



RADIO TEST REPORT

Test Report No. : 11932168H-A-R1

Applicant : Murata Manufacturing Co., Ltd.
Type of Equipment : Communication Module
Model No. : Type1NX
FCC ID : VPYLB1NX
Test regulation : FCC Part 15 Subpart C: 2018
(WLAN, BT LE parts)
Test Result : Complied

1. This test report shall not be reproduced in full or partial, without the written approval of UL Japan, Inc.
2. The results in this report apply only to the sample tested.
3. This sample tested is in compliance with the above regulation.
4. The test results in this report are traceable to the national or international standards.
5. This test report must not be used by the customer to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.
6. This test report covers Radio technical requirements. It does not cover administrative issues such as Manual or non-Radio test related Requirements. (if applicable)
7. This report is a revised version of 11932168H-A. 11932168H-A is replaced with this report.

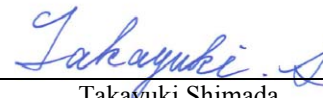
Date of test: September 19 to December 27, 2017

Representative test engineer:

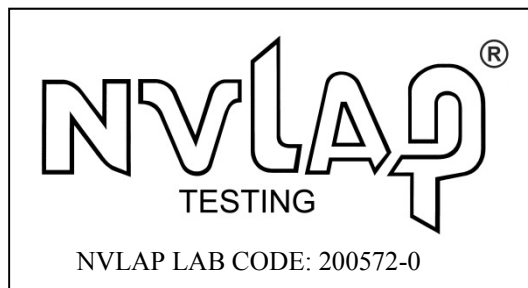


Takafumi Noguchi
Engineer
Consumer Technology Division

Approved by:



Takayuki Shimada
Leader
Consumer Technology Division



This laboratory is accredited by the NVLAP LAB CODE 200572-0, U.S.A. The tests reported herein have been performed in accordance with its terms of accreditation.
*As for the range of Accreditation in NVLAP, you may refer to the WEB address,
http://japan.ul.com/resources/emc_accredited/

UL Japan, Inc.

Ise EMC Lab.

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

Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

13-EM-F0429

CONTENTS	PAGE
SECTION 1: Customer information.....	4
SECTION 2: Equipment under test (E.U.T.).....	4
SECTION 3: Test specification, procedures & results.....	6
SECTION 4: Operation of E.U.T. during testing.....	9
SECTION 5: Conducted Emission.....	14
SECTION 6: Radiated Spurious Emission	15
SECTION 7: Antenna Terminal Conducted Tests.....	17
APPENDIX 1: Test data	18
Conducted Emission	18
6 dB Bandwidth and 99 % Occupied Bandwidth.....	21
Maximum Peak Output Power	26
Average Output Power	30
Radiated Spurious Emission	33
Conducted Spurious Emission	55
Power Density	59
APPENDIX 2: Test instruments	62
APPENDIX 3: Photographs of test setup	63
Conducted Emission	63
Radiated Spurious Emission	64
Worst Case Position	65

SECTION 1: Customer information

Company Name : Murata Manufacturing Co., Ltd.
Address : 1-10-1 Higashikotari, Nagaokakyo-shi, Kyoto 617-8555 Japan
Telephone Number : +81-75-955-6736
Facsimile Number : +81-75-955-6634
Contact Person : Motoo Hayashi

SECTION 2: Equipment under test (E.U.T.)

2.1 Identification of E.U.T.

Type of Equipment : Communication Module
Model No. : Type1NX
Serial No. : Refer to Section 4, Clause 4.2
Rating : VBAT: Min. 3.35 V / Typ. 3.6 V / Max. 4.8 V
 *VIO: Min. 1.71 V / Typ. 1.8 V / Max. 1.89 V
 * VIO don't influence the RF characteristic.
Receipt Date of Sample : September 15, 2017
Country of Mass-production : China and Japan
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: Type1NX (referred to as the EUT in this report) is a Communication Module.

General Specification

Clock frequency(ies) in the system : 37.4 MHz (X'tal)

Radio Specification

Radio Type : Transceiver
Power Supply (inner) : DC 1.35 V, 1.2 V, 3.3 V, 2.5 V

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

Type of radio	IEEE802.11b *1)	IEEE802.11g/n (20 M band) *1)	IEEE802.11a/n/ac (20 M band)	IEEE802.11n/ac (40 M band)	IEEE802.11ac (80 M band)
Frequency of operation	2412 MHz - 2462 MHz	2412 MHz - 2462 MHz	5180 MHz - 5240 MHz 5260 MHz - 5320 MHz 5500 MHz - 5720 MHz 5745 MHz - 5825 MHz	5190 MHz - 5230 MHz 5270 MHz - 5310 MHz 5510 MHz - 5710 MHz 5755 MHz - 5795 MHz	5210 MHz 5290 MHz 5530 MHz - 5690 MHz 5775 MHz
Type of modulation	DSSS (CCK, DQPSK, DBPSK)	OFDM-CCK (64QAM, 16QAM, QPSK, BPSK)	OFDM (64QAM, 16QAM, QPSK, BPSK, 256QAM(IEEE802.11ac only))		
Channel spacing	5 MHz		20 MHz	40 MHz	80 MHz
Antenna type	Dipole antenna				
Antenna Gain	2.4 GHz: 0.2 dBi 5 GHz: 1.4dBi				

Bluetooth (Ver. 4.2 with EDR function)

	Bluetooth Ver.4.2 with EDR function *1)
Frequency of operation	2402 MHz - 2480 MHz
Type of modulation	BT: FHSS (GFSK, $\pi/4$ DQPSK, 8DPSK) LE: GFSK
Channel spacing	BT: 1 MHz LE: 2 MHz
Antenna type	Dipole antenna
Antenna Gain	2.4 GHz: 0.2 dBi

*1) This test report applies to IEEE802.11b/g/n-20 (2412 MHz - 2462 MHz) and Bluetooth Ver.4.2 with EDR function (LE part: 2402 MHz - 2480 MHz).

* WLAN and Bluetooth do not transmit simultaneously.

UL Japan, Inc.

Ise EMC Lab.

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

Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification : FCC Part 15 Subpart C
FCC Part 15 final revised on February 2, 2018 and effective March 5, 2018

Title : FCC 47CFR Part15 Radio Frequency Device Subpart C Intentional Radiators
Section 15.207 Conducted limits
Section 15.247 Operation within the bands 902-928MHz,
2400-2483.5MHz, and 5725-5850MHz

* The revisions made after testing date do not affect the test specification applied to the EUT.

3.2 Procedures and results

Item	Test Procedure	Specification	Worst margin	Results	Remarks
Conducted Emission	FCC: ANSI C63.10-2013 6. Standard test methods IC: RSS-Gen 8.8	FCC: Section 15.207 IC: RSS-Gen 8.8	QP 25.9 dB, 0.15000 MHz, N AV 24.3 dB, 29.03089 MHz, N / 29.02807 MHz, N	Complied	-
6dB Bandwidth	FCC: KDB 558074 D01 DTS Meas Guidance v04 IC: -	FCC: Section 15.247(a)(2) IC: RSS-247 5.2(a)	See data.	Complied	Conducted
Maximum Peak Output Power	FCC: KDB 558074 D01 DTS Meas Guidance v04 IC: RSS-Gen 6.12	FCC: Section 15.247(b)(3) IC: RSS-247 5.4(d)		Complied	Conducted
Power Density	FCC: KDB 558074 D01 DTS Meas Guidance v04 IC: -	FCC: Section 15.247(e) IC: RSS-247 5.2(b)		Complied	Conducted
Spurious Emission Restricted Band Edges	FCC: KDB 558074 D01 DTS Meas Guidance v04 IC: RSS-Gen 6.13	FCC: Section15.247(d) IC: RSS-247 5.5 RSS-Gen 8.9 RSS-Gen 8.10	0.6 dB 2390.000 MHz, AV, Hori.	Complied	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 DTS Meas Guidance v04 12.2.7.

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

FCC Part 15.31 (e)

The RF Module has its own regulator.

The RF Module is constantly provided voltage (DC 1.35 V, 1.2 V, 3.3 V, 2.5 V) through the regulator regardless of input voltage. Therefore, this EUT complies with the requirement.

FCC Part 15.203/212 Antenna requirement

The antenna is not removable from the EUT.

Therefore, the equipment complies with the antenna requirement of Section 15.203.

UL Japan, Inc.

Ise EMC Lab.

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

Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

3.3 Addition to standard

Item	Test Procedure	Specification	Worst margin	Results	Remarks
99% Occupied Bandwidth	IC: RSS-Gen 6.6	IC: -	N/A	-	Conducted

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

3.4 Uncertainty

EMI

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

Ise EMC Lab.

Antenna terminal test	Uncertainty (+/-)
RF output power	1.2 dB
Antenna terminal conducted emission / Power density / Burst power	3.1 dB
Adjacent channel power / Channel power	
Below 3 GHz	1.8 dB
3 GHz to 6 GHz	2.7 dB

Frequency range	Conducted emission using AMN(LISN) (+/-)
0.009 MHz - 0.15 MHz	3.1 dB
0.15 MHz - 30 MHz	2.5 dB

Test distance	Radiated emission (+/-) 9 kHz - 30 MHz
3 m	3.8 dB
10 m	3.6 dB

Polarity	Radiated emission (Below 1 GHz)			
	(3 m*) (+/-)		(10 m*) (+/-)	
	30 MHz - 200 MHz	200 MHz - 1000 MHz	30 MHz - 200 MHz	200 MHz - 1000 MHz
Horizontal	5.0 dB	5.3 dB	5.0 dB	5.0 dB
Vertical	5.2 dB	6.3 dB	5.0 dB	5.0 dB

Radiated emission (Above 1 GHz)				
	(3 m*) (+/-)	(1 m*) (+/-)		(10 m*) (+/-)
1 GHz - 6 GHz	6 GHz - 18 GHz	10 GHz - 26.5 GHz	26.5 GHz - 40 GHz	1 GHz - 18 GHz
5.2 dB	5.5 dB	5.5 dB	5.4 dB	5.5 dB

*Measurement distance

Conducted Emission test

The data listed in this test report has enough margin, more than the site margin.

Radiated emission test

The data listed in this report meets the limits unless the uncertainty is taken into consideration.

UL Japan, Inc.

Ise EMC Lab.

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

Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

3.5 Test Location

UL Japan, Inc. Ise EMC Lab.
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN
Telephone: +81 596 24 8999, Facsimile: +81 596 24 8124
NVLAP Lab. code: 200572-0 / FCC Test Firm Registration Number: 199967

Test site	IC Registration Number	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	2973C-1	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	2973C-2	7.5 x 5.8 x 5.2	4.0 x 4.0	-	3 m
No.3 semi-anechoic chamber	2973C-3	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	2973C-4	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.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	N/A	-	-
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 m x 2.0m 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.

SECTION 4: Operation of E.U.T. during testing

4.1 Operating Mode(s)

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

Mode	Remarks*
IEEE 802.11b (11b)	11 Mbps, PN9
IEEE 802.11g (11g)	48 Mbps, PN9
IEEE 802.11n 20 MHz BW (11n-20)	MCS 0, PN9
Bluetooth Low Energy (BT LE)	Maximum Packet Size, PRBS9
*The worst condition was determined based on the test result of Maximum Peak Output Power (Mid Channel)	
*Power of the EUT was set by the software as follows; Power settings: 11b: 15 11g: 9.5 11n: 7.5 BT LE: CYW4373A0_001.001.025.0007.0000_02 Software: WLAN: Tera term- 4.8.7 BT LE: Blue tool 1.8.9.3	
*This setting of software is the worst case. Any conditions under the normal use do not exceed the condition of setting. In addition, end users cannot change the settings of the output power of the product.	

*The details of Operating mode(s) for WLAN

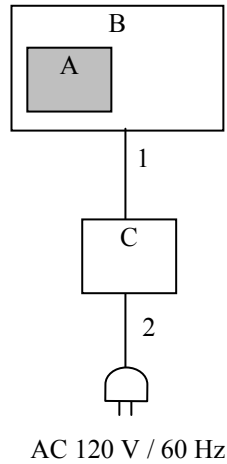
Test Item	Operating Mode	Tested frequency
Conducted Emission, Radiated Spurious Emission (Below 1GHz) Conducted Spurious Emission	Tx 11g *1)	2437 MHz
Radiated Spurious Emission (Above 1GHz)	Tx 11b Tx 11g Tx 11n-20	2412 MHz 2437 MHz 2462 MHz
6dB Bandwidth, Maximum Peak Output Power, Power Density, 99%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

*The details of Operating mode(s) for BT LE

Test Item	Operating Mode	Tested frequency
Conducted Emission, 6dB Bandwidth, Maximum Peak Output Power, Power Density, 99% Occupied Bandwidth, Spurious Emission (Radiated / Conducted)	Tx BT LE	2402 MHz 2440 MHz 2480 MHz

4.2 Configuration and peripherals

For Conducted Emission



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

Description of EUT

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	Communication Module	Type1NX	17	Murata Manufacturing Co., Ltd.	EUT
B	Jig Board	-	-	Murata Manufacturing Co., Ltd.	*1)
C	Regulated DC Power Supply	PW16-5ADP	171116437	TEXIO	-

*1) The test was performed with the module that as normal assumed implementation conditions.
The use of a jig does not influence on the test result.

List of cables used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	DC Cable	2.5	Unshielded	Unshielded	-
2	AC Cable	1.0	Unshielded	Unshielded	-

UL Japan, Inc.

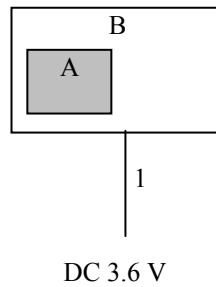
Ise EMC Lab.

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

Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

For Radiated Emission test



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

Description of EUT

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	Communication Module	Type1NX	17	Murata Manufacturing Co., Ltd.	EUT
B	Jig Board	-	-	Murata Manufacturing Co., Ltd.	*1)

*1) The test was performed with the module that as normal assumed implementation conditions.
 The use of a jig does not influence on the test result.

List of cables used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	DC Cable	2.5	Unshielded	Unshielded	-

UL Japan, Inc.

Ise EMC Lab.

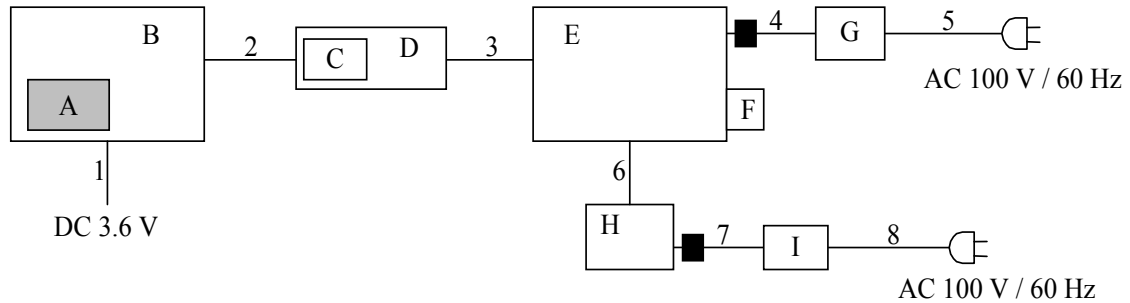
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

[For Antenna Terminal Conducted test]

WLAN



■ : Standard Ferrite Core

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

Description of EUT and Support equipment

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	Communication Module	Type1NX	9	Murata Manufacturing Co., Ltd.	EUT
B	Jig board 1	-	-	-	*1)
C	Jig board 2	-	-	-	-
D	Jig board 3	-	-	-	-
E	BRIX	GB-BKi3HA-7100	SN1717630455	GIGABYTE	-
F	USB Memory	SDCZ33	BM170525475D	Sandisk	-
G	AC Adaptor	9NA0654719	H6141013436	FSP GROUP INC.	-
H	Laptop PC	CF-N8HWCDPS	OBKSA07449	Panasonic	-
I	AC Adaptor	CF-AA6372B	637BM610701051E	Panasonic	-

*1) The test was performed with the module that as normal assumed implementation conditions.
The use of a jig does not influence on the test result.

List of cables used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	DC Cable	0.55	Unshielded	Unshielded	-
2	Signal Cable	0.10	Unshielded	Unshielded	-
3	Signal Cable	0.30	Unshielded	Unshielded	-
4	DC Cable	1.50	Unshielded	Unshielded	-
5	AC Cable	0.60	Unshielded	Unshielded	-
6	LAN Cable	3.00	Unshielded	Unshielded	-
7	DC Cable	1.10	Unshielded	Unshielded	-
8	AC Cable	0.90	Unshielded	Unshielded	-

UL Japan, Inc.

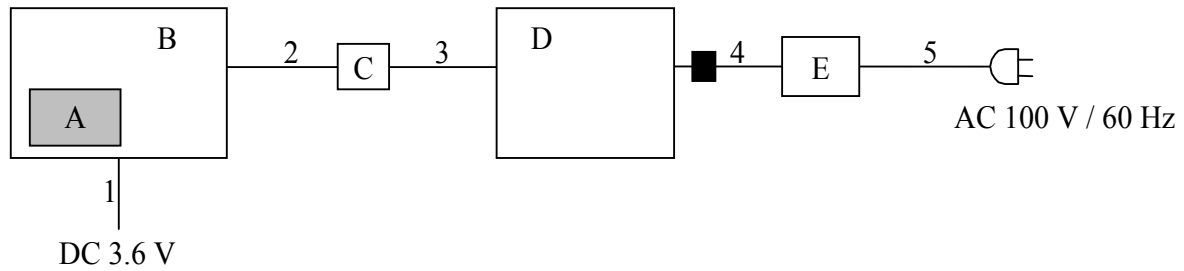
Ise EMC Lab.

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

Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

BLE



■ : Standard Ferrite Core

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

Description of EUT and Support equipment

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	Communication Module	Type1NX	9	Murata Manufacturing Co., Ltd.	EUT
B	Jig board 1	-	-	-	*1)
C	Jig board 2	-	-	-	-
D	Laptop PC	CF-N8HWC DPS	OBKSA07449	Panasonic	-
E	AC Adaptor	CF-AA6372B	637BM610701051E	Panasonic	-

*1) The test was performed with the module that as normal assumed implementation conditions.
The use of a jig does not influence on the test result.

List of cables used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	DC Cable	0.55	Unshielded	Unshielded	-
2	Signal Cable	0.10	Unshielded	Unshielded	-
3	Serial Cable	0.50	Shielded	Shielded	-
4	DC Cable	1.10	Unshielded	Unshielded	-
5	AC Cable	0.90	Unshielded	Unshielded	-

SECTION 5: Conducted Emission

Test Procedure and conditions

EUT was placed on a urethane platform of nominal size, 1.0 m by 1.5 m, raised 0.8 m above the conducting ground plane.

The rear of tabletop was located 40 cm to the vertical conducting plane. The rear of EUT, including peripherals 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

SECTION 6: Radiated Spurious Emission

Test Procedure

It was measured based on "11.0 Emissions in non-restricted frequency bands" of "KDB 558074 D01 DTS Meas Guidance v04".

[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 and 4 m and EUT was rotated a full revolution in order to obtain the maximum value of the electric field strength.

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

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

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

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

Test Antennas are used as below;

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

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

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

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	Average Power Method: RBW: 1 MHz VBW: 3 MHz Detector: Power Averaging (RMS) Trace: 100 traces If duty cycle was less than 98%, a duty factor was added to the results.	RBW: 100 kHz VBW: 300kHz
Test Distance	3 m	4.5 m *2) (1 GHz – 10 GHz), 1 m *3) (10 GHz – 26.5 GHz)		4.5 m *2) (1 GHz – 10 GHz), 1 m *3) (10 GHz – 26.5 GHz)

*1) Average Power Measurement was performed based on 6.0 & 12.2.5 of "KDB 558074 D01 DTS Meas Guidance v04".

