

RADIO TEST REPORT

Test Report No. 15482376H-A-R1

Customer	DENSO TEN Limited
Description of EUT	Car Navigation
Model Number of EUT	TN0022A
FCC ID	BABTN0022A
Test Regulation	FCC Part 15 Subpart C
Test Result	Complied
Issue Date	February 5, 2025
Remarks	Wireless LAN (2.4 GHz band) and Bluetooth Low Energy part(s) Radiated Spurious Emission only *For permissive change

Representative Test EngineerTakumi Nishida
Engineer**Approved By**Ryota Yamanaka
Engineer

CERTIFICATE 5107.02

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

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REVISION HISTORY

Original Test Report No.: 15482376H-A

This report is a revised version of 15482376H-A. 15482376H-A is replaced with this report.

Revision	Test Report No.	Date	Page Revised Contents												
- (Original)	15482376H-A	October 25, 2024	-												
1	15482376H-A-R1	February 5, 2025	P.6 Correction of antenna gain as follows;<table><tr><td></td><td>from</td><td>to</td></tr><tr><td>WLAN (2.4 GHz band)</td><td>0.86 dBi</td><td>0.21 dBi</td></tr><tr><td>Bluetooth</td><td>0.21 dBi</td><td>0.86 dBi</td></tr><tr><td>WLAN (5 GHz band)</td><td>0.85 dBi (ANT 1) 1.9 dBi (ANT 2)</td><td>1.9 dBi (ANT 1) 0.85 dBi (ANT 2)</td></tr></table>		from	to	WLAN (2.4 GHz band)	0.86 dBi	0.21 dBi	Bluetooth	0.21 dBi	0.86 dBi	WLAN (5 GHz band)	0.85 dBi (ANT 1) 1.9 dBi (ANT 2)	1.9 dBi (ANT 1) 0.85 dBi (ANT 2)
	from	to													
WLAN (2.4 GHz band)	0.86 dBi	0.21 dBi													
Bluetooth	0.21 dBi	0.86 dBi													
WLAN (5 GHz band)	0.85 dBi (ANT 1) 1.9 dBi (ANT 2)	1.9 dBi (ANT 1) 0.85 dBi (ANT 2)													

Reference: Abbreviations (Including words undescribed in this report)

A2LA	The American Association for Laboratory Accreditation	IEC	International Electrotechnical Commission
AC	Alternating Current	IEEE	Institute of Electrical and Electronics Engineers
AFH	Adaptive Frequency Hopping	IF	Intermediate Frequency
AM	Amplitude Modulation	ILAC	International Laboratory Accreditation Conference
Amp, AMP	Amplifier	ISED	Innovation, Science and Economic Development Canada
ANSI	American National Standards Institute	ISO	International Organization for Standardization
Ant, ANT	Antenna	JAB	Japan Accreditation Board
AP	Access Point	LAN	Local Area Network
ASK	Amplitude Shift Keying	LIMS	Laboratory Information Management System
Atten., ATT	Attenuator	MCS	Modulation and Coding Scheme
AV	Average	MRA	Mutual Recognition Arrangement
BPSK	Binary Phase-Shift Keying	N/A	Not Applicable
BR	Bluetooth Basic Rate	NIST	National Institute of Standards and Technology
BT	Bluetooth	NS	No signal detect.
BT LE	Bluetooth Low Energy	NSA	Normalized Site Attenuation
BW	BandWidth	NVLAP	National Voluntary Laboratory Accreditation Program
Cal Int	Calibration Interval	OBW	Occupied Band Width
CCK	Complementary Code Keying	OFDM	Orthogonal Frequency Division Multiplexing
Ch., CH	Channel	OFDMA	Orthogonal Frequency Division Multiple Access
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	PP	Preamble Puncturing
DSSS	Direct Sequence Spread Spectrum	PRBS	Pseudo-Random Bit Sequence
EDR	Enhanced Data Rate	PSD	Power Spectral Density
EIRP, e.i.r.p.	Equivalent Isotropically Radiated Power	QAM	Quadrature Amplitude Modulation
EMC	ElectroMagnetic Compatibility	QP	Quasi-Peak
EMI	ElectroMagnetic Interference	QPSK	Quadri-Phase Shift Keying
EN	European Norm	RBW	Resolution Band Width
ERP, e.r.p.	Effective Radiated Power	RDS	Radio Data System
EU	European Union	RE	Radio Equipment
EUT	Equipment Under Test	RF	Radio Frequency
Fac.	Factor	RMS	Root Mean Square
FCC	Federal Communications Commission	RSS	Radio Standards Specifications
FHSS	Frequency Hopping Spread Spectrum	Rx	Receiving
FM	Frequency Modulation	SA, S/A	Spectrum Analyzer
Freq.	Frequency	SG	Signal Generator
FSK	Frequency Shift Keying	SVSWR	Site-Voltage Standing Wave Ratio
GFSK	Gaussian Frequency-Shift Keying	TR	Test Receiver
GNSS	Global Navigation Satellite System	Tx	Transmitting
GPS	Global Positioning System	VBW	Video BandWidth
Hori.	Horizontal	Vert.	Vertical
ICES	Interference-Causing Equipment Standard	WLAN	Wireless LAN

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SECTION 1: Customer Information

Company Name	DENSO TEN Limited
Address	2-28, Goshō-dori 1-Chome, Hyogo-ku, Kobe, 652-8510 Japan
Telephone Number	+81-78-682-2159
Contact Person	Kaoru Abe

The information provided by the customer is as follows;

- Customer, Description of EUT, Model Number of EUT, FCC ID on the cover and other relevant pages
- Operating/Test Mode(s) (Mode(s)) on all the relevant pages
- SECTION 1: Customer Information
- SECTION 2: Equipment Under Test (EUT) other than the Receipt Date and Test Date
- SECTION 4: Operation of EUT during testing

SECTION 2: Equipment Under Test (EUT)

2.1 Identification of EUT

Description	Car Navigation
Model Number	TN0022A
Serial Number	Refer to SECTION 4.2
Condition	Production prototype (Not for Sale: This sample is equivalent to mass-produced items.)
Modification	No Modification by the test lab
Receipt Date	September 17, 2024
Test Date	September 17 to 25, 2024

2.2 Product Description

General Specification

Rating	DC 12 V
Operating temperature	-30 deg. C to +65 deg. C

Radio Specification

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

Equipment Type	Transceiver
Frequency of Operation	2412 MHz to 2462 MHz
Type of Modulation	DSSS, OFDM
Antenna Gain	0.21 dBi

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 Gain	0.86 dBi

WLAN (IEEE802.11a/11n-20/11ac-20/11n-40/11ac-40/11ac-80)

Equipment Type	Transceiver	
Frequency of Operation	20 MHz Band	5180 MHz to 5240 MHz 5745 MHz to 5825 MHz
	40 MHz Band	5190 MHz to 5230 MHz 5755 MHz to 5795 MHz
	80 MHz Band	5210 MHz 5775 MHz
Type of Modulation	OFDM	
Antenna Gain	1.9 dBi (ANT 1) / 0.85 dBi (ANT 2)	

AM (incl. HD_AM) / FM (incl. RBDS/HD_FM)

Equipment Type	Receiver
Frequency of Operation	AM, HD_AM: 530 kHz - 1710 kHz FM, RBDS/HD_FM: 87.75 MHz - 107.9 MHz SDARS: 2320 MHz - 2345 MHz
Type of Modulation	AM, HD_AM: 10 kHz FM, RBDS/HD_FM: 200 kHz
Antenna Connector Type	HFC IV
Impedance	AM, FM: 75 ohm

SECTION 3: Test Specification, Procedures & Results

3.1 Test Specification

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

3.2 Procedures and Results

Item	Test Procedure	Specification	Worst Margin	Results	Remarks
Spurious Emission Restricted Band Edges	FCC: KDB 558074 D01 15.247 Meas Guidance v05r02 ISED: RSS-Gen 6.13	FCC: Section15.247(d) ISED: RSS-247 5.5 RSS-Gen 8.9 RSS-Gen 8.10	12.0 dB 2483.4 MHz, AV, Horizontal	Complied	Radiated (above 30 MHz) *1)
Note: UL Japan, Inc.'s EMI Work Procedures: Work Instructions-ULID-003591 and Work Instructions-ULID-003593. * In case any questions arise about test procedure, ANSI C63.10: 2013 is also referred. *1) Radiated test was selected over 30 MHz based on section 15.247(d) and KDB 558074 D01 15.247 Meas Guidance v05r02 8.5 and 8.6.					

FCC Part 15.31 (e)

This EUT provides the stable voltage constantly to RF part regardless of input voltage.
Therefore, this EUT complies with the requirement.

FCC Part 15.203 Antenna requirement

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

3.3 Addition to Standard

No addition, exclusion nor deviation has been made from the standard.

3.4 Uncertainty

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

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

Radiated emission

Measurement distance	Frequency range		Unit	Calculated Uncertainty (+/-)
3 m	9 kHz to 30 MHz		dB	3.3
10 m			dB	3.1
3 m	30 MHz to 200 MHz	Horizontal	dB	5.0
		Vertical	dB	5.0
	200 MHz to 1000 MHz	Horizontal	dB	5.2
		Vertical	dB	6.2
10 m	30 MHz to 200 MHz	Horizontal	dB	5.5
		Vertical	dB	5.4
	200 MHz to 1000 MHz	Horizontal	dB	5.5
		Vertical	dB	5.5
3 m	1 GHz to 6 GHz		dB	5.1
	6 GHz to 18 GHz		dB	5.4
1 m	10 GHz to 18 GHz		dB	5.4
	18 GHz to 26.5 GHz		dB	5.3
	26.5 GHz to 40 GHz		dB	4.8
0.5 m	26.5 GHz to 40 GHz		dB	5.0

3.5 Test Location

UL Japan, Inc. Ise EMC Lab.

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 Japan

Telephone: +81-596-24-8999

A2LA Certificate Number: 5107.02 / FCC Test Firm Registration Number: 884919

ISED Lab Company Number: 2973C / CAB identifier: JP0002

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

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)

[WLAN 2.4 GHz]

Mode	Remarks*
IEEE 802.11b (11b)	11 Mbps, PN9
IEEE 802.11n 20 MHz BW (11n-20)	MCS 6 (Short GI), PN9
*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 : 14 dBm 11g/11n : 6 dBm Software: QCA RCT Ver 3.0.144.0 (Date: October 9, 2017, Storage location: Driven by connected PC)	
*This setting of software is the worst case. Any conditions under the normal use do not exceed the condition of setting. In addition, end users cannot change the settings of the output power of the product. 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.	

*The Details of Operating Mode(s)

Test Item	Operating Mode	Tested Frequency
Radiated Spurious Emission (Below 1 GHz)	Tx 11n-20 *1)	2437 MHz
Radiated Spurious Emission (Above 1 GHz)	11b Tx 11n-20 Tx *1)	2412 MHz 2437 MHz 2462 MHz
*1) Since 11g and 11n-20 have the same modulation method and no differences in transmitting specification, test was performed on the representative mode that had the highest peak output power.		

[BT LE]

Mode	Remarks*
Bluetooth Low Energy (BT LE)	Maximum Packet Size, PRBS9
*Power of the EUT was set by the software as follows; Power Setting: 0 dBm Software: BSDT Ver 5.2.0 (Date: October 9, 2019, Storage location: Driven by connected PC)	
*This setting of software is the worst case. Any conditions under the normal use do not exceed the condition of setting. In addition, end users cannot change the settings of the output power of the product.	

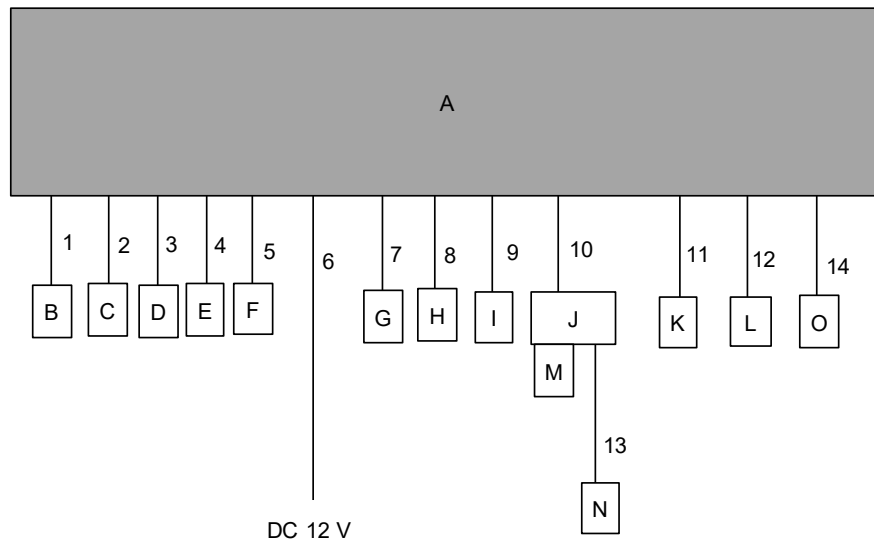
*The Details of Operating Mode(s)

Test Item	Operating Mode	Tested Frequency
Radiated Spurious Emission	BT LE Tx	2402 MHz 2440 MHz 2480 MHz

Simultaneous Transmission

Test Item	Mode *1)	Tested Antenna
Radiated Spurious Emission	Tx BT LE 2402 MHz + Tx 11a 5180 MHz Tx BT LE 2440 MHz + Tx 11a 5180 MHz Tx BT LE 2480 MHz + Tx 11a 5180 MHz	BT LE (Antenna 2) + 11a (Antenna 2)
*1) The test was conducted on representative mode, the worst mode at Spurious emission test for BT LE and the test was performed on the mode as a representative, because it had the highest power (11a mode /Antenna 2) of 5 GHz band at antenna terminal test. (*The highest power is regarding high power setting in original report.)		

