




RADIO TEST REPORT


Test Report No. : 13568152S-E-R1

Applicant : KONICA MINOLTA, Inc.
Type of EUT : SKR 3000
Model Number of EUT : P-65
FCC ID : YR7SKR3000P7
Test regulation : FCC Part 15 Subpart C: 2021
Test item(s) : Radiated Emission test
Test Result : Complied (Refer to SECTION 3)

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2. The results in this report apply only to the sample tested.
3. This sample tested is in compliance with the limits of the above regulation.
4. The test results in this test report are traceable to the national or international standards.
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6. This test report covers Radio technical requirements.
It does not cover administrative issues such as Manual or non-Radio test related Requirements. (if applicable)
7. The all test items in this test report are conducted by UL Japan, Inc. Kashima EMC Lab.
8. The opinions and the interpretations to the result of the description in this report are outside scopes where UL Japan has been accredited.
9. The information provided from the customer for this report is identified in SECTION 1.
10. This report is a revised version of 13568152S-E. 13568152S-E is replaced with this report.

Date of test: November 24 to December 2, 2020

Representative test engineer: 
Kazuhiro Ando
Engineer

Approved by: 
Kenichi Suda
Manager



CERTIFICATE 1266.01

- 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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Kashima EMC Lab.

1614, Mushihata, Katori-shi, Chiba-ken, 289-0341 Japan
Telephone : +81 478 88 6500
Facsimile : +81 478 82 3373

REVISION HISTORY

Original Test Report No.: 13568152S-E

Revision	Test report No.	Date	Page revised	Contents
- (Original)	13568152S-E	February 10, 2021	-	-
1	13568152S-E-R1	May 27, 2021	P.6	Correct the spell of Plamar to Planar in Antenna Type.
1	13568152S-E-R1	May 27, 2021	P.6	Delete the duplicated value (dBi) in Antenna gain.

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Telephone : +81 478 88 6500

Facsimile : +81 478 82 3373

Reference: Abbreviations (Including words undescribed in this report)

A2LA	The American Association for Laboratory Accreditation	LIMS	Laboratory Information Management System
AC	Alternating Current	MCS	Modulation and Coding Scheme
AFH	Adaptive Frequency Hopping	MRA	Mutual Recognition Arrangement
AM	Amplitude Modulation	N/A	Not Applicable
Amp, AMP	Amplifier	NIST	National Institute of Standards and Technology
ANSI	American National Standards Institute	NS	No signal detect.
Ant, ANT	Antenna	NSA	Normalized Site Attenuation
AP	Access Point	NVLAP	National Voluntary Laboratory Accreditation Program
ASK	Amplitude Shift Keying	OBW	Occupied Band Width
Atten., ATT	Attenuator	OFDM	Orthogonal Frequency Division Multiplexing
AV	Average	P/M	Power meter
BPSK	Binary Phase-Shift Keying	PCB	Printed Circuit Board
BR	Bluetooth Basic Rate	PER	Packet Error Rate
BT	Bluetooth	PHY	Physical Layer
BT LE	Bluetooth Low Energy	PK	Peak
BW	BandWidth	PN	Pseudo random Noise
Cal Int	Calibration Interval	PRBS	Pseudo-Random Bit Sequence
CCK	Complementary Code Keying	PSD	Power Spectral Density
Ch., CH	Channel	QAM	Quadrature Amplitude Modulation
CISPR	Comite International Special des Perturbations Radioelectriques	QP	Quasi-Peak
CW	Continuous Wave	QPSK	Quadrature Phase Shift Keying
DBPSK	Differential BPSK	RBW	Resolution Band Width
DC	Direct Current	RDS	Radio Data System
D-factor	Distance factor	RE	Radio Equipment
DFS	Dynamic Frequency Selection	RF	Radio Frequency
DQPSK	Differential QPSK	RMS	Root Mean Square
DSSS	Direct Sequence Spread Spectrum	RSS	Radio Standards Specifications
DUT	Device Under Test	Rx	Receiving
EDR	Enhanced Data Rate	SA, S/A	Spectrum Analyzer
EIRP, e.i.r.p.	Equivalent Isotropically Radiated Power	SG	Signal Generator
EMC	ElectroMagnetic Compatibility	SVSWR	Site-Voltage Standing Wave Ratio
EMI	ElectroMagnetic Interference	TR	Test Receiver
EN	European Norm	Tx	Transmitting
ERP, e.r.p.	Effective Radiated Power	VBW	Video BandWidth
ETSI	European Telecommunications Standards Institute	Vert.	Vertical
EU	European Union	WLAN	Wireless LAN
EUT	Equipment Under Test		
Fac.	Factor		
FCC	Federal Communications Commission		
FHSS	Frequency Hopping Spread Spectrum		
FM	Frequency Modulation		
Freq.	Frequency		
FSK	Frequency Shift Keying		
GFSK	Gaussian Frequency-Shift Keying		
GNSS	Global Navigation Satellite System		
GPS	Global Positioning System		
Hori.	Horizontal		
ICES	Interference-Causing Equipment Standard		
IEC	International Electrotechnical Commission		
IEEE	Institute of Electrical and Electronics Engineers		
IF	Intermediate Frequency		
ILAC	International Laboratory Accreditation Conference		
ISED	Innovation, Science and Economic Development Canada		
ISO	International Organization for Standardization		
JAB	Japan Accreditation Board		
LAN	Local Area Network		

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Kashima EMC Lab.

1614, Mushiata, Katori-shi, Chiba-ken, 289-0341 Japan
Telephone : +81 478 88 6500
Facsimile : +81 478 82 3373

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SECTION 1: Customer information

Company Name : KONICA MINOLTA, Inc.
Address : 1 Sakura-machi, Hino-shi, Tokyo, 191-8511, Japan
Telephone Number : +81-42-589-8429
Facsimile Number : +81-42-589-8053
Contact Person : Yukihiro Niekawa

The information provided from the customer is as follows;

- Applicant, Type of EUT, Model Number of EUT, FCC ID on the cover and other relevant pages
- Operating/Test Mode(s) (Mode(s)) on all the relevant pages
- SECTION 1: Customer information
- SECTION 2: Equipment under test (EUT) other than the Receipt Date
- SECTION 4: Operation of EUT 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 (EUT)

2.1 Identification of EUT

Type : SKR 3000
Model Number : P-65
Serial Number : Refer to SECTION 4.2
Rating : DC 15 V
Receipt Date : November 24, 2020
Country of Mass-production : Japan
Condition : Production prototype
(Not for Sale: This sample is equivalent to mass-produced items.)
Modification : No Modification by the test lab.

2.2 Product Description

Model: P-65 (referred to as the EUT in this report) is a SKR 3000.

General Specification

Clock frequency(ies) in the system : 532 MHz

Radio Specification

Equipment Type : Transceiver
Operating Temperature : +10 deg. C to +35 deg. C

	IEEE802.11b	IEEE802.11g	IEEE802.11a	IEEE802.11n (20 M band)	IEEE802.11n (40 M band)
Frequency of operation	2412 MHz - 2462 MHz	2412 MHz - 2462 MHz	5180 MHz - 5240 MHz 5260 MHz - 5320 MHz 5500 MHz - 5700 MHz 5745 MHz - 5825 MHz	2412 MHz - 2462 MHz 5180 MHz - 5240 MHz 5260 MHz - 5320 MHz 5500 MHz - 5700 MHz 5745 MHz - 5825 MHz	5190 MHz - 5230 MHz 5270 MHz - 5310 MHz 5510 MHz - 5670 MHz 5755 MHz - 5795 MHz
Type of modulation	DSSS (CCK, DQPSK, DBPSK)	OFDM-CCK (64QAM, 16QAM, QPSK, BPSK)	OFDM (64QAM, 16QAM, QPSK, BPSK)		OFDM (BPSK, QPSK, 16QAM, 64QAM)
Channel spacing	5 MHz		20 MHz	5 MHz (2.4 GHz band) 20 MHz (5 GHz band)	40 MHz
Antenna Type	[Main Antenna (chain 0)/Sub Antenna(chain 1)] PIFA (Planar Inverted F Antenna)				
Antenna gain	[Main Antenna (chain 0)] -1.95 dBi (2.4 GHz Band), -0.98 dBi (5 GHz Band)				
	[Sub Antenna (chain 1)] -2.21 dBi (2.4 GHz Band), -1.54 dBi (5 GHz Band)				
Antenna Connector type	[Main Antenna (chain0)/Sub Antenna(chain 1)] Connector PCB side: ULF, Antenna side: Soldered				

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1614, Mushihata, Katori-shi, Chiba-ken, 289-0341 Japan

Telephone : +81 478 88 6500

Facsimile : +81 478 82 3373

SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification : FCC Part 15 Subpart C
FCC Part 15 final revised on January 12, 2021 and effective February 11, 2021
* The revision does not affect the test result conducted before its effective date.

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

*The customer has declared that the EUT has complies with FCC Part 15 Subpart B as SDoC.

* For test report(s) referred in this report, the latest version (including any revisions) is always referred.

3.2 Procedures and results

Item	Test Procedure	Specification	Worst margin	Results	Remarks
Conducted Emission	FCC: ANSI C63.10-2013 6. Standard test methods ----- ISED: RSS-Gen 8.8	FCC: Section 15.207 ----- ISED: RSS-Gen 8.8	-	N/A	- *1)
6dB Bandwidth	FCC: KDB 558074 D01 15.247 Meas Guidance v05r02 ----- ISED: -	FCC: Section 15.247(a)(2) ----- ISED: RSS-247 5.2(a)	-	N/A	Conducted *2)
Maximum Peak Output Power	FCC: KDB 558074 D01 15.247 Meas Guidance v05r02 ----- ISED: RSS-Gen 6.12	FCC: Section 15.247(b)(3) ----- ISED: RSS-247 5.4(d)	-	N/A	Conducted *2)
Power Density	FCC: KDB 558074 D01 15.247 Meas Guidance v05r02 ----- ISED: -	FCC: Section 15.247(e) ----- ISED: RSS-247 5.2(b)	-	N/A	Conducted *2)
Spurious Emission Restricted Band Edges	FCC: KDB 558074 D01 15.247 Meas Guidance v05r02 ----- ISED: RSS-Gen 6.13	FCC: Section 15.247(d) ----- ISED: RSS-247 5.5 RSS-Gen 8.9 RSS-Gen 8.10	9.7 dB 2400.000MHz, PK, Hori.	Complied a)	Conducted *2) (below 30 MHz)/ Radiated *3) (above 30 MHz)

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

*1) The test is not applicable since the EUT has no AC mains. Wireless LAN does not operate during charging.

