



# RADIO TEST REPORT

Test Report No. : 11107783H-B

**Applicant** : FUJITSU TEN LIMITED  
**Type of Equipment** : Car Navigation  
**Model No.** : FT0103A  
**FCC ID** : BABFT0103A  
**Test regulation** : FCC Part 15 Subpart C: 2015  
\*WLAN part  
**Test Result** : Complied

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2. The results in this report apply only to the sample tested.
3. This sample tested is in compliance with the 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)

**Date of test:** January 22 to 28, 2016

**Representative test engineer:**



Yutaka Yoshida  
Engineer  
Consumer Technology Division

**Approved by:**



Takahiro Hatakeda  
Leader  
Consumer Technology Division



NVLAP LAB CODE: 200572-0

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13-EM-F0429



<b>CONTENTS</b>	<b>PAGE</b>
<b>SECTION 1: Customer information.....</b>	<b>4</b>
<b>SECTION 2: Equipment under test (E.U.T.).....</b>	<b>4</b>
<b>SECTION 3: Test specification, procedures &amp; results.....</b>	<b>5</b>
<b>SECTION 4: Operation of E.U.T. during testing.....</b>	<b>8</b>
<b>SECTION 5: Radiated Spurious Emission .....</b>	<b>10</b>
<b>SECTION 6: Antenna Terminal Conducted Tests.....</b>	<b>12</b>
<b>APPENDIX 1: Test data .....</b>	<b>13</b>
6dB Bandwidth .....	13
Maximum Peak Output Power .....	16
Average Output Power .....	19
Radiated Spurious Emission .....	23
Conducted Spurious Emission .....	34
Power Density .....	35
99% Occupied Bandwidth .....	38
<b>APPENDIX 2: Test instruments .....</b>	<b>40</b>
<b>APPENDIX 3: Photographs of test setup .....</b>	<b>41</b>
Radiated Spurious Emission .....	41

## **SECTION 1: Customer information**

Company Name : FUJITSU TEN LIMITED  
Address : 2-28, Goshō-dori 1-Chome, Hyogo-ku, Kobe 652-8510, JAPAN  
Telephone Number : +81-78-682-2159  
Facsimile Number : +81-78-671-7160  
Contact Person : Fukii Daisuke

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

### **2.1 Identification of E.U.T.**

Type of Equipment : Car Navigation  
Model No. : FT0103A  
Serial No. : Refer to Section 4, Clause 4.2  
Rating : DC 12 V  
Receipt Date of Sample : December 24, 2015  
Country of Mass-production : Mexico  
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**

#### **General Specification**

Clock frequency(ies) in the system : 26 MHz, Main: 792 MHz, WLAN : 24.75 MHz, Bluetooth : 1.833 MHz

#### **Radio Specification**

##### **[WLAN (IEEE802.11b/g/n-20)]**

Radio Type : Transceiver  
Frequency of Operation : 2412 MHz - 2462 MHz  
Modulation : DSSS, DFDM  
Power Supply (radio part input) : DC 3.3 V  
Antenna type : Inverted F Antenna  
Antenna Gain : -0.08 dBi (Max)

##### **[Bluetooth (Ver. 3.0 with EDR function)]**

Radio Type : Transceiver  
Frequency of Operation : 2402 MHz - 2480 MHz  
Modulation : FHSS  
Power Supply (radio part input) : DC 3.3 V  
Antenna type : Surface Mountable Dielectric Chip Antenna  
Antenna Gain : 1.1 dBi (Max)

\*This test report applies for WLAN.

## **SECTION 3: Test specification, procedures & results**

### **3.1 Test Specification**

Test Specification : FCC Part 15 Subpart C: 2015, final revised on November 23, 2015  
\*Some parts are effective on and after December 17, 2015 or December 23, 2015. The revision does not affect the test specification applied to the EUT.

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

### **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	-	N/A *1)	-
6dB Bandwidth	FCC: KDB 558074 D01 DTS Meas Guidance v03r04 ----- IC: -	FCC: Section 15.247(a)(2) ----- IC: RSS-247 5.2(1)	See data.	Complied	Conducted
Maximum Peak Output Power	FCC: KDB 558074 D01 DTS Meas Guidance v03r04 ----- IC: RSS-Gen 6.12	FCC: Section 15.247(b)(3) ----- IC: RSS-247 5.4(4)		Complied	Conducted
Power Density	FCC: KDB 558074 D01 DTS Meas Guidance v03r04 ----- IC: -	FCC: Section 15.247(e) ----- IC: RSS-247 5.2(2)		Complied	Conducted
Spurious Emission Restricted Band Edges	FCC: KDB 558074 D01 DTS Meas Guidance v03r04 ----- IC: RSS-Gen 6.13	FCC: Section15.247(d) ----- IC: RSS-247 5.5 RSS-Gen 8.9 RSS-Gen 8.10		3.9 dB 1920.051 MHz, AV, Horizontal.	Complied

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 v03r04 12.2.7.

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

#### **FCC Part 15.31 (e)**

The EUT provides stable voltage (DC3.3V) constantly to the wireless transmitter regardless of input voltage.  
Instead of a new battery, DC power supply was used for the test.  
That does not affect the test result, therefore the 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.

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### 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.

Polarity	Radiated emission (Below 1GHz)			
	(3 m*)(±dB)		(10 m*)(±dB)	
	30 – 300 MHz	300 – 1000MHz	30 – 300 MHz	300 – 1000MHz
Horizontal	4.8 dB	5.2 dB	4.8 dB	5.0 dB
Vertical	4.5 dB	5.9 dB	4.8 dB	5.1 dB

Radiated emission				
(3 m*)(±dB)		(1 m*)(±dB)	(0.5 m*)(±dB)	(10 m*)(±dB)
1 – 6GHz	6 – 18GHz	10 – 26.5 GHz	26.5 – 40GHz	1 -18 GHz
5.1 dB	5.3 dB	5.1 dB	5.1 dB	5.3 dB

\*Measurement distance

#### Radiated emission test

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

### 3.5 Test Location

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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.

<b>Mode</b>	<b>Remarks*</b>
IEEE 802.11b (11b)	5.5 Mbps, PN9
IEEE 802.11g (11g)	24 Mbps, PN9
IEEE 802.11n MIMO 20 MHz BW (11n-20)	MCS 2 (Long GI), PN9
*The worst condition was determined based on the test result of Maximum Peak Output Power (Mid Channel)	
*Power of the EUT was set by the software as follows; Power settings: Same as production model Software: Diag. mode(Wi-Fi Auth mode) *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)

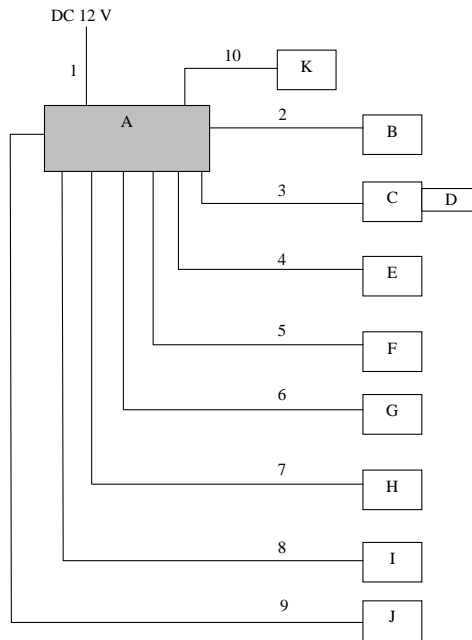
<b>Test Item</b>	<b>Operating Mode</b>	<b>Tested frequency</b>
Spurious Emission above 1 GHz (Radiated)	11b Tx 11n-20 Tx *1)	2412 MHz 2437 MHz 2462 MHz
6dB Bandwidth, Maximum Peak Output Power, Power Density, 99% Occupied Bandwidth	11b Tx 11g Tx 11n-20 Tx	2412 MHz 2437 MHz 2462 MHz
Spurious Emission (Conducted), Spurious Emission below 1 GHz (Radiated)	11n-20 Tx *2)	2412MHz

\*1) Since 11g and 11n-20 have the same modulation method and no differences in transmitting specification, test was performed on the representative mode that had the highest peak output power

\*2) The mode was tested as a representative, because it had the highest power at antenna terminal test.



## 4.2 Configuration and peripherals



\* 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	Car Navigation	FT0103A	MMA00021 *1) MMA00031 *2)	FUJITSU TEN LIMITED	EUT
B	Radio ANT-AMP	-	-	FUJITSU TEN LIMITED	-
C	USB Connector	86190-30020	10078	FUJITSU TEN LIMITED	-
D	USB Memory	PD07-WH	090000000014303	KINGMAX	-
E	Steering Switch	-	-	-	-
F	Camera	86790-58111	36C00633	-	-
G	Mic	-	-	-	-
H	Speaker	SGS-1601	153000-154	FUJITSU TEN LIMITED	-
I	Speaker	5GS-1630	153000-3500141	FUJITSU TEN LIMITED	-
K	GPS Antenna	-	-	FUJITSU TEN LIMITED	-
J	Switch	-	-	-	-

\*1) Used for Antenna Terminal conducted tests

\*2) Used for Radiated Emission test

### List of cables used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	DC Cable	4.0	Unshielded	Unshielded	-
2	FM/AM Antenna Cable	2.5	Shielded	Shielded	-
3	Signal Cable	2.0	Shielded	Shielded	-
4	Steering SW Cable	2.8	Unshielded	Unshielded	-
5	Camera Cable	2.8	Unshielded	Unshielded	-
6	Mic Cable	2.8	Unshielded	Unshielded	-
7	Speaker Cable	2.8	Unshielded	Unshielded	-
8	Speaker Cable	2.8	Unshielded	Unshielded	-
9	Signal Cable	2.8	Unshielded	Unshielded	-
10	GPS Antenna Cable	7.0	Shielded	Shielded	-

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## **SECTION 5: Radiated Spurious Emission**

### **Test Procedure**

[For below 1GHz]

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 1GHz]

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 300 MHz	300 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	PK
IF Bandwidth	BW 120 kHz	RBW: 1 MHz VBW: 3 MHz	Average Power Method: <u>12.2.5.1(11b)</u> RBW: 1 MHz VBW: 3 MHz Detector: Power Averaging (RMS) Trace: 100 traces <u>12.2.5.2 (11n-20)</u> RBW: 1 MHz VBW: 3 MHz Detector: Power Averaging (RMS) Trace: 100 traces Duty factor was added to the results.	RBW: 100 kHz VBW: 300kHz
Test Distance	3m	4.4 m *1) (below 10 GHz), 1 m *2) (above 10 GHz)		4.4 m *1) (below 10 GHz), 1 m *2) (above 10 GHz)

\*1) Distance Factor:  $20 \times \log(4.4 \text{ m} / 3.0 \text{ m}) = 3.3 \text{ dB}$

\*2) Distance Factor:  $20 \times \log(1.0 \text{ m} / 3.0 \text{ m}) = -9.5 \text{ dB}$

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The test was made on EUT at the normal use position.

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

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

## **SECTION 6: Antenna Terminal Conducted Tests**

### **Test Procedure**

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

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

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

\*2) Reference data

\*3) Section 10.2 Method PKPSD (peak PSD) of "KDB 558074 D01 DTS Meas Guidance v03r04".

\*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.

