



RADIO TEST REPORT

Test Report No. : 13343708H-B-R1

Applicant : AIPHONE CO., LTD.

Type of EUT : Residential / Tenant station

Model Number of EUT : GT-1C7W-L (Tested Model)
GT-1C7W (Variant Model)

FCC ID : 2ALNEGT1C7W

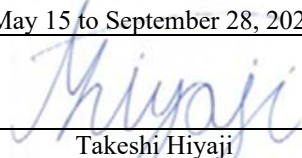
Test regulation : FCC Part 15 Subpart C: 2020

Test Result : Complied (Refer to SECTION 3.2)

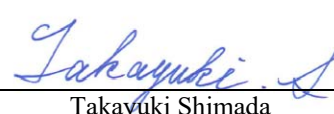
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7. The all test items in this test report are conducted by UL Japan, Inc. Ise EMC Lab.
8. The opinions and the interpretations to the result of the description in this report are outside scopes where UL Japan has been accredited.
9. The information provided from the customer for this report is identified in Section 1.
10. This report is a revised version of 13343708H-B. 13343708H-B is replaced with this report.

Date of test: May 15 to September 28, 2020

Representative test engineer:


Takeshi Hiyaji
Engineer
Consumer Technology Division

Approved by:


Takayuki Shimada
Leader
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.: 13343708H-B

Revision	Test report No.	Date	Page revised	Contents
- (Original)	13343708H-B	October 15, 2020	-	-
1	13343708H-B-R1	November 17, 2020	P 11	Addition of below explanatory note *4) *4) EUT has a metal frame of dedicated wall attachment so after the check the worst case, radiated spurious emission test was performed without attachment.
1	13343708H-B-R1	November 17, 2020	P 12	Correction of list of cables used for No.1 and 2 in Section 4.2: configuration and peripherals No.1: Name: AC Cable, Length (m): 1.8 →Name: DC Cable, Length (m): 0.5 No.2: Name: DC Cable, Length (m): 0.5 →Name: AC Cable, Length (m): 1.8
1	13343708H-B-R1	November 17, 2020	P 44, 46, 47	Replacement to new test data of 2462 MHz for 11g and 11n-20 in APPENDIX 1: test data (power density)
1	13343708H-B-R1	November 17, 2020	P 53	Addition of photo of worst case confirmation in APPENDIX 3: photographs of test setup

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	:	AIPHONE CO., LTD.
Address	:	2-18, Jinno-cho, Atsuta-ku, Nagoya 456-8666, JAPAN
Telephone Number	:	+81-52-681-8721
Facsimile Number	:	+81-52-681-5476
Contact Person	:	Kenichi Idota

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	:	Residential / Tenant station
Model Number	:	GT-1C7W-L (Tested Model) GT-1C7W (Variant Model)
Serial Number	:	Refer to SECTION 4.2
Rating	:	DC 24 V (Residential / Tenant station)
Receipt Date	:	May 14, 2020 (for Antenna Terminal Conducted tests) August 18, 2020 (for Conducted Emission and Radiated Emission tests)
Country of Mass-production	:	Thailand
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: GT-1C7W-L (Tested Model), GT-1C7W (Variant Model) (referred to as the EUT in this report) is a Residential / Tenant station.

Radio Specification

Specification of Wireless LAN (IEEE802.11b/g/n-20)

Type of radio	IEEE802.11b	IEEE802.11g/n (20 M band)
Equipment Type	Transceiver	
Frequency of operation	2412 MHz - 2462 MHz	2412 MHz - 2462 MHz
Type of modulation	DSSS (CCK, DQPSK, DBPSK)	OFDM-CCK (64QAM, 16QAM, QPSK, BPSK)
Antenna type	Dipole antenna	
Antenna Gain	2.1 dBi	
Operating temperature range	-20 deg. C - +70 deg. C	

Variant model

This model has a variant model: GT-1C7W.

	GT-1C7W-L (Tested Model)	GT-1C7W (Variant Model)
Hearing Coil	Presence	Absence

Two models are identical in RF characteristics.

The test was performed with GT-1C7W-L as a representative according to the customer's request.

SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification : FCC Part 15 Subpart C
FCC Part 15 final revised on June 26, 2020 and effective July 27, 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

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

3.2 Procedures and results

Item	Test Procedure	Specification	Worst margin	Results	Remarks
Conducted Emission	FCC: ANSI C63.10-2013 6. Standard test methods ISED: RSS-Gen 8.8	FCC: Section 15.207 ISED: RSS-Gen 8.8	3.10 dB 13.56000 MHz, L, 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	0.2 dB 2483.500 MHz, AV, Vert.	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.

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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

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

3.3 Addition to standard

Item	Test Procedure	Specification	Worst margin	Results	Remarks
99% Occupied Bandwidth	ISED: RSS-Gen 6.7	ISED: -	N/A	- a)	Conducted
a) Refer to APPENDIX 1 (data of 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)	4.8 dB
		(Vertical) 5.0 dB
	200 MHz to 1000 MHz (Horizontal)	5.2 dB
		(Vertical) 6.3 dB
10 m	30 MHz to 200 MHz (Horizontal)	4.8 dB
		(Vertical) 4.8 dB
	200 MHz to 1000 MHz (Horizontal)	5.0 dB
		(Vertical) 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

3.5 Test Location

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*A2LA Certificate Number: 5107.02 / FCC Test Firm Registration Number: 199967 / ISED Lab Company Number: 2973C

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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)

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)	11 Mbps, PN9
IEEE 802.11g (11g)	54 Mbps, PN9
IEEE 802.11n MIMO 20 MHz BW (11n-20)	MCS 6 , 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: 11b: 13 dBm 11g: 11 dBm 11n: 11 dBm Software: Realtime Tuning Tool Version 2.0.0.5.5 (Date: 2020.5.15, Storage location: Driven by connected PC) *This setting of software is the worst case. Any conditions under the normal use do not exceed the condition of setting. In addition, end users cannot change the settings of the output power of the product.	

*The details of Operating mode(s)

Test Item	Operating Mode	Tested Antenna Port	Tested frequency
Conducted Emission	11n-20 Tx *1)	B *3) *4)	2462 MHz
Radiated Spurious Emission below 1 GHz			
Conducted Spurious Emission			
Radiated Spurious Emission above 1 GHz	11b Tx 11n-20 Tx *2)	B *3) *4)	2412 MHz 2442 MHz 2462 MHz
6dB Bandwidth	11b Tx	B *3)	2412 MHz
99% Occupied Bandwidth	11g Tx 11n-20 Tx		2442 MHz 2462 MHz
Maximum Peak Output Power	11b Tx 11g Tx	A, B	2412 MHz 2442 MHz
Average Output Power	11n-20 Tx		2462 MHz
Power Density	11b Tx 11g Tx 11n-20 Tx	B *3)	2412 MHz 2442 MHz 2462 MHz
*1) The mode was tested as a representative, because it has the highest power at antenna terminal test. *2) The test was performed on 11n-20 Tx mode according to “Section 1 of 6 802.11 a/b/g/n testing- Managing Complex Regulatory Approvals - ” of TCB Council Workshop October 2009, as the 11n-20 Tx mode had higher power than 11g mode at antenna terminal test. *3) After the comparison between Antenna A and Antenna B, the test was performed with the antenna that had higher power as a representative. *4) EUT has a metal frame of dedicated wall attachment so after the check the worst case, radiated spurious emission test was performed without attachment.			

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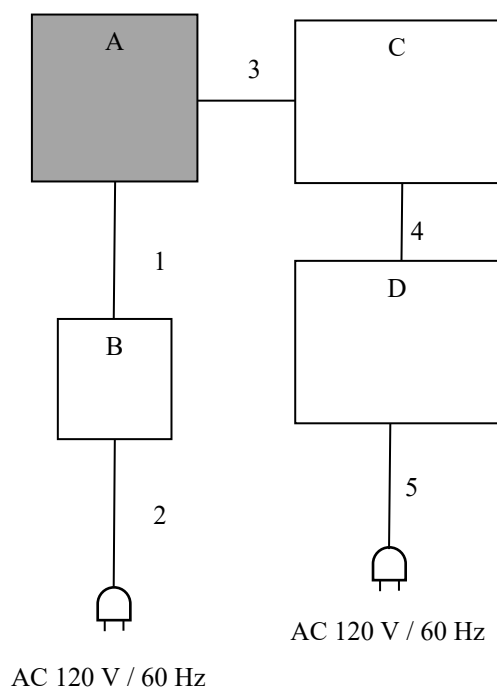
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4.2 Configuration and peripherals

For Antenna Terminal Conducted tests



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

Description of EUT and Support equipment

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	Residential / Tenant station	GT-1C7W-L	J203-147	AIPHONE CO., LTD	EUT
B	AC adapter	PS-2420	J203-065	AIPHONE CO., LTD	
C	Laptop PC	CF-N8HWC DPS	0CKSA09265	Panasonic	
D	AC Adapter	CF-AA6372B	6372BM610X10953E	Panasonic	

List of cables used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	DC Cable	0.5	Unshielded	Unshielded	-
2	AC Cable	1.8	Unshielded	Unshielded	-
3	Signal Cable	0.5	Unshielded	Unshielded	-
4	DC Cable	0.8	Unshielded	Unshielded	-
5	AC Cable	0.8	Unshielded	Unshielded	-

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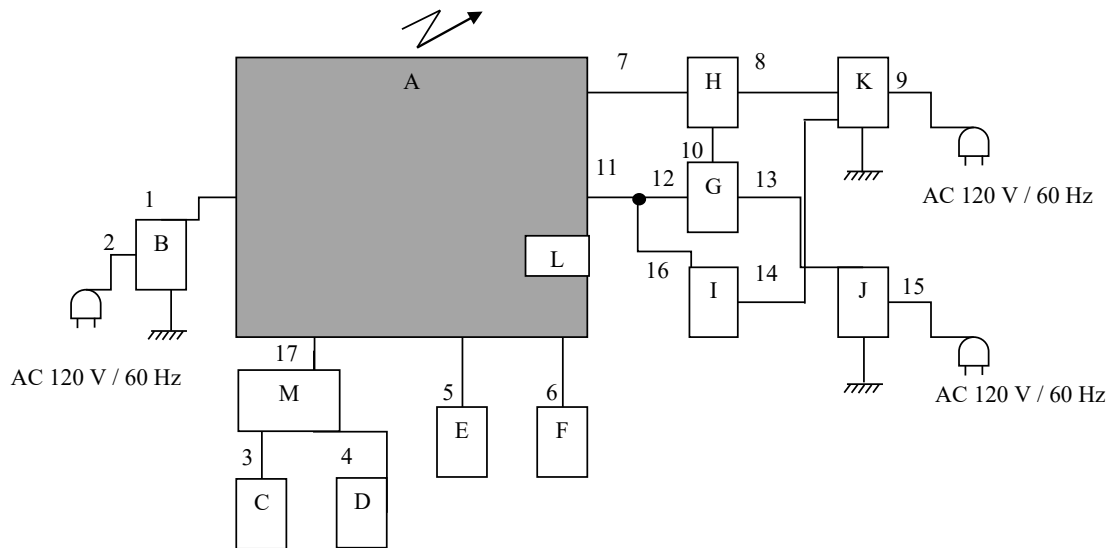
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For Conducted Emission and Radiated Emission tests



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

*As a result of comparing AC 120 V and AC 240 V at pre-check, conducted emission test was performed with AC 120 V of the worst voltage as representative.

Description of EUT and Support equipment

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	Residential / Tenant station	GT-1C7W-L	0000207 R	AIPHONE CO., LTD	EUT
B	AC adapter	PS-2420	J203-410	AIPHONE CO., LTD	EUT
C	Jig board	-	-	-	-
D	Jig board	-	-	-	-
E	Jig board	-	-	-	-
F	Jig board	-	-	-	-
G	Entrance station	GT-DMB-LVN.M	J203-196	AIPHONE CO., LTD	-
H	Video Bus control unit	GT-VBC.M	J203-155	AIPHONE CO., LTD	-
I	Audio Bus control unit	GT-BC.M	-	AIPHONE CO., LTD	-
J	AC adapter	PS-2420	J203-277	AIPHONE CO., LTD	-
K	AC adapter	PS-2420	J203-276	AIPHONE CO., LTD	-
L	SD Card	KM-MCSDHC4X4G	T04GMRTAD721 80050	KINFMAX	-
M	Relay	GT-RY	2594197	AIPHONE CO., LTD	-

List of cables used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	DC Cable	0.8	Unshielded	Unshielded	-
2	AC Cable	1.9	Unshielded	Unshielded	-
3	Signal Cable	2.0	Unshielded	Unshielded	-
4	Signal Cable	2.0	Unshielded	Unshielded	-
5	Signal Cable	2.0	Unshielded	Unshielded	-
6	Signal Cable	2.0	Unshielded	Unshielded	-
7	Signal Cable	1.9	Unshielded	Unshielded	-
8	DC Cable	0.6	Unshielded	Unshielded	-
9	AC Cable	1.9	Unshielded	Unshielded	-
10	Signal Cable	1.8	Unshielded	Unshielded	-
11	Signal Cable	1.6	Unshielded	Unshielded	-
12	Signal Cable	1.8	Unshielded	Unshielded	-
13	DC Cable	2.0	Unshielded	Unshielded	-
14	DC Cable	0.6	Unshielded	Unshielded	-
15	AC Cable	1.9	Unshielded	Unshielded	-
16	Signal Cable	1.9	Unshielded	Unshielded	-
17	Signal Cable	0.5	Unshielded	Unshielded	-

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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.

