



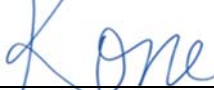
# RADIO TEST REPORT

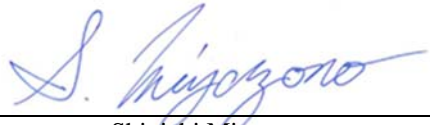
**Test Report No. : 14037108H**

**Applicant** : Pacific Industrial Company, LTD.  
**Type of EUT** : TPMS (Tire Pressure Monitoring System Transmitter)  
**Model Number of EUT** : PMV-E001  
**FCC ID** : PAXPMVE001A  
**Test regulation** : FCC Part 15 Subpart C: 2021  
**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 Radio technical requirements. It does not cover administrative issues such as Manual or non-Radio 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, Inc. has been accredited.
9. The information provided from the customer for this report is identified in SECTION 1.

**Date of test:** November 6 and 26, 2021

**Representative test engineer:**   
Nachi Konegawa  
Engineer

**Approved by:**   
Shinichi Miyazono  
Engineer



CERTIFICATE 5107.02

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

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

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN  
Telephone : +81 596 24 8999  
Facsimile : +81 596 24 8124

## **REVISION HISTORY**

**Original Test Report No.: 14037108H**

Revision	Test report No.	Date	Page revised	Contents
- (Original)	14037108H	November 30, 2021	-	-

---

**UL Japan, Inc.**

**Ise EMC Lab.**

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

Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

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

A2LA	The American Association for Laboratory Accreditation	MCS	Modulation and Coding Scheme
AC	Alternating Current	MRA	Mutual Recognition Arrangement
AFH	Adaptive Frequency Hopping	N/A	Not Applicable
AM	Amplitude Modulation	NIST	National Institute of Standards and Technology
Amp, AMP	Amplifier	NS	No signal detect.
ANSI	American National Standards Institute	NSA	Normalized Site Attenuation
Ant, ANT	Antenna	NVLAP	National Voluntary Laboratory Accreditation Program
AP	Access Point	OBW	Occupied Band Width
ASK	Amplitude Shift Keying	OFDM	Orthogonal Frequency Division Multiplexing
Atten., ATT	Attenuator	P/M	Power meter
AV	Average	PCB	Printed Circuit Board
BPSK	Binary Phase-Shift Keying	PER	Packet Error Rate
BR	Bluetooth Basic Rate	PHY	Physical Layer
BT	Bluetooth	PK	Peak
BT LE	Bluetooth Low Energy	PK/w	Peak with duty factor
BW	BandWidth	PN	Pseudo random Noise
Cal Int	Calibration Interval	PRBS	Pseudo-Random Bit Sequence
CCK	Complementary Code Keying	PSD	Power Spectral Density
Ch., CH	Channel	QAM	Quadrature Amplitude Modulation
CISPR	Comite International Special des Perturbations Radioelectriques	QP	Quasi-Peak
CW	Continuous Wave	QPSK	Quadri-Phase Shift Keying
DBPSK	Differential BPSK	RBW	Resolution Band Width
DC	Direct Current	RDS	Radio Data System
D-factor	Distance factor	RE	Radio Equipment
DFS	Dynamic Frequency Selection	RF	Radio Frequency
DQPSK	Differential QPSK	RMS	Root Mean Square
DSSS	Direct Sequence Spread Spectrum	RSS	Radio Standards Specifications
EDR	Enhanced Data Rate	Rx	Receiving
EIRP, e.i.r.p.	Equivalent Isotropically Radiated Power	SA, S/A	Spectrum Analyzer
EMC	ElectroMagnetic Compatibility	SG	Signal Generator
EMI	ElectroMagnetic Interference	SVSWR	Site-Voltage Standing Wave Ratio
EN	European Norm	TR	Test Receiver
ERP, e.r.p.	Effective Radiated Power	Tx	Transmitting
EU	European Union	VBW	Video BandWidth
EUT	Equipment Under Test	Vert.	Vertical
Fac.	Factor	WLAN	Wireless LAN
FCC	Federal Communications Commission		
FHSS	Frequency Hopping Spread Spectrum		
FM	Frequency Modulation		
Freq.	Frequency		
FSK	Frequency Shift Keying		
GFSK	Gaussian Frequency-Shift Keying		
GNSS	Global Navigation Satellite System		
GPS	Global Positioning System		
Hori.	Horizontal		
ICES	Interference-Causing Equipment Standard		
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		
ISO	International Organization for Standardization		
JAB	Japan Accreditation Board		
LAN	Local Area Network		
LIMS	Laboratory Information Management System		

**UL Japan, Inc.**

**Ise EMC Lab.**

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

Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

<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 (Fundamental and Spurious Emission) .....</b>	<b>10</b>
<b>SECTION 6: Automatically deactivate .....</b>	<b>12</b>
<b>SECTION 7: -20 dB Bandwidth and 99 % Occupied Bandwidth .....</b>	<b>12</b>
<b>APPENDIX 1: Test data .....</b>	<b>13</b>
Automatically deactivate .....	13
Radiated Emission (Electric Field Strength of Fundamental and Spurious Emission).....	16
Duty Cycle .....	18
-20 dB Bandwidth and 99% Occupied Bandwidth .....	19
<b>APPENDIX 2: Test instruments .....</b>	<b>20</b>
<b>APPENDIX 3: Photographs of test setup .....</b>	<b>21</b>
Radiated Emission .....	21
Worst Case Position .....	23

## **SECTION 1: Customer information**

Company Name : Pacific Industrial Company, LTD.  
Address : 1300-1, YOKOI, GODO-CHO, ANPACHI-GUN, GIFU 503-2397,  
JAPAN  
Telephone Number : +81-584-28-0113  
Contact Person : Takashi Takeyama

The information provided from the customer is as follows;

- Applicant, Type 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)
- 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 : TPMS (Tire Pressure Monitoring System Transmitter)  
Model Number : PMV-E001  
Serial Number : Refer to SECTION 4.2  
Receipt Date : November 1, 2021  
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: PMV-E001 (referred to as the EUT in this report) is a TPMS (Tire Pressure Monitoring System Transmitter).