4.2 Configuration and Peripherals



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

Description of EUT and Support Equipment

No.	Item	Model number	Serial Number	Manufacturer	Remarks
A	Car Navigation	TN0022A	AX800012	DENSO TEN Limited	EUT
B	Switch	-	-	-	-
C	DCM	19MC_DCM	86741-48071	DENSO Corporation.	-
D	Steering Switch	PA6-CF30	No.1	TOYOTA	-
E	Low noise Amp	ZX60-242	GLN-S+	Mini-Circuits	-
F	GPS Antenna	23D90064	29020039	yokowo co.,ltd	-
G	FM/AM connector (Main)	86300-30C30	146000-63300101	DENSO TEN Limited	-
H	FM/AM connector (Sub)	86300-30C70	146000-63400101	DENSO TEN Limited	-
I	Back Camera	GP-KDM301	07SD0013	KYOCERA CORPORATION	-
J	USB/AUX socket	86190-12040	No.1	Kojima Industries Corporation	-
K	Mic	SDA3510A	0DC040819	Panasonic	-
L	Mic	SDA3510A	0DC040834	Panasonic	-
M	USB Memory	RUF3-K16GB	P10416	Buffalo.Inc	-
N	iPhone	MD297B/A	C34JJ55EDTWD	Apple	-
O	Speaker Dummy	-	-	-	-

List of Cables Used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	Signal Cable	2.4	Unshielded	Unshielded	-
2	Signal Cable	2.4	Unshielded	Unshielded	-
3	Signal Cable	2.4	Unshielded	Unshielded	-
4	Signal Cable	1.0	Unshielded	Unshielded	-
5	GNSS Antenna Cable	8.0	Shielded	Shielded	-
6	DC Cable	4.4	Unshielded	Unshielded	-
7	Signal Cable	2.6	Unshielded	Unshielded	-
8	Signal Cable	2.6	Unshielded	Unshielded	-
9	Signal Cable	6.8	Unshielded	Unshielded	-
10	USB Cable	2.5	Shielded	Shielded	-
11	Signal Cable	2.7	Unshielded	Unshielded	-
12	Signal Cable	2.7	Unshielded	Unshielded	-
13	Audio Cable	1.5	Shielded	Shielded	-
14	Speaker Cable	3.2	Unshielded	Unshielded	-

SECTION 5: Radiated Spurious Emission

Test Procedure

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

[For below 1 GHz]

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

[For above 1 GHz]

EUT was placed on a urethane platform of nominal size, 0.5 m by 0.5 m, raised 1.5 m above the conducting ground plane. The Radiated Electric Field Strength has been measured in a Semi Anechoic Chamber with absorbent materials lined on a ground plane. Test antenna was aimed at the EUT for receiving the maximum signal and always kept within the illumination area of the 3 dB beamwidth of the antenna.

The height of the measuring antenna varied between 1 m and 4 m and EUT was rotated a full revolution in order to obtain the maximum value of the electric field strength.

The measurements were performed for both vertical and horizontal antenna polarization with the Test Receiver, or the Spectrum Analyzer.

The measurements were made with the following detector function of the test receiver and the Spectrum analyzer (in linear mode).

The test was made with the detector (RBW/VBW) in the following table.

When using Spectrum analyzer, the test was made with adjusting span to zero by using peak hold.

Test Antennas are used as below;

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

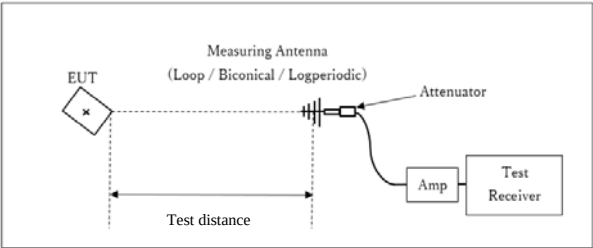
In any 100 kHz bandwidth outside the restricted band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator confirmed 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired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

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

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

Figure 1: Test Setup

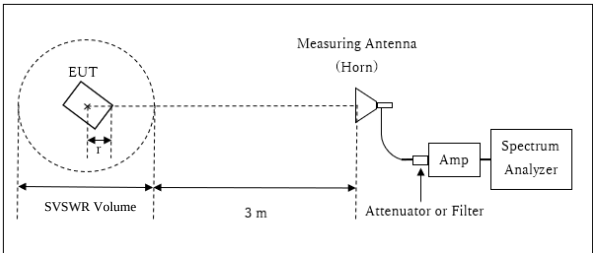
Below 1 GHz



x : Center of turn table

Test Distance: 3 m

1 GHz to 10 GHz



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

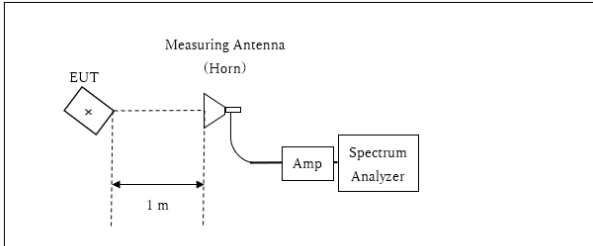
[1 GHz to 6 GHz]
Distance Factor: $20 \times \log (3.8 \text{ m}^*/3.0 \text{ m}) = 2.06 \text{ dB}$
*(Test Distance + SVSWR Volume /2) - r = 3.8 m

Test Distance: 3 m
SVSWR Volume: 2m
(SVSWR Volume has been calibrated based on CISPR 16-1-4.)
r: 0.2m

[6 GHz to 10 GHz]
Distance Factor: $20 \times \log (4.8 \text{ m}^*/3.0 \text{ m}) = 4.09 \text{ dB}$
*(Test Distance + SVSWR Volume /2) - r = 4.8 m

Test Distance: 4.3 m
SVSWR Volume: 1.4m
(SVSWR Volume has been calibrated based on CISPR 16-1-4.)
r: 0.2m

10 GHz to 26.5 GHz



x : Center of turn table

Distance Factor: $20 \times \log (1.0 \text{ m} / 3.0 \text{ m}) = -9.5 \text{ dB}$
*Test Distance: 1 m

The test was made on EUT at the normal use position.

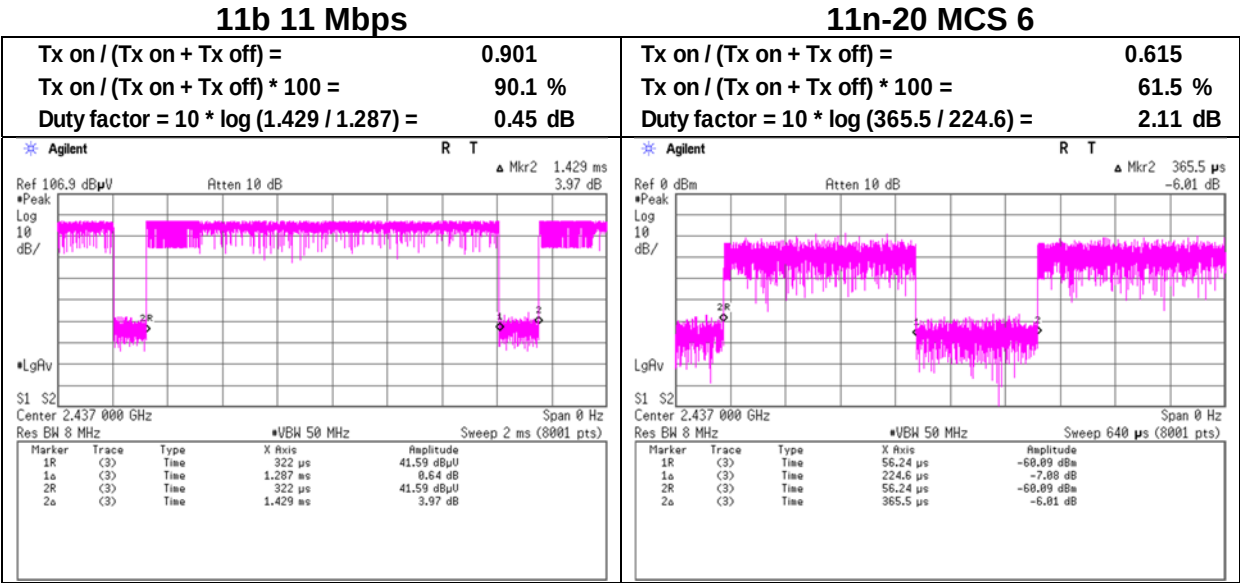
Test results are rounded off and limit are rounded down, so some differences might be observed.

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

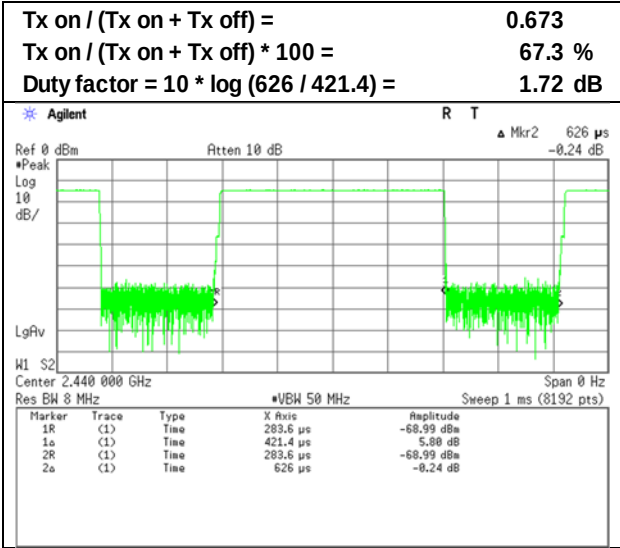
APPENDIX 1: Test Data

Burst rate confirmation

Test place	Ise EMC Lab. No.4 Semi Anechoic Chamber	
Date	September 20, 2024	September 19, 2024
Temperature / Humidity	22 deg. C / 55 % RH	24 deg. C / 75 % RH
Engineer	Takumi Nishida	Yuichiro Yamazaki
	(WLAN)	(BT LE)
Mode	Tx	



BT LE



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

Radiated Spurious Emission

Test place	Ise EMC Lab.			
Semi Anechoic Chamber	No.4	No.4	No.4	No.4
Date	September 17, 2024	September 20, 2024	September 20, 2024	September 21, 2024
Temperature / Humidity	23 deg. C / 55 % RH	22 deg. C / 55 % RH	23 deg. C / 66 % RH	22 deg. C / 54 % RH
Engineer	Takumi Nishida (1 GHz to 6 GHz)	Takumi Nishida (6 GHz to 10 GHz)	Yuichiro Yamazaki (10 GHz to 18 GHz)	Takumi Nishida (Above 18 GHz)
Mode	Tx 11b 2412 MHz			

Polarity	Frequency	Reading (QP / PK)	Reading (AV)	Ant. Factor	Loss	Gain	Duty Factor	Result (QP / PK)	Result (AV)	Limit (QP / PK)	Limit (AV)	Margin (QP / PK)	Margin (AV)	Remark
[Hori/Vert]	[MHz]	[dBuV]	[dBuV]	[dB/m]	[dB]	[dB]		[dBuV/m]	[dBuV/m]	[dBuV/m]	[dBuV/m]	[dB]	[dB]	
Hori.	1579.9	44.3	35.9	25.1	4.7	33.1	-	41.0	32.5	73.9	53.9	32.9	21.4	
Hori.	2390.0	44.4	35.0	27.5	5.3	31.8	0.5	45.5	36.5	73.9	53.9	28.4	17.4	*1)
Hori.	4824.0	40.7	30.6	31.4	7.7	30.8	-	49.0	38.9	73.9	53.9	24.9	15.0	Floor noise
Hori.	7236.0	42.8	33.2	35.6	11.1	32.1	-	57.4	47.8	73.9	53.9	16.5	6.1	Floor noise
Hori.	9648.0	41.6	32.4	35.7	12.1	32.3	-	57.1	47.9	73.9	53.9	16.8	6.0	Floor noise
Vert.	1579.9	45.0	38.2	25.1	4.7	33.1	-	41.6	34.9	73.9	53.9	32.3	19.0	
Vert.	2390.0	44.5	35.3	27.5	5.3	31.8	0.5	45.5	36.8	73.9	53.9	28.4	17.1	*1)
Vert.	4824.0	40.6	32.7	31.4	7.7	30.8	-	48.8	40.9	73.9	53.9	25.1	13.0	Floor noise
Vert.	7236.0	42.7	33.1	35.6	11.1	32.1	-	57.3	47.8	73.9	53.9	16.6	6.1	Floor noise
Vert.	9648.0	42.2	32.4	35.7	12.1	32.3	-	57.6	47.8	73.9	53.9	16.3	6.1	Floor noise

Result (QP / PK) = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier)
Result (AV)= Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier) + Duty factor
*Other frequency noises omitted in this report were not seen or had enough margin (more than 20 dB).
*QP detector was used up to 1GHz.
*1) Not Out of Band emission(Leakage Power)

