



EMI TEST REPORT

Test Report No. : 13648806Y-R1

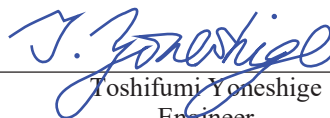
Applicant: DENSO CORPORATION
Type of EUT: Navigation ECU
Model Number of EUT: DNNS082-02
FCC ID: HYQDNNS134
Test regulation: FCC Part 15 Subpart B:2021
Test result: Complied (Refer to Section 3.2)

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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 aboveregulation.
4. The test results in this test report are traceable to the national or international standards.
5. This test report covers EMC technical requirements. It does not cover administrative issues such as Manual or non-EMC test related Requirements. (if applicable)
6. The all test items in this test report are conducted by UL Japan, Inc. Yokowa EMC Lab.
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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 13648806Y. 13648806Y is replaced with this report.

Date of test:

January 20 to 26, 2021

**Representative
test engineer:**



Toshifumi Yoneshige
Engineer
Consumer Technology Division

Approved by:



Daigo Hamaguchi
Leader
Consumer Technology Division



- ☐ 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.: 13648806Y

Revision	Test report No.	Date	Page revised	Contents
- (Original)	13648806Y	February 25, 2021	-	-
1	13648806Y-R1	March 8, 2021	P.10, 11	Addition of Item F' and Cable 5'

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Reference: Abbreviations (Including words undescribed in this report)

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

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Section 1: Customer information

Company Name : DENSO CORPORATION
Address : 1-1 Showa-cho, Kariya-shi, Aichi-ken, 448-8661 Japan
Telephone Number : +81-566-55-8528

The information provided from the customer is as follows:

- Applicant, Type of EUT, Model Number of EUT on the cover page 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 3: Test specification, procedures and results
 - Section 4: Operation of EUT during testing
- * The laboratory is exempted from liability of any test results affected from the information in Section 2 and 4.

Section 2: Equipment under test (EUT)

2.1 Identification of EUT

Type : Navigation ECU
Model Number : DNNS082-02
Serial Number : Refer to Clause 4.2
Rating : DC 12 V
Country of Mass-production : Japan
Condition : Production prototype
(Not for Sale: This sample is equivalent to mass-produced items.)
Size : 272.23 x 191.4 x 313.25 (Width x Depth x Height (mm))
Modification : No modification by the test lab.
Receipt Date : January 19, 2021

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2.2 Product description

Model: DNNS082-02 (referred to as the EUT in this report) is a Navigation ECU.
The clock frequencies used in the EUT: 533 MHz, 26 MHz
FM Lo 1st 2816 MHz to 3462.4 MHz

Radio Specification

Bluetooth (Version 3.0 + EDR)

Radio Type : Transceiver
Frequency of Operation : 2402 MHz - 2480 MHz
Modulation : FHSS (GFSK, $\pi/4$ DQPSK, 8DPSK)
Antenna type : METAL PLATE Antenna

GNSS

Radio Type : Receiver
Frequency of Operation : See table below.
Antenna type : External Antenna

Supported GNSS and GNSS signals

GNSS	RNSS Frequency Band / Frequency [MHz]		
	1559 to 1610	1215 to 1300	1164 to 1215
BDS	☐ B1I 1561.098	-	-
Galileo	☐ E1 1575.42	☐ E6 1278.75	☐ E5a 1176.45
			☐ E5b 1207.14
GLONASS	☐ G1 1598.0625 - 1605.375	☐ G2 1242.9375 - 1248.625	-
GPS	☒ L1 1575.42	☐ L2 1227.6	☐ L5 1176.45
SBAS	☐ L1 1575.42	-	☐ L5 1176.45

☒ Supported GNSS signal

☐ Not supported GNSS signal

Radio Tuner

Type of radio	FM	AM
Equipment Type	Receiver	
Frequency of Operation	87.7 MHz - 107.9 MHz	530 kHz - 1710 kHz
Type of Modulation	FM	AM
Antenna Connector Type	HFC III 2P + 0.64 type 1P	HFC III 2P + 0.64 type 1P
Impedance	75 ohm	75 ohm

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Section 3: Test specification, procedures and 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

* The revision does not affect the test result conducted before its effective date.

3.2 Procedures & 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	Part 15 Subpart B 15.107(a)	N/A	N/A	N/A	*1)
Radiated emission	ANSI C63.4: 2014 + C63.4a: 2017 8. Radiated emission measurements	Part 15 Subpart B 15.109(a)	N/A	0.21dB (225.001MHz, Horizontal, Mode: 1.FM Reception (Main))	Complied# a)	-
Antenna Terminal	ANSI C63.4: 2014 + C63.4a: 2017 12. Measurement of unintentional radiators other than ITE	Part 15 Subpart B 15.111(a)	N/A	3.8 dB (1331.667 MHz, Mode: 1.FM Reception (Sub))	Complied# b)	-
*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. Note: UL Japan's EMI Work Procedures No. 13-EM-W0420 a) Refer to Appendix 2 (data of Radiated disturbance) b) Refer to Appendix 2 (data of Antenna Terminal) 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 Confirmation

UL Japan, Inc. hereby confirms that EUT, in the configuration tested, complies with the specifications FCC Part 15 Subpart B:2021.

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3.5 Uncertainty

EMI

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 $k = 2$.

		Open area test site			Shielded room				Ucisp (±)
		No.1	No.2	No.3	No.1	No.2	No.3	No.7	
		(±)	(±)	(±)	(±)	(±)	(±)	(±)	
Conducted disturbance									
LISN (AMN)	9 kHz - 150 kHz	3.8 dB							3.8 dB
	150 kHz - 30 MHz	3.4 dB							3.4 dB
ISN (LCL= 55 dB - 40 dB)	150 kHz - 30 MHz	4.2 dB							5.0 dB
ISN (LCL= 65 dB - 50 dB)	150 kHz - 30 MHz	4.6 dB							5.0 dB
ISN (LCL= 75 dB - 60 dB)	150 kHz - 30 MHz	5.0 dB							5.0 dB
ISN (Screened)	150 kHz - 30 MHz	3.4 dB							5.0 dB
ISN (75 ohm)	150 kHz - 30 MHz	3.4 dB							5.0 dB
Current probe	150 kHz - 30 MHz	2.8 dB							2.9 dB
Capacitive Voltage Probe	150 kHz - 30 MHz	3.8 dB							3.9 dB
Voltage probe	150 kHz - 30 MHz	2.9 dB							2.9 dB
Radiated disturbance									
3 m	9 kHz - 30 MHz	3.7 dB	3.5 dB	3.6 dB	-	-	-	-	Not Defined
	30 MHz - 200 MHz (Horizontal)	4.5 dB	4.7 dB	4.7 dB	-	-	-	-	6.3 dB
	30 MHz - 200 MHz (Vertical)	4.6 dB	4.9 dB	4.9 dB	-	-	-	-	6.3 dB
	200 MHz - 1000 MHz (Horizontal)	4.9 dB	5.2 dB	5.2 dB	-	-	-	-	6.3 dB
	200 MHz - 1000 MHz (Vertical)	6.0 dB	6.2 dB	6.2 dB	-	-	-	-	6.3 dB
	1 GHz - 6 GHz	5.0 dB			-	-	-	-	5.2 dB
	6 GHz - 18 GHz	5.2 dB			-	-	-	-	5.5 dB
10 m	9 kHz - 30 MHz	3.3 dB	3.4 dB	3.4 dB	-	-	-	-	Not Defined
	30 MHz - 200 MHz (Horizontal)	4.5 dB	4.7 dB	4.7 dB	-	-	-	-	6.3 dB
	30 MHz - 200 MHz (Vertical)	4.5 dB	4.7 dB	4.7 dB	-	-	-	-	6.3 dB
	200 MHz - 1000 MHz (Horizontal)	4.7 dB	4.9 dB	4.9 dB	-	-	-	-	6.3 dB
	200 MHz - 1000 MHz (Vertical)	4.7 dB	4.9 dB	4.9 dB	-	-	-	-	6.3 dB
	1 GHz - 18 GHz	5.2 dB			-	-	-	-	Not Defined
Antenna terminal voltage									
	30 MHz - 1000 MHz	3.8 dB							Not Defined
	1 GHz - 2.15 GHz	3.8 dB							Not Defined
Disturbance power									
	30 MHz - 300 MHz	3.6 dB							4.5 dB

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3.6 Test Location

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FCC Test Firm Registration Number: 788329

	Width x Depth x Height (m)	Size of reference ground plane (m) / horizontal conducting plane	Other rooms
No.1 open area test site	-	40 x 20	-
No.2 open area test site	-	20 x 18	-
No.3 open area test site	-	20 x 18	-
No.1 shielded room	5.5 x 6.4 x 2.7	5.5 x 6.4	-
No.2 shielded room	4.5 x 3.6 x 2.7	4.5 x 3.6	-
No.3 shielded room	3.6 x 7.2 x 2.4	3.6 x 7.2	-
No.4 shielded room	5.5 x 5.0 x 2.4	4.35 x 3.35	-
No.5 shielded room	5.5 x 4.3 x 2.5	5.54 x 3.0	-
No.6 shielded room	5.2 x 3.2 x 2.9	5.2 x 3.2	-
No.7 shielded room	9.3 x 3.4 x 2.7	9.3 x 3.4	-
No.1 EMS lab. (Full-anechoic chamber)	5.0 x 8.0 x 3.5	-	-
No.2 EMS lab. (Full-anechoic chamber)	4.0 x 7.0 x 3.5	-	-

3.7 Test setup, Data of EMI & Test instruments

Refer to Appendix 1 to 3.