1) 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.

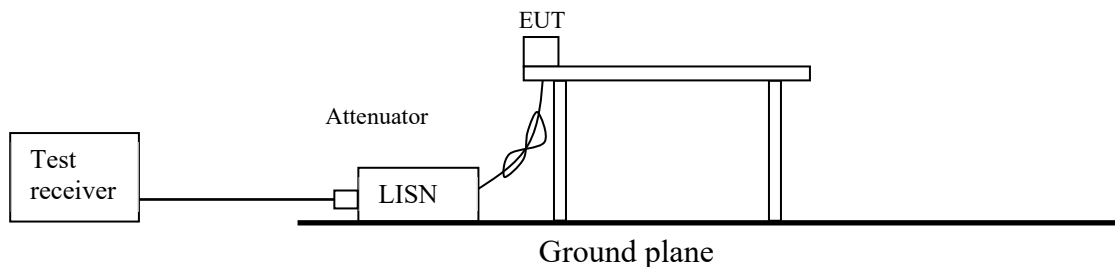
The AC Mains Terminal Continuous disturbance Voltage has been measured with the EUT in a Semi Anechoic Chamber. The EUT was connected to a LISN (AMN).

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	11.12.2.5.1 RBW: 1 MHz VBW: 3 MHz Detector: Power Averaging (RMS) Trace: 100 traces 11.12.2.5.2 The duty cycle was less than 98% for detected noise, a duty factor was added to the 11.12.2.5.1 results.	RBW: 100 kHz VBW: 300 kHz

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

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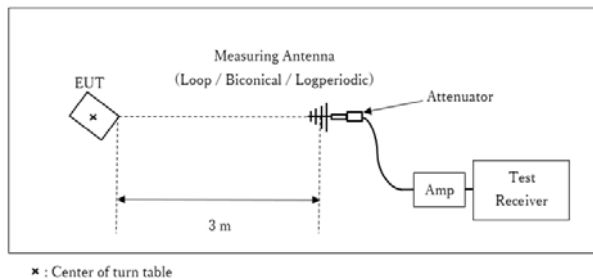
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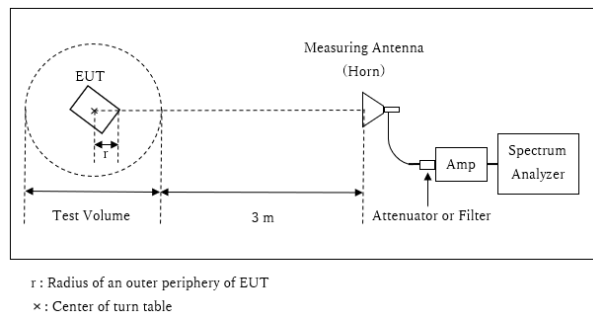
Figure 2: Test Setup

Below 1 GHz



Test Distance: 3 m

1 GHz - 10 GHz



Distance Factor: $20 \times \log (3.9 \text{ m} / 3.0 \text{ m}) = 2.28 \text{ dB}$

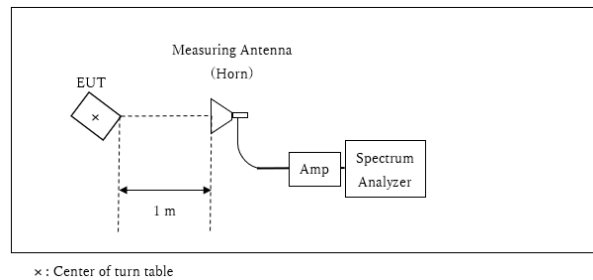
* Test Distance: $(3 + \text{Test Volume} / 2) - r = 3.9 \text{ m}$

Test Volume : 2.0 m

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

r = 0.1 m

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	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)	9kHz to 150kHz	200 Hz	620 Hz	Auto	Peak	Max Hold	Spectrum Analyzer
	150kHz to 30MHz	9.1 kHz	27 kHz				
*1) Peak hold was applied as Worst-case measurement. *2) Reference data *3) Section 11.10.2 Method PKPSD (peak PSD) of "ANSI C63.10-2013". *4) In the frequency range below 30MHz, RBW was narrowed to separate the noise contents. Then, wide-band noise near the limit was checked separately, however the noise was not detected as shown in the chart.							

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.

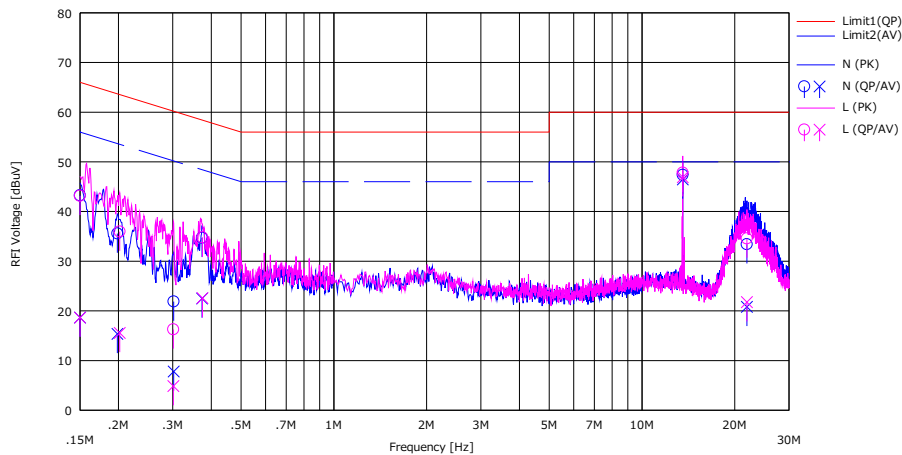
Test data : APPENDIX
Test result : Pass

APPENDIX 1: Test data

Conducted Emission

Report No. 13343708H
Test place Ise EMC Lab. No.4 Semi Anechoic Chamber
Date August 24, 2020
Temperature / Humidity 24 deg. C / 54 % RH
Engineer Masaya Minami
Mode Tx 11n-20

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	30.00	5.40	0.05	13.20	43.25	18.65	66.00	56.00	22.75	37.35	N	
2	0.19845	22.30	2.10	0.05	13.21	35.56	15.36	63.70	53.70	28.14	38.34	N	
3	0.30215	8.60	-5.50	0.06	13.22	21.88	7.78	60.20	50.20	38.32	42.42	N	
4	0.37355	21.40	9.20	0.06	13.23	34.69	22.49	58.40	48.40	23.71	25.91	N	
5	13.56000	33.30	32.40	0.28	13.79	47.37	46.47	60.00	50.00	12.63	3.53	N	
6	21.90000	19.00	6.40	0.43	13.97	33.40	20.80	60.00	50.00	26.60	29.20	N	
7	0.15000	29.90	5.40	0.06	13.20	43.16	18.66	66.00	56.00	22.84	37.34	L	
8	0.20185	22.70	2.30	0.05	13.21	35.96	15.56	63.50	53.50	27.54	37.94	L	
9	0.30130	3.00	-8.40	0.05	13.22	16.27	4.87	60.20	50.20	43.93	45.33	L	
10	0.37500	21.50	9.30	0.05	13.23	34.78	22.58	58.40	48.40	23.62	25.82	L	
11	13.56000	33.70	32.80	0.31	13.79	47.80	46.90	60.00	50.00	12.20	3.10	L	
12	21.90000	20.10	7.30	0.49	13.97	34.56	21.76	60.00	50.00	25.44	28.24	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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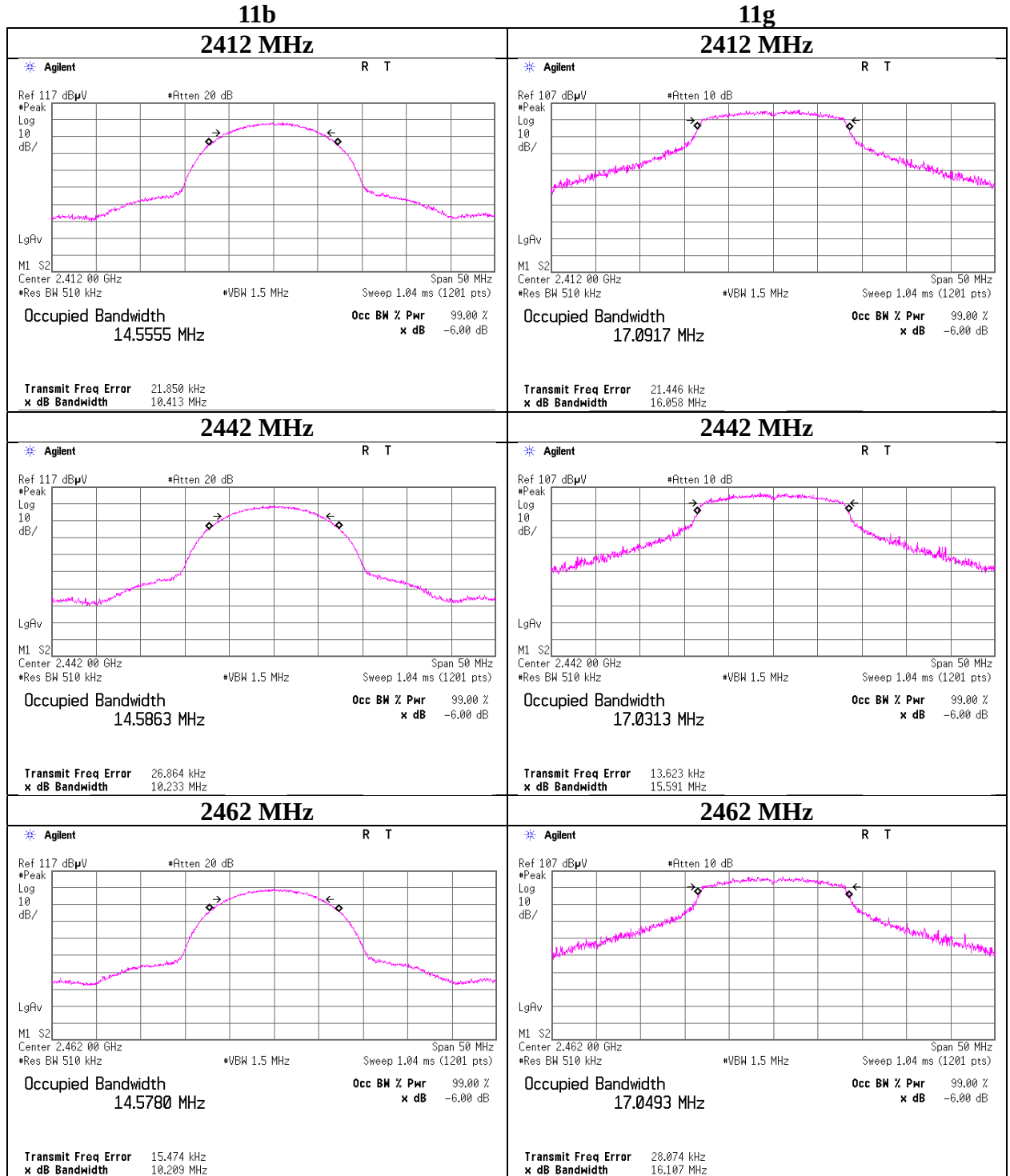
6 dB Bandwidth and 99 % Occupied Bandwidth

Report No. 13343708H
Test place Ise EMC Lab. No. 6 Shielded Room
Date May 19, 2020
Temperature / Humidity 23 deg. C / 69 % RH
Engineer Tomohisa Nakagawa
Mode Tx

Antenna port B

Mode	Frequency [MHz]	99% Occupied Bandwidth [kHz]	6dB Bandwidth [MHz]	Limit for 6dB Bandwidth [MHz]
11b	2412	14555.5	10.783	> 0.5000
	2442	14586.3	10.491	> 0.5000
	2462	14578.0	9.496	> 0.5000
11g	2412	17091.7	15.690	> 0.5000
	2442	17031.3	15.110	> 0.5000
	2462	17049.3	15.112	> 0.5000
11n-20	2412	18176.1	15.825	> 0.5000
	2442	18038.2	15.109	> 0.5000
	2462	18050.6	15.090	> 0.5000

