RADIO TEST REPORT

Test Report No. : 12952598S-B-R1

Applicant	:	**Panasonic Corporation**
Type of Equipment	:	**AV Control Unit for In-Vehicle Infotainment**
Model No.	:	**AM1904**
FCC ID	:	**ACJ932AM1904**
Test regulation	:	**FCC Part 15 Subpart C: 2019 (*WLAN part)**
Test Result	:	**Complied (Refer to SECTION 3.2)**

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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 limits of the above regulation.
4. The test results in this test report are traceable to the national or international standards.
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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. The all test items in this test report are conducted by UL Japan, Inc. Shonan EMC Lab.
8. The opinions and the interpretations to the result of the description in this report are outside scopes where UL Japan has been accredited.
9. The information provided from the customer for this report is identified in SECTION 1.
10. This report is a revised version of 12952598S-B. 12952598S-B is replaced with this report.

Date of test: September 19 to October 10, 2019

Representative test engineer: T. Kawakami
Takahiro Kawakami
Engineer
Consumer Technology Division

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

CERTIFICATE 1266.03

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

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REVISION HISTORY

Original Test Report No.: 12952598S-B

Revision	Test report No.	Date	Page revised	Contents
- (Original)	12952598S-B	January 24, 2020	-	-
1	12952598S-B-R1	January 27, 2020	P.7	Update of 3.4: Adjust the cell widths
			P.9	Addition of Software information: (Date: 2019.9.19, Storage location: EUT memory)

Reference: Abbreviations (Including words undescribed in this report)

A2LA	The American Association for Laboratory Accreditation
AC	Alternating Current
AFH	Adaptive Frequency Hopping
AM	Amplitude Modulation
Amp, AMP	Amplifier
ANSI	American National Standards Institute
Ant, ANT	Antenna
AP	Access Point
Atten., ATT	Attenuator
AV	Average
BPSK	Binary Phase-Shift Keying
BR	Bluetooth Basic Rate
BT	Bluetooth
BT LE	Bluetooth Low Energy
BW	BandWidth
Cal Int	Calibration Interval
CCK	Complementary Code Keying
Ch., CH	Channel
CISPR	Comite International Special des Perturbations Radioelectriques
CW	Continuous Wave
DBPSK	Differential BPSK
DC	Direct Current
DFS	Dynamic Frequency Selection
DQPSK	Differential QPSK
DSSS	Direct Sequence Spread Spectrum
EDR	Enhanced Data Rate
EIRP, e.i.r.p.	Equivalent Isotropically Radiated Power
EMC	ElectroMagnetic Compatibility
EMI	ElectroMagnetic Interference
EN	European Norm
ERP, e.r.p.	Effective Radiated Power
EU	European Union
EUT	Equipment Under Test
Fac.	Factor
FCC	Federal Communications Commission
FHSS	Frequency Hopping Spread Spectrum
FM	Frequency Modulation
Freq.	Frequency
GFSK	Gaussian Frequency-Shift Keying
GNSS	Global Navigation Satellite System
GPS	Global Positioning System
Hori.	Horizontal
ICES	Interference-Causing Equipment Standard
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronics Engineers
IF	Intermediate Frequency
ILAC	International Laboratory Accreditation Conference
ISED	Innovation, Science and Economic Development Canada
ISO	International Organization for Standardization
JAB	Japan Accreditation Board
LAN	Local Area Network
LIMS	Laboratory Information Management System
MCS	Modulation and Coding Scheme
MRA	Mutual Recognition Arrangement
NIST	National Institute of Standards and Technology
NS	No signal detect.
NSA	Normalized Site Attenuation
NVLAP	National Voluntary Laboratory Accreditation Program
OBW	Occupied Band Width
OFDM	Orthogonal Frequency Division Multiplexing
P/M	Power meter
PCB	Printed Circuit Board
PER	Packet Error Rate
PHY	Physical Layer
PK	Peak
PN	Pseudo random Noise
PRBS	Pseudo-Random Bit Sequence
PSD	Power Spectral Density
QAM	Quadrature Amplitude Modulation
QP	Quasi-Peak
QPSK	Quadri-Phase Shift Keying
RBW	Resolution Band Width
RDS	Radio Data System
RE	Radio Equipment
RF	Radio Frequency
RMS	Root Mean Square
RSS	Radio Standards Specifications
Rx	Receiving
SA, S/A	Spectrum Analyzer
SG	Signal Generator
SVSWR	Site-Voltage Standing Wave Ratio
TR	Test Receiver
Tx	Transmitting
VBW	Video BandWidth
Vert.	Vertical
WLAN	Wireless LAN

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SECTION 1: Customer information

Company Name	:	Panasonic Corporation
Address	:	4261 Ikonobe-cho, Tsuzuki-ku, Yokohama-shi, Kanagawa 224-8520 Japan
Telephone Number	:	+81-50-3689-7389
Facsimile Number	:	+81-45-931-0806
Contact Person	:	Yoshinori Nagatani

The information provided from the customer is as follows;
- Applicant, Type of Equipment, Model No., FCC ID on the cover and other relevant pages
- Operating/Test Mode(s) (Mode(s)) on all the relevant pages
- SECTION 1: Customer information
- SECTION 2: Equipment under test (E.U.T.)
- SECTION 4: Operation of E.U.T. during testing

* The laboratory is exempted from liability of any test results affected from the above information in SECTION 2 and 4.

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

2.1 Identification of E.U.T.

Type of Equipment	:	AV Control Unit for In-Vehicle Infotainment
Model No.	:	AM1904
Serial No.	:	Refer to SECTION 4.2
Rating	:	DC 13.2 V
Receipt Date of Sample (Information from test lab.)	:	August 7, 2019
Country of Mass-production	:	Thailand, Mexico
Condition of EUT	:	Engineering 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: AM1904 (referred to as the EUT in this report) is a AV Control Unit for In-Vehicle Infotainment.

Radio Specification

Bluetooth (BDR / EDR function)

Radio Type	:	Transceiver
Frequency of Operation	:	2402 MHz - 2480 MHz
Modulation	:	FHSS
Antenna type	:	Pattern antenna
Antenna Gain	:	2 dBi
Clock frequency (Maxmum)	:	48 MHz

WLAN (IEEE802.11a/b/g/ac-20/ac-40/ac-80/n-20/n-40)

Radio Type	:	Transceiver
Frequency of Operation	:	2412 MHz - 2462 MHz, 5180 MHz - 5240 MHz, 5745 MHz - 5825 MHz
Modulation	:	DSSS, OFDM
Antenna type	:	Pattern antenna
Antenna Gain	:	2 dBi (2.4 GHz), 6 dBi (5 GHz)

SECTION 3: Test specification, procedures & results

3.1 Test Specification

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

Title : FCC 47 CFR Part 15 Radio Frequency Device Subpart C Intentional Radiators
Section 15.207 Conducted limits
Section 15.247 Operation within the bands 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz

3.2 Procedures and results

Item	Test Procedure	Specification	Worst margin	Results	Remarks
Conducted Emission	**FCC:** ANSI C63.10-2013 6. Standard test methods **ISED:** RSS-Gen 8.8	**FCC:** Section 15.207 **ISED:** RSS-Gen 8.8	N/A	N/A	N/A *1)
6dB Bandwidth	**FCC:** KDB 558074 D01 15.247 Meas Guidance v05r02 **ISED:** -	**FCC:** Section 15.247(a)(2) **ISED:** RSS-247 5.2(a)	See data.	Complied a)	Conducted
Maximum Peak Output Power	**FCC:** KDB 558074 D01 15.247 Meas Guidance v05r02 **ISED:** RSS-Gen 6.12	**FCC:** Section 15.247(b)(3) **ISED:** RSS-247 5.4(d)		Complied b)	Conducted
Power Density	**FCC:** KDB 558074 D01 15.247 Meas Guidance v05r02 **ISED:** -	**FCC:** Section 15.247(e) **ISED:** RSS-247 5.2(b)		Complied c)	Conducted
Spurious Emission Restricted Band Edges	**FCC:** KDB 558074 D01 15.247 Meas Guidance v05r02 **ISED:** RSS-Gen 6.13	**FCC:** Section15.247(d) **ISED:** RSS-247 5.5 RSS-Gen 8.9 RSS-Gen 8.10	5.3 dB 9848.00 MHz, AV, Horizontal Mode: Tx 11n-20 2462 MHz	Complied d), e)	Conducted (below 30 MHz)/ Radiated (above 30 MHz) *2)

*1) The test is not applicable since the EUT does not have AC power ports.
*2) Radiated test was selected over 30 MHz based on section 15.247(d).
a) Refer to APPENDIX 1 (data of 6 dB Bandwidth and 99 % Occupied Bandwidth)
b) Refer to APPENDIX 1 (data of Maximum Peak Output Power)
c) Refer to APPENDIX 1 (data of Power Density)
d) Refer to APPENDIX 1 (data of Conducted Spurious Emission)
e) Refer to APPENDIX 1 (data of Radiated Spurious Emission)

Symbols:
Complied The data of this test item has enough margin, more than the measurement uncertainty.
Complied# The data of this test item meets the limits unless the measurement uncertainty is taken into consideration.

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

FCC Part 15.31 (e)
The equipment provides the wireless transmitter with stable power supply.
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 of Section 15.203.

3.3 Addition to standard

Item	Test Procedure	Specification	Worst margin	Results	Remarks
99% Occupied Bandwidth	RSS-Gen 6.7	**ISED:** -	N/A	- a)	Conducted
a) Refer to APPENDIX 1 (data of 20dB Bandwidth, 99%Occupied Bandwidth and Carrier Frequency Separation)					

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

3.4 Uncertainty

There is no applicable rule of uncertainty in this applied standard. Therefore, the results are derived depending on whether or not laboratory uncertainty is applied.

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

Item	Frequency range	Uncertainty (+/-)			
		No. 1 SAC / SR	No. 2 SAC / SR	No. 3 SAC / SR	No. 4,5,6,8 SR
Radiated emission (Measurement distance: 3 m)	9 kHz-30 MHz	3.0 dB	3.0 dB	3.0 dB	-
	30 MHz-200 MHz	4.6 dB	4.6 dB	4.6 dB	-
	200 MHz-1 GHz	6.0 dB	6.0 dB	6.0 dB	-
	1 GHz-6 GHz	4.9 dB	4.9 dB	4.9 dB	-
	6 GHz-18 GHz	5.5 dB	5.5 dB	5.5 dB	-
Radiated emission (Measurement distance: 1 m)	1 GHz-18 GHz	5.8 dB	5.8 dB	5.8 dB	-
	18 GHz-40 GHz	5.7 dB	5.7 dB	5.7 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	0.98 dB
Power Measurement above 1 GHz (Peak Detector)_SPM-06	1.75 dB
Power Measurement above 1 GHz (Average Detector)_SPM-07	0.89 dB
Power Measurement above 1 GHz (Peak Detector)_SPM-07	1.12 dB
Power Measurement above 1 GHz (Average Detector)_SPM-13	1.06 dB
Power Measurement above 1 GHz (Peak Detector)_SPM-13	1.24 dB
Spurious emission (Conducted) below 1GHz	0.9 dB
Spurious emission (Conducted) 1 GHz-3 GHz	0.9 dB
Spurious emission (Conducted) 3 GHz-18 GHz	2.9 dB
Spurious emission (Conducted) 18 GHz-26.5 GHz	2.6 dB
Spurious emission (Conducted) 26.5 GHz-40 GHz	2.0 dB
Bandwidth Measurement	0.07 %
Duty cycle and Time Measurement	0.262 %
Temperature	0.95 deg.C.
Voltage	0.83 %

3.5 Test Location

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A2LA Certificate Number: 1266.03 (FCC Test Firm Registration Number: 626366, ISED Lab Company Number: 2973D)

Test site	Width x Depth x Height (m)	Size of reference ground plane (m) / horizontal conducting plane	Maximum measurement distance
No.1 Semi-anechoic chamber	20.6 x 11.3 x 7.65	20.6 x 11.3	10 m
No.2 Semi-anechoic chamber	20.6 x 11.3 x 7.65	20.6 x 11.3	10 m
No.3 Semi-anechoic chamber	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)	2 Mbps, PN9
IEEE 802.11g (11g)	48 Mbps, PN9
IEEE 802.11n-20 (11n-20)	MCS 4(800 ns GI), PN9
*The worst condition was determined based on the test result of Maximum Peak Output Power (Mid Channel)	
*Power of the EUT was set by the software as follows; Power settings: Fixed Software: 03218 (Date: 2019.9.19, Storage location: EUT memory) *This setting of software is the worst case. Any conditions under the normal use do not exceed the condition of setting. In addition, end users cannot change the settings of the output power of the product.	

*The details of Operating mode(s)

Test Item	Operating Mode	Tested frequency
Spurious Emission	11b Tx	2412 MHz 2437 MHz 2462 MHz
	11g Tx 11n-20 Tx	2412 MHz 2417 MHz *1) 2437 MHz 2457 MHz *1) 2462 MHz
Maximum Peak Output Power	11b Tx	2412 MHz 2437 MHz 2462 MHz
	11g Tx 11n-20 Tx	2412 MHz 2437 MHz 2462 MHz
6dB Bandwidth Maximum Peak Output Power Power Density 99% Occupied Bandwidth	11b Tx 11g Tx 11n-20 Tx	2412 MHz 2437 MHz 2462 MHz

*1) Band-edge only

4.2 Configuration and peripherals

This page has been submitted for separate exhibit (refer to APPENDIX 4).

SECTION 5: Radiated Spurious Emission

Test Procedure

It was measured based on "8.5 and 8.6 of KDB 558074 D01 15.247 Meas Guidance v05r02".

[For below 1 GHz]
EUT was placed on a urethane platform of nominal size, 2.0 m by 1.0 m, raised 0.8 m above the conducting ground plane. The Radiated Electric Field Strength has been measured in a Semi Anechoic Chamber with a ground plane.

[For above 1 GHz]
EUT was placed on a urethane platform of nominal size, 0.5 m by 0.5 m, raised 1.5 m above the conducting ground plane.
The Radiated Electric Field Strength has been measured in a Semi Anechoic Chamber with absorbent materials lined on a ground plane.

The height of the measuring antenna varied between 1 m and 4 m and EUT was rotated a full revolution in order to obtain the maximum value of the electric field strength.
Test antenna was aimed at the EUT for receiving the maximum signal and always kept within the illumination area of the 3 dB beamwidth of the antenna.
The measurements were performed for both vertical and horizontal antenna polarization with the Test Receiver, or the Spectrum Analyzer.
The measurements were made with the following detector function of the test receiver and the Spectrum analyzer (in linear mode).
The test was made with the detector (RBW/VBW) in the following table.
When using Spectrum analyzer, the test was made with adjusting span to zero by using peak hold.

Test Antennas are used as below;

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

In any 100 kHz bandwidth outside the 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.

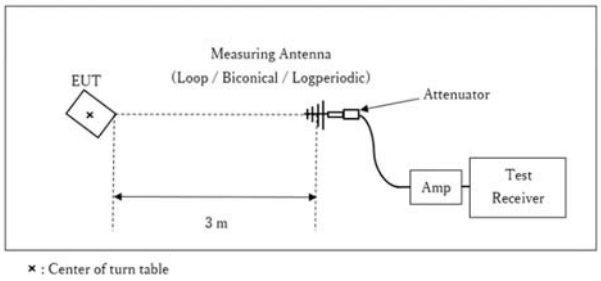
20 dBc was applied to the frequency over the limit of FCC 15.209 / Table 4 of RSS-Gen 8.9(IC) and outside the restricted band of FCC15.205 / Table 6 of RSS-Gen 8.10 (IC).

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: 12.2.5.2 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: 300 kHz

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

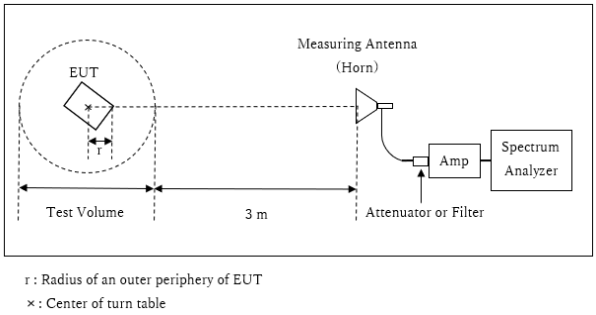
Figure 1: Test Setup

Below 1 GHz



Test Distance: 3 m

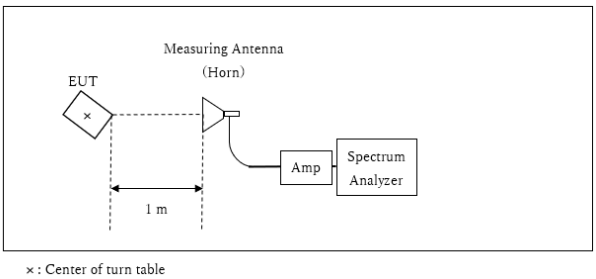
1 GHz - 13 GHz



Distance Factor: 20 x log (3.94 m / 3.0 m) = 2.36 dB
* Test Distance: (3 + Test Volume /2) - r = 3.94 m

Test Volume : 2.0 m
(Test Volume has been calibrated based on CISPR 16-1-4.)
r = 0.06 m

13 GHz - 40 GHz



Distance Factor: 20 x log (1.0 m / 3.0 m) = -9.54 dB
*Test Distance: 1 m

- The carrier level and noise levels were confirmed at each position of 0 deg. and 28 deg. of EUT to see the position of maximum noise, and the test was made at the position that has the maximum noise.

Antenna polarization	Frequency			
	Below 1 GHz	1 GHz - 2.8 GHz	2.8 GHz - 13 GHz	13 GHz - 26.5 GHz
Horizontal	0 deg.	28 deg.	0 deg.	0 deg.
Vertical	0 deg.	28 deg.	0 deg.	0 deg.