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Section 4: Operation of EUT during testing

4.1 Operating modes

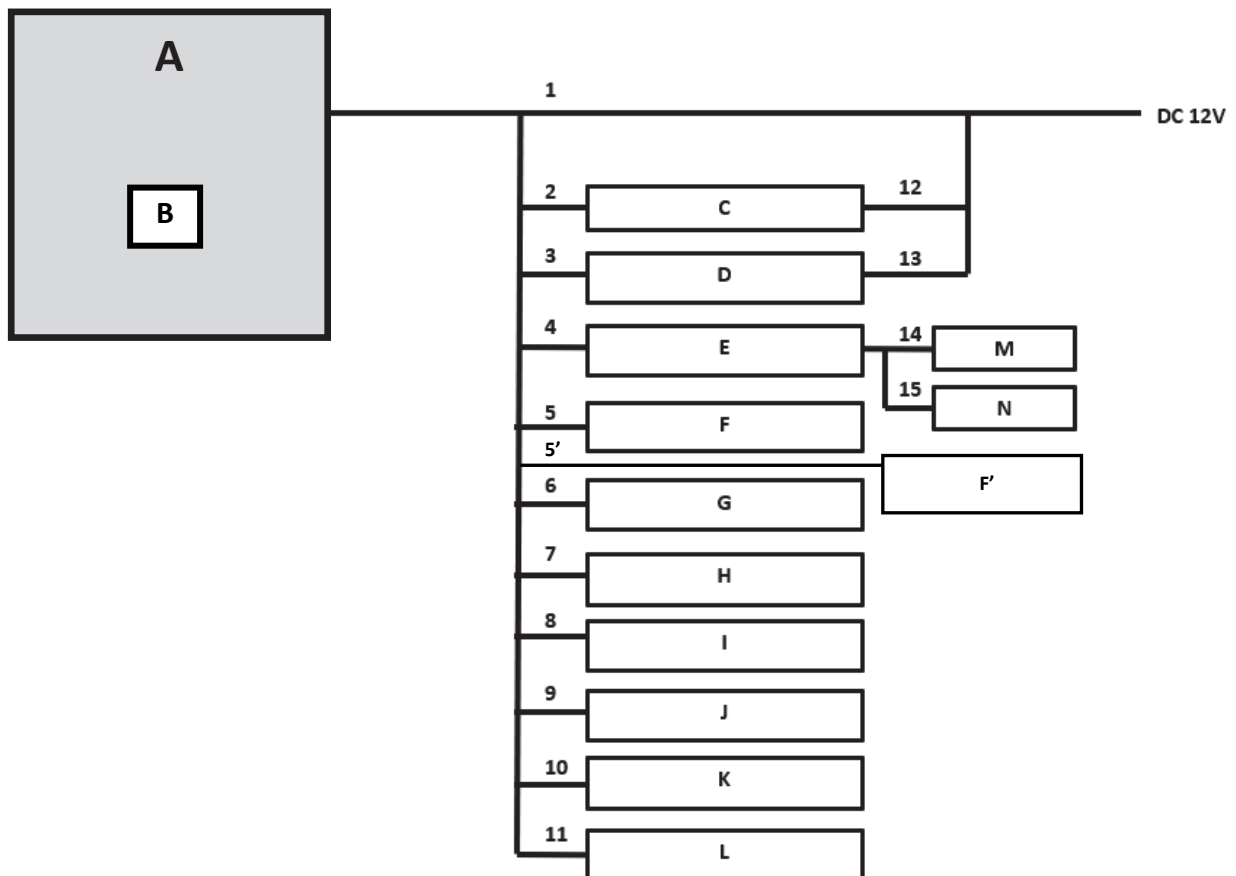
The EUT exercise program used during testing was designed to exercise the various system components in a manner similar to typical use.

Test sequence is used: 1. FM Reception (Main / Sub)

Software Version (Navigation ECU) : R10A8300

Justification: The system was configured in typical fashion (as a customer would normally use it) for testing.

4.2 Configuration and peripherals



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

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Description of EUT and Support equipment

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	Navigation ECU	DNNS082-02	468147003067329	DENSO CORPORATION	EUT
B	Micro SD	-	-	-	-
C	Extension Box	GEX-0128	NEGE077316US	PIONEER Corporation	-
D	Air Conditioner ECU	88650-47510	277400-0851	DENSO CORPORATION	-
E	USB Audio Box	-	-	DENSO CORPORATION	-
F	Speaker	KSC-01X	30500543	KENWOOD	-
F'	Speaker	KSC-01X	40700528	KENWOOD	-
G	Back Camera	GP-K-D33-D15R	58B00651	-	-
H	Steering SW	-	-	-	-
I	Microphone	-	-	-	-
J	FM Antenna	-	-	-	-
K	GPS Antenna	-	06080005	-	-
L	Amplifier	86280-48260	N0.6	JBL	-
M	Smart Phone	SC-04D	R2EBB51195E	Samsung	-
N	Reversible Connector	ADR-ML1155V	4100180	SANWA SUPPLY	-

List of cables used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	DC Cable	3.5	Unshielded	Unshielded	-
2	Signal Cable	2.9	Unshielded	Unshielded	-
3	Signal Cable	3.5	Unshielded	Unshielded	-
4	USB Cable	3.5	Shielded	Shielded	-
5	Signal Cable	2.9	Unshielded	Unshielded	-
5'	Signal Cable	2.9	Unshielded	Unshielded	-
6	Signal Cable	3.2	Unshielded	Unshielded	-
7	Signal Cable	3.2	Unshielded	Unshielded	-
8	Signal Cable	9.2	Unshielded	Unshielded	-
9	Antenna Cable	4.5	Shielded	Shielded	-
10	Signal Cable	5.6	Unshielded	Unshielded	-
11	Signal Cable	2.9	Unshielded	Unshielded	-
12	DC Cable	2.9	Unshielded	Unshielded	-
13	DC Cable	2.9	Unshielded	Unshielded	-
14	Audio Cable	1.5	Shielded	Shielded	-
15	USB Cable	0.1	Shielded	Shielded	-

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Section 5: Radiated emission

5.1 Operating environment

This test was carried out in open area test site.

Temperature : See data

Humidity : See data

5.2 Test configuration

EUT was placed on a table which consisted by polystyrene foam, polypropylene foam and polycarbonate of nominal size, 1 m by 1.5 m, raised 0.8 m above the conducting ground plane.

The rear of EUT and its peripherals was aligned and flushed with rear of tabletop.

I/O cables that were connected to the peripherals were bundled in center. They were folded back and forth forming a bundle and were hanged 0.4 m height to the ground plane. The measurements were performed for vertical or horizontal antenna polarization or both as necessary. 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 1.

5.3 Test conditions

Frequency range : 30 MHz - 18000 MHz

Test distance : 3 m

EUT position : Table top

5.4 Test procedure

<Below 1 GHz>

The Radiated Electric Field Strength intensity has been measured on open area test site with a ground plane at a distance of 3 m*

* Measuring distance

The boundary of the EUT is defined by an imaginary circular periphery.

Pre check measurements were performed in a screened room with a search coil at 30 MHz-1000 MHz to distinguish disturbances of EUT from the ambient noise

Measurements were performed with a quasi-peak detector.

The measuring antenna height was varied between 1 m and 4 m and EUT was rotated a full revolution in order to obtain the maximum value of the electric field intensity.

The measurements were performed for vertical or horizontal antenna polarization or both as necessary.

<Above 1 GHz>

The Radiated Electric Field Strength intensity has been measured on open area test site with a ground plane. The distance is shown in Appendix 2.

Pre check measurements were performed in a screened room with a horn antenna at 1000 MHz - 18000 MHz to distinguish disturbances of EUT from the ambient noise.

Measurements were performed with a peak detector and an average detector.

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.

EUT was rotated a full revolution in order to obtain the maximum value of the electric field intensity.

The measurements were performed for vertical or horizontal antenna polarization or both as necessary.

The radiated emission measurements were made with the following detector function.

Frequency	: 30 MHz - 1000 MHz	1000 MHz - 18000 MHz *1)
Instrument used	: Test Receiver	Test Receiver
Detector Type	: QP	AV PK
IF Band width	: 120 kHz	1 MHz 1 MHz

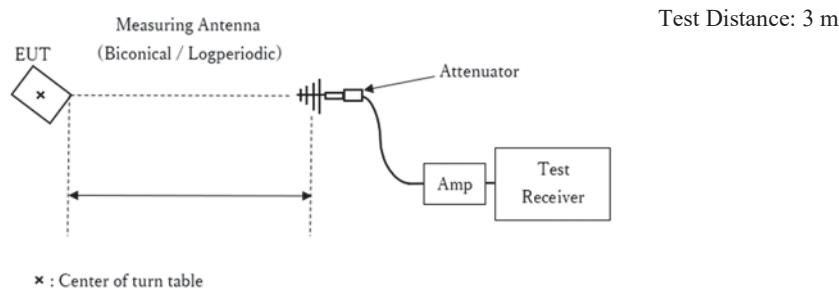
*1) The measurement data was adjusted to a 3 m distance using the following Distance Factor.

Distance factor: $20 \log (\text{Actual distance}/3 \text{ m})$

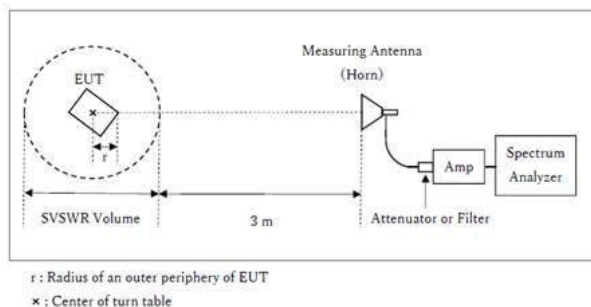
Distance factor and actual distance are shown in Appendix 2

Figure 2: Test Setup

Below 1 GHz



1 GHz - 18 GHz



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

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

SVSWR: 1.6 m

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

r = 0.8 m

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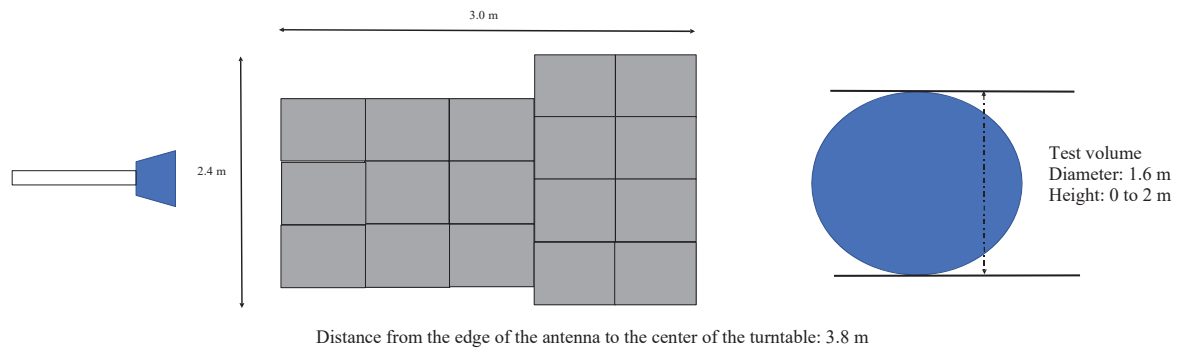
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5.5 Results

Summary of the test results: Pass

Figure. Absorber arrangement

3Site



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SECTION 6: Antenna Terminal

6.1 Operating environment

This test was carried out in shielded 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 1.8 m, raised 0.8 m from the ground.

Photographs of the set up are shown in Appendix 1.

