



RADIO TEST REPORT

Test Report No. 14033198S-B-R1

Customer	Panasonic Automotive Systems Co., Ltd.
Description of EUT	Car Navigation
Model Number of EUT	AT2107
FCC ID	ACJ932AT2107
Test Regulation	FCC Part 15 Subpart C
Test Result	Complied (Refer to SECTION 3)
Issue Date	January 18, 2024
Remarks	WLAN (2.4 GHz band) and Bluetooth Low Energy parts

Representative Test Engineer

Shiro Kobayashi
Engineer

Approved By

Shinichi Takano
Engineer



CERTIFICATE 1266.03

- ☐ The testing in which "Non-accreditation" is displayed is outside the accreditation scopes in UL Japan, Inc.
- ☒ There is no testing item of "Non-accreditation".

Report Cover Page - Form-ULID-003532 (DCS:13-EM-F0429) Issue# 20.0

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- The opinions and the interpretations to the result of the description in this report are outside scopes where UL Japan, Inc. has been accredited.
- The information provided from the applicant 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.: 14033198S-B

This report is a revised version of 14033198S-B. 14033198S-B is replaced with this report.

Revision	Test Report No.	Date	Page Revised Contents
- (Original)	14033198S-B	April 22, 2022	-
1	14033198S-B-R1	January 18, 2024	Cover page Addition of FCC ID Update of Regulation (Deletion of “2022”) SECTION 1 Customer Information Addition of ‘*1) The Grantee name in the FCC application is “Panasonic Corporation of North America”.’ 3.1 Test Specification Revised from “FCC Part 15 final revised on April 1, 2022 and effective May 2, 2022” to “The latest version on the first day of the testing period”. Deleted “* The revision does not affect the test result conducted before its effective date.” APPENDIX 2: Test Instruments Correction of typo on P.82 From: Test Equipment [1/2] To: Test Equipment [2/2]

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

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SECTION 1: Customer Information

Company Name	Panasonic Automotive Systems Co., Ltd. *1)
Address	4261 Ikonobe-cho, Tsuzuki-ku, Yokohama-shi, Kanagawa-ken 224-8520, Japan
Telephone Number	+81-70-1552-3093
Contact Person	Kouji Uchino

*1) The Grantee name in the FCC application is "Panasonic Corporation of North America".

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	Car Navigation
Model Number	AT2107
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	October 4, 2021 (for Antenna Terminal Conducted test, Radiated Emission test) April 4 2022 (for Duty Cycle Correction factor)
Test Date	October 7, 2021 to April 13, 2022

2.2 Product Description

General Specification

Rating	DC 13.2 V
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Radio Specification

Bluetooth (BR / EDR / Low Energy)

Equipment Type	Transceiver
Frequency of Operation	2402 MHz to 2480 MHz
Type of Modulation	BT: FHSS (GFSK, $\pi/4$ DQPSK, 8 DPSK) BT LE: GFSK
Antenna Type	Inverted F type Antenna
Antenna Gain	2.08 dBi

WLAN (IEEE802.11b/11g/11n-20)

Equipment Type	Transceiver
Frequency of Operation	2412 MHz to 2462 MHz
Type of Modulation	DSSS, OFDM
Antenna Type	Inverted F type Antenna
Antenna Gain	4.04 dBi

*1) This test report applies to WLAN and Bluetooth (Low Energy) parts.

SECTION 3: Test Specification, Procedures & Results

3.1 Test Specification

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

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

3.2 Procedures and Results

Item	Test Procedure	Specification	Worst Margin	Results	Remarks
Conducted Emission	FCC: ANSI C63.10-2013 6. Standard test methods ----- ISED: RSS-Gen 8.8	FCC: Section 15.207 ----- ISED: RSS-Gen 8.8	-	N/A	*1)
6 dB Bandwidth	FCC: KDB 558074 D01 15.247 Meas Guidance v05r02 ----- ISED: -	FCC: Section 15.247(a)(2) ----- ISED: RSS-247 5.2(a)	See data.	Complied a)	Conducted
Maximum Peak Output Power	FCC: KDB 558074 D01 15.247 Meas Guidance v05r02 ----- ISED: RSS-Gen 6.12	FCC: Section 15.247(b)(3) ----- ISED: RSS-247 5.4(d)		Complied b)	Conducted
Power Density	FCC: KDB 558074 D01 15.247 Meas Guidance v05r02 ----- ISED: -	FCC: Section 15.247(e) ----- ISED: RSS-247 5.2(b)		Complied c)	Conducted
Spurious Emission Restricted Band Edges	FCC: KDB 558074 D01 15.247 Meas Guidance v05r02 ----- ISED: RSS-Gen 6.13	FCC: Section 15.247(d) ----- ISED: RSS-247 5.5 RSS-Gen 8.9 RSS-Gen 8.10	5.5 dB 2390.000 MHz, AV, Vert. Tx 11g 2412 MHz	Complied d), e)	Conducted (below 30 MHz)/ Radiated (above 30 MHz) *2)
Note: UL Japan, Inc.'s EMI Work Procedures: Work Instructions-ULID-003591 and Work Instructions-ULID-003593. * In case any questions arise about test procedure, ANSI C63.10: 2013 is also referred. *1) The test is not applicable since the EUT does not have AC Mains. *2) Radiated test was selected over 30 MHz based on section 15.247(d) and KDB 558074 D01 15.247 Meas Guidance v05r02 8.5 and 8.6. a) Refer to APPENDIX 1 (data of 99 % Occupied Bandwidth and 6 dB Bandwidth) b) Refer to APPENDIX 1 (data of Maximum Peak Output Power) c) Refer to APPENDIX 1 (data of Power Density) d) Refer to APPENDIX 1 (data of Conducted Spurious Emission) e) Refer to APPENDIX 1 (data of Radiated Spurious Emission) 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 EUT provides stable voltage constantly to the RF Part regardless of input voltage.

Instead of a new battery, DC power supply was used for the test. That does not affect the test result, therefore the EUT complies with the requirement.

FCC Part 15.203 Antenna requirement

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

3.3 Addition to Standard

Item	Test Procedure	Specification	Worst Margin	Results	Remarks
99 % Occupied Bandwidth	ISED: RSS-Gen 6.7	ISED: -	N/A	- a)	Conducted
a) Refer to APPENDIX 1 (data of 99 % Occupied Bandwidth and 6 dB Bandwidth)					

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 $k=2$.

Shonan EMC Lab.

Item	Frequency range	Uncertainty (+/-)			
		No. 1 SAC / SR	No. 2 SAC / SR	No. 3 SAC / SR	No. 4,5,6,8 SR
Conducted emission (AC Mains) LISN	150 kHz-30 MHz	2.9 dB	2.9 dB	3.0 dB	2.9 dB
Radiated emission (Measurement distance: 3 m)	9 kHz-30 MHz	3.2 dB	3.1 dB	3.1 dB	-
	30 MHz-200 MHz	4.6 dB	4.6 dB	4.6 dB	-
	200 MHz-1 GHz	6.0 dB	6.1 dB	6.1 dB	-
	1 GHz-6 GHz	4.7 dB	4.7 dB	4.7 dB	-
	6 GHz-18 GHz	5.2 dB	5.3 dB	5.3 dB	-
	18 GHz-40 GHz	5.4 dB	5.5 dB	5.5 dB	-
Radiated emission (Measurement distance: 1 m)	1 GHz-18 GHz	5.6 dB	5.6 dB	5.6 dB	-
	18 GHz-40 GHz	5.8 dB	5.8 dB	5.8 dB	-

SAC=Semi-Anechoic Chamber

SR= Shielded Room is applied besides radiated emission

Antenna terminal test	Uncertainty (+/-)
Power Measurement above 1 GHz (Average Detector)_SPM-06	1.2 dB
Power Measurement above 1 GHz (Peak Detector)_SPM-06	2.0 dB
Power Measurement above 1 GHz (Average Detector)_SPM-07	1.2 dB
Power Measurement above 1 GHz (Peak Detector)_SPM-07	1.3 dB
Power Measurement above 1 GHz (Average Detector)_SPM-13	1.3 dB
Power Measurement above 1 GHz (Peak Detector)_SPM-13	1.3 dB
Spurious emission (Conducted) below 1 GHz	0.93 dB
Conducted emissions and Power Density Measurement 1 GHz-3 GHz	0.92 dB
Conducted emissions and Power Density Measurement 3 GHz-18 GHz	2.3 dB
Spurious emission (Conducted) 18 GHz-26.5 GHz	2.3 dB
Spurious emission (Conducted) 26.5 GHz-40 GHz	2.3 dB
Bandwidth Measurement	0.012 %
Duty cycle and Time Measurement	0.27 %
Temperature_SCH-01	0.93 deg.C.
Humidity_SCH-01	4.1 %
Temperature_SCH-02	2.0 deg.C.
Humidity_SCH-02	6.6 %
Voltage	0.97 %

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, Facsimile: +81 463 50 6401

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)

Test operating mode was determined as follows according to “Section 1 of 6 802.11 a/b/g/n testing - Managing Complex Regulatory Approvals - ” of TCB Council Workshop October 2009.

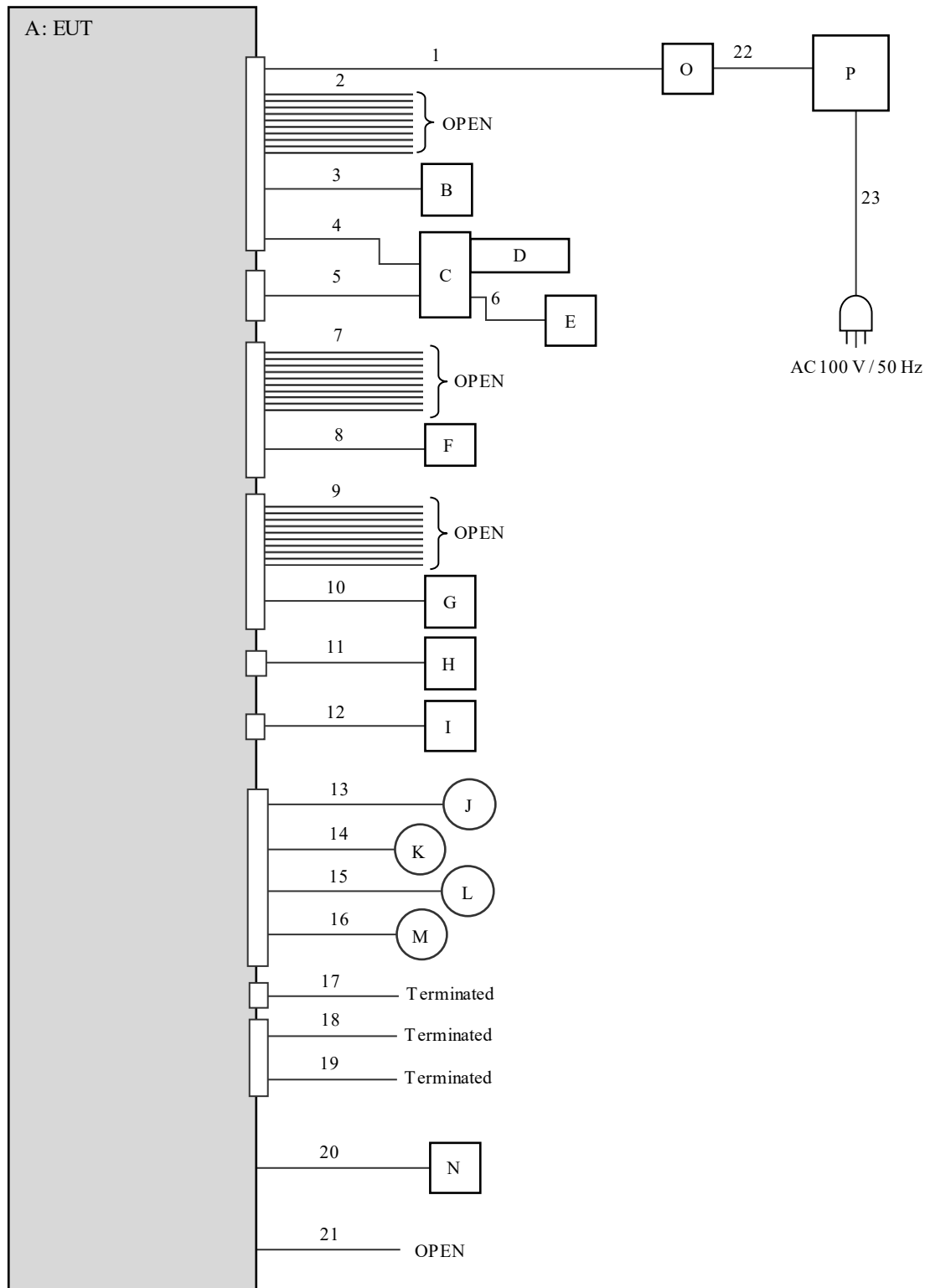
Mode	Remarks*
IEEE 802.11b (11b)	1 Mbps, PN9
IEEE 802.11g (11g)	54 Mbps, PN9
IEEE 802.11n SISO 20 MHz BW (11n-20)	MCS 7, PN9
Bluetooth (BT) Low Energy (LE)	Uncoded 1 M-PHY, Maximum Packet Size, PRBS9
	Uncoded 2 M-PHY, Maximum Packet Size, PRBS9
*The worst condition was determined based on the test result of Maximum Peak Output Power (Mid Channel)	
*Power of the EUT was set by the software as follows;	
Power Setting: 11b: 13 dBm, 11g: 11 dBm (2412 MHz, 2462 MHz), 13 dBm (2417 MHz to 2457 MHz) 11n-20: 10 dBm (2412 MHz, 2462 MHz), 12 dBm (2417 MHz to 2457 MHz) BT LE 1 M-PHY: Fixed BT LE 2 M-PHY: Fixed	
Software: Labtool Version: 2.0.0.71 (Date: 2021.08.19, 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 Spurious Emission	Tx, 11g *1)	2437 MHz
	Tx, BT LE 1 M-PHY, Tx, BT LE 2 M-PHY	2402 MHz, 2440 MHz, 2480 MHz
Radiated Spurious Emission (Below 1 GHz)	Tx, 11g *1)	2437 MHz
	Tx, BT LE 1 M-PHY, Tx, BT LE 2 M-PHY	2402 MHz, 2440 MHz, 2480 MHz
Radiated Spurious Emission (Above 1 GHz)	Tx, 11b	2412 MHz, 2437 MHz, 2462 MHz
	Tx, 11g, Tx, 11n-20	2412 MHz, 2417 MHz, 2437 MHz 2457 MHz, 2462 MHz
	Tx, BT LE 1 M-PHY, Tx, BT LE 2 M-PHY	2402 MHz, 2440 MHz, 2480 MHz
6 dB Bandwidth Maximum Peak Output Power Power Density 99 % Occupied Bandwidth	Tx, 11b Tx, 11g Tx, 11n-20	2412 MHz, 2437 MHz, 2462 MHz
	Tx, BT LE 1 M-PHY, Tx, BT LE 2 M-PHY	2402 MHz, 2440 MHz, 2480 MHz
*1) The mode was tested as a representative, because it had the highest power at antenna terminal test.		

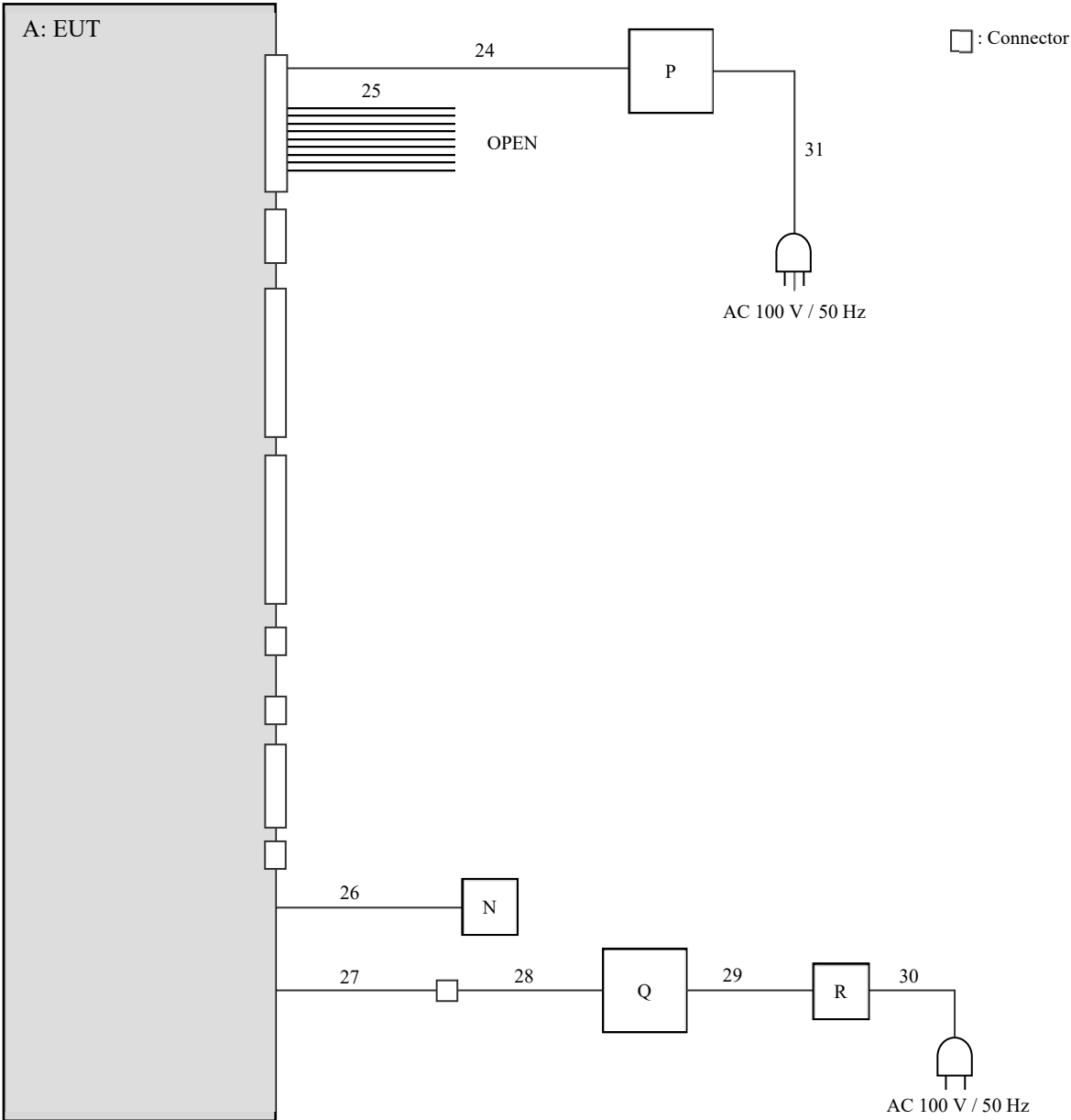
4.2 Configuration and Peripherals

< Radiated Emission test >

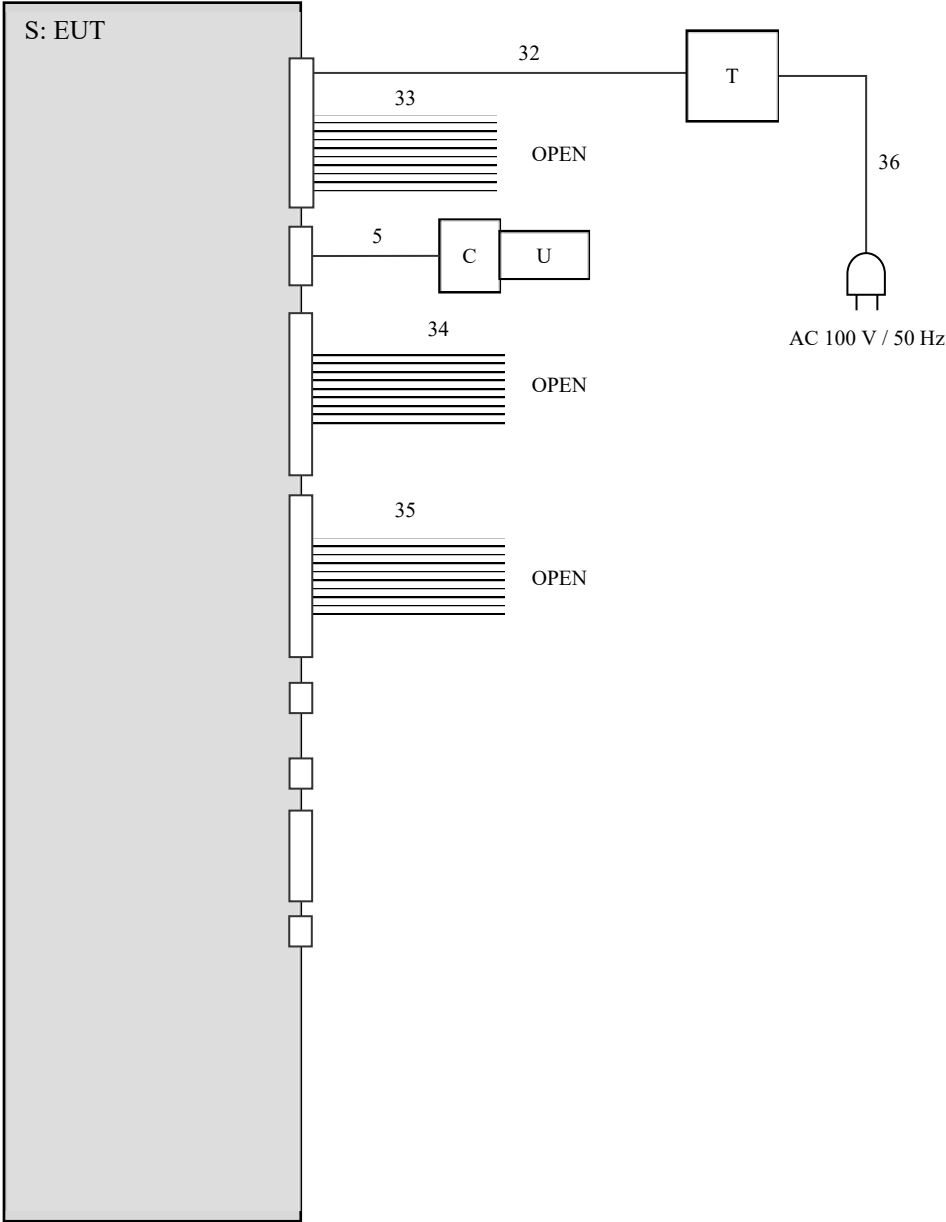


* Cabling and setup(s) were taken into consideration and test data was taken under worse case conditions.

< Antenna Terminal Conducted test >



< Duty Cycle (Reference data) only >



Description of EUT and support equipment

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	Car Navigation	AT2107	No.2 *1) N0.1 *2)	Panasonic Automotive Systems Co., Ltd.	EUT
B	Steering Switch	ST-SW-IF	0011	Panasonic Automotive Systems Co., Ltd.	-
C	IF-Box	DEP32-10078	033	Panasonic Automotive Systems Co., Ltd.	-
D	USB Memory	USM4GU	-	Sony Corporation	-
E	Mobile Phone	SO-01F	CB5125QLDK	Sony Corporation	-
F	MIC	GP-SDA3510A	0DC062519	Panasonic Automotive Systems Co., Ltd.	-
G	MIC	GP-SDA3510A	0DC062856	Panasonic Automotive Systems Co., Ltd.	-
H	Rear Camera	GP-KDM301RC	92	Panasonic Automotive Systems Co., Ltd.	-
I	GPS Antenna	ANN-MS	-	U-Blox	-
J	Speaker	KFC-RS160	-	KENWOOD	-
K	Speaker	KFC-RS160	-	KENWOOD	-
L	Speaker	KFC-RS160	-	KENWOOD	-
M	Speaker	KFC-RS160	-	KENWOOD	-
N	Jig board	RCarDBG_JTAG2	WR14-4333 *1) WR20-4923 *2)	WESTEK	-
O	Terminal Block	-	-	-	-
P	Power Supply (DC)	PAN35-10A	BP002287	KIKUSUI	-
Q	Laptop Computer	7666-77J	LV-B8R1X 08/05	Lenovo	-
R	AC Adapter	42T4422	11S92P1154Z1DXF 1DBFDN	Lenovo	-
S	Car Navigation	AT2103 Lo type (9.8 inch Display)	No.009 *3)	Panasonic Automotive Systems Co., Ltd.	EUT
T	DC Power Supply	SPI008	-	GOODGOODS	-
U	USB Memory	USM4GL-W	-	Sony	-

*1) For Antenna Terminal test

*2) For Radiated Emission test

*3) Since the models are different but the radio part is the same, only the measurement of the maximum Duty Cycle of the actual product was used.

List of cables used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	DC	2.5 + 0.2	Unshielded	Unshielded	-
2	Signal	2.5	Unshielded	Unshielded	-
3	Signal	2.5 + 0.1	Unshielded	Unshielded	-
4	IF Box Power	2.5 + 0.3	Unshielded	Unshielded	-
5	Signal	2.5	Shielded	Shielded	-
6	USB type C	0.9	Shielded	Shielded	-
7	Signal	2.5	Unshielded	Unshielded	-
8	MIC	2.5 + 0.5	Unshielded	Unshielded	-
9	Signal	2.5	Unshielded	Unshielded	-
10	MIC	2.5 + 0.5	Unshielded	Unshielded	-
11	Rear Camera	3.0 + 0.15	Unshielded	Unshielded	-
12	GPS	3.0 + 0.12	Shielded	Shielded	-
13	Speaker	1.0 + 1.9	Unshielded	Unshielded	-
14	Speaker	1.0 + 1.9	Unshielded	Unshielded	-
15	Speaker	1.0 + 1.9	Unshielded	Unshielded	-
16	Speaker	1.0 + 1.9	Unshielded	Unshielded	-
17	DCM	3.0	Shielded	Shielded	-
18	FM	2.5	Shielded	Shielded	-
19	FM	2.5	Shielded	Shielded	-
20	Signal	0.1	Unshielded	Unshielded	*3)
21	UART	0.3	Unshielded	Unshielded	*3)
22	DC	2.4	Unshielded	Unshielded	-
23	AC	2.0	Unshielded	Unshielded	-
24	DC	3.0	Unshielded	Unshielded	-
25	Signal	3.0	Unshielded	Unshielded	-
26	Signal	0.1	Unshielded	Unshielded	*3)
27	UART	0.3	Unshielded	Unshielded	*3)
28	UART-USB	1.5	Shielded	Shielded	-
29	DC	1.8	Unshielded	Unshielded	-
30	AC	0.9	Unshielded	Unshielded	-
31	AC	2.0	Unshielded	Unshielded	-
32	DC	0.2	Unshielded	Unshielded	-
33	Signal	0.2	Unshielded	Unshielded	-
34	Signal	0.2	Unshielded	Unshielded	-
35	Signal	0.2	Unshielded	Unshielded	-
36	AC	1.8	Unshielded	Unshielded	-

*3) This cable is for testing and is not included with products.

SECTION 5: Radiated Spurious Emission

Test Procedure

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

[For below 1 GHz]

EUT was placed on a urethane platform of nominal size, 2.0 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), *2)	PK
IF Bandwidth	BW 120 kHz	RBW: 1 MHz VBW: 3 MHz	11.12.2.5.2 RBW: 1 MHz VBW: 3 MHz Detector: Power Averaging (Linear voltage) Trace: 100 traces Duty factor was added to the results.	RBW: 100 kHz VBW: 300 kHz

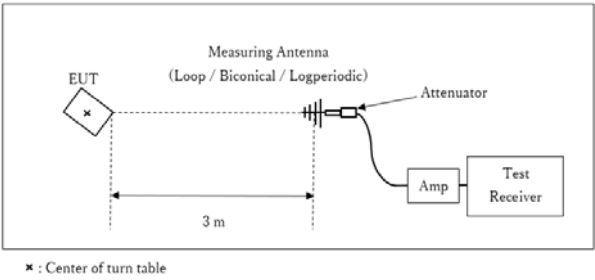
*1) Average Power Measurement was performed based on ANSI C63.10-2013.

*2) In unwanted emission derived from BT LE carrier, measurement with Average detector was not performed.

The limit for Average detector is applied to the measurement value with Peak detector used Duty cycle correction factor (DCCF).

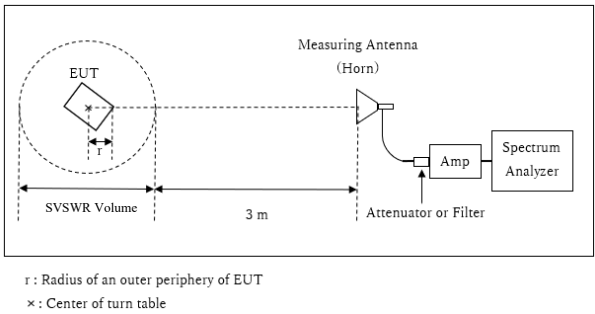
Figure 2: Test Setup

Below 1 GHz



Test Distance: 3 m

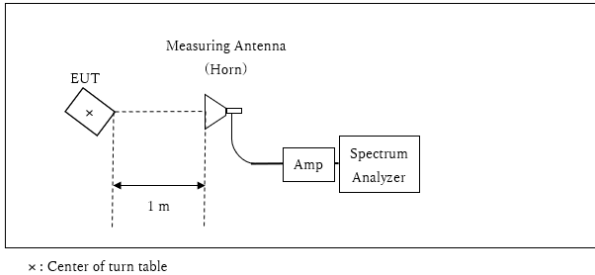
1 GHz to 10 GHz



Distance Factor: $20 \times \log (3.80 \text{ m} / 3.0 \text{ m}) = 2.06 \text{ dB}$
* Test Distance: $(3 + \text{SVSWR Volume} / 2) - r = 3.80 \text{ m}$

SVSWR Volume : 2.0 m
(SVSWR Volume has been calibrated based on CISPR 16-1-4.)
 $r = 0.20 \text{ m}$

10 GHz to 26.5 GHz



Distance Factor: $20 \times \log (1.0 \text{ m} / 3.0 \text{ m}) = -9.54 \text{ dB}$
*Test Distance: 1 m

The test was made on EUT at the normal use position (12 deg.).

