





# EMI TEST REPORT

## Test Report No. 15738317H-C-R1

Customer	Panasonic Corporation of North America
Description of EUT	BLE UNIT
Model Number of EUT	HU500030C
FCC ID	ACJ932HU500030C
Test Regulation	FCC Part 15 Subpart B, Class B
Test Result	Complied
Issue Date	September 16, 2025
Remarks	-

<b>Representative test engineer</b>	<b>Approved by</b>
	
Tetsuro Yoshida Engineer	Shinichi Miyazono 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".	

Report Cover Page - Form-ULID-003532 (DCS:13-EM-F0429) Issue# 24.0

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- For any test report referred in this report, the latest version (including any revisions) is always referred to.
- If the latest version is a revision, it replaces the previous version. See the table below for revisions and versions.

## REVISION HISTORY

Revision	Test Report No.	Date	Page Revised Contents
- (Original)	15738317H-C	July 1, 2025	-
1	15738317H-C-R1	September 16, 2025	<b>Clause 3.3</b> Corrected Result of Conducted Emission: Complied → N/A

**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 / BLE	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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## **SECTION 1: Customer information**

Company Name	Panasonic Corporation of North America
Address	Two Riverfront Plaza, Newark, New Jersey, 07102-5490, USA
Telephone Number	+1-201-348-7760
Contact Person	Ben Botros

**\*Remarks:**

Panasonic Corporation of North America designates Panasonic Automotive Systems Asia Pacific Co., Ltd as manufacturer of the product (BLE UNIT).

The information provided by the customer is as follows;

- Customer, Description of EUT, Model Number of EUT, FCC ID 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	BLE UNIT
Model Number	HU500030C
Serial Number	Refer to SECTION 4.2
Condition	Engineering prototype (Not for Sale: This sample is equivalent to mass-produced items.)
Modification	No Modification by the test lab
Receipt Date	June 20, 2025
Test Date	June 22, 2025

### **2.2 Product Description**

#### **General Specification**

Rating	DC 8 V to 16 V
Clock frequency (ies) in the system	32 MHz (BLE), 40 MHz (CAN controller)

#### **Radio Specification**

##### **Bluetooth (Low Energy)**

Equipment Type	Transceiver
Frequency of Operation	2402 MHz to 2480 MHz
Type of Modulation	GFSK
Antenna Gain	2.9 dBi

## SECTION 3: Test Summary

### 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 Reference Standards

ANSI/USEMCSC C63.2-2023  
ANSI C63.4-2014+C63.4a-2017  
ANSI C63.5-2017  
ANSI C63.25.1-2018

### 3.3 Summary of Test Results

Item	Limits	Result	Remarks
Conducted emission	Class B	N/A	*1)
Radiated emission	Class B	Complied	-

\* 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.

### 3.4 Addition to standard

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

### 3.5 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	5.0
		Vertical	5.0
	200 MHz to 1000 MHz	Horizontal	5.2
		Vertical	6.2
10 m	30 MHz to 200 MHz	Horizontal	5.5
		Vertical	5.4
	200 MHz to 1000 MHz	Horizontal	5.5
		Vertical	5.5
3 m	1 GHz to 6 GHz	dB	5.1
	6 GHz to 18 GHz	dB	5.4
1 m	10 GHz to 18 GHz	dB	5.4
	18 GHz to 26.5 GHz	dB	5.3
	26.5 GHz to 40 GHz	dB	4.8
0.5 m	26.5 GHz to 40 GHz	dB	5.0

### 3.6 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 (SAC1)	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 (SAC2)	7.5 x 5.8 x 5.2	4.0 x 4.0	-	3 m
No.3 semi-anechoic chamber (SAC3)	12.0 x 8.5 x 5.9	6.8 x 5.75	No.3 Preparation room (PR3)	3 m
No.3 shielded room (SR3)	4.0 x 6.0 x 2.7	N/A	-	-
No.4 semi-anechoic chamber (SAC4)	12.0 x 8.5 x 5.9	6.8 x 5.75	No.4 Preparation room (PR4)	3 m
No.4 shielded room (SR4)	4.0 x 6.0 x 2.7	N/A	-	-
No.5 semi-anechoic chamber (SAC5)	6.0 x 6.0 x 3.9	6.0 x 6.0	-	-
No.5 measurement room (MR5)	6.4 x 6.4 x 3.0	6.4 x 6.4	-	-
No.6 shielded room (SR6)	4.0 x 4.5 x 2.7	4.0 x 4.5	-	-
No.6 measurement room (MR6)	4.75 x 5.4 x 3.0	4.75 x 4.15	-	-
No.7 shielded room (SR7)	4.7 x 7.5 x 2.7	4.7 x 7.5	-	-
No.8 measurement room (MR8)	3.1 x 5.0 x 2.7	3.1 x 5.0	-	-
No.9 measurement room (MR9)	8.8 x 4.6 x 2.8	2.4 x 2.4	-	-
No.10 shielded room (SR10)	3.8 x 2.8 x 2.8	3.8 x 2.8	-	-
No.11 measurement room (MR11)	4.0 x 3.4 x 2.5	N/A	-	-
No.12 measurement room (MR12)	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	-	-