6.3 Test conditions

Frequency range : 30 MHz - 1000 MHz / 1000 MHz - 18000 MHz

Test distance : N / A

EUT position : Table top

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

Appendix 2: Data of EMI test

DATA OF RADIATED DISTURBANCE TEST

UL Japan, Inc. Yokowa EMC Lab. No. 1 Open area test site
Date : 01/22/2021

Mode : 1.FM Reception(Main)
Order No. : 13648806
Power : DC 12 V
Temp. / Humi. : 19 deg. C / 41 % RH

Remarks : 87.7 MHz

Limit : FCC Part 15B CLASS B (3m)

Engineer : Makoto Kashishita

<< QP DATA >>

No.	Freq. [MHz]	Reading <QP>	Ant.Fac [dBm]	Loss [dB]	Gain [dB]	S.Fac [dB]	Result <QP>	Limit <QP>	Margin <QP>	Pola. [H/V]	Ant. Type	Comment
		[dBuV]					[dBuV/m]	[dBuV/m]	[dB]			
1	88.000	26.00	7.78	8.51	29.91	0.38	12.76	40.00	27.24	Hori.	BA	
2	88.000	28.80	7.78	8.51	29.91	0.38	15.56	40.00	24.44	Vert.	BA	
3	176.000	22.10	16.11	9.70	29.87	-0.01	18.03	43.50	25.47	Hori.	BA	
4	176.000	21.80	16.11	9.70	29.87	-0.01	17.73	43.50	25.77	Vert.	BA	
5	264.000	34.80	12.30	7.70	29.96	0.00	24.84	46.00	21.16	Hori.	LA	
6	264.000	30.40	12.30	7.70	29.96	0.00	20.44	46.00	25.56	Vert.	LA	
7	352.000	26.10	14.95	8.57	30.06	0.00	19.56	46.00	26.44	Hori.	LA	
8	352.000	23.00	14.95	8.57	30.06	0.00	16.46	46.00	29.54	Vert.	LA	
9	440.000	26.60	16.08	9.30	30.16	0.00	21.82	46.00	24.18	Hori.	LA	
10	440.000	28.50	16.08	9.30	30.16	0.00	23.72	46.00	22.28	Vert.	LA	
11	528.000	26.40	17.51	9.98	30.22	0.00	23.67	46.00	22.33	Hori.	LA	
12	528.000	26.30	17.51	9.98	30.22	0.00	23.57	46.00	22.43	Vert.	LA	
13	616.000	26.70	19.22	10.63	30.22	0.00	26.33	46.00	19.67	Hori.	LA	
14	616.000	25.60	19.22	10.63	30.22	0.00	25.23	46.00	20.77	Vert.	LA	
15	704.000	23.70	19.56	11.25	30.21	0.00	24.30	46.00	21.70	Hori.	LA	
16	704.000	23.50	19.56	11.25	30.21	0.00	24.10	46.00	21.90	Vert.	LA	
17	792.000	25.80	20.48	11.86	29.99	0.00	28.15	46.00	17.85	Hori.	LA	
18	792.000	27.10	20.48	11.86	29.99	0.00	29.45	46.00	16.55	Vert.	LA	
19	880.000	21.30	21.67	12.44	29.59	0.00	25.82	46.00	20.18	Hori.	LA	
20	880.000	21.50	21.67	12.44	29.59	0.00	26.02	46.00	19.98	Vert.	LA	
21	968.000	20.60	21.97	13.03	29.05	0.00	26.55	54.00	27.45	Hori.	LA	
22	968.000	21.00	21.97	13.03	29.05	0.00	26.95	54.00	27.05	Vert.	LA	

DATA OF RADIATED DISTURBANCE TEST

UL Japan, Inc. Yokowa EMC Lab. No. 1 Open area test site
Date : 01/22/2021

Mode : 1.FM Reception(Main)
Order No. : 13648806
Power : DC 12 V
Temp. / Humi. : 19 deg. C / 41 % RH

Remarks : 98.1 MHz

Limit : FCC Part 15B CLASS B (3m)

Engineer : Makoto Kashishita

<< QP DATA >>

No.	Freq. [MHz]	Reading <QP>	Ant.Fac [dB/m]	Loss [dB]	Gain [dB]	S.Fac [dB]	Result <QP>	Limit <QP>	Margin <QP>	Pola. [H/V]	Ant. Type	Comment
		[dBuV]					[dBuV/m]	[dBuV/m]	[dB]			
1	98.400	33.30	9.85	8.68	29.89	0.11	22.05	43.50	21.45	Hori.	BA	
2	98.400	30.40	9.85	8.68	29.89	0.11	19.15	43.50	24.35	Vert.	BA	
3	196.800	25.20	16.72	9.97	29.86	-0.14	21.89	43.50	21.61	Hori.	BA	
4	196.800	23.10	16.72	9.97	29.86	-0.14	19.79	43.50	23.71	Vert.	BA	
5	295.200	29.00	13.53	8.06	30.00	0.00	20.59	46.00	25.41	Hori.	LA	
6	295.200	27.30	13.53	8.06	30.00	0.00	18.89	46.00	27.11	Vert.	LA	
7	393.600	25.20	15.38	8.94	30.11	0.00	19.41	46.00	26.59	Hori.	LA	
8	393.600	23.80	15.38	8.94	30.11	0.00	18.01	46.00	27.99	Vert.	LA	
9	492.000	23.70	17.51	9.69	30.21	0.00	20.69	46.00	25.31	Hori.	LA	
10	492.000	23.60	17.51	9.69	30.21	0.00	20.59	46.00	25.41	Vert.	LA	
11	590.400	22.70	18.77	10.45	30.22	0.00	21.70	46.00	24.30	Hori.	LA	
12	590.400	22.40	18.77	10.45	30.22	0.00	21.40	46.00	24.60	Vert.	LA	
13	688.800	22.30	19.41	11.14	30.22	0.00	22.63	46.00	23.37	Hori.	LA	
14	688.800	22.70	19.41	11.14	30.22	0.00	23.03	46.00	22.97	Vert.	LA	
15	787.200	22.90	20.37	11.83	30.00	0.00	25.10	46.00	20.90	Hori.	LA	
16	787.200	23.80	20.37	11.83	30.00	0.00	26.00	46.00	20.00	Vert.	LA	
17	984.000	21.00	22.31	13.13	28.95	0.00	27.49	54.00	26.51	Hori.	LA	
18	984.000	20.80	22.31	13.13	28.95	0.00	27.29	54.00	26.71	Vert.	LA	

DATA OF RADIATED DISTURBANCE TEST

UL Japan, Inc. Yokowa EMC Lab. No. 1 Open area test site
Date : 01/22/2021

Mode : 1.FM Reception(Main)
Order No. : 13648806
Power : DC 12 V
Temp. / Humi. : 19 deg. C / 41 % RH

Remarks : 107.9 MHz

Limit : FCC Part 15B CLASS B (3m)

Engineer : Makoto Kashishita

<< QP DATA >>

No.	Freq. [MHz]	Reading	Ant.Fac [dB/m]	Loss [dB]	Gain [dB]	S.Fac [dB]	Result	Limit	Margin	Pola. [H/V]	Ant. Type	Comment
		<QP> [dBuV]					<QP> [dBuV/m]	<QP> [dBuV/m]	<QP> [dB]			
1	108.200	23.90	11.55	8.82	29.89	-0.10	14.28	43.50	29.22	Hori.	BA	
2	108.200	28.50	11.55	8.82	29.89	-0.10	18.88	43.50	24.62	Vert.	BA	
3	216.400	39.10	11.19	7.16	29.88	0.00	27.57	46.00	18.43	Hori.	LA	
4	216.400	39.00	11.19	7.16	29.88	0.00	27.47	46.00	18.53	Vert.	LA	
5	324.600	26.20	14.12	8.33	30.04	0.00	18.61	46.00	27.39	Hori.	LA	
6	324.600	25.10	14.12	8.33	30.04	0.00	17.51	46.00	28.49	Vert.	LA	
7	432.800	23.20	15.99	9.25	30.15	0.00	18.29	46.00	27.71	Hori.	LA	
8	432.800	22.50	15.99	9.25	30.15	0.00	17.59	46.00	28.41	Vert.	LA	
9	541.000	22.00	17.72	10.07	30.22	0.00	19.57	46.00	26.43	Hori.	LA	
10	541.000	22.00	17.72	10.07	30.22	0.00	19.57	46.00	26.43	Vert.	LA	
11	649.200	23.40	19.14	10.86	30.22	0.00	23.18	46.00	22.82	Hori.	LA	
12	649.200	22.50	19.14	10.86	30.22	0.00	22.28	46.00	23.72	Vert.	LA	
13	757.400	21.50	20.11	11.62	30.08	0.00	23.15	46.00	22.85	Hori.	LA	
14	757.400	21.30	20.11	11.62	30.08	0.00	22.95	46.00	23.05	Vert.	LA	
15	973.800	20.60	22.12	13.06	29.02	0.00	26.76	54.00	27.24	Hori.	LA	
16	973.800	20.60	22.12	13.06	29.02	0.00	26.76	54.00	27.24	Vert.	LA	

DATA OF RADIATED DISTURBANCE TEST

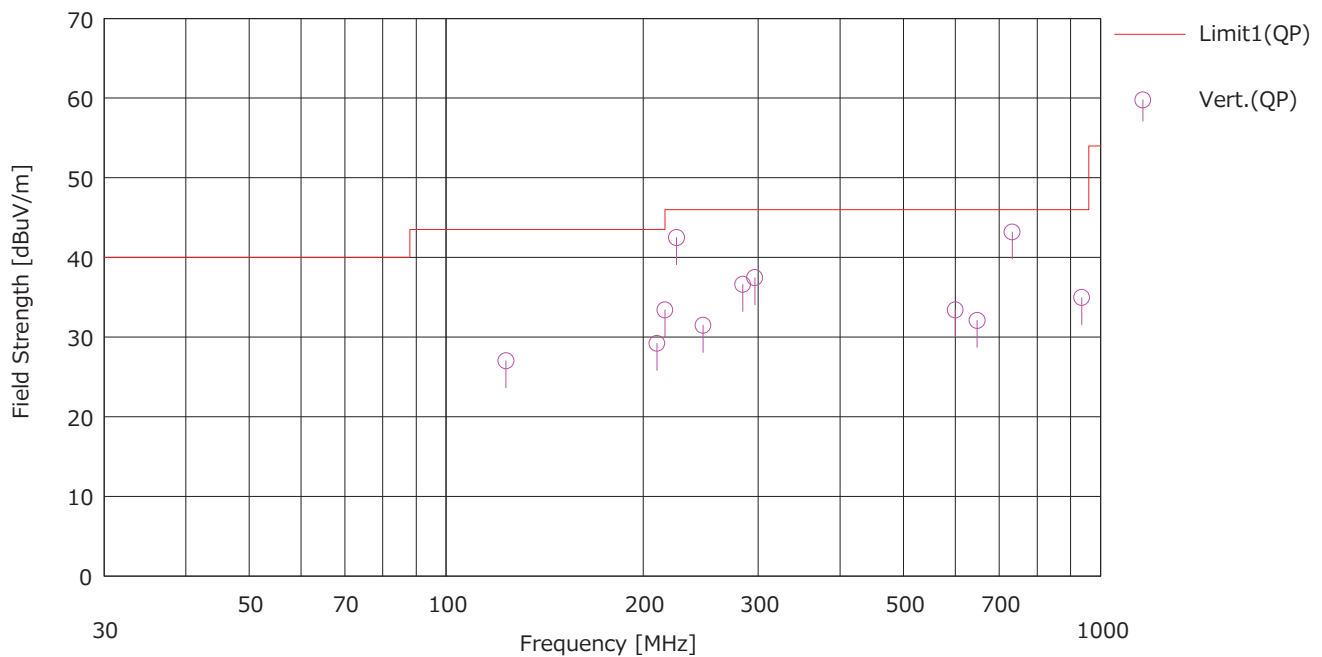
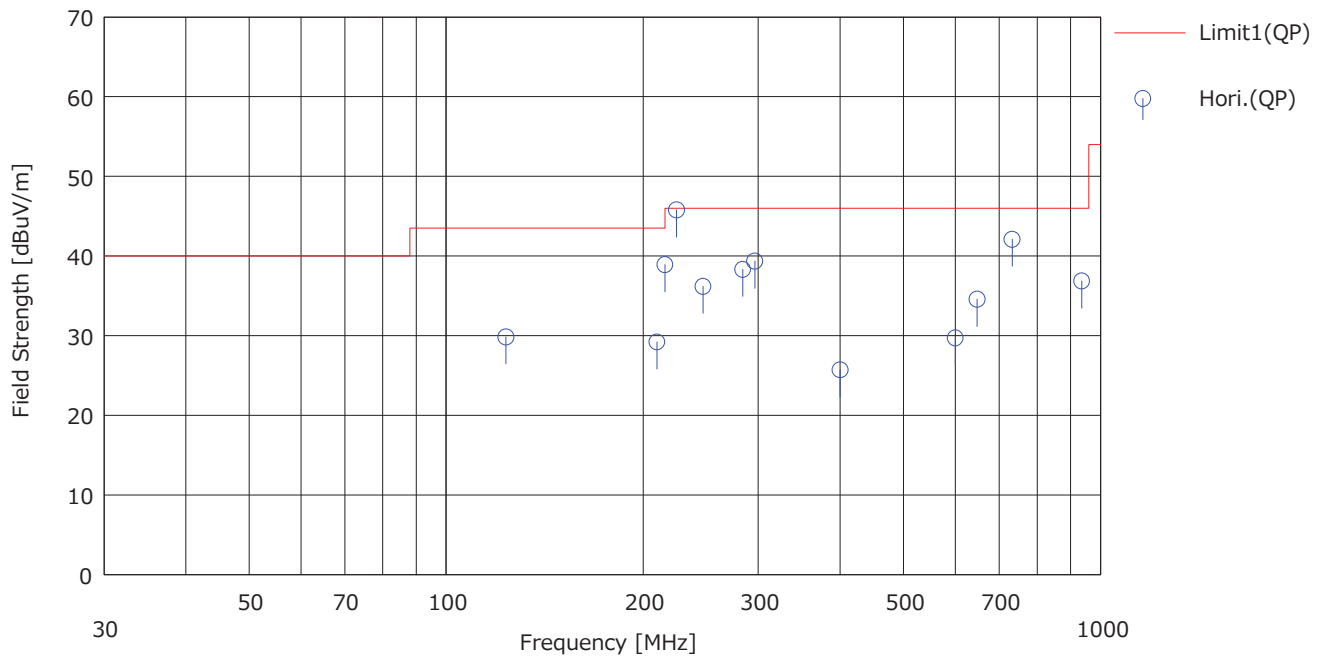
UL Japan, Inc. Yokowa EMC Lab. No. 3 Open area test site
Date : 01/20/2021