### **General Specification**

Rating : DC 3.0 V

### **Radio Specification**

Radio Type : Transceiver  
Frequency of Operation : 315 MHz  
Modulation : FSK  
Antenna type : One lithium battery (Built-in type)  
Clock frequency (Maximum) : 26 MHz

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

### **3.1 Test Specification**

Test Specification : FCC Part 15 Subpart C  
FCC Part 15 final revised on May 3, 2021 and effective July 2, 2021

Title : FCC 47CFR Part15 Radio Frequency Device Subpart C Intentional Radiators  
Section 15.231 Periodic operation in the band 40.66-40.70 MHz and above 70 MHz.

### **3.2 Procedures and results**

Item	Test Procedure	Specification	Worst margin	Results	Remarks
Conducted emission	FCC: ANSI C63.10:2013 6 Standard test methods	FCC: Section 15.207	N/A	N/A	*1)
Automatically Deactivate	FCC: ANSI C63.10:2013 6 Standard test methods	FCC: Section 15.231(a)(2) Section 15.231(e)	N/A	Complied a)	Radiated
Electric Field Strength of Fundamental Emission	FCC: ANSI C63.10:2013 6 Standard test methods	FCC: Section 15.231(e)	10.8 dB 315.000 MHz Horizontal, PK	Complied b)	Radiated
Electric Field Strength of Spurious Emission	FCC: ANSI C63.10:2013 6 Standard test methods	FCC: Section 15.205 Section 15.209 Section 15.231(e)	5.5 dB 2205.000 MHz Horizontal, PK	Complied b)	Radiated
-20dB Bandwidth	FCC: ANSI C63.10:2013 6 Standard test methods	FCC: Section 15.231(c)	N/A	Complied c)	Radiated

Note: UL Japan, Inc.'s EMI Work Procedures No. 13-EM-W0420 and 13-EM-W0422.

\*1) The test is not applicable since the EUT does not have AC Mains.

a) Refer to APPENDIX 1 (data of Automatically deactivate)

b) Refer to APPENDIX 1 (data of Radiated Emission (Electric Field Strength of Fundamental and Spurious Emission))

c) Refer to APPENDIX 1 (data of -20 dB Bandwidth and 99% Occupied Bandwidth)

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.

#### **FCC Part 15.31 (e)**

The test was performed with the New Battery during the tests.

Therefore, this EUT complies with the requirement.

#### **FCC Part 15.203 Antenna requirement**

It is impossible for end users to replace the antenna, because the antenna is mounted inside of the EUT.

Therefore, the equipment complies with the antenna requirement of Section 15.203.

**UL Japan, Inc.**

**Ise EMC Lab.**

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

Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

### 3.3 Addition to standard

Item	Test Procedure	Specification	Worst margin	Results	Remarks
99 % Occupied Bandwidth	ANSI C63.10:2013 6 Standard test methods	Reference data	N/A	-	Radiated

Other than above, 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  $k=2$ .

#### Radiated emission

Measurement distance	Frequency range	Uncertainty (+/-)
3 m	9 kHz to 30 MHz	3.3 dB
10 m		3.2 dB
3 m	30 MHz to 200 MHz	(Horizontal) 4.8 dB
		(Vertical) 5.0 dB
	200 MHz to 1000 MHz	(Horizontal) 5.1 dB
		(Vertical) 6.2 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

#### Antenna Terminal test

Test Item	Uncertainty (+/-)
Automatically Deactivate	0.10 %
-20 dB Bandwidth / 99 % Occupied Bandwidth	0.96 %

### 3.5 Test Location

UL Japan, Inc. Ise EMC Lab.

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

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

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

Telephone: +81 596 24 8999, Facsimile: +81 596 24 8124

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	-	-

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

Refer to APPENDIX.

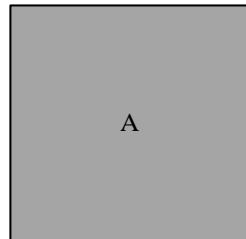


## **SECTION 4: Operation of EUT during testing**

### **4.1. Operating Mode(s)**

<b>Test Item*</b>	<b>Mode</b>
Automatically Deactivate	1) Normal use mode
Electric Field Strength of Fundamental Emission Electric Field Strength of Spurious Emission Duty Cycle -20 dB Bandwidth & 99 % Occupied Bandwidth	2) Transmitting mode (Tx)
<p>* The system was configured in typical fashion (as a user would normally use it) for testing.  * EUT was set by the software as follows;  Software: PMV-E001 Ver 1.0  (Date: 2021.10.27, Storage location: EUT memory)</p> <p>*This setting of software is the worst case.  Any conditions under the normal use do not exceed the condition of setting.  In addition, end users cannot change the settings of the output power of the product.</p>	

### **4.2. Configuration and peripherals**



\* Setup was taken into consideration and test data was taken under worse case conditions.

