RADIO TEST REPORT

Test Report No. 14597255S-H

Customer	**NTT Sonority Inc.**
Description of EUT	**wireless on-ear speakers**
Model Number of EUT	**MBE001**
FCC ID	**2A58O-MBE001**
Test Regulation	**FCC Part 15 Subpart C**
Test Result	**Complied (Refer to SECTION 3)**
Issue Date	**January 20, 2023**
Remarks	**Bluetooth Low Energy part(s)**

Representative Test Engineer	Approved By
Miku Ikudome 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".

Report Cover Page - Form-ULID-003532 (DCS:13-EM-F0429) Issue# 21.0

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- The information provided from the customer for this report is identified in Section 1.
- For test report(s) referred in this report, the latest version (including any revisions) is always referred.

REVISION HISTORY

Original Test Report No.: 14597255S-H

Revision	Test Report No.	Date	Page Revised Contents
- (Original)	14597255S-H	January 20, 2023	-

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

Company Name	NTT Sonority Inc.
Address	1-5-1 Otemachi, Chiyoda-ku, Tokyo 100-8116, Japan
Telephone Number	+81-80-8231-5126
Contact Person	Akira Nakagawa

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	wireless on-ear speakers
Model Number	MBE001
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 1, 2022
Test Date	December 1 to 20, 2022

2.2 Product Description

General Specification

Rating	Typical: DC 3.85 V (3.0 V to 4.4 V)
Operating temperature	-10 deg. C to +50 deg. C

Radio Specification

Bluetooth (BR / EDR)

Equipment Type	Transceiver
Frequency of Operation	2402 MHz to 2480 MHz
Type of Modulation	FHSS (GFSK, π/4 DQPSK, 8 DPSK)
Antenna Gain	Left: -1.8 dBi, Right: -1.6 dBi

Bluetooth (Low Energy)

Equipment Type	Transceiver
Frequency of Operation	2402 MHz to 2480 MHz
Type of Modulation	GFSK
Antenna Gain	Left: -1.8 dBi, Right: -1.6 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

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

3.2 Procedures and Results

Item	Test Procedure	Specification	Worst Margin	Results	Remarks
Conducted Emission	**FCC:** ANSI C63.10-2013 6. Standard test methods	**FCC:** Section 15.207	-	N/A	*1)
	ISED: RSS-Gen 8.8	**ISED:** RSS-Gen 8.8			
6dB Bandwidth	**FCC:** KDB 558074 D01 15.247 Meas Guidance v05r02	**FCC:** Section 15.247(a)(2)	See data.	Complied a)	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 b)	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 c)	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)	3.5 dB 7212.000 MHz, AV, Horizontal Mode: Tx BT LE 2 M-PHY 2404 MHz EUT: Right	Complied d), e)	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 is not applicable since the EUT has no AC mains. Bluetooth 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.

a) Refer to APPENDIX 1 (data of 6 dB Bandwidth and 99 % Occupied Bandwidth)
b) Refer to APPENDIX 1 (data of Maximum Peak Output Power)
c) Refer to APPENDIX 1 (data of Power Density)
d) Refer to APPENDIX 1 (data of Conducted Spurious Emission)
e) Refer to APPENDIX 1 (data of Radiated Spurious Emission)

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	- a)	Conducted
a) 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	0.8 dB
Conducted emissions Power Density Measurement 1 GHz-3 GHz	0.9 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 Low Energy (BT LE) 1M-PHY Uncoded PHY (1 M-PHY)	Maximum Packet Size, PRBS9
Bluetooth Low Energy (BT LE) 2M-PHY Uncoded PHY (2 M-PHY)	Maximum Packet Size, PRBS9

*EUT has the power settings by the software as follows;
Power Setting: 7
Software: Version: 0.8.2
(Date: 2022.11 21, Storage location: EUT memory)

*This setting of software is the worst case.
Any conditions under the normal use do not exceed the condition of setting.
In addition, end users cannot change the settings of the output power of the product.
*Antenna Terminal Conducted test was performed with a sample of Right side as a representative. This is because the antenna gain on the right side is higher, and there is no difference in the RF part between the right and left sides.

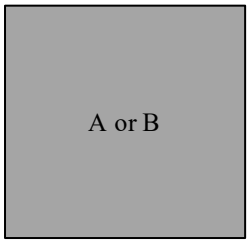
*The Details of Operating Mode(s)

Test Item	Operating Mode	Tested frequency
Radiated Spurious Emission (Below 1 GHz) Conducted Spurious Emission	Tx BT LE, 2M-PHY *1)	2478 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	2402 MHz 2440 MHz 2480 MHz
	Tx BT LE, 2M-PHY	2404 MHz 2440 MHz 2478 MHz

*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>

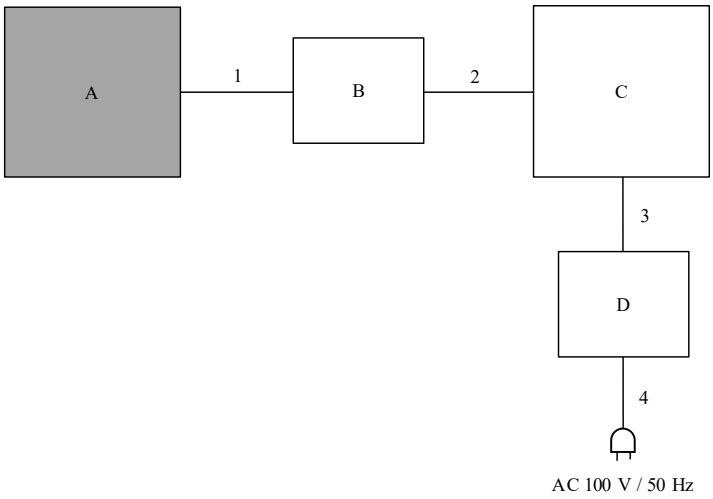


* Cabling and setup(s) were taken into consideration and test data was taken under worse case conditions.

Description of EUT and Support Equipment

No.	Item	Model Number	Serial Number	Manufacturer	Remarks
A	wireless on-ear speakers	MBE001	B2242025B02	Foster Electric	EUT(Left)
B	wireless on-ear speakers	MBE001	B2242023B02	Foster Electric	EUT(Right)

<Antenna Terminal conducted test>



Description of EUT and Support Equipment

No.	Item	Model Number	Serial Number	Manufacturer	Remarks
A	wireless on-ear speakers	MBE001	B2242004802	Foster Electric	EUT (Right)
B	HIGH SPEED DEBUG ADAPTOR	TRBI200	N178553	QUALCOMM	-
C	Laptop PC	ProBook 5220m	CNF038C2C6	hp	-
D	AC Adapter	HSTNN-DA14	WAWQL0AARZE35R	hp	-

List of Cables Used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	Signal	0.02+0.1+0.3	Unshielded	Unshielded	-
2	USB	1.8	Shielded	Shielded	-
3	DC	1.1	Unshielded	Unshielded	-
4	AC	1.8	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 platform of nominal size, 1.0 m by 2.0 m or 1.0 m by 1.5 m, raised 0.8 m above the conducting ground plane. *1)
The table is made of expanded polystyrol and expanded polypropylene and the table top is covered with polycarbonate. That has very low permittivity.
The Radiated Electric Field Strength has been measured in a Semi Anechoic Chamber with a ground plane.
*1) Test for EUT (Left): 1.0 m by 2.0 m, EUT (Right): 1.0 m by 1.5 m

[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.

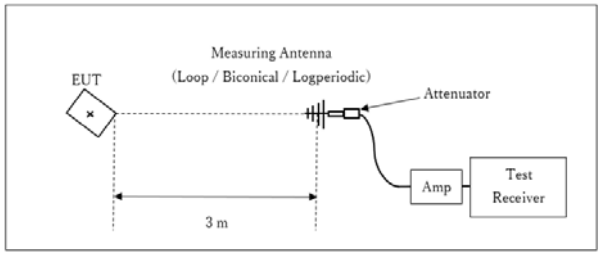
20 dBc was applied to the frequency over the limit of FCC 15.209 / Table 4 of RSS-Gen 8.9(ISED) and outside the restricted band of FCC15.205 / Table 6 of RSS-Gen 8.10 (ISED).

Frequency	Below 1 GHz	Above 1 GHz		20 dBc
Instrument Used	Test Receiver	Spectrum Analyzer		Spectrum Analyzer
Detector	QP	PK	AV *2)	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

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

Figure 2: Test Setup

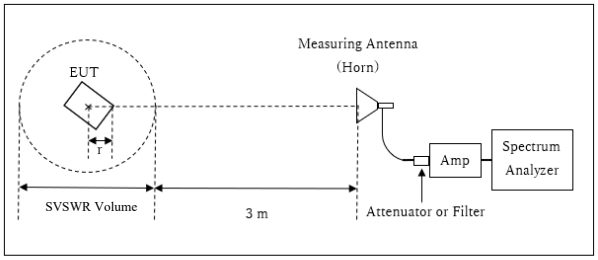
Below 1 GHz



× : Center of turn table

Test Distance: 3 m

1 GHz to 10 GHz

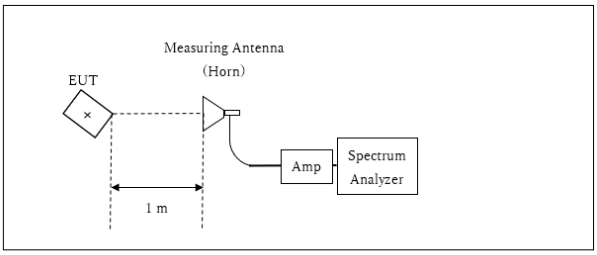


r : Radius of an outer periphery of EUT
× : Center of turn table

Distance Factor: 20 x log (3.98 m / 3.0 m) = 2.46 dB
* Test Distance: (3 + SVSWR Volume /2) - r = 0.02 m

SVSWR Volume : 2.0 m
(SVSWR Volume has been calibrated based on CISPR 16-1-4.)
r = 0.02 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 to see the position of maximum noise, and the test was made at the position that has the maximum noise.

Antenna polarization	Carrier	Spurious (30 MHz - 1 GHz)	Spurious (1 GHz - 2.8 GHz)	Spurious (2.8 GHz - 10 GHz)	Spurious (10 GHz - 18 GHz)	Spurious (18 GHz - 26.5 GHz)
Horizontal	Z	X	Z	Y	X	X
Vertical	Y	X	Y	Z	X	X

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 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 6 dB 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.

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

99 % Occupied Bandwidth and 6 dB Bandwidth

Test place	Shonan EMC Lab. No.1 Measurement Room
Date	December 1, 2022
Temperature / Humidity	23 deg. C / 35 % RH
Engineer	Takahiro Kawakami
Mode	Tx

BT LE 1 M-PHY

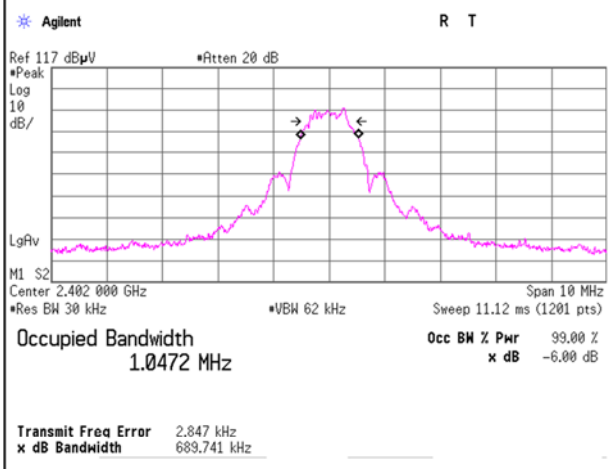
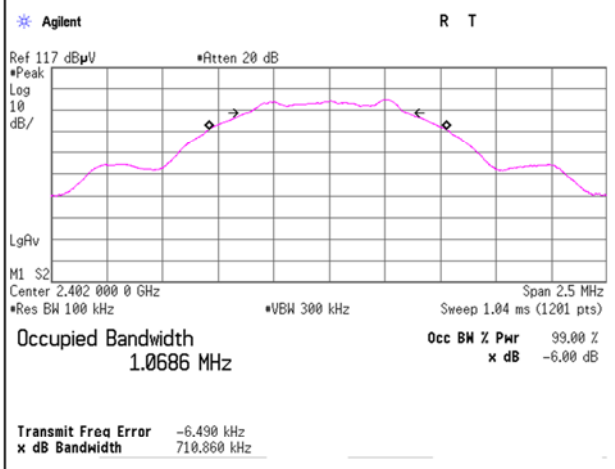
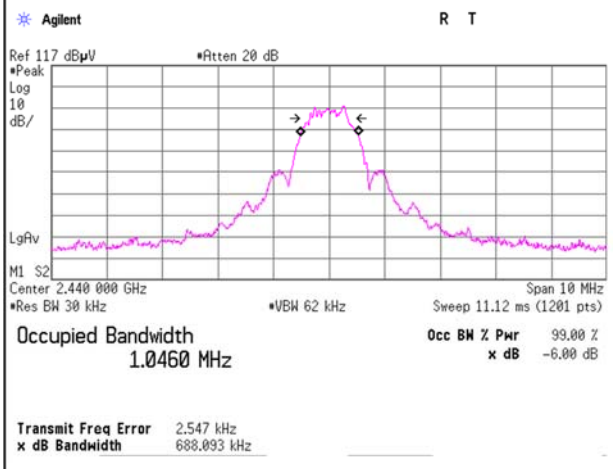
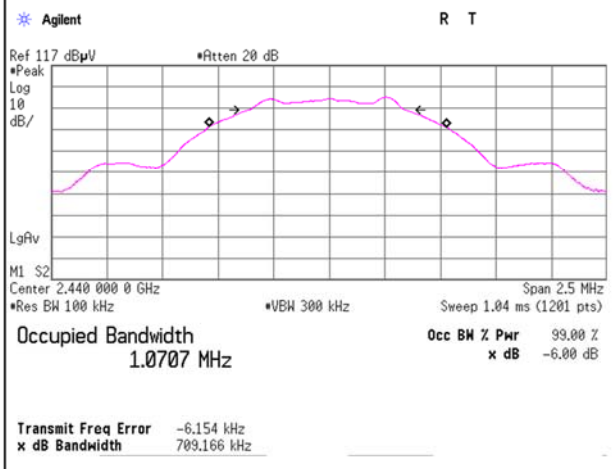
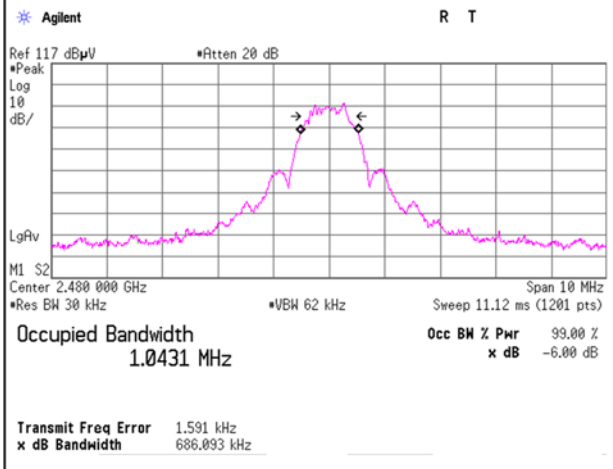
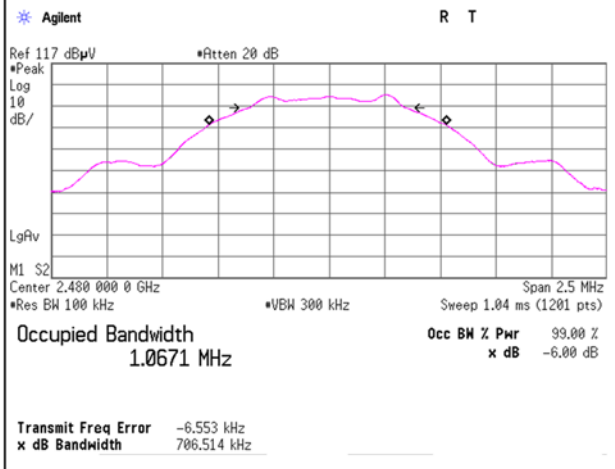
Frequency [MHz]	99 % Occupied Bandwidth [kHz]	6 dB Bandwidth [MHz]	Limit for 6 dB Bandwidth [MHz]
2402	1047.2	0.711	> 0.5000
2440	1046.0	0.709	> 0.5000
2480	1043.1	0.707	> 0.5000

