



EMI TEST REPORT

Test Report No. : 12317275Y-B

Applicant: Hitachi, Ltd. Service Platform Businesses Division Group

Type of Equipment: Biometric Reader

Model No.: PC-KCB120

FCC ID: ZQDPCKCB120

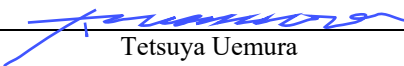
Test regulation: FCC Part 15 Subpart B:2018 Class B
ICES-003 Issue 6 + Amendment 1 Class B (SMSE-015-16)

Test result: Complied


1. This test report shall not be reproduced in full or partial, without the written approval of UL Japan, Inc.
2. The results in this report apply only to the sample tested.
3. This sample tested is in compliance with the limits of the above regulation.
4. The test results in this test report are traceable to the national or international standards.
5. This test report 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.
7. This test report must not be used by the customer to claim product certification, approval, or endorsement by any agency of the Federal Government.
8. The opinions and the interpretations to the result of the description in this report are outside scopes where UL Japan has been accredited.

Date of test: May 21 and 22, 2018

**Representative
test engineer:**


Tetsuya Uemura
Engineer
Consumer Technology Division

Approved by:


Makoto Toyoda
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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13-EM-F0429

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Section 1: Customer information

Company Name : Hitachi, Ltd. Service Platform Businesses Division Group
Brand Name : HITACHI
Address : Hitachi Omori 2nd Bldg., 27-18, Minami-Oi 6-chome, Shinagawa-ku,
Tokyo, 140-8572 Japan
Telephone Number : +81 3 5471 2265
Facsimile Number : +81 3 5471 2582
Contact Person : Keiji Kitane

Section 2: Equipment under test (E.U.T.)

2.1 Identification of E.U.T.

Type of equipment : Biometric Reader
Model No. : PC-KCB120
Serial No. : Refer to Clause 4.2
Rating : DC 5 V, 500 mA
Country of Mass-production : Japan
Condition of EUT : Engineering prototype
(Not for Sale: This sample is equivalent to mass-produced items.)
Size : 69 x 97 x 79 (Width x Depth x Height (mm))
Modification of EUT : No modification by the test lab.
Receipt Date of Sample : May 21, 2018

2.2 Product description

Model: PC-KCB120 (referred to as the EUT in this report) is a Biometric Reader.
The clock frequencies used in the EUT: 120 MHz (Max)

Section 3: Test specification, procedures and results

3.1 Test Specification

Test Specification : FCC Part 15 Subpart B
FCC Part 15 final revised on March 12, 2018 and effective April 11, 2018
Title : FCC 47CFR Part15 Radio Frequency Device
Subpart B Unintentional Radiators

Test Specification : ICES-003 Issue 6 + Amendment 1 (SMSE-015-16)
Title : Spectrum Management and Telecommunications
Interference-Causing Equipment Standard
Information Technology Equipment (Including Digital Apparatus) –
Limits and Methods of Measurement

3.2 Procedures & results

Item	Test Procedure	Limits	Deviation	Worst margin	Result
Conducted emission	ANSI C63.4: 2014 7. AC powerline conducted emission measurements *1)	Class B	N/A	20.4 dB (0.15000 MHz, QP, L, 1. Running mode)	Complied
Radiated emission	ANSI C63.4: 2014 8. Radiated emission measurements *1)	Class B	N/A	7.5 dB (852.008 MHz, Horizontal, QP, 2. Standby mode)	Complied
*1) Measurements were limited up to 2 GHz since the highest frequency of internal source of the EUT is between 108 MHz and 500 MHz. Note: UL Japan's EMI Work Procedures No. 13-EM-W0420					
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 E.U.T., in the configuration tested, complies with the specifications FCC Part 15 Subpart B:2018 Class B and ICES-003 Issue 6 + Amendment 1 Class B (SMSE-015-16).

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3.5 Uncertainty

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

EMI

		Open area test site			Shielded room			
		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						
	150 kHz - 30 MHz	3.4 dB						
ISN (LCL= 55 dB - 40 dB)	150 kHz - 30 MHz	4.2 dB						
ISN (LCL= 65 dB - 50 dB)	150 kHz - 30 MHz	4.6 dB						
ISN (LCL= 75 dB - 60 dB)	150 kHz - 30 MHz	5.0 dB						
ISN (Screened)	150 kHz - 30 MHz	3.4 dB						
ISN (75 ohm)	150 kHz - 30 MHz	3.4 dB						
Current probe	150 kHz - 30 MHz	2.9 dB						
Capacitive Voltage Probe	150 kHz - 30 MHz	3.8 dB						
Voltage probe	150 kHz - 30 MHz	2.9 dB						
Radiated disturbance								
3 m	9 kHz - 30 MHz	3.3 dB	3.4 dB	3.4 dB	-	-	-	-
	30 MHz - 200 MHz (Horizontal)	4.6 dB	4.5 dB	4.7 dB	-	-	-	-
	30 MHz - 200 MHz (Vertical)	4.7 dB	4.7 dB	4.9 dB	-	-	-	-
	200 MHz - 1000 MHz (Horizontal)	4.9 dB	5.2 dB	5.2 dB	-	-	-	-
	200 MHz - 1000 MHz (Vertical)	6.1 dB	6.2 dB	6.2 dB	-	-	-	-
	1 GHz - 6 GHz	4.9 dB			-	-	-	-
	6 GHz - 18 GHz	5.2 dB			-	-	-	-
10 m	9 kHz - 30 MHz	3.1 dB	3.3 dB	3.2 dB	-	-	-	-
	30 MHz - 200 MHz (Horizontal)	4.6 dB	4.5 dB	4.7 dB	-	-	-	-
	30 MHz - 200 MHz (Vertical)	4.5 dB	4.5 dB	4.8 dB	-	-	-	-
	200 MHz - 1000 MHz (Horizontal)	4.7 dB	4.9 dB	4.9 dB	-	-	-	-
	200 MHz - 1000 MHz (Vertical)	4.7 dB	5.0 dB	5.0 dB	-	-	-	-
	1 GHz - 18 GHz	5.1 dB			-	-	-	-

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3.6 Test Location

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FCC Test Firm Registration Number: 788329

	IC Registration Number	Width x Depth x Height (m)	Size of reference ground plane (m) / horizontal conducting plane	Other rooms
No.1 open area test site	2973A-1	-	40 x 20	-
No.2 open area test site	2973A-2	-	20 x 18	-
No.3 open area test site	2973A-3	-	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 E.U.T. during testing

4.1 Operating modes

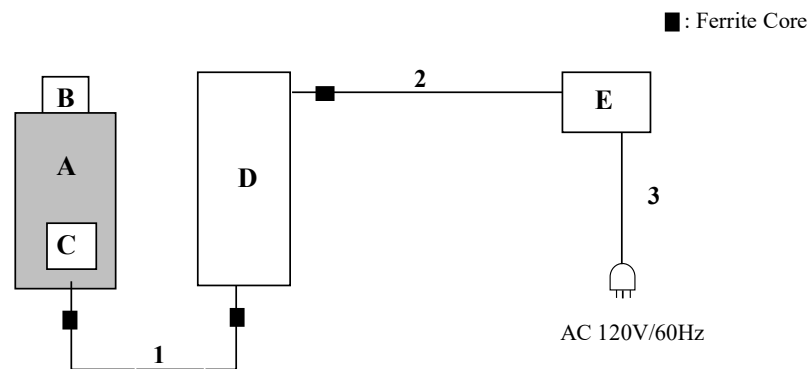
The EUT exercise program used during testing was designed to exercise the various system components in a manner similar to typical use.

