



RADIO TEST REPORT

Test Report No. : 12170940S-A-R3

Applicant : Panasonic Corporation
Type of Equipment : Car Audio System
Model No. : AT1801
FCC ID : ACJ932AT1801
Test regulation : FCC Part 15 Subpart C: 2018
* Wireless LAN 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. The opinions and the interpretations to the result of the description in this report are outside scopes where UL Japan has been accredited.
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 12170940S-A-R2. 12170940S-A-R2 is replaced with this report.

Date of test: October 27 to November 9, 2015
February 8 to 15, 2018

Representative test engineer: K. Noda
Kazuya Noda
Engineer
Consumer Technology Division

Approved by: S. Takano
Shinichi Takano
Engineer
Consumer Technology Division



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

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13-EM-F0429

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SECTION 1: Customer information

Company Name : Panasonic Corporation
Address : 4261 Ikonobe-cho, Tsuzuki-ku, Yokohama-city, 224-8520, Japan
Telephone Number : +81-50-3689-7051
Contact Person : Syuuichi Suzuki

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

2.1 Identification of E.U.T.

Type of Equipment : Car Audio System
Model No. : AT1801
Serial No. : Refer to Section 4, Clause 4.2
Rating : DC 13.2 V
Receipt Date of Sample : October 27, 2015 (AT1603)
February 8, 2018 (AT1801)
Country of Mass-production : Japan, Czech, Mexico, Thailand
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: AT1801 (referred to as the EUT in this report) is a Car Audio System.

General Specification

Clock frequency(ies) in the system : 37 MHz, 48 MHz, 54.9 MHz, 194 MHz, 795 MHz, 1.56 GHz

Radio Specification

Radio Type : Transceiver
Frequency of Operation : 2412 MHz - 2462 MHz
Modulation : DSSS
Power Supply (radio part input) : DC 3.3 V, DC 1.8 V
Antenna type : Dipole Antenna
Antenna gain with cable loss : -1.15 dBi

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	FCC: Section 15.207	-	N/A *1)	-
	IC: RSS-Gen 8.8	IC: RSS-Gen 8.8			
6dB Bandwidth	FCC: KDB 558074 D01 DTS Meas Guidance v04	FCC: Section 15.247(a)(2)	See data.	Complied	Conducted
	IC: -	IC: RSS-247 5.2(a)			
Maximum Peak Output Power	FCC: KDB 558074 D01 DTS Meas Guidance v04	FCC: Section 15.247(b)(3)		Complied	Conducted
	IC: RSS-Gen 6.12	IC: RSS-247 5.4(d)			
Power Density	FCC: KDB 558074 D01 DTS Meas Guidance v04	FCC: Section 15.247(e)	Complied	Conducted	
	IC: -	IC: RSS-247 5.2(b)			
Spurious Emission Restricted Band Edges	FCC: KDB 558074 D01 DTS Meas Guidance v04	FCC: Section 15.247(d)	4.5 dB 658.568 MHz, QP, Vert. Tx 11g 2437MHz	Complied	Conducted (below 30 MHz)/ Radiated (above 30 MHz) *2)
	IC: RSS-Gen 6.13	IC: RSS-247 5.5 RSS-Gen 8.9 RSS-Gen 8.10			

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

*1) The test is not applicable since the EUT has no AC mains.

*2) 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 equipment provides the wireless transmitter with stable power supply (RF: DC 3.3 V, I/O: DC 1.8 V). 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

The equipment and its antenna comply with the requirement since the antenna is built in the equipment and it cannot be replaced by end users. Therefore, the equipment complies with the antenna requirement.

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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

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

Item	Frequency range	Uncertainty (+/-)				
		No. 1 SAC / SR	No. 2 SAC / SR	No. 3 SAC / SR	No. 4 SAC / SR	No. 5,6,8 SR
Conducted emission (AC Mains) LISN	150 kHz-30 MHz	2.5 dB	2.5 dB	2.5 dB	2.6 dB	2.6 dB
Radiated emission (Measurement distance: 3 m)	9 kHz-30 MHz	3.2 dB	3.2 dB	3.3 dB	-	-
	30 MHz-200 MHz	4.3 dB	4.3 dB	4.3 dB	-	-
	200 MHz-1 GHz	5.9 dB	5.9 dB	5.9 dB	-	-
	1 GHz-6 GHz	4.7 dB	4.7 dB	4.7 dB	-	-
	6 GHz-18 GHz	5.3 dB	5.3 dB	5.3 dB	-	-
Radiated emission (Measurement distance: 1 m)	18 GHz-40 GHz	5.6 dB	5.6 dB	5.6 dB	-	-
	1 GHz-18 GHz	5.6 dB	5.6 dB	5.6 dB	-	-
	18 GHz-40 GHz	5.9 dB	5.9 dB	5.9 dB	-	-

SAC=Semi-Anechoic Chamber

SR= Shielded Room is applied besides radiated emission

Antenna terminal test	Uncertainty (+/-)
Power Measurement above 1 GHz (Average Detector)_SPM-06	0.76 dB
Power Measurement above 1 GHz (Peak Detector)_SPM-06	0.79 dB
Power Measurement above 1 GHz (Average Detector)_SPM-07	0.74 dB
Power Measurement above 1 GHz (Peak Detector)_SPM-07	1.08 dB
Spurious emission (Conducted) below 1GHz	1.5 dB
Spurious emission (Conducted) 1 GHz-3 GHz	1.7 dB
Spurious emission (Conducted) 3 GHz-18 GHz	2.4 dB
Spurious emission (Conducted) 18 GHz-26.5 GHz	2.5 dB
Spurious emission (Conducted) 26.5 GHz-40 GHz	2.5 dB
Bandwidth Measurement	0.66 %
Duty cycle and Time Measurement	0.012 %

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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JAB Accreditation No. RTL02610
FCC Test Firm Registration Number: 839876

Test site	IC Registration Number	Width x Depth x Height (m)	Size of reference ground plane (m) / horizontal conducting plane	Maximum measurement distance
No.1 Semi-anechoic chamber	2973D-1	20.6 x 11.3 x 7.65	20.6 x 11.3	10 m
No.2 Semi-anechoic chamber	2973D-2	20.6 x 11.3 x 7.65	20.6 x 11.3	10 m
No.3 Semi-anechoic chamber	2973D-3	12.7 x 7.7 x 5.35	12.7 x 7.7	5 m
No.4 Semi-anechoic chamber	-	8.1 x 5.1 x 3.55	8.1 x 5.1	-
No.1 Shielded room	-	6.8 x 4.1 x 2.7	6.8 x 4.1	-
No.2 Shielded room	-	6.8 x 4.1 x 2.7	6.8 x 4.1	-
No.3 Shielded room	-	6.3 x 4.7 x 2.7	6.3 x 4.7	-
No.4 Shielded room	-	4.4 x 4.7 x 2.7	4.4 x 4.7	-
No.5 Shielded room	-	7.8 x 6.4 x 2.7	7.8 x 6.4	-
No.6 Shielded room	-	7.8 x 6.4 x 2.7	7.8 x 6.4	-
No.8 shielded room	-	3.45 x 5.5 x 2.4	3.45 x 5.5	-
No.1 Measurement room	-	2.55 x 4.1 x 2.5	-	-

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)

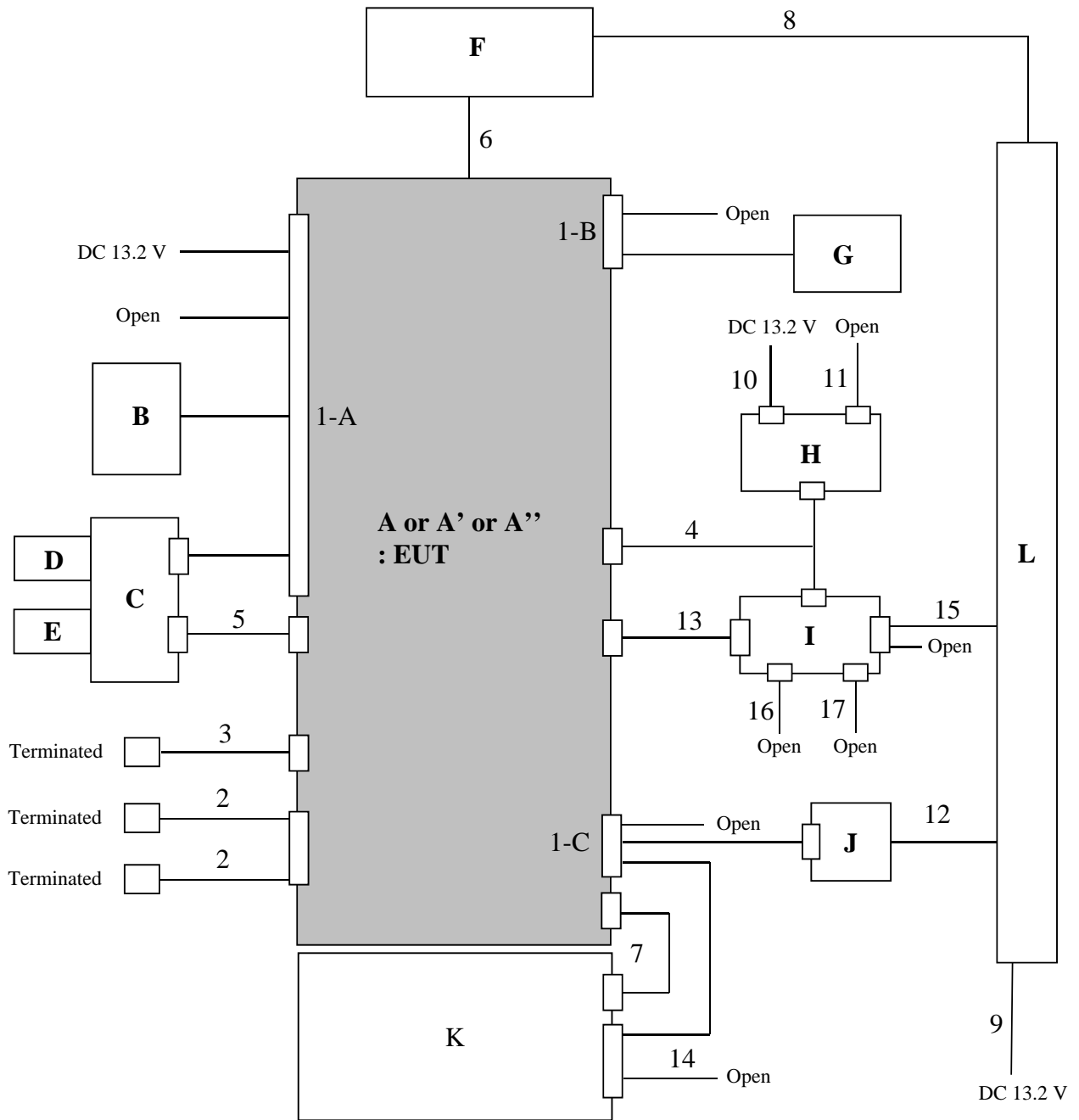
Test operating mode was determined as follows according to “Section 1 of 6 802.11 a/b/g/n testing - Managing Complex Regulatory Approvals - ” of TCB Council Workshop October 2009.

Mode	Remarks*
IEEE 802.11b (11b)	11 Mbps, PN9
IEEE 802.11g (11g)	36 Mbps, PN9
IEEE 802.11n HT20 (11n-20)	MCS 4 (800 ns GI), PN9
IEEE 802.11n HT40 (11n-40)	MCS 7 (800 ns GI), PN9
*The worst condition was determined based on the test result of Maximum Peak Output Power (Mid Channel) of AT1603 Display Separated Type (L2).	
*Power of the EUT was set by the software as follows; Power settings: Fixed Software (Firmware): D17517010700001V0, Ver. 1.0 Any conditions under the normal use do not exceed the condition of setting. In addition, end users cannot change the settings of the output power of the product.	

*The details of Operating mode(s)

Test Item	Operating Mode	Tested frequency
Spurious Emission (below 1 GHz)	11g Tx	2437 MHz
Spurious Emission (above 1 GHz) 6dB Bandwidth Maximum Peak Output Power Power Density 99% Occupied Bandwidth	11b Tx	2412 MHz
	11g Tx	2437 MHz
	11n-20 Tx	2462 MHz
	11n-40 Tx	2422 MHz
		2437 MHz
Bandedge Compliance		2452 MHz
	11b Tx	2412 MHz
	11g Tx	2462 MHz
	11n-20 Tx	
	11n-40 Tx	2422 MHz
		2452 MHz

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	Remark
A	Car Audio System	AT1801	CV-DL58N0AJ No. 500030	Panasonic Corporation	EUT
A'	Car Audio System	AT1603 (Display Combined Type (T2))	CV-CS87N08X No.180	Panasonic Corporation	EUT *1)
A''	Car Audio System	AT1603 (Display Separated Type (L2))	CV-DL56N0AJ No.13	Panasonic Corporation	EUT *1)
B	Steering SW	-	0009	-	-
C	IF-Box	CA-UL56X0AJ	3	Panasonic	-
D	USB Memory	SDK-USM4GL(B)	-	SONY	-
E	USB Memory	SDK-USM4GL(B)	-	SONY	-
F	Display	83290-48130	No.1	DENSO	-
G	Microphone	86730-20050	-	-	-
H	AMP	86280-76050	521343	Panasonic	-
I	RSE-ECU	CV-UL45H0AJ	-	Panasonic	-
J	DCM	86741-53054	8KYLK327398	DENSO	-
K	MEU	CN-SL56N0AJ	004	Panasonic	-
L	Jig Board	-	-	-	-

*1) As for Antenna conducted test, the result of AT1603 (Display Combined Type (T2)) and AT1603 (Display Separate Type (L2)) was used. There is no difference in the radio block of AT1801, AT1603 (Display Combined Type (T2)) and AT1603 (Display Separate Type (L2)).

List of cables used

No.	Name	Length (m)	Cable Shield	Connector Shield	Remark
1-A	General-purpose	2.0	Unshielded	Unshielded	-
1-B	General-purpose	2.0	Unshielded	Unshielded	-
1-C	General-purpose	2.0	Unshielded	Unshielded	-
2	Radio/D-Radio antenna	0.15 + 1.2	Shielded	Shielded	-
3	XM antenna	1.0	Shielded	Shielded	-
4	AVC-LAN Step3	2.0	Unshielded	Unshielded	-
5	USB (IF-BOX)	2.0	Shielded	Shielded	-
6	GVIF	2.0	Shielded	Shielded	-
7	GVIF, USB from MEU	0.15	Unshielded	Unshielded	-
8	DC Power / Signal	0.9	Unshielded	Unshielded	-
9	DC Power	0.5	Unshielded	Unshielded	-
10	DC Power	1.0 + 1.5	Unshielded	Unshielded	-
11	Signal	1.0	Unshielded	Unshielded	-
12	DC Power / Signal	1.0	Unshielded	Unshielded	-
13	GVIF	2.0	Unshielded	Unshielded	-
14	Signal	2.0	Unshielded	Unshielded	-
15	DC Power / Signal	2.0	Unshielded	Unshielded	-
16	Signal	2.0	Unshielded	Unshielded	-
17	Signal	2.0	Unshielded	Unshielded	-

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SECTION 5: 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 platform of nominal size, 1.0 m by 2.0 m, raised 0.8 m above the conducting ground plane. The table is made of expanded polystyrol and expanded polypropylene and the table top is covered with polycarbonate. That has very low permittivity. The Radiated Electric Field Strength has been measured in a Semi Anechoic Chamber with a ground plane.

[For above 1 GHz]

EUT was placed on a urethane platform of nominal size, 0.5 m by 0.5 m, raised 1.5 m above the conducting ground plane. The Radiated Electric Field Strength has been measured in a Semi Anechoic Chamber with absorbent materials lined on a ground plane.

The height of the measuring antenna varied between 1 m and 4 m and EUT was rotated a full revolution in order to obtain the maximum value of the electric field strength. 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: <u>12.2.5.2</u> RBW: 1 MHz VBW: 3 MHz Detector: Power Averaging (Linear voltage) Trace: 100 traces Duty factor was added to the results.	RBW: 100 kHz VBW: 300kHz
Test Distance	3 m	3.85 m *2) (1 GHz – 13 GHz), 1 m *3) (13 GHz – 26.5 GHz)		3.85 m *2) (1 GHz – 13 GHz), 1 m *3) (13 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: $20 \times \log(3.85 \text{ m} / 3.0 \text{ m}) = 2.17 \text{ dB}$

*3) Distance Factor: $20 \times \log(1.0 \text{ m} / 3.0 \text{ m}) = -9.54 \text{ dB}$

The EUT was set at 10 degree as normal position according to the EUT's specification.

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

Measurement range : 30 MHz - 26.5 GHz

Test data : APPENDIX

Test result : Pass

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SECTION 6: 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	50 MHz / 100 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	Sample / 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	9.1 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	10 kHz	30 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 30 MHz, 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 = 10 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

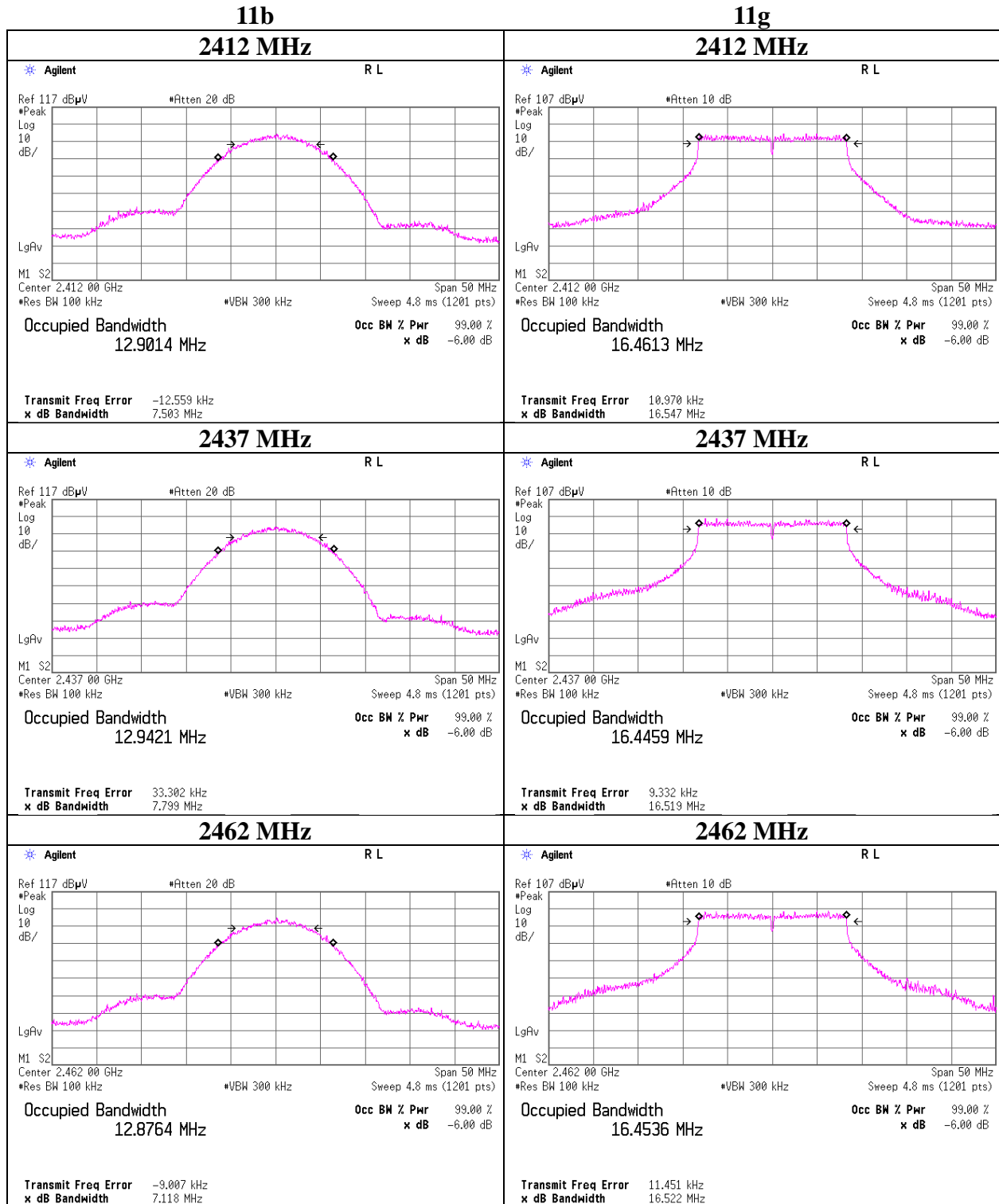
APPENDIX 1: Test data

6 dB Bandwidth and 99 % Occupied Bandwidth

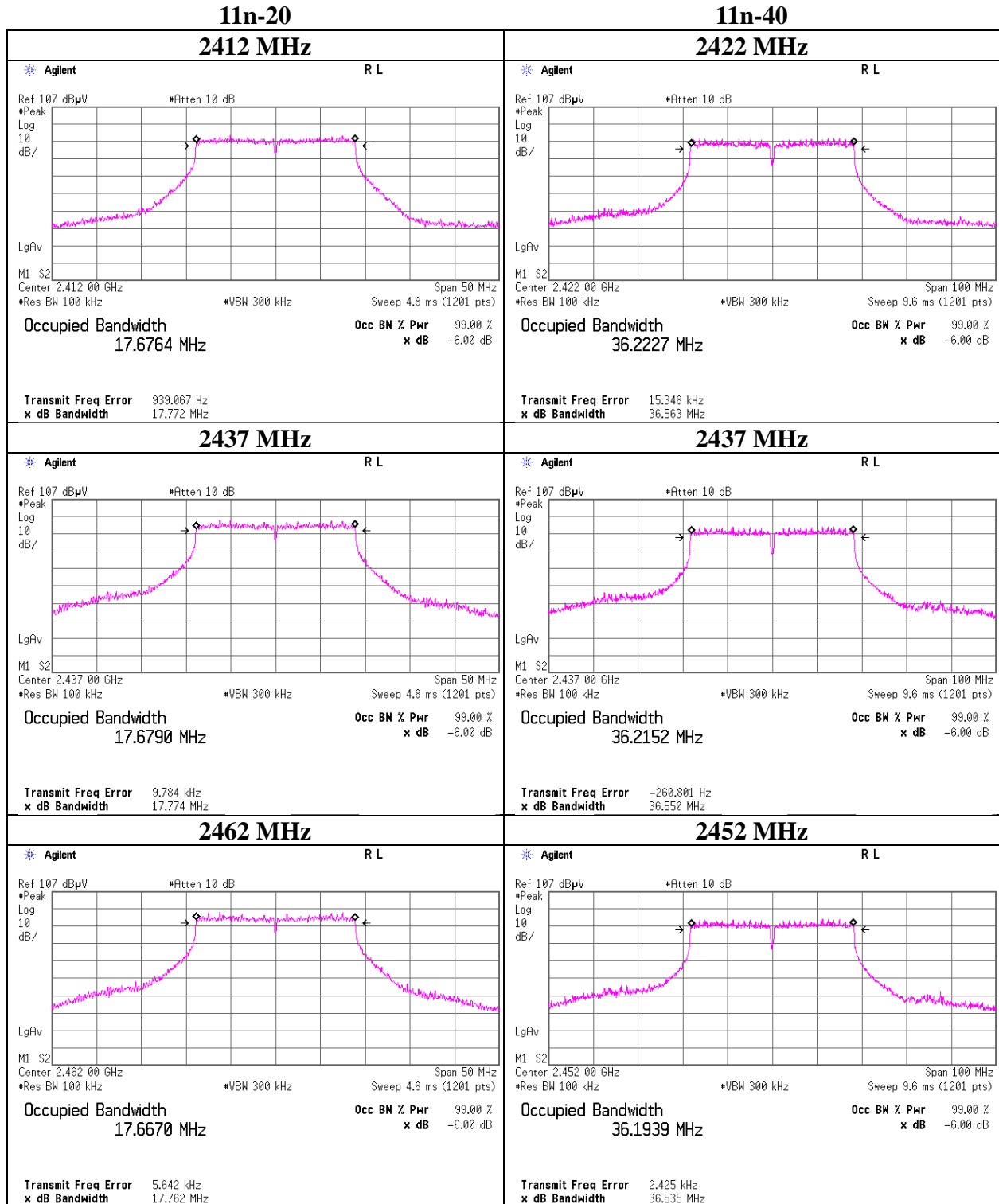
Test place Shonan EMC Lab. No.5 Shielded Room
Report No. 12170940S-A-R3
Date October 27, 2015
Temperature / Humidity 26 deg. C / 40 % RH
Engineer Hiroyuki Morikawa
Mode Tx (AT1603 Display Combined Type(T2))