#### **Description of EUT**

<b>No.</b>	<b>Item</b>	<b>Model number</b>	<b>Serial number</b>	<b>Manufacturer</b>	<b>Remarks</b>
A	TPMS (Tire Pressure Monitoring System Transmitter)	PMV-E001	00024FB	Pacific Industrial Company, LTD.	EUT

**UL Japan, Inc.**

**Ise EMC Lab.**

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

Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

## **SECTION 5: Radiated emission (Fundamental and Spurious Emission)**

### **Test Procedure**

[For below 30 MHz]

The noise level was checked by moving a search-coil (Loop Antenna) close to the EUT.

[For 30 MHz to 1 GHz]

EUT was placed on a urethane platform of nominal size, 0.5 m by 0.5 m, raised 0.8 m above the conducting ground plane. The Radiated Electric Field Strength has been measured in a Semi Anechoic Chamber with a ground plane.

[For above 1 GHz]

EUT was placed on a urethane platform of nominal size, 0.5 m by 0.5 m, raised 1.5 m above the conducting ground plane. The Radiated Electric Field Strength has been measured in a Semi Anechoic Chamber with absorbent materials lined on a ground plane.

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

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.

The measurements were performed for both vertical and horizontal antenna polarization.

The radiated emission measurements were made with the following detector function of the test receiver / spectrum analyzer.

### **Test Antennas are used as below;**

Frequency	Below 30 MHz	30 MHz to 200 MHz	200 MHz to 1 GHz	Above 1 GHz
Antenna Type	Loop	Biconical	Logperiodic	Horn

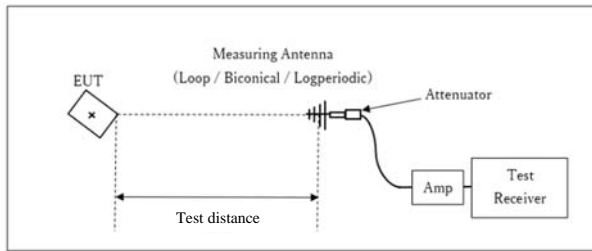
	From 9 kHz to 90 kHz and From 110 kHz to 150 kHz	From 90 kHz to 110 kHz	From 150 kHz to 490 kHz	From 490 kHz to 30 MHz	From 30 MHz to 1 GHz	Above 1 GHz
Detector Type	Peak	Peak	Peak	Peak	Peak and Peak with Duty factor	Peak and Peak with Duty factor
IF Bandwidth	200 Hz	200 Hz	9.1 kHz	9.1 kHz	120 kHz	PK: S/A: RBW 1 MHz, VBW: 3 MHz

- 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.

The test results and limit are rounded off to one decimal place, so some differences might be observed.

**Measurement range** : 9 kHz - 3.2 GHz  
**Test data** : APPENDIX  
**Test result** : Pass

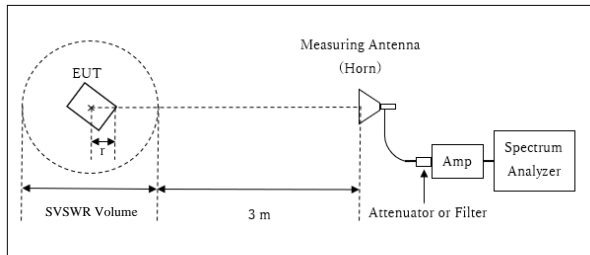
[Test Setup]  
Below 1 GHz



× : Center of turn table

Test Distance: 3 m

1 GHz - 3.2 GHz



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

Distance Factor:  $20 \times \log(4.0 \text{ m} / 3.0 \text{ m}) = 2.50 \text{ dB}$

\* Test Distance:  $(3 + \text{SVSWR Volume} / 2) - r = 4.00 \text{ m}$

SVSWR Volume : 2.0 m

(SVSWR Volume has been calibrated based on CISPR 16-1-4.)

$r = 0.0 \text{ m}$

\* The test was performed with  $r = 0.0 \text{ m}$  since EUT is small and it was the rather conservative condition.

## **SECTION 6: Automatically deactivate**

### **Test Procedure**

The measurement was performed with Electric field strength using a spectrum analyzer.

**Test data** : APPENDIX  
**Test result** : Pass

## **SECTION 7: -20 dB Bandwidth and 99 % Occupied Bandwidth**

### **Test Procedure**

The test was measured with a spectrum analyzer using a test fixture.

<b>Test</b>	<b>Span</b>	<b>RBW</b>	<b>VBW</b>	<b>Sweep</b>	<b>Detector</b>	<b>Trace</b>	<b>Instrument used</b>
-20 dB Bandwidth / 99 % Occupied Bandwidth	Enough width to display emission skirts	1 to 5 % of OBW	Three times of RBW	Auto	Peak *1)	Max Hold *1)	Spectrum Analyzer
*1) The measurement was performed with Peak detector, Max Hold since the duty cycle was not 100 %. Peak hold was applied as Worst-case measurement.							

