



RADIO TEST REPORT

Test Report No. : 12423101S-C

Applicant : Nintendo Co., Ltd.
Type of Equipment : Game Console
Model No. : HAC-001(-01)
FCC ID : BKEHAC001
Test regulation : **FCC Part 15 Subpart C: 2019**
For Permissive Change
(Radiated Spurious Emission tests only)
* Bluetooth BDR/EDR part
Test Result : **Complied (Refer to SECTION 3.2)**

1. This test report shall not be reproduced in full or partial, without the written approval of UL Japan, Inc.
2. The results in this report apply only to the sample tested.
3. This sample tested is in compliance with the 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. The information provided from the customer for this report is identified in SECTION 1.

Date of test: August 8 to 26, 2018

Representative test engineer:

M. Hosaka

Makoto Hosaka
Engineer

Consumer Technology Division

Approved by:

A. Hayashi

Akio Hayashi
Leader

Consumer Technology Division



JAB
Testing
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".

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Shonan EMC Lab.

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CONTENTS	PAGE
SECTION 1: Customer information.....	4
SECTION 2: Equipment under test (E.U.T.).....	4
SECTION 3: Test specification, procedures & results.....	6
SECTION 4: Operation of E.U.T. during testing.....	8
SECTION 5: Radiated Spurious Emission	10
APPENDIX 1: Test data	12
Radiated Spurious Emission	14
APPENDIX 2: Test instruments	25
APPENDIX 3: Photographs of test setup	27
Radiated Spurious Emission	27
Pre-check of Worst Case Position.....	28

SECTION 1: Customer information

Company Name	:	Nintendo Co., Ltd.
Address	:	11-1 Hokotate-cho, Kamitoba, Minami-ku, Kyoto 601-8501, Japan
Telephone Number	:	+81 75 662 9600
Facsimile Number	:	+81 75 662 9624
Contact Person	:	Kazuya Kuramoto

The information provided from the customer is as follows;

- Applicant, Type of Equipment, Model No., FCC ID on the cover and other 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	:	Game Console
Model No.	:	HAC-001(-01)
Serial No.	:	Refer to SECTION 4.2
Rating	:	AC 100 V – 240 V, 50 Hz/60 Hz AC Adapter output: 15 V, 2.6 A Internal battery: 3.7 V
Receipt Date of Sample (Information from test lab.)	:	July 19, 2018
Country of Mass-production	:	China
Condition of EUT	:	Production prototype (Not for Sale: This sample is equivalent to mass-produced items.)
Modification of EUT	:	No Modification by the test lab.

2.2 Product Description

Model: HAC-001(-01) (referred to as the EUT in this report) is a Game Console.

General Specification

Clock frequency(ies) in the system	:	37.4 MHz
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Radio Specification

Radio Type	: Transceiver
Frequency of Operation	: Wireless LAN part: 2412 MHz - 2472 MHz, W52: 5180 MHz -5240 MHz, W53: 5260 MHz -5320 MHz, W56: 5500 MHz -5700 MHz *, W58: 5745 MHz -5825 MHz *, Bluetooth part: 2402 MHz - 2480 MHz
Modulation	: Wireless LAN part: 2.4 GHz bands: DBPSK, DQPSK, CCK, OFDM 5 GHz bands: OFDM Bluetooth part: BDR (Basic Data Rate): GFSK EDR (Enhanced Data Rate): $\pi/4$ -DQPSK, 8DPSK LE (Low Energy mode): GFSK
Antenna type	: PCB Antenna (Dipole)
Antenna connector	: (Ant: 0): MHF 4L, (Ant: 1): MHF II
Antenna Gain	: 2.4 GHz band: -0.70 dBi max (ANT0: Wireless LAN & Bluetooth), -8.38 dBi max (ANT1: Wireless LAN) 5 GHz band: +3.31 dBi max (ANT0: Wireless LAN), -0.96 dBi max (ANT1: Wireless LAN)
Operation temperature	: +5 deg.C to +35 deg.C

Remarks: This Wireless Module consists of 1 chip each of 5 GHz band and 2.4 GHz band.

*This model does not have 40MHz Bandwidth mode on W56 and W58.

SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification : FCC Part 15 Subpart C
 FCC Part 15 final revised on June 4, 2019 and effective July 5, 2019 except 15.258

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

* The revision on June 4, 2019, does not affect the test specification applied to the EUT.

* Also the EUT complies with FCC Part 15 Subpart B.

3.2 Procedures and results

Item	Test Procedure	Specification	Worst Margin	Results	Remarks
Spurious Emission & Band Edge Compliance	FCC: KDB 558074 D01 15.247 Meas Guidance v05r02 IC: RSS-Gen 6.13	FCC: Section15.247(d) IC: RSS-247 5.5 RSS-Gen 8.9 RSS-Gen 8.10	3.2 dB 250.015 MHz, QP, Horizontal Tx 3DH5 2441 MHz	Complied# a)	Radiated (above 30 MHz) *1)

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

*1) Radiated test was selected over 30 MHz based on section 15.247(d).

a) 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)

This EUT provides stable voltage constantly to RF Part regardless of input voltage. Therefore, the EUT complies with the requirement.

FCC Part 15.203 Antenna requirement

It is impossible for end users to replace the antenna, because the antenna is mounted inside of the EUT. Therefore, the EUT complies with the requirement.

3.3 Addition to standard

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 SAC / SR
Conducted emission (AC Mains) LISN	150 kHz-30 MHz	2.9 dB	2.8 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, 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.

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

4.1 Operating Mode(s)

Test Item	Mode	Tested frequency
Spurious Emission (Radiated)	Bluetooth Tx (Hopping Off) DH5, 3DH5 Payload: PRBS9	2402 MHz 2441 MHz 2480 MHz
* 2DH mode (2Mb/s EDR: pi/4DQPSK) was excluded for other tests than power measurement by using 3DH mode (3 Mb/s EDR: 8DPSK) as a representative. * It is considered that the non-tested packet type (e.g. inquiry) can be omitted as it is complied with above all the test items based on Bluetooth Core specification. *EUT has the power settings by the software as follows; Power settings: Fixed Software: cmd.exe, Ver. 6.3.9600.17415, Bluetool.exe, Ver.1.9.3.0 *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.		

SECTION 5: Radiated Spurious Emission

Test Procedure

[For below 1 GHz]

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 table is made of Styrofoam and covered with polyvinyl chloride. That has very low permittivity. The Radiated Electric Field Strength has been measured in a Semi Anechoic Chamber with a ground plane.

[For above 1 GHz]

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

The height of the measuring antenna varied between 1 m and 4 m and EUT was rotated a full revolution in order to obtain the maximum value of the electric field strength.

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.

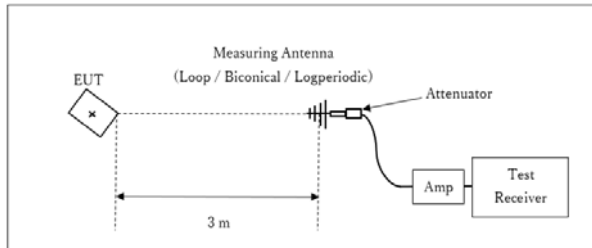
20 dBc was applied to the frequency over the limit of FCC 15.209 / Table 4 of RSS-Gen 8.9 (IC) and outside the restricted band of FCC15.205 / Table 6 of RSS-Gen 8.10 (IC).

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	-	RBW: 100 kHz VBW: 300 kHz

*1) Measurement with Average detector was not performed. The limit for Average detector is applied to the measurement value with Peak detector used Duty cycle correction factor (DCCF).

Figure 1: Test Setup

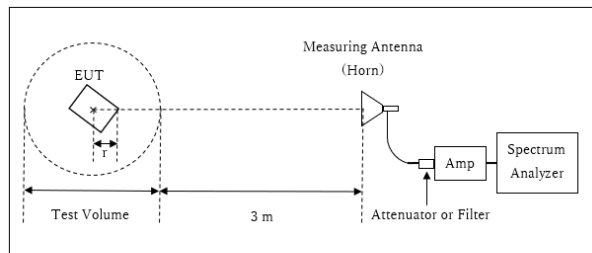
Below 1 GHz



x : Center of turn table

Test Distance: 3 m

1 GHz - 13 GHz



r : Radius of an outer periphery of EUT

x : Center of turn table

Distance Factor: $20 \times \log (3.9 \text{ m} / 3.0 \text{ m}) = 2.28 \text{ dB}$

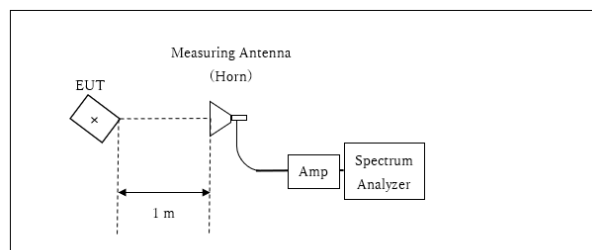
* Test Distance: $(3 + \text{Test Volume} / 2) - r = 3.9 \text{ m}$

Test Volume : 2.0 m

(Test Volume has been calibrated based on CISPR 16-1-4.)

r = 0.1 m

13 GHz - 26.5 GHz



x : Center of turn table

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

*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.

