



Test report No.
Page
Issued date
FCC ID

: 13558632H-C-R1
: 1 of 40
: February 5, 2021
: A6RTSXN237

EMI TEST REPORT

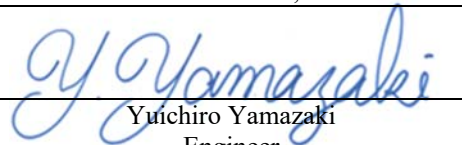
Test Report No. : 13558632H-C-R1

Applicant : Yamaha Corporation
Type of EUT : Desktop Audio System
Model Number of EUT : TSX-N237
FCC ID : A6RTSXN237
Test regulation : FCC Part 18: 2017
Test Result : Complied (Refer to SECTION 3.2)

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2. The results in this report apply only to the sample tested.
3. This sample tested is in compliance with the limits of the above standard.
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 13558632H-C. 13558632H-C is replaced with this report.

Date of test: December 8 to 16, 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".

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REVISION HISTORY

Original Test Report No.: 13558632H-C

Revision	Test report No.	Date	Page revised	Contents
- (Original)	13558632H-C	January 27, 2021	-	-
1	13558632H-C-R1	February 5, 2021	corresponding page (for original report)	Deletion of contents related to Mode 1 and Mode 2.
1	13558632H-C-R1	February 5, 2021	P.28 to 35	Correction of Extrapolation Factor under the test data.

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Reference: Abbreviations (Including words undescribed in this report)

A2LA	The American Association for Laboratory Accreditation	MCS	Modulation and Coding Scheme
AC	Alternating Current	MRA	Mutual Recognition Arrangement
AFH	Adaptive Frequency Hopping	N/A	Not Applicable
AM	Amplitude Modulation	NIST	National Institute of Standards and Technology
Amp, AMP	Amplifier	NS	No signal detect.
ANSI	American National Standards Institute	NSA	Normalized Site Attenuation
Ant, ANT	Antenna	NVLAP	National Voluntary Laboratory Accreditation Program
AP	Access Point	OBW	Occupied Band Width
ASK	Amplitude Shift Keying	OFDM	Orthogonal Frequency Division Multiplexing
Atten., ATT	Attenuator	P/M	Power meter
AV	Average	PCB	Printed Circuit Board
BPSK	Binary Phase-Shift Keying	PER	Packet Error Rate
BR	Bluetooth Basic Rate	PHY	Physical Layer
BT	Bluetooth	PK	Peak
BT LE	Bluetooth Low Energy	PN	Pseudo random Noise
BW	BandWidth	PRBS	Pseudo-Random Bit Sequence
Cal Int	Calibration Interval	PSD	Power Spectral Density
CCK	Complementary Code Keying	QAM	Quadrature Amplitude Modulation
Ch., CH	Channel	QP	Quasi-Peak
CISPR	Comite International Special des Perturbations Radioelectriques	QPSK	Quadri-Phase Shift Keying
CW	Continuous Wave	RBW	Resolution Band Width
DBPSK	Differential BPSK	RDS	Radio Data System
DC	Direct Current	RE	Radio Equipment
D-factor	Distance factor	RF	Radio Frequency
DFS	Dynamic Frequency Selection	RMS	Root Mean Square
DQPSK	Differential QPSK	RSS	Radio Standards Specifications
DSSS	Direct Sequence Spread Spectrum	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
EU	European Union	Vert.	Vertical
EUT	Equipment Under Test	WLAN	Wireless LAN
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		

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SECTION 1: Customer information

Company Name	:	Yamaha Corporation
Address	:	10-1 Nakazawa-cho, Naka-ku, Hamamatsu-shi, Shizuoka-ken 430-8650, Japan
Telephone Number	:	+81-53-460-2376
Facsimile Number	:	+81-53-460-2379
Contact Person	:	Kenji Kawasaki

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	:	Desktop Audio System
Model Number	:	TSX-N237
Serial Number	:	Refer to SECTION 4.2
Rating	:	AC 120 V, 60 Hz (power consumption: 42 W)
Receipt Date	:	December 7, 2020
Country of Mass-production	:	Malaysia
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: TSX-N237 (referred to as the EUT in this report) is a Desktop Audio System.

General Specification

Clock frequency in the system (maximum)	:	4.5 GHz
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Radio Specification

[Wireless power transmission systems] *1)

Operating Frequency	: 127.7 kHz
Rated Output Power	: 5 W (BPP), 10 W (EPP)
Coil system	: Single Coil
Charging distance	: Contact
Operating Temperature	: 5 deg. C to +35 deg. C

[WLAN / Bluetooth]

Common	
Power Supply	DC 3.7 V
Power consumption	4.21 W
Clock frequencies in the system	25 MHz, 37.4 MHz, 32.768 kHz, 800 MHz, 1 GHz
Country of Origin	China

R0	WLAN		Bluetooth (Class 2)
Equipment Radio Type	Transceiver	Transceiver	Transceiver
Frequency of Operation	2412 MHz - 2472 MHz	5180 MHz - 5825 MHz	2402 MHz - 2480 MHz
Type of Modulation	DSSS OFDM	OFDM	FHSS (GFSK, $\pi/4$ DQPSK, 8DQPSK)
Method of frequency generation	Synthesizer	Synthesizer	Synthesizer
Bandwidth	20 MHz	20 MHz	1 MHz
Channel Spacing	5 MHz	20 MHz	1 MHz
Standard / Version	IEEE 802.11b/g/n (20 MHz)	IEEE 802.11a/n/ac (20 MHz)	4.2 (except BLE)
Antenna Gain (Including Cable Loss)	3.01 dBi	3.99 dBi	3.01 dBi

R1	WLAN
Equipment Radio Type	Transceiver
Frequency of Operation	5180 MHz - 5825 MHz
Type of Modulation	OFDM
Method of frequency generation	Synthesizer
Bandwidth	20 MHz
Channel Spacing	20 MHz
Standard / Version	IEEE 802.11a/n/ac (20 MHz)
Antenna Gain (Including Cable Loss)	3.62 dBi

*1) This test report applies to Wireless power transmission systems.

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SECTION 3: Test specification, procedures & results

3.1 Test specification

Test Specification : FCC Part 18 2017, final revised on November 2, 2017.
 Title : FCC 47CFR Part18 Industrial, scientific, and medical equipment

3.2 Procedures and results

Item	Test Procedure & Limits	Deviation	Worst margin	Results	Remarks
Radiated emission	Section 18.305 FCC/OST MP-5	N/A	5.5 dB, 0.6385 MHz, Horizontal	Complied a)	-
Conducted emission	Section 18.307 FCC/OST MP-5	N/A	13.30 dB, 0.46542 MHz, AV, Phase N	Complied b)	-
*Note: UL Japan, Inc.'s EMI Work Procedure 13-EM-W0420. a) Refer to APPENDIX 1 (data of Radiated emission) b) Refer to APPENDIX 1 (data of Conducted 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.					

3.3 Addition to standard

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

3.4 Uncertainty

EMI

There is no applicable rule of uncertainty in this applied standard. Therefore, the following 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 $k = 2$.

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
		5.0 dB
	200 MHz to 1000 MHz (Horizontal)	5.2 dB
		6.3 dB
10 m	30 MHz to 200 MHz (Horizontal)	4.8 dB
		4.8 dB
	200 MHz to 1000 MHz (Horizontal)	5.0 dB
		5.0 dB

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3.5 Test Location

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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.

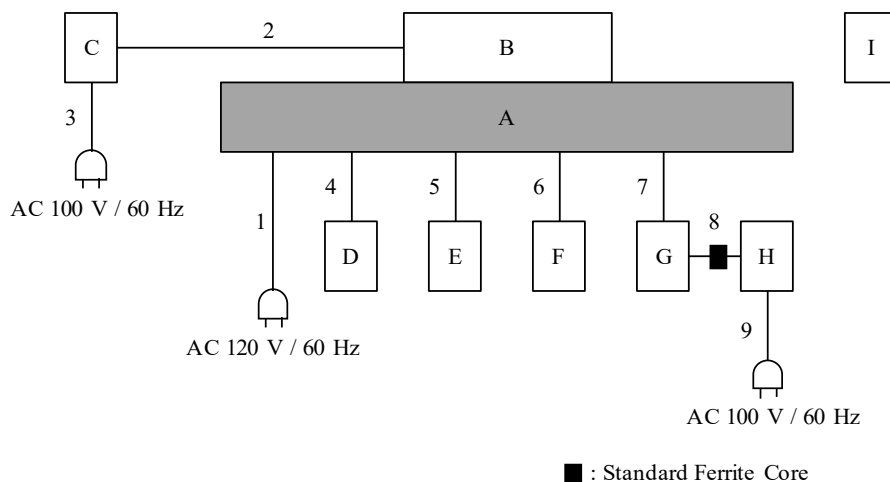
SECTION 4: Operation of EUT during testing

4.1 Operating mode(s)

The mode is used :

Test mode	Remarks
1) Normal Operating mode Transmit power: 10 W Frequency: 127.7 kHz (Un-mod) Modulation: FSK (Pos/Depth 31.25 ns)	Mode 1
2) Normal Operating mode Transmit power: 10 W Frequency: 127.7 kHz (Un-mod) Modulation: FSK (Pos/Depth 62.5 ns)	Mode 2
3) Normal Operating mode Transmit power: 10 W Frequency: 127.7 kHz (Un-mod) Modulation: FSK (Pos/Depth 125 ns)	Mode 3
4) Normal Operating mode Transmit power: 10 W Frequency: 127.7 kHz (Un-mod) Modulation: FSK (Pos/Depth 250 ns)	Mode 4
5) Normal Operating mode Transmit power: 10 W Frequency: 127.7 kHz (Un-mod) Modulation: FSK (Neg/Depth 31.25 ns)	Mode 5
6) Normal Operating mode Transmit power: 10 W Frequency: 127.7 kHz (Un-mod) Modulation: FSK (Neg/Depth 62.5 ns)	Mode 6
7) Normal Operating mode Transmit power: 10 W Frequency: 127.7 kHz (Un-mod) Modulation: FSK (Neg/Depth 125 ns)	Mode 7
8) Normal Operating mode Transmit power: 10 W Frequency: 127.7 kHz (Un-mod) Modulation: FSK (Neg/Depth 250 ns)	Mode 8

