





# EMI TEST REPORT

## Test Report No. 15141991H-A-R1

Customer	Panasonic Corporation of North America
Description of EUT	Cooling BOX
Model Number of EUT	AE-VU0GPR
FCC ID	ACJAE-VU0GPR
Test Regulation	FCC Part 15 Subpart B, Class A
Test Result	Complied
Issue Date	April 15, 2024
Remarks	-

<b>Representative test engineer</b>	<b>Approved by</b>
	
Junki Nagatomi Engineer	Takumi Shimada Engineer
 	
CERTIFICATE 5107.02	
<input type="checkbox"/> The testing in which "Non-accreditation" is displayed is outside the accreditation scopes in UL Japan, Inc.	
<input checked="" type="checkbox"/> There is no testing item of "Non-accreditation".	

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## **REVISION HISTORY**

### **Original Test Report No. 15141991H-A**

This report is a revised version of 15141991H-A. 15141991H-A is replaced with this report.

Revision	Test Report No.	Date	Page Revised Contents
- (Original)	15141991H-A	March 18, 2024	-
1	15141991H-A-R1	April 15, 2024	SECTION 5: Radiated Emission Figure 1: Test Setup  -Correction of following sentence. The test was made on EUT at the normal use position. → 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 the position that has the maximum noise.
1	15141991H-A-R1	April 15, 2024	APPENDIX 3: Photographs of test setup  -Addition of photographs for worst case position (Horizontal: X-axis / Vertical: Xaxis).

## Reference: Abbreviations (Including words undescribed in this report)

A2LA	The American Association for Laboratory Accreditation	Hori.	Horizontal
AAN	Asymmetric Artificial Network	ICES	Interference-Causing Equipment Standard
AC	Alternating Current	I/O	Input/Output
AE	Auxiliary equipment	IEC	International Electrotechnical Commission
AM	Amplitude Modulation	IEEE	Institute of Electrical and Electronics Engineers
AMN	Artificial Mains Network	IF	Intermediate Frequency
Amp, AMP	Amplifier	ILAC	International Laboratory Accreditation Conference
ANSI	American National Standards Institute	ISED	Innovation, Science and Economic Development Canada
Ant, ANT	Antenna	ISN	Impedance Stabilization Network
AP	Access Point	ISO	International Organization for Standardization
ASK	Amplitude Shift Keying	JAB	Japan Accreditation Board
Atten., ATT	Attenuator	LAN	Local Area Network
AV	Average	LCL	Longitudinal Conversion Loss
BPSK	Binary Phase-Shift Keying	LIMS	Laboratory Information Management System
BR	Bluetooth Basic Rate	LISN	Line Impedance Stabilization Network
BT	Bluetooth	MRA	Mutual Recognition Arrangement
BT LE	Bluetooth Low Energy	N/A	Not Applicable
BW	BandWidth	NIST	National Institute of Standards and Technology
C.F	Correction Factor	NS	No signal detect.
Cal Int	Calibration Interval	NSA	Normalized Site Attenuation
CAV	CISPR AV	OBW	Occupied BandWidth
CCK	Complementary Code Keying	OFDM	Orthogonal Frequency Division Multiplexing
CDN	Coupling Decoupling Network	PER	Packet Error Rate
Ch., CH	Channel	PK	Peak
CISPR	Comite International Special des Perturbations Radioelectriques	P <sub>LT</sub>	long-term flicker severity
Corr.	Correction	POHC(A)	Partial Odd Harmonic Current
CPE	Customer premise equipment	Pol., Pola.	Polarization
CW	Continuous Wave	PR-ASK	Phase Reversal ASK
DBPSK	Differential BPSK	P <sub>ST</sub>	short-term flicker severity
DC	Direct Current	QAM	Quadrature Amplitude Modulation
DET	Detector	QP	Quasi-Peak
D-factor, D.fac.	Distance factor	QPSK	Quadrature Phase Shift Keying
Dmax	maximum absolute voltage change during an observation period	r.m.s., RMS	Root Mean Square
DQPSK	Differential QPSK	RBW	Resolution BandWidth
DSSS	Direct Sequence Spread Spectrum	RE	Radio Equipment
DUT	Device Under Test	REV	Reverse
EDR	Enhanced Data Rate	RF	Radio Frequency
e.i.r.p., EIRP	Equivalent Isotropically Radiated Power	RFID	Radio Frequency Identifier
EM clamp	Electromagnetic clamp	RNSS	Radio Navigation Satellite Service
EMC	ElectroMagnetic Compatibility	RSS	Radio Standards Specifications
EMI	ElectroMagnetic Interference	Rx	Receiving
EMS	ElectroMagnetic Susceptibility	S.fac.	Site factor
EN	European Norm	SINAD	Ratio of (Signal + Noise + Distortion) to (Noise + Distortion)
e.r.p., ERP	Effective Radiated Power	S/N	Signal to Noise ratio
ETSI	European Telecommunications Standards Institute	SA, S/A	Spectrum Analyzer
EU	European Union	SABS	South African Bureau of Standards
EUT	Equipment Under Test	SANS	South African National Standards
Fac.	Factor	SG	Signal Generator
FCC	Federal Communications Commission	SVSWR	Site-Voltage Standing Wave Ratio
FHSS	Frequency Hopping Spread Spectrum	THC(A)	Total Harmonic Current
FM	Frequency Modulation	THD(%)	Total Harmonic Distortion
Freq.	Frequency	TR, T/R	Test Receiver
FSK	Frequency Shift Keying	Tx	Transmitting
Fund	Fundamental	UFA	Uniform field area
FWD	Forward	VBW	Video BandWidth
GFSK	Gaussian Frequency-Shift Keying	Vert.	Vertical
GNSS	Global Navigation Satellite System	WLAN	Wireless LAN
GPS	Global Positioning System	xDSL	Generic term for all types of DSL technology (DSL: Digital Subscriber Line)

