



# EMI TEST REPORT

## Test Report No. : 13874120H-B-R1

**Applicant** : Daiken Medical Co., Ltd.  
**Type of EUT** : Amy PCA Switch  
**Model Number of EUT** : CAP-S100-US  
**FCC ID** : 2A2XA-CAPS100US  
**Test regulation** : FCC Part 15 Subpart B: 2021 Class B  
**Test Result** : Complied (Refer to SECTION 3)

1. This test report shall not be reproduced in full or partial, without the written approval of UL Japan, Inc.
2. The results in this report apply only to the sample tested.
3. This sample tested is in compliance with the limits of the above regulation.
4. The test results in this test report are traceable to the national or international standards.
5. This test report must not be used by the customer to claim product certification, approval, or endorsement by the A2LA accreditation body.
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 13874120H-B. 13874120H-B is replaced with this report.

**Date of test:** July 6 and September 15, 2021

**Representative test engineer:** Kiyo  
Kiyoshiro Okazaki  
Engineer

**Approved by:** S. Matsuyama  
Satofumi Matsuyama  
Engineer



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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Report Cover Page - 13-EM-F0429 Issue # 19.0

## **REVISION HISTORY**

### **Original Test Report No.: 13874120H-B**

Revision	Test report No.	Date	Page revised	Contents
- (Original)	13874120H-B	September 10, 2021	-	-
1	13874120H-B-R1	September 16, 2021	P.1	Correction of the test date due to retest in cover page.
1	13874120H-B-R1	September 16, 2021	P.1	Correction of the Representative test engineer due to retest in cover page.
1	13874120H-B-R1	September 16, 2021	P.6	Change the description location of "*1").
1	13874120H-B-R1	September 16, 2021	P.9	Correction of the Note *1) in Clause 4.1.
1	13874120H-B-R1	September 16, 2021	P.9	Correction of the arrow direction on the block diagram in Clause 4.2.
1	13874120H-B-R1	September 16, 2021	P.10	Correction of the Frequency range due to retest in Clause 5.3; From 1000 MHz - 4000 MHz To 1000 MHz - 2000 MHz
1	13874120H-B-R1	September 16, 2021	P.11	Correction of the Frequency range in Test Setup (Figure 2); From 1 GHz - 4 GHz To 1 GHz - 2 GHz
1	13874120H-B-R1	September 16, 2021	P.11	Correction of the test date due to retest in Clause 5.5.
1	13874120H-B-R1	September 16, 2021	P.13	Replacement of the test data due to retest.

## 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	PlT	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	Pst	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 : Daiken Medical Co., Ltd.  
Address : 2-6-2 Ayumino, Izumi-shi, Osaka-fu, 594-1157, Japan  
Telephone Number : +81-725-51-2134  
Facsimile Number : +81-725-54-3862  
Contact Person : Ryo Takuwa

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 : Amy PCA Switch  
Model Number : CAP-S100-US  
Serial Number : Refer to SECTION 4.2  
Rating : DC 3.0 V  
Receipt Date : June 22, 2021  
Country of Mass-production : 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: CAP-S100-US (referred to as the EUT in this report) is a Amy PCA Switch.

### **Radio Specification**

Radio Type : Transmitter  
Frequency of Operation : 433.92 MHz  
Modulation : GFSK  
Antenna type : Chip Antenna  
Clock frequency (Maximum) : 26 MHz

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## **SECTION 3: Test specification, procedures & results**

### **3.1 Test Specification**

Test Specification : FCC Part 15 Subpart B  
FCC Part 15 final revised on May 3, 2021 and effective July 2, 2021  
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	Class B	N/A	N/A	N/A	*1)
Radiated emission	FCC: ANSI C63.4: 2014 + C63.4a: 2017 8. Radiated emission measurements	Class B	N/A	4.64 dB 433.768 MHz, Horizontal, QP	Complied# a)	-
*Note: UL Japan, Inc's EMI Work Procedure 13-EM-W0420.						
*1) The test is not applicable since the EUT is not the device that is designed to be connected to the public utility (AC) power line.						
a) 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.

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### 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  $k = 2$ .

#### 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
0.5 m	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 / CAB identifier: JP0002

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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.10 shielded room	3.8 x 2.8 x 2.8	3.8 x 2.8	-	-
No.11 measurement room	4.0 x 3.4 x 2.5	N/A	-	-
No.12 measurement room	2.6 x 3.4 x 2.5	N/A	-	-

\* Size of vertical conducting plane (for Conducted Emission test) : 2.0 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.

