



EMC TEST REPORT

Test Report No. : 13538007H-B

Applicant : OMRON HEALTHCARE Co., Ltd.

Type of EUT : BLOOD PRESSURE MONITOR

Model Number of EUT : HEM-7140T1

**Test standard : EN 301 489-1 V2.2.3
EN 301 489-17 V3.2.4**

Test Result : Complied (Refer to SECTION 3.2)

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3. This sample tested is in compliance with the limits of the above standard.
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6. This test report covers EMC technical requirements. It does not cover administrative issues such as Manual or non-EMC test related Requirements. (if applicable)
7. The all test items in this test report are conducted by UL Japan, Inc. Ise EMC Lab.
8. The opinions and the interpretations to the result of the description in this report are outside scopes where UL Japan has been accredited.
9. The information provided from the customer for this report is identified in Section 1.

Date of test: November 9 to 12, 2020

Representative test engineer:

Takeshi Hiyaji
Engineer

Consumer Technology Division

Approved by:

Takayuki Shimada
Leader

Consumer Technology Division



CERTIFICATE 5107.02

- ☐ The testing in which "Non-accreditation" is displayed is outside the accreditation scopes in UL Japan.
- ☒ There is no testing item of "Non-accreditation".

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REVISION HISTORY

Original Test Report No.: 13538007H-B

Revision	Test report No.	Date	Page revised	Contents
- (Original)	13538007H-B	December 4, 2020	-	-

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Reference: Abbreviations (Including words undescribed in this report)

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

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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 EUT, Model Number of EUT on the cover and other relevant pages
 - Operating/Test Mode(s) (Mode(s)) on all the relevant pages
 - SECTION 1: Customer information
 - SECTION 2: Equipment under test (EUT) other than the Receipt Date
 - SECTION 4: Operation of EUT during testing
- * The laboratory is exempted from liability of any test results affected from the above information in SECTION 2 and 4.

SECTION 2: Equipment under test (EUT)

2.1 Identification of EUT

Type : BLOOD PRESSURE MONITOR
Model Number : HEM-7140T1
Serial Number : Refer to SECTION 4.2
Rating : DC 6.0 V (Battery)
AC 100 V to 240 V, 50 Hz / 60 Hz (AC Adapter)
Receipt Date : October 31, 2020
Country of Mass-production : China, Vietnam, Brazil, and Japan
Condition : Production prototype
(Not for Sale: This sample is equivalent to mass-produced items.)
Modification : No Modification by the test lab

2.2 Product description

Model: HEM-7140T1 (referred to as the EUT in this report) is a BLOOD PRESSURE MONITOR.

Variant models: HEM-7141T1, HEM-7142T1, HEM-7143T1, HEM-7144T1, HEM-7143T1-EBK, HEM-7143T1-D

The differences among these models are as follow;

- the place of destination
- the specification of Blood Pressure Monitor

Radio Specification

Bluetooth Low Energy

Equipment Type : Transceiver
Frequency of Operation : 2402 MHz - 2480 MHz
Type of Modulation : GFSK
Antenna Type : Pattern Antenna
Antenna Gain : -3.07 dBi (max)
Operating Temperature : 5 deg. C to 40 deg. C
Receiver Category : Category 3

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SECTION 3: Test specification, procedures and results

3.1 Test specification

EMC : EN 301 489-1 V2.2.3
EMC : EN 301 489-17 V3.2.4
Title : ElectroMagnetic Compatibility (EMC) standard for radio equipment and services;
Part 1 : Common technical requirements;
Harmonised Standard for ElectroMagnetic Compatibility
Part 17 : Specific conditions for Broadband Data Transmission Systems; Harmonised Standard for ElectroMagnetic Compatibility
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	20.69 dB (0.40800 MHz, QP, Phase N) <Mode 1>	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 Harmonics current emissions and 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.

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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	<u>AC Power ports</u> ±1.0 kV ±0.5 kV 5 / 50 ns, 5 kHz	Complied c)	*2)
Surges	AC mains power input ports, Wired network ports (indoor, outdoor cables)	Applicable	EN 61000-4-5 :2014+A1:2017	B	<u>AC mains power input ports</u> ±0.5 kV, ±1.0 kV, ±2.0 kV (Line to Earth) ±0.5 kV, ±1.0 kV (Line to Line) 1.2 / 50 us	Complied d)	*3)
Radio frequency, common mode	Signal, Wired network and control ports, DC and AC Power ports	Applicable	EN 61000-4-6 :2014	A	<u>AC Power ports,</u> 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+A1:2017	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.

- 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

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3.3 Addition to standard

Test Item	Listed of Standard *1)	Applied Test Procedure
Conducted emission	EN 55032: 2015	EN 55032:2015 + AC:2016
Voltage dips and interruptions	EN 61000-4-11:2004	EN 61000-4-11:2004+A1:2017

*1) Normative Reference of EN 301 489-1 V2.2.3

Other than above, 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). Shall be no loss of function. Shall be no unintentional transmissions.	Shall operate as intended. Shall be no degradation of performance. Shall be no loss of function. Shall be no loss of critical stored data.
B	May be loss of function	Functions shall be self-recoverable. Shall operate as intended after recovering. Shall be no loss of critical stored data.
C	May be loss of function	Functions shall be recoverable by the operator. Shall operate as intended after recovering. Shall be no loss of critical stored data.
NOTE: Operate as intended during the test allows a level of degradation in accordance with EN 301 489-17 V3.2.4 clause 6.2.2 (see following row)		
6.2.2 Minimum performance level		
☐ For equipment that supports a PER or FER, the minimum performance level shall be a PER or FER less than or equal to 10 %.		
☒ For equipment that does not support a PER or a FER, the minimum performance level shall be no loss of the wireless transmission function needed fro the intended use the equipment.		

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	3.4 dB
	0.15 MHz to 30 MHz	2.9 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

The laboratory calculates the uncertainty for the EMS test facilities.

The EMS test is qualitative test and uncertainties do not apply directly to the results.

3.6 Test Location

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A2LA Certificate Number: 5107.02

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

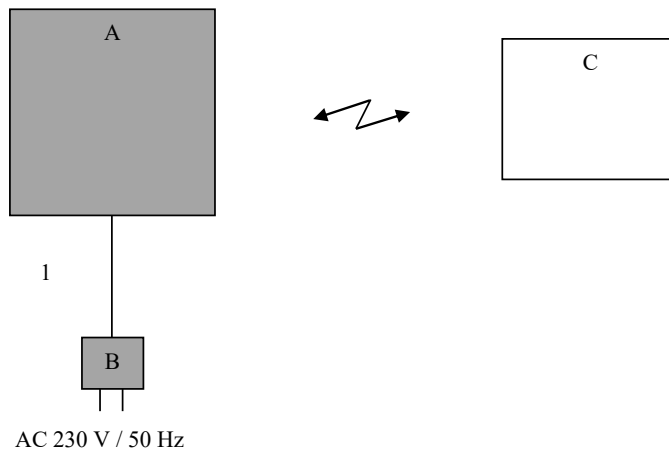
Refer to APPENDIX.

SECTION 4: Operation of EUT during testing

4.1 Operating mode(s)

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

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	BLOOD PRESSURE MONITOR	HEM-7140T1	ES1010000019V	OMRON HEALTHCARE Co., Ltd.	EUT
B	AC Adaptere	HHP-CM01	2020-07-26	OMRON HEALTHCARE Co., Ltd.	EUT
C	Smart Phone	Galaxy A7	RF8N50421FD	Samsung	-

List of cables used

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

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SECTION 5: Conducted emission

5.1 Operating environment

Test place : No.3 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, 1.0 m by 1.5 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: November 9, 2020

Test engineer: Takafumi Noguchi

SECTION 6: Harmonic current emissions, Voltage fluctuations and flicker

6.1 Operating environment

Test place : No.5 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: November 9, 2020

Test engineer: Takafumi Noguchi

SECTION 7: Electrostatic discharge

7.1 Operating environment

Test place : No.5 semi anechoic chamber
Temperature : 20 deg. C
Humidity : 50 % RH
Atmosphere : 1030 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($2 \times 470 \text{ k}\Omega$) 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: November 12, 2020 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	Pass
-2	Pass
+4	Pass
-4	Pass
+8	Pass
-8	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)



Green: Air discharge

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SECTION 8: Radio frequency electromagnetic field

8.1 Operating environment

Test place : No.5 semi anechoic chamber
Temperature : 18 deg. C
Humidity : 44 % RH
Atmosphere : 1020 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 Horn antennas
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) / 3.4 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 Horn 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.

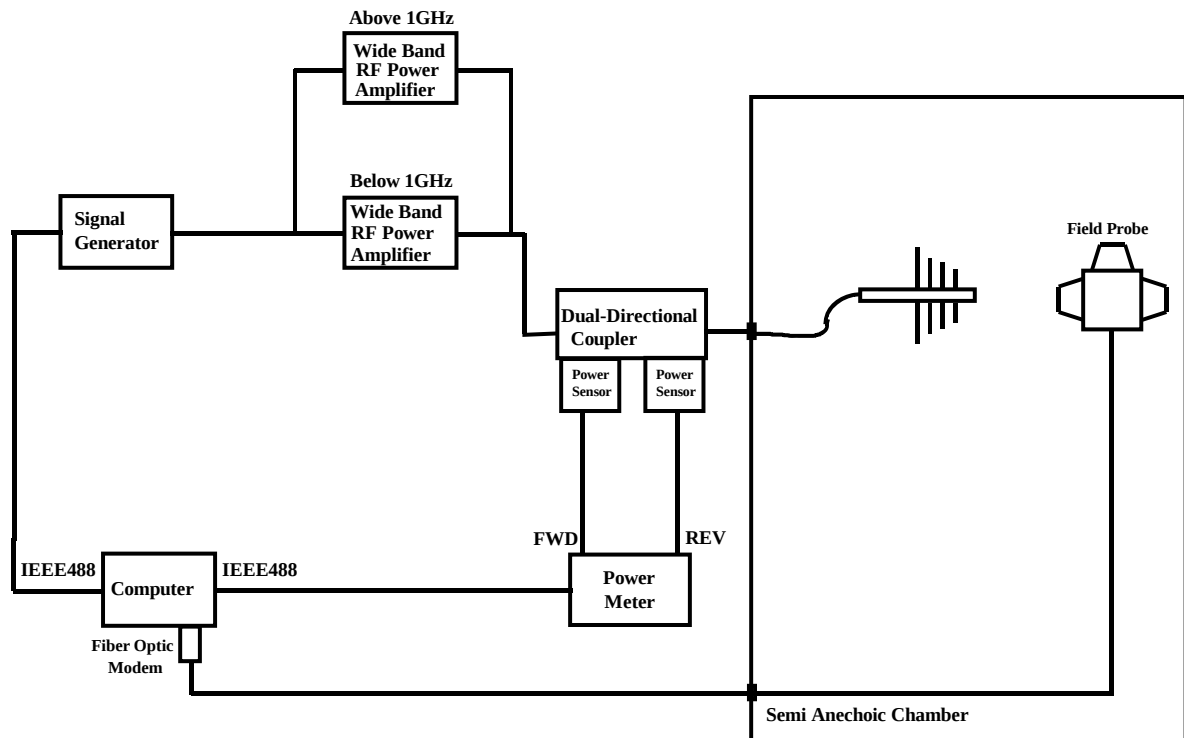
Date: November 10, 2020 Test engineer: Takeshi Hiyaji

