



RADIO TEST REPORT

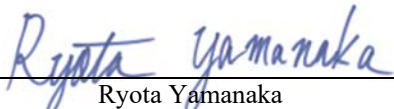
Test Report No. : 13521383H-A-R1

Applicant : silex technology, Inc.
Type of EUT : Embedded Wireless Module
Model Number of EUT : SX-USBAC
FCC ID : N6C-USBAC
Test regulation : FCC Part 15 Subpart C: 2020
*WLAN and Bluetooth Low Energy parts
Test Result : Complied (Refer to SECTION 3)

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2. The results in this report apply only to the sample tested.
3. This sample tested is in compliance with the limits of the above regulation.
4. The test results in this test report are traceable to the national or international standards.
5. This test report must not be used by the customer to claim product certification, approval, or endorsement by the A2LA accreditation body.
6. This test report covers Radio technical requirements.
It does not cover administrative issues such as Manual or non-Radio test related Requirements. (if applicable)
7. The all test items in this test report are conducted by UL Japan, Inc. Ise EMC Lab.
8. The opinions and the interpretations to the result of the description in this report are outside scopes where UL Japan has been accredited.
9. The information provided from the customer for this report is identified in Section 1.
10. This report is a revised version of 13521383H-A. 13521383H-A is replaced with this report.

Date of test: October 14 2020 to March 22, 2021

Representative test engineer:


Ryota Yamanaka
Engineer
Consumer Technology Division

Approved by:


Satofumi Matsuyama
Engineer
Consumer Technology Division



CERTIFICATE 5107.02

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

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REVISION HISTORY

Original Test Report No.: 13521383H-A

Revision	Test report No.	Date	Page revised	Contents
- (Original)	13521383H-A	November 20, 2020	-	-
1	13521383H-A-R1	April 16, 2021	P.1	Correction of Date of test October 14 to November 4, 2020→ October 14 2020 to March 22, 2021
1	13521383H-A-R1	April 16, 2021	P.5	Addition of Receipt Date for BT LE in Section 2.1.
1	13521383H-A-R1	April 16, 2021	P.14	Correction of Test voltage in Section 4.2. AC 100 V/ 60 Hz→AC 120 V/ 60 Hz
1	13521383H-A-R1	April 16, 2021	P.14	Addition of below explanatory note *5) in Section 4.2. *5) Conducted Emission test was performed on this port.
1	13521383H-A-R1	April 16, 2021	P.15	Addition of Serial number and *3), *4) for BT LE in Section 4.2.
1	13521383H-A-R1	April 16, 2021	P.18	Addition of (BT LE) following sentence in Section 6. <u>11.12.2.5.2</u> The duty cycle was less than 98% for detected noise, a duty factor was added to the 11.12.2.5.1 results. → <u>11.12.2.5.2 (BT LE)</u> The duty cycle was less than 98% for detected noise, a duty factor was added to the 11.12.2.5.1 results.
1	13521383H-A-R1	April 16, 2021	P.37	Replacement to new test data in APPENDIX 1: Test data (Burst rate confirmation)
1	13521383H-A-R1	April 16, 2021	P.22 to 24, 27, 30, 31, 33, 74 to 78, 80, 81, 82, 87	Replacement to new test data in APPENDIX 1: Test data for BT LE
1	13521383H-A-R1	April 16, 2021	P.88, 89	Replacement to new test instruments in APPENDIX 2: Test instruments

Reference: Abbreviations (Including words undescribed in this report)

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

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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
Facsimile Number	:	+81-774-98-3758
Contact Person	:	Yoshinori Nakai

The information provided from the customer is as follows;

- Applicant, Type 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
- SECTION 4: Operation of EUT during testing

* The laboratory is exempted from liability of any test results affected from the above information in SECTION 2 and 4.

SECTION 2: Equipment under test (EUT)

2.1 Identification of EUT

Type	:	Embedded Wireless Module
Model Number	:	SX-USBAC
Serial Number	:	Refer to SECTION 4.2
Rating	:	Typ: DC 3.3 V (Min: DC 3.14 V to Max: DC 3.46 V)
Receipt Date	:	September 30, 2020 (WLAN) March 15, 2021 (BT LE)
Country of Mass-production	:	Japan
Condition	:	Engineering prototype (Not for Sale: This sample is equivalent to mass-produced items.)
Modification	:	No Modification by the test lab.

2.2 Product Description

Model: SX-USBAC (referred to as the EUT in this report) is a Embedded Wireless Module.

Radio Specification

Radio Type : Transceiver
Method of Frequency Generation : Synthesizer
Clock frequency (Maximum) : 48 MHz

Specification of Wireless LAN (IEEE802.11b/g/a/n-20/n-40/11ac-20/11ac-40/11ac-80)

	IEEE802.11b *1)	IEEE802.11g/n *1) (20 M band)	IEEE802.11a/n/ac (20 M band)	IEEE802.11n/ac (40 M band)	IEEE802.11ac (80 M band)
Frequency of operation	2412 MHz - 2462 MHz	2412 MHz - 2462 MHz	5180 MHz - 5240 MHz 5260 MHz - 5320 MHz 5500 MHz - 5720 MHz 5745 MHz - 5825 MHz	2422 MHz - 2452 MHz 5190 MHz - 5230 MHz 5270 MHz - 5310 MHz 5510 MHz - 5710 MHz 5755 MHz - 5795 MHz	5210 MHz 5290 MHz 5530 MHz - 5690 MHz 5775 MHz
Type of modulation	DSSS (CCK, DQPSK, DBPSK)	OFDM-CCK (64QAM, 16QAM, QPSK, BPSK)	11a/n: OFDM (64QAM, 16QAM, QPSK, BPSK) 11ac: OFDM (64QAM, 16QAM, QPSK, BPSK, 256QAM)		
Channel spacing	5 MHz		20 MHz	40 MHz	80 MHz
Antenna type	PCB antenna				
Antenna Gain	2.4 GHz: 2 dBi 5 GHz: 3 dBi				

Bluetooth (Ver. 5.0 with EDR function)

	Bluetooth
Frequency of operation	2402 MHz - 2480 MHz
Type of modulation	BT: FHSS (GFSK, $\pi/4$ DQPSK, 8DPSK) LE: GFSK
Channel spacing	BT: 1 MHz LE: 2 MHz
Antenna type	PCB antenna
Antenna Gain	2 dBi

*1) This test report applies to WLAN (2.4 GHz band) and Bluetooth Low Energy parts.

*Following channels are not used in Canada.

- 20 MHz Bandwidth (5600 MHz - 5640 MHz)
- 40 MHz Bandwidth (5590 MHz - 5630 MHz)
- 80 MHz Bandwidth (5610 MHz - 5650 MHz)

SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification : FCC Part 15 Subpart C
FCC Part 15 final revised on October 13, 2020

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

* The revision does not affect the test result conducted before its effective date.

3.2 Procedures and results

Item	Test Procedure	Specification	Worst margin	Results	Remarks
Conducted Emission	FCC: ANSI C63.10-2013 6. Standard test methods ISED: RSS-Gen 8.8	FCC: Section 15.207 ISED: RSS-Gen 8.8	11.30 dB 0.40156 MHz, N, AV	Complied a)	-
6dB Bandwidth	FCC: KDB 558074 D01 15.247 Meas Guidance v05r02 ISED: -	FCC: Section 15.247(a)(2) ISED: RSS-247 5.2(a)	See data.	Complied b)	Conducted
Maximum Peak Output Power	FCC: KDB 558074 D01 15.247 Meas Guidance v05r02 ISED: RSS-Gen 6.12	FCC: Section 15.247(b)(3) ISED: RSS-247 5.4(d)		Complied c)	Conducted
Power Density	FCC: KDB 558074 D01 15.247 Meas Guidance v05r02 ISED: -	FCC: Section 15.247(e) ISED: RSS-247 5.2(b)		Complied d)	Conducted
Spurious Emission Restricted Band Edges	FCC: KDB 558074 D01 15.247 Meas Guidance v05r02 ISED: RSS-Gen 6.13	FCC: Section 15.247(d) ISED: RSS-247 5.5 RSS-Gen 8.9 RSS-Gen 8.10	1.4 dB 2390.000 MHz, 4824.000 MHz, AV, Horizontal	Complied# e), f)	Conducted (below 30 MHz)/ Radiated (above 30 MHz) *1)

Note: UL Japan, Inc.'s EMI Work Procedures No. 13-EM-W0420 and 13-EM-W0422.

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

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

Symbols:

Complied The data of this test item has enough margin, more than the measurement uncertainty.

Complied# The data of this test item meets the limits unless the measurement uncertainty is taken into consideration.

* In case any questions arise about test procedure, ANSI C63.10: 2013 is also referred.

FCC Part 15.31 (e)

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

FCC Part 15.203 Antenna requirement

The antenna is not removable from the EUT.
Therefore, the equipment complies with the antenna requirement of Section 15.203.

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3.3 Addition to standard

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

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

3.4 Uncertainty

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

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

Test Item	Uncertainty (+/-)
20 dB Bandwidth / 99 % Occupied Bandwidth	0.96 %
Maximum Peak Output Power / Average Output Power	1.4 dB
Carrier Frequency Separation	0.42 %
Dwell time / Burst rate	0.10 %
Conducted Spurious Emission	2.6 dB

Conducted emission

using Item	Frequency range	Uncertainty (+/-)
AMN (LISN)	0.009 MHz to 0.15 MHz	3.4 dB
	0.15 MHz to 30 MHz	2.9 dB

Radiated emission

Measurement distance	Frequency range	Uncertainty (+/-)
3 m	9 kHz to 30 MHz	3.3 dB
10 m		3.2 dB
3 m	30 MHz to 200 MHz (Horizontal) (Vertical)	4.8 dB
		5.0 dB
	200 MHz to 1000 MHz (Horizontal) (Vertical)	5.2 dB
		6.3 dB
10 m	30 MHz to 200 MHz (Horizontal) (Vertical)	4.8 dB
		4.8 dB
	200 MHz to 1000 MHz (Horizontal) (Vertical)	5.0 dB
		5.0 dB
3 m	1 GHz to 6 GHz	4.9 dB
	6 GHz to 18 GHz	5.2 dB
1 m	10 GHz to 26.5 GHz	5.5 dB
	26.5 GHz to 40 GHz	5.5 dB
10 m	1 GHz to 18 GHz	5.2 dB

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3.5 Test Location

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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.11 measurement room	6.2 x 4.7 x 3.0	4.8 x 4.6	-	-

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

3.6 Test data, Test instruments, and Test set up

Refer to APPENDIX.

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SECTION 4: Operation of EUT during testing

4.1 Operating Mode(s)

[WLAN]

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

Mode	Remarks*
IEEE 802.11b (11b)	1 Mbps, PN9
IEEE 802.11g (11g)	48 Mbps, PN9
IEEE 802.11n 20 MHz BW (11n-20)	MCS 4(Long GI), PN9
IEEE 802.11n 40 MHz BW (11n-40)	MCS 3(Long 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 settings: Refer to the following table Software: HY103880XX (Date: 2020.10.14, 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.	

[Power setting: WLAN]

	Rate	Ch	Frequency	Power Setting [dBm]
11b	1 Mbps	1	2412 MHz	16.0
		2	2417 MHz	16.5
		6	2437 MHz	16.5
		10	2457 MHz	16.5
		11	2462 MHz	19.0
11g	48 Mbps	1	2412 MHz	14.5
		2	2417 MHz	15.5
		6	2437 MHz	15.5
		10	2457 MHz	15.5
		11	2462 MHz	13.5
11n20	MCS 4	1	2412 MHz	14.0
		2	2417 MHz	16.0
		6	2437 MHz	16.0
		10	2457 MHz	16.0
		11	2462 MHz	13.5
11n40	MCS 3	3	2422 MHz	11.0
		4	2432 MHz	11.5
		5	2447 MHz	12.5
		8	2437 MHz	12.5
		9	2452 MHz	11.5

*Details of Operating mode for WLAN

Test Item	Operating Mode	Tested frequency
Conducted Emission Radiated Spurious Emission (Below 1 GHz)	11n-20 Tx *1)	2437 MHz
Radiated Spurious Emission (Above 1 GHz)	11b Tx 11n-20 Tx	2412 MHz 2417 MHz 2437 MHz 2457 MHz 2462 MHz
	11g Tx	2412 MHz 2417 MHz 2457 MHz 2462 MHz
	11n-40 Tx	2422 MHz 2432 MHz 2437 MHz 2447 MHz 2452 MHz
Conducted Spurious Emission	11n-20 Tx *1)	2437 MHz
Maximum Peak Output Power Power Density	11b Tx 11g Tx 11n-20 Tx	2412 MHz 2417 MHz 2437 MHz 2457 MHz 2462 MHz
	11n-40 Tx	2422 MHz 2427 MHz 2432 MHz 2437 MHz 2447 MHz 2452 MHz
6dB Bandwidth 99% Occupied Bandwidth	11b Tx 11g Tx 11n-20 Tx	2412 MHz 2437 MHz 2462 MHz
	11n-40 Tx	2422 MHz 2437 MHz 2452 MHz
*1) The mode was tested as a representative, because it had the highest power at antenna terminal test.		

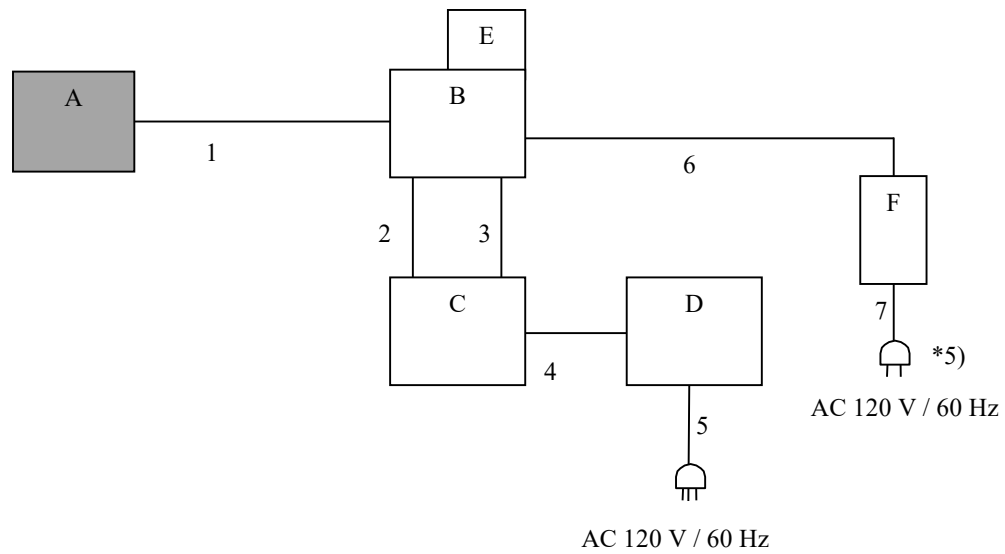
[BT LE]

Mode	Remarks*
Bluetooth Low Energy (BT LE) 1M-PHY	Maximum Packet Size, PRBS9
*Power of the EUT was set by the software as follows; Power settings: power level 8 Software: QRCT Ver 4.0.113.0 (2019.1.10, 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.	

*Details of Operating mode for BT LE

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

4.2 Configuration and peripherals



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

*5) Conducted Emission test was performed on this port.

Description of EUT and Support equipment

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	Embedded Wireless Module	SX-USBAC	015B15 *1)	silex technology, Inc.	EUT
			015B0B *2)		
			016147 *3) *4)		
B	Jig Board	SX07042 *1)	TR18272275 *1)	silex technology, Inc.	-
		SX04847 *2)	TR16345192 *2)		
		SX07342 *3)	TR18272106 *3)		
C	Laptop PC	Latitude 5590	CFSPRH2 *1)	DELL	-
			HSLHST2 *2)		
			B0JXHR2 *3) *4)		
D	AC Adaptor	LA90PM130	CN-50GT3K-LOC00-8AF-4753-A02 *1)	DELL	-
			CN-50GT3K-LOC00-8AF-4EB6-A02 *2)		
			CN-05GT3K-LOC00-85M-4B9B-A02 *3) *4)		
E	SD Card	SD-K08G *1)	1704 WM05716 *1)	TOSHIBA *1)	-
		SDSDUN-008G-J01 *2)	BI1529450177D *2)	SanDisk *2)	
		SDSDUN-008G-G46 *3) *4)	342-27962 REV A *3) *4)	SanDisk *3)	
F	AC Adaptor	ATS036T-A050	400-75956 *1)	Sceptre	-
			2832S 07 *2)		
			SX05342 *3) *4)		

List of cables used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	USB Cable	3.0 *1) *3) 1.8 *2) 2.0 *4)	Shielded	Shielded	-
2	LAN Cable	2.0 3.0 *4)	Unshielded	Unshielded	-
3	USB Cable	1.9	Shielded	Shielded	-
4	DC Cable	1.8	Unshielded	Unshielded	-
5	AC Cable	0.9	Unshielded	Unshielded	-
6	DC Cable	1.0	Unshielded	Unshielded	-
7	AC Cable	1.8	Unshielded	Unshielded	-

*1) Used for Antenna Terminal Conducted test (WLAN).

*2) Used for Conducted Emission test and Radiated Emission test (WLAN).

*3) Used for Antenna Terminal Conducted test (BT LE).

*4) Used for Conducted Emission test and Radiated Emission test (BT LE).

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

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

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

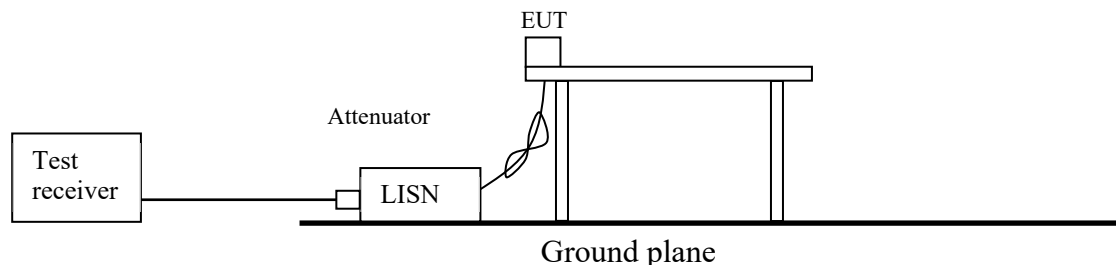
The AC Mains Terminal Continuous disturbance Voltage has been measured with the EUT in a Semi Anechoic Chamber. The EUT was connected to a LISN (AMN).

An overview sweep with peak detection has been performed.

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

Detector	: QP and CISPR AV
Measurement range	: 0.15 MHz - 30 MHz
Test data	: APPENDIX
Test result	: Pass

Figure 1: Test Setup



SECTION 6: Radiated Spurious Emission

Test Procedure

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

[For below 1 GHz]

EUT was placed on a urethane platform of nominal size, 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.

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

Test antenna was aimed at the EUT for receiving the maximum signal and always kept within the illumination area of the 3 dB beamwidth of the antenna.

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

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

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

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

Test Antennas are used as below;

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

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

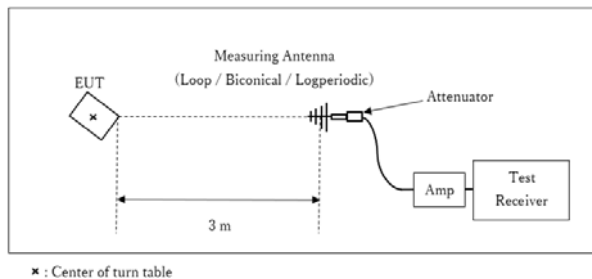
20 dBc was applied to the frequency over the limit of FCC 15.209 / Table 4 of RSS-Gen 8.9(ISED) and outside the restricted band of FCC15.205 / Table 6 of RSS-Gen 8.10 (ISED).

Frequency	Below 1 GHz	Above 1 GHz		20 dBc
Instrument used	Test Receiver	Spectrum Analyzer		Spectrum Analyzer
Detector	QP	PK	AV *1)	PK
IF Bandwidth	BW 120 kHz	RBW: 1 MHz VBW: 3 MHz	<u>11.12.2.5.1(BT LE)</u> RBW: 1 MHz VBW: 3 MHz Detector: Power Averaging (RMS) Trace: 100 traces <u>11.12.2.5.2 (BT LE)</u> The duty cycle was less than 98% for detected noise, a duty factor was added to the 11.12.2.5.1 results. <u>11.12.2.5.3(WLAN 2.4GHz)</u> RBW: 1 MHz VBW: 1/T Detector: Power Averaging (RMS)	RBW: 100 kHz VBW: 300 kHz

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

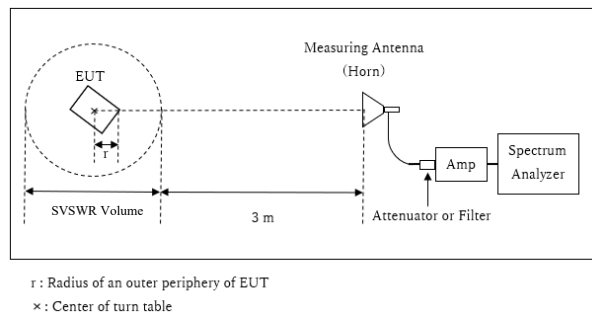
Figure 2: Test Setup

Below 1 GHz



Test Distance: 3 m

1 GHz - 10 GHz



Distance Factor: $20 \times \log (4.0 \text{ m} / 3.0 \text{ m}) = 2.50 \text{ dB}$

* Test Distance: $(3 + \text{SVSWR Volume} / 2) - r = 4.0 \text{ m}$

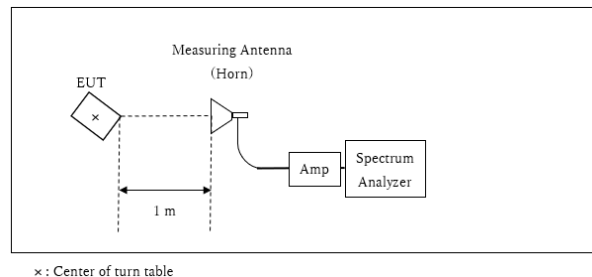
SVSWR Volume : 2.0 m

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

r = 0.0m

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

10 GHz – 26.5 GHz



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.

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

Measurement range	: 30 MHz - 26.5 GHz
Test data	: APPENDIX
Test result	: Pass

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SECTION 7: Antenna Terminal Conducted Tests

Test Procedure

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

Test	Span	RBW	VBW	Sweep time	Detector	Trace	Instrument used
6dB Bandwidth	20 MHz (11b/g/n-20) 40 MHz (11n-40) 3 MHz (BT LE)	100 kHz	300 kHz	Auto	Peak	Max Hold	Spectrum Analyzer
99% Occupied Bandwidth *1)	Enough width to display emission skirts	1 to 5 % of OBW	Three times of RBW	Auto	Peak	Max Hold	Spectrum Analyzer
Maximum Peak Output Power	-	-	-	Auto	Peak/ Average *2	-	Power Meter (Sensor: 50 MHz BW)
Peak Power Density	1.5 times the 6dB Bandwidth	3 kHz	10 kHz	Auto	Peak	Max Hold	Spectrum Analyzer *3)
Conducted Spurious Emission *4) *5)	9kHz to 150kHz 150kHz to 30MHz	200 Hz 9.1 kHz	620 Hz 27 kHz	Auto	Peak	Max Hold	Spectrum Analyzer

*1) Peak hold was applied as Worst-case measurement.
 *2) Reference data for average measurement (WLAN) is based on section 11.9.2.3.2 Method AVGPM-G of "ANSI C63.10-2013". BLE is 11.9.2.3.1 Method AVGPM thereof.
 *3) Section 11.10.2 Method PKPSD (peak PSD) of "ANSI C63.10-2013".
 *4) In the frequency range below 30MHz, RBW was narrowed to separate the noise contents.
 Then, wide-band noise near the limit was checked separately, however the noise was low enough as shown in the chart.
 (9 kHz - 150 kHz: RBW = 200 Hz, 150 kHz - 30 MHz: RBW = 9.1 kHz).
 *5) The limits in CFR 47, Part 15, Subpart C, paragraph 15.209(a), are identical to those in RSS-Gen section 8.9, Table 6, since the measurements are performed in terms of magnetic field strength and converted to electric field strength levels (as reported in the table) using the free space impedance of 377 Ohms. For example, the measurement at frequency 9 kHz resulted in a level of 45.5 dBuV/m, which is equivalent to 45.5 – 51.5 = -6.0 dBuA/m, which has the same margin, 3 dB, to the corresponding RSS-Gen Table 6 limit as it has to 15.209(a) limit.

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

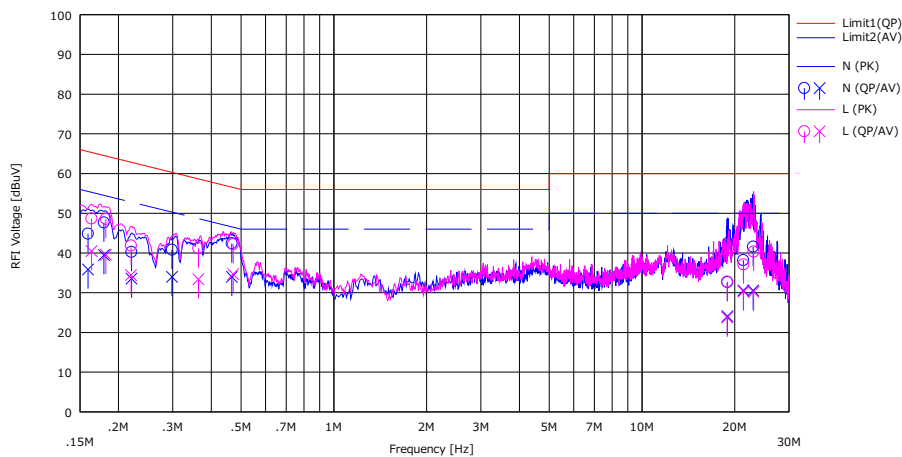
Test data : APPENDIX
Test result : Pass

APPENDIX 1: Test data

Conducted Emission

Report No. 13521383H
Test place Ise EMC Lab. No.4
Date November 4, 2020
Temperature / Humidity 23 deg. C / 41 % RH
Engineer Junki Nagatomi
Mode Tx 11n-20, 2437 MHz

Limit : FCC_Part 15 Subpart C(15.207)



No.	Freq. [MHz]	Reading		LISN [dB]	LOSS [dB]	Results		Limit		Margin		Phase	Comment
		(QP) [dBuV]	(AV) [dBuV]			(QP) [dBuV]	(AV) [dBuV]	(QP) [dBuV]	(AV) [dBuV]	(QP) [dB]	(AV) [dB]		
1	0.15935	31.60	22.60	0.05	13.20	44.85	35.85	65.50	55.50	20.65	19.65	N	
2	0.17950	34.40	26.20	0.05	13.21	47.66	39.46	64.51	54.51	16.85	15.05	N	
3	0.22055	27.00	20.30	0.05	13.21	40.26	33.56	62.80	52.80	22.54	19.24	N	
4	0.29850	27.50	20.70	0.06	13.22	40.78	33.98	60.28	50.28	19.50	16.30	N	
5	0.46670	29.10	20.70	0.05	13.25	42.40	34.00	56.57	46.57	14.17	12.57	N	
6	18.93895	18.40	9.80	0.36	13.91	32.67	24.07	60.00	50.00	27.33	25.93	N	
7	21.32350	23.80	16.20	0.42	13.96	38.18	30.58	60.00	50.00	21.82	19.42	N	
8	22.95480	27.10	16.10	0.46	13.99	41.55	30.55	60.00	50.00	18.45	19.45	N	
9	0.16360	35.42	27.20	0.06	13.20	48.68	40.46	65.28	55.28	16.60	14.82	L	
10	0.18200	35.30	26.30	0.05	13.21	48.56	39.56	64.39	54.39	15.83	14.83	L	
11	0.21970	28.60	21.20	0.05	13.21	41.86	34.46	62.83	52.83	20.97	18.37	L	
12	0.36350	27.90	20.10	0.05	13.23	41.18	33.38	58.65	48.65	17.47	15.27	L	
13	0.47130	28.90	21.40	0.05	13.25	42.20	34.70	56.49	46.49	14.29	11.79	L	
14	18.89630	18.40	9.40	0.42	13.91	32.73	23.73	60.00	50.00	27.27	26.27	L	
15	21.35150	22.67	15.90	0.48	13.96	37.11	30.34	60.00	50.00	22.89	19.66	L	
16	23.04000	25.80	15.70	0.52	13.99	40.31	30.21	60.00	50.00	19.69	19.79	L	

