EMI TEST REPORT

Test Report No. : 13665469H-E-R1

Applicant	:	**DENSO TEN Limited**
Type of EUT	:	**Car Navigation**
Model Number of EUT	:	**FT0091A**
FCC ID	:	**BABFT0091A**
Test regulation	:	**FCC Part 15 Subpart B: 2021**
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 regulation.
4. The test results in this test report are traceable to the national or international standards.
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6. This test report covers EMC technical requirements. It does not cover administrative issues such as Manual or non-EMC 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 13665469H-E. 13665469H-E is replaced with this report.

Date of test: February 24 and 25, 2021

Representative test engineer:

Kiyoshiro Okazaki
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.: 13665469H-E

Revision	Test report No.	Date	Page revised	Contents
- (Original)	13665469H-E	February 26, 2021	-	-
1	13665469H-E-R1	March 1, 2021	P.6	Correction of Radio Specification for Broadband Receiver
1	13665469H-E-R1	March 1, 2021	P.11	Correction of Item Name: No. C and D: from “USB” to “USB Memory” No. G: from “GPS” to “GPS Antenna”
1	13665469H-E-R1	March 1, 2021	P.21, 23	Deletion of Comment

Reference: Abbreviations (Including words undescribed in this report)

AAN	Asymmetric Artificial Network
AC	Alternating Current
AM	Amplitude Modulation
AMN	Artificial Mains Network
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
C.F	Correction Factor
Cal Int	Calibration Interval
CAV	CISPR AV
CCK	Complementary Code Keying
CDN	Coupling Decoupling Network
Ch., CH	Channel
CISPR	Comite International Special des Perturbations Radioelectriques
Corr.	Correction
CPE	Customer premise equipment
CW	Continuous Wave
DBPSK	Differential BPSK
DC	Direct Current
DET	Detector
D-factor	Distance factor
Dmax	maximum absolute voltage change during an observation period
DQPSK	Differential QPSK
DSSS	Direct Sequence Spread Spectrum
EDR	Enhanced Data Rate
e.i.r.p., EIRP	Equivalent Isotropically Radiated Power
EM clamp	Electromagnetic clamp
EMC	ElectroMagnetic Compatibility
EMI	ElectroMagnetic Interference
EMS	ElectroMagnetic Susceptibility
EN	European Norm
e.r.p., ERP	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
Fund	Fundamental
FWD	Forward
GFSK	Gaussian Frequency-Shift Keying
GNSS	Global Navigation Satellite System
GPS	Global Positioning System
Hori.	Horizontal
ICES	Interference-Causing Equipment Standard
I/O	Input/Output
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
ISN	Impedance Stabilization Network
ISO	International Organization for Standardization
JAB	Japan Accreditation Board
LAN	Local Area Network
LCL	Longitudinal Conversion Loss
LIMS	Laboratory Information Management System
LISN	Line Impedance Stabilization Network
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
PK	Peak
P_{LT}	long-term flicker severity
POHC(A)	Partial Odd Harmonic Current
Pol., Pola.	Polarization
PR-ASK	Phase Reversal ASK
P_{ST}	short-term flicker severity
QAM	Quadrature Amplitude Modulation
QP	Quasi-Peak
QPSK	Quadri-Phase Shift Keying
r.m.s., RMS	Root Mean Square
RBW	Resolution Band Width
RE	Radio Equipment
REV	Reverse
RF	Radio Frequency
RFID	Radio Frequency Identifier
RSS	Radio Standards Specifications
Rx	Receiving
SINAD	Ratio of (Signal + Noise + Distortion) to (Noise + Distortion)
S/N	Signal to Noise ratio
SA, S/A	Spectrum Analyzer
SG	Signal Generator
SVSWR	Site-Voltage Standing Wave Ratio
THC(A)	Total Harmonic Current
THD(%)	Total Harmonic Distortion
TR	Test Receiver
Tx	Transmitting
VBW	Video BandWidth
Vert.	Vertical
WLAN	Wireless LAN
xDSL	Generic term for all types of DSL technology (DSL: Digital Subscriber Line)

CONTENTS **PAGE**

SECTION 1: Customer information

Company Name	:	DENSO TEN Limited
Address	:	2-28, Gosho-dori 1-Chome, Hyoo-ku, Kobe, 652-8510 JAPAN
Telephone Number	:	+81-78-682-2159
Facsimile Number	:	+81-78-671-7160
Contact Person	:	Daisuke Fukii

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	:	Car Navigation
Model Number	:	FT0091A
Serial Number	:	Refer to SECTION 4.2
Rating	:	DC 12 V
Receipt Date	:	January 15, 2021
Country of Mass-production	:	Mexico
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: FT0091A (referred to as the EUT in this report) is a Car Navigation.

General Specification

Clock frequency(ies) in the system : 41.6 MHz

Radio Specification

	IEEE802.11b	IEEE802.11g/n	IEEE802.11a/n (20 M band)	IEEE802.11n (40M band)
Frequency of operation	2412 MHz - 2462 MHz	2412 MHz - 2462 MHz	5180 MHz - 5240 MHz 5260 MHz - 5320 MHz 5500 MHz - 5700 MHz 5745 MHz - 5825 MHz	5190 MHz - 5230 MHz 5270 MHz - 5310 MHz 5510 MHz - 5670 MHz 5755 MHz - 5795 MHz
Type of modulation	DSSS (CCK, DQPSK, DBPSK)	OFDM-CCK (64QAM, 16QAM, QPSK, BPSK)	OFDM (64QAM, 16QAM, QPSK, BPSK, 256QAM)	
Channel spacing	5 MHz		20 MHz	40 MHz
Antenna type	Surface Mountable Dielectric Chip Antenna			
Antenna Connector type	-			
Antenna Gain	1.6 dBi (2.4 GHz Band), 0 dBi (5 GHz Band)			

	Bluetooth Ver 3.0 with EDR function
Frequency of operation	2402 MHz - 2480 MHz
Type of modulation	FHSS (GFSK, π/4-DQPSK, 8-DPSK)
Channel spacing	1 MHz
Antenna type	Surface Mountable Dielectric Chip Antenna
Antenna Connector type	-
Antenna Gain	1.6 dBi

	Broadband Receiver
Frequency of operation	AM / HD_AM: 530 kHz - 1710 kHz FM / HD_FM: 87.75 MHz - 107.9 MHz XM:2332.5 MHz - 2345.0 MHz
Local oscillation frequency	AM: 472.5 kHz - 1777.5 kHz FM: 88.05 MHz - 108.2 MHz
Channel spacing	AM / HD_AM: 10 kHz FM / HD_FM: 0.2 MHz
IF Frequency	AM: 57.5 kHz FM: 300 kHz
Antenna Connector type	HFC

*Wireless LAN and Bluetooth do not transmit simultaneously.

SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification	:	FCC Part 15 Subpart B FCC Part 15 final revised on January 12, 2021 and effective February 11, 2021
Title	:	FCC 47CFR Part15 Radio Frequency Device Subpart B Unintentional Radiators

3.2 Procedures and results

Item	Test Procedure	Limits	Deviation	Worst margin	Result	Remarks
Conducted emission	ANSI C63.4: 2014 +C63.4a:2017 7. AC power - line conducted emission measurements IEEE 187:2003	Part 15 Subpart B 15.107(a)	N/A	-	N/A	*1)
Radiated emission	ANSI C63.4: 2014 +C63.4a:2017 8. Radiated emission measurements IEEE 187:2003	Part 15 Subpart B 15.109(a)	N/A	3.5 dB (3384.083 MHz, Horizontal, AV, USB Play mode)	Complied# a)	-
Antenna Terminal	ANSI C63.4: 2014 +C63.4a:2017 12. Measurement of unintentional radiators other than ITE IEEE 187:2003	Part 15 Subpart B 15.111(a)	N/A	11.3 dB 3334.500 MHz	Complied b)	-
*Note: UL Japan, Inc's EMI Work Procedure 13-EM-W0420. *1) The test is not applicable since the EUT is not the device that is designed to be connected to the public utility (AC) power line. a) Refer to APPENDIX 1 (data of Radiated Emission) b) Refer to APPENDIX 1 (data of Antenna Terminal 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

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 $k = 2$.

Radiated emission

Measurement distance	Frequency range		Uncertainty (+/-)
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
0.5 m	26.5 GHz to 40 GHz		5.5 dB
10 m	1 GHz to 18 GHz		5.2 dB

Antenna Terminal test

Test Item	Uncertainty (+/-)
Antenna terminal conducted emission / Power density / Burst power	2.6 dB

3.5 Test Location

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
* A2LA Certificate Number: 5107.02/ FCC Test Firm Registration Number: 199967 / ISED Lab Company Number: 2973C

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 m 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.

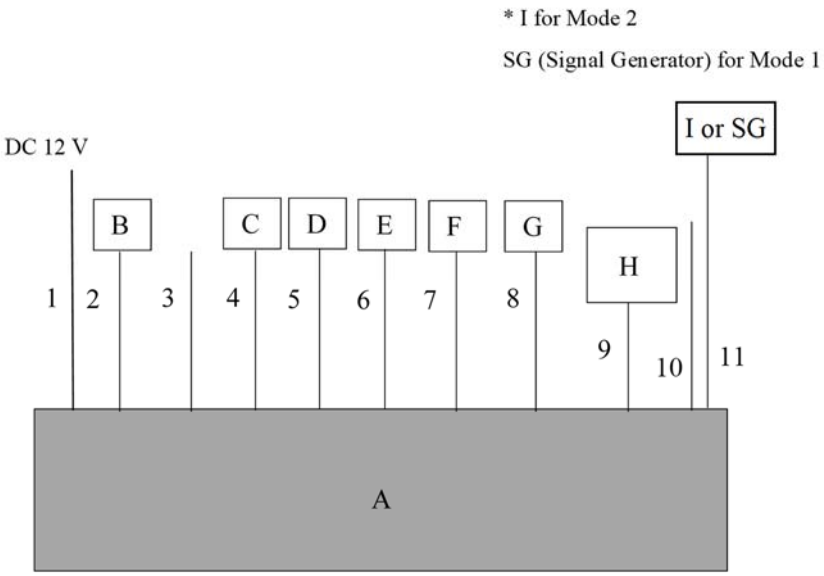
SECTION 4: Operation of EUT during testing

4.1 Operating Mode(s)

Mode 1: FM Reception mode (Local / other)
Mode 2: USB Play mode
* Radiated Emission test was performed on all mode,
Antenna Terminal test was only performed on Mode 1 (Local).

Software : Build Ver. 84.01E.01.B.1025.17ada1gKA.20200414.161946

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	Car Navigation	FT0091A	MSC00012	DENSO TEN Limited	EUT
B	Load resistance	-	-	-	-
C	USB Memory	RUF2-JV4GSWH	121101	BUFFALO	-
D	USB Memory	RUF2-JV4GSWH	121201	BUFFALO	-
E	MIC ASSY	W01B-5012-D240	03U1520000005	TRANSTRON Inc.	-
F	Camera	39530-T5A-003	09621	-	-
G	GPS Antenna	3985-TSA-E010-M1	25260094	yokowo	-
H	Jig board	0M-STSWEH0051-1	-	-	-
I	Radio Antenna	-	-	-	

List of cables used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	DC Cable	3.0	Unshielded	Unshielded	-
2	Signal Cable	1.3	Unshielded	Unshielded	-
3	Signal Cable	1.2	Unshielded	Unshielded	-
4	USB Cable	1.0	Shielded	Shielded	-
5	USB Cable	1.0	Shielded	Shielded	-
6	Signal Cable	1.3	Unshielded	Unshielded	-
7	Camera Cable	1.3	Shielded	Shielded	-
8	GPS Cable	0.5	Shielded	Shielded	-
9	FFC Cable	1.3	Unshielded	Unshielded	-
10	XM Cable	3.0	Shielded	Shielded	
11	RF Cable	0.5	Shielded	Shielded	

SECTION 5: Radiated Emission

5.1 Operating environment

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

5.2 Test configuration

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 EUT was set on the edge of the tabletop.
Test was made with the antenna positioned in both the horizontal and vertical planes of polarization. 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.

