



EMI TEST REPORT

Test Report No.: 14483763H-D-R2

Customer	DENSO TEN Limited
Description of EUT	Car Audio
Model Number of EUT	TN0040A
FCC ID	BABTN0040A
Test Regulation	FCC Part 15 Subpart B
Test Result	Complied (Refer to SECTION 3)
Issue Date	July 18, 2023
Remarks	-

Representative test engineer

Hiroyuki Furutaka
Engineer

Approved by

Ryota Yamanaka
Engineer



CERTIFICATE 5107.02

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 There is no testing item of "Non-accreditation".

Report Cover Page - Form-ULID-003532 (DCS:13-EM-F0429) Issue# 21.0

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- The information provided from the customer for this report is identified in SECTION 1.
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REVISION HISTORY

Original Test Report No.: 14483763H-D

This report is a revised version of 14483763H-D-R1. 14483763H-D-R1 is replaced with this report.

Revision	Test Report No.	Date	Page Revised Contents
- (Original)	14483763H-D	April 26, 2023	-
1	14483763H-D-R1	July 4, 2023	SECTION 2.2: General Specification Correction of Clock frequency(ies) in the system from 26 MHz to 1.716 GHz
1	14483763H-D-R1	July 4, 2023	SECTION 2.2: Radio Specification from 4.17 dBi to 3.79 dBi (U-NII-1) 3.34 dBi (U-NII-3)
1	14483763H-D-R1	July 4, 2023	SECTION 2.2 Deletion of sentence about simultaneous transmission.
1	14483763H-D-R1	July 4, 2023	SECTION 3.2 Correction of Worst margin frequency for Antenna Terminal: from 1299.995.000 MHz to 1299.995 MHz
1	14483763H-D-R2	July 18, 2023	Cover page and SECTION 1: Correction of Company Name from “Denso TEN Limited” to “DENSO TEN Limited”

Reference: Abbreviations (Including words undescribed in this report)

A2LA	The American Association for Laboratory Accreditation	GPS	Global Positioning System
AAN	Asymmetric Artificial Network	Hori.	Horizontal
AC	Alternating Current	ICES	Interference-Causing Equipment Standard
AM	Amplitude Modulation	I/O	Input/Output
AMN	Artificial Mains Network	IEC	International Electrotechnical Commission
Amp, AMP	Amplifier	IEEE	Institute of Electrical and Electronics Engineers
ANSI	American National Standards Institute	IF	Intermediate Frequency
Ant, ANT	Antenna	ILAC	International Laboratory Accreditation Conference
AP	Access Point	ISED	Innovation, Science and Economic Development Canada
ASK	Amplitude Shift Keying	ISN	Impedance Stabilization Network
Atten., ATT	Attenuator	ISO	International Organization for Standardization
AV	Average	JAB	Japan Accreditation Board
BPSK	Binary Phase-Shift Keying	LAN	Local Area Network
BR	Bluetooth Basic Rate	LCL	Longitudinal Conversion Loss
BT	Bluetooth	LIMS	Laboratory Information Management System
BT LE	Bluetooth Low Energy	LISN	Line Impedance Stabilization Network
BW	BandWidth	MRA	Mutual Recognition Arrangement
C.F	Correction Factor	N/A	Not Applicable
Cal Int	Calibration Interval	NIST	National Institute of Standards and Technology
CAV	CISPR AV	NS	No signal detect.
CCK	Complementary Code Keying	NSA	Normalized Site Attenuation
CDN	Coupling Decoupling Network	OBW	Occupied BandWidth
Ch., CH	Channel	OFDM	Orthogonal Frequency Division Multiplexing
CISPR	Comite International Special des Perturbations Radioelectriques	PER	Packet Error Rate
Corr.	Correction	PK	Peak
CPE	Customer premise equipment	P _{Lt}	long-term flicker severity
CW	Continuous Wave	POHC(A)	Partial Odd Harmonic Current
DBPSK	Differential BPSK	Pol., Pola.	Polarization
DC	Direct Current	PR-ASK	Phase Reversal ASK
DET	Detector	P _{St}	short-term flicker severity
D-factor	Distance factor	QAM	Quadrature Amplitude Modulation
Dmax	maximum absolute voltage change during an observation period	QP	Quasi-Peak
DQPSK	Differential QPSK	QPSK	Quadrature Phase Shift Keying
DSSS	Direct Sequence Spread Spectrum	r.m.s., RMS	Root Mean Square
DUT	Device Under Test	RBW	Resolution BandWidth
EDR	Enhanced Data Rate	RE	Radio Equipment
e.i.r.p., EIRP	Equivalent Isotropically Radiated Power	REV	Reverse
EM clamp	Electromagnetic clamp	RF	Radio Frequency
EMC	ElectroMagnetic Compatibility	RFID	Radio Frequency Identifier
EMI	ElectroMagnetic Interference	RNSS	Radio Navigation Satellite Service
EMS	ElectroMagnetic Susceptibility	RSS	Radio Standards Specifications
EN	European Norm	Rx	Receiving
e.r.p., ERP	Effective Radiated Power	SINAD	Ratio of (Signal + Noise + Distortion) to (Noise + Distortion)
ETSI	European Telecommunications Standards Institute	S/N	Signal to Noise ratio
EU	European Union	SA, S/A	Spectrum Analyzer
EUT	Equipment Under Test	SG	Signal Generator
Fac.	Factor	SVSWR	Site-Voltage Standing Wave Ratio
FCC	Federal Communications Commission	THC(A)	Total Harmonic Current
FHSS	Frequency Hopping Spread Spectrum	THD(%)	Total Harmonic Distortion
FM	Frequency Modulation	TR, T/R	Test Receiver
Freq.	Frequency	Tx	Transmitting
FSK	Frequency Shift Keying	VBW	Video BandWidth
Fund	Fundamental	Vert.	Vertical
FWD	Forward	WLAN	Wireless LAN
GFSK	Gaussian Frequency-Shift Keying	xDSL	Generic term for all types of DSL technology
GNSS	Global Navigation Satellite System		(DSL: Digital Subscriber Line)

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SECTION 1: Customer information

Company Name	DENSO TEN Limited
Address	2-28, Goshō-dori 1-chome, Hyogo-ku, Kobe, 652-8510 Japan
Telephone Number	+81-78-682-2159
Contact Person	Kaoru Abe

The information provided from the customer is as follows;

- Customer, Description 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 and Test 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**

Description	Car Audio
Model Number	TN0040A
Serial Number	Refer to SECTION 4.2
Condition	Production prototype (Not for Sale: This sample is equivalent to mass-produced items.)
Modification	No Modification by the test lab
Receipt Date	September 20, 2022
Test Date	October 11, 2022 to April 25, 2023

2.2 Product Description

General Specification

Rating	DC 12 V
Clock frequency (ies) in the system	1.716 GHz

Radio Specification

WLAN (IEEE802.11b/11g/11n-20)

Equipment Type	Transceiver
Frequency of Operation	2412 MHz to 2462 MHz
Type of Modulation	DSSS/CCK(11b), OFDM(11g, 11n)
Antenna Gain	0.63 dBi

WLAN (IEEE802.11a/11n-20/11ac-20/11n-40/11ac-40/11ac-80)

Equipment Type	Transceiver	
Frequency of Operation	20 MHz Band:	5180 MHz to 5240 MHz 5745 MHz to 5805 MHz
	40 MHz Band:	5190 MHz to 5230 MHz 5755 MHz to 5795 MHz
	80 MHz Band:	5210 MHz 5775 MHz
Type of Modulation	OFDM(11a,11n,11ac)	
Antenna Gain	3.79 dBi (U-NII-1)	
	3.34 dBi (U-NII-3)	

Bluetooth (BR / EDR)

Equipment Type	Transceiver
Frequency of Operation	2402 MHz to 2480 MHz
Type of Modulation	FHSS (GFSK, $\pi/4$ DQPSK, 8 DPSK)
Antenna Gain	-0.99 dBi

AM/FM (incl. RDS) / DAB

Equipment Type	Receiver
Frequency of Operation	AM: MW:522 kHz to 1710 kHz FM: 87.5 MHz to 108.0 MHz DAB (Band III): 174.928 MHz to 239.200 MHz
Type of Modulation	AM FM DAB: OFDM
Antenna Connector Type	GT21
Impedance	AM, FM: 75 ohm DAB: 50 ohm

SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification	FCC Part 15 Subpart B The latest version on the first day of the testing period
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 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 8. Radiated emission measurements IEEE 187:2003	Part 15 Subpart B 15.109(a)	N/A	2.97 dB 926.233 MHz, QP, Vert., Mode 2 (Other)	Complied a)	-
Antenna Terminal	ANSI C63.4: 2014 12. Measurement of unintentional radiators other than ITE IEEE 187:2003	Part 15 Subpart B 15.111(a)	N/A	16.0 dB 1299.995 MHz, PK, Mode 3	Complied b)	-

* Note: UL Japan, Inc.'s EMI Work Procedure: Work Instructions-ULID-003591.