Test sequence is used:

1. Running mode
2. Standby mode

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.

Description of EUT and Support equipment

No.	Item	Model number	Serial number	Manufacturer	Remark
A	Biometric Reader	PC-KCB120	No.20	Hitachi, Ltd. Service Platform Businesses Division Group	EUT
B	Smart Card	-	-	-	-
C	Test Jig	-	-	-	-
D	Laptop PC	Lenovo	-	Lenovo Japan Co., Ltd.	-
E	AC Adapter	ADLX45NCC3A	00HM615	Lenovo Japan Co., Ltd.	-

List of cables used

No.	Name	Length (m)	Cable Shield	Connector Shield	Remark
1	USB cable	1.8	shielded	shielded	-
2	DC Power Cable	1.5	Unshielded	Unshielded	-
3	AC Power Cable	0.9	Unshielded	Unshielded	3 wire

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Section 5: Conducted emission

5.1 Operating environment

The test was carried out in shielded room.

Temperature	: See data
Humidity	: See data

5.2 Test configuration

EUT was placed on a wooden platform of nominal size, 1 m by 1.8 m raised 80 cm above the conducting ground plane. The rear of tabletop was located 40cm to the vertical conducting plane. The rear of EUT and its peripherals was aligned and flushed with rear of tabletop. All other surfaces of tabletop were at least 80 cm from any other grounded conducting surface.

EUT was located 80 cm from the LISN and excess AC cable was bundled in center. I/O cables that were connected to the peripherals were bundled in center. They were folded back and forth forming a bundle and were hanged at a 40 cm height to the ground plane. Each EUT current-carrying power lead, except the ground (safety) lead, was individually connected through a LISN to the input power source. All unused 50 ohm connectors of the LISN were resistively terminated in 50 ohm when not connected to the measuring equipment.

Photographs of the set up are shown in Appendix 1.

5.3 Test conditions

Frequency range	: 0.15 MHz - 30 MHz
EUT position	: Table top

5.4 Test procedure

The AC Mains Terminal Continuous disturbance Voltage had been measured with the EUT in shielded room. The EUT was connected to a Line Impedance Stabilization Network (LISN).

An overview sweep with peak detection has been performed.

The measurements had been performed with a quasi-peak detector and if required, with an average detector.

The conducted emission measurements were made with the following detector function of the test receiver.

Detector Type	: QP / CAV
IF Band width	: 9 kHz / 9 kHz

5.5 Results

Summary of the test results: Pass

Section 6: Radiated emission

6.1 Operating environment

This test was carried out in open area test site.

Temperature : See data

Humidity : See data

6.2 Test configuration

EUT was placed on a table which was 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 40 cm 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.

6.3 Test conditions

Frequency range : 30 MHz - 2000 MHz

Test distance : 3 m

EUT position : Table top

6.4 Test procedure

The Radiated Electric Field Strength intensity has been measured on an open test site with a ground plane at a distance of 3 m*. (30 MHz – 1000 MHz)

* Measuring distance

☐ The boundary of the EUT is defined by an imaginary straight-line periphery describing a simple geometric configuration encompassing the EUT.

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

☐ This test report use worst case for the setup.

Pre check measurements were performed in shielded room with a search coil at 30 MHz - 2000 MHz to distinguish disturbances of EUT from the ambient noise.

Measurements were performed with quasi-peak detector, average detector and 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.

The radiated emission measurements were made with the following detector function of the test receiver and spectrum analyzer.

Frequency	: 30 MHz-1000 MHz	1000 MHz-2000 MHz *1)
Instrument used	: Test Receiver	Test Receiver
Detector Type	: QP	AV PK
IF Band width	: 120 kHz	RBW 1 MHz RBW 1 MHz

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

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

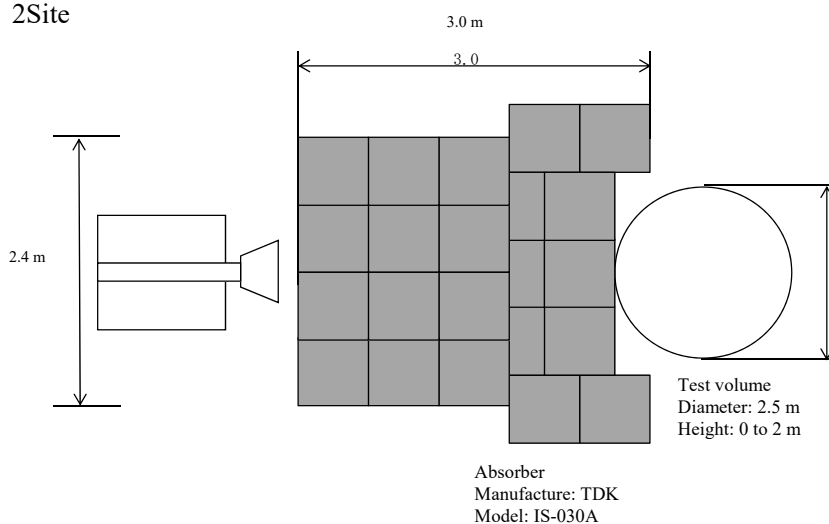
Distance factor and actual distance are shown in Appendix 2.

6.5 Results

Summary of the test results: Pass

Figure. Absorber arrangement

2Site



Appendix 1: Data of EMI test

DATA OF CONDUCTED DISTURBANCE TEST

UL Japan, Inc. Yokowa EMC Lab. No.2 Shielded room
Date : 05/21/2018

Report No. : 12317275Y-B
Power : AC 120 V / 60 Hz
Temp./Humi. : 22 deg.C / 44 % RH
Engineer : Tetsuya Uemura

Mode / Remarks : 1. Running / ID:146973 LISN N Phase with Adapter_HP OFF (2017-10-10)

LIMIT : FCC Part 15 B CLASS B (QP)
FCC Part 15 B CLASS B (AV)

