RADIO TEST REPORT

Test Report No. : 12517639S-A-R1

Applicant	:	**Japan Radio Co., Ltd.**
Type of Equipment	:	**Wireless LAN Module**
Model No.	:	**CMN-851A**
FCC ID	:	**CKECMN851A**
Test regulation	:	**FCC Part 15 Subpart C: 2018** **For Permissive Change**
Test item	:	**Conducted Emission** **Spurious Emission Restricted Band Edges**
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 limits of the above regulation.
4. The test results in this test report are traceable to the national or international standards.
5. This test report must not be used by the customer to claim product certification, approval, or endorsement by any agency of the Federal Government.
6. This test report covers Radio technical requirements.
   It does not cover administrative issues such as Manual or non-Radio test related Requirements. (if applicable)
7. 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. This report is a revised version of 12517639S-A. 12517639S-A is replaced with this report.

Date of test: October 18 to November 2, 2018

Representative test engineer:

Makoto Hosaka
Engineer
Consumer Technology Division

Approved by:

Hikaru Shirasawa
Engineer
Consumer Technology Division

RTL02610

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

REVISION HISTORY

Original Test Report No.: 12517639S-A

Revision	Test report No.	Date	Page revised	Contents
- (Original)	12517639S-A	December 6, 2018	-	-
1	12517639S-A-R1	December 25, 2018	1 24, 34	Deletion of (Radiated Spurious Emission tests only) Correction of Frequency

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SECTION 1: Customer information

Company Name	:	Japan Radio Co., Ltd.
Address	:	21-11, mure 6, maitaka city, tokyo, Japan
Telephone Number	:	+81-49-257-6443
Facsimile Number	:	+81-49-257-6206
Contact Person	:	Shinsuke Miyazaki

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

2.1 Identification of E.U.T.

Type of Equipment	:	Wireless LAN Module
Model No.	:	CMN-851A
Serial No.	:	Refer to Section 4, Clause 4.2
Rating	:	DC 3.3 V
Receipt Date of Sample	:	October 13, 2018
Country of Mass-production	:	Japan
Condition of EUT	:	Production model
Modification of EUT	:	No Modification by the test lab

2.2 Product Description

Model: CMN-851A (referred to as the EUT in this report) is a Wireless LAN Module.

Radio Specification

Equipment type	:	Transceiver	
Frequency of operation	:	2.4 GHz:	2412 MHz - 2462 MHz (IEEE 802.11b, 11g, 11n-HT20)
			2422 MHz - 2452 MHz (IEEE 802.11n-HT40)
		U-NII-1:	5180 MHz - 5240 MHz (IEEE 802.11a, 11n-HT20)
			5190 MHz - 5230 MHz (IEEE 802.11n-HT40)
		U-NII-2A:	5260 MHz - 5320 MHz (IEEE 802.11a, 11n-HT20)
			5270 MHz - 5310 MHz (IEEE 802.11n-HT40)
		U-NII-2C:	5500 MHz - 5700 MHz (IEEE 802.11a, 11n-HT20)
			5510 MHz - 5670 MHz (IEEE 802.11n-HT40)
		U-NII-3:	5745 MHz - 5825 MHz (IEEE 802.11a, 11n-HT20)
			5755 MHz - 5795 MHz (IEEE 802.11n-HT40)
Bandwidth	:	20 MHz (IEEE 802.11a/b/g/n), 40 MHz (IEEE 802.11n)	
Channel spacing	:	5 MHz (2.4 GHz),	
		20 MHz (11a, 11n (HT20, 5 GHz)), 40 MHz (11n (HT40, 5 GHz))	
Type of modulation	:	DSSS, OFDM	
Antenna type	:	Dual (Pattern)	
Antenna gain	:	2.4 GHz band: 3.9145 dBi	
		5 GHz band: 0.24 dBi	
Antenna connector type	:	Module side: U.FL	
		Antenna side: RP-SMA	
ITU code	:	D1D, G1D	
Clock frequency (Maximum)	:	40 MHz	

* The EUT does not perform simultaneous transmission of 2.4 GHz and 5 GHz Wireless LAN.

SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification	:	FCC Part 15 Subpart C FCC Part 15 final revised on March 12, 2018 and effective April 11, 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

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	10.4 dB 16.39301 MHz,, N, AV	Complied	-
	IC: RSS-Gen 8.8	**IC:** RSS-Gen 8.8			
Spurious Emission Restricted Band Edges	**FCC:** KDB 558074 D01 15.247 Meas Guidance v05	**FCC:** Section15.247(d)	0.4 dB 2488.450 MHz, AV, Hori Tx 11b 2412 MHz	Complied#	Radiated (above 30 MHz) *1)
	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) Radiated test was selected over 30 MHz based on section 15.247(d) and KDB 558074 D01 15.247 Meas Guidance v05 8.5 and 8.6.
For below 30 MHz the EUT was confirmed to comply with the requirement by conducted test (original test report: 10009516S-A).

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 host device provides stable voltage constantly to the EUT regardless of input voltage. Therefore, this EUT complies with the requirement.

FCC Part 15.203 Antenna requirement
The EUT has a unique coupling/antenna connector. Therefore the equipment complies with the requirement.

3.3 Addition to standard

No addition, exclusion nor deviation has been made from the standard.

3.4 Uncertainty

EMI

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

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	2.9 dB	2.8 dB	2.9 dB	2.9 dB	2.9 dB
Radiated emission (Measurement distance: 3 m)	9 kHz-30 MHz	3.0 dB	3.0 dB	3.1 dB	-	-
	30 MHz-200 MHz	4.6 dB	4.6 dB	4.7 dB	-	-
	200 MHz-1 GHz	6.0 dB	6.0 dB	6.1 dB	-	-
	1 GHz-6 GHz	4.8 dB	4.8 dB	4.8 dB	-	-
	6 GHz-18 GHz	5.4 dB	5.4 dB	5.4 dB	-	-
	18 GHz-40 GHz	5.6 dB	5.6 dB	5.6 dB	-	-
Radiated emission (Measurement distance: 1 m)	1 GHz-18 GHz	5.7 dB	5.7 dB	5.7 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

3.5 Test Location

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
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

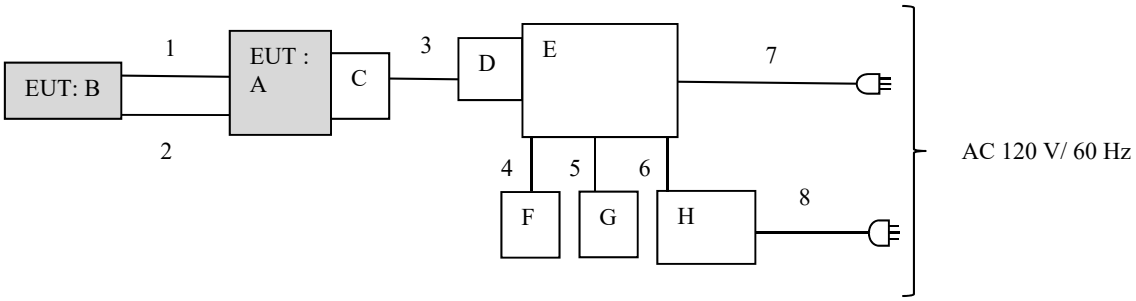
4.1 Operating Mode(s)

Test item	Mode	Tested frequency	Worst data mode *1)
Conducted emission Radiated emission (below 1 GHz) *2)	Transmitting IEEE 802.11n (HT20) (MIMO)	2412 MHz	PN9, MCS8
Radiated emission (above 1 GHz)	Transmitting IEEE 802.11b	2412 MHz, 2437 MHz, 2462 MHz	PN9, 1 Mbps
	Transmitting IEEE 802.11g	2412 MHz, 2437 MHz, 2462 MHz	PN9, 6 Mbps
	Transmitting IEEE 802.11n (HT20) (MIMO) *3)	2412 MHz, 2437 MHz, 2462 MHz	PN9, MCS8
	Transmitting IEEE 802.11n (HT40) (MIMO) *3)	2422 MHz, 2437 MHz, 2452 MHz	PN9, MCS8

*1) The worst condition was determined based on the test result of Maximum Peak Output Power.
*2) 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.
*3) As this transmitter has MIMO mode for only MCS8 to MCS15, we need not to consider array gains.

*Power of the EUT was set by the software as follows;
Power settings: Fixed
Software: ART v 0.9 634
*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.

4.2 Configuration and peripherals



* Test data was taken under worse case conditions.

Description of EUT and support equipment

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	Wireless LAN Module	CMN-851A	815306000007	Japan Radio Co., Ltd.	EUT
B	AP-Double WiFi Antenna	AP-PAN-WW-x-S22-RP-xx-18 (Panasonic: ARB-APWWxS22-RP-xx) *1)	1	Airgain, Inc.	EUT
C	Jig	PEM2PEM-100	-	-	-
D	PC Card	-	-	-	-
E	PC	HP Compaq dc8000p	JPA03801BS	HP	-
F	mouse	M-UAE96	265986-011	HP	-
G	Keyboard	KB-0316	BC3480AGA U3M4A	HP	-
H	monitor	RDTI77LM (BK)	76205729AJ	MITSUBISHI	-

*1) x : Mount Style (Q : Bolt or M : Magnetic)
xx : Color (WH : White or BL : Black)

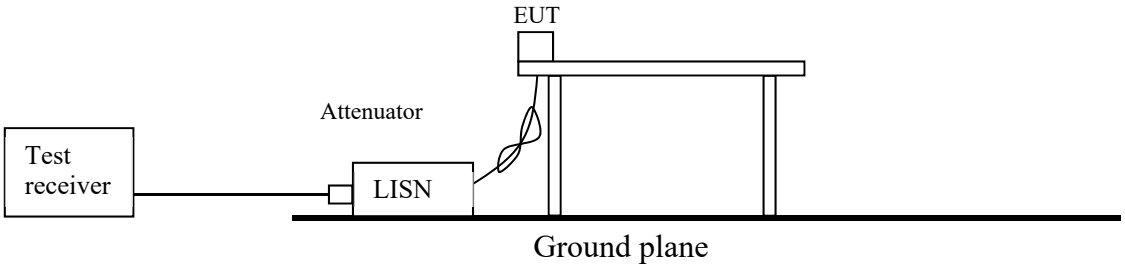
List of cables used

No.	Cable Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	Coaxial	5.6	Shielded	Shielded	-
2	Coaxial	5.6	Shielded	Shielded	-
3	HDMI	0.9	Shielded	Shielded	-
4	USB	2.0	Shielded	Shielded	-
5	PS/2	1.9	Shielded	Shielded	-
6	RGB	2.0	Shielded	Shielded	-
7	AC	1.4	Unshielded	Unshielded	-
8	AC	2.0	Unshielded	Unshielded	-

SECTION 5: Conducted Emission

Test Procedure and conditions

EUT was placed on a platform of nominal size, 1.0 m by 1.5 m, raised 0.8 m above the conducting ground plane. The rear of tabletop was located 40 cm to the vertical conducting plane. The rear of EUT, including peripherals aligned and flushed with rear of tabletop. All other surfaces of tabletop were at least 80cm from any other grounded conducting surface. EUT was located 80 cm from a Line Impedance Stabilization Network (LISN) / Artificial mains Network (AMN) and excess AC cable was bundled in center.



For the tests on EUT with other peripherals (as a whole system)
I/O cables that were connected to the peripherals were bundled in center. They were folded back and forth forming a bundle 30 cm to 40 cm long and were hanged at a 40 cm height to the ground plane. All unused 50ohm connectors of the LISN (AMN) were resistivity terminated in 50 ohm when not connected to the measuring equipment.

The AC Mains Terminal Continuous disturbance Voltage has been measured with the EUT in a Semi Anechoic Chamber.
The EUT was connected to a LISN (AMN).
An overview sweep with peak detection has been performed.

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

Detector : QP and CISPR AV
Measurement range : 0.15 MHz - 30 MHz
Test data : APPENDIX
Test result : Pass

SECTION 6: Radiated Spurious Emission

Test Procedure

It was measured based on "8.5 and 8.6 of KDB 558074 D01 15.247 Meas Guidance v05".

[For below 1 GHz]
EUT was placed on a urethane platform of nominal size, 1.0 m by 1.5 m, raised 0.8 m above the conducting ground plane. The Radiated Electric Field Strength has been measured in a Semi Anechoic Chamber with a ground plane.

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

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

Test Antennas are used as below;

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

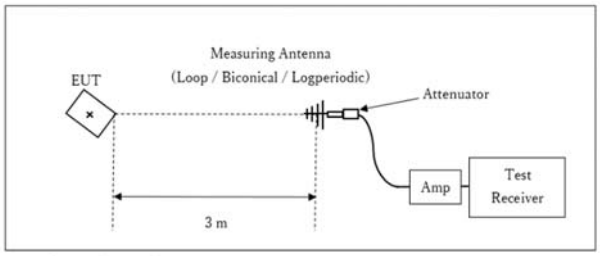
In any 100 kHz bandwidth outside the restricted band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator confirmed 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired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

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

Frequency	Below 1 GHz	Above 1 GHz		20 dBc
Instrument used	Test Receiver	Spectrum Analyzer		Spectrum Analyzer
Detector	QP	PK	AV *1)	PK
IF Bandwidth	BW 120 kHz	RBW: 1 MHz VBW: 3 MHz	Average Power Method: 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.

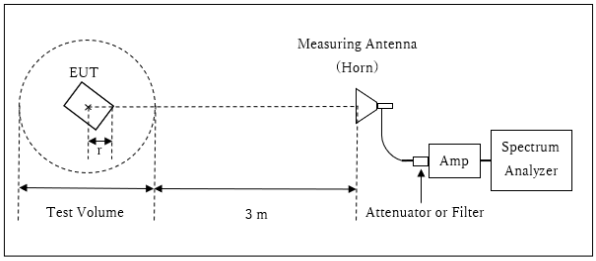
Below 1 GHz



× : Center of turn table

Test Distance: 3 m

1 GHz - 13 GHz

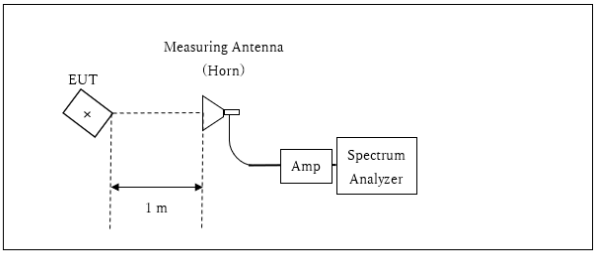


r : Radius of an outer periphery of EUT
× : Center of turn table

Distance Factor: 20 x log (3.9 m*/3.0 m) = 2.28 dB
* Test Distance: (3 + Test Volume /2) - r = 3.9 m

Test Volume: 2 m
(Test Volume has been calibrated based on CISPR 16-1-4.)
r = 0.1 m

13 GHz - 26.5 GHz



× : Center of turn table

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 X, Y and Z axes of EUT to see the position of maximum noise, and the test was made at the position that has the maximum noise.
The test results and limit are rounded off to one decimal place, so some differences might be observed.