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<b>CONTENTS</b>	<b>PAGE</b>
<b>SECTION 1: Customer information</b> .....	<b>5</b>
<b>SECTION 2: Equipment under test (EUT)</b> .....	<b>5</b>
<b>SECTION 3: Test specification, procedures &amp; results</b> .....	<b>6</b>
<b>SECTION 4: Operation of EUT during testing</b> .....	<b>9</b>
<b>SECTION 5: Radiated Emission</b> .....	<b>10</b>
<b>APPENDIX 1: Test data</b> .....	<b>12</b>
Radiated Emission .....	12
<b>APPENDIX 2: Test instruments</b> .....	<b>13</b>
<b>APPENDIX 3: Photographs of test setup</b> .....	<b>14</b>
Radiated Emission .....	14

## **SECTION 1: Customer information**

Company Name	Panasonic Corporation of North America <sup>*1)</sup>
Address	Two Riverfront Plaza, Newark, NJ 07102-5490, U.S.A.
Telephone Number	+1-201-348-7760
Contact Person	Ben Botros

\*1) Remarks:

Panasonic Corporation is on behalf of the applicant: Panasonic Corporation of North America (Company incorporated abroad).

The information provided by the customer is as follows;

- Customer, Description 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 and Test Date
- SECTION 4: Operation of EUT during testing

## **SECTION 2: Equipment under test (EUT)**

### **2.1 Identification of EUT**

Description	Cooling BOX
Model Number	AE-VU0GPR
Serial Number	Refer to SECTION 4.2
Condition	Production prototype (Not for Sale: This sample is equivalent to mass-produced items.)
Modification	No Modification by the test lab
Receipt Date	February 1 and 15, 2024
Test Date	February 26, 2024

