EMC TEST REPORT

Test Report No. : 12903641H-B

Applicant	:	**OMRON HEALTHCARE Co., Ltd.**
Type of Equipment	:	**BLOOD PRESSURE MONITOR**
Model No.	:	**HEM-7155T**
Test standard	:	**EN 301 489-1 V2.1.1** **EN 301 489-17 V3.1.1**
Test Result	:	**Complied (Refer to Section 3.2)**

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2. The results in this report apply only to the sample tested.
3. This sample tested is in compliance with the limits of the above standard.
4. The test results in this test report are traceable to the national or international standards.
5. This test report 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. Ise EMC Lab.
7. The opinions and the interpretations to the result of the description in this report are outside scopes where UL Japan has been accredited.
8. The information provided from the customer for this report is identified in SECTION 1.

Date of test: June 13 to 21, 2019

Representative test engineer: K. Yamamoto
Koji Yamamoto
Engineer
Consumer Technology Division

Approved by: Takayuki. S
Takayuki Shimada
Leader
Consumer Technology Division

RTL02610

☐ 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.: 12903641H-B

Revision	Test report No.	Date	Page revised	Contents
- (Original)	12903641H-B	June 26, 2019	-	-

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SECTION 1: Customer information

Company Name	:	OMRON HEALTHCARE Co., Ltd.
Address	:	53, Kunotsubo, Terado-cho, Muko, KYOTO, 617-0002 Japan
Telephone Number	:	+81-75-925-2045
Facsimile Number	:	+81-75-925-2046
Contact Person	:	Yoshinori Tsurumi

The information provided from the customer is as follows;
- Applicant, Type of Equipment, Model No. on the cover and other relevant pages
- SECTION 1: Customer information
- SECTION 2: Equipment under test (E.U.T.)
- SECTION 4: Operation of E.U.T. 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 (E.U.T.)

2.1 Identification of E.U.T.

Type of Equipment	:	BLOOD PRESSURE MONITOR
Model No.	:	HEM-7155T
Serial No.	:	Refer to SECTION 4, SECTION 4.2
Rating	:	DC 6.0 V (Battery) AC 100 V to 240 V / 50 Hz (AC Adapter)
Receipt Date of Sample (Information from test lab.)	:	June 12, 2019
Country of Mass-production	:	China, Vietnam, and Japan
Condition of EUT	:	Production prototype (Not for Sale: This sample is equivalent to mass-produced items.)
Modification of EUT	:	No Modification by the test lab.

2.2 Product description

Model: HEM-7155T (referred to as the EUT in this report) is a BLOOD PRESSURE MONITOR.

Variant models: HEM-7155T-E, HEM-7155T-D, HEM-7155T-ALRU, HEM-7157T, HEM-7159T, JPN616T, JPN610T

The differences among these models are as follow;
- the place of destination
- the existence or non-existence of backlight on the LCD

Radio Specification

Bluetooth Low Energy

Equipment Type	:	Transceiver
Frequency of Operation	:	2402 MHz - 2480 MHz
Type of Modulation	:	GFSK
Antenna Type	:	Chip Antenna
Antenna Gain	:	5.05 dBi
Operating Temperature	:	+10 deg. C to +40 deg. C
Receiver Category	:	Category 2

SECTION 3: Test specification, procedures and results

3.1 Test specification

EMC : EN 301 489-1 V2.1.1
EMC : EN 301 489-17 V3.1.1
Title : ElectroMagnetic Compatibility (EMC)standard for radio equipment and services;
Part 1 : Common technical requirements;
Harmonised Standard covering the essential requirements of article 3.1(b) of Directive 2014/53/EU and the essential requirements of article 6 of Directive 2014/30/EU
Part 17 : Specific conditions for Broadband Data Transmission Systems;
Harmonised standard covering the essential requirements of article 3.1(b) of Directive 2014/53/EU

Purpose of test : Compliance with the EMC standard for RE Directive 2014/53/EU

3.2 Procedures and results

EMI

Phenomena	Application	Equipment Test requirement: Radio and Ancillary equipment for fixed use (eg. base station equipment)	Test Procedure	Deviation	Worst margin	Result	Remarks
Radiated emission	Enclosure of ancillary equipment	Applicable to ancillary equipment	EN 55032:2015 +AC:2016	N/A	N/A	N/A	*1)
Conducted emission	DC Power input/output port	Applicable	EN 55032:2015 +AC:2016	N/A	N/A	N/A	*2)
Conducted emission	AC Mains input/output port	Applicable	EN 55032:2015 +AC:2016	N/A	23.81 dB (4.91638 MHz, QP, L)	Complied a)	-
Harmonics current emissions	AC Mains input port	Applicable	EN 61000-3-2:2014 Class A	N/A	Refer to attached data	Complied b)	*3)
Voltage Fluctuations and flicker	AC Mains input port	Applicable	EN 61000-3-3:2013 Clause 5	N/A	Refer to attached data	Complied b)	-
Conducted emission	Wired network port	Applicable	EN 55032:2015 +AC:2016	N/A	N/A	N/A	*4)

*Note: UL Japan, Inc.'s EMI Work Procedure 13-EM-W0420.
*1) The test is not applicable since the EUT does not have ancillary equipment.
*2) Conducted emission test was performed on AC adaptor and was not applied at DC power port.
*3) Although the EUT is not applicable to Harmonics test since the rated power is less than 75W, it has been tested as a reference according to limits for Class A.
*4) The test is not applicable since the EUT does not have Wired network ports.

a) Refer to APPENDIX 1 (data of Conducted emission)
b) Refer to APPENDIX 1 (data of Harmonic current emissions, Voltage fluctuations and flicker)

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.

EMS

Requirement	Application	Equipment Test requirement: Radio and Ancillary Equipment for fixed use (eg. base station equipment)	Test Procedure	Criteria	Actual Performance	Result	Remarks
Electrostatic Discharge	Enclosure	Applicable	EN 61000-4-2 :2009	B	±2 kV, ±4 kV contact discharge ±2 kV, ±4 kV, ±8 kV air discharge	Complied a)	*1)
Radio frequency electromagnetic field	Enclosure	Applicable	EN 61000-4-3: 2006+A1: 2008+A2:2010	A	80 MHz - 6000 MHz 3.0 V/m (unmodulated, r.m.s.) AM, 1 kHz, 80 %	Complied b)	-
Fast transients, common mode	Signal, Wired network and control ports, DC and AC Power ports	Applicable	EN 61000-4-4 :2012	B	AC Power ports ±1.0 kV 5 / 50 ns, 5 kHz / 100 kHz	Complied c)	*2)
Surges	AC mains power input ports, Wired network ports (indoor, outdoor cables)	Applicable	EN 61000-4-5 :2014	B	AC mains power input ports ±0.5 kV,±1.0 kV(Line to Line) 1.2 / 50 us	Complied d)	*3), *4)
Radio frequency, common mode	Signal, Wired network and control ports, DC and AC Power ports	Applicable	EN 61000-4-6 :2014	A	AC Power ports, 0.15 MHz - 80 MHz, 3.0 V (unmodulated, r.m.s.) AM, 1 kHz, 80 %	Complied e)	*2)
Transients and surges in the vehicular environment	DC power input ports	Not applicable	ISO7637-2 :2004	N/A	N/A	N/A	-
Voltage dips and interruptions	AC mains power input ports	Applicable	EN 61000-4-11 :2004	C B C	0 % Ut / 250 periods (interruptions) 0 % Ut / 0.5, 1.0 periods (dips) 70 % Ut / 25 periods (dips) Ut: Rated voltage of EUT.	Complied f)	-

*Note: UL Japan, Inc.'s EMS Work Procedure 13-EM-W0417.
*1) The test was performed from lower level.
*2) The tests on signal, control, DC Power ports and Wired network ports are not applicable since the EUT does not have these ports.
*3) The test on Wired network ports is not applicable since the EUT does not have Wired network ports.
*4) *4) The test on Line to ground is not applicable since the EUT does not have the protective earth terminal.

a) Refer to Table 1 of SECTION 7
b) Refer to Table 2 of SECTION 8
c) Refer to Table 3 of SECTION 9
d) Refer to Table 4 of SECTION 10
e) Refer to Table 5 of SECTION 11
f) Refer to Table 6 of SECTION 12

3.3 Addition to standard

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

3.4 Performance criteria

For the EUT, the customer has decided that the performance criteria defined in EN 301 489-17, should be applied as follows:

Criteria	During test	After test
A	Shall operate as intended. (see note 1). Shall be no loss of function. Shall be no unintentional transmissions.	Shall operate as intended. Shall be no degradation of performance (see note 3). Shall be no loss of function. Shall be no loss of stored data or user programmable functions.
B	May show loss of function (one or more) May show degradation of performance (see note 2). Shall be no unintentional transmissions.	Functions shall be self-recoverable. Shall operate as intended after recovering. Shall be no degradation of performance (see note 3). Shall be no loss of stored data or user programmable functions.
C	May be loss of function (one or more)	Functions shall be recoverable by the operator. Shall operate as intended after recovering. Shall be no degradation of performance (see note 3).

NOTE 1: Operate as intended during the test allows a level of degradation not below a minimum performance level specified by the manufacturer for the use of the apparatus as intended. In some cases the specified minimum performance level may be replaced by a permissible degradation of performance. If the minimum performance level or the permissible performance degradation is not specified by the manufacturer then either of these may be derived from the product description and documentation (including leaflets and advertising) and what the user may reasonably expect from the apparatus if used as intended.

NOTE 2: Degradation of performance during the test is understood as a degradation to a level not below a minimum performance level specified by the manufacturer for the use of the apparatus as intended. In some cases the specified minimum performance level may be replaced by a permissible degradation of performance.
If the minimum performance level or the permissible performance degradation is not specified by the manufacturer then either of these may be derived from the product description and documentation (including leaflets and advertising) and what the user may reasonably expect from the apparatus if used as intended.

NOTE 3: No degradation of performance after the test is understood as no degradation below a minimum performance level specified by the manufacturer for the use of the apparatus as intended. In some cases the specified minimum performance level may be replaced by a permissible degradation of performance. After the test no change of actual operating data or user retrievable data is allowed.
If the minimum performance level or the permissible performance degradation is not specified by the manufacturer then either of these may be derived from the product description and documentation (including leaflets and advertising) and what the user may reasonably expect from the apparatus if used as intended.

3.5 Uncertainty

EMI

Although this standard determines only the limit value of uncertainty, there is no applicable rule of uncertainty in this. 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 $k = 2$.

Conducted emission

using Item	Frequency range	Uncertainty (+/-)
AMN (LISN)	0.009 MHz to 0.15 MHz	3.8 dB
	0.15 MHz to 30 MHz	3.4 dB

Harmonics Current, Flicker and voltage fluctuations

Test Item		Uncertainty (+/-)
Harmonics Current		0.38 %
Flicker and voltage fluctuations	PST, PLT	0.28 %
	dc	0.24 %
	dmax	0.31 %
	d(t)	0.09 %

EMS

These tests are qualitative tests and uncertainties do not apply directly to the results.
The uncertainty of the EMS testing of the laboratory is within the tolerance specified by each standard.

3.6 Test Location

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JAB Accreditation No. RTL02610

Test site	Width x Depth x Height (m)	Size of reference ground plane (m) / horizontal conducting plane	Other rooms	Maximum measurement distance
No.1 semi-anechoic chamber	19.2 x 11.2 x 7.7	7.0 x 6.0	No.1 Power source room	10 m
No.2 semi-anechoic chamber	7.5 x 5.8 x 5.2	4.0 x 4.0	-	3 m
No.3 semi-anechoic chamber	12.0 x 8.5 x 5.9	6.8 x 5.75	No.3 Preparation room	3 m
No.3 shielded room	4.0 x 6.0 x 2.7	N/A	-	-
No.4 semi-anechoic chamber	12.0 x 8.5 x 5.9	6.8 x 5.75	No.4 Preparation room	3 m
No.4 shielded room	4.0 x 6.0 x 2.7	N/A	-	-
No.5 semi-anechoic chamber	6.0 x 6.0 x 3.9	6.0 x 6.0	-	-
No.5 measurement room	6.4 x 6.4 x 3.0	6.4 x 6.4	-	-
No.6 shielded room	4.0 x 4.5 x 2.7	4.0 x 4.5	-	-
No.6 measurement room	4.75 x 5.4 x 3.0	4.75 x 4.15	-	-
No.7 shielded room	4.7 x 7.5 x 2.7	4.7 x 7.5	-	-
No.8 measurement room	3.1 x 5.0 x 2.7	3.1 x 5.0	-	-
No.9 measurement room	8.8 x 4.6 x 2.8	2.4 x 2.4	-	-
No.11 measurement room	6.2 x 4.7 x 3.0	4.8 x 4.6	-	-

* Size of vertical conducting plane (for Conducted Emission test) : 2.0 m × 2.0 m for No.1, No.2, No.3, and No.4 semi-anechoic chambers and No.3 and No.4 shielded rooms.

3.7 Test data, Test instruments, and Test set up

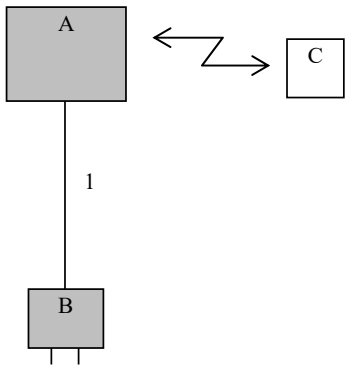
Refer to APPENDIX.