BT LE 2 M-PHY

Frequency [MHz]	99 % Occupied Bandwidth [kHz]	6 dB Bandwidth [MHz]	Limit for 6 dB Bandwidth [MHz]
2404	2073.2	1.281	> 0.5000
2440	2073.5	1.287	> 0.5000
2478	2070.1	1.285	> 0.5000

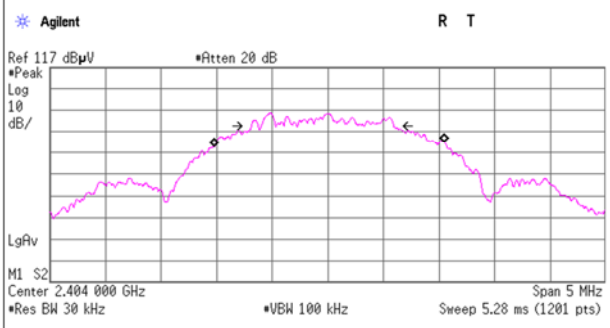
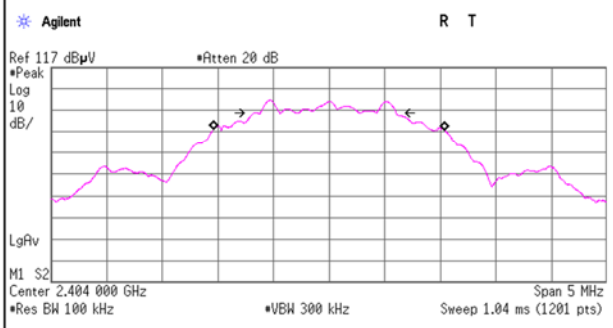
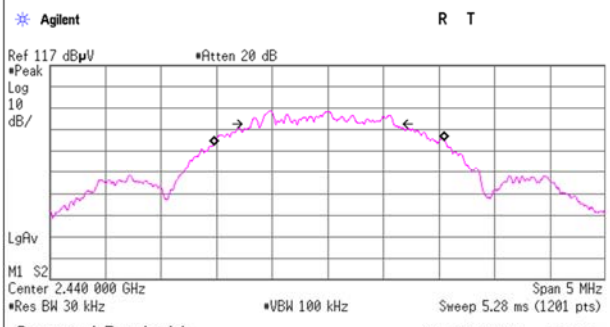
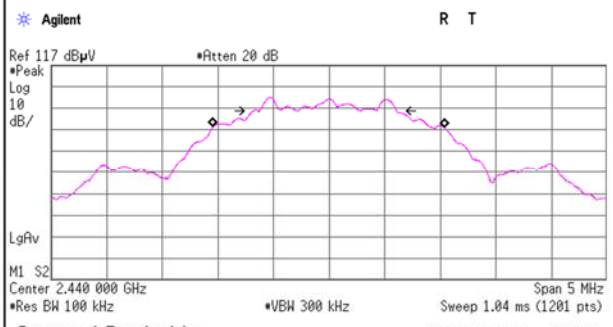
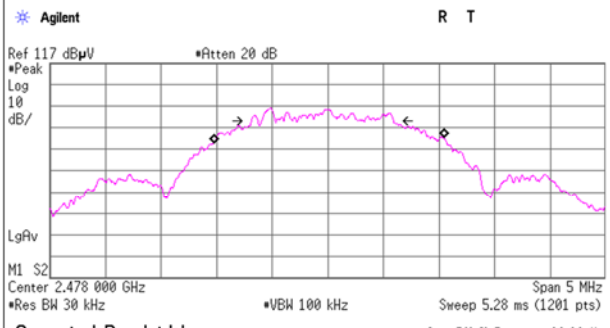
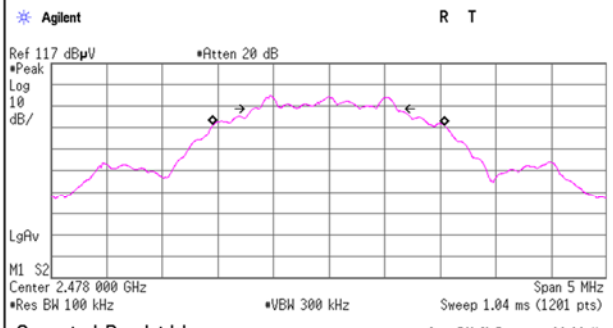
99 % Occupied Bandwidth and 6 dB Bandwidth

BT LE 1 M-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 2 M-PHY

99 % Occupied Bandwidth	6 dB Bandwidth
2404 MHz	**2404 MHz**
	
2440 MHz	**2440 MHz**
	
2478 MHz	**2478 MHz**
	

Maximum Peak Output Power/Average Output Power(Reference data for RF Exposure)

Test place	Shonan EMC Lab. No.1 Measurement Room
Date	December 1, 2022
Temperature / Humidity	23 deg. C / 35 % RH
Engineer	Takahiro Kawakami
Mode	Tx

BT LE 1 M-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	-4.83	2.10	9.91	7.18	5.22	30.00	1000	22.82	-1.60	5.58	3.61	36.02	4000	30.44
2440	-4.71	2.11	9.91	7.31	5.38	30.00	1000	22.69	-1.60	5.71	3.72	36.02	4000	30.31
2480	-4.63	2.13	9.91	7.41	5.51	30.00	1000	22.59	-1.60	5.81	3.81	36.02	4000	30.21

BT LE 2 M-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]
2404	-4.81	2.10	9.91	7.20	5.25	30.00	1000	22.80	-1.60	5.60	3.63	36.02	4000	30.42
2440	-4.68	2.11	9.91	7.34	5.42	30.00	1000	22.66	-1.60	5.74	3.75	36.02	4000	30.28
2478	-4.60	2.13	9.91	7.44	5.55	30.00	1000	22.56	-1.60	5.84	3.84	36.02	4000	30.18

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

BT LE 1 M-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	-5.70	2.10	9.91	6.31	4.28	0.64	6.95	4.95
2440	-5.58	2.11	9.91	6.44	4.41	0.64	7.08	5.11
2480	-5.48	2.13	9.91	6.56	4.53	0.64	7.20	5.25

BT LE 2 M-PHY

Average power

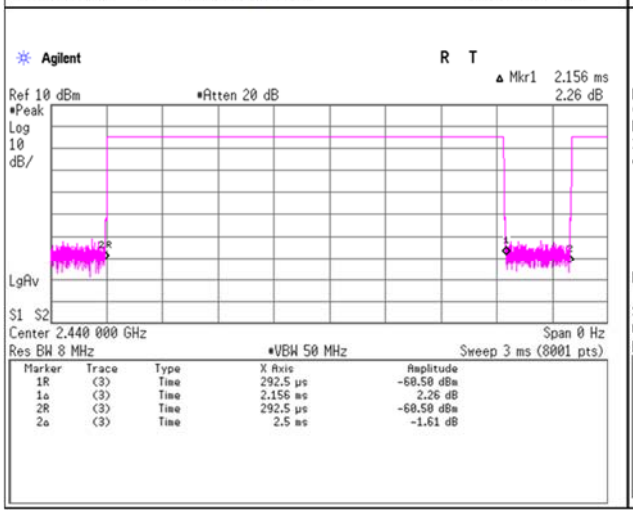
Freq.	Reading	Cable Loss	Atten. Loss	Result (Time average)		Duty factor	Result (Burst power average)	
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[mW]	[dB]	[dBm]	[mW]
2404	-7.39	2.10	9.91	4.62	2.90	2.32	6.94	4.94
2440	-7.24	2.11	9.91	4.78	3.01	2.32	7.10	5.13
2478	-7.17	2.13	9.91	4.87	3.07	2.32	7.19	5.24

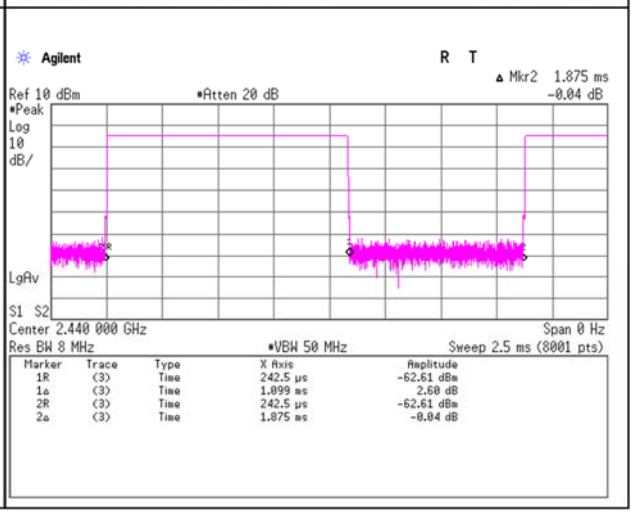
Sample Calculation:
Result (Time average) = Reading + Cable Loss (including the cable(s) customer supplied) + Attenuator Loss
Result (Burst power average) = Result (Time average) + Duty factor

Burst rate confirmation

Test place	Shonan EMC Lab. No.1 Measurement Room
Date	December 1, 2022
Temperature / Humidity	23 deg. C / 35 % RH
Engineer	Takahiro Kawakami
Mode	Tx

BT LE 1 M-PHY (for Average power) *1) **BT LE 1 M-PHY (for Radiated emission) *2)**		**BT LE 2 M-PHY (for Average power) *3)** **BT LE 2 M-PHY (for Radiated emission) *4)**	
Tx on / (Tx on + Tx off) =	**0.862**	**Tx on / (Tx on + Tx off) =**	**0.586**
Tx on / (Tx on + Tx off) * 100 =	**86.2 %**	**Tx on / (Tx on + Tx off) * 100 =**	**58.6 %**
Duty factor = 10 * log (2.5 / 2.156) =	**0.64 dB *1)**	**Duty factor = 10 * log (1.875 / 1.099) =**	**2.32 dB *3)**
Duty factor = 20 * log (2.5 / 2.156) =	**1.29 dB *2)**	**Duty factor = 20 * log (1.875 / 1.099) =**	**4.65 dB *4)**





* Since the burst rate is not different between the channels, the data has been obtained on the representative channel.