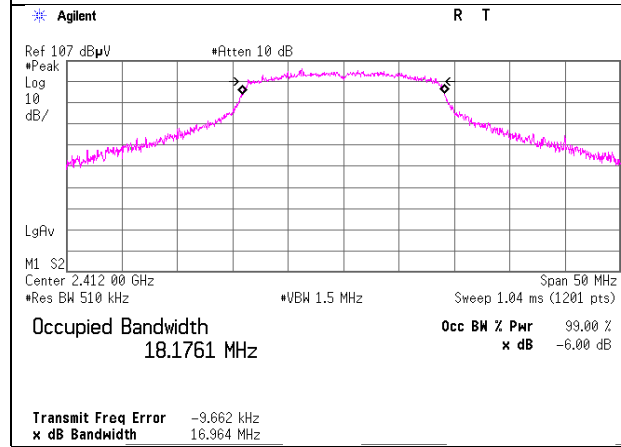
99 % Occupied Bandwidth



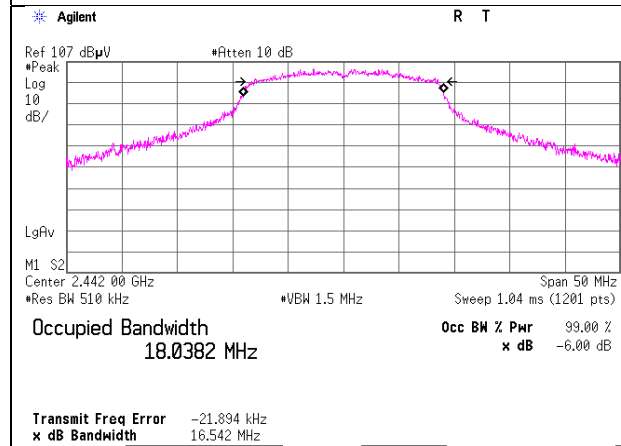
99 % Occupied Bandwidth

11n-20

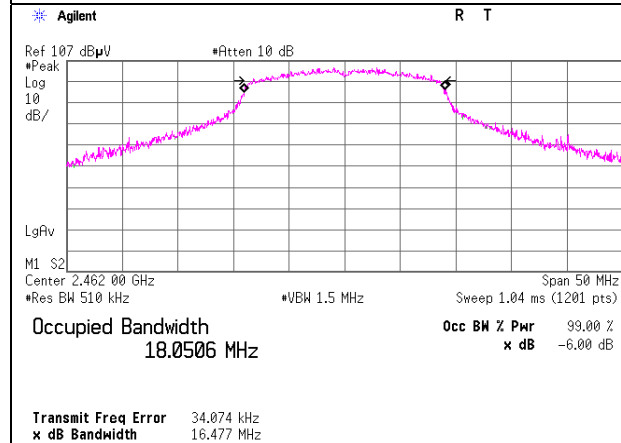
2412 MHz



2442 MHz



2462 MHz



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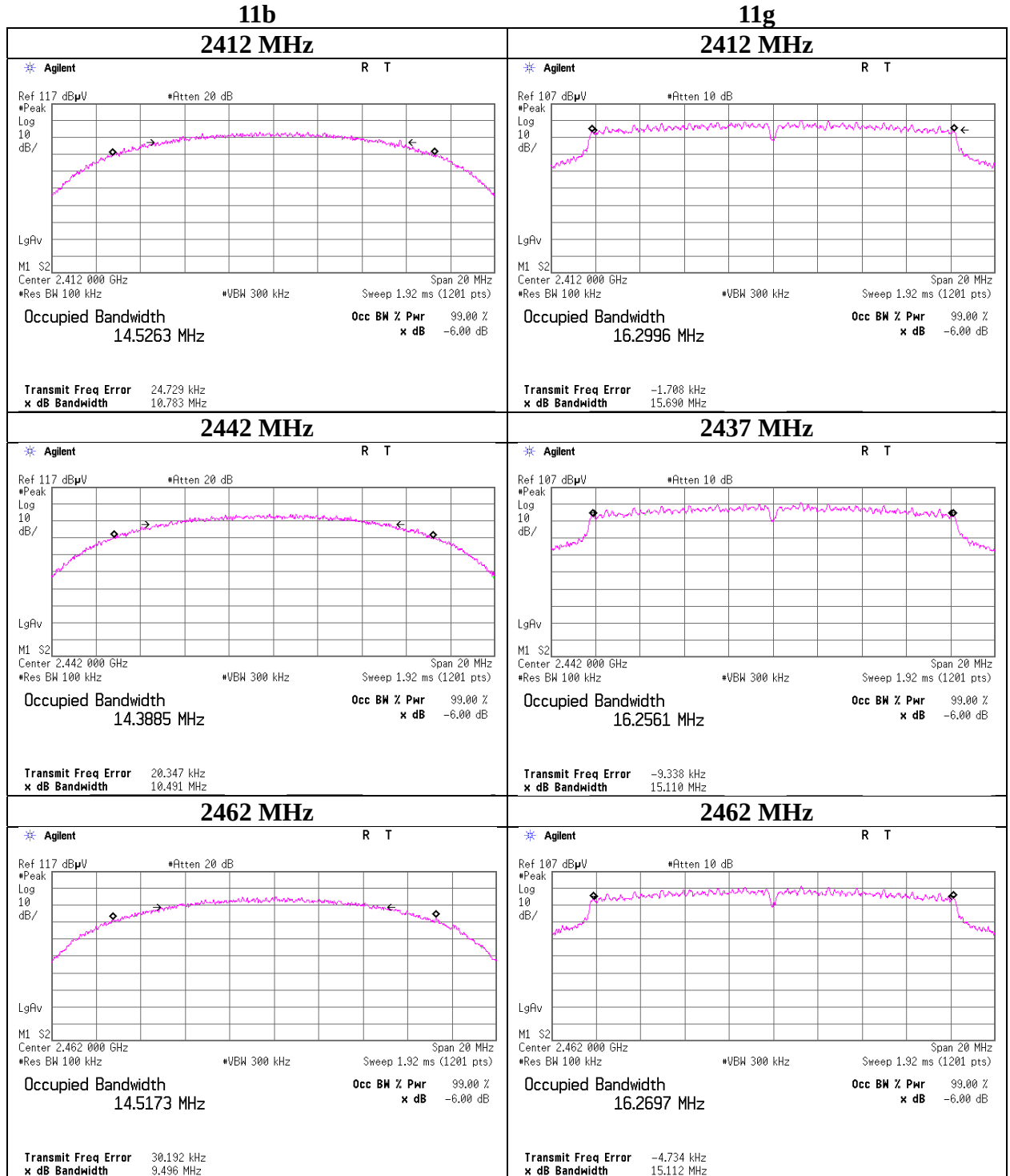
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6 dB Bandwidth



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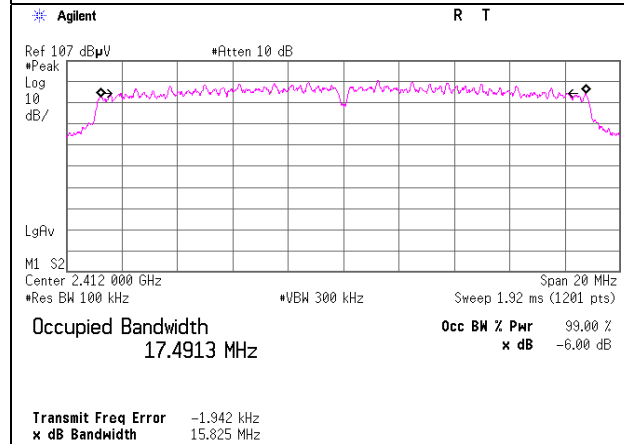
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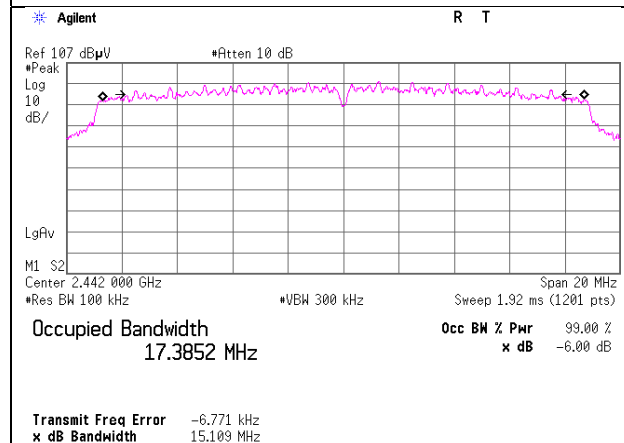
6 dB Bandwidth

11n-20

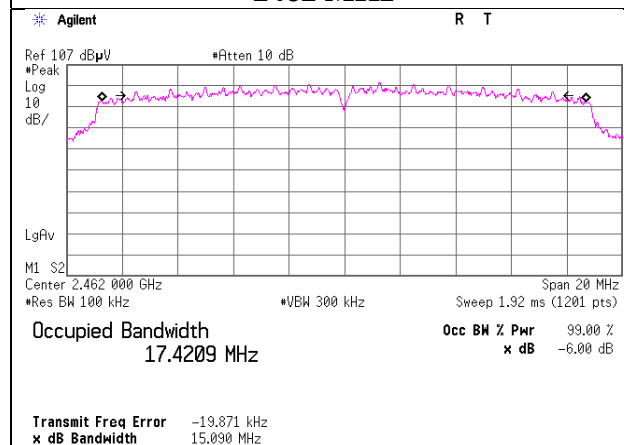
2412 MHz



2442 MHz



2462 MHz



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Maximum Peak Output Power

Report No. 13343708H
Test place Ise EMC Lab. No. 6 Shielded Room
Date May 19, 2020 May 15, 2020
Temperature / Humidity 23 deg. C / 69 % RH 24 deg. C / 50 % RH
Engineer Tomohisa Nakagawa Tomohisa Nakagawa
Mode Tx 11b For rate check

Antenna port A				Conducted Power					e.i.r.p. for RSS-247					
Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result		Limit		Margin [dB]	Antenna Gain [dBi]	Result		Limit		Margin [dB]
				[dBm]	[mW]	[dBm]	[mW]			[dBm]	[mW]	[dBm]	[mW]	
2412	4.22	0.12	9.49	13.83	24.15	30.00	1000	16.17	2.10	15.93	39.17	36.02	4000	20.09
2442	4.72	0.12	9.49	14.33	27.10	30.00	1000	15.67	2.10	16.43	43.95	36.02	4000	19.59
2462	4.99	0.12	9.49	14.60	28.84	30.00	1000	15.40	2.10	16.70	46.77	36.02	4000	19.32

Antenna port B				Conducted Power					e.i.r.p. for RSS-247					
Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result		Limit		Margin [dB]	Antenna Gain [dBi]	Result		Limit		Margin [dB]
				[dBm]	[mW]	[dBm]	[mW]			[dBm]	[mW]	[dBm]	[mW]	
2412	4.63	0.12	9.49	14.24	26.55	30.00	1000	15.76	2.10	16.34	43.05	36.02	4000	19.68
2442	5.17	0.12	9.49	14.78	30.06	30.00	1000	15.22	2.10	16.88	48.75	36.02	4000	19.14
2462	5.35	0.12	9.49	14.96	31.33	30.00	1000	15.04	2.10	17.06	50.82	36.02	4000	18.96

Sample Calculation:

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

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

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

2442 MHz

Rate	Port A	Port B	Preamble
[Mbps]	Reading [dBm]	Reading [dBm]	
1	6.03	-	Long
2	6.03	-	Long
5.5	6.03	-	Long
11	6.05	6.36	Long*
11	6.04	6.33	Short

*: Worst Rate

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

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Maximum Peak Output Power

Report No. 13343708H
Test place Ise EMC Lab. No. 6 Shielded Room
Date May 19, 2020 May 15, 2020
Temperature / Humidity 23 deg. C / 69 % RH 24 deg. C / 50 % RH
Engineer Tomohisa Nakagawa Tomohisa Nakagawa
Mode Tx 11g For rate check

Antenna port A				Conducted Power					e.i.r.p. for RSS-247					
Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result		Limit		Margin [dB]	Antenna Gain [dBi]	Result		Limit		Margin [dB]
				[dBm]	[mW]	[dBm]	[mW]			[dBm]	[mW]	[dBm]	[mW]	
2412	7.82	0.12	9.49	17.43	55.34	30.00	1000	12.57	2.10	19.53	89.74	36.02	4000	16.49
2442	7.89	0.12	9.49	17.50	56.23	30.00	1000	12.50	2.10	19.60	91.20	36.02	4000	16.42
2462	8.65	0.12	9.49	18.26	66.99	30.00	1000	11.74	2.10	20.36	108.64	36.02	4000	15.66

Antenna port B				Conducted Power					e.i.r.p. for RSS-247					
Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result		Limit		Margin [dB]	Antenna Gain [dBi]	Result		Limit		Margin [dB]
				[dBm]	[mW]	[dBm]	[mW]			[dBm]	[mW]	[dBm]	[mW]	
2412	8.29	0.12	9.49	17.90	61.66	30.00	1000	12.10	2.10	20.00	100.00	36.02	4000	16.02
2442	8.85	0.12	9.49	18.46	70.15	30.00	1000	11.54	2.10	20.56	113.76	36.02	4000	15.46
2462	9.03	0.12	9.49	18.64	73.11	30.00	1000	11.36	2.10	20.74	118.58	36.02	4000	15.28

Sample Calculation:

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

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

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

Antenna A, 2442 MHz

Rate [Mbps]	Port A Reading [dBm]	Port B Reading [dBm]	Remark
6	7.93	-	
9	7.93	-	
12	7.87	-	
18	8.03	-	
24	8.04	-	
36	8.00	-	
48	8.04	-	
54	8.23	8.66	*

*: Worst Rate

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

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Maximum Peak Output Power

Report No. 13343708H
Test place Ise EMC Lab. No. 6 Shielded Room
Date May 19, 2020 May 15, 2020
Temperature / Humidity 23 deg. C / 69 % RH 24 deg. C / 50 % RH
Engineer Tomohisa Nakagawa Tomohisa Nakagawa
Mode Tx 11n-20 For rate check