Measurement range : 30 MHz - 26.5 GHz

Test data : APPENDIX

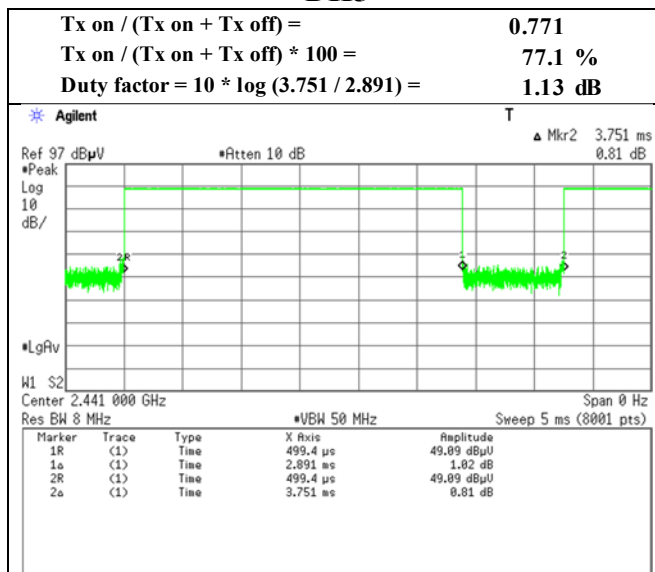
Test result : Pass

APPENDIX 1: Test data

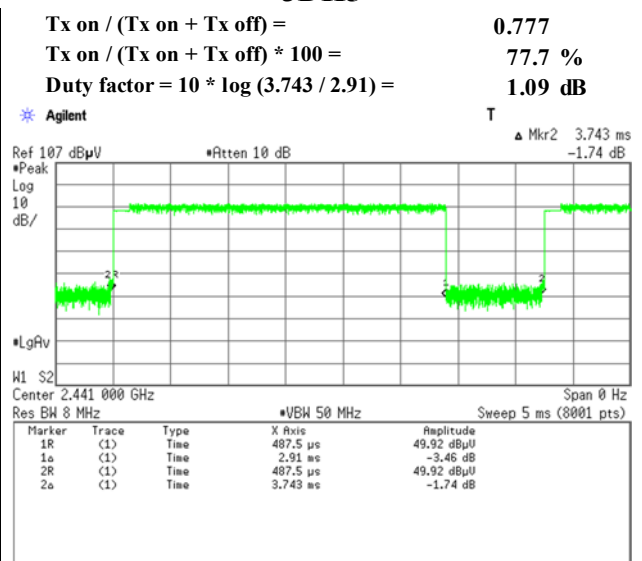
Burst Rate Confirmation

Test place	Shonan EMC Lab. No.2 Semi Anechoic Chamber
Report No.	12423101S-C
Date	August 9, 2018
Temperature / Humidity	24 deg. C / 65 % RH
Engineer	Makoto Hosaka
Mode	Tx, Hopping Off

DH5



3DH5

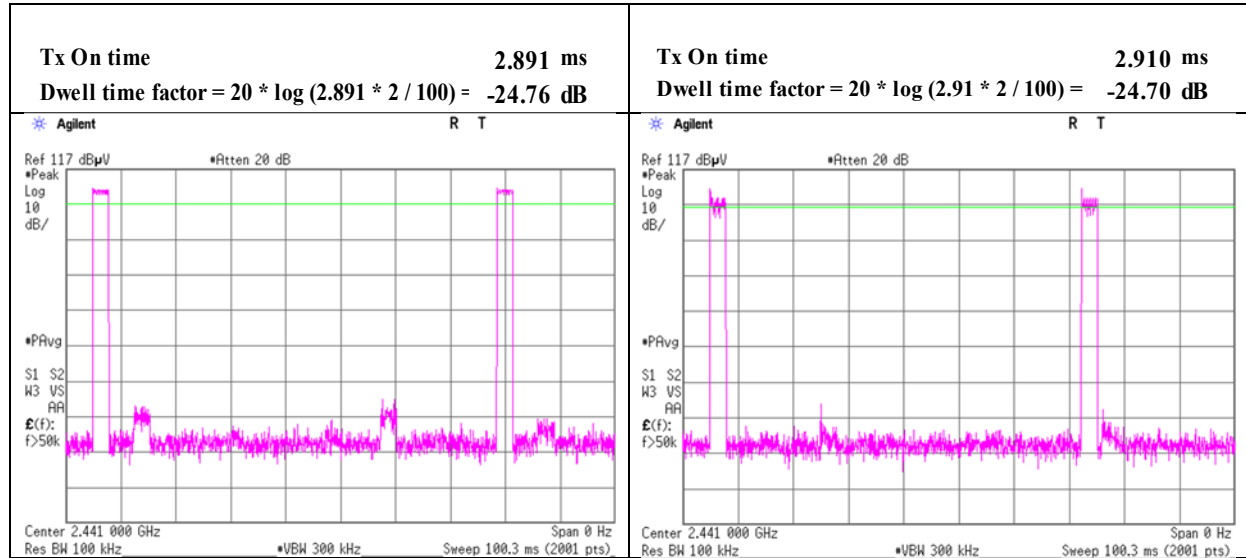


Dwell time factor

Test place	Shonan EMC Lab. No.2 Semi Anechoic Chamber
Report No.	12423101S-C
Date	August 9, 2018
Temperature / Humidity	24 deg. C / 65 % RH
Engineer	Makoto Hosaka
Mode	Tx, Hopping On

DH5

3DH5



*Tx On time refers to the data of Burst Rate Confirmation sheet.

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Radiated Spurious Emission

Report No. 12423101S-C
Test place Shonan EMC Lab.
Semi Anechoic Chamber 2 2 1 2
Date August 26, 2018 August 9, 2018 August 24, 2018 August 8, 2018
Temperature / Humidity 24 deg. C / 63 % RH 24 deg. C / 65 % RH 23 deg. C / 67 % RH 24 deg. C / 66 % RH
Engineer Makoto Hosaka Makoto Hosaka Yosuke Ishikawa Makoto Hosaka
(30 MHz -1 GHz) (1 GHz -13 GHz) (13 GHz -18 GHz) (18 GHz -26.5 GHz)
Mode Tx, Hopping Off, DH5 2402 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.	62.914	QP	40.20	7.59	6.94	31.90	0.00	22.83	40.00	17.1	330	359	
Hori.	95.745	QP	39.80	9.42	8.01	31.88	0.00	25.35	43.50	18.1	351	108	
Hori.	205.603	QP	40.50	11.25	5.45	31.78	0.00	25.42	43.50	18.0	172	10	
Hori.	250.014	QP	55.40	11.74	5.81	31.73	0.00	41.22	46.00	4.7	154	4	
Hori.	298.893	QP	37.80	13.57	6.21	31.70	0.00	25.88	46.00	20.1	128	280	
Hori.	348.552	QP	38.60	15.01	6.65	31.66	0.00	28.60	46.00	17.4	100	212	
Hori.	2390.000	PK	45.66	27.91	13.89	36.58	2.28	53.16	73.90	20.7	156	151	
Hori.	3202.654	PK	48.16	28.83	5.61	36.62	2.28	48.26	73.90	25.6	100	179	
Hori.	4804.000	PK	47.70	31.31	6.51	36.88	2.28	50.92	73.90	22.9	100	346	
Hori.	7206.000	PK	44.57	36.77	7.66	37.26	2.28	54.02	73.90	19.8	150	0	
Hori.	9608.000	PK	45.43	38.11	8.64	38.47	2.28	55.99	73.90	17.9	150	0	
Hori.	12010.000	PK	45.72	39.10	10.21	38.04	2.28	59.27	73.90	14.6	150	0	
Hori.	3202.654	AV	40.32	28.83	5.61	36.62	2.28	40.42	53.90	13.4	100	179	*1)
Vert.	63.186	QP	44.24	7.54	6.93	31.90	0.00	26.81	40.00	13.1	100	219	
Vert.	250.014	QP	48.90	11.74	5.81	31.73	0.00	34.72	46.00	11.2	100	193	
Vert.	339.053	QP	38.80	14.82	6.57	31.67	0.00	28.52	46.00	17.4	149	291	
Vert.	2390.000	PK	43.87	27.91	13.89	36.58	2.28	51.37	73.90	22.5	152	228	
Vert.	3202.654	PK	48.24	28.83	5.61	36.62	2.28	48.34	73.90	25.5	142	211	
Vert.	4804.000	PK	45.35	31.31	6.51	36.88	2.28	48.57	73.90	25.3	387	28	
Vert.	7206.000	PK	45.19	36.77	7.66	37.26	2.28	54.64	73.90	19.2	150	0	
Vert.	9608.000	PK	45.56	38.11	8.64	38.47	2.28	56.12	73.90	17.7	150	0	
Vert.	12010.000	PK	45.95	39.10	10.21	38.04	2.28	59.50	73.90	14.4	150	0	
Vert.	3202.654	AV	41.40	28.83	5.61	36.62	2.28	41.50	53.90	12.4	142	211	*1)

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

Distance factor : 1 GHz - 13 GHz : $20\log(3.90\text{ m} / 3.0\text{ m}) = 2.28\text{ dB}$

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

*1) The duty factor correction was not done, because it was a signal without the off period.

