RADIO TEST REPORT

Test Report No.: 14353270H-A-R1

Customer	**FUJITSU COMPONENT LIMITED**
Description of EUT	**Bluetooth Dual Mode Module**
Model Number of EUT	**FWM7BTZ61**
FCC ID	**SQK-7BTZ61**
Test Regulation	**FCC Part 15 Subpart C**
Test Result	**Complied (Refer to SECTION 3)**
Issue Date	**July 27, 2022**
Remarks	**Bluetooth Low Energy part**

Representative Test Engineer

Tetsuro Yoshida
Engineer

Approved By

Takumi Shimada
Engineer

CERTIFICATE 5107.02

☐ 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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REVISION HISTORY

Original Test Report No.: 14353270H-A

Revision	Test Report No.	Date	Page Revised Contents
- (Original)	14353270H-A	July 13, 2022	-
1	14353270H-A-R1	July 27, 2022	Correction of the description of “FCC Part 15.31 (e)” in Clause 3.2
1	14353270H-A-R1	July 27, 2022	Addition of Item E to configuration diagram and list for Radiated Emission test in Clause 4.2
1	14353270H-A-R1	July 27, 2022	Correction of power supply in configuration diagram for Antenna Terminal Conducted test in Clause 4.2; From 50 Hz to 60 Hz
1	14353270H-A-R1	July 27, 2022	Fixed the value of cable loss for Average Output Power test (P.22)

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	FUJITSU COMPONENT LIMITED
Address	Shinagawa Seaside Park Tower, 12-4, Higashi-shinagawa 4-chome, Shinagawa-ku, Tokyo, 140-0002, Japan
Telephone Number	+81-3-3450-1639
Contact Person	Koichi Nishizawa

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	Bluetooth Dual Mode Module
Model Number	FWM7BTZ61
Serial Number	Refer to SECTION 4.2
Condition	Production prototype (Not for Sale: This sample is equivalent to mass-produced items.)
Modification	No Modification by the test lab
Receipt Date	May 31, 2022
Test Date	June 7 to 15, 2022

2.2 Product Description

General Specification

Rating	DC 3.0 V
Operating temperature	-30 deg. C to +85 deg. C

Radio Specification

Bluetooth (Low Energy) *1)

Equipment Type	Transceiver
Frequency of Operation	2402 MHz to 2480 MHz
Type of Modulation	GFSK
Antenna Gain	0.2 dBi

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	0.2 dBi

*1) This test report applies to Bluetooth (Low Energy) part.
* Bluetooth Low Energy and Bluetooth do not transmit simultaneously.

SECTION 3: Test Specification, Procedures & Results

3.1 Test Specification

Test Specification	FCC Part 15 Subpart C FCC Part 15 final revised on April 1, 2022 and effective May 2, 2022
Title	FCC 47 CFR Part 15 Radio Frequency Device Subpart C Intentional Radiators Section 15.207 Conducted limits Section 15.247 Operation within the bands 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz

3.2 Procedures and Results

Item	Test Procedure	Specification	Worst Margin	Results	Remarks
Conducted Emission	**FCC:** ANSI C63.10-2013 6. Standard test methods	**FCC:** Section 15.207	10.79 dB, 3.73600 MHz, Phase L <1M-PHY>	Complied# a)	-
	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 b)	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 c)	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 d)	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)	4.1 dB 59.6 MHz, QP, Vertical <1M-PHY>	Complied# e), f)	Conducted (below 30 MHz)/ Radiated (above 30 MHz) *1)
	ISED: RSS-Gen 6.13	**ISED:** RSS-247 5.5 RSS-Gen 8.9 RSS-Gen 8.10			

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

*1) Radiated test was selected over 30 MHz based on section 15.247(d) and KDB 558074 D01 15.247 Meas Guidance v05r02 8.5 and 8.6.

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

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

FCC Part 15.31 (e)

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

FCC Part 15.203/212 Antenna requirement

It is impossible for end users to replace the antenna, because the antenna is mounted inside of the 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

There is no applicable rule of uncertainty in this applied standard. Therefore, the results are derived depending on whether or not laboratory uncertainty is applied.

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

Conducted emission

Using Item	Frequency range	Uncertainty (+/-)
AMN (LISN)	0.009 MHz to 0.15 MHz	3.7 dB
	0.15 MHz to 30 MHz	3.3 dB

Radiated emission

Measurement distance	Frequency range		Uncertainty (+/-)
3 m	9 kHz to 30 MHz		3.2 dB
10 m			3.0 dB
3 m	30 MHz to 200 MHz	Horizontal	4.8 dB
		Vertical	5.0 dB
	200 MHz to 1000 MHz	Horizontal	5.1 dB
		Vertical	6.2 dB
10 m	30 MHz to 200 MHz	Horizontal	4.8 dB
		Vertical	4.8 dB
	200 MHz to 1000 MHz	Horizontal	5.0 dB
		Vertical	5.0 dB
3 m	1 GHz to 6 GHz		4.9 dB
	6 GHz to 18 GHz		5.2 dB
1 m	10 GHz to 26.5 GHz		5.4 dB
	26.5 GHz to 40 GHz		5.4 dB
10 m	1 GHz to 18 GHz		5.4 dB

Antenna Terminal test

Test Item	Uncertainty (+/-)
20 dB Bandwidth / 99 % Occupied Bandwidth	0.96 %
Maximum Peak Output Power / Average Output Power	1.5 dB
Carrier Frequency Separation	0.42 %
Dwell time / Burst rate	0.10 %
Conducted Spurious Emission	2.7 dB

3.5 Test Location

UL Japan, Inc. Ise EMC Lab.
*A2LA Certificate Number: 5107.02 / FCC Test Firm Registration Number: 884919
ISED Lab Company Number: 2973C / CAB identifier: JP0002
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 Japan
Telephone: +81-596-24-8999

Test site	Width x Depth x Height (m)	Size of reference ground plane (m) / horizontal conducting plane	Other rooms	Maximum measurement distance
No.1 semi-anechoic chamber	19.2 x 11.2 x 7.7	7.0 x 6.0	No.1 Power source room	10 m
No.2 semi-anechoic chamber	7.5 x 5.8 x 5.2	4.0 x 4.0	-	3 m
No.3 semi-anechoic chamber	12.0 x 8.5 x 5.9	6.8 x 5.75	No.3 Preparation room	3 m
No.3 shielded room	4.0 x 6.0 x 2.7	N/A	-	-
No.4 semi-anechoic chamber	12.0 x 8.5 x 5.9	6.8 x 5.75	No.4 Preparation room	3 m
No.4 shielded room	4.0 x 6.0 x 2.7	N/A	-	-
No.5 semi-anechoic chamber	6.0 x 6.0 x 3.9	6.0 x 6.0	-	-
No.5 measurement room	6.4 x 6.4 x 3.0	6.4 x 6.4	-	-
No.6 shielded room	4.0 x 4.5 x 2.7	4.0 x 4.5	-	-
No.6 measurement room	4.75 x 5.4 x 3.0	4.75 x 4.15	-	-
No.7 shielded room	4.7 x 7.5 x 2.7	4.7 x 7.5	-	-
No.8 measurement room	3.1 x 5.0 x 2.7	3.1 x 5.0	-	-
No.9 measurement room	8.8 x 4.6 x 2.8	2.4 x 2.4	-	-
No.10 shielded room	3.8 x 2.8 x 2.8	3.8 x 2.8	-	-
No.11 measurement room	4.0 x 3.4 x 2.5	N/A	-	-
No.12 measurement room	2.6 x 3.4 x 2.5	N/A	-	-
Large Chamber	16.9 x 22.1 x 10.17	16.9 x 22.1	-	10 m
Small Chamber	5.3 x 6.69 x 3.59	5.3 x 6.69	-	-

* Size of vertical conducting plane (for Conducted Emission test) : 2.0 x 2.0 m for No.1, No.2, No.3, and No.4 semi-anechoic chambers and No.3 and No.4 shielded rooms.

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: +4dBm
Software: sppv5 Version: v4.00
(Date: 2022.04 19, 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.

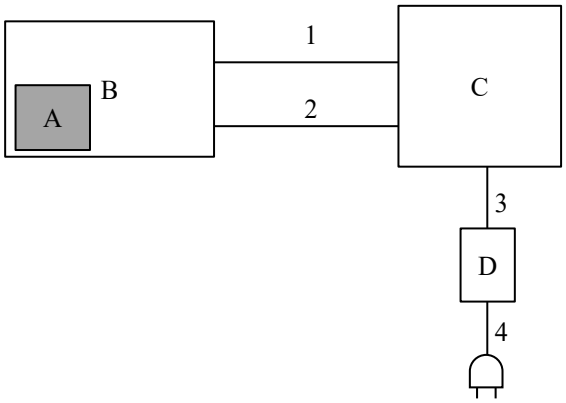
*The Details of Operating Mode(s)

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

[Conducted Emission tests]



AC 120 V / 60 Hz

* Cabling and setup(s) were taken into consideration and test data was taken under worse case conditions.
* As a result of comparing AC 120 V and AC 240 V at pre-check, Conducted Emission test was performed with AC 120 V of the worst voltage as representative.

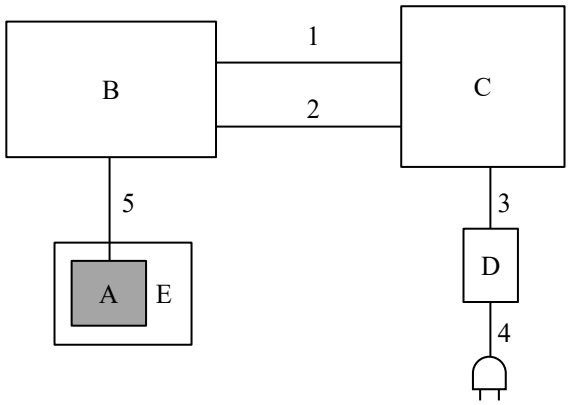
Description of EUT and Support Equipment

No.	Item	Model number	Serial Number	Manufacturer	Remarks
A	Bluetooth Dual Mode Module	FWM7BTZ61	000B5DB4EB1C	FUJITSU COMPONENT LIMITED	EUT
B	Jig Board	T015265	-	FUJITSU COMPONENT LIMITED	-
C	Laptop PC	X1 Carbon	R9-OH8OBW 15/9	Lenovo	-
D	AC Adapter	ADLX45NCC2A	36200281	Lenovo	-

List of Cables Used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	USB Cable	2.0	Shielded	Shielded	-
2	USB Cable	2.0	Shielded	Shielded	-
3	DC Cable	1.7	Unshielded	Unshielded	-
4	AC Cable	0.8	Unshielded	Unshielded	-

[Radiated Emission test]



AC 120 V / 60 Hz

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

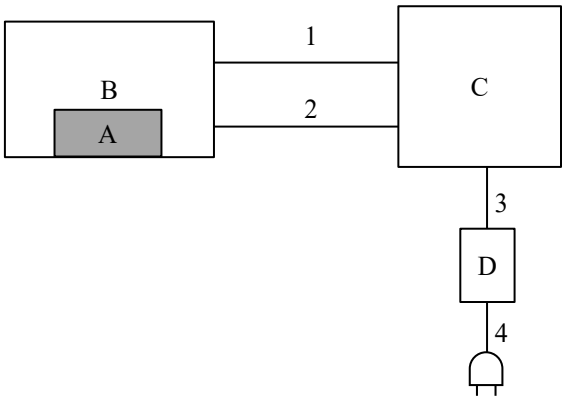
Description of EUT and Support Equipment

No.	Item	Model number	Serial Number	Manufacturer	Remarks
A	Bluetooth Dual Mode Module	FWM7BTZ61	000B5DB4EB1C	FUJITSU COMPONENT LIMITED	EUT
B	Jig Board	T015265	-	FUJITSU COMPONENT LIMITED	-
C	Laptop PC	X1 Carbon	R9-OH8OBW 15/9	Lenovo	-
D	AC Adapter	ADLX45NCC2A	36200281	Lenovo	-
E	Jig Board	-	-	FUJITSU COMPONENT LIMITED	-

List of Cables Used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	USB Cable	2.0	Shielded	Shielded	-
2	USB Cable	2.0	Shielded	Shielded	-
3	DC Cable	1.7	Unshielded	Unshielded	-
4	AC Cable	0.8	Unshielded	Unshielded	-
5	Signal Cable	0.2	Unshielded	Unshielded	-

[Antenna Terminal Conducted test]



AC 120 V / 60 Hz

* 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	Bluetooth Dual Mode Module	FWM7BTZ61	000B5DB4EB22	FUJITSU COMPONENT LIMITED	EUT
B	Jig Board	T015265	-	FUJITSU COMPONENT LIMITED	-
C	Laptop PC	PR63PBAA337AD7X	6F053913H	TOSHIBA	-
D	AC Adapter	PA51770-1ACA	FX10800NSKACC	TOSHIBA	-

List of Cables Used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	USB Cable	2.0	Shielded	Shielded	-
2	USB Cable	2.0	Shielded	Shielded	-
3	DC Cable	1.7	Unshielded	Unshielded	-
4	AC Cable	0.8	Unshielded	Unshielded	-

SECTION 5: Conducted Emission

Test Procedure and Conditions

EUT was placed on a urethane platform / a wooden table of nominal size, 1.0 m by 1.5 m, raised 0.8 m above the conducting ground plane.
The rear of tabletop was located 40 cm to the vertical conducting plane. The rear of EUT, including peripherals aligned and flushed with rear of tabletop. All other surfaces of tabletop were at least 80cm from any other grounded conducting surface.
EUT was located 80 cm from a Line Impedance Stabilization Network (LISN) / Artificial mains Network (AMN) and excess AC cable was bundled in center.