SECTION 4: Operation of E.U.T. during testing

4.1 Operating mode(s)

The mode(s) : 1. BLE Communication mode
2. Standby mode

4.2 Configuration and peripherals



AC 230 V / 50 Hz

* 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	BLOOD PRESSURE MONITOR	HEM-7155T	ES1904000029V	OMRON HEALTHCARE Co., Ltd.	EUT
B	AC Adapter	HHP-AM01	852A	OMRON HEALTHCARE Co., Ltd.	EUT
C	Smart Phone	Xperia Z3	-	Sony Corporation	-

List of cables used

No.	Name	Length (m)	Shield		Remark
			Cable	Connector	
1	DC Cable	1.5	Unshielded	Unshielded	-

SECTION 5: Conducted emission

5.1 Operating environment

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

5.2 Test configuration

AC power port
EUT was placed on a urethane platform of nominal size, 0.5 m by 1.0 m, raised 0.8 m above the horizontal ground plane. The rear of tabletop was located 40 cm to the vertical ground plane. The rear of EUT and its peripherals was aligned and flushed with rear of tabletop. All other surfaces of tabletop were at least 80 cm from any other grounded conducting surface. EUT was located 80 cm from LISN/AMN and excess AC cable was bundled in center. I/O cables that were connected to the peripherals were bundled in center. They were folded back and forth forming a bundle 30 cm to 40 cm long and were hanged at a 40 cm height to the ground plane. Each EUT current-carrying power lead, except the ground (safety) lead, was individually connected through a LISN/ an AMN to the input power source. All unused 50 ohm connectors of the LISN/ AMN were resistively terminated in 50 ohm when not connected to the measuring equipment.
Photographs of the set up are shown in APPENDIX 3.

5.3 Test conditions

Frequency range : 0.15 MHz - 30 MHz
EUT position : Table top
EUT operation mode : See Clause 4.1

5.4 Test procedure

An overview sweep with peak detection has been performed.
The measurements had been performed with a quasi-peak detector and if required, with a CISPR average detector (CAV).
The conducted emission measurements were made with the following detector function of the test receiver.
Detector Type : QP/CAV
IF Bandwidth : 9 kHz / 9 kHz

5.5 Test result

Summary of the test results : Pass

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

Date: June 13, 2019 Test engineer: Koji Yamamoto

SECTION 6: Harmonic current emissions, Voltage fluctuations and flicker

6.1 Operating environment

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

6.2 Test configuration

The EUT was placed on a non-metallic table height of 0.8 m.
Photographs of the set up are shown in APPENDIX 3.

6.3 Test conditions

EUT position : Table top
EUT operation mode : See Clause 4.1

6.4 Test procedure

Harmonic current emissions
The test was performed with connecting to the measuring instrumentation.

Voltage fluctuations and flicker
As the EUT does not have a manual switch, limit 4 % was applied for the maximum relative voltage change (D_{max}) evaluation. D_{max} is measured for voltage fluctuation test when the EUT is supplied power.

6.5 Test result

Summary of the test results: Pass

Harmonics current emissions
Remarks: This EUT complies with the Repeatability requirement of EN61000-3-2 Section 6.2.3.1.

Date: June 13, 2019 Test engineer: Koji Yamamoto

SECTION 7: Electrostatic discharge

7.1 Operating environment

Test place	:	No.7 shielded room
Temperature	:	23 deg. C
Humidity	:	51 % RH
Atmosphere	:	1012 hPa

7.2 Test configuration

The EUT was placed on a non-metallic table height of 0.8 m above a reference ground plane.
(The EUT was placed on an isolation foil which is on the Horizontal coupling plane.
The Horizontal coupling plane is connected to the reference ground plane with a cable of which 470 k ohm resistances placed each side.)
Photographs of the set up are shown in APPENDIX 3.

7.3 Test conditions

Test levels		±2 kV and ±4 kV for indirect discharge ±2 kV, ±4 kV and ±8 kV for air discharge
Performance criterion	:	B
Number of discharges	:	10
EUT position	:	Table top
EUT operation mode	:	See Clause 4.1

7.4 Test procedure

The discharges were fired beginning with 2 kV. The performance of the EUT was monitored continuously.
Photographs of EUT showing the selected test points are found in Figure 1.

EUT is ungrounded.
Touching of the EUT with a grounded brush with bleeder resistors(2x470kΩ) in the grounding cable.

7.5 Test result

The test was carried out according to the test protocol in Table 1.

Summary of the test results: Pass
The EUT operated without any recorded disturbance during the test.

Date: June 18, 2019 Test engineer: Takeshi Hiyaji

Table 1. Test protocol of Electrostatic discharge test

1) Indirect discharge

Test level (kV)	Coupling Plane	Exposed Side	Pass/ Fail
±2	Horizontal Vertical	Front, Right, Left, Rear, Top, Bottom	Pass
±4	Horizontal Vertical	Front, Right, Left, Rear, Top, Bottom	Pass

2) Air discharge

Test level (kV)	Pass/Fail
+2 -2	Pass Pass
+4 -4	Pass Pass
+8 -8	Pass Pass

***Direct discharge was not performed since the EUT does not have any applicable points.**

Figure 1. Photographs of EUT showing the selected test points
Photograph (1/1)

Yellow: Direct discharge
Green: Air discharge

SECTION 8: Radio frequency electromagnetic field

8.1 Operating environment

Test date	:	June 20, 2019	June 21, 2019
Test place	:	No.5 semi anechoic chamber	No.5 semi anechoic chamber
Temperature	:	24 deg. C	24 deg. C
Humidity	:	45 % RH	53 % RH
Atmosphere	:	1009 hPa	1006 hPa

8.2 Test configuration

The EUT was placed on a non-metallic table height of 0.8 m with cable(s) placed horizontally.
Photographs of the set up are shown in APPENDIX 3.

8.3 Test conditions

Frequency range	:	80 MHz to 6000 MHz
Test level	:	3.0 V/m
Modulation	:	80 % AM (1 kHz)
Performance criterion	:	A
Frequency step size	:	1 %
Dwell time	:	1 sec.
Field orientation	:	Horizontal and Vertical
Antenna	:	Logperiodic and Stacked double Logperi
Antenna height	:	1.6 m (80 MHz to 1000 MHz) / 1.3 m (1000 MHz to 6000 MHz)
Antenna distance	:	2.4 m (80 MHz to 1000 MHz) / 3.25 m (1000 MHz to 6000 MHz)
EUT position	:	Table top
EUT operation mode	:	See Clause 4.1

8.4 Generation of the electromagnetic field

The electromagnetic field is generated from a computer controlled signal generator.
The output power is amplified and then radiated from Logperiodic and Stacked double Logperi antennas.
At every test frequency the field strength is checked prior to the actual test by placing the field sensor at the same distance from and in the same relative location to the field generating antenna, as will be used by the EUT.

8.5 Test procedure

The verification of performance was established by monitoring the operation with a video camera during the test.

The test was divided into 12 parts to cover the complete frequency span; 2 polarizations and 6 sides (front, right, rear, left, top, and bottom) of the EUT facing the antenna.

8.6 Test result

The test protocol is found in Table 2.

Summary of the test results: Pass
The EUT operated without any recorded disturbance during the test.

Date: June 20, 2019
June 21, 2019

Test engineer: Hiroyuki Furutaka
Yuta Moriya

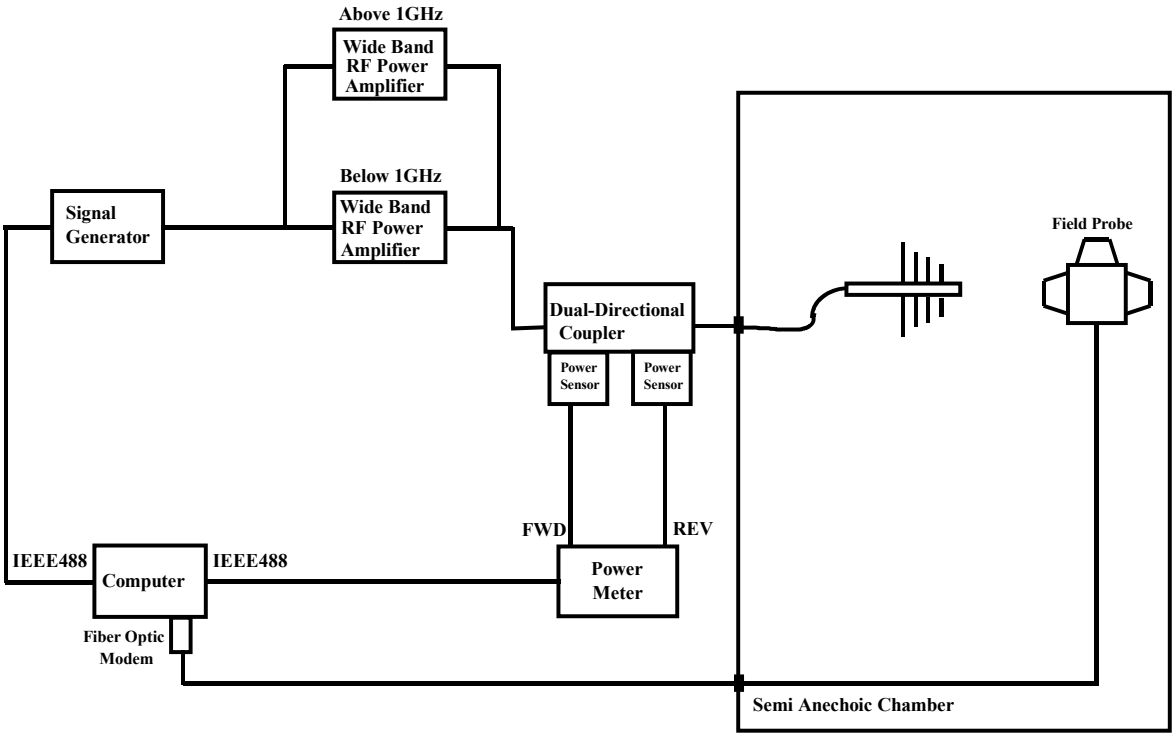
Table 2. Test protocol of Radio frequency electromagnetic field

1) 80 MHz to 6000 MHz

Test No.	Frequency (MHz)	Test level (V/m)	Pol. Ver / Hor	Exposed Side	Pass / Fail
1	80 - 6000	3.0	H	Front	Pass
2	80 - 6000	3.0	V	Front	Pass
3	80 - 6000	3.0	H	Rear	Pass
4	80 - 6000	3.0	V	Rear	Pass
5	80 - 6000	3.0	H	Right	Pass
6	80 - 6000	3.0	V	Right	Pass
7	80 - 6000	3.0	H	Left	Pass
8	80 - 6000	3.0	V	Left	Pass
9	80 - 6000	3.0	H	Top *	Pass
10	80 - 6000	3.0	V	Top *	Pass
11	80 - 6000	3.0	H	Bottom *	Pass
12	80 - 6000	3.0	V	Bottom *	Pass

*AC Adapter only

RS Test System



Tested frequency list:

80 MHz - 1000 MHz

80.000	102.581	131.538	168.675	216.299	277.378	355.702	456.151	584.969	750.171	962.031
80.800	103.606	132.853	170.361	218.461	280.151	359.259	460.712	590.818	757.672	971.651
81.608	104.642	134.181	172.064	220.645	282.952	362.851	465.319	596.726	765.248	981.367
82.424	105.688	135.522	173.784	222.851	285.781	366.479	469.972	602.693	772.900	991.180
83.248	106.744	136.877	175.521	225.079	288.638	370.143	474.671	608.719	780.629	1000.000
84.080	107.811	138.245	177.276	227.329	291.524	373.844	479.417	614.806	788.435	
84.920	108.889	139.627	179.048	229.602	294.439	377.582	484.211	620.954	796.319	
85.769	109.977	141.023	180.838	231.898	297.383	381.357	489.053	627.163	804.282	
86.626	111.076	142.433	182.646	234.216	300.356	385.170	493.943	633.434	812.324	
87.492	112.186	143.857	184.472	236.558	303.359	389.021	498.882	639.768	820.447	
88.366	113.307	145.295	186.316	238.923	306.392	392.911	503.870	646.165	828.651	
89.249	114.440	146.747	188.179	241.312	309.455	396.840	508.908	652.626	836.937	
90.141	115.584	148.214	190.060	243.725	312.549	400.808	513.997	659.152	845.306	
91.042	116.739	149.696	191.960	246.162	315.674	404.816	519.136	665.743	853.759	
91.952	117.906	151.192	193.879	248.623	318.830	408.864	524.327	672.400	862.296	
92.871	119.085	152.703	195.817	251.109	322.018	412.952	529.570	679.124	870.918	
93.799	120.275	154.230	197.775	253.620	325.238	417.081	534.865	685.915	879.627	
94.736	121.477	155.772	199.752	256.156	328.490	421.251	540.213	692.774	888.423	
95.683	122.691	157.329	201.749	258.717	331.774	425.463	545.615	699.701	897.307	
96.639	123.917	158.902	203.766	261.304	335.091	429.717	551.071	706.698	906.280	
97.605	125.156	160.491	205.803	263.917	338.441	434.014	556.581	713.764	915.342	
98.581	126.407	162.095	207.861	266.556	341.825	438.354	562.146	720.901	924.495	
99.566	127.671	163.715	209.939	269.221	345.243	442.737	567.767	728.110	933.739	
100.561	128.947	165.352	212.038	271.913	348.695	447.164	573.444	735.391	943.076	
101.566	130.236	167.005	214.158	274.632	352.181	451.635	579.178	742.744	952.506	