5.3 Test conditions

Frequency range : 30 MHz - 200 MHz (Biconical antenna) / 200 MHz - 1000 MHz (Logperiodic antenna)
1000 MHz - 40000 MHz (Horn antenna)
Test distance : 3 m (30 MHz - 10000 MHz) / 1 m (10000 MHz - 40000 MHz)
EUT position : Table top
EUT operation mode : See Clause 4.1

5.4 Test procedure

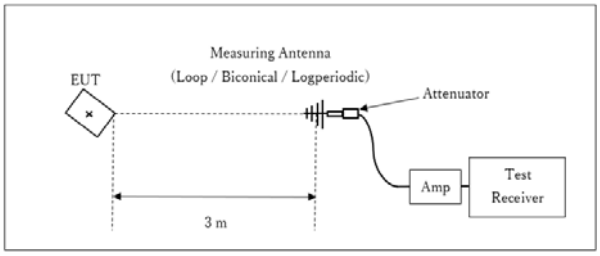
The height of the measuring antenna varied between 1 and 4 m and EUT was rotated a full revolution in order to obtain the maximum value of the electric field intensity.
The measurements were performed for both vertical and horizontal antenna polarization with the Test Receiver.
The radiated emission measurements were made with the following detector function of the Test Receiver.
The test of Local oscillator spurious has been measured up to appropriate frequency based on the result of the antenna terminal test.
For above 1 GHz, 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.

Frequency	Below 1GHz	Above 1GHz *1)
Instrument used	Test Receiver	Test Receiver
IF Bandwidth	QP: BW 120 kHz	PK: BW 1 MHz, CISPR AV: BW 1 MHz

*1) The measurement data was adjusted to a 3 m distance using the following Distance Factor.
Distance Factor: See Figure 2.

Figure 1: Test Setup

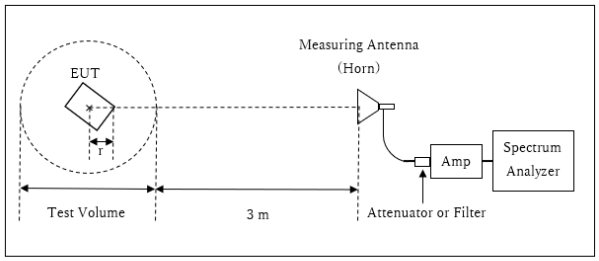
Below 1 GHz



× : Center of turn table

Test Distance: 3 m

1 GHz - 10 GHz

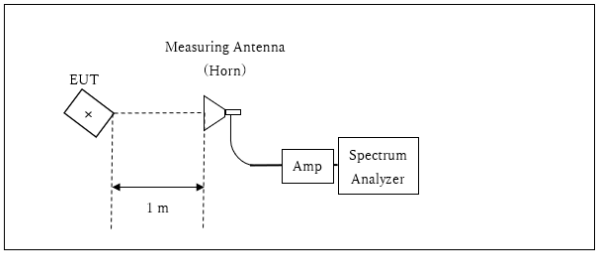


r : Radius of an outer periphery of EUT
× : Center of turn table

Distance Factor: 20 x log (3.25 m*/3.0 m) = 0.7 dB
* Test Distance: (3 + Test Volume /2) - r = 3.25 m

Test Volume: 2 m
(Test Volume has been calibrated based on CISPR 16-1-4.)
r = 0.75 m

10 GHz - 40 GHz



× : Center of turn table

Distance Factor: 20 x log (1.0 m* / 3.0 m) = -9.54 dB
*Test Distance: 1 m

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

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: February 24, 2021
February 25, 2021

Test engineer: Junya Okuno
Kiyoshiro Okazaki

SECTION 6: Antenna Terminal

6.1 Operating environment

Test place : No.4 Measurement room
Temperature : See data
Humidity : See data

6.2 Test configuration

EUT was placed on a wooden table of nominal size, 1.0 m by 1.5 m, raised 0.8 m from the ground.
Photographs of the set up are shown in Appendix 3.

6.3 Test conditions

Frequency range : 30 MHz - 1000 MHz / 1000 MHz - 40000 MHz
Test distance : N / A
EUT position : Table top
EUT operation mode : See Clause 4.1

6.4 Test procedure

The Antenna Terminal was measured with a spectrum analyzer connected to the antenna port.

Frequency	Below 1 GHz	Above 1 GHz
Instrument used	Spectrum Analyzer	Spectrum Analyzer *1)
IF Bandwidth	PK: RBW: 100 kHz / VBW: 100 kHz	PK: RBW: 1 MHz / VBW: 3 MHz

*1) The Spectrum Analyzer was used in 3 dB resolution bandwidth.

6.5 Test result

Summary of the test results: Pass

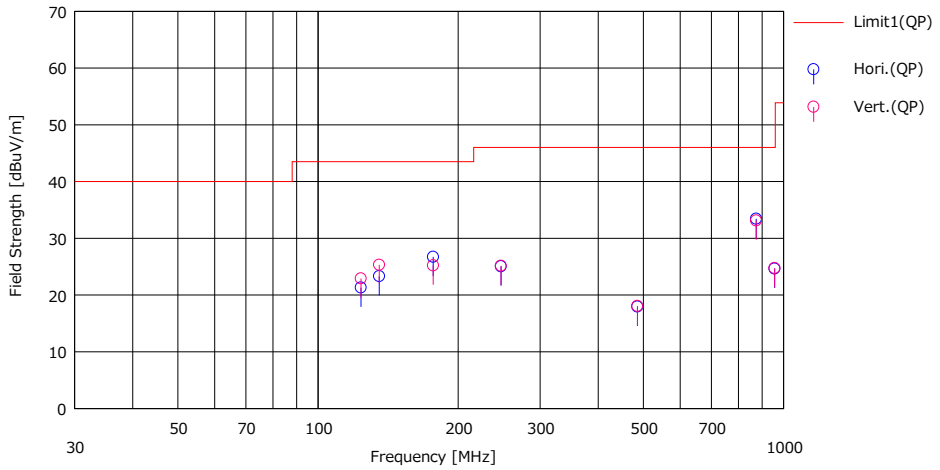
Date: February 24, 2021 Test engineer: Kiyoshiro Okazaki and Junya Okuno

APPENDIX 1: Test data

Radiated Emission

Report No.	13665469H
Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.4
Date	February 25, 2021
Temperature / Humidity	19 deg. C / 32 % RH
Engineer	Kiyoshiro Okazaki
	(Below 1 GHz)
Mode	Mode 1 (Local)