*2) For these items, refer to the test report: 13568152S-K. The test was carried out with the same module (SX-SDMAN2) which is installed in the EUT.

*3) Radiated test was selected over 30 MHz based on section 15.247(d) and KDB 558074 D01 15.247 Meas Guidance v05r02 8.5 and 8.6.

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 the stable voltage constantly to RF part regardless of input voltage. Therefore, this EUT complies with the requirement.

FCC Part 15.203 Antenna requirement

It is impossible for end users to replace the antenna, because the antenna is mounted inside of the EUT. Therefore, the equipment complies with the antenna requirement of Section 15.203.

UL Japan, Inc.

Kashima EMC Lab.

1614, Mushiata, Katori-shi, Chiba-ken, 289-0341 Japan

Telephone : +81 478 88 6500

Facsimile : +81 478 82 3373

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 $k=2$.

Conducted emission

Frequency range	Required Uncertainty (+/-)	Uncertainty (+/-)
0.15 MHz to 30 MHz	3.4 dB	3.3 dB

Radiated emission

Measurement distance	Frequency range	Required Uncertainty (+/-)	Uncertainty (+/-)
3 m	9 kHz to 30 MHz	Not Defined	2.9 dB
	30 MHz to 200 MHz	6.3 dB	6.1 dB
	200 MHz to 1000 MHz		6.2 dB
	1 GHz to 6 GHz	5.2 dB	5.0 dB
	6 GHz to 18 GHz	5.5 dB	5.4 dB
	18 GHz to 40 GHz	Not Defined	5.5 dB
1 m	1 GHz to 18 GHz	Not Defined	5.4 dB
	18 GHz to 40 GHz		5.6 dB

Antenna Terminal test

Test Item	Required Uncertainty (+/-)	Uncertainty (+/-)
6 dB Bandwidth / 99 % Occupied Bandwidth	Not Defined	1.6 %
Maximum Output Power	0.75 dB	0.73 dB
Burst Rate	Not Defined	0.256 %
Power Density	4 dB	2.2 dB
Conducted Spurious Emission (9 kHz to 30 MHz)	4 dB	2.2 dB

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Kashima EMC Lab.

1614, Mushihata, Katori-shi, Chiba-ken, 289-0341 Japan

Telephone : +81 478 88 6500

Facsimile : +81 478 82 3373

3.5 Test Location

UL Japan, Inc. Kashima EMC Lab.

1614 Mushihata, Katori-shi, Chiba-ken, 289-0341 JAPAN

Telephone: +81 478 88 6500, Facsimile: +81 478 82 3373

A2LA Certificate Number: 1266.01 / FCC Test Firm Registration Number: 910230 / ISED Lab Company Number: 4659A

Test site	Width x Depth x Height (m)	Size of reference ground plane (m) / horizontal conducting plane	Maximum measurement distance
No.1 Open site	6.0 x 5.5 x 2.5	20 x 40	10 m
No.5 Open site	8.6 x 7.1 x 2.4	18 x 23	10 m
No.1 Shielded room	5.4 x 4.5 x 2.3	-	-
No.5 Shielded Room	4.2 x 3.1 x 2.5	-	-
No.9 Shielded Room	6.1 x 3.6 x 2.8	-	-
No.6 Semi-anechoic Chamber	8.5 x 5.5 x 5.2	-	3 m
No.10 Semi-anechoic Chamber	18.4 x 9.9 x 7.7	-	10 m
No.11 Semi-anechoic Chamber	9.0 x 6.5 x 5.2	-	3 m
No.1 Measurement room	5.0 x 3.7 x 2.6	-	-
No.2 Measurement room	4.3 x 4.4 x 2.7	-	-
No.3 Measurement room	4.5 x 5.3 x 2.7	-	-

3.6 Test data, Test instruments, and Test set up

Refer to APPENDIX.

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Telephone : +81 478 88 6500

Facsimile : +81 478 82 3373

SECTION 4: Operation of EUT during testing

4.1 Operating Mode(s)

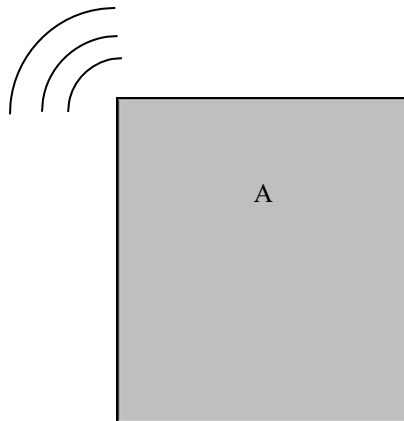
Test operating mode was determined as follows according to “Section 1 of 6 802.11 a/b/g/n testing - Managing Complex Regulatory Approvals - ” of TCB Council Workshop October 2009 and also was judged the necessity of 802.11ac mode by the pre-test.

Mode	Remarks*	Power Setting (dBm)
IEEE 802.11b (11b)	11 Mbps, PN9	14
IEEE 802.11g (11g)	36 Mbps, PN9	8, 15, 11
IEEE 802.11n MIMO 20 MHz BW (11n-20)	MCS 12 (Long GI), PN9	6, 14, 7
*Transmitting duty was 100 % on all tests.		
*The worst condition was determined based on the test result of Maximum Peak Output Power (Mid Channel)		
*Power of the EUT was set by the software as follows; - Software: WLAN Auth Tool ver.1.3.0 (Date: 2016.7.13, Storage location: Driven by connected PC)		
*This setting of software is the worst case. Any conditions under the normal use do not exceed the condition of setting. In addition, end users cannot change the settings of the output power of the product.		

*The details of Operating mode(s)

Test Item	Operating Mode	Tested Antenna	Tested frequency
Spurious Emission	11b Tx 11g Tx	Sub	2412 MHz 2437 MHz 2462 MHz
	11n-20 (MIMO) Tx	Main + Sub	2412 MHz 2437 MHz 2462 MHz

4.2 Configuration and peripherals



Description of EUT and Support equipment

No.	Item	Model number	Serial number	Manufacturer	Remark
A	SKR 3000	P-65	A9YF-S003	KONICA MINOLTA Inc.	EUT

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1614, Mushihata, Katori-shi, Chiba-ken, 289-0341 Japan

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SECTION 5: Radiated Spurious Emission

Test Procedure

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

[For below 1 GHz]

EUT was placed on a urethane platform of nominal size, 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 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	Below 1 GHz	Above 1 GHz
Antenna Type	Hybrid	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(ISED) and outside the restricted band of FCC15.205 / Table 6 of RSS-Gen 8.10 (ISED).

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	11.12.2.5.1 RBW: 1 MHz VBW: 3 MHz Detector: Power Averaging (RMS) Trace: 100 traces 11.12.2.5.2 The duty cycle was less than 98% for detected noise, a duty factor was added to the 11.12.2.5.1 results.	RBW: 100 kHz VBW: 300 kHz

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

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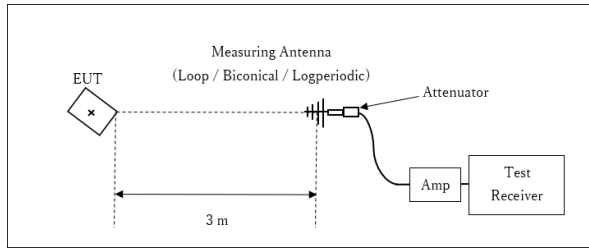
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Telephone : +81 478 88 6500

Facsimile : +81 478 82 3373

Figure 2: Test Setup

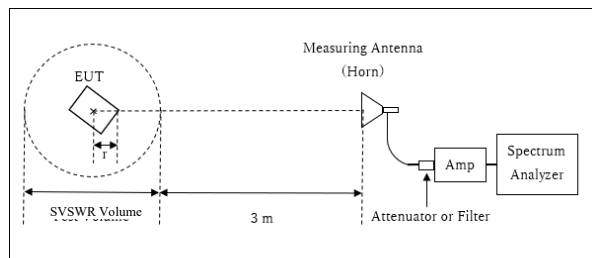
Below 1 GHz



× : Center of turn table

Test Distance: 3 m

1 GHz - 10 GHz

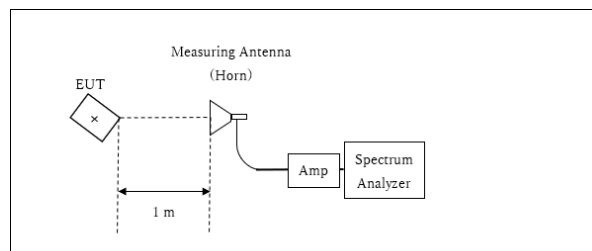


r : Radius of an outer periphery of EUT
 × : Center of turn table

Distance Factor: $20 \times \log(3.7 \text{ m} / 3.0 \text{ m}) = 1.82 \text{ dB}$
 * Test Distance: $(3 + \text{SVSWR Volume} / 2) - r = 3.7 \text{ m}$

SVSWR Volume : 2.0 m
 (SVSWR Volume has been calibrated based on CISPR 16-1-4.)
 $r = 0.3 \text{ m}$

10 GHz - 26.5 GHz



× : Center of turn table

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

11b, 11g

Antenna polarization	Carrier	Spurious (30 MHz - 1 GHz)	Spurious (1 GHz - 2.8 GHz)	Spurious (2.8 GHz - 10 GHz)	Spurious (10 GHz - 18 GHz)	Spurious (18 GHz - 26.5 GHz)
Horizontal	Z	-	Z	Z	Z	Z
Vertical	X	-	X	X	X	X

11n-20 (MIMO)

Antenna polarization	Carrier	Spurious (30 MHz - 1 GHz)	Spurious (1 GHz - 2.8 GHz)	Spurious (2.8 GHz - 10 GHz)	Spurious (10 GHz - 18 GHz)	Spurious (18 GHz - 26.5 GHz)
Horizontal	Z	Z	Z	Z	Z	Z
Vertical	X	Z	X	X	X	X

