EMI TEST REPORT

Test Report No. : 13174069H-R3

Applicant	:	**HARTING K.K.**
Type of EUT	:	**rMICA-master (USB RF Receiver)**
Model Number of EUT	:	**72RMICAMSTR11**
FCC ID	:	**2AVNORMICAM**
Test regulation	:	**FCC Part 15 Subpart B: 2020 Class A**
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 regulation.
4. The test results in this test report are traceable to the national or international standards.
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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.
10. This report is a revised version of 13174069H-R2. 13174069H-R2 is replaced with this report.

Date of test: October 29 to November 3, 2020

Representative test engineer:

Masaya Minami
Engineer
Consumer Technology Division

Approved by:

Shinichi Miyazono
Engineer
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.: 13174069H

Revision	Test report No.	Date	Page revised	Contents
- (Original)	13174069H	December 17, 2020	-	-
1	13174069H-R1	January 18, 2021	P.6	Correction of the worst Margin and Result for the Radiated emission test data in Clause 3.2; From 2.4 dB, 35.908 MHz, Vertical, QP, Complied# To 4.8 dB, 46.530 MHz, Vertical, QP, Complied
1	13174069H-R1	January 18, 2021	P.10	Correction of power supply voltage on the configuration diagram in Clause 4.2; From “AC 100 V / 60 Hz” to “AC 120 V / 60 Hz”
1	13174069H-R1	January 18, 2021	P.12	Correction of the Test distance in Clause 6.4; from 3 m to 10 m
1	13174069H-R1	January 18, 2021	P.13	Correction of the Test distance in Figure 2 (1 GHz - 5 GHz drawing); from 3 m to 10 m
1	13174069H-R1	January 18, 2021	P.15, 16	Correction of the Radiated emission test data (including limit correction)
2	13174069H-R2	January 20, 2021	P.10	Addition of the No. I and Cable 6 in configuration diagram and list for Clause 4.2.
2	13174069H-R2	January 20, 2021	P.13	Correction of the Test distance in Figure 2 (1 GHz - 5 GHz drawing); from 10 m to 3 m
3	13174068H-R3	January 25, 2021	P.10	Addition of the note *1) in configuration diagram in Clause 4.2
3	13174068H-R3	January 25, 2021	P.10	Correction of Model number and Serial number for the No. I and Cable length for No.6 in configuration diagram and list for Clause 4.2; < No. I > From Model number: AD-A240P80 Serial number: 001 To Model number: AD-B240P100 Serial number: 1913 <Cable length for No.6> From 1.6 m to 3.6
3	13174068H-R3	January 25, 2021	P.12	Correction of the Test place in Clause 6.1; From No.3 semi anechoic chamber to No.1 semi anechoic chamber
3	13174068H-R3	January 25, 2021	P.15, 16	Correction of the Radiated emission test place; from Semi Anechoic Chamber No.3 to Semi Anechoic Chamber No.1.

Reference: Abbreviations (Including words undescribed in this report)

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

CONTENTS **PAGE**

SECTION 1: Customer information

Company Name	:	HARTING K.K.
Address	:	YusenShinYokohama1Bldg 2F, 1-7-9 ShinYokohama, Kohoku-ku, Yokohama, 2220033 Japan
Telephone Number	:	+81-45-476-3456
Facsimile Number	:	+81-45-476-3466
Contact Person	:	Kenji Nogata

The information provided from the customer is as follows;
- Applicant, Type of Equipment, 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	:	rMICA-master (USB RF Receiver)
Model Number	:	72RMICAMSTR11
Serial Number	:	Refer to SECTION 4.2
Rating	:	DC 2.1 V to 3.6 V
Receipt Date	:	October 25, 2020
Country of Mass-production	:	Taiwan
Condition	:	Production model
Modification	:	No Modification by the test lab

2.2 Product Description

Model: 72RMICAMSTR11 (referred to as the EUT in this report) is a rMICA-master (USB RF Receiver).