*2) Distance Factor: $20 \times \log(4.5 \text{ m} / 3.0 \text{ m}) = 3.53 \text{ dB}$

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

- The 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

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 / 3 MHz	100 kHz	300 kHz	Auto	Peak	Max Hold	Spectrum Analyzer
99% Occupied Bandwidth *1)	Enough width to display emission skirts	1 to 5 % of OBW	Three times of RBW	Auto	Peak	Max Hold	Spectrum Analyzer
Maximum Peak Output Power	-	-	-	Auto	Peak/Average *2)	-	Power Meter (Sensor: 50 MHz BW)
Peak Power Density	1.5 times the 6dB Bandwidth	3 kHz	10 kHz	Auto	Peak	Max Hold	Spectrum Analyzer *3)
Conducted Spurious Emission *4)	9kHz to 150kHz	200 Hz	620 Hz	Auto	Peak	Max Hold	Spectrum Analyzer
	150kHz to 30MHz	9.1 kHz	27 kHz				

*1) Peak hold was applied as Worst-case measurement.

*2) Reference data

*3) Section 10.2 Method PKPSD (peak PSD) of "KDB 558074 D01 DTS Meas Guidance v04".

*4) In the frequency range below 30MHz, RBW was narrowed to separate the noise contents.

Then, wide-band noise near the limit was checked separately, however the noise was low enough as shown in the chart.

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

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

Test data : APPENDIX

Test result : Pass

UL Japan, Inc.

Ise EMC Lab.

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

Telephone : +81 596 24 8999

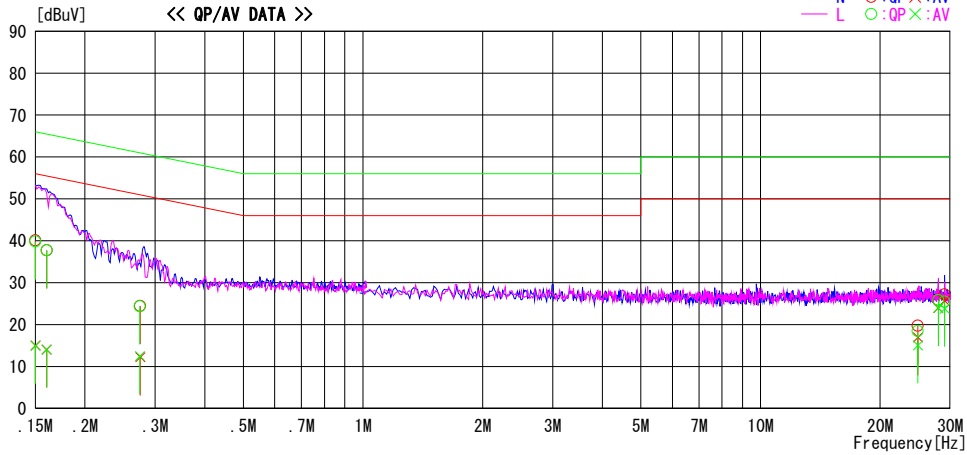
Facsimile : +81 596 24 8124

APPENDIX 1: Test data

Conducted Emission

Test place : Ise EMC Lab. No.3 Measurement Room
Report No. : 11932168H
Date : October 29, 2017
Temperature / Humidity : 21 deg. C / 59 % RH
Engineer : Takafumi Noguchi
Mode : Tx 11g 2437 MHz

LIMIT : FCC15.207 QP
FCC15.207 AV



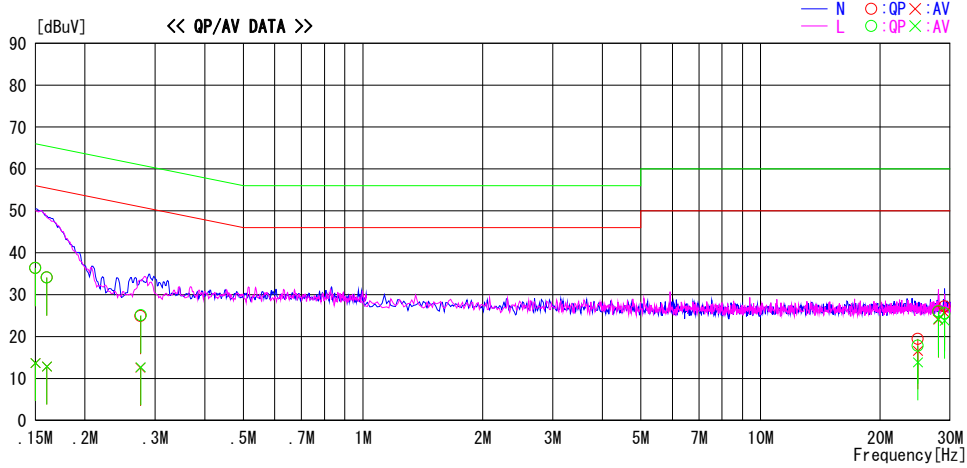
Frequency [MHz]	Reading		Corr. Factor	Results		Limit		Margin		Phase	Comment
	QP [dBuV]	AV [dBuV]		QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	QP [dB]	AV [dB]		
0.15000	26.9	1.9	13.2	40.1	15.1	66.0	56.0	25.9	40.9	N	
0.16016	24.5	0.9	13.2	37.7	14.1	65.5	55.5	27.8	41.4	N	
0.27522	11.3	-1.0	13.2	24.5	12.2	61.0	51.0	36.5	38.8	N	
24.88358	5.2	2.5	14.5	19.7	17.0	60.0	50.0	40.3	33.0	N	
27.99410	11.3	9.4	14.6	25.9	24.0	60.0	50.0	34.1	26.0	N	
29.03089	12.6	11.1	14.6	27.2	25.7	60.0	50.0	32.8	24.3	N	
0.15000	26.6	1.8	13.2	39.8	15.0	66.0	56.0	26.2	41.0	L	
0.16016	24.5	0.9	13.2	37.7	14.1	65.5	55.5	27.8	41.4	L	
0.27466	11.2	-0.7	13.2	24.4	12.5	61.0	51.0	36.6	38.5	L	
24.88339	4.0	0.6	14.5	18.5	15.1	60.0	50.0	41.5	34.9	L	
27.99378	11.2	9.4	14.6	25.8	24.0	60.0	50.0	34.2	26.0	L	
29.03052	10.9	9.2	14.6	25.5	23.8	60.0	50.0	34.5	26.2	L	

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

Conducted Emission

Test place	Ise EMC Lab. No.3 Measurement Room
Report No.	11932168H
Date	October 29, 2017
Temperature / Humidity	21 deg. C / 59 % RH
Engineer	Takafumi Noguchi
Mode	Tx BT LE 2402 MHz

LIMIT : FCC15.207 QP
FCC15.207 AV

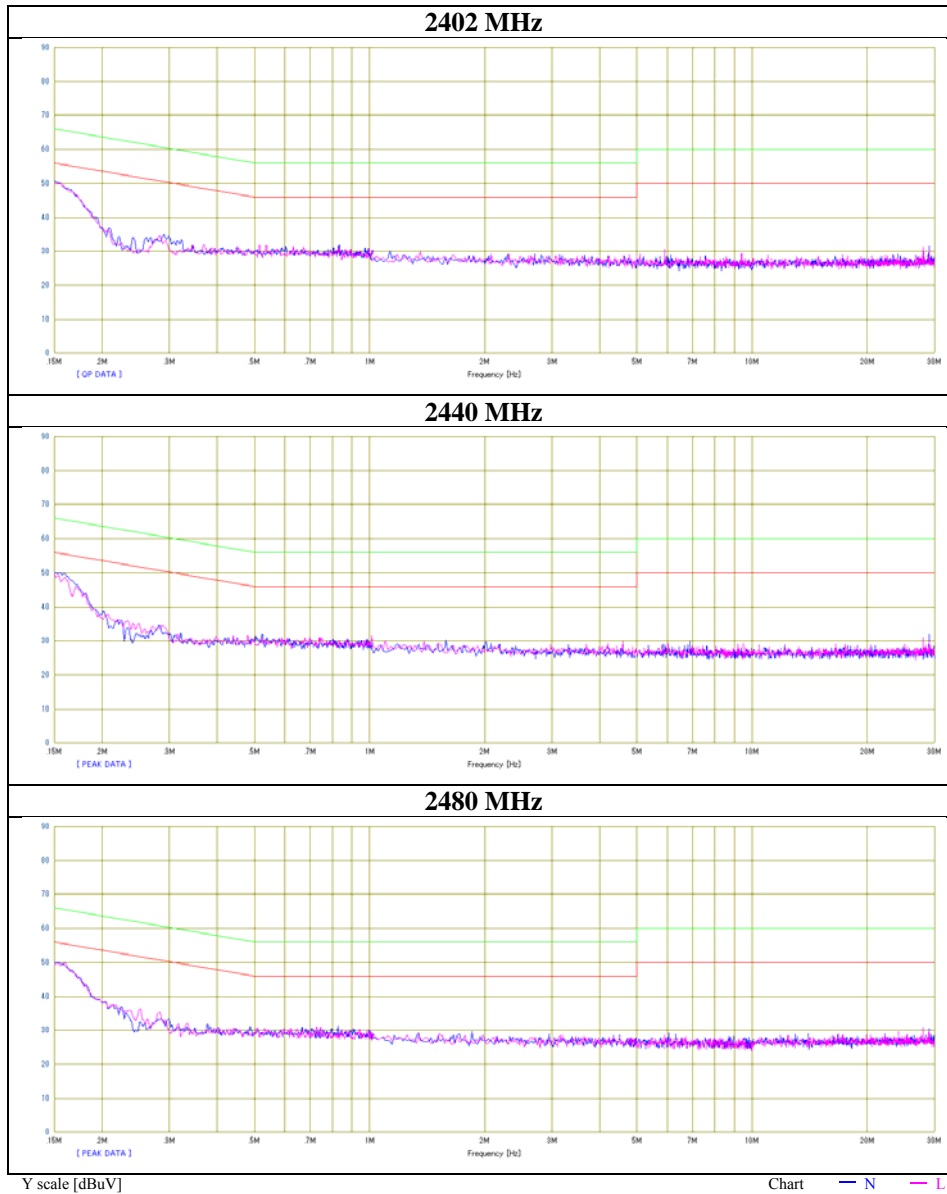


Frequency [MHz]	Reading Level		Corr. Factor	Results		Limit		Margin		Phase	Comment
	QP [dBuV]	AV [dBuV]		QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	QP [dB]	AV [dB]		
0.15000	23.2	0.5	13.2	36.4	13.7	66.0	56.0	29.6	42.3	N	
0.16036	20.9	-0.3	13.2	34.1	12.9	65.4	55.4	31.3	42.5	N	
0.27565	11.7	-0.6	13.2	24.9	12.6	60.9	50.9	36.0	38.3	N	
24.88136	5.0	2.1	14.5	19.5	16.6	60.0	50.0	40.5	33.4	N	
27.99141	11.3	9.5	14.6	25.9	24.1	60.0	50.0	34.1	25.9	N	
29.02807	12.6	11.1	14.6	27.2	25.7	60.0	50.0	32.8	24.3	N	
0.15000	23.2	0.5	13.2	36.4	13.7	66.0	56.0	29.6	42.3	L	
0.16028	20.9	-0.3	13.2	34.1	12.9	65.4	55.4	31.3	42.5	L	
0.27623	11.9	-0.5	13.2	25.1	12.7	60.9	50.9	35.8	38.2	L	
24.88130	3.3	-0.6	14.5	17.8	13.9	60.0	50.0	42.2	36.1	L	
27.99141	11.4	9.6	14.6	26.0	24.2	60.0	50.0	34.0	25.8	L	
29.02807	11.0	9.2	14.6	25.6	23.8	60.0	50.0	34.4	26.2	L	

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

Conducted Emission

Test place	Ise EMC Lab. No.3 Measurement Room
Report No.	11932168H
Date	October 29, 2017
Temperature / Humidity	21 deg. C / 59 % RH
Engineer	Takafumi Noguchi
Mode	Tx BT LE



UL Japan, Inc.

Ise EMC Lab.

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

Telephone : +81 596 24 8999

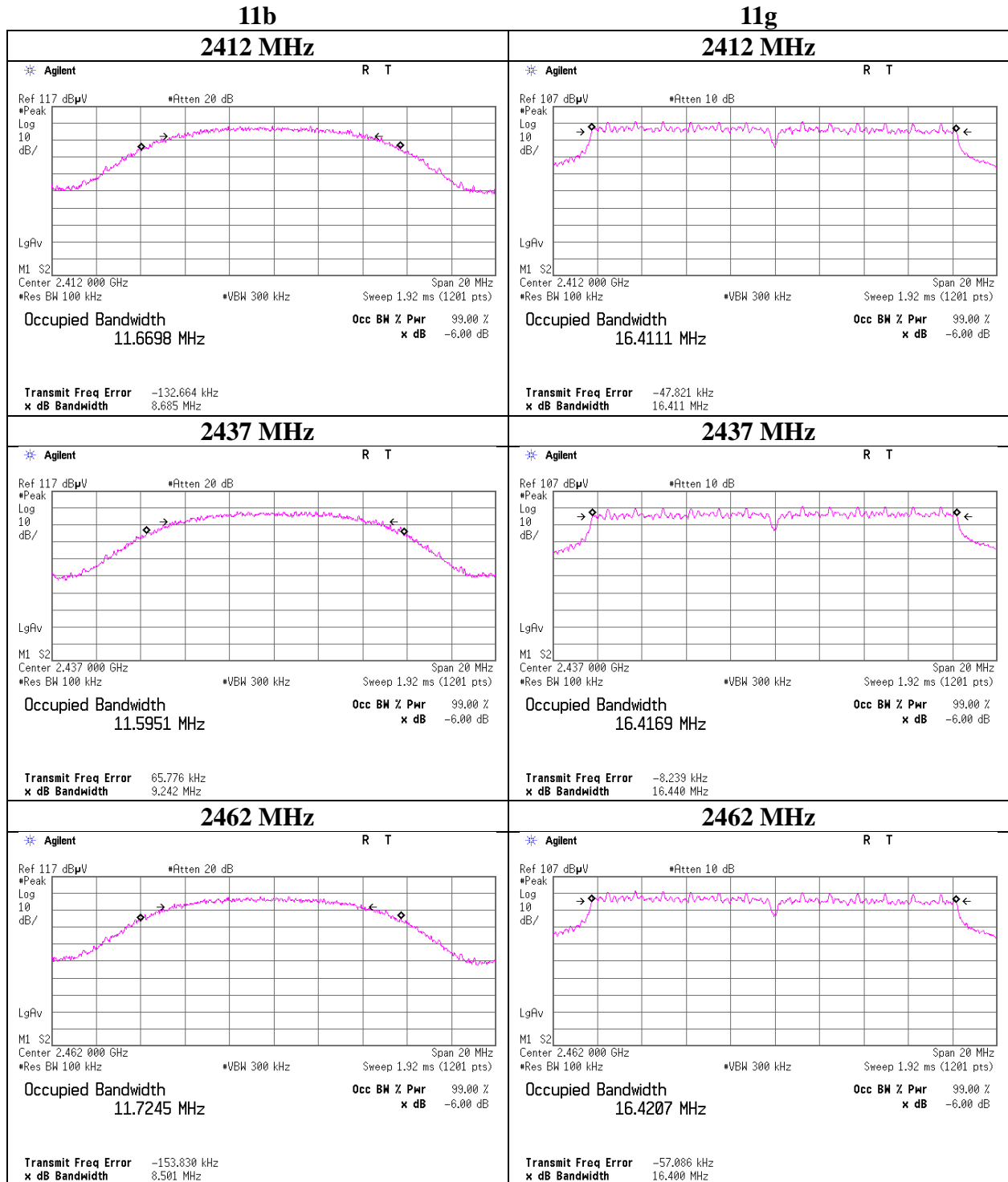
Facsimile : +81 596 24 8124

6 dB Bandwidth and 99 % Occupied Bandwidth

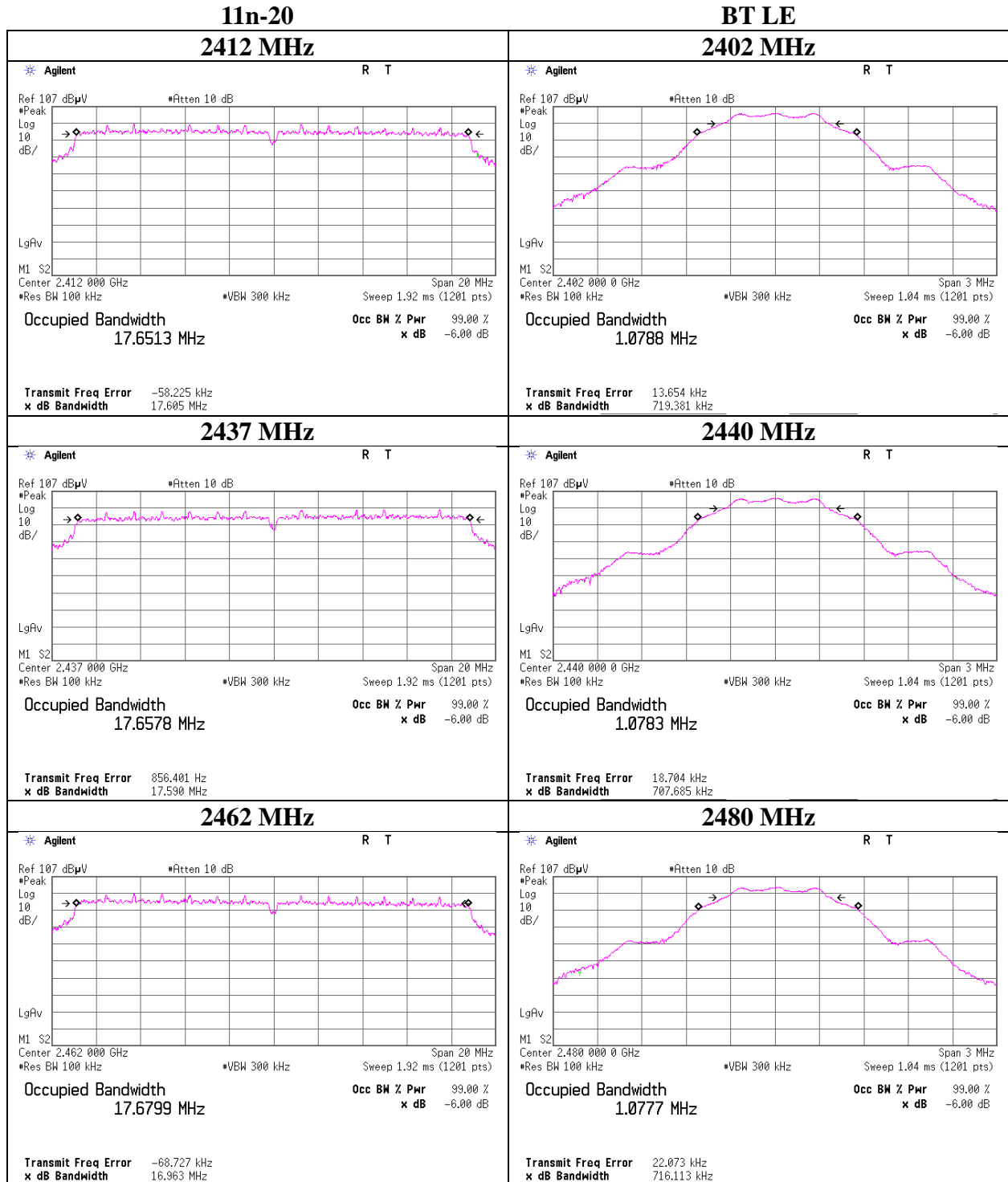
Test place Ise EMC Lab. No.6 Measurement Room
Report No. 11932168H
Date October 19, 2017
Temperature / Humidity 24 deg. C / 53 % RH
Engineer Ryota Yamanaka
Mode Tx

