	Tx BT LE 2M-PHY 2440 MHz, Left		

(* 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.	4880.000	PK	46.84	31.87	-35.78	-	2.48	45.41	73.9	28.4	150	0	-
Hori.	7320.000	PK	46.48	36.30	-34.01	-	2.48	51.25	73.9	22.6	150	0	-
Hori.	9760.000	PK	44.90	37.71	-31.47	-	2.48	53.62	73.9	20.2	150	0	-
Hori.	4880.000	AV	35.20	31.87	-35.78	-	2.48	33.77	53.9	20.1	150	0	Floor Noise
Hori.	7320.000	AV	35.28	36.30	-34.01	-	2.48	40.05	53.9	13.8	150	0	Floor Noise
Hori.	9760.000	AV	32.97	37.71	-31.47	-	2.48	41.69	53.9	**12.2**	150	0	Floor Noise
Vert.	4880.000	PK	46.79	31.87	-35.78	-	2.48	45.36	73.9	28.5	150	0	-
Vert.	7320.000	PK	46.85	36.30	-34.01	-	2.48	51.62	73.9	22.2	150	0	-
Vert.	9760.000	PK	44.56	37.71	-31.47	-	2.48	53.28	73.9	20.6	150	0	-
Vert.	4880.000	AV	35.61	31.87	-35.78	-	2.48	34.18	53.9	19.7	150	0	Floor Noise
Vert.	7320.000	AV	35.42	36.30	-34.01	-	2.48	40.19	53.9	13.7	150	0	Floor Noise
Vert.	9760.000	AV	32.82	37.71	-31.47	-	2.48	41.54	53.9	12.3	150	0	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 (3.99 m / 3.0 m) = 2.48 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

Radiated Spurious Emission

Test place	Shonan EMC Lab.			
Semi Anechoic Chamber	WAC1	WAC2	WAC1	WAC1
Date	February 8, 2024	February 8, 2024	February 9, 2024	January 9, 2024
Temperature / Humidity	20 deg. C / 30 % RH	21 deg. C / 31 % RH	23 deg. C / 27 % RH	20 deg. C / 33 % RH
Engineer	Shiro Kobayashi	Miku Ikudome	Miku Ikudome	Takahiro Suzuki
	(30 MHz to 1 GHz)	(1 GHz to 10 GHz)	(10 GHz to 18 GHz)	(18 GHz to 26.5 GHz)
Mode	Tx BT LE 2M-PHY 2480 MHz, Left			

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	31.276	QP	22.10	13.40	6.16	32.55	0.00	9.11	40.0	30.8	100	0	-
Hori.	840.190	QP	20.50	21.44	8.59	30.88	0.00	19.65	46.0	26.3	100	0	-
Hori.	890.275	QP	20.70	22.13	8.67	30.59	0.00	20.91	46.0	25.0	100	0	-
Hori.	954.112	QP	20.00	22.14	8.78	30.15	0.00	20.77	46.0	25.2	100	0	-
Hori.	2483.500	PK	48.29	27.64	-28.21	-	2.48	50.20	73.9	23.7	226	239	-
Hori.	4960.000	PK	46.85	32.11	-35.86	-	2.48	45.58	73.9	28.3	150	0	-
Hori.	7440.000	PK	46.97	36.46	-33.79	-	2.48	52.12	73.9	21.7	150	0	-
Hori.	9920.000	PK	44.41	37.72	-31.31	-	2.48	53.30	73.9	20.6	150	0	-
Hori.	4960.000	AV	34.52	32.11	-35.86	-	2.48	33.25	53.9	20.6	150	0	Floor Noise
Hori.	7440.000	AV	34.91	36.46	-33.79	-	2.48	40.06	53.9	13.8	150	0	Floor Noise
Hori.	9920.000	AV	32.26	37.72	-31.31	-	2.48	41.15	53.9	12.7	150	0	Floor Noise
Vert.	33.081	QP	20.80	12.93	6.18	32.62	0.00	7.29	40.0	32.7	100	0	-
Vert.	861.886	QP	20.50	21.94	8.63	30.77	0.00	20.30	46.0	25.7	100	0	-
Vert.	923.592	QP	20.30	22.14	8.73	30.36	0.00	20.81	46.0	25.1	100	0	-
Vert.	946.303	QP	20.00	22.06	8.76	30.21	0.00	20.61	46.0	25.3	100	0	-
Vert.	2483.500	PK	47.89	27.64	-28.21	-	2.48	49.80	73.9	24.1	277	198	-
Vert.	4960.000	PK	46.84	32.11	-35.86	-	2.48	45.57	73.9	28.3	150	0	-
Vert.	7440.000	PK	46.92	36.46	-33.79	-	2.48	52.07	73.9	21.8	150	0	-
Vert.	9920.000	PK	44.81	37.72	-31.31	-	2.48	53.70	73.9	20.2	150	0	-
Vert.	4960.000	AV	34.82	32.11	-35.86	-	2.48	33.55	53.9	20.3	150	0	Floor Noise
Vert.	7440.000	AV	35.00	36.46	-33.79	-	2.48	40.15	53.9	13.7	150	0	Floor Noise
Vert.	9920.000	AV	32.35	37.72	-31.31	-	2.48	41.24	53.9	12.6	150	0	Floor Noise

1 GHz - 18 GHz : Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz) - Gain(Amplifier)) + Distance factor
Other bands : Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.99 m / 3.0 m) = 2.48 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

Average measurement value with duty factor

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2483.500	AV	36.27	27.64	-28.21	-	4.80	2.48	42.98	53.9	**10.9**	*1)
Vert.	2483.500	AV	35.87	27.64	-28.21	-	4.80	2.48	42.58	53.9	11.3	*1)

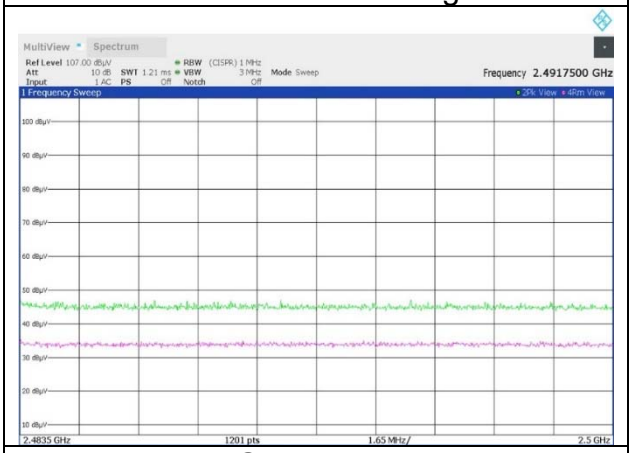
Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz) - Gain(Amplifier)) + Duty factor + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.99 m / 3.0 m) = 2.48 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB
Duty factor refer to "Burst rate confirmation" sheet.
*1) Not out of band emission (Leakage Power)

Radiated Spurious Emission
(Reference Plot for band-edge)

Test place	Shonan EMC Lab.
Semi Anechoic Chamber	WAC2
Date	February 8, 2024
Temperature / Humidity	21 deg. C / 31 % RH
Engineer	Miku Ikudome (1 GHz to 10 GHz)
Mode	Tx BT LE 2M-PHY 2480 MHz, Left

Horizontal

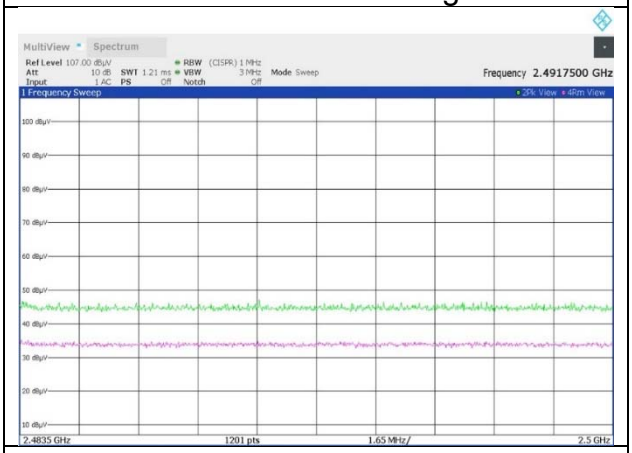
Restricted-band band-edge Plot



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	WAC1	WAC1
Date	February 6, 2024	February 9, 2024
Temperature / Humidity	23 deg. C / 31 % RH	23 deg. C / 27 % RH
Engineer	Shiro Kobayashi (1 GHz to 10 GHz)	Miku Ikudome (10 GHz to 26.5 GHz)
Mode	Tx BT LE 1M-PHY 2402 MHz, Right	

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	2390.000	PK	47.80	27.77	-27.48	-	2.48	50.57	73.9	23.3	147	118	-
Hori.	4804.000	PK	47.68	31.53	-34.65	-	2.48	47.04	73.9	26.8	150	0	-
Hori.	7206.000	PK	48.04	36.19	-32.92	-	2.48	53.79	73.9	20.1	150	0	-
Hori.	9608.000	PK	47.03	38.64	-30.10	-	2.48	58.05	73.9	15.8	150	0	-
Hori.	4804.000	AV	36.27	31.53	-34.65	-	2.48	35.63	53.9	18.2	150	0	Floor Noise
Hori.	7206.000	AV	36.58	36.19	-32.92	-	2.48	42.33	53.9	11.5	150	0	Floor Noise
Hori.	9608.000	AV	35.39	38.64	-30.10	-	2.48	46.41	53.9	7.4	150	0	Floor Noise
Vert.	2390.000	PK	48.20	27.77	-27.48	-	2.48	50.97	73.9	22.9	125	87	-
Vert.	4804.000	PK	47.86	31.53	-34.65	-	2.48	47.22	73.9	26.6	150	0	-
Vert.	7206.000	PK	48.64	36.19	-32.92	-	2.48	54.39	73.9	19.5	150	0	-
Vert.	9608.000	PK	46.99	38.64	-30.10	-	2.48	58.01	73.9	15.8	150	0	-
Vert.	4804.000	AV	36.19	31.53	-34.65	-	2.48	35.55	53.9	18.3	150	0	Floor Noise
Vert.	7206.000	AV	36.65	36.19	-32.92	-	2.48	42.40	53.9	11.5	150	0	Floor Noise
Vert.	9608.000	AV	35.55	38.64	-30.10	-	2.48	46.57	53.9	**7.3**	150	0	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 (3.99 m / 3.0 m) = 2.48 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