**Test data** : APPENDIX  
**Test result** : Pass

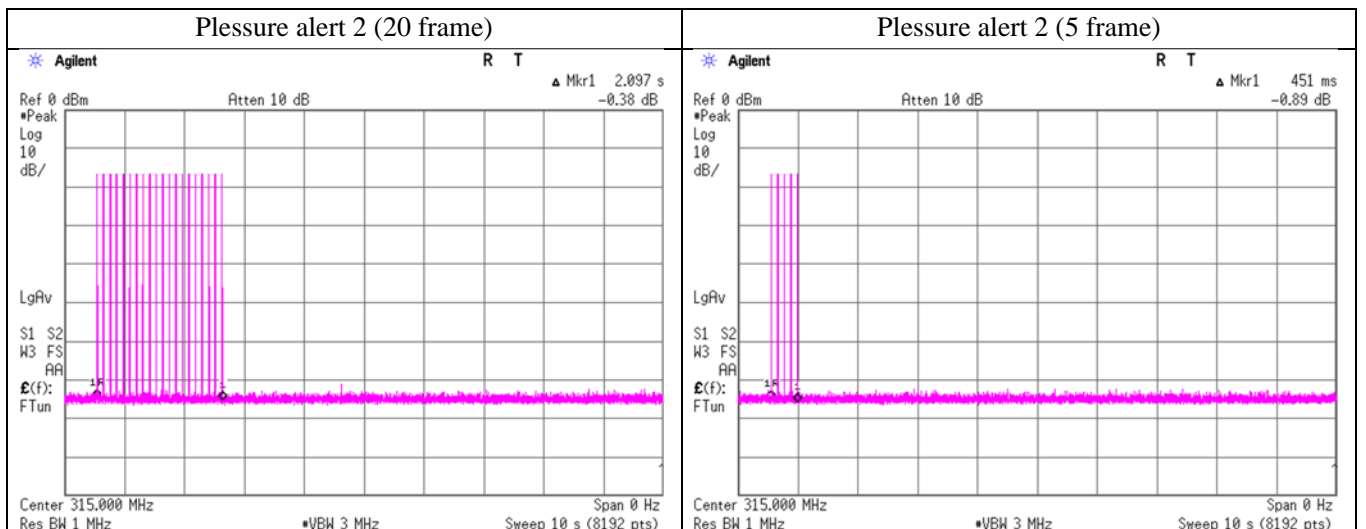
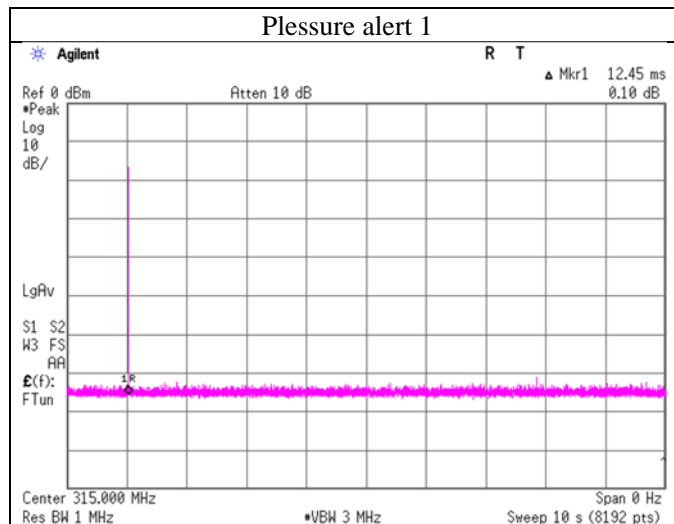
**APPENDIX 1: Test data**

**Automatically deactivate**

Report No. 14037108H  
Test place Ise EMC Lab.  
Measurement Room No.5  
Date November 26, 2021  
Temperature / Humidity 22 deg. C / 51 % RH  
Engineer Takafumi Noguchi  
Mode Normal use mode

Operation in FCC 15.231(a)(2)

Mode	Tx Frequency [MHz]	Time of Transmitting [sec]	Limit [sec]	Result
Plessness alert 1	315	0.012	5.00	Pass
Plessness alert 2 (20 frame)	315	2.097	5.00	Pass
Plessness alert 2 (5 frame)	315	0.451	5.00	Pass



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

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN  
Telephone : +81 596 24 8999  
Facsimile : +81 596 24 8124

**Automatically deactivate**

Report No. 14037108H  
Test place Ise EMC Lab.  
Measurement Room No.8  
Date November 26, 2021  
Temperature / Humidity 25 deg. C / 31 % RH  
Engineer Takafumi Noguchi  
Mode Normal use mode

Operation in FCC 15.231(e)