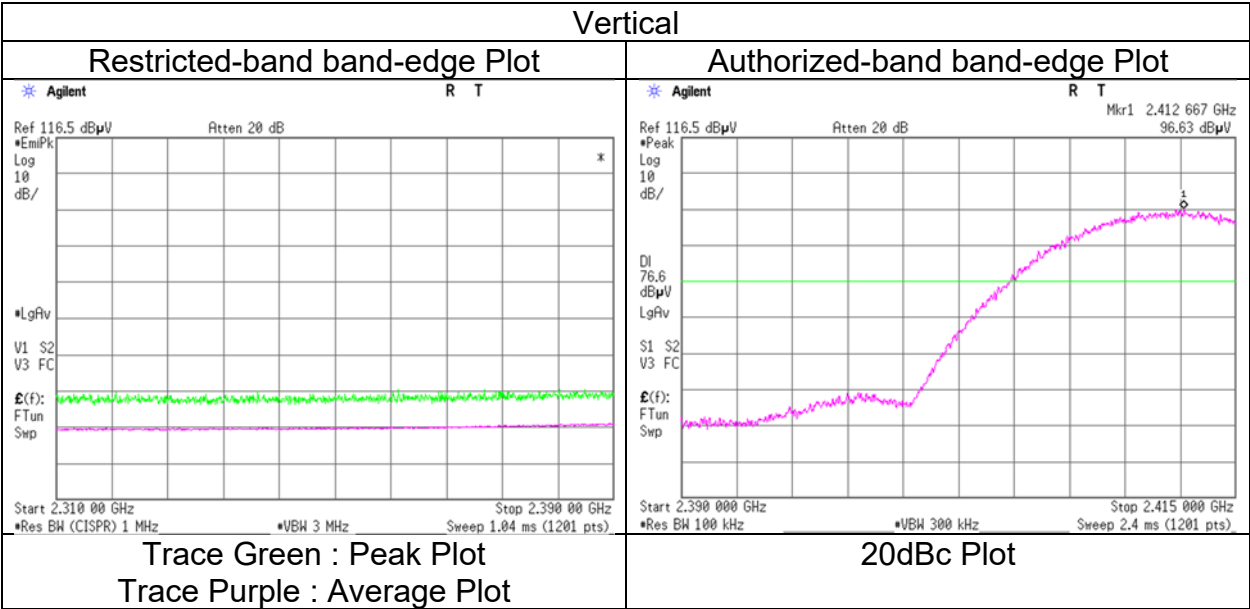
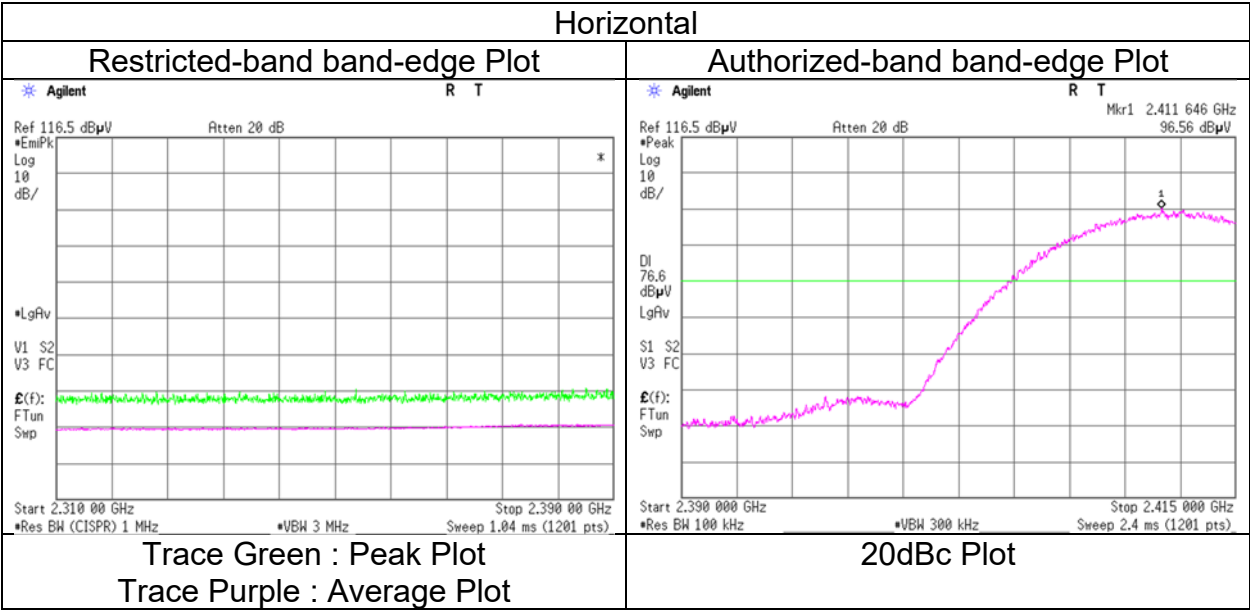
20dBc Data Sheet

Polarity	Frequency	Reading (PK)	Ant Factor	Loss	Gain	Result	Limit	Margin	Remark
[Hori/Vert]	[MHz]	[dBuV]	[dB/m]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	
Hori.	2412.0	96.6	27.5	5.4	31.8	97.7	-	-	Carrier
Hori.	2400.0	41.9	27.5	5.3	31.8	42.9	77.7	34.7	
Vert.	2412.0	96.6	27.5	5.4	31.8	97.6	-	-	Carrier
Vert.	2400.0	40.4	27.5	5.3	31.8	41.5	77.6	36.1	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier)
Distance factor:
1 GHz - 6 GHz 20log (3.8 m / 3.0 m) = 2.06 dB
6 GHz - 10 GHz 20log (4.8 m / 3.0 m) = 4.09 dB
10 GHz - 26.5 GHz 20log (1.0 m / 3.0 m) = -9.5 dB

Radiated Spurious Emission
(Reference Plot for band-edge)

Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.4
Date	September 17, 2024
Temperature / Humidity	23 deg. C / 55 % RH
Engineer	Takumi Nishida
	(1 GHz to 6 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 and authorized band edge were shown in tabular data.

Radiated Spurious Emission

Test place	Ise EMC Lab.			
Semi Anechoic Chamber	No.4	No.4	No.4	No.4
Date	September 17, 2024	September 20, 2024	September 20, 2024	September 21, 2024
Temperature / Humidity	23 deg. C / 55 % RH	22 deg. C / 55 % RH	23 deg. C / 66 % RH	22 deg. C / 54 % RH
Engineer	Takumi Nishida (1 GHz to 6 GHz)	Takumi Nishida (6 GHz to 10 GHz)	Yuichiro Yamazaki (10 GHz to 18 GHz)	Takumi Nishida (Above 18 GHz)
Mode	Tx 11b 2437 MHz			

Polarity [Hori/Vert]	Frequency [MHz]	Reading (QP / PK) [dBuV]	Reading (AV) [dBuV]	Ant. Factor [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result (QP / PK) [dBuV/m]	Result (AV) [dBuV/m]	Limit (QP / PK) [dBuV/m]	Limit (AV) [dBuV/m]	Margin (QP / PK) [dB]	Margin (AV) [dB]	Remark
Hori.	1579.9	44.4	35.8	25.1	4.7	33.1	-	41.1	32.4	73.9	53.9	32.8	21.5	
Hori.	4874.0	40.2	33.1	31.4	7.7	30.8	-	48.5	41.5	73.9	53.9	25.4	12.4	Floor noise
Hori.	7311.0	41.9	33.0	35.6	11.1	32.1	-	56.5	47.5	73.9	53.9	17.4	6.4	Floor noise
Hori.	9748.0	41.5	32.2	35.9	12.1	32.4	-	57.1	47.8	73.9	53.9	16.8	6.1	Floor noise
Vert.	1579.9	45.0	38.3	25.1	4.7	33.1	-	41.7	35.0	73.9	53.9	32.2	18.9	
Vert.	4874.0	40.3	32.7	31.4	7.7	30.8	-	48.6	41.0	73.9	53.9	25.3	12.9	Floor noise
Vert.	7311.0	42.3	33.2	35.6	11.1	32.1	-	56.9	47.8	73.9	53.9	17.0	6.1	Floor noise
Vert.	9748.0	41.7	32.1	35.9	12.1	32.4	-	57.3	47.7	73.9	53.9	16.6	6.2	Floor noise

Result (QP / PK) = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier)
Result (AV)= Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier) + Duty factor
*Other frequency noises omitted in this report were not seen or had enough margin (more than 20 dB).
*QP detector was used up to 1GHz.

Distance factor: 1 GHz - 6 GHz 20log (3.8 m / 3.0 m) = 2.06 dB
 6 GHz - 10 GHz 20log (4.8 m / 3.0 m) = 4.09 dB
 10 GHz - 26.5 GHz 20log (1.0 m / 3.0 m) = -9.5 dB

Radiated Spurious Emission

Test place	Ise EMC Lab.			
Semi Anechoic Chamber	No.4	No.4	No.4	No.4
Date	September 17, 2024	September 20, 2024	September 20, 2024	September 21, 2024
Temperature / Humidity	23 deg. C / 55 % RH	22 deg. C / 55 % RH	23 deg. C / 66 % RH	22 deg. C / 54 % RH
Engineer	Takumi Nishida (1 GHz to 6 GHz)	Takumi Nishida (6 GHz to 10 GHz)	Yuichiro Yamazaki (10 GHz to 18 GHz)	Takumi Nishida (Above 18 GHz)
Mode	Tx 11b 2462 MHz			

Polarity	Frequency	Reading (QP / PK)	Reading (AV)	Ant. Factor	Loss	Gain	Duty Factor	Result (QP / PK)	Result (AV)	Limit (QP / PK)	Limit (AV)	Margin (QP / PK)	Margin (AV)	Remark
[Hori/Vert]	[MHz]	[dBuV]	[dBuV]	[dB/m]	[dB]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dBuV/m]	[dBuV/m]	[dB]	[dB]	
Hori.	1579.9	44.2	35.7	25.1	4.7	33.1	-	40.8	32.3	73.9	53.9	33.1	21.6	
Hori.	2483.5	48.7	40.5	27.4	5.4	31.7	0.5	49.7	42.0	73.9	53.9	24.2	12.0	*1)
Hori.	4924.0	40.7	32.7	31.5	7.8	30.8	-	49.1	41.1	73.9	53.9	24.8	12.8	Floor noise
Hori.	7386.0	42.5	33.2	35.5	11.1	32.1	-	57.0	47.7	73.9	53.9	16.9	6.2	Floor noise
Hori.	9848.0	42.1	32.1	36.0	12.2	32.4	-	57.8	47.9	73.9	53.9	16.1	6.1	Floor noise
Vert.	1579.9	45.3	38.4	25.1	4.7	33.1	-	41.9	35.1	73.9	53.9	32.0	18.8	
Vert.	2483.5	46.2	35.5	27.4	5.4	31.7	0.5	47.2	37.0	73.9	53.9	26.7	16.9	*1)
Vert.	4924.0	41.6	32.3	31.5	7.8	30.8	-	50.0	40.8	73.9	53.9	23.9	13.2	Floor noise
Vert.	7386.0	43.0	33.1	35.5	11.1	32.1	-	57.5	47.6	73.9	53.9	16.4	6.3	Floor noise
Vert.	9848.0	41.8	32.1	36.0	12.2	32.4	-	57.6	47.8	73.9	53.9	16.3	6.1	Floor noise

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

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

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

*QP detector was used up to 1GHz.

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

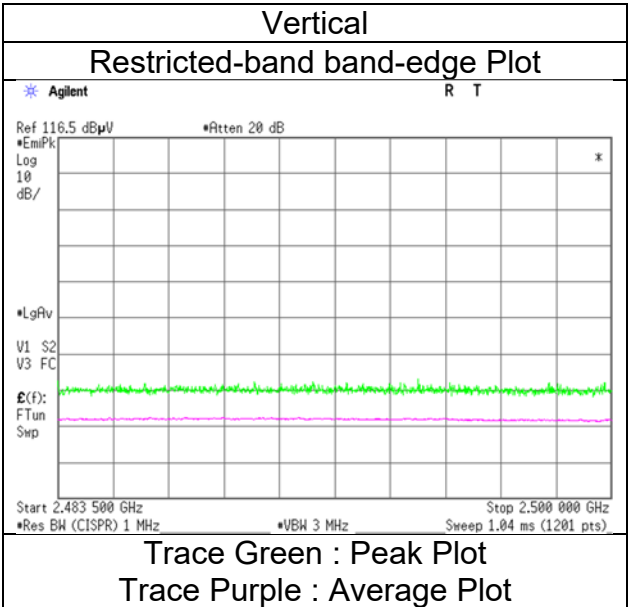
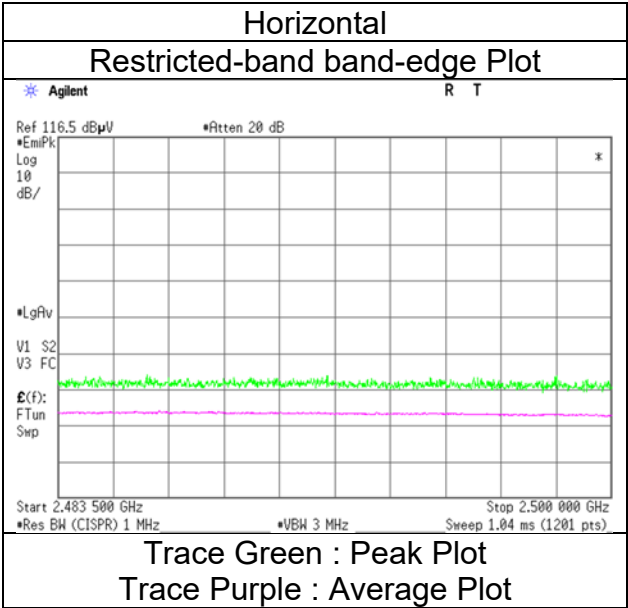
Distance factor:	1 GHz - 6 GHz	20log (3.8 m / 3.0 m) = 2.06 dB
	6 GHz - 10 GHz	20log (4.8 m / 3.0 m) = 4.09 dB
	10 GHz - 26.5 GHz	20log (1.0 m / 3.0 m) = -9.5 dB

Radiated Spurious Emission
(Reference Plot for band-edge)

Test place
Semi Anechoic Chamber
Date
Temperature / Humidity
Engineer

Mode

Ise EMC Lab.
No.4
September 17, 2024
23 deg. C / 55 % RH
Takumi Nishida
(1 GHz to 6 GHz)
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	Ise EMC Lab.			
Semi Anechoic Chamber	No.4	No.4	No.4	No.4
Date	September 17, 2024	September 20, 2024	September 20, 2024	September 21, 2024
Temperature / Humidity	23 deg. C / 55 % RH	22 deg. C / 55 % RH	23 deg. C / 66 % RH	22 deg. C / 54 % RH
Engineer	Takumi Nishida (1 GHz to 6 GHz)	Takumi Nishida (6 GHz to 10 GHz)	Yuichiro Yamazaki (10 GHz to 18 GHz)	Takumi Nishida (Above 18 GHz)
Mode	Tx 11n-20 2412 MHz			