Average measurement value with duty factor

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2390.000	AV	36.20	27.77	-27.48	-	1.37	2.48	40.34	53.9	13.5	*1)
Vert.	2390.000	AV	36.21	27.77	-27.48	-	1.37	2.48	40.35	53.9	13.5	*1)

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz) - Gain(Amplifier)) + Duty factor + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.99 m / 3.0 m) = 2.48 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB
Duty factor refer to "Burst rate confirmation" sheet.
*1) Not out of band emission (Leakage Power)

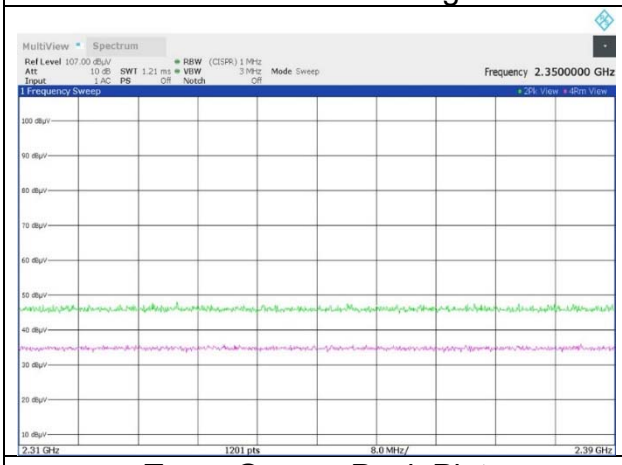
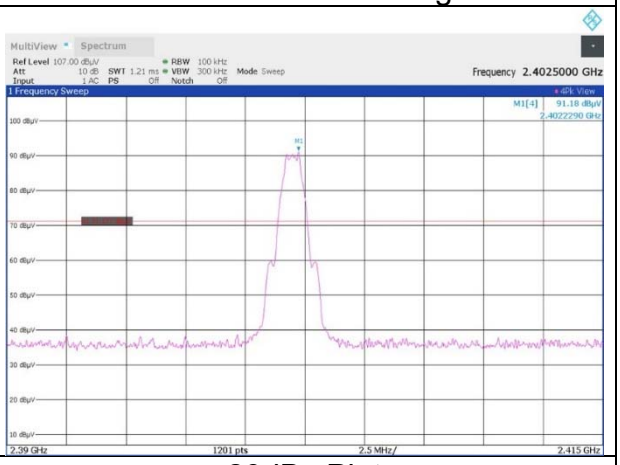
20 dBc Data Sheet **(RBW 100 kHz, VBW 300 kHz)**

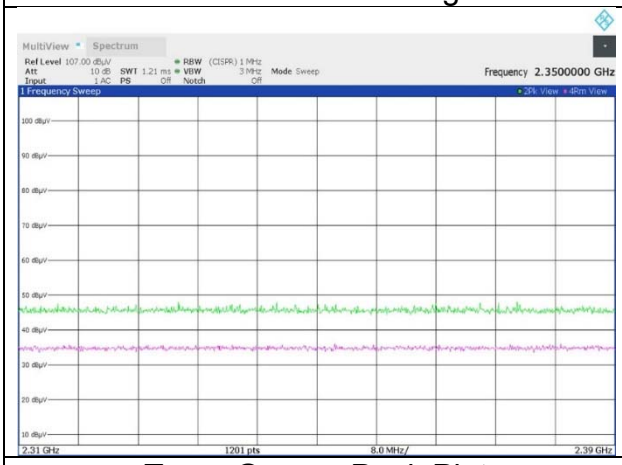
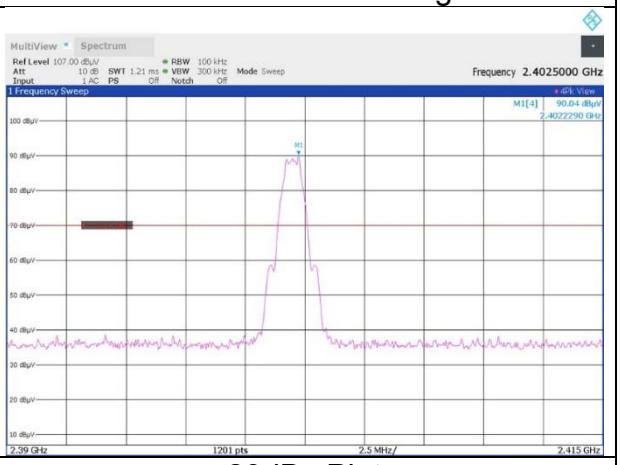
Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2402.000	PK	91.18	27.76	-27.47	-	2.48	93.95	-	-	Carrier
Hori.	2400.000	PK	39.79	27.76	-27.47	-	2.48	42.56	73.9	31.3	-
Vert.	2402.000	PK	90.04	27.76	-27.47	-	2.48	92.81	-	-	Carrier
Vert.	2400.000	PK	39.00	27.76	-27.47	-	2.48	41.77	72.8	31.0	-

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz) - Gain(Amplifier)) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.99 m / 3.0 m) = 2.48 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	WAC1
Date	February 6, 2024
Temperature / Humidity	23 deg. C / 31 % RH
Engineer	Shiro Kobayashi (1 GHz to 10 GHz)
Mode	Tx BT LE 1M-PHY 2402 MHz, Right

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 and authorized band edge were shown in tabular data.

Radiated Spurious Emission

Test place	Shonan EMC Lab.	
Semi Anechoic Chamber	WAC1	WAC1
Date	February 6, 2024	February 9, 2024
Temperature / Humidity	23 deg. C / 31 % RH	23 deg. C / 27 % RH
Engineer	Shiro Kobayashi (1 GHz to 10 GHz)	Miku Ikudome (10 GHz to 26.5 GHz)
Mode	Tx BT LE 1M-PHY 2440 MHz, Right	

(* 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.	4880.000	PK	48.55	31.62	-34.71	-	2.48	47.94	73.9	25.9	150	0	-
Hori.	7320.000	PK	49.05	36.27	-32.70	-	2.48	55.10	73.9	18.8	150	0	-
Hori.	9760.000	PK	47.53	39.01	-29.94	-	2.48	59.08	73.9	14.8	150	0	-
Hori.	4880.000	AV	36.56	31.62	-34.71	-	2.48	35.95	53.9	17.9	150	0	Floor Noise
Hori.	7320.000	AV	37.01	36.27	-32.70	-	2.48	43.06	53.9	10.8	150	0	Floor Noise
Hori.	9760.000	AV	35.87	39.01	-29.94	-	2.48	47.42	53.9	**6.4**	150	0	Floor Noise
Vert.	4880.000	PK	48.34	31.62	-34.71	-	2.48	47.73	73.9	26.1	150	0	-
Vert.	7320.000	PK	48.29	36.27	-32.70	-	2.48	54.34	73.9	19.5	150	0	-
Vert.	9760.000	PK	48.09	39.01	-29.94	-	2.48	59.64	73.9	14.2	150	0	-
Vert.	4880.000	AV	36.78	31.62	-34.71	-	2.48	36.17	53.9	17.7	150	0	Floor Noise
Vert.	7320.000	AV	36.99	36.27	-32.70	-	2.48	43.04	53.9	10.8	150	0	Floor Noise
Vert.	9760.000	AV	35.71	39.01	-29.94	-	2.48	47.26	53.9	6.6	150	0	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 (3.99 m / 3.0 m) = 2.48 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

Radiated Spurious Emission

Test place	Shonan EMC Lab.	
Semi Anechoic Chamber	WAC2	WAC1
Date	February 8, 2024	February 9, 2024
Temperature / Humidity	21 deg. C / 31 % RH	23 deg. C / 27 % RH
Engineer	Miku Ikudome	Miku Ikudome
	(1 GHz to 10 GHz)	(10 GHz to 26.5 GHz)
Mode	Tx BT LE 1M-PHY 2480 MHz, Right	

(* 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	46.84	27.64	-28.21	-	2.48	48.75	73.9	25.1	197	122	-
Hori.	4960.000	PK	47.01	32.11	-35.86	-	2.48	45.74	73.9	28.1	150	0	-
Hori.	7440.000	PK	47.24	36.46	-33.79	-	2.48	52.39	73.9	21.5	150	0	-
Hori.	9920.000	PK	44.53	37.72	-31.31	-	2.48	53.42	73.9	20.4	150	0	-
Hori.	4960.000	AV	35.25	32.11	-35.86	-	2.48	33.98	53.9	19.9	150	0	Floor Noise
Hori.	7440.000	AV	35.64	36.46	-33.79	-	2.48	40.79	53.9	13.1	150	0	Floor Noise
Hori.	9920.000	AV	32.68	37.72	-31.31	-	2.48	41.57	53.9	**12.3**	150	0	Floor Noise
Vert.	2483.500	PK	47.55	27.64	-28.21	-	2.48	49.46	73.9	24.4	233	133	-
Vert.	4960.000	PK	47.50	32.11	-35.86	-	2.48	46.23	73.9	27.6	150	0	-
Vert.	7440.000	PK	47.17	36.46	-33.79	-	2.48	52.32	73.9	21.5	150	0	-
Vert.	9920.000	PK	44.41	37.72	-31.31	-	2.48	53.30	73.9	20.6	150	0	-
Vert.	4960.000	AV	34.85	32.11	-35.86	-	2.48	33.58	53.9	20.3	150	0	Floor Noise
Vert.	7440.000	AV	35.09	36.46	-33.79	-	2.48	40.24	53.9	13.6	150	0	Floor Noise
Vert.	9920.000	AV	32.53	37.72	-31.31	-	2.48	41.42	53.9	12.4	150	0	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 (3.99 m / 3.0 m) = 2.48 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