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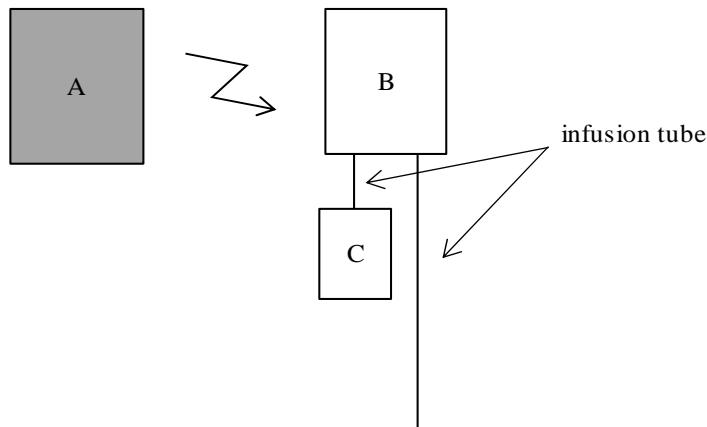
## SECTION 4: Operation of EUT during testing

### 4.1 Operating Mode(s)

Mode	Remarks
1) Normal Operating mode	*1) * EUT was set by the software as follows; Software: MPC4-2689_20210701_lockout_ignore_MPCA_MDUS1.hex Version MPC4-2689_20210701_lockout_ignore_MPCA

\*1) EUT continues to transmit when transmitter button is pressed (For Normal operation, EUT stops to transmit when transmitter button is pressed once.)  
 The wireless operation of EUT is transmission only.

### 4.2 Configuration and peripherals



\* Cabling and setup(s) 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	Remarks
A	Amy PCA Switch	CAP-S100-US	10000014	Daiken Medical Co., Ltd.	EUT
B	COOPDECH Amy PCA	CAP-D100-US	10000029	Daiken Medical Co., Ltd.	-
C	Amy MP Unit	-	-	Daiken Medical Co., Ltd.	-

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## **SECTION 5: Radiated Emission**

### **5.1 Operating environment**

Test place : No.4 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 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.

### **5.3 Test conditions**

Frequency range : 30 MHz - 200 MHz (Biconical antenna) / 200 MHz - 1000 MHz (Logperiodic antenna)  
1000 MHz - 2000 MHz (Horn antenna)  
Test distance : 3 m  
EUT position : Table top  
EUT operation mode : See Clause 4.1

### **5.4 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.

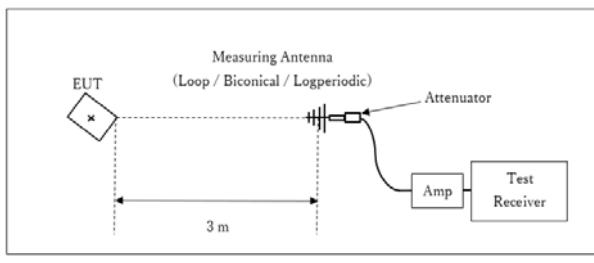
Frequency	Below 1GHz	Above 1GHz *1)
Instrument used	Test Receiver	Test Receiver
IF Bandwidth	QP: BW 120 kHz	PK: BW 1 MHz, CISPR AV: BW 1 MHz

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

Distance Factor: See Figure 2.

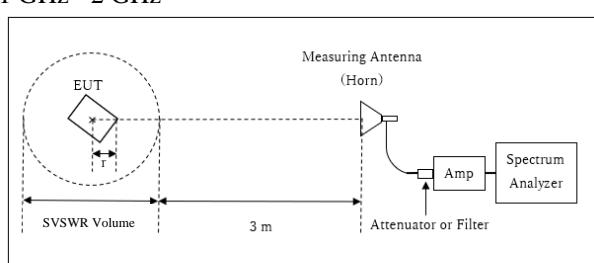
## Figure 2: Test Setup

Below 1 GHz



Test Distance: 3 m

1 GHz - 2 GHz



Distance Factor:  $20 \times \log (3.95 \text{ m} / 3.0 \text{ m}) = 2.39 \text{ dB}$   
 \* Test Distance:  $(3 + \text{SVSWR Volume} / 2) - r = 3.95 \text{ m}$

SVSWR Volume: 2 m  
 (SVSWR Volume has been calibrated based on CISPR 16-1-4.)  
 $r = 0.05\text{m}$

- The carrier level and 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 the position that has the maximum noise.