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

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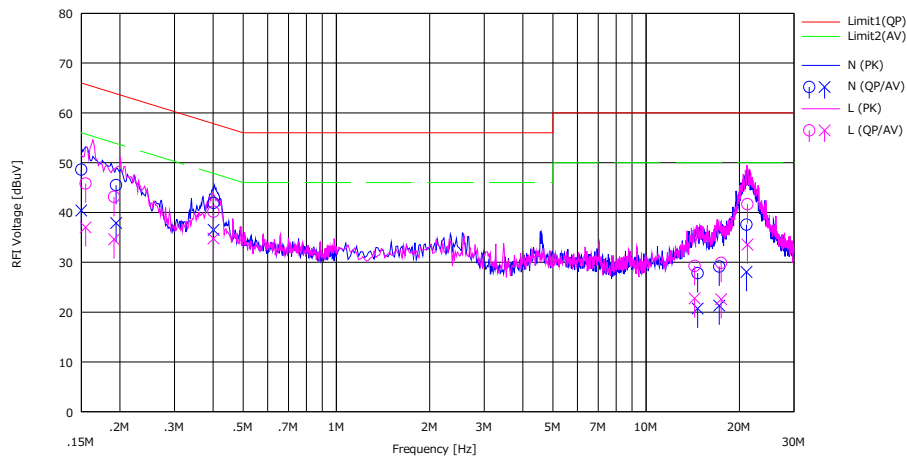
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Conducted Emission

Report No. 13521383H
Test place Ise EMC Lab. No.3
Date March 22, 2021
Temperature / Humidity 20 deg. C / 45 % RH
Engineer Junki Nagatomi
Mode Tx BT LE, 2480 MHz

Limit : FCC_Part 15 Subpart C(15.207)

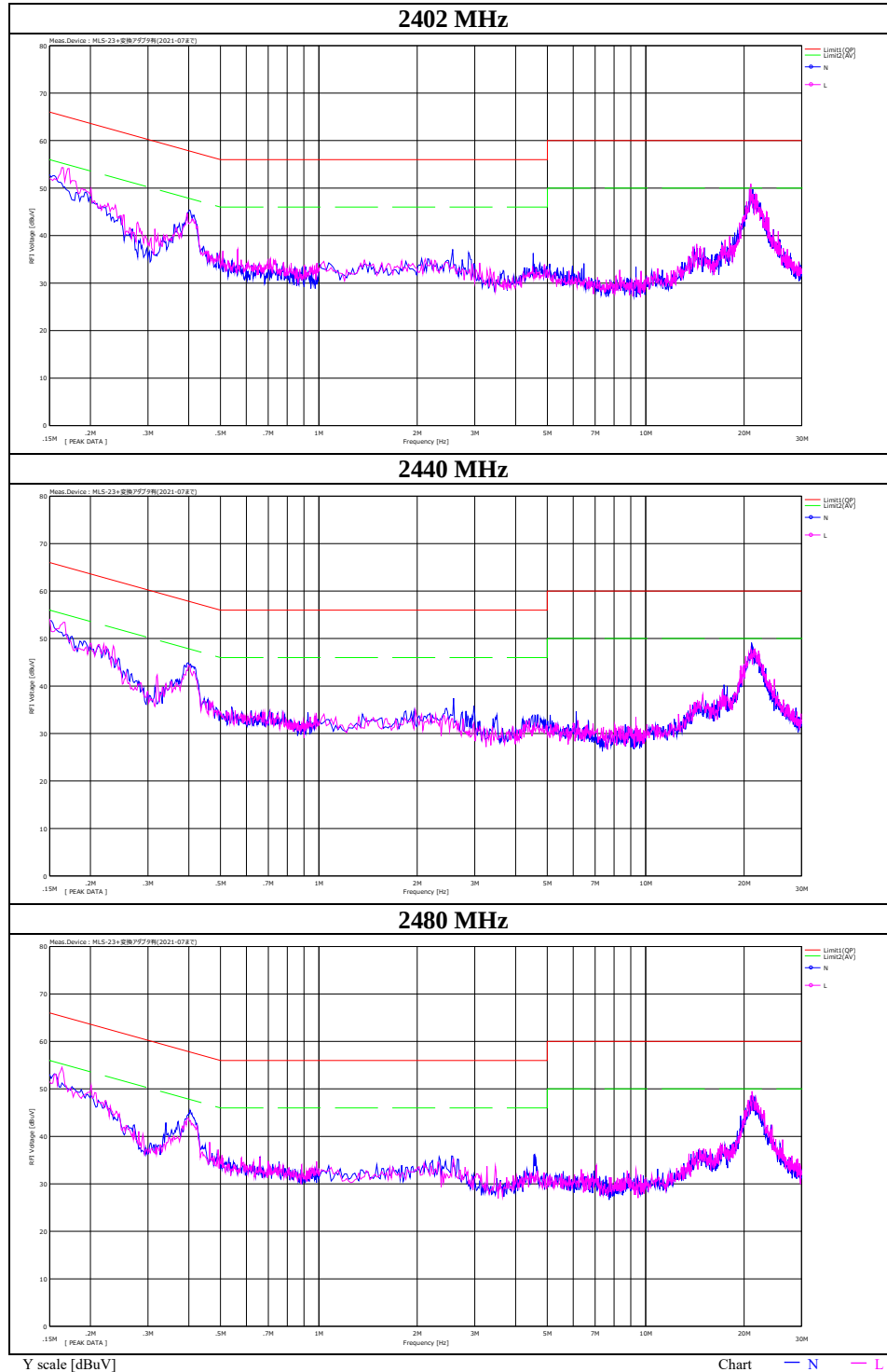


No.	Freq. [MHz]	Reading		LISN [dB]	LOSS [dB]	Results		Limit		Margin		Phase	Comment
		<QP> [dBuV]	<AV> [dBuV]			<QP> [dBuV]	<AV> [dBuV]	<QP> [dBuV]	<AV> [dBuV]	<QP> [dB]	<AV> [dB]		
1	0.15000	35.30	27.10	0.07	13.23	48.60	40.40	66.00	56.00	17.40	15.60	N	
2	0.19441	32.20	24.60	0.06	13.23	45.49	37.89	63.85	53.85	18.36	15.96	N	
3	0.40156	28.60	23.20	0.06	13.26	41.92	36.52	57.82	47.82	15.90	11.30	N	
4	14.67210	13.70	6.60	0.31	13.80	27.81	20.71	60.00	50.00	32.19	29.29	N	
5	17.22802	14.90	7.10	0.36	13.86	29.12	21.32	60.00	50.00	30.88	28.68	N	
6	21.08024	23.20	13.70	0.42	13.95	37.57	28.07	60.00	50.00	22.43	21.93	N	
7	0.15492	32.50	23.70	0.10	13.23	45.83	37.03	65.73	55.73	19.90	18.70	L	
8	0.19148	29.80	21.30	0.10	13.23	43.13	34.63	63.97	53.97	20.84	19.34	L	
9	0.40080	26.80	21.40	0.10	13.26	40.16	34.76	57.84	47.84	17.68	13.08	L	
10	14.34233	15.10	8.60	0.37	13.79	29.26	22.76	60.00	50.00	30.74	27.24	L	
11	17.47231	15.60	8.30	0.43	13.86	29.89	22.59	60.00	50.00	30.11	27.41	L	
12	21.23210	27.20	19.10	0.51	13.95	41.66	33.56	60.00	50.00	18.34	16.44	L	

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

Conducted Emission

Report No. 13521383H
Test place Ise EMC Lab. No.3
Date March 22, 2021
Temperature / Humidity 20 deg. C / 45 % RH
Engineer Junki Nagatomi
Mode Tx BT LE



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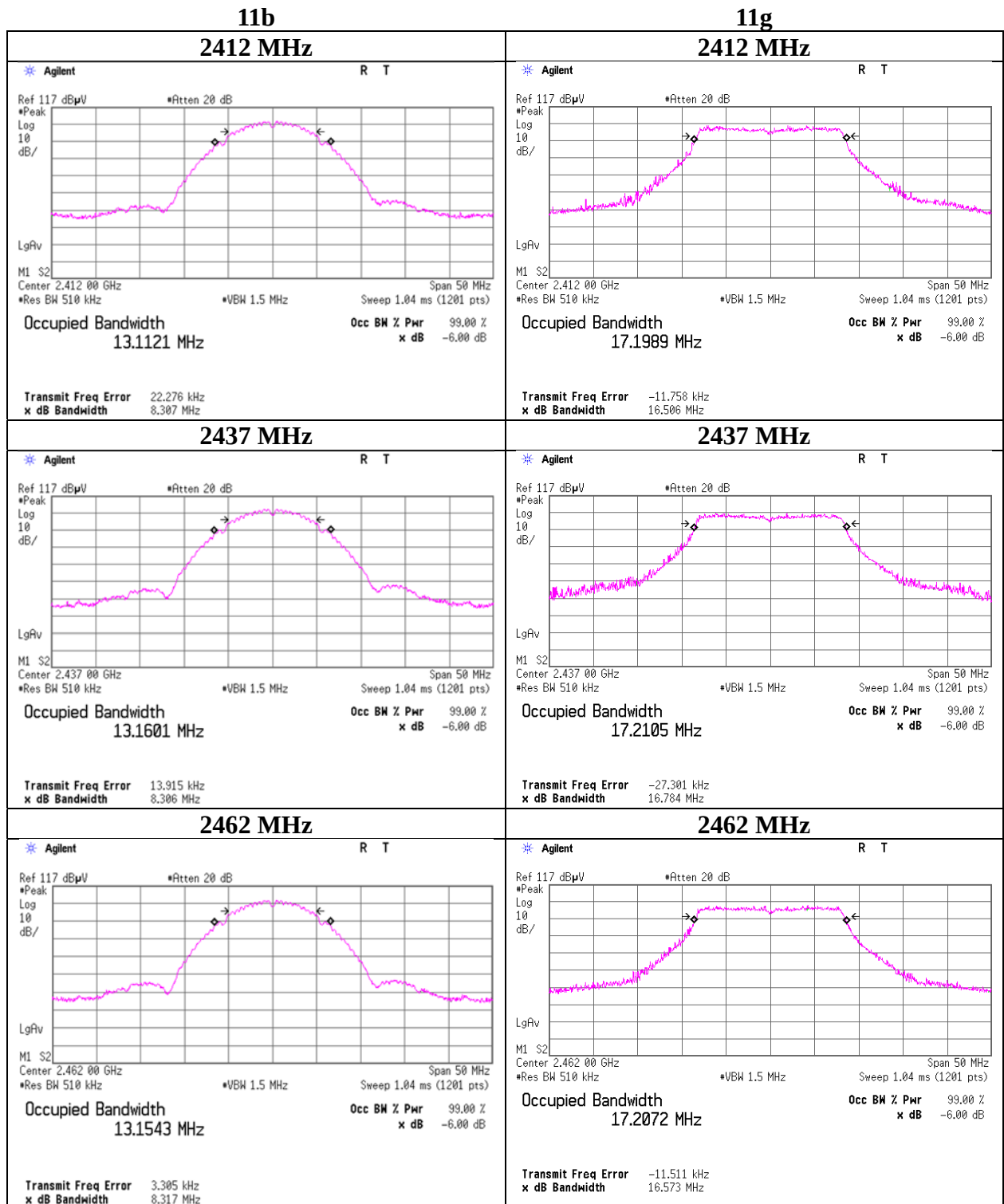
Facsimile : +81 596 24 8124

6 dB Bandwidth and 99 % Occupied Bandwidth

Report No. 13521383H
Test place Ise EMC Lab. No.6 Shielded Room
Date October 16, 2020 October 27, 2020 March 17, 2021
Temperature / Humidity 23 deg. C / 42 % RH 25 deg. C / 42 % RH 23 deg. C / 30 % RH
Engineer Tomohisa Nakagawa Takafumi Noguchi Takafumi Noguchi
Mode Tx

Mode	Frequency [MHz]	99% Occupied Bandwidth [kHz]	6dB Bandwidth [MHz]	Limit for 6dB Bandwidth [MHz]
11b	2412	13112.1	8.072	> 0.5000
	2437	13160.1	8.072	> 0.5000
	2462	13154.3	8.030	> 0.5000
11g	2412	17198.9	16.505	> 0.5000
	2437	17210.5	16.493	> 0.5000
	2462	17207.2	16.493	> 0.5000
11n-20	2412	18235.1	17.709	> 0.5000
	2437	18249.2	17.717	> 0.5000
	2462	18189.9	17.740	> 0.5000
11n-40	2422	35973.9	35.122	> 0.5000
	2437	35907.1	35.139	> 0.5000
	2452	35959.2	35.139	> 0.5000
BT LE	2402	1058.5	0.680	> 0.5000
	2440	1057.1	0.674	> 0.5000
	2480	1057.2	0.673	> 0.5000

99 % Occupied Bandwidth



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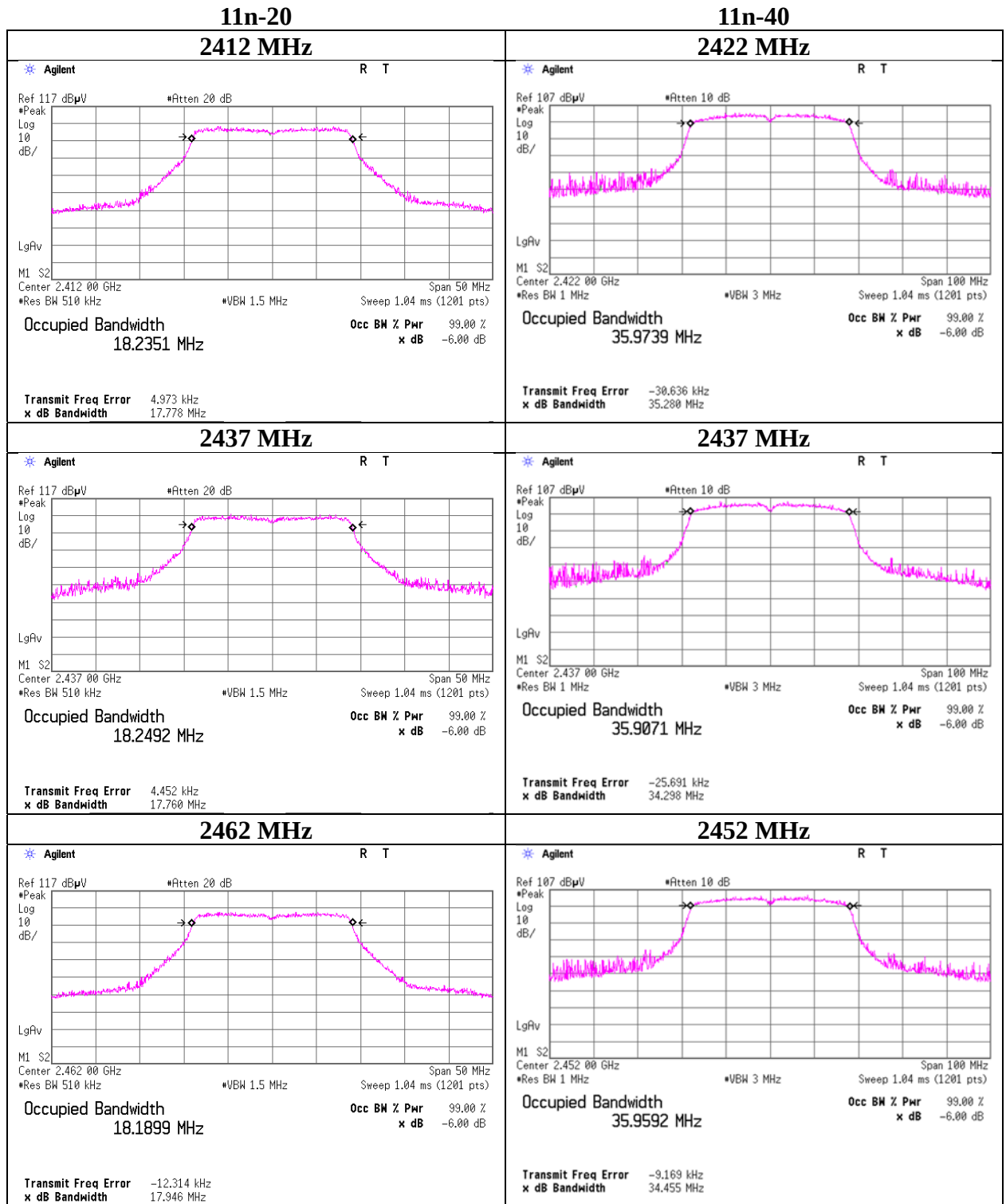
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99 % Occupied Bandwidth



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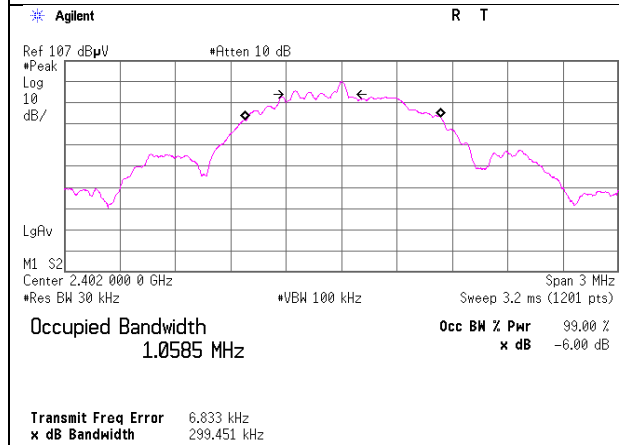
Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

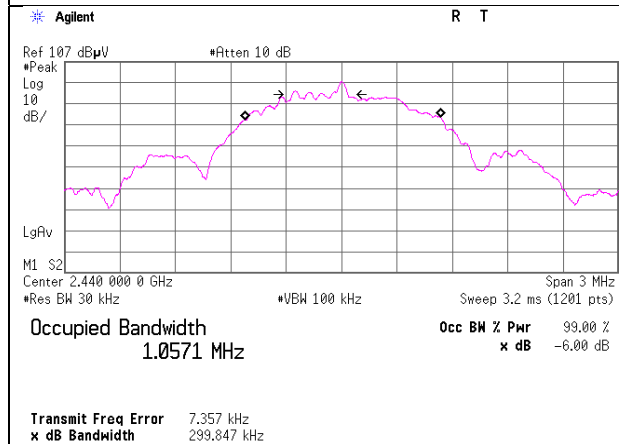
99% Occupied Bandwidth

BT LE

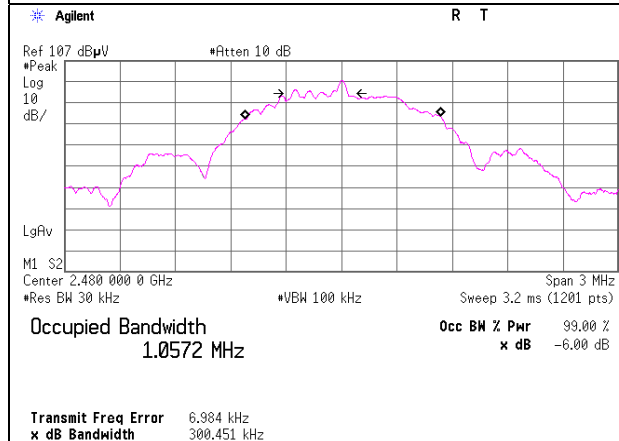
2402 MHz



2440 MHz



2480 MHz



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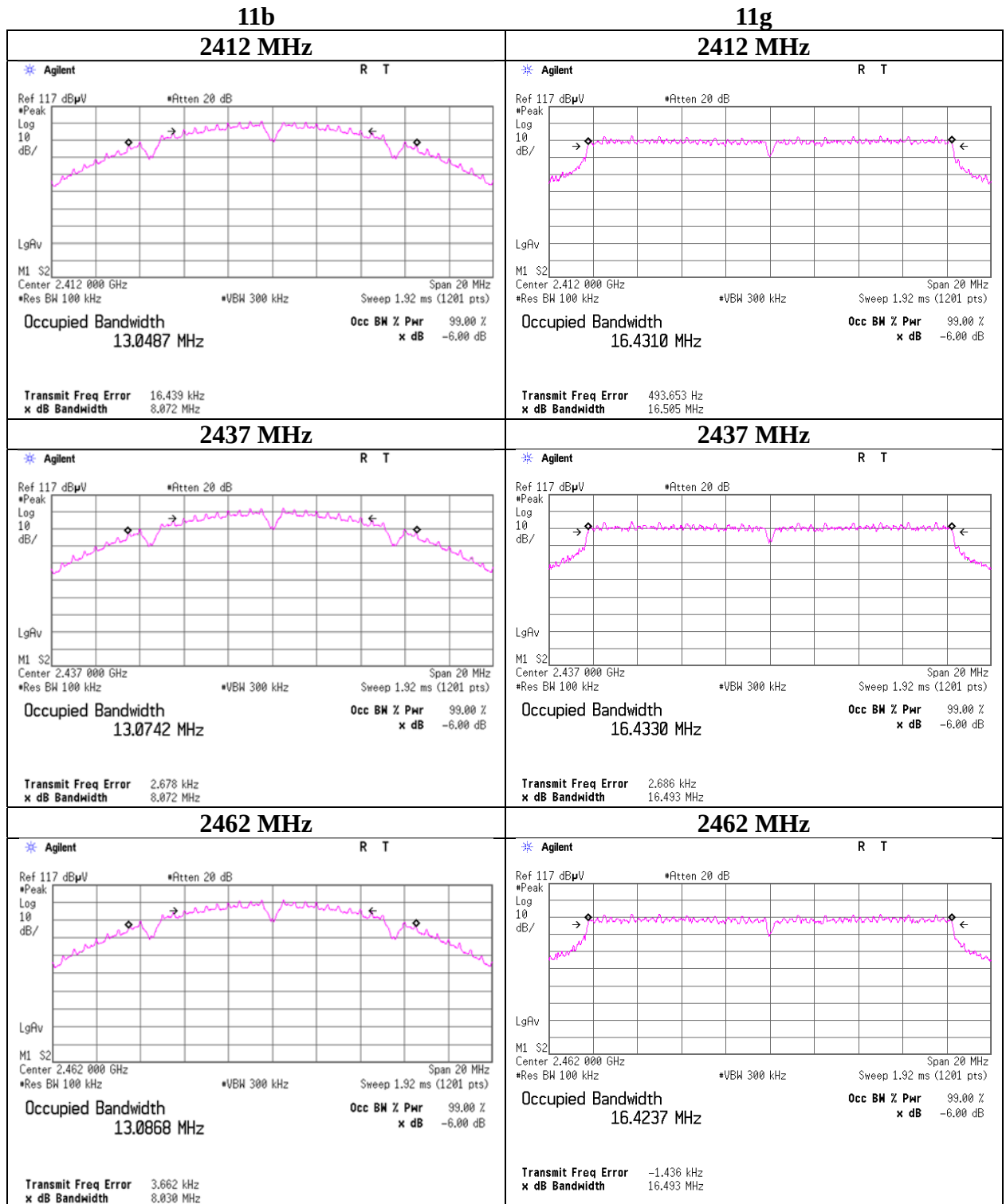
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6 dB Bandwidth



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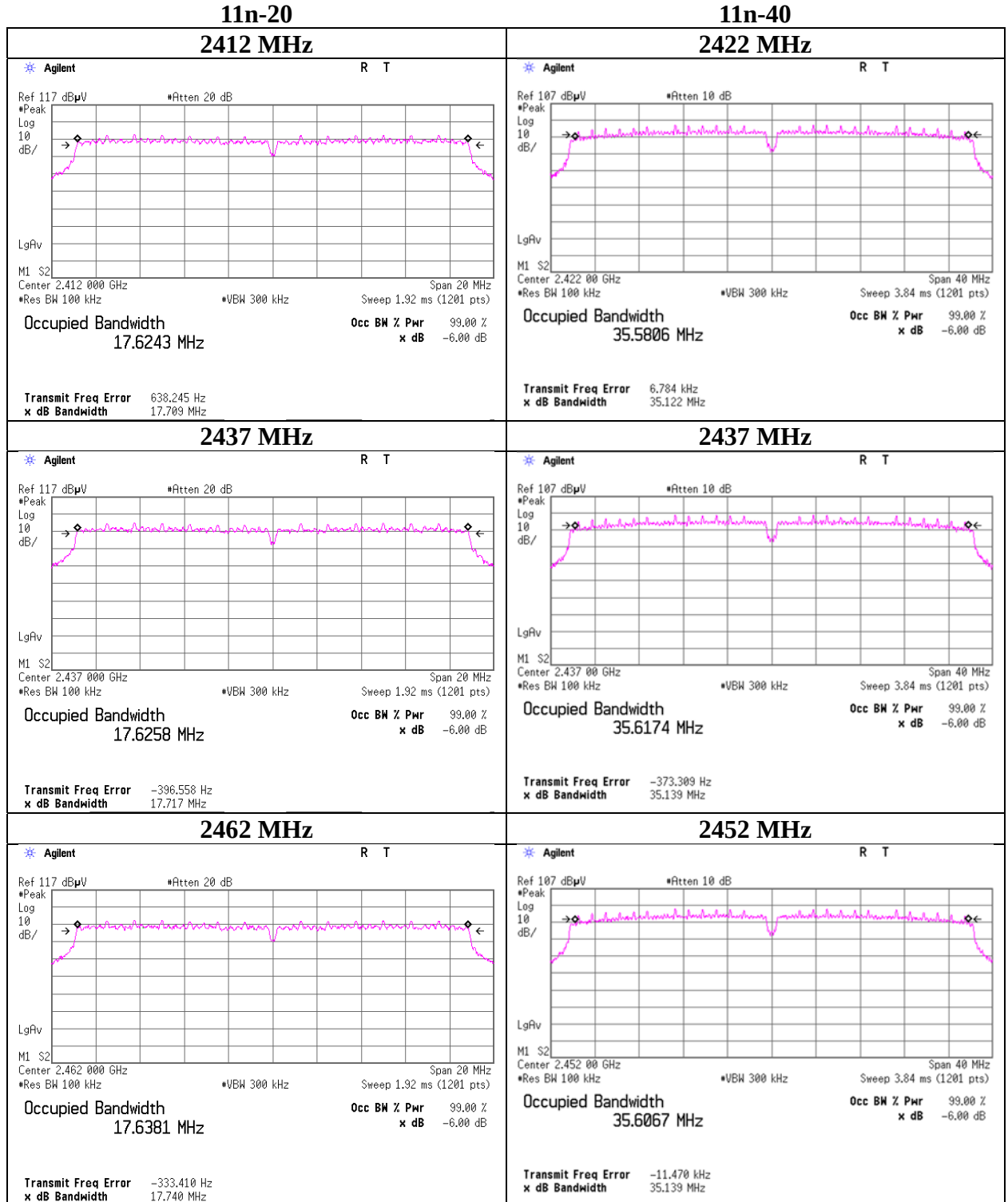
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6 dB Bandwidth



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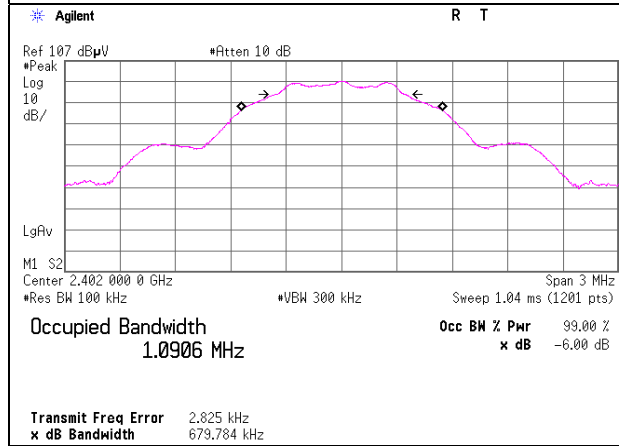
Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

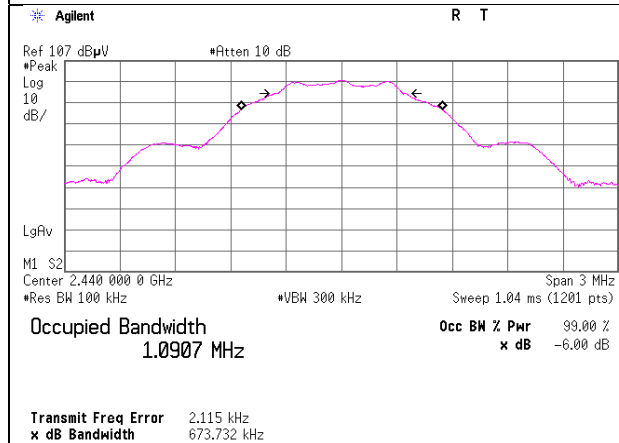
6 dB Bandwidth

BT LE

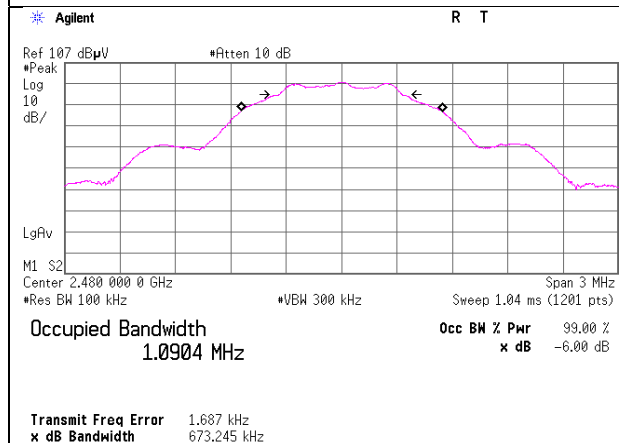
2402 MHz



2440 MHz



2480 MHz



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Maximum Peak Output Power

Report No. 13521383H
Test place Ise EMC Lab. No.6 Shielded Room
Date October 27, 2020 March 17, 2021
Temperature / Humidity 25 deg. C / 42 % RH 23 deg. C / 30 % RH
Engineer Takafumi Noguchi Takafumi Noguchi
Mode Tx

