



RADIO TEST REPORT

Test Report No. : 12992253S-A-R2

Applicant : TOHNICHI MFG. CO., LTD.
Type of Equipment : RF TRANSCEIVER
Model No. : T-FHM
FCC ID : UY6-TFHM
Test regulation : FCC Part 15 Subpart C: 2019
Test Result : Complied (Refer to SECTION 3.2)

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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.
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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. Shonan 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 12992253S-A-R1. 12992253S-A-R1 is replaced with this report.

Date of test: August 30, 2019

Representative test engineer:

H. Sato

Hiromasa Sato
Engineer
Consumer Technology Division

Approved by:

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Leader
Consumer Technology Division



CERTIFICATE 1266.03

- ☐ 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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REVISION HISTORY

Original Test Report No.: 12992253S-A

| Revision | Test report No. | Date | Page revised | Contents |
|--------------|-----------------|--------------------|--------------|-------------------------------------------------------------------------------------------------------|
| - (Original) | 12992253S-A | September 19, 2019 | - | - |
| 1 | 12992253S-A-R1 | September 26, 2019 | 5 | Correction of antenna gain: “-8.5 dBi” to “-5 dBi” |
| | | | 14,16,17 | Changes of significant digits |
| 2 | 12992253S-A-R2 | September 27, 2019 | 14,16,17 | Deletion: “* These results have sufficient margin without taking account Dwell time factor.” |

Reference: Abbreviations (Including words undescribed in this report)

| | | | |
|----------------|-----------------------------------------------------------------|---------|-----------------------------------------------------|
| A2LA | The American Association for Laboratory Accreditation | NS | No signal detect. |
| AC | Alternating Current | NSA | Normalized Site Attenuation |
| AFH | Adaptive Frequency Hopping | NVLAP | National Voluntary Laboratory Accreditation Program |
| AM | Amplitude Modulation | OBW | Occupied Band Width |
| Amp, AMP | Amplifier | OFDM | Orthogonal Frequency Division Multiplexing |
| ANSI | American National Standards Institute | P/M | Power meter |
| Ant, ANT | Antenna | PCB | Printed Circuit Board |
| AP | Access Point | PER | Packet Error Rate |
| Atten., ATT | Attenuator | PHY | Physical Layer |
| AV | Average | PK | Peak |
| BPSK | Binary Phase-Shift Keying | PN | Pseudo random Noise |
| BR | Bluetooth Basic Rate | PRBS | Pseudo-Random Bit Sequence |
| BT | Bluetooth | PSD | Power Spectral Density |
| BT LE | Bluetooth Low Energy | QAM | Quadrature Amplitude Modulation |
| BW | BandWidth | QP | Quasi-Peak |
| Cal Int | Calibration Interval | QPSK | Quadri-Phase Shift Keying |
| CCK | Complementary Code Keying | RBW | Resolution Band Width |
| Ch., CH | Channel | RDS | Radio Data System |
| CISPR | Comite International Special des Perturbations Radioelectriques | RE | Radio Equipment |
| CW | Continuous Wave | RF | Radio Frequency |
| DBPSK | Differential BPSK | RMS | Root Mean Square |
| DC | Direct Current | RSS | Radio Standards Specifications |
| DFS | Dynamic Frequency Selection | Rx | Receiving |
| DQPSK | Differential QPSK | SA, S/A | Spectrum Analyzer |
| DSSS | Direct Sequence Spread Spectrum | SG | Signal Generator |
| EDR | Enhanced Data Rate | SVSWR | Site-Voltage Standing Wave Ratio |
| EIRP, e.i.r.p. | Equivalent Isotropically Radiated Power | TR | Test Receiver |
| EMC | ElectroMagnetic Compatibility | Tx | Transmitting |
| EMI | ElectroMagnetic Interference | VBW | Video BandWidth |
| EN | European Norm | Vert. | Vertical |
| ERP, e.r.p. | Effective Radiated Power | WLAN | Wireless LAN |
| EU | European Union | | |
| EUT | Equipment Under Test | | |
| Fac. | Factor | | |
| FCC | Federal Communications Commission | | |
| FHSS | Frequency Hopping Spread Spectrum | | |
| FM | Frequency Modulation | | |
| Freq. | Frequency | | |
| 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 | | |
| MCS | Modulation and Coding Scheme | | |
| MRA | Mutual Recognition Arrangement | | |
| NIST | National Institute of Standards and Technology | | |

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SECTION 1: Customer information

| | | |
|------------------|---|---------------------------------------------------------|
| Company Name | : | TOHNICHI MFG. CO., LTD. |
| Address | : | 2-12, OMORI-KITA 2-CHOME OTA-KU, TOKYO, 143-0016, JAPAN |
| Telephone Number | : | +81-3-3762-7859 |
| Facsimile Number | : | +81-3-3762-7166 |
| Contact Person | : | Yuya Iwashita |

The information provided from the customer is as follows;

- Applicant, Type of Equipment, Model No., 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 (E.U.T.)
 - SECTION 4: Operation of E.U.T. 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 (E.U.T.)

2.1 Identification of E.U.T.

| | | |
|--------------------------------------------------------|---|-------------------------------------------------------------------------------------------|
| Type of Equipment | : | RF TRANSCEIVER |
| Model No. | : | T-FHM |
| Serial No. | : | Refer to SECTION 4.2 |
| Rating | : | DC 1.5 V |
| Receipt Date of Sample (Information from test lab.) | : | August 23, 2019 |
| Country of Mass-production | : | Japan |
| Condition of EUT | : | Production prototype (Not for Sale: This sample is equivalent to mass-produced items.) |
| Modification of EUT | : | No Modification by the test lab. |

2.2 Product Description

Model: T-FHM (referred to as the EUT in this report) is an RF TRANSCEIVER.

Radio Specification

| | | |
|---------------------------|---|-----------------------|
| Equipment Type | : | Transceiver |
| Frequency of Operation | : | 2402 MHz - 2479 MHz |
| Type of Modulation | : | FHSS (GFSK) |
| Antenna Type | : | Chip antenna |
| Antenna Gain | : | -5 dBi |
| Operating Temperature | : | 0 deg. C - +45 deg. C |
| Clock frequency (Maximum) | : | 16 MHz |

SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification : FCC Part 15 Subpart C
FCC Part 15 final revised on July 19, 2019 and effective August 19, 2019 except 15.258

Title : FCC 47CFR Part15 Radio Frequency Device Subpart C Intentional Radiators
Section 15.207 Conducted limits
Section 15.249 Operation within the bands 902-928 MHz, 2400-2483.5 MHz, 5725-5875 MHz, and 24.0-24.25 GHz.

3.2 Procedures and results

| Item | Test Procedure | Specification | Worst margin | Results | Remarks |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------|--------------------------------------------------------------------------|-------------------------------------------------------------|--------------|---------|
| Conducted emission | FCC: ANSI C63.10:2013 ISED: RSS-Gen 8.8 | FCC 15.207(a) RSS-Gen 8.8 | - | N/A | *1) |
| Electric field strength of fundamental emission | FCC: ANSI C63.10:2013 ISED: RSS-Gen 6.6, 6.12 | FCC 15.249(a)(e) RSS-210 B.10 | 1.4 dB (2402.000 MHz, Horizontal, AV, Mode: Tx 2402 MHz) | Complied# a) | - |
| Electric field strength of spurious emission | FCC: ANSI C63.10:2013 ISED: RSS-Gen 6.5, 6.6, 6.13 | FCC 15.205(a)(b) FCC 15.209(a) FCC 15.249(a)(d)(e) RSS-210 B.10 | 2.2 dB (2400.00 MHz, Horizontal, PK, Mode: Tx 2402 MHz) | Complied# a) | - |
| 20 dB bandwidth | FCC: ANSI C63.10:2013 ISED: - | FCC 15.215 | - | Complied b) | - |
| Frequency tolerance | FCC: ANSI C63.10:2013 ISED: RSS-Gen 6.11, 8.11 | FCC 15.249(b) | - | - | *2) |
| Note: UL Japan's Work Procedures No. 13-EM-W0420 and 13-EM-W0422 *1) The test is not applicable since the EUT has no AC mains. *2) The test is not required since this EUT does not operate with 24.05 GHz to 24.25 GHz. a) Refer to APPENDIX 1 (data of Radiated Emission) b) Refer to APPENDIX 1 (data of 20dB Bandwidth, 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 EUT is a battery-operated device and test was performed with the new battery. Therefore, this EUT complies with the requirement.

FCC Part 15.203 Antenna requirement

The antenna is not removable from the EUT. Therefore the equipment complies with the requirement.

