

RADIO TEST REPORT

Test Report No. 15247953H-B-R1

Customer	Silex Technology, Inc.
Description of EUT	Low Latency Wireless Device
Model Number of EUT	LLW-4250
FCC ID	N6C-LLW4250
Test Regulation	FCC Part 15 Subpart E
Test Result	Complied
Issue Date	August 26, 2024
Remarks	WLAN (5 GHz band) part Except for DFS test

Representative Test EngineerTomoya Sone
Engineer**Approved By**Satofumi Matsuyama
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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- For test report(s) referred in this report, the latest version (including any revisions) is always referred.

REVISION HISTORY

Original Test Report No. 15247953H-B

This report is a revised version of 15247953H-B. 15247953H-B is replaced with this report

Revision	Test Report No.	Date	Page Revised Contents
- (Original)	15247953H-B-R1	August 8, 2024	-
1	15247953H-B-R1	August 26, 2024	p.6, 11 Modified Antenna numbers: Antenna 0, 1, 2, 3 → Antenna 1, 2, 3, 4
1	15247953H-B-R1	August 26, 2024	p.11 Modified tested frequency for Maximum Conducted Output Power and Maximum Power Spectral Density: 5220 MHz → 5200 MHz
1	15247953H-B-R1	August 26, 2024	p.11, 21 Modified tested frequency for 99 % Occupied Bandwidth: 5220 MHz → 5200 MHz
1	15247953H-B-R1	August 26, 2024	p.46 Modified tested frequency: 5720 MHz → 5725 MHz

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	Silex Technology, Inc.
Address	2-3-1 Hikaridai, Seika-cho, Soraku-gun, Kyoto 619-0237, Japan
Telephone Number	+81-774-98-3878
Contact Person	Keisuke Ishiro

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	Low Latency Wireless Device
Model Number	LLW-4250
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	April 22, 2024
Test Date	April 23 to May 28, 2024

2.2 Product Description

General Specification

Rating	DC 12 V (AC Adapter Input), DC 24 V (DC Power Input), DC 48 V (PoE Input)
Operating temperature	0 deg. C to 40 deg. C

Radio Specification

This report contains data provided by the customer which can impact the validity of results. UL Japan, Inc. is only responsible for the validity of results after the integration of the data provided by the customer. The data provided by the customer is marked "a)" in the table below.

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

Equipment Type	Transceiver
Frequency of Operation	2412 MHz to 2462 MHz
Type of Modulation	DSSS, OFDM
Antenna Gain ^{a)}	1.5 dBi (Antenna 1, 2, 3, 4)

WLAN (IEEE802.11a/11n-20)

Equipment Type	Transceiver		
Frequency of Operation	5180 MHz to 5240 MHz 5260 MHz to 5320 MHz 5500 MHz to 5700 MHz 5745 MHz to 5825 MHz		
Type of Modulation	OFDM		
Antenna Gain ^{a)}	1.6 dBi	5180 MHz to 5240 MHz	(Antenna 1, 2, 3, 4)
	1.7 dBi	5260 MHz to 5320 MHz	(Antenna 1, 2, 3, 4)
	1.7 dBi	5500 MHz to 5700 MHz	(Antenna 1, 2, 3, 4)
	1.6 dBi	5745 MHz to 5825 MHz	(Antenna 1, 2, 3, 4)

*The Antenna 3 and 4 are only used to detect DFS Radar signals and not to transmit them.

SECTION 3: Test specification, Procedures & Results

3.1 Test Specification

Test Specification	FCC Part 15 Subpart E The latest version on the first day of the testing period
Title	FCC 47 CFR Part 15 Radio Frequency Device Subpart E Unlicensed National Information Infrastructure Devices Section 15.407 General technical requirements

* 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 ISED: RSS-Gen 8.8	FCC: 15.407 (b) (6) / 15.207 ISED: RSS-Gen 8.8	6.50 dB, 0.49658 MHz, L, AV	Complied	-
26 dB Emission Bandwidth	FCC: KDB Publication Number 789033 ISED: -	FCC: 15.407 (a) (1) (2) (3) ISED: -	See data	Complied	Conducted
Maximum Conducted Output Power	FCC: KDB Publication Number 789033 ISED: -	FCC: 15.407 (a) (1) (2) (3) ISED: RSS-247 6.2.1.1 6.2.2.1 6.2.3.1 6.2.4.1	See data	Complied	Conducted
Maximum Power Spectral Density	FCC: KDB Publication Number 789033 ISED: -	FCC : 15.407 (a) (1) (2) (3) ISED: RSS-247 6.2.1.1 6.2.2.1 6.2.3.1 6.2.4.1	See data	Complied	Conducted
Spurious Emission Restricted Band Edge	FCC: ANSI C63.10-2013 KDB Publication Number 789033 ISED: -	FCC: 15.407 (b), 15.205 and 15.209 ISED: RSS-247 6.2.1.2 6.2.2.2 6.2.3.2 6.2.4.2	0.5 dB 68.4 MHz, QP, Vert.	Complied	Conducted (< 30 MHz) / Radiated (> 30 MHz) *1)
6 dB Emission Bandwidth	FCC: ANSI C63.10-2013 ISED: -	FCC: 15.407 (e) ISED: RSS-247 6.2.4.1	See data	Complied	Conducted

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 RSS-247 6.2 and KDB 789033 D02 G.3.b).

FCC Part 15.31 (e)

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

FCC Part 15.203 Antenna requirement

The EUT has a unique coupling/antenna connector (Revers SMA). Therefore the equipment complies with the requirement of 15.203.

3.3 Addition to Standard

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

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

3.4 Uncertainty

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

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

Conducted emission

Item	Frequency range	Unit	Calculated Uncertainty (+/-)
AMN (LISN)	0.15 MHz to 30 MHz	dB	3.3

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	4.7
		Vertical	4.7
	200 MHz to 1000 MHz	Horizontal	4.8
		Vertical	6.0
10 m	30 MHz to 200 MHz	Horizontal	5.2
		Vertical	5.1
	200 MHz to 1000 MHz	Horizontal	5.2
		Vertical	5.2
3 m	1 GHz to 6 GHz	dB	5.0
	6 GHz to 18 GHz	dB	5.2
1 m	10 GHz to 18 GHz	dB	5.3
	18 GHz to 26.5 GHz	dB	5.2
	26.5 GHz to 40 GHz	dB	4.7
0.5 m	26.5 GHz to 40 GHz	dB	4.8

Antenna Terminal Conducted

Item	Unit	Calculated Uncertainty (+/-)
Antenna terminated conducted emission / Power density / Burst power	dB	3.47
Adjacent channel power (ACP)	dB	2.28
Bandwidth (OBW)	%	0.96
Time readout (time span upto 100 msec)	%	0.11
Time readout (time span upto 1000 msec)	%	0.11
Time readout (time span upto 60 sec)	%	0.02
Power measurement (Power meter < 8 GHz)	dB	1.46
Power measurement (Call box < 6 GHz)	dB	1.69
Frequency readout (Frequency counter)	ppm	0.67
Frequency readout (Spectrum analyzer frequency readout function)	ppm	2.13
Temperature (constant temperature bath)	deg. C	0.69
Humidity (constant temperature bath)	%RH	2.98
Modulation characteristics	%	6.93
Frequency for mobile	ppm	0.08
Contention-based protocol	dB	2.26

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	-	-

* Size of vertical conducting plane (for Conducted Emission test): 2.0 x 3.0 m for No.1, No.2, No.3, No.4, and No.5 semi-anechoic chambers and No.3 and No.4 shielded rooms.

3.6 Test Data, Test Instruments, and Test Set Up

Refer to APPENDIX.

SECTION 4: Operation of EUT during testing

4.1 Operating Mode(s)

Mode	Remarks*
IEEE 802.11a (11a)	6 Mbps, PN9
IEEE 802.11n MIMO 20 MHz BW (11n-20)	MCS 9, PN9
*Transmitting duty was 100 % on all tests. *The worst antenna and condition was determined based on the test result of Maximum Conducted Output Power. *Power of the EUT was set by the software as follows; Power Setting: Refer to the following table Software: Tera Term Version: 4.106 (Date: 2024.04.11, 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 power setting below is adjusted for testing so that the maximum power of EUT's product specification will be outputted. Therefore, the below power is different from the production model.	

[Power Setting]

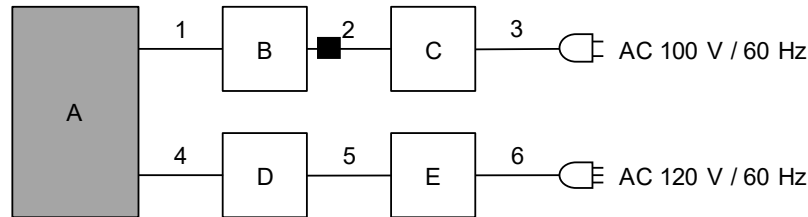
Mode	Ch	Frequency	Power Setting [dBm]
11a	36	5180 MHz	16
	40	5200 MHz	
	48	5240 MHz	
	52	5260 MHz	17
	60	5300 MHz	
	64	5320 MHz	
	100	5500 MHz	17.5
	116	5580 MHz	17
	120	5600 MHz	
	140	5700 MHz	
	149	5745 MHz	17.5
	157	5785 MHz	
	165	5825 MHz	
11n-20	36	5180 MHz	16
	40	5200 MHz	15.5
	48	5240 MHz	16
	52	5260 MHz	
	60	5300 MHz	
	64	5320 MHz	15.5
	100	5500 MHz	
	116	5580 MHz	
	120	5600 MHz	14.5
	140	5700 MHz	
	149	5745 MHz	
	157	5785 MHz	15
	165	5825 MHz	14.5
			15

*The Details of Operation Mode(s)

Test Item	Operating Mode	Tested Antenna	Tested Frequency			
			Lower Band	Middle Band	Additional Band	Upper Band
Conducted emission	Tx 11n-20 *1)	1 + 2	-	5320 MHz	-	-
26 dB Emission Bandwidth	Tx 11a Tx 11n-20	1	-	5260 MHz 5300 MHz 5320 MHz	5500 MHz 5580 MHz 5700 MHz	-
Maximum Conducted Output Power	Tx 11a	1	5180 MHz	5260 MHz	5500 MHz	5745 MHz
	Tx 11n-20	1 + 2	5200 MHz 5240 MHz	5300 MHz 5320 MHz	5580 MHz 5700 MHz	5785 MHz 5825 MHz
Maximum Power Spectral Density	Tx 11n-20	1 + 2	5180 MHz 5200 MHz 5240 MHz	5260 MHz 5300 MHz 5320 MHz	5500 MHz 5580 MHz 5700 MHz	5745 MHz 5785 MHz 5825 MHz
99 % Occupied Bandwidth	Tx 11a Tx 11n-20	1	5180 MHz 5200 MHz 5240 MHz	5260 MHz 5300 MHz 5320 MHz	5500 MHz 5580 MHz 5700 MHz	5745 MHz 5785 MHz 5825 MHz
6 dB Bandwidth	Tx 11a Tx 11n-20	1	-	-	-	5745 MHz 5785 MHz 5825 MHz
Radiated Spurious Emission (Below 1 GHz)	Tx 11n-20 *1)	1 + 2	-	5320 MHz	-	-
Radiated Spurious Emission (Above 1 GHz)	Tx 11n-20 *1)	1 + 2	5180 MHz 5240 MHz	5320 MHz	5500 MHz 5580 MHz 5700 MHz	5745 MHz 5785 MHz 5825 MHz
Conducted Spurious Emission	Tx 11n-20 *1)	1	-	5320 MHz	-	-
*1) The mode was tested as a representative, because it had the highest power at antenna terminal test.						

4.2 Configuration and Peripherals

Conducted Emission test



■ : Standard Ferrite Core

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

* The power supply for the following three systems and pre-checked as follows.

- (1) Power supply using AC adapter (120 V)
- (2) Power supply using AC adapter (240 V)
- (3) DC 24 V power supply (via regulated power supply (120 V))
- (4) PoE power supply from LAN Hub (120 V)

From the result of pre-check, the test configuration for this test is as above.

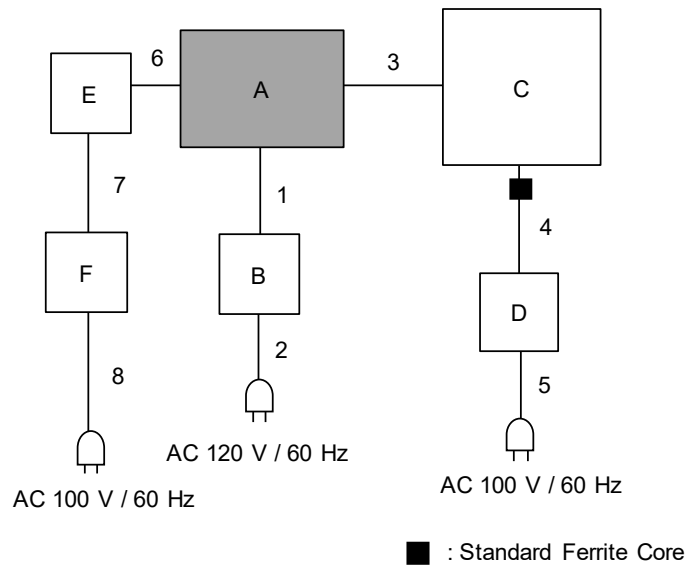
Description of EUT and Support Equipment

No.	Item	Model Number	Serial Number	Manufacturer	Remarks
A	Low Latency Wireless Device	LLW-4250	84253FED6E78	Silex Technology, Inc.	EUT
B	Laptop PC	CF-SV8RDCVS	0FKSC24469	Panasonic Corporation	-
C	AC Adapter	CF-AA6532A M1	6532AM120422507A	Panasonic Corporation	-
D	5-Port Gigabit Desktop Switch with 4-Port PoE+	TL-SG1005P	22150D7003448	tp-link	-
E	AC Adapter	T535131-2-DT	200037-15	tp-link	-

List of Cables Used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	LAN Cable	1.6	Unshielded	Unshielded	-
2	DC Cable	0.9	Unshielded	Unshielded	-
3	AC Cable	0.8	Unshielded	Unshielded	-
4	LAN Cable	1.6	Unshielded	Unshielded	-
5	DC Cable	1.2	Unshielded	Unshielded	-
6	AC Cable	1.0	Unshielded	Unshielded	-

Radiated Emission test



* Cabling and setup(s) were taken into consideration and test data was taken under worse case conditions.
* The power supply for the following three systems and pre-checked as follows.

- (1) Power supply using AC adapter (120 V)
- (2) DC 24 V power supply
- (3) PoE power supply from LAN Hub

Above 1 GHz was (1) AC 120 V powered, as shown in the above configuration diagram.

Item B, cable1 and cable2 were not used for (3) PoE power supply in Below 1 GHz.

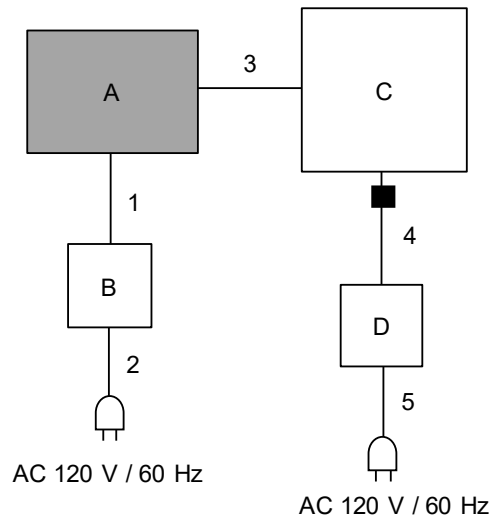
Description of EUT and Support Equipment

No.	Item	Model Number	Serial Number	Manufacturer	Remarks
A	Low Latency Wireless Device	LLW-4250	84253FED6E78	Silex Technology, Inc.	EUT
B	AC Adapter	ATS036T-A120	151273-11	Adapter Technology Co., Ltd.	-
C	Laptop PC	CF-SV8RDCVS	0HKSC51454	Panasonic Corporation	-
D	AC Adapter	CF-AA65D2A M1	65D2AM120Y033282WWA	Panasonic Corporation	-
E	5-Port Gigabit Desktop Switch with 4-Port PoE+	TL-SG1005P	22150D7003448	tp-link	-
F	AC Adapter	T535131-2-DT	200037-15	tp-link	-

List of Cables Used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	DC Cable	1.5	Unshielded	Unshielded	-
2	AC Cable	0.9	Unshielded	Unshielded	-
3	LAN Cable	1.5	Unshielded	Unshielded	-
4	DC Cable	0.9	Unshielded	Unshielded	-
5	AC Cable	0.8	Unshielded	Unshielded	-
6	LAN Cable	1.6	Unshielded	Unshielded	-
7	DC Cable	1.2	Unshielded	Unshielded	-
8	AC Cable	1.5	Unshielded	Unshielded	-

Antenna Terminal Conducted Tests



■ : Standard Ferrite Core

* 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	Low Latency Wireless Device	LLW-4250	84253FED6E78	Silex Technology, Inc.	EUT
B	AC Adapter	ATS036T-A120	151273-11	Adapter Technology Co., Ltd.	-
C	Laptop PC	CF-SV8RDCVS	0HKSC51454	Panasonic Corporation	-
D	AC Adapter	CF-AA6532A M1	6532AM120720658A	Panasonic Corporation	-

List of Cables Used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	DC Cable	1.5	Unshielded	Unshielded	-
2	AC Cable	0.9	Unshielded	Unshielded	-
3	LAN Cable	1.5	Unshielded	Unshielded	-
4	DC Cable	0.9	Unshielded	Unshielded	-
5	AC Cable	0.8	Unshielded	Unshielded	-

SECTION 5: Conducted Emission

Test Procedure and Conditions

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 rear of tabletop was located 40 cm to the vertical conducting plane. The rear of EUT, including peripherals was aligned and flushed with rear of tabletop. All other surfaces of tabletop were at least 80cm from any other grounded conducting surface. EUT was located 80cm from a Line Impedance Stabilization Network (LISN) / Artificial mains Network (AMN) and excess AC cable was bundled in center.