### **2.2 Product Description**

#### **General Specification**

Rating	None (supplied by NFC)
Clock frequency (ies) in the system	16 MHz

#### **Radio Specification**

Radio Type	Passive Tag
Frequency of Operation	13.56 MHz
Type of Modulation	ASK

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

#### **3.1 Test Specification**

Test Specification	FCC Part 15 Subpart B The latest version on the first day of the testing period
Title	FCC 47CFR Part15 Radio Frequency Device Subpart B Unintentional Radiators

#### **3.2 Procedures and results**

Item	Test Procedure	Limits	Worst margin	Result	Remarks
Conducted emission	ANSI C63.4: 2014 + C63.4a: 2017 7. AC power - line conducted emission measurements	Class A	-	N/A	*1)
Radiated emission	ANSI C63.4: 2014 C63.4a: 2017 8. Radiated emission measurements	Class A	16.79 dB 30.000 MHz, Horizontal, QP	Complied	*2)

\* Note: UL Japan, Inc.'s EMI Work Procedure: Work Instructions-ULID-003591.

\*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.

\*2) Measurements were limited up to 1 GHz since the highest frequency of internal source of the EUT is less than 108 MHz.

#### **3.3 Addition to standard**

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

### 3.4 Uncertainty

Measurement uncertainty is not taken into account when stating conformity with a specified requirement. Note: When margins obtained from test results are less than the measurement uncertainty, the test results may exceed the limit.

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		Unit	Calculated Uncertainty (+/-)
3 m	9 kHz to 30 MHz		dB	3.3
10 m			dB	3.1
3 m	30 MHz to 200 MHz	Horizontal	dB	4.8
		Vertical	dB	5.0
	200 MHz to 1000 MHz	Horizontal	dB	5.1
		Vertical	dB	6.2
10 m	30 MHz to 200 MHz	Horizontal	dB	4.8
		Vertical	dB	4.8
	200 MHz to 1000 MHz	Horizontal	dB	4.9
		Vertical	dB	5.0
3 m	1 GHz to 6 GHz	Test Receiver	dB	5.1
		Spectrum Analyzer	dB	4.9
	6 GHz to 18 GHz	Test Receiver	dB	5.4
		Spectrum Analyzer	dB	5.2
1 m	10 GHz to 18 GHz	Spectrum analyzer	dB	5.0
	18 GHz to 26.5 GHz	Spectrum analyzer	dB	5.6
	26.5 GHz to 40 GHz	Spectrum analyzer	dB	4.9
0.5 m	26.5 GHz to 40 GHz	Spectrum analyzer	dB	4.9
10 m	1 GHz to 18 GHz	Test Receiver	dB	5.4

### 3.5 Test Location

UL Japan, Inc. Ise EMC Lab.

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 Japan

Telephone: +81-596-24-8999

A2LA Certificate Number: 5107.02 / FCC Test Firm Registration Number: 884919

ISED Lab Company Number: 2973C / CAB identifier: JP0002

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	-	-
Large Chamber	16.9 x 22.1 x 10.17	16.9 x 22.1	-	10 m
Small Chamber	5.3 x 6.69 x 3.59	5.3 x 6.69	-	-

### 3.6 Test data, Test instruments, and Test set up

Refer to APPENDIX.

