RADIO TEST REPORT

Test Report No. 14727491S-H-R1

Customer	**Murata Manufacturing Co., Ltd.**
Description of EUT	**Communication Module**
Model Number of EUT	**LBUA2ZZ2DK**
FCC ID	**VPYLB2DK**
Test Regulation	**FCC Part 15 Subpart C**
Test Result	**Complied**
Issue Date	**August 30, 2023**
Remarks	**Bluetooth Low Energy part(s)**

Representative Test Engineer	Approved By
Yosuke Murakami 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".

UL Japan, Inc. Shonan EMC Lab.
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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.: 14727491S-H

This report is a revised version of 14727491S-H. 14727491S-H is replaced with this report.

Revision	Test Report No.	Date	Page Revised Contents
- (Original)	14727491S-H	August 9, 2023	-
1	14727491S-H-R1	August 30, 2023	P9 Correction of Power Setting from “4 dBm, -30 dBm (Maximum Peak Output Power only)” to “4 (Setting value, Maximum value which includes the tolerance), -30 (Setting value) *Maximum Peak Output Power only”
			P13, 47 Addition of the pre-check results of the top and bottom surfaces

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	Murata Manufacturing Co., Ltd.
Address	1-10-1 Higashikotari, Nagaokakyo-shi, Kyoto 617-8555 Japan
Telephone Number	+81-75-955-6736
Contact Person	Kenji Hayashikoshi

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	Communication Module
Model Number	LBUA2ZZ2DK
Serial Number	Refer to SECTION 4.2
Condition	Engineering prototype (Not for Sale: This sample is equivalent to mass-produced items.)
Modification	No Modification by the test lab
Receipt Date	November 15, 2022 (Sample for Maximum Peak Output Power (Power setting -30 dBm)) April 17, 2023 (Other than above)
Test Date	December 9, 2022 to July 24, 2023

2.2 Product Description

General Specification

Rating	DC 3.3 V
Operating temperature	-30 deg. C to +85 deg. C

Radio Specification

Bluetooth (Low Energy)

Equipment Type	Transceiver
Frequency of Operation	2402 MHz to 2480 MHz
Type of Modulation	GFSK
Antenna Gain	-4.8 dBi

UWB

Equipment Type	Transceiver
Frequency of Operation	6489.6 MHz (6240.0 MHz to 6739.2 MHz) (CH5), 7987.2 MHz (7737.6 MHz to 8236.8 MHz) (CH9)
Type of Modulation	BPM-BPSK
Antenna Gain	1.6 dBi (CH5), 4.0 dBi (CH9)

SECTION 3: Test Specification, Procedures & Results

3.1 Test Specification

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

3.2 Procedures and Results

Item	Test Procedure	Specification	Worst Margin	Results	Remarks
Conducted Emission	**FCC:** ANSI C63.10-2013 6. Standard test methods	**FCC:** Section 15.207	27.8 dB, QP Mode: Tx_BT LE 1M-PHY 2402 MHz 0.40000 MHz, L1	Complied	-
	ISED: RSS-Gen 8.8	**ISED:** RSS-Gen 8.8			
6dB Bandwidth	**FCC:** KDB 558074 D01 15.247 Meas Guidance v05r02	**FCC:** Section 15.247(a)(2)	See data.	Complied	Conducted
	ISED: -	**ISED:** RSS-247 5.2(a)			
Maximum Peak Output Power	**FCC:** KDB 558074 D01 15.247 Meas Guidance v05r02	**FCC:** Section 15.247(b)(3)		Complied	Conducted
	ISED: RSS-Gen 6.12	**ISED:** RSS-247 5.4(d)			
Power Density	**FCC:** KDB 558074 D01 15.247 Meas Guidance v05r02	**FCC:** Section 15.247(e)		Complied	Conducted
	ISED: -	**ISED:** RSS-247 5.2(b)			
Spurious Emission Restricted Band Edges	**FCC:** KDB 558074 D01 15.247 Meas Guidance v05r02	**FCC:** Section15.247(d)	2.4 dB, PK Mode: Tx_BT LE 2M-PHY 2480MHz 2483.645 MHz, Horizontal	Complied	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.

FCC Part 15.31 (e)
The stable voltage was provided to the EUT during the tests. 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 it is on the circuit board. Therefore, the equipment complies with the requirement of 15.203/212.

3.3 Addition to Standard

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

Other than above, no addition, exclusion nor deviation has been made from the standard.

3.4 Uncertainty

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

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

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

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

3.5 Test Location

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

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

3.6 Test Data, Test Instruments, and Test Set Up

Refer to APPENDIX.

SECTION 4: Operation of EUT during testing

4.1 Operating Mode(s)

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

*Power of the EUT was set by the software as follows;
Power Setting: 4 (Setting value, Maximum value which includes the tolerance)
-30 (Setting value) *Maximum Peak Output Power only
Software: Test FW Version: 1
(Date: 2022.11 11, Storage location: EUT memory)

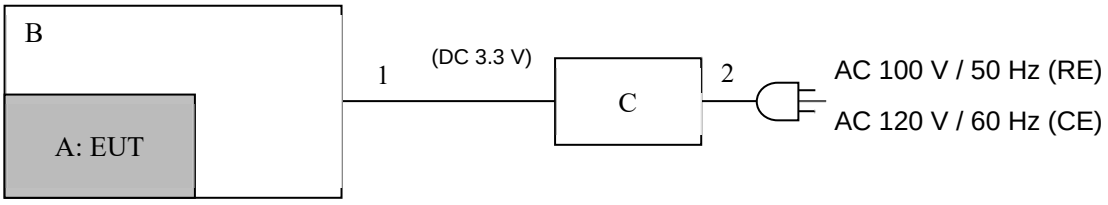
*This setting of software is the worst case.
Any conditions under the normal use do not exceed the condition of setting.
In addition, end users cannot change the settings of the output power of the product.

*The Details of Operating Mode(s)

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

[Radiated emission test (RE) and Conducted emission test (CE)]



* Test data was taken under worse case conditions.

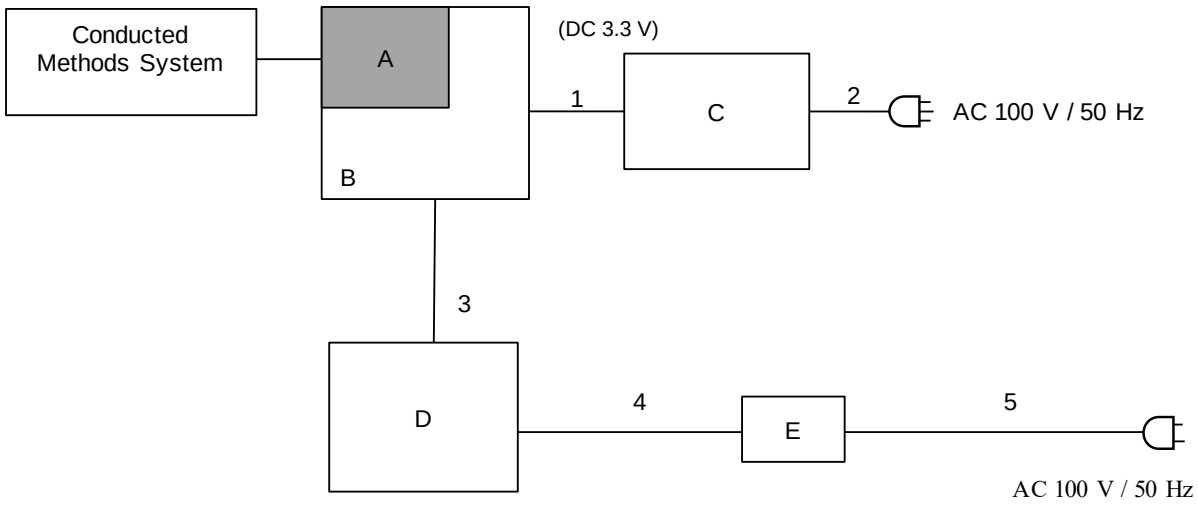
Description of EUT and support equipment

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	Communication Module	LBUA2ZZ2DK	BLE No.1	Murata Manufacturing Co., Ltd.	EUT
B	Jig Board	-	-	Murata Manufacturing Co., Ltd.	-
C	Power Supply (DC)	PAN60-10A	NL002383	KIKUSUI	-

List of cables used

No.	Cable	Length (m)	Shield-Cable	Shield-Connector	Remarks
1	DC	2.0	Unshielded	Unshielded	-
2	AC	2.8	Unshielded	Unshielded	-

[Antenna Terminal Conducted test]



Description of EUT and Support Equipment

No.	Item	Model number	Serial Number	Manufacturer	Remarks
A	Communication Module	LBUA2ZZ2DK	BLE No.4	Murata Manufacturing Co., Ltd.	EUT
B	Jig Board	-	-	Murata Manufacturing Co., Ltd.	-
C	Power Supply (DC)	PAN60-10A	NL002383	KIKUSUI	-
D	Laptop Computer	ThinkPad E14 Gen2	PF397TQG	LENOVO	-
E	AC Adapter	ADLX65YCC2D	8SSA10R16922C2TJ19M1368	LENOVO	-

List of Cables Used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	DC	0.4	Unshielded	Unshielded	-
2	AC	2.5	Unshielded	Unshielded	-
3	USB	1.0	Shielded	Shielded	-
4	DC	1.8	Unshielded	Unshielded	-
5	AC	0.8	Unshielded	Unshielded	-

SECTION 5: Conducted Emission

Test Procedure and Conditions

EUT was placed on a platform of nominal size, 1.0 m by 1.5 m, raised 0.8 m above the conducting ground plane. The table is made of expanded polystyrol and expanded polypropylene and the tabletop is covered with polycarbonate. That has very low permittivity.

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.

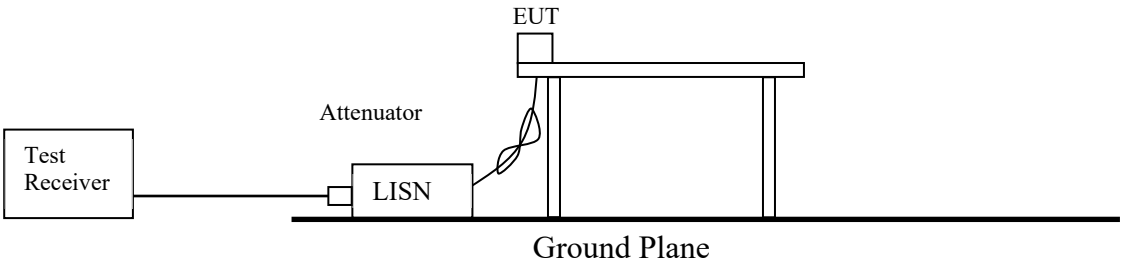
For the tests on EUT itself (as a standalone equipment)
Each EUT current-carrying power lead, except the ground (safety) lead, was individually connected through a LISN / (AMN) to the input power source.

The AC Mains Terminal Continuous disturbance Voltage has been measured with the EUT in a Shielded room. 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 platform of nominal size, 1.0 m by 1.5 m, raised 0.8 m above the conducting ground plane. The table is made of expanded polystyrol and expanded polypropylene and the tabletop 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.

[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

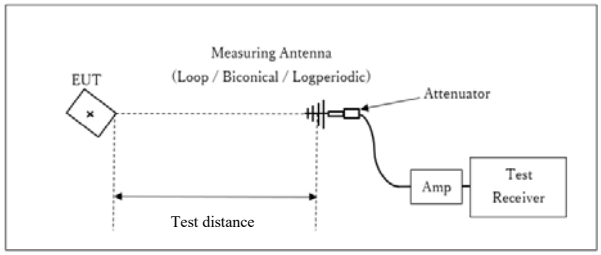
In any 100 kHz bandwidth outside the restricted band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator confirmed 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired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

Figure 2: Test Setup

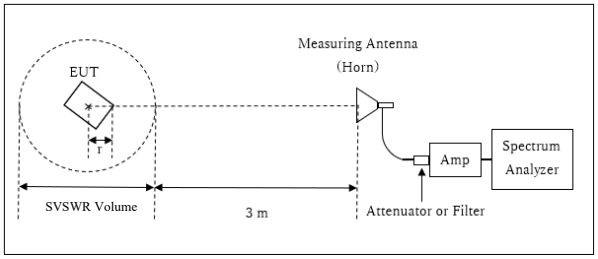
Below 1 GHz



× : Center of turn table

Test Distance: 3 m

1 GHz to 10 GHz

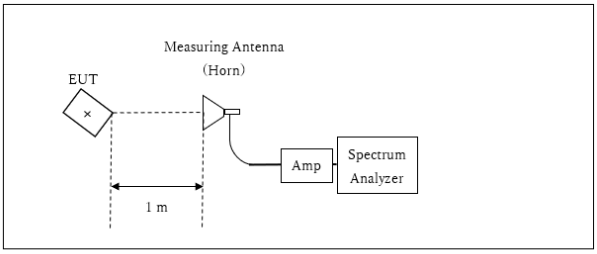


r : Radius of an outer periphery of EUT
× : Center of turn table

Distance Factor: 20 x log (3.98 m / 3.0 m) = 2.47 dB
* Test Distance: (3 + SVSWR Volume /2) - r = 3.98 m

SVSWR Volume : 2.0 m
(SVSWR Volume has been calibrated based on CISPR 16-1-4.)
r = 0.0175 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, Top or Bottom 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 to 1 GHz)	Spurious (1 GHz to 10 GHz)	Spurious (10 GHz to 18 GHz)	Spurious (18 GHz to 26.5 GHz)
Horizontal	X, Bottom	X, Bottom	X, Bottom	Y, Bottom	X, Bottom
Vertical	Y, Bottom	X, Bottom	Y, Bottom	Y, Bottom	X, Bottom

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: 160 MHz BW)
Peak Power Density	1.5 times the 6dB Bandwidth	3 kHz	9.1 kHz	Auto	Peak	Max Hold	Spectrum Analyzer *3)
Conducted Spurious Emission *4) *5)	9 kHz to 150 kHz	200 Hz	620 Hz	Auto	Peak	Max Hold	Spectrum Analyzer
	150 kHz to 30 MHz	10 kHz	30 kHz				

*1) Peak hold was applied as Worst-case measurement.
*2) Reference data
*3) Section 11.10.2 Method PKPSD (peak PSD) of "ANSI C63.10-2013".
*4) The test was not performed at RBW:3 kHz however the measurement is to be performed with RBW:3kHz in the regulation, because, the measurement value with RBW:3 kHz is less than the value of RBW:30 kHz and the test data met the limit with RBW:30 kHz.
*5) 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)

The test results and limit are rounded off to two decimals place, so some differences might be observed.
The equipment and cables were not used for factor 0 dB of the data sheets.