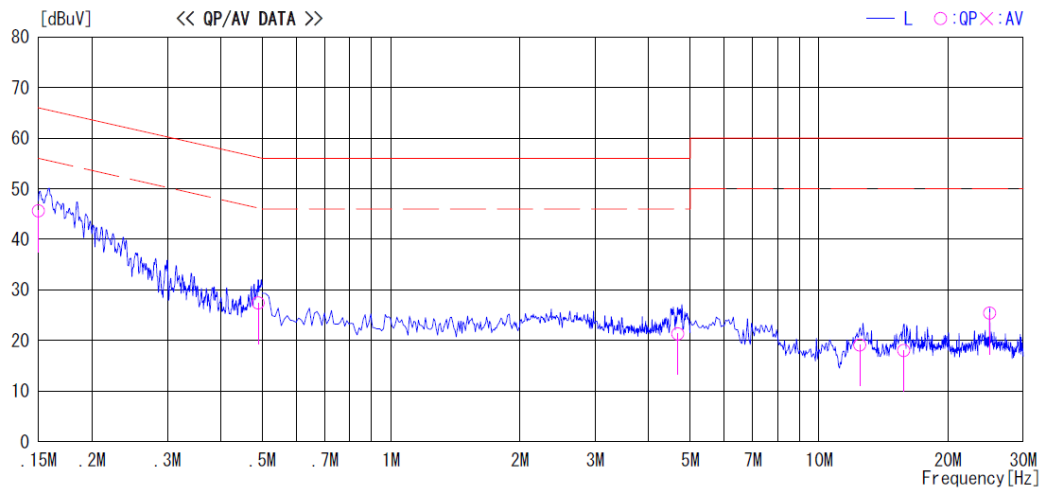
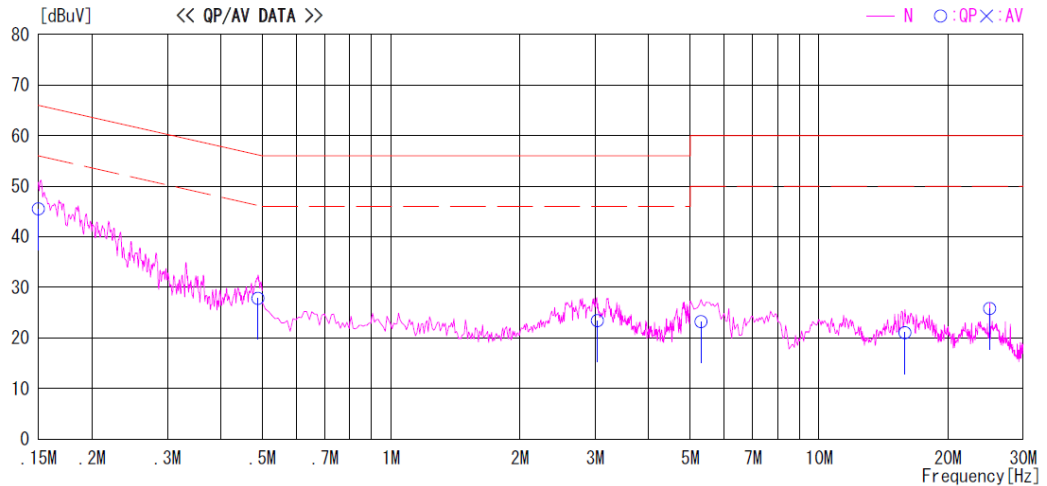


CHART:WITH FACTOR. Peak hold data. Except for the above table: adequate margin data below the limits.
CALCULATION:RESULT[dBuV]=READING[dBuV]+C. F (LOSS) [dB] (LISN+CABLE)

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DATA OF CONDUCTED DISTURBANCE TEST

UL Japan, Inc. Yokowa EMC Lab. No.2 Shielded room
Date : 05/21/2018

Report No. : 12317275Y-B
Power : AC 120 V / 60 Hz
Temp./Humi. : 22 deg.C / 44 % RH
Engineer : Tetsuya Uemura

Mode / Remarks : 1. Running / ID:146973 LISN N Phase with Adapter_HP OFF (2017-10-10)

LIMIT : FCC Part 15 B CLASS B (QP)
FCC Part 15 B CLASS B (AV)

Frequency [MHz]	Reading Level		Corr. Factor [dB]	Results		Limit		Margin		Phase
	QP [dBuV]	AV [dBuV]		QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	QP [dB]	AV [dB]	
0.15000	35.6	---	9.9	45.5	---	66.0	---	20.5	---	N
0.15000	35.7	---	9.9	45.6	---	66.0	---	20.4	---	L
0.48878	17.9	---	9.9	27.8	---	56.2	---	28.4	---	N
0.48948	17.5	---	9.9	27.4	---	56.2	---	28.8	---	L
3.03487	13.3	---	10.1	23.4	---	56.0	---	32.6	---	N
4.67533	11.1	---	10.2	21.3	---	56.0	---	34.7	---	L
5.30060	13.0	---	10.2	23.2	---	60.0	---	36.8	---	N
12.44527	8.6	---	10.5	19.1	---	60.0	---	40.9	---	L
15.77157	7.3	---	10.7	18.0	---	60.0	---	42.0	---	L
15.87177	10.3	---	10.7	21.0	---	60.0	---	39.0	---	N
25.04013	14.8	---	11.0	25.8	---	60.0	---	34.2	---	N
25.04013	14.4	---	11.0	25.4	---	60.0	---	34.6	---	L

CHART: WITH FACTOR, Peak hold data. Except for the above table: adequate margin data below the limits.
CALCULATION: RESULT [dBuV] = READING [dBuV] + C. F (LOSS) [dB] (LISN+CABLE)

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DATA OF CONDUCTED DISTURBANCE TEST

UL Japan, Inc. Yokowa EMC Lab. No.2 Shielded room
Date : 05/21/2018

Report No. : 12317275Y-B
Power : AC 120 V / 60 Hz
Temp./Humi. : 22 deg. C / 44 % RH
Engineer : Tetsuya Uemura

Mode / Remarks : 2.Standby / ID:146973 LISN N Phase with Adapter_HP OFF (2017-10-10)

LIMIT : FCC Part 15 B CLASS B (QP)
FCC Part 15 B CLASS B (AV)