General Specification

Clock frequency (Maximum)	:	32 MHz
Operating temperature range	:	-25 deg. C to +75 deg. C

Radio Specification*

Sub GHz

Radio Type	:	Transceiver
Frequency of Operation	:	902 MHz to 928 MHz
Modulation	:	FSK
Antenna type	:	Dipole antenna
Antenna Gain	:	5 dBi

*The RF module is a FCC certificated module.

SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification	:	FCC Part 15 Subpart B FCC Part 15 final revised on October 13, 2020
Title	:	FCC 47CFR Part15 Radio Frequency Device Subpart B Unintentional Radiators

3.2 Procedures and results

Item	Test Procedure	Limits	Deviation	Worst margin	Result	Remarks
Conducted emission	**FCC:** ANSI C63.4: 2014 + C63.4a: 2017 7. AC power - line conducted emission measurements	**FCC:**Part 15 Subpart B 15.107(b)	N/A	24.79 dB 0.15000 MHz, QP, Phase L	Complied a)	-
Radiated emission	**FCC:** ANSI C63.4: 2014 + C63.4a: 2017 8. Radiated emission measurements	**FCC:** Part 15 Subpart B 15.109(b)	N/A	4.8 dB 46.530 MHz, Vertical, QP	Complied b)	-
*Note: UL Japan, Inc's EMI Work Procedure 13-EM-W0420. b) Refer to APPENDIX 1 (data of Conducted Emission) b) Refer to APPENDIX 1 (data of Radiated Emission)						
Symbols: Complied: The data of this test item has enough margin, more than the measurement uncertainty. Complied#: The data of this test item meets the limits unless the measurement uncertainty is taken into consideration.						

3.3 Addition to standard

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

3.4 Uncertainty

There is no applicable rule of uncertainty in this applied standard. Therefore, the results are derived depending on whether or not laboratory uncertainty is applied.

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

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

Radiated emission

Measurement distance	Frequency range		Uncertainty (+/-)
3 m	30 MHz to 200 MHz	(Horizontal)	4.8 dB
		(Vertical)	5.0 dB
	200 MHz to 1000 MHz	(Horizontal)	5.2 dB
		(Vertical)	6.3 dB
10 m	30 MHz to 200 MHz	(Horizontal)	4.8 dB
		(Vertical)	4.8 dB
	200 MHz to 1000 MHz	(Horizontal)	5.0 dB
		(Vertical)	5.0 dB
3 m	1 GHz to 6 GHz		4.9 dB
	6 GHz to 18 GHz		5.2 dB
1 m	10 GHz to 26.5 GHz		5.5 dB
	26.5 GHz to 40 GHz		5.5 dB
10 m	1 GHz to 18 GHz		5.2 dB

3.5 Test Location

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* A2LA Certificate Number: 5107.02/ FCC Test Firm Registration Number: 199967 / ISED Lab Company Number: 2973C

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 x 2.0 m for No.1, No.2, No.3, and No.4 semi-anechoic chambers and No.3 and No.4 shielded rooms.

3.6 Test data, Test instruments, and Test set up

Refer to APPENDIX.