Mode	Frequency [MHz]	99% Occupied Bandwidth [kHz]	6dB Bandwidth [MHz]	Limit for 6dB Bandwidth [MHz]
11b	2412	12960.1	7.503	> 0.5000
	2437	12973.7	7.799	> 0.5000
	2462	12952.9	7.118	> 0.5000
11g	2412	17058.0	16.547	> 0.5000
	2437	17094.1	16.519	> 0.5000
	2462	17053.9	16.522	> 0.5000
11n-20	2412	18151.5	17.772	> 0.5000
	2437	18221.9	17.774	> 0.5000
	2462	18204.0	17.762	> 0.5000
11n-40	2422	36994.3	36.563	> 0.5000
	2437	36987.3	36.550	> 0.5000
	2452	36921.3	36.535	> 0.5000

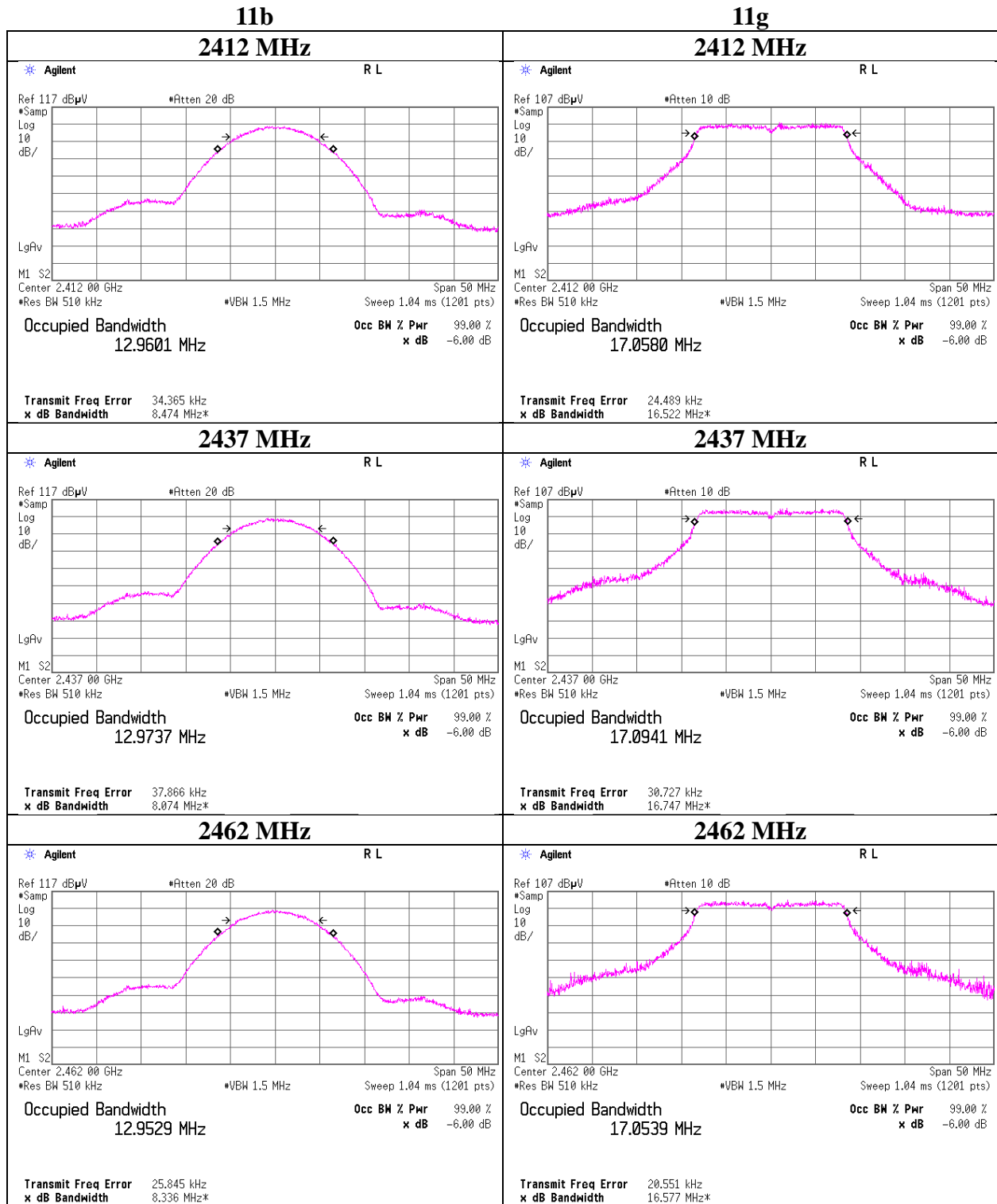
6dB Bandwidth



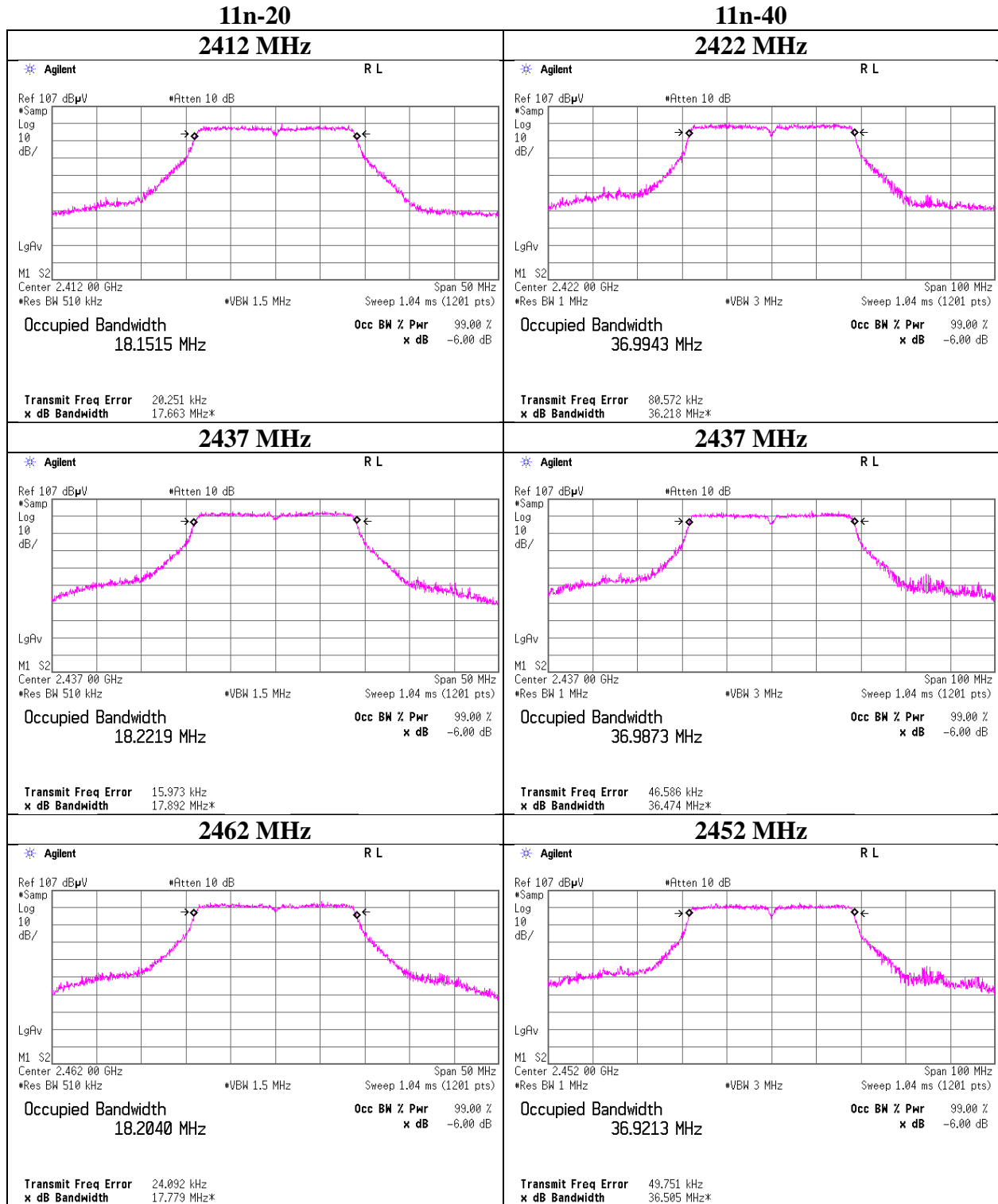
6dB Bandwidth



99%Occupied Bandwidth



99% Occupied Bandwidth



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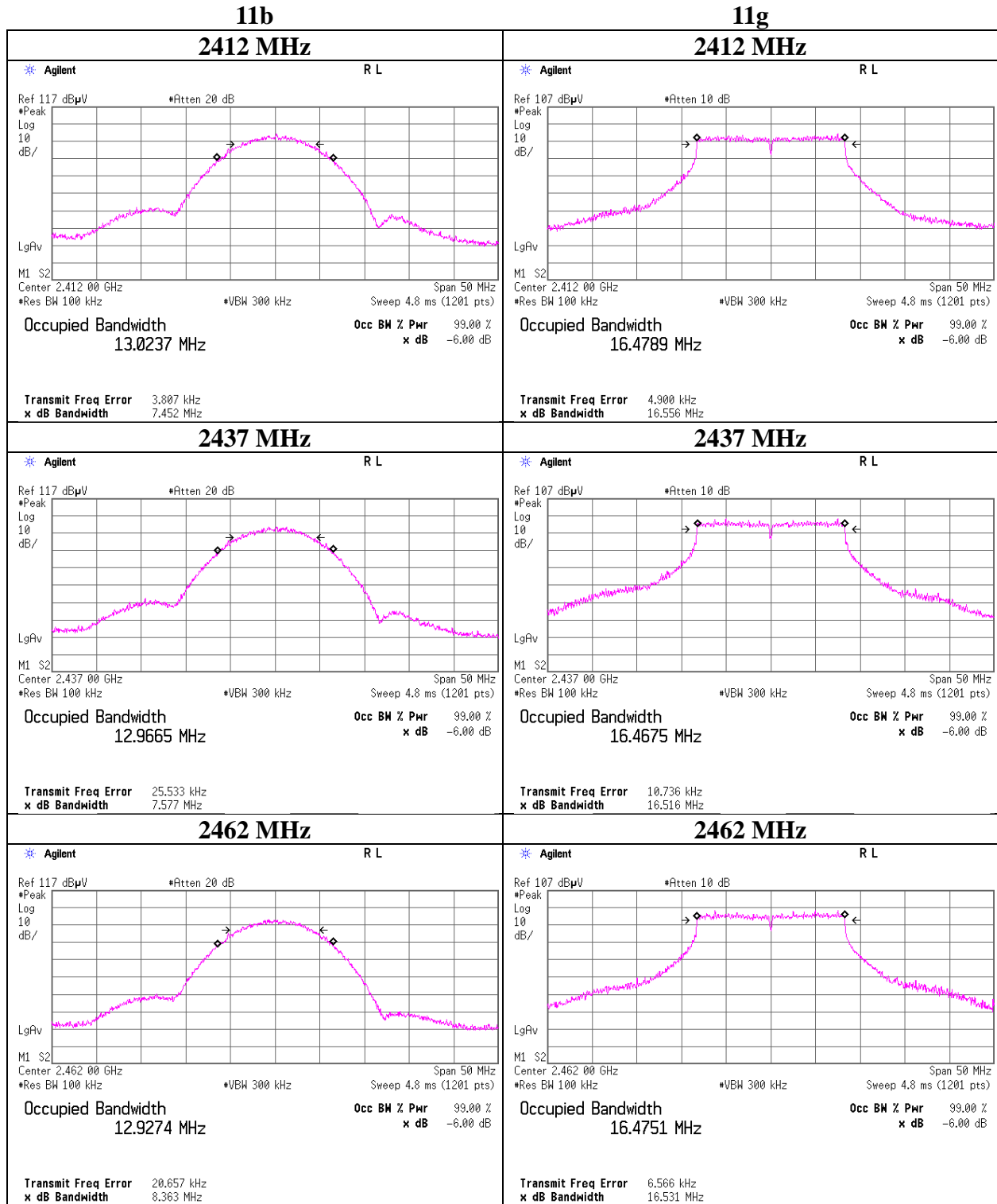
Facsimile : +81 463 50 6401

6 dB Bandwidth and 99 % Occupied Bandwidth

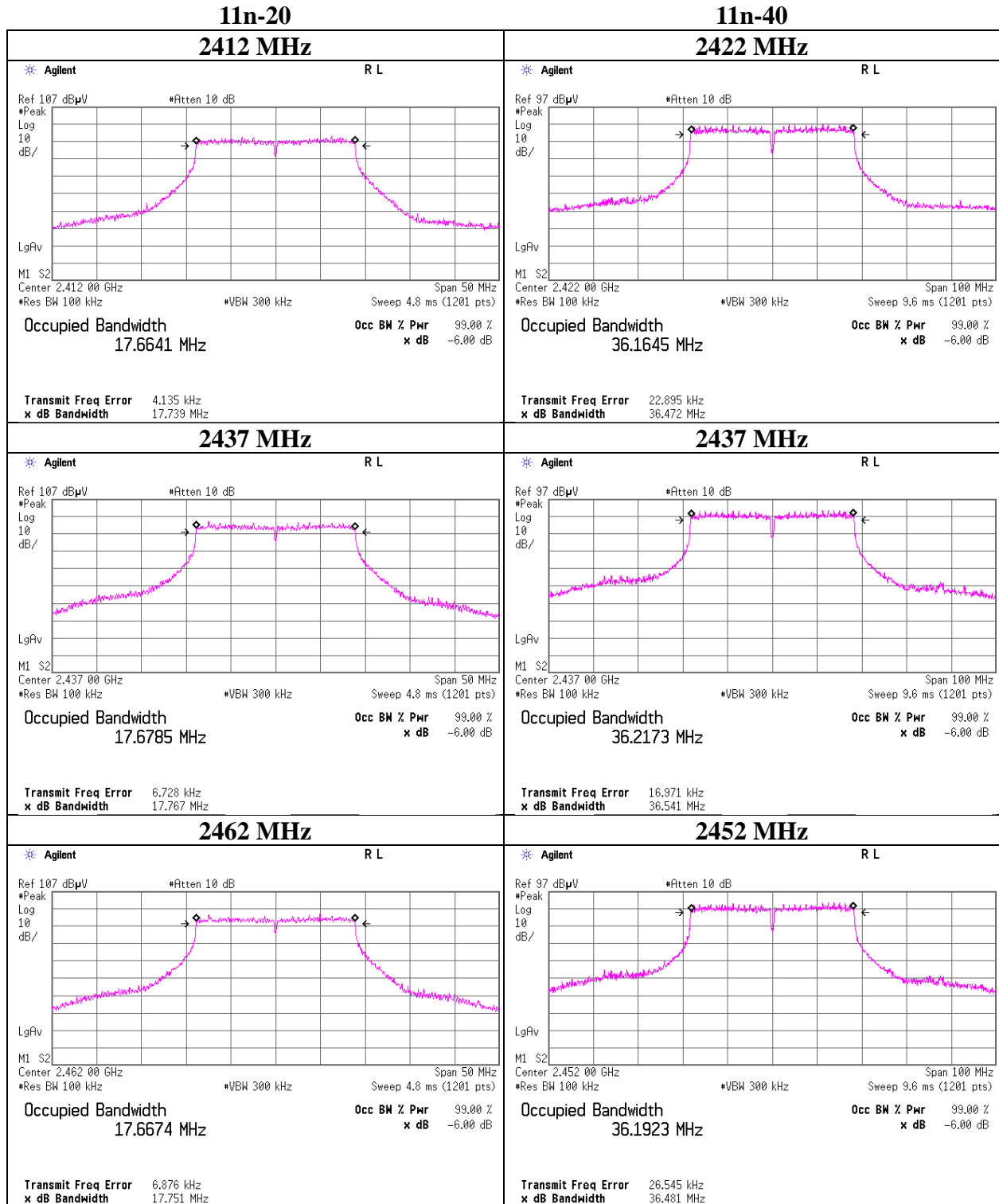
Test place Shonan EMC Lab. No.5 Shielded Room
Report No. 12170940S-A-R3
Date November 9, 2015
Temperature / Humidity 24 deg. C / 41 % RH
Engineer Yosuke Ishikawa
Mode Tx (AT1603 Display Separated Type(L2))

Mode	Frequency [MHz]	99% Occupied Bandwidth [kHz]	6dB Bandwidth [MHz]	Limit for 6dB Bandwidth [MHz]
11b	2412	13048.3	7.452	> 0.5000
	2437	13048.1	7.577	> 0.5000
	2462	12979.0	8.363	> 0.5000
11g	2412	17112.2	16.556	> 0.5000
	2437	17185.7	16.516	> 0.5000
	2462	17106.0	16.531	> 0.5000
11n-20	2412	18209.5	17.739	> 0.5000
	2437	18232.5	17.767	> 0.5000
	2462	18192.5	17.751	> 0.5000
11n-40	2422	37038.2	36.472	> 0.5000
	2437	37100.9	36.541	> 0.5000
	2452	37114.5	36.481	> 0.5000

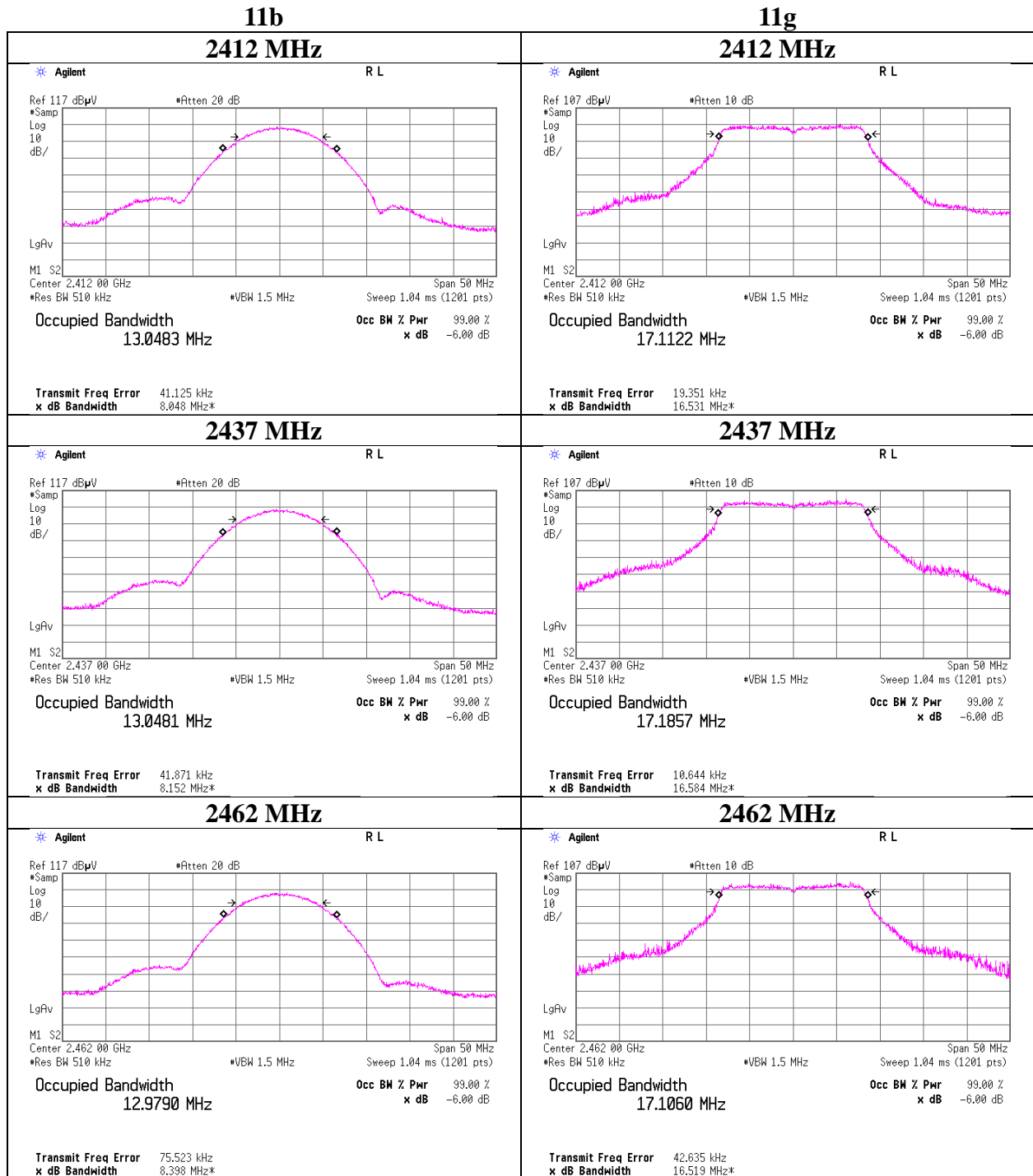
6dB Bandwidth



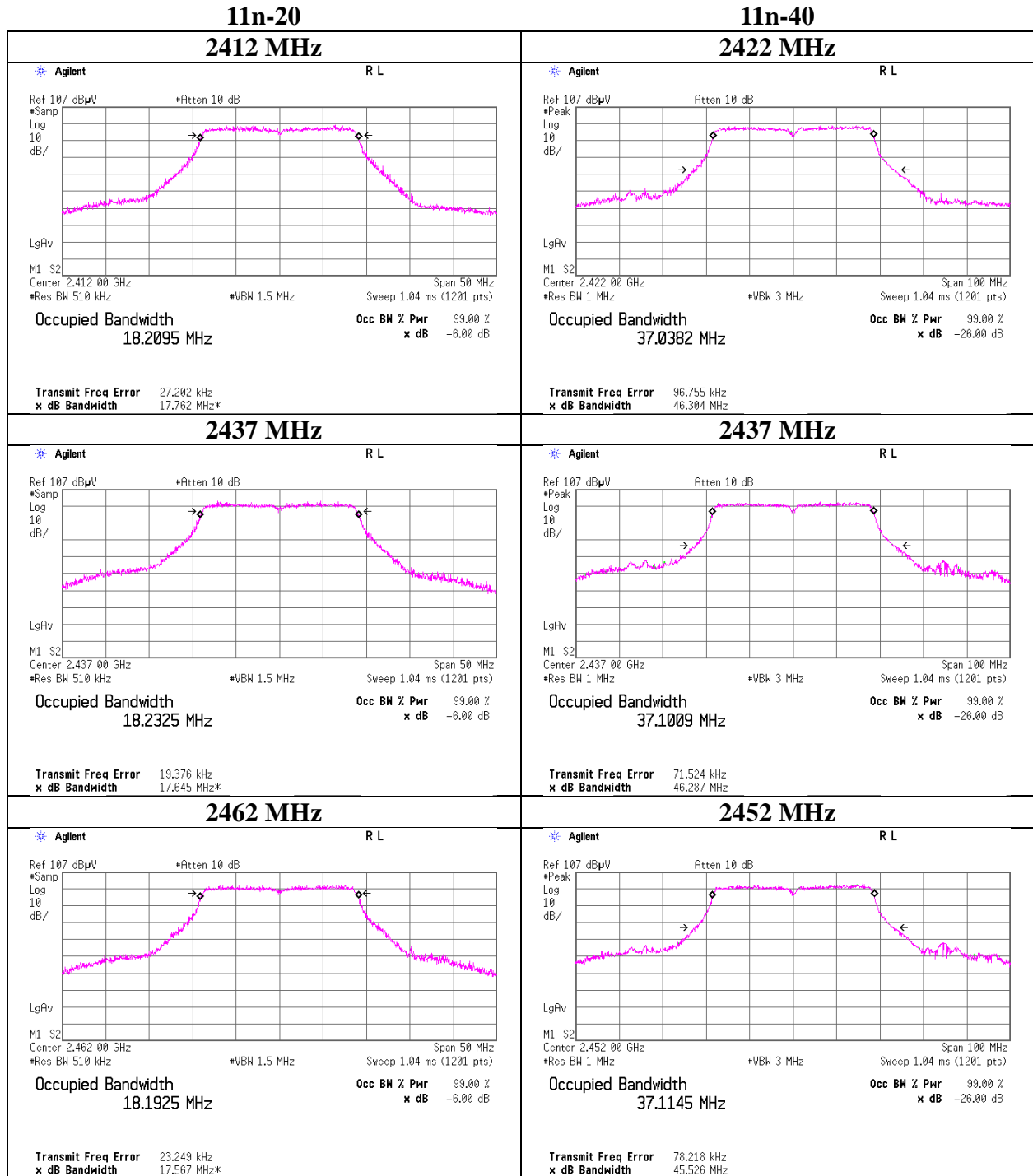
6dB Bandwidth



99% Occupied Bandwidth



99% Occupied Bandwidth



Maximum Peak Output Power

Test place : Shonan EMC Lab. No.5 Shielded Room
Report No. : 12170940S-A-R3
Date : October 27, 2015
Temperature / Humidity : 26 deg. C / 40 % RH
Engineer : Hiroyuki Morikawa
Mode : Tx 11b (AT1603 Display Combined Type(T2))