Mode	Frequency [MHz]	99 % Occupied Bandwidth [kHz]	6 dB Bandwidth [MHz]	Limit for 6 dB Bandwidth [MHz]
11b	2412	11.7691	8.685	> 500.000
	2437	11.7441	9.242	> 500.000
	2462	11.8673	8.501	> 500.000
11g	2412	17.3281	16.411	> 500.000
	2437	17.3456	16.440	> 500.000
	2462	17.3629	16.400	> 500.000
11n-20	2412	18.5732	17.605	> 500.000
	2437	18.5872	17.590	> 500.000
	2462	18.6830	16.963	> 500.000
BT LE	2402	1.0544	0.719	> 500.000
	2440	1.0541	0.708	> 500.000
	2480	1.0549	0.716	> 500.000

6 dB Bandwidth

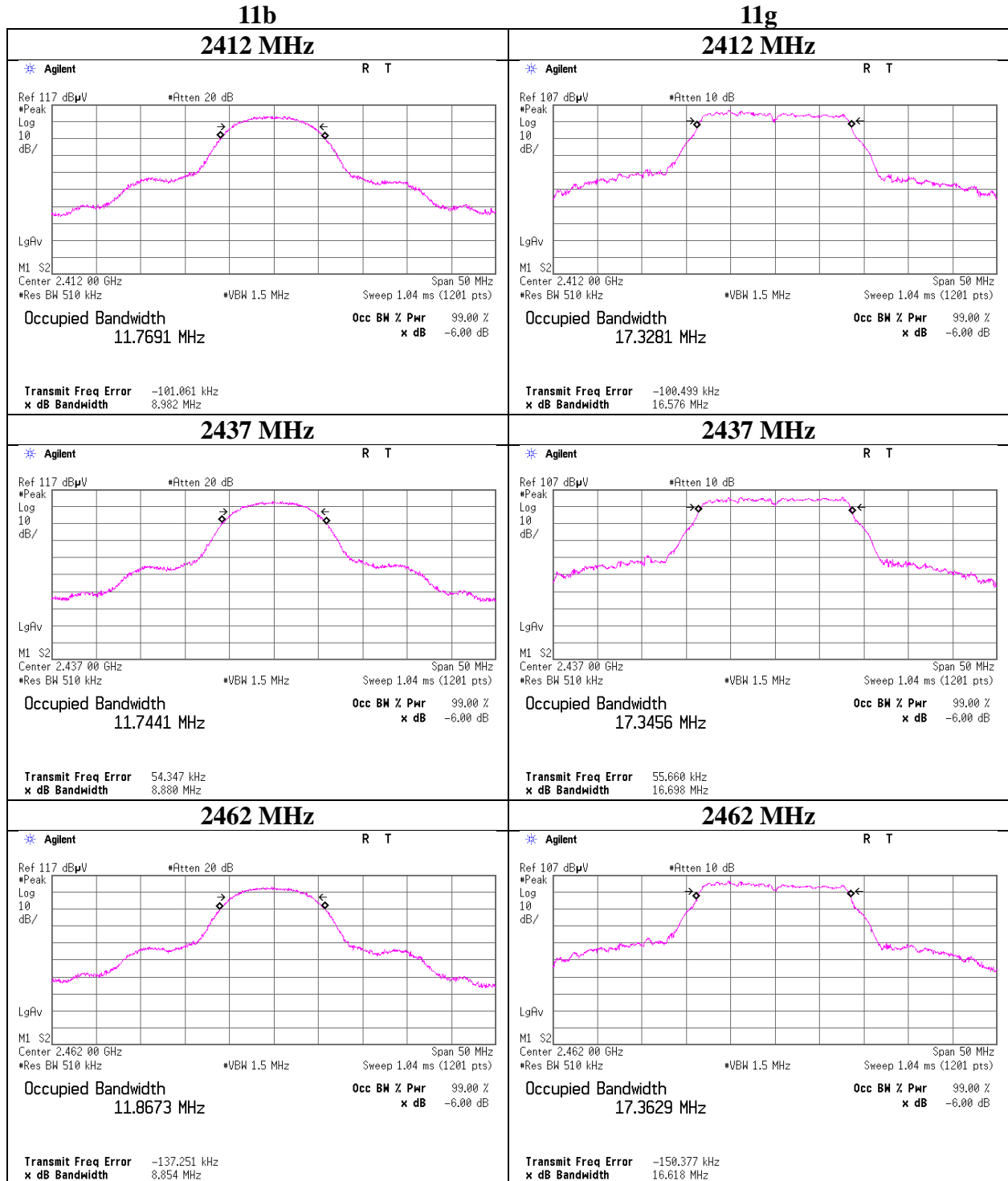


6 dB Bandwidth



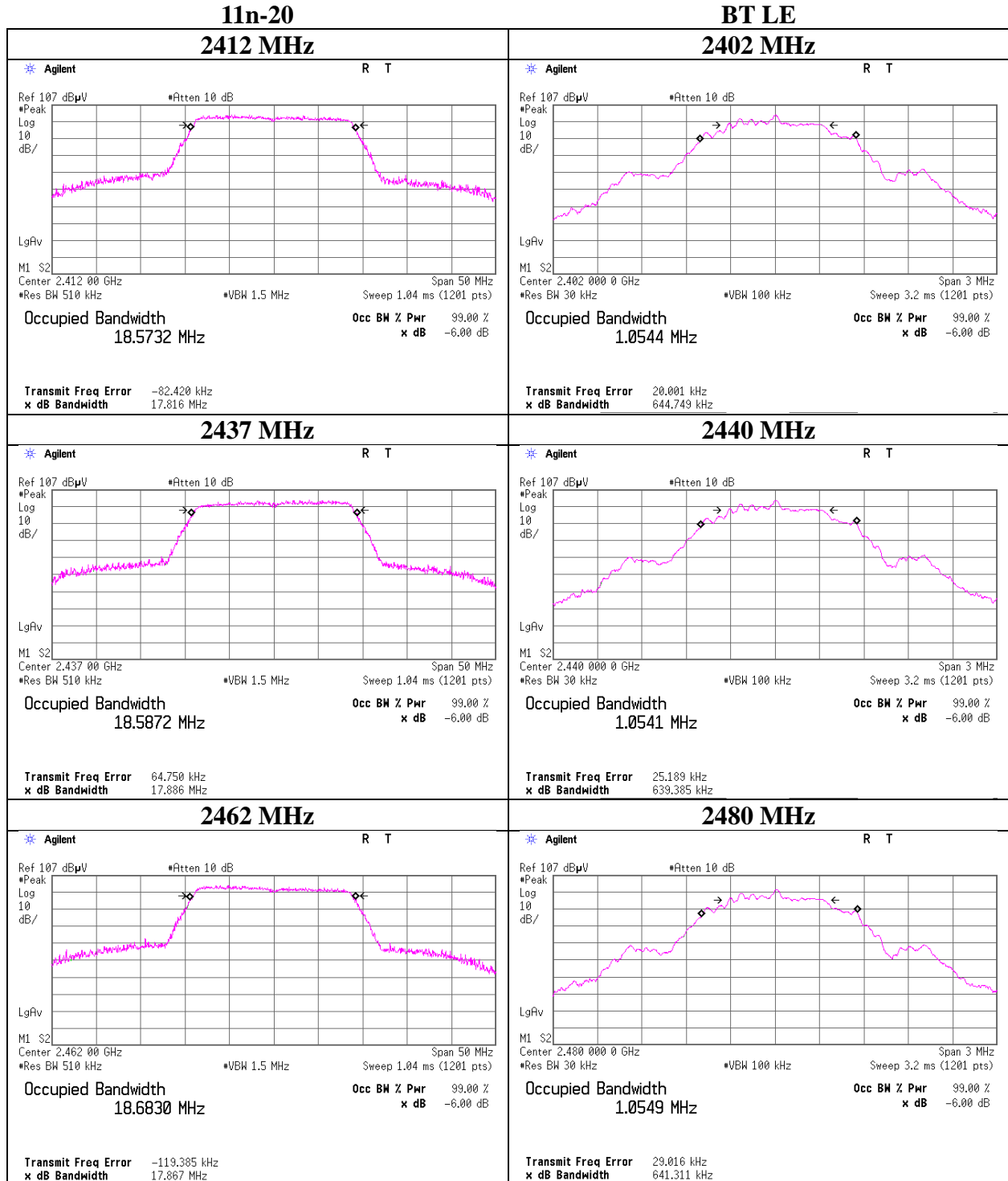
99 %Occupied Bandwidth

Test place Report No. Date Temperature / Humidity Engineer Mode	Ise EMC Lab. No.6 Measurement Room 11932168H October 19, 2017 24 deg. C / 53 % RH Ryota Yamanaka Tx
--	--



99 % Occupied Bandwidth

Test place	Ise EMC Lab. No.6 Measurement Room
Report No.	11932168H
Date	September 21, 2017
Temperature / Humidity	25.5 deg. C / 47 % RH
Engineer	Takafumi Noguchi
Mode	Tx



UL Japan, Inc.

Ise EMC Lab.

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

Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

Maximum Peak Output Power

Test place	Ise EMC Lab. No.3 Measurement Room
Report No.	11932168H
Date	December 27, 2017
Temperature / Humidity	25 deg. C / 31 % RH
Engineer	Takafumi Noguchi
Mode	Tx 11b

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result		Limit		Margin [dB]
				[dBm]	[mW]	[dBm]	[mW]	
2412	7.05	1.70	10.10	18.85	76.74	30.00	1000	11.15
2437	6.79	1.70	10.10	18.59	72.28	30.00	1000	11.41
2462	6.50	1.70	10.10	18.30	67.61	30.00	1000	11.70

Sample Calculation:

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

2412MHz

Rate	Reading	Remark
[Mbps]	[dBm]	
1	5.89	
2	6.48	
5.5	6.66	
11	7.05	*

*: Worst Rate

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

Maximum Peak Output Power

Test place : Ise EMC Lab. No.6 Measurement Room
Report No. : 11932168H
Date : September 19, 2017 November 2, 2017
Temperature / Humidity : 24 deg. C / 53 % RH 25 deg. C / 50 % RH
Engineer : Tomohisa Nakagawa Ken Fujita
Mode : Tx 11g

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result		Limit		Margin [dB]
				[dBm]	[mW]	[dBm]	[mW]	
2412	10.08	0.80	10.05	20.93	123.88	30.00	1000	9.07
2437	10.14	0.80	10.05	20.99	125.60	30.00	1000	9.01
2462	9.91	0.80	10.05	20.76	119.12	30.00	1000	9.24

Sample Calculation:

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

2412MHz

Rate [Mbps]	Reading [dBm]	Remark
6	10.03	
9	9.95	
12	9.64	
18	9.50	
24	9.16	
36	9.10	
48	10.08	*
54	8.11	

*: Worst Rate

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

Maximum Peak Output Power

Test place : Ise EMC Lab. No.6 Measurement Room
Report No. : 11932168H
Date : September 19, 2017 November 2, 2017
Temperature / Humidity : 24 deg. C / 53 % RH 25 deg. C / 50 % RH
Engineer : Tomohisa Nakagawa Ken Fujita
Mode : Tx 11n-20

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result		Limit		Margin [dB]
				[dBm]	[mW]	[dBm]	[mW]	
2412	9.95	0.80	10.05	20.80	120.23	30.00	1000	9.20
2437	9.09	0.80	10.05	19.94	98.63	30.00	1000	10.06
2462	9.34	0.80	10.05	20.19	104.47	30.00	1000	9.81

Sample Calculation:

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

2412MHz

MCS Number	Reading [dBm]	Remark
0	9.95	*
1	9.07	
2	8.92	
3	8.94	
4	8.12	
5	9.29	
6	8.11	
7	8.19	

* Worst MCS

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

Maximum Peak Output Power

Test place Ise EMC Lab. No.6 Measurement Room
Report No. 11932168H
Date September 19, 2017 October 19, 2017
Temperature / Humidity 24 deg. C / 53 % RH 24 deg. C / 53 % RH
Engineer Tomohisa Nakagawa Ryota Yamanaka
Mode Tx BT LE

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result		Limit		Margin [dB]
				[dBm]	[mW]	[dBm]	[mW]	
2402	-3.51	0.80	10.05	7.34	5.42	30.00	1000	22.66
2440	-3.76	0.80	10.05	7.09	5.12	30.00	1000	22.91
2480	-5.80	0.80	10.05	5.05	3.20	30.00	1000	24.95

Sample Calculation:

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

Average Output Power
(Reference data for RF Exposure / SAR testing)

Test place Ise EMC Lab. No.6 Measurement Room
Report No. 11932168H
Date October 19, 2017 November 2, 2017 December 27, 2017
Temperature / Humidity 24 deg. C / 3 % RH 25 deg. C / 50 % RH 25 deg. C / 31 % RH
Engineer Ryota Yamanaka Ken Fujita Takafumi Noguchi
Mode Tx

11b **1Mbps**

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Time average)		Duty factor [dB]	Result (Burst power average)	
				[dBm]	[mW]		[dBm]	[mW]
2412	3.25	0.80	10.05	14.10	25.70	0.08	14.18	26.18
2437	2.70	0.80	10.05	13.55	22.65	0.08	13.63	23.07
2462	3.05	0.80	10.05	13.90	24.55	0.08	13.98	25.00

11g **6 Mbps**

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Time average)		Duty factor [dB]	Result (Burst power average)	
				[dBm]	[mW]		[dBm]	[mW]
2412	-0.47	0.80	10.05	10.38	10.91	0.28	10.66	11.64
2437	-0.38	0.80	10.05	10.47	11.14	0.28	10.75	11.89
2462	-0.46	0.80	10.05	10.39	10.94	0.28	10.67	11.67

11n-20 **MCS 0**

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Time average)		Duty factor [dB]	Result (Burst power average)	
				[dBm]	[mW]		[dBm]	[mW]
2412	-1.99	0.80	10.05	8.86	7.69	0.30	9.16	8.24
2437	-2.24	0.80	10.05	8.61	7.26	0.30	8.91	7.78
2462	-1.97	0.80	10.05	8.88	7.73	0.30	9.18	8.28

BT LE

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Time average)		Duty factor [dB]	Result (Burst power average)	
				[dBm]	[mW]		[dBm]	[mW]
2402	-5.87	0.80	10.05	4.98	3.15	2.00	6.98	4.99
2440	-6.14	0.80	10.05	4.71	2.96	2.00	6.71	4.69
2480	-8.25	0.80	10.05	2.60	1.82	2.00	4.60	2.88

Sample Calculation:

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

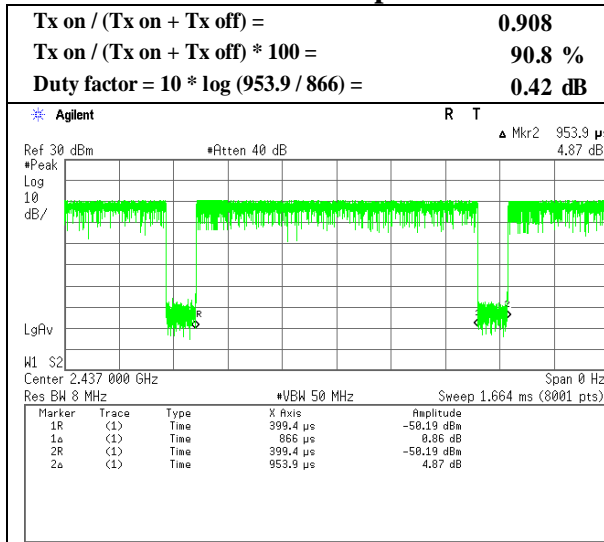
Result (Burst power average) = Time average + Duty factor

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

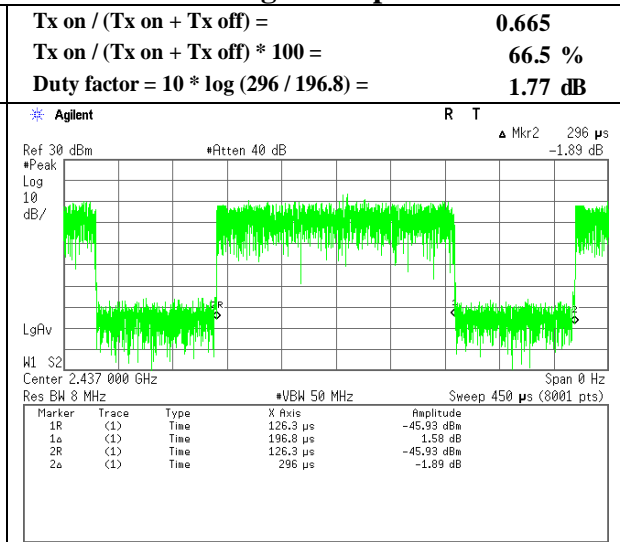
Burst rate confirmation

Test place	Ise EMC Lab. No.6 Measurement Room
Report No.	11932168H
Date	September 21, 2017
Temperature / Humidity	25.5 deg. C / 47 % RH
Engineer	Takafumi Noguchi
Mode	Tx

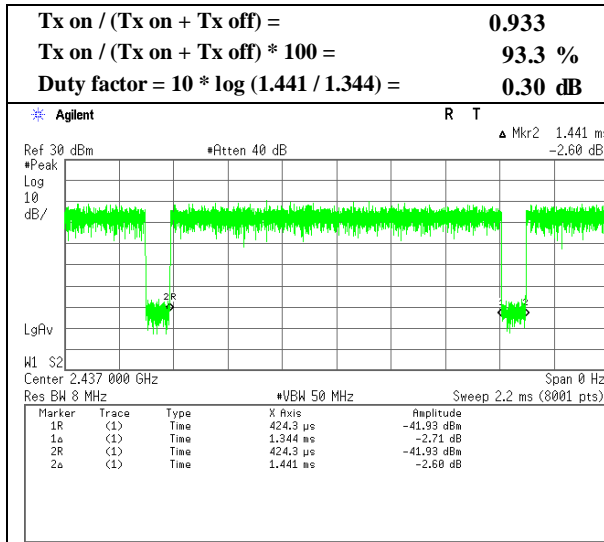
11b 11 Mbps



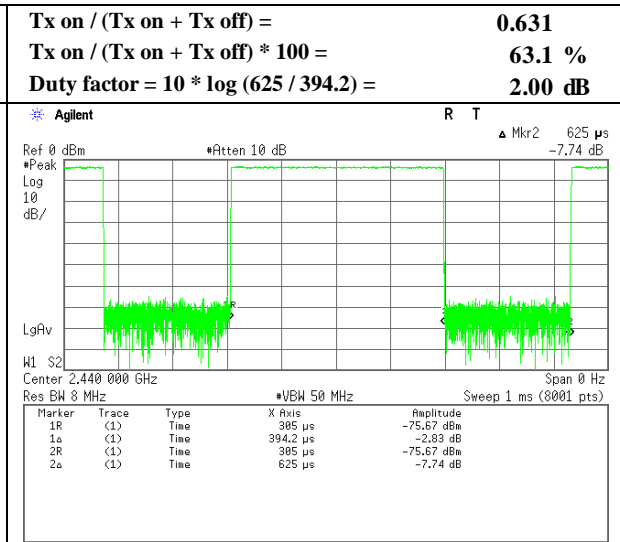
11g 48 Mbps



11n-20 MCS 0



BT LE



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

UL Japan, Inc.

Ise EMC Lab.