For the tests on EUT with other peripherals (as a whole system)

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

The AC Mains Terminal Continuous disturbance Voltage has been measured with the EUT in a Semi Anechoic Chamber.

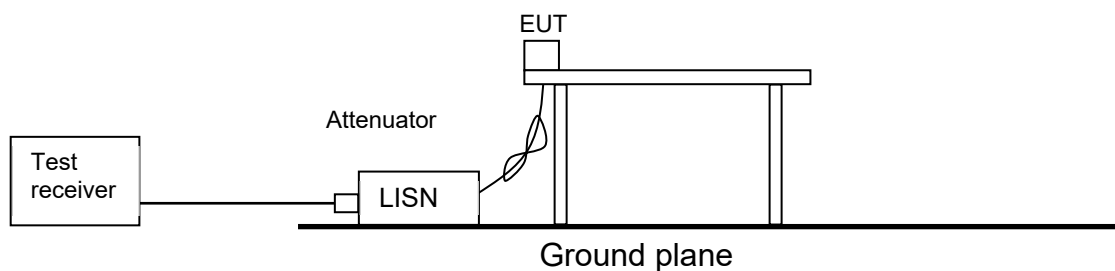
The EUT was connected to a LISN (AMN) via AC adapter and PoE HUB.

An overview sweep with peak detection has been performed.

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

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

Figure 1: Test Setup



SECTION 6: Radiated Spurious Emission and Band Edge Compliance

Test Procedure

< Below 1 GHz >

EUT was placed on a urethane platform of nominal size, 0.5 m by 1.0 m, raised 0.8 m above the conducting ground plane. The Radiated Electric Field Strength has been measured in a Semi Anechoic Chamber with a ground plane.

< 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.

< Below 1 GHz >

The result also satisfied with the general limits specified in section 15.209 (a).

< Above 1 GHz >

Inside of restricted bands (Section 15.205):

Apply to limit in the Section 15.209 (a).

Outside of the restricted bands:

Apply to limit 68.2 dBuV/m, 3 m (-27 dBm e.i.r.p.*) in the Section 15.407 (b) (1) (2) (3).

Restricted band edge:

Apply to limit in the Section 15.209 (a).

Since this limit is severer than the limit of the inside of restricted bands.

*Electric field strength to e.i.r.p. conversion:

$$E = \frac{1000000\sqrt{30P}}{3} \text{ (uV/m)} \quad :P \text{ is the e.i.r.p. (Watts)}$$

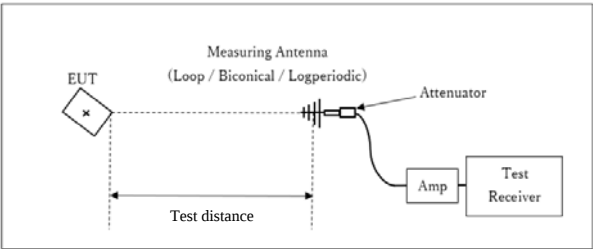
Test Antennas are used as below;

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

Frequency	Below 1 GHz	Above 1 GHz	
Instrument Used	Test Receiver	Spectrum Analyzer	
Detector	QP	Peak	Average
IF Bandwidth	BW: 120 kHz	RBW: 1 MHz VBW: 3 MHz	Method AD RBW: 1 MHz VBW: 3 MHz Detector: Power Averaging (RMS) Trace: ≥ 100 traces If duty cycle was less than 98%, a duty factor was added to the results.

Figure 2: Test Setup

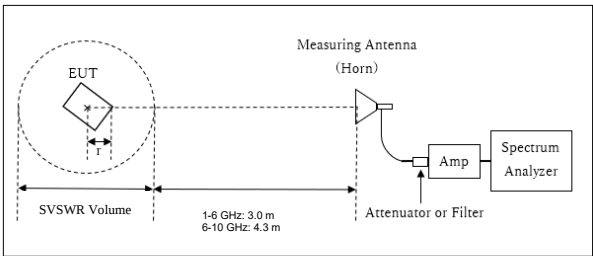
Below 1 GHz



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: $20 \times \log (3.75 \text{ m} / 3.0 \text{ m}) = 1.94 \text{ dB}$

* Test Distance: $(3 + \text{SVSWR Volume} / 2) - r = 3.75 \text{ m}$

SVSWR Volume : 2.0 m

(SVSWR Volume has been calibrated based on CISPR 16-1-4.)

r = 0.25 m

[6 GHz to 10 GHz]

Distance Factor: $20 \times \log (4.75 \text{ m} / 3.0 \text{ m}) = 4.00 \text{ dB}$

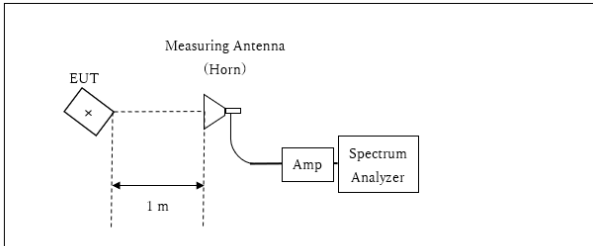
* Test Distance: $(4.3 + \text{SVSWR Volume} / 2) - r = 4.75 \text{ m}$

SVSWR Volume : 1.4 m

(SVSWR Volume has been calibrated based on CISPR 16-1-4.)

r = 0.25 m

10 GHz to 40 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 carrier level and noise levels were confirmed at each position of X, Y and Z axes of EUT to see the position of maximum noise, and the test was made at the position that has the maximum noise.

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

Measurement Range : 30 MHz to 40 GHz
Test Data : APPENDIX
Test Result : Pass

SECTION 7: Antenna Terminal Conducted Tests

Test Procedure

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

Test	Span	RBW	VBW	Sweep time	Detector	Trace	Instrument used and Test method
26 dB Bandwidth	Enough to capture the emission	Close to 1 % of EBW	> RBW	Auto	Peak	Max Hold	Spectrum Analyzer
99 % Occupied Bandwidth *1)	Enough width to display emission skirts	1 % to 5 % of OBW	≥ 3 RBW	Auto	Peak	Max Hold	Spectrum Analyzer
6 dB Bandwidth	Enough to capture the emission	100 kHz	300 kHz	Auto	Peak	Max Hold	Spectrum Analyzer
Maximum Conducted Output Power	-	-	-	Auto	Average	-	Power Meter (Sensor: 80 MHz BW) (Method PM-G)
Maximum Power Spectral Density	Encompass the entire EBW	1 MHz or 470 kHz *2)	≥ 3 RBW	Auto	RMS Power Averaging (200 times)	Clear Write	Spectrum Analyzer
Conducted Spurious Emission*3) *4)	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) KDB 789033 D02 says that RBW is set to be 500 kHz for 5.725 GHz to 5.850 GHz, but it is not possible with spectrum analyzer, so RBW Correction Factor ($10 \log(500 \text{ kHz} / 470 \text{ kHz})$) was added to the test result.

*3) In the frequency range below 30 MHz, 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 to 150 kHz: RBW = 200 Hz, 150 kHz to 30 MHz: RBW = 10 kHz)

*4) 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.

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

Test Data : APPENDIX
Test Result : Pass

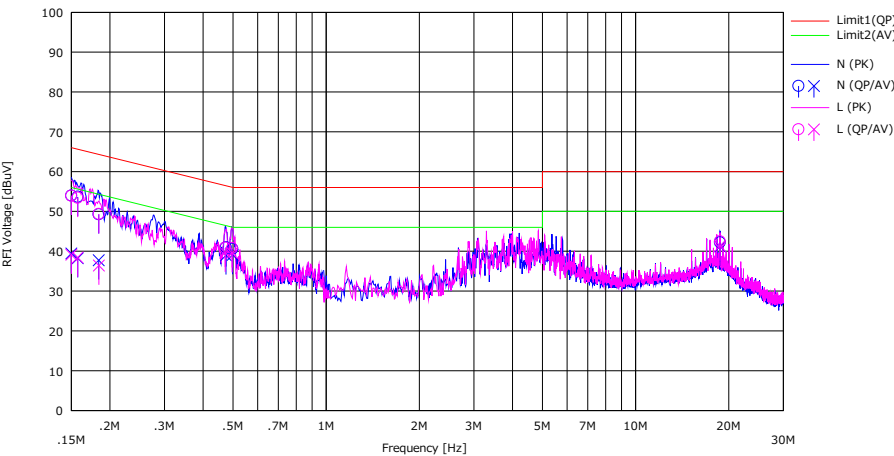
APPENDIX 1: Test Data

Conducted Emission

Test place
Date
Temperature / Humidity
Engineer
Mode

Ise EMC Lab. No.4 Semi Anechoic Chamber
May 28, 2024
22 deg. C / 60 % RH
Yuichiro Yamazaki
Tx 11n-20 5320 MHz

Limit : FCC_Part 15 Subpart E(15.207)



No.	Freq. [MHz]	Reading		USN	LOSS	Results		Limit		Margin		Phase	Comment
		(QP) [dBuV]	(AV) [dBuV]			(QP) [dBuV]	(AV) [dBuV]	(QP) [dBuV]	(AV) [dBuV]	(QP) [dB]	(AV) [dB]		
1	0.15000	40.70	26.20	0.06	13.18	53.94	39.44	66.00	56.00	12.06	16.56	N	
2	0.15735	40.40	25.00	0.06	13.18	53.64	38.24	65.60	55.60	11.96	17.36	N	
3	0.18404	36.00	24.50	0.06	13.18	49.24	37.74	64.30	54.30	15.06	16.56	N	
4	0.47433	27.70	25.70	0.06	13.22	40.98	38.98	56.44	46.44	15.46	7.46	N	
5	0.49809	27.30	25.80	0.06	13.22	40.58	39.08	56.03	46.03	15.45	6.95	N	
6	18.74431	28.00	27.00	0.37	13.85	42.22	41.22	60.00	50.00	17.78	8.78	N	
7	0.15000	40.70	25.90	0.03	13.18	53.91	39.11	66.00	56.00	12.09	16.89	L	
8	0.15730	40.20	25.20	0.03	13.18	53.41	38.41	65.61	55.61	12.20	17.20	L	
9	0.18413	36.10	23.20	0.04	13.18	49.32	36.42	64.30	54.30	14.98	17.88	L	
10	0.47165	27.60	26.40	0.04	13.22	40.86	39.66	56.48	46.48	15.62	6.82	L	
11	0.49658	27.50	26.30	0.04	13.22	40.76	39.56	56.06	46.06	15.30	6.50	L	
12	18.73931	28.20	27.10	0.40	13.85	42.45	41.35	60.00	50.00	17.55	8.65	L	

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

26 dB Emission Bandwidth and 99 % Occupied Bandwidth

Test place Ise EMC Lab. No.8 Measurement Room
Date May 23, 2024
Temperature / Humidity 25 deg. C / 57 % RH
Engineer Shousei Hamaguchi
Mode Tx

11a

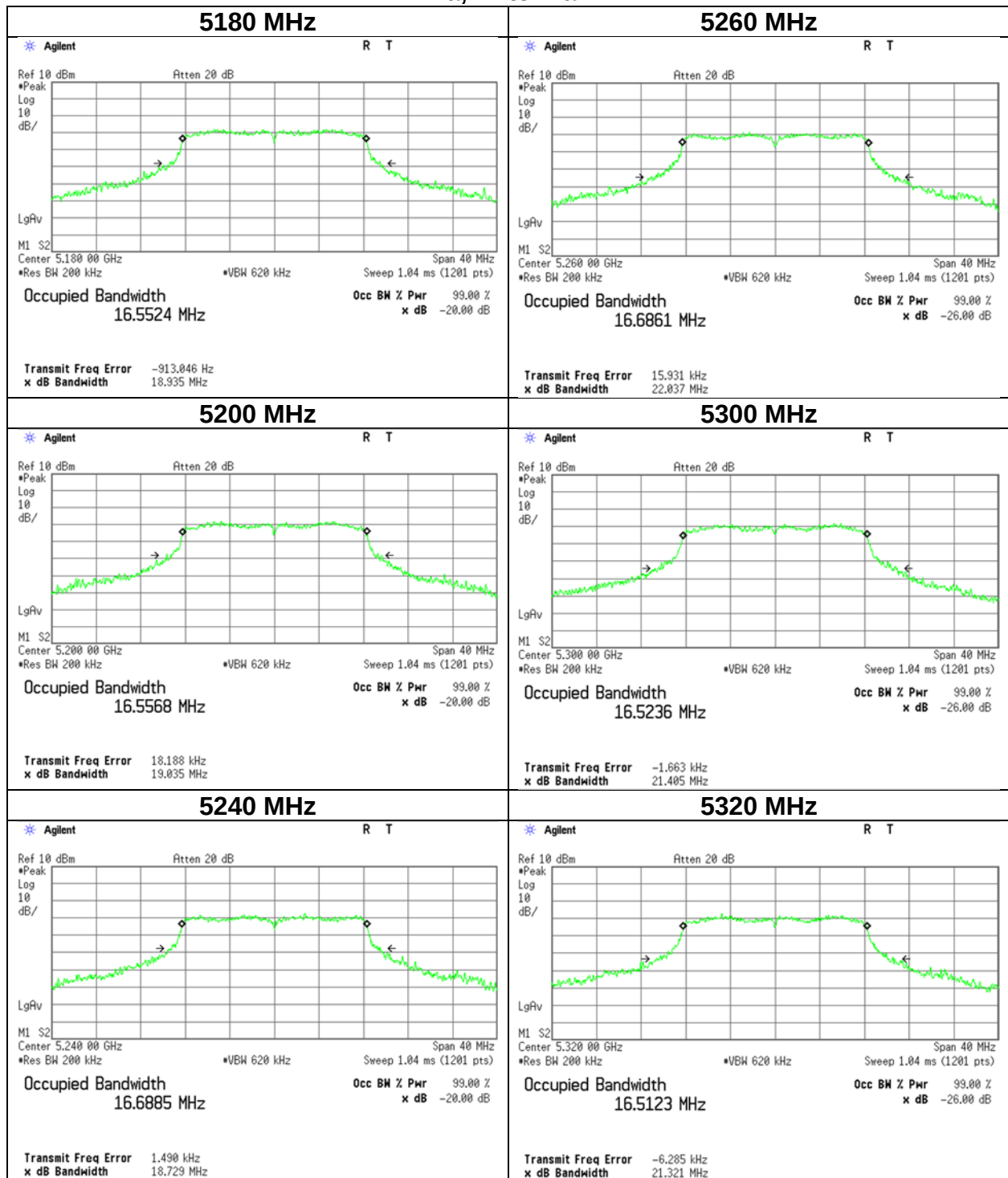
Antenna	Tested Frequency [MHz]	26 dB Emission Bandwidth [MHz]	99 % Occupied Bandwidth [kHz]
Antenna 1	5180	-	16552.4
	5200	-	16556.8
	5240	-	16688.5
	5260	22.037	16686.1
	5300	21.405	16523.6
	5320	21.321	16512.3
	5500	21.767	16598.2
	5580	22.672	16593.7
	5700	22.082	16628.9
	5745	-	16569.8
	5785	-	16601.1
	5825	-	16777.4

11n-20

Antenna	Tested Frequency [MHz]	26 dB Emission Bandwidth [MHz]	99 % Occupied Bandwidth [kHz]
Antenna 1	5180	-	17695.4
	5200	-	17697.3
	5240	-	17671.9
	5260	22.302	17695.8
	5300	21.610	17690.8
	5320	22.093	17694.8
	5500	22.198	17688.6
	5580	22.463	17698.5
	5700	21.676	17686.9
	5745	-	17687.2
	5785	-	17674.3
	5825	-	17696.6