Radiated Spurious Emission

Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	No.2	No.1	No.1
Date	December 11, 2022	December 15, 2022	December 18, 2022
Temperature / Humidity	22 deg.C, 35 % RH	24 deg.C, 42 % RH	24 deg.C, 40 % RH
Engineer	Akihiro Oda	Hiromasa Sato	Hiromasa Sato
	(1 GHz -2.8 GHz)	(2.8 GHz -10 GHz)	(10 GHz -26.5 GHz)
Mode	Tx BT LE 1 M-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	45.02	28.57	14.19	38.81	2.46	51.43	73.9	22.4	142	116	-
Hori.	3603.000	PK	47.22	29.01	6.88	39.61	2.46	45.96	73.9	27.9	136	145	-
Hori.	4804.000	PK	44.66	31.17	7.42	39.73	2.46	45.98	73.9	27.9	129	106	-
Hori.	7206.000	PK	45.06	36.88	9.13	39.52	2.46	54.01	73.9	19.8	134	132	-
Hori.	9608.000	PK	44.37	38.11	10.79	39.73	2.46	56.00	73.9	17.9	150	0	-
Hori.	9608.000	AV	36.00	38.11	10.79	39.73	2.46	47.63	53.9	**6.2**	150	0	Floor noise
Vert.	2390.000	PK	45.54	28.57	14.19	38.81	2.46	51.95	73.9	21.9	145	147	-
Vert.	3603.000	PK	46.23	29.01	6.88	39.61	2.46	44.97	73.9	28.9	139	155	-
Vert.	4804.000	PK	44.62	31.17	7.42	39.73	2.46	45.94	73.9	27.9	149	172	-
Vert.	7206.000	PK	44.93	36.88	9.13	39.52	2.46	53.88	73.9	20.0	155	142	-
Vert.	9608.000	PK	44.51	38.11	10.79	39.73	2.46	56.14	73.9	17.7	150	0	-
Vert.	9608.000	AV	35.72	38.11	10.79	39.73	2.46	47.35	53.9	6.5	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 (3.98 m / 3.0 m) = 2.46 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	35.83	28.57	14.19	38.81	1.29	2.46	43.53	53.9	10.3	*1)
Hori.	3603.000	AV	38.76	29.01	6.88	39.61	1.29	2.46	38.79	53.9	15.1	-
Hori.	4804.000	AV	36.25	31.17	7.42	39.73	1.29	2.46	38.86	53.9	15.0	-
Hori.	7206.000	AV	35.80	36.88	9.13	39.52	1.29	2.46	46.04	53.9	7.8	-
Vert.	2390.000	AV	35.11	28.57	14.19	38.81	1.29	2.46	42.81	53.9	11.0	*1)
Vert.	3603.000	AV	37.65	29.01	6.88	39.61	1.29	2.46	37.68	53.9	16.2	-
Vert.	4804.000	AV	36.08	31.17	7.42	39.73	1.29	2.46	38.69	53.9	15.2	-
Vert.	7206.000	AV	35.87	36.88	9.13	39.52	1.29	2.46	46.11	53.9	7.7	-

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 (3.98 m / 3.0 m) = 2.46 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)

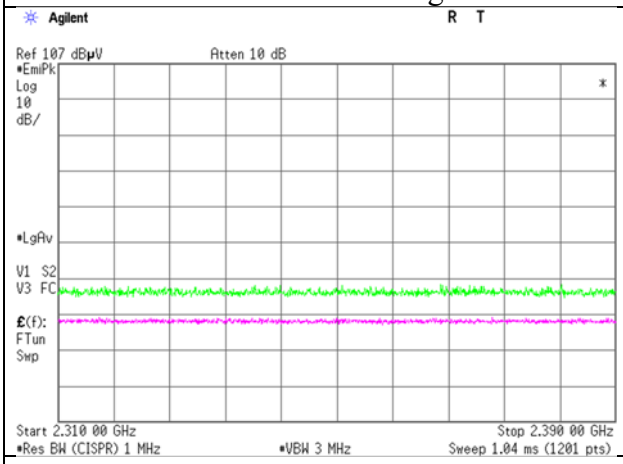
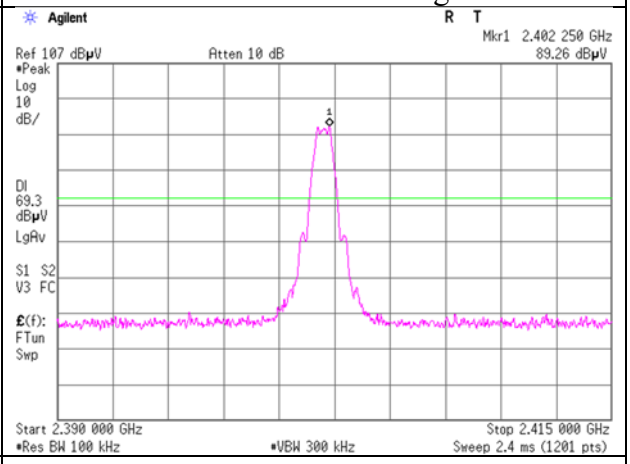
20 dBc Data Sheet **(RBW 100 kHz, VBW 300 kHz)**

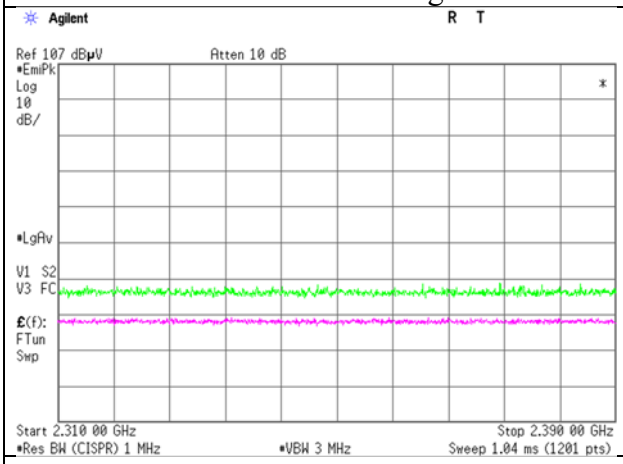
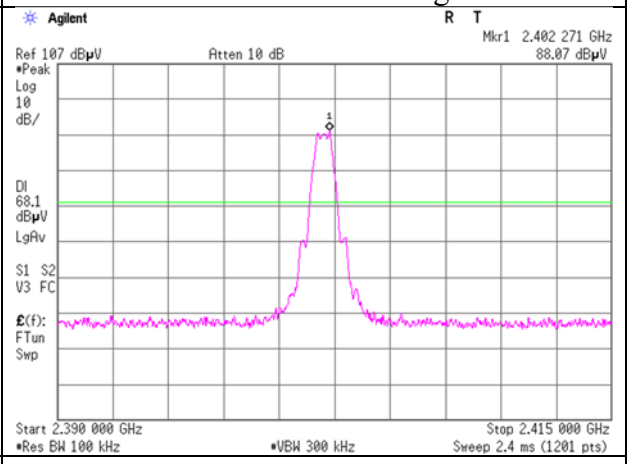
Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2402.000	PK	89.16	28.55	14.21	38.80	2.46	95.58	-	-	Carrier
Hori.	2400.000	PK	41.20	28.55	14.20	38.81	2.46	47.60	75.5	27.9	-
Vert.	2402.000	PK	88.47	28.55	14.21	38.80	2.46	94.89	-	-	Carrier
Vert.	2400.000	PK	38.69	28.55	14.20	38.81	2.46	45.09	74.8	29.7	-

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.98 m / 3.0 m) = 2.46 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.2
Date	December 11, 2022
Temperature / Humidity	22 deg.C, 35 % RH
Engineer	Akihiro Oda
	(1 GHz -2.8 GHz)
Mode	Tx BT LE 1 M-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 was shown in tabular data.

Radiated Spurious Emission

Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	No.2	No.1	No.1
Date	December 11, 2022	December 15, 2022	December 18, 2022
Temperature / Humidity	22 deg.C, 35 % RH	24 deg.C, 42 % RH	24 deg.C, 40 % RH
Engineer	Akihiro Oda	Hiromasa Sato	Hiromasa Sato
	(1 GHz -2.8 GHz)	(2.8 GHz -10 GHz)	(10 GHz -26.5 GHz)
Mode	Tx BT LE 1 M-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.	3660.000	PK	47.57	29.15	6.89	39.60	2.46	46.47	73.9	27.4	126	125	-
Hori.	4880.000	PK	45.54	31.23	7.48	39.76	2.46	46.95	73.9	26.9	144	118	-
Hori.	7320.000	PK	45.64	36.92	9.20	39.48	2.46	54.74	73.9	19.1	152	137	-
Hori.	9760.000	PK	45.12	38.55	10.79	39.67	2.46	57.25	73.9	16.6	150	0	-
Hori.	9760.000	AV	35.87	38.55	10.79	39.67	2.46	48.00	53.9	5.9	150	0	Floor noise
Vert.	3660.000	PK	46.67	29.15	6.89	39.60	2.46	45.57	73.9	28.3	111	158	-
Vert.	4880.000	PK	45.40	31.23	7.48	39.76	2.46	46.81	73.9	27.0	148	167	-
Vert.	7320.000	PK	45.48	36.92	9.20	39.48	2.46	54.58	73.9	19.3	151	131	-
Vert.	9760.000	PK	44.63	38.55	10.79	39.67	2.46	56.76	73.9	17.1	150	0	-
Vert.	9760.000	AV	36.00	38.55	10.79	39.67	2.46	48.13	53.9	**5.7**	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 (3.98 m / 3.0 m) = 2.46 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.	3660.000	AV	38.95	29.15	6.89	39.60	1.29	2.46	39.14	53.9	14.7	-
Hori.	4880.000	AV	35.96	31.23	7.48	39.76	1.29	2.46	38.66	53.9	15.2	-
Hori.	7320.000	AV	35.67	36.92	9.20	39.48	1.29	2.46	46.06	53.9	7.8	-
Vert.	3660.000	AV	38.49	29.15	6.89	39.60	1.29	2.46	38.68	53.9	15.2	-
Vert.	4880.000	AV	35.67	31.23	7.48	39.76	1.29	2.46	38.37	53.9	15.5	-
Vert.	7320.000	AV	35.55	36.92	9.20	39.48	1.29	2.46	45.94	53.9	7.9	-

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 (3.98 m / 3.0 m) = 2.46 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB
Duty factor refer to "Burst rate confirmation" sheet.

Radiated Spurious Emission

Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	No.2	No.1	No.1
Date	December 11, 2022	December 15, 2022	December 18, 2022
Temperature / Humidity	22 deg.C, 35 % RH	24 deg.C, 42 % RH	24 deg.C, 40 % RH
Engineer	Akihiro Oda	Hiromasa Sato	Hiromasa Sato
	(1 GHz -2.8 GHz)	(2.8 GHz -10 GHz)	(10 GHz -26.5 GHz)
Mode	Tx BT LE 1 M-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	46.48	28.44	14.29	38.76	2.46	52.91	73.9	20.9	122	316	-
Hori.	3720.000	PK	48.53	29.28	6.90	39.60	2.46	47.57	73.9	26.3	148	138	-
Hori.	4960.000	PK	45.18	31.40	7.55	39.79	2.46	46.80	73.9	27.1	149	106	-
Hori.	7440.000	PK	45.31	37.02	9.26	39.43	2.46	54.62	73.9	19.2	150	143	-
Hori.	9920.000	PK	44.41	38.57	10.79	39.60	2.46	56.63	73.9	17.2	150	0	-
Hori.	9920.000	AV	35.50	38.57	10.79	39.60	2.46	47.72	53.9	6.1	150	0	Floor noise
Vert.	2483.500	PK	47.10	28.44	14.29	38.76	2.46	53.53	73.9	20.3	129	157	-
Vert.	3720.000	PK	47.12	29.28	6.90	39.60	2.46	46.16	73.9	27.7	124	152	-
Vert.	4960.000	PK	44.47	31.40	7.55	39.79	2.46	46.09	73.9	27.8	148	121	-
Vert.	7440.000	PK	45.30	37.02	9.26	39.43	2.46	54.61	73.9	19.2	146	144	-
Vert.	9920.000	PK	44.62	38.57	10.79	39.60	2.46	56.84	73.9	17.0	150	0	-
Vert.	9920.000	AV	35.63	38.57	10.79	39.60	2.46	47.85	53.9	**6.0**	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 (3.98 m / 3.0 m) = 2.46 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	35.91	28.44	14.29	38.76	1.29	2.46	43.63	53.9	10.2	*1)
Hori.	3720.000	AV	39.19	29.28	6.90	39.60	1.29	2.46	39.52	53.9	14.3	-
Hori.	4960.000	AV	36.24	31.40	7.55	39.79	1.29	2.46	39.15	53.9	14.7	-
Hori.	7440.000	AV	35.68	37.02	9.26	39.43	1.29	2.46	46.28	53.9	7.6	-
Vert.	2483.500	AV	35.85	28.44	14.29	38.76	1.29	2.46	43.57	53.9	10.3	*1)
Vert.	3720.000	AV	38.45	29.28	6.90	39.60	1.29	2.46	38.78	53.9	15.1	-
Vert.	4960.000	AV	35.88	31.40	7.55	39.79	1.29	2.46	38.79	53.9	15.1	-
Vert.	7440.000	AV	35.73	37.02	9.26	39.43	1.29	2.46	46.33	53.9	7.5	-

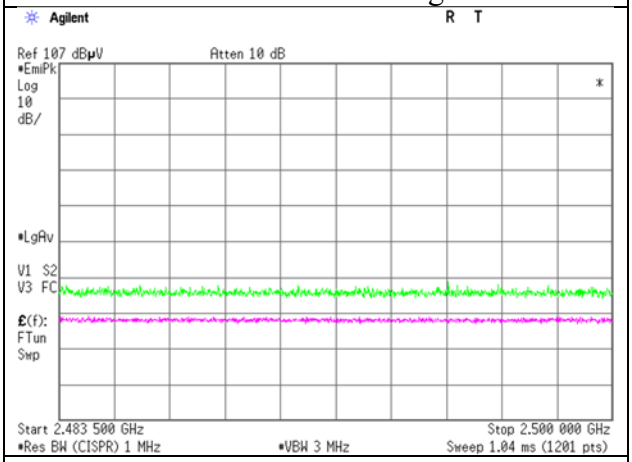
Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Duty factor + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.98 m / 3.0 m) = 2.46 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB
Duty factor refer to "Burst rate confirmation" sheet.
*1) Not out of band emission (Leakage Power)

Radiated Spurious Emission
(Reference Plot for band-edge)

Test place	Shonan EMC Lab.
Semi Anechoic Chamber	No.2
Date	December 11, 2022
Temperature / Humidity	22 deg.C, 35 % RH
Engineer	Akihiro Oda
	(1 GHz -2.8 GHz)
Mode	Tx BT LE 1 M-PHY 2480 MHz, Left