Antenna port A				Conducted Power					e.i.r.p. for RSS-247					
Freq.	Reading	Cable Loss	Atten. Loss	Result		Limit		Margin	Antenna Gain	Result		Limit		Margin
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[mW]	[dBm]	[mW]	[dB]	[dBi]	[dBm]	[mW]	[dBm]	[mW]	[dB]
2412	7.81	0.12	9.49	17.42	55.21	30.00	1000	12.58	2.10	19.52	89.54	36.02	4000	16.50
2442	8.25	0.12	9.49	17.86	61.09	30.00	1000	12.14	2.10	19.96	99.08	36.02	4000	16.06
2462	8.61	0.12	9.49	18.22	66.37	30.00	1000	11.78	2.10	20.32	107.65	36.02	4000	15.70

Antenna port B				Conducted Power					e.i.r.p. for RSS-247					
Freq.	Reading	Cable Loss	Atten. Loss	Result		Limit		Margin	Antenna Gain	Result		Limit		Margin
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[mW]	[dBm]	[mW]	[dB]	[dBi]	[dBm]	[mW]	[dBm]	[mW]	[dB]
2412	8.31	0.12	9.49	17.92	61.94	30.00	1000	12.08	2.10	20.02	100.46	36.02	4000	16.00
2442	8.76	0.12	9.49	18.37	68.71	30.00	1000	11.63	2.10	20.47	111.43	36.02	4000	15.55
2462	9.04	0.12	9.49	18.65	73.28	30.00	1000	11.35	2.10	20.75	118.85	36.02	4000	15.27

Sample Calculation:

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

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

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

Antenna A, 2442 MHz, Mix Mode (Long)

MCS Number	Port A Reading [dBm]	Port B Reading [dBm]	Remark
0	7.79	-	
1	7.82	-	
2	7.92	-	
3	7.99	-	
4	8.02	-	
5	7.92	-	
6	-	8.60	Greenfield (Long)
6	-	8.60	Sounding (Long)
6	-	8.66	Mix Mode (Short)
6	8.12	8.68	Mix Mode (Long)*
7	7.98	-	

* Worst Condition

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

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Average Output Power **(Reference data for RF Exposure)**

Report No. 13343708H
Test place Ise EMC Lab. No. 6 Shielded Room
Date May 19, 2020
Temperature / Humidity 23 deg. C / 69 % RH
Engineer Tomohisa Nakagawa
Mode Tx

11b 1 Mbps Antenna port A

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Time average)		Duty factor [dB]	Result (Burst power average)	
				[dBm]	[mW]		[dBm]	[mW]
2412	2.19	0.12	9.49	11.80	15.14	0.07	11.87	15.38
2442	2.94	0.12	9.49	12.55	17.99	0.07	12.62	18.28
2462	2.96	0.12	9.49	12.57	18.07	0.07	12.64	18.37

11g 6 Mbps

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Time average)		Duty factor [dB]	Result (Burst power average)	
				[dBm]	[mW]		[dBm]	[mW]
2412	-0.68	0.12	9.49	8.93	7.82	0.45	9.38	8.67
2442	-0.18	0.12	9.49	9.43	8.77	0.45	9.88	9.73
2462	0.16	0.12	9.49	9.77	9.48	0.45	10.22	10.52

11n-20 MCS 0

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Time average)		Duty factor [dB]	Result (Burst power average)	
				[dBm]	[mW]		[dBm]	[mW]
2412	-0.58	0.12	9.49	9.03	8.00	0.47	9.50	8.91
2442	0.00	0.12	9.49	9.61	9.14	0.47	10.08	10.19
2462	0.28	0.12	9.49	9.89	9.75	0.47	10.36	10.86

Sample Calculation:

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

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

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

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.

Average Output Power **(Reference data for RF Exposure)**

Report No. 13343708H
Test place Ise EMC Lab. No. 6 Shielded Room
Date May 19, 2020
Temperature / Humidity 23 deg. C / 69 % RH
Engineer Tomohisa Nakagawa
Mode Tx

11b 1 Mbps Antenna port B

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Time average)		Duty factor [dB]	Result (Burst power average)	
				[dBm]	[mW]		[dBm]	[mW]
2412	2.64	0.12	9.49	12.25	16.79	0.07	12.32	17.06
2442	3.16	0.12	9.49	12.77	18.92	0.07	12.84	19.23
2462	3.37	0.12	9.49	12.98	19.86	0.07	13.05	20.18

11g 6 Mbps

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Time average)		Duty factor [dB]	Result (Burst power average)	
				[dBm]	[mW]		[dBm]	[mW]
2412	-0.21	0.12	9.49	9.40	8.71	0.45	9.85	9.66
2442	0.30	0.12	9.49	9.91	9.79	0.45	10.36	10.86
2462	0.52	0.12	9.49	10.13	10.30	0.45	10.58	11.43

11n-20 MCS 0

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Time average)		Duty factor [dB]	Result (Burst power average)	
				[dBm]	[mW]		[dBm]	[mW]
2412	-0.01	0.12	9.49	9.60	9.12	0.47	10.07	10.16
2442	0.47	0.12	9.49	10.08	10.19	0.47	10.55	11.35
2462	0.67	0.12	9.49	10.28	10.67	0.47	10.75	11.89

Sample Calculation:

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

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

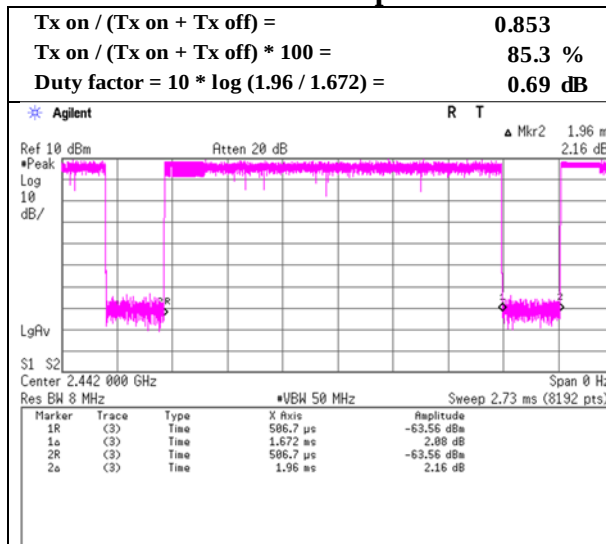
*The equipment and cables were not used for factor 0 dB of the data sheets.

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.

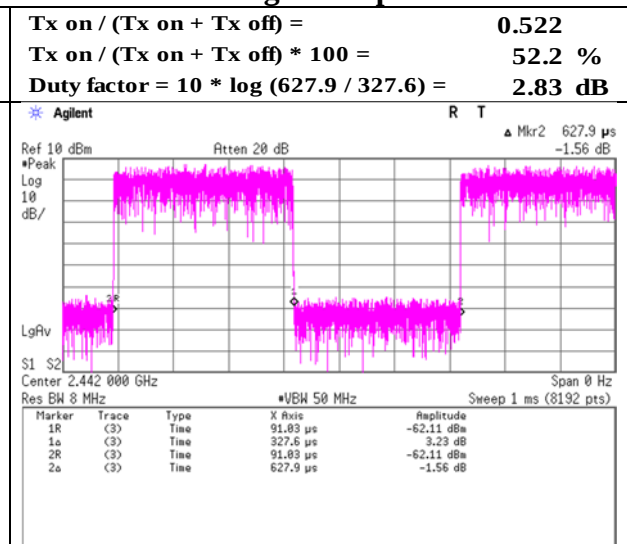
Burst rate confirmation

Report No. 13343708H
Test place Ise EMC Lab. No. 6 Shielded Room
Date May 19, 2020
Temperature / Humidity 23 deg. C / 69 % RH
Engineer Tomohisa Nakagawa
Mode Tx

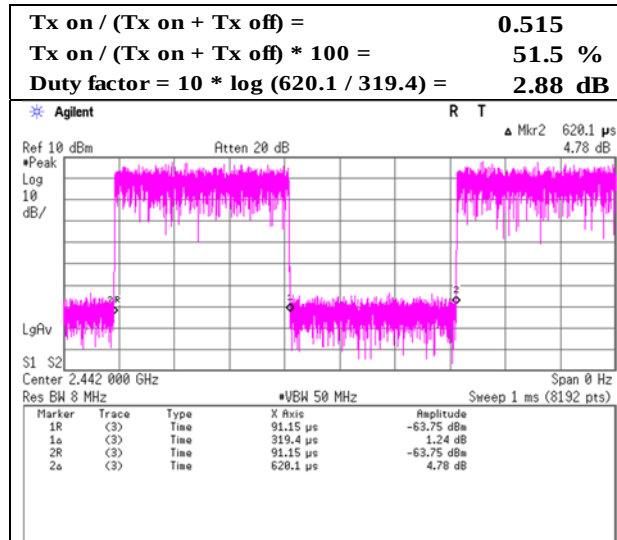
11b 11 Mbps



11g 54 Mbps



11n-20 MCS 6

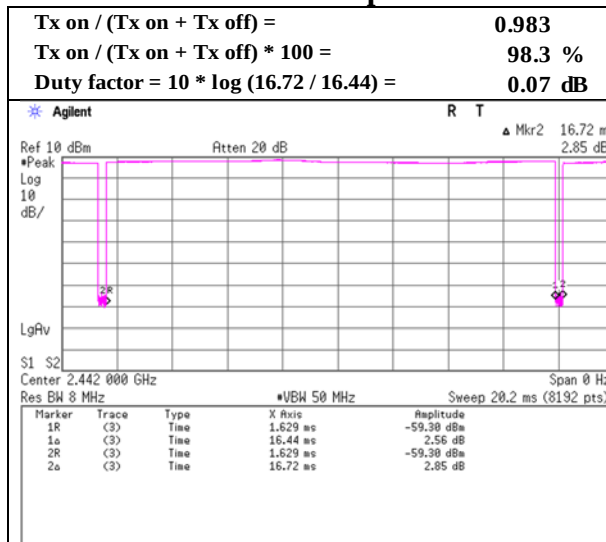


* Since the burst rate is not different between the channels, the data has been obtained on the representative channel.

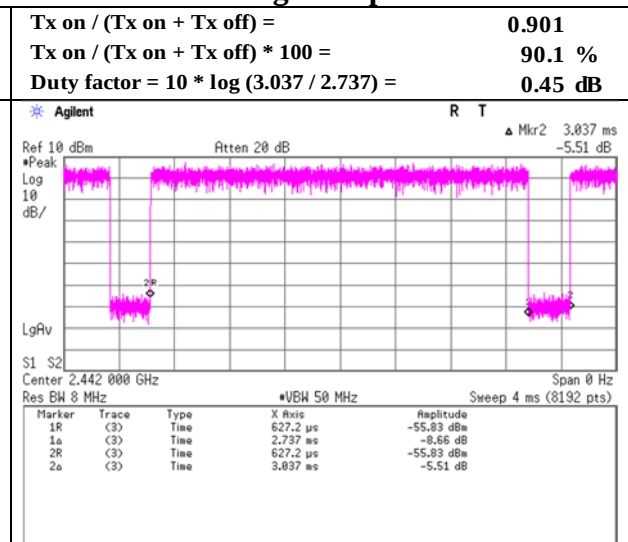
Burst rate confirmation

Report No. 13343708H
Test place Ise EMC Lab. No. 6 Shielded Room
Date May 19, 2020
Temperature / Humidity 23 deg. C / 69 % RH
Engineer Tomohisa Nakagawa
Mode Tx

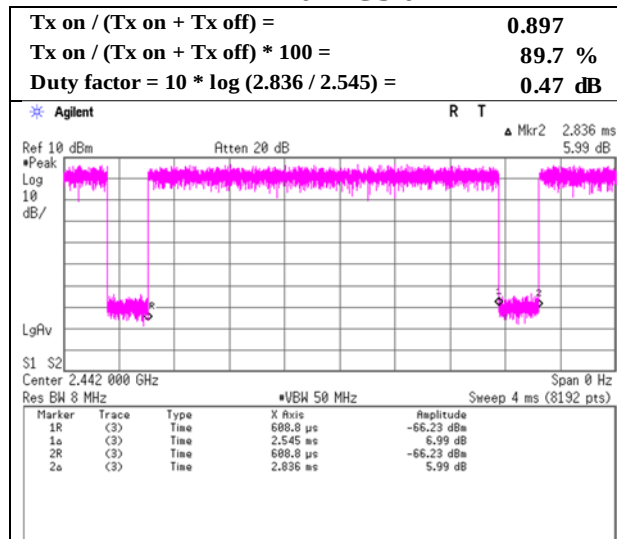
11b 1 Mbps



11g 6 Mbps



11n-20 MCS 0



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

Radiated Spurious Emission

Report No. 13343708H
Test place Ise EMC Lab.
Semi Anechoic Chamber No.4
Date August 23, 2020 August 23, 2020
Temperature / Humidity 22 deg. C / 52 % RH 22 deg. C / 47 % RH
Engineer Takeshi Hiyaji Yuta Moriya
(1 GHz - 10 GHz) (10 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	5.3	31.9	-	53.0	73.9	20.9	
Hori.	4824.000	PK	41.8	31.6	7.5	31.3	-	49.6	73.9	24.3	
Hori.	7236.000	PK	42.2	36.5	8.8	32.4	-	55.0	73.9	18.9	Floor noise
Hori.	9648.000	PK	40.8	38.1	9.5	32.8	-	55.6	73.9	18.3	Floor noise
Hori.	2390.000	AV	44.1	27.8	5.3	31.9	0.7	46.1	53.9	7.8	*1)
Hori.	4824.000	AV	31.7	31.6	7.5	31.3	0.7	40.2	53.9	13.7	
Hori.	7236.000	AV	31.2	36.5	8.8	32.4	-	44.0	53.9	9.9	Floor noise
Hori.	9648.000	AV	31.0	38.1	9.5	32.8	-	45.8	53.9	8.1	Floor noise
Vert.	2390.000	PK	52.0	27.8	5.3	31.9	-	53.3	73.9	20.6	
Vert.	4824.000	PK	43.9	31.6	7.5	31.3	-	51.7	73.9	22.2	
Vert.	7236.000	PK	41.7	36.5	8.8	32.4	-	54.5	73.9	19.4	Floor noise
Vert.	9648.000	PK	43.0	38.1	9.5	32.8	-	57.8	73.9	16.1	Floor noise
Vert.	2390.000	AV	43.7	27.8	5.3	31.9	0.7	45.7	53.9	8.3	*1)
Vert.	4824.000	AV	32.2	31.6	7.5	31.3	0.7	40.7	53.9	13.2	
Vert.	7236.000	AV	31.2	36.5	8.8	32.4	-	44.0	53.9	9.9	Floor noise
Vert.	9648.000	AV	30.8	38.1	9.5	32.8	-	45.5	53.9	8.4	Floor noise