Limit : FCC15.109(a) 3m, below 1GHz:QP, above 1GHz:AV



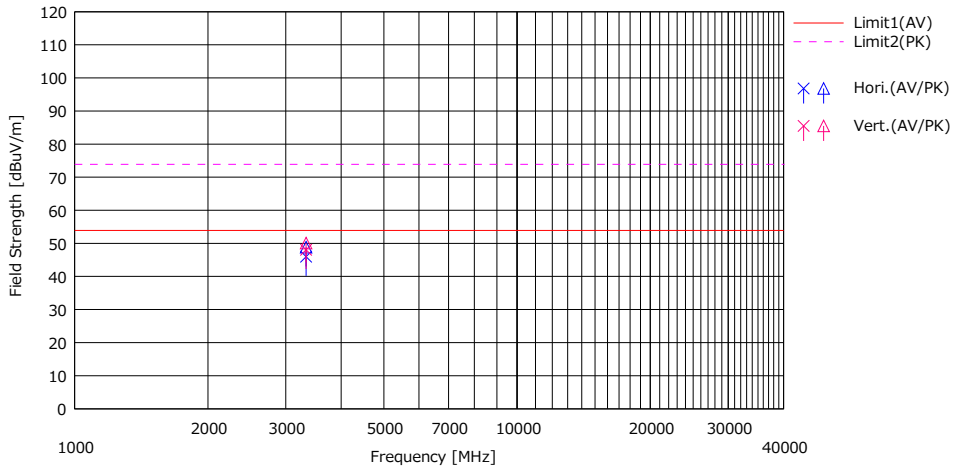
No.	Freq. [MHz]	Reading (QP) [dBuV]	Ant.Fac [dB/m]	Loss [dB]	Gain [dB]	Result (QP) [dBuV/m]	Limit (QP) [dBuV/m]	Margin (QP) [dB]	Pola. [H/V]	Height [cm]	Angle [deg]	Ant. Type	Comment
1	123.599	31.50	13.07	8.19	31.44	21.32	43.50	22.1	Hori.	100	263	BA	
2	135.361	32.40	14.04	8.30	31.42	23.32	43.50	20.1	Hori.	110	271	BA	
3	176.701	33.60	15.85	8.64	31.37	26.72	43.50	16.7	Hori.	100	291	BA	
4	247.211	35.40	11.73	9.21	31.30	25.04	46.00	20.9	Hori.	100	102	LA23	
5	485.510	21.30	17.36	10.65	31.35	17.96	46.00	28.0	Hori.	100	0	LA23	
6	873.512	30.10	21.82	12.27	30.77	33.42	46.00	12.5	Hori.	119	327	LA23	
7	956.958	20.40	21.98	12.61	30.35	24.64	46.00	21.3	Hori.	100	0	LA23	
8	123.599	33.10	13.07	8.19	31.44	22.92	43.50	20.5	Vert.	100	21	BA	
9	135.361	34.40	14.04	8.30	31.42	25.32	43.50	18.1	Vert.	101	12	BA	
10	176.701	32.10	15.85	8.64	31.37	25.22	43.50	18.2	Vert.	101	172	BA	
11	247.211	35.50	11.73	9.21	31.30	25.14	46.00	20.8	Vert.	100	92	LA23	
12	485.510	21.40	17.36	10.65	31.35	18.06	46.00	27.9	Vert.	100	0	LA23	
13	873.512	29.80	21.82	12.27	30.77	33.12	46.00	12.8	Vert.	100	54	LA23	
14	956.958	20.50	21.98	12.61	30.35	24.74	46.00	21.2	Vert.	102	22	LA23	

CHART: WITH FACTOR
ANT TYPE: - 30 MHz: LOOP, 30 MHz - 200 MHz: BICONICAL, 200 MHz - 1000 MHz: LOGPERIODIC, 1000 MHz -: HORN
CALCULATION: RESULT = READING + ANT FACTOR + LOSS(CABLE + ATT) - GAIN(AMP)
Except for the above table: adequate margin data below the limits.

Radiated Emission

Report No.	13665469H
Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.4
Date	February 24, 2021
Temperature / Humidity	21 deg. C / 32 % RH
Engineer	Junya Okuno
	(Above 1 GHz)
Mode	Mode 1 (Local)

Limit : FCC_Part 15 Subpart B(15.109)_ClassB



No.	Freq.	Reading		Ant.Fac	Loss	Gain	Result		Limit		Margin		Pola.	Height	Angle	Ant. Type	Comment
		(AV)	(PK)				(AV)	(PK)	(AV)	(PK)	(AV)	(PK)					
	[MHz]	[dBuV]	[dBuV]	[dB/m]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dBuV/m]	[dBuV/m]	[dB]	[dB]	[H/V]	[cm]	[deg]		
1	3334.500	45.52	48.41	28.30	3.64	31.52	45.94	48.83	53.90	73.90	7.9	25.0	Hori.	113	126	H21	
2	3334.500	47.61	49.66	28.30	3.64	31.52	48.03	50.06	53.90	73.90	5.8	23.8	Vert.	104	178	H21	

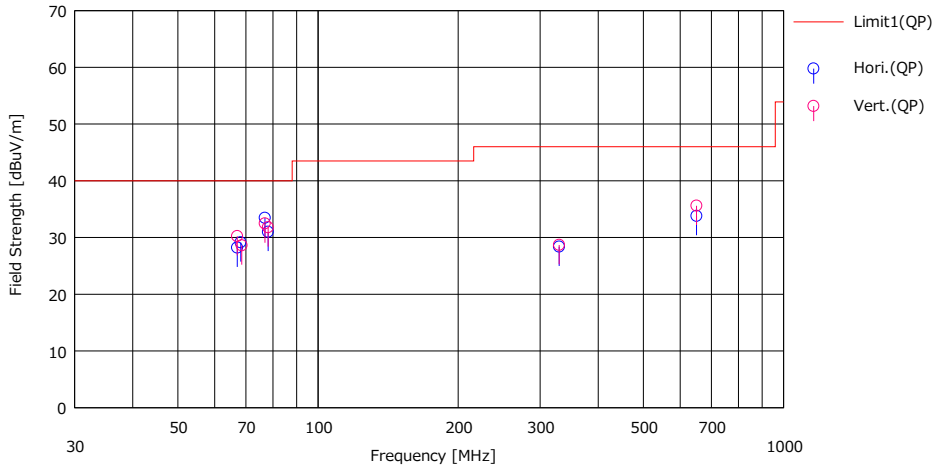
CHART: WITH FACTOR
ANT TYPE: - 30 MHz: LOOP, 30 MHz - 200 MHz: BICONICAL, 200 MHz - 1000 MHz: LOGPERIODIC, 1000 MHz -: HORN
CALCULATION: RESULT = READING + ANT FACTOR + LOSS(CABLE + D-factor) - GAIN(AMP)
Except for the above table: adequate margin data below the limits.

* No signal was detected above 10 GHz.