Average measurement value with duty factor

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2483.500	AV	35.23	27.64	-28.21	-	1.37	2.48	38.51	53.9	15.3	*1)
Vert.	2483.500	AV	35.17	27.64	-28.21	-	1.37	2.48	38.45	53.9	15.4	*1)

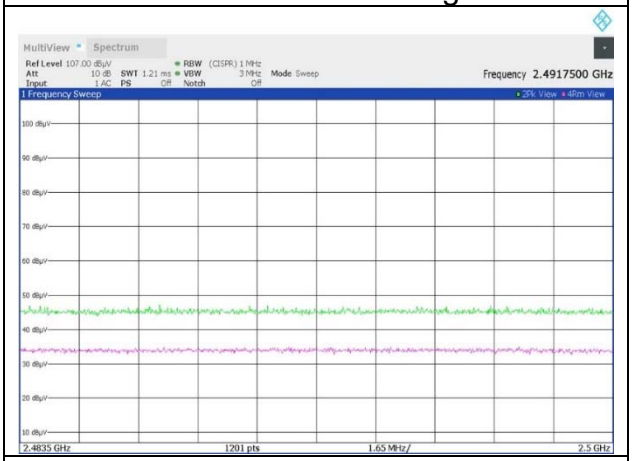
Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz) - Gain(Amplifier)) + Duty factor + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.99 m / 3.0 m) = 2.48 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB
Duty factor refer to "Burst rate confirmation" sheet.
*1) Not out of band emission (Leakage Power)

Radiated Spurious Emission
(Reference Plot for band-edge)

Test place	Shonan EMC Lab.
Semi Anechoic Chamber	WAC2
Date	February 8, 2024
Temperature / Humidity	21 deg. C / 31 % RH
Engineer	Miku Ikudome (1 GHz to 10 GHz)
Mode	Tx BT LE 1M-PHY 2480 MHz, Right

Horizontal

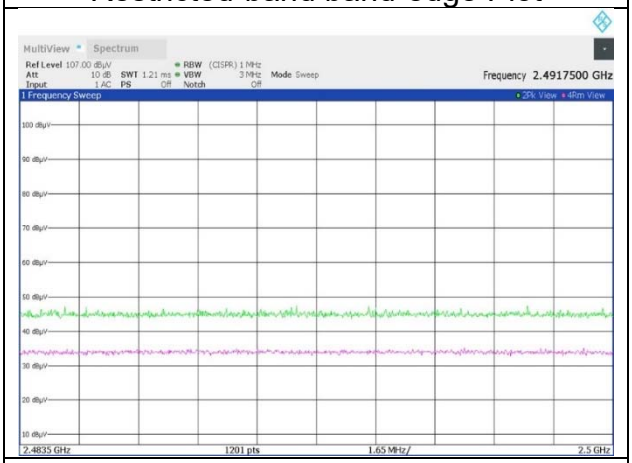
Restricted-band band-edge Plot



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	WAC2	WAC1
Date	February 8, 2024	February 9, 2024
Temperature / Humidity	21 deg. C / 31 % RH	23 deg. C / 27 % RH
Engineer	Miku Ikudome	Miku Ikudome
	(1 GHz to 10 GHz)	(10 GHz to 26.5 GHz)
Mode	Tx BT LE 2M-PHY 2402 MHz, Right	

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	2390.000	PK	47.02	27.62	-28.27	-	2.48	48.85	73.9	25.0	207	125	-
Hori.	4804.000	PK	47.23	31.57	-35.70	-	2.48	45.58	73.9	28.3	150	0	-
Hori.	7206.000	PK	46.40	36.04	-34.23	-	2.48	50.69	73.9	23.2	150	0	-
Hori.	9608.000	PK	44.90	37.74	-31.63	-	2.48	53.49	73.9	20.4	150	0	-
Hori.	4804.000	AV	35.00	31.57	-35.70	-	2.48	33.35	53.9	20.5	150	0	Floor Noise
Hori.	7206.000	AV	34.73	36.04	-34.23	-	2.48	39.02	53.9	14.8	150	0	Floor Noise
Hori.	9608.000	AV	32.86	37.74	-31.63	-	2.48	41.45	53.9	12.4	150	0	Floor Noise
Vert.	2390.000	PK	47.05	27.62	-28.27	-	2.48	48.88	73.9	25.0	183	165	-
Vert.	4804.000	PK	47.25	31.57	-35.70	-	2.48	45.60	73.9	28.3	150	0	-
Vert.	7206.000	PK	46.49	36.04	-34.23	-	2.48	50.78	73.9	23.1	150	0	-
Vert.	9608.000	PK	45.03	37.74	-31.63	-	2.48	53.62	73.9	20.2	150	0	-
Vert.	4804.000	AV	34.92	31.57	-35.70	-	2.48	33.27	53.9	20.6	150	0	Floor Noise
Vert.	7206.000	AV	34.78	36.04	-34.23	-	2.48	39.07	53.9	14.8	150	0	Floor Noise
Vert.	9608.000	AV	32.48	37.74	-31.63	-	2.48	41.07	53.9	12.8	150	0	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 (3.99 m / 3.0 m) = 2.48 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

Average measurement value with duty factor

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2390.000	AV	35.15	27.62	-28.27	-	4.80	2.48	41.78	53.9	12.1	*1)
Vert.	2390.000	AV	35.07	27.62	-28.27	-	4.80	2.48	41.70	53.9	12.2	*1)

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz) - Gain(Amplifier)) + Duty factor + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.99 m / 3.0 m) = 2.48 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB
Duty factor refer to "Burst rate confirmation" sheet.
*1) Not out of band emission (Leakage Power)

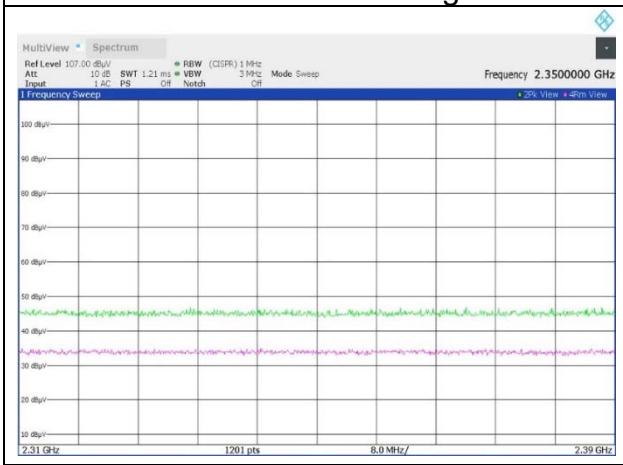
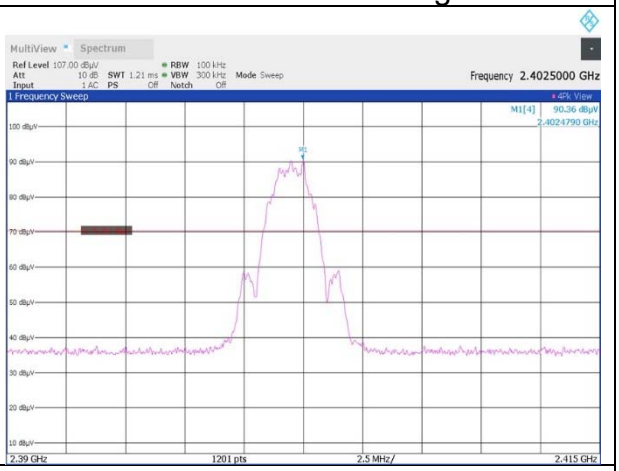
20 dBc Data Sheet **(RBW 100 kHz, VBW 300 kHz)**

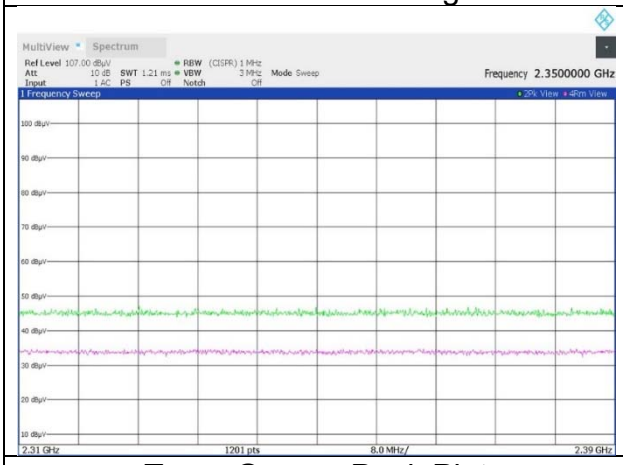
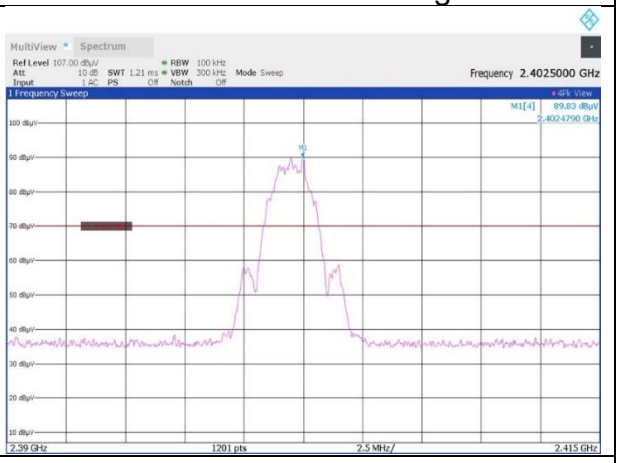
Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2402.000	PK	90.42	27.63	-28.26	-	2.48	92.27	-	-	Carrier
Hori.	2400.000	PK	58.40	27.63	-28.26	-	2.48	60.25	72.2	**11.9**	-
Vert.	2402.000	PK	89.86	27.63	-28.26	-	2.48	91.71	-	-	Carrier
Vert.	2400.000	PK	57.82	27.63	-28.26	-	2.48	59.67	71.7	12.0	-

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz) - Gain(Amplifier)) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.99 m / 3.0 m) = 2.48 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	WAC2
Date	February 8, 2024
Temperature / Humidity	21 deg. C / 31 % RH
Engineer	Miku Ikudome (1 GHz to 10 GHz)
Mode	Tx BT LE 2M-PHY 2402 MHz, Right

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 and authorized band edge were shown in tabular data.