Test Data : APPENDIX
Test Result : Pass

APPENDIX 1: Test Data

Conducted Emission

DATA OF CONDUCTED EMISSION TEST

UL Japan,Inc. Shonan EMC Lab. No.3 Shielded Room
Date : 2023/04/26

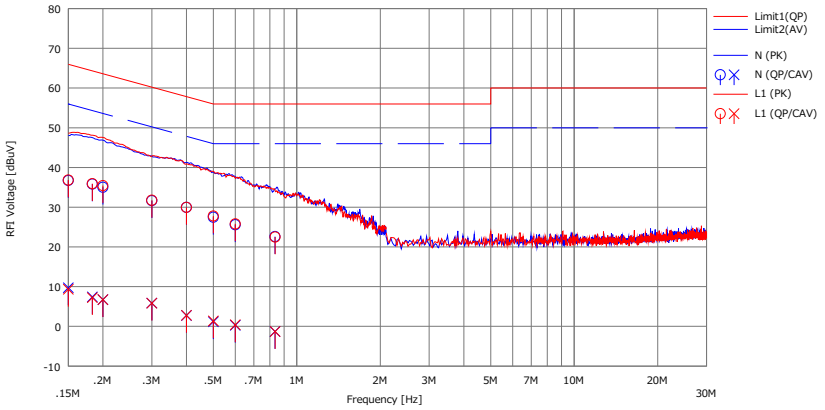
Mode : Tx_BT LE 1M 2402 MHz

Power : DC 3.3 V
Temp./Humi. : 24 deg.C / 30 %RH

Remarks : DC Power Supply : AC 120 V / 60 Hz

Limit : FCC_Part 15 Subpart C(15.207)

Engineer : Kouki Yamada



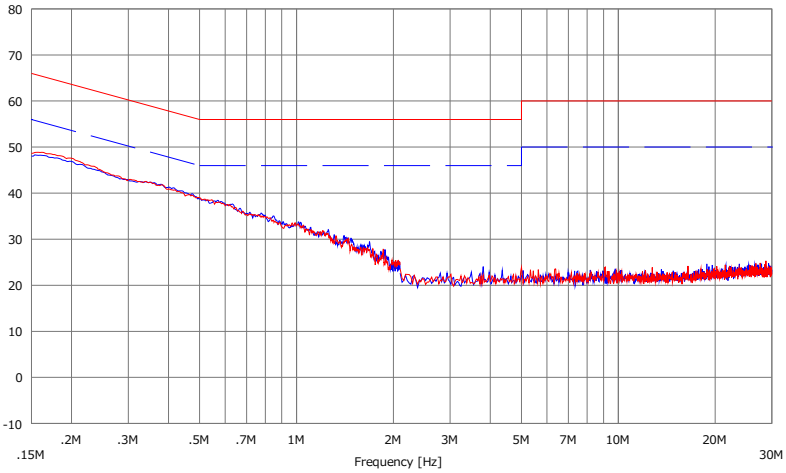
No.	Freq.	Reading		C.Fac	Results		Limit		Margin		Phase	Comment
		〈QP〉	〈CAV〉		〈QP〉	〈CAV〉	〈QP〉	〈AV〉	〈QP〉	〈AV〉		
	[MHz]	[dBuV]	[dBuV]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dB]	[dB]		
1	0.15000	24.30	-2.70	12.42	36.72	9.72	66.00	56.00	29.2	46.2	N	
2	0.18325	23.40	-5.00	12.42	35.82	7.42	64.34	54.34	28.5	46.9	N	
3	0.20000	22.60	-5.70	12.42	35.02	6.72	63.61	53.61	28.5	46.8	N	
4	0.30000	19.20	-6.60	12.45	31.65	5.85	60.24	50.24	28.5	44.3	N	
5	0.40000	17.50	-9.70	12.45	29.95	2.75	57.85	47.85	27.9	45.1	N	
6	0.50000	15.00	-11.30	12.46	27.46	1.16	56.00	46.00	28.5	44.8	N	
7	0.60000	13.10	-12.20	12.47	25.57	0.27	56.00	46.00	30.4	45.7	N	
8	0.83456	10.10	-13.80	12.49	22.59	-1.31	56.00	46.00	33.4	47.3	N	
9	0.15000	24.40	-3.10	12.43	36.83	9.33	66.00	56.00	29.1	46.6	L1	
10	0.18324	23.50	-5.20	12.42	35.92	7.22	64.34	54.34	28.4	47.1	L1	
11	0.20000	23.00	-5.70	12.43	35.43	6.73	63.61	53.61	28.1	46.8	L1	
12	0.30000	19.30	-6.60	12.44	31.74	5.84	60.24	50.24	28.5	44.4	L1	
13	0.40000	17.50	-9.70	12.46	29.96	2.76	57.85	47.85	27.8	45.0	L1	
14	0.50000	15.30	-11.10	12.47	27.77	1.37	56.00	46.00	28.2	44.6	L1	
15	0.60000	13.30	-12.10	12.49	25.79	0.39	56.00	46.00	30.2	45.6	L1	
16	0.83564	10.00	-13.80	12.49	22.49	-1.31	56.00	46.00	33.5	47.3	L1	

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

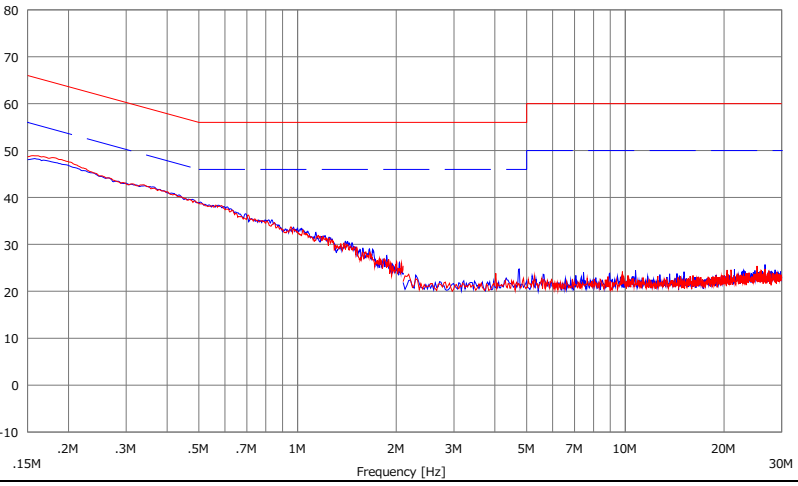
Conducted Emission

Test place	Shonan EMC Lab. No.3 Shielded Room
Date	April 26, 2023
Temperature / Humidity	24 deg. C / 30 % RH
Engineer	Kouki Yamada
Mode	Tx BT LE 1M-PHY

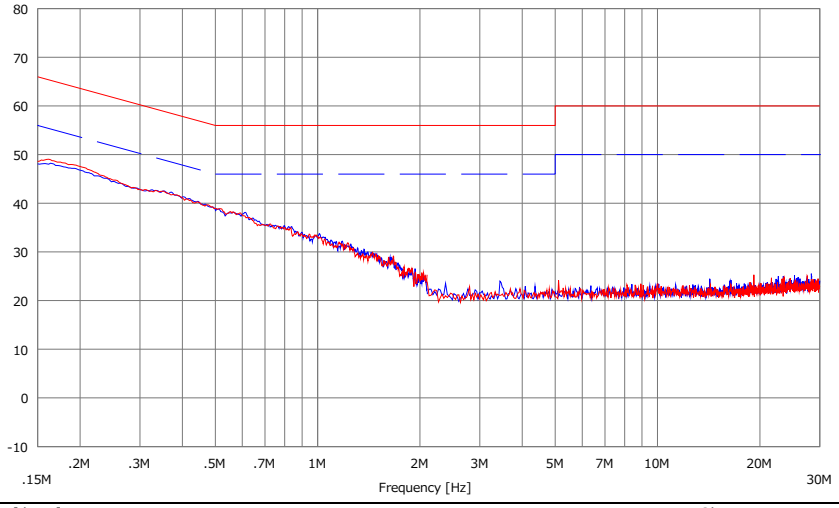
2402 MHz



2440 MHz



2480 MHz



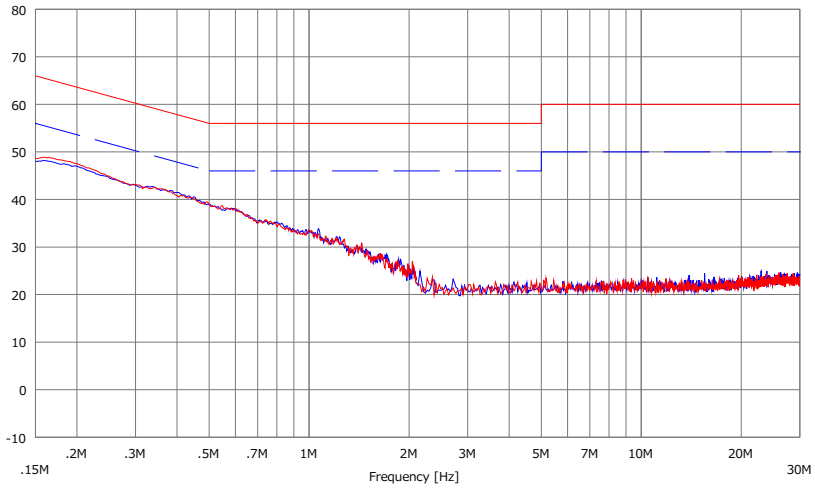
Y scale [dBuV]

Chart — N — L

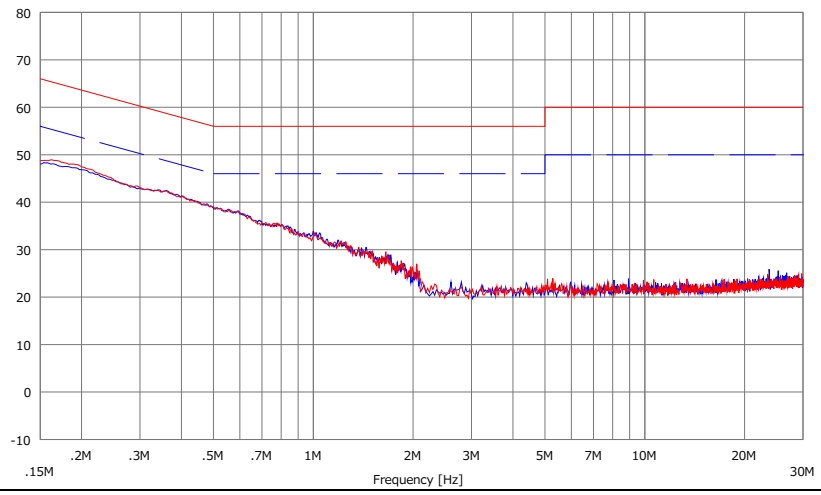
Conducted Emission

Test place	Shonan EMC Lab. No.3 Shielded Room
Date	April 26, 2023
Temperature / Humidity	24 deg. C / 30 % RH
Engineer	Kouki Yamada
Mode	Tx BT LE 2M-PHY

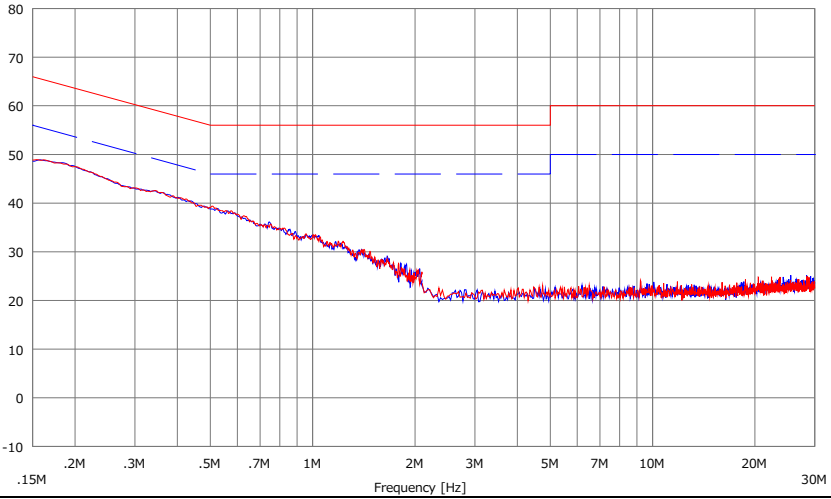
2402 MHz



2440 MHz



2480 MHz



Y scale [dBuV]

Chart — N — L

99 % Occupied Bandwidth and 6 dB Bandwidth

Test place	Shonan EMC Lab. No. 5 Shielded Room
Date	April 18, 2023
Temperature / Humidity	26 deg. C / 30 % RH
Engineer	Yosuke Murakami
Mode	Tx BT LE

BT LE 1 M-PHY

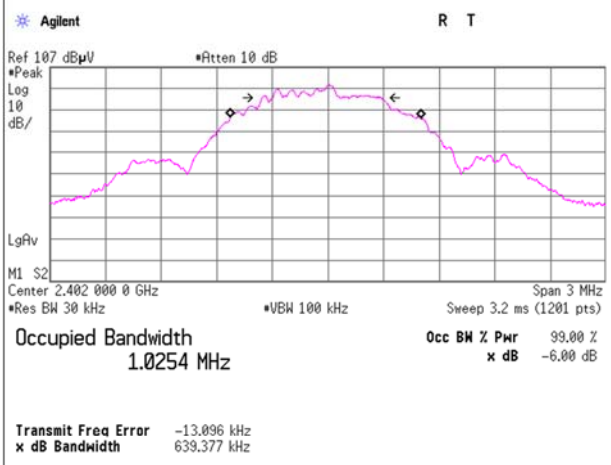
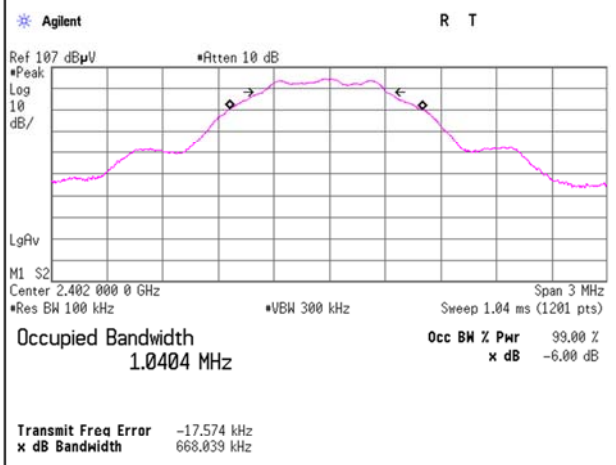
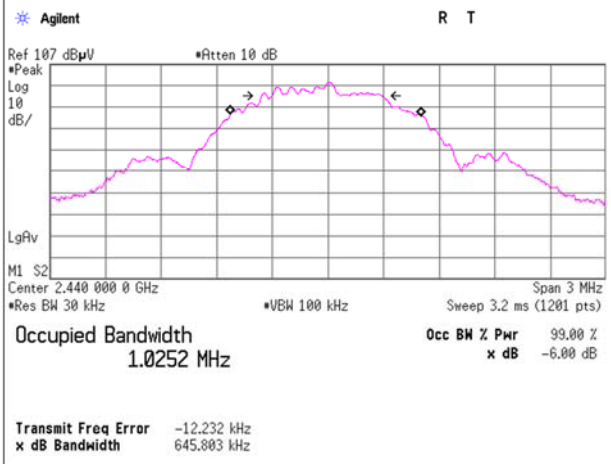
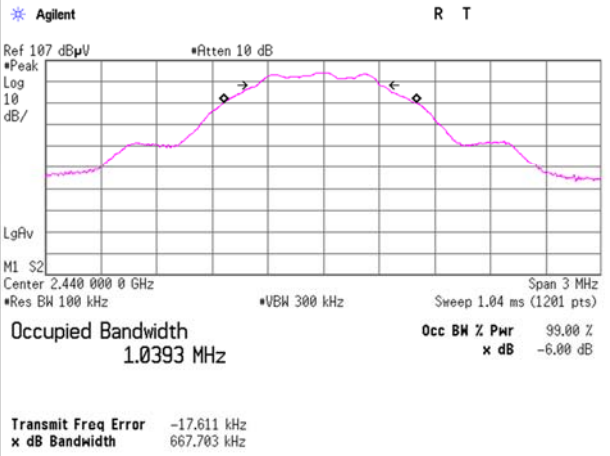
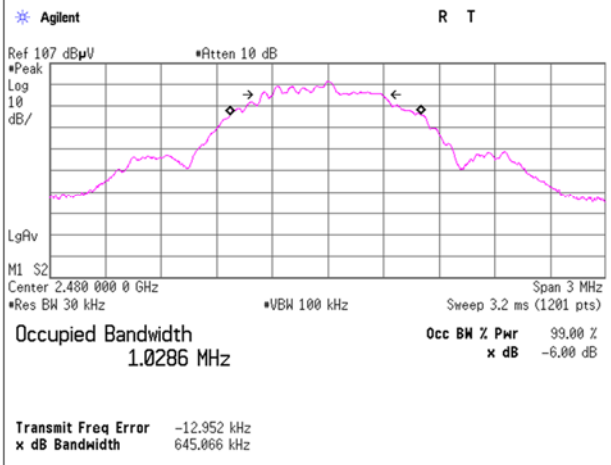
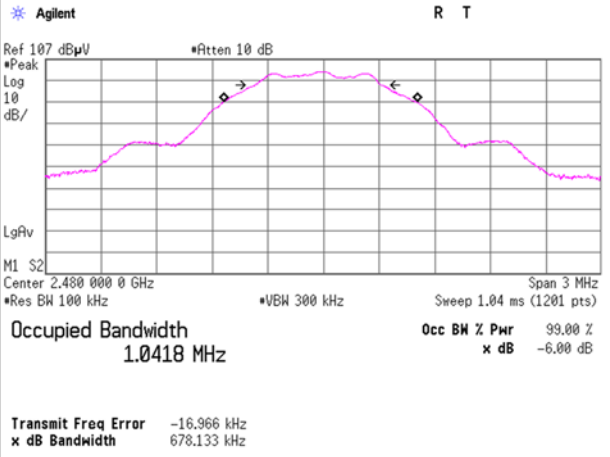
Frequency [MHz]	99 % Occupied Bandwidth [kHz]	6 dB Bandwidth [MHz]	Limit for 6 dB Bandwidth [MHz]
2402	1025.4	0.668	> 0.5000
2440	1025.2	0.668	> 0.5000
2480	1028.6	0.678	> 0.5000