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

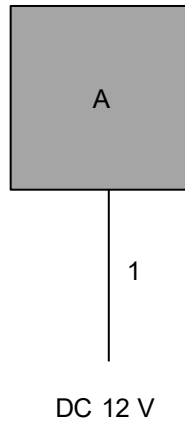
Refer to APPENDIX.

## SECTION 4: Operation of EUT during testing

### 4.1 Operating Mode(s)

Mode	1. Maximum Load Operation mode
Software(s)	Ver: FF.03

### 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

No.	Item	Model number	Serial Number	Manufacturer	Remarks
A	BLE UNIT	HU500030C	No.67	Panasonic Automotive Systems Asia Pacific Co., Ltd	EUT

#### List of Cables Used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	DC Cable	2.7	Unshielded	Unshielded	-

## **SECTION 5: Radiated Emission**

### **5.1 Operating environment**

Date	Test site	Temperature	Humidity	Engineer	Mode
See data	See data	See data	See data	See data	See data

### **5.2 Test configuration**

EUT was placed on the 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 platform.

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.

### **5.3 Test conditions**

Frequency range	:	30 MHz to 200 MHz (Biconical antenna) 200 MHz to 1000 MHz (Logperiodic antenna) 1000 MHz to 13000 MHz (Horn antenna)
Test distance	:	See Figure 1
EUT position	:	Table top
EUT operation mode	:	See Clause 4.1

### **5.4 Test procedure**

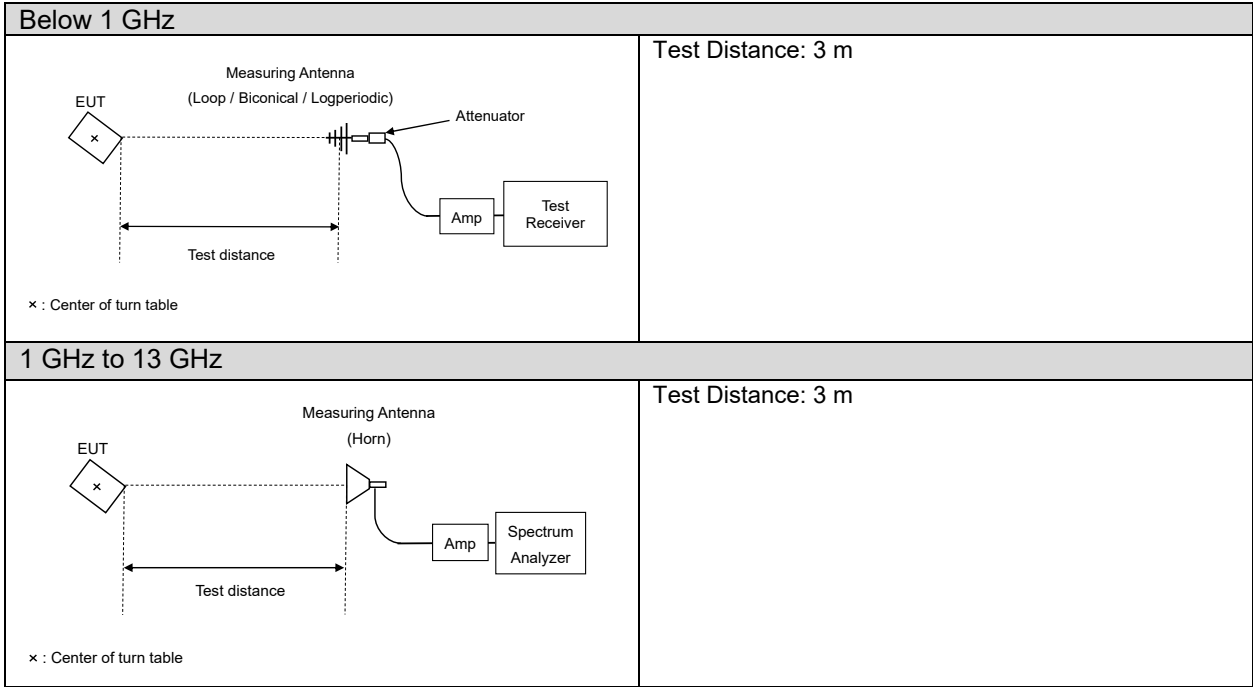
The height of the measuring antenna varied between 1 and 4 m and EUT was rotated a full revolution in order to obtain the maximum value of the electric field intensity.