Worst position:
Antenna_axis(SISO)

	Carrier	Spurious				
		Below 1 GHz	1 GHz - 2.8 GHz	2.8 GHz - 13 GHz	13 GHz – 18 GHz	18 GHz – 26.5 GHz
Horizontal	Y	-	X	X	X	X
Vertical	X	-	X	X	X	X

Antenna_axis(MIMO)

	Carrier	Spurious				
		Below 1 GHz	1 GHz - 2.8 GHz	2.8 GHz - 13 GHz	13 GHz – 18 GHz	18 GHz – 26.5 GHz
Horizontal	Y	Z	X	Z	X	X
Vertical	X	Z	X	Z	X	X

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

APPENDIX 1: Test data

Conducted Emission

DATA OF CONDUCTED EMISSION TEST

UL Japan, Inc. Shonan EMC Lab. No.3 Shielded Room
Date : 2018/11/02

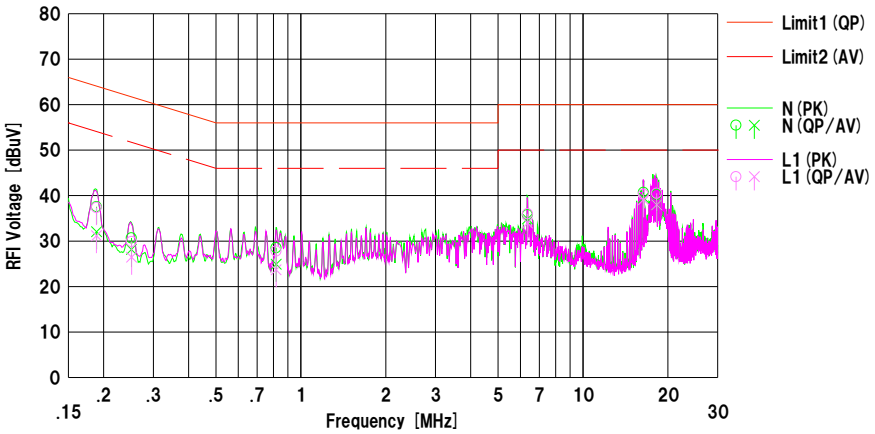
Mode : WLAN MIMO 11n(HT20) 2412 MHz

Power : AC 120 V / 60 Hz
Temp./Humi. : 24 deg.C / 34 %RH

Remarks : -

Limit1 : FCC 15C(15.207) QP
Limit2 : FCC 15C(15.207) AV

Engineer : Kazuya Noda



No.	Freq.	Reading		C.Fac	Results		Limit		Margin		Phase	Comment
		<QP>	<AV>		<QP>	<AV>	<QP>	<AV>	<QP>	<AV>		
	[MHz]	[dBuV]	[dBuV]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dB]	[dB]		
1	0.18885	25.18	19.67	12.39	37.57	32.06	64.09	54.09	26.5	22.0	N	
2	0.25090	18.27	15.75	12.40	30.67	28.15	61.73	51.73	31.0	23.5	N	
3	0.81801	16.06	12.43	12.47	28.53	24.90	56.00	46.00	27.4	21.1	N	
4	6.35879	23.04	22.13	12.75	35.79	34.88	60.00	50.00	24.2	15.1	N	
5	16.39301	27.55	26.38	13.15	40.70	39.53	60.00	50.00	19.3	10.4	N	
6	18.24640	27.01	24.76	13.23	40.24	37.99	60.00	50.00	19.7	12.0	N	
7	0.18871	24.98	18.81	12.39	37.37	31.20	64.09	54.09	26.7	22.8	L1	
8	0.25130	17.48	14.06	12.40	29.88	26.46	61.71	51.71	31.8	25.2	L1	
9	0.81750	15.33	11.22	12.47	27.80	23.69	56.00	46.00	28.2	22.3	L1	
10	6.36189	23.25	21.20	12.75	36.00	33.95	60.00	50.00	24.0	16.0	L1	
11	16.39147	27.13	25.96	13.15	40.28	39.11	60.00	50.00	19.7	10.8	L1	
12	18.24740	27.28	24.74	13.23	40.51	37.97	60.00	50.00	19.4	12.0	L1	

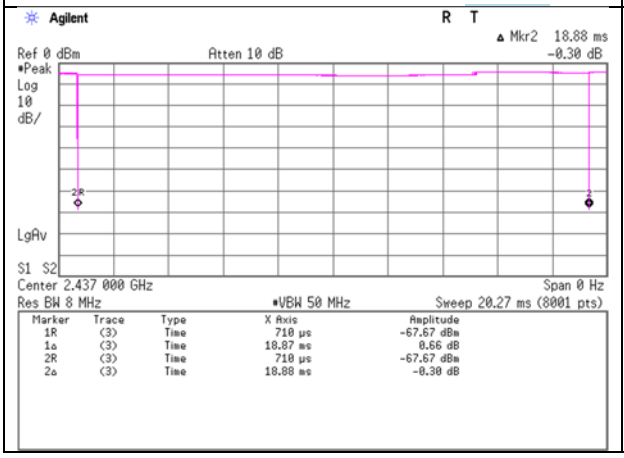
Calculation:Result [dBuV] =Reading [dBuV] +C.Fac (LISN (AMN) +Cable+ATT) [dB]
LISN (AMN) =SLS-02

Burst rate confirmation

Report No.	12517639S-A-R1
Test place	Shonan EMC Lab. No.1 Shielded Room
Date	October 14, 2018
Temperature / Humidity	24 deg. C / 47 % RH
Engineer	Shiro Kobayashi
Mode	Tx

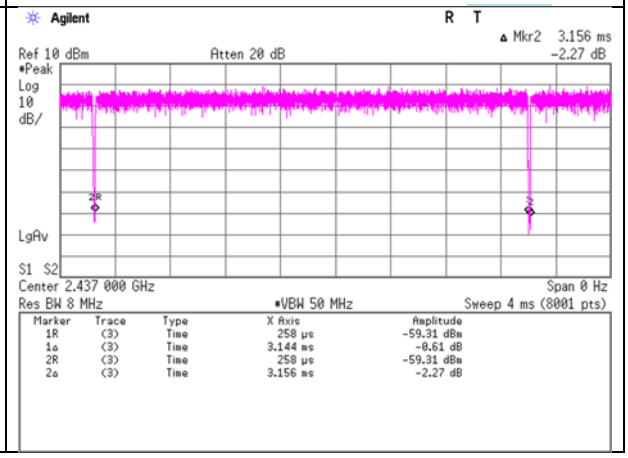
11b 1 Mbps

Tx on / (Tx on + Tx off) =	0.999
Tx on / (Tx on + Tx off) * 100 =	99.9 %
Duty factor = 10 * log (18.88 / 18.87) =	0.00 dB
Duty factor = 20 * log (18.88 / 18.87) =	0.00 dB



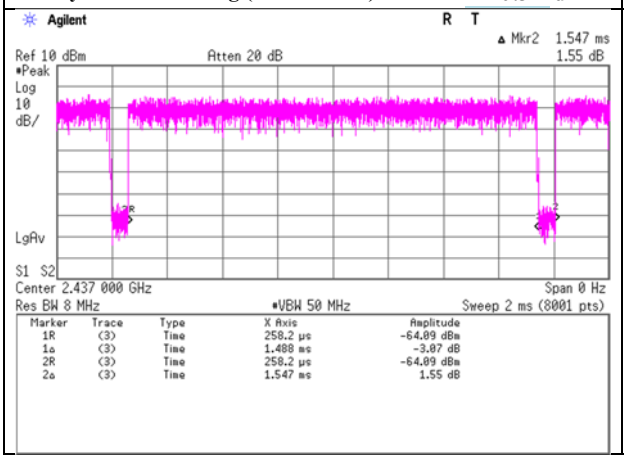
11g 6 Mbps

Tx on / (Tx on + Tx off) =	0.996
Tx on / (Tx on + Tx off) * 100 =	99.6 %
Duty factor = 10 * log (3.156 / 3.144) =	0.02 dB
Duty factor = 20 * log (3.156 / 3.144) =	0.03 dB



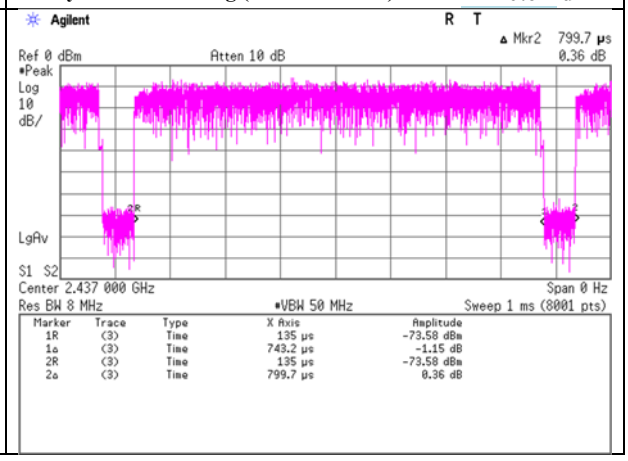
11n-20 MCS 8

Tx on / (Tx on + Tx off) =	0.962
Tx on / (Tx on + Tx off) * 100 =	96.2 %
Duty factor = 10 * log (1.547 / 1.488) =	0.17 dB
Duty factor = 20 * log (1.547 / 1.488) =	0.34 dB



11n-40 MCS 8

Tx on / (Tx on + Tx off) =	0.929
Tx on / (Tx on + Tx off) * 100 =	92.9 %
Duty factor = 10 * log (0.7997 / 0.7432) =	0.32 dB
Duty factor = 20 * log (0.7997 / 0.7432) =	0.64 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.	12517639S-A-R1		
Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	3	3	3
Date	October 18, 2018	October 22, 2018	October 19, 2018
Temperature / Humidity	23 deg. C / 44 % RH	24 deg. C / 40 % RH	22 deg. C / 51 % RH
Engineer	Makoto Hosaka	Makoto Hosaka	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.	2390.000	PK	46.23	27.86	14.17	43.71	2.28	46.83	73.90	27.0	128	76	
Hori.	2488.450	PK	65.27	27.63	14.26	43.72	2.28	65.72	73.90	8.1	205	131	*1)
Hori.	2498.803	PK	65.27	27.59	14.27	43.72	2.28	65.69	73.90	8.2	208	130	*1)
Hori.	4824.000	PK	50.72	31.46	6.53	43.90	2.28	47.09	73.90	26.8	146	153	
Hori.	4976.436	PK	58.39	31.68	6.62	43.89	2.28	55.08	73.90	18.8	133	345	*1)
Hori.	4998.978	PK	58.50	31.86	6.63	43.89	2.28	55.38	73.90	18.5	131	357	*1)
Hori.	7236.000	PK	48.42	36.85	8.26	43.66	2.28	52.15	73.90	21.7	165	225	
Hori.	9648.000	PK	48.79	38.64	9.21	43.62	2.28	55.30	73.90	18.6	181	157	
Hori.	2390.000	AV	38.58	27.86	14.17	43.71	2.28	39.18	53.90	14.7	128	76	
Hori.	2488.450	AV	52.96	27.63	14.26	43.72	2.28	53.41	53.90	**0.4**	205	131	*1)
Hori.	2498.803	AV	52.37	27.59	14.27	43.72	2.28	52.79	53.90	1.1	208	130	*1)
Hori.	4824.000	AV	43.54	31.46	6.53	43.90	2.28	39.91	53.90	13.9	146	153	
Hori.	4976.436	AV	45.58	31.68	6.62	43.89	2.28	42.27	53.90	11.6	133	345	*1)
Hori.	4998.978	AV	45.72	31.86	6.63	43.89	2.28	42.60	53.90	11.3	131	357	*1)
Hori.	7236.000	AV	39.07	36.85	8.26	43.66	2.28	42.80	53.90	11.1	165	225	
Hori.	9648.000	AV	39.94	38.64	9.21	43.62	2.28	46.45	53.90	7.4	181	157	
Vert.	2390.000	PK	45.09	27.86	14.17	43.71	2.28	45.69	73.90	28.2	144	122	
Vert.	2488.070	PK	63.09	27.63	14.26	43.72	2.28	63.54	73.90	10.3	189	118	*1)
Vert.	2499.104	PK	62.67	27.58	14.27	43.72	2.28	63.08	73.90	10.8	154	119	*1)
Vert.	4824.000	PK	49.85	31.46	6.53	43.90	2.28	46.22	73.90	27.6	147	172	
Vert.	4976.045	PK	57.15	31.67	6.62	43.89	2.28	53.83	73.90	20.0	135	117	*1)
Vert.	4998.262	PK	57.17	31.86	6.63	43.89	2.28	54.05	73.90	19.8	134	116	*1)
Vert.	7236.000	PK	48.85	36.85	8.26	43.66	2.28	52.58	73.90	21.3	145	243	
Vert.	9648.000	PK	48.53	38.64	9.21	43.62	2.28	55.04	73.90	18.8	100	349	
Vert.	2390.000	AV	38.21	27.86	14.17	43.71	2.28	38.81	53.90	15.0	144	122	
Vert.	2488.070	AV	49.76	27.63	14.26	43.72	2.28	50.21	53.90	3.6	189	118	*1)
Vert.	2499.104	AV	50.79	27.58	14.27	43.72	2.28	51.20	53.90	2.7	154	119	*1)
Vert.	4824.000	AV	42.58	31.46	6.53	43.90	2.28	38.95	53.90	14.9	147	172	
Vert.	4976.045	AV	44.33	31.67	6.62	43.89	2.28	41.01	53.90	12.8	135	117	*1)
Vert.	4998.262	AV	44.80	31.86	6.63	43.89	2.28	41.68	53.90	12.2	134	116	*1)
Vert.	7236.000	AV	39.31	36.85	8.26	43.66	2.28	43.04	53.90	10.8	145	243	
Vert.	9648.000	AV	39.77	38.64	9.21	43.62	2.28	46.28	53.90	7.6	100	349	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Distance factor : 1 GHz - 13 GHz : 20log (3.90 m / 3.0 m) = 2.28 dB
13 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB
*1) Not Leakage Power (out of band emission)

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	95.83	27.85	14.19	43.71	2.28	96.44	-	-	Carrier
Hori.	2400.000	PK	52.02	27.86	14.18	43.71	2.28	52.63	76.44	23.8	
Vert.	2412.000	PK	94.85	27.85	14.19	43.71	2.28	95.46	-	-	Carrier
Vert.	2400.000	PK	48.39	27.86	14.18	43.71	2.28	49.00	75.46	26.5	

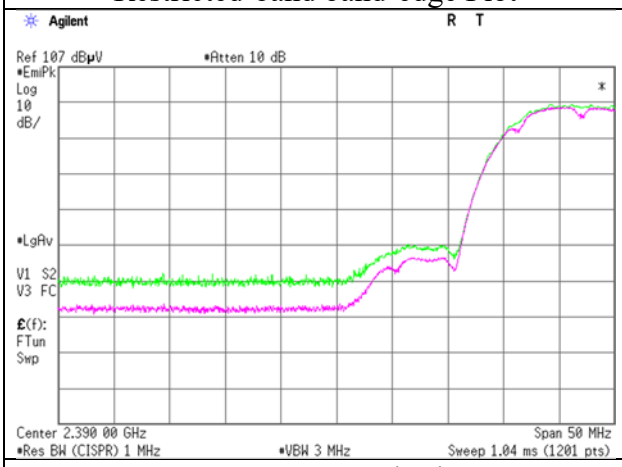
Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Distance factor : 1 GHz - 13 GHz : 20log (3.90 m / 3.0 m) = 2.28 dB
13 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