*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)

3.3 Addition to standard

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

3.4 Uncertainty

Measurement uncertainty is not taken into account when stating conformity with a specified requirement.

Note: When margins obtained from test results are less than the measurement uncertainty, the test results may exceed the limit.

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	5.1 dB
		Vertical	6.2 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		5.1 dB
	6 GHz to 18 GHz		5.4 dB
1 m	10 GHz to 26.5 GHz		5.4 dB
	26.5 GHz to 40 GHz		5.4 dB
0.5 m	26.5 GHz to 40 GHz		5.4 dB
10 m	1 GHz to 18 GHz		5.4 dB

Antenna Terminal test

Test Item	Uncertainty (+/-)
Antenna terminal conducted emission	2.7 dB

3.5 Test Location

UL Japan, Inc. Ise EMC Lab.

*A2LA Certificate Number: 5107.02 / FCC Test Firm Registration Number: 884919

ISED Lab Company Number: 2973C / CAB identifier: JP0002

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

Telephone: +81-596-24-8999

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.10 shielded room	3.8 x 2.8 x 2.8	3.8 x 2.8	-	-
No.11 measurement room	4.0 x 3.4 x 2.5	N/A	-	-
No.12 measurement room	2.6 x 3.4 x 2.5	N/A	-	-
Large Chamber	16.9 x 22.1 x 10.17	16.9 x 22.1	-	10 m
Small Chamber	5.3 x 6.69 x 3.59	5.3 x 6.69	-	-

3.6 Test data, Test instruments, and Test set up

Refer to APPENDIX.

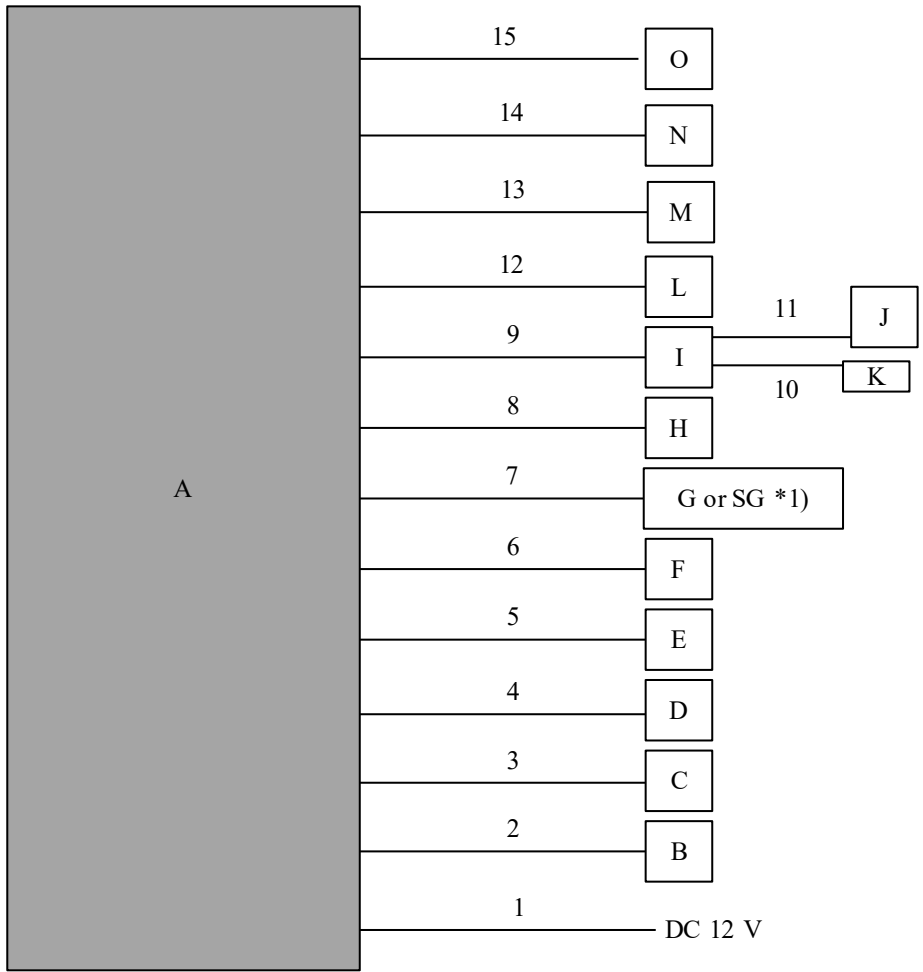
SECTION 4: Operation of EUT during testing

4.1 Operating Mode(s)

Mode	Remarks
Mode 1: USB Memory Play mode	Radiated Emission test
Mode 2: FM Receiving mode (Local / Other)	Radiated Emission test
Mode 3: FM Seek mode	Antenna Terminal test

Software(s)	1A.00.12.78.00
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4.2 Configuration and peripherals



*1) SG (Signal Generator) used other than Mode 1,3

* 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 Audio	TN0040A	NAVI-0031	DENSO TEN Limited	EUT
B	Microphone	8983963631	1Y141500310277	Transtron	-
C	Analog Camera	8983980531	0289018	Faurecia Clarion Electronics	-
D	Digital Camera	5JX4707170	0112	AISIN	-
E	Steering Switch	876521340	-	TOYODENSO	-
F	Meter	8976834551	A220405111418	YAZAKI	-
G	Radio and DAB Antenna	8983960350	-	HARADA INDUSTRY	-
H	GPS Antenna	8983963531	-	JVCKENWOOD	-
I	Rear USB CN	-	No.1	-	-
J	iPhone7	MNCE2J/A	F17T6AKFHG7X	Apple Inc.	-
K	USB Memory	RUF3-K8GA-BK/N	P90611	BUFFALO	-
L	Speaker	-	-	-	-
M	Speaker	-	-	-	-
N	Speaker	-	-	-	-
O	Speaker	-	-	-	-

List of Cables Used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	DC Cable	5.0	Unshielded	Unshielded	-
2	MIC Cable	3.0	Unshielded	Unshielded	-
3	Signal Cable	3.0	Unshielded	Unshielded	-
4	Signal Cable	9.6	Unshielded	Unshielded	-
5	Signal Cable	3.0	Unshielded	Unshielded	-
6	Signal Cable	3.0	Unshielded	Unshielded	-
7	Antenna Cable	2.7	Shielded	Shielded	-
8	GNSS Antenna Cable	3.0	Shielded	Shielded	-
9	Signal Cable	3.0	Unshielded	Unshielded	-
10	USB Cable	3.0	Shielded	Shielded	-
11	USB Cable	1.6	Shielded	Shielded	-
12	Speaker Cable	3.0	Unshielded	Unshielded	-
13	Speaker Cable	3.0	Unshielded	Unshielded	-
14	Speaker Cable	3.0	Unshielded	Unshielded	-
15	Speaker Cable	3.0	Unshielded	Unshielded	-

SECTION 5: Radiated Emission

5.1 Operating environment

Date	:	See data
Test place	:	See data
Temperature	:	See data
Humidity	:	See data
Test engineer	:	See data