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result		Limit		Margin [dB]
				[dBm]	[mW]	[dBm]	[mW]	
2412	4.91	2.03	9.63	16.57	45.39	30.00	1000	13.43
2437	4.94	2.04	9.63	16.61	45.81	30.00	1000	13.39
2462	4.84	2.05	9.63	16.52	44.87	30.00	1000	13.48

Sample Calculation:

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

2412MHz

Rate [Mbps]	Reading [dBm]	Remark
1	4.72	
2	4.90	
5.5	4.90	
11	4.91	*

*: Worst Rate

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

Maximum Peak Output Power

Test place : Shonan EMC Lab. No.5 Shielded Room
Report No. : 12170940S-A-R3
Date : October 27, 2015
Temperature / Humidity : 26 deg. C / 40 % RH
Engineer : Hiroyuki Morikawa
Mode : Tx 11g (AT1603 Display Combined Type(T2))

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result		Limit		Margin [dB]
				[dBm]	[mW]	[dBm]	[mW]	
2412	7.20	2.03	9.63	18.86	76.91	30.00	1000	11.14
2437	10.00	2.04	9.63	21.67	146.89	30.00	1000	8.33
2462	9.88	2.05	9.63	21.56	143.22	30.00	1000	8.44

Sample Calculation:

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

2412 MHz

Rate [Mbps]	Reading [dBm]	Remark
6	2.67	
9	2.65	
12	2.57	
18	2.78	
24	7.19	
36	7.19	
48	6.24	
54	7.20	*

*: Worst Rate

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

Maximum Peak Output Power

Test place : Shonan EMC Lab. No.5 Shielded Room
Report No. : 12170940S-A-R3
Date : October 27, 2015
Temperature / Humidity : 26 deg. C / 40 % RH
Engineer : Hiroyuki Morikawa
Mode : Tx 11n-20 (AT1603 Display Combined Type(T2))

800 ns GI

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result		Limit		Margin [dB]
				[dBm]	[mW]	[dBm]	[mW]	
2412	6.71	2.03	9.63	18.37	68.71	30.00	1000	11.63
2437	9.61	2.04	9.63	21.28	134.28	30.00	1000	8.72
2462	9.34	2.05	9.63	21.02	126.47	30.00	1000	8.98

Sample Calculation:

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

Maximum Peak Output Power

Test place : Shonan EMC Lab. No.5 Shielded Room
Report No. : 12170940S-A-R3
Date : October 27, 2015
Temperature / Humidity : 26 deg. C / 40 % RH
Engineer : Hiroyuki Morikawa
Mode : Tx 11n-20 (AT1603 Display Combined Type(T2))

800 ns GI, 2412 MHz

MCS Number	Reading [dBm]	Remark
0	2.02	
1	1.76	
2	1.96	
3	6.68	
4	6.45	
5	6.10	
6	6.71	*
7	6.32	

* Worst MCS

400 ns GI, 2412 MHz

MCS Number	Reading [dBm]	Remark
16	2.01	
17	1.75	
18	1.95	
19	6.67	
20	6.45	
21	6.08	
22	6.69	
23	6.30	

Maximum Peak Output Power

Test place Shonan EMC Lab. No.5 Shielded Room
Report No. 12170940S-A-R3
Date October 27, 2015
Temperature / Humidity 26 deg. C / 40 % RH
Engineer Hiroyuki Morikawa
Mode Tx 11n-40 (AT1603 Display Combined Type(T2))

800 ns GI

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result		Limit		Margin [dB]
				[dBm]	[mW]	[dBm]	[mW]	
2422	6.45	2.03	9.63	18.11	64.71	30.00	1000	11.89
2437	9.35	2.04	9.63	21.02	126.47	30.00	1000	8.98
2452	9.28	2.04	9.63	20.95	124.45	30.00	1000	9.05

Sample Calculation:

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

Maximum Peak Output Power

Test place : Shonan EMC Lab. No.5 Shielded Room
Report No. : 12170940S-A-R3
Date : October 27, 2015
Temperature / Humidity : 26 deg. C / 40 % RH
Engineer : Hiroyuki Morikawa
Mode : Tx 11n-40 (AT1603 Display Combined Type(T2))

800 ns GI, 2422 MHz

MCS Number	Reading [dBm]	Remark
0	1.36	
1	1.55	
2	1.37	
3	5.20	
4	5.80	
5	5.87	
6	5.38	
7	6.45	*

* Worst MCS

400 ns GI, 2422 MHz

MCS Number	Reading [dBm]	Remark
16	1.35	
17	1.54	
18	1.33	
19	5.18	
20	5.79	
21	5.86	
22	5.37	
23	6.42	

Maximum Peak Output Power

Test place : Shonan EMC Lab. No.5 Shielded Room
Report No. : 12170940S-A-R3
Date : November 9, 2015
Temperature / Humidity : 24 deg. C / 41 % RH
Engineer : Yosuke Ishikawa
Mode : Tx 11b (AT1603 Display Separated Type(L2))

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result		Limit		Margin [dB]
				[dBm]	[mW]	[dBm]	[mW]	
2412	4.49	2.03	10.01	16.53	44.98	30.00	1000	13.47
2437	4.44	2.04	10.01	16.49	44.57	30.00	1000	13.51
2462	4.21	2.05	10.01	16.27	42.36	30.00	1000	13.73

Sample Calculation:

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

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

2437MHz

Rate [Mbps]	Reading [dBm]	Remark
1	4.13	
2	4.41	
5.5	4.39	
11	4.44	*

*: Worst Rate

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

Maximum Peak Output Power

Test place : Shonan EMC Lab. No.5 Shielded Room
Report No. : 12170940S-A-R3
Date : November 9, 2015
Temperature / Humidity : 24 deg. C / 41 % RH
Engineer : Yosuke Ishikawa
Mode : Tx 11g (AT1603 Display Separated Type(L2))

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result		Limit		Margin [dB]
				[dBm]	[mW]	[dBm]	[mW]	
2412	7.01	2.03	10.01	19.05	80.35	30.00	1000	10.95
2437	9.58	2.04	10.01	21.63	145.55	30.00	1000	8.37
2462	9.28	2.05	10.01	21.34	136.14	30.00	1000	8.66

Sample Calculation:

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

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

2437 MHz

Rate [Mbps]	Reading [dBm]	Remark
6	5.74	
9	5.68	
12	5.71	
18	5.94	
24	9.43	
36	9.58	*
48	8.83	
54	9.42	

*: Worst Rate

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

Maximum Peak Output Power

Test place : Shonan EMC Lab. No.5 Shielded Room
Report No. : 12170940S-A-R3
Date : November 9, 2015
Temperature / Humidity : 24 deg. C / 41 % RH
Engineer : Yosuke Ishikawa
Mode : Tx 11n-20 (AT1603 Display Separated Type(L2))

800 ns GI

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result		Limit		Margin [dB]
				[dBm]	[mW]	[dBm]	[mW]	
2412	6.41	2.03	10.01	18.45	69.98	30.00	1000	11.55
2437	9.20	2.04	10.01	21.25	133.35	30.00	1000	8.75
2462	8.86	2.05	10.01	20.92	123.59	30.00	1000	9.08

Sample Calculation:

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

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

800 ns GI, 2437 MHz

Mode [MCS]	Reading [dBm]	Remark
0	4.87	
1	4.75	
2	4.86	
3	9.02	
4	9.20	*
5	8.58	
6	9.18	
7	9.10	

400 ns GI, 2437 MHz

Mode [MCS]	Reading [dBm]	Remark
0	4.97	
1	4.53	
2	4.64	
3	8.96	
4	8.90	
5	8.51	
6	9.12	
7	8.62	

*: Worst Mode

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

Maximum Peak Output Power

Test place : Shonan EMC Lab. No.5 Shielded Room
Report No. : 12170940S-A-R3
Date : November 9, 2015
Temperature / Humidity : 24 deg. C / 41 % RH
Engineer : Yosuke Ishikawa
Mode : Tx 11n-40 (AT1603 Display Separated Type(L2))

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result		Limit		Margin [dB]
				[dBm]	[mW]	[dBm]	[mW]	
2422	5.68	2.03	10.01	17.72	59.16	30.00	1000	12.28
2437	8.77	2.04	10.01	20.82	120.78	30.00	1000	9.18
2452	8.95	2.04	10.01	21.00	125.89	30.00	1000	9.00

Sample Calculation:

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

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

800 ns GI, 2437 MHz

Mode [MCS]	Reading [dBm]	Remark
0	4.70	
1	4.53	
2	4.46	
3	8.24	
4	8.62	
5	8.67	
6	8.18	
7	8.77	*

400 ns GI, 2437 MHz

Mode [MCS]	Reading [dBm]	Remark
0	4.56	
1	4.54	
2	4.58	
3	8.30	
4	8.40	
5	8.63	
6	8.37	
7	8.74	

*: Worst Mode

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

Average Output Power
(Reference data for RF Exposure)

Test place : Shonan EMC Lab. No.5 Shielded Room
Report No. : 12170940S-A-R3
Date : October 27, 2015
Temperature / Humidity : 26 deg. C / 40 % RH
Engineer : Hiroyuki Morikawa
Mode : Tx (AT1603 Display Combined Type(T2))

11b 5.5 Mbps

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Frame power)		Duty factor [dB]	Result (Burst power)	
				[dBm]	[mW]		[dBm]	[mW]
2412	2.44	2.03	9.63	14.10	25.70	0.01	14.11	25.76
2437	2.47	2.04	9.63	14.14	25.94	0.01	14.15	26.00
2462	2.24	2.05	9.63	13.92	24.66	0.01	13.93	24.72

11g 54 Mbps

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Frame power)		Duty factor [dB]	Result (Burst power)	
				[dBm]	[mW]		[dBm]	[mW]
2412	-3.75	2.03	9.63	7.91	6.18	0.15	8.06	6.40
2437	-0.14	2.04	9.63	11.53	14.22	0.15	11.68	14.72
2462	-0.18	2.05	9.63	11.50	14.13	0.15	11.65	14.62

11n-20 MCS 4 (800 ns GI)

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Frame power)		Duty factor [dB]	Result (Burst power)	
				[dBm]	[mW]		[dBm]	[mW]
2412	-4.63	2.03	9.63	7.03	5.05	0.11	7.14	5.18
2437	-1.09	2.04	9.63	10.58	11.43	0.11	10.69	11.72
2462	-1.19	2.05	9.63	10.49	11.19	0.11	10.60	11.48

11n-40 MCS 7 (800 ns GI)

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Frame power)		Duty factor [dB]	Result (Burst power)	
				[dBm]	[mW]		[dBm]	[mW]
2422	-6.07	2.03	9.63	5.59	3.62	0.66	6.25	4.22
2437	-2.53	2.04	9.63	9.14	8.20	0.66	9.80	9.55
2452	-2.67	2.04	9.63	9.00	7.94	0.66	9.66	9.25

Sample Calculation:

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

Result (Burst power) = Frame power + Duty factor

Average Output Power
(Reference data for RF Exposure)

Test place : Shonan EMC Lab. No.5 Shielded Room
Report No. : 12170940S-A-R3
Date : October 27, 2015
Temperature / Humidity : 26 deg. C / 40 % RH
Engineer : Hiroyuki Morikawa
Mode : Tx (AT1603 Display Combined Type(T2))

2412 MHz

Mode	Rate Mbps	Reading [dBm]	Duty factor [dB]	Burst power [dBm]	Remarks
11b	1	2.02	0.00	2.02	
	2	2.30	0.00	2.30	
	5.5	2.44	0.01	2.45	*
	11	2.32	0.03	2.35	
11g	6	-4.11	0.02	-4.09	
	9	-4.00	0.02	-3.98	
	12	-4.19	0.03	-4.16	
	18	-4.27	0.05	-4.22	
	24	-3.79	0.07	-3.72	
	36	-3.73	0.10	-3.63	
	48	-3.84	0.13	-3.71	
	54	-3.75	0.15	-3.60	*

* Worst rate

Sample Calculation:

$$\text{Burst power} = \text{Reading (timed average)} + \text{Duty factor}$$

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

11n-20, 2412 MHz

Mode	Rate MCS	Reading [dBm]	Duty factor [dB]	Burst power [dBm]	Remarks
800 ns	0	-5.10	0.02	-5.08	
	1	-5.21	0.03	-5.18	
	2	-5.16	0.06	-5.10	
	3	-4.71	0.07	-4.64	
	4	-4.63	0.11	-4.52	*
	5	-4.70	0.14	-4.56	
	6	-4.74	0.16	-4.58	
	7	-4.73	0.19	-4.54	
400 ns	0	-5.12	0.02	-5.10	
	1	-5.22	0.03	-5.19	
	2	-5.18	0.06	-5.12	
	3	-4.72	0.07	-4.65	
	4	-4.66	0.11	-4.55	
	5	-4.71	0.14	-4.57	
	6	-4.75	0.16	-4.59	
	7	-4.74	0.19	-4.55	

* Worst rate

Sample Calculation:

$$\text{Burst power} = \text{Reading (timed average)} + \text{Duty factor}$$

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

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Average Output Power
(Reference data for RF Exposure)

Test place : Shonan EMC Lab. No.5 Shielded Room
Report No. : 12170940S-A-R3
Date : October 27, 2015
Temperature / Humidity : 26 deg. C / 40 % RH
Engineer : Hiroyuki Morikawa
Mode : Tx (AT1603 Display Combined Type(T2))

11n-40, 2422MHz

Mode	Rate	Reading	Duty factor	Burst power	Remarks
	MCS	[dBm]	[dB]	[dBm]	
800 ns	0	-5.82	0.08	-5.74	
	1	-5.86	0.15	-5.71	
	2	-5.94	0.23	-5.71	
	3	-5.71	0.29	-5.42	
	4	-5.93	0.42	-5.51	
	5	-6.12	0.54	-5.58	
	6	-6.16	0.63	-5.53	
	7	-6.07	0.66	-5.41	*
400 ns	0	-5.84	0.08	-5.76	
	1	-5.88	0.15	-5.73	
	2	-5.95	0.23	-5.72	
	3	-5.72	0.29	-5.43	
	4	-5.94	0.42	-5.52	
	5	-6.13	0.54	-5.59	
	6	-6.18	0.63	-5.55	
	7	-6.08	0.66	-5.42	

* Worst rate

Sample Calculation:

$$\text{Burst power} = \text{Reading (timed average)} + \text{Duty factor}$$

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

Average Output Power
(Reference data for RF Exposure)

Test place : Shonan EMC Lab. No.5 Shielded Room
Report No. : 12170940S-A-R3
Date : November 9, 2015
Temperature / Humidity : 24 deg. C / 41 % RH
Engineer : Yosuke Ishikawa
Mode : Tx (AT1603 Display Separated Type(L2))

11b 11 Mbps

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Frame power)		Duty factor [dB]	Result (Burst power)	
				[dBm]	[mW]		[dBm]	[mW]
2412	1.94	2.03	10.01	13.98	25.00	0.03	14.01	25.18
2437	1.89	2.04	10.01	13.94	24.77	0.03	13.97	24.95
2462	1.51	2.05	10.01	13.57	22.75	0.03	13.60	22.91

11g 36 Mbps

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Frame power)		Duty factor [dB]	Result (Burst power)	
				[dBm]	[mW]		[dBm]	[mW]
2412	-4.28	2.03	10.01	7.76	5.97	0.11	7.87	6.12
2437	-0.55	2.04	10.01	11.50	14.13	0.11	11.61	14.49
2462	-0.73	2.05	10.01	11.33	13.58	0.11	11.44	13.93

11n-20 MCS 4 (800 ns GI)

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Frame power)		Duty factor [dB]	Result (Burst power)	
				[dBm]	[mW]		[dBm]	[mW]
2412	-5.12	2.03	10.01	6.92	4.92	0.11	7.03	5.05
2437	-1.60	2.04	10.01	10.45	11.09	0.11	10.56	11.38
2462	-1.80	2.05	10.01	10.26	10.62	0.11	10.37	10.89

11n-40 MCS 7 (800 ns GI)

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Frame power)		Duty factor [dB]	Result (Burst power)	
				[dBm]	[mW]		[dBm]	[mW]
2422	-6.05	2.03	10.01	5.99	3.97	0.67	6.66	4.63
2437	-3.01	2.04	10.01	9.04	8.02	0.67	9.71	9.35
2452	-3.14	2.04	10.01	8.91	7.78	0.67	9.58	9.08

Sample Calculation:

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

Result (Burst power) = Frame power + Duty factor

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

Average Output Power
(Reference data for RF Exposure)

Test place : Shonan EMC Lab. No.5 Shielded Room
Report No. : 12170940S-A-R3
Date : November 9, 2015
Temperature / Humidity : 24 deg. C / 41 % RH
Engineer : Yosuke Ishikawa
Mode : Tx (AT1603 Display Separated Type(L2))

2437 MHz

Mode	Rate Mbps	Reading [dBm]	Duty factor [dB]	Burst power [dBm]	Remarks
11b	1	1.52	0.00	1.52	
	2	1.78	0.00	1.78	
	5.5	1.87	0.01	1.88	
	11	1.89	0.03	1.92	*
11g	6	-0.90	0.02	-0.88	
	9	-0.94	0.03	-0.91	
	12	-0.93	0.04	-0.89	
	18	-0.97	0.05	-0.92	
	24	-0.55	0.07	-0.48	
	36	-0.55	0.11	-0.44	*
	48	-0.63	0.13	-0.50	
	54	-0.64	0.16	-0.48	

* Worst rate

Sample Calculation:

$$\text{Burst power} = \text{Reading (timed average)} + \text{Duty factor}$$

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

11n-20, 2437 MHz

GI	Mode MCS	Reading [dBm]	Duty factor [dB]	Burst power [dBm]	Remarks
800 ns	0	-2.08	0.02	-2.06	
	1	-2.08	0.04	-2.04	
	2	-2.14	0.06	-2.08	
	3	-1.58	0.08	-1.50	
	4	-1.60	0.11	-1.49	*
	5	-1.64	0.14	-1.50	
	6	-1.67	0.17	-1.50	
	7	-1.68	0.18	-1.50	
400 ns	0	-2.02	0.02	-2.00	
	1	-2.13	0.04	-2.09	
	2	-2.15	0.06	-2.09	
	3	-1.59	0.08	-1.51	
	4	-1.62	0.11	-1.51	
	5	-1.64	0.14	-1.50	
	6	-1.67	0.17	-1.50	
	7	-1.68	0.18	-1.50	

* Worst Mode

Sample Calculation:

$$\text{Burst power} = \text{Reading (timed average)} + \text{Duty factor}$$

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

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Average Output Power
(Reference data for RF Exposure)

Test place Shonan EMC Lab. No.5 Shielded Room
Report No. 12170940S-A-R3
Date November 9, 2015
Temperature / Humidity 24 deg. C / 41 % RH
Engineer Yosuke Ishikawa
Mode Tx (AT1603 Display Separated Type(L2))

11n-40, 2437 MHz

GI	Mode	Reading	Duty factor	Burst power	Remarks
	MCS	[dBm]	[dB]	[dBm]	
800 ns	0	-2.61	0.07	-2.54	
	1	-2.68	0.16	-2.52	
	2	-2.76	0.22	-2.54	
	3	-2.69	0.30	-2.39	
	4	-2.78	0.41	-2.37	
	5	-2.94	0.54	-2.40	
	6	-2.99	0.63	-2.36	
	7	-3.01	0.67	-2.34	*
400 ns	0	-2.62	0.07	-2.55	
	1	-2.70	0.16	-2.54	
	2	-2.78	0.22	-2.56	
	3	-2.67	0.30	-2.37	
	4	-2.79	0.41	-2.38	
	5	-2.91	0.54	-2.37	
	6	-3.04	0.63	-2.41	
	7	-3.08	0.67	-2.41	

* Worst Mode

Sample Calculation:

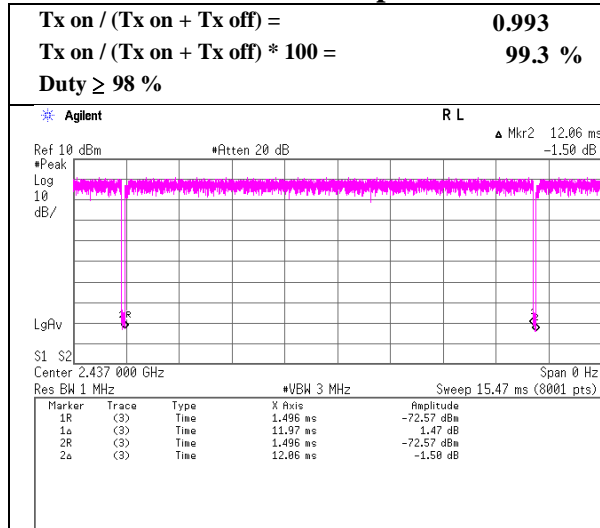
$$\text{Burst power} = \text{Reading (timed average)} + \text{Duty factor}$$