Polarity	Frequency	Reading (QP / PK)	Reading (AV)	Ant. Factor	Loss	Gain	Duty Factor	Result (QP / PK)	Result (AV)	Limit (QP / PK)	Limit (AV)	Margin (QP / PK)	Margin (AV)	Remark
[Hori/Vert]	[MHz]	[dBuV]	[dBuV]	[dB/m]	[dB]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dBuV/m]	[dBuV/m]	[dB]	[dB]	
Hori.	1579.9	44.3	34.8	25.1	4.7	33.1	-	41.0	31.4	73.9	53.9	32.9	22.5	
Hori.	2390.0	44.2	32.5	27.5	5.3	31.8	2.1	45.3	35.6	73.9	53.9	28.7	18.3	*1)
Hori.	4824.0	33.8	30.8	31.4	7.7	30.8	-	42.1	39.1	73.9	53.9	31.8	14.8	Floor noise
Hori.	7236.0	42.0	33.0	35.6	11.1	32.1	-	56.6	47.7	73.9	53.9	17.3	6.2	Floor noise
Hori.	9648.0	41.4	32.2	35.7	12.1	32.3	-	56.8	47.6	73.9	53.9	17.1	6.3	Floor noise
Vert.	1579.9	45.4	38.0	25.1	4.7	33.1	-	42.1	34.7	73.9	53.9	31.8	19.3	
Vert.	2390.0	44.2	32.1	27.5	5.3	31.8	2.1	45.3	35.3	73.9	53.9	28.6	18.6	*1)
Vert.	4824.0	40.7	30.5	31.4	7.7	30.8	-	49.0	38.8	73.9	53.9	24.9	15.1	Floor noise
Vert.	7236.0	42.6	33.3	35.6	11.1	32.1	-	57.3	47.9	73.9	53.9	16.6	6.0	Floor noise
Vert.	9648.0	41.5	32.3	35.7	12.1	32.3	-	56.9	47.7	73.9	53.9	17.0	6.2	Floor noise

Result (QP / PK) = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier)
Result (AV)= Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier) + Duty factor
*Other frequency noises omitted in this report were not seen or had enough margin (more than 20 dB).
*QP detector was used up to 1GHz.
*1) Not Out of Band emission(Leakage Power)

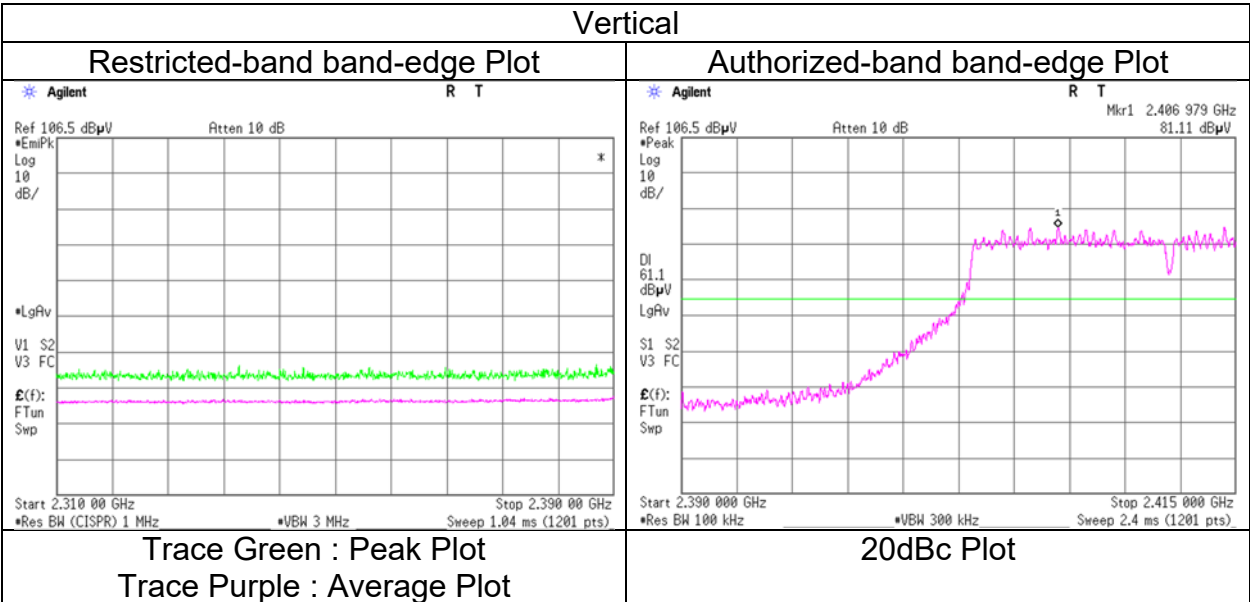
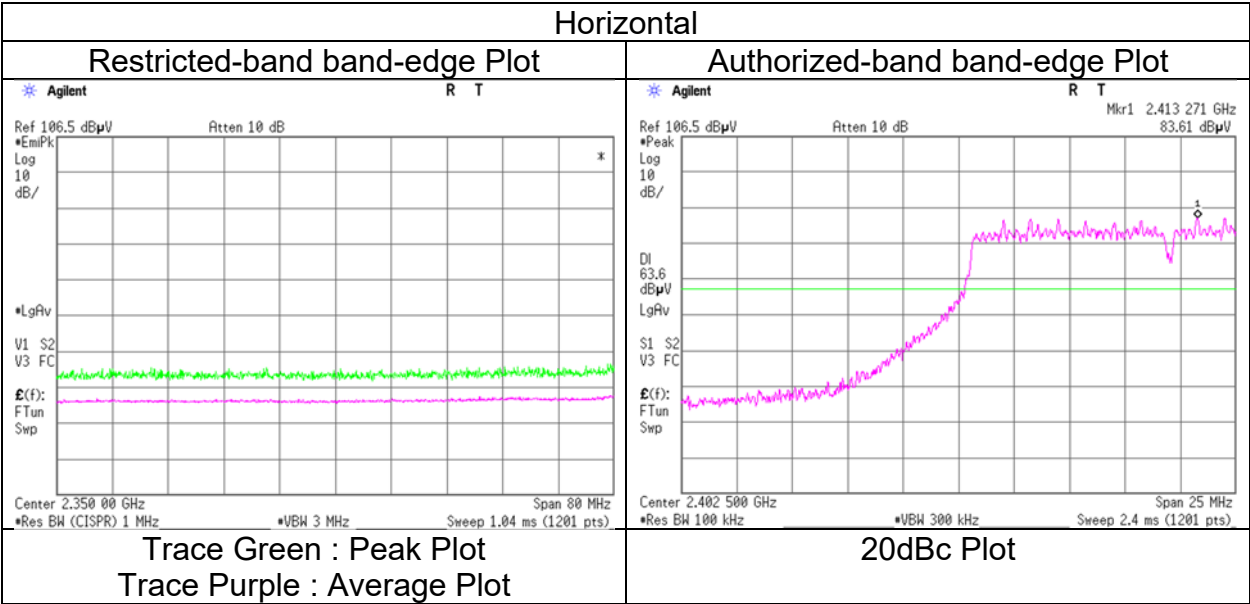
20dBc Data Sheet

Polarity	Frequency	Reading (PK)	Ant Factor	Loss	Gain	Result	Limit	Margin	Remark
[Hori/Vert]	[MHz]	[dBuV]	[dB/m]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	
Hori.	2412.0	83.6	27.5	5.4	31.8	84.6	-	-	Carrier
Hori.	2400.0	49.6	27.5	5.3	31.8	50.6	64.6	14.0	
Vert.	2412.0	81.1	27.5	5.4	31.8	82.1	-	-	Carrier
Vert.	2400.0	49.1	27.5	5.3	31.8	50.2	62.1	12.0	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier)
Distance factor:
1 GHz - 6 GHz 20log (3.8 m / 3.0 m) = 2.06 dB
6 GHz - 10 GHz 20log (4.8 m / 3.0 m) = 4.09 dB
10 GHz - 26.5 GHz 20log (1.0 m / 3.0 m) = -9.5 dB

Radiated Spurious Emission
(Reference Plot for band-edge)

Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.4
Date	September 17, 2024
Temperature / Humidity	23 deg. C / 55 % RH
Engineer	Takumi Nishida
	(1 GHz to 6 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 and authorized band edge were shown in tabular data.

Radiated Spurious Emission

Test place Ise EMC Lab.
Semi Anechoic No.4 No.4 No.4
Chamber
Date September 17, 2024 September 20, 2024 September 20, 2024
Temperature / 23 deg. C / 55 % RH 22 deg. C / 55 % RH 23 deg. C / 66 % RH
Humidity
Engineer Takumi Nishida Takumi Nishida Yuichiro Yamazaki
 (1 GHz to 6 GHz) (6 GHz to 10 GHz) (10 GHz to 18 GHz)

Semi Anechoic No.4 No.4
Chamber
Date September 21, 2024 September 22, 2024
Temperature / 22 deg. C / 54 % RH 23 deg. C / 71 % RH
Humidity
Engineer Takumi Nishida Tomoya Sone
 (Above 18 GHz) (Below 1 GHz)
Mode Tx 11n-20 2437 MHz

Polarity	Frequency	Reading	Reading	Ant.	Loss	Gain	Duty	Result	Result	Limit	Limit	Margin	Margin	Remark
[Hori/Vert]	[MHz]	(QP / PK)	(AV)	Factor			Factor	(QP / PK)	(AV)	(QP / PK)	(AV)	(QP / PK)	(AV)	
		[dBuV]	[dBuV]	[dB/m]	[dB]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dBuV/m]	[dBuV/m]	[dB]	[dB]	
Hori.	71.5	29.8	-	6.4	7.6	32.1	-	11.6	-	40.0	-	28.4	-	
Hori.	104.8	30.1	-	11.0	7.9	32.1	-	17.0	-	43.5	-	26.6	-	
Hori.	110.9	32.1	-	11.9	8.0	32.1	-	19.9	-	43.5	-	23.6	-	
Hori.	561.6	30.3	-	18.1	11.1	32.2	-	27.2	-	46.0	-	18.8	-	
Hori.	615.2	28.7	-	19.4	11.3	32.3	-	27.2	-	46.0	-	18.8	-	
Hori.	915.2	27.4	-	22.3	12.4	31.0	-	31.0	-	46.0	-	15.0	-	
Hori.	1579.9	44.3	35.6	25.1	4.7	33.1	-	40.9	32.2	73.9	53.9	33.0	21.7	
Hori.	4874.0	40.7	32.5	31.4	7.7	30.8	-	49.0	40.8	73.9	53.9	24.9	13.1	Floor noise
Hori.	7311.0	42.4	33.0	35.6	11.1	32.1	-	57.0	47.6	73.9	53.9	16.9	6.4	Floor noise
Hori.	9748.0	42.0	32.2	35.9	12.1	32.4	-	57.6	47.9	73.9	53.9	16.3	6.0	Floor noise
Vert.	71.5	29.4	-	6.4	7.6	32.1	-	11.2	-	40.0	-	28.8	-	
Vert.	104.8	29.5	-	11.0	7.9	32.1	-	16.4	-	43.5	-	27.2	-	
Vert.	110.9	29.6	-	11.9	8.0	32.1	-	17.4	-	43.5	-	26.1	-	
Vert.	561.6	28.7	-	18.1	11.1	32.2	-	25.6	-	46.0	-	20.4	-	
Vert.	615.2	31.3	-	19.4	11.3	32.3	-	29.8	-	46.0	-	16.2	-	
Vert.	915.2	29.0	-	22.3	12.4	31.0	-	32.6	-	46.0	-	13.4	-	
Vert.	1579.9	44.9	38.2	25.1	4.7	33.1	-	41.6	34.9	73.9	53.9	32.3	19.1	
Vert.	4874.0	40.9	32.6	31.4	7.7	30.8	-	49.3	40.9	73.9	53.9	24.6	13.0	Floor noise
Vert.	7311.0	42.5	33.0	35.6	11.1	32.1	-	57.1	47.5	73.9	53.9	16.8	6.4	Floor noise
Vert.	9748.0	41.6	32.2	35.9	12.1	32.4	-	57.2	47.8	73.9	53.9	16.7	6.1	Floor noise

Result (QP / PK) = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier)
Result (AV)= Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier) + Duty factor
*Other frequency noises omitted in this report were not seen or had enough margin (more than 20 dB).
*QP detector was used up to 1GHz.