Peak with Duty cycle correction 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	PK	45.66	27.91	13.89	36.58	-24.76	2.28	28.40	53.90	25.5	
Hori.	4804.000	PK	47.70	31.31	6.51	36.88	-24.76	2.28	26.16	53.90	27.7	
Hori.	7206.000	PK	44.57	36.77	7.66	37.26	-24.76	2.28	29.26	53.90	24.6	
Hori.	9608.000	PK	45.43	38.11	8.64	38.47	-24.76	2.28	31.23	53.90	22.7	
Hori.	12010.000	PK	45.72	39.10	10.21	38.04	-24.76	2.28	34.51	53.90	19.4	
Vert.	2390.000	PK	43.87	27.91	13.89	36.58	-24.76	2.28	26.61	53.90	27.3	
Vert.	4804.000	PK	45.35	31.31	6.51	36.88	-24.76	2.28	23.81	53.90	30.1	
Vert.	7206.000	PK	45.19	36.77	7.66	37.26	-24.76	2.28	29.88	53.90	24.0	
Vert.	9608.000	PK	45.56	38.11	8.64	38.47	-24.76	2.28	31.36	53.90	22.5	
Vert.	12010.000	PK	45.95	39.10	10.21	38.04	-24.76	2.28	34.74	53.90	19.2	

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

Distance factor : 1 GHz - 13 GHz : $20\log(3.90\text{ m} / 3.0\text{ m}) = 2.28\text{ dB}$

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

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

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2402.000	PK	84.88	27.90	13.90	36.57	2.28	92.39	-	-	Carrier
Hori.	2400.000	PK	35.70	27.91	13.90	36.58	2.28	43.21	72.39	29.2	
Vert.	2402.000	PK	85.44	27.90	13.90	36.57	2.28	92.95	-	-	Carrier
Vert.	2400.000	PK	34.76	27.91	13.90	36.58	2.28	42.27	72.95	30.7	

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

Distance factor : 1 GHz - 13 GHz : $20\log(3.90\text{ m} / 3.0\text{ m}) = 2.28\text{ dB}$

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

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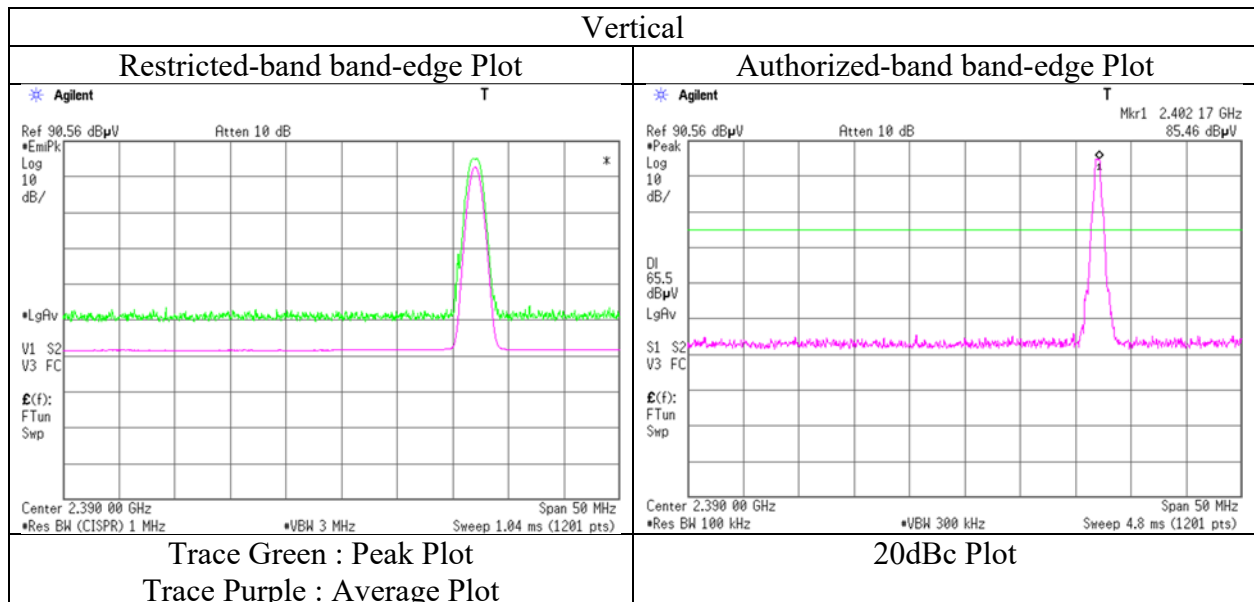
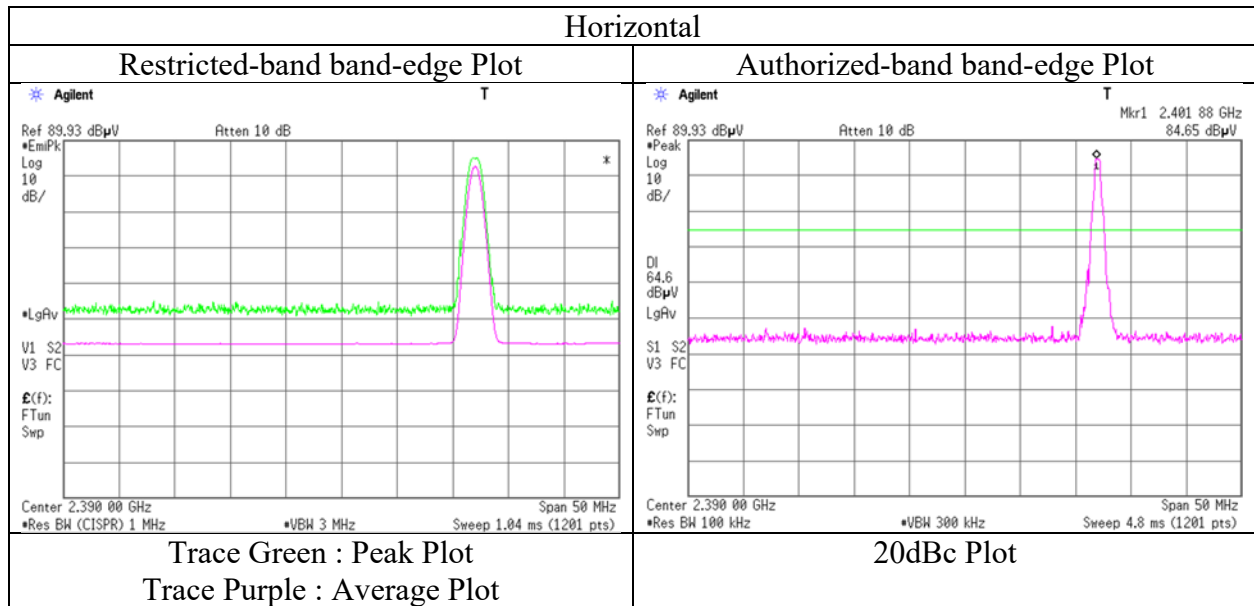
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Radiated Spurious Emission (Reference Plot for band-edge)

Report No.	12423101S-C
Test place	Shonan EMC Lab.
Semi Anechoic Chamber	2
Date	August 9, 2018
Temperature / Humidity	24 deg. C / 65 % RH
Engineer	Makoto Hosaka
	(1 GHz -13 GHz)
Mode	Tx, Hopping Off, DH5 2402 MHz



* 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.