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

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

SECTION 6: Antenna Terminal Conducted Tests

Test Procedure

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

Test	Span	RBW	VBW	Sweep time	Detector	Trace	Instrument Used
6 dB Bandwidth	50 MHz, 10 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 6 dB Bandwidth	3 kHz	9.1 kHz	Auto	Peak	Max Hold	Spectrum Analyzer *3)
Conducted Spurious Emission *4) *5)	9 kHz to 150 kHz	200 Hz	620 Hz	Auto	Peak	Max Hold	Spectrum Analyzer
	150 kHz to 30 MHz	10 kHz	30 kHz				

*1) Peak hold was applied as Worst-case measurement.

*2) Reference data

*3) Section 11.10.2 Method PKPSD (peak PSD) of "ANSI C63.10-2013".

*4) In the frequency range below 30MHz, RBW was narrowed to separate the noise contents.

Then, wide-band noise near the limit was checked separately, however the noise was not detected as shown in the chart.

(9 kHz - 150 kHz: RBW = 200 Hz, 150 kHz - 30 MHz: RBW = 10 kHz)

*5) The limits in CFR 47, Part 15, Subpart C, paragraph 15.209(a), are identical to those in RSS-Gen section 8.9, Table 6, since the measurements are performed in terms of magnetic field strength and converted to electric field strength levels (as reported in the table) using the free space impedance of 377 Ohms. 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

SECTION 7: Other Tests

Test Procedure

Duty cycle correction factor was measured with a spectrum analyzer via search coil.

Test Data : APPENDIX

APPENDIX 1: Test Data

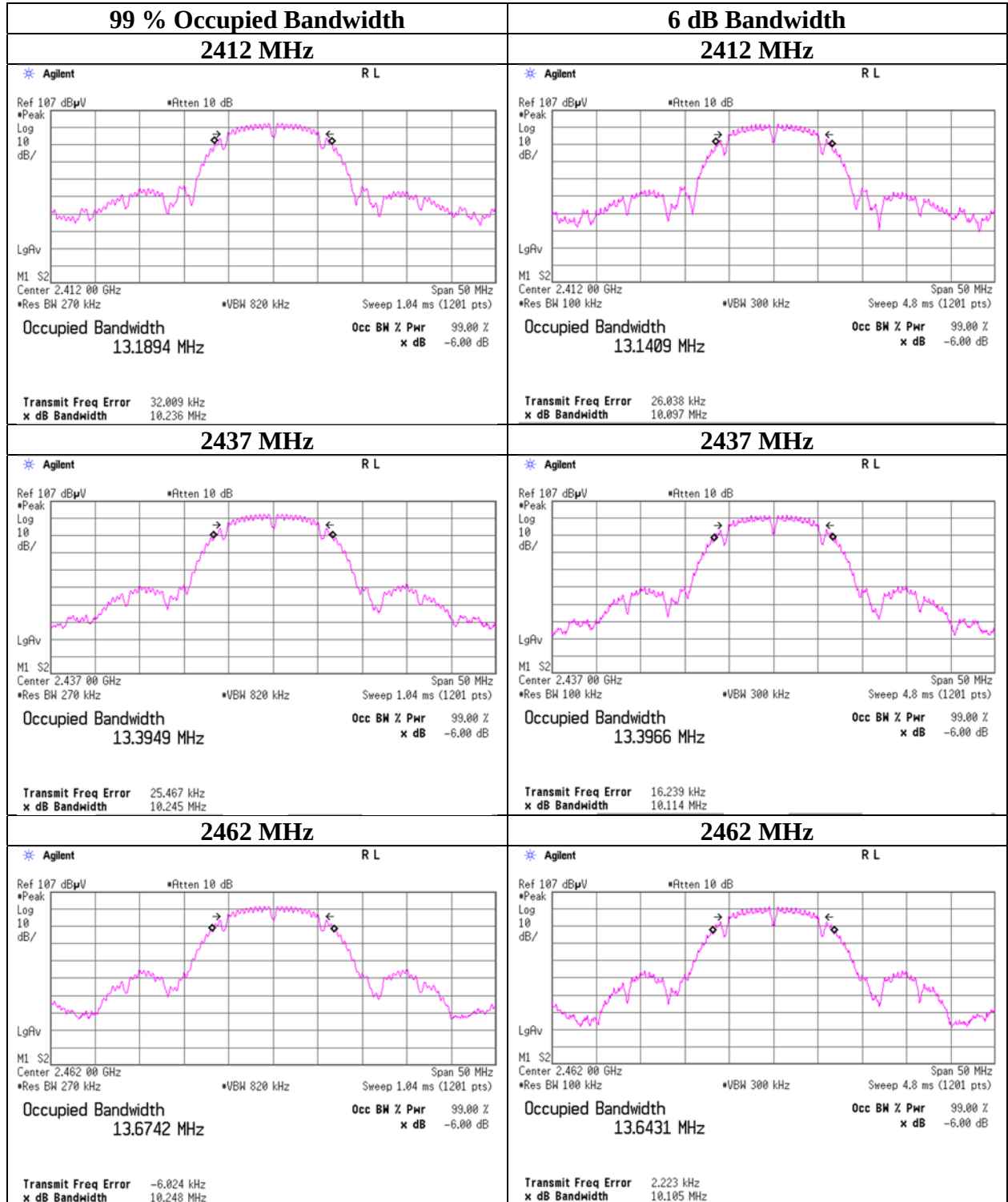
99 % Occupied Bandwidth and 6 dB Bandwidth

Report No.	14033198S-B-R1
Test place	Shonan EMC Lab. No.3 Shielded Room
Date	October 14, 2021
Temperature / Humidity	23 deg. C / 54 % RH
Engineer	Shiro Kobayashi
Mode	Tx

Mode	Frequency [MHz]	99 % Occupied Bandwidth [kHz]	6 dB Bandwidth [MHz]	Limit for 6 dB Bandwidth [MHz]
11b	2412	13189.4	10.097	> 0.5000
	2437	13394.9	10.114	> 0.5000
	2462	13674.2	10.105	> 0.5000
11g	2412	16740.1	16.512	> 0.5000
	2437	16730.2	16.526	> 0.5000
	2462	16754.4	16.508	> 0.5000
11n-20	2412	17845.1	17.699	> 0.5000
	2437	17835.1	17.706	> 0.5000
	2462	17808.7	17.726	> 0.5000
BT LE 1 M-PHY	2402	1039.4	0.732	> 0.5000
	2440	1040.2	0.710	> 0.5000
	2480	1040.2	0.712	> 0.5000
BT LE 2 M-PHY	2402	2072.2	1.205	> 0.5000
	2440	2075.0	1.202	> 0.5000
	2480	2072.7	1.174	> 0.5000

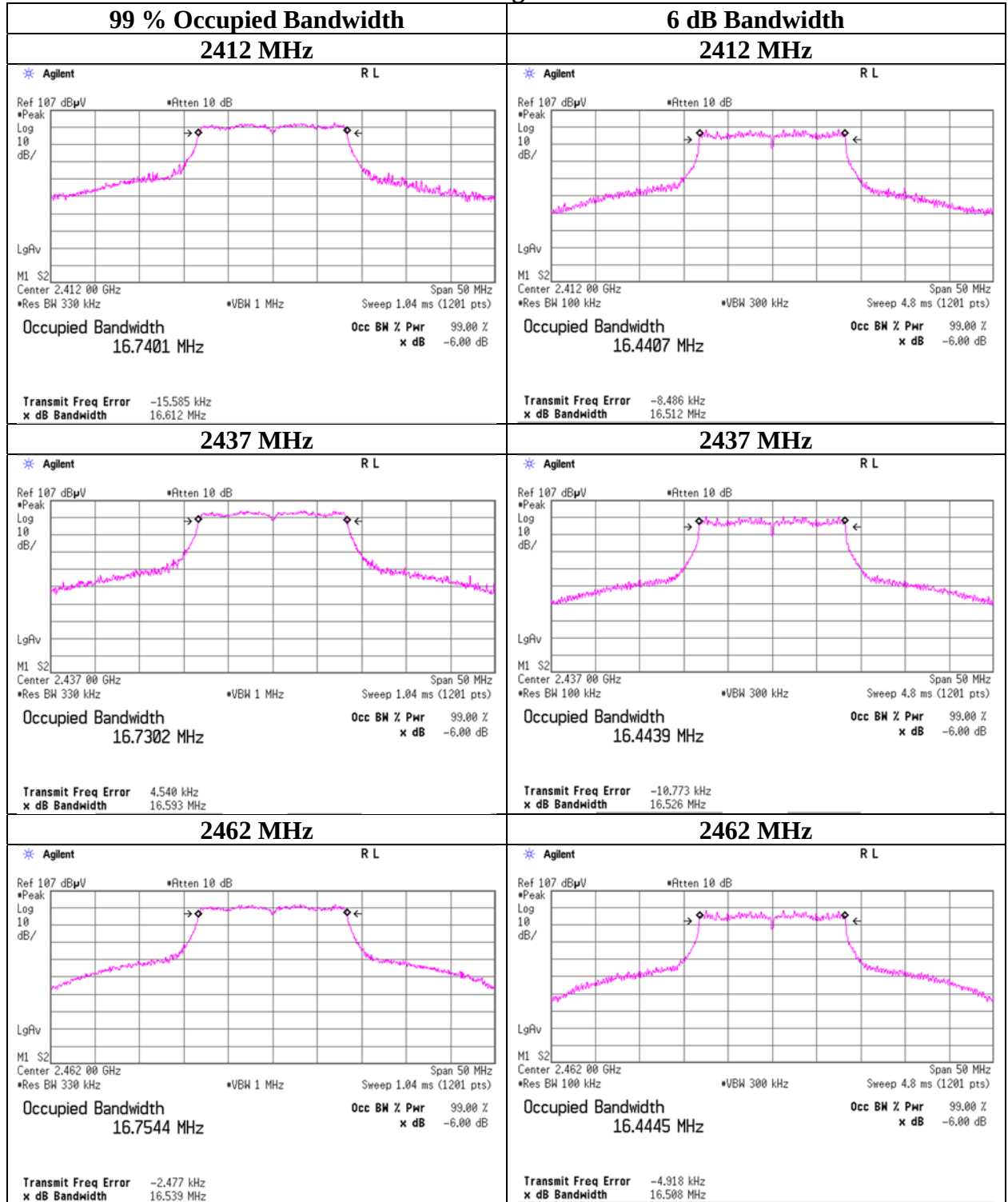
99 % Occupied Bandwidth and 6 dB Bandwidth

11b



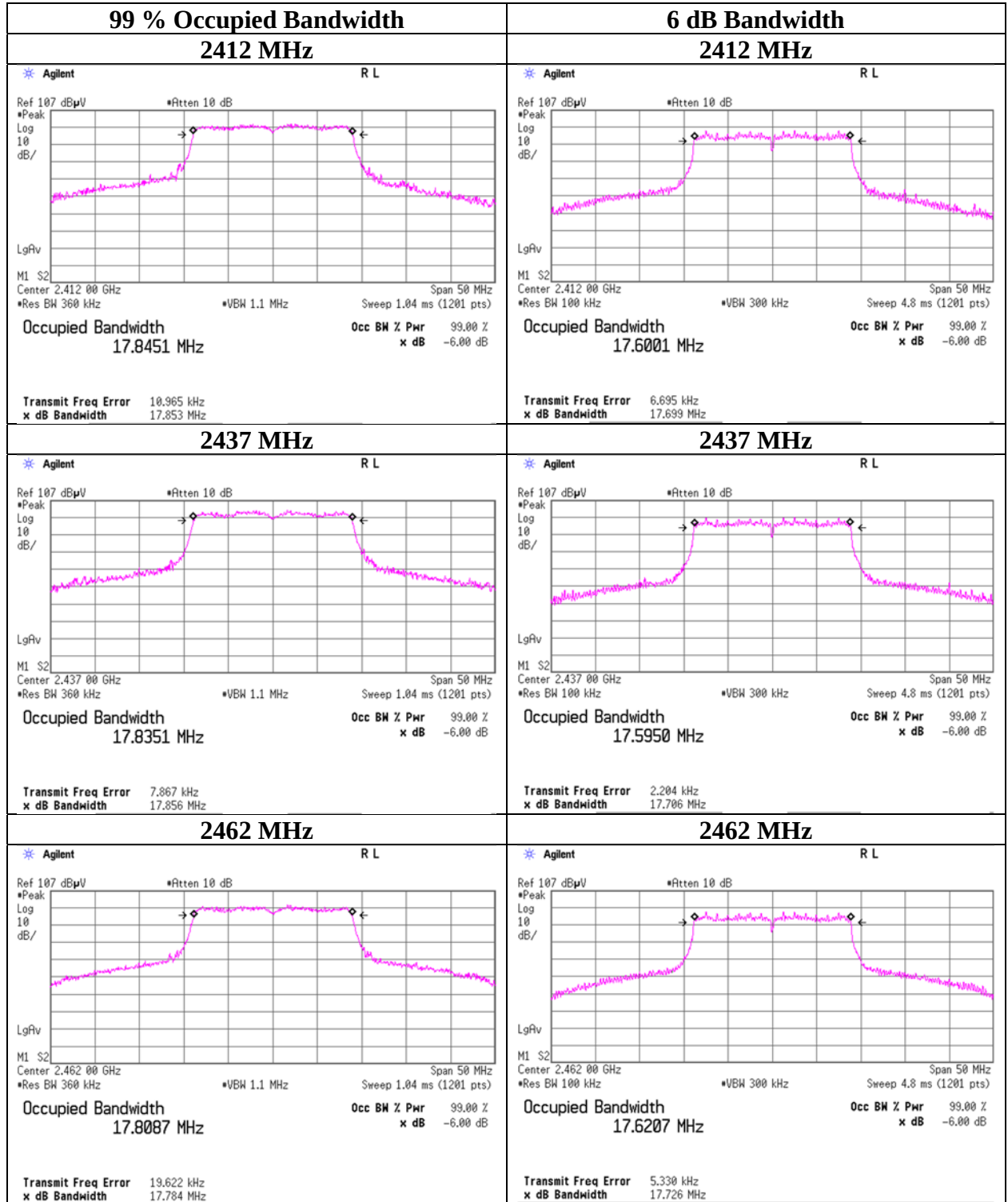
99 % Occupied Bandwidth and 6 dB Bandwidth

11g



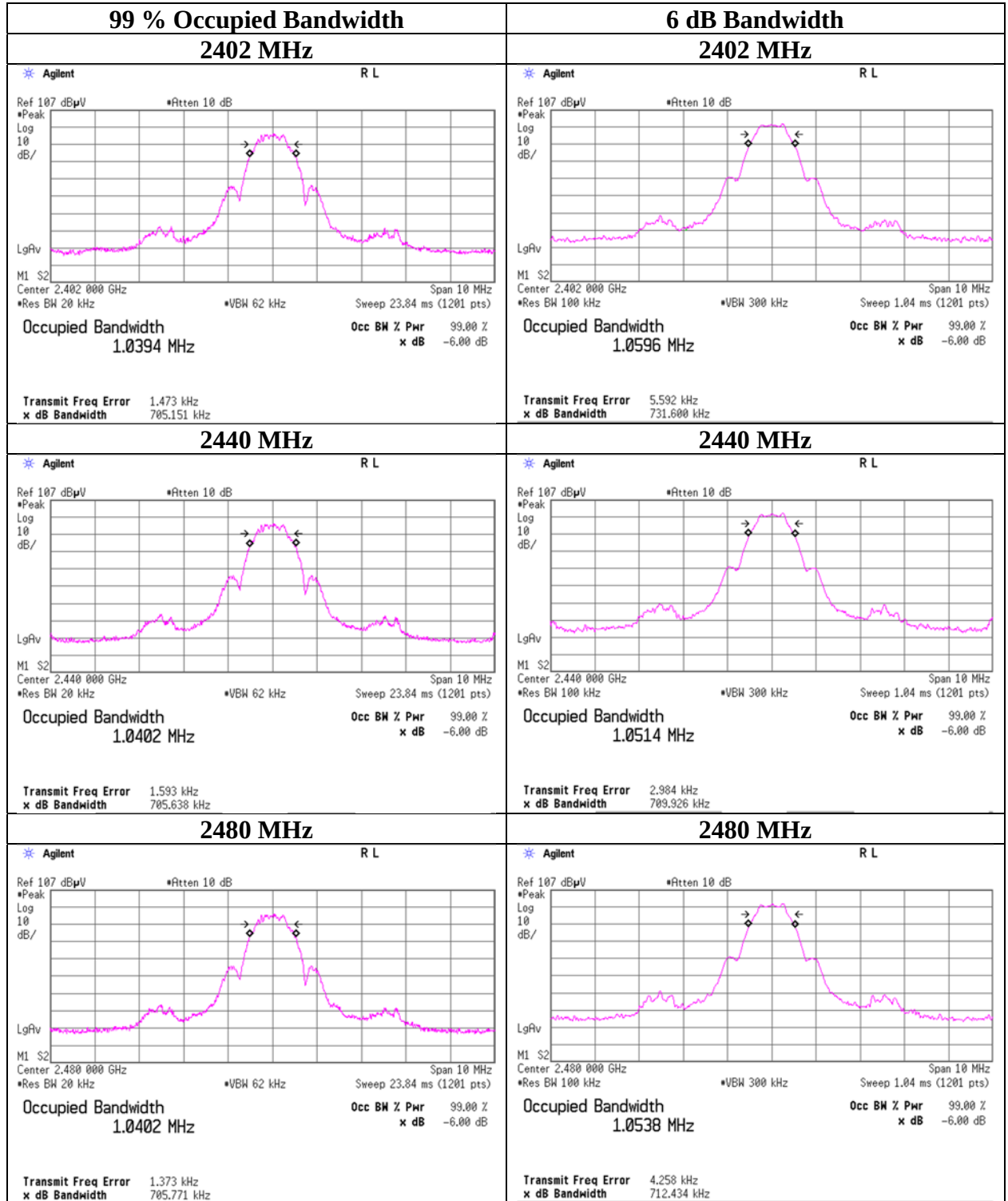
99 % Occupied Bandwidth and 6 dB Bandwidth

11n-20



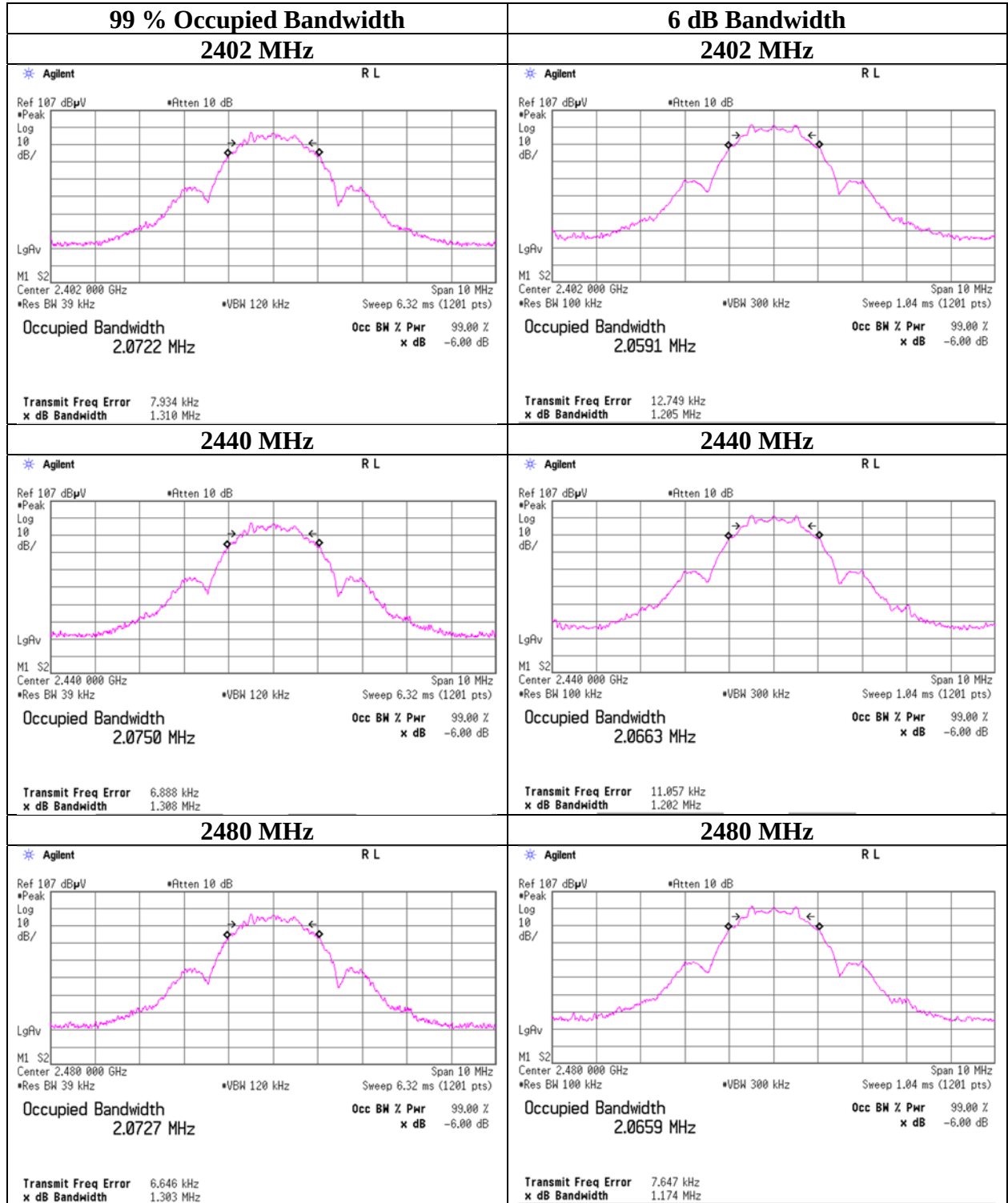
99 % Occupied Bandwidth and 6 dB Bandwidth

BT LE 1 M-PHY



99 % Occupied Bandwidth and 6 dB Bandwidth

BT LE 2 M-PHY



Maximum Peak Output Power

Report No.	14033198S-B-R1
Test place	Shonan EMC Lab. No.5 Shielded Room
Date	October 7, 2021
Temperature / Humidity	23 deg. C / 64 % RH
Engineer	Miku Ikudome
Mode	Tx 11b

Freq.	Reading	Cable Loss	Atten. Loss	Conducted Power					e.i.r.p. for RSS-247					
				Result		Limit		Margin	Antenna Gain	Result		Limit		Margin
				[dBm]	[mW]	[dBm]	[mW]			[dBm]	[mW]	[dBm]	[mW]	
2412	3.43	1.68	9.82	14.93	31.12	30.00	1000	15.07	4.04	18.97	78.89	36.02	4000	17.05
2437	3.81	1.68	9.82	15.31	33.96	30.00	1000	14.69	4.04	19.35	86.10	36.02	4000	16.67
2462	3.49	1.68	9.82	14.99	31.55	30.00	1000	15.01	4.04	19.03	79.98	36.02	4000	16.99

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.

2437 MHz

Rate	Reading	Remark
[Mbps]	[dBm]	
1	3.81	*
2	3.69	-
5.5	3.65	-
11	3.79	-

*: Worst Rate

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

Maximum Peak Output Power

Report No.	14033198S-B-R1
Test place	Shonan EMC Lab. No.5 Shielded Room
Date	October 7, 2021
Temperature / Humidity	23 deg. C / 64 % RH
Engineer	Miku Ikudome
Mode	Tx 11g

				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]
2412	10.40	1.68	9.82	21.90	154.88	30.00	1000	8.10	4.04	25.94	392.64	36.02	4000	10.08
2437	10.78	1.68	9.82	22.28	169.04	30.00	1000	7.72	4.04	26.32	428.55	36.02	4000	9.70
2462	8.04	1.68	9.82	19.54	89.95	30.00	1000	10.46	4.04	23.58	228.03	36.02	4000	12.44

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.

2437 MHz

Rate	Reading	Remark
[Mbps]	[dBm]	
6	10.70	-
9	10.65	-
12	10.70	-
18	10.71	-
24	10.70	-
36	10.68	-
48	10.71	-
54	10.78	*

*: Worst Rate

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

Maximum Peak Output Power

Report No. 14033198S-B-R1
 Test place Shonan EMC Lab. No.5 Shielded Room
 Date October 7, 2021
 Temperature / Humidity 23 deg. C / 64 % RH
 Engineer Miku Ikudome
 Mode Tx 11n-20

Freq.	Reading	Cable Loss	Atten. Loss	Conducted Power					e.i.r.p. for RSS-247					
				Result		Limit		Margin	Antenna Gain	Result		Limit		Margin
				[dBm]	[mW]	[dBm]	[mW]			[dB]	[dBm]	[mW]	[dBm]	
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[mW]	[dBm]	[mW]	[dB]	[dBi]	[dBm]	[mW]	[dBm]	[mW]	[dB]
2412	10.38	1.68	9.82	21.88	154.17	30.00	1000	8.12	4.04	25.92	390.84	36.02	4000	10.10
2437	10.54	1.68	9.82	22.04	159.96	30.00	1000	7.96	4.04	26.08	405.51	36.02	4000	9.94
2462	7.58	1.68	9.82	19.08	80.91	30.00	1000	10.92	4.04	23.12	205.12	36.02	4000	12.90

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.