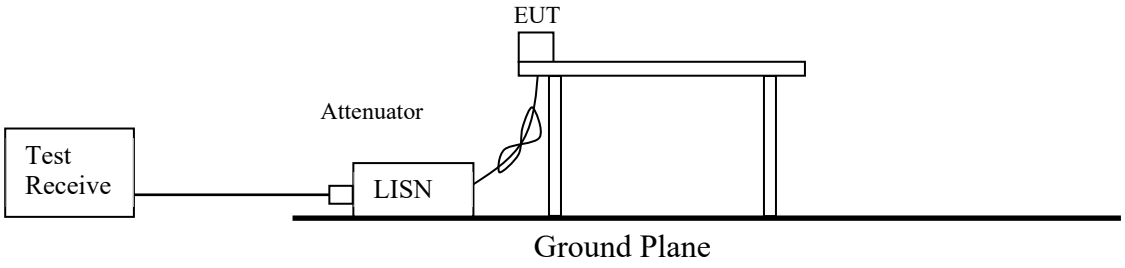
For the tests on EUT with other peripherals (as a whole system)
I/O cables that were connected to the peripherals were bundled in center. They were folded back and forth forming a bundle 30 cm to 40 cm long and were hanged at a 40 cm height to the ground plane. All unused 50ohm connectors of the LISN (AMN) were resistivity terminated in 50 ohm when not connected to the measuring equipment.

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

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

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

Figure 1: Test Setup



SECTION 6: Radiated Spurious Emission

Test Procedure

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, 0.5 m by 1.0 m, raised 0.8 m above the conducting ground plane.
The Radiated Electric Field Strength has been measured in a Semi Anechoic Chamber with a ground plane.

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

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

Test Antennas are used as below;

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

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

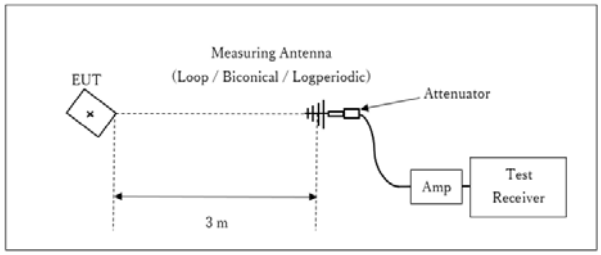
20 dBc was applied to the frequency over the limit of FCC 15.209 / Table 4 of RSS-Gen 8.9(ISED) and outside the restricted band of FCC15.205 / Table 6 of RSS-Gen 8.10 (ISED).

Frequency	Below 1 GHz	Above 1 GHz		20 dBc
Instrument Used	Test Receiver	Spectrum Analyzer		Spectrum Analyzer
Detector	QP	PK	AV *1)	PK
IF Bandwidth	BW 120 kHz	RBW: 1 MHz VBW: 3 MHz	11.12.2.5.1 RBW: 1 MHz VBW: 3 MHz Detector: Power Averaging (RMS) Trace: 100 traces 11.12.2.5.2 The duty cycle was less than 98% for detected noise, a duty factor was added to the 11.12.2.5.1 results.	RBW: 100 kHz VBW: 300 kHz

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

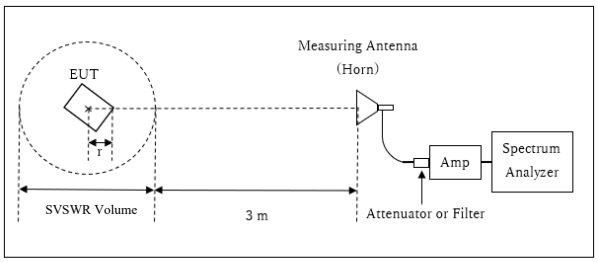
Figure 2: Test Setup

Below 1 GHz



Test Distance: 3 m

1 GHz to 10 GHz

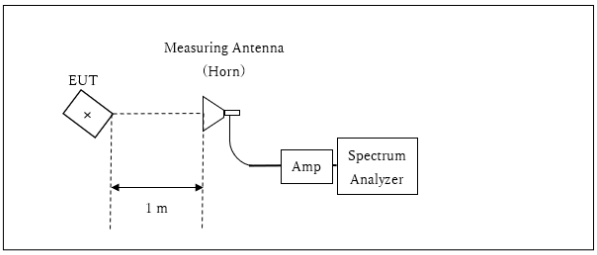


Distance Factor: 20 x log (4.0 m / 3.0 m) = 2.50 dB
* Test Distance: (3 + SVSWR Volume /2) - r = 4.0 m

SVSWR Volume : 2.0 m
(SVSWR Volume has been calibrated based on CISPR 16-1-4.)
r = 0.0 m

* The test was performed with r = 0.0 m since EUT is small and it was the rather conservative condition.

10 GHz to 26.5 GHz



Distance Factor: 20 x log (1.0 m / 3.0 m) = -9.5 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.

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

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

SECTION 7: Antenna Terminal Conducted Tests

Test Procedure

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

Test	Span	RBW	VBW	Sweep time	Detector	Trace	Instrument Used
6dB Bandwidth	3 MHz	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: 50 MHz BW)
Peak Power Density	1.5 times the 6dB Bandwidth	3 kHz	10 kHz	Auto	Peak	Max Hold	Spectrum Analyzer *3)
Conducted Spurious Emission *4) *5)	9kHz to 150kHz	200 Hz	620 Hz	Auto	Peak	Max Hold	Spectrum Analyzer
	150kHz to 30MHz	9.1 kHz	27 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 = 9.1 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.

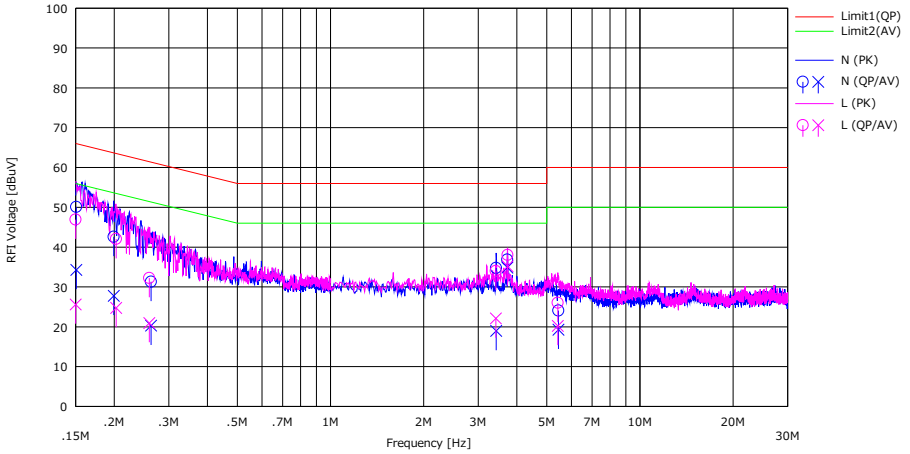
Test Data : APPENDIX
Test Result : Pass

APPENDIX 1: Test Data

Conducted Emission

Test place	Ise EMC Lab. No.3 Semi Anechoic Chamber
Date	June 15, 2022
Temperature / Humidity	24 deg. C / 55 % RH
Engineer	Kiyoshiro Okazaki
Mode	Tx BT LE 1M-PHY 2480 MHz

Limit : FCC_Part 15 Subpart C(15.207)



No.	Freq.	Reading		LISN	LOSS	Results		Limit		Margin		Phase	Comment
		〈QP〉	〈AV〉			〈QP〉	〈AV〉	〈QP〉	〈AV〉	〈QP〉	〈AV〉		
	[MHz]	[dBuV]	[dBuV]	[dB]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dB]	[dB]		
1	0.15085	36.80	21.00	0.09	13.18	50.07	34.27	65.95	55.95	15.88	21.68	N	
2	0.19930	29.30	14.50	0.08	13.19	42.57	27.77	63.64	53.64	21.07	25.87	N	
3	0.26305	18.00	7.00	0.08	13.20	31.28	20.28	61.33	51.33	30.05	31.05	N	
4	3.43000	21.20	5.40	0.13	13.41	34.74	18.94	56.00	46.00	21.26	27.06	N	
5	3.72700	23.30	21.30	0.13	13.42	36.85	34.85	56.00	46.00	19.15	11.15	N	
6	5.45500	10.40	5.60	0.16	13.50	24.06	19.26	60.00	50.00	35.94	30.74	N	
7	0.15000	33.60	12.30	0.13	13.18	46.91	25.61	66.00	56.00	19.09	30.39	L	
8	0.20270	28.70	11.40	0.13	13.19	42.02	24.72	63.50	53.50	21.48	28.78	L	
9	0.25965	18.90	7.60	0.13	13.20	32.23	20.93	61.44	51.44	29.21	30.51	L	
10	3.42100	20.40	8.50	0.19	13.41	34.00	22.10	56.00	46.00	22.00	23.90	L	
11	3.73600	24.40	21.60	0.19	13.42	38.01	35.21	56.00	46.00	17.99	10.79	L	
12	5.42800	12.30	6.50	0.22	13.49	26.01	20.21	60.00	50.00	33.99	29.79	L	

CHART: WITH FACTOR Peak hold data. CALCULATION : RESULT = READING + LISN + LOSS (CABLE + ATT)
Except for the above table: adequate margin data below the limits.