BT LE 2 M-PHY

Frequency [MHz]	99 % Occupied Bandwidth [kHz]	6 dB Bandwidth [MHz]	Limit for 6 dB Bandwidth [MHz]
2402	2022.9	1.125	> 0.5000
2440	2020.7	1.135	> 0.5000
2480	2026.5	1.138	> 0.5000

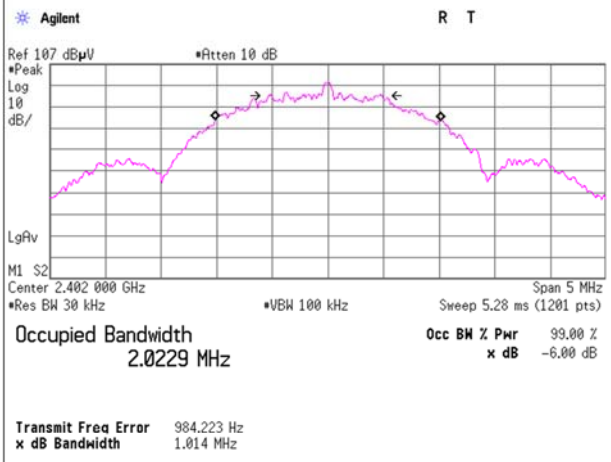
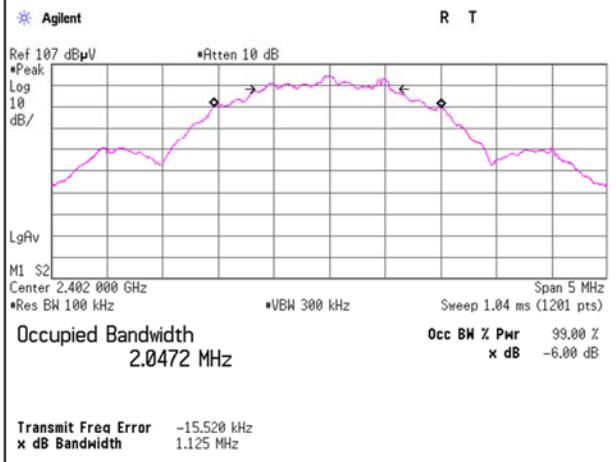
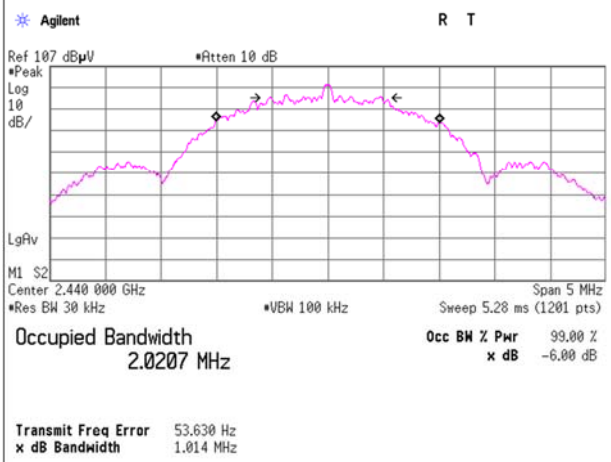
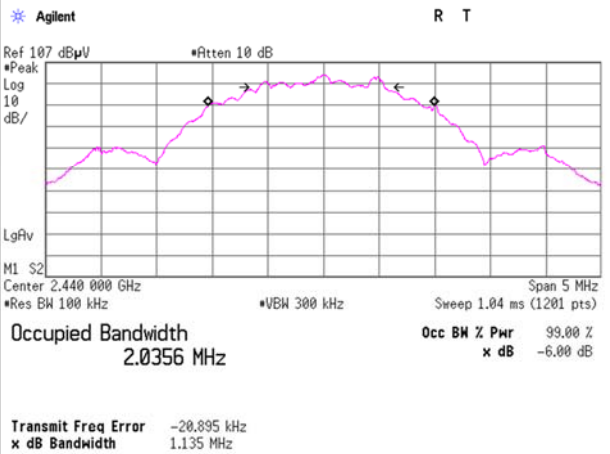
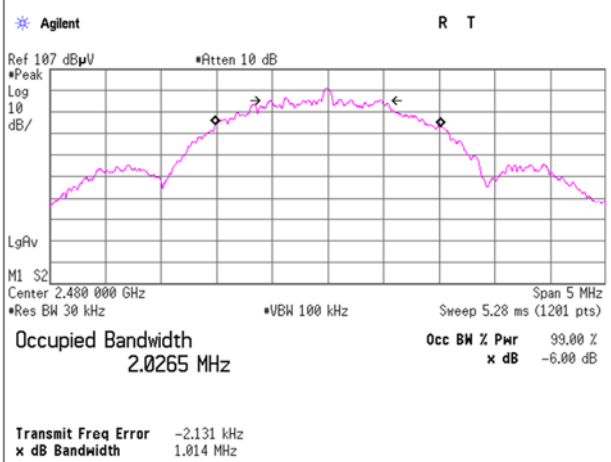
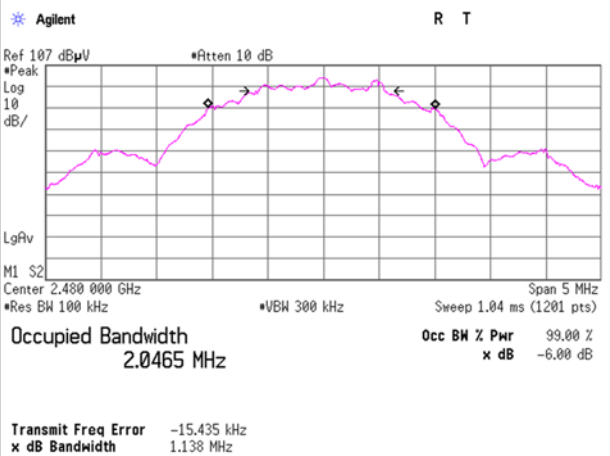
99 % Occupied Bandwidth and 6 dB Bandwidth

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
2402 MHz	**2402 MHz**
	
2440 MHz	**2440 MHz**
	
2480 MHz	**2480 MHz**
	

Maximum Peak Output Power

Test place	Shonan EMC Lab. No. 5 Shielded Room
Date	July 24, 2023
Temperature / Humidity	24 deg. C / 34 % RH
Engineer	Yosuke Murakami
Mode	Tx BT LE

BT LE 1M-PHY

Maximum peak output power

				Conducted Power					e.i.r.p. for RSS-247					
Freq.	Reading	Cable Loss	Atten. Loss	Result		Limit		Margin	Antenna Gain	Result		Limit		Margin
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[mW]	[dBm]	[mW]	[dB]	[dBi]	[dBm]	[mW]	[dBm]	[mW]	[dB]
2402	-6.56	0.82	10.18	4.44	2.78	30.00	1000	25.56	-4.80	-0.36	0.92	36.02	4000	36.38
2440	-6.73	0.83	10.18	4.28	2.68	30.00	1000	25.72	-4.80	-0.52	0.89	36.02	4000	36.54
2480	-7.13	0.83	10.18	3.88	2.44	30.00	1000	26.12	-4.80	-0.92	0.81	36.02	4000	36.94

BT LE 2M-PHY

Maximum peak output power

				Conducted Power					e.i.r.p. for RSS-247					
Freq.	Reading	Cable Loss	Atten. Loss	Result		Limit		Margin	Antenna Gain	Result		Limit		Margin
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[mW]	[dBm]	[mW]	[dB]	[dBi]	[dBm]	[mW]	[dBm]	[mW]	[dB]
2402	-6.57	0.82	10.18	4.43	2.77	30.00	1000	25.57	-4.80	-0.37	0.92	36.02	4000	36.39
2440	-6.75	0.83	10.18	4.26	2.67	30.00	1000	25.74	-4.80	-0.54	0.88	36.02	4000	36.56
2480	-7.13	0.83	10.18	3.88	2.44	30.00	1000	26.12	-4.80	-0.92	0.81	36.02	4000	36.94

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

BT LE 1M-PHY

Average power

Freq.	Reading	Cable Loss	Atten. Loss	Result (Time average)		Duty factor	Result (Burst power average)	
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[mW]	[dB]	[dBm]	[mW]
2402	-8.74	0.82	10.18	2.26	1.68	1.87	4.13	2.59
2440	-8.88	0.83	10.18	2.13	1.63	1.87	4.00	2.51
2480	-9.30	0.83	10.18	1.71	1.48	1.87	3.58	2.28

BT LE 2M-PHY

Average power

Freq.	Reading	Cable Loss	Atten. Loss	Result (Time average)		Duty factor	Result (Burst power average)	
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[mW]	[dB]	[dBm]	[mW]
2402	-10.46	0.82	10.18	0.54	1.13	3.58	4.12	2.58
2440	-10.59	0.83	10.18	0.42	1.10	3.58	4.00	2.51
2480	-11.00	0.83	10.18	0.01	1.00	3.58	3.59	2.29

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

Maximum Peak Output Power

Test place	Shonan EMC Lab. No.6 Shielded Room
Date	December 9, 2022
Temperature / Humidity	22 deg. C / 35 % RH
Engineer	Akihiro Oda
Mode	Tx BT LE_-30 dBm

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	-32.31	0.65	0.00	-31.66	0.000682	30.00	1000	61.66	-4.80	-36.46	0.000226	36.02	4000	72.48
2440	-32.70	0.66	0.00	-32.04	0.000625	30.00	1000	62.04	-4.80	-36.84	0.000207	36.02	4000	72.86
2480	-33.12	0.66	0.00	-32.46	0.000568	30.00	1000	62.46	-4.80	-37.26	0.000188	36.02	4000	73.28

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]
2402	-32.79	0.65	0.00	-32.14	0.000611	30.00	1000	62.14	-4.80	-36.94	0.000202	36.02	4000	72.96
2440	-32.33	0.66	0.00	-31.67	0.000681	30.00	1000	61.67	-4.80	-36.47	0.000225	36.02	4000	72.49
2480	-33.21	0.66	0.00	-32.55	0.000556	30.00	1000	62.55	-4.80	-37.35	0.000184	36.02	4000	73.37

Sample Calculation:

Result = Reading + Cable Loss + Attenuator Loss

e.i.r.p. Result = Conducted Power Result + Antenna Gain

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

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

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	-35.77	0.65	0.00	-35.12	0.000308	1.84	-33.28	0.000470
2440	-36.30	0.66	0.00	-35.64	0.000273	1.84	-33.80	0.000417
2480	-36.69	0.66	0.00	-36.03	0.000249	1.84	-34.19	0.000381

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]
2402	-37.44	0.65	0.00	-36.79	0.000209	3.57	-33.22	0.000476
2440	-38.08	0.66	0.00	-37.42	0.000181	3.57	-33.85	0.000412
2480	-38.44	0.66	0.00	-37.78	0.000167	3.57	-34.21	0.000379

Sample Calculation:

Result (Time average) = Reading + Cable Loss + Attenuator Loss

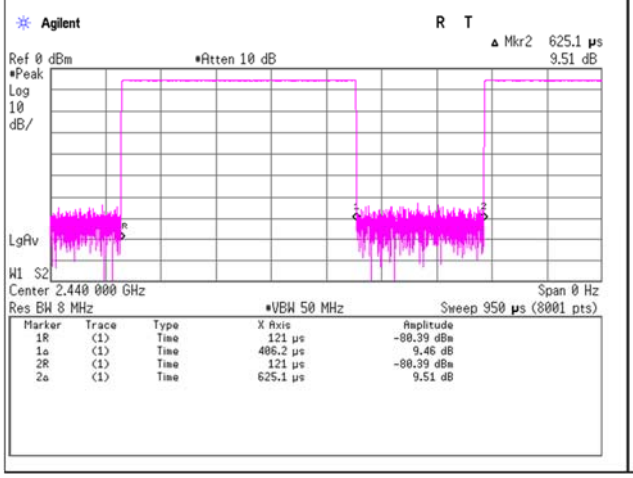
Result (Burst power average) = Result (Time average) + Duty factor

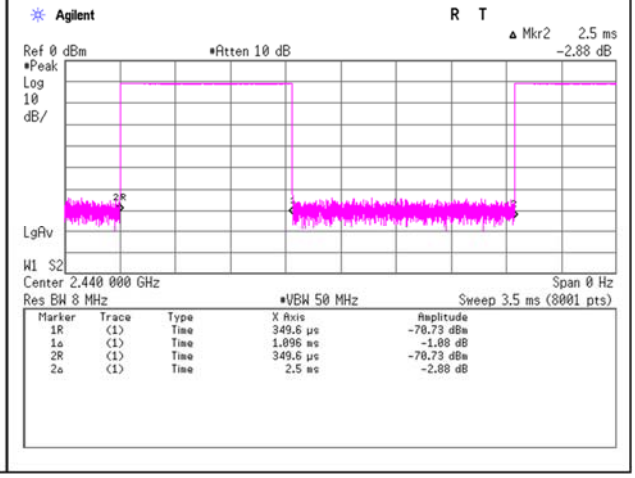
*The equipment and cables were not used for factor 0 dB of the data sheets.