3.3 Addition to standard

| Item | Test Procedure | Specification | Worst margin | Results | Remarks |
|-------------------------------------------------------------------------|----------------|---------------|--------------|---------|---------|
| 99% Occupied Bandwidth | RSS-Gen 6.7 | - | N/A | - b) | - |
| b) Refer to APPENDIX 1 (data of 20dB Bandwidth, 99% Occupied Bandwidth) | | | | | |

Other than above, 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 $k=2$.

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| Item | Frequency range | Uncertainty (+/-) | | | |
|--------------------------------------------------|-----------------|-------------------|----------------|----------------|----------------|
| | | No. 1 SAC / SR | No. 2 SAC / SR | No. 3 SAC / SR | No. 4 SAC / SR |
| Conducted emission (AC Mains) LISN | 150 kHz-30 MHz | 2.9 dB | 2.8 dB | 2.9 dB | 2.9 dB |
| Radiated emission (Measurement distance: 3 m) | 9 kHz-30 MHz | 3.0 dB | 3.0 dB | 3.1 dB | - |
| | 30 MHz-200 MHz | 4.6 dB | 4.6 dB | 4.7 dB | - |
| | 200 MHz-1 GHz | 6.0 dB | 6.0 dB | 6.1 dB | - |
| | 1 GHz-6 GHz | 4.8 dB | 4.8 dB | 4.8 dB | - |
| | 6 GHz-18 GHz | 5.4 dB | 5.4 dB | 5.4 dB | - |
| | 18 GHz-40 GHz | 5.6 dB | 5.6 dB | 5.6 dB | - |
| Radiated emission (Measurement distance: 1 m) | 1 GHz-18 GHz | 5.7 dB | 5.7 dB | 5.7 dB | - |
| | 18 GHz-40 GHz | 5.9 dB | 5.9 dB | 5.9 dB | - |

SAC=Semi-Anechoic Chamber

SR= Shielded Room is applied besides radiated emission

| Antenna terminal test | Uncertainty (+/-) |
|---------------------------------------------------------|-------------------|
| Power Measurement above 1 GHz (Average Detector)_SPM-06 | 0.81 dB |
| Power Measurement above 1 GHz (Peak Detector)_SPM-06 | 1.53 dB |
| Power Measurement above 1 GHz (Average Detector)_SPM-07 | 0.95 dB |
| Power Measurement above 1 GHz (Peak Detector)_SPM-07 | 1.21 dB |
| Power Measurement above 1 GHz (Average Detector)_SPM-13 | 0.90 dB |
| Power Measurement above 1 GHz (Peak Detector)_SPM-13 | 1.04 dB |
| Spurious emission (Conducted) below 1GHz | 1.8 dB |
| Spurious emission (Conducted) 1 GHz-3 GHz | 1.7 dB |
| Spurious emission (Conducted) 3 GHz-18 GHz | 2.3 dB |
| Spurious emission (Conducted) 18 GHz-26.5 GHz | 2.4 dB |
| Spurious emission (Conducted) 26.5 GHz-40 GHz | 2.4 dB |
| Bandwidth Measurement | 0.61 % |
| Duty cycle and Time Measurement | 0.012 % |

3.5 Test Location

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A2LA Certificate Number: 1266.03 (FCC Test Firm Registration Number: 626366, ISED Lab Company Number: 2973D)

| Test site | Width x Depth x Height (m) | Size of reference ground plane (m) / horizontal conducting plane | Maximum measurement distance |
|----------------------------|----------------------------|------------------------------------------------------------------|------------------------------|
| No.1 Semi-anechoic chamber | 20.6 x 11.3 x 7.65 | 20.6 x 11.3 | 10 m |
| No.2 Semi-anechoic chamber | 20.6 x 11.3 x 7.65 | 20.6 x 11.3 | 10 m |
| No.3 Semi-anechoic chamber | 12.7 x 7.7 x 5.35 | 12.7 x 7.7 | 5 m |
| No.4 Semi-anechoic chamber | 8.1 x 5.1 x 3.55 | 8.1 x 5.1 | - |
| No.1 Shielded room | 6.8 x 4.1 x 2.7 | 6.8 x 4.1 | - |
| No.2 Shielded room | 6.8 x 4.1 x 2.7 | 6.8 x 4.1 | - |
| No.3 Shielded room | 6.3 x 4.7 x 2.7 | 6.3 x 4.7 | - |
| No.4 Shielded room | 4.4 x 4.7 x 2.7 | 4.4 x 4.7 | - |
| No.5 Shielded room | 7.8 x 6.4 x 2.7 | 7.8 x 6.4 | - |
| No.6 Shielded room | 7.8 x 6.4 x 2.7 | 7.8 x 6.4 | - |
| No.8 shielded room | 3.45 x 5.5 x 2.4 | 3.45 x 5.5 | - |
| No.1 Measurement room | 2.55 x 4.1 x 2.5 | - | - |

3.6 Test data, Test instruments, and Test set up

Refer to APPENDIX.

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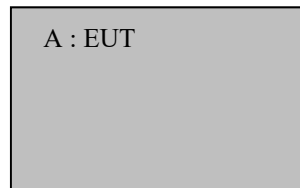
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SECTION 4: Operation of E.U.T. during testing

4.1 Operating Mode(s)

| Test Item | Mode | Tested frequency |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|---------------------------------|
| Electric Field Strength of Fundamental Emission Electric Field Strength of Spurious Emission Bandwidth Duty cycle | Transmitting (Tx) | 2402 MHz, 2440 MHz, 2479 MHz |
| <p>The system was configured in typical fashion (as a customer would normally use it) for testing.</p> <p>*EUT has the power settings by the software as follows; - Power Setting: Fixed - Software: R023M01 ver. R023M01_38_08</p> <p>*This setting of software is the worst case. Any conditions under the normal use do not exceed the condition of setting.</p> | | |

4.2 Configuration and peripherals



* Test data was taken under worse case conditions.

Description of EUT

| No. | Item | Model number | Serial number | Manufacturer | Remark |
|-----|----------------|--------------|---------------|--------------|--------|
| A | RF TRANSCEIVER | T-FHM | 6 | TOHNICHI | EUT |

SECTION 5: Radiated Spurious Emission

Test Procedure

[For below 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.

Although these tests were performed other than open area test site, adequate comparison measurements were confirmed against 30 m open area test site. Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the ones of tests made in an open field based on KDB 414788. These tests were performed in semi anechoic chamber. Therefore the measured level of emissions may be higher than if measurements were made without a ground plane. However test results were confirmed to pass against standard limit.

Frequency: From 9 kHz to 30 MHz at distance 3 m (Refer to Figure 2)

The EUT was rotated a full revolution in order to obtain the maximum value of the electric field intensity.

The measurements were performed for vertical polarization (antenna angle: 0 deg., 45 deg., 90 deg. and 135 deg.) and horizontal polarization. Drawing of the antenna direction is shown in Figure 1.

Frequency: From 30 MHz to 26.5 GHz at distance 3 m (Refer to Figure 2).

The measuring antenna height was varied between 1 m 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.

Measurements were performed with QP, PK, and AV detector.

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 |

| | 9 kHz to 90 kHz & 110 kHz to 150 kHz | 90 kHz to 110 kHz | 150 kHz to 490 kHz | 490 kHz to 30 MHz | 30 MHz to 1 GHz |
|---------------------|--------------------------------------|-------------------|--------------------|-------------------|-----------------|
| Detector Type | PK/AV | QP | PK/AV | QP | QP |
| IF Bandwidth | 200 Hz | 200 Hz | 10 kHz | 9 kHz | 120 kHz |
| Distance factor *1) | -80 dB | -80 dB | -80 dB | -40 dB | - |

*1) FCC 15.31 (f)(2) (9kHz-30MHz)

Distance Factor: $40 \times \log(3 \text{ m} / 300 \text{ m}) = -80 \text{ dB}$

Distance Factor: $40 \times \log(3 \text{ m} / 30 \text{ m}) = -40 \text{ dB}$

| | above 1 GHz | |
|---------------|--------------------------|---------------------------------------------------------------------------------------------------------|
| Detector Type | PK | AV *2) |
| IF Bandwidth | RBW: 1 MHz VBW: 3 MHz | Reduced VBW Method 11.12.2.5.3 RBW: 1 MHz VBW: $\geq 1/T$ Detector: Peak Trace: max hold |

*2) Average Power Measurement was performed based on ANSI C63.10-2013.