4.2 Configuration and peripherals



* 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	Desktop Audio System	TSX-N237	Y010270XZ	Yamaha Corporation	EUT
B	Reference receiver	TPR#MP1B	1	Nok9	-
C	Qi Reference Tester	CATSII Qi BST	200134-1807	Nok9	-
D	Portable CD Player	SL-CT520-A	WL7GA002317R	Panasonic	-
E	iPad	MUJ2J/A	DMPZ2766LMPD	Apple	-
F	Headphones	ATH-AVC200	-	Audio Technica	-
G	Laptop PC	CF-N8HWCDDPS	9LKSA04645	Panasonic	-
H	AC Adapter	CF-AA6372B	6372BM610214975E	Panasonic	-
I	remote controller	VDA3670	-	Yamaha Corporation	-

List of cables used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	AC Cable	1.6	Unshielded	Unshielded	-
2	Communication Cable	0.6	Shielded	Shielded	-
3	AC Cable	1.5	Unshielded	Unshielded	-
4	Audio Cable	1.5	Shielded	Shielded	-
5	USB Cable	1.0	Shielded	Shielded	-
6	Audio Cable	3.0	Shielded	Shielded	-
7	LAN Cable	1.0	Unshielded	Unshielded	-
8	DC Cable	1.0	Unshielded	Unshielded	-
9	AC Cable	0.8	Unshielded	Unshielded	-

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SECTION 5: Conducted emission

5.1 Operating environment

Test place : No.4 semi anechoic chamber
 Temperature : See data
 Humidity : See data

5.2 Test configuration

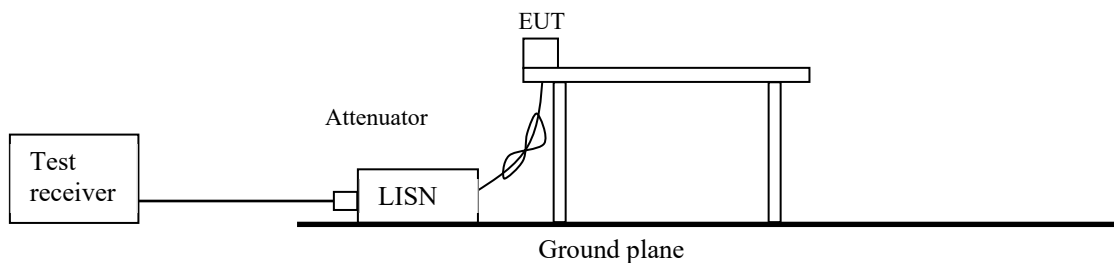
AC line

EUT was placed on a urethane platform of nominal size, 1.0 m by 1.5 m, raised 0.8 m above the horizontal ground plane. The rear of tabletop was located 40 cm to the vertical ground plane. The rear of EUT and its peripherals was 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 LISN/AMN and excess AC cable was bundled in center. 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. Each EUT current-carrying power lead, except the ground (safety) lead, was individually connected through a LISN/ an AMN to the input power source. All unused 50 ohm connectors of the LISN/ AMN were resistively terminated in 50 ohm when not connected to the measuring equipment. Photographs of the set up are shown in APPENDIX 3.

5.3 Test conditions

Frequency range : 150 kHz - 30 MHz
 EUT position : Table top
 EUT operation mode : See Clause 4.1

[Test Setup]



5.4 Test procedure

An overview sweep with peak detection has been performed. The measurements had been performed with a quasi-peak detector and if required, with a CISPR average detector (CAV). The conducted emission measurements were made with the detector (RBW) in the following table.

Frequency	150 kHz - 30 MHz
Instrument used	Test Receiver
IF Bandwidth	QP/CAV: 9 kHz / 9 kHz

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5.5 Test result

Summary of the test results : Pass

*The limit is rounded down to one decimal place.

*The test result is rounded off to one or two decimal places, so some differences might be observed.

Date: December 16, 2020

Test engineer: Yuichiro Yamazaki

SECTION 6: Radiated Emission

6.1 Operating environment

Test place : No.1 semi anechoic chamber
Temperature : See data
Humidity : See data

6.2 Test configuration

EUT was placed on a urethane platform of nominal size, 0.5 m by 1.0 m, raised 1.0 m above the conducting ground plane. The EUT was set on the center of the table top.
Test was made with the antenna positioned in 0 deg., 45 deg., 90 deg., 135deg., and 180 deg..
The measurement antenna was varied in height above the conducting ground plane to obtain the maximum signal strength. Photographs of the set up are shown in APPENDIX 3.
*Refer to Figure 1 about Direction of the Loop Antenna.

6.3 Test conditions

Frequency range : 9 kHz - 30 MHz (Loop antenna)
30 MHz - 200 MHz (Biconical antenna)
200 MHz - 400 MHz (Logperiodic antenna)
Test distance : 3 m / 10 m
EUT position : Table top
EUT operation mode : See Clause 4.1

6.4 Test procedure

Below 30 MHz

The height of antenna was fixed in 2 m.
EUT was rotated a full revolution in order to obtain the maximum value of the electric field intensity.
The measurements were performed in 0 deg., 45 deg., 90 deg., 135deg., and 180 deg. with the Test Receiver.
The test was made with the detector (RBW) in the following table.
The electric field intensity at a distance of 300 m was calculated from the measurement results at distances of 3 m and 10 m.

Above 30 MHz

Maximum electric field intensity was confirmed with the measurements at distances of 3 m and 10 m.
The electric field intensity at a distance of 300 m was calculated from the measurement results at distances of 3 m and 10 m.
The radiated emission measurements were made with the following detector function of the test receiver.
The test was made with the detector (RBW) in the following table.

Frequency	9 kHz - 150 kHz	150 kHz - 30 MHz	30 MHz - 400 MHz
Instrument used	Test Receiver		
IF Bandwidth	AV: 200 Hz	AV: 9 kHz	AV: 120 kHz

The measurement result was calculated by the following formula:

[Frequency at which the signal was confirmed at both 10m and 3m]

Result = Reading + ANT Factor + Cable loss + Atten loss + Extrapolation Factor - AMP gain

Extrapolation Factor = decade * Log (Test distance (3m) / Separate distance (300m))

decade = (10m reading - 3m reading) / (log 3m - log 10m)

*Refer to Part 18 Section 305 Notes 2 and KDB 629601.

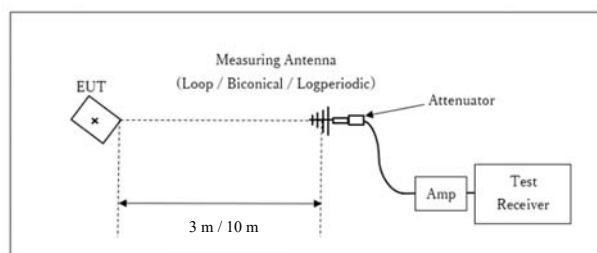
[Other Frequency]

Result = Reading + ANT Factor + Cable loss + Atten loss + Extrapolation Factor - AMP gain

Extrapolation Factor = 20 * Log (Test distance (3m) / Separate distance (300m))

<Test Setup>

Below 1 GHz



Test Distance: 3 m / 10 m

The test was made on EUT at the normal use position.

6.5 Test result

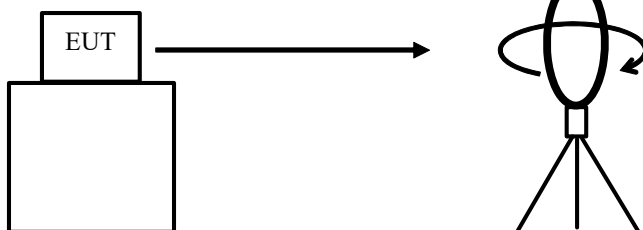
Summary of the test results: Pass

Date: December 8, 2020
December 8, 9, 10, 2020

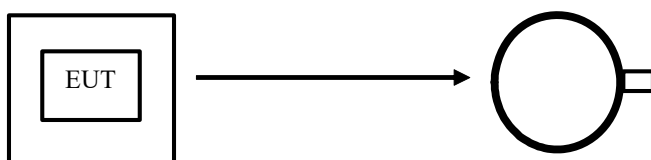
Test engineer: Kiyoshiro Okazaki
Takafumi Noguchi

Figure 1: Direction of the Loop Antenna

Side View (Vertical)

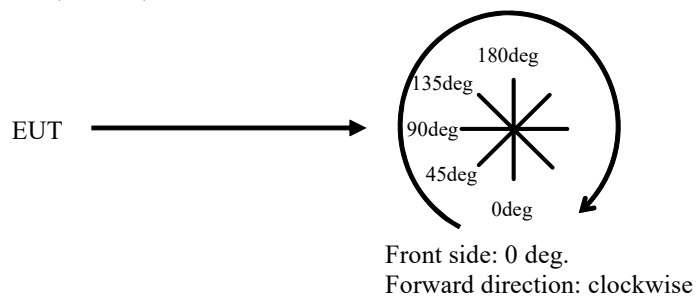


Top View (Horizontal)



Antenna was not rotated.