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

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

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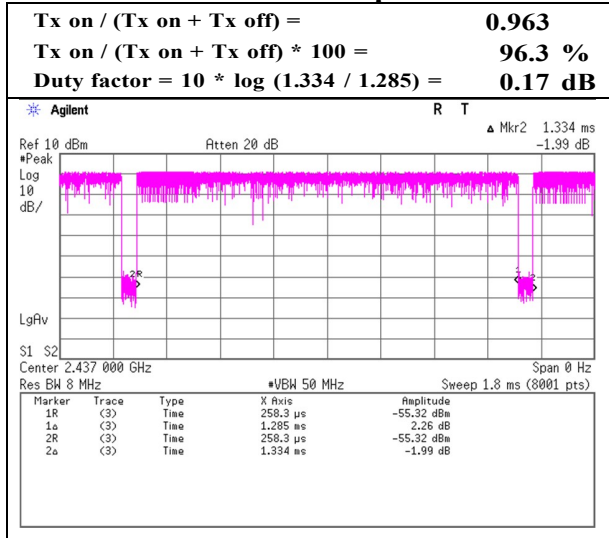
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 Telephone : +81 478 88 6500
 Facsimile : +81 478 82 3373

APPENDIX 1: Test data

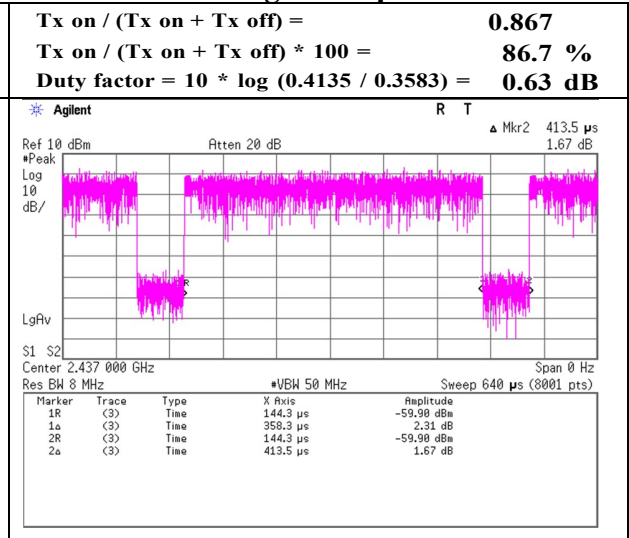
Burst rate confirmation

Report No. 13568152S-E
 Test place Kashima EMC Lab. No.2 Measurement Room
 Date November 24, 2020
 Temperature / Humidity 20 deg. C / 40 % RH
 Engineer Kazuhiro Ando
 Mode Tx

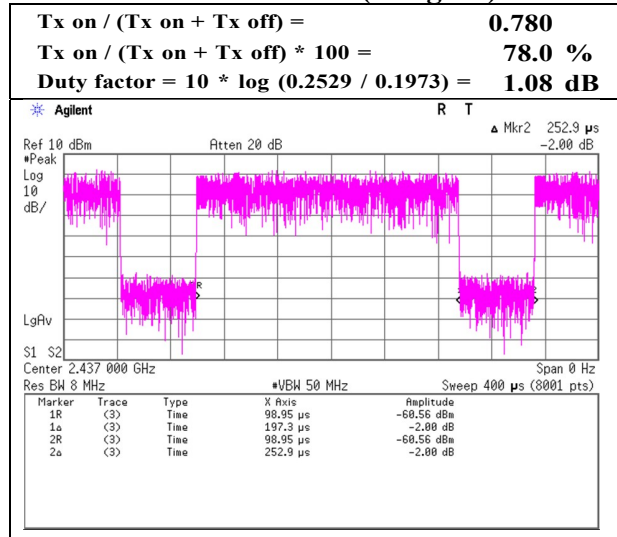
11b 11 Mbps



11g 36 Mbps



11n-20 MCS 12 (Long GI)



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

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Kashima EMC Lab.

1614, Mushihata, Katori-shi, Chiba-ken, 289-0341 Japan

Telephone : +81 478 88 6500

Facsimile : +81 478 82 3373

Radiated Spurious Emission

Report No.	13568152S-E		
Test place	Kashima EMC Lab.		
Semi Anechoic Chamber	No.6	No.6	No.6
Date	November 25, 2020	November 26, 2020	November 30, 2020
Temperature / Humidity	22 deg. C / 54 % RH	22 deg. C / 56 % RH	20 deg. C / 43 % RH
Engineer	Hiromitsu Tanabe	Hiromitsu Tanabe	Hiromitsu Tanabe
	(1 GHz - 10 GHz)	(10 GHz -18 GHz)	(18 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	50.60	27.53	13.32	43.84	1.82	49.43	73.9	24.4	150	65	
Hori.	4824.000	PK	55.80	31.27	5.35	45.18	1.82	49.06	73.9	24.8	140	60	
Hori.	7236.000	PK	49.60	36.39	6.61	43.99	1.82	50.43	73.9	23.4	100	0	Floor noise
Hori.	9648.000	PK	46.30	39.09	7.41	41.88	1.82	52.74	73.9	21.1	100	0	Floor noise
Vert.	2390.000	PK	50.80	27.53	13.32	43.84	1.82	49.63	73.9	24.2	195	0	
Vert.	4824.000	PK	54.40	31.27	5.35	45.18	1.82	47.66	73.9	26.2	195	0	
Vert.	7236.000	PK	48.80	36.39	6.61	43.99	1.82	49.63	73.9	24.2	100	0	Floor noise
Vert.	9648.000	PK	46.10	39.09	7.41	41.88	1.82	52.54	73.9	21.3	100	0	Floor noise

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

Distance factor : 1 GHz - 10 GHz : $20\log(3.7\text{ m} / 3.0\text{ m}) = 1.82\text{ dB}$

10 GHz - 26.5 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

Average measurement value with duty factor

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2390.000	AV	41.50	27.53	13.32	43.84	0.17	1.82	40.50	53.9	13.4	*1)
Hori.	4824.000	AV	46.40	31.27	5.35	45.18	0.17	1.82	39.83	53.9	14.0	
Hori.	7236.000	AV	40.20	36.39	6.61	43.99	0.17	1.82	41.20	53.9	12.7	Floor noise
Hori.	9648.000	AV	37.50	39.09	7.41	41.88	0.17	1.82	44.11	53.9	9.7	Floor noise
Vert.	2390.000	AV	41.60	27.53	13.32	43.84	0.17	1.82	40.60	53.9	13.3	*1)
Vert.	4824.000	AV	46.50	31.27	5.35	45.18	0.17	1.82	39.93	53.9	13.9	
Vert.	7236.000	AV	40.10	36.39	6.61	43.99	0.17	1.82	41.10	53.9	12.8	Floor noise
Vert.	9648.000	AV	37.70	39.09	7.41	41.88	0.17	1.82	44.31	53.9	9.5	Floor noise

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

Distance factor : 1 GHz - 10 GHz : $20\log(3.7\text{ m} / 3.0\text{ m}) = 1.82\text{ dB}$

10 GHz - 26.5 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

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

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

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2412.000	PK	93.10	27.48	13.34	43.83	1.82	91.91	-	-	Carrier
Hori.	2400.000	PK	51.00	27.48	13.33	43.83	1.82	49.80	71.91	22.1	
Vert.	2412.000	PK	93.30	27.48	13.34	43.83	1.82	92.11	-	-	Carrier
Vert.	2400.000	PK	51.70	27.48	13.33	43.83	1.82	50.50	72.11	21.6	

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

Distance factor : 1 GHz - 10 GHz : $20\log(3.7\text{ m} / 3.0\text{ m}) = 1.82\text{ dB}$

10 GHz - 26.5 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

UL Japan, Inc.

Kashima EMC Lab.

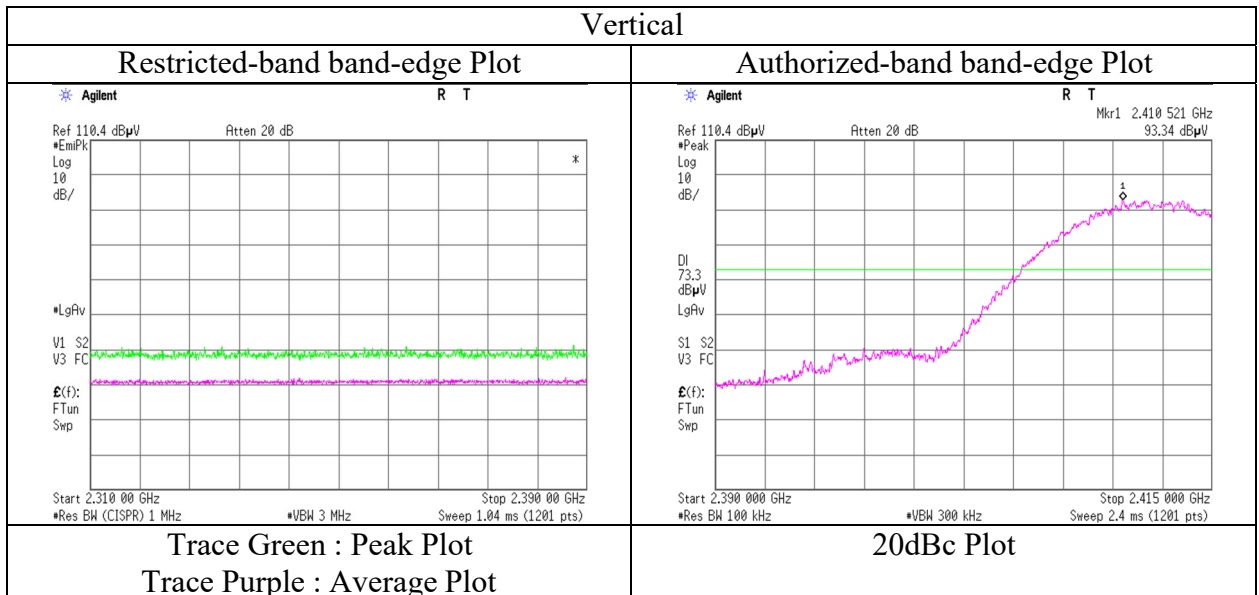
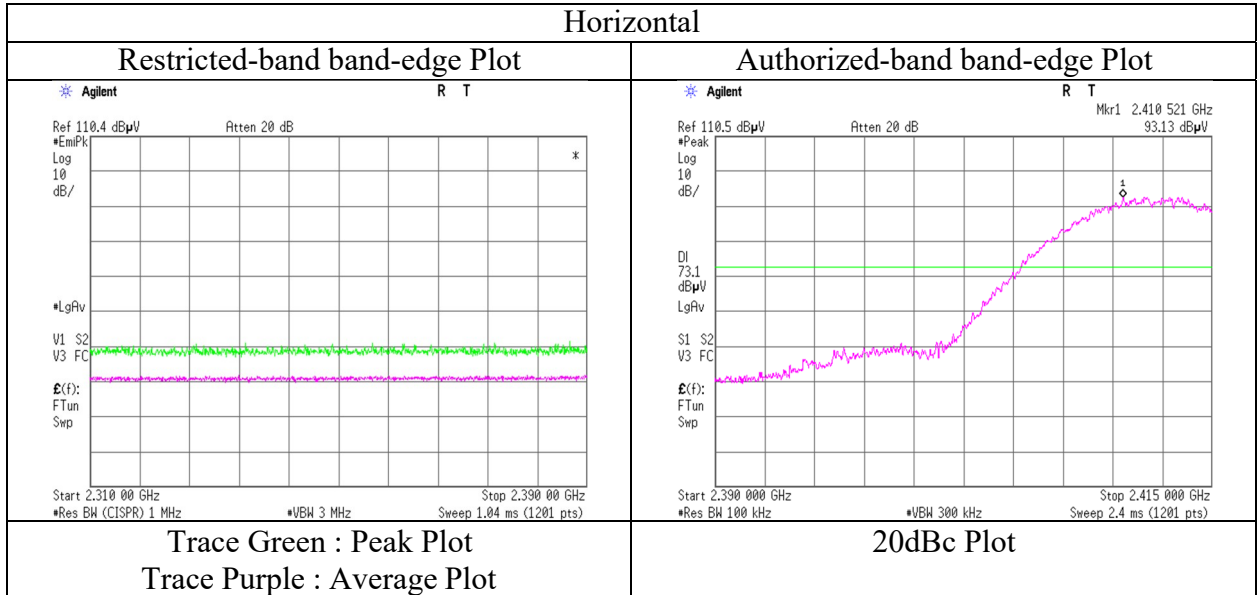
1614, Mushiata, Katori-shi, Chiba-ken, 289-0341 Japan