1000 MHz - 6000 MHz

1000.000	1269.724	1612.199	2047.052	2599.199	3300.280	4190.468	5320.768
1010.000	1282.421	1628.320	2067.522	2625.190	3333.282	4232.372	5373.975
1020.100	1295.245	1644.603	2088.197	2651.441	3366.614	4274.695	5427.714
1030.301	1308.197	1661.049	2109.078	2677.955	3400.280	4317.441	5481.991
1040.604	1321.278	1677.659	2130.168	2704.734	3434.282	4360.615	5536.810
1051.010	1334.490	1694.435	2151.469	2731.781	3468.624	4404.221	5592.178
1061.520	1347.834	1711.379	2172.983	2759.098	3503.310	4448.263	5648.099
1072.135	1361.312	1728.492	2194.712	2786.688	3538.343	4492.745	5704.579
1082.856	1374.925	1745.776	2216.659	2814.554	3573.726	4537.672	5761.624
1093.684	1388.674	1763.233	2238.825	2842.699	3609.463	4583.048	5819.240
1104.620	1402.560	1780.865	2261.213	2871.125	3645.557	4628.878	5877.432
1115.666	1416.585	1798.673	2283.825	2899.836	3682.012	4675.166	5936.206
1126.822	1430.750	1816.659	2306.663	2928.834	3718.832	4721.917	5995.568
1138.090	1445.057	1834.825	2329.729	2958.122	3756.020	4769.136	6000.000
1149.470	1459.507	1853.173	2353.026	2987.703	3793.580	4816.827	
1160.964	1474.102	1871.704	2376.556	3017.580	3831.515	4864.995	
1172.573	1488.843	1890.421	2400.321	3047.755	3869.830	4913.644	
1184.298	1503.731	1909.325	2424.324	3078.232	3908.528	4962.780	
1196.140	1518.768	1928.418	2448.567	3109.014	3947.613	5012.407	
1208.101	1533.955	1947.702	2473.052	3140.104	3987.089	5062.531	
1220.182	1549.294	1967.179	2497.782	3171.505	4026.959	5113.156	
1232.383	1564.786	1986.850	2522.759	3203.220	4067.228	5164.287	
1244.706	1580.433	2006.718	2547.986	3235.252	4107.900	5215.929	
1257.153	1596.237	2026.785	2573.465	3267.604	4148.979	5268.088	

SECTION 9: Fast transients, common mode

9.1 Operating environment

Test place : No.3 semi anechoic chamber
Temperature : 24 deg. C
Humidity : 50 % RH
Atmosphere : 1007 hPa

9.2 Test configuration

The EUT was placed on a non-metallic pallet height of 0.1 m above a reference ground plane.
Photographs of the set up are shown in APPENDIX 3.

9.3 Test conditions

Test level : ± 1.0 kV / AC power port
Performance criterion : B
Repetition rate : 5 kHz / 100 kHz
Application method : Direct injection
Duration of each test : 1.0 min.
Lines for test : AC power port
EUT position : Floor standing
EUT operation mode : See Clause 4.1

9.4 Test procedure

The test voltage was applied to the AC power port for 1.0 min. each.
The performance of the EUT was monitored continuously.

9.5 Test result

The test protocol is found in Table 3.

Summary of the test results: Pass
The EUT operated without any recorded disturbance during the test.

Date: June 17, 2019 Test engineer: Ryota Yamanaka

Table 3. Test protocol of Fast transients, common mode

1) AC power port

Test No.	Test Level (kV)	Polarity (+/-)	Line	Pass/ Fail	Comment
1	1.0	+	N+L	Pass	Direct Injection
2	1.0	-	N+L	Pass	Direct Injection

SECTION 10: Surges

10.1 Operating environment

Test place	:	No.7 shielded room
Temperature	:	23 deg. C
Humidity	:	51 % RH
Atmosphere	:	1012 hPa

10.2 Test configuration

The EUT was placed on a non-metallic table height of 0.8 m above a reference ground plane.
Photographs of the set up are shown in APPENDIX 3.

10.3 Test condition

Test level	:	<AC power port> Line to Line ±0.5 kV, ±1.0 kV
Polarity	:	Positive / Negative
Phase shifting	:	0, 90, 180 and 270 phase angle (degree)
Performance criterion	:	B
Repetition rate	:	1.0 min.
Number	:	5 points
Lines for test	:	AC power port
EUT position	:	Table top
EUT operation mode	:	See Clause 4.1

10.4 Test procedure

The test voltage was applied to the AC power port.
The performance of the EUT was monitored continuously.

10.5 Test result

The test protocol is found in Table 4.

Summary of the test results: Pass
The EUT operated without any recorded disturbance during the test.

Date: June 18, 2019 Test engineer: Takeshi Hiyaji

Table 4. Test protocol of Surges

AC power port

1) Line to Line (N-L)

Test No.	Test Level (kV)	Polarity +/-	Pass/ Fail
1	0.5	+	Pass
2	0.5	-	Pass
3	1.0	+	Pass
4	1.0	-	Pass

SECTION 11: Radio frequency, common mode

11.1 Operating environment

Test place : No.3 semi anechoic chamber
Temperature : 24 deg. C
Humidity : 50 % RH
Atmosphere : 1007 hPa

11.2 Test configuration

The EUT was placed on a non-metallic pallet height of 0.1 m above a reference ground plane.
Photographs of the set up are shown in APPENDIX 3.

11.3 Test conditions

Frequency range : 0.15 MHz to 80 MHz
Test level : 3.0 V
Modulation : 80 % AM (1 kHz)
Performance criterion : A
Frequency step size : 1 %
Dwell time : 1 sec.
EUT position : Floor standing
EUT operation mode : See Clause 4.1

11.4 Test procedure

The test electromagnetic disturbance was applied to AC power port via CDN.
The performance of the EUT was monitored continuously.

11.5 Test result

The test protocol is found in Table 5.

Summary of the test results: Pass
The EUT operated without any recorded disturbance during the test.

Date: June 17, 2019 Test engineer: Ryota Yamanaka

Table 5. Test protocol of Radio frequency, common mode

1) AC power port

Test No.	Test line	Frequency (MHz)	Test level (V)	Pass/Fail	Comments
1	AC line	0.15 - 80	3.0	Pass	CDN M3

Tested Frequency List: No.2 System

0.15 MHz - 80 MHz

0.1500	0.2437	0.3978	0.6508	1.0673	1.7524	2.8789	4.7312	7.7780	12.776	20.977	34.464	56.652
0.1515	0.2461	0.4017	0.6573	1.0779	1.7699	2.9076	4.7785	7.8557	12.903	21.186	34.808	57.218
0.1530	0.2485	0.4057	0.6638	1.0886	1.7875	2.9366	4.8262	7.9342	13.032	21.397	35.156	57.790
0.1545	0.2509	0.4097	0.6704	1.0994	1.8053	2.9659	4.8744	8.0135	13.162	21.610	35.507	58.367
0.1560	0.2534	0.4137	0.6771	1.1103	1.8233	2.9955	4.9231	8.0936	13.293	21.826	35.862	58.950
0.1575	0.2559	0.4178	0.6838	1.1214	1.8415	3.0254	4.9723	8.1745	13.425	22.044	36.220	59.539
0.1590	0.2584	0.4219	0.6906	1.1326	1.8599	3.0556	5.0220	8.2562	13.559	22.264	36.582	60.134
0.1605	0.2609	0.4261	0.6975	1.1439	1.8784	3.0861	5.0722	8.3387	13.694	22.486	36.947	60.735
0.1621	0.2635	0.4303	0.7044	1.1553	1.8971	3.1169	5.1229	8.4220	13.830	22.710	37.316	61.342
0.1637	0.2661	0.4346	0.7114	1.1668	1.9160	3.1480	5.1741	8.5062	13.968	22.937	37.689	61.955
0.1653	0.2687	0.4389	0.7185	1.1784	1.9351	3.1794	5.2258	8.5912	14.107	23.166	38.065	62.574
0.1669	0.2713	0.4432	0.7256	1.1901	1.9544	3.2111	5.2780	8.6771	14.248	23.397	38.445	63.199
0.1685	0.2740	0.4476	0.7328	1.2020	1.9739	3.2432	5.3307	8.7638	14.390	23.630	38.829	63.830
0.1701	0.2767	0.4520	0.7401	1.2140	1.9936	3.2756	5.3840	8.8514	14.533	23.866	39.217	64.468
0.1718	0.2794	0.4565	0.7475	1.2261	2.0135	3.3083	5.4378	8.9399	14.678	24.104	39.609	65.112
0.1735	0.2821	0.4610	0.7549	1.2383	2.0336	3.3413	5.4921	9.0292	14.824	24.345	40.005	65.763
0.1752	0.2849	0.4656	0.7624	1.2506	2.0539	3.3747	5.5470	9.1194	14.972	24.588	40.405	66.420
0.1769	0.2877	0.4702	0.7700	1.2631	2.0744	3.4084	5.6024	9.2105	15.121	24.833	40.809	67.084
0.1786	0.2905	0.4749	0.7777	1.2757	2.0951	3.4424	5.6584	9.3026	15.272	25.081	41.217	67.754
0.1803	0.2934	0.4796	0.7854	1.2884	2.1160	3.4768	5.7149	9.3956	15.424	25.331	41.629	68.431
0.1821	0.2963	0.4843	0.7932	1.3012	2.1371	3.5115	5.7720	9.4895	15.578	25.584	42.045	69.115
0.1839	0.2992	0.4891	0.8011	1.3142	2.1584	3.5466	5.8297	9.5843	15.733	25.839	42.465	69.806
0.1857	0.3021	0.4939	0.8091	1.3273	2.1799	3.5820	5.8879	9.6801	15.890	26.097	42.889	70.504
0.1875	0.3051	0.4988	0.8171	1.3405	2.2016	3.6178	5.9467	9.7769	16.048	26.357	43.317	71.209
0.1893	0.3081	0.5037	0.8252	1.3539	2.2236	3.6539	6.0061	9.8746	16.208	26.620	43.750	71.921
0.1911	0.3111	0.5087	0.8334	1.3674	2.2458	3.6904	6.0661	9.9733	16.370	26.886	44.187	72.640
0.1930	0.3142	0.5137	0.8417	1.3810	2.2682	3.7273	6.1267	10.073	16.533	27.154	44.628	73.366
0.1949	0.3173	0.5188	0.8501	1.3948	2.2908	3.7645	6.1879	10.173	16.698	27.425	45.074	74.099
0.1968	0.3204	0.5239	0.8586	1.4087	2.3137	3.8021	6.2497	10.274	16.864	27.699	45.524	74.839
0.1987	0.3236	0.5291	0.8671	1.4227	2.3368	3.8401	6.3121	10.376	17.032	27.975	45.979	75.587
0.2006	0.3268	0.5343	0.8757	1.4369	2.3601	3.8785	6.3752	10.479	17.202	28.254	46.438	76.342
0.2026	0.3300	0.5396	0.8844	1.4512	2.3837	3.9172	6.4389	10.583	17.374	28.536	46.902	77.105
0.2046	0.3333	0.5449	0.8932	1.4657	2.4075	3.9563	6.5032	10.688	17.547	28.821	47.371	77.876
0.2066	0.3366	0.5503	0.9021	1.4803	2.4315	3.9958	6.5682	10.794	17.722	29.109	47.844	78.654
0.2086	0.3399	0.5558	0.9111	1.4951	2.4558	4.0357	6.6338	10.901	17.899	29.400	48.322	79.440
0.2106	0.3432	0.5613	0.9202	1.5100	2.4803	4.0760	6.7001	11.010	18.077	29.694	48.805	80.000
0.2127	0.3466	0.5669	0.9294	1.5251	2.5051	4.1167	6.7671	11.120	18.257	29.990	49.293	
0.2148	0.3500	0.5725	0.9386	1.5403	2.5301	4.1578	6.8347	11.231	18.439	30.289	49.785	
0.2169	0.3535	0.5782	0.9479	1.5557	2.5554	4.1993	6.9030	11.343	18.623	30.591	50.282	
0.2190	0.3570	0.5839	0.9573	1.5712	2.5809	4.2412	6.9720	11.456	18.809	30.896	50.784	
0.2211	0.3605	0.5897	0.9668	1.5869	2.6067	4.2836	7.0417	11.570	18.997	31.204	51.291	
0.2233	0.3641	0.5955	0.9764	1.6027	2.6327	4.3264	7.1121	11.685	19.186	31.516	51.803	
0.2255	0.3677	0.6014	0.9861	1.6187	2.6590	4.3696	7.1832	11.801	19.377	31.831	52.321	
0.2277	0.3713	0.6074	0.9959	1.6348	2.6855	4.4132	7.2550	11.919	19.570	32.149	52.844	
0.2299	0.3750	0.6134	1.0058	1.6511	2.7123	4.4573	7.3275	12.038	19.765	32.470	53.372	
0.2321	0.3787	0.6195	1.0158	1.6676	2.7394	4.5018	7.4007	12.158	19.962	32.794	53.905	
0.2344	0.3824	0.6256	1.0259	1.6842	2.7667	4.5468	7.4747	12.279	20.161	33.121	54.444	
0.2367	0.3862	0.6318	1.0361	1.7010	2.7943	4.5922	7.5494	12.401	20.362	33.452	54.988	
0.2390	0.3900	0.6381	1.0464	1.7180	2.8222	4.6381	7.6248	12.525	20.565	33.786	55.537	
0.2413	0.3939	0.6444	1.0568	1.7351	2.8504	4.6844	7.7010	12.650	20.770	34.123	56.092	

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SECTION 12: Voltage dips and interruptions

12.1 Operating environment

Test place	:	No.5 semi anechoic chamber
Temperature	:	24 deg. C
Humidity	:	50 % RH
Atmosphere	:	1007 hPa

12.2 Test configuration

The EUT was placed on a non-metallic table height of 0.8 m above a reference ground plane.
Photographs of the set up are shown in APPENDIX 3.