**Test data : APPENDIX**  
**Test result : Pass**

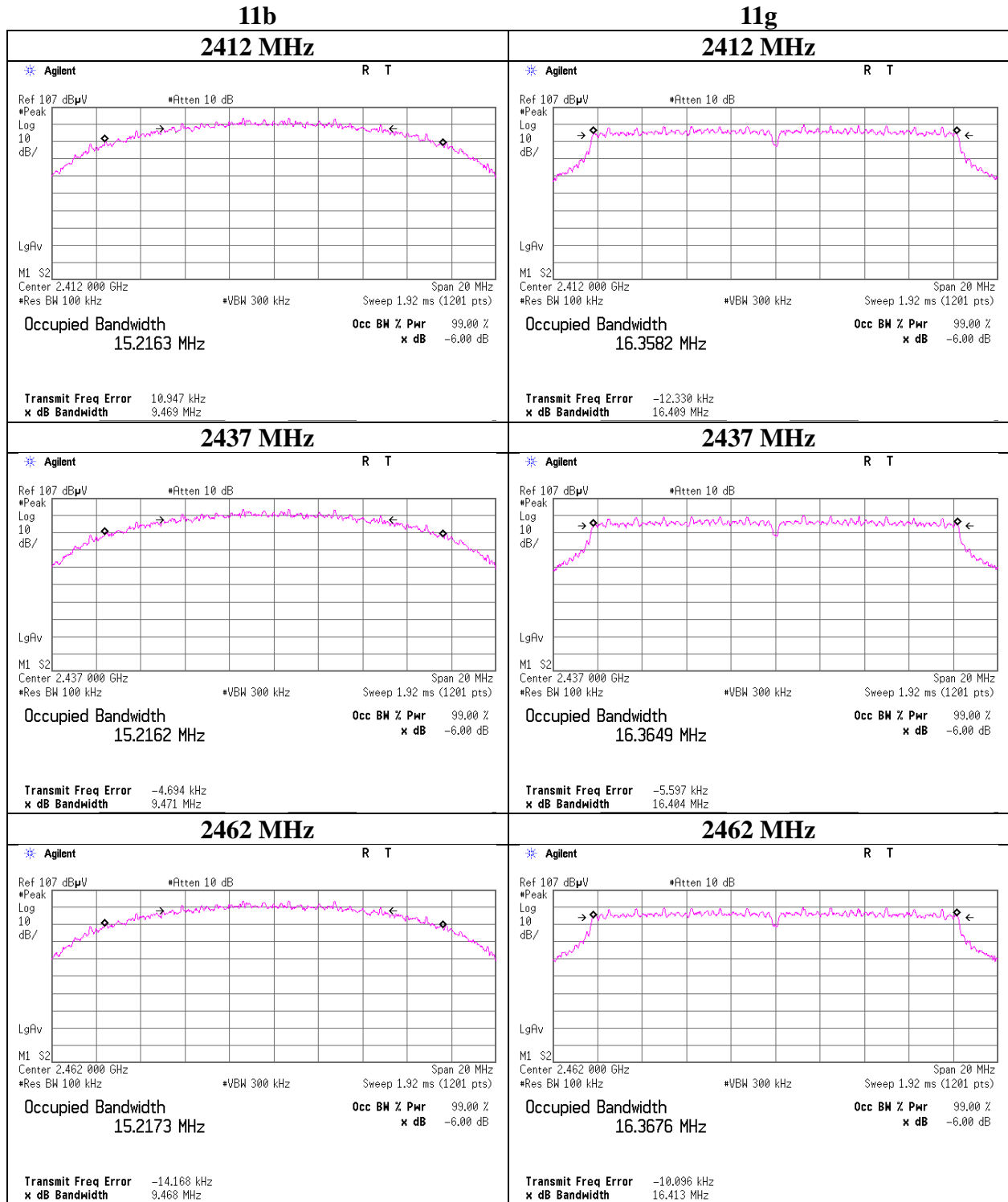
**APPENDIX 1: Test data**

**6dB Bandwidth**

Test place	Ise EMC Lab. No.6 Measurement Room
Report No.	11107783H
Date	January 22, 2016
Temperature / Humidity	21 deg. C / 23 % RH
Engineer	Yutaka Yoshida
Mode	Tx

Mode	Frequency [MHz]	6dB Bandwidth [MHz]	Limit [kHz]
11b	2412	9.469	> 500
	2437	9.471	> 500
	2462	9.468	> 500
11g	2412	16.409	> 500
	2437	16.404	> 500
	2462	16.413	> 500
11n-20	2412	16.870	> 500
	2437	16.915	> 500
	2462	16.922	> 500

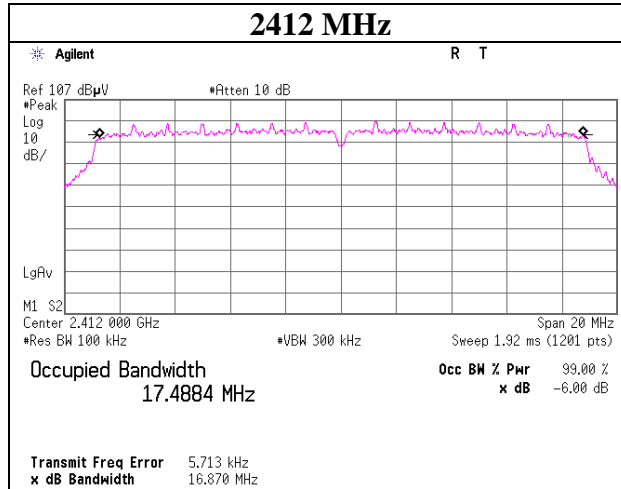
### 6dB Bandwidth



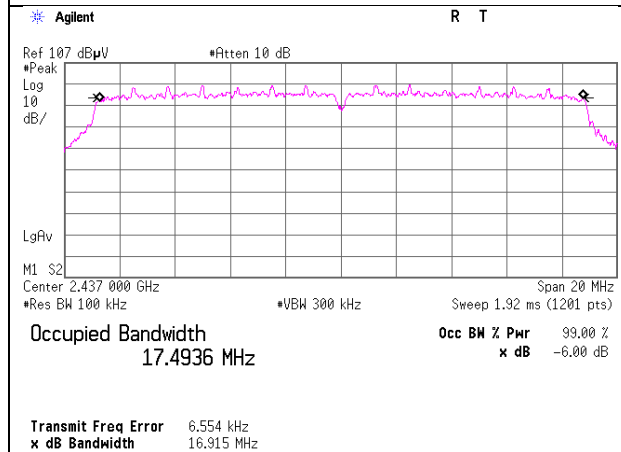
## 6dB Bandwidth

**11n-20**

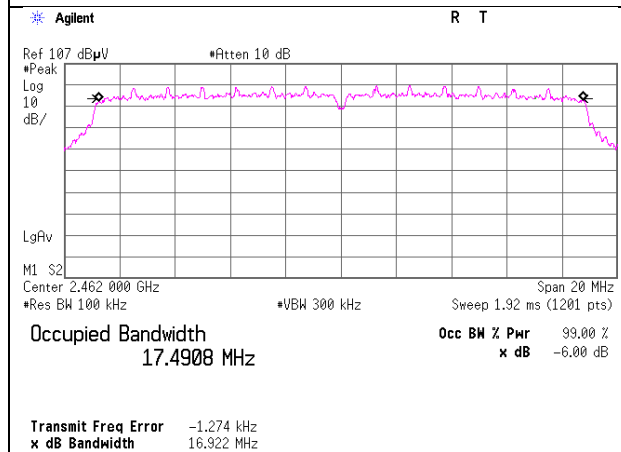
**2412 MHz**



**2437 MHz**



**2462 MHz**



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## Maximum Peak Output Power

Test place : Ise EMC Lab. No.6 Measurement Room  
Report No. : 11107783H  
Date : January 22, 2016  
Temperature / Humidity : 21 deg. C / 23 % RH  
Engineer : Yutaka Yoshida  
Mode : Tx 11b

5.5Mbps

Freq. [MHz]	Reading PK [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result		Limit		Margin [dB]
				[dBm]	[mW]	[dBm]	[mW]	
2412	4.25	2.34	9.74	16.33	42.92	30.00	1000	13.67
2437	4.47	2.34	9.74	16.55	45.23	30.00	1000	13.45
2462	4.47	2.35	9.74	16.57	45.38	30.00	1000	13.43

Sample Calculation:

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

2437MHz

Rate [Mbps]	Reading PK [dBm]	Remark
1	4.40	
2	4.39	
5.5	4.47	*
11	4.45	

\*: 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.	11107783H
Date	January 22, 2016
Temperature / Humidity	21 deg. C / 23 % RH
Engineer	Yutaka Yoshida
Mode	Tx 11g

24Mbps

Freq. [MHz]	Reading PK [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result		Limit		Margin [dB]
				[dBm]	[mW]	[dBm]	[mW]	
2412	8.50	2.34	9.74	20.58	114.19	30.00	1000	9.42
2437	8.38	2.34	9.74	20.46	111.29	30.00	1000	9.54
2462	8.21	2.35	9.74	20.31	107.36	30.00	1000	9.69

Sample Calculation:

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

2437 MHz

Rate [Mbps]	Reading PK [dBm]	Remark
6	8.32	
9	8.22	
12	8.37	
18	8.30	
24	8.38	*
36	8.34	
48	8.27	
54	8.35	

\*: 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. : 11107783H  
Date : January 22, 2016  
Temperature / Humidity : 21 deg. C / 23 % RH  
Engineer : Yutaka Yoshida  
Mode : Tx 11n-20

### MCS 2(Long GI)

Freq. [MHz]	Reading PK [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result		Limit		Margin [dB]
				[dBm]	[mW]	[dBm]	[mW]	
2412	8.77	2.34	9.74	20.85	121.63	30.00	1000	9.15
2437	8.52	2.34	9.74	20.60	114.86	30.00	1000	9.40
2462	8.50	2.35	9.74	20.59	114.66	30.00	1000	9.41

Sample Calculation:

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

### 2437 MHz

MCS Index	Reading PK [dBm]	GI	Remark
0	8.36	Long	
1	8.29	Long	
2	8.52	Long	*
3	8.25	Long	
4	8.26	Long	
5	8.26	Long	
6	8.10	Long	
7	7.86	Long	
0	8.31	Short	
1	8.14	Short	
2	8.47	Short	
3	8.20	Short	
4	8.11	Short	
5	7.68	Short	
6	8.11	Short	
7	7.93	Short	

\*: Worst Rate

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

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

Test place : Ise EMC Lab. No.6 Measurement Room  
Report No. : 11107783H  
Date : January 22, 2016  
Temperature / Humidity : 21 deg. C / 23 % RH  
Engineer : Yutaka Yoshida  
Mode : Tx

**11b 1 Mbps**

Freq. [MHz]	Reading AV [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Frame power)		Duty factor [dB]	Result (Burst power)	
				[dBm]	[mW]		[dBm]	[mW]
				2412	2.11		2.34	9.74
2437	2.34	2.34	9.74	14.42	27.68	0.01	14.43	27.74
2462	2.46	2.35	9.74	14.55	28.54	0.01	14.56	28.60

**11g 6 Mbps**

Freq. [MHz]	Reading AV [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Frame power)		Duty factor [dB]	Result (Burst power)	
				[dBm]	[mW]		[dBm]	[mW]
				2412	0.25		2.34	9.74
2437	0.33	2.34	9.74	12.41	17.43	0.04	12.45	17.59
2462	0.55	2.35	9.74	12.64	18.38	0.04	12.68	18.55

**11n-20 MCS 0(Short GI)**

Freq. [MHz]	Reading AV [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Frame power)		Duty factor [dB]	Result (Burst power)	
				[dBm]	[mW]		[dBm]	[mW]
				2412	0.57		2.34	9.74
2437	0.37	2.34	9.74	12.45	17.59	0.05	12.50	17.79
2462	0.46	2.35	9.74	12.55	18.01	0.05	12.60	18.21