Top View (Vertical)

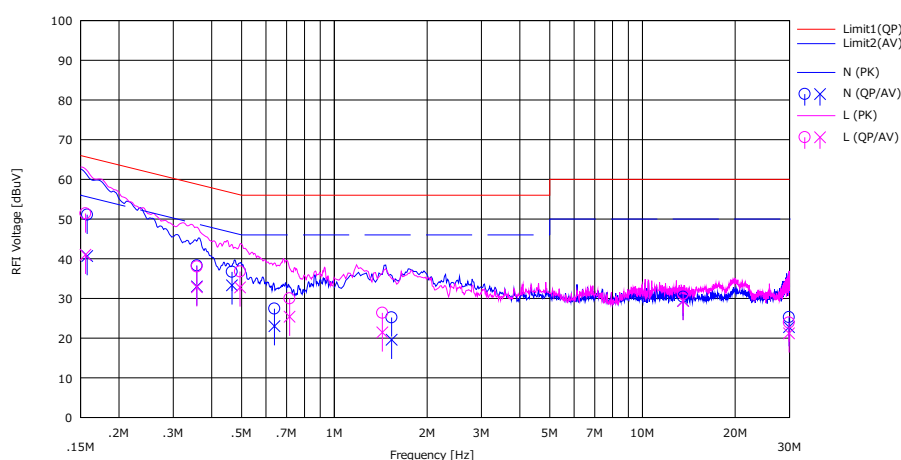


APPENDIX 1: Test data

Conducted Emission

Report No.	13558632H
Test place	Ise EMC Lab. No.4 Semi Anechoic Chamber
Date	December 16, 2020
Temperature / Humidity	22 deg. C / 33 % RH
Engineer	Yuichiro Yamazaki
Mode	Mode 1

Limit : FCC_Part 18



No.	Freq. [MHz]	Reading		LISN [dB]	LOSS [dB]	Results		Limit		Margin		Phase	Comment
		[QP] [dBuV]	[AV] [dBuV]			[QP] [dBuV]	[AV] [dBuV]	[QP] [dBuV]	[AV] [dBuV]	[QP] [dB]	[AV] [dB]		
1	0.15777	37.80	27.40	0.07	13.20	51.07	40.67	65.58	55.58	14.51	14.91	N	
2	0.35789	25.00	19.70	0.06	13.23	38.29	32.99	58.78	48.78	20.49	15.79	N	
3	0.46542	23.40	20.00	0.06	13.24	36.70	33.30	56.60	46.60	19.90	13.30	N	
4	0.63897	14.10	9.70	0.06	13.26	27.42	23.02	56.00	46.00	28.58	22.98	N	
5	1.53355	11.80	6.20	0.08	13.33	25.21	19.61	56.00	46.00	30.79	26.39	N	
6	13.54626	16.30	15.30	0.30	13.79	30.39	29.39	60.00	50.00	29.61	20.61	N	
7	29.90404	10.50	8.00	0.62	14.14	25.26	22.76	60.00	50.00	34.74	27.24	N	
8	0.15573	38.10	27.70	0.10	13.20	51.40	41.00	65.69	55.69	14.29	14.69	L	
9	0.35782	24.70	19.50	0.10	13.23	38.03	32.83	58.78	48.78	20.75	15.95	L	
10	0.49451	23.40	19.40	0.10	13.25	36.75	32.75	56.09	46.09	19.34	13.34	L	
11	0.71566	16.60	12.00	0.11	13.27	29.98	25.38	56.00	46.00	26.02	20.62	L	
12	1.43110	12.90	8.00	0.12	13.32	26.34	21.44	56.00	46.00	29.66	24.56	L	
13	13.54626	17.00	15.20	0.35	13.79	31.14	29.34	60.00	50.00	28.86	20.66	L	
14	29.90405	9.00	6.30	0.76	14.14	23.90	21.20	60.00	50.00	36.10	28.80	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.

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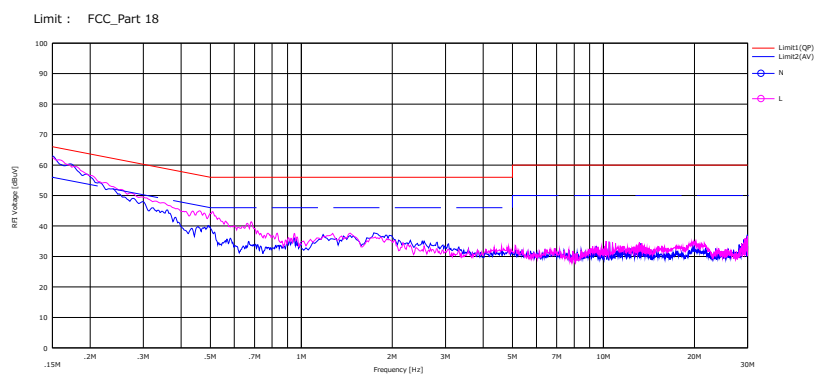
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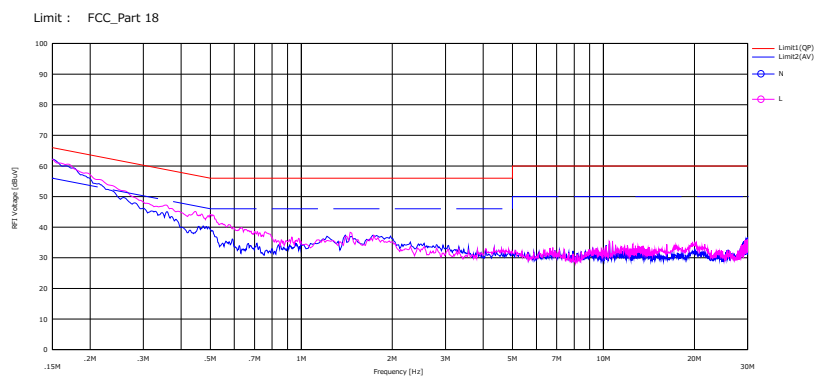
Conducted Emission

Report No.	13558632H
Test place	Ise EMC Lab. No.4 Semi Anechoic Chamber
Date	December 16, 2020
Temperature / Humidity	22 deg. C / 33 % RH
Engineer	Yuichiro Yamazaki
Mode	Tx

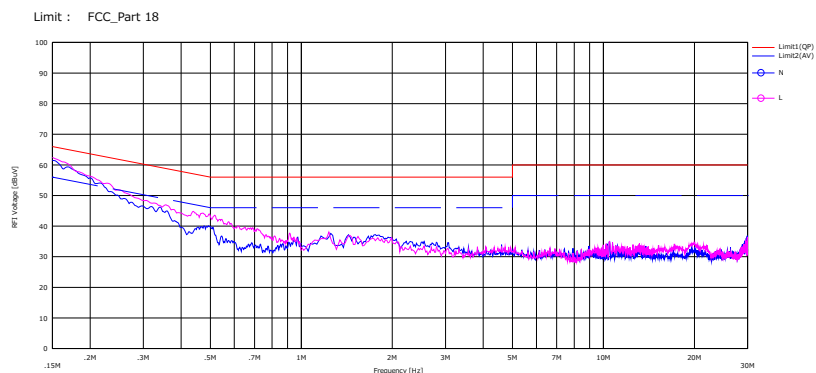
Mode 1



Mode 2



Mode 3



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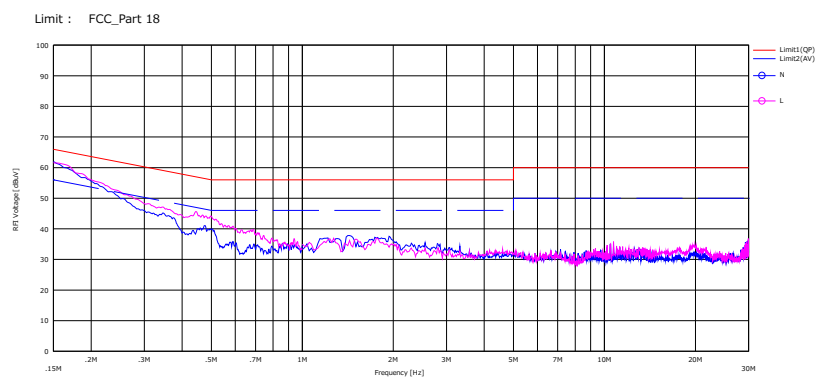
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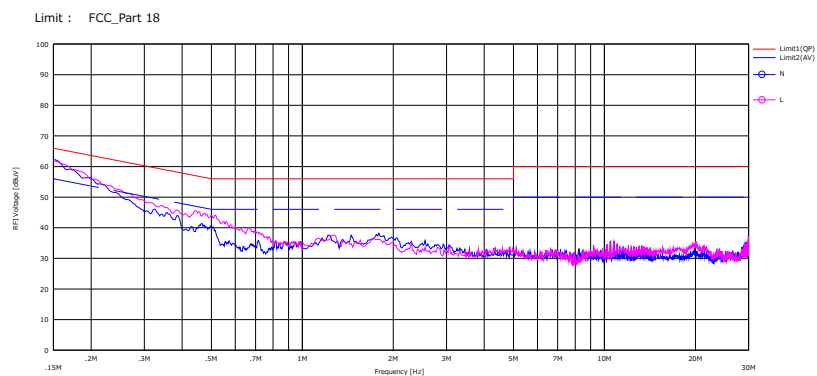
Conducted Emission

Report No. 13558632H
Test place Ise EMC Lab. No.4 Semi Anechoic Chamber
Date December 16, 2020
Temperature / Humidity 22 deg. C / 33 % RH
Engineer Yuichiro Yamazaki
Mode Tx