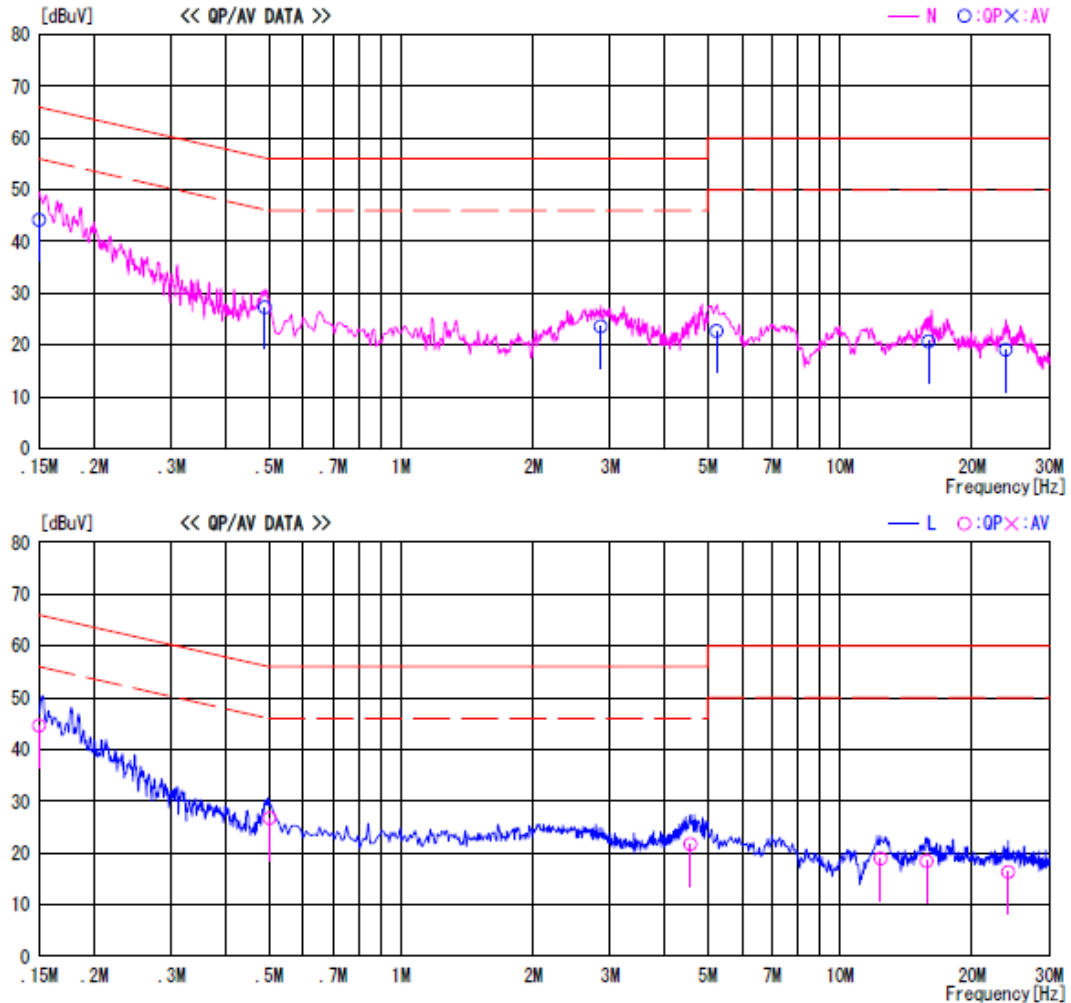


CHART:WITH FACTOR, Peak hold data. Except for the above table: adequate margin data below the limits.
CALCULATION: RESULT[dBuV]=READING[dBuV]+C. F (LOSS) [dB] (LISN+CABLE)

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Date : 05/21/2018

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Power : AC 120 V / 60 Hz
Temp./Humi. : 22 deg. C / 44 % RH
Engineer : Tetsuya Uemura

Mode / Remarks : 2. Standby / ID:146973 LISN N Phase with Adapter_HP OFF (2017-10-10)

LIMIT : FCC Part 15 B CLASS B (QP)
FCC Part 15 B CLASS B (AV)

Frequency [MHz]	Reading Level		Corr. Factor [dB]	Results		Limit		Margin		Phase
	QP [dBuV]	AV [dBuV]		QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	QP [dB]	AV [dB]	
0.15000	34.3	---	9.9	44.2	---	66.0	---	21.8	---	N
0.15000	34.7	---	9.9	44.6	---	66.0	---	21.4	---	L
0.49018	17.4	---	9.9	27.3	---	56.2	---	28.9	---	N
0.50256	16.8	---	9.9	26.7	---	56.0	---	29.3	---	L
2.85370	13.5	---	10.1	23.6	---	56.0	---	32.4	---	N
4.56711	11.5	---	10.2	21.7	---	56.0	---	34.3	---	L
5.24021	12.5	---	10.2	22.7	---	60.0	---	37.3	---	N
12.39408	8.4	---	10.5	18.9	---	60.0	---	41.1	---	L
15.77157	7.7	---	10.7	18.4	---	60.0	---	41.6	---	L
15.92960	10.0	---	10.7	20.7	---	60.0	---	39.3	---	N
23.88782	8.2	---	10.9	19.1	---	60.0	---	40.9	---	N
24.18843	5.4	---	10.9	16.3	---	60.0	---	43.7	---	L

CHART:WITH FACTOR. Peak hold data. Except for the above table: adequate margin data below the limits.
CALCULATION: RESULT [dBuV]=READING [dBuV]+C. F (LOSS) [dB] (LISN+CABLE)

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DATA OF RADIATED DISTURBANCE TEST

UL Japan, Inc. Yokowa EMC Lab. No.2 Open area test site
Date : 05/22/2018

Report No. : 12317275Y-B
Power : DC 5 V(AC 120 V / 60 Hz)
Temp./Humi. : 18 deg. C / 47 % RH
Engineer : Tetsuya Uemura

Mode / Remarks : 1. Running

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

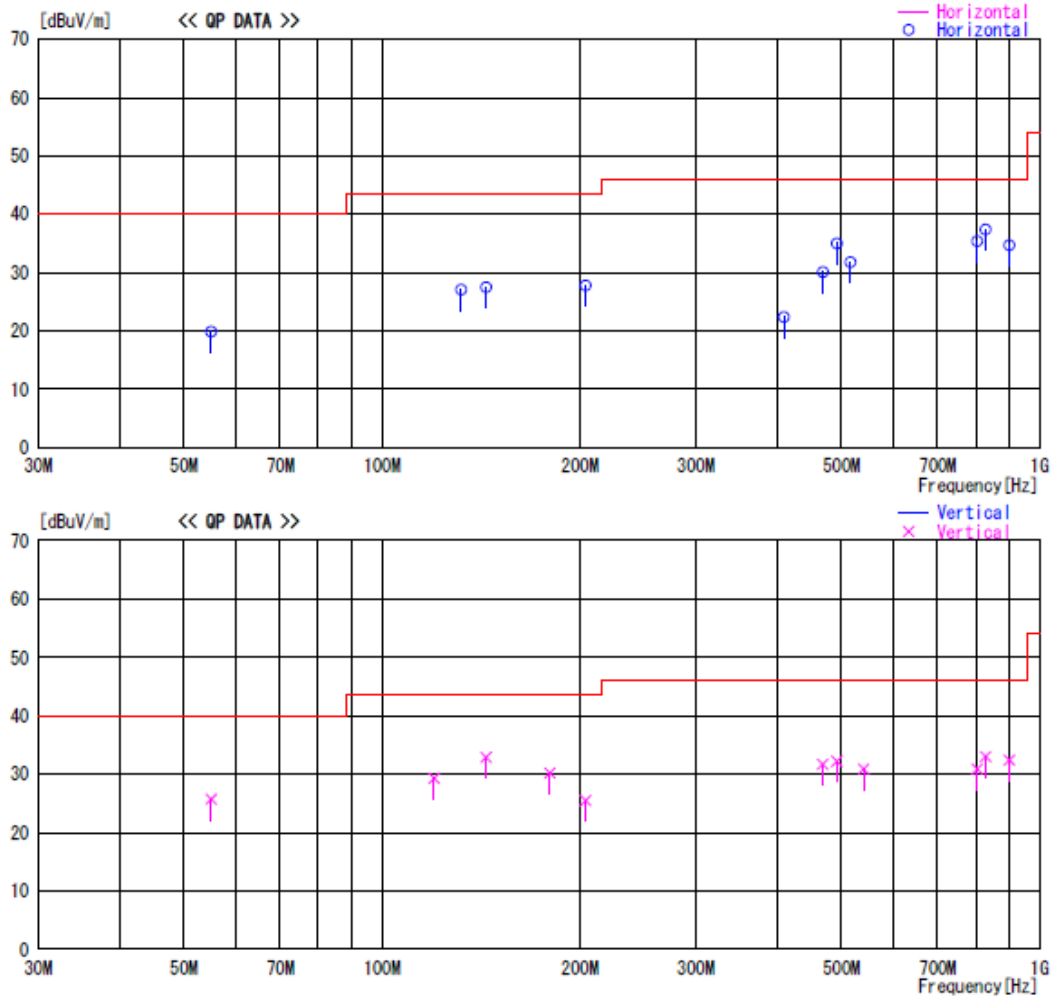


CHART: WITH FACTOR ANT TYPE: -30MHz: LOOP, 30-199.99MHz: BICONICAL, 200MHz-1000MHz: LOGPERIODIC, 1000MHz-: HORN
CALCULATION: RESULT = READING + ANT FACTOR + LOSS (CABLE+ATTEN. (ATTEN: Below 1GHz only)) - GAIN (AMP) + ANSI C63.5_ΔAF