Sample Calculation:

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

Result (Burst power) = Frame power + Duty factor

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

Test place : Ise EMC Lab. No.6 Measurement Room  
Report No. : 11107783H  
Date : January 22, 2016  
Temperature / Humidity : 21 deg. C / 23 % RH  
Engineer : Yutaka Yoshida  
Mode : Tx

2437 MHz

Mode	Rate [Mbps]	Reading AV [dBm]	Remark
11b	1	2.34	*
	2	2.26	
	5.5	2.25	
	11	2.20	
11g	0	0.33	*
	1	0.32	
	2	0.32	
	3	0.31	
	4	0.22	
	5	0.10	
	6	-0.53	
7	-0.99		

2437 MHz

Mode	MCS Index	Reading AV [dBm]	GI	Remark
11n-20	0	0.18	Long	
	1	0.09	Long	
	2	0.14	Long	
	3	0.08	Long	
	4	0.02	Long	
	5	-2.69	Long	
	6	-3.07	Long	
	7	-3.40	Long	
	0	0.37	Short	*
	1	0.19	Short	
	2	0.12	Short	
	3	0.03	Short	
	4	-0.18	Short	
	5	-3.00	Short	
6	-3.43	Short		
7	-3.76	Short		

\*: Worst Rate

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

**UL Japan, Inc.**

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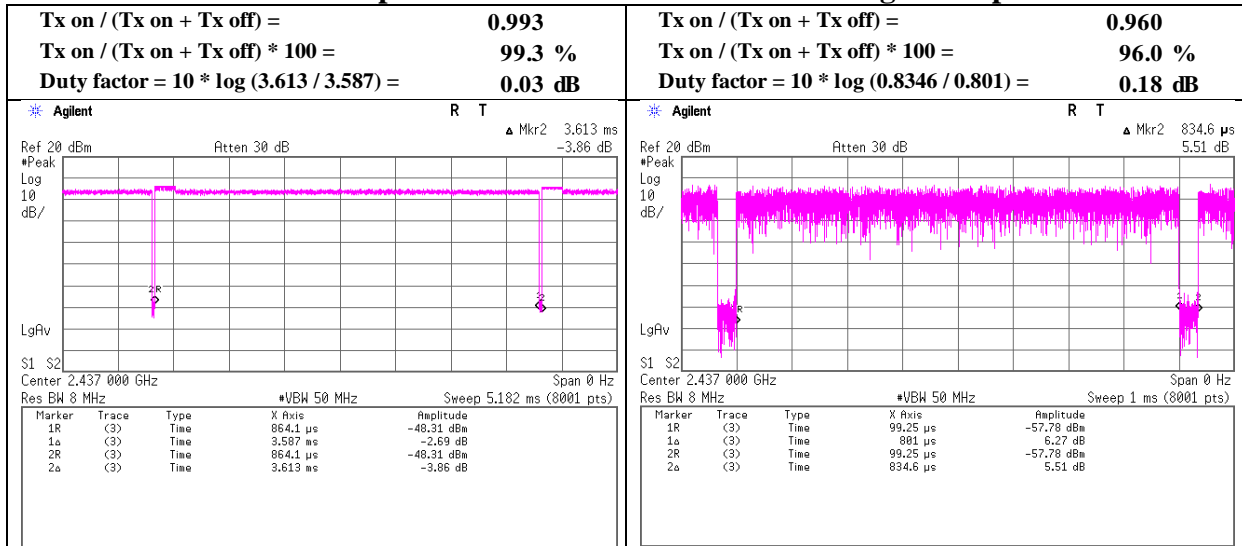
Facsimile : +81 596 24 8124

### Burst rate confirmation

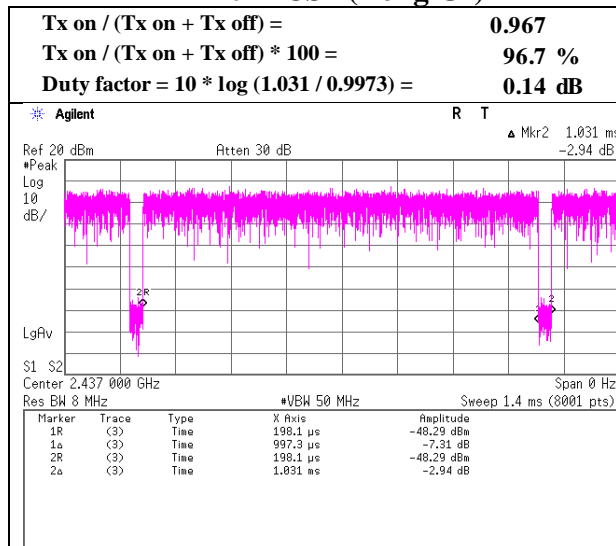
Test place	Ise EMC Lab. No.6 Measurement Room
Report No.	11107783H
Date	January 22, 2016
Temperature / Humidity	21 deg. C / 23 % RH
Engineer	Yutaka Yoshida
Mode	Tx

#### 11b 5.5 Mbps

#### 11g 24 Mbps



#### 11n-20 MCS 2(Long GI)

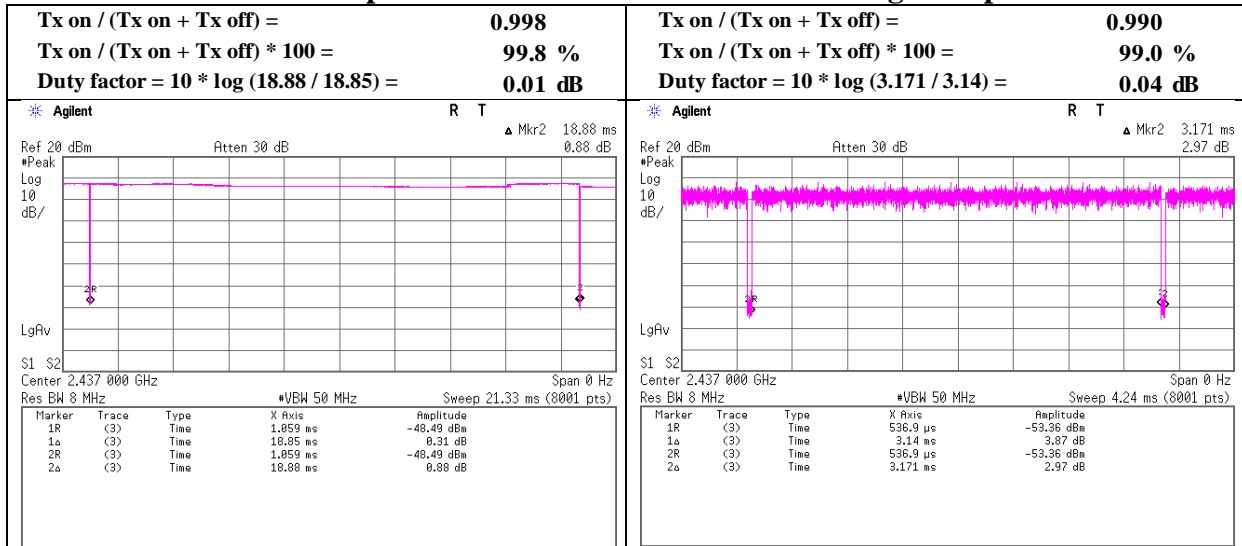


### Burst rate confirmation

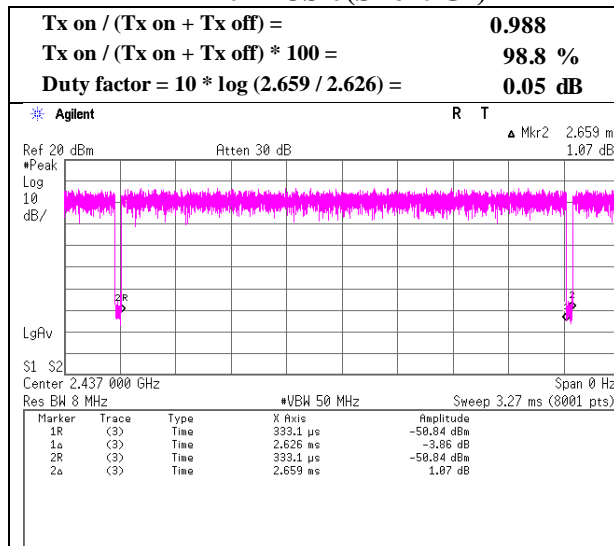
Test place	Ise EMC Lab. No.6 Measurement Room
Report No.	11107783H
Date	January 22, 2016
Temperature / Humidity	21 deg. C / 23 % RH
Engineer	Yutaka Yoshida
Mode	Tx

#### 11b 1 Mbps

#### 11g 6 Mbps



#### 11n-20 MCS 0(Short GI)



## Radiated Spurious Emission

Test place : Ise EMC Lab. No.4 Semi Anechoic Chamber  
Report No. : 11107783H  
Date : January 27, 2016      January 28, 2016  
Temperature / Humidity : 20 deg. C / 35 % RH      22 deg. C / 33 % RH  
Engineer : Kazuya Yoshioka      Ken Fujita  
            (1-10GHz)                      (10-26.5GHz)  
Mode : Tx 11b 2412 MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	1919.897	PK	48.1	27.2	6.4	32.5	49.2	73.9	24.7	
Hori	2390.000	PK	58.6	27.9	6.6	32.1	61.0	73.9	12.9	
Hori	2545.834	PK	51.6	28.1	6.7	32.1	54.3	73.9	19.6	
Hori	4824.000	PK	48.0	32.9	9.0	31.3	58.6	73.9	15.3	
Hori	7236.000	PK	41.2	36.8	10.2	32.6	55.6	73.9	18.3	Floor Noise
Hori	9648.000	PK	41.9	38.1	9.5	32.6	56.9	73.9	17.0	Floor Noise
Hori	1919.897	AV	44.6	27.2	6.4	32.5	45.7	53.9	8.2	
Hori	2390.000	AV	35.4	27.9	6.6	32.1	37.8	53.9	16.1	
Hori	2545.834	AV	42.3	28.1	6.7	32.1	45.0	53.9	8.9	
Hori	4824.000	AV	32.0	32.9	9.0	31.3	42.6	53.9	11.3	
Hori	7236.000	AV	31.9	36.8	10.2	32.6	46.3	53.9	7.6	Floor Noise
Hori	9648.000	AV	31.1	38.1	9.5	32.6	46.1	53.9	7.8	Floor Noise
Vert	1919.997	PK	49.4	27.2	6.4	32.5	50.5	73.9	23.4	
Vert	2390.000	PK	54.9	27.9	6.6	32.1	57.3	73.9	16.6	
Vert	4824.000	PK	50.0	32.9	9.0	31.3	60.6	73.9	13.3	
Vert	7236.000	PK	41.4	36.8	10.2	32.6	55.8	73.9	18.1	Floor Noise
Vert	9648.000	PK	41.9	38.1	9.5	32.6	56.9	73.9	17.0	Floor Noise
Vert	1919.997	AV	46.4	27.2	6.4	32.5	47.5	53.9	6.4	
Vert	2390.000	AV	38.4	27.9	6.6	32.1	40.8	53.9	13.1	
Vert	4824.000	AV	32.4	32.9	9.0	31.3	43.0	53.9	10.9	
Vert	7236.000	AV	31.9	36.8	10.2	32.6	46.3	53.9	7.6	Floor Noise
Vert	9648.000	AV	31.1	38.1	9.5	32.6	46.1	53.9	7.8	Floor Noise

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

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

\*The 10th harmonic was not seen so the result was its base noise level.