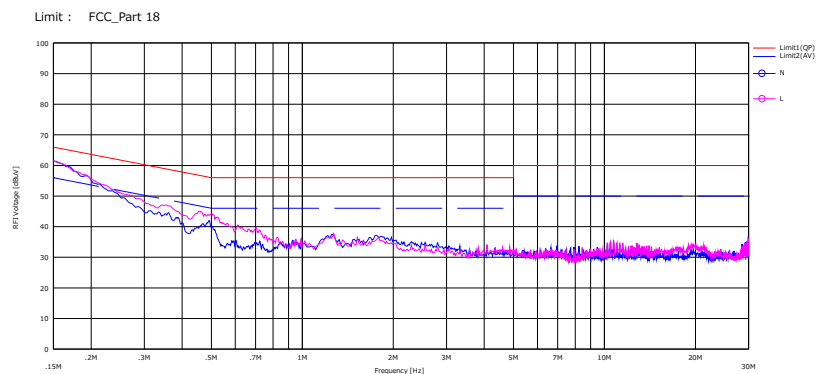
Mode 4



Mode 5



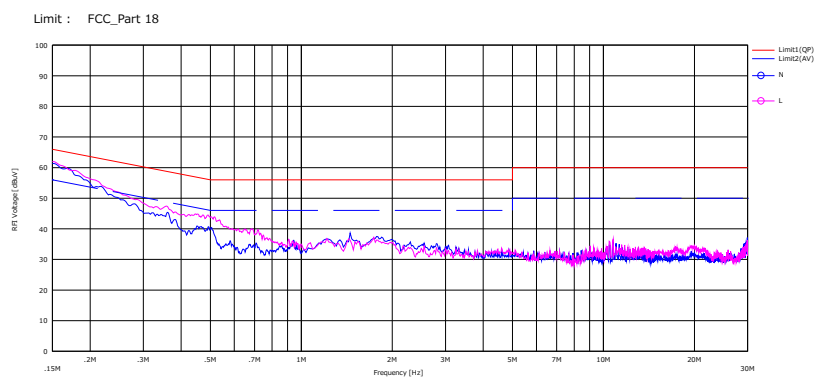
Mode 6



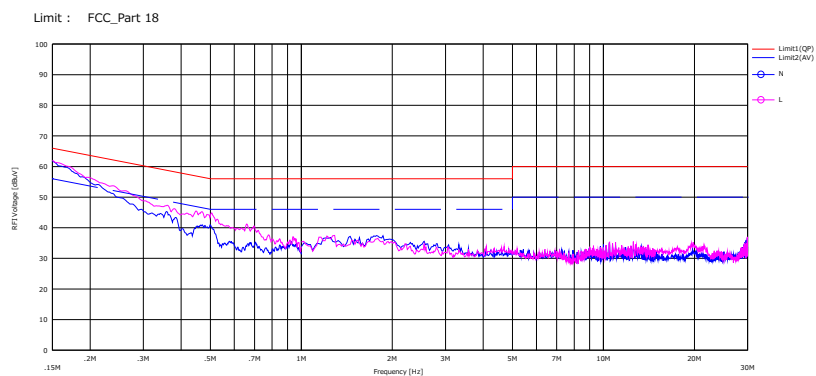
Conducted Emission

Report No.	13558632H
Test place	Ise EMC Lab. No.4 Semi Anechoic Chamber
Date	December 16, 2020
Temperature / Humidity	22 deg. C / 33 % RH
Engineer	Yuichiro Yamazaki
Mode	Tx

Mode 7



Mode 8



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Radiated Emission (Below 30 MHz)

Report No.	13558632H	No.1
Test place	Ise EMC Lab.	No.1
Semi Anechoic Chamber	No.1	No.1
Date	December 8, 2020	December 9, 2020
Temperature / Humidity	21 deg. C / 42 % RH	21 deg. C / 40 % RH
Engineer	Kiyoshiro Okazaki	Takafumi Noguchi
Mode	Mode 1	

FREQ [MHz]	Reading (3m) [dBμV]	Reading (10m) [dBμV]	ANT Factor [dB/m]	Atten + Cable loss [dB]	AMP Gain [dB]	Extrapolation Factor [dB]	Result (300 m) [dBμV/m]	Limit (300 m) [dBμV/m]	Margin [dB]	Antenna [deg]
0.1280	90.3	62.5	18.7	6.0	32.1	-106.3	-23.3	23.5	46.8	0
0.1280	89.3	61.8	18.7	6.0	32.1	-105.3	-23.3	23.5	46.8	45
0.1280	88.2	61.1	18.7	6.0	32.1	-103.5	-22.7	23.5	46.2	90
0.1280	89.2	62.2	18.7	6.0	32.1	-103.2	-21.4	23.5	44.9	135
0.1280	90.2	62.5	18.7	6.0	32.1	-105.9	-23.1	23.5	46.6	180
0.1280	90.7	54.4	18.7	6.0	32.1	-138.7	-55.4	23.5	78.9	Horizontal
0.2559	47.0	NS	18.7	6.0	32.1	-40.0	-0.4	23.5	23.9	Horizontal
0.3839	71.9	37.1	18.6	6.1	32.1	-133.0	-68.5	23.5	92.0	Horizontal
0.5118	35.7	NS	18.6	6.1	32.1	-40.0	-11.7	23.5	35.2	Horizontal
0.6398	61.7	NS	18.6	6.1	32.0	-40.0	14.4	23.5	9.1	Horizontal
0.7677	32.3	NS	18.6	6.2	32.0	-40.0	-15.0	23.5	38.5	Horizontal
0.8957	57.2	NS	18.6	6.2	32.0	-40.0	9.9	23.5	13.6	Horizontal
1.0237	31.4	NS	18.6	6.2	32.0	-40.0	-15.9	23.5	39.4	Horizontal
1.1516	53.9	NS	18.6	6.2	32.0	-40.0	6.7	25.5	18.8	Horizontal
1.2796	30.7	NS	18.6	6.2	32.0	-40.0	-16.5	23.5	40.0	Horizontal

NS : No-Signal

Except for the above table : adequate margin data below the limits.

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Radiated Emission (Below 30 MHz)

Report No.	13558632H	No.1
Test place	Ise EMC Lab.	
Semi Anechoic Chamber	No.1	
Date	December 8, 2020	December 9, 2020
Temperature / Humidity	21 deg. C / 42 % RH	21 deg. C / 40 % RH
Engineer	Kiyoshiro Okazaki	Takafumi Noguchi
Mode	Mode 2	

FREQ [MHz]	Reading (3m) [dBμV]	Reading (10m) [dBμV]	ANT Factor [dB/m]	Atten + Cable loss [dB]	AMP Gain [dB]	Extrapolation Factor [dB]	Result (300 m) [dBμV/m]	Limit (300 m) [dBμV/m]	Margin [dB]	Antenna [deg]
0.1282	90.2	62.6	18.7	6.0	32.1	-105.7	-22.8	23.5	46.3	0
0.1282	89.4	61.7	18.7	6.0	32.1	-106.1	-24.0	23.5	47.5	45
0.1282	88.2	61.1	18.7	6.0	32.1	-103.6	-22.8	23.5	46.3	90
0.1282	89.2	62.2	18.7	6.0	32.1	-103.3	-21.5	23.5	45.0	135
0.1282	90.4	62.5	18.7	6.0	32.1	-106.6	-23.6	23.5	47.1	180
0.1282	90.7	54.5	18.7	6.0	32.1	-138.7	-55.3	23.5	78.8	Horizontal
0.2564	47.1	NS	18.7	6.0	32.1	-40.0	-0.2	23.5	23.8	Horizontal
0.3846	71.8	37.2	18.6	6.1	32.1	-132.5	-68.1	23.5	91.6	Horizontal
0.5129	36.4	NS	18.6	6.1	32.1	-40.0	-11.0	23.5	34.5	Horizontal
0.6411	61.8	NS	18.6	6.1	32.0	-40.0	14.5	23.5	9.0	Horizontal
0.7693	32.0	NS	18.6	6.2	32.0	-40.0	-15.3	23.5	38.8	Horizontal
0.8975	57.3	NS	18.6	6.2	32.0	-40.0	10.0	23.5	13.5	Horizontal
1.0257	31.4	NS	18.6	6.2	32.0	-40.0	-15.9	23.5	39.4	Horizontal
1.1539	53.8	NS	18.6	6.2	32.0	-40.0	6.6	25.5	18.9	Horizontal
1.2821	30.6	NS	18.6	6.2	32.0	-40.0	-16.6	23.5	40.1	Horizontal

NS : No-Signal

Except for the above table : adequate margin data below the limits.

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Radiated Emission (Below 30 MHz)

Report No.	13558632H	No.1
Test place	Ise EMC Lab.	
Semi Anechoic Chamber	No.1	
Date	December 8, 2020	December 9, 2020
Temperature / Humidity	21 deg. C / 42 % RH	21 deg. C / 40 % RH
Engineer	Kiyoshiro Okazaki	Takafumi Noguchi
Mode	Mode 3	

FREQ [MHz]	Reading (3m) [dBμV]	Reading (10m) [dBμV]	ANT Factor [dB/m]	Atten + Cable loss [dB]	AMP Gain [dB]	Extrapolation Factor [dB]	Result (300 m) [dBμV/m]	Limit (300 m) [dBμV/m]	Margin [dB]	Antenna [deg]
0.1287	90.1	62.5	18.7	6.0	32.1	-105.4	-22.7	23.5	46.2	0
0.1287	89.1	61.6	18.7	6.0	32.1	-105.1	-23.4	23.5	46.9	45
0.1287	87.6	61.1	18.7	6.0	32.1	-101.4	-21.1	23.5	44.6	90
0.1287	88.7	62.1	18.7	6.0	32.1	-101.8	-20.4	23.5	43.9	135
0.1287	89.9	62.3	18.7	6.0	32.1	-105.4	-22.9	23.5	46.4	180
0.1287	90.7	54.5	18.7	6.0	32.1	-138.5	-55.2	23.5	78.7	Horizontal
0.2575	45.6	NS	18.7	6.0	32.1	-40.0	-1.7	23.5	25.3	Horizontal
0.3862	71.7	36.9	18.6	6.1	32.1	-133.0	-68.7	23.5	92.2	Horizontal
0.5149	35.9	NS	18.6	6.1	32.1	-40.0	-11.5	23.5	35.0	Horizontal
0.6437	62.0	NS	18.6	6.1	32.0	-40.0	14.7	23.5	8.8	Horizontal
0.7724	31.9	NS	18.6	6.2	32.0	-40.0	-15.4	23.5	38.9	Horizontal
0.9012	57.1	NS	18.6	6.2	32.0	-40.0	9.8	23.5	13.7	Horizontal
1.0299	30.9	NS	18.6	6.2	32.0	-40.0	-16.4	23.5	39.9	Horizontal
1.1586	53.7	NS	18.6	6.2	32.0	-40.0	6.5	25.5	19.0	Horizontal
1.2874	30.3	NS	18.6	6.2	32.0	-40.0	-16.9	23.5	40.4	Horizontal

NS : No-Signal

Except for the above table : adequate margin data below the limits.