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Report No. : 12317275Y-B
Power : DC 5 V(AC 120 V / 60 Hz)
Temp./Humi. : 18 deg.C / 47 % RH
Engineer : Tetsuya Uemura

Mode / Remarks : 1. Running

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

Frequency [MHz]	Reading [dBuV]	DET	Antenna	Loss&	Level [dBuV/m]	Polar.	Limit [dBuV/m]	Margin [dB]
			Factor [dB/m]	Gain [dB]				
54.997	39.2	QP	8.9	-22.4	25.7	Vert.	40.0	14.3
54.998	33.4	QP	8.9	-22.4	19.9	Hori.	40.0	20.1
120.039	40.3	QP	10.5	-21.5	29.3	Vert.	43.5	14.2
132.004	37.1	QP	11.4	-21.4	27.1	Hori.	43.5	16.4
144.004	41.9	QP	12.2	-21.2	32.9	Vert.	43.5	10.6
144.020	36.5	QP	12.2	-21.2	27.5	Hori.	43.5	16.0
180.002	36.6	QP	14.3	-20.7	30.2	Vert.	43.5	13.3
204.008	39.8	QP	11.6	-23.6	27.8	Hori.	43.5	15.7
204.008	37.5	QP	11.6	-23.6	25.5	Vert.	43.5	18.0
408.613	28.5	QP	16.0	-22.1	22.4	Hori.	46.0	23.6
468.003	36.2	QP	17.2	-21.7	31.7	Vert.	46.0	14.3
468.331	34.6	QP	17.2	-21.7	30.1	Hori.	46.0	15.9
492.002	38.9	QP	17.7	-21.6	35.0	Hori.	46.0	11.0
492.002	36.1	QP	17.7	-21.6	32.2	Vert.	46.0	13.8
516.002	35.2	QP	18.1	-21.5	31.8	Hori.	46.0	14.2
540.004	33.9	QP	18.4	-21.4	30.9	Vert.	46.0	15.1
804.007	34.3	QP	20.9	-19.8	35.4	Hori.	46.0	10.6
804.002	29.8	QP	20.9	-19.8	30.9	Vert.	46.0	15.1
828.055	35.7	QP	21.2	-19.5	37.4	Hori.	46.0	8.6
828.003	31.3	QP	21.2	-19.5	33.0	Vert.	46.0	13.0
900.004	31.2	QP	22.1	-18.6	34.7	Hori.	46.0	11.3
900.003	28.9	QP	22.1	-18.6	32.4	Vert.	46.0	13.6

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

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DATA OF RADIATED DISTURBANCE TEST

UL Japan, Inc. Yokowa EMC Lab. No.2 Open area test site
Date : 05/22/2018

Report No. : 12317275Y-B
Power : DC 5 V (AC 120 V / 60 Hz)
Temp./Humi. : 18 deg.C / 47 % RH
Engineer : Yasunori Hashizume

Mode / Remarks : 2.Standby

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

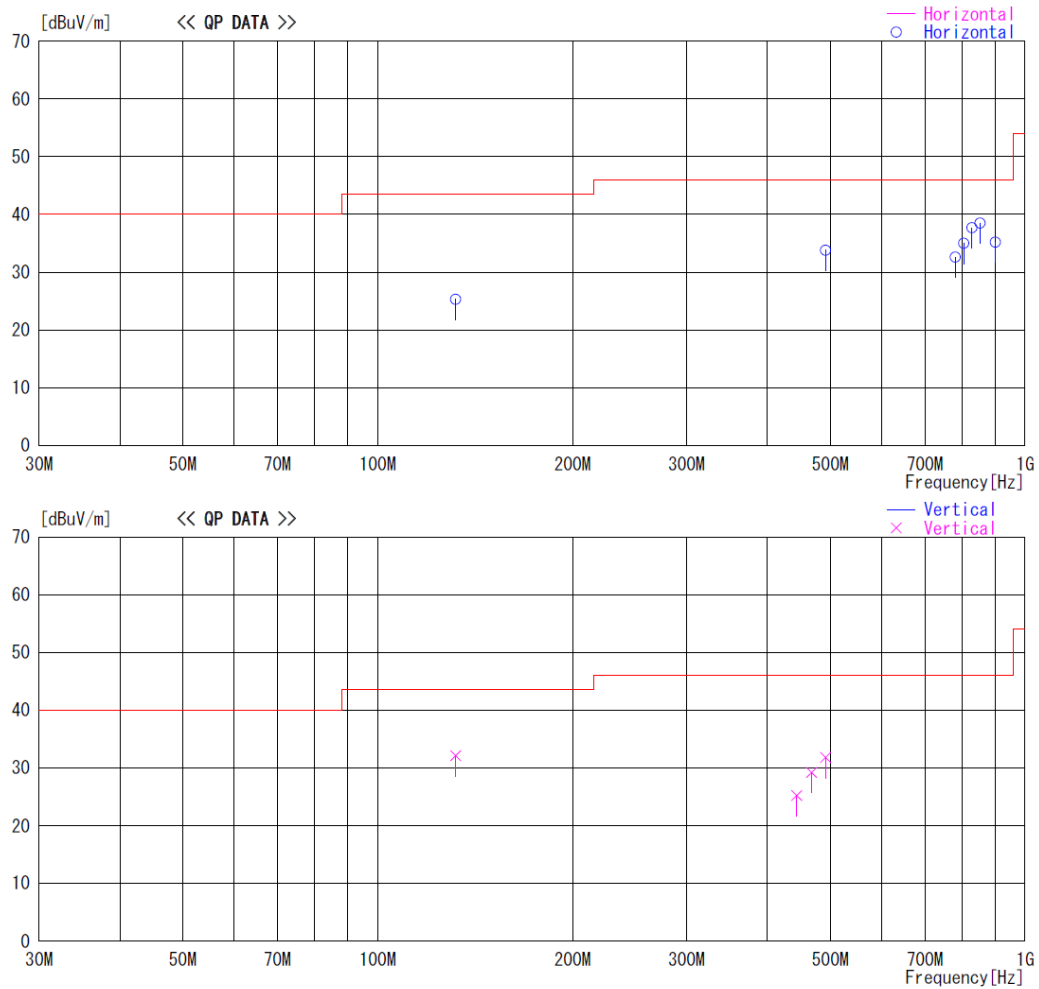


CHART:WITH FACTOR ANT TYPE: -30MHz:LOOP, 30-199.99MHz:BICONICAL, 200MHz-1000MHz:LOGPERIODIC, 1000MHz-:HORN
CALCULATION:RESULT = READING + ANT FACTOR + LOSS(CABLE+ATTEN. (ATTEN: Below 1GHz only)) - GAIN(AMP) + ANSI C63.5_ΔAF