2437 MHz

MCS Index	Reading [dBm]	Remark
0	10.43	-
1	10.44	-
2	10.47	-
3	10.46	-
4	10.50	-
5	10.52	-
6	10.52	-
7	10.54	*

*: Worst Rate

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

Maximum Peak Output Power

Report No. 14033198S-B-R1
Test place Shonan EMC Lab. No.5 Shielded Room
Date October 7, 2021
Temperature / Humidity 23 deg. C / 64 % RH
Engineer Miku Ikudome
Mode Tx BT LE

1 M-PHY				Conducted Power					e.i.r.p. for RSS-247					
Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result		Limit		Margin [dB]	Antenna Gain [dBi]	Result		Limit		Margin [dB]
				[dBm]	[mW]	[dBm]	[mW]			[dBm]	[mW]	[dBm]	[mW]	
2402	-7.79	1.68	9.82	3.71	2.35	30.00	1000	26.29	2.08	5.79	3.79	36.02	4000	30.23
2440	-7.74	1.68	9.82	3.76	2.38	30.00	1000	26.24	2.08	5.84	3.84	36.02	4000	30.18
2480	-7.99	1.69	9.82	3.52	2.25	30.00	1000	26.48	2.08	5.60	3.63	36.02	4000	30.42

Sample Calculation:

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

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

2440 MHz

Mode	Data rate [bps]	Reading [dBm]	Remark
1 M-PHY	1 M	-7.74	*
Coded-PHY(S=8)	125 k	-7.75	-
Coded-PHY(S=2)	500 k	-7.77	-

*: Worst Rate

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

2 M-PHY				Conducted Power					e.i.r.p. for RSS-247					
Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result		Limit		Margin [dB]	Antenna Gain [dBi]	Result		Limit		Margin [dB]
				[dBm]	[mW]	[dBm]	[mW]			[dBm]	[mW]	[dBm]	[mW]	
2402	-7.79	1.68	9.82	3.71	2.35	30.00	1000	26.29	2.08	5.79	3.79	36.02	4000	30.23
2440	-7.75	1.68	9.82	3.75	2.37	30.00	1000	26.25	2.08	5.83	3.83	36.02	4000	30.19
2480	-7.97	1.68	9.82	3.53	2.25	30.00	1000	26.47	2.08	5.61	3.64	36.02	4000	30.41

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)

Report No.	14033198S-B-R1
Test place	Shonan EMC Lab. No.5 Shielded Room
Date	October 7, 2021
Temperature / Humidity	23 deg. C / 64 % RH
Engineer	Miku Ikudome
Mode	Tx

11b 11 Mbps

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Time average)		Duty factor [dB]	Result (Burst power average)	
				[dBm]	[mW]		[dBm]	[mW]
2412	-0.14	1.68	9.82	11.36	13.68	0.49	11.85	15.31
2437	0.42	1.68	9.82	11.92	15.56	0.49	12.41	17.42
2462	0.02	1.68	9.82	11.52	14.19	0.49	12.01	15.89

11g 18 Mbps

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Time average)		Duty factor [dB]	Result (Burst power average)	
				[dBm]	[mW]		[dBm]	[mW]
2412	-1.50	1.68	9.82	10.00	10.00	0.81	10.81	12.05
2437	0.12	1.68	9.82	11.62	14.52	0.81	12.43	17.50
2462	-2.37	1.68	9.82	9.13	8.18	0.81	9.94	9.86

11n-20 MCS 7

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Time average)		Duty factor [dB]	Result (Burst power average)	
				[dBm]	[mW]		[dBm]	[mW]
2412	-3.04	1.68	9.82	8.46	7.01	2.00	10.46	11.12
2437	-1.59	1.68	9.82	9.91	9.79	2.00	11.91	15.52
2462	-4.31	1.68	9.82	7.19	5.24	2.00	9.19	8.30

BT LE 1 M-PHY

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Time average)		Duty factor [dB]	Result (Burst power average)	
				[dBm]	[mW]		[dBm]	[mW]
2402	-8.51	1.68	9.82	2.99	1.99	0.68	3.67	2.33
2440	-8.02	1.68	9.82	3.48	2.23	0.68	4.16	2.61
2480	-8.71	1.69	9.82	2.80	1.91	0.68	3.48	2.23

BT LE 2 M-PHY

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Time average)		Duty factor [dB]	Result (Burst power average)	
				[dBm]	[mW]		[dBm]	[mW]
2402	-11.69	1.68	9.82	-0.19	0.96	3.63	3.44	2.21
2440	-11.65	1.68	9.82	-0.15	0.97	3.63	3.48	2.23
2480	-11.88	1.68	9.82	-0.38	0.92	3.63	3.25	2.11

Sample Calculation:

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

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

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

Average Output Power (Reference data for RF Exposure)

Report No.	14033198S-B-R1
Test place	Shonan EMC Lab. No.5 Shielded Room
Date	October 7, 2021
Temperature / Humidity	23 deg. C / 64 % RH
Engineer	Miku Ikudome
Mode	Tx

2437 MHz

Mode	Rate [Mbps]	Reading [dBm]	Duty factor [dB]	Burst power [dBm]	Remarks
11b	1	0.82	0.05	0.87	-
	2	0.75	0.09	0.84	-
	5.5	0.56	0.26	0.82	-
	11	0.42	0.49	0.91	*
11g	6	0.53	0.28	0.81	-
	9	0.41	0.40	0.81	-
	12	0.27	0.52	0.79	-
	18	0.12	0.81	0.93	*
	24	-0.17	0.99	0.82	-
	36	-0.49	1.37	0.88	-
	48	-0.87	1.70	0.83	-
	54	-0.97	1.88	0.91	-

Mode	MCS Number [MCS]	Reading [dBm]	Duty factor [dB]	Burst power [dBm]	Remarks
11n-20	0	-0.04	0.30	0.26	-
	1	-0.27	0.57	0.30	-
	2	-0.47	0.81	0.34	-
	3	-0.70	1.04	0.34	-
	4	-1.04	1.37	0.33	-
	5	-1.35	1.70	0.35	-
	6	-1.45	1.78	0.33	-
	7	-1.59	2.00	0.41	*

BT LE, 2440 MHz

Mode	Data rate [bps]	Reading [dBm]	Duty factor [dB]	Burst power [dBm]	Remarks
1 M-PHY	1 M	-8.02	0.68	-7.34	*
Coded-PHY(S=8)	125 k	-8.10	0.69	-7.41	-
Coded-PHY(S=2)	500 k	-7.83	0.40	-7.43	-

* Worst rate

Sample Calculation:

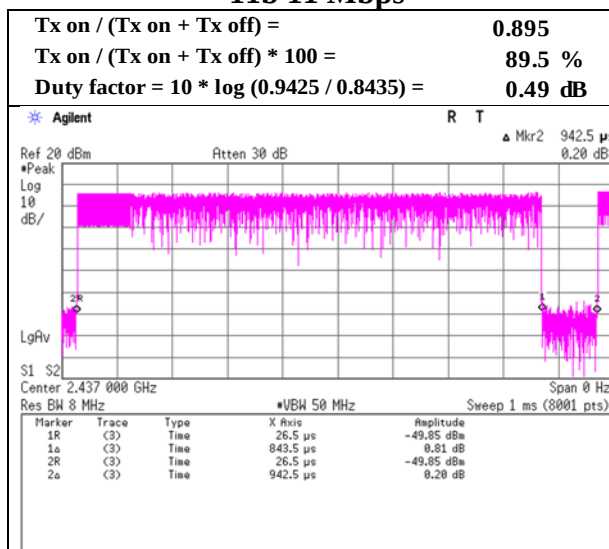
$$\text{Burst power} = \text{Reading (timed average)} + \text{Duty factor}$$

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

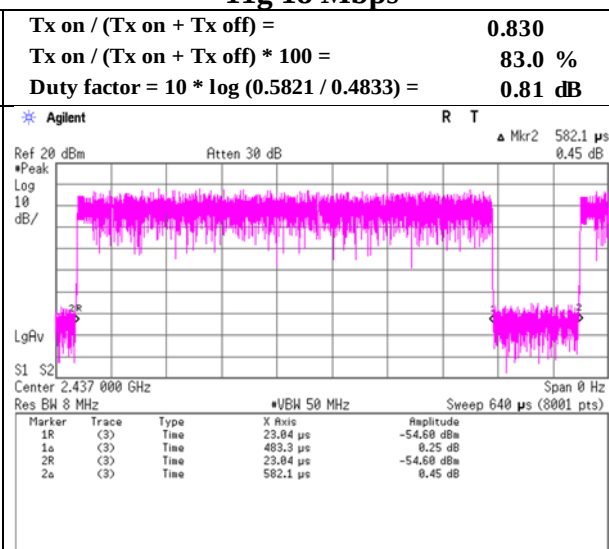
Burst rate confirmation (for Average Output Power)

Report No.	14033198S-B-R1
Test place	Shonan EMC Lab. No.5 Shielded Room
Date	October 7, 2021
Temperature / Humidity	23 deg. C / 64 % RH
Engineer	Miku Ikudome
Mode	Tx

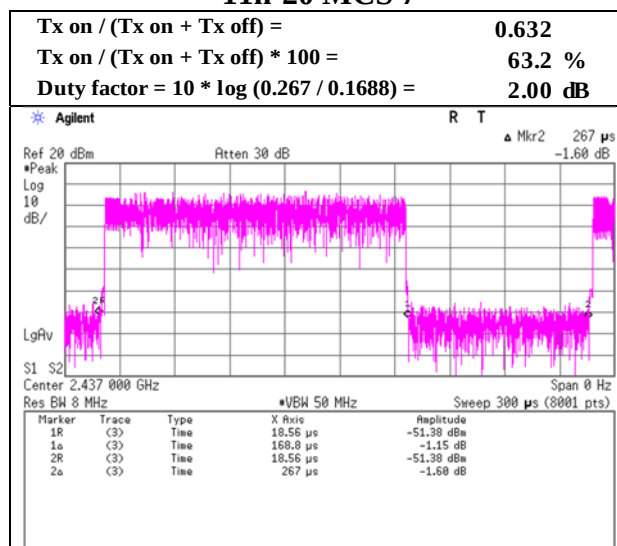
11b 11 Mbps



11g 18 Mbps



11n-20 MCS 7

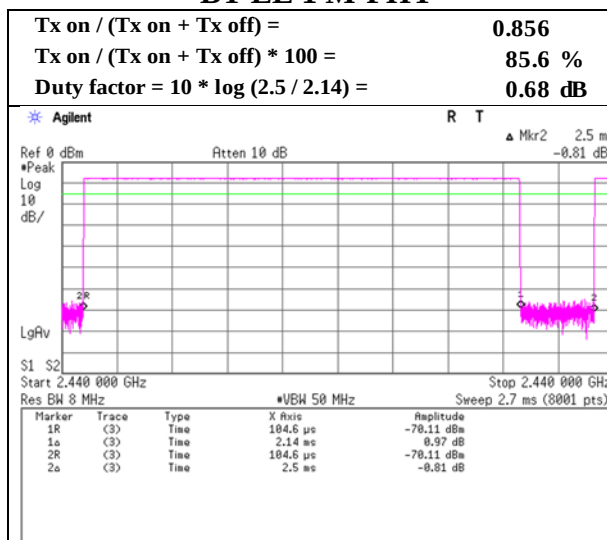


* Since the burst rate is not different between the channels, the data has been obtained on the representative channel.

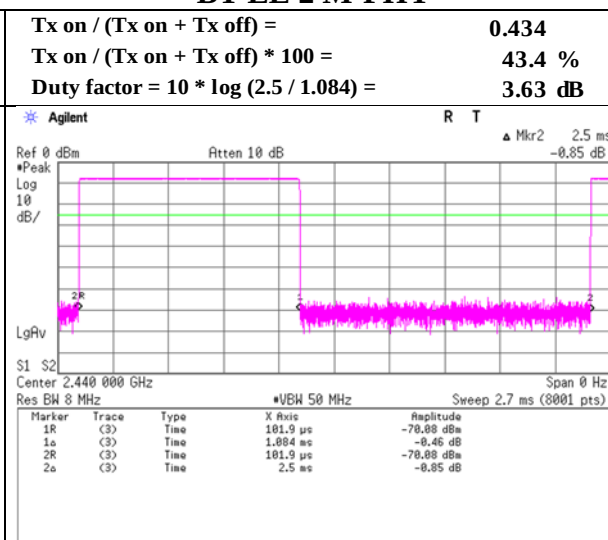
Burst rate confirmation (for Average Output Power)

Report No.	14033198S-B-R1
Test place	Shonan EMC Lab. No.5 Shielded Room
Date	October 7, 2021
Temperature / Humidity	23 deg. C / 64 % RH
Engineer	Miku Ikudome
Mode	Tx

BT LE 1 M-PHY



BT LE 2 M-PHY

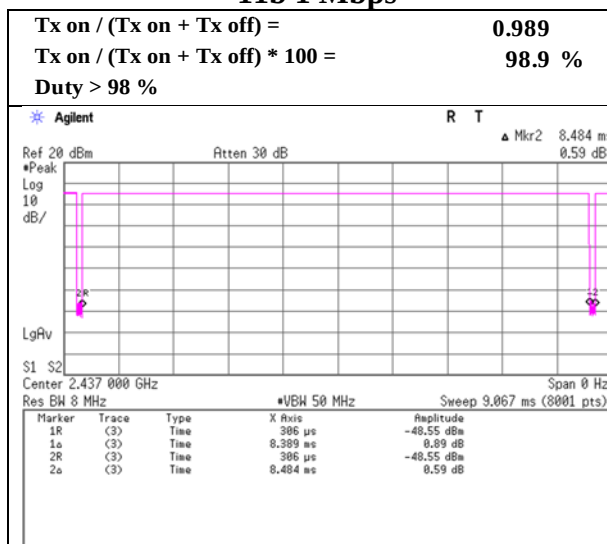


* Since the burst rate is not different between the channels, the data has been obtained on the representative channel.

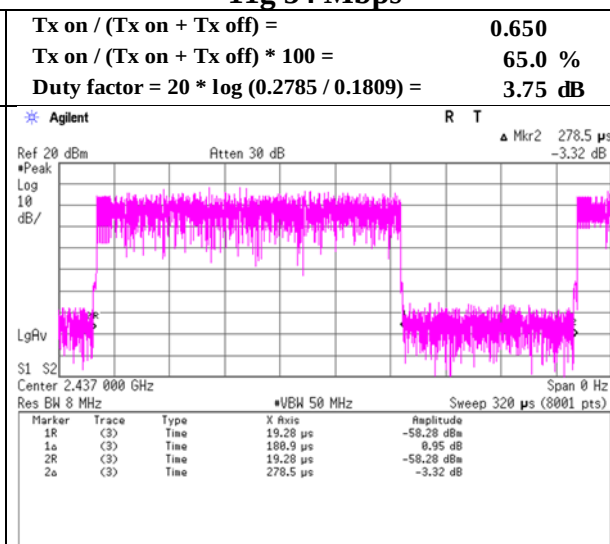
Burst rate confirmation (for Radiated Emission)

Report No. 14033198S-B-R1
Test place Shonan EMC Lab. No.5 Shielded Room
Date October 7, 2021
Temperature / Humidity 23 deg. C / 64 % RH
Engineer Miku Ikudome
Mode Tx

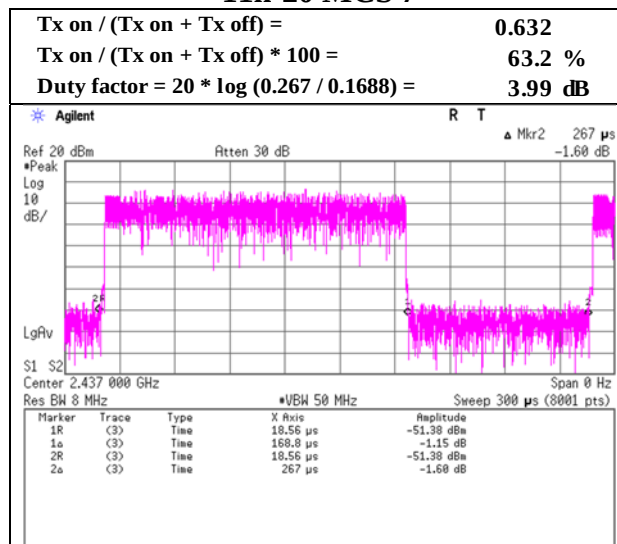
11b 1 Mbps



11g 54 Mbps



11n-20 MCS 7

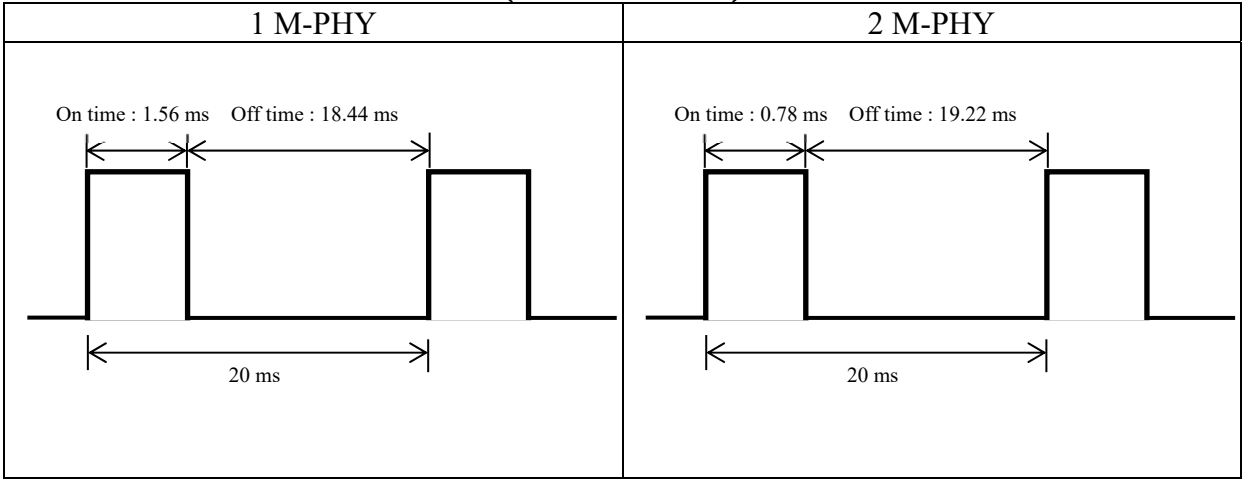


* Since the burst rate is not different between the channels, the data has been obtained on the representative channel.

Duty cycle correction factor
(Declared value of applicant)

The information provided from the applicant.

(Reference chart)



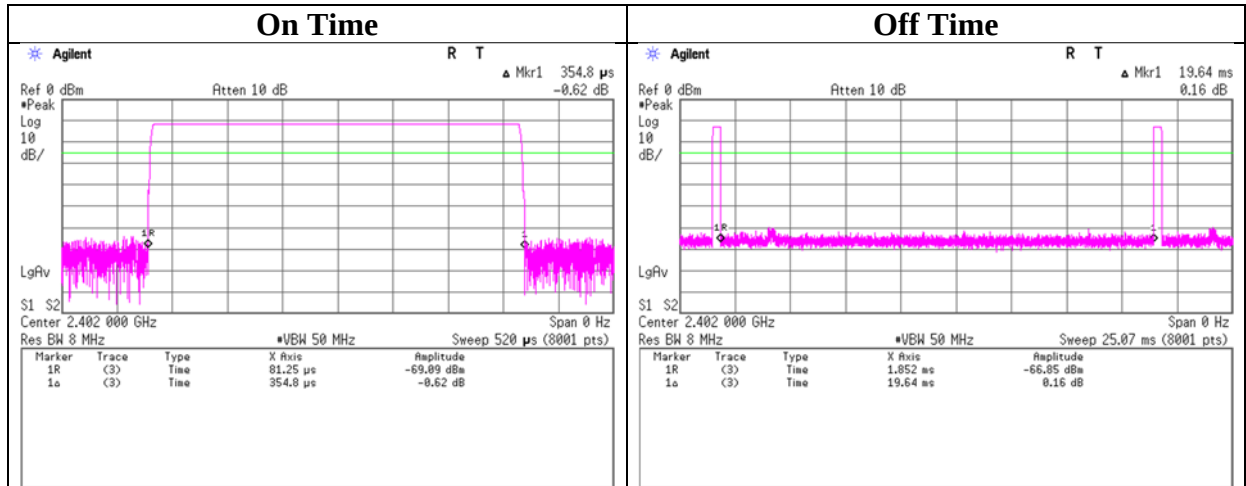
(for Duty cycle correction factor for Radiated Spurious Emission)
Worst 100 ms case

1 M-PHY	2 M-PHY
DCCF = 20 log(1.56 x 5 / 100) = -22.15 dB	DCCF = 20 log(0.78 x 5 / 100) = -28.17 dB

*Since the burst rate is not different between the channels, the data has been obtained on the representative channel.
*Worst TX Duty cycle BLE is Advertising mode.
The actual measurement value was applied as Duty Cycle Correction factor.

Duty cycle correction factor (Actual measured value)

Report No. 14033198S-B-R1
Test place Shonan EMC Lab. No.5 Shielded Room
Date April 13, 2022
Temperature / Humidity 25 deg. C / 56 % RH
Engineer Shiro Kobayashi
Mode Tx



$$DCCF = 20 \log(0.3548 \times 5 / 100) = -35.02 \text{ dB} *$$

*On time: 354.8 us

*Off time: 19.64 ms

* The above chart was the maximum Duty cycle for 1 M-PHY and 2 M-PHY that can be achieved using the sample provided by the applicant (Advertising mode).

*The DCCF of the applicant's declared value, which is theoretically the maximum, was applied to Radiated Spurious Emission.

Radiated Spurious Emission

Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	3	3	3
Date	October 16, 2021	October 17, 2021	October 22, 2021
Temperature / Humidity	23 deg.C, 53 %RH	22 deg.C, 56 %RH	22 deg.C, 41 %RH
Engineer	Takahiro Kawakami (1 GHz -2.8 GHz)	Yasumasa Owaki (2.8 GHz -18 GHz)	Yosuke Murakami (18 GHz -26.5 GHz)
Mode	Tx 11b 2412 MHz		

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	2390.000	PK	48.62	28.33	14.42	41.62	2.06	51.81	73.9	22.0	100	309	-
Hori.	4824.000	PK	48.94	31.80	7.03	42.89	2.06	46.94	73.9	26.9	109	301	-
Hori.	7236.000	PK	48.52	37.40	8.50	43.42	2.06	53.06	73.9	20.8	150	0	-
Hori.	9648.000	PK	49.21	39.19	9.70	43.12	2.06	57.04	73.9	16.8	150	0	-
Hori.	2390.000	AV	38.17	28.33	14.42	41.62	2.06	41.36	53.9	12.5	100	309	-
Hori.	4824.000	AV	40.05	31.80	7.03	42.89	2.06	38.05	53.9	15.8	109	301	-
Hori.	7236.000	AV	39.87	37.40	8.50	43.42	2.06	44.41	53.9	9.4	150	0	Floor noise
Hori.	9648.000	AV	40.16	39.19	9.70	43.12	2.06	47.99	53.9	5.9	150	0	Floor noise
Vert.	2390.000	PK	48.38	28.33	14.42	41.62	2.06	51.57	73.9	22.3	146	239	-
Vert.	4824.000	PK	47.94	31.80	7.03	42.89	2.06	45.94	73.9	27.9	168	301	-
Vert.	7236.000	PK	49.11	37.40	8.50	43.42	2.06	53.65	73.9	20.2	150	0	-
Vert.	9648.000	PK	49.84	39.19	9.70	43.12	2.06	57.67	73.9	16.2	150	0	-
Vert.	2390.000	AV	38.94	28.33	14.42	41.62	2.06	42.13	53.9	11.7	146	239	-
Vert.	4824.000	AV	39.96	31.80	7.03	42.89	2.06	37.96	53.9	15.9	168	301	-
Vert.	7236.000	AV	39.43	37.40	8.50	43.42	2.06	43.97	53.9	9.9	150	0	Floor noise
Vert.	9648.000	AV	40.31	39.19	9.70	43.12	2.06	48.14	53.9	5.7	150	0	Floor noise

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

Distance factor : 1 GHz - 10 GHz : 20log (3.80 m / 3.0 m) = 2.06 dB

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

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.	2412.000	PK	93.39	28.29	14.44	41.63	2.06	96.55	-	-	Carrier
Hori.	2397.025	PK	48.81	28.32	14.43	41.62	2.06	52.00	76.5	24.5	-
Hori.	2400.000	PK	38.66	28.31	14.44	41.63	2.06	41.84	76.5	34.6	-
Vert.	2412.000	PK	92.84	28.29	14.44	41.63	2.06	96.00	-	-	Carrier
Vert.	2398.489	PK	46.91	28.31	14.43	41.63	2.06	50.08	76.0	25.9	-
Vert.	2400.000	PK	38.56	28.31	14.44	41.63	2.06	41.74	76.0	34.2	-

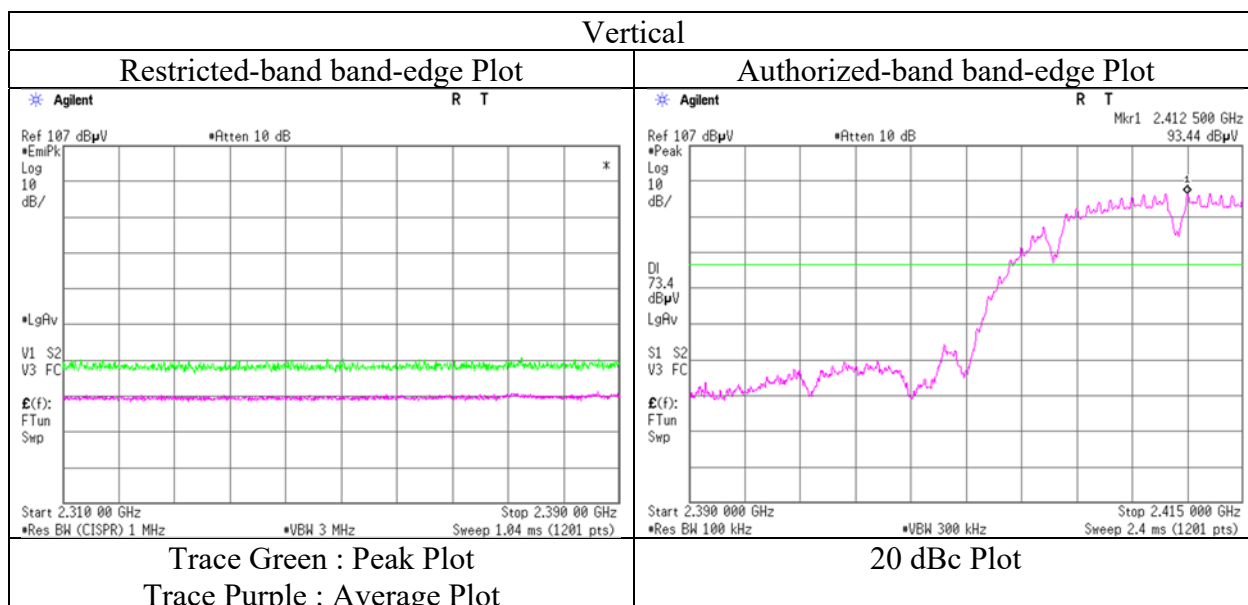
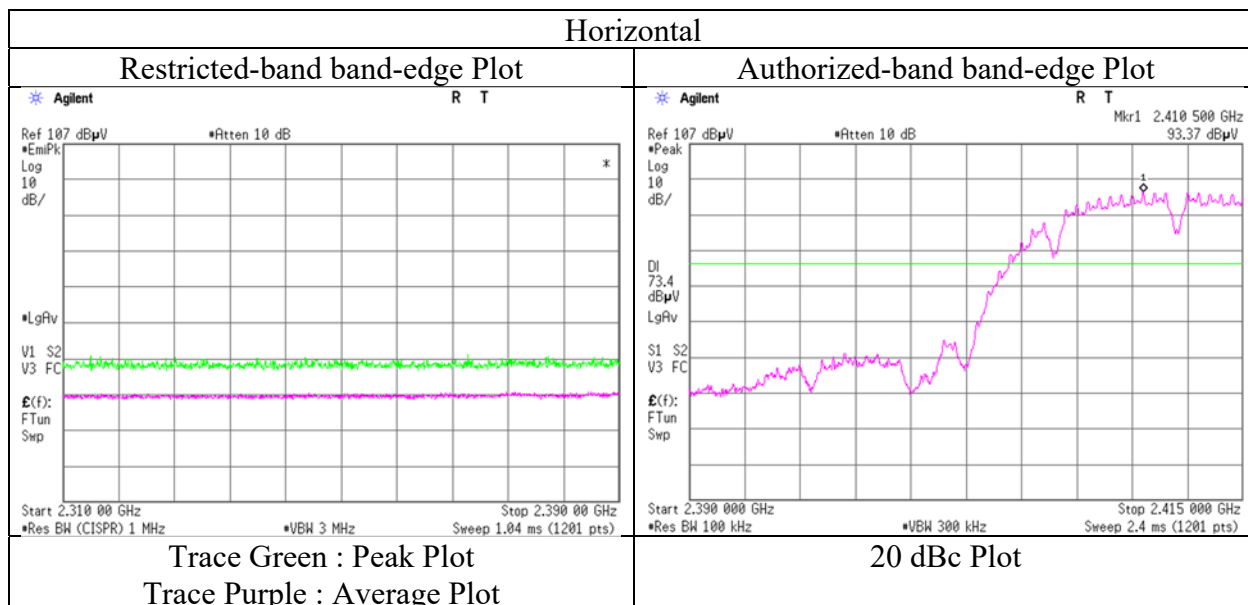
Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 10 GHz : 20log (3.80 m / 3.0 m) = 2.06 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	3
Date	October 16, 2021
Temperature / Humidity	23 deg.C, 53 %RH
Engineer	Takahiro Kawakami
	(1 GHz -2.8 GHz)
Mode	Tx 11b 2412 MHz



* 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	3	3	3
Date	October 16, 2021	October 17, 2021	October 22, 2021
Temperature / Humidity	23 deg.C, 53 %RH	22 deg.C, 56 %RH	22 deg.C, 41 %RH
Engineer	Takahiro Kawakami (1 GHz -2.8 GHz)	Yasumasa Owaki (2.8 GHz -18 GHz)	Yosuke Murakami (18 GHz -26.5 GHz)
Mode	Tx 11b 2437 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.	4874.000	PK	49.90	31.86	7.07	42.89	2.06	48.00	73.9	25.9	159	305	-
Hori.	7311.000	PK	48.14	37.51	8.55	43.51	2.06	52.75	73.9	21.1	150	0	-
Hori.	9748.000	PK	49.12	39.40	9.74	42.99	2.06	57.33	73.9	16.5	150	0	-
Hori.	4874.000	AV	41.26	31.86	7.07	42.89	2.06	39.36	53.9	14.5	159	305	-
Hori.	7311.000	AV	39.52	37.51	8.55	43.51	2.06	44.13	53.9	9.7	150	0	Floor noise
Hori.	9748.000	AV	40.13	39.40	9.74	42.99	2.06	48.34	53.9	5.5	150	0	Floor noise
Vert.	4874.000	PK	49.30	31.86	7.07	42.89	2.06	47.40	73.9	26.5	110	305	-
Vert.	7311.000	PK	48.51	37.51	8.55	43.51	2.06	53.12	73.9	20.7	150	0	-
Vert.	9748.000	PK	49.81	39.40	9.74	42.99	2.06	58.02	73.9	15.8	150	0	-
Vert.	4874.000	AV	40.53	31.86	7.07	42.89	2.06	38.63	53.9	15.2	110	305	-
Vert.	7311.000	AV	39.21	37.51	8.55	43.51	2.06	43.82	53.9	10.0	150	0	Floor noise
Vert.	9748.000	AV	40.38	39.40	9.74	42.99	2.06	48.59	53.9	5.3	150	0	Floor noise

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

Distance factor : 1 GHz - 10 GHz : $20\log(3.80\text{ m} / 3.0\text{ m}) = 2.06\text{ dB}$