**Rotating mode 2**

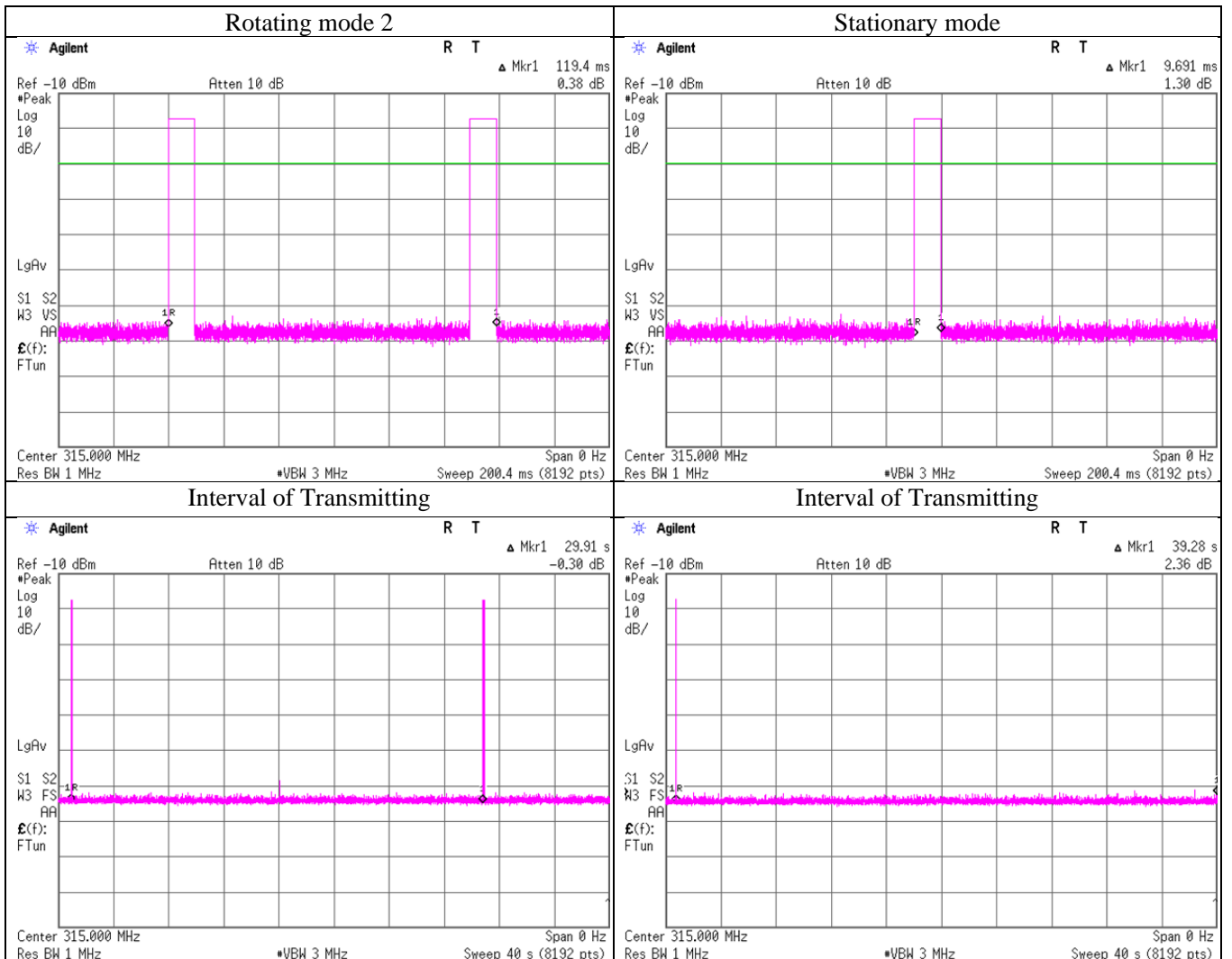
Duration of transmission: 119.4 msec < 1sec

Silent period between transmissions: 29.91 sec - 0.1194 sec = 29.7906 sec >30 times the duration of transmission and 10 sec.

**Stationary mode**

Duration of transmission: 9.691 msec < 1 sec

Silent period between transmissions: 39.28 sec - 0.009691 sec = 39.270309 sec >30 times the duration of transmission and 10sec.



**UL Japan, Inc.**

**Ise EMC Lab.**

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

Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

## Automatically deactivate

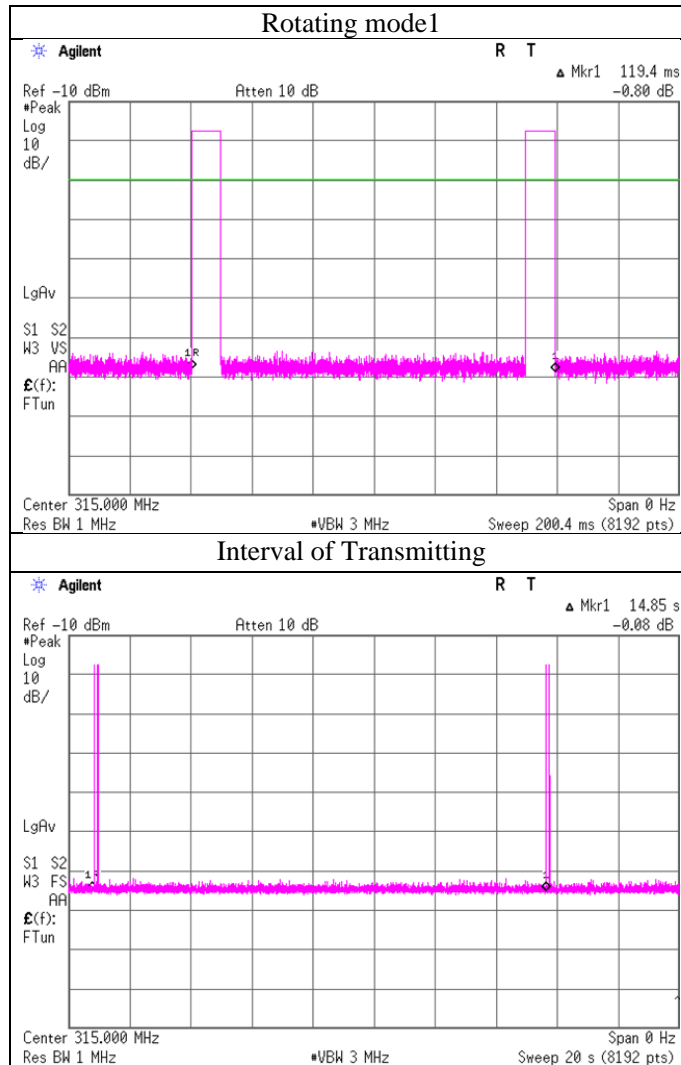
Report No.	14037108H
Test place	Ise EMC Lab.
Measurement Room	No.8
Date	November 26, 2021
Temperature / Humidity	25 deg. C / 31 % RH
Engineer	Takafumi Noguchi
Mode	Normal use mode

Operation in FCC 15.231(e)

Rotating model

Duration of transmission: 119.4 msec < 1 sec

Silent period between transmissions: 14.85 sec - 0.1194 sec = 14.7306 sec >30 times the duration of transmission and 10sec.