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

RS Test System



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Tested frequency list:

80 MHz - 1000 MHz

80.000	102.595	131.571	168.730	216.385	277.499	355.874	456.384	585.282	750.584	962.572
80.800	103.621	132.886	170.418	218.549	280.274	359.433	460.948	591.134	758.089	972.198
81.608	104.657	134.215	172.122	220.734	283.077	363.027	465.557	597.046	765.670	981.920
82.424	105.703	135.557	173.843	222.942	285.908	366.657	470.213	603.016	773.327	991.739
83.248	106.760	136.913	175.581	225.171	288.767	370.324	474.915	609.046	781.060	1000.000
84.081	107.828	138.282	177.337	227.423	291.654	374.027	479.664	615.137	788.871	
84.922	108.906	139.665	179.111	229.697	294.571	377.767	484.461	621.288	796.760	
85.771	109.995	141.061	180.902	231.994	297.517	381.545	489.306	627.501	804.727	
86.629	111.095	142.472	182.711	234.314	300.492	385.360	494.199	633.776	812.774	
87.495	112.206	143.897	184.538	236.657	303.497	389.214	499.141	640.114	820.902	
88.370	113.328	145.336	186.383	239.024	306.532	393.106	504.132	646.515	829.111	
89.253	114.462	146.789	188.247	241.414	309.597	397.037	509.173	652.980	837.402	
90.146	115.606	148.257	190.130	243.828	312.693	401.008	514.265	659.510	845.776	
91.047	116.762	149.740	192.031	246.266	315.820	405.018	519.408	666.105	854.234	
91.958	117.930	151.237	193.951	248.729	318.978	409.068	524.602	672.766	862.776	
92.878	119.109	152.749	195.891	251.216	322.168	413.159	529.848	679.494	871.404	
93.806	120.300	154.277	197.850	253.729	325.390	417.290	535.146	686.289	880.118	
94.744	121.503	155.820	199.828	256.266	328.644	421.463	540.498	693.151	888.919	
95.692	122.718	157.378	201.826	258.829	331.930	425.678	545.903	700.083	897.809	
96.649	123.945	158.952	203.845	261.417	335.249	429.934	551.362	707.084	906.787	
97.615	125.185	160.541	205.883	264.031	338.602	434.234	556.875	714.155	915.854	
98.591	126.437	162.147	207.942	266.671	341.988	438.576	562.444	721.296	925.013	
99.577	127.701	163.768	210.021	269.338	345.408	442.962	568.068	728.509	934.263	
100.573	128.978	165.406	212.122	272.031	348.862	447.392	573.749	735.794	943.606	
101.579	130.268	167.060	214.243	274.752	352.350	451.865	579.487	743.152	953.042	

1000 MHz - 6000 MHz

1000.000	1269.735	1612.226	2047.099	2599.273	3300.387	4190.616	5320.971
1010.000	1282.432	1628.348	2067.570	2625.266	3333.391	4232.522	5374.181
1020.100	1295.256	1644.632	2088.246	2651.519	3366.725	4274.848	5427.922
1030.301	1308.209	1661.078	2109.128	2678.034	3400.392	4317.596	5482.202
1040.604	1321.291	1677.689	2130.220	2704.814	3434.396	4360.772	5537.023
1051.010	1334.504	1694.466	2151.522	2731.863	3468.74	4404.379	5592.394
1061.520	1347.849	1711.410	2173.037	2759.181	3503.428	4448.423	5648.317
1072.135	1361.328	1728.525	2194.768	2786.773	3538.462	4492.908	5704.800
1082.857	1374.941	1745.810	2216.715	2814.640	3573.846	4537.836	5761.849
1093.685	1388.690	1763.268	2238.883	2842.787	3609.585	4583.215	5819.467
1104.622	1402.577	1780.901	2261.271	2871.215	3645.681	4629.047	5877.662
1115.668	1416.603	1798.709	2283.884	2899.927	3682.137	4675.337	5936.438
1126.825	1430.769	1816.697	2306.723	2928.926	3718.959	4722.091	5995.803
1138.093	1445.077	1834.864	2329.790	2958.216	3756.148	4769.312	6000.000
1149.474	1459.527	1853.212	2353.088	2987.798	3793.710	4817.005	
1160.969	1474.123	1871.744	2376.619	3017.676	3831.647	4865.175	
1172.579	1488.864	1890.462	2400.385	3047.853	3869.963	4913.827	
1184.304	1503.752	1909.366	2424.389	3078.331	3908.663	4962.965	
1196.147	1518.790	1928.460	2448.633	3109.114	3947.750	5012.595	
1208.109	1533.978	1947.745	2473.119	3140.206	3987.228	5062.721	
1220.190	1549.318	1967.222	2497.851	3171.607	4027.100	5113.348	
1232.392	1564.811	1986.895	2522.829	3203.323	4067.371	5164.481	
1244.716	1580.459	2006.764	2548.057	3235.357	4108.044	5216.126	
1257.163	1596.263	2026.831	2573.538	3267.710	4149.125	5268.288	

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SECTION 9: Fast transients, common mode

9.1 Operating environment

Test place : No.5 measurement room
Temperature : 18 deg. C
Humidity : 44 % RH
Atmosphere : 1028 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
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: November 11, 2020 Test engineer: Takeshi Hiyaji

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.5 measurement room
Temperature : 18 deg. C
Humidity : 44 % RH
Atmosphere : 1028 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 Earth ± 0.5 kV, ± 1.0 kV, ± 2.0 kV
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: November 11, 2020 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

2) Line to Earth (PE-N)

Test No.	Test Level (kV)	Polarity +/-	Pass/ Fail
1	0.5	+	Pass
2	0.5	-	Pass
3	1.0	+	Pass
4	1.0	-	Pass
5	2.0	+	Pass
6	2.0	-	Pass

3) Line to Earth (PE-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
5	2.0	+	Pass
6	2.0	-	Pass

SECTION 11: Radio frequency, common mode

11.1 Operating environment

Test place : No.5 measurement room
Temperature : 20 deg. C
Humidity : 50 % RH
Atmosphere : 1030 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: November 12, 2020 Test engineer: Takeshi Hiyaji

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 M2

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	

SECTION 12: Voltage dips and interruptions

12.1 Operating environment

Test place : No.5 measurement room
Temperature : 18 deg. C
Humidity : 44 % RH
Atmosphere : 1028 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 (500 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, 1.0 period), 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: November 11, 2020 Test engineer: Takeshi Hiyaji

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	

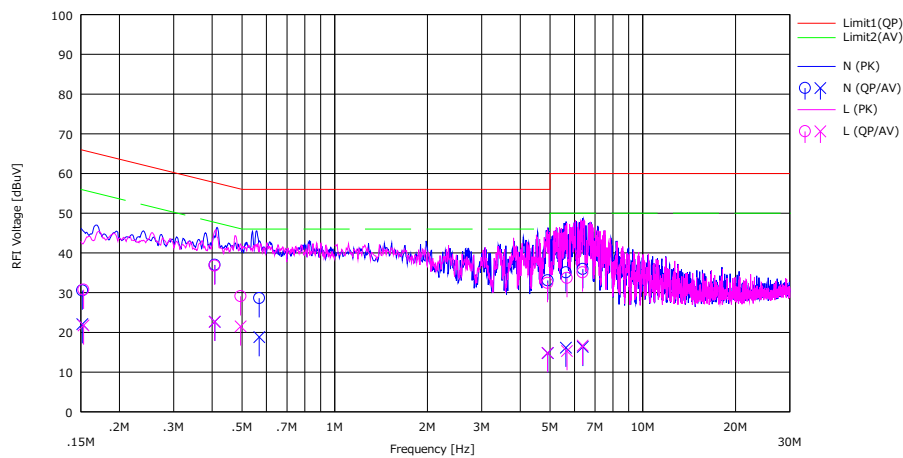
* U_T : 100 V, 240 V

APPENDIX 1: Test data

Conducted emission

Report No. 13538007H
Test place Ise EMC Lab.
Semi Anechoic Chamber No.3
Date November 9, 2020
Temperature / Humidity 21 deg. C / 42 % RH
Engineer Takafumi Noguchi
Mode Mode 1

Limit : EN 55032_Class B_AC mains



No.	Freq. [MHz]	Reading		LISN [dB]	LOSS [dB]	Results		Limit		Margin		Phase	Comment
		<QP> [dBuV]	<AV> [dBuV]			<QP> [dBuV]	<AV> [dBuV]	<QP> [dBuV]	<AV> [dBuV]	<QP> [dB]	<AV> [dB]		
1	0.15160	17.20	8.70	0.13	13.23	30.56	22.06	65.91	55.91	35.35	33.85	N	
2	0.40800	23.60	9.30	0.14	13.26	37.00	22.70	57.69	47.69	20.69	24.99	N	
3	0.56910	15.20	5.40	0.14	13.28	28.62	18.82	56.00	46.00	27.38	27.18	N	
4	4.91440	19.20	0.90	0.38	13.52	33.10	14.80	56.00	46.00	22.90	31.20	N	
5	5.62860	21.10	2.20	0.43	13.54	35.07	16.17	60.00	50.00	24.93	33.83	N	
6	6.38700	21.90	2.30	0.49	13.57	35.96	16.36	60.00	50.00	24.04	33.64	N	
7	0.15295	17.40	8.40	0.13	13.23	30.76	21.76	65.84	55.84	35.08	34.08	L	
8	0.40740	23.40	9.30	0.13	13.26	36.79	22.69	57.70	47.70	20.91	25.01	L	
9	0.49501	15.70	8.10	0.13	13.27	29.10	21.50	56.08	46.08	26.98	24.58	L	
10	4.90630	18.50	0.90	0.39	13.52	32.41	14.81	56.00	46.00	23.59	31.19	L	
11	5.67480	19.70	1.30	0.45	13.54	33.69	15.29	60.00	50.00	26.31	34.71	L	
12	6.37520	21.00	2.60	0.50	13.57	35.07	16.67	60.00	50.00	24.93	33.33	L	