12.3 Test conditions

(1) Voltage dips

Test level		
Voltage / duration	:	0 % U_T / 1.0 period (20 ms) 0 % U_T / 0.5 periods (10 ms) 70 % U_T / 25 periods (10 ms)
Phase angle of insertion	:	0 deg., 180 deg. (0.5 periods)
	:	0 deg. (other)
Number of events	:	3 at each
Recovery time between pulses	:	10 sec
Performance criterion	:	B (0.5 periods, 1 periods), C (25 periods)
EUT position	:	Table top
EUT operation mode	:	See Clause 4.1

(2) Voltage interruptions

Test level		
Voltage / duration	:	0 % U_T / 250 periods (5000 ms)
Phase angle of insertion	:	0 deg., (0 % U_T)
Number of events	:	3 at each
Recovery time between pulses	:	10 sec
Performance criterion	:	C
EUT position	:	Table top
EUT operation mode	:	See Clause 4.1

12.4 Test procedure

The dips and interruptions are generated using a simulator with pre-programmed test sequences for each test level.
The performance of the EUT was monitored continuously.

12.5 Test result

The test protocol is found in Table 6.

Summary of the test results: Pass
The EUT operated without any recorded disturbance during the test.

Date: June 17, 2019 Test engineer: Ryota Yamanaka

Table 6. Test protocol of Voltage dips and interruptions

Test No.	Test level	Phase angle of insertion	Duration in periods of rated frequency	Pass/ Fail	Remarks
1	0 % U_T	0 deg.	10 ms (0.5 periods)	Pass	
2	0 % U_T	180 deg.	10 ms (0.5 periods)	Pass	
3	0 % U_T	0 deg.	20 ms (1.0 period)	Pass	
4	70 % U_T	0 deg.	500 ms (25 periods)	Pass	
5	0 % U_T	0 deg.	5000 ms (250 periods)	Pass	

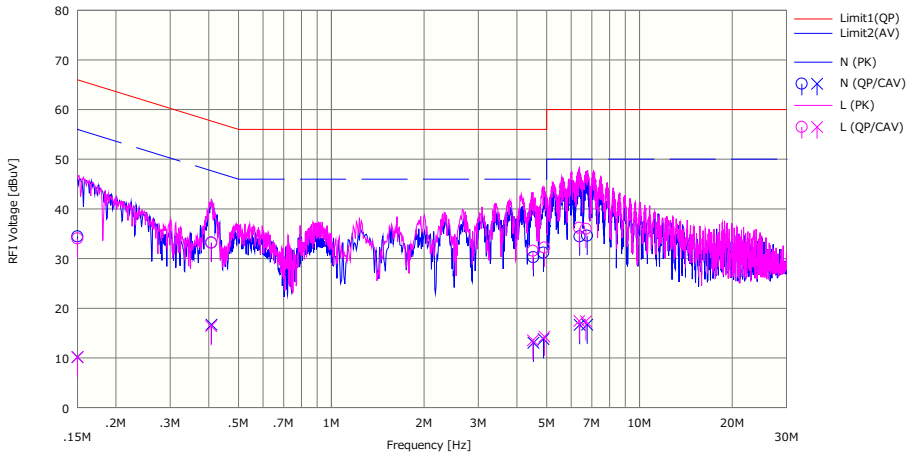
*U_T : 100 V, 240 V

APPENDIX 1: Test data

Conducted emission

Report No.	12903641H
Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.4
Date	June 13, 2019
Temperature / Humidity	22 deg. C / 43 % RH
Engineer	Koji Yamamoto
Mode	Mode 1

Limit : EN 55032_Class B_AC mains



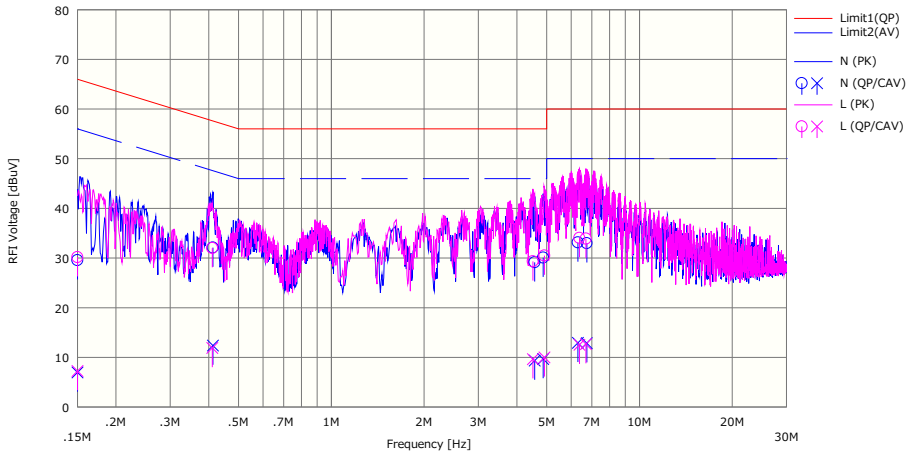
No.	Freq.	Reading ⟨QP⟩	Reading ⟨CAV⟩	LISN	LOSS	Results ⟨QP⟩	Results ⟨CAV⟩	Limit ⟨QP⟩	Limit ⟨AV⟩	Margin ⟨QP⟩	Margin ⟨AV⟩	Phase	Comment
	[MHz]	[dBuV]	[dBuV]	[dB]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dB]	[dB]		
1	0.15000	21.00	-3.30	0.17	13.28	34.45	10.15	66.00	56.00	31.55	45.85	N	
2	0.40839	19.70	3.20	0.18	13.31	33.19	16.69	57.70	47.70	24.51	31.01	N	
3	4.52637	16.30	-0.90	0.38	13.56	30.24	13.04	56.00	46.00	25.76	32.96	N	
4	4.88010	17.20	-0.20	0.41	13.57	31.18	13.78	56.00	46.00	24.82	32.22	N	
5	6.39479	20.30	2.50	0.51	13.64	34.45	16.65	60.00	50.00	25.55	33.35	N	
6	6.76666	20.40	2.50	0.53	13.65	34.58	16.68	60.00	50.00	25.42	33.32	N	
7	0.15000	20.60	-3.30	0.17	13.28	34.05	10.15	66.00	56.00	31.95	45.85	L	
8	0.40752	19.70	2.90	0.18	13.31	33.19	16.39	57.70	47.70	24.51	31.31	L	
9	4.50823	17.60	-0.40	0.38	13.56	31.54	13.54	56.00	46.00	24.46	32.46	L	
10	4.91638	18.20	0.30	0.41	13.58	32.19	14.29	56.00	46.00	23.81	31.71	L	
11	6.37665	22.00	3.30	0.51	13.64	36.15	17.45	60.00	50.00	23.85	32.55	L	
12	6.70317	21.80	3.20	0.53	13.65	35.98	17.38	60.00	50.00	24.02	32.62	L	

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

Conducted emissions

Report No.	12903641H
Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.4
Date	June 13, 2019
Temperature / Humidity	22 deg. C / 43 % RH
Engineer	Koji Yamamoto
Mode	Mode 2

Limit : EN 55032_Class B_AC mains



No.	Freq.	Reading		LISN	LOSS	Results		Limit		Margin		Phase	Comment
		(QP)	(CAV)			(QP)	(CAV)	(QP)	(AV)	(QP)	(AV)		
	[MHz]	[dBuV]	[dBuV]	[dB]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dB]	[dB]		
1	0.15000	16.10	-6.50	0.17	13.28	29.55	6.95	66.00	56.00	36.45	49.05	N	
2	0.41274	18.60	-1.10	0.18	13.31	32.09	12.39	57.60	47.60	25.51	35.21	N	
3	4.57172	15.20	-4.60	0.39	13.56	29.15	9.35	56.00	46.00	26.85	36.65	N	
4	4.87103	16.10	-4.30	0.41	13.57	30.08	9.68	56.00	46.00	25.92	36.32	N	
5	6.31316	19.00	-1.20	0.50	13.64	33.14	12.94	60.00	50.00	26.86	37.06	N	
6	6.74852	18.80	-1.30	0.53	13.65	32.98	12.88	60.00	50.00	27.02	37.12	N	
7	0.15000	16.70	-6.20	0.17	13.28	30.15	7.25	66.00	56.00	35.85	48.75	L	
8	0.41100	18.50	-1.60	0.18	13.31	31.99	11.89	57.60	47.60	25.61	35.71	L	
9	4.50823	15.40	-4.30	0.38	13.56	29.34	9.64	56.00	46.00	26.66	36.36	L	
10	4.91638	16.50	-4.00	0.41	13.58	30.49	9.99	56.00	46.00	25.51	36.01	L	
11	6.38572	19.90	-1.60	0.51	13.64	34.05	12.55	60.00	50.00	25.95	37.45	L	
12	6.70317	19.70	-1.50	0.53	13.65	33.88	12.68	60.00	50.00	26.12	37.32	L	

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

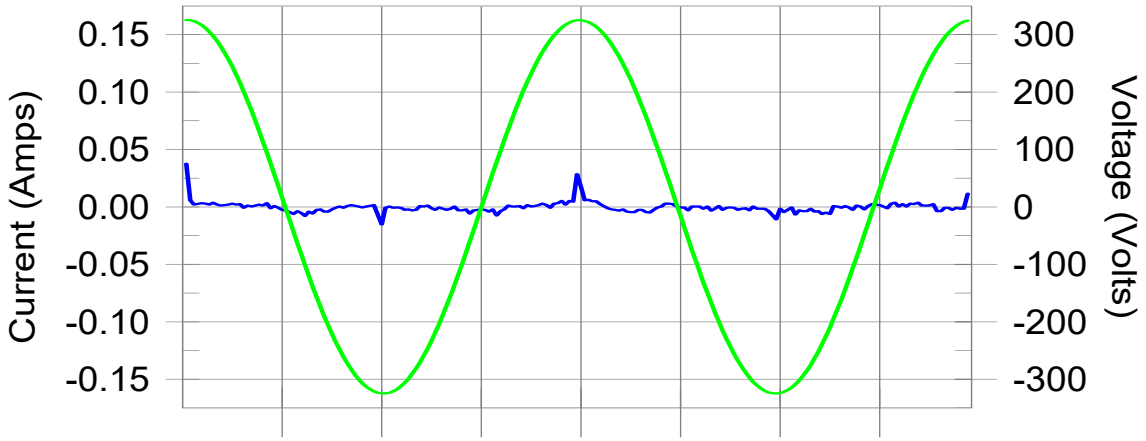
Harmonic current emissions, Voltage fluctuations and flicker

Harmonics – Class-A

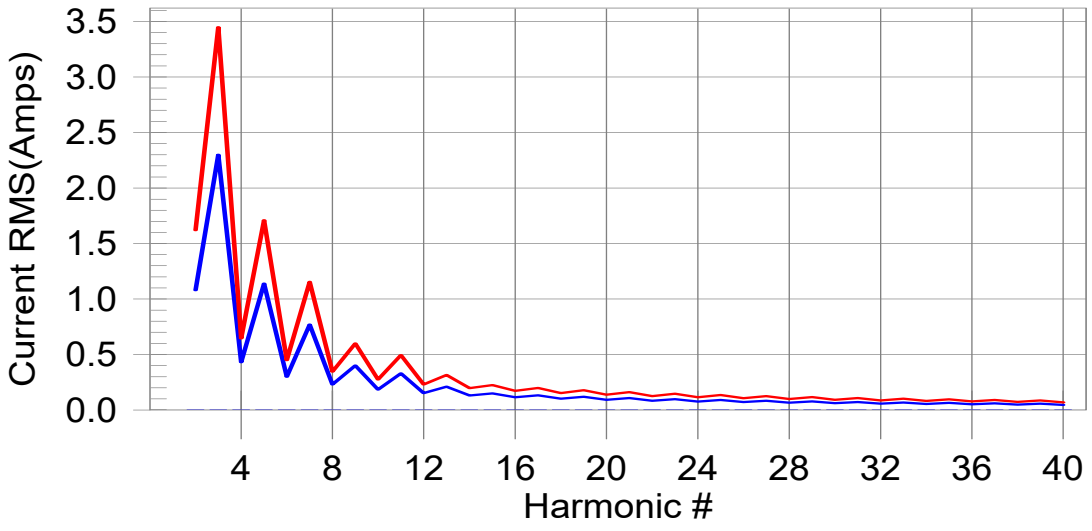
Tested by: Koji Yamamoto, 23 deg. C / 45 % RH
Test category: Class-A (European limits) Test Margin: 100
Test date: 2019/06/13
Test duration (min): 2.5
Comment: Mode 1

Test Result: Pass Source qualification: Normal

Current & voltage waveforms



Harmonics and Class A limit line European Limits



Test result: Pass Worst harmonic was #0 with 0.00% of the limit.