Distance factor: 1 GHz - 6 GHz 20log (3.8 m / 3.0 m) = 2.06 dB
 6 GHz - 10 GHz 20log (4.8 m / 3.0 m) = 4.09 dB
 10 GHz - 26.5 GHz 20log (1.0 m / 3.0 m) = -9.5 dB

Radiated Spurious Emission

Test place	Ise EMC Lab.			
Semi Anechoic Chamber	No.4	No.4	No.4	No.4
Date	September 17, 2024	September 20, 2024	September 20, 2024	September 21, 2024
Temperature / Humidity	23 deg. C / 55 % RH	22 deg. C / 55 % RH	23 deg. C / 66 % RH	22 deg. C / 54 % RH
Engineer	Takumi Nishida (1 GHz to 6 GHz)	Takumi Nishida (6 GHz to 10 GHz)	Yuichiro Yamazaki (10 GHz to 18 GHz)	Takumi Nishida (Above 18 GHz)
Mode	Tx 11n-20 2462 MHz			

Polarity	Frequency	Reading (QP / PK)	Reading (AV)	Ant. Factor	Loss	Gain	Duty Factor	Result (QP / PK)	Result (AV)	Limit (QP / PK)	Limit (AV)	Margin (QP / PK)	Margin (AV)	Remark
[Hori/Vert]	[MHz]	[dBuV]	[dBuV]	[dB/m]	[dB]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dBuV/m]	[dBuV/m]	[dB]	[dB]	
Hori.	1579.9	44.0	35.5	25.1	4.7	33.1	-	40.7	32.2	73.9	53.9	33.2	21.7	
Hori.	2483.5	43.5	34.6	27.4	5.4	31.7	2.1	44.5	37.7	73.9	53.9	29.4	16.2	*1)
Hori.	4924.0	41.3	33.0	31.5	7.8	30.8	-	49.7	41.5	73.9	53.9	24.2	12.5	Floor noise
Hori.	7386.0	42.5	33.1	35.5	11.1	32.1	-	57.0	47.6	73.9	53.9	16.9	6.3	Floor noise
Hori.	9848.0	41.5	32.1	36.0	12.2	32.4	-	57.3	47.9	73.9	53.9	16.7	6.0	Floor noise
Vert.	1579.9	45.2	38.3	25.1	4.7	33.1	-	41.9	35.0	73.9	53.9	32.0	18.9	
Vert.	2483.5	42.8	34.9	27.4	5.4	31.7	2.1	43.8	38.1	73.9	53.9	30.1	15.8	*1)
Vert.	4924.0	41.3	32.7	31.5	7.8	30.8	-	49.7	41.1	73.9	53.9	24.2	12.8	Floor noise
Vert.	7386.0	42.4	33.1	35.5	11.1	32.1	-	56.9	47.6	73.9	53.9	17.0	6.3	Floor noise
Vert.	9848.0	41.5	32.1	36.0	12.2	32.4	-	57.3	47.9	73.9	53.9	16.6	6.0	Floor noise

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

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

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

*QP detector was used up to 1GHz

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

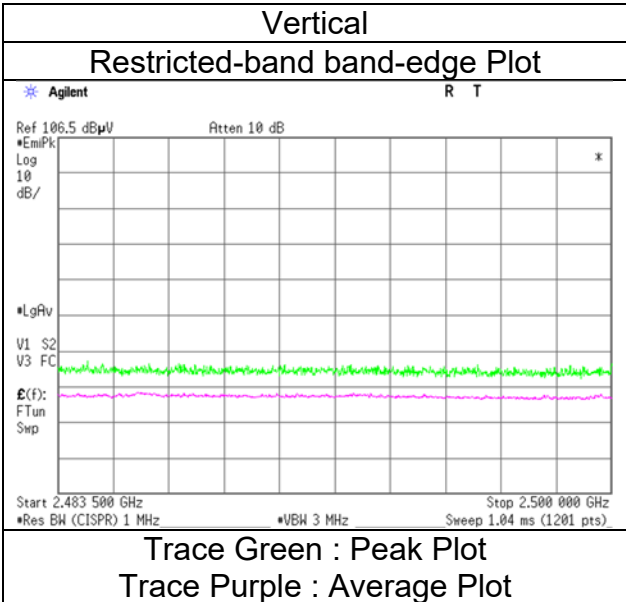
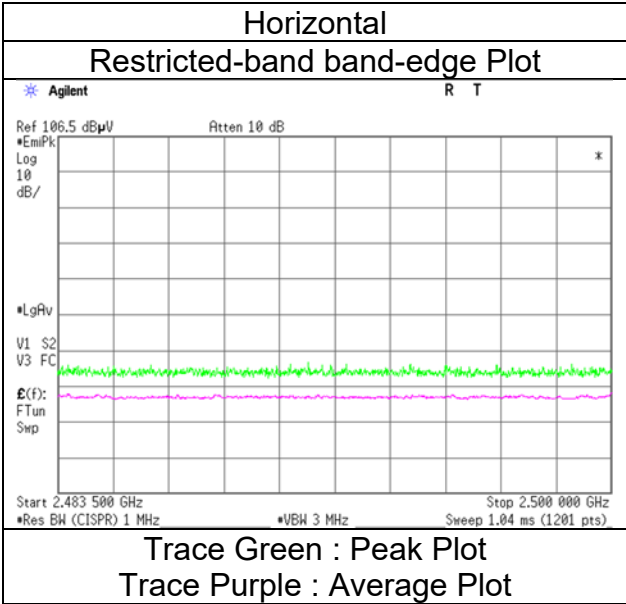
Distance factor:	1 GHz - 6 GHz	$20\log(3.8\text{ m} / 3.0\text{ m}) = 2.06\text{ dB}$
	6 GHz - 10 GHz	$20\log(4.8\text{ m} / 3.0\text{ m}) = 4.09\text{ dB}$
	10 GHz - 26.5 GHz	$20\log(1.0\text{ m} / 3.0\text{ m}) = -9.5\text{ dB}$

Radiated Spurious Emission
(Reference Plot for band-edge)

Test place
Semi Anechoic Chamber
Date
Temperature / Humidity
Engineer

Mode

Ise EMC Lab.
No.4
September 17, 2024
23 deg. C / 55 % RH
Takumi Nishida
(1 GHz to 6 GHz)
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

Test place	Ise EMC Lab.		
Semi Anechoic Chamber	No.4	No.4	No.4
Date	September 19, 2024	September 20, 2024	September 20, 2024
Temperature / Humidity	24 deg. C / 75 % RH	22 deg. C / 55 % RH	23 deg. C / 66 % RH
Engineer	Yuichiro Yamazaki (1 GHz to 6 GHz)	Takumi Nishida (6 GHz to 10 GHz)	Yuichiro Yamazaki (10 GHz to 18 GHz)
Semi Anechoic Chamber	No.4		
Date	September 21, 2024	September 22, 2024	
Temperature / Humidity	22 deg. C / 54 % RH	23 deg. C / 71 % RH	
Engineer	Takumi Nishida (Above 18 GHz)	Tomoya Sone (Below 1 GHz)	
Mode	Tx BT LE 2402 MHz		

Polarity	Frequency	Reading (QP / PK)	Reading (AV)	Ant. Factor	Loss	Gain	Duty Factor	Result (QP / PK)	Result (AV)	Limit (QP / PK)	Limit (AV)	Margin (QP / PK)	Margin (AV)	Remark
[Hori/Vert]	[MHz]	[dBuV]	[dBuV]	[dB/m]	[dB]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dBuV/m]	[dBuV/m]	[dB]	[dB]	
Hori.	71.5	28.3	-	6.4	7.6	32.1	-	10.1	-	40.0	-	29.9	-	
Hori.	108.9	27.6	-	11.6	7.9	32.1	-	15.1	-	43.5	-	28.5	-	
Hori.	110.9	23.0	-	11.9	8.0	32.1	-	10.8	-	43.5	-	32.7	-	
Hori.	561.6	29.5	-	18.1	11.1	32.2	-	26.4	-	46.0	-	19.6	-	
Hori.	615.2	28.8	-	19.4	11.3	32.3	-	27.3	-	46.0	-	18.7	-	
Hori.	915.2	29.7	-	22.3	12.4	31.0	-	33.3	-	46.0	-	12.7	-	
Hori.	1580.0	44.9	37.9	25.1	4.7	33.1	-	41.6	34.6	73.9	53.9	32.3	19.3	
Hori.	2390.0	42.7	33.1	27.5	5.3	31.8	1.7	43.8	35.8	73.9	53.9	30.1	18.1	*1)
Hori.	4804.0	41.7	32.7	31.4	7.7	30.9	-	50.0	41.0	73.9	53.9	23.9	12.9	Floor noise
Hori.	7203.0	42.7	33.2	35.6	11.1	32.0	-	57.3	47.8	73.9	53.9	16.6	6.1	Floor noise
Hori.	9604.0	41.5	32.6	35.6	12.0	32.3	-	56.8	47.9	73.9	53.9	17.1	6.0	Floor noise
Vert.	71.5	28.4	-	6.4	7.6	32.1	-	10.2	-	40.0	-	29.8	-	
Vert.	108.9	25.7	-	11.6	7.9	32.1	-	13.2	-	43.5	-	30.4	-	
Vert.	110.9	22.4	-	11.9	8.0	32.1	-	10.2	-	43.5	-	33.3	-	
Vert.	561.6	27.5	-	18.1	11.1	32.2	-	24.4	-	46.0	-	21.6	-	
Vert.	615.2	29.6	-	19.4	11.3	32.3	-	28.1	-	46.0	-	17.9	-	
Vert.	915.2	31.0	-	22.3	12.4	31.0	-	34.6	-	46.0	-	11.4	-	
Vert.	1580.0	45.3	39.1	25.1	4.7	33.1	-	41.9	35.8	73.9	53.9	32.0	18.1	
Vert.	2390.0	42.9	32.9	27.5	5.3	31.8	1.7	44.0	35.7	73.9	53.9	29.9	18.2	*1)
Vert.	4804.0	41.4	32.8	31.4	7.7	30.9	-	49.6	41.1	73.9	53.9	24.3	12.8	Floor noise
Vert.	7203.0	42.5	33.3	35.6	11.1	32.0	-	57.1	47.9	73.9	53.9	16.8	6.0	Floor noise
Vert.	9604.0	42.1	32.3	35.6	12.0	32.3	-	57.4	47.6	73.9	53.9	16.5	6.3	Floor noise

Result (QP / PK) = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier)
Result (AV)= Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier) + Duty factor
*Other frequency noises omitted in this report were not seen or had enough margin (more than 20 dB).
*QP detector was used up to 1GHz.
*1) Not Out of Band emission(Leakage Power)

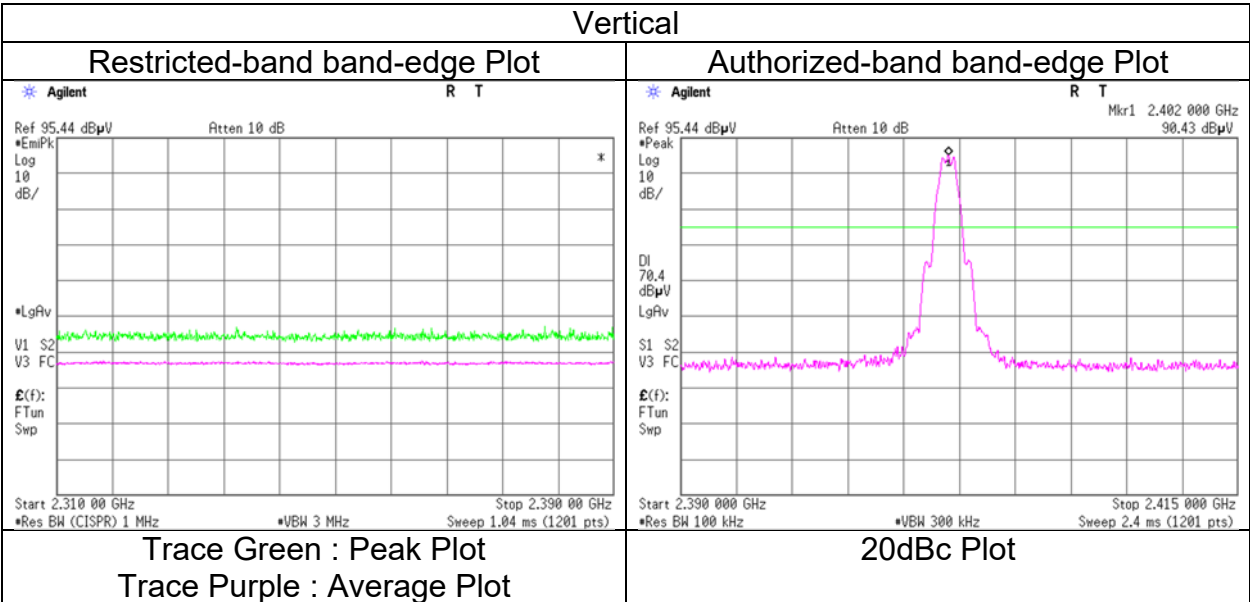
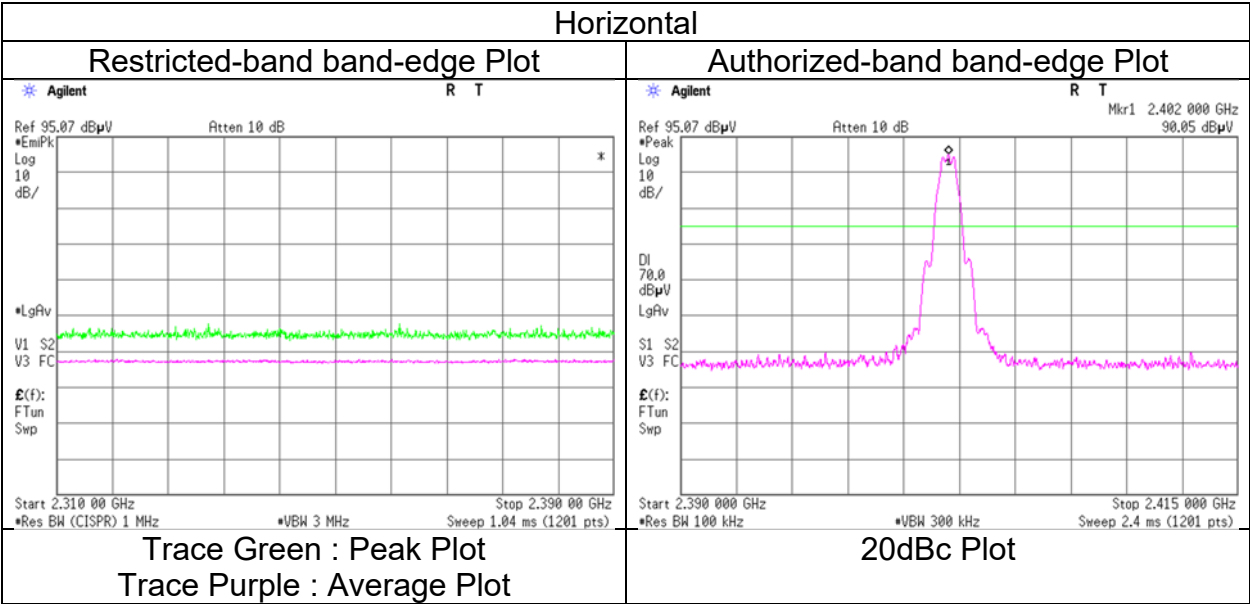
20dBc Data Sheet

Polarity	Frequency	Reading (PK)	Ant Factor	Loss	Gain	Result	Limit	Margin	Remark
[Hori/Vert]	[MHz]	[dBuV]	[dB/m]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	
Hori.	2402.0	90.1	27.5	5.3	31.8	91.1	-	-	Carrier
Hori.	2400.0	37.6	27.5	5.3	31.8	38.6	71.1	32.5	
Vert.	2402.0	90.4	27.5	5.3	31.8	91.5	-	-	Carrier
Vert.	2400.0	38.6	27.5	5.3	31.8	39.6	71.5	31.9	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier)
Distance factor: 1 GHz - 6 GHz 20log (3.8 m / 3.0 m) = 2.06 dB
6 GHz - 10 GHz 20log (4.8 m / 3.0 m) = 4.09 dB
10 GHz - 26.5 GHz 20log (1.0 m / 3.0 m) = -9.5 dB