5.2 Test configuration

EUT was placed on a urethane platform of nominal size, 1.0 m by 2.0 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 to 200 MHz (Biconical antenna) 200 MHz to 1000 MHz (Logperiodic antenna) 1000 MHz to 40000 MHz (Horn antenna)
Test distance	:	3 m
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)	Above 26.5 GHz *1)
Instrument used	Test Receiver	Test Receiver	Spectrum Analyzer
IF Bandwidth	QP: BW 120 kHz	PK: BW 1 MHz, CAV: BW 1 MHz	PK: RBW: 1 MHz / VBW: 3 MHz AV *2): RBW: 1 MHz / VBW: 10 Hz

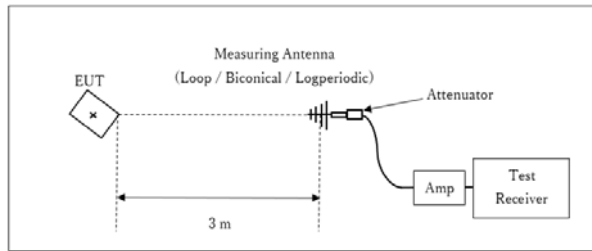
*1) The measurement data was adjusted to a 3 m distance using the following Distance Factor.

Distance Factor: See Figure 1.

2) When using Spectrum analyzer, the test was made with adjusting span to zero by using peak hold.

Figure 1: Test Setup

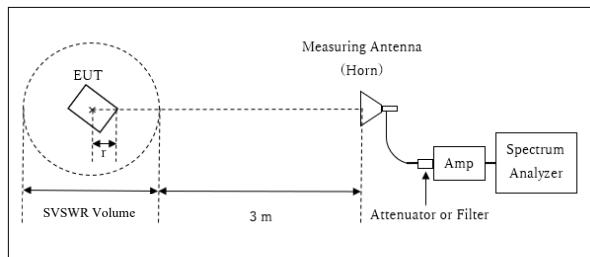
Below 1 GHz



x : Center of turn table

Test Distance: 3 m

1 GHz to 10 GHz



r : Radius of an outer periphery of EUT

x : Center of turn table

Distance Factor: $20 \times \log(3.0 \text{ m}^*/3.0 \text{ m}) = 0 \text{ dB}$

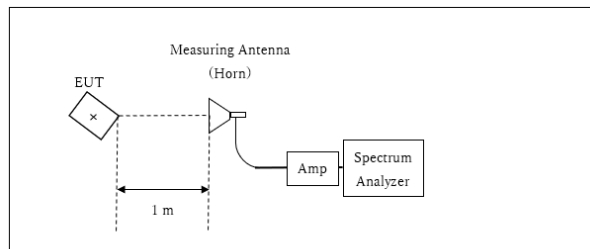
* Test Distance: $(3 + \text{SVSWR Volume} / 2) - r = 3.0 \text{ m}$

SVSWR Volume: 2 m

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

$r = 1.0 \text{ m}$

10 GHz to 40 GHz



x : Center of turn table

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

*Test Distance: 1 m

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

6.5 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.

SECTION 6: Antenna Terminal

6.1 Operating environment

Date : See data
Test place : See data
Temperature : See data
Humidity : See data
Test engineer : See data

6.2 Test configuration

EUT was placed on a urethane platform 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 - 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: 300 kHz	PK: RBW: 1 MHz / VBW: 3 MHz

*1) The Spectrum Analyzer was used in 6 dB resolution bandwidth.

6.5 Test result

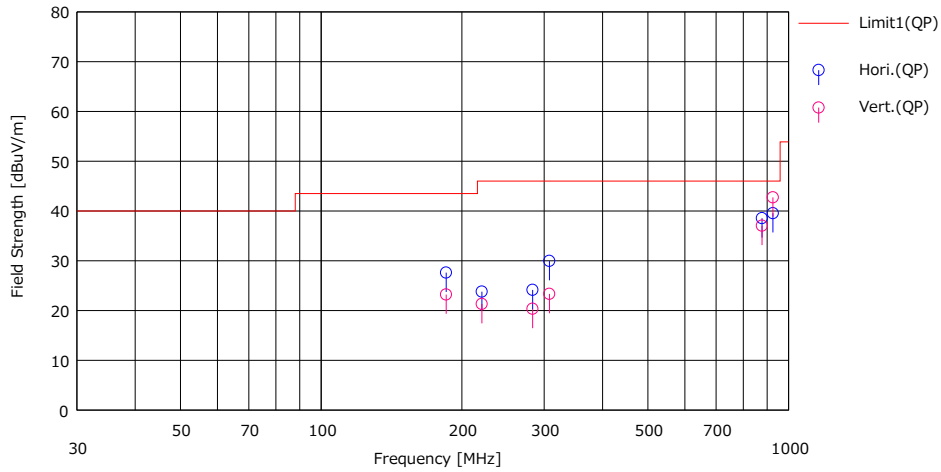
Summary of the test results: Pass

APPENDIX 1: Test data

Radiated Emission

Test place Ise EMC Lab.
Semi Anechoic Chamber No.2
Date October 13, 2022
Temperature / Humidity 23 deg. C / 50 % RH
Engineer Hiroyuki Furutaka
 (Below 1 GHz)
Mode Mode 1

Limit : FCC_Part 15 Subpart B(15.109)_Class B



No.	Freq. [MHz]	Reading	Ant.Fac [dB/m]	Loss [dB]	Gain [dB]	Result	Limit	Margin	Pola. [H/V]	Height [cm]	Angle [deg]	Ant. Type	Comment
		[dBuV]				[QP]	[QP]	[QP]					
1	1850.53	31.40	16.27	7.99	28.06	27.60	43.50	15.90	Hori.	100	275	BA	
2	2207.18	31.60	11.86	8.22	27.89	23.79	46.00	22.21	Hori.	100	272	LA21	
3	2834.93	29.30	13.96	8.60	27.73	24.13	46.00	21.87	Hori.	120	196	LA21	
4	3078.64	34.90	14.07	8.73	27.77	29.93	46.00	16.07	Hori.	100	285	LA21	
5	8774.86	34.20	22.09	11.12	28.89	38.52	46.00	7.48	Hori.	144	202	LA21	
6	9262.33	34.80	22.21	11.29	28.77	39.53	46.00	6.47	Hori.	100	244	LA21	
7	1850.53	27.00	16.27	7.99	28.06	23.20	43.50	20.30	Vert.	100	146	BA	
8	2207.18	29.10	11.86	8.22	27.89	21.29	46.00	24.71	Vert.	100	196	LA21	
9	2834.93	25.50	13.96	8.60	27.73	20.33	46.00	25.67	Vert.	100	295	LA21	
10	3078.64	28.30	14.07	8.73	27.77	23.33	46.00	22.67	Vert.	100	307	LA21	
11	8774.86	32.70	22.09	11.12	28.89	37.02	46.00	8.98	Vert.	100	222	LA21	
12	9262.33	38.00	22.21	11.29	28.77	42.73	46.00	3.27	Vert.	100	225	LA21	

CHART: WITH FACTOR

ANT TYPE: - 30 MHz: LOOP, 30 MHz - 200 MHz: BICONICAL, 200 MHz - 1000 MHz: LOGPERIODIC, 1000 MHz :-
HORN

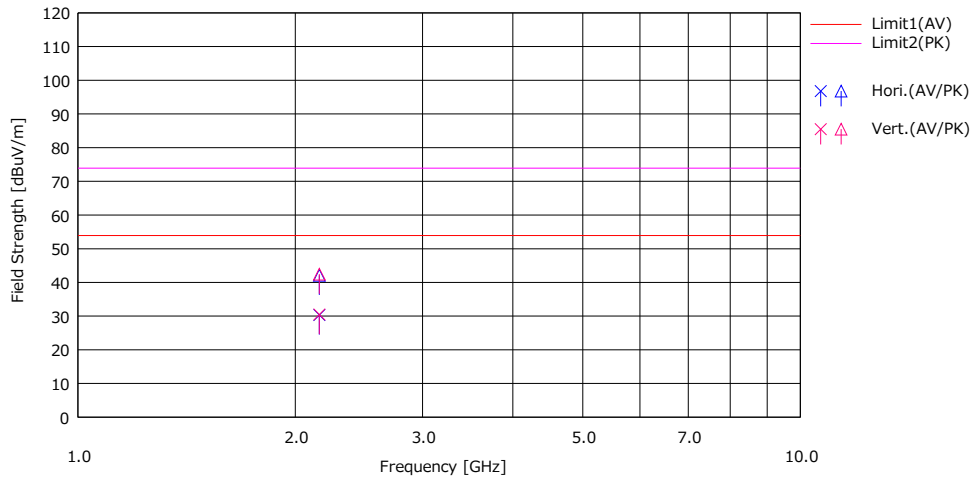
CALCULATION: RESULT = READING + ANT FACTOR + LOSS(CABLE + ATT) - GAIN(AMP)