10 GHz - 40 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

Radiated Spurious Emission

Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	3	3	3
Date	October 16, 2021	October 17, 2021	October 22, 2021
Temperature / Humidity	23 deg.C, 53 %RH	22 deg.C, 56 %RH	22 deg.C, 41 %RH
Engineer	Takahiro Kawakami (1 GHz -2.8 GHz)	Yasumasa Owaki (2.8 GHz -18 GHz)	Yosuke Murakami (18 GHz -26.5 GHz)
Mode	Tx 11b 2462 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	48.03	28.24	14.52	41.65	2.06	51.20	73.9	22.7	150	308	-
Hori.	2498.831	PK	48.84	28.24	14.53	41.66	2.06	52.01	73.9	21.8	150	308	-
Hori.	4924.000	PK	49.78	31.99	7.11	42.89	2.06	48.05	73.9	25.8	172	306	-
Hori.	7386.000	PK	48.47	37.61	8.60	43.59	2.06	53.15	73.9	20.7	150	0	-
Hori.	9848.000	PK	49.24	39.39	9.78	42.86	2.06	57.61	73.9	16.2	150	0	-
Hori.	2483.500	AV	37.51	28.24	14.52	41.65	2.06	40.68	53.9	13.2	150	308	-
Hori.	2498.831	AV	39.29	28.24	14.53	41.66	2.06	42.46	53.9	11.4	150	308	-
Hori.	4924.000	AV	42.26	31.99	7.11	42.89	2.06	40.53	53.9	13.3	172	306	-
Hori.	7386.000	AV	39.37	37.61	8.60	43.59	2.06	44.05	53.9	9.8	150	0	Floor noise
Hori.	9848.000	AV	39.70	39.39	9.78	42.86	2.06	48.07	53.9	5.8	150	0	Floor noise
Vert.	2483.500	PK	47.37	28.24	14.52	41.65	2.06	50.54	73.9	23.3	154	127	-
Vert.	2498.776	PK	48.87	28.24	14.53	41.66	2.06	52.04	73.9	21.8	154	127	-
Vert.	4924.000	PK	50.28	31.99	7.11	42.89	2.06	48.55	73.9	25.3	140	307	-
Vert.	7386.000	PK	48.62	37.61	8.60	43.59	2.06	53.30	73.9	20.6	150	0	-
Vert.	9848.000	PK	49.68	39.39	9.78	42.86	2.06	58.05	73.9	15.8	150	0	-
Vert.	2483.500	AV	38.12	28.24	14.52	41.65	2.06	41.29	53.9	12.6	154	127	-
Vert.	2498.776	AV	39.69	28.24	14.53	41.66	2.06	42.86	53.9	11.0	154	127	-
Vert.	4924.000	AV	42.02	31.99	7.11	42.89	2.06	40.29	53.9	13.6	140	307	-
Vert.	7386.000	AV	39.39	37.61	8.60	43.59	2.06	44.07	53.9	9.8	150	0	Floor noise
Vert.	9848.000	AV	39.43	39.39	9.78	42.86	2.06	47.80	53.9	6.1	150	0	Floor noise

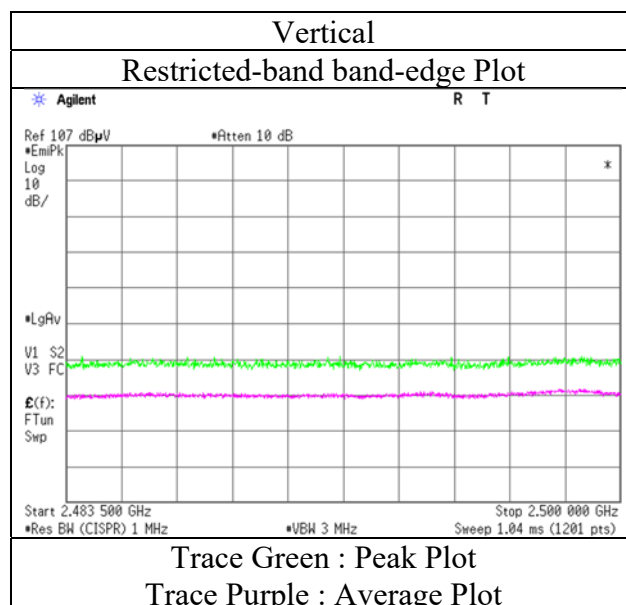
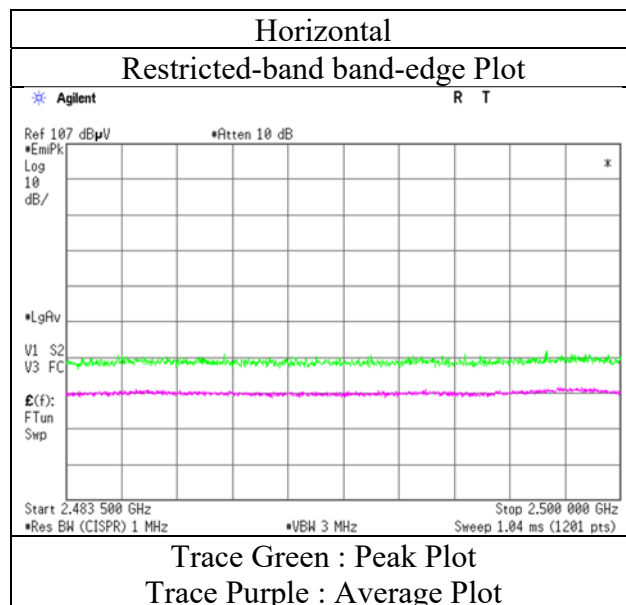
Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 10 GHz : $20\log(3.80\text{ m} / 3.0\text{ m}) = 2.06\text{ dB}$

10 GHz - 40 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

Radiated Spurious Emission (Reference Plot for band-edge)

Test place Shonan EMC Lab.
Semi Anechoic Chamber 3
Date October 16, 2021
Temperature / Humidity 23 deg.C, 53 %RH
Engineer Takahiro Kawakami
 (1 GHz -2.8 GHz)
Mode Tx 11b 2462 MHz



* 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	3	3	3
Date	October 16, 2021	October 17, 2021	October 22, 2021
Temperature / Humidity	23 deg.C, 53 %RH	22 deg.C, 56 %RH	22 deg.C, 41 %RH
Engineer	Takahiro Kawakami (1 GHz -2.8 GHz)	Yasumasa Owaki (2.8 GHz -18 GHz)	Yosuke Murakami (18 GHz -26.5 GHz)
Mode	Tx 11g 2412 MHz		

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	2390.000	PK	57.74	28.33	14.42	41.62	2.06	60.93	73.9	12.9	156	311	-
Hori.	4824.000	PK	48.84	31.80	7.03	42.89	2.06	46.84	73.9	27.0	150	0	-
Hori.	7236.000	PK	48.46	37.40	8.50	43.42	2.06	53.00	73.9	20.9	150	0	-
Hori.	9648.000	PK	49.48	39.19	9.70	43.12	2.06	57.31	73.9	16.5	150	0	-
Hori.	4824.000	AV	39.28	31.80	7.03	42.89	2.06	37.28	53.9	16.6	150	0	Floor noise
Hori.	7236.000	AV	39.76	37.40	8.50	43.42	2.06	44.30	53.9	9.6	150	0	Floor noise
Hori.	9648.000	AV	40.05	39.19	9.70	43.12	2.06	47.88	53.9	6.0	150	0	Floor noise
Vert.	2390.000	PK	59.58	28.33	14.42	41.62	2.06	62.77	73.9	11.1	119	348	-
Vert.	4824.000	PK	48.82	31.80	7.03	42.89	2.06	46.82	73.9	27.0	150	0	-
Vert.	7236.000	PK	49.20	37.40	8.50	43.42	2.06	53.74	73.9	20.1	150	0	-
Vert.	9648.000	PK	49.13	39.19	9.70	43.12	2.06	56.96	73.9	16.9	150	0	-
Vert.	4824.000	AV	39.38	31.80	7.03	42.89	2.06	37.38	53.9	16.5	150	0	Floor noise
Vert.	7236.000	AV	39.68	37.40	8.50	43.42	2.06	44.22	53.9	9.6	150	0	Floor noise
Vert.	9648.000	AV	40.17	39.19	9.70	43.12	2.06	48.00	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(3.80 m / 3.0 m) = 2.06 dB

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

Average measurement value with duty factor

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2390.000	AV	39.82	28.33	14.42	41.62	3.75	2.06	46.76	53.9	7.1	*1)
Vert.	2390.000	AV	41.40	28.33	14.42	41.62	3.75	2.06	48.34	53.9	5.5	*1)

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

Distance factor : 1 GHz - 10 GHz : 20log(3.80 m / 3.0 m) = 2.06 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.	2412.000	PK	91.33	28.29	14.44	41.63	2.06	94.49	-	-	Carrier
Hori.	2400.000	PK	52.85	28.31	14.44	41.63	2.06	56.03	74.4	18.3	-
Vert.	2412.000	PK	92.41	28.29	14.44	41.63	2.06	95.57	-	-	Carrier
Vert.	2400.000	PK	54.75	28.31	14.44	41.63	2.06	57.93	75.5	17.5	-

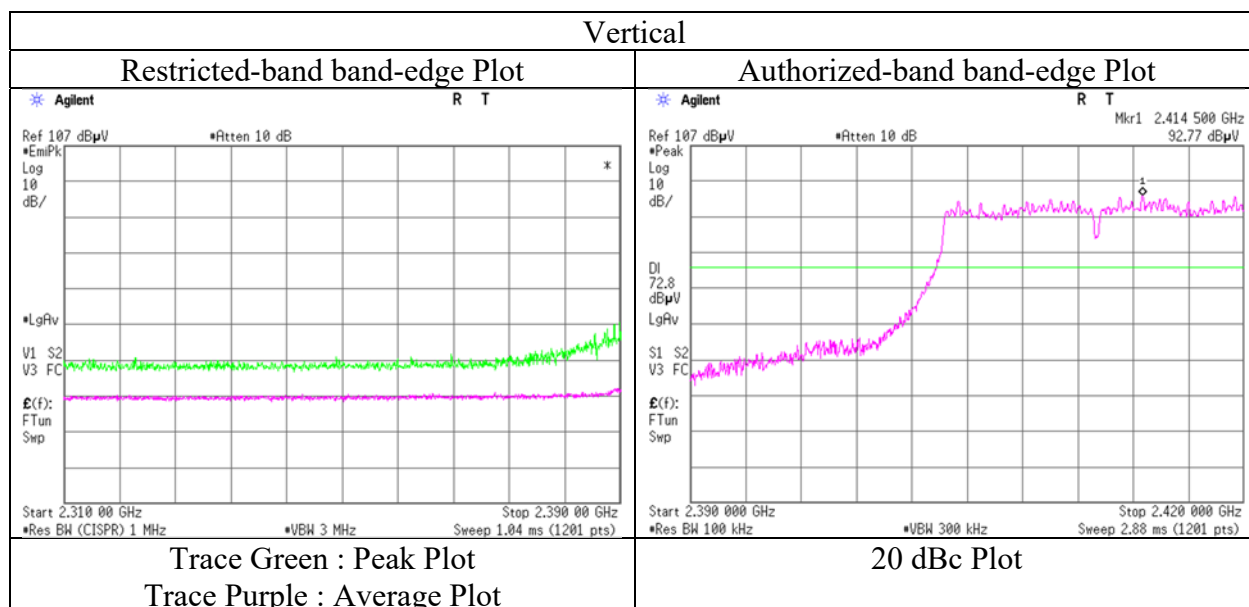
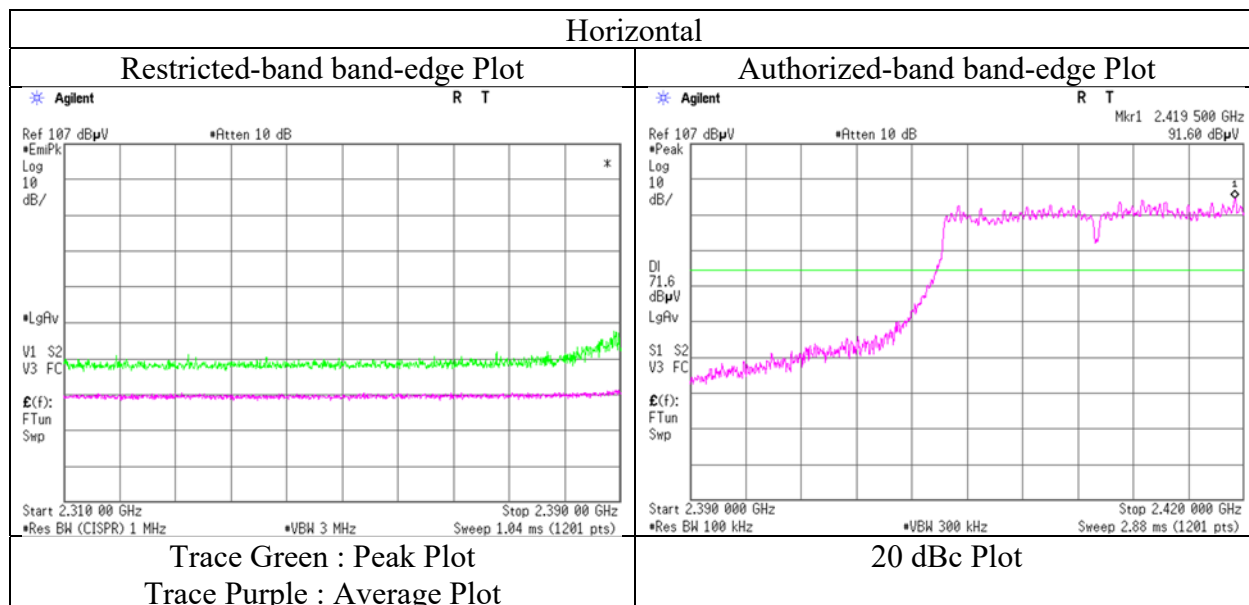
Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 10 GHz : 20log(3.80 m / 3.0 m) = 2.06 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	3
Date	October 16, 2021
Temperature / Humidity	23 deg.C, 53 %RH
Engineer	Takahiro Kawakami
	(1 GHz -2.8 GHz)
Mode	Tx 11g 2412 MHz



* 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 3
Date October 16, 2021
Temperature / Humidity 23 deg.C, 53 %RH
Engineer Takahiro Kawakami
 (1 GHz -2.8 GHz)
Mode Tx 11g 2417 MHz

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	2390.000	PK	59.48	28.33	14.42	41.62	2.06	62.67	73.9	11.2	154	312	-
Vert.	2390.000	PK	59.92	28.33	14.42	41.62	2.06	63.11	73.9	10.7	140	343	-

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

Distance factor : 1 GHz - 10 GHz : $20\log(3.80\text{ m} / 3.0\text{ m}) = 2.06\text{ dB}$

10 GHz - 40 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

Average measurement value with duty factor

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2390.000	AV	38.74	28.33	14.42	41.62	3.75	2.06	45.68	53.9	8.2	*1)
Vert.	2390.000	AV	40.64	28.33	14.42	41.62	3.75	2.06	47.58	53.9	6.3	*1)

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

Distance factor : 1 GHz - 10 GHz : $20\log(3.80\text{ m} / 3.0\text{ m}) = 2.06\text{ dB}$

10 GHz - 40 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

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.	2417.000	PK	93.52	28.28	14.45	41.63	2.06	96.68	-	-	Carrier
Hori.	2400.000	PK	50.38	28.31	14.44	41.63	2.06	53.56	76.6	23.0	-
Vert.	2417.000	PK	93.00	28.28	14.45	41.63	2.06	96.16	-	-	Carrier
Vert.	2400.000	PK	51.43	28.31	14.44	41.63	2.06	54.61	76.1	21.4	-

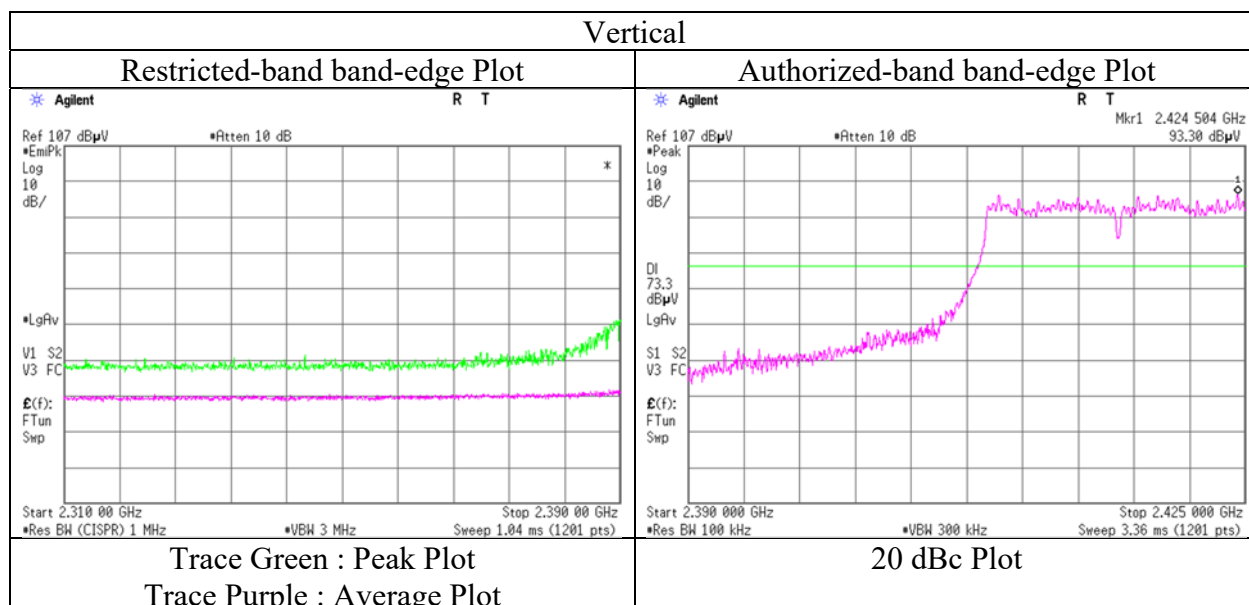
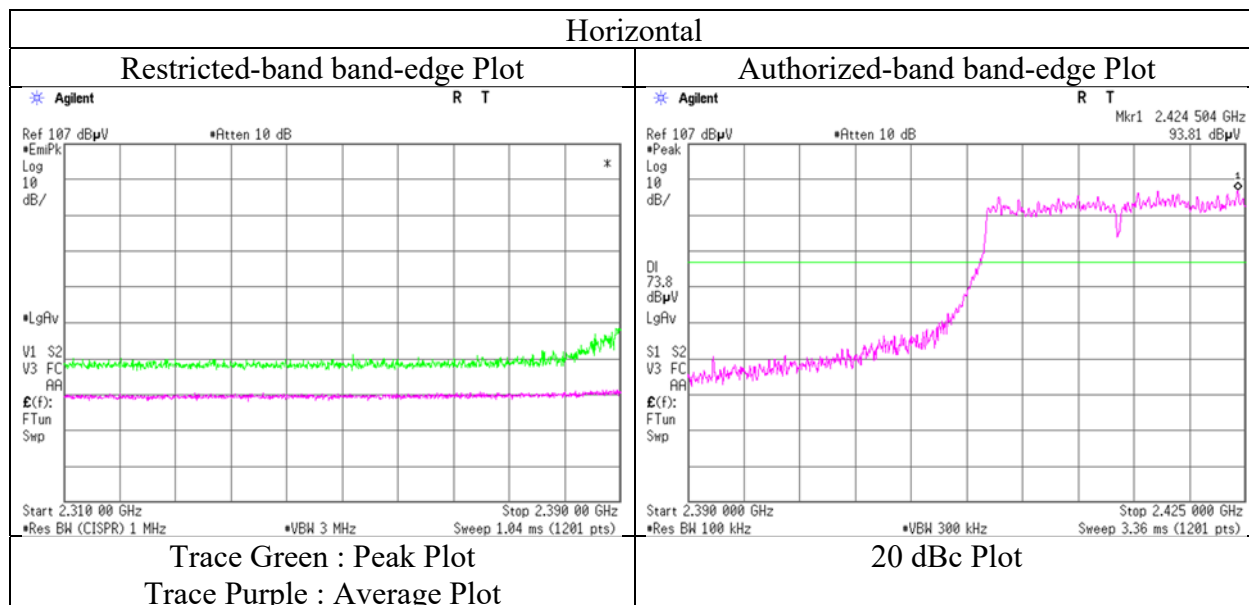
Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 10 GHz : $20\log(3.80\text{ m} / 3.0\text{ m}) = 2.06\text{ dB}$

10 GHz - 40 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

Radiated Spurious Emission (Reference Plot for band-edge)

Test place	Shonan EMC Lab.
Semi Anechoic Chamber	3
Date	October 16, 2021
Temperature / Humidity	23 deg.C, 53 %RH
Engineer	Takahiro Kawakami
	(1 GHz -2.8 GHz)
Mode	Tx 11g 2417 MHz



* 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	3	3	3
Date	October 16, 2021	October 17, 2021	October 22, 2021
Temperature / Humidity	23 deg.C, 53 %RH	22 deg.C, 56 %RH	22 deg.C, 41 %RH
Engineer	Takahiro Kawakami	Yasumasa Owaki	Yosuke Murakami
	(1 GHz -2.8 GHz)	(2.8 GHz -18 GHz)	(18 GHz -26.5 GHz)
Mode	Tx 11g 2437 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.	363.993	QP	40.30	15.28	8.89	31.93	0.00	32.54	46.0	13.4	100	25	-
Hori.	575.709	QP	33.10	18.55	9.80	31.93	0.00	29.52	46.0	16.4	112	1	-
Hori.	638.303	QP	39.60	19.25	10.03	31.92	0.00	36.96	46.0	9.0	100	54	-
Hori.	718.131	QP	34.90	20.05	10.34	31.80	0.00	33.49	46.0	12.5	100	184	-
Hori.	815.974	QP	29.50	20.91	10.67	31.48	0.00	29.60	46.0	16.4	100	218	-
Hori.	913.987	QP	30.10	22.07	10.98	30.91	0.00	32.24	46.0	13.7	100	217	-
Hori.	4874.000	PK	48.20	31.86	7.07	42.89	2.06	46.30	73.9	27.6	150	0	-
Hori.	7311.000	PK	49.01	37.51	8.55	43.51	2.06	53.62	73.9	20.2	150	0	-
Hori.	9748.000	PK	49.46	39.40	9.74	42.99	2.06	57.67	73.9	16.2	150	0	-
Hori.	4874.000	AV	39.13	31.86	7.07	42.89	2.06	37.23	53.9	16.6	150	0	Floor noise
Hori.	7311.000	AV	39.31	37.51	8.55	43.51	2.06	43.92	53.9	9.9	150	0	Floor noise
Hori.	9748.000	AV	39.94	39.40	9.74	42.99	2.06	48.15	53.9	5.7	150	0	Floor noise
Vert.	632.379	QP	38.90	19.31	10.01	31.91	0.00	36.31	46.0	9.6	128	219	-
Vert.	848.689	QP	31.30	21.45	10.79	31.34	0.00	32.20	46.0	13.8	155	1	-
Vert.	873.588	QP	26.10	21.91	10.86	31.19	0.00	27.68	46.0	18.3	102	188	-
Vert.	913.981	QP	32.20	22.07	10.98	30.91	0.00	34.34	46.0	11.6	100	182	-
Vert.	4874.000	PK	49.38	31.86	7.07	42.89	2.06	47.48	73.9	26.4	150	0	-
Vert.	7311.000	PK	48.37	37.51	8.55	43.51	2.06	52.98	73.9	20.9	150	0	-
Vert.	9748.000	PK	49.34	39.40	9.74	42.99	2.06	57.55	73.9	16.3	150	0	-
Vert.	4874.000	AV	39.05	31.86	7.07	42.89	2.06	37.15	53.9	16.7	150	0	Floor noise
Vert.	7311.000	AV	39.47	37.51	8.55	43.51	2.06	44.08	53.9	9.8	150	0	Floor noise
Vert.	9748.000	AV	40.00	39.40	9.74	42.99	2.06	48.21	53.9	5.6	150	0	Floor noise

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

Distance factor : 1 GHz - 10 GHz : $20\log(3.80\text{ m} / 3.0\text{ m}) = 2.06\text{ dB}$ 10 GHz - 40 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

Radiated Spurious Emission

Test place Shonan EMC Lab.
Semi Anechoic Chamber 3
Date October 16, 2021
Temperature / Humidity 23 deg.C, 53 %RH
Engineer Takahiro Kawakami
 (1 GHz -2.8 GHz)
Mode Tx 11g 2457 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	63.52	28.24	14.52	41.65	2.06	66.69	73.9	7.2	136	313	-
Vert.	2483.500	PK	59.30	28.24	14.52	41.65	2.06	62.47	73.9	11.4	141	238	-

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

Distance factor : 1 GHz - 10 GHz : $20\log(3.80\text{ m} / 3.0\text{ m}) = 2.06\text{ dB}$

10 GHz - 40 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

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	41.01	28.24	14.52	41.65	3.75	2.06	47.93	53.9	5.9	*1)
Vert.	2483.500	AV	40.26	28.24	14.52	41.65	3.75	2.06	47.18	53.9	6.7	*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 : $20\log(3.80\text{ m} / 3.0\text{ m}) = 2.06\text{ dB}$

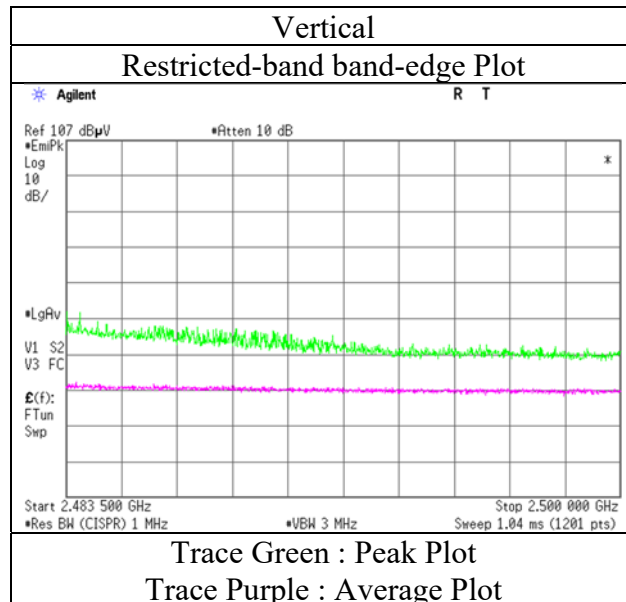
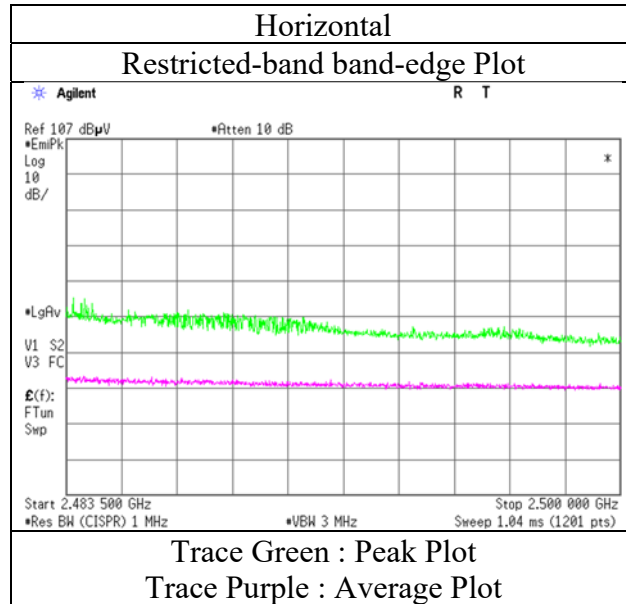
10 GHz - 40 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

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 3
Date October 16, 2021
Temperature / Humidity 23 deg.C, 53 %RH
Engineer Takahiro Kawakami
 (1 GHz -2.8 GHz)
Mode Tx 11g 2457 MHz



* 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	3	3	3
Date	October 16, 2021	October 17, 2021	October 22, 2021
Temperature / Humidity	23 deg.C, 53 %RH	22 deg.C, 56 %RH	22 deg.C, 41 %RH
Engineer	Takahiro Kawakami (1 GHz -2.8 GHz)	Yasumasa Owaki (2.8 GHz -18 GHz)	Yosuke Murakami (18 GHz -26.5 GHz)
Mode	Tx 11g 2462 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	61.99	28.24	14.52	41.65	2.06	65.16	73.9	8.7	147	316	-
Hori.	4924.000	PK	49.73	31.99	7.11	42.89	2.06	48.00	73.9	25.9	150	0	-
Hori.	7386.000	PK	48.98	37.61	8.60	43.59	2.06	53.66	73.9	20.2	150	0	-
Hori.	9848.000	PK	49.17	39.39	9.78	42.86	2.06	57.54	73.9	16.3	150	0	-
Hori.	4924.000	AV	39.21	31.99	7.11	42.89	2.06	37.48	53.9	16.4	150	0	Floor noise
Hori.	7386.000	AV	39.55	37.61	8.60	43.59	2.06	44.23	53.9	9.6	150	0	Floor noise
Hori.	9848.000	AV	39.77	39.39	9.78	42.86	2.06	48.14	53.9	5.7	150	0	Floor noise
Vert.	2483.500	PK	60.72	28.24	14.52	41.65	2.06	63.89	73.9	10.0	149	128	-
Vert.	4924.000	PK	48.77	31.99	7.11	42.89	2.06	47.04	73.9	26.8	150	0	-
Vert.	7386.000	PK	49.14	37.61	8.60	43.59	2.06	53.82	73.9	20.0	150	0	-
Vert.	9848.000	PK	48.84	39.39	9.78	42.86	2.06	57.21	73.9	16.6	150	0	-
Vert.	4924.000	AV	39.27	31.99	7.11	42.89	2.06	37.54	53.9	16.3	150	0	Floor noise
Vert.	7386.000	AV	39.29	37.61	8.60	43.59	2.06	43.97	53.9	9.9	150	0	Floor noise
Vert.	9848.000	AV	39.68	39.39	9.78	42.86	2.06	48.05	53.9	5.8	150	0	Floor noise

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

Distance factor : 1 GHz - 10 GHz : $20\log(3.80\text{ m} / 3.0\text{ m}) = 2.06\text{ dB}$