Radiated Spurious Emission
(Reference Plot for band-edge)

Report No.	12517639S-A-R1		
Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	3	3	3
Date	October 18, 2018	October 22, 2018	October 19, 2018
Temperature / Humidity	23 deg. C / 44 % RH	24 deg. C / 40 % RH	22 deg. C / 51 % RH
Engineer	Makoto Hosaka (1 GHz – 2.8 GHz)	Makoto Hosaka (2.8 GHz – 13 GHz)	Shiro Kobayashi (13 GHz – 26.5 GHz)
Mode	Tx 11b 2412 MHz		

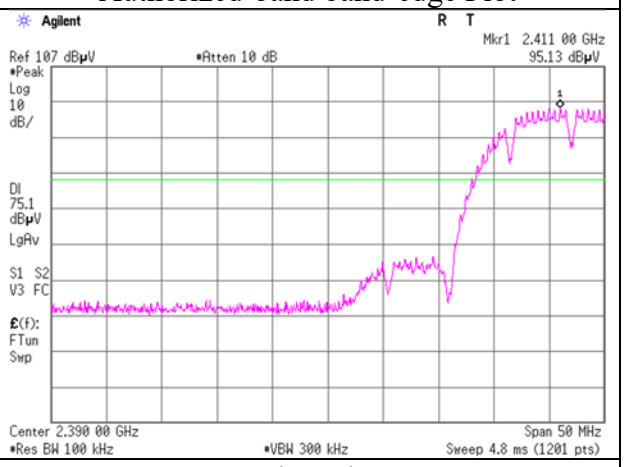
Horizontal

Restricted-band band-edge Plot



Trace Green : Peak Plot
Trace Purple : Average Plot

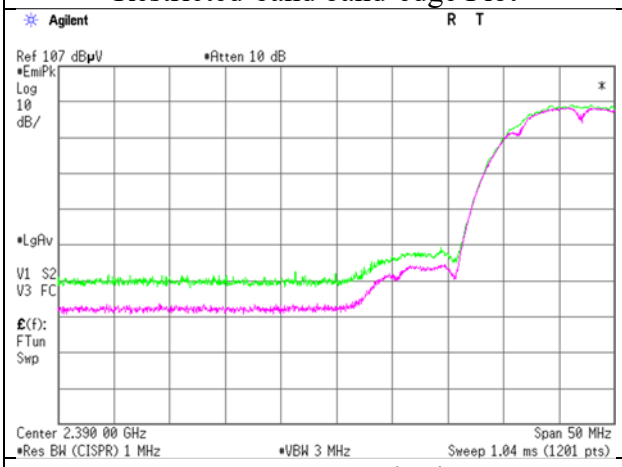
Authorized-band band-edge Plot



20dBc Plot

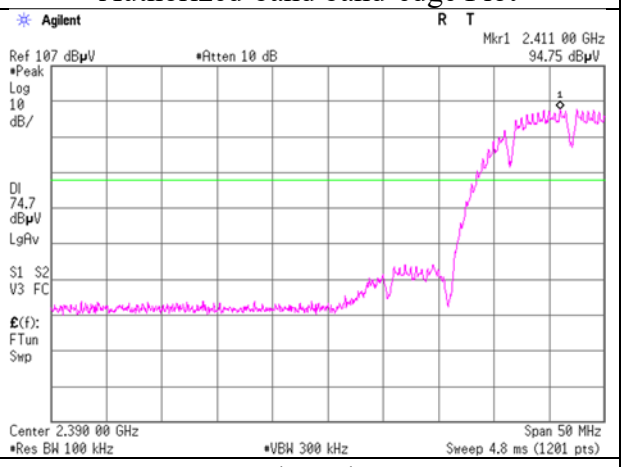
Vertical

Restricted-band band-edge Plot



Trace Green : Peak Plot
Trace Purple : Average Plot

Authorized-band band-edge Plot



20dBc Plot

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

Radiated Spurious Emission

Report No.	12517639S-A-R1		
Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	3	3	3
Date	October 18, 2018	October 22, 2018	October 19, 2018
Temperature / Humidity	23 deg. C / 44 % RH	24 deg. C / 40 % RH	22 deg. C / 51 % RH
Engineer	Makoto Hosaka	Makoto Hosaka	Shiro Kobayashi
	(1 GHz – 2.8 GHz)	(2.8 GHz – 13 GHz))	(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.	2488.091	PK	65.09	27.63	14.26	43.72	2.28	65.54	73.90	8.3	267	119	*1)
Hori.	2499.099	PK	64.53	27.58	14.27	43.72	2.28	64.94	73.90	8.9	251	118	*1)
Hori.	4874.000	PK	51.03	31.40	6.55	43.90	2.28	47.36	73.90	26.5	155	153	
Hori.	4976.107	PK	57.24	31.67	6.62	43.89	2.28	53.92	73.90	19.9	268	348	*1)
Hori.	4999.077	PK	58.13	31.86	6.63	43.89	2.28	55.01	73.90	18.8	279	358	*1)
Hori.	7311.000	PK	49.04	36.99	8.31	43.66	2.28	52.96	73.90	20.9	150	0	
Hori.	9748.000	PK	49.39	38.92	9.21	43.57	2.28	56.23	73.90	17.6	203	160	
Hori.	2488.091	AV	52.37	27.63	14.26	43.72	2.28	52.82	53.90	**1.0**	267	119	*1)
Hori.	2499.099	AV	52.37	27.58	14.27	43.72	2.28	52.78	53.90	1.1	251	118	*1)
Hori.	4874.000	AV	44.32	31.40	6.55	43.90	2.28	40.65	53.90	13.2	155	153	
Hori.	4976.107	AV	44.16	31.67	6.62	43.89	2.28	40.84	53.90	13.0	268	348	*1)
Hori.	4999.077	AV	46.17	31.86	6.63	43.89	2.28	43.05	53.90	10.8	279	358	*1)
Hori.	7311.000	AV	39.19	36.99	8.31	43.66	2.28	43.11	53.90	10.7	150	0	
Hori.	9748.000	AV	39.80	38.92	9.21	43.57	2.28	46.64	53.90	7.2	203	160	
Vert.	2488.486	PK	62.19	27.63	14.26	43.72	2.28	62.64	73.90	11.2	237	119	*1)
Vert.	2499.067	PK	62.64	27.58	14.27	43.72	2.28	63.05	73.90	10.8	241	108	*1)
Vert.	4874.000	PK	50.78	31.40	6.55	43.90	2.28	47.11	73.90	26.7	153	195	
Vert.	4975.684	PK	56.48	31.67	6.62	43.89	2.28	53.16	73.90	20.7	155	114	*1)
Vert.	4999.077	PK	56.49	31.86	6.63	43.89	2.28	53.37	73.90	20.5	148	118	*1)
Vert.	7311.000	PK	48.45	36.99	8.31	43.66	2.28	52.37	73.90	21.5	150	0	
Vert.	9748.000	PK	48.81	38.92	9.21	43.57	2.28	55.65	73.90	18.2	150	339	
Vert.	2488.486	AV	50.06	27.63	14.26	43.72	2.28	50.51	53.90	3.3	237	119	*1)
Vert.	2499.067	AV	50.18	27.58	14.27	43.72	2.28	50.59	53.90	3.3	241	108	*1)
Vert.	4874.000	AV	42.43	31.40	6.55	43.90	2.28	38.76	53.90	15.1	153	195	
Vert.	4975.684	AV	43.07	31.67	6.62	43.89	2.28	39.75	53.90	14.1	155	114	*1)
Vert.	4999.077	AV	42.88	31.86	6.63	43.89	2.28	39.76	53.90	14.1	148	118	*1)
Vert.	7311.000	AV	38.92	36.99	8.31	43.66	2.28	42.84	53.90	11.0	150	0	
Vert.	9748.000	AV	39.58	38.92	9.21	43.57	2.28	46.42	53.90	7.4	150	339	

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

Distance factor : 1 GHz - 13 GHz : 20log (3.90 m / 3.0 m) = 2.28 dB

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

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

Radiated Spurious Emission

Report No.	12517639S-A-R1		
Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	3	3	3
Date	October 18, 2018	October 22, 2018	October 19, 2018
Temperature / Humidity	23 deg. C / 44 % RH	24 deg. C / 40 % RH	22 deg. C / 51 % RH
Engineer	Makoto Hosaka	Makoto Hosaka	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.	2483.500	PK	50.57	27.65	14.26	43.72	2.28	51.04	73.90	22.8	131	75	
Hori.	2488.231	PK	64.11	27.63	14.26	43.72	2.28	64.56	73.90	9.3	228	134	*1)
Hori.	2498.981	PK	63.79	27.58	14.27	43.72	2.28	64.20	73.90	9.7	232	132	*1)
Hori.	4924.000	PK	51.96	31.37	6.59	43.90	2.28	48.30	73.90	25.6	184	155	
Hori.	4976.854	PK	58.22	31.68	6.62	43.89	2.28	54.91	73.90	18.9	218	350	*1)
Hori.	4998.524	PK	58.02	31.86	6.63	43.89	2.28	54.90	73.90	19.0	219	348	*1)
Hori.	7386.000	PK	47.48	37.01	8.36	43.65	2.28	51.48	73.90	22.4	150	0	
Hori.	9848.000	PK	48.50	39.12	9.21	43.52	2.28	55.59	73.90	18.3	144	117	
Hori.	2483.500	AV	39.96	27.65	14.26	43.72	2.28	40.43	53.90	13.4	131	75	
Hori.	2488.231	AV	51.25	27.63	14.26	43.72	2.28	51.70	53.90	**2.2**	228	134	*1)
Hori.	2498.981	AV	50.72	27.58	14.27	43.72	2.28	51.13	53.90	2.7	232	132	*1)
Hori.	4924.000	AV	44.58	31.37	6.59	43.90	2.28	40.92	53.90	12.9	184	155	
Hori.	4976.854	AV	44.80	31.68	6.62	43.89	2.28	41.49	53.90	12.4	218	350	*1)
Hori.	4998.524	AV	44.85	31.86	6.63	43.89	2.28	41.73	53.90	12.1	219	348	*1)
Hori.	7386.000	AV	38.87	37.01	8.36	43.65	2.28	42.87	53.90	11.0	150	0	
Hori.	9848.000	AV	39.38	39.12	9.21	43.52	2.28	46.47	53.90	7.4	144	117	
Vert.	2483.500	PK	50.38	27.65	14.26	43.72	2.28	50.85	73.90	23.0	114	126	
Vert.	2488.345	PK	62.08	27.63	14.26	43.72	2.28	62.53	73.90	11.3	135	97	*1)
Vert.	2499.045	PK	62.60	27.58	14.27	43.72	2.28	63.01	73.90	10.8	246	115	*1)
Vert.	4924.000	PK	50.98	31.37	6.59	43.90	2.28	47.32	73.90	26.5	149	4	
Vert.	4977.194	PK	57.58	31.68	6.62	43.89	2.28	54.27	73.90	19.6	146	111	*1)
Vert.	4998.321	PK	56.39	31.86	6.63	43.89	2.28	53.27	73.90	20.6	139	118	*1)
Vert.	7386.000	PK	47.86	37.01	8.36	43.65	2.28	51.86	73.90	22.0	150	0	
Vert.	9848.000	PK	49.56	39.12	9.21	43.52	2.28	56.65	73.90	17.2	151	116	
Vert.	2483.500	AV	39.25	27.65	14.26	43.72	2.28	39.72	53.90	14.1	114	126	
Vert.	2488.345	AV	49.36	27.63	14.26	43.72	2.28	49.81	53.90	4.0	135	97	*1)
Vert.	2499.045	AV	50.96	27.58	14.27	43.72	2.28	51.37	53.90	2.5	246	115	*1)
Vert.	4924.000	AV	42.30	31.37	6.59	43.90	2.28	38.64	53.90	15.2	149	4	
Vert.	4977.194	AV	43.88	31.68	6.62	43.89	2.28	40.57	53.90	13.3	146	111	*1)
Vert.	4998.321	AV	43.84	31.86	6.63	43.89	2.28	40.72	53.90	13.1	139	118	*1)
Vert.	7386.000	AV	39.05	37.01	8.36	43.65	2.28	43.05	53.90	10.8	150	0	
Vert.	9848.000	AV	39.48	39.12	9.21	43.52	2.28	46.57	53.90	7.3	151	116	

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

Distance factor : 1 GHz - 13 GHz : 20log (3.90 m / 3.0 m) = 2.28 dB

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

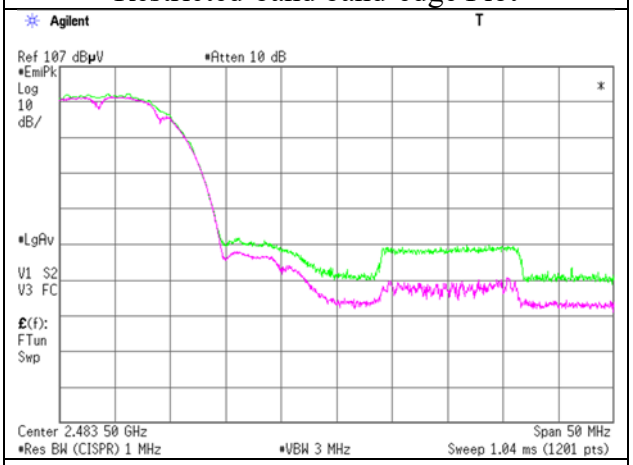
*1) Not Leakage Power (out of band emission)

Radiated Spurious Emission
(Reference Plot for band-edge)

Report No.	12517639S-A-R1		
Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	3	3	3
Date	October 18, 2018	October 22, 2018	October 19, 2018
Temperature / Humidity	23 deg. C / 44 % RH	24 deg. C / 40 % RH	22 deg. C / 51 % RH
Engineer	Makoto Hosaka	Makoto Hosaka	Shiro Kobayashi
	(1 GHz – 2.8 GHz)	(2.8 GHz – 13 GHz)	(13 GHz – 26.5 GHz)
Mode	Tx 11b 2462 MHz		

