RADIO TEST REPORT

Test Report No.: 14579076H-A-R2

Customer	**Pacific Industrial Company, LTD.**
Description of EUT	**TPMS (Tire Pressure Monitoring System Transmitter)**
Model Number of EUT	**PMV-E106**
FCC ID	**PAXPMVE106**
Test Regulation	**FCC Part 15 Subpart C**
Test Result	**Complied (Refer to SECTION 3)**
Issue Date	**June 8, 2023**
Remarks	**-**

Representative test engineer

Ken Fujita
Engineer

Approved by

Shinichi Miyazono
Engineer

CERTIFICATE 5107.02

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- The information provided from the customer for this report is identified in Section 1.
- For test report(s) referred in this report, the latest version (including any revisions) is always referred.

REVISION HISTORY

Original Test Report No.: 14579076H-A

This report is a revised version of 14579076H-A-R1. 14579076H-A-R1 is replaced with this report.

Revision	Test Report No.	Date	Page Revised Contents
- (Original)	14579076H-A	December 19, 2022	-
1	14579076H-A-R1	April 27, 2023	Correction of frequency of worst margin for Electric Field Strength of Spurious Emission test in Clause 3.2; From 3037.400 MHz to 3037.440 MHz
1	14579076H-A-R1	April 27, 2023	Correction of the Test Date in Clause 2.1.
1	14579076H-A-R1	April 27, 2023	Addition of the notation for the variant model in Clause 2.2.
1	14579076H-A-R1	April 27, 2023	Retest of Maximum RF Output Power test. - Changed from Time Average to Burst. - Correction to result of Conducted power (Burst) only - Change of test date by the retest.
1	14579076H-A-R1	April 27, 2023	Updating for Test Equipment list.
2	14579076H-A-R2	June 8, 2023	Addition of the description of variant models in Clause 2.2.

Reference: Abbreviations (Including words undescribed in this report)

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

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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;
- 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

* 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

Description	TPMS (Tire Pressure Monitoring System Transmitter)
Model Number	PMV-E106
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	November 15, 2022
Test Date	November 20, 2022 to February 6, 2023

2.2 Product Description

General Specification

Rating	DC 3 V

Radio Specification

Equipment Type	Transceiver
Frequency of Operation	433.92 MHz
Type of Modulation	FSK
Antenna Gain	-20.0 dBi

Variant model

Tested model: PMV-E106 has two variations: variation No.1 and variation No.2.
The difference of these models is only the appearance configuration.

The worst case was confirmed with variation No.1 and variation No.2 at pre check.
The test was performed with variation No.1 as representative since there is no difference the worst result between these variations.

SECTION 3: Test Specification, Procedures & Results

3.1 Test Specification

Test Specification	FCC Part 15 Subpart C The latest version on the first day of the testing period
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 **ISED:** RSS-Gen 8.8	**FCC:** Section 15.207 **ISED:** RSS-Gen 8.8	N/A	N/A	*1)
Automatically Deactivate	**FCC:** ANSI C63.10:2013 6 Standard test methods **ISED:** -	**FCC:** Section 15.231(a)(2) Section 15.231(e) **ISED:** RSS-210 A1.1(b) RSS-210 A1.4(b)	N/A	Complied a)	Radiated
Electric Field Strength of Fundamental Emission	**FCC:** ANSI C63.10:2013 6 Standard test methods **ISED:** RSS-Gen 6.12	**FCC:** Section 15.231(e) **ISED:** RSS-210 A1.4	16.0 dB 433.920 MHz Horizontal, PK	Complied b)	Radiated
Electric Field Strength of Spurious Emission	**FCC:** ANSI C63.10:2013 6 Standard test methods **ISED:** RSS-Gen 6.13	**FCC:** Section 15.205 Section 15.209 Section 15.231(b) Section 15.231(e) **ISED:** RSS-210 A1.4 RSS-Gen 8.9	10.1 dB 3037.440 MHz Vertical, PK	Complied b)	Radiated
-20dB Bandwidth	**FCC:** ANSI C63.10:2013 6 Standard test methods **ISED:** -	**FCC:** Section 15.231(c) **ISED:** Reference data	N/A	Complied c)	Radiated

