



RADIO TEST REPORT

Test Report No. : 13274888H-B

Applicant : SOURCENEXT CORPORATION
Type of EUT : POCKETALK S
Model Number of EUT : PTS
FCC ID : 2AOJA-PTS
Test regulation : FCC Part 15 Subpart C: 2019
*WLAN and Bluetooth Low Energy parts
Test Result : Complied (Refer to SECTION 3.2)

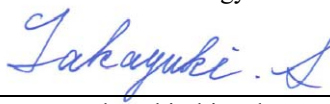
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8. The information provided from the customer for this report is identified in SECTION 1.

Date of test: November 19 to December 11, 2019

Representative test engineer:


Yuta Moriya
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Approved by:


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Leader
Consumer Technology Division



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REVISION HISTORY

Original Test Report No.: 13274888H-B

Revision	Test report No.	Date	Page revised	Contents
- (Original)	13274888H-B	April 2, 2020	-	-

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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	:	SOURCENEXT CORPORATION
Address	:	Shiodome City Center 33F, 1-5-2 Higashi Shimbashi Minato-ku, Tokyo 105-7133, Japan
Telephone Number	:	+81-50-5533-9606
Facsimile Number	:	+81-3-6430-6405
Contact Person	:	Yukio Aotani

The information provided from the customer is as follows;

- Applicant, Type of Equipment, Model No., 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 of Equipment	:	POCKETALK S
Model No.	:	PTS
Serial No.	:	Refer to SECTION 4.2
Rating	:	DC 3.8 V (Lithium-ion battery) AC 100 V to AC 240 V (AC Adapter)
Receipt Date of Sample	:	November 14, 2019
Country of Mass-production	:	China
Condition of EUT	:	Production prototype (Not for Sale: This sample is equivalent to mass-produced items.)
Modification of EUT	:	No Modification by the test lab.

2.2 Product Description

Model: PTS (referred to as the EUT in this report) is a POCKETALK S.

There are 2 versions. One has eSIM and SIM slot. Another has only SIM slot. Also there are some color variations.

General Specification

Operating Temperature	:	0 deg. C to +40 deg. C
-----------------------	---	------------------------

Radio Specification (1/2)

WLAN (IEEE802.11b/g/a/n-20/n-40)

Type of radio	IEEE802.11b	IEEE802.11g/n-20	IEEE802.11n-40	IEEE802.11a/n-20	IEEE802.11n-40
Frequency of operation	2412 MHz - 2462 MHz	2412 MHz - 2462 MHz	2422 MHz - 2452 MHz	5180 MHz - 5240 MHz 5260 MHz - 5320 MHz 5500 MHz - 5700 MHz	5190 MHz - 5230 MHz 5270 MHz - 5310 MHz 5510 MHz - 5670 MHz
Type of modulation	DSSS (CCK, DQPSK, DBPSK)	OFDM-CCK (64QAM, 16QAM, QPSK, BPSK)		OFDM (64QAM, 16QAM, QPSK, BPSK)	
Channel spacing	5 MHz			20 MHz	40 MHz
Antenna type	Planar Inverted-F Antenna				
Antenna Gain	2.4 GHz: 1.25 dBi 5 GHz: 0.36 dBi				
Clock frequency	26 MHz				

Bluetooth (BR/EDR, Low Energy)

	BR/EDR	Low Energy
Frequency of operation	2402 MHz - 2480 MHz	
Type of modulation	FHSS (GFSK, $\pi/4$ DQPSK, 8DPSK)	GFSK
Channel spacing	1 MHz	2 MHz
Antenna type	Planar Inverted-F Antenna	
Antenna Gain	1.25 dBi	
Clock frequency	26 MHz	

GNSS

Radio Type	Receiver
Frequency of Operation	See table below.
Antenna type	Planar Inverted-F Antenna
Antenna Gain	-0.45 dBi
Clock frequency	26 MHz

Supported GNSS and GNSS signals

GNSS	RNSS Frequency Band / Frequency [MHz]		
	1559 to 1610	1215 to 1300	1164 to 1215
BDS	☐ B1I 1561.098	-	-
Galileo	☐ E1 1575.42	☐ E6 1278.75	☐ E5a 1176.45
			☐ E5b 1207.14
GLONASS	☒ G1 1598.0625 - 1605.375	☐ G2 1242.9375 - 1248.625	-
GPS	☒ L1 1575.42	☐ L2 1227.6	☐ L5 1176.45
SBAS	☐ L1 1575.42	-	☐ L5 1176.45

- ☒ Supported GNSS signal
☐ Not supported GNSS signal

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Radio Specification (2/2)

GSM

Equipment Type	Transceiver	
Frequency of Operation	[Up Link] PCS1900: 1850 MHz to 1910 MHz GSM850: 824 MHz to 849 MHz	[Down Link] PCS1900: 1930 MHz to 1990 MHz GSM850: 869 MHz to 894 MHz
Type of Modulation	GMSK, 8-PSK	
Multi-Slot Class	GPRS:12(4 Down/4 Up/5 Sum) EGPRS:12(4 Down/4 Up/5 Sum)	
Voice & Data communication	Data only	
Antenna Type	Planar Inverted-F Antenna	
Antenna Gain	PCS1900: 1850 MHz to 1910 MHz: -4.61 dBi GSM850 824 MHz to 849 MHz: -4.81 dBi	

WCDMA

Equipment Type	Transceiver	
Frequency of Operation	[Up Link] Band 2: 1850 MHz to 1910 MHz Band 5: 824 MHz to 849 MHz	[Down Link] Band 2: 1930 MHz to 1990 MHz Band 5: 869 MHz to 894 MHz
Type of Modulation	QPSK	
Voice & Data communication	Data only	
Antenna Type	Planar Inverted-F Antenna	
Antenna Gain	Band 2: 1850 MHz to 1910 MHz: -4.61 dBi Band 5 824 MHz to 849 MHz: -4.81 dBi	

LTE

Equipment Type	Transceiver	
Frequency of Operation	[Up Link] Band 2: 1850 MHz to 1910 MHz Band 5: 824 MHz to 849 MHz Band 7: 2500 MHz to 2570 MHz Band 26: 814 MHz to 849 MHz	[Down Link] Band 2: 1930 MHz to 1990 MHz Band 5: 869 MHz to 894 MHz Band 7: 2620 MHz to 2690 MHz Band 26: 859 MHz to 894 MHz
Type of Modulation	QPSK, 16QAM, 64QAM	
Voice & Data communication	Data only	
Antenna Gain	Band 2: 1850 MHz to 1910 MHz: -4.61 dBi Band 5: 824 MHz to 849 MHz: -4.81 dBi Band 7: 2500 MHz to 2570 MHz: -2.15 dBi Band 26: 814 MHz to 849 MHz: -4.81 dBi	

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

* WLAN and Bluetooth do not transmit simultaneously.

SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification : FCC Part 15 Subpart C
FCC Part 15 final revised on July 19, 2019 and effective August 19, 2019 except 15.258

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	28.38 dB 0.41180 MHz AV, Phase: L	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	10.3 dB 2483.500 MHz Horizontal, AV	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)

The EUT is a battery-operated device and test was performed with the full-charged battery.
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	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

3.5 Test Location

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*NVLAP Lab. code: 200572-0 / 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)

[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)	6 Mbps, PN9
IEEE 802.11n 20 MHz BW (11n-20)	MCS 2, PN9
IEEE 802.11n 40 MHz BW (11n-40)	MCS 3, PN9
*Transmitting duty was 100 % on all tests.	
*The worst condition was determined based on the test result of Maximum Peak Output Power (Low Channel)	
*Power of the EUT was set by the software as follows; Power settings: 10 Software: 1.1.5 *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 WLAN**

Test Item	Operating Mode	Tested frequency
Radiated Spurious Emission (Below 1GHz), Conducted Spurious Emission	11n-40 Tx *1)	2452 MHz
Radiated Spurious Emission	11b Tx	2412 MHz
	11g Tx	2437 MHz
		2462 MHz
	11n-20 Tx *2)	2412 MHz
		2462 MHz
	11n-40 Tx	2422 MHz
6dB Bandwidth, 99% Occupied Bandwidth, Maximum Peak Output Power, Power Density		2437 MHz
		2452 MHz
	11b Tx	2412 MHz
	11g Tx	2437 MHz
	11n-20 Tx	2462 MHz
	11n-40 Tx	2422 MHz
*1) The mode was tested as a representative, because it had the highest power at antenna terminal test.		
*2) 11n-20 was only tested band edge since 11g and 11n-20 have the same modulation method and no differences in transmitting specification, other test was performed on the 11g mode that had the highest peak output power.		

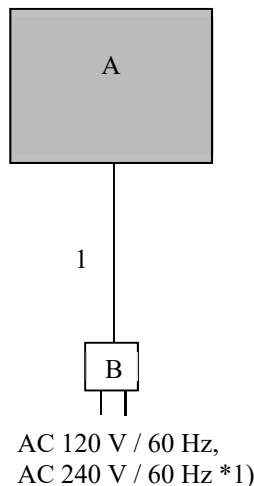
[BT LE]

Mode	Remarks*
Bluetooth Low Energy (BT LE)	Maximum Packet Size, PRBS9
*Power of the EUT was set by the software as follows; Power settings: Same as production model Software: 1.1.5 *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
6dB Bandwidth, Maximum Peak Output Power, 99% Occupied Bandwidth, Conducted Emission, Power Density Spurious Emission (Radiated / Conducted)	BT LE	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.

*1) Conducted emission test only

Description of EUT and Support equipment

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	POCKETALK S	PTS	868792030071602*AT 868792030072428*RE	SOURCENEXT CORPORATION	EUT
B	AC Adaptor	UB-305-0510	K10-1126479	UNIFIVE	-

List of cables used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	USB Cable	1.0	Shielded	Shielded	-

*AT: Antenna Terminal Conducted Tests, RE: Radiated Spurious Emission test

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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.

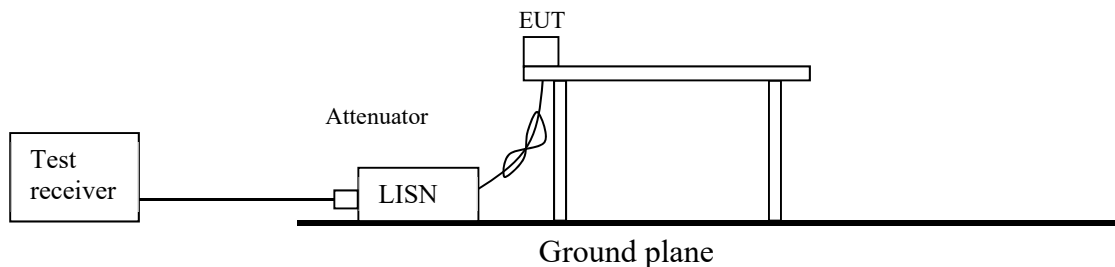
The EUT was connected to a LISN (AMN).

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, 0.5 m by 1.0 m, raised 0.8 m above the conducting ground plane. The Radiated Electric Field Strength has been measured in a Semi Anechoic Chamber with a ground plane.

[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 frequency 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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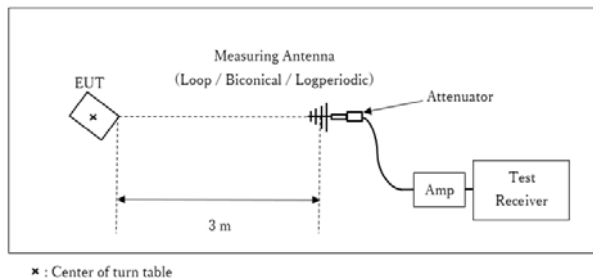
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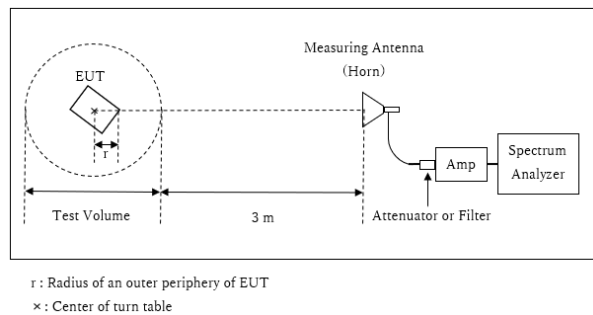
Figure 2: Test Setup

Below 1 GHz



Test Distance: 3 m

1 GHz - 10 GHz



Distance Factor: $20 \times \log (4.0 \text{ m} / 3.0 \text{ m}) = 2.5 \text{ dB}$

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

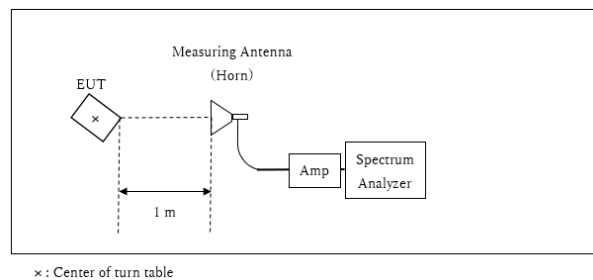
Test Volume : 2.0 m

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

r = 0.0 m

* 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/40MHz/3MHz	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. (9 kHz - 150 kHz: RBW = 200 Hz, 150 kHz - 30 MHz: RBW = 9.1 kHz)							

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.

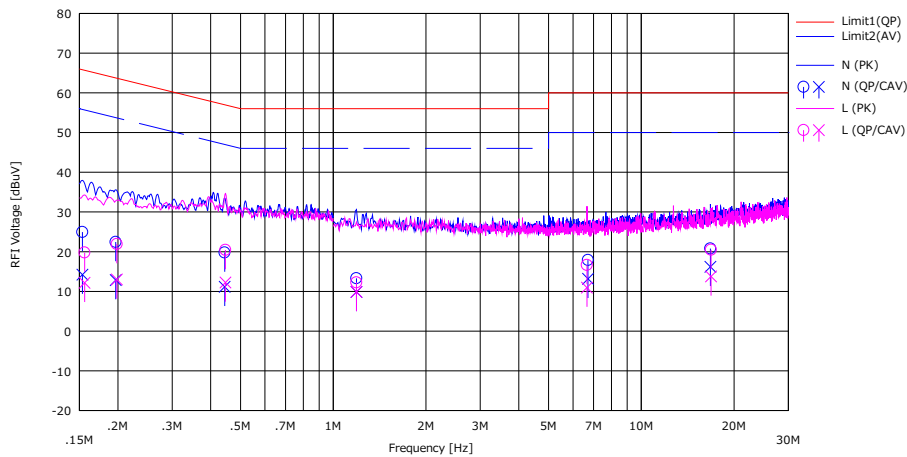
Test data : APPENDIX
Test result : Pass

APPENDIX 1: Test data

Conducted Emission (AC 120 V)

Report No. 13274888H
Test place Ise EMC Lab.
Semi Anechoic Chamber No.4
Date December 11, 2019
Temperature / Humidity 23 deg. C / 30 % RH
Engineer Yuta Moriya
Mode Tx 11n-40 2452 MHz

Limit : FCC_Part 15 Subpart C(15.207)



No.	Freq. [MHz]	Reading		LISN [dB]	LOSS [dB]	Results		Limit		Margin		Phase	Comment
		<QP> [dBuV]	<CAV> [dBuV]			<QP> [dBuV]	<CAV> [dBuV]	<QP> [dBuV]	<AV> [dBuV]	<QP> [dB]	<AV> [dB]		
1	0.15340	11.40	0.70	0.15	13.38	24.93	14.23	65.80	55.80	40.87	41.57	N	
2	0.19675	8.90	-0.70	0.15	13.39	22.44	12.84	63.70	53.70	41.26	40.86	N	
3	0.44410	6.20	-2.40	0.15	13.41	19.76	11.16	57.00	47.00	37.24	35.84	N	
4	1.18900	-0.40	-3.80	0.22	13.47	13.29	9.89	56.00	46.00	42.71	36.11	N	
5	6.71500	3.40	-1.30	0.73	13.75	17.88	13.18	60.00	50.00	42.12	36.82	N	
6	16.76000	4.30	-0.30	2.46	14.02	20.78	16.18	60.00	50.00	39.22	33.82	N	
7	0.15595	6.20	-1.40	0.20	13.38	19.78	12.18	65.70	55.70	45.92	43.52	L	
8	0.19845	8.30	-0.60	0.21	13.39	21.90	13.00	63.70	53.70	41.80	40.70	L	
9	0.44665	6.80	-1.40	0.21	13.41	20.42	12.22	56.90	46.90	36.48	34.68	L	
10	1.18900	-1.50	-3.90	0.28	13.47	12.25	9.85	56.00	46.00	43.75	36.15	L	
11	6.66100	2.10	-3.60	0.80	13.75	16.65	10.95	60.00	50.00	43.35	39.05	L	
12	16.84000	3.90	-2.80	2.55	14.02	20.47	13.77	60.00	50.00	39.53	36.23	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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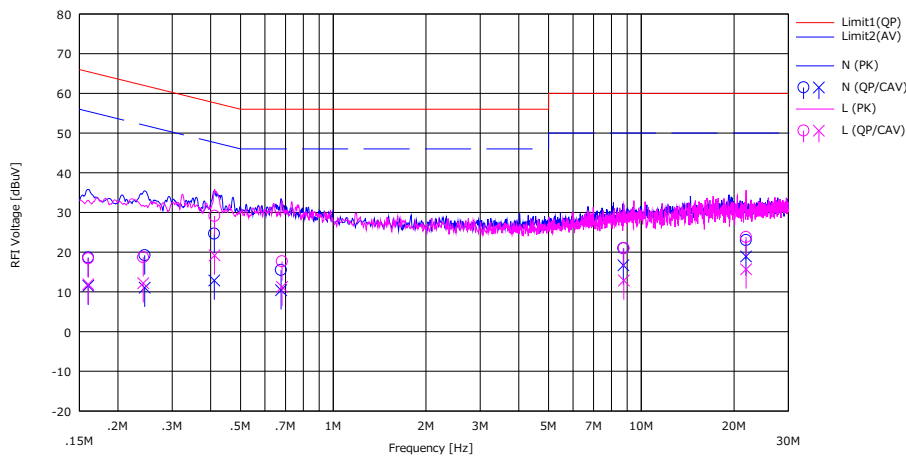
Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

Conducted Emission (AC 240 V)

Report No. 13274888H
Test place Ise EMC Lab.
Semi Anechoic Chamber No.4
Date December 11, 2019
Temperature / Humidity 23 deg. C / 30 % RH
Engineer Yuta Moriya
Mode Tx 11n-40 2452 MHz

Limit : FCC_Part 15 Subpart C(15.207)



No.	Freq. [MHz]	Reading		LISN	LOSS	Results		Limit		Margin		Phase	Comment
		<QP> [dBuV]	<CAV> [dBuV]			<QP> [dBuV]	<CAV> [dBuV]	<QP> [dBuV]	<AV> [dBuV]	<QP> [dB]	<AV> [dB]		
1	0.16020	5.10	-2.00	0.15	13.38	18.63	11.53	65.50	55.50	46.87	43.97	N	
2	0.24435	5.67	-2.50	0.15	13.39	19.21	11.04	61.90	51.90	42.69	40.86	N	
3	0.41095	11.10	-0.70	0.15	13.41	24.66	12.86	57.60	47.60	32.94	34.74	N	
4	0.67700	1.90	-3.20	0.17	13.43	15.50	10.40	56.00	46.00	40.50	35.60	N	
5	8.74900	6.20	1.90	0.97	13.82	20.99	16.69	60.00	50.00	39.01	33.31	N	
6	21.86000	5.40	1.30	3.48	14.14	23.02	18.92	60.00	50.00	36.98	31.08	N	
7	0.16020	4.80	-1.70	0.20	13.38	18.38	11.88	65.50	55.50	47.12	43.62	L	
8	0.24180	5.10	-1.40	0.21	13.39	18.70	12.20	62.00	52.00	43.30	39.80	L	
9	0.41180	15.50	5.60	0.21	13.41	29.12	19.22	57.60	47.60	28.48	28.38	L	
10	0.68210	4.00	-2.40	0.23	13.43	17.66	11.26	56.00	46.00	38.34	34.74	L	
11	8.77600	6.10	-2.00	1.05	13.82	20.97	12.87	60.00	50.00	39.03	37.13	L	
12	21.88000	6.10	-2.00	3.55	14.14	23.79	15.69	60.00	50.00	36.21	34.31	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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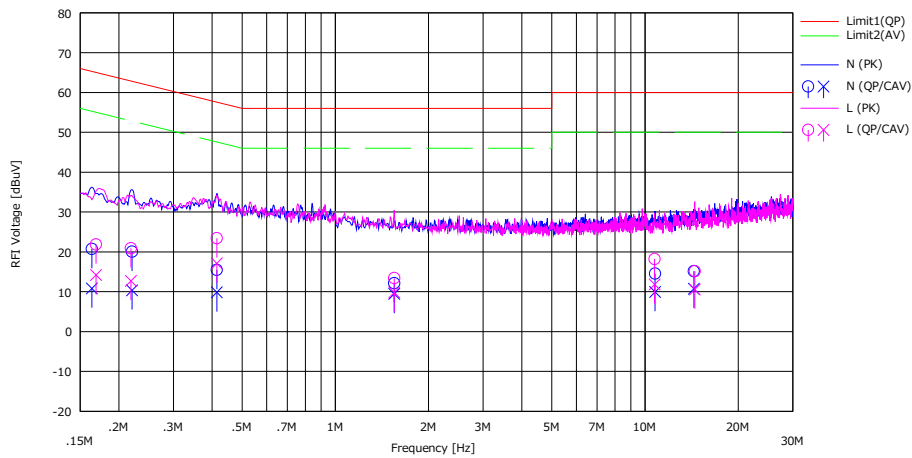
Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

Conducted Emission (AC 120 V)

Report No. 13274888H
Test place Ise EMC Lab.
Semi Anechoic Chamber No.4
Date December 11, 2019
Temperature / Humidity 23 deg. C / 30 % RH
Engineer Yuta Moriya
Mode Tx BT LE 2440 MHz

Limit : FCC_Part 15 Subpart C(15.207)