Mode : 1.FM Reception(Main)
Order No. : 13648806
Power : DC 12 V
Temp. / Humi. : 19 deg. C / 37 % RH

Remarks : -

Limit : FCC Part 15B CLASS B (3m)

Engineer : Toshifumi Yoneshige



DATA OF RADIATED DISTURBANCE TEST

UL Japan, Inc. Yokowa EMC Lab. No. 3 Open area test site
Date : 01/20/2021

Mode : 1.FM Reception(Main)
Order No. : 13648806
Power : DC 12 V
Temp. / Humi. : 19 deg. C / 37 % RH

Remarks : -

Limit : FCC Part 15B CLASS B (3m)

Engineer : Toshifumi Yoneshige

<< QP DATA >>

No.	Freq. [MHz]	Reading <QP>	Ant.Fac [dB/m]	Loss [dB]	Gain [dB]	S.Fac [dB]	Result <QP>	Limit <QP>	Margin <QP>	Pola. [H/V]	Ant. Type	Comment
		[dBuV]					[dBuV/m]	[dBuV/m]	[dB]			
1	123.455	33.50	13.61	8.08	27.98	-0.18	27.03	43.50	16.47	Vert.	BA	
2	123.468	36.30	13.61	8.08	27.98	-0.18	29.83	43.50	13.67	Hori.	BA	
3	209.898	39.90	11.44	5.77	27.90	0.00	29.21	43.50	14.29	Vert.	LA	
4	209.900	39.90	11.44	5.77	27.90	0.00	29.21	43.50	14.29	Hori.	LA	
5	215.995	49.50	11.50	5.81	27.90	0.00	38.91	43.50	4.59	Hori.	LA	
6	215.998	44.00	11.50	5.81	27.90	0.00	33.41	43.50	10.09	Vert.	LA	
7	224.998	52.70	11.81	5.87	27.90	0.00	42.48	46.00	3.52	Vert.	LA	
8	225.001	56.00	11.82	5.87	27.90	0.00	45.79	46.00	0.21	Hori.	LA	
9	246.940	46.10	11.94	6.02	27.88	0.00	36.18	46.00	9.82	Hori.	LA	
10	246.941	41.40	11.94	6.02	27.88	0.00	31.48	46.00	14.52	Vert.	LA	
11	283.975	46.00	13.89	6.28	27.86	0.00	38.31	46.00	7.69	Hori.	LA	
12	283.978	44.30	13.89	6.28	27.86	0.00	36.61	46.00	9.39	Vert.	LA	
13	296.331	45.20	13.73	6.37	27.85	0.00	37.45	46.00	8.55	Vert.	LA	
14	296.338	47.10	13.73	6.37	27.85	0.00	39.35	46.00	6.65	Hori.	LA	
15	400.200	30.31	16.14	7.03	27.77	0.00	25.71	46.00	20.29	Hori.	LA	
16	600.001	29.60	19.45	8.08	27.42	0.00	29.71	46.00	16.29	Hori.	LA	
17	600.002	33.30	19.45	8.08	27.42	0.00	33.41	46.00	12.59	Vert.	LA	
18	648.000	34.30	19.29	8.28	27.29	0.00	34.58	46.00	11.42	Hori.	LA	
19	648.001	31.80	19.29	8.28	27.29	0.00	32.08	46.00	13.92	Vert.	LA	
20	732.968	40.30	20.24	8.64	27.08	0.00	42.10	46.00	3.90	Hori.	LA	
21	732.976	41.40	20.24	8.64	27.08	0.00	43.20	46.00	2.80	Vert.	LA	
22	936.000	30.30	22.17	9.46	26.97	0.00	34.96	46.00	11.04	Vert.	LA	
23	936.001	32.20	22.17	9.46	26.97	0.00	36.86	46.00	9.14	Hori.	LA	

DATA OF RADIATED DISTURBANCE TEST

UL Japan, Inc. Yokowa EMC Lab. No. 1 Open area test site
Date : 01/22/2021

Mode : 2.FM Reception(Sub)
Order No. : 13648806
Power : DC 12 V
Temp. / Humi. : 19 deg. C / 41 % RH

Remarks : 87.7 MHz

Limit : FCC Part 15B CLASS B (3m)

Engineer : Makoto Kashishita

<< QP DATA >>

No.	Freq. [MHz]	Reading <QP>	Ant.Fac [dB/m]	Loss [dB]	Gain [dB]	S.Fac [dB]	Result <QP>	Limit <QP>	Margin <QP>	Pola. [H/V]	Ant. Type	Comment
		[dBuV]					[dBuV/m]	[dBuV/m]	[dB]			
1	88.000	25.80	7.78	8.51	29.91	0.38	12.56	40.00	27.44	Hori.	BA	
2	88.000	29.30	7.78	8.51	29.91	0.38	16.06	40.00	23.94	Vert.	BA	
3	176.000	22.00	16.11	9.70	29.87	-0.01	17.93	43.50	25.57	Hori.	BA	
4	176.000	22.40	16.11	9.70	29.87	-0.01	18.33	43.50	25.17	Vert.	BA	
5	264.000	34.90	12.30	7.70	29.96	0.00	24.94	46.00	21.06	Hori.	LA	
6	264.000	30.30	12.30	7.70	29.96	0.00	20.34	46.00	25.66	Vert.	LA	
7	352.000	26.90	14.95	8.57	30.06	0.00	20.36	46.00	25.64	Hori.	LA	
8	352.000	23.70	14.95	8.57	30.06	0.00	17.16	46.00	28.84	Vert.	LA	
9	440.000	27.00	16.08	9.30	30.16	0.00	22.22	46.00	23.78	Hori.	LA	
10	440.000	28.80	16.08	9.30	30.16	0.00	24.02	46.00	21.98	Vert.	LA	
11	528.000	26.70	17.51	9.98	30.22	0.00	23.97	46.00	22.03	Hori.	LA	
12	528.000	26.60	17.51	9.98	30.22	0.00	23.87	46.00	22.13	Vert.	LA	
13	616.000	26.60	19.22	10.63	30.22	0.00	26.23	46.00	19.77	Hori.	LA	
14	616.000	25.10	19.22	10.63	30.22	0.00	24.73	46.00	21.27	Vert.	LA	
15	704.000	23.00	19.56	11.25	30.21	0.00	23.60	46.00	22.40	Hori.	LA	
16	704.000	23.10	19.56	11.25	30.21	0.00	23.70	46.00	22.30	Vert.	LA	
17	792.000	25.60	20.48	11.86	29.99	0.00	27.95	46.00	18.05	Hori.	LA	
18	792.000	28.00	20.48	11.86	29.99	0.00	30.35	46.00	15.65	Vert.	LA	
19	880.000	21.30	21.67	12.44	29.59	0.00	25.82	46.00	20.18	Hori.	LA	
20	880.000	21.90	21.67	12.44	29.59	0.00	26.42	46.00	19.58	Vert.	LA	
21	968.000	20.50	21.97	13.03	29.05	0.00	26.45	54.00	27.55	Hori.	LA	
22	968.000	21.30	21.97	13.03	29.05	0.00	27.25	54.00	26.75	Vert.	LA	

DATA OF RADIATED DISTURBANCE TEST

UL Japan, Inc. Yokowa EMC Lab. No. 1 Open area test site
Date : 01/22/2021

Mode : 2.FM Reception(Sub)
Order No. : 13648806
Power : DC 12 V
Temp. / Humi. : 19 deg. C / 41 % RH

Remarks : 98.1 MHz

Limit : FCC Part 15B CLASS B (3m)