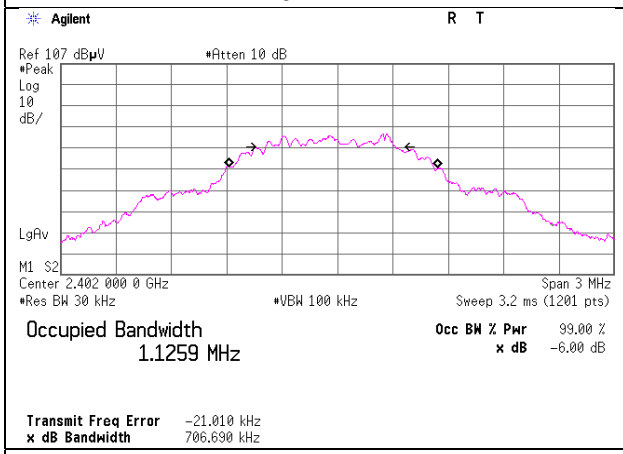
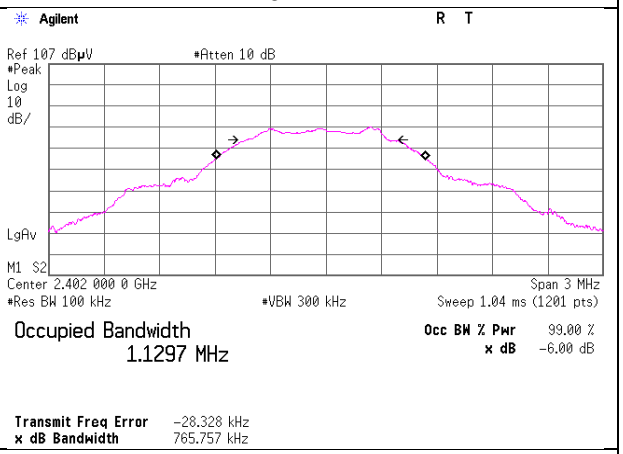
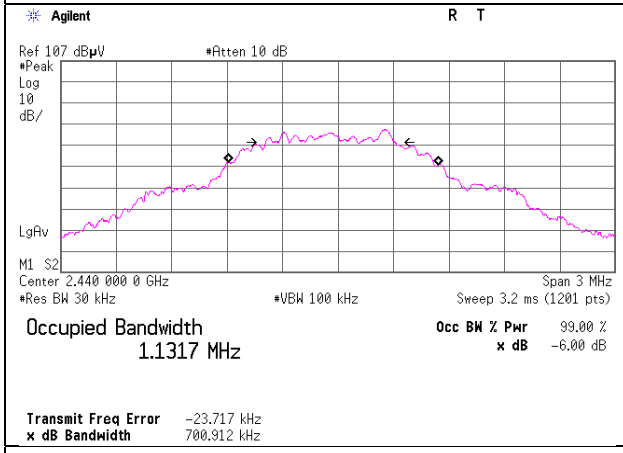
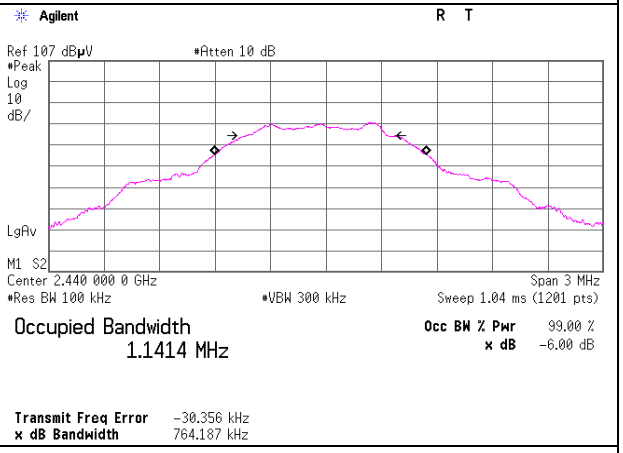
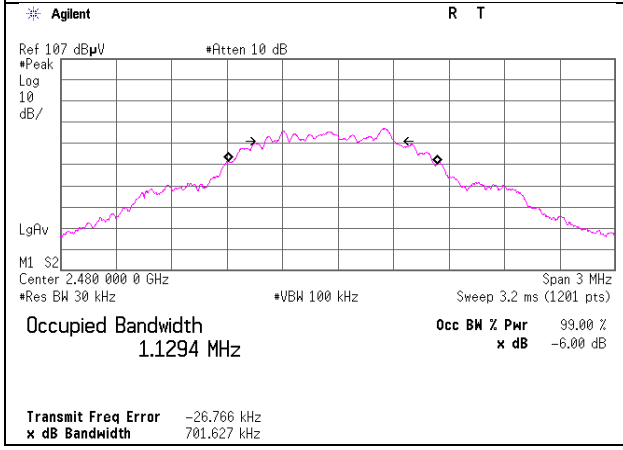
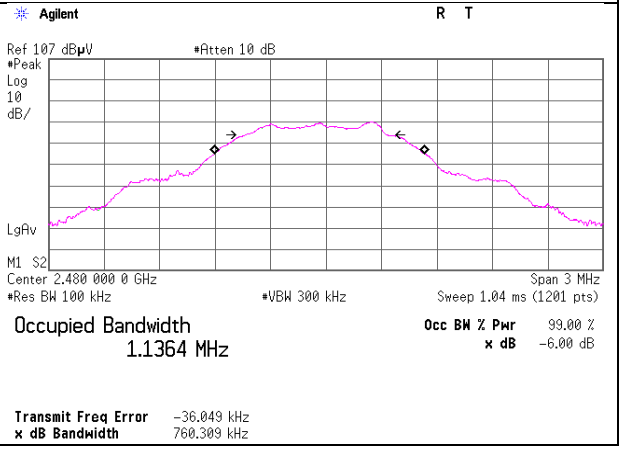
99 % Occupied Bandwidth and 6 dB Bandwidth

Test place	Ise EMC Lab. No.6 Measurement Room
Date	June 7, 2022
Temperature / Humidity	22 deg. C / 44 % RH
Engineer	Tetsuro Yoshida
Mode	Tx BT LE

Mode	Frequency [MHz]	99 % Occupied Bandwidth [kHz]	6 dB Bandwidth [MHz]	Limit for 6 dB Bandwidth [MHz]
1M-PHY	2402	1125.9	0.766	> 0.5000
	2440	1131.7	0.764	> 0.5000
	2480	1129.4	0.760	> 0.5000
2M-PHY	2402	1799.3	0.863	> 0.5000
	2440	1816.8	0.864	> 0.5000
	2480	1817.2	0.882	> 0.5000

99 % Occupied Bandwidth and 6 dB Bandwidth

BT LE 1M-PHY

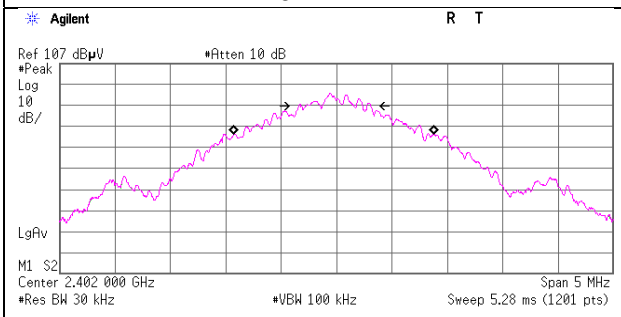
99 % Occupied Bandwidth	6 dB Bandwidth
2402 MHz	2402 MHz
	
2440 MHz	2440 MHz
	
2480 MHz	2480 MHz
	

99 % Occupied Bandwidth and 6 dB Bandwidth

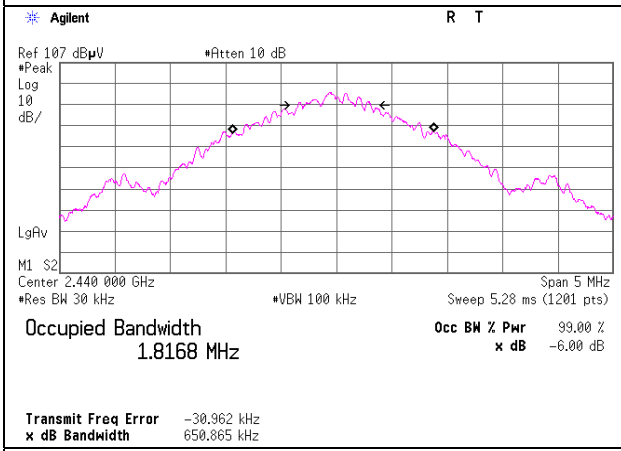
BT LE 2M-PHY

99 % Occupied Bandwidth

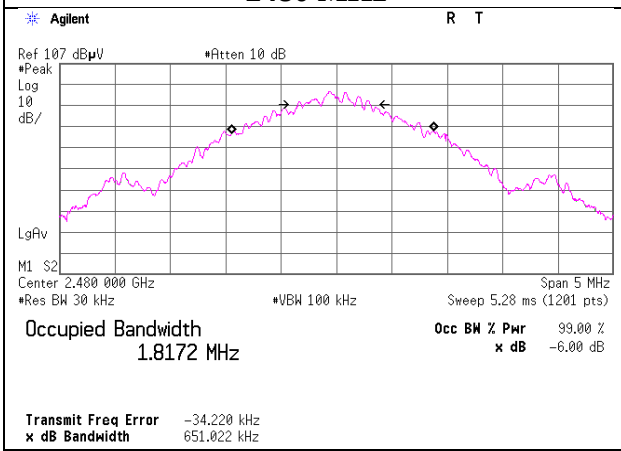
2402 MHz



2440 MHz

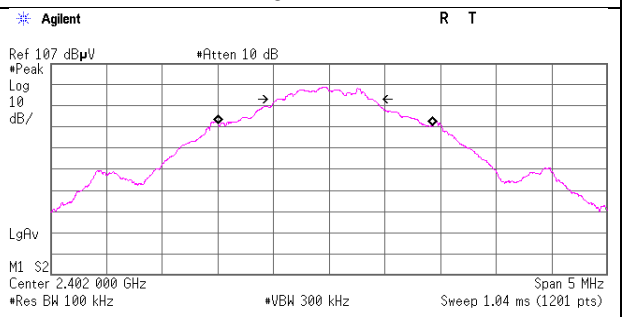


2480 MHz

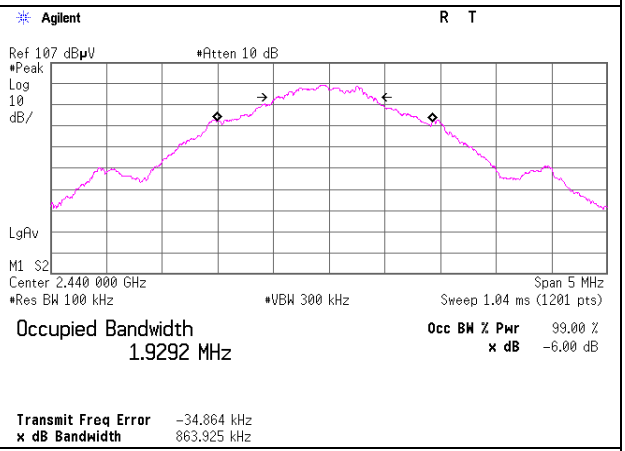


6 dB Bandwidth

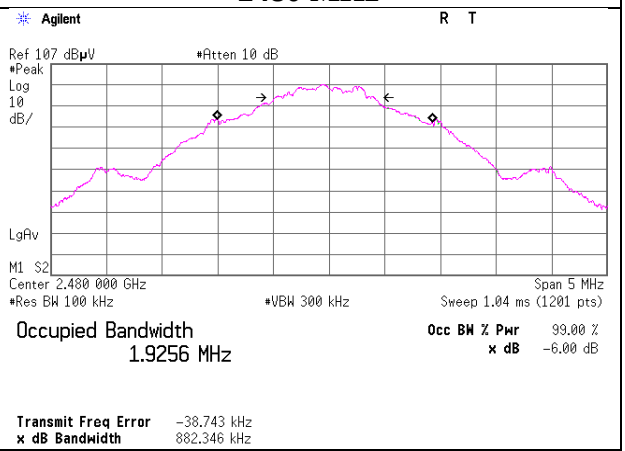
2402 MHz



2440 MHz



2480 MHz



Maximum Peak Output Power

Test place	Ise EMC Lab. No.6 Measurement Room
Date	June 7, 2022
Temperature / Humidity	22 deg. C / 44 % RH
Engineer	Tetsuro Yoshida
Mode	Tx BT LE

1M-PHY				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	-9.37	0.30	10.02	0.95	1.24	30.00	1000	29.05	0.20	1.15	1.30	36.02	4000	34.87
2440	-8.93	0.30	10.02	1.39	1.38	30.00	1000	28.61	0.20	1.59	1.44	36.02	4000	34.43
2480	-8.24	0.30	10.02	2.08	1.61	30.00	1000	27.92	0.20	2.28	1.69	36.02	4000	33.74

2M-PHY				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	-9.41	0.30	10.02	0.91	1.23	30.00	1000	29.09	0.20	1.11	1.29	36.02	4000	34.91
2440	-8.95	0.30	10.02	1.37	1.37	30.00	1000	28.63	0.20	1.57	1.44	36.02	4000	34.45
2480	-8.25	0.30	10.02	2.07	1.61	30.00	1000	27.93	0.20	2.27	1.69	36.02	4000	33.75

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

Average Output Power
(Reference data for RF Exposure)

Test place	Ise EMC Lab. No.6 Measurement Room
Date	June 7, 2022
Temperature / Humidity	22 deg. C / 44 % RH
Engineer	Tetsuro Yoshida
Mode	Tx BT LE

1M-PHY

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	-10.40	0.30	10.02	-0.08	0.98	0.67	0.59	1.15
2440	-9.94	0.30	10.02	0.38	1.09	0.67	1.05	1.27
2480	-9.25	0.30	10.02	1.07	1.28	0.67	1.74	1.49

2M-PHY

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	-11.87	0.30	10.02	-1.55	0.70	2.38	0.83	1.21
2440	-11.48	0.30	10.02	-1.16	0.77	2.38	1.22	1.32
2480	-10.35	0.30	10.02	-0.03	0.99	2.38	2.35	1.72

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

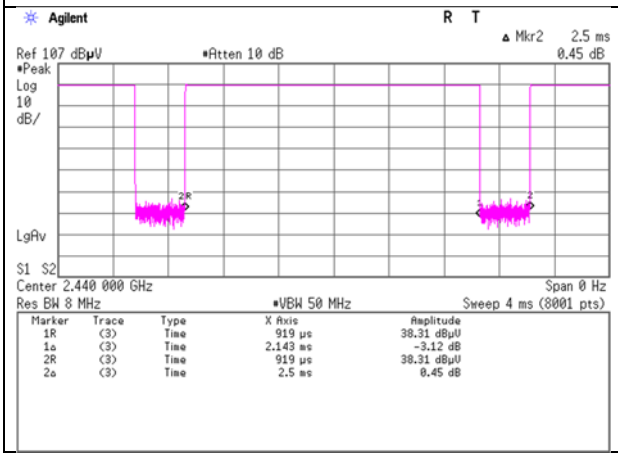
*The equipment and cables were not used for factor 0 dB of the data sheets.