				Conducted Power					e.i.r.p. for RSS-247					
Freq.	Reading	Cable Loss	Atten. Loss	Result		Limit		Margin	Antenna Gain	Result		Limit		Margin
				[dBm]	[mW]	[dBm]	[mW]			[dBm]	[mW]	[dBm]	[mW]	
2412	9.21	1.00	9.73	19.94	98.63	30.00	1000	10.06	2.00	21.94	156.31	36.02	4000	14.08
2417	9.82	1.00	9.73	20.55	113.50	30.00	1000	9.45	2.00	22.55	179.89	36.02	4000	13.47
2437	9.69	1.00	9.73	20.42	110.15	30.00	1000	9.58	2.00	22.42	174.58	36.02	4000	13.60
2457	9.72	1.00	9.73	20.45	110.92	30.00	1000	9.55	2.00	22.45	175.79	36.02	4000	13.57
2462	12.10	1.00	9.73	22.83	191.87	30.00	1000	7.17	2.00	24.83	304.09	36.02	4000	11.19

				Conducted Power					e.i.r.p. for RSS-247					
Freq.	Reading	Cable Loss	Atten. Loss	Result		Limit		Margin	Antenna Gain	Result		Limit		Margin
				[dBm]	[mW]	[dBm]	[mW]			[dBm]	[mW]	[dBm]	[mW]	
2412	15.47	1.00	9.73	26.20	416.87	30.00	1000	3.80	2.00	28.20	660.69	36.02	4000	7.82
2417	15.81	1.00	9.73	26.54	450.82	30.00	1000	3.46	2.00	28.54	714.50	36.02	4000	7.48
2437	15.91	1.00	9.73	26.64	461.32	30.00	1000	3.36	2.00	28.64	731.14	36.02	4000	7.38
2457	16.03	1.00	9.73	26.76	474.24	30.00	1000	3.24	2.00	28.76	751.62	36.02	4000	7.26
2462	14.83	1.00	9.73	25.56	359.75	30.00	1000	4.44	2.00	27.56	570.16	36.02	4000	8.46

				Conducted Power					e.i.r.p. for RSS-247					
Freq.	Reading	Cable Loss	Atten. Loss	Result		Limit		Margin	Antenna Gain	Result		Limit		Margin
				[dBm]	[mW]	[dBm]	[mW]			[dBm]	[mW]	[dBm]	[mW]	
2412	15.48	1.00	9.73	26.21	417.83	30.00	1000	3.79	2.00	28.21	662.22	36.02	4000	7.81
2417	16.01	1.00	9.73	26.74	472.06	30.00	1000	3.26	2.00	28.74	748.17	36.02	4000	7.28
2437	16.18	1.00	9.73	26.91	490.91	30.00	1000	3.09	2.00	28.91	778.04	36.02	4000	7.11
2457	16.09	1.00	9.73	26.82	480.84	30.00	1000	3.18	2.00	28.82	762.08	36.02	4000	7.20
2462	15.23	1.00	9.73	25.96	394.46	30.00	1000	4.04	2.00	27.96	625.17	36.02	4000	8.06

				Conducted Power					e.i.r.p. for RSS-247					
Freq.	Reading	Cable Loss	Atten. Loss	Result		Limit		Margin	Antenna Gain	Result		Limit		Margin
				[dBm]	[mW]	[dBm]	[mW]			[dBm]	[mW]	[dBm]	[mW]	
2422	11.53	1.00	9.73	22.26	168.27	30.00	1000	7.74	2.00	24.26	266.69	36.02	4000	11.76
2427	12.07	1.00	9.73	22.80	190.55	30.00	1000	7.20	2.00	24.80	302.00	36.02	4000	11.22
2432	12.86	1.00	9.73	23.59	228.56	30.00	1000	6.41	2.00	25.59	362.24	36.02	4000	10.43
2437	12.80	1.00	9.73	23.53	225.42	30.00	1000	6.47	2.00	25.53	357.27	36.02	4000	10.49
2447	12.78	1.00	9.73	23.51	224.39	30.00	1000	6.49	2.00	25.51	355.63	36.02	4000	10.51
2452	12.07	1.00	9.73	22.80	190.55	30.00	1000	7.20	2.00	24.80	302.00	36.02	4000	11.22

				Conducted Power					e.i.r.p. for RSS-247					
Freq.	Reading	Cable Loss	Atten. Loss	Result		Limit		Margin	Antenna Gain	Result		Limit		Margin
				[dBm]	[mW]	[dBm]	[mW]			[dBm]	[mW]	[dBm]	[mW]	
2402	-9.67	1.00	9.73	1.06	1.28	30.00	1000	28.94	2.00	3.06	2.02	36.02	4000	32.96
2440	-9.34	1.00	9.73	1.39	1.38	30.00	1000	28.61	2.00	3.39	2.18	36.02	4000	32.63
2480	-9.21	1.00	9.73	1.52	1.42	30.00	1000	28.48	2.00	3.52	2.25	36.02	4000	32.50

Sample Calculation:

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

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

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Maximum Peak Output Power

Report No. 13521383H
Test place Ise EMC Lab. No.6 Shielded Room
Date October 14, 2020 October 27, 2020
Temperature / Humidity 24 deg. C / 49 % RH 25 deg. C / 42 % RH
Engineer Tomohisa Nakagawa Takafumi Noguchi
Mode Tx

802.11b

Rate	Reading LGI	Reading SGI	Remark
[Mbps]	[dBm]	[dBm]	
1	9.71	NA	*
2	9.67	-	
5.5	9.70	9.69	
11	9.68	-	

802.11g

Rate	Reading LGI	Reading SGI	Remark
[Mbps]	[dBm]	[dBm]	
6	12.65	-	
9	12.63	-	
12	12.75	-	
18	13.06	-	
24	15.76	-	
36	15.83	-	
48	16.04	16.01	*
54	15.37	-	

802.11n-20

MCS Number	Reading LGI	Reading SGI	Remark
	[dBm]	[dBm]	
0	12.98	-	
1	13.19	-	
2	13.20	-	
3	15.88	-	
4	16.27	16.05	*
5	16.02	-	
6	15.48	-	
7	15.07	-	

802.11n-40

MCS Number	Reading LGI	Reading SGI	Remark
	[dBm]	[dBm]	
0	10.08	-	
1	10.02	-	
2	10.13	-	
3	12.96	12.66	*
4	12.77	-	
5	12.55	-	
6	12.88	-	
7	12.62	-	

Notes

Italic is worst rate

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

Rate check frequency :2437 MHz

Difference between worst rate check data and formal test result is due to the different test condition.

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Average Output Power (Reference data for RF Exposure)

Report No. 13521383H
Test place Ise EMC Lab. No.6 Shielded Room
Date October 14, 2020 October 16, 2020 October 27, 2020 March 17, 2021
Temperature / Humidity 24 deg. C / 49 % RH 23 deg. C / 42 % RH 25 deg. C / 42 % RH 23 deg. C / 30 % RH
Engineer Tomohisa Nakagawa Tomohisa Nakagawa Takafumi Noguchi Takafumi Noguchi
Mode Tx

802.11b

Freq. [MHz]	Reading (time ave) [dBm]	Reading (Burst ave) [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Time average)		Result (Burst power average)	
					[dBm]	[mW]	[dBm]	[mW]
2412	6.14	6.21	1.00	9.73	16.87	48.64	16.94	49.43
2417	6.67	6.73	1.00	9.73	17.40	54.95	17.46	55.72
2437	6.52	6.57	1.00	9.73	17.25	53.09	17.30	53.70
2457	6.65	6.72	1.00	9.73	17.38	54.70	17.45	55.59
2462	9.22	9.35	1.00	9.73	19.95	98.86	20.08	101.86

802.11g

Freq. [MHz]	Reading (time ave) [dBm]	Reading (Burst ave) [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Time average)		Result (Burst power average)	
					[dBm]	[mW]	[dBm]	[mW]
2412	4.41	4.72	1.00	9.73	15.14	32.66	15.45	35.08
2417	5.50	5.83	1.00	9.73	16.23	41.98	16.56	45.29
2437	5.51	5.84	1.00	9.73	16.24	42.07	16.57	45.39
2457	5.50	5.83	1.00	9.73	16.23	41.98	16.56	45.29
2462	3.60	3.84	1.00	9.73	14.33	27.10	14.57	28.64

802.11n-20

Freq. [MHz]	Reading (time ave) [dBm]	Reading (Burst ave) [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Time average)		Result (Burst power average)	
					[dBm]	[mW]	[dBm]	[mW]
2412	3.63	3.95	1.00	9.73	14.36	27.29	14.68	29.38
2417	5.68	5.96	1.00	9.73	16.41	43.75	16.69	46.67
2437	5.61	5.90	1.00	9.73	16.34	43.05	16.63	46.03
2457	5.64	5.94	1.00	9.73	16.37	43.35	16.67	46.45
2462	3.25	3.51	1.00	9.73	13.98	25.00	14.24	26.55

802.11n-40

Freq. [MHz]	Reading (time ave) [dBm]	Reading (Burst ave) [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Time average)		Result (Burst power average)	
					[dBm]	[mW]	[dBm]	[mW]
2422	0.22	0.88	1.00	9.73	10.95	12.45	11.61	14.49
2427	0.80	1.39	1.00	9.73	11.53	14.22	12.12	16.29
2432	1.77	2.34	1.00	9.73	12.50	17.78	13.07	20.28
2437	1.75	2.38	1.00	9.73	12.48	17.70	13.11	20.46
2447	1.84	2.48	1.00	9.73	12.57	18.07	13.21	20.94
2452	0.84	1.40	1.00	9.73	11.57	14.35	12.13	16.33

BT LE

Freq. [MHz]	Reading (time ave) [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Time average)		Duty factor [dB]	Result (Burst power average)	
				[dBm]	[mW]		[dBm]	[mW]
2402	-12.09	1.00	9.73	-1.36	0.73	1.67	0.31	1.07
2440	-11.70	1.00	9.73	-0.97	0.80	1.67	0.70	1.17
2480	-11.60	1.00	9.73	-0.87	0.82	1.67	0.80	1.20

Sample Calculation:

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

Result (Burst power average) for WLAN = Gated Time average

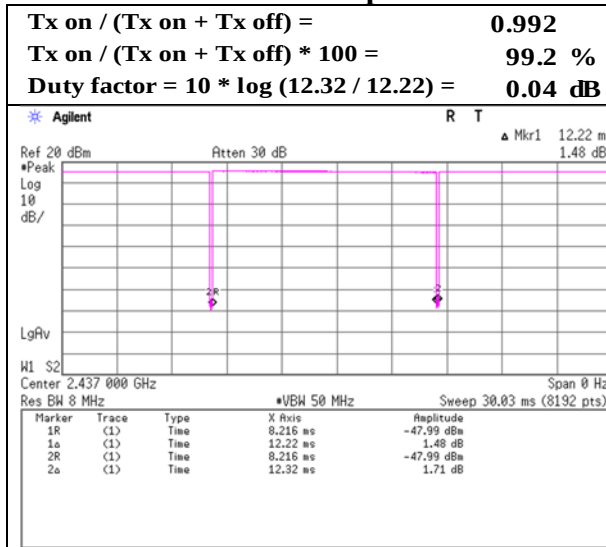
Result (Burst power average) for BT = Time average + Duty factor

The average output power was measured with the lowest order modulation and lowest data rate configuration in each IEEE 802.11 mode based on KDB 248227 D01.

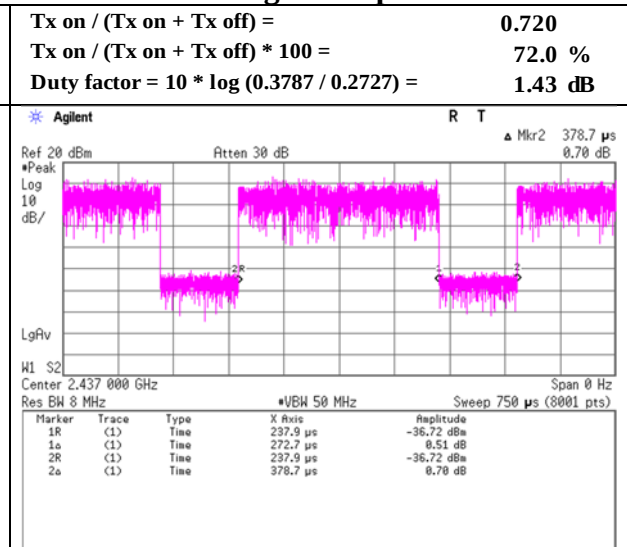
Burst rate confirmation

Report No. 13521383H
Test place Ise EMC Lab. No.6 Shielded Room
Date October 14, 2020 October 27, 2020
Temperature / Humidity 24 deg. C / 49 % RH 25 deg. C / 42 % RH
Engineer Tomohisa Nakagawa Takafumi Noguchi
Mode Tx

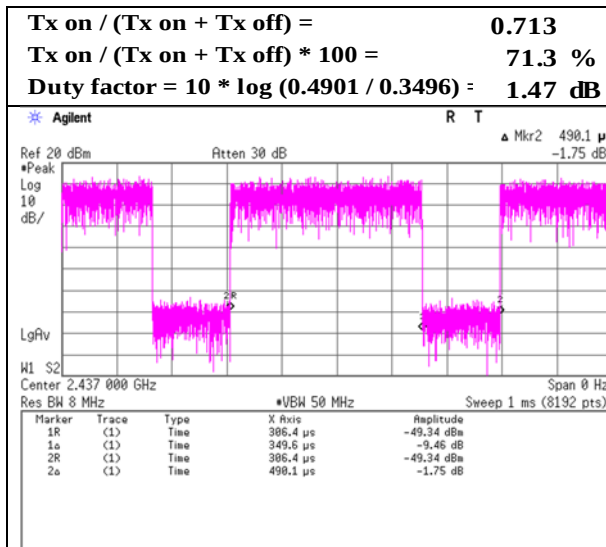
11b 1 Mbps



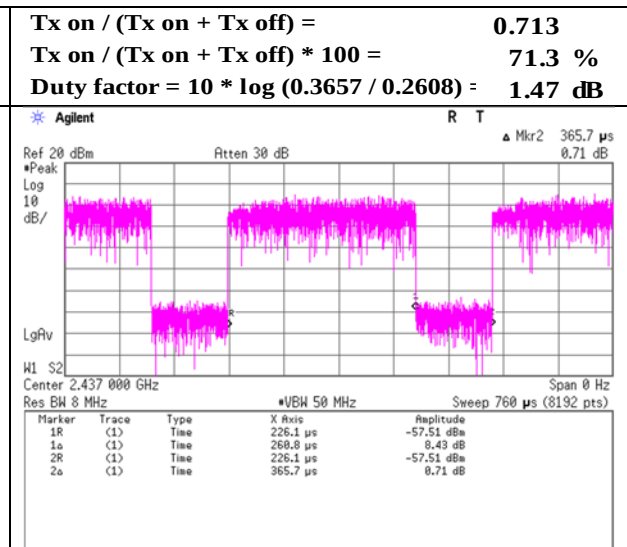
11g 48 Mbps



11n-20 MCS 4



11n-40 MCS 3

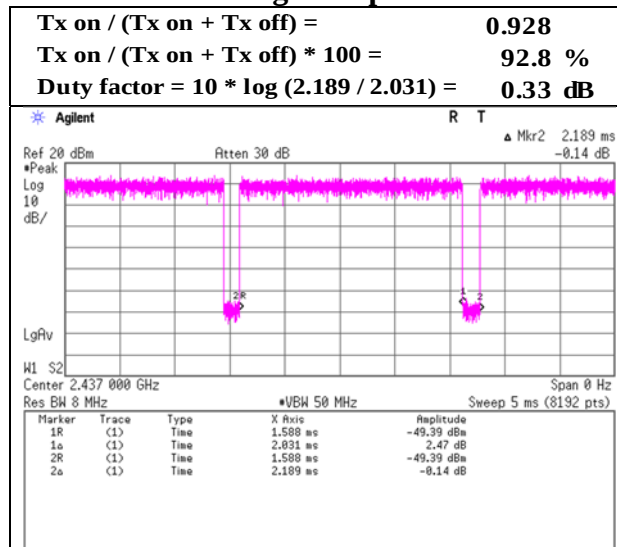


* Since the burst rate is not different between the channels, the data has been obtained on the representative channel.

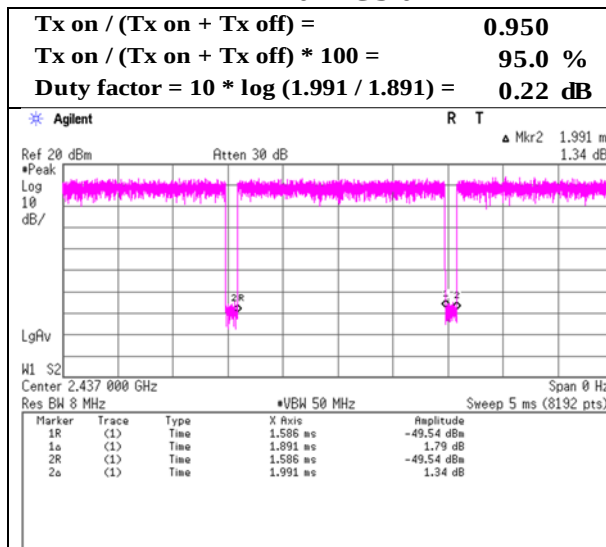
Burst rate confirmation

Report No.	13521383H
Test place	Ise EMC Lab. No.6 Shielded Room
Date	October 14, 2020
Temperature / Humidity	24 deg. C / 49 % RH
Engineer	Tomohisa Nakagawa
Mode	Tx

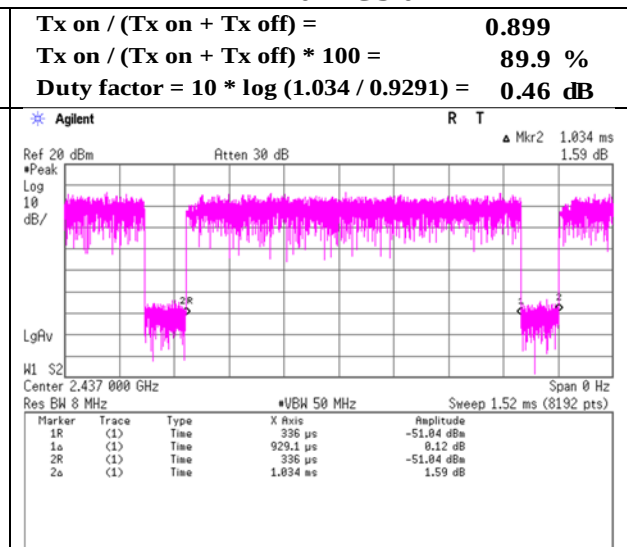
11g 6 Mbps



11n-20 MCS 0



11n-40 MCS 0



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

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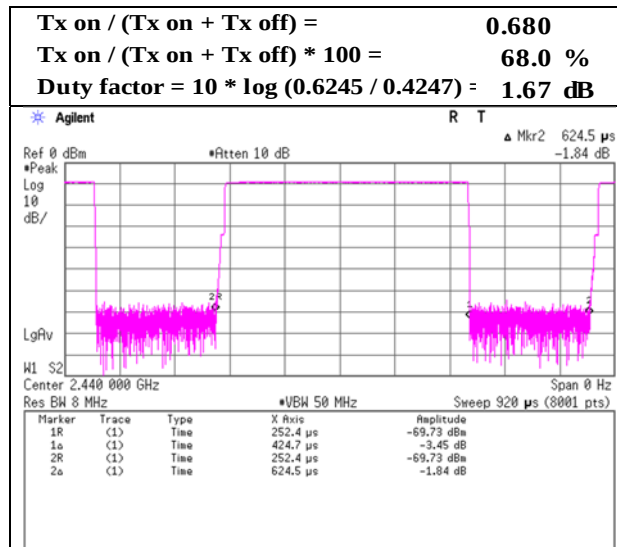
Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

Burst rate confirmation

Report No. 13521383H
Test place Ise EMC Lab. No.6 Shielded Room
Date March 17, 2021
Temperature / Humidity 23 deg. C / 30 % RH
Engineer Takafumi Noguchi
Mode Tx

BT LE



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

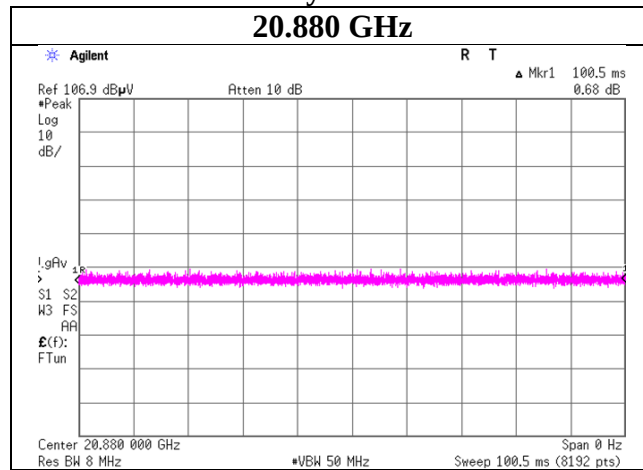
Burst rate confirmation
(for Radiated Spurious Emission)

Report No. 13521383H
Test place Ise EMC Lab.
Semi Anechoic Chamber No.3
Date March 22, 2021
Temperature / Humidity 20 deg. C / 45 % RH
Engineer Junki Nagatomi
(10 GHz - 26.5 GHz)
Mode Tx BT LE

BT LE

Duty 100%

20.880 GHz



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Radiated Spurious Emission

Report No.	13521383H		
Test place	Ise EMC Lab.		
Semi Anechoic Chamber	No.4	No.4	No.4
Date	October 28, 2020	October 29, 2020	November 1, 2020
Temperature / Humidity	21 deg. C / 46 % RH	20 deg. C / 49 % RH	22 deg. C / 45 % RH
Engineer	Junki Nagatomi	Yuta Moriya	Junya Okuno
	(1 GHz - 10 GHz)	(10 GHz - 18 GHz)	(18 GHz - 26.5 GHz)
Mode	Tx 11b 2412 MHz		

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2390.000	PK	51.7	27.8	5.5	31.8	-	53.2	73.9	20.7	
Hori.	4824.000	PK	48.6	31.6	7.7	31.2	-	56.7	73.9	17.2	
Hori.	7236.000	PK	42.6	36.5	8.9	32.4	-	55.6	73.9	18.3	Floor noise
Hori.	9648.000	PK	42.3	38.1	9.6	32.6	-	57.3	73.9	16.6	Floor noise
Hori.	2390.000	AV	42.4	27.8	5.5	31.8	-	43.9	53.9	10.0	
Hori.	4824.000	AV	44.4	31.6	7.7	31.2	-	52.5	53.9	1.4	
Hori.	7236.000	AV	32.0	36.5	8.9	32.4	-	44.9	53.9	9.0	Floor noise
Hori.	9648.000	AV	32.0	38.1	9.6	32.6	-	47.1	53.9	6.8	Floor noise
Vert.	2390.000	PK	50.1	27.8	5.5	31.8	-	51.6	73.9	22.4	
Vert.	4824.000	PK	47.8	31.6	7.7	31.2	-	55.9	73.9	18.0	
Vert.	7236.000	PK	43.1	36.5	8.9	32.4	-	56.0	73.9	17.9	Floor noise
Vert.	9648.000	PK	43.3	38.1	9.6	32.6	-	58.4	73.9	15.5	Floor noise
Vert.	2390.000	AV	40.4	27.8	5.5	31.8	-	41.9	53.9	12.0	
Vert.	4824.000	AV	43.3	31.6	7.7	31.2	-	51.3	53.9	2.6	
Vert.	7236.000	AV	32.0	36.5	8.9	32.4	-	44.9	53.9	9.0	Floor noise
Vert.	9648.000	AV	32.0	38.1	9.6	32.6	-	47.1	53.9	6.8	Floor noise

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

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

Distance factor: 1 GHz - 10 GHz 20log (4.0 m / 3.0 m) = 2.5 dB
10 GHz - 26.5 GHz 20log (1.0 m / 3.0 m) = -9.5 dB

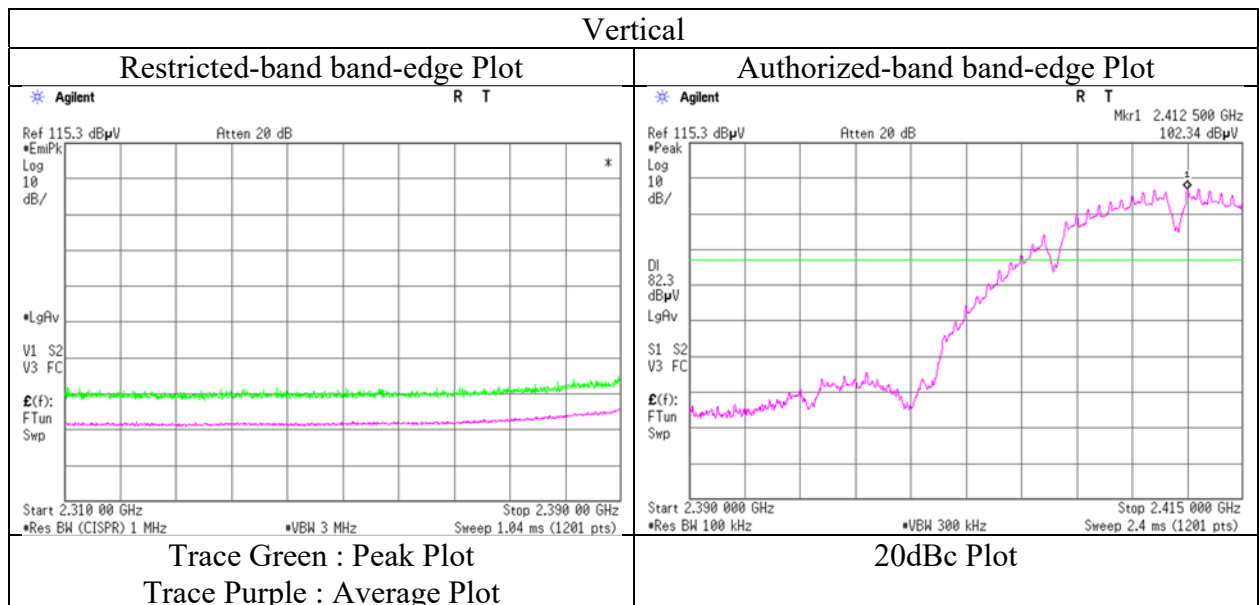
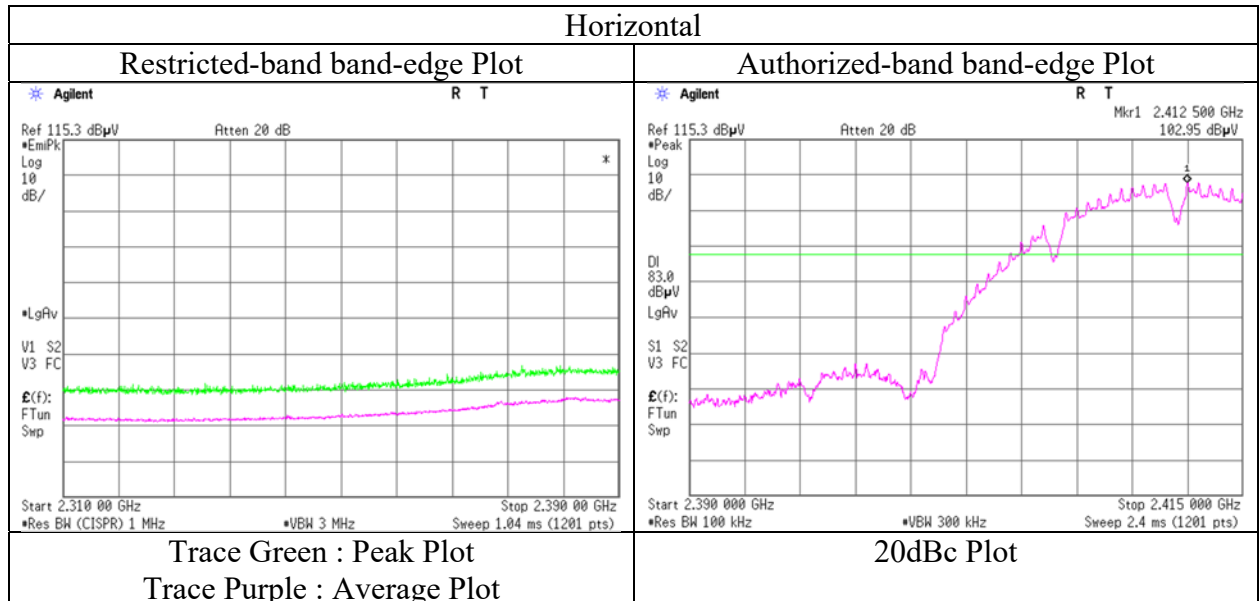
20dBc Data Sheet

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2412.000	PK	103.0	27.8	5.5	31.8	104.5	-	-	Carrier
Hori.	2400.000	PK	44.9	27.8	5.5	31.8	46.4	84.5	38.1	
Vert.	2412.000	PK	102.3	27.8	5.5	31.8	103.8	-	-	Carrier
Vert.	2400.000	PK	43.8	27.8	5.5	31.8	45.3	83.8	38.6	

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

Radiated Spurious Emission (Reference Plot for band-edge)

Report No.	13521383H
Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.4
Date	October 28, 2020
Temperature / Humidity	21 deg. C / 46 % RH
Engineer	Junki Nagatomi
	(1 GHz - 10 GHz)
Mode	Tx 11b 2412 MHz



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

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

UL Japan, Inc.