10 GHz - 40 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

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	40.42	28.24	14.52	41.65	3.75	2.06	47.34	53.9	6.5	*1)
Vert.	2483.500	AV	40.67	28.24	14.52	41.65	3.75	2.06	47.59	53.9	6.3	*1)

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

Distance factor : 1 GHz - 10 GHz : $20\log(3.80\text{ m} / 3.0\text{ m}) = 2.06\text{ dB}$

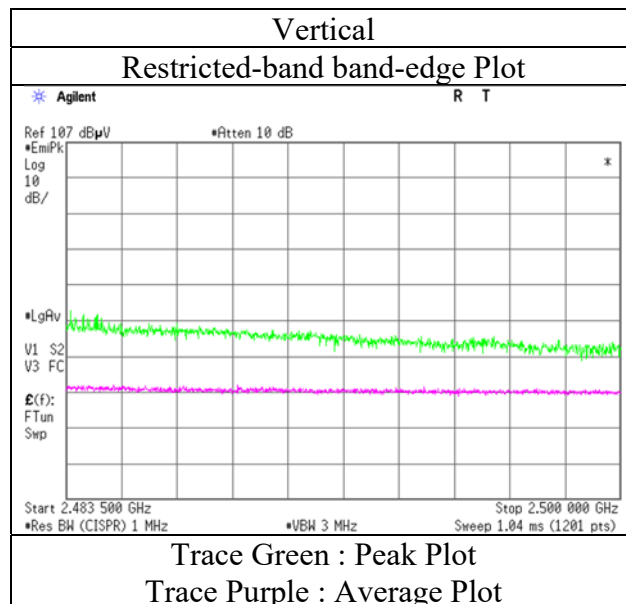
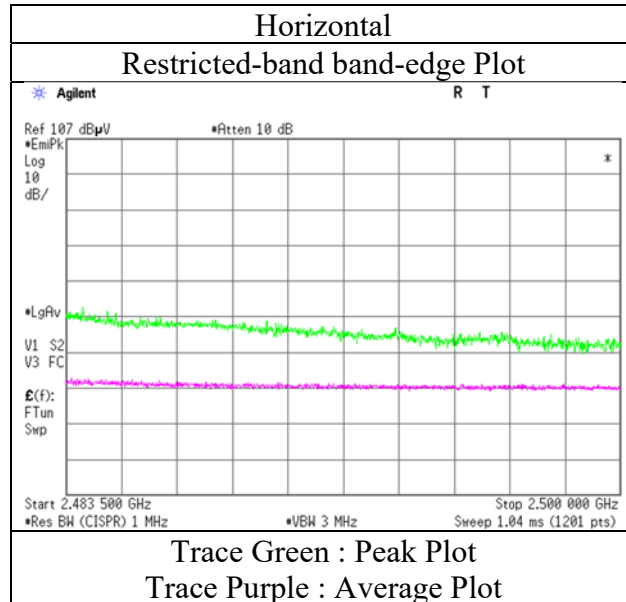
10 GHz - 40 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

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 3
Date October 16, 2021
Temperature / Humidity 23 deg.C, 53 %RH
Engineer Takahiro Kawakami
 (1 GHz -2.8 GHz)
Mode Tx 11g 2462 MHz



* 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	3	3	3
Date	October 16, 2021	October 17, 2021	October 22, 2021
Temperature / Humidity	23 deg.C, 53 %RH	22 deg.C, 56 %RH	22 deg.C, 41 %RH
Engineer	Takahiro Kawakami (1 GHz -2.8 GHz)	Yasumasa Owaki (2.8 GHz -18 GHz)	Yosuke Murakami (18 GHz -26.5 GHz)
Mode	Tx 11n-20 2412 MHz		

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	2390.000	PK	56.09	28.33	14.42	41.62	2.06	59.28	73.9	14.6	100	310	-
Hori.	4824.000	PK	49.24	31.80	7.03	42.89	2.06	47.24	73.9	26.6	150	0	-
Hori.	7236.000	PK	50.20	37.40	8.50	43.42	2.06	54.74	73.9	19.1	150	0	-
Hori.	9648.000	PK	49.30	39.19	9.70	43.12	2.06	57.13	73.9	16.7	150	0	-
Hori.	4824.000	AV	39.27	31.80	7.03	42.89	2.06	37.27	53.9	16.6	150	0	Floor noise
Hori.	7236.000	AV	39.66	37.40	8.50	43.42	2.06	44.20	53.9	9.7	150	0	Floor noise
Hori.	9648.000	AV	40.03	39.19	9.70	43.12	2.06	47.86	53.9	6.0	150	0	Floor noise
Vert.	2390.000	PK	57.47	28.33	14.42	41.62	2.06	60.66	73.9	13.2	116	349	-
Vert.	4824.000	PK	49.25	31.80	7.03	42.89	2.06	47.25	73.9	26.6	150	0	-
Vert.	7236.000	PK	49.55	37.40	8.50	43.42	2.06	54.09	73.9	19.8	150	0	-
Vert.	9648.000	PK	49.93	39.19	9.70	43.12	2.06	57.76	73.9	16.1	150	0	-
Vert.	4824.000	AV	39.22	31.80	7.03	42.89	2.06	37.22	53.9	16.6	150	0	Floor noise
Vert.	7236.000	AV	39.62	37.40	8.50	43.42	2.06	44.16	53.9	9.7	150	0	Floor noise
Vert.	9648.000	AV	39.87	39.19	9.70	43.12	2.06	47.70	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(3.80 m / 3.0 m) = 2.06 dB

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

Average measurement value with duty factor

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2390.000	AV	38.78	28.33	14.42	41.62	3.99	2.06	45.96	53.9	7.9	*1)
Vert.	2390.000	AV	40.22	28.33	14.42	41.62	3.99	2.06	47.40	53.9	6.4	*1)

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

Distance factor : 1 GHz - 10 GHz : 20log(3.80 m / 3.0 m) = 2.06 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.	2412.000	PK	89.25	28.29	14.44	41.63	2.06	92.41	-	-	Carrier
Hori.	2400.000	PK	52.54	28.31	14.44	41.63	2.06	55.72	72.4	16.6	-
Vert.	2412.000	PK	90.59	28.29	14.44	41.63	2.06	93.75	-	-	Carrier
Vert.	2400.000	PK	52.82	28.31	14.44	41.63	2.06	56.00	73.7	17.7	-

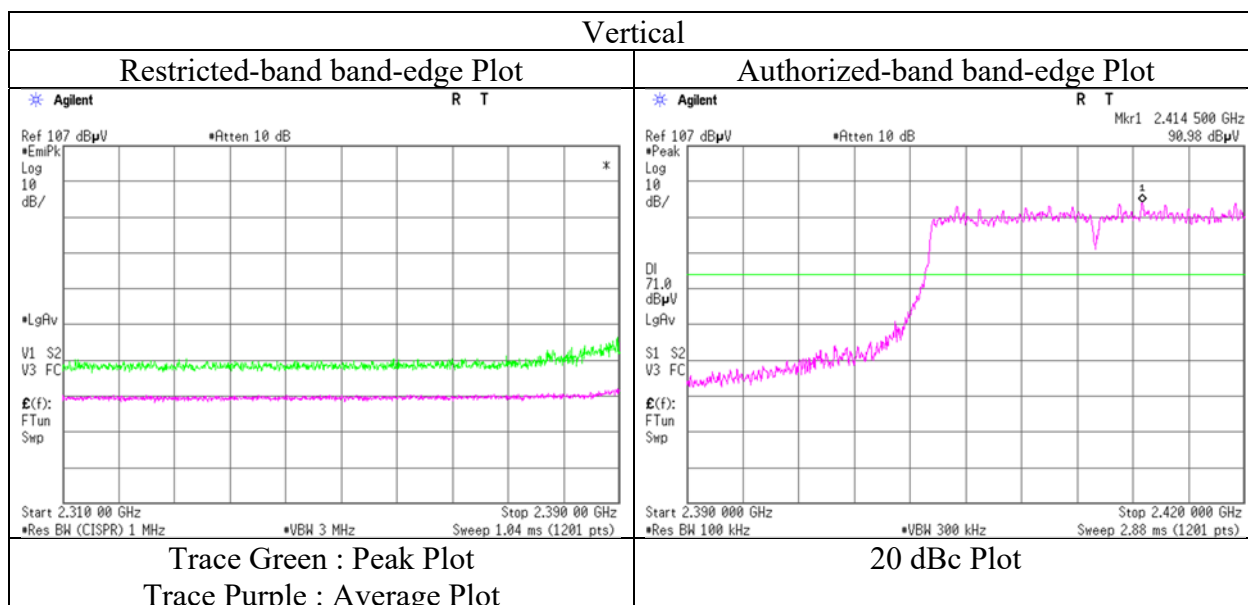
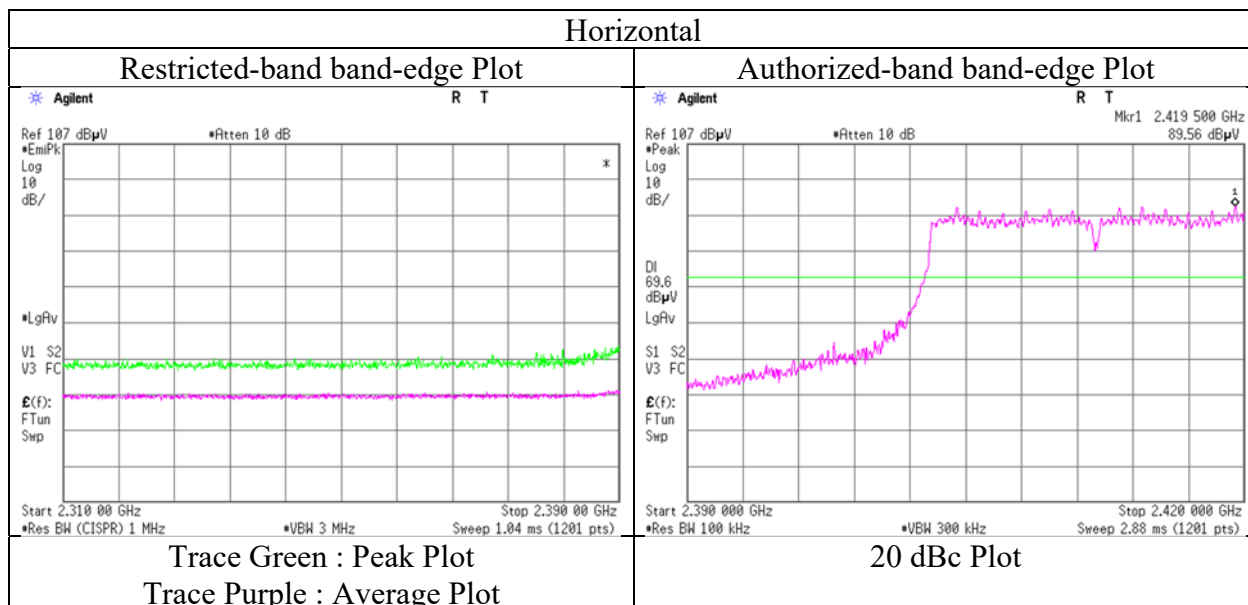
Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 10 GHz : 20log(3.80 m / 3.0 m) = 2.06 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	3
Date	October 16, 2021
Temperature / Humidity	23 deg.C, 53 %RH
Engineer	Takahiro Kawakami
	(1 GHz -2.8 GHz)
Mode	Tx 11n-20 2412 MHz



* 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 3
Date October 16, 2021
Temperature / Humidity 23 deg.C, 53 %RH
Engineer Takahiro Kawakami
 (1 GHz -2.8 GHz)
Mode Tx 11n-20 2417 MHz

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	2390.000	PK	58.37	28.33	14.42	41.62	2.06	61.56	73.9	12.3	111	311	-
Vert.	2390.000	PK	58.42	28.33	14.42	41.62	2.06	61.61	73.9	12.2	117	341	-

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

Distance factor : 1 GHz - 10 GHz : $20\log(3.80\text{ m} / 3.0\text{ m}) = 2.06\text{ dB}$

10 GHz - 40 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

Average measurement value with duty factor

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2390.000	AV	38.55	28.33	14.42	41.62	3.99	2.06	45.73	53.9	8.1	*1)
Vert.	2390.000	AV	39.08	28.33	14.42	41.62	3.99	2.06	46.26	53.9	7.6	*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 : $20\log(3.80\text{ m} / 3.0\text{ m}) = 2.06\text{ dB}$

10 GHz - 40 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

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.	2417.000	PK	92.36	28.28	14.45	41.63	2.06	95.52	-	-	Carrier
Hori.	2400.000	PK	49.54	28.31	14.44	41.63	2.06	52.72	75.5	22.7	-
Vert.	2417.000	PK	91.98	28.28	14.45	41.63	2.06	95.14	-	-	Carrier
Vert.	2400.000	PK	48.62	28.31	14.44	41.63	2.06	51.80	75.1	23.3	-

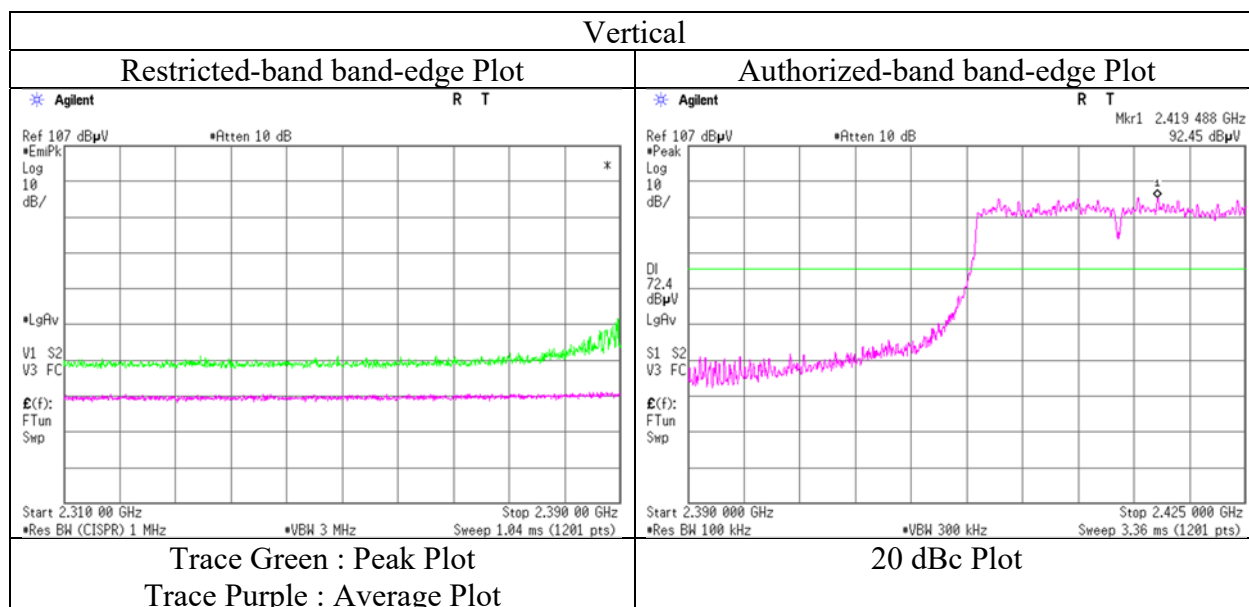
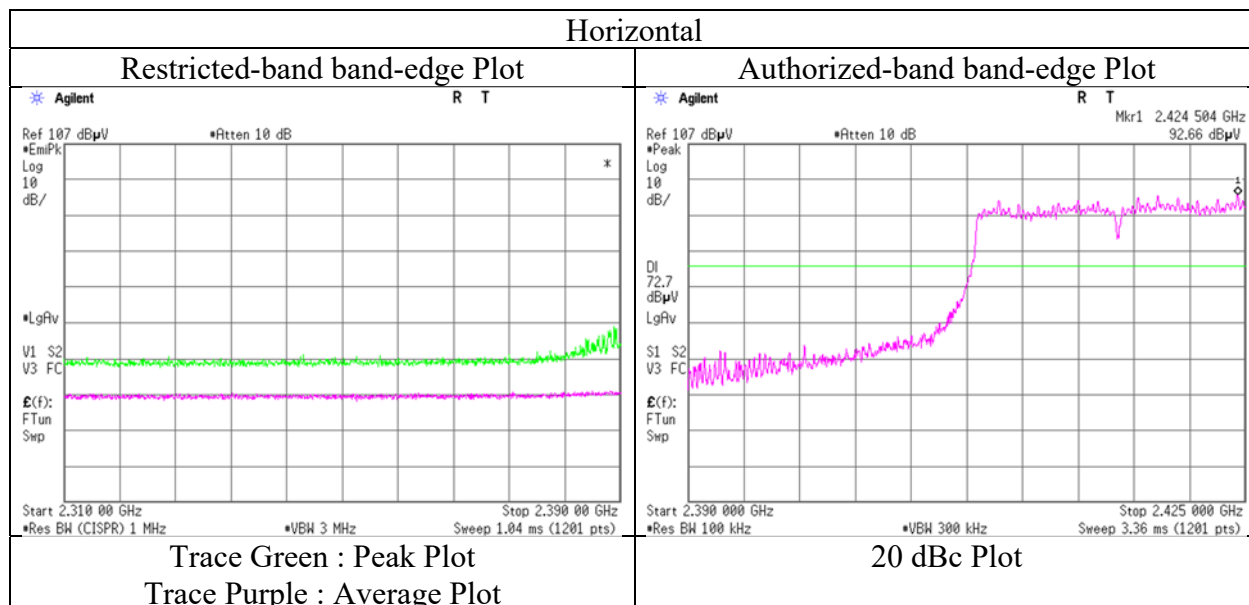
Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 10 GHz : $20\log(3.80\text{ m} / 3.0\text{ m}) = 2.06\text{ dB}$

10 GHz - 40 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

Radiated Spurious Emission (Reference Plot for band-edge)

Test place	Shonan EMC Lab.
Semi Anechoic Chamber	3
Date	October 16, 2021
Temperature / Humidity	23 deg.C, 53 %RH
Engineer	Takahiro Kawakami
	(1 GHz -2.8 GHz)
Mode	Tx 11n-20 2417 MHz



* 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	3	3	3
Date	October 16, 2021	October 17, 2021	October 22, 2021
Temperature / Humidity	23 deg.C, 53 %RH	22 deg.C, 56 %RH	22 deg.C, 41 %RH
Engineer	Takahiro Kawakami (1 GHz -2.8 GHz)	Yasumasa Owaki (2.8 GHz -18 GHz)	Yosuke Murakami (18 GHz -26.5 GHz)
Mode	Tx 11n-20 2437 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.	4874.000	PK	48.86	31.86	7.07	42.89	2.06	46.96	73.9	26.9	150	0	-
Hori.	7311.000	PK	48.49	37.51	8.55	43.51	2.06	53.10	73.9	20.8	150	0	-
Hori.	9748.000	PK	49.02	39.40	9.74	42.99	2.06	57.23	73.9	16.6	150	0	-
Hori.	4874.000	AV	39.00	31.86	7.07	42.89	2.06	37.10	53.9	16.8	150	0	Floor noise
Hori.	7311.000	AV	39.26	37.51	8.55	43.51	2.06	43.87	53.9	10.0	150	0	Floor noise
Hori.	9748.000	AV	39.95	39.40	9.74	42.99	2.06	48.16	53.9	5.7	150	0	Floor noise
Vert.	4874.000	PK	48.35	31.86	7.07	42.89	2.06	46.45	73.9	27.4	150	0	-
Vert.	7311.000	PK	49.47	37.51	8.55	43.51	2.06	54.08	73.9	19.8	150	0	-
Vert.	9748.000	PK	48.78	39.40	9.74	42.99	2.06	56.99	73.9	16.9	150	0	-
Vert.	4874.000	AV	39.13	31.86	7.07	42.89	2.06	37.23	53.9	16.6	150	0	Floor noise
Vert.	7311.000	AV	39.34	37.51	8.55	43.51	2.06	43.95	53.9	9.9	150	0	Floor noise
Vert.	9748.000	AV	39.63	39.40	9.74	42.99	2.06	47.84	53.9	6.0	150	0	Floor noise

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

Distance factor : 1 GHz - 10 GHz : $20\log(3.80\text{ m} / 3.0\text{ m}) = 2.06\text{ dB}$

10 GHz - 40 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

Radiated Spurious Emission

Test place Shonan EMC Lab.
Semi Anechoic Chamber 3
Date October 16, 2021
Temperature / Humidity 23 deg.C, 53 %RH
Engineer Takahiro Kawakami
 (1 GHz -2.8 GHz)
Mode Tx 11n-20 2457 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	57.95	28.24	14.52	41.65	2.06	61.12	73.9	12.7	144	313	-
Vert.	2483.500	PK	52.86	28.24	14.52	41.65	2.06	56.03	73.9	17.8	110	346	-

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

Distance factor : 1 GHz - 10 GHz : $20\log(3.80\text{ m} / 3.0\text{ m}) = 2.06\text{ dB}$

10 GHz - 40 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

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	40.12	28.24	14.52	41.65	3.99	2.06	47.28	53.9	6.6	*1)
Vert.	2483.500	AV	38.66	28.24	14.52	41.65	3.99	2.06	45.82	53.9	8.0	*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 : $20\log(3.80\text{ m} / 3.0\text{ m}) = 2.06\text{ dB}$

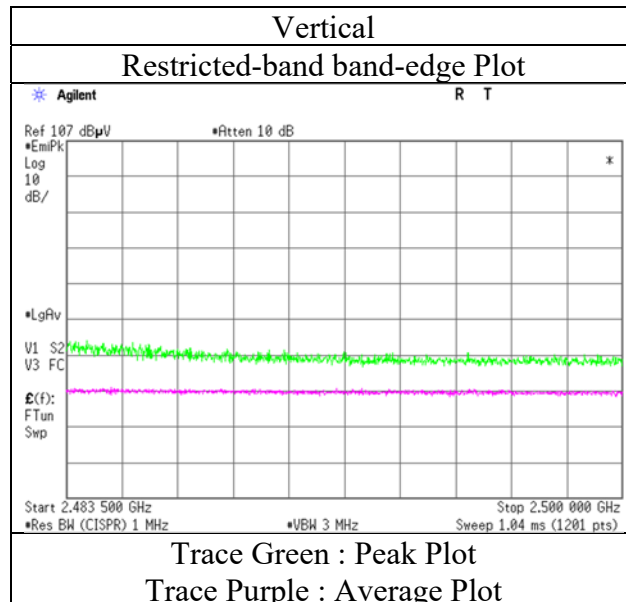
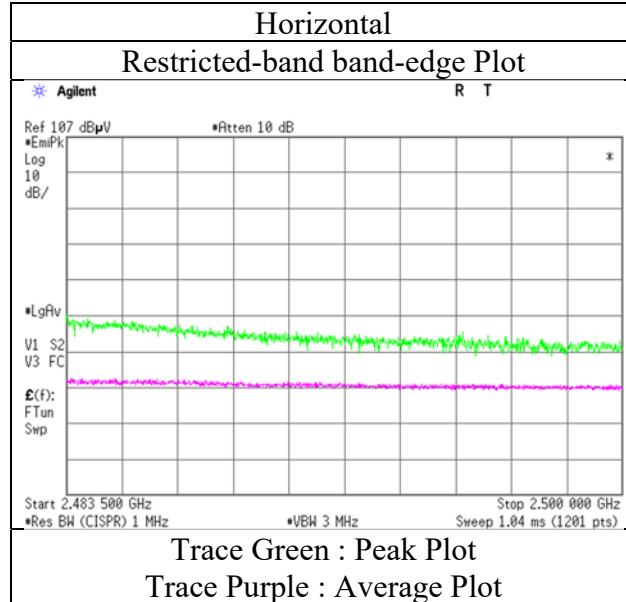
10 GHz - 40 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

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 3
Date October 16, 2021
Temperature / Humidity 23 deg.C, 53 %RH
Engineer Takahiro Kawakami
 (1 GHz -2.8 GHz)
Mode Tx 11n-20 2457 MHz



* 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	3	3	3
Date	October 16, 2021	October 17, 2021	October 22, 2021
Temperature / Humidity	23 deg.C, 53 %RH	22 deg.C, 56 %RH	22 deg.C, 41 %RH
Engineer	Takahiro Kawakami (1 GHz -2.8 GHz)	Yasumasa Owaki (2.8 GHz -18 GHz)	Yosuke Murakami (18 GHz -26.5 GHz)
Mode	Tx 11n-20 2462 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	58.46	28.24	14.52	41.65	2.06	61.63	73.9	12.2	154	310	-
Hori.	4924.000	PK	48.96	31.99	7.11	42.89	2.06	47.23	73.9	26.6	150	0	-
Hori.	7386.000	PK	48.87	37.61	8.60	43.59	2.06	53.55	73.9	20.3	150	0	-
Hori.	9848.000	PK	48.76	39.39	9.78	42.86	2.06	57.13	73.9	16.7	150	0	-
Hori.	4924.000	AV	39.13	31.99	7.11	42.89	2.06	37.40	53.9	16.5	150	0	Floor noise
Hori.	7386.000	AV	39.38	37.61	8.60	43.59	2.06	44.06	53.9	9.8	150	0	Floor noise
Hori.	9848.000	AV	39.78	39.39	9.78	42.86	2.06	48.15	53.9	5.7	150	0	Floor noise
Vert.	2483.500	PK	58.52	28.24	14.52	41.65	2.06	61.69	73.9	12.2	147	126	-
Vert.	4924.000	PK	48.74	31.99	7.11	42.89	2.06	47.01	73.9	26.8	150	0	-
Vert.	7386.000	PK	48.86	37.61	8.60	43.59	2.06	53.54	73.9	20.3	150	0	-
Vert.	9848.000	PK	48.88	39.39	9.78	42.86	2.06	57.25	73.9	16.6	150	0	-
Vert.	4924.000	AV	39.28	31.99	7.11	42.89	2.06	37.55	53.9	16.3	150	0	Floor noise
Vert.	7386.000	AV	39.41	37.61	8.60	43.59	2.06	44.09	53.9	9.8	150	0	Floor noise
Vert.	9848.000	AV	39.36	39.39	9.78	42.86	2.06	47.73	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(3.80 m / 3.0 m) = 2.06 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	39.32	28.24	14.52	41.65	3.99	2.06	46.48	53.9	7.4	*1)
Vert.	2483.500	AV	40.25	28.24	14.52	41.65	3.99	2.06	47.41	53.9	6.4	*1)

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

Distance factor : 1 GHz - 10 GHz : 20log(3.80 m / 3.0 m) = 2.06 dB

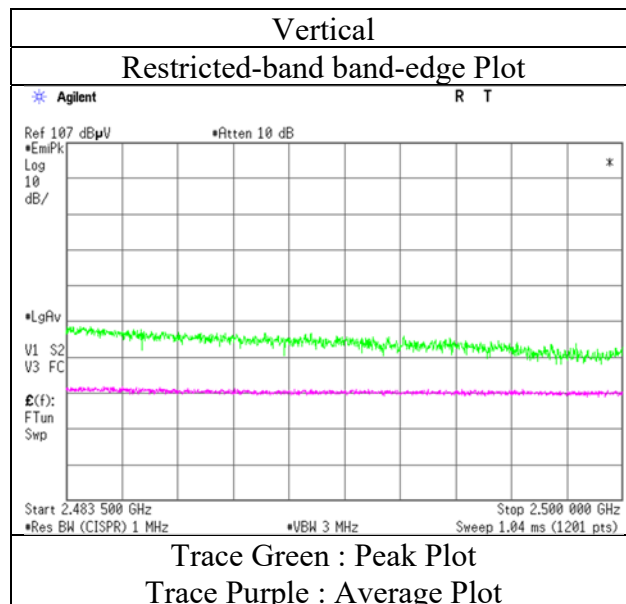
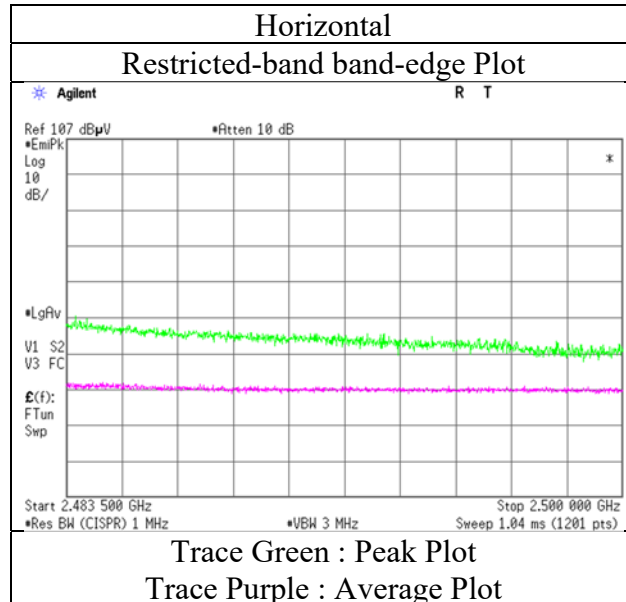
10 GHz - 40 GHz : 20log(1.0 m / 3.0 m) = -9.54 dB

Duty factor refer to "Burst rate confirmation" sheet.