Radiated Spurious Emission
(Reference Plot for band-edge)

Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.4
Date	September 17, 2024
Temperature / Humidity	23 deg. C / 55 % RH
Engineer	Takumi Nishida
	(1 GHz to 6 GHz)
Mode	Tx BT LE 2402 MHz



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

Radiated Spurious Emission

Test place	Ise EMC Lab.		
Semi Anechoic Chamber	No.4	No.4	No.4
Date	September 19, 2024	September 20, 2024	September 20, 2024
Temperature / Humidity	24 deg. C / 75 % RH	22 deg. C / 55 % RH	23 deg. C / 66 % RH
Engineer	Yuichiro Yamazaki (1 GHz to 6 GHz)	Takumi Nishida (6 GHz to 10 GHz)	Yuichiro Yamazaki (10 GHz to 18 GHz)
Semi Anechoic Chamber	No.4	No.4	
Date	September 21, 2024	September 22, 2024	
Temperature / Humidity	22 deg. C / 54 % RH	23 deg. C / 71 % RH	
Engineer	Takumi Nishida (Above 18 GHz)	Tomoya Sone (Below 1 GHz)	
Mode	Tx BT LE 2440 MHz		

Polarity [Hori/Vert]	Frequency [MHz]	Reading (QP / PK) [dBuV]	Reading (AV) [dBuV]	Ant. Factor [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result (QP / PK) [dBuV/m]	Result (AV) [dBuV/m]	Limit (QP / PK) [dBuV/m]	Limit (AV) [dBuV/m]	Margin (QP / PK) [dB]	Margin (AV) [dB]	Remark
Hori.	71.5	28.4	-	6.4	7.6	32.1	-	10.2	-	40.0	-	29.8	-	
Hori.	108.9	27.7	-	11.6	7.9	32.1	-	15.2	-	43.5	-	28.4	-	
Hori.	110.9	23.1	-	11.9	8.0	32.1	-	10.9	-	43.5	-	32.6	-	
Hori.	561.6	29.6	-	18.1	11.1	32.2	-	26.5	-	46.0	-	19.5	-	
Hori.	615.2	28.9	-	19.4	11.3	32.3	-	27.4	-	46.0	-	18.6	-	
Hori.	915.2	29.9	-	22.3	12.4	31.0	-	33.5	-	46.0	-	12.5	-	
Hori.	1580.0	44.1	37.8	25.1	4.7	33.1	-	40.8	34.4	73.9	53.9	33.1	19.5	
Hori.	4880.0	41.6	32.5	31.4	7.7	30.8	-	49.9	40.8	73.9	53.9	24.0	13.1	Floor noise
Hori.	7320.0	42.0	32.8	35.6	11.1	32.1	-	56.6	47.4	73.9	53.9	17.3	6.5	Floor noise
Hori.	9760.0	42.2	32.2	35.9	12.1	32.4	-	57.9	47.9	73.9	53.9	16.0	6.0	Floor noise
Vert.	71.5	28.5	-	6.4	7.6	32.1	-	10.3	-	40.0	-	29.7	-	
Vert.	108.9	25.8	-	11.6	7.9	32.1	-	13.3	-	43.5	-	30.3	-	
Vert.	110.9	22.5	-	11.9	8.0	32.1	-	10.3	-	43.5	-	33.2	-	
Vert.	561.6	27.6	-	18.1	11.1	32.2	-	24.5	-	46.0	-	21.5	-	
Vert.	615.2	29.7	-	19.4	11.3	32.3	-	28.2	-	46.0	-	17.8	-	
Vert.	915.2	31.7	-	22.3	12.4	31.0	-	35.3	-	46.0	-	10.7	-	
Vert.	1580.0	46.4	39.5	25.1	4.7	33.1	-	43.1	36.1	73.9	53.9	30.8	17.8	
Vert.	4880.0	41.4	32.6	31.4	7.7	30.8	-	49.7	40.9	73.9	53.9	24.2	13.0	Floor noise
Vert.	7320.0	42.2	33.0	35.6	11.1	32.1	-	56.8	47.6	73.9	53.9	17.1	6.3	Floor noise
Vert.	9760.0	42.0	32.0	35.9	12.1	32.4	-	57.6	47.7	73.9	53.9	16.3	6.2	Floor noise

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

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

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

*QP detector was used up to 1GHz.

Distance factor:

1 GHz - 6 GHz	$20\log(3.8\text{ m} / 3.0\text{ m}) = 2.06\text{ dB}$
6 GHz - 10 GHz	$20\log(4.8\text{ m} / 3.0\text{ m}) = 4.09\text{ dB}$
10 GHz - 26.5 GHz	$20\log(1.0\text{ m} / 3.0\text{ m}) = -9.5\text{ dB}$

Radiated Spurious Emission

Test place Ise EMC Lab.
Semi Anechoic Chamber No.4 No.4 No.4
Date September 19, 2024 September 20, 2024 September 20, 2024
Temperature / Humidity 24 deg. C / 75 % RH 22 deg. C / 55 % RH 23 deg. C / 66 % RH
Engineer Yuichiro Yamazaki (1 GHz to 6 GHz) Takumi Nishida (6 GHz to 10 GHz) Yuichiro Yamazaki (10 GHz to 18 GHz)

Semi Anechoic Chamber No.4 No.4
Date September 21, 2024 September 22, 2024
Temperature / Humidity 22 deg. C / 54 % RH 23 deg. C / 71 % RH
Engineer Takumi Nishida (Above 18 GHz) Tomoya Sone (Below 1 GHz)
Mode Tx BT LE 2480 MHz

Polarity	Frequency	Reading (QP / PK)	Reading (AV)	Ant. Factor	Loss	Gain	Duty Factor	Result (QP / PK)	Result (AV)	Limit (QP / PK)	Limit (AV)	Margin (QP / PK)	Margin (AV)	Remark
[Hori/Vert]	[MHz]	[dBuV]	[dBuV]	[dB/m]	[dB]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dBuV/m]	[dBuV/m]	[dB]	[dB]	
Hori.	71.8	28.2	-	6.4	7.6	32.1	-	10.0	-	40.0	-	30.0	-	
Hori.	108.9	27.5	-	11.6	7.9	32.1	-	15.0	-	43.5	-	28.6	-	
Hori.	110.6	22.9	-	11.8	8.0	32.1	-	10.6	-	43.5	-	32.9	-	
Hori.	561.6	29.4	-	18.1	11.1	32.2	-	26.3	-	46.0	-	19.7	-	
Hori.	615.2	28.7	-	19.4	11.3	32.3	-	27.2	-	46.0	-	18.8	-	
Hori.	915.2	29.5	-	22.3	12.4	31.0	-	33.1	-	46.0	-	12.9	-	
Hori.	1580.0	44.5	37.7	25.1	4.7	33.1	-	41.2	34.3	73.9	53.9	32.7	19.6	
Hori.	2483.5	49.3	36.1	27.4	5.4	31.7	1.7	50.4	38.8	73.9	53.9	23.5	15.1	*1)
Hori.	4960.0	41.3	32.5	31.6	7.8	30.8	-	49.8	41.0	73.9	53.9	24.1	12.9	Floor noise
Hori.	7440.0	42.3	33.1	35.5	11.1	32.2	-	56.7	47.6	73.9	53.9	17.2	6.3	Floor noise
Hori.	9920.0	42.8	32.0	36.1	12.2	32.5	-	58.6	47.9	73.9	53.9	15.3	6.0	Floor noise
Vert.	71.8	28.3	-	6.4	7.6	32.1	-	10.1	-	40.0	-	29.9	-	
Vert.	108.9	25.6	-	11.6	7.9	32.1	-	13.1	-	43.5	-	30.5	-	
Vert.	110.6	22.3	-	11.8	8.0	32.1	-	10.0	-	43.5	-	33.5	-	
Vert.	561.6	27.4	-	18.1	11.1	32.2	-	24.3	-	46.0	-	21.7	-	
Vert.	615.2	29.5	-	19.4	11.3	32.3	-	28.0	-	46.0	-	18.0	-	
Vert.	915.2	30.8	-	22.3	12.4	31.0	-	34.4	-	46.0	-	11.6	-	
Vert.	1580.0	45.9	39.0	25.1	4.7	33.1	-	42.6	35.7	73.9	53.9	31.3	18.2	
Vert.	2483.5	48.3	34.6	27.4	5.4	31.7	1.7	49.3	37.4	73.9	53.9	24.6	16.5	*1)
Vert.	4960.0	41.0	32.5	31.6	7.8	30.8	-	49.6	41.1	73.9	53.9	24.4	12.9	Floor noise
Vert.	7440.0	42.4	33.3	35.5	11.1	32.2	-	56.8	47.7	73.9	53.9	17.1	6.2	Floor noise
Vert.	9920.0	42.1	32.0	36.1	12.2	32.5	-	58.0	47.9	73.9	53.9	15.9	6.0	Floor noise

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

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

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

*QP detector was used up to 1GHz.

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

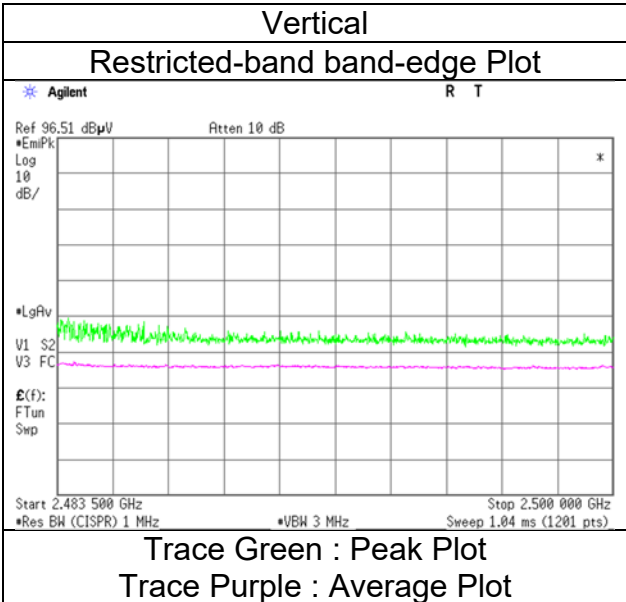
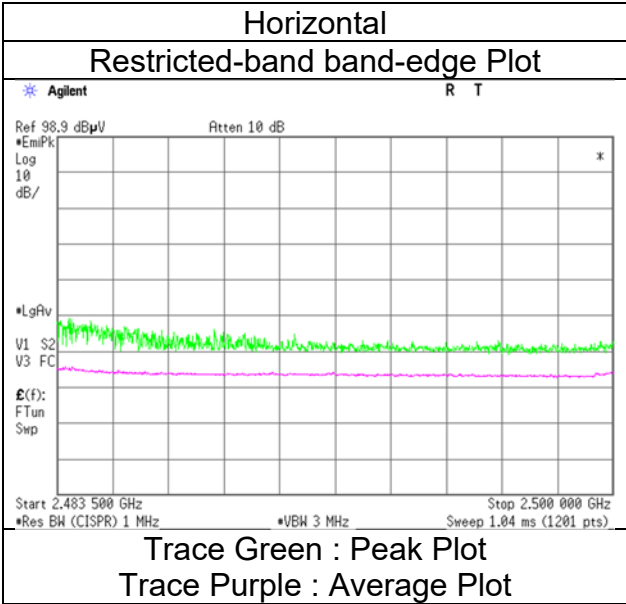
Distance factor: 1 GHz - 6 GHz $20\log(3.8\text{ m} / 3.0\text{ m}) = 2.06\text{ dB}$
 6 GHz - 10 GHz $20\log(4.8\text{ m} / 3.0\text{ m}) = 4.09\text{ dB}$
 10 GHz - 26.5 GHz $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.5\text{ dB}$

Radiated Spurious Emission
(Reference Plot for band-edge)

Test place
Semi Anechoic Chamber
Date
Temperature / Humidity
Engineer

Mode

Ise EMC Lab.
No.4
September 19, 2024
24 deg. C / 75 % RH
Yuichiro Yamazaki
(1 GHz to 6 GHz)
Tx BT LE 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

Test place Ise EMC Lab.
Semi Anechoic No.4 No.4
Chamber
Date September 24, 2024 September 25, 2024
Temperature / 23 deg. C / 59 % RH 23 deg. C / 55 % RH
Humidity
Engineer Tomoya Sone Kiyoshiro Okazaki
 (Below 1 GHz) (1 GHz to 6 GHz)
Mode Tx BT LE 2402 MHz + 11a 5180 MHz

Polarity	Frequency	Reading	Reading	Ant.	Loss	Gain	Duty	Result	Result	Limit	Limit	Margin	Margin	Remark
[Hori/Vert]	[MHz]	(QP / PK)	(AV)	Factor	[dB]	[dB]	Factor	(QP / PK)	(AV)	(QP / PK)	(AV)	(QP / PK)	(AV)	
		[dBuV]	[dBuV]	[dB/m]			[dB]	[dBuV/m]	[dBuV/m]	[dBuV/m]	[dBuV/m]	[dB]	[dB]	
Hori.	71.8	28.9	-	6.4	7.6	32.1	-	10.7	-	40.0	-	29.3	-	
Hori.	89.3	26.4	-	8.4	7.7	32.1	-	10.5	-	43.5	-	33.0	-	
Hori.	108.9	33.7	-	11.6	7.9	32.1	-	21.2	-	43.5	-	22.4	-	
Hori.	284.0	31.7	-	13.6	9.5	32.0	-	22.7	-	46.0	-	23.3	-	
Hori.	508.0	29.8	-	17.8	10.8	32.2	-	26.1	-	46.0	-	19.9	-	
Hori.	915.2	23.6	-	22.3	12.4	31.0	-	27.2	-	46.0	-	18.8	-	
Hori.	1580.0	44.2	37.0	25.1	4.7	33.1	-	40.9	33.7	73.9	53.9	33.0	20.2	
Hori.	2390.0	43.1	33.6	27.5	5.3	31.8	1.7	44.2	36.4	73.9	53.9	29.7	17.5	*1)
Vert.	71.8	29.7	-	6.4	7.6	32.1	-	11.5	-	40.0	-	28.5	-	
Vert.	89.3	30.2	-	8.4	7.7	32.1	-	14.3	-	43.5	-	29.2	-	
Vert.	108.9	30.5	-	11.6	7.9	32.1	-	18.0	-	43.5	-	25.6	-	
Vert.	284.0	30.8	-	13.6	9.5	32.0	-	21.8	-	46.0	-	24.2	-	
Vert.	508.0	26.9	-	17.8	10.8	32.2	-	23.2	-	46.0	-	22.8	-	
Vert.	915.2	22.4	-	22.3	12.4	31.0	-	26.0	-	46.0	-	20.0	-	
Vert.	1580.0	46.3	38.7	25.1	4.7	33.1	-	43.0	35.4	73.9	53.9	30.9	18.5	
Vert.	2390.0	43.1	33.9	27.5	5.3	31.8	1.7	44.1	36.6	73.9	53.9	29.8	17.3	*1)

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

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

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

*QP detector was used up to 1GHz.