Distance factor:      1 GHz - 10 GHz      20log (4.4 m / 3.0 m) = 3.3 dB  
                                 10 GHz - 26.5 GHz 20log (1.0 m / 3.0 m) = -9.5 dB

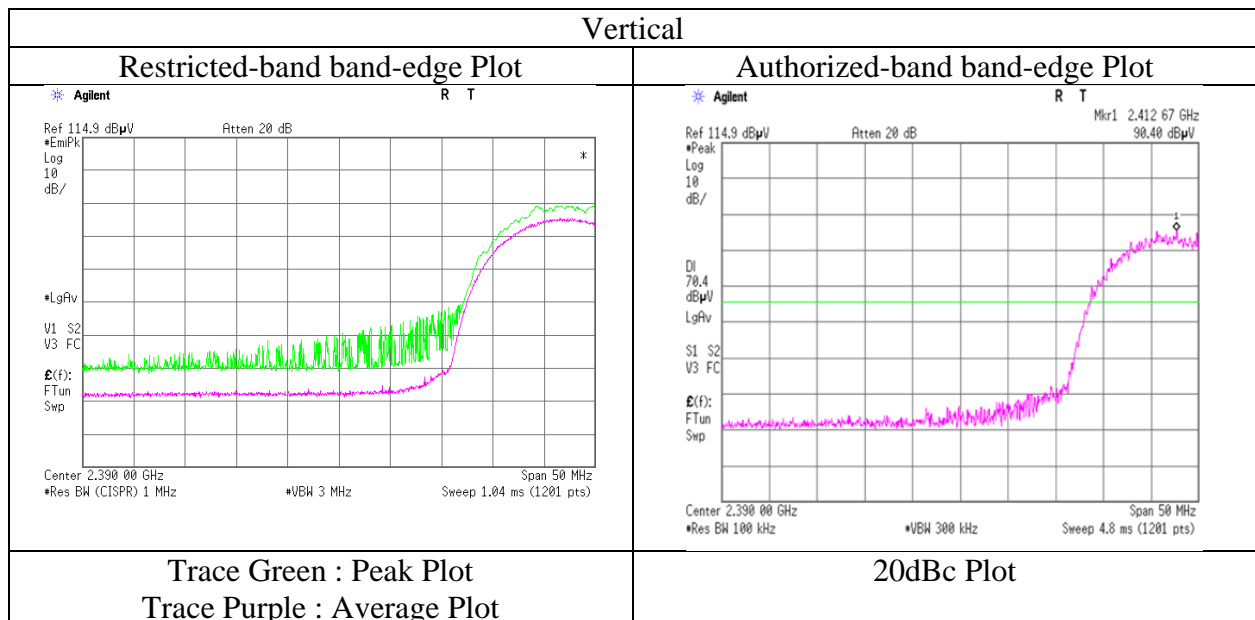
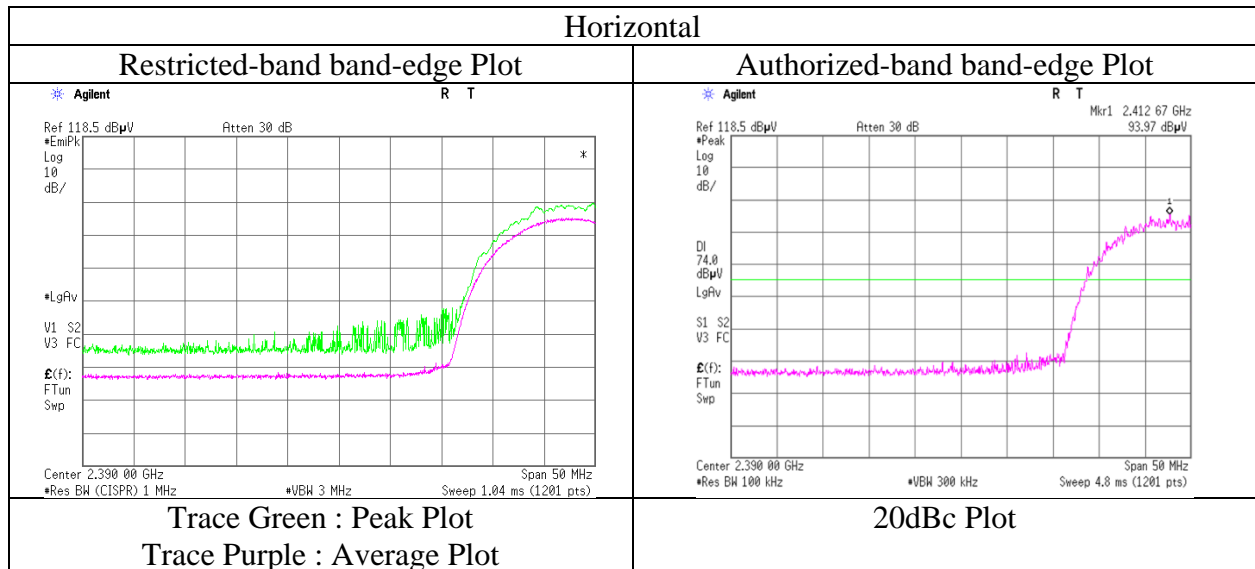
### 20dBc Data Sheet

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	94.0	28.0	6.6	32.1	96.5	-	-	Carrier
Hori	2400.000	PK	47.7	28.0	6.6	32.1	50.2	76.5	26.3	
Vert	2412.000	PK	90.4	28.0	6.6	32.1	92.9	-	-	Carrier
Vert	2400.000	PK	44.2	28.0	6.6	32.1	46.7	72.9	26.2	

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

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

Test place : Ise EMC Lab. No.4 Semi Anechoic Chamber  
Report No. : 11107783H  
Date : January 27, 2016  
Temperature / Humidity : 20 deg. C / 35 % RH  
Engineer : Kazuya Yoshioka  
(1-10GHz)  
Mode : Tx 11b 2412 MHz



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



## Radiated Spurious Emission

Test place : Ise EMC Lab. No.4 Semi Anechoic Chamber  
Report No. : 11107783H  
Date : January 27, 2016      January 28, 2016  
Temperature / Humidity : 20 deg. C / 35 % RH      22 deg. C / 33 % RH  
Engineer : Kazuya Yoshioka      Ken Fujita  
            (1-10GHz)      (10-26.5GHz)  
Mode : Tx 11b 2437 MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	1919.892	PK	47.6	27.2	6.4	32.5	48.7	73.9	25.2	
Hori	2512.000	PK	53.5	28.1	6.7	32.1	56.2	73.9	17.7	
Hori	4874.000	PK	44.6	33.1	9.0	31.3	55.4	73.9	18.5	
Hori	7311.000	PK	40.4	36.8	10.2	32.6	54.8	73.9	19.1	Floor Noise
Hori	9748.000	PK	40.4	38.2	9.5	32.7	55.4	73.9	18.5	Floor Noise
Hori	1919.892	AV	44.5	27.2	6.4	32.5	45.6	53.9	8.3	
Hori	2512.000	AV	42.9	28.1	6.7	32.1	45.6	53.9	8.3	
Hori	4874.000	AV	33.6	33.1	9.0	31.3	44.4	53.9	9.5	
Hori	7311.000	AV	31.9	36.8	10.2	32.6	46.3	53.9	7.6	Floor Noise
Hori	9748.000	AV	32.1	38.2	9.5	32.7	47.1	53.9	6.8	Floor Noise
Vert	1919.814	PK	49.3	27.2	6.4	32.5	50.4	73.9	23.5	
Vert	4874.000	PK	47.1	33.1	9.0	31.3	57.9	73.9	16.0	
Vert	7311.000	PK	41.0	36.8	10.2	32.6	55.4	73.9	18.5	Floor Noise
Vert	9748.000	PK	40.4	38.2	9.5	32.7	55.4	73.9	18.5	Floor Noise
Vert	1919.814	AV	46.3	27.2	6.4	32.5	47.4	53.9	6.5	
Vert	4874.000	AV	36.0	33.1	9.0	31.3	46.8	53.9	7.1	
Vert	7311.000	AV	31.9	36.8	10.2	32.6	46.3	53.9	7.6	Floor Noise
Vert	9748.000	AV	32.1	38.2	9.5	32.7	47.1	53.9	6.8	Floor Noise

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

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

\*The 10th harmonic was not seen so the result was its base noise level.

Distance factor:      1 GHz - 10 GHz      20log (4.4 m / 3.0 m) = 3.3 dB  
                                 10 GHz - 26.5 GHz 20log (1.0 m / 3.0 m) = -9.5 dB

## Radiated Spurious Emission

Test place : Ise EMC Lab. No.4 Semi Anechoic Chamber  
Report No. : 11107783H  
Date : January 27, 2016      January 28, 2016  
Temperature / Humidity : 20 deg. C / 35 % RH      22 deg. C / 33 % RH  
Engineer : Kazuya Yoshioka      Ken Fujita  
            (1-10GHz)                      (10-26.5GHz)  
Mode : Tx 11b 2462 MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	1920.100	PK	47.2	27.2	6.4	32.5	48.3	73.9	25.6	
Hori	2483.500	PK	65.9	28.1	6.7	32.1	68.6	73.9	5.3	
Hori	4924.000	PK	43.6	33.3	9.1	31.3	54.7	73.9	19.2	
Hori	7386.000	PK	42.5	36.8	10.2	32.6	56.9	73.9	17.0	Floor Noise
Hori	9848.000	PK	41.2	38.2	9.4	32.7	56.1	73.9	17.8	Floor Noise
Hori	1920.100	AV	43.1	27.2	6.4	32.5	44.2	53.9	9.7	
Hori	2483.500	AV	39.8	28.1	6.7	32.1	42.5	53.9	11.4	
Hori	4924.000	AV	30.3	33.3	9.1	31.3	41.4	53.9	12.5	
Hori	7386.000	AV	32.0	36.8	10.2	32.6	46.4	53.9	7.5	Floor Noise
Hori	9848.000	AV	31.1	38.2	9.4	32.7	46.0	53.9	7.9	Floor Noise
Vert	1920.008	PK	49.5	27.2	6.4	32.5	50.6	73.9	23.3	
Vert	2483.500	PK	59.9	28.1	6.7	32.1	62.6	73.9	11.3	
Vert	4924.000	PK	42.0	33.3	9.1	31.3	53.1	73.9	20.8	
Vert	7386.000	PK	42.3	36.8	10.2	32.6	56.7	73.9	17.2	Floor Noise
Vert	9848.000	PK	41.4	38.2	9.4	32.7	56.3	73.9	17.6	Floor Noise
Vert	1920.008	AV	46.4	27.2	6.4	32.5	47.5	53.9	6.4	
Vert	2483.500	AV	43.1	28.1	6.7	32.1	45.8	53.9	8.1	
Vert	4924.000	AV	30.0	33.3	9.1	31.3	41.1	53.9	12.8	
Vert	7386.000	AV	32.0	36.8	10.2	32.6	46.4	53.9	7.5	Floor Noise
Vert	9848.000	AV	31.1	38.2	9.4	32.7	46.0	53.9	7.9	Floor Noise