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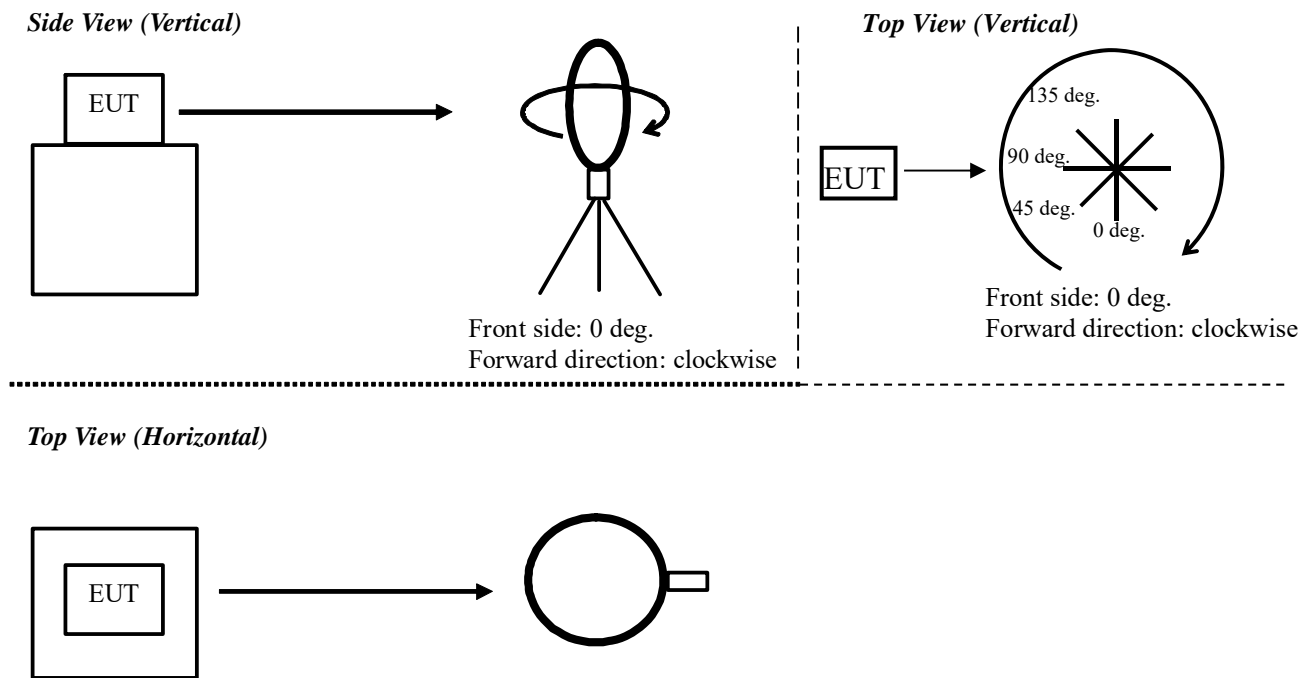
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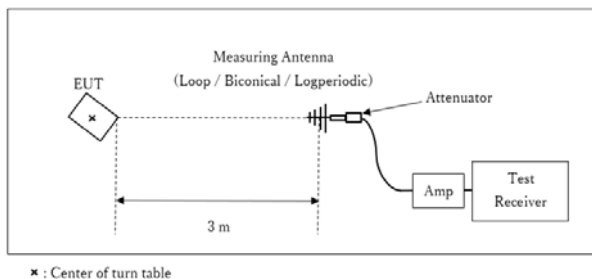
Figure 1. Direction of the Loop Antenna



Antenna was not rotated.

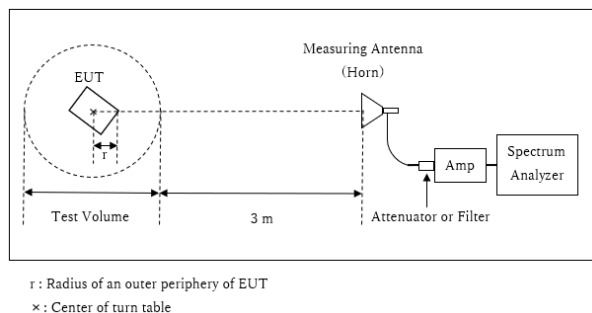
Figure 2: Test Setup

Below 1 GHz



Test Distance: 3 m

1 GHz - 13 GHz



Distance Factor: $20 \times \log (3.96 \text{ m} / 3.0 \text{ m}) = 2.42 \text{ dB}$

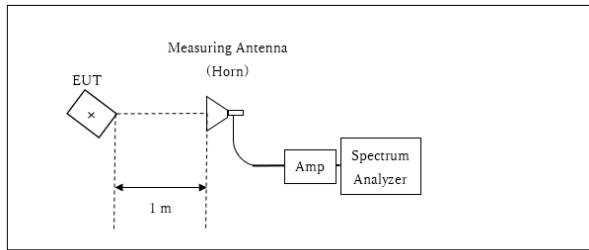
* Test Distance: $(3 + \text{Test Volume} / 2) - r = 3.96 \text{ m}$

Test Volume : 2.0 m

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

$r = 0.04 \text{ m}$

13 GHz – 26.5 GHz



x : Center of turn table

Distance Factor: $20 \times \log(1.0 \text{ m} / 3.0 \text{ m}) = -9.54 \text{ dB}$

*Test Distance: 1 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.

| Antenna polarization | Carrier | Spurious (Below 1 GHz) | Spurious (1 GHz -13 GHz) | Spurious (13 GHz -26.5 GHz) |
|----------------------|---------|------------------------|--------------------------|-----------------------------|
| Horizontal | Z | X | Z | X |
| Vertical | X | X | Y | X |

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

Measurement range : 9 kHz - 26.5 GHz

Test data : APPENDIX

Test result : Pass

SECTION 6: Bandwidth and Duty Cycle

Test Procedure

| Test | Span | RBW | VBW | Sweep | Detector | Trace | Instrument used |
|-------------------------|-----------------------------------------|-----------------|--------------------|--------|----------|--------------|-------------------|
| Duty Cycle | zero span | 1 MHz | 3 MHz | 3 msec | Peak | Single | Spectrum Analyzer |
| 20 dB Bandwidth | 2 to 5 time of OBW. | 1 to 5 % of OBW | Three times of RBW | Auto | Peak | Max Hold | Spectrum Analyzer |
| 99 % Occupied Bandwidth | Enough width to display emission skirts | 1 to 5 % of OBW | Three times of RBW | Auto | Peak | Max Hold *1) | Spectrum Analyzer |

*1) Peak hold was applied as Worst-case measurement.

Test data : APPENDIX 1

Test result : Pass

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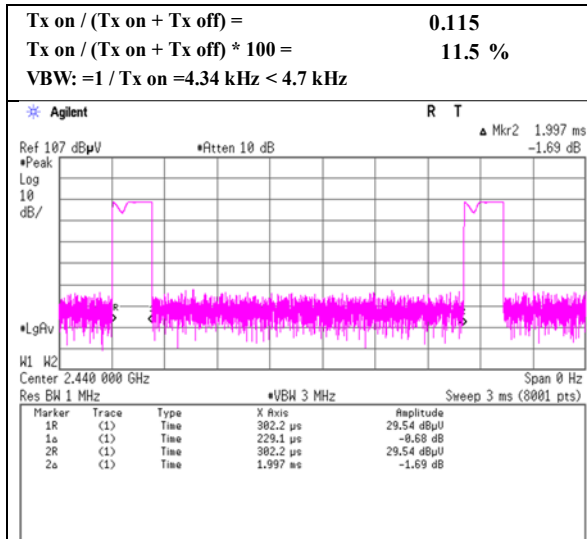
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APPENDIX 1: Test data

Duty Cycle

| | |
|------------------------|---------------------|
| Semi Anechoic Chamber | No.2 |
| Date | August 30, 2019 |
| Temperature / Humidity | 24 deg. C / 67 % RH |
| Engineer | Toshinori Yamada |



Radiated Spurious Emission

Report No. 12992253S-A-R2
Test place Shonan EMC Lab.
Semi Anechoic Chamber No.2 No.2
Date August 30, 2019 August 30, 2019
Temperature / Humidity 22 deg. C / 68 % RH 24 deg. C / 67 % RH
Engineer Hiromasa Sato Toshinori Yamada
(9 kHz -1000 MHz) (1 GHz -26.5 GHz)
Mode Tx 2402 MHz