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

Radiated Emission

Test place Ise EMC Lab.
Semi Anechoic Chamber No.3
Date October 14, 2022
Temperature / Humidity 23 deg. C / 51 % RH
Engineer Nachi Konegawa
 (Above 1 GHz)
Mode Mode 1

Limit : FCC_Part 15 Subpart B(15.109)_Class B



No.	Freq. [MHz]	Reading		Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result		Limit		Margin		Pola. [H/V]	Height [cm]	Angle [deg]	Ant. Type	Comment
		(AV) [dBuV]	(PK) [dBuV]				(AV) [dBuV/m]	(PK) [dBuV/m]	(AV) [dBuV/m]	(PK) [dBuV/m]	(AV) [dB]	(PK) [dB]					
1	2159.897	32.76	44.56	28.00	2.55	33.01	30.30	42.10	53.90	73.90	23.60	31.80	Hori.	100	171	H20	
2	2159.897	32.91	44.89	28.00	2.55	33.01	30.45	42.43	53.90	73.90	23.45	31.47	Vert.	100	6	H20	

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

Test place Ise EMC Lab.
Semi Anechoic Chamber No.4
Date April 24, 2023
Temperature / Humidity 21 deg. C / 44 % RH
Engineer Hiroki Numata
 (Below 1 GHz)
Mode Mode 2 (Local) 87.5 MHz

Limit : FCC_Part 15 Subpart B(15.109)_Class B

<< QP DATA >>

No.	Freq. [MHz]	Reading	Ant.Fac	Loss	Gain	Result	Limit	Margin	Pola	Height	Angle	Ant. Type	Comment
		(QP)				(QP)	(QP)	[dBuV/m]					
		[dBuV]	[dB/m]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	[H/V]	[cm]	[deg]		
1	87.796	33.50	8.20	7.77	32.06	17.41	40.00	22.59	Hori.	100	0	BA	
2	175.592	26.00	16.01	8.56	32.02	18.55	43.50	24.95	Hori.	100	0	BA	
3	263.387	26.10	12.49	9.34	32.01	15.92	46.00	30.08	Hori.	100	0	LA23	
4	351.183	23.80	15.18	9.92	32.06	16.84	46.00	29.16	Hori.	100	0	LA23	
5	438.979	24.20	16.39	10.41	32.14	18.86	46.00	27.14	Hori.	100	0	LA23	
6	526.775	26.70	17.79	10.95	32.20	23.24	46.00	22.76	Hori.	100	0	LA23	
7	614.570	27.10	19.50	11.37	32.25	25.72	46.00	20.28	Hori.	100	0	LA23	
8	702.366	23.80	19.94	11.66	32.28	23.12	46.00	22.88	Hori.	100	0	LA23	
9	790.162	23.70	20.71	11.97	31.76	24.62	46.00	21.38	Hori.	100	0	LA23	
10	877.958	23.90	22.03	12.29	31.25	26.97	46.00	19.03	Hori.	100	0	LA23	
11	965.753	24.30	22.16	12.67	30.73	28.40	53.90	25.50	Hori.	100	0	LA23	
12	87.796	34.30	8.20	7.77	32.06	18.21	40.00	21.79	Vert.	100	0	BA	
13	175.592	26.00	16.01	8.56	32.02	18.55	43.50	24.95	Vert.	100	0	BA	
14	263.387	21.20	12.49	9.34	32.01	11.02	46.00	34.98	Vert.	100	0	BA	
15	351.183	24.20	15.18	9.92	32.06	17.24	46.00	28.76	Vert.	100	0	BA	
16	438.979	24.50	16.39	10.41	32.14	19.16	46.00	26.84	Vert.	100	0	BA	
17	526.775	24.70	17.79	10.95	32.20	21.24	46.00	24.76	Vert.	100	0	BA	
18	614.570	25.00	19.50	11.37	32.25	23.62	46.00	22.38	Vert.	100	0	BA	
19	702.366	23.80	19.94	11.66	32.28	23.12	46.00	22.88	Vert.	100	0	BA	
20	790.162	25.20	20.71	11.97	31.76	26.12	46.00	19.88	Vert.	100	0	BA	
21	877.958	23.00	22.03	12.29	31.25	26.07	46.00	19.93	Vert.	100	0	BA	
22	965.753	20.30	22.16	12.67	30.73	24.40	53.90	29.50	Vert.	100	0	BA	

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

Test place Ise EMC Lab.
Semi Anechoic Chamber No.4
Date April 24, 2023
Temperature / Humidity 21 deg. C / 44 % RH
Engineer Hiroki Numata
 (Above 1 GHz)
Mode Mode 2 (Local) 87.5 MHz

Limit : FCC_Part 15 Subpart B(15.109)_Class B

<< AV/PK DATA >>

No.	Freq. [MHz]	Reading		Ant.Fac [dB/m]	Loss [dB]	Gain [dB]	Result		Limit		Margin		Pola. [H/V]	Height [cm]	Angle [deg]	Ant. Type	Comment
		(AV) [dBuV]	(PK) [dBuV]				(AV) [dBuV/m]	(PK) [dBuV/m]	(AV) [dBuV/m]	(PK) [dBuV/m]	(AV) [dB]	(PK) [dB]					
1	1053.549	35.50	49.00	24.31	1.96	34.73	27.04	40.54	53.90	73.90	26.86	33.36	Horiz.	100	0	H21	
2	1141.345	33.00	47.90	24.71	2.02	34.50	25.23	40.13	53.90	73.90	28.67	33.77	Horiz.	100	0	H21	
3	1229.141	31.40	44.20	25.16	2.08	34.27	24.37	37.17	53.90	73.90	29.53	36.73	Horiz.	100	0	H21	
4	1316.936	31.90	49.20	25.48	2.14	34.03	25.49	42.79	53.90	73.90	28.41	31.11	Horiz.	100	0	H21	
5	1053.549	34.60	47.90	24.31	1.96	34.73	26.14	39.44	53.90	73.90	27.76	34.46	Vert.	100	0	H21	
6	1141.345	32.20	46.60	24.71	2.02	34.50	24.43	38.83	53.90	73.90	29.47	35.07	Vert.	100	0	H21	
7	1229.141	31.90	46.40	25.16	2.08	34.27	24.87	39.37	53.90	73.90	29.03	34.53	Vert.	100	0	H21	
8	1316.936	32.90	51.90	25.48	2.14	34.03	26.49	45.49	53.90	73.90	27.41	28.41	Vert.	100	0	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

Test place Ise EMC Lab.
Semi Anechoic Chamber No.4
Date April 24, 2023
Temperature / Humidity 21 deg. C / 44 % RH
Engineer Hiroki Numata
 (Below 1 GHz)
Mode Mode 2 (Local) 98 MHz