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

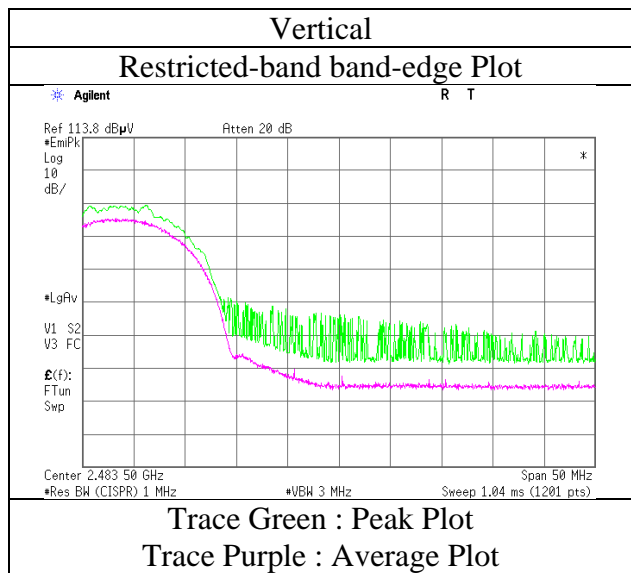
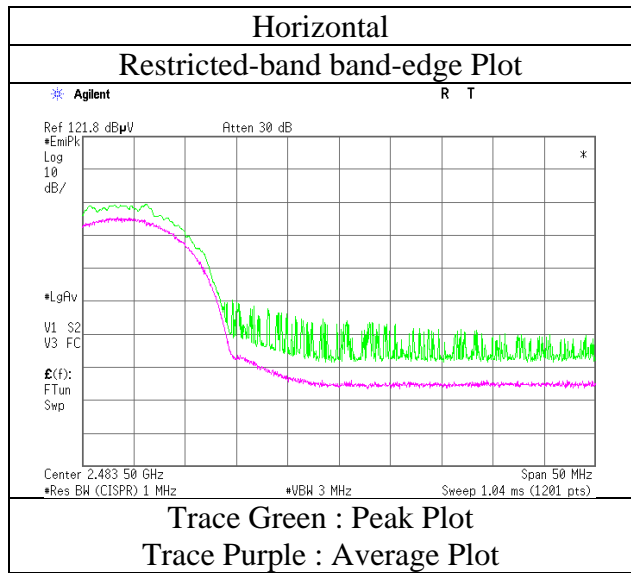
\*Other frequency noises omitted in this report were not seen or had enough margin (more than 20 dB).

\*The 10th harmonic was not seen so the result was its base noise level.

Distance factor:      1 GHz - 10 GHz      20log (4.4 m / 3.0 m) = 3.3 dB  
                             10 GHz - 26.5 GHz 20log (1.0 m / 3.0 m) = -9.5 dB

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

Test place : Ise EMC Lab. No.4 Semi Anechoic Chamber  
Report No. : 11107783H  
Date : January 27, 2016  
Temperature / Humidity : 20 deg. C / 35 % RH  
Engineer : Kazuya Yoshioka  
(1-10GHz)  
Mode : Tx 11b 2462 MHz



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

## Radiated Spurious Emission

Test place : Ise EMC Lab. No.3 and No.4 Semi Anechoic Chamber  
Report No. : 11107783H  
Date : January 25, 2016      January 27, 2016      January 28, 2016  
Temperature / Humidity : 20 deg. C / 37 % RH      20 deg. C / 35 % RH      22 deg. C / 33 % RH  
Engineer : Kazuya Yoshioka      Kazuya Yoshioka      Ken Fujita  
            (30-1000MHz)      (1-10GHz)      (10-26.5GHz)  
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	160.514	QP	36.3	15.4	8.7	32.2	-	28.2	43.5	15.3	
Hori	246.943	QP	43.1	17.2	9.5	32.0	-	37.8	46.0	8.2	
Hori	480.023	QP	37.8	17.8	11.1	32.1	-	34.6	46.0	11.4	
Hori	532.123	QP	32.9	18.4	11.4	32.1	-	30.6	46.0	15.4	
Hori	804.353	QP	33.0	22.0	12.9	31.5	-	36.4	46.0	9.6	
Hori	829.113	QP	34.1	22.1	13.0	31.4	-	37.8	46.0	8.2	
Hori	1920.051	PK	51.5	27.2	6.4	32.5	-	52.6	73.9	21.3	
Hori	2390.000	PK	55.4	27.9	6.6	32.1	-	57.8	73.9	16.1	
Hori	2541.440	PK	53.4	28.1	6.7	32.1	-	56.1	73.9	17.8	
Hori	4824.000	PK	43.7	32.9	9.0	31.3	-	54.3	73.9	19.6	
Hori	7236.000	PK	41.7	36.8	10.2	32.6	-	56.1	73.9	17.8	Floor Noise
Hori	9648.000	PK	41.7	38.1	9.5	32.6	-	56.7	73.9	17.2	Floor Noise
Hori	1920.051	AV	48.9	27.2	6.4	32.5	-	50.0	53.9	3.9	
Hori	2390.000	AV	41.7	27.9	6.6	32.1	0.1	44.2	53.9	9.7	*1)
Hori	2541.440	AV	43.5	28.1	6.7	32.1	-	46.2	53.9	7.7	
Hori	4824.000	AV	33.7	32.9	9.0	31.3	0.1	44.4	53.9	9.5	
Hori	7236.000	AV	31.7	36.8	10.2	32.6	-	46.1	53.9	7.8	Floor Noise
Hori	9648.000	AV	31.2	38.1	9.5	32.6	-	46.2	53.9	7.7	Floor Noise
Vert	154.227	QP	30.1	15.1	8.6	32.2	-	21.6	43.5	21.9	
Vert	246.943	QP	42.8	17.2	9.5	32.0	-	37.5	46.0	8.5	
Vert	592.136	QP	34.4	19.2	11.7	32.1	-	33.2	46.0	12.8	
Vert	666.166	QP	35.9	20.1	12.1	32.2	-	35.9	46.0	10.1	
Vert	740.166	QP	31.6	21.1	12.5	31.9	-	33.3	46.0	12.7	
Vert	777.188	QP	31.3	21.7	12.7	31.7	-	34.0	46.0	12.0	
Vert	1920.010	PK	48.8	27.2	6.4	32.5	-	49.9	73.9	24.0	
Vert	2390.000	PK	54.0	27.9	6.6	32.1	-	56.4	73.9	17.5	
Vert	4824.000	PK	45.2	32.9	9.0	31.3	-	55.8	73.9	18.1	
Vert	7236.000	PK	41.4	36.8	10.2	32.6	-	55.8	73.9	18.1	Floor Noise
Vert	9648.000	PK	41.5	38.1	9.5	32.6	-	56.5	73.9	17.4	Floor Noise
Vert	1920.010	AV	45.5	27.2	6.4	32.5	-	46.6	53.9	7.3	
Vert	2390.000	AV	42.2	27.9	6.6	32.1	0.1	44.7	53.9	9.2	*1)
Vert	4824.000	AV	34.9	32.9	9.0	31.3	0.1	45.6	53.9	8.3	
Vert	7236.000	AV	31.7	36.8	10.2	32.6	-	46.1	53.9	7.8	Floor Noise
Vert	9648.000	AV	31.2	38.1	9.5	32.6	-	46.2	53.9	7.7	Floor Noise

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

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

\*The 10th harmonic was not seen so the result was its base noise level.

Distance factor:      1 GHz - 10 GHz      20log (4.4 m / 3.0 m) = 3.3 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	90.4	28.0	6.6	32.1	92.9	-	-	Carrier
Hori	2400.000	PK	49.9	28.0	6.6	32.1	52.4	72.9	20.5	
Vert	2412.000	PK	87.2	28.0	6.6	32.1	89.7	-	-	Carrier
Vert	2400.000	PK	48.8	28.0	6.6	32.1	51.3	69.7	18.4	

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

**UL Japan, Inc.**

**Ise EMC Lab.**

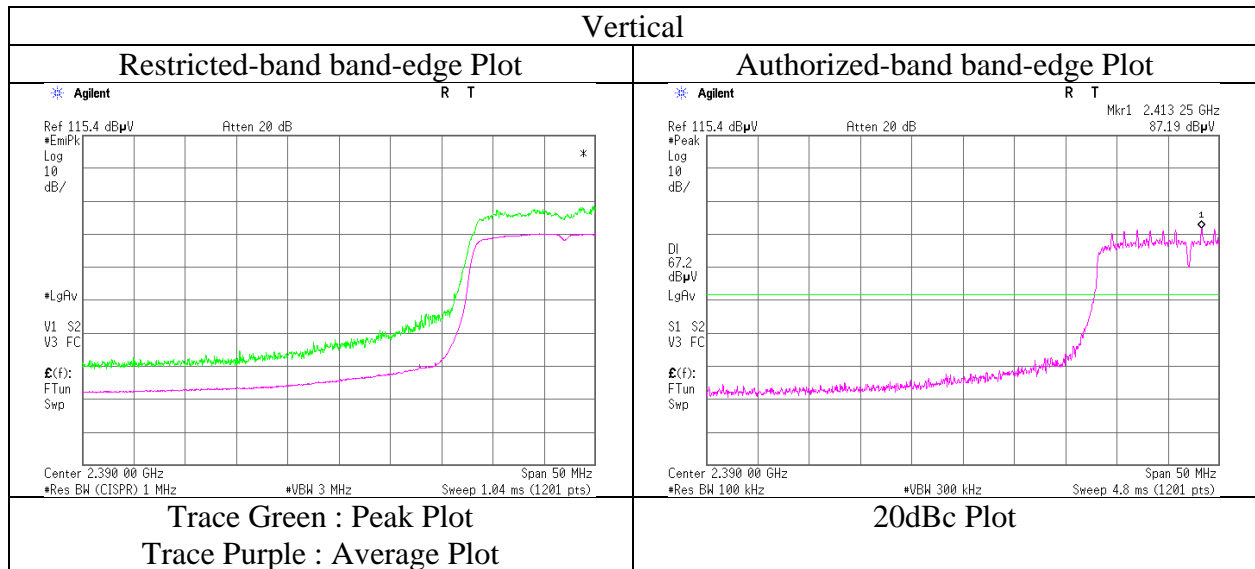
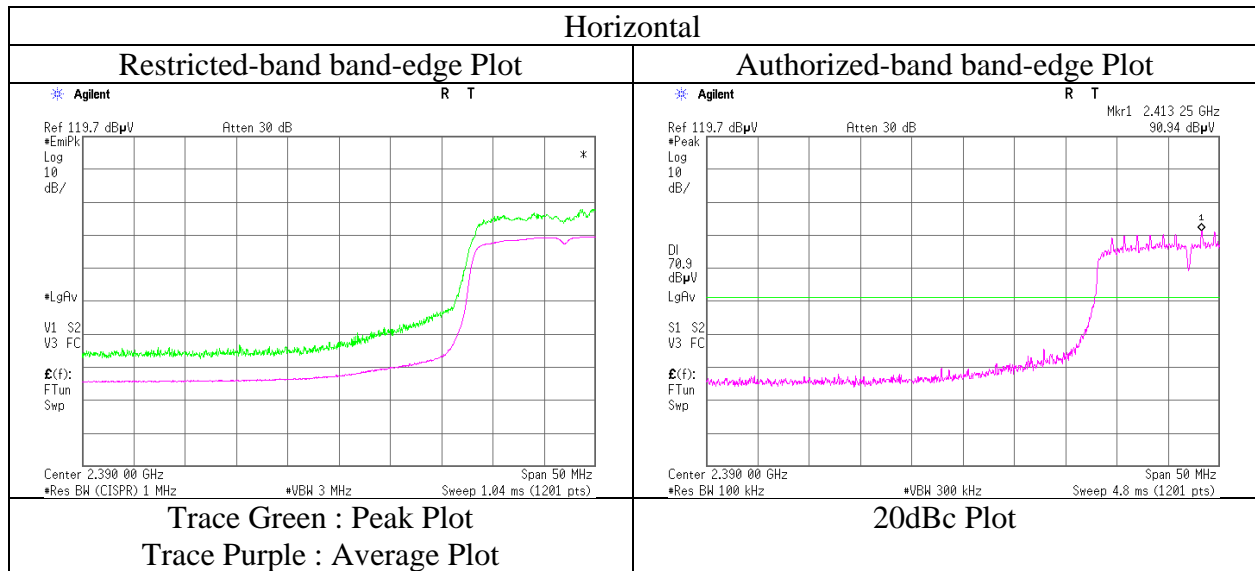
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