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DATA OF RADIATED DISTURBANCE TEST

UL Japan, Inc. Yokowa EMC Lab. No.2 Open area test site
Date : 05/22/2018

Report No. : 12317275Y-B
Power : DC 5 V (AC 120 V / 60 Hz)
Temp./Humi. : 18 deg.C / 47 % RH
Engineer : Yasunori Hashizume

Mode / Remarks : 2.Standby

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

Frequency	Reading	DET	Antenna	Loss&	Level	Polar.	Limit	Margin
			Factor	Gain				
[MHz]	[dBuV]		[dB/m]	[dB]	[dBuV/m]		[dBuV/m]	[dB]
131.998	35.3	QP	11.4	-21.4	25.3	Hori.	43.5	18.2
132.001	42.1	QP	11.4	-21.4	32.1	Vert.	43.5	11.4
444.008	30.4	QP	16.7	-21.9	25.2	Vert.	46.0	20.8
468.008	33.7	QP	17.2	-21.7	29.2	Vert.	46.0	16.8
492.008	37.7	QP	17.7	-21.6	33.8	Hori.	46.0	12.2
492.010	35.7	QP	17.7	-21.6	31.8	Vert.	46.0	14.2
780.008	32.0	QP	20.6	-20.0	32.6	Hori.	46.0	13.4
804.010	33.9	QP	20.9	-19.8	35.0	Hori.	46.0	11.0
828.008	36.0	QP	21.2	-19.5	37.7	Hori.	46.0	8.3
852.008	36.2	QP	21.5	-19.2	38.5	Hori.	46.0	7.5
900.008	31.7	QP	22.1	-18.6	35.2	Hori.	46.0	10.8

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

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DATA OF RADIATED DISTURBANCE TEST

UL Japan, Inc. Yokowa EMC Lab. No. 2 Open area test site
Date : 05/22/2018

Report No. : 12317275Y-B
Power : DC 5 V (AC 120 V / 60 Hz)
Temp./Humi. : 18 deg. C / 47 % RH
Engineer : Yasunori Hashizume

Mode / Remarks : 1. Running

LIMIT : FCC Part 15B CLASS B (PK, 3m)
FCC Part 15B CLASS B (AV, 3m)

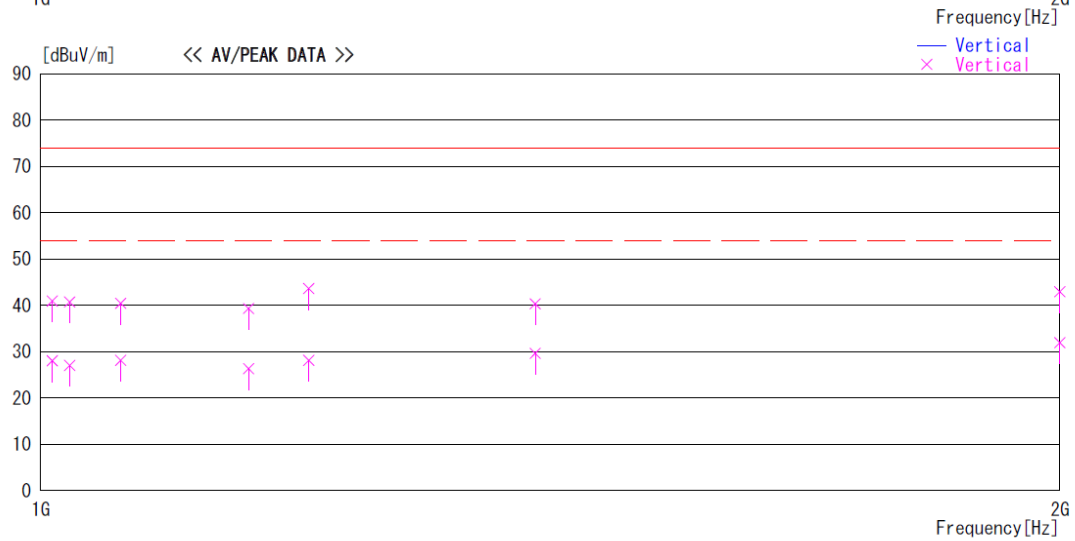
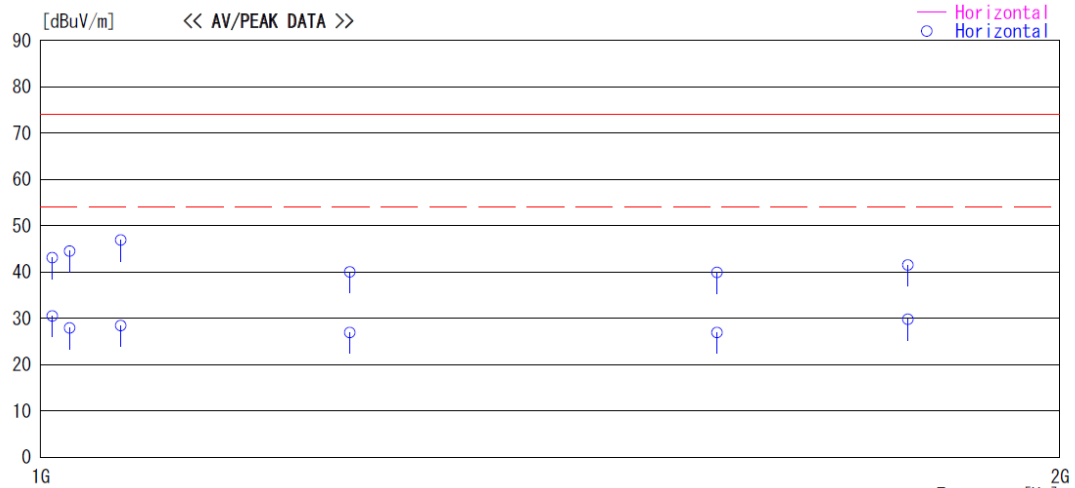


CHART:WITH FACTOR ANT TYPE: -30MHz:LOOP, 30-199.99MHz:BICONICAL, 200MHz-1000MHz:LOGPERIODIC, 1000MHz-:HORN
CALCULATION:RESULT = READING + ANT FACTOR + LOSS(CABLE+DISTANCE FACTOR) - GAIN(AMP). ACTUAL DISTANCE=4.05m

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DATA OF RADIATED DISTURBANCE TEST

UL Japan, Inc. Yokowa EMC Lab. No.2 Open area test site
Date : 05/22/2018

Report No. : 12317275Y-B
Power : DC 5 V (AC 120 V / 60 Hz)
Temp./Humi. : 18 deg. C / 47 % RH
Engineer : Yasunori Hashizume