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

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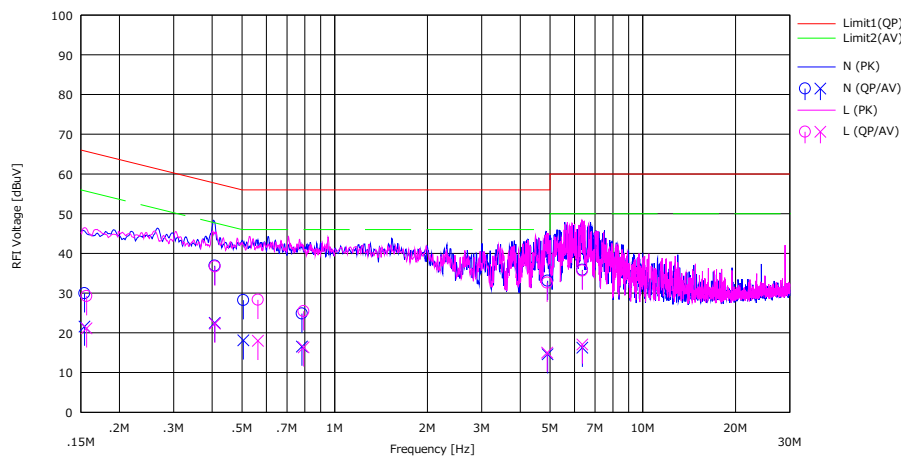
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Facsimile : +81 596 24 8124

Conducted emission

Report No. 13538007H
Test place Ise EMC Lab.
Semi Anechoic Chamber No.3
Date November 9, 2020
Temperature / Humidity 21 deg. C / 42 % RH
Engineer Takafumi Noguchi
Mode Mode 2

Limit : EN 55032_Class B_AC mains



No.	Freq. [MHz]	Reading		LISN	LOSS	Results		Limit		Margin		Phase	Comment
		[QP] [dBuV]	[AV] [dBuV]			[QP] [dBuV]	[AV] [dBuV]	[QP] [dBuV]	[AV] [dBuV]	[QP] [dB]	[AV] [dB]		
1	0.15408	16.60	8.20	0.13	13.23	29.96	21.56	65.78	55.78	35.82	34.22	N	
2	0.40780	23.50	9.10	0.14	13.26	36.90	22.50	57.69	47.69	20.79	25.19	N	
3	0.50510	14.80	4.70	0.14	13.27	28.21	18.11	56.00	46.00	27.79	27.89	N	
4	0.78250	11.40	3.10	0.15	13.29	24.84	16.54	56.00	46.00	31.16	29.46	N	
5	4.90810	19.20	0.70	0.38	13.52	33.10	14.60	56.00	46.00	22.90	31.40	N	
6	6.36500	21.80	2.20	0.49	13.57	35.86	16.26	60.00	50.00	24.14	33.74	N	
7	0.15650	15.90	7.80	0.13	13.23	29.26	21.16	65.65	55.65	36.39	34.49	L	
8	0.40840	23.30	8.90	0.13	13.26	36.69	22.29	57.68	47.68	20.99	25.39	L	
9	0.56315	14.90	4.60	0.13	13.28	28.31	18.01	56.00	46.00	27.69	27.99	L	
10	0.79240	12.00	2.90	0.15	13.29	25.44	16.34	56.00	46.00	30.56	29.66	L	
11	4.89360	18.70	1.10	0.39	13.52	32.61	15.01	56.00	46.00	23.39	30.99	L	
12	6.36200	21.60	3.00	0.50	13.57	35.67	17.07	60.00	50.00	24.33	32.93	L	

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

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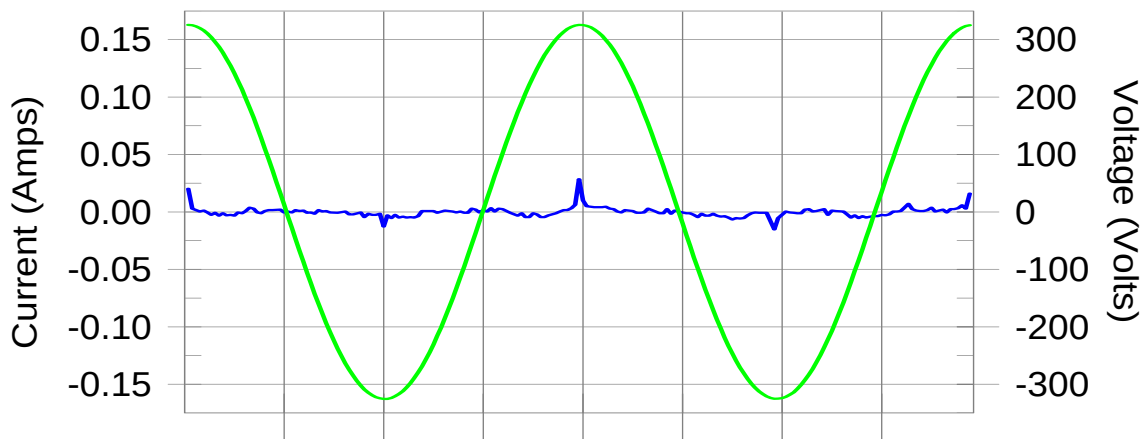
Harmonic current emissions, Voltage fluctuations and flicker
Harmonics – Class-A

Tested by: Takafumi Noguchi, 21 deg. C / 42 % RH
Test category: Class-A (European limits)
Test date: 2020/11/09
Test duration (min): 2.5
Comment: Mode 1

Test Margin: 100

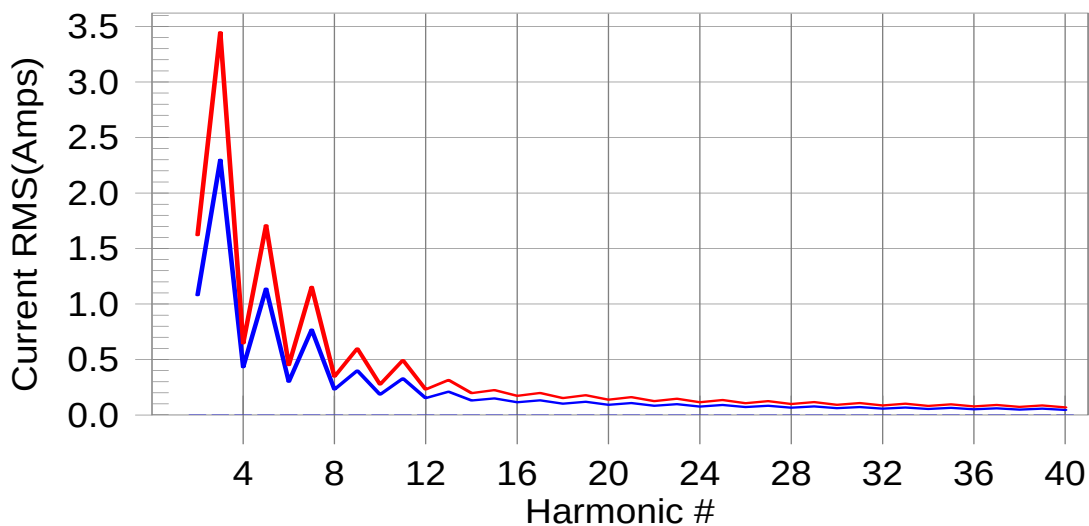
Test Result: Pass Source qualification: Normal

Current & voltage waveforms



Harmonics and Class A limit line

European Limits



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

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

Tested by: Takafumi Noguchi, 21 deg. C / 42 % RH
Test category: Class-A (European limits)
Test date: 2020/11/09
Test duration (min): 2.5
Comment: Mode 1

Test Margin: 100

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): 230.27 Frequency(Hz): 50.00
I_Peak (Amps): 0.043 I_RMS (Amps): 0.004
I_Fund (Amps): 0.002 Crest Factor: 10.828
Power (Watts): 0.4 Power Factor: 0.421

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	0.03	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	0.07	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	0.13	Pass
10	0.000	0.184	0.3	0.001	0.276	0.19	Pass
11	0.001	0.330	0.2	0.001	0.495	0.16	Pass
12	0.000	0.153	0.3	0.001	0.230	0.23	Pass
13	0.001	0.210	0.3	0.001	0.315	0.23	Pass
14	0.000	0.131	0.3	0.000	0.197	0.20	Pass
15	0.001	0.150	0.5	0.001	0.225	0.34	Pass
16	0.000	0.115	0.3	0.000	0.173	0.22	Pass
17	0.001	0.132	0.5	0.001	0.199	0.34	Pass
18	0.000	0.102	0.4	0.000	0.153	0.31	Pass
19	0.001	0.118	0.5	0.001	0.178	0.37	Pass
20	0.000	0.092	0.4	0.000	0.138	0.27	Pass
21	0.001	0.107	0.6	0.001	0.161	0.41	Pass
22	0.000	0.084	0.4	0.000	0.125	0.29	Pass
23	0.001	0.098	0.6	0.001	0.147	0.44	Pass
24	0.000	0.077	0.4	0.000	0.115	0.33	Pass
25	0.001	0.090	0.7	0.001	0.135	0.47	Pass
26	0.000	0.071	0.5	0.000	0.106	0.34	Pass
27	0.001	0.083	0.7	0.001	0.125	0.50	Pass
28	0.000	0.066	0.5	0.000	0.099	0.35	Pass
29	0.001	0.078	0.7	0.001	0.116	0.51	Pass
30	0.000	0.061	0.5	0.000	0.092	0.42	Pass
31	0.001	0.073	0.9	0.001	0.109	0.59	Pass
32	0.000	0.058	0.5	0.000	0.086	0.38	Pass
33	0.001	0.068	0.8	0.001	0.102	0.54	Pass
34	0.000	0.054	0.5	0.000	0.081	0.38	Pass
35	0.001	0.064	0.8	0.001	0.096	0.56	Pass
36	0.000	0.051	0.5	0.000	0.077	0.38	Pass
37	0.000	0.061	0.8	0.001	0.091	0.57	Pass
38	0.000	0.048	0.5	0.000	0.073	0.40	Pass
39	0.000	0.058	0.8	0.001	0.087	0.58	Pass
40	0.000	0.046	0.5	0.000	0.069	0.39	Pass