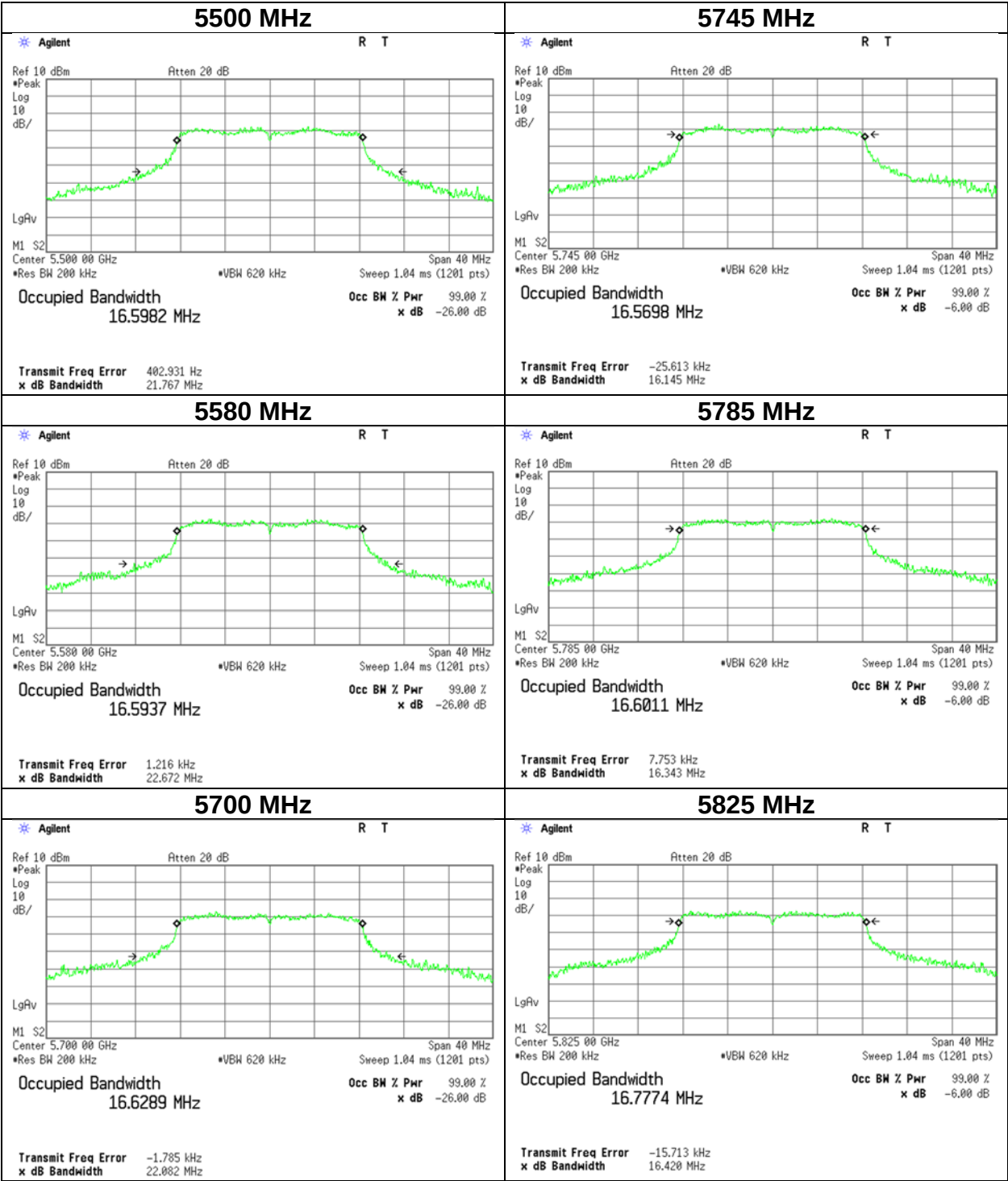
26 dB Emission Bandwidth and 99 % Occupied Bandwidth

11a, Antenna 1



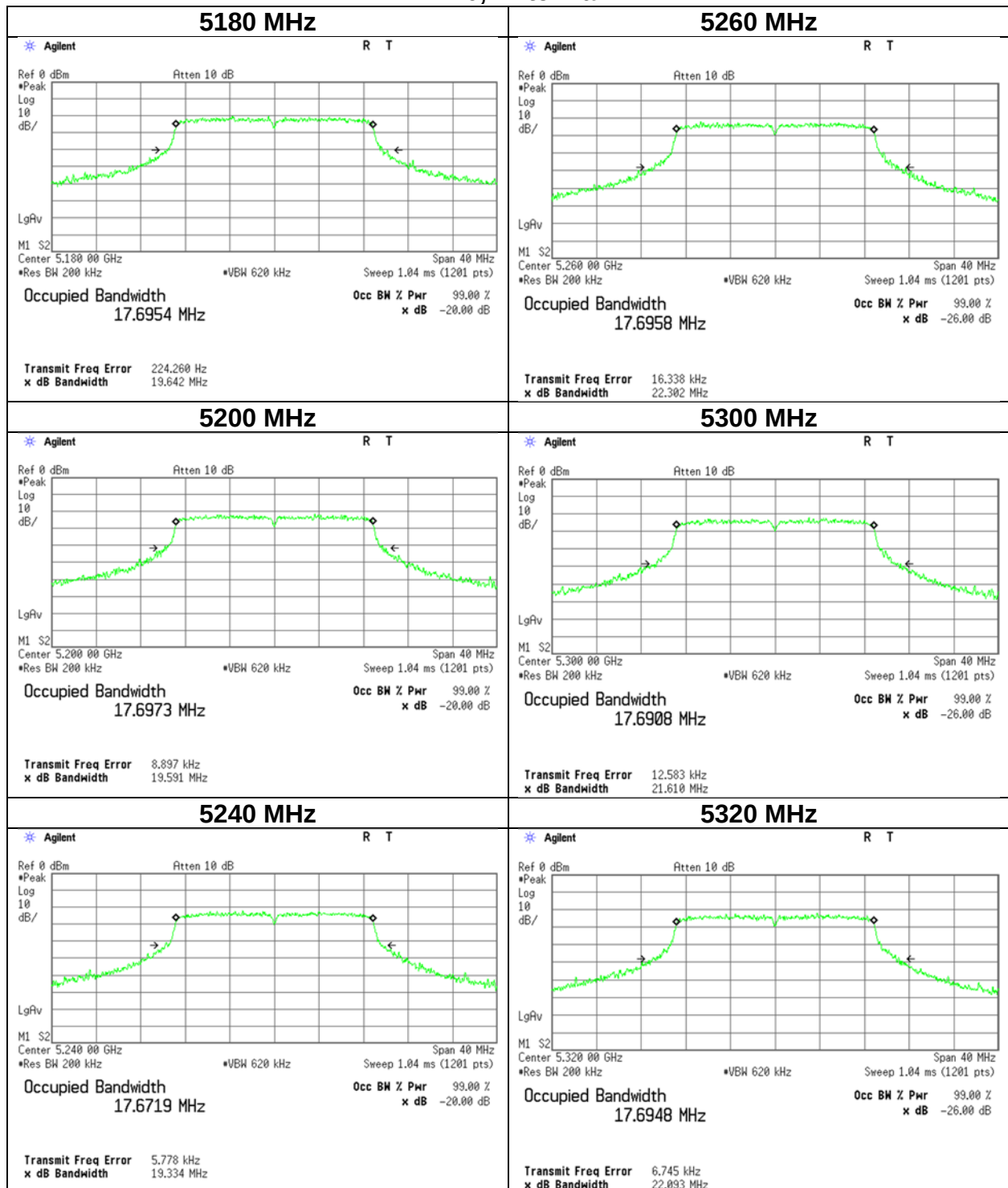
26 dB Emission Bandwidth and 99 % Occupied Bandwidth

11a, Antenna 1



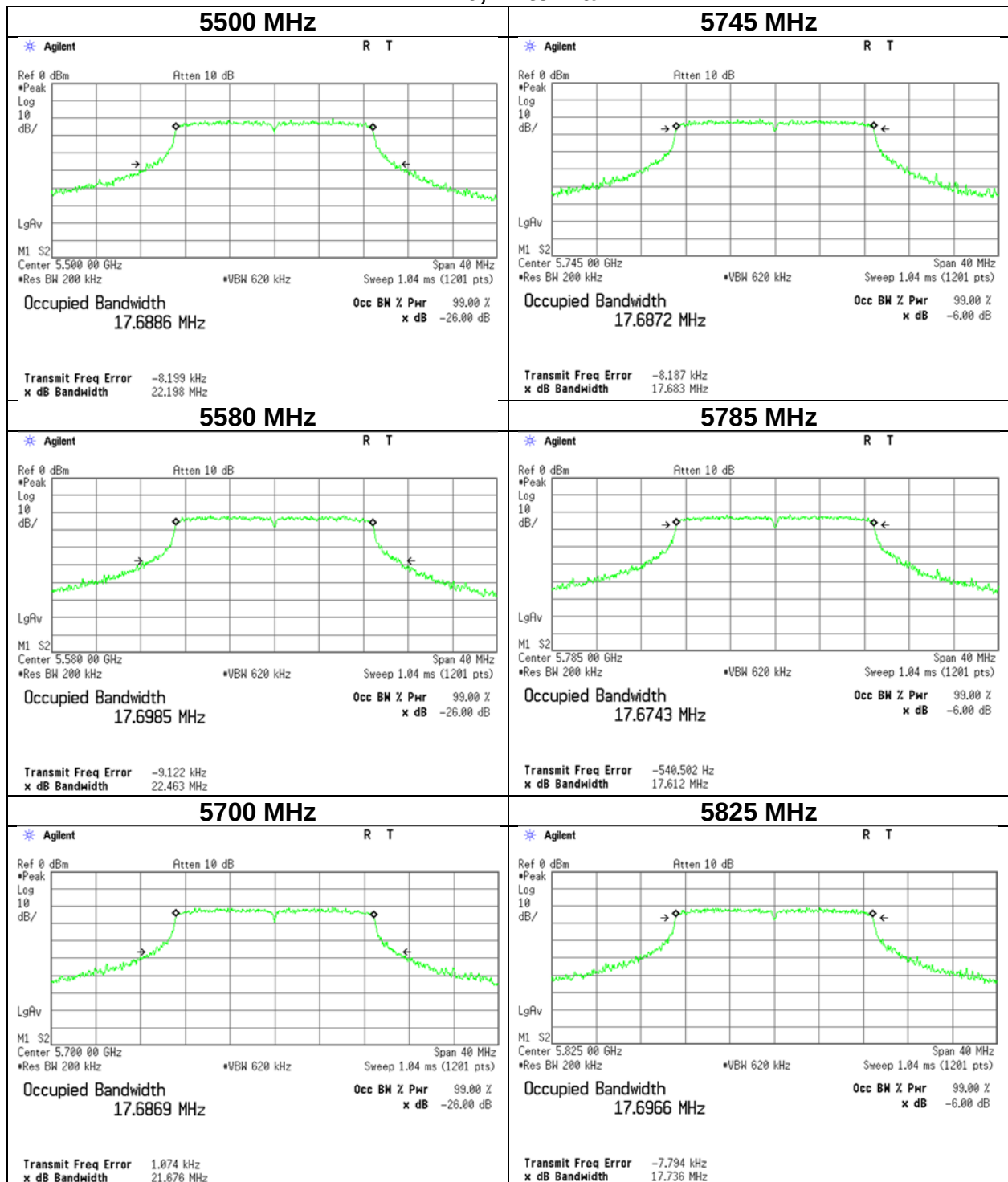
26 dB Emission Bandwidth and 99 % Occupied Bandwidth

11n-20, Antenna 1



26 dB Emission Bandwidth and 99 % Occupied Bandwidth

11n-20, Antenna 1



6 dB Bandwidth

Test place
Date
Temperature / Humidity
Engineer
Mode

Ise EMC Lab. No.8 Measurement Room
May 23, 2024
25 deg. C / 57 % RH
Shousei Hamaguchi
Tx

11a

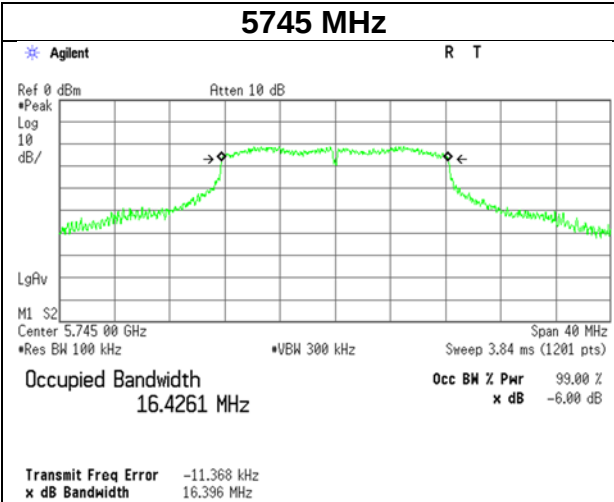
Antenna	Tested Frequency [MHz]	6 dB Bandwidth [MHz]	Limit [MHz]
Antenna 1	5745	16.396	> 0.500
	5785	16.411	> 0.500
	5825	16.511	> 0.500

11n-20

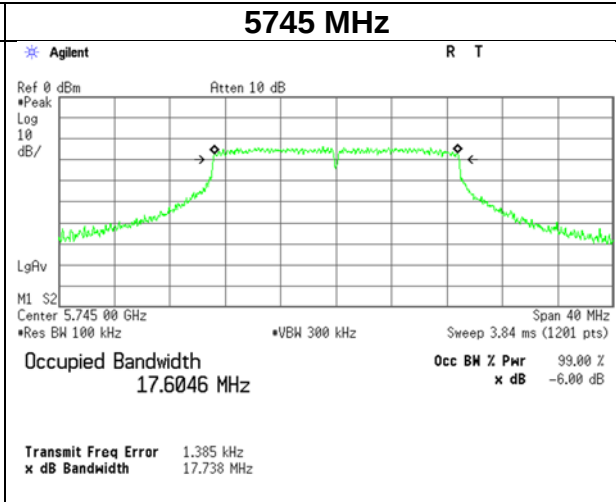
Antenna	Tested Frequency [MHz]	6 dB Bandwidth [MHz]	Limit [MHz]
Antenna 1	5745	17.738	> 0.500
	5785	17.735	> 0.500
	5825	17.764	> 0.500

6 dB Bandwidth

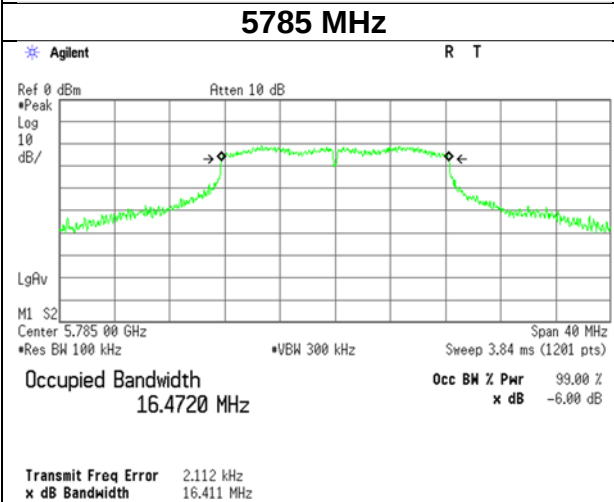
11a, Antenna 1
5745 MHz



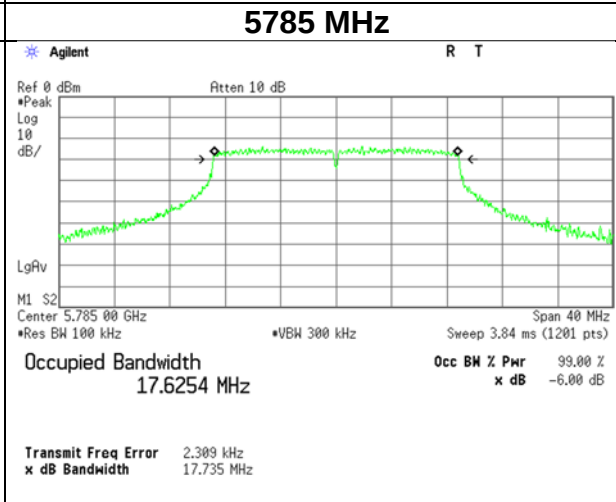
11n-20, Antenna 1
5745 MHz



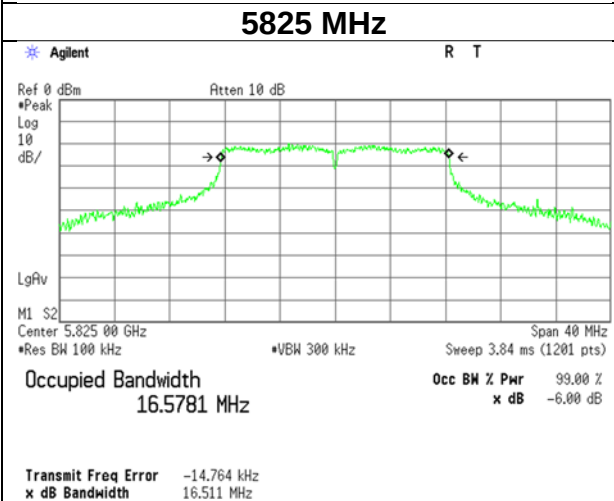
5785 MHz



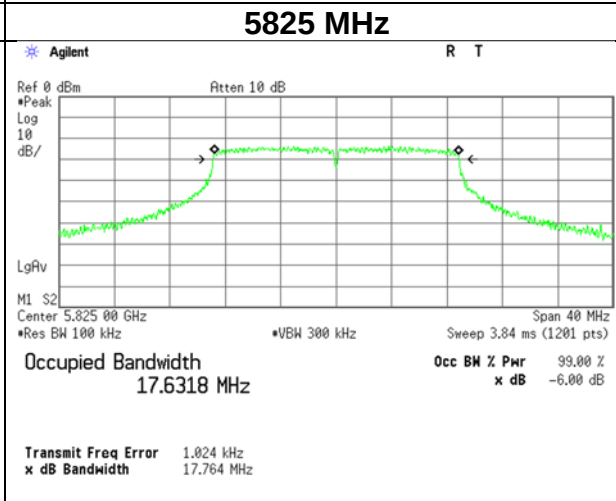
5785 MHz



5825 MHz



5825 MHz



Maximum Conducted Output Power

Test place	Ise EMC Lab. No.4 Measurement Room
Date	April 25, 2024
Temperature / Humidity	22 deg. C / 50 % RH
Engineer	Junki Nagatomi
Mode	Tx 11a