Engineer : Makoto Kashishita

<< QP DATA >>

No.	Freq. [MHz]	Reading	Ant.Fac [dB/m]	Loss [dB]	Gain [dB]	S.Fac [dB]	Result	Limit	Margin	Pola. [H/V]	Ant. Type	Comment
		<QP> [dBuV]					<QP> [dBuV/m]	<QP> [dBuV/m]	<QP> [dB]			
1	98.400	32.40	9.85	8.68	29.89	0.11	21.15	43.50	22.35	Hori.	BA	
2	98.400	30.60	9.85	8.68	29.89	0.11	19.35	43.50	24.15	Vert.	BA	
3	196.800	24.80	16.72	9.97	29.86	-0.14	21.49	43.50	22.01	Hori.	BA	
4	196.800	24.10	16.72	9.97	29.86	-0.14	20.79	43.50	22.71	Vert.	BA	
5	295.200	26.90	13.53	8.06	30.00	0.00	18.49	46.00	27.51	Hori.	LA	
6	295.200	26.90	13.53	8.06	30.00	0.00	18.49	46.00	27.51	Vert.	LA	
7	393.600	24.80	15.38	8.94	30.11	0.00	19.01	46.00	26.99	Hori.	LA	
8	393.600	23.40	15.38	8.94	30.11	0.00	17.61	46.00	28.39	Vert.	LA	
9	492.000	24.00	17.51	9.69	30.21	0.00	20.99	46.00	25.01	Hori.	LA	
10	492.000	23.10	17.51	9.69	30.21	0.00	20.09	46.00	25.91	Vert.	LA	
11	590.400	22.40	18.77	10.45	30.22	0.00	21.40	46.00	24.60	Hori.	LA	
12	590.400	22.60	18.77	10.45	30.22	0.00	21.60	46.00	24.40	Vert.	LA	
13	688.800	21.80	19.41	11.14	30.22	0.00	22.13	46.00	23.87	Hori.	LA	
14	688.800	23.00	19.41	11.14	30.22	0.00	23.33	46.00	22.67	Vert.	LA	
15	787.200	22.70	20.37	11.83	30.00	0.00	24.90	46.00	21.10	Hori.	LA	
16	787.200	23.60	20.37	11.83	30.00	0.00	25.80	46.00	20.20	Vert.	LA	
17	984.000	20.70	22.31	13.13	28.95	0.00	27.19	54.00	26.81	Hori.	LA	
18	984.000	20.50	22.31	13.13	28.95	0.00	26.99	54.00	27.01	Vert.	LA	

DATA OF RADIATED DISTURBANCE TEST

UL Japan, Inc. Yokowa EMC Lab. No. 1 Open area test site
Date : 01/22/2021

Mode : 2.FM Reception(Sub)
Order No. : 13648806
Power : DC 12 V
Temp. / Humi. : 19 deg. C / 41 % RH

Remarks : 107.9 MHz

Limit : FCC Part 15B CLASS B (3m)

Engineer : Makoto Kashishita

<< QP DATA >>

No.	Freq. [MHz]	Reading	Ant.Fac [dB/m]	Loss [dB]	Gain [dB]	S.Fac [dB]	Result	Limit	Margin	Pola. [H/V]	Ant. Type	Comment
		<QP> [dBuV]					<QP> [dBuV/m]	<QP> [dBuV/m]	<QP> [dB]			
1	108.200	23.80	11.55	8.82	29.89	-0.10	14.18	43.50	29.32	Hori.	BA	
2	108.200	28.50	11.55	8.82	29.89	-0.10	18.88	43.50	24.62	Vert.	BA	
3	216.400	41.00	11.19	7.16	29.88	0.00	29.47	46.00	16.53	Hori.	LA	
4	216.400	38.00	11.19	7.16	29.88	0.00	26.47	46.00	19.53	Vert.	LA	
5	324.600	24.20	14.12	8.33	30.04	0.00	16.61	46.00	29.39	Hori.	LA	
6	324.600	23.90	14.12	8.33	30.04	0.00	16.31	46.00	29.69	Vert.	LA	
7	432.800	23.50	15.99	9.25	30.15	0.00	18.59	46.00	27.41	Hori.	LA	
8	432.800	23.00	15.99	9.25	30.15	0.00	18.09	46.00	27.91	Vert.	LA	
9	541.000	21.90	17.72	10.07	30.22	0.00	19.47	46.00	26.53	Hori.	LA	
10	541.000	21.90	17.72	10.07	30.22	0.00	19.47	46.00	26.53	Vert.	LA	
11	649.200	23.00	19.14	10.86	30.22	0.00	22.78	46.00	23.22	Hori.	LA	
12	649.200	22.60	19.14	10.86	30.22	0.00	22.38	46.00	23.62	Vert.	LA	
13	757.400	21.30	20.11	11.62	30.08	0.00	22.95	46.00	23.05	Hori.	LA	
14	757.400	21.40	20.11	11.62	30.08	0.00	23.05	46.00	22.95	Vert.	LA	
15	973.800	20.70	22.12	13.06	29.02	0.00	26.86	54.00	27.14	Hori.	LA	
16	973.800	20.50	22.12	13.06	29.02	0.00	26.66	54.00	27.34	Vert.	LA	

DATA OF RADIATED DISTURBANCE TEST

UL Japan, Inc. Yokowa EMC Lab. No. 3 Open area test site
Date : 01/20/2021

Mode : 2.FM Reception(Sub)
Order No. : 13648806
Power : DC 12 V
Temp. / Humi. : 19 deg. C / 37 % RH

Remarks : -

Limit : FCC Part 15B CLASS B (3m)

Engineer : Toshifumi Yoneshige

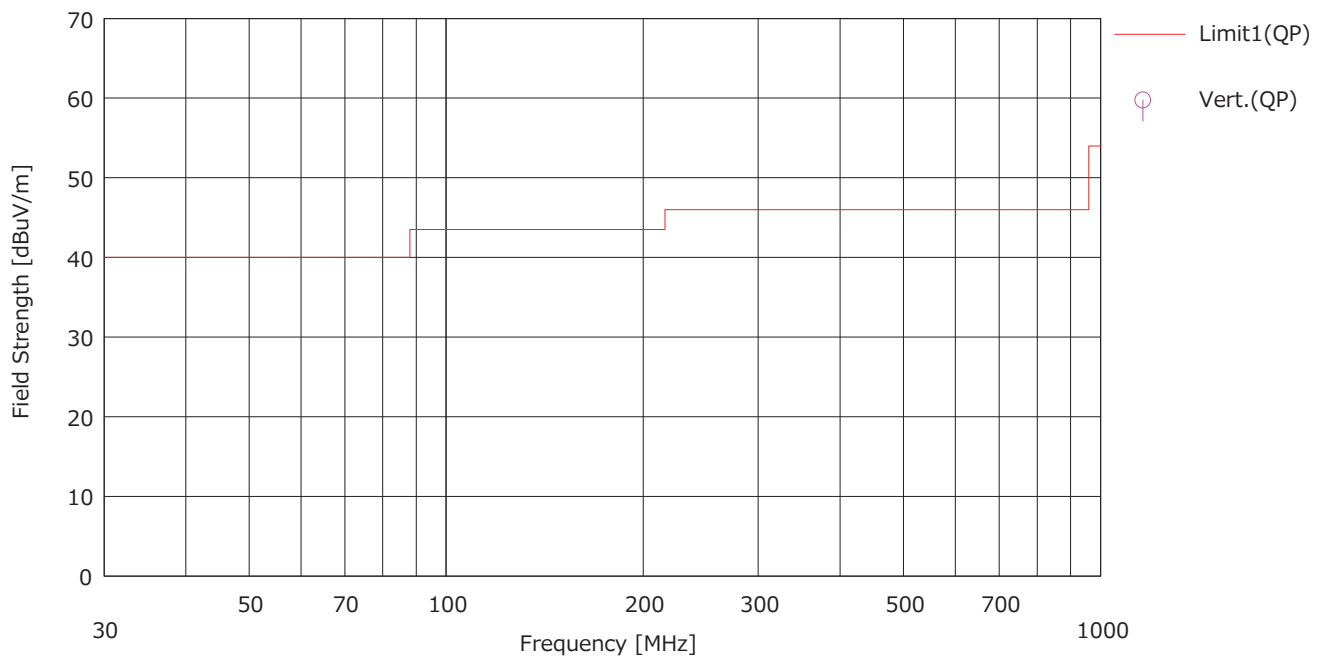
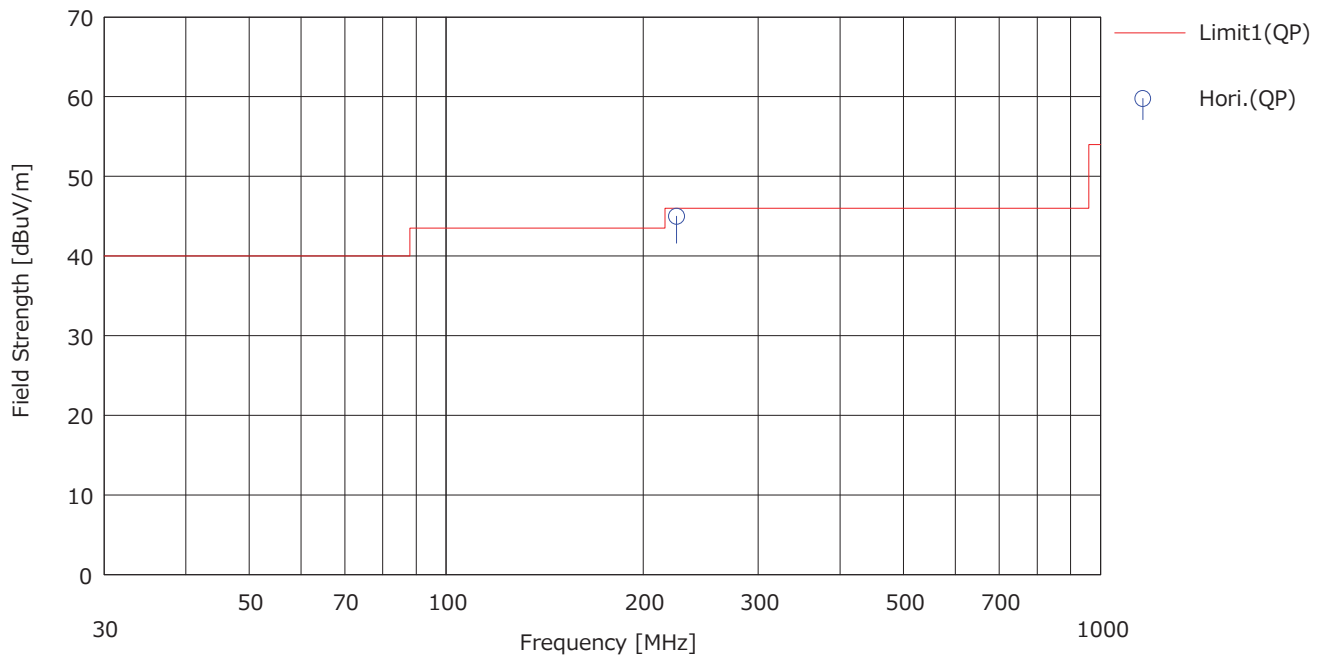


CHART:WITH FACTOR ANT TYPE: -30MHz:LOOP, 30-199.99MHz:BICONICAL, 200MHz-1000MHz:LOGPERIODIC, 1000MHz-:HORN
CALCULATION:RESULT = READING+ANT.Fac.+LOSS(CABLE+ATTEN(Below 1GHz only)) - GAIN(AMP)+S.Fac(ANSI C63.5 ΔAF)

DATA OF RADIATED DISTURBANCE TEST

UL Japan, Inc. Yokowa EMC Lab. No. 3 Open area test site
Date : 01/20/2021

Mode : 1.FM Reception(Main)
Order No. : 13648806
Power : DC 12 V
Temp. / Humi. : 19 deg. C / 37 % RH

Remarks : -

Limit : FCC Part 15B CLASS B (GHz, 3m)