Radiated Spurious Emission

Test place	Shonan EMC Lab.	
Semi Anechoic Chamber	WAC2	WAC1
Date	February 8, 2024	February 9, 2024
Temperature / Humidity	21 deg. C / 31 % RH	23 deg. C / 27 % RH
Engineer	Miku Ikudome (1 GHz to 10 GHz)	Miku Ikudome (10 GHz to 26.5 GHz)
Mode	Tx BT LE 2M-PHY 2440 MHz, Right	

(* 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.	4880.000	PK	46.90	31.87	-35.78	-	2.48	45.47	73.9	28.4	150	0	-
Hori.	7320.000	PK	46.51	36.30	-34.01	-	2.48	51.28	73.9	22.6	150	0	-
Hori.	9760.000	PK	44.75	37.71	-31.47	-	2.48	53.47	73.9	20.4	150	0	-
Hori.	4880.000	AV	35.72	31.87	-35.78	-	2.48	34.29	53.9	19.6	150	0	Floor Noise
Hori.	7320.000	AV	35.83	36.30	-34.01	-	2.48	40.60	53.9	13.3	150	0	Floor Noise
Hori.	9760.000	AV	32.76	37.71	-31.47	-	2.48	41.48	53.9	12.4	150	0	Floor Noise
Vert.	4880.000	PK	46.83	31.87	-35.78	-	2.48	45.40	73.9	28.5	150	0	-
Vert.	7320.000	PK	46.60	36.30	-34.01	-	2.48	51.37	73.9	22.5	150	0	-
Vert.	9760.000	PK	45.02	37.71	-31.47	-	2.48	53.74	73.9	20.1	150	0	-
Vert.	4880.000	AV	35.67	31.87	-35.78	-	2.48	34.24	53.9	19.6	150	0	Floor Noise
Vert.	7320.000	AV	35.73	36.30	-34.01	-	2.48	40.50	53.9	13.4	150	0	Floor Noise
Vert.	9760.000	AV	32.84	37.71	-31.47	-	2.48	41.56	53.9	**12.3**	150	0	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 (3.99 m / 3.0 m) = 2.48 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

Radiated Spurious Emission

Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	WAC1	WAC2	WAC1
Date	February 8, 2024	February 8, 2024	February 9, 2024
Temperature / Humidity	20 deg. C / 30 % RH	21 deg. C / 31 % RH	23 deg. C / 27 % RH
Engineer	Shiro Kobayashi	Miku Ikudome	Miku Ikudome
	(30 MHz to 1 GHz)	(1 GHz to 10 GHz)	(10 GHz to 26.5 GHz)
Mode	Tx BT LE 2M-PHY 2480 MHz, Right		

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	30.595	QP	22.20	13.58	6.14	32.53	0.00	9.39	40.0	30.6	100	0	-
Hori.	688.892	QP	21.10	19.72	8.31	31.57	0.00	17.56	46.0	28.4	100	0	-
Hori.	726.417	QP	20.90	20.15	8.38	31.44	0.00	17.99	46.0	28.0	100	0	-
Hori.	774.301	QP	21.00	20.51	8.47	31.21	0.00	18.77	46.0	27.2	100	0	-
Hori.	841.218	QP	20.50	21.47	8.59	30.88	0.00	19.68	46.0	26.3	100	0	-
Hori.	2483.500	PK	48.17	27.64	-28.21	-	2.48	50.08	73.9	23.8	264	126	-
Hori.	4960.000	PK	47.18	32.11	-35.86	-	2.48	45.91	73.9	27.9	150	0	-
Hori.	7440.000	PK	46.93	36.46	-33.79	-	2.48	52.08	73.9	21.8	150	0	-
Hori.	9920.000	PK	44.47	37.72	-31.31	-	2.48	53.36	73.9	20.5	150	0	-
Hori.	4960.000	AV	35.31	32.11	-35.86	-	2.48	34.04	53.9	19.8	150	0	Floor Noise
Hori.	7440.000	AV	35.15	36.46	-33.79	-	2.48	40.30	53.9	13.6	150	0	Floor Noise
Hori.	9920.000	AV	32.42	37.72	-31.31	-	2.48	41.31	53.9	12.5	150	0	Floor Noise
Vert.	30.214	QP	22.20	13.69	6.14	32.52	0.00	9.51	40.0	30.4	100	0	-
Vert.	799.900	QP	20.70	20.84	8.52	31.05	0.00	19.01	46.0	26.9	100	0	-
Vert.	920.688	QP	20.10	22.16	8.72	30.39	0.00	20.59	46.0	25.4	100	0	-
Vert.	2483.500	PK	47.03	27.64	-28.21	-	2.48	48.94	73.9	24.9	201	232	-
Vert.	4960.000	PK	46.86	32.11	-35.86	-	2.48	45.59	73.9	28.3	150	0	-
Vert.	7440.000	PK	46.41	36.46	-33.79	-	2.48	51.56	73.9	22.3	150	0	-
Vert.	9920.000	PK	44.22	37.72	-31.31	-	2.48	53.11	73.9	20.7	150	0	-
Vert.	4960.000	AV	35.23	32.11	-35.86	-	2.48	33.96	53.9	19.9	150	0	Floor Noise
Vert.	7440.000	AV	35.13	36.46	-33.79	-	2.48	40.28	53.9	13.6	150	0	Floor Noise
Vert.	9920.000	AV	32.38	37.72	-31.31	-	2.48	41.27	53.9	12.6	150	0	Floor Noise

1 GHz - 18 GHz : Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz) - Gain(Amplifier)) + Distance factor
Other bands : Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.99 m / 3.0 m) = 2.48 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

Average measurement value with duty factor

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2483.500	AV	35.65	27.64	-28.21	-	4.80	2.48	42.36	53.9	**11.5**	*1)
Vert.	2483.500	AV	35.31	27.64	-28.21	-	4.80	2.48	42.02	53.9	11.8	*1)

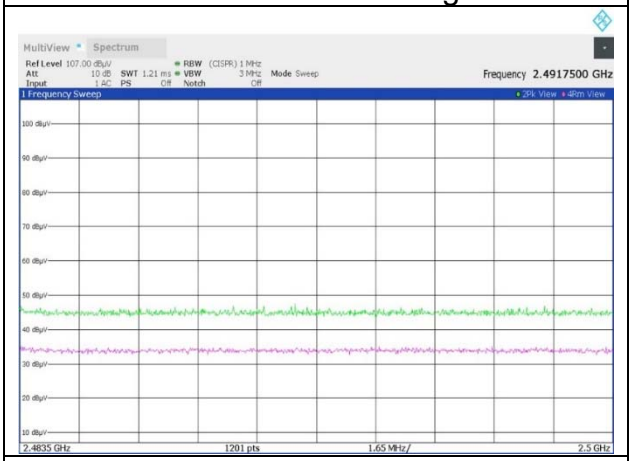
Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz) - Gain(Amplifier)) + Duty factor + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.99 m / 3.0 m) = 2.48 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB
Duty factor refer to "Burst rate confirmation" sheet.
*1) Not out of band emission (Leakage Power)

Radiated Spurious Emission
(Reference Plot for band-edge)

Test place	Shonan EMC Lab.
Semi Anechoic Chamber	WAC2
Date	February 8, 2024
Temperature / Humidity	21 deg. C / 31 % RH
Engineer	Miku Ikudome (1 GHz to 10 GHz)
Mode	Tx BT LE 2M-PHY 2480 MHz, Right