Note: UL Japan, Inc.'s EMI Work Procedures: Work Instructions-ULID-003591 and Work Instructions-ULID-003593.
*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 (Fundamental and Spurious Emission))
c) Refer to APPENDIX 1 (data of -20 dB Bandwidth / 99% emission bandwidth)

FCC Part 15.31 (e)

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

3.3 Addition to Standard

Item	Test Procedure	Specification	Worst margin	Results	Remarks
Maximum RF Output Power	ANSI C63.10:2013 11 Procedures for testing DTS devices	Reference data	N/A	-	Conducted
99 % Occupied Bandwidth	ANSI C63.10:2013 6 Standard test methods	Reference data	N/A	-	Radiated
Note: UL Japan, Inc.'s EMI Work Procedures: Work Instructions-ULID-003591 and Work Instructions-ULID-003593.					

Other than above, 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.

Test Item		Frequency range		Uncertainty (+/-)
Conducted emission AMN (LISN)		0.15 MHz to 30 MHz		3.3 dB
Radiated emission	3 m	9 kHz to 30 MHz		3.2 dB
	10 m			3.0 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		5.4 dB
		26.5 GHz to 40 GHz		5.4 dB
	10 m	1 GHz to 18 GHz		5.4 dB
Automatically Deactivate		-		0.10 %
-20 dB Bandwidth / 99% emission 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

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

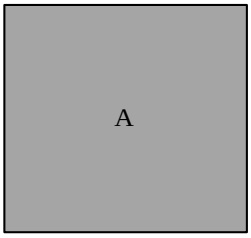
Refer to APPENDIX.

SECTION 4: Operation of EUT during testing

4.1 Operating Mode(s)

Test mode	Remarks
1) Rotating mode 2) Stationary mode 3) Pressure alert	Automatically Deactivate
4) Transmitting mode (Tx 433.92 MHz)	Maximum RF Output Power Electric Field Strength of Fundamental Emission Electric Field Strength of Spurious Emission Duty Cycle -20 dB Bandwidth / 99% emission bandwidth
* The system was configured in typical fashion (as a user would normally use it) for testing.	
*Power of the EUT was set by the software as follows; Software: PMV-E106 Ver1.0 (Date: 2022.11 14, Storage location: EUT memory)	
*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.	
Justification: The system was configured in typical fashion (as a user would normally use it) for testing.	

4.2 Configuration and Peripherals



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

Description of EUT

No.	Item	Model number	Serial Number	Manufacturer	Remarks
A	TPMS (Tire Pressure Monitoring System Transmitter)	PMV-E106	000012E *1) 0000167 *2)	Pacific Industrial Company, LTD.	EUT

*1) Used for other tests except for Maximum RF Output Power test
*2) Used for Maximum RF Output Power test

SECTION 5: Radiated 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, 1.0 m by 1.5 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

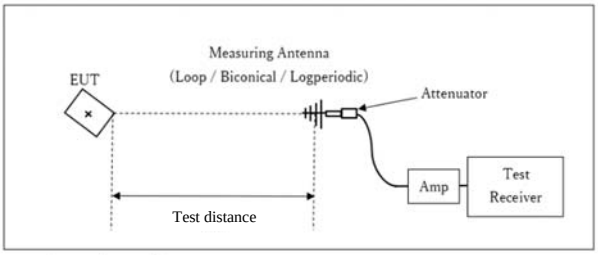
- The carrier level and noise levels were confirmed at each position of X, Y and Z axes of EUT to see the position of maximum noise, and the test was made at the position that has the maximum noise.