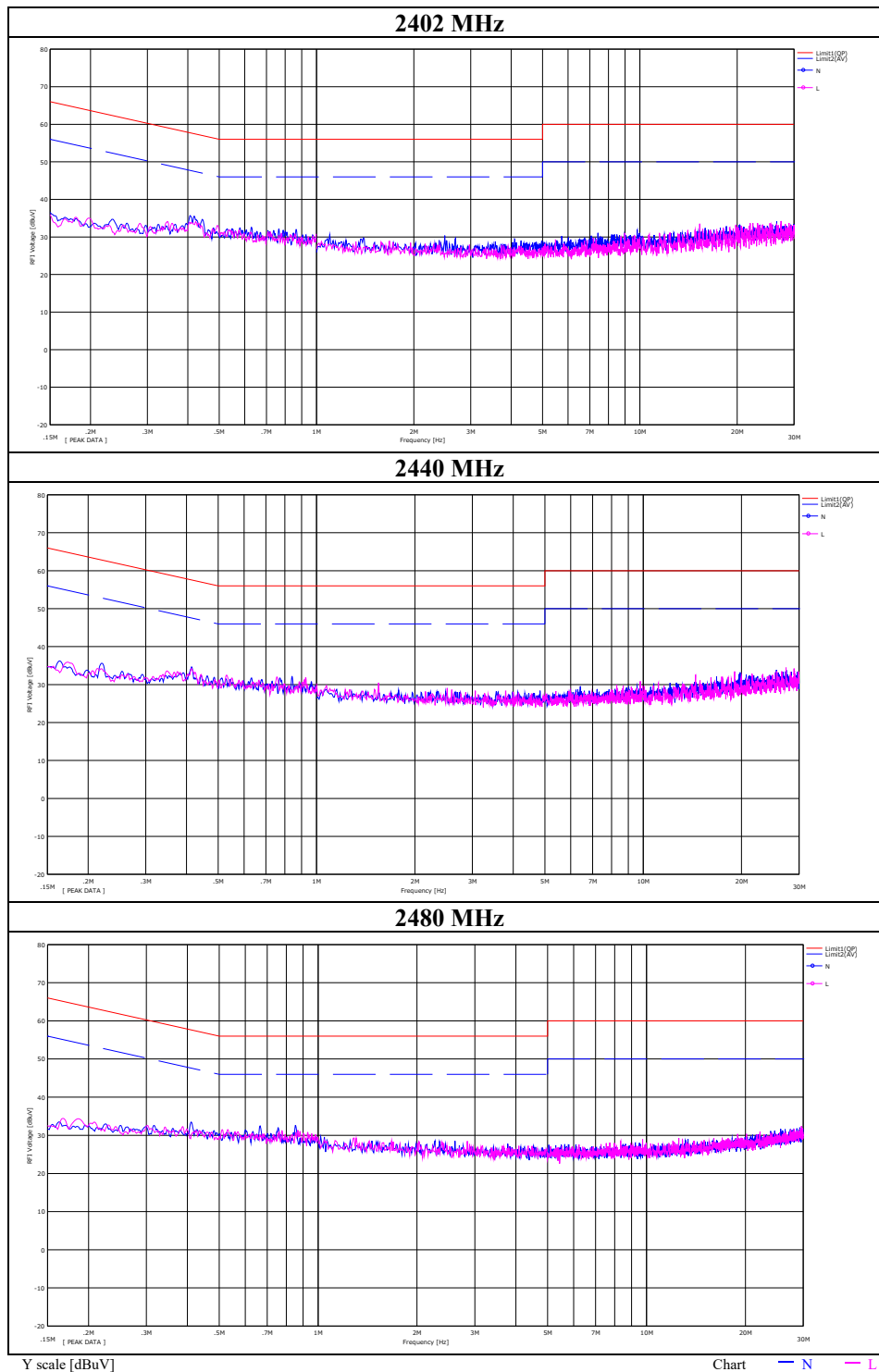
No.	Freq. [MHz]	Reading		LISN	LOSS	Results		Limit		Margin		Phase	Comment
		<QP> [dBuV]	<CAV> [dBuV]			<QP> [dBuV]	<CAV> [dBuV]	<QP> [dBuV]	<AV> [dBuV]	<QP> [dB]	<AV> [dB]		
1	0.16360	7.20	-2.70	0.15	13.38	20.73	10.83	65.30	55.30	44.57	44.47	N	
2	0.22055	6.50	-3.20	0.15	13.39	20.04	10.34	62.80	52.80	42.76	42.46	N	
3	0.41435	1.90	-3.70	0.15	13.41	15.46	9.86	57.60	47.60	42.14	37.74	N	
4	1.54900	-1.60	-4.30	0.24	13.50	12.14	9.44	56.00	46.00	43.86	36.56	N	
5	10.78000	-0.60	-5.20	1.27	13.88	14.55	9.95	60.00	50.00	45.45	40.05	N	
6	14.38000	-0.80	-5.20	1.98	13.97	15.15	10.75	60.00	50.00	44.85	39.25	N	
7	0.16870	8.30	0.60	0.20	13.38	21.88	14.18	65.00	55.00	43.12	40.82	L	
8	0.21885	7.30	-0.90	0.21	13.39	20.90	12.70	62.90	52.90	42.00	40.20	L	
9	0.41435	9.80	3.50	0.21	13.41	23.42	17.12	57.60	47.60	34.18	30.48	L	
10	1.54900	-0.40	-4.00	0.31	13.50	13.41	9.81	56.00	46.00	42.59	36.19	L	
11	10.74000	3.00	-3.40	1.35	13.88	18.23	11.83	60.00	50.00	41.77	38.17	L	
12	14.48000	-0.90	-5.50	2.09	13.97	15.16	10.56	60.00	50.00	44.84	39.44	L	

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

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 (AC 120 V)

Report No. 13274888H
Test place Ise EMC Lab.
Semi Anechoic Chamber No.4
Date December 11, 2019
Temperature / Humidity 23 deg. C / 30 % RH
Engineer Yuta Moriya
Mode Tx BT LE



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Ise EMC Lab.

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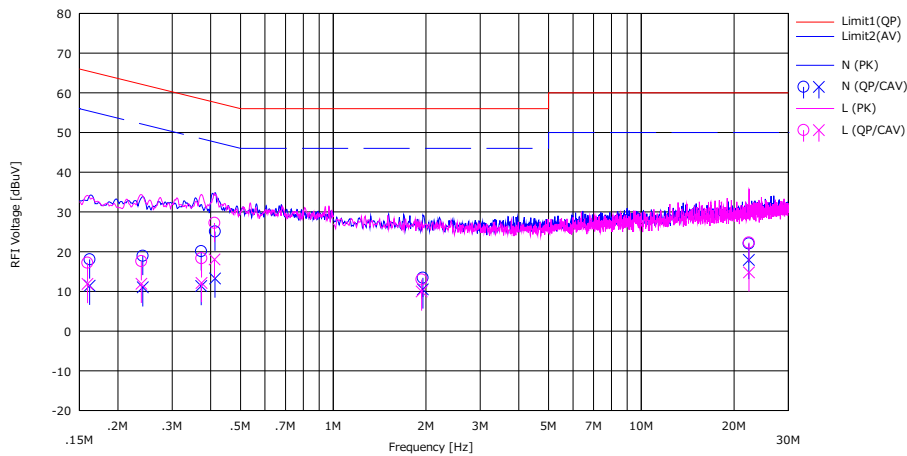
Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

Conducted Emission (AC 240 V)

Report No. 13274888H
Test place Ise EMC Lab.
Semi Anechoic Chamber No.4
Date December 11, 2019
Temperature / Humidity 23 deg. C / 30 % RH
Engineer Yuta Moriya
Mode Tx BT LE 2440 MHz

Limit : FCC_Part 15 Subpart C(15.207)

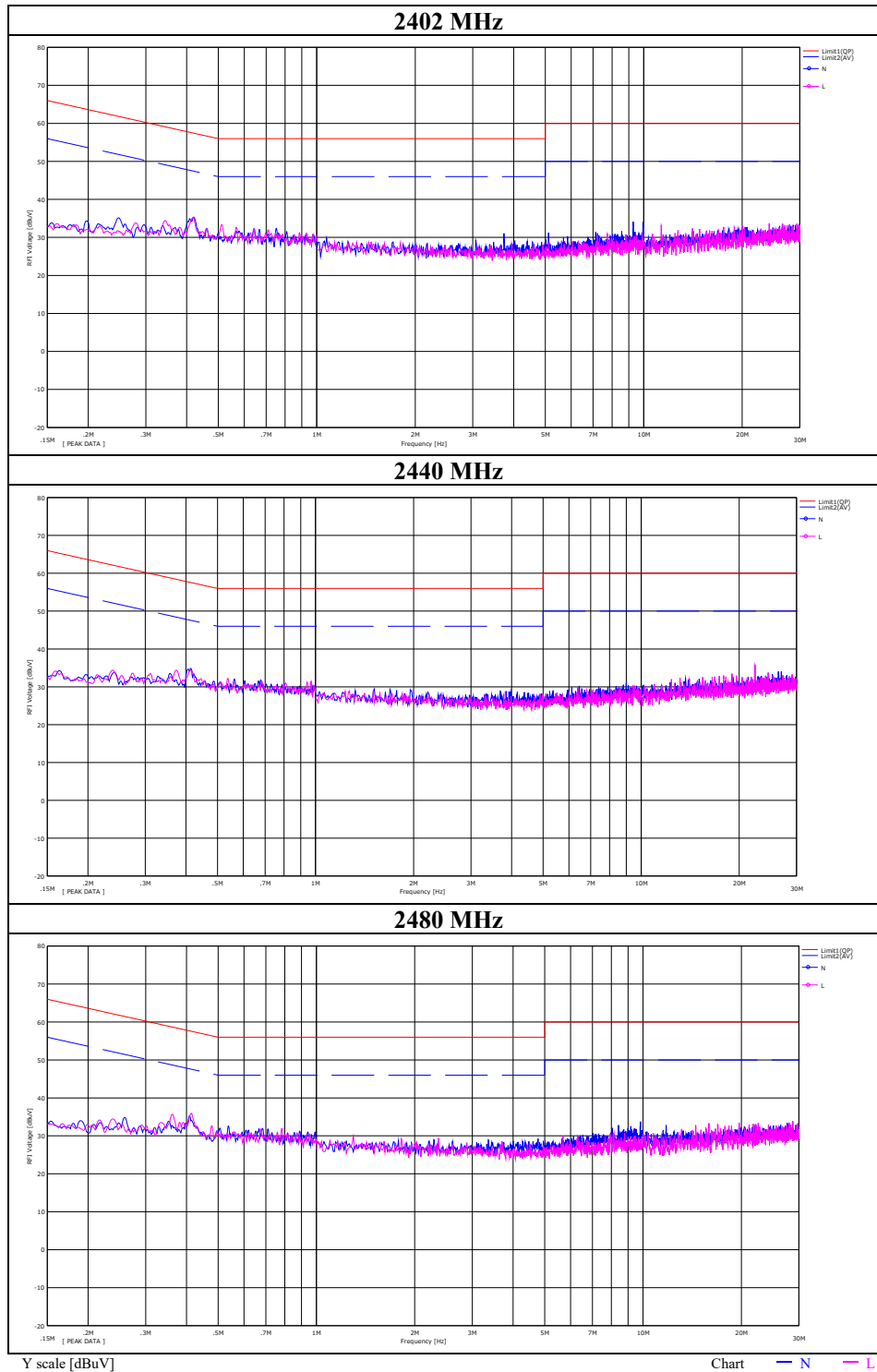


No.	Freq. [MHz]	Reading		LISN	LOSS	Results		Limit		Margin		Phase	Comment
		(QP) [dBuV]	(CAV) [dBuV]			(QP) [dBuV]	(CAV) [dBuV]	(QP) [dBuV]	(AV) [dBuV]	(QP) [dB]	(AV) [dB]		
1	0.16190	4.50	-2.10	0.15	13.38	18.03	11.43	65.40	55.40	47.37	43.97	N	
2	0.24095	5.40	-2.50	0.15	13.39	18.94	11.04	62.10	52.10	43.16	41.06	N	
3	0.37270	6.55	-2.20	0.15	13.41	20.11	11.36	58.40	48.40	38.29	37.04	N	
4	0.41350	11.50	-0.30	0.15	13.41	25.06	13.26	57.60	47.60	32.54	34.34	N	
5	1.95400	-0.40	-3.30	0.28	13.53	13.41	10.51	56.00	46.00	42.59	35.49	N	
6	22.34000	4.30	0.20	3.58	14.14	22.02	17.92	60.00	50.00	37.98	32.08	N	
7	0.15935	3.60	-1.70	0.20	13.38	17.18	11.88	65.50	55.50	48.32	43.62	L	
8	0.23840	4.00	-1.70	0.21	13.39	17.60	11.90	62.20	52.20	44.60	40.30	L	
9	0.37355	4.70	-1.50	0.22	13.41	18.33	12.13	58.40	48.40	40.07	36.27	L	
10	0.41180	13.60	4.40	0.21	13.41	27.22	18.02	57.60	47.60	30.38	29.58	L	
11	1.93600	-0.89	-3.90	0.34	13.53	12.96	9.97	56.00	46.00	43.02	36.03	L	
12	22.36000	4.50	-3.00	3.65	14.14	22.29	14.79	60.00	50.00	37.71	35.21	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 (AC 240 V)

Report No. 13274888H
Test place Ise EMC Lab.
Semi Anechoic Chamber No.4
Date December 11, 2019
Temperature / Humidity 23 deg. C / 30 % RH
Engineer Yuta Moriya
Mode Tx BT LE



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Ise EMC Lab.

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Telephone : +81 596 24 8999

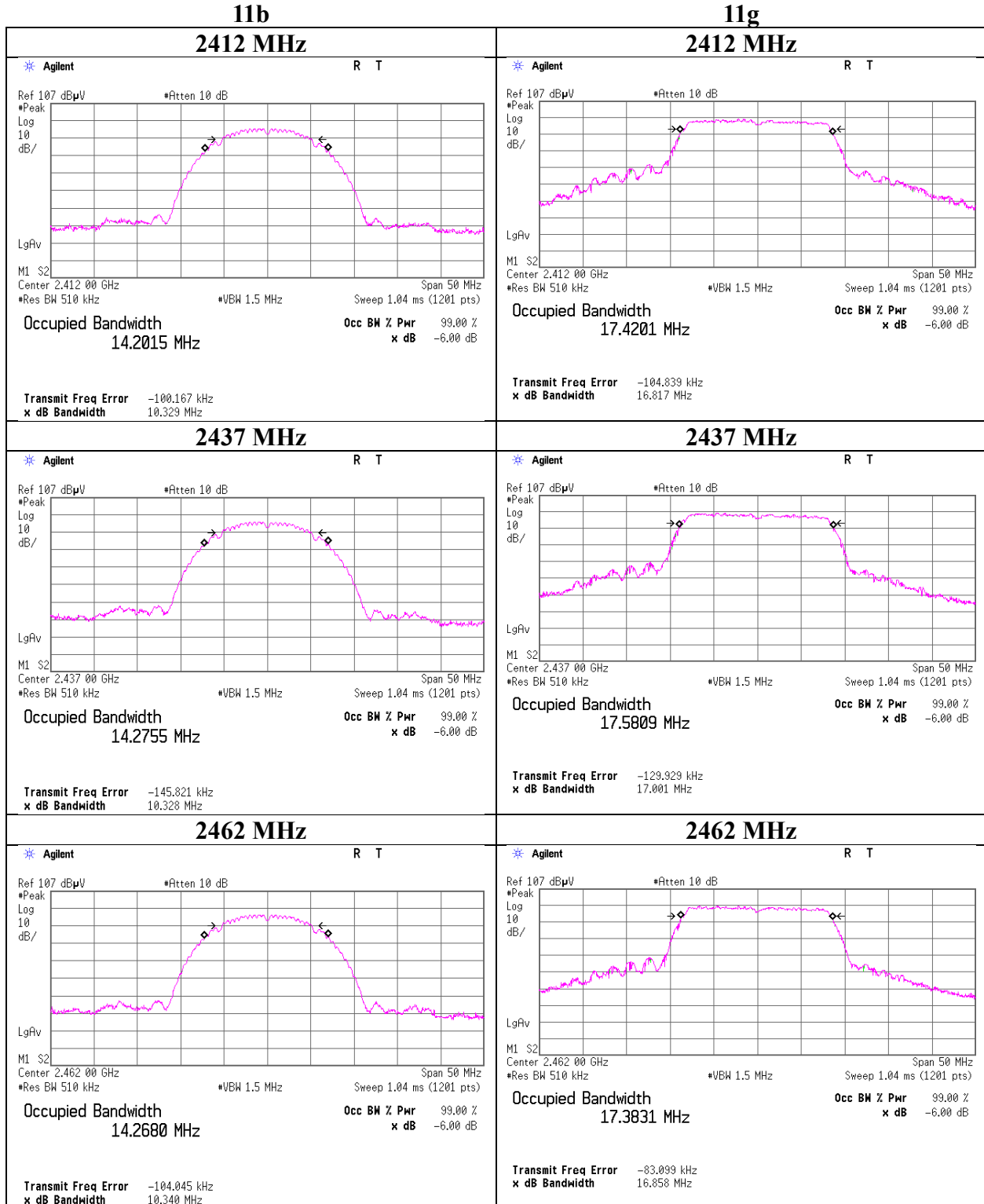
Facsimile : +81 596 24 8124

6 dB Bandwidth and 99 % Occupied Bandwidth

Report No.	13274888H	
Test place	Ise EMC Lab. No.6 Measurement Room	
Date	November 19, 2019	November 21, 2019
Temperature / Humidity	22 deg. C / 43 % RH	23 deg. C / 36 % RH
Engineer	Takafumi Noguchi	Takafumi Noguchi
Mode	Tx	

Mode	Frequency [MHz]	99% Occupied Bandwidth [kHz]	6dB Bandwidth [MHz]	Limit for 6dB Bandwidth [MHz]
11b	2412	14201.5	9.589	> 0.5000
	2437	14275.5	9.598	> 0.5000
	2462	14268.0	9.594	> 0.5000
11g	2412	17420.1	16.587	> 0.5000
	2437	17580.9	16.586	> 0.5000
	2462	17383.1	16.583	> 0.5000
11n-20	2412	18028.4	17.781	> 0.5000
	2437	18049.7	17.786	> 0.5000
	2462	18064.3	17.775	> 0.5000
11n-40	2422	36300.3	36.345	> 0.5000
	2437	36335.0	36.311	> 0.5000
	2452	36373.3	36.469	> 0.5000
BT LE	2402	1032.1	0.688	> 0.5000
	2440	1033.9	0.680	> 0.5000
	2480	1035.5	0.697	> 0.5000

99%Occupied Bandwidth



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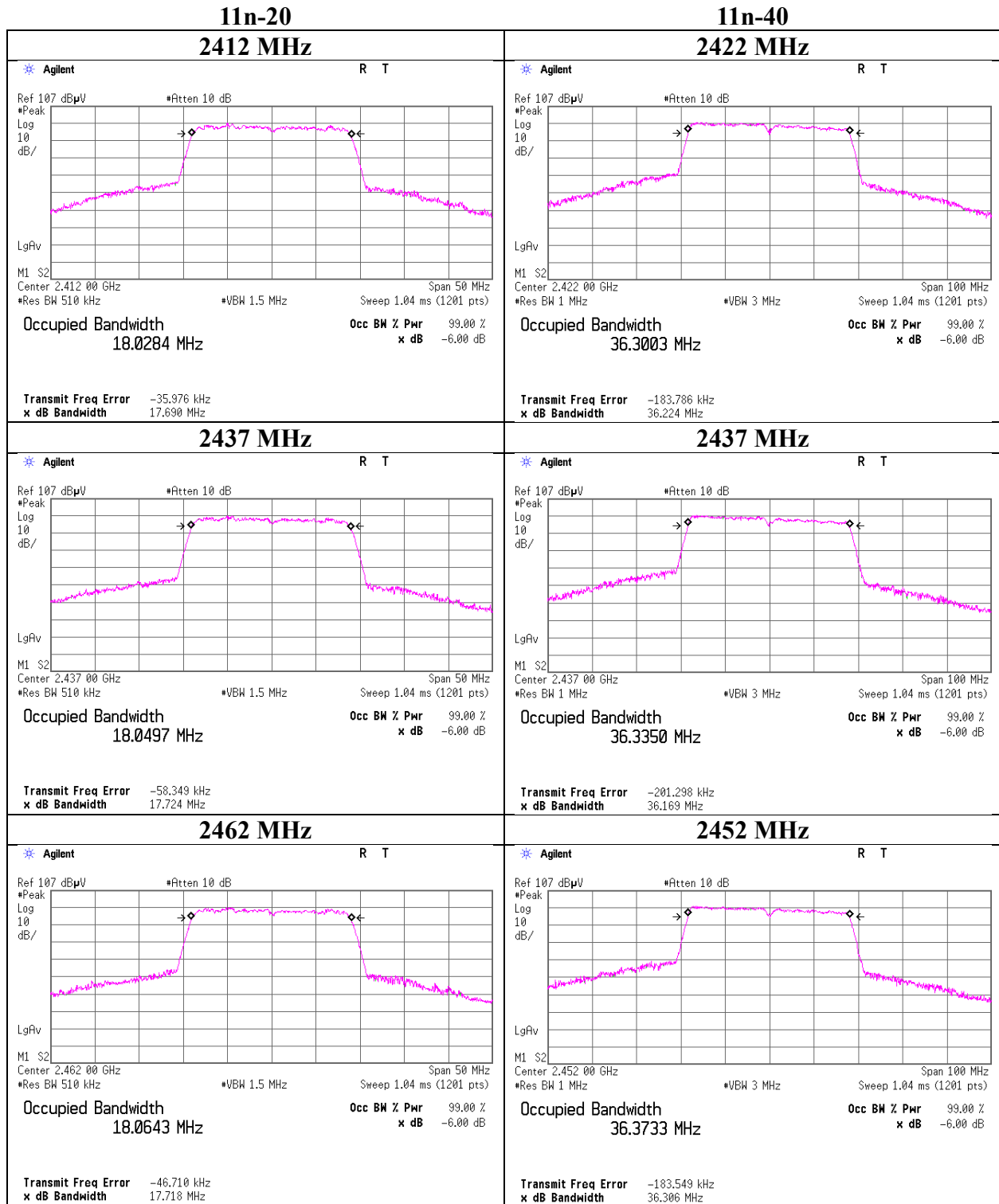
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99% Occupied Bandwidth



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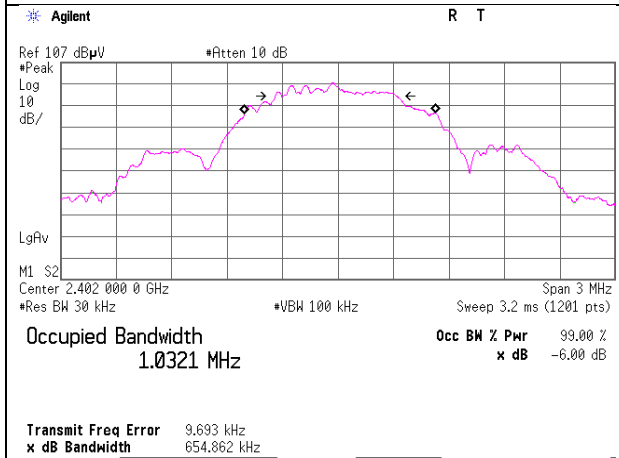
Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