**UL Japan, Inc.**

**Ise EMC Lab.**

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

Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

## Radiated Emission (Electric Field Strength of Fundamental and Spurious Emission)

Report No. 14037108H  
Test place Ise EMC Lab.  
Semi Anechoic Chamber No.4  
Date November 6, 2021  
Temperature / Humidity 21 deg. C / 51 % RH  
Engineer Nachi Konegawa  
Mode Transmitting mode

### QP or PK

Frequency [MHz]	Detector	Reading [dBuV]		Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]		Limit [dBuV/m]	Margin [dB]		Remark Inside or Outside of Restricted Bands
		Hor	Ver					Hor	Ver		Hor	Ver	
315.000	PK	84.9	82.0	14.2	9.7	31.9	-	76.9	74.0	87.7	10.8	13.7	Carrier
630.000	PK	33.2	35.8	19.5	11.3	32.1	-	32.0	34.6	67.7	35.7	33.1	Outside
945.000	PK	30.7	30.6	22.2	12.5	31.0	-	34.5	34.4	67.7	33.2	33.3	Outside
1260.000	PK	46.4	46.2	25.8	6.1	33.9	-	44.4	44.2	67.7	23.3	23.5	Outside
1575.000	PK	52.1	51.4	25.3	5.5	33.1	-	49.9	49.2	67.7	17.8	18.5	Inside
1890.000	PK	58.1	58.6	25.8	5.6	32.2	-	57.2	57.7	67.7	10.4	10.0	Outside
2205.000	PK	60.1	59.5	28.3	5.6	31.8	-	62.2	61.6	67.7	5.5	6.1	Inside
2520.000	PK	43.9	43.8	27.6	5.7	31.7	-	45.5	45.5	67.7	22.1	22.2	Outside
2835.000	PK	49.6	50.1	28.3	5.8	31.5	-	52.3	52.7	67.7	15.4	15.0	Inside
3150.000	PK	50.6	52.1	28.5	5.9	31.3	-	53.7	55.2	67.7	13.9	12.5	Outside

### PK with Duty factor

Frequency [MHz]	Detector	Reading [dBuV]		Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]		Limit [dBuV/m]	Margin [dB]		Remark
		Hor	Ver					Hor	Ver		Hor	Ver	
315.000	PK	84.9	82.0	14.2	9.7	31.9	-20.3	56.6	53.7	67.7	11.1	14.0	Carrier
630.000	PK	33.2	35.8	19.5	11.3	32.1	-20.3	11.7	14.3	47.7	36.0	33.4	Outside
945.000	PK	30.7	30.6	22.2	12.5	31.0	-20.3	14.2	14.1	47.7	33.5	33.6	Outside
1260.000	PK	46.4	46.2	25.8	6.1	33.9	-20.3	24.1	23.9	47.7	23.5	23.8	Outside
1575.000	PK	52.1	51.4	25.3	5.5	33.1	-20.3	29.6	28.9	47.7	18.1	18.7	Inside
1890.000	PK	58.1	58.6	25.8	5.6	32.2	-20.3	37.0	37.4	47.7	10.7	10.2	Outside
2205.000	PK	60.1	59.5	28.3	5.6	31.8	-20.3	41.9	41.3	47.7	5.8	6.4	Inside
2520.000	PK	43.9	43.8	27.6	5.7	31.7	-20.3	25.3	25.2	47.7	22.4	22.5	Outside
2835.000	PK	49.6	50.1	28.3	5.8	31.5	-20.3	32.0	32.4	47.7	15.7	15.2	Inside
3150.000	PK	50.6	52.1	28.5	5.9	31.3	-20.3	33.5	35.0	47.7	14.2	12.7	Outside

Sample calculation:

Result of PK = Reading + Ant Factor + Loss {Cable + Attenuator + Filter (above 1GHz) + Distance factor (above 1 GHz)} - Gain (Amplifier)

Result of PK with Duty factor = Reading + Ant Factor + Loss {Cable + Attenuator + Filter (above 1 GHz) + Distance factor (above 1 GHz)} - Gain (Amplifier) + Duty factor (Refer to Duty cycle data sheet)

For above 1GHz : Distance Factor:  $20 \times \log(4.0 \text{ m}/3.0 \text{ m}) = 2.50 \text{ dB}$