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 $20\log(3.9\text{ m} / 3.0\text{ m}) = 2.28\text{ dB}$
10 GHz - 26.5 GHz $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.5\text{ dB}$

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

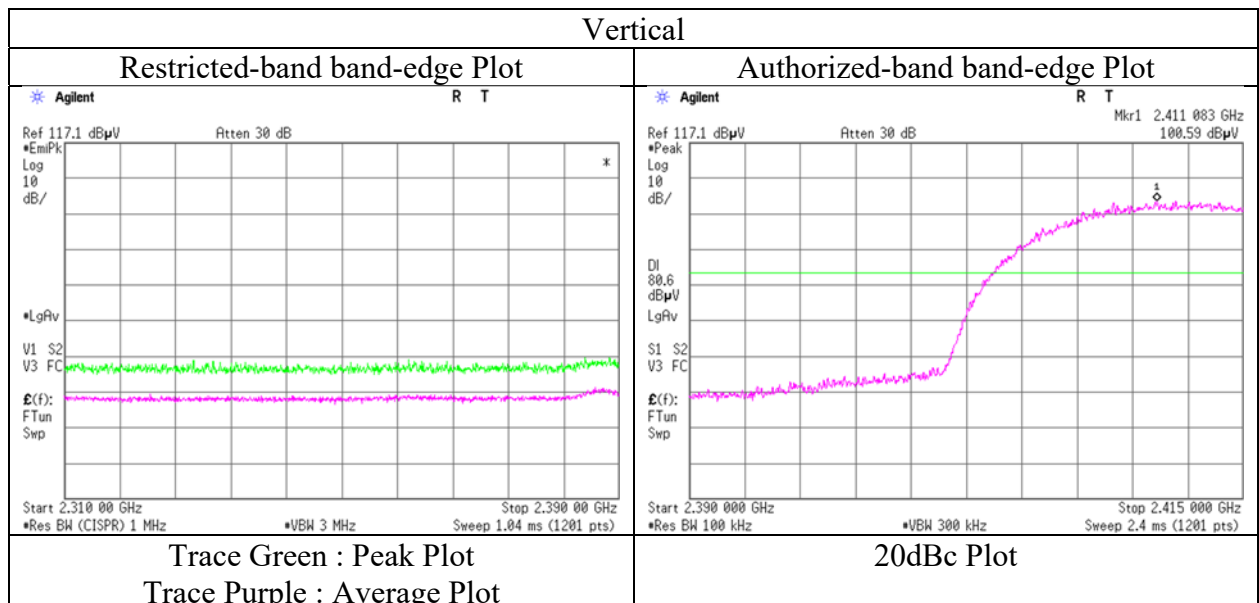
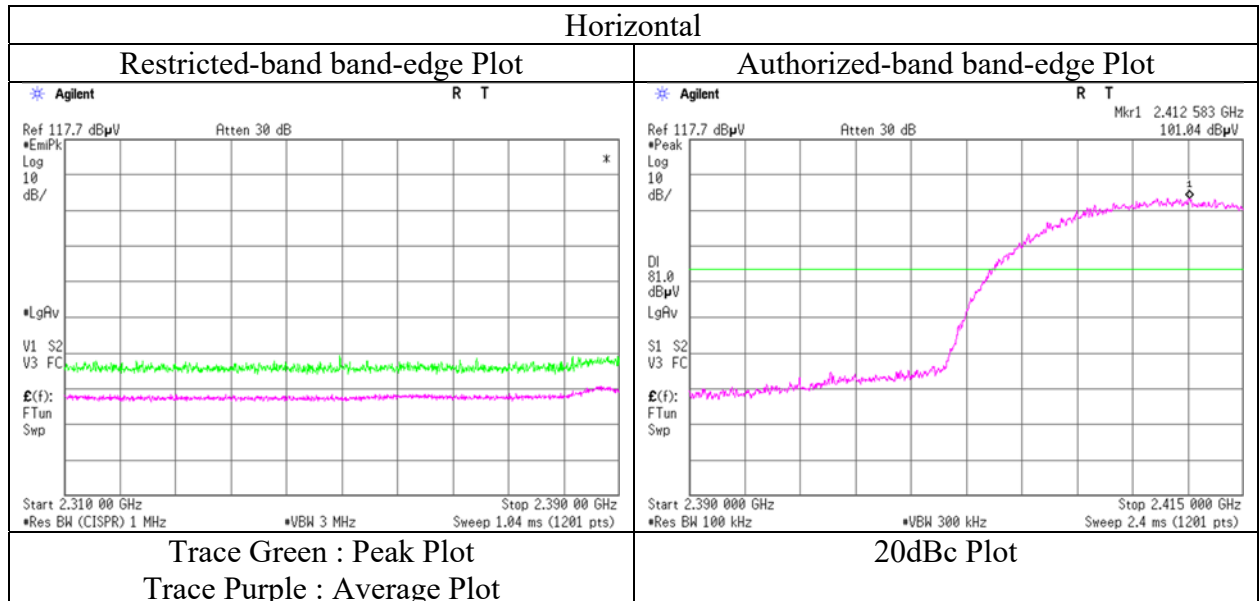
20dBc Data Sheet

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2412.000	PK	101.0	27.8	5.3	31.9	102.3	-	-	Carrier
Hori.	2400.000	PK	51.4	27.8	5.3	31.9	52.7	82.3	29.6	
Vert.	2412.000	PK	100.6	27.8	5.3	31.9	101.9	-	-	Carrier
Vert.	2400.000	PK	51.7	27.8	5.3	31.9	53.0	81.9	28.9	

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.	13343708H
Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.4
Date	August 23, 2020
Temperature / Humidity	22 deg. C / 52 % RH
Engineer	Takeshi Hiyaji
	(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.

Ise EMC Lab.

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

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Radiated Spurious Emission

Report No. 13343708H
Test place Ise EMC Lab.
Semi Anechoic Chamber No.4
Date August 23, 2020 August 23, 2020
Temperature / Humidity 22 deg. C / 52 % RH 22 deg. C / 47 % RH
Engineer Takeshi Hiyaji Yuta Moriya
(1 GHz - 10 GHz) (10 GHz - 26.5 GHz)
Mode Tx 11b 2442 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.	4884.000	PK	41.0	31.6	7.5	31.2	-	48.9	73.9	25.0	
Hori.	7326.000	PK	41.4	36.6	8.8	32.5	-	54.3	73.9	19.6	Floor noise
Hori.	9768.000	PK	40.9	38.5	9.6	32.9	-	56.0	73.9	17.9	Floor noise
Hori.	4884.000	AV	33.3	31.6	7.5	31.2	0.7	41.8	53.9	12.1	
Hori.	7326.000	AV	33.3	36.6	8.8	32.5	-	46.3	53.9	7.6	Floor noise
Hori.	9768.000	AV	32.2	38.5	9.6	32.9	-	47.3	53.9	6.6	Floor noise
Vert.	4884.000	PK	43.5	31.6	7.5	31.2	-	51.3	73.9	22.6	
Vert.	7326.000	PK	39.7	36.6	8.8	32.5	-	52.7	73.9	21.2	Floor noise
Vert.	9768.000	PK	40.2	38.5	9.6	32.9	-	55.4	73.9	18.5	Floor noise
Vert.	4884.000	AV	35.3	31.6	7.5	31.2	0.7	43.8	53.9	10.1	
Vert.	7326.000	AV	33.2	36.6	8.8	32.5	-	46.1	53.9	7.8	Floor noise
Vert.	9768.000	AV	31.9	38.5	9.6	32.9	-	47.1	53.9	6.8	Floor noise

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 $20\log(3.9\text{ m} / 3.0\text{ m}) = 2.28\text{ dB}$
10 GHz - 26.5 GHz $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.5\text{ dB}$

Radiated Spurious Emission

Report No. 13343708H
Test place Ise EMC Lab.
Semi Anechoic Chamber No.4
Date August 23, 2020 August 23, 2020
Temperature / Humidity 22 deg. C / 52 % RH 22 deg. C / 47 % RH
Engineer Takeshi Hiyaji Yuta Moriya
(1 GHz - 10 GHz) (10 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	51.0	27.7	5.4	31.8	-	52.3	73.9	21.6	
Hori.	4924.000	PK	41.2	31.5	7.5	31.2	-	49.1	73.9	24.8	
Hori.	7386.000	PK	41.4	36.7	8.8	32.5	-	54.4	73.9	19.5	Floor noise
Hori.	9848.000	PK	41.4	38.7	9.6	32.9	-	56.8	73.9	17.2	Floor noise
Hori.	2483.500	AV	43.1	27.7	5.4	31.8	0.7	45.0	53.9	8.9	*1)
Hori.	4924.000	AV	30.8	31.5	7.5	31.2	0.7	39.3	53.9	14.6	
Hori.	7386.000	AV	31.1	36.7	8.8	32.5	-	44.1	53.9	9.8	Floor noise
Hori.	9848.000	AV	31.4	38.7	9.6	32.9	-	46.8	53.9	7.1	Floor noise
Vert.	2483.500	PK	51.7	27.7	5.4	31.8	-	53.0	73.9	20.9	
Vert.	4924.000	PK	43.4	31.5	7.5	31.2	-	51.3	73.9	22.7	
Vert.	7386.000	PK	41.6	36.7	8.8	32.5	-	54.6	73.9	19.3	Floor noise
Vert.	9848.000	PK	42.5	38.7	9.6	32.9	-	57.9	73.9	16.0	Floor noise
Vert.	2483.500	AV	43.8	27.7	5.4	31.8	0.7	45.7	53.9	8.2	*1)
Vert.	4924.000	AV	31.4	31.5	7.5	31.2	0.7	39.9	53.9	14.0	
Vert.	7386.000	AV	31.1	36.7	8.8	32.5	-	44.1	53.9	9.8	Floor noise
Vert.	9848.000	AV	31.4	38.7	9.6	32.9	-	46.8	53.9	7.1	Floor noise

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

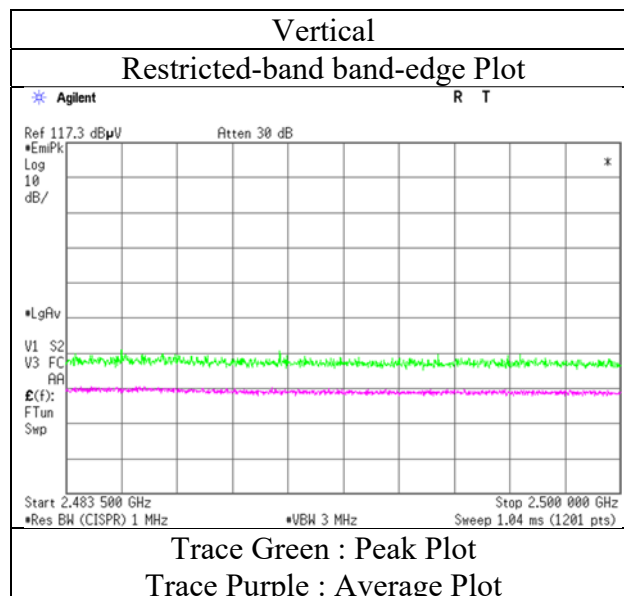
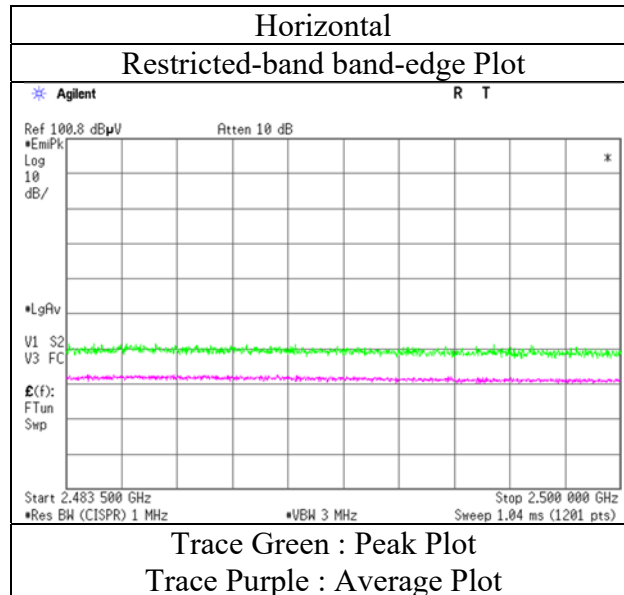
*Other frequency noises omitted in this report were not seen or had enough margin (more than 20 dB).