*1) Not out of band emission (Leakage Power)

Radiated Spurious Emission (Reference Plot for band-edge)

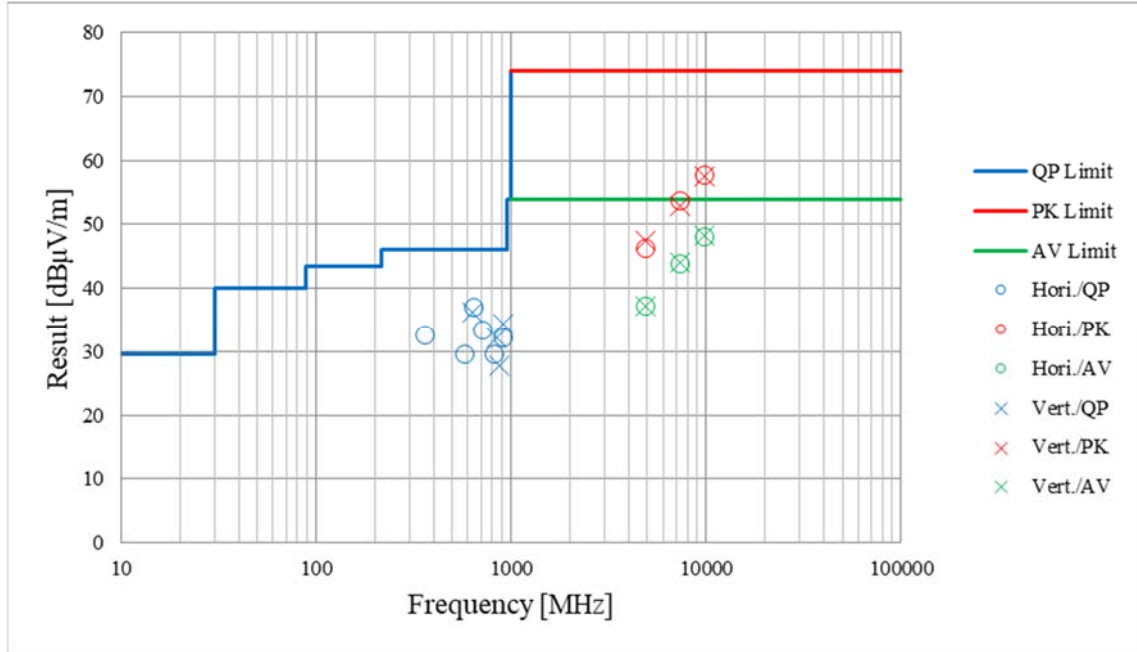
Test place Shonan EMC Lab.
Semi Anechoic Chamber 3
Date October 16, 2021
Temperature / Humidity 23 deg.C, 53 %RH
Engineer Takahiro Kawakami
 (1 GHz -2.8 GHz)
Mode Tx 11n-20 2462 MHz



* 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	3	3	3	3
Date	October 25, 2021	October 16, 2021	October 17, 2021	October 22, 2021
Temperature / Humidity	21 deg.C, 41 %RH	23 deg.C, 53 %RH	22 deg.C, 56 %RH	22 deg.C, 41 %RH
Engineer	Miku Ikudome	Takahiro Kawakami	Yasumasa Owaki	Yosuke Murakami
	(30 MHz -1 GHz)	(1 GHz -2.8 GHz)	(2.8 GHz -18 GHz)	(18 GHz -26.5 GHz)
Mode	Tx 11g 2437 MHz			



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

Radiated Spurious Emission

Report No. 14033198S-B-R1
 Test place Shonan EMC Lab.
 Semi Anechoic Chamber 3 3 3 3
 Date October 25, 2021 October 20, 2021 October 18, 2021 October 22, 2021
 Temperature / Humidity 21 deg.C, 41 %RH 20 deg.C, 53 %RH 22 deg.C, 40 %RH 22 deg.C, 41 %RH
 Engineer Takahiro Suzuki Yosuke Murakami Yosuke Murakami Yosuke Murakami
 (30 MHz -1 GHz) (1 GHz -2.8 GHz) (2.8 GHz -10 GHz) (10 GHz -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.	543.220	QP	32.66	17.75	9.68	31.95	0.00	28.14	46.0	17.8	100	185	-
Hori.	650.290	QP	39.63	19.15	10.07	31.92	0.00	36.93	46.0	9.0	140	29	-
Hori.	697.356	QP	32.03	19.92	10.28	31.83	0.00	30.40	46.0	15.6	100	3	-
Hori.	833.348	QP	30.25	21.15	10.73	31.40	0.00	30.73	46.0	15.2	100	153	-
Hori.	913.996	QP	32.09	22.07	10.98	30.91	0.00	34.23	46.0	11.7	100	257	-
Hori.	2347.042	PK	48.41	28.44	14.38	41.61	2.06	51.68	73.9	22.2	224	53	-
Hori.	2390.000	PK	47.23	28.33	14.42	41.62	2.06	50.42	73.9	23.4	224	53	-
Hori.	4804.000	PK	51.55	31.77	7.02	42.89	2.06	49.51	73.9	24.3	150	213	-
Hori.	7206.000	PK	51.33	37.37	8.49	43.39	2.06	55.86	73.9	18.0	179	21	-
Hori.	9608.000	PK	49.61	39.12	9.66	43.18	2.06	57.27	73.9	16.6	150	0	-
Hori.	9608.000	AV	39.38	39.12	9.66	43.18	2.06	47.04	53.9	6.8	150	0	Floor noise
Vert.	549.066	QP	38.28	17.89	9.71	31.96	0.00	33.92	46.0	12.0	100	156	-
Vert.	626.815	QP	36.23	19.44	9.99	31.91	0.00	33.75	46.0	12.2	100	223	-
Vert.	637.979	QP	37.03	19.25	10.03	31.92	0.00	34.39	46.0	11.6	100	230	-
Vert.	848.634	QP	32.21	21.45	10.79	31.34	0.00	33.11	46.0	12.8	148	357	-
Vert.	913.999	QP	31.84	22.07	10.98	30.91	0.00	33.98	46.0	12.0	100	180	-
Vert.	2390.000	PK	48.79	28.33	14.42	41.62	2.06	51.98	73.9	21.9	173	350	-
Vert.	4804.000	PK	49.88	31.77	7.02	42.89	2.06	47.84	73.9	26.0	209	133	-
Vert.	7206.000	PK	53.05	37.37	8.49	43.39	2.06	57.58	73.9	16.3	168	175	-
Vert.	9608.000	PK	49.41	39.12	9.66	43.18	2.06	57.07	73.9	16.8	150	0	-
Vert.	9608.000	AV	39.17	39.12	9.66	43.18	2.06	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 (3.80 m / 3.0 m) = 2.06 dB

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

Peak measurement value with Duty cycle correction factor (DCCF)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	DCCF [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2347.042	PK	48.41	28.44	14.38	41.61	-22.15	2.06	29.53	53.9	24.3	*1)
Hori.	2390.000	PK	47.23	28.33	14.42	41.62	-22.15	2.06	28.27	53.9	25.6	*1)
Hori.	4804.000	PK	51.55	31.77	7.02	42.89	-22.15	2.06	27.36	53.9	26.5	-
Hori.	7206.000	PK	51.33	37.37	8.49	43.39	-22.15	2.06	33.71	53.9	20.1	-
Vert.	2390.000	PK	48.79	28.33	14.42	41.62	-22.15	2.06	29.83	53.9	24.0	*1)
Vert.	4804.000	PK	49.88	31.77	7.02	42.89	-22.15	2.06	25.69	53.9	28.2	-
Vert.	7206.000	PK	53.05	37.37	8.49	43.39	-22.15	2.06	35.43	53.9	18.4	-

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

Distance factor : 1 GHz - 10 GHz : 20log (3.80 m / 3.0 m) = 2.06 dB

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

Duty cycle correction factor (DCCF) refer to "Duty cycle correction factor" 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	93.94	28.31	14.44	41.63	2.06	97.12	-	-	Carrier
Hori.	2399.633	PK	43.75	28.31	14.44	41.63	2.06	46.93	77.1	30.1	-
Hori.	2400.000	PK	41.02	28.31	14.44	41.63	2.06	44.20	77.1	32.9	-
Vert.	2402.000	PK	95.80	28.31	14.44	41.63	2.06	98.98	-	-	Carrier
Vert.	2399.662	PK	46.13	28.31	14.44	41.63	2.06	49.31	78.9	29.5	-
Vert.	2400.000	PK	41.52	28.31	14.44	41.63	2.06	44.70	78.9	34.2	-

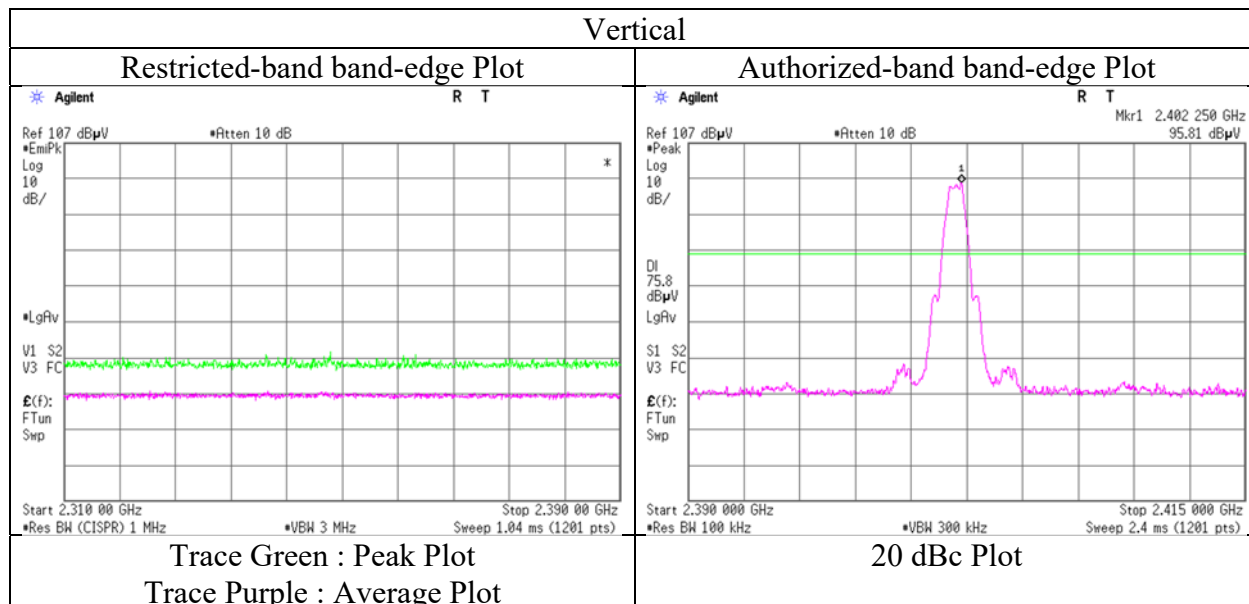
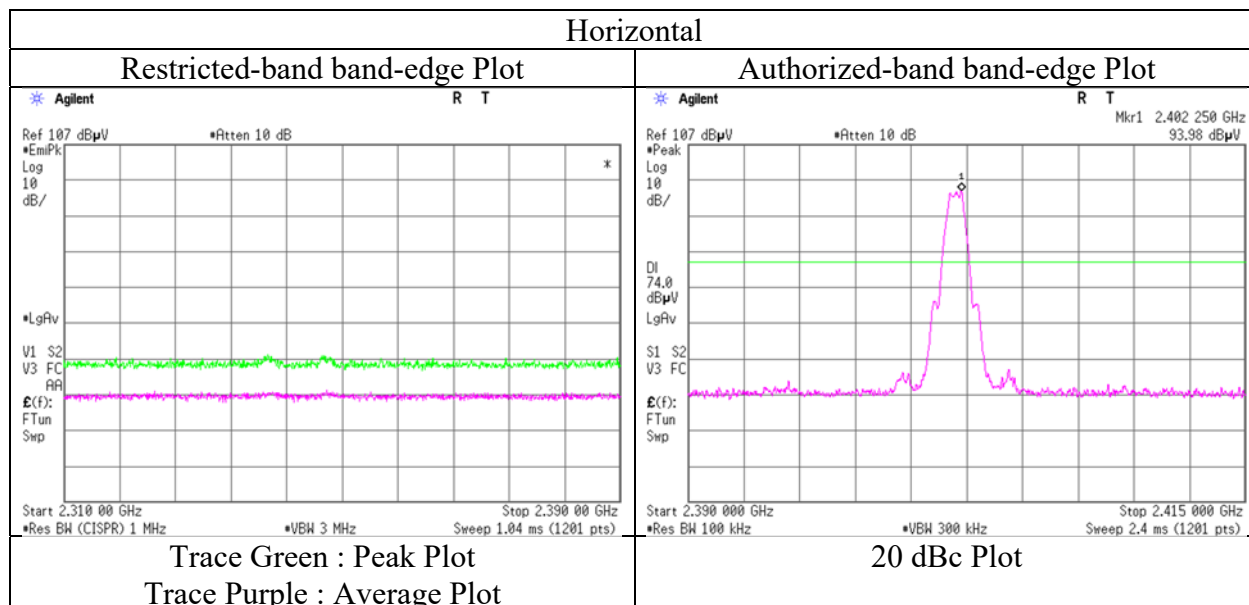
Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 10 GHz : 20log (3.80 m / 3.0 m) = 2.06 dB

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

Radiated Spurious Emission (Reference Plot for band-edge)

Report No.	14033198S-B-R1
Test place	Shonan EMC Lab.
Semi Anechoic Chamber	3
Date	October 20, 2021
Temperature / Humidity	20 deg.C, 53 %RH
Engineer	Yosuke Murakami
Mode	Tx BT LE 1 M-PHY 2402 MHz



* 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

Report No.	14033198S-B-R1			
Test place	Shonan EMC Lab.			
Semi Anechoic Chamber	3	3	3	3
Date	October 25, 2021	October 20, 2021	October 18, 2021	October 22, 2021
Temperature / Humidity	21 deg.C, 41 %RH	20 deg.C, 53 %RH	22 deg.C, 40 %RH	22 deg.C, 41 %RH
Engineer	Takahiro Suzuki	Yosuke Murakami	Yosuke Murakami	Yosuke Murakami
	(30 MHz -1 GHz)	(1 GHz -2.8 GHz)	(2.8 GHz -10 GHz)	(10 GHz -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.	542.907	QP	34.64	17.75	9.68	31.95	0.00	30.12	46.0	15.8	134	217	-
Hori.	649.381	QP	39.47	19.16	10.07	31.92	0.00	36.78	46.0	9.2	141	27	-
Hori.	697.309	QP	31.85	19.92	10.28	31.83	0.00	30.22	46.0	15.7	100	174	-
Hori.	832.722	QP	29.29	21.13	10.73	31.41	0.00	29.74	46.0	16.2	100	225	-
Hori.	914.010	QP	31.96	22.07	10.98	30.91	0.00	34.10	46.0	11.9	100	294	-
Hori.	4880.000	PK	48.25	31.87	7.08	42.89	2.06	46.37	73.9	27.5	158	352	-
Hori.	7320.000	PK	50.59	37.53	8.57	43.52	2.06	55.23	73.9	18.6	151	130	-
Hori.	9760.000	PK	48.69	39.41	9.74	42.98	2.06	56.92	73.9	16.9	150	0	-
Hori.	9760.000	AV	39.39	39.41	9.74	42.98	2.06	47.62	53.9	6.2	150	0	Floor noise
Vert.	548.401	QP	36.89	17.88	9.70	31.96	0.00	32.51	46.0	13.4	100	147	-
Vert.	626.206	QP	36.75	19.46	9.98	31.91	0.00	34.28	46.0	11.7	100	197	-
Vert.	637.834	QP	36.62	19.25	10.03	31.92	0.00	33.98	46.0	12.0	100	234	-
Vert.	848.714	QP	31.77	21.45	10.79	31.34	0.00	32.67	46.0	13.3	154	357	-
Vert.	913.978	QP	31.74	22.07	10.98	30.91	0.00	33.88	46.0	12.1	100	187	-
Vert.	4880.000	PK	49.84	31.87	7.08	42.89	2.06	47.96	73.9	25.9	154	193	-
Vert.	7320.000	PK	51.40	37.53	8.57	43.52	2.06	56.04	73.9	17.8	151	20	-
Vert.	9760.000	PK	48.22	39.41	9.74	42.98	2.06	56.45	73.9	17.4	150	0	-
Vert.	9760.000	AV	39.38	39.41	9.74	42.98	2.06	47.61	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 (3.80 m / 3.0 m) = 2.06 dB

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

Peak measurement value with Duty cycle correction factor (DCCF)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	DCCF [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	4880.000	PK	48.25	31.87	7.08	42.89	-22.15	2.06	24.22	53.9	29.6	-
Hori.	7320.000	PK	50.59	37.53	8.57	43.52	-22.15	2.06	33.08	53.9	20.8	-
Vert.	4880.000	PK	49.84	31.87	7.08	42.89	-22.15	2.06	25.81	53.9	28.0	-
Vert.	7320.000	PK	51.40	37.53	8.57	43.52	-22.15	2.06	33.89	53.9	20.0	-

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

Distance factor : 1 GHz - 10 GHz : 20log (3.80 m / 3.0 m) = 2.06 dB

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

Duty cycle correction factor (DCCF) refer to "Duty cycle correction factor" sheet.

Radiated Spurious Emission

Report No. 14033198S-B-R1
 Test place Shonan EMC Lab.
 Semi Anechoic Chamber 3 3 3 3
 Date October 25, 2021 October 20, 2021 October 18, 2021 October 22, 2021
 Temperature / Humidity 21 deg.C, 41 %RH 20 deg.C, 53 %RH 22 deg.C, 40 %RH 22 deg.C, 41 %RH
 Engineer Takahiro Suzuki Yosuke Murakami Yosuke Murakami Yosuke Murakami
 (30 MHz -1 GHz) (1 GHz -2.8 GHz) (2.8 GHz -10 GHz) (10 GHz -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.	555.041	QP	35.67	18.04	9.73	31.95	0.00	31.49	46.0	14.5	100	116	-
Hori.	649.418	QP	36.98	19.16	10.07	31.92	0.00	34.29	46.0	11.7	115	335	-
Hori.	697.263	QP	32.17	19.92	10.28	31.83	0.00	30.54	46.0	15.4	100	169	-
Hori.	837.874	QP	30.26	21.22	10.75	31.38	0.00	30.85	46.0	15.1	100	225	-
Hori.	913.982	QP	31.24	22.07	10.98	30.91	0.00	33.38	46.0	12.6	100	265	-
Hori.	2483.500	PK	47.68	28.24	14.52	41.65	2.06	50.85	73.9	23.0	160	43	-
Hori.	2487.776	PK	48.37	28.24	14.52	41.66	2.06	51.53	73.9	22.3	160	43	-
Hori.	4960.000	PK	48.25	32.14	7.14	42.89	2.06	46.70	73.9	27.2	173	250	-
Hori.	7440.000	PK	50.69	37.62	8.64	43.65	2.06	55.36	73.9	18.5	101	281	-
Hori.	9920.000	PK	48.01	39.30	9.83	42.77	2.06	56.43	73.9	17.4	150	0	-
Hori.	9920.000	AV	38.88	39.30	9.83	42.77	2.06	47.30	53.9	6.6	150	0	Floor noise
Vert.	549.602	QP	37.13	17.90	9.71	31.96	0.00	32.78	46.0	13.2	100	158	-
Vert.	626.211	QP	36.04	19.46	9.98	31.91	0.00	33.57	46.0	12.4	100	222	-
Vert.	638.563	QP	36.76	19.24	10.03	31.92	0.00	34.11	46.0	11.8	100	181	-
Vert.	848.727	QP	32.31	21.45	10.79	31.34	0.00	33.21	46.0	12.7	152	17	-
Vert.	914.002	QP	32.09	22.07	10.98	30.91	0.00	34.23	46.0	11.7	100	188	-
Vert.	2483.500	PK	48.14	28.24	14.52	41.65	2.06	51.31	73.9	22.5	103	341	-
Vert.	2487.776	PK	49.55	28.24	14.52	41.65	2.06	52.72	73.9	21.1	103	341	-
Vert.	4960.000	PK	48.82	32.14	7.14	42.89	2.06	47.27	73.9	26.6	151	349	-
Vert.	7440.000	PK	51.68	37.62	8.64	43.65	2.06	56.35	73.9	17.5	125	29	-
Vert.	9920.000	PK	47.89	39.30	9.83	42.77	2.06	56.31	73.9	17.5	150	0	-
Vert.	9920.000	AV	39.00	39.30	9.83	42.77	2.06	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 : $20\log(3.80\text{ m} / 3.0\text{ m}) = 2.06\text{ dB}$ 10 GHz - 40 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$ **Peak measurement value with Duty cycle correction factor (DCCF)**

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	DCCF [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2483.500	PK	47.68	28.24	14.52	41.65	-22.15	2.06	28.70	53.9	25.2	*1)
Hori.	2487.776	PK	48.37	28.24	14.52	41.66	-22.15	2.06	29.38	53.9	24.5	*1)
Hori.	4960.000	PK	48.25	32.14	7.14	42.89	-22.15	2.06	24.55	53.9	29.3	-
Hori.	7440.000	PK	50.69	37.62	8.64	43.65	-22.15	2.06	33.21	53.9	20.6	-
Vert.	2483.500	PK	48.14	28.24	14.52	41.65	-22.15	2.06	29.16	53.9	24.7	*1)
Vert.	2487.776	PK	49.55	28.24	14.52	41.65	-22.15	2.06	30.57	53.9	23.3	*1)
Vert.	4960.000	PK	48.82	32.14	7.14	42.89	-22.15	2.06	25.12	53.9	28.7	-
Vert.	7440.000	PK	51.68	37.62	8.64	43.65	-22.15	2.06	34.20	53.9	19.7	-

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

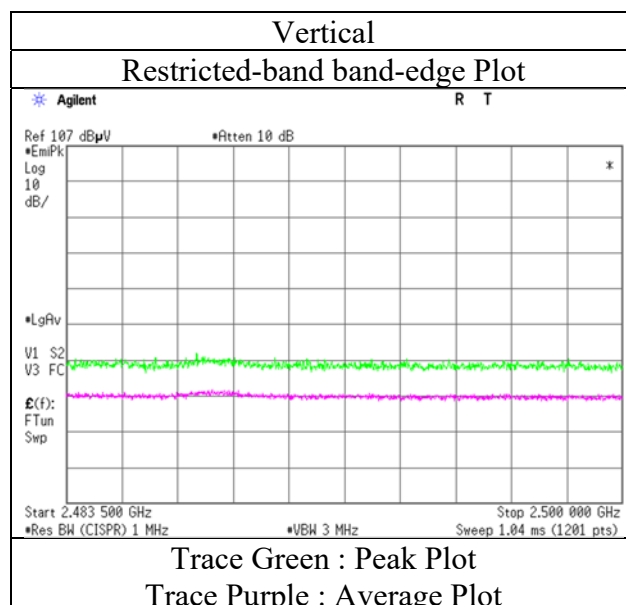
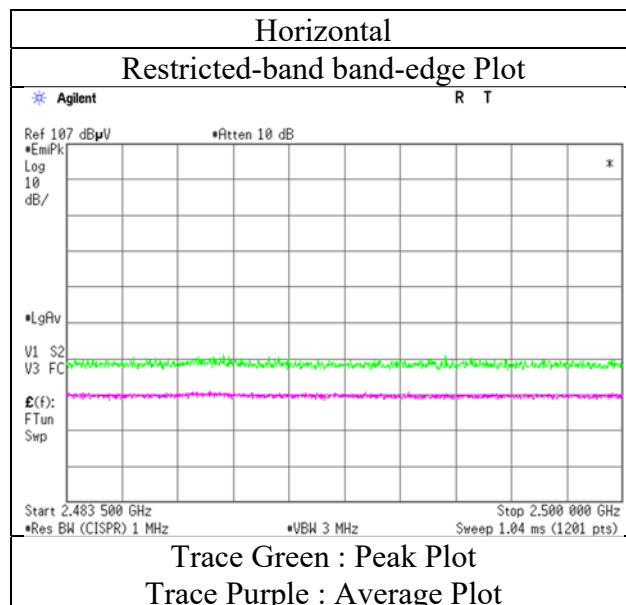
Distance factor : 1 GHz - 10 GHz : $20\log(3.80\text{ m} / 3.0\text{ m}) = 2.06\text{ dB}$ 10 GHz - 40 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

Duty cycle correction factor (DCCF) refer to "Duty cycle correction factor" sheet.

*1) Not out of band emission (Leakage Power)

Radiated Spurious Emission (Reference Plot for band-edge)

Report No.	14033198S-B-R1
Test place	Shonan EMC Lab.
Semi Anechoic Chamber	3
Date	October 20, 2021
Temperature / Humidity	20 deg.C, 53 %RH
Engineer	Yosuke Murakami
Mode	Tx BT LE 1 M-PHY 2480 MHz



* 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

Report No. 14033198S-B-R1
 Test place Shonan EMC Lab.
 Semi Anechoic Chamber 3 3 3 3
 Date October 25, 2021 October 20, 2021 October 18, 2021 October 22, 2021
 Temperature / Humidity 21 deg.C, 41 %RH 20 deg.C, 53 %RH 22 deg.C, 40 %RH 22 deg.C, 41 %RH
 Engineer Takahiro Suzuki Yosuke Murakami Yosuke Murakami Yosuke Murakami
 (30 MHz -1 GHz) (1 GHz -2.8 GHz) (2.8 GHz -10 GHz) (10 GHz -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.	552.297	QP	36.83	17.98	9.72	31.96	0.00	32.57	46.0	13.4	201	181	-
Hori.	649.402	QP	39.51	19.16	10.07	31.92	0.00	36.82	46.0	9.1	143	38	-
Hori.	697.272	QP	31.75	19.92	10.28	31.83	0.00	30.12	46.0	15.8	100	162	-
Hori.	837.464	QP	31.33	21.21	10.74	31.39	0.00	31.89	46.0	14.1	100	225	-
Hori.	913.972	QP	31.14	22.07	10.98	30.91	0.00	33.28	46.0	12.7	100	264	-
Hori.	2325.800	PK	51.41	28.48	14.36	41.60	2.06	54.71	73.9	19.1	225	51	-
Hori.	2390.000	PK	47.99	28.33	14.42	41.62	2.06	51.18	73.9	22.7	225	51	-
Hori.	4804.000	PK	49.82	31.77	7.02	42.89	2.06	47.78	73.9	26.1	100	260	-
Hori.	7206.000	PK	51.84	37.37	8.49	43.39	2.06	56.37	73.9	17.5	336	141	-
Hori.	9608.000	PK	49.06	39.12	9.66	43.18	2.06	56.72	73.9	17.1	150	0	-
Hori.	9608.000	AV	39.12	39.12	9.66	43.18	2.06	46.78	53.9	7.1	150	0	Floor noise
Vert.	548.915	QP	37.61	17.89	9.71	31.96	0.00	33.25	46.0	12.7	100	156	-
Vert.	626.160	QP	35.74	19.46	9.98	31.91	0.00	33.27	46.0	12.7	100	171	-
Vert.	637.913	QP	36.83	19.25	10.03	31.92	0.00	34.19	46.0	11.8	100	223	-
Vert.	848.650	QP	32.00	21.45	10.79	31.34	0.00	32.90	46.0	13.1	145	3	-
Vert.	913.981	QP	32.06	22.07	10.98	30.91	0.00	34.20	46.0	11.8	100	181	-
Vert.	2337.600	PK	50.95	28.46	14.37	41.60	2.06	54.24	73.9	19.6	117	345	-
Vert.	2390.000	PK	47.66	28.33	14.42	41.62	2.06	50.85	73.9	23.0	117	345	-
Vert.	4804.000	PK	49.39	31.77	7.02	42.89	2.06	47.35	73.9	26.5	152	254	-
Vert.	7206.000	PK	51.20	37.37	8.49	43.39	2.06	55.73	73.9	18.1	167	175	-
Vert.	9608.000	PK	49.23	39.12	9.66	43.18	2.06	56.89	73.9	17.0	150	0	-
Vert.	9608.000	AV	39.29	39.12	9.66	43.18	2.06	46.95	53.9	6.9	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(3.80 m / 3.0 m) = 2.06 dB

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

Peak measurement value with Duty cycle correction factor (DCCF)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	DCCF [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2325.800	PK	51.41	28.48	14.36	41.60	-28.17	2.06	26.54	53.9	27.3	*1)
Hori.	2390.000	PK	47.99	28.33	14.42	41.62	-28.17	2.06	23.01	53.9	30.8	*1)
Hori.	4804.000	PK	49.82	31.77	7.02	42.89	-28.17	2.06	19.61	53.9	34.2	-
Hori.	7206.000	PK	51.84	37.37	8.49	43.39	-28.17	2.06	28.20	53.9	25.7	-
Vert.	2337.600	PK	50.95	28.46	14.37	41.60	-28.17	2.06	26.07	53.9	27.8	-
Vert.	2390.000	PK	47.66	28.33	14.42	41.62	-28.17	2.06	22.68	53.9	31.2	*1)
Vert.	4804.000	PK	49.39	31.77	7.02	42.89	-28.17	2.06	19.18	53.9	34.7	-
Vert.	7206.000	PK	51.20	37.37	8.49	43.39	-28.17	2.06	27.56	53.9	26.3	-

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

Distance factor : 1 GHz - 10 GHz : 20log(3.80 m / 3.0 m) = 2.06 dB

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

Duty cycle correction factor (DCCF) refer to "Duty cycle correction factor" sheet.