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

Measurement range : 9 kHz to 4.4 GHz
Test data : APPENDIX
Test result : Pass

[Test Setup]

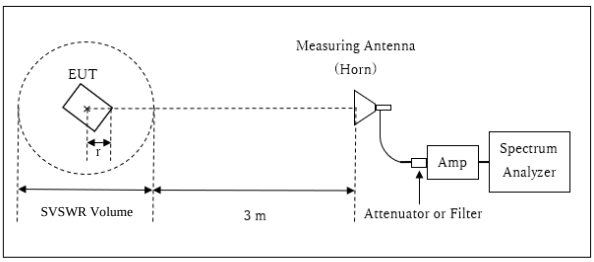
Below 1 GHz



× : Center of turn table

Test Distance: 3 m

1 GHz to 4.4 GHz



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

Distance Factor: 20 x log (4.0 m / 3.0 m) = 2.5 dB
* Test Distance: (3 + SVSWR Volume /2) - r = 4.0 m

SVSWR Volume : 2.0 m
(SVSWR Volume has been calibrated based on CISPR 16-1-4.)
r = 0.0 m

* The test was performed with r = 0.0 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% emission bandwidth

Test Procedure

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

Test	Span	RBW	VBW	Sweep	Detector	Trace	Instrument used
-20 dB Bandwidth / 99% emission 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) Peak hold was applied as Worst-case measurement.							

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

APPENDIX 1: Test Data

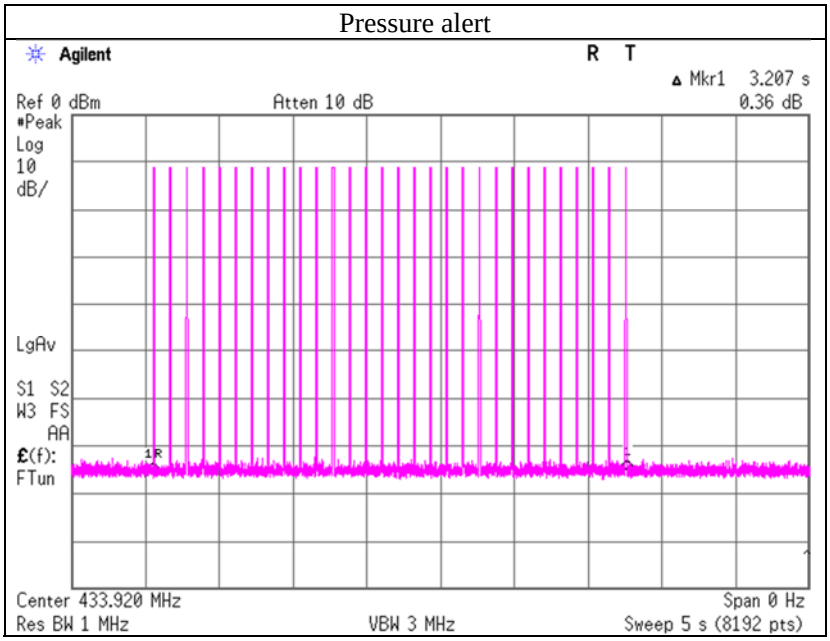
Automatically deactivate

Test place	Ise EMC Lab.
Measurement Room	No.4
Date	November 21, 2022
Temperature / Humidity	21 deg. C / 41 % RH
Engineer	Ken Fujita
Mode	Mode 3

Operation in FCC 15.231(a)(2)

Mode	Tx Frequency [MHz]	Time of Transmitting [s]	Limit [s]	Result
Pressure alert	433.92	3.207	5.000	Pass

Pressure alert



Automatically deactivate

Test place	Ise EMC Lab.
Measurement Room	No.4
Date	November 21, 2022
Temperature / Humidity	21 deg. C / 41 % RH
Engineer	Ken Fujita
Mode	Mode 1, 2