Distance factor: 1 GHz - 10 GHz $20\log(3.9\text{ m} / 3.0\text{ m}) = 2.28\text{ dB}$
10 GHz - 26.5 GHz $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.5\text{ dB}$

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

Radiated Spurious Emission **(Reference Plot for band-edge)**

Report No. 13343708H
Test place Ise EMC Lab.
Semi Anechoic Chamber No.4
Date August 23, 2020
Temperature / Humidity 22 deg. C / 52 % RH
Engineer Takeshi Hiyaji
(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.

Ise EMC Lab.

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Radiated Spurious Emission

Report No. 13343708H
Test place Ise EMC Lab.
Semi Anechoic Chamber No.4
Date August 23, 2020 August 23, 2020
Temperature / Humidity 22 deg. C / 52 % RH 22 deg. C / 47 % RH
Engineer Takeshi Hiyaji Yuta Moriya
(1 GHz - 10 GHz) (10 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	60.9	27.8	5.3	31.9	-	62.1	73.9	11.8	
Hori.	4824.000	PK	40.6	31.6	7.5	31.3	-	48.5	73.9	25.4	Floor noise
Hori.	7236.000	PK	40.2	36.5	8.8	32.4	-	53.1	73.9	20.8	Floor noise
Hori.	9648.000	PK	41.0	38.1	9.5	32.8	-	55.8	73.9	18.1	Floor noise
Hori.	2390.000	AV	48.0	27.8	5.3	31.9	2.9	52.1	53.9	1.8	*1)
Hori.	4824.000	AV	30.3	31.6	7.5	31.3	-	38.2	53.9	15.7	Floor noise
Hori.	7236.000	AV	31.2	36.5	8.8	32.4	-	44.0	53.9	9.9	Floor noise
Hori.	9648.000	AV	31.2	38.1	9.5	32.8	-	46.0	53.9	7.9	Floor noise
Vert.	2390.000	PK	61.3	27.8	5.3	31.9	-	62.6	73.9	11.3	
Vert.	4824.000	PK	41.3	31.6	7.5	31.3	-	49.2	73.9	24.7	Floor noise
Vert.	7236.000	PK	41.0	36.5	8.8	32.4	-	53.8	73.9	20.1	Floor noise
Vert.	9648.000	PK	42.2	38.1	9.5	32.8	-	56.9	73.9	17.0	Floor noise
Vert.	2390.000	AV	49.2	27.8	5.3	31.9	2.9	53.4	53.9	0.5	*1)
Vert.	4824.000	AV	30.6	31.6	7.5	31.3	-	38.5	53.9	15.4	Floor noise
Vert.	7236.000	AV	31.1	36.5	8.8	32.4	-	43.9	53.9	10.0	Floor noise
Vert.	9648.000	AV	31.6	38.1	9.5	32.8	-	46.4	53.9	7.5	Floor noise

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 $20\log(3.9\text{ m} / 3.0\text{ m}) = 2.28\text{ dB}$

10 GHz - 26.5 GHz $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.5\text{ dB}$

*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.	2412.000	PK	97.8	27.8	5.3	31.9	99.1	-	-	Carrier
Hori.	2400.000	PK	67.7	27.8	5.3	31.9	69.0	79.1	10.1	
Vert.	2412.000	PK	98.1	27.8	5.3	31.9	99.4	-	-	Carrier
Vert.	2400.000	PK	67.6	27.8	5.3	31.9	68.9	79.4	10.4	

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

UL Japan, Inc.

Ise EMC Lab.

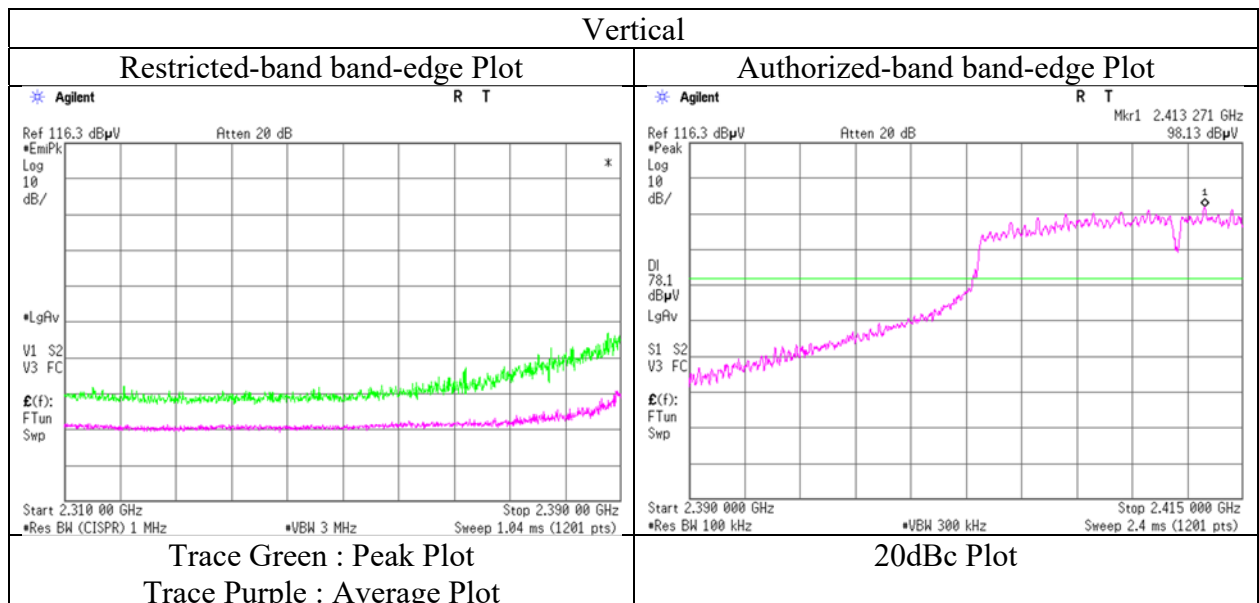
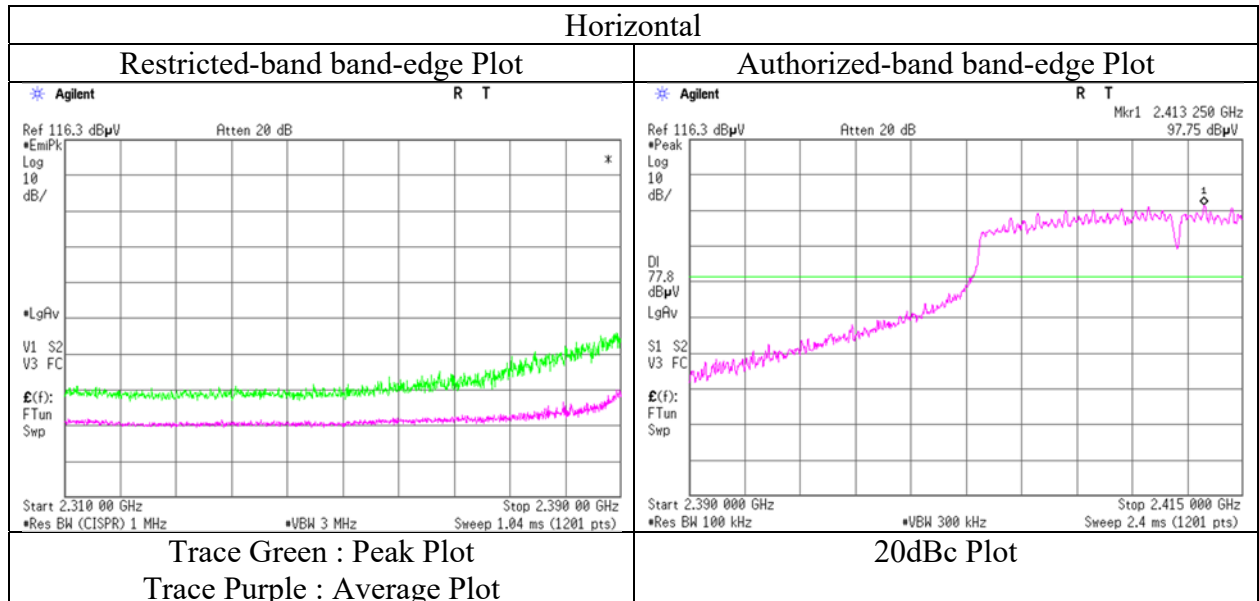
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8999

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Radiated Spurious Emission (Reference Plot for band-edge)

Report No.	13343708H
Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.4
Date	August 23, 2020
Temperature / Humidity	22 deg. C / 52 % RH
Engineer	Takeshi Hiyaji
	(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.

UL Japan, Inc.

Ise EMC Lab.

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

Telephone : +81 596 24 8999

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Radiated Spurious Emission

Report No. 13343708H
Test place Ise EMC Lab.
Semi Anechoic Chamber No.4
Date August 23, 2020 August 23, 2020
Temperature / Humidity 22 deg. C / 52 % RH 22 deg. C / 47 % RH
Engineer Takeshi Hiyaji Yuta Moriya
(1 GHz - 10 GHz) (10 GHz - 26.5 GHz)
Mode Tx 11n-20 2442 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.	4884.000	PK	40.9	31.6	7.5	31.2	-	48.7	73.9	25.2	Floor noise
Hori.	7326.000	PK	41.2	36.6	8.8	32.5	-	54.1	73.9	19.8	Floor noise
Hori.	9768.000	PK	41.6	38.5	9.6	32.9	-	56.8	73.9	17.1	Floor noise
Hori.	4884.000	AV	30.3	31.6	7.5	31.2	-	38.1	53.9	15.8	Floor noise
Hori.	7326.000	AV	31.4	36.6	8.8	32.5	-	44.3	53.9	9.6	Floor noise
Hori.	9768.000	AV	31.6	38.5	9.6	32.9	-	46.8	53.9	7.1	Floor noise
Vert.	4884.000	PK	40.8	31.6	7.5	31.2	-	48.6	73.9	25.3	Floor noise
Vert.	7326.000	PK	41.1	36.6	8.8	32.5	-	54.0	73.9	19.9	Floor noise
Vert.	9768.000	PK	41.5	38.5	9.6	32.9	-	56.6	73.9	17.3	Floor noise
Vert.	4884.000	AV	30.3	31.6	7.5	31.2	-	38.1	53.9	15.8	Floor noise
Vert.	7326.000	AV	31.5	36.6	8.8	32.5	-	44.5	53.9	9.5	Floor noise
Vert.	9768.000	AV	31.5	38.5	9.6	32.9	-	46.7	53.9	7.2	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 (3.9 m / 3.0 m) = 2.28 dB
10 GHz - 26.5 GHz 20log (1.0 m / 3.0 m) = -9.5 dB

Radiated Spurious Emission

Report No. 13343708H
Test place Ise EMC Lab.
Semi Anechoic Chamber No.4
Date August 23, 2020 August 23, 2020
Temperature / Humidity 22 deg. C / 52 % RH 22 deg. C / 47 % RH
Engineer Takeshi Hiyaji Yuta Moriya
(1 GHz - 10 GHz) (10 GHz - 26.5 GHz)
(Below 1 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.	87.502	QP	36.1	9.2	8.0	31.9	-	21.3	40.0	18.7	
Hori.	122.033	QP	33.0	10.9	8.3	31.9	-	20.3	43.5	23.2	
Hori.	263.425	QP	35.8	12.4	9.5	31.8	-	25.9	46.0	20.1	
Hori.	359.620	QP	33.2	15.2	10.1	31.8	-	26.7	46.0	19.3	
Hori.	501.725	QP	33.5	17.9	10.9	31.9	-	30.4	46.0	15.6	
Hori.	515.283	QP	37.2	17.9	11.0	31.9	-	34.2	46.0	11.8	
Hori.	2483.500	PK	63.9	27.7	5.4	31.8	-	65.1	73.9	8.8	
Hori.	4924.000	PK	40.3	31.5	7.5	31.2	-	48.1	73.9	25.8	Floor noise
Hori.	7386.000	PK	40.8	36.7	8.8	32.5	-	53.8	73.9	20.1	Floor noise
Hori.	9848.000	PK	42.5	38.7	9.6	32.9	-	57.9	73.9	16.0	Floor noise
Hori.	2483.500	AV	48.5	27.7	5.4	31.8	2.9	52.6	53.9	1.3	*1)
Hori.	4924.000	AV	30.6	31.5	7.5	31.2	-	38.4	53.9	15.5	Floor noise
Hori.	7386.000	AV	31.1	36.7	8.8	32.5	-	44.1	53.9	9.8	Floor noise
Hori.	9848.000	AV	31.3	38.7	9.6	32.9	-	46.7	53.9	7.2	Floor noise
Vert.	52.120	QP	37.5	9.6	7.5	32.0	-	22.6	40.0	17.4	
Vert.	84.437	QP	33.8	9.1	7.9	31.9	-	18.8	40.0	21.2	
Vert.	94.914	QP	34.2	9.5	8.0	31.9	-	19.8	43.5	23.7	
Vert.	122.033	QP	37.5	10.9	8.3	31.9	-	24.8	43.5	18.7	
Vert.	501.725	QP	36.3	17.9	10.9	31.9	-	33.2	46.0	12.8	
Vert.	528.842	QP	35.6	17.6	11.1	31.9	-	32.4	46.0	13.6	
Vert.	2483.500	PK	65.2	27.7	5.4	31.8	-	66.5	73.9	7.4	
Vert.	4924.000	PK	42.0	31.5	7.5	31.2	-	49.8	73.9	24.1	Floor noise
Vert.	7386.000	PK	42.6	36.7	8.8	32.5	-	55.6	73.9	18.3	Floor noise
Vert.	9848.000	PK	42.8	38.7	9.6	32.9	-	58.2	73.9	15.7	Floor noise
Vert.	2483.500	AV	49.6	27.7	5.4	31.8	2.9	53.7	53.9	0.2	*1)
Vert.	4924.000	AV	29.8	31.5	7.5	31.2	-	37.6	53.9	16.3	Floor noise
Vert.	7386.000	AV	31.3	36.7	8.8	32.5	-	44.2	53.9	9.7	Floor noise
Vert.	9848.000	AV	31.3	38.7	9.6	32.9	-	46.7	53.9	7.2	Floor noise

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).