Telephone : +81 478 88 6500

Facsimile : +81 478 82 3373

Radiated Spurious Emission
(Reference Plot for band-edge)

Report No. 13568152S-E
Test place Kashima EMC Lab.
Semi Anechoic Chamber No.6
Date November 25, 2020
Temperature / Humidity 22 deg. C / 54 % RH
Engineer Hiromitsu Tanabe
(1 GHz - 10 GHz)
Mode Tx 11b 2412 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.	13568152S-E		
Test place	Kashima EMC Lab.		
Semi Anechoic Chamber	No.6	No.6	No.6
Date	November 25, 2020	November 26, 2020	November 30, 2020
Temperature / Humidity	22 deg. C / 54 % RH	22 deg. C / 56 % RH	20 deg. C / 43 % RH
Engineer	Hiromitsu Tanabe	Hiromitsu Tanabe	Hiromitsu Tanabe
	(1 GHz - 10 GHz)	(10 GHz -18 GHz)	(18 GHz -26.5 GHz)
Mode	Tx 11b 2437 MHz		

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	4874.000	PK	53.30	31.23	5.37	45.20	1.82	46.52	73.9	27.3	150	60	
Hori.	7311.000	PK	48.60	36.45	6.65	43.82	1.82	49.70	73.9	24.2	100	0	Floor noise
Hori.	9748.000	PK	46.30	39.51	7.46	41.80	1.82	53.29	73.9	20.6	100	0	Floor noise
Vert.	4874.000	PK	54.10	31.23	5.37	45.20	1.82	47.32	73.9	26.5	200	20	
Vert.	7311.000	PK	48.20	36.45	6.65	43.82	1.82	49.30	73.9	24.6	100	0	Floor noise
Vert.	9748.000	PK	46.60	39.51	7.46	41.80	1.82	53.59	73.9	20.3	100	0	Floor noise

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

Distance factor : 1 GHz - 10 GHz : $20\log(3.7\text{ m} / 3.0\text{ m}) = 1.82\text{ dB}$

10 GHz - 26.5 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

Average measurement value with duty factor

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	4874.000	AV	44.90	31.23	5.37	45.20	0.17	1.82	38.29	53.9	15.6	
Hori.	7311.000	AV	39.60	36.45	6.65	43.82	0.17	1.82	40.87	53.9	13.0	Floor noise
Hori.	9748.000	AV	38.00	39.51	7.46	41.80	0.17	1.82	45.16	53.9	8.7	Floor noise
Vert.	4874.000	AV	45.20	31.23	5.37	45.20	0.17	1.82	38.59	53.9	15.3	
Vert.	7311.000	AV	39.70	36.45	6.65	43.82	0.17	1.82	40.97	53.9	12.9	Floor noise
Vert.	9748.000	AV	37.80	39.51	7.46	41.80	0.17	1.82	44.96	53.9	8.9	Floor noise

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

Distance factor : 1 GHz - 10 GHz : $20\log(3.7\text{ m} / 3.0\text{ m}) = 1.82\text{ dB}$

10 GHz - 26.5 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

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

Radiated Spurious Emission

Report No.	13568152S-E		
Test place	Kashima EMC Lab.		
Semi Anechoic Chamber	No.6	No.6	No.6
Date	November 25, 2020	November 26, 2020	November 30, 2020
Temperature / Humidity	22 deg. C / 54 % RH	22 deg. C / 56 % RH	20 deg. C / 43 % RH
Engineer	Hiromitsu Tanabe	Hiromitsu Tanabe	Hiromitsu Tanabe
	(1 GHz - 10 GHz)	(10 GHz -18 GHz)	(18 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	50.50	27.52	13.40	43.80	1.82	49.44	73.9	24.4	120	70	
Hori.	4924.000	PK	53.10	31.31	5.41	45.24	1.82	46.40	73.9	27.5	150	60	
Hori.	7386.000	PK	48.60	36.46	6.65	43.63	1.82	49.90	73.9	24.0	100	0	Floor noise
Hori.	9848.000	PK	46.10	39.63	7.50	41.76	1.82	53.29	73.9	20.6	100	0	Floor noise
Vert.	2483.500	PK	50.40	27.52	13.40	43.80	1.82	49.34	73.9	24.5	195	345	
Vert.	4924.000	PK	52.90	31.31	5.41	45.24	1.82	46.20	73.9	27.7	195	0	
Vert.	7386.000	PK	48.60	36.46	6.65	43.63	1.82	49.90	73.9	24.0	100	0	Floor noise
Vert.	9848.000	PK	46.60	39.63	7.50	41.76	1.82	53.79	73.9	20.1	100	0	Floor noise

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

Distance factor : 1 GHz - 10 GHz : 20log (3.7 m / 3.0 m) = 1.82 dB

10 GHz - 26.5 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

Average measurement value with duty factor

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2483.500	AV	41.40	27.52	13.40	43.80	0.17	1.82	40.51	53.9	13.3	*1)
Hori.	4924.000	AV	44.60	31.31	5.41	45.24	0.17	1.82	38.07	53.9	15.8	
Hori.	7386.000	AV	40.00	36.46	6.65	43.63	0.17	1.82	41.47	53.9	12.4	Floor noise
Hori.	9848.000	AV	37.90	39.63	7.50	41.76	0.17	1.82	45.26	53.9	8.6	Floor noise
Vert.	2483.500	AV	41.50	27.52	13.40	43.80	0.17	1.82	40.61	53.9	13.2	*1)
Vert.	4924.000	AV	44.50	31.31	5.41	45.24	0.17	1.82	37.97	53.9	15.9	
Vert.	7386.000	AV	39.90	36.46	6.65	43.63	0.17	1.82	41.37	53.9	12.5	Floor noise
Vert.	9848.000	AV	38.00	39.63	7.50	41.76	0.17	1.82	45.36	53.9	8.5	Floor noise

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

Distance factor : 1 GHz - 10 GHz : 20log (3.7 m / 3.0 m) = 1.82 dB

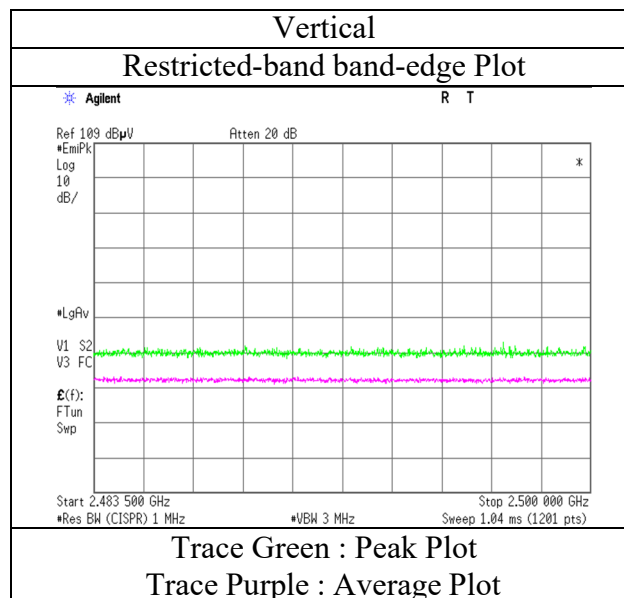
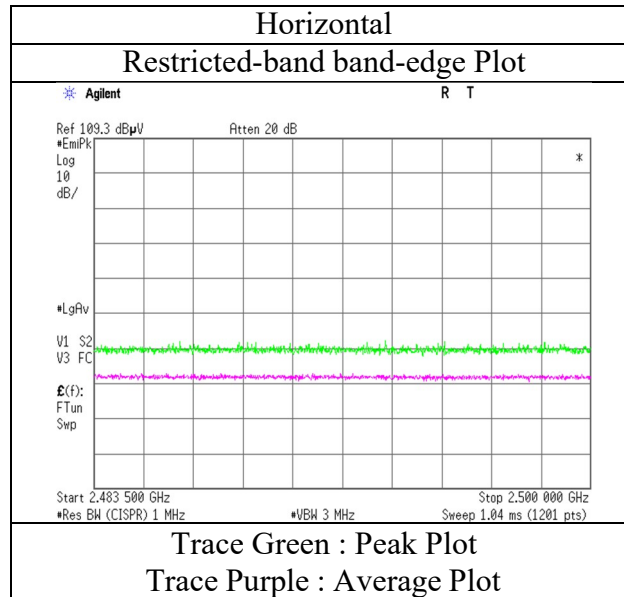
10 GHz - 26.5 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

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

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

Radiated Spurious Emission
(Reference Plot for band-edge)