Burst rate confirmation

Test place	Ise EMC Lab. No.6 Measurement Room
Date	June 7, 2022
Temperature / Humidity	22 deg. C / 44 % RH
Engineer	Tetsuro Yoshida
Mode	Tx BT LE

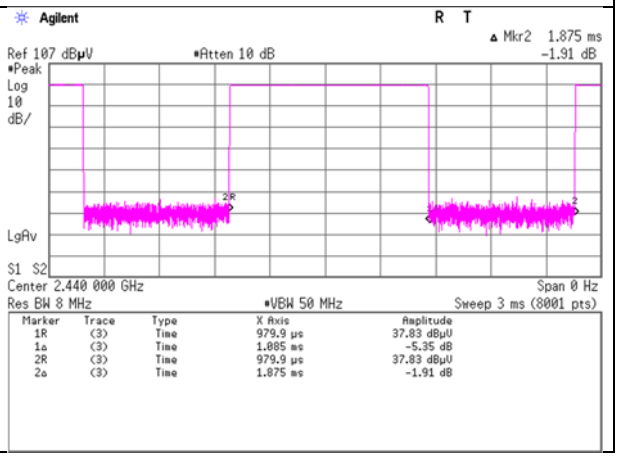
BT LE 1M-PHY

Tx on / (Tx on + Tx off) =	**0.857**
Tx on / (Tx on + Tx off) * 100 =	**85.7 %**
Duty factor = 10 * log (2.5 / 2.143) =	**0.67 dB**



BT LE 2M-PHY

Tx on / (Tx on + Tx off) =	**0.579**
Tx on / (Tx on + Tx off) * 100 =	**57.9 %**
Duty factor = 10 * log (1.875 / 1.085) =	**2.38 dB**



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

Radiated Spurious Emission

Test place	Ise EMC Lab.	
Semi Anechoic Chamber	No.3	No.3
Date	June 10, 2022	June 12, 2022
Temperature / Humidity	21 deg. C / 43 % RH	20 deg. C / 50 % RH
Engineer	Nachi Konegawa	Keiya Ido
	(1 GHz - 10 GHz)	(10 GHz - 26.5 GHz)
Mode	Tx BT LE 1M-PHY 2402 MHz	

Polarity [Hori/Vert]	Frequency [MHz]	Reading (QP / PK) [dBuV]	Reading (AV) [dBuV]	Ant. Factor [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result (QP / PK) [dBuV/m]	Result (AV) [dBuV/m]	Limit (QP / PK) [dBuV/m]	Limit (AV) [dBuV/m]	Margin (QP / PK) [dB]	Margin (AV) [dB]	Remark
Hori.	2378.0	44.9	37.8	27.6	5.8	32.9	-	45.4	38.3	73.9	53.9	28.5	15.7	
Hori.	2390.0	41.8	33.7	27.6	5.8	32.9	0.7	42.2	34.8	73.9	53.9	31.7	19.1	*1)
Hori.	4804.0	41.5	33.3	31.5	8.1	32.0	-	49.1	41.0	73.9	53.9	24.8	12.9	Floor noise
Hori.	7206.0	42.9	34.5	35.7	9.7	32.8	-	55.5	47.2	73.9	53.9	18.4	6.8	Floor noise
Hori.	9608.0	44.4	32.2	38.7	10.3	33.5	-	59.9	47.7	73.9	53.9	14.0	6.2	Floor noise
Vert.	2378.0	44.8	37.7	27.6	5.8	32.9	-	45.3	38.2	73.9	53.9	28.6	15.7	
Vert.	2390.0	41.6	33.9	27.6	5.8	32.9	0.7	42.0	35.0	73.9	53.9	31.9	18.9	*1)
Vert.	4804.0	41.5	33.3	31.5	8.1	32.0	-	49.1	41.0	73.9	53.9	24.8	12.9	Floor noise
Vert.	7206.0	42.9	34.5	35.7	9.7	32.8	-	55.5	47.2	73.9	53.9	18.4	6.8	Floor noise
Vert.	9608.0	44.4	32.2	38.7	10.3	33.5	-	59.9	47.7	73.9	53.9	14.0	6.2	Floor noise

Result (QP / PK) = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier)

Result (AV)= Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier) + Duty factor

*Other frequency noises omitted in this report were not seen or had enough margin (more than 20 dB).

*QP detector was used up to 1GHz.

*1) Not Out of Band emission(Leakage Power)

20dBc Data Sheet

Polarity [Hori/Vert]	Frequency [MHz]	Reading (PK) [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2402.0	88.4	27.5	5.8	32.9	88.8	-	-	Carrier
Hori.	2400.0	39.0	27.5	5.8	32.9	39.4	68.8	29.4	
Vert.	2402.0	88.0	27.5	5.8	32.9	88.4	-	-	Carrier
Vert.	2400.0	38.4	27.5	5.8	32.9	38.8	68.4	29.6	

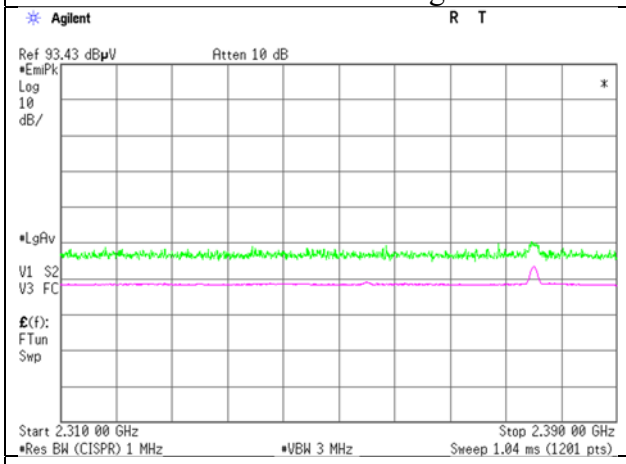
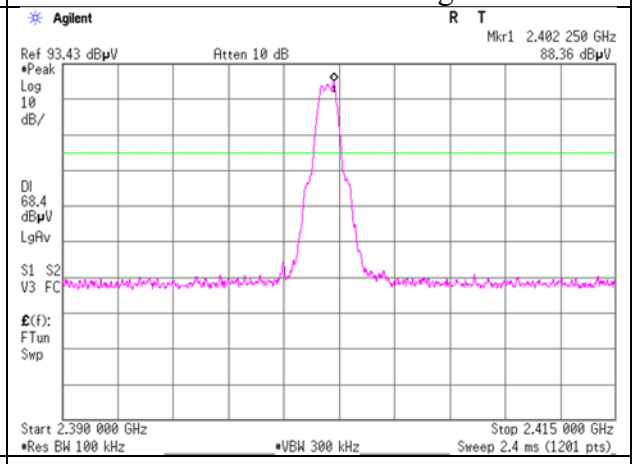
Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amprifier)

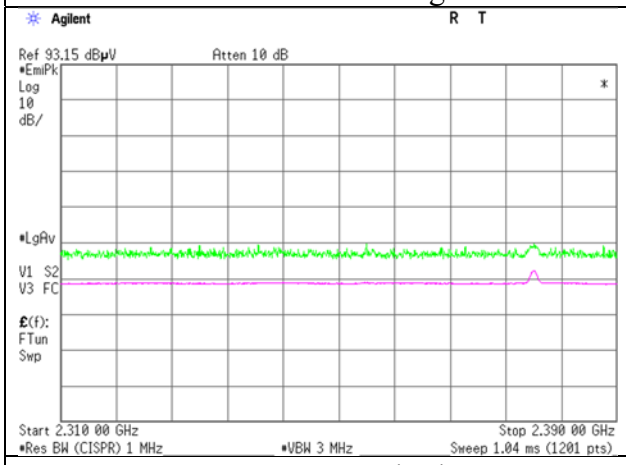
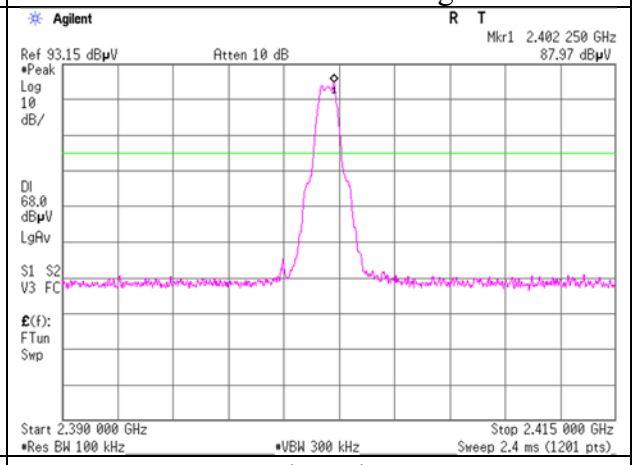
Distance factor: 1 GHz - 10 GHz 20log (4 m / 3.0 m) = 2.5 dB

10 GHz - 26.5 GHz 20log (1.0 m / 3.0 m) = -9.5 dB

Radiated Spurious Emission
(Reference Plot for band-edge)

Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.3
Date	June 10, 2022
Temperature / Humidity	21 deg. C / 43 % RH
Engineer	Nachi Konegawa
	(1 GHz - 10 GHz)
Mode	Tx BT LE 1M-PHY 2402 MHz

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

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

* The measurement was conducted for a sufficiently long enough time to detect any possible spurious emissions.
Final result of restricted band edge was shown in tabular data.

Radiated Spurious Emission

Test place	Ise EMC Lab.	
Semi Anechoic Chamber	No.3	No.3
Date	June 10, 2022	June 12, 2022
Temperature / Humidity	21 deg. C / 43 % RH	20 deg. C / 50 % RH
Engineer	Nachi Konegawa	Keiya Ido
	(1 GHz - 10 GHz)	(10 GHz - 26.5 GHz)
Mode	Tx BT LE 1M-PHY 2440 MHz	

Polarity [Hori/Vert]	Frequency [MHz]	Reading (QP / PK) [dBuV]	Reading (AV) [dBuV]	Ant. Factor [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result (QP / PK) [dBuV/m]	Result (AV) [dBuV/m]	Limit (QP / PK) [dBuV/m]	Limit (AV) [dBuV/m]	Margin (QP / PK) [dB]	Margin (AV) [dB]	Remark
Hori.	4880.0	41.8	32.7	31.6	8.2	32.0	-	49.5	40.5	73.9	53.9	24.4	13.4	Floor noise
Hori.	7320.0	42.9	34.0	35.9	9.7	32.8	-	55.6	46.7	73.9	53.9	18.3	7.2	Floor noise
Hori.	9760.0	44.1	31.9	39.2	10.4	33.6	-	60.0	47.8	73.9	53.9	13.9	6.1	Floor noise
Vert.	4880.0	41.8	32.7	31.6	8.2	32.0	-	49.5	40.5	73.9	53.9	24.4	13.4	Floor noise
Vert.	7320.0	42.9	34.0	35.9	9.7	32.8	-	55.6	46.7	73.9	53.9	18.3	7.2	Floor noise
Vert.	9760.0	44.1	31.9	39.2	10.4	33.6	-	60.0	47.8	73.9	53.9	13.9	6.1	Floor noise

Result (QP / PK) = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier)

Result (AV)= Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier) + Duty factor

*Other frequency noises omitted in this report were not seen or had enough margin (more than 20 dB).

*QP detector was used up to 1GHz.