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

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

SECTION 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	Enough width to display emission skirts	100 kHz	300 kHz	Auto	Peak	Max Hold	Spectrum Analyzer
99% Occupied Bandwidth *1)	Enough width to display emission skirts	1 to 5 % of OBW	Three times of RBW	Auto	Peak	Max Hold	Spectrum Analyzer
Maximum Peak Output Power	-	-	-	Auto	Peak/ Average *2)	-	Power Meter (Sensor: 160 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 11.10.2 Method PKPSD (peak PSD) of "ANSI C63.10-2013".
*4) In the frequency range below 30MHz, RBW was narrowed to separate the noise contents.
Then, wide-band noise near the limit was checked separately, however the noise was not detected as shown in the chart.
(9 kHz - 150 kHz: RBW = 200 Hz, 150 kHz - 30 MHz: RBW = 10 kHz)

The test results and limit are rounded off to two decimals place, so some differences might be observed.
The equipment and cables were not used for factor 0 dB of the data sheets.

Test data : APPENDIX
Test result : Pass

APPENDIX 1: Test data

6 dB Bandwidth and 99 % Occupied Bandwidth

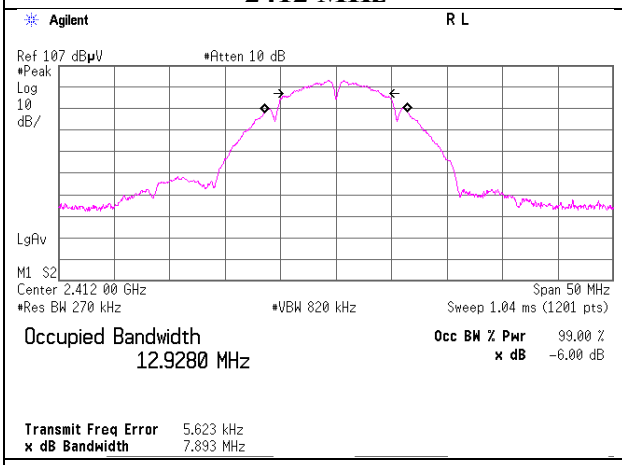
Report No.	12952598S-B-R1
Test place	Shonan EMC Lab. No.5 Shielded Room
Date	September 19, 2019
Temperature / Humidity	24 deg. C / 58 % RH
Engineer	Takahiro Kawakami
Mode	Tx

Mode	Frequency [MHz]	99% Occupied Bandwidth [kHz]	6dB Bandwidth [MHz]	Limit for 6dB Bandwidth [MHz]
11b	2412	12928.0	7.929	> 0.5000
	2437	12927.4	7.870	> 0.5000
	2462	12916.5	7.848	> 0.5000
11g	2412	16801.8	16.541	> 0.5000
	2437	16867.3	16.536	> 0.5000
	2462	16846.0	16.557	> 0.5000
11n-20	2412	18002.7	17.765	> 0.5000
	2437	18055.9	17.772	> 0.5000
	2462	18012.0	17.726	> 0.5000

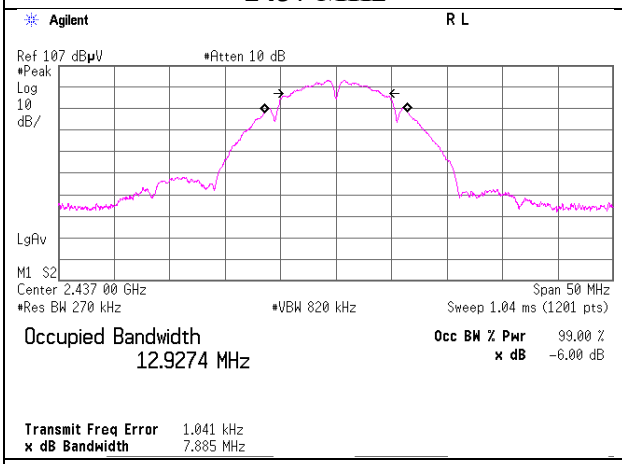
99%Occupied Bandwidth

11b

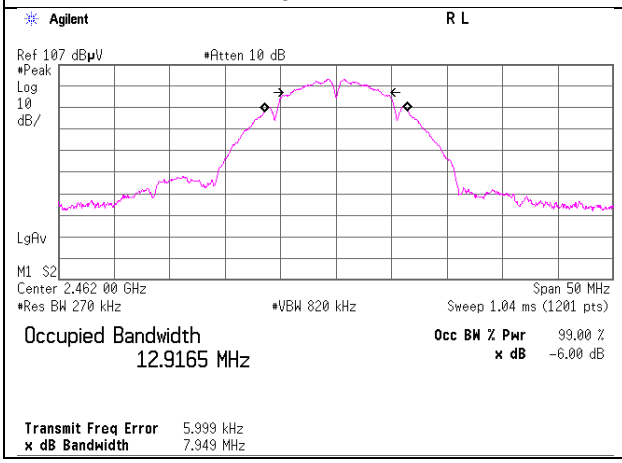
2412 MHz



2437 MHz

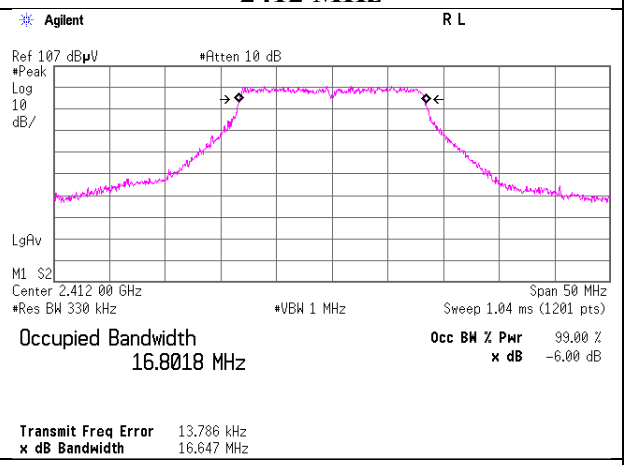


2462 MHz

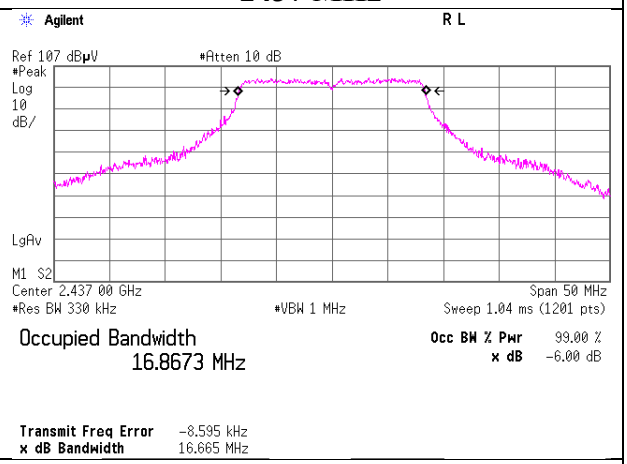


11g

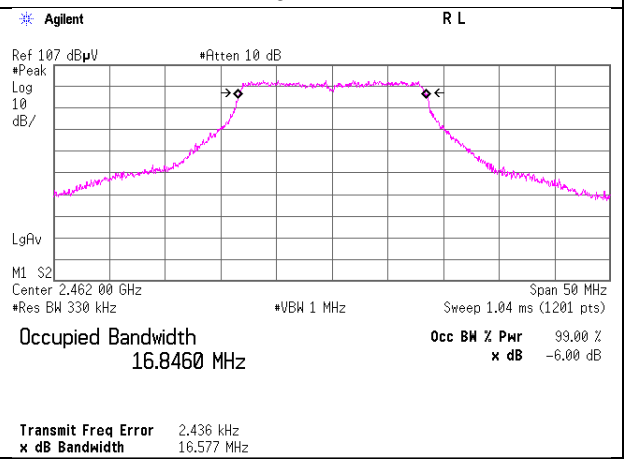
2412 MHz



2437 MHz



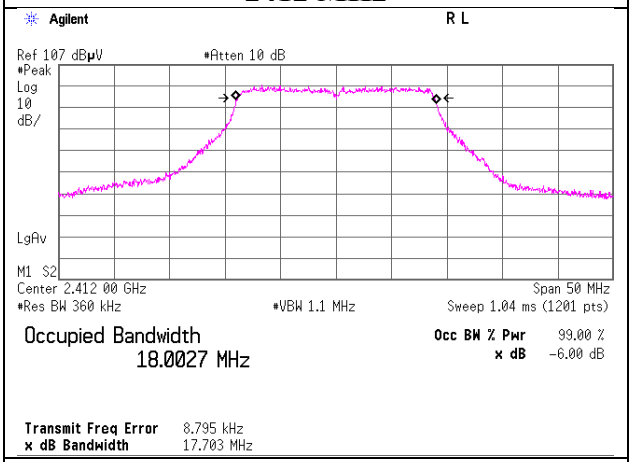
2462 MHz



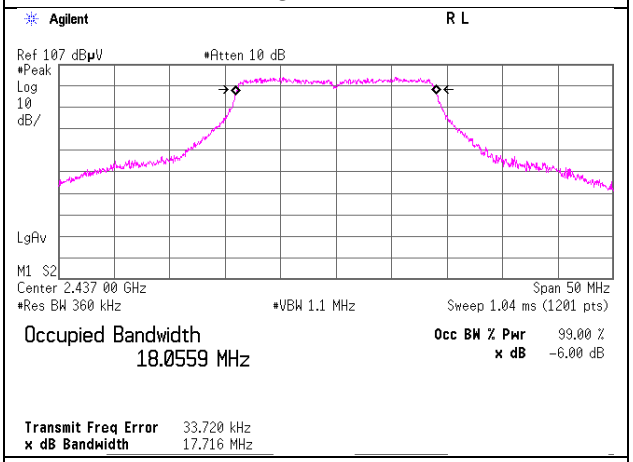
99% Occupied Bandwidth

11n-20

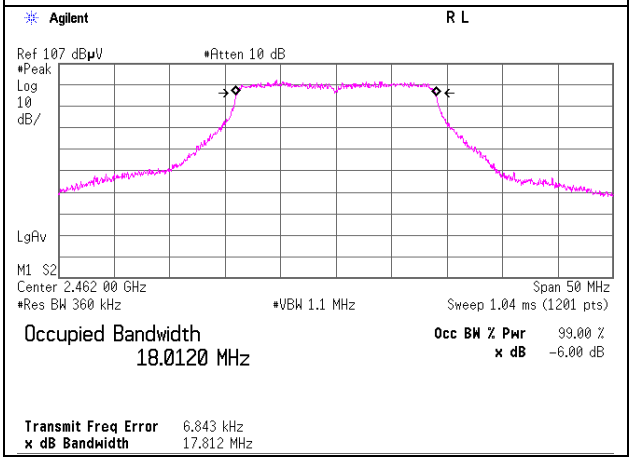
2412 MHz



2437 MHz



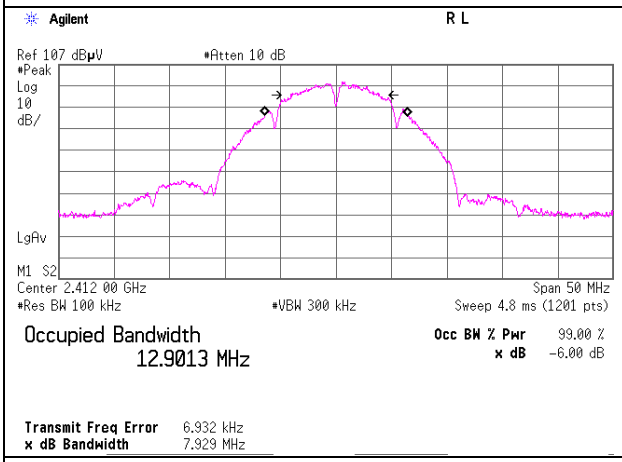
2462 MHz



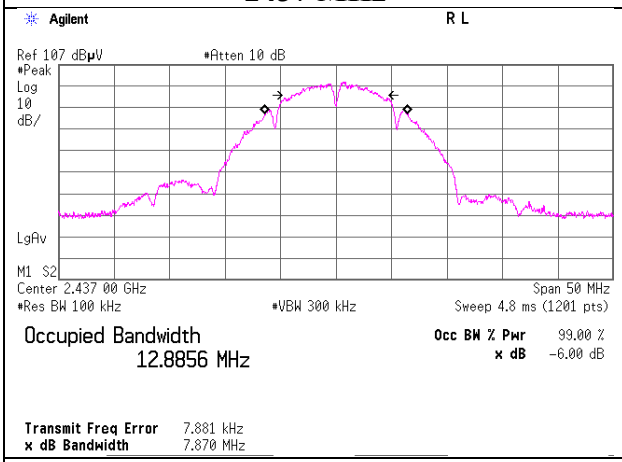
6dB Bandwidth

11b

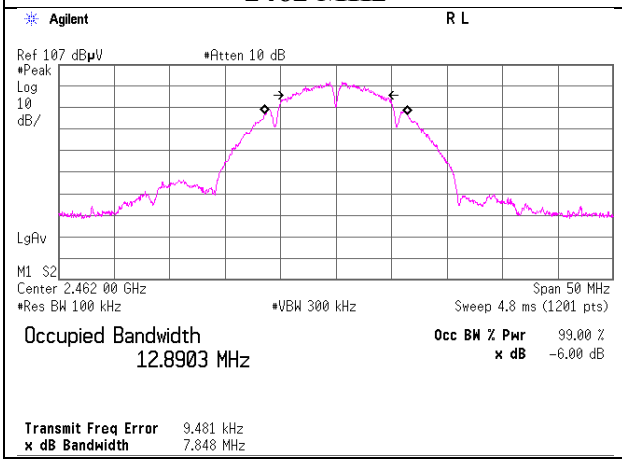
2412 MHz



2437 MHz

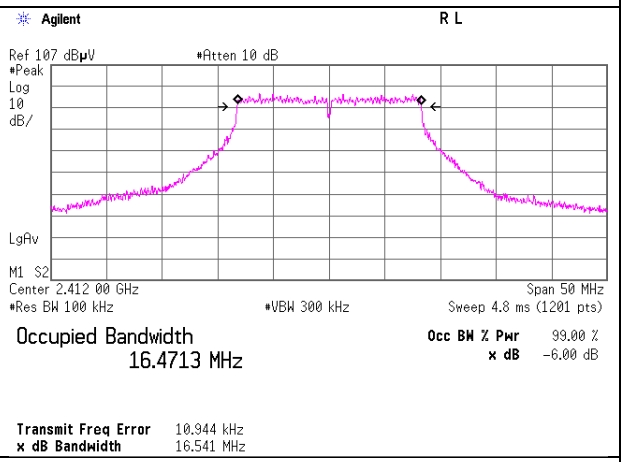


2462 MHz

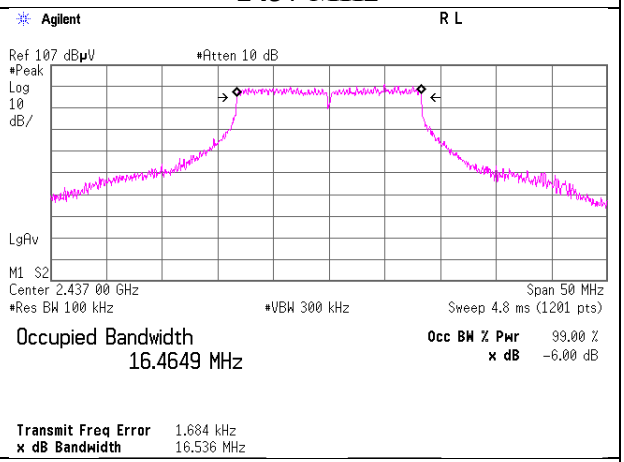


11g

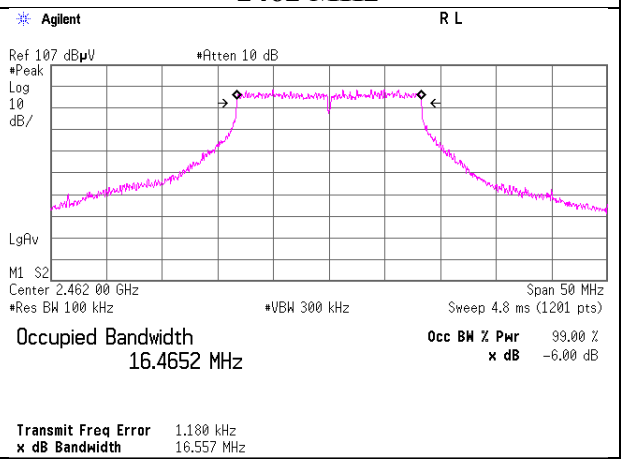
2412 MHz



2437 MHz



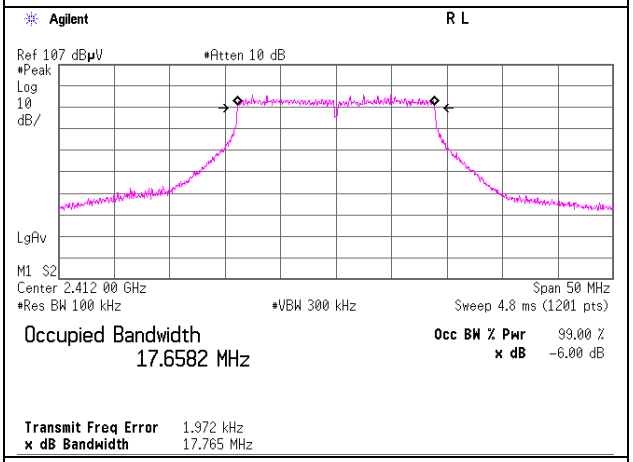
2462 MHz



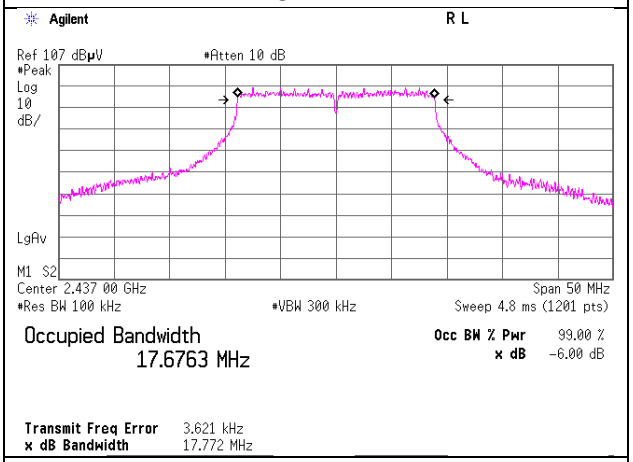
6dB Bandwidth

11n-20

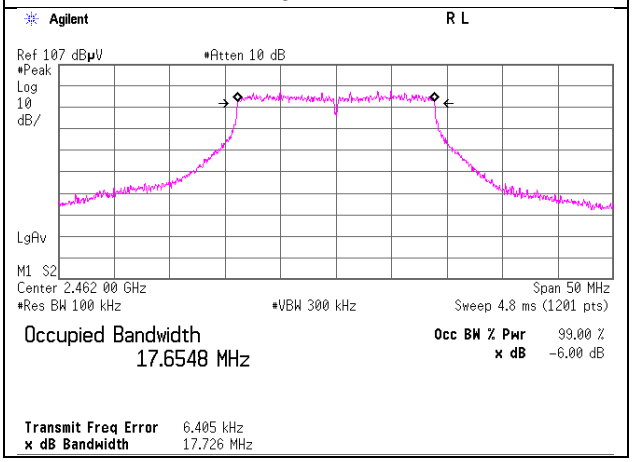
2412 MHz



2437 MHz



2462 MHz



Maximum Peak Output Power

Report No.	12952598S-B-R1
Test place	Shonan EMC Lab. No.5 Shielded Room
Date	September 19, 2019
Temperature / Humidity	24 deg. C / 58 % RH
Engineer	Takahiro Kawakami
Mode	Tx 11b