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

Telephone : +81 596 24 8999

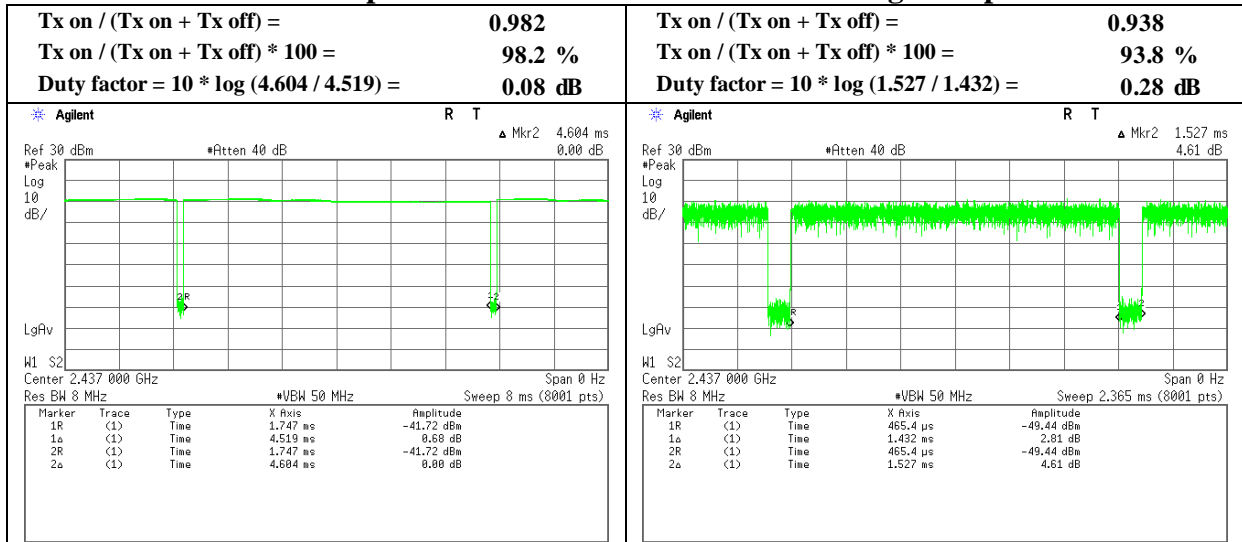
Facsimile : +81 596 24 8124

Burst rate confirmation

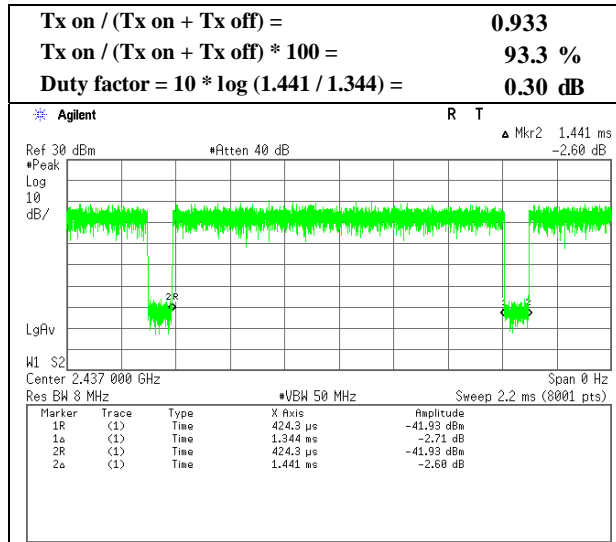
Test place	Ise EMC Lab. No.6 Measurement Room
Report No.	11932168H
Date	September 21, 2017
Temperature / Humidity	25.5 deg. C / 47 % RH
Engineer	Takafumi Noguchi
Mode	Tx

11b 1 Mbps

11g 6 Mbps



11n-20 MCS 0



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

Radiated Spurious Emission

Report No.	11932168H		
Test place	Ise EMC Lab.		
Semi Anechoic Chamber	No.3	No.3	No.3
Date	October 17, 2017	October 20, 2017	October 28, 2017
Temperature / Humidity	23 deg. C / 60 % RH	23 deg. C / 58 % RH	21 deg. C / 59 % RH
Engineer	Takafumi Noguchi	Takafumi Noguchi	Takafumi Noguchi
	(1 GHz - 10 GHz)	(10 GHz - 18 GHz)	(18 GHz - 26.5 GHz)
Mode	Tx 11b 2412 MHz		

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2390.000	PK	56.6	27.7	6.7	32.4	-	58.6	73.9	15.3	
Hori	4824.000	PK	45.2	31.7	9.0	31.4	-	54.5	73.9	19.4	
Hori	7236.000	PK	40.9	36.1	8.9	32.1	-	53.8	73.9	20.1	Floor noise
Hori	9648.000	PK	41.0	38.6	10.0	32.9	-	56.7	73.9	17.2	Floor noise
Hori	2390.000	AV	47.4	27.7	6.7	32.4	0.4	49.8	53.9	4.1	*1)
Hori	4824.000	AV	36.6	31.7	9.0	31.4	0.4	46.3	53.9	7.6	
Hori	7236.000	AV	32.0	36.1	8.9	32.1	-	44.9	53.9	9.0	Floor noise
Hori	9648.000	AV	32.2	38.6	10.0	32.9	-	47.9	53.9	6.0	Floor noise
Vert	2390.000	PK	55.4	27.7	6.7	32.4	-	57.4	73.9	16.5	
Vert	4824.000	PK	45.9	31.7	9.0	31.4	-	55.2	73.9	18.7	
Vert	7236.000	PK	41.0	36.1	8.9	32.1	-	53.9	73.9	20.0	Floor noise
Vert	9648.000	PK	41.1	38.6	10.0	32.9	-	56.8	73.9	17.1	Floor noise
Vert	2390.000	AV	46.3	27.7	6.7	32.4	0.4	48.7	53.9	5.2	*1)
Vert	4824.000	AV	37.0	31.7	9.0	31.4	0.4	46.7	53.9	7.2	
Vert	7236.000	AV	32.0	36.1	8.9	32.1	-	44.9	53.9	9.0	Floor noise
Vert	9648.000	AV	32.2	38.6	10.0	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) + 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 (4.5 m / 3.0 m) = 3.53 dB
 10 GHz - 26.5 GHz 20log (1.0 m / 3.0 m) = -9.5 dB

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

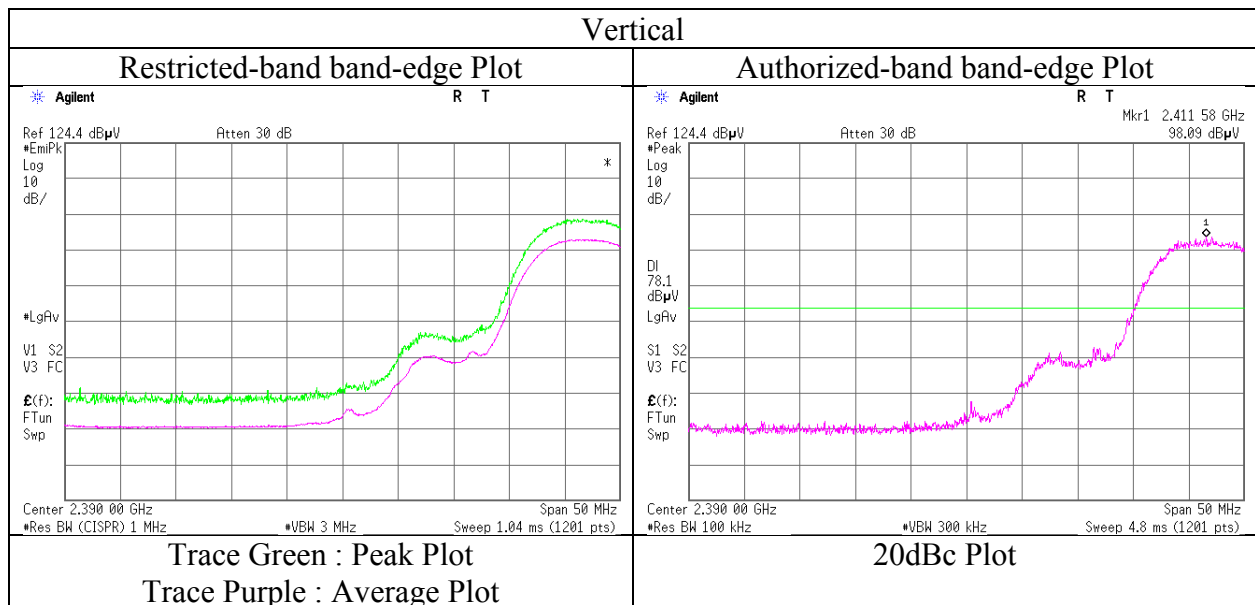
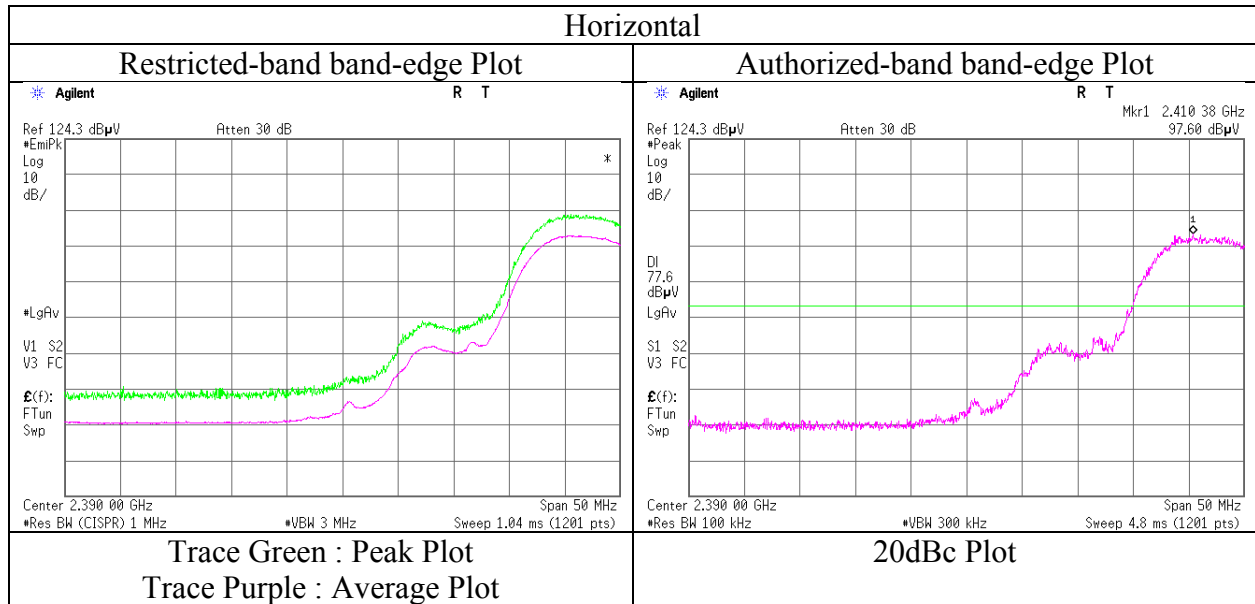
20dBc Data Sheet

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2412.000	PK	97.6	27.7	6.8	32.4	99.7	-	-	Carrier
Hori	2400.000	PK	64.3	27.7	6.8	32.4	66.4	79.7	13.3	
Vert	2412.000	PK	98.1	27.7	6.8	32.4	100.2	-	-	Carrier
Vert	2400.000	PK	62.8	27.7	6.8	32.4	64.9	80.2	15.3	

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

Radiated Spurious Emission
(Reference Plot for band-edge)

Report No. 11932168H
Test place Ise EMC Lab.
Semi Anechoic Chamber No.3
Date October 17, 2017
Temperature / Humidity 23 deg. C / 60 % RH
Engineer Takafumi Noguchi
(1 GHz - 10 GHz)
Mode Tx 11b 2412 MHz



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

Radiated Spurious Emission

Report No.	11932168H		
Test place	Ise EMC Lab.		
Semi Anechoic Chamber	No.3	No.3	No.3
Date	October 17, 2017	October 20, 2017	October 28, 2017
Temperature / Humidity	23 deg. C / 60 % RH	23 deg. C / 58 % RH	21 deg. C / 59 % RH
Engineer	Takafumi Noguchi (1 GHz - 10 GHz)	Takafumi Noguchi (10 GHz - 18 GHz)	Takafumi Noguchi (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	46.6	31.9	9.0	31.4	-	56.1	73.9	17.8	
Hori	7311.000	PK	41.2	36.2	8.9	32.2	-	54.1	73.9	19.8	Floor noise
Hori	9748.000	PK	41.4	38.7	10.1	33.0	-	57.2	73.9	16.7	Floor noise
Hori	4874.000	AV	37.6	31.9	9.0	31.4	0.4	47.5	53.9	6.4	
Hori	7311.000	AV	31.8	36.2	8.9	32.2	-	44.7	53.9	9.2	Floor noise
Hori	9748.000	AV	31.9	38.7	10.1	33.0	-	47.7	53.9	6.2	Floor noise
Vert	4874.000	PK	47.2	31.9	9.0	31.4	-	56.7	73.9	17.2	
Vert	7311.000	PK	41.2	36.2	8.9	32.2	-	54.1	73.9	19.8	Floor noise
Vert	9748.000	PK	41.3	38.7	10.1	33.0	-	57.1	73.9	16.8	Floor noise
Vert	4874.000	AV	38.1	31.9	9.0	31.4	0.4	48.0	53.9	5.9	
Vert	7311.000	AV	31.8	36.2	8.9	32.2	-	44.7	53.9	9.2	Floor noise
Vert	9748.000	AV	31.9	38.7	10.1	33.0	-	47.7	53.9	6.2	Floor noise

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

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

Distance factor: 1 GHz - 10 GHz 20log (4.5 m / 3.0 m) = 3.53 dB
 10 GHz - 26.5 GHz 20log (1.0 m / 3.0 m) = -9.5 dB

Radiated Spurious Emission

Report No.	11932168H		
Test place	Ise EMC Lab.		
Semi Anechoic Chamber	No.3	No.3	No.3
Date	October 17, 2017	October 20, 2017	October 28, 2017
Temperature / Humidity	23 deg. C / 60 % RH	23 deg. C / 58 % RH	21 deg. C / 59 % RH
Engineer	Takafumi Noguchi	Takafumi Noguchi	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	51.8	27.8	6.8	32.4	-	54.0	73.9	19.9	
Hori	4924.000	PK	44.3	32.0	9.1	31.3	-	54.1	73.9	19.8	
Hori	7386.000	PK	41.4	36.3	8.9	32.2	-	54.4	73.9	19.5	Floor noise
Hori	9848.000	PK	41.4	38.8	10.1	33.0	-	57.3	73.9	16.6	Floor noise
Hori	2483.500	AV	43.8	27.8	6.8	32.4	0.4	46.4	53.9	7.5	*1)
Hori	4924.000	AV	35.4	32.0	9.1	31.3	0.4	45.6	53.9	8.3	
Hori	7386.000	AV	32.0	36.3	8.9	32.2	-	45.0	53.9	8.9	Floor noise
Hori	9848.000	AV	32.0	38.8	10.1	33.0	-	47.9	53.9	6.0	Floor noise
Vert	2483.500	PK	50.6	27.8	6.8	32.4	-	52.8	73.9	21.1	
Vert	4924.000	PK	44.4	32.0	9.1	31.3	-	54.2	73.9	19.7	
Vert	7386.000	PK	41.4	36.3	8.9	32.2	-	54.4	73.9	19.5	Floor noise
Vert	9848.000	PK	41.3	38.8	10.1	33.0	-	57.2	73.9	16.7	Floor noise
Vert	2483.500	AV	42.7	27.8	6.8	32.4	0.4	45.3	53.9	8.6	*1)
Vert	4924.000	AV	35.6	32.0	9.1	31.3	0.4	45.8	53.9	8.1	
Vert	7386.000	AV	32.0	36.3	8.9	32.2	-	45.0	53.9	8.9	Floor noise
Vert	9848.000	AV	32.0	38.8	10.1	33.0	-	47.9	53.9	6.0	Floor noise

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

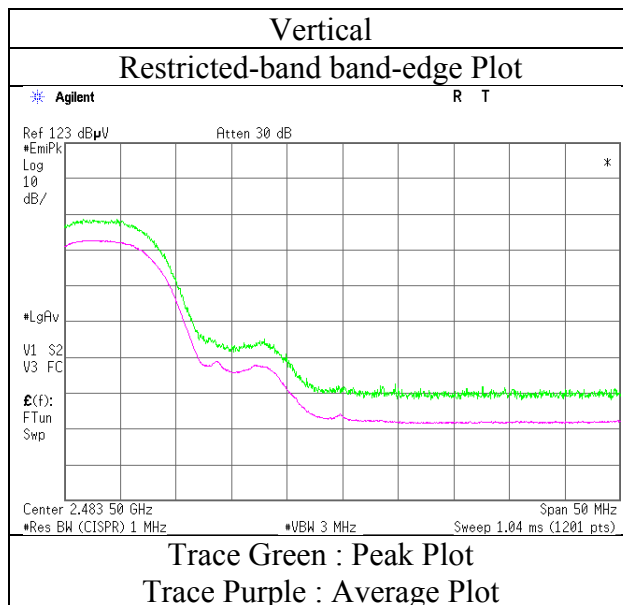
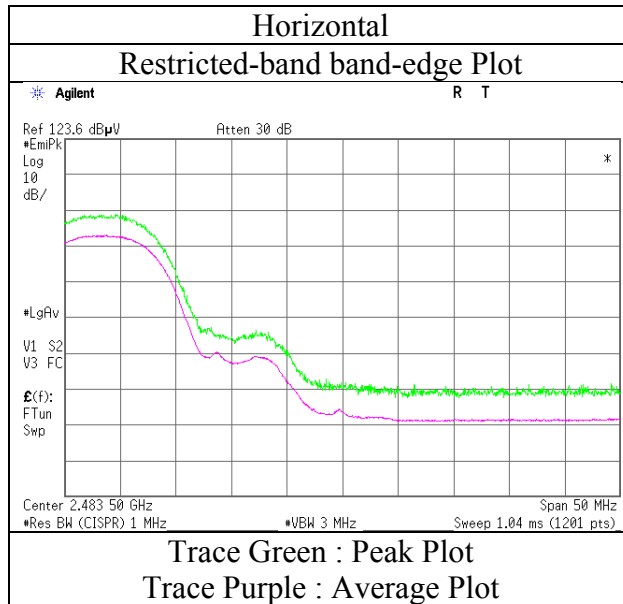
*Other frequency noises omitted in this report were not seen or had enough margin (more than 20 dB).