SECTION 4: Operation of EUT during testing

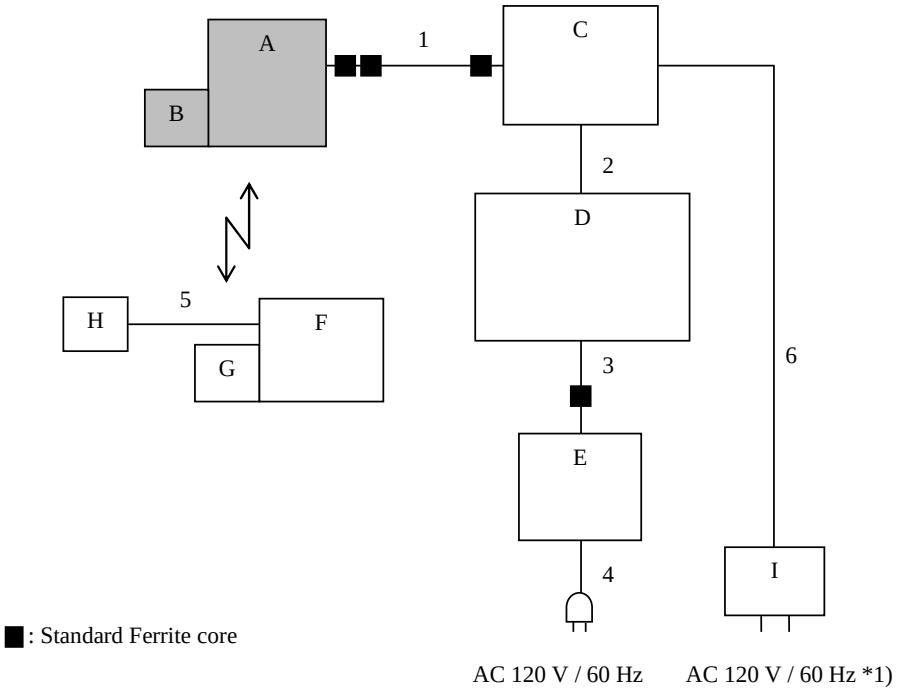
4.1 Operating Mode(s)

Mode	Remarks
Mode 1	Normal operation mode
*EUT was set by the software as follows; Software: (DIGI SX920 module) XbeeSX Version 9007	

*The test signal level was confirmed to be sufficient to stabilize the local oscillator of the EUT.

* It was confirmed by using checker that the EUT receives the signal from the transmitter (pair of EUT).

4.2 Configuration and peripherals



* Cabling and setup were taken into consideration and test data was taken under worse case conditions.
*1) Conducted emission test was performed on this port.

Description of EUT and Support equipment

No.	Item	Model number	Serial number	Manufacturer	Remark
A	USB RF Reciever	72RMICAMSTR11	0013A200 418EB7FD	HARTING K.K.	EUT
B	Antenna	A09-HASM-7	001	DIGI International	EUT
C	MICA-R BASIC	72MRSN1000R20	1049630200FB	HARTING K.K.	-
D	Laptop PC	CF-N8HWCDPS	0CKSA09265	Panasonic	-
E	AC Adapter	CF-AA6372B	6372BM610X10953E	Panasonic	-
F	RF Sensor BOX	72RMICAVIBR11	0013A200 418EB7DF	HARTING K.K.	-
G	Antenna	A09-HASM-7	001	DIGI International	-
H	Sensor	72SMICAACCR01	001	HARTING K.K.	-
I	AC Adapter	AD-B240P100	1913	XIAMEN UME ELECTRONICS CO.,LTD	-

List of cables used

No.	Name	Length (m)	Shield		Remark
			Cable	Connector	
1	USB Cable	2.0	Shielded	Shielded	-
2	LAN Cable	2.0	Unshielded	Unshielded	-
3	DC Cable	1.0	Unshielded	Unshielded	-
4	AC Cable	0.8	Unshielded	Unshielded	-
5	Signal Cable	2.0	Shielded	Shielded	-
6	DC Cable	3.6	Unshielded	Unshielded	-

SECTION 5: Conducted Emission

5.1 Operating environment

Test place : No.1 semi anechoic chamber
Temperature : See data
Humidity : See data

5.2 Test configuration

EUT was placed on a urethane platform of nominal size, 1.0 m by 1.5 m, raised 0.8 m above the conducting ground plane.
The rear of tabletop was located 40 cm to the vertical conducting plane. The rear of EUT and its peripherals was aligned and flushed with rear of tabletop. All other surfaces of tabletop were at least 80 cm from any other grounded conducting surface. EUT was located 80 cm from the LISN/AMN and excess AC cable was bundled in center. I/O cables that were connected to the other 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/AMN to the input power source. All unused 50 ohm connectors of the LISN/AMN were resistivity terminated in 50 ohm when not connected to the measuring equipment.
Photographs of the set up are shown in Appendix 3.