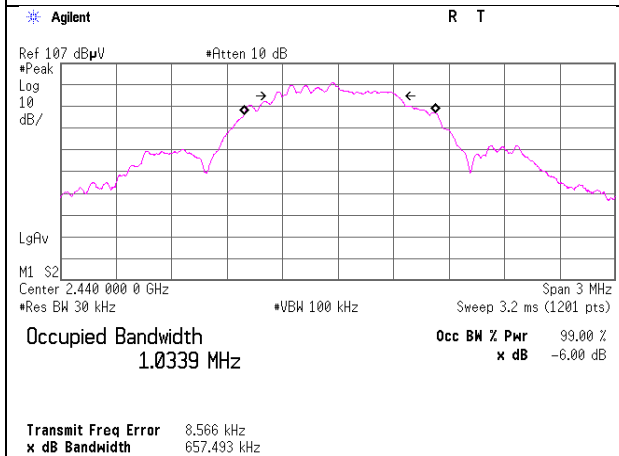
99% Occupied Bandwidth

BT LE

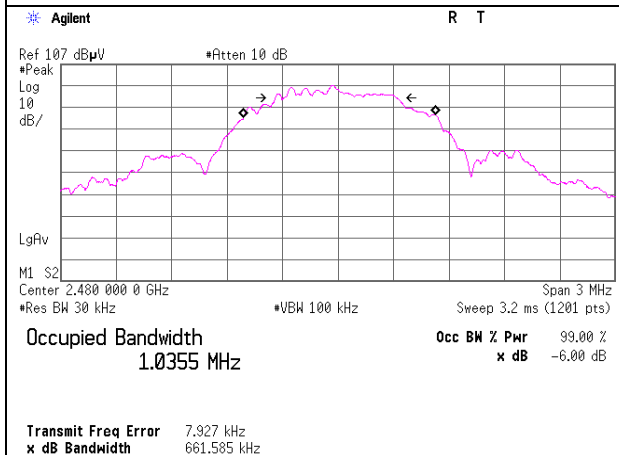
2402 MHz



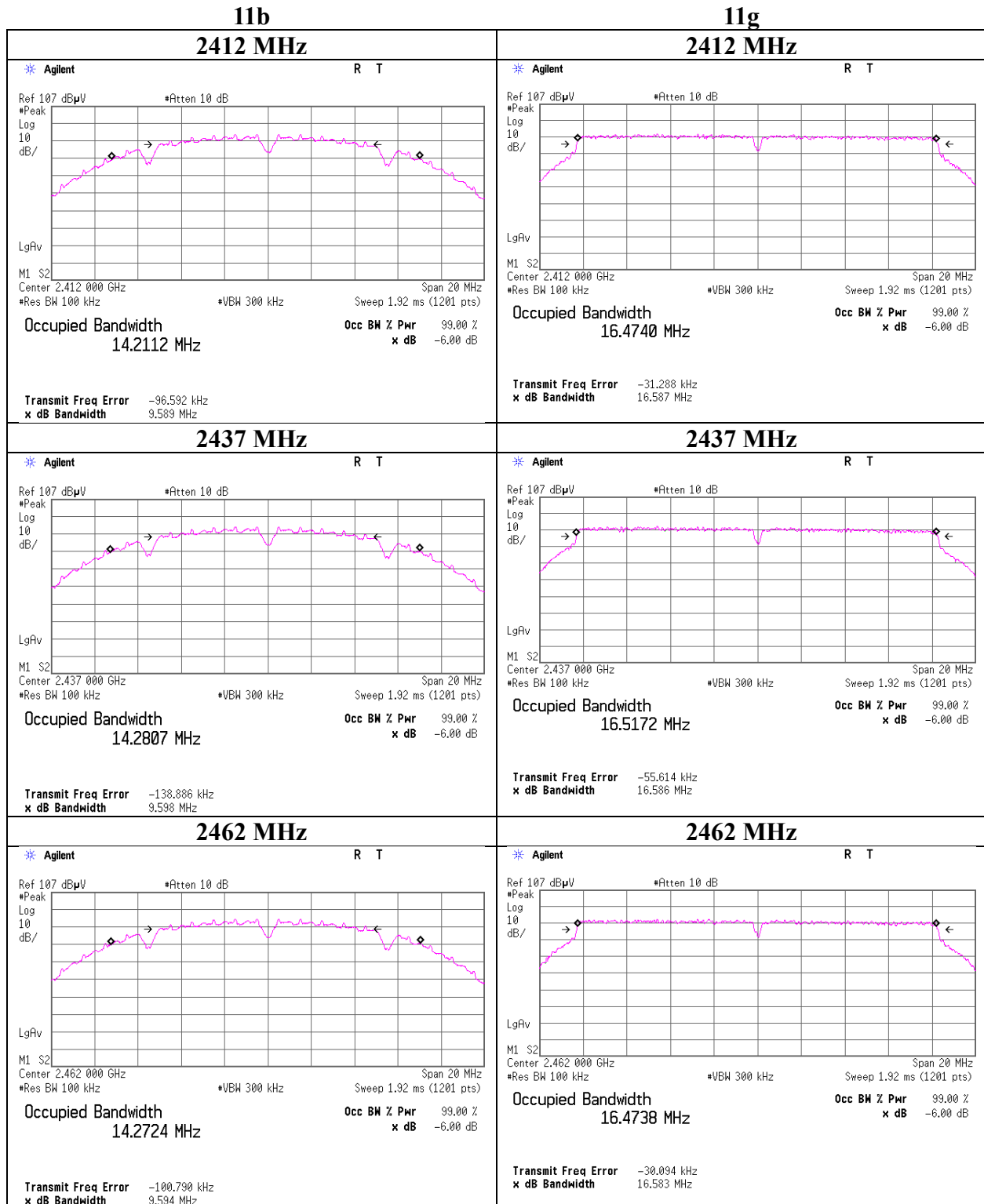
2440 MHz



2480 MHz



6dB Bandwidth



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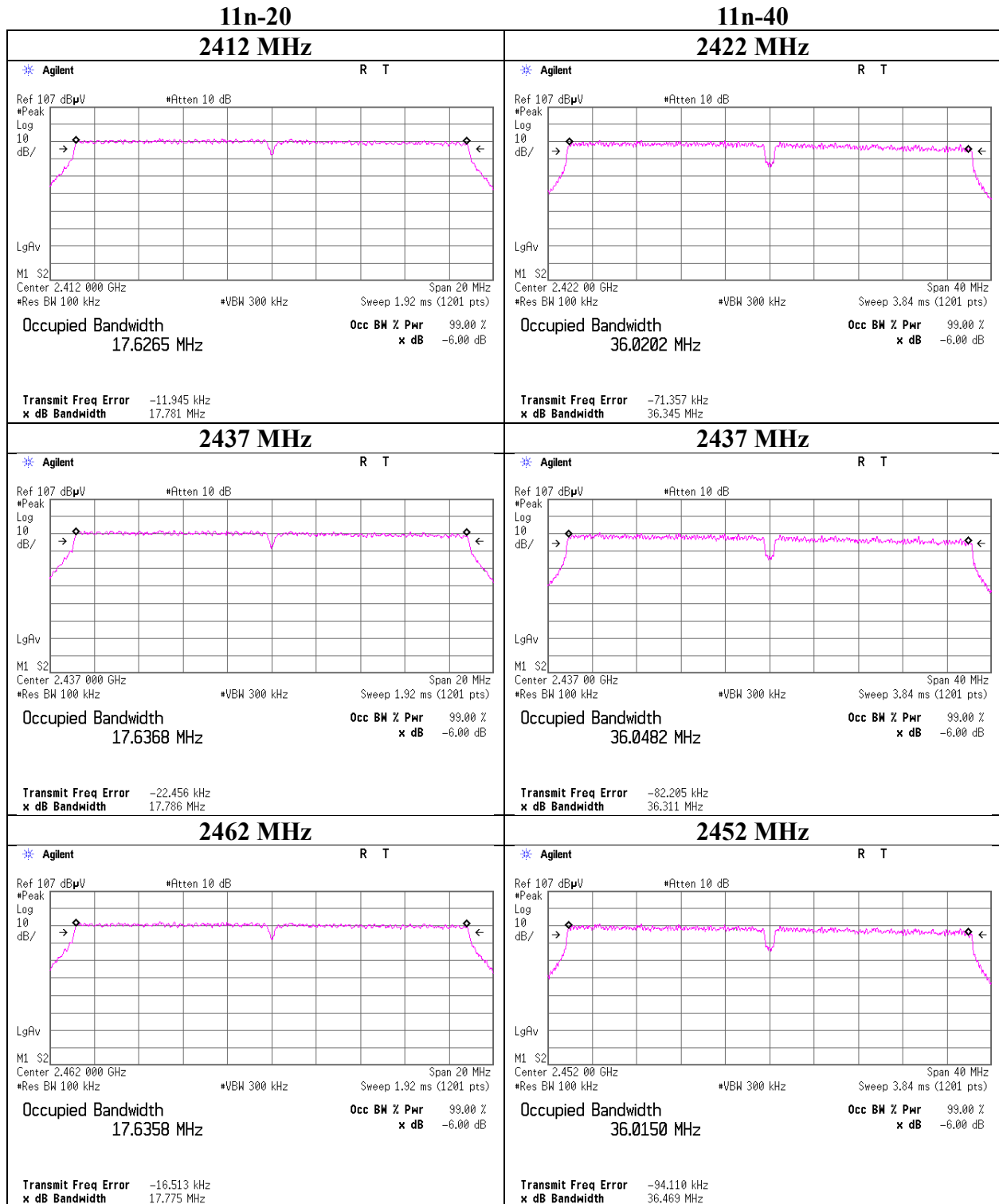
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6dB Bandwidth



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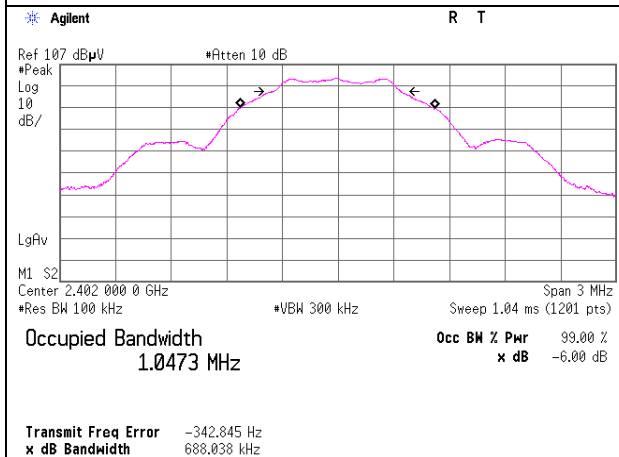
Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

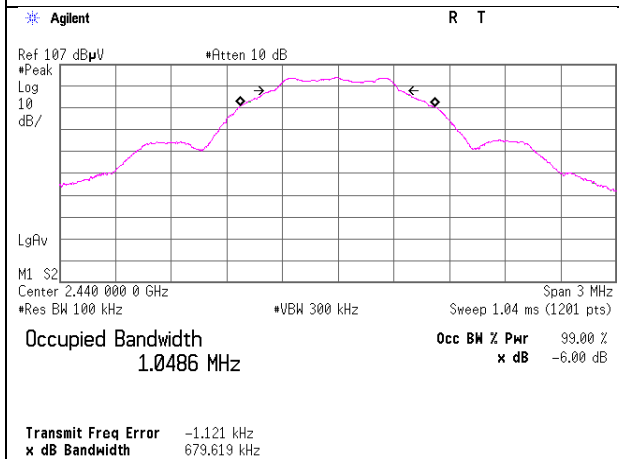
6dB Bandwidth

BT LE

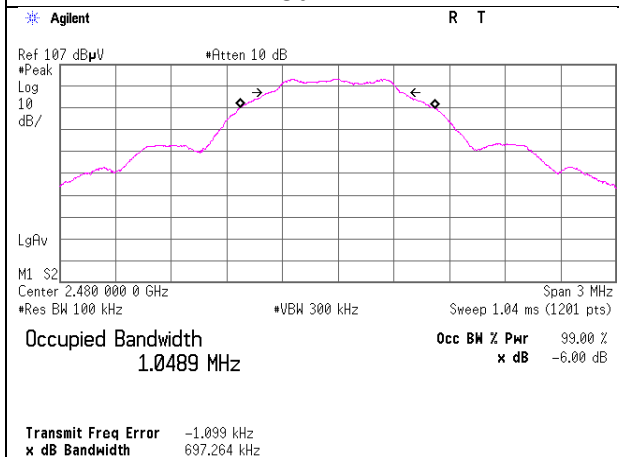
2402 MHz



2440 MHz



2480 MHz



Maximum Peak Output Power

Report No. 13274888H
Test place Ise EMC Lab. No.6 Measurement Room
Date November 21, 2019
Temperature / Humidity 23 deg. C / 36 % RH
Engineer Takafumi Noguchi
Mode Tx 11b

Freq.	Reading	Cable Loss	Atten. Loss	Conducted Power					e.i.r.p. for RSS-247					
				Result		Limit		Margin	Antenna Gain	Result		Limit		Margin
				[dBm]	[mW]	[dBm]	[mW]			[dB]	[dBm]	[mW]	[dBm]	
2412	-3.93	1.00	10.06	7.13	5.16	30.00	1000	22.87	1.25	8.38	6.89	36.02	4000	27.64
2437	-3.50	1.00	10.06	7.56	5.70	30.00	1000	22.44	1.25	8.81	7.60	36.02	4000	27.21
2462	-3.00	1.00	10.06	8.06	6.40	30.00	1000	21.94	1.25	9.31	8.53	36.02	4000	26.71

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.

2412MHz

Rate	Reading	Remark
[Mbps]	[dBm]	
1	-3.79	*
2	-3.83	
5.5	-4.37	
11	-3.82	

*: Worst Rate

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

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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Maximum Peak Output Power

Report No. 13274888H
Test place Ise EMC Lab. No.6 Measurement Room
Date November 21, 2019
Temperature / Humidity 23 deg. C / 36 % RH
Engineer Takafumi Noguchi
Mode Tx 11g

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Conducted Power					e.i.r.p. for RSS-247					
				Result		Limit		Margin [dB]	Antenna Gain [dBi]	Result		Limit		Margin [dB]
				[dBm]	[mW]	[dBm]	[mW]			[dBm]	[mW]	[dBm]	[mW]	
2412	5.10	1.00	10.06	16.16	41.30	30.00	1000	13.84	1.25	17.41	55.08	36.02	4000	18.61
2437	5.54	1.00	10.06	16.60	45.71	30.00	1000	13.40	1.25	17.85	60.95	36.02	4000	18.17
2462	5.86	1.00	10.06	16.92	49.20	30.00	1000	13.08	1.25	18.17	65.61	36.02	4000	17.85

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.

2412 MHz

Rate	Reading	Remark
[Mbps]	[dBm]	
6	4.77	*
9	4.24	
12	3.96	
18	3.13	
24	4.75	
36	4.13	
48	3.05	
54	3.84	

*: Worst Rate

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

Maximum Peak Output Power

Report No. 13274888H
Test place Ise EMC Lab. No.6 Measurement Room
Date November 21, 2019
Temperature / Humidity 23 deg. C / 36 % RH
Engineer Takafumi Noguchi
Mode Tx 11n-20

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Conducted Power					e.i.r.p. for RSS-247					
				Result		Limit		Margin [dB]	Antenna Gain [dBi]	Result		Limit		Margin [dB]
				[dBm]	[mW]	[dBm]	[mW]			[dBm]	[mW]	[dBm]	[mW]	
2412	5.08	1.00	10.06	16.14	41.11	30.00	1000	13.86	1.25	17.39	54.83	36.02	4000	18.63
2437	5.49	1.00	10.06	16.55	45.19	30.00	1000	13.45	1.25	17.80	60.26	36.02	4000	18.22
2462	5.85	1.00	10.06	16.91	49.09	30.00	1000	13.09	1.25	18.16	65.46	36.02	4000	17.86

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.

2412 MHz

Rate	Reading	Remark
[MCS]	[dBm]	
0	4.14	
1	4.24	
2	4.76	*
3	4.34	
4	4.28	
5	3.60	
6	4.58	
7	3.59	

*: Worst Rate

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

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Ise EMC Lab.

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Maximum Peak Output Power

Report No. 13274888H
Test place Ise EMC Lab. No.6 Measurement Room
Date November 21, 2019
Temperature / Humidity 23 deg. C / 36 % RH
Engineer Takafumi Noguchi
Mode Tx 11n-40

				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]	
2422	5.65	1.00	10.06	16.71	46.88	30.00	1000	13.29	1.25	17.96	62.52	36.02	4000	18.06
2437	5.97	1.00	10.06	17.03	50.47	30.00	1000	12.97	1.25	18.28	67.30	36.02	4000	17.74
2452	6.34	1.00	10.06	17.40	54.95	30.00	1000	12.60	1.25	18.65	73.28	36.02	4000	17.37

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.

2412 MHz

Rate	Reading	Remark
[MCS]	[dBm]	
0	4.58	
1	4.53	
2	5.09	
3	5.51	*
4	5.28	
5	4.65	
6	4.43	
7	4.33	

*: Worst Rate

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

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Maximum Peak Output Power

Report No. 13274888H
Test place Ise EMC Lab. No.6 Measurement Room
Date November 19, 2019
Temperature / Humidity 22 deg. C / 43 % RH
Engineer Takafumi Noguchi
Mode Tx BT LE

Freq.	Reading	Cable Loss	Atten. Loss	Conducted Power					e.i.r.p. for RSS-247					
				Result		Limit		Margin	Antenna Gain	Result		Limit		Margin
				[dBm]	[mW]	[dBm]	[mW]			[dBm]	[mW]	[dBm]	[mW]	
[MHz]	[dBm]	[dB]	[dB]					[dB]	[dBi]					[dB]
2402	-5.83	1.00	10.06	5.23	3.33	30.00	1000	24.77	1.25	6.48	4.45	36.02	4000	29.54
2440	-5.41	1.00	10.06	5.65	3.67	30.00	1000	24.35	1.25	6.90	4.90	36.02	4000	29.12
2480	-6.13	1.00	10.06	4.93	3.11	30.00	1000	25.07	1.25	6.18	4.15	36.02	4000	29.84

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.

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Average Output Power **(Reference data for SAR testing)**

Report No.	13274888H
Test place	Ise EMC Lab. No.6 Measurement Room
Date	November 21, 2019
Temperature / Humidity	23 deg. C / 36 % RH
Engineer	Takafumi Noguchi
Mode	Tx

11b 1 Mbps

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Burst power average)	
				[dBm]	[mW]
2412	-6.14	1.00	10.06	4.92	3.10
2437	-5.68	1.00	10.06	5.38	3.45
2462	-5.16	1.00	10.06	5.90	3.89

11g 6 Mbps

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Burst power average)	
				[dBm]	[mW]
2412	-4.35	1.00	10.06	6.71	4.69
2437	-4.17	1.00	10.06	6.89	4.89
2462	-3.78	1.00	10.06	7.28	5.35

11n-20 MCS 0

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Burst power average)	
				[dBm]	[mW]
2412	-4.36	1.00	10.06	6.70	4.68
2437	-4.18	1.00	10.06	6.88	4.88
2462	-3.79	1.00	10.06	7.27	5.33

11n-40 MCS 0

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Burst power average)	
				[dBm]	[mW]
2422	-4.05	1.00	10.06	7.01	5.02
2437	-4.26	1.00	10.06	6.80	4.79
2452	-3.80	1.00	10.06	7.26	5.32

Sample Calculation:

Result (Burst power average) = 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.

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.

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Average Output Power
(Reference data for SAR testing)

Report No. 13274888H
Test place Ise EMC Lab. No.6 Measurement Room
Date November 19, 2019
Temperature / Humidity 22 deg. C / 43 % RH
Engineer Takafumi Noguchi
Mode Tx

BT LE

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Timed average)		Duty factor [dB]	Result (Burst power average)	
				[dBm]	[mW]		[dBm]	[mW]
2402	-8.34	1.00	10.06	2.72	1.87	2.11	4.83	3.04
2440	-7.85	1.00	10.06	3.21	2.09	2.11	5.32	3.40
2480	-8.52	1.00	10.06	2.54	1.79	2.11	4.65	2.92

Sample Calculation:

Result (Timed 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.

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Ise EMC Lab.