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. Test antenna was aimed at the emission source for receiving the maximum signal and always kept. (Above 1 GHz)

Frequency	Below 1 GHz	Above 1 GHz
Instrument used	Test Receiver	Test Receiver
IF Bandwidth	QP: BW 120 kHz	PK: BW 1 MHz, CAV: BW 1 MHz

Figure 1: Test Setup



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.

**5.5 Test result**

Summary of the test results: Pass

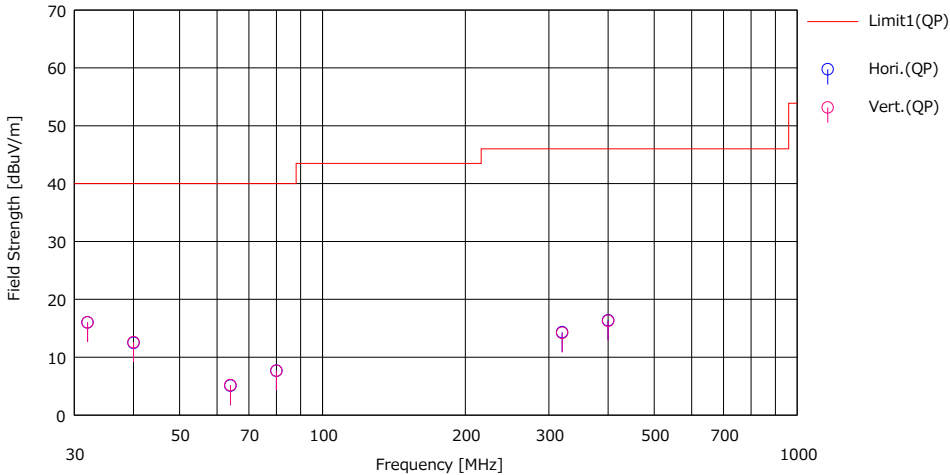
Test results are rounded off and limit are rounded down, so some differences might be observed.

**APPENDIX 1: Test data**

**Radiated Emission**

Mode	1				
Date	Test site	Temperature	Humidity	Engineer	Measurement Range
June 22, 2025	SAC3	23 deg. C	50 % RH	Tetsuro Yoshida	Below 1 GHz

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



No.	Freq. [MHz]	Reading	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result	Limit	Margin	Pola. [H/V]	Height [cm]	Angle [deg]	Ant. Type	Comment
		[dBuV]				[QP]	[QP]	[QP]					
1	32.000	23.30	17.93	6.98	32.20	16.01	40.00	23.99	Hori.	100	0	BA	
2	40.000	22.70	14.86	7.12	32.20	12.48	40.00	27.52	Hori.	100	0	BA	
3	64.000	22.80	6.98	7.47	32.17	5.08	40.00	34.92	Hori.	100	0	BA	
4	80.000	25.20	6.92	7.69	32.15	7.66	40.00	32.34	Hori.	100	0	BA	
5	320.000	22.40	14.09	9.82	31.99	14.32	46.00	31.68	Hori.	100	0	LA22	
6	400.000	22.30	15.68	10.40	32.01	16.37	46.00	29.63	Hori.	100	0	LA22	
7	32.000	23.30	17.93	6.98	32.20	16.01	40.00	23.99	Vert.	100	0	BA	
8	40.000	22.80	14.86	7.12	32.20	12.58	40.00	27.42	Vert.	100	0	BA	
9	64.000	22.90	6.98	7.47	32.17	5.18	40.00	34.82	Vert.	100	0	BA	
10	80.000	25.20	6.92	7.69	32.15	7.66	40.00	32.34	Vert.	100	0	BA	
11	320.000	22.30	14.09	9.82	31.99	14.22	46.00	31.78	Vert.	100	0	LA22	
12	400.000	22.20	15.68	10.40	32.01	16.27	46.00	29.73	Vert.	100	0	LA22	