Limit : FCC_Part 15 Subpart B(15.109)_Class B

<< QP DATA >>

No.	Freq. [MHz]	Reading	Ant Fac [dB/m]	Loss [dB]	Gain [dB]	Result	Limit	Moran	Pola. [H/V]	Height [cm]	Angle [deg]	Ant. Type	Comment
		(QP)				(QP)	(QP)	[dBuV/m]					
1	98.301	22.10	9.99	7.87	32.04	7.92	43.50	35.58	Hori.	100	0	BA	
2	196.602	21.10	16.45	8.74	32.01	14.28	43.50	29.22	Hori.	100	0	BA	
3	294.903	26.40	13.75	9.63	32.01	17.77	46.00	28.23	Hori.	100	0	LA23	
4	393.204	31.70	15.70	10.13	32.09	25.44	46.00	20.56	Hori.	100	0	LA23	
5	491.504	25.70	17.70	10.74	32.18	21.96	46.00	24.04	Hori.	100	0	LA23	
6	589.805	24.40	18.96	11.26	32.23	22.39	46.00	23.61	Hori.	100	0	LA23	
7	688.106	23.00	19.68	11.61	32.28	22.01	46.00	23.99	Hori.	100	0	LA23	
8	786.407	22.80	20.66	11.95	31.78	23.63	46.00	22.37	Hori.	100	0	LA23	
9	884.708	24.10	22.06	12.33	31.21	27.28	46.00	18.72	Hori.	100	0	LA23	
10	983.009	23.20	22.24	12.76	30.63	27.57	53.90	26.33	Hori.	100	0	LA23	
11	98.301	23.60	9.99	7.87	32.04	9.42	43.50	34.06	Vert.	100	0	BA	
12	196.602	20.60	16.45	8.74	32.01	13.78	43.50	29.72	Vert.	100	0	BA	
13	294.903	21.10	13.75	9.63	32.01	12.47	46.00	33.53	Vert.	100	0	LA23	
14	393.204	23.60	15.70	10.13	32.09	17.34	46.00	28.66	Vert.	100	0	LA23	
15	491.504	24.70	17.70	10.74	32.18	20.96	46.00	25.04	Vert.	100	0	LA23	
16	589.805	23.20	18.96	11.26	32.23	21.19	46.00	24.81	Vert.	100	0	LA23	
17	688.106	25.20	19.68	11.61	32.28	24.21	46.00	21.79	Vert.	100	0	LA23	
18	786.407	22.90	20.66	11.95	31.78	23.73	46.00	22.27	Vert.	100	0	LA23	
19	884.708	21.60	22.06	12.33	31.21	24.78	46.00	21.22	Vert.	100	0	LA23	
20	983.009	20.90	22.24	12.76	30.63	25.27	53.90	26.63	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

Test place Ise EMC Lab.
Semi Anechoic Chamber No.4
Date April 24, 2023
Temperature / Humidity 21 deg. C / 44 % RH
Engineer Hiroki Numata
 (Above 1 GHz)
Mode Mode 2 (Local) 98 MHz

Limit : FCC_Part 15 Subpart B(15.109)_Class B

<< AV/PK DATA >>

No.	Freq. [MHz]	Reading		Ant Fac [dB/m]	Loss [dB]	Gain [dB]	Result		Limit		Margin		Pda. [H/V]	Height [cm]	Angle [deg]	Ant. Type	Comment
		(AV) [dBuV]	(PK) [dBuV]				(AV) [dBuV/m]	(PK) [dBuV/m]	(AV) [dBuV/m]	(PK) [dBuV/m]	(AV) [dB]	(PK) [dB]					
		1	1081.310				33.80	47.50	24.42	1.98	34.66	25.54					
2	1179.610	32.00	45.70	24.86	2.05	34.40	24.51	38.21	53.90	73.90	29.39	35.69	Hori.	100	0	H21	
3	1277.911	33.20	52.20	25.43	2.11	34.14	26.60	45.60	53.90	73.90	27.30	28.30	Hori.	100	0	H21	
4	1376.212	31.20	44.80	25.54	2.18	33.88	25.04	38.64	53.90	73.90	28.86	35.26	Hori.	100	0	H21	
5	1474.513	30.10	44.20	25.19	2.25	33.62	23.92	38.02	53.90	73.90	29.98	35.88	Hori.	100	0	H21	
6	1081.310	35.10	50.30	24.42	1.98	34.66	26.84	42.04	53.90	73.90	27.06	31.86	Vert.	100	0	H21	
7	1179.610	31.70	45.90	24.86	2.05	34.40	24.21	38.41	53.90	73.90	29.69	35.49	Vert.	100	0	H21	
8	1277.911	34.30	54.80	25.43	2.11	34.14	27.70	48.20	53.90	73.90	26.20	25.70	Vert.	100	0	H21	
9	1376.212	31.20	44.70	25.54	2.18	33.88	25.04	38.54	53.90	73.90	28.86	35.36	Vert.	100	0	H21	
10	1474.513	30.30	46.40	25.19	2.25	33.62	24.12	40.22	53.90	73.90	29.78	33.68	Vert.	100	0	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

Test place Ise EMC Lab.
Semi Anechoic Chamber No.4
Date April 24, 2023
Temperature / Humidity 21 deg. C / 44 % RH
Engineer Hiroki Numata
 (Below 1 GHz)
Mode Mode 2 (Local) 108 MHz

Limit : FCC_Part 15 Subpart B(15.109)_Class B

<< QP DATA >>

No.	Freq. [MHz]	Reading	Ant.Fac [dB/m]	Loss [dB]	Gain [dB]	Result	Limit	Margin	Pol. [H/V]	Height [cm]	Angle [deg]	Ant. Type	Comment
		[QP]				[QP]	[QP]	[dBuV/m]					
1	107.703	19.70	11.40	7.96	32.04	7.02	43.50	36.48	Hor.	100	0	BA	
2	215.405	22.50	11.08	8.92	32.01	10.49	43.50	33.01	Hor.	100	0	LA23	
3	323.108	26.80	14.37	9.79	32.03	18.93	46.00	27.07	Hor.	100	0	LA23	
4	430.811	26.00	16.24	10.36	32.13	20.47	46.00	25.53	Hor.	100	0	LA23	
5	538.513	29.70	17.75	11.01	32.21	26.25	46.00	19.75	Hor.	100	0	LA23	
6	646.216	25.10	19.33	11.47	32.26	23.64	46.00	22.36	Hor.	100	0	LA23	
7	753.918	23.90	20.27	11.81	31.97	24.01	46.00	21.99	Hor.	100	0	LA23	
8	861.621	23.90	21.77	12.20	31.34	26.53	46.00	19.47	Hor.	100	0	LA23	
9	969.324	23.40	22.19	12.69	30.71	27.57	53.90	26.33	Hor.	100	0	LA23	
10	107.703	21.60	11.40	7.96	32.04	8.92	43.50	34.58	Vert.	100	0	BA	
11	215.405	22.00	11.08	8.92	32.01	9.99	43.50	33.51	Vert.	100	0	LA23	
12	323.108	21.80	14.37	9.79	32.03	13.93	46.00	32.07	Vert.	100	0	LA23	
13	430.811	24.90	16.24	10.36	32.13	19.37	46.00	26.63	Vert.	100	0	LA23	
14	538.513	24.40	17.75	11.01	32.21	20.95	46.00	25.05	Vert.	100	0	LA23	
15	646.216	23.50	19.33	11.47	32.26	22.04	46.00	23.96	Vert.	100	0	LA23	
16	753.918	23.70	20.27	11.81	31.97	23.81	46.00	22.19	Vert.	100	0	LA23	
17	861.621	23.00	21.77	12.20	31.34	25.63	46.00	20.37	Vert.	100	0	LA23	
18	969.324	23.90	22.19	12.69	30.71	28.07	53.90	25.83	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

Test place Ise EMC Lab.
Semi Anechoic Chamber No.4
Date April 24, 2023
Temperature / Humidity 21 deg. C / 44 % RH
Engineer Hiroki Numata
 (Above 1 GHz)
Mode Mode 2 (Local) 108 MHz