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Radiated Spurious Emission

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Test place Shonan EMC Lab.
Semi Anechoic Chamber 2 2 1 2
Date August 26, 2018 August 9, 2018 August 24, 2018 August 8, 2018
Temperature / Humidity 24 deg. C / 63 % RH 24 deg. C / 65 % RH 23 deg. C / 67 % RH 24 deg. C / 66 % RH
Engineer Makoto Hosaka Makoto Hosaka Yosuke Ishikawa Makoto Hosaka
(30 MHz -1 GHz) (1 GHz -13 GHz) (13 GHz -18 GHz) (18 GHz -26.5 GHz)
Mode Tx, Hopping Off, DH5 2441 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.	65.320	QP	34.00	7.14	6.94	31.90	0.00	16.18	40.00	23.8	312	6	
Hori.	119.993	QP	38.60	13.11	7.91	31.86	0.00	27.76	43.50	15.7	273	162	
Hori.	205.101	QP	37.10	11.27	5.45	31.78	0.00	22.04	43.50	21.4	188	60	
Hori.	250.015	QP	56.60	11.74	5.81	31.73	0.00	42.42	46.00	3.5	150	1	
Hori.	324.286	QP	37.40	14.33	6.44	31.68	0.00	26.49	46.00	19.5	100	264	
Hori.	356.393	QP	36.00	15.08	6.71	31.66	0.00	26.13	46.00	19.8	100	226	
Hori.	946.620	QP	30.50	21.94	9.29	30.58	0.00	31.15	46.00	14.8	100	228	
Hori.	3254.652	PK	48.08	28.43	5.62	36.63	2.28	47.78	73.90	26.1	215	226	
Hori.	4882.000	PK	48.65	31.14	6.53	36.91	2.28	51.69	73.90	22.2	111	346	
Hori.	7323.000	PK	44.39	36.84	7.73	37.44	2.28	53.80	73.90	20.1	150	0	
Hori.	9764.000	PK	44.90	38.59	8.81	38.66	2.28	55.92	73.90	17.9	150	0	
Hori.	12205.000	PK	44.36	39.00	10.65	38.38	2.28	57.91	73.90	15.9	150	0	
Hori.	3254.652	AV	42.73	28.43	5.62	36.63	2.28	42.43	53.90	11.4	215	226	*1)
Vert.	62.448	QP	42.20	7.66	6.94	31.90	0.00	24.90	40.00	15.1	100	92	
Vert.	122.902	QP	38.70	13.34	7.96	31.86	0.00	28.14	43.50	15.3	100	86	
Vert.	250.015	QP	47.10	11.74	5.81	31.73	0.00	32.92	46.00	13.0	100	204	
Vert.	329.972	QP	32.90	14.53	6.49	31.68	0.00	22.24	46.00	23.7	143	14	
Vert.	3254.652	PK	47.97	28.43	5.62	36.63	2.28	47.67	73.90	26.2	145	226	
Vert.	4882.000	PK	45.47	31.14	6.53	36.91	2.28	48.51	73.90	25.3	400	35	
Vert.	7323.000	PK	43.40	36.84	7.73	37.44	2.28	52.81	73.90	21.0	150	0	
Vert.	9764.000	PK	43.19	38.59	8.81	38.66	2.28	54.21	73.90	19.6	150	0	
Vert.	12205.000	PK	43.75	39.00	10.65	38.38	2.28	57.30	73.90	16.6	150	0	
Vert.	3254.652	AV	41.66	28.43	5.62	36.63	2.28	41.36	53.90	12.5	145	226	*1)

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

Distance factor : 1 GHz - 13 GHz : $20\log(3.90\text{ m} / 3.0\text{ m}) = 2.28\text{ dB}$

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

*1) The duty factor correction was not done, because it was a signal without the off period.

Peak with Duty cycle correction 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.	4882.000	PK	48.65	31.14	6.53	36.91	-24.76	2.28	26.93	53.90	27.0	
Hori.	7323.000	PK	44.39	36.84	7.73	37.44	-24.76	2.28	29.04	53.90	24.9	
Hori.	9764.000	PK	44.90	38.59	8.81	38.66	-24.76	2.28	31.16	53.90	22.7	
Hori.	12205.000	PK	44.36	39.00	10.65	38.38	-24.76	2.28	33.15	53.90	20.8	
Vert.	4882.000	PK	45.47	31.14	6.53	36.91	-24.76	2.28	23.75	53.90	30.2	
Vert.	7323.000	PK	43.40	36.84	7.73	37.44	-24.76	2.28	28.05	53.90	25.9	
Vert.	9764.000	PK	43.19	38.59	8.81	38.66	-24.76	2.28	29.45	53.90	24.5	
Vert.	12205.000	PK	43.75	39.00	10.65	38.38	-24.76	2.28	32.54	53.90	21.4	

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

Distance factor : 1 GHz - 13 GHz : $20\log(3.90\text{ m} / 3.0\text{ m}) = 2.28\text{ dB}$

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

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

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Radiated Spurious Emission

Report No. 12423101S-C
Test place Shonan EMC Lab.
Semi Anechoic Chamber 2 2 1 2
Date August 26, 2018 August 9, 2018 August 24, 2018 August 8, 2018
Temperature / Humidity 24 deg. C / 63 % RH 24 deg. C / 65 % RH 23 deg. C / 67 % RH 24 deg. C / 66 % RH
Engineer Makoto Hosaka Makoto Hosaka Yosuke Ishikawa Makoto Hosaka
(30 MHz -1 GHz) (1 GHz -13 GHz) (13 GHz -18 GHz) (18 GHz -26.5 GHz)
Mode Tx, Hopping Off, DH5 2480 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.	120.024	QP	39.30	13.11	7.91	31.86	0.00	28.46	43.50	15.0	271	156	
Hori.	201.807	QP	34.90	11.37	5.42	31.78	0.00	19.91	43.50	23.5	166	4	
Hori.	250.010	QP	56.70	11.74	5.81	31.73	0.00	42.52	46.00	3.4	166	4	
Hori.	323.409	QP	40.30	14.30	6.43	31.68	0.00	29.35	46.00	16.6	108	259	
Hori.	947.729	QP	30.30	21.95	9.29	30.57	0.00	30.97	46.00	15.0	100	226	
Hori.	2483.500	PK	45.01	27.67	13.96	36.52	2.28	52.40	73.90	21.5	147	39	
Hori.	3306.650	PK	48.46	28.11	5.61	36.63	2.28	47.83	73.90	26.0	138	204	
Hori.	4960.000	PK	47.41	31.33	6.56	36.93	2.28	50.65	73.90	23.2	174	328	
Hori.	7440.000	PK	43.41	36.97	7.81	37.63	2.28	52.84	73.90	21.0	150	0	
Hori.	9920.000	PK	43.44	38.80	9.00	38.84	2.28	54.68	73.90	19.2	150	0	
Hori.	12400.000	PK	42.63	38.29	11.08	38.72	2.28	55.56	73.90	18.3	150	0	
Hori.	3306.650	AV	42.06	28.11	5.61	36.63	2.28	41.43	53.90	12.4	138	204	*1)
Vert.	48.531	QP	33.80	11.71	7.15	31.91	0.00	20.75	40.00	19.2	100	262	
Vert.	71.970	QP	46.40	6.37	7.40	31.90	0.00	28.27	40.00	11.7	100	35	
Vert.	120.063	QP	41.20	13.11	7.91	31.86	0.00	30.36	43.50	13.1	100	107	
Vert.	250.010	QP	46.60	11.74	5.81	31.73	0.00	32.42	46.00	13.5	100	193	
Vert.	2483.500	PK	44.80	27.67	13.96	36.52	2.28	52.19	73.90	21.7	156	292	
Vert.	3306.650	PK	52.41	28.11	5.61	36.63	2.28	51.78	73.90	22.1	129	327	
Vert.	4960.000	PK	45.50	31.33	6.56	36.93	2.28	48.74	73.90	25.1	266	278	
Vert.	7440.000	PK	44.32	36.97	7.81	37.63	2.28	53.75	73.90	20.1	150	0	
Vert.	9920.000	PK	42.95	38.80	9.00	38.84	2.28	54.19	73.90	19.7	150	0	
Vert.	12400.000	PK	43.27	38.29	11.08	38.72	2.28	56.20	73.90	17.7	150	0	
Vert.	3306.650	AV	41.10	28.11	5.61	36.63	2.28	40.47	53.90	13.4	129	327	*1)

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

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

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

*1) The duty factor correction was not done, because it was a signal without the off period.