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Harmonic current emissions, Voltage fluctuations and flicker

Current Test Result Summary (2nd Time)

Tested by: Takafumi Noguchi, 21 deg. C / 42 % RH
Test category: Class-A (European limits)
Test date: 2020/11/09
Test duration (min): 2.5
Comment: Mode 1

Test Margin: 100

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): 230.27 Frequency(Hz): 50.00
I_Peak (Amps): 0.044 I_RMS (Amps): 0.004
I_Fund (Amps): 0.002 Crest Factor: 11.174
Power (Watts): 0.4 Power Factor: 0.422

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	0.03	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	0.07	Pass
8	0.001	0.230	0.2	0.001	0.345	0.15	Pass
9	0.001	0.400	0.2	0.001	0.600	0.13	Pass
10	0.000	0.184	0.3	0.001	0.276	0.18	Pass
11	0.001	0.330	0.2	0.001	0.495	0.16	Pass
12	0.000	0.153	0.2	0.001	0.230	0.22	Pass
13	0.001	0.210	0.3	0.001	0.315	0.23	Pass
14	0.000	0.131	0.3	0.000	0.197	0.21	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	0.22	Pass
17	0.001	0.132	0.5	0.001	0.199	0.35	Pass
18	0.000	0.102	0.4	0.000	0.153	0.32	Pass
19	0.001	0.118	0.5	0.001	0.178	0.37	Pass
20	0.000	0.092	0.4	0.000	0.138	0.28	Pass
21	0.001	0.107	0.6	0.001	0.161	0.41	Pass
22	0.000	0.084	0.4	0.000	0.125	0.30	Pass
23	0.001	0.098	0.6	0.001	0.147	0.44	Pass
24	0.000	0.077	0.4	0.000	0.115	0.35	Pass
25	0.001	0.090	0.7	0.001	0.135	0.47	Pass
26	0.000	0.071	0.4	0.000	0.106	0.33	Pass
27	0.001	0.083	0.7	0.001	0.125	0.49	Pass
28	0.000	0.066	0.5	0.000	0.099	0.34	Pass
29	0.001	0.078	0.7	0.001	0.116	0.52	Pass
30	0.000	0.061	0.6	0.000	0.092	0.46	Pass
31	0.001	0.073	0.8	0.001	0.109	0.56	Pass
32	0.000	0.058	0.5	0.000	0.086	0.38	Pass
33	0.001	0.068	0.8	0.001	0.102	0.55	Pass
34	0.000	0.054	0.5	0.000	0.081	0.38	Pass
35	0.001	0.064	0.8	0.001	0.096	0.57	Pass
36	0.000	0.051	0.5	0.000	0.077	0.40	Pass
37	0.000	0.061	0.8	0.001	0.091	0.57	Pass
38	0.000	0.048	0.5	0.000	0.073	0.40	Pass
39	0.000	0.058	0.8	0.000	0.087	0.57	Pass
40	0.000	0.046	0.5	0.000	0.069	0.39	Pass

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Harmonic current emissions, Voltage fluctuations and flicker

Voltage Source Verification Data (Run Time)

Tested by: Takafumi Noguchi, 21 deg. C / 42 % RH
Test category: Class-A (European limits)
Test date: 2020/11/09
Test duration (min): 2.5
Comment: Mode 1

Test Margin: 100

Test Result: Pass Source qualification: Normal

Highest parameter values during test:

Voltage (Vrms): 230.27	Frequency(Hz): 50.00
I_Peak (Amps): 0.043	I_RMS (Amps): 0.004
I_Fund (Amps): 0.002	Crest Factor: 10.828
Power (Watts): 0.4	Power Factor: 0.421

Harm#	Harmonics V-rms	Limit V-rms	% of Limit	Status
2	0.105	0.461	22.84	OK
3	0.053	2.072	2.55	OK
4	0.005	0.461	1.02	OK
5	0.005	0.921	0.55	OK
6	0.026	0.461	5.70	OK
7	0.009	0.691	1.28	OK
8	0.008	0.461	1.74	OK
9	0.004	0.461	0.78	OK
10	0.005	0.461	1.07	OK
11	0.008	0.230	3.46	OK
12	0.012	0.230	5.28	OK
13	0.004	0.230	1.84	OK
14	0.005	0.230	2.15	OK
15	0.009	0.230	3.72	OK
16	0.004	0.230	1.77	OK
17	0.006	0.230	2.42	OK
18	0.007	0.230	3.18	OK
19	0.005	0.230	2.29	OK
20	0.005	0.230	1.96	OK
21	0.005	0.230	2.05	OK
22	0.004	0.230	1.68	OK
23	0.011	0.230	4.58	OK
24	0.005	0.230	2.36	OK
25	0.004	0.230	1.75	OK
26	0.004	0.230	1.73	OK
27	0.010	0.230	4.18	OK
28	0.004	0.230	1.81	OK
29	0.004	0.230	1.74	OK
30	0.005	0.230	2.35	OK
31	0.008	0.230	3.36	OK
32	0.004	0.230	1.86	OK
33	0.004	0.230	1.73	OK
34	0.005	0.230	2.01	OK
35	0.005	0.230	2.09	OK
36	0.004	0.230	1.81	OK
37	0.009	0.230	3.85	OK
38	0.005	0.230	2.03	OK
39	0.004	0.230	1.77	OK
40	0.004	0.230	1.67	OK

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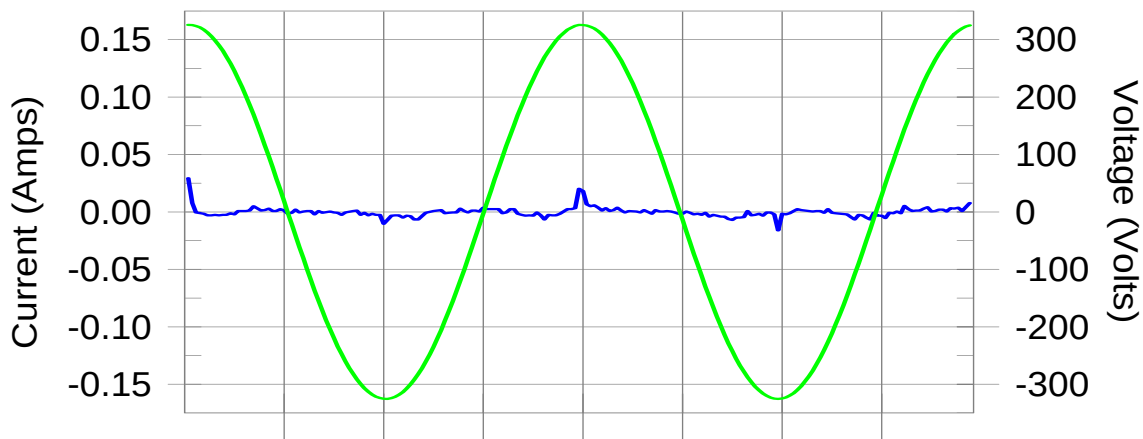
Harmonic current emissions, Voltage fluctuations and flicker
Harmonics – Class-A

Tested by: Takafumi Noguchi, 21 deg. C / 42 % RH
Test category: Class-A (European limits)
Test date: 2020/11/09
Test duration (min): 2.5
Comment: Mode 2

Test Margin: 100

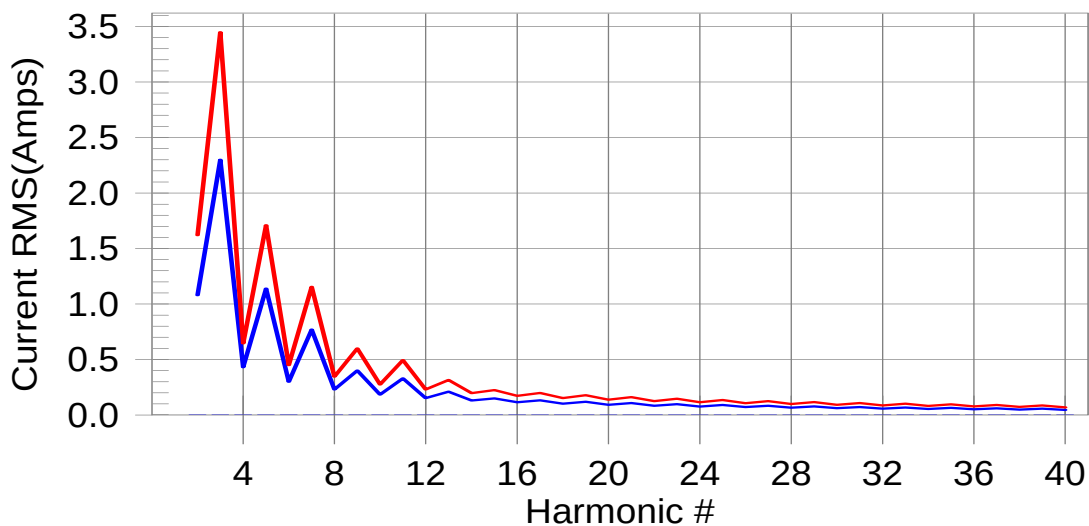
Test Result: Pass Source qualification: Normal

Current & voltage waveforms



Harmonics and Class A limit line

European Limits



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

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Harmonic current emissions, Voltage fluctuations and flicker

Current Test Result Summary (1st Time)

Tested by: Takafumi Noguchi, 21 deg. C / 42 % RH
Test category: Class-A (European limits)
Test date: 2020/11/09
Test duration (min): 2.5
Comment: Mode 2