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Radiated Spurious Emission

Report No.	13521383H
Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.4
Date	October 28, 2020
Temperature / Humidity	23 deg. C / 45 % RH
Engineer	Yuta Moriya
	(1 GHz - 10 GHz)
Mode	Tx 11b 2417 MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2390.000	PK	56.9	27.8	5.5	31.8	-	58.4	73.9	15.5	
Hori.	2390.000	AV	45.3	27.8	5.5	31.8	-	46.8	53.9	7.1	
Vert.	2390.000	PK	54.3	27.8	5.5	31.8	-	55.8	73.9	18.1	
Vert.	2390.000	AV	42.9	27.8	5.5	31.8	-	44.4	53.9	9.6	

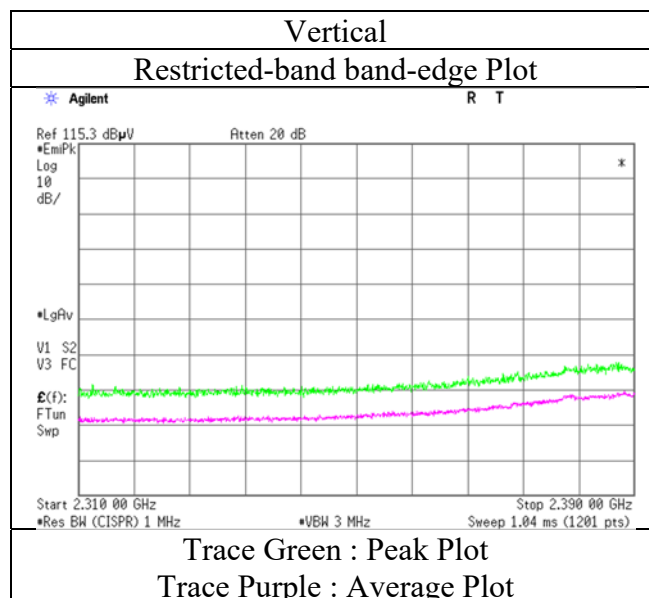
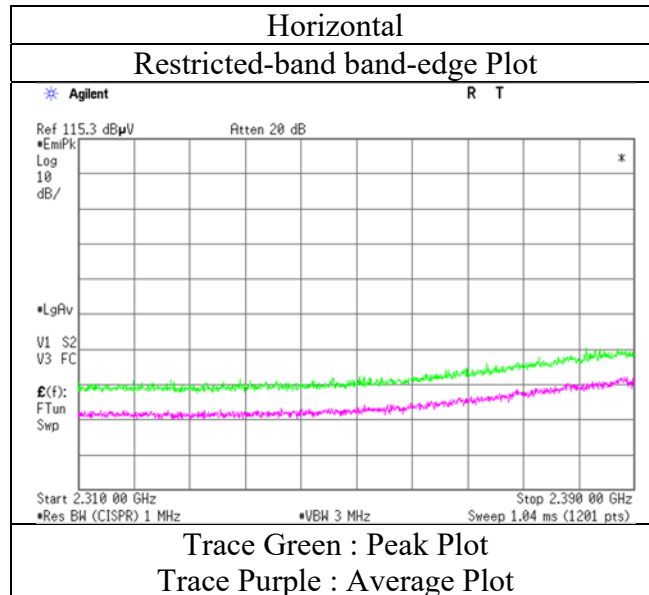
Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier)

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

Distance factor: 1 GHz - 10 GHz 20log (4.0 m / 3.0 m) = 2.5 dB
 10 GHz - 26.5 GHz 20log (1.0 m / 3.0 m) = -9.5 dB

Radiated Spurious Emission (Reference Plot for band-edge)

Report No.	13521383H
Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.4
Date	October 28, 2020
Temperature / Humidity	23 deg. C / 45 % RH
Engineer	Yuta Moriya
	(1 GHz - 10 GHz)
Mode	Tx 11b 2417 MHz



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

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

UL Japan, Inc.

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Radiated Spurious Emission

Report No.	13521383H		
Test place	Ise EMC Lab.		
Semi Anechoic Chamber	No.4	No.4	No.4
Date	October 28, 2020	October 29, 2020	November 1, 2020
Temperature / Humidity	23 deg. C / 45 % RH	20 deg. C / 49 % RH	22 deg. C / 45 % RH
Engineer	Yuta Moriya	Yuta Moriya	Junya Okuno
	(1 GHz - 10 GHz)	(10 GHz - 18 GHz)	(18 GHz - 26.5 GHz)
Mode	Tx 11b 2437 MHz		

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	4874.000	PK	47.4	31.6	7.7	31.2	-	55.4	73.9	18.5	
Hori.	7311.000	PK	44.9	36.6	8.9	32.4	-	57.9	73.9	16.0	Floor noise
Hori.	9748.000	PK	42.9	38.4	9.6	32.7	-	58.3	73.9	15.7	Floor noise
Hori.	4874.000	AV	42.3	31.6	7.7	31.2	-	50.4	53.9	3.5	
Hori.	7311.000	AV	31.9	36.6	8.9	32.4	-	44.9	53.9	9.0	Floor noise
Hori.	9748.000	AV	31.5	38.4	9.6	32.7	-	46.9	53.9	7.0	Floor noise
Vert.	4874.000	PK	47.1	31.6	7.7	31.2	-	55.1	73.9	18.8	
Vert.	7311.000	PK	44.6	36.6	8.9	32.4	-	57.6	73.9	16.3	Floor noise
Vert.	9748.000	PK	41.8	38.4	9.6	32.7	-	57.1	73.9	16.8	Floor noise
Vert.	4874.000	AV	42.1	31.6	7.7	31.2	-	50.1	53.9	3.8	
Vert.	7311.000	AV	31.7	36.6	8.9	32.4	-	44.8	53.9	9.1	Floor noise
Vert.	9748.000	AV	31.3	38.4	9.6	32.7	-	46.6	53.9	7.3	Floor noise

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

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

Distance factor: 1 GHz - 10 GHz $20\log(4.0\text{ m} / 3.0\text{ m}) = 2.5\text{ dB}$
 10 GHz - 26.5 GHz $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.5\text{ dB}$

Radiated Spurious Emission

Report No. 13521383H
Test place Ise EMC Lab.
Semi Anechoic Chamber No.4
Date October 28, 2020
Temperature / Humidity 21 deg. C / 47 % RH
Engineer Junki Nagatomi
(1 GHz - 10 GHz)
Mode Tx 11b 2457 MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2483.500	PK	52.5	27.7	5.6	31.8	-	54.0	73.9	19.9	
Hori.	2483.500	AV	41.0	27.7	5.6	31.8	-	42.4	53.9	11.5	
Vert.	2483.500	PK	50.3	27.7	5.6	31.8	-	51.7	73.9	22.2	
Vert.	2483.500	AV	38.9	27.7	5.6	31.8	-	40.4	53.9	13.6	

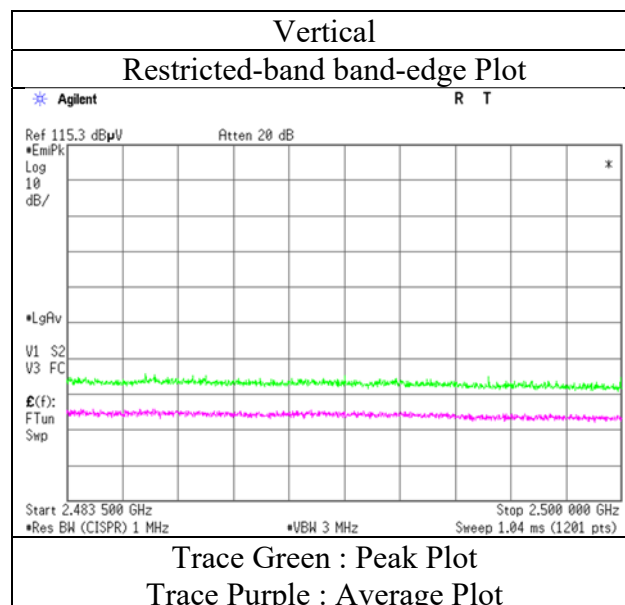
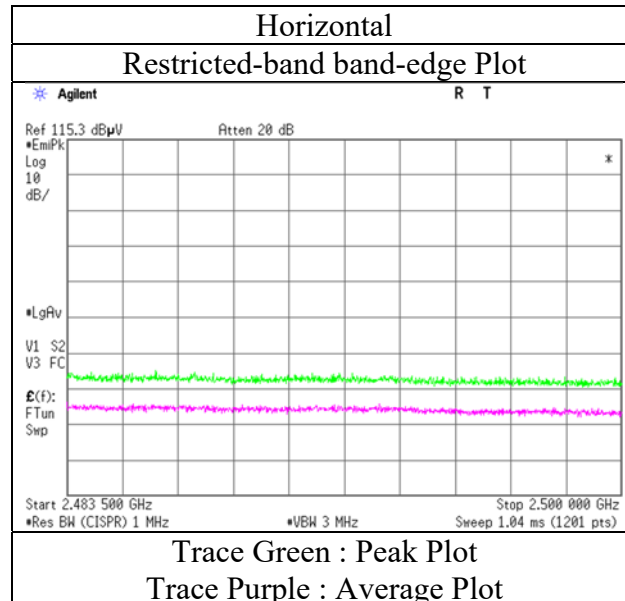
Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier)

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

Distance factor: 1 GHz - 10 GHz $20\log(4.0\text{ m} / 3.0\text{ m}) = 2.5\text{ dB}$
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)**

Report No. 13521383H
Test place Ise EMC Lab.
Semi Anechoic Chamber No.4
Date October 28, 2020
Temperature / Humidity 21 deg. C / 47 % RH
Engineer Junki Nagatomi
(1 GHz - 10 GHz)
Mode Tx 11b 2457 MHz



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

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

UL Japan, Inc.

Ise EMC Lab.

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

Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

Radiated Spurious Emission

Report No.	13521383H		
Test place	Ise EMC Lab.		
Semi Anechoic Chamber	No.4	No.4	No.4
Date	October 28, 2020	October 29, 2020	November 1, 2020
Temperature / Humidity	21 deg. C / 47 % RH	20 deg. C / 49 % RH	22 deg. C / 45 % RH
Engineer	Junki Nagatomi (1 GHz - 10 GHz)	Yuta Moriya (10 GHz - 18 GHz)	Junya Okuno (18 GHz - 26.5 GHz)
Mode	Tx 11b 2462 MHz		

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2483.500	PK	53.4	27.7	5.6	31.8	-	54.9	73.9	19.1	
Hori.	4924.000	PK	47.8	31.5	6.9	31.2	-	55.0	73.9	18.9	
Hori.	7386.000	PK	42.7	36.7	8.9	32.5	-	55.9	73.9	18.0	Floor noise
Hori.	9848.000	PK	42.4	38.7	9.7	32.7	-	58.0	73.9	15.9	Floor noise
Hori.	2483.500	AV	39.9	27.7	5.6	31.8	-	41.3	53.9	12.6	
Hori.	4924.000	AV	44.1	31.5	6.9	31.2	-	51.4	53.9	2.5	
Hori.	7386.000	AV	31.8	36.7	8.9	32.5	-	44.9	53.9	9.0	Floor noise
Hori.	9848.000	AV	31.4	38.7	9.7	32.7	-	47.0	53.9	6.9	Floor noise
Vert.	2483.500	PK	49.9	27.7	5.6	31.8	-	51.4	73.9	22.5	
Vert.	4924.000	PK	46.6	31.5	6.9	31.2	-	53.9	73.9	20.0	
Vert.	7386.000	PK	42.6	36.7	8.9	32.5	-	55.8	73.9	18.1	Floor noise
Vert.	9848.000	PK	42.8	38.7	9.7	32.7	-	58.5	73.9	15.4	Floor noise
Vert.	2483.500	AV	40.2	27.7	5.6	31.8	-	41.6	53.9	12.3	
Vert.	4924.000	AV	43.8	31.5	6.9	31.2	-	51.1	53.9	2.8	
Vert.	7386.000	AV	31.8	36.7	8.9	32.5	-	44.9	53.9	9.0	Floor noise
Vert.	9848.000	AV	31.4	38.7	9.7	32.7	-	47.0	53.9	6.9	Floor noise

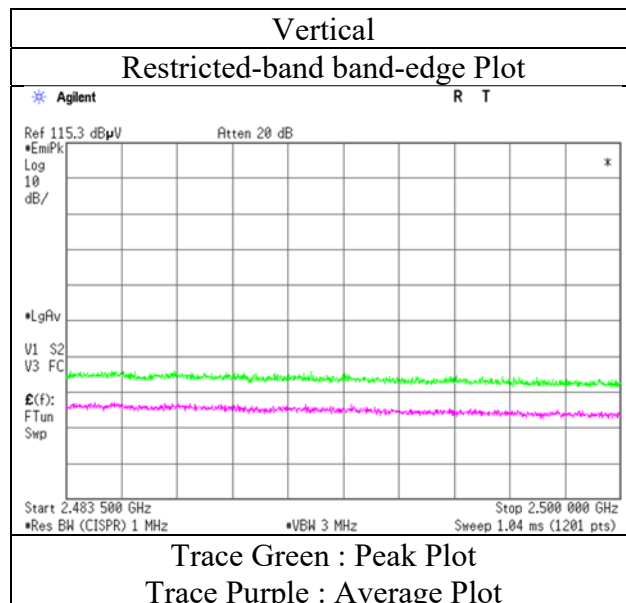
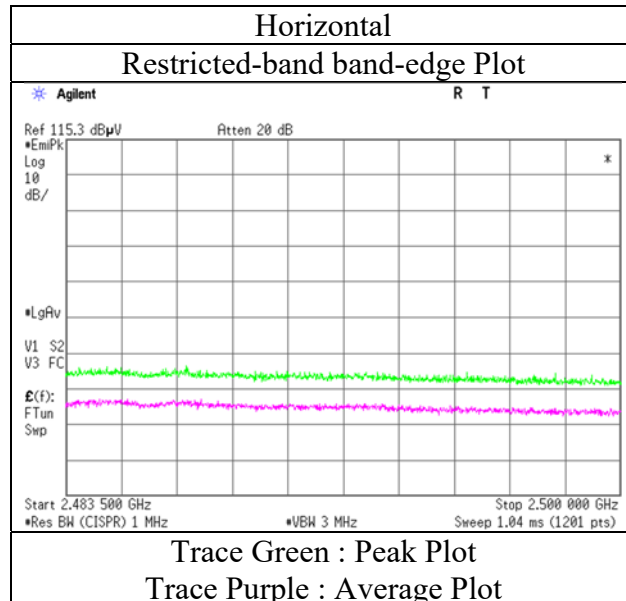
Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier)

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

Distance factor: 1 GHz - 10 GHz 20log (4.0 m / 3.0 m) = 2.5 dB
10 GHz - 26.5 GHz 20log (1.0 m / 3.0 m) = -9.5 dB

Radiated Spurious Emission (Reference Plot for band-edge)

Report No.	13521383H
Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.4
Date	October 28, 2020
Temperature / Humidity	21 deg. C / 47 % RH
Engineer	Junki Nagatomi (1 GHz - 10 GHz)
Mode	Tx 11b 2462 MHz



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

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

UL Japan, Inc.

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Radiated Spurious Emission

Report No. 13521383H
Test place Ise EMC Lab.
Semi Anechoic Chamber No.6
Date October 28, 2020
Temperature / Humidity 23 deg. C / 45 % RH
Engineer Yuta Moriya
(1 GHz - 10 GHz)
Mode Tx 11g 2412 MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2390.000	PK	66.0	27.8	5.5	31.8	-	67.5	73.9	6.4	
Hori.	2390.000	AV	48.9	27.8	5.5	31.8	-	50.4	53.9	3.5	
Vert.	2390.000	PK	63.2	27.8	5.5	31.8	-	64.7	73.9	9.2	
Vert.	2390.000	AV	48.7	27.8	5.5	31.8	-	50.2	53.9	3.7	

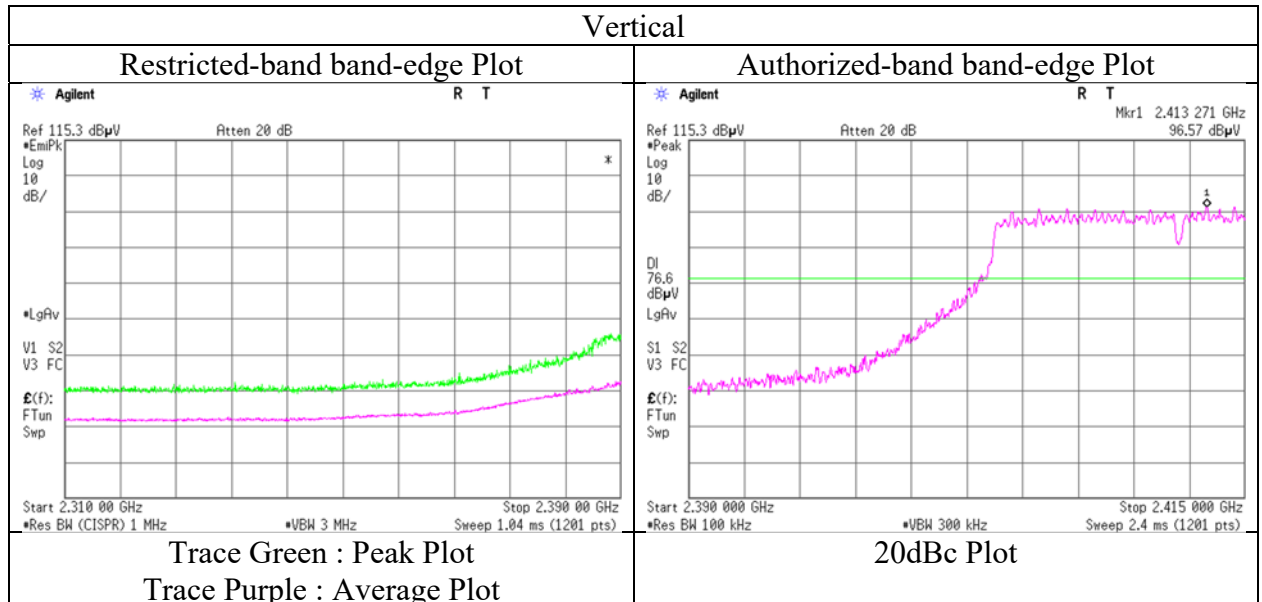
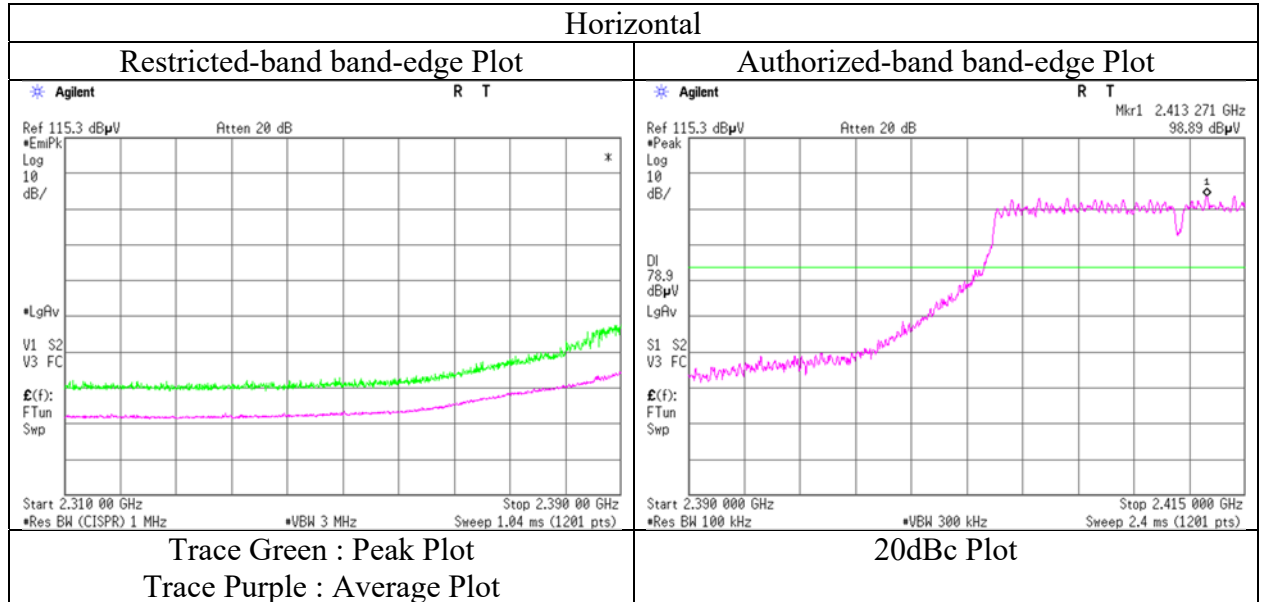
Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier)

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

Distance factor: 1 GHz - 10 GHz 20log(4.0 m / 3.0 m) = 2.5 dB
10 GHz - 26.5 GHz 20log(1.0 m / 3.0 m) = -9.5 dB

Radiated Spurious Emission (Reference Plot for band-edge)

Report No.	13521383H
Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.6
Date	October 28, 2020
Temperature / Humidity	23 deg. C / 45 % RH
Engineer	Yuta Moriya
	(1 GHz - 10 GHz)
Mode	Tx 11g 2412 MHz



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

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

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Radiated Spurious Emission

Report No.	13521383H
Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.6
Date	October 28, 2020
Temperature / Humidity	23 deg. C / 45 % RH
Engineer	Yuta Moriya
	(1 GHz - 10 GHz)
Mode	Tx 11g 2417 MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2390.000	PK	64.3	27.8	5.5	31.8	-	65.8	73.9	8.1	
Hori.	2390.000	AV	51.0	27.8	5.5	31.8	-	52.5	53.9	1.4	
Vert.	2390.000	PK	63.6	27.8	5.5	31.8	-	65.1	73.9	8.8	
Vert.	2390.000	AV	49.9	27.8	5.5	31.8	-	51.3	53.9	2.6	

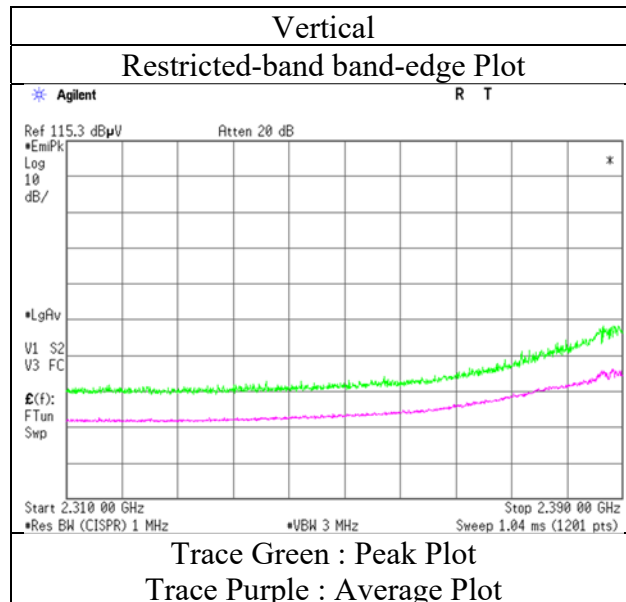
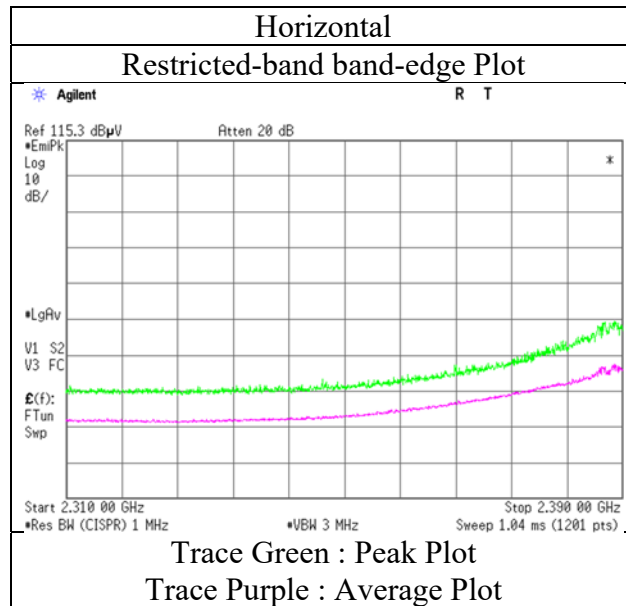
Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier)

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

Distance factor: 1 GHz - 10 GHz 20log (4.0 m / 3.0 m) = 2.5 dB
 10 GHz - 26.5 GHz 20log (1.0 m / 3.0 m) = -9.5 dB

Radiated Spurious Emission (Reference Plot for band-edge)

Report No.	13521383H
Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.6
Date	October 28, 2020
Temperature / Humidity	23 deg. C / 45 % RH
Engineer	Yuta Moriya
	(1 GHz - 10 GHz)
Mode	Tx 11g 2417 MHz



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

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

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Radiated Spurious Emission

Report No. 13521383H
Test place Ise EMC Lab.
Semi Anechoic Chamber No.6
Date October 28, 2020
Temperature / Humidity 23 deg. C / 45 % RH
Engineer Yuta Moriya
(1 GHz - 10 GHz)
Mode Tx 11g 2457 MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2483.500	PK	60.1	27.7	5.6	31.8	-	61.5	73.9	12.4	
Hori.	2483.500	AV	48.9	27.7	5.6	31.8	-	50.3	53.9	3.6	
Vert.	2483.500	PK	57.3	27.7	5.6	31.8	-	58.7	73.9	15.2	
Vert.	2483.500	AV	45.8	27.7	5.6	31.8	-	47.2	53.9	6.7	

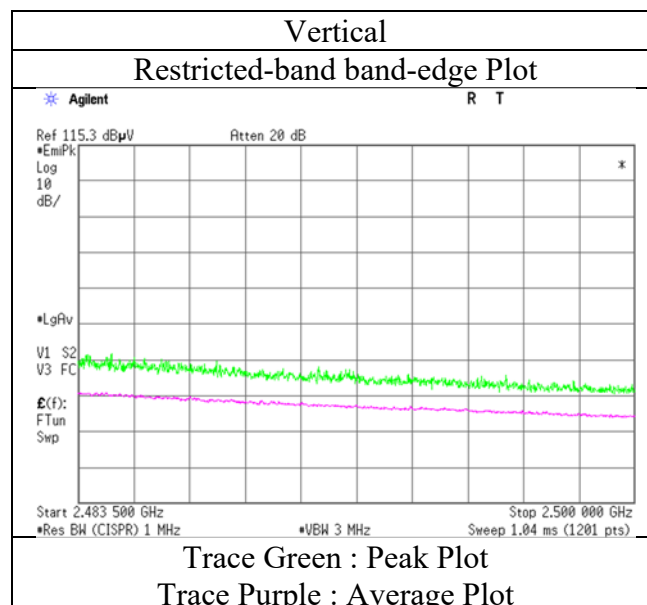
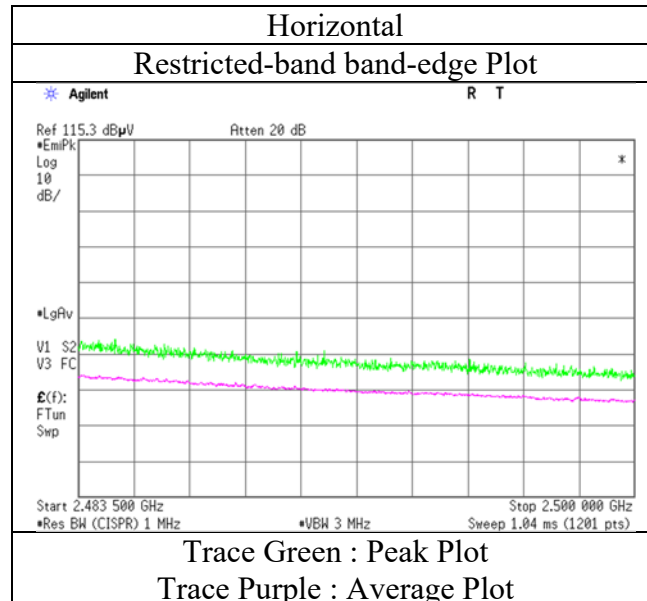
Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier)