Peak with Duty cycle correction 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	PK	45.01	27.67	13.96	36.52	-24.76	2.28	27.64	53.90	26.3	
Hori.	4960.000	PK	47.41	31.33	6.56	36.93	-24.76	2.28	25.89	53.90	28.0	
Hori.	7440.000	PK	43.41	36.97	7.81	37.63	-24.76	2.28	28.08	53.90	25.8	
Hori.	9920.000	PK	43.44	38.80	9.00	38.84	-24.76	2.28	29.92	53.90	24.0	
Hori.	12400.000	PK	42.63	38.29	11.08	38.72	-24.76	2.28	30.80	53.90	23.1	
Vert.	2483.500	PK	44.80	27.67	13.96	36.52	-24.76	2.28	27.43	53.90	26.5	
Vert.	4960.000	PK	45.50	31.33	6.56	36.93	-24.76	2.28	23.98	53.90	29.9	
Vert.	7440.000	PK	44.32	36.97	7.81	37.63	-24.76	2.28	28.99	53.90	24.9	
Vert.	9920.000	PK	42.95	38.80	9.00	38.84	-24.76	2.28	29.43	53.90	24.5	
Vert.	12400.000	PK	43.27	38.29	11.08	38.72	-24.76	2.28	31.44	53.90	22.5	

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

Distance factor : 1 GHz - 13 GHz : 20log(3.90 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 "Dwell time factor Calculation chart" sheet.

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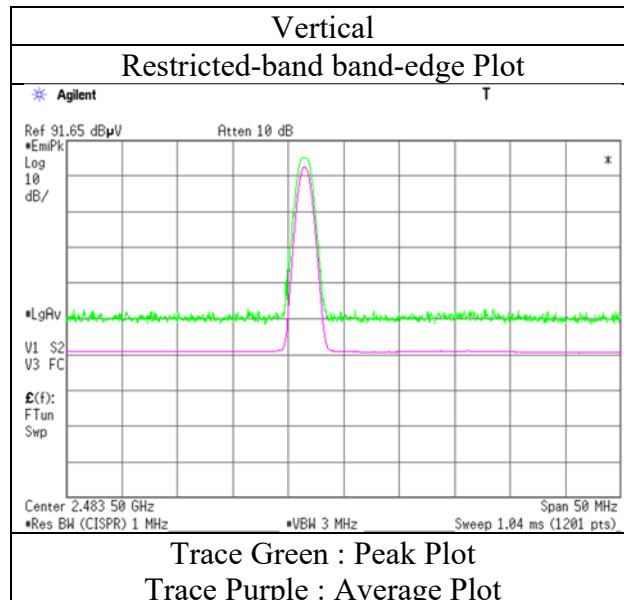
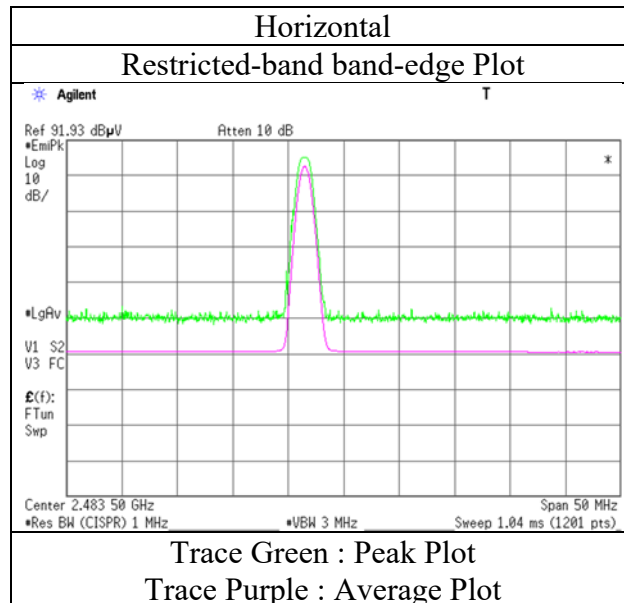
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Radiated Spurious Emission (Reference Plot for band-edge)

Report No.	12423101S-C
Test place	Shonan EMC Lab.
Semi Anechoic Chamber	2
Date	August 9, 2018
Temperature / Humidity	24 deg. C / 65 % RH
Engineer	Makoto Hosaka (1 GHz -13 GHz)
Mode	Tx, Hopping Off, DH5 2480 MHz



* 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. 12423101S-C
Test place Shonan EMC Lab.
Semi Anechoic Chamber 2 2 1 2
Date August 26, 2018 August 9, 2018 August 24, 2018 August 8, 2018
Temperature / Humidity 24 deg. C / 63 % RH 24 deg. C / 65 % RH 23 deg. C / 67 % RH 24 deg. C / 66 % RH
Engineer Makoto Hosaka Makoto Hosaka Yosuke Ishikawa Makoto Hosaka
(30 MHz -1 GHz) (1 GHz -13 GHz) (13 GHz -18 GHz) (18 GHz -26.5 GHz)
Mode Tx, Hopping Off, 3DH5 2402 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.	250.017	QP	56.60	11.74	5.81	31.73	0.00	42.42	46.00	3.5	159	14	
Hori.	282.498	QP	37.00	13.30	6.08	31.71	0.00	24.67	46.00	21.3	144	239	
Hori.	331.400	QP	38.30	14.58	6.50	31.68	0.00	27.70	46.00	18.3	113	317	
Hori.	936.894	QP	29.40	21.99	9.25	30.65	0.00	29.99	46.00	16.0	100	232	
Hori.	2390.000	PK	44.97	27.91	13.89	36.58	2.28	52.47	73.90	21.4	155	153	
Hori.	3202.654	PK	47.83	28.83	5.61	36.62	2.28	47.93	73.90	25.9	100	178	
Hori.	4804.000	PK	47.64	31.31	6.51	36.88	2.28	50.86	73.90	23.0	100	345	
Hori.	7206.000	PK	45.11	36.77	7.66	37.26	2.28	54.56	73.90	19.3	150	0	
Hori.	9608.000	PK	45.39	38.11	8.64	38.47	2.28	55.95	73.90	17.9	150	0	
Hori.	12010.000	PK	45.73	39.10	10.21	38.04	2.28	59.28	73.90	14.6	150	0	
Hori.	3202.654	AV	40.30	28.83	5.61	36.62	2.28	40.40	53.90	13.5	100	178	*1)
Vert.	51.653	QP	35.40	10.60	7.16	31.91	0.00	21.25	40.00	18.7	100	67	
Vert.	72.103	QP	46.50	6.37	7.41	31.90	0.00	28.38	40.00	11.6	100	266	
Vert.	250.017	QP	47.20	11.74	5.81	31.73	0.00	33.02	46.00	12.9	100	193	
Vert.	500.018	QP	38.10	17.70	7.43	31.64	0.00	31.59	46.00	14.4	131	238	
Vert.	2390.000	PK	44.96	27.91	13.89	36.58	2.28	52.46	73.90	21.4	142	309	
Vert.	3202.654	PK	47.74	28.83	5.61	36.62	2.28	47.84	73.90	26.0	144	227	
Vert.	4804.000	PK	45.31	31.31	6.51	36.88	2.28	48.53	73.90	25.3	144	225	
Vert.	7206.000	PK	45.14	36.77	7.66	37.26	2.28	54.59	73.90	19.3	150	0	
Vert.	9608.000	PK	44.95	38.11	8.64	38.47	2.28	55.51	73.90	18.3	150	0	
Vert.	12010.000	PK	45.14	39.10	10.21	38.04	2.28	58.69	73.90	15.2	150	0	
Vert.	3202.654	AV	41.28	28.83	5.61	36.62	2.28	41.38	53.90	12.5	144	227	*1)

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

Distance factor : 1 GHz - 13 GHz : $20\log(3.90\text{ m} / 3.0\text{ m}) = 2.28\text{ dB}$

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

*1) The duty factor correction was not done, because it was a signal without the off period.

Peak with Duty cycle correction 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	PK	44.97	27.91	13.89	36.58	-24.70	2.28	27.77	53.90	26.1	
Hori.	4804.000	PK	47.64	31.31	6.51	36.88	-24.70	2.28	26.16	53.90	27.7	
Hori.	7206.000	PK	45.11	36.77	7.66	37.26	-24.70	2.28	29.86	53.90	24.0	
Hori.	9608.000	PK	45.39	38.11	8.64	38.47	-24.70	2.28	31.25	53.90	22.7	
Hori.	12010.000	PK	45.73	39.10	10.21	38.04	-24.70	2.28	34.58	53.90	19.3	
Vert.	2390.000	PK	44.96	27.91	13.89	36.58	-24.70	2.28	27.76	53.90	26.1	
Vert.	4804.000	PK	45.31	31.31	6.51	36.88	-24.70	2.28	23.83	53.90	30.1	
Vert.	7206.000	PK	45.14	36.77	7.66	37.26	-24.70	2.28	29.89	53.90	24.0	
Vert.	9608.000	PK	44.95	38.11	8.64	38.47	-24.70	2.28	30.81	53.90	23.1	
Vert.	12010.000	PK	45.14	39.10	10.21	38.04	-24.70	2.28	33.99	53.90	19.9	

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

Distance factor : 1 GHz - 13 GHz : $20\log(3.90\text{ m} / 3.0\text{ m}) = 2.28\text{ dB}$

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

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

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2402.000	PK	84.94	27.90	13.90	36.57	2.28	92.45	-	-	Carrier
Hori.	2400.000	PK	36.10	27.91	13.90	36.58	2.28	43.61	72.45	28.8	
Vert.	2402.000	PK	85.76	27.90	13.90	36.57	2.28	93.27	-	-	Carrier
Vert.	2400.000	PK	35.92	27.91	13.90	36.58	2.28	43.43	73.27	29.8	

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

Distance factor : 1 GHz - 13 GHz : $20\log(3.90\text{ m} / 3.0\text{ m}) = 2.28\text{ dB}$

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

UL Japan, Inc.