Horizontal

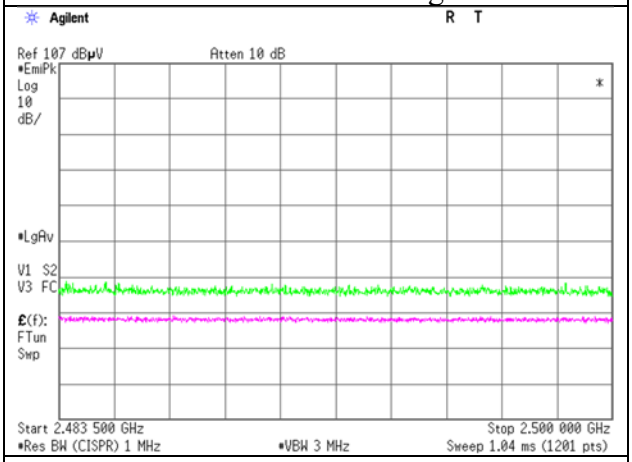
Restricted-band band-edge Plot



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	No.1	No.1
Date	December 15, 2022	December 18, 2022
Temperature / Humidity	24 deg.C, 42 % RH	24 deg.C, 40 % RH
Engineer	Hiromasa Sato	Hiromasa Sato
	(1 GHz -10 GHz)	(10 GHz -26.5 GHz)
Mode	Tx BT LE 2 M-PHY 2404 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	45.21	27.85	14.79	39.62	2.46	50.69	73.9	23.2	112	96	-
Hori.	3606.000	PK	47.83	29.01	6.88	39.61	2.46	46.57	73.9	27.3	132	117	-
Hori.	4808.000	PK	44.45	31.18	7.42	39.73	2.46	45.78	73.9	28.1	151	134	-
Hori.	7212.000	PK	44.82	36.88	9.14	39.52	2.46	53.78	73.9	20.1	154	159	-
Hori.	9616.000	PK	44.40	38.12	10.79	39.72	2.46	56.05	73.9	17.8	150	0	-
Hori.	9616.000	AV	35.62	38.12	10.79	39.72	2.46	47.27	53.9	6.6	150	0	Floor noise
Vert.	2390.000	PK	45.62	27.85	14.79	39.62	2.46	51.10	73.9	22.8	139	146	-
Vert.	3606.000	PK	47.15	29.01	6.88	39.61	2.46	45.89	73.9	28.0	159	149	-
Vert.	4808.000	PK	44.57	31.18	7.42	39.73	2.46	45.90	73.9	28.0	158	192	-
Vert.	7212.000	PK	44.43	36.88	9.14	39.52	2.46	53.39	73.9	20.5	154	175	-
Vert.	9616.000	PK	44.49	38.12	10.79	39.72	2.46	56.14	73.9	17.7	150	0	-
Vert.	9616.000	AV	35.69	38.12	10.79	39.72	2.46	47.34	53.9	6.5	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 (3.98 m / 3.0 m) = 2.46 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	36.06	27.85	14.79	39.62	4.65	2.46	46.19	53.9	7.7	*1)
Hori.	3606.000	AV	36.70	29.01	6.88	39.61	4.65	2.46	40.09	53.9	13.8	-
Hori.	4808.000	AV	36.03	31.18	7.42	39.73	4.65	2.46	42.01	53.9	11.8	-
Hori.	7212.000	AV	35.43	36.88	9.14	39.52	4.65	2.46	49.04	53.9	4.8	-
Vert.	2390.000	AV	36.48	27.85	14.79	39.62	4.65	2.46	46.61	53.9	7.2	*1)
Vert.	3606.000	AV	36.83	29.01	6.88	39.61	4.65	2.46	40.22	53.9	13.6	-
Vert.	4808.000	AV	35.94	31.18	7.42	39.73	4.65	2.46	41.92	53.9	11.9	-
Vert.	7212.000	AV	35.67	36.88	9.14	39.52	4.65	2.46	49.28	53.9	**4.6**	-

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 (3.98 m / 3.0 m) = 2.46 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)

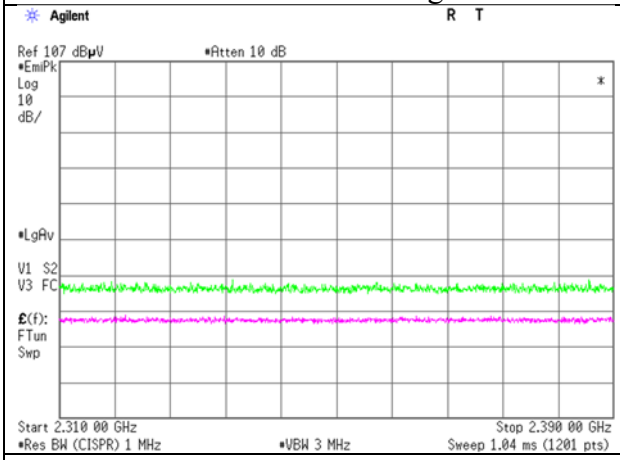
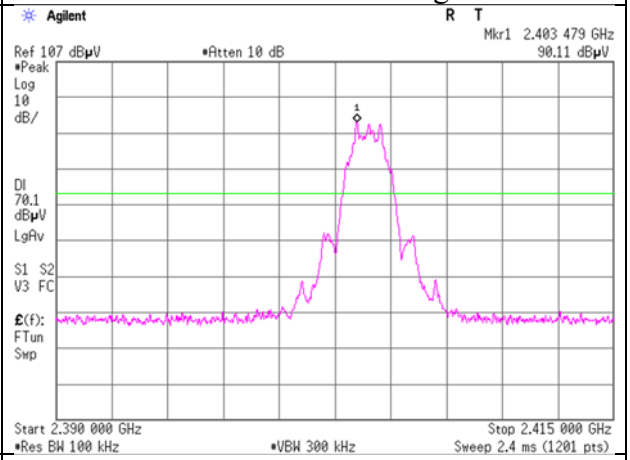
20 dBc Data Sheet **(RBW 100 kHz, VBW 300 kHz)**

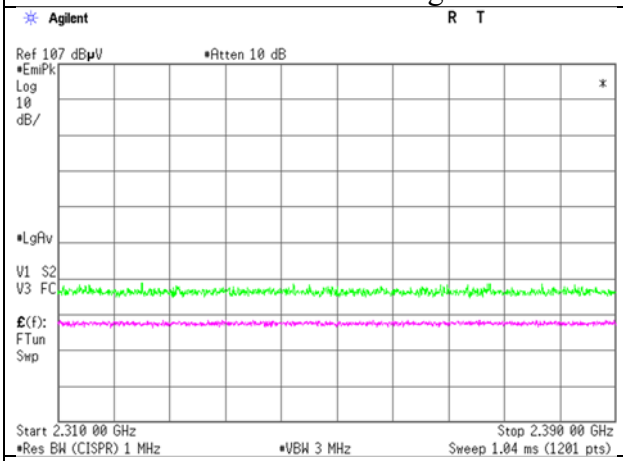
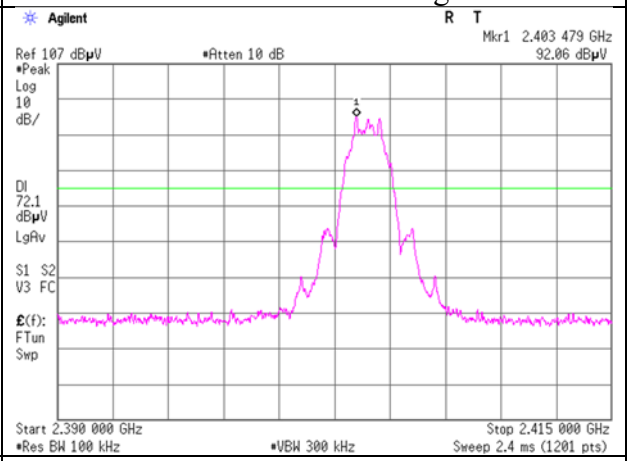
Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2404.000	PK	89.51	27.82	14.82	39.63	2.46	94.98	-	-	Carrier
Hori.	2400.000	PK	38.25	27.83	14.81	39.62	2.46	43.73	74.9	31.1	-
Vert.	2404.000	PK	91.83	27.82	14.82	39.63	2.46	97.30	-	-	Carrier
Vert.	2400.000	PK	39.13	27.83	14.81	39.62	2.46	44.61	77.3	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 (3.98 m / 3.0 m) = 2.46 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 15, 2022
Temperature / Humidity	24 deg.C, 42 % RH
Engineer	Hiromasa Sato
	(1 GHz -10 GHz)
Mode	Tx BT LE 2 M-PHY 2404 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 was shown in tabular data.

Radiated Spurious Emission

Test place	Shonan EMC Lab.	
Semi Anechoic Chamber	No.1	No.1
Date	December 15, 2022	December 18, 2022
Temperature / Humidity	24 deg.C, 42 % RH	24 deg.C, 40 % RH
Engineer	Hiromasa Sato	Hiromasa Sato
	(1 GHz -10 GHz)	(10 GHz -26.5 GHz)
Mode	Tx BT LE 2 M-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.	3660.000	PK	48.02	29.15	6.89	39.60	2.46	46.92	73.9	26.9	147	132	-
Hori.	4880.000	PK	45.30	31.23	7.48	39.76	2.46	46.71	73.9	27.1	150	133	-
Hori.	7320.000	PK	45.87	36.92	9.20	39.48	2.46	54.97	73.9	18.9	149	164	-
Hori.	9760.000	PK	44.27	38.55	10.79	39.67	2.46	56.40	73.9	17.5	150	0	-
Hori.	9760.000	AV	35.84	38.55	10.79	39.67	2.46	47.97	53.9	5.9	150	0	Floor noise
Vert.	3660.000	PK	47.44	29.15	6.89	39.60	2.46	46.34	73.9	27.5	132	119	-
Vert.	4880.000	PK	45.79	31.23	7.48	39.76	2.46	47.20	73.9	26.7	155	169	-
Vert.	7320.000	PK	45.15	36.92	9.20	39.48	2.46	54.25	73.9	19.6	152	143	-
Vert.	9760.000	PK	45.54	38.55	10.79	39.67	2.46	57.67	73.9	16.2	150	0	-
Vert.	9760.000	AV	36.10	38.55	10.79	39.67	2.46	48.23	53.9	5.6	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 (3.98 m / 3.0 m) = 2.46 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.	3660.000	AV	38.57	29.15	6.89	39.60	4.65	2.46	42.12	53.9	11.7	-
Hori.	4880.000	AV	35.91	31.23	7.48	39.76	4.65	2.46	41.97	53.9	11.9	-
Hori.	7320.000	AV	35.54	36.92	9.20	39.48	4.65	2.46	49.29	53.9	**4.6**	-
Vert.	3660.000	AV	38.07	29.15	6.89	39.60	4.65	2.46	41.62	53.9	12.2	-
Vert.	4880.000	AV	35.79	31.23	7.48	39.76	4.65	2.46	41.85	53.9	12.0	-
Vert.	7320.000	AV	35.36	36.92	9.20	39.48	4.65	2.46	49.11	53.9	4.7	-

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 (3.98 m / 3.0 m) = 2.46 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB
Duty factor refer to "Burst rate confirmation" sheet.

Radiated Spurious Emission

Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	No.2	No.1	No.1
Date	December 19, 2022	December 15, 2022	December 18, 2022
Temperature / Humidity	20 deg.C, 27 % RH	24 deg.C, 42 % RH	24 deg.C, 40 % RH
Engineer	Miku Ikudome	Hiromasa Sato	Hiromasa Sato
	(30 MHz -1 GHz)	(1 GHz -10 GHz)	(10 GHz -26.5 GHz)
Mode	Tx BT LE 2 M-PHY 2478 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.	156.078	QP	21.02	15.08	8.62	31.83	0.00	12.89	43.5	30.6	150	0	-
Hori.	199.045	QP	20.71	16.65	9.04	31.79	0.00	14.61	43.5	28.8	150	0	-
Hori.	945.419	QP	20.04	21.99	9.94	30.63	0.00	21.34	46.0	24.6	150	0	-
Hori.	2483.500	PK	45.71	27.72	14.91	39.65	2.46	51.15	73.9	22.7	140	88	-
Hori.	3717.000	PK	48.16	29.27	6.90	39.60	2.46	47.19	73.9	26.7	125	138	-
Hori.	4956.000	PK	45.26	31.38	7.54	39.78	2.46	46.86	73.9	27.0	147	114	-
Hori.	7434.000	PK	45.38	37.02	9.26	39.44	2.46	54.68	73.9	19.2	153	148	-
Hori.	9912.000	PK	44.63	38.58	10.80	39.61	2.46	56.86	73.9	17.0	150	0	-
Hori.	9912.000	AV	35.15	38.58	10.80	39.61	2.46	47.38	53.9	6.5	150	0	Floor noise
Vert.	71.635	QP	31.20	6.49	7.61	31.91	0.00	13.39	40.0	26.6	222	215	-
Vert.	73.111	QP	27.78	6.40	7.63	31.91	0.00	9.90	40.0	30.1	231	219	-
Vert.	195.069	QP	20.74	16.57	9.00	31.79	0.00	14.52	43.5	28.9	150	0	-
Vert.	943.526	QP	20.08	22.00	9.93	30.64	0.00	21.37	46.0	24.6	150	0	-
Vert.	2483.500	PK	45.36	27.72	14.91	39.65	2.46	50.80	73.9	23.1	155	131	-
Vert.	3717.000	PK	47.30	29.27	6.90	39.60	2.46	46.33	73.9	27.5	159	134	-
Vert.	4956.000	PK	45.30	31.38	7.54	39.78	2.46	46.90	73.9	27.0	142	171	-
Vert.	7434.000	PK	45.58	37.02	9.26	39.44	2.46	54.88	73.9	19.0	149	183	-
Vert.	9912.000	PK	44.78	38.58	10.80	39.61	2.46	57.01	73.9	16.8	150	0	-
Vert.	9912.000	AV	35.08	38.58	10.80	39.61	2.46	47.31	53.9	6.5	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 (3.98 m / 3.0 m) = 2.46 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	36.31	27.72	14.91	39.65	4.65	2.46	46.40	53.9	7.5	*1)
Hori.	3717.000	AV	37.85	29.27	6.90	39.60	4.65	2.46	41.53	53.9	12.3	-
Hori.	4956.000	AV	35.96	31.38	7.54	39.78	4.65	2.46	42.21	53.9	11.6	-
Hori.	7434.000	AV	35.52	37.02	9.26	39.44	4.65	2.46	49.47	53.9	4.4	-
Vert.	2483.500	AV	36.08	27.72	14.91	39.65	4.65	2.46	46.17	53.9	7.7	*1)
Vert.	3717.000	AV	37.44	29.27	6.90	39.60	4.65	2.46	41.12	53.9	12.7	-
Vert.	4956.000	AV	36.03	31.38	7.54	39.78	4.65	2.46	42.28	53.9	11.6	-
Vert.	7434.000	AV	35.65	37.02	9.26	39.44	4.65	2.46	49.60	53.9	**4.2**	-