Engineer : Toshifumi Yoneshige

<< CAV/PK DATA >>

No.	Freq. [MHz]	Reading		Ant.Fac [dB/m]	Loss [dB]	Gain [dB]	Result		Limit		Margin		Pola. [H/V]	Ant. Type	Comment
		<CAV>	<PK>				<CAV>	<PK>	<AV>	<PK>	<AV>	<PK>			
		[dBuV]	[dBuV]				[dBuV/m]	[dBuV/m]	[dBuV/m]	[dBuV/m]	[dB]	[dB]			
1	2816.000	35.30	45.80	28.37	3.41	36.02	31.06	41.56	54.00	74.00	22.94	32.44	Hori.	HA	87.7MHz
2	2816.000	38.10	47.30	28.37	3.41	36.02	33.86	43.06	54.00	74.00	20.14	30.94	Vert.	HA	87.7MHz
3	3148.800	43.50	49.50	28.78	3.63	35.92	39.99	45.99	54.00	74.00	14.01	28.01	Hori.	HA	98.1MHz
4	3148.800	41.20	48.80	28.78	3.63	35.92	37.69	45.29	54.00	74.00	16.31	28.71	Vert.	HA	98.1MHz
5	3462.400	45.00	51.30	28.55	3.79	35.67	41.67	47.97	54.00	74.00	12.33	26.03	Hori.	HA	107.9MHz
6	3462.400	41.80	48.80	28.55	3.79	35.67	38.47	45.47	54.00	74.00	15.53	28.53	Vert.	HA	107.9MHz

DATA OF RADIATED DISTURBANCE TEST

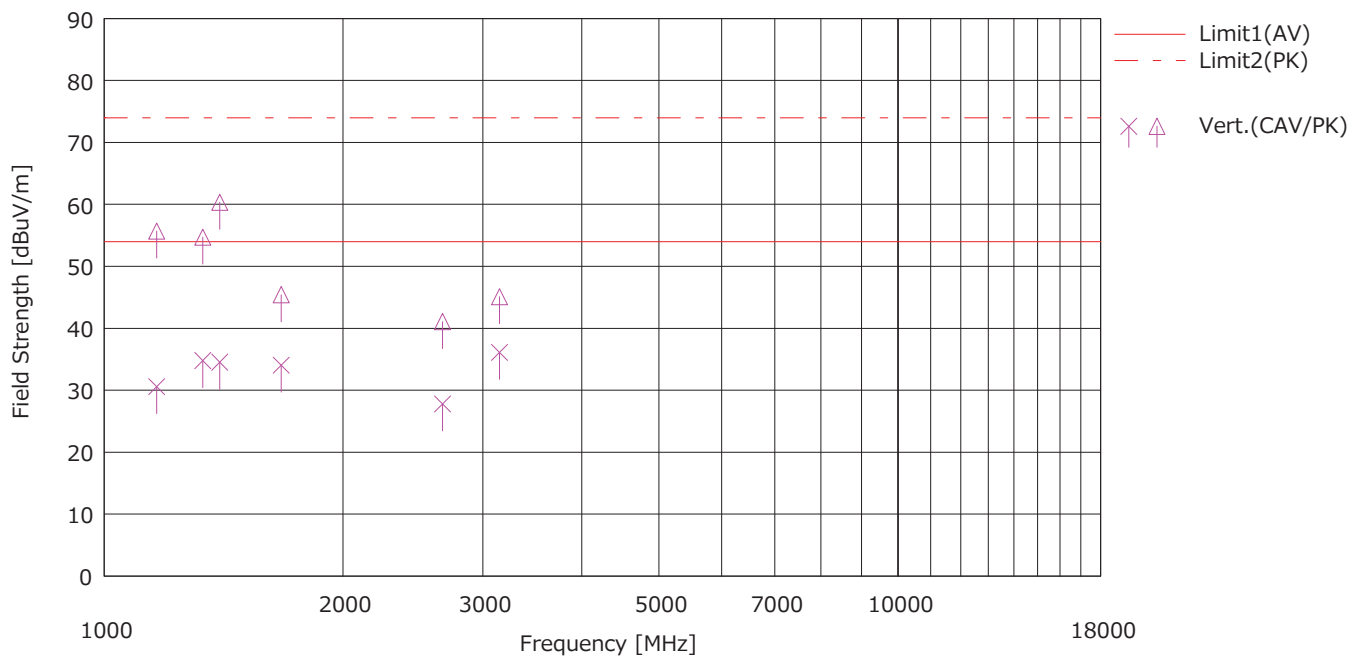
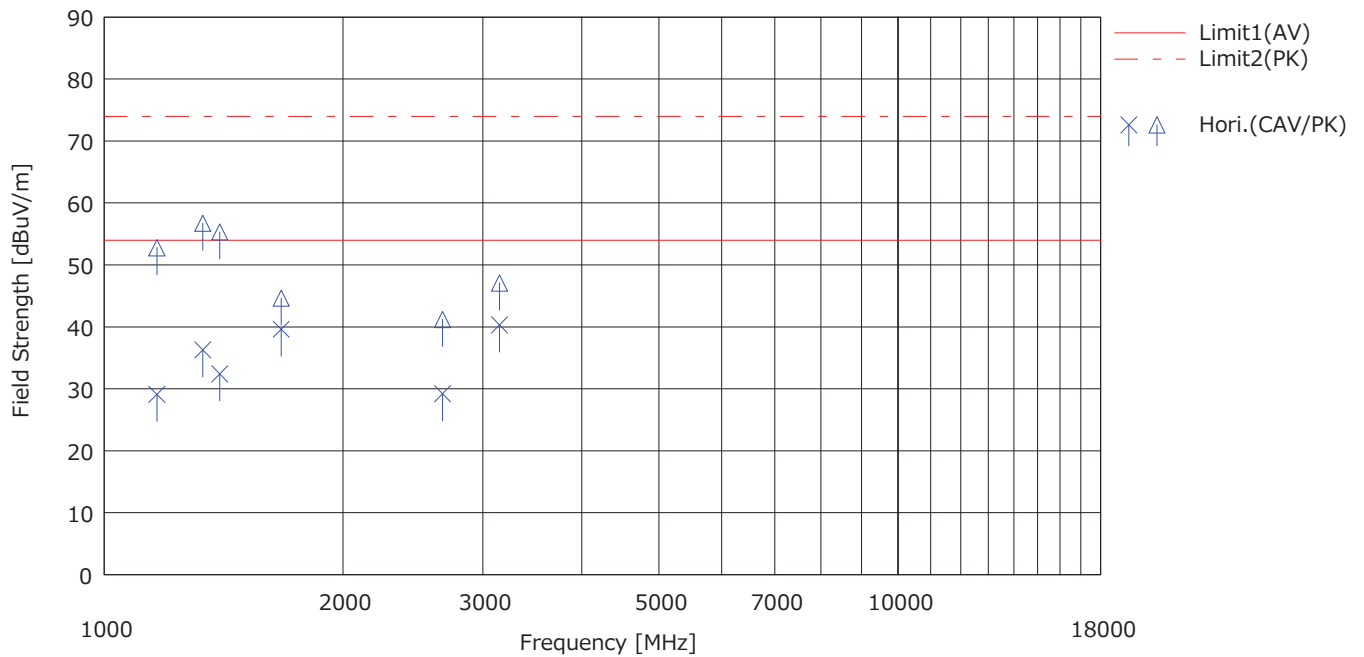
UL Japan, Inc. Yokowa EMC Lab. No. 3 Open area test site
Date : 01/20/2021

Mode : 1.FM Reception(Main)
Order No. : 13648806
Power : DC 12 V
Temp. / Humi. : 19 deg. C / 37 % RH

Remarks : -

Limit : FCC Part 15B CLASS B (GHz, 3m)

Engineer : Toshifumi Yoneshige



DATA OF RADIATED DISTURBANCE TEST

UL Japan, Inc. Yokowa EMC Lab. No. 3 Open area test site
Date : 01/20/2021

Mode : 1.FM Reception(Main)
Order No. : 13648806
Power : DC 12 V
Temp. / Humi. : 19 deg. C / 37 % RH

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Limit : FCC Part 15B CLASS B (GHz, 3m)

Engineer : Toshifumi Yoneshige

<< CAV/PK DATA >>

No.	Freq. [MHz]	Reading		Ant.Fac [dB/m]	Loss [dB]	Gain [dB]	Result		Limit		Margin		Pola. [H/V]	Ant. Type	Comment
		<CAV>	<PK>				<CAV>	<PK>	<AV>	<PK>	<AV>	<PK>			
		[dBuV]	[dBuV]				[dBuV/m]	[dBuV/m]	[dBuV/m]	[dBuV/m]	[dB]	[dB]			
1	1165.640	40.30	65.40	25.16	2.12	37.00	30.58	55.68	54.00	74.00	23.42	18.32	Vert.	HA	
2	1165.643	38.80	62.50	25.16	2.12	37.00	29.08	52.78	54.00	74.00	24.92	21.22	Hori.	HA	
3	1332.432	43.40	63.30	25.95	2.25	36.80	34.80	54.70	54.00	74.00	19.20	19.30	Vert.	HA	
4	1332.435	44.90	65.30	25.95	2.25	36.80	36.30	56.70	54.00	74.00	17.70	17.30	Hori.	HA	
5	1399.138	43.30	69.10	25.63	2.31	36.72	34.52	60.32	54.00	74.00	19.48	13.68	Vert.	HA	
6	1399.144	41.20	64.10	25.63	2.31	36.72	32.42	55.32	54.00	74.00	21.58	18.68	Hori.	HA	
7	1672.285	48.40	53.40	25.07	2.53	36.38	39.62	44.62	54.00	74.00	14.38	29.38	Hori.	HA	
8	1672.288	42.80	54.20	25.07	2.53	36.38	34.02	45.42	54.00	74.00	19.98	28.58	Vert.	HA	
9	2670.268	32.60	45.90	27.91	3.29	36.01	27.79	41.09	54.00	74.00	26.21	32.91	Vert.	HA	
10	2670.269	34.00	46.00	27.91	3.29	36.01	29.19	41.19	54.00	74.00	24.81	32.81	Hori.	HA	
11	3148.848	39.60	48.60	28.78	3.63	35.92	36.09	45.09	54.00	74.00	17.91	28.91	Vert.	HA	
12	3148.859	43.80	50.60	28.78	3.63	35.92	40.29	47.09	54.00	74.00	13.71	26.91	Hori.	HA	

DATA OF RADIATED DISTURBANCE TEST

UL Japan, Inc. Yokowa EMC Lab. No. 3 Open area test site
Date : 01/20/2021

Mode : 2.FM Reception(Sub)
Order No. : 13648806
Power : DC 12 V
Temp. / Humi. : 19 deg. C / 37 % RH

Remarks : -

Limit : FCC Part 15B CLASS B (GHz, 3m)