Horizontal

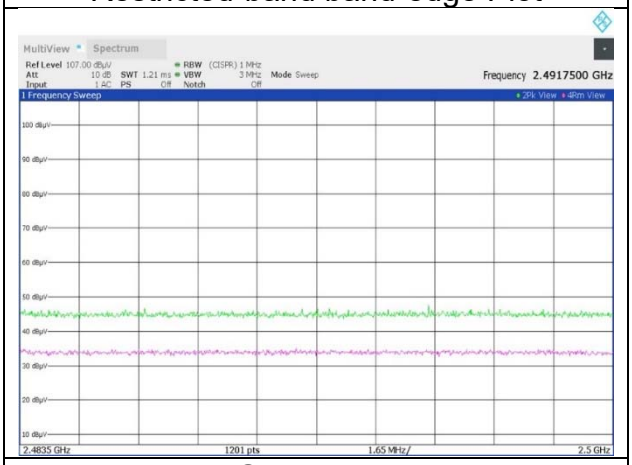
Restricted-band band-edge Plot



Trace Green : Peak Plot
Trace Purple : Average Plot

Vertical

Restricted-band band-edge Plot

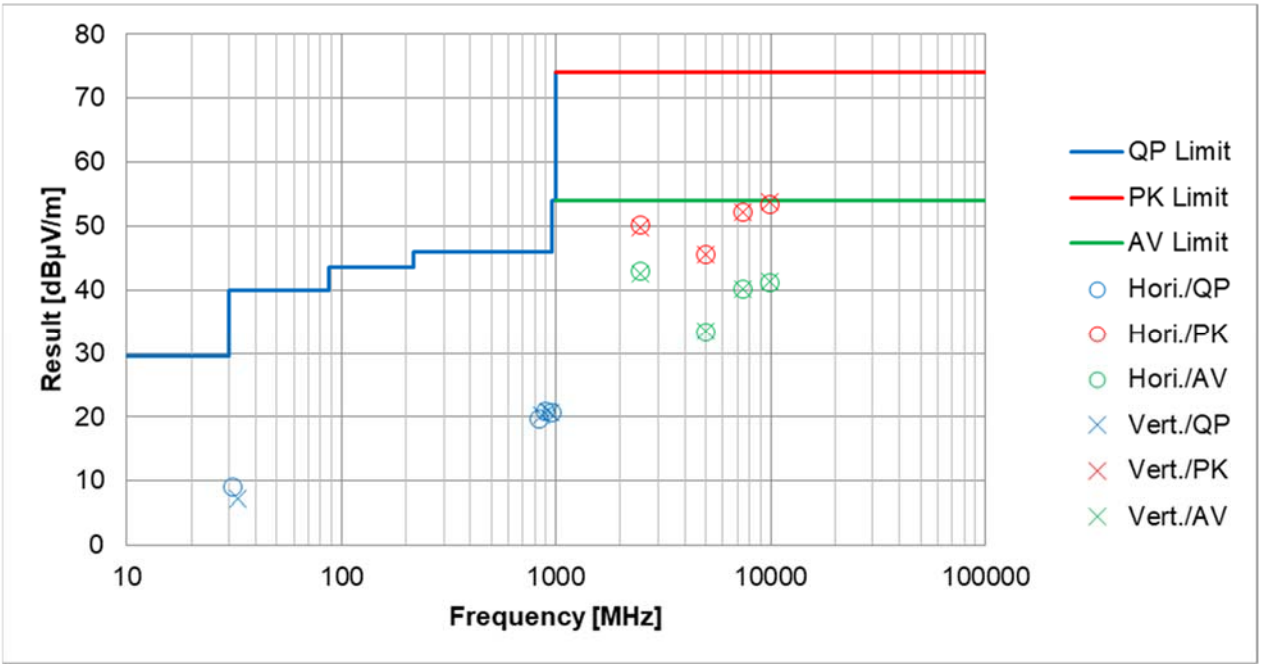


Trace Green : Peak Plot
Trace Purple : Average Plot

* 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)

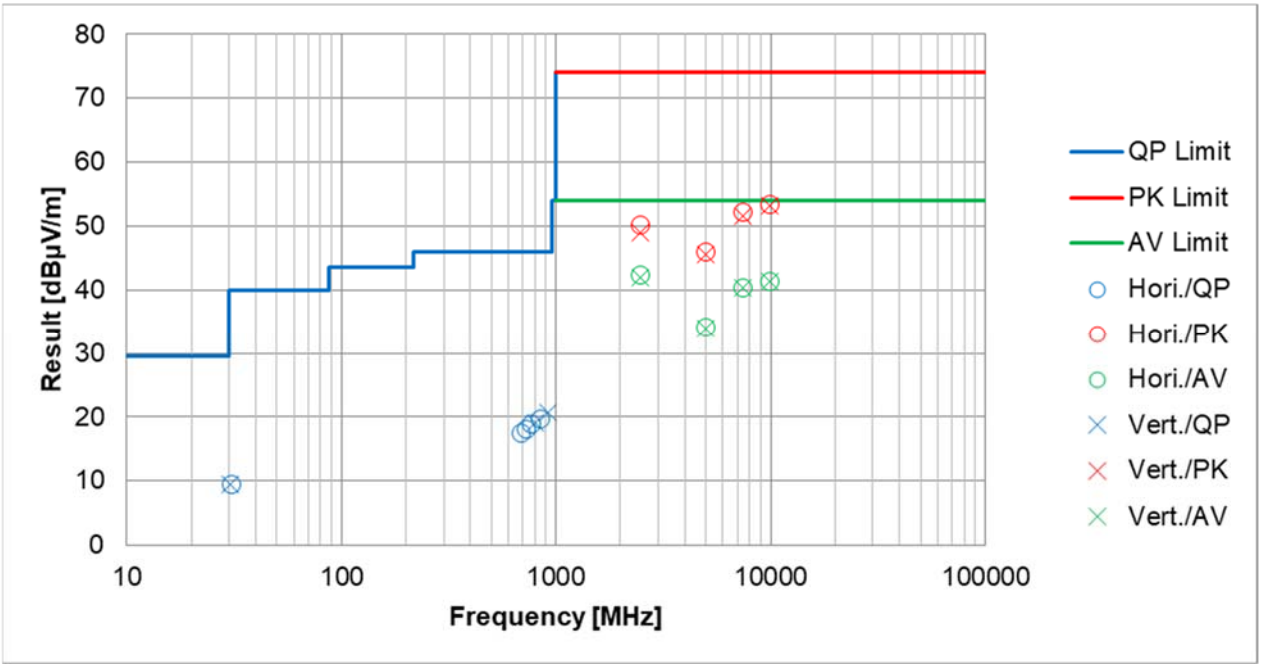
Test place	Shonan EMC Lab.			
Semi Anechoic Chamber	WAC1	WAC2	WAC1	WAC1
Date	February 8, 2024	February 8, 2024	February 9, 2024	January 9, 2024
Temperature / Humidity	20 deg. C / 30 % RH	21 deg. C / 31 % RH	23 deg. C / 27 % RH	20 deg. C / 33 % RH
Engineer	Shiro Kobayashi (30 MHz to 1 GHz)	Miku Ikudome (1 GHz to 10 GHz)	Miku Ikudome (10 GHz to 18 GHz)	Takahiro Suzuki (18 GHz to 26.5 GHz)
Mode	Tx BT LE 2M-PHY 2480 MHz, Left			



*These plots data contain 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	WAC1	WAC2	WAC1
Date	February 8, 2024	February 8, 2024	February 9, 2024
Temperature / Humidity	20 deg. C / 30 % RH	21 deg. C / 31 % RH	23 deg. C / 27 % RH
Engineer	Shiro Kobayashi (30 MHz to 1 GHz)	Miku Ikudome (1 GHz to 10 GHz)	Miku Ikudome (10 GHz to 26.5 GHz)
Mode	Tx BT LE 2M-PHY 2480 MHz, Right		

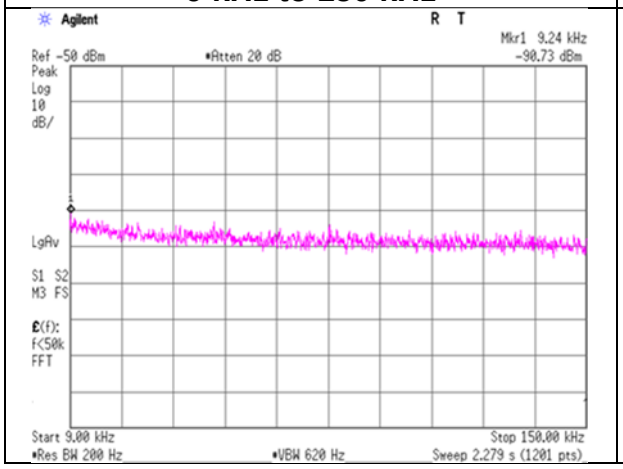


*These plots data contain sufficient number to show the trend of characteristic features for EUT.

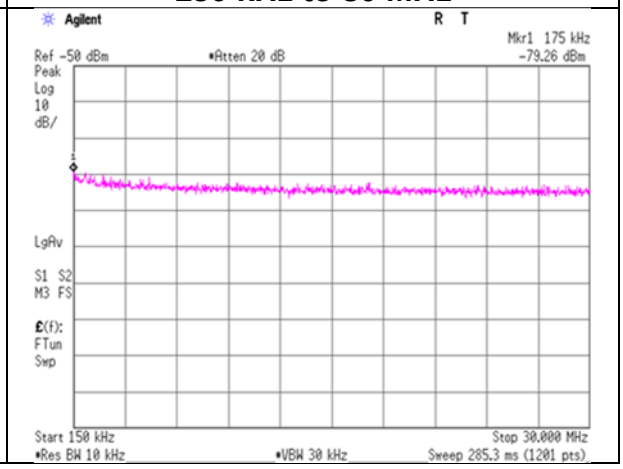
Conducted Spurious Emission

Test place	Shonan EMC Lab. No.5 Shielded Room
Date	December 18, 2023
Temperature / Humidity	23 deg. C / 35 % RH
Engineer	Miku Ikudome
Mode	Tx BT LE 1M-PHY 2402 MHz

9 kHz to 150 kHz



150 kHz to 30 MHz



Frequency [kHz]	Reading [dBm]	Cable Loss [dB]	Attenuator Loss [dB]	Antenna Gain * [dBi]	N (Number of Output)	EIRP [dBm]	Distance [m]	Ground bounce [dB]	E (field strength) [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
9.24	-90.7	1.9	9.8	2.0	1.0	-77.0	300	6.0	-15.8	48.2	64.0	-
175.00	-79.3	1.9	9.8	2.0	1.0	-65.5	300	6.0	-4.3	22.7	27.0	-