(* PK: Peak, AV: Average, QP: Quasi-Peak)

| Polarity | Frequency [MHz] | Detector | Reading [dBuV] | Ant.Fac. [dB/m] | Loss [dB] | Gain [dB] | Distance Factor [dB] | Result [dBuV/m] | Limit [dBuV/m] | Margin [dB] | Height [cm] | Angle [deg] | Remark |
|----------|-----------------|----------|----------------|-----------------|-----------|-----------|----------------------|-----------------|----------------|-------------|-------------|-------------|----------------------|
| Hori. | 38.571 | QP | 22.90 | 15.42 | 7.11 | 31.93 | 0.00 | 13.50 | 40.0 | 26.5 | 100 | 355 | |
| Hori. | 197.822 | QP | 22.33 | 16.61 | 9.18 | 31.80 | 0.00 | 16.32 | 43.5 | 27.1 | 100 | 21 | |
| Hori. | 505.174 | QP | 22.01 | 17.73 | 8.09 | 31.62 | 0.00 | 16.21 | 46.0 | 29.7 | 100 | 106 | |
| Hori. | 874.609 | QP | 21.89 | 22.03 | 9.73 | 31.03 | 0.00 | 22.62 | 46.0 | 23.3 | 100 | 204 | |
| Hori. | 2390.000 | PK | 52.15 | 28.51 | 14.11 | 38.68 | 2.42 | 58.51 | 73.9 | 15.3 | 116 | 125 | |
| Hori. | 2400.000 | PK | 65.31 | 28.48 | 14.12 | 38.67 | 2.42 | 71.66 | 73.9 | 2.2 | 116 | 125 | |
| Hori. | 2402.000 | PK | 86.47 | 28.48 | 14.12 | 38.67 | 2.42 | 92.82 | 113.9 | 21.1 | 116 | 125 | Carrier |
| Hori. | 4804.000 | PK | 44.22 | 31.71 | 6.45 | 38.55 | 2.42 | 46.25 | 73.9 | 27.6 | 100 | 343 | |
| Hori. | 7206.000 | PK | 47.36 | 37.30 | 8.19 | 39.15 | 2.42 | 56.12 | 73.9 | 17.7 | 124 | 330 | |
| Hori. | 9608.000 | PK | 46.62 | 38.78 | 9.39 | 39.74 | 2.42 | 57.47 | 73.9 | 16.4 | 150 | 0 | |
| Hori. | 19216.000 | PK | 51.21 | 40.44 | 13.64 | 47.69 | -9.54 | 48.06 | 73.9 | 25.8 | 172 | 144 | |
| Hori. | 21618.000 | PK | 45.15 | 40.41 | 14.58 | 47.43 | -9.54 | 43.17 | 73.9 | 30.7 | 156 | 192 | |
| Hori. | 2390.000 | AV | 34.82 | 28.51 | 14.11 | 38.68 | 2.42 | 41.18 | 53.9 | 12.7 | 116 | 125 | VBW: 4.7 kHz |
| Hori. | 2400.000 | AV | 40.24 | 28.48 | 14.12 | 38.67 | 2.42 | 46.59 | 53.9 | 7.3 | 116 | 125 | VBW: 4.7 kHz |
| Hori. | 2402.000 | AV | 86.18 | 28.48 | 14.12 | 38.67 | 2.42 | 92.53 | 93.9 | 1.4 | 116 | 125 | Carrier VBW: 4.7 kHz |
| Hori. | 4804.000 | AV | 36.23 | 31.71 | 6.45 | 38.55 | 2.42 | 38.26 | 53.9 | 15.6 | 100 | 343 | VBW: 4.7 kHz |
| Hori. | 7206.000 | AV | 41.23 | 37.30 | 8.19 | 39.15 | 2.42 | 49.99 | 53.9 | 3.9 | 124 | 330 | VBW: 4.7 kHz |
| Hori. | 9608.000 | AV | 36.62 | 38.78 | 9.39 | 39.74 | 2.42 | 47.47 | 53.9 | 6.4 | 150 | 0 | VBW: 4.7 kHz |
| Hori. | 19216.000 | AV | 45.43 | 40.44 | 13.64 | 47.69 | -9.54 | 42.28 | 53.9 | 11.6 | 172 | 144 | VBW: 4.7 kHz |
| Hori. | 21618.000 | AV | 36.96 | 40.41 | 14.58 | 47.43 | -9.54 | 34.98 | 53.9 | 18.9 | 156 | 192 | VBW: 4.7 kHz |
| Vert. | 30.241 | QP | 22.84 | 18.62 | 6.96 | 31.93 | 0.00 | 16.49 | 40.0 | 23.5 | 100 | 58 | |
| Vert. | 167.513 | QP | 22.39 | 15.44 | 8.83 | 31.83 | 0.00 | 14.83 | 43.5 | 28.6 | 100 | 25 | |
| Vert. | 721.221 | QP | 21.81 | 20.09 | 9.05 | 31.52 | 0.00 | 19.43 | 46.0 | 26.5 | 100 | 82 | |
| Vert. | 948.442 | QP | 21.36 | 21.96 | 10.05 | 30.53 | 0.00 | 22.84 | 46.0 | 23.1 | 100 | 151 | |
| Vert. | 2390.000 | PK | 51.69 | 28.51 | 14.11 | 38.68 | 2.42 | 58.05 | 73.9 | 15.8 | 275 | 73 | |
| Vert. | 2400.000 | PK | 64.45 | 28.48 | 14.12 | 38.67 | 2.42 | 70.80 | 73.9 | 3.1 | 275 | 73 | |
| Vert. | 2402.000 | PK | 85.73 | 28.48 | 14.12 | 38.67 | 2.42 | 92.08 | 113.9 | 21.8 | 275 | 73 | Carrier |
| Vert. | 4804.000 | PK | 44.36 | 31.71 | 6.45 | 38.55 | 2.42 | 46.39 | 73.9 | 27.5 | 169 | 265 | |
| Vert. | 7206.000 | PK | 46.24 | 37.30 | 8.19 | 39.15 | 2.42 | 55.00 | 73.9 | 18.9 | 281 | 278 | |
| Vert. | 9608.000 | PK | 46.47 | 38.78 | 9.39 | 39.74 | 2.42 | 57.32 | 73.9 | 16.5 | 150 | 0 | |
| Vert. | 19216.000 | PK | 50.85 | 40.44 | 13.64 | 47.69 | -9.54 | 47.70 | 73.9 | 26.2 | 109 | 174 | |
| Vert. | 21618.000 | PK | 48.93 | 40.41 | 14.58 | 47.43 | -9.54 | 46.95 | 73.9 | 26.9 | 139 | 177 | |
| Vert. | 2390.000 | AV | 35.23 | 28.51 | 14.11 | 38.68 | 2.42 | 41.59 | 53.9 | 12.3 | 275 | 73 | VBW: 4.7 kHz |
| Vert. | 2400.000 | AV | 39.60 | 28.48 | 14.12 | 38.67 | 2.42 | 45.95 | 53.9 | 7.9 | 275 | 73 | VBW: 4.7 kHz |
| Vert. | 2402.000 | AV | 85.43 | 28.48 | 14.12 | 38.67 | 2.42 | 91.78 | 93.9 | 2.1 | 275 | 73 | Carrier VBW: 4.7 kHz |
| Vert. | 4804.000 | AV | 36.27 | 31.71 | 6.45 | 38.55 | 2.42 | 38.30 | 53.9 | 15.6 | 169 | 265 | VBW: 4.7 kHz |
| Vert. | 7206.000 | AV | 40.32 | 37.30 | 8.19 | 39.15 | 2.42 | 49.08 | 53.9 | 4.8 | 281 | 278 | VBW: 4.7 kHz |
| Vert. | 9608.000 | AV | 36.70 | 38.78 | 9.39 | 39.74 | 2.42 | 47.55 | 53.9 | 6.3 | 150 | 0 | VBW: 4.7 kHz |
| Vert. | 19216.000 | AV | 44.74 | 40.44 | 13.64 | 47.69 | -9.54 | 41.59 | 53.9 | 12.3 | 109 | 174 | VBW: 4.7 kHz |
| Vert. | 21618.000 | AV | 41.62 | 40.41 | 14.58 | 47.43 | -9.54 | 39.64 | 53.9 | 14.2 | 139 | 177 | VBW: 4.7 kHz |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 13 GHz : 20log(3.96 m / 3.0 m) = 2.42 dB