Report No. 13568152S-E
Test place Kashima EMC Lab.
Semi Anechoic Chamber No.6
Date November 25, 2020
Temperature / Humidity 22 deg. C / 54 % RH
Engineer Hiromitsu Tanabe
(1 GHz - 10 GHz)
Mode Tx 11b 2462 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.	13568152S-E		
Test place	Kashima EMC Lab.		
Semi Anechoic Chamber	No.6	No.6	No.6
Date	November 25, 2020	November 26, 2020	November 30, 2020
Temperature / Humidity	22 deg. C / 54 % RH	22 deg. C / 56 % RH	20 deg. C / 43 % RH
Engineer	Hiromitsu Tanabe	Hiromitsu Tanabe	Hiromitsu Tanabe
Mode	(1 GHz - 10 GHz) Tx 11g 2412 MHz	(10 GHz -18 GHz)	(18 GHz -26.5 GHz)

(* 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	54.10	27.53	13.32	43.84	1.82	52.93	73.9	20.9	150	65	
Hori.	4824.000	PK	51.20	31.27	5.35	45.18	1.82	44.46	73.9	29.4	100		Floor noise
Hori.	7236.000	PK	48.70	36.39	6.61	43.99	1.82	49.53	73.9	24.3	100		Floor noise
Hori.	9648.000	PK	46.30	39.09	7.41	41.88	1.82	52.74	73.9	21.1	100		Floor noise
Vert.	2390.000	PK	54.20	27.53	13.32	43.84	1.82	53.03	73.9	20.8	195		
Vert.	4824.000	PK	52.40	31.27	5.35	45.18	1.82	45.66	73.9	28.2	100		Floor noise
Vert.	7236.000	PK	48.50	36.39	6.61	43.99	1.82	49.33	73.9	24.5	100		Floor noise
Vert.	9648.000	PK	46.00	39.09	7.41	41.88	1.82	52.44	73.9	21.4	100		Floor noise

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

Distance factor : 1 GHz - 10 GHz : $20\log(3.7\text{ m} / 3.0\text{ m}) = 1.82\text{ dB}$

10 GHz - 26.5 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

Average measurement value with duty factor

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2390.000	AV	43.00	27.53	13.32	43.84	0.63	1.82	42.46	53.9	11.4	*1)
Hori.	4824.000	AV	43.60	31.27	5.35	45.18	0.63	1.82	37.49	53.9	16.4	Floor noise
Hori.	7236.000	AV	40.10	36.39	6.61	43.99	0.63	1.82	41.56	53.9	12.3	Floor noise
Hori.	9648.000	AV	37.80	39.09	7.41	41.88	0.63	1.82	44.87	53.9	9.0	Floor noise
Vert.	2390.000	AV	43.40	27.53	13.32	43.84	0.63	1.82	42.86	53.9	11.0	*1)
Vert.	4824.000	AV	43.30	31.27	5.35	45.18	0.63	1.82	37.19	53.9	16.7	Floor noise
Vert.	7236.000	AV	40.00	36.39	6.61	43.99	0.63	1.82	41.46	53.9	12.4	Floor noise
Vert.	9648.000	AV	37.70	39.09	7.41	41.88	0.63	1.82	44.77	53.9	9.1	Floor noise

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

Distance factor : 1 GHz - 10 GHz : $20\log(3.7\text{ m} / 3.0\text{ m}) = 1.82\text{ dB}$

10 GHz - 26.5 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

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

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

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2412.000	PK	84.50	27.48	13.34	43.83	1.82	83.31	-	-	Carrier
Hori.	2400.000	PK	54.80	27.48	13.33	43.83	1.82	53.60	63.31	9.7	
Vert.	2412.000	PK	84.70	27.48	13.34	43.83	1.82	83.51	-	-	Carrier
Vert.	2400.000	PK	54.50	27.48	13.33	43.83	1.82	53.30	63.51	10.2	

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

Distance factor : 1 GHz - 10 GHz : $20\log(3.7\text{ m} / 3.0\text{ m}) = 1.82\text{ dB}$

10 GHz - 26.5 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

UL Japan, Inc.

Kashima EMC Lab.

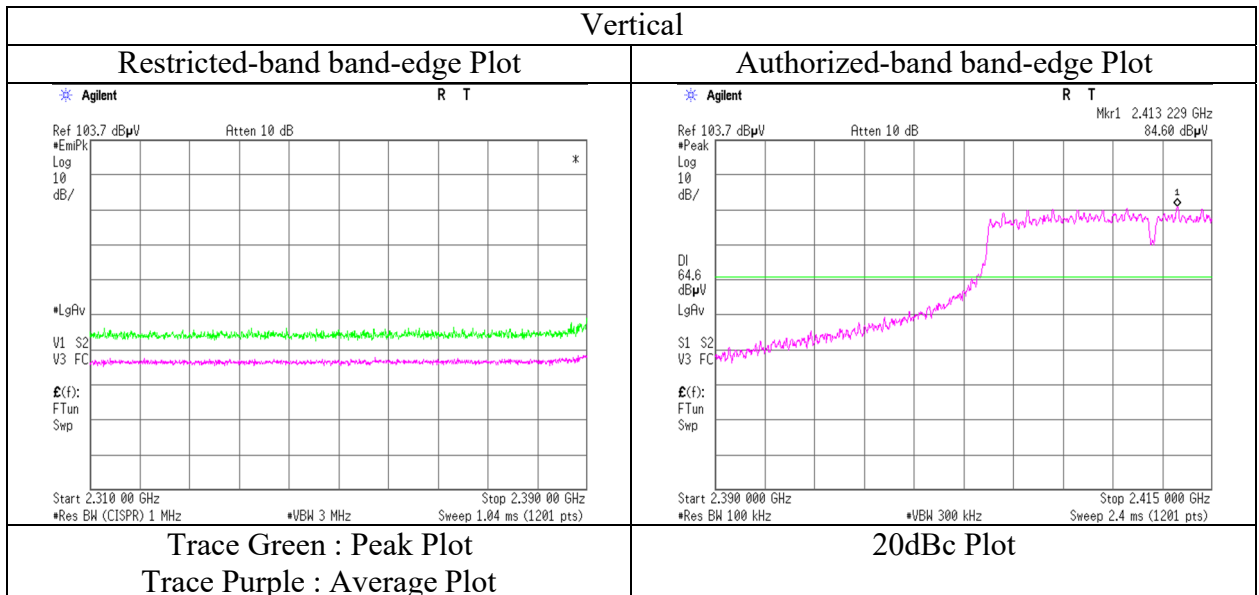
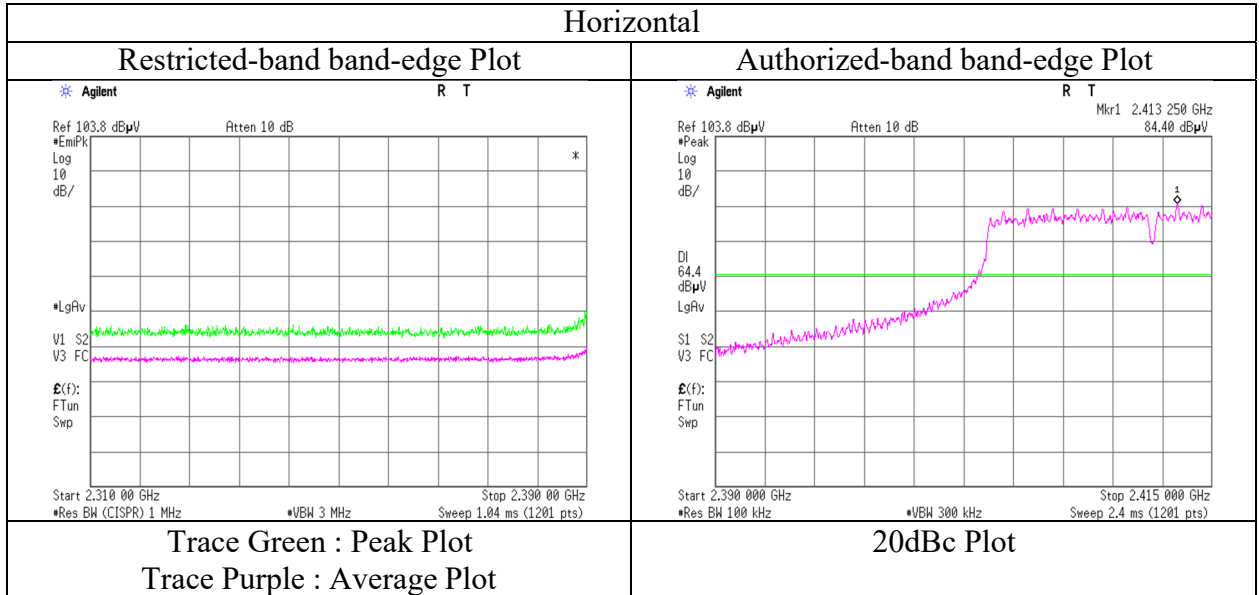
1614, Mushiata, Katori-shi, Chiba-ken, 289-0341 Japan

Telephone : +81 478 88 6500

Facsimile : +81 478 82 3373

Radiated Spurious Emission
(Reference Plot for band-edge)

Report No. 13568152S-E
Test place Kashima EMC Lab.
Semi Anechoic Chamber No.6
Date November 25, 2020
Temperature / Humidity 22 deg. C / 54 % RH
Engineer Hiromitsu Tanabe
(1 GHz - 10 GHz)
Mode Tx 11g 2412 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.	13568152S-E		
Test place	Kashima EMC Lab.		
Semi Anechoic Chamber	No.6	No.6	No.6
Date	November 25, 2020	November 26, 2020	November 30, 2020
Temperature / Humidity	22 deg. C / 54 % RH	22 deg. C / 56 % RH	20 deg. C / 43 % RH
Engineer	Hiromitsu Tanabe	Hiromitsu Tanabe	Hiromitsu Tanabe
	(1 GHz - 10 GHz)	(10 GHz -18 GHz)	(18 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.	4874.000	PK	51.70	31.23	5.37	45.20	1.82	44.92	73.9	28.9	100		Floor noise
Hori.	7311.000	PK	48.30	36.45	6.65	43.82	1.82	49.40	73.9	24.5	100		Floor noise
Hori.	9748.000	PK	46.30	39.51	7.46	41.80	1.82	53.29	73.9	20.6	100		Floor noise
Vert.	4874.000	PK	52.80	31.23	5.37	45.20	1.82	46.02	73.9	27.8	100		Floor noise
Vert.	7311.000	PK	48.80	36.45	6.65	43.82	1.82	49.90	73.9	24.0	100		Floor noise
Vert.	9748.000	PK	46.90	39.51	7.46	41.80	1.82	53.89	73.9	20.0	100		Floor noise

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

Distance factor : 1 GHz - 10 GHz : $20\log(3.7\text{ m} / 3.0\text{ m}) = 1.82\text{ dB}$