E [dBuV/m] = EIRP [dBm] - 20 log (Distance [m]) + Ground bounce [dB] + 104.8 [dBuV/m]

EIRP[dBm] = Reading [dBm] + Cable loss [dB] + Attenuator Loss [dB] + Antenna gain [dBi] + 10 * log (N)

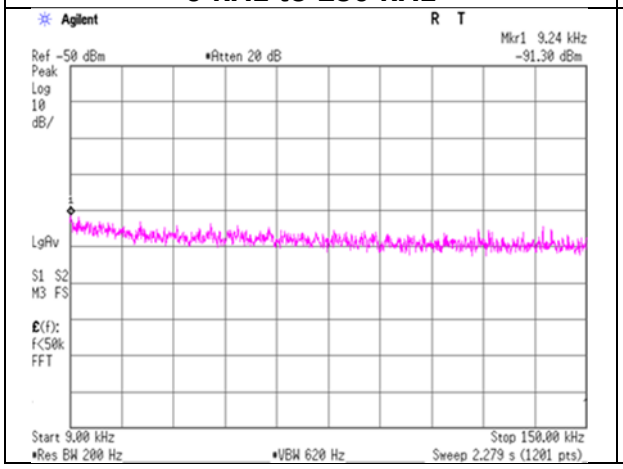
N: Number of output

*2.0 dBi was applied to the test result based on ANSI C63.10 since antenna gain was less than 2.0 dBi.

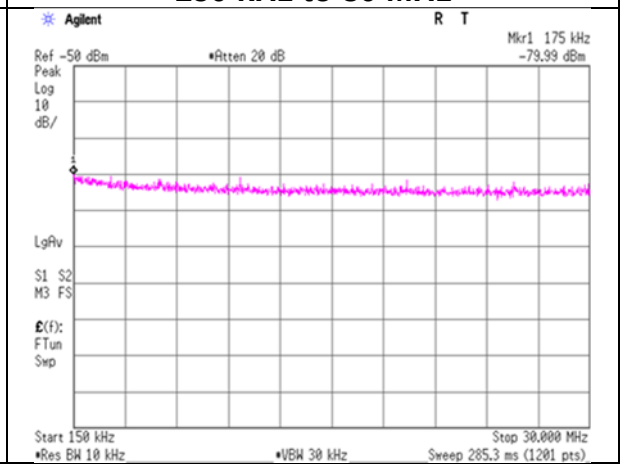
Conducted Spurious Emission

Test place	Shonan EMC Lab. No.5 Shielded Room
Date	December 18, 2023
Temperature / Humidity	23 deg. C / 35 % RH
Engineer	Miku Ikudome
Mode	Tx BT LE 1M-PHY 2440 MHz

9 kHz to 150 kHz



150 kHz to 30 MHz



Frequency [kHz]	Reading [dBm]	Cable Loss [dB]	Attenuator Loss [dB]	Antenna Gain * [dBi]	N (Number of Output)	EIRP [dBm]	Distance [m]	Ground bounce [dB]	E (field strength) [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
9.24	-91.3	1.9	9.8	2.0	1.0	-77.6	300	6.0	-16.3	48.2	64.5	-
175.00	-80.0	1.9	9.8	2.0	1.0	-66.3	300	6.0	-5.0	22.7	27.7	-

E [dBuV/m] = EIRP [dBm] - 20 log (Distance [m]) + Ground bounce [dB] + 104.8 [dBuV/m]

EIRP[dBm] = Reading [dBm] + Cable loss [dB] + Attenuator Loss [dB] + Antenna gain [dBi] + 10 * log (N)

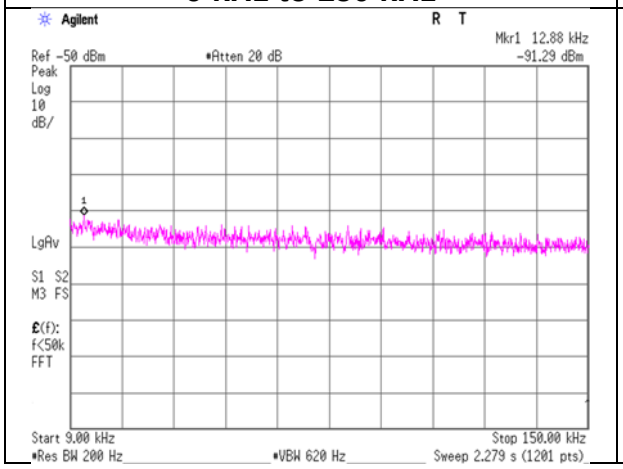
N: Number of output

*2.0 dBi was applied to the test result based on ANSI C63.10 since antenna gain was less than 2.0 dBi.

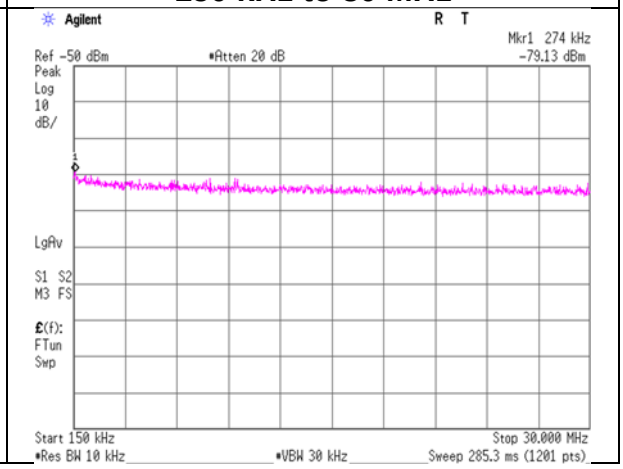
Conducted Spurious Emission

Test place	Shonan EMC Lab. No.5 Shielded Room
Date	December 18, 2023
Temperature / Humidity	23 deg. C / 35 % RH
Engineer	Miku Ikudome
Mode	Tx BT LE 1M-PHY 2480 MHz

9 kHz to 150 kHz



150 kHz to 30 MHz



Frequency [kHz]	Reading [dBm]	Cable Loss [dB]	Attenuator Loss [dB]	Antenna Gain * [dBi]	N (Number of Output)	EIRP [dBm]	Distance [m]	Ground bounce [dB]	E (field strength) [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
12.88	-91.3	1.9	9.8	2.0	1.0	-77.6	300	6.0	-16.3	45.4	61.7	-
274.00	-79.1	1.9	9.8	2.0	1.0	-65.4	300	6.0	-4.2	18.8	23.0	-

E [dBuV/m] = EIRP [dBm] - 20 log (Distance [m]) + Ground bounce [dB] + 104.8 [dBuV/m]

EIRP[dBm] = Reading [dBm] + Cable loss [dB] + Attenuator Loss [dB] + Antenna gain [dBi] + 10 * log (N)

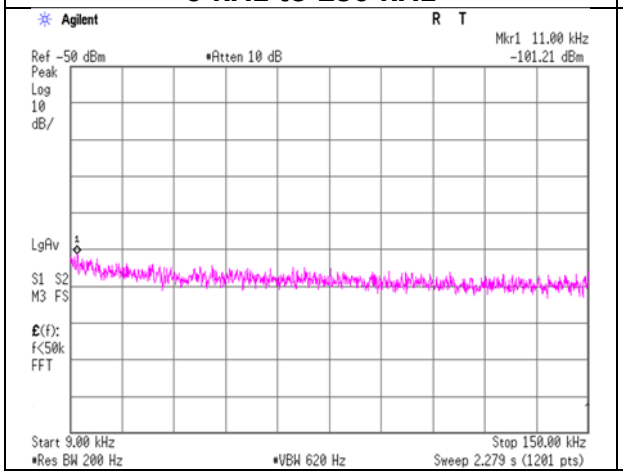
N: Number of output

*2.0 dBi was applied to the test result based on ANSI C63.10 since antenna gain was less than 2.0 dBi.

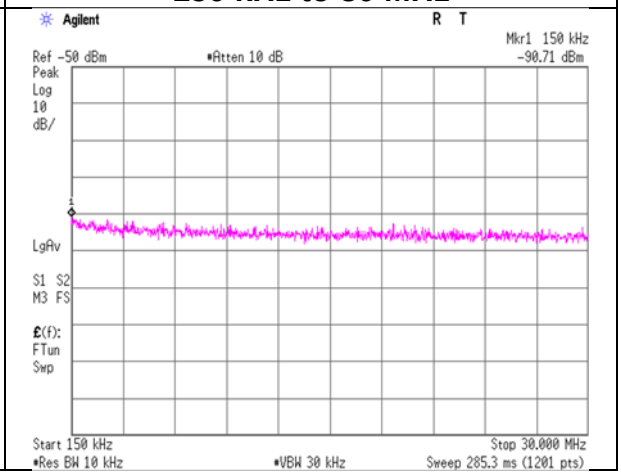
Conducted Spurious Emission

Test place	Shonan EMC Lab. No.5 Shielded Room
Date	December 19, 2023
Temperature / Humidity	23 deg. C / 38 % RH
Engineer	Yohsuke Matsuzawa
Mode	Tx BT LE 2M-PHY 2402 MHz

9 kHz to 150 kHz



150 kHz to 30 MHz



Frequency [kHz]	Reading [dBm]	Cable Loss [dB]	Attenuator Loss [dB]	Antenna Gain * [dBi]	N (Number of Output)	EIRP [dBm]	Distance [m]	Ground bounce [dB]	E (field strength) [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
11.00	-101.2	1.9	9.8	2.0	1.0	-87.5	300	6.0	-26.2	46.7	72.9	-
150.00	-90.7	1.9	9.8	2.0	1.0	-77.0	300	6.0	-15.7	24.0	39.7	-