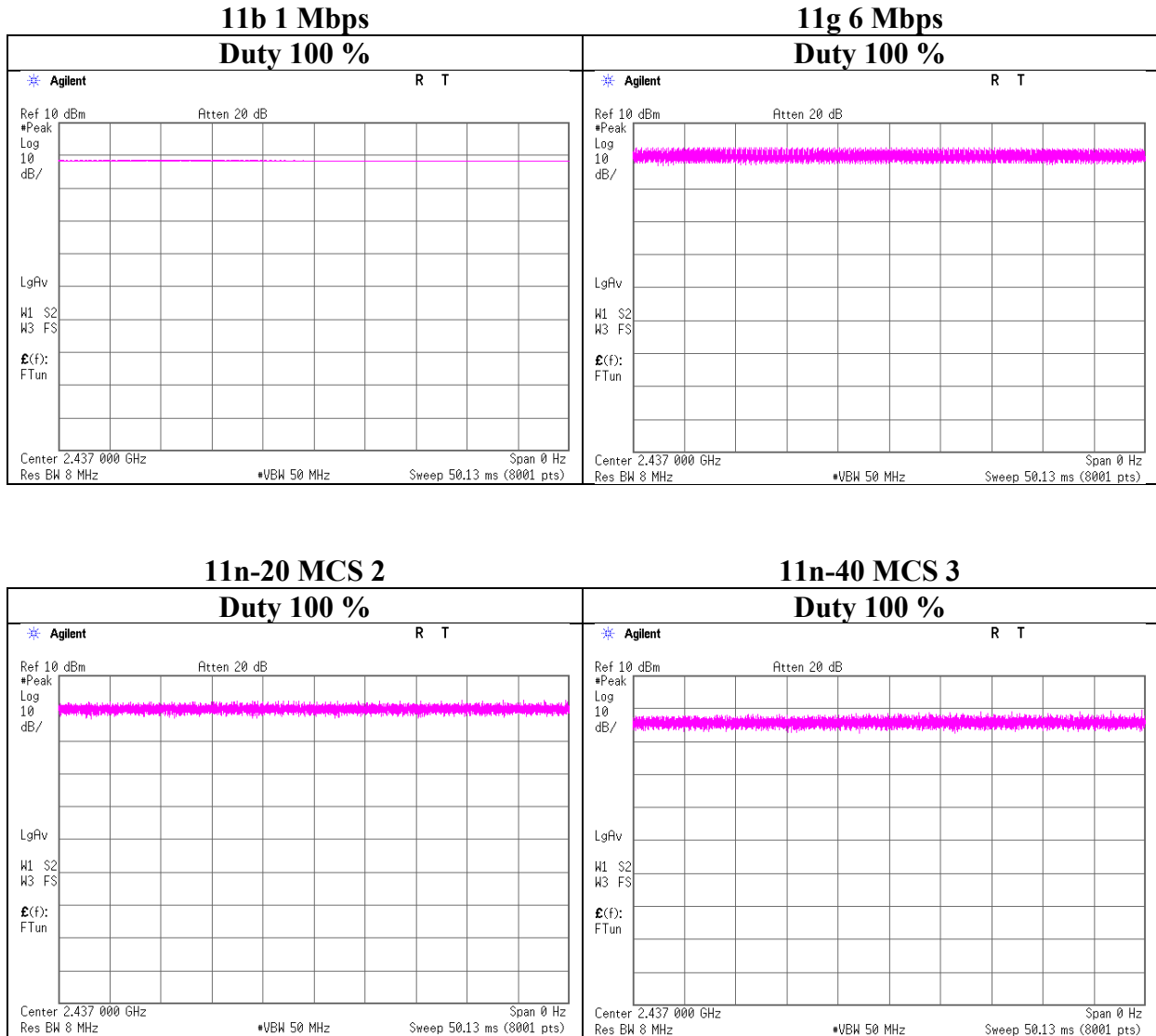
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

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Burst rate confirmation

Report No.	13274888H
Test place	Ise EMC Lab. No.6 Measurement Room
Date	November 21, 2019
Temperature / Humidity	23 deg. C / 36 % RH
Engineer	Takafumi Noguchi
Mode	Tx



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

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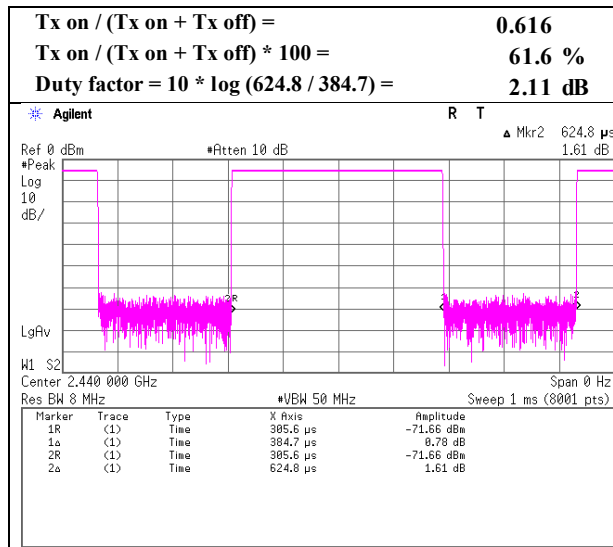
Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

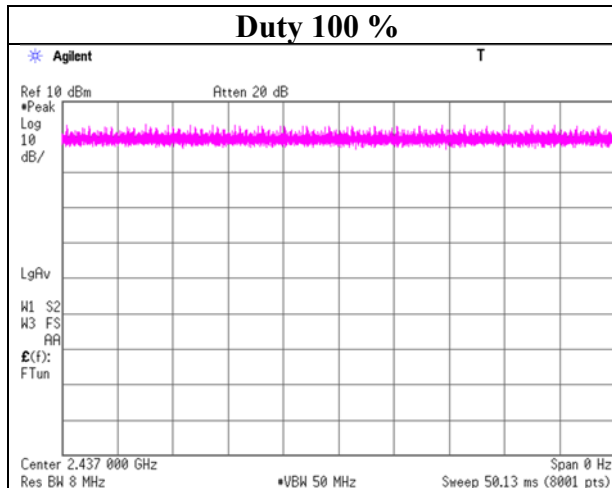
Burst rate confirmation

Report No. 13274888H
Test place Ise EMC Lab. No.6 Measurement Room
Date November 19, 2019 November 21, 2019
Temperature / Humidity 22 deg. C / 43 % RH 23 deg. C / 36 % RH
Engineer Takafumi Noguchi Takafumi Noguchi
Mode Tx

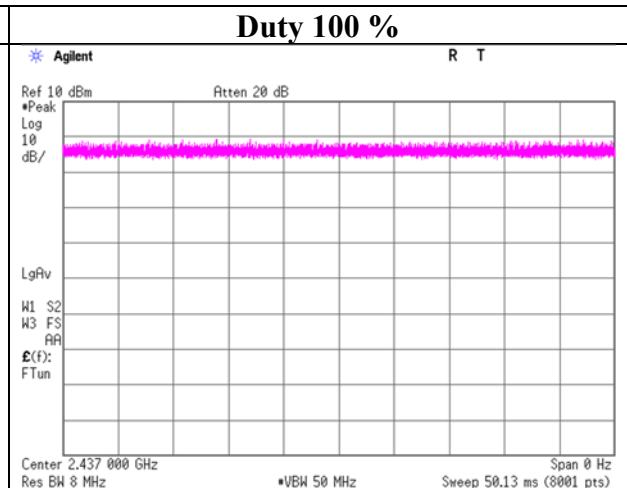
BT LE



11n-20 MCS 0 Duty 100 %



11n-40 MCS 0 Duty 100 %



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

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Radiated Spurious Emission

Report No. 13274888H
Test place Ise EMC Lab.
Semi Anechoic Chamber No.4
Date November 21, 2019
Temperature / Humidity 21 deg. C / 35 % RH
Engineer Junya Okuno
Mode (1 GHz - 10 GHz)
Tx 11b 2412 MHz

No.3
December 6, 2019
23 deg. C / 40 % RH
Ryota Yamanaka
(10 GHz - 18 GHz)

No.3
December 7, 2019
20 deg. C / 35 % RH
Takafumi Noguchi
(18 GHz - 26.5 GHz)

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	42.9	27.9	5.9	31.9	-	44.8	73.9	29.1	
Hori.	4824.000	PK	41.3	31.7	8.1	31.3	-	49.8	73.9	24.2	Floor noise
Hori.	7236.000	PK	42.2	36.3	9.5	32.4	-	55.6	73.9	18.4	Floor noise
Hori.	9648.000	PK	43.2	38.0	10.4	32.8	-	58.9	73.9	15.0	Floor noise
Hori.	2390.000	AV	33.4	27.9	5.9	31.9	-	35.3	53.9	18.6	
Hori.	4824.000	AV	30.2	31.7	8.1	31.3	-	38.7	53.9	15.2	Floor noise
Hori.	7236.000	AV	31.5	36.3	9.5	32.4	-	44.8	53.9	9.1	Floor noise
Hori.	9648.000	AV	32.1	38.0	10.4	32.8	-	47.8	53.9	6.1	Floor noise
Vert.	2390.000	PK	42.6	27.9	5.9	31.9	-	44.5	73.9	29.4	
Vert.	4824.000	PK	41.4	31.7	8.1	31.3	-	49.9	73.9	24.0	Floor noise
Vert.	7236.000	PK	42.3	36.3	9.5	32.4	-	55.7	73.9	18.2	Floor noise
Vert.	9648.000	PK	43.3	38.0	10.4	32.8	-	59.0	73.9	15.0	Floor noise
Vert.	2390.000	AV	34.1	27.9	5.9	31.9	-	36.0	53.9	17.9	
Vert.	4824.000	AV	30.1	31.7	8.1	31.3	-	38.6	53.9	15.3	Floor noise
Vert.	7236.000	AV	31.4	36.3	9.5	32.4	-	44.7	53.9	9.2	Floor noise
Vert.	9648.000	AV	32.1	38.0	10.4	32.8	-	47.7	53.9	6.2	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 (4 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

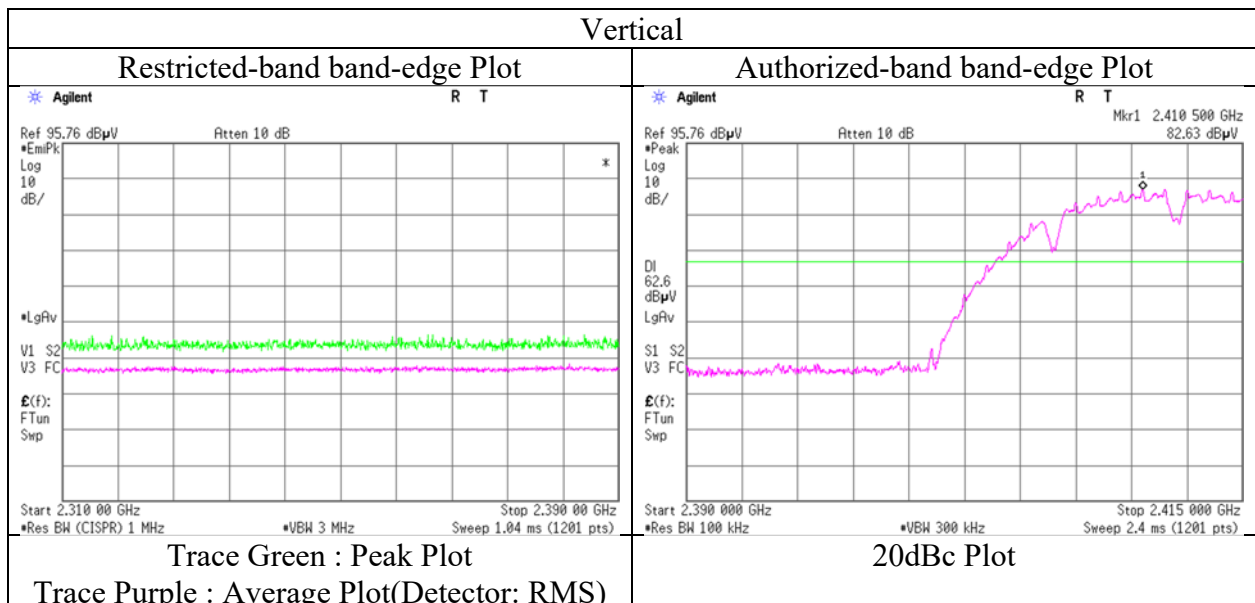
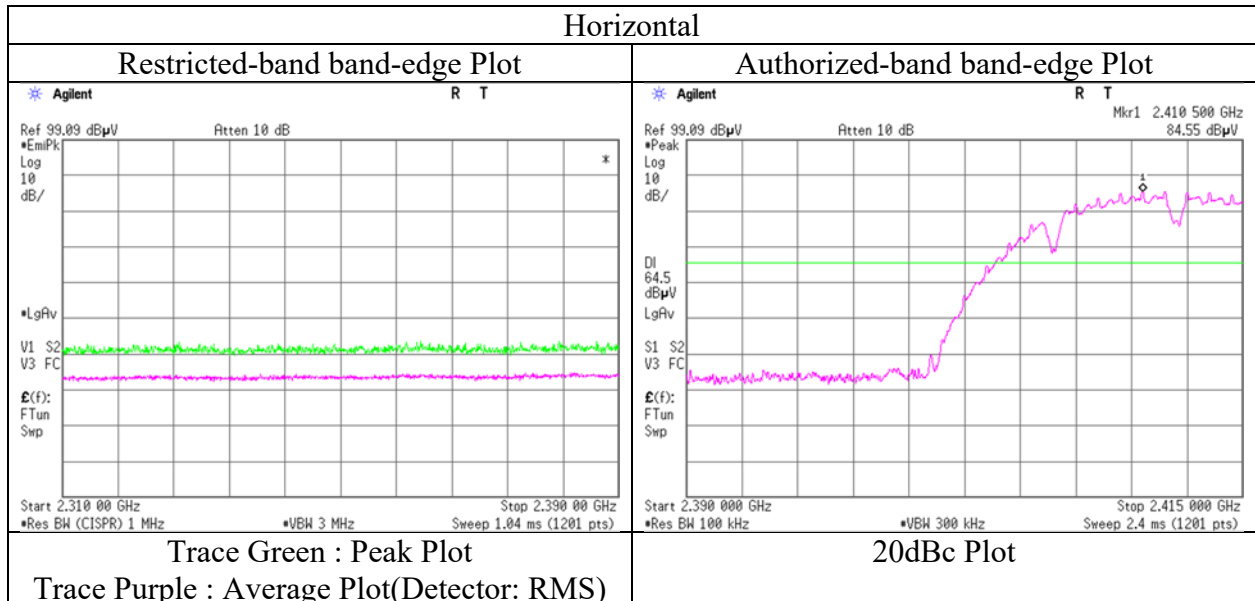
Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2412.000	PK	84.6	27.9	5.9	31.9	86.5	-	-	Carrier
Hori.	2400.000	PK	34.3	27.9	5.9	31.9	36.2	66.5	30.2	
Vert.	2412.000	PK	82.6	27.9	5.9	31.9	84.5	-	-	Carrier
Vert.	2400.000	PK	35.4	27.9	5.9	31.9	37.3	64.5	27.2	

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

*All other emissions were complied 20dBc limit.

Radiated Spurious Emission (Reference Plot for band-edge)

Report No.	13274888H
Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.4
Date	November 21, 2019
Temperature / Humidity	21 deg. C / 35 % RH
Engineer	Junya Okuno
	(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.

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Radiated Spurious Emission

Report No.	13274888H		
Test place	Ise EMC Lab.		
Semi Anechoic Chamber	No.4	No.3	No.3
Date	November 21, 2019	December 6, 2019	December 7, 2019
Temperature / Humidity	21 deg. C / 35 % RH	23 deg. C / 40 % RH	20 deg. C / 35 % RH
Engineer	Junya Okuno	Ryota Yamanaka	Takafumi Noguchi
	(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	41.0	31.6	8.1	31.2	-	49.5	73.9	24.4	Floor noise
Hori.	7311.000	PK	41.4	36.4	9.5	32.5	-	54.9	73.9	19.0	Floor noise
Hori.	9748.000	PK	43.7	38.3	10.5	32.9	-	59.5	73.9	14.4	Floor noise
Hori.	4874.000	AV	31.0	31.6	8.1	31.2	-	39.5	53.9	14.4	Floor noise
Hori.	7311.000	AV	31.7	36.4	9.5	32.5	-	45.2	53.9	8.7	Floor noise
Hori.	9748.000	AV	32.0	38.3	10.5	32.9	-	47.9	53.9	6.0	Floor noise
Vert.	4874.000	PK	40.9	31.6	8.1	31.2	-	49.4	73.9	24.5	Floor noise
Vert.	7311.000	PK	41.7	36.4	9.5	32.5	-	55.2	73.9	18.8	Floor noise
Vert.	9748.000	PK	43.5	38.3	10.5	32.9	-	59.4	73.9	14.5	Floor noise
Vert.	4874.000	AV	30.9	31.6	8.1	31.2	-	39.4	53.9	14.5	Floor noise
Vert.	7311.000	AV	31.8	36.4	9.5	32.5	-	45.3	53.9	8.6	Floor noise
Vert.	9748.000	AV	32.1	38.3	10.5	32.9	-	47.9	53.9	6.0	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 m / 3.0 m) = 2.5 dB
10 GHz - 26.5 GHz 20log (1.0 m / 3.0 m) = -9.5 dB

*All other emissions were complied 20dBc limit.

Radiated Spurious Emission

Report No.	13274888H		
Test place	Ise EMC Lab.		
Semi Anechoic Chamber	No.4	No.3	No.3
Date	November 21, 2019	December 6, 2019	December 7, 2019
Temperature / Humidity	21 deg. C / 35 % RH	23 deg. C / 40 % RH	20 deg. C / 35 % RH
Engineer	Junya Okuno	Ryota Yamanaka	Takafumi Noguchi
	(1 GHz - 10 GHz)	(10 GHz - 18 GHz)	(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	43.7	27.7	6.0	31.8	-	45.6	73.9	28.3	
Hori.	4924.000	PK	40.6	31.6	8.1	31.2	-	49.1	73.9	24.8	Floor noise
Hori.	7386.000	PK	41.4	36.5	9.5	32.5	-	55.0	73.9	19.0	Floor noise
Hori.	9848.000	PK	43.2	38.5	10.5	32.9	-	59.3	73.9	14.6	Floor noise
Hori.	2483.500	AV	35.6	27.7	6.0	31.8	-	37.5	53.9	16.4	
Hori.	4924.000	AV	30.1	31.6	8.1	31.2	-	38.6	53.9	15.3	Floor noise
Hori.	7386.000	AV	31.2	36.5	9.5	32.5	-	44.8	53.9	9.2	Floor noise
Hori.	9848.000	AV	31.7	38.5	10.5	32.9	-	47.8	53.9	6.1	Floor noise
Vert.	2483.500	PK	43.0	27.7	6.0	31.8	-	44.9	73.9	29.1	
Vert.	4924.000	PK	40.4	31.6	8.1	31.2	-	48.9	73.9	25.0	Floor noise
Vert.	7386.000	PK	41.7	36.5	9.5	32.5	-	55.2	73.9	18.7	Floor noise
Vert.	9848.000	PK	43.1	38.5	10.5	32.9	-	59.2	73.9	14.7	Floor noise
Vert.	2483.500	AV	34.7	27.7	6.0	31.8	-	36.6	53.9	17.3	
Vert.	4924.000	AV	30.0	31.6	8.1	31.2	-	38.5	53.9	15.4	Floor noise
Vert.	7386.000	AV	31.1	36.5	9.5	32.5	-	44.7	53.9	9.2	Floor noise
Vert.	9848.000	AV	31.8	38.5	10.5	32.9	-	47.8	53.9	6.1	Floor noise

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

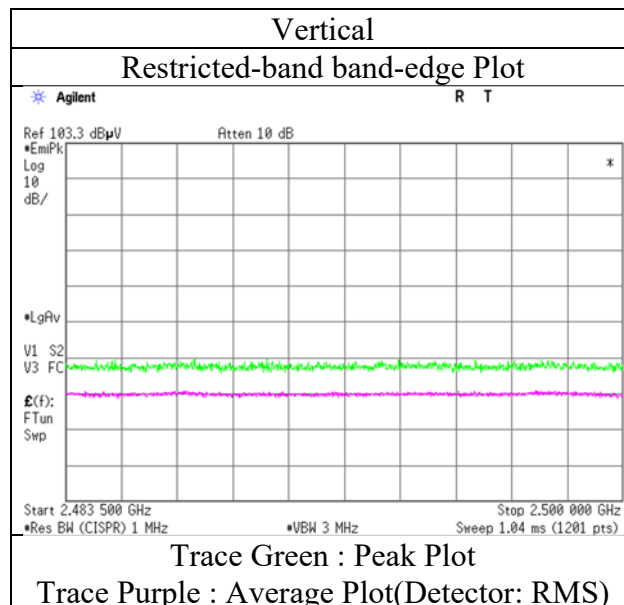
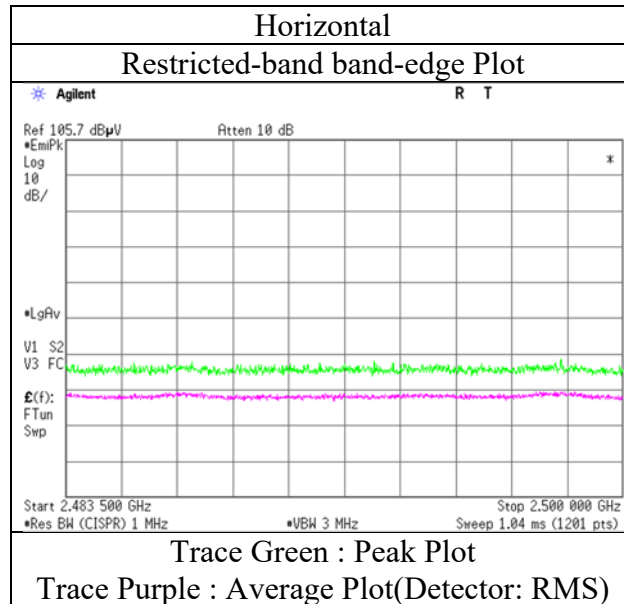
*Other frequency noises omitted in this report were not seen or had enough margin (more than 20 dB).

Distance factor: 1 GHz - 10 GHz 20log (4 m / 3.0 m) = 2.5 dB
10 GHz - 26.5 GHz 20log (1.0 m / 3.0 m) = -9.5 dB

*All other emissions were complied 20dBc limit.

Radiated Spurious Emission (Reference Plot for band-edge)

Report No.	13274888H
Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.4
Date	November 21, 2019
Temperature / Humidity	21 deg. C / 35 % RH
Engineer	Junya Okuno
	(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.