13 GHz - 40 GHz : 20log(1.0 m / 3.0 m) = -9.54 dB

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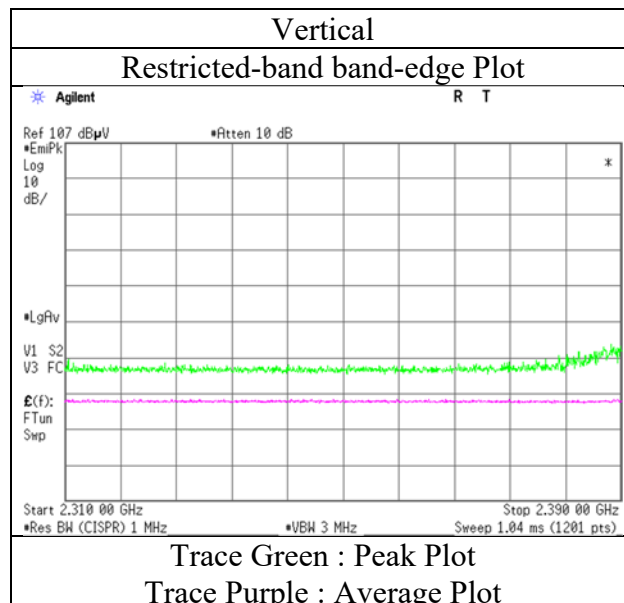
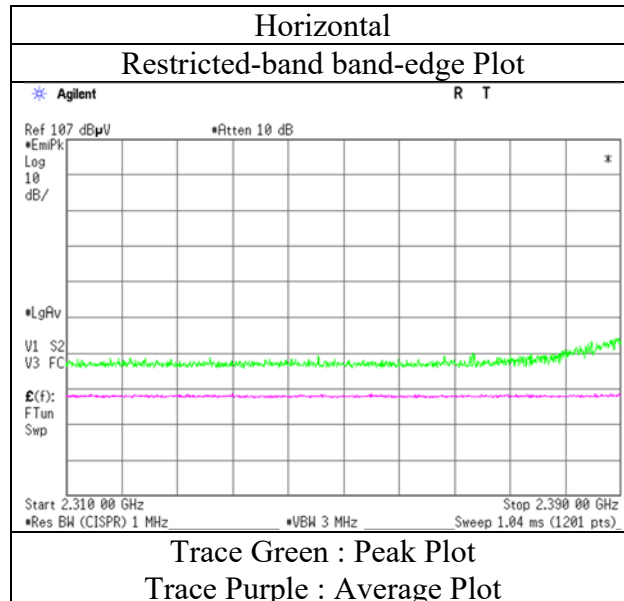
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Radiated Spurious Emission (Reference Plot for band-edge)

| | | |
|------------------------|---------------------|---------------------|
| Report No. | 12992253S-A-R2 | No.2 |
| Test place | Shonan EMC Lab. | |
| Semi Anechoic Chamber | No.2 | |
| Date | August 30, 2019 | August 30, 2019 |
| Temperature / Humidity | 22 deg. C / 68 % RH | 24 deg. C / 67 % RH |
| Engineer | Hiromasa Sato | Toshinori Yamada |
| | (9 kHz -1000 MHz) | (1 GHz -26.5 GHz) |
| Mode | Tx 2402 MHz | |



* The measurement was conducted for a sufficiently long enough time to detect any possible spurious emissions.

Final result of restricted band edge was shown in tabular data.

Radiated Spurious Emission

Report No. 12992253S-A-R2
Test place Shonan EMC Lab.
Semi Anechoic Chamber No.2 No.2
Date August 30, 2019 August 30, 2019
Temperature / Humidity 22 deg. C / 68 % RH 24 deg. C / 67 % RH
Engineer Hiromasa Sato Toshinori Yamada
(9 kHz -1000 MHz) (1 GHz -26.5 GHz)
Mode Tx 2440 MHz

(* PK: Peak, AV: Average, QP: Quasi-Peak)

| Polarity | Frequency [MHz] | Detector | Reading [dBuV] | Ant. Fac. [dB/m] | Loss [dB] | Gain [dB] | Distance Factor [dB] | Result [dBuV/m] | Limit [dBuV/m] | Margin [dB] | Height [cm] | Angle [deg] | Remark |
|----------|--------------------|----------|-------------------|---------------------|--------------|--------------|-------------------------|--------------------|-------------------|----------------|----------------|----------------|----------------------|
| Hori. | 38.876 | QP | 22.82 | 15.33 | 7.12 | 31.93 | 0.00 | 13.34 | 40.0 | 26.6 | 100 | 343 | |
| Hori. | 184.753 | QP | 22.25 | 16.20 | 9.03 | 31.81 | 0.00 | 15.67 | 43.5 | 27.8 | 100 | 359 | |
| Hori. | 565.565 | QP | 22.22 | 18.21 | 8.38 | 31.64 | 0.00 | 17.17 | 46.0 | 28.8 | 100 | 0 | |
| Hori. | 864.002 | QP | 21.90 | 21.79 | 9.68 | 31.08 | 0.00 | 22.29 | 46.0 | 23.7 | 101 | 42 | |
| Hori. | 2440.000 | PK | 85.91 | 28.42 | 14.16 | 38.65 | 2.42 | 92.26 | 113.9 | 21.6 | 153 | 116 | Carrier |
| Hori. | 4880.000 | PK | 44.38 | 31.74 | 6.48 | 38.55 | 2.42 | 46.47 | 73.9 | 27.4 | 118 | 24 | |
| Hori. | 7320.000 | PK | 45.35 | 37.42 | 8.23 | 39.33 | 2.42 | 54.09 | 73.9 | 19.8 | 132 | 325 | |
| Hori. | 9760.000 | PK | 45.23 | 39.36 | 9.35 | 39.63 | 2.42 | 56.73 | 73.9 | 17.1 | 150 | 0 | |
| Hori. | 19520.000 | PK | 53.04 | 40.45 | 13.73 | 47.51 | -9.54 | 50.17 | 73.9 | 23.7 | 174 | 188 | |
| Hori. | 21960.000 | PK | 44.54 | 40.51 | 14.79 | 47.80 | -9.54 | 42.50 | 73.9 | 31.4 | 164 | 198 | |
| Hori. | 2440.000 | AV | 85.58 | 28.42 | 14.16 | 38.65 | 2.42 | 91.93 | 93.9 | 2.0 | 153 | 116 | Carrier VBW: 4.7 kHz |
| Hori. | 4880.000 | AV | 35.75 | 31.74 | 6.48 | 38.55 | 2.42 | 37.84 | 53.9 | 16.0 | 118 | 24 | VBW: 4.7 kHz |
| Hori. | 7320.000 | AV | 39.13 | 37.42 | 8.23 | 39.33 | 2.42 | 47.87 | 53.9 | 6.0 | 132 | 325 | VBW: 4.7 kHz |
| Hori. | 9760.000 | AV | 35.30 | 39.36 | 9.35 | 39.63 | 2.42 | 46.80 | 53.9 | 7.1 | 150 | 0 | VBW: 4.7 kHz |
| Hori. | 19520.000 | AV | 45.25 | 40.45 | 13.73 | 47.51 | -9.54 | 42.38 | 53.9 | 11.5 | 174 | 188 | VBW: 4.7 kHz |
| Hori. | 21960.000 | AV | 36.01 | 40.51 | 14.79 | 47.80 | -9.54 | 33.97 | 53.9 | 19.9 | 164 | 198 | VBW: 4.7 kHz |
| Vert. | 32.448 | QP | 22.38 | 17.73 | 7.00 | 31.93 | 0.00 | 15.18 | 40.0 | 24.8 | 100 | 211 | |
| Vert. | 167.609 | QP | 22.41 | 15.45 | 8.83 | 31.83 | 0.00 | 14.86 | 43.5 | 28.6 | 100 | 74 | |
| Vert. | 767.283 | QP | 21.81 | 20.35 | 9.26 | 31.44 | 0.00 | 19.98 | 46.0 | 26.0 | 100 | 355 | |
| Vert. | 945.022 | QP | 21.63 | 21.93 | 10.04 | 30.56 | 0.00 | 23.04 | 46.0 | 22.9 | 100 | 252 | |
| Vert. | 2440.000 | PK | 84.55 | 28.42 | 14.16 | 38.65 | 2.42 | 90.90 | 113.9 | 23.0 | 336 | 70 | Carrier |
| Vert. | 4880.000 | PK | 44.90 | 31.74 | 6.48 | 38.55 | 2.42 | 46.99 | 73.9 | 26.9 | 155 | 201 | |
| Vert. | 7320.000 | PK | 45.86 | 37.42 | 8.23 | 39.33 | 2.42 | 54.60 | 73.9 | 19.3 | 251 | 282 | |
| Vert. | 9760.000 | PK | 44.89 | 39.36 | 9.35 | 39.63 | 2.42 | 56.39 | 73.9 | 17.5 | 150 | 0 | |
| Vert. | 19520.000 | PK | 53.63 | 40.45 | 13.73 | 47.51 | -9.54 | 50.76 | 73.9 | 23.1 | 162 | 177 | |
| Vert. | 21960.000 | PK | 46.40 | 40.51 | 14.79 | 47.80 | -9.54 | 44.36 | 73.9 | 29.5 | 160 | 233 | |
| Vert. | 2440.000 | AV | 84.18 | 28.42 | 14.16 | 38.65 | 2.42 | 90.53 | 93.9 | 3.4 | 336 | 70 | Carrier VBW: 4.7 kHz |
| Vert. | 4880.000 | AV | 35.54 | 31.74 | 6.48 | 38.55 | 2.42 | 37.63 | 53.9 | 16.2 | 155 | 201 | VBW: 4.7 kHz |
| Vert. | 7320.000 | AV | 37.72 | 37.42 | 8.23 | 39.33 | 2.42 | 46.46 | 53.9 | 7.4 | 251 | 282 | VBW: 4.7 kHz |
| Vert. | 9760.000 | AV | 35.01 | 39.36 | 9.35 | 39.63 | 2.42 | 46.51 | 53.9 | 7.3 | 150 | 0 | VBW: 4.7 kHz |
| Vert. | 19520.000 | AV | 45.29 | 40.45 | 13.73 | 47.51 | -9.54 | 42.42 | 53.9 | 11.4 | 162 | 177 | VBW: 4.7 kHz |
| Vert. | 21960.000 | AV | 37.43 | 40.51 | 14.79 | 47.80 | -9.54 | 35.39 | 53.9 | 18.5 | 160 | 233 | VBW: 4.7 kHz |

Result = Reading + Ant. Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 13 GHz : $20\log(3.96\text{ m} / 3.0\text{ m}) = 2.42\text{ dB}$

13 GHz - 40 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

UL Japan, Inc.