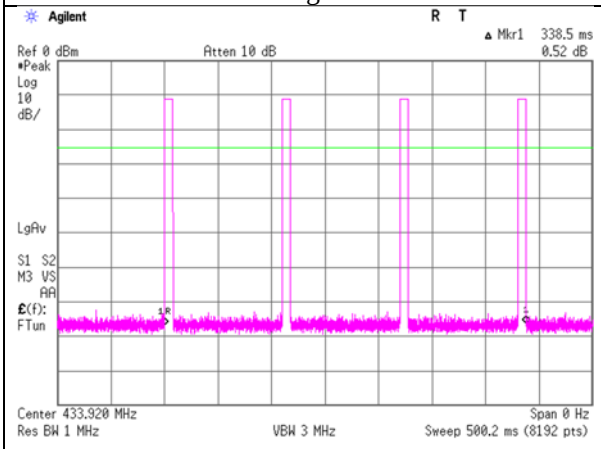
Operation in FCC 15.231(e)

Rotating mode 1
Duration of transmission: 338.5 ms < 1 s
Silent period between transmissions: 63.34 s - 0.3385 s = 63.0015 s >30 times the duration of transmission and 10 s.

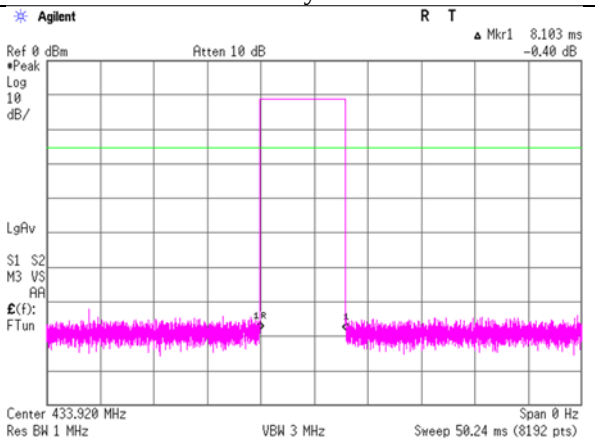
Stationary mode
Duration of transmission: 8.103 ms < 1s
Silent period between transmissions: 3840 s* - 0.008103 s = 3839.991897 s >30 times the duration of transmission and 10 s.

*Calculated from the technical documents.

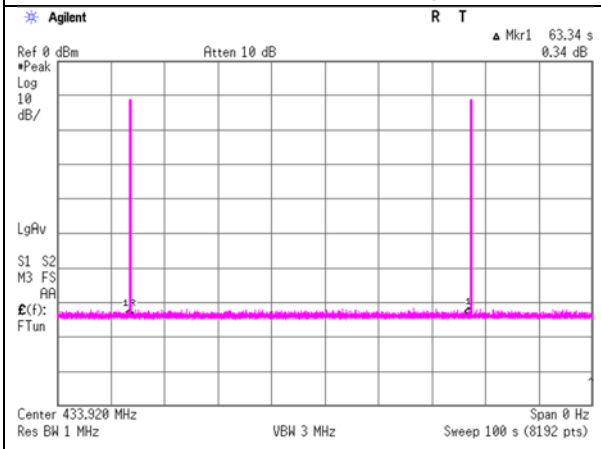
Rotating mode



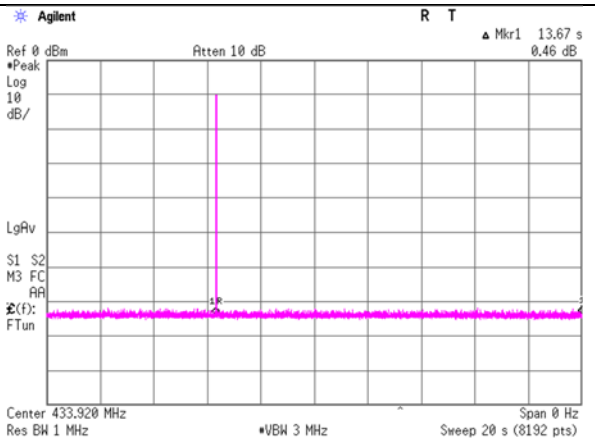
Stationary mode



Interval of Transmitting



Interval of Transmitting



Maximum RF Output Power
(Reference data for RF Exposure)