Burst rate confirmation

Test place	Shonan EMC Lab. No. 5 Shielded Room
Date	April 18, 2023
Temperature / Humidity	26 deg. C / 30 % RH
Engineer	Yosuke Murakami
Mode	Tx BT LE

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) =	0.650	Tx on / (Tx on + Tx off) =	0.438
Tx on / (Tx on + Tx off) * 100 =	65.0 %	Tx on / (Tx on + Tx off) * 100 =	43.8 %
Duty factor = 10 * log (0.625 / 0.406) =	1.87 dB *1)	Duty factor = 10 * log (2.5 / 1.096) =	3.58 dB *3)
Duty factor = 20 * log (0.625 / 0.406) =	3.75 dB *2)	Duty factor = 20 * log (2.5 / 1.096) =	7.16 dB *4)





Radiated Spurious Emission

Test place	Shonan EMC Lab.			
Semi Anechoic Chamber	No.3	No.3	No.3	No.3
Date	April 19, 2023	April 23, 2023	April 24, 2023	April 24, 2023
Temperature / Humidity	22 deg.C, 45 %RH	23 deg.C, 30 %RH	22 deg.C, 30 %RH	24 deg.C, 29 %RH
Engineer	Yohsuke Matsuzawa	Yasumasa Owaki	Yasumasa Owaki	Hiromasa Sato
	(Below 1 GHz)	(1 GHz to 2.8 GHz)	(2.8 GHz to 18 GHz)	(18 GHz to 26.5 GHz)
Mode	Tx BT LE 1 M-PHY 2402 MHz			

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	30.737	QP	23.80	18.46	6.60	32.20	0.00	16.66	40.0	23.3	161	120	-
Hori.	187.493	QP	23.30	16.48	7.93	32.08	0.00	15.63	43.5	27.8	200	26	-
Hori.	261.824	QP	25.70	17.82	8.39	32.01	0.00	19.90	46.0	26.1	201	359	-
Hori.	392.226	QP	24.20	16.28	9.04	31.95	0.00	17.57	46.0	28.4	141	227	-
Hori.	918.766	QP	22.80	22.18	11.02	30.94	0.00	25.06	46.0	20.9	153	29	-
Hori.	2373.950	PK	54.57	28.01	14.68	41.60	2.47	58.13	73.9	15.7	139	119	-
Hori.	2377.995	PK	54.57	28.00	14.69	41.60	2.47	58.13	73.9	15.7	139	119	-
Hori.	2382.005	PK	54.96	28.00	14.70	41.60	2.47	58.53	73.9	15.3	139	119	-
Hori.	2386.050	PK	55.93	27.99	14.70	41.61	2.47	59.48	73.9	14.4	139	119	-
Hori.	2390.000	PK	58.42	27.98	14.70	41.61	2.47	61.96	73.9	11.9	139	119	-
Hori.	4804.000	PK	49.05	31.39	7.21	42.87	2.47	47.25	73.9	26.6	127	15	-
Hori.	7206.000	PK	48.08	37.12	8.60	43.34	2.47	52.93	73.9	20.9	150	0	-
Hori.	9608.000	PK	48.20	38.58	9.79	43.12	2.47	55.92	73.9	17.9	150	0	-
Hori.	16814.000	PK	50.88	39.51	12.77	40.55	-9.54	53.07	73.9	20.8	137	96	-
Hori.	7206.000	AV	39.16	37.12	8.60	43.34	2.47	44.01	53.9	9.8	150	0	Floor noise
Hori.	9608.000	AV	39.13	38.58	9.79	43.12	2.47	46.85	53.9	7.0	150	0	Floor noise
Vert.	31.282	QP	23.60	18.26	6.61	32.20	0.00	16.27	40.0	23.7	100	1	-
Vert.	191.270	QP	23.30	16.59	7.95	32.08	0.00	15.76	43.5	27.7	100	211	-
Vert.	249.537	QP	26.20	17.47	8.32	32.01	0.00	19.98	46.0	26.0	100	353	-
Vert.	405.994	QP	24.70	16.56	9.11	31.95	0.00	18.42	46.0	27.5	100	261	-
Vert.	927.029	QP	23.00	22.19	11.05	30.88	0.00	25.36	46.0	20.6	100	165	-
Vert.	2373.950	PK	56.60	28.01	14.68	41.60	2.47	60.16	73.9	13.7	117	229	-
Vert.	2377.995	PK	57.41	28.00	14.69	41.60	2.47	60.97	73.9	12.9	117	229	-
Vert.	2382.005	PK	58.43	28.00	14.70	41.60	2.47	62.00	73.9	11.9	117	229	-
Vert.	2386.050	PK	60.44	27.99	14.70	41.61	2.47	63.99	73.9	9.9	117	229	-
Vert.	2390.000	PK	61.84	27.98	14.70	41.61	2.47	65.38	73.9	8.5	117	229	-
Vert.	4804.000	PK	49.26	31.39	7.21	42.87	2.47	47.46	73.9	26.4	106	21	-
Vert.	7206.000	PK	48.20	37.12	8.60	43.34	2.47	53.05	73.9	20.8	150	0	-
Vert.	9608.000	PK	48.58	38.58	9.79	43.12	2.47	56.30	73.9	17.6	150	0	-
Vert.	16814.000	PK	50.17	39.51	12.77	40.55	-9.54	52.36	73.9	21.5	130	196	-
Vert.	7206.000	AV	39.12	37.12	8.60	43.34	2.47	43.97	53.9	9.9	150	0	Floor noise
Vert.	9608.000	AV	39.06	38.58	9.79	43.12	2.47	46.78	53.9	7.1	150	0	Floor noise

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.98 m / 3.0 m) = 2.47 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.	2373.950	AV	38.42	28.01	14.68	41.60	3.75	2.47	45.73	53.9	8.1	-
Hori.	2377.995	AV	38.44	28.00	14.69	41.60	3.75	2.47	45.75	53.9	8.1	-
Hori.	2382.005	AV	38.46	28.00	14.70	41.60	3.75	2.47	45.78	53.9	8.1	-
Hori.	2386.050	AV	38.59	27.99	14.70	41.61	3.75	2.47	45.89	53.9	8.0	-
Hori.	2390.000	AV	39.01	27.98	14.70	41.61	3.75	2.47	46.30	53.9	7.6	*1)
Hori.	4804.000	AV	39.43	31.39	7.21	42.87	3.75	2.47	41.38	53.9	12.5	-
Hori.	16814.000	AV	42.24	39.51	12.77	40.55	3.75	-9.54	48.18	53.9	**5.7**	-
Vert.	2373.950	AV	38.45	28.01	14.68	41.60	3.75	2.47	45.76	53.9	8.1	-
Vert.	2377.995	AV	38.90	28.00	14.69	41.60	3.75	2.47	46.21	53.9	7.6	-
Vert.	2382.005	AV	39.19	28.00	14.70	41.60	3.75	2.47	46.51	53.9	7.3	-
Vert.	2386.050	AV	39.24	27.99	14.70	41.61	3.75	2.47	46.54	53.9	7.3	-
Vert.	2390.000	AV	39.73	27.98	14.70	41.61	3.75	2.47	47.02	53.9	6.8	*1)
Vert.	4804.000	AV	39.23	31.39	7.21	42.87	3.75	2.47	41.18	53.9	12.7	-
Vert.	16814.000	AV	40.84	39.51	12.77	40.55	3.75	-9.54	46.78	53.9	7.1	-

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) = 2.47 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)

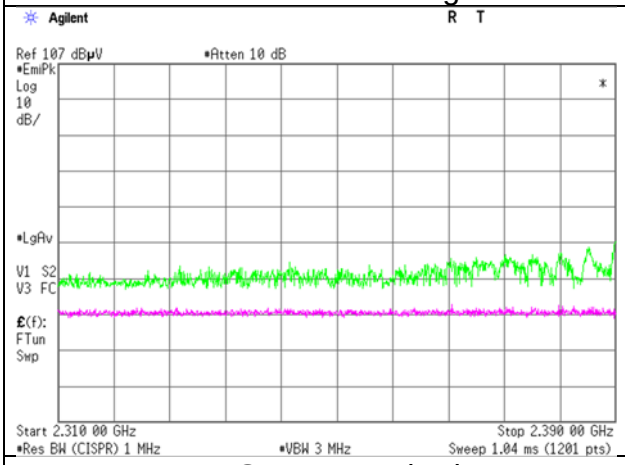
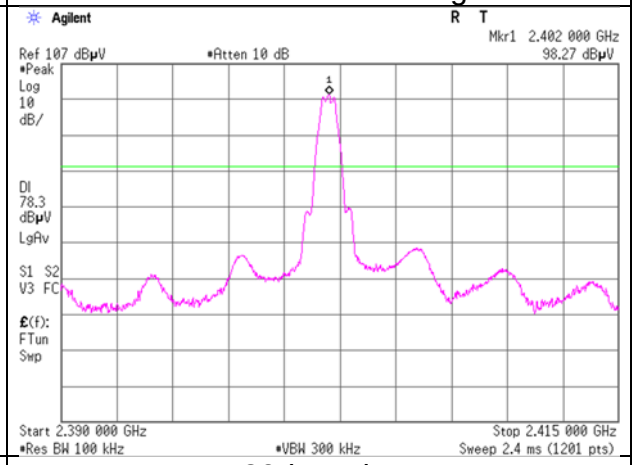
20 dBc Data Sheet (RBW 100 kHz, VBW 300 kHz)

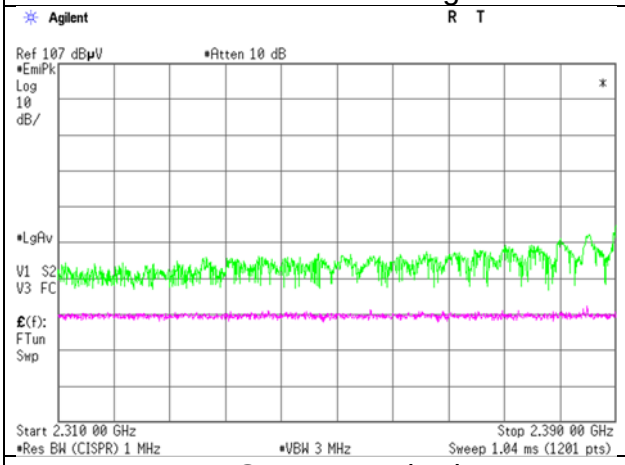
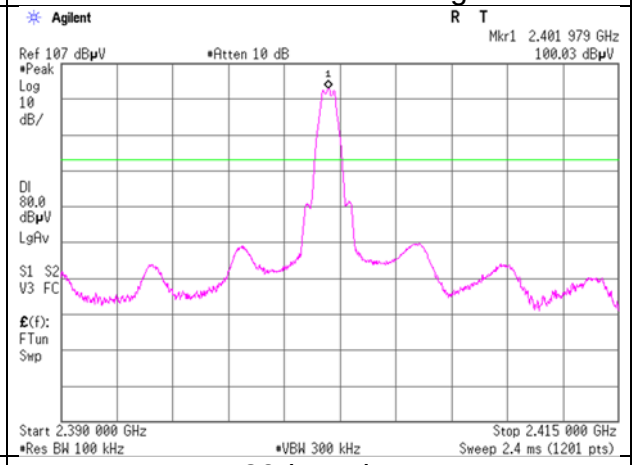
Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2402.000	PK	98.13	27.97	14.71	41.61	2.47	101.67	-	-	Carrier
Hori.	2390.095	PK	44.60	27.98	14.70	41.61	2.47	48.14	81.6	33.4	-
Hori.	2394.100	PK	46.99	27.98	14.71	41.61	2.47	50.54	81.6	31.0	-
Hori.	2398.105	PK	53.01	27.97	14.71	41.61	2.47	56.55	81.6	25.0	-
Hori.	2400.000	PK	48.81	27.97	14.71	41.61	2.47	52.35	81.6	29.2	-
Vert.	2402.000	PK	99.94	27.97	14.71	41.61	2.47	103.48	-	-	Carrier
Vert.	2390.095	PK	47.46	27.98	14.70	41.61	2.47	51.00	83.4	32.4	-
Vert.	2394.100	PK	49.90	27.98	14.71	41.61	2.47	53.45	83.4	29.9	-
Vert.	2398.105	PK	55.02	27.97	14.71	41.61	2.47	58.56	83.4	24.8	-
Vert.	2400.000	PK	50.59	27.97	14.71	41.61	2.47	54.13	83.4	29.2	-

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) = 2.47 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

Radiated Spurious Emission
(Reference Plot for band-edge)

Test place	Shonan EMC Lab.
Semi Anechoic Chamber	No.3
Date	April 23, 2023
Temperature / Humidity	23 deg.C, 30 %RH
Engineer	Yasumasa Owaki
Mode	Tx BT LE 1 M-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	Shonan EMC Lab.		
Semi Anechoic Chamber	No.3	No.3	No.3
Date	April 23, 2023	April 24, 2023	April 24, 2023
Temperature / Humidity	23 deg.C, 30 %RH	22 deg.C, 30 %RH	24 deg.C, 29 %RH
Engineer	Yasumasa Owaki	Yasumasa Owaki	Hiromasa Sato
	(1 GHz to 2.8 GHz)	(2.8 GHz to 10 GHz)	(10 GHz to 26.5 GHz)
Mode	Tx BT LE 1 M-PHY 2440 MHz		

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	4880.000	PK	48.91	31.51	7.26	42.88	2.47	47.27	73.9	26.6	148	3	-
Hori.	7320.000	PK	48.65	37.25	8.64	43.42	2.47	53.59	73.9	20.3	150	0	-
Hori.	9760.000	PK	48.48	39.02	9.88	43.01	2.47	56.84	73.9	17.0	150	0	-
Hori.	17080.000	PK	49.23	39.81	12.98	40.44	-9.54	52.04	73.9	21.8	143	95	-
Hori.	7320.000	AV	39.11	37.25	8.64	43.42	2.47	44.05	53.9	9.8	150	0	Floor noise
Hori.	9760.000	AV	39.16	39.02	9.88	43.01	2.47	47.52	53.9	6.3	150	0	Floor noise
Vert.	4880.000	PK	48.97	31.51	7.26	42.88	2.47	47.33	73.9	26.5	109	46	-
Vert.	7320.000	PK	48.42	37.25	8.64	43.42	2.47	53.36	73.9	20.5	150	0	-
Vert.	9760.000	PK	48.47	39.02	9.88	43.01	2.47	56.83	73.9	17.0	150	0	-
Vert.	17080.000	PK	50.13	39.81	12.98	40.44	-9.54	52.94	73.9	20.9	135	190	-
Vert.	7320.000	AV	39.00	37.25	8.64	43.42	2.47	43.94	53.9	9.9	150	0	Floor noise
Vert.	9760.000	AV	39.36	39.02	9.88	43.01	2.47	47.72	53.9	**6.1**	150	0	Floor noise

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.98 m / 3.0 m) = 2.47 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.	4880.000	AV	39.74	31.51	7.26	42.88	3.75	2.47	41.85	53.9	12.0	-
Hori.	17080.000	AV	39.41	39.81	12.98	40.44	3.75	-9.54	45.97	53.9	7.9	-
Vert.	4880.000	AV	39.47	31.51	7.26	42.88	3.75	2.47	41.58	53.9	12.3	-
Vert.	17080.000	AV	39.24	39.81	12.98	40.44	3.75	-9.54	45.80	53.9	8.0	-

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) = 2.47 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.3	No.3	No.3
Date	April 23, 2023	April 24, 2023	April 24, 2023
Temperature / Humidity	23 deg.C, 30 %RH	22 deg.C, 30 %RH	24 deg.C, 29 %RH
Engineer	Yasumasa Owaki	Yasumasa Owaki	Hiromasa Sato
	(1 GHz to 2.8 GHz)	(2.8 GHz to 10 GHz)	(10 GHz to 26.5 GHz)
Mode	Tx BT LE 1 M-PHY 2480 MHz		