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

20dBc Data Sheet

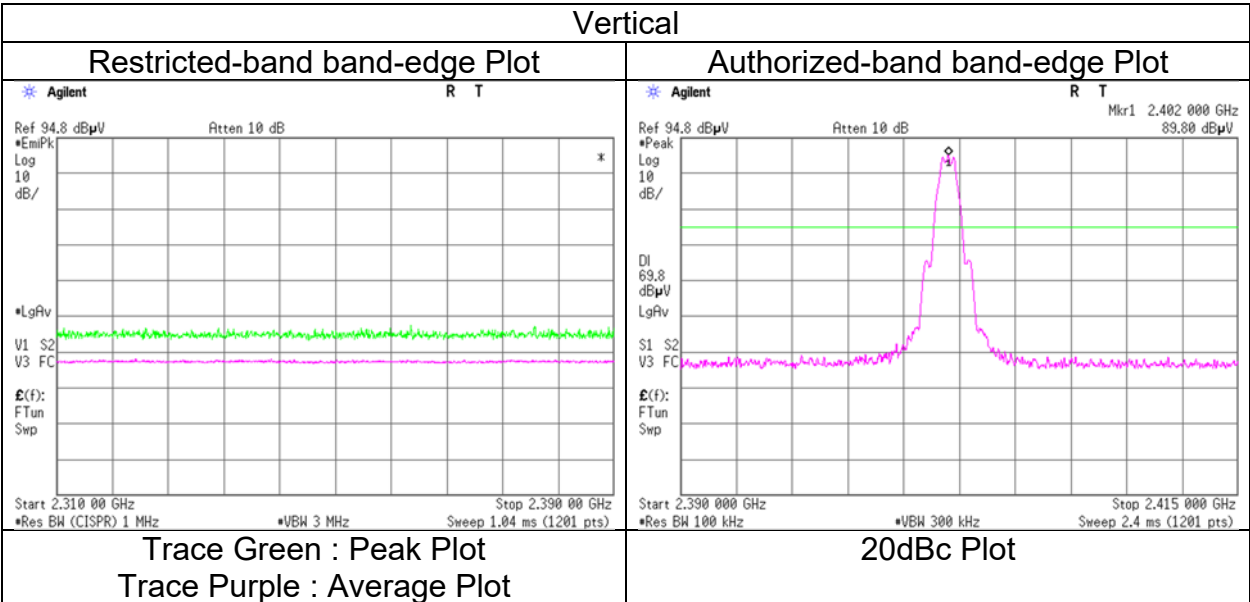
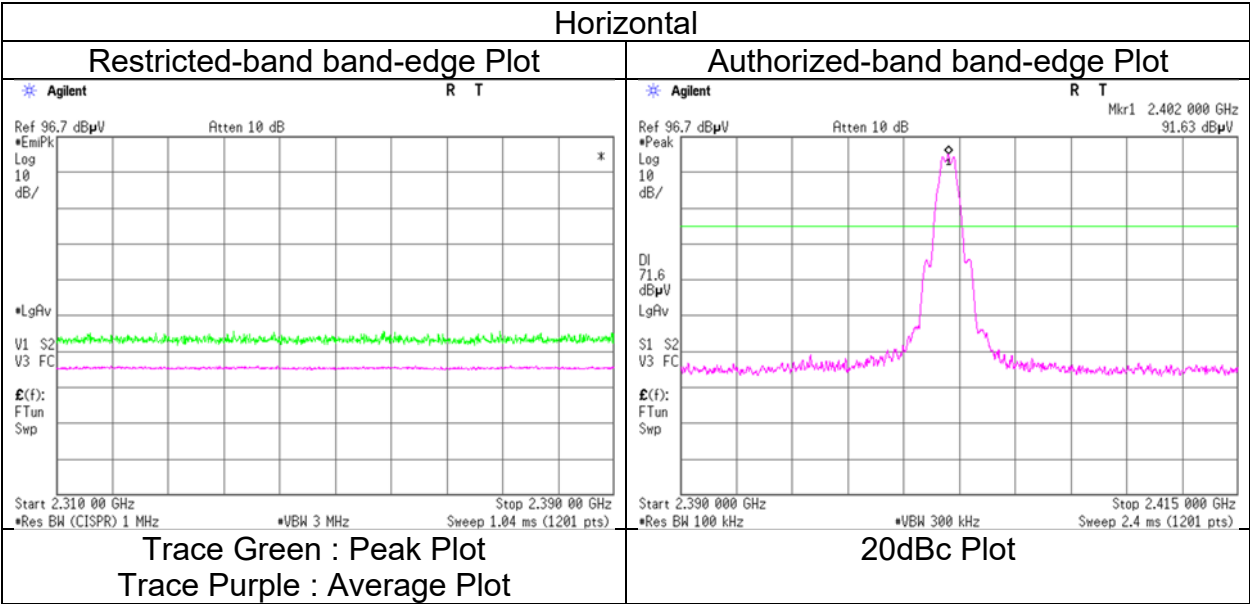
Polarity	Frequency	Reading	Ant	Loss	Gain	Result	Limit	Margin	Remark
[Hori/Vert]	[MHz]	(PK)	Factor	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	
		[dBuV]	[dB/m]						
Hori.	2402.0	91.6	27.5	5.3	31.8	92.7	-	-	Carrier
Hori.	2400.0	39.3	27.5	5.3	31.8	40.4	72.7	32.3	
Vert.	2402.0	89.8	27.5	5.3	31.8	90.9	-	-	Carrier
Vert.	2400.0	38.0	27.5	5.3	31.8	39.1	70.9	31.8	

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

Distance factor: 1 GHz - 6 GHz 20log (3.8 m / 3.0 m) = 2.06 dB
 6 GHz - 10 GHz 20log (4.8 m / 3.0 m) = 4.09 dB
 10 GHz - 26.5 GHz 20log (1.0 m / 3.0 m) = -9.5 dB

Radiated Spurious Emission
(Reference Plot for band-edge)

Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.4
Date	September 25, 2024
Temperature / Humidity	23 deg. C / 55 % RH
Engineer	Kiyoshiro Okazaki
	(1 GHz to 6 GHz)
Mode	Tx BT LE 2402 MHz + 11a 5180 MHz



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

Radiated Spurious Emission

Test place Ise EMC Lab.
Semi Anechoic No.4 No.4 No.4
Chamber
Date September 24, 2024 September 25, 2024 September 25, 2024
Temperature / 23 deg. C / 59 % RH 23 deg. C / 55 % RH 22 deg. C / 62 % RH
Humidity
Engineer Tomoya Sone Kiyoshiro Okazaki Tomoya Sone
 (Below 1 GHz) (1 GHz to 10 GHz) (10 GHz to 18 GHz)
 Above 18 GHz)
Mode Tx BT LE 2440 MHz + 11a 5180 MHz

Polarity	Frequency	Reading	Reading	Ant.	Loss	Gain	Duty	Result	Result	Limit	Limit	Margin	Margin	Remark
[Hori/Vert]	[MHz]	(QP / PK) [dBuV]	(AV) [dBuV]	Factor [dB/m]	[dB]	[dB]	[dB]	(QP / PK) [dBuV/m]	(AV) [dBuV/m]	(QP / PK) [dBuV/m]	(AV) [dBuV/m]	(QP / PK) [dB]	(AV) [dB]	
Hori.	71.5	29.0	-	6.4	7.6	32.1	-	10.8	-	40.0	-	29.2	-	
Hori.	89.2	26.5	-	8.4	7.7	32.1	-	10.6	-	43.5	-	32.9	-	
Hori.	108.9	33.8	-	11.6	7.9	32.1	-	21.3	-	43.5	-	22.3	-	
Hori.	272.8	31.8	-	13.1	9.4	32.0	-	22.2	-	46.0	-	23.8	-	
Hori.	509.6	29.9	-	17.7	10.8	32.2	-	26.2	-	46.0	-	19.8	-	
Hori.	915.2	23.7	-	22.3	12.4	31.0	-	27.3	-	46.0	-	18.7	-	
Hori.	1580.0	43.9	37.0	25.1	4.7	33.1	-	40.5	33.6	73.9	53.9	33.4	20.3	
Hori.	4880.0	41.1	32.3	31.4	7.7	30.8	-	49.4	40.6	73.9	53.9	24.5	13.3	Floor noise
Hori.	7320.0	41.8	32.5	35.6	11.1	32.1	-	56.3	47.1	73.9	53.9	17.6	6.8	Floor noise
Hori.	9760.0	41.6	30.7	35.9	12.1	32.4	-	57.2	46.3	73.9	53.9	16.7	7.6	Floor noise
Vert.	71.5	29.8	-	6.4	7.6	32.1	-	11.6	-	40.0	-	28.4	-	
Vert.	89.2	30.3	-	8.4	7.7	32.1	-	14.4	-	43.5	-	29.1	-	
Vert.	108.9	30.6	-	11.6	7.9	32.1	-	18.1	-	43.5	-	25.5	-	
Vert.	272.8	30.9	-	13.1	9.4	32.0	-	21.3	-	46.0	-	24.7	-	
Vert.	509.6	27.0	-	17.7	10.8	32.2	-	23.3	-	46.0	-	22.7	-	
Vert.	915.2	22.5	-	22.3	12.4	31.0	-	26.1	-	46.0	-	19.9	-	
Vert.	1580.0	46.2	38.5	25.1	4.7	33.1	-	42.9	35.1	73.9	53.9	31.0	18.8	
Vert.	4880.0	41.5	32.3	31.4	7.7	30.8	-	49.8	40.7	73.9	53.9	24.1	13.2	Floor noise
Vert.	7320.0	41.2	32.5	35.6	11.1	32.1	-	55.8	47.0	73.9	53.9	18.1	6.9	Floor noise
Vert.	9760.0	41.4	30.5	35.9	12.1	32.4	-	57.0	46.1	73.9	53.9	16.9	7.8	Floor noise

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

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

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

*QP detector was used up to 1GHz.

Distance factor: 1 GHz - 6 GHz 20log (3.8 m / 3.0 m) = 2.06 dB
 6 GHz - 10 GHz 20log (4.8 m / 3.0 m) = 4.09 dB
 10 GHz - 26.5 GHz 20log (1.0 m / 3.0 m) = -9.5 dB

Radiated Spurious Emission

Test place	Ise EMC Lab.	
Semi Anechoic Chamber	No.4	No.4
Date	September 24, 2024	September 25, 2024
Temperature / Humidity	23 deg. C / 59 % RH	23 deg. C / 55 % RH
Engineer	Tomoya Sone (Below 1 GHz)	Kiyoshiro Okazaki (1 GHz to 10 GHz)
Mode	Tx BT LE 2480 MHz + 11a 5180 MHz	

Polarity	Frequency	Reading (QP / PK)	Reading (AV)	Ant. Factor	Loss	Gain	Duty Factor	Result (QP / PK)	Result (AV)	Limit (QP / PK)	Limit (AV)	Margin (QP / PK)	Margin (AV)	Remark
[Hori/Vert]	[MHz]	[dBuV]	[dBuV]	[dBm]	[dB]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dBuV/m]	[dBuV/m]	[dB]	[dB]	
Hori.	71.3	28.8	-	6.4	7.6	32.1	-	10.6	-	40.0	-	29.4	-	
Hori.	90.2	26.3	-	8.6	7.8	32.1	-	10.6	-	43.5	-	33.0	-	
Hori.	108.9	33.6	-	11.6	7.9	32.1	-	21.1	-	43.5	-	22.5	-	
Hori.	280.0	31.6	-	13.5	9.4	32.0	-	22.5	-	46.0	-	23.6	-	
Hori.	508.0	29.7	-	17.8	10.8	32.2	-	26.0	-	46.0	-	20.0	-	
Hori.	915.2	23.5	-	22.3	12.4	31.0	-	27.1	-	46.0	-	18.9	-	
Hori.	1580.0	43.6	36.8	25.1	4.7	33.1	-	40.2	33.4	73.9	53.9	33.7	20.5	
Hori.	2483.5	51.1	37.0	27.4	5.4	31.7	1.7	52.1	39.8	73.9	53.9	21.8	14.2	*1)
Vert.	71.3	29.6	-	6.4	7.6	32.1	-	11.4	-	40.0	-	28.6	-	
Vert.	90.2	30.1	-	8.6	7.8	32.1	-	14.4	-	43.5	-	29.2	-	
Vert.	108.9	30.4	-	11.6	7.9	32.1	-	17.9	-	43.5	-	25.7	-	
Vert.	280.0	30.7	-	13.5	9.4	32.0	-	21.6	-	46.0	-	24.5	-	
Vert.	508.0	26.8	-	17.8	10.8	32.2	-	23.1	-	46.0	-	22.9	-	
Vert.	915.2	22.3	-	22.3	12.4	31.0	-	25.9	-	46.0	-	20.1	-	
Vert.	1580.0	46.0	38.5	25.1	4.7	33.1	-	42.6	35.2	73.9	53.9	31.3	18.7	
Vert.	2483.5	48.5	34.5	27.4	5.4	31.7	1.7	49.5	37.2	73.9	53.9	24.4	16.7	*1)

