RADIO TEST REPORT

Test Report No. : 13607775H-A-R1

Applicant	:	**DENSO WAVE INCORPORATED**
Type of EUT	:	**Fixed Type RFID Scanner**
Model Number of EUT	:	**UR50-M-ERU**
FCC ID	:	**PZWUR50MERU**
Test regulation	:	**FCC Part 15 Subpart C: 2020**
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 the A2LA accreditation body.
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. Ise 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 13607775H-A. 13607775H-A is replaced with this report.

Date of test: November 26 to December 4, 2020

Representative test engineer:
Yuichiro Yamazaki
Engineer
Consumer Technology Division

Approved by:
Tsubasa Takayama
Leader
Consumer Technology Division

CERTIFICATE 5107.02

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

REVISION HISTORY

Original Test Report No.: 13607775H-A

Revision	Test report No.	Date	Page revised	Contents
- (Original)	13607775H-A	December 21, 2020	-	-
1	13607775H-A-R1	January 8, 2021	P 1	Correction of Applicant DENSO WAVE INCORPORAT→ DENSO WAVE INCORPORATED
1	13607775H-A-R1	January 8, 2021	P 7	Correction of Specification of the table in 3.2: Procedures and results [Carrier Frequency Separation] ISED: RSS-247 5.1 (b)→ ISED: RSS-247 5.1 (c) [Number of Hopping Frequency] [Dwell time] FCC: Section15.247(a)(1)(iii)→ FCC: Section15.247(a)(1)(i) ISED: RSS-247 5.1 (d)→ ISED: RSS-247 5.1 (c) [Maximum Peak Output Power] FCC: Section15.247(a)(b)(1)→ FCC: Section15.247(b)(2) ISED: RSS-247 5.4 (b)→ ISED: RSS-247 5.4 (a)
1	13607775H-A-R1	January 8, 2021	P 16	Correction of distance factor for internal antenna in SECTION 6: Radiated Spurious Emission (Figure 2: Test Setup) <Internal Antenna> Distance Factor: 20 x log (3.95 m / 3.0 m) = 2.38dB → <Internal Antenna> Distance Factor: 20 x log (3.95 m / 3.0 m) = 2.39dB
1	13607775H-A-R1	January 8, 2021	P 33 P 35 P 36	Correction of distance factor in APPENDIX 2: Test instruments (Radiated Spurious Emission) Distance factor: 1 GHz - 10 GHz 20log (4.45 m / 3.0 m) = 3.43 dB → Distance factor: 1 GHz - 10 GHz 20log (3.95 m / 3.0 m) = 2.39 dB
1	13607775H-A-R1	January 8, 2021	P 40	Deletion of carrier frequency (921.250 MHz) in APPENDIX 2: Test instruments (Radiated Spurious Emission)

Reference: Abbreviations (Including words undescribed in this report)

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

CONTENTS **PAGE**

SECTION 1: Customer information

Company Name	:	DENSO WAVE INCORPORATED
Address	:	1 Yshiike, Kusagi, Agui-cho, Chita-gun, Aichi 470-2297, Japan
Telephone Number	:	+81-569-49-5276
Facsimile Number	:	+81-569-49-5488
Contact Person	:	Akira Ito

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	:	Fixed Type RFID Scanner
Model Number	:	UR50-M-ERU
Serial Number	:	Refer to SECTION 4.2
Rating	:	DC 20.4 V - 26.4 V
Receipt Date	:	November 26, 2020
Country of Mass-production	:	Japan
Condition	:	Engineering prototype (Not for Sale: This sample is equivalent to mass-produced items.)
Modification	:	No Modification by the test lab.

2.2 Product Description

Model: UR50-M-ERU (referred to as the EUT in this report) is a Fixed Type RFID Scanner.

Feature of EUT:

Clock frequency(ies) in the system	:	CPU 384 MHz, SUB-SPU 66.666 MHz, Ethernet 25 MHz, R/W IC 24MHz, Crystal Oscillator 32.768 kHz, 48 MHz, 18.432 MHz

Radio Specification

Radio Type	:	Transceiver
Frequency of Operation	:	915.25 MHz to 927.5 MHz
Modulation	:	PR-ASK
Antenna type	:	Polarization switching antenna (Circularly / Linearly) (Internal (Int.)), Circularly polarized antenna (External (Ext.))
Antenna Gain	:	Internal: 3.0 dBi External: 2.0 dBi

*Simultaneously transmission does not do among combination of two external antennas and internal antenna.

SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification	:	FCC Part 15 Subpart C FCC Part 15 final revised on October 13, 2020
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

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

3.2 Procedures and results

Item	Test Procedure	Specification	Worst Margin	Results	Remarks
Conducted Emission	**FCC:** ANSI C63.10-2013 6. Standard test methods	**FCC:** Section 15.207	6.93 dB, 9.00100 MHz, N	Complied a)	-
	ISED: RSS-Gen 8.8	**ISED:** RSS-Gen 8.8			
Carrier Frequency Separation	**FCC:** KDB 558074 D01 15.247 Meas Guidance v05r02	**FCC:** Section15.247(a)(1)	See data.	Complied b)	Conducted
	ISED: -	**ISED:** RSS-247 5.1 (C)			
20dB Bandwidth	**FCC:** KDB 558074 D01 15.247 Meas Guidance v05r02	**FCC:** Section15.247(a)(1)		Complied b)	Conducted
	ISED: -	**ISED:** RSS-247 5.1 (a)			
Number of Hopping Frequency	**FCC:** KDB 558074 D01 15.247 Meas Guidance v05r02	**FCC:** Section15.247(a)(1)(i)		Complied c)	Conducted
	ISED: -	**ISED:** RSS-247 5.1 (c)			
Dwell time	**FCC:** KDB 558074 D01 15.247 Meas Guidance v05r02	**FCC:** Section15.247(a)(1)(i)		Complied d)	Conducted
	ISED: -	**ISED:** RSS-247 5.1 (c)			
Maximum Peak Output Power	**FCC:** KDB 558074 D01 15.247 Meas Guidance v05r02	**FCC:** Section15.247(b)(2)		Complied e)	Conducted
	ISED: RSS-Gen 6.12	**ISED:** RSS-247 5.4 (a)			
Spurious Emission & Band Edge Compliance	**FCC:** KDB 558074 D01 15.247 Meas Guidance v05r02	**FCC:** Section15.247(d)	5.6 dB 2782.500 MHz, AV, Hori.	Complied f) / g)	Conducted/ Radiated (above 30 MHz) *1)
	ISED: RSS-Gen 6.13	**ISED:** RSS-247 5.5 RSS-Gen 8.9 RSS-Gen 8.10			

Note: UL Japan, Inc.'s EMI Work Procedures No. 13-EM-W0420 and 13-EM-W0422.
*1) Radiated test was selected over 30 MHz based on section 15.247(d).
a) Refer to APPENDIX 1 (data of Conducted Emission)
b) Refer to APPENDIX 1 (data of 20dB Bandwidth, 99%Occupied Bandwidth and Carrier Frequency Separation)
c) Refer to APPENDIX 1 (data of Number of Hopping Frequency)
d) Refer to APPENDIX 1 (data of Dwell time)
e) Refer to APPENDIX 1 (data of Maximum Peak Output Power)
f) Refer to APPENDIX 1 (data of Conducted Spurious Emission)
g) 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 Module regardless of input voltage. Therefore, this EUT complies with the requirement.

FCC Part 15.203 Antenna requirement

For Internal Antenna

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.

For External Antenna

The EUT has an external antenna connector, but it is installed by the professionals.
Therefore, the equipment complies with the antenna requirement of Section 15.203.

3.3 Addition to standard

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

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

3.4 Uncertainty

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

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

Antenna Terminal test

Test Item	Uncertainty (+/-)
20 dB Bandwidth / 99 % Occupied Bandwidth	0.96 %
Maximum Peak Output Power / Average Output Power	1.4 dB
Carrier Frequency Separation	0.42 %
Dwell time / Burst rate	0.10 %
Conducted Spurious Emission	2.6 dB

Conducted emission

using Item	Frequency range	Uncertainty (+/-)
AMN (LISN)	0.009 MHz to 0.15 MHz	3.4 dB
	0.15 MHz to 30 MHz	2.9 dB

Radiated emission

Measurement distance	Frequency range	Uncertainty (+/-)
3 m	9 kHz to 30 MHz	3.3 dB
10 m		3.2 dB
3 m	30 MHz to 200 MHz (Horizontal)	4.8 dB
	(Vertical)	5.0 dB
	200 MHz to 1000 MHz (Horizontal)	5.2 dB
	(Vertical)	6.3 dB
10 m	30 MHz to 200 MHz (Horizontal)	4.8 dB
	(Vertical)	4.8 dB
	200 MHz to 1000 MHz (Horizontal)	5.0 dB
	(Vertical)	5.0 dB
3 m	1 GHz to 6 GHz	4.9 dB
	6 GHz to 18 GHz	5.2 dB
1 m	10 GHz to 26.5 GHz	5.5 dB
	26.5 GHz to 40 GHz	5.5 dB
10 m	1 GHz to 18 GHz	5.2 dB

3.5 Test Location

UL Japan, Inc. Ise EMC Lab.
*A2LA Certificate Number: 5107.02 / FCC Test Firm Registration Number: 199967
ISED Lab Company Number: 2973C / CAB identifier: JP0002
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN
Telephone: +81 596 24 8999, Facsimile: +81 596 24 8124

Test site	Width x Depth x Height (m)	Size of reference ground plane (m) / horizontal conducting plane	Other rooms	Maximum measurement distance
No.1 semi-anechoic chamber	19.2 x 11.2 x 7.7	7.0 x 6.0	No.1 Power source room	10 m
No.2 semi-anechoic chamber	7.5 x 5.8 x 5.2	4.0 x 4.0	-	3 m
No.3 semi-anechoic chamber	12.0 x 8.5 x 5.9	6.8 x 5.75	No.3 Preparation room	3 m
No.3 shielded room	4.0 x 6.0 x 2.7	N/A	-	-
No.4 semi-anechoic chamber	12.0 x 8.5 x 5.9	6.8 x 5.75	No.4 Preparation room	3 m
No.4 shielded room	4.0 x 6.0 x 2.7	N/A	-	-
No.5 semi-anechoic chamber	6.0 x 6.0 x 3.9	6.0 x 6.0	-	-
No.5 measurement room	6.4 x 6.4 x 3.0	6.4 x 6.4	-	-
No.6 shielded room	4.0 x 4.5 x 2.7	4.0 x 4.5	-	-
No.6 measurement room	4.75 x 5.4 x 3.0	4.75 x 4.15	-	-
No.7 shielded room	4.7 x 7.5 x 2.7	4.7 x 7.5	-	-
No.8 measurement room	3.1 x 5.0 x 2.7	3.1 x 5.0	-	-
No.9 measurement room	8.8 x 4.6 x 2.8	2.4 x 2.4	-	-
No.11 measurement room	6.2 x 4.7 x 3.0	4.8 x 4.6	-	-

* Size of vertical conducting plane (for Conducted Emission test) : 2.0 x 2.0 m for No.1, No.2, No.3, and No.4 semi-anechoic chambers and No.3 and No.4 shielded rooms.

3.6 Test data, Test instruments, and Test set up

Refer to APPENDIX.

SECTION 4: Operation of EUT during testing

4.1 Operating Mode(s)

RFID: Transmitting (Tx)
* Test was performed using each antenna (Internal / External).

Worst rate:

Internal Antenna	Polarization: Hori.	Profile: 4
External Antenna	Antenna: 1	Profile: 4

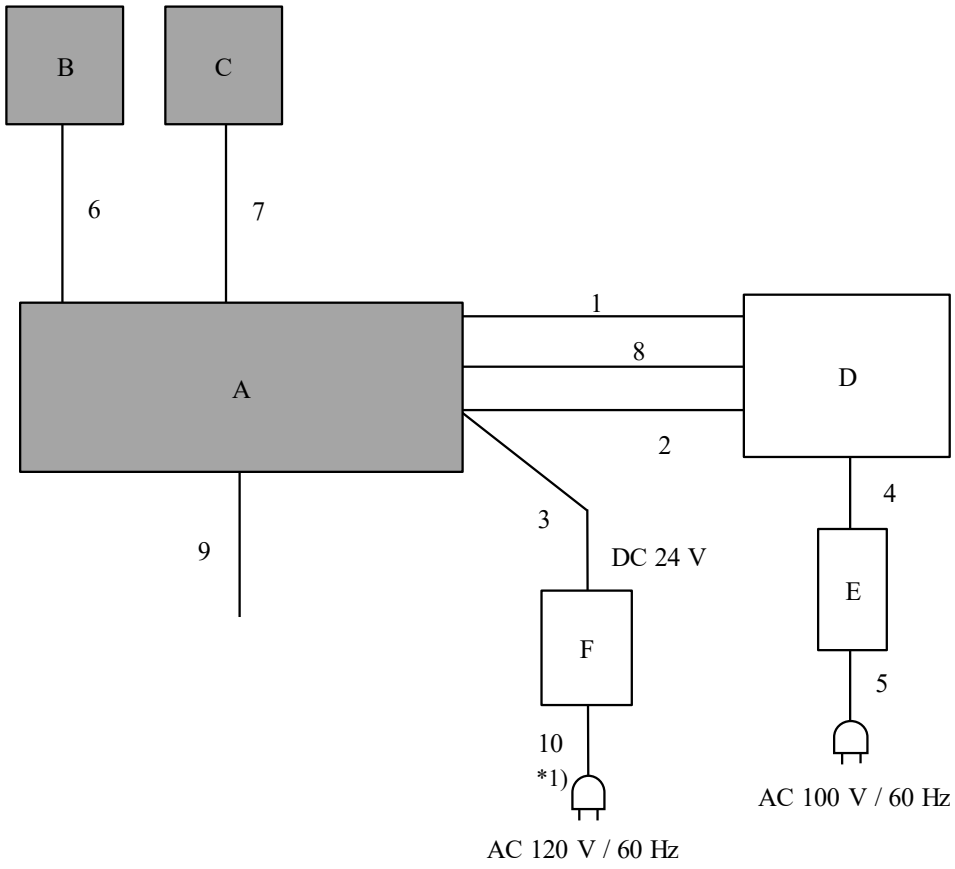
Details of Operating Mode(s)

Test Item	Mode	Tested frequency
Conducted Emission, Spurious Emission (Conducted/Radiated)	Tx (Hopping Off)	915.25 MHz 921.25 MHz 927.50 MHz
Carrier Frequency Separation	Tx (Hopping Off)	915.25 MHz 921.25 MHz 927.50 MHz
20dB Bandwidth	Tx (Hopping Off)	915.25 MHz 921.25 MHz 927.50 MHz
Number of Hopping Frequency	Tx (Hopping On / Off)	-
Dwell time	Tx (Hopping On / Off)	915.25 MHz 921.25 MHz 927.50 MHz
Maximum Peak Output Power	Tx (Hopping Off)	915.25 MHz 921.25 MHz 927.50 MHz
Band Edge Compliance (Conducted)	Tx (Hopping On / Off)	915.25 MHz 927.50 MHz
99% Occupied Bandwidth	Tx (Hopping On / Off)	915.25 MHz 921.25 MHz 927.50 MHz

*EUT has the power settings by the software as follows;
Power settings: 24 (All tests except for Maximum Peak Output Power),
4 (Maximum Peak Output Power only)
Software: ・IndyTool (Ver.2.6.0)
・UR40_TestTool (Ver.0.7.0)
(Date: 2020.06.29 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.

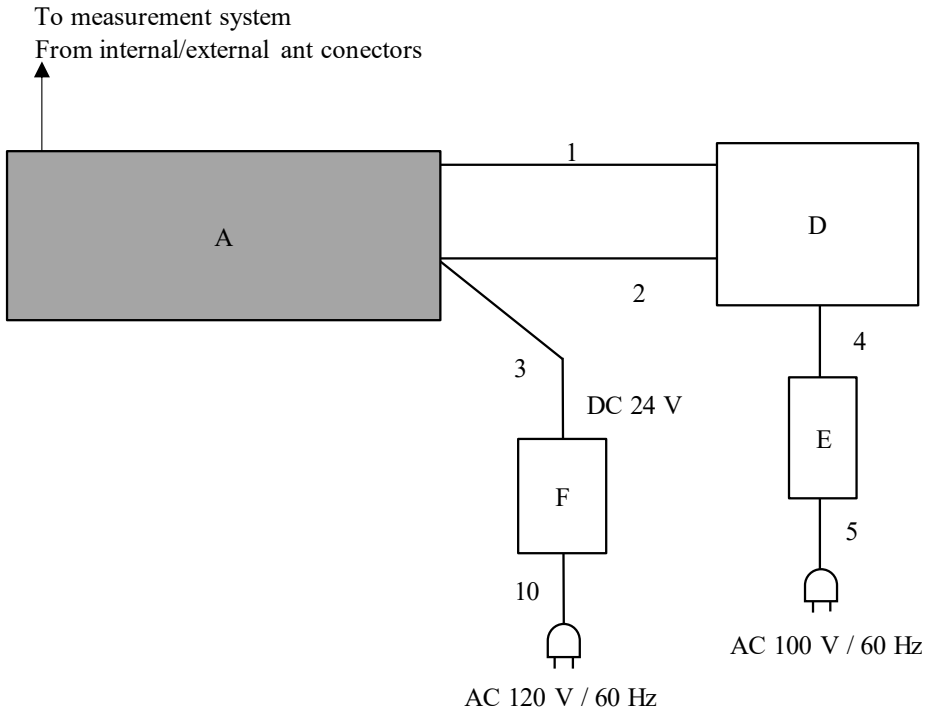
4.2 Configuration and peripherals

Radiated emission and Conducted emission test



* Cabling and setup(s) were taken into consideration and test data was taken under worse case conditions.
*1) Conducted Emission test was performed on this port.

Antenna Terminal test



* Cabling and setup(s) were taken into consideration and test data was taken under worse case conditions.

Description of EUT and Support equipment

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	Fixed Type RFID Scanner	UR50-M-ERU	000058	DENSO WAVE INCORPORATED	EUT
B	Antenna	URAN-50M1	900005	DENSO WAVE INCORPORATED	EUT
C	Antenna	URAN-50M1	900012	DENSO WAVE INCORPORATED	EUT
D	Laptop PC	PR63PBAA337AD7X	6F053983H	TOSHIBA	-
E	AC Adapter	PA51770-1ACA	FX1200E91PCC	TOSHIBA	-
F	DC Power Supply	PMC35-2A	02871	KIKUSUI ELECTRONICS CORP.	-

List of cables used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	USB Cable	2.0	Shielded	Shielded	-
2	RS-232C + USB cable	2.7	Shielded	Shielded	-
3	DC Cable	2.3	Unshielded	Unshielded	-
4	DC Cable	1.7	Unshielded	Unshielded	-
5	AC Cable	0.8	Unshielded	Unshielded	-
6	Antenna Cabe	5.0	Shielded	Shielded	-
7	Antenna Cabe	5.0	Shielded	Shielded	-
8	ETHERNET MEDIA M12 PACH CORD	2.0	Shielded	Shielded	Model: 1585D-M4UBJM-2 Manufacturer: Allen-Bradley *1)
9	Signal Cable	2.0	Shielded	Shielded	-
10	AC Cable	2.4	Unshielded	Unshielded	-

*1) As for the port which is connected to this cable, this cable only could be connected. Other cables should not be connected to this port.

SECTION 5: Conducted Emission

Test Procedure and conditions

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 rear of tabletop was located 40 cm to the vertical conducting plane. The rear of EUT, including peripherals aligned and flushed with rear of tabletop. All other surfaces of tabletop were at least 80 cm from any other grounded conducting surface. EUT was located 80 cm from a Line Impedance Stabilization Network (LISN) / Artificial mains Network (AMN) and excess AC cable was bundled in center.