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Radiated Spurious Emission

Report No. 13274888H
Test place Ise EMC Lab.
Semi Anechoic Chamber No.4
Date November 21, 2019
Temperature / Humidity 21 deg. C / 35 % RH
Engineer Junya Okuno
Mode Tx 11g 2412 MHz

No.3
December 6, 2019
23 deg. C / 40 % RH
Ryota Yamanaka
(10 GHz - 18 GHz)

No.3
December 7, 2019
20 deg. C / 35 % RH
Takafumi Noguchi
(18 GHz - 26.5 GHz)

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	48.4	27.9	5.9	31.9	-	50.4	73.9	23.6	
Hori.	4824.000	PK	41.3	31.7	8.1	31.3	-	49.8	73.9	24.1	Floor noise
Hori.	7236.000	PK	42.3	36.3	9.5	32.4	-	55.7	73.9	18.2	Floor noise
Hori.	9648.000	PK	43.0	38.0	10.4	32.8	-	58.7	73.9	15.2	Floor noise
Hori.	2390.000	AV	39.6	27.9	5.9	31.9	-	41.5	53.9	12.4	
Hori.	4824.000	AV	30.3	31.7	8.1	31.3	-	38.7	53.9	15.2	Floor noise
Hori.	7236.000	AV	31.6	36.3	9.5	32.4	-	44.9	53.9	9.0	Floor noise
Hori.	9648.000	AV	32.1	38.0	10.4	32.8	-	47.7	53.9	6.2	Floor noise
Vert.	2390.000	PK	45.6	27.9	5.9	31.9	-	47.5	73.9	26.4	
Vert.	4824.000	PK	41.5	31.7	8.1	31.3	-	49.9	73.9	24.0	Floor noise
Vert.	7236.000	PK	42.6	36.3	9.5	32.4	-	55.9	73.9	18.0	Floor noise
Vert.	9648.000	PK	43.5	38.0	10.4	32.8	-	59.1	73.9	14.8	Floor noise
Vert.	2390.000	AV	36.4	27.9	5.9	31.9	-	38.3	53.9	15.6	
Vert.	4824.000	AV	30.2	31.7	8.1	31.3	-	38.7	53.9	15.2	Floor noise
Vert.	7236.000	AV	31.5	36.3	9.5	32.4	-	44.8	53.9	9.1	Floor noise
Vert.	9648.000	AV	32.2	38.0	10.4	32.8	-	47.8	53.9	6.1	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 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

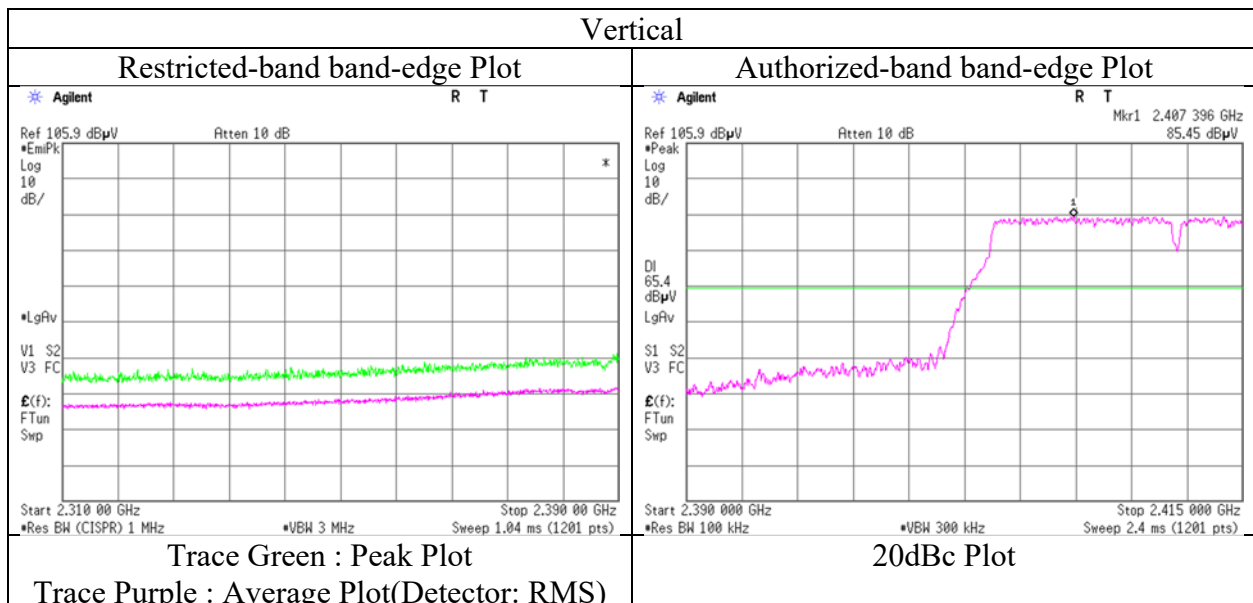
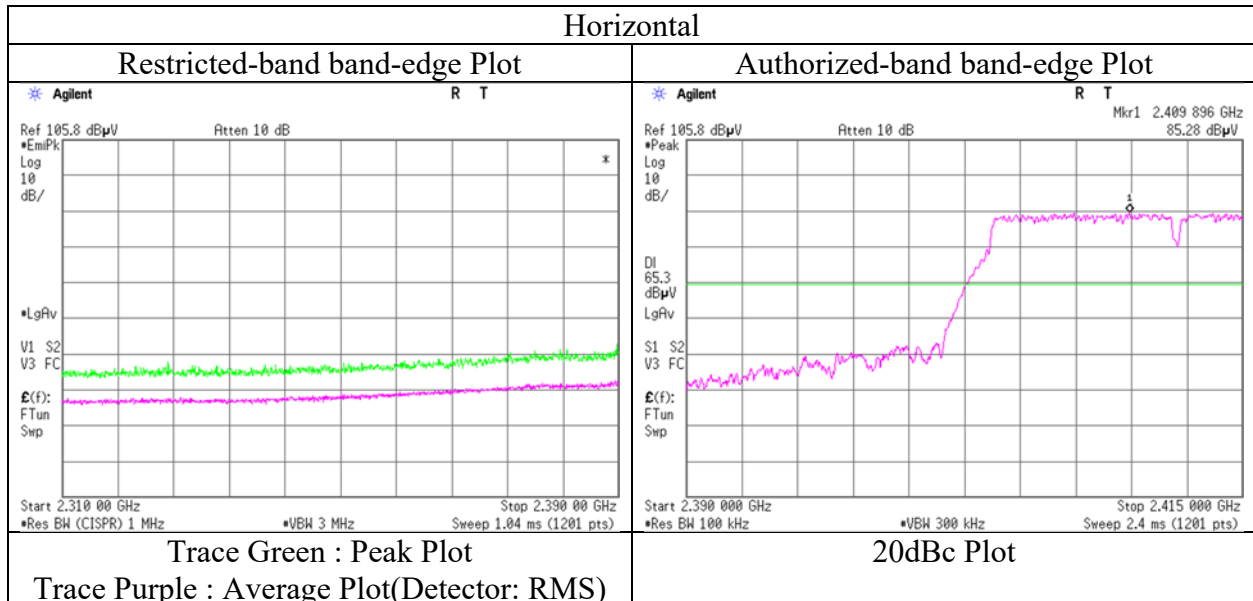
Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2412.000	PK	85.3	27.9	5.9	31.9	87.2	-	-	Carrier
Hori.	2400.000	PK	46.6	27.9	5.9	31.9	48.6	67.2	18.6	
Vert.	2412.000	PK	85.5	27.9	5.9	31.9	87.4	-	-	Carrier
Vert.	2400.000	PK	39.6	27.9	5.9	31.9	41.5	67.4	25.9	

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

*All other emissions were complied 20dBc limit.

Radiated Spurious Emission (Reference Plot for band-edge)

Report No.	13274888H
Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.4
Date	November 21, 2019
Temperature / Humidity	21 deg. C / 35 % RH
Engineer	Junya Okuno
	(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.

UL Japan, Inc.

Ise EMC Lab.

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Radiated Spurious Emission

Report No.	13274888H		
Test place	Ise EMC Lab.		
Semi Anechoic Chamber	No.4	No.3	No.3
Date	November 21, 2019	December 6, 2019	December 7, 2019
Temperature / Humidity	21 deg. C / 35 % RH	23 deg. C / 40 % RH	20 deg. C / 35 % RH
Engineer	Junya Okuno	Ryota Yamanaka	Takafumi Noguchi
	(1 GHz - 10 GHz)	(10 GHz - 18 GHz)	(18 GHz - 26.5 GHz)
Mode	Tx 11g 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	41.0	31.6	8.1	31.2	-	49.5	73.9	24.4	Floor noise
Hori.	7311.000	PK	41.3	36.4	9.5	32.5	-	54.8	73.9	19.1	Floor noise
Hori.	9748.000	PK	43.5	38.3	10.5	32.9	-	59.3	73.9	14.6	Floor noise
Hori.	4874.000	AV	31.1	31.6	8.1	31.2	-	39.6	53.9	14.3	Floor noise
Hori.	7311.000	AV	31.7	36.4	9.5	32.5	-	45.2	53.9	8.7	Floor noise
Hori.	9748.000	AV	32.1	38.3	10.5	32.9	-	47.9	53.9	6.0	Floor noise
Vert.	4874.000	PK	40.9	31.6	8.1	31.2	-	49.4	73.9	24.5	Floor noise
Vert.	7311.000	PK	41.8	36.4	9.5	32.5	-	55.3	73.9	18.6	Floor noise
Vert.	9748.000	PK	43.5	38.3	10.5	32.9	-	59.3	73.9	14.6	Floor noise
Vert.	4874.000	AV	31.0	31.6	8.1	31.2	-	39.5	53.9	14.4	Floor noise
Vert.	7311.000	AV	31.7	36.4	9.5	32.5	-	45.2	53.9	8.7	Floor noise
Vert.	9748.000	AV	32.0	38.3	10.5	32.9	-	47.8	53.9	6.1	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 $20\log(4\text{ m} / 3.0\text{ m}) = 2.5\text{ dB}$
10 GHz - 26.5 GHz $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.5\text{ dB}$

*All other emissions were complied 20dBc limit.

Radiated Spurious Emission

Report No.	13274888H		
Test place	Ise EMC Lab.		
Semi Anechoic Chamber	No.4	No.3	No.3
Date	November 21, 2019	December 6, 2019	December 7, 2019
Temperature / Humidity	21 deg. C / 35 % RH	23 deg. C / 40 % RH	20 deg. C / 35 % RH
Engineer	Junya Okuno	Ryota Yamanaka	Takafumi Noguchi
	(1 GHz - 10 GHz)	(10 GHz - 18 GHz)	(18 GHz - 26.5 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	49.4	27.7	6.0	31.8	-	51.3	73.9	22.6	
Hori.	4924.000	PK	40.7	31.6	8.1	31.2	-	49.2	73.9	24.7	Floor noise
Hori.	7386.000	PK	41.6	36.5	9.5	32.5	-	55.2	73.9	18.7	Floor noise
Hori.	9848.000	PK	43.3	38.5	10.5	32.9	-	59.4	73.9	14.5	Floor noise
Hori.	2483.500	AV	40.9	27.7	6.0	31.8	-	42.8	53.9	11.2	
Hori.	4924.000	AV	30.1	31.6	8.1	31.2	-	38.6	53.9	15.3	Floor noise
Hori.	7386.000	AV	32.1	36.5	9.5	32.5	-	45.6	53.9	8.3	Floor noise
Hori.	9848.000	AV	31.7	38.5	10.5	32.9	-	47.8	53.9	6.1	Floor noise
Vert.	2483.500	PK	48.8	27.7	6.0	31.8	-	50.6	73.9	23.3	
Vert.	4924.000	PK	40.6	31.6	8.1	31.2	-	49.0	73.9	24.9	Floor noise
Vert.	7386.000	PK	41.5	36.5	9.5	32.5	-	55.1	73.9	18.8	Floor noise
Vert.	9848.000	PK	43.3	38.5	10.5	32.9	-	59.3	73.9	14.6	Floor noise
Vert.	2483.500	AV	40.6	27.7	6.0	31.8	-	42.5	53.9	11.4	
Vert.	4924.000	AV	30.1	31.6	8.1	31.2	-	38.6	53.9	15.3	Floor noise
Vert.	7386.000	AV	31.2	36.5	9.5	32.5	-	44.8	53.9	9.1	Floor noise
Vert.	9848.000	AV	31.7	38.5	10.5	32.9	-	47.8	53.9	6.1	Floor noise

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

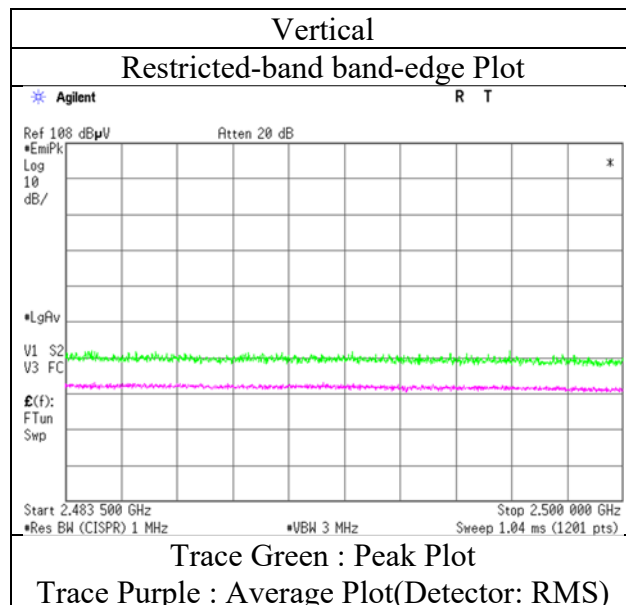
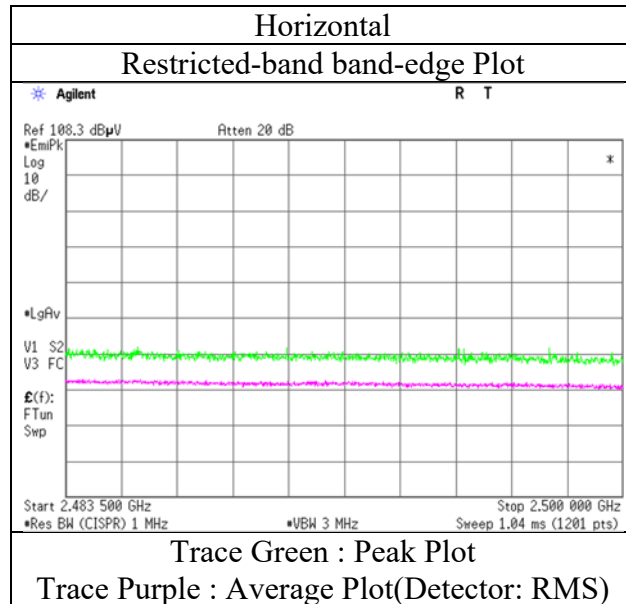
*Other frequency noises omitted in this report were not seen or had enough margin (more than 20 dB).

Distance factor: 1 GHz - 10 GHz 20log (4 m / 3.0 m) = 2.5 dB
10 GHz - 26.5 GHz 20log (1.0 m / 3.0 m) = -9.5 dB

*All other emissions were complied 20dBc limit.

Radiated Spurious Emission (Reference Plot for band-edge)

Report No.	13274888H
Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.4
Date	November 21, 2019
Temperature / Humidity	21 deg. C / 35 % RH
Engineer	Junya Okuno
	(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. 13274888H
Test place Ise EMC Lab.
Semi Anechoic Chamber No.4
Date November 21, 2019
Temperature / Humidity 21 deg. C / 35 % RH
Engineer Junya Okuno
(1 GHz - 10 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	48.3	27.9	5.9	31.9	-	50.2	73.9	23.7	
Hori.	2390.000	AV	39.4	27.9	5.9	31.9	-	41.3	53.9	12.6	
Vert.	2390.000	PK	48.4	27.9	5.9	31.9	-	50.3	73.9	23.6	
Vert.	2390.000	AV	38.7	27.9	5.9	31.9	-	40.6	53.9	13.3	

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 $20\log(4\text{ m} / 3.0\text{ m}) = 2.5\text{ dB}$

20dBc Data Sheet

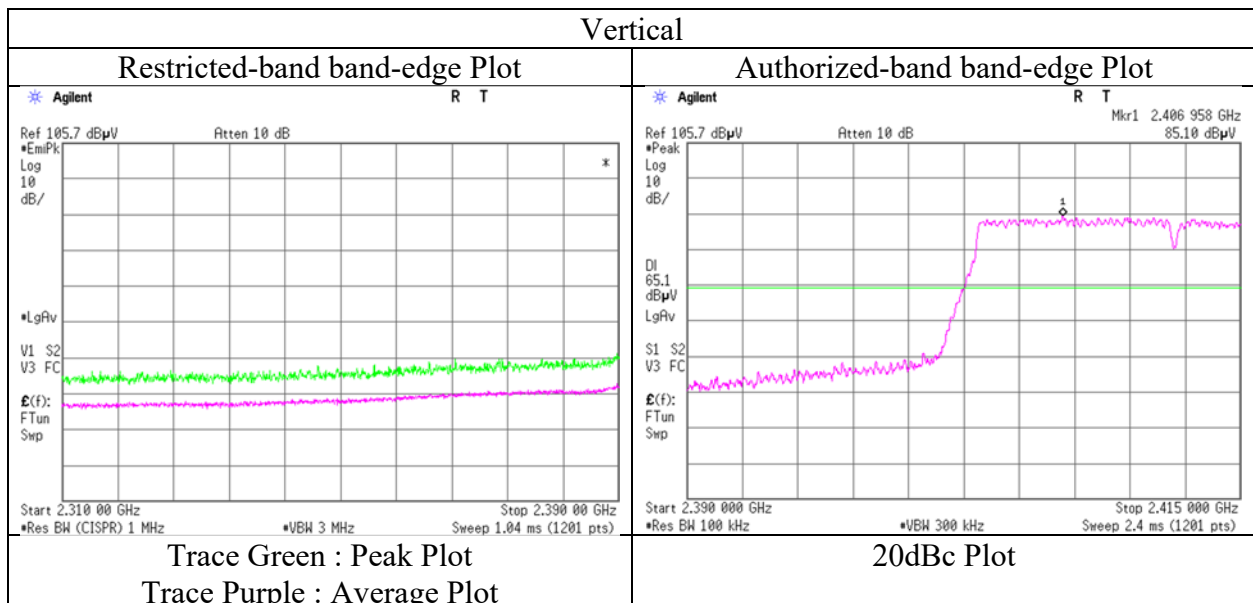
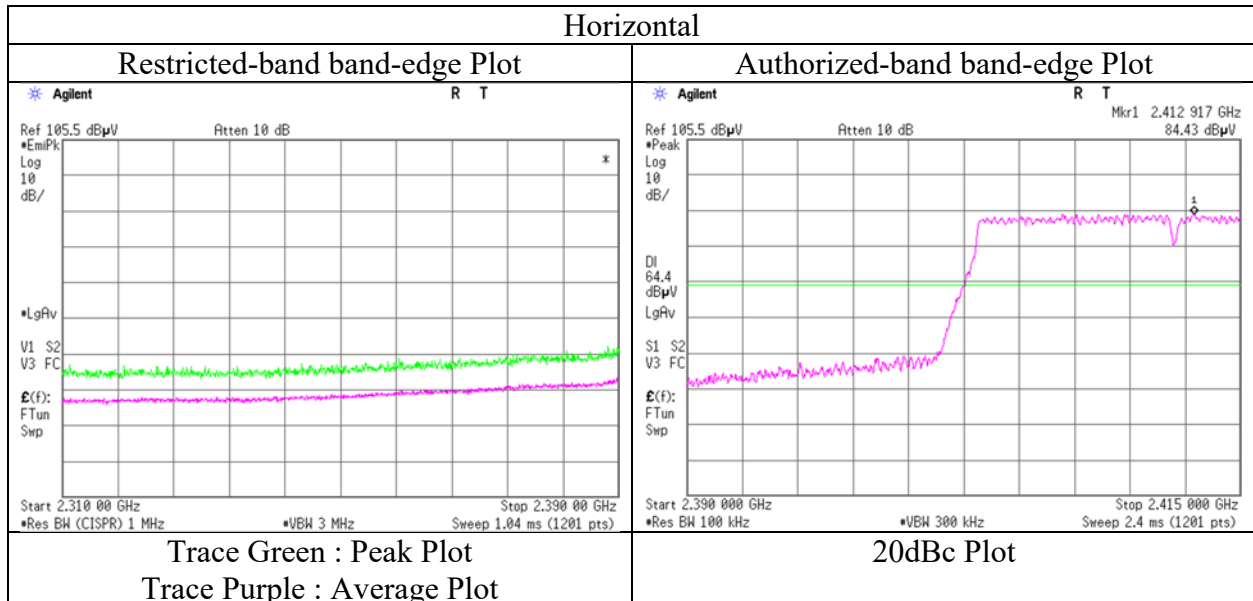
Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2412.000	PK	84.4	27.9	5.9	31.9	86.3	-	-	Carrier
Hori.	2400.000	PK	43.0	27.9	5.9	31.9	44.9	66.3	21.4	
Vert.	2412.000	PK	85.1	27.9	5.9	31.9	87.0	-	-	Carrier
Vert.	2400.000	PK	43.3	27.9	5.9	31.9	45.2	67.0	21.8	

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

*All other emissions were complied 20dBc limit.

Radiated Spurious Emission (Reference Plot for band-edge)

Report No.	13274888H
Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.4
Date	November 21, 2019
Temperature / Humidity	21 deg. C / 35 % RH
Engineer	Junya Okuno
	(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. 13274888H
Test place Ise EMC Lab.
Semi Anechoic Chamber No.4
Date November 21, 2019
Temperature / Humidity 21 deg. C / 35 % RH
Engineer Junya Okuno
(1 GHz - 10 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	49.1	27.7	6.0	31.8	-	51.0	73.9	22.9	
Hori.	2483.500	AV	40.8	27.7	6.0	31.8	-	42.6	53.9	11.3	
Vert.	2483.500	PK	48.8	27.7	6.0	31.8	-	50.7	73.9	23.2	
Vert.	2483.500	AV	40.6	27.7	6.0	31.8	-	42.5	53.9	11.4	

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

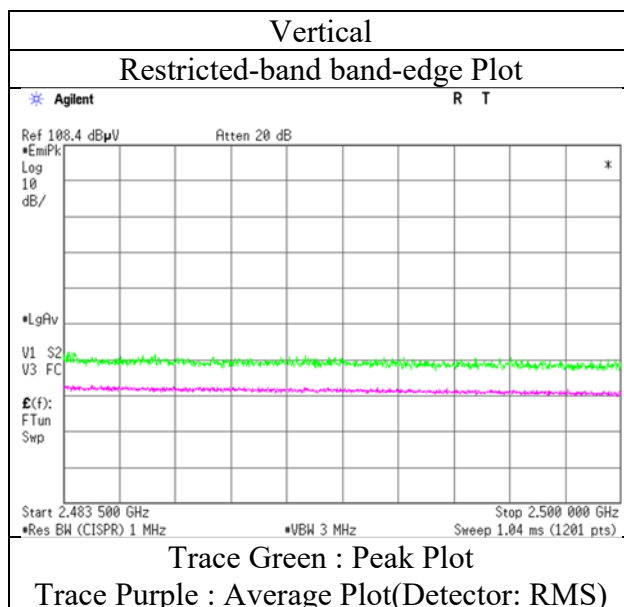
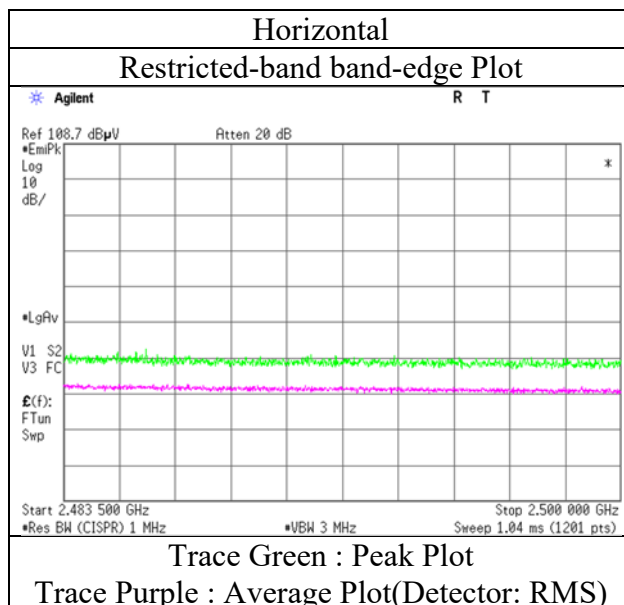
*Other frequency noises omitted in this report were not seen or had enough margin (more than 20 dB).

Distance factor: 1 GHz - 10 GHz $20\log(4\text{ m} / 3.0\text{ m}) = 2.5\text{ dB}$

*All other emissions were complied 20dBc limit.