### 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: July 6, 2021  
 September 15, 2021

Test engineer:

Akihiko Maeda  
 Kiyoshiro Okazaki

**UL Japan, Inc.**  
**Ise EMC Lab.**

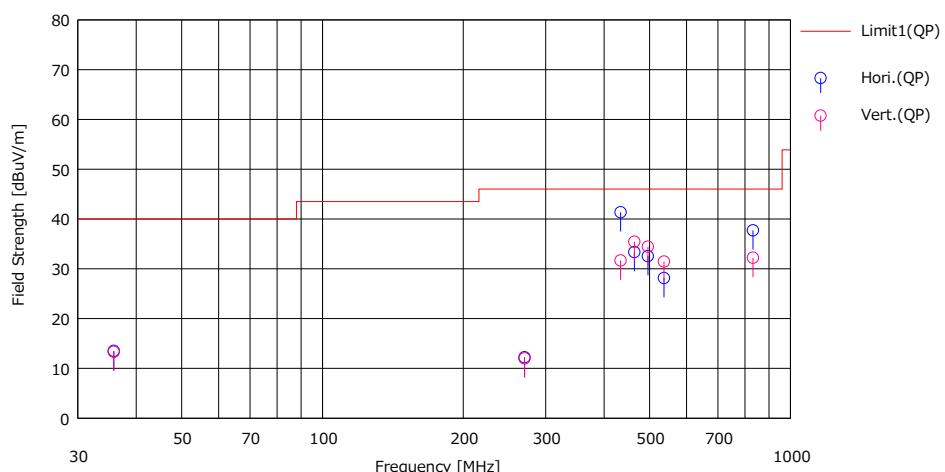
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## APPENDIX 1: Test data

### Radiated Emission

Report No. 13874120H  
 Test place Ise EMC Lab.  
 Semi Anechoic Chamber No.4  
 Date July 6, 2021  
 Temperature / Humidity 24 deg. C / 68 % RH  
 Engineer Akihiko Maeda  
 (Below 1 GHz)  
 Mode Mode 1

Limit : FCC\_Part 15 Subpart B(15.109)\_Class B



No.	Freq. [MHz]	Reading (QP) [dBuV]	Ant.Foc [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	35.822	22.10	16.24	7.22	32.04	13.52	40.00	26.48	Hori.	100	0	BA	
2	270.298	21.80	12.92	9.36	31.87	12.21	46.00	33.79	Hori.	100	0	LA23	
3	433.768	46.70	16.24	10.36	31.94	41.36	46.00	4.64	Hori.	100	242	LA23	
4	464.010	38.00	16.77	10.53	31.96	33.34	46.00	12.66	Hori.	100	74	LA23	
5	496.006	36.20	17.63	10.71	31.99	32.55	46.00	13.45	Hori.	196	228	LA23	
6	536.987	31.50	17.75	10.91	32.02	28.14	46.00	17.86	Hori.	184	281	LA23	
7	832.032	36.20	20.94	12.08	31.51	37.71	46.00	8.29	Hori.	100	86	LA23	
8	35.822	21.90	16.24	7.22	32.04	13.32	40.00	26.68	Vert.	100	0	BA	
9	270.298	21.60	12.92	9.36	31.87	12.01	46.00	33.99	Vert.	100	0	LA23	
10	433.768	37.00	16.24	10.36	31.94	31.66	46.00	14.34	Vert.	135	133	LA23	
11	464.010	40.10	16.77	10.53	31.96	35.44	46.00	10.56	Vert.	100	282	LA23	
12	496.006	38.10	17.63	10.71	31.99	34.45	46.00	11.55	Vert.	100	320	LA23	
13	536.987	34.80	17.75	10.91	32.02	31.44	46.00	14.55	Vert.	100	110	LA23	
14	832.032	30.70	20.94	12.08	31.51	32.21	46.00	13.79	Vert.	127	146	LA23	

#### 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)

Except for the above table: adequate margin data below the limits.

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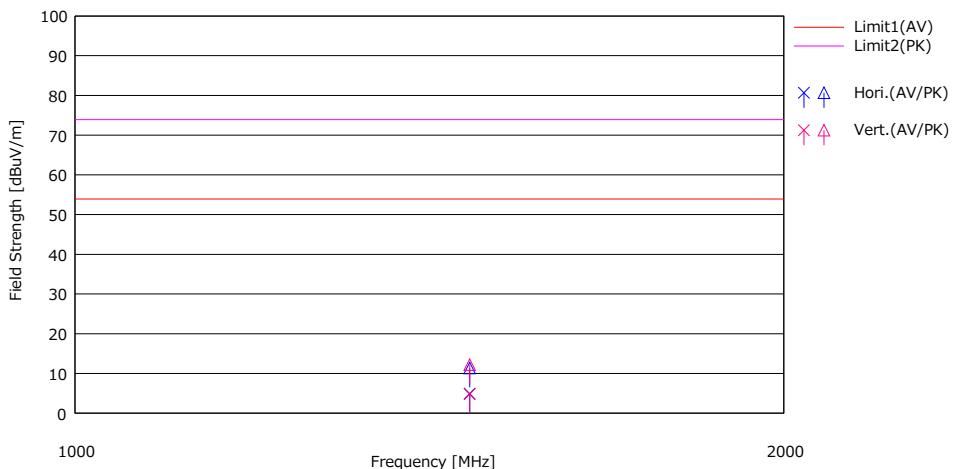
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## Radiated Emission