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

Distance factor: 1 GHz - 10 GHz 20log (4.0 m / 3.0 m) = 2.5 dB
10 GHz - 26.5 GHz 20log (1.0 m / 3.0 m) = -9.5 dB

Radiated Spurious Emission (Reference Plot for band-edge)

Report No.	13521383H
Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.6
Date	October 28, 2020
Temperature / Humidity	23 deg. C / 45 % RH
Engineer	Yuta Moriya
	(1 GHz - 10 GHz)
Mode	Tx 11g 2457 MHz



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

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

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Radiated Spurious Emission

Report No. 13521383H
Test place Ise EMC Lab.
Semi Anechoic Chamber No.6
Date October 28, 2020
Temperature / Humidity 23 deg. C / 45 % RH
Engineer Yuta Moriya
(1 GHz - 10 GHz)
Mode Tx 11g 2462 MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2483.500	PK	59.9	27.7	5.6	31.8	-	61.3	73.9	12.6	
Hori.	2483.500	AV	47.8	27.7	5.6	31.8	-	49.3	53.9	4.7	
Vert.	2483.500	PK	57.2	27.7	5.6	31.8	-	58.6	73.9	15.3	
Vert.	2483.500	AV	45.9	27.7	5.6	31.8	-	47.3	53.9	6.6	

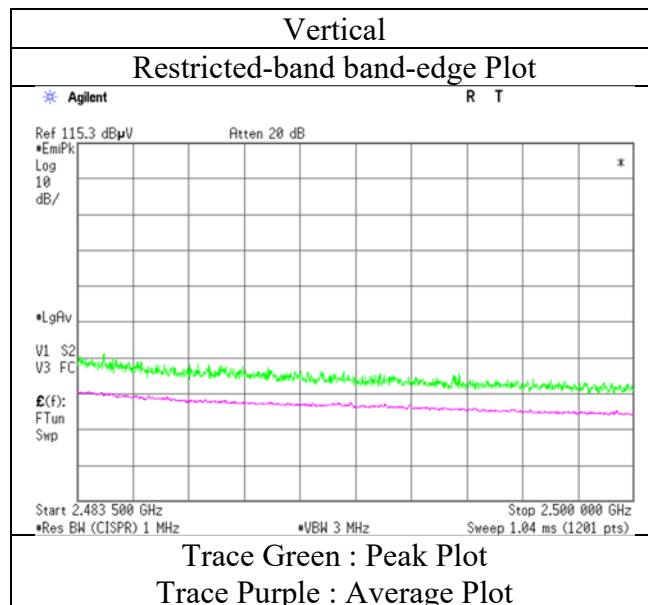
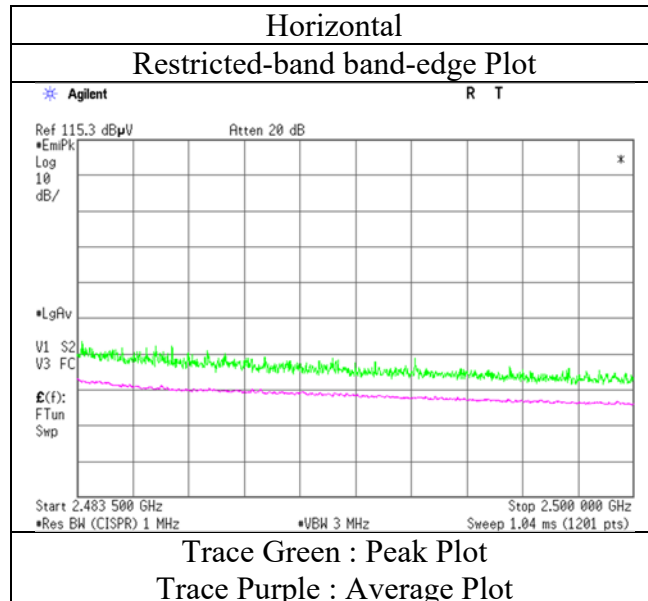
Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier)

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

Distance factor: 1 GHz - 10 GHz $20\log(4.0\text{ m} / 3.0\text{ m}) = 2.5\text{ dB}$
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)

Report No.	13521383H
Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.6
Date	October 28, 2020
Temperature / Humidity	23 deg. C / 45 % RH
Engineer	Yuta Moriya
	(1 GHz - 10 GHz)
Mode	Tx 11g 2462 MHz



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

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

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Radiated Spurious Emission

Report No.	13521383H		
Test place	Ise EMC Lab.		
Semi Anechoic Chamber	No.4	No.4	No.4
Date	October 28, 2020	October 29, 2020	November 1, 2020
Temperature / Humidity	21 deg. C / 46 % RH	22 deg. C / 42 % RH	22 deg. C / 45 % RH
Engineer	Junki Nagatomi	Junki Nagatomi	Junya Okuno
	(1 GHz - 10 GHz)	(10 GHz - 18 GHz)	(18 GHz - 26.5 GHz)
Mode	Tx 11n-20 2412 MHz		

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2390.000	PK	61.9	27.8	5.5	31.8	-	63.3	73.9	10.6	
Hori.	4824.000	PK	42.5	31.6	7.7	31.2	-	50.5	73.9	23.4	
Hori.	7236.000	PK	43.3	36.5	8.9	32.4	-	56.3	73.9	17.6	Floor noise
Hori.	9648.000	PK	43.2	38.1	9.6	32.6	-	58.3	73.9	15.6	Floor noise
Hori.	2390.000	AV	45.3	27.8	5.5	31.8	-	46.7	53.9	7.2	
Hori.	4824.000	AV	32.3	31.6	7.7	31.2	-	40.4	53.9	13.5	
Hori.	7236.000	AV	32.2	36.5	8.9	32.4	-	45.1	53.9	8.8	Floor noise
Hori.	9648.000	AV	32.0	38.1	9.6	32.6	-	47.1	53.9	6.8	Floor noise
Vert.	2390.000	PK	58.6	27.8	5.5	31.8	-	60.1	73.9	13.8	
Vert.	4824.000	PK	43.1	31.6	7.7	31.2	-	51.2	73.9	22.8	
Vert.	7236.000	PK	42.9	36.5	8.9	32.4	-	55.8	73.9	18.1	Floor noise
Vert.	9648.000	PK	42.3	38.1	9.6	32.6	-	57.4	73.9	16.5	Floor noise
Vert.	2390.000	AV	42.8	27.8	5.5	31.8	-	44.3	53.9	9.7	
Vert.	4824.000	AV	32.1	31.6	7.7	31.2	-	40.2	53.9	13.7	
Vert.	7236.000	AV	32.2	36.5	8.9	32.4	-	45.1	53.9	8.8	Floor noise
Vert.	9648.000	AV	32.0	38.1	9.6	32.6	-	47.1	53.9	6.8	Floor noise

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

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

Distance factor: 1 GHz - 10 GHz 20log (4.0 m / 3.0 m) = 2.5 dB
10 GHz - 26.5 GHz 20log (1.0 m / 3.0 m) = -9.5 dB

20dBc Data Sheet

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2412.000	PK	97.2	27.8	5.5	31.8	98.7	-	-	Carrier
Hori.	2400.000	PK	62.9	27.8	5.5	31.8	64.4	78.7	14.2	
Vert.	2412.000	PK	96.0	27.8	5.5	31.8	97.5	-	-	Carrier
Vert.	2400.000	PK	61.1	27.8	5.5	31.8	62.6	77.5	14.9	

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

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Ise EMC Lab.

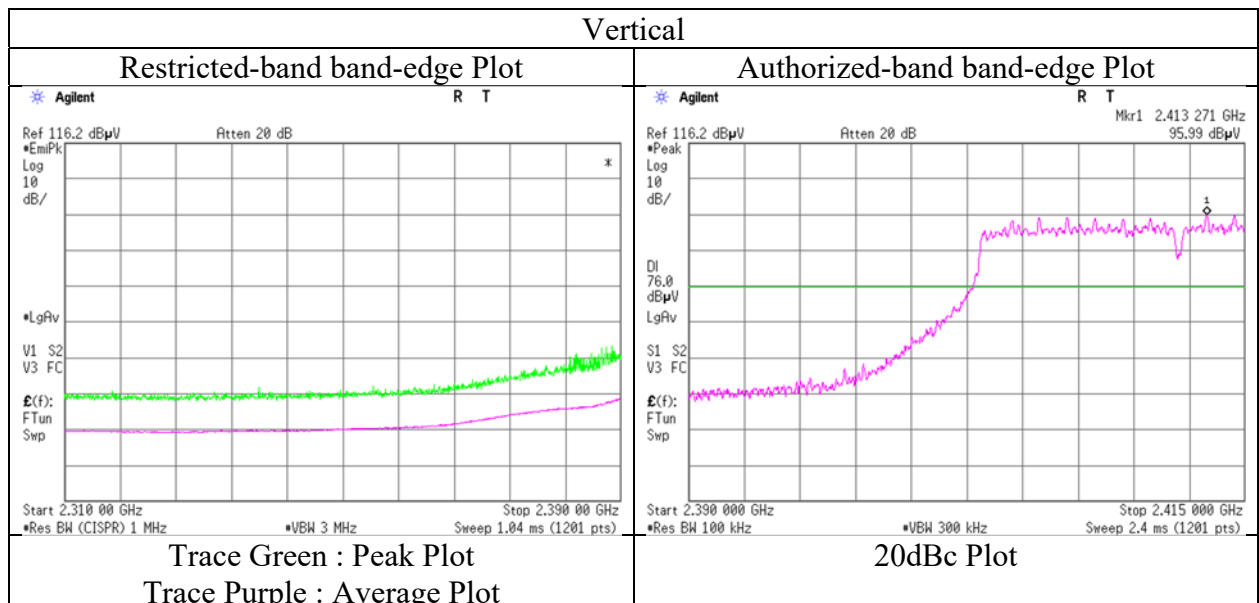
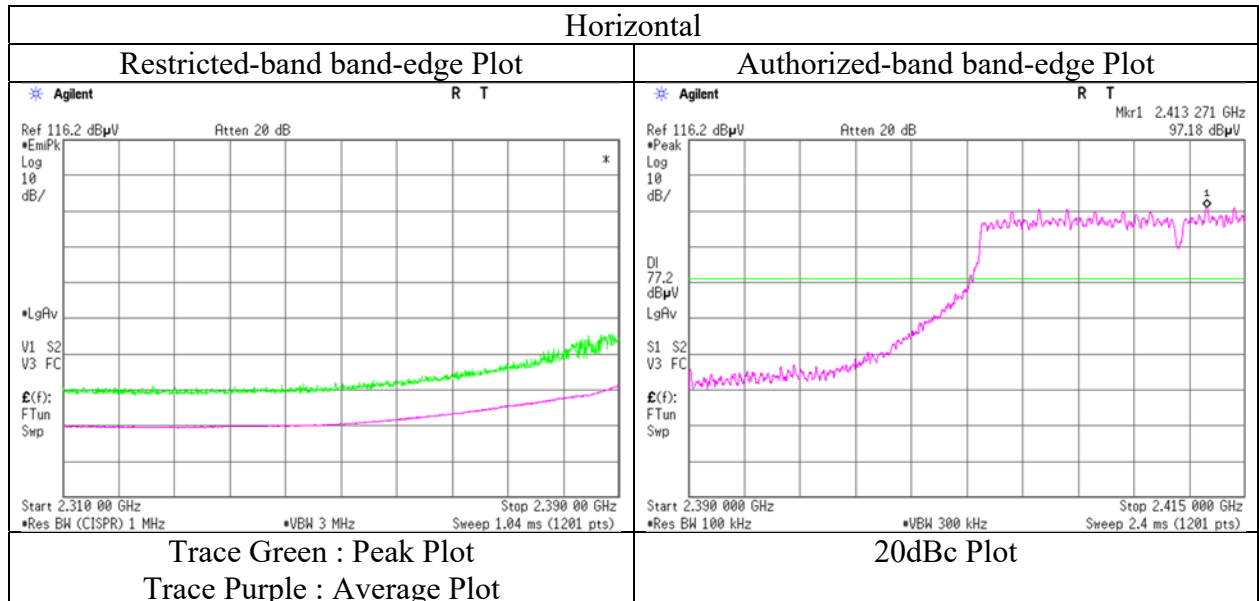
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

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Radiated Spurious Emission (Reference Plot for band-edge)

Report No.	13521383H
Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.4
Date	October 28, 2020
Temperature / Humidity	21 deg. C / 46 % RH
Engineer	Junki Nagatomi
	(1 GHz - 10 GHz)
Mode	Tx 11n-20 2412 MHz



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

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

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Radiated Spurious Emission

Report No.	13521383H
Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.4
Date	October 28, 2020
Temperature / Humidity	21 deg. C / 46 % RH
Engineer	Junki Nagatomi
	(1 GHz - 10 GHz)
Mode	Tx 11n-20 2417 MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2390.000	PK	68.8	27.8	5.5	31.8	-	70.3	73.9	3.6	
Hori.	2390.000	AV	47.8	27.8	5.5	31.8	-	49.3	53.9	4.6	
Vert.	2390.000	PK	66.5	27.8	5.5	31.8	-	68.0	73.9	5.9	
Vert.	2390.000	AV	46.0	27.8	5.5	31.8	-	47.5	53.9	6.4	

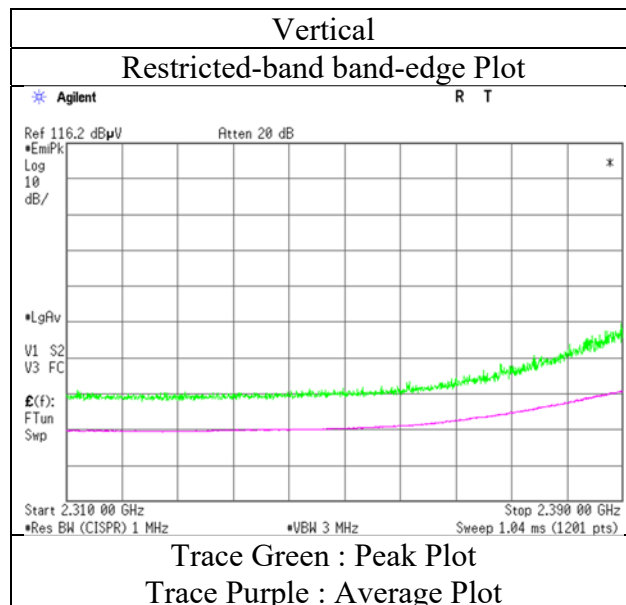
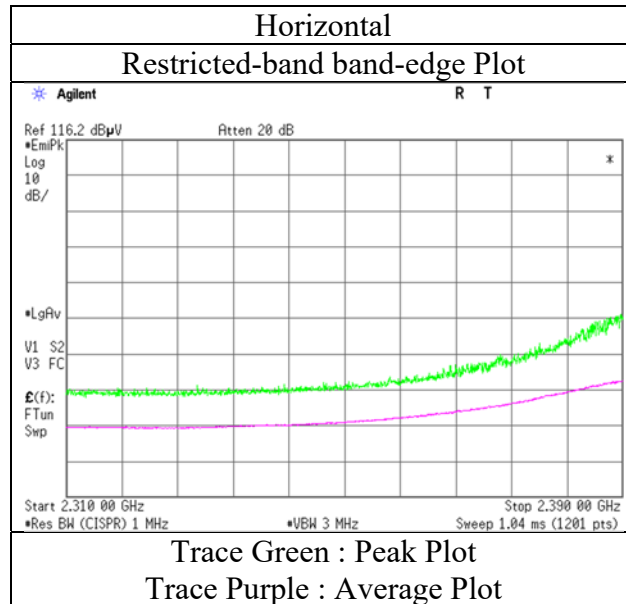
Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier)

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

Distance factor: 1 GHz - 10 GHz $20\log(4.0\text{ m} / 3.0\text{ m}) = 2.5\text{ dB}$
 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)**

Report No. 13521383H
Test place Ise EMC Lab.
Semi Anechoic Chamber No.4
Date October 28, 2020
Temperature / Humidity 21 deg. C / 46 % RH
Engineer Junki Nagatomi
(1 GHz - 10 GHz)
Mode Tx 11n-20 2417 MHz



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

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

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Radiated Spurious Emission

Report No.	13521383H			
Test place	Ise EMC Lab.			
Semi Anechoic Chamber	No.4	No.4	No.4	No.4
Date	October 28, 2020	October 29, 2020	November 1, 2020	November 3, 2020
Temperature / Humidity	21 deg. C / 46 % RH	22 deg. C / 42 % RH	22 deg. C / 45 % RH	20 deg. C / 40 % RH
Engineer	Junki Nagatomi	Junki Nagatomi	Junya Okuno	Junya Okuno
	(1 GHz - 10 GHz)	(10 GHz - 18 GHz)	(18 GHz - 26.5 GHz)	(Below 1 GHz)
Mode	Tx 11n-20 2437 MHz			

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	30.000	QP	24.2	18.4	7.2	32.0	-	17.8	40.0	22.2	
Hori.	95.042	QP	27.2	9.3	8.0	31.9	-	12.6	43.5	30.9	
Hori.	190.910	QP	27.0	16.3	8.9	31.8	-	20.4	43.5	23.2	
Hori.	247.335	QP	27.6	11.7	9.4	31.8	-	16.9	46.0	29.1	
Hori.	275.075	QP	30.9	13.2	9.6	31.8	-	21.8	46.0	24.2	
Hori.	368.945	QP	27.5	15.2	10.2	31.8	-	21.1	46.0	24.9	
Hori.	4874.000	PK	44.2	31.6	7.7	31.2	-	52.3	73.9	21.6	
Hori.	7311.000	PK	43.2	36.6	8.9	32.4	-	56.3	73.9	17.6	Floor noise
Hori.	9748.000	PK	42.5	38.4	9.6	32.7	-	57.8	73.9	16.1	Floor noise
Hori.	4874.000	AV	32.8	31.6	7.7	31.2	-	40.9	53.9	13.1	
Hori.	7311.000	AV	32.1	36.6	8.9	32.4	-	45.1	53.9	8.8	Floor noise
Hori.	9748.000	AV	31.8	38.4	9.6	32.7	-	47.2	53.9	6.7	Floor noise
Vert.	74.996	QP	42.3	6.4	7.8	32.0	-	24.5	40.0	15.5	
Vert.	79.952	QP	39.0	6.8	7.9	32.0	-	21.7	40.0	18.3	
Vert.	135.170	QP	38.2	14.0	8.4	31.9	-	28.8	43.5	14.7	
Vert.	190.980	QP	39.0	16.3	8.9	31.8	-	32.4	43.5	11.2	
Vert.	275.068	QP	36.5	13.2	9.6	31.8	-	27.4	46.0	18.6	
Vert.	481.260	QP	29.4	17.2	10.8	31.9	-	25.6	46.0	20.4	
Vert.	4874.000	PK	44.2	31.6	7.7	31.2	-	52.3	73.9	21.7	
Vert.	7311.000	PK	43.9	36.6	8.9	32.4	-	57.0	73.9	16.9	Floor noise
Vert.	9748.000	PK	42.5	38.4	9.6	32.7	-	57.9	73.9	16.0	Floor noise
Vert.	4874.000	AV	32.9	31.6	7.7	31.2	-	41.0	53.9	12.9	
Vert.	7311.000	AV	32.1	36.6	8.9	32.4	-	45.1	53.9	8.8	Floor noise
Vert.	9748.000	AV	31.8	38.4	9.6	32.7	-	47.2	53.9	6.7	Floor noise

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

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

Distance factor: 1 GHz - 10 GHz 20log (4.0 m / 3.0 m) = 2.5 dB
10 GHz - 26.5 GHz 20log (1.0 m / 3.0 m) = -9.5 dB

Radiated Spurious Emission

Report No. 13521383H
Test place Ise EMC Lab.
Semi Anechoic Chamber No.4
Date October 28, 2020
Temperature / Humidity 21 deg. C / 46 % RH
Engineer Junki Nagatomi
(1 GHz - 10 GHz)
Mode Tx 11n-20 2457 MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2483.500	PK	61.4	27.7	5.6	31.8	-	62.8	73.9	11.1	
Hori.	2483.500	AV	43.8	27.7	5.6	31.8	-	45.3	53.9	8.7	
Vert.	2483.500	PK	60.3	27.7	5.6	31.8	-	61.7	73.9	12.2	
Vert.	2483.500	AV	41.6	27.7	5.6	31.8	-	43.1	53.9	10.8	

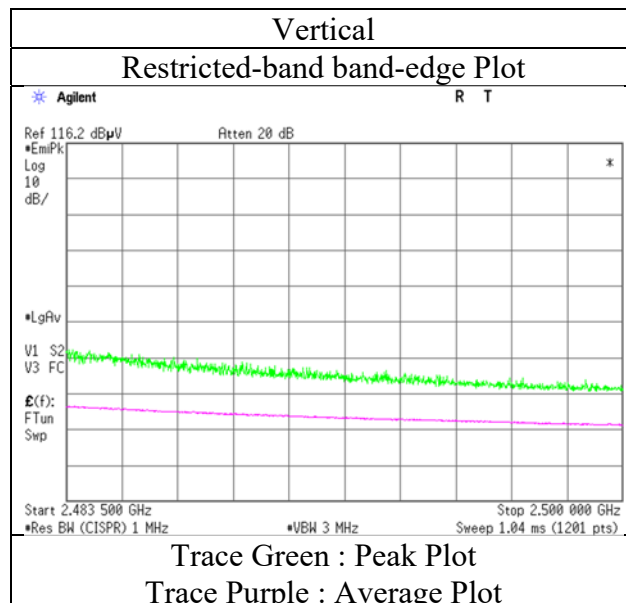
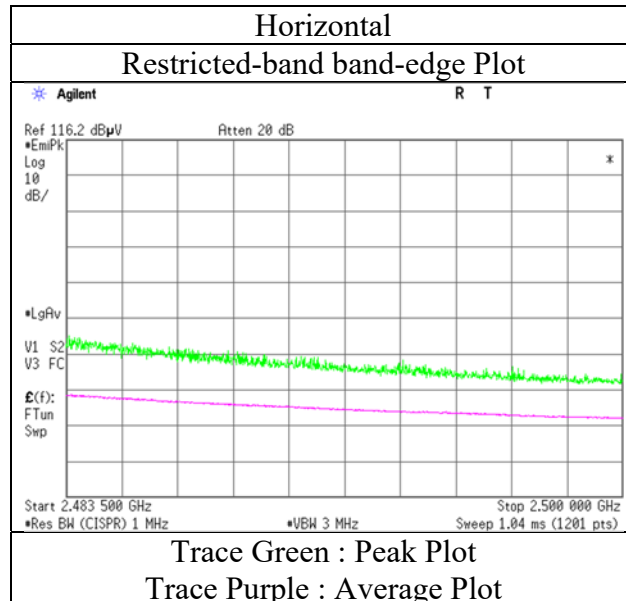
Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier)

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

Distance factor: 1 GHz - 10 GHz $20\log(4.0\text{ m} / 3.0\text{ m}) = 2.5\text{ dB}$
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)**

Report No. 13521383H
Test place Ise EMC Lab.
Semi Anechoic Chamber No.4
Date October 28, 2020
Temperature / Humidity 21 deg. C / 46 % RH
Engineer Junki Nagatomi
(1 GHz - 10 GHz)
Mode Tx 11n-20 2457 MHz



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

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

UL Japan, Inc.

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Radiated Spurious Emission

Report No.	13521383H		
Test place	Ise EMC Lab.		
Semi Anechoic Chamber	No.4	No.4	No.4
Date	October 28, 2020	October 29, 2020	November 1, 2020
Temperature / Humidity	21 deg. C / 46 % RH	22 deg. C / 42 % RH	22 deg. C / 45 % RH
Engineer	Junki Nagatomi (1 GHz - 10 GHz)	Junki Nagatomi (10 GHz - 18 GHz)	Junya Okuno (18 GHz - 26.5 GHz)
Mode	Tx 11n-20 2462 MHz		

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2483.500	PK	63.1	27.7	5.6	31.8	-	64.5	73.9	9.4	
Hori.	4924.000	PK	40.9	31.5	7.7	31.2	-	48.9	73.9	25.0	Floor noise
Hori.	7386.000	PK	42.6	36.7	8.9	32.5	-	55.7	73.9	18.2	Floor noise
Hori.	9848.000	PK	42.3	38.7	9.7	32.7	-	58.0	73.9	15.9	Floor noise
Hori.	2483.500	AV	48.2	27.7	5.6	31.8	-	49.7	53.9	4.2	
Hori.	4924.000	AV	30.5	31.5	7.7	31.2	-	38.5	53.9	15.4	Floor noise
Hori.	7386.000	AV	31.9	36.7	8.9	32.5	-	45.1	53.9	8.8	Floor noise
Hori.	9848.000	AV	31.5	38.7	9.7	32.7	-	47.2	53.9	6.7	Floor noise
Vert.	2483.500	PK	61.4	27.7	5.6	31.8	-	62.8	73.9	11.1	
Vert.	4924.000	PK	42.5	31.5	7.7	31.2	-	50.5	73.9	23.4	Floor noise
Vert.	7386.000	PK	42.6	36.7	8.9	32.5	-	55.8	73.9	18.1	Floor noise
Vert.	9848.000	PK	41.9	38.7	9.7	32.7	-	57.6	73.9	16.3	Floor noise
Vert.	2483.500	AV	46.5	27.7	5.6	31.8	-	47.9	53.9	6.0	
Vert.	4924.000	AV	30.5	31.5	7.7	31.2	-	38.6	53.9	15.3	Floor noise
Vert.	7386.000	AV	32.1	36.7	8.9	32.5	-	45.2	53.9	8.7	Floor noise
Vert.	9848.000	AV	31.7	38.7	9.7	32.7	-	47.3	53.9	6.6	Floor noise

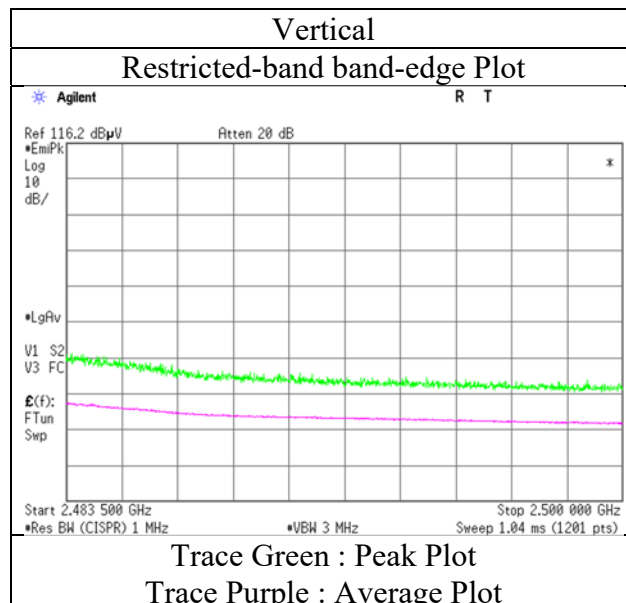
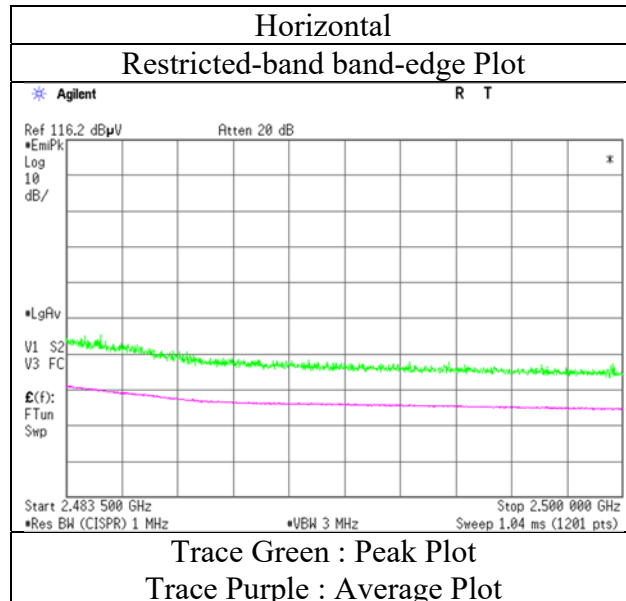
Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier)

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

Distance factor: 1 GHz - 10 GHz 20log (4.0 m / 3.0 m) = 2.5 dB
10 GHz - 26.5 GHz 20log (1.0 m / 3.0 m) = -9.5 dB

Radiated Spurious Emission (Reference Plot for band-edge)

Report No.	13521383H
Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.4
Date	October 28, 2020
Temperature / Humidity	21 deg. C / 46 % RH
Engineer	Junki Nagatomi
	(1 GHz - 10 GHz)
Mode	Tx 11n-20 2462 MHz



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

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

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Radiated Spurious Emission

Report No.	13521383H		
Test place	Ise EMC Lab.		
Semi Anechoic Chamber	No.4	No.4	No.4
Date	October 24, 2020	October 29, 2020	November 1, 2020
Temperature / Humidity	19 deg. C / 58 % RH	22 deg. C / 42 % RH	22 deg. C / 45 % RH
Engineer	Takeshi Hiyaji	Junki Nagatomi	Junya Okuno
	(1 GHz - 10 GHz)	(10 GHz - 18 GHz)	(18 GHz - 26.5 GHz)
Mode	Tx 11n-40 2422 MHz		

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2390.000	PK	58.5	27.8	5.5	31.8	-	60.0	73.9	13.9	
Hori.	4844.000	PK	41.8	31.6	7.7	31.2	-	49.9	73.9	24.0	Floor noise
Hori.	7266.000	PK	41.5	36.5	8.9	32.4	-	54.4	73.9	19.5	Floor noise
Hori.	9688.000	PK	41.9	38.2	9.6	32.6	-	57.1	73.9	16.8	Floor noise
Hori.	2390.000	AV	46.1	27.8	5.5	31.8	-	47.6	53.9	6.3	
Hori.	4844.000	AV	32.1	31.6	7.7	31.2	-	40.2	53.9	13.7	Floor noise
Hori.	7266.000	AV	32.2	36.5	8.9	32.4	-	45.2	53.9	8.7	Floor noise
Hori.	9688.000	AV	32.2	38.2	9.6	32.6	-	47.3	53.9	6.6	Floor noise
Vert.	2390.000	PK	55.1	27.8	5.5	31.8	-	56.6	73.9	17.3	
Vert.	4844.000	PK	41.4	31.6	7.7	31.2	-	49.5	73.9	24.4	Floor noise
Vert.	7266.000	PK	41.7	36.5	8.9	32.4	-	54.7	73.9	19.2	Floor noise
Vert.	9688.000	PK	41.3	38.2	9.6	32.6	-	56.5	73.9	17.4	Floor noise
Vert.	2390.000	AV	42.0	27.8	5.5	31.8	-	43.5	53.9	10.4	
Vert.	4844.000	AV	32.5	31.6	7.7	31.2	-	40.6	53.9	13.3	Floor noise
Vert.	7266.000	AV	32.8	36.5	8.9	32.4	-	45.7	53.9	8.2	Floor noise
Vert.	9688.000	AV	31.9	38.2	9.6	32.6	-	47.1	53.9	6.8	Floor noise

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

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

Distance factor: 1 GHz - 10 GHz 20log (4.0 m / 3.0 m) = 2.5 dB
10 GHz - 26.5 GHz 20log (1.0 m / 3.0 m) = -9.5 dB

20dBc Data Sheet

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2422.000	PK	89.3	27.8	5.5	31.8	90.8	-	-	Carrier
Hori.	2400.000	PK	57.2	27.8	5.5	31.8	58.7	70.8	12.1	
Vert.	2422.000	PK	87.8	27.8	5.5	31.8	89.3	-	-	Carrier
Vert.	2400.000	PK	55.8	27.8	5.5	31.8	57.3	69.3	12.0	

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

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Ise EMC Lab.