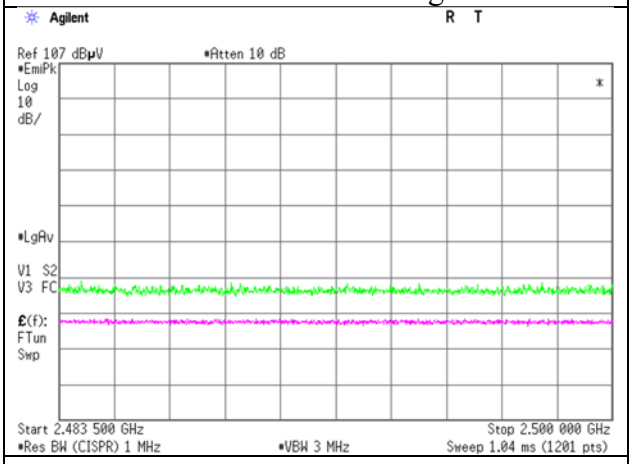
Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Duty factor + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.98 m / 3.0 m) = 2.46 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB
Duty factor refer to "Burst rate confirmation" sheet.
*1) Not out of band emission (Leakage Power)

Radiated Spurious Emission
(Reference Plot for band-edge)

Test place	Shonan EMC Lab.
Semi Anechoic Chamber	No.1
Date	December 15, 2022
Temperature / Humidity	24 deg.C, 42 % RH
Engineer	Hiromasa Sato
	(1 GHz -10 GHz)
Mode	Tx BT LE 2 M-PHY 2478 MHz, Left

Horizontal

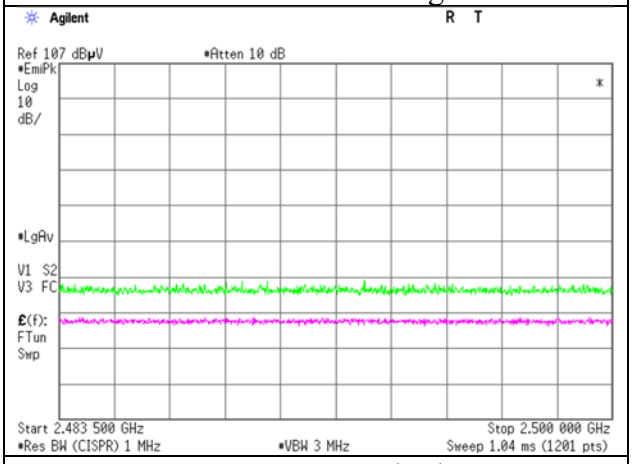
Restricted-band band-edge Plot



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	No.2	No.1
Date	December 10, 2022	December 18, 2022
Temperature / Humidity	20 deg.C, 33 % RH	24 deg.C, 40 % RH
Engineer	Shiro Kobayashi	Hiromasa Sato
	(1 GHz -10 GHz)	(10 GHz -26.5 GHz)
Mode	Tx BT LE 1 M-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	46.33	28.57	14.19	38.81	2.46	52.74	73.9	21.1	114	27	-
Hori.	3603.000	PK	50.03	29.71	6.43	38.28	2.46	50.35	73.9	23.5	134	38	-
Hori.	4804.000	PK	45.39	31.90	7.00	38.64	2.46	48.11	73.9	25.7	136	193	-
Hori.	7206.000	PK	45.82	37.57	8.40	39.24	2.46	55.01	73.9	18.8	121	119	-
Vert.	2390.000	PK	46.60	28.57	14.19	38.81	2.46	53.01	73.9	20.8	140	33	-
Vert.	3603.000	PK	48.57	29.71	6.43	38.28	2.46	48.89	73.9	25.0	118	199	-
Vert.	4804.000	PK	46.13	31.90	7.00	38.64	2.46	48.85	73.9	25.0	308	245	-
Vert.	7206.000	PK	46.72	37.57	8.40	39.24	2.46	55.91	73.9	17.9	135	286	-

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.98 m / 3.0 m) = 2.46 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	35.65	28.57	14.19	38.81	1.29	2.46	43.35	53.9	10.5	*1)
Hori.	3603.000	AV	41.87	29.71	6.43	38.28	1.29	2.46	43.48	53.9	10.4	-
Hori.	4804.000	AV	35.22	31.90	7.00	38.64	1.29	2.46	39.23	53.9	14.6	-
Hori.	7206.000	AV	35.75	37.57	8.40	39.24	1.29	2.46	46.23	53.9	**7.6**	-
Vert.	2390.000	AV	35.71	28.57	14.19	38.81	1.29	2.46	43.41	53.9	10.4	*1)
Vert.	3603.000	AV	41.06	29.71	6.43	38.28	1.29	2.46	42.67	53.9	11.2	-
Vert.	4804.000	AV	36.15	31.90	7.00	38.64	1.29	2.46	40.16	53.9	13.7	-
Vert.	7206.000	AV	35.81	37.57	8.40	39.24	1.29	2.46	46.29	53.9	**7.6**	-

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 (3.98 m / 3.0 m) = 2.46 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)**

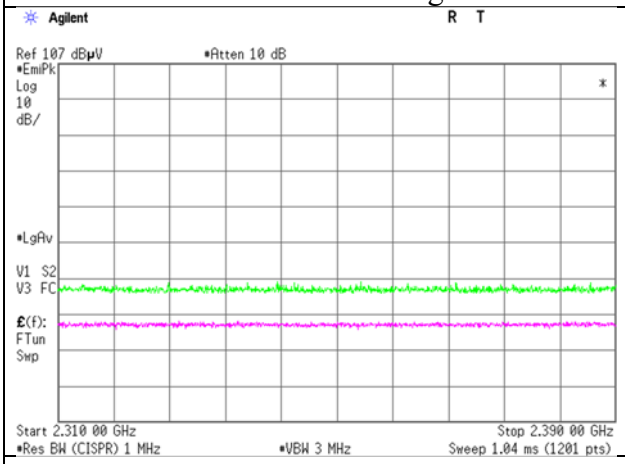
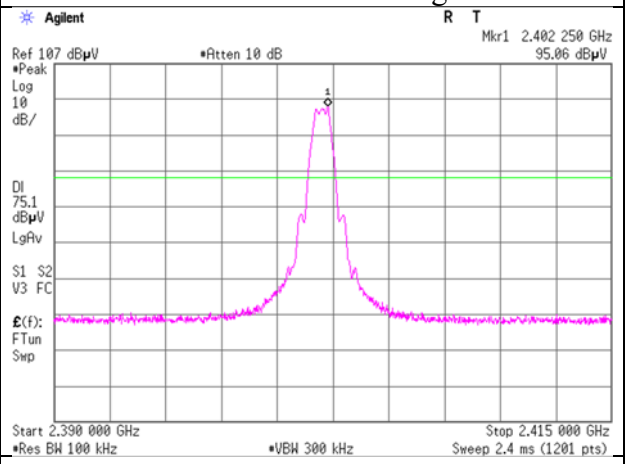
Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2402.000	PK	95.17	28.55	14.21	38.80	2.46	101.59	-	-	Carrier
Hori.	2400.000	PK	43.09	28.55	14.20	38.81	2.46	49.49	81.5	32.0	-
Vert.	2402.000	PK	95.58	28.55	14.21	38.80	2.46	102.00	-	-	Carrier
Vert.	2400.000	PK	42.76	28.55	14.20	38.81	2.46	49.16	82.0	32.8	-

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.98 m / 3.0 m) = 2.46 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

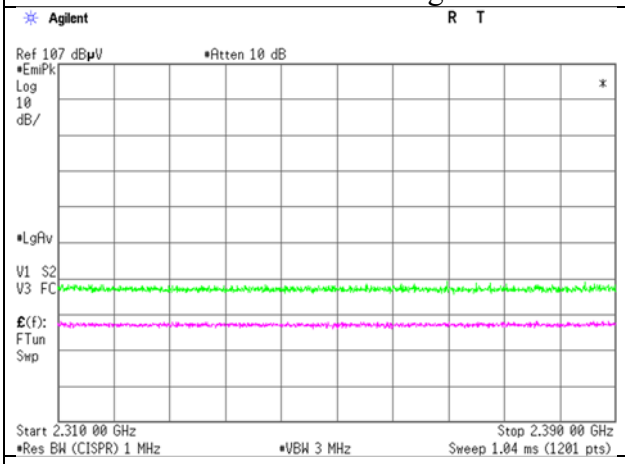
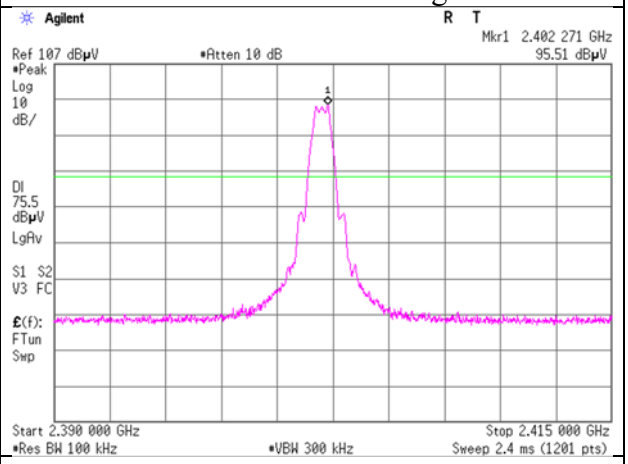
Radiated Spurious Emission
(Reference Plot for band-edge)

Test place	Shonan EMC Lab.
Semi Anechoic Chamber	No.2
Date	December 10, 2022
Temperature / Humidity	20 deg.C, 33 % RH
Engineer	Shiro Kobayashi
	(1 GHz -10 GHz)
Mode	Tx BT LE 1 M-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 was shown in tabular data.

Radiated Spurious Emission

Test place	Shonan EMC Lab.	
Semi Anechoic Chamber	No.2	No.1
Date	December 10, 2022	December 18, 2022
Temperature / Humidity	20 deg.C, 33 % RH	24 deg.C, 40 % RH
Engineer	Shiro Kobayashi	Hiromasa Sato
	(1 GHz -10 GHz)	(10 GHz -26.5 GHz)
Mode	Tx BT LE 1 M-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.	3660.000	PK	49.59	29.85	6.47	38.29	2.46	50.08	73.9	23.8	105	151	-
Hori.	4880.000	PK	45.23	31.92	7.05	38.68	2.46	47.98	73.9	25.9	166	170	-
Hori.	7320.000	PK	44.96	37.66	8.50	39.28	2.46	54.30	73.9	19.6	357	162	-
Vert.	3660.000	PK	48.71	29.85	6.47	38.29	2.46	49.20	73.9	24.7	102	186	-
Vert.	4880.000	PK	46.53	31.92	7.05	38.68	2.46	49.28	73.9	24.6	296	224	-
Vert.	7320.000	PK	45.54	37.66	8.50	39.28	2.46	54.88	73.9	19.0	302	253	-

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.98 m / 3.0 m) = 2.46 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.	3660.000	AV	42.68	29.85	6.47	38.29	1.29	2.46	44.46	53.9	9.4	-
Hori.	4880.000	AV	34.89	31.92	7.05	38.68	1.29	2.46	38.93	53.9	14.9	-
Hori.	7320.000	AV	34.66	37.66	8.50	39.28	1.29	2.46	45.29	53.9	8.6	-
Vert.	3660.000	AV	41.48	29.85	6.47	38.29	1.29	2.46	43.26	53.9	10.6	-
Vert.	4880.000	AV	36.65	31.92	7.05	38.68	1.29	2.46	40.69	53.9	13.2	-
Vert.	7320.000	AV	35.44	37.66	8.50	39.28	1.29	2.46	46.07	53.9	**7.8**	-

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 (3.98 m / 3.0 m) = 2.46 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB
Duty factor refer to "Burst rate confirmation" sheet.