E [dBuV/m] = EIRP [dBm] - 20 log (Distance [m]) + Ground bounce [dB] + 104.8 [dBuV/m]

EIRP[dBm] = Reading [dBm] + Cable loss [dB] + Attenuator Loss [dB] + Antenna gain [dBi] + 10 * log (N)

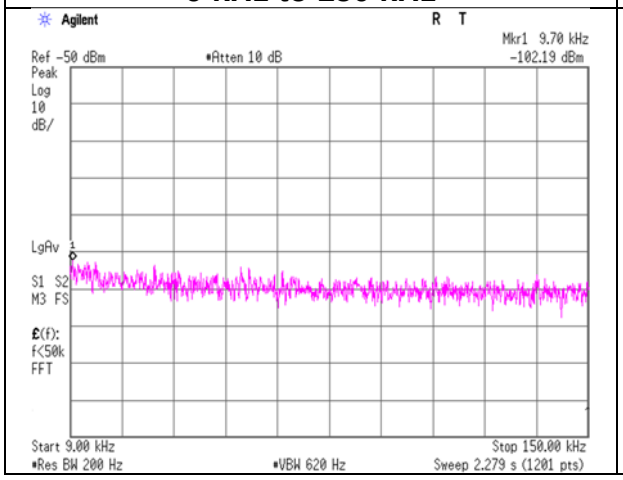
N: Number of output

*2.0 dBi was applied to the test result based on ANSI C63.10 since antenna gain was less than 2.0 dBi.

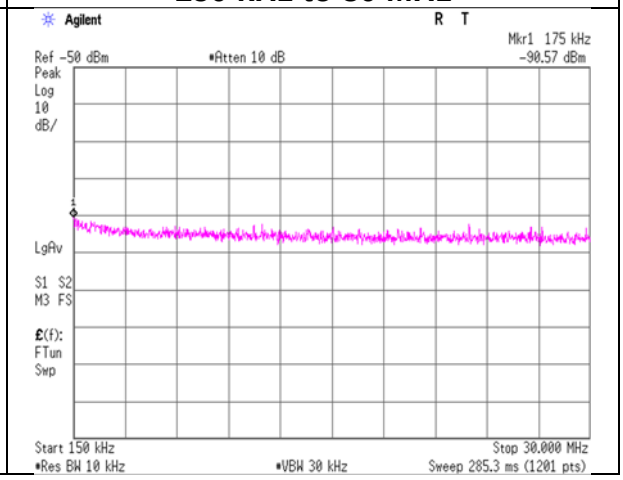
Conducted Spurious Emission

Test place	Shonan EMC Lab. No.5 Shielded Room
Date	December 19, 2023
Temperature / Humidity	23 deg. C / 38 % RH
Engineer	Yohsuke Matsuzawa
Mode	Tx BT LE 2M-PHY 2440 MHz

9 kHz to 150 kHz



150 kHz to 30 MHz



Frequency [kHz]	Reading [dBm]	Cable Loss [dB]	Attenuator Loss [dB]	Antenna Gain * [dBi]	N (Number of Output)	EIRP [dBm]	Distance [m]	Ground bounce [dB]	E (field strength) [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
9.70	-102.2	1.9	9.8	2.0	1.0	-88.5	300	6.0	-27.2	47.8	75.0	-
175.00	-90.6	1.9	9.8	2.0	1.0	-76.9	300	6.0	-15.6	22.7	38.3	-

E [dBuV/m] = EIRP [dBm] - 20 log (Distance [m]) + Ground bounce [dB] + 104.8 [dBuV/m]

EIRP[dBm] = Reading [dBm] + Cable loss [dB] + Attenuator Loss [dB] + Antenna gain [dBi] + 10 * log (N)

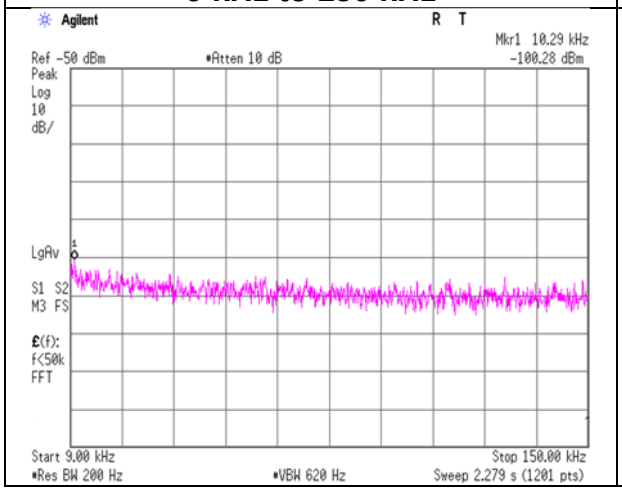
N: Number of output

*2.0 dBi was applied to the test result based on ANSI C63.10 since antenna gain was less than 2.0 dBi.

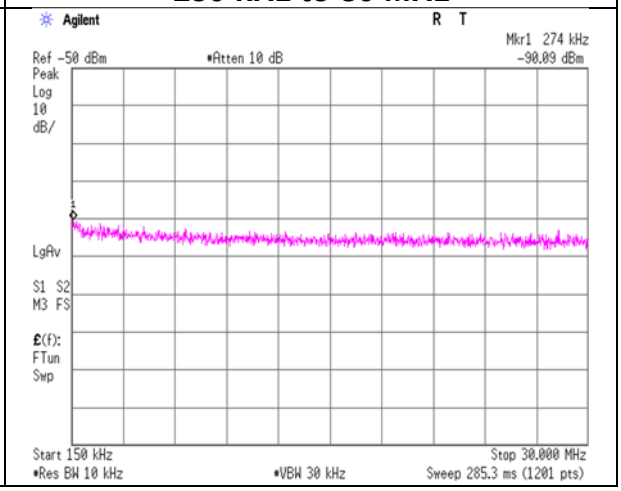
Conducted Spurious Emission

Test place	Shonan EMC Lab. No.5 Shielded Room
Date	December 19, 2023
Temperature / Humidity	23 deg. C / 38 % RH
Engineer	Yohsuke Matsuzawa
Mode	Tx BT LE 2M-PHY 2480 MHz

9 kHz to 150 kHz



150 kHz to 30 MHz



Frequency [kHz]	Reading [dBm]	Cable Loss [dB]	Attenuator Loss [dB]	Antenna Gain * [dBi]	N (Number of Output)	EIRP [dBm]	Distance [m]	Ground bounce [dB]	E (field strength) [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
10.29	-100.3	1.9	9.8	2.0	1.0	-86.6	300	6.0	-25.3	47.3	72.6	-
274.00	-90.1	1.9	9.8	2.0	1.0	-76.4	300	6.0	-15.1	18.8	33.9	-

E [dBuV/m] = EIRP [dBm] - 20 log (Distance [m]) + Ground bounce [dB] + 104.8 [dBuV/m]

EIRP[dBm] = Reading [dBm] + Cable loss [dB] + Attenuator Loss [dB] + Antenna gain [dBi] + 10 * log (N)

N: Number of output

*2.0 dBi was applied to the test result based on ANSI C63.10 since antenna gain was less than 2.0 dBi.

Power Density

Test place	Shonan EMC Lab. No.5 Shielded Room	
Date	December 18, 2023	December 19, 2023
Temperature / Humidity	23 deg. C / 35 % RH	23 deg. C / 38 % RH
Engineer	Miku Ikudome	Yohsuke Matsuzawa
Mode	Tx BT LE	

BT LE 1M-PHY

Frequency [MHz]	Measured Frequency [MHz]	Reading [dBm/3 kHz]	Cable Loss [dB]	Atten. Loss [dB]	Result [dBm/3 kHz]	Limit [dBm/3 kHz]	Margin [dB]
2402	2402.017	-17.23	3.26	9.82	-4.15	8.00	12.15
2440	2440.016	-17.14	3.27	9.82	-4.05	8.00	12.05
2480	2480.016	-17.00	3.28	9.82	-3.90	8.00	11.90

BT LE 2M-PHY

Frequency [MHz]	Measured Frequency [MHz]	Reading [dBm/3 kHz]	Cable Loss [dB]	Atten. Loss [dB]	Result [dBm/3 kHz]	Limit [dBm/3 kHz]	Margin [dB]
2402	2401.964	-20.42	3.26	9.82	-7.34	8.00	15.34
2440	2439.964	-20.39	3.27	9.82	-7.30	8.00	15.30
2480	2479.963	-20.15	3.28	9.82	-7.05	8.00	15.05

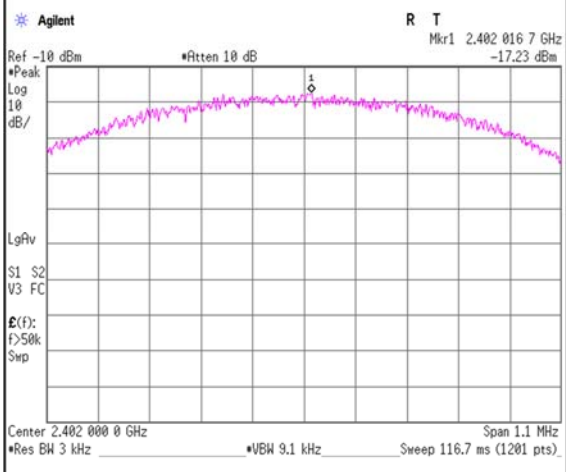
Sample Calculation:
Result = Reading + Cable Loss (including the cable(s) customer supplied) + Attenuator Loss