				Conducted Power					e.i.r.p. for RSS-247					
Freq.	Reading	Cable Loss	Atten. Loss	Result		Limit		Margin	Antenna Gain	Result		Limit		Margin
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[mW]	[dBm]	[mW]	[dB]	[dBi]	[dBm]	[mW]	[dBm]	[mW]	[dB]
2412	2.87	1.84	9.69	14.40	27.54	30.00	1000	15.60	2.00	16.40	43.65	36.02	4000	19.62
2437	2.94	1.84	9.69	14.47	27.99	30.00	1000	15.53	2.00	16.47	44.36	36.02	4000	19.55
2462	2.93	1.84	9.70	14.47	27.99	30.00	1000	15.53	2.00	16.47	44.36	36.02	4000	19.55

Sample Calculation:
Result = Reading + Cable Loss (including the cable(s) customer supplied) + Attenuator Loss
e.i.r.p. Result = Conducted Power Result + Antenna Gain
*The equipment and cables were not used for factor 0 dB of the data sheets.

2437 MHz

Rate [Mbps]	Reading [dBm]	Remark
1	2.62	
2	2.94	*
5.5	2.80	
11	2.88	

*: Worst Rate
All comparison were carried out on same frequency and measurement factors.

Maximum Peak Output Power

Report No.	12952598S-B-R1
Test place	Shonan EMC Lab. No.5 Shielded Room
Date	September 19, 2019
Temperature / Humidity	24 deg. C / 58 % RH
Engineer	Takahiro Kawakami
Mode	Tx 11g

				Conducted Power					e.i.r.p. for RSS-247					
Freq.	Reading	Cable Loss	Atten. Loss	Result		Limit		Margin	Antenna Gain	Result		Limit		Margin
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[mW]	[dBm]	[mW]	[dB]	[dBi]	[dBm]	[mW]	[dBm]	[mW]	[dB]
2412	9.23	1.84	9.69	20.76	119.12	30.00	1000	9.24	2.00	22.76	188.80	36.02	4000	13.26
2437	11.73	1.84	9.69	23.26	211.84	30.00	1000	6.74	2.00	25.26	335.74	36.02	4000	10.76
2462	10.75	1.84	9.70	22.29	169.43	30.00	1000	7.71	2.00	24.29	268.53	36.02	4000	11.73

Sample Calculation:
Result = Reading + Cable Loss (including the cable(s) customer supplied) + Attenuator Loss
e.i.r.p. Result = Conducted Power Result + Antenna Gain
*The equipment and cables were not used for factor 0 dB of the data sheets.

2437 MHz

Rate [Mbps]	Reading [dBm]	Remark
6	8.32	
9	8.45	
12	8.36	
18	8.32	
24	11.67	
36	11.52	
48	11.73	*
54	11.52	

*: Worst Rate

Maximum Peak Output Power

Report No.	12952598S-B-R1
Test place	Shonan EMC Lab. No.5 Shielded Room
Date	September 19, 2019
Temperature / Humidity	24 deg. C / 58 % RH
Engineer	Takahiro Kawakami
Mode	Tx 11n-20

				Conducted Power					e.i.r.p. for RSS-247					
Freq.	Reading	Cable Loss	Atten. Loss	Result		Limit		Margin	Antenna Gain	Result		Limit		Margin
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[mW]	[dBm]	[mW]	[dB]	[dBi]	[dBm]	[mW]	[dBm]	[mW]	[dB]
2412	8.80	1.84	9.69	20.33	107.89	30.00	1000	9.67	2.00	22.33	171.00	36.02	4000	13.69
2437	11.39	1.84	9.69	22.92	195.88	30.00	1000	7.08	2.00	24.92	310.46	36.02	4000	11.10
2462	10.38	1.84	9.70	21.92	155.60	30.00	1000	8.08	2.00	23.92	246.60	36.02	4000	12.10

Sample Calculation:
Result = Reading + Cable Loss (including the cable(s) customer supplied) + Attenuator Loss
e.i.r.p. Result = Conducted Power Result + Antenna Gain
*The equipment and cables were not used for factor 0 dB of the data sheets.

800 ns GI 2437 MHz

Rate [MCS]	Reading [dBm]	Remark
0	7.21	
1	7.27	
2	7.32	
3	10.93	
4	11.39	*
5	10.66	
6	11.36	
7	10.93	

*: Worst Rate

400 ns GI 2437 MHz

Rate [MCS]	Reading [dBm]	Remark
0	7.24	
1	7.29	
2	7.30	
3	10.91	
4	11.32	
5	10.92	
6	11.00	
7	11.04	

Average Output Power
(Reference data for RF Exposure)

Report No.	12952598S-B-R1
Test place	Shonan EMC Lab. No.5 Shielded Room
Date	September 19, 2019
Temperature / Humidity	24 deg. C / 58 % RH
Engineer	Takahiro Kawakami
Mode	Tx

11b **2 Mbps**

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Time average) [dBm]	Result (Time average) [mW]	Duty factor [dB]	Result (Burst power average) [dBm]	Result (Burst power average) [mW]
2412	0.12	1.84	9.69	11.65	14.62	0.00	11.65	14.62
2437	0.16	1.84	9.69	11.69	14.76	0.00	11.69	14.76
2462	0.22	1.84	9.70	11.76	15.00	0.00	11.76	15.00

11g **48 Mbps**

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Time average) [dBm]	Result (Time average) [mW]	Duty factor [dB]	Result (Burst power average) [dBm]	Result (Burst power average) [mW]
2412	-2.20	1.84	9.69	9.33	8.57	0.14	9.47	8.85
2437	1.87	1.84	9.69	13.40	21.88	0.14	13.54	22.59
2462	-0.02	1.84	9.70	11.52	14.19	0.14	11.66	14.66

11n-20 **MCS 7 (800 ns GI)**

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Time average) [dBm]	Result (Time average) [mW]	Duty factor [dB]	Result (Burst power average) [dBm]	Result (Burst power average) [mW]
2412	-2.64	1.84	9.69	8.89	7.74	0.19	9.08	8.09
2437	0.77	1.84	9.69	12.30	16.98	0.19	12.49	17.74
2462	-1.14	1.84	9.70	10.40	10.96	0.19	10.59	11.46

Sample Calculation:
Result (Time average) = Reading + Cable Loss (including the cable(s) customer supplied) + Attenuator Loss
Result (Burst power average) = Time average + Duty factor

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

Average Output Power
(Reference data for RF Exposure)

Report No.	12952598S-B-R1
Test place	Shonan EMC Lab. No.5 Shielded Room
Date	September 19, 2019
Temperature / Humidity	24 deg. C / 58 % RH
Engineer	Takahiro Kawakami
Mode	Tx

2437 MHz

Mode	Rate Mbps	Reading [dBm]	Duty factor [dB]	Burst power [dBm]	Remarks
11b	1	-0.13	0.00	-0.13	
	2	0.16	0.00	0.16	*
	5.5	0.09	0.02	0.11	
	11	0.12	0.03	0.15	
11g	6	1.58	0.02	1.60	
	9	1.55	0.03	1.58	
	12	1.55	0.04	1.59	
	18	1.53	0.06	1.59	
	24	1.93	0.07	2.00	
	36	1.89	0.11	2.00	
	48	1.87	0.14	2.01	*
	54	1.84	0.16	2.00	

* Worst rate

Sample Calculation:

Burst power = Reading (timed average) + Duty factor

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

11n-20, 2437 MHz

Mode	Rate MCS	Reading [dBm]	Duty factor [dB]	Burst power [dBm]	Remarks
800 ns GI	0	0.36	0.02	0.38	
	1	0.34	0.04	0.38	
	2	0.30	0.06	0.36	
	3	0.84	0.07	0.91	
	4	0.84	0.11	0.95	
	5	0.78	0.15	0.93	
	6	0.78	0.17	0.95	
	7	0.77	0.19	0.96	*
400 ns GI	0	0.37	0.02	0.39	
	1	0.36	0.04	0.40	
	2	0.31	0.06	0.37	
	3	0.84	0.07	0.91	
	4	0.83	0.11	0.94	
	5	0.80	0.15	0.95	
	6	0.78	0.17	0.95	
	7	0.76	0.19	0.95	

* Worst rate

Sample Calculation:

Burst power = Reading (timed average) + Duty factor

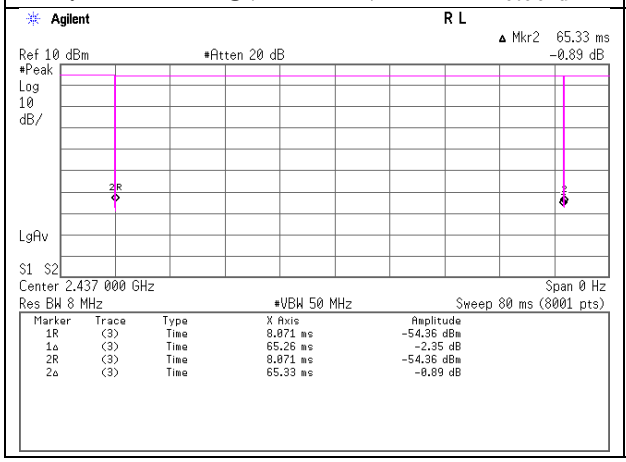
All comparison were carried out on same frequency and measurement factors.

Burst rate confirmation(for Average Output Power)

Report No.	12952598S-B-R1
Test place	Shonan EMC Lab. No.5 Shielded Room
Date	September 19, 2019
Temperature / Humidity	24 deg. C / 58 % RH
Engineer	Takahiro Kawakami
Mode	Tx

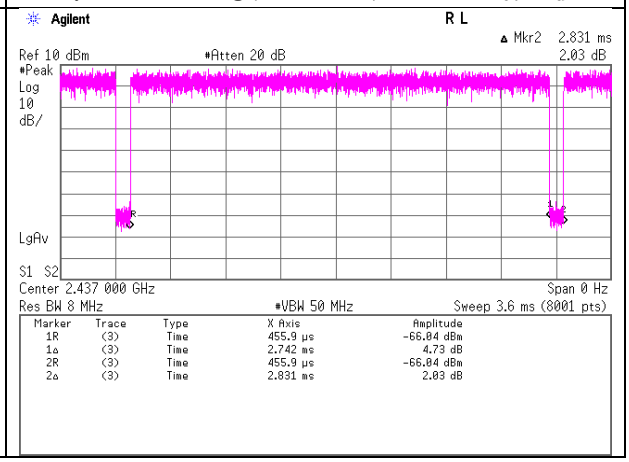
11b 2 Mbps

Tx on / (Tx on + Tx off) =	0.999
Tx on / (Tx on + Tx off) * 100 =	99.9 %
Duty factor = 10 * log (65.33 / 65.26) =	0.00 dB



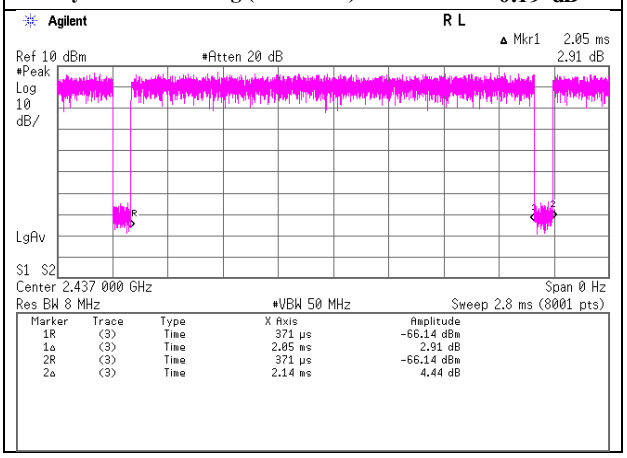
11g 48 Mbps

Tx on / (Tx on + Tx off) =	0.969
Tx on / (Tx on + Tx off) * 100 =	96.9 %
Duty factor = 10 * log (2.831 / 2.742) =	0.14 dB



11n-20 MCS 7 (800 ns GI)

Tx on / (Tx on + Tx off) =	0.958
Tx on / (Tx on + Tx off) * 100 =	95.8 %
Duty factor = 10 * log (2.14 / 2.05) =	0.19 dB



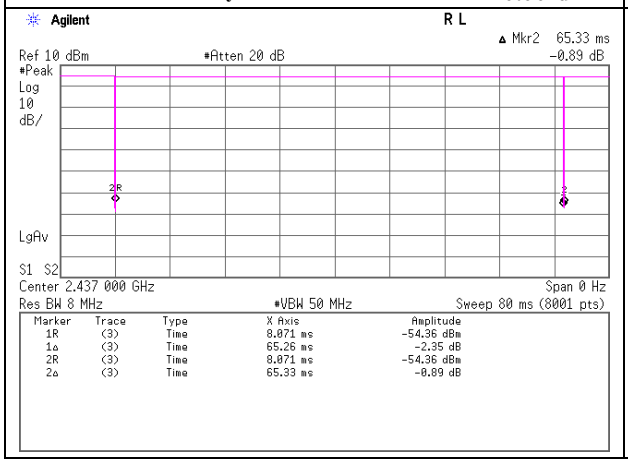
* Since the burst rate is not different between the channels, the data has been obtained on the representative channel.

Burst rate confirmation(for Radiated Spurious Emission)

Report No.	12952598S-B-R1
Test place	Shonan EMC Lab. No.5 Shielded Room
Date	September 19, 2019
Temperature / Humidity	24 deg. C / 58 % RH
Engineer	Takahiro Kawakami
Mode	Tx

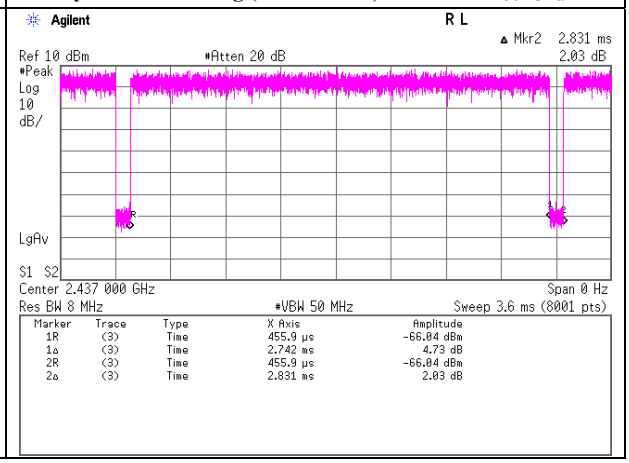
11b 2 Mbps

Tx on / (Tx on + Tx off) =	0.999
Tx on / (Tx on + Tx off) * 100 =	99.9 %
Duty > 98 %	0.00 dB



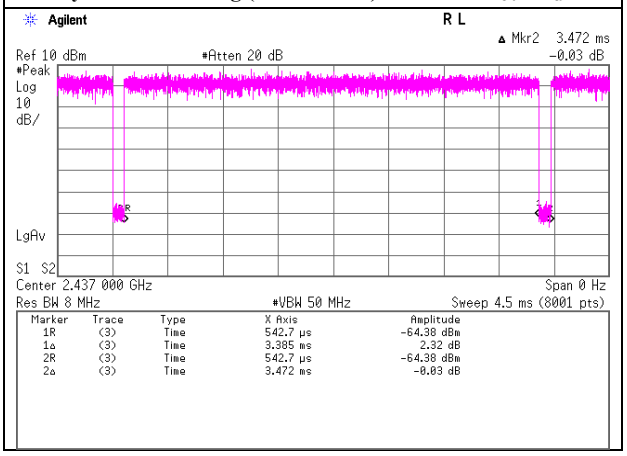
11g 48 Mbps

Tx on / (Tx on + Tx off) =	0.969
Tx on / (Tx on + Tx off) * 100 =	96.9 %
Duty factor = 20 * log (2.831 / 2.742) =	0.28 dB



11n-20 MCS 4 (800 ns GI)