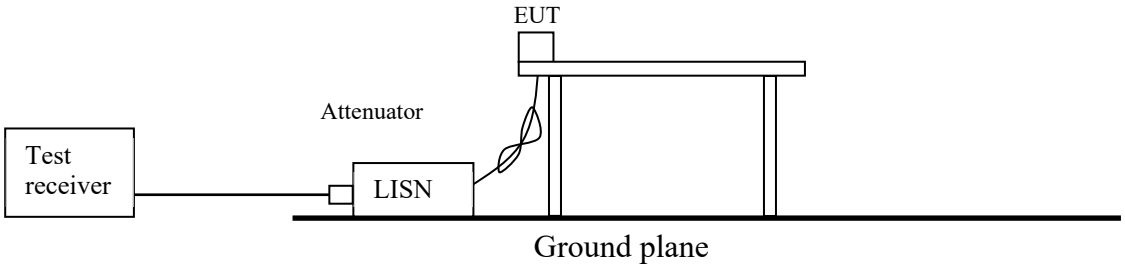
For the tests on EUT with other peripherals (as a whole system)
I/O cables that were connected to the peripherals were bundled in center. They were folded back and forth forming a bundle 30 cm to 40 cm long and were hanged at a 40 cm height to the ground plane. All unused 50 ohm connectors of the LISN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

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

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

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

Figure 1: Test Setup



SECTION 6: Radiated Spurious Emission

Test Procedure

[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	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.

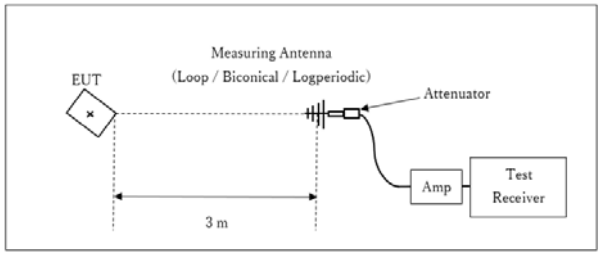
20 dBc was applied to the frequency over the limit of FCC 15.209 / Table 4 of RSS-Gen 8.9 (ISED) and outside the restricted band of FCC15.205 / Table 6 of RSS-Gen 8.10 (ISED).

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	RBW: 1 MHz VBW: 3 MHz Detector: Power Averaging (RMS) Trace: 100 traces Duty factor was added to the results.	RBW: 100 kHz VBW: 300 kHz

*1) Average Power Measurement was performed based on KDB 558074 D01 15.247 Meas Guidance v05r02.

Figure 2: Test Setup

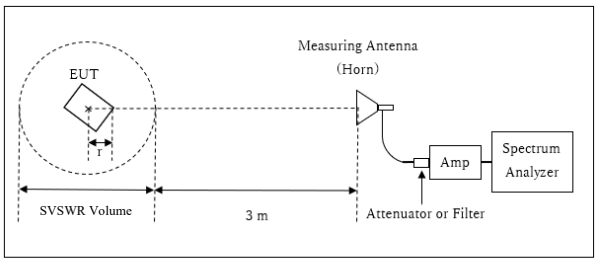
Below 1 GHz



× : Center of turn table

Test Distance: 3 m

1 GHz - 10 GHz



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

<Internal Antenna>
Distance Factor: 20 x log (3.95 m / 3.0 m) = 2.39dB
* Test Distance: (3 + SVSWR Volume /2) - r = 3.95 m

SVSWR Volume : 2.0 m
(SVSWR Volume has been calibrated based on CISPR 16-1-4.)
r = 0.05 m

<External Antenna>
Distance Factor: 20 x log (3.6 m / 3.0 m) = 1.59dB
* Test Distance: (3 + SVSWR Volume /2) - r = 3.6 m

SVSWR Volume : 1.5 m
(SVSWR Volume has been calibrated based on CISPR 16-1-4.)
r = 0.15 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.

This EUT has two modes which Tag is inserted or not. The worst case was confirmed with and without Tag, as a result, the test without Tag was the worst case. Therefore the test without Tag was performed only.

The test result was not affected by the separation distance.

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

Measurement range : 30 MHz - 10 GHz
Test data : APPENDIX
Test result : Pass

SECTION 7: Antenna Terminal Conducted Tests

Test Procedure

The tests were made with below setting connected to the antenna port.

Test	Span	RBW	VBW	Sweep time	Detector	Trace	Instrument used
20dB Bandwidth	0.5 MHz	5.1 kHz	16 kHz	Auto	Peak	Max Hold	Spectrum Analyzer
99% Occupied Bandwidth *1)	Enough width to display emission skirts	1 to 5 % of OBW	Three times of RBW	Auto	Peak	Max Hold	Spectrum Analyzer
Maximum Peak Output Power	-	-	-	Auto	Peak Average *2)	-	Power Meter (Sensor: 50MHz BW)
Carrier Frequency Separation	0.750 MHz	10 kHz	30 kHz	Auto	Peak	Max Hold	Spectrum Analyzer
Number of Hopping Frequency	25 MHz	62 kHz	180 kHz	Auto	Peak	Max Hold	Spectrum Analyzer
Dwell Time	Zero Span	100 kHz, 1 MHz	300 kHz, 3 MHz	As necessary capture the entire dwell time per hopping channel	Peak	Clear Write	Spectrum Analyzer
Conducted Spurious Emission *3) *4)	9 kHz to 150 kHz	200 Hz	620 Hz	Auto	Peak	Max Hold	Spectrum Analyzer
	150 kHz to 30 MHz	9.1 kHz	27 kHz				
	30 MHz to 25 GHz	100 kHz	300 kHz				
Conducted Spurious Emission Band Edge compliance	10 MHz	100 kHz	300 kHz	Auto	Peak	Max Hold	Spectrum Analyzer

*1) Peak hold was applied as Worst-case measurement.
*2) Reference data
*3) In the frequency range below 30MHz, RBW was narrowed to separate the noise contents.
Then, wide-band noise near the limit was checked separately, however the noise was low enough as shown in the chart.
(9 kHz - 150 kHz: RBW = 200 Hz, 150 kHz - 30 MHz: RBW = 9.1 kHz).
*4) The limits in CFR 47, Part 15, Subpart C, paragraph 15.209(a), are identical to those in RSS-Gen section 8.9, Table 6, since the measurements are performed in terms of magnetic field strength and converted to electric field strength levels (as reported in the table) using the free space impedance of 377 Ohmes. For example, the measurement at frequency 9 kHz resulted in a level of 45.5 dBuV/m, which is equivalent to 45.5 – 51.5 = -6.0 dBuA/m, which has the same margin, 3 dB, to the corresponding RSS-Gen Table 6 limit as it has to 15.209(a) limit.

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

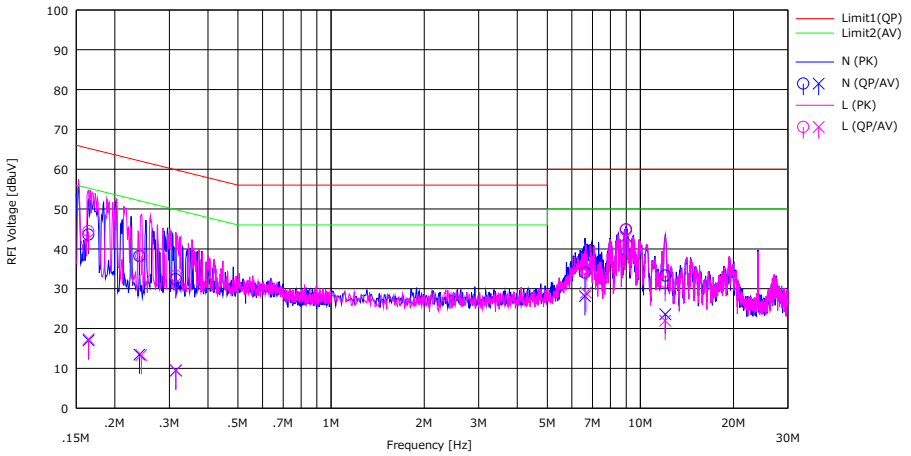
Test data : APPENDIX
Test result : Pass

APPENDIX 1: Test data

Conducted Emission
(Internal Antenna)

Report No.	13607775H
Test place	Ise EMC Lab. No.1 Semi Anechoic Chamber
Date	December 4, 2020
Temperature / Humidity	22 deg. C / 38 % RH
Engineer	Masaya Minami
Mode	Tx, Hopping Off, 927.5 MHz

Limit : FCC_Part 15 Subpart C(15.207)



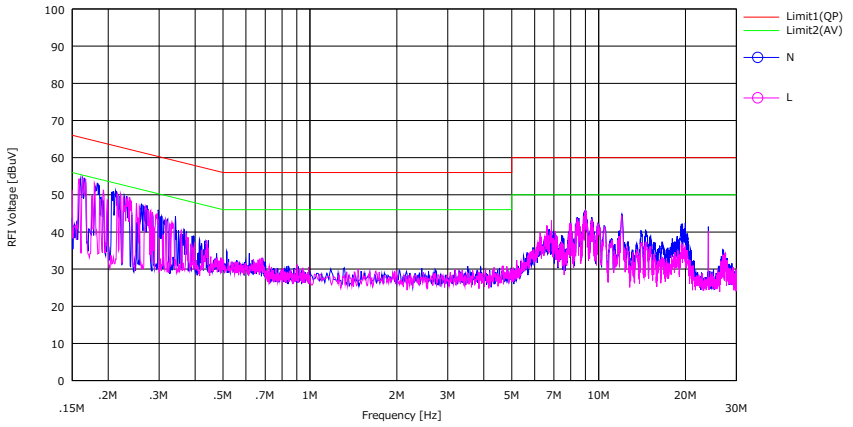
No.	Freq.	Reading		LISN	LOSS	Results		Limit		Margin		Phase	Comment
		〈QP〉	〈AV〉			〈QP〉	〈AV〉	〈QP〉	〈AV〉	〈QP〉	〈AV〉		
	[MHz]	[dBuV]	[dBuV]	[dB]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dB]	[dB]		
1	0.16445	30.40	3.90	0.08	13.06	43.54	17.04	65.24	55.24	21.70	38.20	N	
2	0.24010	25.00	0.30	0.09	13.08	38.17	13.47	62.09	52.09	23.92	38.62	N	
3	0.31490	19.20	-3.70	0.08	13.09	32.37	9.47	59.84	49.84	27.47	40.37	N	
4	6.62500	20.10	14.20	0.18	13.73	34.01	28.11	60.00	50.00	25.99	21.89	N	
5	9.00100	30.80	29.00	0.21	13.86	44.87	43.07	60.00	50.00	15.13	6.93	N	
6	12.04000	19.00	9.30	0.26	14.00	33.26	23.56	60.00	50.00	26.74	26.44	N	
7	0.16445	31.30	4.20	0.06	13.06	44.42	17.32	65.24	55.24	20.82	37.92	L	
8	0.24350	25.00	0.20	0.06	13.08	38.14	13.34	61.98	51.98	23.84	38.64	L	
9	0.31490	20.10	-3.70	0.06	13.09	33.25	9.45	59.84	49.84	26.59	40.39	L	
10	6.67000	21.00	15.10	0.19	13.73	34.92	29.02	60.00	50.00	25.08	20.98	L	
11	8.96500	30.70	28.90	0.23	13.86	44.79	42.99	60.00	50.00	15.21	7.01	L	
12	12.02000	17.40	7.70	0.28	14.00	31.68	21.98	60.00	50.00	28.32	28.02	L	

CHART: WITH FACTOR Peak hold data. CALCULATION : RESULT = READING + LISN + LOSS (CABLE + ATT)
Except for the above table: adequate margin data below the limits.

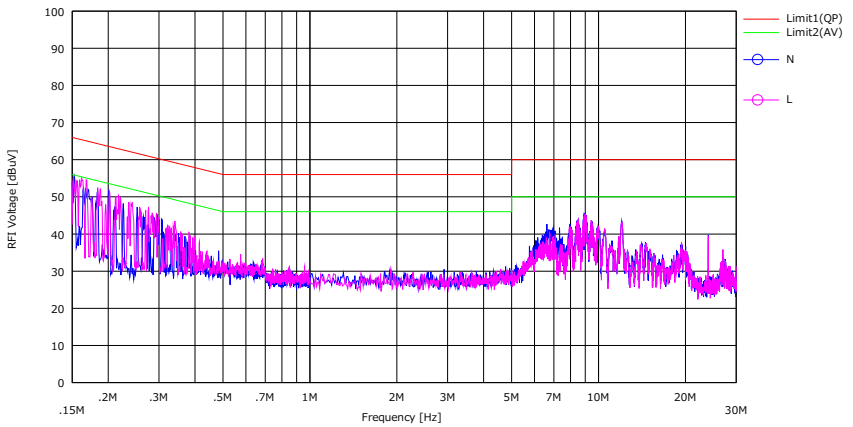
Conducted Emission
(Internal Antenna)

Report No.	13607775H
Test place	Ise EMC Lab. No.1 Semi Anechoic Chamber
Date	December 4, 2020
Temperature / Humidity	22 deg. C / 38 % RH
Engineer	Masaya Minami
Mode	Tx, Hopping Off

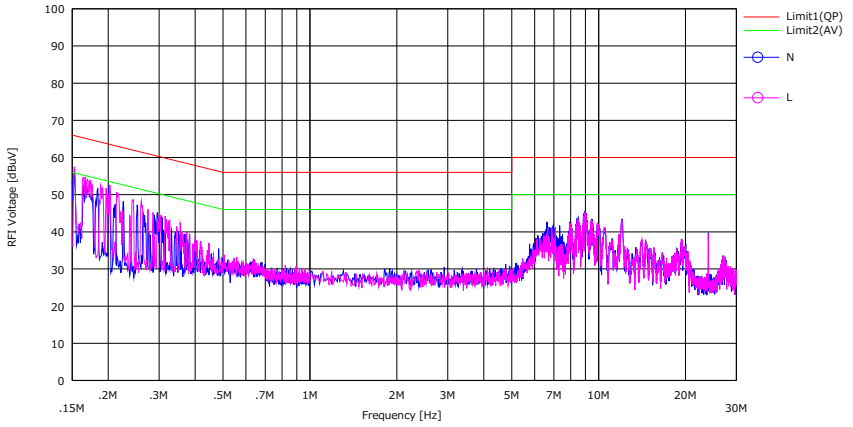
915.25 MHz



921.25 MHz



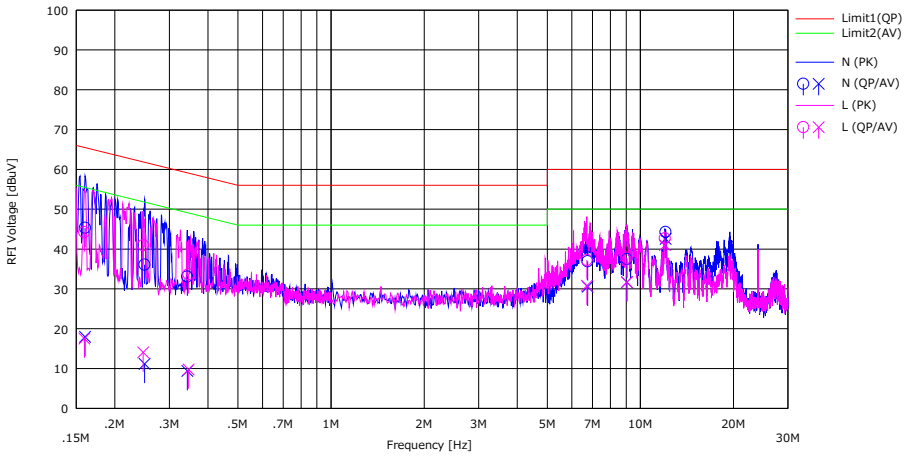
927.5 MHz



Conducted Emission
(External Antenna)

Report No.	13607775H
Test place	Ise EMC Lab. No.1 Semi Anechoic Chamber
Date	December 4, 2020
Temperature / Humidity	22 deg. C / 38 % RH
Engineer	Masaya Minami
Mode	Tx, Hopping Off, 927.5 MHz

Limit : FCC_Part 15 Subpart C(15.207)



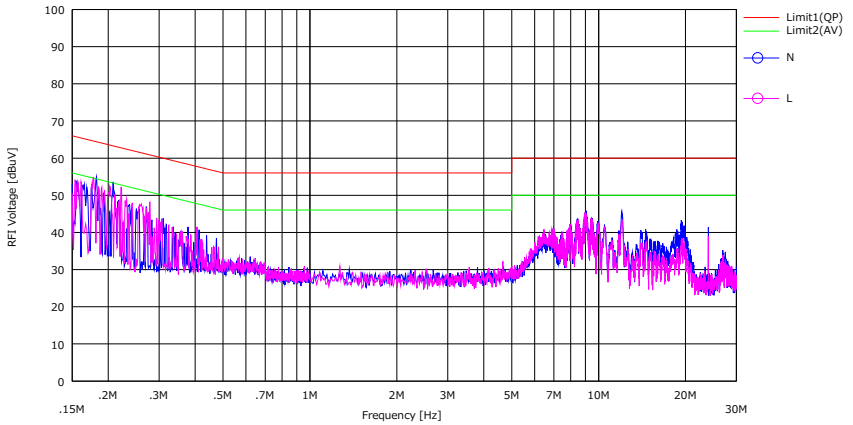
No.	Freq.	Reading		LISN	LOSS	Results		Limit		Margin		Phase	Comment
		〈QP〉	〈AV〉			〈QP〉	〈AV〉	〈QP〉	〈AV〉	〈QP〉	〈AV〉		
	[MHz]	[dBuV]	[dBuV]	[dB]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dB]	[dB]		
1	0.16020	32.20	4.80	0.08	13.05	45.33	17.93	65.45	55.45	20.12	37.52	N	
2	0.24945	22.90	-2.00	0.09	13.08	36.07	11.17	61.78	51.78	25.71	40.61	N	
3	0.34295	19.90	-3.80	0.08	13.10	33.08	9.38	59.13	49.13	26.05	39.75	N	
4	6.75100	23.00	16.60	0.18	13.74	36.92	30.52	60.00	50.00	23.08	19.48	N	
5	9.04600	23.40	17.60	0.22	13.86	37.48	31.68	60.00	50.00	22.52	18.32	N	
6	12.06000	30.00	28.30	0.26	14.00	44.26	42.56	60.00	50.00	15.74	7.44	N	
7	0.15935	31.10	4.40	0.06	13.05	44.21	17.51	65.50	55.50	21.29	37.99	L	
8	0.24690	27.80	0.90	0.06	13.08	40.94	14.04	61.86	51.86	20.92	37.82	L	
9	0.34635	20.50	-3.40	0.06	13.10	33.66	9.76	59.05	49.05	25.39	39.29	L	
10	6.71500	23.30	16.90	0.19	13.73	37.22	30.82	60.00	50.00	22.78	19.18	L	
11	9.04600	23.70	17.60	0.23	13.86	37.79	31.69	60.00	50.00	22.21	18.31	L	
12	12.00000	28.40	26.70	0.28	14.00	42.68	40.98	60.00	50.00	17.32	9.02	L	

CHART: WITH FACTOR Peak hold data. CALCULATION : RESULT = READING + LISN + LOSS (CABLE + ATT)
Except for the above table: adequate margin data below the limits.