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	2483.500	PK	67.51	27.89	14.82	41.64	2.47	71.05	73.9	2.8	138	127	-
Hori.	2483.875	PK	67.70	27.89	14.82	41.64	2.47	71.24	73.9	**2.6**	138	127	-
Hori.	2487.785	PK	63.02	27.89	14.82	41.64	2.47	66.56	73.9	7.3	138	127	-
Hori.	2491.705	PK	57.71	27.89	14.82	41.64	2.47	61.25	73.9	12.6	138	127	-
Hori.	2495.650	PK	55.79	27.89	14.83	41.64	2.47	59.34	73.9	14.5	138	127	-
Hori.	2499.535	PK	54.72	27.89	14.83	41.64	2.47	58.27	73.9	15.6	138	127	-
Hori.	4960.000	PK	48.70	31.73	7.31	42.89	2.47	47.32	73.9	26.5	153	350	-
Hori.	7440.000	PK	48.60	37.42	8.70	43.50	2.47	53.69	73.9	20.2	150	0	-
Hori.	9920.000	PK	48.11	38.95	9.97	42.89	2.47	56.61	73.9	17.2	150	0	-
Hori.	17360.000	PK	48.99	40.18	13.19	40.25	-9.54	52.57	73.9	21.3	140	84	-
Hori.	7440.000	AV	39.68	37.42	8.70	43.50	2.47	44.77	53.9	9.1	150	0	Floor noise
Hori.	9920.000	AV	38.96	38.95	9.97	42.89	2.47	47.46	53.9	6.4	150	0	Floor noise
Vert.	2483.500	PK	66.78	27.89	14.82	41.64	2.47	70.32	73.9	3.5	108	233	-
Vert.	2483.875	PK	66.85	27.89	14.82	41.64	2.47	70.39	73.9	3.5	108	233	-
Vert.	2487.785	PK	60.90	27.89	14.82	41.64	2.47	64.44	73.9	9.4	108	233	-
Vert.	2491.705	PK	58.06	27.89	14.82	41.64	2.47	61.60	73.9	12.3	108	233	-
Vert.	2495.650	PK	55.78	27.89	14.83	41.64	2.47	59.33	73.9	14.5	108	233	-
Vert.	2499.535	PK	54.55	27.89	14.83	41.64	2.47	58.10	73.9	15.8	108	233	-
Vert.	4960.000	PK	49.02	31.73	7.31	42.89	2.47	47.64	73.9	26.2	250	8	-
Vert.	7440.000	PK	49.03	37.42	8.70	43.50	2.47	54.12	73.9	19.7	150	0	-
Vert.	9920.000	PK	48.73	38.95	9.97	42.89	2.47	57.23	73.9	16.6	150	0	-
Vert.	17360.000	PK	48.23	40.18	13.19	40.25	-9.54	51.81	73.9	22.0	139	194	-
Vert.	7440.000	AV	39.47	37.42	8.70	43.50	2.47	44.56	53.9	9.3	150	0	Floor noise
Vert.	9920.000	AV	39.41	38.95	9.97	42.89	2.47	47.91	53.9	5.9	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) = 2.47 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	42.54	27.89	14.82	41.64	3.75	2.47	49.83	53.9	4.0	*1)
Hori.	2483.875	AV	42.81	27.89	14.82	41.64	3.75	2.47	50.10	53.9	3.7	-
Hori.	2487.785	AV	40.15	27.89	14.82	41.64	3.75	2.47	47.44	53.9	6.4	-
Hori.	2491.705	AV	39.03	27.89	14.82	41.64	3.75	2.47	46.32	53.9	7.5	-
Hori.	2495.650	AV	38.63	27.89	14.83	41.64	3.75	2.47	45.93	53.9	7.9	-
Hori.	2499.535	AV	38.34	27.89	14.83	41.64	3.75	2.47	45.64	53.9	8.2	-
Hori.	4960.000	AV	39.93	31.73	7.31	42.89	3.75	2.47	42.30	53.9	11.6	-
Hori.	17360.000	AV	39.36	40.18	13.19	40.25	3.75	-9.54	46.69	53.9	7.2	-
Vert.	2483.500	AV	40.99	27.89	14.82	41.64	3.75	2.47	48.28	53.9	5.6	*1)
Vert.	2483.875	AV	41.45	27.89	14.82	41.64	3.75	2.47	48.74	53.9	5.1	-
Vert.	2487.785	AV	38.38	27.89	14.82	41.64	3.75	2.47	45.67	53.9	8.2	-
Vert.	2491.705	AV	37.31	27.89	14.82	41.64	3.75	2.47	44.60	53.9	9.2	-
Vert.	2495.650	AV	37.11	27.89	14.83	41.64	3.75	2.47	44.41	53.9	9.4	-
Vert.	2499.535	AV	36.80	27.89	14.83	41.64	3.75	2.47	44.10	53.9	9.8	-
Vert.	4960.000	AV	40.19	31.73	7.31	42.89	3.75	2.47	42.56	53.9	11.3	-
Vert.	17360.000	AV	39.11	40.18	13.19	40.25	3.75	-9.54	46.44	53.9	7.4	-

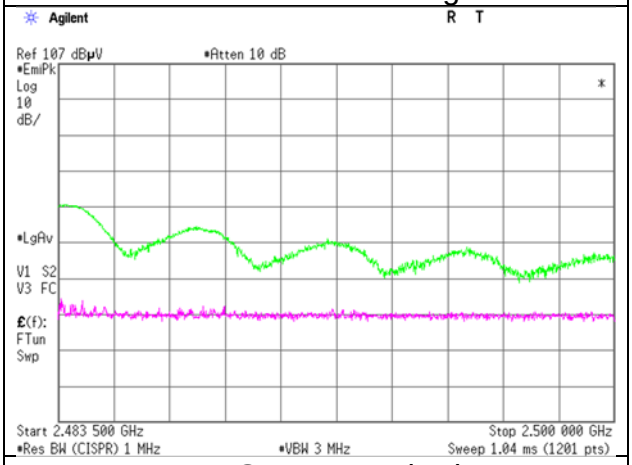
Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Duty factor + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.98 m / 3.0 m) = 2.47 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB
Duty factor refer to "Burst rate confirmation" sheet.
*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.3
Date	April 23, 2023
Temperature / Humidity	23 deg.C, 30 %RH
Engineer	Yasumasa Owaki
Mode	Tx BT LE 1 M-PHY 2480 MHz

Horizontal

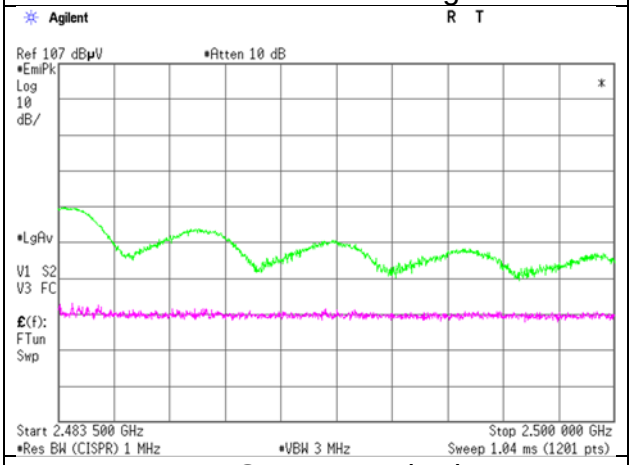
Restricted-band band-edge Plot



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	Shonan EMC Lab.		
Semi Anechoic Chamber	No.3	No.3	No.3
Date	April 23, 2023	April 24, 2023	April 24, 2023
Temperature / Humidity	23 deg.C, 30 %RH	22 deg.C, 30 %RH	24 deg.C, 29 %RH
Engineer	Yasumasa Owaki	Yasumasa Owaki	Hiromasa Sato
	(1 GHz to 2.8 GHz)	(2.8 GHz to 10 GHz)	(10 GHz to 26.5 GHz)
Mode	Tx BT LE 2 M-PHY 2402 MHz		

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	2374.050	PK	53.73	28.01	14.68	41.60	2.47	57.29	73.9	16.6	137	118	-
Hori.	2378.000	PK	53.84	28.00	14.69	41.60	2.47	57.40	73.9	16.5	137	118	-
Hori.	2381.985	PK	54.57	28.00	14.70	41.60	2.47	58.14	73.9	15.7	137	118	-
Hori.	2386.065	PK	55.72	27.99	14.70	41.61	2.47	59.27	73.9	14.6	137	118	-
Hori.	2390.000	PK	57.98	27.98	14.70	41.61	2.47	61.52	73.9	12.3	137	118	-
Hori.	4804.000	PK	49.21	31.39	7.21	42.87	2.47	47.41	73.9	26.4	140	4	-
Hori.	7206.000	PK	48.41	37.12	8.60	43.34	2.47	53.26	73.9	20.6	150	0	-
Hori.	9608.000	PK	48.23	38.58	9.79	43.12	2.47	55.95	73.9	17.9	150	0	-
Hori.	16814.000	PK	49.53	39.51	12.77	40.55	-9.54	51.72	73.9	22.1	146	91	-
Hori.	7206.000	AV	38.90	37.12	8.60	43.34	2.47	43.75	53.9	10.1	150	0	Floor noise
Hori.	9608.000	AV	39.19	38.58	9.79	43.12	2.47	46.91	53.9	6.9	150	0	Floor noise
Vert.	2374.050	PK	56.66	28.01	14.68	41.60	2.47	60.22	73.9	13.6	118	228	-
Vert.	2378.000	PK	57.43	28.00	14.69	41.60	2.47	60.99	73.9	12.9	118	228	-
Vert.	2381.985	PK	58.34	28.00	14.70	41.60	2.47	61.91	73.9	11.9	118	228	-
Vert.	2386.065	PK	60.03	27.99	14.70	41.61	2.47	63.58	73.9	10.3	118	228	-
Vert.	2390.000	PK	61.69	27.98	14.70	41.61	2.47	65.23	73.9	8.6	118	228	-
Vert.	4804.000	PK	48.77	31.39	7.21	42.87	2.47	46.97	73.9	26.9	112	12	-
Vert.	7206.000	PK	48.33	37.12	8.60	43.34	2.47	53.18	73.9	20.7	150	0	-
Vert.	9608.000	PK	48.11	38.58	9.79	43.12	2.47	55.83	73.9	18.0	150	0	-
Vert.	16814.000	PK	49.81	39.51	12.77	40.55	-9.54	52.00	73.9	21.9	139	199	-
Vert.	7206.000	AV	39.29	37.12	8.60	43.34	2.47	44.14	53.9	9.7	150	0	Floor noise
Vert.	9608.000	AV	39.11	38.58	9.79	43.12	2.47	46.83	53.9	7.0	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) = 2.47 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.	2374.050	AV	37.71	28.01	14.68	41.60	7.16	2.47	48.43	53.9	5.4	-
Hori.	2378.000	AV	37.79	28.00	14.69	41.60	7.16	2.47	48.51	53.9	5.3	-
Hori.	2381.985	AV	37.96	28.00	14.70	41.60	7.16	2.47	48.69	53.9	5.2	-
Hori.	2386.065	AV	38.08	27.99	14.70	41.61	7.16	2.47	48.79	53.9	5.1	-
Hori.	2390.000	AV	38.14	27.98	14.70	41.61	7.16	2.47	48.84	53.9	5.0	*1)
Hori.	4804.000	AV	39.49	31.39	7.21	42.87	7.16	2.47	44.85	53.9	9.0	-
Hori.	16814.000	AV	40.60	39.51	12.77	40.55	7.16	-9.54	49.95	53.9	3.9	-
Vert.	2374.050	AV	38.11	28.01	14.68	41.60	7.16	2.47	48.83	53.9	5.0	-
Vert.	2378.000	AV	38.22	28.00	14.69	41.60	7.16	2.47	48.94	53.9	4.9	-
Vert.	2381.985	AV	38.33	28.00	14.70	41.60	7.16	2.47	49.06	53.9	4.8	-
Vert.	2386.065	AV	38.72	27.99	14.70	41.61	7.16	2.47	49.43	53.9	4.4	-
Vert.	2390.000	AV	39.42	27.98	14.70	41.61	7.16	2.47	50.12	53.9	**3.7**	*1)
Vert.	4804.000	AV	39.51	31.39	7.21	42.87	7.16	2.47	44.87	53.9	9.0	-
Vert.	16814.000	AV	39.83	39.51	12.77	40.55	7.16	-9.54	49.18	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) = 2.47 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)

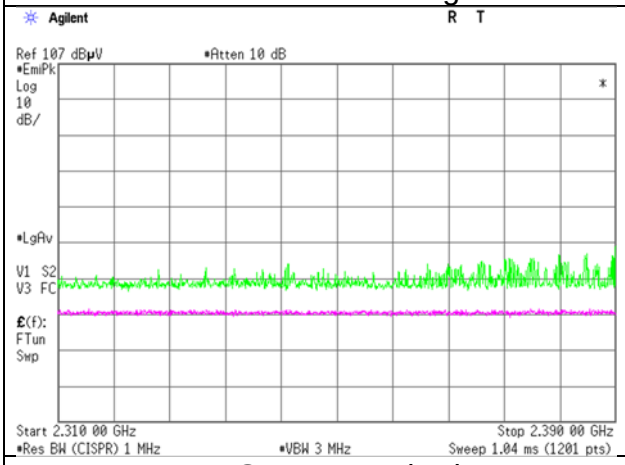
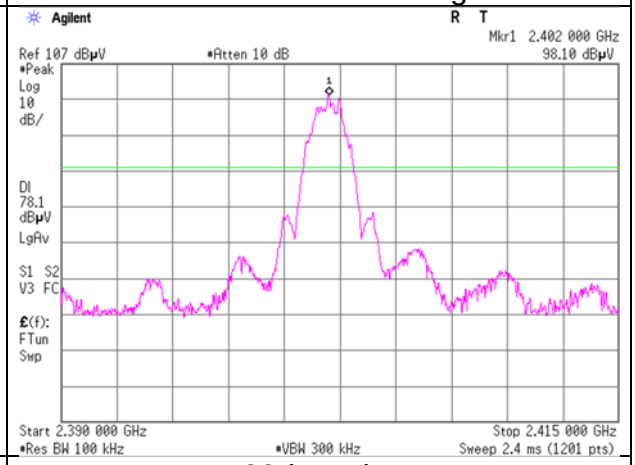
20 dBc Data Sheet **(RBW 100 kHz, VBW 300 kHz)**