10 GHz - 26.5 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

Average measurement value with duty factor

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	4874.000	AV	43.00	31.23	5.37	45.20	0.63	1.82	36.85	53.9	17.0	Floor noise
Hori.	7311.000	AV	39.70	36.45	6.65	43.82	0.63	1.82	41.43	53.9	12.4	Floor noise
Hori.	9748.000	AV	37.60	39.51	7.46	41.80	0.63	1.82	45.22	53.9	8.6	Floor noise
Vert.	4874.000	AV	43.40	31.23	5.37	45.20	0.63	1.82	37.25	53.9	16.6	Floor noise
Vert.	7311.000	AV	39.70	36.45	6.65	43.82	0.63	1.82	41.43	53.9	12.4	Floor noise
Vert.	9748.000	AV	37.70	39.51	7.46	41.80	0.63	1.82	45.32	53.9	8.5	Floor noise

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

Distance factor : 1 GHz - 10 GHz : $20\log(3.7\text{ m} / 3.0\text{ m}) = 1.82\text{ dB}$

10 GHz - 26.5 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

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

Radiated Spurious Emission

Report No.	13568152S-E		
Test place	Kashima EMC Lab.		
Semi Anechoic Chamber	No.6	No.6	No.6
Date	November 25, 2020	November 26, 2020	November 30, 2020
Temperature / Humidity	22 deg. C / 54 % RH	22 deg. C / 56 % RH	20 deg. C / 43 % RH
Engineer	Hiromitsu Tanabe	Hiromitsu Tanabe	Hiromitsu Tanabe
	(1 GHz - 10 GHz)	(10 GHz -18 GHz)	(18 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	56.00	27.52	13.40	43.80	1.82	54.94	73.9	18.9	150	70	
Hori.	4924.000	PK	50.50	31.31	5.41	45.24	1.82	43.80	73.9	30.1	100		Floor noise
Hori.	7386.000	PK	48.80	36.46	6.65	43.63	1.82	50.10	73.9	23.8	100		Floor noise
Hori.	9848.000	PK	46.10	39.63	7.50	41.76	1.82	53.29	73.9	20.6	100		Floor noise
Vert.	2483.500	PK	57.20	27.52	13.40	43.80	1.82	56.14	73.9	17.7	190	345	
Vert.	4924.000	PK	50.80	31.31	5.41	45.24	1.82	44.10	73.9	29.8	195		Floor noise
Vert.	7386.000	PK	48.20	36.46	6.65	43.63	1.82	49.50	73.9	24.4	100		Floor noise
Vert.	9848.000	PK	47.10	39.63	7.50	41.76	1.82	54.29	73.9	19.6	100		Floor noise

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

Distance factor : 1 GHz - 10 GHz : 20log (3.7 m / 3.0 m) = 1.82 dB

10 GHz - 26.5 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

Average measurement value with duty factor

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2483.500	AV	44.00	27.52	13.40	43.80	0.63	1.82	43.57	53.9	10.3	*1)
Hori.	4924.000	AV	42.10	31.31	5.41	45.24	0.63	1.82	36.03	53.9	17.8	Floor noise
Hori.	7386.000	AV	39.80	36.46	6.65	43.63	0.63	1.82	41.73	53.9	12.1	Floor noise
Hori.	9848.000	AV	37.80	39.63	7.50	41.76	0.63	1.82	45.62	53.9	8.2	Floor noise
Vert.	2483.500	AV	44.10	27.52	13.40	43.80	0.63	1.82	43.67	53.9	10.2	*1)
Vert.	4924.000	AV	42.20	31.31	5.41	45.24	0.63	1.82	36.13	53.9	17.7	Floor noise
Vert.	7386.000	AV	40.00	36.46	6.65	43.63	0.63	1.82	41.93	53.9	11.9	Floor noise
Vert.	9848.000	AV	37.90	39.63	7.50	41.76	0.63	1.82	45.72	53.9	8.1	Floor noise

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

Distance factor : 1 GHz - 10 GHz : 20log (3.7 m / 3.0 m) = 1.82 dB

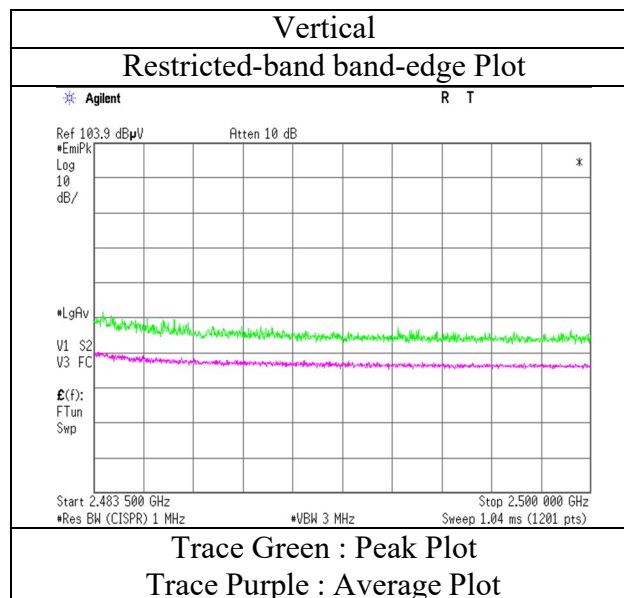
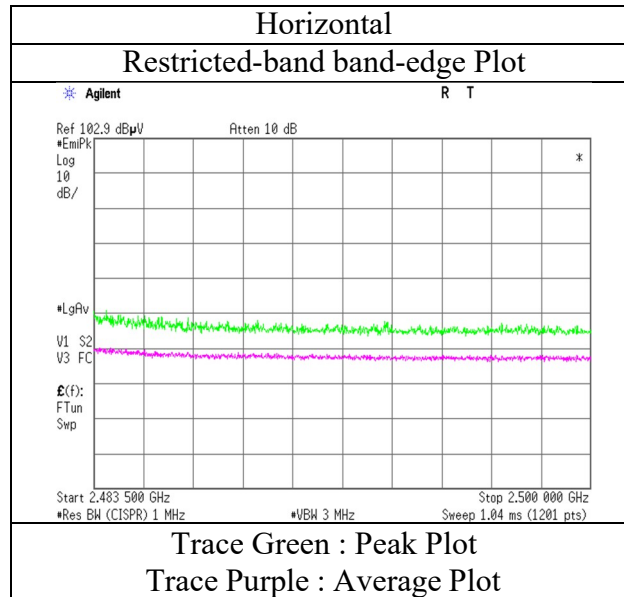
10 GHz - 26.5 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

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

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

Radiated Spurious Emission
(Reference Plot for band-edge)

Report No. 13568152S-E
Test place Kashima EMC Lab.
Semi Anechoic Chamber No.6
Date November 25, 2020
Temperature / Humidity 22 deg. C / 54 % RH
Engineer Hiromitsu Tanabe
(1 GHz - 10 GHz)
Mode Tx 11g 2462 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. 13568152S-E
Test place Kashima EMC Lab.
Semi Anechoic Chamber No.6 No.6 No.6
Date November 26, 2020 November 26, 2020 November 30, 2020
Temperature / Humidity 22 deg. C / 56 % RH 22 deg. C / 56 % RH 20 deg. C / 43 % RH
Engineer Hiromitsu Tanabe Hiromitsu Tanabe Hiromitsu Tanabe
(1 GHz - 10 GHz) (10 GHz -18 GHz) (18 GHz -26.5 GHz)
Mode Tx 11n-20 2412 MHz

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	2390.000	PK	54.30	27.53	13.32	43.84	1.82	53.13	73.9	20.7	110	70	
Hori.	4824.000	PK	51.50	31.27	5.35	45.18	1.82	44.76	73.9	29.1	100		Floor noise
Hori.	7236.000	PK	48.90	36.39	6.61	43.99	1.82	49.73	73.9	24.1	100		Floor noise
Hori.	9648.000	PK	46.00	39.09	7.41	41.88	1.82	52.44	73.9	21.4	100		Floor noise
Vert.	2390.000	PK	54.90	27.53	13.32	43.84	1.82	53.73	73.9	20.1	285	345	
Vert.	4824.000	PK	51.90	31.27	5.35	45.18	1.82	45.16	73.9	28.7	100		Floor noise
Vert.	7236.000	PK	48.90	36.39	6.61	43.99	1.82	49.73	73.9	24.1	100		Floor noise
Vert.	9648.000	PK	46.80	39.09	7.41	41.88	1.82	53.24	73.9	20.6	100		Floor noise

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

Distance factor : 1 GHz - 10 GHz : $20\log(3.7\text{ m} / 3.0\text{ m}) = 1.82\text{ dB}$

10 GHz - 26.5 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

Average measurement value with duty factor

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2390.000	AV	42.80	27.53	13.32	43.84	1.08	1.82	42.71	53.9	11.1	*1)
Hori.	4824.000	AV	43.20	31.27	5.35	45.18	1.08	1.82	37.54	53.9	16.3	Floor noise
Hori.	7236.000	AV	40.00	36.39	6.61	43.99	1.08	1.82	41.91	53.9	11.9	Floor noise
Hori.	9648.000	AV	37.60	39.09	7.41	41.88	1.08	1.82	45.12	53.9	8.7	Floor noise
Vert.	2390.000	AV	43.40	27.53	13.32	43.84	1.08	1.82	43.31	53.9	10.5	*1)
Vert.	4824.000	AV	43.50	31.27	5.35	45.18	1.08	1.82	37.84	53.9	16.0	Floor noise
Vert.	7236.000	AV	40.10	36.39	6.61	43.99	1.08	1.82	42.01	53.9	11.8	Floor noise
Vert.	9648.000	AV	37.70	39.09	7.41	41.88	1.08	1.82	45.22	53.9	8.6	Floor noise

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

Distance factor : 1 GHz - 10 GHz : $20\log(3.7\text{ m} / 3.0\text{ m}) = 1.82\text{ dB}$

10 GHz - 26.5 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

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

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

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2412.000	PK	87.60	27.48	13.34	43.83	1.82	86.41	-	-	Carrier
Hori.	2400.000	PK	54.30	27.48	13.33	43.83	1.82	53.10	66.41	13.3	
Vert.	2412.000	PK	88.40	27.48	13.34	43.83	1.82	87.21	-	-	Carrier
Vert.	2400.000	PK	55.20	27.48	13.33	43.83	1.82	54.00	67.21	13.2	