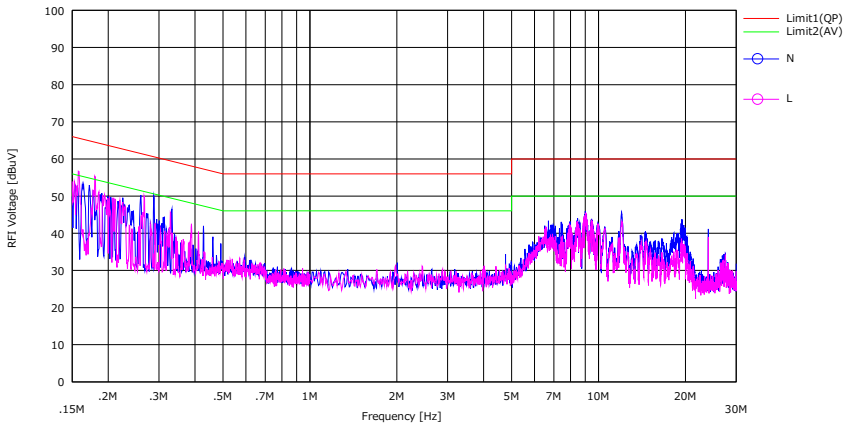
Conducted Emission
(External Antenna)

Report No.	13607775H
Test place	Ise EMC Lab. No.1 Semi Anechoic Chamber
Date	December 4, 2020
Temperature / Humidity	22 deg. C / 38 % RH
Engineer	Masaya Minami
Mode	Tx, Hopping Off

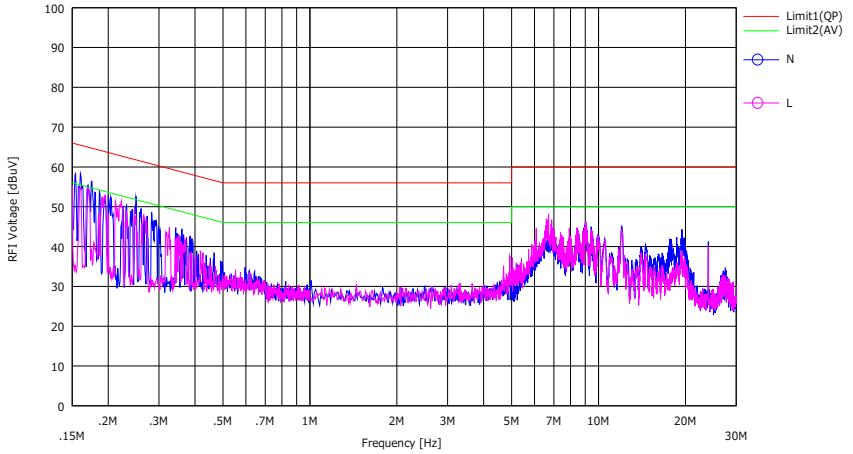
915.25 MHz



921.25 MHz



927.5 MHz



20 dB Bandwidth, 99 % Occupied Bandwidth and Carrier Frequency Separation

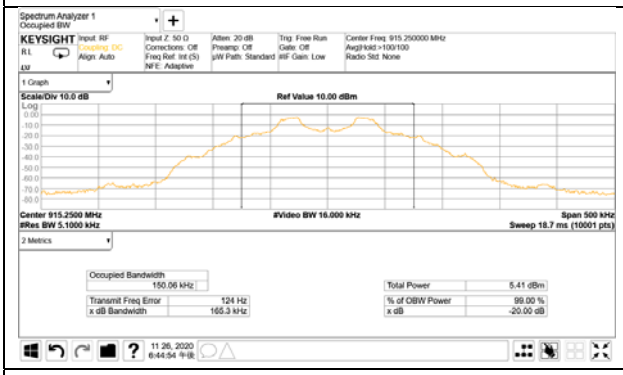
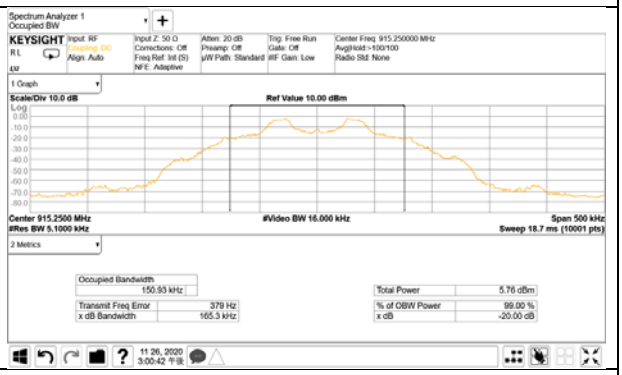
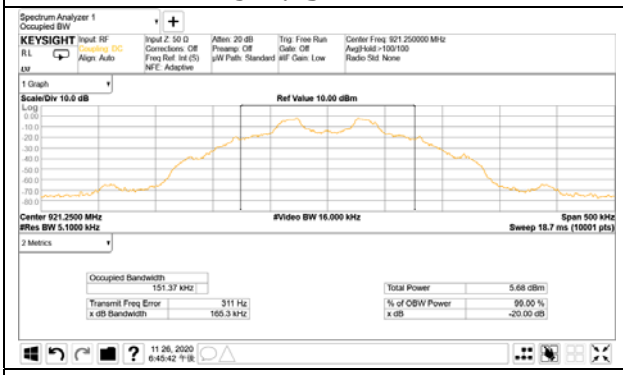
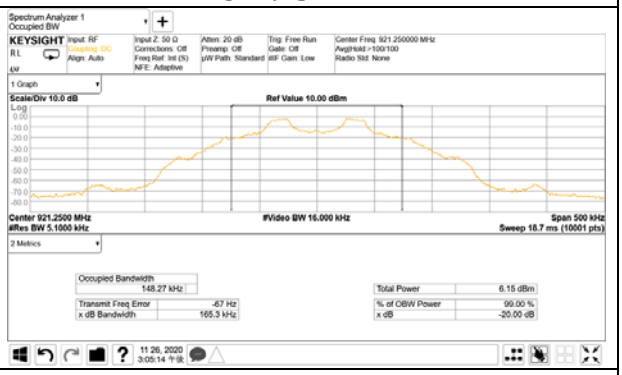
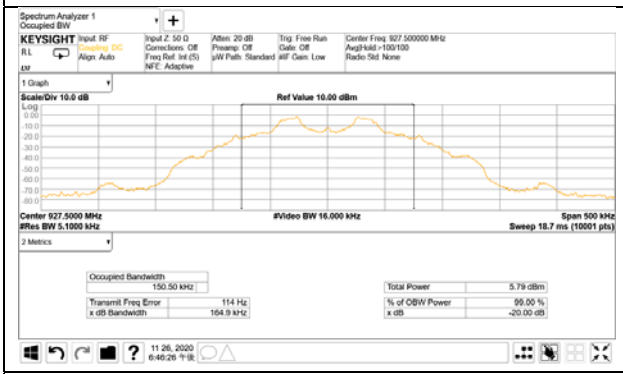
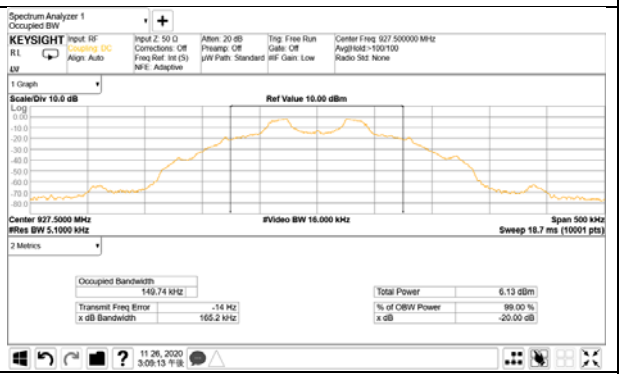
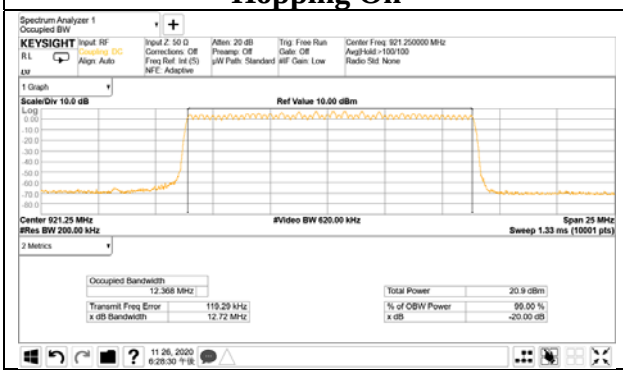
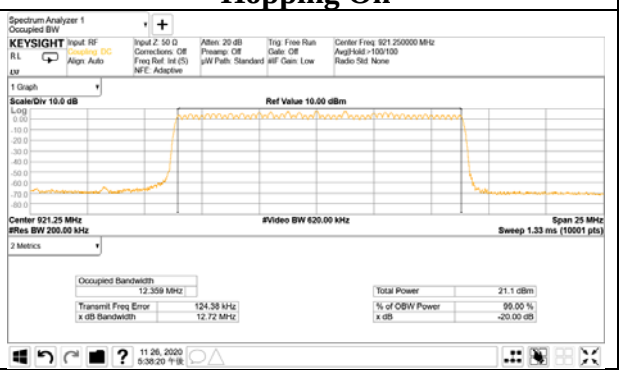
Report No.	13607775H
Test place	Ise EMC Lab. No.3 Measurement Room
Date	November 26, 2020
Temperature / Humidity	20 deg. C / 37 % RH
Engineer	Tomohisa Nakagawa
Mode	Tx, Hopping On / Tx, Hopping Off

Mode	Freq. [MHz]	20dB Bandwidth [MHz]	Limit for 20dB Bandwidth [MHz]	99% Occupied Bandwidth [kHz]	Carrier Frequency Separation [MHz]	Limit for Carrier Frequency separation [MHz]
Internal	915.25	0.165	0.500	150.060	0.250	>= 0.165
Internal	921.25	0.165	0.500	151.370	0.250	>= 0.165
Internal	927.50	0.165	0.500	150.500	0.250	>= 0.165
Internal	Hopping On	-	-	12368	-	-
External	915.25	0.165	0.500	150.930	0.250	>= 0.165
External	921.25	0.165	0.500	148.270	0.250	>= 0.165
External	927.50	0.165	0.500	149.740	0.250	>= 0.165
External	Hopping On	-	-	12359	-	-

Limit for Carrier Frequency separation: 20dB Bandwidth or 25kHz (whichever is greater).

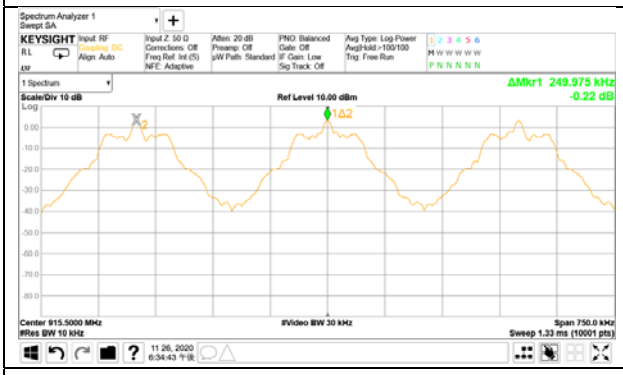
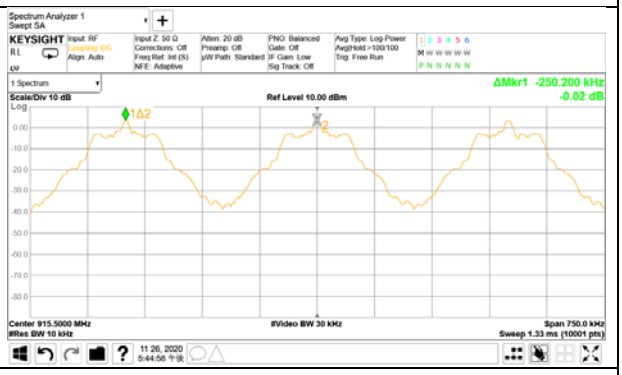
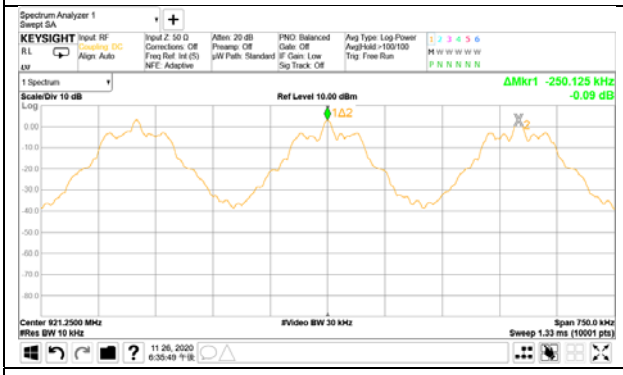
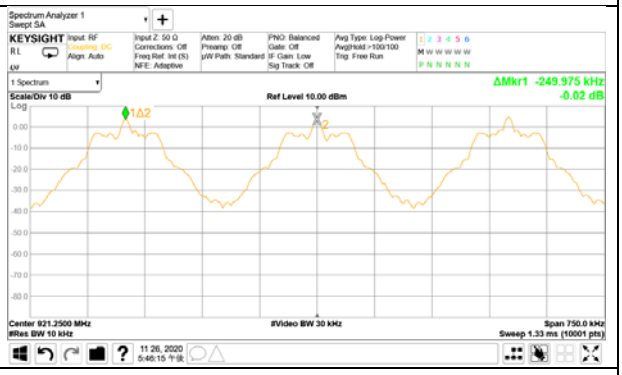
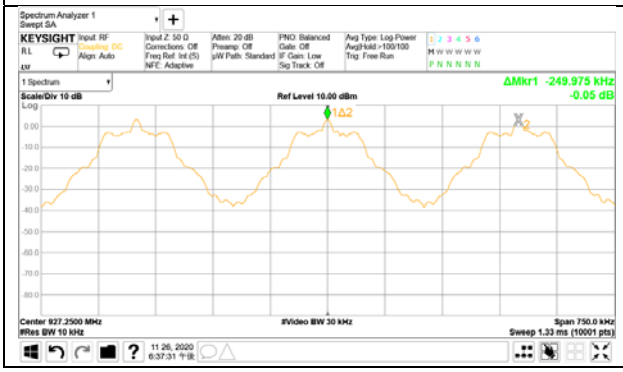
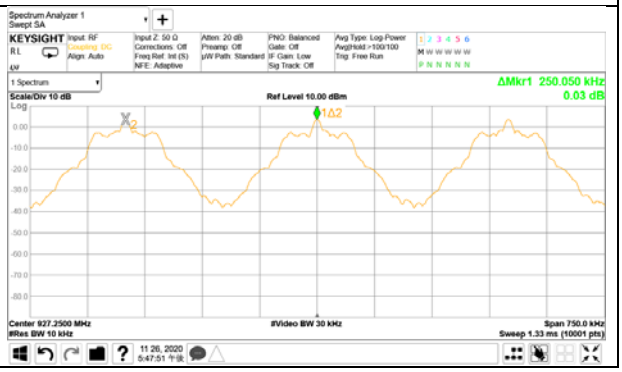
20 dB Bandwidth and 99 % Occupied Bandwidth

(Internal / External Antenna)

Internal Antenna	External Antenna
915.25 MHz	**915.25 MHz**
	
921.25 MHz	**921.25 MHz**
	
927.5 MHz	**927.5 MHz**
	
Hopping On	**Hopping On**
	

UL Japan, Inc.
Ise EMC Lab.
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN
Telephone : +81 596 24 8999
Facsimile : +81 596 24 8124

Carrier Frequency Separation

Internal Antenna	External Antenna
915.25 MHz	915.25 MHz
	
921.25 MHz	921.25 MHz
	
927.50 MHz	927.50 MHz
	

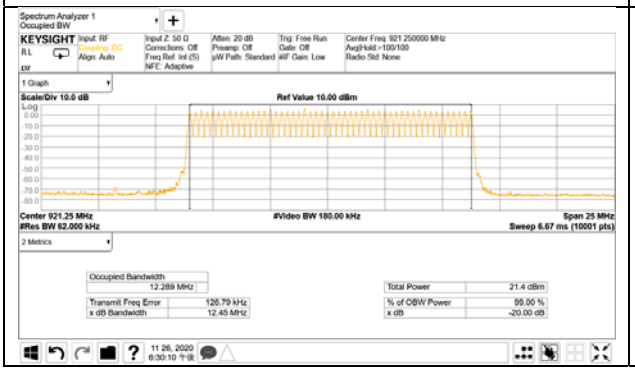
UL Japan, Inc.
Ise EMC Lab.
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN
Telephone : +81 596 24 8999
Facsimile : +81 596 24 8124

Number of Hopping Frequency

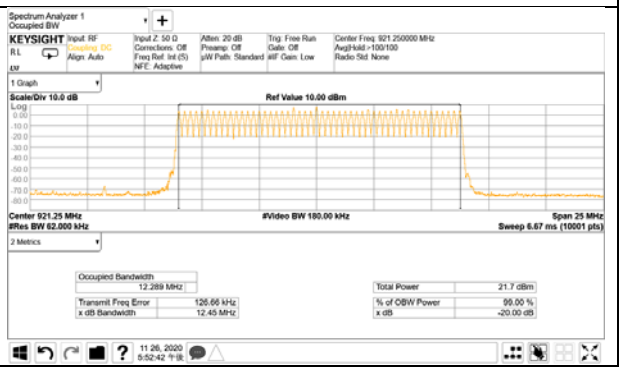
Report No.	13607775H
Test place	Ise EMC Lab. No.3 Measurement Room
Date	November 26, 2020
Temperature / Humidity	20 deg. C / 37 % RH
Engineer	Tomohisa Nakagawa
Mode	Tx, Hopping On / Tx, Hopping Off

Mode	Number of channel [channels]	Limit [channels]
Internal	50	>= 50
External	50	>= 50

Internal Antenna



External Antenna



Dwell time

Report No.	13607775H
Test place	Ise EMC Lab. No.3 Measurement Room
Date	November 26, 2020
Temperature / Humidity	20 deg. C / 37 % RH
Engineer	Tomohisa Nakagawa
Mode	Tx, Hopping On / Tx, Hopping Off