Radiated Emission

Report No.	13665469H
Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.4
Date	February 25, 2021
Temperature / Humidity	19 deg. C / 32 % RH
Engineer	Kiyoshiro Okazaki
	(Below 1 GHz)
Mode	Mode 1 (Other)

Limit : FCC15.109(a) 3m, below 1GHz:QP, above 1GHz:AV



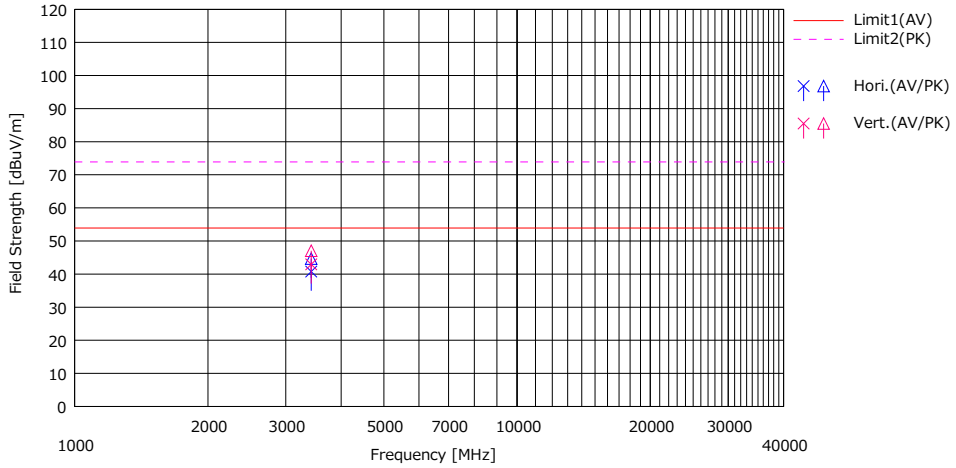
No.	Freq. [MHz]	Reading (QP) [dBuV]	Ant.Fac [dB/m]	Loss [dB]	Gain [dB]	Result (QP) [dBuV/m]	Limit (QP) [dBuV/m]	Margin (QP) [dB]	Pola. [H/V]	Height [cm]	Angle [deg]	Ant. Type	Comment
1	67.051	45.60	6.47	7.63	31.48	28.22	40.00	11.7	Hori.	400	359	BA	
2	68.200	46.60	6.37	7.65	31.48	29.14	40.00	10.8	Hori.	300	356	BA	
3	76.911	50.70	6.49	7.75	31.48	33.46	40.00	6.5	Hori.	400	355	BA	
4	78.107	48.10	6.59	7.77	31.48	30.98	40.00	9.0	Hori.	300	182	BA	
5	329.601	35.40	14.49	9.76	31.27	28.38	46.00	17.6	Hori.	100	93	LA23	
6	650.412	34.70	19.24	11.42	31.56	33.80	46.00	12.2	Hori.	100	1	LA23	
7	67.051	47.60	6.47	7.63	31.48	30.22	40.00	9.7	Vert.	100	0	BA	
8	68.570	46.10	6.33	7.65	31.48	28.60	40.00	11.4	Vert.	100	22	BA	
9	76.911	49.70	6.49	7.75	31.48	32.46	40.00	7.5	Vert.	100	1	BA	
10	78.107	48.90	6.59	7.77	31.48	31.78	40.00	8.2	Vert.	100	0	BA	
11	329.601	35.70	14.49	9.76	31.27	28.68	46.00	17.3	Vert.	100	11	LA23	
12	650.412	36.50	19.24	11.42	31.56	35.60	46.00	10.4	Vert.	100	0	LA23	

CHART: WITH FACTOR
ANT TYPE: - 30 MHz: LOOP, 30 MHz - 200 MHz: BICONICAL, 200 MHz - 1000 MHz: LOGPERIODIC, 1000 MHz -: HORN
CALCULATION: RESULT = READING + ANT FACTOR + LOSS(CABLE + ATT) - GAIN(AMP)
Except for the above table: adequate margin data below the limits.

Radiated Emission

Report No.	13665469H
Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.4
Date	February 24, 2021
Temperature / Humidity	21 deg. C / 32 % RH
Engineer	Junya Okuno
	(Above 1 GHz)
Mode	Mode 1 (Other)

Limit : FCC_Part 15 Subpart B(15.109)_ClassB



No.	Freq.	Reading		Ant.Fac	Loss	Gain	Result		Limit		Margin		Pola.	Height	Angle	Ant. Type	Comment
		(AV)	(PK)				(AV)	(PK)	(AV)	(PK)	(AV)	(PK)					
	[MHz]	[dBuV]	[dBuV]	[dB/m]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dBuV/m]	[dBuV/m]	[dB]	[dB]	[H/V]	[cm]	[deg]		
1	3424.065	40.07	43.96	28.53	3.68	31.49	40.79	44.68	53.90	73.90	13.1	29.2	Hori.	100	123	H21	
2	3424.065	42.24	46.34	28.53	3.68	31.49	42.96	47.06	53.90	73.90	10.9	26.8	Vert.	100	163	H21	

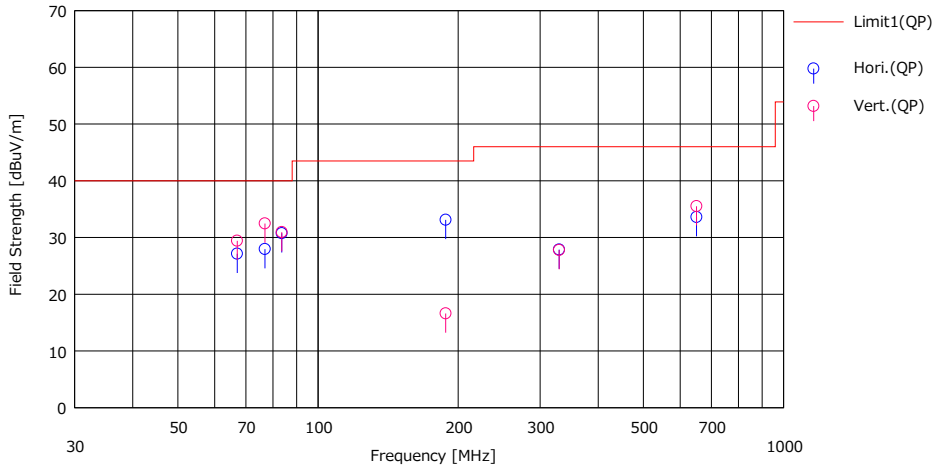
CHART: WITH FACTOR
ANT TYPE: - 30 MHz: LOOP, 30 MHz - 200 MHz: BICONICAL, 200 MHz - 1000 MHz: LOGPERIODIC, 1000 MHz -: HORN
CALCULATION: RESULT = READING + ANT FACTOR + LOSS(CABLE + D-factor) - GAIN(AMP)
Except for the above table: adequate margin data below the limits.