Radiated Spurious Emission

Test place	Shonan EMC Lab.	
Semi Anechoic Chamber	No.2	No.1
Date	December 10, 2022	December 18, 2022
Temperature / Humidity	20 deg.C, 33 % RH	24 deg.C, 40 % RH
Engineer	Shiro Kobayashi	Hiromasa Sato
	(1 GHz -10 GHz)	(10 GHz -26.5 GHz)
Mode	Tx BT LE 1 M-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	51.33	28.44	14.29	38.76	2.46	57.76	73.9	16.1	112	35	-
Hori.	3720.000	PK	49.32	29.97	6.48	38.29	2.46	49.94	73.9	23.9	105	151	-
Hori.	4960.000	PK	45.23	32.10	7.09	38.72	2.46	48.16	73.9	25.7	166	170	-
Hori.	7440.000	PK	44.75	37.82	8.58	39.33	2.46	54.28	73.9	19.6	106	89	-
Vert.	2483.500	PK	51.13	28.44	14.29	38.76	2.46	57.56	73.9	16.3	158	34	-
Vert.	3720.000	PK	49.71	29.97	6.48	38.29	2.46	50.33	73.9	23.5	100	191	-
Vert.	4960.000	PK	45.89	32.10	7.09	38.72	2.46	48.82	73.9	25.0	304	237	-
Vert.	7440.000	PK	46.63	37.82	8.58	39.33	2.46	56.16	73.9	17.7	302	253	-

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.98 m / 3.0 m) = 2.46 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	36.78	28.44	14.29	38.76	1.29	2.46	44.50	53.9	9.4	*1)
Hori.	3720.000	AV	41.76	29.97	6.48	38.29	1.29	2.46	43.67	53.9	10.2	-
Hori.	4960.000	AV	34.89	32.10	7.09	38.72	1.29	2.46	39.11	53.9	14.7	-
Hori.	7440.000	AV	34.79	37.82	8.58	39.33	1.29	2.46	45.61	53.9	8.2	-
Vert.	2483.500	AV	36.60	28.44	14.29	38.76	1.29	2.46	44.32	53.9	9.5	*1)
Vert.	3720.000	AV	41.16	29.97	6.48	38.29	1.29	2.46	43.07	53.9	10.8	-
Vert.	4960.000	AV	35.93	32.10	7.09	38.72	1.29	2.46	40.15	53.9	13.7	-
Vert.	7440.000	AV	36.10	37.82	8.58	39.33	1.29	2.46	46.92	53.9	**6.9**	-

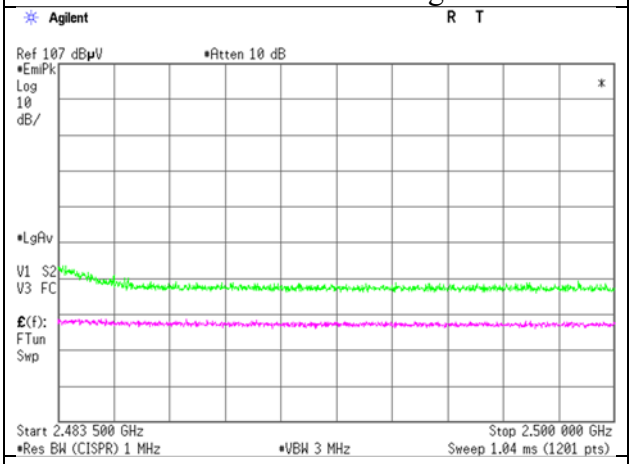
Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Duty factor + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.98 m / 3.0 m) = 2.46 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB
Duty factor refer to "Burst rate confirmation" sheet.
*1) Not out of band emission (Leakage Power)

Radiated Spurious Emission
(Reference Plot for band-edge)

Test place	Shonan EMC Lab.
Semi Anechoic Chamber	No.2
Date	December 10, 2022
Temperature / Humidity	20 deg.C, 33 % RH
Engineer	Shiro Kobayashi
	(1 GHz -10 GHz)
Mode	Tx BT LE 1 M-PHY 2480 MHz, Right

Horizontal

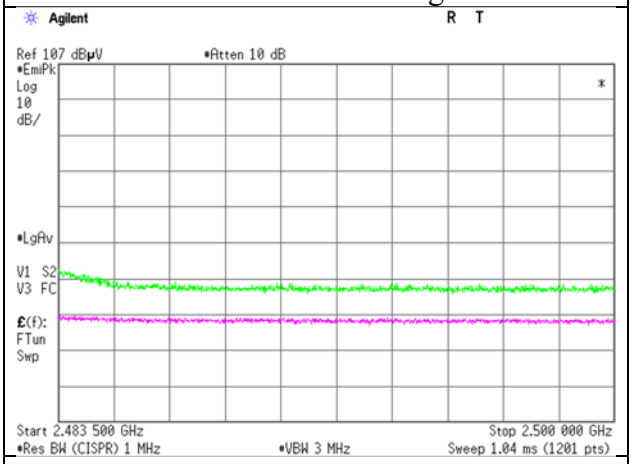
Restricted-band band-edge Plot



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	No.2	No.1
Date	December 10, 2022	December 18, 2022
Temperature / Humidity	20 deg.C, 33 % RH	24 deg.C, 40 % RH
Engineer	Shiro Kobayashi	Hiromasa Sato
	(1 GHz -10 GHz)	(10 GHz -26.5 GHz)
Mode	Tx BT LE 2 M-PHY 2404 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	44.65	28.57	14.19	38.81	2.46	51.06	73.9	22.8	113	26	-
Hori.	3606.000	PK	49.21	29.72	6.43	38.28	2.46	49.54	73.9	24.3	139	148	-
Hori.	4808.000	PK	45.57	31.91	7.00	38.64	2.46	48.30	73.9	25.6	164	153	-
Hori.	7212.000	PK	45.87	37.57	8.42	39.24	2.46	55.08	73.9	18.8	103	75	-
Vert.	2390.000	PK	45.22	28.57	14.19	38.81	2.46	51.63	73.9	22.2	139	33	-
Vert.	3606.000	PK	49.04	29.72	6.43	38.28	2.46	49.37	73.9	24.5	107	186	-
Vert.	4808.000	PK	46.18	31.91	7.00	38.64	2.46	48.91	73.9	24.9	308	234	-
Vert.	7212.000	PK	46.60	37.57	8.42	39.24	2.46	55.81	73.9	18.0	302	253	-

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.98 m / 3.0 m) = 2.46 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	35.66	28.57	14.19	38.81	4.65	2.46	46.72	53.9	7.1	*1)
Hori.	3606.000	AV	39.47	29.72	6.43	38.28	4.65	2.46	44.45	53.9	9.4	-
Hori.	4808.000	AV	35.51	31.91	7.00	38.64	4.65	2.46	42.89	53.9	11.0	-
Hori.	7212.000	AV	36.45	37.57	8.42	39.24	4.65	2.46	50.31	53.9	**3.5**	-
Vert.	2390.000	AV	35.79	28.57	14.19	38.81	4.65	2.46	46.85	53.9	7.0	*1)
Vert.	3606.000	AV	39.15	29.72	6.43	38.28	4.65	2.46	44.13	53.9	9.7	-
Vert.	4808.000	AV	35.35	31.91	7.00	38.64	4.65	2.46	42.73	53.9	11.1	-
Vert.	7212.000	AV	36.23	37.57	8.42	39.24	4.65	2.46	50.09	53.9	3.8	-

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 (3.98 m / 3.0 m) = 2.46 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)

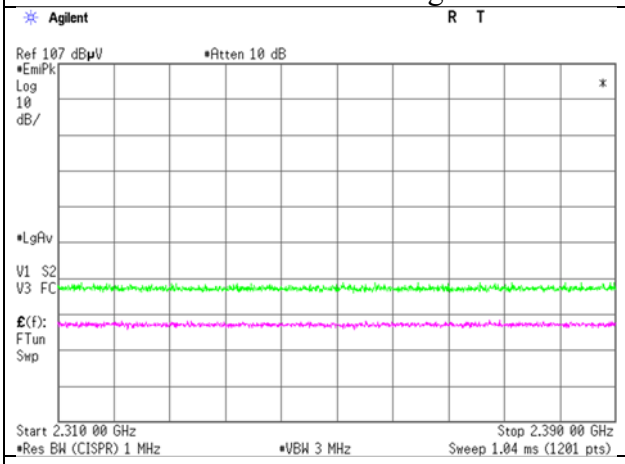
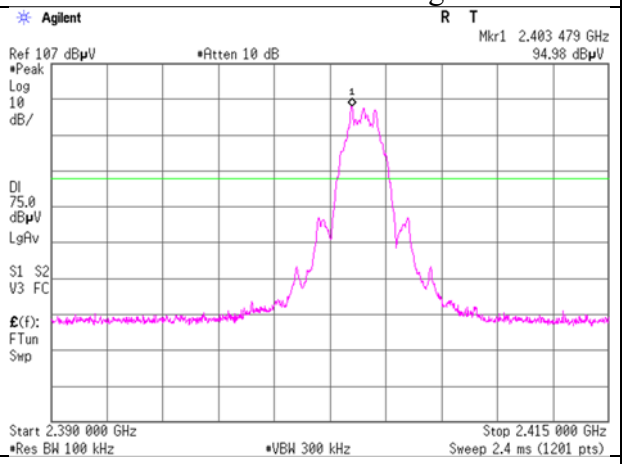
20 dBc Data Sheet **(RBW 100 kHz, VBW 300 kHz)**

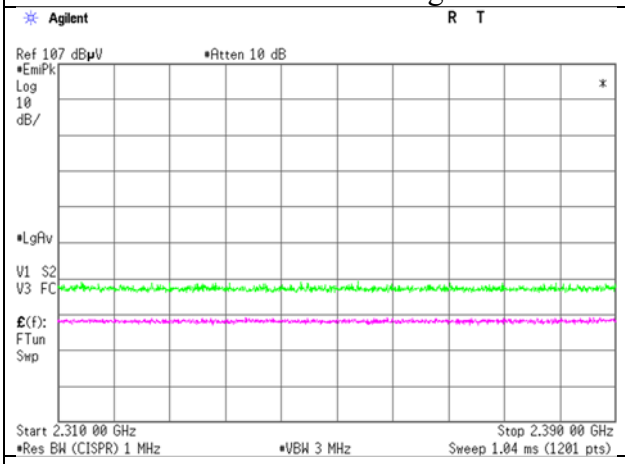
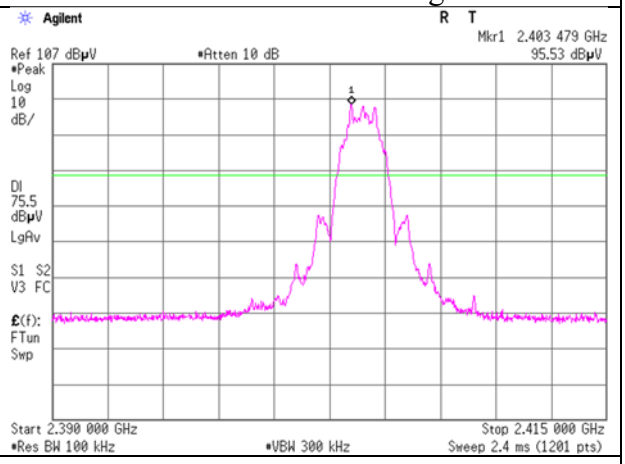
Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2404.000	PK	95.01	28.54	14.21	38.80	2.46	101.42	-	-	Carrier
Hori.	2398.983	PK	41.67	28.55	14.20	38.81	2.46	48.07	81.4	33.3	-
Hori.	2400.000	PK	40.81	28.55	14.20	38.81	2.46	47.21	81.4	34.1	-
Vert.	2404.000	PK	95.59	28.54	14.21	38.80	2.46	102.00	-	-	Carrier
Vert.	2399.000	PK	41.47	28.55	14.20	38.81	2.46	47.87	82.0	34.1	-
Vert.	2400.000	PK	41.05	28.55	14.20	38.81	2.46	47.45	82.0	34.5	-

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.98 m / 3.0 m) = 2.46 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.2
Date	December 10, 2022
Temperature / Humidity	20 deg.C, 33 % RH
Engineer	Shiro Kobayashi
	(1 GHz -10 GHz)
Mode	Tx BT LE 2 M-PHY 2404 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 was shown in tabular data.

Radiated Spurious Emission

Test place	Shonan EMC Lab.	
Semi Anechoic Chamber	No.2	No.1
Date	December 10, 2022	December 18, 2022
Temperature / Humidity	20 deg.C, 33 % RH	24 deg.C, 40 % RH
Engineer	Shiro Kobayashi	Hiromasa Sato
	(1 GHz -10 GHz)	(10 GHz -26.5 GHz)
Mode	Tx BT LE 2 M-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.	3660.000	PK	48.90	29.85	6.47	38.29	2.46	49.39	73.9	24.5	129	141	-
Hori.	4880.000	PK	45.47	31.92	7.05	38.68	2.46	48.22	73.9	25.6	173	164	-
Hori.	7320.000	PK	44.48	37.66	8.50	39.28	2.46	53.82	73.9	20.0	101	88	-
Vert.	3660.000	PK	48.69	29.85	6.47	38.29	2.46	49.18	73.9	24.7	101	200	-
Vert.	4880.000	PK	45.58	31.92	7.05	38.68	2.46	48.33	73.9	25.5	280	242	-
Vert.	7320.000	PK	45.10	37.66	8.50	39.28	2.46	54.44	73.9	19.4	316	251	-

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.98 m / 3.0 m) = 2.46 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.	3660.000	AV	38.78	29.85	6.47	38.29	4.65	2.46	43.92	53.9	9.9	-
Hori.	4880.000	AV	34.43	31.92	7.05	38.68	4.65	2.46	41.83	53.9	12.0	-
Hori.	7320.000	AV	34.96	37.66	8.50	39.28	4.65	2.46	48.95	53.9	**4.9**	-
Vert.	3660.000	AV	38.24	29.85	6.47	38.29	4.65	2.46	43.38	53.9	10.5	-
Vert.	4880.000	AV	34.87	31.92	7.05	38.68	4.65	2.46	42.27	53.9	11.6	-
Vert.	7320.000	AV	34.72	37.66	8.50	39.28	4.65	2.46	48.71	53.9	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 (3.98 m / 3.0 m) = 2.46 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB
Duty factor refer to "Burst rate confirmation" sheet.