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

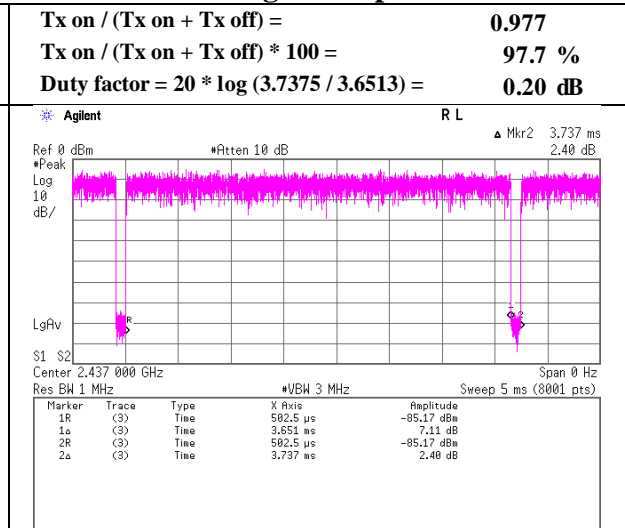
Burst rate confirmation

Test place	Shonan EMC Lab. No.5 Shielded Room
Report No.	12170940S-A-R3
Date	November 9, 2015
Temperature / Humidity	24 deg. C / 41 % RH
Engineer	Yosuke Ishikawa
Mode	Tx

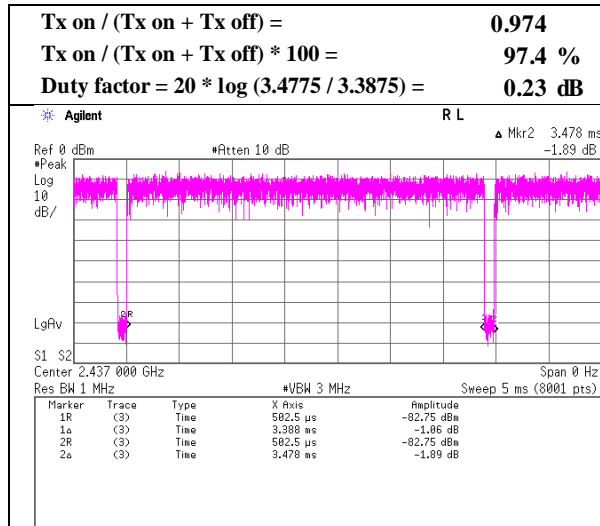
11b 11 Mbps



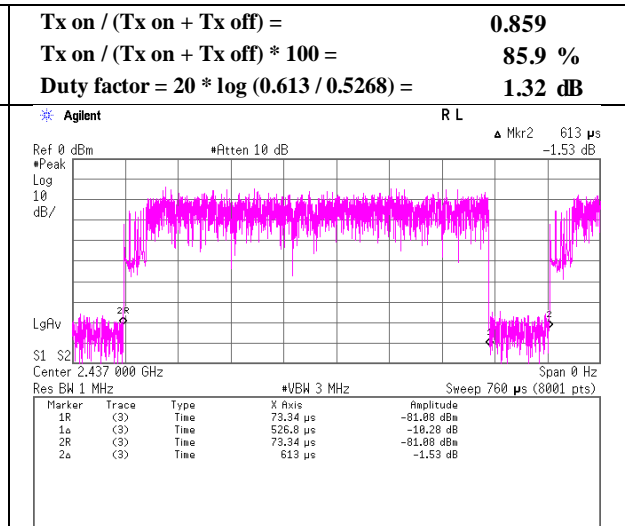
11g 36 Mbps



11n-20 MCS 4



11n-40 MCS 7



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

Radiated Spurious Emission

Report No. 12170940S-A-R3
Test place Shonan EMC Lab.
Semi Anechoic Chamber 3 3
Date February 9, 2018 February 13, 2018 February 15, 2018
Temperature / Humidity 23 deg. C / 33 % RH 22 deg. C / 30 % RH 21 deg. C / 30 % RH
Engineer Kazuya Noda Hiroyuki Morikawa Shiro Kobayashi
(1 GHz – 2.8 GHz) (2.8 GHz – 13 GHz) (13 GHz – 26.5 GHz)
Mode Tx 11b 2412 MHz

(* PK: Peak, AV: Average, QP: Quasi-Peak)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	1594.562	PK	49.51	25.20	13.37	37.21	2.17	53.04	73.90	20.8	241	310	
Hori.	2390.000	PK	44.68	27.26	14.15	36.83	2.17	51.43	73.90	22.4	157	337	
Hori.	3531.487	PK	50.21	28.88	6.21	36.73	2.17	50.74	73.90	23.1	172	243	
Hori.	4824.000	PK	47.27	31.46	6.69	37.00	2.17	50.59	73.90	23.3	128	357	
Hori.	7236.000	PK	44.68	36.62	8.24	37.83	2.17	53.88	73.90	20.0	150	1	
Hori.	1594.562	AV	38.31	25.20	13.37	37.21	2.17	41.84	53.90	12.0	241	310	
Hori.	2390.000	AV	35.75	27.26	14.15	36.83	2.17	42.50	53.90	11.4	157	337	
Hori.	3531.487	AV	45.54	28.88	6.21	36.73	2.17	46.07	53.90	7.8	172	243	
Hori.	4824.000	AV	38.36	31.46	6.69	37.00	2.17	41.68	53.90	12.2	128	357	
Hori.	7236.000	AV	35.47	36.62	8.24	37.83	2.17	44.67	53.90	9.2	150	1	
Vert.	1594.565	PK	46.61	25.20	13.37	37.21	2.17	50.14	73.90	23.7	178	349	
Vert.	2390.000	PK	45.34	27.26	14.15	36.83	2.17	52.09	73.90	21.8	180	25	
Vert.	3531.486	PK	49.85	28.88	6.21	36.73	2.17	50.38	73.90	23.5	144	339	
Vert.	4824.000	PK	46.82	31.46	6.69	37.00	2.17	50.14	73.90	23.7	120	7	
Vert.	7236.000	PK	44.32	36.62	8.24	37.83	2.17	53.52	73.90	20.3	150	1	
Vert.	1594.565	AV	37.31	25.20	13.37	37.21	2.17	40.84	53.90	13.0	178	349	
Vert.	2390.000	AV	36.32	27.26	14.15	36.83	2.17	43.07	53.90	10.8	180	25	
Vert.	3531.486	AV	45.21	28.88	6.21	36.73	2.17	45.74	53.90	8.1	144	339	
Vert.	4824.000	AV	36.42	31.46	6.69	37.00	2.17	39.74	53.90	14.1	120	7	
Vert.	7236.000	AV	35.46	36.62	8.24	37.83	2.17	44.66	53.90	9.2	150	1	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 13 GHz : 20log (3.85 m / 3.0 m) = 2.17 dB

13 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

20 dBc Data Sheet (RBW 100 kHz, VBW 300 kHz)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2412.000	PK	91.05	27.33	14.16	36.82	2.17	97.89	-	-	Carrier
Hori.	2398.542	PK	48.48	27.28	14.15	36.83	2.17	55.25	77.89	22.6	
Hori.	2400.000	PK	46.24	27.29	14.15	36.83	2.17	53.02	77.89	24.9	
Hori.	9648.000	PK	39.44	38.66	9.27	38.53	2.17	51.01	77.89	26.9	
Vert.	2412.000	PK	90.70	27.33	14.16	36.82	2.17	97.54	-	-	Carrier
Vert.	2397.117	PK	48.46	27.28	14.15	36.83	2.17	55.23	77.54	22.3	
Vert.	2400.000	PK	46.41	27.29	14.15	36.83	2.17	53.19	77.54	24.4	
Vert.	9648.000	PK	39.79	38.66	9.27	38.53	2.17	51.36	77.54	26.2	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 13 GHz : 20log (3.85 m / 3.0 m) = 2.17 dB

13 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

UL Japan, Inc.

Shonan EMC Lab.

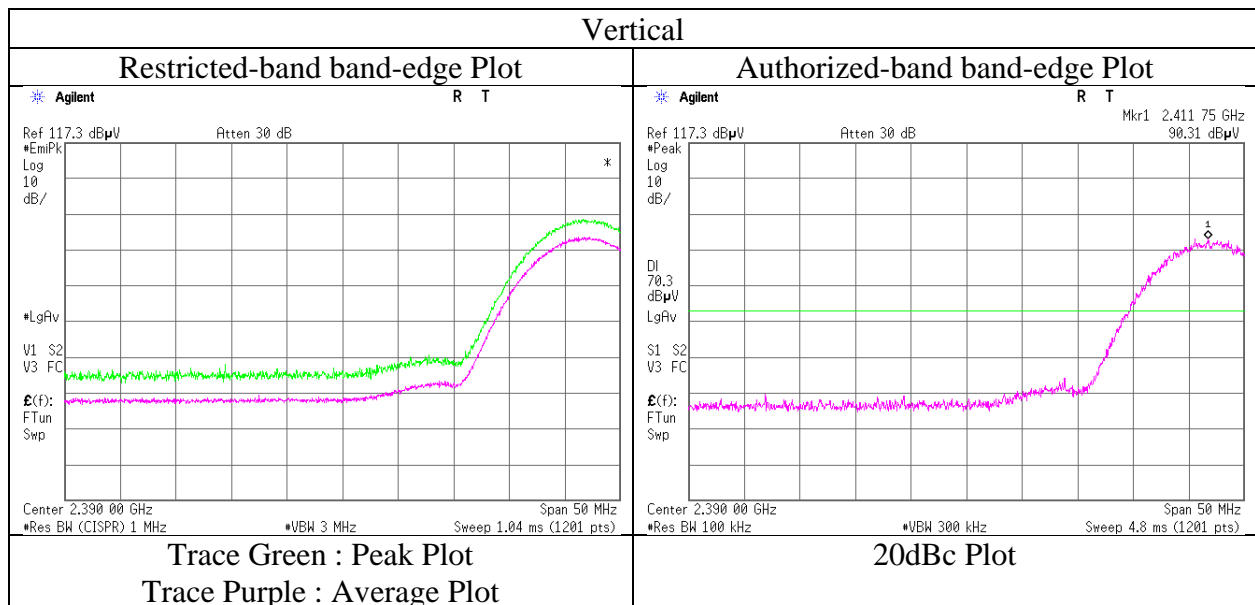
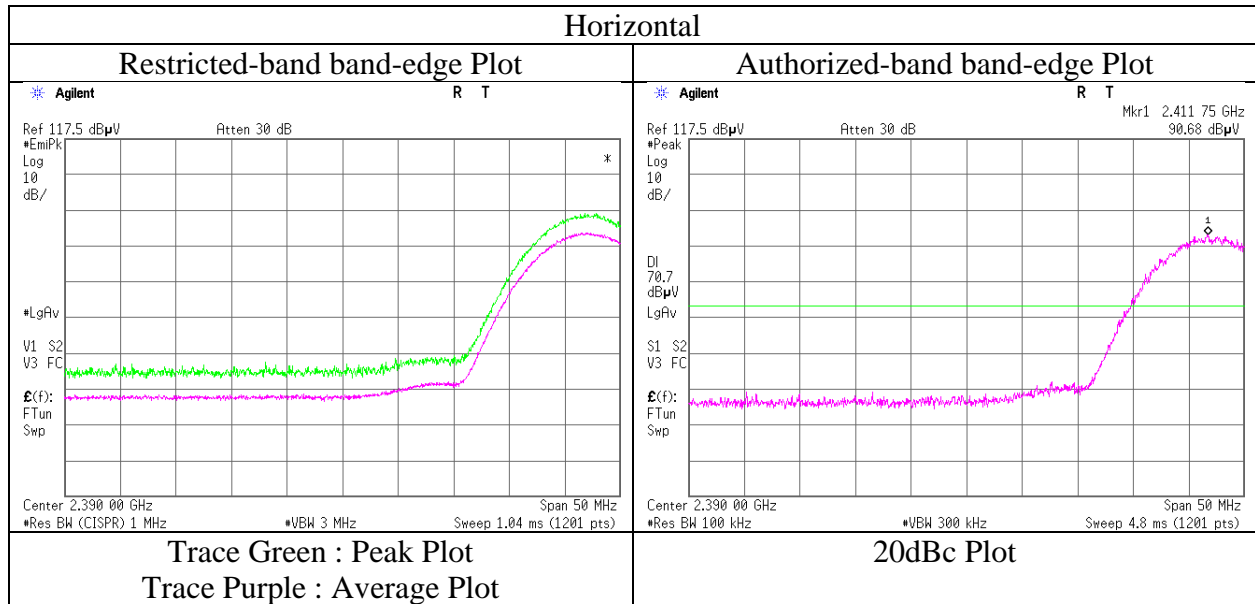
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Radiated Spurious Emission
(Reference Plot for band-edge)

Report No. 12170940S-A-R3
Test place Shonan EMC Lab.
Semi Anechoic Chamber 3
Date February 9, 2018
Temperature / Humidity 23 deg. C / 33 % RH
Engineer Kazuya Noda
(1 GHz – 2.8 GHz)
Mode Tx 11b 2412 MHz



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

Radiated Spurious Emission

Report No.	12170940S-A-R3		
Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	3	3	3
Date	February 9, 2018	February 13, 2018	February 15, 2018
Temperature / Humidity	23 deg. C / 33 % RH	22 deg. C / 30 % RH	21 deg. C / 30 % RH
Engineer	Kazuya Noda (1 GHz – 2.8 GHz)	Hiroyuki Morikawa (2.8 GHz – 13 GHz)	Shiro Kobayashi (13 GHz – 26.5 GHz)
Mode	Tx 11b 2437 MHz		

(* PK: Peak, AV: Average, QP: Quasi-Peak)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	1594.612	PK	49.41	25.20	13.37	37.21	2.17	52.94	73.90	20.9	242	310	
Hori.	3531.485	PK	48.36	28.88	6.21	36.73	2.17	48.89	73.90	25.0	172	243	
Hori.	4874.000	PK	47.54	31.59	6.69	37.03	2.17	50.96	73.90	22.9	124	357	
Hori.	7311.000	PK	45.02	36.75	8.25	37.87	2.17	54.32	73.90	19.5	150	1	
Hori.	1594.612	AV	37.91	25.20	13.37	37.21	2.17	41.44	53.90	12.4	242	310	
Hori.	3531.485	AV	42.92	28.88	6.21	36.73	2.17	43.45	53.90	10.4	172	243	
Hori.	4874.000	AV	38.31	31.59	6.69	37.03	2.17	41.73	53.90	12.1	124	357	
Hori.	7311.000	AV	35.14	36.75	8.25	37.87	2.17	44.44	53.90	9.4	150	1	
Vert.	1594.440	PK	47.22	25.20	13.37	37.21	2.17	50.75	73.90	23.1	164	348	
Vert.	3531.484	PK	50.19	28.88	6.21	36.73	2.17	50.72	73.90	23.1	144	338	
Vert.	4874.000	PK	46.43	31.59	6.69	37.03	2.17	49.85	73.90	24.0	111	5	
Vert.	7311.000	PK	45.69	36.75	8.25	37.87	2.17	54.99	73.90	18.9	150	1	
Vert.	1594.440	AV	36.87	25.20	13.37	37.21	2.17	40.40	53.90	13.5	164	348	
Vert.	3531.484	AV	46.20	28.88	6.21	36.73	2.17	46.73	53.90	7.1	144	338	
Vert.	4874.000	AV	36.62	31.59	6.69	37.03	2.17	40.04	53.90	13.8	111	5	
Vert.	7311.000	AV	34.84	36.75	8.25	37.87	2.17	44.14	53.90	9.7	150	1	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 13 GHz : $20\log(3.85\text{ m} / 3.0\text{ m}) = 2.17\text{ dB}$

13 GHz - 40 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

20 dBc Data Sheet (RBW 100 kHz, VBW 300 kHz)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2437.000	PK	89.72	27.40	14.20	36.81	2.17	96.68	-	-	Carrier
Hori.	9748.000	PK	39.75	38.78	9.31	38.65	2.17	51.36	76.68	25.3	
Vert.	2437.000	PK	90.01	27.40	14.20	36.81	2.17	96.97	-	-	Carrier
Vert.	9748.000	PK	39.81	38.78	9.31	38.65	2.17	51.42	76.97	25.6	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 13 GHz : $20\log(3.85\text{ m} / 3.0\text{ m}) = 2.17\text{ dB}$

13 GHz - 40 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

Radiated Spurious Emission

Report No.	12170940S-A-R3		
Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	3	3	3
Date	February 9, 2018	February 13, 2018	February 15, 2018
Temperature / Humidity	23 deg. C / 33 % RH	22 deg. C / 30 % RH	21 deg. C / 30 % RH
Engineer	Kazuya Noda	Hiroyuki Morikawa	Shiro Kobayashi
	(1 GHz – 2.8 GHz)	(2.8 GHz – 13 GHz)	(13 GHz – 26.5 GHz)
Mode	Tx 11b 2462 MHz		

(* PK: Peak, AV: Average, QP: Quasi-Peak)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	1594.566	PK	49.52	25.20	13.37	37.21	2.17	53.05	73.90	20.8	244	310	
Hori.	2483.500	PK	44.61	27.55	14.25	36.79	2.17	51.79	73.90	22.1	177	351	
Hori.	3531.486	PK	48.11	28.88	6.21	36.73	2.17	48.64	73.90	25.2	172	244	
Hori.	4924.000	PK	48.31	31.73	6.71	37.05	2.17	51.87	73.90	22.0	137	356	
Hori.	7386.000	PK	44.04	36.88	8.26	37.92	2.17	53.43	73.90	20.4	150	1	
Hori.	1594.566	AV	39.19	25.20	13.37	37.21	2.17	42.72	53.90	11.1	244	310	
Hori.	2483.500	AV	35.27	27.55	14.25	36.79	2.17	42.45	53.90	11.4	177	351	
Hori.	3531.486	AV	42.32	28.88	6.21	36.73	2.17	42.85	53.90	11.0	172	244	
Hori.	4924.000	AV	38.33	31.73	6.71	37.05	2.17	41.89	53.90	12.0	137	356	
Hori.	7386.000	AV	34.79	36.88	8.26	37.92	2.17	44.18	53.90	9.7	150	1	
Vert.	1594.562	PK	46.21	25.20	13.37	37.21	2.17	49.74	73.90	24.1	167	325	
Vert.	2483.500	PK	45.04	27.55	14.25	36.79	2.17	52.22	73.90	21.6	169	31	
Vert.	3531.485	PK	49.87	28.88	6.21	36.73	2.17	50.40	73.90	23.5	151	344	
Vert.	4924.000	PK	45.15	31.73	6.71	37.05	2.17	48.71	73.90	25.1	125	7	
Vert.	7386.000	PK	44.13	36.88	8.26	37.92	2.17	53.52	73.90	20.3	150	1	
Vert.	1594.562	AV	37.02	25.20	13.37	37.21	2.17	40.55	53.90	13.3	167	325	
Vert.	2483.500	AV	35.36	27.55	14.25	36.79	2.17	42.54	53.90	11.3	169	31	
Vert.	3531.485	AV	44.21	28.88	6.21	36.73	2.17	44.74	53.90	9.1	151	344	
Vert.	4924.000	AV	36.66	31.73	6.71	37.05	2.17	40.22	53.90	13.6	125	7	
Vert.	7386.000	AV	35.10	36.88	8.26	37.92	2.17	44.49	53.90	9.4	150	1	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 13 GHz : $20\log(3.85\text{ m} / 3.0\text{ m}) = 2.17\text{ dB}$

13 GHz - 40 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

20 dBc Data Sheet (RBW 100 kHz, VBW 300 kHz)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2462.000	PK	90.22	27.48	14.23	36.80	2.17	97.30	-	-	Carrier
Hori.	9848.000	PK	39.34	38.90	9.36	38.78	2.17	50.99	77.30	26.3	
Vert.	2462.000	PK	90.65	27.48	14.23	36.80	2.17	97.73	-	-	Carrier
Vert.	9848.000	PK	40.54	38.90	9.36	38.78	2.17	52.19	77.73	25.5	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 13 GHz : $20\log(3.85\text{ m} / 3.0\text{ m}) = 2.17\text{ dB}$

13 GHz - 40 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

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Shonan EMC Lab.

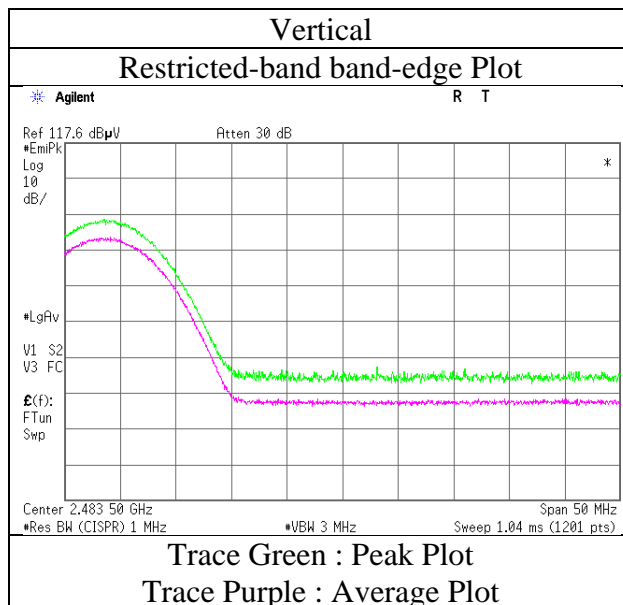
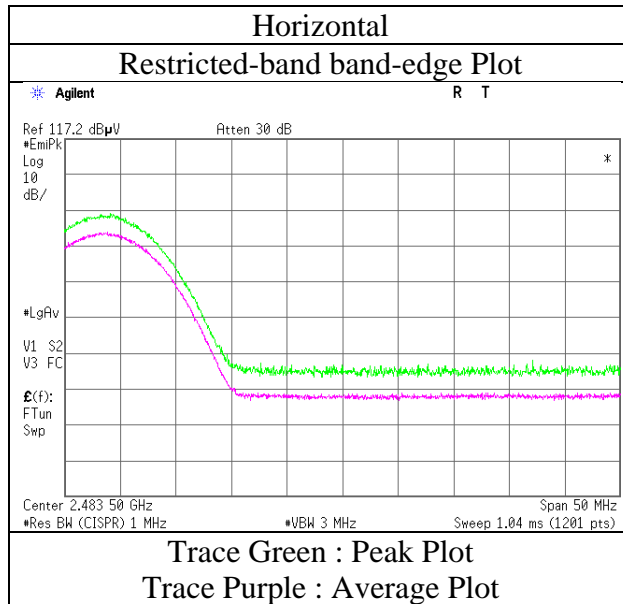
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone : +81 463 50 6400

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Radiated Spurious Emission
(Reference Plot for band-edge)

Report No. 12170940S-A-R3
Test place Shonan EMC Lab.
Semi Anechoic Chamber 3
Date February 9, 2018
Temperature / Humidity 23 deg. C / 33 % RH
Engineer Kazuya Noda
(1 GHz – 2.8 GHz)
Mode Tx 11b 2462 MHz



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

Radiated Spurious Emission

Report No.	12170940S-A-R3		
Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	3	3	3
Date	February 9, 2018	February 13, 2018	February 15, 2018
Temperature / Humidity	23 deg. C / 33 % RH	22 deg. C / 30 % RH	21 deg. C / 30 % RH
Engineer	Kazuya Noda (1 GHz – 2.8 GHz)	Hiroyuki Morikawa (2.8 GHz – 13 GHz)	Shiro Kobayashi (13 GHz – 26.5 GHz)
Mode	Tx 11g 2412 MHz		

(* PK: Peak, AV: Average, QP: Quasi-Peak)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	1594.491	PK	49.72	25.20	13.37	37.21	2.17	53.25	73.90	20.6	243	309	
Hori.	2390.000	PK	45.81	27.26	14.15	36.83	2.17	52.56	73.90	21.3	157	340	
Hori.	3531.484	PK	48.24	28.88	6.21	36.73	2.17	48.77	73.90	25.1	166	242	
Hori.	4824.000	PK	44.51	31.46	6.69	37.00	2.17	47.83	73.90	26.0	150	1	
Hori.	7236.000	PK	44.88	36.62	8.24	37.83	2.17	54.08	73.90	19.8	150	1	
Hori.	1594.491	AV	38.66	25.20	13.37	37.21	2.17	42.19	53.90	11.7	243	309	*1)
Hori.	3531.484	AV	42.16	28.88	6.21	36.73	2.17	42.69	53.90	11.2	166	242	*1)
Vert.	1594.491	PK	49.10	25.20	13.37	37.21	2.17	52.63	73.90	21.2	163	312	
Vert.	2390.000	PK	46.13	27.26	14.15	36.83	2.17	52.88	73.90	21.0	182	25	
Vert.	3531.485	PK	50.18	28.88	6.21	36.73	2.17	50.71	73.90	23.1	151	340	
Vert.	4824.000	PK	44.63	31.46	6.69	37.00	2.17	47.95	73.90	25.9	150	1	
Vert.	7236.000	PK	44.61	36.62	8.24	37.83	2.17	53.81	73.90	20.0	150	1	
Vert.	1594.491	AV	35.45	25.20	13.37	37.21	2.17	38.98	53.90	14.9	163	312	*1)
Vert.	3531.485	AV	46.38	28.88	6.21	36.73	2.17	46.91	53.90	6.9	151	340	*1)

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 13 GHz : 20log (3.85 m / 3.0 m) = 2.17 dB

13 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

*1) Not apply duty factor, because duty cycle of this noise was above 98 %.