Distance factor:	1 GHz - 10 GHz	20log (4 m / 3.0 m) = 2.5 dB
	10 GHz - 26.5 GHz	20log (1.0 m / 3.0 m) = -9.5 dB

Radiated Spurious Emission

Test place	Ise EMC Lab.		
Semi Anechoic Chamber	No.3	No.3	No.3
Date	June 10, 2022	June 12, 2022	June 12, 2022
Temperature / Humidity	21 deg. C / 43 % RH	20 deg. C / 50 % RH	21 deg. C / 52 % RH
Engineer	Nachi Konegawa	Keiya Ido	Hiroki Numata
	(1 GHz - 10 GHz)	(10 GHz - 26.5 GHz)	(Below 1 GHz)
Mode	Tx BT LE 1M-PHY 2480 MHz		

Polarity [Hori/Vert]	Frequency [MHz]	Reading (QP / PK) [dBuV]	Reading (AV) [dBuV]	Ant. Factor [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result (QP / PK) [dBuV/m]	Result (AV) [dBuV/m]	Limit (QP / PK) [dBuV/m]	Limit (AV) [dBuV/m]	Margin (QP / PK) [dB]	Margin (AV) [dB]	Remark
Hori.	30.2	22.5	-	18.6	7.1	32.2	-	15.9	-	40.0	-	24.1	-	
Hori.	59.6	42.2	-	8.0	7.6	32.2	-	25.5	-	40.0	-	14.5	-	
Hori.	93.2	37.2	-	9.1	8.1	32.1	-	22.3	-	43.5	-	21.3	-	
Hori.	125.8	31.9	-	13.5	8.4	32.1	-	21.7	-	43.5	-	21.9	-	
Hori.	173.7	31.5	-	16.0	8.9	32.1	-	24.4	-	43.5	-	19.1	-	
Hori.	285.4	45.2	-	13.9	9.9	32.0	-	37.0	-	46.0	-	9.0	-	
Hori.	2483.5	43.0	34.1	27.4	5.8	32.9	0.7	43.5	35.2	73.9	53.9	30.5	18.7	*1)
Hori.	4960.0	42.1	32.8	31.7	8.2	31.9	-	50.0	40.7	73.9	53.9	23.9	13.2	Floor noise
Hori.	7440.0	42.4	34.0	36.1	9.7	32.9	-	55.3	46.9	73.9	53.9	18.6	7.0	Floor noise
Hori.	9920.0	43.9	32.0	39.1	10.4	33.7	-	59.8	47.9	73.9	53.9	14.1	6.0	Floor noise
Vert.	30.0	23.4	-	18.6	7.1	32.2	-	16.9	-	40.0	-	23.1	-	
Vert.	59.6	52.6	-	8.0	7.6	32.2	-	35.9	-	40.0	-	4.1	-	
Vert.	126.2	35.7	-	13.5	8.4	32.1	-	25.5	-	43.5	-	18.0	-	
Vert.	158.9	30.3	-	15.5	8.8	32.1	-	22.5	-	43.5	-	21.0	-	
Vert.	174.2	28.3	-	16.0	8.9	32.1	-	21.2	-	43.5	-	22.3	-	
Vert.	285.3	36.5	-	13.9	9.9	32.0	-	28.3	-	46.0	-	17.8	-	
Vert.	2483.5	42.7	34.0	27.4	5.8	32.9	0.7	43.1	35.1	73.9	53.9	30.8	18.8	*1)
Vert.	4960.0	42.1	32.8	31.7	8.2	31.9	-	50.0	40.7	73.9	53.9	23.9	13.2	Floor noise
Vert.	7440.0	42.4	34.0	36.1	9.7	32.9	-	55.3	46.9	73.9	53.9	18.6	7.0	Floor noise
Vert.	9920.0	43.9	32.0	39.1	10.4	33.7	-	59.8	47.9	73.9	53.9	14.1	6.0	Floor noise

Result (QP / PK) = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier)

Result (AV)= Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier) + Duty factor

*Other frequency noises omitted in this report were not seen or had enough margin (more than 20 dB).

*QP detector was used up to 1GHz.

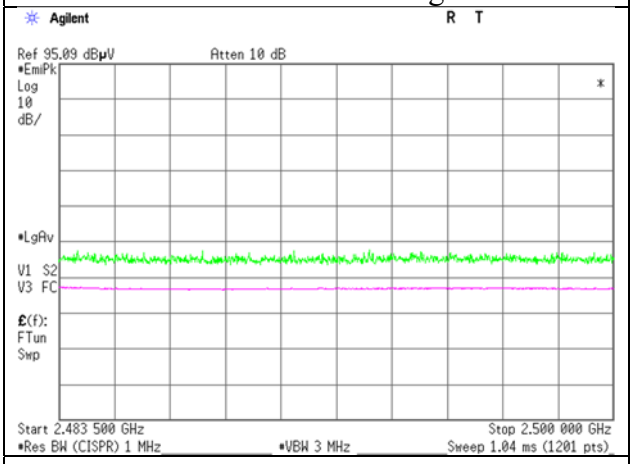
*1) Not Out of Band emission(Leakage Power)

Radiated Spurious Emission
(Reference Plot for band-edge)

Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.3
Date	June 10, 2022
Temperature / Humidity	21 deg. C / 43 % RH
Engineer	Nachi Konegawa
	(1 GHz - 10 GHz)
Mode	Tx BT LE 1M-PHY 2480 MHz

Horizontal

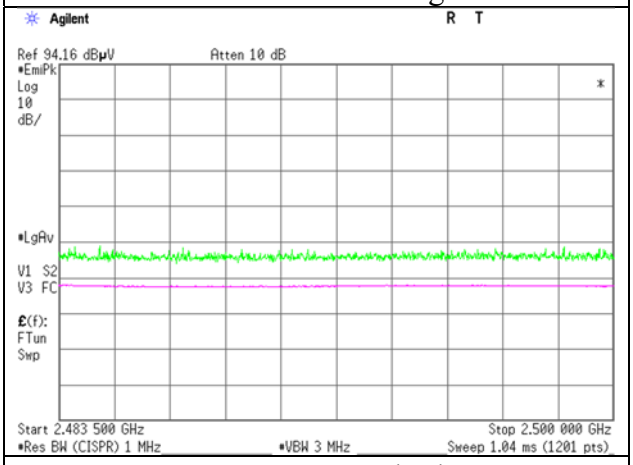
Restricted-band band-edge Plot



Trace Green : Peak Plot
Trace Purple : Average Plot

Vertical

Restricted-band band-edge Plot



Trace Green : Peak Plot
Trace Purple : Average Plot

* The measurement was conducted for a sufficiently long enough time to detect any possible spurious emissions. Final result of restricted band edge was shown in tabular data.

Radiated Spurious Emission

Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.3
Date	June 12, 2022
Temperature / Humidity	20 deg. C / 50 % RH
Engineer	Keiya Ido
	(Above 1GHz)
Mode	Tx BT LE 2M-PHY 2402 MHz

Polarity [Hori/Vert]	Frequency [MHz]	Reading (QP / PK) [dBuV]	Reading (AV) [dBuV]	Ant. Factor [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result (QP / PK) [dBuV/m]	Result (AV) [dBuV/m]	Limit (QP / PK) [dBuV/m]	Limit (AV) [dBuV/m]	Margin (QP / PK) [dB]	Margin (AV) [dB]	Remark
Hori.	2378.0	45.2	38.2	27.6	5.8	32.9	-	45.7	38.7	73.9	53.9	28.2	15.2	
Hori.	2390.0	42.6	33.4	27.6	5.8	32.9	2.4	43.0	36.2	73.9	53.9	30.9	17.7	*1)
Hori.	4804.0	41.5	33.3	31.5	8.1	32.0	-	49.1	41.0	73.9	53.9	24.8	12.9	Floor noise
Hori.	7206.0	42.9	34.5	35.7	9.7	32.8	-	55.5	47.2	73.9	53.9	18.4	6.8	Floor noise
Hori.	9608.0	44.4	32.2	38.7	10.3	33.5	-	59.9	47.7	73.9	53.9	14.0	6.2	Floor noise
Vert.	2378.0	44.9	37.2	27.6	5.8	32.9	-	45.4	37.7	73.9	53.9	28.6	16.2	
Vert.	2390.0	43.1	33.7	27.6	5.8	32.9	2.4	43.5	36.5	73.9	53.9	30.4	17.4	*1)
Vert.	4804.0	41.5	33.3	31.5	8.1	32.0	-	49.1	41.0	73.9	53.9	24.8	12.9	Floor noise
Vert.	7206.0	42.9	34.5	35.7	9.7	32.8	-	55.5	47.2	73.9	53.9	18.4	6.8	Floor noise
Vert.	9608.0	44.4	32.2	38.7	10.3	33.5	-	59.9	47.7	73.9	53.9	14.0	6.2	Floor noise

Result (QP / PK) = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier)

Result (AV)= Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier) + Duty factor

*Other frequency noises omitted in this report were not seen or had enough margin (more than 20 dB).

*QP detector was used up to 1GHz.

*1) Not Out of Band emission(Leakage Power)

20dBc Data Sheet

Polarity [Hori/Vert]	Frequency [MHz]	Reading (PK) [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2402.0	88.4	27.5	5.8	32.9	88.8	-	-	Carrier
Hori.	2400.0	39.0	27.5	5.8	32.9	39.4	68.8	29.4	
Hori.	2400.0	63.1	27.5	5.8	32.9	63.5	68.8	5.2	
Vert.	2402.0	88.0	27.5	5.8	32.9	88.4	-	-	Carrier
Vert.	2400.0	38.4	27.5	5.8	32.9	38.8	68.4	29.6	
Vert.	2400.0	61.4	27.5	5.8	32.9	61.8	68.4	6.5	

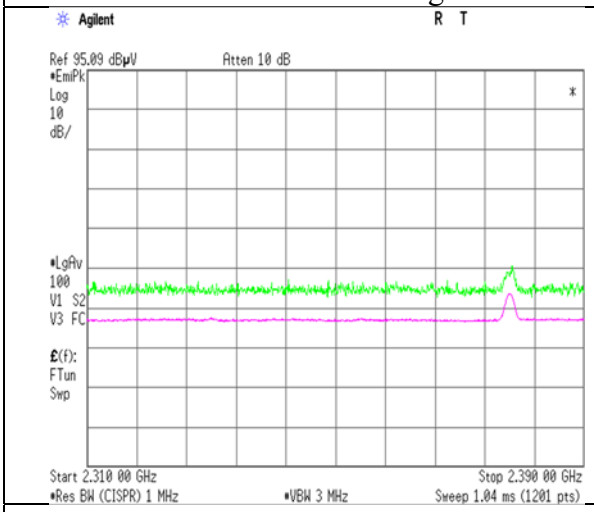
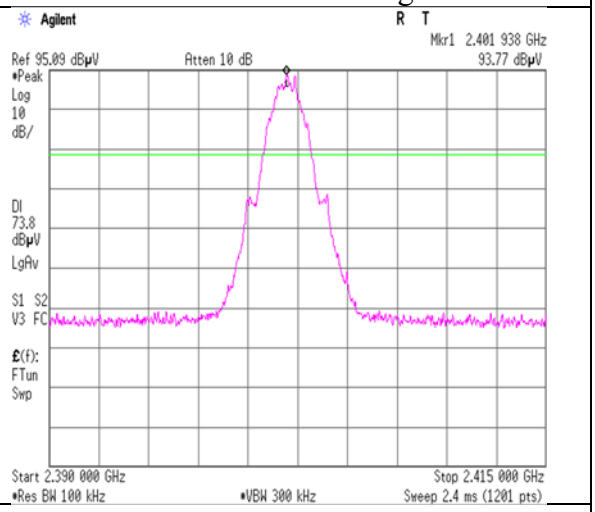
Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amprifier)

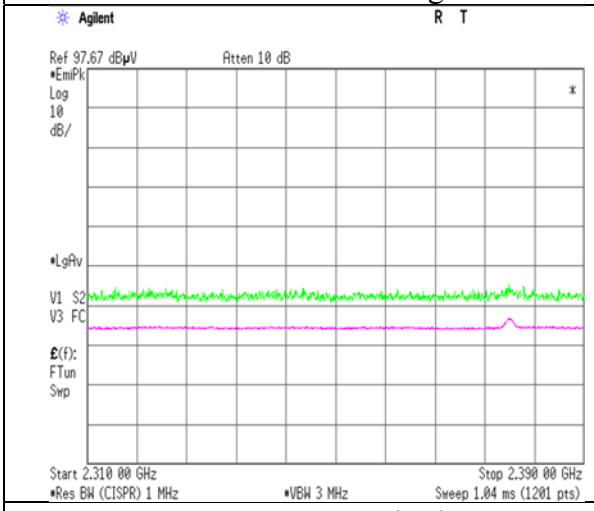
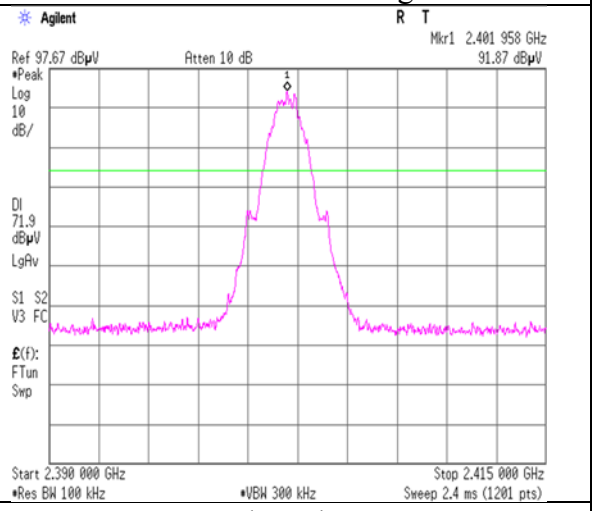
Distance factor: 1 GHz - 10 GHz 20log (4 m / 3.0 m) = 2.5 dB

10 GHz - 26.5 GHz 20log (1.0 m / 3.0 m) = -9.5 dB

Radiated Spurious Emission
(Reference Plot for band-edge)

Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.3
Date	June 12, 2022
Temperature / Humidity	20 deg. C / 50 % RH
Engineer	Keiya Ido
	(Above 1GHz)
Mode	Tx BT LE 2M-PHY 2402 MHz

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

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

* The measurement was conducted for a sufficiently long enough time to detect any possible spurious emissions. Final result of restricted band edge was shown in tabular data.