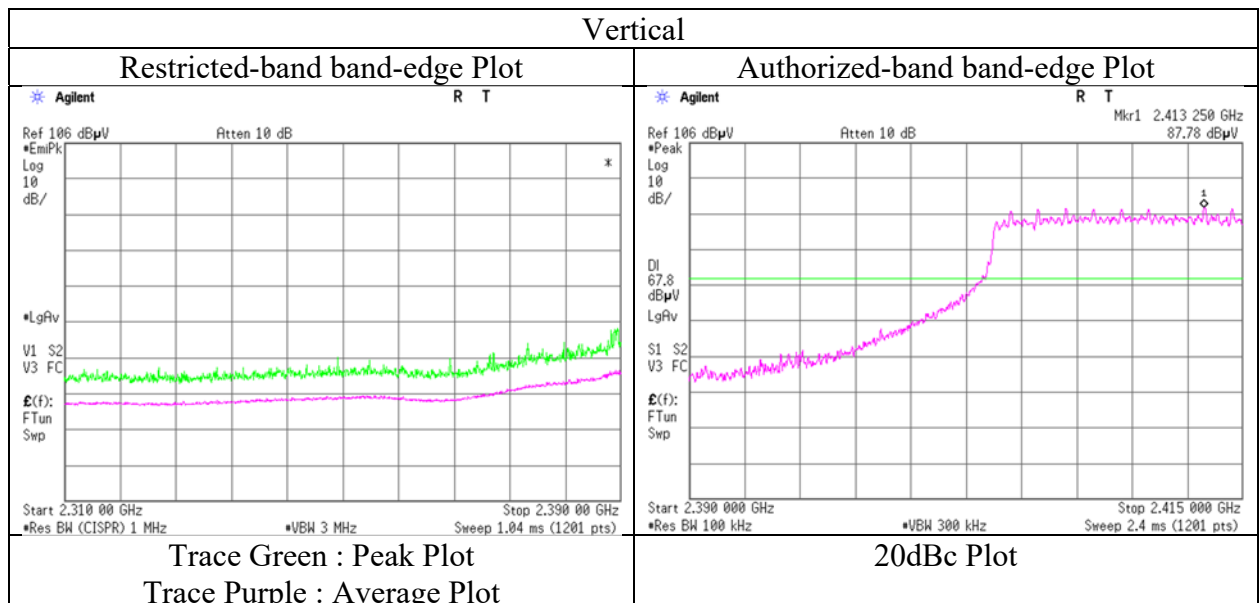
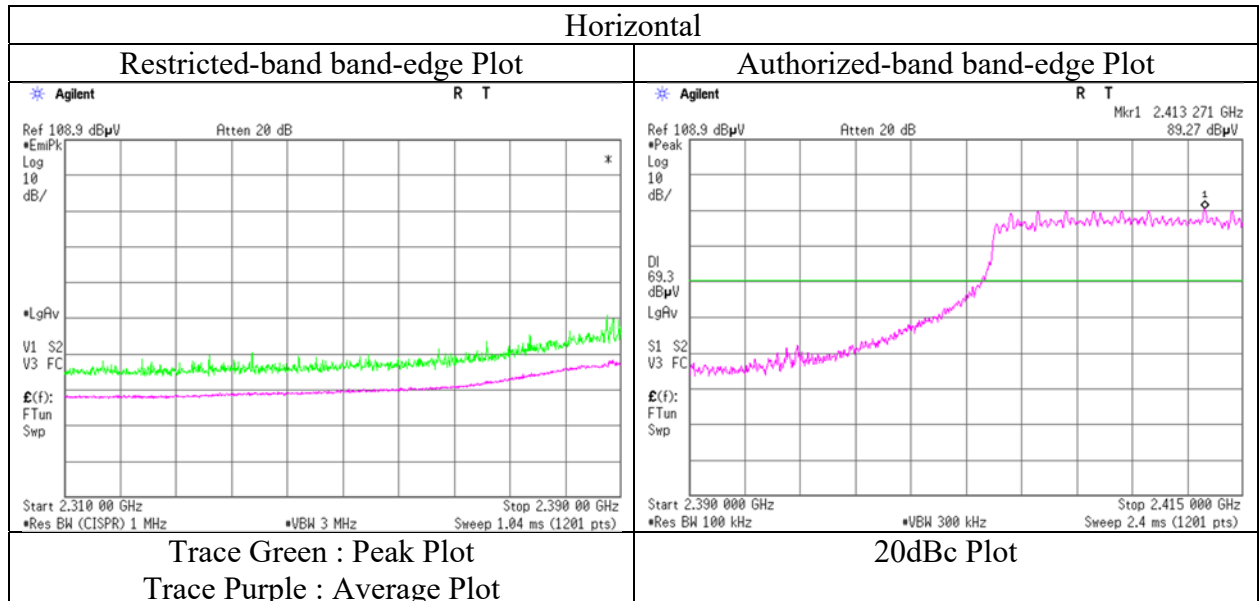
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Radiated Spurious Emission (Reference Plot for band-edge)

Report No.	13521383H
Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.4
Date	October 24, 2020
Temperature / Humidity	19 deg. C / 58 % RH
Engineer	Takeshi Hiyaji
	(1 GHz - 10 GHz)
Mode	Tx 11n-40 2422 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.

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Radiated Spurious Emission

Report No. 13521383H
Test place Ise EMC Lab.
Semi Anechoic Chamber No.4
Date October 24, 2020
Temperature / Humidity 19 deg. C / 58 % RH
Engineer Takeshi Hiyaji
(1 GHz - 10 GHz)
Mode Tx 11n-40 2427 MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2390.000	PK	57.7	27.8	5.5	31.8	-	59.1	73.9	14.8	
Hori.	2390.000	AV	46.9	27.8	5.5	31.8	-	48.4	53.9	5.5	
Vert.	2390.000	PK	59.3	27.8	5.5	31.8	-	60.8	73.9	13.1	
Vert.	2390.000	AV	48.7	27.8	5.5	31.8	-	50.2	53.9	3.7	

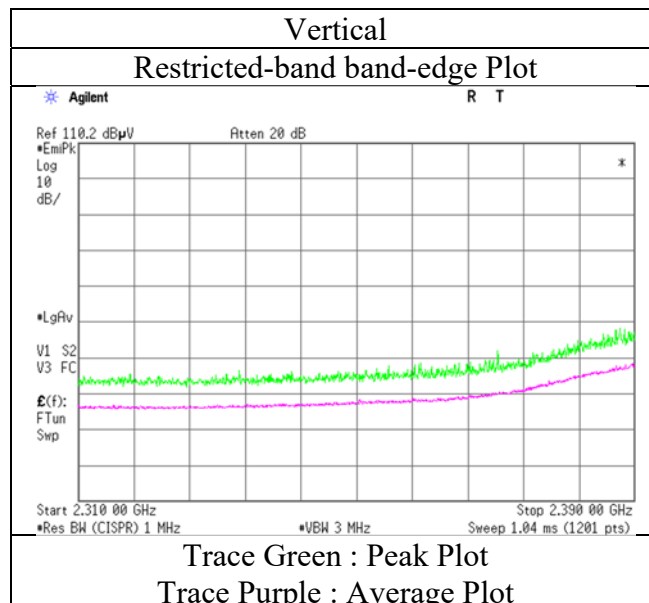
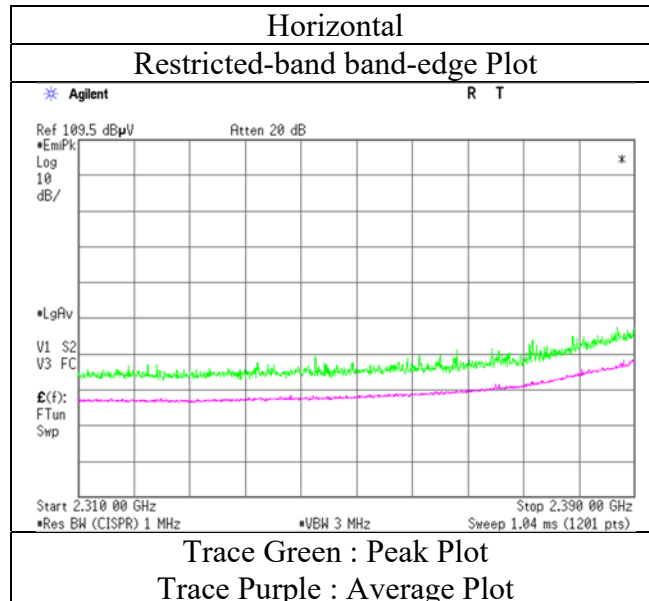
Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier)

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

Distance factor: 1 GHz - 10 GHz $20\log(4.0\text{ m} / 3.0\text{ m}) = 2.5\text{ dB}$
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)

Report No.	13521383H
Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.4
Date	October 24, 2020
Temperature / Humidity	19 deg. C / 58 % RH
Engineer	Takeshi Hiyaji
	(1 GHz - 10 GHz)
Mode	Tx 11n-40 2427 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.

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Radiated Spurious Emission

Report No.	13521383H		
Test place	Ise EMC Lab.		
Semi Anechoic Chamber	No.4	No.4	No.4
Date	October 24, 2020	October 29, 2020	November 1, 2020
Temperature / Humidity	19 deg. C / 58 % RH	22 deg. C / 42 % RH	22 deg. C / 45 % RH
Engineer	Takeshi Hiyaji (1 GHz - 10 GHz)	Junki Nagatomi (10 GHz - 18 GHz)	Junya Okuno (18 GHz - 26.5 GHz)
Mode	Tx 11n-40 2432 MHz		

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2390.000	PK	58.2	27.8	5.5	31.8	-	59.6	73.9	14.3	
Hori.	4864.000	PK	41.3	31.6	7.7	31.2	-	49.4	73.9	24.5	Floor noise
Hori.	7296.000	PK	42.5	36.5	8.9	32.4	-	55.5	73.9	18.4	Floor noise
Hori.	9728.000	PK	41.4	38.3	9.6	32.6	-	56.7	73.9	17.2	Floor noise
Hori.	2390.000	AV	45.5	27.8	5.5	31.8	-	47.0	53.9	6.9	
Hori.	4864.000	AV	32.3	31.6	7.7	31.2	-	40.4	53.9	13.5	Floor noise
Hori.	7296.000	AV	32.7	36.5	8.9	32.4	-	45.7	53.9	8.2	Floor noise
Hori.	9728.000	AV	32.2	38.3	9.6	32.6	-	47.5	53.9	6.4	Floor noise
Vert.	2390.000	PK	58.4	27.8	5.5	31.8	-	59.9	73.9	14.0	
Vert.	4864.000	PK	41.3	31.6	7.7	31.2	-	49.4	73.9	24.5	Floor noise
Vert.	7296.000	PK	42.6	36.5	8.9	32.4	-	55.6	73.9	18.3	Floor noise
Vert.	9728.000	PK	42.1	38.3	9.6	32.6	-	57.4	73.9	16.5	Floor noise
Vert.	2390.000	AV	43.5	27.8	5.5	31.8	-	45.0	53.9	8.9	
Vert.	4864.000	AV	31.4	31.6	7.7	31.2	-	39.6	53.9	14.4	Floor noise
Vert.	7296.000	AV	32.3	36.5	8.9	32.4	-	45.3	53.9	8.6	Floor noise
Vert.	9728.000	AV	32.2	38.3	9.6	32.6	-	47.5	53.9	6.4	Floor noise

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

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

Distance factor: 1 GHz - 10 GHz 20log (4.0 m / 3.0 m) = 2.5 dB
10 GHz - 26.5 GHz 20log (1.0 m / 3.0 m) = -9.5 dB

Radiated Spurious Emission

Report No.	13521383H		
Test place	Ise EMC Lab.		
Semi Anechoic Chamber	No.4	No.4	No.4
Date	October 24, 2020	October 29, 2020	November 1, 2020
Temperature / Humidity	19 deg. C / 58 % RH	22 deg. C / 42 % RH	22 deg. C / 45 % RH
Engineer	Takeshi Hiyaji (1 GHz - 10 GHz)	Junki Nagatomi (10 GHz - 18 GHz)	Junya Okuno (18 GHz - 26.5 GHz)
Mode	Tx 11n-40 2437 MHz		

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	4874.000	PK	42.1	31.6	7.7	31.2	-	50.2	73.9	23.7	Floor noise
Hori.	7311.000	PK	42.2	36.6	8.9	32.4	-	55.2	73.9	18.7	Floor noise
Hori.	9748.000	PK	41.1	38.4	9.6	32.7	-	56.5	73.9	17.4	Floor noise
Hori.	4874.000	AV	31.9	31.6	7.7	31.2	-	40.0	53.9	13.9	Floor noise
Hori.	7311.000	AV	32.9	36.6	8.9	32.4	-	45.9	53.9	8.0	Floor noise
Hori.	9748.000	AV	33.0	38.4	9.6	32.7	-	48.4	53.9	5.5	Floor noise
Vert.	4874.000	PK	41.7	31.6	7.7	31.2	-	49.8	73.9	24.1	Floor noise
Vert.	7311.000	PK	42.0	36.6	8.9	32.4	-	55.0	73.9	18.9	Floor noise
Vert.	9748.000	PK	40.9	38.4	9.6	32.7	-	56.3	73.9	17.6	Floor noise
Vert.	4874.000	AV	31.5	31.6	7.7	31.2	-	39.6	53.9	14.4	Floor noise
Vert.	7311.000	AV	32.6	36.6	8.9	32.4	-	45.6	53.9	8.3	Floor noise
Vert.	9748.000	AV	32.8	38.4	9.6	32.7	-	48.2	53.9	5.7	Floor noise

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

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

Distance factor: 1 GHz - 10 GHz 20log (4.0 m / 3.0 m) = 2.5 dB
10 GHz - 26.5 GHz 20log (1.0 m / 3.0 m) = -9.5 dB

Radiated Spurious Emission

Report No. 13521383H
Test place Ise EMC Lab.
Semi Anechoic Chamber No.4
Date October 24, 2020
Temperature / Humidity 19 deg. C / 58 % RH
Engineer Takeshi Hiyaji
(1 GHz - 10 GHz)
Mode Tx 11n-40 2447 MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2483.500	PK	58.9	27.7	5.6	31.8	-	60.3	73.9	13.6	
Hori.	2483.500	AV	46.3	27.7	5.6	31.8	-	47.7	53.9	6.2	
Vert.	2483.500	PK	56.0	27.7	5.6	31.8	-	57.4	73.9	16.5	
Vert.	2483.500	AV	44.0	27.7	5.6	31.8	-	45.4	53.9	8.5	

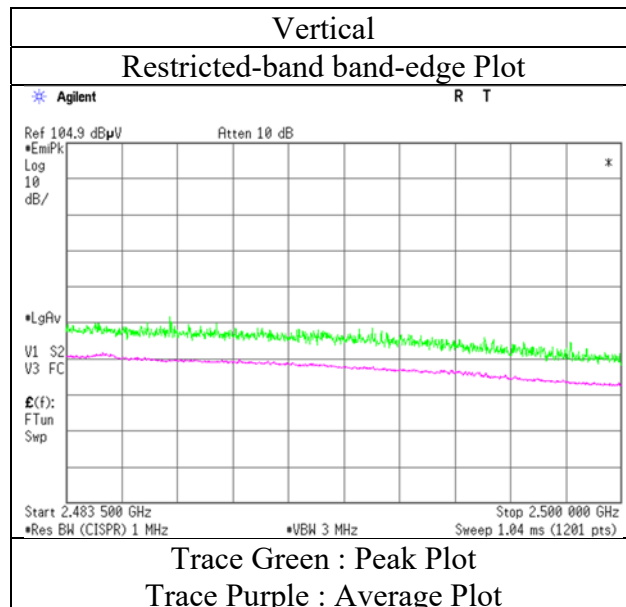
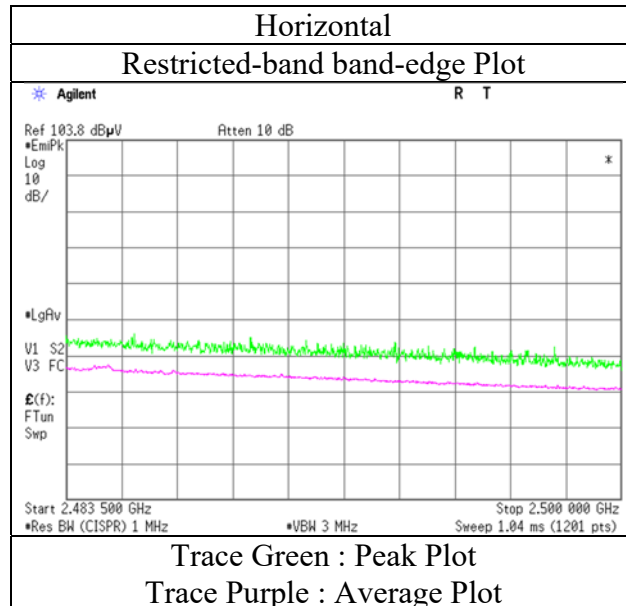
Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier)

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

Distance factor: 1 GHz - 10 GHz $20\log(4.0\text{ m} / 3.0\text{ m}) = 2.5\text{ dB}$
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)

Report No. 13521383H
Test place Ise EMC Lab.
Semi Anechoic Chamber No.4
Date October 24, 2020
Temperature / Humidity 19 deg. C / 58 % RH
Engineer Takeshi Hiyaji
(1 GHz - 10 GHz)
Mode Tx 11n-40 2447 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.

UL Japan, Inc.

Ise EMC Lab.

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Radiated Spurious Emission

Report No.	13521383H		
Test place	Ise EMC Lab.		
Semi Anechoic Chamber	No.4	No.4	No.4
Date	October 24, 2020	October 29, 2020	November 1, 2020
Temperature / Humidity	19 deg. C / 58 % RH	22 deg. C / 42 % RH	22 deg. C / 45 % RH
Engineer	Takeshi Hiyaji (1 GHz - 10 GHz)	Junki Nagatomi (10 GHz - 18 GHz)	Junya Okuno (18 GHz - 26.5 GHz)
Mode	Tx 11n-40 2452 MHz		

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2483.500	PK	55.3	27.7	5.6	31.8	-	56.7	73.9	17.2	
Hori.	4904.000	PK	41.2	31.5	7.7	31.2	-	49.2	73.9	24.7	Floor noise
Hori.	7356.000	PK	42.7	36.7	8.9	32.5	-	55.8	73.9	18.1	Floor noise
Hori.	9808.000	PK	42.0	38.6	9.7	32.7	-	57.5	73.9	16.4	Floor noise
Hori.	2483.500	AV	44.4	27.7	5.6	31.8	-	45.8	53.9	8.1	
Hori.	4904.000	AV	31.1	31.5	7.7	31.2	-	39.1	53.9	14.8	Floor noise
Hori.	7356.000	AV	32.0	36.7	8.9	32.5	-	45.1	53.9	8.8	Floor noise
Hori.	9808.000	AV	31.2	38.6	9.7	32.7	-	46.7	53.9	7.2	Floor noise
Vert.	2483.500	PK	55.4	27.7	5.6	31.8	-	56.8	73.9	17.1	
Vert.	4904.000	PK	40.8	31.5	7.7	31.2	-	48.8	73.9	25.1	Floor noise
Vert.	7356.000	PK	41.7	36.7	8.9	32.5	-	54.9	73.9	19.0	Floor noise
Vert.	9808.000	PK	41.5	38.6	9.7	32.7	-	57.1	73.9	16.8	Floor noise
Vert.	2483.500	AV	43.1	27.7	5.6	31.8	-	44.5	53.9	9.4	
Vert.	4904.000	AV	30.8	31.5	7.7	31.2	-	38.8	53.9	15.1	Floor noise
Vert.	7356.000	AV	31.6	36.7	8.9	32.5	-	44.8	53.9	9.1	Floor noise
Vert.	9808.000	AV	31.0	38.6	9.7	32.7	-	46.5	53.9	7.4	Floor noise

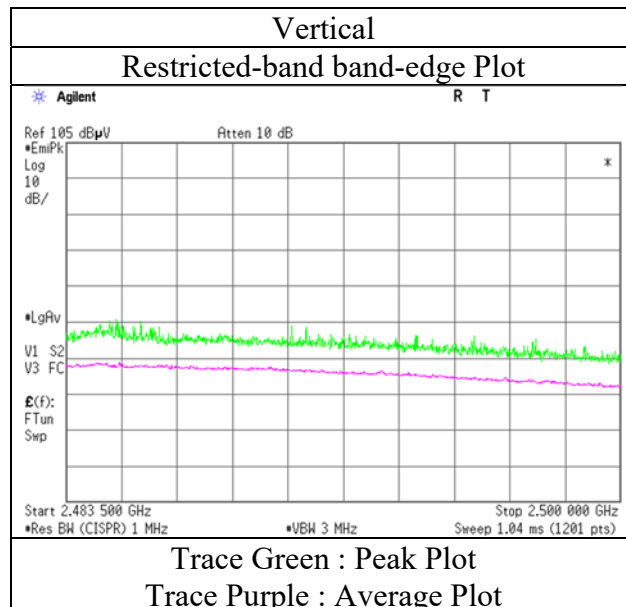
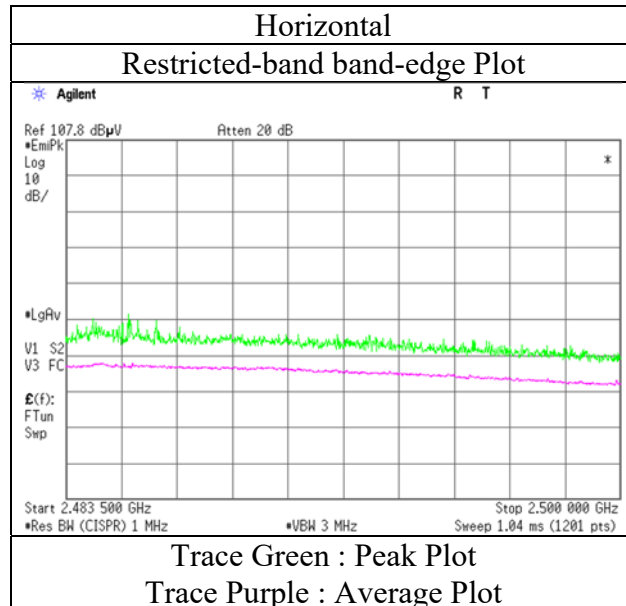
Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier)

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

Distance factor: 1 GHz - 10 GHz 20log (4.0 m / 3.0 m) = 2.5 dB
10 GHz - 26.5 GHz 20log (1.0 m / 3.0 m) = -9.5 dB

Radiated Spurious Emission (Reference Plot for band-edge)

Report No.	13521383H
Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.4
Date	October 24, 2020
Temperature / Humidity	19 deg. C / 58 % RH
Engineer	Takeshi Hiyaji (1 GHz - 10 GHz)
Mode	Tx 11n-40 2452 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.

UL Japan, Inc.

Ise EMC Lab.

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Facsimile : +81 596 24 8124

Radiated Spurious Emission

Report No. 13521383H
Test place Ise EMC Lab.
Semi Anechoic Chamber No.3
Date March 22, 2021
Temperature / Humidity 20 deg. C / 45 % RH
Engineer Junki Nagatomi
(Below 1 GHz)
(Above 1 GHz)
Mode Tx BT LE 2402 MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	30.000	QP	22.7	18.5	7.1	32.2	-	16.1	40.0	23.9	
Hori.	240.003	QP	44.9	11.5	9.6	32.1	-	33.9	46.0	12.1	
Hori.	293.396	QP	30.6	13.6	10.0	32.0	-	22.1	46.0	23.9	
Hori.	343.662	QP	29.4	14.9	10.4	32.0	-	22.7	46.0	23.3	
Hori.	368.242	QP	29.5	15.1	10.5	32.0	-	23.1	46.0	22.9	
Hori.	390.821	QP	31.0	15.4	10.7	32.0	-	25.1	46.0	20.9	
Hori.	2390.000	PK	43.7	27.5	5.6	32.6	-	44.2	73.9	29.7	
Hori.	4804.000	PK	42.1	31.7	7.8	31.7	-	50.0	73.9	23.9	
Hori.	7206.000	PK	43.1	36.1	9.3	32.6	-	55.8	73.9	18.1	Floor noise
Hori.	9608.000	PK	43.4	38.7	7.9	33.0	-	56.9	73.9	17.0	Floor noise
Hori.	20880.000	PK	50.0	38.0	-1.2	32.5	-	54.2	73.9	19.7	
Hori.	2390.000	AV	34.0	27.5	5.6	32.6	1.7	36.3	53.9	17.6	*1)
Hori.	4804.000	AV	35.5	31.7	7.8	31.7	1.7	45.0	53.9	8.9	
Hori.	7206.000	AV	34.0	36.1	9.3	32.6	-	46.8	53.9	7.1	Floor noise
Hori.	9608.000	AV	34.0	38.7	7.9	33.0	-	47.5	53.9	6.4	Floor noise
Hori.	20880.000	AV	45.6	38.0	-1.2	32.5	-	49.8	53.9	4.1	
Vert.	44.724	QP	36.0	13.2	7.4	32.2	-	24.3	40.0	15.7	
Vert.	74.824	QP	40.7	6.5	7.9	32.2	-	22.9	40.0	17.1	
Vert.	142.081	QP	32.6	14.8	8.6	32.2	-	23.9	43.5	19.6	
Vert.	237.041	QP	49.0	11.5	9.5	32.1	-	37.9	46.0	8.1	
Vert.	392.410	QP	37.4	15.5	10.7	32.0	-	31.6	46.0	14.5	
Vert.	492.030	QP	30.8	17.6	11.4	32.0	-	27.7	46.0	18.3	
Vert.	2390.000	PK	46.2	27.5	5.6	32.6	-	46.7	73.9	27.2	
Vert.	4804.000	PK	41.4	31.7	7.8	31.7	-	49.3	73.9	24.6	Floor noise
Vert.	7206.000	PK	42.3	36.1	9.3	32.6	-	55.0	73.9	18.9	Floor noise
Vert.	9608.000	PK	43.5	38.7	7.9	33.0	-	57.1	73.9	16.8	Floor noise
Vert.	20880.000	PK	48.9	38.0	-1.2	32.5	-	53.1	73.9	20.8	
Vert.	2390.000	AV	34.2	27.5	5.6	32.6	1.7	36.5	53.9	17.5	*1)
Vert.	4804.000	AV	34.0	31.7	7.8	31.7	-	41.9	53.9	12.0	Floor noise
Vert.	7206.000	AV	34.0	36.1	9.3	32.6	-	46.8	53.9	7.1	Floor noise
Vert.	9608.000	AV	34.0	38.7	7.9	33.0	-	47.5	53.9	6.4	Floor noise
Vert.	20880.000	AV	43.5	38.0	-1.2	32.5	-	47.7	53.9	6.3	

Result = 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).