Shonan EMC Lab.

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Radiated Spurious Emission

Report No. 12992253S-A-R2
Test place Shonan EMC Lab.
Semi Anechoic Chamber No.2
Date August 30, 2019
Temperature / Humidity 22 deg. C / 68 % RH
Engineer Hiromasa Sato
(9 kHz -1000 MHz)
Mode Tx 2479 MHz
August 30, 2019
24 deg. C / 67 % RH
Toshinori Yamada
(1 GHz -26.5 GHz)

(* PK: Peak, AV: Average, QP: Quasi-Peak)

| Polarity | Frequency [MHz] | Detector | Reading [dBuV] | Ant.Fac. [dB/m] | Loss [dB] | Gain [dB] | Distance Factor [dB] | Result [dBuV/m] | Limit [dBuV/m] | Margin [dB] | Height [cm] | Angle [deg] | Remark |
|----------|-----------------|----------|----------------|-----------------|-----------|-----------|----------------------|-----------------|----------------|-------------|-------------|-------------|----------------------|
| Hori. | 38.728 | QP | 22.84 | 15.37 | 7.11 | 31.93 | 0.00 | 13.39 | 40.0 | 26.6 | 100 | 195 | |
| Hori. | 196.330 | QP | 22.32 | 16.46 | 9.16 | 31.80 | 0.00 | 16.14 | 43.5 | 27.3 | 100 | 116 | |
| Hori. | 539.305 | QP | 21.94 | 17.69 | 8.26 | 31.65 | 0.00 | 16.24 | 46.0 | 29.7 | 100 | 83 | |
| Hori. | 861.123 | QP | 21.82 | 21.73 | 9.67 | 31.10 | 0.00 | 22.12 | 46.0 | 23.8 | 100 | 258 | |
| Hori. | 2479.000 | PK | 84.17 | 28.36 | 14.19 | 38.62 | 2.42 | 90.52 | 113.9 | 23.4 | 174 | 117 | Carrier |
| Hori. | 2483.500 | PK | 55.87 | 28.35 | 14.19 | 38.62 | 2.42 | 62.21 | 73.9 | 11.6 | 174 | 117 | |
| Hori. | 4958.000 | PK | 44.42 | 31.98 | 6.51 | 38.55 | 2.42 | 46.78 | 73.9 | 27.1 | 162 | 231 | |
| Hori. | 7437.000 | PK | 46.33 | 37.58 | 8.26 | 39.50 | 2.42 | 55.09 | 73.9 | 18.8 | 115 | 327 | |
| Hori. | 9916.000 | PK | 44.17 | 39.47 | 9.31 | 39.51 | 2.42 | 55.86 | 73.9 | 18.0 | 150 | 0 | |
| Hori. | 19832.000 | PK | 47.75 | 40.41 | 13.77 | 47.54 | -9.54 | 44.85 | 73.9 | 29.0 | 173 | 178 | |
| Hori. | 22311.000 | PK | 42.46 | 40.56 | 14.83 | 48.07 | -9.54 | 40.24 | 73.9 | 33.6 | 138 | 226 | |
| Hori. | 2479.000 | AV | 83.95 | 28.36 | 14.19 | 38.62 | 2.42 | 90.30 | 93.9 | 3.6 | 174 | 117 | Carrier VBW: 4.7 kHz |
| Hori. | 2483.500 | AV | 35.74 | 28.35 | 14.19 | 38.62 | 2.42 | 42.08 | 53.9 | 11.8 | 174 | 117 | VBW: 4.7 kHz |
| Hori. | 4958.000 | AV | 35.38 | 31.98 | 6.51 | 38.55 | 2.42 | 37.74 | 53.9 | 16.1 | 162 | 231 | VBW: 4.7 kHz |
| Hori. | 7437.000 | AV | 38.16 | 37.58 | 8.26 | 39.50 | 2.42 | 46.92 | 53.9 | 6.9 | 115 | 327 | VBW: 4.7 kHz |
| Hori. | 9916.000 | AV | 34.04 | 39.47 | 9.31 | 39.51 | 2.42 | 45.73 | 53.9 | 8.1 | 150 | 0 | VBW: 4.7 kHz |
| Hori. | 19832.000 | AV | 41.12 | 40.41 | 13.77 | 47.54 | -9.54 | 38.22 | 53.9 | 15.6 | 173 | 178 | VBW: 4.7 kHz |
| Hori. | 22311.000 | AV | 32.99 | 40.56 | 14.83 | 48.07 | -9.54 | 30.77 | 53.9 | 23.1 | 138 | 226 | VBW: 4.7 kHz |
| Vert. | 30.943 | QP | 22.19 | 18.40 | 6.98 | 31.93 | 0.00 | 15.64 | 40.0 | 24.3 | 100 | 292 | |
| Vert. | 144.297 | QP | 22.47 | 14.58 | 8.56 | 31.84 | 0.00 | 13.77 | 43.5 | 29.7 | 100 | 156 | |
| Vert. | 704.479 | QP | 21.98 | 19.90 | 8.97 | 31.54 | 0.00 | 19.31 | 46.0 | 26.6 | 100 | 88 | |
| Vert. | 945.760 | QP | 21.62 | 21.94 | 10.04 | 30.55 | 0.00 | 23.05 | 46.0 | 22.9 | 100 | 228 | |
| Vert. | 2479.000 | PK | 83.25 | 28.36 | 14.19 | 38.62 | 2.42 | 89.60 | 113.9 | 24.3 | 301 | 74 | Carrier |
| Vert. | 2483.500 | PK | 55.11 | 28.35 | 14.19 | 38.62 | 2.42 | 61.45 | 73.9 | 12.4 | 301 | 74 | |
| Vert. | 4958.000 | PK | 45.04 | 31.98 | 6.51 | 38.55 | 2.42 | 47.40 | 73.9 | 26.5 | 171 | 24 | |
| Vert. | 7437.000 | PK | 45.03 | 37.58 | 8.26 | 39.50 | 2.42 | 53.79 | 73.9 | 20.1 | 251 | 274 | |
| Vert. | 9916.000 | PK | 44.50 | 39.47 | 9.31 | 39.51 | 2.42 | 56.19 | 73.9 | 17.7 | 150 | 0 | |
| Vert. | 19832.000 | PK | 49.20 | 40.41 | 13.77 | 47.54 | -9.54 | 46.30 | 73.9 | 27.6 | 162 | 177 | |
| Vert. | 22311.000 | PK | 42.67 | 40.56 | 14.83 | 48.07 | -9.54 | 40.45 | 73.9 | 33.4 | 174 | 224 | |
| Vert. | 2479.000 | AV | 83.08 | 28.36 | 14.19 | 38.62 | 2.42 | 89.43 | 93.9 | 4.5 | 301 | 74 | Carrier VBW: 4.7 kHz |
| Vert. | 2483.500 | AV | 35.80 | 28.35 | 14.19 | 38.62 | 2.42 | 42.14 | 53.9 | 11.7 | 301 | 74 | VBW: 4.7 kHz |
| Vert. | 4958.000 | AV | 34.92 | 31.98 | 6.51 | 38.55 | 2.42 | 37.28 | 53.9 | 16.6 | 171 | 24 | VBW: 4.7 kHz |
| Vert. | 7437.000 | AV | 37.38 | 37.58 | 8.26 | 39.50 | 2.42 | 46.14 | 53.9 | 7.7 | 251 | 274 | VBW: 4.7 kHz |
| Vert. | 9916.000 | AV | 34.23 | 39.47 | 9.31 | 39.51 | 2.42 | 45.92 | 53.9 | 7.9 | 150 | 0 | VBW: 4.7 kHz |
| Vert. | 19832.000 | AV | 40.41 | 40.41 | 13.77 | 47.54 | -9.54 | 37.51 | 53.9 | 16.3 | 162 | 177 | VBW: 4.7 kHz |
| Vert. | 22311.000 | AV | 32.87 | 40.56 | 14.83 | 48.07 | -9.54 | 30.65 | 53.9 | 23.2 | 174 | 224 | VBW: 4.7 kHz |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 13 GHz : 20log (3.96 m / 3.0 m) = 2.42 dB