Report No. 13874120H  
 Test place Ise EMC Lab.  
 Semi Anechoic Chamber No.4  
 Date September 15, 2021  
 Temperature / Humidity 24 deg. C / 54 % RH  
 Engineer Kiyoshiro Okazaki  
 (Above 1 GHz)  
 Mode Mode 1

Limit : FCC\_Part 15 Subpart B(15.109)\_Class B



No.	Freq. [MHz]	Reading		Ant.Foc [dBuV]	Loss [dB]	Gain [dB]	Result		Limit		Margin		Pola.	Height [cm]	Angle [deg]	Ant. Type	Comment
		(AV) [dBuV]	(PK) [dBuV]				(AV) [dBuV/m]	(PK) [dBuV/m]	(AV) [dBuV/m]	(PK) [dBuV/m]	(AV) [dB]	(PK) [dB]					
		(AV) [dBuV]	(PK) [dBuV]				(AV) [dBuV/m]	(PK) [dBuV/m]	(AV) [dBuV/m]	(PK) [dBuV/m]	(AV) [dB]	(PK) [dB]					
1	1471.038	19.12	25.61	25.19	-6.14	33.28	4.89	11.38	53.90	73.90	49.01	62.52	Hori.	100	0	H21	
2	1471.038	19.02	26.45	25.19	-6.14	33.28	4.79	12.22	53.90	73.90	49.11	61.68	Vert.	100	0	H21	

### 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)

Except for the above table: adequate margin data below the limits.

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## APPENDIX 2: Test instruments

### Test equipment

Test Item	Local ID	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Cal Int
RE	MCC-231	177964	Microwave Cable	Junkosha INC.	MMX221	1901S329(1m)/1902S579(5m)	03/04/2021	12
RE	MTR-09	141950	EMI Test Receiver	Rohde & Schwarz	ESU26	100412	06/03/2021	12
RE	MPA-12	141581	MicroWave System Amplifier	Keysight Technologies Inc	83017A	00650	10/19/2020	12
RE	MHA-21	141508	Horn Antenna 1-18GHz	Schwarzbeck Mess-Elektronik OHG	BBHA9120D	557	05/10/2021	12
RE	MAEC-04	142011	AC4_Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-10005	05/25/2020	24
RE	MOS-15	141562	Thermo-Hygrometer	CUSTOM. Inc	CTH-201	0010	01/15/2021	12
RE	MMM-10	141545	DIGITAL HiTESTER	HIOKI E.E. CORPORATION	3805	51201148	01/07/2021	12
RE	MJM-29	142230	Measure	KOMELON	KMC-36	-	-	-
RE	COTS-ME MI-02	178648	EMI measurement program	TSJ (Techno Science Japan)	TEPTO-DV	-	-	-
RE	MAEC-04-SVSWR	142017	AC4_Semi Anechoic Chamber(SVSWR)	TDK	Semi Anechoic Chamber 3m	DA-10005	04/12/2021	24
RE	MOS-42	192303	Thermo-Hygrometer	CUSTOM. Inc	CTH-201	0014	12/06/2020	12
RE	MTR-08	141949	Test Receiver	Rohde & Schwarz	ESCI	100767	08/18/2020	12
RE	MAT-34	141331	Attenuator(6dB)	TME	UFA-01	-	02/02/2021	12
RE	MBA-05	141425	Biconical Antenna	Schwarzbeck Mess-Elektronik OHG	VHA9103+BBA9106	VHA 91031302	08/31/2020	12
RE	MCC-50	141397	Coaxial Cable	UL Japan	-	-	11/06/2020	12
RE	MLA-23	141267	Logperiodic Antenna (200-1000MHz)	Schwarzbeck Mess-Elektronik OHG	VUSLP9111B	9111B-192	09/02/2020	12
RE	MPA-14	141583	Pre Amplifier	SONOMA INSTRUMENT	310	260833	02/18/2021	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:

RE: Radiated emission

**UL Japan, Inc.**

**Ise EMC Lab.**

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