Radiated Spurious Emission

Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.3
Date	June 12, 2022
Temperature / Humidity	20 deg. C / 50 % RH
Engineer	Keiya Ido
	(Above 1GHz)
Mode	Tx BT LE 2M-PHY 2440 MHz

Polarity [Hori/Vert]	Frequency [MHz]	Reading (QP / PK) [dBuV]	Reading (AV) [dBuV]	Ant. Factor [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result (QP / PK) [dBuV/m]	Result (AV) [dBuV/m]	Limit (QP / PK) [dBuV/m]	Limit (AV) [dBuV/m]	Margin (QP / PK) [dB]	Margin (AV) [dB]	Remark
Hori.	4880.0	41.8	32.7	31.6	8.2	32.0	-	49.5	40.5	73.9	53.9	24.4	13.4	Floor noise
Hori.	7320.0	42.9	34.0	35.9	9.7	32.8	-	55.6	46.7	73.9	53.9	18.3	7.2	Floor noise
Hori.	9760.0	44.1	31.9	39.2	10.4	33.6	-	60.0	47.8	73.9	53.9	13.9	6.1	Floor noise
Vert.	4880.0	41.8	32.7	31.6	8.2	32.0	-	49.5	40.5	73.9	53.9	24.4	13.4	Floor noise
Vert.	7320.0	42.9	34.0	35.9	9.7	32.8	-	55.6	46.7	73.9	53.9	18.3	7.2	Floor noise
Vert.	9760.0	44.1	31.9	39.2	10.4	33.6	-	60.0	47.8	73.9	53.9	13.9	6.1	Floor noise

Result (QP / PK) = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier)

Result (AV)= Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier) + Duty factor

*Other frequency noises omitted in this report were not seen or had enough margin (more than 20 dB).

*QP detector was used up to 1GHz.

Distance factor:	1 GHz - 10 GHz	20log (4 m / 3.0 m) = 2.5 dB
	10 GHz - 26.5 GHz	20log (1.0 m / 3.0 m) = -9.5 dB

Radiated Spurious Emission

Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.3
Date	June 12, 2022
Temperature / Humidity	20 deg. C / 50 % RH
Engineer	Keiya Ido
	(Above 1GHz)
Mode	Tx BT LE 2M-PHY 2480 MHz

Polarity [Hori/Vert]	Frequency [MHz]	Reading (QP / PK) [dBuV]	Reading (AV) [dBuV]	Ant. Factor [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result (QP / PK) [dBuV/m]	Result (AV) [dBuV/m]	Limit (QP / PK) [dBuV/m]	Limit (AV) [dBuV/m]	Margin (QP / PK) [dB]	Margin (AV) [dB]	Remark
Hori.	2483.5	43.0	34.1	27.4	5.8	32.9	2.4	43.5	36.9	73.9	53.9	30.5	17.0	*1)
Hori.	4960.0	42.1	32.8	31.7	8.2	31.9	-	50.0	40.7	73.9	53.9	23.9	13.2	Floor noise
Hori.	7440.0	42.4	34.0	36.1	9.7	32.9	-	55.3	46.9	73.9	53.9	18.6	7.0	Floor noise
Hori.	9920.0	43.9	32.0	39.1	10.4	33.7	-	59.8	47.9	73.9	53.9	14.1	6.0	Floor noise
Vert.	2483.5	42.7	34.0	27.4	5.8	32.9	2.4	43.1	36.8	73.9	53.9	30.8	17.1	*1)
Vert.	4960.0	42.1	32.8	31.7	8.2	31.9	-	50.0	40.7	73.9	53.9	23.9	13.2	Floor noise
Vert.	7440.0	42.4	34.0	36.1	9.7	32.9	-	55.3	46.9	73.9	53.9	18.6	7.0	Floor noise
Vert.	9920.0	43.9	32.0	39.1	10.4	33.7	-	59.8	47.9	73.9	53.9	14.1	6.0	Floor noise

Result (QP / PK) = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier)

Result (AV)= Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier) + Duty factor

*Other frequency noises omitted in this report were not seen or had enough margin (more than 20 dB).

*QP detector was used up to 1GHz.

*1) Not Out of Band emission(Leakage Power)

Distance factor: 1 GHz - 10 GHz 20log (4 m / 3.0 m) = 2.5 dB

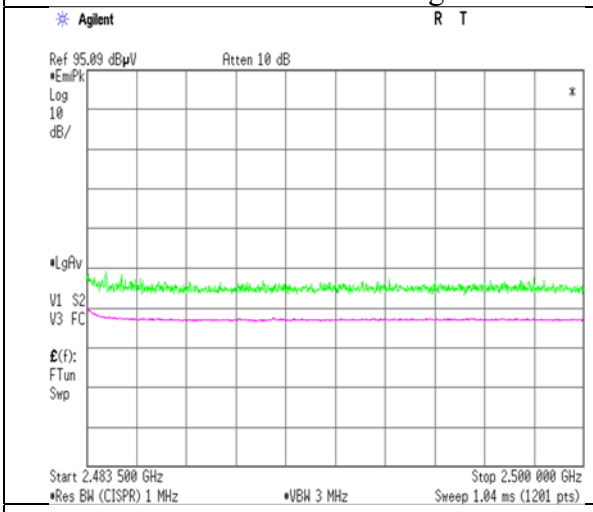
10 GHz - 26.5 GHz 20log (1.0 m / 3.0 m) = -9.5 dB

Radiated Spurious Emission
(Reference Plot for band-edge)

Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.3
Date	June 12, 2022
Temperature / Humidity	20 deg. C / 50 % RH
Engineer	Keiya Ido
	(Above 1GHz)
Mode	Tx BT LE 2M-PHY 2480 MHz

Horizontal

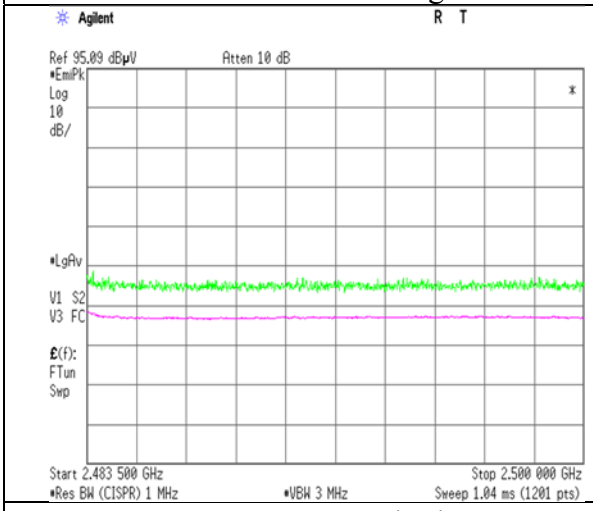
Restricted-band band-edge Plot



Trace Green : Peak Plot
Trace Purple : Average Plot

Vertical

Restricted-band band-edge Plot

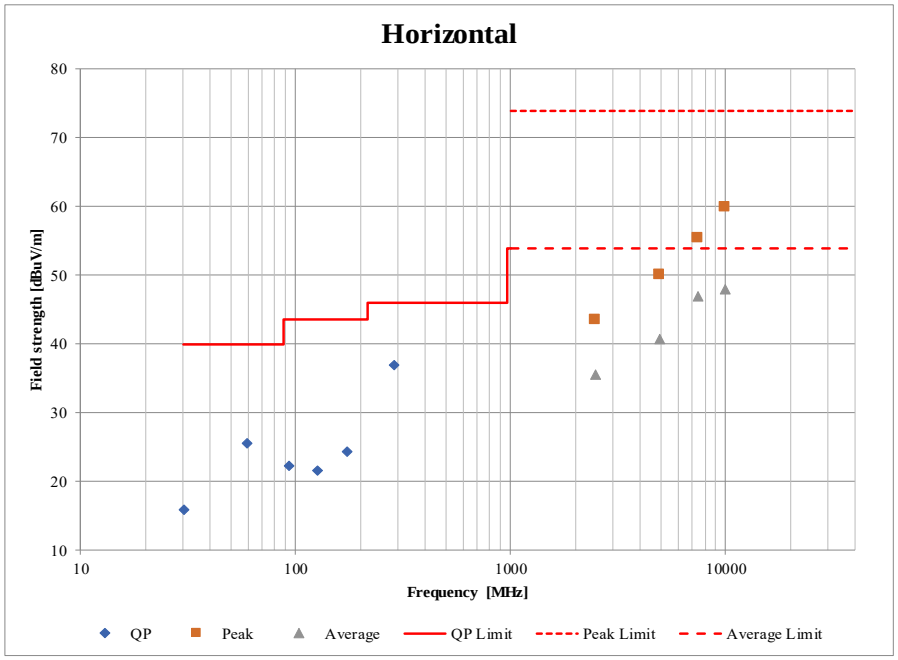


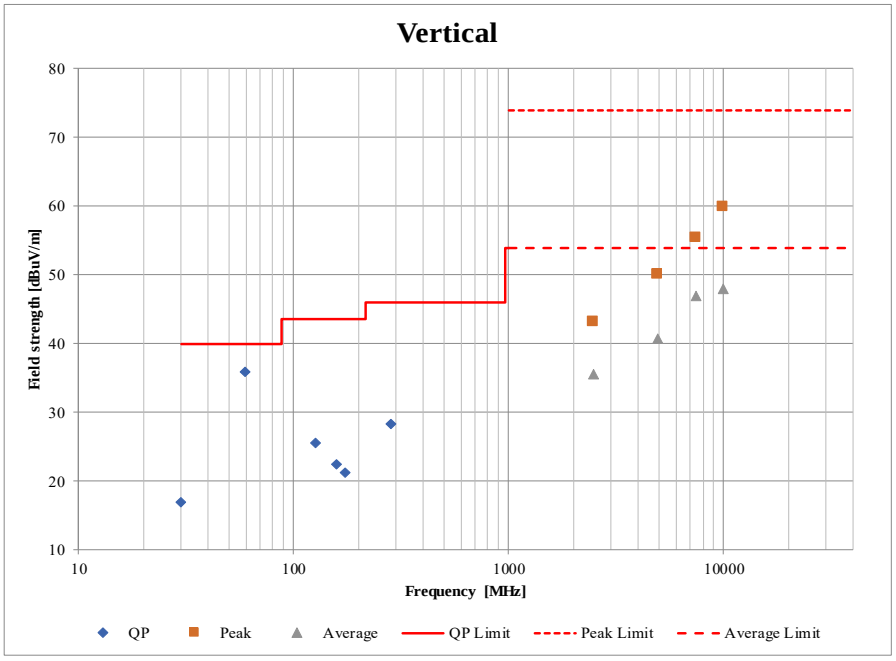
Trace Green : Peak Plot
Trace Purple : Average Plot

* The measurement was conducted for a sufficiently long enough time to detect any possible spurious emissions. Final result of restricted band edge was shown in tabular data.

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

Test place	Ise EMC Lab.		
Semi Anechoic Chamber	No.3	No.3	No.3
Date	June 10, 2022	June 12, 2022	June 12, 2022
Temperature / Humidity	21 deg. C / 43 % RH	20 deg. C / 50 % RH	21 deg. C / 52 % RH
Engineer	Nachi Konegawa	Keiya Ido	Hiroki Numata
	(1 GHz - 10 GHz)	(10 GHz - 26.5 GHz)	(Below 1 GHz)
Mode	Tx BT LE 1M-PHY 2480 MHz		



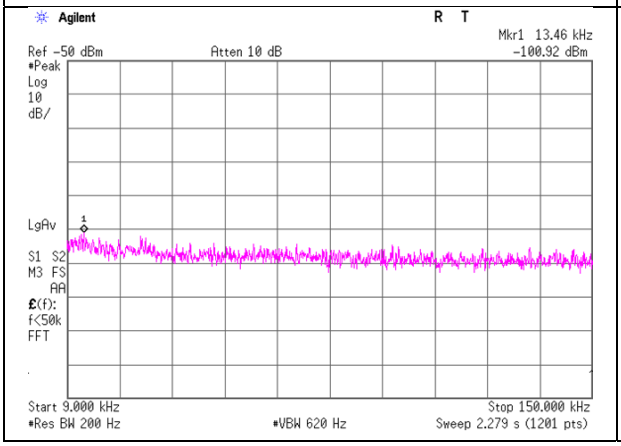


*These plots data contains sufficient number to show the trend of characteristic features for EUT.