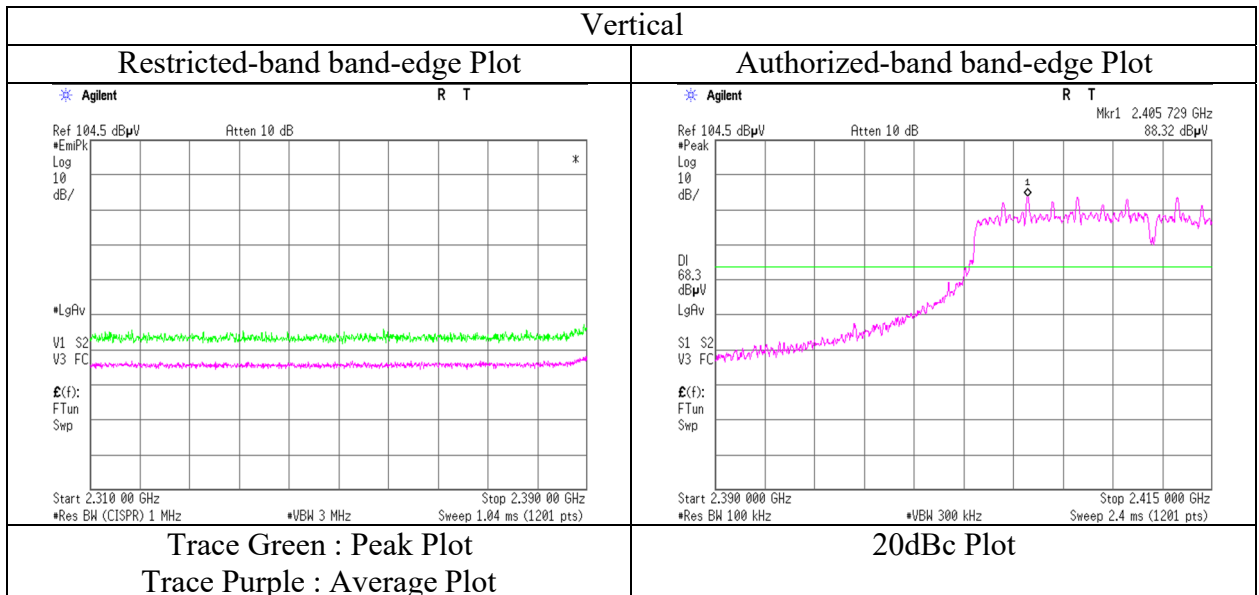
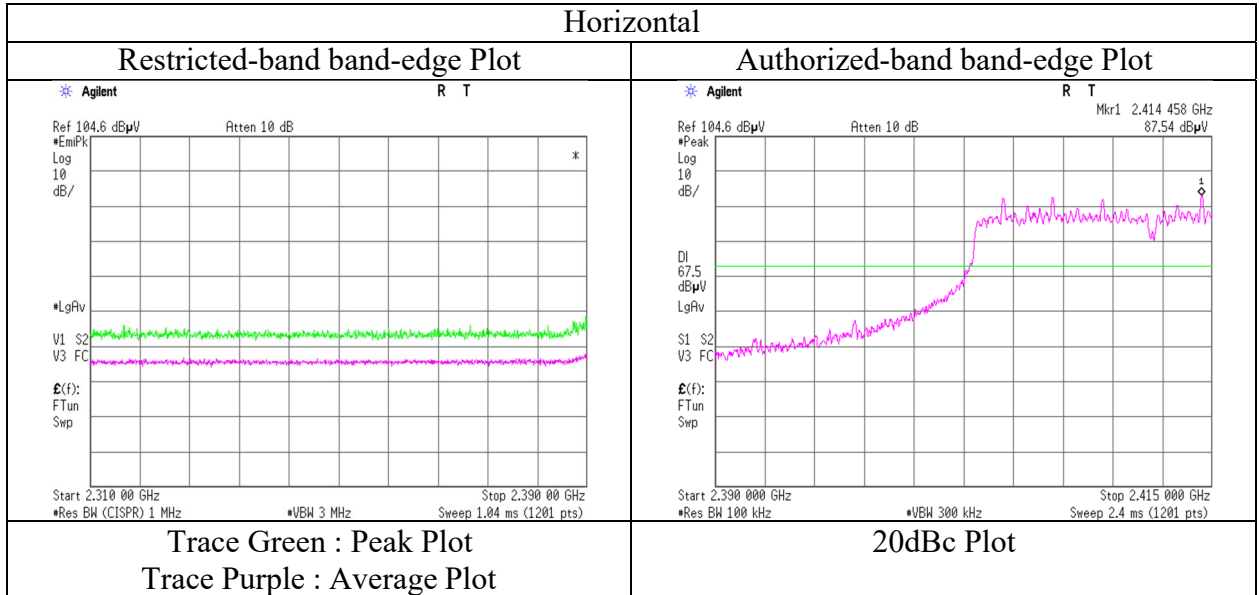
Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 10 GHz : $20\log(3.7\text{ m} / 3.0\text{ m}) = 1.82\text{ dB}$

10 GHz - 26.5 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

Radiated Spurious Emission (Reference Plot for band-edge)

Report No.	13568152S-E
Test place	Kashima EMC Lab.
Semi Anechoic Chamber	No.6
Date	November 26, 2020
Temperature / Humidity	22 deg. C / 56 % RH
Engineer	Hiromitsu Tanabe (1 GHz - 10 GHz)
Mode	Tx 11n-20 2412 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.	13568152S-E			
Test place	Kashima EMC Lab.			
Semi Anechoic Chamber	No.11	No.6	No.6	No.6
Date	December 2, 2020	November 26, 2020	November 26, 2020	November 30, 2020
Temperature / Humidity	20 deg. C / 53 % RH	22 deg. C / 56 % RH	22 deg. C / 56 % RH	20 deg. C / 43 % RH
Engineer	Hirimitsu Tanabe	Hirimitsu Tanabe	Hirimitsu Tanabe	Hirimitsu Tanabe
	(30 MHz - 1000 MHz)	(1 GHz - 10 GHz)	(10 GHz -18 GHz)	(18 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.	250.000	QP	28.70	11.81	7.31	32.05	0.00	15.77	46.0	30.2	100	105	
Hori.	450.000	QP	27.80	17.06	8.24	31.99	0.00	21.11	46.0	24.8	184	150	
Hori.	550.000	QP	30.80	18.52	8.61	32.03	0.00	25.90	46.0	20.1	145	32	
Hori.	900.000	QP	27.80	23.49	9.76	31.41	0.00	29.64	46.0	16.3	105	140	
Hori.	950.000	QP	26.40	24.01	9.92	31.04	0.00	29.29	46.0	16.7	145	138	
Hori.	4874.000	PK	51.70	31.23	5.37	45.20	1.82	44.92	73.9	28.9	100		Floor noise
Hori.	7311.000	PK	49.00	36.45	6.65	43.82	1.82	50.10	73.9	23.8	100		Floor noise
Hori.	9748.000	PK	46.80	39.51	7.46	41.80	1.82	53.79	73.9	20.1	100		Floor noise
Vert.	450.000	QP	27.40	17.06	8.24	31.99	0.00	20.71	46.0	25.2	100	175	
Vert.	550.000	QP	27.70	18.52	8.61	32.03	0.00	22.80	46.0	23.2	100	115	
Vert.	850.000	QP	24.10	22.84	9.61	31.69	0.00	24.86	46.00	21.1	150	180	
Vert.	900.000	QP	26.50	23.49	9.76	31.41	0.00	28.34	46.00	17.6	130	180	
Vert.	950.000	QP	26.90	24.01	9.92	31.04	0.00	29.79	46.00	16.2	128	165	
Vert.	4874.000	PK	51.70	31.23	5.37	45.20	1.82	44.92	73.90	28.9	100		Floor noise
Vert.	7311.000	PK	49.30	36.45	6.65	43.82	1.82	50.40	73.90	23.5	100		Floor noise
Vert.	9748.000	PK	46.80	39.51	7.46	41.80	1.82	53.79	73.90	20.1	100		Floor noise

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

Distance factor : 1 GHz - 10 GHz : $20\log(3.7\text{ m} / 3.0\text{ m}) = 1.82\text{ dB}$

10 GHz - 26.5 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

Average measurement value with duty factor

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	4874.000	AV	43.10	31.23	5.37	45.20	1.08	1.82	37.40	53.9	16.5	Floor noise
Hori.	7311.000	AV	39.90	36.45	6.65	43.82	1.08	1.82	42.08	53.9	11.8	Floor noise
Hori.	9748.000	AV	37.80	39.51	7.46	41.80	1.08	1.82	45.87	53.9	8.0	Floor noise
Vert.	4874.000	AV	43.40	31.23	5.37	45.20	1.08	1.82	37.70	53.9	16.2	Floor noise
Vert.	7311.000	AV	39.70	36.45	6.65	43.82	1.08	1.82	41.88	53.9	12.0	Floor noise
Vert.	9748.000	AV	37.80	39.51	7.46	41.80	1.08	1.82	45.87	53.9	8.0	Floor noise

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

Distance factor : 1 GHz - 10 GHz : $20\log(3.7\text{ m} / 3.0\text{ m}) = 1.82\text{ dB}$

10 GHz - 26.5 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

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

Radiated Spurious Emission

Report No.	13568152S-E		
Test place	Kashima EMC Lab.		
Semi Anechoic Chamber	No.6	No.6	No.6
Date	November 26, 2020	November 26, 2020	November 30, 2020
Temperature / Humidity	22 deg. C / 56 % RH	22 deg. C / 56 % RH	20 deg. C / 43 % RH
Engineer	Hiromitsu Tanabe	Hiromitsu Tanabe	Hiromitsu Tanabe
	(1 GHz - 10 GHz)	(10 GHz -18 GHz)	(18 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	52.40	27.52	13.40	43.80	1.82	51.34	73.9	22.5	120	70	
Hori.	4924.000	PK	50.20	31.31	5.41	45.24	1.82	43.50	73.9	30.4	100		Floor noise
Hori.	7386.000	PK	48.60	36.46	6.65	43.63	1.82	49.90	73.9	24.0	100		Floor noise
Hori.	9848.000	PK	46.80	39.63	7.50	41.76	1.82	53.99	73.9	19.9	100		Floor noise
Vert.	2483.500	PK	53.10	27.52	13.40	43.80	1.82	52.04	73.9	21.8	280	345	
Vert.	4924.000	PK	50.60	31.31	5.41	45.24	1.82	43.90	73.9	30.0	100		Floor noise
Vert.	7386.000	PK	49.20	36.46	6.65	43.63	1.82	50.50	73.9	23.4	100		Floor noise
Vert.	9848.000	PK	46.80	39.63	7.50	41.76	1.82	53.99	73.9	19.9	100		Floor noise