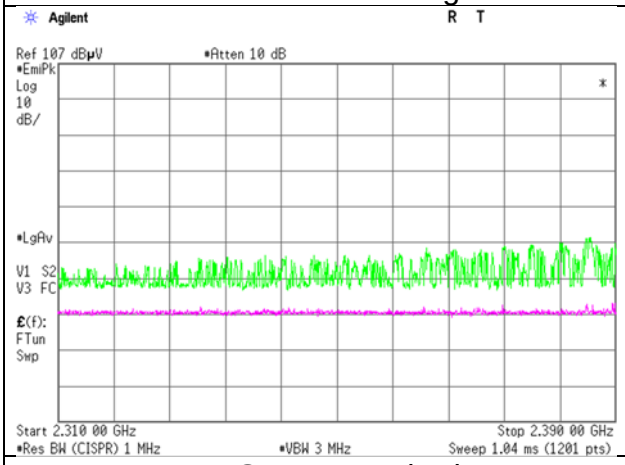
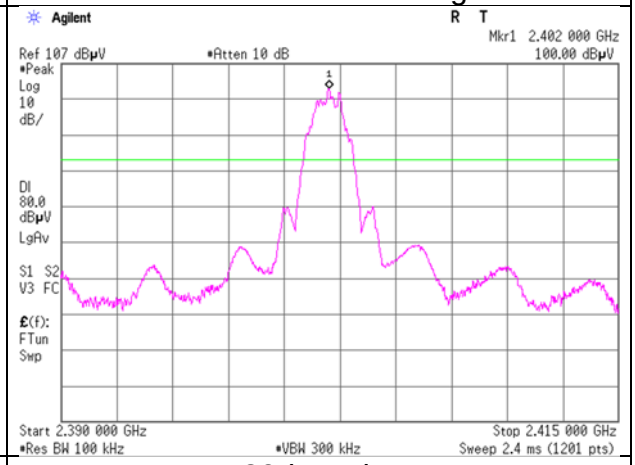
Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2402.000	PK	98.56	27.97	14.71	41.61	2.47	102.10	-	-	Carrier
Hori.	2390.075	PK	44.80	27.98	14.70	41.61	2.47	48.34	82.1	33.7	-
Hori.	2394.115	PK	46.46	27.98	14.71	41.61	2.47	50.01	82.1	32.0	-
Hori.	2398.075	PK	52.52	27.97	14.71	41.61	2.47	56.06	82.1	26.0	-
Hori.	2400.000	PK	63.94	27.97	14.71	41.61	2.47	67.48	82.1	14.6	-
Vert.	2402.000	PK	100.00	27.97	14.71	41.61	2.47	103.54	-	-	Carrier
Vert.	2390.075	PK	47.76	27.98	14.70	41.61	2.47	51.30	83.5	32.2	-
Vert.	2394.115	PK	50.33	27.98	14.71	41.61	2.47	53.88	83.5	29.6	-
Vert.	2398.075	PK	55.05	27.97	14.71	41.61	2.47	58.59	83.5	24.9	-
Vert.	2400.000	PK	65.90	27.97	14.71	41.61	2.47	69.44	83.5	14.0	-

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.98 m / 3.0 m) = 2.47 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

Radiated Spurious Emission
(Reference Plot for band-edge)

Test place	Shonan EMC Lab.
Semi Anechoic Chamber	No.3
Date	April 23, 2023
Temperature / Humidity	23 deg.C, 30 %RH
Engineer	Yasumasa Owaki
Mode	Tx BT LE 2 M-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	Shonan EMC Lab.		
Semi Anechoic Chamber	No.3	No.3	No.3
Date	April 23, 2023	April 24, 2023	April 24, 2023
Temperature / Humidity	23 deg.C, 30 %RH	22 deg.C, 30 %RH	24 deg.C, 29 %RH
Engineer	Yasumasa Owaki	Yasumasa Owaki	Hiromasa Sato
	(1 GHz to 2.8 GHz)	(2.8 GHz to 10 GHz)	(10 GHz to 26.5 GHz)
Mode	Tx BT LE 2 M-PHY 2440 MHz		

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	4880.000	PK	48.31	31.51	7.26	42.88	2.47	46.67	73.9	27.2	143	356	-
Hori.	7320.000	PK	48.58	37.25	8.64	43.42	2.47	53.52	73.9	20.3	150	0	-
Hori.	9760.000	PK	48.23	39.02	9.88	43.01	2.47	56.59	73.9	17.3	150	0	-
Hori.	17080.000	PK	49.81	39.81	12.98	40.44	-9.54	52.62	73.9	21.2	142	93	-
Hori.	7320.000	AV	39.26	37.25	8.64	43.42	2.47	44.20	53.9	9.7	150	0	Floor noise
Hori.	9760.000	AV	38.98	39.02	9.88	43.01	2.47	47.34	53.9	6.5	150	0	Floor noise
Vert.	4880.000	PK	48.71	31.51	7.26	42.88	2.47	47.07	73.9	26.8	108	2	-
Vert.	7320.000	PK	48.60	37.25	8.64	43.42	2.47	53.54	73.9	20.3	150	0	-
Vert.	9760.000	PK	48.34	39.02	9.88	43.01	2.47	56.70	73.9	17.2	150	0	-
Vert.	17080.000	PK	49.62	39.81	12.98	40.44	-9.54	52.43	73.9	21.4	134	188	-
Vert.	7320.000	AV	39.10	37.25	8.64	43.42	2.47	44.04	53.9	9.8	150	0	Floor noise
Vert.	9760.000	AV	39.06	39.02	9.88	43.01	2.47	47.42	53.9	6.4	150	0	Floor noise

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.98 m / 3.0 m) = 2.47 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.	4880.000	AV	39.40	31.51	7.26	42.88	7.16	2.47	44.92	53.9	8.9	-
Hori.	17080.000	AV	39.04	39.81	12.98	40.44	7.16	-9.54	49.01	53.9	**4.8**	-
Vert.	4880.000	AV	39.34	31.51	7.26	42.88	7.16	2.47	44.86	53.9	9.0	-
Vert.	17080.000	AV	38.84	39.81	12.98	40.44	7.16	-9.54	48.81	53.9	5.0	-

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) = 2.47 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.3	No.3	No.3
Date	April 23, 2023	April 24, 2023	April 24, 2023
Temperature / Humidity	23 deg.C, 30 %RH	22 deg.C, 30 %RH	24 deg.C, 29 %RH
Engineer	Yasumasa Owaki	Yasumasa Owaki	Hiromasa Sato
	(1 GHz to 2.8 GHz)	(2.8 GHz to 10 GHz)	(10 GHz to 26.5 GHz)
Mode	Tx BT LE 2 M-PHY 2480 MHz		

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	2483.500	PK	67.76	27.89	14.82	41.64	2.47	71.30	73.9	2.6	130	127	-
Hori.	2483.645	PK	67.90	27.89	14.82	41.64	2.47	71.44	73.9	**2.4**	130	127	-
Hori.	2487.615	PK	61.67	27.89	14.82	41.64	2.47	65.21	73.9	8.6	130	127	-
Hori.	2491.675	PK	57.71	27.89	14.82	41.64	2.47	61.25	73.9	12.6	130	127	-
Hori.	2495.555	PK	55.88	27.89	14.83	41.64	2.47	59.43	73.9	14.4	130	127	-
Hori.	2499.525	PK	53.84	27.89	14.83	41.64	2.47	57.39	73.9	16.5	130	127	-
Hori.	4960.000	PK	49.44	31.73	7.31	42.89	2.47	48.06	73.9	25.8	154	2	-
Hori.	7440.000	PK	48.30	37.42	8.70	43.50	2.47	53.39	73.9	20.5	150	0	-
Hori.	9920.000	PK	48.45	38.95	9.97	42.89	2.47	56.95	73.9	16.9	150	0	-
Hori.	17360.000	PK	49.25	40.18	13.19	40.25	-9.54	52.83	73.9	21.0	140	63	-
Hori.	7440.000	AV	39.64	37.42	8.70	43.50	2.47	44.73	53.9	9.1	150	0	Floor noise
Hori.	9920.000	AV	38.90	38.95	9.97	42.89	2.47	47.40	53.9	6.5	150	0	Floor noise
Vert.	2483.500	PK	66.63	27.89	14.82	41.64	2.47	70.17	73.9	3.7	107	231	-
Vert.	2483.645	PK	66.72	27.89	14.82	41.64	2.47	70.26	73.9	3.6	107	231	-
Vert.	2487.615	PK	60.65	27.89	14.82	41.64	2.47	64.19	73.9	9.7	107	231	-
Vert.	2491.675	PK	57.81	27.89	14.82	41.64	2.47	61.35	73.9	12.5	107	231	-
Vert.	2495.555	PK	55.75	27.89	14.83	41.64	2.47	59.30	73.9	14.6	107	231	-
Vert.	2499.525	PK	53.51	27.89	14.83	41.64	2.47	57.06	73.9	16.8	107	231	-
Vert.	4960.000	PK	49.02	31.73	7.31	42.89	2.47	47.64	73.9	26.2	248	8	-
Vert.	7440.000	PK	48.67	37.42	8.70	43.50	2.47	53.76	73.9	20.1	150	0	-
Vert.	9920.000	PK	47.81	38.95	9.97	42.89	2.47	56.31	73.9	17.5	150	0	-
Vert.	17360.000	PK	48.75	40.18	13.19	40.25	-9.54	52.33	73.9	21.5	132	184	-
Vert.	7440.000	AV	39.57	37.42	8.70	43.50	2.47	44.66	53.9	9.2	150	0	Floor noise
Vert.	9920.000	AV	39.12	38.95	9.97	42.89	2.47	47.62	53.9	6.2	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) = 2.47 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	39.76	27.89	14.82	41.64	7.16	2.47	50.46	53.9	3.4	*1)
Hori.	2483.645	AV	39.92	27.89	14.82	41.64	7.16	2.47	50.62	53.9	3.2	-
Hori.	2487.615	AV	38.29	27.89	14.82	41.64	7.16	2.47	48.99	53.9	4.9	-
Hori.	2491.675	AV	37.67	27.89	14.82	41.64	7.16	2.47	48.37	53.9	5.5	-
Hori.	2495.555	AV	37.55	27.89	14.83	41.64	7.16	2.47	48.26	53.9	5.6	-
Hori.	2499.525	AV	37.42	27.89	14.83	41.64	7.16	2.47	48.13	53.9	5.7	-
Hori.	4960.000	AV	39.36	31.73	7.31	42.89	7.16	2.47	45.14	53.9	8.7	-
Hori.	17360.000	AV	39.11	40.18	13.19	40.25	7.16	-9.54	49.85	53.9	4.0	-
Vert.	2483.500	AV	39.94	27.89	14.82	41.64	7.16	2.47	50.64	53.9	3.2	*1)
Vert.	2483.645	AV	39.48	27.89	14.82	41.64	7.16	2.47	50.18	53.9	3.7	-
Vert.	2487.615	AV	38.09	27.89	14.82	41.64	7.16	2.47	48.79	53.9	5.1	-
Vert.	2491.675	AV	37.65	27.89	14.82	41.64	7.16	2.47	48.35	53.9	5.5	-
Vert.	2495.555	AV	37.52	27.89	14.83	41.64	7.16	2.47	48.23	53.9	5.6	-
Vert.	2499.525	AV	37.63	27.89	14.83	41.64	7.16	2.47	48.34	53.9	5.5	-
Vert.	4960.000	AV	39.51	31.73	7.31	42.89	7.16	2.47	45.29	53.9	8.6	-
Vert.	17360.000	AV	38.81	40.18	13.19	40.25	7.16	-9.54	49.55	53.9	4.3	-

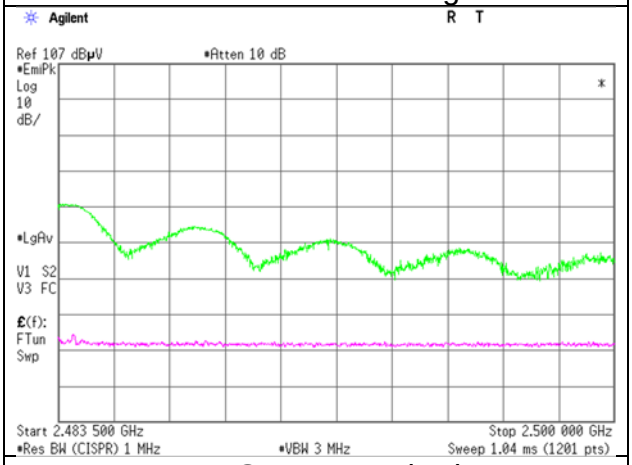
Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Duty factor + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.98 m / 3.0 m) = 2.47 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB
Duty factor refer to "Burst rate confirmation" sheet.
*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.3
Date	April 23, 2023
Temperature / Humidity	23 deg.C, 30 %RH
Engineer	Yasumasa Owaki
Mode	Tx BT LE 2 M-PHY 2480 MHz

Horizontal

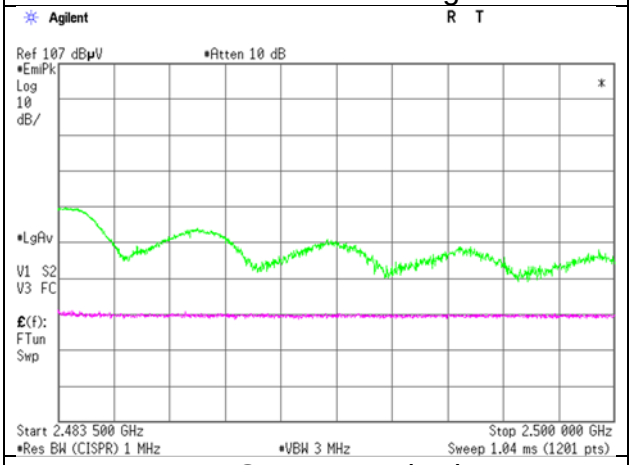
Restricted-band band-edge Plot



Trace Green : Peak Plot
Trace Purple : Average Plot

Vertical

Restricted-band band-edge Plot

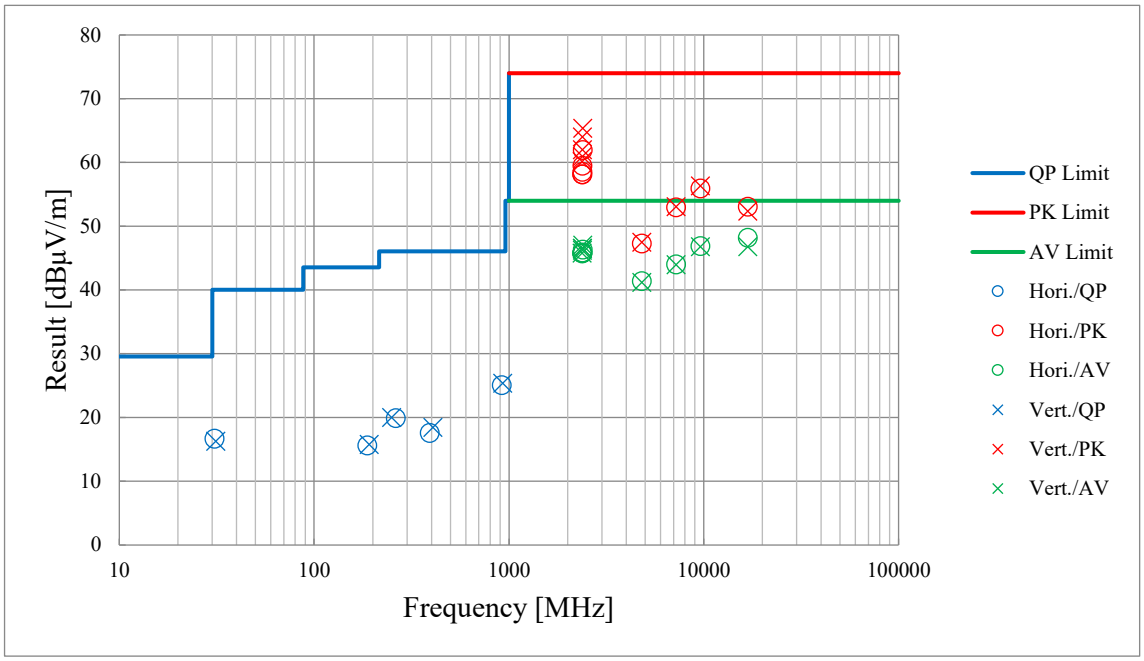


Trace Green : Peak Plot
Trace Purple : Average Plot

* 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	Shonan EMC Lab.			
Semi Anechoic Chamber	No.3	No.3	No.3	No.3
Date	April 19, 2023	April 23, 2023	April 24, 2023	April 24, 2023
Temperature / Humidity	22 deg.C, 45 %RH	23 deg.C, 30 %RH	22 deg.C, 30 %RH	24 deg.C, 29 %RH
Engineer	Yohsuke Matsuzawa (Below 1 GHz)	Yasumasa Owaki (1 GHz to 2.8 GHz)	Yasumasa Owaki (2.8 GHz to 18 GHz)	Hiromasa Sato (18 GHz to 26.5 GHz)
Mode	Tx BT LE 1 M-PHY 2402 MHz			



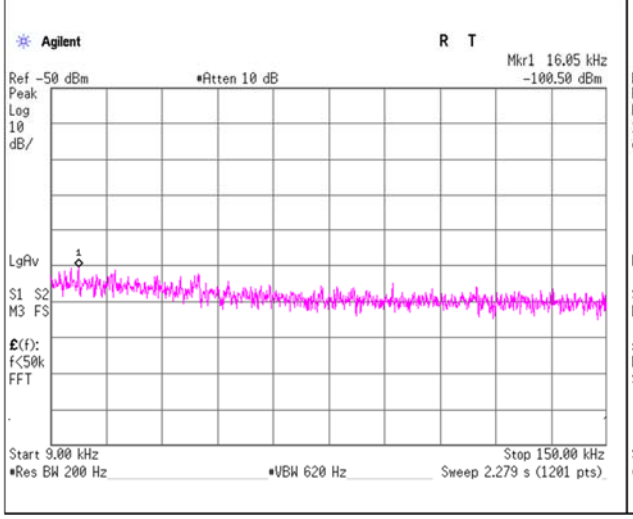
*These plots data contains sufficient number to show the trend of characteristic features for EUT.