Distance factor: 1 GHz - 10 GHz 20log (4.5 m / 3.0 m) = 3.53 dB
 10 GHz - 26.5 GHz 20log (1.0 m / 3.0 m) = -9.5 dB

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

Radiated Spurious Emission
(Reference Plot for band-edge)

Report No. 11932168H
Test place Ise EMC Lab.
Semi Anechoic Chamber No.3
Date October 17, 2017
Temperature / Humidity 23 deg. C / 60 % RH
Engineer Takafumi Noguchi
(1 GHz - 10 GHz)
Mode Tx 11b 2462 MHz



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

Radiated Spurious Emission

Report No.	11932168H		
Test place	Ise EMC Lab.		
Semi Anechoic Chamber	No.3	No.3	No.3
Date	October 17, 2017	October 20, 2017	October 28, 2017
Temperature / Humidity	23 deg. C / 60 % RH	23 deg. C / 58 % RH	21 deg. C / 59 % RH
Engineer	Takafumi Noguchi (1 GHz - 10 GHz)	Takafumi Noguchi (10 GHz - 18 GHz)	Takafumi Noguchi (18 GHz - 26.5 GHz)
Mode	Tx 11g 2412 MHz		

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2390.000	PK	59.1	27.7	6.7	32.4	-	61.1	73.9	12.8	
Hori	4824.000	PK	41.0	31.7	8.0	31.4	-	49.3	73.9	24.6	Floor noise
Hori	7236.000	PK	40.9	36.1	8.9	32.1	-	53.8	73.9	20.1	Floor noise
Hori	9648.000	PK	41.1	38.6	10.0	32.9	-	56.8	73.9	17.1	Floor noise
Hori	2390.000	AV	49.5	27.7	6.7	32.4	1.8	53.3	53.9	0.6	*1)
Hori	4824.000	AV	31.0	31.7	8.0	31.4	-	39.3	53.9	14.6	Floor noise
Hori	7236.000	AV	32.0	36.1	8.9	32.1	-	44.9	53.9	9.0	Floor noise
Hori	9648.000	AV	32.2	38.6	10.0	32.9	-	47.9	53.9	6.0	Floor noise
Vert	2390.000	PK	58.1	27.7	6.7	32.4	-	60.1	73.9	13.8	
Vert	4824.000	PK	41.0	31.7	8.0	31.4	-	49.3	73.9	24.6	Floor noise
Vert	7236.000	PK	41.0	36.1	8.9	32.1	-	53.9	73.9	20.0	Floor noise
Vert	9648.000	PK	41.0	38.6	10.0	32.9	-	56.7	73.9	17.2	Floor noise
Vert	2390.000	AV	48.5	27.7	6.7	32.4	1.8	52.3	53.9	1.6	*1)
Vert	4824.000	AV	31.0	31.7	8.0	31.4	-	39.3	53.9	14.6	Floor noise
Vert	7236.000	AV	32.0	36.1	8.9	32.1	-	44.9	53.9	9.0	Floor noise
Vert	9648.000	AV	32.1	38.6	10.0	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) + Duty factor

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

Distance factor: 1 GHz - 10 GHz $20\log(4.5\text{ m} / 3.0\text{ m}) = 3.53\text{ dB}$
10 GHz - 26.5 GHz $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.5\text{ dB}$

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

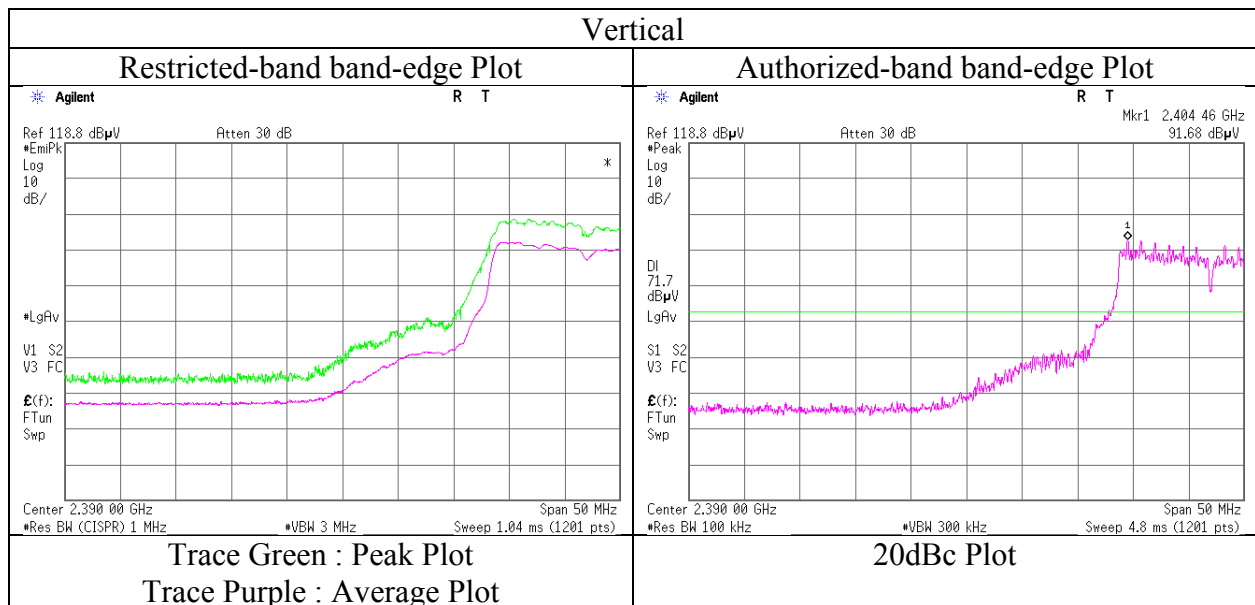
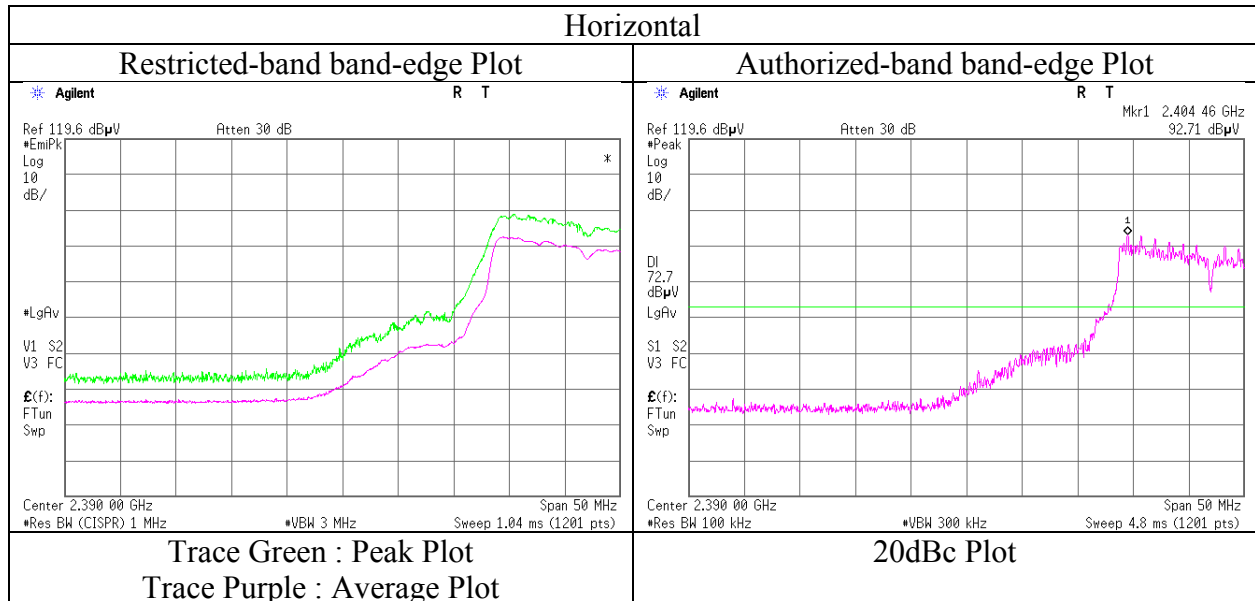
20dBc Data Sheet

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2412.000	PK	92.7	27.7	6.8	32.4	94.8	-	-	Carrier
Hori	2400.000	PK	58.3	27.7	6.8	32.4	60.4	74.8	14.4	
Vert	2412.000	PK	91.7	27.7	6.8	32.4	93.8	-	-	Carrier
Vert	2400.000	PK	56.7	27.7	6.8	32.4	58.8	73.8	15.0	

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

Radiated Spurious Emission
(Reference Plot for band-edge)

Report No. 11932168H
Test place Ise EMC Lab.
Semi Anechoic Chamber No.3
Date October 17, 2017
Temperature / Humidity 23 deg. C / 60 % RH
Engineer Takafumi Noguchi
(1 GHz - 10 GHz)
Mode Tx 11g 2412 MHz



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

Radiated Spurious Emission

Report No.	11932168H			
Test place	Ise EMC Lab.			
Semi Anechoic Chamber	No.3	No.3	No.3	No.3
Date	October 17, 2017	October 20, 2017	October 28, 2017	November 20, 2017
Temperature / Humidity	23 deg. C / 60 % RH	23 deg. C / 58 % RH	21 deg. C / 59 % RH	23 deg. C / 45 % RH
Engineer	Takafumi Noguchi	Takafumi Noguchi	Takafumi Noguchi	Shuichi Ohyama
	(1 GHz - 10 GHz)	(10 GHz - 18 GHz)	(18 GHz - 26.5 GHz)	(Below 1 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	35.000	QP	22.8	15.7	7.2	32.2	-	13.5	40.0	26.5	
Hori	50.000	QP	22.6	10.7	7.5	32.2	-	8.6	40.0	31.4	
Hori	100.000	QP	22.1	10.1	8.2	32.2	-	8.2	43.5	35.3	
Hori	240.000	QP	22.1	11.7	9.5	32.0	-	11.3	46.0	34.7	
Hori	610.000	QP	22.0	19.1	12.0	32.0	-	21.1	46.0	24.9	
Hori	700.000	QP	22.0	19.7	12.5	32.1	-	22.1	46.0	23.9	
Hori	4874.000	PK	40.2	31.9	8.0	31.4	-	48.7	73.9	25.2	Floor noise
Hori	7311.000	PK	41.3	36.2	8.9	32.2	-	54.2	73.9	19.7	Floor noise
Hori	9748.000	PK	41.4	38.7	10.1	33.0	-	57.2	73.9	16.7	Floor noise
Hori	4874.000	AV	31.0	31.9	8.0	31.4	-	39.5	53.9	14.4	Floor noise
Hori	7311.000	AV	31.8	36.2	8.9	32.2	-	44.7	53.9	9.2	Floor noise
Hori	9748.000	AV	31.9	38.7	10.1	33.0	-	47.7	53.9	6.2	Floor noise
Vert	35.000	QP	22.8	15.7	7.2	32.2	-	13.5	40.0	26.5	
Vert	50.000	QP	22.6	10.7	7.5	32.2	-	8.6	40.0	31.4	
Vert	100.000	QP	22.1	10.1	8.2	32.2	-	8.2	43.5	35.3	
Vert	240.000	QP	22.1	11.7	9.5	32.0	-	11.3	46.0	34.7	
Vert	610.000	QP	22.0	19.1	12.0	32.0	-	21.1	46.0	24.9	
Vert	700.000	QP	22.0	19.7	12.5	32.1	-	22.1	46.0	23.9	
Vert	4874.000	PK	40.1	31.9	8.0	31.4	-	48.6	73.9	25.3	Floor noise
Vert	7311.000	PK	41.4	36.2	8.9	32.2	-	54.3	73.9	19.6	Floor noise
Vert	9748.000	PK	41.3	38.7	10.1	33.0	-	57.1	73.9	16.8	Floor noise
Vert	4874.000	AV	31.0	31.9	8.0	31.4	-	39.5	53.9	14.4	Floor noise
Vert	7311.000	AV	31.8	36.2	8.9	32.2	-	44.7	53.9	9.2	Floor noise
Vert	9748.000	AV	31.9	38.7	10.1	33.0	-	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 (4.5 m / 3.0 m) = 3.53 dB
10 GHz - 26.5 GHz 20log (1.0 m / 3.0 m) = -9.5 dB

Radiated Spurious Emission

Report No.	11932168H		
Test place	Ise EMC Lab.		
Semi Anechoic Chamber	No.3	No.3	No.3
Date	October 17, 2017	October 20, 2017	October 28, 2017
Temperature / Humidity	23 deg. C / 60 % RH	23 deg. C / 58 % RH	21 deg. C / 59 % RH
Engineer	Takafumi Noguchi	Takafumi Noguchi	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	55.9	27.8	6.8	32.4	-	58.1	73.9	15.8	
Hori	4924.000	PK	40.2	32.0	8.1	31.3	-	49.0	73.9	24.9	Floor noise
Hori	7386.000	PK	41.3	36.3	8.9	32.2	-	54.3	73.9	19.6	Floor noise
Hori	9848.000	PK	41.3	38.8	10.1	33.0	-	57.2	73.9	16.7	Floor noise
Hori	2483.500	AV	46.3	27.8	6.8	32.4	1.8	50.3	53.9	3.6	*1)
Hori	4924.000	AV	30.7	32.0	8.1	31.3	-	39.5	53.9	14.4	Floor noise
Hori	7386.000	AV	32.0	36.3	8.9	32.2	-	45.0	53.9	8.9	Floor noise
Hori	9848.000	AV	32.0	38.8	10.1	33.0	-	47.9	53.9	6.0	Floor noise
Vert	2483.500	PK	54.0	27.8	6.8	32.4	-	56.2	73.9	17.7	
Vert	4924.000	PK	40.3	32.0	8.1	31.3	-	49.1	73.9	24.8	Floor noise
Vert	7386.000	PK	41.4	36.3	8.9	32.2	-	54.4	73.9	19.5	Floor noise
Vert	9848.000	PK	41.3	38.8	10.1	33.0	-	57.2	73.9	16.7	Floor noise
Vert	2483.500	AV	44.9	27.8	6.8	32.4	1.8	48.9	53.9	5.0	*1)
Vert	4924.000	AV	30.7	32.0	8.1	31.3	-	39.5	53.9	14.4	Floor noise
Vert	7386.000	AV	32.0	36.3	8.9	32.2	-	45.0	53.9	8.9	Floor noise
Vert	9848.000	AV	32.0	38.8	10.1	33.0	-	47.9	53.9	6.0	Floor noise

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

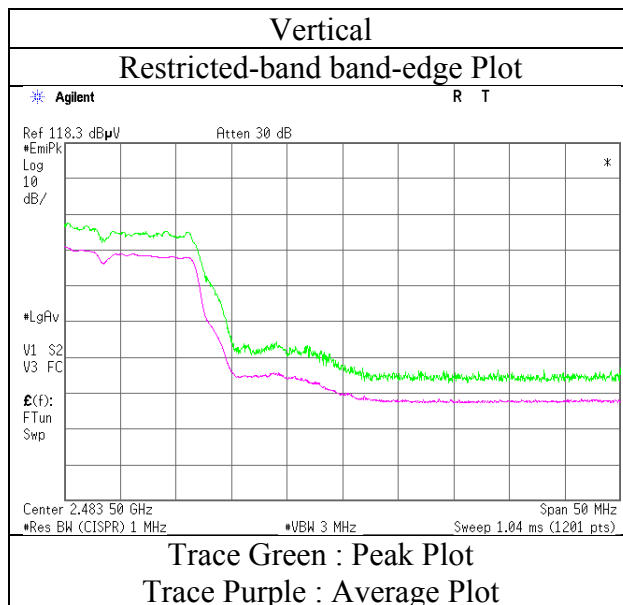
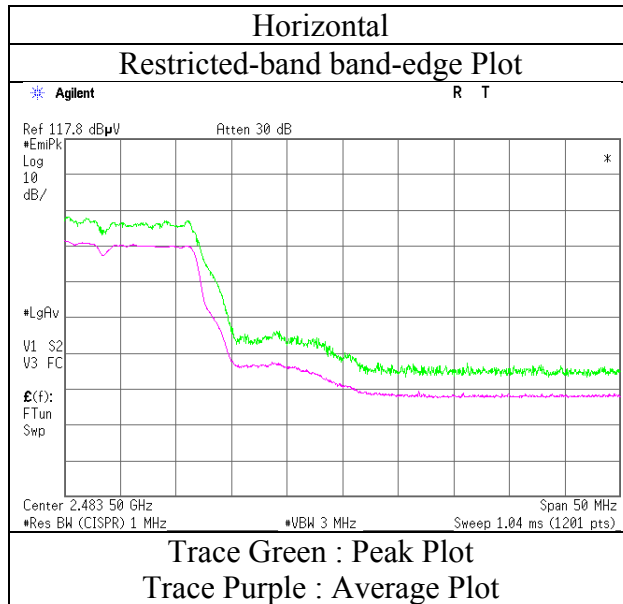
*Other frequency noises omitted in this report were not seen or had enough margin (more than 20 dB).

Distance factor: 1 GHz - 10 GHz 20log (4.5 m / 3.0 m) = 3.53 dB
 10 GHz - 26.5 GHz 20log (1.0 m / 3.0 m) = -9.5 dB

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

Radiated Spurious Emission
(Reference Plot for band-edge)

Report No. 11932168H
Test place Ise EMC Lab.
Semi Anechoic Chamber No.3
Date October 17, 2017
Temperature / Humidity 23 deg. C / 60 % RH
Engineer Takafumi Noguchi
(1 GHz - 10 GHz)
Mode Tx 11g 2462 MHz



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

Radiated Spurious Emission

Report No.	11932168H		
Test place	Ise EMC Lab.		
Semi Anechoic Chamber	No.3	No.3	No.3
Date	October 17, 2017	October 20, 2017	October 28, 2017
Temperature / Humidity	23 deg. C / 60 % RH	23 deg. C / 58 % RH	21 deg. C / 59 % RH
Engineer	Takafumi Noguchi	Takafumi Noguchi	Takafumi Noguchi
	(1 GHz - 10 GHz)	(10 GHz - 18 GHz)	(18 GHz - 26.5 GHz)
Mode	Tx 11n-20 2412 MHz		

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2390.000	PK	65.2	27.7	6.7	32.4	-	67.2	73.9	6.7	
Hori	4824.000	PK	40.9	31.7	8.0	31.4	-	49.2	73.9	24.7	Floor noise
Hori	7236.000	PK	40.9	36.1	8.9	32.1	-	53.8	73.9	20.1	Floor noise
Hori	9648.000	PK	41.1	38.6	10.0	32.9	-	56.8	73.9	17.1	Floor noise
Hori	2390.000	AV	50.7	27.7	6.7	32.4	0.3	53.0	53.9	0.9	*1)
Hori	4824.000	AV	31.0	31.7	8.0	31.4	-	39.3	53.9	14.6	Floor noise
Hori	7236.000	AV	32.0	36.1	8.9	32.1	-	44.9	53.9	9.0	Floor noise
Hori	9648.000	AV	32.2	38.6	10.0	32.9	-	47.9	53.9	6.0	Floor noise
Vert	2390.000	PK	64.2	27.7	6.7	32.4	-	66.2	73.9	7.7	
Vert	4824.000	PK	40.9	31.7	8.0	31.4	-	49.2	73.9	24.7	Floor noise
Vert	7236.000	PK	41.1	36.1	8.9	32.1	-	54.0	73.9	19.9	Floor noise
Vert	9648.000	PK	41.2	38.6	10.0	32.9	-	56.9	73.9	17.0	Floor noise
Vert	2390.000	AV	49.7	27.7	6.7	32.4	0.3	52.0	53.9	1.9	*1)
Vert	4824.000	AV	31.0	31.7	8.0	31.4	-	39.3	53.9	14.6	Floor noise
Vert	7236.000	AV	32.0	36.1	8.9	32.1	-	44.9	53.9	9.0	Floor noise
Vert	9648.000	AV	32.2	38.6	10.0	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) + 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 (4.5 m / 3.0 m) = 3.53 dB
 10 GHz - 26.5 GHz 20log (1.0 m / 3.0 m) = -9.5 dB