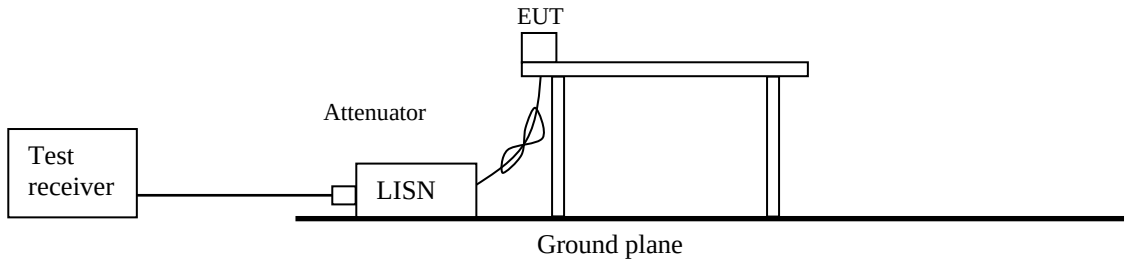
Frequency range : 0.15 MHz - 30 MHz
EUT position : Table top
EUT operation mode : See Clause 4.1

5.3 Test procedure

The AC Mains Terminal Continuous disturbance Voltage has been measured with the EUT within a semi anechoic chamber. The EUT was connected to a Line Impedance Stabilization Network (LISN)/ Artificial Mains network (AMN). An overview sweep with peak detection has been performed. The measurements have been performed with a quasi-peak detector and if required, with an average detector.
The conducted emission measurements were made with the following detector function of the test receiver.

Detector Type : Quasi-Peak and CISPR AV
IF Bandwidth : 9 kHz

Figure 1: Test Setup



5.4 Test result

Summary of the test results: Pass

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

Date: November 3, 2020 Test engineer: Masaya Minami

SECTION 6: Radiated Emission

6.1 Operating environment

Test place : No.1 semi anechoic chamber
Temperature : See data
Humidity : See data

6.2 Test configuration

EUT was placed on a urethane platform of nominal size, 1.0 m by 1.5 m, raised 0.8 m above the conducting ground plane.
The EUT was set on the edge of the tabletop.
Test was made with the antenna positioned in both the horizontal and vertical planes of polarization. The measurement antenna was varied in height above the conducting ground plane to obtain the maximum signal strength.
Photographs of the set up are shown in Appendix 3.

6.3 Test conditions

Frequency range : 30 MHz - 200 MHz (Biconical antenna) / 200 MHz - 1000 MHz (Logperiodic antenna)
1000 MHz - 5000 MHz (Horn antenna)
Test distance : 10 m (30 MHz - 1000 MHz) / 3 m (1000 MHz - 5000 MHz)
EUT position : Table top
EUT operation mode : See Clause 4.1

6.4 Test procedure

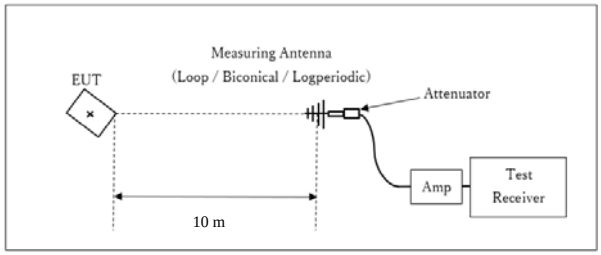
The height of the measuring antenna varied between 1 and 4 m and EUT was rotated a full revolution in order to obtain the maximum value of the electric field intensity.
The measurements were performed for both vertical and horizontal antenna polarization with the Test Receiver.
The radiated emission measurements were made with the following detector function of the Test Receiver.
For above 1 GHz, test antenna was aimed at the EUT for receiving the maximum signal and always kept within the illumination area of the 3 dB beamwidth of the antenna.