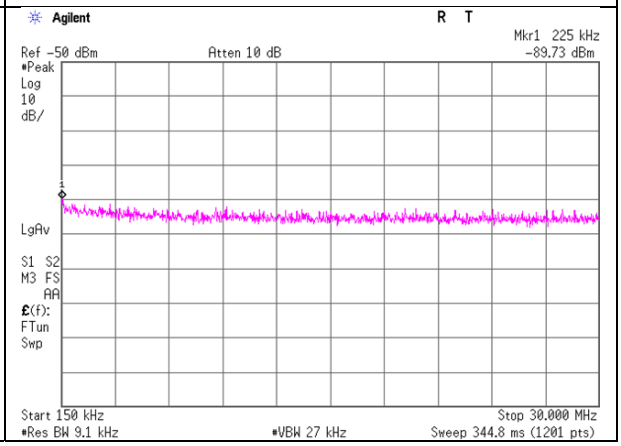
Conducted Spurious Emission

Test place	Ise EMC Lab. No.6 Measurement Room
Date	June 7, 2022
Temperature / Humidity	22 deg. C / 44 % RH
Engineer	Tetsuro Yoshida
Mode	Tx BT LE 1M-PHY 2402 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
13.46	-100.9	0.07	0.0	2.0	1	-98.9	300	6.0	-37.6	45.0	82.6	
225.00	-89.7	0.36	0.0	2.0	1	-87.4	300	6.0	-26.1	20.5	46.6	

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)

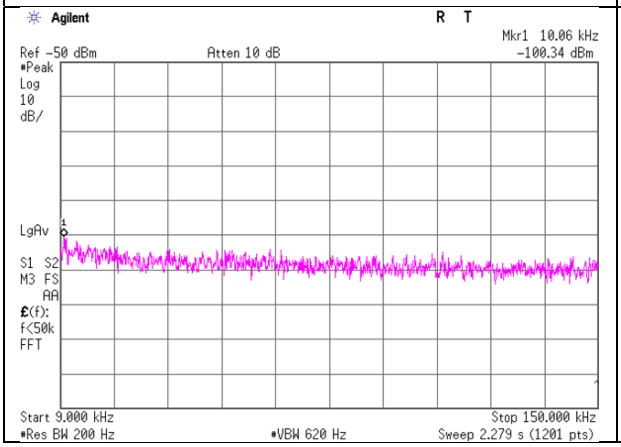
N: Number of output

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

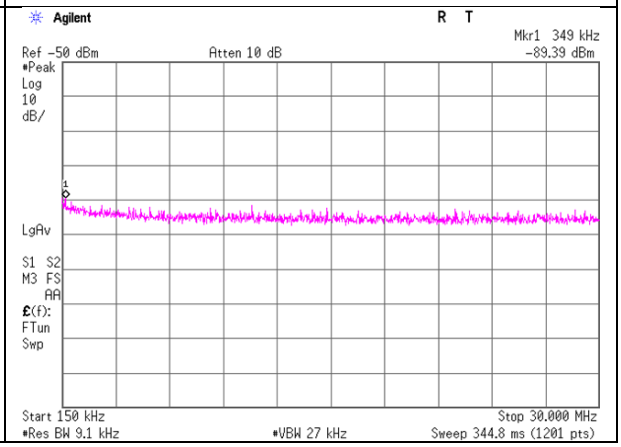
Conducted Spurious Emission

Test place	Ise EMC Lab. No.6 Measurement Room
Date	June 7, 2022
Temperature / Humidity	22 deg. C / 44 % RH
Engineer	Tetsuro Yoshida
Mode	Tx BT LE 1M-PHY 2440 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
10.06	-100.3	0.06	0.0	2.0	1	-98.3	300	6.0	-37.0	47.5	84.5	
349.00	-89.4	0.55	0.0	2.0	1	-86.8	300	6.0	-25.6	16.7	42.3	

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)

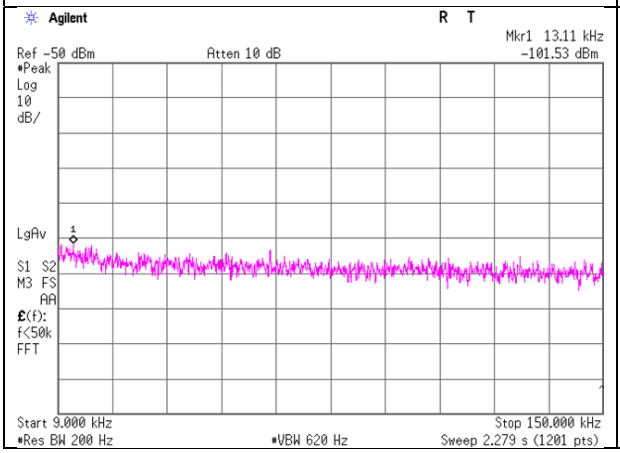
N: Number of output

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

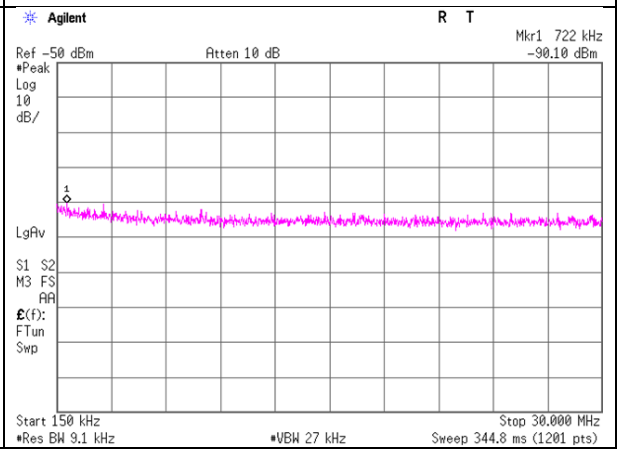
Conducted Spurious Emission

Test place	Ise EMC Lab. No.6 Measurement Room
Date	June 7, 2022
Temperature / Humidity	22 deg. C / 44 % RH
Engineer	Tetsuro Yoshida
Mode	Tx BT LE 1M-PHY 2480 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
13.11	-101.5	0.07	0.0	2.0	1	-99.5	300	6.0	-38.2	45.2	83.4	
722.00	-90.1	0.73	0.0	2.0	1	-87.4	30	6.0	-6.1	30.4	36.5	

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)

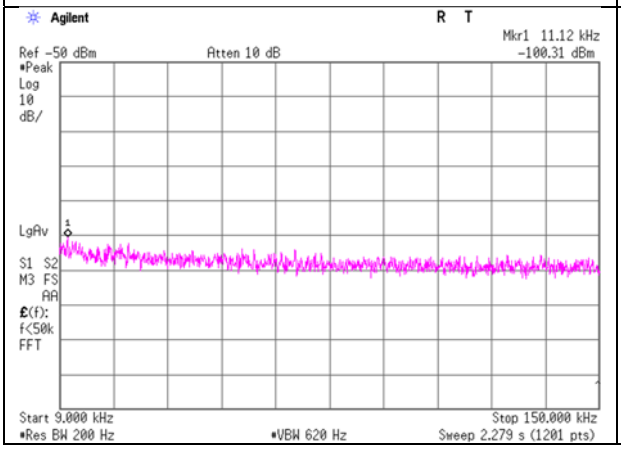
N: Number of output

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

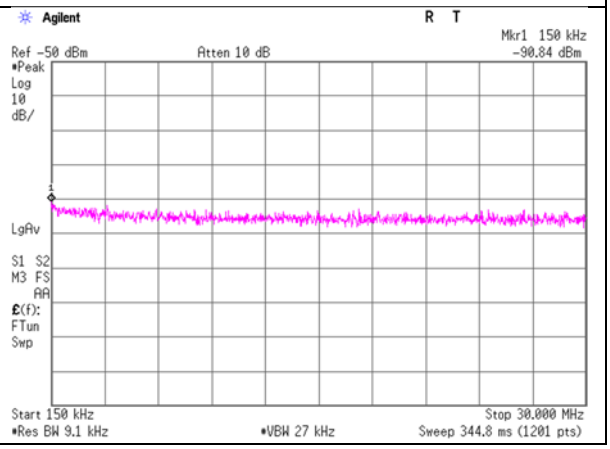
Conducted Spurious Emission

Test place	Ise EMC Lab. No.6 Measurement Room
Date	June 7, 2022
Temperature / Humidity	22 deg. C / 44 % RH
Engineer	Tetsuro Yoshida
Mode	Tx BT LE 2M-PHY 2402 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
11.12	-100.3	0.06	0.0	2.0	1	-98.3	300	6.0	-37.0	46.6	83.6	
150.00	-90.8	0.28	0.0	2.0	1	-88.6	300	6.0	-27.3	24.0	51.3	

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)

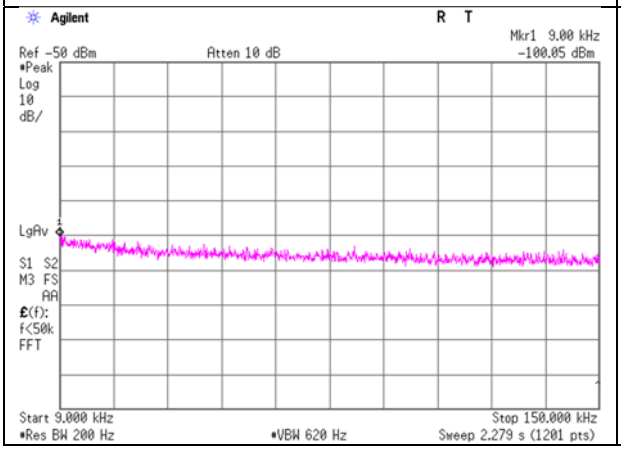
N: Number of output

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

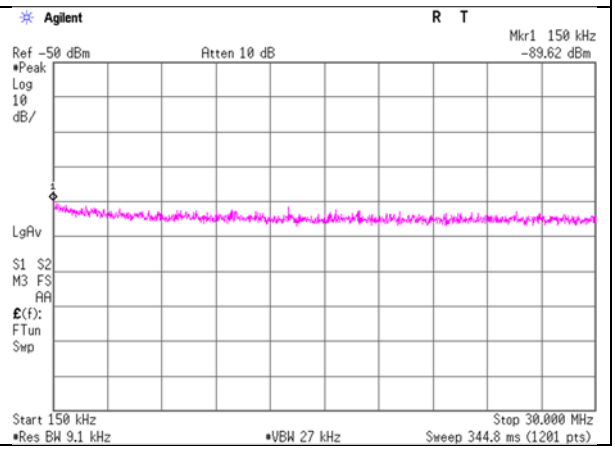
Conducted Spurious Emission

Test place	Ise EMC Lab. No.6 Measurement Room
Date	June 7, 2022
Temperature / Humidity	22 deg. C / 44 % RH
Engineer	Tetsuro Yoshida
Mode	Tx BT LE 2M-PHY 2440 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
9.00	-100.1	0.06	0.0	2.0	1	-98.0	300	6.0	-36.7	48.5	85.2	
150.00	-89.6	0.28	0.0	2.0	1	-87.3	300	6.0	-26.1	24.0	50.1	

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)

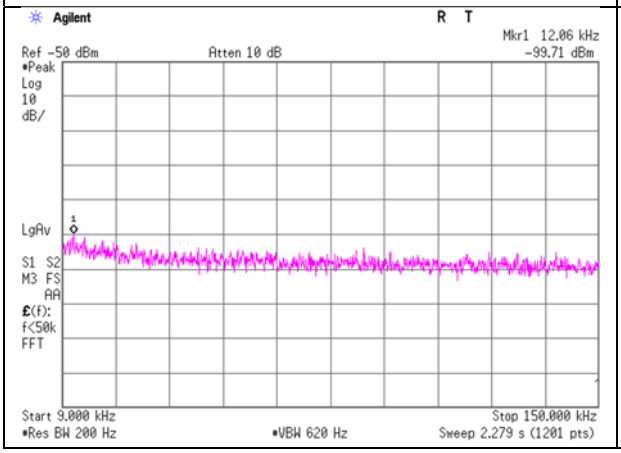
N: Number of output

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

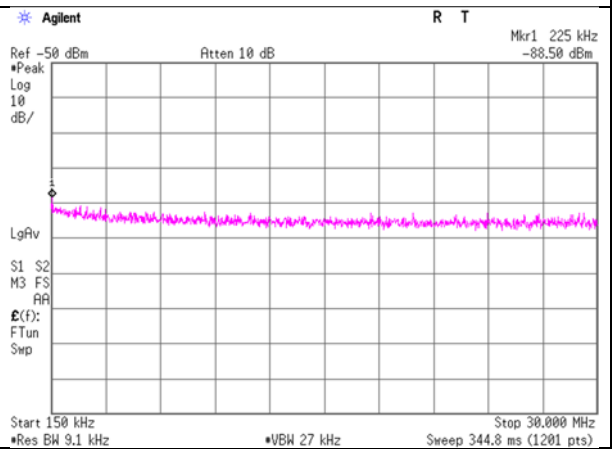
Conducted Spurious Emission

Test place	Ise EMC Lab. No.6 Measurement Room
Date	June 7, 2022
Temperature / Humidity	22 deg. C / 44 % RH
Engineer	Tetsuro Yoshida
Mode	Tx BT LE 2M-PHY 2480 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
12.06	-99.7	0.07	0.0	2.0	1	-97.6	300	6.0	-36.4	45.9	82.3	
225.00	-88.5	0.36	0.0	2.0	1	-86.1	300	6.0	-24.9	20.5	45.4	