* No signal was detected above 10 GHz.

Radiated Emission

Report No.	13665469H
Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.4
Date	February 25, 2021
Temperature / Humidity	19 deg. C / 32 % RH
Engineer	Kiyoshiro Okazaki
	(Below 1 GHz)
Mode	Mode 2

Limit : FCC15.109(a) 3m, below 1GHz:QP, above 1GHz:AV



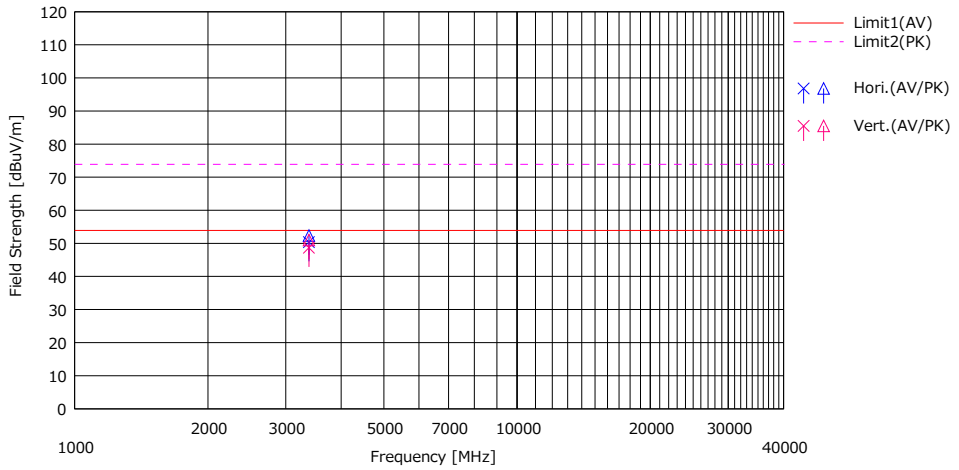
No.	Freq. [MHz]	Reading (QP) [dBuV]	Ant.Fac [dB/m]	Loss [dB]	Gain [dB]	Result (QP) [dBuV/m]	Limit (QP) [dBuV/m]	Margin (QP) [dB]	Pola. [H/V]	Height [cm]	Angle [deg]	Ant. Type	Comment
1	67.022	44.50	6.47	7.63	31.48	27.12	40.00	12.8	Hori.	400	333	BA	
2	76.916	45.20	6.49	7.75	31.48	27.96	40.00	12.0	Hori.	300	5	BA	
3	83.594	47.10	7.30	7.82	31.48	30.74	40.00	9.2	Hori.	300	358	BA	
4	188.107	39.50	16.24	8.73	31.36	33.11	43.50	10.3	Hori.	273	237	BA	
5	329.603	34.90	14.49	9.76	31.27	27.88	46.00	18.1	Hori.	100	188	LA23	
6	650.410	34.50	19.24	11.42	31.56	33.60	46.00	12.4	Hori.	100	327	LA23	
7	67.022	46.80	6.47	7.63	31.48	29.42	40.00	10.5	Vert.	100	267	BA	
8	76.916	49.70	6.49	7.75	31.48	32.46	40.00	7.5	Vert.	100	2	BA	
9	83.594	47.30	7.30	7.82	31.48	30.94	40.00	9.0	Vert.	100	359	BA	
10	188.107	23.00	16.24	8.73	31.36	16.61	43.50	26.8	Vert.	100	2	BA	
11	329.603	34.80	14.49	9.76	31.27	27.78	46.00	18.2	Vert.	100	309	LA23	
12	650.410	36.40	19.24	11.42	31.56	35.50	46.00	10.5	Vert.	100	7	LA23	

CHART: WITH FACTOR
ANT TYPE: - 30 MHz: LOOP, 30 MHz - 200 MHz: BICONICAL, 200 MHz - 1000 MHz: LOGPERIODIC, 1000 MHz -: HORN
CALCULATION: RESULT = READING + ANT FACTOR + LOSS(CABLE + ATT) - GAIN(AMP)
Except for the above table: adequate margin data below the limits.

Radiated Emission

Report No.	13665469H
Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.4
Date	February 24, 2021
Temperature / Humidity	21 deg. C / 32 % RH
Engineer	Junya Okuno
	(Above 1 GHz)
Mode	Mode 2

Limit : FCC_Part 15 Subpart B(15.109)_ClassB



No.	Freq.	Reading		Ant.Fac	Loss	Gain	Result		Limit		Margin		Pola.	Height	Angle	Ant. Type	Comment
		(AV)	(PK)				(AV)	(PK)	(AV)	(PK)	(AV)	(PK)					
	[MHz]	[dBuV]	[dBuV]	[dB/m]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dBuV/m]	[dBuV/m]	[dB]	[dB]	[H/V]	[cm]	[deg]		
1	3384.083	49.84	51.82	28.36	3.66	31.50	50.36	52.34	53.90	73.90	3.5	21.5	Hori.	130	147	H21	
2	3384.083	48.15	50.48	28.36	3.66	31.50	48.67	51.00	53.90	73.90	5.2	22.9	Vert.	100	173	H21	

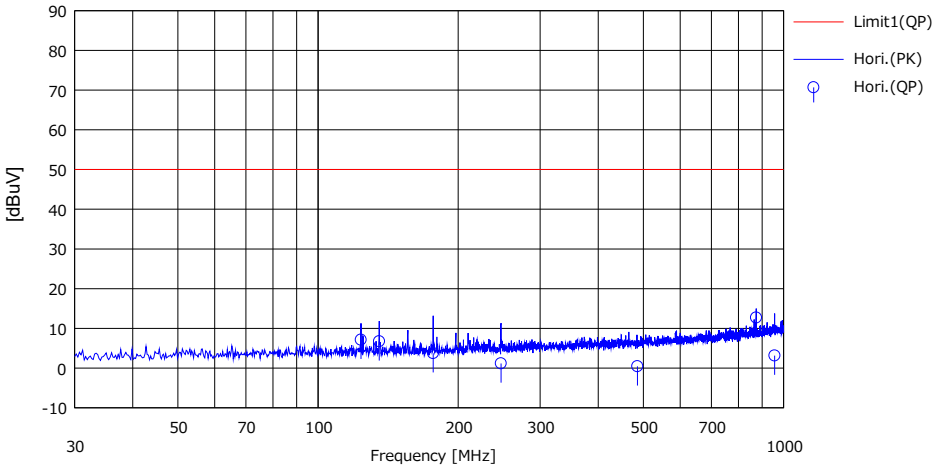
CHART: WITH FACTOR
ANT TYPE: - 30 MHz: LOOP, 30 MHz - 200 MHz: BICONICAL, 200 MHz - 1000 MHz: LOGPERIODIC, 1000 MHz -: HORN
CALCULATION: RESULT = READING + ANT FACTOR + LOSS(CABLE + D-factor) - GAIN(AMP)
Except for the above table: adequate margin data below the limits.