Horizontal

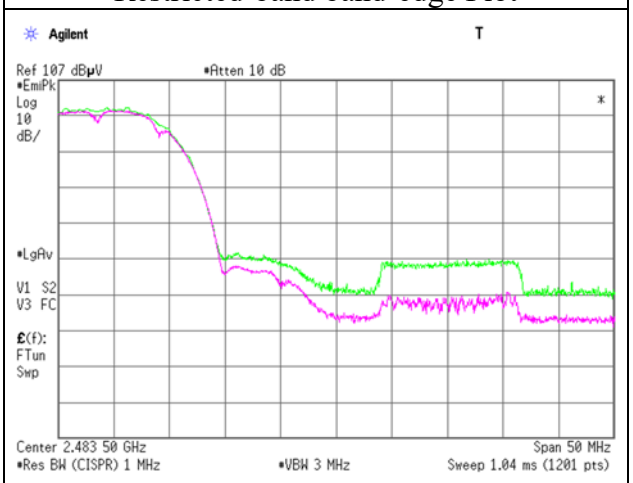
Restricted-band band-edge Plot



Trace Green : Peak Plot
Trace Purple : Average Plot

Vertical

Restricted-band band-edge Plot



Trace Green : Peak Plot
Trace Purple : Average Plot

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

Radiated Spurious Emission

Report No.	12517639S-A-R1		
Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	3	3	3
Date	October 18, 2018	October 22, 2018	October 19, 2018
Temperature / Humidity	23 deg. C / 44 % RH	24 deg. C / 40 % RH	22 deg. C / 51 % RH
Engineer	Makoto Hosaka	Makoto Hosaka	Shiro Kobayashi
	(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	65.28	27.86	14.17	43.71	2.28	65.88	73.90	8.0	100	0	
Hori.	2488.459	PK	64.77	27.63	14.26	43.72	2.28	65.22	73.90	8.6	169	162	*1)
Hori.	2499.107	PK	63.99	27.58	14.27	43.72	2.28	64.40	73.90	9.5	163	160	*1)
Hori.	4824.000	PK	51.27	31.46	6.53	43.90	2.28	47.64	73.90	26.2	153	155	
Hori.	4976.086	PK	56.86	31.67	6.62	43.89	2.28	53.54	73.90	20.3	154	310	*1)
Hori.	4998.409	PK	58.24	31.86	6.63	43.89	2.28	55.12	73.90	18.7	110	300	*1)
Hori.	7236.000	PK	52.43	36.85	8.26	43.66	2.28	56.16	73.90	17.7	181	224	
Hori.	9648.000	PK	49.74	38.64	9.21	43.62	2.28	56.25	73.90	17.6	184	158	
Hori.	2390.000	AV	48.23	27.86	14.17	43.71	2.28	48.83	53.90	5.0	100	0	
Hori.	2488.459	AV	51.91	27.63	14.26	43.72	2.28	52.36	53.90	**1.5**	169	162	*1)
Hori.	2499.107	AV	51.51	27.58	14.27	43.72	2.28	51.92	53.90	1.9	163	160	*1)
Hori.	4824.000	AV	41.19	31.46	6.53	43.90	2.28	37.56	53.90	16.3	153	155	
Hori.	4976.086	AV	44.33	31.67	6.62	43.89	2.28	41.01	53.90	12.8	154	310	*1)
Hori.	4998.409	AV	45.17	31.86	6.63	43.89	2.28	42.05	53.90	11.8	110	300	*1)
Hori.	7236.000	AV	41.23	36.85	8.26	43.66	2.28	44.96	53.90	8.9	181	224	
Hori.	9648.000	AV	40.11	38.64	9.21	43.62	2.28	46.62	53.90	7.2	184	158	
Vert.	2390.000	PK	62.14	27.86	14.17	43.71	2.28	62.74	73.90	11.1	134	130	
Vert.	2488.428	PK	63.07	27.63	14.26	43.72	2.28	63.52	73.90	10.3	174	102	*1)
Vert.	2499.191	PK	61.67	27.58	14.27	43.72	2.28	62.08	73.90	11.8	177	108	*1)
Vert.	4824.000	PK	50.15	31.46	6.53	43.90	2.28	46.52	73.90	27.3	157	195	
Vert.	4976.236	PK	56.67	31.68	6.62	43.89	2.28	53.36	73.90	20.5	127	114	*1)
Vert.	4998.678	PK	56.45	31.86	6.63	43.89	2.28	53.33	73.90	20.5	130	116	*1)
Vert.	7236.000	PK	50.50	36.85	8.26	43.66	2.28	54.23	73.90	19.6	128	303	
Vert.	9648.000	PK	49.12	38.64	9.21	43.62	2.28	55.63	73.90	18.2	100	350	
Vert.	2390.000	AV	46.53	27.86	14.17	43.71	2.28	47.13	53.90	6.7	134	130	
Vert.	2488.428	AV	50.75	27.63	14.26	43.72	2.28	51.20	53.90	2.7	174	102	*1)
Vert.	2499.191	AV	49.27	27.58	14.27	43.72	2.28	49.68	53.90	4.2	177	108	*1)
Vert.	4824.000	AV	41.36	31.46	6.53	43.90	2.28	37.73	53.90	16.1	157	195	
Vert.	4976.236	AV	44.12	31.68	6.62	43.89	2.28	40.81	53.90	13.0	127	114	*1)
Vert.	4998.678	AV	44.19	31.86	6.63	43.89	2.28	41.07	53.90	12.8	130	116	*1)
Vert.	7236.000	AV	40.17	36.85	8.26	43.66	2.28	43.90	53.90	10.0	128	303	
Vert.	9648.000	AV	40.01	38.64	9.21	43.62	2.28	46.52	53.90	7.3	100	350	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Distance factor : 1 GHz - 13 GHz : 20log (3.90 m / 3.0 m) = 2.28 dB
13 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB
*1) Not Leakage Power (out of band emission)

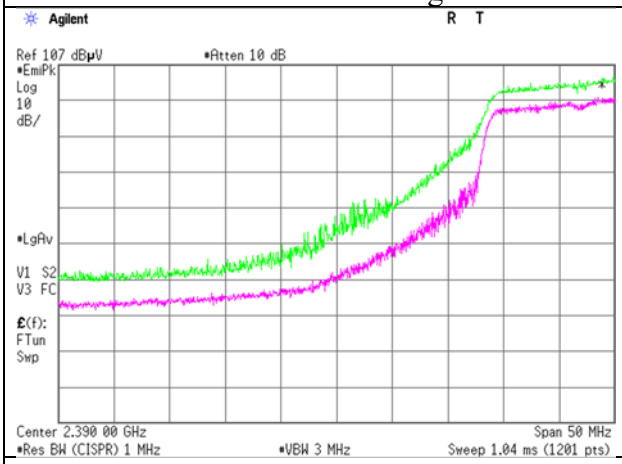
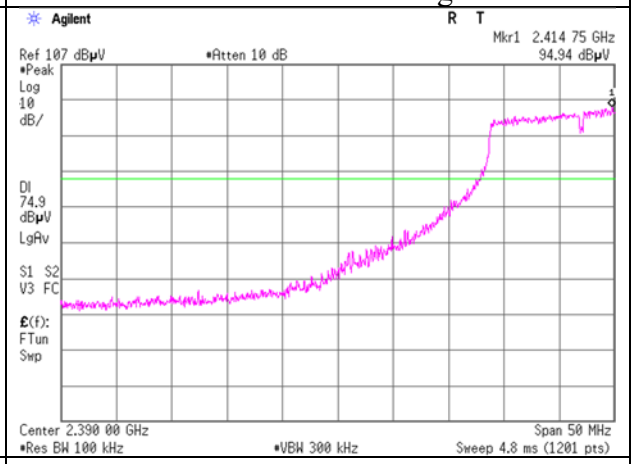
20 dBc Data Sheet (RBW 100 kHz, VBW 300 kHz)

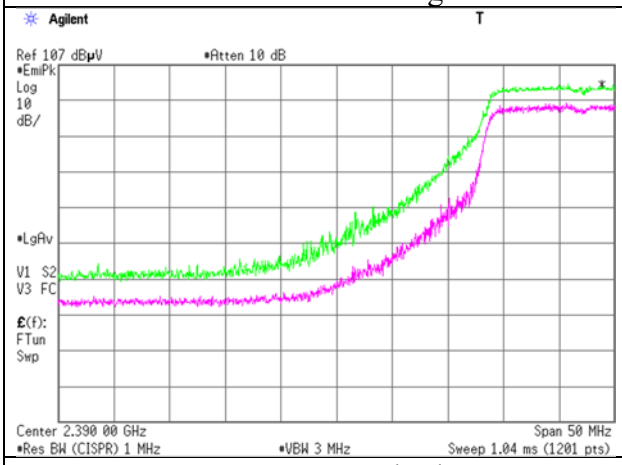
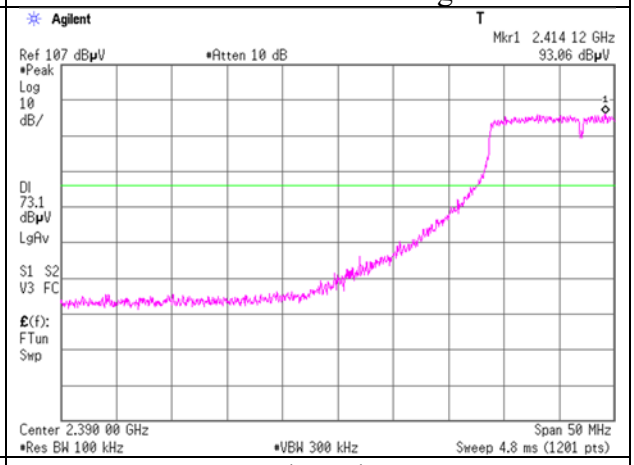
Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2412.000	PK	94.97	27.85	14.19	43.71	2.28	95.58	-	-	Carrier
Hori.	2400.000	PK	67.46	27.86	14.18	43.71	2.28	68.07	75.58	7.5	
Vert.	2412.000	PK	93.19	27.85	14.19	43.71	2.28	93.80	-	-	Carrier
Vert.	2400.000	PK	67.02	27.86	14.18	43.71	2.28	67.63	73.80	6.2	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Distance factor : 1 GHz - 13 GHz : 20log (3.90 m / 3.0 m) = 2.28 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.	12517639S-A-R1		
Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	3	3	3
Date	October 18, 2018	October 22, 2018	October 19, 2018
Temperature / Humidity	23 deg. C / 44 % RH	24 deg. C / 40 % RH	22 deg. C / 51 % RH
Engineer	Makoto Hosaka (1 GHz – 2.8 GHz)	Makoto Hosaka (2.8 GHz – 13 GHz)	Shiro Kobayashi (13 GHz – 26.5 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

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

Radiated Spurious Emission

Report No.	12517639S-A-R1		
Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	3	3	3
Date	October 18, 2018	October 22, 2018	October 19, 2018
Temperature / Humidity	23 deg. C / 44 % RH	24 deg. C / 40 % RH	22 deg. C / 51 % RH
Engineer	Makoto Hosaka	Makoto Hosaka	Shiro Kobayashi
	(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.	2488.175	PK	65.00	27.63	14.26	43.72	2.28	65.45	73.90	8.4	243	137	*1)
Hori.	2498.954	PK	63.21	27.58	14.27	43.72	2.28	63.62	73.90	10.2	233	159	*1)
Hori.	4874.000	PK	52.44	31.40	6.55	43.90	2.28	48.77	73.90	25.1	147	154	
Hori.	4976.028	PK	57.74	31.67	6.62	43.89	2.28	54.42	73.90	19.4	171	342	*1)
Hori.	4998.634	PK	57.40	31.86	6.63	43.89	2.28	54.28	73.90	19.6	177	356	*1)
Hori.	7311.000	PK	51.14	36.99	8.31	43.66	2.28	55.06	73.90	18.8	181	222	
Hori.	9748.000	PK	48.91	38.92	9.21	43.57	2.28	55.75	73.90	18.1	182	158	
Hori.	2488.175	AV	52.77	27.63	14.26	43.72	2.28	53.22	53.90	**0.6**	243	137	*1)
Hori.	2498.954	AV	51.16	27.58	14.27	43.72	2.28	51.57	53.90	2.3	233	159	*1)
Hori.	4874.000	AV	41.62	31.40	6.55	43.90	2.28	37.95	53.90	15.9	147	154	
Hori.	4976.028	AV	44.79	31.67	6.62	43.89	2.28	41.47	53.90	12.4	171	342	*1)
Hori.	4998.634	AV	44.17	31.86	6.63	43.89	2.28	41.05	53.90	12.8	177	356	*1)
Hori.	7311.000	AV	40.20	36.99	8.31	43.66	2.28	44.12	53.90	9.7	181	222	
Hori.	9748.000	AV	39.63	38.92	9.21	43.57	2.28	46.47	53.90	7.4	182	158	
Vert.	2488.175	PK	62.19	27.63	14.26	43.72	2.28	62.64	73.90	11.2	142	96	*1)
Vert.	2499.196	PK	62.28	27.58	14.27	43.72	2.28	62.69	73.90	11.2	144	117	*1)
Vert.	4874.000	PK	50.14	31.40	6.55	43.90	2.28	46.47	73.90	27.4	162	192	
Vert.	4976.160	PK	56.50	31.67	6.62	43.89	2.28	53.18	73.90	20.7	166	106	*1)
Vert.	4998.419	PK	57.10	31.86	6.63	43.89	2.28	53.98	73.90	19.9	127	114	*1)
Vert.	7311.000	PK	49.72	36.99	8.31	43.66	2.28	53.64	73.90	20.2	128	294	
Vert.	9748.000	PK	48.88	38.92	9.21	43.57	2.28	55.72	73.90	18.1	100	357	
Vert.	2488.175	AV	49.76	27.63	14.26	43.72	2.28	50.21	53.90	3.7	142	96	*1)
Vert.	2499.196	AV	50.89	27.58	14.27	43.72	2.28	51.30	53.90	2.6	144	117	*1)
Vert.	4874.000	AV	40.41	31.40	6.55	43.90	2.28	36.74	53.90	17.1	162	192	
Vert.	4976.160	AV	44.68	31.67	6.62	43.89	2.28	41.36	53.90	12.5	166	106	*1)
Vert.	4998.419	AV	44.45	31.86	6.63	43.89	2.28	41.33	53.90	12.5	127	114	*1)
Vert.	7311.000	AV	39.43	36.99	8.31	43.66	2.28	43.35	53.90	10.5	128	294	
Vert.	9748.000	AV	39.47	38.92	9.21	43.57	2.28	46.31	53.90	7.5	100	357	