Harmonic current emissions, Voltage fluctuations and flicker
Current Test Result Summary (1st Time)

Tested by: Koji Yamamoto, 23 deg. C / 45 % RH
Test category: Class-A (European limits) Test Margin: 100
Test date: 2019/06/13
Test duration (min): 2.5
Comment: Mode 1

Test Result: Pass Source qualification: Normal
THC(A): 0.00 I-THD(%): 0.00 POHC(A): 0.000 POHC Limit(A): 0.251
Highest parameter values during test:

V_RMS (Volts):	229.93	Frequency (Hz):	50.00
I_Peak (Amps):	0.045	I_RMS (Amps):	0.004
I_Fund (Amps):	0.002	Crest Factor:	10.321
Power (Watts):	0.4	Power Factor:	0.453

Harm#	Harms(avg)	100%Limit	%of Limit	Harms(max)	150%Limit	%of Limit	Status
2	0.002	1.080	0.2	0.002	1.620	0.10	Pass
3	0.001	2.300	0.0	0.001	3.450	0.03	Pass
4	0.001	0.430	0.2	0.001	0.645	0.16	Pass
5	0.001	1.140	0.1	0.001	1.710	0.07	Pass
6	0.001	0.300	0.2	0.001	0.450	0.19	Pass
7	0.001	0.770	0.1	0.001	1.155	0.08	Pass
8	0.001	0.230	0.2	0.001	0.345	0.16	Pass
9	0.001	0.400	0.2	0.001	0.600	0.14	Pass
10	0.000	0.184	0.3	0.001	0.276	0.19	Pass
11	0.001	0.330	0.3	0.001	0.495	0.18	Pass
12	0.000	0.153	0.3	0.001	0.230	0.24	Pass
13	0.001	0.210	0.4	0.001	0.315	0.26	Pass
14	0.001	0.131	0.4	0.001	0.197	0.29	Pass
15	0.001	0.150	0.5	0.001	0.225	0.35	Pass
16	0.000	0.115	0.3	0.000	0.173	0.24	Pass
17	0.001	0.132	0.6	0.001	0.199	0.39	Pass
18	0.000	0.102	0.4	0.000	0.153	0.31	Pass
19	0.001	0.118	0.6	0.001	0.178	0.42	Pass
20	0.000	0.092	0.4	0.000	0.138	0.28	Pass
21	0.001	0.107	0.7	0.001	0.161	0.46	Pass
22	0.000	0.084	0.4	0.000	0.125	0.30	Pass
23	0.001	0.098	0.7	0.001	0.147	0.49	Pass
24	0.000	0.077	0.4	0.000	0.115	0.33	Pass
25	0.001	0.090	0.8	0.001	0.135	0.53	Pass
26	0.000	0.071	0.5	0.000	0.106	0.33	Pass
27	0.001	0.083	0.8	0.001	0.125	0.54	Pass
28	0.000	0.066	0.5	0.000	0.099	0.36	Pass
29	0.001	0.078	0.9	0.001	0.116	0.63	Pass
30	0.000	0.061	0.5	0.000	0.092	0.40	Pass
31	0.001	0.073	0.8	0.001	0.109	0.58	Pass
32	0.000	0.058	0.5	0.000	0.086	0.39	Pass
33	0.001	0.068	0.9	0.001	0.102	0.60	Pass
34	0.000	0.054	0.5	0.000	0.081	0.39	Pass
35	0.001	0.064	0.9	0.001	0.096	0.62	Pass
36	0.000	0.051	0.6	0.000	0.077	0.41	Pass
37	0.001	0.061	0.9	0.001	0.091	0.63	Pass
38	0.000	0.048	0.6	0.000	0.073	0.41	Pass
39	0.001	0.058	0.9	0.001	0.087	0.64	Pass
40	0.000	0.046	0.5	0.000	0.069	0.39	Pass

Harmonic current emissions, Voltage fluctuations and flicker

Current Test Result Summary (2nd Time)

Tested by: Koji Yamamoto, 23 deg. C / 45 % RH
Test category: Class-A (European limits) Test Margin: 100
Test date: 2019/06/13
Test duration (min): 2.5
Comment: Mode 1

Test Result: Pass Source qualification: Normal
THC(A): 0.00 I-THD(%): 0.00 POHC(A): 0.000 POHC Limit(A): 0.251
Highest parameter values during test:

V_RMS (Volts):	229.93	Frequency (Hz):	50.00
I_Peak (Amps):	0.049	I_RMS (Amps):	0.004
I_Fund (Amps):	0.002	Crest Factor:	11.164
Power (Watts):	0.4	Power Factor:	0.457

Harm#	Harms(avg)	100%Limit	%of Limit	Harms(max)	150%Limit	%of Limit	Status
2	0.002	1.080	0.2	0.002	1.620	0.10	Pass
3	0.001	2.300	0.0	0.001	3.450	0.03	Pass
4	0.001	0.430	0.2	0.001	0.645	0.17	Pass
5	0.001	1.140	0.1	0.001	1.710	0.07	Pass
6	0.001	0.300	0.2	0.001	0.450	0.20	Pass
7	0.001	0.770	0.1	0.001	1.155	0.08	Pass
8	0.001	0.230	0.2	0.001	0.345	0.16	Pass
9	0.001	0.400	0.2	0.001	0.600	0.15	Pass
10	0.001	0.184	0.3	0.001	0.276	0.19	Pass
11	0.001	0.330	0.3	0.001	0.495	0.18	Pass
12	0.000	0.153	0.3	0.001	0.230	0.23	Pass
13	0.001	0.210	0.4	0.001	0.315	0.26	Pass
14	0.001	0.131	0.4	0.001	0.197	0.39	Pass
15	0.001	0.150	0.5	0.001	0.225	0.35	Pass
16	0.000	0.115	0.3	0.000	0.173	0.23	Pass
17	0.001	0.132	0.6	0.001	0.199	0.39	Pass
18	0.000	0.102	0.4	0.000	0.153	0.30	Pass
19	0.001	0.118	0.6	0.001	0.178	0.43	Pass
20	0.000	0.092	0.4	0.000	0.138	0.28	Pass
21	0.001	0.107	0.7	0.001	0.161	0.46	Pass
22	0.000	0.084	0.4	0.000	0.125	0.30	Pass
23	0.001	0.098	0.7	0.001	0.147	0.49	Pass
24	0.000	0.077	0.4	0.000	0.115	0.35	Pass
25	0.001	0.090	0.8	0.001	0.135	0.52	Pass
26	0.000	0.071	0.5	0.000	0.106	0.33	Pass
27	0.001	0.083	0.8	0.001	0.125	0.55	Pass
28	0.000	0.066	0.5	0.000	0.099	0.36	Pass
29	0.001	0.078	0.9	0.001	0.116	0.64	Pass
30	0.000	0.061	0.5	0.000	0.092	0.42	Pass
31	0.001	0.073	0.8	0.001	0.109	0.58	Pass
32	0.000	0.058	0.5	0.000	0.086	0.38	Pass
33	0.001	0.068	0.9	0.001	0.102	0.61	Pass
34	0.000	0.054	0.5	0.000	0.081	0.39	Pass
35	0.001	0.064	0.9	0.001	0.096	0.61	Pass
36	0.000	0.051	0.6	0.000	0.077	0.41	Pass
37	0.001	0.061	0.9	0.001	0.091	0.62	Pass
38	0.000	0.048	0.6	0.000	0.073	0.42	Pass
39	0.001	0.058	0.9	0.001	0.087	0.62	Pass
40	0.000	0.046	0.6	0.000	0.069	0.40	Pass

Harmonic current emissions, Voltage fluctuations and flicker

Voltage Source Verification Data (Run Time)

Tested by: Koji Yamamoto, 23 deg. C / 45 % RH
Test category: Class-A (European limits) Test Margin: 100
Test date: 2019/06/13
Test duration (min): 2.5
Comment: Mode 1

Test Result: Pass Source qualification: Normal

Highest parameter values during test:

Voltage (Vrms):	229.93	Frequency (Hz):	50.00
I_Peak (Amps):	0.045	I_RMS (Amps):	0.004
I_Fund (Amps):	0.002	Crest Factor:	10.321
Power (Watts):	0.4	Power Factor:	0.453

Harm#	Harmonics V-rms	Limit V-rms	% of Limit	Status
2	0.100	0.460	21.85	OK
3	0.053	2.069	2.57	OK
4	0.006	0.460	1.20	OK
5	0.005	0.920	0.54	OK
6	0.026	0.460	5.66	OK
7	0.009	0.690	1.28	OK
8	0.008	0.460	1.74	OK
9	0.004	0.460	0.89	OK
10	0.005	0.460	1.06	OK
11	0.008	0.230	3.50	OK
12	0.013	0.230	5.66	OK
13	0.005	0.230	1.99	OK
14	0.005	0.230	2.19	OK
15	0.009	0.230	3.77	OK
16	0.004	0.230	1.68	OK
17	0.006	0.230	2.51	OK
18	0.007	0.230	3.14	OK
19	0.005	0.230	2.14	OK
20	0.004	0.230	1.83	OK
21	0.005	0.230	2.00	OK
22	0.004	0.230	1.65	OK
23	0.010	0.230	4.49	OK
24	0.005	0.230	2.35	OK
25	0.004	0.230	1.70	OK
26	0.004	0.230	1.85	OK
27	0.009	0.230	3.96	OK
28	0.004	0.230	1.75	OK
29	0.004	0.230	1.78	OK
30	0.006	0.230	2.50	OK
31	0.007	0.230	3.01	OK
32	0.005	0.230	2.05	OK
33	0.004	0.230	1.75	OK
34	0.005	0.230	2.05	OK
35	0.005	0.230	2.23	OK
36	0.004	0.230	1.80	OK
37	0.009	0.230	3.76	OK
38	0.004	0.230	1.83	OK
39	0.005	0.230	1.96	OK
40	0.004	0.230	1.68	OK

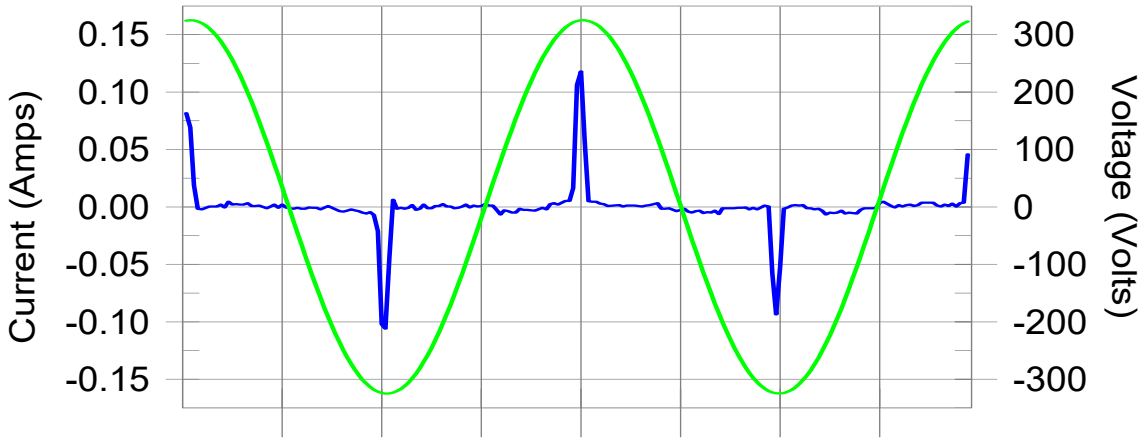
Harmonic current emissions, Voltage fluctuations and flicker

Harmonics – Class-A

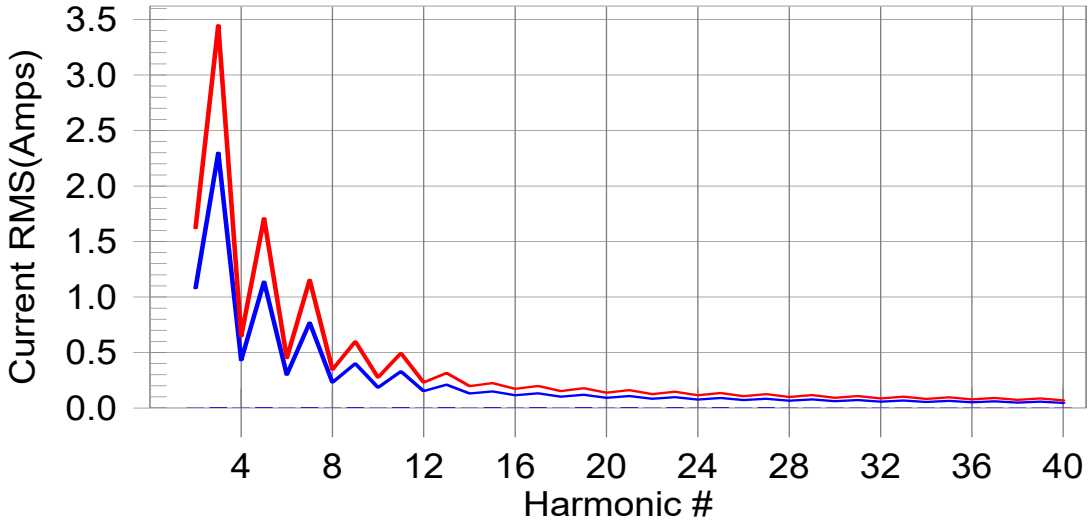
Tested by: Koji Yamamoto, 23 deg. C / 45 % RH
Test category: Class-A (European limits) Test Margin: 100
Test date: 2019/06/13
Test duration (min): 2.5
Comment: Mode 2

Test Result: Pass Source qualification: Normal

Current & voltage waveform



Harmonics and Class A limit line European Limits



Test result: Pass Worst harmonic was #7 with 0.44% of the limit.