Radiated Spurious Emission

Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	No.1	No.2	No.1
Date	December 20, 2022	December 10, 2022	December 18, 2022
Temperature / Humidity	21 deg.C, 25 % RH	20 deg.C, 33 % RH	24 deg.C, 40 % RH
Engineer	Miku Ikudome	Shiro Kobayashi	Hiromasa Sato
	(30 MHz -1 GHz)	(1 GHz -10 GHz)	(10 GHz -26.5 GHz)
Mode	Tx BT LE 2 M-PHY 2478 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.	75.582	QP	23.04	6.34	7.86	31.82	0.00	5.42	40.0	34.5	150	0	-
Hori.	172.546	QP	22.94	15.80	8.96	31.78	0.00	15.92	43.5	27.5	150	0	-
Hori.	909.023	QP	22.90	22.15	10.02	31.28	0.00	23.79	46.0	22.2	150	0	-
Hori.	2483.500	PK	47.90	28.44	14.29	38.76	2.46	54.33	73.9	19.5	114	35	-
Hori.	3717.000	PK	48.20	29.96	6.48	38.29	2.46	48.81	73.9	25.0	125	155	-
Hori.	4956.000	PK	45.25	32.08	7.09	38.72	2.46	48.16	73.9	25.7	185	164	-
Hori.	7434.000	PK	45.09	37.82	8.57	39.32	2.46	54.62	73.9	19.2	112	98	-
Vert.	71.489	QP	21.99	6.49	7.81	31.82	0.00	4.47	40.0	35.5	235	218	-
Vert.	73.628	QP	23.20	6.38	7.84	31.82	0.00	5.60	40.0	34.4	231	206	-
Vert.	194.221	QP	22.83	16.63	9.17	31.77	0.00	16.86	43.5	26.6	150	0	-
Vert.	939.825	QP	22.86	22.11	10.14	31.11	0.00	24.00	46.0	22.0	150	0	-
Vert.	2483.500	PK	47.66	28.44	14.29	38.76	2.46	54.09	73.9	19.8	156	29	-
Vert.	3717.000	PK	48.69	29.96	6.48	38.29	2.46	49.30	73.9	24.6	100	194	-
Vert.	4956.000	PK	45.06	32.08	7.09	38.72	2.46	47.97	73.9	25.9	306	233	-
Vert.	7434.000	PK	45.89	37.82	8.57	39.32	2.46	55.42	73.9	18.4	316	251	-

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.98 m / 3.0 m) = 2.46 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	36.09	28.44	14.29	38.76	4.65	2.46	47.17	53.9	6.7	*1)
Hori.	3717.000	AV	38.35	29.96	6.48	38.29	4.65	2.46	43.61	53.9	10.2	-
Hori.	4956.000	AV	34.79	32.08	7.09	38.72	4.65	2.46	42.35	53.9	11.5	-
Hori.	7434.000	AV	34.75	37.82	8.57	39.32	4.65	2.46	48.93	53.9	4.9	-
Vert.	2483.500	AV	36.09	28.44	14.29	38.76	4.65	2.46	47.17	53.9	6.7	*1)
Vert.	3717.000	AV	37.47	29.96	6.48	38.29	4.65	2.46	42.73	53.9	11.1	-
Vert.	4956.000	AV	34.86	32.08	7.09	38.72	4.65	2.46	42.42	53.9	11.4	-
Vert.	7434.000	AV	35.57	37.82	8.57	39.32	4.65	2.46	49.75	53.9	**4.1**	-

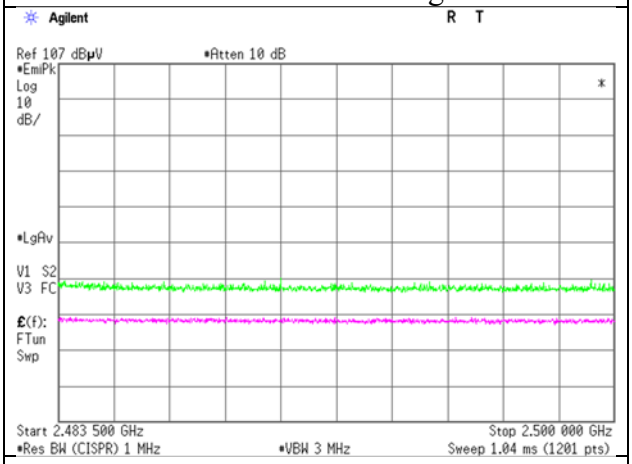
Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Duty factor + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.98 m / 3.0 m) = 2.46 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB
Duty factor refer to "Burst rate confirmation" sheet.
*1) Not out of band emission (Leakage Power)

Radiated Spurious Emission
(Reference Plot for band-edge)

Test place	Shonan EMC Lab.
Semi Anechoic Chamber	No.2
Date	December 10, 2022
Temperature / Humidity	20 deg.C, 33 % RH
Engineer	Shiro Kobayashi
	(1 GHz -10 GHz)
Mode	Tx BT LE 2 M-PHY 2478 MHz, Right

Horizontal

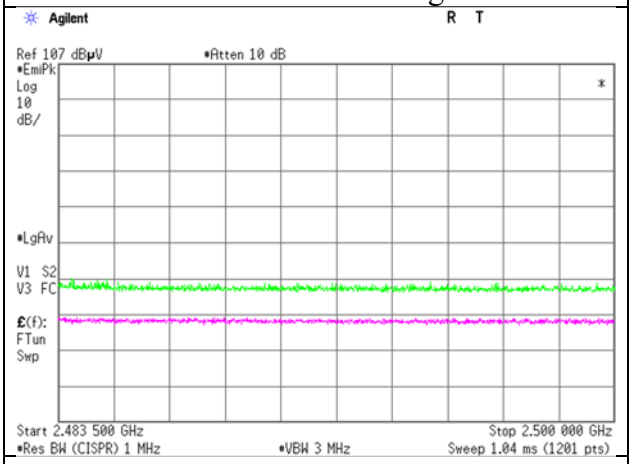
Restricted-band band-edge Plot



Trace Green : Peak Plot
Trace Purple : Average Plot

Vertical

Restricted-band band-edge Plot

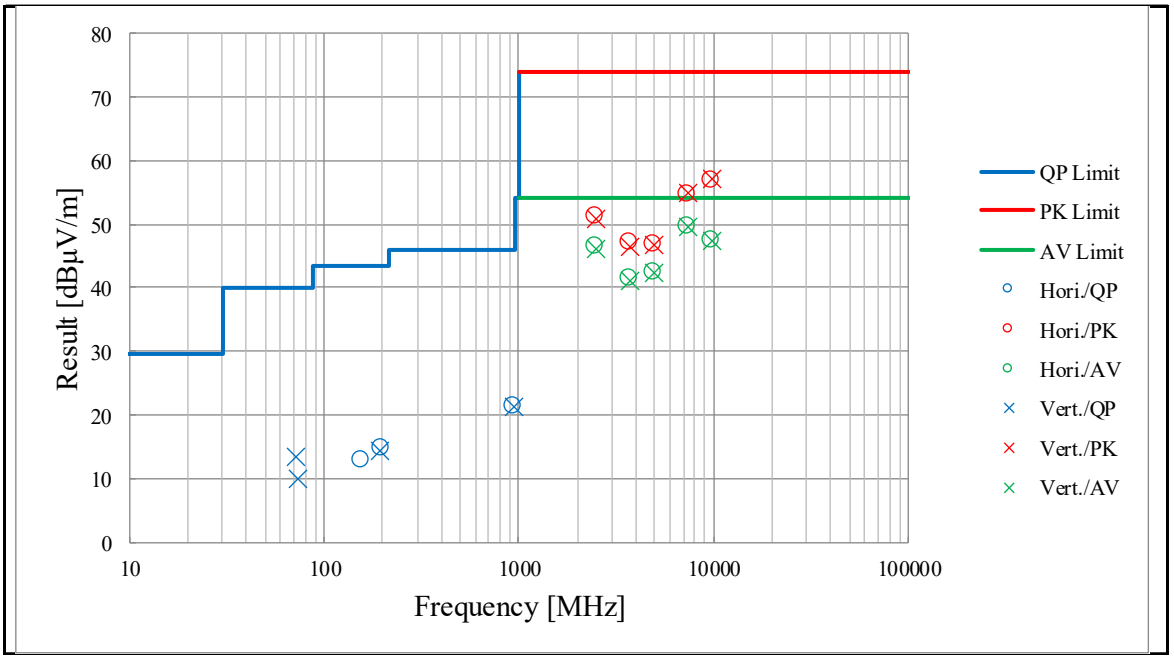


Trace Green : Peak Plot
Trace Purple : Average Plot

* 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)

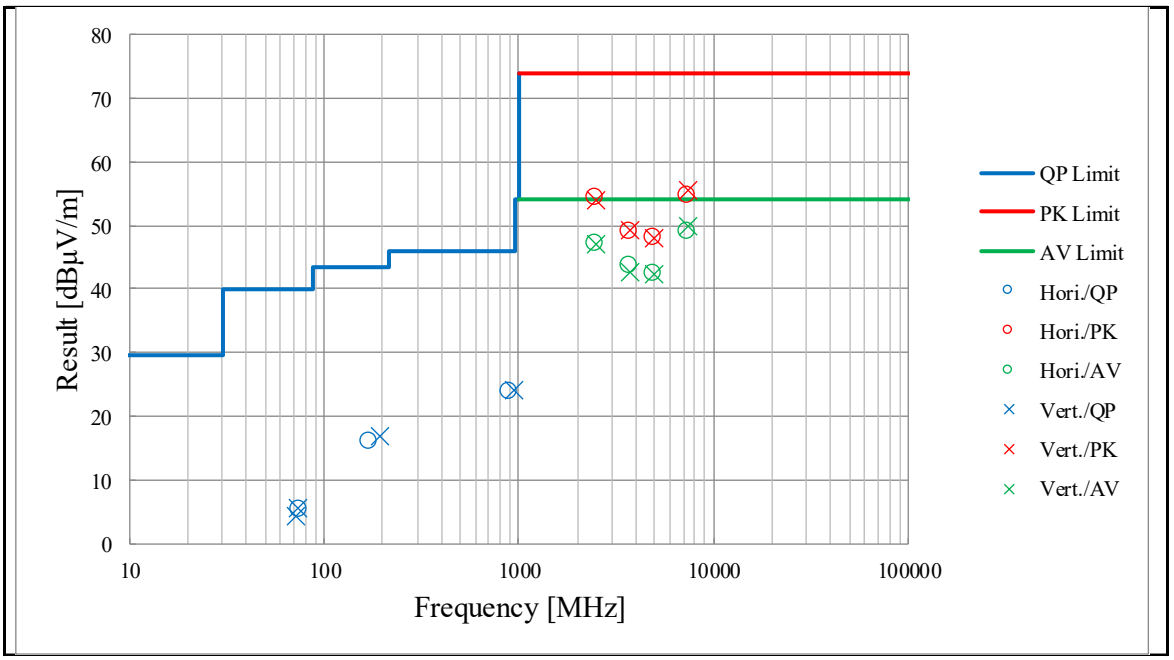
Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	No.2	No.1	No.1
Date	December 19, 2022	December 15, 2022	December 18, 2022
Temperature / Humidity	20 deg.C, 27 % RH	24 deg.C, 42 % RH	24 deg.C, 40 % RH
Engineer	Miku Ikudome	Hiromasa Sato	Hiromasa Sato
	(30 MHz -1 GHz)	(1 GHz -10 GHz)	(10 GHz -26.5 GHz)
Mode	Tx BT LE 2 M-PHY 2478 MHz, Left		



*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.1	No.2	No.1
Date	December 20, 2022	December 10, 2022	December 18, 2022
Temperature / Humidity	21 deg.C, 25 % RH	20 deg.C, 33 % RH	24 deg.C, 40 % RH
Engineer	Miku Ikudome	Shiro Kobayashi	Hiromasa Sato
	(30 MHz -1 GHz)	(1 GHz -10 GHz)	(10 GHz -26.5 GHz)
Mode	Tx BT LE 2 M-PHY 2478 MHz, Right		



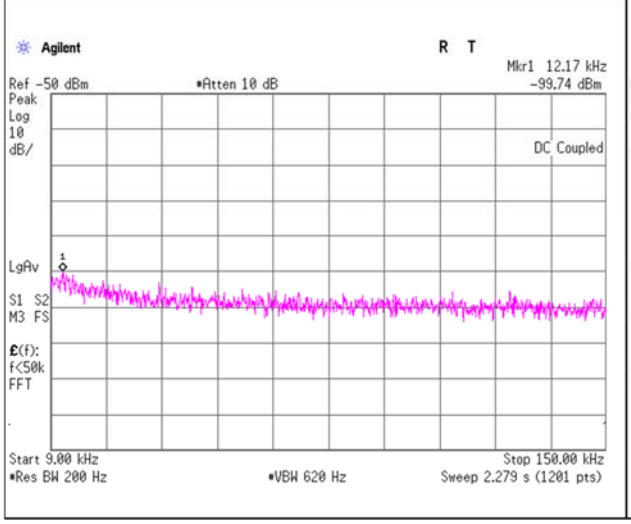
*These plots data contains sufficient number to show the trend of characteristic features for EUT.