Test place	Ise EMC Lab.
Measurement Room	No.4
Date	February 6, 2023
Temperature / Humidity	23 deg. C / 38 % RH
Engineer	Ken Fujita
Mode	Mode 4

				Conducted Power	
Freq.	Reading (P/M)	Cable Loss	Atten. Loss	Result (Burst)	
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[mW]
433.92	-6.79	0.16	9.92	3.29	2.13

Sample Calculation:
Conducted Power Result = Reading + Cable Loss + Atten. Loss
*The equipment and cables were not used for factor 0 dB of the data sheets.

Radiated Emission (Fundamental and Spurious Emission)

Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.4
Date	November 20, 2022
Temperature / Humidity	21 deg. C / 41 % RH
Engineer	Ken Fujita
Mode	Mode 4

Polarity [Hori/Vert]	Frequency [MHz]	Reading (PK) [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result (PK) [dBuV/m]	Result (PK with Duty Factor) [dBuV/m]	Limit (PK) [dBuV/m]	Limit (AV) [dBuV/m]	Margin (PK) [dB]	Margin (AV) [dB]	Inside or Outside of Restricted Bands	Remarks
Hori.	433.920	82.4	16.3	10.3	32.2	-21.8	76.8	55.0	92.8	72.8	16.0	17.8	Carrier	
Hori.	867.840	43.2	21.9	12.2	31.4	-21.8	45.9	24.1	72.8	52.8	26.9	28.7	Outside	
Hori.	1301.760	49.6	25.5	6.2	34.1	-21.8	47.2	25.4	73.9	53.9	26.7	28.5	Inside	
Hori.	1735.680	57.6	25.0	5.8	32.9	-21.8	55.5	33.7	73.9	53.9	18.4	20.2	Outside	
Hori.	2169.600	56.6	27.9	5.9	32.1	-21.8	58.3	36.5	73.9	53.9	15.6	17.4	Outside	
Hori.	2603.520	48.5	27.9	6.0	31.9	-21.8	50.5	28.7	73.9	53.9	23.4	25.2	Outside	
Hori.	3037.440	60.2	28.6	6.2	31.7	-21.8	63.3	41.5	73.9	53.9	10.6	12.4	Outside	
Hori.	3471.360	49.2	28.7	6.4	31.5	-21.8	52.8	31.0	73.9	53.9	21.1	22.9	Outside	
Hori.	3905.280	47.1	29.7	6.7	31.4	-21.8	52.1	30.3	73.9	53.9	21.8	23.6	Inside	
Hori.	4339.200	48.8	30.5	6.9	31.3	-21.8	54.9	33.1	73.9	53.9	19.0	20.8	Inside	
Vert.	433.920	82.1	16.3	10.3	32.2	-21.8	76.5	54.7	92.8	72.8	16.3	18.1	Carrier	
Vert.	867.840	34.0	21.9	12.2	31.4	-21.8	36.7	14.9	72.8	52.8	36.1	37.9	Outside	
Vert.	1301.760	48.3	25.5	4.4	34.1	-21.8	44.1	22.3	73.9	53.9	29.8	31.6	Inside	
Vert.	1735.680	57.7	25.0	5.8	32.9	-21.8	55.6	33.8	73.9	53.9	18.3	20.1	Outside	
Vert.	2169.600	56.7	27.9	5.9	32.1	-21.8	58.4	36.6	73.9	53.9	15.5	17.3	Outside	
Vert.	2603.520	47.3	27.9	6.0	31.9	-21.8	49.3	27.5	73.9	53.9	24.6	26.4	Outside	
Vert.	3037.440	61.5	28.6	5.4	31.7	-21.8	63.8	42.0	73.9	53.9	***10.1***	11.9	Outside	
Vert.	3471.360	51.1	28.7	5.7	31.5	-21.8	54.0	32.2	73.9	53.9	19.9	21.7	Outside	
Vert.	3905.280	48.5	29.7	6.7	31.4	-21.8	53.5	31.7	73.9	53.9	20.4	22.2	Inside	
Vert.	4339.200	52.0	30.5	6.1	31.3	-21.8	57.3	35.5	73.9	53.9	16.6	18.4	Inside	