Test Margin: 100

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): 230.27 Frequency(Hz): 50.00
I_Peak (Amps): 0.045 I_RMS (Amps): 0.004
I_Fund (Amps): 0.002 Crest Factor: 11.513
Power (Watts): 0.4 Power Factor: 0.423

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	0.03	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	0.07	Pass
8	0.000	0.230	0.2	0.001	0.345	0.15	Pass
9	0.001	0.400	0.2	0.001	0.600	0.13	Pass
10	0.000	0.184	0.3	0.001	0.276	0.18	Pass
11	0.001	0.330	0.2	0.001	0.495	0.15	Pass
12	0.000	0.153	0.3	0.001	0.230	0.22	Pass
13	0.001	0.210	0.3	0.001	0.315	0.23	Pass
14	0.000	0.131	0.3	0.000	0.197	0.20	Pass
15	0.001	0.150	0.5	0.001	0.225	0.34	Pass
16	0.000	0.115	0.3	0.000	0.173	0.22	Pass
17	0.001	0.132	0.5	0.001	0.199	0.35	Pass
18	0.000	0.102	0.4	0.000	0.153	0.29	Pass
19	0.001	0.118	0.5	0.001	0.178	0.36	Pass
20	0.000	0.092	0.4	0.000	0.138	0.27	Pass
21	0.001	0.107	0.6	0.001	0.161	0.40	Pass
22	0.000	0.084	0.4	0.000	0.125	0.29	Pass
23	0.001	0.098	0.6	0.001	0.147	0.43	Pass
24	0.000	0.077	0.4	0.000	0.115	0.32	Pass
25	0.001	0.090	0.7	0.001	0.135	0.46	Pass
26	0.000	0.071	0.4	0.000	0.106	0.32	Pass
27	0.001	0.083	0.7	0.001	0.125	0.47	Pass
28	0.000	0.066	0.5	0.000	0.099	0.34	Pass
29	0.001	0.078	0.7	0.001	0.116	0.50	Pass
30	0.000	0.061	0.7	0.000	0.092	0.49	Pass
31	0.001	0.073	0.7	0.001	0.109	0.51	Pass
32	0.000	0.058	0.5	0.000	0.086	0.36	Pass
33	0.001	0.068	0.8	0.001	0.102	0.54	Pass
34	0.000	0.054	0.5	0.000	0.081	0.38	Pass
35	0.001	0.064	0.8	0.001	0.096	0.55	Pass
36	0.000	0.051	0.5	0.000	0.077	0.38	Pass
37	0.000	0.061	0.8	0.001	0.091	0.57	Pass
38	0.000	0.048	0.5	0.000	0.073	0.39	Pass
39	0.000	0.058	0.8	0.000	0.087	0.57	Pass
40	0.000	0.046	0.5	0.000	0.069	0.39	Pass

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Harmonic current emissions, Voltage fluctuations and flicker

Current Test Result Summary (2nd Time)

Tested by: Takafumi Noguchi, 21 deg. C / 42 % RH
Test category: Class-A (European limits)
Test date: 2020/11/09
Test duration (min): 2.5
Comment: Mode 2

Test Margin: 100

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): 230.26 Frequency(Hz): 50.00
I_Peak (Amps): 0.046 I_RMS (Amps): 0.004
I_Fund (Amps): 0.002 Crest Factor: 11.700
Power (Watts): 0.4 Power Factor: 0.424

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	0.03	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	0.07	Pass
8	0.000	0.230	0.2	0.001	0.345	0.15	Pass
9	0.001	0.400	0.2	0.001	0.600	0.13	Pass
10	0.000	0.184	0.3	0.001	0.276	0.18	Pass
11	0.001	0.330	0.2	0.001	0.495	0.15	Pass
12	0.000	0.153	0.3	0.001	0.230	0.22	Pass
13	0.001	0.210	0.3	0.001	0.315	0.23	Pass
14	0.000	0.131	0.3	0.000	0.197	0.20	Pass
15	0.001	0.150	0.5	0.001	0.225	0.36	Pass
16	0.000	0.115	0.3	0.000	0.173	0.22	Pass
17	0.001	0.132	0.5	0.001	0.199	0.34	Pass
18	0.000	0.102	0.4	0.000	0.153	0.31	Pass
19	0.001	0.118	0.5	0.001	0.178	0.37	Pass
20	0.000	0.092	0.4	0.000	0.138	0.27	Pass
21	0.001	0.107	0.6	0.001	0.161	0.40	Pass
22	0.000	0.084	0.4	0.000	0.125	0.29	Pass
23	0.001	0.098	0.6	0.001	0.147	0.43	Pass
24	0.000	0.077	0.4	0.000	0.115	0.31	Pass
25	0.001	0.090	0.7	0.001	0.135	0.46	Pass
26	0.000	0.071	0.4	0.000	0.106	0.32	Pass
27	0.001	0.083	0.7	0.001	0.125	0.48	Pass
28	0.000	0.066	0.5	0.000	0.099	0.34	Pass
29	0.001	0.078	0.7	0.001	0.116	0.50	Pass
30	0.000	0.061	0.7	0.000	0.092	0.48	Pass
31	0.001	0.073	0.7	0.001	0.109	0.52	Pass
32	0.000	0.058	0.5	0.000	0.086	0.37	Pass
33	0.001	0.068	0.8	0.001	0.102	0.54	Pass
34	0.000	0.054	0.5	0.000	0.081	0.38	Pass
35	0.001	0.064	0.8	0.001	0.096	0.55	Pass
36	0.000	0.051	0.5	0.000	0.077	0.39	Pass
37	0.000	0.061	0.8	0.001	0.091	0.56	Pass
38	0.000	0.048	0.5	0.000	0.073	0.40	Pass
39	0.000	0.058	0.8	0.001	0.087	0.58	Pass
40	0.000	0.046	0.5	0.000	0.069	0.39	Pass

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Harmonic current emissions, Voltage fluctuations and flicker

Voltage Source Verification Data (Run Time)

Tested by: Takafumi Noguchi, 21 deg. C / 42 % RH
Test category: Class-A (European limits)
Test date: 2020/11/09
Test duration (min): 2.5
Comment: Mode 2

Test Margin: 100

Test Result: Pass Source qualification: Normal

Highest parameter values during test:

Voltage (Vrms): 230.27	Frequency(Hz): 50.00
I_Peak (Amps): 0.045	I_RMS (Amps): 0.004
I_Fund (Amps): 0.002	Crest Factor: 11.513
Power (Watts): 0.4	Power Factor: 0.423

Harm#	Harmonics V-rms	Limit V-rms	% of Limit	Status
2	0.106	0.461	22.91	OK
3	0.054	2.072	2.59	OK
4	0.005	0.461	1.03	OK
5	0.005	0.921	0.56	OK
6	0.026	0.461	5.67	OK
7	0.009	0.691	1.27	OK
8	0.008	0.461	1.78	OK
9	0.004	0.461	0.86	OK
10	0.005	0.461	1.11	OK
11	0.009	0.230	3.70	OK
12	0.011	0.230	4.89	OK
13	0.004	0.230	1.93	OK
14	0.004	0.230	1.92	OK
15	0.009	0.230	4.11	OK
16	0.004	0.230	1.63	OK
17	0.006	0.230	2.58	OK
18	0.007	0.230	3.10	OK
19	0.005	0.230	2.19	OK
20	0.004	0.230	1.79	OK
21	0.005	0.230	2.04	OK
22	0.004	0.230	1.59	OK
23	0.011	0.230	4.67	OK
24	0.005	0.230	2.25	OK
25	0.004	0.230	1.91	OK
26	0.004	0.230	1.73	OK
27	0.009	0.230	4.02	OK
28	0.004	0.230	1.66	OK
29	0.004	0.230	1.88	OK
30	0.005	0.230	2.34	OK
31	0.008	0.230	3.43	OK
32	0.004	0.230	1.93	OK
33	0.004	0.230	1.66	OK
34	0.005	0.230	2.03	OK
35	0.005	0.230	2.05	OK
36	0.004	0.230	1.74	OK
37	0.008	0.230	3.58	OK
38	0.004	0.230	1.83	OK
39	0.004	0.230	1.73	OK
40	0.004	0.230	1.70	OK

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Harmonic current emissions, Voltage fluctuations and flicker
Flicker Test Summary per EN/IEC61000-3-3 (Run Time)

Tested by: Takafumi Noguchi, 21 deg. C / 42 % RH
Test category: All parameters (European limits)
Test date: 2020/11/09
Test duration (min): 10
Comment: Mode 1

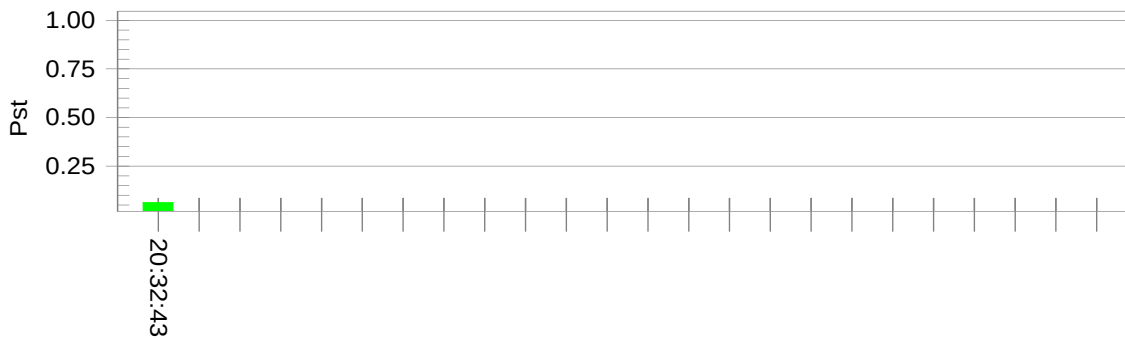
Test Margin: 100

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):	230.28			
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: Takafumi Noguchi, 21 deg. C / 42 % RH
Test category: All parameters (European limits)
Test date: 2020/11/09
Test duration (min): 10
Comment: Mode 2