* No signal was detected above 10 GHz.

Antenna Terminal Conducted Emission

Report No.	13665469H
Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.4
Date	February 24, 2021
Temperature / Humidity	19 deg. C / 32 % RH
Engineer	Kiyoshiro Okazaki
Mode	Mode 1 (Local)

Limit : FCC15.111 Antenna terminal measurement



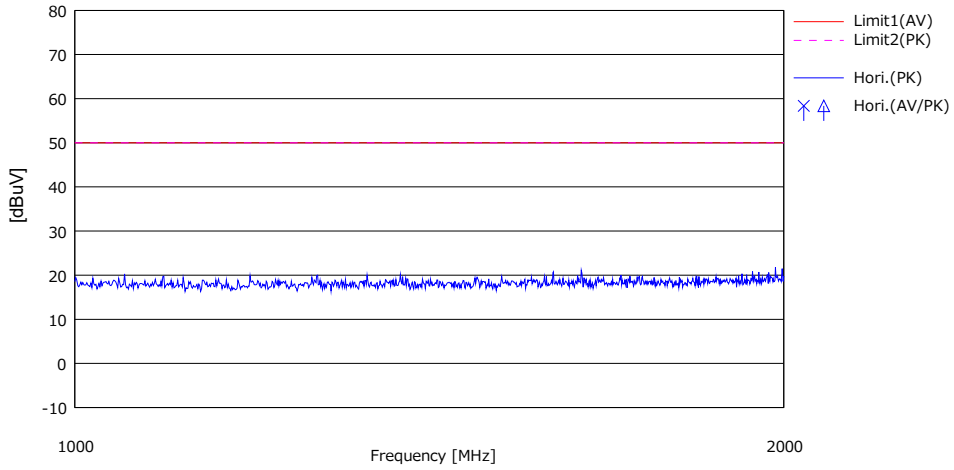
No.	Freq. [MHz]	Reading (QP) [dBuV]	Ant.Fac [dB/m]	Loss [dB]	Gain [dB]	Result (QP) [dBuV]	Limit *1) (QP) [dBuV]	Margin (QP) [dB]	Pola. [H/V]	Height [cm]	Angle [deg]	Ant. Type	Comment
1	123.599	30.10	0.00	8.44	31.44	7.10	50.00	42.9					
2	135.361	29.60	0.00	8.55	31.42	6.73	50.00	43.2					
3	176.701	26.20	0.00	8.90	31.37	3.73	50.00	46.2					
4	247.211	23.00	0.00	9.46	31.30	1.16	50.00	48.8					
5	485.510	20.90	0.00	10.89	31.35	0.44	50.00	49.5					
6	873.512	31.00	0.00	12.46	30.77	12.69	50.00	37.3					
7	956.958	20.70	0.00	12.79	30.35	3.14	50.00	46.8					

*1) 2 nW = -57 dBm = 50 dBuV
CHART: WITH FACTOR
CALCULATION: RESULT = READING + LOSS (CABLE) - GAIN

Antenna Terminal Conducted Emission

Report No.	13665469H
Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.4
Date	February 24, 2021
Temperature / Humidity	19 deg. C / 32 % RH
Engineer	Kiyoshiro Okazaki
Mode	Mode 1 (Local)

Limit : FCC15.111 Antenna terminal measurement



No.	Freq.	Reading		Ant.Fac	Loss	Gain	Result		Limit *1)		Margin		Pola.	Height	Angle	Ant. Type	Comment
		(AV)	(PK)				(AV)	(PK)	(AV)	(PK)	(AV)	(PK)					
	[MHz]	[dBuV]	[dBuV]	[dB/m]	[dB]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dB]	[dB]	[H/V]	[cm]	[deg]		

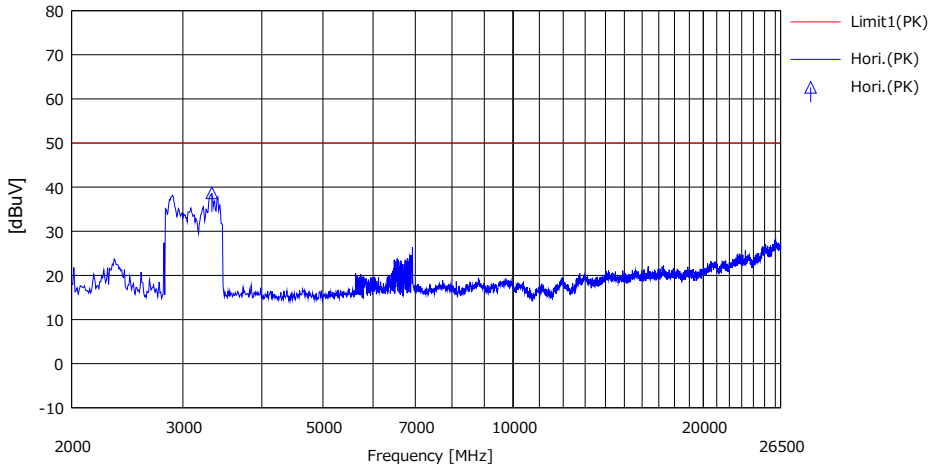
*1) 2 nW = -57 dBm = 50 dBuV
CHART: WITH FACTOR
CALCULATION: RESULT = READING + LOSS (CABLE) - GAIN
No Signal Detected

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

Antenna Terminal Conducted Emission

Report No.	13665469H
Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.4
Date	February 24, 2021
Temperature / Humidity	21 deg. C / 32 % RH
Engineer	Junya Okuno
Mode	Mode 1 (Local)