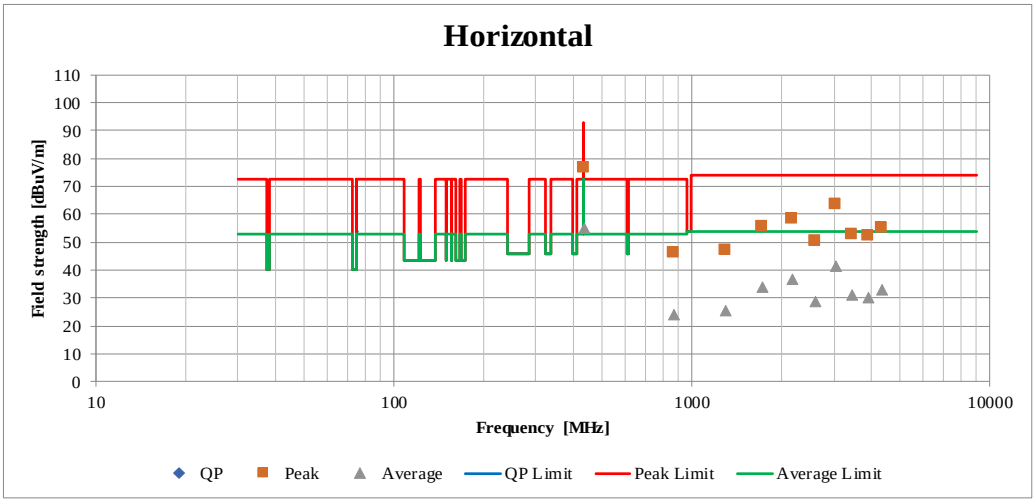
Sample calculation:
Result of PK = Reading + Ant Factor + Loss {Cable + Attenuator + Filter (above 1 GHz) +Distance factor (above 1 GHz)} - Gain (Amplifier)
Result of PK with Duty factor (PK / W) = Reading + Ant Factor + Loss {Cable + Attenuator + Filter (above 1 GHz) +Distance factor (above 1 GHz)}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

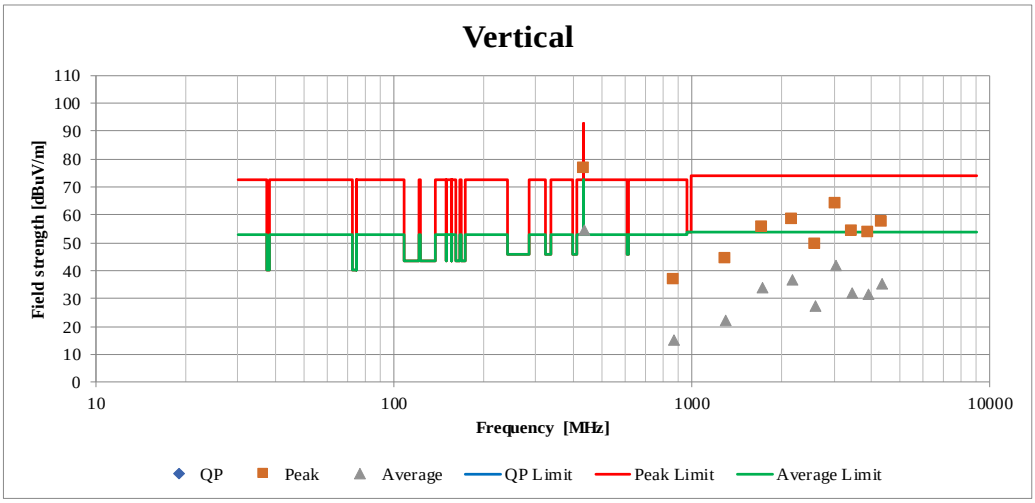
For above 1 GHz: Distance Factor: 20 x log (4.0 m/3.0 m) = 2.50 dB
*Other frequency noises omitted in this report were not seen or had enough margin (more than 20 dB).