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Facsimile : +81 596 24 8124

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

Test place : Ise EMC Lab. No.4 Semi Anechoic Chamber  
Report No. : 11107783H  
Date : January 27, 2016  
Temperature / Humidity : 20 deg. C / 35 % RH  
Engineer : Kazuya Yoshioka  
(1-10GHz)  
Mode : Tx 11n-20 2412 MHz



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

## Radiated Spurious Emission

Test place	Ise EMC Lab. No.4 Semi Anechoic Chamber		
Report No.	11107783H		
Date	January 27, 2016	January 28, 2016	
Temperature / Humidity	20 deg. C / 35 % RH	22 deg. C / 33 % RH	
Engineer	Kazuya Yoshioka	Ken Fujita	
	(1-10GHz)	(10-26.5GHz)	
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	1920.228	PK	47.1	27.2	6.4	32.5	-	48.2	73.9	25.7	
Hori	2543.670	PK	52.2	28.1	6.7	32.1	-	54.9	73.9	19.0	
Hori	4874.000	PK	40.2	33.1	9.0	31.3	-	51.0	73.9	22.9	
Hori	7311.000	PK	40.8	36.8	10.2	32.6	-	55.2	73.9	18.7	Floor Noise
Hori	9748.000	PK	40.2	38.2	9.5	32.7	-	55.2	73.9	18.7	Floor Noise
Hori	1920.228	AV	43.5	27.2	6.4	32.5	-	44.6	53.9	9.3	
Hori	2543.670	AV	45.2	28.1	6.7	32.1	-	47.9	53.9	6.0	
Hori	4874.000	AV	34.3	33.1	9.0	31.3	0.1	45.2	53.9	8.7	
Hori	7311.000	AV	31.8	36.8	10.2	32.6	-	46.2	53.9	7.7	Floor Noise
Hori	9748.000	AV	32.0	38.2	9.5	32.7	-	47.0	53.9	6.9	Floor Noise
Vert	1920.250	PK	49.1	27.2	6.4	32.5	-	50.2	73.9	23.7	
Vert	4874.000	PK	42.0	33.1	9.0	31.3	-	52.8	73.9	21.1	
Vert	7311.000	PK	41.0	36.8	10.2	32.6	-	55.4	73.9	18.5	Floor Noise
Vert	9748.000	PK	41.0	38.2	9.5	32.7	-	56.0	73.9	17.9	Floor Noise
Vert	1920.250	AV	46.6	27.2	6.4	32.5	-	47.7	53.9	6.2	
Vert	4874.000	AV	33.3	33.1	9.0	31.3	0.1	44.2	53.9	9.7	
Vert	7311.000	AV	31.8	36.8	10.2	32.6	-	46.2	53.9	7.7	Floor Noise
Vert	9748.000	AV	32.0	38.2	9.5	32.7	-	47.0	53.9	6.9	Floor Noise

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

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

\*The 10th harmonic was not seen so the result was its base noise level.

Distance factor: 1 GHz - 10 GHz  $20\log(4.4\text{ m} / 3.0\text{ m}) = 3.3\text{ dB}$   
10 GHz - 26.5 GHz  $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.5\text{ dB}$

## Radiated Spurious Emission

Test place : Ise EMC Lab. No.4 Semi Anechoic Chamber  
Report No. : 11107783H  
Date : January 27, 2016      January 28, 2016  
Temperature / Humidity : 20 deg. C / 35 % RH      22 deg. C / 33 % RH  
Engineer : Kazuya Yoshioka      Ken Fujita  
            (1-10GHz)                      (10-26.5GHz)  
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	1920.200	PK	48.7	27.2	6.4	32.5	-	49.8	73.9	24.1	
Hori	2483.500	PK	63.2	28.1	6.7	32.1	-	65.9	73.9	8.0	*1)
Hori	2520.670	PK	53.8	28.1	6.7	32.1	-	56.5	73.9	17.4	
Hori	4924.000	PK	39.8	33.3	9.1	31.3	-	50.9	73.9	23.0	
Hori	7386.000	PK	42.5	36.8	10.2	32.6	-	56.9	73.9	17.0	Floor Noise
Hori	9848.000	PK	41.6	38.2	9.4	32.7	-	56.5	73.9	17.4	Floor Noise
Hori	1920.200	AV	44.7	27.2	6.4	32.5	-	45.8	53.9	8.1	
Hori	2483.500	AV	46.9	28.1	6.7	32.1	0.1	49.7	53.9	4.2	*1)
Hori	2520.670	AV	42.6	28.1	6.7	32.1	-	45.3	53.9	8.6	
Hori	4924.000	AV	30.2	33.3	9.1	31.3	0.1	41.4	53.9	12.5	
Hori	7386.000	AV	31.9	36.8	10.2	32.6	-	46.3	53.9	7.6	Floor Noise
Hori	9848.000	AV	31.2	38.2	9.4	32.7	-	46.1	53.9	7.8	Floor Noise
Vert	1919.935	PK	49.5	27.2	6.4	32.5	-	50.6	73.9	23.3	
Vert	2483.500	PK	55.8	28.1	6.7	32.1	-	58.5	73.9	15.4	*1)
Vert	4924.000	PK	40.6	33.3	9.1	31.3	-	51.7	73.9	22.2	
Vert	7386.000	PK	42.1	36.8	10.2	32.6	-	56.5	73.9	17.4	Floor Noise
Vert	9848.000	PK	41.3	38.2	9.4	32.7	-	56.2	73.9	17.7	Floor Noise
Vert	1919.935	AV	46.4	27.2	6.4	32.5	-	47.5	53.9	6.4	
Vert	2483.500	AV	46.2	28.1	6.7	32.1	0.1	49.0	53.9	4.9	*1)
Vert	4924.000	AV	30.8	33.3	9.1	31.3	0.1	42.0	53.9	11.9	
Vert	7386.000	AV	31.9	36.8	10.2	32.6	-	46.3	53.9	7.6	Floor Noise
Vert	9848.000	AV	31.2	38.2	9.4	32.7	-	46.1	53.9	7.8	Floor Noise

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

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

\*The 10th harmonic was not seen so the result was its base noise level.

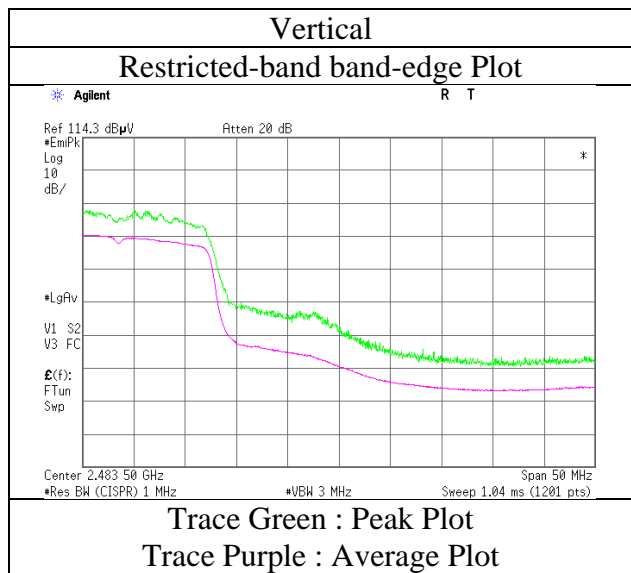
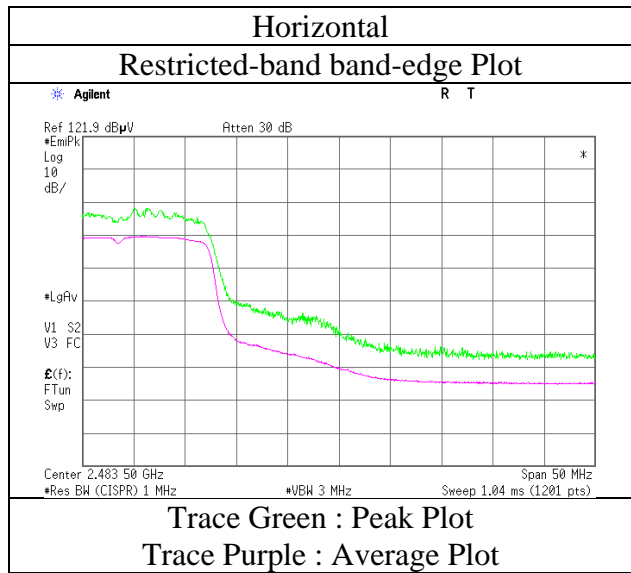
Distance factor: 1 GHz - 10 GHz 20log (4.4 m / 3.0 m) = 3.3 dB

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)**

Test place	Ise EMC Lab. No.4 Semi Anechoic Chamber
Report No.	11107783H
Date	January 27, 2016
Temperature / Humidity	20 deg. C / 35 % RH
Engineer	Kazuya Yoshioka (1-10GHz)
Mode	Tx 11n-20 2462 MHz

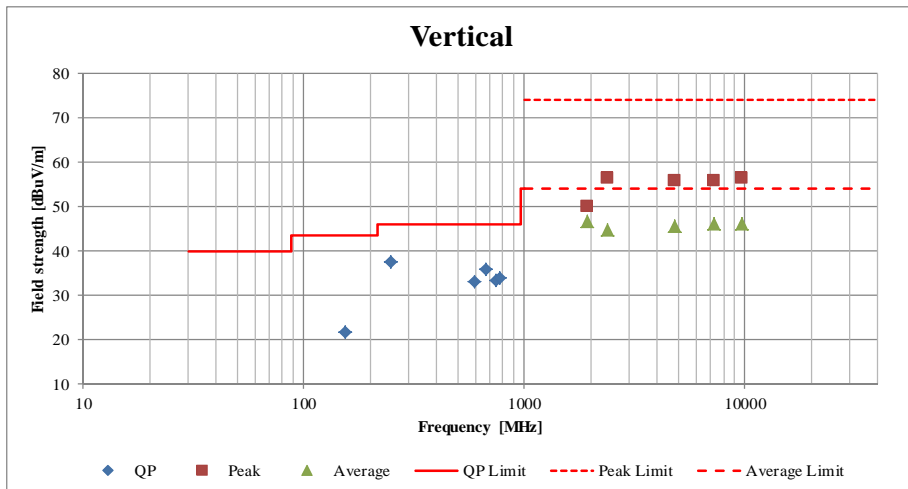
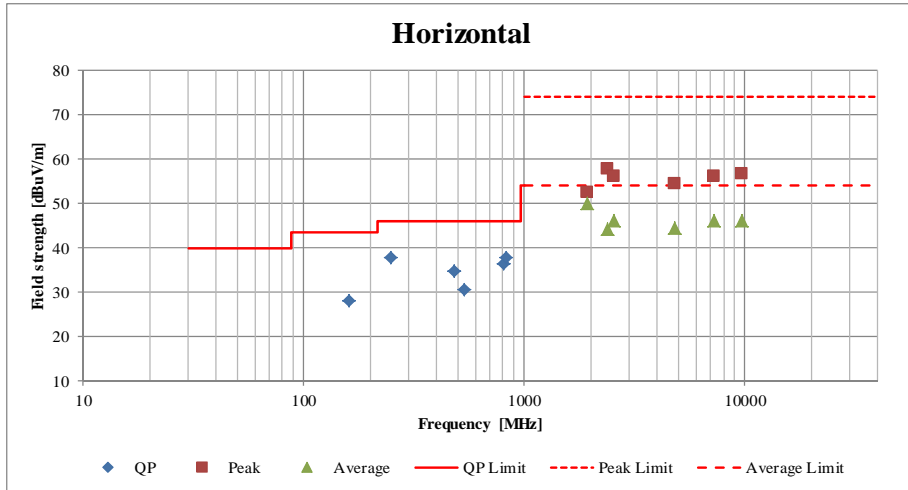


\* Final result of restricted band edge was shown in tabular data.