Radiated Spurious Emission (Reference Plot for band-edge)

Report No. 13274888H
Test place Ise EMC Lab.
Semi Anechoic Chamber No.4
Date November 21, 2019
Temperature / Humidity 21 deg. C / 35 % RH
Engineer Junya Okuno
(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.

UL Japan, Inc.

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Radiated Spurious Emission

Report No. 13274888H
Test place Ise EMC Lab.
Semi Anechoic Chamber No.4
Date November 22, 2019
Temperature / Humidity 21 deg. C / 35 % RH
Engineer Akihiko Maeda
(1 GHz - 10 GHz)
Mode Tx 11n-40 2422 MHz

No.3
December 6, 2019
23 deg. C / 40 % RH
Ryota Yamanaka
(10 GHz - 18 GHz)

No.3
December 7, 2019
20 deg. C / 35 % RH
Takafumi Noguchi
(18 GHz - 26.5 GHz)

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	49.8	27.9	5.9	31.9	-	51.7	73.9	22.2	
Hori.	4844.000	PK	41.3	31.7	8.1	31.2	-	49.8	73.9	24.1	Floor noise
Hori.	7266.000	PK	40.3	36.3	9.5	32.4	-	53.7	73.9	20.2	Floor noise
Hori.	9688.000	PK	39.5	38.2	10.4	32.8	-	55.3	73.9	18.7	Floor noise
Hori.	2390.000	AV	39.0	27.9	5.9	31.9	-	40.9	53.9	13.0	
Hori.	4844.000	AV	32.6	31.7	8.1	31.2	-	41.2	53.9	12.8	Floor noise
Hori.	7266.000	AV	31.3	36.3	9.5	32.4	-	44.7	53.9	9.2	Floor noise
Hori.	9688.000	AV	30.1	38.2	10.4	32.8	-	45.9	53.9	8.0	Floor noise
Vert.	2390.000	PK	52.3	27.9	5.9	31.9	-	54.2	73.9	19.7	
Vert.	4844.000	PK	40.5	31.7	8.1	31.2	-	49.0	73.9	24.9	Floor noise
Vert.	7266.000	PK	40.2	36.3	9.5	32.4	-	53.6	73.9	20.3	Floor noise
Vert.	9688.000	PK	39.5	38.2	10.4	32.8	-	55.3	73.9	18.6	Floor noise
Vert.	2390.000	AV	41.4	27.9	5.9	31.9	-	43.4	53.9	10.6	
Vert.	4844.000	AV	32.5	31.7	8.1	31.2	-	41.1	53.9	12.8	Floor noise
Vert.	7266.000	AV	31.6	36.3	9.5	32.4	-	45.0	53.9	8.9	Floor noise
Vert.	9688.000	AV	30.2	38.2	10.4	32.8	-	46.0	53.9	7.9	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 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

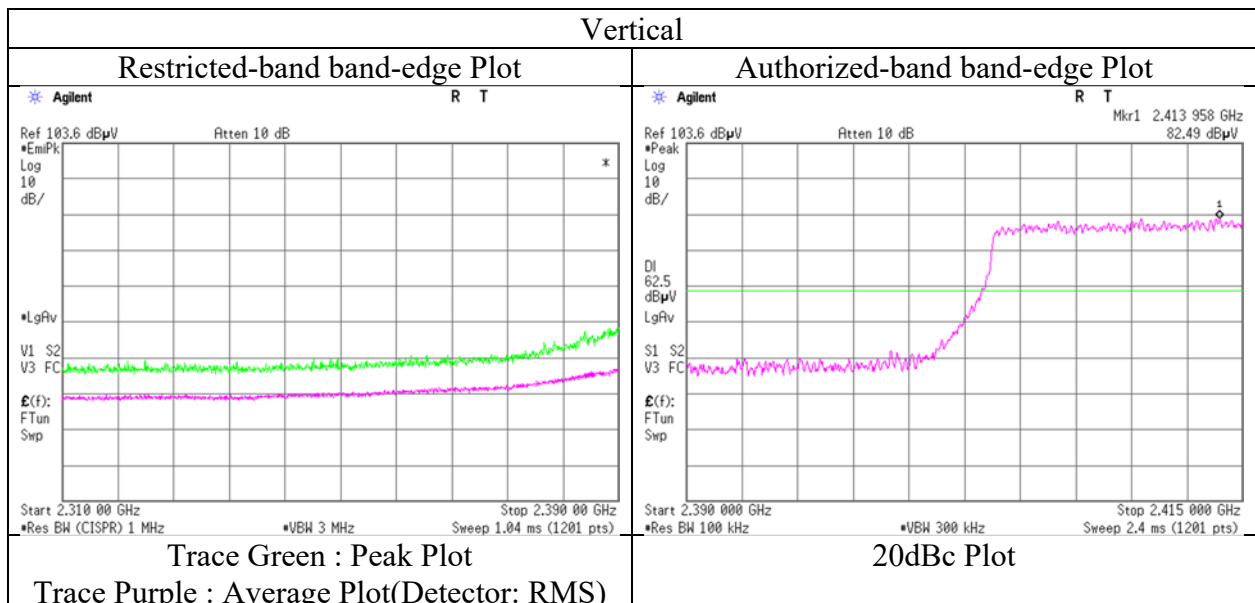
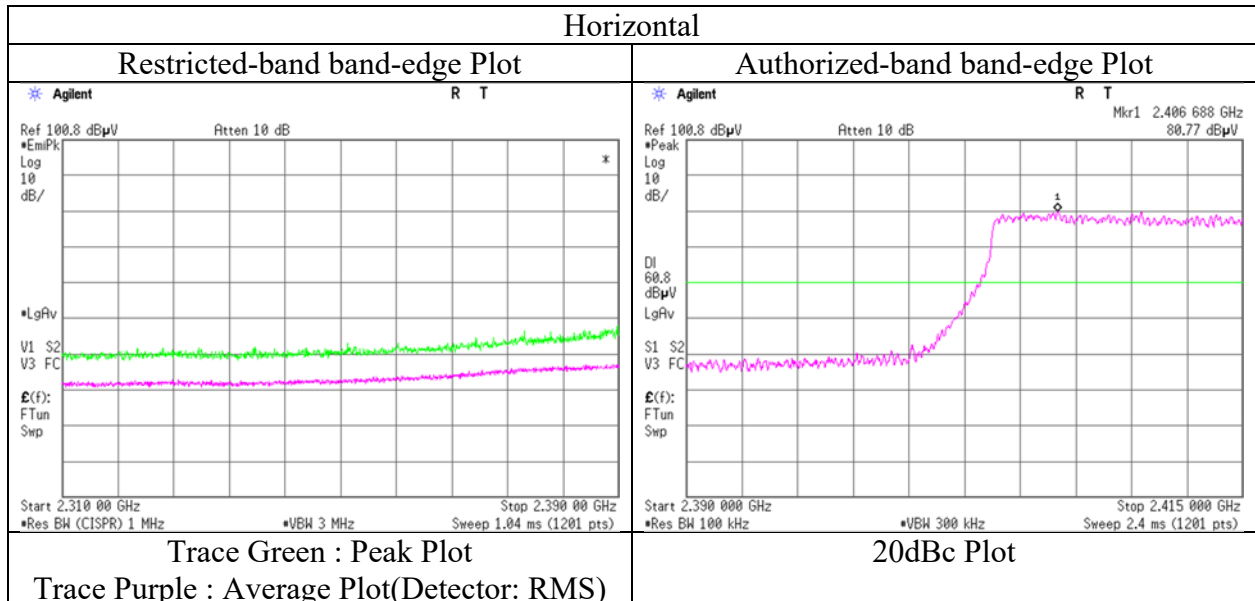
Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2422.000	PK	80.8	27.8	5.9	31.9	82.6	-	-	Carrier
Hori.	2400.000	PK	37.7	27.9	5.9	31.9	39.6	62.6	23.1	
Vert.	2422.000	PK	82.5	27.8	5.9	31.9	84.3	-	-	Carrier
Vert.	2400.000	PK	40.1	27.9	5.9	31.9	42.0	64.3	22.3	

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

*All other emissions were complied 20dBc limit.

Radiated Spurious Emission (Reference Plot for band-edge)

Report No.	13274888H
Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.4
Date	November 22, 2019
Temperature / Humidity	21 deg. C / 35 % RH
Engineer	Akihiko Maeda
	(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.

UL Japan, Inc.

Ise EMC Lab.

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Radiated Spurious Emission

Report No.	13274888H		
Test place	Ise EMC Lab.		
Semi Anechoic Chamber	No.4	No.3	No.3
Date	November 22, 2019	December 6, 2019	December 7, 2019
Temperature / Humidity	21 deg. C / 35 % RH	23 deg. C / 40 % RH	20 deg. C / 35 % RH
Engineer	Akihiko Maeda	Ryota Yamanaka	Takafumi Noguchi
	(1 GHz - 10 GHz)	(10 GHz - 18 GHz)	(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	41.5	31.6	8.1	31.2	-	50.0	73.9	23.9	Floor noise
Hori.	7311.000	PK	40.3	36.4	9.5	32.5	-	53.8	73.9	20.1	Floor noise
Hori.	9748.000	PK	39.4	38.3	10.5	32.9	-	55.3	73.9	18.6	Floor noise
Hori.	4874.000	AV	32.8	31.6	8.1	31.2	-	41.2	53.9	12.7	Floor noise
Hori.	7311.000	AV	31.2	36.4	9.5	32.5	-	44.7	53.9	9.2	Floor noise
Hori.	9748.000	AV	30.1	38.3	10.5	32.9	-	46.0	53.9	7.9	Floor noise
Vert.	4874.000	PK	40.9	31.6	8.1	31.2	-	49.4	73.9	24.5	Floor noise
Vert.	7311.000	PK	40.5	36.4	9.5	32.5	-	54.0	73.9	19.9	Floor noise
Vert.	9748.000	PK	39.2	38.3	10.5	32.9	-	55.0	73.9	18.9	Floor noise
Vert.	4874.000	AV	32.8	31.6	8.1	31.2	-	41.3	53.9	12.6	Floor noise
Vert.	7311.000	AV	31.1	36.4	9.5	32.5	-	44.6	53.9	9.3	Floor noise
Vert.	9748.000	AV	30.1	38.3	10.5	32.9	-	46.0	53.9	7.9	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 $20\log(4\text{ m} / 3.0\text{ m}) = 2.5\text{ dB}$
10 GHz - 26.5 GHz $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.5\text{ dB}$

*All other emissions were complied 20dBc limit.

Radiated Spurious Emission

Report No.	13274888H			
Test place	Ise EMC Lab.			
Semi Anechoic Chamber	No.4	No.3	No.3	No.3
Date	November 22, 2019	December 6, 2019	December 7, 2019	December 8, 2019
Temperature / Humidity	21 deg. C / 35 % RH	23 deg. C / 40 % RH	20 deg. C / 35 % RH	23 deg. C / 44 % RH
Engineer	Akihiko Maeda	Ryota Yamanaka	Takafumi Noguchi	Ryota Yamanaka
	(1 GHz - 10 GHz)	(10 GHz - 18 GHz)	(18 GHz - 26.5 GHz)	(Below 1 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.	40.000	QP	22.3	14.8	7.2	32.2	-	12.1	40.0	28.0	
Hori.	110.000	QP	22.0	11.7	8.2	32.1	-	9.7	43.5	33.8	
Hori.	250.000	QP	21.5	11.8	9.6	32.0	-	10.9	46.0	35.1	
Hori.	400.000	QP	21.4	15.7	10.7	32.0	-	15.8	46.0	30.3	
Hori.	610.000	QP	21.6	19.3	12.0	32.0	-	20.9	46.0	25.1	
Hori.	800.000	QP	21.4	20.8	13.0	31.5	-	23.7	46.0	22.3	
Hori.	2483.500	PK	50.9	27.7	6.0	31.8	-	52.8	73.9	21.2	
Hori.	4904.000	PK	41.3	31.6	8.1	31.2	-	49.7	73.9	24.2	Floor noise
Hori.	7356.000	PK	40.2	36.6	9.5	32.5	-	53.8	73.9	20.1	Floor noise
Hori.	9808.000	PK	39.3	38.3	10.5	32.9	-	55.2	73.9	18.7	Floor noise
Hori.	2483.500	AV	41.7	27.7	6.0	31.8	-	43.6	53.9	10.3	
Hori.	4904.000	AV	32.5	31.6	8.1	31.2	-	41.0	53.9	12.9	Floor noise
Hori.	7356.000	AV	31.2	36.6	9.5	32.5	-	44.8	53.9	9.1	Floor noise
Hori.	9808.000	AV	30.1	38.3	10.5	32.9	-	46.0	53.9	7.9	Floor noise
Vert.	40.000	QP	22.2	14.8	7.2	32.2	-	12.0	40.0	28.0	
Vert.	110.000	QP	22.1	11.7	8.2	32.1	-	9.8	43.5	33.7	
Vert.	250.000	QP	21.7	11.8	9.6	32.0	-	11.0	46.0	35.0	
Vert.	400.000	QP	21.4	15.7	10.7	32.0	-	15.8	46.0	30.2	
Vert.	610.000	QP	21.3	19.3	12.0	32.0	-	20.6	46.0	25.4	
Vert.	800.000	QP	21.4	20.8	13.0	31.5	-	23.7	46.0	22.3	
Vert.	2483.500	PK	51.2	27.7	6.0	31.8	-	53.0	73.9	20.9	
Vert.	4904.000	PK	40.2	31.6	8.1	31.2	-	48.7	73.9	25.3	Floor noise
Vert.	7356.000	PK	40.3	36.6	9.5	32.5	-	53.9	73.9	20.0	Floor noise
Vert.	9808.000	PK	39.1	38.3	10.5	32.9	-	55.0	73.9	18.9	Floor noise
Vert.	2483.500	AV	40.7	27.7	6.0	31.8	-	42.6	53.9	11.4	
Vert.	4904.000	AV	32.7	31.6	8.1	31.2	-	41.2	53.9	12.8	Floor noise
Vert.	7356.000	AV	31.2	36.6	9.5	32.5	-	44.8	53.9	9.1	Floor noise
Vert.	9808.000	AV	30.1	38.3	10.5	32.9	-	46.0	53.9	7.9	Floor noise

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

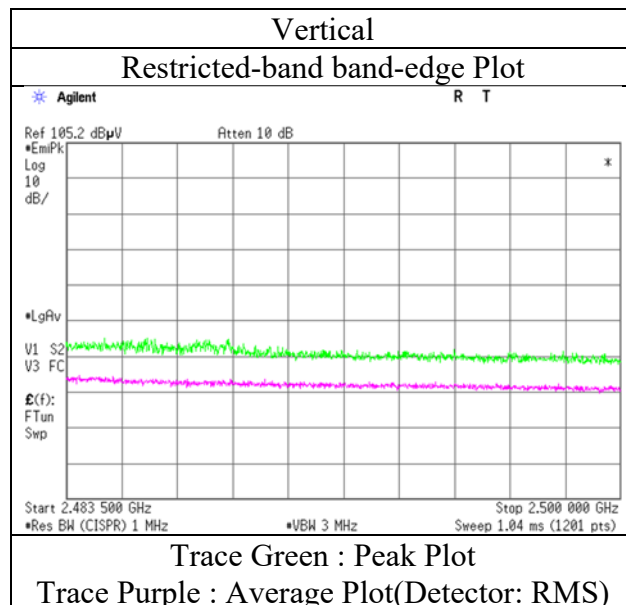
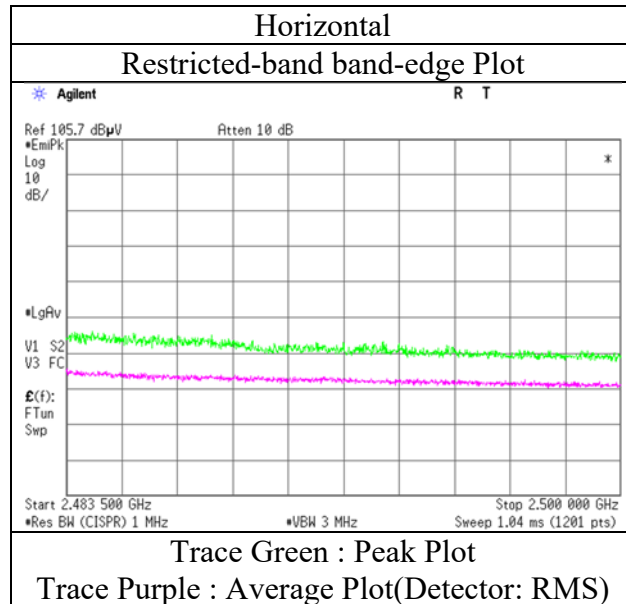
*Other frequency noises omitted in this report were not seen or had enough margin (more than 20 dB).

Distance factor: 1 GHz - 10 GHz 20log (4 m / 3.0 m) = 2.5 dB
10 GHz - 26.5 GHz 20log (1.0 m / 3.0 m) = -9.5 dB

*All other emissions were complied 20dBc limit.

Radiated Spurious Emission (Reference Plot for band-edge)

Report No.	13274888H
Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.4
Date	November 22, 2019
Temperature / Humidity	21 deg. C / 35 % RH
Engineer	Akihiko Maeda
	(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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Radiated Spurious Emission

Report No.	13274888H			
Test place	Ise EMC Lab.			
Semi Anechoic Chamber	No.4	No.3	No.3	No.3
Date	November 22, 2019	December 6, 2019	December 7, 2019	December 8, 2019
Temperature / Humidity	21 deg. C / 35 % RH	23 deg. C / 40 % RH	20 deg. C / 35 % RH	23 deg. C / 44 % RH
Engineer	Akihiko Maeda	Ryota Yamanaka	Takafumi Noguchi	Ryota Yamanaka
	(1 GHz - 10 GHz)	(10 GHz - 18 GHz)	(18 GHz - 26.5 GHz)	(Below 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.	40.000	QP	22.4	14.8	7.2	32.2	-	12.2	40.0	27.9	
Hori.	110.000	QP	22.0	11.7	8.2	32.1	-	9.8	43.5	33.7	
Hori.	250.000	QP	21.7	11.8	9.6	32.0	-	11.0	46.0	35.0	
Hori.	400.000	QP	21.5	15.7	10.7	32.0	-	15.9	46.0	30.1	
Hori.	610.000	QP	21.4	19.3	12.0	32.0	-	20.7	46.0	25.3	
Hori.	800.000	QP	21.4	20.8	13.0	31.5	-	23.7	46.0	22.3	
Hori.	2390.000	PK	42.9	27.9	5.9	31.9	-	44.8	73.9	29.1	
Hori.	4804.000	PK	40.5	31.7	8.1	31.3	-	49.0	73.9	24.9	Floor noise
Hori.	7206.000	PK	40.2	36.2	9.5	32.4	-	53.5	73.9	20.4	Floor noise
Hori.	9608.000	PK	39.4	38.0	10.4	32.8	-	55.1	73.9	18.8	Floor noise
Hori.	2390.000	AV	33.6	27.9	5.9	31.9	2.1	37.6	53.9	16.3	*1)
Hori.	4804.000	AV	33.0	31.7	8.1	31.3	-	41.5	53.9	12.4	Floor noise
Hori.	7206.000	AV	31.0	36.2	9.5	32.4	-	44.4	53.9	9.6	Floor noise
Hori.	9608.000	AV	30.1	38.0	10.4	32.8	-	45.7	53.9	8.2	Floor noise
Vert.	40.000	QP	22.3	14.8	7.2	32.2	-	12.1	40.0	27.9	
Vert.	110.000	QP	22.1	11.7	8.2	32.1	-	9.8	43.5	33.7	
Vert.	250.000	QP	21.7	11.8	9.6	32.0	-	11.0	46.0	35.0	
Vert.	400.000	QP	21.5	15.7	10.7	32.0	-	15.9	46.0	30.1	
Vert.	610.000	QP	21.4	19.3	12.0	32.0	-	20.7	46.0	25.3	
Vert.	800.000	QP	21.5	20.8	13.0	31.5	-	23.8	46.0	22.2	
Vert.	2390.000	PK	42.3	27.9	5.9	31.9	-	44.2	73.9	29.7	
Vert.	4804.000	PK	41.9	31.7	8.1	31.3	-	50.4	73.9	23.5	Floor noise
Vert.	7206.000	PK	40.1	36.2	9.5	32.4	-	53.4	73.9	20.5	Floor noise
Vert.	9608.000	PK	39.4	38.0	10.4	32.8	-	55.0	73.9	18.9	Floor noise
Vert.	2390.000	AV	33.7	27.9	5.9	31.9	2.1	37.7	53.9	16.2	*1)
Vert.	4804.000	AV	32.6	31.7	8.1	31.3	-	41.0	53.9	12.9	Floor noise
Vert.	7206.000	AV	31.2	36.2	9.5	32.4	-	44.6	53.9	9.3	Floor noise
Vert.	9608.000	AV	30.2	38.0	10.4	32.8	-	45.8	53.9	8.1	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 20log (4 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	96.7	27.9	5.9	31.9	98.6	-	-	Carrier
Hori.	2400.000	PK	40.1	27.9	5.9	31.9	42.0	78.6	36.6	
Vert.	2402.000	PK	96.2	27.9	5.9	31.9	98.1	-	-	Carrier
Vert.	2400.000	PK	41.4	27.9	5.9	31.9	43.3	78.1	34.7	

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

*All other emissions were complied 20dBc limit.

UL Japan, Inc.

Ise EMC Lab.