If Gain 0.0 dB shown in the above table, pre-amplifier was not used to avoid the influence of carrier power. The pre-amplifier used for carrier frequency measurement was not saturated.

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

Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.4
Date	November 20, 2022
Temperature / Humidity	21 deg. C / 41 % RH
Engineer	Ken Fujita
Mode	Mode 4





Duty Cycle

Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.4
Date	November 20, 2022
Temperature / Humidity	21 deg. C / 41 % RH
Engineer	Ken Fujita
Mode	Mode 4

(Pulse length)

Type	Times	ON time(One pulse) [ms]	ON time(in 100 ms) [ms]	ON time(in 100 ms) [ms]
A	1	8.168	8.168	8.168

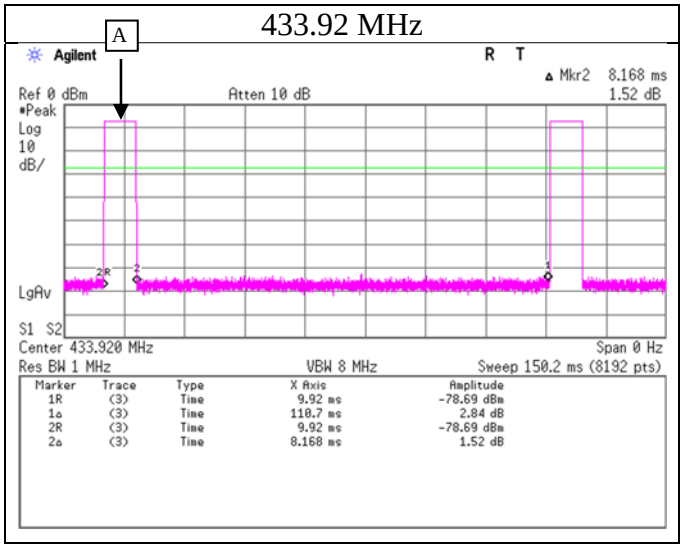
ON time(in 100 ms) = Times * ON time(One pulse)

(Total)

ON time [ms]	Cycle [ms]	Duty (On time/Cycle)	Duty [dB]
8.168	100	0.0817	-21.8

ON time[ms] = Type A's On Time(in 100 ms)
Duty = 20 * $\log_{10}$(ON time/Cycle)

* "Timing of transmission" of the application documents was referred, since Intentional off time was unrealizable in measurement circumstance.



The ON time (8.168 ms) appears 1 times in 100 ms.
The actual measurement value was applied as Averaging factor (Duty factor).

-20 dB Bandwidth / 99% emission bandwidth

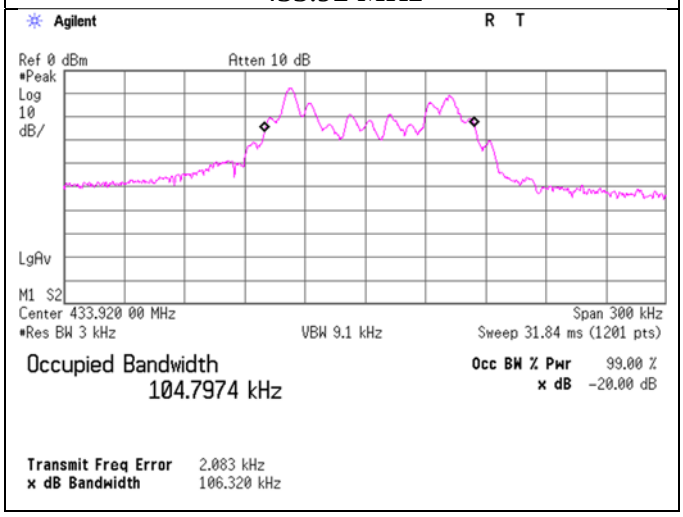
Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.4
Date	November 20, 2022
Temperature / Humidity	21 deg. C / 41 % RH
Engineer	Ken Fujita
Mode	Mode 4