Applied limit: 15.407, access point

Tested Frequency	Power Meter Reading	Cable Loss	Atten. Loss	Duty Factor	Antenna Gain	26 dB EBW (B for FCC)	99% OBW (B for IC)	Conducted Power				e.i.r.p.			
								Result		Limit	Margin	Result		Limit	Margin
								[dBm]	[mW]			[dBm]	[mW]		
[MHz]	[dBm]	[dB]	[dB]	[dB]	[dB]	[MHz]	[MHz]	[dBm]	[mW]	[dBm]	[dB]	[dBm]	[mW]	[dBm]	[dB]
5180	-7.65	2.03	20.18	0.00	1.6	-	16.552	14.56	28.58	30.00	15.44	16.16	41.30	36.00	19.84
5200	-7.59	2.03	20.18	0.00	1.6	-	16.557	14.62	28.97	30.00	15.38	16.22	41.88	36.00	19.78
5240	-7.68	2.04	20.18	0.00	1.6	-	16.689	14.54	28.44	30.00	15.46	16.14	41.11	36.00	19.86
5260	-7.56	2.04	20.20	0.00	1.7	22.037	16.686	14.68	29.38	23.97	9.29	16.38	43.45	29.97	13.59
5300	-7.58	2.05	20.20	0.00	1.7	21.405	16.524	14.67	29.31	23.97	9.30	16.37	43.35	29.97	13.60
5320	-7.71	2.06	20.20	0.00	1.7	21.321	16.512	14.55	28.51	23.97	9.42	16.25	42.17	29.97	13.72
5500	-7.59	2.09	20.20	0.00	1.7	21.767	16.598	14.70	29.51	23.97	9.27	16.40	43.65	29.97	13.57
5580	-7.48	2.11	20.20	0.00	1.7	22.672	16.594	14.83	30.41	23.97	9.14	16.53	44.98	29.97	13.44
5700	-7.66	2.13	20.20	0.00	1.7	22.082	16.629	14.67	29.31	23.97	9.30	16.37	43.35	29.97	13.60
5745	2.31	2.14	10.08	0.00	1.6	-	16.570	14.53	28.38	30.00	15.47	16.13	41.02	36.00	19.87
5785	2.50	2.15	10.08	0.00	1.6	-	16.601	14.73	29.72	30.00	15.27	16.33	42.95	36.00	19.67
5825	2.69	2.16	10.08	0.00	1.6	-	16.777	14.93	31.12	30.00	15.07	16.53	44.98	36.00	19.47

Sample Calculation:

Conducted Power Result = Reading + Cable Loss + Atten. Loss + Duty Factor

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

Conducted Power Limit (5250 MHz-5350 MHz, 5470 MHz-5725 MHz) = 250 mW or $(11 + 10\log B)$ dBm, whichever is lower

Conducted Power Limit (5725 MHz-5850 MHz) = 1W

Maximum Conducted Output Power

Test place
Date
Temperature / Humidity
Engineer
Mode

Ise EMC Lab. No.8 Measurement Room
May 14, 2024
21 deg. C / 39 % RH
Tomoya Sone
Tx 11n-20 (MIMO)

Antenna 1+2

Applied limit: 15.407, access point

Tested Frequency [MHz]	26 dB EBW [MHz] (B for FCC)	99% OBW [MHz] (B for IC)	Conducted power						e.i.r.p.					
			Antenna			Result	Limit	Margin	Antenna			Result	Limit	Margin
			1	2	Sum				1	2	Sum			
[MHz]	[MHz]	[MHz]	[mW]	[mW]	[mW]	[dBm]	[dBm]	[dB]	[mW]	[mW]	[mW]	[dBm]	[dBm]	[dB]
5180	-	17.695	42.95	31.92	74.87	18.74	30.00	11.26	62.09	46.13	108.22	20.34	36.00	15.66
5200	-	17.697	40.55	34.67	75.22	18.76	30.00	11.24	58.61	50.12	108.73	20.36	36.00	15.64
5240	-	17.672	36.14	35.56	71.70	18.56	30.00	11.44	52.24	51.40	103.64	20.16	36.00	15.84
5260	22.302	17.696	35.48	38.28	73.76	18.68	23.97	5.29	52.48	56.62	109.10	20.38	29.97	9.59
5300	21.61	17.691	36.22	35.16	71.38	18.54	23.97	5.43	53.58	52.00	105.58	20.24	29.97	9.73
5320	22.093	17.695	37.76	37.50	75.25	18.77	23.97	5.20	55.85	55.46	111.31	20.47	29.97	9.50
5500	22.198	17.689	34.43	31.05	65.48	18.16	23.97	5.81	50.93	45.92	96.85	19.86	29.97	10.11
5580	22.463	17.699	31.11	32.73	63.84	18.05	23.97	5.92	46.02	48.42	94.43	19.75	29.97	10.22
5700	21.676	17.687	32.14	32.51	64.65	18.11	23.97	5.86	47.53	48.08	95.62	19.81	29.97	10.16
5745	-	17.687	29.72	33.88	63.60	18.03	30.00	11.97	42.95	48.98	91.93	19.63	36.00	16.37
5785	-	17.674	32.36	33.57	65.93	18.19	30.00	11.81	46.77	48.53	95.30	19.79	36.00	16.21
5825	-	17.697	34.51	30.20	64.71	18.11	30.00	11.89	49.89	43.65	93.54	19.71	36.00	16.29

Antenna 1							Antenna 2						
Tested Frequency	Duty Factor	Power Meter Reading	Cable Loss	Atten. Loss	Antenna Gain	Result	Power Meter Reading	Cable Loss	Atten. Loss	Antenna Gain	Result	Cond. Power	e.i.r.p.
[MHz]	[dB]	[dBm]	[dB]	[dB]	[dBi]	[dBm]	[dBm]	[dB]	[dB]	[dBi]	[dBm]	[dBm]	[dBm]
5180	0.00	-5.35	1.50	20.18	1.60	16.33	17.93	-6.64	1.50	20.18	1.60	15.04	16.64
5200	0.00	-5.60	1.50	20.18	1.60	16.08	17.68	-6.28	1.50	20.18	1.60	15.40	17.00
5240	0.00	-6.10	1.50	20.18	1.60	15.58	17.18	-6.17	1.50	20.18	1.60	15.51	17.11
5260	0.00	-6.21	1.51	20.20	1.70	15.50	17.20	-5.88	1.51	20.20	1.70	15.83	17.53
5300	0.00	-6.12	1.51	20.20	1.70	15.59	17.29	-6.25	1.51	20.20	1.70	15.46	17.16
5320	0.00	-5.94	1.51	20.20	1.70	15.77	17.47	-5.97	1.51	20.20	1.70	15.74	17.44
5500	0.00	-6.36	1.53	20.20	1.70	15.37	17.07	-6.81	1.53	20.20	1.70	14.92	16.62
5580	0.00	-6.82	1.55	20.20	1.70	14.93	16.63	-6.60	1.55	20.20	1.70	15.15	16.85
5700	0.00	-6.71	1.58	20.20	1.70	15.07	16.77	-6.66	1.58	20.20	1.70	15.12	16.82
5745	0.00	-7.07	1.60	20.20	1.60	14.73	16.33	-6.50	1.60	20.20	1.60	15.30	16.90
5785	0.00	-6.71	1.61	20.20	1.60	15.10	16.70	-6.55	1.61	20.20	1.60	15.26	16.86
5825	0.00	-6.44	1.62	20.20	1.60	15.38	16.98	-7.02	1.62	20.20	1.60	14.80	16.40

Sample Calculation:

Conducted Power Result = Reading + Cable Loss + Atten. Loss + Duty Factor

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

Conducted Power Limit (5250 MHz-5350 MHz, 5470 MHz-5725 MHz) = 250 mW or (11 + 10logB) dBm, whichever is lower

Conducted Power Limit (5725 MHz-5850 MHz) = 1W

Maximum Conducted Output Power

Test place	Ise EMC Lab. No.4 Measurement Room
Date	April 23, 2024
Temperature / Humidity	22 deg. C / 35 % RH
Engineer	Junki Nagatomi
Mode	Tx 11a

5500 MHz Antenna 1

Mode	Rate Mbps	Reading (timed average) [dBm]	Duty factor [dB]	Burst power [dBm]	Remarks
11a	6	-6.03	0.00	-6.03	*
	9	-6.93	0.00	-6.93	
	12	-6.79	0.00	-6.79	
	18	-6.90	0.00	-6.90	
	24	-6.73	0.00	-6.73	
	36	-6.79	0.00	-6.79	
	48	-6.81	0.00	-6.81	
	54	-6.49	0.00	-6.49	

5500 MHz Antenna 2

Mode	Rate Mbps	Reading (timed average) [dBm]	Duty factor [dB]	Burst power [dBm]	Remarks
11a	6	-7.54	0.00	-7.54	

* Worst rate

Sample Calculation:

Burst power = Reading (timed average) + Duty factor

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

Maximum Conducted Output Power

Test place Ise EMC Lab. No.4 Measurement Room
Date April 23, 2024
Temperature / Humidity 22 deg. C / 35 % RH
Engineer Junki Nagatomi
Mode Tx 11n-20

5500 MHz

Mode	MCS Number	Reading (timed average)						Duty factor	Burst power			Remarks
		Antenna							Antenna			
		1 [dBm]	2 [dBm]	1 [mW]	2 [mW]	1+2 [mW]	1+2 [dBm]		1 [dBm]	2 [dBm]	1+2 [dBm]	
11n-20	0	0.08	0.39	1.02	1.09	-	-	0.00	0.08	0.39	-	
	1	0.50	0.77	1.12	1.19	-	-	0.00	0.50	0.77	-	
	2	-0.48	-0.21	0.90	0.95	-	-	0.00	-0.48	-0.21	-	
	3	-0.51	-0.31	0.89	0.93	-	-	0.00	-0.51	-0.31	-	
	4	-0.33	-0.26	0.93	0.94	-	-	0.00	-0.33	-0.26	-	
	5	-0.16	-0.10	0.96	0.98	-	-	0.00	-0.16	-0.10	-	
	6	-0.22	-0.09	0.95	0.98	-	-	0.00	-0.22	-0.09	-	
	7	-0.23	-0.13	0.95	0.97	-	-	0.00	-0.23	-0.13	-	
	8	-0.07	-1.24	0.98	0.75	1.74	2.39	0.00	-0.07	-1.24	2.39	
	9	0.09	-0.74	1.02	0.84	1.86	2.71	0.00	0.09	-0.74	2.71	*
	10	-0.42	-1.22	0.91	0.76	1.66	2.21	0.00	-0.42	-1.22	2.21	
	11	-0.43	-1.14	0.91	0.77	1.67	2.24	0.00	-0.43	-1.14	2.24	
	12	-0.46	-1.17	0.90	0.76	1.66	2.21	0.00	-0.46	-1.17	2.21	
	13	0.02	-0.71	1.00	0.85	1.85	2.68	0.00	0.02	-0.71	2.68	
	14	0.00	-0.75	1.00	0.84	1.84	2.65	0.00	0.00	-0.75	2.65	
15	-0.06	-0.72	0.99	0.85	1.83	2.63	0.00	-0.06	-0.72	2.63		

* Worst rate

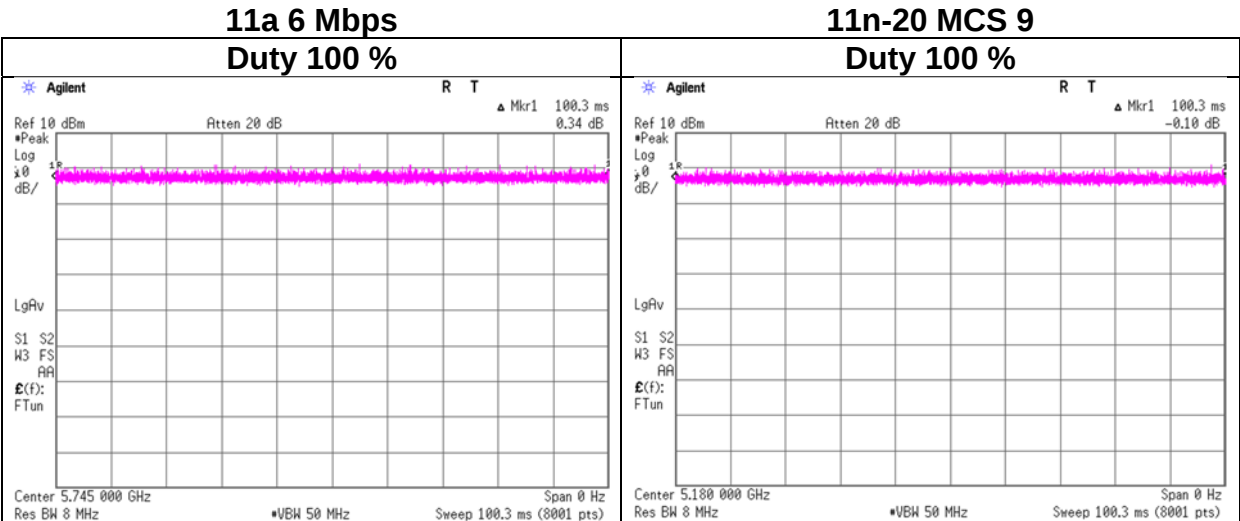
Sample Calculation:

Burst power = Reading (timed average) + Duty factor

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

Burst rate confirmation

Test place	Ise EMC Lab. No.8 Measurement Room
Date	May 23, 2024
Temperature / Humidity	25 deg. C / 57 % RH
Engineer	Shousei Hamaguchi
Mode	Tx



Maximum Power Spectral Density

Test place
Date
Temperature / Humidity
Engineer
Mode

Ise EMC Lab. No.8 Measurement Room
May 23, 2024
25 deg. C / 57 % RH
Shousei Hamaguchi
Tx 11n-20

Antenna 1+Antenna 2

Applied limit: 15.407, access point

Tested Frequency [MHz]	PSD (Conducted)						PSD (e.i.r.p.)					
	Antenna 1 [mW/MHz]	Antenna 2 [mW/MHz]	Sum [mW/MHz]	Result [dBm/MHz]	Limit [dBm/MHz]	Margin [dB]	Antenna 1 [mW/MHz]	Antenna 2 [mW/MHz]	Sum [mW/MHz]	Result [dBm/MHz]	Limit [dBm/MHz]	Margin [dB]
5180	1.81	2.32	4.13	6.15	17.00	10.85	2.61	3.35	5.96	7.75	23.00	15.25
5200	1.41	1.77	3.19	5.03	17.00	11.97	2.04	2.56	4.61	6.63	23.00	16.37
5240	1.14	1.94	3.09	4.90	17.00	12.10	1.65	2.81	4.46	6.50	23.00	16.50
5260	0.93	1.79	2.72	4.34	11.00	6.66	1.38	2.64	4.02	6.04	17.00	10.96
5300	0.79	1.61	2.41	3.81	11.00	7.19	1.18	2.38	3.56	5.51	17.00	11.49
5320	0.91	1.69	2.60	4.15	11.00	6.85	1.35	2.49	3.85	5.85	17.00	11.15
5500	0.56	1.36	1.91	2.82	11.00	8.18	0.82	2.00	2.83	4.52	17.00	12.48
5580	0.59	1.39	1.98	2.96	11.00	8.04	0.87	2.05	2.93	4.66	17.00	12.34
5700	0.82	1.21	2.03	3.07	11.00	7.93	1.21	1.79	3.00	4.77	17.00	12.23
5745	0.39	0.77	1.17	0.67	30.00	29.33	0.57	1.12	1.69	2.27	36.00	33.73
5785	0.41	0.66	1.07	0.31	30.00	29.69	0.59	0.96	1.55	1.91	36.00	34.09
5825	0.50	0.62	1.12	0.51	30.00	29.49	0.72	0.90	1.63	2.11	36.00	33.89