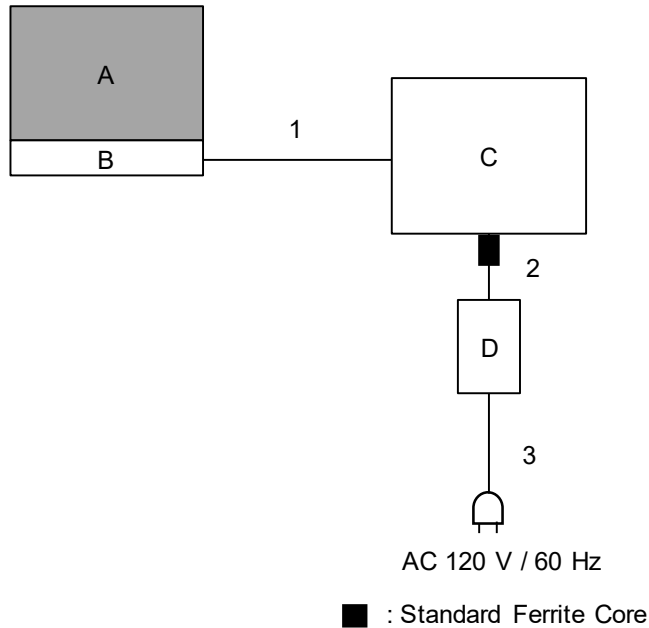


## SECTION 4: Operation of EUT during testing

### 4.1 Operating Mode(s)

Mode	1. RFID Communication mode
Software(s)	VIXELL Performance Inspection Ver.1.05E

### 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	Cooling BOX	AE-VU0GPR	24020814230500	Panasonic Corporation	EUT
B	RFID Read and Writer	AMI2450X/08C/U-PAP	7E5310006	Art Finex Co,Ltd	-
C	Laptop PC	CF-NX1GWGYS	2KKSA14614	Panasonic	-
D	AC Adapter	CF-AA6412C	6412CM112714770A	Panasonic	-

#### List of Cables Used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	USB Cable	1.8	Shielded	Shielded	-
2	DC Cable	0.9	Unshielded	Unshielded	-
3	AC Cable	0.8	Unshielded	Unshielded	-

## **SECTION 5: Radiated Emission**

### **5.1 Operating environment**

Date : See data  
Test place : See data  
Temperature : See data  
Humidity : See data  
Test engineer : 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 to 200 MHz (Biconical antenna)  
200 MHz to 1000 MHz (Logperiodic antenna)  
Test distance : 10 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.

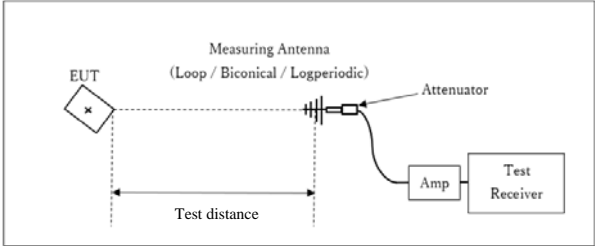
The measurements were performed for both vertical and horizontal antenna polarization with the Test Receiver.

The radiated emission measurements were made with the following detector function of the Test Receiver.

Frequency	Below 1 GHz
Instrument used	Test Receiver
IF Bandwidth	QP: BW 120 kHz

Figure 1: Test Setup

Below 1 GHz



Test Distance: 10 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 the position that has the maximum noise.

5.5 Test result

Summary of the test results: Pass

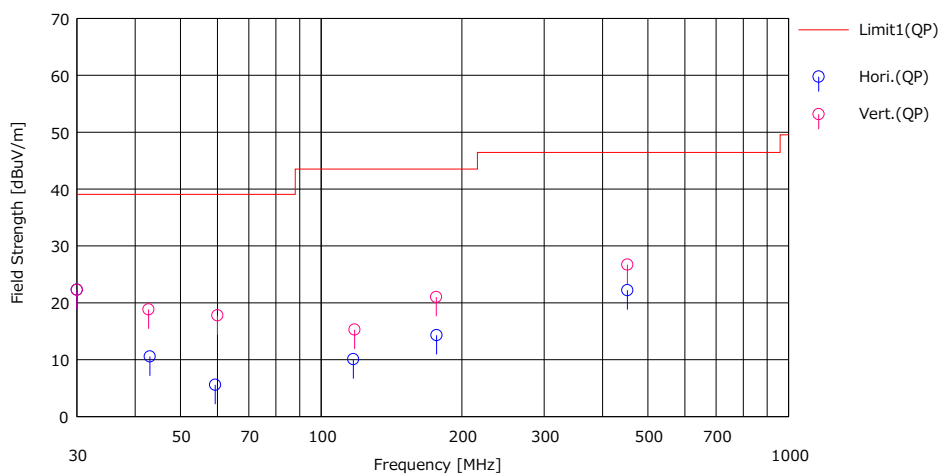
The limit is rounded down to one decimal place.  
The test result is rounded off to one or two decimal places, so some differences might be observed.