Limit : FCC_Part 15 Subpart B(15.109)_Class B

<< AV/PK DATA >>

No.	Freq. [MHz]	Reading		Ant.Fac [dB/m]	Loss [dB]	Gain [dB]	Result		Limit		Margin		Pda. [H/V]	Height [cm]	Angle [deg]	Ant. Type	Comment
		(AV) [dBuV]	(PK) [dBuV]				(AV) [dBuV/m]	(PK) [dBuV/m]	(AV) [dBuV/m]	(PK) [dBuV/m]	(AV) [dB]	(PK) [dB]					
1	1077.026	32.60	48.10	24.40	1.97	34.67	24.30	39.80	53.90	73.90	29.60	34.10	Hori.	100	0	H21	
2	1184.729	32.20	45.50	24.88	2.05	34.38	24.75	38.05	53.90	73.90	29.15	35.85	Hori.	100	0	H21	
3	1292.432	41.20	60.40	25.49	2.12	34.10	34.71	53.91	53.90	73.90	19.19	19.99	Hori.	100	0	H21	
4	1400.134	31.80	46.40	25.51	2.20	33.81	25.70	40.30	53.90	73.90	28.20	33.60	Hori.	100	0	H21	
5	1507.837	30.80	44.80	25.12	2.28	33.53	24.67	38.67	53.90	73.90	29.23	35.23	Hori.	100	0	H21	
6	1615.539	30.50	44.30	24.89	2.35	33.24	24.50	38.30	53.90	73.90	29.40	35.60	Hori.	100	0	H21	
7	1077.026	35.50	50.30	24.40	1.97	34.67	27.20	42.00	53.90	73.90	26.70	31.90	Vert.	100	0	H21	
8	1184.729	32.20	45.90	24.88	2.05	34.38	24.75	38.45	53.90	73.90	29.15	35.45	Vert.	100	0	H21	
9	1292.432	42.60	61.90	25.49	2.12	34.10	36.11	55.41	53.90	73.90	17.79	18.49	Vert.	100	0	H21	
10	1400.134	32.20	46.00	25.51	2.20	33.81	26.10	39.90	53.90	73.90	27.80	34.00	Vert.	100	0	H21	
11	1507.837	30.80	44.20	25.12	2.28	33.53	24.67	38.07	53.90	73.90	29.23	35.83	Vert.	100	0	H21	
12	1615.539	30.50	45.60	24.89	2.35	33.24	24.50	39.60	53.90	73.90	29.40	34.30	Vert.	100	0	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)

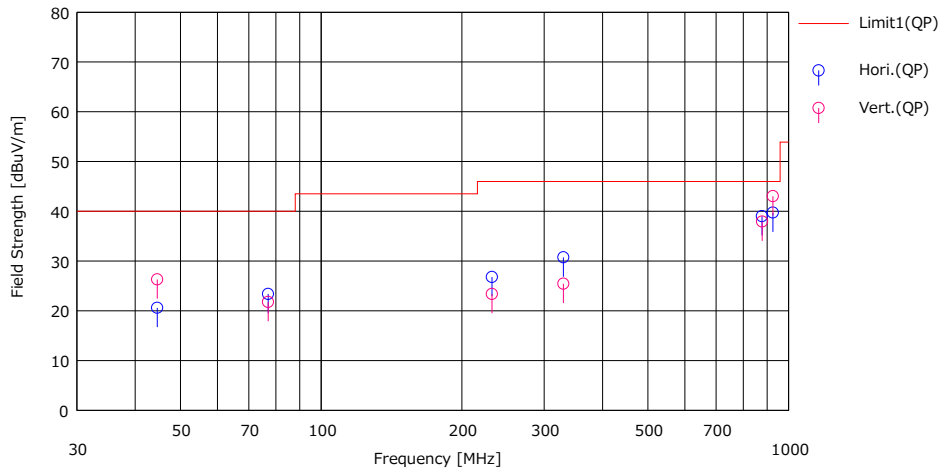
Except for the above table: adequate margin data below the limits.

* No signal was detected above 10 GHz.

Radiated Emission

Test place Ise EMC Lab.
Semi Anechoic Chamber No.2
Date October 13, 2022
Temperature / Humidity 23 deg. C / 50 % RH
Engineer Hiroyuki Furutaka
 (Below 1 GHz)
Mode Mode 2 (Other)

Limit : FCC_Part 15 Subpart B(15.109)_Class B



No.	Freq. [MHz]	Reading	Ant.Fac [dB/m]	Loss [dB]	Gain [dB]	Result	Limit	Margin	Pola. [H/V]	Height [cm]	Angle [deg]	Ant. Type	Comment
		[dBuV]				[dBuV/m]	[dBuV/m]	[dB]					
1	44.580	29.00	13.32	6.82	28.54	20.60	40.00	19.40	Hori.	243	230	BA	
2	77.001	38.10	6.59	7.16	28.47	23.38	40.00	16.62	Hori.	218	273	BA	
3	231.983	34.20	12.12	8.30	27.84	26.78	46.00	19.22	Hori.	146	87	LA21	
4	330.000	34.70	15.09	8.86	27.91	30.74	46.00	15.26	Hori.	100	223	LA21	
5	877.482	34.70	22.09	11.12	28.89	39.02	46.00	6.98	Hori.	145	203	LA21	
6	9262.33	35.00	22.21	11.29	28.77	39.73	46.00	6.27	Hori.	100	242	LA21	
7	44.580	34.70	13.32	6.82	28.54	26.30	40.00	13.70	Vert.	100	302	BA	
8	77.001	36.50	6.59	7.16	28.47	21.78	40.00	18.22	Vert.	100	237	BA	
9	231.983	30.80	12.12	8.30	27.84	23.38	46.00	22.62	Vert.	100	165	LA21	
10	330.000	29.40	15.09	8.86	27.91	25.44	46.00	20.56	Vert.	100	336	LA21	
11	8783.72	33.60	22.09	11.13	28.89	37.93	46.00	8.07	Vert.	100	203	LA21	
12	9262.33	38.30	22.21	11.29	28.77	43.03	46.00	2.97	Vert.	100	227	LA21	

CHART: WITH FACTOR

ANT TYPE: - 30 MHz: LOOP, 30 MHz - 200 MHz: BICONICAL, 200 MHz - 1000 MHz: LOGPERIODIC, 1000 MHz :-
HORN

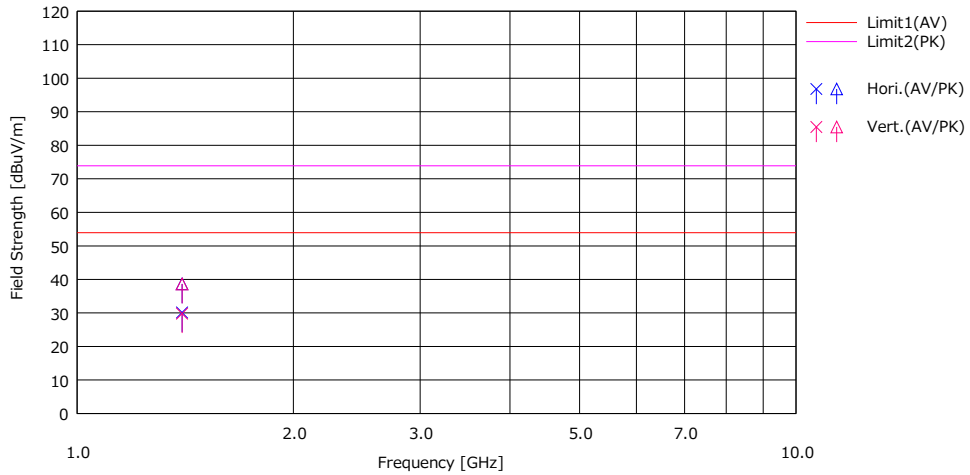
CALCULATION: RESULT = READING + ANT FACTOR + LOSS(CABLE + ATT) - GAIN(AMP)

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

Radiated Emission

Test place Ise EMC Lab.
Semi Anechoic Chamber No.3
Date October 14, 2022
Temperature / Humidity 23 deg. C / 51 % RH
Engineer Nachi Konegawa
 (Above 1 GHz)
Mode Mode 2 (Other)