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Radiated Emission (Below 30 MHz)

Report No.	13558632H	No.1
Test place	Ise EMC Lab.	
Semi Anechoic Chamber	No.1	
Date	December 8, 2020	December 9, 2020
Temperature / Humidity	22 deg. C / 42 % RH	21 deg. C / 40 % RH
Engineer	Takafumi Noguchi	Takafumi Noguchi
Mode	Mode 4	

FREQ [MHz]	Reading (3m) [dBμV]	Reading (10m) [dBμV]	ANT Factor [dB/m]	Atten + Cable loss [dB]	AMP Gain [dB]	Extrapolation Factor [dB]	Result (300 m) [dBμV/m]	Limit (300 m) [dBμV/m]	Margin [dB]	Antenna [deg]
0.1298	90.0	62.5	18.7	6.0	32.1	-105.4	-22.7	23.5	46.2	0
0.1298	88.8	61.6	18.7	6.0	32.1	-103.8	-22.4	23.5	45.9	45
0.1298	87.4	60.9	18.7	6.0	32.1	-101.3	-21.2	23.5	44.7	90
0.1298	88.6	62.2	18.7	6.0	32.1	-101.1	-19.8	23.5	43.3	135
0.1298	89.7	62.4	18.7	6.0	32.1	-104.3	-22.0	23.5	45.5	180
0.1298	91.1	54.5	18.7	6.0	32.1	-140.0	-56.2	23.5	79.7	Horizontal
0.2596	47.9	NS	18.7	6.0	32.1	-40.0	0.5	23.5	23.0	Horizontal
0.3894	72.2	37.0	18.6	6.1	32.1	-134.6	-69.7	23.5	93.2	Horizontal
0.5192	37.8	NS	18.6	6.1	32.1	-40.0	-9.6	23.5	33.1	Horizontal
0.6491	62.3	NS	18.6	6.1	32.0	-40.0	14.9	23.5	8.6	Horizontal
0.7789	34.5	NS	18.6	6.2	32.0	-40.0	-12.9	23.5	36.4	Horizontal
0.9087	57.6	NS	18.6	6.2	32.0	-40.0	10.3	23.5	13.2	Horizontal
1.0385	33.5	NS	18.6	6.2	32.0	-40.0	-13.8	23.5	37.3	Horizontal
1.1683	54.2	NS	18.6	6.2	32.0	-40.0	7.0	25.5	18.5	Horizontal
1.2981	32.8	NS	18.6	6.2	32.0	-40.0	-14.5	23.5	38.0	Horizontal

NS : No-Signal

Except for the above table : adequate margin data below the limits.

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Radiated Emission (Below 30 MHz)

Report No.	13558632H	No.1
Test place	Ise EMC Lab.	
Semi Anechoic Chamber	No.1	
Date	December 8, 2020	December 9, 2020
Temperature / Humidity	22 deg. C / 42 % RH	21 deg. C / 40 % RH
Engineer	Takafumi Noguchi	Takafumi Noguchi
Mode	Mode 5	

FREQ [MHz]	Reading (3m) [dBμV]	Reading (10m) [dBμV]	ANT Factor [dB/m]	Atten + Cable loss [dB]	AMP Gain [dB]	Extrapolation Factor [dB]	Result (300 m) [dBμV/m]	Limit (300 m) [dBμV/m]	Margin [dB]	Antenna [deg]
0.1275	90.1	62.7	18.7	6.0	32.1	-104.7	-22.0	23.5	45.5	0
0.1275	89.1	61.8	18.7	6.0	32.1	-104.4	-22.7	23.5	46.2	45
0.1275	87.9	61.3	18.7	6.0	32.1	-101.7	-21.2	23.5	44.7	90
0.1275	88.7	62.2	18.7	6.0	32.1	-101.3	-19.9	23.5	43.4	135
0.1275	89.8	62.5	18.7	6.0	32.1	-104.4	-22.0	23.5	45.5	180
0.1275	90.7	54.5	18.7	6.0	32.1	-138.4	-55.1	23.5	78.6	Horizontal
0.2549	47.2	NS	18.7	6.0	32.1	-40.0	-0.2	23.5	23.7	Horizontal
0.3823	71.9	37.1	18.6	6.1	32.1	-133.0	-68.5	23.5	92.0	Horizontal
0.5098	37.5	NS	18.6	6.1	32.1	-40.0	-9.9	23.5	33.4	Horizontal
0.6372	61.1	NS	18.6	6.1	32.0	-40.0	13.8	23.5	9.7	Horizontal
0.7647	34.1	NS	18.6	6.1	32.0	-40.0	-13.2	23.5	36.7	Horizontal
0.8921	56.8	NS	18.6	6.2	32.0	-40.0	9.5	23.5	14.0	Horizontal
1.0196	33.1	NS	18.6	6.2	32.0	-40.0	-14.1	23.5	37.6	Horizontal
1.1470	53.6	NS	18.6	6.2	32.0	-40.0	6.4	25.5	19.1	Horizontal
1.2745	32.6	NS	18.6	6.2	32.0	-40.0	-14.7	23.5	38.2	Horizontal

NS : No-Signal

Except for the above table : adequate margin data below the limits.

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Radiated Emission (Below 30 MHz)

Report No.	13558632H	No.1
Test place	Ise EMC Lab.	
Semi Anechoic Chamber	No.1	
Date	December 8, 2020	December 9, 2020
Temperature / Humidity	22 deg. C / 42 % RH	21 deg. C / 40 % RH
Engineer	Takafumi Noguchi	Takafumi Noguchi
Mode	Mode 6	

FREQ [MHz]	Reading (3m) [dBμV]	Reading (10m) [dBμV]	ANT Factor [dB/m]	Atten + Cable loss [dB]	AMP Gain [dB]	Extrapolation Factor [dB]	Result (300 m) [dBμV/m]	Limit (300 m) [dBμV/m]	Margin [dB]	Antenna [deg]
0.1279	89.5	62.5	18.7	6.0	32.1	-103.3	-21.2	23.5	44.7	0
0.1279	88.6	61.8	18.7	6.0	32.1	-102.4	-21.1	23.5	44.6	45
0.1279	87.0	61.1	18.7	6.0	32.1	-99.3	-19.6	23.5	43.1	90
0.1279	88.6	62.1	18.7	6.0	32.1	-101.2	-20.0	23.5	43.5	135
0.1279	89.5	62.5	18.7	6.0	32.1	-103.3	-21.2	23.5	44.7	180
0.1279	91.2	53.4	18.7	6.0	32.1	-144.6	-60.7	23.5	84.2	Horizontal
0.2559	42.5	NS	18.7	6.0	32.1	-40.0	-4.9	23.5	28.4	Horizontal
0.3838	72.3	38.3	18.6	6.1	32.1	-129.9	-65.0	23.5	88.5	Horizontal
0.5118	38.1	NS	18.6	6.1	32.1	-40.0	-9.2	23.5	32.7	Horizontal
0.6397	62.2	NS	18.6	6.1	32.0	-40.0	14.9	23.5	8.6	Horizontal
0.7676	34.7	NS	18.6	6.2	32.0	-40.0	-12.6	23.5	36.1	Horizontal
0.8956	57.6	NS	18.6	6.2	32.0	-40.0	10.3	23.5	13.2	Horizontal
1.0235	33.4	NS	18.6	6.2	32.0	-40.0	-13.9	23.5	37.4	Horizontal
1.1515	54.1	NS	18.6	6.2	32.0	-40.0	6.9	25.5	18.6	Horizontal
1.2794	32.7	NS	18.6	6.2	32.0	-40.0	-14.5	23.5	38.0	Horizontal

NS : No-Signal

Except for the above table : adequate margin data below the limits.