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

Distance factor : 1 GHz - 10 GHz : $20\log(3.7\text{ m} / 3.0\text{ m}) = 1.82\text{ dB}$

10 GHz - 26.5 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

Average measurement value with duty factor

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2483.500	AV	42.40	27.52	13.40	43.80	1.08	1.82	42.42	53.9	11.4	*1)
Hori.	4924.000	AV	42.40	31.31	5.41	45.24	1.08	1.82	36.78	53.9	17.1	Floor noise
Hori.	7386.000	AV	40.00	36.46	6.65	43.63	1.08	1.82	42.38	53.9	11.5	Floor noise
Hori.	9848.000	AV	38.00	39.63	7.50	41.76	1.08	1.82	46.27	53.9	7.6	Floor noise
Vert.	2483.500	AV	42.90	27.52	13.40	43.80	1.08	1.82	42.92	53.9	10.9	*1)
Vert.	4924.000	AV	42.50	31.31	5.41	45.24	1.08	1.82	36.88	53.9	17.0	Floor noise
Vert.	7386.000	AV	40.00	36.46	6.65	43.63	1.08	1.82	42.38	53.9	11.5	Floor noise
Vert.	9848.000	AV	37.90	39.63	7.50	41.76	1.08	1.82	46.17	53.9	7.7	Floor noise

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

Distance factor : 1 GHz - 10 GHz : $20\log(3.7\text{ m} / 3.0\text{ m}) = 1.82\text{ dB}$

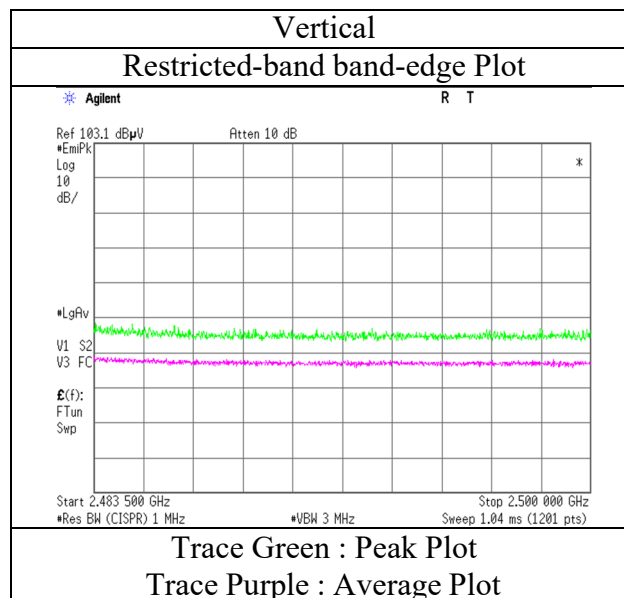
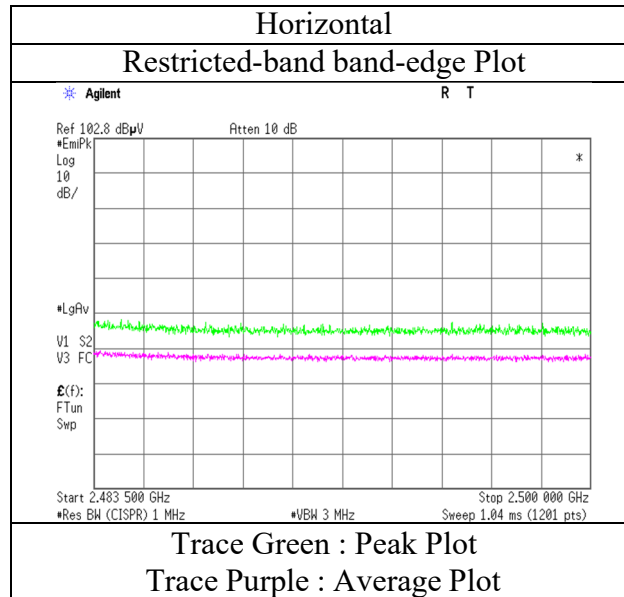
10 GHz - 26.5 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

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

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

Radiated Spurious Emission
(Reference Plot for band-edge)

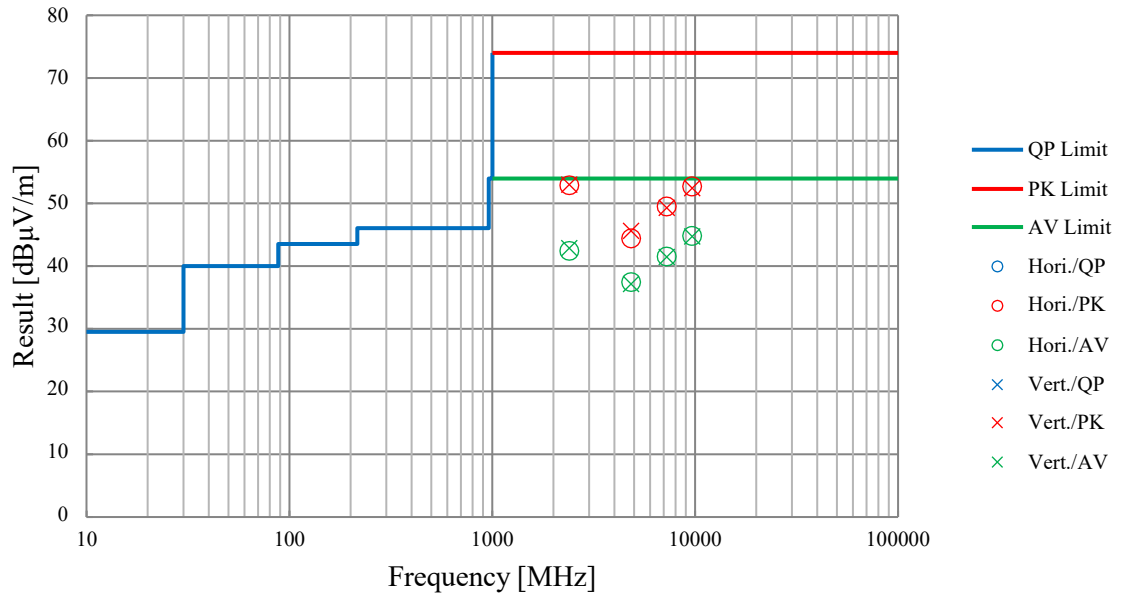
Report No. 13568152S-E
Test place Kashima EMC Lab.
Semi Anechoic Chamber No.6
Date November 26, 2020
Temperature / Humidity 22 deg. C / 56 % RH
Engineer Hiromitsu Tanabe
(1 GHz - 10 GHz)
Mode Tx 11n-20 2462 MHz



* 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.	13568152S-E		
Test place	Kashima EMC Lab.		
Semi Anechoic Chamber	No.6	No.6	No.6
Date	November 25, 2020	November 26, 2020	November 30, 2020
Temperature / Humidity	22 deg. C / 54 % RH	22 deg. C / 56 % RH	20 deg. C / 43 % RH
Engineer	Hiromitsu Tanabe	Hiromitsu Tanabe	Hiromitsu Tanabe
Mode	Tx 11g 2412 MHz		



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

APPENDIX 2: Test instruments

Test equipment

Test Item	Local ID	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Cal Int
RE	CCC-S11-R	143169	Coaxial Cable	Fujikura,Suhner,Suhner,Agilent,Suhner,-,Suhner	5D-2W,SF106,SF104,8496B+8494B,SF106,-,SF106	MY42143380,US00431042(Step Att)	2020/11/10	12
RE	CBL-09	143122	LOGBICON	Schwarzbeck Mess - Elektronik	VULB 9168	508	2020/04/07	12
RE	CAT5-04	178807	5dB Fixed Atten.	PASTERNAK	PE7047-5	none	2020/04/01	12
RE	CAF-16	142936	Pre-Amplifier	SONOMA INSTRUMENT	310N	325015	2020/05/12	12
RE	CTR-01	144193	Test Receiver	Rohde & Schwarz	ESU40	100426	2020/04/21	12
RE(GHz)	CHA-20	143453	Broad Band Horn	Schwarzbeck Mess - Elektronik	BBHA 9120D	9120D-1270	2020/06/06	12
RE(GHz)	TSA-01	143642	Spectrum Analyzer	Keysight Technologies Inc	N9030A	MY53310670 Version A.13.12	2020/05/19	12
RE(GHz)	CAF-22	142940	Pre-Amplifier	Micro Wave Factory	MPR-1G26.5-35	161399	2020/06/08	12
RE(GHz)	CCC-G15	192242	Microwave Cable	Huber+Suhner	AnySF104/PC35m/PC35m/1000mm	805419/4	2020/01/15	12
RE(GHz)	CCC-G18	192245	Microwave Cable	Huber+Suhner	SF104/11N/11PC35/8000MM	808997/4	2020/01/15	12
RE(GHz)	CHA-07	143438	Double Ridged Horn	ETS-Lindgren	3160-09	00166043	2020/06/06	12
RE(GHz)	CAF-19	142937	Pre-Amplifier	TOYO	HAP18-26W	00000035	2020/06/09	12
RE(GHz)	CCC-W09	143113	Micro Wave Cable	Suhner	SUCOFLEX104	MY588/4	2020/07/05	12
RE(GHz)	CAT10-17	143023	10dB Fixed Atten.	Weinschel - API Technologies Corp	54A-10	56251	2020/05/15	12
RE(GHz)	CHF-04	143442	HPF	MICRO-TRONICS	HPM50111-02	009	2020/05/15	12
EMI	CSCL-08	143667	Ruler	TAJIMA	L25-55	none	-	-
EMI	COS-06	143538	Temperature & Humidity Indicator	Hioki	3641/9680-50	070727010/070799296	2020/07/21	12
EMI	CTS-07	144209	Digital Multimeter	Fluke Corporation	FLK-83- V	17610192	2020/10/20	12
EMI	COTS-CEMI-03	178804	EMI Software	TSJ (Techno Science Japan)	TEPTO-DV3(RE,CE,ME,PE)	-	-	-

*Hyphens for Last Calibration 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.

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

All equipment is calibrated with valid calibrations. Each measurement data is traceable to the national or international standards.

Test item: RE: Radiated Emission test

UL Japan, Inc.

Kashima EMC Lab.

1614, Mushiata, Katori-shi, Chiba-ken, 289-0341 Japan

Telephone : +81 478 88 6500

Facsimile : +81 478 82 3373