Frequency	Below 1GHz	Above 1GHz *1)
Instrument used	Test Receiver	Test Receiver
IF Bandwidth	QP: BW 120 kHz	PK: BW 1 MHz, CISPR AV: BW 1 MHz

*1) The measurement data was adjusted to a 10 m distance using the following Distance Factor.
Distance Factor: See Figure 2.

Figure 2: Test Setup

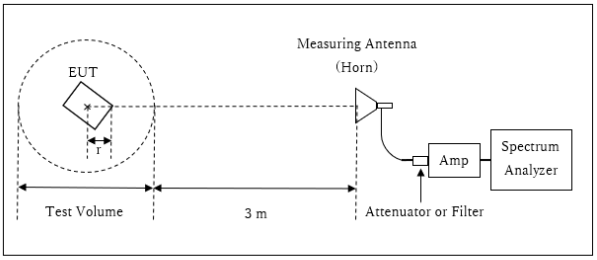
Below 1 GHz



× : Center of turn table

Test Distance: 10 m

1 GHz - 5 GHz



r : Radius of an outer periphery of EUT
× : Center of turn table

Distance Factor: 20 x log (3.5 m/10.0 m) = -9.11 dB
* Test Distance: (3 + Test Volume /2) - r = 3.5 m

Test Volume: 2 m
(Test Volume has been calibrated based on CISPR 16-1-4.)
r = 0.5 m

The noise levels were confirmed at each position of X, Y and Z axes of EUT to see the position of maximum noise, and the test was made at representative X-axis since no difference was found among each position.

6.5 Test result

Summary of the test results: Pass

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

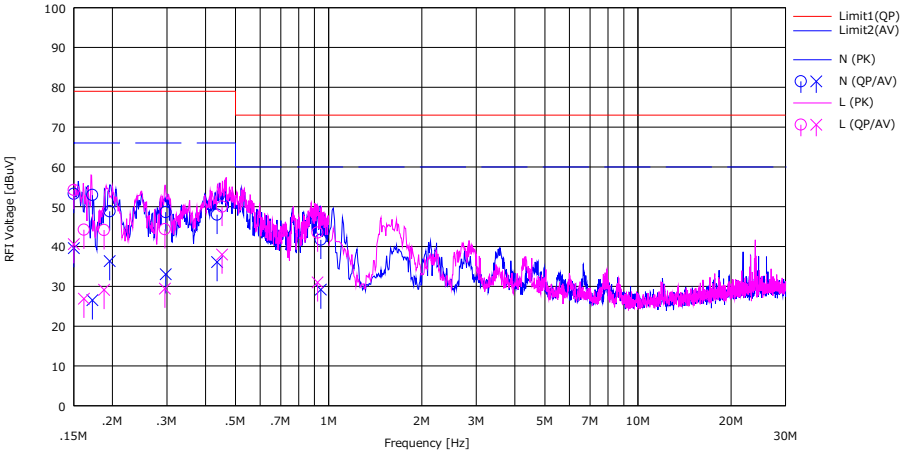
Date: October 29 and November 1, 2020 Test engineer: Masaya Minami

APPENDIX 1: Test data

Conducted Emission

Report No.	13174069H
Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.1
Date	November 3, 2020
Temperature / Humidity	23 deg. C / 47 % RH
Engineer	Masaya Minami
Mode	Mode 1