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Harmonic current emissions, Voltage fluctuations and flicker

Current Test Result Summary (1st Time)

Tested by: Koji Yamamoto, 23 deg. C / 45 % RH
Test category: Class-A (European limits) Test Margin: 100
Test date: 2019/06/13
Test duration (min): 2.5
Comment: Mode 2

Test Result: Pass Source qualification: Normal
THC(A): 0.00 I-THD(%): 0.00 POHC(A): 0.000 POHC Limit(A): 0.251
Highest parameter values during test:

V_RMS (Volts):	229.93	Frequency (Hz):	50.00
I_Peak (Amps):	0.130	I_RMS (Amps):	0.019
I_Fund (Amps):	0.006	Crest Factor:	10.773
Power (Watts):	1.5	Power Factor:	0.480

Harm#	Harms(avg)	100%Limit	%of Limit	Harms(max)	150%Limit	%of Limit	Status
2	0.002	1.080	0.1	0.002	1.620	0.11	Pass
3	0.001	2.300	0.0	0.006	3.450	0.16	Pass
4	0.001	0.430	0.2	0.001	0.645	0.19	Pass
5	0.001	1.140	0.1	0.005	1.710	0.31	Pass
6	0.001	0.300	0.2	0.001	0.450	0.20	Pass
7	0.001	0.770	0.1	0.005	1.155	0.44	Pass
8	0.000	0.230	0.2	0.001	0.345	0.20	Pass
9	0.001	0.400	0.2	0.005	0.600	0.82	Pass
10	0.000	0.184	0.3	0.001	0.276	0.24	Pass
11	0.001	0.330	0.2	0.005	0.495	0.94	Pass
12	0.000	0.153	0.3	0.001	0.230	0.26	Pass
13	0.001	0.210	0.4	0.004	0.315	1.41	Pass
14	0.000	0.131	0.3	0.001	0.197	0.28	Pass
15	0.001	0.150	0.5	0.004	0.225	1.84	Pass
16	0.000	0.115	0.3	0.001	0.173	0.31	Pass
17	0.001	0.132	0.5	0.004	0.199	1.94	Pass
18	0.000	0.102	0.4	0.001	0.153	0.34	Pass
19	0.001	0.118	0.6	0.004	0.178	2.00	Pass
20	0.000	0.092	0.4	0.000	0.138	0.35	Pass
21	0.001	0.107	0.6	0.003	0.161	2.02	Pass
22	0.000	0.084	0.4	0.000	0.125	0.37	Pass
23	0.001	0.098	0.6	0.003	0.147	2.00	Pass
24	0.000	0.077	0.4	0.000	0.115	0.36	Pass
25	0.001	0.090	0.7	0.003	0.135	1.95	Pass
26	0.000	0.071	0.4	0.000	0.106	0.39	Pass
27	0.001	0.083	0.7	0.002	0.125	1.84	Pass
28	0.000	0.066	0.7	0.000	0.099	0.50	Pass
29	0.001	0.078	0.7	0.002	0.116	1.73	Pass
30	0.000	0.061	0.5	0.000	0.092	0.42	Pass
31	0.001	0.073	0.7	0.002	0.109	1.57	Pass
32	0.000	0.058	0.5	0.000	0.086	0.43	Pass
33	0.001	0.068	0.8	0.001	0.102	1.40	Pass
34	0.000	0.054	0.5	0.000	0.081	0.44	Pass
35	0.000	0.064	0.8	0.001	0.096	1.21	Pass
36	0.000	0.051	0.5	0.000	0.077	0.42	Pass
37	0.000	0.061	0.8	0.001	0.091	1.02	Pass
38	0.000	0.048	0.5	0.000	0.073	0.43	Pass
39	0.000	0.058	0.8	0.001	0.087	0.85	Pass
40	0.000	0.046	0.5	0.000	0.069	0.44	Pass

Harmonic current emissions, Voltage fluctuations and flicker

Current Test Result Summary (2nd Time)

Tested by: Koji Yamamoto, 23 deg. C / 45 % RH
Test category: Class-A (European limits) Test Margin: 100
Test date: 2019/06/13
Test duration (min): 2.5
Comment: Mode 2

Test Result: Pass Source qualification: Normal
THC(A): 0.00 I-THD(%): 0.00 POHC(A): 0.000 POHC Limit(A): 0.251
Highest parameter values during test:

V_RMS (Volts):	229.93	Frequency (Hz):	50.00
I_Peak (Amps):	0.037	I_RMS (Amps):	0.004
I_Fund (Amps):	0.002	Crest Factor:	10.527
Power (Watts):	0.4	Power Factor:	0.483

Harm#	Harms(avg)	100%Limit	%of Limit	Harms(max)	150%Limit	%of Limit	Status
2	0.002	1.080	0.1	0.002	1.620	0.10	Pass
3	0.001	2.300	0.0	0.001	3.450	0.02	Pass
4	0.001	0.430	0.2	0.001	0.645	0.16	Pass
5	0.001	1.140	0.1	0.001	1.710	0.06	Pass
6	0.001	0.300	0.2	0.001	0.450	0.18	Pass
7	0.001	0.770	0.1	0.001	1.155	0.06	Pass
8	0.000	0.230	0.2	0.000	0.345	0.14	Pass
9	0.001	0.400	0.1	0.001	0.600	0.10	Pass
10	0.000	0.184	0.2	0.000	0.276	0.17	Pass
11	0.001	0.330	0.2	0.001	0.495	0.12	Pass
12	0.000	0.153	0.2	0.000	0.230	0.19	Pass
13	0.001	0.210	0.3	0.001	0.315	0.21	Pass
14	0.000	0.131	0.2	0.000	0.197	0.17	Pass
15	0.000	0.150	0.3	0.000	0.225	0.22	Pass
16	0.000	0.115	0.3	0.000	0.173	0.19	Pass
17	0.000	0.132	0.4	0.001	0.199	0.25	Pass
18	0.000	0.102	0.3	0.000	0.153	0.25	Pass
19	0.000	0.118	0.4	0.000	0.178	0.27	Pass
20	0.000	0.092	0.3	0.000	0.138	0.23	Pass
21	0.000	0.107	0.4	0.000	0.161	0.29	Pass
22	0.000	0.084	0.4	0.000	0.125	0.25	Pass
23	0.000	0.098	0.5	0.000	0.147	0.32	Pass
24	0.000	0.077	0.4	0.000	0.115	0.29	Pass
25	0.000	0.090	0.5	0.000	0.135	0.35	Pass
26	0.000	0.071	0.4	0.000	0.106	0.29	Pass
27	0.000	0.083	0.5	0.000	0.125	0.37	Pass
28	0.000	0.066	0.6	0.000	0.099	0.46	Pass
29	0.000	0.078	0.5	0.000	0.116	0.38	Pass
30	0.000	0.061	0.4	0.000	0.092	0.35	Pass
31	0.000	0.073	0.6	0.000	0.109	0.40	Pass
32	0.000	0.058	0.5	0.000	0.086	0.33	Pass
33	0.000	0.068	0.6	0.000	0.102	0.42	Pass
34	0.000	0.054	0.5	0.000	0.081	0.35	Pass
35	0.000	0.064	0.6	0.000	0.096	0.43	Pass
36	0.000	0.051	0.5	0.000	0.077	0.36	Pass
37	0.000	0.061	0.6	0.000	0.091	0.44	Pass
38	0.000	0.048	0.5	0.000	0.073	0.36	Pass
39	0.000	0.058	0.6	0.000	0.087	0.45	Pass
40	0.000	0.046	0.5	0.000	0.069	0.37	Pass

Harmonic current emissions, Voltage fluctuations and flicker

Voltage Source Verification Data (Run Time)

Tested by: Koji Yamamoto, 23 deg. C / 45 % RH
Test category: Class-A (European limits) Test Margin: 100
Test date: 2019/06/13
Test duration (min): 2.5
Comment: Mode 2

Test Result: Pass Source qualification: Normal

Highest parameter values during test:

Voltage (Vrms):	229.93	Frequency (Hz):	50.00
I_Peak (Amps):	0.130	I_RMS (Amps):	0.019
I_Fund (Amps):	0.006	Crest Factor:	10.773
Power (Watts):	1.5	Power Factor:	0.480

Harm#	Harmonics V-rms	Limit V-rms	% of Limit	Status
2	0.102	0.460	22.15	OK
3	0.054	2.069	2.63	OK
4	0.005	0.460	1.09	OK
5	0.005	0.920	0.55	OK
6	0.027	0.460	5.94	OK
7	0.009	0.690	1.37	OK
8	0.008	0.460	1.68	OK
9	0.004	0.460	0.80	OK
10	0.005	0.460	1.10	OK
11	0.008	0.230	3.37	OK
12	0.013	0.230	5.58	OK
13	0.005	0.230	2.15	OK
14	0.004	0.230	1.88	OK
15	0.009	0.230	3.90	OK
16	0.004	0.230	1.58	OK
17	0.005	0.230	2.33	OK
18	0.008	0.230	3.31	OK
19	0.005	0.230	1.99	OK
20	0.004	0.230	1.84	OK
21	0.005	0.230	2.09	OK
22	0.004	0.230	1.61	OK
23	0.010	0.230	4.23	OK
24	0.005	0.230	2.14	OK
25	0.004	0.230	1.82	OK
26	0.004	0.230	1.79	OK
27	0.010	0.230	4.15	OK
28	0.004	0.230	1.67	OK
29	0.004	0.230	1.82	OK
30	0.005	0.230	2.21	OK
31	0.007	0.230	3.20	OK
32	0.005	0.230	2.18	OK
33	0.004	0.230	1.83	OK
34	0.005	0.230	2.06	OK
35	0.005	0.230	2.15	OK
36	0.004	0.230	1.89	OK
37	0.009	0.230	3.73	OK
38	0.004	0.230	1.90	OK
39	0.004	0.230	1.68	OK
40	0.004	0.230	1.66	OK

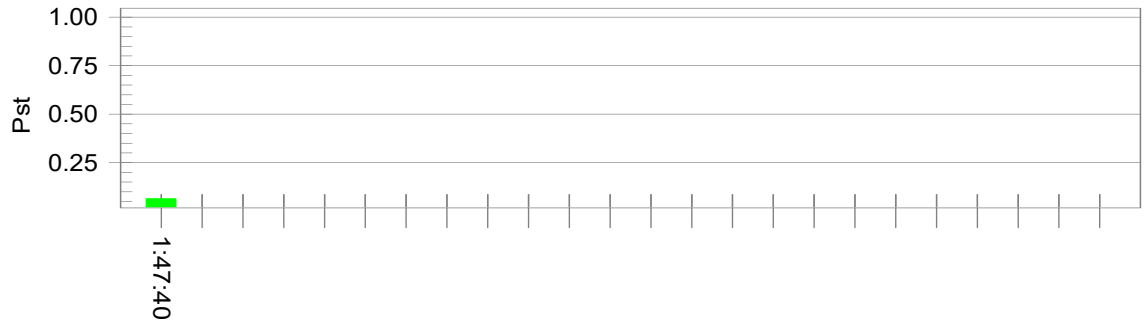
Harmonic current emissions, Voltage fluctuations and flicker

Flicker Test Summary per EN/IEC61000-3-3 (Run Time)

Tested by: Koji Yamamoto, 23 deg. C / 45 % RH
Test category: All parameters (European limits) Test Margin: 100
Test date: 2019/06/14
Test duration (min): 10
Comment: Mode 1

Test Result: Pass Status: Test Completed

Pst_i and limit line European Limits



Parameter values recorded during the test:

Vrms at the end of test (Volt):	229.94			
Highest dt (%):	0.00	Test limit (%):	3.30	Pass
Time(mS) > dt:	0.0	Test limit (mS):	500.0	Pass
Highest dc (%):	0.00	Test limit (%):	3.30	Pass
Highest dmax (%):	0.00	Test limit (%):	4.00	Pass
Highest Pst (10 min. period):	0.064	Test limit:	1.000	Pass

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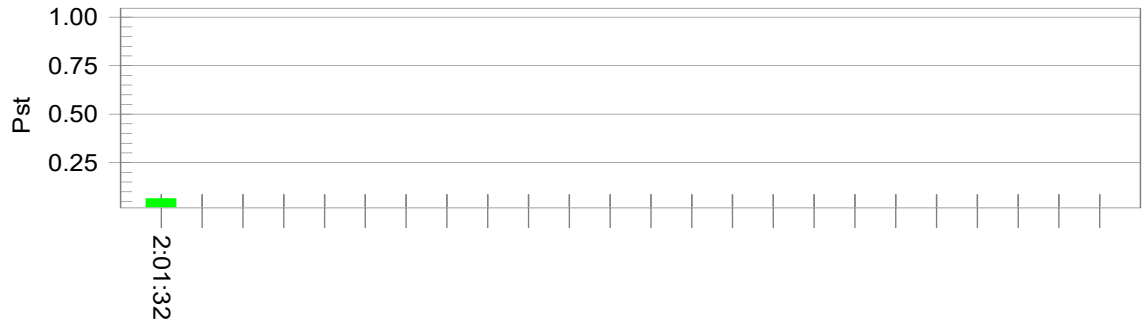
Harmonic current emissions, Voltage fluctuations and flicker