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

Distance factor : 1 GHz - 13 GHz : 20log (3.90 m / 3.0 m) = 2.28 dB

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

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

Radiated Spurious Emission

Report No.	12517639S-A-R1		
Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	3	3	3
Date	October 18, 2018	October 22, 2018	October 19, 2018
Temperature / Humidity	23 deg. C / 44 % RH	24 deg. C / 40 % RH	22 deg. C / 51 % RH
Engineer	Makoto Hosaka	Makoto Hosaka	Shiro Kobayashi
	(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	67.18	27.65	14.26	43.72	2.28	67.65	73.90	6.2	127	71	
Hori.	2488.341	PK	66.45	27.63	14.26	43.72	2.28	66.90	73.90	7.0	100	0	*1)
Hori.	2499.134	PK	65.46	27.58	14.27	43.72	2.28	65.87	73.90	8.0	234	135	*1)
Hori.	4924.000	PK	52.03	31.37	6.59	43.90	2.28	48.37	73.90	25.5	150	154	
Hori.	4976.183	PK	57.73	31.67	6.62	43.89	2.28	54.41	73.90	19.4	177	341	*1)
Hori.	4998.420	PK	57.60	31.86	6.63	43.89	2.28	54.48	73.90	19.4	180	354	*1)
Hori.	7386.000	PK	51.34	37.01	8.36	43.65	2.28	55.34	73.90	18.5	181	218	
Hori.	9848.000	PK	46.91	39.12	9.21	43.52	2.28	54.00	73.90	19.9	150	0	
Hori.	2483.500	AV	47.25	27.65	14.26	43.72	2.28	47.72	53.90	6.1	127	71	
Hori.	2488.341	AV	51.80	27.63	14.26	43.72	2.28	52.25	53.90	1.6	100	0	*1)
Hori.	2499.134	AV	52.25	27.58	14.27	43.72	2.28	52.66	53.90	**1.2**	234	135	*1)
Hori.	4924.000	AV	41.82	31.37	6.59	43.90	2.28	38.16	53.90	15.7	150	154	
Hori.	4976.183	AV	44.92	31.67	6.62	43.89	2.28	41.60	53.90	12.3	177	341	*1)
Hori.	4998.420	AV	44.66	31.86	6.63	43.89	2.28	41.54	53.90	12.3	180	354	*1)
Hori.	7386.000	AV	39.97	37.01	8.36	43.65	2.28	43.97	53.90	9.9	181	218	
Hori.	9848.000	AV	37.76	39.12	9.21	43.52	2.28	44.85	53.90	9.0	150	0	
Vert.	2483.500	PK	65.38	27.65	14.26	43.72	2.28	65.85	73.90	8.0	126	123	
Vert.	2488.312	PK	70.17	27.63	14.26	43.72	2.28	70.62	73.90	3.2	170	106	*1)
Vert.	2499.134	PK	69.13	27.58	14.27	43.72	2.28	69.54	73.90	4.3	157	108	*1)
Vert.	4924.000	PK	51.19	31.37	6.59	43.90	2.28	47.53	73.90	26.3	161	186	
Vert.	4976.242	PK	57.07	31.68	6.62	43.89	2.28	53.76	73.90	20.1	149	111	*1)
Vert.	4998.264	PK	56.14	31.86	6.63	43.89	2.28	53.02	73.90	20.8	147	118	*1)
Vert.	7386.000	PK	50.63	37.01	8.36	43.65	2.28	54.63	73.90	19.2	146	240	
Vert.	9848.000	PK	47.66	39.12	9.21	43.52	2.28	54.75	73.90	19.1	128	351	
Vert.	2483.500	AV	49.02	27.65	14.26	43.72	2.28	49.49	53.90	4.4	126	123	
Vert.	2488.312	AV	52.25	27.63	14.26	43.72	2.28	52.70	53.90	**1.2**	170	106	*1)
Vert.	2499.134	AV	51.14	27.58	14.27	43.72	2.28	51.55	53.90	2.3	157	108	*1)
Vert.	4924.000	AV	40.77	31.37	6.59	43.90	2.28	37.11	53.90	16.7	161	186	
Vert.	4976.242	AV	44.33	31.68	6.62	43.89	2.28	41.02	53.90	12.8	149	111	*1)
Vert.	4998.264	AV	43.38	31.86	6.63	43.89	2.28	40.26	53.90	13.6	147	118	*1)
Vert.	7386.000	AV	39.77	37.01	8.36	43.65	2.28	43.77	53.90	10.1	146	240	
Vert.	9848.000	AV	37.73	39.12	9.21	43.52	2.28	44.82	53.90	9.0	128	351	

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

Distance factor : 1 GHz - 13 GHz : 20log (3.90 m / 3.0 m) = 2.28 dB

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

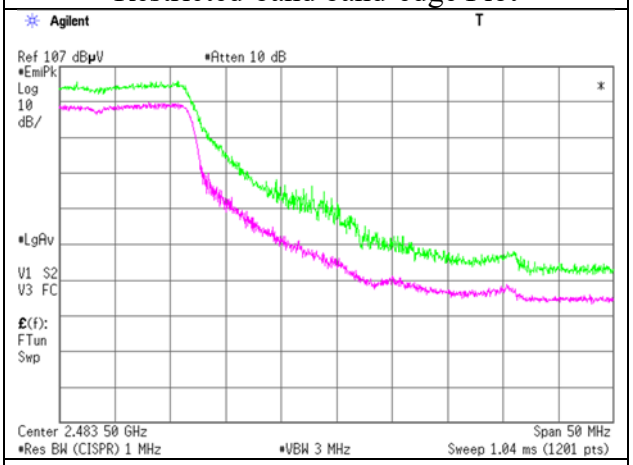
*1) Not Leakage Power (out of band emission)

Radiated Spurious Emission
(Reference Plot for band-edge)

Report No.	12517639S-A-R1		
Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	3	3	3
Date	October 18, 2018	October 22, 2018	October 19, 2018
Temperature / Humidity	23 deg. C / 44 % RH	24 deg. C / 40 % RH	22 deg. C / 51 % RH
Engineer	Makoto Hosaka	Makoto Hosaka	Shiro Kobayashi
	(1 GHz – 2.8 GHz)	(2.8 GHz – 13 GHz)	(13 GHz – 26.5 GHz)
Mode	Tx 11g 2462 MHz		

Horizontal

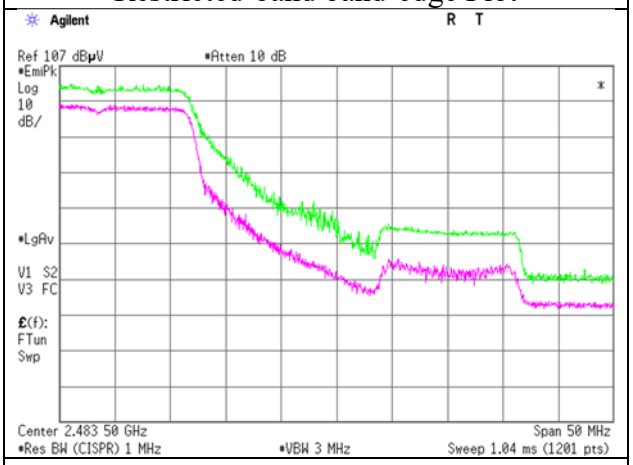
Restricted-band band-edge Plot



Trace Green : Peak Plot
Trace Purple : Average Plot

Vertical

Restricted-band band-edge Plot



Trace Green : Peak Plot
Trace Purple : Average Plot

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

Radiated Spurious Emission

Report No.	12517639S-A-R1		
Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	1	3	3
Date	November 4, 2018	October 18, 2018	October 19, 2018
Temperature / Humidity	22 deg. C / 44 % RH	24 deg. C / 40 % RH	22 deg. C / 51 % RH
Engineer	Kazutaka Takeyama	Makoto Hosaka	Shiro Kobayashi
	(30 MHz – 1000 MHz)	(1 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.	78.675	QP	54.60	6.33	8.24	31.81	0.00	37.36	40.00	2.6	249	248	
Hori.	99.947	QP	52.00	10.24	8.22	31.81	0.00	38.65	43.50	4.8	300	224	
Hori.	299.861	QP	50.40	14.25	6.91	31.77	0.00	39.79	46.00	6.2	100	108	
Hori.	2390.000	PK	64.08	27.86	14.17	43.71	2.28	64.68	73.90	9.2	129	67	
Hori.	2488.401	PK	62.14	27.63	14.26	43.72	2.28	62.59	73.90	11.3	158	104	*1)
Hori.	2498.406	PK	61.89	27.59	14.27	43.72	2.28	62.31	73.90	11.5	158	167	*1)
Hori.	4824.000	PK	47.68	31.46	6.52	43.90	2.28	44.04	73.90	29.8	100	0	
Hori.	4976.583	PK	56.58	31.68	6.62	43.89	2.28	53.27	73.90	20.6	153	308	*1)
Hori.	4998.465	PK	56.06	31.86	6.63	43.89	2.28	52.94	73.90	20.9	155	307	*1)
Hori.	7236.000	PK	47.96	36.85	8.34	43.66	2.28	51.77	73.90	22.1	100	0	
Hori.	9648.000	PK	49.23	38.64	9.21	43.62	2.28	55.74	73.90	18.1	100	0	
Hori.	2488.401	AV	49.49	27.63	14.26	43.72	2.28	49.94	53.90	3.9	158	104	*1)
Hori.	2498.406	AV	49.49	27.59	14.27	43.72	2.28	49.91	53.90	3.9	158	167	*1)
Hori.	4976.583	AV	43.65	31.68	6.62	43.89	2.28	40.34	53.90	13.5	153	308	*1)
Hori.	4998.465	AV	43.58	31.86	6.63	43.89	2.28	40.46	53.90	13.4	155	307	*1)
Vert.	33.066	QP	46.10	17.50	7.08	31.84	0.00	38.84	40.00	1.1	100	295	
Vert.	36.013	QP	44.70	16.33	7.16	31.83	0.00	36.36	40.00	3.6	100	0	
Vert.	49.880	QP	51.00	11.21	7.45	31.82	0.00	37.84	40.00	2.1	100	127	
Vert.	64.242	QP	54.50	7.37	7.20	31.82	0.00	37.25	40.00	2.7	100	123	
Vert.	80.592	QP	54.60	6.53	8.35	31.81	0.00	37.67	40.00	2.3	100	46	
Vert.	99.947	QP	55.30	10.24	8.22	31.81	0.00	41.95	43.50	1.5	105	284	
Vert.	299.853	QP	48.00	14.25	6.91	31.77	0.00	37.39	46.00	8.6	100	161	
Vert.	891.286	QP	34.40	21.95	9.64	31.40	0.00	34.59	46.00	11.4	100	332	
Vert.	2390.000	PK	60.40	27.86	14.17	43.71	2.28	61.00	73.90	12.9	122	0	
Vert.	2488.278	PK	65.34	27.63	14.26	43.72	2.28	65.79	73.90	8.1	232	124	*1)
Vert.	2498.403	PK	64.38	27.59	14.27	43.72	2.28	64.80	73.90	9.1	242	141	*1)
Vert.	4824.000	PK	48.41	31.46	6.52	43.90	2.28	44.77	73.90	29.1	152	0	
Vert.	4976.285	PK	57.76	31.68	6.62	43.89	2.28	54.45	73.90	19.4	227	354	*1)
Vert.	4998.486	PK	56.41	31.86	6.63	43.89	2.28	53.29	73.90	20.6	213	354	*1)
Vert.	7236.000	PK	47.69	36.85	8.34	43.66	2.28	51.50	73.90	22.4	100	76	
Vert.	9648.000	PK	48.75	38.64	9.21	43.62	2.28	55.26	73.90	18.6	100	0	
Vert.	2488.278	AV	52.35	27.63	14.26	43.72	2.28	52.80	53.90	1.1	232	124	*1)
Vert.	2498.403	AV	52.63	27.59	14.27	43.72	2.28	53.05	53.90	**0.8**	242	141	*1)
Vert.	4976.285	AV	44.26	31.68	6.62	43.89	2.28	40.95	53.90	12.9	227	354	*1)
Vert.	4998.486	AV	43.80	31.86	6.63	43.89	2.28	40.68	53.90	13.2	213	354	*1)

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Distance factor : 1 GHz - 13 GHz : 20log (3.90 m / 3.0 m) = 2.28 dB
13 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB
*1) Not Leakage Power (out of band emission)

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	46.73	27.86	14.17	43.71	0.34	2.28	47.67	53.90	**6.2**	*2)
Hori.	4824.000	AV	38.00	31.46	6.52	43.90	0.34	2.28	34.70	53.90	19.2	
Hori.	7236.000	AV	37.78	36.85	8.34	43.66	0.34	2.28	41.93	53.90	12.0	
Hori.	9648.000	AV	38.38	38.64	9.21	43.62	0.34	2.28	45.23	53.90	8.7	
Vert.	2390.000	AV	43.62	27.86	14.17	43.71	0.34	2.28	44.56	53.90	9.3	*2)
Vert.	4824.000	AV	37.47	31.46	6.52	43.90	0.34	2.28	34.17	53.90	19.7	
Vert.	7236.000	AV	37.68	36.85	8.34	43.66	0.34	2.28	41.83	53.90	12.1	
Vert.	9648.000	AV	37.98	38.64	9.21	43.62	0.34	2.28	44.83	53.90	9.1	

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 (3.90 m / 3.0 m) = 2.28 dB
13 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB
Duty factor refer to "Duty factor Calculation chart" sheet.
*2) 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	98.00	27.85	14.19	43.71	2.28	98.61	-	-	Carrier
Hori.	2400.000	PK	68.31	27.86	14.18	43.71	2.28	68.92	78.61	9.7	
Vert.	2412.000	PK	96.66	27.85	14.19	43.71	2.28	97.27	-	-	Carrier
Vert.	2400.000	PK	65.61	27.86	14.18	43.71	2.28	66.22	77.27	11.1	

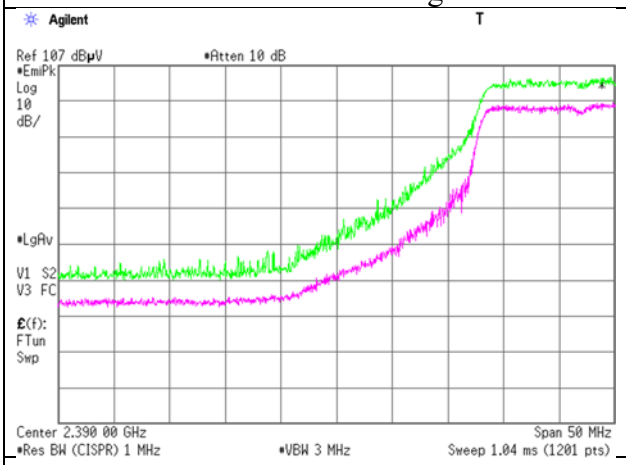
Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Distance factor : 1 GHz - 13 GHz : 20log (3.90 m / 3.0 m) = 2.28 dB
13 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

Radiated Spurious Emission

Report No.	12517639S-A-R1		
Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	3	3	3
Date	October 18, 2018	October 18, 2018	October 19, 2018
Temperature / Humidity	23 deg. C / 44 % RH	24 deg. C / 40 % RH	22 deg. C / 51 % RH
Engineer	Makoto Hosaka (1 GHz – 2.8 GHz)	Makoto Hosaka (2.8 GHz – 13 GHz)	Shiro Kobayashi (13 GHz – 26.5 GHz)
Mode	Tx 11n-20 2412 MHz		