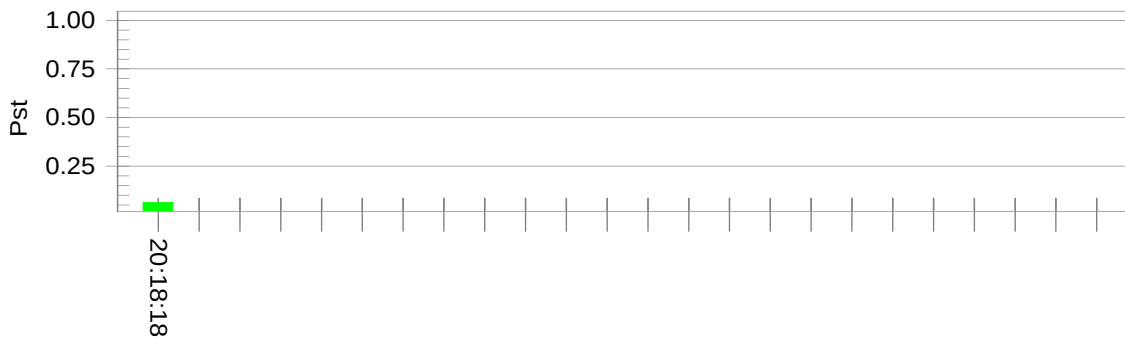
Test Margin: 100

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):	230.20			
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 equipment (1/2)

Test Item	Local ID	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Cal Int
CE	MTR-03	141942	Test Receiver	Rohde & Schwarz	ESCI	100300	08/18/2020	12
CE	MAEC-03	142008	AC3 Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-10005	05/22/2020	24
CE	MOS-13	141554	Thermo-Hygrometer	CUSTOM. Inc	CTH-201	1301	01/07/2020	12
CE	MMM-08	141532	DIGITAL HiTESTER	Hioki	3805	51201197	01/06/2020	12
CE	MJM-16	142183	Measure	KOMELON	KMC-36	-	-	-
CE	COTS-MEMI-02	178648	EMI measurement program	TSJ (Techno Science Japan)	TEPTO-DV	-	-	-
CE	MLS-23	141357	LISN(AMN)	Schwarzbeck Mess - Elektronik	NSLK8127	8127-729	07/22/2020	12
CE	MAT-67	141248	Attenuator	JFW Industries, Inc.	50FP-013H2 N	-	12/02/2019	12
CE	MCC-112	141216	Coaxial cable	Fujikura/Suhner/TSJ	5D-2W/SFM14/sucoform141-PE/421-010/RFM-E321(SW)	-/00640	07/06/2020	12
H/F	MOS-17	141563	Thermo-Hygrometer	TFA	CTH-180	1005	01/07/2020	12
H/F	MMM-11	141546	Digital HiTESTER	Hioki	3805	60100600	05/07/2020	12
H/F	MJM-28	142229	Measure	KOMELON	KMC-36	-	-	-
H/F	COTS-MHF-02	141166	Harmonics / Voltage fluctuations and flicker test program	California Instruments (Ametek)	CTS3.0	-	-	-
H/F	MHC-02	141518	Harmonics and Flicker measuring system	California Instruments (Ametek)	PACS-1-6192B	72446	11/25/2019	12
H/F	MRIN-01	141876	Reference Impedance Network	California Instruments (Ametek)	REF-IMP3S	S010	11/14/2019	12
H/F	MPSU-17	142746	PROGRAMMABLE AC/DC POWER SOURCE 2kVA BOOSTER	NF CORPORATION	ES 2000B	9110744	11/13/2019	12
ESD	MVT-02	MVT-02	Digital High Voltage Meter	BRANDENBURG	139D	L00144	07/27/2020	12
ESD	TESD-02	90298	ESD Simulator	BIG BANG	5300	105190	05/19/2020	12
ESD	MOS-17	141563	Thermo-Hygrometer	TFA	CTH-180	1005	01/07/2020	12
ESD	MBM-04	141343	Barometer	Sunoh	SBR121	596	02/08/2018	36
ESD	MMM-11	141546	Digital HiTESTER	Hioki	3805	60100600	05/07/2020	12
ESD	MJM-28	142229	Measure	KOMELON	KMC-36	-	-	-
RS	COTS-MRS02	141190	Radio frequency electromagnetic field test program	TSJ (Techno Science Japan)	TEPTO-RS	-	-	-
RS	MSG-13	141893	Signal Generator	Rohde & Schwarz	SMA 100A	103764	06/02/2020	12
RS	MPM-06	141803	Power Meter	Keysight Technologies Inc	E4419B	MY45100796	10/15/2020	12
RS	MPSE-09	141838	Power sensor	Keysight Technologies Inc	E9301A	MY41497704	10/15/2020	12
RS	MPSE-10	141839	Power sensor	Keysight Technologies Inc	E9301A	MY41497720	10/15/2020	12
RS	MEFS-05	141494	Isotropic Electric Field Probe	ETS LINDGREN	HI-6105	00064433	-	-
RS	MEA-01	142530	EMS Antenna	Rohde & Schwarz	HL046/HL046-P	100003/359364/002	-	-
RS	MRFA-25	142232	RF Power Amplifier	PRANA	MT700DC	1309-1398	03/03/2020	12
RS	MHDC-01	141515	Dual Directional Coupler	WERLATONE	C3908	10147	04/01/2020	12
RS	MHA-13	142549	Horn Antenna	Schwarzbeck Mess - Elektronik	BBHA 9120 LF(A)	177	-	-
RS	MRFA-27	142234	RF Power Amplifier	Rohde & Schwarz	BBA150	102019	10/30/2020	12
RS	MHDC-29	165114	Dual Directional Coupler	RLC ELECTRONICS	CHP-1040-D-40-40-FF	1743	11/06/2019	12
RS	MHDC-28	165113	Dual Directional Coupler	RLC ELECTRONICS	CHP-2080-D-40-40-FF	1743	11/07/2019	12
RS	MOS-17	141563	Thermo-Hygrometer	TFA	CTH-180	1005	01/07/2020	12
RS	MBM-04	141343	Barometer	Sunoh	SBR121	596	02/08/2018	36
RS	MMM-11	141546	Digital HiTESTER	Hioki	3805	60100600	05/07/2020	12
RS	MJM-28	142229	Measure	KOMELON	KMC-36	-	-	-
RS	MAEC-05-Uninformaty	142114	AC5 3V 80MHz-6000MHz	TDK	Semi Anechoic Chamber	DA-10005	10/05/2020	12

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Test equipment (2/2)

Test Item	Local ID	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Cal Int
EFTB	COTS-MCOMBI	141144	Remote Control Software	Teseq	WIN3000-SDR	-	-	-
EFTB	MPG-14	141603	EMC Test System	Teseq	NSG3040	1684	05/26/2020	12
EFTB	MOS-17	141563	Thermo-Hygrometer	TFA	CTH-180	1005	01/07/2020	12
EFTB	MBM-04	141343	Barometer	Sunoh	SBR121	596	02/08/2018	36
EFTB	MMM-11	141546	Digital HiTESTER	Hioki	3805	60100600	05/07/2020	12
EFTB	MJM-28	142229	Measure	KOMELON	KMC-36	-	-	-
SG	COTS-MCOMBI	141144	Remote Control Software	Teseq	WIN3000-SDR	-	-	-
SG	MPG-14-SG	141604	EMC Test System(Surge)	Teseq	NSG3040	1684	01/21/2020	12
SG	MOS-17	141563	Thermo-Hygrometer	TFA	CTH-180	1005	01/07/2020	12
SG	MBM-04	141343	Barometer	Sunoh	SBR121	596	02/08/2018	36
SG	MMM-11	141546	Digital HiTESTER	Hioki	3805	60100600	05/07/2020	12
SG	MJM-28	142229	Measure	KOMELON	KMC-36	-	-	-
CS	COTS-MCS-03	159904	Radio frequency Common mode (CS) test program	TSJ (Techno Science Japan)	TEPT-CS2	-	-	-
CS	MSG-04	141907	Signal Generator	Rohde & Schwarz	SML03	101859	06/01/2020	12
CS	MPM-05	141802	Power Meter	Rohde & Schwarz	NRVD	101239	11/06/2019	12
CS	MIU-08	141238	Insertion unit	Rohde & Schwarz	URV5-Z4	100303	03/24/2020	12
CS	MCN-16	141448	Coupling decoupling network	Toyo Corporation	TCND-801-M2-16	6015	02/05/2020	12
CS	MRFA-22	146912	RF Power Amplifier	AMPLIFIER RESEARCH	25A250	15720	03/25/2020	12
CS	MAT-102	166643	Attenuator 6dB 100W	Bird Electronic Corporation	100-SA-FFN-06	1386810	-	-
CS	MOS-17	141563	Thermo-Hygrometer	TFA	CTH-180	1005	01/07/2020	12
CS	MBM-04	141343	Barometer	Sunoh	SBR121	596	02/08/2018	36
CS	MMM-11	141546	Digital HiTESTER	Hioki	3805	60100600	05/07/2020	12
CS	MJM-28	142229	Measure	KOMELON	KMC-36	-	-	-
Dip	COTS-MDIP-03	141151	Low frequency immunity tests program	NF	ES0406C	-	-	-
Dip	MPSU-06	142243	Power Supply / AC5	NF	ES2000S	424604	11/13/2019	12
Dip	MPSU-17	142746	PROGRAMMABLE AC/DC POWER SOURCE 2kVA BOOSTER	NF CORPORATION	ES 2000B	9110744	11/13/2019	12
Dip	MVD-04	141960	Voltage Dips Simulator	NF	AS-517A	9081222	10/23/2020	12
Dip	MOS-17	141563	Thermo-Hygrometer	TFA	CTH-180	1005	01/07/2020	12
Dip	MBM-04	141343	Barometer	Sunoh	SBR121	596	02/08/2018	36
Dip	MMM-11	141546	Digital HiTESTER	Hioki	3805	60100600	05/07/2020	12
Dip	MJM-28	142229	Measure	KOMELON	KMC-36	-	-	-

*Hyphens for Last Calibration Date and Cal Int (month) are instruments that Calibration is not required (e.g. software), or instruments checked in advance before use.

The expiration date of the calibration is the end of the expired month.