Average measurement value with duty factor

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2390.000	AV	34.00	27.26	14.15	36.83	0.20	2.17	40.95	53.90	13.0	*1)
Hori.	4824.000	AV	34.75	31.46	6.69	37.00	0.20	2.17	38.27	53.90	15.6	
Hori.	7236.000	AV	35.72	36.62	8.24	37.83	0.20	2.17	45.12	53.90	8.8	
Vert.	2390.000	AV	34.26	27.26	14.15	36.83	0.20	2.17	41.21	53.90	12.7	*1)
Vert.	4824.000	AV	34.61	31.46	6.69	37.00	0.20	2.17	38.13	53.90	15.8	
Vert.	7236.000	AV	35.50	36.62	8.24	37.83	0.20	2.17	44.90	53.90	9.0	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Duty factor + Distance factor

Distance factor : 1 GHz - 13 GHz : 20log (3.85 m / 3.0 m) = 2.17 dB

13 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

Duty factor refer to "Duty factor Calculation chart" sheet.

*1) Not out of band emission (Leakage Power)

20 dBc Data Sheet (RBW 100 kHz, VBW 300 kHz)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2412.000	PK	79.97	27.33	14.16	36.82	2.17	86.81	-	-	Carrier
Hori.	2400.000	PK	46.63	27.29	14.15	36.83	2.17	53.41	66.81	13.4	
Hori.	9648.000	PK	37.81	38.66	9.27	38.53	2.17	49.38	66.81	17.4	
Vert.	2412.000	PK	81.09	27.33	14.16	36.82	2.17	87.93	-	-	Carrier
Vert.	2400.000	PK	48.82	27.29	14.15	36.83	2.17	55.60	67.93	12.3	
Vert.	9648.000	PK	37.96	38.66	9.27	38.53	2.17	49.53	67.93	18.4	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 13 GHz : 20log (3.85 m / 3.0 m) = 2.17 dB

13 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

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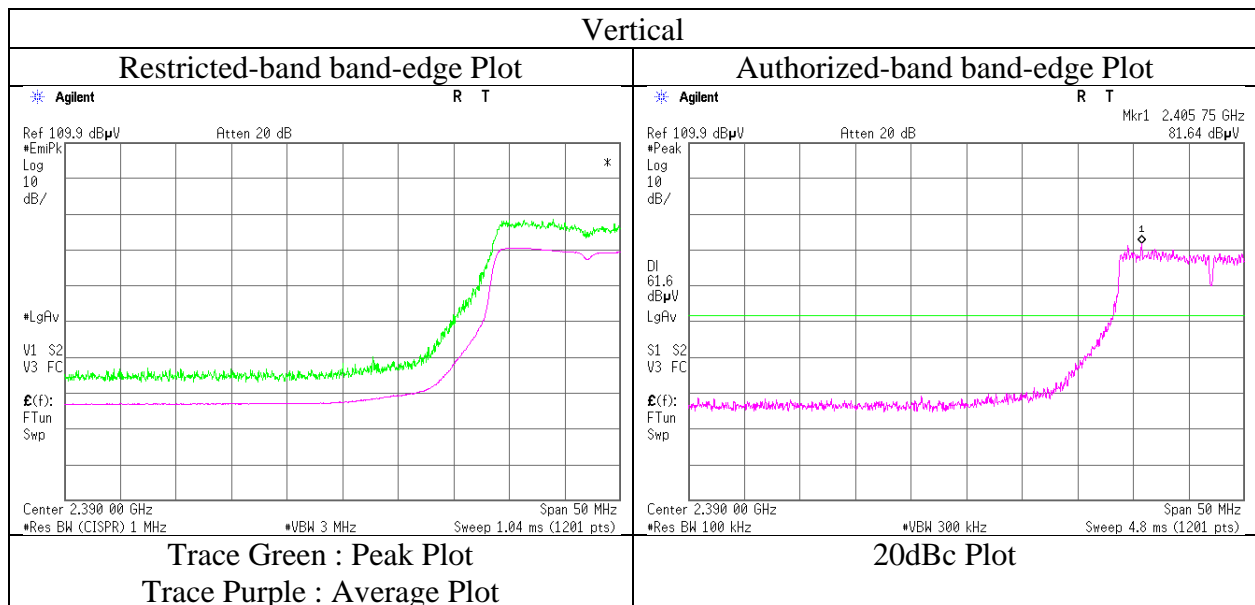
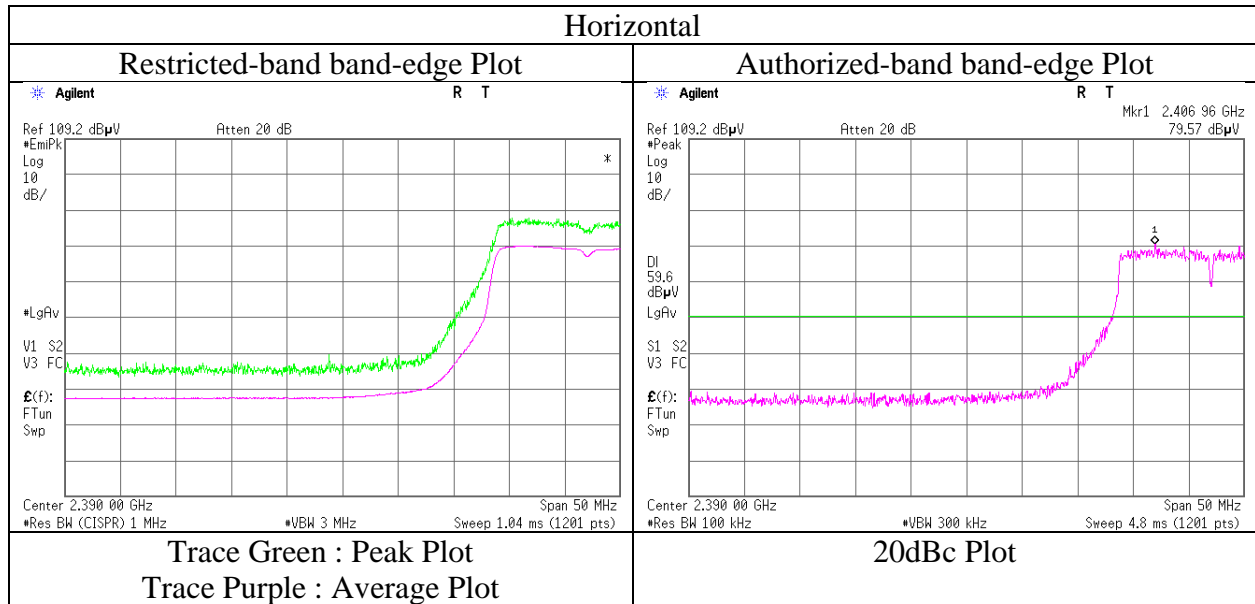
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Radiated Spurious Emission
(Reference Plot for band-edge)

Report No. 12170940S-A-R3
Test place Shonan EMC Lab.
Semi Anechoic Chamber 3
Date February 9, 2018
Temperature / Humidity 23 deg. C / 33 % RH
Engineer Kazuya Noda
(1 GHz – 2.8 GHz)
Mode Tx 11g 2412 MHz



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

Radiated Spurious Emission

Report No. 12170940S-A-R3
Test place Shonan EMC Lab.
Semi Anechoic Chamber 3 3 3 3
Date February 8, 2018 February 9, 2018 February 13, 2018 February 15, 2018
Temperature / Humidity 24 deg. C / 31 % RH 23 deg. C / 33 % RH 22 deg. C / 30 % RH 21 deg. C / 30 % RH
Engineer Kazuya Noda Kazuya Noda Hiroyuki Morikawa Shiro Kobayashi
(30 MHz - 1 GHz) (1 GHz - 2.8 GHz) (2.8 GHz - 13 GHz) (13 GHz - 26.5 GHz)
Mode Tx 11g 2437 MHz

(* PK: Peak, AV: Average, QP: Quasi-Peak)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	181.245	QP	37.08	16.07	7.97	32.01	0.00	29.11	43.50	14.3	235	241	
Hori.	269.997	QP	41.02	12.28	8.56	31.92	0.00	29.94	46.00	16.0	174	231	
Hori.	372.062	QP	38.85	14.82	9.09	31.85	0.00	30.91	46.00	15.0	100	345	
Hori.	542.402	QP	37.77	18.13	9.80	31.88	0.00	33.82	46.00	12.1	100	188	
Hori.	658.565	QP	43.64	19.29	10.23	31.83	0.00	41.33	46.00	4.6	104	354	
Hori.	1594.565	PK	49.27	25.20	13.37	37.21	2.17	52.80	73.90	21.1	242	315	
Hori.	3531.487	PK	49.10	28.88	6.21	36.73	2.17	49.63	73.90	24.2	166	244	
Hori.	4874.000	PK	44.27	31.59	6.69	37.03	2.17	47.69	73.90	26.2	150	1	
Hori.	7311.000	PK	44.69	36.75	8.25	37.87	2.17	53.99	73.90	19.9	150	1	
Hori.	1594.565	AV	38.78	25.20	13.37	37.21	2.17	42.31	53.90	11.5	242	315	*1)
Hori.	3531.487	AV	43.04	28.88	6.21	36.73	2.17	43.57	53.90	10.3	166	244	*1)
Vert.	202.497	QP	41.17	11.51	8.16	31.99	0.00	28.85	43.50	14.6	100	137	
Vert.	269.999	QP	42.15	12.28	8.56	31.92	0.00	31.07	46.00	14.9	208	187	
Vert.	658.568	QP	43.75	19.29	10.23	31.83	0.00	41.44	46.00	4.5	131	355	
Vert.	960.277	QP	37.72	22.10	11.23	30.40	0.00	40.65	53.90	13.2	147	34	
Vert.	1594.562	PK	46.85	25.20	13.37	37.21	2.17	50.38	73.90	23.5	177	343	
Vert.	3531.488	PK	50.44	28.88	6.21	36.73	2.17	50.97	73.90	22.9	155	336	
Vert.	4874.000	PK	43.86	31.59	6.69	37.03	2.17	47.28	73.90	26.6	150	1	
Vert.	7311.000	PK	44.95	36.75	8.25	37.87	2.17	54.25	73.90	19.6	150	1	
Vert.	1594.562	AV	36.42	25.20	13.37	37.21	2.17	39.95	53.90	13.9	177	343	*1)
Vert.	3531.488	AV	46.22	28.88	6.21	36.73	2.17	46.75	53.90	7.1	155	336	*1)

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 13 GHz : 20log(3.85 m / 3.0 m) = 2.17 dB

13 GHz - 40 GHz : 20log(1.0 m / 3.0 m) = -9.54 dB

*1) Not apply duty factor, because duty cycle of this noise was above 98 %.

Average measurement value with duty factor

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	4874.000	AV	34.56	31.59	6.69	37.03	0.20	2.17	38.18	53.90	15.7	
Hori.	7311.000	AV	35.49	36.75	8.25	37.87	0.20	2.17	44.99	53.90	8.9	
Vert.	4874.000	AV	34.62	31.59	6.69	37.03	0.20	2.17	38.24	53.90	15.7	
Vert.	7311.000	AV	35.71	36.75	8.25	37.87	0.20	2.17	45.21	53.90	8.7	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Duty factor + Distance factor

Distance factor : 1 GHz - 13 GHz : 20log(3.85 m / 3.0 m) = 2.17 dB

13 GHz - 40 GHz : 20log(1.0 m / 3.0 m) = -9.54 dB

Duty factor refer to "Duty factor Calculation chart" sheet.

20 dBc Data Sheet (RBW 100 kHz, VBW 300 kHz)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2437.000	PK	83.68	27.40	14.20	36.81	2.17	90.64	-	-	Carrier
Hori.	9748.000	PK	37.84	38.78	9.31	38.65	2.17	49.45	70.64	21.2	
Vert.	2437.000	PK	83.82	27.40	14.20	36.81	2.17	90.78	-	-	Carrier
Vert.	9748.000	PK	38.24	38.78	9.31	38.65	2.17	49.85	70.78	20.9	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 13 GHz : 20log(3.85 m / 3.0 m) = 2.17 dB

13 GHz - 40 GHz : 20log(1.0 m / 3.0 m) = -9.54 dB

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Shonan EMC Lab.

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Radiated Spurious Emission

Report No.	12170940S-A-R3		
Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	3	3	3
Date	February 9, 2018	February 13, 2018	February 15, 2018
Temperature / Humidity	23 deg. C / 33 % RH	22 deg. C / 30 % RH	21 deg. C / 30 % RH
Engineer	Kazuya Noda (1 GHz – 2.8 GHz)	Hiroyuki Morikawa (2.8 GHz – 13 GHz)	Shiro Kobayashi (13 GHz – 26.5 GHz)
Mode	Tx 11g 2462 MHz		

(* PK: Peak, AV: Average, QP: Quasi-Peak)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	1594.568	PK	48.92	25.20	13.37	37.21	2.17	52.45	73.90	21.4	240	311	
Hori.	2483.500	PK	47.74	27.55	14.25	36.79	2.17	54.92	73.90	18.9	149	333	
Hori.	3531.484	PK	48.51	28.88	6.21	36.73	2.17	49.04	73.90	24.8	172	243	
Hori.	4924.000	PK	44.76	31.73	6.71	37.05	2.17	48.32	73.90	25.5	150	1	
Hori.	7386.000	PK	44.65	36.88	8.26	37.92	2.17	54.04	73.90	19.8	150	1	
Hori.	1594.568	AV	38.94	25.20	13.37	37.21	2.17	42.47	53.90	11.4	240	311	*1)
Hori.	3531.484	AV	43.29	28.88	6.21	36.73	2.17	43.82	53.90	10.0	172	243	*1)
Vert.	1594.561	PK	46.85	25.20	13.37	37.21	2.17	50.38	73.90	23.5	176	343	
Vert.	2483.500	PK	48.10	27.55	14.25	36.79	2.17	55.28	73.90	18.6	169	35	
Vert.	3531.485	PK	48.93	28.88	6.21	36.73	2.17	49.46	73.90	24.4	148	346	
Vert.	4924.000	PK	44.64	31.73	6.71	37.05	2.17	48.20	73.90	25.7	150	1	
Vert.	7386.000	PK	44.58	36.88	8.26	37.92	2.17	53.97	73.90	19.9	150	1	
Vert.	1594.561	AV	36.44	25.20	13.37	37.21	2.17	39.97	53.90	13.9	176	343	*1)
Vert.	3531.485	AV	43.95	28.88	6.21	36.73	2.17	44.48	53.90	9.4	148	346	*1)

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 13 GHz : 20log(3.85 m / 3.0 m) = 2.17 dB

13 GHz - 40 GHz : 20log(1.0 m / 3.0 m) = -9.54 dB

*1) Not apply duty factor, because duty cycle of this noise was above 98 %.

Average measurement value with duty factor

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2483.500	AV	36.00	27.55	14.25	36.79	0.20	2.17	43.38	53.90	10.5	*1)
Hori.	4924.000	AV	34.47	31.73	6.71	37.05	0.20	2.17	38.23	53.90	15.7	
Hori.	7386.000	AV	34.90	36.88	8.26	37.92	0.20	2.17	44.49	53.90	9.4	
Vert.	2483.500	AV	36.31	27.55	14.25	36.79	0.20	2.17	43.69	53.90	10.2	*1)
Vert.	4924.000	AV	34.45	31.73	6.71	37.05	0.20	2.17	38.21	53.90	15.7	
Vert.	7386.000	AV	35.36	36.88	8.26	37.92	0.20	2.17	44.95	53.90	9.0	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Duty factor + Distance factor

Distance factor : 1 GHz - 13 GHz : 20log(3.85 m / 3.0 m) = 2.17 dB

13 GHz - 40 GHz : 20log(1.0 m / 3.0 m) = -9.54 dB

Duty factor refer to "Duty factor Calculation chart" sheet.

*1) Not out of band emission (Leakage Power)

20 dBc Data Sheet (RBW 100 kHz, VBW 300 kHz)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2462.000	PK	82.77	27.48	14.23	36.80	2.17	89.85	-	-	Carrier
Hori.	9848.000	PK	38.56	38.90	9.36	38.78	2.17	50.21	69.85	19.6	
Vert.	2462.000	PK	83.14	27.48	14.23	36.80	2.17	90.22	-	-	Carrier
Vert.	9848.000	PK	39.36	38.90	9.36	38.78	2.17	51.01	70.22	19.2	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 13 GHz : 20log(3.85 m / 3.0 m) = 2.17 dB

13 GHz - 40 GHz : 20log(1.0 m / 3.0 m) = -9.54 dB

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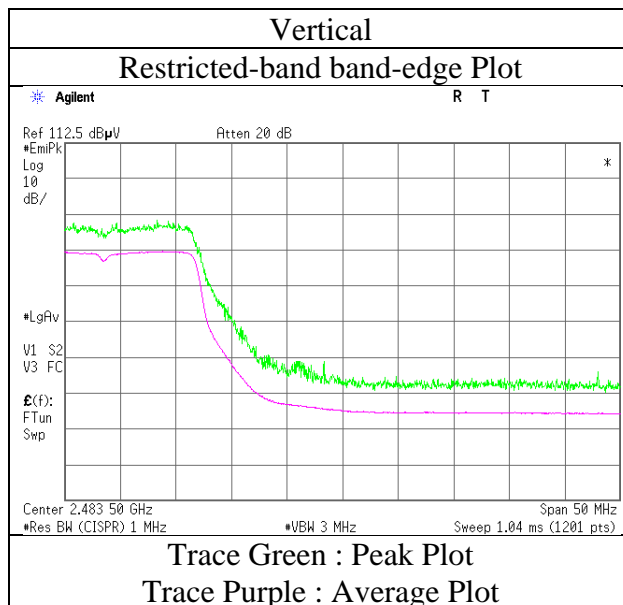
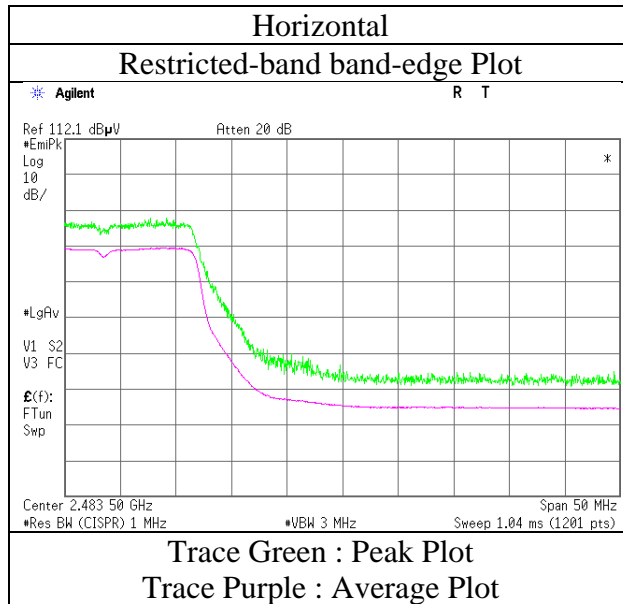
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Radiated Spurious Emission
(Reference Plot for band-edge)

Report No. 12170940S-A-R3
Test place Shonan EMC Lab.
Semi Anechoic Chamber 3
Date February 9, 2018
Temperature / Humidity 23 deg. C / 33 % RH
Engineer Kazuya Noda
(1 GHz – 2.8 GHz)
Mode Tx 11g 2462 MHz



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

Radiated Spurious Emission

Report No.	12170940S-A-R3		
Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	3	3	3
Date	February 9, 2018	February 13, 2018	February 15, 2018
Temperature / Humidity	23 deg. C / 33 % RH	22 deg. C / 30 % RH	21 deg. C / 30 % RH
Engineer	Kazuya Noda	Hiroyuki Morikawa	Shiro Kobayashi
	(1 GHz – 2.8 GHz)	(2.8 GHz – 13 GHz)	(13 GHz – 26.5 GHz)
Mode	Tx 11n-20 2412 MHz		

(* PK: Peak, AV: Average, QP: Quasi-Peak)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	1594.565	PK	48.75	25.20	13.37	37.21	2.17	52.28	73.90	21.6	244	325	
Hori.	2390.000	PK	45.59	27.26	14.15	36.83	2.17	52.34	73.90	21.5	155	335	
Hori.	3531.485	PK	47.81	28.88	6.21	36.73	2.17	48.34	73.90	25.5	169	244	
Hori.	4824.000	PK	44.09	31.46	6.69	37.00	2.17	47.41	73.90	26.4	150	1	
Hori.	7236.000	PK	44.76	36.62	8.24	37.83	2.17	53.96	73.90	19.9	150	2	
Hori.	1594.565	AV	38.93	25.20	13.37	37.21	2.17	42.46	53.90	11.4	244	325	*1)
Hori.	3531.485	AV	41.22	28.88	6.21	36.73	2.17	41.75	53.90	12.1	169	244	*1)
Vert.	1594.564	PK	46.76	25.20	13.37	37.21	2.17	50.29	73.90	23.6	177	343	
Vert.	2390.000	PK	46.08	27.26	14.15	36.83	2.17	52.83	73.90	21.0	173	31	
Vert.	3531.486	PK	50.02	28.88	6.21	36.73	2.17	50.55	73.90	23.3	152	342	
Vert.	4824.000	PK	44.03	31.46	6.69	37.00	2.17	47.35	73.90	26.5	150	1	
Vert.	7236.000	PK	44.87	36.62	8.24	37.83	2.17	54.07	73.90	19.8	150	1	
Vert.	1594.564	AV	36.45	25.20	13.37	37.21	2.17	39.98	53.90	13.9	177	343	*1)
Vert.	3531.486	AV	45.38	28.88	6.21	36.73	2.17	45.91	53.90	7.9	152	342	*1)

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 13 GHz : 20log (3.85 m / 3.0 m) = 2.17 dB

13 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

*1) Not apply duty factor, because duty cycle of this noise was above 98 %.