*1) Not out of band emission (Leakage Power)

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2402.000	PK	92.99	28.31	14.44	41.63	2.06	96.17	-	-	Carrier
Hori.	2400.000	PK	61.14	28.31	14.44	41.63	2.06	64.32	76.1	11.7	-
Vert.	2402.000	PK	95.53	28.31	14.44	41.63	2.06	98.71	-	-	Carrier
Vert.	2400.000	PK	63.51	28.31	14.44	41.63	2.06	66.69	78.7	12.0	-

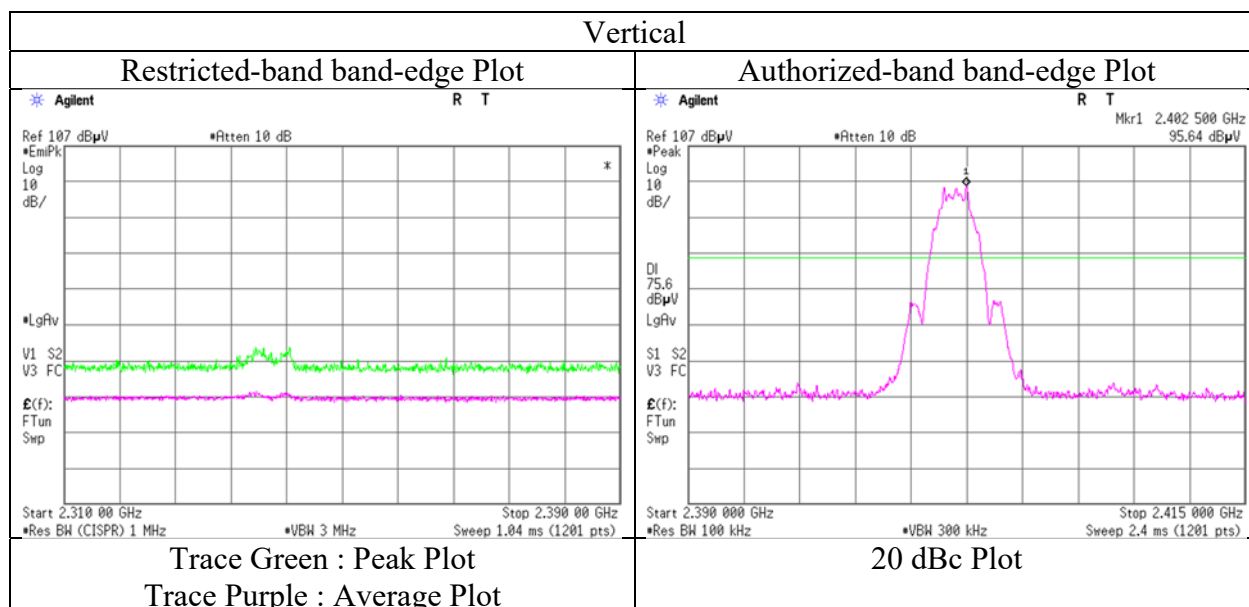
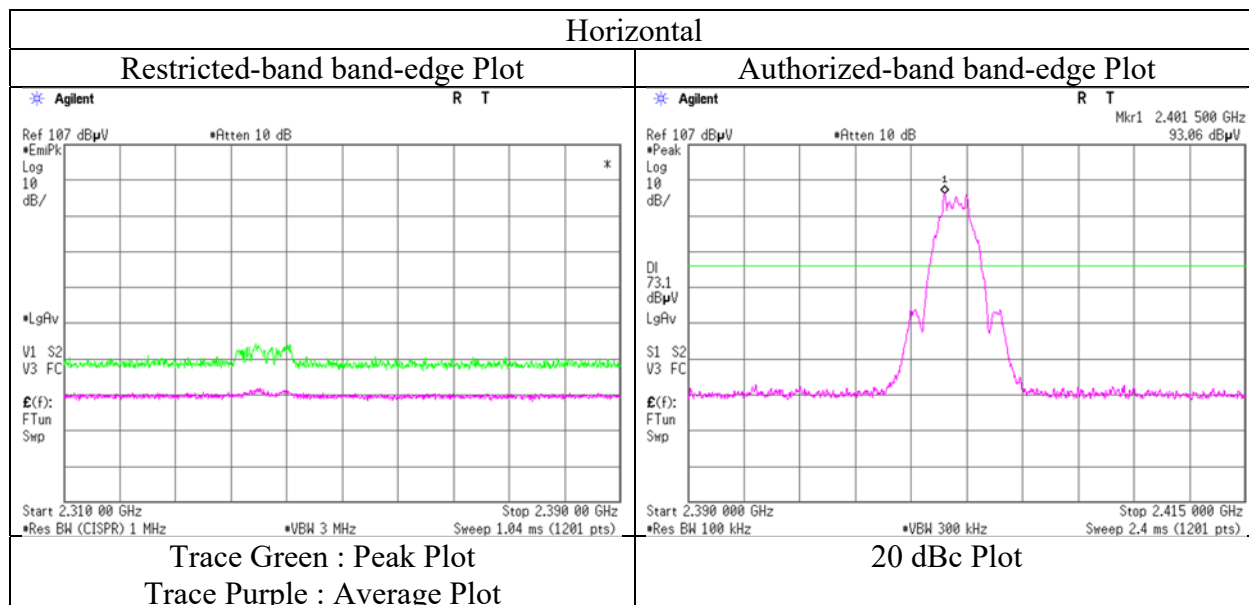
Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 10 GHz : 20log(3.80 m / 3.0 m) = 2.06 dB

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

Radiated Spurious Emission (Reference Plot for band-edge)

Report No.	14033198S-B-R1
Test place	Shonan EMC Lab.
Semi Anechoic Chamber	3
Date	October 20, 2021
Temperature / Humidity	20 deg.C, 53 %RH
Engineer	Yosuke Murakami
Mode	Tx BT LE 2 M-PHY 2402 MHz



* 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

Report No. 14033198S-B-R1
 Test place Shonan EMC Lab.
 Semi Anechoic Chamber 3 3 3 3
 Date October 25, 2021 October 20, 2021 October 18, 2021 October 22, 2021
 Temperature / Humidity 21 deg.C, 41 %RH 20 deg.C, 53 %RH 22 deg.C, 40 %RH 22 deg.C, 41 %RH
 Engineer Takahiro Suzuki Yosuke Murakami Yosuke Murakami Yosuke Murakami
 (30 MHz -1 GHz) (1 GHz -2.8 GHz) (2.8 GHz -10 GHz) (10 GHz -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.	540.296	QP	36.12	17.68	9.67	31.95	0.00	31.52	46.0	14.4	100	185	-
Hori.	650.033	QP	39.67	19.15	10.07	31.92	0.00	36.97	46.0	9.0	152	30	-
Hori.	697.417	QP	34.75	19.92	10.28	31.83	0.00	33.12	46.0	12.8	113	173	-
Hori.	828.198	QP	29.19	21.07	10.71	31.43	0.00	29.54	46.0	16.4	100	225	-
Hori.	913.980	QP	31.18	22.07	10.98	30.91	0.00	33.32	46.0	12.6	100	266	-
Hori.	4880.000	PK	48.61	31.87	7.08	42.89	2.06	46.73	73.9	27.1	164	56	-
Hori.	7320.000	PK	50.75	37.53	8.57	43.52	2.06	55.39	73.9	18.5	186	97	-
Hori.	9760.000	PK	48.30	39.41	9.74	42.98	2.06	56.53	73.9	17.3	150	0	-
Hori.	9760.000	AV	39.29	39.41	9.74	42.98	2.06	47.52	53.9	6.3	150	0	Floor noise
Vert.	548.816	QP	37.13	17.89	9.70	31.96	0.00	32.76	46.0	13.2	100	166	-
Vert.	626.020	QP	38.05	19.46	9.98	31.91	0.00	35.58	46.0	10.4	144	185	-
Vert.	638.048	QP	38.34	19.25	10.03	31.92	0.00	35.70	46.0	10.3	141	183	-
Vert.	848.717	QP	32.17	21.45	10.79	31.34	0.00	33.07	46.0	12.9	161	359	-
Vert.	914.012	QP	32.02	22.07	10.98	30.91	0.00	34.16	46.0	11.8	100	176	-
Vert.	4880.000	PK	48.77	31.87	7.08	42.89	2.06	46.89	73.9	27.0	196	207	-
Vert.	7320.000	PK	50.87	37.53	8.57	43.52	2.06	55.51	73.9	18.3	101	30	-
Vert.	9760.000	PK	48.50	39.41	9.74	42.98	2.06	56.73	73.9	17.1	150	0	-
Vert.	9760.000	AV	39.71	39.41	9.74	42.98	2.06	47.94	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(3.80 m / 3.0 m) = 2.06 dB

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

Peak measurement value with Duty cycle correction factor (DCCF)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	DCCF [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	4880.000	PK	48.61	31.87	7.08	42.89	-28.17	2.06	18.56	53.9	35.3	-
Hori.	7320.000	PK	50.75	37.53	8.57	43.52	-28.17	2.06	27.22	53.9	26.6	-
Vert.	4880.000	PK	48.77	31.87	7.08	42.89	-28.17	2.06	18.72	53.9	35.1	-
Vert.	7320.000	PK	50.87	37.53	8.57	43.52	-28.17	2.06	27.34	53.9	26.5	-

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

Distance factor : 1 GHz - 10 GHz : 20log(3.80 m / 3.0 m) = 2.06 dB

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

Duty cycle correction factor (DCCF) refer to "Duty cycle correction factor" sheet.

Radiated Spurious Emission

Report No. 14033198S-B-R1
 Test place Shonan EMC Lab.
 Semi Anechoic Chamber 3 3 3 3
 Date October 25, 2021 October 20, 2021 October 18, 2021 October 22, 2021
 Temperature / Humidity 21 deg.C, 41 %RH 20 deg.C, 53 %RH 22 deg.C, 40 %RH 22 deg.C, 41 %RH
 Engineer Takahiro Suzuki Yosuke Murakami Yosuke Murakami Yosuke Murakami
 (30 MHz -1 GHz) (1 GHz -2.8 GHz) (2.8 GHz -10 GHz) (10 GHz -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.	539.753	QP	36.26	17.67	9.66	31.95	0.00	31.64	46.0	14.3	100	178	-
Hori.	649.383	QP	39.31	19.16	10.07	31.92	0.00	36.62	46.0	9.3	142	29	-
Hori.	697.497	QP	39.37	19.92	10.28	31.83	0.00	37.74	46.0	8.2	128	6	-
Hori.	824.557	QP	31.04	21.02	10.70	31.44	0.00	31.32	46.0	14.6	100	218	-
Hori.	913.996	QP	32.18	22.07	10.98	30.91	0.00	34.32	46.0	11.6	100	186	-
Hori.	2483.500	PK	48.78	28.24	14.52	41.65	2.06	51.95	73.9	21.9	157	42	-
Hori.	4960.000	PK	48.56	32.14	7.14	42.89	2.06	47.01	73.9	26.8	124	205	-
Hori.	7440.000	PK	49.25	37.62	8.64	43.65	2.06	53.92	73.9	19.9	102	282	-
Hori.	9920.000	PK	48.30	39.30	9.83	42.77	2.06	56.72	73.9	17.1	150	0	-
Hori.	9920.000	AV	38.95	39.30	9.83	42.77	2.06	47.37	53.9	6.5	150	0	Floor noise
Vert.	548.851	QP	36.79	17.89	9.70	31.96	0.00	32.42	46.0	13.5	100	151	-
Vert.	626.271	QP	38.22	19.45	9.98	31.91	0.00	35.74	46.0	10.2	151	185	-
Vert.	637.739	QP	38.64	19.25	10.03	31.92	0.00	36.00	46.0	10.0	147	179	-
Vert.	848.618	QP	32.25	21.45	10.79	31.34	0.00	33.15	46.0	12.8	156	1	-
Vert.	913.976	QP	32.13	22.07	10.98	30.91	0.00	34.27	46.0	11.7	100	182	-
Vert.	2483.500	PK	49.58	28.24	14.52	41.65	2.06	52.75	73.9	21.1	103	340	-
Vert.	4960.000	PK	47.78	32.14	7.14	42.89	2.06	46.23	73.9	27.6	149	350	-
Vert.	7440.000	PK	50.10	37.62	8.64	43.65	2.06	54.77	73.9	19.1	285	22	-
Vert.	9920.000	PK	48.63	39.30	9.83	42.77	2.06	57.05	73.9	16.8	150	0	-
Vert.	9920.000	AV	39.19	39.30	9.83	42.77	2.06	47.61	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(3.80 m / 3.0 m) = 2.06 dB

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

Peak measurement value with Duty cycle correction factor (DCCF)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	DCCF [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2483.500	PK	48.78	28.24	14.52	41.65	-28.17	2.06	23.78	53.9	30.1	*1)
Hori.	4960.000	PK	48.56	32.14	7.14	42.89	-28.17	2.06	18.84	53.9	35.0	-
Hori.	7440.000	PK	49.25	37.62	8.64	43.65	-28.17	2.06	25.75	53.9	28.1	-
Vert.	2483.500	PK	49.58	28.24	14.52	41.65	-28.17	2.06	24.58	53.9	29.3	*1)
Vert.	4960.000	PK	47.78	32.14	7.14	42.89	-28.17	2.06	18.06	53.9	35.8	-
Vert.	7440.000	PK	50.10	37.62	8.64	43.65	-28.17	2.06	26.60	53.9	27.3	-

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

Distance factor : 1 GHz - 10 GHz : 20log(3.80 m / 3.0 m) = 2.06 dB

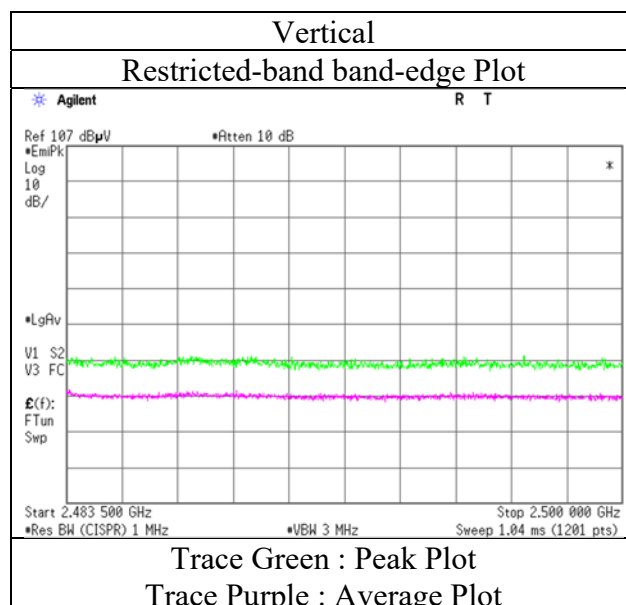
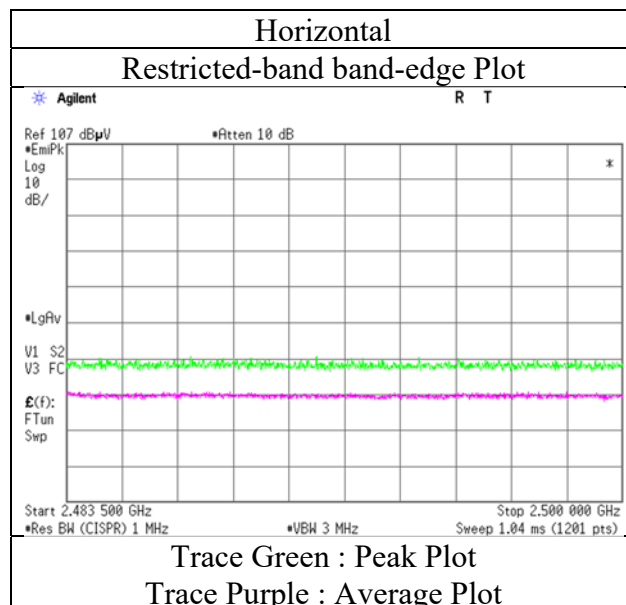
10 GHz - 40 GHz : 20log(1.0 m / 3.0 m) = -9.54 dB

Duty cycle correction factor (DCCF) refer to "Duty cycle correction factor" sheet.

*1) Not out of band emission (Leakage Power)

Radiated Spurious Emission (Reference Plot for band-edge)

Report No. 14033198S-B-R1
Test place Shonan EMC Lab.
Semi Anechoic Chamber 3
Date October 20, 2021
Temperature / Humidity 20 deg.C, 53 %RH
Engineer Yosuke Murakami
Mode Tx BT LE 2 M-PHY 2480 MHz

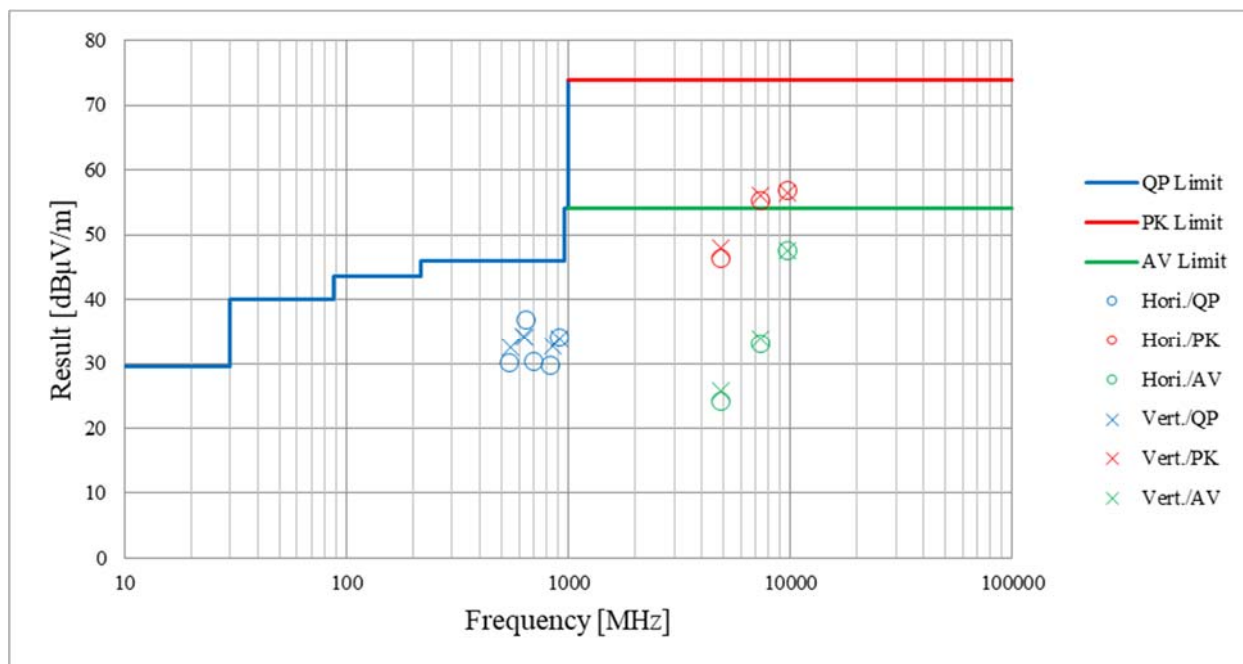


* The measurement was conducted for a sufficiently long enough time to detect any possible spurious emissions.

Final result of restricted band edge was shown in tabular data.

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

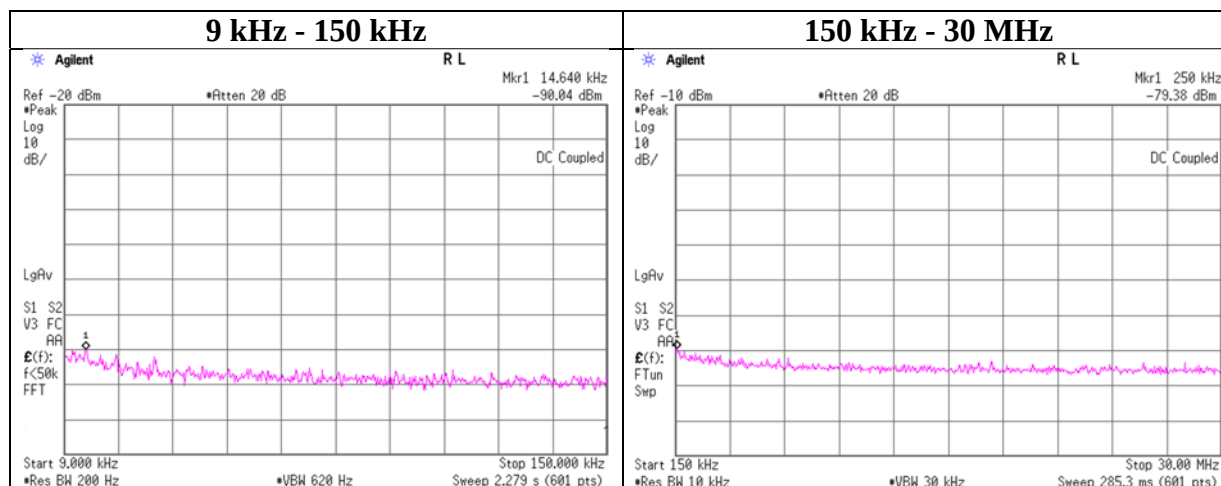
Report No.	14033198S-B-R1			
Test place	Shonan EMC Lab.			
Semi Anechoic Chamber	3	3	3	3
Date	October 25, 2021	October 20, 2021	October 18, 2021	October 22, 2021
Temperature / Humidity	21 deg.C, 41 %RH	20 deg.C, 53 %RH	22 deg.C, 40 %RH	22 deg.C, 41 %RH
Engineer	Takahiro Suzuki (30 MHz -1 GHz)	Yosuke Murakami (1 GHz -2.8 GHz)	Yosuke Murakami (2.8 GHz -10 GHz)	Yosuke Murakami (10 GHz -26.5 GHz)
Mode	Tx BT LE 1 M-PHY 2440 MHz			



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

Conducted Spurious Emission

Report No. 14033198S-B-R1
Test place Shonan EMC Lab. No.3 Shielded Room
Date October 14, 2021
Temperature / Humidity 23 deg. C / 54 % RH
Engineer Shiro Kobayashi
Mode Tx 11g 2437 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
14.640	-90.04	0.01	9.74	4.04	1	-76.3	300	6.0	-15.0	44.2	59.2	-
250.000	-79.38	0.01	9.74	4.04	1	-65.6	300	6.0	-4.3	19.6	23.9	-

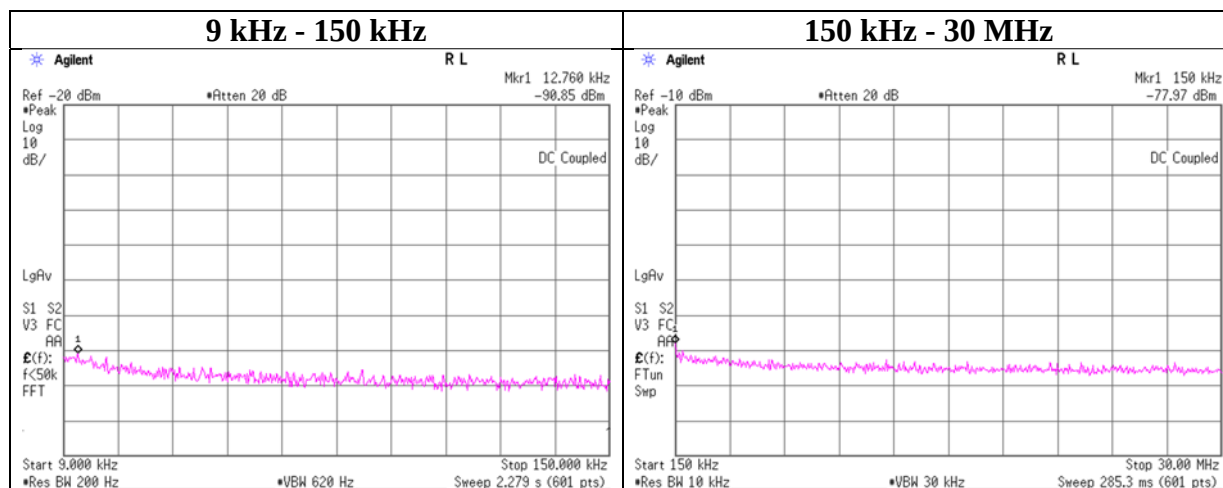
$$E \text{ [dBuV/m]} = \text{EIRP [dBm]} - 20 \log (\text{Distance [m]}) + \text{Ground bounce [dB]} + 104.8 \text{ [dBuV/m]}$$

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

N: Number of output

Conducted Spurious Emission

Report No. 14033198S-B-R1
Test place Shonan EMC Lab. No.3 Shielded Room
Date October 14, 2021
Temperature / Humidity 23 deg. C / 54 % RH
Engineer Shiro Kobayashi
Mode Tx BT LE 1 M-PHY 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
12.760	-90.85	0.01	9.74	2.08	1	-79.0	300	6.0	-17.8	45.4	63.2	-
150.000	-77.97	0.01	9.74	2.08	1	-66.1	300	6.0	-4.9	24.0	28.9	-

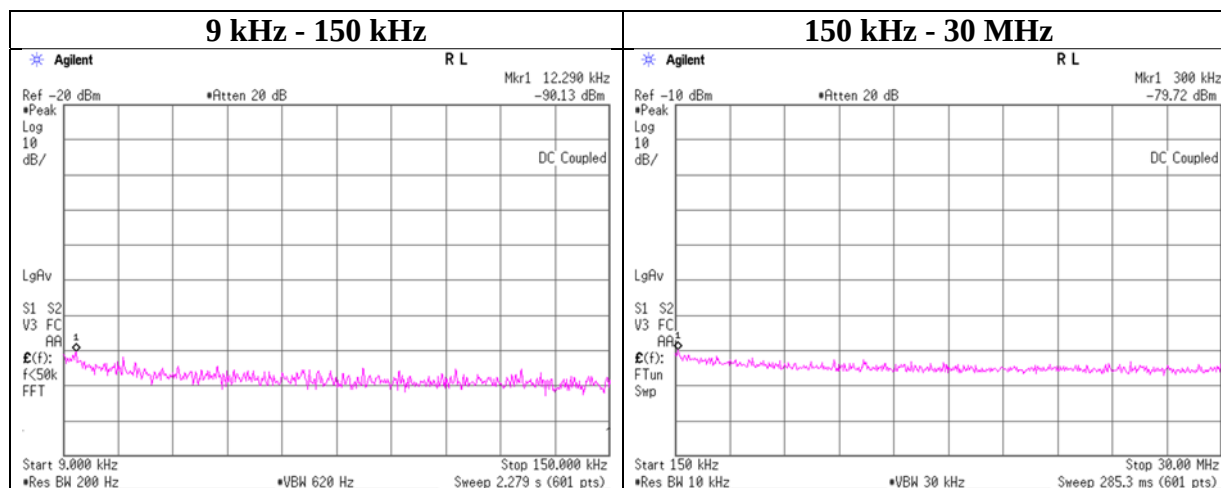
$E [dBuV/m] = EIRP [dBm] - 20 \log (Distance [m]) + Ground\ bounce [dB] + 104.8 [dBuV/m]$

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

N: Number of output

Conducted Spurious Emission

Report No. 14033198S-B-R1
Test place Shonan EMC Lab. No.3 Shielded Room
Date October 14, 2021
Temperature / Humidity 23 deg. C / 54 % RH
Engineer Shiro Kobayashi
Mode Tx BT LE 1 M-PHY 2440 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
12.290	-90.13	0.01	9.74	2.08	1	-78.3	300	6.0	-17.0	45.8	62.8	-
300.000	-79.72	0.01	9.74	2.08	1	-67.9	300	6.0	-6.6	18.0	24.6	-

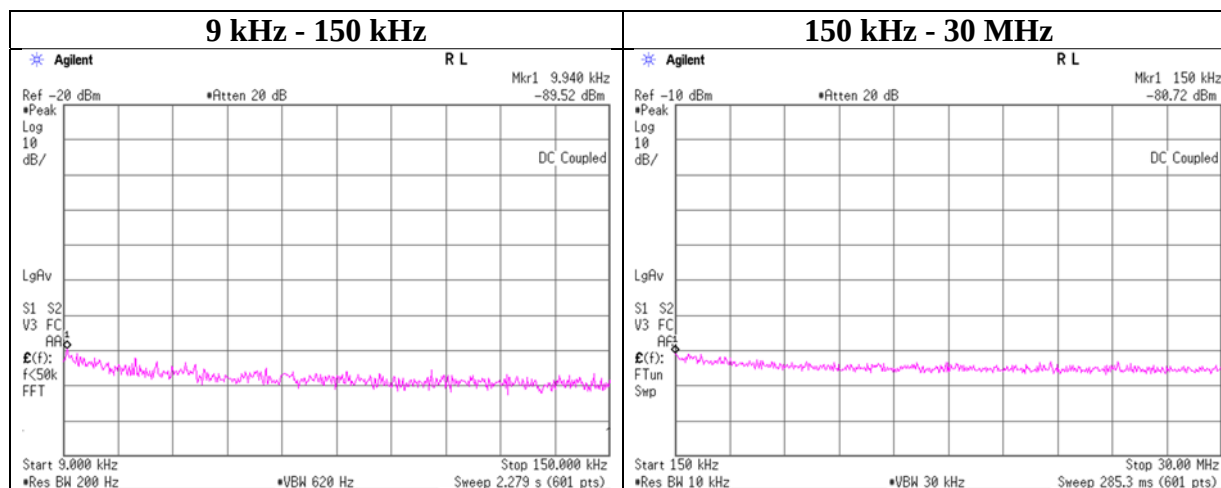
$E [dBuV/m] = EIRP [dBm] - 20 \log (Distance [m]) + Ground\ bounce [dB] + 104.8 [dBuV/m]$