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Radiated Emission (Below 30 MHz)

Report No.	13558632H	No.1
Test place	Ise EMC Lab.	
Semi Anechoic Chamber	No.1	
Date	December 8, 2020	December 9, 2020
Temperature / Humidity	22 deg. C / 42 % RH	21 deg. C / 40 % RH
Engineer	Takafumi Noguchi	Takafumi Noguchi
Mode	Mode 7	

FREQ [MHz]	Reading (3m) [dBμV]	Reading (10m) [dBμV]	ANT Factor [dB/m]	Atten + Cable loss [dB]	AMP Gain [dB]	Extrapolation Factor [dB]	Result (300 m) [dBμV/m]	Limit (300 m) [dBμV/m]	Margin [dB]	Antenna [deg]
0.1267	89.8	62.5	18.7	6.0	32.1	-104.3	-21.9	23.5	45.4	0
0.1267	88.6	61.9	18.7	6.0	32.1	-102.2	-21.0	23.5	44.5	45
0.1267	87.2	60.9	18.7	6.0	32.1	-100.6	-20.8	23.5	44.3	90
0.1267	88.5	62.1	18.7	6.0	32.1	-100.8	-19.7	23.5	43.2	135
0.1267	89.6	62.5	18.7	6.0	32.1	-103.8	-21.6	23.5	45.1	180
0.1267	91.1	54.4	18.7	6.0	32.1	-140.5	-56.7	23.5	80.2	Horizontal
0.2534	48.0	NS	18.7	6.0	32.1	-40.0	0.6	23.5	22.9	Horizontal
0.3801	72.2	37.3	18.6	6.1	32.1	-133.6	-68.7	23.5	92.2	Horizontal
0.5068	38.0	NS	18.6	6.1	32.1	-40.0	-9.4	23.5	32.9	Horizontal
0.6335	62.2	NS	18.6	6.1	32.0	-40.0	14.9	23.5	8.6	Horizontal
0.7602	34.5	NS	18.6	6.1	32.0	-40.0	-12.8	23.5	36.3	Horizontal
0.8869	57.7	NS	18.6	6.2	32.0	-40.0	10.4	23.5	13.1	Horizontal
1.0136	33.4	NS	18.6	6.2	32.0	-40.0	-13.9	23.5	37.4	Horizontal
1.1403	54.2	NS	18.6	6.2	32.0	-40.0	7.0	25.5	18.6	Horizontal
1.2670	32.8	NS	18.6	6.2	32.0	-40.0	-14.5	23.5	38.0	Horizontal

NS : No-Signal

Except for the above table : adequate margin data below the limits.

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Radiated Emission (Below 30 MHz)

Report No.	13558632H	No.1
Test place	Ise EMC Lab.	
Semi Anechoic Chamber	No.1	
Date	December 8, 2020	December 9, 2020
Temperature / Humidity	22 deg. C / 42 % RH	21 deg. C / 40 % RH
Engineer	Takafumi Noguchi	Takafumi Noguchi
Mode	Mode 8	

FREQ [MHz]	Reading (3m) [dBμV]	Reading (10m) [dBμV]	ANT Factor [dB/m]	Atten + Cable loss [dB]	AMP Gain [dB]	Extrapolation Factor [dB]	Result (300 m) [dBμV/m]	Limit (300 m) [dBμV/m]	Margin [dB]	Antenna [deg]
0.1257	89.6	63.4	19.9	6.0	32.1	-100.4	-16.9	23.5	40.4	0
0.1257	88.6	62.5	19.9	6.0	32.1	-100.1	-17.6	23.5	41.1	45
0.1257	87.0	61.3	19.9	6.0	32.1	-98.5	-17.6	23.5	41.1	90
0.1257	88.5	62.8	19.9	6.0	32.1	-98.4	-16.1	23.5	39.6	135
0.1257	89.5	63.4	19.9	6.0	32.1	-100.2	-16.8	23.5	40.3	180
0.1257	91.5	54.2	19.9	6.0	32.1	-142.6	-57.2	23.5	80.7	Horizontal
0.2515	48.7	NS	19.9	6.0	32.1	-40.0	2.5	23.5	21.0	Horizontal
0.3772	72.5	37.8	19.8	6.1	32.1	-132.8	-66.4	23.5	89.9	Horizontal
0.5029	38.5	NS	19.8	6.1	32.1	-40.0	-7.6	23.5	31.1	Horizontal
0.6286	62.5	NS	19.8	6.1	32.0	-40.0	16.3	23.5	7.2	Horizontal
0.7544	34.9	NS	19.8	6.1	32.0	-40.0	-11.2	23.5	34.7	Horizontal
0.8801	58.1	NS	19.8	6.2	32.0	-40.0	12.0	23.5	11.6	Horizontal
1.0058	33.6	NS	19.8	6.2	32.0	-40.0	-12.5	23.5	36.0	Horizontal
1.1315	54.8	NS	19.8	6.2	32.0	-40.0	8.7	25.5	16.8	Horizontal
1.2573	32.9	NS	19.8	6.2	32.0	-40.0	-13.1	23.5	36.6	Horizontal

NS : No-Signal

Except for the above table : adequate margin data below the limits.

UL Japan, Inc.

Ise EMC Lab.

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8999

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Radiated Emission (Above 30 MHz)

Report No.	13558632H
Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.1
Date	December 10, 2020
Temperature / Humidity	22 deg. C / 43 % RH
Engineer	Takafumi Noguchi
Mode	Mode 1

FREQ [MHz]	Reading (3m) [dBμV]	ANT Factor [dB/m]	AMP gain [dB]	Atten + Cable loss [dB]	Extrapolation Factor [dB]	Result (300 m) [dBμV/m]	Limit (300 m) [dBμV/m]	Margin [dB]	Antenna Polarization
50.212	54.7	10.9	38.8	7.7	-40.0	-5.6	23.5	29.1	Horizontal
62.852	74.6	7.1	38.8	8.0	-40.0	10.8	23.5	12.7	Horizontal
71.718	59.3	6.2	38.9	8.1	-40.0	-5.2	23.5	28.7	Horizontal
123.561	47.7	13.0	39.0	8.8	-40.0	-9.5	23.5	33.0	Horizontal
162.192	42.1	15.4	38.9	9.3	-40.0	-12.2	23.5	35.7	Horizontal
234.689	53.5	11.1	38.9	10.1	-40.0	-4.2	23.5	27.7	Horizontal
245.341	47.5	11.5	38.9	10.2	-40.0	-9.8	23.5	33.3	Horizontal
290.032	42.8	13.3	38.8	10.6	-40.0	-12.0	23.5	35.5	Horizontal
36.621	45.6	15.8	38.8	7.5	-40.0	-10.0	23.5	33.5	Vertical
50.109	56.9	10.9	38.8	7.7	-40.0	-3.3	23.5	26.8	Vertical
62.876	72.4	7.1	38.8	8.0	-40.0	8.7	23.5	14.8	Vertical
71.512	52.8	6.2	38.9	8.1	-40.0	-11.8	23.5	35.3	Vertical
114.530	39.1	12.0	39.0	8.7	-40.0	-19.1	23.5	42.6	Vertical
162.191	36.8	15.4	38.9	9.3	-40.0	-17.4	23.5	40.9	Vertical
234.231	42.2	11.1	38.9	10.1	-40.0	-15.5	23.5	39.0	Vertical
300.002	39.9	13.4	38.7	10.7	-40.0	-14.7	23.5	38.2	Vertical

CALCULATION(Result) : Reading + ANT Factor + Cable loss + Atten loss + Extrapolation Factor - AMP gain
Extrapolation Factor = $20 \times \log(\text{Test distance}(3\text{m}) / \text{Separate distance}(300\text{m}))$

NS : No-Signal

Except for the above table : adequate margin data below the limits.

Radiated Emission (Above 30 MHz)

Report No.	13558632H
Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.1
Date	December 10, 2020
Temperature / Humidity	22 deg. C / 43 % RH
Engineer	Takafumi Noguchi
Mode	Mode 2

FREQ [MHz]	Reading (3m) [dBμV]	ANT Factor [dB/m]	AMP gain [dB]	Atten + Cable loss [dB]	Extrapolation Factor [dB]	Result (300 m) [dBμV/m]	Limit (300 m) [dBμV/m]	Margin [dB]	Antenna Polarization
49.895	54.6	11.0	38.8	7.7	-40.0	-5.6	23.5	29.1	Horizontal
62.792	73.2	7.1	38.8	8.0	-40.0	9.4	23.5	14.1	Horizontal
72.437	57.2	6.2	38.9	8.1	-40.0	-7.3	23.5	30.8	Horizontal
125.028	49.3	13.1	39.0	8.9	-40.0	-7.6	23.5	31.1	Horizontal
162.251	42.8	15.4	38.9	9.3	-40.0	-11.5	23.5	35.0	Horizontal
239.998	48.1	11.4	38.9	10.1	-40.0	-9.3	23.5	32.8	Horizontal
300.049	42.3	13.4	38.7	10.7	-40.0	-12.3	23.5	35.8	Horizontal
336.717	37.8	14.5	38.6	11.0	-40.0	-15.3	23.5	38.8	Horizontal
35.767	47.8	16.1	38.8	7.4	-40.0	-7.5	23.5	31.0	Vertical
49.895	57.7	11.0	38.8	7.7	-40.0	-2.5	23.5	26.0	Vertical
62.792	68.8	7.1	38.8	8.0	-40.0	5.0	23.5	18.5	Vertical
71.550	47.5	6.2	38.9	8.1	-40.0	-17.0	23.5	40.5	Vertical
121.453	32.6	12.8	39.0	8.8	-40.0	-24.8	23.5	48.3	Vertical
162.892	35.6	15.4	38.9	9.3	-40.0	-18.7	23.5	42.2	Vertical
299.966	40.4	13.4	38.7	10.7	-40.0	-14.2	23.5	37.7	Vertical
339.550	35.0	14.6	38.6	11.0	-40.0	-18.0	23.5	41.5	Vertical

CALCULATION(Result) : Reading + ANT Factor + Cable loss + Atten loss + Extrapolation Factor - AMP gain

Extrapolation Factor = $20 \times \log(\text{Test distance}(3\text{m}) / \text{Separate distance}(300\text{m}))$

NS : No-Signal

Except for the above table : adequate margin data below the limits.

UL Japan, Inc.

Ise EMC Lab.