Internal Antenna

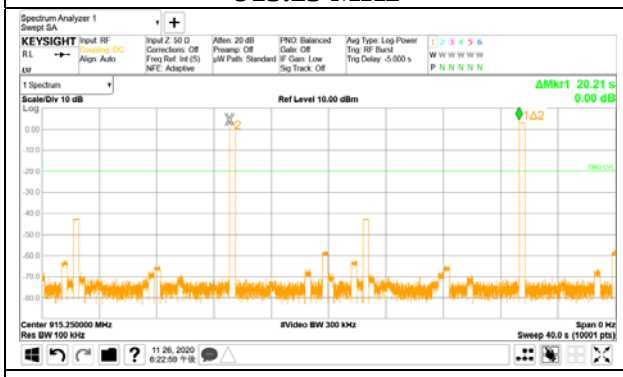
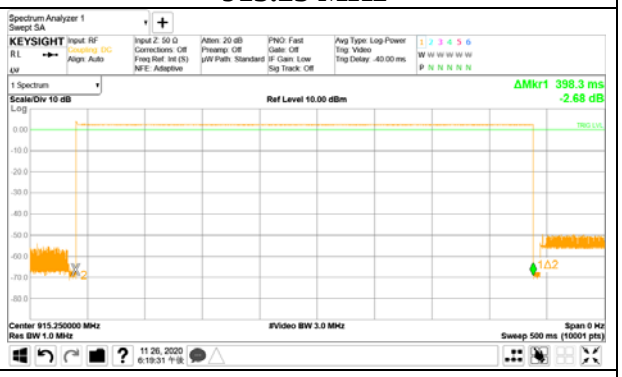
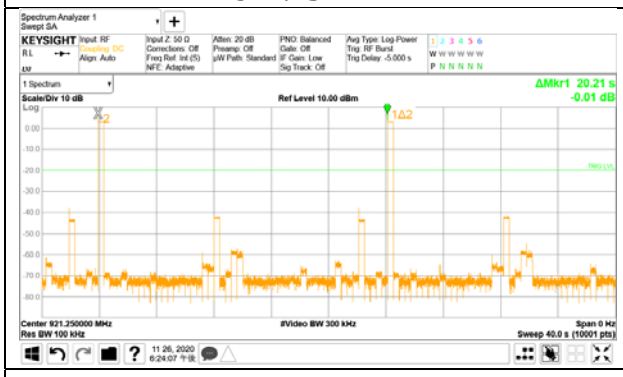
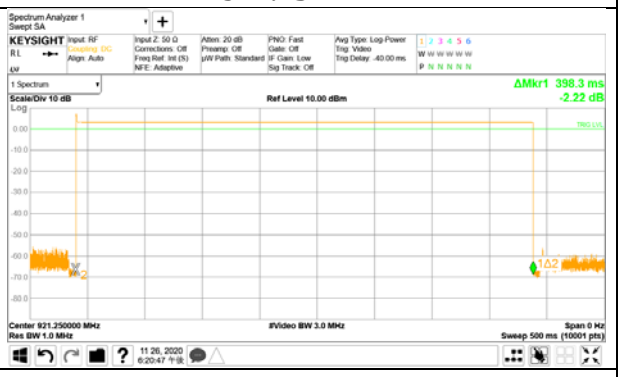
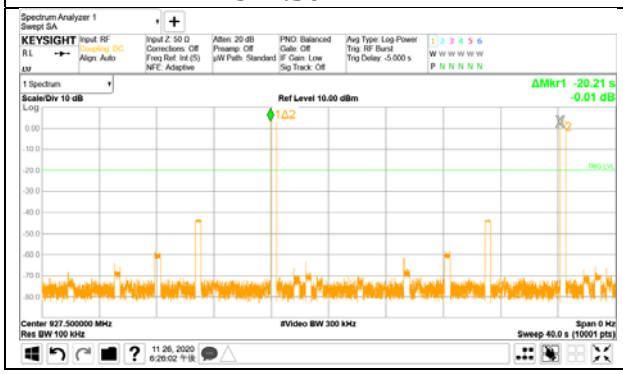
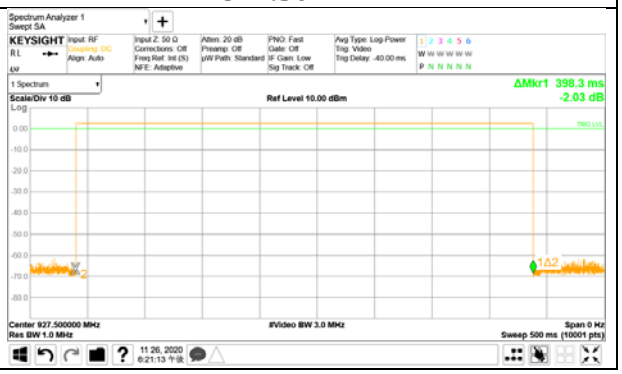
Mode	Number of transmiusson in 20 sec period	Length of transmission [msec]	Result [msec]	Limit [msec]
915.25	1	398.300	398.3	400
921.25	1	398.300	398.3	400
927.50	1	398.300	398.3	400

External Antenna

Mode	Number of transmiusson in 20 sec period	Length of transmission [msec]	Result [msec]	Limit [msec]
915.25	1	398.300	398.3	400
921.25	1	398.300	398.3	400
927.50	1	398.300	398.3	400

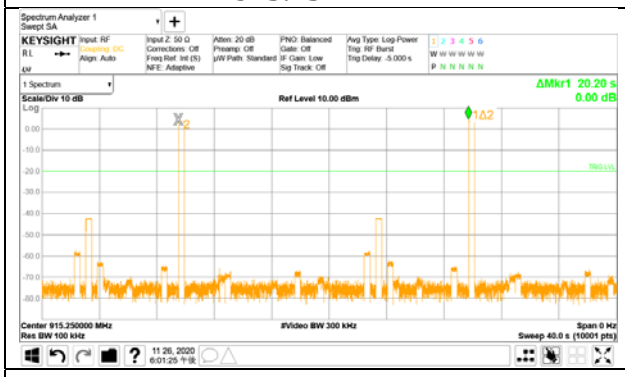
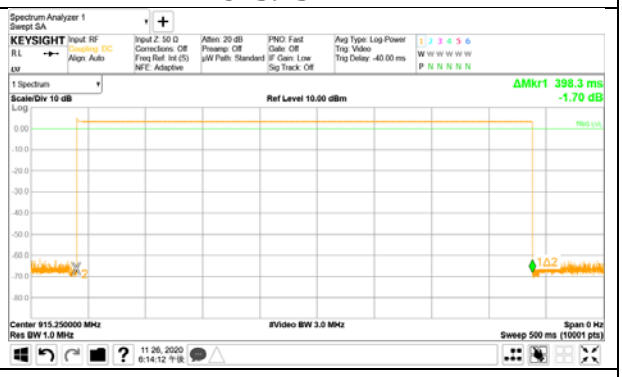
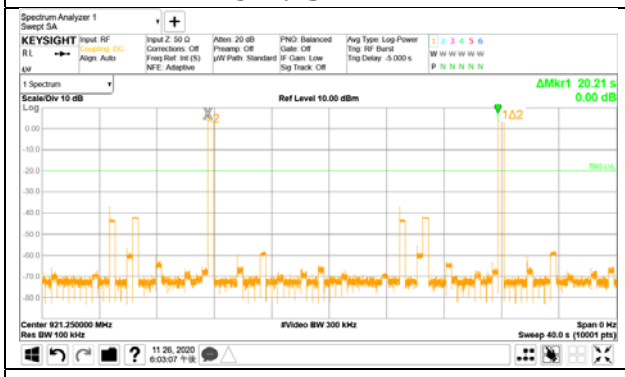
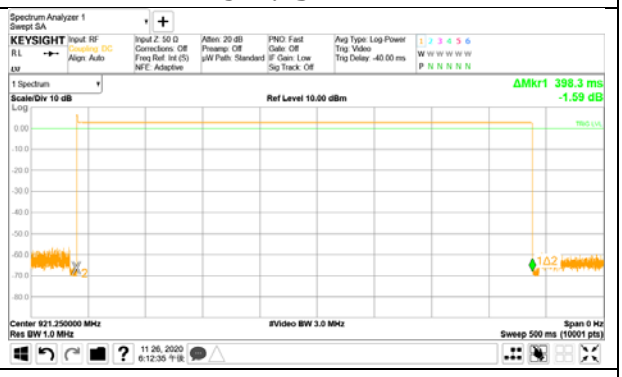
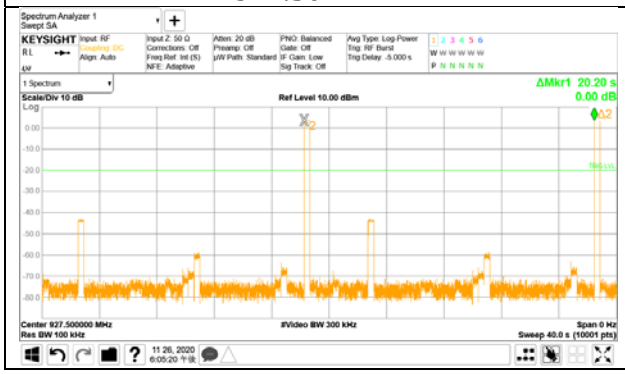
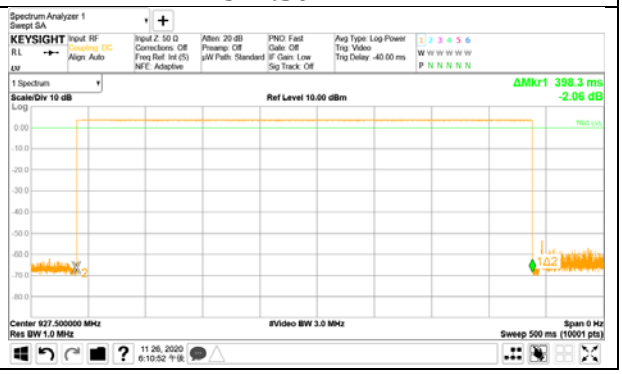
Sample Calculation
Result = Number of transmission x Length of transmission

Dwell time

Sampling (Representative chart)	Transmit Time
915.25 MHz	915.25 MHz
	
921.25 MHz	921.25 MHz
	
927.50 MHz	927.50 MHz
	

Dwell time

(Internal Antenna)

Sampling (Representative chart)	Transmit Time
915.25 MHz	915.25 MHz
	
921.25 MHz	921.25 MHz
	
927.50 MHz	927.50 MHz
	

UL Japan, Inc.
Ise EMC Lab.
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN
Telephone : +81 596 24 8999
Facsimile : +81 596 24 8124

Maximum Peak Output Power

Report No.	13607775H
Test place	Ise EMC Lab. No.3 Measurement Room
Date	November 26, 2020
Temperature / Humidity	20 deg. C / 37 % RH
Engineer	Tomohisa Nakagawa
Mode	Tx, Hopping Off

Internal Ant

					Conducted Power					e.i.r.p. for RSS-247					
Freq.	Power setting	Reading	Cable Loss	Atten. Loss	Result		Limit		Margin	Antenna Gain	Result		Limit		Margin
[MHz]		[dBm]	[dB]	[dB]	[dBm]	[mW]	[dBm]	[mW]	[dB]	[dBi]	[dBm]	[mW]	[dBm]	[mW]	[dB]
915.25	24.0	2.82	0.40	19.92	23.14	206.06	30.00	1000	6.86	3.00	26.14	411.15	36.02	4000	9.88
921.25	24.0	2.97	0.40	19.92	23.29	213.30	30.00	1000	6.71	3.00	26.29	425.60	36.02	4000	9.73
927.50	24.0	2.98	0.40	19.92	***23.30***	***213.80***	30.00	1000	6.70	3.00	26.30	426.58	36.02	4000	9.72

Freq.	Power setting	Reading	Cable Loss	Atten. Loss	Result		Limit		Margin	Antenna Gain	Result		Limit		Margin
[MHz]		[dBm]	[dB]	[dB]	[dBm]	[mW]	[dBm]	[mW]	[dB]	[dBi]	[dBm]	[mW]	[dBm]	[mW]	[dB]
915.25	4.0	-0.12	0.40	2.85	3.13	2.06	30.00	1000	26.87	3.00	6.13	4.10	36.02	4000	29.89
921.25	4.0	-0.07	0.40	2.85	3.18	2.08	30.00	1000	26.82	3.00	6.18	4.15	36.02	4000	29.84
927.50	4.0	0.06	0.40	2.85	3.31	2.14	30.00	1000	26.69	3.00	6.31	4.28	36.02	4000	29.71

External Ant

					Conducted Power					e.i.r.p. for RSS-247					
Freq.	Power setting	Reading	Cable Loss	Atten. Loss	Result		Limit		Margin	Antenna Gain	Result		Limit		Margin
[MHz]		[dBm]	[dB]	[dB]	[dBm]	[mW]	[dBm]	[mW]	[dB]	[dBi]	[dBm]	[mW]	[dBm]	[mW]	[dB]
915.25	24.0	3.13	0.00	19.92	23.05	201.84	30.00	1000	6.95	2.00	25.05	319.89	36.02	4000	10.97
921.25	24.0	3.20	0.00	19.92	23.12	205.12	30.00	1000	6.88	2.00	25.12	325.09	36.02	4000	10.90
927.50	24.0	3.34	0.00	19.92	***23.26***	***211.84***	30.00	1000	6.74	2.00	25.26	335.74	36.02	4000	10.76

Freq.	Power setting	Reading	Cable Loss	Atten. Loss	Result		Limit		Margin	Antenna Gain	Result		Limit		Margin
[MHz]		[dBm]	[dB]	[dB]	[dBm]	[mW]	[dBm]	[mW]	[dB]	[dBi]	[dBm]	[mW]	[dBm]	[mW]	[dB]
915.25	4.0	0.22	0.00	2.85	3.07	2.03	30.00	1000	26.93	2.00	5.07	3.21	36.02	4000	30.95
921.25	4.0	0.21	0.00	2.85	3.06	2.02	30.00	1000	26.94	2.00	5.06	3.21	36.02	4000	30.96
927.50	4.0	0.35	0.00	2.85	3.20	2.09	30.00	1000	26.80	2.00	5.20	3.31	36.02	4000	30.82

Sample Calculation:
Result = Reading + Cable Loss + Attenuator Loss
e.i.r.p. Result = Conducted Power Result + Antenna Gain

Average Output Power
(Reference data for RF Exposure)

Report No.	13607775H
Test place	Ise EMC Lab. No.3 Measurement Room
Date	November 26, 2020
Temperature / Humidity	20 deg. C / 37 % RH
Engineer	Tomohisa Nakagawa
Mode	Tx, Hopping Off

Internal Ant

Freq.	Power setting	Reading	Cable Loss	Atten. Loss	Result (Time average)		Duty factor	Result (Burst power average)	
[MHz]		[dBm]	[dB]	[dB]	[dBm]	[mW]	[dB]	[dBm]	[mW]
915.25	24.0	0.41	0.40	19.92	20.73	118.30	0.00	20.73	118.30
921.25	24.0	0.66	0.40	19.92	20.98	125.31	0.00	20.98	125.31
927.50	24.0	0.72	0.40	19.92	***21.04***	***127.06***	0.00	21.04	127.06
915.25	4.0	-2.47	0.40	2.85	0.78	1.20	0.00	0.78	1.20
921.25	4.0	-2.38	0.40	2.85	0.87	1.22	0.00	0.87	1.22
927.50	4.0	-2.31	0.40	2.85	0.94	1.24	0.00	0.94	1.24

External Ant

Freq.	Power setting	Reading	Cable Loss	Atten. Loss	Result (Time average)		Duty factor	Result (Burst power average)	
[MHz]		[dBm]	[dB]	[dB]	[dBm]	[mW]	[dB]	[dBm]	[mW]
915.25	24.0	0.89	0.00	19.92	20.81	120.50	0.00	20.81	120.50
921.25	24.0	0.92	0.00	19.92	20.84	121.34	0.00	20.84	121.34
927.50	24.0	1.06	0.00	19.92	***20.98***	***125.31***	0.00	20.98	125.31
915.25	4.0	-2.14	0.00	2.85	0.71	1.18	0.00	0.71	1.18
921.25	4.0	-2.13	0.00	2.85	0.72	1.18	0.00	0.72	1.18
927.50	4.0	-1.93	0.00	2.85	0.92	1.24	0.00	0.92	1.24

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

Maximum Peak Output Power (Worst Case Check)

Report No.	13607775H
Test place	Ise EMC Lab. No.3 Measurement Room
Date	November 26, 2020
Temperature / Humidity	20 deg. C / 37 % RH
Engineer	Tomohisa Nakagawa
Mode	Tx, Hopping Off

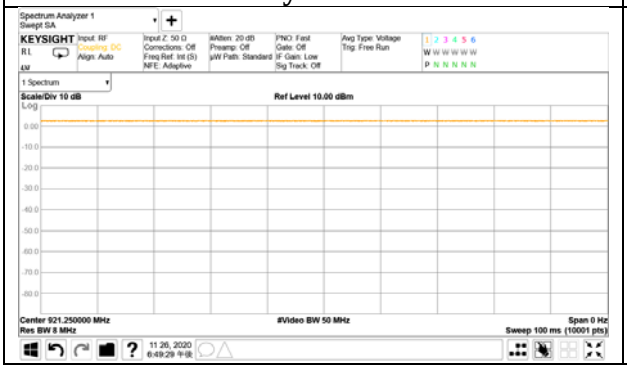
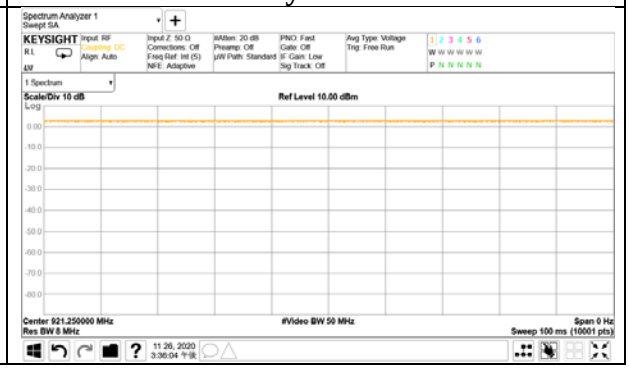
Internal Antenna Polarization	Profile	Freq. [MHz]	Reading [dBm]	Reading [dBm]	Sum [dBm]	Remarks
Circle	1	915.25	-0.20	-0.38	2.72	*Sum is Hori + Vert
	2	915.25	-0.24	-0.33	2.73	
	4	915.25	-0.18	-0.26	2.79	
	5	915.25	-0.21	-0.24	2.79	
Hori.	1	915.25	2.93	-	-	
	2	915.25	2.95	-	-	
	4	915.25	***2.96***	-	-	
	5	915.25	2.93	-	-	
Vert.	1	915.25	2.62	-	-	
	2	915.25	2.86	-	-	
	4	915.25	2.87	-	-	
	5	915.25	2.91	-	-	

External Antenna	Profile	Freq. [MHz]	Reading [dBm]	Remarks
ANT1	1	915.25	3.12	
	2	915.25	3.12	
	4	915.25	***3.13***	
	5	915.25	3.12	
ANT2	1	915.25	3.04	
	2	915.25	3.04	
	4	915.25	3.06	
	5	915.25	3.06	

Difference between worst rate check data and formal test result is due to the different test condition.
All comparison was carried out on same frequency and measurement factors.