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

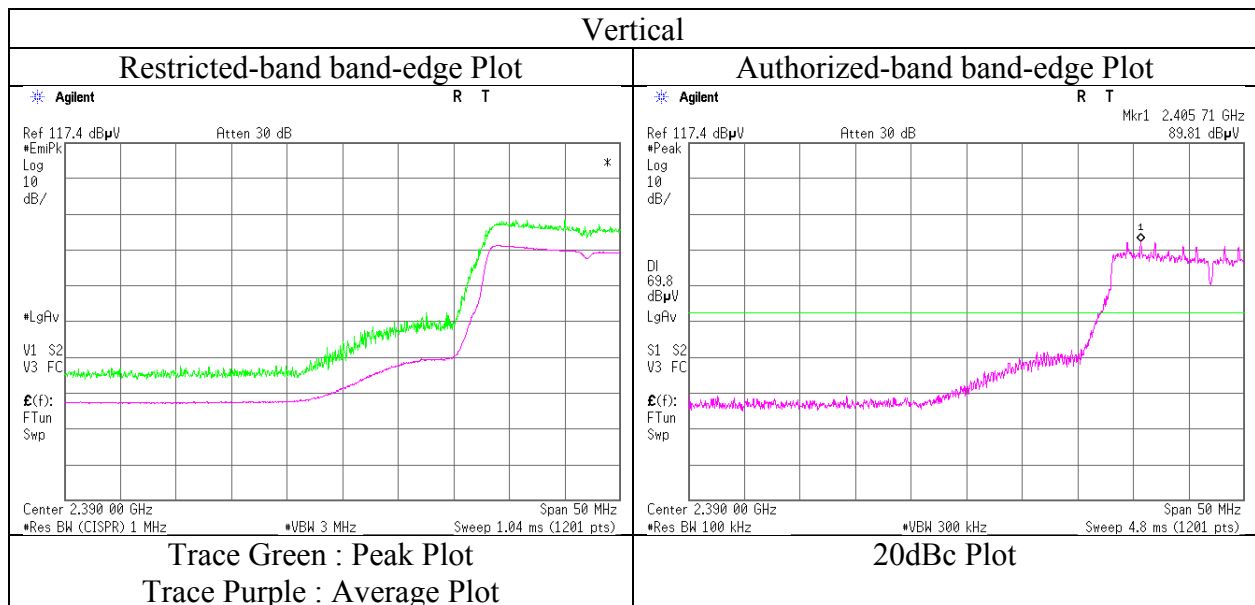
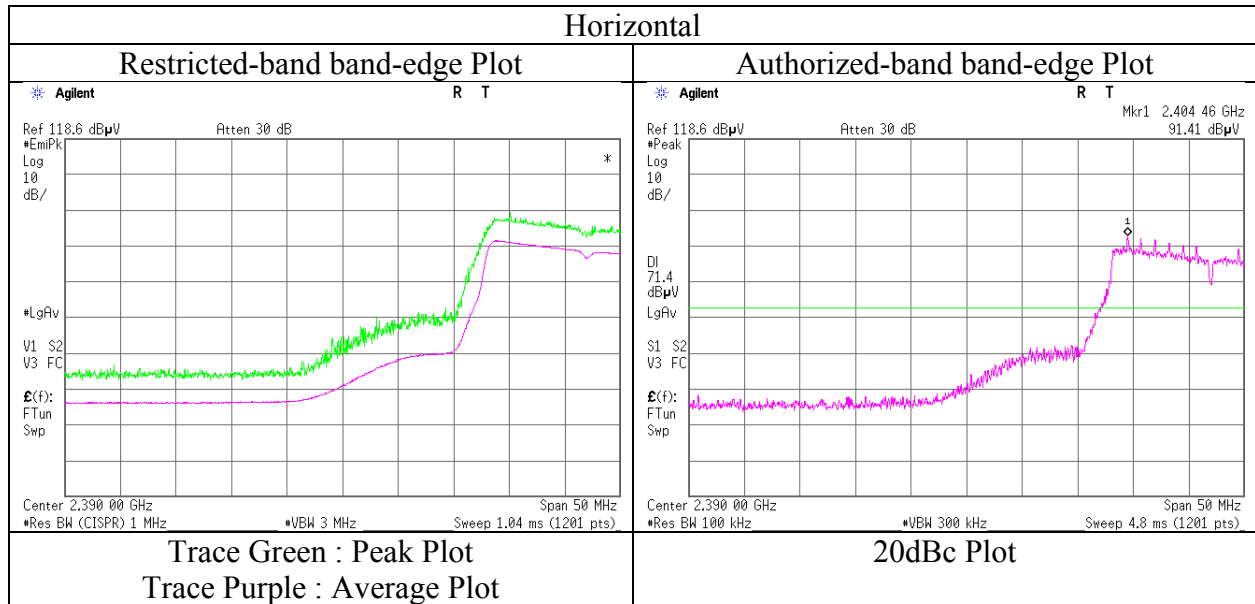
20dBc Data Sheet

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2412.000	PK	91.4	27.7	6.8	32.4	93.5	-	-	Carrier
Hori	2400.000	PK	59.8	27.7	6.8	32.4	61.9	73.5	11.6	
Vert	2412.000	PK	89.8	27.7	6.8	32.4	91.9	-	-	Carrier
Vert	2400.000	PK	58.3	27.7	6.8	32.4	60.4	71.9	11.5	

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

Radiated Spurious Emission
(Reference Plot for band-edge)

Report No. 11932168H
Test place Ise EMC Lab.
Semi Anechoic Chamber No.3
Date October 17, 2017
Temperature / Humidity 23 deg. C / 60 % RH
Engineer Takafumi Noguchi
(1 GHz - 10 GHz)
Mode Tx 11n-20 2412 MHz



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

Radiated Spurious Emission

Report No.	11932168H		
Test place	Ise EMC Lab.		
Semi Anechoic Chamber	No.3	No.3	No.3
Date	October 17, 2017	October 20, 2017	October 28, 2017
Temperature / Humidity	23 deg. C / 60 % RH	23 deg. C / 58 % RH	21 deg. C / 59 % RH
Engineer	Takafumi Noguchi	Takafumi Noguchi	Takafumi Noguchi
	(1 GHz - 10 GHz)	(10 GHz - 18 GHz)	(18 GHz - 26.5 GHz)
Mode	Tx 11n-20 2437 MHz		

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	4874.000	PK	40.2	31.9	8.0	31.4	-	48.7	73.9	25.2	Floor noise
Hori	7311.000	PK	41.3	36.2	8.9	32.2	-	54.2	73.9	19.7	Floor noise
Hori	9748.000	PK	41.4	38.7	10.1	33.0	-	57.2	73.9	16.7	Floor noise
Hori	4874.000	AV	31.0	31.9	8.0	31.4	-	39.5	53.9	14.4	Floor noise
Hori	7311.000	AV	31.8	36.2	8.9	32.2	-	44.7	53.9	9.2	Floor noise
Hori	9748.000	AV	31.9	38.7	10.1	33.0	-	47.7	53.9	6.2	Floor noise
Vert	4874.000	PK	40.2	31.9	8.0	31.4	-	48.7	73.9	25.2	Floor noise
Vert	7311.000	PK	41.3	36.2	8.9	32.2	-	54.2	73.9	19.7	Floor noise
Vert	9748.000	PK	41.4	38.7	10.1	33.0	-	57.2	73.9	16.7	Floor noise
Vert	4874.000	AV	31.0	31.9	8.0	31.4	-	39.5	53.9	14.4	Floor noise
Vert	7311.000	AV	31.9	36.2	8.9	32.2	-	44.8	53.9	9.1	Floor noise
Vert	9748.000	AV	32.0	38.7	10.1	33.0	-	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 (4.5 m / 3.0 m) = 3.53 dB
 10 GHz - 26.5 GHz 20log (1.0 m / 3.0 m) = -9.5 dB

Radiated Spurious Emission

Report No.	11932168H		
Test place	Ise EMC Lab.		
Semi Anechoic Chamber	No.3	No.3	No.3
Date	October 17, 2017	October 20, 2017	October 28, 2017
Temperature / Humidity	23 deg. C / 60 % RH	23 deg. C / 58 % RH	21 deg. C / 59 % RH
Engineer	Takafumi Noguchi (1 GHz - 10 GHz)	Takafumi Noguchi (10 GHz - 18 GHz)	Takafumi Noguchi (18 GHz - 26.5 GHz)
Mode	Tx 11n-20 2462 MHz		

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2483.500	PK	59.7	27.8	6.8	32.4	-	61.9	73.9	12.0	
Hori	4924.000	PK	40.3	32.0	8.1	31.3	-	49.1	73.9	24.8	Floor noise
Hori	7386.000	PK	41.4	36.3	8.9	32.2	-	54.4	73.9	19.5	Floor noise
Hori	9848.000	PK	41.4	38.8	10.1	33.0	-	57.3	73.9	16.6	Floor noise
Hori	2483.500	AV	46.3	27.8	6.8	32.4	0.3	48.8	53.9	5.1	*1)
Hori	4924.000	AV	30.8	32.0	8.1	31.3	-	39.6	53.9	14.3	Floor noise
Hori	7386.000	AV	32.0	36.3	8.9	32.2	-	45.0	53.9	8.9	Floor noise
Hori	9848.000	AV	32.0	38.8	10.1	33.0	-	47.9	53.9	6.0	Floor noise
Vert	2483.500	PK	58.1	27.8	6.8	32.4	-	60.3	73.9	13.6	
Vert	4924.000	PK	40.4	32.0	8.1	31.3	-	49.2	73.9	24.7	Floor noise
Vert	7386.000	PK	41.3	36.3	8.9	32.2	-	54.3	73.9	19.6	Floor noise
Vert	9848.000	PK	41.3	38.8	10.1	33.0	-	57.2	73.9	16.7	Floor noise
Vert	2483.500	AV	44.4	27.8	6.8	32.4	0.3	46.9	53.9	7.0	*1)
Vert	4924.000	AV	30.8	32.0	8.1	31.3	-	39.6	53.9	14.3	Floor noise
Vert	7386.000	AV	31.9	36.3	8.9	32.2	-	44.9	53.9	9.0	Floor noise
Vert	9848.000	AV	31.9	38.8	10.1	33.0	-	47.8	53.9	6.1	Floor noise

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

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

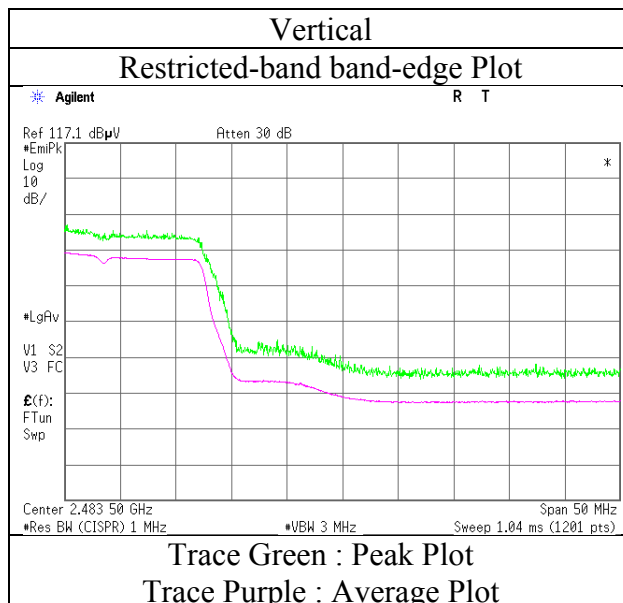
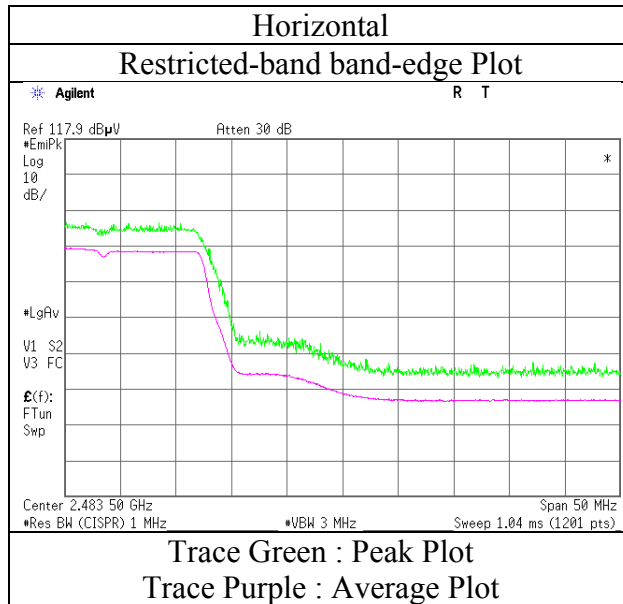
Distance factor: 1 GHz - 10 GHz $20\log(4.5\text{ m} / 3.0\text{ m}) = 3.53\text{ dB}$

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

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

Radiated Spurious Emission
(Reference Plot for band-edge)

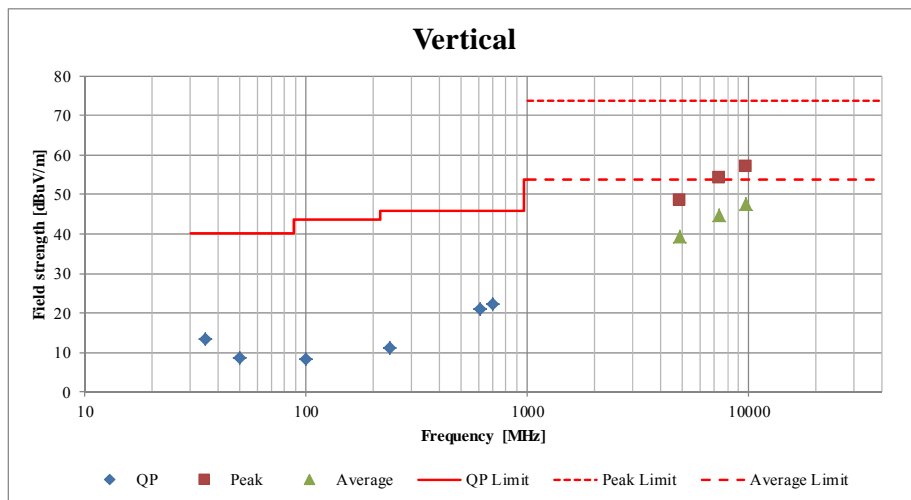
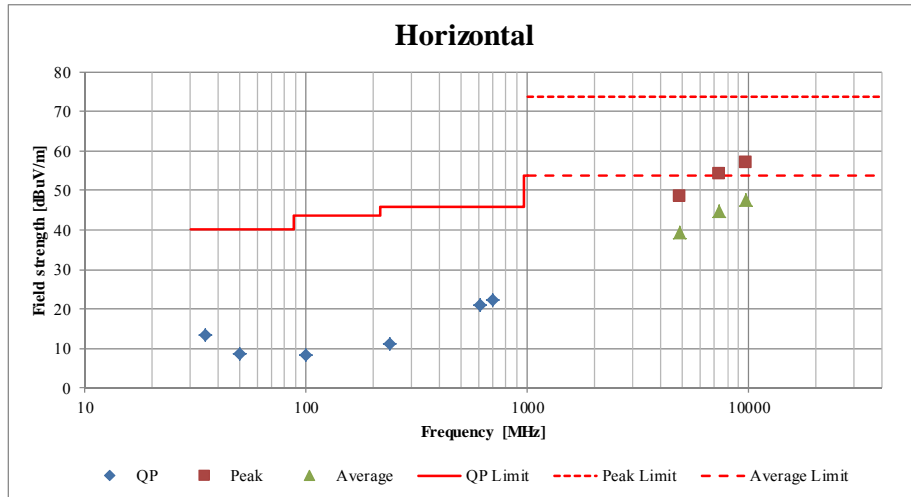
Report No.	11932168H
Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.3
Date	October 17, 2017
Temperature / Humidity	23 deg. C / 60 % RH
Engineer	Takafumi Noguchi
	(1 GHz - 10 GHz)
Mode	Tx 11n-20 2462 MHz



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

Radiated Spurious Emission
(Plot data, Worst case)

Report No.	11932168H			
Test place	Ise EMC Lab.			
Semi Anechoic Chamber	No.3	No.3	No.3	No.3
Date	October 17, 2017	October 20, 2017	October 28, 2017	November 21, 2017
Temperature / Humidity	23 deg. C / 60 % RH	23 deg. C / 58 % RH	21 deg. C / 59 % RH	23 deg. C / 45 % RH
Engineer	Takafumi Noguchi (1 GHz - 10 GHz)	Takafumi Noguchi (10 GHz - 18 GHz)	Takafumi Noguchi (18 GHz - 26.5 GHz)	Shuichi Ohyama (Below 1 GHz)
Mode	Tx 11g 2437 MHz			



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

Radiated Spurious Emission

Report No. 11932168H
Test place Ise EMC Lab.
Semi Anechoic Chamber No.3
Date October 5, 2017
Temperature / Humidity 23 deg. C / 45 % RH
Engineer Koji Yamamoto
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	22.7	14.5	7.3	32.2	-	12.3	40.0	27.7	
Hori	100.000	QP	22.6	10.0	8.2	32.2	-	8.6	43.5	34.9	
Hori	150.000	QP	22.1	14.9	8.7	32.1	-	13.6	43.5	29.9	
Hori	300.000	QP	22.1	13.4	10.0	32.0	-	13.5	46.0	32.5	
Hori	500.000	QP	22.0	17.7	11.3	32.0	-	19.0	46.0	27.0	
Hori	700.000	QP	22.0	19.7	12.5	32.1	-	22.1	46.0	23.9	
Hori	2390.000	PK	41.2	27.7	6.7	32.4	-	43.2	73.9	30.7	
Hori	4804.000	PK	41.4	31.6	9.0	31.4	-	50.6	73.9	23.3	Floor noise
Hori	7206.000	PK	41.6	36.0	10.4	32.1	-	55.9	73.9	18.0	Floor noise
Hori	9608.000	PK	41.3	38.5	10.9	32.9	-	57.8	73.9	16.1	Floor noise
Hori	2390.000	AV	33.4	27.7	6.7	32.4	2.0	37.4	53.9	16.5	*1)
Hori	4804.000	AV	31.1	31.6	9.0	31.4	-	40.3	53.9	13.6	Floor noise
Hori	7206.000	AV	31.3	36.0	10.4	32.1	-	45.6	53.9	8.3	Floor noise
Hori	9608.000	AV	31.3	38.5	10.9	32.9	-	47.8	53.9	6.1	Floor noise
Vert	40.000	QP	22.7	14.5	7.3	32.2	-	12.3	40.0	27.7	
Vert	100.000	QP	22.6	10.0	8.2	32.2	-	8.6	43.5	34.9	
Vert	150.000	QP	22.1	14.9	8.7	32.1	-	13.6	43.5	29.9	
Vert	300.000	QP	22.1	13.4	10.0	32.0	-	13.5	46.0	32.5	
Vert	500.000	QP	22.0	17.7	11.3	32.0	-	19.0	46.0	27.0	
Vert	700.000	QP	22.0	19.7	12.5	32.1	-	22.1	46.0	23.9	
Vert	2390.000	PK	41.4	27.7	6.7	32.4	-	43.4	73.9	30.5	
Vert	4804.000	PK	41.4	31.6	9.0	31.4	-	50.6	73.9	23.3	Floor noise
Vert	7206.000	PK	41.6	36.0	10.4	32.1	-	55.9	73.9	18.0	Floor noise
Vert	9608.000	PK	41.3	38.5	10.9	32.9	-	57.8	73.9	16.1	Floor noise
Vert	2390.000	AV	33.3	27.7	6.7	32.4	2.0	37.3	53.9	16.6	*1)
Vert	4804.000	AV	31.1	31.6	9.0	31.4	-	40.3	53.9	13.6	Floor noise
Vert	7206.000	AV	31.3	36.0	10.4	32.1	-	45.6	53.9	8.3	Floor noise
Vert	9608.000	AV	31.3	38.5	10.9	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) + Duty factor

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

Distance factor: 1 GHz - 10 GHz $20\log(4.5\text{ m} / 3.0\text{ m}) = 3.53\text{ dB}$
10 GHz - 26.5 GHz $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.5\text{ dB}$

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

20dBc Data Sheet

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2402.000	PK	98.8	27.7	6.8	32.4	100.9	-	-	Carrier
Hori	2400.000	PK	38.0	27.7	6.8	32.4	40.1	80.9	40.8	
Vert	2402.000	PK	95.4	27.7	6.8	32.4	97.5	-	-	Carrier
Vert	2400.000	PK	36.3	27.7	6.8	32.4	38.4	77.5	39.1	

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

UL Japan, Inc.

Ise EMC Lab.