Limit : FCC_Part 15 Subpart B(15.109)_Class B



No.	Freq. [MHz]	Reading		Ant.Fac [dB/m]	Loss [dB]	Gain [dB]	Result		Limit		Margin		Pola [H/V]	Height [cm]	Angle [deg]	Ant. Type	Comment
		(AV) [dBuV]	(PK) [dBuV]				(AV) [dBuV/m]	(PK) [dBuV/m]	(AV) [dBuV/m]	(PK) [dBuV/m]	(AV) [dB]	(PK) [dB]					
1	1400.027	36.91	45.44	25.76	2.02	34.54	30.15	38.68	53.90	73.90	23.75	35.22	Hori.	100	304	H20	
2	1400.027	36.56	45.41	25.76	2.02	34.54	29.80	38.65	53.90	73.90	24.10	35.25	Vert.	100	4	H20	

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)

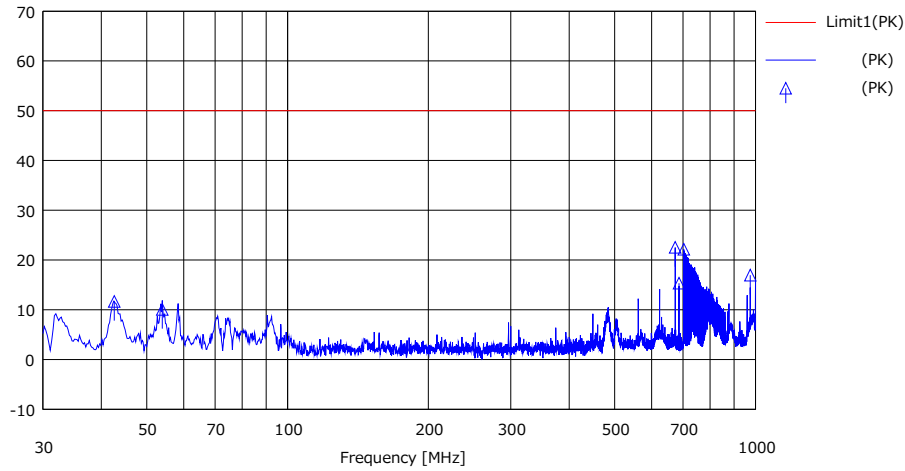
Except for the above table: adequate margin data below the limits.

* No signal was detected above 10 GHz.

Antenna Terminal Conducted Emission

Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.7
Date	October 11, 2022
Temperature / Humidity	22 deg. C / 41 % RH
Engineer	Hiroyuki Furutaka
Mode	Mode 3

Limit : FCC15.111 Antenna terminal measurement



No.	Freq. [MHz]	Reading	Ant.Fac [dB/m]	Loss [dB]	Gain [dB]	Result	Limit *1)	Margin	Pola. [H/V]	Ant. Type	Comment
		(PK) [dBuV]				(PK) [dBuV]	(PK) [dB]				
1	42.624	37.70	0.00	6.06	32.09	11.67	50.00	38.3			
2	53.998	36.10	0.00	6.07	32.09	10.08	50.00	39.9			
3	673.918	48.70	0.00	6.25	32.42	22.53	50.00	27.4			
4	686.395	41.50	0.00	6.25	32.41	15.34	50.00	34.6			
5	702.609	48.30	0.00	6.25	32.38	22.17	50.00	27.8			Local 875MHz Receiving
6	975.000	41.50	0.00	6.30	30.84	16.96	50.00	33.0			

*1) 2 nW = -57 dBm = 50 dBuV

CHART: WITH FACTOR

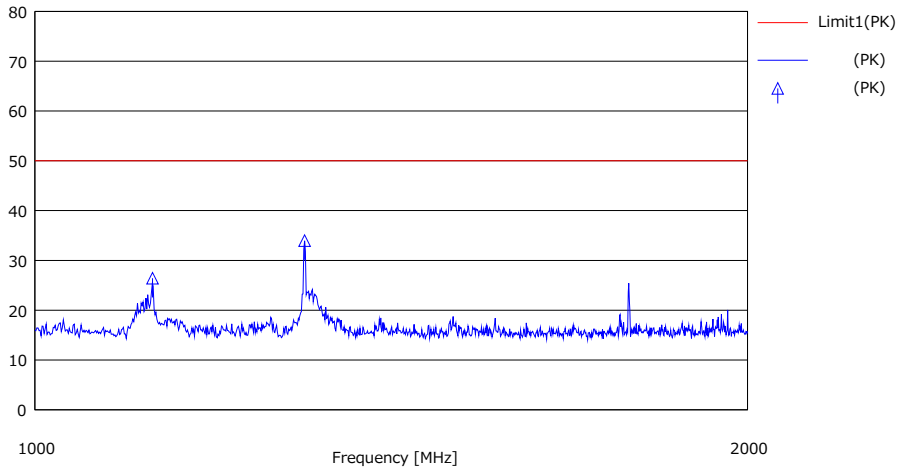
CALCULATION: RESULT = READING + LOSS (CABLE + Matching Pad) – GAIN (AMP)

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

Antenna Terminal Conducted Emission

Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.7
Date	October 11, 2022
Temperature / Humidity	22 deg. C / 41 % RH
Engineer	Hiroyuki Furutaka
Mode	Mode 3

Limit : FCC15.111 Antenna terminal measurement



No.	Freq. [MHz]	Reading	Ant.Fac [dB/m]	Loss [dB]	Gain [dB]	Result	Limit *1)	Margn	Pola. [H/V]	Ant. Type	Comment
		(PK) [dBuV]				(PK) [dBuV]	(PK) [dB]				
1	1121.255	55.30	0.00	6.32	35.21	26.41	50.00	23.5			
2	1299.995	62.40	0.00	6.34	34.78	33.96	50.00	16.0			

*1) 2 nW = -57 dBm = 50 dBuV

CHART: WITH FACTOR

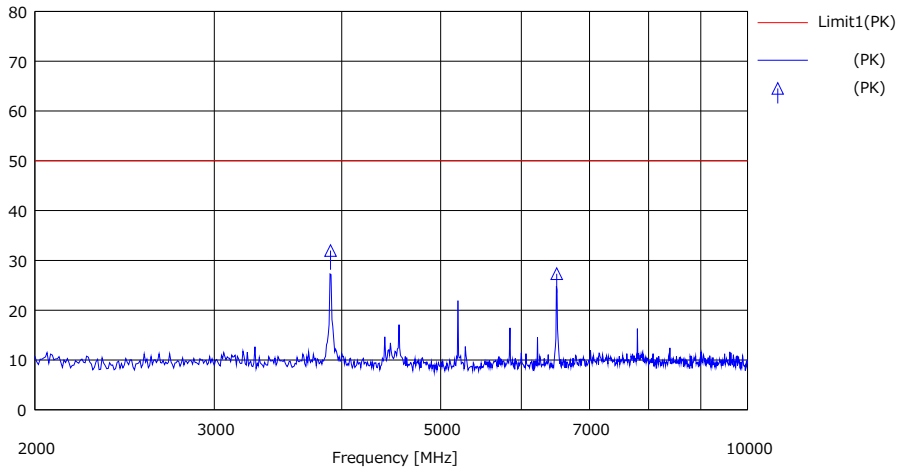
CALCULATION: RESULT = READING + LOSS (CABLE + Matching Pad) – GAIN (AMP)

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

Antenna Terminal Conducted Emission

Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.7
Date	October 11, 2022
Temperature / Humidity	22 deg. C / 41 % RH
Engineer	Hiroyuki Furutaka
Mode	Mode 3

Limit : FCC15.111 Antenna terminal measurement



No.	Freq. [MHz]	Reading	Ant.Fac [dB/m]	Loss [dB]	Gain [dB]	Result	Limit *1)	Margn	Pola. [H/V]	Ant. Type	Comment
		(PK) [dBuV]				(PK) [dBuV]	(PK) [dB]				
1	3899.630	63.90	0.00	0.34	32.26	31.98	50.00	18.0			
2	6500.070	59.20	0.00	0.45	32.33	27.32	50.00	22.6			

*1) 2 nW = -57 dBm = 50 dBuV

CHART: WITH FACTOR

CALCULATION: RESULT = READING + LOSS (CABLE) – GAIN (AMP)

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

* No signal was detected above 10 GHz.