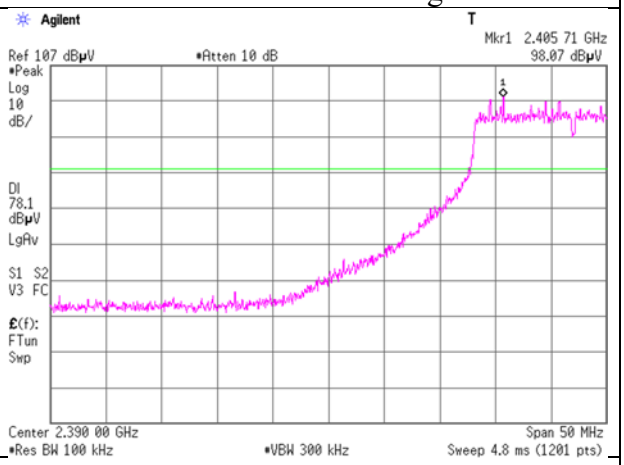
Horizontal

Restricted-band band-edge Plot



Trace Green : Peak Plot
Trace Purple : Average Plot

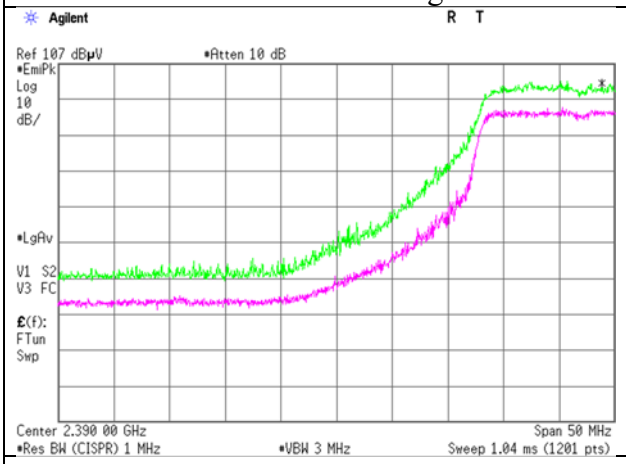
Authorized-band band-edge Plot



20dBc Plot

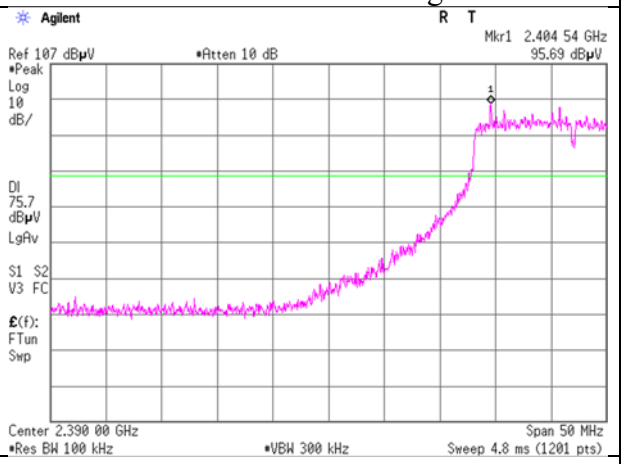
Vertical

Restricted-band band-edge Plot



Trace Green : Peak Plot
Trace Purple : Average Plot

Authorized-band band-edge Plot



20dBc Plot

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

Radiated Spurious Emission

Report No.	12517639S-A-R1		
Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	3	3	3
Date	October 18, 2018	October 18, 2018	October 19, 2018
Temperature / Humidity	23 deg. C / 44 % RH	24 deg. C / 40 % RH	22 deg. C / 51 % RH
Engineer	Makoto Hosaka	Makoto Hosaka	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.	2488.647	PK	61.88	27.63	14.26	43.72	2.28	62.33	73.90	11.5	155	132	*1)
Hori.	2498.945	PK	61.47	27.58	14.27	43.72	2.28	61.88	73.90	12.0	153	162	*1)
Hori.	4874.000	PK	49.04	31.40	6.52	43.90	2.28	45.34	73.90	28.5	100	0	
Hori.	4976.454	PK	57.62	31.68	6.62	43.89	2.28	54.31	73.90	19.5	129	306	*1)
Hori.	4998.554	PK	57.71	31.86	6.63	43.89	2.28	54.59	73.90	19.3	137	307	*1)
Hori.	7311.000	PK	46.77	36.99	8.40	43.66	2.28	50.78	73.90	23.1	100	0	
Hori.	9748.000	PK	47.92	38.92	9.22	43.57	2.28	54.77	73.90	19.1	100	0	
Hori.	2488.647	AV	49.98	27.63	14.26	43.72	2.28	50.43	53.90	**3.4**	155	132	*1)
Hori.	2498.945	AV	48.89	27.58	14.27	43.72	2.28	49.30	53.90	4.6	153	162	*1)
Hori.	4976.454	AV	44.30	31.68	6.62	43.89	2.28	40.99	53.90	12.9	129	306	*1)
Hori.	4998.554	AV	44.34	31.86	6.63	43.89	2.28	41.22	53.90	12.6	137	307	*1)
Vert.	2488.684	PK	61.38	27.63	14.26	43.72	2.28	61.83	73.90	12.0	221	100	*1)
Vert.	2498.957	PK	61.32	27.58	14.27	43.72	2.28	61.73	73.90	12.1	222	101	*1)
Vert.	4874.000	PK	49.04	31.40	6.52	43.90	2.28	45.34	73.90	28.5	100	0	
Vert.	4976.487	PK	55.48	31.68	6.62	43.89	2.28	52.17	73.90	21.7	228	308	*1)
Vert.	4998.443	PK	55.03	31.86	6.63	43.89	2.28	51.91	73.90	21.9	229	317	*1)
Vert.	7311.000	PK	47.64	36.99	8.40	43.66	2.28	51.65	73.90	22.2	144	0	
Vert.	9748.000	PK	48.26	38.92	9.22	43.57	2.28	55.11	73.90	18.7	129	0	
Vert.	2488.684	AV	48.97	27.63	14.26	43.72	2.28	49.42	53.90	4.4	221	100	*1)
Vert.	2498.957	AV	48.83	27.58	14.27	43.72	2.28	49.24	53.90	4.6	222	101	*1)
Vert.	4976.487	AV	42.88	31.68	6.62	43.89	2.28	39.57	53.90	14.3	228	308	*1)
Vert.	4998.443	AV	42.91	31.86	6.63	43.89	2.28	39.79	53.90	14.1	229	317	*1)

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Distance factor : 1 GHz - 13 GHz : 20log (3.90 m / 3.0 m) = 2.28 dB
13 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB
*1) Not Leakage Power (out of band emission)

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	38.00	31.40	6.52	43.90	0.34	2.28	34.64	53.90	19.3	
Hori.	7311.000	AV	37.12	36.99	8.40	43.66	0.34	2.28	41.47	53.90	12.4	
Hori.	9748.000	AV	37.99	38.92	9.22	43.57	0.34	2.28	45.18	53.90	**8.7**	
Vert.	4874.000	AV	38.25	31.40	6.52	43.90	0.34	2.28	34.89	53.90	19.0	
Vert.	7311.000	AV	36.88	36.99	8.40	43.66	0.34	2.28	41.23	53.90	12.7	
Vert.	9748.000	AV	36.96	38.92	9.22	43.57	0.34	2.28	44.15	53.90	9.8	

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 (3.90 m / 3.0 m) = 2.28 dB
13 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB
Duty factor refer to "Duty factor Calculation chart" sheet.
*2) 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.	2437.000	PK	98.24	27.82	14.20	43.71	2.28	98.83	-	-	Carrier
Vert.	2437.000	PK	95.62	27.82	14.20	43.71	2.28	96.21	-	-	Carrier

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Distance factor : 1 GHz - 13 GHz : 20log (3.90 m / 3.0 m) = 2.28 dB
13 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

Radiated Spurious Emission

Report No.	12517639S-A-R1		
Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	3	3	3
Date	October 18, 2018	October 18, 2018	October 19, 2018
Temperature / Humidity	23 deg. C / 44 % RH	24 deg. C / 40 % RH	22 deg. C / 51 % RH
Engineer	Makoto Hosaka	Makoto Hosaka	Shiro Kobayashi
	(1 GHz – 2.8 GHz)	(2.8 GHz – 13 GHz)	(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.	2483.500	PK	63.53	27.65	14.26	43.72	2.28	64.00	73.90	9.9	100	0	
Hori.	2488.344	PK	62.35	27.63	14.26	43.72	2.28	62.80	73.90	11.1	152	132	*1)
Hori.	2499.324	PK	62.08	27.58	14.27	43.72	2.28	62.49	73.90	11.4	156	157	*1)
Hori.	4924.000	PK	48.67	31.37	6.54	43.90	2.28	44.96	73.90	28.9	100	0	
Hori.	4976.208	PK	56.95	31.67	6.62	43.89	2.28	53.63	73.90	20.2	131	305	*1)
Hori.	4998.245	PK	57.95	31.86	6.63	43.89	2.28	54.83	73.90	19.0	134	304	*1)
Hori.	7386.000	PK	47.85	37.01	8.46	43.65	2.28	51.95	73.90	21.9	155	0	
Hori.	9848.000	PK	46.33	39.12	9.23	43.52	2.28	53.44	73.90	20.4	100	0	
Hori.	2488.344	AV	49.47	27.63	14.26	43.72	2.28	49.92	53.90	**3.9**	152	132	*1)
Hori.	2499.324	AV	49.17	27.58	14.27	43.72	2.28	49.58	53.90	4.3	156	157	*1)
Hori.	4976.208	AV	43.85	31.67	6.62	43.89	2.28	40.53	53.90	13.3	131	305	*1)
Hori.	4998.245	AV	44.41	31.86	6.63	43.89	2.28	41.29	53.90	12.6	134	304	*1)
Vert.	2483.500	PK	59.62	27.65	14.26	43.72	2.28	60.09	73.90	13.8	120	256	
Vert.	2488.459	PK	61.29	27.63	14.26	43.72	2.28	61.74	73.90	12.1	214	100	*1)
Vert.	2499.178	PK	61.45	27.58	14.27	43.72	2.28	61.86	73.90	12.0	225	101	*1)
Vert.	4924.000	PK	47.95	31.37	6.54	43.90	2.28	44.24	73.90	29.6	100	0	
Vert.	4976.360	PK	55.03	31.68	6.62	43.89	2.28	51.72	73.90	22.1	225	305	*1)
Vert.	4998.243	PK	55.37	31.86	6.63	43.89	2.28	52.25	73.90	21.6	227	308	*1)
Vert.	7386.000	PK	45.37	37.01	8.46	43.65	2.28	49.47	73.90	24.4	100	0	
Vert.	9848.000	PK	46.83	39.12	9.23	43.52	2.28	53.94	73.90	19.9	100	0	
Vert.	2488.459	AV	49.12	27.63	14.26	43.72	2.28	49.57	53.90	4.3	214	100	*1)
Vert.	2499.178	AV	49.17	27.58	14.27	43.72	2.28	49.58	53.90	4.3	225	101	*1)
Vert.	4976.360	AV	42.37	31.68	6.62	43.89	2.28	39.06	53.90	14.8	225	305	*1)
Vert.	4998.243	AV	42.94	31.86	6.63	43.89	2.28	39.82	53.90	14.0	227	308	*1)

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Distance factor : 1 GHz - 13 GHz : 20log (3.90 m / 3.0 m) = 2.28 dB
13 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB
*1) Not Leakage Power (out of band emission)

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	48.77	27.65	14.26	43.72	0.34	2.28	49.58	53.90	**4.3**	*2)
Hori.	4924.000	AV	38.05	31.37	6.54	43.90	0.34	2.28	34.68	53.90	19.2	
Hori.	7386.000	AV	37.83	37.01	8.46	43.65	0.34	2.28	42.27	53.90	11.6	
Hori.	9848.000	AV	36.49	39.12	9.23	43.52	0.34	2.28	43.94	53.90	10.0	
Vert.	2483.500	AV	46.27	27.65	14.26	43.72	0.34	2.28	47.08	53.90	6.8	*2)
Vert.	4924.000	AV	37.93	31.37	6.54	43.90	0.34	2.28	34.56	53.90	19.3	
Vert.	7386.000	AV	36.70	37.01	8.46	43.65	0.34	2.28	41.14	53.90	12.8	
Vert.	9848.000	AV	36.67	39.12	9.23	43.52	0.34	2.28	44.12	53.90	9.8	

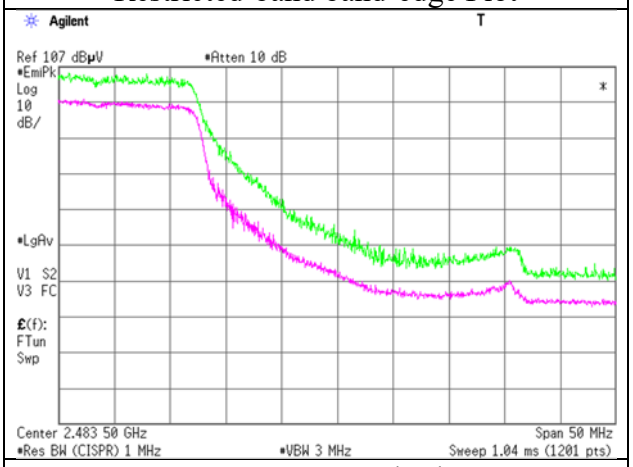
Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Duty factor + Distance factor
Distance factor : 1 GHz - 13 GHz : 20log (3.90 m / 3.0 m) = 2.28 dB
13 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB
Duty factor refer to "Duty factor Calculation chart" sheet.
*2) Not out of band emission (Leakage Power)

Radiated Spurious Emission

Report No.	12517639S-A-R1		
Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	3	3	3
Date	October 18, 2018	October 18, 2018	October 19, 2018
Temperature / Humidity	23 deg. C / 44 % RH	24 deg. C / 40 % RH	22 deg. C / 51 % RH
Engineer	Makoto Hosaka	Makoto Hosaka	Shiro Kobayashi
	(1 GHz – 2.8 GHz)	(2.8 GHz – 13 GHz)	(13 GHz – 26.5 GHz)
Mode	Tx 11n-20 2462 MHz		