Burst Rate Confirmation

Report No.	13607775H
Test place	Ise EMC Lab. No.3 Measurement Room
Date	November 26, 2020
Temperature / Humidity	20 deg. C / 37 % RH
Engineer	Tomohisa Nakagawa
Mode	Tx, Hopping Off

Internal Antenna	External Antenna
Duty 100 %	**Duty 100 %**
	

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

Radiated Spurious Emission
(Internal Antenna)

Report No.	13607775H	
Test place	Ise EMC Lab.	
Semi Anechoic Chamber	No.4	No.4
Date	November 28, 2020	November 29, 2020
Temperature / Humidity	23 deg. C / 47 % RH	22 deg. C / 37 % RH
Engineer	Takafumi Noguchi	Junya Okuno
	(Below 1 GHz)	(Above 1 GHz)
Mode	Tx, Hopping Off, 915.25 MHz	

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	54.964	QP	31.2	9.3	7.7	32.2	-	16.0	40.0	24.0	
Hori.	66.040	QP	33.0	6.6	7.8	32.2	-	15.2	40.0	24.8	
Hori.	118.566	QP	25.7	12.6	8.4	32.1	-	14.6	43.5	28.9	
Hori.	172.971	QP	27.0	15.8	8.9	32.1	-	19.6	43.5	23.9	
Hori.	412.911	QP	24.4	16.1	10.9	32.0	-	19.4	46.0	26.7	
Hori.	639.003	QP	20.8	19.3	12.2	32.0	-	20.3	46.0	25.7	
Hori.	2745.750	PK	49.6	28.5	5.6	31.7	-	52.0	73.9	21.9	
Hori.	3661.000	PK	45.0	29.1	6.0	31.4	-	48.7	73.9	25.2	
Hori.	4576.250	PK	43.6	30.9	6.4	31.2	-	49.7	73.9	24.2	
Hori.	5491.500	PK	42.7	32.2	6.9	31.3	-	50.5	73.9	23.4	
Hori.	6406.750	PK	40.6	34.2	7.2	31.8	-	50.2	73.9	23.7	Floor noise
Hori.	7322.000	PK	40.3	36.6	7.3	32.4	-	51.8	73.9	22.1	Floor noise
Hori.	8237.250	PK	42.3	36.6	7.6	32.6	-	53.9	73.9	20.0	Floor noise
Hori.	9152.500	PK	40.4	37.5	8.1	32.3	-	53.7	73.9	20.3	Floor noise
Hori.	2745.750	AV	43.8	28.5	5.6	31.7	-	46.3	53.9	7.7	
Hori.	3661.000	AV	40.2	29.1	6.0	31.4	-	43.9	53.9	10.0	
Hori.	4576.250	AV	36.6	30.9	6.4	31.2	-	42.7	53.9	11.2	
Hori.	5491.500	AV	36.7	32.2	6.9	31.3	-	44.5	53.9	9.5	
Hori.	6406.750	AV	32.3	34.2	7.2	31.8	-	41.9	53.9	12.0	Floor noise
Hori.	7322.000	AV	33.6	36.6	7.3	32.4	-	45.1	53.9	8.8	Floor noise
Hori.	8237.250	AV	33.6	36.6	7.6	32.6	-	45.3	53.9	8.6	Floor noise
Hori.	9152.500	AV	31.7	37.5	8.1	32.3	-	44.9	53.9	9.0	Floor noise
Vert.	53.976	QP	37.2	9.7	7.6	32.2	-	22.3	40.0	17.7	
Vert.	66.033	QP	39.7	6.6	7.8	32.2	-	21.9	40.0	18.1	
Vert.	118.557	QP	31.0	12.6	8.4	32.1	-	19.9	43.5	23.6	
Vert.	176.882	QP	28.3	15.9	9.0	32.0	-	21.1	43.5	22.4	
Vert.	412.911	QP	23.2	16.1	10.9	32.0	-	18.2	46.0	27.9	
Vert.	645.302	QP	21.0	19.2	12.2	32.0	-	20.4	46.0	25.6	
Vert.	2745.750	PK	47.0	28.5	5.6	31.7	-	49.5	73.9	24.4	
Vert.	3661.000	PK	44.3	29.1	6.0	31.4	-	48.0	73.9	25.9	
Vert.	4576.250	PK	44.6	30.9	6.4	31.2	-	50.7	73.9	23.2	
Vert.	5491.500	PK	42.0	32.2	6.9	31.3	-	49.8	73.9	24.1	
Vert.	6406.750	PK	39.7	34.2	7.2	31.8	-	49.3	73.9	24.6	Floor noise
Vert.	7322.000	PK	40.5	36.6	7.3	32.4	-	52.0	73.9	21.9	Floor noise
Vert.	8237.250	PK	40.9	36.6	7.6	32.6	-	52.5	73.9	21.4	Floor noise
Vert.	9152.500	PK	40.5	37.5	8.1	32.3	-	53.8	73.9	20.1	Floor noise
Vert.	2745.750	AV	40.8	28.5	5.6	31.7	-	43.2	53.9	10.7	
Vert.	3661.000	AV	38.3	29.1	6.0	31.4	-	42.0	53.9	11.9	
Vert.	4576.250	AV	38.1	30.9	6.4	31.2	-	44.2	53.9	9.7	
Vert.	5491.500	AV	35.5	32.2	6.9	31.3	-	43.3	53.9	10.6	
Vert.	6406.750	AV	32.4	34.2	7.2	31.8	-	42.0	53.9	11.9	Floor noise
Vert.	7322.000	AV	33.5	36.6	7.3	32.4	-	45.0	53.9	8.9	Floor noise
Vert.	8237.250	AV	34.0	36.6	7.6	32.6	-	45.6	53.9	8.3	Floor noise
Vert.	9152.500	AV	31.8	37.5	8.1	32.3	-	45.1	53.9	8.9	Floor noise

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier)
*Other frequency noises omitted in this report were not seen or had enough margin (more than 20 dB).

Distance factor: 1 GHz - 10 GHz 20log (3.95 m / 3.0 m) = 2.39 dB

***These results have sufficient margin without taking account Duty cycle correction factor.**

20dBc Data Sheet

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	915.250	PK	88.1	21.9	12.5	0.0	122.5	-	-	Carrier
Hori.	902.000	PK	24.8	21.9	12.4	0.0	59.1	102.5	43.4	
Hori.	1830.500	PK	66.1	25.3	5.4	32.4	64.4	102.5	38.1	
Vert.	915.250	PK	86.9	21.9	12.5	0.0	121.3	-	-	Carrier
Vert.	902.000	PK	24.6	21.9	12.4	0.0	58.9	101.3	42.4	
Vert.	1830.500	PK	65.9	25.3	5.4	32.4	64.2	101.3	37.1	

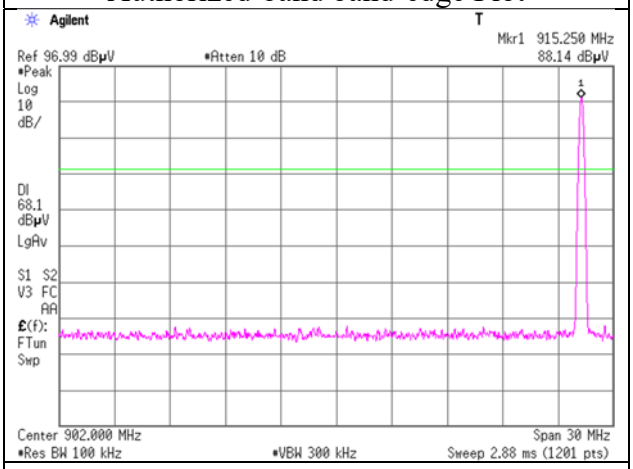
Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amprifier)

Radiated Spurious Emission
(Reference Plot for band-edge)
(Internal Antenna)

Report No.	13607775H
Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.4
Date	November 28, 2020
Temperature / Humidity	23 deg. C / 47 % RH
Engineer	Takafumi Noguchi (Below 1 GHz)
Mode	Tx, Hopping Off, 915.25 MHz

Horizontal

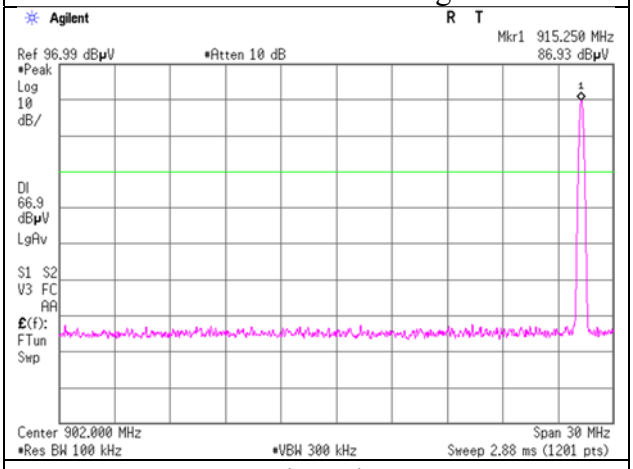
Authorized-band band-edge Plot



20dBc Plot

Vertical

Authorized-band band-edge Plot



20dBc Plot

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

Radiated Spurious Emission
(Internal Antenna)

Report No.	13607775H	
Test place	Ise EMC Lab.	
Semi Anechoic Chamber	No.4	No.4
Date	November 28, 2020	November 29, 2020
Temperature / Humidity	23 deg. C / 47 % RH	22 deg. C / 37 % RH
Engineer	Takafumi Noguchi	Junya Okuno
	(Below 1 GHz)	(Above 1 GHz)
Mode	Tx, Hopping Off, 921.25 MHz	

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	54.017	QP	30.7	9.6	7.6	32.2	-	15.8	40.0	24.2	
Hori.	66.041	QP	34.2	6.6	7.8	32.2	-	16.4	40.0	23.6	
Hori.	118.645	QP	25.9	12.6	8.4	32.1	-	14.8	43.5	28.7	
Hori.	173.084	QP	25.8	15.8	8.9	32.0	-	18.5	43.5	25.1	
Hori.	411.111	QP	29.8	16.0	10.9	32.0	-	24.7	46.0	21.4	
Hori.	639.794	QP	20.9	19.3	12.2	32.0	-	20.4	46.0	25.6	
Hori.	2763.750	PK	49.8	28.6	5.6	31.7	-	52.3	73.9	21.6	
Hori.	3685.000	PK	48.4	29.2	6.0	31.4	-	52.2	73.9	21.7	
Hori.	4606.250	PK	43.4	31.0	6.4	31.2	-	49.7	73.9	24.2	
Hori.	5527.500	PK	42.9	32.2	6.9	31.3	-	50.7	73.9	23.2	
Hori.	6448.750	PK	38.9	34.3	7.2	31.8	-	48.6	73.9	25.3	Floor noise
Hori.	7370.000	PK	40.5	36.7	7.3	32.5	-	52.1	73.9	21.8	Floor noise
Hori.	8291.250	PK	40.8	36.5	7.7	32.6	-	52.3	73.9	21.6	Floor noise
Hori.	9212.500	PK	40.5	37.8	8.1	32.4	-	54.0	73.9	19.9	Floor noise
Hori.	2763.750	AV	45.7	28.6	5.6	31.7	-	48.2	53.9	5.7	
Hori.	3685.000	AV	43.2	29.2	6.0	31.4	-	47.0	53.9	6.9	
Hori.	4606.250	AV	37.5	31.0	6.4	31.2	-	43.8	53.9	10.2	
Hori.	5527.500	AV	37.9	32.2	6.9	31.3	-	45.8	53.9	8.1	
Hori.	6448.750	AV	32.1	34.3	7.2	31.8	-	41.9	53.9	12.0	Floor noise
Hori.	7370.000	AV	33.8	36.7	7.3	32.5	-	45.4	53.9	8.5	Floor noise
Hori.	8291.250	AV	33.9	36.5	7.7	32.6	-	45.4	53.9	8.5	Floor noise
Hori.	9212.500	AV	31.9	37.8	8.1	32.4	-	45.5	53.9	8.4	Floor noise
Vert.	53.145	QP	36.9	9.9	7.6	32.2	-	22.3	40.0	17.7	
Vert.	66.025	QP	39.8	6.6	7.8	32.2	-	22.0	40.0	18.0	
Vert.	118.435	QP	30.2	12.6	8.4	32.1	-	19.1	43.5	24.4	
Vert.	173.464	QP	27.9	15.7	9.0	32.0	-	20.6	43.5	23.0	
Vert.	414.240	QP	23.1	16.1	10.9	32.0	-	18.1	46.0	27.9	
Vert.	658.367	QP	21.1	19.4	12.3	32.0	-	20.8	46.0	25.2	
Vert.	2763.750	PK	49.5	28.6	5.6	31.7	-	51.9	73.9	22.0	
Vert.	3685.000	PK	45.7	29.2	6.0	31.4	-	49.5	73.9	24.4	
Vert.	4606.250	PK	44.8	31.0	6.4	31.2	-	51.1	73.9	22.8	
Vert.	5527.500	PK	42.2	32.2	6.9	31.3	-	50.1	73.9	23.8	
Vert.	6448.750	PK	39.9	34.3	7.2	31.8	-	49.7	73.9	24.2	Floor noise
Vert.	7370.000	PK	41.4	36.7	7.3	32.5	-	53.0	73.9	20.9	Floor noise
Vert.	8291.250	PK	41.7	36.5	7.7	32.6	-	53.2	73.9	20.7	Floor noise
Vert.	9212.500	PK	40.6	37.8	8.1	32.4	-	54.1	73.9	19.8	Floor noise
Vert.	2763.750	AV	45.2	28.6	5.6	31.7	-	47.7	53.9	6.2	
Vert.	3685.000	AV	40.8	29.2	6.0	31.4	-	44.7	53.9	9.2	
Vert.	4606.250	AV	39.3	31.0	6.4	31.2	-	45.6	53.9	8.3	
Vert.	5527.500	AV	36.6	32.2	6.9	31.3	-	44.4	53.9	9.5	
Vert.	6448.750	AV	32.5	34.3	7.2	31.8	-	42.2	53.9	11.7	Floor noise
Vert.	7370.000	AV	33.5	36.7	7.3	32.5	-	45.1	53.9	8.8	Floor noise
Vert.	8291.250	AV	34.3	36.5	7.7	32.6	-	45.8	53.9	8.1	Floor noise
Vert.	9212.500	AV	31.7	37.8	8.1	32.4	-	45.3	53.9	8.6	Floor noise

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier)
*Other frequency noises omitted in this report were not seen or had enough margin (more than 20 dB).

Distance factor: 1 GHz - 10 GHz 20log (3.95 m / 3.0 m) = 2.39 dB

***These results have sufficient margin without taking account Duty cycle correction factor.**

20dBc Data Sheet

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	921.250	PK	89.2	22.0	12.5	0.0	123.6	-	-	Carrier
Hori.	1842.500	PK	68.3	25.3	5.4	32.4	66.7	103.6	37.0	
Vert.	921.250	PK	88.4	22.0	12.5	0.0	122.8	-	-	Carrier
Vert.	1842.500	PK	69.2	25.3	5.4	32.4	67.6	102.8	35.2	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amprifier)

Radiated Spurious Emission
(Internal Antenna)

Report No.	13607775H	
Test place	Ise EMC Lab.	
Semi Anechoic Chamber	No.4	No.4
Date	November 28, 2020	November 29, 2020
Temperature / Humidity	23 deg. C / 47 % RH	22 deg. C / 37 % RH
Engineer	Takafumi Noguchi	Junya Okuno
	(Below 1 GHz)	(Above 1 GHz)
Mode	Tx, Hopping Off, 927.5 MHz	

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	53.290	QP	29.5	9.9	7.6	32.2	-	14.8	40.0	25.2	
Hori.	66.026	QP	34.1	6.6	7.8	32.2	-	16.3	40.0	23.7	
Hori.	115.380	QP	25.7	12.2	8.4	32.1	-	14.2	43.5	29.3	
Hori.	173.497	QP	26.0	15.7	9.0	32.0	-	18.7	43.5	24.9	
Hori.	412.804	QP	28.8	16.1	10.9	32.0	-	23.8	46.0	22.3	
Hori.	657.715	QP	21.0	19.4	12.3	32.0	-	20.6	46.0	25.4	
Hori.	2782.500	PK	50.8	28.5	5.6	31.7	-	53.3	73.9	20.6	
Hori.	3710.000	PK	48.0	29.3	6.0	31.4	-	51.9	73.9	22.0	
Hori.	4637.500	PK	41.0	31.1	6.5	31.2	-	47.3	73.9	26.6	
Hori.	5565.000	PK	42.2	32.2	6.9	31.3	-	50.0	73.9	23.9	
Hori.	6492.500	PK	40.8	34.6	7.2	31.8	-	50.7	73.9	23.2	Floor noise
Hori.	7420.000	PK	40.7	36.7	7.4	32.5	-	52.3	73.9	21.6	Floor noise
Hori.	8347.500	PK	41.9	36.4	7.7	32.6	-	53.4	73.9	20.5	Floor noise
Hori.	9275.000	PK	40.0	38.0	8.1	32.4	-	53.7	73.9	20.2	Floor noise
Hori.	2782.500	AV	45.9	28.5	5.6	31.7	-	48.3	53.9	5.6	
Hori.	3710.000	AV	43.7	29.3	6.0	31.4	-	47.6	53.9	6.4	
Hori.	4637.500	AV	35.1	31.1	6.5	31.2	-	41.4	53.9	12.5	
Hori.	5565.000	AV	36.0	32.2	6.9	31.3	-	43.8	53.9	10.1	
Hori.	6492.500	AV	32.3	34.6	7.2	31.8	-	42.2	53.9	11.7	Floor noise
Hori.	7420.000	AV	33.5	36.7	7.4	32.5	-	45.1	53.9	8.8	Floor noise
Hori.	8347.500	AV	34.1	36.4	7.7	32.6	-	45.6	53.9	8.3	Floor noise
Hori.	9275.000	AV	31.3	38.0	8.1	32.4	-	45.0	53.9	8.9	Floor noise
Vert.	53.281	QP	36.4	9.9	7.6	32.2	-	21.7	40.0	18.3	
Vert.	66.032	QP	40.5	6.6	7.8	32.2	-	22.7	40.0	17.3	
Vert.	118.582	QP	29.4	12.6	8.4	32.1	-	18.3	43.5	25.2	
Vert.	173.469	QP	27.7	15.7	9.0	32.0	-	20.4	43.5	23.2	
Vert.	414.280	QP	23.2	16.1	10.9	32.0	-	18.2	46.0	27.8	
Vert.	655.174	QP	21.4	19.3	12.3	32.0	-	21.0	46.0	25.1	
Vert.	2782.500	PK	50.1	28.5	5.6	31.7	-	52.6	73.9	21.3	
Vert.	3710.000	PK	47.1	29.3	6.0	31.4	-	51.0	73.9	22.9	
Vert.	4637.500	PK	44.1	31.1	6.5	31.2	-	50.4	73.9	23.5	
Vert.	5565.000	PK	41.6	32.2	6.9	31.3	-	49.4	73.9	24.5	
Vert.	6492.500	PK	39.5	34.6	7.2	31.8	-	49.5	73.9	24.4	Floor noise
Vert.	7420.000	PK	40.5	36.7	7.4	32.5	-	52.0	73.9	21.9	Floor noise
Vert.	8347.500	PK	41.4	36.4	7.7	32.6	-	52.9	73.9	21.0	Floor noise
Vert.	9275.000	PK	40.6	38.0	8.1	32.4	-	54.3	73.9	19.6	Floor noise
Vert.	2782.500	AV	45.2	28.5	5.6	31.7	-	47.7	53.9	6.2	
Vert.	3710.000	AV	42.3	29.3	6.0	31.4	-	46.2	53.9	7.7	
Vert.	4637.500	AV	37.8	31.1	6.5	31.2	-	44.1	53.9	9.8	
Vert.	5565.000	AV	35.8	32.2	6.9	31.3	-	43.6	53.9	10.3	
Vert.	6492.500	AV	31.9	34.6	7.2	31.8	-	41.9	53.9	12.1	Floor noise
Vert.	7420.000	AV	33.4	36.7	7.4	32.5	-	44.9	53.9	9.0	Floor noise
Vert.	8347.500	AV	34.1	36.4	7.7	32.6	-	45.6	53.9	8.3	Floor noise
Vert.	9275.000	AV	31.8	38.0	8.1	32.4	-	45.6	53.9	8.3	Floor noise

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier)
*Other frequency noises omitted in this report were not seen or had enough margin (more than 20 dB).