Limit : FCC15.111 Antenna terminal measurement



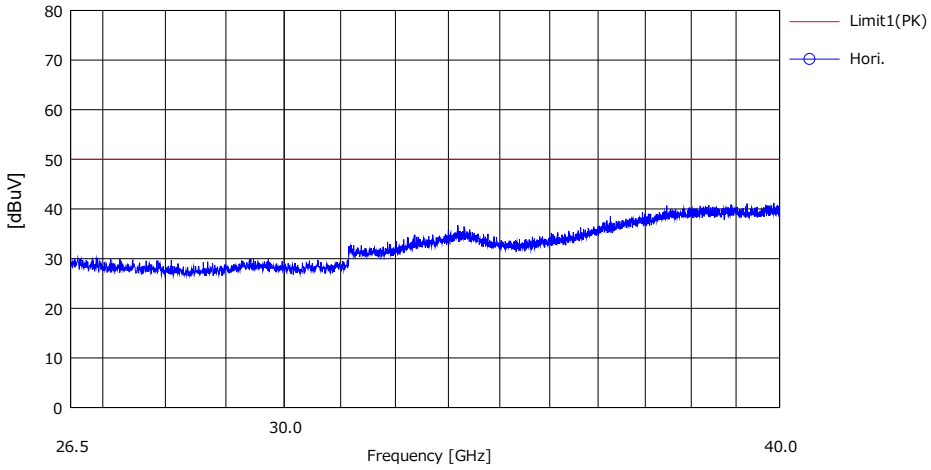
No.	Freq. [MHz]	Reading ⟨PK⟩ [dBuV]	Ant.Fac [dB/m]	Loss [dB]	Gain [dB]	Result ⟨PK⟩ [dBuV]	Limit *1) ⟨PK⟩ [dBuV]	Margin ⟨PK⟩ [dB]	Pola. [H/V]	Height [cm]	Angle [deg]	Ant. Type	Comment
1	3334.500	65.65	0.00	4.57	31.52	38.70	50.00	11.3					

*1) 2 nW = -57 dBm = 50 dBuV
CHART: WITH FACTOR
CALCULATION: RESULT = READING + LOSS (CABLE) - GAIN

Antenna Terminal Conducted Emission

Report No.	13665469H
Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.4
Date	February 24, 2021
Temperature / Humidity	21 deg. C / 32 % RH
Engineer	Junya Okuno
Mode	Mode 1 (Local)

Limit : FCC15.111 Antenna terminal measurement



No.	Freq. [MHz]	Reading [dBuV]	Ant.Fac [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV]	Limit *1) 〈PK〉 [dBuV]	Margin 〈PK〉 [dB]	Pola. [H/V]	Height [cm]	Angle [deg]	Ant. Type	Comment

*1) 2 nW = -57 dBm = 50 dBuV
CHART: WITH FACTOR
CALCULATION: RESULT = READING + LOSS (CABLE) - GAIN
No Signal Detected

APPENDIX 2: Test instruments

Test equipment

Test Item	Local ID	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Cal Int
RE	MAEC-04	142011	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-10005	05/25/2020	24
RE	MOS-15	141562	Thermo-Hygrometer	CUSTOM	CTH-180	1501	01/15/2021	12
RE	MMM-10	141545	DIGITAL HiTESTER	HIOKI	3805	51201148	01/07/2021	12
RE	MJM-26	142227	Measure	KOMELON	KMC-36	-	-	-
RE	COTS-MEMI-02	178648	EMI measurement program	TSJ (Techno Science Japan)	TEPTO-DV	-	-	-
RE	MTR-08	141949	Test Receiver	Rohde & Schwarz	ESCI	100767	08/18/2020	12
RE	MSA-04	141885	Spectrum Analyzer	AGILENT	E4448A	US44300523	11/09/2020	12
RE	MCC-246	199563	Microwave Cable	HUBER+SUNER	SF126E/11PC35/11PC35/ 1000M,5000M	537061/126E / 537072/126E	06/11/2020	12
RE	MPA-12	141581	MicroWave System Amplifier	AGILENT	83017A	650	10/19/2020	12
AT	MMP-01	141550	Matching Pad Anritsu	ANRITSU	MB-009	40063	07/02/2020	12
RE	MCC-50	141397	Coaxial Cable	UL Japan	-	-	11/06/2020	12
RE	MPA-14	141583	Pre Amplifier	SONOMA INSTRUMENT	11/5/1900	260833	02/18/2020	12
RE	MAT-34	141331	Attenuator(6dB)	TME	UFA-01	-	02/05/2020	12
RE	MBA-05	141425	Biconical Antenna	Schwarzbeck	BBA9106	1302	08/31/2020	12
RE	MLA-23	141267	Logperiodic Antenna (200-1000MHz)	Schwarzbeck	VUSLP9111B	911B-192	09/02/2020	12
AT	MOS-15	141562	Thermo-Hygrometer	CUSTOM	CTH-180	1501	01/15/2021	12
AT	MMM-10	141545	DIGITAL HiTESTER	HIOKI	3805	51201148	01/07/2021	12
AT	COTS-MEMI-02	178648	EMI measurement program	TSJ (Techno Science Japan)	TEPTO-DV	-	-	-
AT	MPA-12	141581	MicroWave System Amplifier	AGILENT	83017A	650	10/19/2020	12
AT	MCC-246	199563	Microwave Cable	HUBER+SUNER	SF126E/11PC35/11PC35/ 1000M,5000M	537061/126E / 537072/126E	06/11/2020	12
AT	MSA-04	141885	Spectrum Analyzer	AGILENT	E4448A	US44300523	11/09/2020	12
RE	MAEC-04-SVSWR	142017	Semi Anechoic Chamber(SVSWR)	TDK	Semi Anechoic Chamber 3m	DA-10005	04/04/2019	24
RE	MHA-21	141508	Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D	9120D-557	05/22/2020	12
RE	MHA-17	141506	Horn Antenna 15-40GHz	Schwarzbeck	BBHA9170	BBHA9170307	07/16/2020	12
RE	MPA-22	141588	Pre Amplifier	MITEQ, Inc	AMF-6F-2600400-33-8P / AMF-4F-2600400-33-8P	1871355 /1871328	09/07/2020	12
RE	MHA-29	141517	Horn Antenna 26.5-40GHz	ETS LINDGREN	22190	152399	08/03/2020	12
RE	MSG-14	141894	Signal Generator	Rohde & Schwarz	SMC100A	1411.4002k02	10/16/2020	12
RE	MCC-224	160324	Coaxial Cable	Huber+Suhner	SUCOFLEX 102A	MY009/2A	11/17/2020	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:

RE: Radiated emission
AT: Antenna Terminal Conducted test