			Antenna 1						Antenna 2					
Tested Frequency	Duty Factor	RBW Correction Factor	PSD Reading	Cable Loss	Atten. Loss	Antenna Gain	PSD Cond.	PSD Result e.i.r.p.	PSD Reading	Cable Loss	Atten. Loss	Antenna Gain	PSD Cond.	PSD Result e.i.r.p.
[MHz]	[dB]	[dB]	[dBm/MHz]	[dB]	[dB]	[dBi]	[dBm/MHz]	[dBm/MHz]	[dBm/MHz]	[dB]	[dB]	[dBi]	[dBm/MHz]	[dBm/MHz]
5180	0.00	0.00	-18.97	1.50	20.04	1.60	2.57	4.17	-17.89	1.50	20.04	1.60	3.65	5.25
5200	0.00	0.00	-20.04	1.50	20.04	1.60	1.51	3.11	-19.06	1.50	20.04	1.60	2.49	4.09
5240	0.00	0.00	-20.95	1.50	20.04	1.60	0.59	2.19	-18.65	1.50	20.04	1.60	2.89	4.49
5260	0.00	0.00	-21.87	1.51	20.04	1.70	-0.32	1.38	-19.03	1.51	20.04	1.70	2.52	4.22
5300	0.00	0.00	-22.55	1.51	20.04	1.70	-1.00	0.70	-19.48	1.51	20.04	1.70	2.07	3.77
5320	0.00	0.00	-21.94	1.51	20.04	1.70	-0.39	1.31	-19.28	1.51	20.04	1.70	2.27	3.97
5500	0.00	0.00	-24.11	1.53	20.04	1.70	-2.54	-0.84	-20.25	1.53	20.04	1.70	1.32	3.02
5580	0.00	0.00	-23.88	1.55	20.04	1.70	-2.29	-0.59	-20.16	1.55	20.04	1.70	1.43	3.13
5700	0.00	0.00	-22.50	1.58	20.05	1.70	-0.87	0.83	-20.81	1.58	20.05	1.70	0.82	2.52
5745	0.00	0.27	-25.98	1.60	20.05	1.60	-4.06	-2.46	-23.03	1.60	20.05	1.60	-1.11	0.49
5785	0.00	0.27	-25.79	1.61	20.05	1.60	-3.86	-2.26	-23.72	1.61	20.05	1.60	-1.79	-0.19
5825	0.00	0.27	-24.95	1.62	20.05	1.60	-3.01	-1.41	-23.98	1.62	20.05	1.60	-2.04	-0.44

Sample Calculation:

PSD: Power Spectral Density

The PSD within 5725 MHz to 5825 MHz are based on any 500 kHz band.

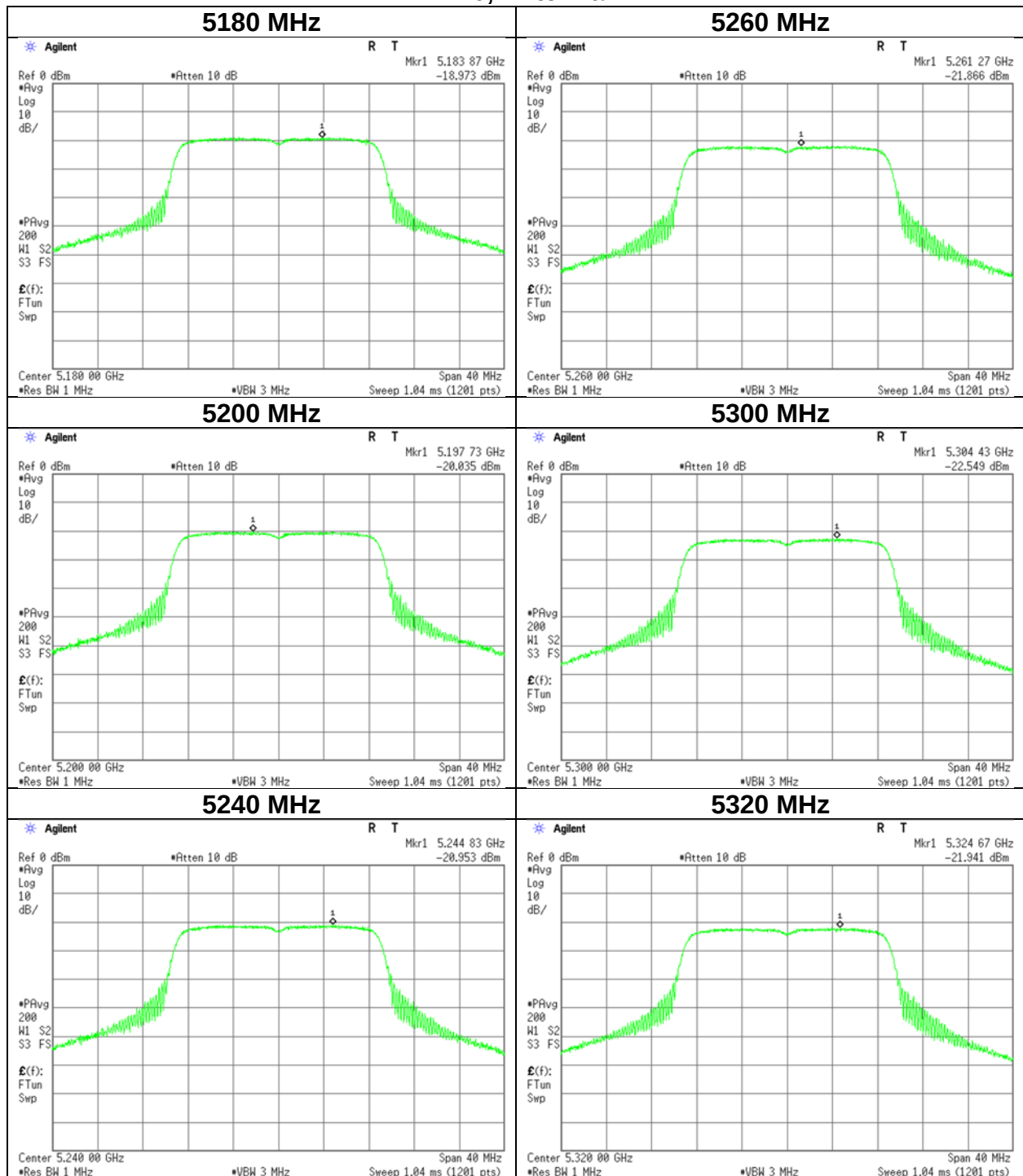
RBW Correction Factor = 10 * log (Specified bandwidth / Measured bandwidth)

PSD Result (Conducted) = Reading + Cable Loss + Atten. Loss + Duty Factor + RBW Correction Factor