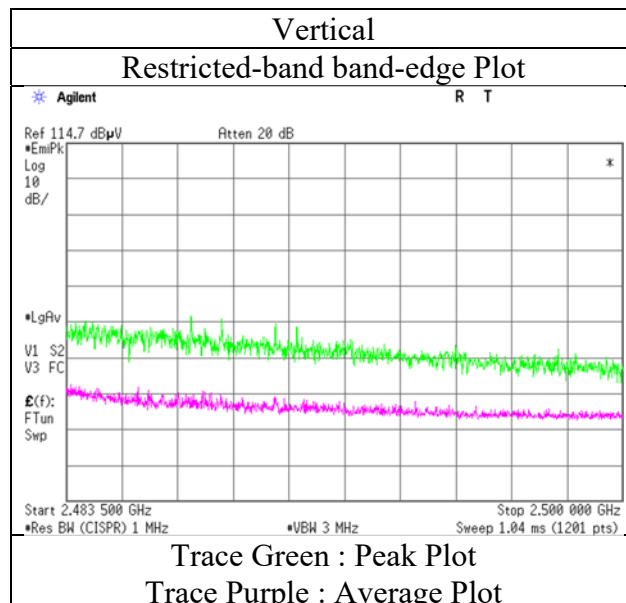
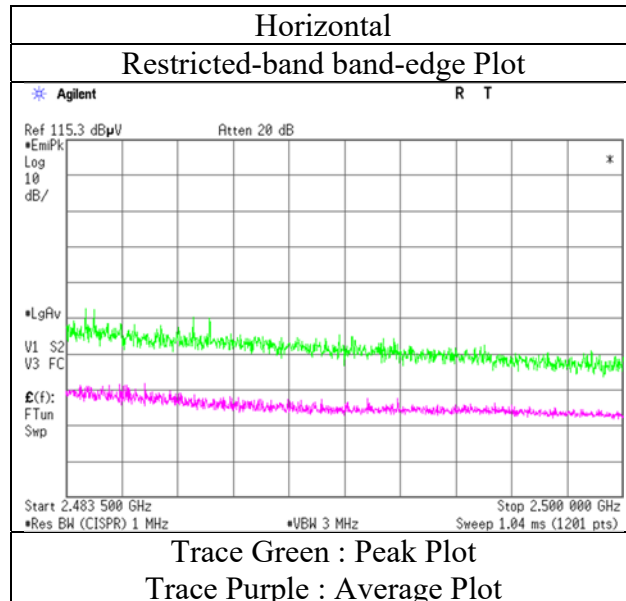
Distance factor: 1 GHz - 10 GHz $20\log(3.9\text{ m} / 3.0\text{ m}) = 2.28\text{ dB}$

10 GHz - 26.5 GHz $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.5\text{ dB}$

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

Radiated Spurious Emission **(Reference Plot for band-edge)**

Report No. 13343708H
Test place Ise EMC Lab.
Semi Anechoic Chamber No.4
Date August 23, 2020
Temperature / Humidity 22 deg. C / 52 % RH
Engineer Takeshi Hiyaji
(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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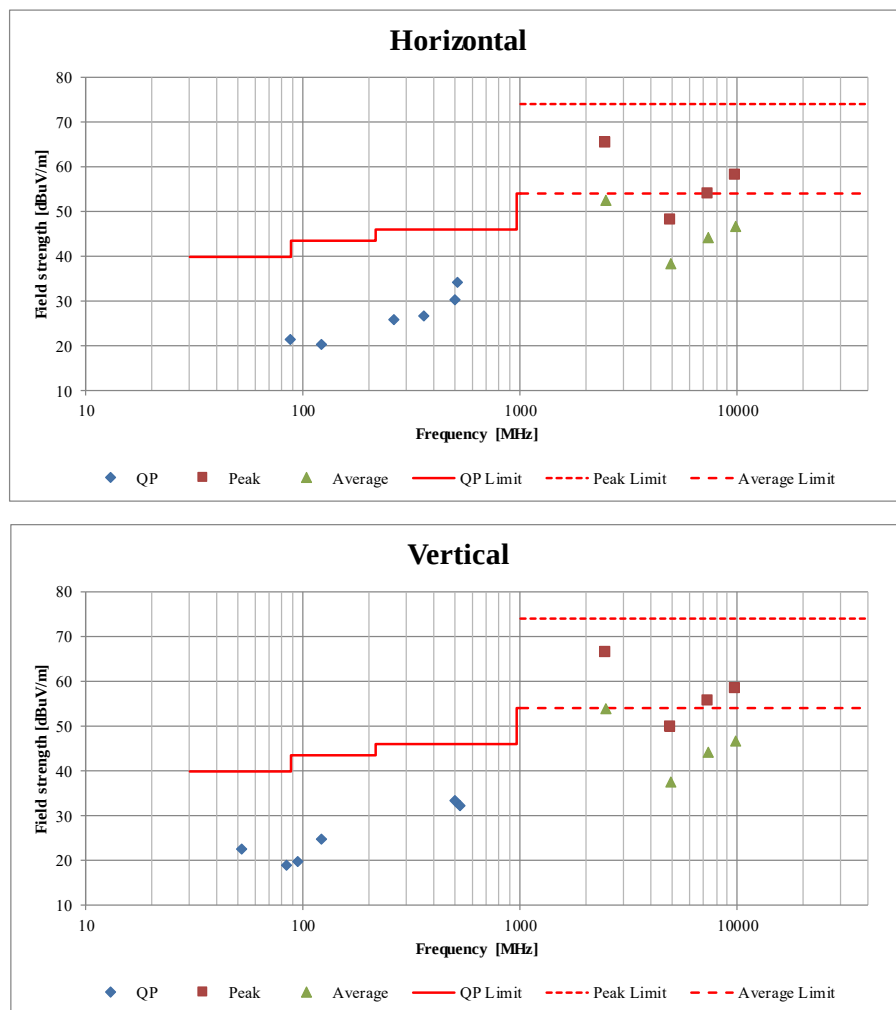
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Radiated Spurious Emission **(Plot data, Worst case)**

Report No.	13343708H	
Test place	Ise EMC Lab.	
Semi Anechoic Chamber	No.4	
Date	August 23, 2020	August 23, 2020
Temperature / Humidity	22 deg. C / 52 % RH	22 deg. C / 47 % RH
Engineer	Takeshi Hiyaji (1 GHz - 10 GHz)	Yuta Moriya (10 GHz - 26.5 GHz) (Below 1 GHz)
Mode	Tx 11n-20 2462 MHz	



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

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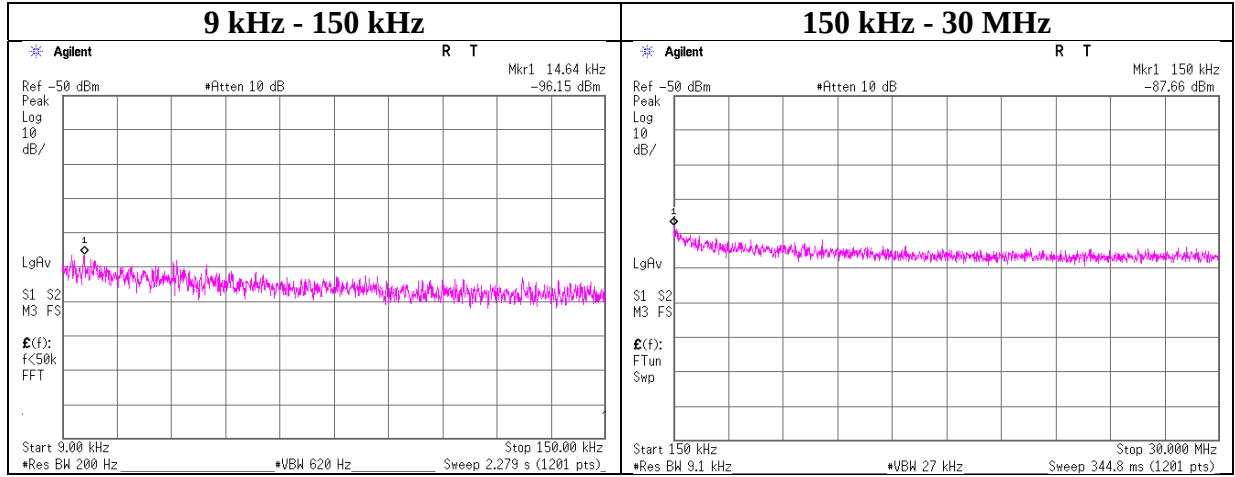
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Conducted Spurious Emission

Report No.	13343708H
Test place	Ise EMC Lab. No. 7 Shielded Room
Date	September 28, 2020
Temperature / Humidity	24 deg. C / 58 % RH
Engineer	Tomohisa Nakagawa
Mode	Tx 11n-20 2462 MHz



Frequency [kHz]	Reading [dBm]	Cable Loss [dB]	Attenuator Loss [dB]	Antenna Gain [dBi]	N (Number of Output)	EIRP [dBm]	Distance [m]	Ground bounce [dB]	E (field strength) [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
14.64	-96.2	0.12	9.9	2.1	1	-84.1	300	6.0	-22.8	44.2	67.0	
150.00	-87.7	0.12	9.9	2.1	1	-75.6	300	6.0	-14.3	24.0	38.3	

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

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

N: Number of output

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Power Density

Report No. 13343708H
Test place Ise EMC Lab. No. 6 Shielded Room
Date May 19, 2020
Temperature / Humidity 23 deg. C / 69 % RH
Engineer Tomohisa Nakagawa
Mode Tx

11b Antenna port B

Freq.	Reading	Cable Loss	Atten. Loss	Result	Limit	Margin
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[dBm]	[dB]
2412.00	-19.42	0.12	9.49	-9.81	8.00	17.81
2442.00	-20.40	0.12	9.49	-10.79	8.00	18.79
2462.00	-20.72	0.12	9.49	-11.11	8.00	19.11

11g Antenna port B

Freq.	Reading	Cable Loss	Atten. Loss	Result	Limit	Margin
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[dBm]	[dB]
2412.00	-24.88	0.12	9.49	-15.27	8.00	23.27
2442.00	-24.04	0.12	9.49	-14.43	8.00	22.43
2462.00	-23.90	0.12	9.49	-14.29	8.00	22.29

11n-20 Antenna port B

Freq.	Reading	Cable Loss	Atten. Loss	Result	Limit	Margin
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[dBm]	[dB]
2412.00	-24.99	0.12	9.49	-15.38	8.00	23.38
2442.00	-23.98	0.12	9.49	-14.37	8.00	22.37
2462.00	-23.10	0.12	9.49	-13.49	8.00	21.49