Average measurement value with duty factor

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2390.000	AV	35.27	27.26	14.15	36.83	0.23	2.17	42.25	53.90	11.7	*1)
Hori.	4824.000	AV	34.67	31.46	6.69	37.00	0.23	2.17	38.22	53.90	15.7	
Hori.	7236.000	AV	35.39	36.62	8.24	37.83	0.23	2.17	44.82	53.90	9.1	
Vert.	2390.000	AV	35.80	27.26	14.15	36.83	0.23	2.17	42.78	53.90	11.1	*1)
Vert.	4824.000	AV	34.57	31.46	6.69	37.00	0.23	2.17	38.12	53.90	15.8	
Vert.	7236.000	AV	35.47	36.62	8.24	37.83	0.23	2.17	44.90	53.90	9.0	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Duty factor + Distance factor

Distance factor : 1 GHz - 13 GHz : 20log (3.85 m / 3.0 m) = 2.17 dB

13 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

Duty factor refer to "Duty factor Calculation chart" sheet.

*1) Not out of band emission (Leakage Power)

20 dBc Data Sheet (RBW 100 kHz, VBW 300 kHz)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2412.000	PK	79.96	27.33	14.16	36.82	2.17	86.80	-	-	Carrier
Hori.	2400.000	PK	46.21	27.29	14.15	36.83	2.17	52.99	66.80	13.8	
Hori.	9648.000	PK	37.85	38.66	9.27	38.53	2.17	49.42	66.80	17.4	
Vert.	2412.000	PK	80.19	27.33	14.16	36.82	2.17	87.03	-	-	Carrier
Vert.	2400.000	PK	46.85	27.29	14.15	36.83	2.17	53.63	67.03	13.4	
Vert.	9648.000	PK	38.14	38.66	9.27	38.53	2.17	49.71	67.03	17.3	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 13 GHz : 20log (3.85 m / 3.0 m) = 2.17 dB

13 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

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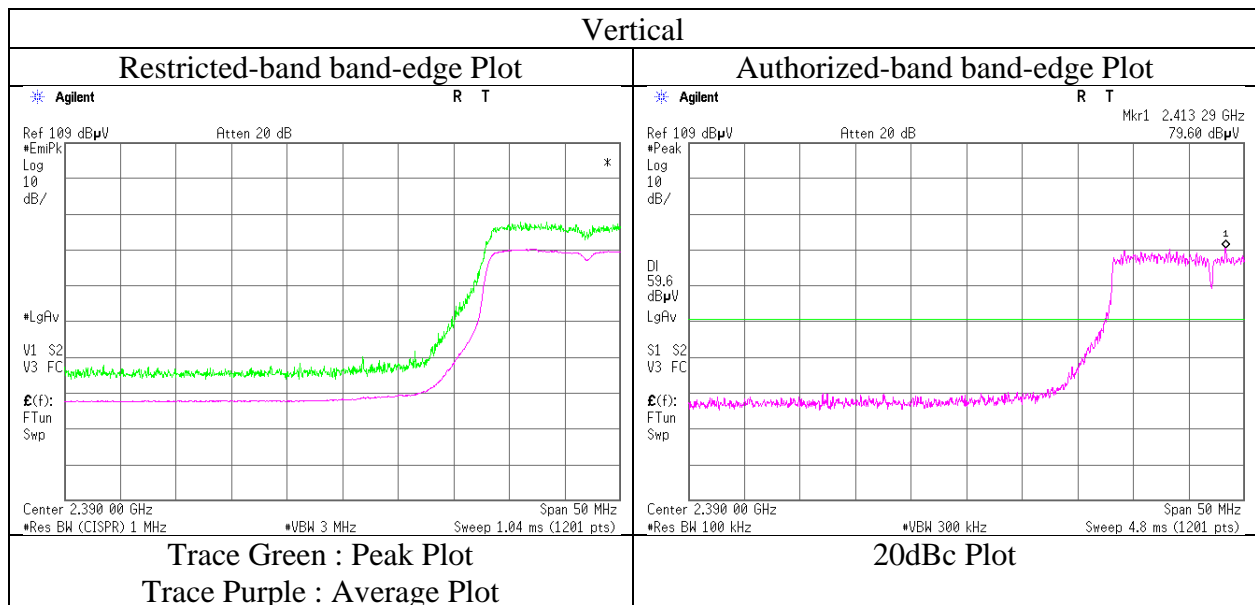
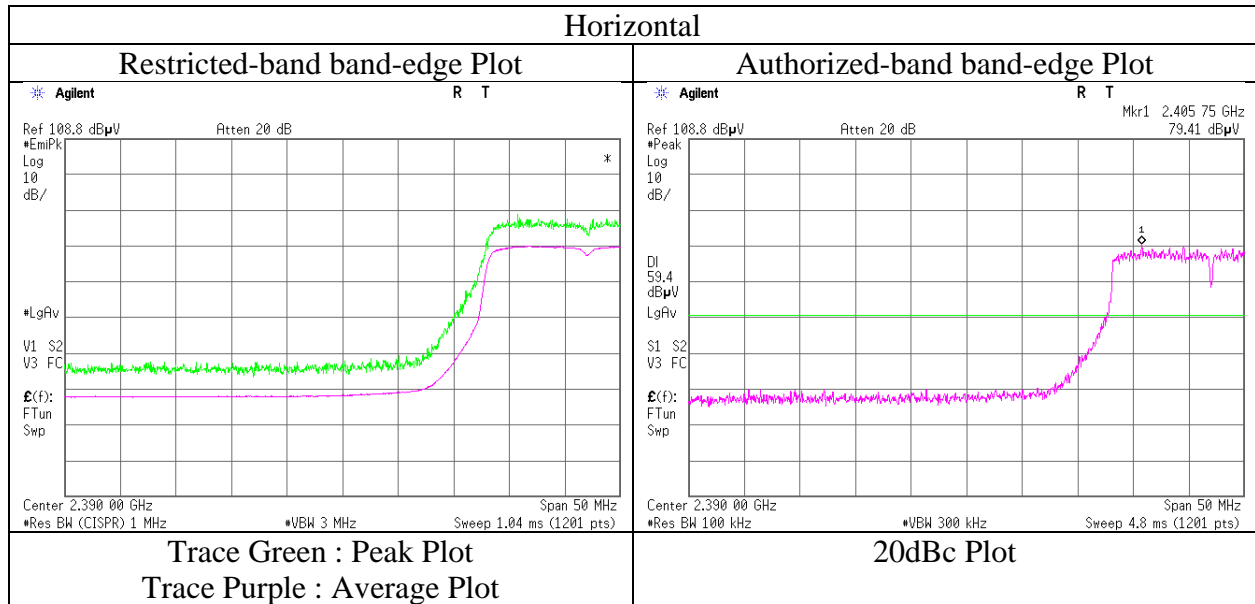
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Radiated Spurious Emission
(Reference Plot for band-edge)

Report No. 12170940S-A-R3
Test place Shonan EMC Lab.
Semi Anechoic Chamber 3
Date February 9, 2018
Temperature / Humidity 23 deg. C / 33 % RH
Engineer Kazuya Noda
(1 GHz – 2.8 GHz)
Mode Tx 11n-20 2412 MHz



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

Radiated Spurious Emission

Report No.	12170940S-A-R3		
Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	3	3	3
Date	February 9, 2018	February 13, 2018	February 15, 2018
Temperature / Humidity	23 deg. C / 33 % RH	22 deg. C / 30 % RH	21 deg. C / 30 % RH
Engineer	Kazuya Noda	Hiroyuki Morikawa	Shiro Kobayashi
	(1 GHz – 2.8 GHz)	(2.8 GHz – 13 GHz)	(13 GHz – 26.5 GHz)
Mode	Tx 11n-20 2437 MHz		

(* PK: Peak, AV: Average, QP: Quasi-Peak)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	1594.565	PK	48.53	25.20	13.37	37.21	2.17	52.06	73.90	21.8	241	312	
Hori.	3531.488	PK	48.20	28.88	6.21	36.73	2.17	48.73	73.90	25.1	165	244	
Hori.	4874.000	PK	44.31	31.59	6.69	37.03	2.17	47.73	73.90	26.1	150	2	
Hori.	7311.000	PK	44.42	36.75	8.25	37.87	2.17	53.72	73.90	20.1	150	1	
Hori.	1594.565	AV	38.82	25.20	13.37	37.21	2.17	42.35	53.90	11.5	241	312	*1)
Hori.	3531.488	AV	43.07	28.88	6.21	36.73	2.17	43.60	53.90	10.3	165	244	*1)
Vert.	1594.562	PK	46.91	25.20	13.37	37.21	2.17	50.44	73.90	23.4	181	344	
Vert.	3531.485	PK	49.03	28.88	6.21	36.73	2.17	49.56	73.90	24.3	144	339	
Vert.	4874.000	PK	44.20	31.59	6.69	37.03	2.17	47.62	73.90	26.2	150	1	
Vert.	7311.000	PK	44.02	36.75	8.25	37.87	2.17	53.32	73.90	20.5	150	1	
Vert.	1594.562	AV	36.78	25.20	13.37	37.21	2.17	40.31	53.90	13.5	181	344	*1)
Vert.	3531.485	AV	44.17	28.88	6.21	36.73	2.17	44.70	53.90	9.2	144	339	*1)

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 13 GHz : 20log(3.85 m / 3.0 m) = 2.17 dB

13 GHz - 40 GHz : 20log(1.0 m / 3.0 m) = -9.54 dB

*1) Not apply duty factor, because duty cycle of this noise was above 98 %.

Average measurement value with duty factor

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	4874.000	AV	34.57	31.59	6.69	37.03	0.23	2.17	38.22	53.90	15.7	
Hori.	7311.000	AV	35.25	36.75	8.25	37.87	0.23	2.17	44.78	53.90	9.1	
Vert.	4874.000	AV	34.66	31.59	6.69	37.03	0.23	2.17	38.31	53.90	15.6	
Vert.	7311.000	AV	35.14	36.75	8.25	37.87	0.23	2.17	44.67	53.90	9.2	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Duty factor + Distance factor

Distance factor : 1 GHz - 13 GHz : 20log(3.85 m / 3.0 m) = 2.17 dB

13 GHz - 40 GHz : 20log(1.0 m / 3.0 m) = -9.54 dB

Duty factor refer to "Duty factor Calculation chart" sheet.

20 dBc Data Sheet (RBW 100 kHz, VBW 300 kHz)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2437.000	PK	83.15	27.40	14.20	36.81	2.17	90.11	-	-	Carrier
Hori.	9748.000	PK	37.64	38.78	9.31	38.65	2.17	49.25	70.11	20.9	
Vert.	2437.000	PK	83.87	27.40	14.20	36.81	2.17	90.83	-	-	Carrier
Vert.	9748.000	PK	38.11	38.78	9.31	38.65	2.17	49.72	70.83	21.1	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 13 GHz : 20log(3.85 m / 3.0 m) = 2.17 dB

13 GHz - 40 GHz : 20log(1.0 m / 3.0 m) = -9.54 dB

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Radiated Spurious Emission

Report No.	12170940S-A-R3		
Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	3	3	3
Date	February 9, 2018	February 13, 2018	February 15, 2018
Temperature / Humidity	23 deg. C / 33 % RH	22 deg. C / 30 % RH	21 deg. C / 30 % RH
Engineer	Kazuya Noda (1 GHz – 2.8 GHz)	Hiroyuki Morikawa (2.8 GHz – 13 GHz)	Shiro Kobayashi (13 GHz – 26.5 GHz)
Mode	Tx 11n-20 2462 MHz		

(* PK: Peak, AV: Average, QP: Quasi-Peak)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	1594.561	PK	48.91	25.20	13.37	37.21	2.17	52.44	73.90	21.4	241	317	
Hori.	2483.500	PK	46.60	27.55	14.25	36.79	2.17	53.78	73.90	20.1	146	343	
Hori.	3531.486	PK	48.60	28.88	6.21	36.73	2.17	49.13	73.90	24.7	169	241	
Hori.	4924.000	PK	44.09	31.73	6.71	37.05	2.17	47.65	73.90	26.2	150	1	
Hori.	7386.000	PK	44.72	36.88	8.26	37.92	2.17	54.11	73.90	19.7	130	51	
Hori.	1594.561	AV	38.75	25.20	13.37	37.21	2.17	42.28	53.90	11.6	241	317	*1)
Hori.	3531.486	AV	43.41	28.88	6.21	36.73	2.17	43.94	53.90	9.9	169	241	*1)
Vert.	1594.565	PK	47.04	25.20	13.37	37.21	2.17	50.57	73.90	23.3	176	346	
Vert.	2483.500	PK	46.89	27.55	14.25	36.79	2.17	54.07	73.90	19.8	169	39	
Vert.	3531.485	PK	49.37	28.88	6.21	36.73	2.17	49.90	73.90	24.0	153	336	
Vert.	4924.000	PK	44.06	31.73	6.71	37.05	2.17	47.62	73.90	26.2	150	2	
Vert.	7386.000	PK	44.67	36.88	8.26	37.92	2.17	54.06	73.90	19.8	150	1	
Vert.	1594.565	AV	36.35	25.20	13.37	37.21	2.17	39.88	53.90	14.0	176	346	*1)
Vert.	3531.485	AV	45.13	28.88	6.21	36.73	2.17	45.66	53.90	8.2	153	336	*1)

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 13 GHz : 20log (3.85 m / 3.0 m) = 2.17 dB

13 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

*1) Not apply duty factor, because duty cycle of this noise was above 98 %.

Average measurement value with duty factor

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2483.500	AV	35.70	27.55	14.25	36.79	0.23	2.17	43.11	53.90	10.8	*1)
Hori.	4924.000	AV	34.56	31.73	6.71	37.05	0.23	2.17	38.35	53.90	15.6	
Hori.	7386.000	AV	35.14	36.88	8.26	37.92	0.23	2.17	44.76	53.90	9.1	
Vert.	2483.500	AV	36.02	27.55	14.25	36.79	0.23	2.17	43.43	53.90	10.5	*1)
Vert.	4924.000	AV	34.68	31.73	6.71	37.05	0.23	2.17	38.47	53.90	15.4	
Vert.	7386.000	AV	35.32	36.88	8.26	37.92	0.23	2.17	44.94	53.90	9.0	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Duty factor + Distance factor

Distance factor : 1 GHz - 13 GHz : 20log (3.85 m / 3.0 m) = 2.17 dB

13 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

Duty factor refer to "Duty factor Calculation chart" sheet.

*1) Not out of band emission (Leakage Power)

20 dBc Data Sheet (RBW 100 kHz, VBW 300 kHz)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2462.000	PK	81.95	27.48	14.23	36.80	2.17	89.03	-	-	Carrier
Hori.	9848.000	PK	38.37	38.90	9.36	38.78	2.17	50.02	69.03	19.0	
Vert.	2462.000	PK	82.31	27.48	14.23	36.80	2.17	89.39	-	-	Carrier
Vert.	9848.000	PK	39.72	38.90	9.36	38.78	2.17	51.37	69.39	18.0	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 13 GHz : 20log (3.85 m / 3.0 m) = 2.17 dB

13 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

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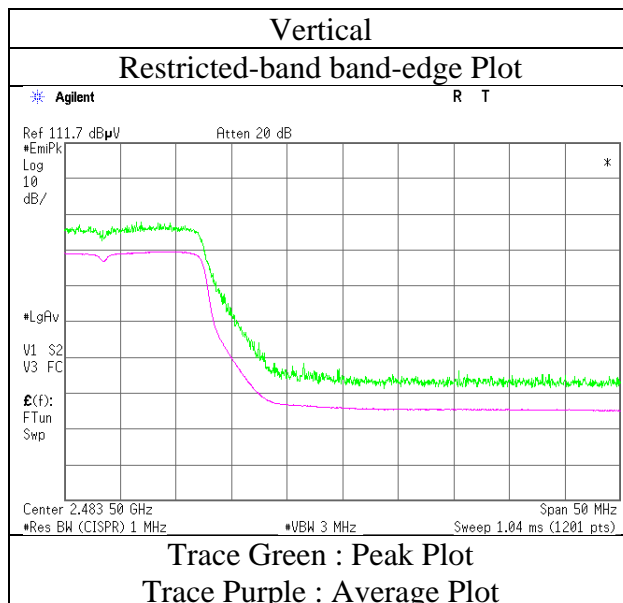
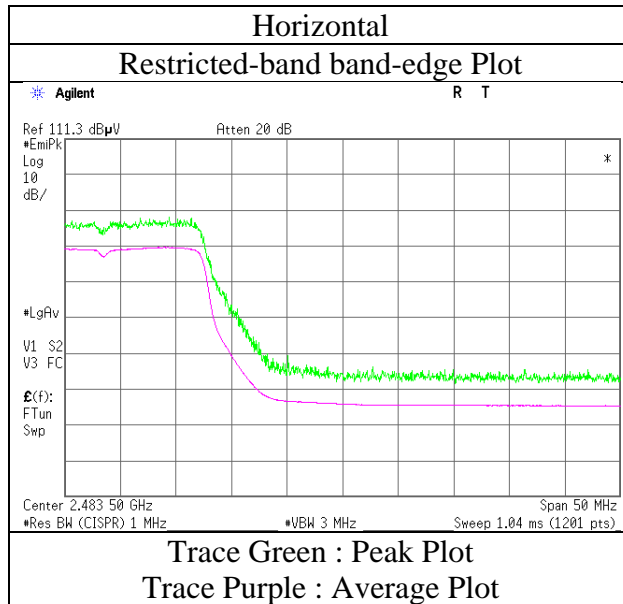
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Radiated Spurious Emission
(Reference Plot for band-edge)

Report No. 12170940S-A-R3
Test place Shonan EMC Lab.
Semi Anechoic Chamber 3
Date February 9, 2018
Temperature / Humidity 23 deg. C / 33 % RH
Engineer Kazuya Noda
(1 GHz – 2.8 GHz)
Mode Tx 11n-20 2462 MHz



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

Radiated Spurious Emission

Report No.	12170940S-A-R3		
Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	3	3	3
Date	February 9, 2018	February 13, 2018	February 15, 2018
Temperature / Humidity	23 deg. C / 33 % RH	22 deg. C / 30 % RH	21 deg. C / 30 % RH
Engineer	Kazuya Noda (1 GHz – 2.8 GHz)	Hiroyuki Morikawa (2.8 GHz – 13 GHz)	Shiro Kobayashi (13 GHz – 26.5 GHz)
Mode	Tx 11n-40 2422 MHz		

(* PK: Peak, AV: Average, QP: Quasi-Peak)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	1594.565	PK	49.23	25.20	13.37	37.21	2.17	52.76	73.90	21.1	241	312	
Hori.	2390.000	PK	45.20	27.26	14.15	36.83	2.17	51.95	73.90	21.9	149	335	
Hori.	3531.484	PK	48.20	28.88	6.21	36.73	2.17	48.73	73.90	25.1	165	241	
Hori.	4844.000	PK	44.23	31.51	6.68	37.01	2.17	47.58	73.90	26.3	150	1	
Hori.	7266.000	PK	44.98	36.67	8.25	37.84	2.17	54.23	73.90	19.6	150	1	
Hori.	1594.565	AV	39.19	25.20	13.37	37.21	2.17	42.72	53.90	11.1	241	312	*1)
Hori.	3531.484	AV	42.95	28.88	6.21	36.73	2.17	43.48	53.90	10.4	165	241	*1)
Vert.	1594.561	PK	46.71	25.20	13.37	37.21	2.17	50.24	73.90	23.6	174	344	
Vert.	2390.000	PK	45.61	27.26	14.15	36.83	2.17	52.36	73.90	21.5	143	27	
Vert.	3531.486	PK	50.65	28.88	6.21	36.73	2.17	51.18	73.90	22.7	152	339	
Vert.	4844.000	PK	44.19	31.51	6.68	37.01	2.17	47.54	73.90	26.3	150	1	
Vert.	7266.000	PK	44.80	36.67	8.25	37.84	2.17	54.05	73.90	19.8	150	1	
Vert.	1594.561	AV	36.44	25.20	13.37	37.21	2.17	39.97	53.90	13.9	174	344	*1)
Vert.	3531.486	AV	46.70	28.88	6.21	36.73	2.17	47.23	53.90	6.6	152	339	*1)

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 13 GHz : 20log(3.85 m / 3.0 m) = 2.17 dB

13 GHz - 40 GHz : 20log(1.0 m / 3.0 m) = -9.54 dB

*1) Not apply duty factor, because duty cycle of this noise was above 98 %.

Average measurement value with duty factor

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2390.000	AV	35.36	27.26	14.15	36.83	1.32	2.17	43.43	53.90	10.5	*1)
Hori.	4844.000	AV	34.28	31.51	6.68	37.01	1.32	2.17	38.95	53.90	15.0	
Hori.	7266.000	AV	35.37	36.67	8.25	37.84	1.32	2.17	45.94	53.90	8.0	
Vert.	2390.000	AV	35.46	27.26	14.15	36.83	1.32	2.17	43.53	53.90	10.4	*1)
Vert.	4844.000	AV	34.41	31.51	6.68	37.01	1.32	2.17	39.08	53.90	14.8	
Vert.	7266.000	AV	35.63	36.67	8.25	37.84	1.32	2.17	46.20	53.90	7.7	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Duty factor + Distance factor

Distance factor : 1 GHz - 13 GHz : 20log(3.85 m / 3.0 m) = 2.17 dB

13 GHz - 40 GHz : 20log(1.0 m / 3.0 m) = -9.54 dB

Duty factor refer to "Duty factor Calculation chart" sheet.