Mode / Remarks : 1. Running

LIMIT : FCC Part 15B CLASS B (PK, 3m)
FCC Part 15B CLASS B (AV, 3m)

Frequency [MHz]	Reading [dBuV]	DET	Antenna	Loss&	Level [dBuV/m]	Polar.	Limit [dBuV/m]	Margin [dB]
			Factor [dB/m]	Gain [dB]				
1008.001	50.9	PK	25.5	-35.5	40.9	Vert.	74.0	33.1
1008.001	38.0	AV	25.5	-35.5	28.0	Vert.	54.0	26.0
1008.017	53.1	PK	25.5	-35.5	43.1	Hori.	74.0	30.9
1008.017	40.5	AV	25.5	-35.5	30.5	Hori.	54.0	23.5
1020.001	54.5	PK	25.4	-35.4	44.5	Hori.	74.0	29.5
1020.001	37.9	AV	25.4	-35.4	27.9	Hori.	54.0	26.1
1020.004	50.7	PK	25.4	-35.4	40.7	Vert.	74.0	33.3
1020.004	37.0	AV	25.4	-35.4	27.0	Vert.	54.0	27.0
1055.993	50.3	PK	25.4	-35.3	40.4	Vert.	74.0	33.6
1055.993	38.0	AV	25.4	-35.3	28.1	Vert.	54.0	25.9
1056.001	38.3	AV	25.4	-35.3	28.4	Hori.	54.0	25.6
1056.001	56.8	PK	25.4	-35.3	46.9	Hori.	74.0	27.1
1152.009	49.0	PK	25.3	-35.0	39.3	Vert.	74.0	34.7
1152.009	36.0	AV	25.3	-35.0	26.3	Vert.	54.0	27.7
1200.016	53.2	PK	25.3	-34.9	43.6	Vert.	74.0	30.4
1200.016	37.7	AV	25.3	-34.9	28.1	Vert.	54.0	25.9
1234.022	49.6	PK	25.2	-34.8	40.0	Hori.	74.0	34.0
1234.022	36.5	AV	25.2	-34.8	26.9	Hori.	54.0	27.1
1399.862	49.5	PK	25.1	-34.3	40.3	Vert.	74.0	33.7
1399.862	38.8	AV	25.1	-34.3	29.6	Vert.	54.0	24.4
1584.014	48.6	PK	25.3	-34.0	39.9	Hori.	74.0	34.1
1584.014	35.6	AV	25.3	-34.0	26.9	Hori.	54.0	27.1
1803.570	49.2	PK	25.8	-33.5	41.5	Hori.	74.0	32.5
1803.570	37.5	AV	25.8	-33.5	29.8	Hori.	54.0	24.2
1999.823	49.9	PK	26.2	-33.2	42.9	Vert.	74.0	31.1
1999.823	38.9	AV	26.2	-33.2	31.9	Vert.	54.0	22.1

CHART:WITH FACTOR ANT TYPE: -30MHz:LOOP, 30-199.99MHz:BICONICAL, 200MHz-1000MHz:LOGPERIODIC, 1000MHz-:HORN
CALCULATION:RESULT = READING + ANT FACTOR + LOSS(CABLE+DISTANCE FACTOR) - GAIN(AMP). ACTUAL DISTANCE=4.05m

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DATA OF RADIATED DISTURBANCE TEST

UL Japan, Inc. Yokowa EMC Lab. No.2 Open area test site
Date : 05/22/2018

Report No. : 12317275Y-B
Power : DC 5 V (AC 120 V / 60 Hz)
Temp./Humi. : 18 deg. C / 47 % RH
Engineer : Yasunori Hashizume

Mode / Remarks : 2. Standby

LIMIT : FCC Part 15B CLASS B (PK, 3m)
FCC Part 15B CLASS B (AV, 3m)

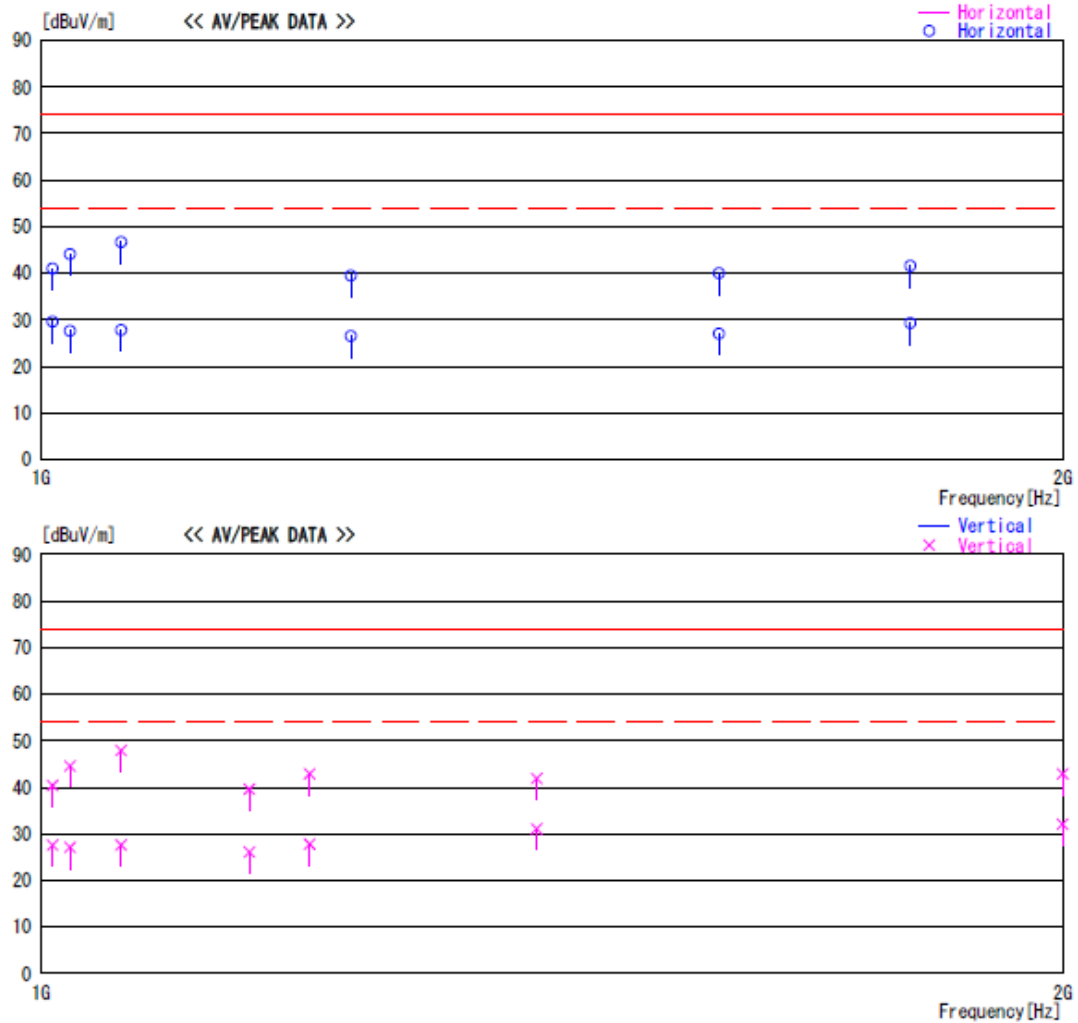


CHART:WITH FACTOR ANT TYPE: -30MHz:LOOP, 30-199.99MHz:BICONICAL, 200MHz-1000MHz:LOGPERIODIC, 1000MHz-:HORN
CALCULATION:RESULT = READING + ANT FACTOR + LOSS(CABLE+DISTANCE FACTOR) - GAIN(AMP). ACTUAL DISTANCE=4.05m