**APPENDIX 1: Test data**

**Radiated Emission**

Test place Ise EMC Lab.  
Semi Anechoic Chamber No.1  
Date February 26, 2024  
Temperature / Humidity 20 deg. C / 40 % RH  
Engineer Junki Nagatomi  
(Below 1 GHz)  
Mode Mode 1

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



No.	Freq. [MHz]	Reading	Ant.Fac	Loss	Gain	Result	Limit	Margin	Pols.	Height	Angle	Ant.	Comment
		<QP> [dBuV]	[dB/m]	[dB]	[dB]	<QP> [dBuV/m]	<QP> [dBuV/m]	<QP> [dB]	[H/V]	[cm]	[deg]	Type	
1	30.000	35.30	18.62	7.23	38.86	22.29	39.08	16.79	Hori.	100	30	BA	
2	42.986	28.20	13.73	7.50	38.88	10.55	39.08	28.53	Hori.	100	0	BA	
3	59.321	28.80	7.87	7.80	38.90	5.57	39.08	33.51	Hori.	100	0	BA	
4	1171.28	28.10	12.32	8.62	38.96	10.08	43.52	33.44	Hori.	100	3	BA	
5	1766.26	28.00	16.00	9.29	38.97	14.32	43.52	29.20	Hori.	100	5	BA	
6	4521.21	32.50	16.62	11.53	38.45	22.20	46.44	24.24	Hori.	171	12	LA17	
7	30.000	35.30	18.62	7.23	38.86	22.29	39.08	16.79	Vert.	100	30	BA	
8	42.717	36.40	13.82	7.49	38.88	18.83	39.08	20.25	Vert.	100	2	BA	
9	59.998	41.20	7.67	7.81	38.90	17.78	39.08	21.30	Vert.	226	121	BA	
10	1178.87	33.20	12.41	8.62	38.96	15.27	43.52	28.25	Vert.	118	99	BA	
11	1763.01	34.70	15.99	9.29	38.97	21.01	43.52	22.51	Vert.	100	292	BA	
12	4521.21	37.00	16.62	11.53	38.45	26.70	46.44	19.74	Vert.	100	166	LA17	

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.

## APPENDIX 2: Test instruments

### Test equipment

Test Item	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Cal Int
RE	141198	Biconical Antenna	Schwarzbeck Mess-Elektronik OHG	VHA9103+ BBA9106	2513	06/06/2023	12
RE	141213	Attenuator (6dB)	Weinschel Corp	2	BK7971	11/16/2023	12
RE	141350	Coaxial Cable	Suhner/storm/Agilent/TSJ	-	-	03/03/2023	12
RE	141530	Digital Tester	Fluke Corporation	FLUKE 26-3	78030621	02/01/2024	12
RE	141566	Thermo-Hygrometer	CUSTOM. Inc	CTH-201	A08Q26	-	-
RE	141585	Pre Amplifier	L3 Narda-MITEQ	MLA-10K01-B01-35	1237616	02/17/2024	12
RE	141950	EMI Test Receiver	Rohde & Schwarz	ESU26	100412	11/20/2023	12
RE	141998	AC1_Semi Anechoic Chamber (NSA)	TDK	Semi Anechoic Chamber 10m	DA-06881	12/06/2023	24
RE	142226	Measure, Tape, Steel	KOMELON	KMC-36	-	-	-
RE	160924	Logperiodic Antenna	Schwarzbeck Mess-Elektronik OHG	VUSLP9111B	225	11/29/2023	12
RE	178648	EMI measurement program	TSJ (Techno Science Japan)	TEPTO-DV	-	-	-

\*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