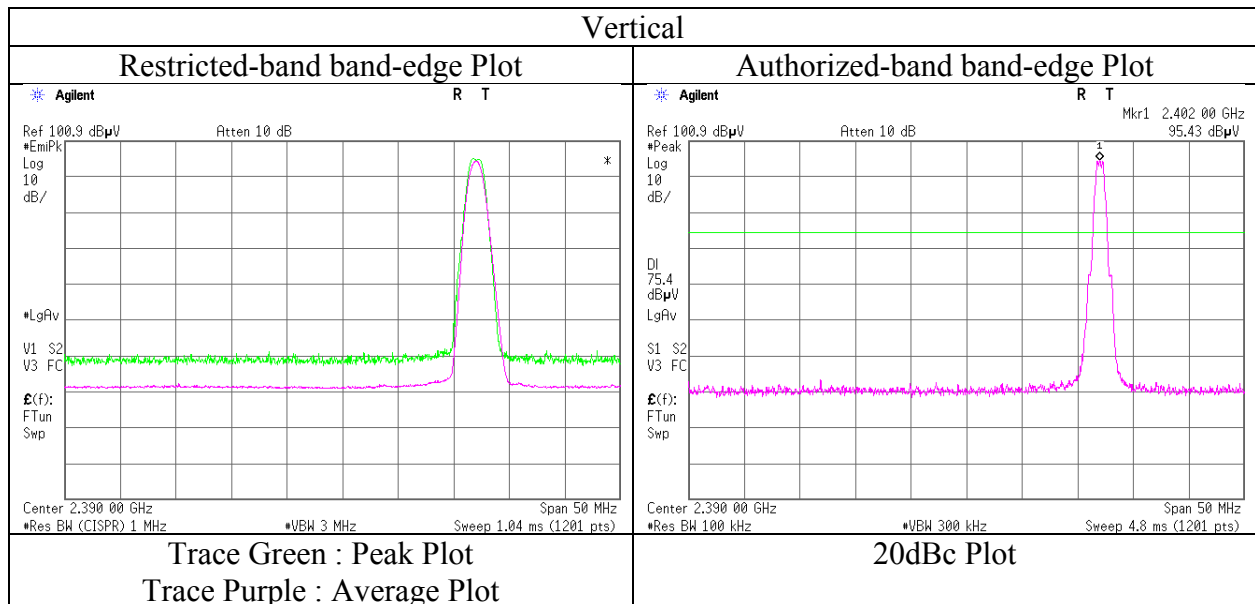
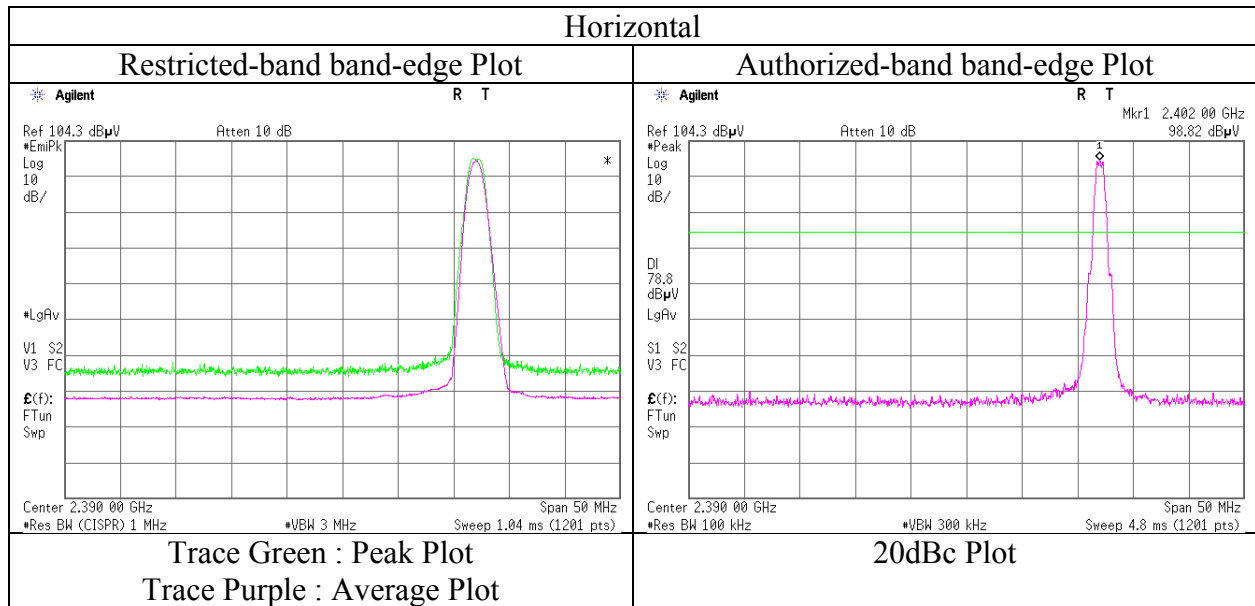
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

Radiated Spurious Emission (Reference Plot for band-edge)

Report No.	11932168H
Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.3
Date	October 5, 2017
Temperature / Humidity	23 deg. C / 45 % RH
Engineer	Koji Yamamoto
Mode	Tx BT LE 2402 MHz



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

UL Japan, Inc.

Ise EMC Lab.

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

Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

Radiated Spurious Emission

Report No. 11932168H
Test place Ise EMC Lab.
Semi Anechoic Chamber No.3
Date October 5, 2017
Temperature / Humidity 23 deg. C / 45 % RH
Engineer Koji Yamamoto
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	22.7	14.5	7.3	32.2	-	12.3	40.0	27.7	
Hori	100.000	QP	22.6	10.0	8.2	32.2	-	8.6	43.5	34.9	
Hori	150.000	QP	22.1	14.9	8.7	32.1	-	13.6	43.5	29.9	
Hori	300.000	QP	22.1	13.4	10.0	32.0	-	13.5	46.0	32.5	
Hori	500.000	QP	22.0	17.7	11.3	32.0	-	19.0	46.0	27.0	
Hori	700.000	QP	22.0	19.7	12.5	32.1	-	22.1	46.0	23.9	
Hori	4880.000	PK	40.9	31.9	9.0	31.4	-	50.4	73.9	23.5	Floor noise
Hori	7320.000	PK	41.5	36.2	10.4	32.2	-	55.9	73.9	18.0	Floor noise
Hori	9760.000	PK	41.4	38.7	11.0	33.0	-	58.1	73.9	15.8	Floor noise
Hori	4880.000	AV	32.0	31.9	9.0	31.4	-	41.5	53.9	12.4	Floor noise
Hori	7320.000	AV	31.4	36.2	10.4	32.2	-	45.8	53.9	8.1	Floor noise
Hori	9760.000	AV	31.1	38.7	11.0	33.0	-	47.8	53.9	6.1	Floor noise
Vert	40.000	QP	22.7	14.5	7.3	32.2	-	12.3	40.0	27.7	
Vert	100.000	QP	22.6	10.0	8.2	32.2	-	8.6	43.5	34.9	
Vert	150.000	QP	22.1	14.9	8.7	32.1	-	13.6	43.5	29.9	
Vert	300.000	QP	22.1	13.4	10.0	32.0	-	13.5	46.0	32.5	
Vert	500.000	QP	22.0	17.7	11.3	32.0	-	19.0	46.0	27.0	
Vert	700.000	QP	22.0	19.7	12.5	32.1	-	22.1	46.0	23.9	
Vert	4880.000	PK	40.9	31.9	9.0	31.4	-	50.4	73.9	23.5	Floor noise
Vert	7320.000	PK	41.5	36.2	10.4	32.2	-	55.9	73.9	18.0	Floor noise
Vert	9760.000	PK	41.4	38.7	11.0	33.0	-	58.1	73.9	15.8	Floor noise
Vert	4880.000	AV	32.0	31.9	9.0	31.4	-	41.5	53.9	12.4	Floor noise
Vert	7320.000	AV	31.4	36.2	10.4	32.2	-	45.8	53.9	8.1	Floor noise
Vert	9760.000	AV	31.1	38.7	11.0	33.0	-	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 $20\log(4.5\text{ m} / 3.0\text{ m}) = 3.53\text{ dB}$
10 GHz - 26.5 GHz $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.5\text{ dB}$

Radiated Spurious Emission

Report No. 11932168H
Test place Ise EMC Lab.
Semi Anechoic Chamber No.3
Date October 5, 2017
Temperature / Humidity 23 deg. C / 45 % RH
Engineer Koji Yamamoto
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	22.7	14.5	7.3	32.2	-	12.3	40.0	27.7	
Hori	100.000	QP	22.6	10.0	8.2	32.2	-	8.6	43.5	34.9	
Hori	150.000	QP	22.1	14.9	8.7	32.1	-	13.6	43.5	29.9	
Hori	300.000	QP	22.1	13.4	10.0	32.0	-	13.5	46.0	32.5	
Hori	500.000	QP	22.0	17.7	11.3	32.0	-	19.0	46.0	27.0	
Hori	700.000	QP	22.0	19.7	12.5	32.1	-	22.1	46.0	23.9	
Hori	2483.500	PK	42.1	27.8	6.8	32.4	-	44.3	73.9	29.6	
Hori	4960.000	PK	40.9	32.1	9.1	31.3	-	50.8	73.9	23.1	Floor noise
Hori	7440.000	PK	41.8	36.4	10.3	32.2	-	56.3	73.9	17.6	Floor noise
Hori	9920.000	PK	41.5	38.9	11.0	33.1	-	58.3	73.9	15.6	Floor noise
Hori	2483.500	AV	34.0	27.8	6.8	32.4	2.0	38.2	53.9	15.7	*1)
Hori	4960.000	AV	32.1	32.1	9.1	31.3	-	42.0	53.9	11.9	Floor noise
Hori	7440.000	AV	31.5	36.4	10.3	32.2	-	46.0	53.9	7.9	Floor noise
Hori	9920.000	AV	30.8	38.9	11.0	33.1	-	47.6	53.9	6.3	Floor noise
Vert	40.000	QP	22.7	14.5	7.3	32.2	-	12.3	40.0	27.7	
Vert	100.000	QP	22.6	10.0	8.2	32.2	-	8.6	43.5	34.9	
Vert	150.000	QP	22.1	14.9	8.7	32.1	-	13.6	43.5	29.9	
Vert	300.000	QP	22.1	13.4	10.0	32.0	-	13.5	46.0	32.5	
Vert	500.000	QP	22.0	17.7	11.3	32.0	-	19.0	46.0	27.0	
Vert	700.000	QP	22.0	19.7	12.5	32.1	-	22.1	46.0	23.9	
Vert	2483.500	PK	41.7	27.8	6.8	32.4	-	43.9	73.9	30.0	
Vert	4960.000	PK	40.9	32.1	9.1	31.3	-	50.8	73.9	23.1	Floor noise
Vert	7440.000	PK	41.8	36.4	10.3	32.2	-	56.3	73.9	17.6	Floor noise
Vert	9920.000	PK	41.5	38.9	11.0	33.1	-	58.3	73.9	15.6	Floor noise
Vert	2483.500	AV	33.7	27.8	6.8	32.4	2.0	37.9	53.9	16.0	*1)
Vert	4960.000	AV	32.1	32.1	9.1	31.3	-	42.0	53.9	11.9	Floor noise
Vert	7440.000	AV	31.5	36.4	10.3	32.2	-	46.0	53.9	7.9	Floor noise
Vert	9920.000	AV	30.8	38.9	11.0	33.1	-	47.6	53.9	6.3	Floor noise

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

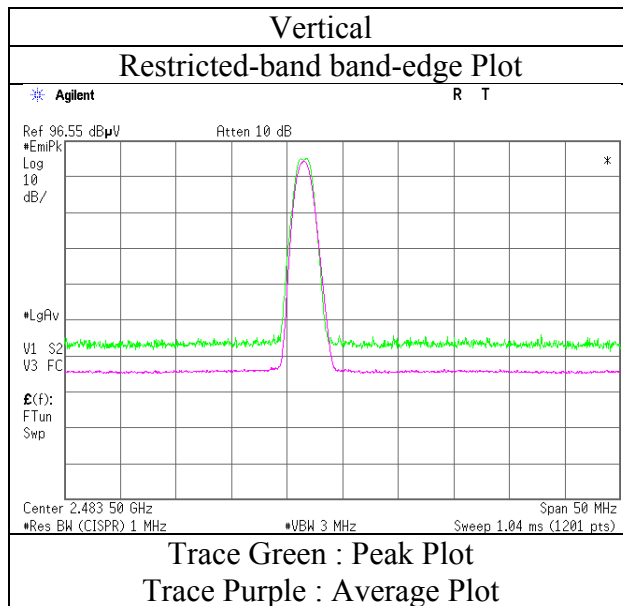
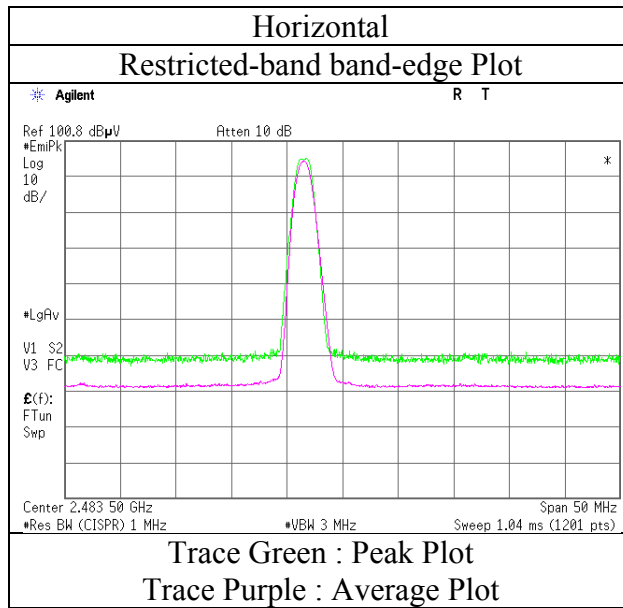
*Other frequency noises omitted in this report were not seen or had enough margin (more than 20 dB).

Distance factor: 1 GHz - 10 GHz $20\log(4.5\text{ m} / 3.0\text{ m}) = 3.53\text{ dB}$
10 GHz - 26.5 GHz $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.5\text{ dB}$

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

Radiated Spurious Emission
(Reference Plot for band-edge)

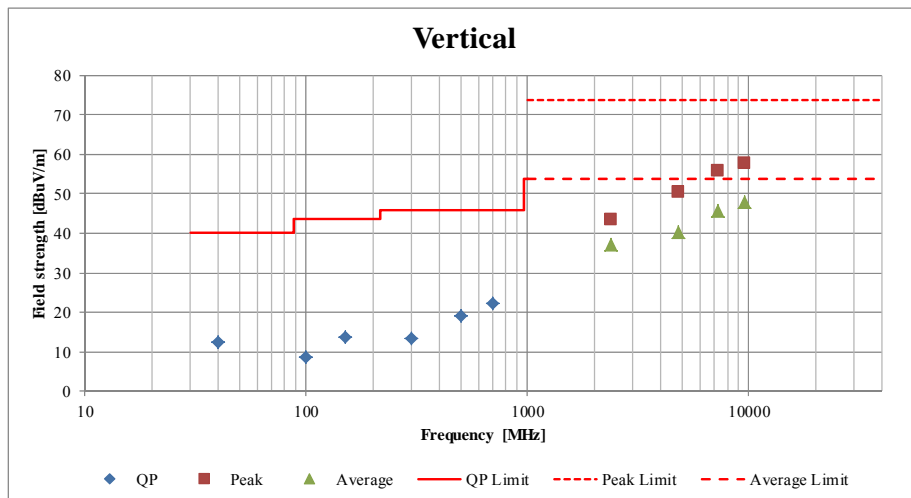
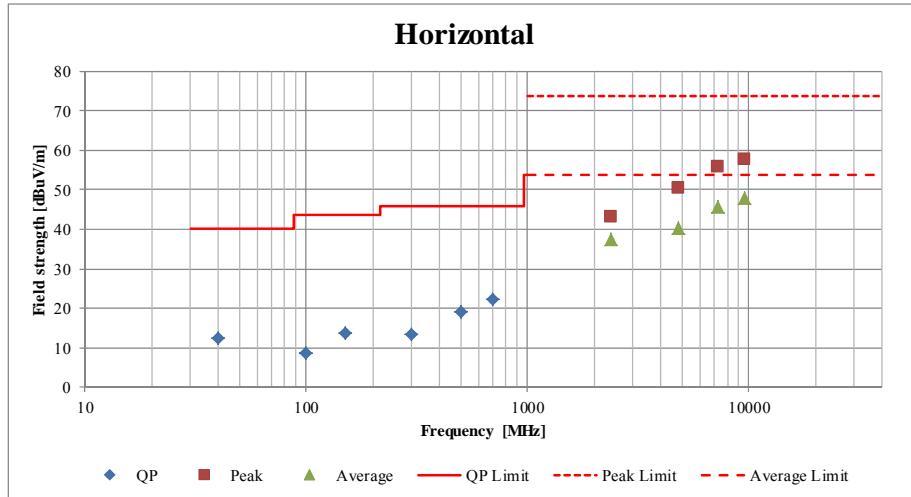
Report No.	11932168H
Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.3
Date	October 5, 2017
Temperature / Humidity	23 deg. C / 45 % RH
Engineer	Koji Yamamoto
Mode	Tx BT LE 2480 MHz



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

Radiated Spurious Emission
(Plot data, Worst case)

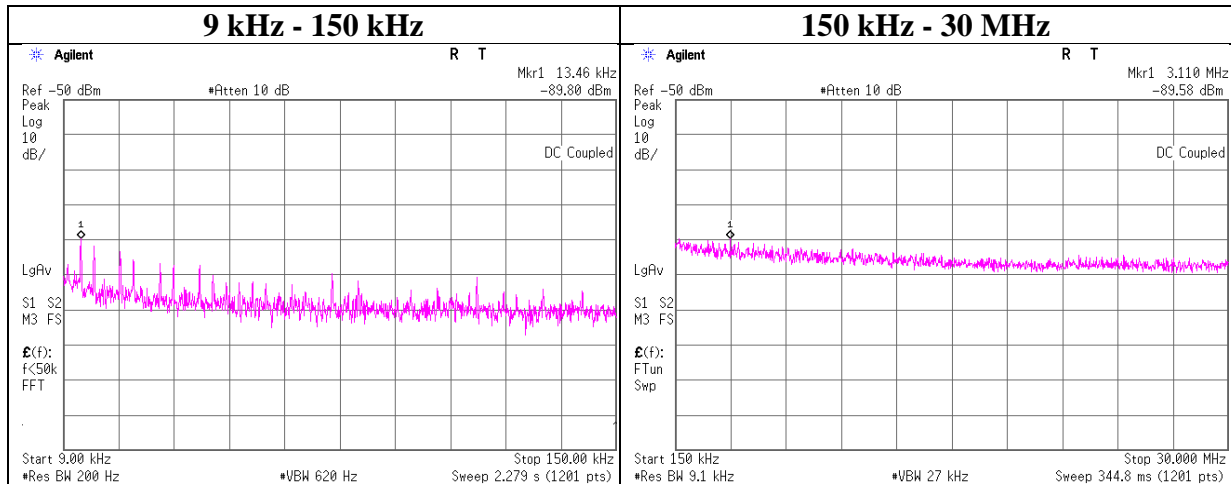
Report No.	11932168H
Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.3
Date	October 5, 2017
Temperature / Humidity	23 deg. C / 45 % RH
Engineer	Koji Yamamoto
Mode	Tx BT LE 2402 MHz



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

Conducted Spurious Emission

Test place	Ise EMC Lab. No.6 Measurement Room
Report No.	11932168H
Date	October 19, 2017
Temperature / Humidity	24 deg. C / 53 % RH
Engineer	Ryota Yamanaka
Mode	Tx 11g 48Mbps 2437MHz



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
13.46	-89.8	0.80	9.8	2.0	1	-77.2	300	6.0	-15.9	45.0	60.9	
3110.00	-89.6	0.80	9.8	2.0	1	-76.9	30	6.0	4.3	29.5	25.2	

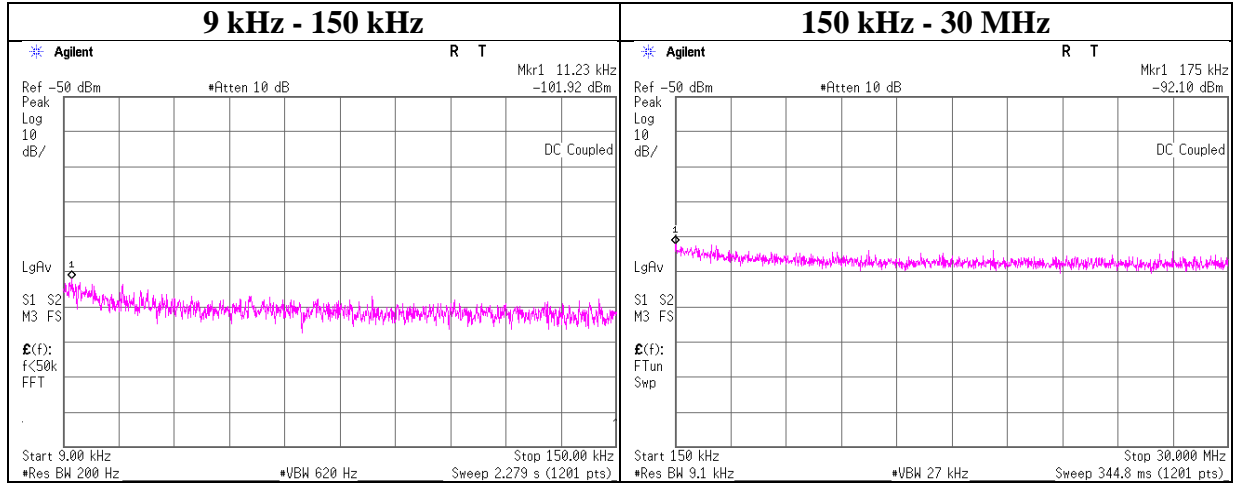
$EIRP[dBm] = Reading [dBm] + Cable loss [dB] + Attenuator Loss [dB] + Antenna gain [dBi] + 10 * \log(N)$

N: Number of output

*2.0 dBi was applied to the test result based on KDB 558074 since antenna gain was less than 2.0 dBi.