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Temp./Humi. : 18 deg.C / 47 % RH
Engineer : Yasunori Hashizume

Mode / Remarks : 2. Standby

LIMIT : FCC Part 15B CLASS B (PK, 3m)
FCC Part 15B CLASS B (AV, 3m)

Frequency [MHz]	Reading [dBuV]	DET	Antenna	Loss&	Level [dBuV/m]	Polar.	Limit [dBuV/m]	Margin [dB]
			Factor [dB/m]	Gain [dB]				
1008.001	50.4	PK	25.5	-35.5	40.4	Vert.	74.0	33.6
1008.001	37.6	AV	25.5	-35.5	27.6	Vert.	54.0	26.4
1008.017	51.0	PK	25.5	-35.5	41.0	Hori.	74.0	33.0
1008.017	39.6	AV	25.5	-35.5	29.6	Hori.	54.0	24.4
1020.001	54.1	PK	25.4	-35.4	44.1	Hori.	74.0	29.9
1020.001	37.6	AV	25.4	-35.4	27.6	Hori.	54.0	26.4
1020.004	54.6	PK	25.4	-35.4	44.6	Vert.	74.0	29.4
1020.004	37.1	AV	25.4	-35.4	27.1	Vert.	54.0	26.9
1055.993	57.8	PK	25.4	-35.3	47.9	Vert.	74.0	26.1
1055.993	37.5	AV	25.4	-35.3	27.6	Vert.	54.0	26.4
1056.001	56.6	PK	25.4	-35.3	46.7	Hori.	74.0	27.3
1056.001	37.7	AV	25.4	-35.3	27.8	Hori.	54.0	26.2
1152.009	49.3	PK	25.3	-35.0	39.6	Vert.	74.0	34.4
1152.009	35.8	AV	25.3	-35.0	26.1	Vert.	54.0	27.9
1200.016	52.5	PK	25.3	-34.9	42.9	Vert.	74.0	31.1
1200.016	37.4	AV	25.3	-34.9	27.8	Vert.	54.0	26.2
1234.022	49.1	PK	25.2	-34.8	39.5	Hori.	74.0	34.5
1234.022	36.1	AV	25.2	-34.8	26.5	Hori.	54.0	27.5
1399.862	51.1	PK	25.1	-34.3	41.9	Vert.	74.0	32.1
1399.862	40.3	AV	25.1	-34.3	31.1	Vert.	54.0	22.9
1584.014	48.7	PK	25.3	-34.0	40.0	Hori.	74.0	34.0
1584.014	35.7	AV	25.3	-34.0	27.0	Hori.	54.0	27.0
1803.570	49.3	PK	25.8	-33.5	41.6	Hori.	74.0	32.4
1803.570	37.0	AV	25.8	-33.5	29.3	Hori.	54.0	24.7
1999.823	49.9	PK	26.2	-33.2	42.9	Vert.	74.0	31.1
1999.823	39.1	AV	26.2	-33.2	32.1	Vert.	54.0	21.9

CHART:WITH FACTOR ANT TYPE:-30MHz:LOOP, 30-199.99MHz:BICONICAL, 200MHz-1000MHz:LOGPERIODIC, 1000MHz-:HORN
CALCULATION:RESULT = READING + ANT FACTOR + LOSS(CABLE+DISTANCE FACTOR) - GAIN(AMP). ACTUAL DISTANCE=4.05m

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Appendix 2: Test Instruments

Order No.: 12317275Y-B

Test Item	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Calibration Due Date	Cal Int
CE RE	146893	EMI Test Receiver	Rohde & Schwarz	ESU 26	100413	2017/7/24	2018/7/31	12
CE RE	146923	EMI measurement program	TSJ	TEPTO-DV	-	-	-	-
CE RE	146648	Tester	SANWA	PC500	7019227	2017/6/12	2018/6/30	12
CE RE	147540	Measure	Rubber KOMBE	GW-3H99W	-	-	-	-
CE	146874	Yokowa No.2 shield coaxial(0.01MHz-1000MHz)	UL Japan	CC-25,CC-27,CC-28,CC-29,SW-21,SW-22	YS0201	2017/6/26	2018/6/30	12
CE	146991	Digital Humidity Indicator	SATO	PC-5000TRH	B-15	2018/4/17	2019/4/30	12
RE	147517	Search Coil	UL Japan	-	-	-	-	-
RE	146984	Digital Humidity Indicator	SATO	PC-5000TRH	B-10	2018/4/17	2019/4/30	12
CE(EUT)	146973	LISN (AMN)	Rohde & Schwarz	ENV216	101055	2017/10/10	2018/10/31	12
RE	146611	Pre Amplifier	ANRITSU	MH648A	M97457	2017/7/5	2018/7/31	12
RE	146625	Attenuator	ANRITSU	MP721A	6200239014	2017/7/5	2018/7/31	12
RE	146572	Attenuator	ANRITSU	MP721B	6201150481	2017/10/25	2018/10/31	12
RE	146832	Biconical Antenna	Schwarzbeck	VHBB 9124	9124-731	2017/12/26	2018/12/31	12
RE	146964	Logperiodic Antenna	Schwarzbeck	VUSLP9111B	185	2017/12/14	2018/12/31	12
RE	146806	Yokowa No.2 open coaxial(0.01-1000MHz)	UL Japan	CC-21,CC-22,CC-23,CC-24,CC-25,CC-27,SW-21,SW	YO0201	2017/10/20	2018/10/31	12

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Order No.: 12317275Y-B

Test Item	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Calibration Due Date	Cal Int
RE	146944	Open area test site	JSE	3m、10m	2	2017/10/19	2018/10/31	12
RE	146601	Pre Amplifier	AGILENT	HP8449B	3008A01672	2017/12/10	2018/12/31	12
RE	146712	Broad-Band Horn Antenna	Schwarzbeck	BBHA 9120 D	9120D-684	2017/11/2	2018/11/30	12
RE	146820	Open area test site	JSE	3m,10m	2	2018/2/2	2019/2/28	12
RE	146811	Microwave Cable	Junkosha INC.	NWX315-0800NMSNMS/NW X315-0200NMSNMS/	NOV-27-15-001/1511-23	2018/1/19	2019/1/31	12
RE	147320	Antenna Tilt Jig	Intelligent System Engineering Co., Ltd	Antenna Tilt Jig	T-0005	-	-	-

***Hyphens for Last Calibration Date, Calibration Due 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.

All equipment is calibrated with valid calibrations. Each measurement data is traceable to the national or international standards.

As for some calibrations performed after the tested dates, those test equipment have been controlled by means of an unbroken chains of calibrations.

Test item

CE : Conducted disturbance

RE : Radiated disturbance

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