Flicker Test Summary per EN/IEC61000-3-3 (Run Time)

Tested by: Koji Yamamoto, 23 deg. C / 45 % RH
Test category: All parameters (European limits) Test Margin: 100
Test date: 2019/06/14
Test duration (min): 10
Comment: Mode 2

Test Result: Pass Status: Test Completed

Pst_i and limit line European Limits



Parameter values recorded during the test:

Vrms at the end of test (Volt):	229.90			
Highest dt (%):	0.00	Test limit (%):	3.30	Pass
Time(mS) > dt:	0.0	Test limit (mS):	500.0	Pass
Highest dc (%):	0.00	Test limit (%):	3.30	Pass
Highest dmax (%):	0.00	Test limit (%):	4.00	Pass
Highest Pst (10 min. period):	0.064	Test limit:	1.000	Pass

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APPENDIX 2: Test instruments

Test Instruments (1/2)

Test item	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Calibration Due Date	Cal Int
CE	142011	AC4_Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-10005	06/28/2018	06/30/2020	24
CE	142227	Measure	KOMELON	KMC-36	-	-	-	-
CE	141152	EMI measurement program	TSJ	TEPTO-DV	-	-	-	-
CE	141949	Test Receiver	Rohde & Schwarz	ESCI	100767	08/06/2018	08/31/2019	12
CE	141357	LISN(AMN)	Schwarzbeck	NSLK8127	8127-729	07/24/2018	07/31/2019	12
CE	141217	Coaxial cable	Fujikura/Suhner/TSJ	5D-2W/SFM141/ 421-010/ sucoform141-P	-/04178	06/18/2019	06/30/2020	12
CE	141248	Attenuator	JFW Industries, Inc.	50FP-013H2 N	-	12/06/2018	12/31/2019	12
CE	141562	Thermo-Hygrometer	CUSTOM	CTH-201	0010	01/11/2019	01/31/2020	12
CE/HF/RS	141546	Digital HiTESTER	HIOKI	3805	60100600	05/21/2019	05/31/2020	12
HF	142746	PROGRAMMABLE AC/DC POWER SOURCE 2kVA BOOSTER	NF CORPORATION	ES 2000B	9110743	11/25/2018	11/30/2019	12
HF	141166	Harmonics / Voltage fluctuations and flicker test program	CALIFORNIA INSTRUMENTS	CTS30		-	-	-
HF	141518	Harmonics and Flicker measuring system	CALIFORNIA INSTRUMENTS	100-CTS-6192B	72446	11/26/2018	11/30/2019	12
HF	141876	Reference Impedance Network	CALIFORNIA INSTRUMENTS	REF-IMP3S	S010	12/21/2018	12/31/2019	12
HF	142243	Power Supply / AC5	NF	ES2000S	424604	11/25/2018	11/30/2019	12
HF/Dip/RS	141563	Thermo-Hygrometer	CUSTOM	CTH-180	1701	01/11/2019	01/31/2020	12
ESD	87539	ESD Simulator	SCHAFFNER	NSG 435	5073	01/17/2019	01/31/2020	12
ESD	142482	Discharging brush	TSJ	-	-	-	-	-
ESD	142597	Vertical Coupling Board	TSJ	-	-	-	-	-
ESD	142752	ESD Resistor cable (V)	UL Japan	ESD Resistor cable (V)	1	-	-	-
ESD	142601	Horizontal coupling Plane	TSJ	-	-	-	-	-
ESD	142757	ESD Resistor cable	UL Japan	ESD Resistor cable	7	-	-	-
ESD	90297	Digital High Voltage Meter	BRANDENBURG	139D	L00144	07/09/2018	07/31/2019	12
ESD/SG	142183	Measure	KOMELON	KMC-36	-	-	-	-
ESD/SG	141360	DIGITAL HiTESTER	HIOKI	3805	70900532	01/29/2019	01/31/2020	12
ESD/SG	141572	Thermo-Hygrometer	CUSTOM	CTH-201	3401	01/11/2019	01/31/2020	12
ESD/SG	141346	Barometer	Sunoh	SBR121	839	12/12/2016	12/31/2019	36
SG	141604	EMC Test System(Surge)	Teseq	NSG3040	1684	01/21/2019	01/31/2020	12
RS	141521	Dual Directional Coupler	MITEQ	CD2-102-602-30S	CD-00264-2	03/01/2019	03/31/2020	12
RS	165128	Dual Directional Coupler	WERLATONE	C3908-10	113794	11/12/2018	11/30/2019	12
RS	165122	Logperiodic Antenna	Schwarzbeck	VULP9118D	9118D641	-	-	-
RS	142180	Measure	KOMELON	KMC-36	-	-	-	-
RS	165116	Power Meter	Rohde & Schwarz	NRP2	1144.1374K02 -106281-gf	11/12/2018	11/30/2019	12
RS	165118	Power Sensor	Rohde & Schwarz	NRP6A	1424.6796K02 -101379-dz	11/12/2018	11/30/2019	12
RS	165119	Power Sensor	Rohde & Schwarz	NRP6A	1424.6796K02 -101380-ez	11/12/2018	11/30/2019	12
RS	155957	Power Amplifier	R&K	GA701M602-5350R	B70543	11/01/2018	11/30/2019	12
RS	165125	RF Power Amplifier	Rohde & Schwarz	BBA150-BC250	102819	01/23/2019	01/31/2020	12
RS	141190	Radio frequency electromagnetic field test program	TSJ	TEPTO-RS	-	-	-	-
RS	165115	Signal Generator	Rohde & Schwarz	SMA100A	1406.600K02-114717-nj	12/14/2018	12/31/2019	12
RS	165124	Stacked double Logperi antenna	Schwarzbeck	STLP9149	9149-542	-	-	-

Test Instruments (2/2)

Test item	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Calibration Due Date	Cal Int
CS	159904	Radio frequency Common mode (CS) test program	TSJ	TEPT-CS2	-	-	-	-
CS	141889	Signal Generator	Rohde & Schwarz	SMY01	842483/050	02/22/2019	02/29/2020	12
CS	141804	MilliVolt Meter	Rohde & Schwarz	URV55	100355	03/14/2019	03/31/2020	12
CS	141238	Insertion unit	Rohde & Schwarz	URV5-Z4	100303	03/14/2019	03/31/2020	12
CS	141920	Terminator	TME	CT-03NP	No,1172690	02/05/2019	02/29/2020	12
CS	142258	RF Power Amplifier	BONN Elektronik	BSA 0125-75	056170A	03/27/2019	03/31/2020	12
CS	142293	Attenuator(6dB, 100W)	Weinschel Corp	100-SA-FFN-06	-	-	-	-
CS	141447	Coupling decoupling network	Toyo Corporation	TCDN-801-M2-16	6014	02/05/2019	02/29/2020	12
CS	141206	Artificial Hand RC element	UL Japan	-	001	05/24/2019	05/31/2020	12
CS/FTB/ Dip	141276	Barometer	Sunoh	SBR121	1051	07/09/2018	07/31/2021	36
CS/FTB/ Dip	141554	Thermo-Hygrometer	CUSTOM	CTH-180	1301	01/11/2019	01/31/2020	12
CS/FTB/ Dip	141532	DIGITAL HiTESTER	HIOKI	3805	51201197	01/29/2019	01/31/2020	12
CS/FTB/ Dip	142229	Measure	KOMELON	KMC-36	-	-	-	-
Dip	141151	Low frequency immunity tests program	NF	ES0406C	-	-	-	-
Dip	141960	Voltage Dips Simulator	NF	AS-517A	9081222	10/18/2018	10/31/2019	12
Dip/RS	141343	Barometer	Sunoh	SBR121	596	02/08/2018	02/28/2021	36
FTB	141144	Remote Control Software	Teseq	WIN3000-SDR	Version 1.20	-	-	-
FTB	141603	EMC Test System	Teseq	NSG3040	1684	05/27/2019	05/31/2020	12

***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 Emissions
RE: Radiated emission
H/F: Harmonic current emissions, Voltage fluctuations and flicker
ESD: Electrostatic discharge
RS: Radio frequency electromagnetic field
FTB: Fast transients, common mode
SG: Surges
CS: Radio frequency, common mode
Dip: Voltage dips and interruptions

APPENDIX 3: Photographs of test setup

Conducted emission

Photo 1

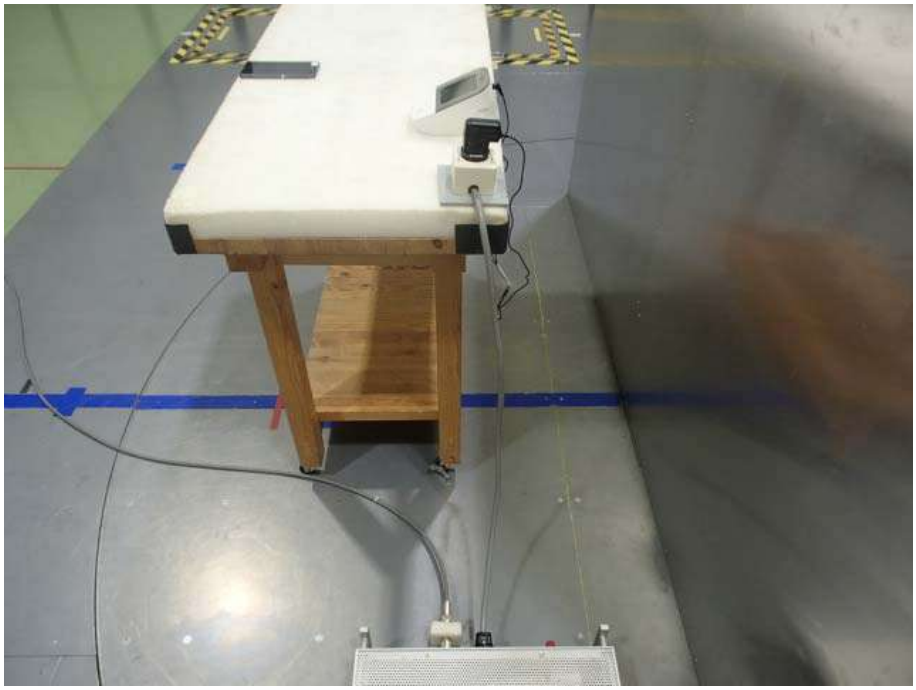

Photo 2

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Harmonic current emissions, Voltage fluctuations and flicker

Photo 1

Photo 2

Electrostatic discharge

Photo 1

Photo 2

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Radio frequency electromagnetic field