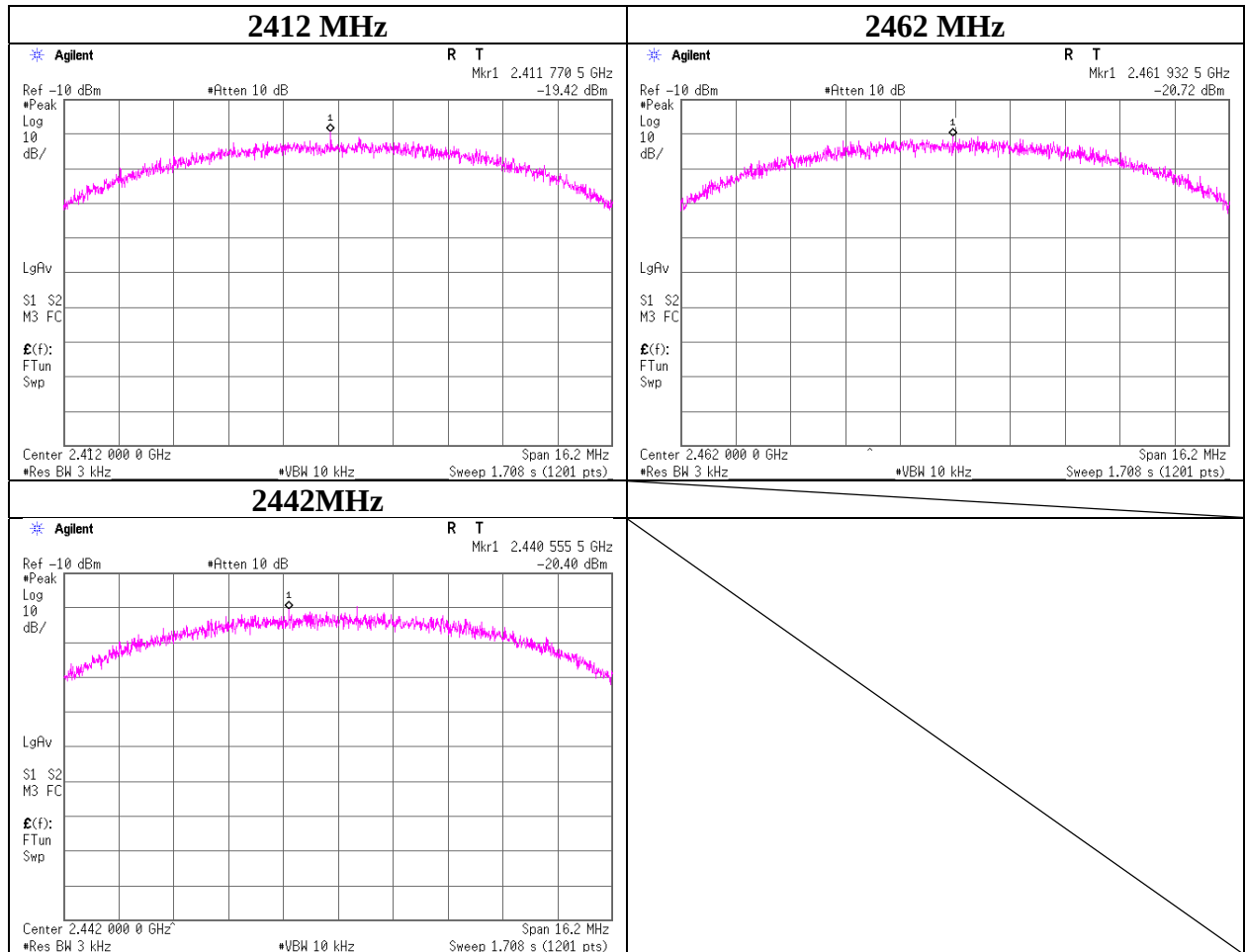
Sample Calculation:

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

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

Power Density

11b



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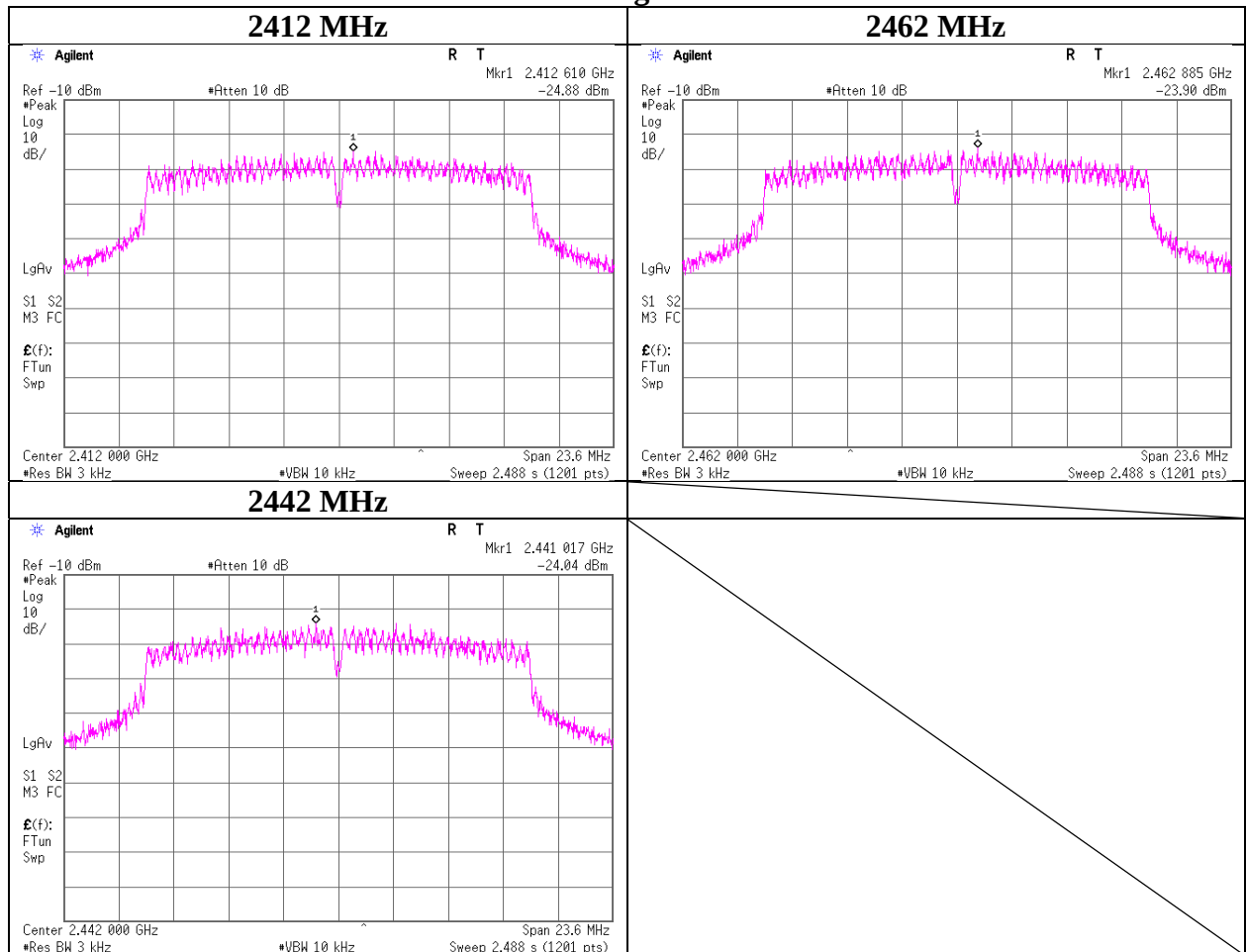
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11g



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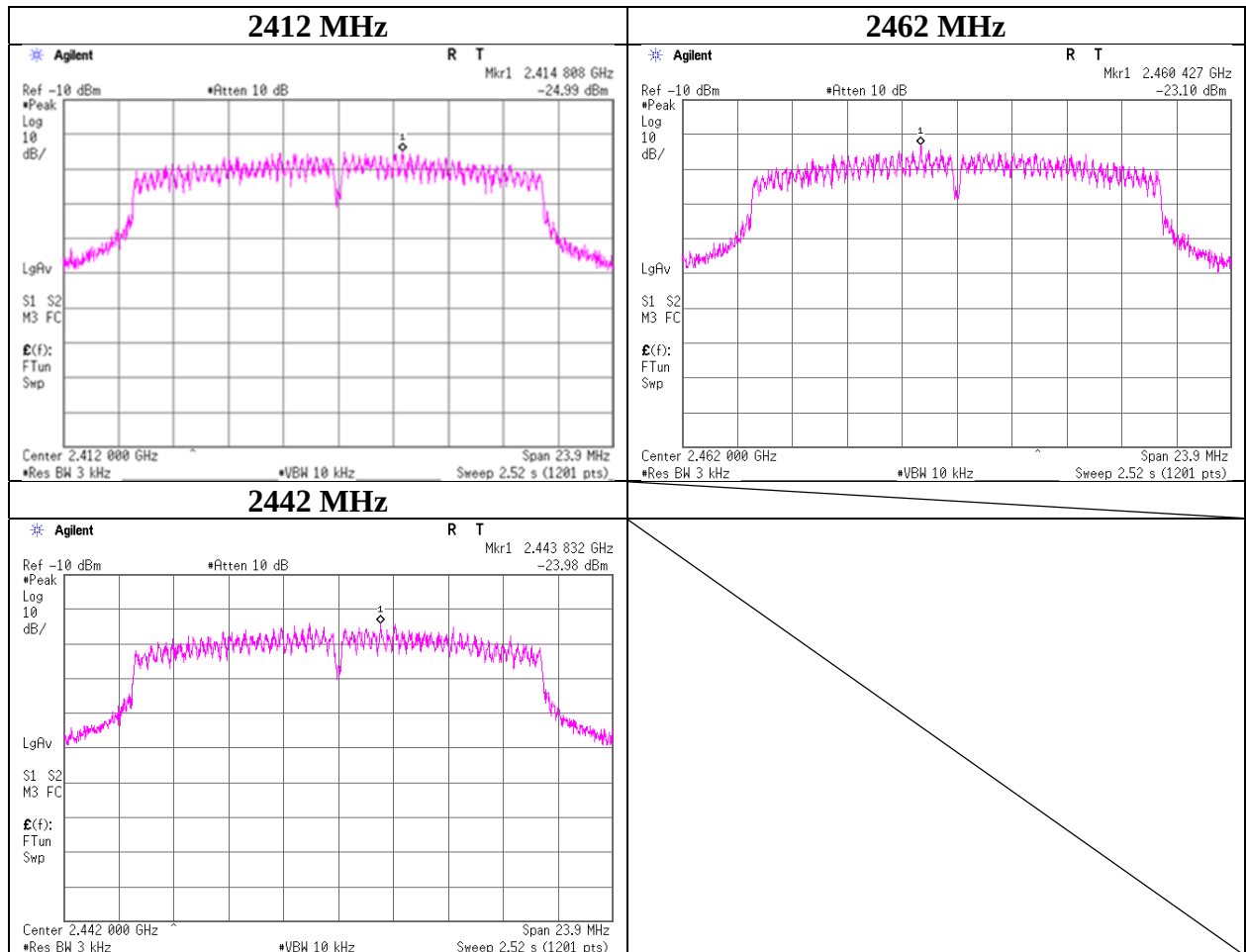
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11n-20



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APPENDIX 2: Test instruments

Test equipment

Test Item	Local ID	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Cal Int
RE	MAEC-04	142011	AC4 Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-10005	2020/05/25	24
RE	MOS-15	141562	Thermo-Hygrometer	CUSTOM. Inc	CTH-201	0010	2020/01/07	12
RE	MMM-10	141545	DIGITAL HiTESTER	Hioki	3805	51201148	2020/01/06	12
RE	MJM-26	142227	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+SUNER	SF126E/11PC35/11PC35/1000M,5000M	537061/126E / 537072/126E	2020/06/11	12
RE	MPA-12	141581	MicroWave System Amplifier	Keysight Technologies Inc	83017A	650	2019/10/16	12
RE	MHA-17	141506	Horn Antenna 15-40GHz	Schwarzbeck Mess - Elektronik	BBHA9170	BBHA9170307	2020/07/16	12
RE	MPA-14	141583	Pre Amplifier	SONOMA INSTRUMENT	310	260833	2020/02/18	12
RE	YBA-03	197990	Biconical Antenna	Schwarzbeck Mess - Elektronik	VHBB 9124 + BBA 9106	01365	2020/05/17	12
RE	LA-17	160924	Logperiodic Antenna	Schwarzbeck Mess - Elektronik	VUSLP9111B	225	2019/11/29	12
RE	MCC-50	141397	Coaxial Cable	UL Japan	-	-	2020/03/24	12
RE	MAT-34	141331	Attenuator(6dB)	TME	UFA-01	-	2020/02/05	12
RE	MTR-08	141949	Test Receiver	Rohde & Schwarz	ESCI	100767	2020/08/18	12
RE	MSA-10	141899	Spectrum Analyzer	Keysight Technologies Inc	E4448A	MY46180655	2020/08/04	12
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	MTA-55	141937	Terminator	TME	CT-01BP	-	2019/12/02	12
CE	MAT-67	141248	Attenuator	JFW Industries, Inc.	50FP-013H2 N	-	2019/12/02	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	MTR-08	141949	Test Receiver	Rohde & Schwarz	ESCI	100767	2020/08/18	12
AT	MAT-90	141223	Attenuator	Weinschel Associates	WA56-10	56100306	2020/05/25	12
AT	MMM-12	141547	DIGITAL HiTESTER	Hioki	3805	60500120	2020/02/03	12
AT	MPSE-17	141830	Power sensor	ANRITSU	MA2411B	738285	2020/05/07	12
AT	MPM-12	141809	Power Meter	ANRITSU	ML2495A	825002	2020/05/07	12
AT	MOS-24	90289	Thermo-Hygrometer	CUSTOM. Inc	CTH-201	0005	2020/01/07	12
AT	MSA-03	141884	Spectrum Analyzer	Keysight Technologies Inc	E4448A	MY44020357	2020/03/04	12
AT	MAT-10	141156	Attenuator(10dB)	Weinschel Corp	2	BL1173	2019/11/07	12
AT	MRENT-130	141855	Spectrum Analyzer	Keysight Technologies Inc	E4440A	MY46187750	2019/11/19	12
AT	MOS-34	141572	Thermo-Hygrometer	CUSTOM. Inc	CTH-201	3401	2020/01/07	12
AT	MMM-16	141360	DIGITAL HiTESTER	Hioki	3805	70900532	2020/01/06	12
CE	COTS-MEMI-02	178648	EMI measurement program	TSJ (Techno Science Japan)	TEPTO-DV	-	-	-
CE	MAEC-04-SVSWR	142017	AC4 Semi Anechoic Chamber(SVSWR)	TDK	Semi Anechoic Chamber 3m	DA-10005	2019/04/04	24

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***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