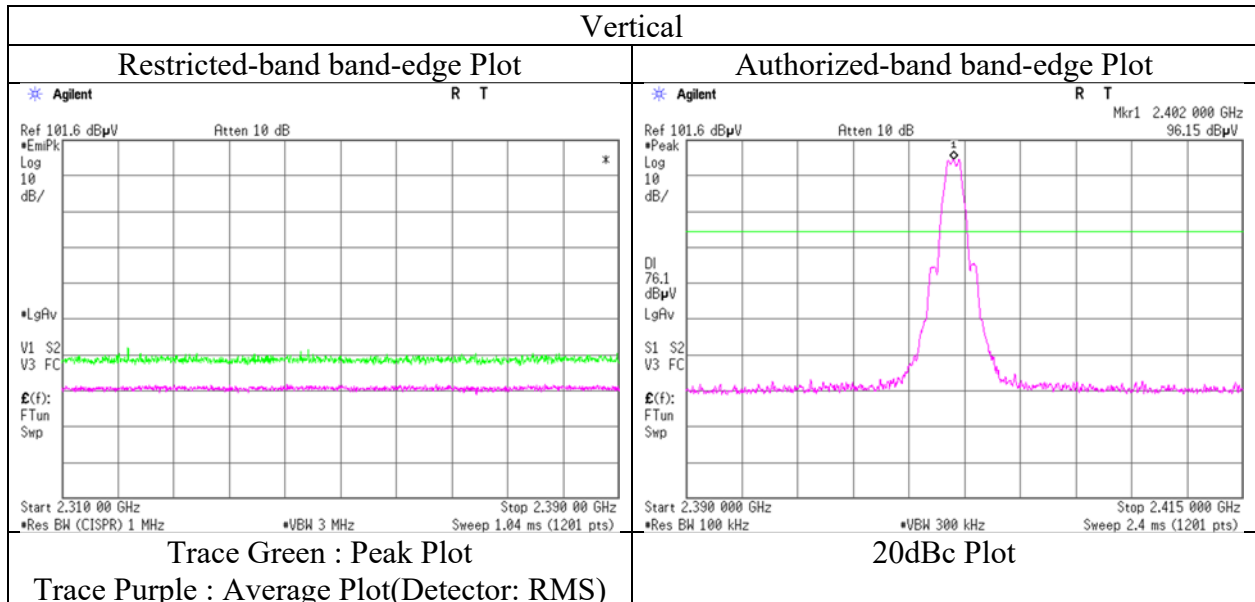
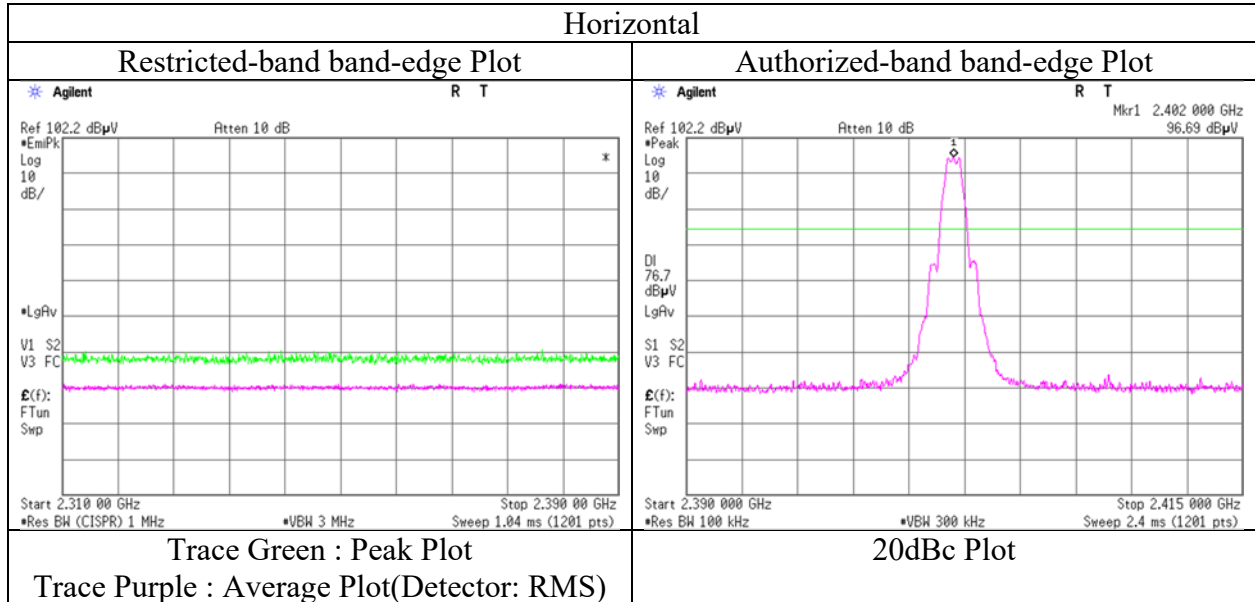
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Radiated Spurious Emission (Reference Plot for band-edge)

Report No. 13274888H
Test place Ise EMC Lab.
Semi Anechoic Chamber No.4
Date November 22, 2019
Temperature / Humidity 21 deg. C / 35 % RH
Engineer Akihiko Maeda
(1 GHz - 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.

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Radiated Spurious Emission

Report No.	13274888H			
Test place	Ise EMC Lab.			
Semi Anechoic Chamber	No.4	No.3	No.3	No.3
Date	November 22, 2019	December 6, 2019	December 7, 2019	December 8, 2019
Temperature / Humidity	21 deg. C / 35 % RH	23 deg. C / 40 % RH	20 deg. C / 35 % RH	23 deg. C / 44 % RH
Engineer	Akihiko Maeda	Ryota Yamanaka	Takafumi Noguchi	Ryota Yamanaka
	(1 GHz - 10 GHz)	(10 GHz - 18 GHz)	(18 GHz - 26.5 GHz)	(Below 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.	40.000	QP	22.4	14.8	7.2	32.2	-	12.2	40.0	27.9	
Hori.	110.000	QP	22.1	11.7	8.2	32.1	-	9.8	43.5	33.7	
Hori.	250.000	QP	21.8	11.8	9.6	32.0	-	11.1	46.0	34.9	
Hori.	400.000	QP	21.5	15.7	10.7	32.0	-	15.9	46.0	30.1	
Hori.	610.000	QP	21.4	19.3	12.0	32.0	-	20.7	46.0	25.3	
Hori.	800.000	QP	21.4	20.8	13.0	31.5	-	23.7	46.0	22.3	
Hori.	4880.000	PK	41.1	31.6	8.1	31.2	-	49.5	73.9	24.4	Floor noise
Hori.	7320.000	PK	40.1	36.5	9.5	32.5	-	53.6	73.9	20.3	Floor noise
Hori.	9760.000	PK	39.5	38.3	10.5	32.9	-	55.3	73.9	18.6	Floor noise
Hori.	4880.000	AV	32.6	31.6	8.1	31.2	-	41.0	53.9	12.9	Floor noise
Hori.	7320.000	AV	31.0	36.5	9.5	32.5	-	44.6	53.9	9.4	Floor noise
Hori.	9760.000	AV	30.1	38.3	10.5	32.9	-	46.0	53.9	7.9	Floor noise
Vert.	40.000	QP	22.3	14.8	7.2	32.2	-	12.1	40.0	27.9	
Vert.	110.000	QP	22.1	11.7	8.2	32.1	-	9.8	43.5	33.7	
Vert.	250.000	QP	21.7	11.8	9.6	32.0	-	11.1	46.0	34.9	
Vert.	400.000	QP	21.5	15.7	10.7	32.0	-	15.9	46.0	30.1	
Vert.	610.000	QP	21.4	19.3	12.0	32.0	-	20.7	46.0	25.3	
Vert.	800.000	QP	21.5	20.8	13.0	31.5	-	23.8	46.0	22.2	
Vert.	4880.000	PK	41.7	31.6	8.1	31.2	-	50.2	73.9	23.7	Floor noise
Vert.	7320.000	PK	40.0	36.5	9.5	32.5	-	53.6	73.9	20.4	Floor noise
Vert.	9760.000	PK	39.4	38.3	10.5	32.9	-	55.3	73.9	18.6	Floor noise
Vert.	4880.000	AV	32.9	31.6	8.1	31.2	-	41.3	53.9	12.6	Floor noise
Vert.	7320.000	AV	31.1	36.5	9.5	32.5	-	44.7	53.9	9.2	Floor noise
Vert.	9760.000	AV	30.1	38.3	10.5	32.9	-	46.0	53.9	7.9	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 m / 3.0 m) = 2.5 dB
10 GHz - 26.5 GHz 20log (1.0 m / 3.0 m) = -9.5 dB

*All other emissions were complied 20dBc limit.

Radiated Spurious Emission

Report No.	13274888H			
Test place	Ise EMC Lab.			
Semi Anechoic Chamber	No.4	No.3	No.3	No.3
Date	November 22, 2019	December 6, 2019	December 7, 2019	December 8, 2019
Temperature / Humidity	21 deg. C / 35 % RH	23 deg. C / 40 % RH	20 deg. C / 35 % RH	23 deg. C / 44 % RH
Engineer	Akihiko Maeda	Ryota Yamanaka	Takafumi Noguchi	Ryota Yamanaka
	(1 GHz - 10 GHz)	(10 GHz - 18 GHz)	(18 GHz - 26.5 GHz)	(Below 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.	40.000	QP	22.4	14.8	7.2	32.2	-	12.2	40.0	27.8	
Hori.	110.000	QP	22.6	11.7	8.2	32.1	-	10.3	43.5	33.2	
Hori.	250.000	QP	21.9	11.8	9.6	32.0	-	11.2	46.0	34.8	
Hori.	400.000	QP	21.6	15.7	10.7	32.0	-	16.0	46.0	30.1	
Hori.	610.000	QP	21.4	19.3	12.0	32.0	-	20.7	46.0	25.3	
Hori.	800.000	QP	21.5	20.8	13.0	31.5	-	23.8	46.0	22.2	
Hori.	2483.500	PK	45.1	27.7	6.0	31.8	-	47.0	73.9	27.0	
Hori.	4960.000	PK	41.0	31.6	8.1	31.2	-	49.5	73.9	24.4	Floor noise
Hori.	7440.000	PK	40.3	36.6	9.5	32.5	-	53.9	73.9	20.0	Floor noise
Hori.	9920.000	PK	39.2	38.5	10.5	33.0	-	55.2	73.9	18.7	Floor noise
Hori.	2483.500	AV	35.7	27.7	6.0	31.8	2.1	39.6	53.9	14.3	*1)
Hori.	4960.000	AV	32.6	31.6	8.1	31.2	-	41.1	53.9	12.8	Floor noise
Hori.	7440.000	AV	31.5	36.6	9.5	32.5	-	45.1	53.9	8.9	Floor noise
Hori.	9920.000	AV	30.2	38.5	10.5	33.0	-	46.2	53.9	7.7	Floor noise
Vert.	40.000	QP	22.4	14.8	7.2	32.2	-	12.2	40.0	27.8	
Vert.	110.000	QP	22.6	11.7	8.2	32.1	-	10.3	43.5	33.2	
Vert.	250.000	QP	22.0	11.8	9.6	32.0	-	11.3	46.0	34.7	
Vert.	400.000	QP	21.6	15.7	10.7	32.0	-	15.9	46.0	30.1	
Vert.	610.000	QP	21.4	19.3	12.0	32.0	-	20.7	46.0	25.3	
Vert.	800.000	QP	21.5	20.8	13.0	31.5	-	23.8	46.0	22.2	
Vert.	2483.500	PK	52.5	27.7	6.0	31.8	-	54.3	73.9	19.6	
Vert.	4960.000	PK	41.4	31.6	8.1	31.2	-	49.9	73.9	24.0	Floor noise
Vert.	7440.000	PK	40.2	36.6	9.5	32.5	-	53.8	73.9	20.1	Floor noise
Vert.	9920.000	PK	39.5	38.5	10.5	33.0	-	55.5	73.9	18.4	Floor noise
Vert.	2483.500	AV	35.0	27.7	6.0	31.8	2.1	38.9	53.9	15.0	*1)
Vert.	4960.000	AV	32.5	31.6	8.1	31.2	-	41.0	53.9	12.9	Floor noise
Vert.	7440.000	AV	31.3	36.6	9.5	32.5	-	44.9	53.9	9.0	Floor noise
Vert.	9920.000	AV	30.2	38.5	10.5	33.0	-	46.3	53.9	7.6	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 20log (4 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)

*All other emissions were complied 20dBc limit.

UL Japan, Inc.

Ise EMC Lab.

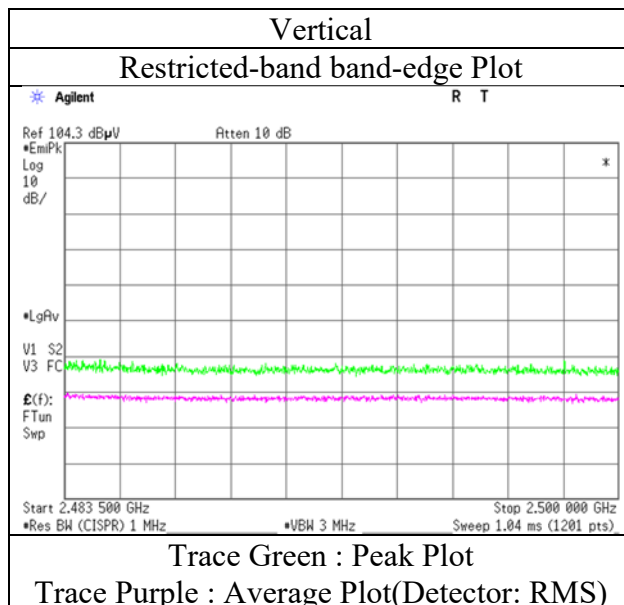
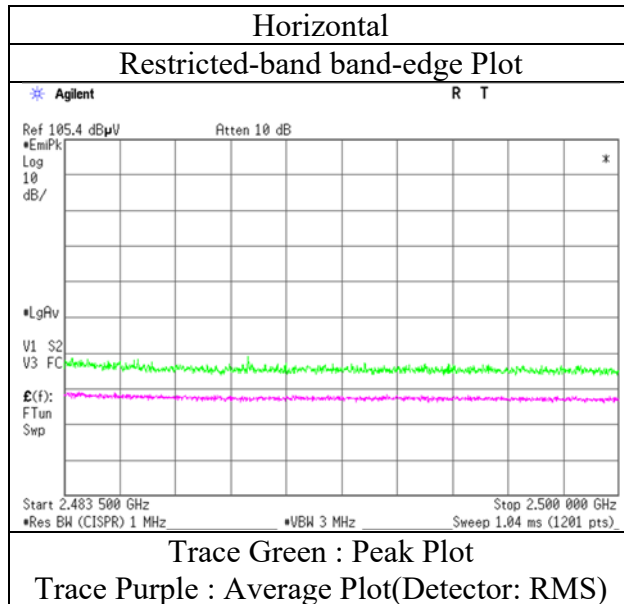
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Radiated Spurious Emission (Reference Plot for band-edge)

Report No.	13274888H
Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.4
Date	November 22, 2019
Temperature / Humidity	21 deg. C / 35 % RH
Engineer	Akihiko Maeda
	(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.

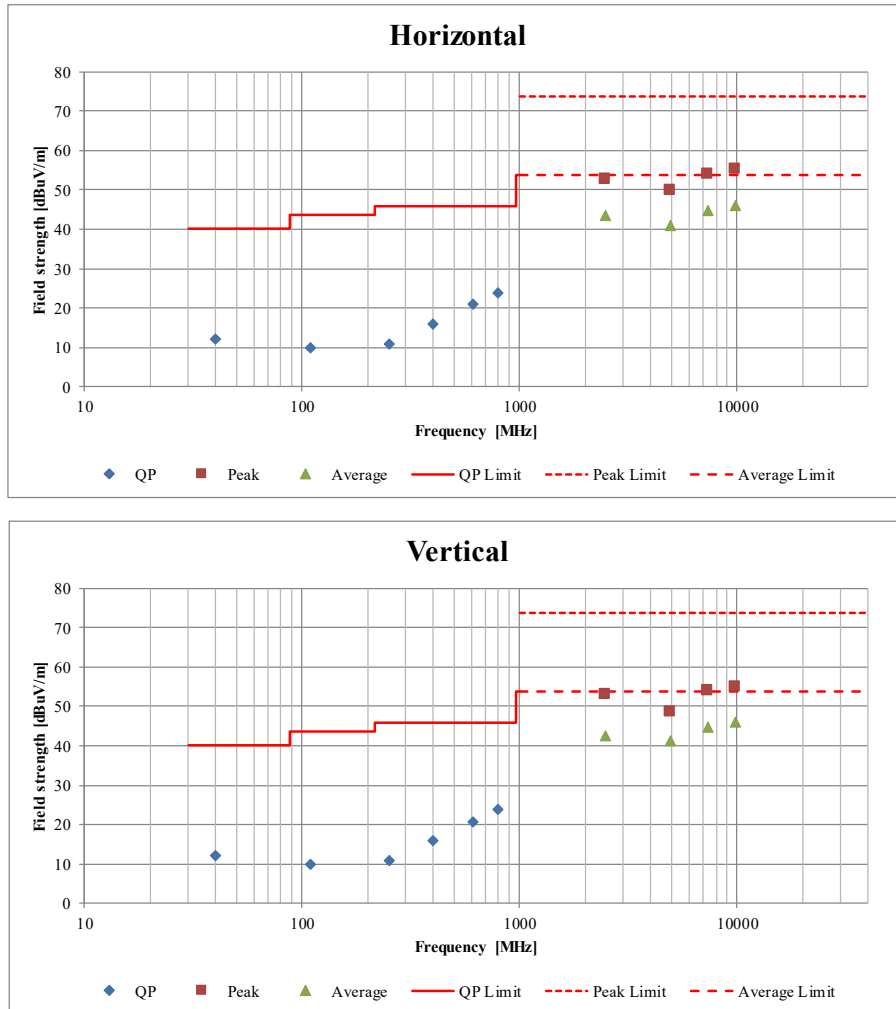
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Radiated Spurious Emission (Plot data, Worst case)

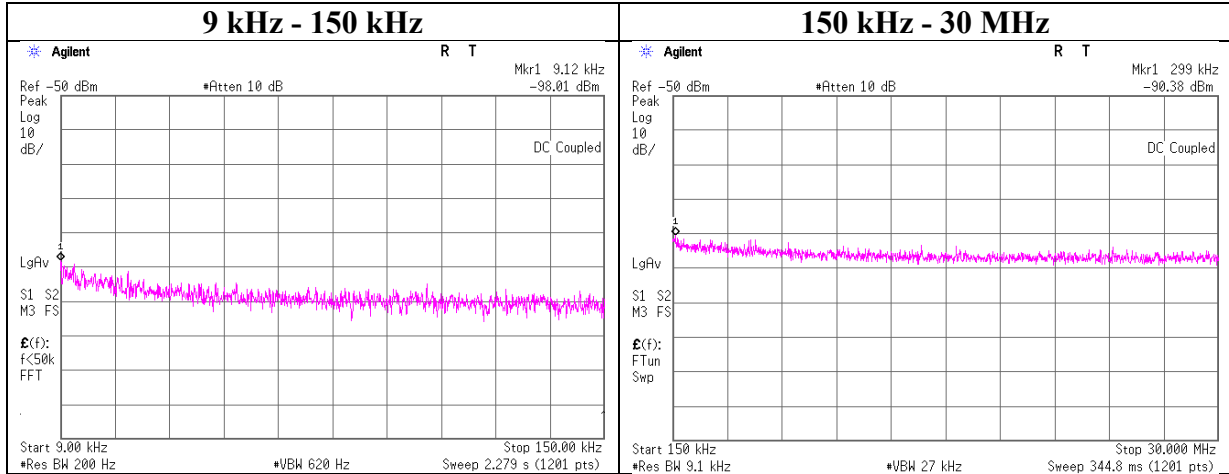
Test place	13274888H			
Semi Anechoic Chamber	Ise EMC Lab.			
Date	No.4	No.3	No.3	No.3
Temperature / Humidity	November 22, 2019	December 6, 2019	December 7, 2019	December 8, 2019
Engineer	21 deg. C / 35 % RH	23 deg. C / 40 % RH	20 deg. C / 35 % RH	23 deg. C / 44 % RH
	Akihiko Maeda	Ryota Yamanaka	Takafumi Noguchi	Ryota Yamanaka
	(1 GHz - 10 GHz)	(10 GHz - 18 GHz)	(18 GHz - 26.5 GHz)	(Below 1 GHz)
Mode	Tx 11n-40 2452 MHz			



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

Conducted Spurious Emission

Report No.	13274888H
Test place	Ise EMC Lab. No.6 Measurement Room
Date	November 21, 2019
Temperature / Humidity	23 deg. C / 36 % RH
Engineer	Takafumi Noguchi
Mode	Tx 11n-40 2452 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
9.12	-98.0	1.0	9.9	2.0	1	-85.1	300	6.0	-23.9	48.4	72.3	
299.00	-90.4	1.0	9.9	2.0	1	-77.5	300	6.0	-16.3	18.0	34.3	

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

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

N: Number of output

*2.0 dBi was applied to the test result based on ANSI C63.10 since antenna gain was less than 2.0 dBi.

UL Japan, Inc.

Ise EMC Lab.

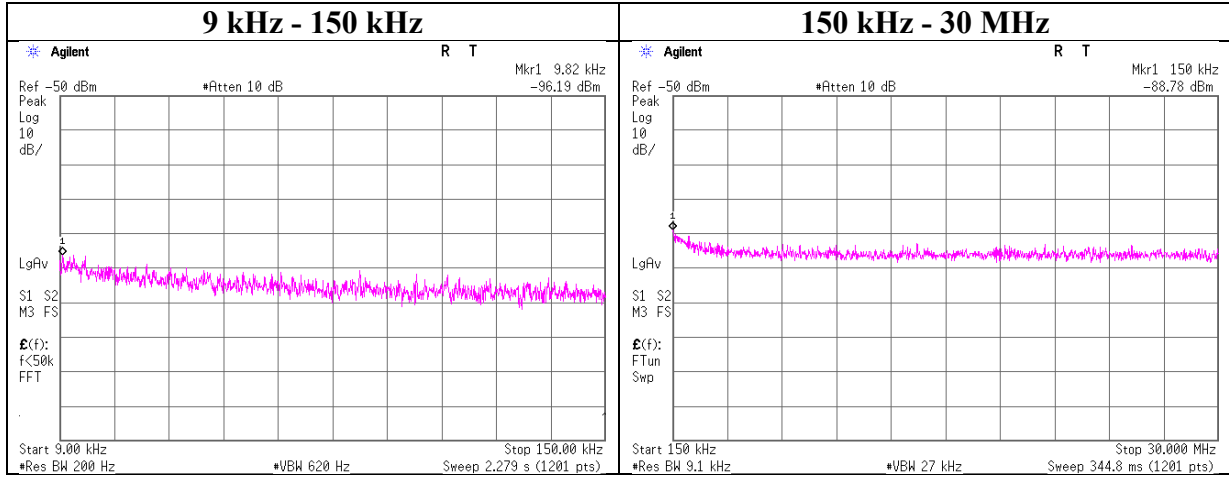
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Conducted Spurious Emission

Report No.	13274888H
Test place	Ise EMC Lab. No.6 Measurement Room
Date	November 19, 2019
Temperature / Humidity	22 deg. C / 43 % RH
Engineer	Takafumi Noguchi
Mode	Tx BT LE 2402 MHz



Frequency [kHz]	Reading [dBm]	Cable Loss [dB]	Attenuator Loss [dB]	Antenna Gain* [dBi]	N (Number of Output)	EIRP [dBm]	Distance [m]	Ground bounce [dB]	E (field strength) [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
9.82	-96.2	1.0	9.9	2.0	1	-83.3	300	6.0	-22.1	47.7	69.8	
150.00	-88.8	1.0	9.9	2.0	1	-75.9	300	6.0	-14.7	24.0	38.7	

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

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

N: Number of output

*2.0 dBi was applied to the test result based on ANSI C63.10 since antenna gain was less than 2.0 dBi.