Shonan EMC Lab.

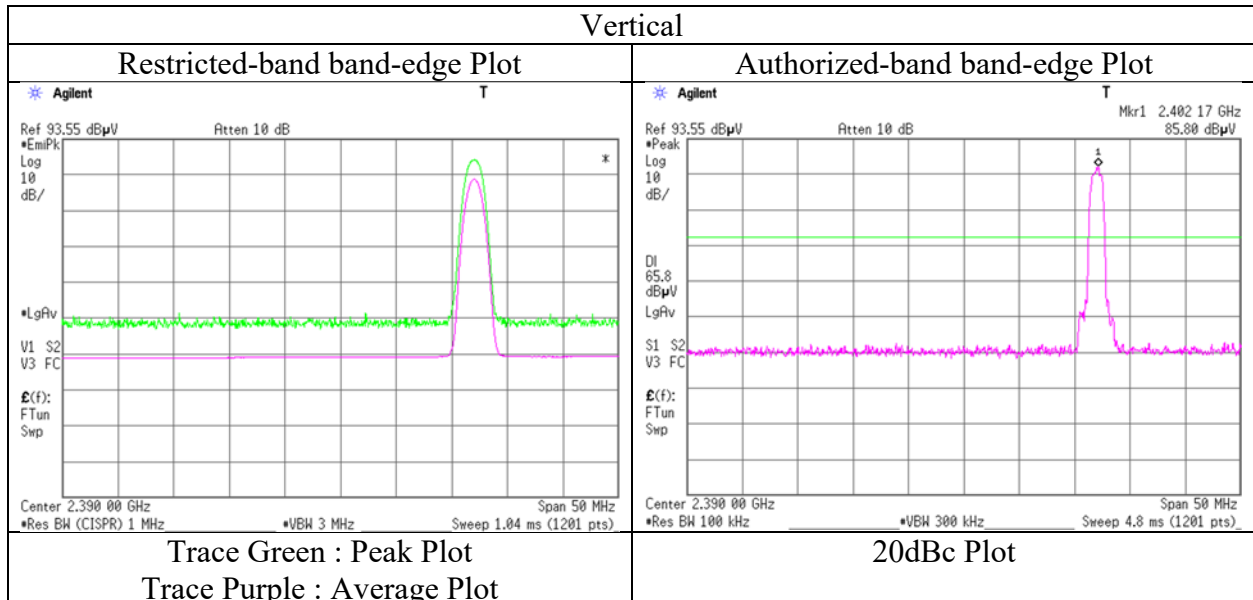
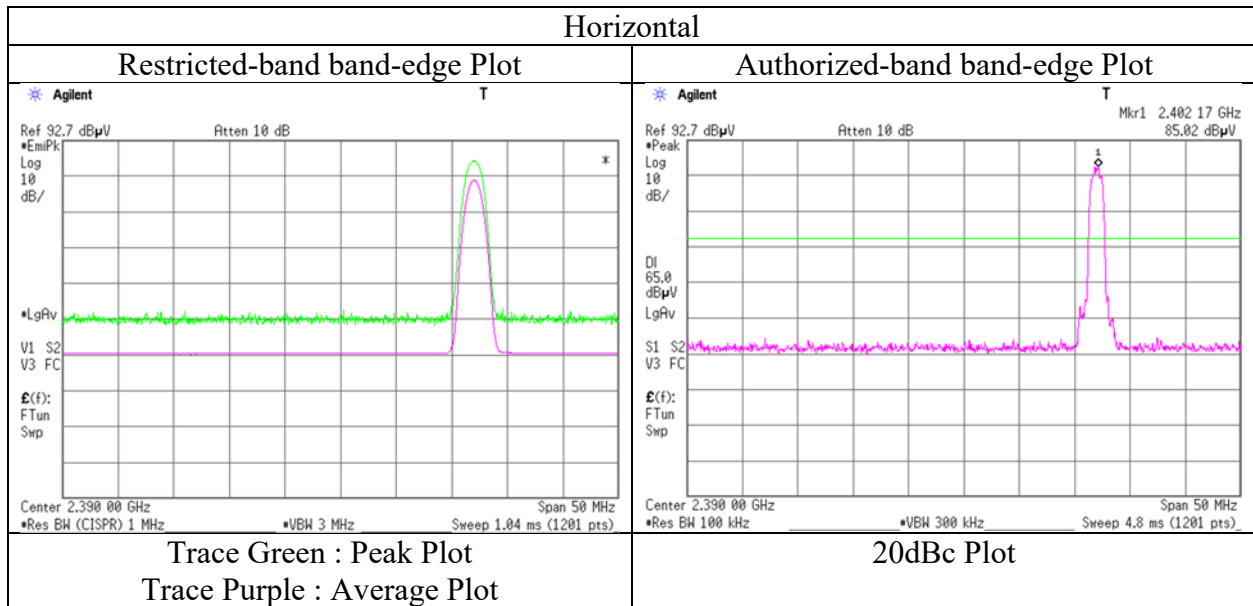
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Facsimile : +81 463 50 6401

Radiated Spurious Emission (Reference Plot for band-edge)

Report No.	12423101S-C
Test place	Shonan EMC Lab.
Semi Anechoic Chamber	2
Date	August 9, 2018
Temperature / Humidity	24 deg. C / 65 % RH
Engineer	Makoto Hosaka (1 GHz -13 GHz)
Mode	Tx, Hopping Off, 3DH5 2402 MHz



* 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. 12423101S-C
Test place Shonan EMC Lab.
Semi Anechoic Chamber 2 2 1 2
Date August 26, 2018 August 9, 2018 August 24, 2018 August 8, 2018
Temperature / Humidity 24 deg. C / 63 % RH 24 deg. C / 65 % RH 23 deg. C / 67 % RH 24 deg. C / 66 % RH
Engineer Makoto Hosaka Makoto Hosaka Yosuke Ishikawa Makoto Hosaka
(30 MHz -1 GHz) (1 GHz -13 GHz) (13 GHz -18 GHz) (18 GHz -26.5 GHz)
Mode Tx, Hopping Off, 3DH5 2441 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.	129.073	QP	32.60	13.93	8.07	31.85	0.00	22.75	43.50	20.7	271	116	
Hori.	250.015	QP	56.90	11.74	5.81	31.73	0.00	42.72	46.00	3.2	148	11	
Hori.	323.093	QP	41.80	14.29	6.43	31.68	0.00	30.84	46.00	15.1	116	241	
Hori.	949.038	QP	30.20	21.96	9.30	30.56	0.00	30.90	46.00	15.1	100	238	
Hori.	3254.652	PK	48.32	28.43	5.62	36.63	2.28	48.02	73.90	25.8	215	225	
Hori.	4882.000	PK	47.65	31.14	6.53	36.91	2.28	50.69	73.90	23.2	111	347	
Hori.	7323.000	PK	44.67	36.84	7.73	37.44	2.28	54.08	73.90	19.8	150	0	
Hori.	9764.000	PK	43.98	38.59	8.81	38.66	2.28	55.00	73.90	18.9	150	0	
Hori.	12205.000	PK	43.70	39.00	10.65	38.38	2.28	57.25	73.90	16.6	150	0	
Hori.	3254.652	AV	42.41	28.43	5.62	36.63	2.28	42.11	53.90	11.7	215	225	*1)
Vert.	52.824	QP	36.40	10.21	7.15	31.91	0.00	21.85	40.00	18.1	100	10	
Vert.	77.516	QP	40.70	6.30	7.87	31.89	0.00	22.98	40.00	17.0	100	14	
Vert.	112.576	QP	39.30	12.25	7.86	31.87	0.00	27.54	43.50	15.9	100	60	
Vert.	250.015	QP	47.40	11.74	5.81	31.73	0.00	33.22	46.00	12.7	100	103	
Vert.	339.323	QP	34.00	14.83	6.57	31.67	0.00	23.73	46.00	22.2	139	271	
Vert.	3254.652	PK	48.21	28.43	5.62	36.63	2.28	47.91	73.90	25.9	156	215	
Vert.	4882.000	PK	45.56	31.14	6.53	36.91	2.28	48.60	73.90	25.3	139	225	
Vert.	7323.000	PK	45.09	36.84	7.73	37.44	2.28	54.50	73.90	19.4	150	0	
Vert.	9764.000	PK	44.61	38.59	8.81	38.66	2.28	55.63	73.90	18.2	150	0	
Vert.	12205.000	PK	44.19	39.00	10.65	38.38	2.28	57.74	73.90	16.1	150	0	
Vert.	3254.652	AV	41.54	28.43	5.62	36.63	2.28	41.24	53.90	12.6	156	215	*1)

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

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

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

*1) The duty factor correction was not done, because it was a signal without the off period.