Tx on / (Tx on + Tx off) =	0.975
Tx on / (Tx on + Tx off) * 100 =	97.5 %
Duty factor = 20 * log (3.472 / 3.385) =	0.22 dB



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

Radiated Spurious Emission

Report No.	12952598S-B-R1		
Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	1	1	1
Date	September 24, 2019	September 25, 2019	September 25, 2019
Temperature / Humidity	25 deg. C / 56 % RH	23 deg. C / 54 % RH	24 deg. C / 53 % RH
Engineer	Hiromasa Sato	Takahiro Suzuki	Hiromasa Sato
	(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.	2390.000	PK	47.01	28.31	14.62	39.59	2.36	52.71	73.9	21.1	343	22	
Hori.	4824.000	PK	50.13	31.61	7.06	39.75	2.36	51.41	73.9	22.4	100	310	
Hori.	7236.000	PK	48.02	37.17	8.75	39.55	2.36	56.75	73.9	17.1	150	0	
Hori.	9648.000	PK	47.42	38.68	10.27	39.62	2.36	59.11	73.9	14.7	150	0	
Hori.	2390.000	AV	38.07	28.31	14.62	39.59	2.36	43.77	53.9	10.1	343	22	
Hori.	4824.000	AV	43.95	31.61	7.06	39.75	2.36	45.23	53.9	8.6	100	310	
Hori.	7236.000	AV	36.13	37.17	8.75	39.55	2.36	44.86	53.9	9.0	150	0	
Hori.	9648.000	AV	36.62	38.68	10.27	39.62	2.36	48.31	53.9	**5.5**	150	0	
Vert.	2390.000	PK	47.35	28.31	14.62	39.59	2.36	53.05	73.9	20.8	231	241	
Vert.	4824.000	PK	50.05	31.61	7.06	39.75	2.36	51.33	73.9	22.5	110	27	
Vert.	7236.000	PK	46.06	37.17	8.75	39.55	2.36	54.79	73.9	19.1	150	0	
Vert.	9648.000	PK	48.17	38.68	10.27	39.62	2.36	59.86	73.9	14.0	100	308	
Vert.	2390.000	AV	37.02	28.31	14.62	39.59	2.36	42.72	53.9	11.1	231	241	
Vert.	4824.000	AV	43.09	31.61	7.06	39.75	2.36	44.37	53.9	9.5	110	27	
Vert.	7236.000	AV	35.93	37.17	8.75	39.55	2.36	44.66	53.9	9.2	150	0	
Vert.	9648.000	AV	36.18	38.68	10.27	39.62	2.36	47.87	53.9	6.0	100	308	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Distance factor : 1 GHz - 13 GHz : 20log (3.94 m / 3.0 m) = 2.36 dB
13 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

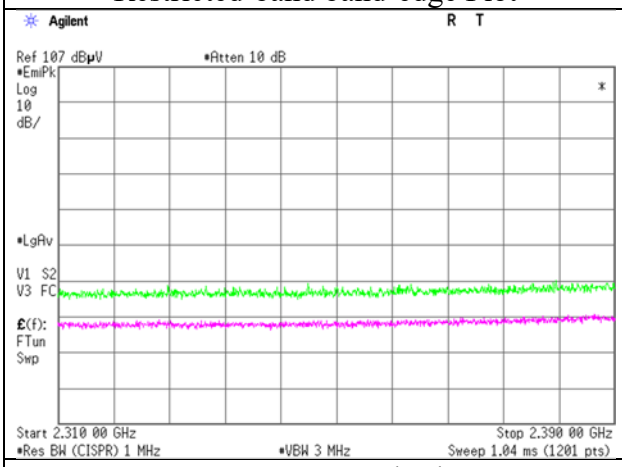
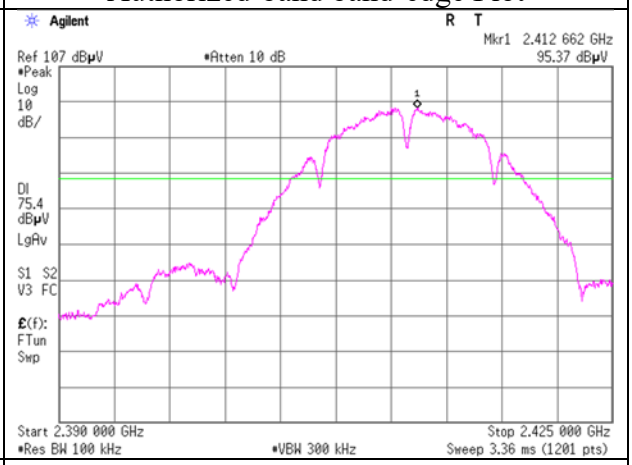
20 dBc Data Sheet **(RBW 100 kHz, VBW 300 kHz)**

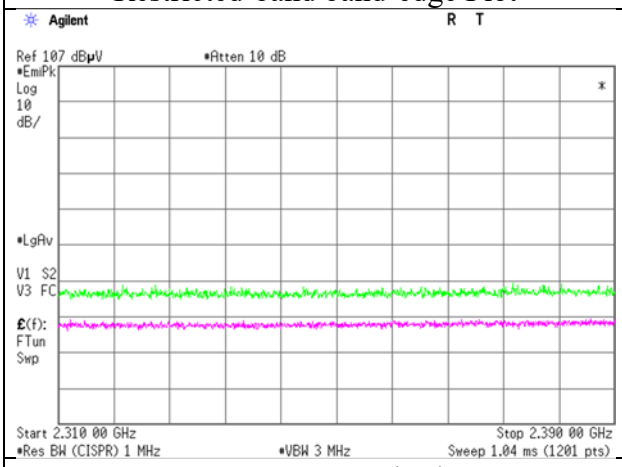
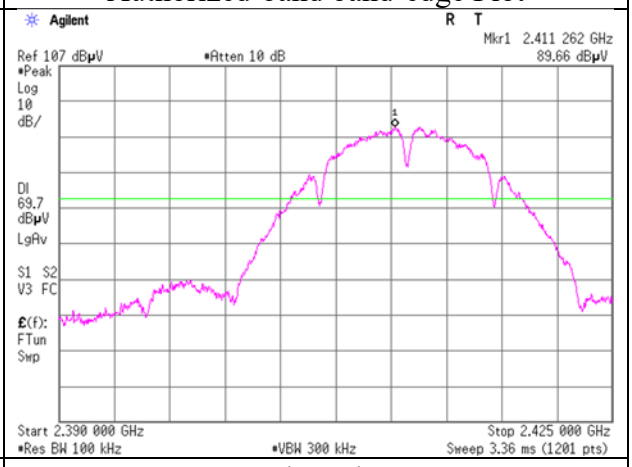
Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2412.000	PK	95.65	28.26	14.64	39.60	2.36	101.31	-	-	Carrier
Hori.	2400.000	PK	46.13	28.29	14.63	39.59	2.36	51.82	81.31	29.4	
Vert.	2412.000	PK	89.28	28.26	14.64	39.60	2.36	94.94	-	-	Carrier
Vert.	2400.000	PK	43.77	28.29	14.63	39.59	2.36	49.46	74.94	25.4	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Distance factor : 1 GHz - 13 GHz : 20log (3.94 m / 3.0 m) = 2.36 dB
13 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

Radiated Spurious Emission
(Reference Plot for band-edge)

Report No.	12952598S-B-R1
Test place	Shonan EMC Lab.
Semi Anechoic Chamber	1
Date	September 24, 2019
Temperature / Humidity	25 deg. C / 56 % RH
Engineer	Hiromasa Sato (1 GHz – 2.8 GHz)
Mode	Tx 11b 2412 MHz

Horizontal	
Restricted-band band-edge Plot	Authorized-band band-edge Plot
	
Trace Green : Peak Plot Trace Purple : Average Plot	20dBc Plot

Vertical	
Restricted-band band-edge Plot	Authorized-band band-edge Plot
	
Trace Green : Peak Plot Trace Purple : Average Plot	20dBc Plot

* The measurement was conducted for a sufficiently long enough time to detect any possible spurious emissions.
Final result of restricted band edge was shown in tabular data.

Radiated Spurious Emission

Report No.	12952598S-B-R1	
Test place	Shonan EMC Lab.	
Semi Anechoic Chamber	1	1
Date	September 25, 2019	September 25, 2019
Temperature / Humidity	23 deg. C / 54 % RH	24 deg. C / 53 % RH
Engineer	Takahiro Suzuki (1 GHz – 13 GHz)	Hiromasa Sato (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.	4874.000	PK	52.00	31.65	7.10	39.74	2.36	53.37	73.9	20.5	106	310	
Hori.	7311.000	PK	46.52	37.23	8.82	39.60	2.36	55.33	73.9	18.5	150	0	
Hori.	9748.000	PK	46.94	39.08	10.24	39.50	2.36	59.12	73.9	14.7	150	0	
Hori.	4874.000	AV	45.28	31.65	7.10	39.74	2.36	46.65	53.9	7.2	106	310	
Hori.	7311.000	AV	33.59	37.23	8.82	39.60	2.36	42.40	53.9	11.5	150	0	
Hori.	9748.000	AV	34.87	39.08	10.24	39.50	2.36	47.05	53.9	6.8	150	0	
Vert.	4874.000	PK	50.83	31.65	7.10	39.74	2.36	52.20	73.9	21.7	146	27	
Vert.	7311.000	PK	45.72	37.23	8.82	39.60	2.36	54.53	73.9	19.3	150	0	
Vert.	9748.000	PK	46.69	39.08	10.24	39.50	2.36	58.87	73.9	15.0	150	0	
Vert.	4874.000	AV	43.94	31.65	7.10	39.74	2.36	45.31	53.9	8.5	146	27	
Vert.	7311.000	AV	35.32	37.23	8.82	39.60	2.36	44.13	53.9	9.7	150	0	
Vert.	9748.000	AV	35.02	39.08	10.24	39.50	2.36	47.20	53.9	**6.7**	150	0	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Distance factor : 1 GHz - 13 GHz : 20log (3.94 m / 3.0 m) = 2.36 dB
13 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

Radiated Spurious Emission

Report No.	12952598S-B-R1		
Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	1	1	1
Date	September 24, 2019	September 25, 2019	September 25, 2019
Temperature / Humidity	25 deg. C / 56 % RH	23 deg. C / 54 % RH	24 deg. C / 53 % RH
Engineer	Hiromasa Sato	Takahiro Suzuki	Hiromasa Sato
	(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.	2483.500	PK	46.88	28.16	14.71	39.62	2.36	52.49	73.9	21.4	146	15	
Hori.	4924.000	PK	52.41	31.73	7.14	39.73	2.36	53.91	73.9	19.9	130	328	
Hori.	7386.000	PK	46.65	37.32	8.87	39.64	2.36	55.56	73.9	18.3	150	0	
Hori.	9848.000	PK	46.87	39.22	10.22	39.37	2.36	59.30	73.9	14.6	150	0	
Hori.	2483.500	AV	37.93	28.16	14.71	39.62	2.36	43.54	53.9	10.3	146	15	
Hori.	4924.000	AV	45.28	31.73	7.14	39.73	2.36	46.78	53.9	7.1	130	328	
Hori.	7386.000	AV	33.73	37.32	8.87	39.64	2.36	42.64	53.9	11.2	150	0	
Hori.	9848.000	AV	35.23	39.22	10.22	39.37	2.36	47.66	53.9	**6.2**	150	0	
Vert.	2483.500	PK	45.79	28.16	14.71	39.62	2.36	51.40	73.9	22.5	275	234	
Vert.	4924.000	PK	51.44	31.73	7.14	39.73	2.36	52.94	73.9	20.9	128	340	
Vert.	7386.000	PK	45.81	37.32	8.87	39.64	2.36	54.72	73.9	19.1	150	0	
Vert.	9848.000	PK	46.63	39.22	10.22	39.37	2.36	59.06	73.9	14.8	150	0	
Vert.	2483.500	AV	37.08	28.16	14.71	39.62	2.36	42.69	53.9	11.2	275	234	
Vert.	4924.000	AV	43.09	31.73	7.14	39.73	2.36	44.59	53.9	9.3	128	340	
Vert.	7386.000	AV	35.39	37.32	8.87	39.64	2.36	44.30	53.9	9.6	150	0	
Vert.	9848.000	AV	35.05	39.22	10.22	39.37	2.36	47.48	53.9	6.4	150	0	

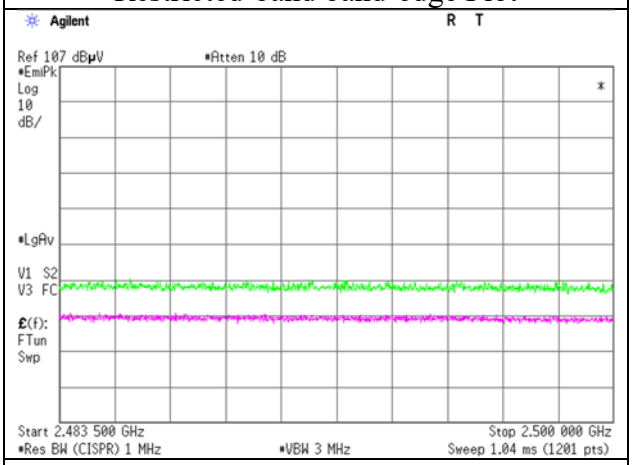
Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Distance factor : 1 GHz - 13 GHz : 20log (3.94 m / 3.0 m) = 2.36 dB
13 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

Radiated Spurious Emission
(Reference Plot for band-edge)

Report No.	12952598S-B-R1
Test place	Shonan EMC Lab.
Semi Anechoic Chamber	1
Date	September 24, 2019
Temperature / Humidity	25 deg. C / 56 % RH
Engineer	Hiromasa Sato (1 GHz – 2.8 GHz)
Mode	Tx 11b 2462 MHz

Horizontal

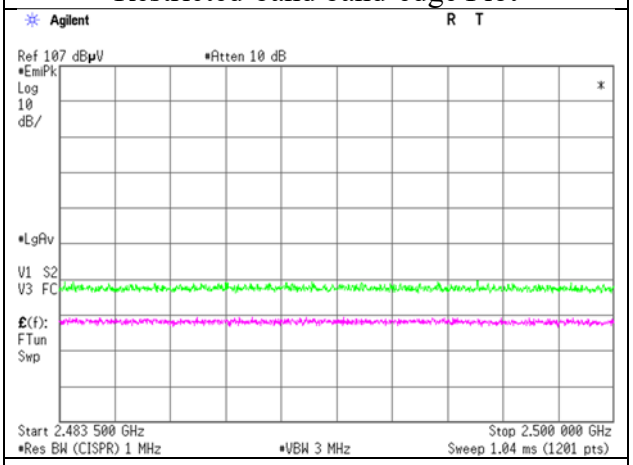
Restricted-band band-edge Plot



Trace Green : Peak Plot
Trace Purple : Average Plot

Vertical

Restricted-band band-edge Plot



Trace Green : Peak Plot
Trace Purple : Average Plot

* The measurement was conducted for a sufficiently long enough time to detect any possible spurious emissions.
Final result of restricted band edge was shown in tabular data.

Radiated Spurious Emission

Report No.	12952598S-B-R1		
Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	1	1	1
Date	September 24, 2019	September 25, 2019	September 25, 2019
Temperature / Humidity	25 deg. C / 56 % RH	23 deg. C / 54 % RH	24 deg. C / 53 % RH
Engineer	Hiromasa Sato	Takahiro Suzuki	Hiromasa Sato
	(1 GHz – 2.8 GHz)	(2.8 GHz - 13 GHz)	(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.	2390.000	PK	53.76	28.31	14.62	39.59	2.36	59.46	73.9	14.4	226	19	
Hori.	4824.000	PK	47.93	31.61	7.06	39.75	2.36	49.21	73.9	24.6	147	312	
Hori.	7236.000	PK	47.95	37.17	8.75	39.55	2.36	56.68	73.9	17.2	150	0	
Hori.	9648.000	PK	47.23	38.68	10.27	39.62	2.36	58.92	73.9	14.9	150	0	
Vert.	2390.000	PK	49.70	28.31	14.62	39.59	2.36	55.40	73.9	18.5	228	237	
Vert.	4824.000	PK	46.93	31.61	7.06	39.75	2.36	48.21	73.9	25.6	112	27	
Vert.	7236.000	PK	46.00	37.17	8.75	39.55	2.36	54.73	73.9	19.1	150	0	
Vert.	9648.000	PK	48.03	38.68	10.27	39.62	2.36	59.72	73.9	**14.1**	150	0	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Distance factor : 1 GHz - 13 GHz : 20log (3.94 m / 3.0 m) = 2.36 dB
13 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

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	40.65	28.31	14.62	39.59	0.28	2.36	46.63	53.9	7.3	*1)
Hori.	4824.000	AV	37.77	31.61	7.06	39.75	0.28	2.36	39.33	53.9	14.6	
Hori.	7236.000	AV	36.00	37.17	8.75	39.55	0.28	2.36	45.01	53.9	8.9	
Hori.	9648.000	AV	36.49	38.68	10.27	39.62	0.28	2.36	48.46	53.9	**5.4**	
Vert.	2390.000	AV	38.07	28.31	14.62	39.59	0.28	2.36	44.05	53.9	9.9	*1)
Vert.	4824.000	AV	37.08	31.61	7.06	39.75	0.28	2.36	38.64	53.9	15.3	
Vert.	7236.000	AV	35.76	37.17	8.75	39.55	0.28	2.36	44.77	53.9	9.1	
Vert.	9648.000	AV	36.02	38.68	10.27	39.62	0.28	2.36	47.99	53.9	5.9	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Duty factor + Distance factor
Distance factor : 1 GHz - 13 GHz : 20log (3.94 m / 3.0 m) = 2.36 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)