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Radiated Emission (Above 30 MHz)

Report No.	13558632H
Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.1
Date	December 10, 2020
Temperature / Humidity	22 deg. C / 43 % RH
Engineer	Takafumi Noguchi
Mode	Mode 3

FREQ [MHz]	Reading (3m) [dBμV]	ANT Factor [dB/m]	AMP gain [dB]	Atten + Cable loss [dB]	Extrapolation Factor [dB]	Result (300 m) [dBμV/m]	Limit (300 m) [dBμV/m]	Margin [dB]	Antenna Polarization
50.101	54.4	10.9	38.8	7.7	-40.0	-5.9	23.5	29.4	Horizontal
62.112	74.5	7.2	38.8	8.0	-40.0	10.9	23.5	12.6	Horizontal
71.978	59.2	6.2	38.9	8.1	-40.0	-5.3	23.5	28.8	Horizontal
124.210	47.8	13.0	39.0	8.9	-40.0	-9.3	23.5	32.8	Horizontal
163.120	42.6	15.4	38.9	9.3	-40.0	-11.6	23.5	35.1	Horizontal
234.453	53.2	11.1	38.9	10.1	-40.0	-4.5	23.5	28.0	Horizontal
244.798	47.8	11.5	38.9	10.2	-40.0	-9.4	23.5	32.9	Horizontal
290.291	42.9	13.3	38.8	10.6	-40.0	-11.9	23.5	35.4	Horizontal
37.021	46.5	15.6	38.8	7.5	-40.0	-9.2	23.5	32.7	Vertical
50.540	45.5	10.8	38.8	7.7	-40.0	-14.8	23.5	38.3	Vertical
62.581	72.2	7.2	38.8	8.0	-40.0	8.5	23.5	15.0	Vertical
72.121	52.4	6.2	38.9	8.1	-40.0	-12.1	23.5	35.6	Vertical
114.521	39.1	12.0	39.0	8.7	-40.0	-19.1	23.5	42.6	Vertical
162.212	37.1	15.4	38.9	9.3	-40.0	-17.1	23.5	40.6	Vertical
234.267	42.4	11.1	38.9	10.1	-40.0	-15.3	23.5	38.8	Vertical
300.102	39.8	13.4	38.7	10.7	-40.0	-14.8	23.5	38.3	Vertical

CALCULATION(Result) : Reading + ANT Factor + Cable loss + Atten loss + Extrapolation Factor - AMP gain

Extrapolation Factor = $20 \times \log(\text{Test distance}(3\text{m}) / \text{Separate distance}(300\text{m}))$

NS : No-Signal

Except for the above table : adequate margin data below the limits.

UL Japan, Inc.

Ise EMC Lab.

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Radiated Emission (Above 30 MHz)

Report No.	13558632H
Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.1
Date	December 10, 2020
Temperature / Humidity	22 deg. C / 43 % RH
Engineer	Takafumi Noguchi
Mode	Mode 4

FREQ [MHz]	Reading (3m) [dBμV]	ANT Factor [dB/m]	AMP gain [dB]	Atten + Cable loss [dB]	Extrapolation Factor [dB]	Result (300 m) [dBμV/m]	Limit (300 m) [dBμV/m]	Margin [dB]	Antenna Polarization
48.980	54.0	11.3	38.8	7.7	-40.0	-5.8	23.5	29.3	Horizontal
62.220	74.4	7.2	38.8	8.0	-40.0	10.7	23.5	12.8	Horizontal
71.690	59.3	6.2	38.9	8.1	-40.0	-5.2	23.5	28.7	Horizontal
123.230	47.4	12.9	39.0	8.8	-40.0	-9.8	23.5	33.3	Horizontal
162.121	41.9	15.4	38.9	9.3	-40.0	-12.4	23.5	35.9	Horizontal
234.572	53.2	11.1	38.9	10.1	-40.0	-4.5	23.5	28.0	Horizontal
244.778	47.7	11.5	38.9	10.2	-40.0	-9.6	23.5	33.1	Horizontal
289.812	42.7	13.3	38.8	10.6	-40.0	-12.2	23.5	35.7	Horizontal
36.551	44.6	15.8	38.8	7.4	-40.0	-11.0	23.5	34.5	Vertical
49.989	57.0	10.9	38.8	7.7	-40.0	-3.2	23.5	26.7	Vertical
62.232	72.2	7.2	38.8	8.0	-40.0	8.6	23.5	15.0	Vertical
72.112	52.3	6.2	38.9	8.1	-40.0	-12.2	23.5	35.7	Vertical
114.720	38.8	12.0	39.0	8.7	-40.0	-19.4	23.5	42.9	Vertical
162.212	36.8	15.4	38.9	9.3	-40.0	-17.4	23.5	40.9	Vertical
234.221	42.1	11.1	38.9	10.1	-40.0	-15.6	23.5	39.1	Vertical
299.781	39.7	13.4	38.7	10.7	-40.0	-14.9	23.5	38.4	Vertical

CALCULATION(Result) : Reading + ANT Factor + Cable loss + Atten loss + Extrapolation Factor - AMP gain
Extrapolation Factor = 20*Log (Test distance(3m) / Separate distance(300m))

NS : No-Signal

Except for the above table : adequate margin data below the limits.

UL Japan, Inc.

Ise EMC Lab.

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Radiated Emission (Above 30 MHz)

Report No.	13558632H
Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.1
Date	December 10, 2020
Temperature / Humidity	22 deg. C / 43 % RH
Engineer	Takafumi Noguchi
Mode	Mode 5

FREQ [MHz]	Reading (3m) [dBμV]	ANT Factor [dB/m]	AMP gain [dB]	Atten + Cable loss [dB]	Extrapolation Factor [dB]	Result (300 m) [dBμV/m]	Limit (300 m) [dBμV/m]	Margin [dB]	Antenna Polarization
49.790	53.9	11.0	38.8	7.7	-40.0	-6.2	23.5	29.7	Horizontal
62.209	74.5	7.2	38.8	8.0	-40.0	10.8	23.5	12.7	Horizontal
71.723	59.2	6.2	38.9	8.1	-40.0	-5.3	23.5	28.8	Horizontal
123.212	47.5	12.9	39.0	8.8	-40.0	-9.7	23.5	33.2	Horizontal
162.029	41.0	15.4	38.9	9.3	-40.0	-13.3	23.5	36.8	Horizontal
234.356	53.3	11.1	38.9	10.1	-40.0	-4.4	23.5	27.9	Horizontal
244.629	48.1	11.4	38.9	10.2	-40.0	-9.1	23.5	32.6	Horizontal
289.865	42.9	13.3	38.8	10.6	-40.0	-11.9	23.5	35.4	Horizontal
36.532	45.1	15.8	38.8	7.4	-40.0	-10.4	23.5	33.9	Vertical
50.032	57.0	10.9	38.8	7.7	-40.0	-3.2	23.5	26.7	Vertical
62.210	72.3	7.2	38.8	8.0	-40.0	8.6	23.5	14.9	Vertical
72.131	52.3	6.2	38.9	8.1	-40.0	-12.2	23.5	35.7	Vertical
114.587	38.7	12.0	39.0	8.7	-40.0	-19.6	23.5	43.1	Vertical
162.198	36.7	15.4	38.9	9.3	-40.0	-17.6	23.5	41.1	Vertical
234.219	42.0	11.1	38.9	10.1	-40.0	-15.7	23.5	39.2	Vertical
299.882	40.0	13.4	38.7	10.7	-40.0	-14.6	23.5	38.1	Vertical

CALCULATION(Result) : Reading + ANT Factor + Cable loss + Atten loss + Extrapolation Factor - AMP gain
Extrapolation Factor = 20*Log (Test distance(3m) / Separate distance(300m))

NS : No-Signal

Except for the above table : adequate margin data below the limits.

UL Japan, Inc.

Ise EMC Lab.

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Radiated Emission (Above 30 MHz)

Report No.	13558632H
Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.1
Date	December 10, 2020
Temperature / Humidity	22 deg. C / 43 % RH
Engineer	Takafumi Noguchi
Mode	Mode 6

FREQ [MHz]	Reading (3m) [dBμV]	ANT Factor [dB/m]	AMP gain [dB]	Atten + Cable loss [dB]	Extrapolation Factor [dB]	Result (300 m) [dBμV/m]	Limit (300 m) [dBμV/m]	Margin [dB]	Antenna Polarization
49.890	40.6	11.0	38.8	7.7	-40.0	-19.6	23.5	43.1	Horizontal
62.167	59.9	7.2	38.8	8.0	-40.0	-3.8	23.5	27.3	Horizontal
72.089	39.3	6.2	38.9	8.1	-40.0	-25.2	23.5	48.7	Horizontal
123.176	33.3	12.9	39.0	8.8	-40.0	-23.9	23.5	47.4	Horizontal
162.123	32.7	15.4	38.9	9.3	-40.0	-21.6	23.5	45.1	Horizontal
234.123	45.2	11.1	38.9	10.1	-40.0	-12.5	23.5	36.0	Horizontal
244.678	39.7	11.4	38.9	10.2	-40.0	-17.5	23.5	41.0	Horizontal
289.834	34.4	13.3	38.8	10.6	-40.0	-20.4	23.5	43.9	Horizontal
37.120	38.3	15.6	38.8	7.5	-40.0	-17.5	23.5	41.0	Vertical
49.894	45.1	11.0	38.8	7.7	-40.0	-15.1	23.5	38.6	Vertical
62.190	59.1	7.2	38.8	8.0	-40.0	-4.6	23.5	28.1	Vertical
72.162	38.4	6.2	38.9	8.1	-40.0	-26.2	23.5	49.7	Vertical
114.489	28.8	12.0	39.0	8.7	-40.0	-29.5	23.5	53.0	Vertical
162.498	29.6	15.4	38.9	9.3	-40.0	-24.7	23.5	48.2	Vertical
234.232	36.1	11.1	38.9	10.1	-40.0	-21.6	23.5	45.1	Vertical
299.818	34.7	13.4	38.7	10.7	-40.0	-19.9	23.5	43.4	Vertical

CALCULATION(Result) : Reading + ANT Factor + Cable loss + Atten loss + Extrapolation Factor - AMP gain

Extrapolation Factor = $20 \times \log(\text{Test distance}(3\text{m}) / \text{Separate distance}(300\text{m}))$

NS : No-Signal

Except for the above table : adequate margin data below the limits.