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

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

Test item:

CE: Conducted Emissions
HF: 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

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APPENDIX 3: Photographs of test setup

Conducted emission



Photo 1



Photo 2

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Harmonic current emissions, Voltage fluctuations and flicker

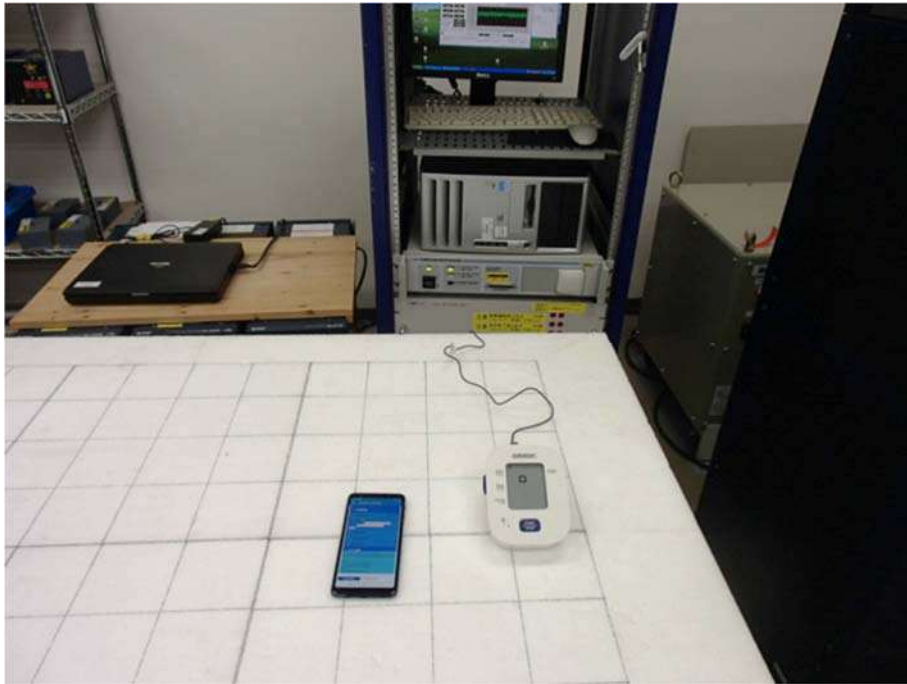


Photo 1

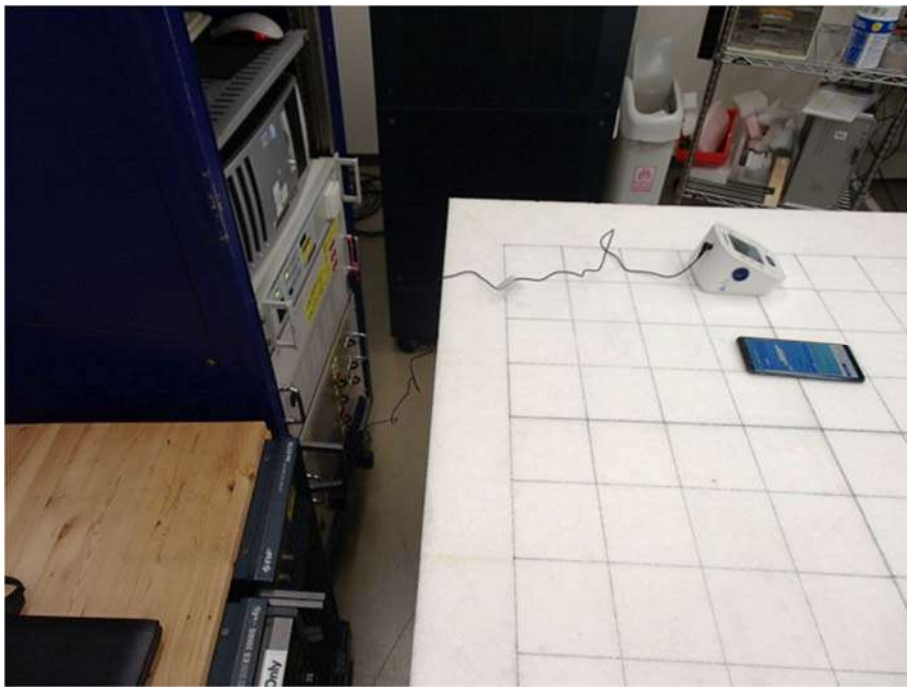


Photo 2

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Electrostatic discharge

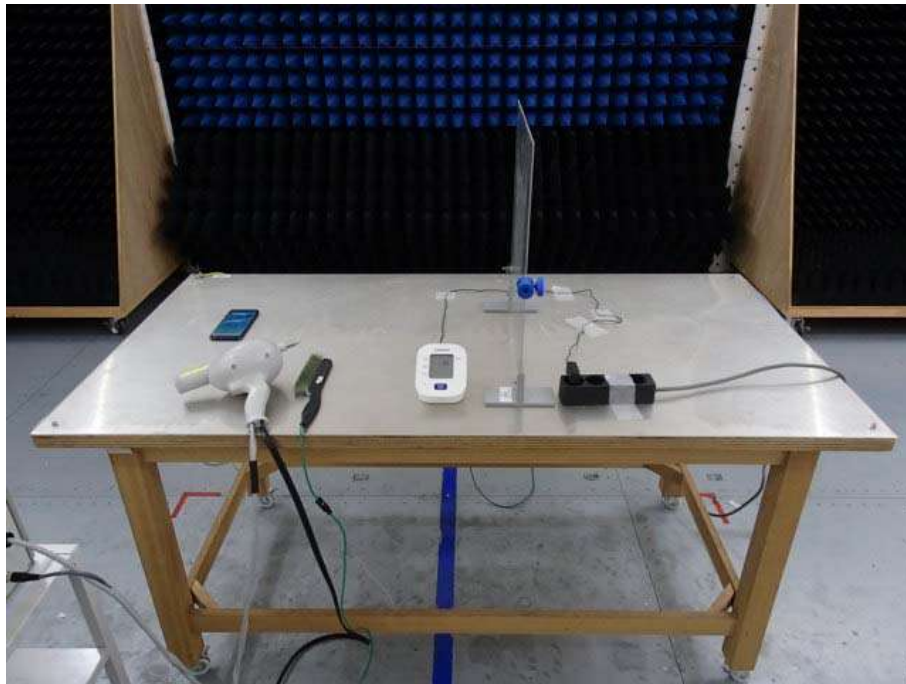


Photo 1



Photo 2

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Radio frequency electromagnetic field

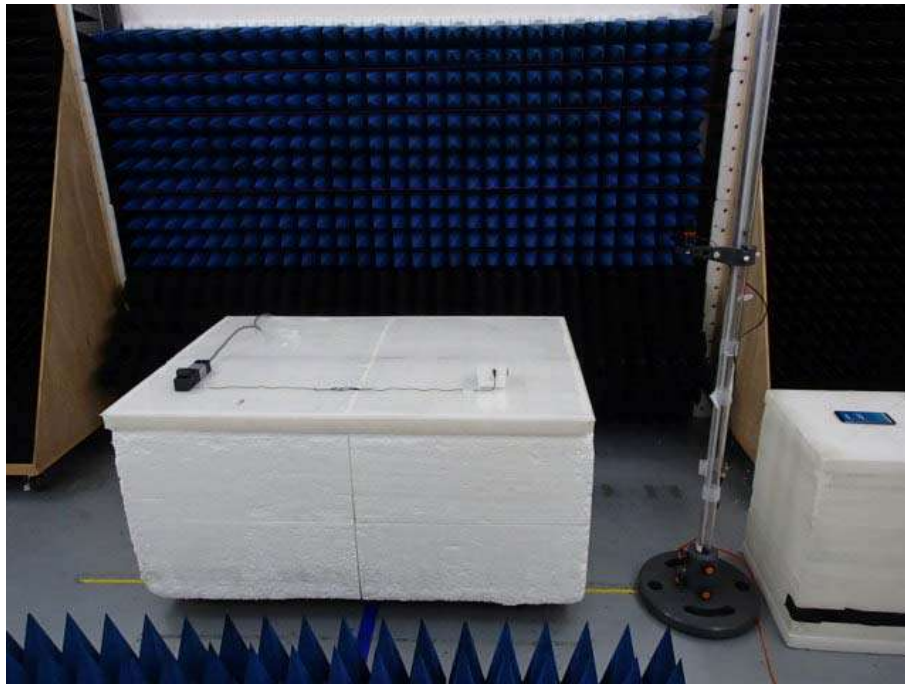


Photo 1



Photo 2

Fast transients, common mode
(CDN)