**Radiated Spurious Emission**  
**(Plot data, Worst case)**

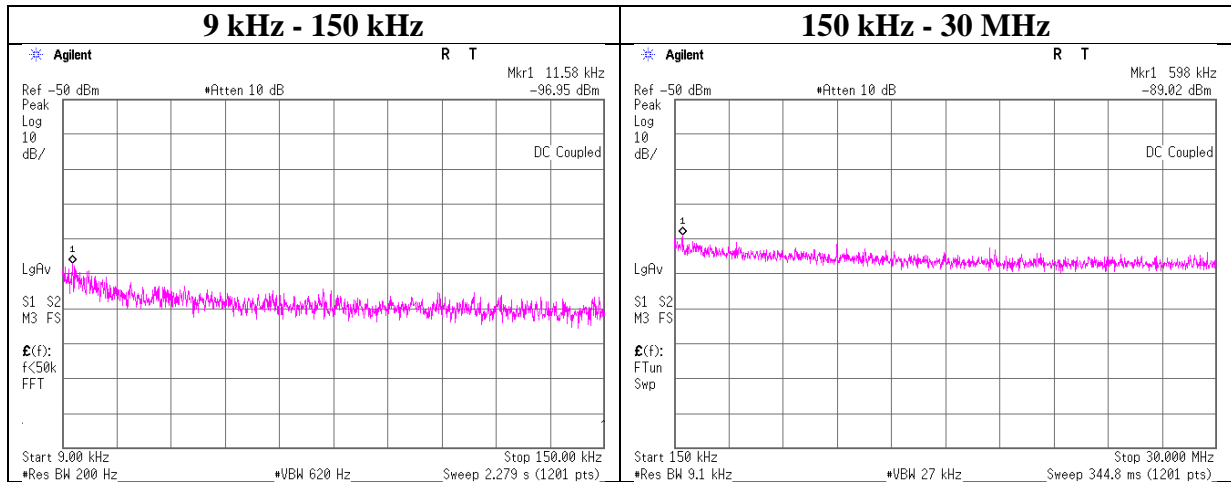
Test place	Ise EMC Lab. No.3 and No.4 Semi Anechoic Chamber		
Report No.	11107783H		
Date	January 25, 2016	January 27, 2016	January 28, 2016
Temperature / Humidity	20 deg. C / 37 % RH	20 deg. C / 35 % RH	22 deg. C / 33 % RH
Engineer	Kazuya Yoshioka (30-1000MHz)	Kazuya Yoshioka (1-10GHz)	Ken Fujita (10-26.5GHz)
Mode	Tx 11n-20 2412 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.	11107783H
Date	January 22, 2016
Temperature / Humidity	21 deg. C / 23 % RH
Engineer	Yutaka Yoshida
Mode	Tx 11n-20 2412 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
11.58	-97.0	2.34	9.7	2.0	1	-82.9	300	6.0	-21.7	46.3	68.0	
598.00	-89.0	2.34	9.7	2.0	1	-75.0	30	6.0	6.3	32.0	25.7	

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

$\text{EIRP} = \text{Reading} + \text{Cable Loss} + \text{Attenuator Loss} + \text{Antenna Gain} + 10 * \log(N)$

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### Power Density

Test place Ise EMC Lab. No.6 Measurement Room  
Report No. 11107783H  
Date January 22, 2016  
Temperature / Humidity 21 deg. C / 23 % RH  
Engineer Yutaka Yoshida  
Mode Tx

#### 11b 5.5Mbps

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result [dBm]	Limit [dBm]	Margin [dB]
2412.00	-6.53	2.34	9.74	5.55	8.00	2.45
2437.00	-6.58	2.34	9.74	5.50	8.00	2.50
2462.00	-6.40	2.35	9.74	5.69	8.00	2.31

#### 11g 24Mbps

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result [dBm]	Limit [dBm]	Margin [dB]
2412.00	-24.28	2.34	9.74	-12.20	8.00	20.20
2437.00	-23.86	2.34	9.74	-11.78	8.00	19.78
2462.00	-23.75	2.35	9.74	-11.66	8.00	19.66

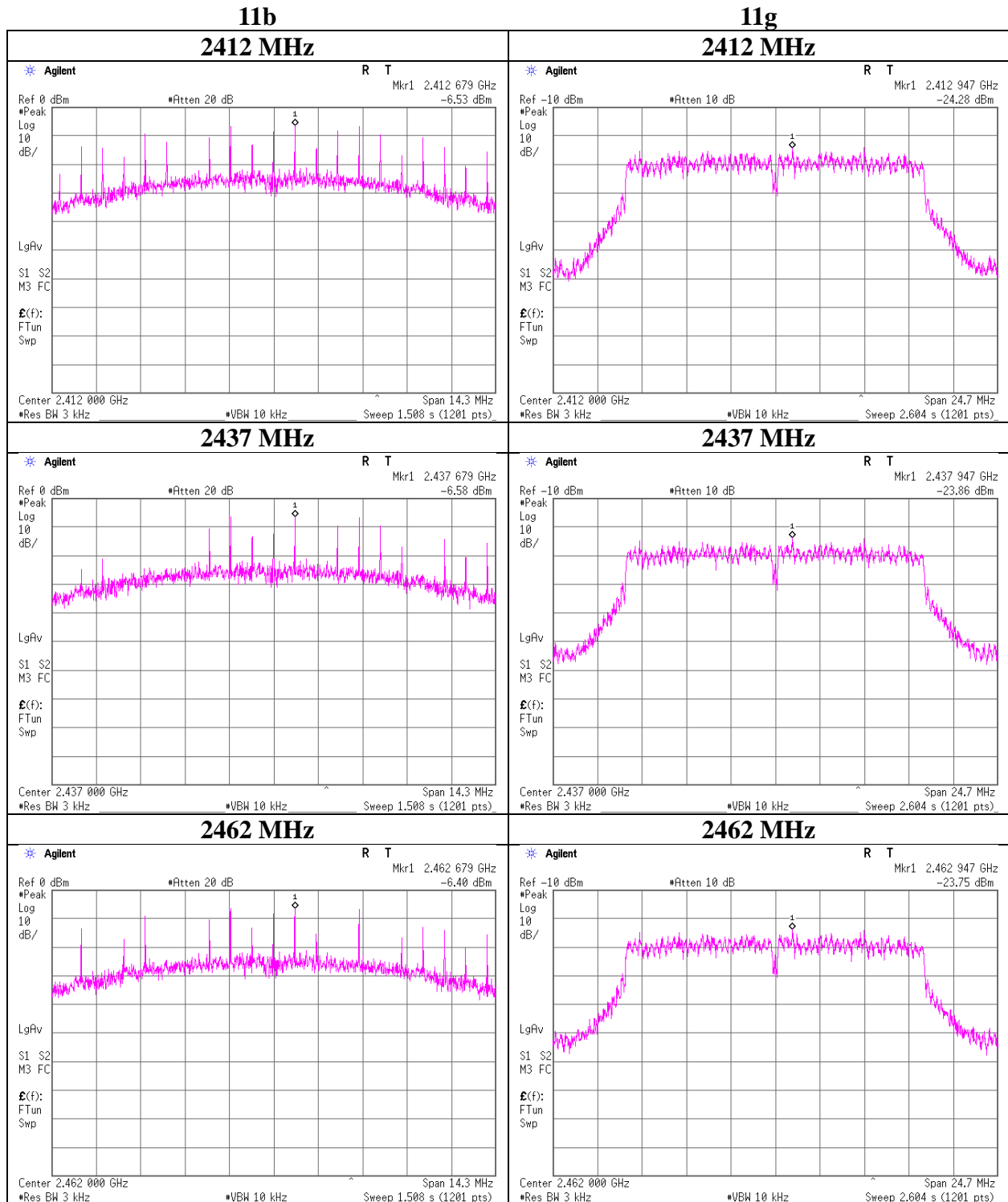
#### 11n-20 MCS 2(Long GI)

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result [dBm]	Limit [dBm]	Margin [dB]
2412.00	-26.30	2.34	9.74	-14.22	8.00	22.22
2437.00	-25.83	2.34	9.74	-13.75	8.00	21.75
2462.00	-25.73	2.35	9.74	-13.64	8.00	21.64

Sample Calculation:

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

**Power Density**



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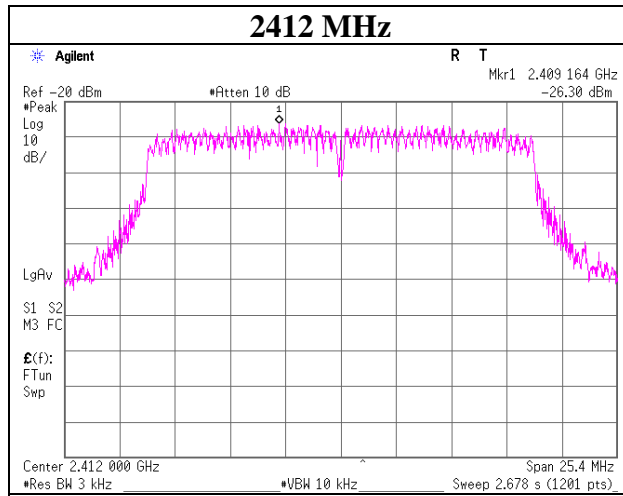
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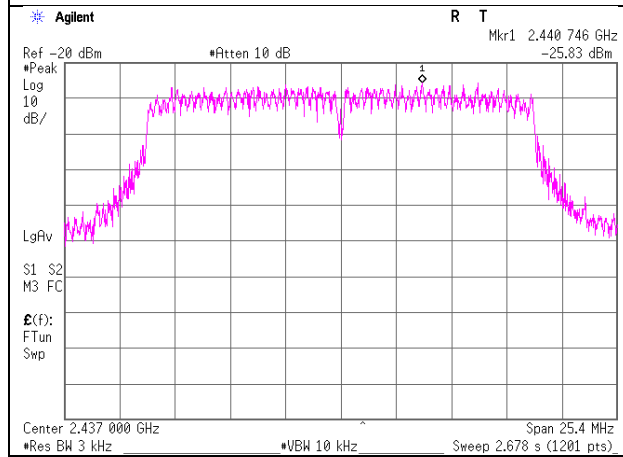
### Power Density