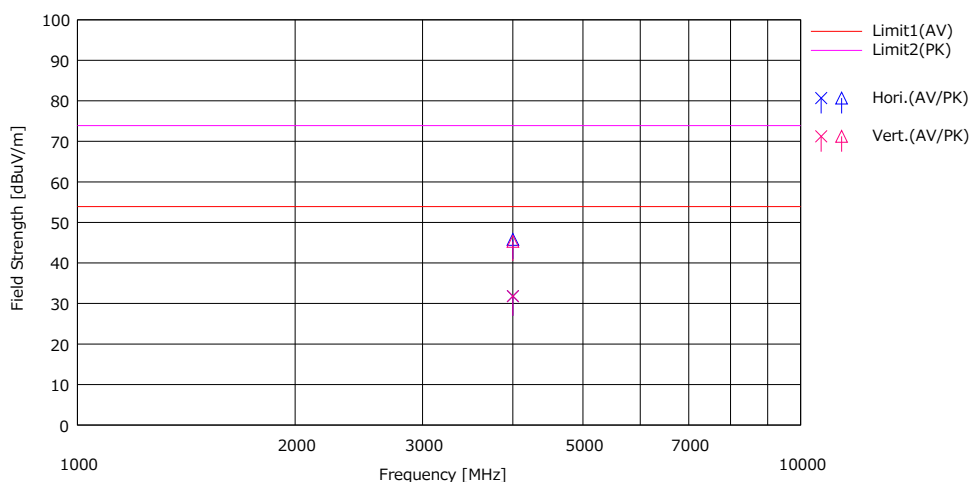
CHART: WITH FACTOR  
 ANT TYPE: - 30 MHz: LOOP, 30 MHz - 200 MHz: BICONICAL, 200 MHz - 1000 MHz: LOGPERIODIC, 1000 MHz -: HORN  
 CALCULATION: RESULT = READING + ANT FACTOR + LOSS(CABLE + ATT) - GAIN(AMP)  
 Except for the above table: adequate margin data below the limits.

## Radiated Emission

Mode	1
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Date	Test site	Temperature	Humidity	Engineer	Measurement Range
June 22, 2025	SAC3	23 deg. C	50 % RH	Tetsuro Yoshida	1 GHz to 13 GHz

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



No.	Freq. [MHz]	Reading		Ant.Fac [dB/m]	Loss [dB]	Gain [dB]	Result		Limit		Margin		Pola. [H/V]	Height [cm]	Angle [deg]	Ant. Type	Comment
		(AV) [dBuV]	(PK) [dBuV]				(AV) [dBuV/m]	(PK) [dBuV/m]	(AV) [dB]	(PK) [dB]							
1	4000.000	30.10	44.10	29.89	3.13	31.30	31.82	45.82	53.90	73.90	22.08	28.08	Hori.	100	0	H20	
2	4000.000	30.10	43.60	29.89	3.13	31.30	31.82	45.32	53.90	73.90	22.08	28.58	Vert.	100	0	H20	

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) - GAIN(AMP)

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

\* No signal was detected above 10 GHz.

## APPENDIX 2: Test instruments

### Test equipment

Test Item	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Cal Int
RE	141266	Logperiodic Antenna (200-1000MHz)	Schwarzbeck Mess-Elektronik OHG	VUSLP9111B	9111B-191	08/23/2024	12
RE	141323	Coaxial cable	UL-ISE	-	-	09/13/2024	12
RE	141425	Biconical Antenna	Schwarzbeck Mess-Elektronik OHG	VHA9103+BBA9106	VHA 91031302	08/23/2024	12
RE	141507	Horn Antenna 1-18GHz	Schwarzbeck Mess-Elektronik OHG	BBHA9120D	258	11/11/2024	12
RE	141532	DIGITAL HiTESTER	HIOKI E. E. CORPORATION	3805	051201197	01/16/2025	12
RE	141580	MicroWave System Amplifier	Keysight Technologies Inc	83017A	MY39500779	03/24/2025	12
RE	141582	Pre Amplifier	SONOMA INSTRUMENT	310	260834	02/14/2025	12
RE	141950	EMI Test Receiver	Rohde & Schwarz	ESU26	100412	11/28/2024	12
RE	142008	AC3_Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-10005	12/11/2023	24
RE	142013	AC3_Semi Anechoic Chamber(SVSWR)	TDK	Semi Anechoic Chamber 3m	DA-10005	04/14/2025	24
RE	142183	Measure	KOMELON	KMC-36	-	10/21/2024	12
RE	142314	Attenuator	Pasternack Enterprises	PE7390-6	D/C 1504	06/06/2024	12
RE	178648	EMI measurement program	TSJ (Techno Science Japan)	TEPTO-DV	-	-	-
RE	244709	Thermo-Hygrometer	HIOKI E. E. CORPORATION	LR5001	231202103	01/19/2025	12
RE	245787	Double Ridge Horn Antenna	Schwarzbeck Mess-Elektronik OHG	BBHA 9120 C	689	04/01/2025	12
RE	263275	Microwave Cable	Junkosha	MWX221-05000DMSDMS+M WX221-01000DMSDMS	2505S043+2503S145	05/20/2025	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