Peak with Duty cycle correction 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.	4882.000	PK	47.65	31.14	6.53	36.91	-24.70	2.28	25.99	53.90	27.9	
Hori.	7323.000	PK	44.67	36.84	7.73	37.44	-24.70	2.28	29.38	53.90	24.5	
Hori.	9764.000	PK	43.98	38.59	8.81	38.66	-24.70	2.28	30.30	53.90	23.6	
Hori.	12205.000	PK	43.70	39.00	10.65	38.38	-24.70	2.28	32.55	53.90	21.4	
Vert.	4882.000	PK	45.56	31.14	6.53	36.91	-24.70	2.28	23.90	53.90	30.0	
Vert.	7323.000	PK	45.09	36.84	7.73	37.44	-24.70	2.28	29.80	53.90	24.1	
Vert.	9764.000	PK	44.61	38.59	8.81	38.66	-24.70	2.28	30.93	53.90	23.0	
Vert.	12205.000	PK	44.19	39.00	10.65	38.38	-24.70	2.28	33.04	53.90	20.9	

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

Distance factor : 1 GHz - 13 GHz : 20log(3.90 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 "Dwell time factor Calculation chart" sheet.

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Radiated Spurious Emission

Report No. 12423101S-C
Test place Shonan EMC Lab.
Semi Anechoic Chamber 2 2 1 2
Date August 26, 2018 August 9, 2018 August 24, 2018 August 8, 2018
Temperature / Humidity 24 deg. C / 63 % RH 24 deg. C / 65 % RH 23 deg. C / 67 % RH 24 deg. C / 66 % RH
Engineer Makoto Hosaka Makoto Hosaka Yosuke Ishikawa Makoto Hosaka
(30 MHz -1 GHz) (1 GHz -13 GHz) (13 GHz -18 GHz) (18 GHz -26.5 GHz)
Mode Tx, Hopping Off, 3DH5 2480 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.	120.482	QP	36.90	13.14	7.91	31.86	0.00	26.09	43.50	17.4	266	124	
Hori.	250.013	QP	56.80	11.74	5.81	31.73	0.00	42.62	46.00	3.3	155	12	
Hori.	318.503	QP	41.80	14.13	6.39	31.69	0.00	30.63	46.00	15.3	113	257	
Hori.	947.586	QP	30.20	21.95	9.29	30.57	0.00	30.87	46.00	15.1	100	226	
Hori.	2483.500	PK	44.48	27.67	13.96	36.52	2.28	51.87	73.90	22.0	149	44	
Hori.	3306.650	PK	49.24	28.11	5.61	36.63	2.28	48.61	73.90	25.2	140	205	
Hori.	4960.000	PK	47.32	31.33	6.56	36.93	2.28	50.56	73.90	23.3	100	342	
Hori.	7440.000	PK	43.81	36.97	7.81	37.63	2.28	53.24	73.90	20.6	150	0	
Hori.	9920.000	PK	43.28	38.80	9.00	38.84	2.28	54.52	73.90	19.3	150	0	
Hori.	12400.000	PK	43.02	38.29	11.08	38.72	2.28	55.95	73.90	17.9	150	0	
Hori.	3306.650	AV	42.29	28.11	5.61	36.63	2.28	41.66	53.90	12.2	140	205	*1)
Vert.	52.826	QP	36.30	10.21	7.15	31.91	0.00	21.75	40.00	18.2	100	45	
Vert.	77.239	QP	40.40	6.31	7.85	31.89	0.00	22.67	40.00	17.3	100	79	
Vert.	109.659	QP	39.80	11.85	7.87	31.87	0.00	27.65	43.50	15.8	100	45	
Vert.	250.013	QP	47.30	11.74	5.81	31.73	0.00	33.12	46.00	12.8	100	199	
Vert.	2483.500	PK	44.52	27.67	13.96	36.52	2.28	51.91	73.90	21.9	155	296	
Vert.	3306.650	PK	52.23	28.11	5.61	36.63	2.28	51.60	73.90	22.3	127	332	
Vert.	4960.000	PK	46.23	31.33	6.56	36.93	2.28	49.47	73.90	24.4	268	278	
Vert.	7440.000	PK	43.95	36.97	7.81	37.63	2.28	53.38	73.90	20.5	150	0	
Vert.	9920.000	PK	43.22	38.80	9.00	38.84	2.28	54.46	73.90	19.4	150	0	
Vert.	12400.000	PK	43.62	38.29	11.08	38.72	2.28	56.55	73.90	17.3	150	0	
Vert.	3306.650	AV	41.17	28.11	5.61	36.63	2.28	40.54	53.90	13.3	127	332	*1)

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

Distance factor : 1 GHz - 13 GHz : $20\log(3.90\text{ m} / 3.0\text{ m}) = 2.28\text{ dB}$

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

*1) The duty factor correction was not done, because it was a signal without the off period.

Peak with Duty cycle correction 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	PK	44.48	27.67	13.96	36.52	-24.70	2.28	27.17	53.90	26.7	
Hori.	4960.000	PK	47.32	31.33	6.56	36.93	-24.70	2.28	25.86	53.90	28.0	
Hori.	7440.000	PK	43.81	36.97	7.81	37.63	-24.70	2.28	28.54	53.90	25.4	
Hori.	9920.000	PK	43.28	38.80	9.00	38.84	-24.70	2.28	29.82	53.90	24.1	
Hori.	12400.000	PK	43.02	38.29	11.08	38.72	-24.70	2.28	31.25	53.90	22.7	
Vert.	2483.500	PK	44.52	27.67	13.96	36.52	-24.70	2.28	27.21	53.90	26.7	
Vert.	4960.000	PK	46.23	31.33	6.56	36.93	-24.70	2.28	24.77	53.90	29.1	
Vert.	7440.000	PK	43.95	36.97	7.81	37.63	-24.70	2.28	28.68	53.90	25.2	
Vert.	9920.000	PK	43.22	38.80	9.00	38.84	-24.70	2.28	29.76	53.90	24.1	
Vert.	12400.000	PK	43.62	38.29	11.08	38.72	-24.70	2.28	31.85	53.90	22.1	

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

Distance factor : 1 GHz - 13 GHz : $20\log(3.90\text{ m} / 3.0\text{ m}) = 2.28\text{ dB}$

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

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

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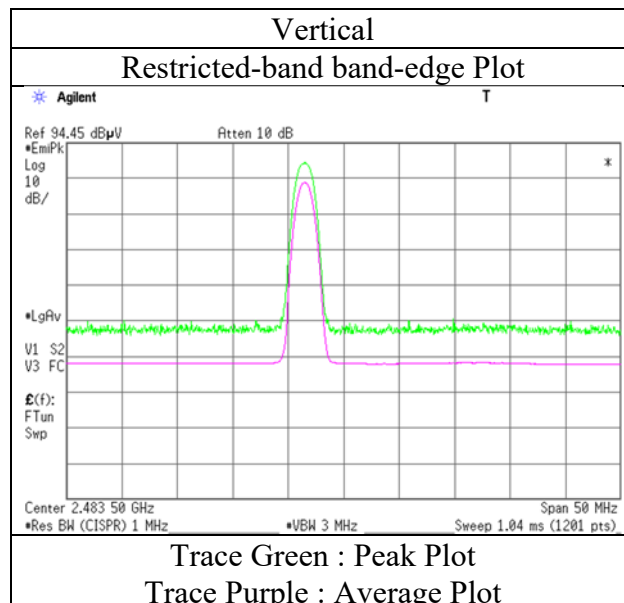
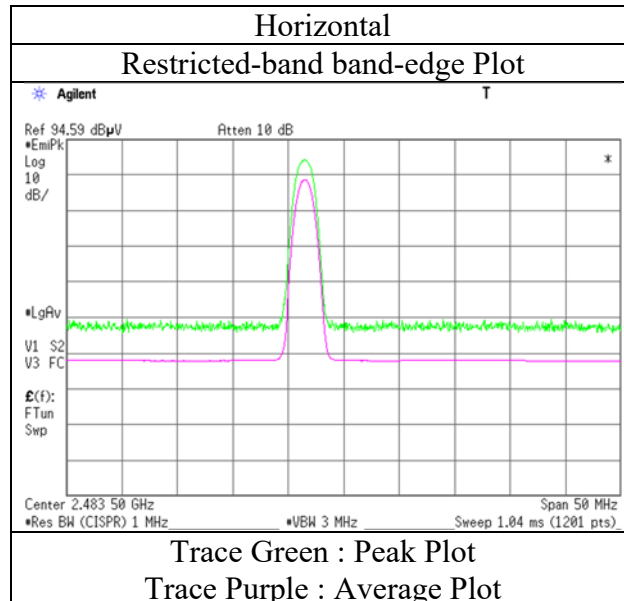
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Radiated Spurious Emission (Reference Plot for band-edge)