*1) Not out of band emission (Leakage Power)

20 dBc Data Sheet (RBW 100 kHz, VBW 300 kHz)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2422.000	PK	76.91	27.36	14.18	36.82	2.17	83.80	-	-	Carrier
Hori.	2400.000	PK	43.54	27.29	14.15	36.83	2.17	50.32	63.80	13.5	
Hori.	9688.000	PK	37.38	38.71	9.29	38.58	2.17	48.97	63.80	14.8	
Vert.	2422.000	PK	76.83	27.36	14.18	36.82	2.17	83.72	-	-	Carrier
Vert.	2400.000	PK	43.18	27.29	14.15	36.83	2.17	49.96	63.72	13.8	
Vert.	9688.000	PK	37.92	38.71	9.29	38.58	2.17	49.51	63.72	14.2	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 13 GHz : 20log(3.85 m / 3.0 m) = 2.17 dB

13 GHz - 40 GHz : 20log(1.0 m / 3.0 m) = -9.54 dB

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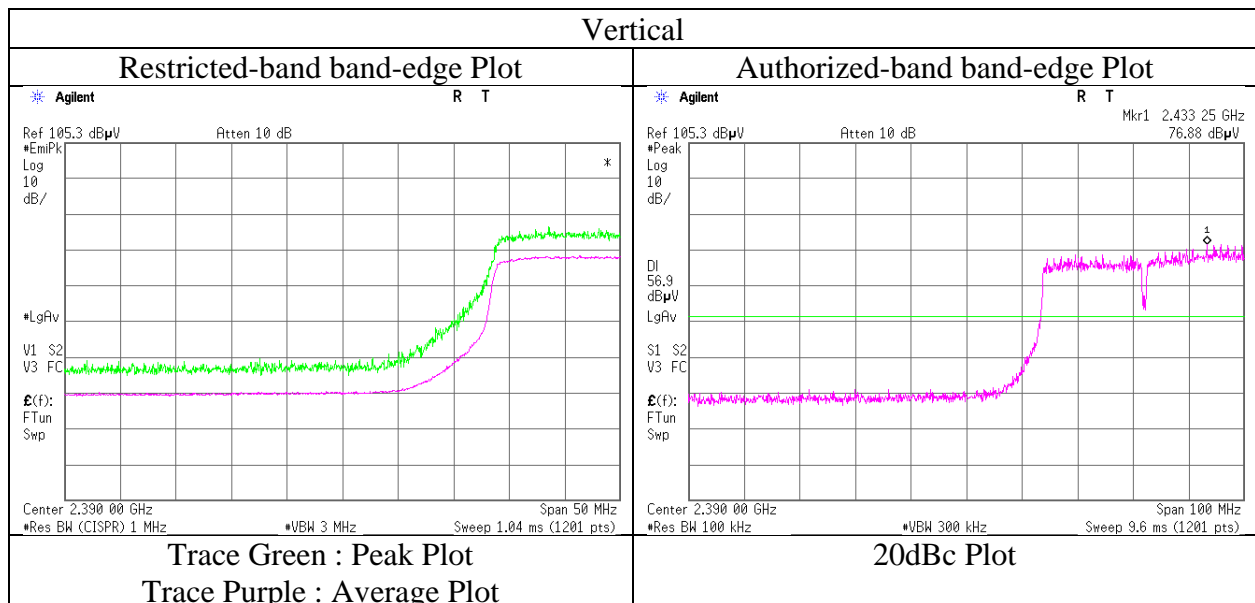
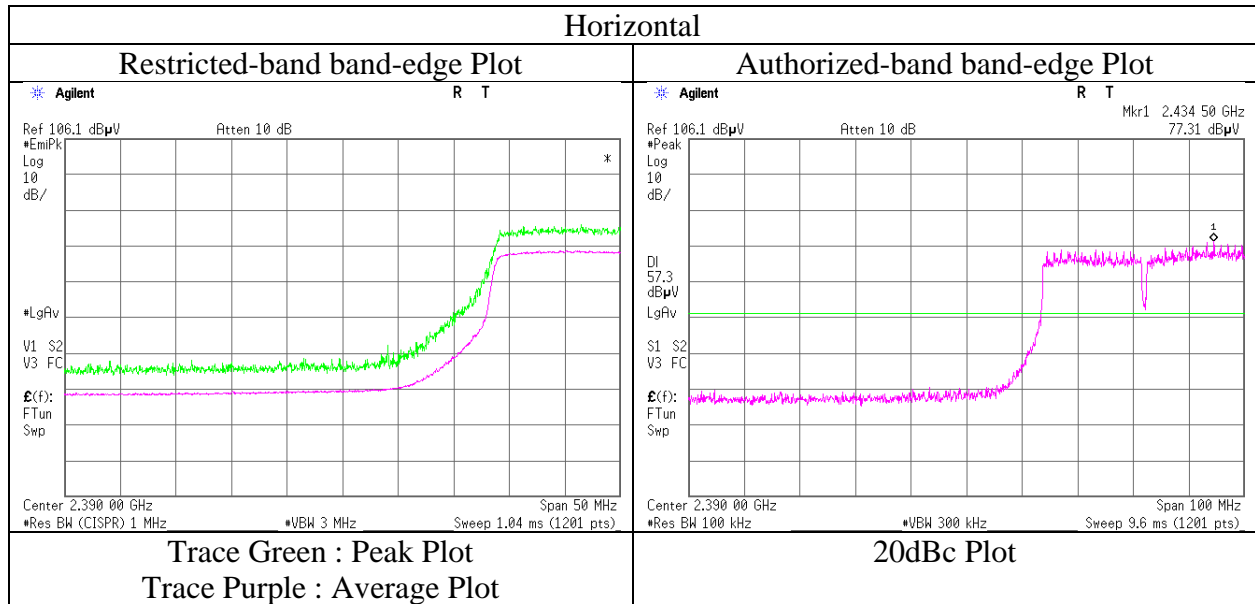
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Radiated Spurious Emission
(Reference Plot for band-edge)

Report No. 12170940S-A-R3
Test place Shonan EMC Lab.
Semi Anechoic Chamber 3
Date February 9, 2018
Temperature / Humidity 23 deg. C / 33 % RH
Engineer Kazuya Noda
(1 GHz – 2.8 GHz)
Mode Tx 11n-40 2422 MHz



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

Radiated Spurious Emission

Report No.	12170940S-A-R3		
Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	3	3	3
Date	February 9, 2018	February 13, 2018	February 15, 2018
Temperature / Humidity	23 deg. C / 33 % RH	22 deg. C / 30 % RH	21 deg. C / 30 % RH
Engineer	Kazuya Noda	Hiroyuki Morikawa	Shiro Kobayashi
	(1 GHz – 2.8 GHz)	(2.8 GHz – 13 GHz)	(13 GHz – 26.5 GHz)
Mode	Tx 11n-40 2437 MHz		

(* PK: Peak, AV: Average, QP: Quasi-Peak)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	1594.565	PK	49.53	25.20	13.37	37.21	2.17	53.06	73.90	20.8	242	311	
Hori.	3531.488	PK	48.56	28.88	6.21	36.73	2.17	49.09	73.90	24.8	165	341	
Hori.	4874.000	PK	44.07	31.59	6.69	37.03	2.17	47.49	73.90	26.4	150	1	
Hori.	7311.000	PK	44.67	36.75	8.25	37.87	2.17	53.97	73.90	19.9	150	1	
Hori.	1594.565	AV	39.32	25.20	13.37	37.21	2.17	42.85	53.90	11.0	242	311	*1)
Hori.	3531.488	AV	42.19	28.88	6.21	36.73	2.17	42.72	53.90	11.1	165	341	*1)
Vert.	1594.565	PK	46.44	25.20	13.37	37.21	2.17	49.97	73.90	23.9	177	348	
Vert.	3531.482	PK	50.22	28.88	6.21	36.73	2.17	50.75	73.90	23.1	152	337	
Vert.	4874.000	PK	44.05	31.59	6.69	37.03	2.17	47.47	73.90	26.4	150	1	
Vert.	7311.000	PK	44.67	36.75	8.25	37.87	2.17	53.97	73.90	19.9	150	1	
Vert.	1594.565	AV	37.21	25.20	13.37	37.21	2.17	40.74	53.90	13.1	177	348	*1)
Vert.	3531.482	AV	46.18	28.88	6.21	36.73	2.17	46.71	53.90	7.1	152	337	*1)

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 13 GHz : 20log (3.85 m / 3.0 m) = 2.17 dB

13 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

*1) Not apply duty factor, because duty cycle of this noise was above 98 %.

Average measurement value with duty factor

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	4874.000	AV	34.39	31.59	6.69	37.03	1.32	2.17	39.13	53.90	14.8	
Hori.	7311.000	AV	35.42	36.75	8.25	37.87	1.32	2.17	46.04	53.90	7.9	
Vert.	4874.000	AV	34.27	31.59	6.69	37.03	1.32	2.17	39.01	53.90	14.9	
Vert.	7311.000	AV	35.38	36.75	8.25	37.87	1.32	2.17	46.00	53.90	7.9	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Duty factor + Distance factor

Distance factor : 1 GHz - 13 GHz : 20log (3.85 m / 3.0 m) = 2.17 dB

13 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

Duty factor refer to "Duty factor Calculation chart" sheet.

20 dBc Data Sheet (RBW 100 kHz, VBW 300 kHz)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2437.000	PK	80.23	27.40	14.20	36.81	2.17	87.19	-	-	Carrier
Hori.	9748.000	PK	37.65	38.78	9.31	38.65	2.17	49.26	67.19	17.9	
Vert.	2437.000	PK	80.79	27.40	14.20	36.81	2.17	87.75	-	-	Carrier
Vert.	9748.000	PK	38.38	38.78	9.31	38.65	2.17	49.99	67.75	17.8	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 13 GHz : 20log (3.85 m / 3.0 m) = 2.17 dB

13 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

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Radiated Spurious Emission

Report No.	12170940S-A-R3		
Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	3	3	3
Date	February 9, 2018	February 13, 2018	February 15, 2018
Temperature / Humidity	23 deg. C / 33 % RH	22 deg. C / 30 % RH	21 deg. C / 30 % RH
Engineer	Kazuya Noda	Hiroyuki Morikawa	Shiro Kobayashi
	(1 GHz – 2.8 GHz)	(2.8 GHz – 13 GHz)	(13 GHz – 26.5 GHz)
Mode	Tx 11n-40 2452 MHz		

(* PK: Peak, AV: Average, QP: Quasi-Peak)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	1594.565	PK	49.97	25.20	13.37	37.21	2.17	53.50	73.90	20.4	244	311	
Hori.	2483.500	PK	49.28	27.55	14.25	36.79	2.17	56.46	73.90	17.4	148	344	
Hori.	3531.483	PK	45.83	28.88	6.21	36.73	2.17	46.36	73.90	27.5	172	246	
Hori.	4904.000	PK	44.03	31.68	6.71	37.04	2.17	47.55	73.90	26.3	150	1	
Hori.	7356.000	PK	44.59	36.83	8.26	37.90	2.17	53.95	73.90	19.9	150	1	
Hori.	1594.565	AV	39.51	25.20	13.37	37.21	2.17	43.04	53.90	10.8	244	311	*1)
Hori.	3531.483	AV	36.97	28.88	6.21	36.73	2.17	37.50	53.90	16.4	172	246	*1)
Vert.	1594.565	PK	46.41	25.20	13.37	37.21	2.17	49.94	73.90	23.9	171	345	
Vert.	2483.500	PK	48.68	27.55	14.25	36.79	2.17	55.86	73.90	18.0	171	35	
Vert.	3531.485	PK	49.69	28.88	6.21	36.73	2.17	50.22	73.90	23.6	152	336	
Vert.	4904.000	PK	44.09	31.68	6.71	37.04	2.17	47.61	73.90	26.2	150	1	
Vert.	7356.000	PK	44.78	36.83	8.26	37.90	2.17	54.14	73.90	19.7	150	1	
Vert.	1594.565	AV	37.22	25.20	13.37	37.21	2.17	40.75	53.90	13.1	171	345	*1)
Vert.	3531.485	AV	46.12	28.88	6.21	36.73	2.17	46.65	53.90	7.2	152	336	*1)

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 13 GHz : 20log(3.85 m / 3.0 m) = 2.17 dB

13 GHz - 40 GHz : 20log(1.0 m / 3.0 m) = -9.54 dB

*1) Not apply duty factor, because duty cycle of this noise was above 98 %.

Average measurement value with duty factor

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2483.500	AV	36.27	27.55	14.25	36.79	1.32	2.17	44.77	53.90	9.1	*1)
Hori.	4904.000	AV	34.53	31.68	6.71	37.04	1.32	2.17	39.37	53.90	14.5	
Hori.	7356.000	AV	35.56	36.83	8.26	37.90	1.32	2.17	46.24	53.90	7.7	
Vert.	2483.500	AV	36.45	27.55	14.25	36.79	1.32	2.17	44.95	53.90	9.0	*1)
Vert.	4904.000	AV	34.62	31.68	6.71	37.04	1.32	2.17	39.46	53.90	14.4	
Vert.	7356.000	AV	35.47	36.83	8.26	37.90	1.32	2.17	46.15	53.90	7.8	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Duty factor + Distance factor

Distance factor : 1 GHz - 13 GHz : 20log(3.85 m / 3.0 m) = 2.17 dB

13 GHz - 40 GHz : 20log(1.0 m / 3.0 m) = -9.54 dB

Duty factor refer to "Duty factor Calculation chart" sheet.

*1) Not out of band emission (Leakage Power)

20 dBc Data Sheet (RBW 100 kHz, VBW 300 kHz)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2452.000	PK	78.74	27.45	14.22	36.80	2.17	85.78	-	-	Carrier
Hori.	9808.000	PK	37.74	38.85	9.34	38.73	2.17	49.37	65.78	16.4	
Vert.	2452.000	PK	78.82	27.45	14.22	36.80	2.17	85.86	-	-	Carrier
Vert.	9808.000	PK	38.78	38.85	9.34	38.73	2.17	50.41	65.86	15.5	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 13 GHz : 20log(3.85 m / 3.0 m) = 2.17 dB

13 GHz - 40 GHz : 20log(1.0 m / 3.0 m) = -9.54 dB

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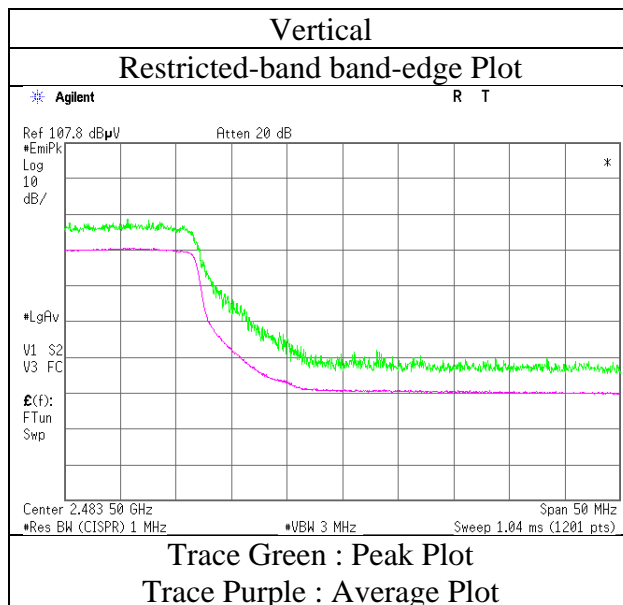
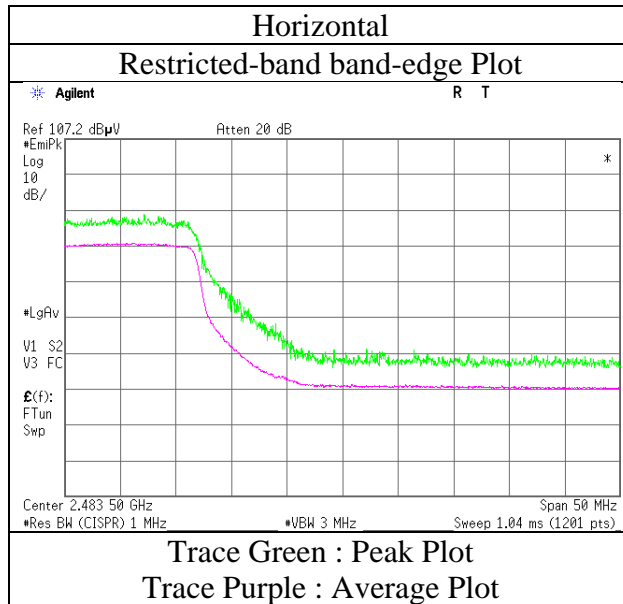
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Radiated Spurious Emission
(Reference Plot for band-edge)

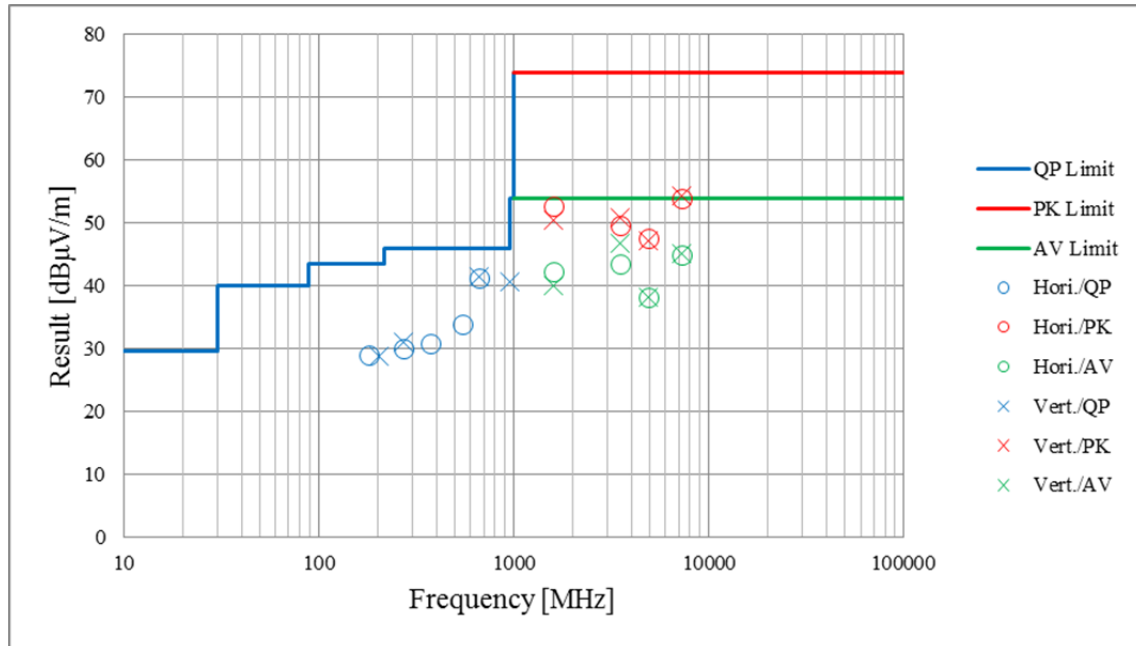
Report No. 12170940S-A-R3
Test place Shonan EMC Lab.
Semi Anechoic Chamber 3
Date February 9, 2018
Temperature / Humidity 23 deg. C / 33 % RH
Engineer Kazuya Noda
(1 GHz – 2.8 GHz)
Mode Tx 11n-40 2452 MHz



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

Radiated Spurious Emission
(Plot data, Worst case)

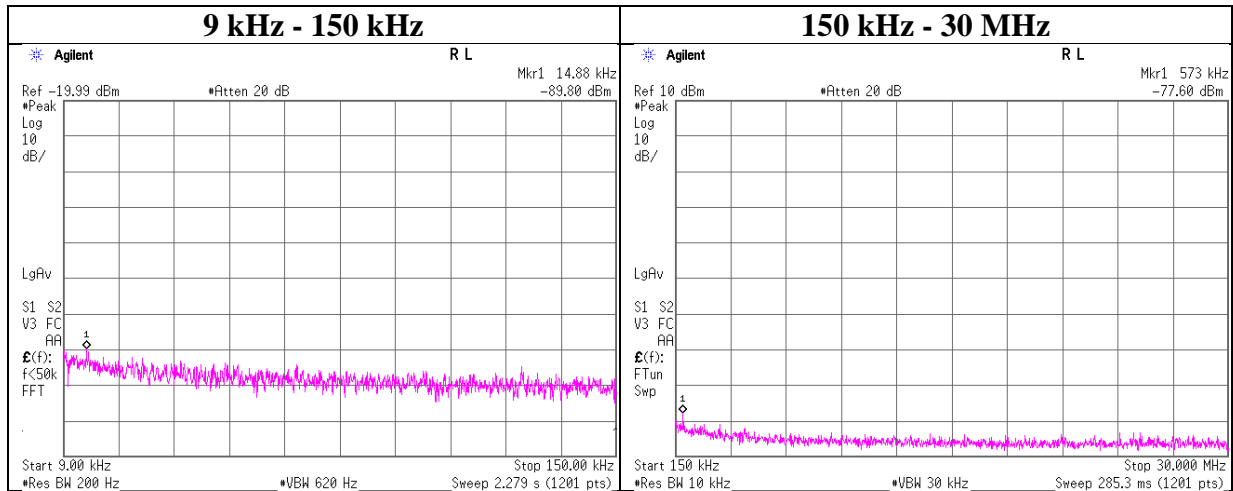
Report No.	12170940S-A-R3			
Test place	Shonan EMC Lab.			
Semi Anechoic Chamber	3	3	3	3
Date	February 8, 2018	February 9, 2018	February 13, 2018	February 15, 2018
Temperature / Humidity	24 deg. C / 31 % RH	23 deg. C / 33 % RH	22 deg. C / 30 % RH	21 deg. C / 30 % RH
Engineer	Kazuya Noda (30 MHz - 1 GHz)	Kazuya Noda (1 GHz - 2.8 GHz)	Hiroyuki Morikawa (2.8 GHz - 13 GHz)	Shiro Kobayashi (13 GHz - 26.5 GHz)
Mode	Tx 11g 2437 MHz			



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

Conducted Spurious Emission

Test place	Shonan EMC Lab. No.5 Shielded Room
Report No.	12170940S-A-R3
Date	October 27, 2015
Temperature / Humidity	26 deg. C / 40 % RH
Engineer	Hiroyuki Morikawa
Mode	Tx 11g 2437 MHz (AT1603 Display Combined Type(T2))



Frequency [kHz]	Reading [dBm]	Cable Loss [dB]	Attenuator Loss [dB]	Antenna Gain* [dBi]	N (Number of Output)	EIRP [dBm]	Distance [m]	Ground bounce [dB]	E (field strength) [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
14.88	-89.8	0.01	9.5	2.0	1	-78.3	300	6.0	-17.0	44.1	61.1	
573.00	-77.6	0.02	9.5	2.0	1	-66.1	30	6.0	15.2	32.4	17.2	

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

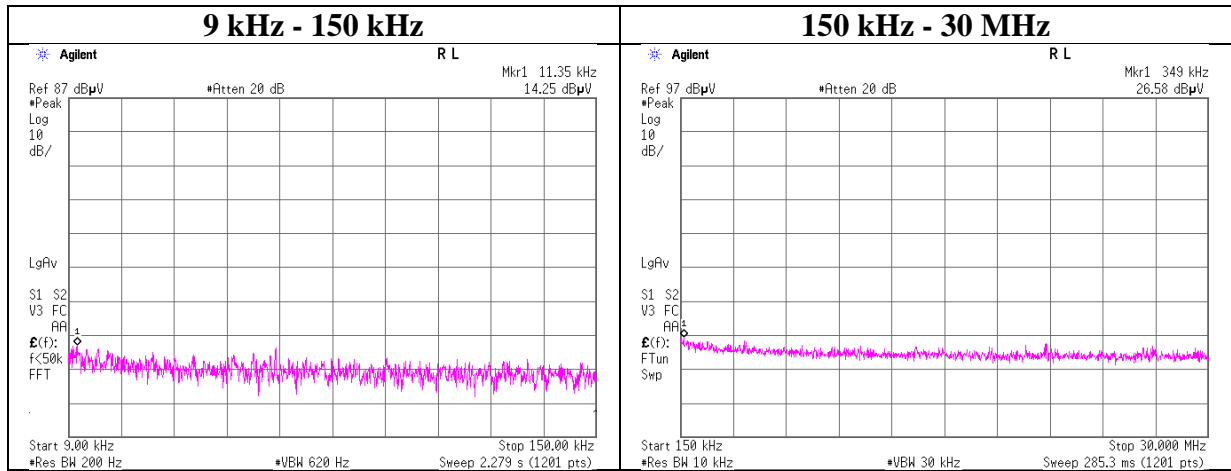
$$\text{EIRP [dBm]} = \text{Reading [dBm]} + \text{Cable loss [dB]} + \text{Attenuator Loss [dB]} + \text{Antenna gain [dBi]} + 10 * \log(N)$$