#### 11n-20

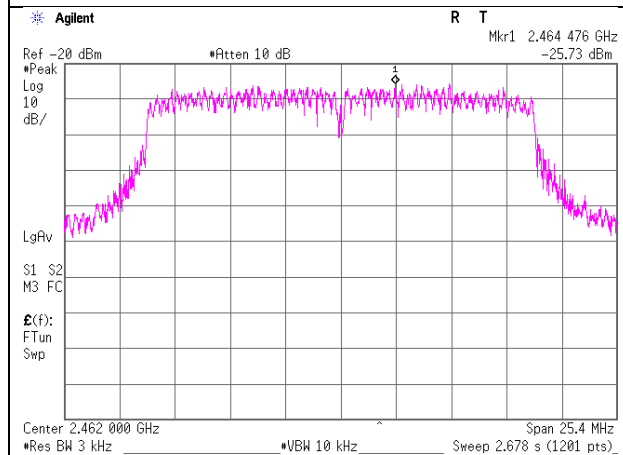
#### 2412 MHz



#### 2437 MHz

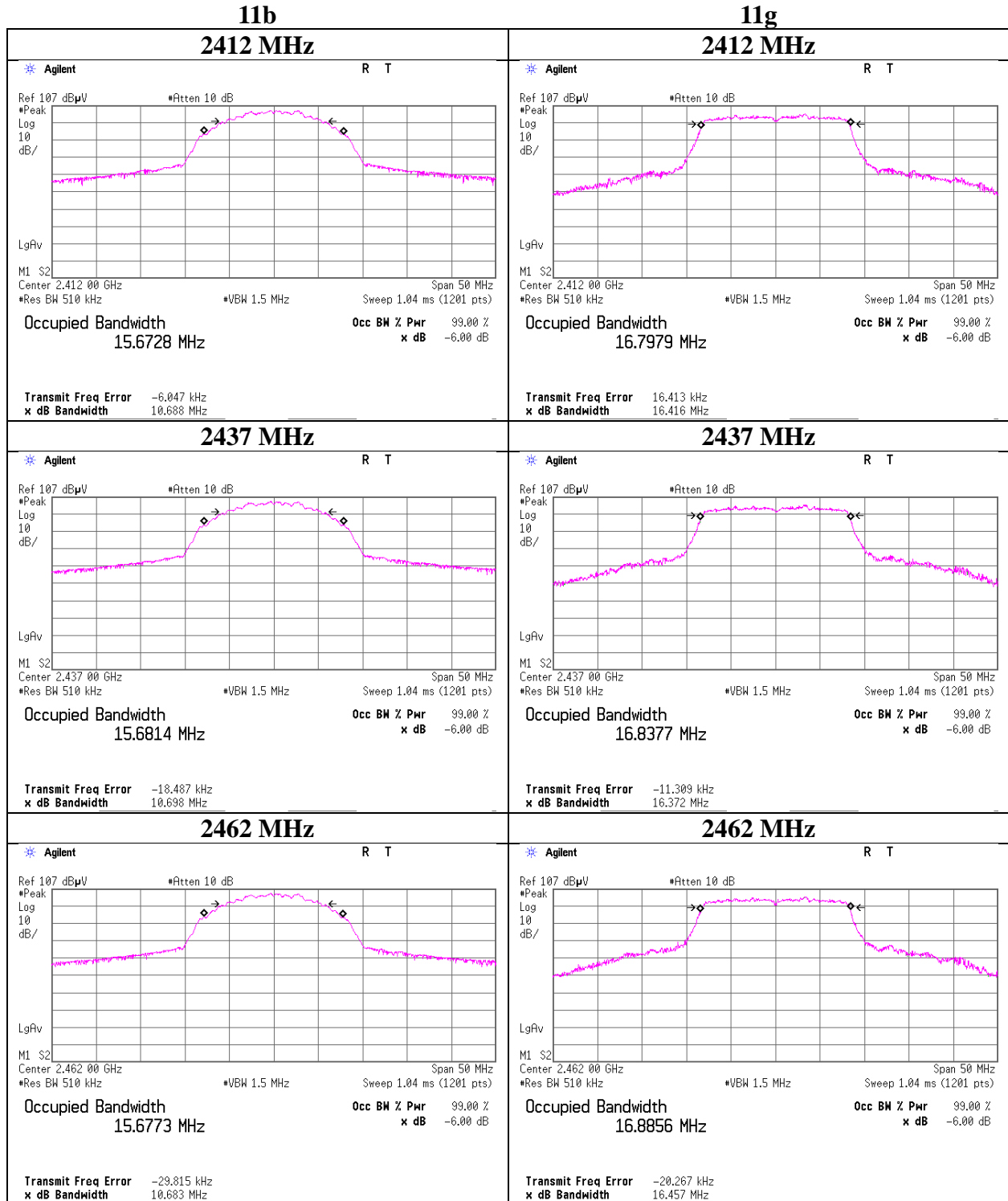


#### 2462 MHz



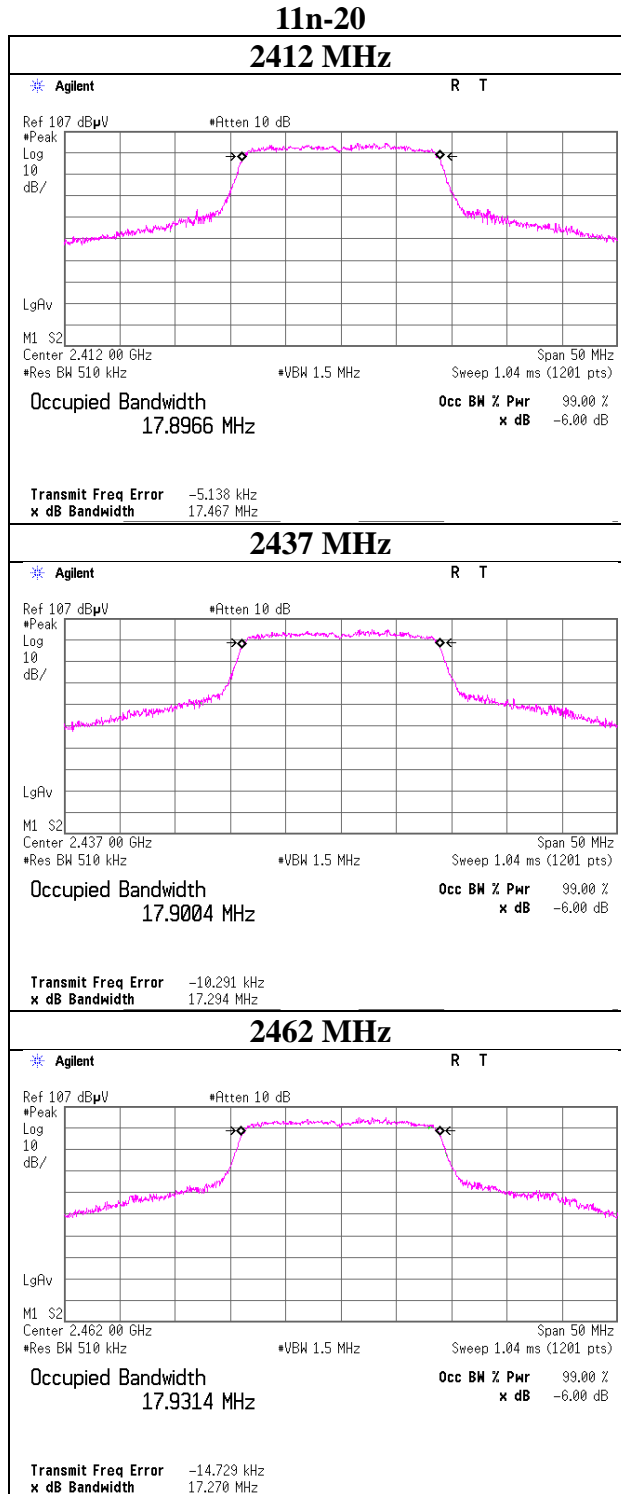
### 99%Occupied Bandwidth

Test place	Ise EMC Lab. No.6 Measurement Room
Report No.	11107783H
Date	January 22, 2016
Temperature / Humidity	21 deg. C / 23 % RH
Engineer	Yutaka Yoshida
Mode	Tx



## 99% Occupied Bandwidth

Test place	Ise EMC Lab. No.6 Measurement Room
Report No.	11107783H
Date	January 22, 2016
Temperature / Humidity	21 deg. C / 23 % RH
Engineer	Yutaka Yoshida
Mode	Tx



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## APPENDIX 2: Test instruments

### Test equipment

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
MSA-13	Spectrum Analyzer	Agilent	E4440A	MY46185823	AT	2015/06/02 * 12
MPM-13	Power Meter	Anritsu	ML2495A	0824014	AT	2015/11/11 * 12
MPSE-18	Power sensor	Anritsu	MA2411B	0738174	AT	2015/11/11 * 12
MCC-66	Microwave Cable 1G-40GHz	Suhner	SUCOFLEX102	28636/2	AT	2015/04/02 * 12
MAT-88	Attenuator	Weinschel Associates	WA56-10	56100304	AT	2015/06/01 * 12
MOS-14	Thermo-Hygrometer	Custom	CTH-201	1401	AT	2016/01/21 * 12
MAEC-03	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-10005	RE	2015/10/01 * 12
MOS-13	Thermo-Hygrometer	Custom	CTH-180	1301	RE	2016/01/21 * 12
MJM-16	Measure	KOMELON	KMC-36	-	RE	-
COTS-MEMI	EMI measurement program	TSJ	TEPTO-DV	-	RE	-
MSA-03	Spectrum Analyzer	Agilent	E4448A	MY44020357	RE	2015/05/18 * 12
MMM-08	DIGITAL HiTESTER	Hioki	3805	051201197	RE	2016/01/13 * 12
MTR-08	Test Receiver	Rohde & Schwarz	ESCI	100767	RE	2015/09/02 * 12
MBA-03	Biconical Antenna	Schwarzbeck	BBA9106	1915	RE	2015/10/11 * 12
MLA-03	Logperiodic Antenna	Schwarzbeck	USLP9143	174	RE	2015/10/11 * 12
MCC-51	Coaxial cable	UL Japan	-	-	RE	2015/07/13 * 12
MAT-70	Attenuator(6dB)	Agilent	8491A-006	MY52460153	RE	2015/04/08 * 12
MPA-13	Pre Amplifier	SONOMA INSTRUMENT	310	260834	RE	2015/03/10 * 12
MAEC-04	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-10005	RE	2015/10/02 * 12
MOS-15	Thermo-Hygrometer	Custom	CTH-180	1501	RE	2016/01/21 * 12
MJM-26	Measure	KOMELON	KMC-36	-	RE	-
MSA-10	Spectrum Analyzer	Agilent	E4448A	MY46180655	RE	2015/02/26 * 12
MHA-21	Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D	9120D-557	RE	2015/08/10 * 12
MCC-141	Microwave Cable	Junkosha	MWX221	1305S002R(1m) / 1405S146(5m)	RE	2015/06/22 * 12
MPA-12	MicroWave System Amplifier	Agilent	83017A	00650	RE	2015/10/01 * 12
MHA-17	Horn Antenna 15-40GHz	Schwarzbeck	BBHA9170	BBHA9170307	RE	2015/06/06 * 12
MMM-10	DIGITAL HiTESTER	Hioki	3805	051201148	RE	2016/01/18 * 12
MHF-06	High Pass Filter 3.5-24GHz	TOKIMEC	TF323DCA	601	RE	2015/05/15 * 12
MHF-26	High Pass Filter 3.5-18.0GHz	UL Japan	HPF SELECTOR	002	RE	2015/09/17 * 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: RE: Radiated Emission test  
AT: Antenna Terminal Conducted test

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