Distance factor: 1 GHz - 10 GHz 20log (3.95 m / 3.0 m) = 2.39 dB

***These results have sufficient margin without taking account Duty cycle correction factor.**

20dBc Data Sheet

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	927.500	PK	89.5	21.9	12.5	0.0	123.9	-	-	Carrier
Hori.	928.000	PK	24.9	21.9	12.5	0.0	59.3	103.9	44.6	
Hori.	1855.000	PK	68.9	25.4	5.4	32.3	67.3	103.9	36.6	
Vert.	927.500	PK	88.4	21.9	12.5	0.0	122.8	-	-	Carrier
Vert.	928.000	PK	24.8	21.9	12.5	0.0	59.2	102.8	43.6	
Vert.	1855.000	PK	69.0	25.4	5.4	32.3	67.4	102.8	35.4	

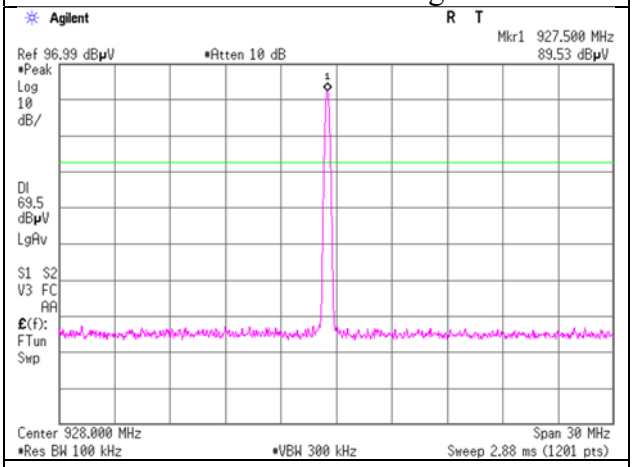
Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amprifier)

Radiated Spurious Emission
(Reference Plot for band-edge)
(Internal Antenna)

Report No.	13607775H
Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.4
Date	November 28, 2020
Temperature / Humidity	23 deg. C / 47 % RH
Engineer	Takafumi Noguchi (Below 1 GHz)
Mode	Tx, Hopping Off, 927.5 MHz

Horizontal

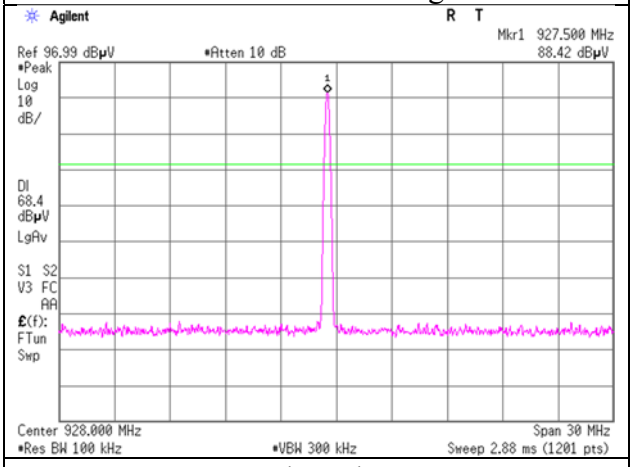
Restricted-band band-edge Plot



20dBc Plot

Vertical

Restricted-band band-edge Plot



20dBc Plot

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

Radiated Spurious Emission

(External Antenna)

Report No.	13607775H	
Test place	Ise EMC Lab.	
Semi Anechoic Chamber	No.4	No.2
Date	November 29, 2020	November 30, 2020
Temperature / Humidity	20 deg. C / 37 % RH	23 deg. C / 42 % RH
Engineer	Yuichiro Yamazaki	Junya Okuno
	(Below 1 GHz)	(Above 1 GHz)
Mode	Tx, Hopping Off, 915.25 MHz	

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	55.766	QP	33.1	9.0	7.7	32.2	-	17.7	40.0	22.4	
Hori.	79.941	QP	35.7	6.8	8.0	32.2	-	18.4	40.0	21.6	
Hori.	115.512	QP	24.9	12.2	8.4	32.1	-	13.4	43.5	30.1	
Hori.	173.007	QP	26.3	15.8	8.9	32.1	-	18.9	43.5	24.6	
Hori.	412.724	QP	30.5	16.1	10.9	32.0	-	25.4	46.0	20.6	
Hori.	649.204	QP	21.4	19.2	12.2	32.0	-	20.9	46.0	25.1	
Hori.	2745.750	PK	47.2	28.4	4.8	35.1	-	45.4	73.9	28.5	
Hori.	3661.000	PK	45.0	29.2	5.2	34.5	-	45.0	73.9	29.0	
Hori.	4576.250	PK	42.3	30.9	5.6	34.4	-	44.5	73.9	29.4	
Hori.	5491.500	PK	41.8	31.7	6.1	34.2	-	45.5	73.9	28.4	
Hori.	6406.750	PK	40.4	33.6	6.5	34.2	-	46.3	73.9	27.6	Floor noise
Hori.	7322.000	PK	41.2	36.2	6.6	34.4	-	49.6	73.9	24.3	Floor noise
Hori.	8237.250	PK	41.2	36.2	6.9	34.7	-	49.6	73.9	24.3	Floor noise
Hori.	9152.500	PK	42.8	38.1	7.4	34.8	-	53.5	73.9	20.4	Floor noise
Hori.	2745.750	AV	40.5	28.4	4.8	35.1	-	38.6	53.9	15.3	
Hori.	3661.000	AV	39.5	29.2	5.2	34.5	-	39.5	53.9	14.4	
Hori.	4576.250	AV	35.3	30.9	5.6	34.4	-	37.4	53.9	16.5	
Hori.	5491.500	AV	34.7	31.7	6.1	34.2	-	38.4	53.9	15.5	
Hori.	6406.750	AV	33.0	33.6	6.5	34.2	-	38.9	53.9	15.0	Floor noise
Hori.	7322.000	AV	33.2	36.2	6.6	34.4	-	41.6	53.9	12.3	Floor noise
Hori.	8237.250	AV	33.3	36.2	6.9	34.7	-	41.7	53.9	12.2	Floor noise
Hori.	9152.500	AV	34.8	38.1	7.4	34.8	-	45.5	53.9	8.4	Floor noise
Vert.	56.423	QP	37.9	8.8	7.7	32.2	-	22.2	40.0	17.8	
Vert.	79.463	QP	38.7	6.8	8.0	32.2	-	21.3	40.0	18.7	
Vert.	115.144	QP	32.1	12.2	8.4	32.1	-	20.6	43.5	23.0	
Vert.	172.184	QP	28.0	15.7	8.9	32.1	-	20.6	43.5	22.9	
Vert.	411.960	QP	24.3	16.0	10.9	32.0	-	19.2	46.0	26.8	
Vert.	649.207	QP	21.3	19.2	12.2	32.0	-	20.8	46.0	25.2	
Vert.	2745.750	PK	45.4	28.4	4.8	35.1	-	43.5	73.9	30.4	
Vert.	3661.000	PK	44.0	29.2	5.2	34.5	-	43.9	73.9	30.0	
Vert.	4576.250	PK	42.7	30.9	5.6	34.4	-	44.8	73.9	29.1	
Vert.	5491.500	PK	40.7	31.7	6.1	34.2	-	44.4	73.9	29.5	
Vert.	6406.750	PK	40.9	33.6	6.5	34.2	-	46.8	73.9	27.1	Floor noise
Vert.	7322.000	PK	41.5	36.2	6.6	34.4	-	49.9	73.9	24.0	Floor noise
Vert.	8237.250	PK	41.6	36.2	6.9	34.7	-	50.0	73.9	23.9	Floor noise
Vert.	9152.500	PK	42.4	38.1	7.4	34.8	-	53.1	73.9	20.8	Floor noise
Vert.	2745.750	AV	37.5	28.4	4.8	35.1	-	35.6	53.9	18.3	
Vert.	3661.000	AV	37.4	29.2	5.2	34.5	-	37.3	53.9	16.6	
Vert.	4576.250	AV	34.9	30.9	5.6	34.4	-	37.1	53.9	16.8	
Vert.	5491.500	AV	33.1	31.7	6.1	34.2	-	36.7	53.9	17.2	
Vert.	6406.750	AV	33.0	33.6	6.5	34.2	-	38.9	53.9	15.0	Floor noise
Vert.	7322.000	AV	34.2	36.2	6.6	34.4	-	42.7	53.9	11.3	Floor noise
Vert.	8237.250	AV	33.7	36.2	6.9	34.7	-	42.1	53.9	11.8	Floor noise
Vert.	9152.500	AV	34.8	38.1	7.4	34.8	-	45.5	53.9	8.4	Floor noise

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier)

*Other frequency noises omitted in this report were not seen or had enough margin (more than 20 dB).

Distance factor: 1 GHz - 10 GHz 20log (3.6 m / 3.0 m) = 1.59 dB

***These results have sufficient margin without taking account Duty cycle correction factor.**

20dBc Data Sheet

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	915.250	PK	85.8	21.9	12.5	0.0	120.2	-	-	Carrier
Hori.	902.000	PK	24.3	21.9	12.4	0.0	58.6	100.2	41.6	
Hori.	1830.500	PK	63.2	25.4	4.6	35.5	57.7	100.2	42.5	
Vert.	915.250	PK	83.8	21.9	12.5	0.0	118.1	-	-	Carrier
Vert.	902.000	PK	24.8	21.9	12.4	0.0	59.1	98.1	39.1	
Vert.	1830.500	PK	61.2	25.4	4.6	35.5	55.7	98.1	42.5	

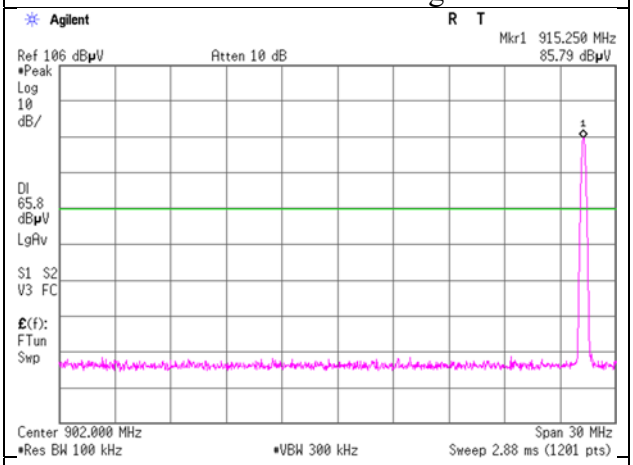
Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amprifier)

Radiated Spurious Emission
(Reference Plot for band-edge)
(External Antenna)

Report No.	13607775H
Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.4
Date	November 29, 2020
Temperature / Humidity	20 deg. C / 37 % RH
Engineer	Yuichiro Yamazaki (Below 1 GHz)
Mode	Tx, Hopping Off, 915.25 MHz

Horizontal

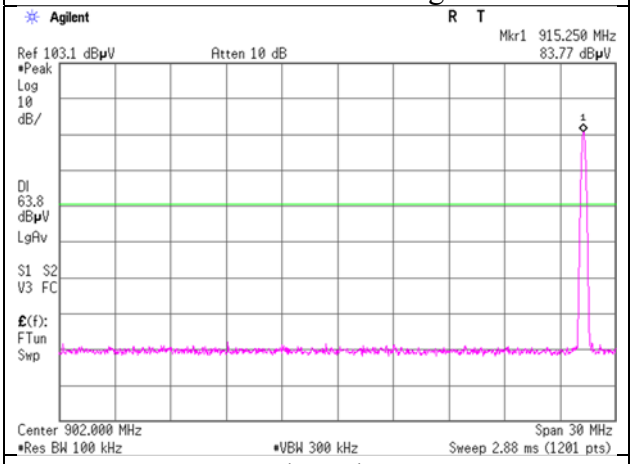
Restricted-band band-edge Plot



20dBc Plot

Vertical

Restricted-band band-edge Plot



20dBc Plot

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

Radiated Spurious Emission
(External Antenna)

Report No.	13607775H	
Test place	Ise EMC Lab.	
Semi Anechoic Chamber	No.4	No.2
Date	November 29, 2020	November 30, 2020
Temperature / Humidity	20 deg. C / 37 % RH	23 deg. C / 42 % RH
Engineer	Yuichiro Yamazaki	Junya Okuno
	(Below 1 GHz)	(Above 1 GHz)
Mode	Tx, Hopping Off, 921.25 MHz	

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	55.784	QP	32.5	9.0	7.7	32.2	-	17.1	40.0	23.0	
Hori.	80.218	QP	35.1	6.9	8.0	32.2	-	17.8	40.0	22.2	
Hori.	115.333	QP	25.6	12.2	8.4	32.1	-	14.1	43.5	29.4	
Hori.	173.922	QP	25.3	15.7	9.0	32.0	-	17.9	43.5	25.6	
Hori.	412.541	QP	31.0	16.0	10.9	32.0	-	25.9	46.0	20.1	
Hori.	649.204	QP	21.5	19.2	12.2	32.0	-	21.0	46.0	25.0	
Hori.	2763.750	PK	49.8	28.4	4.9	35.1	-	48.0	73.9	25.9	
Hori.	3685.000	PK	47.3	29.3	5.2	34.5	-	47.3	73.9	26.6	
Hori.	4606.250	PK	43.9	31.0	5.7	34.4	-	46.2	73.9	27.7	
Hori.	5527.500	PK	43.7	31.7	6.2	34.2	-	47.3	73.9	26.6	
Hori.	6448.750	PK	40.0	33.8	6.5	34.2	-	46.0	73.9	27.9	Floor noise
Hori.	7370.000	PK	41.3	36.1	6.6	34.4	-	49.6	73.9	24.3	Floor noise
Hori.	8291.250	PK	41.5	36.1	7.0	34.7	-	49.8	73.9	24.1	Floor noise
Hori.	9212.500	PK	43.1	38.5	7.4	34.8	-	54.2	73.9	19.8	Floor noise
Hori.	2763.750	AV	44.3	28.4	4.9	35.1	-	42.6	53.9	11.3	
Hori.	3685.000	AV	42.1	29.3	5.2	34.5	-	42.1	53.9	11.8	
Hori.	4606.250	AV	36.9	31.0	5.7	34.4	-	39.2	53.9	14.7	
Hori.	5527.500	AV	35.6	31.7	6.2	34.2	-	39.2	53.9	14.7	
Hori.	6448.750	AV	33.2	33.8	6.5	34.2	-	39.2	53.9	14.7	Floor noise
Hori.	7370.000	AV	34.1	36.1	6.6	34.4	-	42.5	53.9	11.4	Floor noise
Hori.	8291.250	AV	33.9	36.1	7.0	34.7	-	42.2	53.9	11.7	Floor noise
Hori.	9212.500	AV	33.7	38.5	7.4	34.8	-	44.8	53.9	9.1	Floor noise
Vert.	56.543	QP	40.0	8.8	7.7	32.2	-	24.3	40.0	15.7	
Vert.	79.484	QP	39.1	6.8	8.0	32.2	-	21.7	40.0	18.3	
Vert.	115.202	QP	34.1	12.2	8.4	32.1	-	22.6	43.5	20.9	
Vert.	172.944	QP	27.4	15.8	8.9	32.1	-	20.0	43.5	23.5	
Vert.	412.241	QP	24.1	16.0	10.9	32.0	-	19.0	46.0	27.0	
Vert.	649.586	QP	21.1	19.2	12.2	32.0	-	20.6	46.0	25.4	
Vert.	2763.750	PK	47.3	28.4	4.9	35.1	-	45.5	73.9	28.4	
Vert.	3685.000	PK	45.7	29.3	5.2	34.5	-	45.7	73.9	28.2	
Vert.	4606.250	PK	43.2	31.0	5.7	34.4	-	45.4	73.9	28.5	
Vert.	5527.500	PK	40.5	31.7	6.2	34.2	-	44.2	73.9	29.8	
Vert.	6448.750	PK	40.2	33.8	6.5	34.2	-	46.2	73.9	27.7	Floor noise
Vert.	7370.000	PK	41.2	36.1	6.6	34.4	-	49.5	73.9	24.4	Floor noise
Vert.	8291.250	PK	41.3	36.1	7.0	34.7	-	49.6	73.9	24.3	Floor noise
Vert.	9212.500	PK	42.2	38.5	7.4	34.8	-	53.3	73.9	20.6	Floor noise
Vert.	2763.750	AV	41.6	28.4	4.9	35.1	-	39.8	53.9	14.1	
Vert.	3685.000	AV	39.9	29.3	5.2	34.5	-	39.9	53.9	14.0	
Vert.	4606.250	AV	36.9	31.0	5.7	34.4	-	39.2	53.9	14.7	
Vert.	5527.500	AV	33.9	31.7	6.2	34.2	-	37.6	53.9	16.4	
Vert.	6448.750	AV	33.0	33.8	6.5	34.2	-	39.0	53.9	14.9	Floor noise
Vert.	7370.000	AV	34.2	36.1	6.6	34.4	-	42.5	53.9	11.4	Floor noise
Vert.	8291.250	AV	33.8	36.1	7.0	34.7	-	42.1	53.9	11.8	Floor noise
Vert.	9212.500	AV	33.9	38.5	7.4	34.8	-	45.0	53.9	8.9	Floor noise

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier)
*Other frequency noises omitted in this report were not seen or had enough margin (more than 20 dB).

Distance factor: 1 GHz - 10 GHz 20log (3.6 m / 3.0 m) = 1.59 dB

***These results have sufficient margin without taking account Duty cycle correction factor.**

20dBc Data Sheet

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	921.250	PK	86.0	22.0	12.5	0.0	120.4	-	-	Carrier
Hori.	1842.500	PK	65.4	25.5	4.6	35.5	60.0	100.4	40.4	
Vert.	921.250	PK	83.7	22.0	12.5	0.0	118.1	-	-	Carrier
Vert.	1842.500	PK	60.2	25.5	4.6	35.5	54.7	98.1	43.4	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amprifier)

Radiated Spurious Emission
(External Antenna)

Report No.	13607775H	
Test place	Ise EMC Lab.	
Semi Anechoic Chamber	No.4	No.2
Date	November 29, 2020	November 30, 2020
Temperature / Humidity	20 deg. C / 37 % RH	23 deg. C / 42 % RH
Engineer	Yuichiro Yamazaki	Junya Okuno
	(Below 1 GHz)	(Above 1 GHz)
Mode	Tx, Hopping Off, 927.5 MHz	

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	55.779	QP	32.9	9.0	7.7	32.2	-	17.5	40.0	22.6	
Hori.	79.693	QP	34.6	6.8	8.0	32.2	-	17.2	40.0	22.8	
Hori.	115.913	QP	25.6	12.3	8.4	32.1	-	14.1	43.5	29.4	
Hori.	172.271	QP	26.5	15.7	8.9	32.1	-	19.1	43.5	24.4	
Hori.	412.724	QP	32.4	16.1	10.9	32.0	-	27.3	46.0	18.7	
Hori.	649.435	QP	21.3	19.2	12.2	32.0	-	20.8	46.0	25.2	
Hori.	2782.500	PK	50.6	28.5	4.9	35.1	-	48.9	73.9	25.0	
Hori.	3710.000	PK	47.8	29.3	5.2	34.4	-	47.8	73.9	26.1	
Hori.	4637.500	PK	41.2	31.1	5.7	34.4	-	43.6	73.9	30.3	
Hori.	5565.000	PK	41.8	31.7	6.2	34.2	-	45.5	73.9	28.5	
Hori.	6492.500	PK	40.6	33.9	6.5	34.2	-	46.7	73.9	27.2	Floor noise
Hori.	7420.000	PK	40.2	36.0	6.6	34.4	-	48.5	73.9	25.4	Floor noise
Hori.	8347.500	PK	42.1	36.1	7.0	34.7	-	50.5	73.9	23.4	Floor noise
Hori.	9275.000	PK	40.3	38.8	7.4	34.8	-	51.7	73.9	22.2	Floor noise
Hori.	2782.500	AV	45.8	28.5	4.9	35.1	-	44.1	53.9	9.8	
Hori.	3710.000	AV	43.1	29.3	5.2	34.4	-	43.2	53.9	10.7	
Hori.	4637.500	AV	35.3	31.1	5.7	34.4	-	37.8	53.9	16.2	
Hori.	5565.000	AV	34.3	31.7	6.2	34.2	-	38.0	53.9	15.9	
Hori.	6492.500	AV	32.1	33.9	6.5	34.2	-	38.3	53.9	15.6	Floor noise
Hori.	7420.000	AV	33.3	36.0	6.6	34.4	-	41.6	53.9	12.4	Floor noise
Hori.	8347.500	AV	33.6	36.1	7.0	34.7	-	42.0	53.9	11.9	Floor noise
Hori.	9275.000	AV	31.7	38.8	7.4	34.8	-	43.1	53.9	10.8	Floor noise
Vert.	56.184	QP	39.2	8.9	7.7	32.2	-	23.6	40.0	16.4	
Vert.	79.586	QP	38.6	6.8	8.0	32.2	-	21.2	40.0	18.8	
Vert.	115.375	QP	32.8	12.2	8.4	32.1	-	21.3	43.5	22.2	
Vert.	172.682	QP	28.5	15.8	8.9	32.1	-	21.1	43.5	22.4	
Vert.	413.230	QP	24.2	16.1	10.9	32.0	-	19.2	46.0	26.8	
Vert.	648.358	QP	21.8	19.2	12.2	32.0	-	21.3	46.0	24.8	
Vert.	2782.500	PK	50.0	28.5	4.9	35.1	-	48.3	73.9	25.6	
Vert.	3710.000	PK	45.5	29.3	5.2	34.4	-	45.6	73.9	28.3	
Vert.	4637.500	PK	43.6	31.1	5.7	34.4	-	46.0	73.9	27.9	
Vert.	5565.000	PK	40.6	31.7	6.2	34.2	-	44.3	73.9	29.6	
Vert.	6492.500	PK	39.8	33.9	6.5	34.2	-	46.0	73.9	28.0	Floor noise
Vert.	7420.000	PK	40.9	36.0	6.6	34.4	-	49.2	73.9	24.7	Floor noise
Vert.	8347.500	PK	40.9	36.1	7.0	34.7	-	49.3	73.9	24.6	Floor noise
Vert.	9275.000	PK	40.6	38.8	7.4	34.8	-	52.0	73.9	21.9	Floor noise
Vert.	2782.500	AV	44.1	28.5	4.9	35.1	-	42.4	53.9	11.5	
Vert.	3710.000	AV	39.6	29.3	5.2	34.4	-	39.7	53.9	14.2	
Vert.	4637.500	AV	36.2	31.1	5.7	34.4	-	38.7	53.9	15.3	
Vert.	5565.000	AV	33.7	31.7	6.2	34.2	-	37.4	53.9	16.5	
Vert.	6492.500	AV	32.2	33.9	6.5	34.2	-	38.4	53.9	15.5	Floor noise
Vert.	7420.000	AV	33.6	36.0	6.6	34.4	-	41.8	53.9	12.1	Floor noise
Vert.	8347.500	AV	33.9	36.1	7.0	34.7	-	42.3	53.9	11.6	Floor noise
Vert.	9275.000	AV	32.1	38.8	7.4	34.8	-	43.5	53.9	10.4	Floor noise

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier)
*Other frequency noises omitted in this report were not seen or had enough margin (more than 20 dB).