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	Ise EMC Lab. No.6 Measurement Room
Date	June 7, 2022
Temperature / Humidity	22 deg. C / 44 % RH
Engineer	Tetsuro Yoshida
Mode	Tx BT LE

BT LE 1M-PHY

Freq. [MHz]	Reading [dBm / 3 kHz]	Cable Loss [dB]	Atten. Loss [dB]	Result [dBm / 3 kHz]	Limit [dBm / 3 kHz]	Margin [dB]
2402	-25.02	1.55	10.02	-13.45	8.00	21.45
2440	-24.51	1.56	10.02	-12.93	8.00	20.93
2480	-23.86	1.57	10.02	-12.27	8.00	20.27

BT LE 2M-PHY

Freq. [MHz]	Reading [dBm / 3 kHz]	Cable Loss [dB]	Atten. Loss [dB]	Result [dBm / 3 kHz]	Limit [dBm / 3 kHz]	Margin [dB]
2402	-24.97	1.55	10.02	-13.40	8.00	21.40
2440	-24.49	1.56	10.02	-12.91	8.00	20.91
2480	-23.74	1.57	10.02	-12.15	8.00	20.15

Sample Calculation:

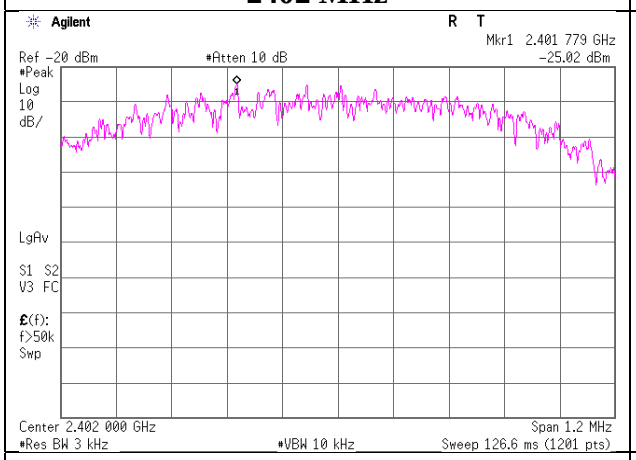
Result = Reading + Cable Loss (including the cable(s) customer supplied) + Attenuator Loss

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

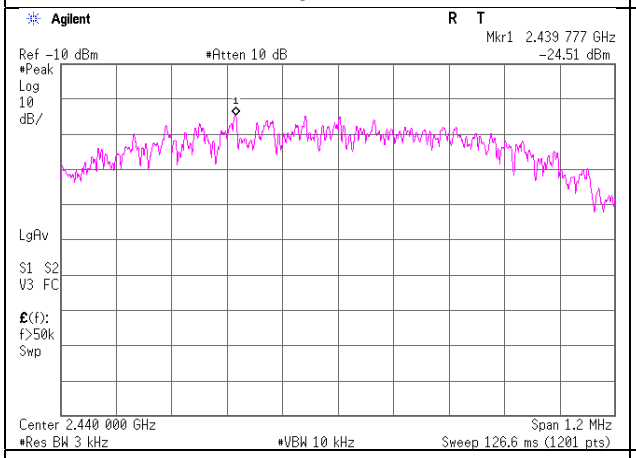
Power Density

BT LE 1M-PHY

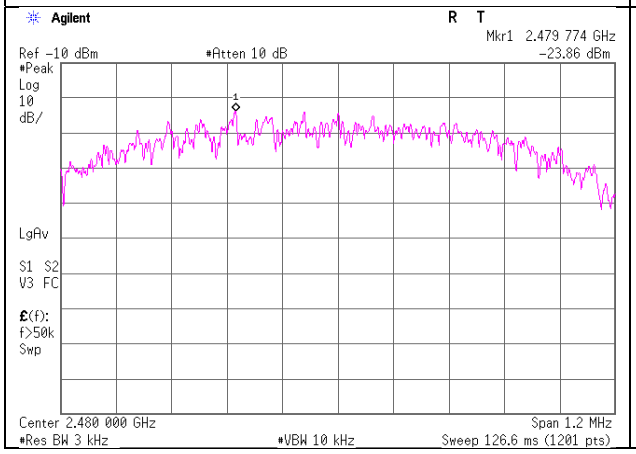
2402 MHz



2440 MHz

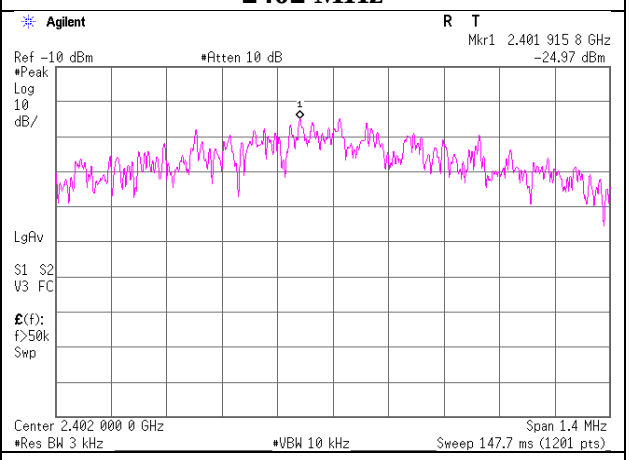


2480 MHz

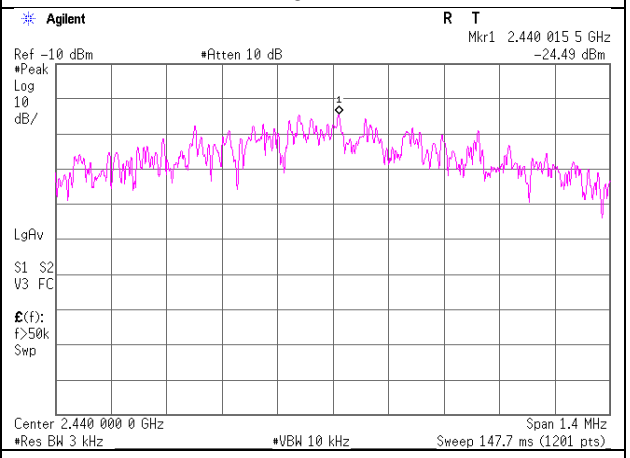


BT LE 2M-PHY

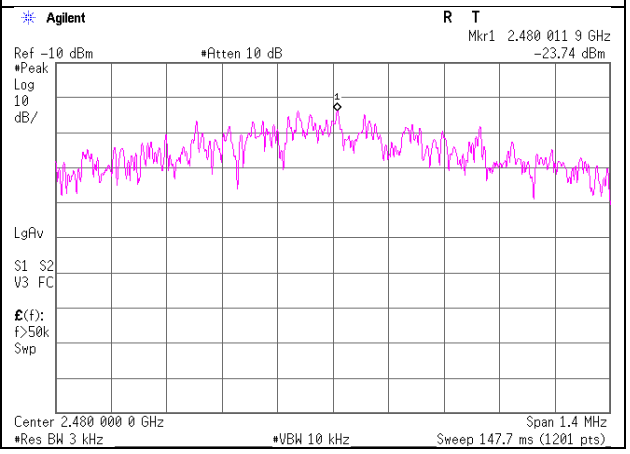
2402 MHz



2440 MHz



2480 MHz



APPENDIX 2: Test Instruments

Test Equipment (1/2)

Test Item	Local ID	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Cal Int
CE	COTS-MEMI-02	178648	EMI measurement program	TSJ (Techno Science Japan)	TEPTO-DV	-	-	-
CE	MAEC-03	142008	AC3_Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-10005	05/23/2022	24
CE	MAT-67	141248	Attenuator	JFW Industries, Inc.	50FP-013H2 N	-	12/17/2021	12
CE	MCC-112	141216	Coaxial cable	Fujikura/Suhner/TSJ	5D-2W/SFM14/ sucoform141-PE/421-010/RFM-E321(SW)	-/00640	07/19/2021	12
CE	MJM-16	142183	Measure	KOMELON	KMC-36	-	-	-
CE	MLS-26	141538	LISN(AMN)	Schwarzbeck Mess-Elektronik OHG	NSLK8127	8127-732	07/20/2021	12
CE	MMM-08	141532	DIGITAL HiTESTER	HIOKI E.E. CORPORATION	3805	51201197	01/16/2022	12
CE	MOS-13	141554	Thermo-Hygrometer	CUSTOM. Inc	CTH-201	1301	01/10/2022	12
CE	MTR-09	141950	EMI Test Receiver	Rohde & Schwarz	ESU26	100412	10/14/2021	12
RE	COTS-MEMI-02	178648	EMI measurement program	TSJ (Techno Science Japan)	TEPTO-DV	-	-	-
RE	MAEC-03	142008	AC3_Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-10005	05/23/2022	24
RE	MAEC-03-SVSWR	142013	AC3_Semi Anechoic Chamber(SVSWR)	TDK	Semi Anechoic Chamber 3m	DA-10005	04/01/2021	24
RE	MAT-95	142314	Attenuator	Pasternack Enterprises	PE7390-6	D/C 1504	06/13/2022	12
RE	MBA-03	141424	Biconical Antenna	Schwarzbeck Mess-Elektronik OHG	VHA9103+BBA9106	1915	08/21/2021	12
RE	MBA-05	141425	Biconical Antenna	Schwarzbeck Mess-Elektronik OHG	VHA9103+BBA9106	VHA 91031302	08/28/2021	12
RE	MCC-231	177964	Microwave Cable	Junkosha INC.	MMX221	1901S329(1m)/ 1902S579(5m)	03/15/2022	12
RE	MCC-51	141323	Coaxial cable	UL Japan	-	-	07/19/2021	12
RE	MHA-16	141513	Horn Antenna 15-40GHz	Schwarzbeck Mess-Elektronik OHG	BBHA9170	BBHA9170306	06/07/2021	12
RE	MHA-20	141507	Horn Antenna 1-18GHz	Schwarzbeck Mess-Elektronik OHG	BBHA9120D	258	11/09/2021	12
RE	MHF-25	141232	High Pass Filter 3.5-18.0GHz	UL Japan	HPF SELECTOR	001	09/30/2021	12
RE	MJM-16	142183	Measure	KOMELON	KMC-36	-	-	-
RE	MLA-22	141266	Logperiodic Antenna(200-1000MHz)	Schwarzbeck Mess-Elektronik OHG	VUSLP9111B	9111B-191	08/21/2021	12
RE	MMM-08	141532	DIGITAL HiTESTER	HIOKI E.E. CORPORATION	3805	51201197	01/16/2022	12
RE	MOS-13	141554	Thermo-Hygrometer	CUSTOM. Inc	CTH-201	1301	01/10/2022	12
RE	MPA-11	141580	MicroWave System Amplifier	Keysight Technologies Inc	83017A	MY39500779	03/17/2022	12
RE	MPA-13	141582	Pre Amplifier	SONOMA INSTRUMENT	310	260834	02/25/2022	12
RE	MSA-04	141885	Spectrum Analyzer	Keysight Technologies Inc	E4448A	US44300523	11/10/2021	12
RE	MTR-08	141949	Test Receiver	Rohde & Schwarz	ESCI	100767	08/05/2021	12

Test Equipment (2/2)

Test Item	Local ID	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Cal Int
AT	MAT-26	141244	Attenuator(10dB)	Weinschel - API Technologies Corp	WA8-10-34	A198	02/25/2022	12
AT	MAT-57	141333	Attenuator(10dB)	Suhner	6810.19.A	-	12/17/2021	12
AT	MCC-138	141410	Microwave cable	Huber+Suhner	SUCOFLEX 102	37953/2	09/30/2021	12
AT	MCC-178	141227	Microwave Cable	Junkosha	MMX221-00500DMSDMS	1502S305	03/15/2022	12
AT	MCC-64	141327	Coaxial Cable	UL Japan	-	-	02/28/2022	12
AT	MMM-10	141545	DIGITAL HiTESTER	HIOKI E.E. CORPORATION	3805	51201148	01/16/2022	12
AT	MOS-15	141562	Thermo-Hygrometer	CUSTOM. Inc	CTH-201	0010	01/10/2022	12
AT	MPM-13	141810	Power Meter	Anritsu Corporation	ML2495A	824014	12/22/2021	12
AT	MPSE-18	141832	Power sensor	Anritsu Corporation	MA2411B	738174	12/22/2021	12
AT	MSA-03	141884	Spectrum Analyzer	Keysight Technologies Inc	E4448A	MY44020357	03/31/2022	12

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

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

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

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