Conducted Spurious Emission

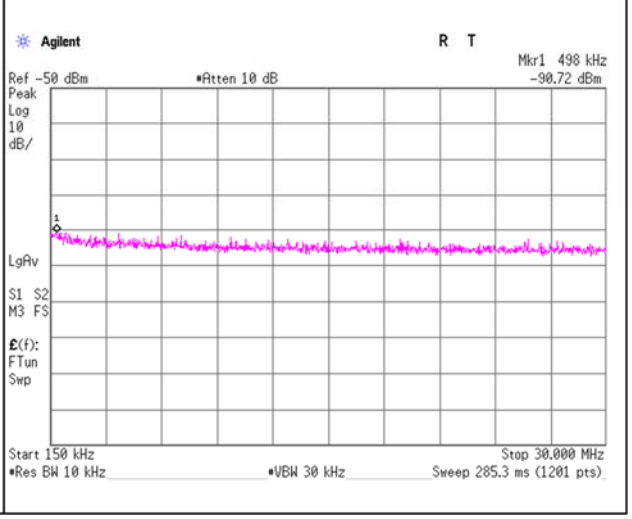
Test place	Shonan EMC Lab. No. 5 Shielded Room
Date	April 18, 2023
Temperature / Humidity	26 deg. C / 30 % RH
Engineer	Yosuke Murakami
Mode	Tx BT LE 1 M-PHY

Tx, 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
16.05	-100.5	0.0	10.1	2.0	1.0	-88.4	300	6.0	-27.1	43.4	70.5	-
498.00	-90.7	0.0	10.1	2.0	1.0	-78.6	30	6.0	2.7	33.6	30.9	-

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

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

N: Number of output

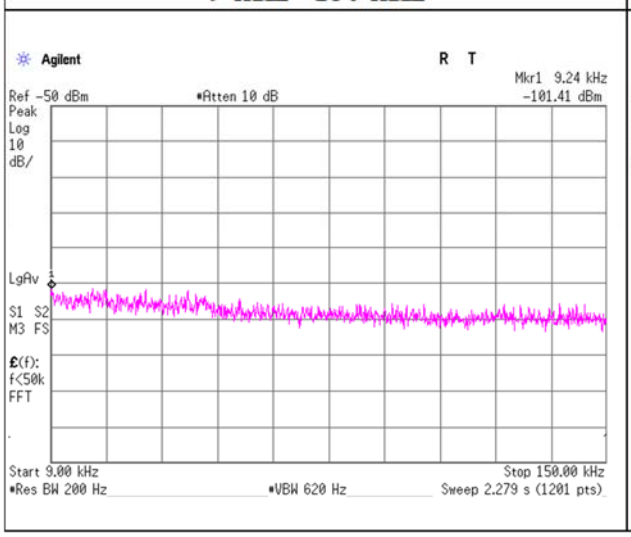
*2.0 dBi was applied to the test result based on ANSI C63.10 since antenna gain was less than 2.0 dBi.

Conducted Spurious Emission

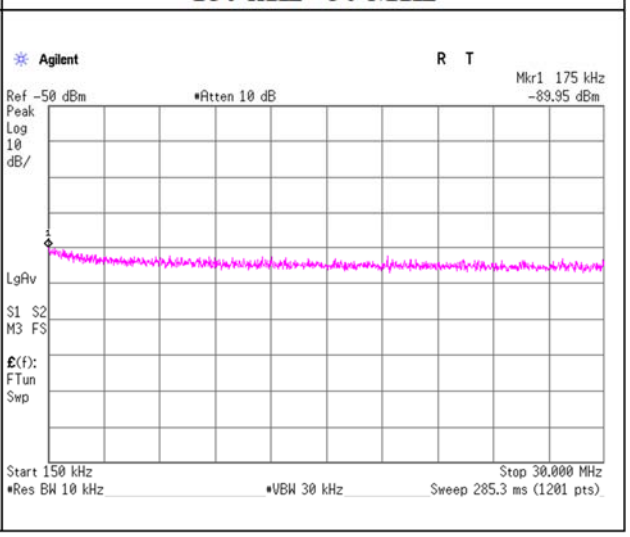
Test place	Shonan EMC Lab. No. 5 Shielded Room
Date	April 18, 2023
Temperature / Humidity	26 deg. C / 30 % RH
Engineer	Yosuke Murakami
Mode	Tx BT LE 1 M-PHY

Tx, 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
9.24	-101.4	0.0	10.1	2.0	1.0	-89.3	300	6.0	-28.0	48.2	76.2	-
175.00	-89.9	0.0	10.1	2.0	1.0	-77.8	300	6.0	-16.6	22.7	39.3	-

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

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

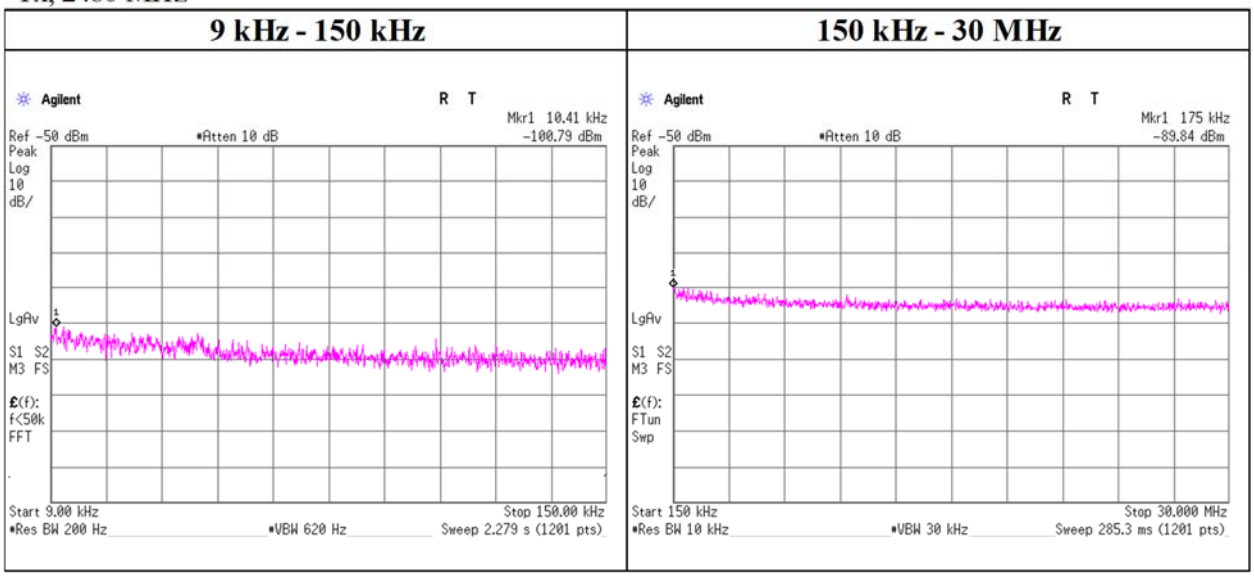
N: Number of output

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

Conducted Spurious Emission

Test place	Shonan EMC Lab. No. 5 Shielded Room
Date	April 18, 2023
Temperature / Humidity	26 deg. C / 30 % RH
Engineer	Yosuke Murakami
Mode	Tx BT LE 1 M-PHY

Tx, 2480 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
10.41	-100.8	0.0	10.1	2.0	1.0	-88.7	300	6.0	-27.4	47.2	74.6	-
175.00	-89.8	0.0	10.1	2.0	1.0	-77.7	300	6.0	-16.4	22.7	39.1	-

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)

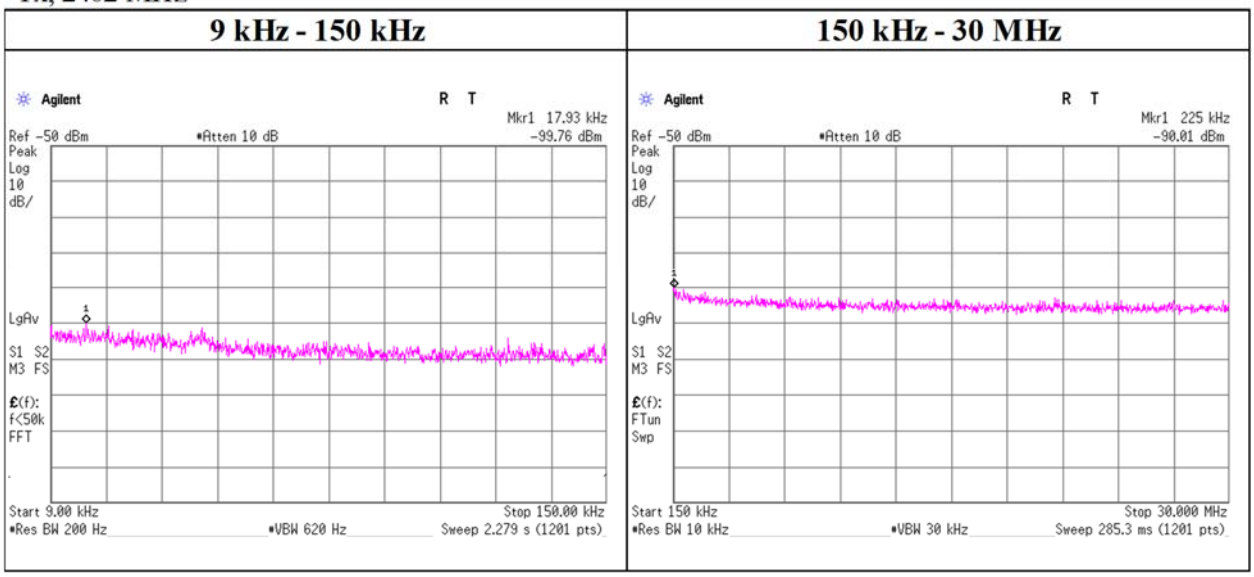
N: Number of output

*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	Shonan EMC Lab. No. 5 Shielded Room
Date	April 18, 2023
Temperature / Humidity	26 deg. C / 30 % RH
Engineer	Yosuke Murakami
Mode	Tx BT LE 2 M-PHY

Tx, 2402 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
17.93	-99.8	0.0	10.1	2.0	1.0	-87.6	300	6.0	-26.4	42.5	68.9	-
225.00	-90.0	0.0	10.1	2.0	1.0	-77.9	300	6.0	-16.6	20.5	37.1	-

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

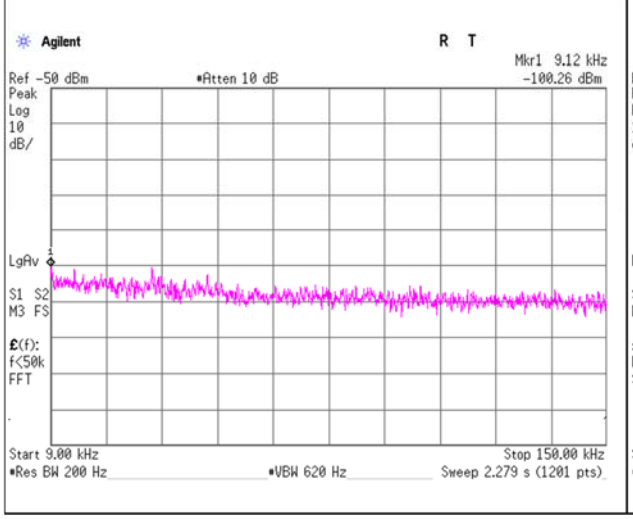
*2.0 dBi was applied to the test result based on ANSI C63.10 since antenna gain was less than 2.0 dBi.

Conducted Spurious Emission

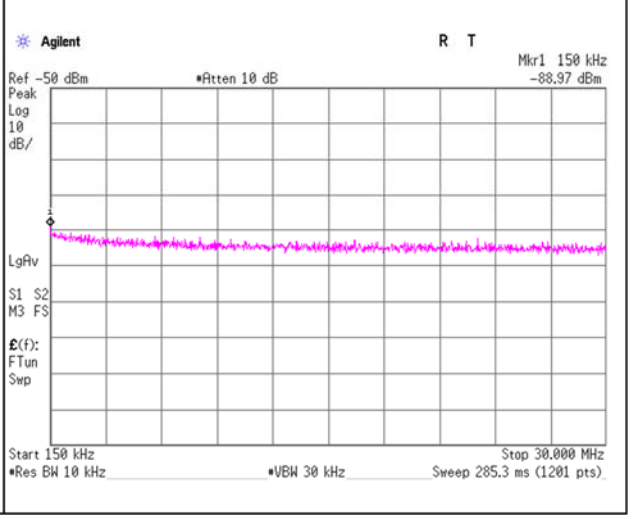
Test place	Shonan EMC Lab. No. 5 Shielded Room
Date	April 18, 2023
Temperature / Humidity	26 deg. C / 30 % RH
Engineer	Yosuke Murakami
Mode	Tx BT LE 2 M-PHY

Tx, 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
9.12	-100.3	0.0	10.1	2.0	1.0	-88.1	300	6.0	-26.9	48.4	75.3	-
150.00	-89.0	0.0	10.1	2.0	1.0	-76.8	300	6.0	-15.6	24.0	39.6	-

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

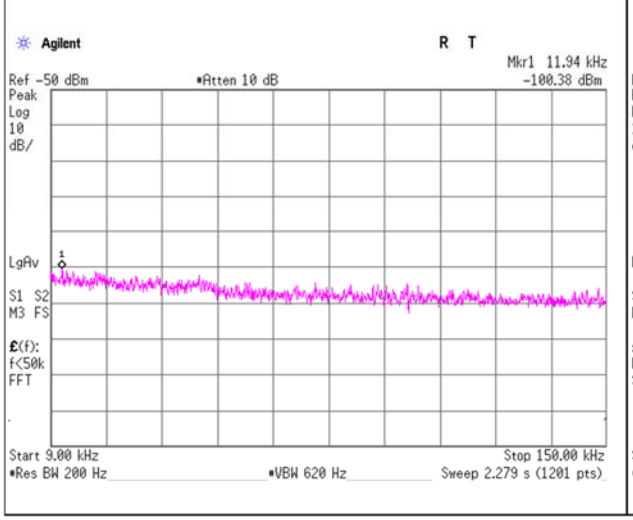
*2.0 dBi was applied to the test result based on ANSI C63.10 since antenna gain was less than 2.0 dBi.