Distance factor: 1 GHz - 10 GHz 20log (4.0 m / 3.0 m) = 2.5 dB

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

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

20dBc Data Sheet

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2402.000	PK	94.6	27.5	5.6	32.6	95.2	-	-	Carrier
Hori.	2400.000	PK	38.8	27.5	5.6	32.6	39.4	75.2	35.8	
Vert.	2402.000	PK	92.7	27.5	5.6	32.6	93.2	-	-	Carrier
Vert.	2400.000	PK	36.8	27.5	5.6	32.6	37.4	73.2	35.9	

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

UL Japan, Inc.

Ise EMC Lab.

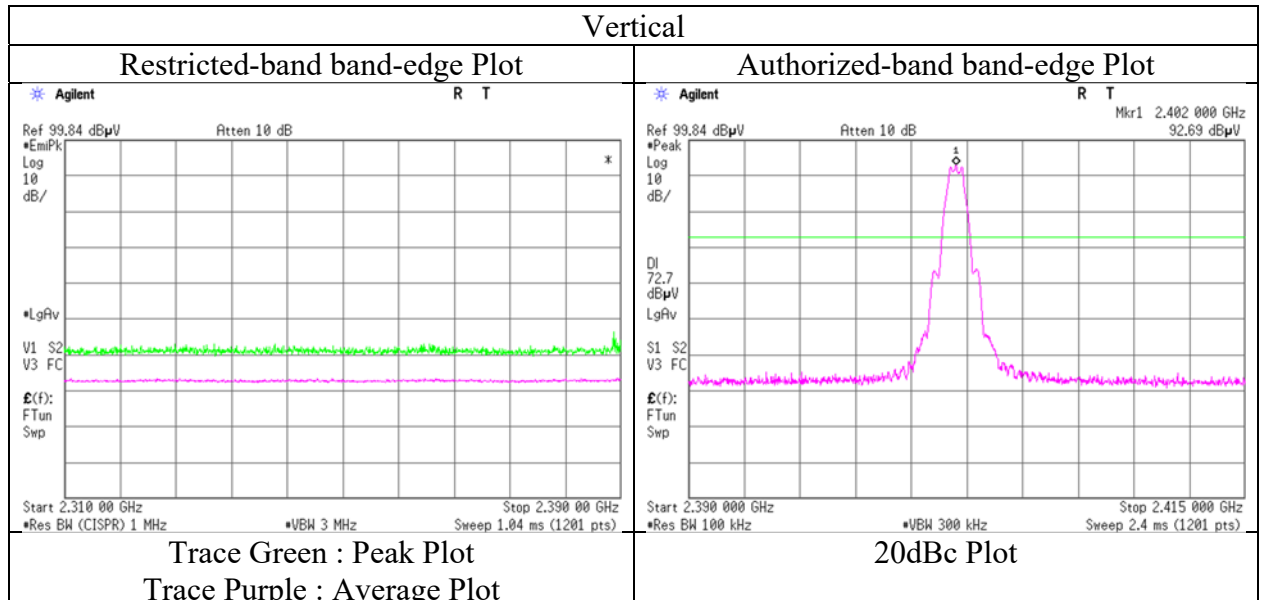
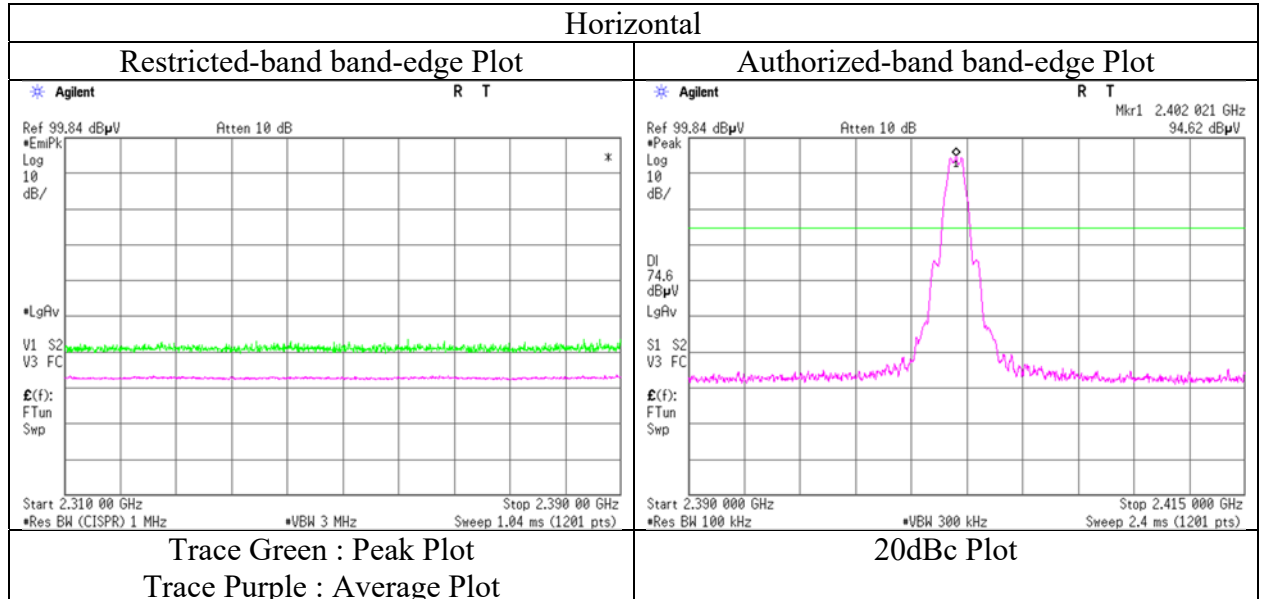
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Facsimile : +81 596 24 8124

Radiated Spurious Emission (Reference Plot for band-edge)

Report No.	13521383H
Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.3
Date	March 22, 2021
Temperature / Humidity	20 deg. C / 45 % RH
Engineer	Junki Nagatomi
	(1 - 10 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 was shown in tabular data.

UL Japan, Inc.

Ise EMC Lab.

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

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Radiated Spurious Emission

Report No. 13521383H
Test place Ise EMC Lab.
Semi Anechoic Chamber No.3
Date March 22, 2021
Temperature / Humidity 20 deg. C / 45 % RH
Engineer Junki Nagatomi
(Below 1 GHz)
(Above 1 GHz)
Mode Tx BT LE 2440 MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	30.000	QP	22.7	18.5	7.1	32.2	-	16.1	40.0	23.9	
Hori.	241.020	QP	44.8	11.6	9.6	32.1	-	33.9	46.0	12.1	
Hori.	294.211	QP	30.6	13.6	10.0	32.0	-	22.2	46.0	23.9	
Hori.	343.062	QP	29.4	14.9	10.4	32.0	-	22.7	46.0	23.4	
Hori.	369.043	QP	20.5	15.1	10.5	32.0	-	14.1	46.0	31.9	
Hori.	391.223	QP	31.1	15.4	10.7	32.0	-	25.2	46.0	20.8	
Hori.	4880.000	PK	43.6	31.5	7.8	31.6	-	51.3	73.9	22.7	
Hori.	7320.000	PK	43.0	36.2	9.3	32.7	-	55.8	73.9	18.1	Floor noise
Hori.	9760.000	PK	42.8	39.0	7.9	33.1	-	56.6	73.9	17.3	Floor noise
Hori.	20880.000	PK	49.6	38.0	-1.2	32.5	-	53.8	73.9	20.1	
Hori.	4880.000	AV	34.3	31.5	7.8	31.6	1.7	43.6	53.9	10.3	
Hori.	7320.000	AV	33.7	36.2	9.3	32.7	-	46.5	53.9	7.4	Floor noise
Hori.	9760.000	AV	33.7	39.0	7.9	33.1	-	47.6	53.9	6.3	Floor noise
Hori.	20880.000	AV	45.3	38.0	-1.2	32.5	-	49.5	53.9	4.4	
Vert.	44.820	QP	36.1	13.1	7.4	32.2	-	24.4	40.0	15.6	
Vert.	75.025	QP	40.6	6.5	7.9	32.2	-	22.8	40.0	17.2	
Vert.	142.102	QP	33.4	14.8	8.6	32.2	-	24.7	43.5	18.8	
Vert.	238.120	QP	49.1	11.5	9.5	32.1	-	38.1	46.0	7.9	
Vert.	393.010	QP	37.3	15.5	10.7	32.0	-	31.5	46.0	14.5	
Vert.	491.898	QP	30.9	17.6	11.4	32.0	-	27.8	46.0	18.2	
Vert.	4880.000	PK	41.7	31.5	7.8	31.6	-	49.3	73.9	24.6	Floor noise
Vert.	7320.000	PK	42.5	36.2	9.3	32.7	-	55.3	73.9	18.6	Floor noise
Vert.	9760.000	PK	42.6	39.0	7.9	33.1	-	56.4	73.9	17.5	Floor noise
Vert.	20880.000	PK	48.4	38.0	-1.2	32.5	-	52.6	73.9	21.3	
Vert.	4880.000	AV	32.6	31.5	7.8	31.6	-	40.2	53.9	13.7	Floor noise
Vert.	7320.000	AV	33.7	36.2	9.3	32.7	-	46.5	53.9	7.4	Floor noise
Vert.	9760.000	AV	33.7	39.0	7.9	33.1	-	47.6	53.9	6.3	Floor noise
Vert.	20880.000	AV	43.0	38.0	-1.2	32.5	-	47.2	53.9	6.7	

Result = 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).

Distance factor: 1 GHz - 10 GHz $20\log(4.0\text{ m} / 3.0\text{ m}) = 2.5\text{ dB}$
10 GHz - 26.5 GHz $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.5\text{ dB}$

Radiated Spurious Emission

Report No. 13521383H
Test place Ise EMC Lab.
Semi Anechoic Chamber No.3
Date March 22, 2021
Temperature / Humidity 20 deg. C / 45 % RH
Engineer Junki Nagatomi
(Below 1 GHz)
(Above 1 GHz)
Mode Tx BT LE 2480 MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	30.000	QP	22.7	18.5	7.1	32.2	-	16.1	40.0	23.9	
Hori.	241.112	QP	44.8	11.6	9.6	32.1	-	33.9	46.0	12.1	
Hori.	295.201	QP	30.6	13.5	10.0	32.0	-	22.2	46.0	23.8	
Hori.	343.670	QP	29.5	14.9	10.4	32.0	-	22.8	46.0	23.2	
Hori.	369.212	QP	20.6	15.1	10.5	32.0	-	14.2	46.0	31.8	
Hori.	391.102	QP	31.2	15.4	10.7	32.0	-	25.3	46.0	20.7	
Hori.	2483.500	PK	47.1	27.3	5.7	32.5	-	47.6	73.9	26.3	
Hori.	4960.000	PK	41.9	31.5	7.8	31.6	-	49.6	73.9	24.3	Floor noise
Hori.	7440.000	PK	42.8	36.3	9.3	32.7	-	55.6	73.9	18.3	Floor noise
Hori.	9920.000	PK	42.5	38.8	8.0	33.2	-	56.1	73.9	17.8	Floor noise
Hori.	20880.000	PK	48.4	38.0	-1.2	32.5	-	52.6	73.9	21.3	
Hori.	2483.500	AV	34.3	27.3	5.7	32.5	1.7	36.5	53.9	17.4	*1)
Hori.	4960.000	AV	33.1	31.5	7.8	31.6	-	40.8	53.9	13.2	Floor noise
Hori.	7440.000	AV	33.8	36.3	9.3	32.7	-	46.7	53.9	7.2	Floor noise
Hori.	9920.000	AV	33.8	38.8	8.0	33.2	-	47.4	53.9	6.5	Floor noise
Hori.	20880.000	AV	42.9	38.0	-1.2	32.5	-	47.1	53.9	6.8	
Vert.	44.820	QP	36.2	13.1	7.4	32.2	-	24.5	40.0	15.5	
Vert.	75.025	QP	40.6	6.5	7.9	32.2	-	22.8	40.0	17.2	
Vert.	142.102	QP	33.2	14.8	8.6	32.2	-	24.5	43.5	19.0	
Vert.	238.120	QP	49.0	11.5	9.5	32.1	-	38.0	46.0	8.0	
Vert.	393.010	QP	37.3	15.5	10.7	32.0	-	31.5	46.0	14.5	
Vert.	491.898	QP	31.0	17.6	11.4	32.0	-	27.9	46.0	18.1	
Vert.	2483.500	PK	45.8	27.3	5.7	32.5	-	46.3	73.9	27.6	
Vert.	4960.000	PK	42.4	31.5	7.8	31.6	-	50.1	73.9	23.8	Floor noise
Vert.	7440.000	PK	42.8	36.3	9.3	32.7	-	55.7	73.9	18.2	Floor noise
Vert.	9920.000	PK	42.5	38.8	8.0	33.2	-	56.1	73.9	17.8	Floor noise
Vert.	20880.000	PK	47.6	38.0	-1.2	32.5	-	51.8	73.9	22.1	
Vert.	2483.500	AV	34.0	27.3	5.7	32.5	1.7	36.1	53.9	17.8	*1)
Vert.	4960.000	AV	33.1	31.5	7.8	31.6	-	40.8	53.9	13.2	Floor noise
Vert.	7440.000	AV	33.8	36.3	9.3	32.7	-	46.7	53.9	7.2	Floor noise
Vert.	9920.000	AV	33.8	38.8	8.0	33.2	-	47.4	53.9	6.5	Floor noise
Vert.	20880.000	AV	42.5	38.0	-1.2	32.5	-	46.7	53.9	7.3	

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

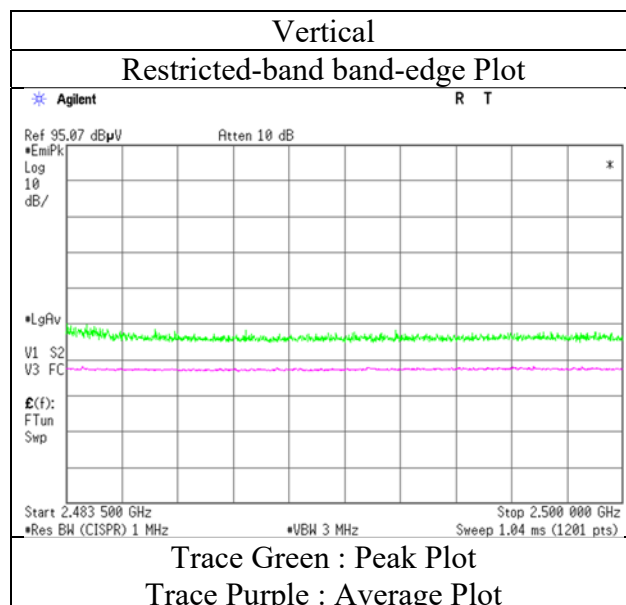
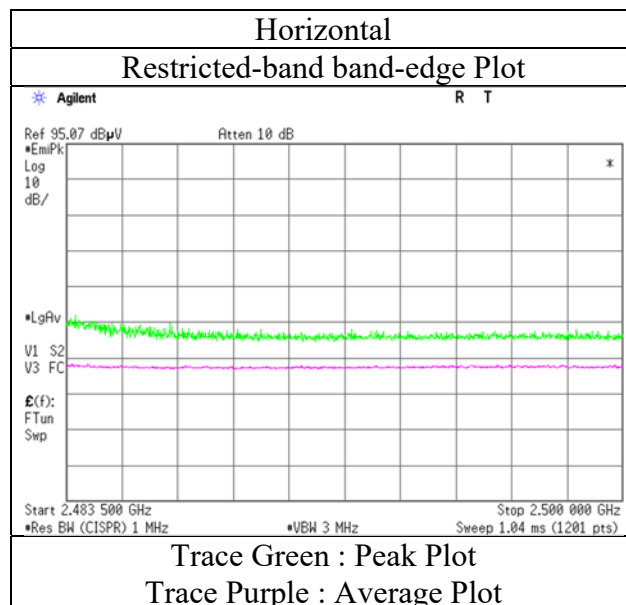
*Other frequency noises omitted in this report were not seen or had enough margin (more than 20 dB).

Distance factor: 1 GHz - 10 GHz 20log (4.0 m / 3.0 m) = 2.5 dB
10 GHz - 26.5 GHz 20log (1.0 m / 3.0 m) = -9.5 dB

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

Radiated Spurious Emission (Reference Plot for band-edge)

Report No.	13521383H
Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.3
Date	March 22, 2021
Temperature / Humidity	20 deg. C / 45 % RH
Engineer	Junki Nagatomi
	(1 GHz - 10 GHz)
Mode	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.

UL Japan, Inc.

Ise EMC Lab.

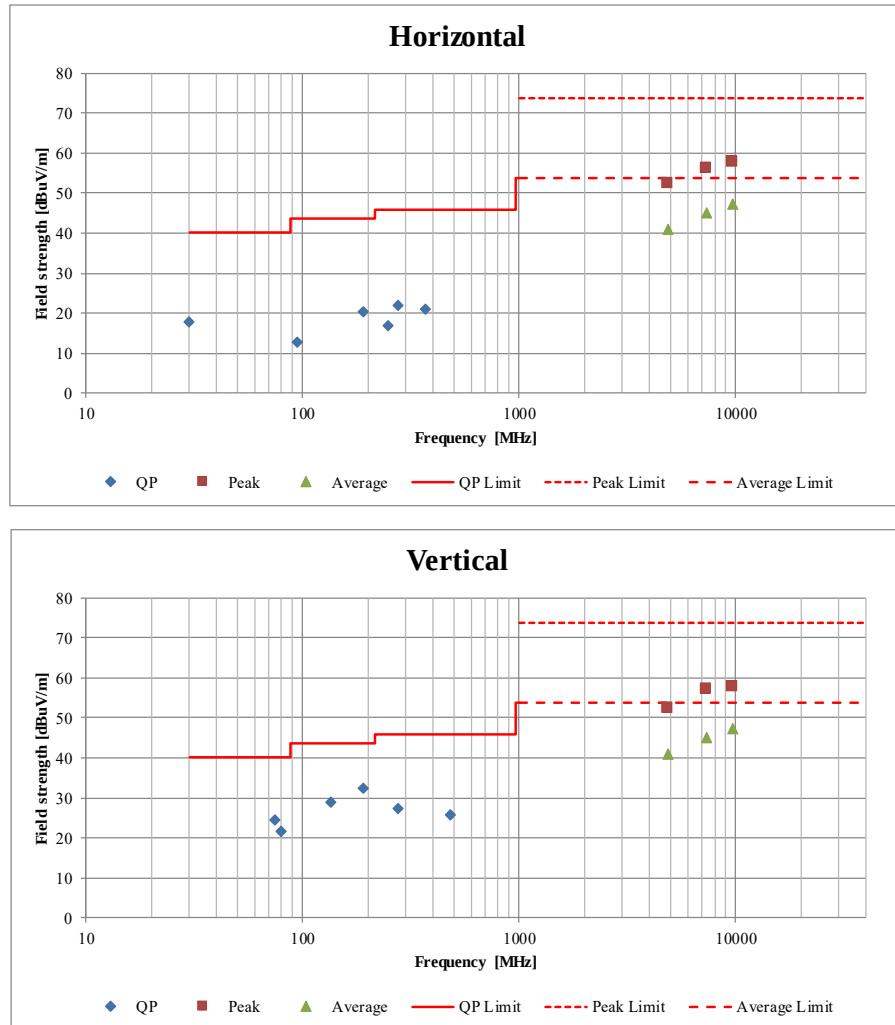
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

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Radiated Spurious Emission (Plot data, Worst case)

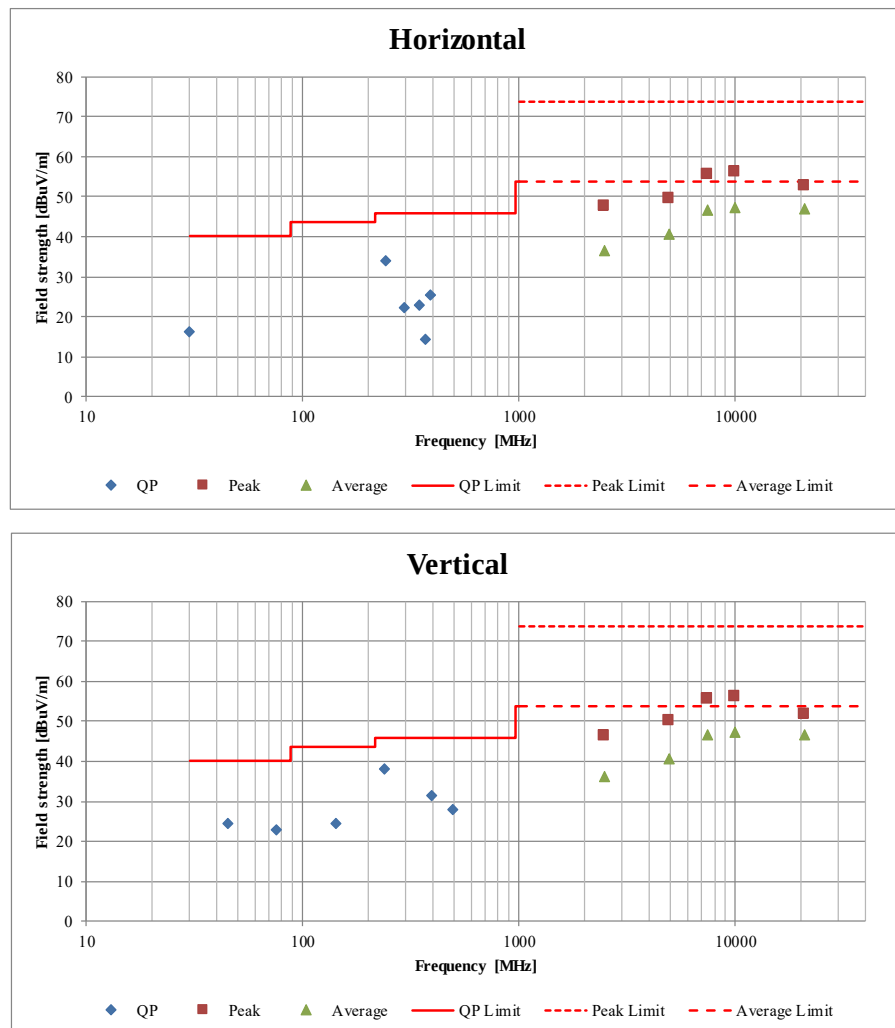
Report No.	13521383H	No.4	No.4	No.4
Test place	Ise EMC Lab.	October 28, 2020	October 29, 2020	November 1, 2020
Semi Anechoic Chamber	No.4	21 deg. C / 46 % RH	22 deg. C / 42 % RH	22 deg. C / 45 % RH
Date	October 28, 2020	Junki Nagatomi	Junki Nagatomi	Junya Okuno
Temperature / Humidity	21 deg. C / 46 % RH	(1 GHz - 10 GHz)	(10 GHz - 18 GHz)	(18 GHz - 26.5 GHz)
Engineer	Junki Nagatomi			
Mode	Tx 11n-20 2437 MHz			



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

Radiated Spurious Emission (Plot data, Worst case)

Report No. 13521383H
Test place Ise EMC Lab.
Semi Anechoic Chamber No.3
Date March 22, 2021
Temperature / Humidity 20 deg. C / 45 % RH
Engineer Junki Nagatomi
(Below 1 GHz)
(Above 1 GHz)
Mode Tx BT LE 2480 MHz

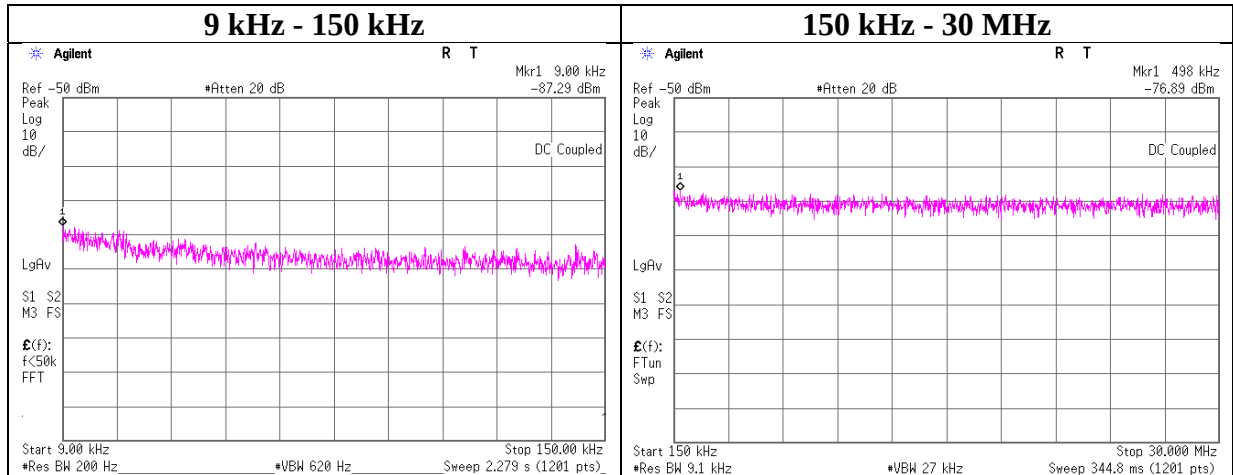


*These plots data contains sufficient number to show the trend of characteristic features for EUT.