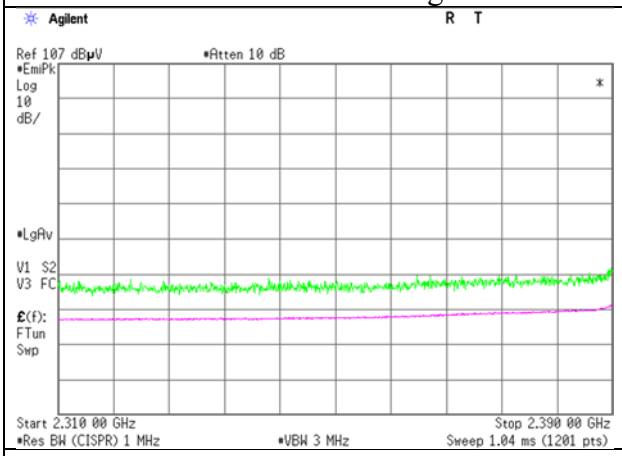
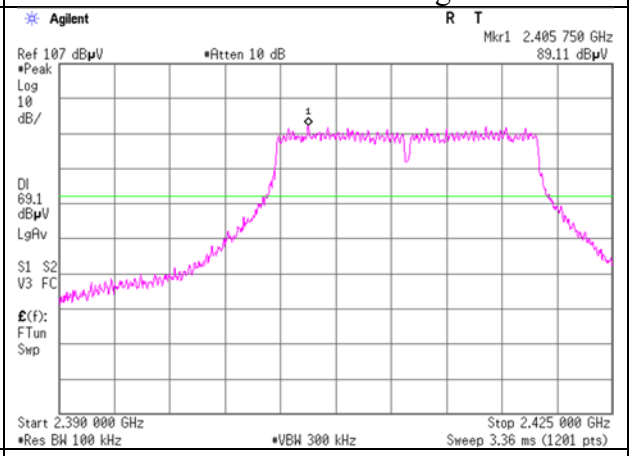
20 dBc Data Sheet (RBW 100 kHz, VBW 300 kHz)

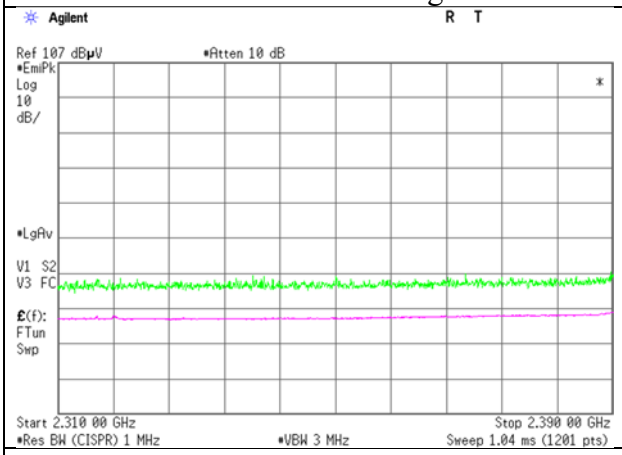
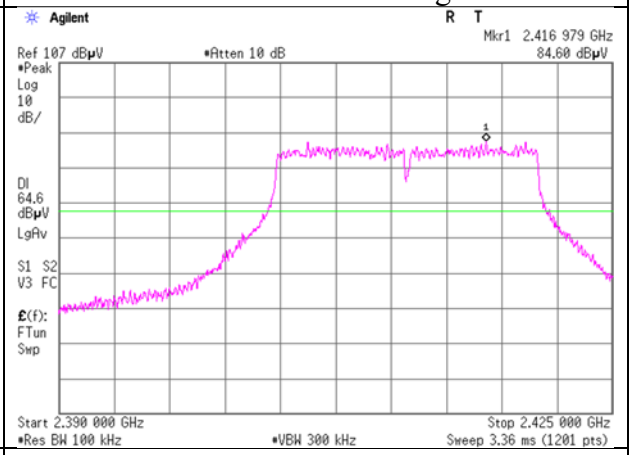
Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2412.000	PK	88.78	28.26	14.64	39.60	2.36	94.44	-	-	Carrier
Hori.	2400.000	PK	53.51	28.29	14.63	39.59	2.36	59.20	74.44	15.2	
Vert.	2412.000	PK	83.83	28.26	14.64	39.60	2.36	89.49	-	-	Carrier
Vert.	2400.000	PK	49.14	28.29	14.63	39.59	2.36	54.83	69.49	14.6	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Distance factor : 1 GHz - 13 GHz : 20log (3.94 m / 3.0 m) = 2.36 dB
13 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

Radiated Spurious Emission
(Reference Plot for band-edge)

Report No.	12952598S-B-R1
Test place	Shonan EMC Lab.
Semi Anechoic Chamber	1
Date	September 24, 2019
Temperature / Humidity	25 deg. C / 56 % RH
Engineer	Hiromasa Sato (1 GHz – 2.8 GHz)
Mode	Tx 11g 2412 MHz

Horizontal	
Restricted-band band-edge Plot	Authorized-band band-edge Plot
	
Trace Green : Peak Plot Trace Purple : Average Plot	20dBc Plot

Vertical	
Restricted-band band-edge Plot	Authorized-band band-edge Plot
	
Trace Green : Peak Plot Trace Purple : Average Plot	20dBc Plot

* The measurement was conducted for a sufficiently long enough time to detect any possible spurious emissions.
Final result of restricted band edge was shown in tabular data.

Radiated Spurious Emission

Report No.	12952598S-B-R1
Test place	Shonan EMC Lab.
Semi Anechoic Chamber	1
Date	September 24, 2019
Temperature / Humidity	25 deg. C / 56 % RH
Engineer	Hiromasa Sato (1 GHz – 2.8 GHz)
Mode	Tx 11g 2417 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.	2390.000	PK	55.99	28.31	14.62	39.59	2.36	61.69	73.9	**12.2**	279	14	
Vert.	2390.000	PK	48.95	28.31	14.62	39.59	2.36	54.65	73.9	19.2	270	238	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Distance factor : 1 GHz - 13 GHz : 20log (3.94 m / 3.0 m) = 2.36 dB
13 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

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	41.18	28.31	14.62	39.59	0.28	2.36	47.16	53.9	**6.7**	*1)
Vert.	2390.000	AV	37.79	28.31	14.62	39.59	0.28	2.36	43.77	53.9	10.1	*1)

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Duty factor + Distance factor
Distance factor : 1 GHz - 13 GHz : 20log (3.94 m / 3.0 m) = 2.36 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)

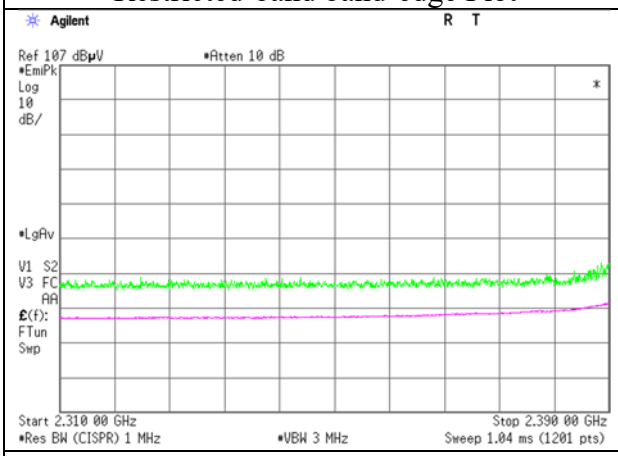
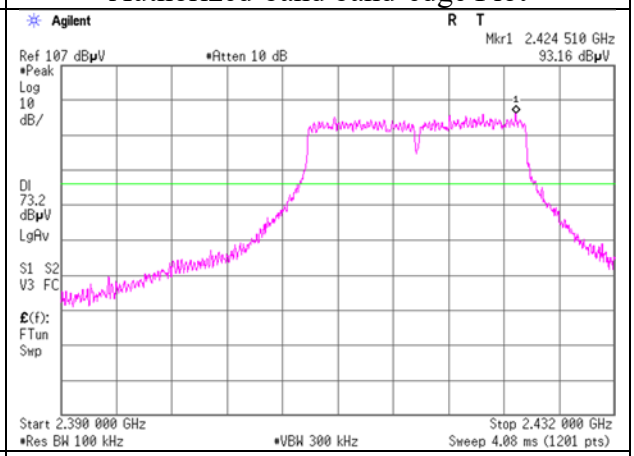
20 dBc Data Sheet (RBW 100 kHz, VBW 300 kHz)

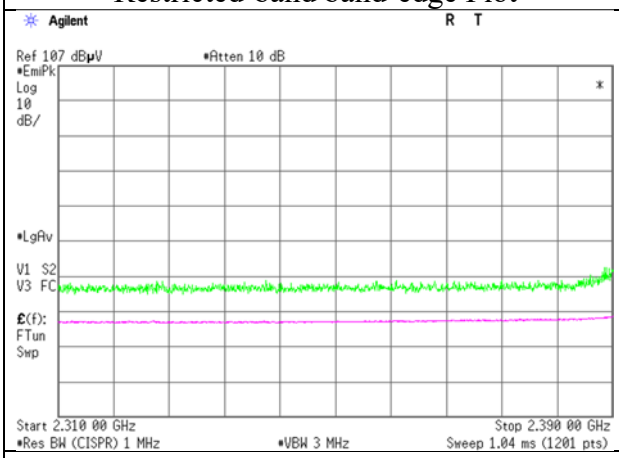
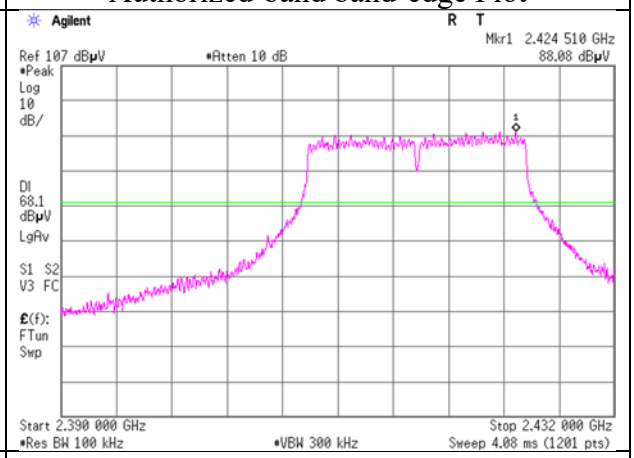
Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Vert.	2417.000	PK	87.44	28.25	14.64	39.60	2.36	93.09	-	-	Carrier
Vert.	2400.000	PK	44.61	28.29	14.63	39.59	2.36	50.30	73.09	22.7	
Hori.	2417.000	PK	92.48	28.25	14.64	39.60	2.36	98.13	-	-	Carrier
Hori.	2400.000	PK	49.66	28.29	14.63	39.59	2.36	55.35	78.13	22.7	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Distance factor : 1 GHz - 13 GHz : 20log (3.94 m / 3.0 m) = 2.36 dB
13 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

Radiated Spurious Emission
(Reference Plot for band-edge)

Report No.	12952598S-B-R1
Test place	Shonan EMC Lab.
Semi Anechoic Chamber	1
Date	September 24, 2019
Temperature / Humidity	25 deg. C / 56 % RH
Engineer	Hiromasa Sato (1 GHz – 2.8 GHz)
Mode	Tx 11g 2417 MHz

Horizontal	
Restricted-band band-edge Plot	Authorized-band band-edge Plot
	
Trace Green : Peak Plot Trace Purple : Average Plot	20dBc Plot

Vertical	
Restricted-band band-edge Plot	Authorized-band band-edge Plot
	
Trace Green : Peak Plot Trace Purple : Average Plot	20dBc Plot

* The measurement was conducted for a sufficiently long enough time to detect any possible spurious emissions.
Final result of restricted band edge was shown in tabular data.

Radiated Spurious Emission

Report No.	12952598S-B-R1		
Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	2	1	1
Date	October 10, 2019	September 25, 2019	September 25, 2019
Temperature / Humidity	21 deg. C / 61 % RH	23 deg. C / 54 % RH	24 deg. C / 53 % RH
Engineer	Kazuya Noda (30 MHz - 1000 MHz)	Takahiro Suzuki (1 GHz – 13 GHz)	Hiromasa Sato (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.	114.049	QP	41.60	12.39	8.01	31.87	0.00	30.13	43.5	13.3	273	224	
Hori.	116.165	QP	44.20	12.70	8.03	31.87	0.00	33.06	43.5	10.4	268	228	
Hori.	118.281	QP	41.80	12.88	8.04	31.87	0.00	30.85	43.5	12.6	266	250	
Hori.	122.494	QP	42.30	13.25	8.10	31.86	0.00	31.79	43.5	11.7	271	238	
Hori.	124.613	QP	44.10	13.56	8.15	31.86	0.00	33.95	43.5	**9.5**	252	240	
Hori.	135.173	QP	42.90	14.18	8.38	31.85	0.00	33.61	43.5	9.8	262	246	
Hori.	552.964	QP	35.40	17.90	8.32	31.66	0.00	29.96	46.0	16.0	100	277	
Hori.	4874.000	PK	48.07	31.65	7.10	39.74	2.36	49.44	73.9	24.4	113	305	
Hori.	7311.000	PK	46.73	37.23	8.82	39.60	2.36	55.54	73.9	18.3	150	0	
Hori.	9748.000	PK	46.78	39.08	10.24	39.50	2.36	58.96	73.9	14.9	150	0	
Vert.	32.691	QP	32.90	17.63	6.90	31.93	0.00	25.50	40.0	14.5	100	5	
Vert.	135.173	QP	40.50	14.18	8.38	31.85	0.00	31.21	43.5	12.2	100	136	
Vert.	541.900	QP	39.10	17.72	8.27	31.65	0.00	33.44	46.0	12.5	123	250	
Vert.	4874.000	PK	47.58	31.65	7.10	39.74	2.36	48.95	73.9	24.9	100	24	
Vert.	7311.000	PK	45.54	37.23	8.82	39.60	2.36	54.35	73.9	19.5	150	0	
Vert.	9748.000	PK	46.52	39.08	10.24	39.50	2.36	58.70	73.9	15.2	150	0	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Distance factor : 1 GHz - 13 GHz : 20log (3.94 m / 3.0 m) = 2.36 dB
13 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

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	38.34	31.65	7.10	39.74	0.28	2.36	39.99	53.9	13.9	
Hori.	7311.000	AV	34.02	37.23	8.82	39.60	0.28	2.36	43.11	53.9	10.8	
Hori.	9748.000	AV	34.52	39.08	10.24	39.50	0.28	2.36	46.98	53.9	6.9	
Vert.	4874.000	AV	37.41	31.65	7.10	39.74	0.28	2.36	39.06	53.9	14.8	
Vert.	7311.000	AV	35.23	37.23	8.82	39.60	0.28	2.36	44.32	53.9	9.6	
Vert.	9748.000	AV	34.76	39.08	10.24	39.50	0.28	2.36	47.22	53.9	**6.7**	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Duty factor + Distance factor
Distance factor : 1 GHz - 13 GHz : 20log (3.94 m / 3.0 m) = 2.36 dB
13 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB
Duty factor refer to "Duty factor Calculation chart" sheet.

Radiated Spurious Emission

Report No.	12952598S-B-R1
Test place	Shonan EMC Lab.
Semi Anechoic Chamber	1
Date	September 24, 2019
Temperature / Humidity	25 deg. C / 56 % RH
Engineer	Hiromasa Sato (1 GHz – 2.8 GHz)
Mode	Tx 11g 2457 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.	2483.500	PK	50.15	28.16	14.71	39.62	2.36	55.76	73.9	**18.1**	146	14	
Vert.	2483.500	PK	47.88	28.16	14.71	39.62	2.36	53.49	73.9	20.4	218	244	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Distance factor : 1 GHz - 13 GHz : 20log (3.94 m / 3.0 m) = 2.36 dB
13 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

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	39.65	28.16	14.71	39.62	0.28	2.36	45.54	53.9	**8.4**	*1)
Vert.	2483.500	AV	36.51	28.16	14.71	39.62	0.28	2.36	42.40	53.9	11.5	*1)

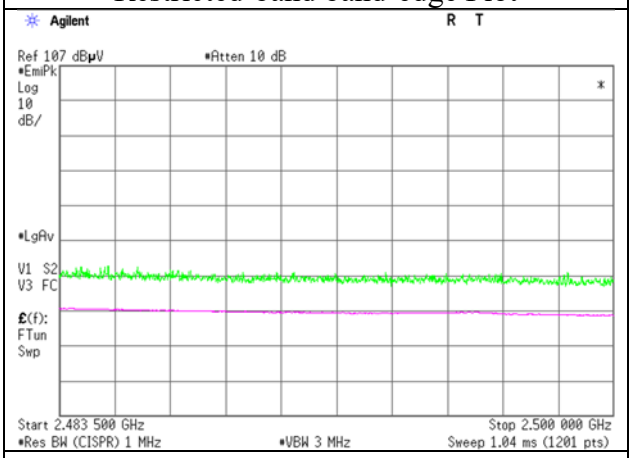
Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Duty factor + Distance factor
Distance factor : 1 GHz - 13 GHz : 20log (3.94 m / 3.0 m) = 2.36 dB
13 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB
Duty factor refer to "Duty factor Calculation chart" sheet.
*1) Not out of band emission (Leakage Power)

Radiated Spurious Emission
(Reference Plot for band-edge)

Report No.	12952598S-B-R1
Test place	Shonan EMC Lab.
Semi Anechoic Chamber	1
Date	September 24, 2019
Temperature / Humidity	25 deg. C / 56 % RH
Engineer	Hiromasa Sato (1 GHz – 2.8 GHz)
Mode	Tx 11g 2457 MHz

Horizontal

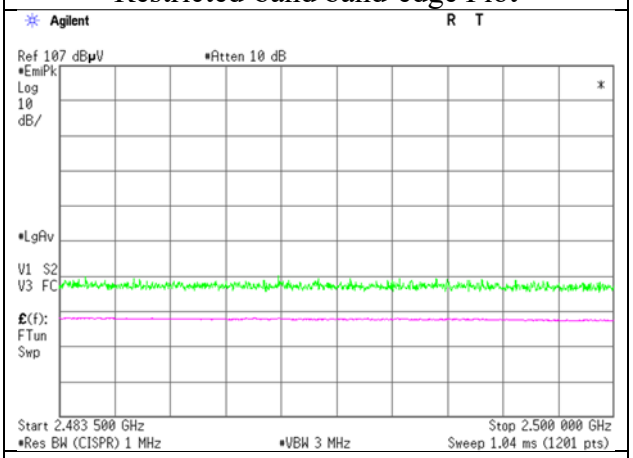
Restricted-band band-edge Plot



Trace Green : Peak Plot
Trace Purple : Average Plot

Vertical

Restricted-band band-edge Plot



Trace Green : Peak Plot
Trace Purple : Average Plot

* The measurement was conducted for a sufficiently long enough time to detect any possible spurious emissions.
Final result of restricted band edge was shown in tabular data.