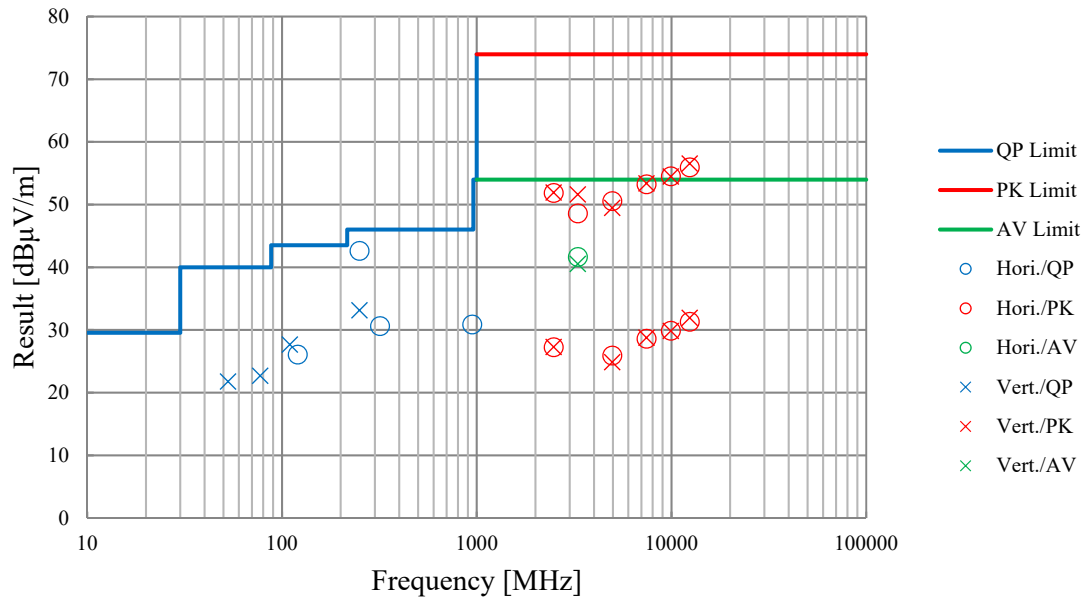
Report No.	12423101S-C
Test place	Shonan EMC Lab.
Semi Anechoic Chamber	2
Date	August 9, 2018
Temperature / Humidity	24 deg. C / 65 % RH
Engineer	Makoto Hosaka (1 GHz -13 GHz)
Mode	Tx, Hopping Off, 3DH5 2480 MHz



* 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.	12423101S-C			
Test place	Shonan EMC Lab.			
Semi Anechoic Chamber	2	2	1	2
Date	August 26, 2018	August 9, 2018	August 24, 2018	August 8, 2018
Temperature / Humidity	24 deg. C / 63 % RH	24 deg. C / 65 % RH	23 deg. C / 67 % RH	24 deg. C / 66 % RH
Engineer	Makoto Hosaka	Makoto Hosaka	Yosuke Ishikawa	Makoto Hosaka
	(30 MHz -1 GHz)	(1 GHz -13 GHz)	(13 GHz -18 GHz)	(18 GHz -26.5 GHz)
Mode	Tx, Hopping Off, 3DH5 2480 MHz			



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

APPENDIX 2: Test instruments

Test Instruments (1/2)

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
SSA-02	Spectrum Analyzer	Agilent	E4448A	MY48250106	RE	2018/03/05 * 12
SHA-05	Horn Antenna	ETS LINDGREN	3160-09	LM4210	RE	2018/07/23 * 12
SAF-09	Pre Amplifier	TOYO Corporation	HAP18-26W	00000018	RE	2017/09/22 * 12
SCC-G45	Coaxial Cable	HUBER+SUHNER	SUCOFLEX 102 E	800137/2EA	RE	2018/03/28 * 12
SOS-03	Humidity Indicator	A&D	AD-5681	4063325	RE	2017/10/30 * 12
COTS-SEMI-1	EMI Software	TSJ	TEPTO- DV(RE,CE,RFI, MF)	-	RE	-
STS-02	Digital Hitester	Hioki	3805-50	080997819	RE	2018/03/08 * 12
SJM-09	Measure	PROMART	SEN1935	-	RE	-
SAF-05	Pre Amplifier	TOYO Corporation	TPA0118-36	1440490	RE	2018/02/15 * 12
SCC-G40	Coaxial Cable	Junkosha	MWX221- 01000NFSNMS/ B	1612S005	RE	2018/01/29 * 12
SCC-G43	Coaxial Cable	HUBER+SUHNER	SUCOFLEX_10 4 E	SN MY 13406/4E	RE	2018/07/10 * 12
SCC-G44	Coaxial Cable	HUBER+SUHNER	SUCOFLEX 104	800070/4A	RE	2018/03/28 * 12
SHA-02	Horn Antenna	Schwarzbeck	BBHA9120D	9120D-726	RE	2018/07/23 * 12
SAEC- 02(SVSWR)	Semi-Anechoic Chamber	TDK	SAEC- 02(SVSWR)	2	RE	2018/07/15 * 12
SAT10-05	Attenuator(above 1 GHz)	Agilent	8493C-010	74864	RE	2017/11/22 * 12
SFL-02	Highpass Filter	MICRO-TRONICS	HPM50111	051	RE	2017/11/16 * 12
SAEC-01(NSA)	Semi-Anechoic Chamber	TDK	SAEC-01(NSA)	1	RE	2018/05/29 * 12
SAF-04	Pre Amplifier	TOYO Corporation	TPA0118-36	1440489	RE	2018/06/26 * 12
SCC-G04	Coaxial Cable	Junkosha	J12J102207-00	JUN-12-14-018	RE	2016/06/23 * 12
SCC-G22	Coaxial Cable	Suhner	SUCOFLEX 104	296199/4	RE	2018/05/11 * 12
SHA-01	Horn Antenna	Schwarzbeck	BBHA9120D	9120D-725	RE	2018/07/23 * 12

Test Instruments (2/2)

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
SOS-01	Humidity Indicator	A&D	AD-5681	4062555	RE	2017/10/30 * 12
STR-01	Test Receiver	Rohde & Schwarz	ESU40	100093	RE	2018/04/13 * 12
KJM-09	Measure	KOMELON	KMC-36	-	RE	-
STS-01	Digital Hitester	Hioki	3805-50	080997812	RE	2017/10/16 * 12
SFL-18	Highpass Filter	MICRO-TRONICS	HPM50111	119	RE	2018/04/20 * 12
SAF-02	Pre Amplifier	SONOMA	310N	290212	RE	2018/02/16 * 12
SAT6-02	Attenuator	JFW	50HF-006N	-	RE	2018/02/16 * 12
SAT3-11	Attenuator	JFW	50HF-003N	-	RE	2018/02/22 * 12
SBA-02	Biconical Antenna	Schwarzbeck	BBA9106	91032665	RE	2018/06/05 * 12
SCC-B1/B3/B5/B7/B8/B13/SRSE-02	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhner/Suhner/Suhner/TOYO	8D2W/12DSFA/141PE/141PE/141PE/141PE/NS4906	-/0901-270(RF Selector)	RE	2018/04/07 * 12
SCC-B2/B4/B6/B7/B8/B13/SRSE-02	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhner/Suhner/Suhner/TOYO	8D2W/12DSFA/141PE/141PE/141PE/141PE/NS4906	-/0901-270(RF Selector)	RE	2018/04/07 * 12
SLA-06	Logperiodic Antenna	Schwarzbeck	VUSLP9111B	195	RE	2018/06/05 * 12
STR-07	Test Receiver	Rohde & Schwarz	ESU26	100484	RE	2017/09/26 * 12
SAEC-02(NSA)	Semi-Anechoic Chamber	TDK	SAEC-02(NSA)	2	RE	2018/05/31 * 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

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