PSD Result (e.i.r.p.) = Conducted PSD Result + Antenna Gain

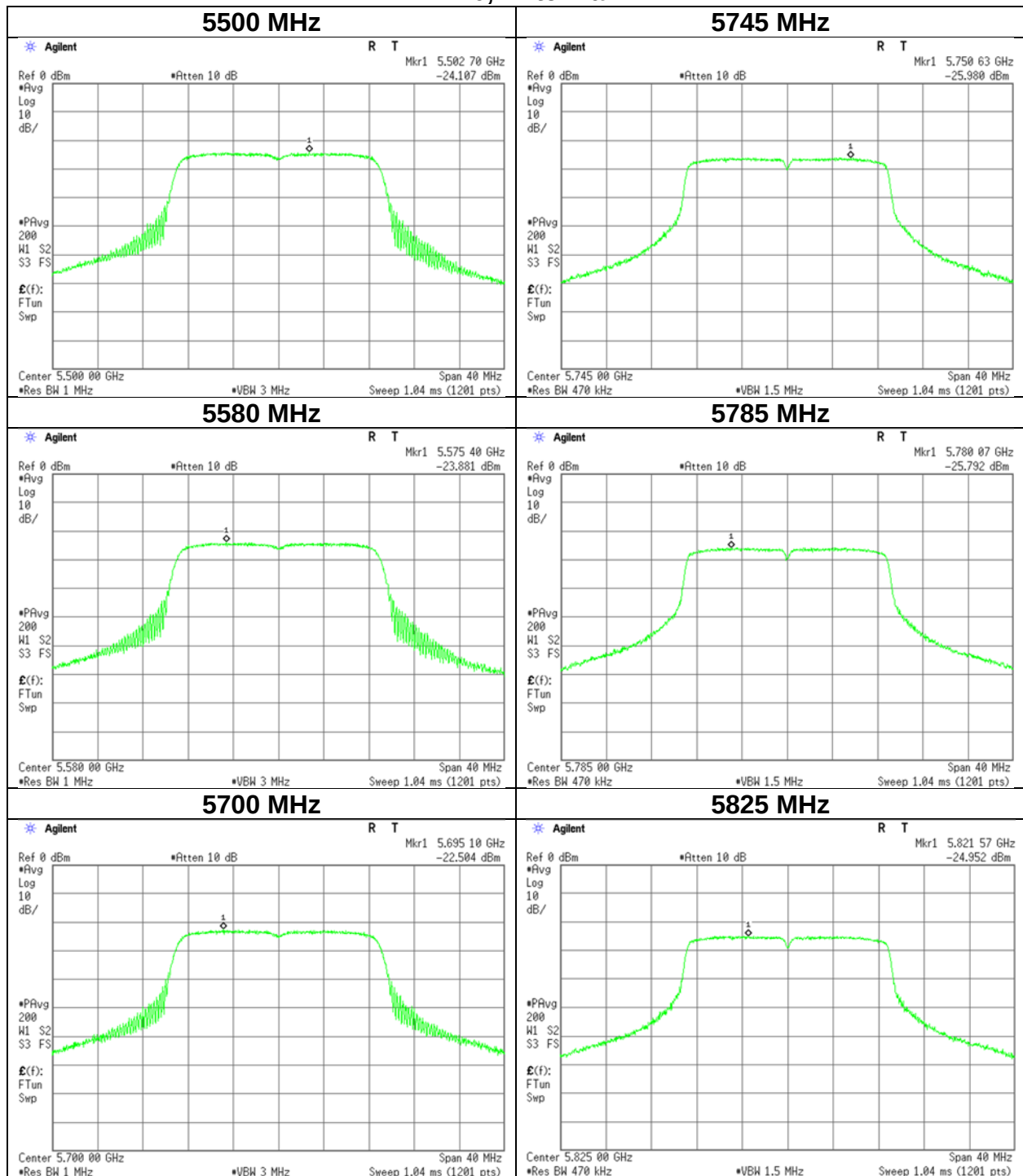
Maximum Power Spectral Density

11n-20, Antenna 1



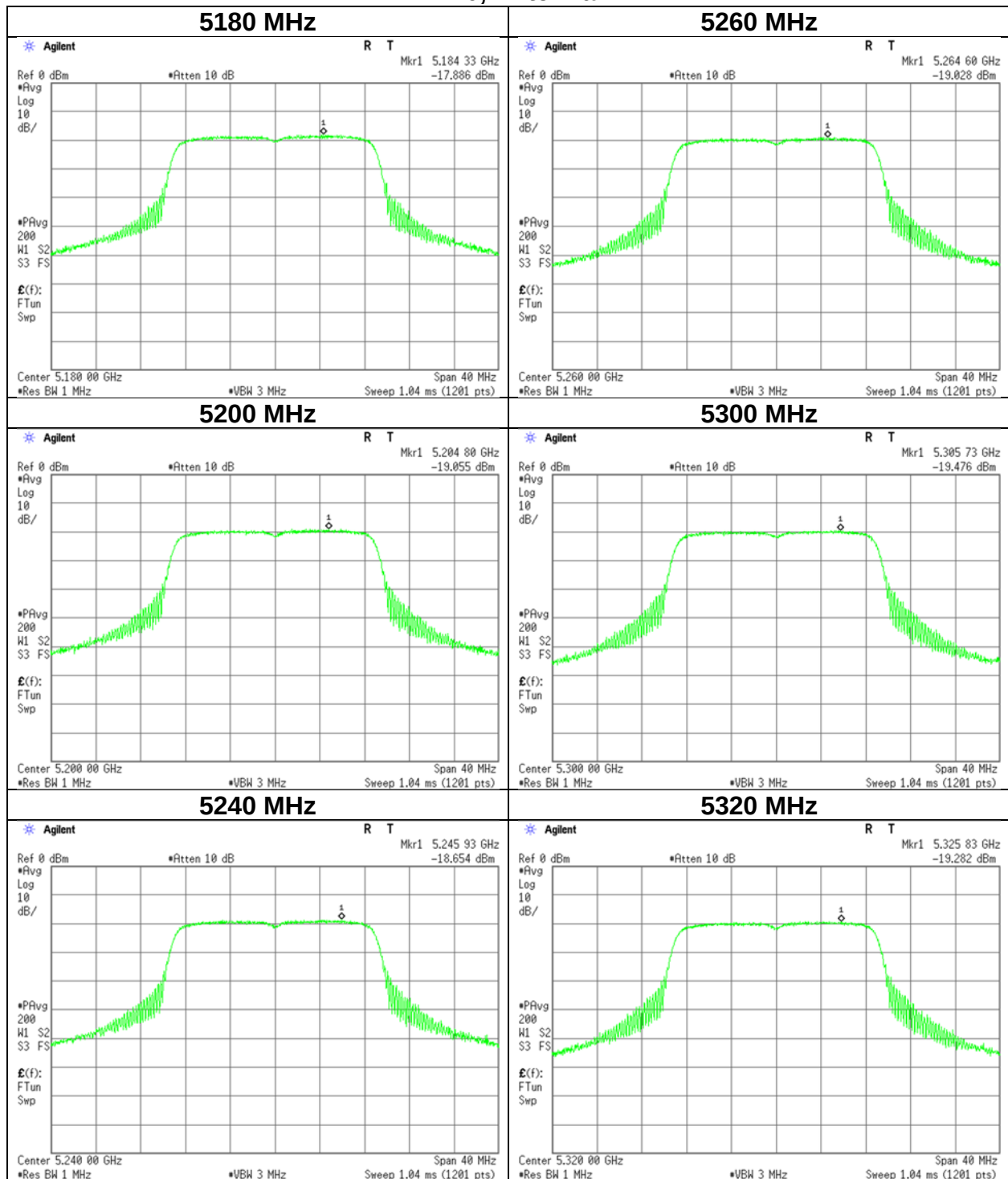
Maximum Power Spectral Density

11n-20, Antenna 1



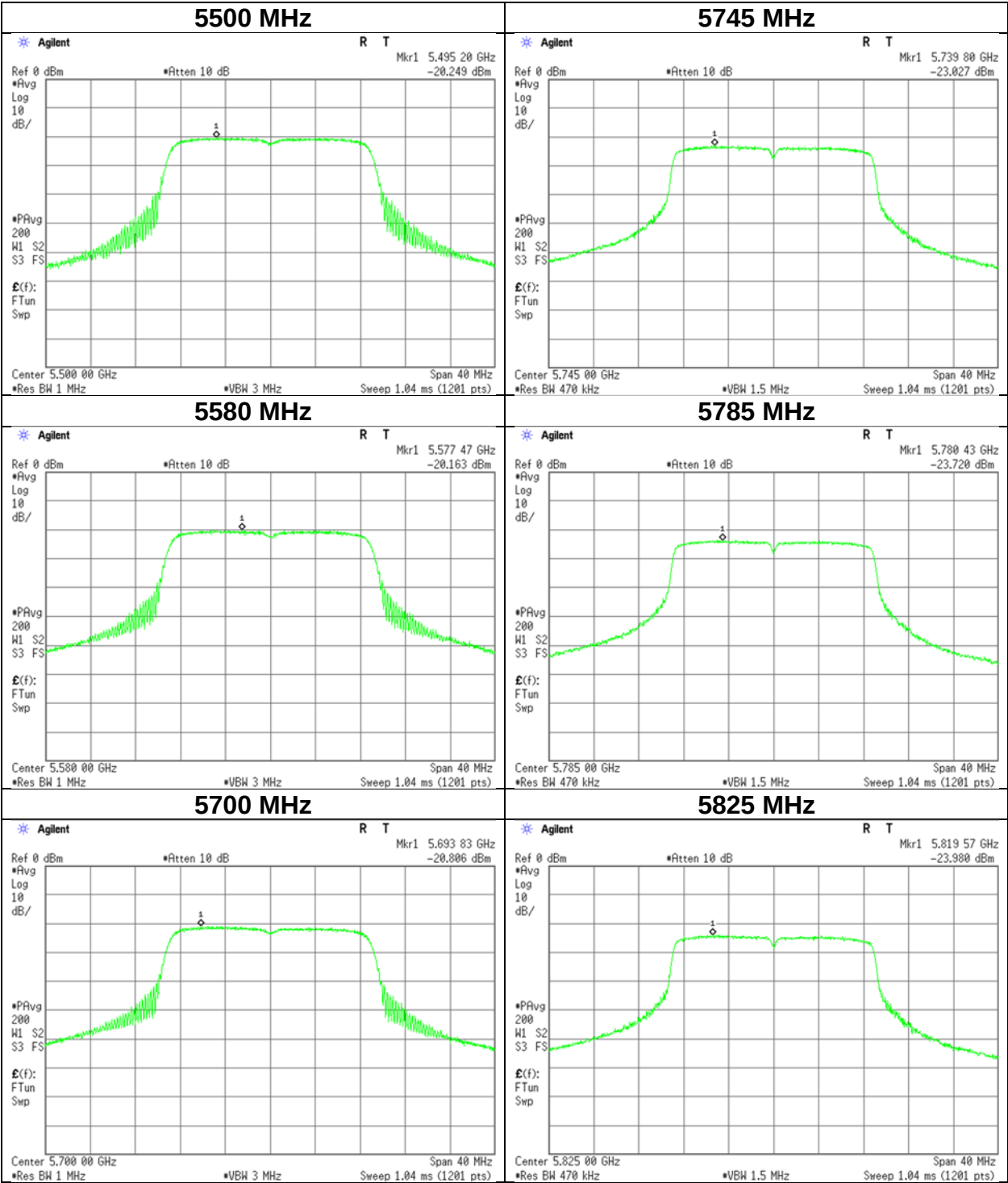
Maximum Power Spectral Density

11n-20, Antenna 2



Maximum Power Spectral Density

11n-20, Antenna 2



Radiated Spurious Emission

Test place	Ise EMC Lab.			
Semi Anechoic Chamber	No.4	No.4	No.4	No.4
Date	May 14, 2024	May 14, 2024	May 17, 2024	May 19, 2024
Temperature / Humidity	20 deg. C / 55 % RH	23 deg. C / 41 % RH	20 deg. C / 46 % RH	23 deg. C / 48 % RH
Engineer	Tomoya Sone	Takumi Nishida	Tomoya Sone	Tomoya Sone
	(1 GHz to 6 GHz)	(6 GHz to 10 GHz)	(10 GHz to 18 GHz)	(Above 18 GHz)
Mode	Tx 11n-20 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]	[dB/m]	[dB]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dBuV/m]	[dBuV/m]	[dB]	[dB]	
Hori.	5000.0	49.4	44.7	31.8	5.8	30.8	-	56.3	51.6	73.9	53.9	17.6	2.3	
Hori.	5150.0	53.7	36.4	31.9	5.9	30.9	-	60.7	43.4	73.9	53.9	13.2	10.5	
Hori.	10360.0	50.8	-	35.9	-1.7	32.6	-	52.5	-	68.2	-	15.7	-	
Hori.	15540.0	42.8	35.3	39.3	-0.2	32.2	-	49.6	42.1	73.9	53.9	24.3	11.8	Floor noise
Vert.	5000.0	49.9	45.3	31.8	5.8	30.8	-	56.8	52.2	73.9	53.9	17.1	1.7	
Vert.	5150.0	52.1	35.5	31.9	5.9	30.9	-	59.0	42.4	73.9	53.9	14.9	11.5	
Vert.	10360.0	47.2	-	35.9	-1.7	32.6	-	48.9	-	68.2	-	19.3	-	
Vert.	15540.0	42.7	32.2	39.3	-0.2	32.2	-	49.5	39.0	73.9	53.9	24.4	14.9	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

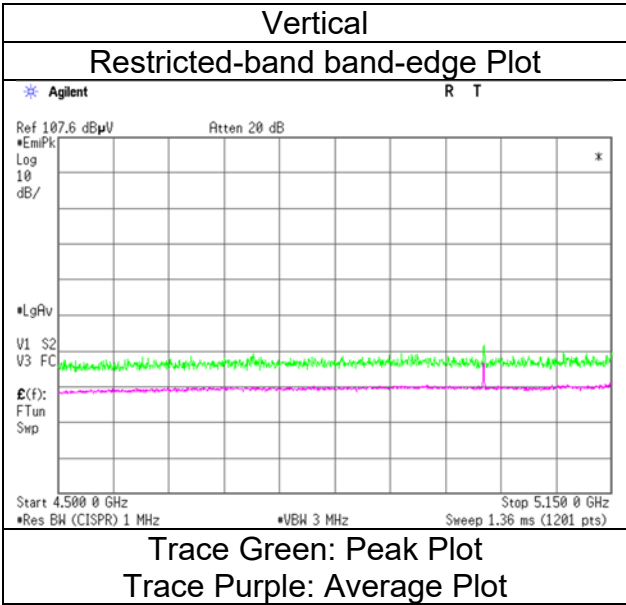
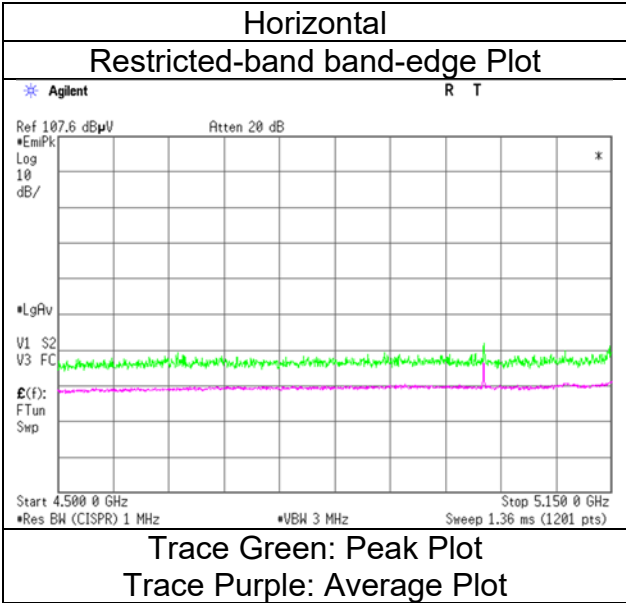
Distance factor: 1 GHz - 6 GHz 20log (3.75 m / 3.0 m) = 1.94 dB
6 GHz - 10 GHz 20log (4.75 m / 3.0 m) = 4 dB
10 GHz - 40 GHz 20log (1.0 m / 3.0 m) = -9.5 dB

Radiated Spurious Emission

Test place
Semi Anechoic Chamber
Date
Temperature / Humidity
Engineer

Mode

Ise EMC Lab.
No.4
May 14, 2024
20 deg. C / 55 % RH
Tomoya Sone
(1 GHz to 6 GHz)
Tx 11n-20 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

Test place	Ise EMC Lab.			
Semi Anechoic Chamber	No.4	No.4	No.4	No.4
Date	May 14, 2024	May 14, 2024	May 17, 2024	May 19, 2024
Temperature / Humidity	20 deg. C / 55 % RH	23 deg. C / 41 % RH	20 deg. C / 46 % RH	23 deg. C / 48 % RH
Engineer	Tomoya Sone	Takumi Nishida	Tomoya Sone	Tomoya Sone
	(1 GHz to 6 GHz)	(6 GHz to 10 GHz)	(10 GHz to 18 GHz)	(Above 18 GHz)
Mode	Tx 11n-20 5240 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.	5000.0	48.1	44.0	31.8	5.8	30.8	-	55.0	50.9	73.9	53.9	18.9	3.0	
Hori.	10480.0	49.9	-	36.1	-1.6	32.6	-	51.6	-	68.2	-	16.6	-	
Hori.	15720.0	42.7	34.9	39.5	-0.2	32.2	-	49.7	41.9	73.9	53.9	24.2	12.0	Floor noise
Vert.	5000.0	47.3	42.5	31.8	5.8	30.8	-	54.1	49.3	73.9	53.9	19.8	4.6	
Vert.	10480.0	45.3	-	36.1	-1.6	32.6	-	47.1	-	68.2	-	21.1	-	
Vert.	15720.0	42.4	35.1	39.5	-0.2	32.2	-	49.5	42.1	73.9	53.9	24.5	11.8	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 (3.75 m / 3.0 m) = 1.94 dB
	6 GHz - 10 GHz	20log (4.75 m / 3.0 m) = 4 dB
	10 GHz - 40 GHz	20log (1.0 m / 3.0 m) = -9.5 dB

Radiated Spurious Emission

Test place	Ise EMC Lab.	No.4	No.4	No.4	No.4
Semi Anechoic Chamber	No.4	No.4	No.4	No.4	No.4
Date	May 14, 2024	May 17, 2024	May 19, 2024	May 19, 2024	May 19, 2024
Temperature / Humidity	23 deg. C / 41 % RH	20 deg. C / 46 % RH	23 deg. C / 48 % RH	22 deg. C / 57 % RH	22 deg. C / 57 % RH
Engineer	Takumi Nishida	Tomoya Sone	Tomoya Sone	Tomoya Sone	Yuichiro Yamazaki
	(1 GHz to 10 GHz)	(10 GHz to 18 GHz)	(Above 18 GHz)	(Above 18 GHz)	(Below 1 GHz)
Mode	Tx 11n-20 5320 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.	68.4	43.9	-	6.5	7.5	32.1	-	25.8	-	40.0	-	14.2	-	
Hori.	140.6	33.9	-	14.6	8.2	32.0	-	24.6	-	43.5	-	18.9	-	
Hori.	163.5	34.3	-	15.6	8.4	32.0	-	26.3	-	43.5	-	17.2	-	
Hori.	300.0	43.5	-	13.7	9.6	32.0	-	34.7	-	46.0	-	11.3	-	
Hori.	625.0	33.9	-	19.4	11.4	32.3	-	32.4	-	46.0	-	13.6	-	
Hori.	875.0	29.6	-	21.9	12.2	31.3	-	32.4	-	46.0	-	13.6	-	
Hori.	5000.0	48.4	44.0	31.8	5.8	30.8	-	55.3	50.8	73.9	53.9	18.6	3.1	
Hori.	5350.0	45.5	37.1	31.7	6.0	30.9	-	52.3	43.9	73.9	53.9	21.6	10.0	
Hori.	10640.0	45.2	36.4	36.7	-1.6	32.7	-	47.6	38.7	73.9	53.9	26.3	15.2	
Hori.	15960.0	42.5	34.8	39.9	-0.3	32.3	-	49.9	42.2	73.9	53.9	24.0	11.7	Floor noise
Vert.	38.6	45.3	-	15.4	7.2	32.1	-	35.8	-	40.0	-	4.2	-	
Vert.	50.2	49.2	-	11.1	7.3	32.1	-	35.5	-	40.0	-	4.5	-	
Vert.	68.4	57.6	-	6.5	7.5	32.1	-	39.5	-	40.0	-	0.5	-	
Vert.	125.0	41.4	-	13.4	8.1	32.1	-	30.8	-	43.5	-	12.7	-	
Vert.	140.6	39.1	-	14.6	8.2	32.0	-	29.8	-	43.5	-	13.7	-	
Vert.	163.5	39.3	-	15.6	8.4	32.0	-	31.3	-	43.5	-	12.2	-	
Vert.	5000.0	46.7	43.2	31.8	5.8	30.8	-	53.5	50.1	73.9	53.9	20.4	3.8	
Vert.	5350.0	45.5	36.9	31.7	6.0	30.9	-	52.2	43.6	73.9	53.9	21.7	10.3	
Vert.	10640.0	44.2	34.7	36.7	-1.6	32.7	-	46.5	37.1	73.9	53.9	27.4	16.8	
Vert.	15960.0	42.4	34.5	39.9	-0.3	32.3	-	49.8	42.0	73.9	53.9	24.1	11.9	Floor noise

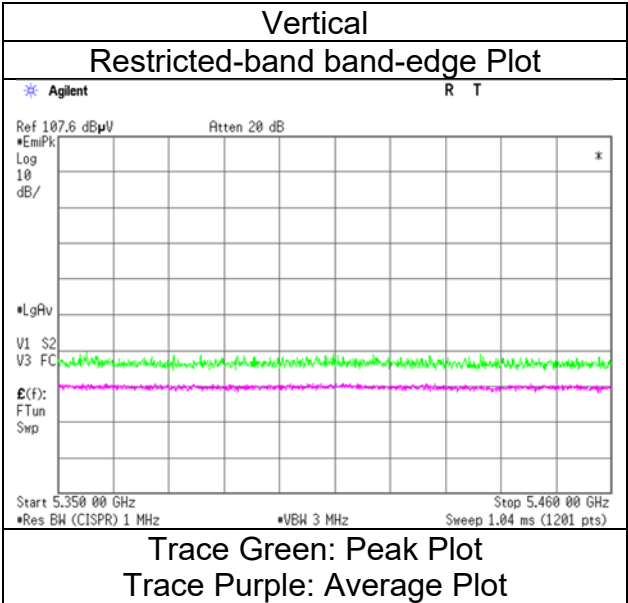
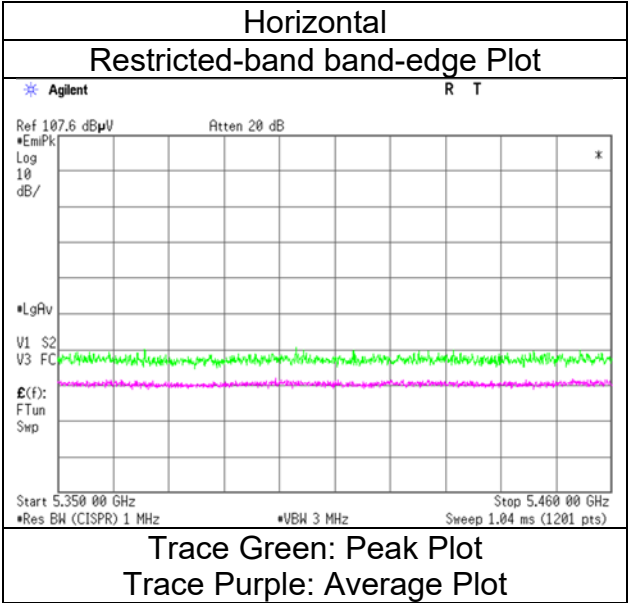
Result (QP / PK) = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier)
Result (AV)= Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier) + Duty factor
*Other frequency noises omitted in this report were not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

Distance factor:	1 GHz - 6 GHz	20log (3.75 m / 3.0 m) = 1.94 dB
	6 GHz - 10 GHz	20log (4.75 m / 3.0 m) = 4 dB
	10 GHz - 40 GHz	20log (1.0 m / 3.0 m) = -9.5 dB

Radiated Spurious Emission

Test place
Semi Anechoic Chamber
Date
Temperature / Humidity
Engineer
Mode

Ise EMC Lab.
No.4
May 14, 2024
23 deg. C / 41 % RH
Takumi Nishida
Tx 11n-20 5320 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	May 14, 2024	May 17, 2024	May 19, 2024
Temperature / Humidity	23 deg. C / 41 % RH	20 deg. C / 46 % RH	23 deg. C / 48 % RH
Engineer	Takumi Nishida	Tomoya Sone	Tomoya Sone
	(1 GHz to 10 GHz)	(10 GHz to 18 GHz)	(Above 18 GHz)
Mode	Tx 11n-20 5500 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.	5000.0	48.3	43.8	31.8	5.8	30.8	-	55.1	50.6	73.9	53.9	18.8	3.3	
Hori.	5460.0	44.3	35.7	31.8	6.1	30.9	-	51.2	42.7	68.2	53.9	17.0	11.2	
Hori.	5470.0	45.5	-	31.8	6.1	30.9	-	52.5	-	68.2	-	15.7	-	
Hori.	11000.0	46.0	36.9	37.4	-1.5	32.8	-	49.1	40.0	73.9	53.9	24.8	13.9	
Hori.	16500.0	42.5	-	39.9	-0.1	32.3	-	49.9	-	68.2	-	18.4	-	Floor noise
Vert.	5000.0	46.8	43.4	31.8	5.8	30.8	-	53.7	50.3	73.9	53.9	20.2	3.6	
Vert.	5460.0	43.0	34.8	31.8	6.1	30.9	-	50.0	41.8	68.2	53.9	18.3	12.1	
Vert.	5470.0	46.0	-	31.8	6.1	30.9	-	53.0	-	68.2	-	15.2	-	
Vert.	11000.0	42.8	34.6	37.4	-1.5	32.8	-	45.9	37.7	73.9	53.9	28.0	16.2	
Vert.	16500.0	43.3	-	39.9	-0.1	32.3	-	50.7	-	68.2	-	17.5	-	Floor noise