Distance factor: 1 GHz - 10 GHz 20log (3.6 m / 3.0 m) = 1.59 dB

***These results have sufficient margin without taking account Duty cycle correction factor.**

20dBc Data Sheet

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	927.500	PK	85.2	21.9	12.5	0.0	119.6	-	-	Carrier
Hori.	928.000	PK	24.4	21.9	12.5	0.0	58.8	99.6	40.8	
Hori.	1855.000	PK	66.2	25.5	4.6	35.5	60.8	99.6	38.9	
Vert.	927.500	PK	83.6	21.9	12.5	0.0	118.0	-	-	Carrier
Vert.	928.000	PK	24.0	21.9	12.5	0.0	58.4	98.0	39.6	
Vert.	1855.000	PK	60.1	25.5	4.6	35.5	54.7	98.0	43.4	

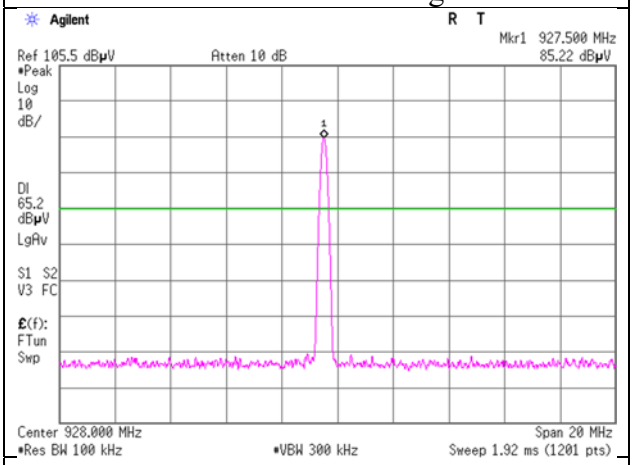
Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amprifier)

Radiated Spurious Emission
(Reference Plot for band-edge)
(External Antenna)

Report No.	13607775H
Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.4
Date	November 29, 2020
Temperature / Humidity	20 deg. C / 37 % RH
Engineer	Yuichiro Yamazaki (Below 1 GHz)
Mode	Tx, Hopping Off, 927.5 MHz

Horizontal

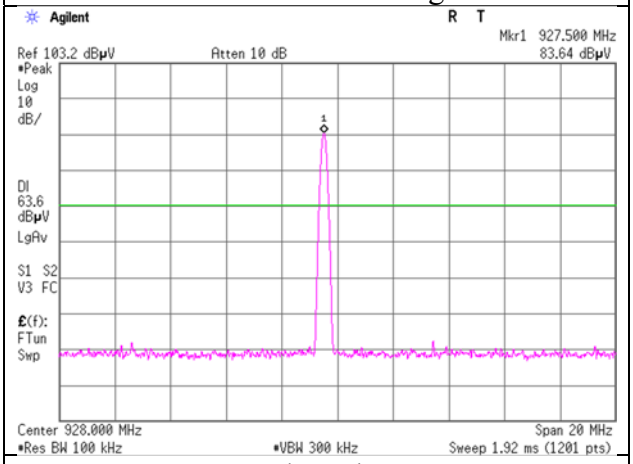
Restricted-band band-edge Plot



20dBc Plot

Vertical

Restricted-band band-edge Plot

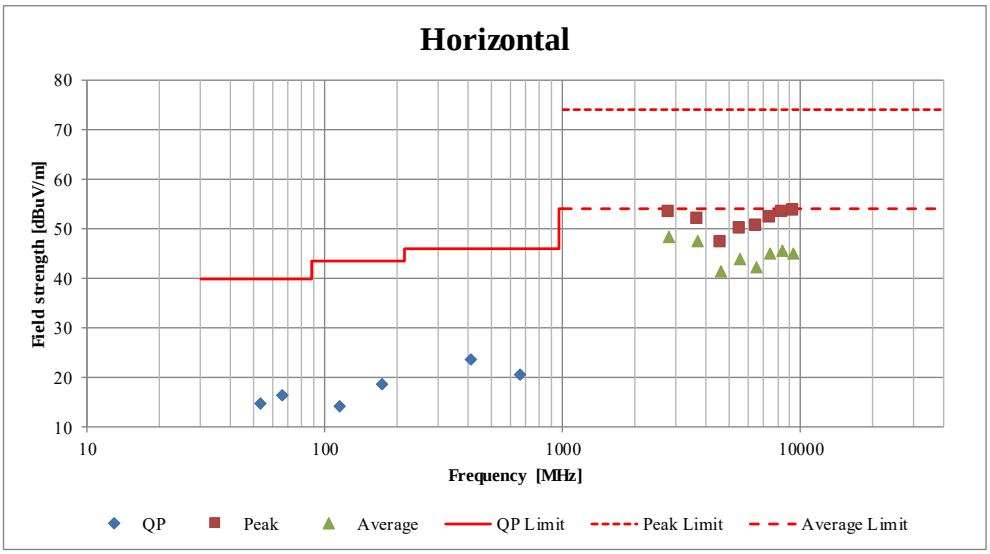


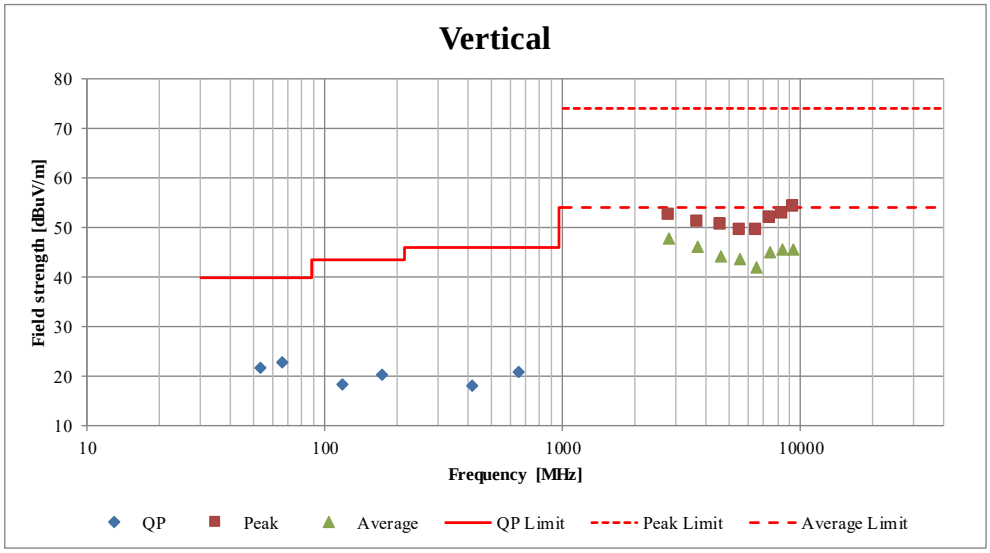
20dBc Plot

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

Radiated Spurious Emission
(Plot data, Worst case)

Report No.	13607775H	
Test place	Ise EMC Lab.	
Semi Anechoic Chamber	No.4	No.4
Date	November 28, 2020	November 29, 2020
Temperature / Humidity	23 deg. C / 47 % RH	22 deg. C / 37 % RH
Engineer	Takafumi Noguchi (Below 1 GHz)	Junya Okuno (Above 1 GHz)
Mode	Internal Antenna, Tx, Hopping Off , 927.5 MHz	





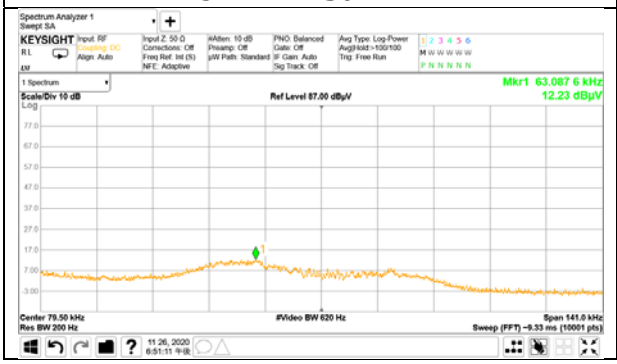
*These plots data contains sufficient number to show the trend of characteristic features for EUT.

Conducted Spurious Emission

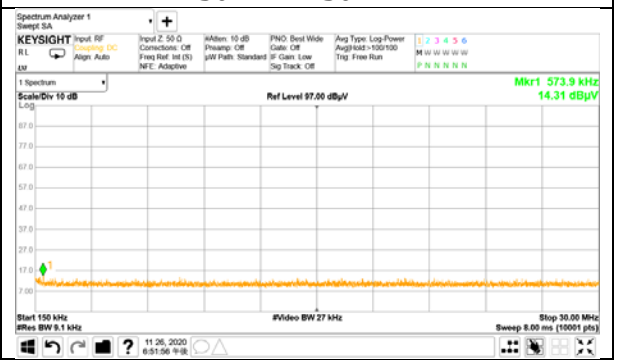
Report No.	13607775H
Test place	Ise EMC Lab. No.3 Measurement Room
Date	November 26, 2020
Temperature / Humidity	20 deg. C / 37 % RH
Engineer	Tomohisa Nakagawa
Mode	Tx, Hopping Off

Internal Ant 915.25 MHz

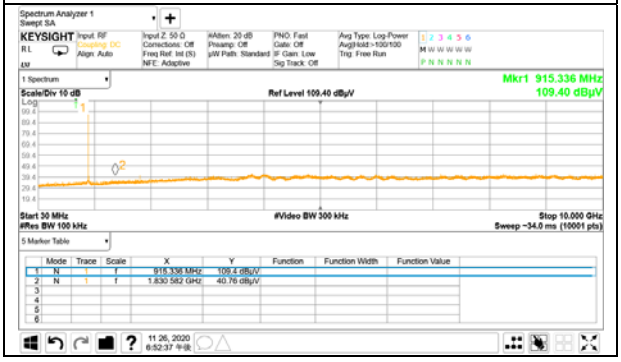
9 kHz - 150 kHz



150 kHz - 30 MHz



30 MHz - 10 GHz

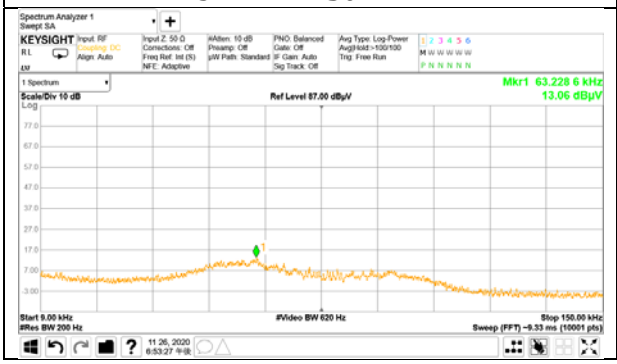


Conducted Spurious Emission

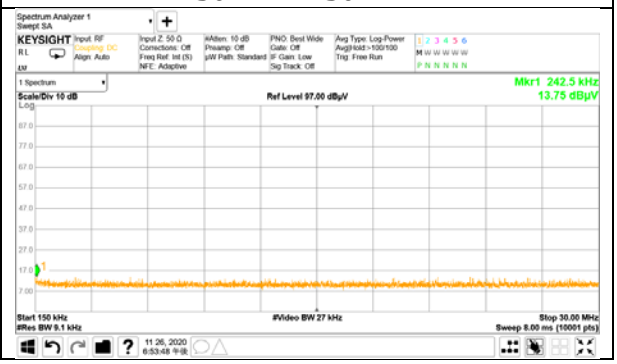
Report No.	13607775H
Test place	Ise EMC Lab. No.3 Measurement Room
Date	November 26, 2020
Temperature / Humidity	20 deg. C / 37 % RH
Engineer	Tomohisa Nakagawa
Mode	Tx, Hopping Off

Internal Ant 921.25 MHz

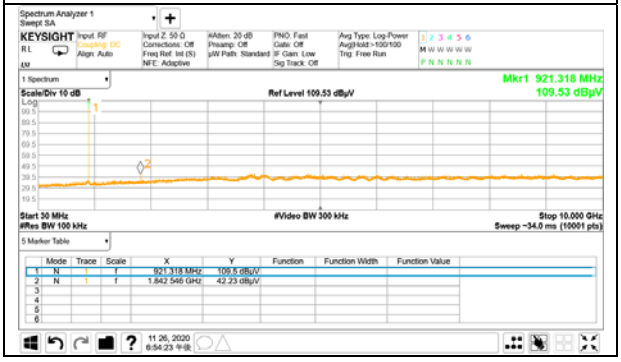
9 kHz – 150 kHz



150 kHz – 30 MHz



30 MHz – 10 GHz

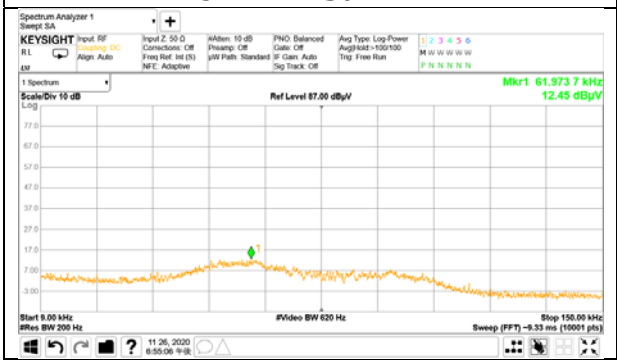


Conducted Spurious Emission

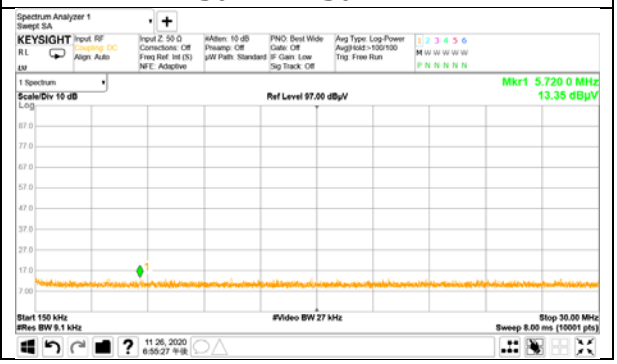
Report No.	13607775H
Test place	Ise EMC Lab. No.3 Measurement Room
Date	November 26, 2020
Temperature / Humidity	20 deg. C / 37 % RH
Engineer	Tomohisa Nakagawa
Mode	Tx, Hopping Off

Internal Ant 927.50 MHz

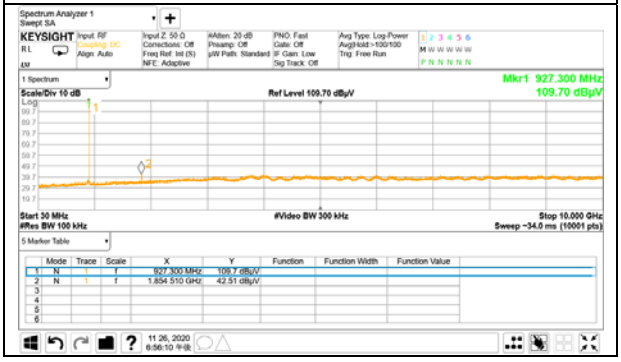
9 kHz - 150 kHz



150 kHz - 30 MHz



30 MHz - 10 GHz

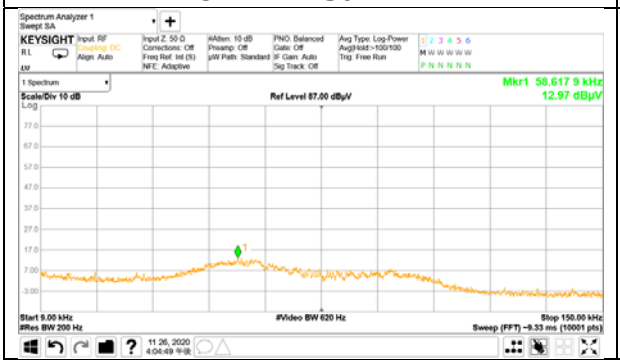


Conducted Spurious Emission

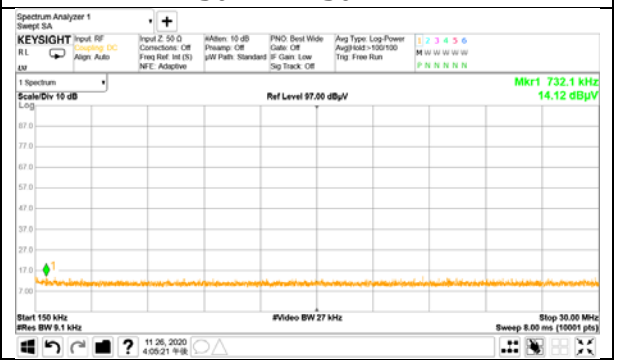
Report No.	13607775H
Test place	Ise EMC Lab. No.3 Measurement Room
Date	November 26, 2020
Temperature / Humidity	20 deg. C / 37 % RH
Engineer	Tomohisa Nakagawa
Mode	Tx, Hopping Off