Engineer : Toshifumi Yoneshige

<< CAV/PK DATA >>

No.	Freq. [MHz]	Reading		Ant.Fac [dB/m]	Loss [dB]	Gain [dB]	Result		Limit		Margin		Pola. [H/V]	Ant. Type	Comment
		<CAV>	<PK>				<CAV>	<PK>	<AV>	<PK>	<AV>	<PK>			
		[dBuV]	[dBuV]				[dBuV/m]	[dBuV/m]	[dBuV/m]	[dBuV/m]	[dB]	[dB]			
1	2816.000	35.40	45.70	28.37	3.41	36.02	31.16	41.46	54.00	74.00	22.84	32.54	Hori.	HA	87.7MHz
2	2816.000	38.40	47.10	28.37	3.41	36.02	34.16	42.86	54.00	74.00	19.84	31.14	Vert.	HA	87.7MHz
3	3148.800	43.10	49.70	28.78	3.63	35.92	39.59	46.19	54.00	74.00	14.41	27.81	Hori.	HA	98.1MHz
4	3148.800	41.60	49.00	28.78	3.63	35.92	38.09	45.49	54.00	74.00	15.91	28.51	Vert.	HA	98.1MHz
5	3462.400	45.10	51.40	28.55	3.79	35.67	41.77	48.07	54.00	74.00	12.23	25.93	Hori.	HA	107.9MHz
6	3462.400	42.10	48.80	28.55	3.79	35.67	38.77	45.47	54.00	74.00	15.23	28.53	Vert.	HA	107.9MHz

DATA OF RADIATED DISTURBANCE TEST

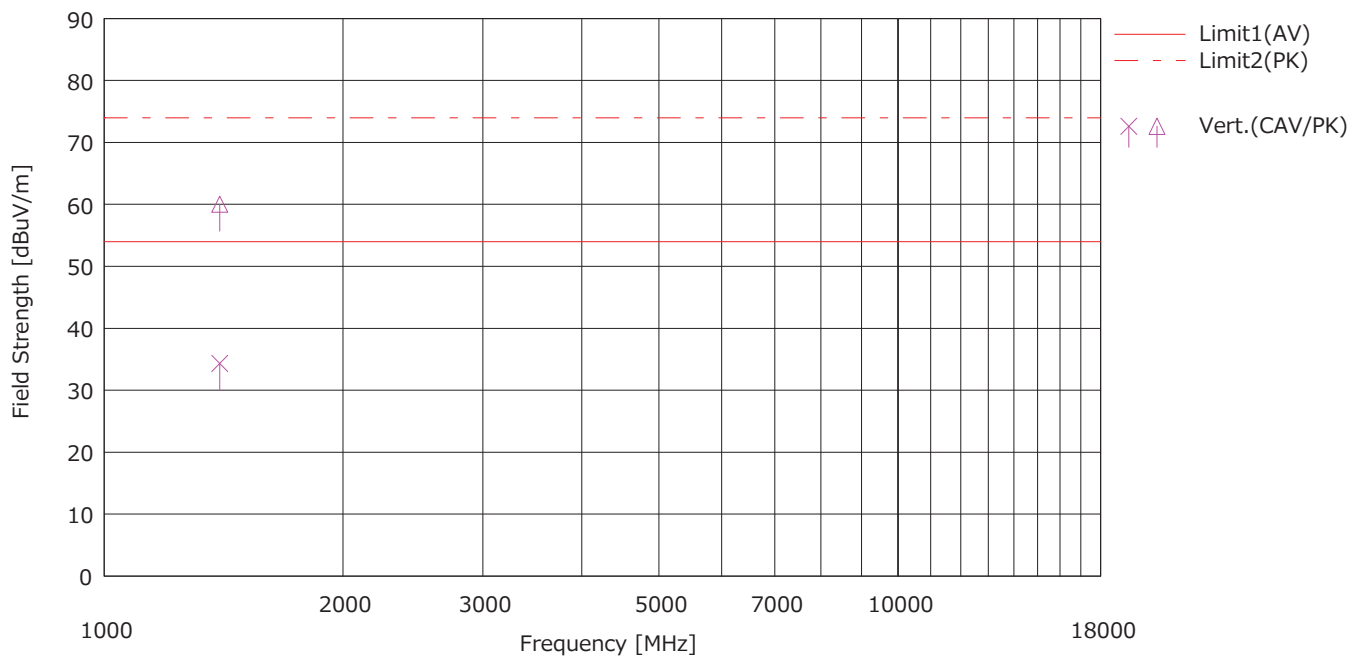
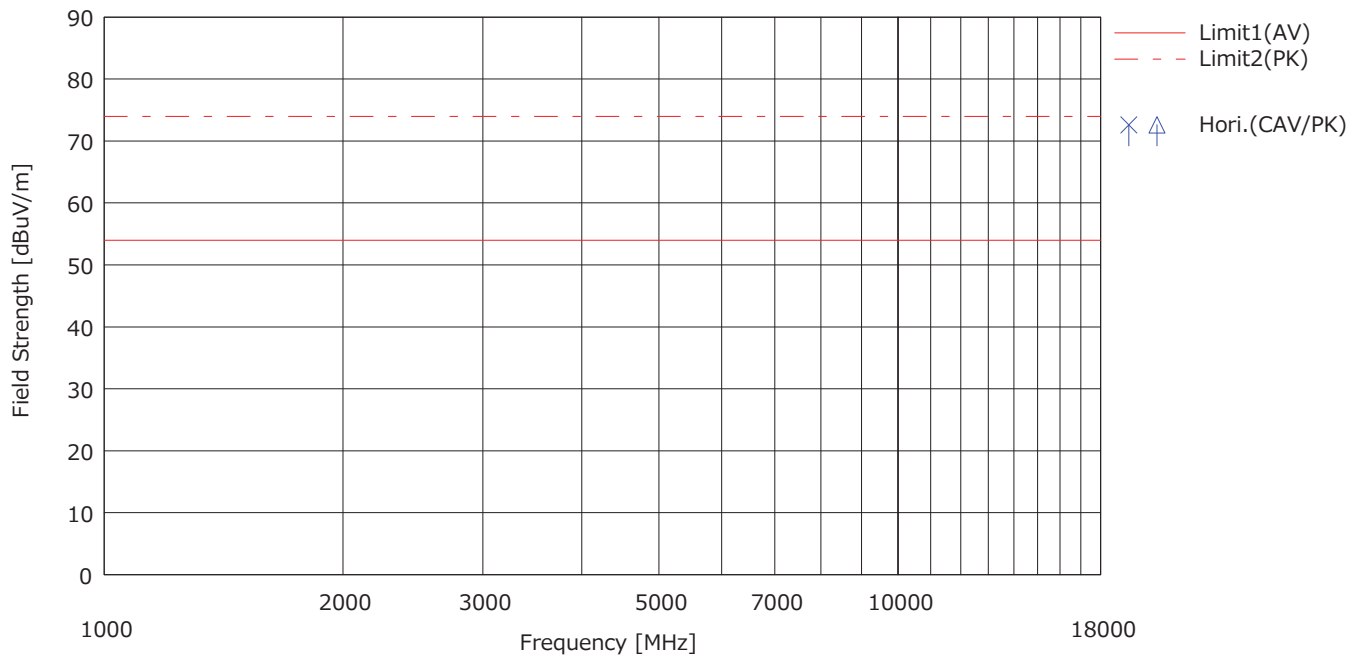
UL Japan, Inc. Yokowa EMC Lab. No. 3 Open area test site
Date : 01/20/2021

Mode : 2.FM Reception(Sub)
Order No. : 13648806
Power : DC 12 V
Temp. / Humi. : 19 deg. C / 37 % RH

Remarks : -

Limit : FCC Part 15B CLASS B (GHz, 3m)

Engineer : Toshifumi Yoneshige

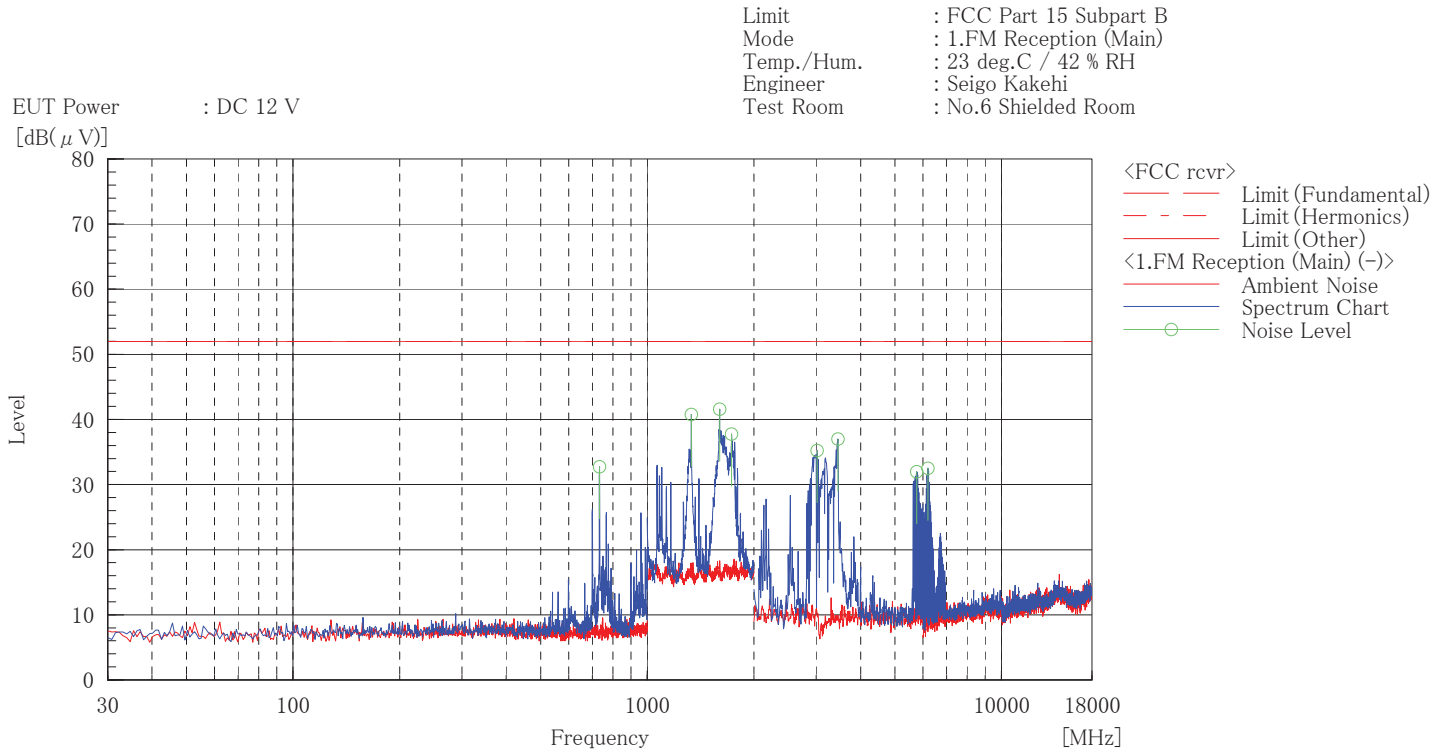


13648806

UL Japan, Inc.
Yokowa No.6 S/R

<<ANTENNA TERMINAL VOLTAGE TEST>>

01/26/2021



Spectrum Selection (Peak Value)