UL Japan, Inc.

Ise EMC Lab.

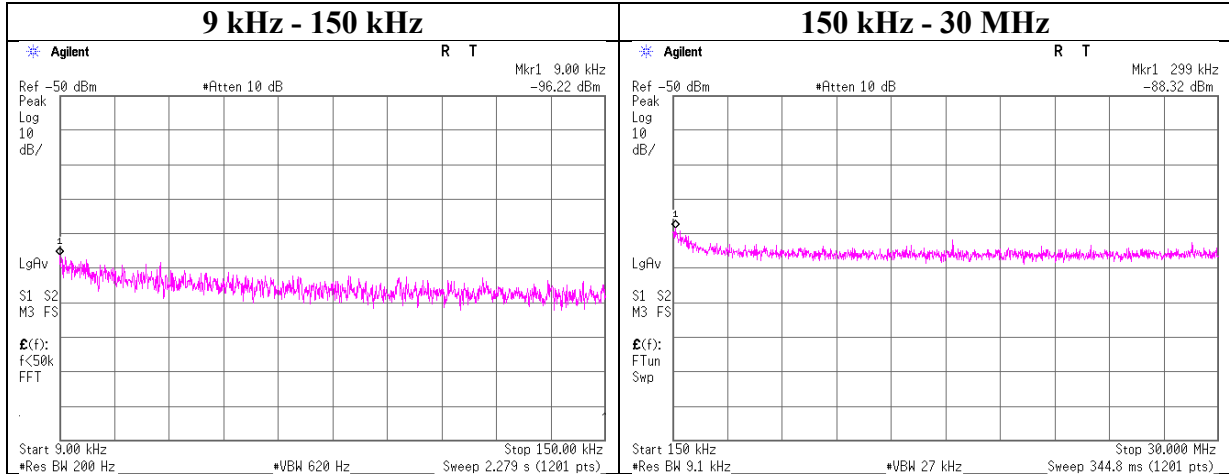
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Conducted Spurious Emission

Report No.	13274888H
Test place	Ise EMC Lab. No.6 Measurement Room
Date	November 19, 2019
Temperature / Humidity	22 deg. C / 43 % RH
Engineer	Takafumi Noguchi
Mode	Tx BT LE 2440 MHz



Frequency [kHz]	Reading [dBm]	Cable Loss [dB]	Attenuator Loss [dB]	Antenna Gain* [dBi]	N (Number of Output)	EIRP [dBm]	Distance [m]	Ground bounce [dB]	E (field strength) [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
9.00	-96.2	1.0	9.9	2.0	1	-83.3	300	6.0	-22.1	48.5	70.6	
299.00	-88.3	1.0	9.9	2.0	1	-75.4	300	6.0	-14.2	18.0	32.2	

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

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

N: Number of output

*2.0 dBi was applied to the test result based on ANSI C63.10 since antenna gain was less than 2.0 dBi.

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Ise EMC Lab.

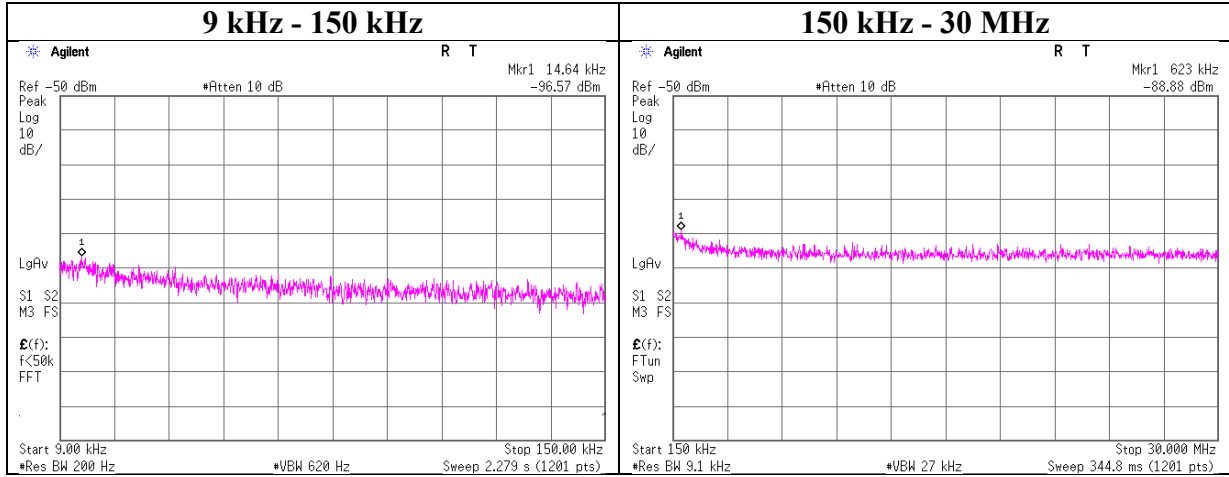
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Facsimile : +81 596 24 8124

Conducted Spurious Emission

Report No.	13274888H
Test place	Ise EMC Lab. No.6 Measurement Room
Date	November 19, 2019
Temperature / Humidity	22 deg. C / 43 % RH
Engineer	Takafumi Noguchi
Mode	Tx 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
14.64	-96.6	1.0	9.9	2.0	1	-83.7	300	6.0	-22.4	44.2	66.6	
623.00	-88.9	1.0	9.9	2.0	1	-76.0	30	6.0	5.3	31.7	26.4	

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

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

N: Number of output

*2.0 dBi was applied to the test result based on ANSI C63.10 since antenna gain was less than 2.0 dBi.

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Power Density

Report No. 13274888H
Test place Ise EMC Lab. No.6 Measurement Room
Date November 19, 2019 November 21, 2019
Temperature / Humidity 22 deg. C / 43 % RH 23 deg. C / 36 % RH
Engineer Takafumi Noguchi Takafumi Noguchi
Mode Tx

11b

Freq.	Reading	Cable Loss	Atten. Loss	Result	Limit	Margin
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[dBm]	[dB]
2412	-34.63	1.00	10.06	-23.57	8.00	31.57
2437	-34.36	1.00	10.06	-23.30	8.00	31.30
2462	-33.68	1.00	10.06	-22.62	8.00	30.62

11g

Freq.	Reading	Cable Loss	Atten. Loss	Result	Limit	Margin
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[dBm]	[dB]
2412	-32.47	1.00	10.06	-21.41	8.00	29.41
2437	-31.92	1.00	10.06	-20.86	8.00	28.86
2462	-31.56	1.00	10.06	-20.50	8.00	28.50

11n-20

Freq.	Reading	Cable Loss	Atten. Loss	Result	Limit	Margin
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[dBm]	[dB]
2412	-30.78	1.00	10.06	-19.72	8.00	27.72
2437	-30.79	1.00	10.06	-19.73	8.00	27.73
2462	-30.55	1.00	10.06	-19.49	8.00	27.49

11n-40

Freq.	Reading	Cable Loss	Atten. Loss	Result	Limit	Margin
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[dBm]	[dB]
2422	-33.61	1.00	10.06	-22.55	8.00	30.55
2437	-33.23	1.00	10.06	-22.17	8.00	30.17
2452	-32.89	1.00	10.06	-21.83	8.00	29.83

BT LE

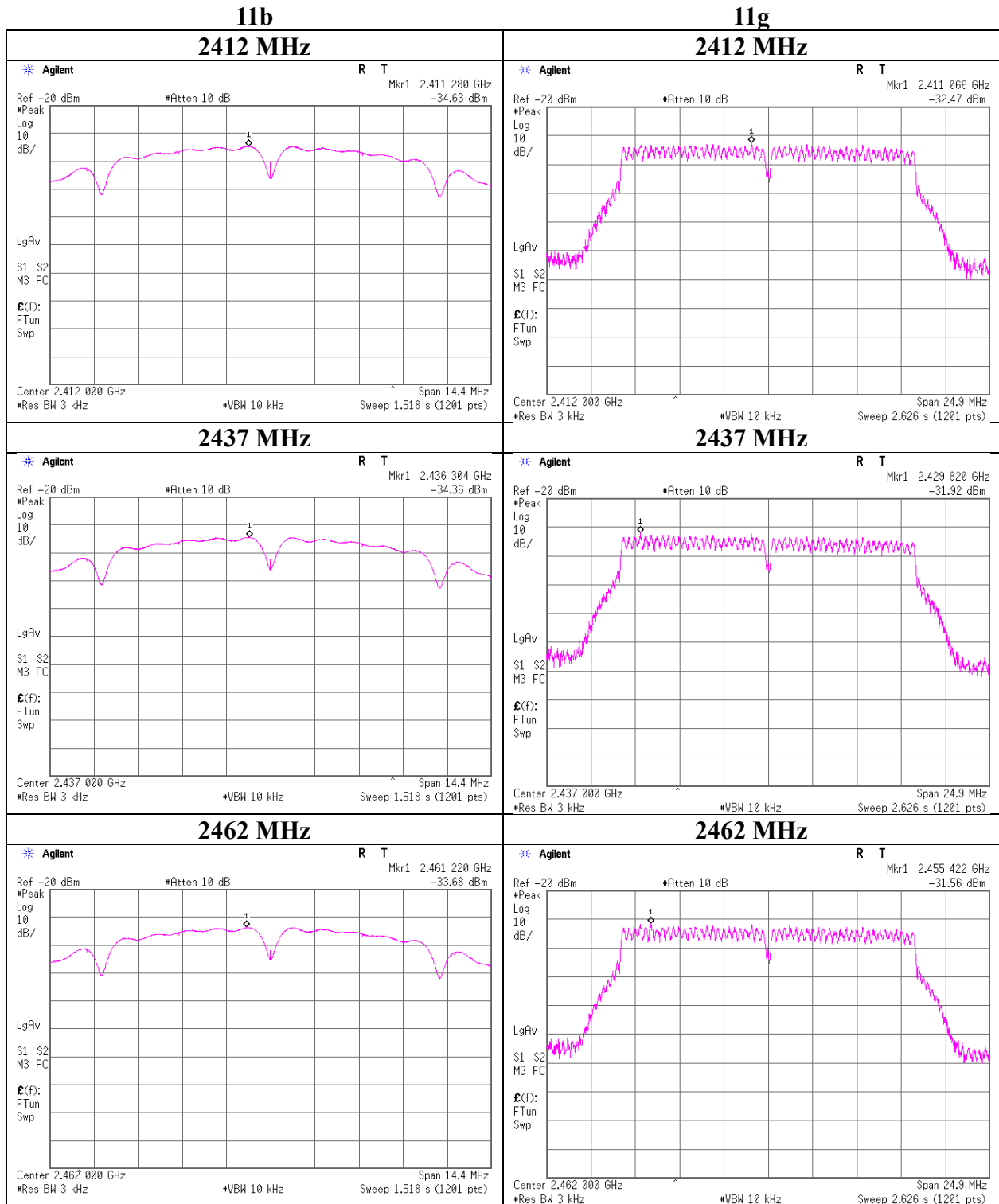
Freq.	Reading	Cable Loss	Atten. Loss	Result	Limit	Margin
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[dBm]	[dB]
2402	-20.68	1.00	10.06	-9.62	8.00	17.62
2440	-20.25	1.00	10.06	-9.19	8.00	17.19
2480	-20.92	1.00	10.06	-9.86	8.00	17.86

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



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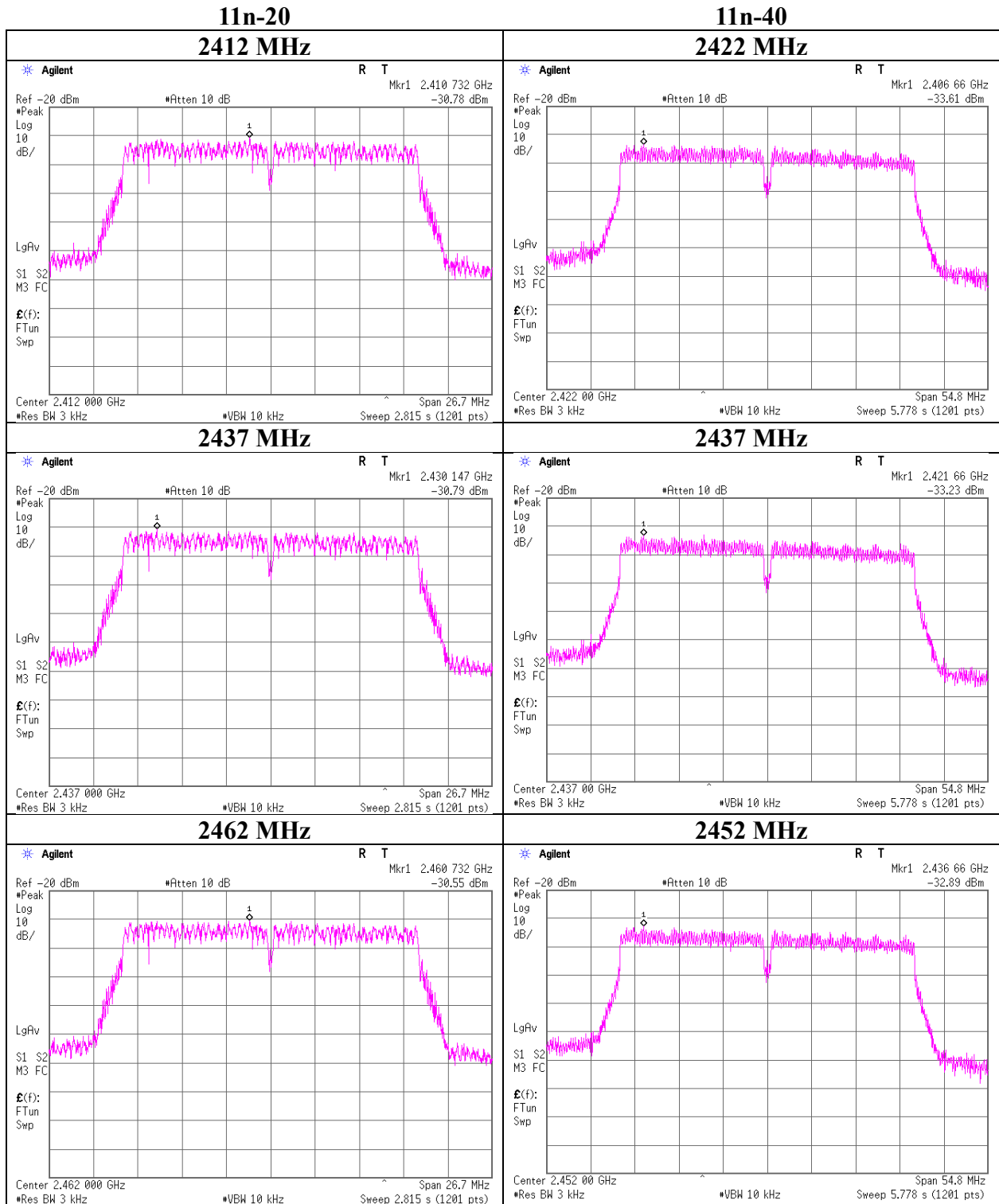
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Power Density



UL Japan, Inc.

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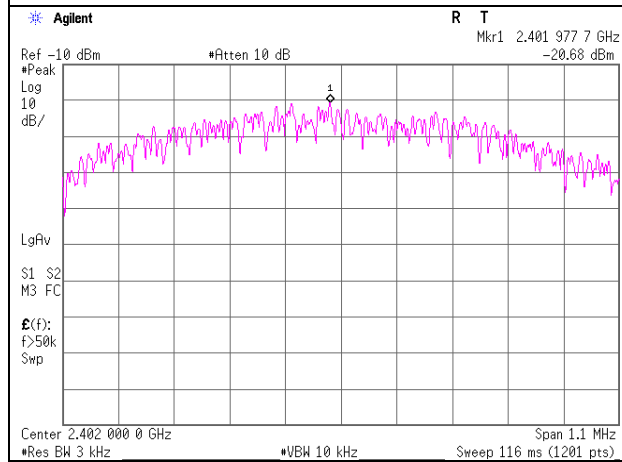
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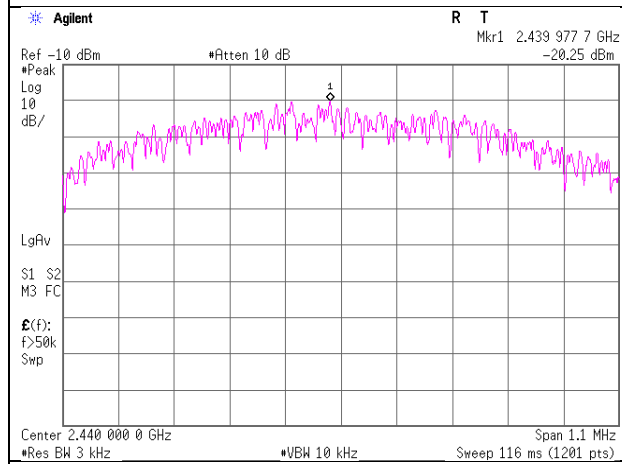
Power Density

BT LE

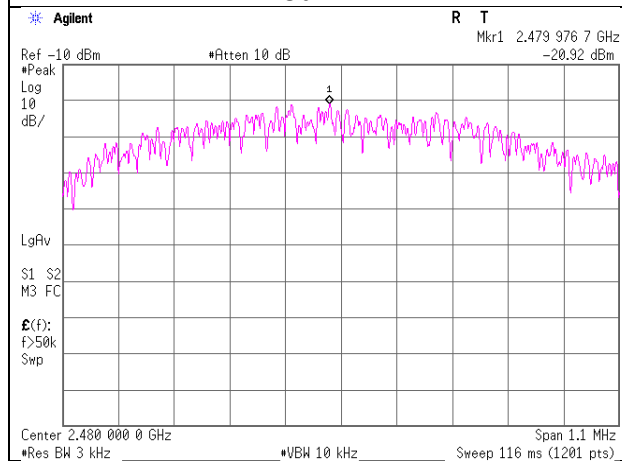
2402 MHz



2440 MHz



2480 MHz



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APPENDIX 2: Test instruments

Test Instruments

Test Item	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Calibration Due Date	Cal Int
AT	141835	Power sensor	AGILENT	N1923A	MY54070004	08/02/2019	08/31/2020	12
AT/RE	141885	Spectrum Analyzer	AGILENT	E4448A	US44300523	11/21/2019	11/30/2020	12
AT	141334	Attenuator(10dB)	Suhner	6810.19.A	-	12/09/2019	12/31/2020	12
AT	141156	Attenuator(10dB)	Weinschel Corp	2	BL1173	11/07/2019	11/30/2020	12
AT	141812	Power Meter	AGILENT	8990B	MY51000271	08/02/2019	08/31/2020	12
AT	141561	Thermo-Hygrometer	CUSTOM	CTH-201	1401	01/11/2019	01/31/2020	12
AT	141194	Antenna Terminal Measurement Software	UL Japan	-	-	-	-	-
AT	141900	Spectrum Analyzer	AGILENT	E4440A	MY46185823	11/20/2019	11/30/2020	12
RE	142017	AC4_Semi Anechoic Chamber(SVSWR)	TDK	Semi Anechoic Chamber 3m	DA-10005	04/04/2019	04/30/2021	24
RE/CE	141545	DIGITAL HiTESTER	HIOKI	3805	51201148	01/29/2019	01/31/2020	12
RE	178648	EMI measurement program	TSJ	TEPTO-DV	-	-	-	-
RE/CE	142227	Measure	KOMELON	KMC-36	-	-	-	-
RE	141296	High Pass Filter 3.5-18.0GHz	UL Japan	HPF SELECTOR	002	09/11/2019	09/30/2020	12
RE/CE	141562	Thermo-Hygrometer	CUSTOM	CTH-201	0010	01/11/2019	01/31/2020	12
RE	141412	Microwave Cable	Junkosha	MWX221	1305S002R(1m) / 1405S146(5m)	06/17/2019	06/30/2020	12
RE	141581	MicroWave System Amplifier	AGILENT	83017A	650	10/16/2019	10/31/2020	12
RE	141508	Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D	9120D-557	09/26/2019	09/30/2020	12
RE	141513	Horn Antenna 15-40GHz	Schwarzbeck	BBHA9170	BBHA9170306	10/08/2019	10/31/2020	12
RE	141293	High Pass Filter 7-20GHz	TOKIMEC	TF37NCCB	602	01/10/2019	01/31/2020	12
RE	141226	Microwave Cable	Junkosha	MMX221-00500DMSDMS	1502S304	03/05/2019	03/31/2020	12
RE	141580	MicroWave System Amplifier	AGILENT	83017A	MY39500779	03/05/2019	03/31/2020	12
RE	177964	Microwave Cable	Junkosha INC.	MMX221	1901S329(1m)/ 1902S579(5m)	03/05/2019	03/31/2020	12
RE	141532	DIGITAL HiTESTER	HIOKI	3805	51201197	01/29/2019	01/31/2020	12
RE	142183	Measure	KOMELON	KMC-36	-	-	-	-
RE	141554	Thermo-Hygrometer	CUSTOM	CTH-180	1301	01/11/2019	01/31/2020	12
RE	142008	AC3_Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-10005	06/26/2018	06/30/2020	24
RE	141507	Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D	258	09/26/2019	09/30/2020	12
RE/CE	141949	Test Receiver	Rohde & Schwarz	ESCI	100767	08/02/2019	08/31/2020	12
RE	141582	Pre Amplifier	SONOMA INSTRUMENT	310	260834	02/08/2019	02/29/2020	12
RE	141323	Coaxial cable	UL Japan	-	-	07/02/2019	07/31/2020	12
RE/CE	141152	EMI measurement program	TSJ	TEPTO-DV	-	-	-	-
RE	141266	Logperiodic Antenna (200-1000MHz)	Schwarzbeck	VUSLP9111B	9111B-191	08/24/2019	08/31/2020	12
RE	142314	Attenuator	Pasternack	PE7390-6	D/C 1504	2019/6/11	2020/6/30	12
RE	141424	Biconical Antenna	Schwarzbeck	VHA9103+BBA9106	1915	08/24/2019	08/31/2020	12
CE	141884	Spectrum Analyzer	AGILENT	E4448A	MY44020357	03/13/2019	03/31/2020	12
CE	142011	AC4_Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-10005	06/28/2018	06/30/2020	24
CE	141357	LISN(AMN)	Schwarzbeck	NSLK8127	8127-729	07/05/2019	07/31/2020	12
CE	141217	Coaxial cable	Fujikura/Suhner/TSJ	5D-2W/ SFM141/421-010/ sucoform141-P	-/04178	06/18/2019	06/30/2020	12
CE	141248	Attenuator	JFW Industries, Inc.	50FP-013H2 N	-	12/02/2019	12/31/2020	12

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*Hyphens for Last Calibration Date, Calibration Due 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.

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

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

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