Photo 1

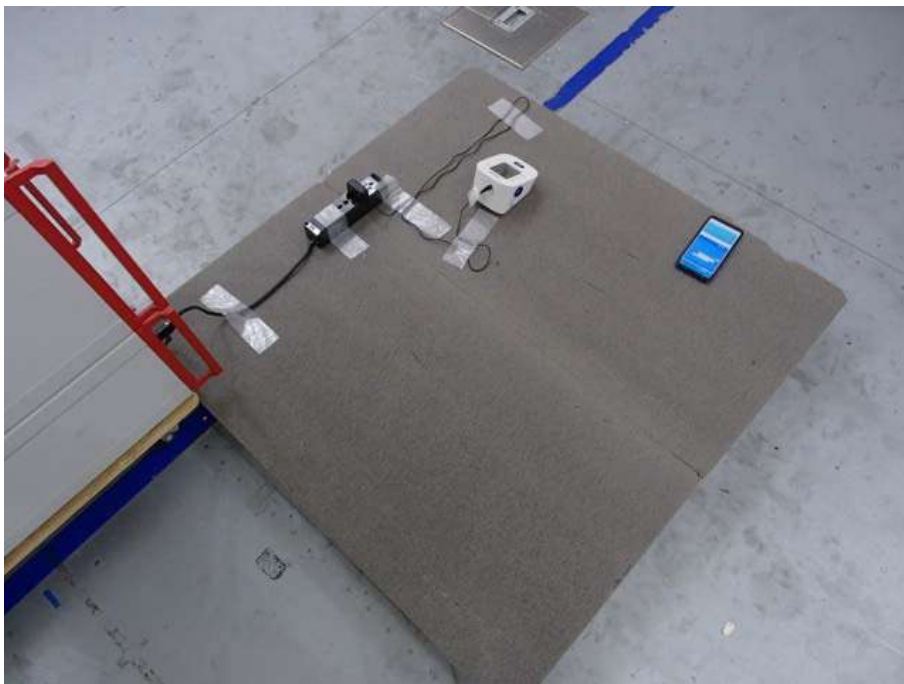


Photo 2

Surges

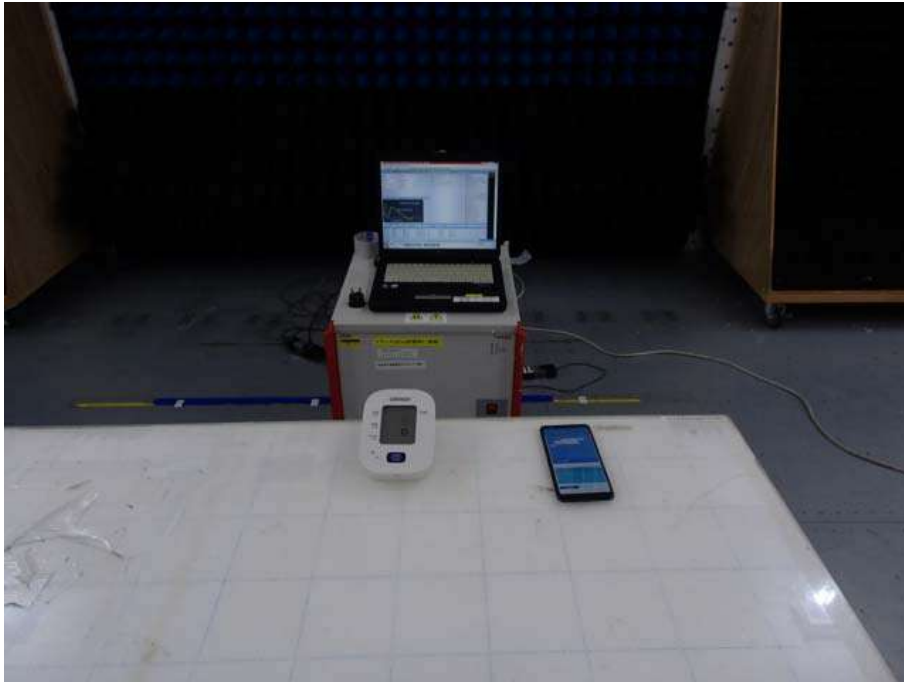


Photo 1

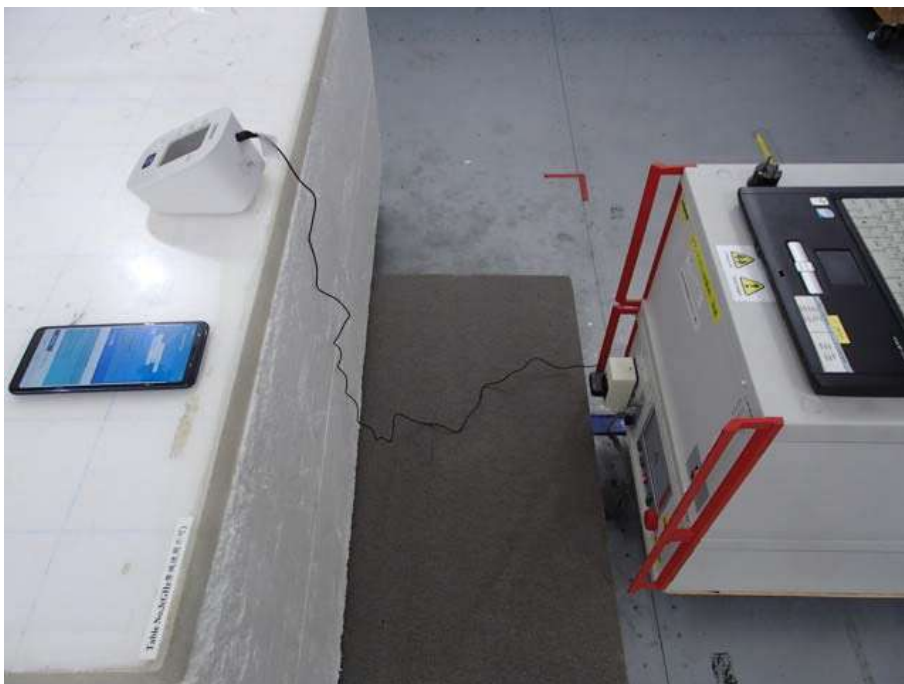


Photo 2

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Radio frequency, common mode
(CDN)

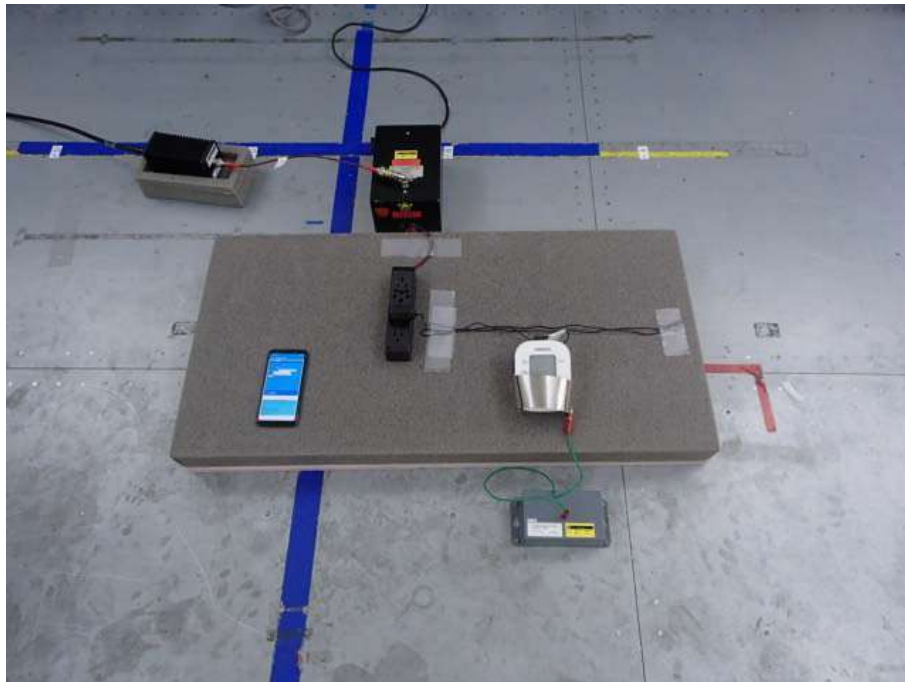


Photo 1

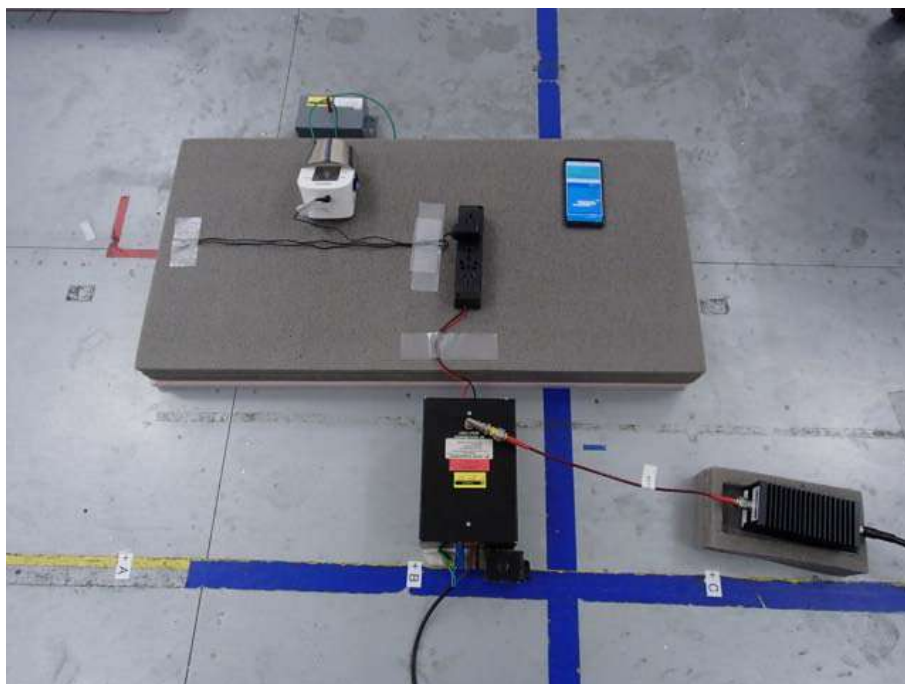


Photo 2

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Voltage dips and interruptions



Photo 1

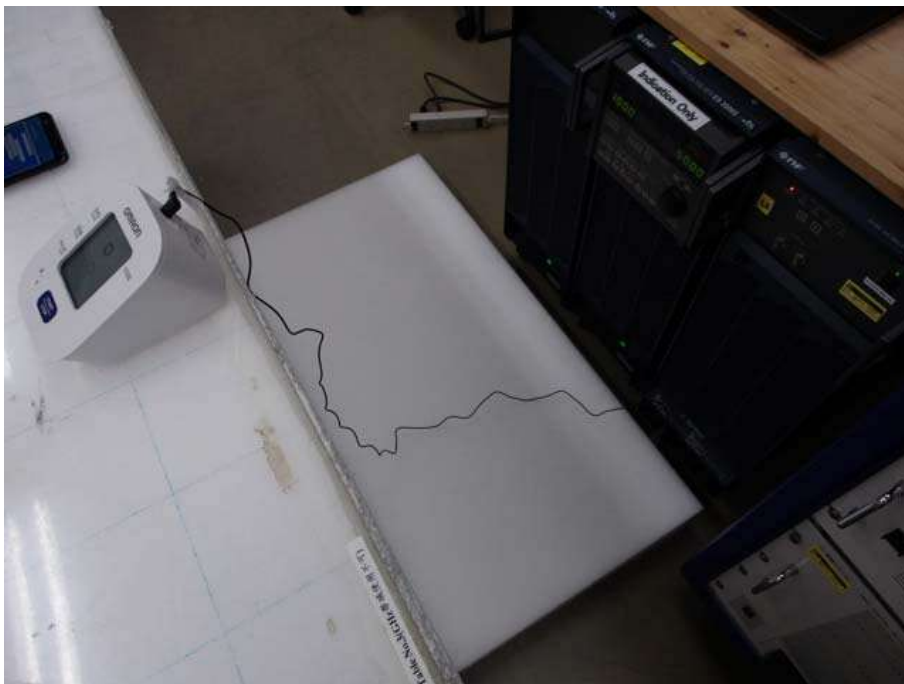


Photo 2

End of Report