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

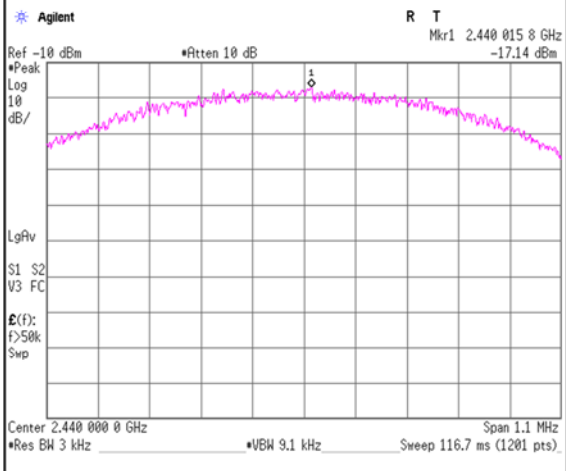
Power Density

BT LE 1M-PHY

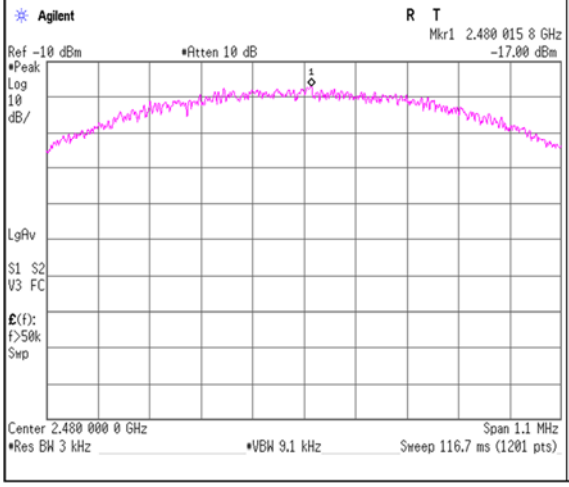
2402 MHz



2440 MHz

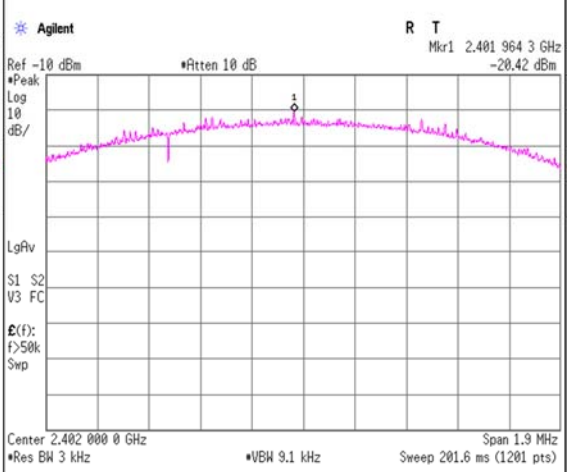


2480 MHz

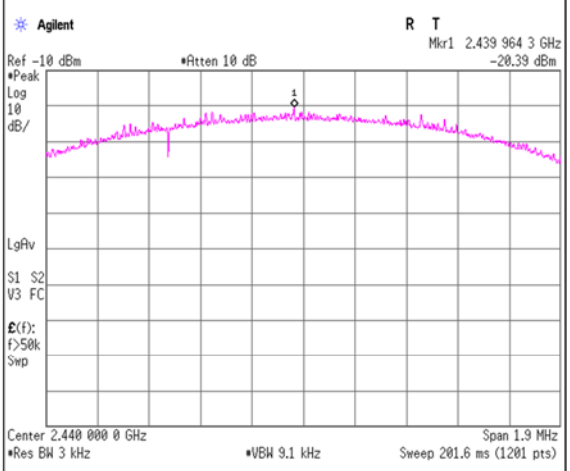


BT LE 2M-PHY

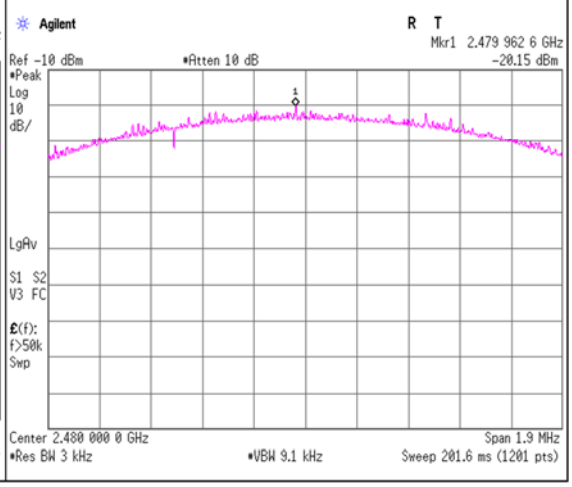
2402 MHz



2440 MHz



2480 MHz



APPENDIX 2: Test Instruments

Test Equipment (1/2)

Test Item	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Cal Int
AT	145175	Coaxial Cable	Suhner	SUCOFLEX 102	31600/2	2023/12/08	12
AT	145800	Spectrum Analyzer	Keysight Technologies Inc	E4448A	MY48250106	2023/03/01	12
AT	146212	Digital Hitester	HIOKI E.E. CORPORATION	3805-50	80997828	2023/09/25	12
AT	146267	Power Meter	Anritsu Corporation	ML2495A	850009	2023/05/29	12
AT	146309	Power sensor	Anritsu Corporation	MA2411B	917063	2023/05/29	12
AT	154591	Attenuator	Weinschel Corp.	54A-10	81595	2023/04/12	12
AT	191845	Thermo-Hygrometer	CUSTOM. Inc	CTH-201	-	2023/08/07	12
AT	196947	Coaxial Cable	Huber+Suhner	SUCOFLEX 102	803478/2	2023/03/02	12
AT	242066	Attenuator	Weinschel Corp.	54A-10	120521	2023/11/02	12
RE	144941	Horn Antenna	Schwarzbeck Mess-Elektronik OHG	BBHA9120D	230	2023/05/11	12
RE	145527	Logperiodic Antenna	Schwarzbeck Mess-Elektronik OHG	VUSLP9111B	193	2023/04/12	12
RE	150463	Test Receiver	Rohde & Schwarz	ESW44	101581	2023/08/25	12
RE	170932	EMI Software	TSJ (Techno Science Japan)	TEPTO-DV3(RE,CE,ME,PE)	-	-	-
RE	199784	Attenuator	JFW	50HF-006N	-	2023/06/14	12
RE	207280	Tape Measure	ASKUL	-	-	-	-
RE	207281	Tape Measure	ASKUL	-	-	-	-
RE	235267	Test Receiver	Rohde & Schwarz	ESW44	103018	2023/02/20	12
RE	235639	DIGITAL MULTIMETER	HIOKI E.E. CORPORATION	DT4261	230313156	2023/05/26	12
RE	235640	DIGITAL MULTIMETER	HIOKI E.E. CORPORATION	DT4261	230313157	2023/05/26	12

Test Equipment (2/2)

Test Item	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Cal Int
RE	235735	Thermo-Hygrometer	CUSTOM. Inc	CTH-230	-	2023/04/26	12
RE	235738	Thermo-Hygrometer	CUSTOM. Inc	CTH-230	-	2023/04/26	12
RE	236212	Semi-Anechoic Chamber	TDK	SWAC-01(NSA)	1	2023/05/08	12
RE	236584	Horn Antenna	AINFO Inc.	LB-8180-NF	2030013000112	2023/06/05	12
RE	236585	Horn Antenna	AINFO Inc.	LB-42-25-C2-KF	2020087000103	2023/06/01	12
RE	236616	Semi-Anechoic Chamber	TDK	SWAC-01(SVSWR)	1	2023/06/01	12
RE	236617	Semi-Anechoic Chamber	TDK	SWAC-02(SVSWR)	2	2023/06/20	12
RE	236708	Coaxial Cable	Hayashi-Repic Co., Ltd.	NMS079B-GL310C-SMS117B-2m	47256-02-03	2023/05/23	12
RE	236710	Coaxial Cable	Hayashi-Repic Co., Ltd.	KMS020B-GL140sE-KMS020B-7.0m	47256-03-01	2023/05/23	12
RE	236720	Coaxial Cable	Huber+Suhner	SF106/SF106/SF106	2001167/2001168/2001161	2023/06/08	12
RE	236723	Coaxial Cable	Hayashi-Repic Co., Ltd.	SF106(HUBER+SUHNER)/LMR400UF/GL310C/GL310C	2000429/47753-1/47256-01-03/47256-01-01	2023/05/25	12
RE	236769	Horn Antenna	AINFO Inc.	LB-8180-NF	2030013000111	2023/06/05	12
RE	236966	Pre Amplifier	TSJ (Techno Science Japan)	MLA-9K01-L01	23050009	2023/06/08	12
RE	237718	Pre Amplifier	TSJ (Techno Science Japan)	MLA-18265-J03	23060016	2023/06/30	12
RE	237784	RF RELAY MATRIX	TSJ (Techno Science Japan)	RFM-E221261R	07795	2023/11/01	12
RE	237786	RF RELAY MATRIX	TSJ (Techno Science Japan)	RFM-E221261R	07796	2023/11/01	12
RE	239644	Coaxial Cable	Junkosha	MWX221-01000NFSNMS/B	2306S022	2023/08/22	12
RE	239646	Coaxial Cable	To-Conne Co., Ltd.	TC-048-2.92P-2.92J-1000	-	2023/08/22	12
RE	239786	Biconical Antenna	Schwarzbeck Mess-Elektronik OHG	VHBB 9124+BBA9106	01895	2023/09/21	12
RE	243215	Coaxial Cable	Hayashi-Repic co., Ltd.	SMS13-13A26-NMS13-9.0m	49306-01-03	2023/12/20	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:

AT: Antenna Terminal Conducted test
RE: Radiated Emission