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

N: Number of output

Conducted Spurious Emission

Report No. 14033198S-B-R1
Test place Shonan EMC Lab. No.3 Shielded Room
Date October 14, 2021
Temperature / Humidity 23 deg. C / 54 % RH
Engineer Shiro Kobayashi
Mode Tx BT LE 1 M-PHY 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
9.940	-89.52	0.01	9.74	2.08	1	-77.7	300	6.0	-16.4	47.6	64.0	-
150.000	-80.72	0.01	9.74	2.08	1	-68.9	300	6.0	-7.6	24.0	31.6	-

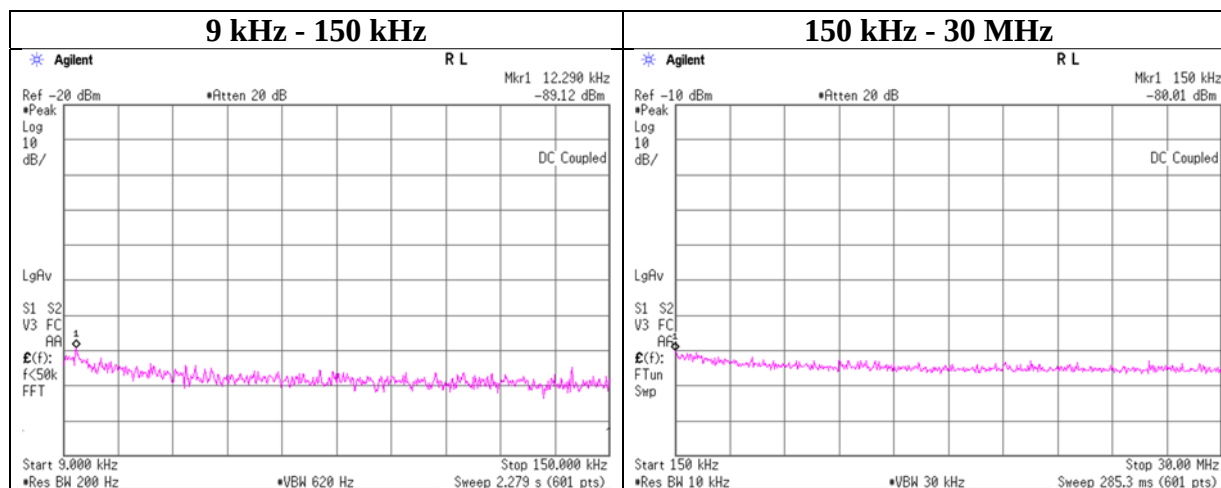
$E [dBuV/m] = EIRP [dBm] - 20 \log (Distance [m]) + Ground\ bounce [dB] + 104.8 [dBuV/m]$

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

N: Number of output

Conducted Spurious Emission

Report No. 14033198S-B-R1
Test place Shonan EMC Lab. No.3 Shielded Room
Date October 14, 2021
Temperature / Humidity 23 deg. C / 54 % RH
Engineer Shiro Kobayashi
Mode Tx BT LE 2 M-PHY 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
12.290	-89.12	0.01	9.74	2.08	1	-77.3	300	6.0	-16.0	45.8	61.8	-
150.000	-80.01	0.01	9.74	2.08	1	-68.2	300	6.0	-6.9	24.0	30.9	-

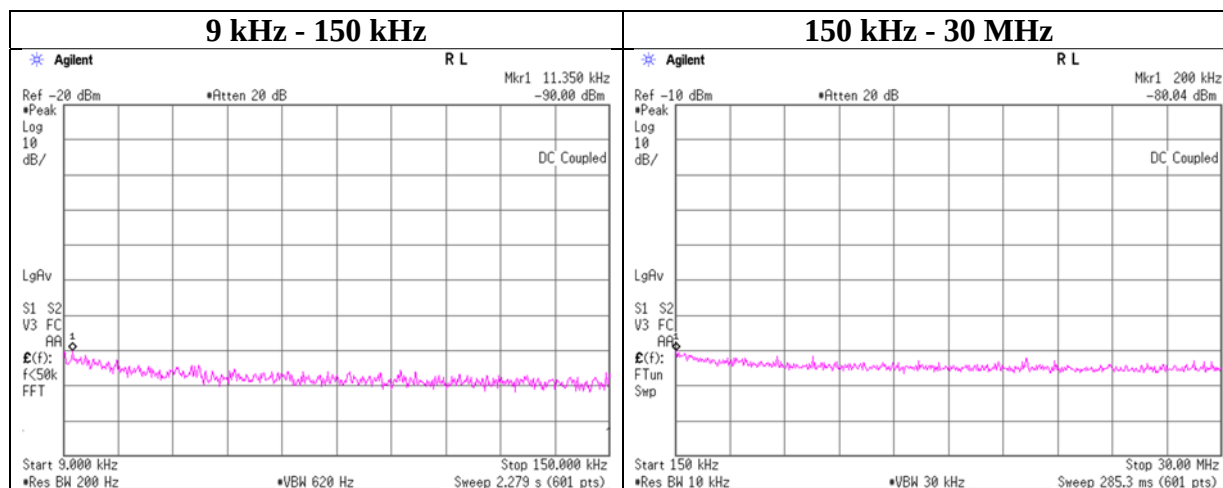
$$E \text{ [dBuV/m]} = \text{EIRP [dBm]} - 20 \log (\text{Distance [m]}) + \text{Ground bounce [dB]} + 104.8 \text{ [dBuV/m]}$$

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

N: Number of output

Conducted Spurious Emission

Report No. 14033198S-B-R1
Test place Shonan EMC Lab. No.3 Shielded Room
Date October 14, 2021
Temperature / Humidity 23 deg. C / 54 % RH
Engineer Shiro Kobayashi
Mode Tx BT LE 2 M-PHY 2440 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
11.350	-90.00	0.01	9.74	2.08	1	-78.2	300	6.0	-16.9	46.5	63.4	-
200.000	-80.04	0.01	9.74	2.08	1	-68.2	300	6.0	-7.0	21.5	28.5	-

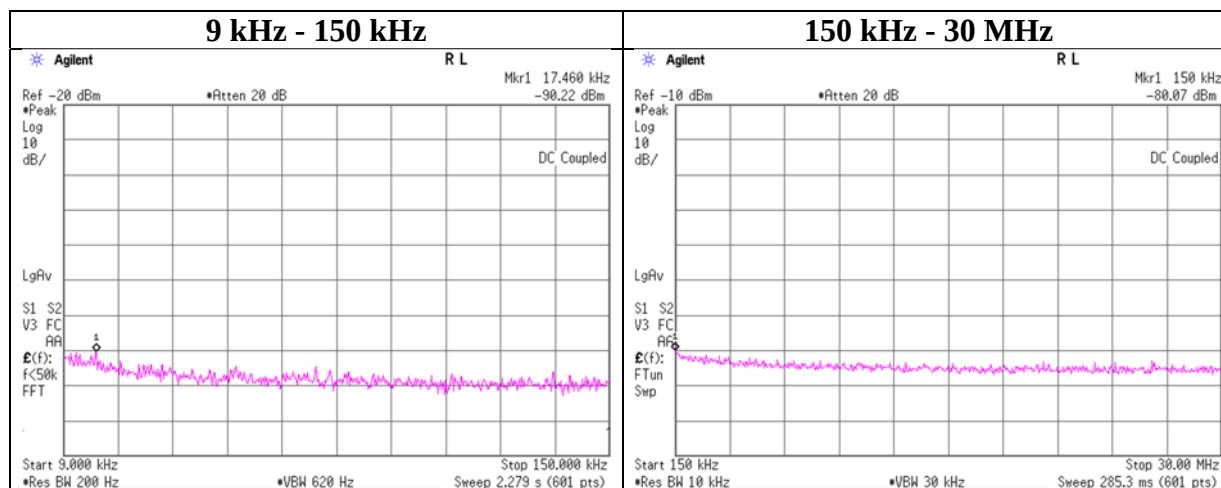
$$E \text{ [dBuV/m]} = \text{EIRP [dBm]} - 20 \log (\text{Distance [m]}) + \text{Ground bounce [dB]} + 104.8 \text{ [dBuV/m]}$$

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

N: Number of output

Conducted Spurious Emission

Report No. 14033198S-B-R1
Test place Shonan EMC Lab. No.3 Shielded Room
Date October 14, 2021
Temperature / Humidity 23 deg. C / 54 % RH
Engineer Shiro Kobayashi
Mode Tx BT LE 2 M-PHY 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
17.460	-90.22	0.01	9.74	2.08	1	-78.4	300	6.0	-17.1	42.7	59.8	-
150.000	-80.07	0.01	9.74	2.08	1	-68.2	300	6.0	-7.0	24.0	31.0	-

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

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

N: Number of output

Power Density

Report No. 14033198S-B-R1
Test place Shonan EMC Lab. No.3 Shielded Room
Date October 14, 2021
Temperature / Humidity 23 deg. C / 54 % RH
Engineer Shiro Kobayashi
Mode Tx

11b

Freq.	Reading	Cable Loss	Atten. Loss	Result	Limit	Margin
[MHz]	[dBm / 3 kHz]	[dB]	[dB]	[dBm / 3 kHz]	[dBm / 3 kHz]	[dB]
2412	-17.61	1.68	9.82	-6.11	8.00	14.11
2437	-18.05	1.68	9.82	-6.55	8.00	14.55
2462	-18.24	1.68	9.82	-6.74	8.00	14.74

11g

Freq.	Reading	Cable Loss	Atten. Loss	Result	Limit	Margin
[MHz]	[dBm / 3 kHz]	[dB]	[dB]	[dBm / 3 kHz]	[dBm / 3 kHz]	[dB]
2412	-25.59	1.68	9.82	-14.09	8.00	22.09
2437	-23.86	1.68	9.82	-12.36	8.00	20.36
2462	-26.57	1.68	9.82	-15.07	8.00	23.07

11n-20

Freq.	Reading	Cable Loss	Atten. Loss	Result	Limit	Margin
[MHz]	[dBm / 3 kHz]	[dB]	[dB]	[dBm / 3 kHz]	[dBm / 3 kHz]	[dB]
2412	-26.32	1.68	9.82	-14.82	8.00	22.82
2437	-25.31	1.68	9.82	-13.81	8.00	21.81
2462	-27.26	1.68	9.82	-15.76	8.00	23.76

BT LE 1 M-PHY

Freq.	Reading	Cable Loss	Atten. Loss	Result	Limit	Margin
[MHz]	[dBm / 3 kHz]	[dB]	[dB]	[dBm / 3 kHz]	[dBm / 3 kHz]	[dB]
2402	-22.04	1.68	9.82	-10.54	8.00	18.54
2440	-22.02	1.68	9.82	-10.52	8.00	18.52
2480	-22.31	1.69	9.82	-10.80	8.00	18.80

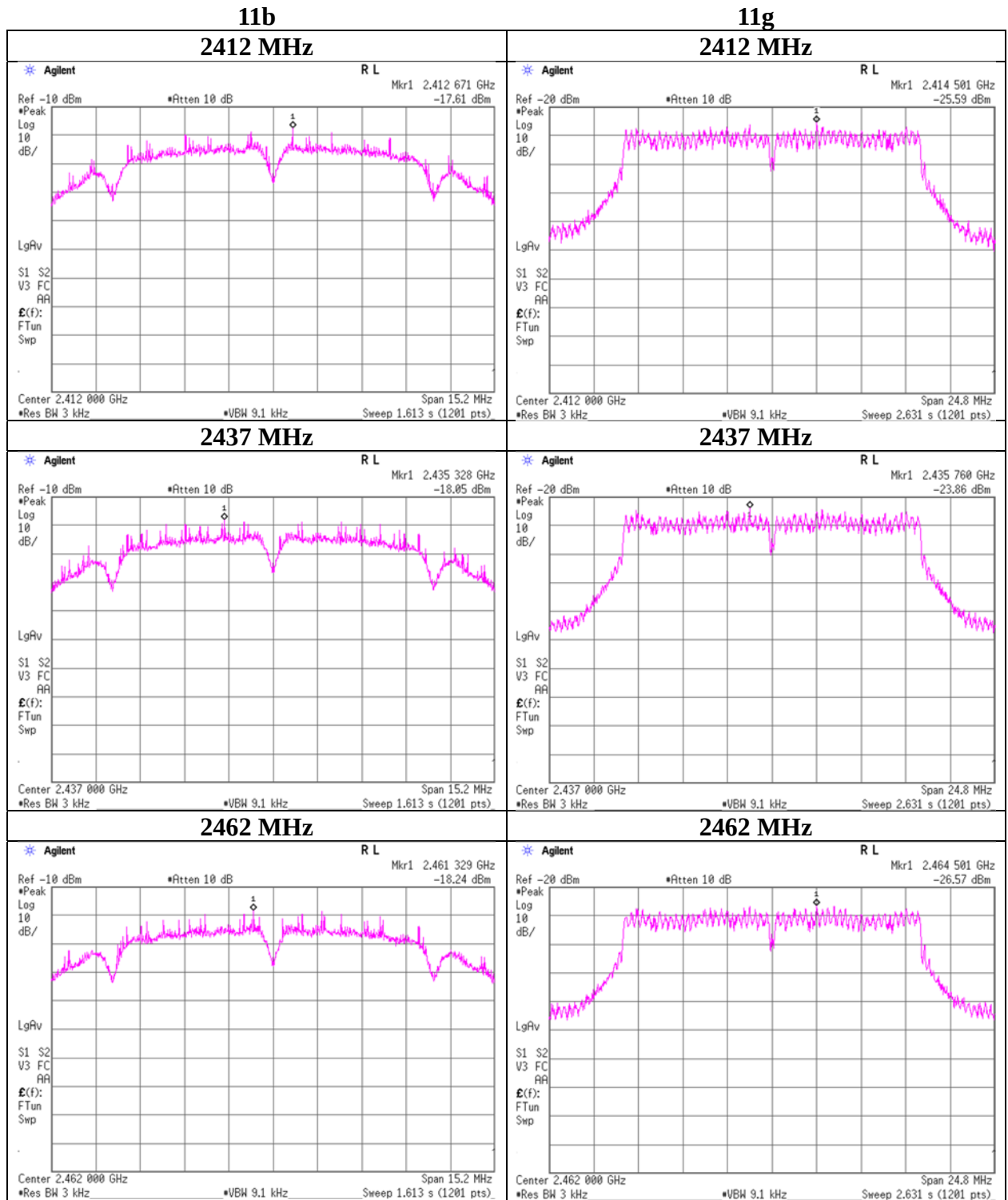
BT LE 2 M-PHY

Freq.	Reading	Cable Loss	Atten. Loss	Result	Limit	Margin
[MHz]	[dBm / 3 kHz]	[dB]	[dB]	[dBm / 3 kHz]	[dBm / 3 kHz]	[dB]
2402	-23.84	1.68	9.82	-12.34	8.00	20.34
2440	-23.80	1.68	9.82	-12.30	8.00	20.30
2480	-24.05	1.68	9.82	-12.55	8.00	20.55

Sample Calculation:

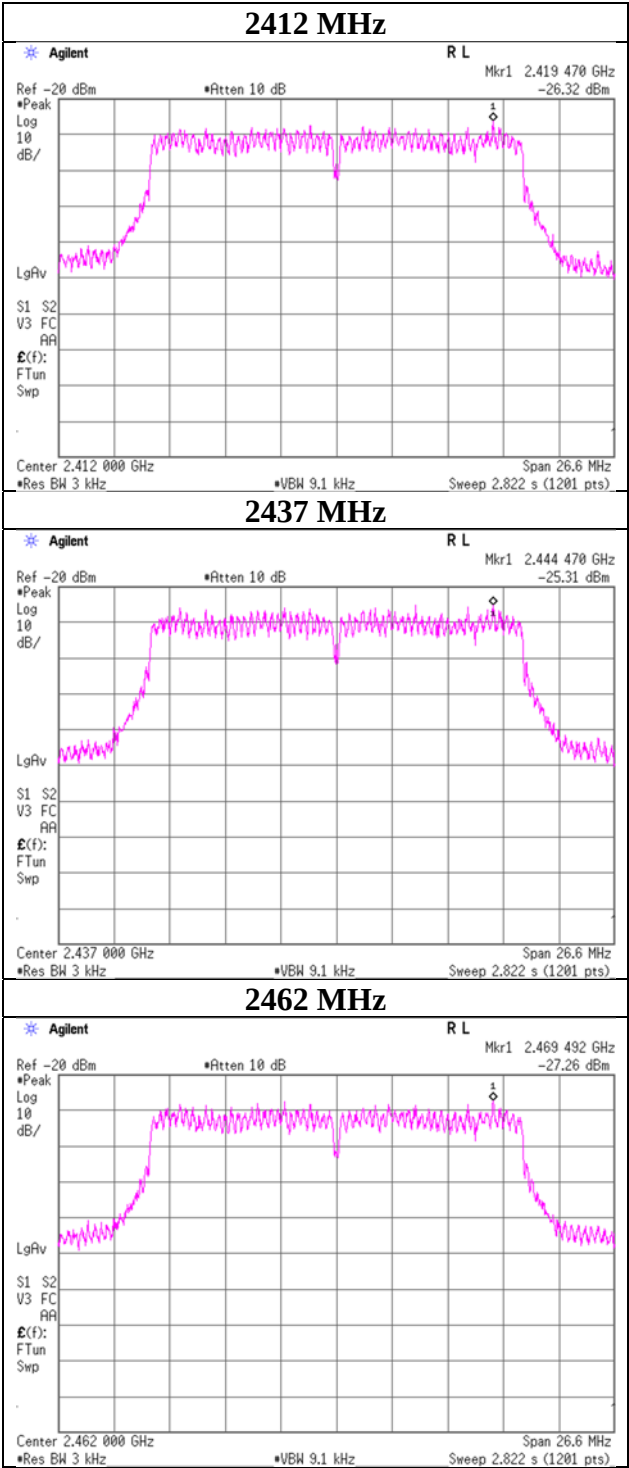
Result = Reading + Cable Loss (including the cable(s) customer supplied) + Attenuator Loss

Power Density



Power Density

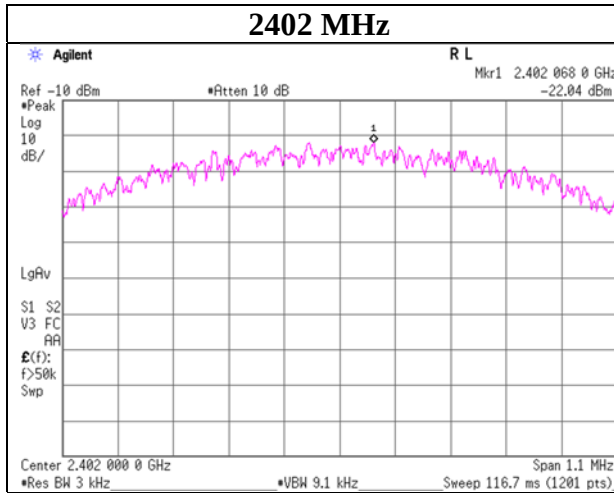
11n-20



Power Density

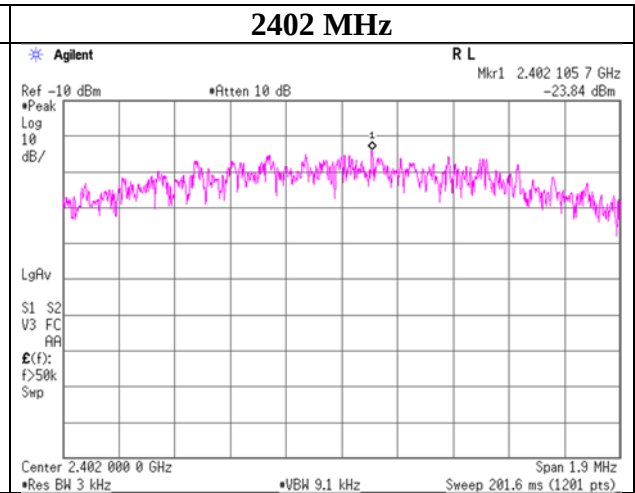
BT LE 1 M-PHY

2402 MHz

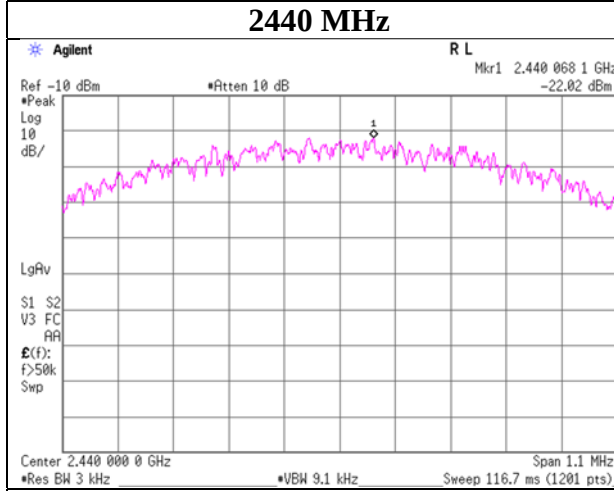


BT LE 2 M-PHY

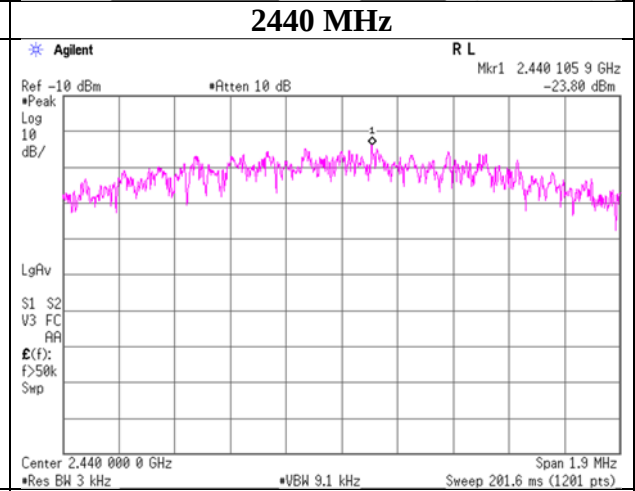
2402 MHz



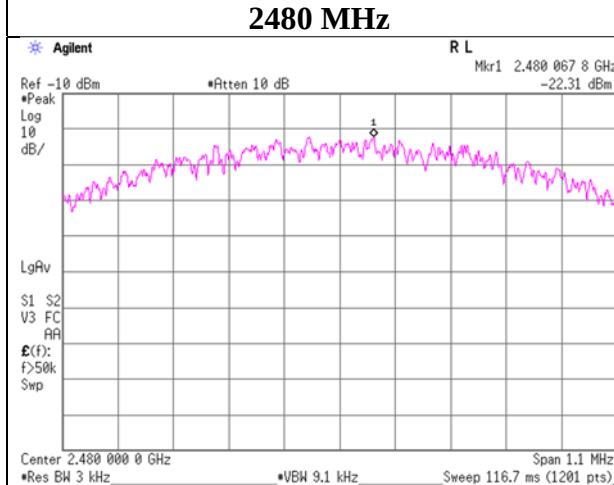
2440 MHz



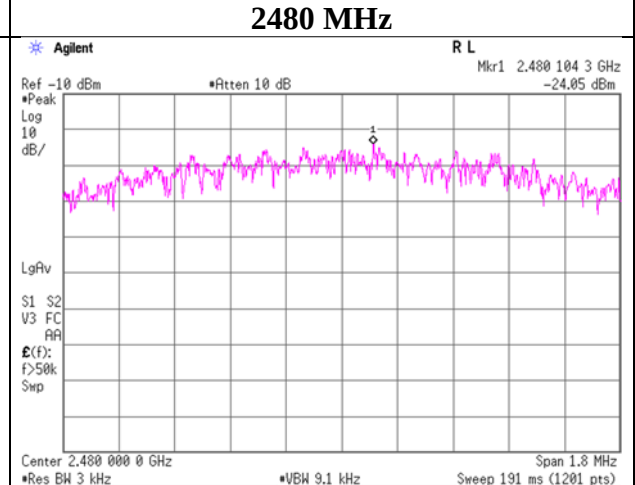
2440 MHz



2480 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	SAT10-14	154591	Attenuator	Weinschel Corp.	54A-10	81595	2021/04/08	12
AT	SCC-G63	196946	Coaxial Cable	Huber+Suhner	SUCOFLEX 102	803411/2	2021/03/01	12
AT, DCCF	SOS-27	191845	Humidity Indicator	CUSTOM. Inc	CTH-201	-	2021/08/02	12
AT	SPM-07	146247	Power Meter	Keysight Technologies Inc	8990B	MY5100272	2021/05/25	12
AT	SPSS-04	146310	Power sensor	Keysight Technologies Inc	N1923A	MY5326009	2021/05/25	12
AT	SRENT-22	202830	Spectrum Analyzer	Keysight Technologies Inc	E4440A	MY48250036	2020/11/24	12
AT	STM-G11	204923	Terminator	Weinschel - API Technologies Corp	M1459A	110101	2021/02/09	12
AT, DCCF	STS-05	146212	Digital Hitester	HIOKI E.E. CORPORATION	3805-50	80997828	2021/09/14	12
AT,RE	SOS-23	191840	Humidity Indicator	CUSTOM. Inc	CTH-201	-	2021/08/02	12
AT,RE	STS-03	146210	Digital Hitester	HIOKI E.E. CORPORATION	3805-50	80997823	2021/09/14	12
RE	COTS-SEMI-5	170932	EMI Software	TSJ (Techno Science Japan)	TEPTO-DV3(RE,CE,ME,P E)	-	-	-
RE	KJM-02	146432	Measure	TAJIMA	GL19-55	-	-	-
RE	SAEC-03(NSA)	145565	Semi-Anechoic Chamber	TDK	SAEC-03(NSA)	3	2021/04/27	12
RE	SAEC-03(SVSWR)	145566	Semi-Anechoic Chamber	TDK	SAEC-03(SVSWR)	3	2021/05/21	12
RE	SAF-03	145126	Pre Amplifier	SONOMA	310N	290213	2021/02/10	12
RE	SAF-06	145005	Pre Amplifier	Toyo Corporation	TPA0118-36	1440491	2021/02/08	12
RE	SAF-08	145007	Pre Amplifier	Toyo Corporation	HAP18-26W	19	2021/03/01	12
RE	SAT10-05	145136	Attenuator	Keysight Technologies Inc	8493C-010	74864	2021/10/07	12
RE	SAT6-13	167094	Attenuator	JFW	50HF-006N	-	2021/02/10	12
RE	SBA-03	145023	Biconical Antenna	Schwarzbeck Mess-Elektronik OHG	BBA9106	91032666	2021/05/15	12
RE	SCC-C1/C2/C3/C4/C5/C10/SRS E-03	145171	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhner/Suhner/Suhner/Suhner/TOYO	8D2W/12DSFA/141PE/141PE/141PE/141PE/NS4906	./0901-271(RF Selector)	2021/04/12	12
RE	SCC-G15	145176	Coaxial Cable	Suhner	SUCOFLEX 102	32703/2	2021/03/01	12
RE	SCC-G40	166491	Coaxial Cable	Junkosha	MWX221-01000NFSNMS/B	1612S005	2021/01/19	12
RE	SCC-G43	156380	Coaxial Cable	Huber+Suhner	SUCOFLEX_104_E	SN MY 13406/4E	2021/05/17	12
RE	SCC-G57	179540	Coaxial Cable	Huber+Suhner	SUCOFLEX 102	802815/2	2021/05/18	12
RE	SCC-G58	183047	Coaxial Cable	Huber+Suhner	SUCOFLEX 104	800287/4A	2021/05/17	12
RE	SCC-G70	200010	Coaxial Cable	Huber+Suhner	SUCOFLEX 104	575618/4	2021/07/06	12
RE	SFL-02	145301	Highpass Filter	MICRO-TRONICS	HPM50111	51	2021/10/07	12
RE	SHA-03	145501	Horn Antenna	Schwarzbeck Mess-Elektronik OHG	BBHA9120D	9120D-739	2021/06/14	12
RE	SHA-04	145512	Horn Antenna	ETS-Lindgren	3160-09	00094868	2021/06/14	12

Test Equipment [2/2]

Test Item	Local ID	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Cal Int
RE	SHA-10	194685	Horn Antenna	Schwarzbeck Mess-Elektronik OHG	BBHA 9120 C	711	2021/03/03	12
RE	SLA-07	145529	Logperiodic Antenna	Schwarzbeck Mess-Elektronik OHG	VUSLP9111B	196	2021/05/15	12
RE	SSA-02	145800	Spectrum Analyzer	Keysight Technologies Inc	E4448A	MY48250106	2021/04/13	12
RE, DCCF	SSA-03	145801	Spectrum Analyzer	Keysight Technologies Inc	E4448A	MY48250152	2021/08/09	12
RE	STR-08	150463	Test Receiver	Rohde & Schwarz	ESW44	101581	2020/12/02	12
DCCF	SCC-G64	196945	Coaxial Cable	Huber+Suhner	SUCOFLEX 102	803414/2	2022/03/01	12
DCCF	-	-	Search coil	UL Japan	-	-	-	-

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

The expiration date of the calibration is the end of the expired month.

As for some calibrations performed after the tested dates, those test equipment have been controlled by means of an unbroken chains of calibrations.

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

Test item: RE: Radiated Emission
AT: Antenna Terminal Conducted
DCCF: Duty Cycle Corrector Factor