Radiated Spurious Emission

Report No.	12952598S-B-R1		
Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	1	1	1
Date	September 24, 2019	September 25, 2019	September 25, 2019
Temperature / Humidity	25 deg. C / 56 % RH	23 deg. C / 54 % RH	24 deg. C / 53 % RH
Engineer	Hiromasa Sato	Takahiro Suzuki	Hiromasa Sato
	(1 GHz – 2.8 GHz)	(2.8 GHz - 13 GHz)	(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.	2483.500	PK	52.24	28.16	14.71	39.62	2.36	57.85	73.9	16.0	147	15	
Hori.	4924.000	PK	47.58	31.73	7.14	39.73	2.36	49.08	73.9	24.8	100	308	
Hori.	7386.000	PK	46.95	37.32	8.87	39.64	2.36	55.86	73.9	18.0	150	0	
Hori.	9848.000	PK	46.72	39.22	10.22	39.37	2.36	59.15	73.9	**14.7**	150	0	
Vert.	2483.500	PK	48.54	28.16	14.71	39.62	2.36	54.15	73.9	19.7	227	232	
Vert.	4924.000	PK	47.47	31.73	7.14	39.73	2.36	48.97	73.9	24.9	112	20	
Vert.	7386.000	PK	46.52	37.32	8.87	39.64	2.36	55.43	73.9	18.4	150	0	
Vert.	9848.000	PK	46.64	39.22	10.22	39.37	2.36	59.07	73.9	14.8	150	0	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Distance factor : 1 GHz - 13 GHz : 20log (3.94 m / 3.0 m) = 2.36 dB
13 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

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	40.88	28.16	14.71	39.62	0.28	2.36	46.77	53.9	7.1	*1)
Hori.	4924.000	AV	37.99	31.73	7.14	39.73	0.28	2.36	39.77	53.9	14.1	
Hori.	7386.000	AV	33.82	37.32	8.87	39.64	0.28	2.36	43.01	53.9	10.9	
Hori.	9848.000	AV	34.91	39.22	10.22	39.37	0.28	2.36	47.62	53.9	6.3	
Vert.	2483.500	AV	38.27	28.16	14.71	39.62	0.28	2.36	44.16	53.9	9.7	*1)
Vert.	4924.000	AV	36.44	31.73	7.14	39.73	0.28	2.36	38.22	53.9	15.7	
Vert.	7386.000	AV	33.83	37.32	8.87	39.64	0.28	2.36	43.02	53.9	10.9	
Vert.	9848.000	AV	35.13	39.22	10.22	39.37	0.28	2.36	47.84	53.9	**6.1**	

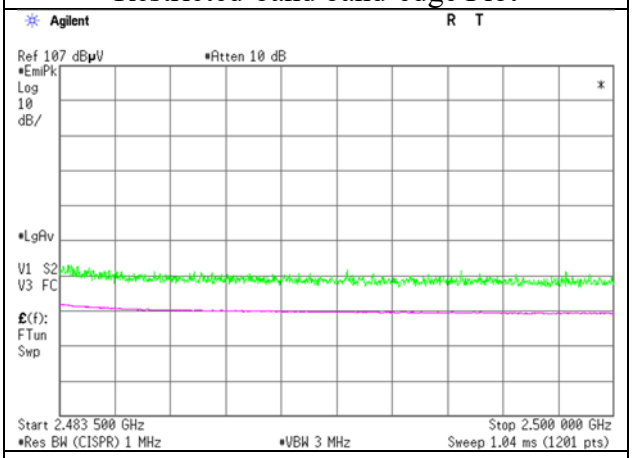
Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Duty factor + Distance factor
Distance factor : 1 GHz - 13 GHz : 20log (3.94 m / 3.0 m) = 2.36 dB
13 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB
Duty factor refer to "Duty factor Calculation chart" sheet.
*1) Not out of band emission (Leakage Power)

Radiated Spurious Emission
(Reference Plot for band-edge)

Report No.	12952598S-B-R1
Test place	Shonan EMC Lab.
Semi Anechoic Chamber	1
Date	September 24, 2019
Temperature / Humidity	25 deg. C / 56 % RH
Engineer	Hiromasa Sato (1 GHz – 2.8 GHz)
Mode	Tx 11g 2462 MHz

Horizontal

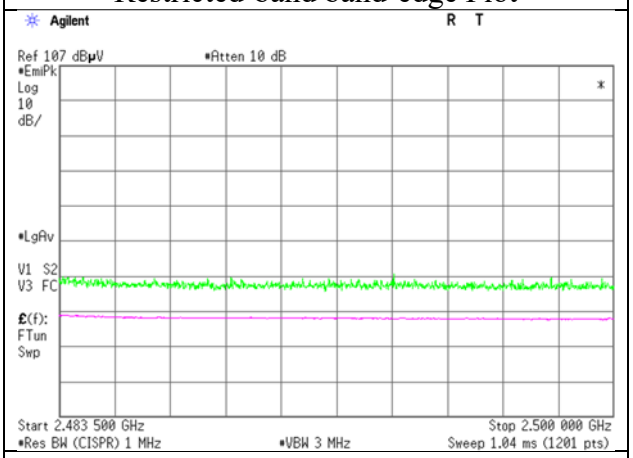
Restricted-band band-edge Plot



Trace Green : Peak Plot
Trace Purple : Average Plot

Vertical

Restricted-band band-edge Plot



Trace Green : Peak Plot
Trace Purple : Average Plot

* The measurement was conducted for a sufficiently long enough time to detect any possible spurious emissions.
Final result of restricted band edge was shown in tabular data.

Radiated Spurious Emission

Report No.	12952598S-B-R1		
Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	1	1	1
Date	September 24, 2019	September 25, 2019	September 25, 2019
Temperature / Humidity	25 deg. C / 56 % RH	23 deg. C / 54 % RH	24 deg. C / 53 % RH
Engineer	Hiromasa Sato	Takahiro Suzuki	Hiromasa Sato
	(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.	2390.000	PK	52.84	28.31	14.62	39.59	2.36	58.54	73.9	15.3	189	16	
Hori.	4824.000	PK	47.98	31.61	7.06	39.75	2.36	49.26	73.9	24.6	100	330	
Hori.	7236.000	PK	48.12	37.17	8.75	39.55	2.36	56.85	73.9	17.0	100	0	
Hori.	9648.000	PK	47.42	38.68	10.27	39.62	2.36	59.11	73.9	14.7	100	0	
Vert.	2390.000	PK	49.57	28.31	14.62	39.59	2.36	55.27	73.9	18.6	228	238	
Vert.	4824.000	PK	48.42	31.61	7.06	39.75	2.36	49.70	73.9	24.2	111	26	
Vert.	7236.000	PK	45.88	37.17	8.75	39.55	2.36	54.61	73.9	19.2	150	0	
Vert.	9648.000	PK	47.85	38.68	10.27	39.62	2.36	59.54	73.9	**14.3**	150	0	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Distance factor : 1 GHz - 13 GHz : 20log (3.94 m / 3.0 m) = 2.36 dB
13 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

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	40.54	28.31	14.62	39.59	0.22	2.36	46.46	53.9	7.4	*1)
Hori.	4824.000	AV	37.52	31.61	7.06	39.75	0.22	2.36	39.02	53.9	14.9	
Hori.	7236.000	AV	36.33	37.17	8.75	39.55	0.22	2.36	45.28	53.9	8.6	
Hori.	9648.000	AV	36.19	38.68	10.27	39.62	0.22	2.36	48.10	53.9	**5.8**	
Vert.	2390.000	AV	38.43	28.31	14.62	39.59	0.22	2.36	44.35	53.9	9.6	*1)
Vert.	4824.000	AV	37.62	31.61	7.06	39.75	0.22	2.36	39.12	53.9	14.8	
Vert.	7236.000	AV	36.00	37.17	8.75	39.55	0.22	2.36	44.95	53.9	9.0	
Vert.	9648.000	AV	35.76	38.68	10.27	39.62	0.22	2.36	47.67	53.9	6.2	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Duty factor + Distance factor
Distance factor : 1 GHz - 13 GHz : 20log (3.94 m / 3.0 m) = 2.36 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)

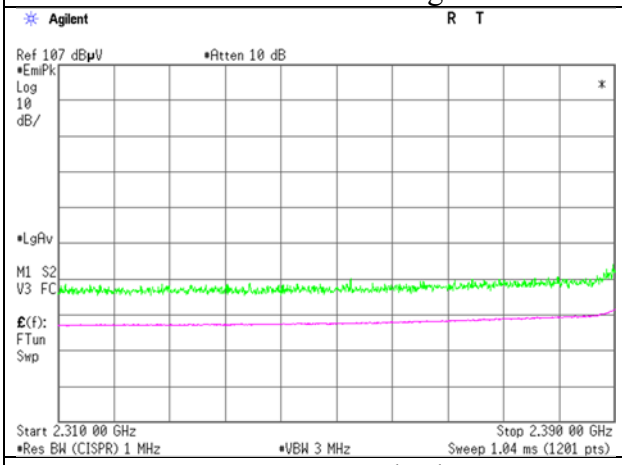
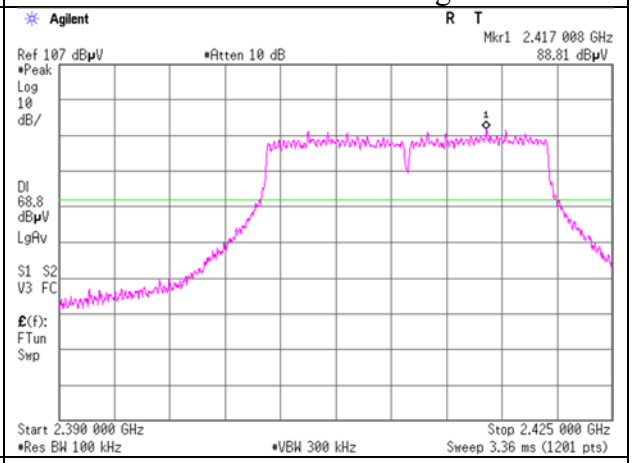
20 dBc Data Sheet (RBW 100 kHz, VBW 300 kHz)

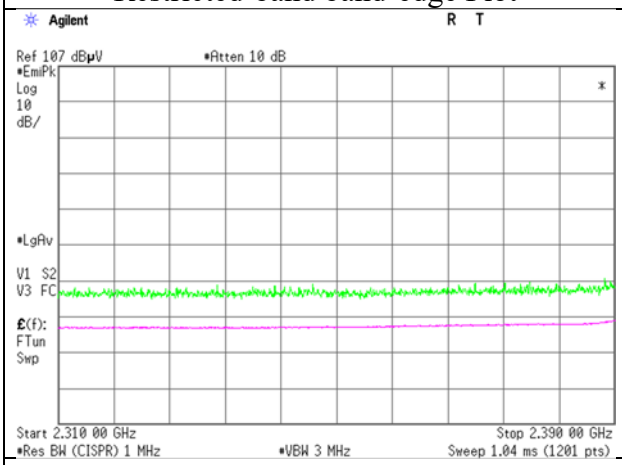
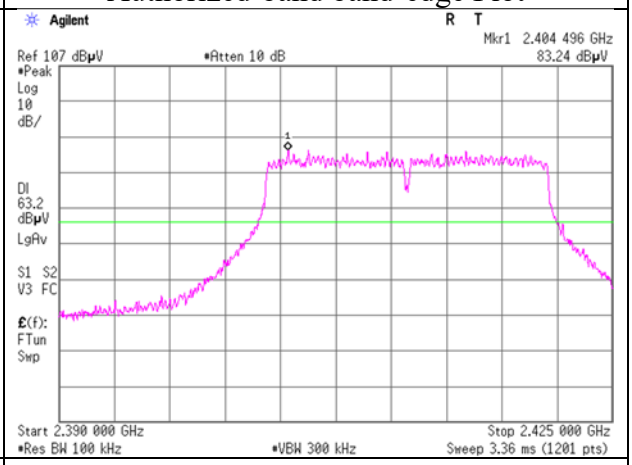
Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2412.000	PK	88.59	28.26	14.64	39.60	2.36	94.25	-	-	Carrier
Hori.	2400.000	PK	52.50	28.29	14.63	39.59	2.36	58.19	74.25	16.0	
Vert.	2412.000	PK	83.12	28.26	14.64	39.60	2.36	88.78	-	-	Carrier
Vert.	2400.000	PK	49.53	28.29	14.63	39.59	2.36	55.22	68.78	13.5	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Distance factor : 1 GHz - 13 GHz : 20log (3.94 m / 3.0 m) = 2.36 dB
13 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

Radiated Spurious Emission
(Reference Plot for band-edge)

Report No.	12952598S-B-R1
Test place	Shonan EMC Lab.
Semi Anechoic Chamber	1
Date	September 24, 2019
Temperature / Humidity	25 deg. C / 56 % RH
Engineer	Hiromasa Sato (1 GHz – 2.8 GHz)
Mode	Tx 11n-20 2412 MHz

Horizontal	
Restricted-band band-edge Plot	Authorized-band band-edge Plot
	
Trace Green : Peak Plot Trace Purple : Average Plot	20dBc Plot

Vertical	
Restricted-band band-edge Plot	Authorized-band band-edge Plot
	
Trace Green : Peak Plot Trace Purple : Average Plot	20dBc Plot

* The measurement was conducted for a sufficiently long enough time to detect any possible spurious emissions.
Final result of restricted band edge was shown in tabular data.

Radiated Spurious Emission

Report No.	12952598S-B-R1
Test place	Shonan EMC Lab.
Semi Anechoic Chamber	1
Date	September 24, 2019
Temperature / Humidity	25 deg. C / 56 % RH
Engineer	Hiromasa Sato (1 GHz – 2.8 GHz)
Mode	Tx 11n-20 2417 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.	2390.000	PK	53.08	28.31	14.62	39.59	2.36	58.78	73.9	**15.1**	175	12	
Vert.	2390.000	PK	50.19	28.31	14.62	39.59	2.36	55.89	73.9	18.0	284	230	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Distance factor : 1 GHz - 13 GHz : 20log (3.94 m / 3.0 m) = 2.36 dB
13 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

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	39.33	28.31	14.62	39.59	0.22	2.36	45.25	53.9	**8.7**	*1)
Vert.	2390.000	AV	38.03	28.31	14.62	39.59	0.22	2.36	43.95	53.9	10.0	*1)

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Duty factor + Distance factor
Distance factor : 1 GHz - 13 GHz : 20log (3.94 m / 3.0 m) = 2.36 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)

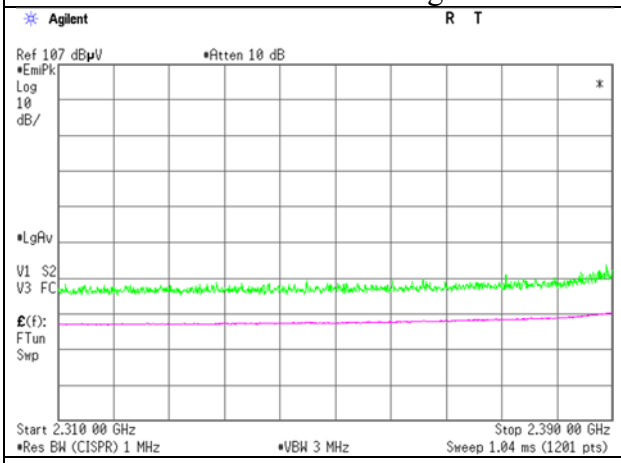
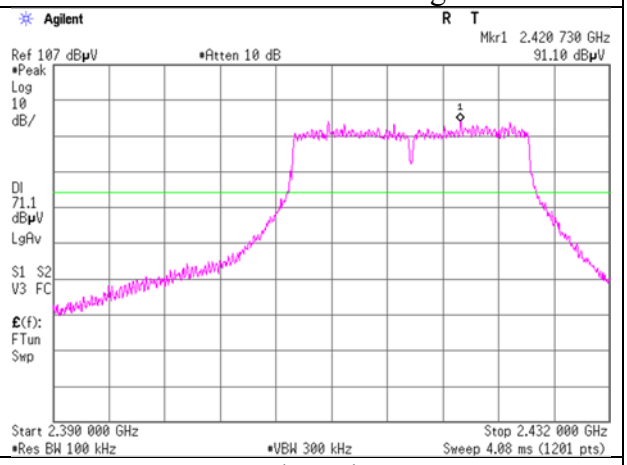
20 dBc Data Sheet **(RBW 100 kHz, VBW 300 kHz)**