13 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

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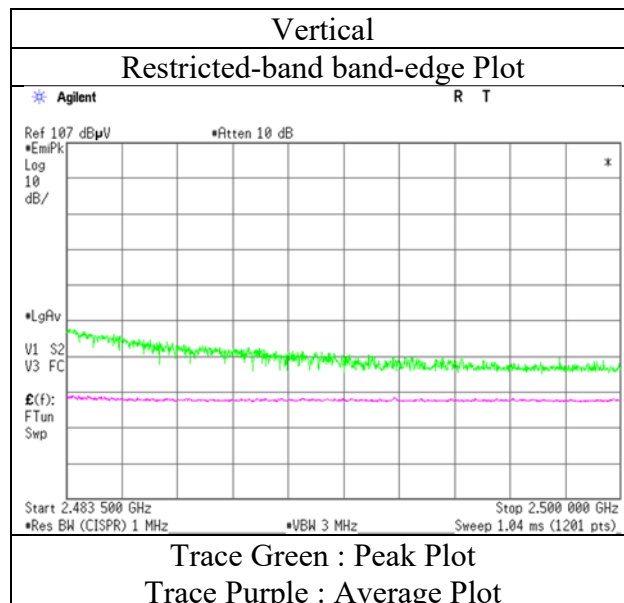
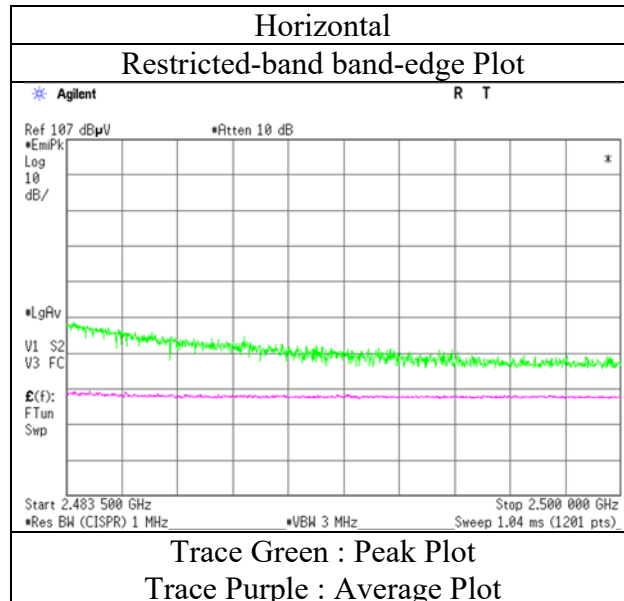
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

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Facsimile : +81 463 50 6401

Radiated Spurious Emission (Reference Plot for band-edge)

| | | |
|------------------------|---------------------|---------------------|
| Report No. | 12992253S-A-R2 | No.2 |
| Test place | Shonan EMC Lab. | |
| Semi Anechoic Chamber | No.2 | |
| Date | August 30, 2019 | August 30, 2019 |
| Temperature / Humidity | 22 deg. C / 68 % RH | 24 deg. C / 67 % RH |
| Engineer | Hiromasa Sato | Toshinori Yamada |
| | (9 kHz -1000 MHz) | (1 GHz -26.5 GHz) |
| Mode | Tx 2479 MHz | |

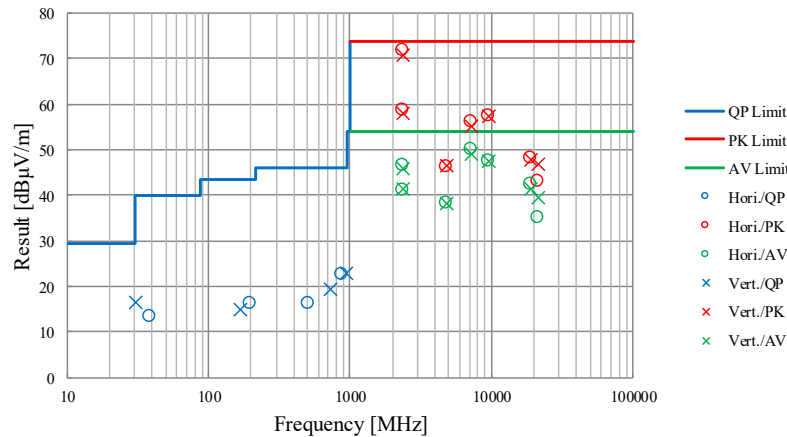


* The measurement was conducted for a sufficiently long enough time to detect any possible spurious emissions.
Final result of restricted band edge was shown in tabular data.

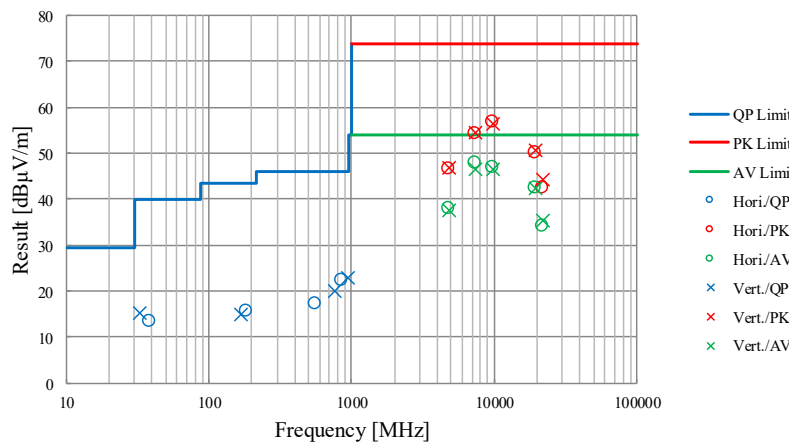
Radiated Spurious Emission **(Plot data)**

| | | |
|------------------------|---------------------|---------------------|
| Report No. | 12992253S-A-R2 | No.2 |
| Test place | Shonan EMC Lab. | No.2 |
| Semi Anechoic Chamber | | |
| Date | August 30, 2019 | August 30, 2019 |
| Temperature / Humidity | 22 deg. C / 68 % RH | 24 deg. C / 67 % RH |
| Engineer | Hiromasa Sato | Toshinori Yamada |
| | (9 kHz -1000 MHz) | (1 GHz -26.5 GHz) |

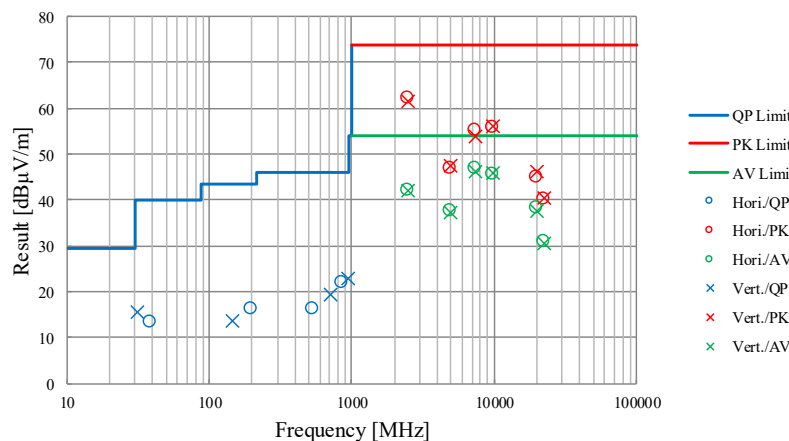
Tx 2402 MHz



Tx 2440 MHz



Tx 2479 MHz



*These plots data contains sufficient number to show the trend of characteristic features for EUT.