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

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

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

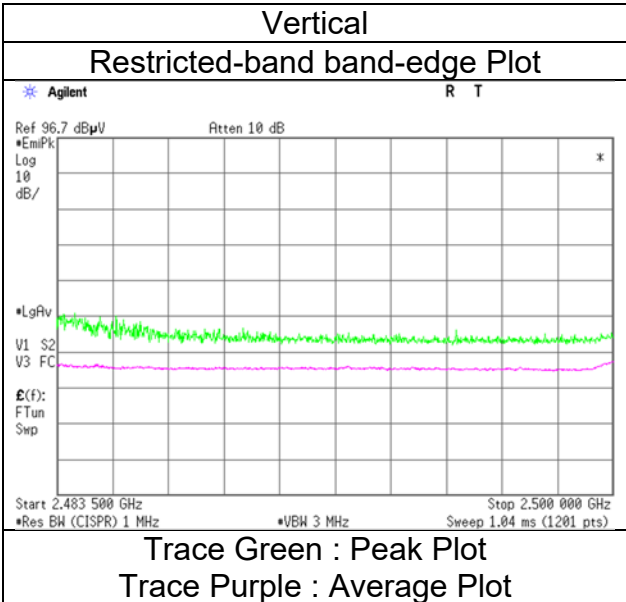
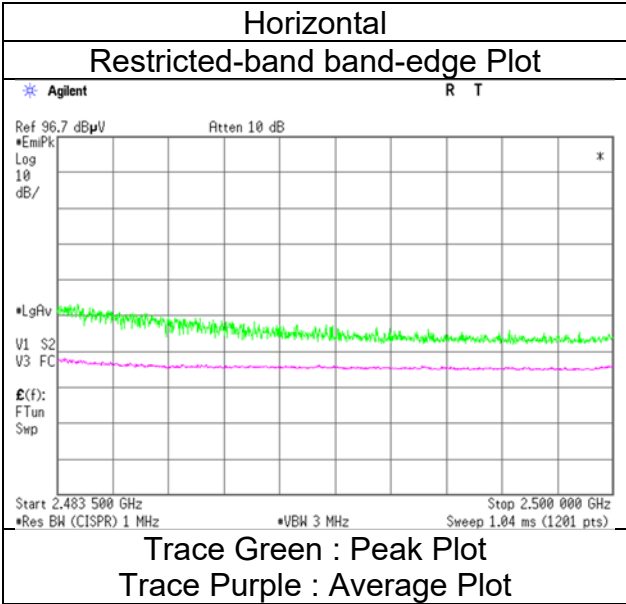
*QP detector was used up to 1GHz.

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

Distance factor:	1 GHz - 6 GHz	$20\log(3.8 \text{ m} / 3.0 \text{ m}) = 2.06 \text{ dB}$
	6 GHz - 10 GHz	$20\log(4.8 \text{ m} / 3.0 \text{ m}) = 4.09 \text{ dB}$
	10 GHz - 26.5 GHz	$20\log(1.0 \text{ m} / 3.0 \text{ m}) = -9.5 \text{ dB}$

Radiated Spurious Emission
(Reference Plot for band-edge)

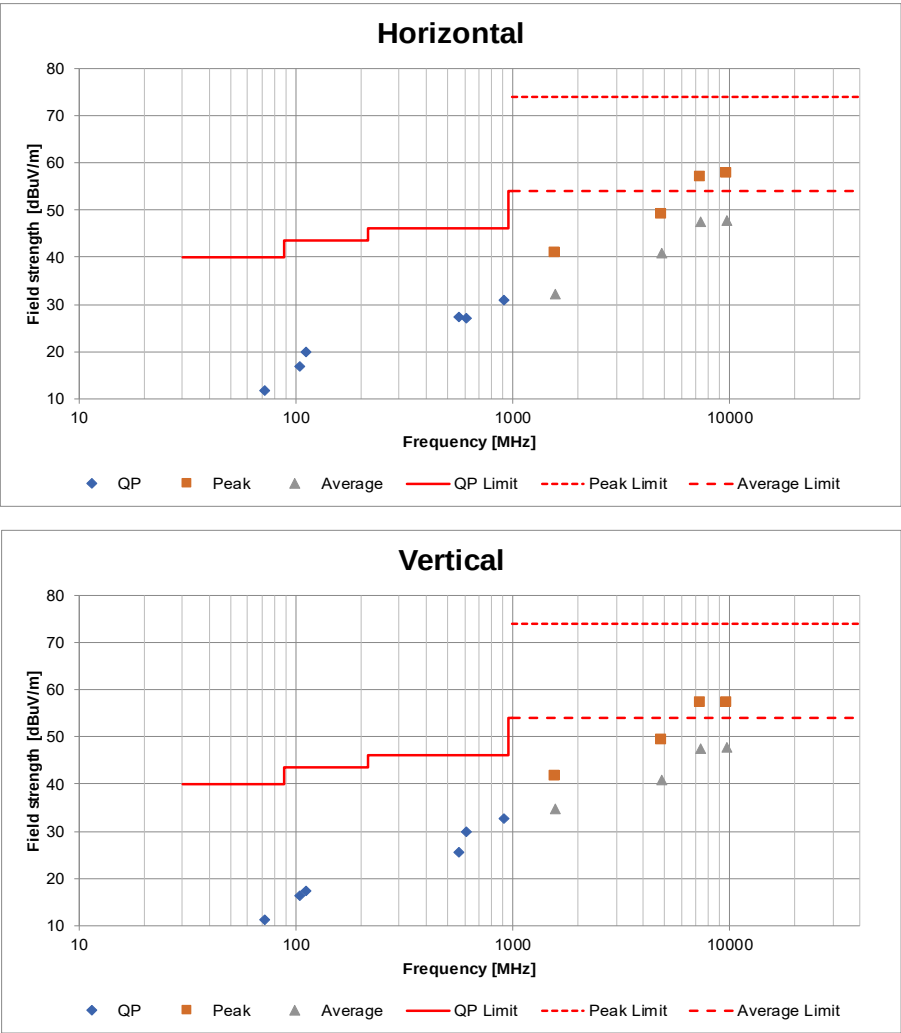
Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.4
Date	September 25, 2024
Temperature / Humidity	23 deg. C / 55 % RH
Engineer	Kiyoshiro Okazaki
	(1 GHz to 6 GHz)
Mode	Tx BT LE 2480 MHz + 11a 5180 MHz



* 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)

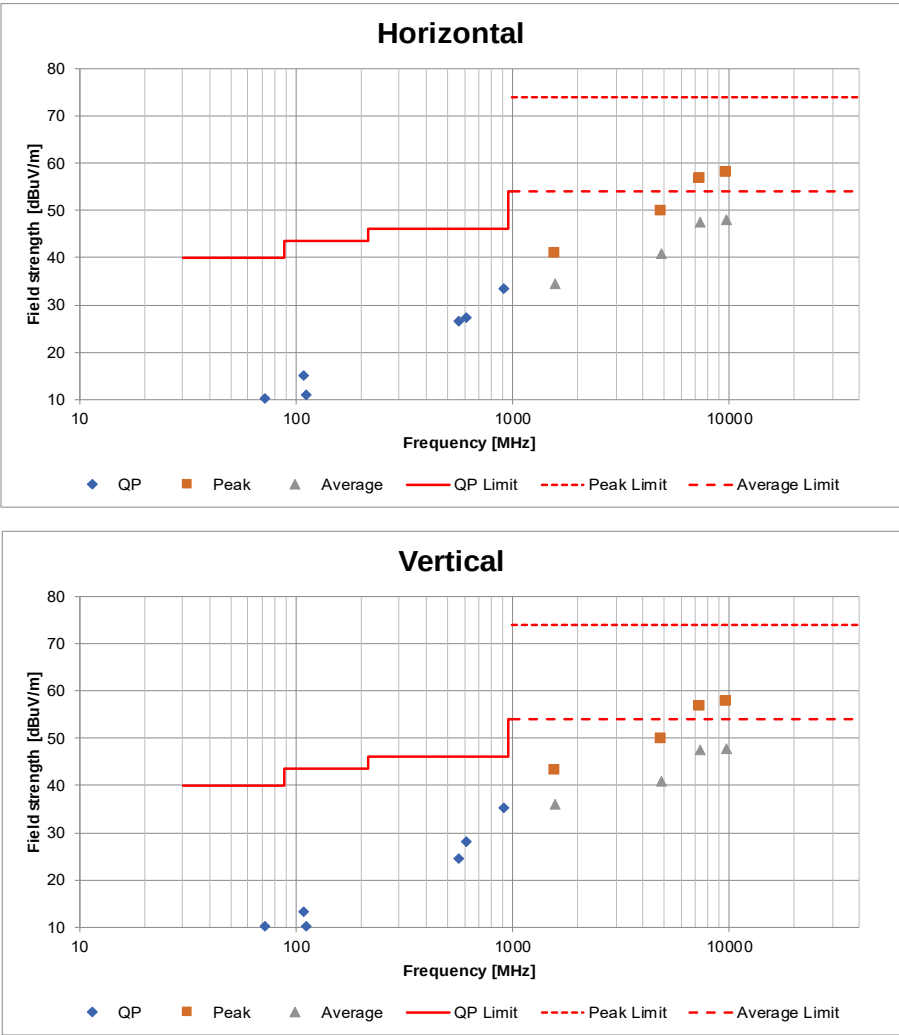
Test place	Ise EMC Lab.		
Semi Anechoic Chamber	No.4	No.4	No.4
Date	September 17, 2024	September 20, 2024	September 20, 2024
Temperature / Humidity	23 deg. C / 55 % RH	22 deg. C / 55 % RH	23 deg. C / 66 % RH
Engineer	Takumi Nishida (1 GHz to 6 GHz)	Takumi Nishida (6 GHz to 10 GHz)	Yuichiro Yamazaki (10 GHz to 18 GHz)
Semi Anechoic Chamber	No.4	No.4	
Date	September 21, 2024	September 22, 2024	
Temperature / Humidity	22 deg. C / 54 % RH	23 deg. C / 71 % RH	
Engineer	Takumi Nishida (Above 18 GHz)	Tomoya Sone (Below 1 GHz)	
Mode	Tx 11n-20 2437 MHz		



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

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

Test place	Ise EMC Lab.		
Semi Anechoic Chamber	No.4	No.4	No.4
Date	September 19, 2024	September 20, 2024	September 20, 2024
Temperature / Humidity	24 deg. C / 75 % RH	22 deg. C / 55 % RH	23 deg. C / 66 % RH
Engineer	Yuichiro Yamazaki (1 GHz to 6 GHz)	Takumi Nishida (6 GHz to 10 GHz)	Yuichiro Yamazaki (10 GHz to 18 GHz)
Semi Anechoic Chamber	No.4	No.4	No.4
Date	September 21, 2024	September 22, 2024	September 21, 2024
Temperature / Humidity	22 deg. C / 54 % RH	23 deg. C / 71 % RH	22 deg. C / 54 % RH
Engineer	Takumi Nishida (Above 18 GHz)	Tomoya Sone (Below 1 GHz)	Takumi Nishida (Above 18 GHz)
Mode	Tx BT LE 2440 MHz		



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

APPENDIX 2: Test Instruments

Test Equipment

Test Item	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Cal Int
RE	141227	Microwave Cable	Junkosha	MMX221-00500DMSDMS	1502S305	03/04/2024	12
RE	141266	Logperiodic Antenna (200-1000MHz)	Schwarzbeck Mess-Elektronik OHG	VUSLP9111B	9111B-191	08/23/2024	12
RE	141294	High Pass Filter 7-20GHz	TOKIMEC	TF37NCCC	603	02/15/2024	12
RE	141296	High Pass Filter 3.5-18.0GHz	UL Japan	HPF SELECTOR	002	09/11/2024	12
RE	141331	Attenuator(6dB)	TME	UFA-01	-	02/17/2024	12
RE	141397	Coaxial Cable	UL Japan	-	-	11/22/2023	12
RE	141425	Biconical Antenna	Schwarzbeck Mess-Elektronik OHG	VHA9103+BBA9106	VHA 91031302	08/23/2024	12
RE	141507	Horn Antenna 1-18GHz	Schwarzbeck Mess-Elektronik OHG	BBHA9120D	258	11/20/2023	12
RE	141513	Horn Antenna 15-40GHz	Schwarzbeck Mess-Elektronik OHG	BBHA9170	BBHA9170306	07/19/2024	12
RE	141545	DIGITAL HiTESTER	HIOKI E.E. CORPORATION	3805	51201148	02/01/2024	12
RE	141581	MicroWave System Amplifier	Keysight Technologies Inc	83017A	00650	10/05/2023	12
RE	141583	Pre Amplifier	SONOMA INSTRUMENT	310	260833	04/04/2024	12
RE	141899	Spectrum Analyzer	Keysight Technologies Inc	E4448A	MY46180655	05/09/2024	12
RE	141951	EMI Test Receiver	Rohde & Schwarz	ESR26	101408	05/17/2024	12
RE	142011	AC4_Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-10005	12/13/2023	24
RE	142017	AC4_Semi Anechoic Chamber(SVSWR)	TDK	Semi Anechoic Chamber 3m	DA-10005	04/14/2023	24
RE	142230	Measure, Tape, Steel	KOMELON	KMC-36	-	-	-
RE	178648	EMI measurement program	TSJ (Techno Science Japan)	TEPTO-DV	-	-	-
RE	234602	Microwave Cable	Huber+Suhner	SF126E/11PC35/11PC35/1000M, 5000M	537063/126E / 537074/126E	03/08/2024	12
RE	244710	Thermo-Hygrometer	HIOKI E.E. CORPORATION	LR5001	231202104	01/25/2024	12
RE	245787	Double Ridge Horn Antenna	Schwarzbeck Mess-Elektronik OHG	BBHA 9120 C	689	03/06/2024	12

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

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

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

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

Test item:

RE: Radiated Emission