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Radiated Emission (Above 30 MHz)

Report No.	13558632H
Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.1
Date	December 10, 2020
Temperature / Humidity	22 deg. C / 43 % RH
Engineer	Takafumi Noguchi
Mode	Mode 7

FREQ [MHz]	Reading (3m) [dBμV]	ANT Factor [dB/m]	AMP gain [dB]	Atten + Cable loss [dB]	Extrapolation Factor [dB]	Result (300 m) [dBμV/m]	Limit (300 m) [dBμV/m]	Margin [dB]	Antenna Polarization
49.678	54.1	11.0	38.8	7.7	-40.0	-6.0	23.5	29.5	Horizontal
62.181	74.5	7.2	38.8	8.0	-40.0	10.8	23.5	12.7	Horizontal
72.131	59.1	6.2	38.9	8.1	-40.0	-5.4	23.5	28.9	Horizontal
123.210	46.8	12.9	39.0	8.8	-40.0	-10.4	23.5	33.9	Horizontal
162.143	41.3	15.4	38.9	9.3	-40.0	-12.9	23.5	36.4	Horizontal
234.218	53.1	11.1	38.9	10.1	-40.0	-4.6	23.5	28.1	Horizontal
244.590	48.0	11.4	38.9	10.2	-40.0	-9.3	23.5	32.8	Horizontal
289.734	42.8	13.3	38.8	10.6	-40.0	-12.1	23.5	35.6	Horizontal
37.152	45.0	15.6	38.8	7.5	-40.0	-10.8	23.5	34.3	Vertical
49.787	56.7	11.0	38.8	7.7	-40.0	-3.5	23.5	27.0	Vertical
62.192	72.0	7.2	38.8	8.0	-40.0	8.3	23.5	15.2	Vertical
72.183	52.1	6.2	38.9	8.1	-40.0	-12.4	23.5	35.9	Vertical
114.492	38.9	12.0	39.0	8.7	-40.0	-19.4	23.5	42.9	Vertical
162.479	36.9	15.4	38.9	9.3	-40.0	-17.4	23.5	40.9	Vertical
234.178	41.8	11.1	38.9	10.1	-40.0	-15.9	23.5	39.4	Vertical
299.821	49.4	13.4	38.7	10.7	-40.0	-5.3	23.5	28.8	Vertical

CALCULATION(Result) : Reading + ANT Factor + Cable loss + Atten loss + Extrapolation Factor - AMP gain

Extrapolation Factor = 20*Log (Test distance(3m) / Separate distance(300m))

NS : No-Signal

Except for the above table : adequate margin data below the limits.

UL Japan, Inc.

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Radiated Emission (Above 30 MHz)

Report No.	13558632H
Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.1
Date	December 10, 2020
Temperature / Humidity	22 deg. C / 43 % RH
Engineer	Takafumi Noguchi
Mode	Mode 8

FREQ [MHz]	Reading (3m) [dBμV]	ANT Factor [dB/m]	AMP gain [dB]	Atten + Cable loss [dB]	Extrapolation Factor [dB]	Result (300 m) [dBμV/m]	Limit (300 m) [dBμV/m]	Margin [dB]	Antenna Polarization
49.721	53.9	11.0	38.8	7.7	-40.0	-6.2	23.5	29.7	Horizontal
62.199	74.3	7.2	38.8	8.0	-40.0	10.7	23.5	12.8	Horizontal
72.530	59.2	6.2	38.9	8.1	-40.0	-5.3	23.5	28.8	Horizontal
123.209	46.7	12.9	39.0	8.8	-40.0	-10.5	23.5	34.0	Horizontal
162.163	41.2	15.4	38.9	9.3	-40.0	-13.0	23.5	36.5	Horizontal
234.222	52.9	11.1	38.9	10.1	-40.0	-4.8	23.5	28.3	Horizontal
244.488	47.8	11.4	38.9	10.2	-40.0	-9.5	23.5	33.0	Horizontal
289.696	43.0	13.3	38.8	10.6	-40.0	-11.9	23.5	35.4	Horizontal
37.122	44.8	15.6	38.8	7.5	-40.0	-10.9	23.5	34.4	Vertical
49.820	56.5	11.0	38.8	7.7	-40.0	-3.6	23.5	27.1	Vertical
62.212	72.0	7.2	38.8	8.0	-40.0	8.3	23.5	15.2	Vertical
72.230	52.0	6.2	38.9	8.1	-40.0	-12.6	23.5	36.1	Vertical
114.519	39.0	12.0	39.0	8.7	-40.0	-19.2	23.5	42.7	Vertical
162.898	37.1	15.4	38.9	9.3	-40.0	-17.1	23.5	40.6	Vertical
234.213	41.8	11.1	38.9	10.1	-40.0	-15.9	23.5	39.4	Vertical
299.789	49.1	13.4	38.7	10.7	-40.0	-5.5	23.5	29.0	Vertical

CALCULATION(Result) : Reading + ANT Factor + Cable loss + Atten loss + Extrapolation Factor - AMP gain
Extrapolation Factor = 20*Log (Test distance(3m) / Separate distance(300m))

NS : No-Signal

Except for the above table : adequate margin data below the limits.

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APPENDIX 2: Test instruments

Test equipment

Test Item	Local ID	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Cal Int
CE	MAEC-04	142011	AC4 Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-10005	05/25/2020	24
CE	MOS-15	141562	Thermo-Hygrometer	CUSTOM. Inc	CTH-201	0010	01/07/2020	12
CE	MMM-10	141545	DIGITAL HiTESTER	Hioki	3805	51201148	01/06/2020	12
CE	MJM-29	142230	Measure	KOMELON	KMC-36	-	-	-
CE	COTS-MEMI-02	178648	EMI measurement program	TSJ (Techno Science Japan)	TEPTO-DV	-	-	-
CE	MTR-10	141951	EMI Test Receiver	Rohde & Schwarz	ESR26	101408	03/10/2020	12
CE	MLS-23	141357	LISN(AMN)	Schwarzbeck Mess - Elektronik	NSLK8127	8127-729	07/22/2020	12
CE	MLS-24	141358	LISN(AMN)	Schwarzbeck Mess - Elektronik	NSLK8127	8127-730	07/22/2020	12
CE	MTA-56	141938	Terminator	TME	CT-01BP	-	12/04/2020	12
CE	MAT-67	141248	Attenuator	JFW Industries, Inc.	50FP-013H2 N	-	12/07/2020	12
CE	MCC-113	141217	Coaxial cable	Fujikura/Suhner/TSJ	5D-2W/SFM141/421-010/sucoform141-PE/RFM-E121(SW)	-/04178	06/18/2020	12
RE	LP-01	146966	Loop Antenna	Rohde & Schwarz	HFH2-Z2	829425/014	01/17/2020	12
RE	MCC-03	141215	Coaxial Cable	Fujikura/Suhner/TSJ	5D-2W/3D-2W/RG400u/RFM-E421(SW)	-/01068 (Switcher)	06/25/2020	12
RE	MAT-08	141213	Attenuator(6dB)	Weinschel Corp	2	BK7971	11/13/2020	12
RE	MPA-14	141583	Pre Amplifier	SONOMA INSTRUMENT	310	260833	02/18/2020	12
RE	MCC-219	159670	Coaxial Cable	UL Japan Inc.	-	-	11/17/2020	12
RE	MAEC-01	141998	AC1 Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 10m	DA-06881	06/08/2020	24
RE	MOS-27	141566	Thermo-Hygrometer	CUSTOM. Inc	CTH-201	A08Q26	01/07/2020	12
RE	MMM-03	141530	Digital Tester	Fluke Corporation	FLUKE 26-3	78030621	08/18/2020	12
RE	MJM-25	142226	Measure	KOMELON	KMC-36	-	-	-
RE	COTS-MEMI-02	178648	EMI measurement program	TSJ (Techno Science Japan)	TEPTO-DV	-	-	-
RE	MAEC-01	141998	AC1 Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 10m	DA-06881	06/08/2020	24
RE	MOS-27	141566	Thermo-Hygrometer	CUSTOM. Inc	CTH-201	A08Q26	01/07/2020	12
RE	MMM-03	141530	Digital Tester	Fluke Corporation	FLUKE 26-3	78030621	08/18/2020	12
RE	MJM-25	142226	Measure	KOMELON	KMC-36	-	-	-
RE	COTS-MEMI-02	178648	EMI measurement program	TSJ (Techno Science Japan)	TEPTO-DV	-	-	-
RE	MAT-08	141213	Attenuator(6dB)	Weinschel Corp	2	BK7971	11/13/2020	12
RE	KBA-05	141198	Biconical Antenna	Schwarzbeck Mess - Elektronik	VHA9103+BBA9106	2513	04/22/2020	12
RE	MCC-02	141350	Coaxial Cable	Suhner/storm/Agilent/TSJ	-	-	06/25/2020	12
RE	MTR-09	141950	EMI Test Receiver	Rohde & Schwarz	ESU26	100412	06/03/2020	12
RE	MLA-20	141264	Logperiodic Antenna(200-1000MHz)	Schwarzbeck Mess - Elektronik	VUSLP9111B	9111B-189	04/22/2020	12
RE	MPA-19	141585	Pre Amplifier	MITEQ	MLA-10K01-B01-35	1237616	02/10/2020	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,

RE: Radiated emission

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