APPENDIX 2: Test instruments

Test equipment (Test on October 11 to 14, 2022)

Test Item	Local ID	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Cal Int
RE	COTS-MEMI-02	178648	EMI measurement program	TSJ (Techno Science Japan)	TEPTO-DV	-	-	-
RE	MAEC-02	142004	AC2_Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-06902	05/30/2022	24
RE	MAEC-03	142008	AC3_Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-10005	05/23/2022	24
RE	MAEC-03-SVSWR	142013	AC3_Semi Anechoic Chamber(SVSWR)	TDK	Semi Anechoic Chamber 3m	DA-10005	04/01/2021	24
RE	MAT-112	220646	Attenuator	Huber+Suhner	6806 N-50-1	-	06/07/2022	12
RE	MBA-08	141427	Biconical Antenna	Schwarzbeck Mess-Elektronik OHG	VHA9103B+BBA9106	08031	07/30/2022	12
RE	MCC-12	141317	Coaxial Cable	UL Japan	-	-	09/27/2022	12
RE	MCC-231	177964	Microwave Cable	Junkosha INC.	MMX221	1901S329(1m)/ 1902S579(5m)	03/15/2022	12
RE	MCC-54	141325	Microwave Cable	Suhner	SUCOFLEX101	2873(1m) / 2876(5m)	03/17/2022	12
RE	MHA-16	141513	Horn Antenna 15-40GHz	Schwarzbeck Mess-Elektronik OHG	BBHA9170	BBHA9170306	07/05/2022	12
RE	MHA-20	141507	Horn Antenna 1-18GHz	Schwarzbeck Mess-Elektronik OHG	BBHA9120D	258	11/09/2021	12
RE	MJM-16	142183	Measure	KOMELON	KMC-36	-	10/03/2022	12
RE	MJM-27	142228	Measure	KOMELON	KMC-36	-	-	-
RE	MLA-21	141265	Logperiodic Antenna (200-1000MHz)	Schwarzbeck Mess-Elektronik OHG	VUSLP9111B	9111B-190	07/30/2022	12
RE	MMM-01	141542	Digital Tester	Fluke Corporation	FLUKE 26-3	78030611	08/12/2022	12
RE	MMM-08	141532	DIGITAL HiTESTER	HIOKI E.E. CORPORATION	3805	51201197	01/16/2022	12
RE	MOS-13	141554	Thermo-Hygrometer	CUSTOM. Inc	CTH-201	1301	01/10/2022	12
RE	MOS-41	192300	Thermo-Hygrometer	CUSTOM. Inc	CTH-201	0013	12/19/2021	12
RE	MPA-11	141580	MicroWave System Amplifier	Keysight Technologies Inc	83017A	MY39500779	03/17/2022	12
RE	MPA-22	141588	Pre Amplifier	MITEQ, Inc	AMF-6F-2600400-33-8P / AMF-4F-2600400-33-8P	1871355 /1871328	09/29/2022	12
RE	MPA-24	141594	Pre Amplifier	Keysight Technologies Inc	8447D	2944A10150	02/25/2022	12
RE	MSA-10	141899	Spectrum Analyzer	Keysight Technologies Inc	E4448A	MY46180655	02/18/2022	12
RE	MTR-03	141942	Test Receiver	Rohde & Schwarz	ESCI	100300	07/29/2022	12
RE	MTR-10	141951	EMI Test Receiver	Rohde & Schwarz	ESR26	101408	07/25/2022	12
AT	COTS-MEMI-02	178648	EMI measurement program	TSJ (Techno Science Japan)	TEPTO-DV	-	-	-
AT	MCC-176	141279	Microwave Cable	Junkosha	MMX221- 00500DMSDMS	1502S303	03/15/2022	12
AT	MCC-54	141325	Microwave Cable	Suhner	SUCOFLEX101	2873(1m) / 2876(5m)	03/17/2022	12
AT	MJM-04	142178	Measure	PROMART	SEN1635	-	-	-
AT	MMM-16	141360	DIGITAL HiTESTER	HIOKI E.E. CORPORATION	3805	70900532	01/16/2022	12
AT	MMP-01	141550	Matching Pad Anritsu	Anritsu Corporation	MB-009	40063	07/28/2022	12
AT	MOS-34	141572	Thermo-Hygrometer	CUSTOM. Inc	CTH-201	3401	01/10/2022	12
AT	MPA-11	141580	MicroWave System Amplifier	Keysight Technologies Inc	83017A	MY39500779	03/17/2022	12
AT	MPA-14	141583	Pre Amplifier	SONOMA INSTRUMENT	310	260833	04/04/2022	12
AT	MPA-22	141588	Pre Amplifier	MITEQ, Inc	AMF-6F-2600400-33-8P / AMF-4F-2600400-33-8P	1871355 /1871328	09/29/2022	12
AT	MSA-16	141903	Spectrum Analyzer	Keysight Technologies Inc	E4440A	MY46186390	01/07/2022	12
AT	MSA-20	212970	Signal Analyzer	Keysight Technologies Inc	N9030B	MY61330357	12/22/2021	12

Test equipment (Test on April 25, 2023)

Test Item	Local ID	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Cal Int
RE	COTS-MEMI-02	178648	EMI measurement program	TSJ (Techno Science Japan)	TEPTO-DV	-	-	-
RE	MAEC-04	142011	AC4 Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-10005	05/22/2022	24
RE	MAEC-04-SVSWR	142017	AC4 Semi Anechoic Chamber(SVSWR)	TDK	Semi Anechoic Chamber 3m	DA-10005	04/12/2021	24
RE	MAT-34	141331	Attenuator(6dB)	TME	UFA-01	-	02/01/2023	12
RE	MBA-05	141425	Biconical Antenna	Schwarzbeck Mess-Elektronik OHG	VHA9103 +BBA9106	VHA 91031302	08/26/2022	12
RE	MCC-218	141394	Microwave Cable	Junkosha	MWX221	1607S141(1 m) / 1608S264(5 m)	09/12/2022	12
RE	MCC-224	160324	Coaxial Cable	Huber+Suhner	SUCOFLEX 102A	MY009/2A	10/19/2022	12
RE	MCC-50	141397	Coaxial Cable	UL Japan	-	-	11/18/2022	12
RE	MHA-17	141506	Horn Antenna 15-40GHz	Schwarzbeck Mess-Elektronik OHG	BBHA9170	BBHA9170307	07/22/2022	12
RE	MHA-21	141508	Horn Antenna 1-18GHz	Schwarzbeck Mess-Elektronik OHG	BBHA9120D	557	05/20/2022	12
RE	MHA-29	141517	Horn Antenna 26.5-40GHz	ETS-Lindgren	3160-10	152399	11/14/2022	12
RE	MJM-29	142230	Measure, Tape, Steel	KOMELON	KMC-36	-	-	-
RE	MLA-23	141267	Logperiodic Antenna (200-1000MHz)	Schwarzbeck Mess-Elektronik OHG	VUSLP9111B	9111B-192	09/21/2022	12
RE	MMM-10	141545	DIGITAL HiTESTER	HIOKI E.E. CORPORATION	3805	51201148	01/18/2023	12
RE	MOS-15	141562	Thermo-Hygrometer	CUSTOM. Inc	CTH-201	0010	01/13/2023	12
RE	MPA-12	141581	MicroWave System Amplifier	Keysight Technologies Inc	83017A	00650	10/05/2022	12
RE	MPA-14	141583	Pre Amplifier	SONOMA INSTRUMENT	310	260833	04/05/2023	12
RE	MPA-22	141588	Pre Amplifier	L3 Narda-MITEQ	AMF-6F-2600400-33-8P / AMF-4F-2600400-33-8P	1871355 / 1871328	01/24/2023	12
RE	MTR-10	141951	EMI Test Receiver	Rohde & Schwarz	ESR26	101408	07/25/2022	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