Limit : FCC_Part 15 Subpart B(15.107)_Class A



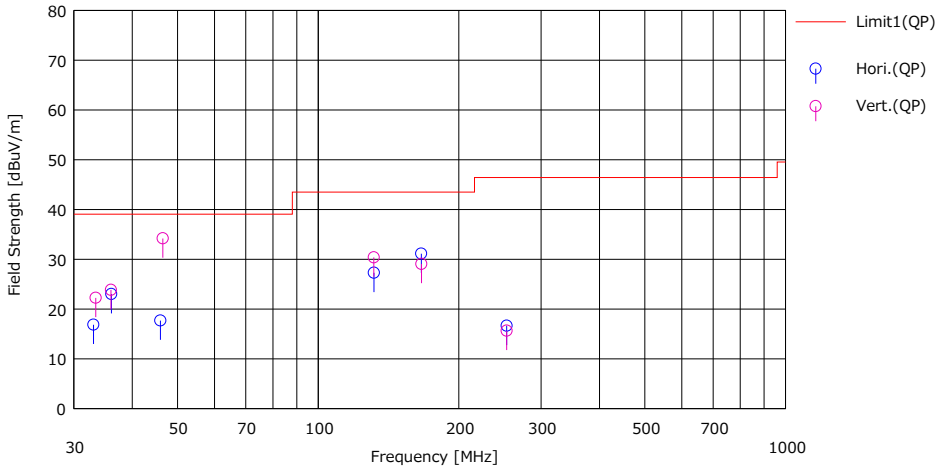
No.	Freq.	Reading		LISN	LOSS	Results		Limit		Margin		Phase	Comment
		〈QP〉	〈AV〉			〈QP〉	〈AV〉	〈QP〉	〈AV〉	〈QP〉	〈AV〉		
	[MHz]	[dBuV]	[dBuV]	[dB]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dB]	[dB]		
1	0.15000	40.00	26.40	0.16	13.05	53.21	39.61	79.00	66.00	25.79	26.39	N	
2	0.17225	39.70	13.30	0.16	13.06	52.92	26.52	79.00	66.00	26.08	39.48	N	
3	0.19590	35.60	23.10	0.16	13.07	48.83	36.33	79.00	66.00	30.17	29.67	N	
4	0.29744	35.40	19.80	0.16	13.09	48.65	33.05	79.00	66.00	30.35	32.95	N	
5	0.43580	34.70	22.80	0.17	13.12	47.99	36.09	79.00	66.00	31.01	29.91	N	
6	0.94360	28.30	15.80	0.19	13.21	41.70	29.20	73.00	60.00	31.30	30.80	N	
7	0.15000	41.00	27.40	0.16	13.05	54.21	40.61	79.00	66.00	24.79	25.39	L	
8	0.16167	31.00	13.70	0.16	13.05	44.21	26.91	79.00	66.00	34.79	39.09	L	
9	0.18787	30.90	15.90	0.16	13.07	44.13	29.13	79.00	66.00	34.87	36.87	L	
10	0.29535	31.10	16.20	0.16	13.09	44.35	29.45	79.00	66.00	34.65	36.55	L	
11	0.45220	36.70	24.70	0.18	13.12	50.00	38.00	79.00	66.00	29.00	28.00	L	
12	0.92080	30.10	17.60	0.19	13.21	43.50	31.00	73.00	60.00	29.50	29.00	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.

Radiated Emission

Report No.	13174069H
Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.1
Date	October 29, 2020
Temperature / Humidity	21 deg. C / 55 % RH
Engineer	Masaya Minami
	(Below 1 GHz)
Mode	Mode 1

Limit : FCC_Part 15 Subpart B(15.109)_Class A



No.	Freq. [MHz]	Reading (QP) [dBuV]	Ant.Fac [dB/m]	Loss [dB]	Gain [dB]	Result (QP) [dBuV/m]	Limit (QP) [dBuV/m]	Margin (QP) [dB]	Pola. [H/V]	Height [cm]	Angle [deg]	Ant. Type	Comment
1	33.050	31.20	17.09	7.38	38.81	16.86	39.08	22.2	Hori.	400	12	BA	
2	36.110	38.40	15.99	7.44	38.81	23.02	39.08	16.0	Hori.	395	0	BA	
3	45.980	36.50	12.37	7.64	38.82	17.69	39.08	21.3	Hori.	399	4	BA	
4	131.652	43.60	13.69	8.94	38.94	27.29	43.52	16.2	Hori.	395	13	BA	
5	166.160	45.20	15.53	9.35	38.94	31.14	43.52	12.3	Hori.	372	45	BA	
6	253.140	33.60	11.64	10.25	38.85	16.64	46.44	29.8	Hori.	100	114	LA20	
7	33.430	36.70	16.98	7.39	38.81	22.26	39.08	16.8	Vert.	100	21	BA	
8	36.030	39.20	16.02	7.44	38.81	23.85	39.08	15.2	Vert.	113	31	BA	
9	46.530	53.20	12.17	7.65	38.82	34.20	39.08	4.8	Vert.	134	44	BA	
10	131.570	46.70	13.68	8.94	38.94	30.38	43.52	13.1	Vert.	100	1	BA	
11	166.360	43.10	15.55	9.36	38.94	29.07	43.52	14.4	Vert.	151	10	BA	
12	253.180	32.60	11.64	10.25	38.85	15.64	46.44	30.8	Vert.	100	162	LA20	