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

**UL Japan, Inc.**

**Ise EMC Lab.**

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

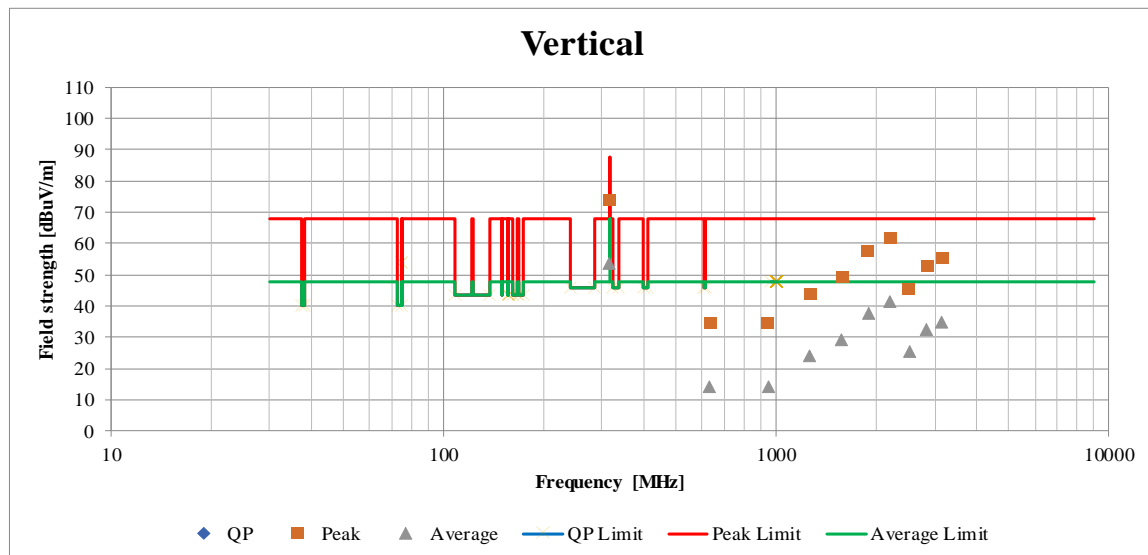
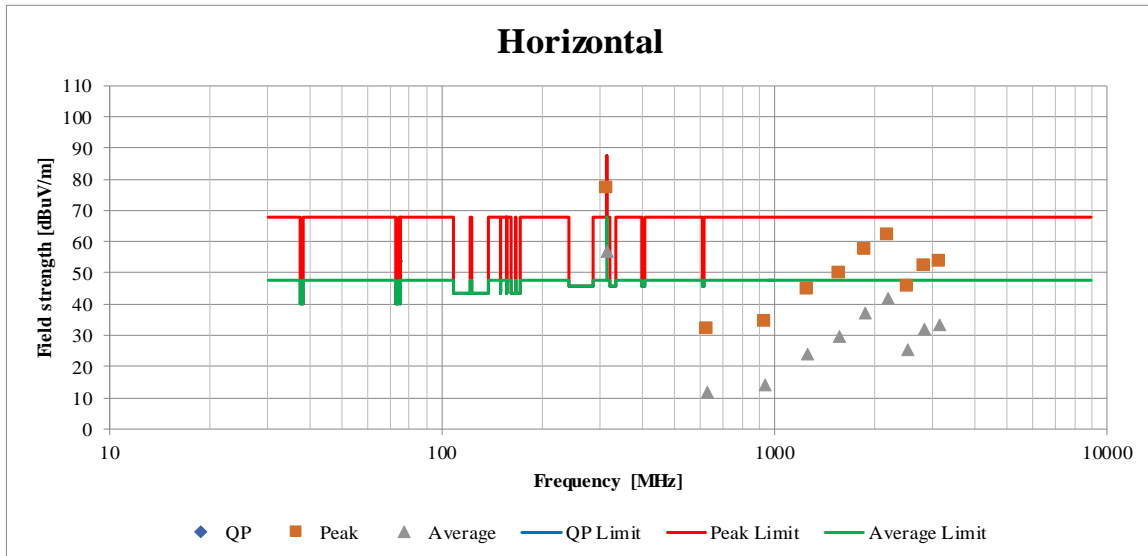
Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124



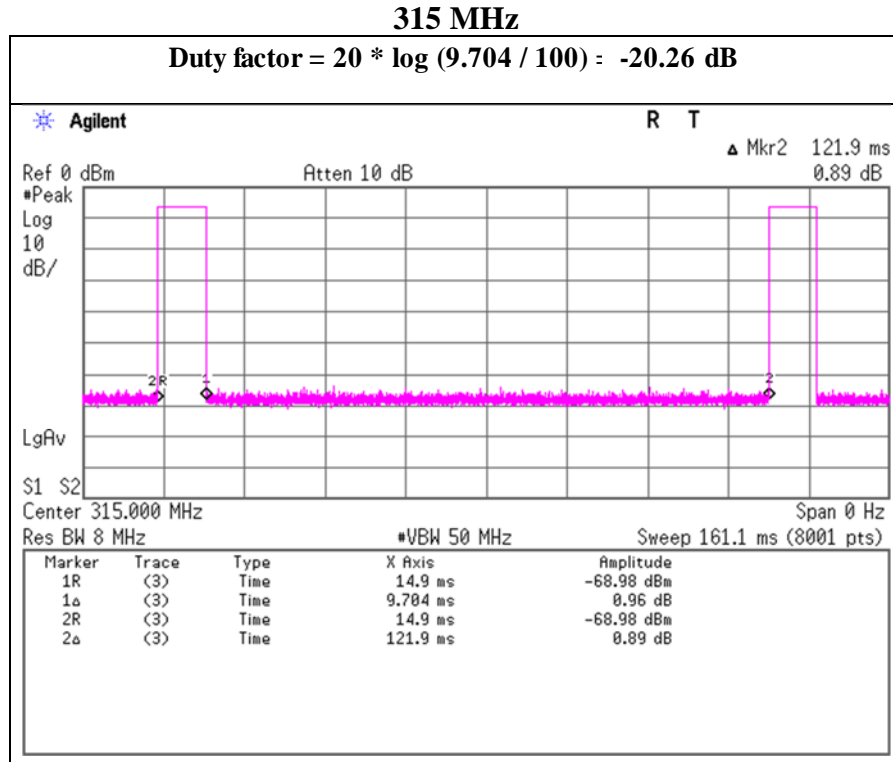
**Radiated Spurious Emission**  
**(Plot data, Worst case)**

Report No.	14037108H
Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.4
Date	November 6, 2021
Temperature / Humidity	21 deg. C / 51 % RH
Engineer	Nachi Konegawa
Mode	Transmitting mode



## Duty Cycle

Report No. 14037108H  
 Test place Ise EMC Lab.  
 Semi Anechoic Chamber No.4  
 Date November 6, 2021  
 Temperature / Humidity 21 deg. C / 51 % RH  
 Engineer Nachi Konegawa  
 Mode Transmitting mode



The ON time (9.704 ms) appears 1 times in 100 ms.  
 The actual measurement value was applied as Averaging factor (Duty factor).