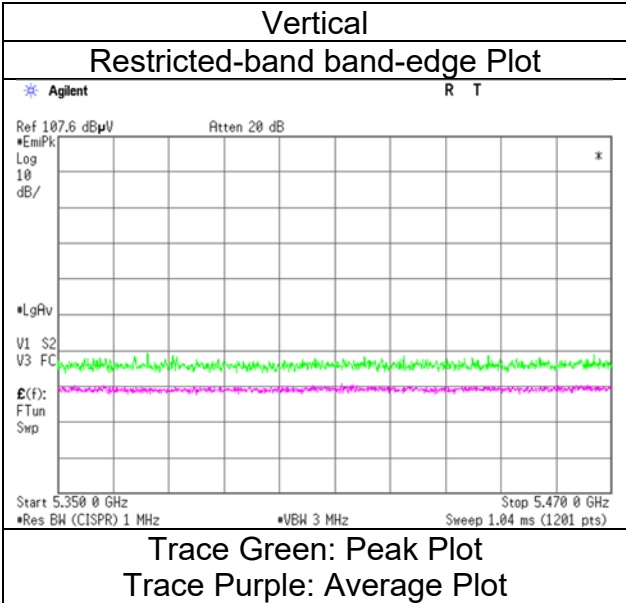
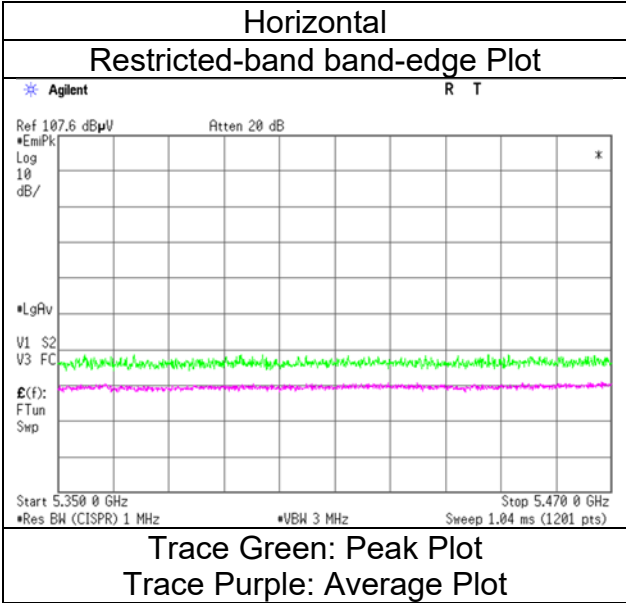
Result (QP / PK) = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier)
Result (AV)= Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier) + Duty factor
*Other frequency noises omitted in this report were not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

Distance factor: 1 GHz - 6 GHz 20log (3.75 m / 3.0 m) = 1.94 dB
 6 GHz - 10 GHz 20log (4.75 m / 3.0 m) = 4 dB
 10 GHz - 40 GHz 20log (1.0 m / 3.0 m) = -9.5 dB

Radiated Spurious Emission

Test place
Semi Anechoic Chamber
Date
Temperature / Humidity
Engineer
Mode

Ise EMC Lab.
No.4
May 14, 2024
23 deg. C / 41 % RH
Takumi Nishida
Tx 11n-20 5500 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	May 14, 2024	May 17, 2024	May 19, 2024
Temperature / Humidity	23 deg. C / 41 % RH	20 deg. C / 46 % RH	23 deg. C / 48 % RH
Engineer	Takumi Nishida	Tomoya Sone	Tomoya Sone
	(1 GHz to 10 GHz)	(10 GHz to 18 GHz)	(Above 18 GHz)
Mode	Tx 11n-20 5580 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.	5000.0	48.0	43.7	31.8	5.8	30.8	-	54.9	50.5	73.9	53.9	19.0	3.4	
Hori.	11160.0	45.5	37.0	37.3	-1.5	32.8	-	48.5	40.0	73.9	53.9	25.4	13.9	
Hori.	16740.0	42.7	-	39.6	-0.1	32.3	-	49.9	-	68.2	-	18.4	-	Floor noise
Vert.	5000.0	46.5	43.2	31.8	5.8	30.8	-	53.4	50.1	73.9	53.9	20.5	3.8	
Vert.	11160.0	43.2	35.5	37.3	-1.5	32.8	-	46.2	38.5	73.9	53.9	27.7	15.4	
Vert.	16740.0	42.5	-	39.6	-0.1	32.3	-	49.7	-	68.2	-	18.5	-	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 (3.75 m / 3.0 m) = 1.94 dB
 6 GHz - 10 GHz 20log (4.75 m / 3.0 m) = 4 dB
 10 GHz - 40 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
Date	May 14, 2024	May 17, 2024	May 19, 2024
Temperature / Humidity	23 deg. C / 41 % RH	20 deg. C / 46 % RH	23 deg. C / 48 % RH
Engineer	Takumi Nishida	Tomoya Sone	Tomoya Sone
	(1 GHz to 10 GHz)	(10 GHz to 18 GHz)	(Above 18 GHz)
Mode	Tx 11n-20 5700 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.	5000.0	48.1	43.6	31.8	5.8	30.8	-	55.0	50.4	73.9	53.9	18.9	3.5	
Hori.	5725.0	54.4	-	32.0	6.2	31.0	-	61.5	-	68.2	-	6.7	-	
Hori.	11400.0	44.7	36.1	37.6	-1.5	32.7	-	48.1	39.5	73.9	53.9	25.8	14.4	
Hori.	17100.0	40.4	-	39.7	0.0	32.4	-	47.7	-	68.2	-	20.5	-	Floor noise
Vert.	5000.0	46.3	43.6	31.8	5.8	30.8	-	53.2	50.5	73.9	53.9	20.7	3.4	
Vert.	5725.0	51.6	-	32.0	6.2	31.0	-	58.6	-	68.2	-	9.6	-	
Vert.	11400.0	42.0	34.4	37.6	-1.5	32.7	-	45.5	37.9	73.9	53.9	28.4	16.0	
Vert.	17100.0	40.7	-	39.7	0.0	32.4	-	48.0	-	68.2	-	20.3	-	Floor noise

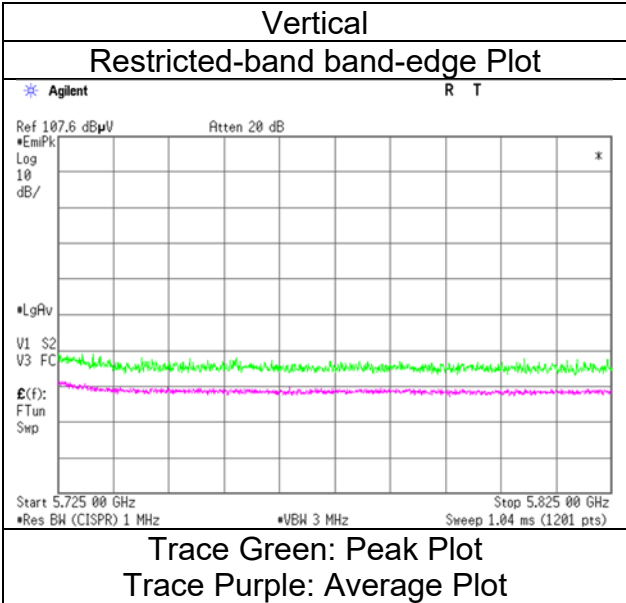
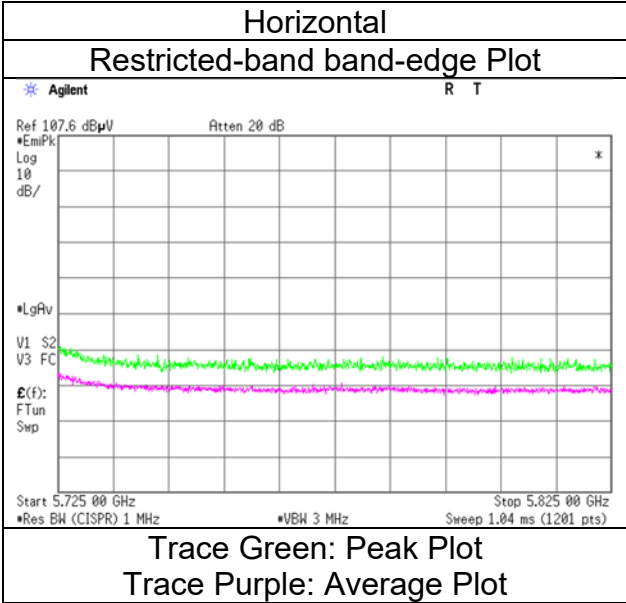
Result (QP / PK) = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier)
Result (AV)= Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier) + Duty factor
*Other frequency noises omitted in this report were not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

Distance factor: 1 GHz - 6 GHz 20log (3.75 m / 3.0 m) = 1.94 dB
 6 GHz - 10 GHz 20log (4.75 m / 3.0 m) = 4 dB
 10 GHz - 40 GHz 20log (1.0 m / 3.0 m) = -9.5 dB

Radiated Spurious Emission

Test place
Semi Anechoic Chamber
Date
Temperature / Humidity
Engineer
Mode

Ise EMC Lab.
No.4
May 14, 2024
23 deg. C / 41 % RH
Takumi Nishida
Tx 11n-20 5700 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	May 14, 2024	May 17, 2024	May 19, 2024
Temperature / Humidity	23 deg. C / 41 % RH	20 deg. C / 46 % RH	23 deg. C / 48 % RH
Engineer	Takumi Nishida	Tomoya Sone	Tomoya Sone
	(1 GHz to 10 GHz)	(10 GHz to 18 GHz)	(Above 18 GHz)
Mode	Tx 11n-20 5745 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.	5000.0	48.1	43.9	31.8	5.8	30.8	-	55.0	50.8	73.9	53.9	18.9	3.1	
Hori.	5650.0	45.7	-	31.8	6.1	31.0	-	52.6	-	68.2	-	15.6	-	
Hori.	5700.0	45.9	-	31.9	6.2	31.0	-	52.9	-	105.2	-	52.3	-	
Hori.	5720.0	52.7	-	32.0	6.2	31.0	-	59.8	-	110.8	-	51.0	-	
Hori.	5725.0	58.6	-	32.0	6.2	31.0	-	65.8	-	122.2	-	56.4	-	
Hori.	11490.0	48.1	40.0	37.7	-1.5	32.7	-	51.6	43.5	73.9	53.9	22.3	10.4	
Hori.	17235.0	39.4	-	39.8	0.0	32.4	-	46.9	-	68.2	-	21.3	-	Floor noise
Vert.	5000.0	46.7	43.4	31.8	5.8	30.8	-	53.6	50.3	73.9	53.9	20.3	3.6	
Vert.	5650.0	43.1	-	31.8	6.1	31.0	-	50.0	-	68.2	-	18.2	-	
Vert.	5700.0	44.3	-	31.9	6.2	31.0	-	51.4	-	105.2	-	53.8	-	
Vert.	5720.0	51.5	-	32.0	6.2	31.0	-	58.6	-	110.8	-	52.2	-	
Vert.	5725.0	56.2	-	32.0	6.2	31.0	-	63.4	-	122.2	-	58.9	-	
Vert.	11490.0	43.5	35.3	37.7	-1.5	32.7	-	47.0	38.9	73.9	53.9	26.9	15.1	
Vert.	17235.0	39.2	-	39.8	0.0	32.4	-	46.7	-	68.2	-	21.5	-	Floor noise

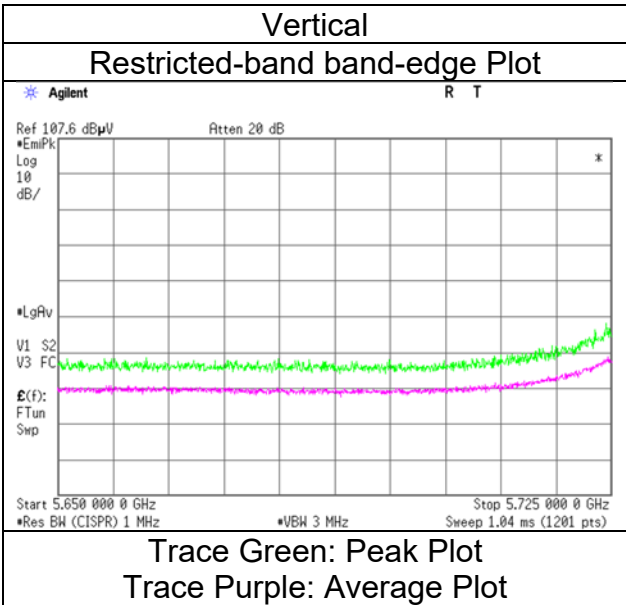
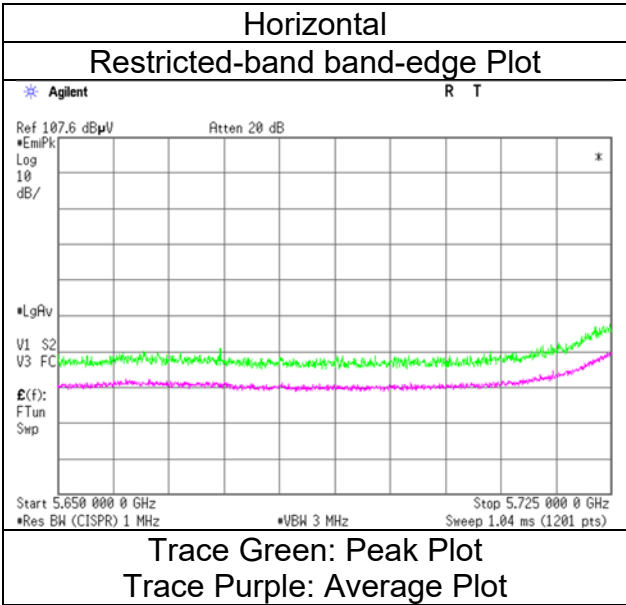
Result (QP / PK) = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier)
Result (AV)= Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier) + Duty factor
*Other frequency noises omitted in this report were not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

Distance factor: 1 GHz - 6 GHz 20log (3.75 m / 3.0 m) = 1.94 dB
 6 GHz - 10 GHz 20log (4.75 m / 3.0 m) = 4 dB
 10 GHz - 40 GHz 20log (1.0 m / 3.0 m) = -9.5 dB

Radiated Spurious Emission

Test place
Semi Anechoic Chamber
Date
Temperature / Humidity
Engineer
Mode

Ise EMC Lab.
No.4
May 14, 2024
23 deg. C / 41 % RH
Takumi Nishida
Tx 11n-20 5745 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	May 14, 2024	May 17, 2024	May 19, 2024
Temperature / Humidity	23 deg. C / 41 % RH	20 deg. C / 46 % RH	23 deg. C / 48 % RH
Engineer	Takumi Nishida	Tomoya Sone	Tomoya Sone
	(1 GHz to 10 GHz)	(10 GHz to 18 GHz)	(Above 18 GHz)
Mode	Tx 11n-20 5785 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.	5000.0	48.3	43.7	31.8	5.8	30.8	-	55.2	50.6	73.9	53.9	18.7	3.3	
Hori.	11570.0	45.8	38.4	37.7	-1.5	32.7	-	49.4	42.0	73.9	53.9	24.5	11.9	
Hori.	17355.0	42.7	-	39.9	0.1	32.4	-	50.3	-	68.2	-	17.9	-	Floor noise
Vert.	5000.0	46.6	43.2	31.8	5.8	30.8	-	53.4	50.1	73.9	53.9	20.5	3.8	
Vert.	11570.0	43.7	35.1	37.7	-1.5	32.7	-	47.2	38.7	73.9	53.9	26.7	15.2	
Vert.	17355.0	43.0	-	39.9	0.1	32.4	-	50.7	-	68.2	-	17.5	-	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 (3.75 m / 3.0 m) = 1.94 dB
 6 GHz - 10 GHz 20log (4.75 m / 3.0 m) = 4 dB
 10 GHz - 40 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
Date	May 14, 2024	May 17, 2024	May 19, 2024
Temperature / Humidity	23 deg. C / 41 % RH	20 deg. C / 46 % RH	23 deg. C / 48 % RH
Engineer	Takumi Nishida	Tomoya Sone	Tomoya Sone
	(1 GHz to 10 GHz)	(10 GHz to 18 GHz)	(Above 18 GHz)
Mode	Tx 11n-20 5825 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.	5000.0	48.3	43.7	31.8	5.8	30.8	-	55.2	50.6	73.9	53.9	18.7	3.3	
Hori.	5850.0	50.5	-	32.3	6.2	31.1	-	57.9	-	122.2	-	64.3	-	
Hori.	5855.0	46.8	-	32.3	6.2	31.1	-	54.2	-	110.8	-	56.6	-	
Hori.	5875.0	42.8	-	32.3	6.2	31.1	-	50.2	-	105.2	-	55.0	-	
Hori.	5925.0	40.6	-	32.4	6.2	31.1	-	48.1	-	68.2	-	20.1	-	
Hori.	11650.0	48.0	41.3	37.7	-1.5	32.6	-	51.6	44.9	73.9	53.9	22.3	9.0	
Hori.	17475.0	42.8	-	40.0	0.1	32.4	-	50.5	-	68.2	-	17.7	-	Floor noise
Vert.	5000.0	46.3	43.6	31.8	5.8	30.8	-	53.2	50.4	73.9	53.9	20.7	3.5	
Vert.	5850.0	45.0	-	32.3	6.2	31.1	-	52.4	-	122.2	-	69.8	-	
Vert.	5855.0	42.8	-	32.3	6.2	31.1	-	50.3	-	110.8	-	60.5	-	
Vert.	5875.0	42.0	-	32.3	6.2	31.1	-	49.5	-	105.2	-	55.7	-	
Vert.	5925.0	40.2	-	32.4	6.2	31.1	-	47.8	-	68.2	-	20.4	-	
Vert.	11650.0	44.1	36.2	37.7	-1.5	32.6	-	47.7	39.9	73.9	53.9	26.2	14.1	
Vert.	17475.0	42.6	-	40.0	0.1	32.4	-	50.4	-	68.2	-	17.9	-	Floor noise