Conducted Spurious Emission

Test place	Ise EMC Lab. No.6 Measurement Room
Report No.	11932168H
Date	September 21, 2017
Temperature / Humidity	26 deg. C / 47 % RH
Engineer	Takafumi Noguchi
Mode	BT LE 2402MHz



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
11.23	-101.9	0.80	9.8	2.0	1	-89.3	300	6.0	-28.0	46.5	74.5	
175.00	-92.1	0.80	9.8	2.0	1	-79.5	300	6.0	-18.2	22.7	40.9	

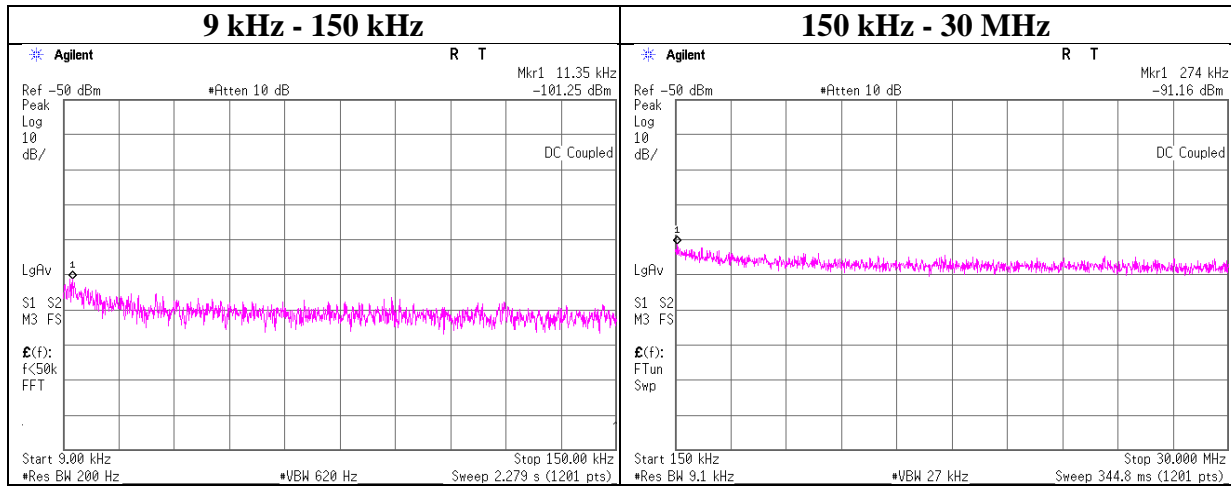
$EIRP[dBm] = Reading [dBm] + Cable loss [dB] + Attenuator Loss [dB] + Antenna gain [dBi] + 10 * \log(N)$

N: Number of output

*2.0 dBi was applied to the test result based on KDB 558074 since antenna gain was less than 2.0 dBi.

Conducted Spurious Emission

Test place	Ise EMC Lab. No.6 Measurement Room
Report No.	11932168H
Date	September 21, 2017
Temperature / Humidity	26 deg. C / 47 % RH
Engineer	Takafumi Noguchi
Mode	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
11.35	-101.3	0.80	9.8	2.0	1	-88.6	300	6.0	-27.4	46.5	73.9	
274.00	-91.2	0.80	9.8	2.0	1	-78.5	300	6.0	-17.3	18.8	36.1	

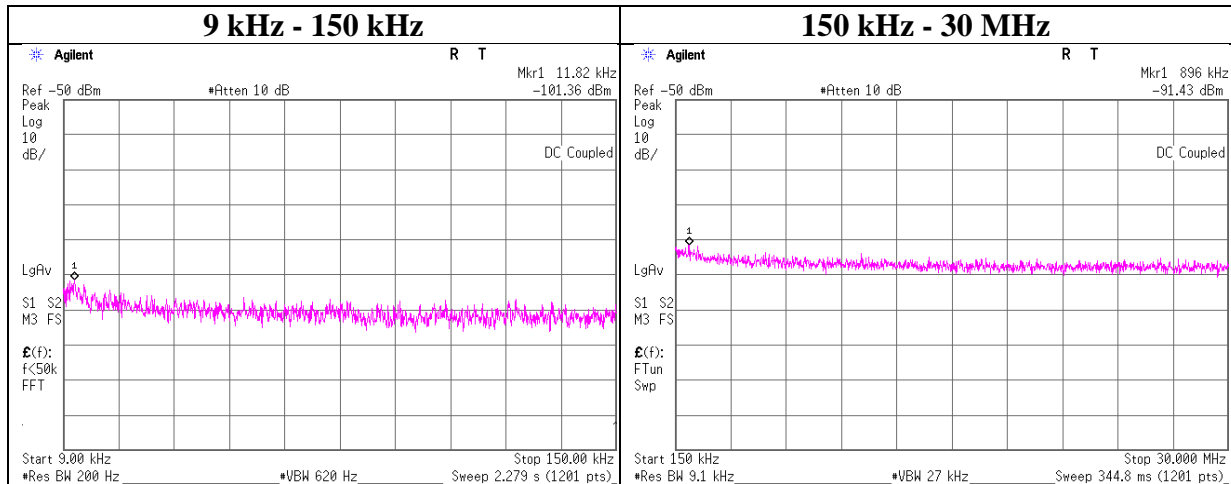
$EIRP[dBm] = Reading [dBm] + Cable loss [dB] + Attenuator Loss [dB] + Antenna gain [dBi] + 10 * \log(N)$

N: Number of output

*2.0 dBi was applied to the test result based on KDB 558074 since antenna gain was less than 2.0 dBi.

Conducted Spurious Emission

Test place	Ise EMC Lab. No.6 Measurement Room
Report No.	11932168H
Date	September 21, 2017
Temperature / Humidity	26 deg. C / 47 % RH
Engineer	Takafumi Noguchi
Mode	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
11.82	-101.4	0.80	9.8	2.0	1	-88.7	300	6.0	-27.5	46.1	73.6	
896.00	-91.4	0.80	9.8	2.0	1	-78.8	30	6.0	2.5	28.5	26.0	

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

N: Number of output

*2.0 dBi was applied to the test result based on KDB 558074 since antenna gain was less than 2.0 dBi.

Power Density

Test place	Ise EMC Lab. No.6 Measurement Room		
Report No.	11932168H		
Date	October 19, 2017	November 2, 2017	December 27, 2017
Temperature / Humidity	24 deg. C / 53 % RH	25 deg. C / 50 % RH	25 deg. C / 31 % RH
Engineer	Ryota Yamanaka	Ken Fujita	Takafumi Noguchi
Mode	Tx		

11b

Freq.	Reading	Cable Loss	Atten. Loss	Result	Limit	Margin
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[dBm]	[dB]
2412	-19.24	1.70	10.10	-7.44	8.00	15.44
2437	-19.04	1.70	10.10	-7.24	8.00	15.24
2462	-18.99	1.70	10.10	-7.19	8.00	15.19

11g

Freq.	Reading	Cable Loss	Atten. Loss	Result	Limit	Margin
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[dBm]	[dB]
2412	-27.37	0.80	10.05	-16.52	8.00	24.52
2437	-26.83	0.80	10.05	-15.98	8.00	23.98
2462	-27.50	0.80	10.05	-16.65	8.00	24.65

11n-20

Freq.	Reading	Cable Loss	Atten. Loss	Result	Limit	Margin
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[dBm]	[dB]
2412	-27.77	0.80	10.05	-16.92	8.00	24.92
2437	-27.11	0.80	10.05	-16.26	8.00	24.26
2462	-26.26	0.80	10.05	-15.41	8.00	23.41

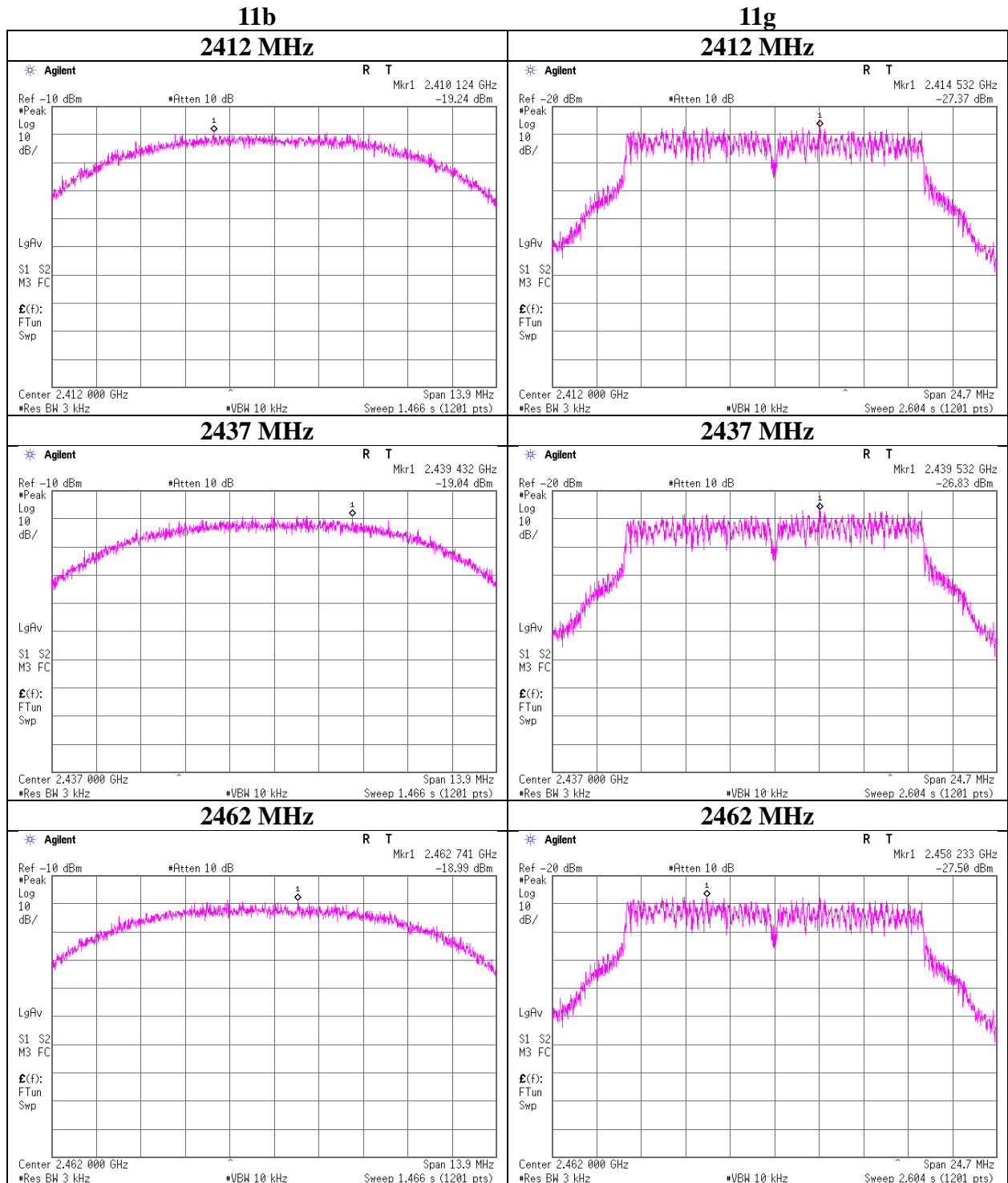
BT LE

Freq.	Reading	Cable Loss	Atten. Loss	Result	Limit	Margin
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[dBm]	[dB]
2402	-17.51	0.80	10.05	-6.66	8.00	14.66
2440	-17.73	0.80	10.05	-6.88	8.00	14.88
2480	-19.87	0.80	10.05	-9.02	8.00	17.02

Sample Calculation:

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

Power Density



UL Japan, Inc.

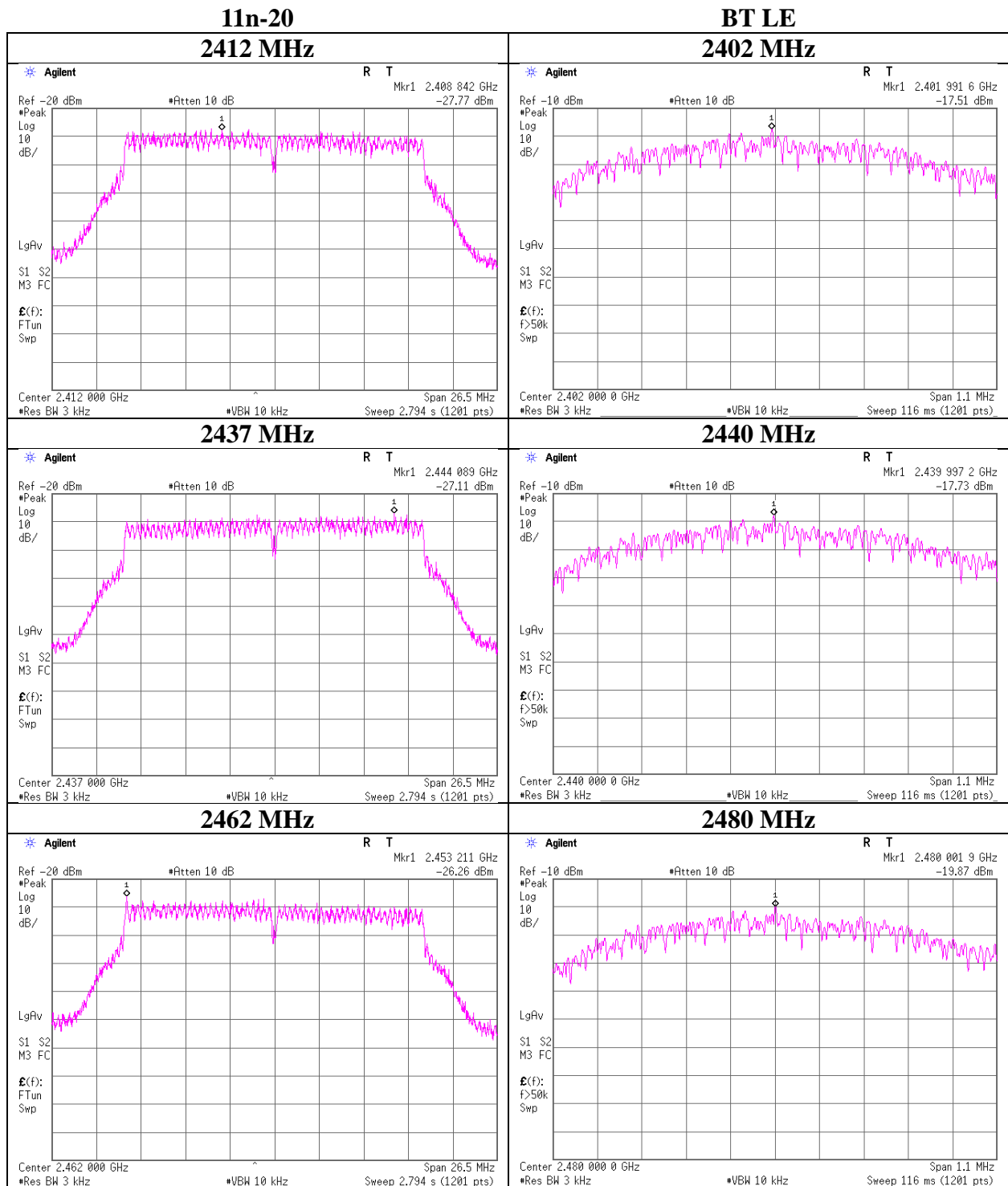
Ise EMC Lab.

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

Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

Power Density



UL Japan, Inc.

Ise EMC Lab.

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

Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

APPENDIX 2: Test instruments

Test equipment

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
MAEC-03	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-10005	RE/CE	2017/10/31 * 12
MOS-13	Thermo-Hygrometer	Custom	CTH-180	1301	RE/CE	2017/01/20 * 12
MJM-16	Measure	KOMELON	KMC-36	-	RE/CE	-
COTS-MEMI	EMI measurement program	TSJ	TEPTO-DV	-	RE/CE	-
MSA-10	Spectrum Analyzer	Agilent	E4448A	MY46180655	RE/CE	2017/08/22 * 12
MTR-08	Test Receiver	Rohde & Schwarz	ESCI	100767	RE/CE	2017/08/22 * 12
MBA-05	Biconical Antenna	Schwarzbeck	BBA9106	1302	RE	2016/11/23 * 12
MLA-22	Logperiodic Antenna(200-1000MHz)	Schwarzbeck	VUSLP9111B	911B-191	RE	2017/01/26 * 12
MCC-51	Coaxial cable	UL Japan	-	-	RE	2017/07/12 * 12
MAT-98	Attenuator	KEYSIGHT	8491A	MY52462349	RE	2016/12/05 * 12
MPA-13	Pre Amplifier	SONOMA INSTRUMENT	310	260834	RE	2017/03/27 * 12
MMM-08	DIGITAL HiTESTER	Hioki	3805	051201197	RE	2017/01/19 * 12
MLS-23	LISN(AMN)	Schwarzbeck	NSLK8127	8127-729	CE(EUT)	2017/07/24 * 12
MCC-112	Coaxial cable	Fujikura/Suhner/TSJ	5D-2W(10m)/SFM141(3m)/sucoform141-PE(1m)/421-010(1.5m)/RFM-E321(Switcher)	-/00640	CE	2017/07/12 * 12
MAT-66	Attenuator(13dB)	JFW Industries, Inc.	50FP-013H2 N	-	CE	2016/12/24 * 12
MHA-20	Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D	258	RE	2017/05/22 * 12
MCC-167	Microwave Cable	Junkosha	MWX221	1404S374(1m) / 1405S074(5m)	RE	2017/05/29 * 12
MPA-11	MicroWave System Amplifier	Agilent	83017A	MY39500779	RE	2017/03/21 * 12
MHA-16	Horn Antenna 15-40GHz	Schwarzbeck	BBHA9170	BBHA9170306	RE	2017/05/14 * 12
MHF-25	High Pass Filter 3.5-18.0GHz	UL Japan	HPF SELECTOR	001	RE	2017/09/22 * 12
MSA-16	Spectrum Analyzer	Agilent	E4440A	MY46186390	AT	2017/09/20 * 12
MAT-58	Attenuator(10dB)	Suhner	6810.19.A	-	AT	2016/12/15 * 12
MMM-17	DIGITAL HiTESTER	Hioki	3805	070900530	AT	2017/01/19 * 12
MOS-19	Thermo-Hygrometer	Custom	CTH-201	0001	AT	2016/12/13 * 12
MOS-29	Thermo-Hygrometer	Custom	CTH-201	2901	AT	2017/01/20 * 12
MMM-08	DIGITAL HiTESTER	Hioki	3805	051201197	AT	2017/01/19 * 12
MSA-03	Spectrum Analyzer	Agilent	E4448A	MY44020357	AT	2017/11/07 * 12
MPM-13	Power Meter	Anritsu	ML2495A	0824014	AT	2017/11/16 * 12
MPSE-18	Power sensor	Anritsu	MA2411B	0738174	AT	2017/11/16 * 12
MCC-170	Microwave Cable	Junkosha	MWX221	1409S493	AT	2017/03/13 * 12
MAT-20	Attenuator(10dB)(above 1GHz)	HIROSE ELECTRIC CO.,LTD.	AT-110	-	AT	2017/12/04 * 12

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 Emission test
AT: Antenna Terminal Conducted test**

UL Japan, Inc.

Ise EMC Lab.

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

Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124