Bandwidth Limit : Fundamental Frequency 433.92 MHz x 0.25% = 1084.800 kHz

-20dB Bandwidth [kHz]	Bandwidth Limit [kHz]	Result
106.3200	1084.800	Pass

99% Occupied Bandwidth Bandwidth [kHz]	Bandwidth Limit [kHz]	Result
104.7974	1084.800	Pass

433.92 MHz



APPENDIX 2: Test Instruments

Test Equipment

Test Item	Local ID	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Cal Int
RE	COTS-MEMI-02	178648	EMI measurement program	TSJ (Techno Science Japan)	TEPTO-DV	-	-	-
RE	MAEC-04	142011	AC4_Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-10005	05/22/2022	24
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	-	02/25/2022	12
RE	MBA-05	141425	Biconical Antenna	Schwarzbeck Mess-Elektronik OHG	VHA9103+ BBA9106	VHA 91031302	08/26/2022	12
RE	MCC-217	141393	Microwave Cable	Junkosha	MWX221	1604S254(1 m) / 1608S088(5 m)	08/02/2022	12
RE	MCC-50	141397	Coaxial Cable	UL Japan	-	-	11/18/2022	12
RE	MHA-21	141508	Horn Antenna 1-18GHz	Schwarzbeck Mess-Elektronik OHG	BBHA9120D	557	05/20/2022	12
RE	MHF-27	141297	High Pass Filter (1.1-10GHz)	TOKYO KEIKI	TF219CD1	1001	01/23/2022 *1)	12
RE	MJM-29	142230	Measure	KOMELON	KMC-36	-	-	-
RE	MLA-23	141267	Logperiodic Antenna (200-1000MHz)	Schwarzbeck Mess-Elektronik OHG	VUSLP9111B	9111B-192	09/21/2022	12
RE	MMM-10	141545	DIGITAL HiTESTER	HIOKI E.E. CORPORATION	3805	51201148	01/16/2022 *1)	12
RE	MOS-15	141562	Thermo-Hygrometer	CUSTOM. Inc	CTH-201	0010	01/10/2022 *1)	12
RE	MPA-12	141581	MicroWave System Amplifier	Keysight Technologies Inc	83017A	00650	10/05/2022	12
RE	MPA-14	141583	Pre Amplifier	SONOMA INSTRUMENT	310	260833	04/04/2022	12
RE	MTR-10	141951	EMI Test Receiver	Rohde & Schwarz	ESR26	101408	07/25/2022	12
RE	MLPA-07	142645	Loop Antenna	UL Japan	-	-	-	-
AT	MAT-10	141156	Attenuator(10dB)	Weinschel Corp	2	BL1173	11/10/2022	12
AT	MCC-243	196430	Microwave Cable	Huber+Suhner	SF102D/11PC24/ 11PC24/1000mm	537059/126EA	02/02/2023	12
AT	MPM-13	141810	Power Meter	Anritsu Corporation	ML2495A	824014	12/26/2022	12
AT	MPSE-18	141832	Power sensor	Anritsu Corporation	MA2411B	738174	12/26/2022	12
AT	MSA-10	141899	Spectrum Analyzer	Keysight Technologies Inc	E4448A	MY46180655	02/18/2022	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.

The expiration*1) This test equipment was used for the tests before the expiration date of the calibration.

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

Test item: RE: Radiated Emission
AT: Antenna Terminal Conducted