**-20 dB Bandwidth and 99% Occupied Bandwidth**

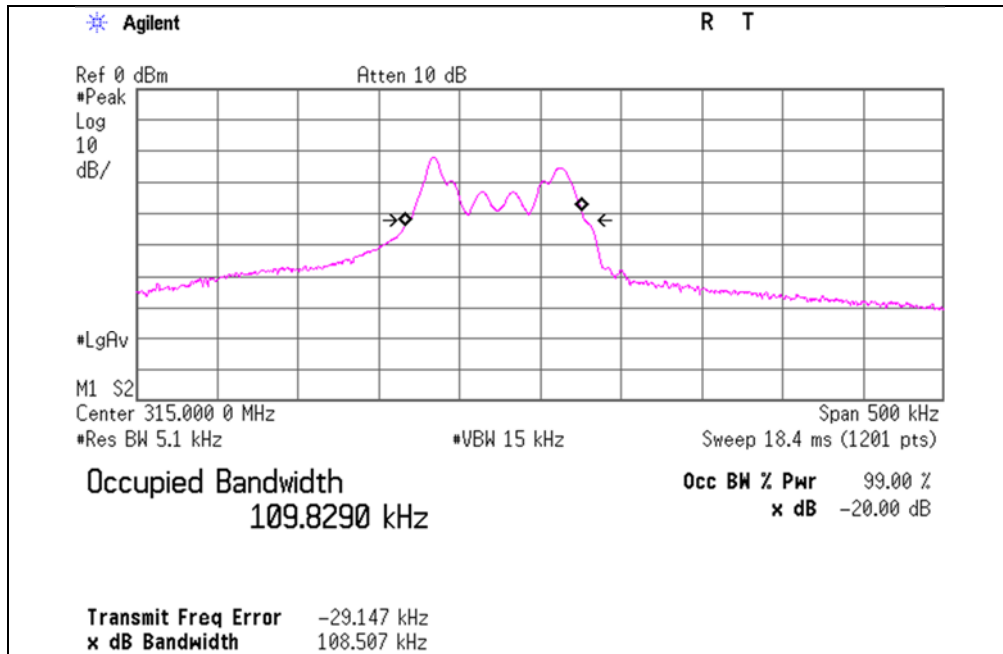
Report No. 14037108H  
Test place Ise EMC Lab.  
Semi Anechoic Chamber No.4  
Date November 6, 2021  
Temperature / Humidity 21 deg. C / 51 % RH  
Engineer Nachi Konegawa  
Mode Transmitting mode

Bandwidth Limit : Fundamental Frequency **315.00** MHz x 0.25% = 787.50 kHz

\* The above limit was calculated from more stringent nominal frequency.

-20dB Bandwidth [kHz]	Bandwidth Limit [kHz]	Result
108.507	787.50	Pass

99% Occupied Bandwidth [kHz]	Bandwidth Limit [kHz]	Result
109.8290	787.50	Pass



## **APPENDIX 2: Test instruments**

### **Test equipment**

Test Item	Local ID	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Cal Int
RE	MOS-28	141567	Thermo-Hygrometer	CUSTOM. Inc	CTH-201	0008	01/15/2021	12
RE	MMM-17	141557	DIGITAL HiTESTER	HIOKI E.E. CORPORATION	3805	70900530	01/07/2021	12
RE	MSA-13	141900	Spectrum Analyzer	Keysight Technologies Inc	E4440A	MY46185823	09/30/2021	12
RE	MLPA-09	202512	Loop Antenna	UL Japan	-	-	-	-
RE	MSA-14	141901	Spectrum Analyzer	Keysight Technologies Inc	E4440A	MY48250080	12/18/2020	12
RE	MTR-03	141942	Test Receiver	Rohde & Schwarz	ESCI	100300	08/05/2021	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-MEMI-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	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	08/28/2021	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	08/28/2021	12
RE	MPA-14	141583	Pre Amplifier	SONOMA INSTRUMENT	310	260833	02/18/2021	12
RE	MPA-12	141581	MicroWave System Amplifier	Keysight Technologies Inc	83017A	00650	10/07/2021	12
RE	MCC-257	208936	Microwave Cable	Huber+Suhner	SF126E/11PC35/11PC35/1000M,5000M	537061/126E / 537076/126E	07/18/2021	12
RE	MHA-05	141511	Horn Antenna 1-18GHz	Schwarzbeck Mess-Elektronik OHG	BBHA9120D	253	09/24/2021	12
RE	MHF-27	141297	High Pass Filter (1.1-10GHz)	TOKYO KEIKI	TF219CD1	1001	01/14/2021	12
RE	MSA-17	141904	Spectrum Analyzer	Keysight Technologies Inc	N9030A	US51350215	09/30/2021	12
RE	MLPA-07	142645	Loop Antenna	UL Japan	-	-	-	-
RE	MOS-17	141563	Thermo-Hygrometer	TFA	CTH-180	1005	01/15/2021	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.**

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

Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124