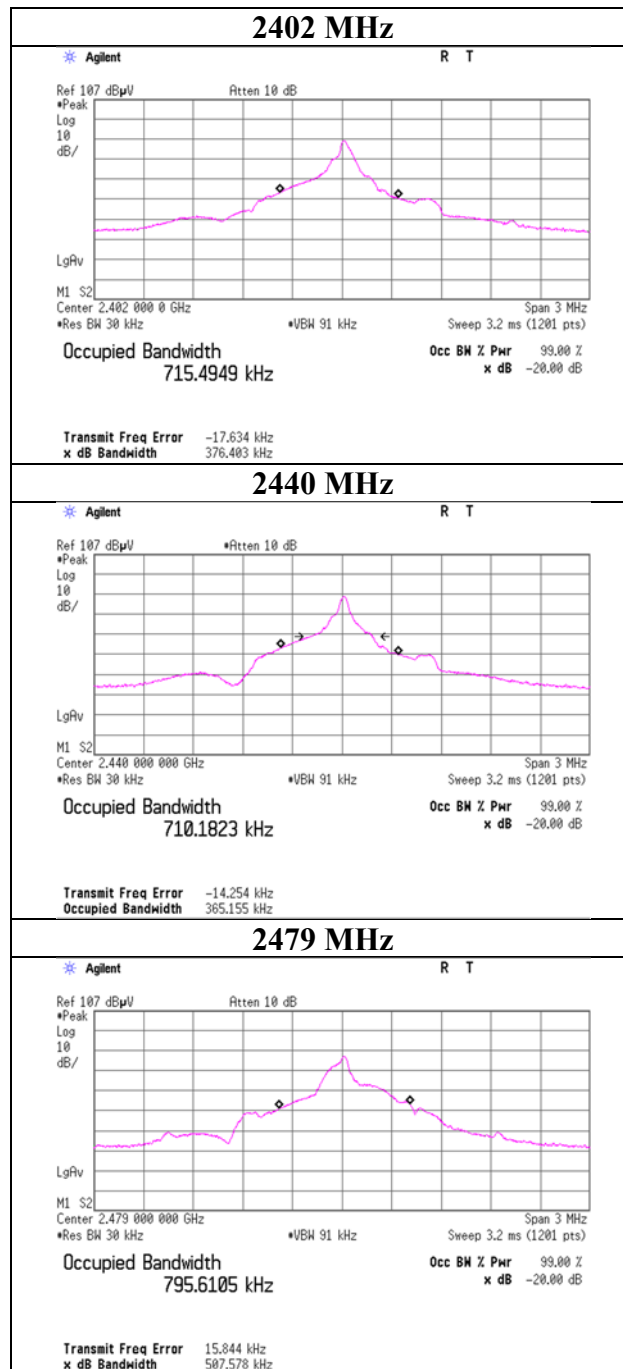
UL Japan, Inc.
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20dB Bandwidth, 99%Occupied Bandwidth

| | |
|------------------------|---------------------|
| Semi Anechoic Chamber | No.2 |
| Date | August 30, 2019 |
| Temperature / Humidity | 24 deg. C / 67 % RH |
| Engineer | Toshinori Yamada |

| Freq. | 20dB Bandwidth | 99% Occupied Bandwidth |
|--------|----------------|------------------------|
| [MHz] | [MHz] | [kHz] |
| 2402.0 | 0.376 | 715.495 |
| 2440.0 | 0.365 | 710.182 |
| 2479.0 | 0.508 | 795.611 |



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APPENDIX 2: Test instruments

Test Instruments (1 / 2)

| Local ID | Test Name | LIMS ID | Description | Manufacturer | Model | Serial | Last Calibration Date | Calibration Due Date | Calibration Interval (Month) |
|--------------------------------|-----------|---------|---------------------------|---------------------------------------------|------------------------------------|-------------------------|-----------------------|----------------------|------------------------------|
| COTS-SEM I-5 | RE | 170932 | EMI Software | TSJ | TEPTO-DV3(RE,CE,ME,PE) | - | - | - | - |
| SAEC-02(NSA) | RE | 145563 | Semi-Anechoic Chamber | TDK | SAEC-02(NSA) | 2 | 2019/4/4 | 2020/4/30 | 12 |
| SAEC-02(SVSWR) | RE | 145598 | Semi-Anechoic Chamber | TDK | SAEC-02(SVSWR) | 2 | 2019/5/9 | 2020/5/31 | 12 |
| SAF-02 | RE | 145004 | Pre Amplifier | SONOMA | 310N | 290212 | 2019/2/5 | 2020/2/29 | 12 |
| SAF-05 | RE | 145128 | Pre Amplifier | Toyo Corporation | TPA0118-36 | 1440490 | 2019/7/12 | 2020/7/31 | 12 |
| SAF-08 | RE | 145007 | Pre Amplifier | Toyo Corporation | HAP18-26W | 19 | 2019/3/5 | 2020/3/31 | 12 |
| SAT10-05 | RE | 145136 | Attenuator(above 1GHz) | AGILENT | 8493C-010 | 74864 | 2018/11/25 | 2019/11/30 | 12 |
| SAT3-11 | RE | 150921 | Attenuator | JFW | 50HF-003N | - | 2019/1/25 | 2020/1/31 | 12 |
| SAT6-02 | RE | 145045 | Attenuator | JFW | 50HF-006N | - | 2019/2/5 | 2020/2/29 | 12 |
| SAT6-12 | RE | 145158 | Attenuator | HIROSE ELECTRIC CO.,LTD. | AT-406(40) | - | 2019/8/6 | 2020/8/31 | 12 |
| SBA-02 | RE | 145022 | Biconical Antenna | Schwarzbeck | BBA9106 | 91032665 | 2019/4/1 | 2020/4/30 | 12 |
| SCC-B1/B3/B5/B7/B8/B13/SRSE-02 | RE | 144975 | Coaxial Cable&RF Selector | Fujikura/Fujikura/Suhner/Suhner/Suhner/TOYO | 8D2W/12DSFA/141PE/141PE/141PE/141P | -/0901-270(RF Selector) | 2019/4/19 | 2020/4/30 | 12 |
| SCC-B2/B4/B6/B7/B8/B13/SRSE-02 | RE | 144976 | Coaxial Cable&RF Selector | Fujikura/Fujikura/Suhner/Suhner/Suhner/TOYO | 8D2W/12DSFA/141PE/141PE/141PE/141P | -/0901-270(RF Selector) | 2019/4/19 | 2020/4/30 | 12 |

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Test Instruments (2 / 2)

| Local ID | Test Name | LIMS ID | Description | Manufacturer | Model | Serial | Last Calibration Date | Calibration Due Date | Calibration Interval (Month) |
|----------|-----------|---------|---------------------|-----------------|-----------------------|-------------|-----------------------|----------------------|------------------------------|
| SCC-G15 | RE | 145176 | Coaxial Cable | Suhner | SUCOFLEX 102 | 32703/2 | 2019/3/27 | 2020/3/31 | 12 |
| SCC-G41 | RE | 151617 | Coaxial Cable | Junkosha | MWX221-01 000NFSNMS/B | 1612S006 | 2019/1/25 | 2020/1/31 | 12 |
| SCC-G50 | RE | 178573 | Coaxial Cable | HUBER+SUNER | SUCOFLEX_104 E | MY13407/4 E | 2019/3/26 | 2020/3/31 | 12 |
| SCC-G51 | RE | 178572 | Coaxial Cable | HUBER+SUNER | SUCOFLEX 104 | 800288 /4A | 2019/3/26 | 2020/3/31 | 12 |
| SCC-G57 | RE | 179540 | Coaxial Cable | Huber+Suhner | SUCOFLEX 102 | 802815/2 | 2019/5/16 | 2020/5/31 | 12 |
| SFL-02 | RE | 145301 | Highpass Filter | MICRO-TRONICS | HPM50111 | 51 | 2018/11/16 | 2019/11/30 | 12 |
| SHA-02 | RE | 145384 | Horn Antenna | Schwarzbeck | BBHA9120D | 9120D-726 | 2019/6/26 | 2020/6/30 | 12 |
| SHA-04 | RE | 145512 | Horn Antenna | ETS LINDGREN | 9-60 | LM3640 | 2019/6/26 | 2020/6/30 | 12 |
| SJM-09 | RE | 145336 | Measure | PROMART | SEN1935 | - | - | - | - |
| SLA-06 | RE | 145528 | Logperiodic Antenna | Schwarzbeck | VUSLP9111B | 195 | 2019/4/1 | 2020/4/30 | 12 |
| SLP-02 | RE | 145536 | Loop Antenna | Rohde & Schwarz | HFH2-Z2 | 100218 | 2018/10/10 | 2019/10/31 | 12 |
| SOS-03 | RE | 146317 | Humidity Indicator | A&D | AD-5681 | 4063325 | 2018/10/25 | 2019/10/31 | 12 |
| SSA-02 | RE | 145800 | Spectrum Analyzer | AGILENT | E4448A | MY482501 06 | 2019/4/4 | 2020/4/30 | 12 |
| STR-02 | RE | 145791 | Test Receiver | Rohde & Schwarz | ESCI | 100575 | 2018/10/19 | 2019/10/31 | 12 |
| STS-02 | RE | 145793 | Digital Hitester | HIOKI | 3805-50 | 80997819 | 2019/4/2 | 2020/4/30 | 12 |

*Hyphens for Last Calibration Date, Calibration Due 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.

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

As for some calibrations performed after the tested dates, those test equipment have been controlled by means of an unbroken chains of calibrations.

Test item: RE: Radiated Emission test

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