Conducted Spurious Emission

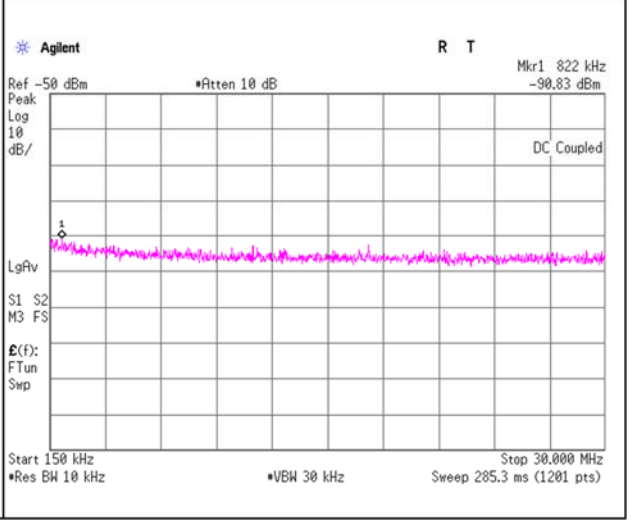
Test place	Shonan EMC Lab. No.5 Shielded Room
Date	December 5, 2022
Temperature / Humidity	24 deg. C / 42 % RH
Engineer	Miku Ikudome
Mode	Tx BT LE 2 M-PHY 2478 MHz

Tx, 2478 MHz

9 kHz - 150 kHz



150 kHz - 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
12.17	-99.7	0.9	9.8	2.0	1.0	-87.1	300	6.0	-25.8	45.8	71.6	-
822.00	-90.8	0.9	9.8	2.0	1.0	-78.1	30	6.0	3.1	29.3	26.2	-

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.1 Measurement Room
Date	December 1, 2022
Temperature / Humidity	23 deg. C / 35 % RH
Engineer	Takahiro Kawakami
Mode	Tx

BT LE 1 M-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	-20.99	2.10	9.91	-8.98	8.00	16.98
2440	2440.019	-20.66	2.11	9.91	-8.64	8.00	16.64
2480	2480.016	-20.57	2.13	9.91	-8.53	8.00	16.53

BT LE 2 M-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]
2404	2403.995	-23.97	2.10	9.91	-11.96	8.00	19.96
2440	2439.995	-23.79	2.11	9.91	-11.77	8.00	19.77
2478	2477.995	-23.45	2.13	9.91	-11.41	8.00	19.41

Sample Calculation:

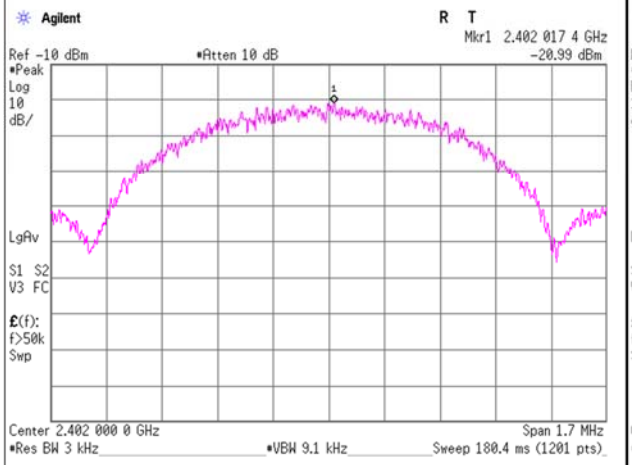
Result = Reading + Cable Loss (including the cable(s) customer supplied) + Attenuator Loss

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

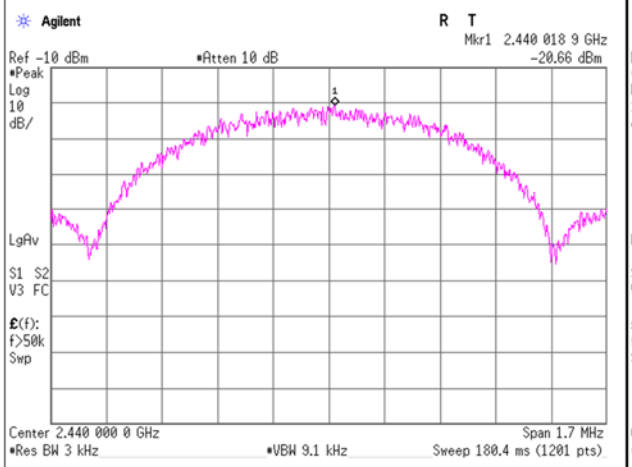
Power Density

BT LE 1 M-PHY

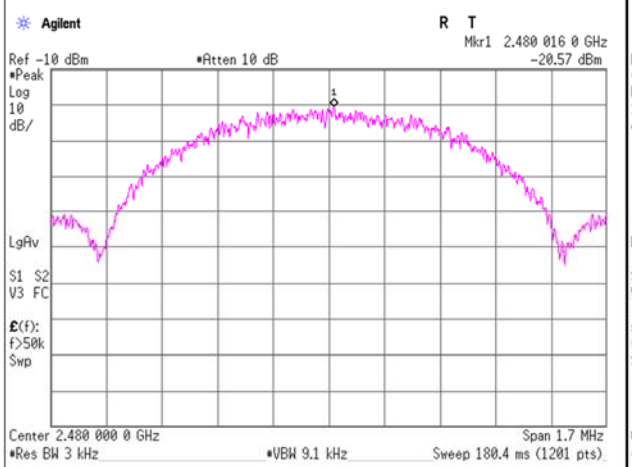
2402 MHz



2440 MHz

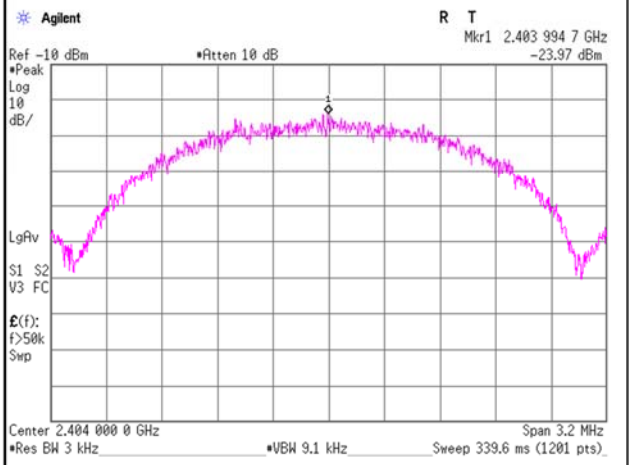


2480 MHz

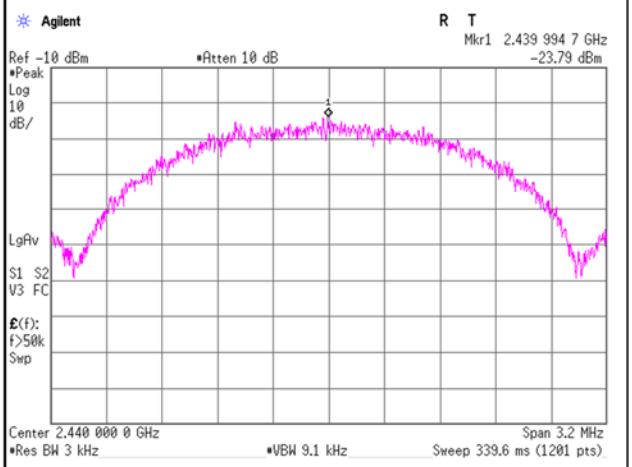


BT LE 2 M-PHY

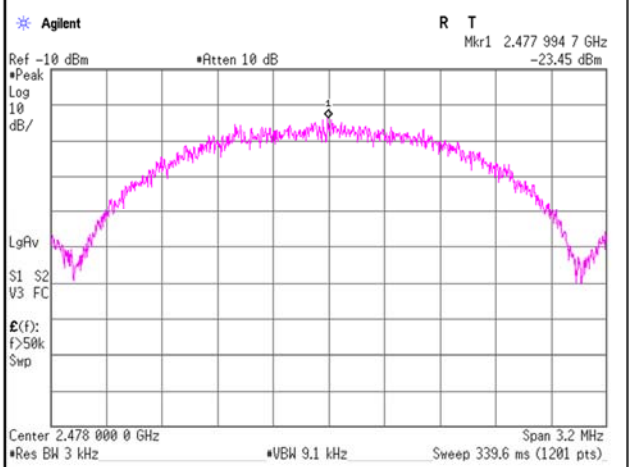
2404 MHz



2440 MHz



2478 MHz



APPENDIX 2: Test Instruments

Test Equipment(1/2)

Test Item	Local ID	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Cal Int
AT	KTS-08	145095	Digital Tester	SANWA	PC500	7019224	2022/04/07	12
AT	SAT10-12	151609	Attenuator	Weinschel Corp.	54A-10	81601	2022/03/02	12
AT	SCC-G66	196947	Coaxial Cable	Huber+Suhner	SUCOFLEX 102	803478/2	2022/03/02	12
AT	SOS-28	191846	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
RE	COTS-SEMI-5	170932	EMI Software	TSJ (Techno Science Japan)	TEPTO-DV3(RE,CE,ME,PE)	-	-	-
RE	KAT6-04	144899	Attenuator	Inmet	18N-6dB	-	2021/12/10	12
RE	KSA-08	145089	Spectrum Analyzer	Keysight Technologies Inc	E4446A	MY46180525	2022/11/01	12
RE	SAEC-01(NSA)	145597	Semi-Anechoic Chamber	TDK	SAEC-01(NSA)	1	2022/04/11	12
RE	SAEC-01(SVSWR)	145561	Semi-Anechoic Chamber	TDK	SAEC-01(SVSWR)	1	2022/05/13	12
RE	SAEC-02(NSA)	145563	Semi-Anechoic Chamber	TDK	SAEC-02(NSA)	2	2022/03/20	12
RE	SAEC-02(SVSWR)	145598	Semi-Anechoic Chamber	TDK	SAEC-02(SVSWR)	2	2022/05/16	12
RE	SAF-01	145003	Pre Amplifier	SONOMA	310N	290211	2022/02/24	12
RE	SAF-02	145004	Pre Amplifier	SONOMA	310N	290212	2022/02/24	12
RE	SAF-04	145127	Pre Amplifier	Toyo Corporation	TPA0118-36	2072554	2022/05/20	12
RE	SAF-05	145128	Pre Amplifier	Toyo Corporation	TPA0118-36	1440490	2022/05/12	12
RE	SAF-08	145007	Pre Amplifier	Toyo Corporation	HAP18-26W	19	2022/03/03	12
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	SAT3-09	144959	Attenuator	JFW	50HF-003N	-	2022/08/23	12
RE	SAT3-11	150921	Attenuator	JFW	50HF-003N	-	2022/02/21	12
RE	SAT6-14	167095	Attenuator	JFW	50HF-006N	-	2022/02/21	12
RE	SBA-01	145161	Biconical Antenna	Schwarzbeck Mess-Elektronik OHG	BBA9106	91032664	2022/04/16	12
RE	SBA-02	145022	Biconical Antenna	Schwarzbeck Mess-Elektronik OHG	BBA9106	91032665	2022/04/16	12
RE	SCC-A1/A3/A5/A7/A8/A13/SRSE-01	144967	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhner/Suhner/Suhner/Suhner/TOYO	8D2W/12DSFA/141PE/141PE/141PE/141PE/NS4906	-/0901-269(RF Selector)	2022/04/20	12
RE	SCC-A2/A4/A6/A7/A8/A13/SRSE-01	144968	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhner/Suhner/Suhner/Suhner/TOYO	8D2W/12DSFA/141PE/141PE/141PE/141PE/NS4906	-/0901-269(RF Selector)	2022/04/20	12
RE	SCC-B1/B3/B5/B7/B8/B13/SRSE-02	144975	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhner/Suhner/Suhner/Suhner/TOYO	8D2W/12DSFA/141PE/141PE/141PE/141PE/NS4906	-/0901-270(RF Selector)	2022/04/20	12
RE	SCC-B2/B4/B6/B7/B8/B13/SRSE-02	144976	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhner/Suhner/Suhner/Suhner/TOYO	8D2W/12DSFA/141PE/141PE/141PE/141PE/NS4906	-/0901-270(RF Selector)	2022/04/20	12

Test Equipment(2/2)

Test Item	Local ID	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Cal Int
RE	SCC-G05	145039	Coaxial Cable	Junkosha	J12J102207-00	APR-30-15-037	2022/01/06	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-G45	168301	Coaxial Cable	Huber+Suhner	SUCOFLEX 102 E	800137/2EA	2022/03/03	12
RE	SCC-G50	178573	Coaxial Cable	Huber+Suhner	SUCOFLEX_104_E	MY13407/4E	2022/03/03	12
RE	SCC-G51	178572	Coaxial Cable	Huber+Suhner	SUCOFLEX 104	800288 /4A	2022/03/03	12
RE	SCC-G62	196985	Coaxial Cable	Huber+Suhner	SUCOFLEX 102	803650/2	2022/03/08	12
RE	SCC-G68	200008	Coaxial Cable	Huber+Suhner	SUCOFLEX 104	575616/4	2022/07/21	12
RE	SFL-02	145301	Highpass Filter	MICRO-TRONICS	HPM50111	51	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-02	145384	Horn Antenna	Schwarzbeck Mess-Elektronik OHG	BBHA9120D	9120D-726	2022/03/10	12
RE	SHA-04	145512	Horn Antenna	ETS-Lindgren	3160-09	00094868	2022/06/06	12
RE	SHA-08	194683	Horn Antenna	Schwarzbeck Mess-Elektronik OHG	BBHA 9120 C	694	2022/03/01	12
RE	SJM-20	207277	Measuring	ASKUL	-	-	-	-
RE	SJM-22	207279	Measuring Tool, Tape Measure	ASKUL	-	-	-	-
RE	SLA-05	145527	Logperiodic Antenna	Schwarzbeck Mess-Elektronik OHG	VUSLP9111B	193	2022/04/16	12
RE	SLA-06	145528	Logperiodic Antenna	Schwarzbeck Mess-Elektronik OHG	VUSLP9111B	195	2022/04/16	12
RE	SOS-20	191837	Thermo-Hygrometer	CUSTOM. Inc	CTH-201	-	2022/08/06	12
RE	SOS-21	191838	Thermo-Hygrometer	CUSTOM. Inc	CTH-201	-	2022/08/08	12
RE	STR-01	145790	Test Receiver	Rohde & Schwarz	ESU40	100093	2022/04/28	12
RE	STR-08	150463	Test Receiver	Rohde & Schwarz	ESW44	101581	2022/03/02	12
RE	STS-01	145792	Digital Hitester	HIOKI E.E. CORPORATION	3805-50	80997812	2022/09/20	12
RE	STS-02	145793	Digital Hitester	HIOKI E.E. CORPORATION	3805-50	80997819	2022/04/07	12

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

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

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

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