External Ant 915.25 MHz

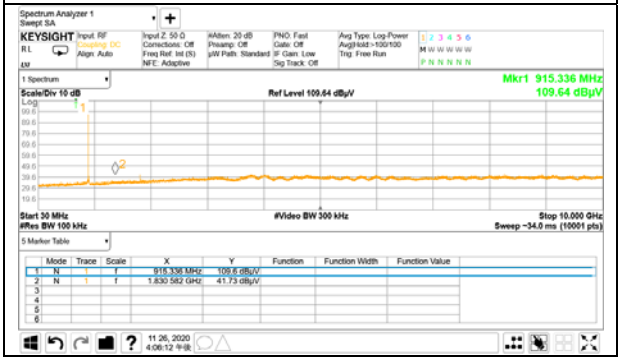
9 kHz - 150 kHz



150 kHz - 30 MHz



30 MHz - 10 GHz

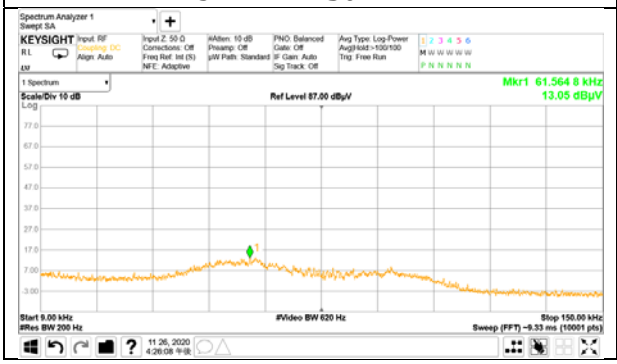


Conducted Spurious Emission

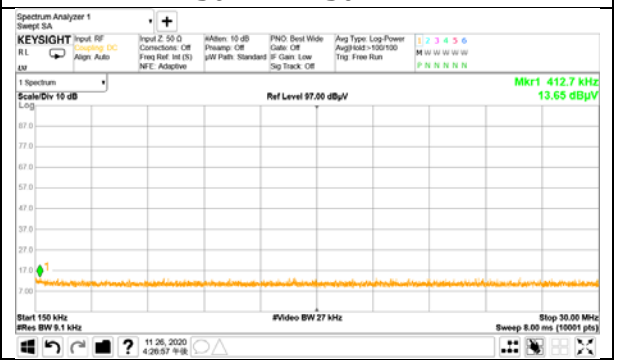
Report No.	13607775H
Test place	Ise EMC Lab. No.3 Measurement Room
Date	November 26, 2020
Temperature / Humidity	20 deg. C / 37 % RH
Engineer	Tomohisa Nakagawa
Mode	Tx, Hopping Off

External Ant 921.25 MHz

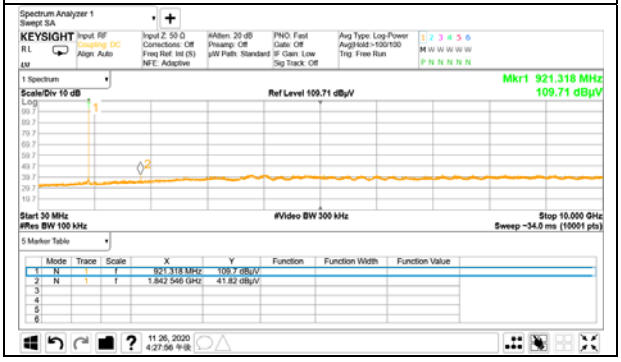
9 kHz – 150 kHz



150 kHz – 30 MHz



30 MHz – 10 GHz



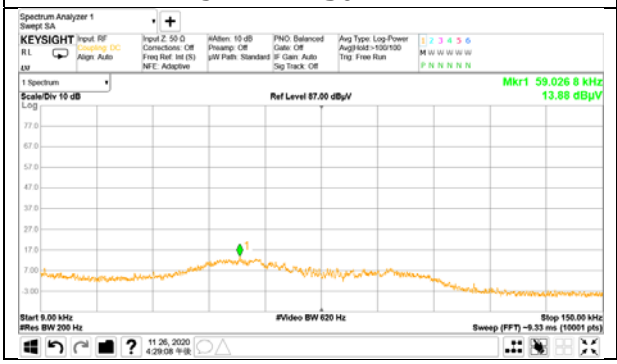
UL Japan, Inc.
Ise EMC Lab.
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN
Telephone : +81 596 24 8999
Facsimile : +81 596 24 8124

Conducted Spurious Emission

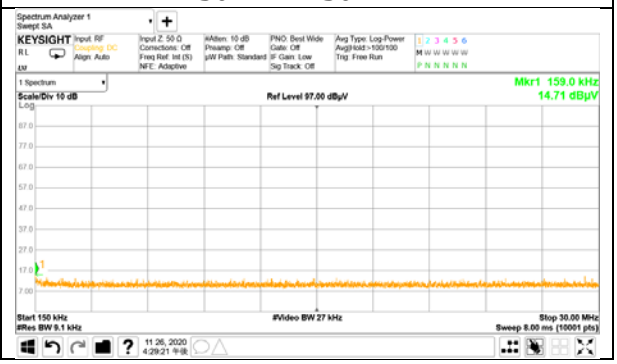
Report No.	13607775H
Test place	Ise EMC Lab. No.3 Measurement Room
Date	November 26, 2020
Temperature / Humidity	20 deg. C / 37 % RH
Engineer	Tomohisa Nakagawa
Mode	Tx, Hopping Off

External Ant 927.50 MHz

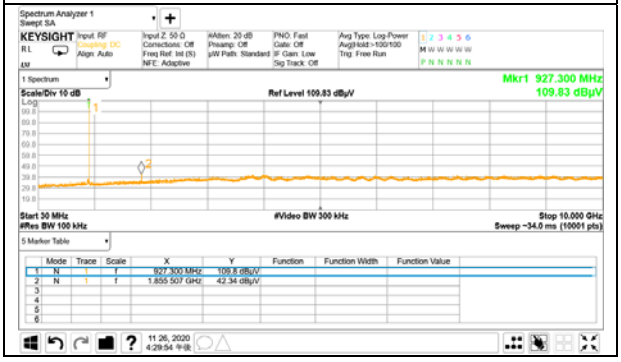
9 kHz - 150 kHz



150 kHz - 30 MHz



30 MHz - 10 GHz



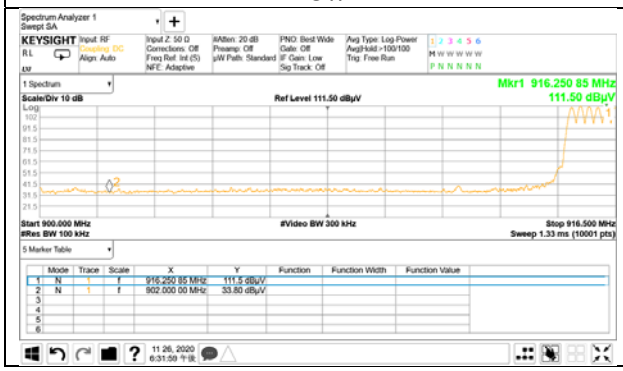
Conducted Emission Band Edge compliance

(Internal Antenna)

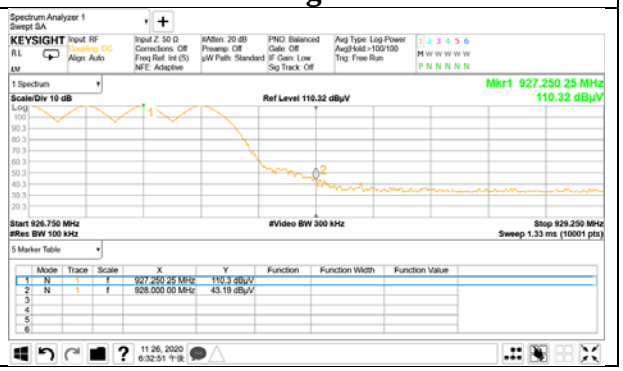
Report No.	13607775H
Test place	Ise EMC Lab. No.3 Measurement Room
Date	November 26, 2020
Temperature / Humidity	20 deg. C / 37 % RH
Engineer	Tomohisa Nakagawa
Mode	Tx, Hopping On / Tx, Hopping Off

Hopping On

Low

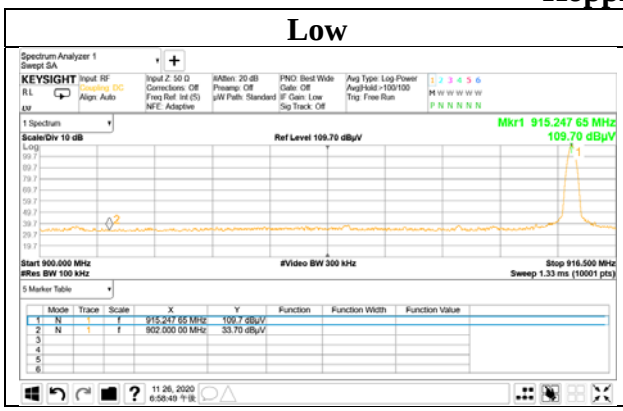


High

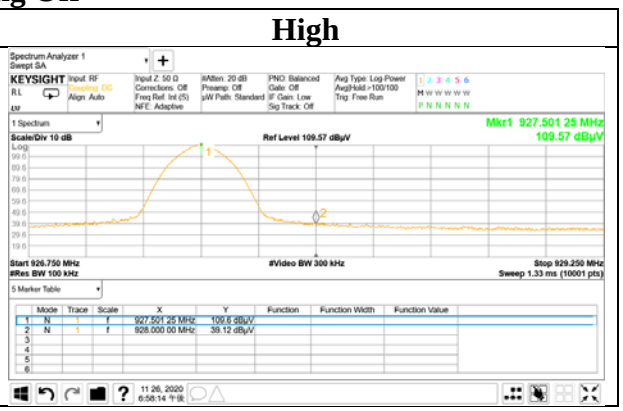


Hopping Off

Low



High



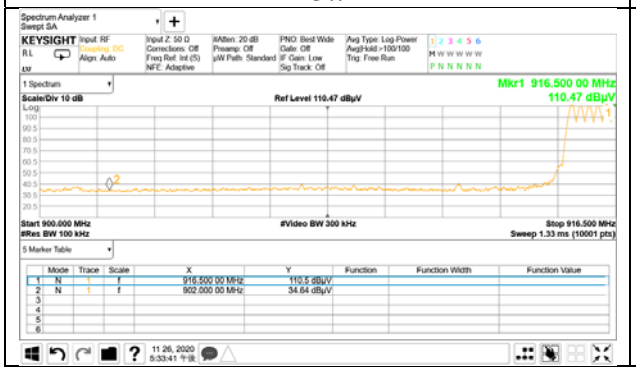
Conducted Emission Band Edge compliance

(External Antenna)

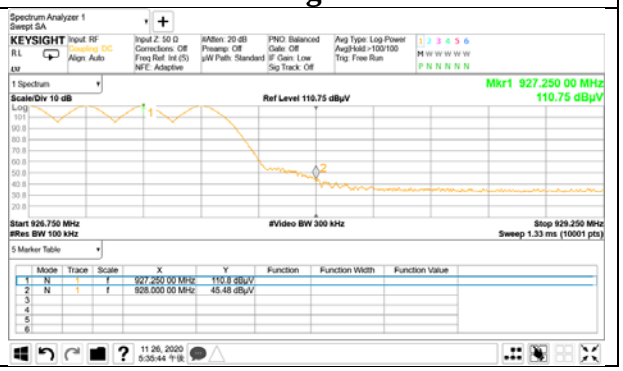
Report No.	13607775H
Test place	Ise EMC Lab. No.3 Measurement Room
Date	November 26, 2020
Temperature / Humidity	20 deg. C / 37 % RH
Engineer	Tomohisa Nakagawa
Mode	Tx, Hopping On / Off

Hopping On

Low

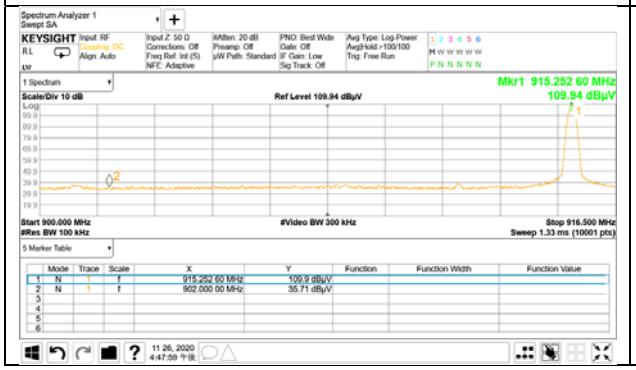


High

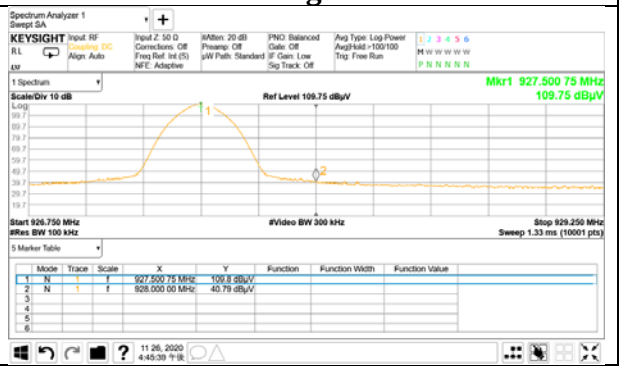


Hopping Off

Low



High



APPENDIX 2: Test instruments

Test equipment(1/2)

Test Item	Local ID	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Cal Int
AT	MOS-29	141568	Thermo-Hygrometer	CUSTOM. Inc	CTH-201	2901	2020/01/07	12
AT	MJM-16	142183	Measure	KOMELON	KMC-36	-	-	-
AT	MPM-12	141809	Power Meter	ANRITSU	ML2495A	825002	2020/05/07	12
AT	MPSE-17	141830	Power sensor	ANRITSU	MA2411B	738285	2020/05/07	12
AT	MAT-17	141171	Attenuator(20dB)_DC-1GHz_N	Weinschel Corp	MODEL 1	BG0143	2019/12/09	12
AT	MAT-99	148899	Attenuator	Pasternack	PE7047-3	1002332	2020/10/16	12
AT	MSA-19	182484	Signal Analyzer	Keysight Technologies Inc	N9030B	MY57143159	2020/06/24	12
RE	MAEC-04	142011	AC4_Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-10005	2020/05/25	24
RE	MAT-34	141331	Attenuator(6dB)	TME	UFA-01	-	2020/02/05	12
RE	MBA-05	141425	Biconical Antenna	Schwarzbeck Mess - Elektronik	VHA9103+BBA9106	VHA 91031302	2020/08/31	12
RE	MCC-50	141397	Coaxial Cable	UL Japan	-	-	2020/11/06	12
RE	MLA-23	141267	Logperiodic Antenna(200-1000MHz)	Schwarzbeck Mess - Elektronik	VUSLP9111B	9111B-192	2020/09/02	12
RE	MPA-13	141582	Pre Amplifier	SONOMA INSTRUMENT	310	260834	2020/02/10	12
RE	MTR-10	141951	EMI Test Receiver	Rohde & Schwarz	ESR26	101408	2020/03/10	12
RE	MRF-12	192072	Band Rejection Filter(902-928MHz)	Wakoh Communication Industrial Co., Ltd.	WFR-481	19122541	2020/03/16	12
RE	MCC-64	141327	Coaxial Cable	UL Japan	-	-	2020/02/04	12
RE	MOS-15	141562	Thermo-Hygrometer	CUSTOM. Inc	CTH-201	0010	2020/01/07	12
RE	MMM-10	141545	DIGITAL HiTESTER	Hioki	3805	51201148	2020/01/06	12
RE	MJM-29	142230	Measure	KOMELON	KMC-36	-	-	-
RE	COTS-MEMI-02	178648	EMI measurement program	TSJ (Techno Science Japan)	TEPTO-DV	-	-	-
RE	MAEC-04-SVSWR	142017	AC4_Semi Anechoic Chamber(SVSWR)	TDK	Semi Anechoic Chamber 3m	DA-10005	2019/04/04	24
RE	MHA-21	141508	Horn Antenna 1-18GHz	Schwarzbeck Mess - Elektronik	BBHA9120D	557	2020/05/22	12
RE	MPA-12	141581	MicroWave System Amplifier	Keysight Technologies Inc	83017A	00650	2020/10/19	12
RE	MCC-246	199563	Microwave Cable	HUBER+SUNER	SF126E/11PC35/11PC35/1000M,5000M	537061/126E / 537072/126E	2020/06/11	12
RE	MHF-27	141297	High Pass Filter(1.1-10GHz)	TOKYO KEIKI	TF219CD1	1001	2020/01/09	12
RE	MRENT-130	141855	Spectrum Analyzer	Keysight Technologies Inc	E4440A	MY46187750	2020/11/18	12
RE	MAJ-01	142236	Antenna Tilt Jig	Intelligent System Engineering Co., Ltd	Antenna Tilt Jig	T-0001	-	-
RE	MOS-41	192300	Thermo-Hygrometer	CUSTOM. Inc	CTH-201	0013	2020/12/06	12
RE	MMM-01	141542	Digital Tester	Fluke Corporation	FLUKE 26-3	78030611	2020/08/18	12
RE	MJM-27	142228	Measure	KOMELON	KMC-36	-	-	-
RE	MAEC-02-SVSWR	142006	AC2_Semi Anechoic Chamber(SVSWR)	TDK	Semi Anechoic Chamber 3m	DA-06902	2019/04/01	24
RE	MHA-06	141512	Horn Antenna 1-18GHz	Schwarzbeck Mess - Elektronik	BBHA9120D	254	2020/09/14	12
RE	MCC-216	141392	Microwave Cable	Junkosha	MWX221	1604S253(1 m) / 537073/126E(5 m)	2020/02/18	12
RE	MPA-10	141579	Pre Amplifier	Keysight Technologies Inc	8449B	3008A02142	2020/01/07	12
RE	MSA-03	141884	Spectrum Analyzer	Keysight Technologies Inc	E4448A	MY44020357	2020/03/04	12
CE	MAEC-01	141998	AC1_Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 10m	DA-06881	2020/06/08	24

Test equipment(2/2)

Test Item	Local ID	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Cal Int
CE	MOS-27	141566	Thermo-Hygrometer	CUSTOM. Inc	CTH-201	A08Q26	2020/01/07	12
CE	MMM-03	141530	Digital Tester	Fluke Corporation	FLUKE 26-3	78030621	2020/08/18	12
CE	MJM-25	142226	Measure	KOMELON	KMC-36	-	-	-
CE	COTS-MEMI-02	178648	EMI measurement program	TSJ (Techno Science Japan)	TEPTO-DV	-	-	-
CE	MLS-25	141537	LISN(AMN)	Schwarzbeck Mess - Elektronik	NSLK8127	8127-731	2020/07/21	12
CE	MAT-64	141290	Attenuator(13dB)	JFW Industries, Inc.	50FP-013H2 N	-	2020/12/07	12
CE	MTA-54	141936	Terminator	TME	CT-01BP	-	2020/12/04	12
CE	MCC-03	141215	Coaxial Cable	Fujikura/Suhner/TSJ	5D-2W/3D-2W/RG400u/RFM-E421(SW)	-/01068(Switcher)	2020/06/25	12
CE	MTR-09	141950	EMI Test Receiver	Rohde & Schwarz	ESU26	100412	2020/06/03	12
CE	MLS-26	141538	LISN(AMN)	Schwarzbeck Mess - Elektronik	NSLK8127	8127-732	2020/07/10	12

***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: **CE: Conducted Emission test**
RE: Radiated Emission test
AT: Antenna Terminal Conducted test