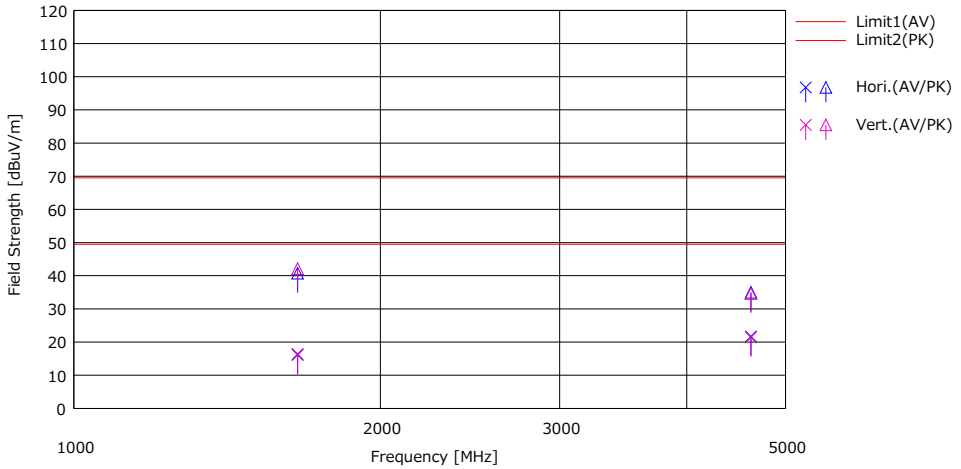
* Other frequency noises omitted in this report were not seen or had enough margin (more than 20 dB).

CHART: WITH FACTOR
ANT TYPE: - 30 MHz: LOOP, 30 MHz - 200 MHz: BICONICAL, 200 MHz - 1000 MHz: LOGPERIODIC, 1000 MHz -: HORN
CALCULATION: RESULT = READING + ANT FACTOR + LOSS(CABLE + ATT) - GAIN(AMP)

Radiated Emission

Report No.	13174069H
Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.1
Date	November 1, 2020
Temperature / Humidity	20 deg. C / 40 % RH
Engineer	Masaya Minami
	(Above 1 GHz)
Mode	Mode 1

Limit : FCC_Part 15 Subpart B(15.109)_Class A



No.	Freq.	Reading		Ant.Fac	Loss	Gain	Result		Limit		Margin		Pola.	Height	Angle	Ant. Type	Comment
		(AV)	(PK)				(AV)	(PK)	(AV)	(PK)	(AV)	(PK)					
	[MHz]	[dBuV]	[dBuV]	[dB/m]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dBuV/m]	[dBuV/m]	[dB]	[dB]	[H/V]	[cm]	[deg]		
1	1658.900	33.70	58.30	24.96	-58.5	36.69	16.12	40.72	49.50	69.50	33.3	28.7	Hori.	100	331	HA5	
2	4624.147	31.50	44.80	30.98	-47.8	36.00	21.70	35.00	49.50	69.50	27.8	34.5	Hori.	100	314	HA5	
3	1658.900	34.00	59.70	24.96	-58.5	36.69	16.42	42.12	49.50	69.50	33.0	27.3	Vert.	100	0	HA5	
4	4624.147	31.20	44.40	30.98	-47.8	36.00	21.40	34.60	49.50	69.50	28.1	34.9	Vert.	100	0	HA5	

* Other frequency noises omitted in this report were not seen or had enough margin (more than 20 dB).