Conducted Spurious Emission

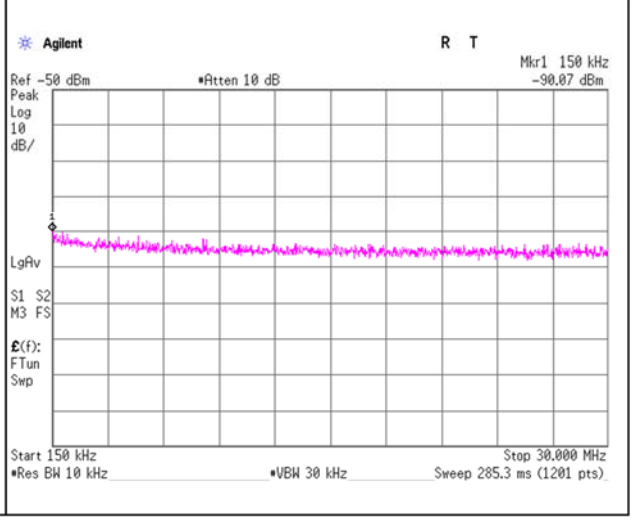
Test place	Shonan EMC Lab. No. 5 Shielded Room
Date	April 18, 2023
Temperature / Humidity	26 deg. C / 30 % RH
Engineer	Yosuke Murakami
Mode	Tx BT LE 2 M-PHY

Tx, 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
11.94	-100.4	0.0	10.1	2.0	1.0	-88.3	300	6.0	-27.0	46.0	73.0	-
150.00	-90.1	0.0	10.1	2.0	1.0	-77.9	300	6.0	-16.7	24.0	40.7	-

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

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

N: Number of output

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

Power Density

Test place	Shonan EMC Lab. No. 5 Shielded Room
Date	July 24, 2023
Temperature / Humidity	24 deg. C / 34 % RH
Engineer	Yosuke Murakami
Mode	Tx BT LE 2 M-PHY

BT LE 1M-PHY

Frequency [MHz]	Measured Frequency [MHz]	Reading [dBm/3 kHz]	Cable Loss [dB]	Atten. Loss [dB]	Result [dBm/3 kHz]	Limit [dBm/3 kHz]	Margin [dB]
2402	2401.879	-22.08	0.82	10.18	-11.08	8.00	19.08
2440	2439.990	-22.42	0.83	10.18	-11.41	8.00	19.41
2480	2479.990	-22.63	0.83	10.18	-11.62	8.00	19.62

BT LE 2M-PHY

Frequency [MHz]	Measured Frequency [MHz]	Reading [dBm/3 kHz]	Cable Loss [dB]	Atten. Loss [dB]	Result [dBm/3 kHz]	Limit [dBm/3 kHz]	Margin [dB]
2402	2402.005	-24.11	0.82	10.18	-13.11	8.00	21.11
2440	2440.005	-24.38	0.83	10.18	-13.37	8.00	21.37
2480	2480.005	-24.74	0.83	10.18	-13.73	8.00	21.73

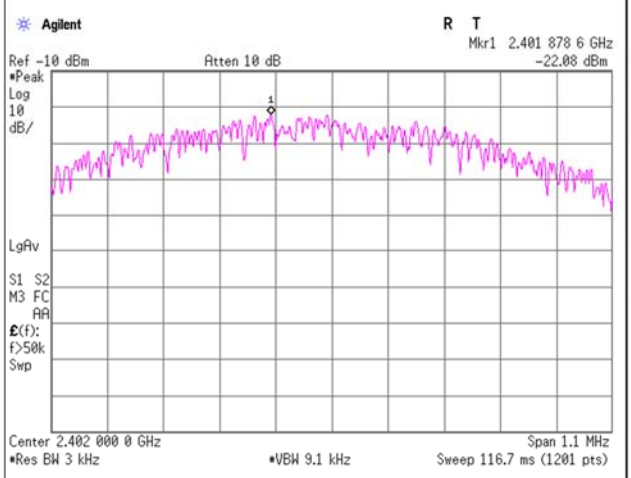
Sample Calculation:
Result = Reading + Cable Loss (including the cable(s) customer supplied) + Attenuator Loss

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

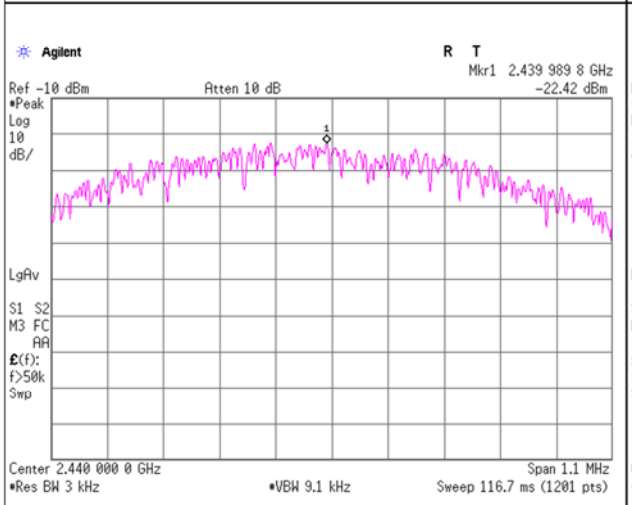
Power Density

BT LE 1M-PHY

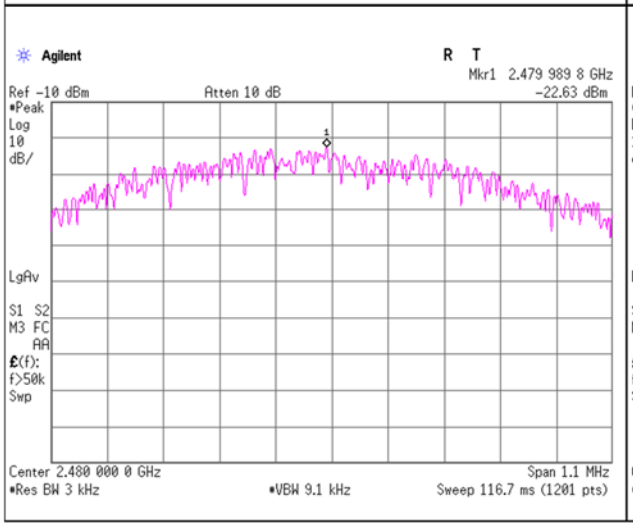
2402 MHz



2440 MHz

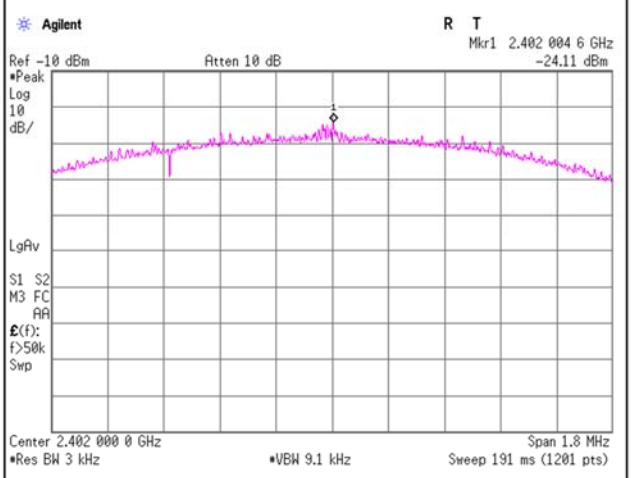


2480 MHz

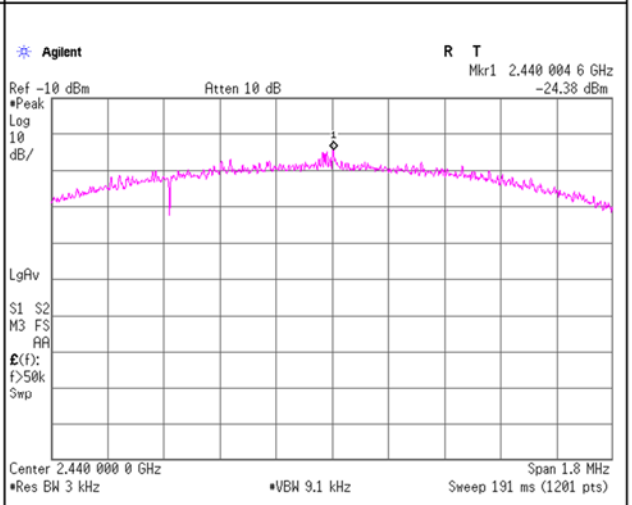


BT LE 2M-PHY

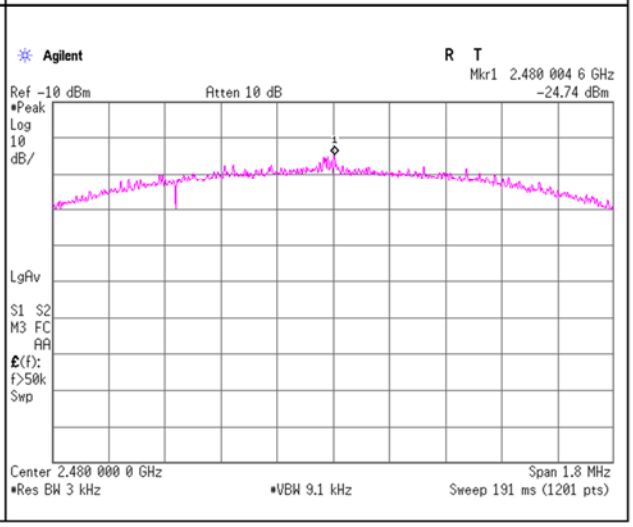
2402 MHz



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
AT	KTS-07	145111	Digital Tester	SANWA	PC500	7019232	2022/09/20	12
AT	SAA-02	145124	Audio Analyzer	AudioPrecision	ATS-1A	ATS1-45123	2022/07/22	12
AT	SAT10-15	160493	Attenuator	Weinschel Corp.	54A-10	83406	2022/12/01	12
AT	SCC-G12	145040	Coaxial Cable	Suhner	SUCOFLEX 102	30790/2	2023/03/02	12
AT	SCC-G67	196949	Coaxial Cable	Huber+Suhner	SUCOFLEX 102	803480/2	2023/03/02	12
AT	SOS-19	175823	Thermo-Hygrometer	CUSTOM. Inc	CTH-201	-	2022/08/06	12
AT	SOS-27	191845	Thermo-Hygrometer	CUSTOM. Inc	CTH-201	-	2022/08/08	12
AT	SPM-13	169910	Power Meter	Keysight Technologies Inc	8990B	MY51000448	2022/11/08	12
AT	SPSS-06	169911	Power sensor	Keysight Technologies Inc	N1923A	MY57270004	2022/11/08	12
AT	SRENT-30	235604	Spectrum Analyzer	Keysight Technologies Inc	E4440A	MY45300743	2023/05/18	12
AT	STS-05	146212	Digital Hitester	HIOKI E.E. CORPORATION	3805-50	80997828	2022/09/20	12
CE	SAT3-10	144960	Attenuator	JFW	50HF-003N	-	2022/08/23	12
CE	SCC-C9/C10/SRSE-03	145036	Coaxial Cable&RF Selector	Suhner/Suhner/TOYO	RG223U/141PE/NS4906	-/0901-271(RF Selector)	2023/04/18	12
CE	SLS-05	145542	LISN	Rohde & Schwarz	ENV216	100516	2023/02/21	12
CE	SOS-06	146294	Humidity Indicator	A&D Company	AD-5681	4062118	-	-
CE,RE	COTS-SEMI-5	170932	EMI Software	TSJ (Techno Science Japan)	TEPTO-DV3(RE,CE,ME,PE)	-	-	-
CE,RE	KJM-02	146432	Measure	TAJIMA	GL19-55	-	-	-
CE,RE	STR-09	213530	Test Receiver	Rohde & Schwarz	ESW44	103068	2023/01/12	12
CE,RE	STS-03	146210	Digital Hitester	HIOKI E.E. CORPORATION	3805-50	80997823	2022/09/20	12
RE	KBA-01	146343	Biconical Antenna	Schwarzbeck Mess-Elektronik OHG	BBA9106	1748	2023/03/14	12
RE	SAEC-03(NSA)	145565	Semi-Anechoic Chamber	TDK	SAEC-03(NSA)	3	2023/04/05	12
RE	SAF-03	145126	Pre Amplifier	SONOMA	310N	290213	2023/02/09	12
RE	SAF-06	145005	Pre Amplifier	Toyo Corporation	TPA0118-36	1440491	2023/02/02	12
RE	SAF-08	145007	Pre Amplifier	Toyo Corporation	HAP18-26W	19	2023/03/03	12
RE	SAT10-05	145136	Attenuator	Keysight Technologies Inc	8493C-010	74864	2022/10/20	12
RE	SAT6-13	167094	Attenuator	JFW	50HF-006N	-	2023/02/09	12

Test Equipment (2/2)

Test Item	Local ID	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Cal Int
RE	SCC-C1/C2/C3/C4/C5/C10/SRSE-03	145171	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhner/Suhner/Suhner/Suhner/TOYO	8D2W/12DSFA/141PE/141PE/141PE/141PE/NS4906	-/0901-271(RF Selector)	2023/04/18	12
RE	SCC-G15	145176	Coaxial Cable	Suhner	SUCOFLEX 102	32703/2	2023/03/03	12
RE	SCC-G40	166491	Coaxial Cable	Junkosha	MWX221-01000NFSNMS/B	1612S005	2023/01/12	12
RE	SCC-G43	156380	Coaxial Cable	Huber+Suhner	SUCOFLEX_104_E	SN MY 13406/4E	2022/05/20	12
RE	SCC-G44	168300	Coaxial Cable	Huber+Suhner	SUCOFLEX 104	800375/4A	2022/11/10 *1)	12
RE	SCC-G57	179540	Coaxial Cable	Huber+Suhner	SUCOFLEX 102	802815/2	2023/03/03	12
RE	SCC-G70	200010	Coaxial Cable	Huber+Suhner	SUCOFLEX 104	575618/4	2022/07/22	12
RE	SFL-18	145305	Highpass Filter	MICRO-TRONICS	HPM50111	119	2023/03/02	12
RE	SHA-03	145501	Horn Antenna	Schwarzbeck Mess-Elektronik OHG	BBHA9120D	9120D-739	2023/03/27	12
RE	SHA-04	145512	Horn Antenna	ETS-Lindgren	3160-09	00094868	2022/06/06 *1)	12
RE	SHA-10	194685	Horn Antenna	Schwarzbeck Mess-Elektronik OHG	BBHA 9120 C	711	2023/03/27	12
RE	SLA-01	145531	Logperiodic Antenna	Schwarzbeck Mess-Elektronik OHG	UHALP9108A	UHALP 9108-A 0888	2022/06/11 *1)	12
RE	SOS-23	191840	Thermo-Hygrometer	CUSTOM. Inc	CTH-201	-	2022/08/08	12
RE	SSA-02	145800	Spectrum Analyzer	Keysight Technologies Inc	E4448A	MY48250106	2023/03/01	12

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

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

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

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