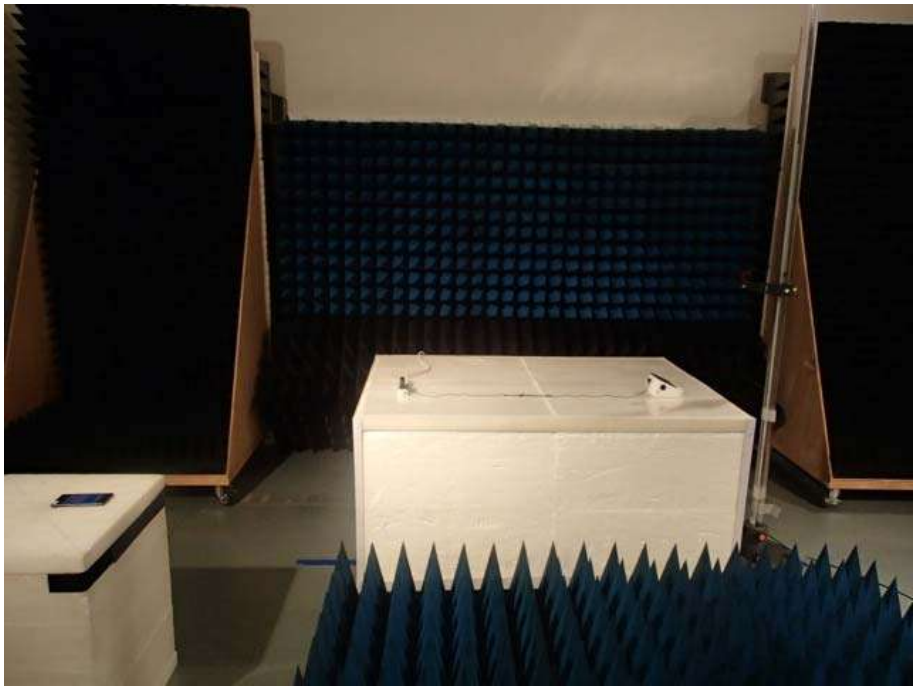

Photo 1

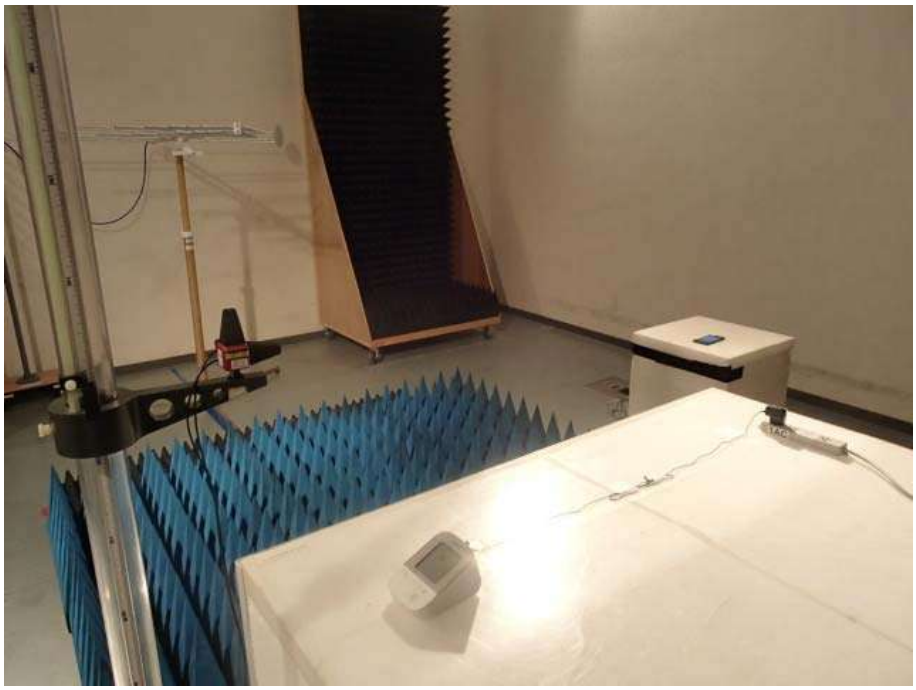

Photo 2

Fast transients, common mode

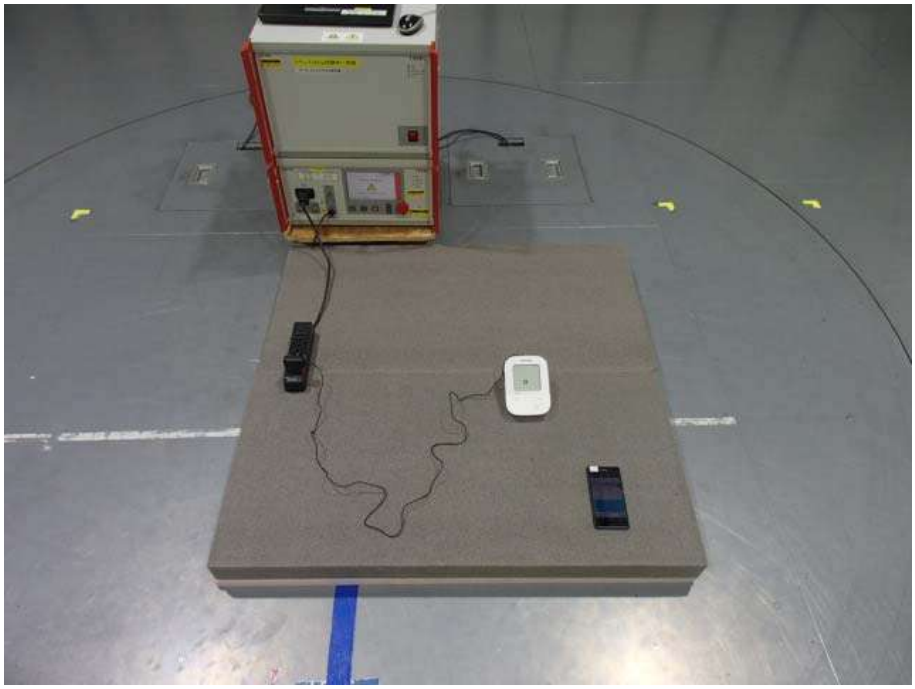

Photo 1

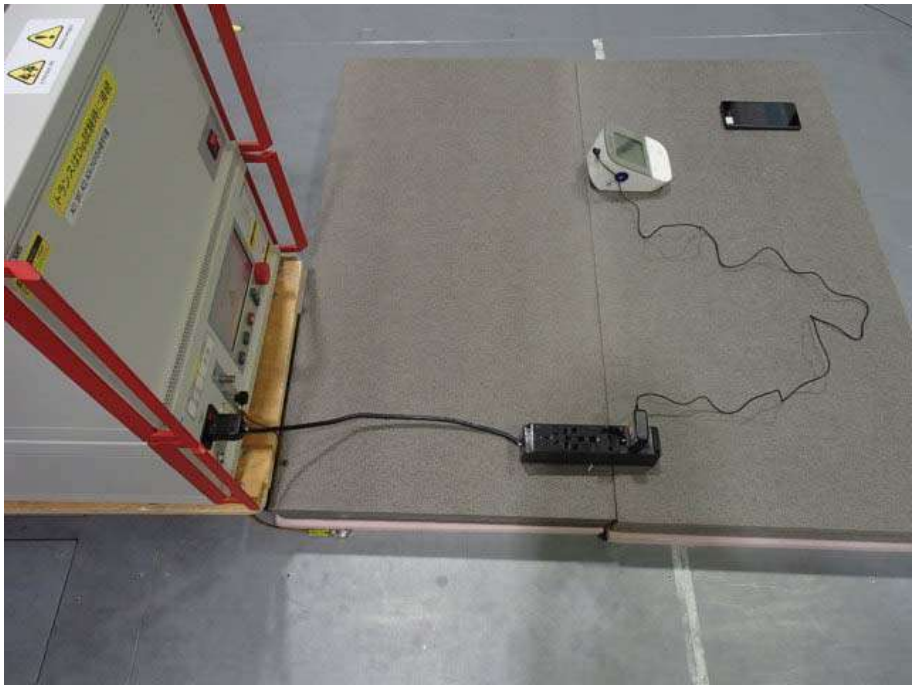

Photo 2

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Surges

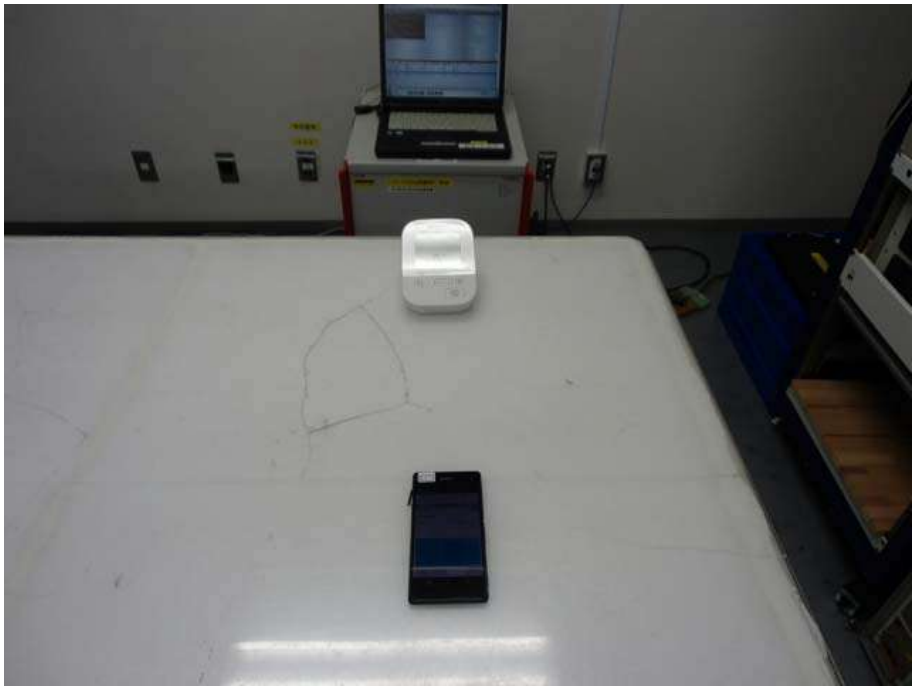

Photo 1

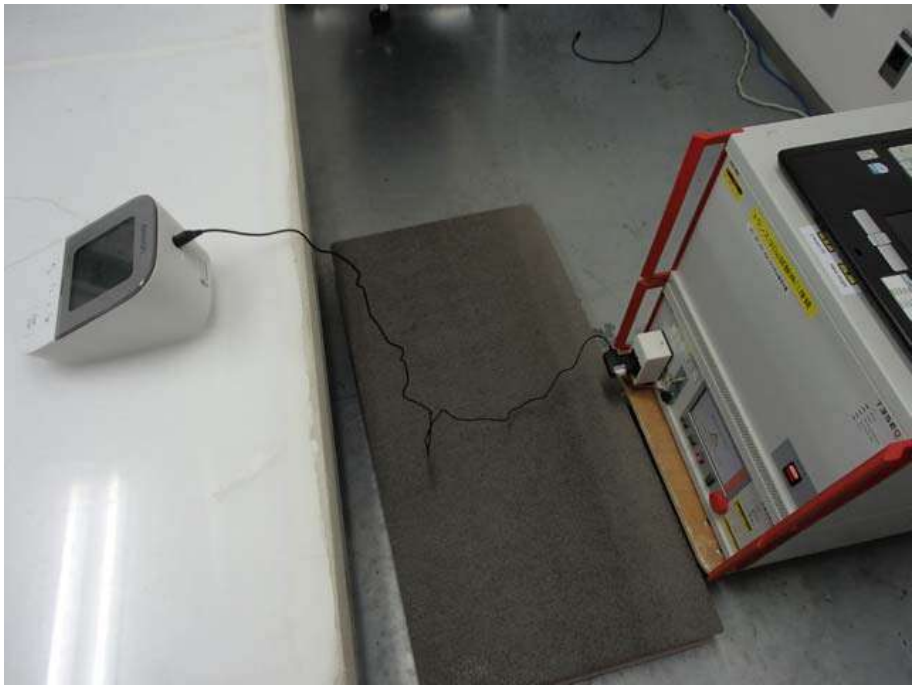

Photo 2

Radio frequency, common mode

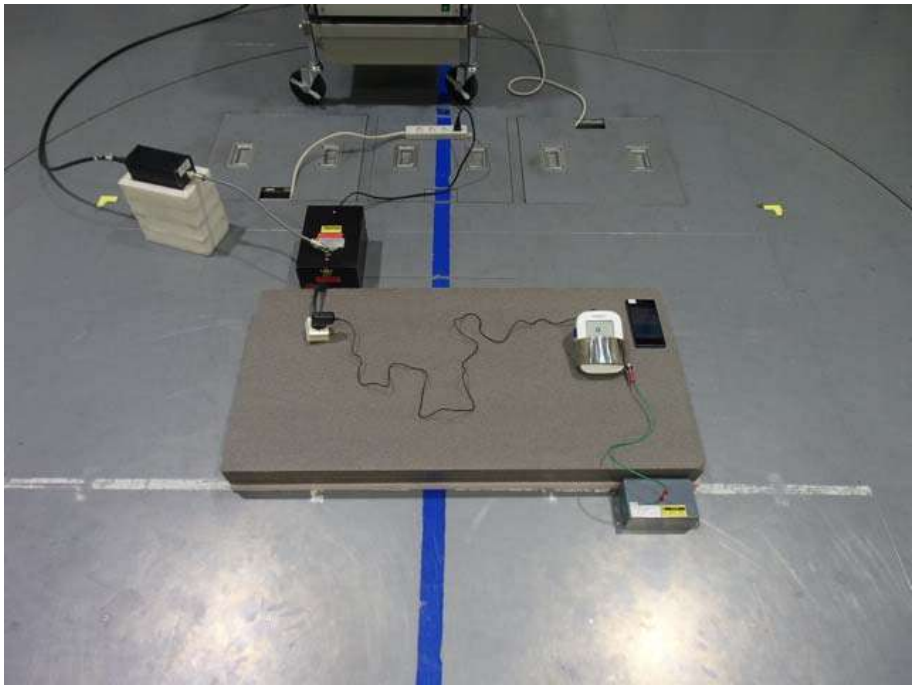

Photo 1

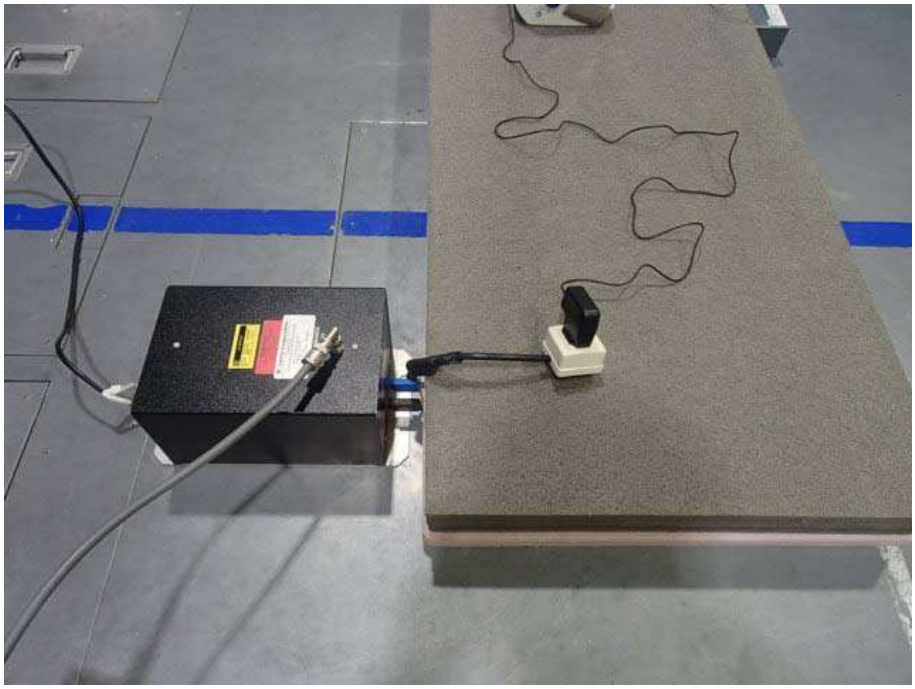

Photo 2

Voltage dips and interruptions

Photo 1

Photo 2

End of Report

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