CHART: WITH FACTOR
ANT TYPE: - 30 MHz: LOOP, 30 MHz - 200 MHz: BICONICAL, 200 MHz - 1000 MHz: LOGPERIODIC, 1000 MHz -: HORN
CALCULATION: RESULT = READING + ANT FACTOR + LOSS(CABLE + D-factor) - GAIN(AMP)

APPENDIX 2: Test instruments

Test equipment

Test Item	Local ID	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Cal Int
CE	MAEC-01	141998	AC1_Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 10m	DA-06881	06/08/2020	24
CE	MOS-27	141566	Thermo-Hygrometer	CUSTOM. Inc	CTH-201	A08Q26	01/07/2020	12
CE	MMM-03	141530	Digital Tester	Fluke Corporation	FLUKE 26-3	78030621	08/18/2020	12
CE	MJM-25	142226	Measure	KOMELON	KMC-36	-	-	-
CE	MAT-64	141290	Attenuator(13dB)	JFW Industries, Inc.	50FP-013H2 N	-	12/02/2019	12
CE	MLS-24	141358	LISN(AMN)	Schwarzbeck Mess - Elektronik	NSLK8127	8127-730	07/22/2020	12
CE	MCC-03	141215	Coaxial Cable	Fujikura/Suhner/TSJ	5D-2W/3D-2W/RG400u/ RFM-E421(SW)	-/01068(Switcher)	06/25/2020	12
CE	MTR-09	141950	EMI Test Receiver	Rohde & Schwarz	ESU26	100412	06/03/2020	12
RE	COTS-ME MI-02	178648	EMI measurement program	TSJ (Techno Science Japan)	TEPTO-DV	-	-	-
RE	MOS-27	141566	Thermo-Hygrometer	CUSTOM. Inc	CTH-201	A08Q26	01/07/2020	12
RE	MMM-03	141530	Digital Tester	Fluke Corporation	FLUKE 26-3	78030621	08/18/2020	12
RE	MJM-25	142226	Measure	KOMELON	KMC-36	-	-	-
RE	MAEC-01	141998	AC1_Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 10m	DA-06881	06/08/2020	24
RE	MAEC-01-S VSWR	141994	AC1_Semi Anechoic Chamber(SVSWR)	TDK	Semi Anechoic Chamber 10m	DA-06881	04/16/2019	24
RE	MAT-08	141213	Attenuator(6dB)	Weinschel Corp	2	BK7971	11/14/2019	12
RE	KBA-05	141198	Biconical Antenna	Schwarzbeck Mess - Elektronik	VHA9103+BBA9106	2513	04/22/2020	12
RE	MCC-02	141350	Coaxial Cable	Suhner/storm/Agilent/ TSJ	-	-	06/25/2020	12
RE	MTR-09	141950	EMI Test Receiver	Rohde & Schwarz	ESU26	100412	06/03/2020	12
RE	MLA-20	141264	Logperiodic Antenna (200-1000MHz)	Schwarzbeck Mess - Elektronik	VUSLP9111B	9111B-189	04/22/2020	12
RE	MPA-19	141585	Pre Amplifier	MITEQ	MLA-10K01-B01-35	1237616	02/10/2020	12
RE	MHA-05	141511	Horn Antenna 1-18GHz	Schwarzbeck Mess - Elektronik	BBHA9120D	253	09/01/2020	12
RE	MCC-216	141392	Microwave Cable	Junkosha	MWX221	1604S253(1 m) / 537073/126E(5 m)	02/18/2020	12
RE	MPA-01	141576	Pre Amplifier	Keysight Technologies Inc	8449B	3008A01671	02/20/2020	12

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

The expiration date of the calibration is the end of the expired month.
As for some calibrations performed after the tested dates, those test equipment have been controlled by means of an unbroken chains of calibrations.

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

Test item:

CE: Conducted emission
RE: Radiated emission