Horizontal

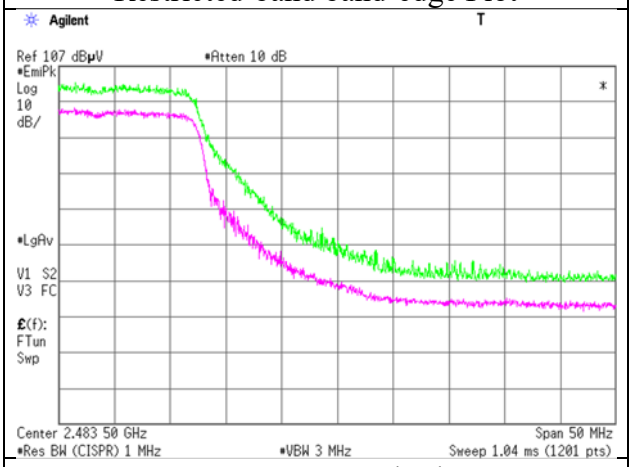
Restricted-band band-edge Plot



Trace Green : Peak Plot
Trace Purple : Average Plot

Vertical

Restricted-band band-edge Plot



Trace Green : Peak Plot
Trace Purple : Average Plot

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

Radiated Spurious Emission

Report No.	12517639S-A-R1		
Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	3	3	3
Date	October 18, 2018	October 18, 2018	October 19, 2018
Temperature / Humidity	23 deg. C / 44 % RH	24 deg. C / 40 % RH	22 deg. C / 51 % RH
Engineer	Makoto Hosaka	Makoto Hosaka	Shiro Kobayashi
	(1 GHz – 2.8 GHz)	(2.8 GHz – 13 GHz)	(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.	2390.000	PK	67.11	27.86	14.17	43.71	2.28	67.71	73.90	6.1	137	73	
Hori.	2488.706	PK	63.49	27.63	14.26	43.72	2.28	63.94	73.90	9.9	231	124	*1)
Hori.	2499.187	PK	63.10	27.58	14.27	43.72	2.28	63.51	73.90	10.3	265	127	*1)
Hori.	4844.000	PK	48.24	31.49	6.52	43.90	2.28	44.63	73.90	29.2	153	1	
Hori.	4976.397	PK	57.16	31.68	6.62	43.89	2.28	53.85	73.90	20.0	120	305	*1)
Hori.	4998.563	PK	57.82	31.86	6.63	43.89	2.28	54.70	73.90	19.2	148	307	*1)
Hori.	7266.000	PK	46.42	36.91	8.37	43.66	2.28	50.32	73.90	23.5	100	0	
Hori.	9688.000	PK	48.82	38.79	9.22	43.60	2.28	55.51	73.90	18.3	100	0	
Hori.	2488.706	AV	51.81	27.63	14.26	43.72	2.28	52.26	53.90	**1.6**	231	124	*1)
Hori.	2499.187	AV	51.43	27.58	14.27	43.72	2.28	51.84	53.90	2.0	265	127	*1)
Hori.	4976.397	AV	44.23	31.68	6.62	43.89	2.28	40.92	53.90	12.9	120	305	*1)
Hori.	4998.563	AV	44.43	31.86	6.63	43.89	2.28	41.31	53.90	12.5	148	307	*1)
Vert.	2390.000	PK	65.16	27.86	14.17	43.71	2.28	65.76	73.90	8.1	144	139	
Vert.	2488.347	PK	61.19	27.63	14.26	43.72	2.28	61.64	73.90	12.2	212	98	*1)
Vert.	2499.256	PK	60.53	27.58	14.27	43.72	2.28	60.94	73.90	12.9	226	97	*1)
Vert.	4844.000	PK	48.23	31.49	6.52	43.90	2.28	44.62	73.90	29.2	132	0	
Vert.	4976.312	PK	56.55	31.68	6.62	43.89	2.28	53.24	73.90	20.6	149	317	*1)
Vert.	4998.685	PK	56.49	31.86	6.63	43.89	2.28	53.37	73.90	20.5	179	310	*1)
Vert.	7266.000	PK	46.93	36.91	8.37	43.66	2.28	50.83	73.90	23.0	100	0	
Vert.	9688.000	PK	48.69	38.79	9.22	43.60	2.28	55.38	73.90	18.5	100	0	
Vert.	2488.347	AV	49.57	27.63	14.26	43.72	2.28	50.02	53.90	3.8	212	98	*1)
Vert.	2499.256	AV	48.41	27.58	14.27	43.72	2.28	48.82	53.90	5.0	226	97	*1)
Vert.	4976.312	AV	42.83	31.68	6.62	43.89	2.28	39.52	53.90	14.3	149	317	*1)
Vert.	4998.685	AV	43.70	31.86	6.63	43.89	2.28	40.58	53.90	13.3	179	310	*1)

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Distance factor : 1 GHz - 13 GHz : 20log (3.90 m / 3.0 m) = 2.28 dB
13 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB
*1) Not Leakage Power (out of band emission)

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	50.69	27.86	14.17	43.71	0.64	2.28	51.93	53.90	**2.0**	*2)
Hori.	4844.000	AV	38.14	31.49	6.52	43.90	0.64	2.28	35.17	53.90	18.7	
Hori.	7266.000	AV	37.16	36.91	8.37	43.66	0.64	2.28	41.70	53.90	12.2	
Hori.	9688.000	AV	38.30	38.79	9.22	43.60	0.64	2.28	45.63	53.90	8.3	
Vert.	2390.000	AV	49.72	27.86	14.17	43.71	0.64	2.28	50.96	53.90	2.9	*2)
Vert.	4844.000	AV	37.84	31.49	6.52	43.90	0.64	2.28	34.87	53.90	19.0	
Vert.	7266.000	AV	37.10	36.91	8.37	43.66	0.64	2.28	41.64	53.90	12.3	
Vert.	9688.000	AV	37.38	38.79	9.22	43.60	0.64	2.28	44.71	53.90	9.2	

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 (3.90 m / 3.0 m) = 2.28 dB
13 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB
Duty factor refer to "Duty factor Calculation chart" sheet.
*2) 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	97.48	27.83	14.19	43.71	2.28	98.07	-	-	Carrier
Hori.	2400.000	PK	66.12	27.86	14.18	43.71	2.28	66.73	78.07	11.3	
Vert.	2422.000	PK	95.06	27.83	14.19	43.71	2.28	95.65	-	-	Carrier
Vert.	2400.000	PK	63.86	27.86	14.18	43.71	2.28	64.47	75.65	11.2	

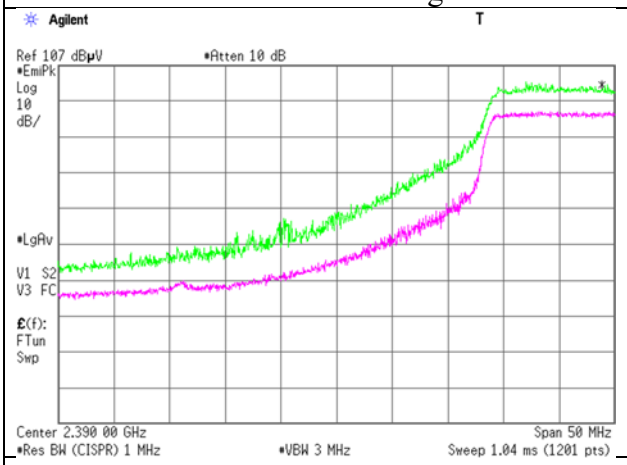
Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Distance factor : 1 GHz - 13 GHz : 20log (3.90 m / 3.0 m) = 2.28 dB
13 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

Radiated Spurious Emission

Report No.	12517639S-A-R1		
Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	3	3	3
Date	October 18, 2018	October 18, 2018	October 19, 2018
Temperature / Humidity	23 deg. C / 44 % RH	24 deg. C / 40 % RH	22 deg. C / 51 % RH
Engineer	Makoto Hosaka (1 GHz – 2.8 GHz)	Makoto Hosaka (2.8 GHz – 13 GHz)	Shiro Kobayashi (13 GHz – 26.5 GHz)
Mode	Tx 11n-40 2422 MHz		

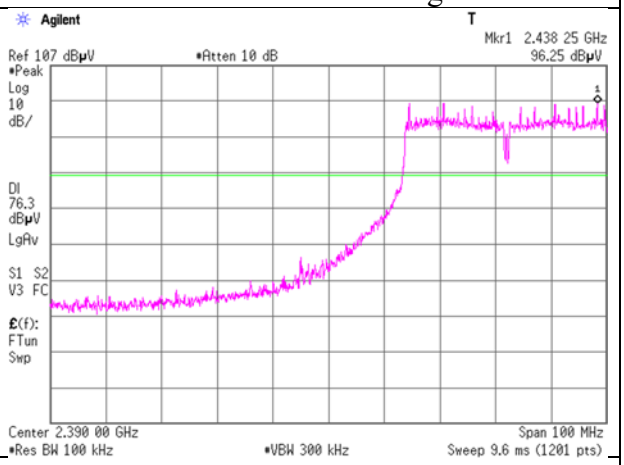
Horizontal

Restricted-band band-edge Plot



Trace Green : Peak Plot
Trace Purple : Average Plot

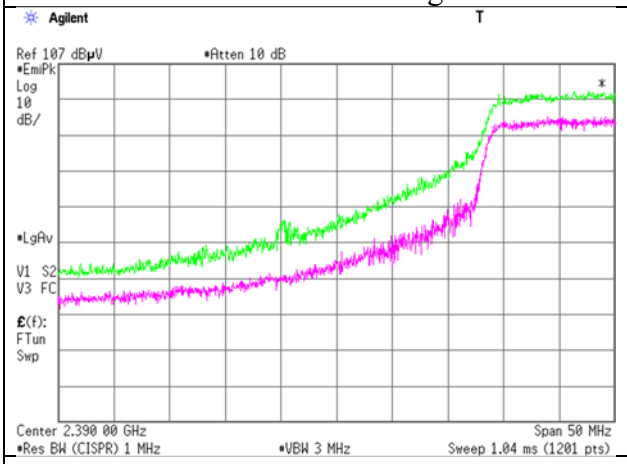
Authorized-band band-edge Plot



20dBc Plot

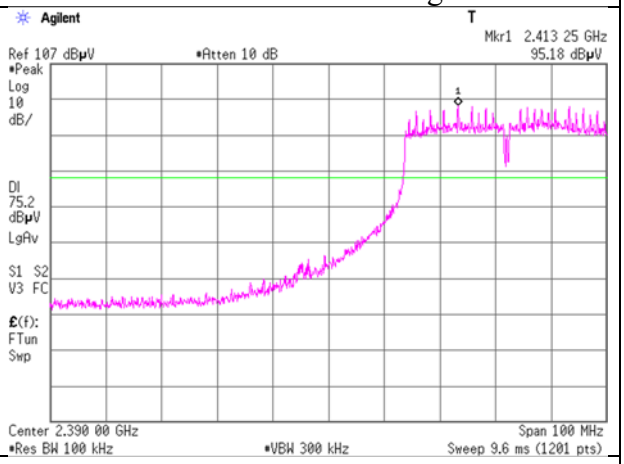
Vertical

Restricted-band band-edge Plot



Trace Green : Peak Plot
Trace Purple : Average Plot

Authorized-band band-edge Plot



20dBc Plot

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

Radiated Spurious Emission

Report No.	12517639S-A-R1		
Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	3	3	3
Date	October 18, 2018	October 18, 2018	October 19, 2018
Temperature / Humidity	23 deg. C / 44 % RH	24 deg. C / 40 % RH	22 deg. C / 51 % RH
Engineer	Makoto Hosaka	Makoto Hosaka	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.	2488.415	PK	62.60	27.63	14.26	43.72	2.28	63.05	73.90	10.8	234	99	*1)
Hori.	2498.920	PK	61.25	27.58	14.27	43.72	2.28	61.66	73.90	12.2	232	132	*1)
Hori.	4874.000	PK	49.11	31.40	6.52	43.90	2.28	45.41	73.90	28.4	150	0	
Hori.	4976.339	PK	58.02	31.68	6.62	43.89	2.28	54.71	73.90	19.1	219	343	*1)
Hori.	4998.332	PK	57.43	31.86	6.63	43.89	2.28	54.31	73.90	19.5	217	345	*1)
Hori.	7311.000	PK	47.66	36.99	8.40	43.66	2.28	51.67	73.90	22.2	100	0	
Hori.	9748.000	PK	48.79	38.92	9.22	43.57	2.28	55.64	73.90	18.2	100	0	
Hori.	2488.415	AV	50.58	27.63	14.26	43.72	2.28	51.03	53.90	**2.8**	234	99	*1)
Hori.	2498.920	AV	49.83	27.58	14.27	43.72	2.28	50.24	53.90	3.6	232	132	*1)
Hori.	4976.339	AV	45.06	31.68	6.62	43.89	2.28	41.75	53.90	12.1	219	343	*1)
Hori.	4998.332	AV	43.98	31.86	6.63	43.89	2.28	40.86	53.90	13.0	217	345	*1)
Vert.	2488.415	PK	60.48	27.63	14.26	43.72	2.28	60.93	73.90	12.9	208	99	*1)
Vert.	2498.648	PK	60.46	27.59	14.27	43.72	2.28	60.88	73.90	13.0	222	98	*1)
Vert.	4874.000	PK	48.44	31.40	6.52	43.90	2.28	44.74	73.90	29.1	144	22	
Vert.	4976.339	PK	56.01	31.68	6.62	43.89	2.28	52.70	73.90	21.2	166	319	*1)
Vert.	4998.196	PK	54.87	31.86	6.63	43.89	2.28	51.75	73.90	22.1	164	320	*1)
Vert.	7311.000	PK	46.32	36.99	8.40	43.66	2.28	50.33	73.90	23.5	100	0	
Vert.	9748.000	PK	46.89	38.92	9.22	43.57	2.28	53.74	73.90	20.1	100	0	
Vert.	2488.415	AV	48.57	27.63	14.26	43.72	2.28	49.02	53.90	4.8	208	99	*1)
Vert.	2498.648	AV	49.17	27.59	14.27	43.72	2.28	49.59	53.90	4.3	222	98	*1)
Vert.	4976.339	AV	43.30	31.68	6.62	43.89	2.28	39.99	53.90	13.9	166	319	*1)
Vert.	4998.196	AV	43.12	31.86	6.63	43.89	2.28	40.00	53.90	13.9	164	320	*1)

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Distance factor : 1 GHz - 13 GHz : 20log (3.90 m / 3.0 m) = 2.28 dB
13 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB
*1) Not Leakage Power (out of band emission)

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	38.51	31.40	6.52	43.90	0.64	2.28	35.45	53.90	18.5	
Hori.	7311.000	AV	37.07	36.99	8.40	43.66	0.64	2.28	41.72	53.90	12.2	
Hori.	9748.000	AV	37.70	38.92	9.22	43.57	0.64	2.28	45.19	53.90	**8.7**	
Vert.	4874.000	AV	38.55	31.40	6.52	43.90	0.64	2.28	35.49	53.90	18.4	
Vert.	7311.000	AV	36.88	36.99	8.40	43.66	0.64	2.28	41.53	53.90	12.4	
Vert.	9748.000	AV	37.51	38.92	9.22	43.57	0.64	2.28	45.00	53.90	8.9	

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 (3.90 m / 3.0 m) = 2.28 dB
13 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB
Duty factor refer to "Duty factor Calculation chart" sheet.
*2) Not out of band emission (Leakage Power)

Radiated Spurious Emission

Report No.	12517639S-A-R1		
Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	3	3	3
Date	October 18, 2018	October 18, 2018	October 19, 2018
Temperature / Humidity	23 deg. C / 44 % RH	24 deg. C / 40 % RH	22 deg. C / 51 % RH
Engineer	Makoto Hosaka	Makoto Hosaka	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.	2483.500	PK	67.92	27.65	14.26	43.72	2.28	68.39	73.90	5.5	134	71	
Hori.	2488.080	PK	68.89	27.63	14.26	43.72	2.28	69.34	73.90	4.5	235	138	*1)
Hori.	2499.165	PK	67.30	27.58	14.27	43.72	2.28	67.71	73.90	6.1	234	143	*1)
Hori.	4904.000	PK	48.42	31.30	6.54	43.90	2.28	44.64	73.90	29.2	100	0	
Hori.	4976.125	PK	55.27	31.67	6.62	43.89	2.28	51.95	73.90	21.9	152	331	*1)
Hori.	4998.230	PK	56.60	31.86	6.63	43.89	2.28	53.48	73.90	20.4	153	334	*1)
Hori.	7356.000	PK	47.47	37.04	8.44	43.66	2.28	51.57	73.90	22.3	100	0	
Hori.	9808.000	PK	47.41	38.95	9.22	43.54	2.28	54.32	73.90	19.5	122	79	
Hori.	2488.080	AV	52.62	27.63	14.26	43.72	2.28	53.07	53.90	**0.8**	235	138	*1)
Hori.	2499.165	AV	51.57	27.58	14.27	43.72	2.28	51.98	53.90	1.9	234	143	*1)
Hori.	4976.125	AV	42.28	31.67	6.62	43.89	2.28	38.96	53.90	14.9	152	331	*1)
Hori.	4998.230	AV	44.56	31.86	6.63	43.89	2.28	41.44	53.90	12.4	153	334	*1)
Vert.	2483.500	PK	65.49	27.65	14.26	43.72	2.28	65.96	73.90	7.9	128	100	
Vert.	2488.080	PK	63.23	27.63	14.26	43.72	2.28	63.68	73.90	10.2	233	102	*1)
Vert.	2499.243	PK	61.74	27.58	14.27	43.72	2.28	62.15	73.90	11.7	221	101	*1)
Vert.	4904.000	PK	48.31	31.30	6.54	43.90	2.28	44.53	73.90	29.3	100	32	
Vert.	4976.225	PK	56.30	31.68	6.62	43.89	2.28	52.99	73.90	20.9	147	317	*1)
Vert.	4998.376	PK	55.68	31.86	6.63	43.89	2.28	52.56	73.90	21.3	188	311	*1)
Vert.	7356.000	PK	46.93	37.04	8.44	43.66	2.28	51.03	73.90	22.8	100	0	
Vert.	9808.000	PK	45.91	38.95	9.22	43.54	2.28	52.82	73.90	21.0	100	0	
Vert.	2488.080	AV	49.36	27.63	14.26	43.72	2.28	49.81	53.90	4.0	233	102	*1)
Vert.	2499.243	AV	49.38	27.58	14.27	43.72	2.28	49.79	53.90	4.1	221	101	*1)
Vert.	4976.225	AV	43.23	31.68	6.62	43.89	2.28	39.92	53.90	13.9	147	317	*1)
Vert.	4998.376	AV	42.76	31.86	6.63	43.89	2.28	39.64	53.90	14.2	188	311	*1)