Conducted Spurious Emission

Report No. 13521383H
Test place Ise EMC Lab. No.6 Shielded Room
Date October 27, 2020 March 17, 2021
Temperature / Humidity 25 deg. C / 42 % RH 23 deg. C / 30 % RH
Engineer Takafumi Noguchi Takafumi Noguchi
Mode Tx

11n-20 2437 MHz



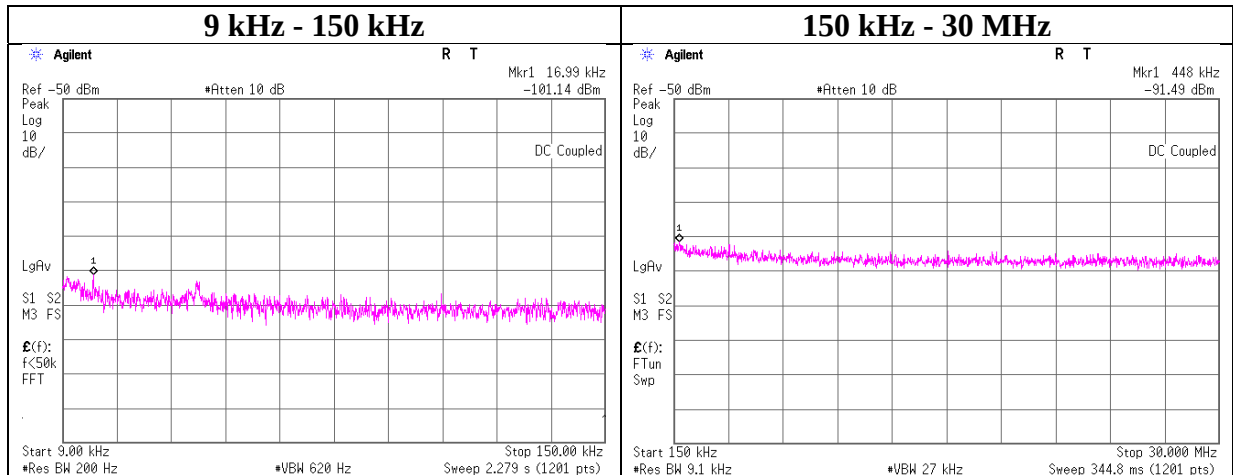
Frequency [kHz]	Reading [dBm]	Cable Loss [dB]	Attenuator Loss [dB]	Antenna Gain [dBi]	N (Number of Output)	EIRP [dBm]	Distance [m]	Ground bounce [dB]	E (field strength) [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
9.00	-87.3	1.00	9.9	2.0	1	-74.4	300	6.0	-13.2	48.5	61.7	
498.00	-76.9	1.00	9.9	2.0	1	-64.0	30	6.0	17.2	33.6	16.4	

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

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

N: Number of output

BT LE 2480 MHz



Frequency [kHz]	Reading [dBm]	Cable Loss [dB]	Attenuator Loss [dB]	Antenna Gain [dBi]	N (Number of Output)	EIRP [dBm]	Distance [m]	Ground bounce [dB]	E (field strength) [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
16.99	-101.1	1.00	9.9	2.0	1	-88.2	300	6.0	-27.0	43.0	70.0	
448.00	-91.5	1.00	9.9	2.0	1	-78.6	300	6.0	-17.3	14.5	31.8	

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

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

N: Number of output

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Power Density

Report No. 13521383H
Test place Ise EMC Lab. No.6 Shielded Room
Date March 17, 2021 October 16, 2020 October 27, 2020 March 17, 2021
Temperature 23 deg. C / 30 % RH 23 deg. C / 42 % RH 25 deg. C / 42 % RH 23 deg. C / 30 % RH
/ Humidity
Engineer Takafumi Noguchi Tomohisa Nakagawa Takafumi Noguchi Takafumi Noguchi

Mode Tx

11b

Freq.	Reading	Cable Loss	Atten. Loss	Result	Limit	Margin
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[dBm]	[dB]
2412	-14.65	1.00	9.73	-3.92	8.00	11.92
2417	-13.60	1.00	9.73	-2.87	8.00	10.87
2437	-14.14	1.00	9.73	-3.41	8.00	11.41
2457	-14.26	1.00	9.73	-3.53	8.00	11.53
2462	-11.71	1.00	9.73	-0.98	8.00	8.98

11g

Freq.	Reading	Cable Loss	Atten. Loss	Result	Limit	Margin
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[dBm]	[dB]
2412	-19.69	1.00	9.73	-8.96	8.00	16.96
2417	-20.47	1.00	9.73	-9.74	8.00	17.74
2437	-18.45	1.00	9.73	-7.72	8.00	15.72
2457	-21.04	1.00	9.73	-10.31	8.00	18.31
2462	-20.81	1.00	9.73	-10.08	8.00	18.08

11n-20

Freq.	Reading	Cable Loss	Atten. Loss	Result	Limit	Margin
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[dBm]	[dB]
2412	-21.64	1.00	9.73	-10.91	8.00	18.91
2417	-19.52	1.00	9.73	-8.79	8.00	16.79
2437	-19.83	1.00	9.73	-9.10	8.00	17.10
2457	-19.59	1.00	9.73	-8.86	8.00	16.86
2462	-22.21	1.00	9.73	-11.48	8.00	19.48

11n-40

Freq.	Reading	Cable Loss	Atten. Loss	Result	Limit	Margin
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[dBm]	[dB]
2422	-27.33	1.00	9.73	-16.60	8.00	24.60
2427	-27.30	1.00	9.73	-16.57	8.00	24.57
2432	-26.83	1.00	9.73	-16.10	8.00	24.10
2437	-26.80	1.00	9.73	-16.07	8.00	24.07
2447	-26.44	1.00	9.73	-15.71	8.00	23.71
2452	-27.45	1.00	9.73	-16.72	8.00	24.72

BT LE

Freq.	Reading	Cable Loss	Atten. Loss	Result	Limit	Margin
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[dBm]	[dB]
2402	-24.13	1.00	9.73	-13.40	8.00	21.40
2440	-23.74	1.00	9.73	-13.01	8.00	21.01
2480	-23.73	1.00	9.73	-13.00	8.00	21.00

Sample Calculation:

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

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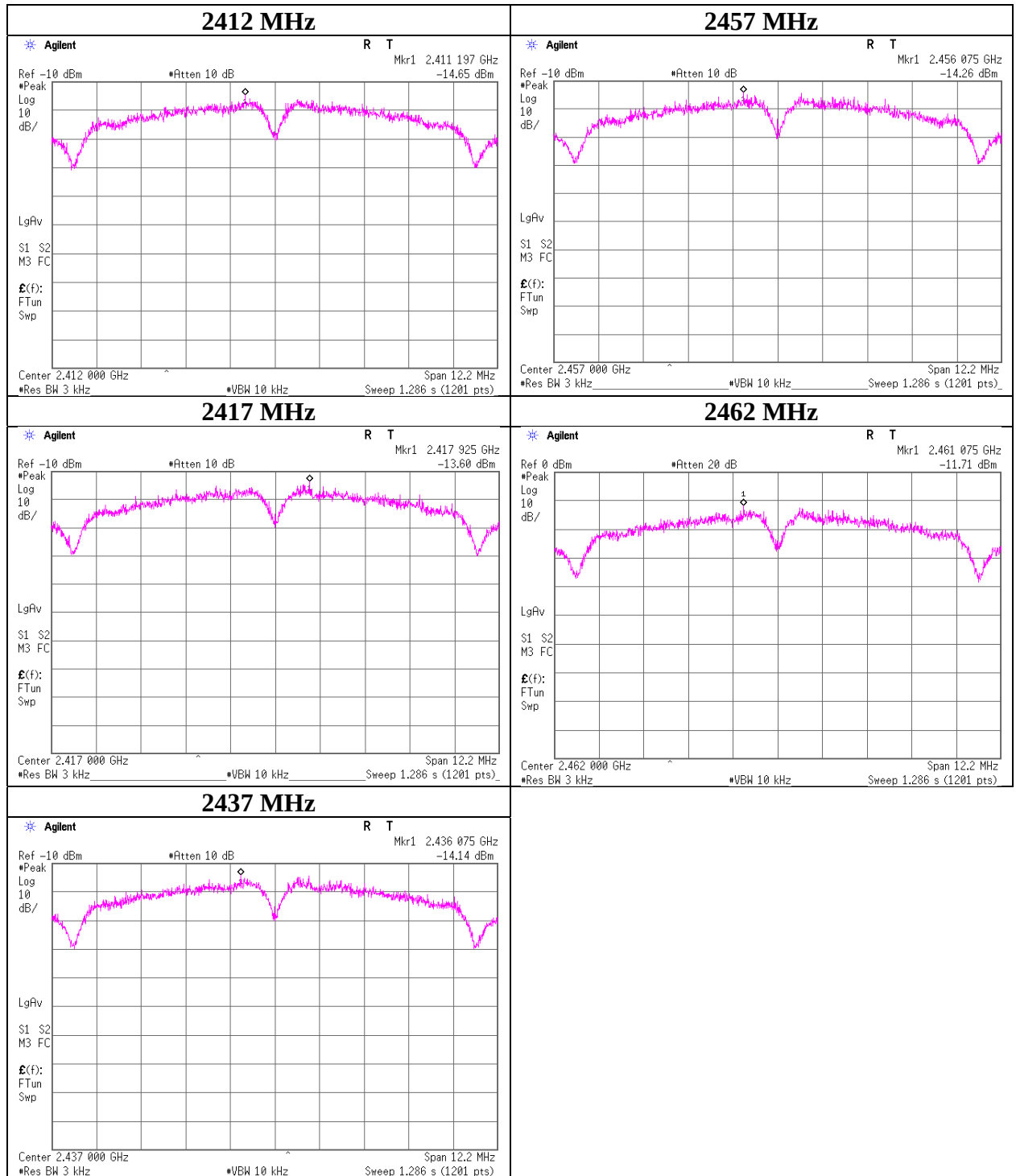
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Power Density

11b



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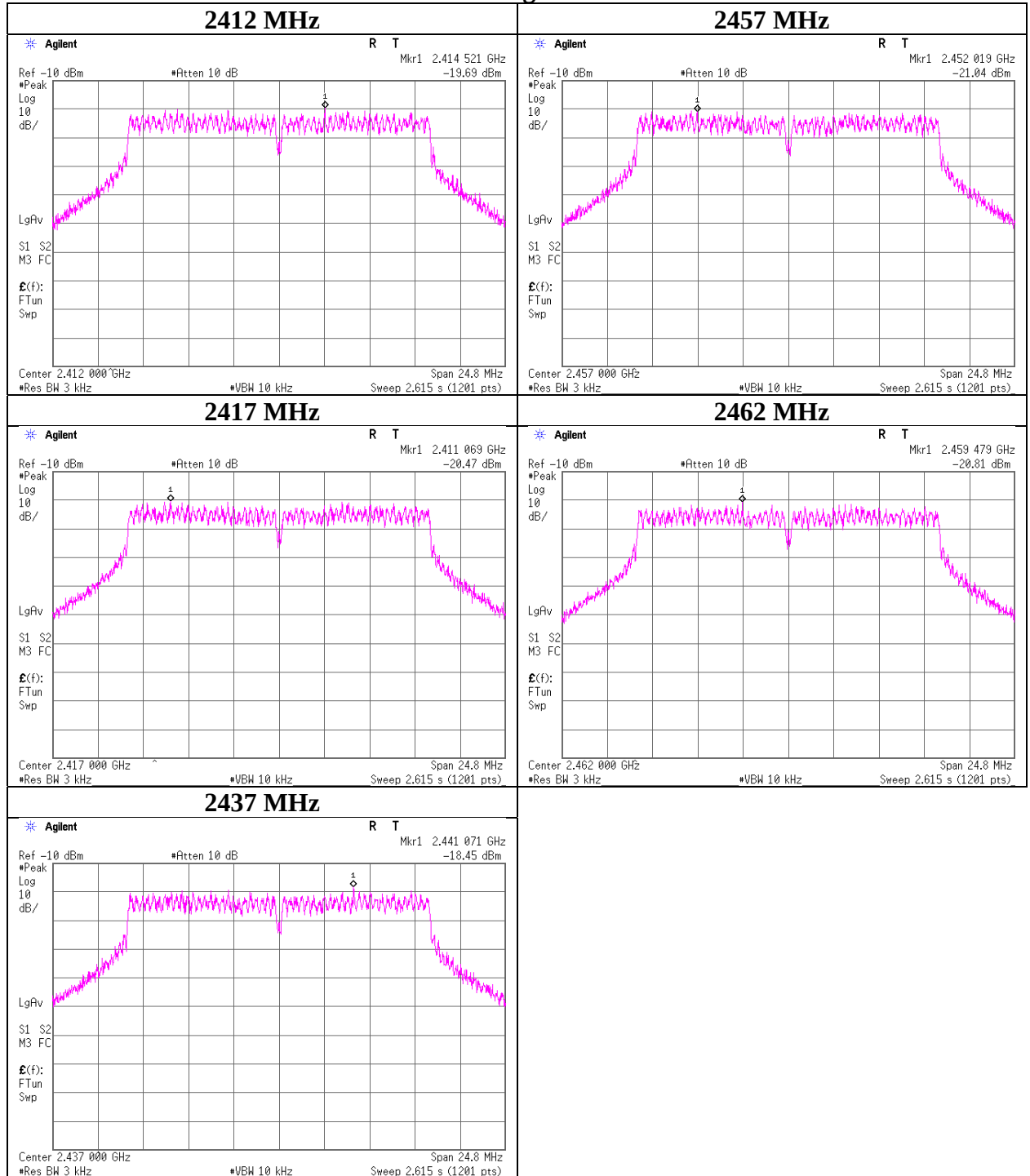
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Power Density

11g



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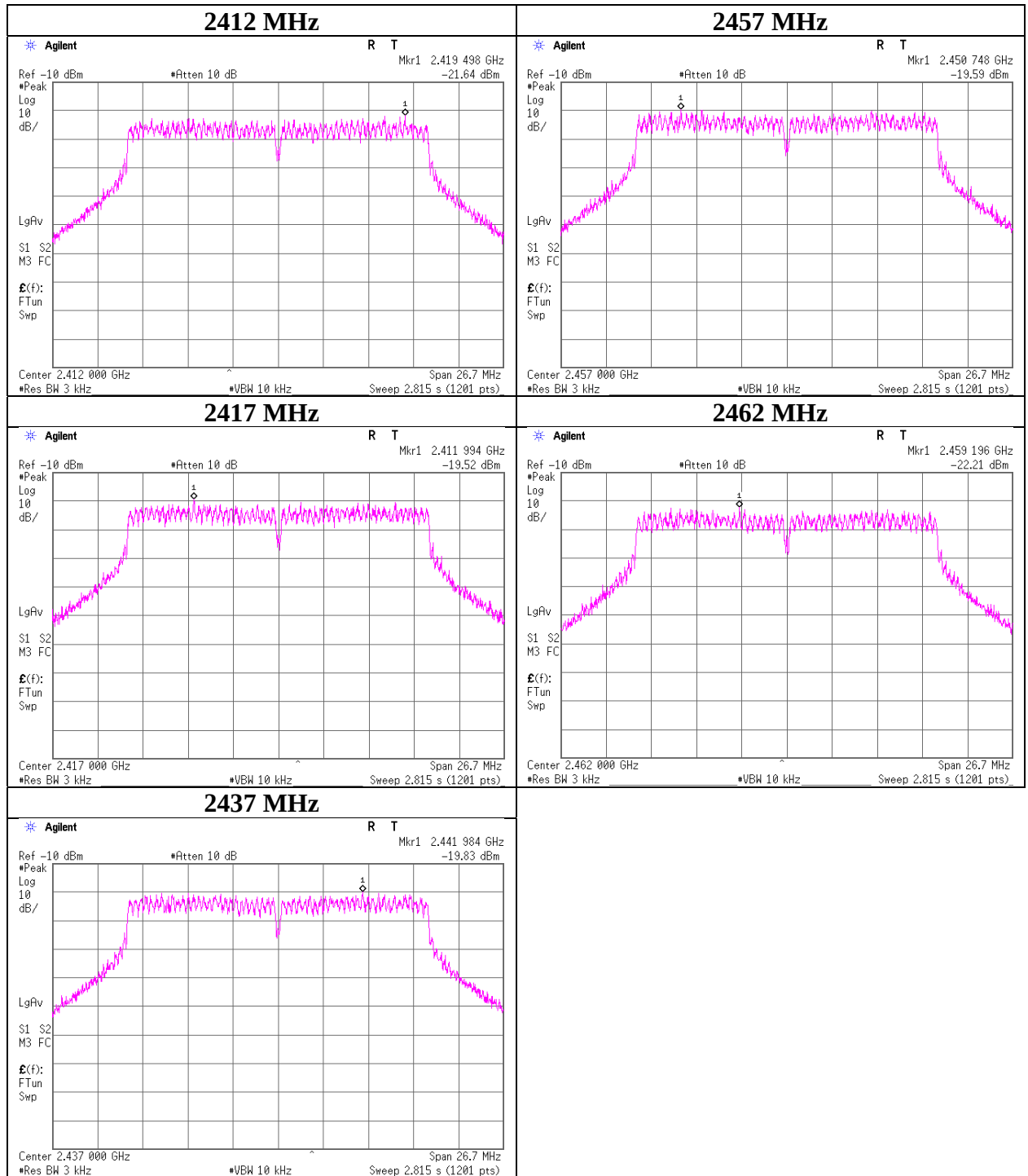
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Power Density

11n-20



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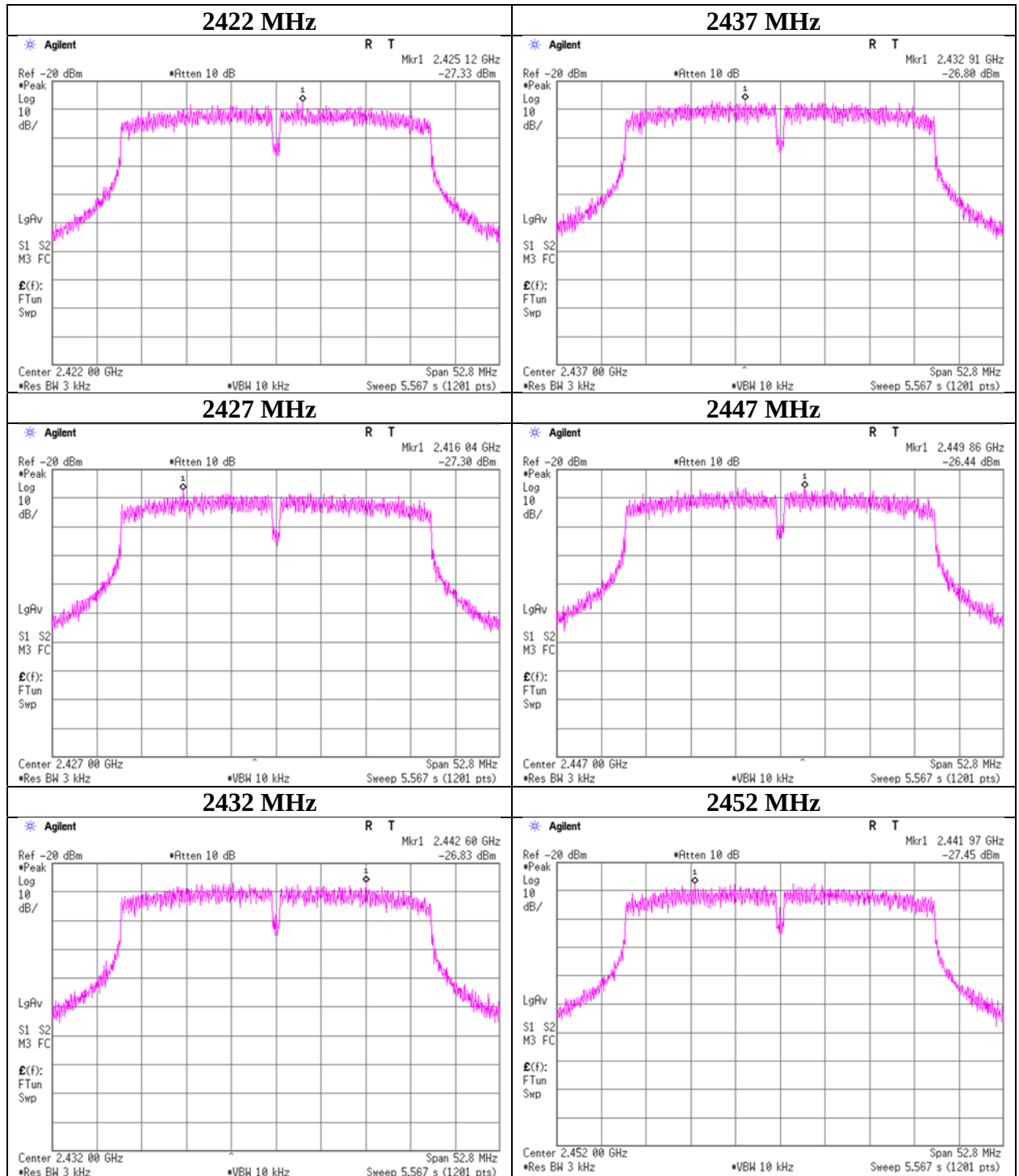
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Power Density

11n-40



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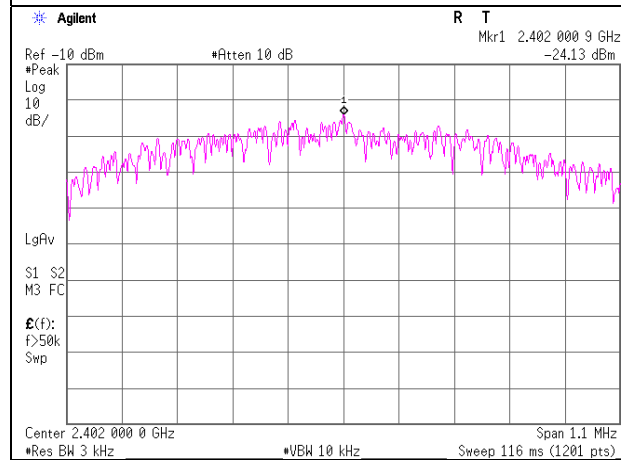
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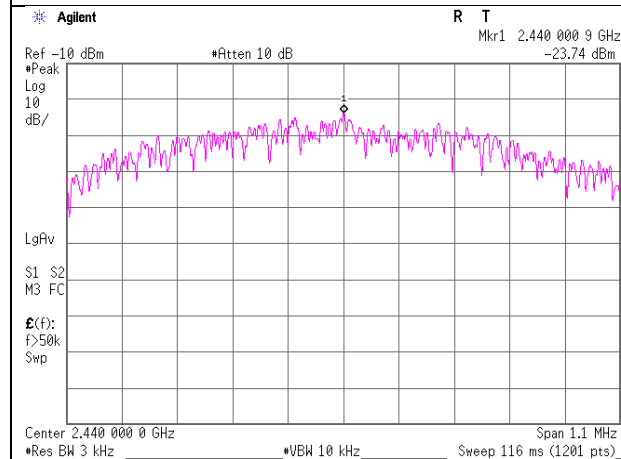
Power Density

BT LE

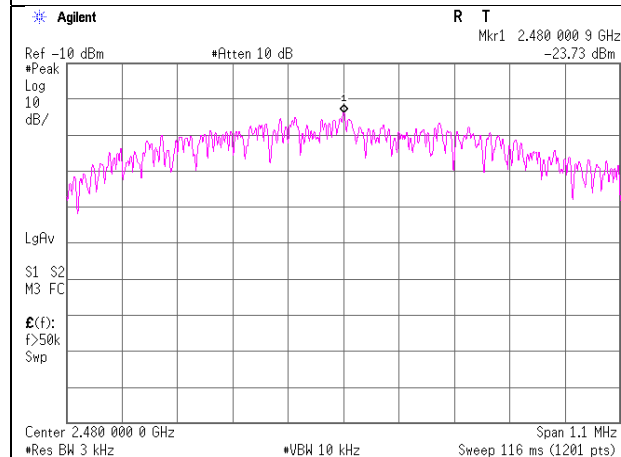
2402 MHz



2440MHz



2480 MHz



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APPENDIX 2: Test instruments

Test equipment (1/2)

Test Item	Local ID	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Cal Int
AT	MSA-10	141899	Spectrum Analyzer	Keysight Technologies Inc	E4448A	MY46180655	2020/08/04	12
AT	MPSE-17	141830	Power sensor	Anritsu Corporation	MA2411B	738285	2020/05/07	12
AT	MPM-12	141809	Power Meter	Anritsu Corporation	ML2495A	825002	2020/05/07	12
AT	MAT-88	141312	Attenuator	Weinschel Associates	WA56-10	56100304	2020/05/27	12
AT	MOS-24	90289	Thermo-Hygrometer	CUSTOM. Inc	CTH-201	0005	2021/01/15	12
AT	MBM-10	141345	Barometer	Sunoh	SBR121	832	2019/12/11	36
AT	MMM-12	141547	DIGITAL HiTESTER	HIOKI E.E. CORPORATION	3805	60500120	2021/02/01	12
AT	MAT-10	141156	Attenuator(10dB)	Weinschel Corp	2	BL1173	2020/11/13	12
RE	MOS-15	141562	Thermo-Hygrometer	CUSTOM. Inc	CTH-201	0010	2021/01/15	12
RE	MMM-10	141545	DIGITAL HiTESTER	HIOKI E.E. CORPORATION	3805	51201148	2021/01/07	12
RE	MJM-29	142230	Measure	KOMELON	KMC-36	-	-	-
RE	COTS-MEMI-02	178648	EMI measurement program	TSJ (Techno Science Japan)	TEPTO-DV	-	-	-
RE	MAEC-04-SVSWR	142017	AC4_Semi Anechoic Chamber(SVSWR)	TDK	Semi Anechoic Chamber 3m	DA-10005	2019/04/04	24
RE	MHA-21	141508	Horn Antenna 1-18GHz	Schwarzbeck Mess - Elektronik	BBHA9120D	557	2020/05/22	12
RE	MCC-246	199563	Microwave Cable	Huber+Suhner	SF126E/11PC35/11PC35/1000M,5000M	537061/126E / 537072/126E	2020/06/11	12
RE	MHF-26	141296	High Pass Filter 3.5-18.0GHz	UL Japan	HPF SELECTOR	002	2020/09/23	12
RE	MSA-03	141884	Spectrum Analyzer	Keysight Technologies Inc	E4448A	MY44020357	2021/03/10	12
AT	MSA-15	141902	Spectrum Analyzer	Keysight Technologies Inc	E4440A	MY46187105	2020/10/15	12
AT	MPM-16	141812	Power Meter	Keysight Technologies Inc	8990B	MY51000271	2020/08/20	12
AT	MPSE-23	141835	Power sensor	Keysight Technologies Inc	N1923A	MY54070004	2020/08/20	12
RE	MAEC-04	142011	AC4_Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-10005	2020/05/25	24
RE	MPA-12	141581	MicroWave System Amplifier	Keysight Technologies Inc	83017A	00650	2020/10/19	12
RE	MCC-141	141412	Microwave Cable	Junkosha	MWX221	1305S002R(1m) / 1405S146(5m)	-	-
RE	MHA-17	141506	Horn Antenna 15-40GHz	Schwarzbeck Mess - Elektronik	BBHA9170	BBHA9170307	2020/07/16	12
RE	MAT-34	141331	Attenuator(6dB)	TME	UFA-01	-	2021/02/02	12
RE	MBA-05	141425	Biconical Antenna	Schwarzbeck Mess - Elektronik	VHA9103+BBA9106	VHA 91031302	2020/08/31	12
RE	MCC-50	141397	Coaxial Cable	UL Japan	-	-	2020/11/06	12
RE	MLA-23	141267	Logperiodic Antenna(200-1000MHz)	Schwarzbeck Mess - Elektronik	VUSLP9111B	9111B-192	2020/09/02	12
RE	MPA-14	141583	Pre Amplifier	SONOMA INSTRUMENT	310	260833	2021/02/18	12
CE	MSA-03	141884	Spectrum Analyzer	Keysight Technologies Inc	E4448A	MY44020357	2021/03/10	12
CE	MTR-03	141942	Test Receiver	Rohde & Schwarz	ESCI	100300	2020/08/18	12
CE	MAEC-04	142011	AC4_Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-10005	2020/05/25	24
CE	MOS-15	141562	Thermo-Hygrometer	CUSTOM. Inc	CTH-201	0010	2021/01/15	12
CE	MMM-10	141545	DIGITAL HiTESTER	HIOKI E.E. CORPORATION	3805	51201148	2021/01/07	12
CE	MJM-29	142230	Measure	KOMELON	KMC-36	-	-	-

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Test equipment (2/2)

Test Item	Local ID	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Cal Int
CE	COTS-MEMI-02	178648	EMI measurement program	TSJ (Techno Science Japan)	TEPTO-DV	-	-	-
CE	MLS-23	141357	LISN(AMN)	Schwarzbeck Mess - Elektronik	NSLK8127	8127-729	2020/07/22	12
CE	MLS-24	141358	LISN(AMN)	Schwarzbeck Mess - Elektronik	NSLK8127	8127-730	2020/07/22	12
CE	MAT-67	141248	Attenuator	JFW Industries, Inc.	50FP-013H2 N	-	2020/12/07	12
CE	MCC-113	141217	Coaxial cable	Fujikura/Suhner/TSJ	5D-2W/SFM141/421-010/sucoform141-PE/RFM-E121(SW)	-/04178	2020/06/18	12
CE	MTA-54	141936	Terminator	TME	CT-01BP	-	2020/12/04	12
RE	MAEC-03	142008	AC3_Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-10005	2020/05/22	24
RE	MOS-13	141554	Thermo-Hygrometer	CUSTOM. Inc	CTH-201	1301	2021/01/15	12
RE	MMM-08	141532	DIGITAL HiTESTER	HIOKI E.E. CORPORATION	3805	51201197	2021/01/07	12
RE	MJM-16	142183	Measure	KOMELON	KMC-36	-	-	-
RE	MAEC-03-SVSWR	142013	AC3_Semi Anechoic Chamber(SVSWR)	TDK	Semi Anechoic Chamber 3m	DA-10005	2019/04/08	24
RE	MAT-95	142314	Attenuator	Pasternack Enterprises	PE7390-6	D/C 1504	2020/06/17	12
RE	MBA-03	141424	Biconical Antenna	Schwarzbeck Mess - Elektronik	VHA9103+BBA9106	1915	2020/08/13	12
RE	MCC-51	141323	Coaxial cable	UL Japan	-	-	2020/07/06	12
RE	MLA-22	141266	Logperiodic Antenna(200-1000MHz)	Schwarzbeck Mess - Elektronik	VUSLP9111B	9111B-191	2020/08/13	12
RE	MPA-13	141582	Pre Amplifier	SONOMA INSTRUMENT	310	260834	2021/02/18	12
RE	MTR-10	141951	EMI Test Receiver	Rohde & Schwarz	ESR26	101408	2021/03/09	12
CE	MCC-112	141216	Coaxial cable	Fujikura/Suhner/TSJ	5D-2W/SFM14/sucoform141-PE/421-010/RFM-E321(SW)	-/00640	2020/07/06	12

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

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

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

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

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

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