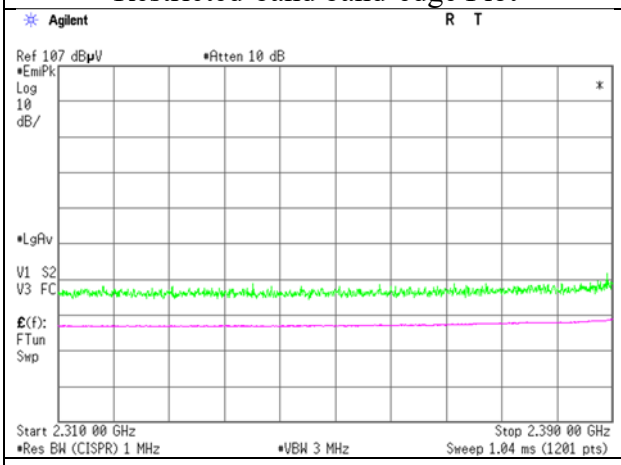
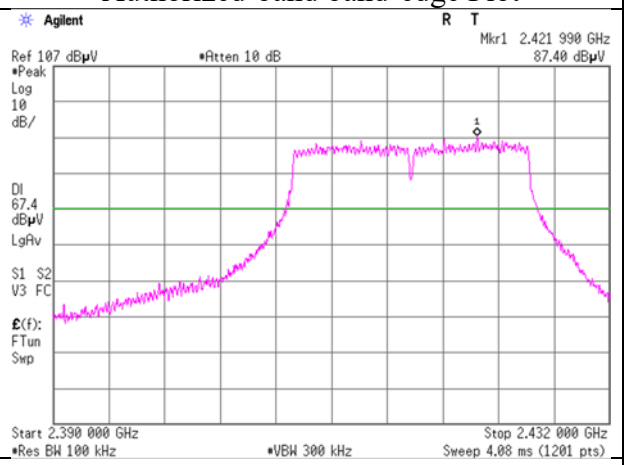
Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2417.000	PK	91.12	28.25	14.64	39.60	2.36	96.77	-	-	Carrier
Hori.	2400.000	PK	49.35	28.29	14.63	39.59	2.36	55.04	76.77	21.7	
Vert.	2417.000	PK	86.80	28.25	14.64	39.60	2.36	92.45	-	-	Carrier
Vert.	2400.000	PK	45.18	28.29	14.63	39.59	2.36	50.87	72.45	21.5	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Distance factor : 1 GHz - 13 GHz : 20log (3.94 m / 3.0 m) = 2.36 dB
13 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

Radiated Spurious Emission
(Reference Plot for band-edge)

Report No.	12952598S-B-R1
Test place	Shonan EMC Lab.
Semi Anechoic Chamber	1
Date	September 24, 2019
Temperature / Humidity	25 deg. C / 56 % RH
Engineer	Hiromasa Sato (1 GHz – 2.8 GHz)
Mode	Tx 11n-20 2417 MHz

Horizontal	
Restricted-band band-edge Plot	Authorized-band band-edge Plot
	
Trace Green : Peak Plot Trace Purple : Average Plot	20dBc Plot

Vertical	
Restricted-band band-edge Plot	Authorized-band band-edge Plot
	
Trace Green : Peak Plot Trace Purple : Average Plot	20dBc Plot

* The measurement was conducted for a sufficiently long enough time to detect any possible spurious emissions.
Final result of restricted band edge was shown in tabular data.

Radiated Spurious Emission

Report No.	12952598S-B-R1	
Test place	Shonan EMC Lab.	
Semi Anechoic Chamber	1	1
Date	September 25, 2019	September 25, 2019
Temperature / Humidity	23 deg. C / 54 % RH	24 deg. C / 53 % RH
Engineer	Takahiro Suzuki (1 GHz – 13 GHz)	Hiromasa Sato (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.	4874.000	PK	48.23	31.65	7.10	39.74	2.36	49.60	73.9	24.3	100	306	
Hori.	7311.000	PK	46.27	37.23	8.82	39.60	2.36	55.08	73.9	18.8	150	0	
Hori.	9748.000	PK	46.81	39.08	10.24	39.50	2.36	58.99	73.9	**14.9**	150	0	
Vert.	4874.000	PK	48.18	31.65	7.10	39.74	2.36	49.55	73.9	24.3	100	27	
Vert.	7311.000	PK	45.64	37.23	8.82	39.60	2.36	54.45	73.9	19.4	150	0	
Vert.	9748.000	PK	46.53	39.08	10.24	39.50	2.36	58.71	73.9	15.1	150	0	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Distance factor : 1 GHz - 13 GHz : 20log (3.94 m / 3.0 m) = 2.36 dB
13 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

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	38.25	31.65	7.10	39.74	0.22	2.36	39.84	53.9	14.1	
Hori.	7311.000	AV	33.44	37.23	8.82	39.60	0.22	2.36	42.47	53.9	11.4	
Hori.	9748.000	AV	34.59	39.08	10.24	39.50	0.22	2.36	46.99	53.9	6.9	
Vert.	4874.000	AV	37.47	31.65	7.10	39.74	0.22	2.36	39.06	53.9	14.8	
Vert.	7311.000	AV	35.19	37.23	8.82	39.60	0.22	2.36	44.22	53.9	9.7	
Vert.	9748.000	AV	34.82	39.08	10.24	39.50	0.22	2.36	47.22	53.9	**6.7**	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Duty factor + Distance factor
Distance factor : 1 GHz - 13 GHz : 20log (3.94 m / 3.0 m) = 2.36 dB
13 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB
Duty factor refer to "Duty factor Calculation chart" sheet.

Radiated Spurious Emission

Report No.	12952598S-B-R1
Test place	Shonan EMC Lab.
Semi Anechoic Chamber	1
Date	September 24, 2019
Temperature / Humidity	25 deg. C / 56 % RH
Engineer	Hiromasa Sato (1 GHz – 2.8 GHz)
Mode	Tx 11n-20 2457 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.	2483.500	PK	50.54	28.16	14.71	39.62	2.36	56.15	73.9	**17.7**	151	13	
Vert.	2483.500	PK	47.31	28.16	14.71	39.62	2.36	52.92	73.9	20.9	218	231	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Distance factor : 1 GHz - 13 GHz : 20log (3.94 m / 3.0 m) = 2.36 dB
13 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

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	39.22	28.16	14.71	39.62	0.22	2.36	45.05	53.9	**8.8**	*1)
Vert.	2483.500	AV	38.03	28.16	14.71	39.62	0.22	2.36	43.86	53.9	10.0	*1)

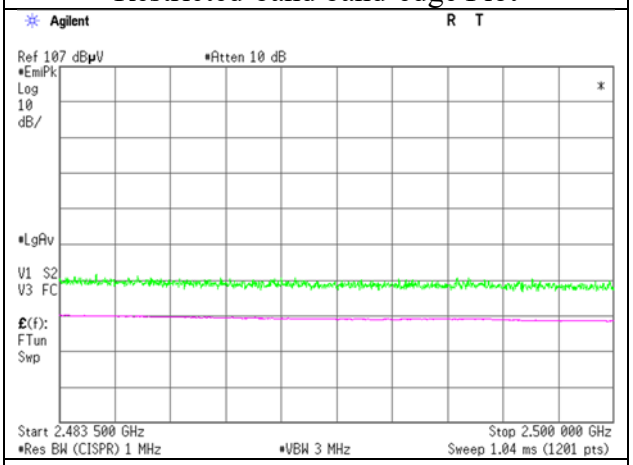
Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Duty factor + Distance factor
Distance factor : 1 GHz - 13 GHz : 20log (3.94 m / 3.0 m) = 2.36 dB
13 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB
Duty factor refer to "Duty factor Calculation chart" sheet.
*1) Not out of band emission (Leakage Power)

Radiated Spurious Emission
(Reference Plot for band-edge)

Report No.	12952598S-B-R1
Test place	Shonan EMC Lab.
Semi Anechoic Chamber	1
Date	September 24, 2019
Temperature / Humidity	25 deg. C / 56 % RH
Engineer	Hiromasa Sato (1 GHz – 2.8 GHz)
Mode	Tx 11n-20 2457 MHz

Horizontal

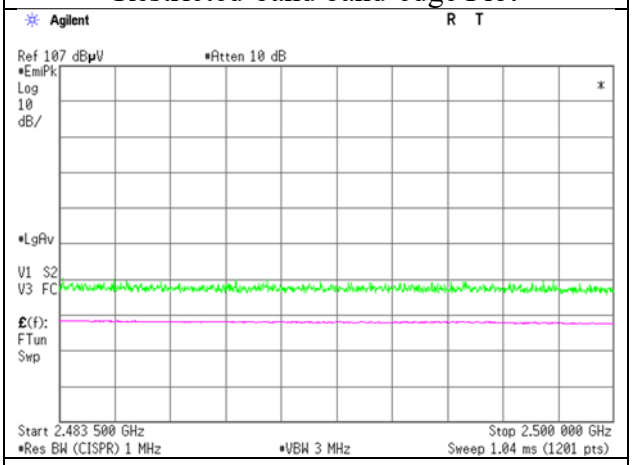
Restricted-band band-edge Plot



Trace Green : Peak Plot
Trace Purple : Average Plot

Vertical

Restricted-band band-edge Plot



Trace Green : Peak Plot
Trace Purple : Average Plot

* The measurement was conducted for a sufficiently long enough time to detect any possible spurious emissions.
Final result of restricted band edge was shown in tabular data.

Radiated Spurious Emission

Report No.	12952598S-B-R1	
Test place	Shonan EMC Lab.	
Semi Anechoic Chamber	1	1
Date	September 24, 2019	September 25, 2019
Temperature / Humidity	25 deg. C / 56 % RH	24 deg. C / 53 % RH
Engineer	Hiromasa Sato	Hiromasa Sato
	(1 GHz – 2.8 GHz)	(2.8 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.	2483.500	PK	51.52	28.16	14.71	39.62	2.36	57.13	73.9	16.7	174	16	
Hori.	4924.000	PK	46.87	31.73	7.14	39.73	2.36	48.37	73.9	25.5	140	309	
Hori.	7386.000	PK	44.62	37.32	8.87	39.64	2.36	53.53	73.9	20.3	150	0	
Hori.	9848.000	PK	45.66	39.22	10.22	39.37	2.36	58.09	73.9	**15.8**	150	0	
Vert.	2483.500	PK	48.71	28.16	14.71	39.62	2.36	54.32	73.9	19.5	222	235	
Vert.	4924.000	PK	46.61	31.73	7.14	39.73	2.36	48.11	73.9	25.7	101	13	
Vert.	7386.000	PK	44.93	37.32	8.87	39.64	2.36	53.84	73.9	20.0	150	0	
Vert.	9848.000	PK	45.14	39.22	10.22	39.37	2.36	57.57	73.9	16.3	150	0	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Distance factor : 1 GHz - 13 GHz : 20log (3.94 m / 3.0 m) = 2.36 dB
13 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

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	40.41	28.16	14.71	39.62	0.22	2.36	46.24	53.9	7.7	*1)
Hori.	4924.000	AV	38.68	31.73	7.14	39.73	0.22	2.36	40.40	53.9	13.5	
Hori.	7386.000	AV	36.27	37.32	8.87	39.64	0.22	2.36	45.40	53.9	8.5	
Hori.	9848.000	AV	35.91	39.22	10.22	39.37	0.22	2.36	48.56	53.9	**5.3**	
Vert.	2483.500	AV	38.21	28.16	14.71	39.62	0.22	2.36	44.04	53.9	9.9	*1)
Vert.	4924.000	AV	37.46	31.73	7.14	39.73	0.22	2.36	39.18	53.9	14.7	
Vert.	7386.000	AV	34.91	37.32	8.87	39.64	0.22	2.36	44.04	53.9	9.9	
Vert.	9848.000	AV	35.49	39.22	10.22	39.37	0.22	2.36	48.14	53.9	5.8	

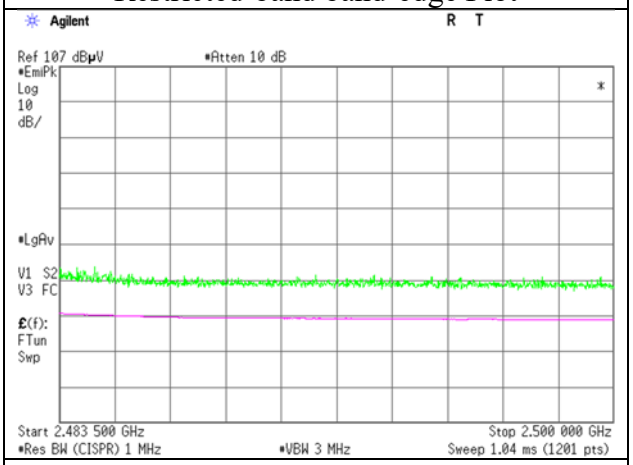
Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Duty factor + Distance factor
Distance factor : 1 GHz - 13 GHz : 20log (3.94 m / 3.0 m) = 2.36 dB
13 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB
Duty factor refer to "Duty factor Calculation chart" sheet.
*1) Not out of band emission (Leakage Power)

Radiated Spurious Emission
(Reference Plot for band-edge)

Report No.	12952598S-B-R1
Test place	Shonan EMC Lab.
Semi Anechoic Chamber	1
Date	September 24, 2019
Temperature / Humidity	25 deg. C / 56 % RH
Engineer	Hiromasa Sato (1 GHz – 2.8 GHz)
Mode	Tx 11n-20 2462 MHz

Horizontal

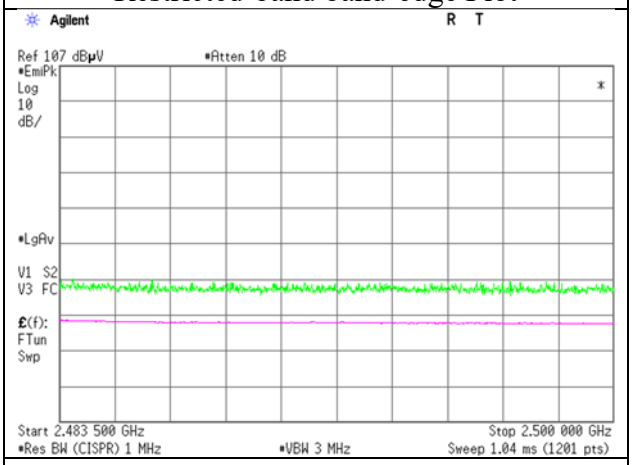
Restricted-band band-edge Plot



Trace Green : Peak Plot
Trace Purple : Average Plot

Vertical

Restricted-band band-edge Plot

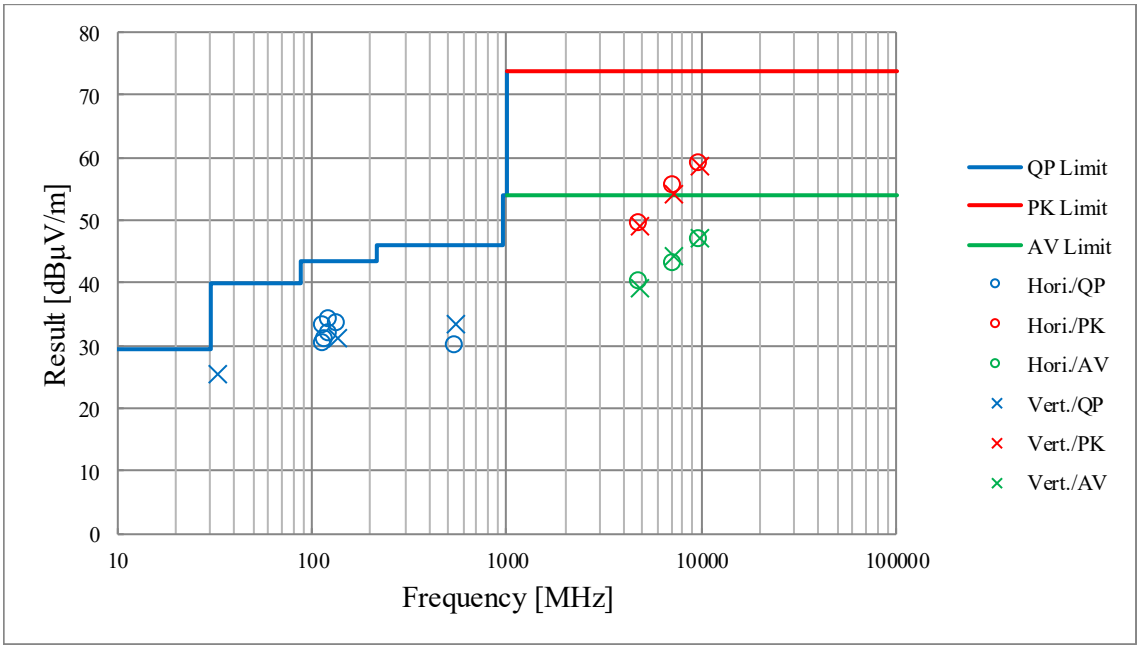


Trace Green : Peak Plot
Trace Purple : Average Plot

* The measurement was conducted for a sufficiently long enough time to detect any possible spurious emissions.
Final result of restricted band edge was shown in tabular data.

Radiated Spurious Emission
(Plot data, Worst case)

Report No.	12952598S-B-R1		
Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	2	1	1
Date	October 10, 2019	September 25, 2019	September 25, 2019
Temperature / Humidity	21 deg. C / 61 % RH	23 deg. C / 54 % RH	24 deg. C / 53 % RH
Engineer	Kazuya Noda (30 MHz - 1000 MHz)	Takahiro Suzuki (1 GHz – 13 GHz)	Hiromasa Sato (13 GHz – 26.5 GHz)
Mode	Tx 11g 2437 MHz		

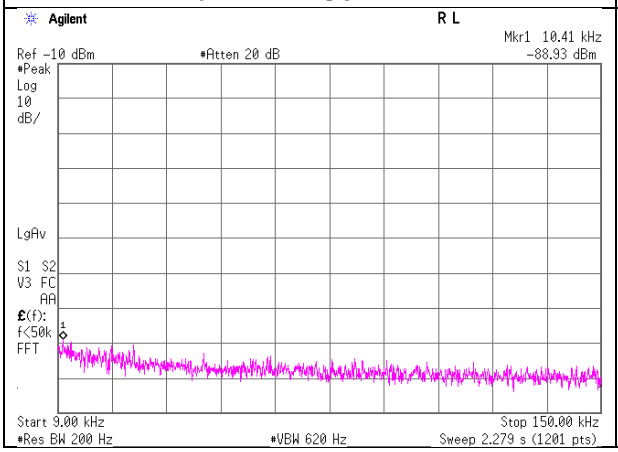


*These plots data contains sufficient number to show the trend of characteristic features for EUT.