Ch.	No.	Frequency [MHz]	Harm	Reading [dB(μV)]	c. f [dB]	Result [dB(μV)]	Limit *1) [dB(μV)]	Margin [dB]
—	1	733.333		53.3	-20.6	32.7	52.0	19.3
	2	1333.333		72.5	-31.7	40.8	52.0	11.2
	3	1600.000		72.6	-31.0	41.6	52.0	10.4
	4	3013.333		71.9	-36.7	35.2	52.0	16.8
	5	3453.333		73.4	-36.4	37.0	52.0	15.0
	6	5760.000		68.0	-36.0	32.0	52.0	20.1
	7	6193.334		68.5	-36.0	32.5	52.0	19.5
	8	1730.000		68.5	-30.7	37.8	52.0	14.2

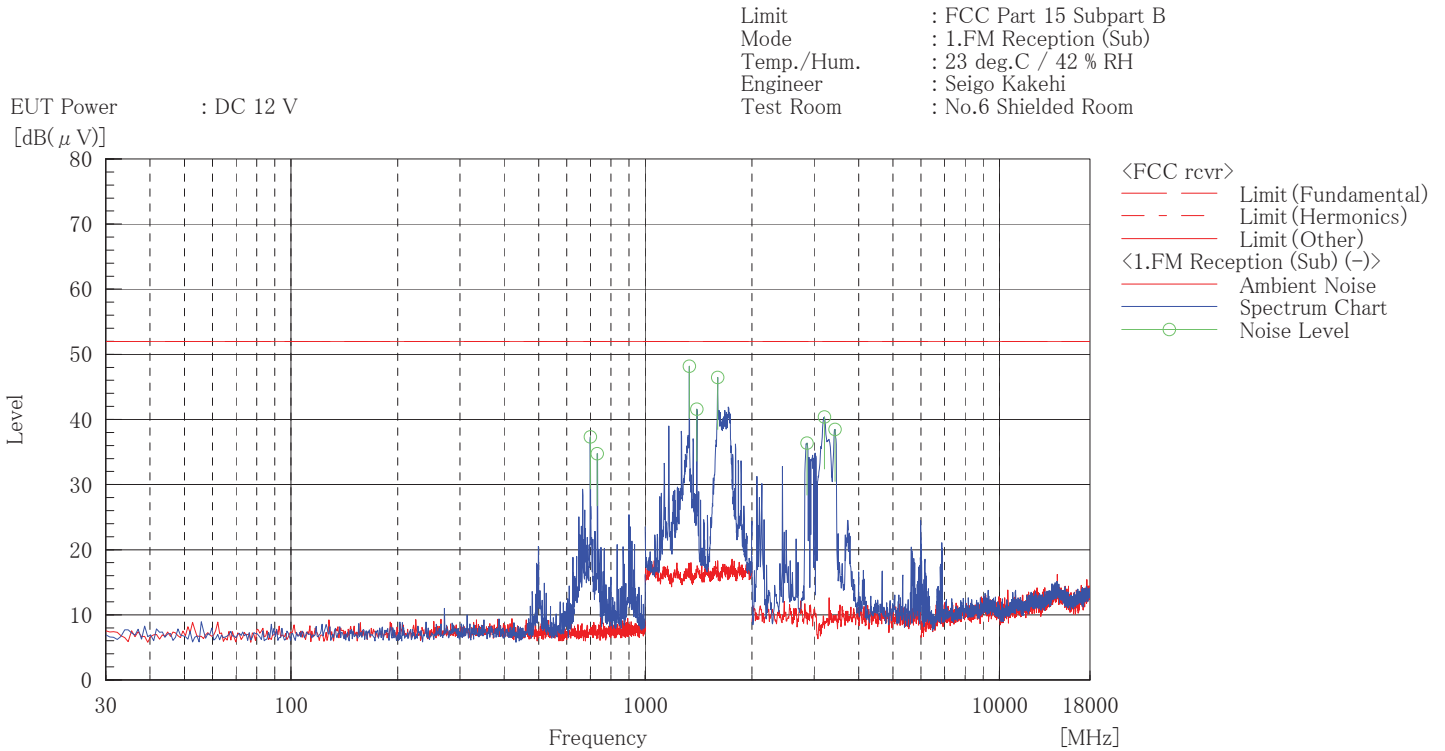
*1) The limits and correction factors were calculated with an impedance of 75Ω.

13648806

UL Japan, Inc.
Yokowa No.6 S/R

<<ANTENNA TERMINAL VOLTAGE TEST>>

01/26/2021



Spectrum Selection (Peak Value)

Ch.	No.	Frequency [MHz]	Harm	Reading [dB(μV)]	c. f [dB]	Result [dB(μV)]	Limit *1) [dB(μV)]	Margin [dB]
—	1	700.000		58.0	-20.7	37.3	52.0	14.7
	2	732.500		55.3	-20.6	34.7	52.0	17.3
	3	1331.667		80.0	-31.8	48.2	52.0	3.8
	4	1600.000		77.5	-31.0	46.5	52.0	5.5
	5	2860.000		73.1	-36.7	36.4	52.0	15.7
	6	3206.667		77.0	-36.6	40.4	52.0	11.6
	7	3433.333		75.0	-36.5	38.5	52.0	13.5
	8	1398.333		73.2	-31.6	41.6	52.0	10.4

*1) The limits and correction factors were calculated with an impedance of 75Ω.

Appendix 3

Test Instruments

***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 disturbance

AT : Antenna terminal conducted disturbance

Test Item	Local ID	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Cal Int
AT	OS-35	197080	Thermo-Hygrometer	CUSTOM. Inc	CTH-201	510Q05R-5	2020/03/25	12
AT	DM-06	146650	Tester	SANWA	PC500	7019239	2020/06/22	12
AT	YJM-17	147545	Measure	Baumer	-	-	-	-
AT	APMAT07	146634	Matching Pad	TME	ZT-130	500101	2020/10/07	12
AT	YATCC-C01	198948	Coaxial cable	HUBER+SUNER	Sucoflex 104	805849/4	2020/05/21	12
AT	YATCC-C02	198943	Coaxial cable	HUBER+SUNER	Sucoflex 104	805251/4	2020/05/21	12
AT	AF-05	146612	Pre Amplifier	Hewlett Packard	8447D	2944A08087	2020/07/14	12
AT	COTS-YW-AT	146723	Software for Antenna Terminal Voltage	Toyo Corporation	-	-	-	-
AT	SA-15	146760	Spectrum Analyzer	EMC Instruments Corporation	E4440A	MY46187096	2020/09/23	12
AT	AF-06	146601	Pre Amplifier	Keysight Technologies Inc	HP8449B	3008A01672	2020/11/16	12
AT	SDC-04	156476	DC Block	Keysight Technologies Inc	N9398C	MY46457609	2020/06/02	12
RE	RT-62	146757	EMI Test Receiver	Rohde & Schwarz	ESW26	101277	2020/07/21	12
RE	DM-01	146647	Tester	SANWA	PC500	7019221	2020/06/22	12
RE	YJM-22	199754	Measure	Shinwa Sokutei	80814	-	-	-
RE	OS-38	197157	Thermo-Hygrometer	CUSTOM. Inc	CTH-201	510Q05R-8	2020/03/25	12

Test Item	Local ID	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Cal Int
RE	AF-02	146599	Pre Amplifier	ANRITSU	MH648A	M89645	2020/03/03	12
RE	AT-25	146574	Attenuator	ANRITSU	MP721A	6200543685	2020/07/16	12
RE	AT-30	146577	Attenuator	ANRITSU	MP721B	6200749339	2020/07/16	12
RE	CC-1ORC	146839	Yokowa No.1 open coaxial(0.1-1000MHz)	TSJ (Techno Science Japan)	CC-11,CC-12,CC-14,CC-15,CC-16,CC-17,SW-11,SW-12	SUCOFLEX104G	2020/07/16	12
RE	YOATS-01(NSA)	146941	Open area test site	JSE	3m、 10m、 30m	1	2020/05/13	12
RE	BA-12	146831	Biconical Antenna	Schwarzbeck Mess - Elektronik	BBA9106	VHA91032273	2020/06/18	12
RE	LA-14	146963	Logperiodic Antenna	Schwarzbeck Mess - Elektronik	VUSLP9111B	184	2020/03/31	12
RE	AF-04	146600	Pre Amplifier	Hewlett Packard	8449B	3008A01207	2020/07/14	12
RE	HA-06	146711	Broad-Band Horn Antenna	Schwarzbeck Mess - Elektronik	BBHA 9120 D	9120D-683	2020/05/15	12
RE	YOATS-01(SVSWR)	146942	Open area test site	JSE	3m,10m	1	2020/03/31	12
RE	CC-C14	178057	Microwave Cable	Huber+Suhner	SUCOFLEX 126EA	800630 / 126EA	2020/03/19	12
RE	CC-C15	178392	Microwave Cable	Junkosha INC.	JUNFLON MWX315	1511-023	2020/03/19	12
RE	TR-13	151197	EMI Test Receiver	Rohde & Schwarz	ESW26	101287	2020/08/03	12
RE	COTS-YW-EMI-TSJ	146923	EMI measurement program	TSJ (Techno Science Japan)	TEPTO-DV	-	-	-
RE	DM-03	146649	Tester	SANWA	PC500	7019229	2020/06/22	12

Test Item	Local ID	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Cal Int
RE	YJM-15	147543	Measure	Baumer	-	-	-	-
RE	COTS-YW-LOCAL-TOYO	146731	Software for Local Oscillator Frequency Test	TOYO Technica Corporation	-	-	-	-
RE	SC-03	147518	Search Coil	UL Japan	-	-	-	-
RE	OS-07	146989	Digital Humidity Indicator	SATO	PC-5000TRH-II	05A06	2021/01/15	12
RE	AF-01	146610	Pre Amplifier	Hewlett Packard	8447D	2443A04060	2020/03/03	12
RE	AT-26	146575	Attenuator	ANRITSU	MP721A	6200543689	2020/07/16	12
RE	AT-44	146580	Attenuator	ANRITSU	MP721B	6201526861	2020/06/08	12
RE	CC-3ORC	146807	Yokowa No.3 open coaxial(0.01-1000MHz)	Fujikura,HP,Mini-Circuits,Fujikura	CC-31,CC-32,CC-34,CC-35,CC-36,CC-37,SW-31,SW-32	YO0301	2020/06/08	12
RE	YOATS-03(NSA)	146999	Open area test site	JSE	3m、 10m	3	2020/09/20	12
RE	YBA-02	147009	Biconical Antenna	Schwarzbeck Mess - Elektronik	VHA9103+BBA9106	1788	2020/03/12	12
RE	LA-16	146965	Logperiodic Antenna	Schwarzbeck Mess - Elektronik	VUSLP9111B	186	2020/03/12	12
RE	HA-05	146710	Broad-Band Horn Antenna	Schwarzbeck Mess - Elektronik	BBHA 9120 D	257	2020/04/10	12
RE	YOATS-03(SVSWR)	147000	Open area test site	JSE	3m,10m	3	2020/03/13	12
RE	CC-C10	146880	Microwave Cable	Junkosha	MWX221-02000AMSDMS	1502S360	2020/03/17	12
RE	CC-C11	146808	Microwave Cable	Junkosha	MWX221-05000AMSDMS	1502S361	2020/03/17	12

End of Report