N: Number of output

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

Conducted Spurious Emission

Test place	Shonan EMC Lab. No.5 Shielded Room
Report No.	12170940S-A-R3
Date	November 9, 2015
Temperature / Humidity	24 deg. C / 41 % RH
Engineer	Yosuke Ishikawa
Mode	Tx 11g 2437 MHz (AT1603 Display Separated Type(L2))



Frequency [kHz]	Reading [dBµV]	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]
11.35	14.25	0.01	9.8	2.00	1	-80.9	300	6.0	-19.7	46.5	66.2
349.00	26.58	0.02	9.8	2.00	1	-68.6	300	6.0	-7.3	16.7	24.0

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

$\text{EIRP [dBm]} = (\text{Reading [dBuV]} - 107 \text{ [dB]}) + \text{Cable loss [dB]} + \text{Attenuator Loss [dB]} + \text{Antenna gain [dBi]} + 10 * \log (N)$

N: Number of output

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

Power Density

Test place : Shonan EMC Lab. No.5 Shielded Room
Report No. : 12170940S-A-R3
Date : October 27, 2015
Temperature / Humidity : 26 deg. C / 40 % RH
Engineer : Hiroyuki Morikawa
Mode : Tx (AT1603 Display Combined Type(T2))

11b

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result [dBm]	Limit [dBm]	Margin [dB]
2412.00	-15.99	2.03	9.63	-4.33	8.00	12.33
2437.00	-15.06	2.04	9.63	-3.39	8.00	11.39
2462.00	-13.54	2.05	9.63	-1.86	8.00	9.86

11g

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result [dBm]	Limit [dBm]	Margin [dB]
2412.00	-28.25	2.03	9.63	-16.59	8.00	24.59
2437.00	-24.54	2.04	9.63	-12.87	8.00	20.87
2462.00	-24.92	2.05	9.63	-13.24	8.00	21.24

11n-20

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result [dBm]	Limit [dBm]	Margin [dB]
2412.00	-29.38	2.03	9.63	-17.72	8.00	25.72
2437.00	-26.19	2.04	9.63	-14.52	8.00	22.52
2462.00	-25.93	2.05	9.63	-14.25	8.00	22.25

11n-40

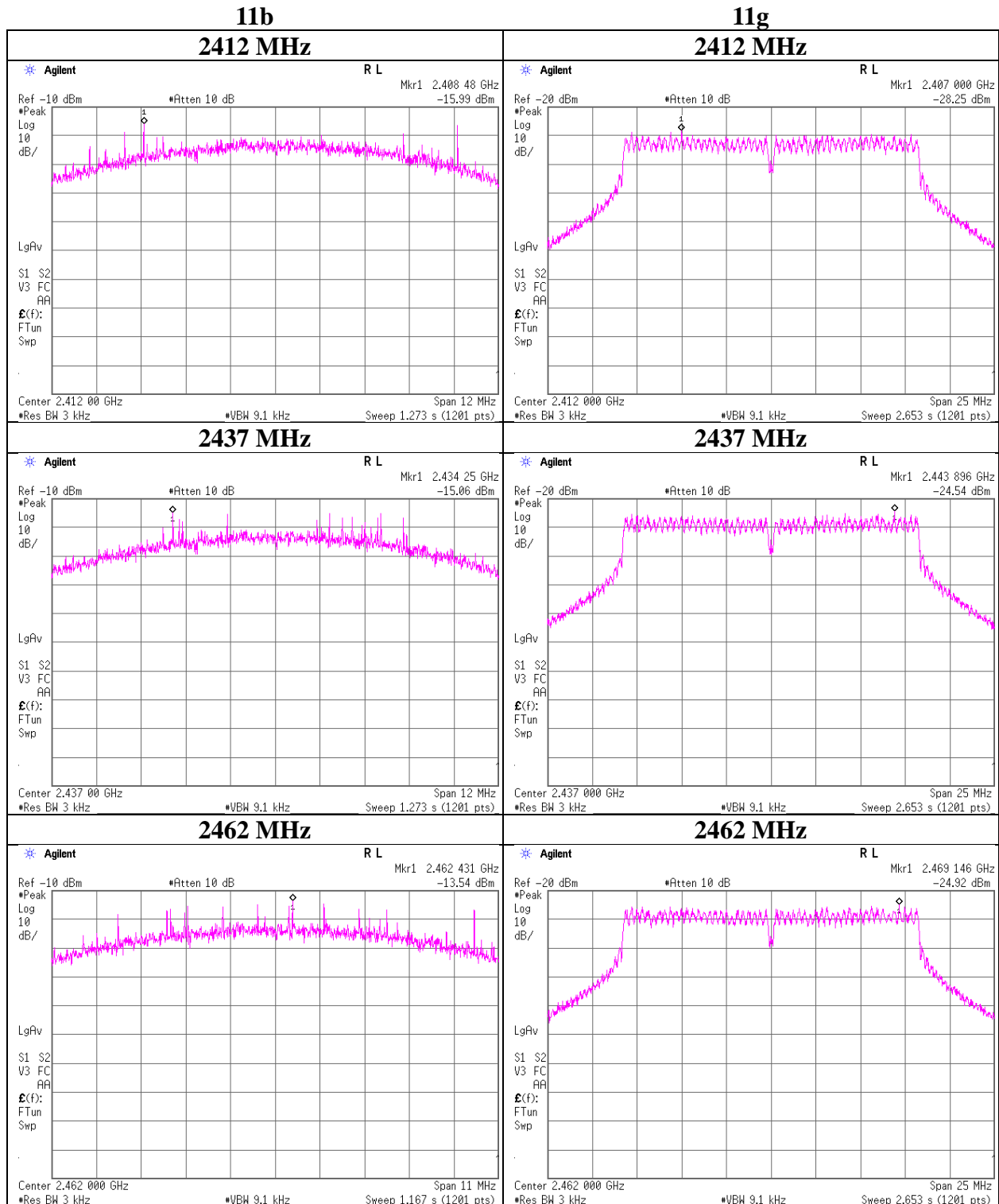
Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result [dBm]	Limit [dBm]	Margin [dB]
2422.00	-32.42	2.03	9.63	-20.76	8.00	28.76
2437.00	-30.41	2.04	9.63	-18.74	8.00	26.74
2452.00	-30.85	2.04	9.63	-19.18	8.00	27.18

Sample Calculation:

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

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

Power Density



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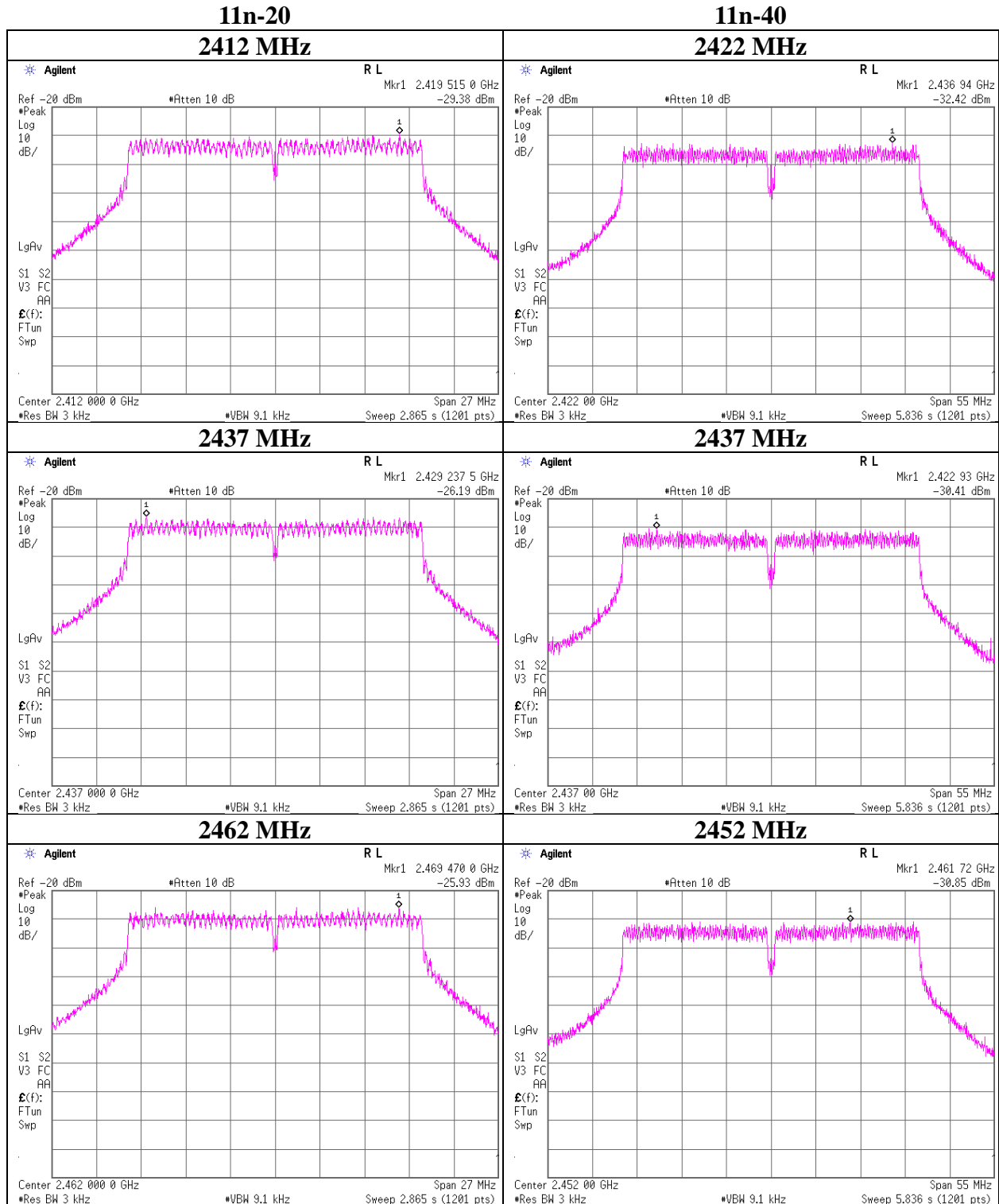
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Power Density

Test place : Shonan EMC Lab. No.5 Shielded Room
Report No. : 12170940S-A-R3
Date : November 9, 2015
Temperature / Humidity : 24 deg. C / 41 % RH
Engineer : Yosuke Ishikawa
Mode : Tx (AT1603 Display Separated Type(L2))

11b

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result [dBm]	Limit [dBm]	Margin [dB]
2412.00	-13.92	2.03	10.01	-1.88	8.00	9.88
2437.00	-10.36	2.04	10.01	1.69	8.00	6.31
2462.00	-10.63	2.05	10.01	1.43	8.00	6.57

11g

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result [dBm]	Limit [dBm]	Margin [dB]
2412.00	-29.05	2.03	10.01	-17.01	8.00	25.01
2437.00	-25.14	2.04	10.01	-13.09	8.00	21.09
2462.00	-25.33	2.05	10.01	-13.27	8.00	21.27

11n-20

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result [dBm]	Limit [dBm]	Margin [dB]
2412.00	-29.25	2.03	10.01	-17.21	8.00	25.21
2437.00	-26.26	2.04	10.01	-14.21	8.00	22.21
2462.00	-25.85	2.05	10.01	-13.79	8.00	21.79

11n-40

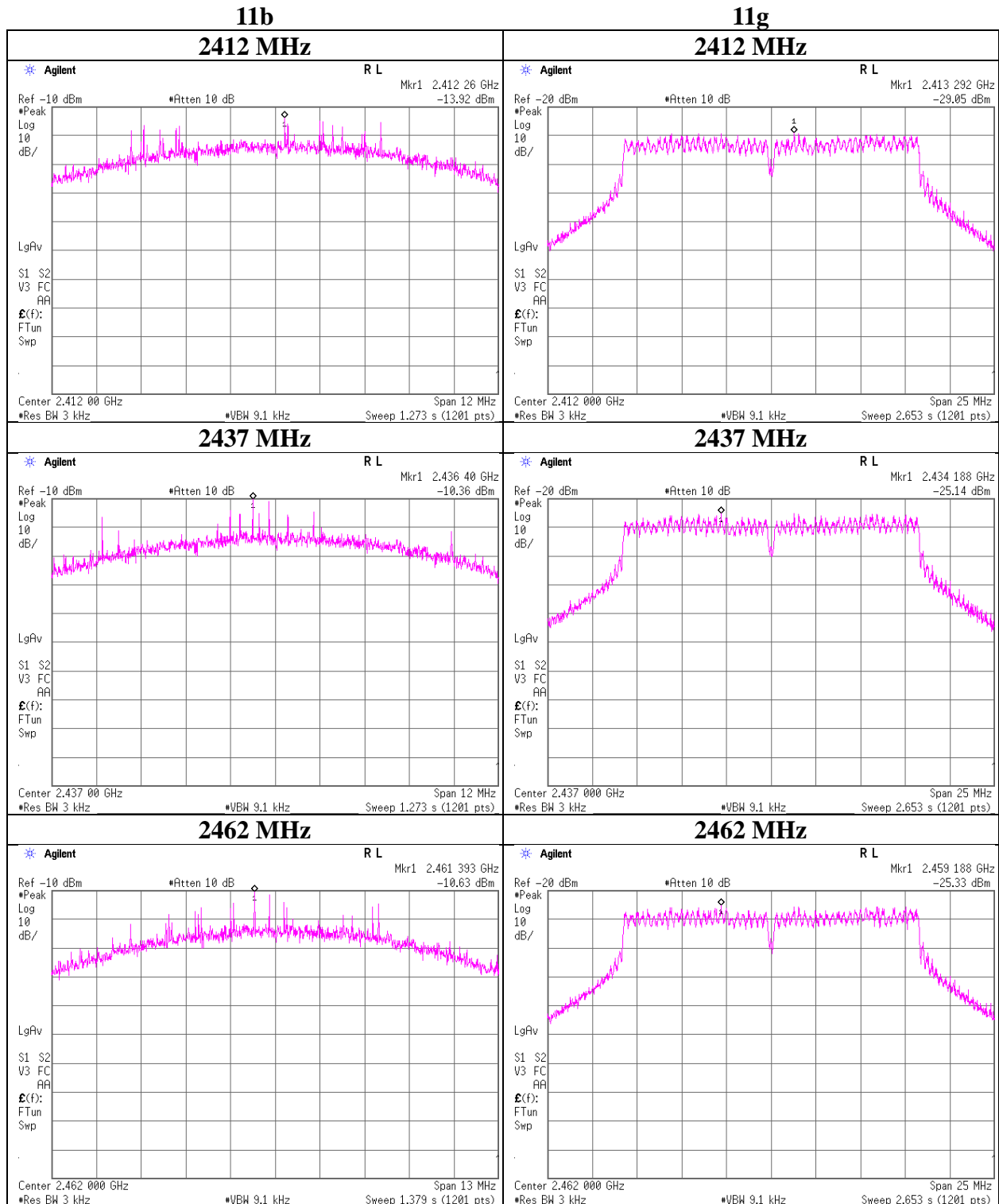
Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result [dBm]	Limit [dBm]	Margin [dB]
2422.00	-35.10	2.03	10.01	-23.06	8.00	31.06
2437.00	-30.42	2.04	10.01	-18.37	8.00	26.37
2452.00	-31.42	2.04	10.01	-19.37	8.00	27.37

Sample Calculation:

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

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

Power Density



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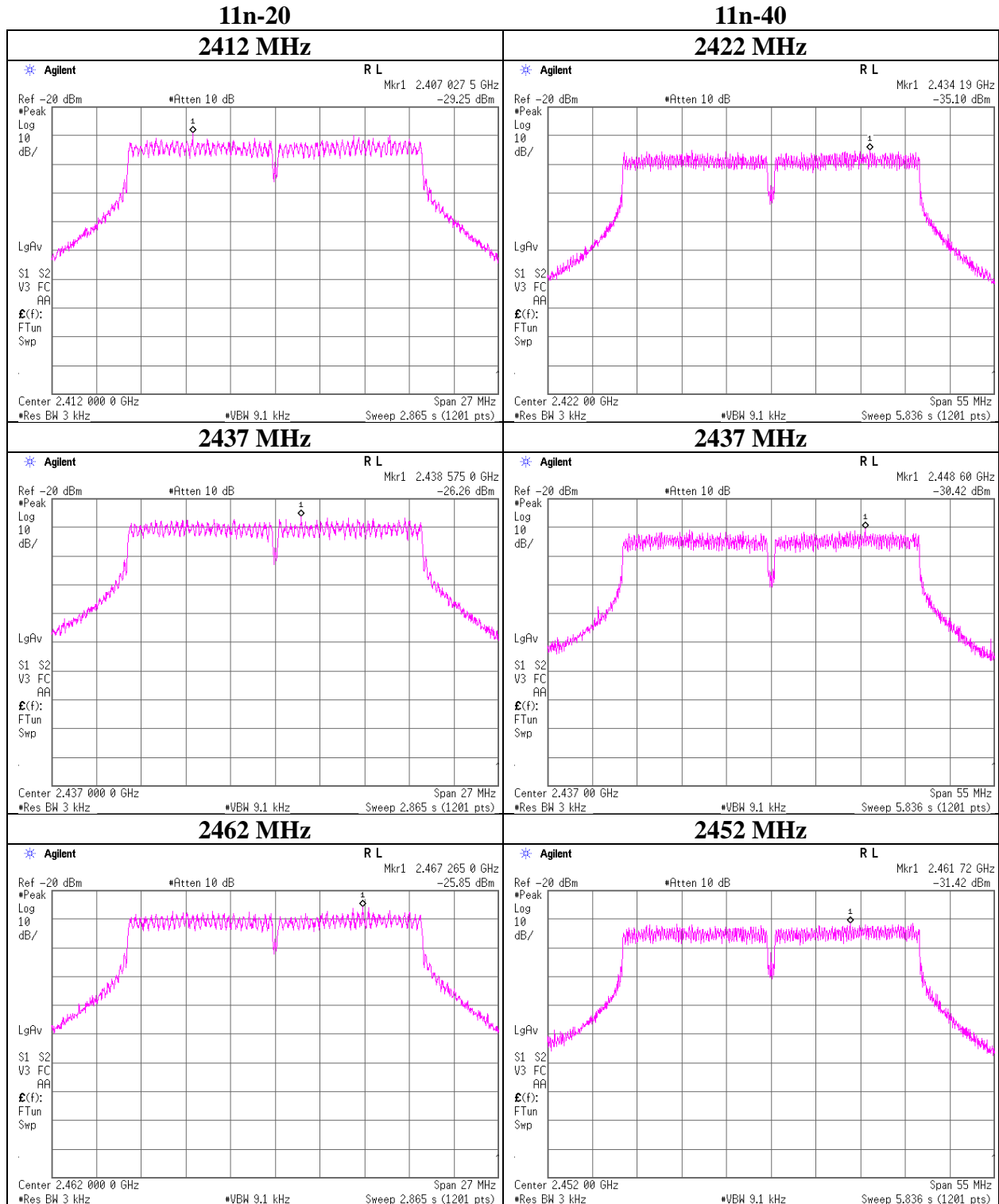
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APPENDIX 2: Test instruments

Test Instruments

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
SSA-03	Spectrum Analyzer	Agilent	E4448A	MY48250152	AT	2016/09/26 * 12 *1)
SPM-07	Power Meter	Agilent	8990B	MY5100272	AT	2016/04/04 * 12 *1)
SPSS-04	Power sensor	Agilent	N1923A	MY5326009	AT	2016/04/04 * 12 *1)
SCC-G14	Coaxial Cable	Suhner	SUCOFLEX 102	31600/2	AT	2016/03/23 * 12 *1)
SAT10-09	Attenuator	Weinschel Corp.	54A-10	W5692	AT	2016/11/07 * 12 *1)
SOS-09	Humidity Indicator	A&D	AD-5681	4061484	AT	2015/12/07 * 12 *1)
STS-05	Digital Hitester	Hioki	3805-50	080997828	AT	2016/10/17 * 12 *1)
SAEC-03(NSA)	Semi-Anechoic Chamber	TDK	SAEC-03(NSA)	3	RE	2017/06/11 * 12
SBA-03	Biconical Antenna	Schwarzbeck	BBA9106	91032666	RE	2017/10/02 * 12
SLA-07	Logperiodic Antenna	Schwarzbeck	VUSLP9111B	196	RE	2018/01/30 * 12
SAT6-08	Attenuator	HIROSE ELECTRIC CO.,LTD.	AT-406(40)	-	RE	2017/08/24 * 12
SCC-C1/C2/C3/C4/C5/C10/SRS E-03	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhner/Suhner/Suhner/TOYO	8D2W/12DSFA/141PE/141PE/141PE/141PE/NS4906	-/0901-271(RF Selector)	RE	2017/04/07 * 12
SAF-03	Pre Amplifier	SONOMA	310N	290213	RE	2017/02/09 * 12
STR-08	Test Receiver	Rohde & Schwarz	ESW44	101581	RE	2017/11/24 * 12
COTS-SEMI-1	EMI Software	TSJ	TEPTO-DV(RE,CE,RF I,MF)	-	RE	-
SOS-05	Humidity Indicator	A&D	AD-5681	4062518	RE	2017/10/30 * 12
SJM-02	Measure	KOMELON	KMC-36	-	RE	-
STS-03	Digital Hitester	Hioki	3805-50	080997823	RE	2017/10/16 * 12
SAF-05	Pre Amplifier	TOYO Corporation	TPA0118-36	1440490	RE	2017/02/17 * 12
SCC-G06	Coaxial Cable	Junkosha	J12J102207-00	MAY-23-16-091	RE	2017/06/13 * 12
SCC-G23	Coaxial Cable	Suhner	SUCOFLEX 104	297342/4	RE	2017/05/08 * 12
SHA-03	Horn Antenna	Schwarzbeck	BBHA9120D	9120D-739	RE	2017/08/23 * 12
SSA-02	Spectrum Analyzer	Agilent	E4448A	MY48250106	RE	2017/03/07 * 12
SAEC-03(SVSWR)	Semi-Anechoic Chamber	TDK	SAEC-03(SVSWR)	3	RE	2017/07/17 * 12
SAT10-05	Attenuator(above 1 GHz)	Agilent	8493C-010	74864	RE	2017/11/22 * 12
SCC-G40	Coaxial Cable	Junkosha	MWX221-01000NFSN MS/B	1612S005	RE	2018/01/29 * 12
SFL-18	Highpass Filter	MICRO-TRONICS	HPM50111	119	RE	2017/04/20 * 12
SCC-G22	Coaxial Cable	Suhner	SUCOFLEX 104	296199/4	RE	2017/05/08 * 12
SCC-G05	Coaxial Cable	Junkosha	J12J102207-00	APR-30-15-037	RE	2018/01/29 * 12
SAF-06	Pre Amplifier	TOYO Corporation	TPA0118-36	2046104	RE	2017/09/22 * 12
SHA-05	Horn Antenna	ETS LINDGREN	3160-09	LM4210	RE	2017/03/15 * 12
SAF-09	Pre Amplifier	TOYO Corporation	HAP18-26W	00000018	RE	2017/09/22 * 12
SCC-G19	Coaxial Cable	Suhner	SUCOFLEX 102A	1188/2A	RE	2017/03/23 * 12
SCC-G33	Coaxial Cable	Junkosha	MWX241-01000KMS KMS	-	RE	2017/04/20 * 12

*1) This test equipment was used for the tests before the expiration date of the calibration.

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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