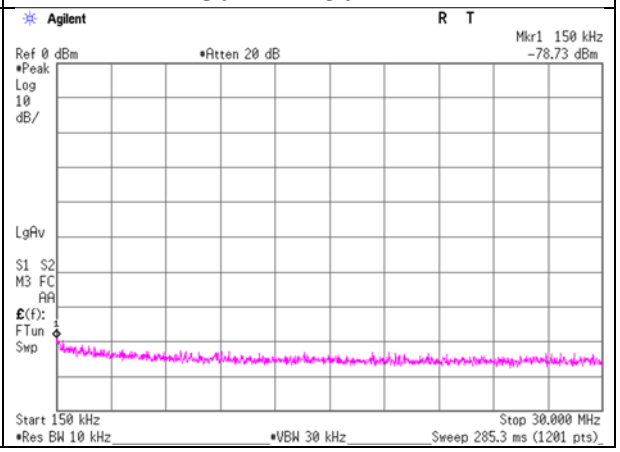
Conducted Spurious Emission

Report No.	12952598S-B-R1
Test place	Shonan EMC Lab. No.5 Shielded Room
Date	September 19, 2019
Temperature / Humidity	24 deg. C / 58 % RH
Engineer	Takahiro Kawakami
Mode	Tx 11g 2437 MHz

9 kHz - 150 kHz



150 kHz - 30 MHz



Frequency [kHz]	Reading [dBm]	Cable Loss [dB]	Attenuator Loss [dB]	Antenna Gain* [dBi]	N (Number of Output)	EIRP [dBm]	Distance [m]	Ground bounce [dB]	E (field strength) [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
10.41	-88.9	0.02	9.55	2.0	1	-77.4	300	6.0	-16.1	47.2	63.3	
150.00	-78.7	0.02	9.55	2.0	1	-67.2	300	6.0	-5.9	24.0	29.9	

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

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

N: Number of output

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

Power Density

Report No.	12952598S-B-R1
Test place	Shonan EMC Lab. No.5 Shielded Room
Date	September 19, 2019
Temperature / Humidity	24 deg. C / 58 % RH
Engineer	Takahiro Kawakami
Mode	Tx

11b

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result [dBm]	Limit [dBm]	Margin [dB]
2412	-21.23	1.84	9.69	-9.70	8.00	17.70
2437	-20.57	1.84	9.69	-9.04	8.00	17.04
2462	-21.02	1.84	9.70	-9.48	8.00	17.48

11g

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result [dBm]	Limit [dBm]	Margin [dB]
2412	-26.83	1.84	9.69	-15.30	8.00	23.30
2437	-22.56	1.84	9.69	-11.03	8.00	19.03
2462	-24.31	1.84	9.70	-12.77	8.00	20.77

11n-20

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result [dBm]	Limit [dBm]	Margin [dB]
2412	-28.41	1.84	9.69	-16.88	8.00	24.88
2437	-24.01	1.84	9.69	-12.48	8.00	20.48
2462	-26.22	1.84	9.70	-14.68	8.00	22.68

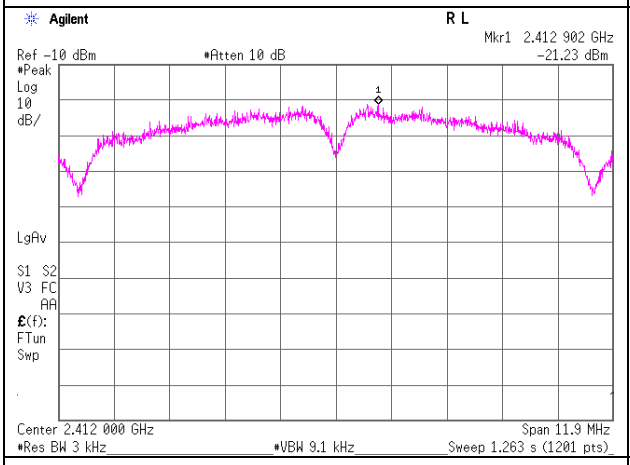
Sample Calculation:
Result = Reading + Cable Loss (including the cable(s) customer supplied) + Attenuator Loss

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

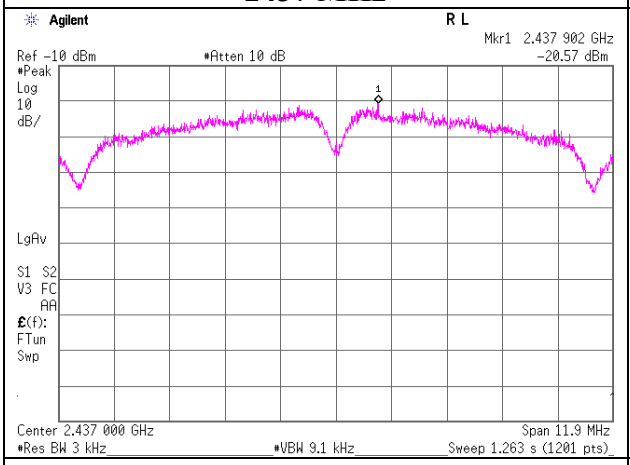
Power Density

11b

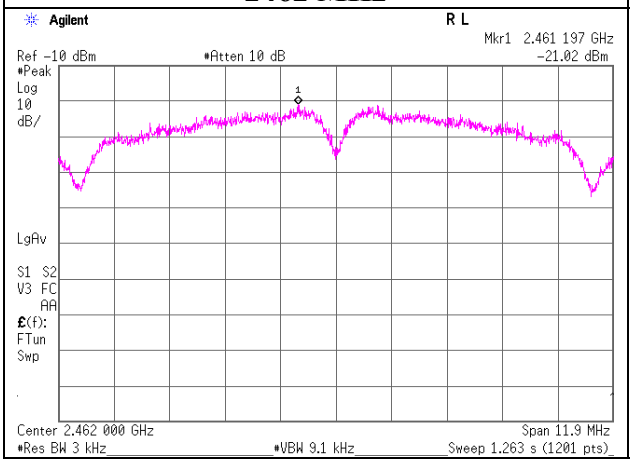
2412 MHz



2437 MHz

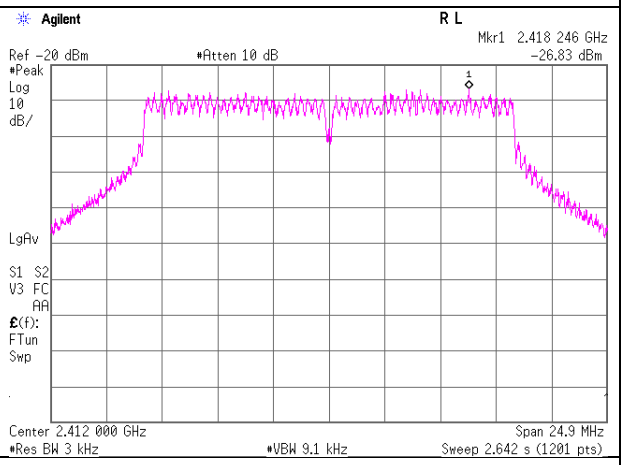


2462 MHz

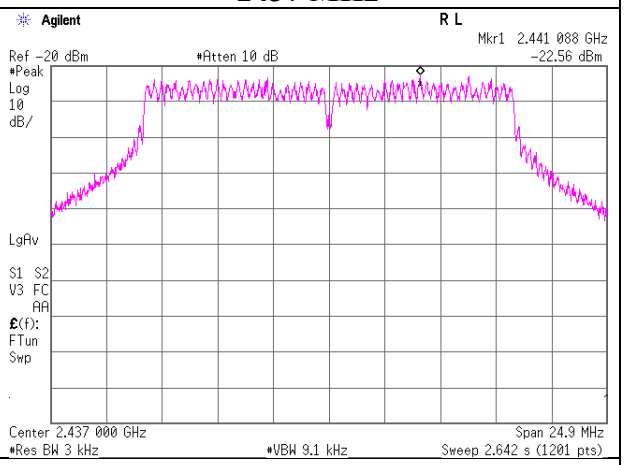


11g

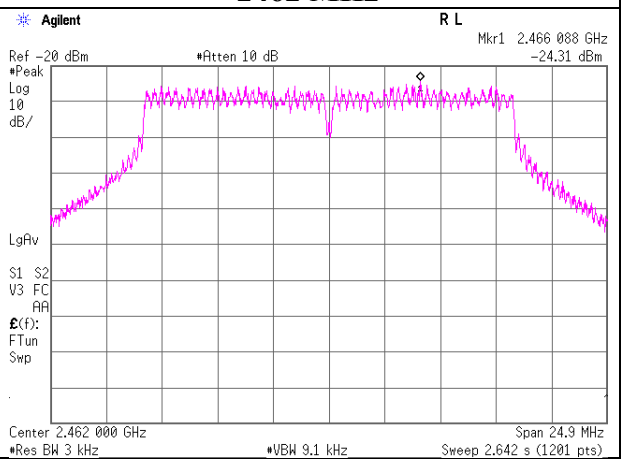
2412 MHz



2437 MHz



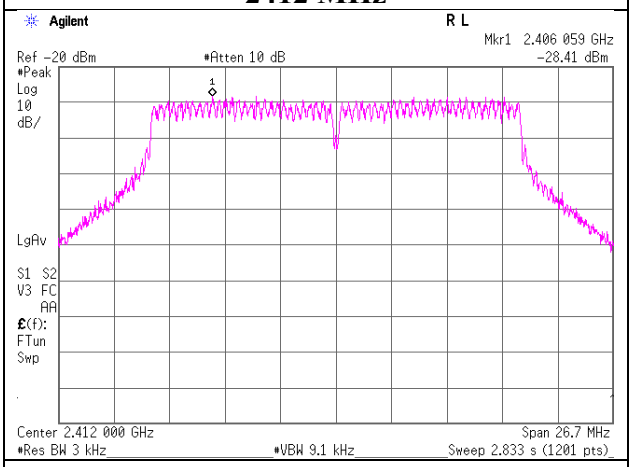
2462 MHz



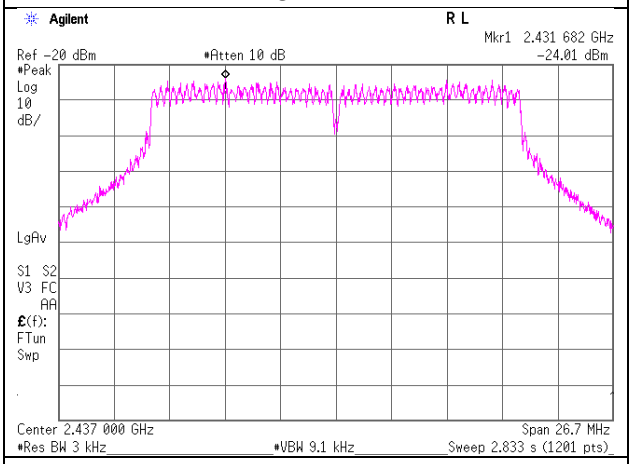
Power Density

11n-20

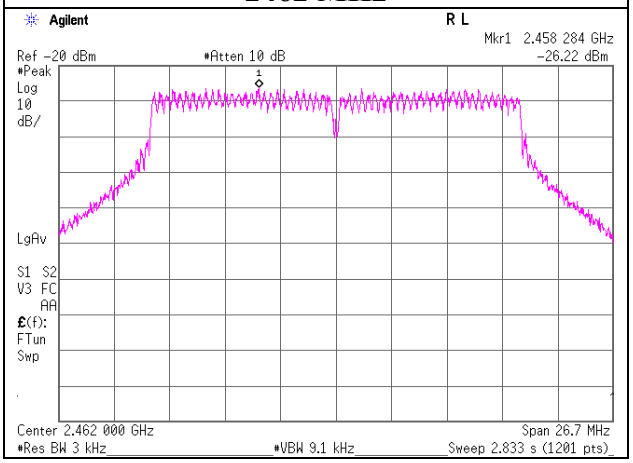
2412 MHz



2437 MHz



2462 MHz



APPENDIX 2: Test instruments

Test Instruments

Local ID	Test Name	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Calibration Due Date	Calibration Interval (Month)
KTS-07	AT	145111	Digital Tester	SANWA	PC500	7019232	2019/10/1	2020/10/31	12
SAT10-09	AT	145132	Attenuator	Weinschel Corp.	54A-10	W5692	2018/11/25	2019/11/30	12
SCC-G31	AT	145042	Coaxial Cable	Junkosha	MWX241-01000KMSKMS	OCT-08-13-046	2019/4/16	2020/4/30	12
SOS-09	AT	146318	Humidity Indicator	A&D	AD-5681	4061484	2018/12/5	2019/12/31	12
SPM-07	AT	146247	Power Meter	AGILENT	8990B	MY5100272	2019/7/16	2020/7/31	12
SPSS-04	AT	146310	Power sensor	AGILENT	N1923A	MY5326009	2019/7/16	2020/7/31	12
SSA-03	AT,RE	145801	Spectrum Analyzer	AGILENT	E4448A	MY48250152	2019/8/8	2020/8/31	12
COTS-SEMI-5	RE	170932	EMI Software	TSJ	TEPTO-DV3(RE,CE,ME,PE)	-	-	-	-
KJM-09	RE	145929	Measure	KOMELON	KMC-36	-	-	-	-
SAEC-01(NSA)	RE	145597	Semi-Anechoic Chamber	TDK	SAEC-01(NSA)	1	2019/4/2	2020/4/30	12
SAEC-01(SVSWR)	RE	145561	Semi-Anechoic Chamber	TDK	SAEC-01(SVSWR)	1	2019/5/6	2020/5/30	12
SAEC-02(NSA)	RE	145563	Semi-Anechoic Chamber	TDK	SAEC-02(NSA)	2	2019/4/4	2020/4/30	12
SAF-02	RE	145004	Pre Amplifier	SONOMA	310N	290212	2019/2/5	2020/2/29	12
SAF-04	RE	145127	Pre Amplifier	Toyo Corporation	TPA0118-36	2072554	2019/6/4	2020/6/30	12
SAF-08	RE	145007	Pre Amplifier	Toyo Corporation	HAP18-26W	19	2019/3/5	2020/3/31	12
SAT10-05	RE	145136	Attenuator(above1GHz)	AGILENT	8493C-010	74864	2018/11/25	2019/11/30	12
SAT3-11	RE	150921	Attenuator	JFW	50HF-003N	-	2019/1/25	2020/1/31	12
SAT6-14	RE	167095	Attenuator	JFW	50HF-006N	-	2019/2/5	2020/2/29	12
SBA-02	RE	145022	Biconical Antenna	Schwarzbeck	BBA9106	91032665	2019/4/1	2020/4/30	12
SCC-B1/B3/B5/B7/B8/B13/SRSE-02	RE	144975	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhner/Suhner/Suhner/Suhner/TOYO	8D2W/12DSFA/141PE/141PE/141PE/141P	-/0901-270(RF Selector)	2019/4/19	2020/4/30	12
SCC-B2/B4/B6/B7/B8/B13/SRSE-02	RE	144976	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhner/Suhner/Suhner/Suhner/TOYO	8D2W/12DSFA/141PE/141PE/141PE/141P	-/0901-270(RF Selector)	2019/4/19	2020/4/30	12
SCC-G05	RE	145039	Coaxial Cable	Junkosha	J12J102207-00	APR-30-15-037	2019/1/25	2020/1/31	12
SCC-G15	RE	145176	Coaxial Cable	Suhner	SUCOFLEX 102	32703/2	2019/3/27	2020/3/31	12
SCC-G41	RE	151617	Coaxial Cable	Junkosha	MWX221-01000NFSNMS/B	1612S006	2019/1/25	2020/1/31	12
SCC-G56	RE	179539	Coaxial Cable	Huber+Suhner	SUCOFLEX 104	803289/4	2019/5/16	2020/5/31	12
SCC-G57	RE	179540	Coaxial Cable	Huber+Suhner	SUCOFLEX 102	802815/2	2019/5/16	2020/5/31	12
SFL-18	RE	145305	Highpass Filter	MICRO-TRONICS	HPM50111	119	2019/4/16	2020/4/30	12
SHA-01	RE	145383	Horn Antenna	Schwarzbeck	BBHA9120D	9120D-725	2019/5/9	2020/5/31	12
SHA-04	RE	145512	Horn Antenna	ETS LINDGREN	3160-09	00094868	2019/6/26	2020/6/30	12

Local ID	Test Name	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Calibration Due Date	Calibration Interval (Month)
SJM-09	RE	145336	Measure	PROMART	SEN1935	-	-	-	-
SLA-06	RE	145528	Logperiodic Antenna	Schwarzbeck	VUSLP9111B	195	2019/4/1	2020/4/30	12
SOS-01	RE	146316	Humidity Indicator	A&D	AD-5681	4062555	2018/10/25	2019/10/31	12
SOS-03	RE	146317	Humidity Indicator	A&D	AD-5681	4063325	2018/10/25	2019/10/31	12
STR-07	RE	146209	Test Receiver	Rohde & Schwarz	ESU26	100484	2019/9/13	2020/9/30	12
STS-01	RE	145792	Digital Hitester	HIOKI	3805-50	80997812	2019/10/1	2020/10/31	12
STS-02	RE	145793	Digital Hitester	HIOKI	3805-50	80997819	2019/4/2	2020/4/30	12

***Hyphens for Last Calibration Date, Calibration Due Date and Cal Int (month) are instruments that Calibration is not required (e.g. software), or instruments checked in advance before use.**

The expiration date of the calibration is the end of the expired month.
All equipment is calibrated with valid calibrations. Each measurement data is traceable to the national or international standards.

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

Test item: **RE: Radiated Emission test**
AT: Antenna Terminal Conducted test