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Distance factor : 1 GHz - 13 GHz : 20log (3.90 m / 3.0 m) = 2.28 dB
13 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB
*1) Not Leakage Power (out of band emission)

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	51.31	27.65	14.26	43.72	0.64	2.28	52.42	53.90	**1.5**	*2)
Hori.	4904.000	AV	37.57	31.30	6.54	43.90	0.64	2.28	34.43	53.90	19.5	
Hori.	7356.000	AV	37.00	37.04	8.44	43.66	0.64	2.28	41.74	53.90	12.2	
Hori.	9808.000	AV	37.20	38.95	9.22	43.54	0.64	2.28	44.75	53.90	9.2	
Vert.	2483.500	AV	49.40	27.65	14.26	43.72	0.64	2.28	50.51	53.90	3.4	*2)
Vert.	4904.000	AV	38.62	31.30	6.54	43.90	0.64	2.28	35.48	53.90	18.4	
Vert.	7356.000	AV	36.65	37.04	8.44	43.66	0.64	2.28	41.39	53.90	12.5	
Vert.	9808.000	AV	36.11	38.95	9.22	43.54	0.64	2.28	43.66	53.90	10.2	

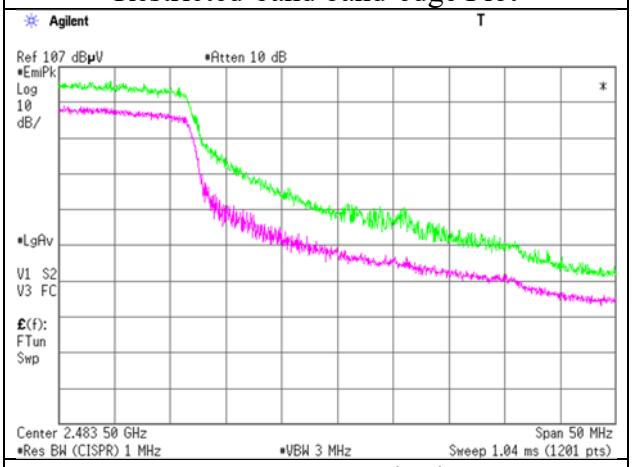
Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Duty factor + Distance factor
Distance factor : 1 GHz - 13 GHz : 20log (3.90 m / 3.0 m) = 2.28 dB
13 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB
Duty factor refer to "Duty factor Calculation chart" sheet.
*2) Not out of band emission (Leakage Power)

Radiated Spurious Emission

Report No.	12517639S-A-R1		
Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	3	3	3
Date	October 18, 2018	October 18, 2018	October 19, 2018
Temperature / Humidity	23 deg. C / 44 % RH	24 deg. C / 40 % RH	22 deg. C / 51 % RH
Engineer	Makoto Hosaka	Makoto Hosaka	Shiro Kobayashi
	(1 GHz – 2.8 GHz)	(2.8 GHz – 13 GHz)	(13 GHz – 26.5 GHz)
Mode	Tx 11n-40 2452 MHz		

Horizontal

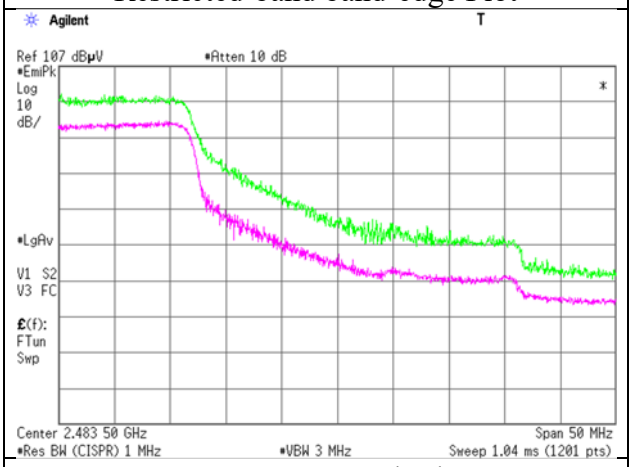
Restricted-band band-edge Plot



Trace Green : Peak Plot
Trace Purple : Average Plot

Vertical

Restricted-band band-edge Plot

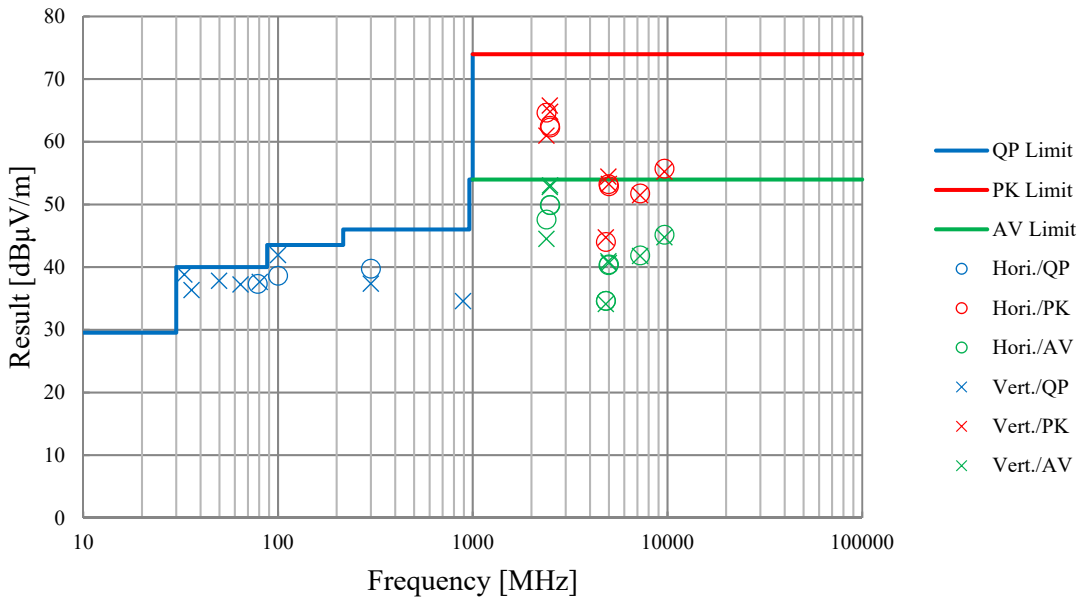


Trace Green : Peak Plot
Trace Purple : Average Plot

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

Radiated Spurious Emission
(Plot data, Worst case)

Report No.	12517639S-A-R1		
Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	1	3	3
Date	November 4, 2018	October 18, 2018	October 19, 2018
Temperature / Humidity	22 deg. C / 44 % RH	24 deg. C / 40 % RH	22 deg. C / 51 % RH
Engineer	Kazutaka Takeyama	Makoto Hosaka	Shiro Kobayashi
	(30 MHz – 1000 MHz)	(1 GHz – 13 GHz)	(13 GHz – 26.5 GHz)
Mode	Tx 11n-20 2412 MHz		



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

APPENDIX 2: Test instruments

Test Instruments (1/2)

Local ID	Test Name	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Calibration Due Date	Calibration Interval (Month)
SAT3-10	CE	144960	Attenuator	JFW	50HF-003N	-	2018/8/23	2019/8/31	12
SCC-C9/C10/SRSE-03	CE	145036	Coaxial Cable&RF Selector	Suhner/Suhner/TOYO	RG223U/141PE/NS4906	-/0901-271(RF Selector)	2018/4/9	2019/4/30	12
SLS-02	CE	145539	LISN	Rohde & Schwarz	ENV216	100512	2018/2/26	2019/2/28	12
SLS-04	CE	145541	LISN	Rohde & Schwarz	ENV216	100514	2018/2/27	2019/2/28	12
STM-03	CE	146188	Terminator	TME	CT-01 BP	-	2017/12/14	2018/12/31	12
STR-08	CE	150463	Test Receiver	Rohde & Schwarz	ESW44	101581	2017/11/24	2018/11/30	12
KJM-02	CE,RE	146432	Measure	TAJIMA	GL19-55	-	-	-	-
SOS-06	CE	146294	Humidity Indicator	A&D	AD-5681	4062118	2017/12/21	2018/12/31	12
STS-03	CE,RE	146210	Digital Hitester	HIOKI	3805-50	80997823	2018/10/16	2019/10/31	12
COTS-SEMI-1	RE	144865	EMI Software	TSJ	TEPTO-DV(RE,CE,RFI,MF)	-	-	-	-
KAT6-04	RE	144899	Attenuator	Inmet	18N-6dB	-	2017/12/14	2018/12/31	12
KJM-09	RE	145929	Measure	KOMELON	KMC-36	-	-	-	-
SAEC-01(NSA)	RE	145597	Semi-Anechoic Chamber	TDK	SAEC-01(NSA)	1	2018/5/29	2019/5/31	12
SAEC-03(SVSWR)	RE	145566	Semi-Anechoic Chamber	TDK	SAEC-03(SVSWR)	3	2018/7/17	2019/7/31	12
SAF-01	RE	145003	Pre Amplifier	SONOMA	310N	290211	2018/2/16	2019/2/28	12
SAF-06	RE	145005	Pre Amplifier	Toyo Corporation	TPA0118-36	1440491	2018/9/14	2019/9/30	12
SAF-08	RE	145007	Pre Amplifier	Toyo Corporation	HAP18-26W	19	2018/3/27	2019/3/31	12
SAT10-06	RE	145137	Attenuator	AGILENT	8493C-010	74865	2017/11/22	2018/11/30	12
SAT3-09	RE	144959	Attenuator	JFW	50HF-003N	-	2018/8/23	2019/8/31	12
SBA-01	RE	145161	Biconical Antenna	Schwarzbeck	BBA9106	91032664	2018/6/5	2019/6/30	12
SCC-A1/A3/A5/A7/A8/A13/SRSE-01	RE	144967	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhner/Suhner/Suhner/Suhner/TOYO	8D2W/12DSFA/141PE/141PE/141PE/141P	-/0901-269(RF Selector)	2018/4/9	2019/4/30	12
SCC-A2/A4/A6/A7/A8/A13/SRSE-01	RE	144968	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhner/Suhner/Suhner/Suhner/TOYO	8D2W/12DSFA/141PE/141PE/141PE/141P	-/0901-269(RF Selector)	2018/4/9	2019/4/30	12
SCC-C6/C7/C8/C10/SRSE-03	RE	145034	Coaxial Cable&RF Selector	Suhner/Fujikura/Suhner/Suhner/TOYO	141PE/12DSFA/141PE/141PE/NS4906	-/0901-271(RF Selector)	2018/4/9	2019/4/30	12
SCC-G06	RE	145173	Coaxial Cable	Junkosha	J12J102207-00	MAY-23-16-091	2018/6/1	2019/6/30	12
SCC-G23	RE	145168	Coaxial Cable	Suhner	SUCOFLEX 104	297342/4	2018/5/11	2019/5/31	12
SCC-G33	RE	145184	Coaxial Cable	Junkosha	MWX241-01000KMSKMS	-	2018/4/20	2019/4/30	12

Test Instruments (2/2)

Local ID	Test Name	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Calibration Due Date	Calibration Interval (Month)
SCC-G40	RE	166491	Coaxial Cable	Junkosha	MWX221-01000NFSNMS/B	1612S005	2018/1/29	2019/1/31	12
SCC-G41	RE	151617	Coaxial Cable	Junkosha	MWX221-01000NFSNMS/B	1612S006	2018/1/29	2019/1/31	12
SCC-G45	RE	168301	Coaxial Cable	HUBER+SUNER	SUCOFLEX 102 E	800137/2EA	2018/3/28	2019/3/31	12
SFL-02	RE	145301	Highpass Filter	MICRO-TRONICS	HPM50111	51	2017/11/16	2018/11/30	12
SFL-03	RE	145377	Highpass Filter	MICRO-TRONICS	HPM50112	28	2017/11/16	2018/11/30	12
SFL-18	RE	145305	Highpass Filter	MICRO-TRONICS	HPM50111	119	2018/4/20	2019/4/30	12
SHA-03	RE	145501	Horn Antenna	Schwarzbeck	BBHA9120D	9120D-739	2018/7/23	2019/7/31	12
SHA-04	RE	145512	Horn Antenna	ETS LINDGREN	Sep-60	LM3640	2018/7/23	2019/7/31	12
SLA-05	RE	145527	Logperiodic Antenna	Schwarzbeck	VUSLP9111B	193	2018/6/5	2019/6/30	12
SOS-01	RE	146316	Humidity Indicator	A&D	AD-5681	4062555	2018/10/25	2019/10/31	12
SOS-05	RE	146293	Humidity Indicator	A&D	AD-5681	4062518	2018/10/25	2019/10/31	12
SRENT-15	RE	160899	Spectrum Analyzer	AGILENT (KEYSIGHT)	E4440A	MY46185516	2017/12/26	2018/12/31	12
SSA-02	RE	145800	Spectrum Analyzer	AGILENT	E4448A	MY48250106	2018/3/5	2019/3/31	12
SSA-03	RE	145801	Spectrum Analyzer	AGILENT	E4448A	MY48250152	2018/8/30	2019/8/31	12
STR-01	RE	145790	Test Receiver	Rohde & Schwarz	ESU40	100093	2018/4/13	2019/4/30	12
STS-01	RE	145792	Digital Hitester	HIOKI	3805-50	80997812	2018/10/16	2019/10/31	12
STS-02	RE	145793	Digital Hitester	HIOKI	3805-50	80997819	2018/3/8	2019/3/31	12
STS-04	RE	146211	Digital Hitester	HIOKI	3805-50	80997827	2018/3/8	2019/3/31	12

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

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

Test item: **CE: Conducted Emission test**
RE: Radiated Emission test