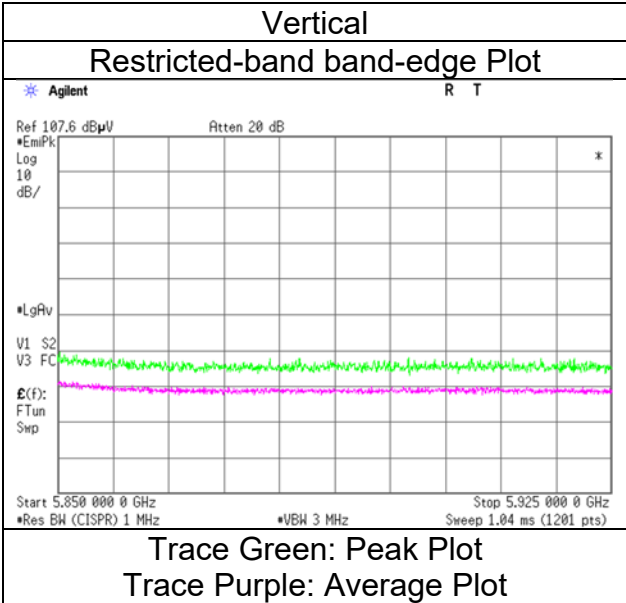
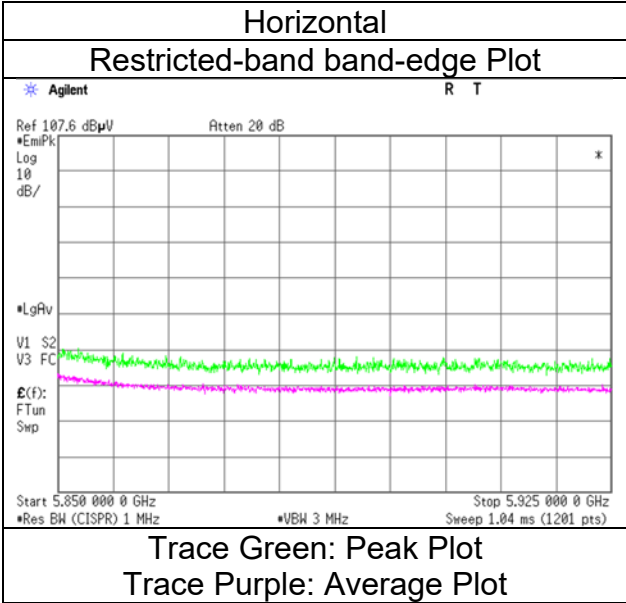
Result (QP / PK) = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier)
Result (AV)= Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier) + Duty factor
*Other frequency noises omitted in this report were not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

Distance factor: 1 GHz - 6 GHz 20log (3.75 m / 3.0 m) = 1.94 dB
 6 GHz - 10 GHz 20log (4.75 m / 3.0 m) = 4 dB
 10 GHz - 40 GHz 20log (1.0 m / 3.0 m) = -9.5 dB

Radiated Spurious Emission

Test place
Semi Anechoic Chamber
Date
Temperature / Humidity
Engineer
Mode

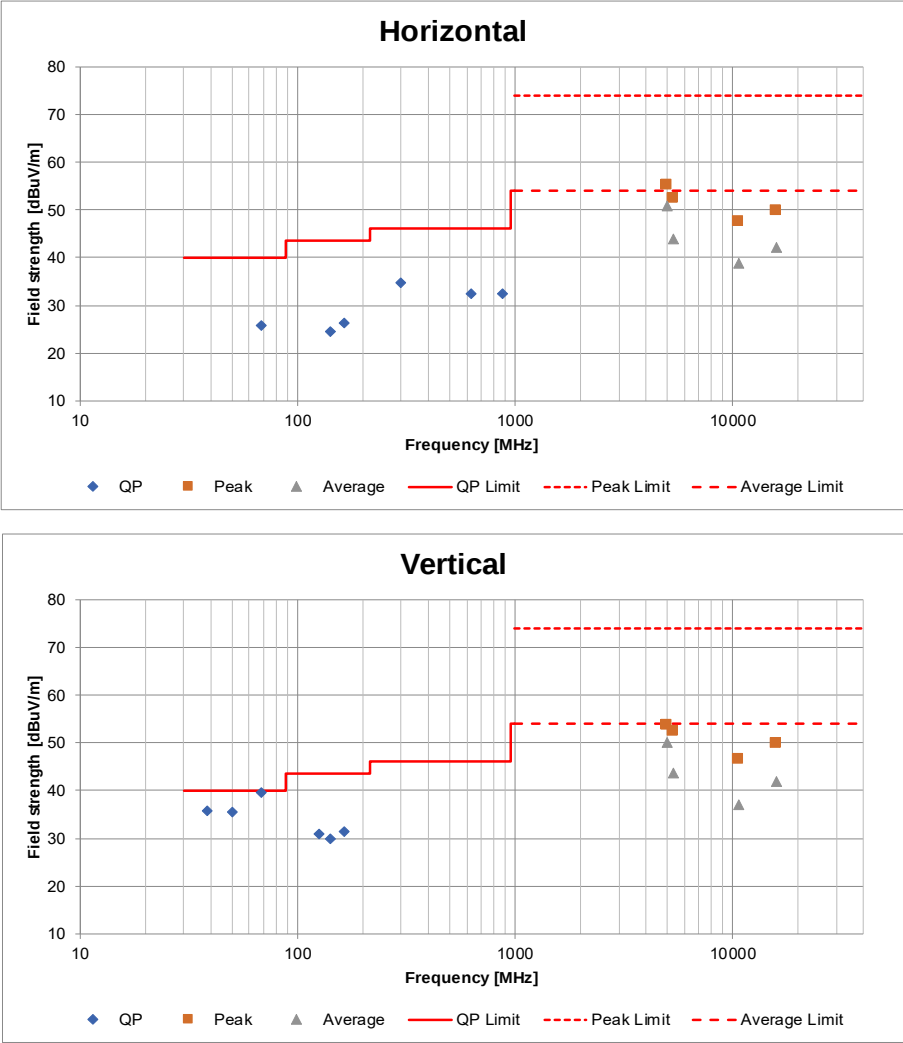
Ise EMC Lab.
No.4
May 14, 2024
23 deg. C / 41 % RH
Takumi Nishida
Tx 11n-20 5825 MHz



* 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 Conducted Output Power)

Test place	Ise EMC Lab.			
Semi Anechoic Chamber	No.4	No.4	No.4	No.4
Date	May 14, 2024	May 17, 2024	May 19, 2024	May 19, 2024
Temperature / Humidity	23 deg. C / 41 % RH	20 deg. C / 46 % RH	23 deg. C / 48 % RH	22 deg. C / 57 % RH
Engineer	Takumi Nishida (1 GHz to 10 GHz)	Tomoya Sone (10 GHz to 18 GHz)	Tomoya Sone (Above 18 GHz)	Yuichiro Yamazaki (Below 1 GHz)
Mode	Tx 11n-20 5320 MHz			

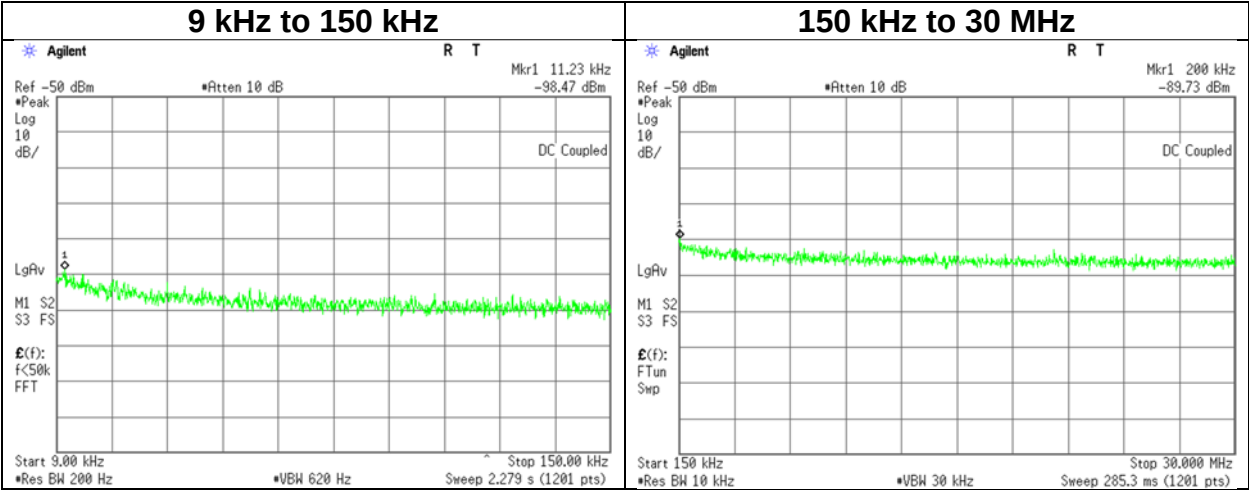


*These plots data contains sufficient number to show the trend of characteristic features for EUT.

Conducted Spurious Emission

Test place
Date
Temperature / Humidity
Engineer
Mode

Ise EMC Lab. No.8 Measurement Room
May 23, 2024
25 deg. C / 57 % RH
Shousei Hamaguchi
Tx 11n-20 5320 MHz



Frequency	Reading	Cable Loss	Attenuator	Antenna Gain*	N	EIRP	Distance	Ground bounce	E	Limit	Margin	Remark
[kHz]	[dBm]	[dB]	[dB]	[dBi]	(Number of Output)	[dBm]	[m]	[dB]	(field strength) [dBuV/m]	[dBuV/m]	[dB]	
11.23	-98.5	0.00	19.9	2.0	2	-73.6	300	6.0	-12.3	46.5	58.8	
200.00	-89.7	0.01	19.9	2.0	2	-64.8	300	6.0	-3.6	21.5	25.1	

$E \text{ [dBuV/m]} = \text{EIRP [dBm]} - 20 \log (\text{Distance [m]}) + \text{Ground bounce [dB]} + 104.8 \text{ [dBuV/m]}$
 $\text{EIRP [dBm]} = \text{Reading [dBm]} + \text{Cable loss [dB]} + \text{Attenuator Loss [dB]} + \text{Antenna gain [dBi]} + 10 * \log (N)$
N: Number of output
*2.0 dBi was applied to the test result based on KDB 789033 since antenna gain was less than 2.0 dBi.

APPENDIX 2: Test Instruments

Test Equipment (1/2)

Test Item	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Cal Int
CE	141217	Coaxial cable	Fujikura/Suhner/TSJ	5D-2W/SFM141/421-010/sucoform141-PE/RFM-E121(SW)	-/04178	06/14/2024	12
CE	141248	Attenuator	JFW Industries, Inc.	50FP-013H2 N	-	12/08/2023	12
CE	141357	LISN(AMN)	Schwarzbeck Mess-Elektronik OHG	NSLK8127	8127-729	07/09/2024	12
CE	141358	LISN(AMN)	Schwarzbeck Mess-Elektronik OHG	NSLK8127	8127-730	07/09/2024	12
CE	141545	DIGITAL HiTESTER	HIOKI E.E. CORPORATION	3805	51201148	02/01/2024	12
CE	141938	Terminator	TME	CT-01BP	-	12/04/2023	12
CE	141949	Test Receiver	Rohde & Schwarz	ESCI	100767	06/05/2024	12
CE	142011	AC4_Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-10005	12/13/2023	24
CE	142230	Measure, Tape, Steel	KOMELON	KMC-36	-	-	-
CE	178648	EMI measurement program	TSJ (Techno Science Japan)	TEPTO-DV	-	-	-
CE	244710	Thermo-Hygrometer	HIOKI E.E. CORPORATION	LR5001	231202104	01/25/2024	12
RE	141227	Microwave Cable	Junkosha	MMX221-00500DMSDMS	1502S305	03/04/2024	12
RE	141267	Logperiodic Antenna(200-1000MHz)	Schwarzbeck Mess-Elektronik OHG	VUSLP9111B	9111B-192	09/21/2023	12
RE	141294	High Pass Filter 7-20GHz	TOKIMEC	TF37NCCC	603	02/15/2024	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	08/10/2023	12
RE	141506	Horn Antenna 15-40GHz	Schwarzbeck Mess-Elektronik OHG	BBHA9170	BBHA9170307	08/09/2023	12
RE	141512	Horn Antenna 1-18GHz	Schwarzbeck Mess-Elektronik OHG	BBHA9120D	254	10/17/2023	12
RE	141517	Horn Antenna 26.5-40GHz	ETS-Lindgren	3160-10	152399	11/20/2023	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	141588	Pre Amplifier	L3 Narda-MITEQ	AMF-6F-2600400-33-8P / AMF-4F-2600400-33-8P	1871355 /1871328	01/22/2024	12
RE	141978	Spectrum Analyzer	Keysight Technologies Inc	E4448A	MY46180899	05/09/2024	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	160324	Coaxial Cable	Huber+Suhner	SUCOFLEX 102A	MY009/2A	10/05/2023	12
RE	178648	EMI measurement program	TSJ (Techno Science Japan)	TEPTO-DV	-	-	-
RE	234602	Microwave Cable	Huber+Suhner	SF126E/11PC35/11 PC35/1000M,5000M	537063/126E / 537074/126E	03/08/2024	12
RE	244710	Thermo-Hygrometer	HIOKI E.E. CORPORATION	LR5001	231202104	01/25/2024	12
RE	245788	Double Ridge Horn Antenna	Schwarzbeck Mess-Elektronik OHG	BBHA 9120 C	690	03/06/2024	12
AT	141171	Attenuator(20dB)_DC-1GHz_N	Weinschel Corp	MODEL 1	BG0143	12/06/2023	12

Test Equipment (2/2)

Test Item	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Cal Int
AT	141327	Coaxial Cable	UL Japan	-	-	02/09/2024	12
AT	141329	Microwave Cable 1G-40GHz	Suhner	SUCOFLEX102	28635/2	04/08/2024	12
AT	141333	Attenuator(10dB)	Suhner	6810.19.A	-	12/11/2023	12
AT	141334	Attenuator(10dB)	Suhner	6810.19.A	-	12/12/2023	12
AT	141366	Attenuator	Weinschel Associates	WA56-20	56200213	05/28/2024	12
AT	141545	DIGITAL HiTESTER	HIOKI E.E. CORPORATION	3805	51201148	02/01/2024	12
AT	141557	DIGITAL HiTESTER	HIOKI E.E. CORPORATION	3805	070900530	01/31/2024	12
AT	141807	Dual Power Meter	Hewlett Packard	E4419A (=EPM-442A)	GB37170359	08/24/2023	12
AT	141810	Power Meter	Anritsu Corporation	ML2495A	824014	12/12/2023	12
AT	141824	Power Sensor	Hewlett Packard	ECP-E18A (=E4412A)	US37181068	08/24/2023	12
AT	141832	Power sensor	Anritsu Corporation	MA2411B	738174	12/12/2023	12
AT	141900	Spectrum Analyzer	Keysight Technologies Inc	E4440A	MY46185823	06/16/2023	12
AT	142230	Measure, Tape, Steel	KOMELON	KMC-36	-	-	-
AT	197219	Microwave cable	Huber+Suhner	SF126E/11PC35/11 PC35/2000MM	536999/126E	03/19/2024	12
AT	244710	Thermo-Hygrometer	HIOKI E.E. CORPORATION	LR5001	231202104	01/25/2024	12
AT	244711	Thermo-Hygrometer	HIOKI E.E. CORPORATION	LR5001	231202105	01/25/2024	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:

AT: Antenna Terminal Conducted test
CE: Conducted Emission
RE: Radiated Emission